SECTION 00010

TITLE PAGE

SAN LORENZO VALLEY WATER DISTRICT
13060 CA-9
BOULDER CREEK, CALIFORNIA 95006

Quail Hollow Pipeline Replacement

August 20, 2021

BID DOCUMENT VOLUME I OF II

BIDDING REQUIREMENTS, CONTRACT FORMS,
CONDITIONS OF THE CONTRACT AND
TECHNICAL SPECIFICATIONS

Prepared by:

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REGISTERED PROFESSIONAL ENGINEER
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No. 69703
CIVIL
STATE OF CALIFORNIA

APPROVED:

Rick Rogers
District Manager

SECTION 00015

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SECTION 00020

INVITATION TO BIDDERS

RECEIPT AND OPENING OF BIDS.

A. Sealed Bids will be received by Holly Hossack at SLVWD, 13060 CA-9, Boulder Creek, California, 95006, Telephone (831) 338-2153 until 3:00 p.m. on September 30, 2021 for the construction of the Work entitled:

Quail Hollow Pipeline Replacement

DESCRIPTION OF WORK: The project consists of providing 7,455 LF of new 12-inch ductile iron water main in Quail Hollow Road, with associated fittings, valves, services and hydrants, and abandoning in-place the existing 6-inch water main. Provide traffic control during the work and repaving of the streets.

SITE OF WORK: Unincorporated Santa Cruz County near Felton.

B. Bids will be publicly opened and read aloud at the place and time stated above. Due to COVID-19 restrictions, public attendance shall be via web meeting. The URL address and log-in credentials for the meeting will be published in an addendum and posted on the District website. Bid opening results will be available to any interested party by e-mailing Holly Hossack at HHossack@slvwd.com one hour after the time listed for the bid opening.

C. The Owner shall not open any bids received after the time specified above and shall return the unopened Bids to the Bidder.

SECURING BID DOCUMENTS. The project documents, including final plans and specifications will be available on August 25, 2021 on the District's website, www.slvwd.com. Plans will also be available via the Central Coast Builder's Association on-line plans room. Hard copies of the plans and specifications may be purchased from the District for $100 per set. Printed sets must be requested at least one business day in advance.

PREBID MEETING. SLVWD will host a non-mandatory pre-bid meeting and site walk at 10:00 a.m. on September 2, 2021. The meeting will be at the District's Cumora Lane Facility, 1611 Quail Hollow Road, Ben Lomond, CA, 95005.

ENGINEER'S OPINION OF PROBABLE COSTS. The Engineer's Opinion of Probable Cost is hereby considered to be $2,700,000, not including special inspections and testing, engineer observations, geotechnical inspections, and environmental observations.

CONTRACT TIME. The contract time is hereby established as 180 calendar days. The contract time shall be consecutive calendar days from the date of receipt of the Notice to Proceed.

LIQUIDATED DAMAGES. The fixed liquidated damages amount is hereby established as $500 for each calendar day of unauthorized delay in completion of the Work.

BONDS. The Bidder to whom the award is made will be required to submit a payment bond and a performance bond, each in a principal amount not less than one hundred percent (100%) of the total Contract Price.

BIDS. Bidders must comply with and agree to all instructions and requirements in this Notice and in the Instructions to Bidders, including post-bidding procedures.

A. All Bids must be submitted on the prescribed Bid Form.

B. Bid security or a bid guaranty bond, in an amount not less than ten percent (10%) of the Total Bid amount, is required to be submitted with the Bid.

C. Requests for interpretation of the Contract Documents shall be submitted to Josh Wolff at SLVWD in writing to jwolff@slvwd.com no later than 5:00 p.m., September 15, 2021. SLVWD will release a final response to requests for interpretation no later than 5:00 p.m. on September 17, 2021.

D. The successful Bidder shall execute the Contract Agreement within ten (10) work days after the date of the Notice of Award.

E. The successful Bidder shall furnish insurance in accordance with the Contract Documents before execution of the Contract Agreement. The required insurance includes, but is not limited to, Contractor's Installation All Risk Insurance covering the value of the Work and all materials and equipment to be incorporated therein while at the site and during inland transit insuring the replacement value, subject to a deductible not to exceed $5,000 for any single loss. This insurance shall also contain an insurer's waiver of subrogation against SLVWD, and it shall specifically cover losses due to earthquake and flooding.

F. SLVWD may withhold issuance of the Notice to Proceed for a period not to exceed sixty (60) calendar days after the date the Contract Agreement is executed.

G. The Contractor shall start the Work within ten (10) work days after the date of the Notice to Proceed.

H. SECURITY SUBSTITUTIONS FOR MONEYS WITHHELD TO INSURE CONTRACTOR'S PERFORMANCE.

In accordance with Section 22300 of the State of California Public Contract Code, the Contractor, at his request and expense, will be permitted to substitute equivalent securities for any monies withheld to ensure performance. Upon satisfactory completion of the Contract, the Contractor shall receive from the escrow agent all securities, interest, and payments received by the escrow agent from SLVWD, pursuant to the terms of Section 22300. Refer to applicable portions of the Escrow Agreement (Section 00630) for Security Deposits in Lieu of Performance Retention included with the

Contract Documents. The Contractor shall be the beneficial owner of any securities substituted for moneys withheld and shall receive any interest thereon.

I. Contractor shall possess a Class 'A' Contractor's License at the time of bid submission and award of the Contract.

J. Pursuant to Sections 1770 *et seq*. of the State of California Labor Code, the successful bidder shall pay not less than the prevailing rate of per diem wages as determined by the Director of the Department of Industrial Relations. SLVWD has obtained the general prevailing rate of per diem wages in the locality in which this work is to be performed for each craft or type of worker needed to execute the contract from the Director of the Department of Industrial Relations. These rates are on file at SLVWD located at 13060 CA-9, Boulder Creek, California, 95006 or may be obtained from the State of California, Division of Labor Statistics and Research at (415) 557-0561. Copies may be obtained on request. A copy of these rates shall be posted at the job site.

K. No contractor or subcontractor may be listed on a bid proposal for a public works project unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725. No contractor or subcontractor may be awarded a contract for public work on a public works project unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5. This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations.

L. SLVWD reserve the right to reject any and all bids.

APPROVAL. This Notice is approved and authorized this __ day of ____, 2021.

_____
Josh Wolff, P.E.
District Engineer

END OF SECTION 00020

SECTION 00100

INSTRUCTIONS TO BIDDERS

IB-01 GENERAL. Sealed bids will be received only to the care of Holly Hossack at CA-9, Boulder Creek, California, 95006, Telephone (831) 426-3186 for the construction of the Work entitled:

Quail Hollow Pipeline Replacement

The Contract Documents will be available for examination without charge on the District's website, www.slvwd.com, or are available for a fee. See Section 00020, paragraph B. Terms used in the Bidding Requirements shall have the meanings defined in the Conditions of the Contract.

IB-02 EXAMINATION BY BIDDERS. At his/her own expense and prior to submitting a Bid, each Bidder shall (a) examine the Contract Documents, (b) visit the site and determine the local conditions which in any way affect the performance of the Work, including access to the site, prevailing wages, and other pertaining cost factors, (c) familiarize himself/herself with all Federal, State, and local laws, ordinances, rules, regulations, and codes affecting the performance of the Work, including the cost of permits and licenses required for the Work, (d) make such surveys and investigations, including investigation of subsurface or latent physical conditions at the site or where Work is to be performed, as he/she may deem necessary for performance of the Work at his/her Bid price within the terms of the Contract Documents, (e) determine the character, quality, and quantities of the Work to be performed and the materials and equipment to be provided, and (f) correlate his/her observations, investigations, and determinations with the requirements of the Contract Documents. The Contract Documents show and describe the existing conditions as they are believed to exist, and the surveys, investigations and other data which have been used in the design of the Work. Except as provided otherwise by law or these Contract Documents, neither SLVWD nor the Engineer shall be liable for any loss sustained by the Contractor resulting from any variance between the conditions and design data given in the Contract Documents and the actual conditions revealed during the Bidder's examination or during the progress of the Work. The submission of a Bid shall be incontrovertible evidence that the Bidder has complied with all the requirements of this Section.

IB-03 QUALIFICATIONS OF BIDDERS.

A. At time of bid submission, all Bidders must currently possess a Class 'A' Contractor's License, according to the laws of the State and legal jurisdiction of the place where the Work is located, and meet the qualifications stipulated hereinafter. All Subcontractors desiring to bid on the Work must possess a Contractor's License within their individual specialties.

B. No person, organization, or corporation is allowed to make, submit, or be interested in more than one Bid for the Work unless in a subcontractor relationship with respect to the Bids or unless Alternative Bids are required. A person,

organization, or corporation submitting sub-proposals or quoting prices on materials to Bidders is not prevented from submitting a Bid for the entire Work.

C. At the time of bid submission, all Bidders must be currently registered with the Department of Industrial Relations ("DIR") and have paid the annual fee pursuant to Section 1725.5 of the California Labor Code.

IB-04 PREPARATION AND SUBMISSION OF BIDS.

A. Bids shall be submitted on the prescribed Bid Document Forms Volume II bound herein. All bid items and statements shall be properly filled out. Numbers shall be stated both in words and in figures, where so indicated, and the signatures of all persons signing shall be in longhand. Where there is a conflict in the words and the figures, the words will govern. An appropriate Power of Attorney shall be submitted if the Bid is executed by other than an official of the Bidder, showing that signer of Bid has the authority to obligate the Bidder. ***BID DOCUMENT VOLUME II*** **MUST BE SUBMITTED AS A WHOLE, BOUND AND INTACT. DO NOT REMOVE ANY PAGES FROM *BID DOCUMENT VOLUME II*. ANY ADDENDA SHALL BE STAPLED TO *BID DOCUMENT VOLUME II* AND SHALL BECOME A PART OF THIS DOCUMENT. FAILURE TO DO SO WILL RESULT IN AN IMMEDIATE REJECTION OF THE BID. ADDITIONAL SHEETS ARE ALLOWABLE, AND MAY BE STAPLED TO THE BACK OF *BID DOCUMENT VOLUME II*.** Any pages not used shall be marked as "NOT USED" by the Bidder.

B. Prices, wording, and notations must be in ink or typewritten. No erasures will be permitted. Mistakes may be crossed out and corrections typed or written in ink adjacent thereto, and must be initialed in ink by the person or persons signing the Bid or the authorized agent. Any alterations in the Contract Documents not thus initialed will be disregarded.

C. Bids shall not contain any recapitulation of the Work or change in the phraseology. Unauthorized conditions, limitations or provisions attached to a Bid will render it informal and may cause its rejection. Alternative Bids or Incomplete Bids will not be received or considered unless required by the Contract Documents. No oral, facsimile, or telephonic proposals or modifications will be considered.

D. Delivery of Bids shall comply with Specific Provisions as to place, date, and time. Bids shall be enclosed in a sealed opaque envelope bearing the Work title.

E. In the event that the Bidder is a joint venture, there shall be submitted with the Bid, certifications signed by authorized officers of each of the parties to the joint venture, naming the individual who shall be the agent of the joint venture. The individual shall sign all necessary documents for the joint venture, and should the joint venture be the successful Bidder, shall act in all matters relative to the Contract resulting therefrom for the joint venture.

F. Mailed Bids sent via the U.S. Postal Service shall be Registered or Certified Mail, Return Receipt Requested. The return receipt will be endorsed to show the date and time received. Bids submitted using other delivery services shall require a similar signature upon delivery with a time-stamped receipt. Mailed Bids not received at the required place before the date and time set for the receipt of Bids

will be rejected. Misdirection of mailed Bids resulting in receipt of the Contractor's Bid after the required date and time will render the Bid non-responsive and will result in rejection of the Bid.

IB-05 WITHDRAWAL OF BIDS. Any Bidder may withdraw his Bid prior to the date and time set for the receipt of Bids, either in person or by written notice delivered to SLVWD before said date and time. Faxed withdrawal notices are not allowed. Mailed withdrawal notices must be received before said date and time. Misdirection of mailed withdrawal notices resulting in receipt of said notice after the date or time set for receipt of Bids will render the withdrawal notice invalid.

IB-06 INTERPRETATIONS. Should any Bidder find discrepancies in or omissions from the Contract Documents, or if there should be doubt as to the true meaning of any part thereof, the Bidder shall at once submit a written request for correction, clarification, or interpretation. Such requests shall be submitted in writing to SLVWD no later than the date and time specified in the Notice Inviting Bids, Section 00020.

A. If SLVWD or the Engineer determines the Contract Documents require changes, correction, clarification, or interpretation prior to the receipt of Bids, an appropriate Addendum will be issued.

B. SLVWD, the Engineer, and their officers, employees, and agents will not be responsible for any changes, instructions, clarifications, interpretations, or other information pertaining to the Contract Documents given to Bidders during the bidding period in any manner other than written Addendum.

IB-07 BID PRICES.

A. Bid prices shall be stated in United States dollars.

B. Each proposed lump sum or unit price shall cover all costs and charges, including without limitation the costs of materials, labor, fabrication, construction, delivery, installation or application, supervision, insurance charges, overhead, profit, and taxes.

C. No separate payment will be made for items other than those on the Bid Proposal Form unless specifically mentioned in these Contract Documents. The costs of overhead, administration, materials, equipment, supplies, insurance, bonds, meetings, temporary facilities, construction utilities, quality control not otherwise specified, and all other such items specified, indicated, or otherwise required to complete the Work, shall be included in the unit prices and/or lump sum prices.

D. The Bid price for mobilization shall not exceed five percent (5%) of the cumulative total price for all other items identified in the Bid Proposal Form. (See Section 01200 regarding mobilization.)

IB-08 SUBCONTRACTOR LIST. Each Bidder shall list in the spaces provided in the Bid Proposal Form: (1) the name and business address of each Subcontractor proposed to perform or render service for a portion of the Work, or to specially fabricate and install a portion of the Work, if the value of such subcontracted portion exceeds one-half of one percent (0.5%) of the Bidder's total aggregate Bid amount, and (2) the portion of the

Work to be performed by each proposed Subcontractor. Only one Subcontractor shall be listed for each portion of the Work so defined by the Bidder. Proposed Subcontractors must be licensed according to the State and jurisdiction where the Work is located. Proposed Subcontractors must be registered with the DIR and have paid the annual fee pursuant to Section 1725.5 of the California Labor Code. No change may be made to the listing after receipt of Bids without the written consent of SLVWD.

IB-09 ADDENDA. Full consideration shall be given to all Addenda in the preparation of Bids, as Addenda form a part of the Contract Documents. Bidders shall verify the number of Addenda issued, if any, and acknowledge the receipt of all Addenda in the Bid. Failure to so acknowledge may cause the Bid to be rejected. Addenda may modify previously issued Addenda. No Addendum will be issued within 72 hours of the advertised Bid closing date and time without an appropriate adjustment to the Bid closing date and time.

IB-10 AWARD. Bids will be publicly opened and read aloud at SLVWD at the date and time specified above. Award of the Contract or the rejection of Bids will be made during the time accorded to review Bids.

A. The Contract for the Work, if awarded, will be awarded to the eligible Bidder submitting the lowest responsive responsible Bid complying with these Instructions to Bidders, and other bidding requirements in the Contract Documents. By submitting a Bid, each Bidder agrees and consents that SLVWD, in determining the successful Bidder and his eligibility for the award, may ascertain and consider the Bidder's experience and facilities, conduct and performance under other contracts, financial condition, reputation in the industry, and other factors which could affect the Bidder's performance of the Work.

B. The lowest Bid will be determined based on the Total Bid amount identified on all Bids received by SLVWD.

C. The successful Bidder shall execute the Contract Agreement within ten (10) work days after the date of the Notice of Award. The contract time is hereby established as consecutive work days from the date of receipt of the Notice to Proceed. Bidder shall furnish Proof of Insurance as required herein, and the Contract Agreement shall be executed in the form provided by SLVWD.

D. If a Bidder receiving a Notice of Award fails or refuses to execute the Contract Agreement within the stated time limit or fails or refuses to furnish Proof of Insurance as required herein, SLVWD may annul the award and issue an award to the next lowest responsive responsible Bidder or may reject all Bids.

E. A corporation receiving the award shall furnish evidence of its corporate existence and evidence that the person signing the Contract Agreement for the corporation is duly authorized to do so.

IB-11 INSURANCE. The successful Bidder shall furnish to SLVWD evidence of insurance ensuring the payment of all obligations arising from the Work. Insurance shall comply with the requirements in the General Conditions. Insurance certificates shall be delivered to SLVWD at the time and place the Contract Agreement is executed.

IB-12 RIGHTS RESERVED. SLVWD reserves the right to reject any or all Bids, to waive any informality or irregularity in any Bid, to have performed the entire Work defined by the Contract Documents or such parts of said Work as SLVWD may elect, to combine various alternative bids and bid items within a Bid, and to accept or reject one or more separately scheduled bid items within a Bid. SLVWD further reserves the right to withhold issuance of the Notice to Proceed, after execution of the Contract Agreement, for the period not to exceed sixty (60) calendar days after the date the Contract Agreement is executed. No additional payment will be made to the successful Bidder on account of such withholding.

IB-13 LOCAL WAGE RATES. In accordance with the laws of the state Department of Industrial Relations and jurisdiction where the Work is located, SLVWD has determined and adopted the general prevailing per diem wages, including wages for overtime and holiday work, for each craft or type of workman needed in the execution of the Work. Said wages shall be the minimum paid to workmen employed for the Work. Copies of the wage determination are on file and may be obtained by interested parties at San Lorenzo Valley Water District, 13060 CA-9, Boulder Creek, California 95006

IB-14 SEPARATE BID PRICE FOR EXCAVATION SAFETY MEASURES. If it is necessary for the Contractor to perform an excavation of 5 ft or more, then the requirements of Sections 6705 and 6707 of the California Labor Code apply to this Project. Accordingly, each Bidder shall state in the Bid the lump sum bid price for providing shoring, sheeting, bracing, and other safety measures for all excavations five (5) feet or more in depth. Before any Work is commenced, the Contractor shall secure and pay for the excavation permit required by the California Division of Occupational Safety and Health, and shall furnish SLVWD with a copy thereof prior to commencing any excavation. The Contractor shall conform to Labor Code Section 6705 by submitting a detailed plan showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during the excavation of such excavations, trench or trenches, or during the pipe installation therein. This plan must be prepared for all trenches five feet or more in depth, submitted by the Contractor, and accepted by SLVWD or by a registered civil or structural engineer employed by SLVWD to whom the authority to accept has been delegated, in advance of excavation. If the plan varies from the shoring system standards established by the Construction Safety Orders, the plan shall be prepared by a registered civil or structural Engineer at the Contractor's expense.

END OF SECTION 00100

SECTION 00500

CONTRACT AGREEMENT

THIS CONTRACT AGREEMENT, made this _____ day of _____, ____, by and between San Lorenzo Valley Water District, 13060 CA-9, Boulder Creek, CA 95006, hereinafter called "SLVWD" and _____, hereinafter called "Contractor".

WITNESSETH

WHEREAS, SLVWD has caused Specifications, Drawings, and other Contract Documents to be prepared for certain Work described as the **Quail Hollow Pipeline Replacement.**

WHEREAS, Contractor has offered to perform the proposed Work in accordance with the terms of the Contract Documents,

NOW, THEREFORE, in consideration of the mutual covenants and agreements of the parties herein contained and to be performed, Contractor hereby agrees to complete the Work at the prices and on the Terms and conditions herein contained, and SLVWD hereby employs the Contractor and agrees to pay him/her the Contract Prices provided herein for the fulfillment of the Work and the performance of the covenants set forth herein.

The further terms, conditions and covenants of the Contract are set forth in the following exhibit parts, each of which is by this reference made a part hereof:

- Legal and Procedural Documents, including the Bidding Requirements and the Contract Forms, Section 00001 through 00800CA;
- Contractor's Bid Proposal, Sections 00300 thru 00485;
- Section 00700, General Conditions of the Contract;
- Section 00800, Supplementary Conditions;
- Technical Specifications, Division 01 thru 40;
- Drawings, titled Quail Hollow Pipeline Replacement, consisting of __ sheets, dated ___, 2021;
- Addenda 1 through __, Section 00901 through _____;
- Notice of Award; and
- Notice to Proceed.

The contract time is hereby established as 180 calendar days. The contract time shall be consecutive calendar days from the date stated on the Notice to Proceed to final completion. For each calendar day of unauthorized delay in completion of the work, Contractor shall be

assessed liquidated damages in the amount of one thousand dollars ($1,000) per day. The provisions of section 4.4 of the General Conditions are incorporated herein by reference. This provision shall be construed in accordance with Government Code Section 53069.85.

IN WITNESS WHEREOF, this Contract Agreement has been executed on the day and year first above written.

San Lorenzo Valley Water District
SLVWD

By: _____
Signature

Rick Rogers, District Manager
Name/Title

_____
Contractor

_____
License No.

By: _____
*Signature

_____
Name/Title (Please Print)

ATTEST:

By: _____
Signature

Holly Hossack, Executive Secretary
Name /Title

ATTEST:

By: _____
Signature

_____
Name/Title (Please Print)

APPROVED:

By: _____
Signature

Gina Nicholls, Legal Counsel
Name /Title

**Signature must be accompanied by notarized document citing the individual's relationship to the Party of the Contract and his/her power to sign on behalf of the Party.*

Submit the following with the signed contract:

- Performance Bond (Section 00610)
- Payment Bond (Section 00620)
- Escrow Agreement for Security Deposit in Lieu of Retention (if requesting this, Section 00630)
- Certificate of Contractor (Section 00640)
- Contractors Certification of Worker's Compensation (Section 00645)
- Information Pursuant to California Labor Code Section 2810 (Section 00648)
- Insurance Certificate(s) as required in Sections 00700 and 00800 (use Acord Form 25)

END OF SECTION 00500

SECTION 00600

NOTICE OF AWARD

To: _____
(Contractor)

Project: **Quail Hollow Pipeline Replacement**

Your Bidder's Proposal dated _____, 2021, is accepted.

You are required by the Notice and Instructions to Bidders to execute the Contract Documents within ten (10) work days of the date of mailing of this notice (not including Sundays and holidays).

Received:

_____	San Lorenzo Valley Water District
Contractor	SLVWD
By: _____	By: _____
_____	Rick Rogers, District Manager
Name /Title:	Name/Title:
Date: _____	Date: _____

END OF SECTION 00600

SECTION 00610

PERFORMANCE BOND

KNOW ALL MEN AND WOMEN BY THESE PRESENTS:

THAT _____, hereinafter called Principal, and _____ hereinafter called Surety, are jointly and severally held and firmly bound unto the San Lorenzo Valley Water District, 13060 CA-9, Boulder Creek, CA 95006, hereinafter called SLVWD, its successors and assigns in the penal sum of _____ Dollars ($_____) lawful money of the United States, for the payment whereof until, the Principal and Surety jointly and severally bind themselves, their heirs, executors, administrators, and successors, jointly and severally, forever firmly by these presents.

WHEREAS, SLVWD has awarded to Principal the Work entitled:

Quail Hollow Pipeline Replacement (the "Contract"), and

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

NOW, THEREFORE, the condition of this obligation is such that if Principal shall faithfully perform the covenants, conditions, and agreements in the Contract and any changes made as therein provided, at the time and in the manner therein specified, and in all respects according to their true intent and meaning, and shall indemnify and save or hold harmless SLVWD, its directors, officers, employees, Engineer, and agents as therein stipulated, then this obligation shall become null and void; otherwise, it shall remain in full force and virtue, and Principal and Surety, in the event suit is brought on this bond, will pay to SLVWD sufficient funds to complete the Scope of Work required by the Contract.

As a condition precedent to the satisfactory completion of the Contract, the above obligation shall hold good for a period of not less than one (1) year after the completion of the Work and its acceptance by SLVWD, during which time if Principal, his/her or its heirs, executors, administrators, successors, or assigns shall fail to make full, complete, and satisfactory repair and replacements and totally protect SLVWD from loss or damage made evident during the period of not less than one (1) year from the date of acceptance of the Work, and resulting from or caused by defective materials and/or faulty workmanship, the above obligation in penal sum thereof shall remain in full force and effect. However, notwithstanding anything in this paragraph to the contrary, the obligation of Surety hereunder shall continue so long as any obligation of Principal remains.

AND, Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration of addition to the terms of the Contract or to the Work to be performed there under or the Specifications and Drawings accompanying the same, shall in any way affect its obligations to 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 Drawings and Specifications. The Surety hereby waives the provisions of Sections 2819 and 2845 of the Civil Code of the State of California.

As part of the obligation secured hereby and in addition to the amount specified therefore, there shall be included costs and reasonable expenses and fees, including reasonable attorneys' fees and court costs, incurred by SLVWD in successfully enforcing any and all obligations hereunder, all to be taxed as costs and included in any judgment rendered.

AND IT IS HEREBY DECLARED AND AGREED that this obligation shall be binding upon and inure to the benefit of Principal, Surety, and SLVWD and their respective heirs, executors, administrators, successors, and assigns.

SIGNED AND SEALED THIS _____ day of _____, ____.

_____
Principal

By: _____
Signature

_____
Surety

By: _____
Signature

_____

_____

_____
(Surety's Mailing Address)

_____
(Telephone Number)

(Attach Notary Acknowledgement of Surety)

Approved as to form this _____ day of _____, ____.

_____
Attorney for SLVWD

NOTE: *The principal amount of this bond shall not be less than one hundred percent (100%) of the total Contract Price.*

END OF SECTION 00610

SECTION 00620

PAYMENT BOND

KNOW ALL MEN AND WOMEN BY THESE PRESENTS:

THAT _____, hereinafter called Principal, and _____ , hereinafter called Surety, are jointly and severally held and firmly bound unto the San Lorenzo Valley Water District, 13060 CA-9, Boulder Creek, CA 95006, hereinafter called SLVWD, its successors and assigns in the penal sum of _____ _____ Dollars ($_____) lawful money of the United States, for the payment whereof unto SLVWD, the Principal and Surety jointly and severally bind themselves, their heirs, executors, administrators, and successors, jointly and severally, forever firmly by these presents.

WHEREAS, SLVWD has awarded to Principal the Work entitled:

Quail Hollow Pipeline Replacement (the "Contract"), and

WHEREAS, said Principal is required to furnish a Payment Bond in connection with said Contract.

NOW, THEREFORE, the condition of this obligation is such that if said Principal, his/her or its heirs, executors, administrators, successors, or assigns, or any of his/her or its Subcontractors, shall fail to pay any of the persons named in Civil Code Section 3181, or amounts due under the Unemployment Insurance Code with respect to work or labor performed under the Contract, or for any amounts required to be deducted, withheld, and paid over to the Franchise Tax Board from the Wages of employees of the Principal and his/her subcontractors pursuant to Section 18668 of the Revenue and Taxation Code, with respect to such work and labor, or any amounts required to be deducted, withheld, and paid over the Employment Development Department from the wages of employees of the Principal and Subcontractors pursuant to Section 13020 of the Unemployment Insurance Code with respect to the work and labor, or for any work or labor for which a bond is required by the provisions of Sections 3247 through 3252 of the Civil Code, and provided that the persons, companies, or corporations so furnishing said materials, provisions, or other supplies, appliances, owned or used, in, upon, for, or about the performance of the work contracted to be executed or performed, or any person who performs work or labor upon the same, or any person who supplies both work and materials, thereto, shall have complied with the provisions of the Civil Code, then the Surety will pay the same or an amount not exceeding the amount herein above set forth, and also will pay in case suit is brought upon this bond, reasonable attorneys' fees and costs of SLVWD as shall be fixed by the court.

This bond shall insure to the benefit of any and all persons, companies, and corporations entitled to file claims under Section 3181 of the Civil Code, so as to give a right of action to them or their assigns in any suit brought upon this bond.

And the 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, or the Drawings and Specifications accompanying the same shall in any way affect its obligations 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 Drawings and Specifications.

The Surety hereby waives the provisions of Sections 2819 of the Civil Code.

AND IT IS HEREBY DECLARED AND AGREED that this obligation shall be binding upon and inure to the benefit of Principal, Surety, and SLVWD and their respective heirs, executors, administrators, successors, and assigns.

SIGNED AND SEALED THIS _____ day of _____, ____.

_____
Principal

By: _____
Signature

_____
Surety

By: _____
Signature

_____

_____

_____
(Surety's Mailing Address)

_____
(Telephone Number)

(Attach Notary Acknowledgement of Surety)

Approved as to form this _____ day of _____, ____.

_____
Attorney for SLVWD

NOTE: *The principal amount of this bond shall not be less than one hundred percent (100%) of the total Contract Price.*

END OF SECTION 00620

SECTION 00630

ESCROW AGREEMENT FOR SECURITY DEPOSIT IN LIEU OF RETENTION

This Escrow Agreement is made and entered into by and between San Lorenzo Valley Water District (SLVWD) whose address is 13060 CA-9, Boulder Creek, CA 95006 hereinafter called "SLVWD" and _____ whose address is _____ hereinafter called "Contractor," and _____ whose address is _____ hereinafter called "Escrow Agent."

For the consideration hereinafter set forth, SLVWD, Contractor, and Escrow Agent agree as follows:

(1) Pursuant to Section 22300 of the Public Contract Code of the State of California, Contractor has the option to deposit securities with an Escrow Agent as a substitute for retention earnings required to be withheld by SLVWD, pursuant to the Construction Contract entered into between SLVWD and Contractor for:

Quail Hollow Pipeline Replacement

in the amount of _____ dated _____ (hereinafter referred to as the "Contract"). Alternatively, on written request of the Contractor, SLVWD shall make payments of the retention earnings directly to the Escrow Agent. When Contractor deposits the securities as a substitute for Contract earnings, the Escrow Agent shall notify SLVWD within ten (10) calendar days of the deposit. The market value of the securities at the time of the substitution shall be at least equal to the cash amount then required to be withheld as retention under the terms of the Contract between SLVWD and Contractor. Securities shall be held in the name of SLVWD, and shall designate the Contractor as the beneficial owner.

(2) SLVWD shall make progress payments to the Contractor for such funds which otherwise would be withheld from progress payments pursuant to the Contract provisions, provided that the Escrow Agent holds securities in the form and amount specified above.

(3) When SLVWD makes payment of retention earned directly to the Escrow Agent, the Escrow Agent shall hold them for the benefit of the Contractor until such time as the escrow created under this Contract is terminated. The Contractor may direct the investment of the payments into securities. All terms and conditions of this agreement and the rights and responsibilities of the parties shall be equally applicable and binding when SLVWD pays the Escrow Agent directly.

(4) Contractor shall be responsible for paying all fees for the expenses incurred by Escrow Agent in administering the Escrow Account and all expenses of SLVWD. These expenses and payment terms shall be determined by SLVWD. Contractor and Escrow Agent.

(5) The interest earned on the securities or the money market accounts held in escrow and all interest earned on that interest shall be for the sole account of Contractor and shall be subject to withdrawal by the Contractor at any time and from time to time without notice to SLVWD.

(6) Contractor shall have the right to withdraw all or any part of the principal in the Escrow Account only by written notice to Escrow Agent accompanied by written authorization from SLVWD to the Escrow Agent that SLVWD consents to the withdrawal of the amount sought to be withdrawn by Contractor.

(7) SLVWD shall have a right to draw upon the securities in the event of default by the Contractor. Upon seven (7) calendar days written notice to the Escrow Agent from SLVWD of the default, the Escrow Agent shall immediately convert the securities to cash and shall distribute the cash as instructed by SLVWD.

(8) Upon receipt of written notification from SLVWD certifying that the Contract is final and complete, and that the Contractor has complied with all requirements and procedures applicable to the Contract, Escrow Agent shall release to Contractor all securities and interest on deposit less escrow fees and charges of the Escrow Account. The escrow shall be closed immediately upon disbursement of all moneys and securities on deposit and payments of fees and charges.

(9) Escrow Agent shall rely on the written notifications from SLVWD and the Contractor pursuant to Sections (5) to (8), inclusive, of this agreement and SLVWD and Contractor shall hold Escrow Agent harmless from Escrow Agent's release and disbursement of the securities and interest as set forth above.

(10) The names of the persons who are authorized to give written notice or to receive written notice on behalf of SLVWD and on behalf of Contractor in connection with the foregoing, and exemplars of their respective signatures are as follows:

On behalf of SLVWD:

District Manager
Title

Rick Rogers
Name

_____
Signature

13060 CA-9, Boulder Creek, California 95006
Address

On behalf of Contractor:

_____
Title

_____
Name

_____
Signature

_____
Address

On behalf of Escrow Agent:

_____
Title

_____
Name

_____
Signature

_____
Address

At the time the Escrow Account is opened, SLVWD and Contractor shall deliver to the Escrow Agent a fully executed counterpart of this Agreement.

IN WITNESS WHEREOF, the parties have executed this Agreement by their proper officers on the date first set forth above.

San Lorenzo Valley Water District	Contractor
_____	_____
Title	Title
_____	_____
Name	Name
_____	_____
Signature	Signature

END OF SECTION 00630

SECTION 00640

CERTIFICATE OF CONTRACTOR

I, _____, certify that I am a/the _____ (designate sole proprietor, partner in partnership, or specify corporate office, e.g., secretary) in the entity named as Contractor in the foregoing Contract. I hereby expressly certify that the name of the entity to which I am associated is _____; that this entity is in good standing and has complied with all applicable laws and regulations, and that I have been expressly authorized by the proper parties in this entity to execute this contract on behalf of the above-named entity.

_____
Date

By: _____
Signature

_____
Name/Title (Please Print)

ATTEST:

By: _____
Signature

_____
Name/Title (Please Print)

END OF SECTION 00640

SECTION 00645

CONTRACTOR'S CERTIFICATION REGARDING WORKERS' COMPENSATION

Description of Contract: **Quail Hollow Pipeline Replacement**.

Labor Code Section 3700:

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

(a) By being insured against liability to pay compensation by one or more insurers duly authorized to write compensation insurance in this State.

(b) By securing from the Director of Industrial Relations a certificate of consent to self-insure, either as an individual employer or as one employer in a group of employers, which may be given upon furnishing proof satisfactory to the Director of Industrial Relations of ability to self-insure and to pay any compensation that may become due to his or her employees.

(c) For any county, city, municipal corporation, public district, public agency, or any political subdivision of the state, including each member of a pooling arrangement under a joint exercise of powers agreement (but not the state itself), by securing from the Director of Industrial Relations a certificate of consent to self-insure against workers' compensation claims, which certificate may be given upon furnishing proof, satisfactory to the director, of ability to administer workers' compensation claims that may become due to its employees. On or before March 31, 1979, a political subdivision of the state which, on December 31, 1978, was uninsured for its liability to pay compensation, shall file a properly completed and executed application for a certificate of consent to self-insure against workers' compensation claims. The certificate shall be issued and be subject to the provisions of Section 3702.

For the purposes of this section, "state" shall include the superior courts of California.

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

Dated: _____, ____ By: _____
(Contractor)

By:_____
(Authorized Representative of Contractor)

(Seal of Corporation) Name/Title: _____
(Please Print)

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

END OF SECTION 00645

Section 00648

Information Pursuant to California Labor Code Section 2810.

1. The name, address, and telephone number of SLVWD is:

   San Lorenzo Valley Water District
   13060 CA-9
   Boulder Creek, California 95006
   (831) 338-2153

2. The name, address, and telephone number of the Contractor is:

   _____
   _____
   _____
   _____
   _____

3. A description of the labor or services to be provided is stated in the Contract Documents, including but not limited to Section 01100, Summary of the Work.

4. The Contract Time is stated in the Contract Documents, including but not limited to Section 00500, Contract Agreement.

5. The Contractor's employer identification number for state tax purposes is _____.

6. The workers' compensation insurance policy and the name, address, and telephone number of the insurance carrier of the Contractor is:

   Workers' Compensation Insurance Policy Number: _____
   Insurance Carrier Name: _____
   Insurance Carrier Address: _____
   _____
   Insurance Carrier Telephone Number: _____

7. The vehicle identification ("VIN") for any vehicle that is owned by the Contractor and used for transportation in connection with any service provided pursuant to this Contract, the number of the vehicle liability insurance policy that covers the vehicle, and the name, address, and telephone number of the insurance carrier are as follows:

VIN: ____
Vehicle Liability Insurance Policy Number: ______________________
Insurance Carrier Name: ________________________________
Insurance Carrier Address: ________________________________
____
Insurance Carrier Telephone Number: ______________________

VIN: ____
Vehicle Liability Insurance Policy Number: ______________________
Insurance Carrier Name: ________________________________
Insurance Carrier Address: ________________________________
____
Insurance Carrier Telephone Number: ______________________

VIN: ____
Vehicle Liability Insurance Policy Number: ______________________
Insurance Carrier Name: ________________________________
Insurance Carrier Address: ________________________________
____
Insurance Carrier Telephone Number: ______________________

VIN: ____
Vehicle Liability Insurance Policy Number: ______________________
Insurance Carrier Name: ________________________________
Insurance Carrier Address: ________________________________
____
Insurance Carrier Telephone Number: ______________________

8. The address of any real property to be used by the Contractor to house workers in connection with the Contract is: ____.

9. The total number of workers to be employed by the Contractor to perform labor or services under this Contract is _____.

   a. If the information pursuant to paragraph 9, above, is unknown, the Contractor shall provide the best estimate available at the time.

   b. If a best estimate is provided, the Contractor shall have a continuing duty to ascertain the actual figures and provide SLVWD with written notice of those actual figures once that information becomes known.

10. The total amount of all wages to be paid, and the date or dates when those wages are to be paid are:

    _____

    _____

    _____

    _____

   a. If the information pursuant to paragraph 10, above, is unknown, the Contractor shall provide the best estimate available at the time.

   b. If a best estimate is provided, the Contractor shall have a continuing duty to ascertain the actual figures and provide SLVWD with written notice of those actual figures once that information becomes known.

11. The total compensation for all services which the Contractor is obligated to perform under the terms and conditions of this Contract is _____ _____.

12. The total number of persons who will be utilized by the Contractor under this Contract as independent contractors, along with a list of any current local, state, and federal contractor license identification numbers that the independent contractors are required to have under local, state, or federal laws or regulations.

    Name of Independent Contractor: _____
    Contractor's License Number(s): _____

    Name of Independent Contractor: _____
    Contractor's License Number(s): _____

    Name of Independent Contractor: _____

Contractor's License
Number(s): _____

Total Number of Persons Utilized as Independent Contractors: _____.

a. If the information pursuant to paragraph 12, above, is unknown, the Contractor shall provide the best estimate available at the time.

b. If a best estimate is provided, the Contractor shall have a continuing duty to ascertain the actual figures and provide SLVWD with written notice of those actual figures once that information becomes known.

END OF SECTION 00648

SECTION 00650

NOTICE TO PROCEED

To: _____ Date: _____
(Contractor)

Project: **Quail Hollow Pipeline Replacement**

You are notified that the Contract Times under the above contract will commence to run on ____, 2021. On or before that date, you are to start performing your obligations under the Contract Agreement dated ____, 2021. In accordance with the Contract Agreement, the date of Final Completion is _____.

Before you may start any Work at the Site, you must:

1. Provide product submittals for the water tanks, valves, pipes and appurtenances, and receive approval of these products from the District, and
2. Obtain the required permits from Santa Cruz County and other jurisdictions listed in the contract documents.

_____
SLVWD

By:_____

Title: District Manager

ACCEPTANCE OF NOTICE

Receipt of the above Notice to Proceed is hereby acknowledged by _____ this the _____ day of _____, _____.

Name: _____
(Print)

By: _____

Title:_____

END OF SECTION 00650

SHOP DRAWING SUBMITTAL FORM

Submittal No. _____ Specifications Section: _____

Submittal Description: _____

PROJECT INFORMATION	ROUTING	DATE
Owner: San Lorenzo Valley Water District	Contractor to C.M.	
Project Name: Quail Hollow Pipeline	C.M. to Engineer	
Project No.:	Engineer to C.M.	
Contractor:	C.M. to Contractor	

We are sending you: _____ Attached _____ Under Separate Cover Via _____

Other: _____

_____ Submittals for Approval (Submit a minimum of 8 copies for approval).

_____ Product Data for Information Only (Submit a minimum of 8 copies).

Item	Copies	Date	Section No.	Description	Review/Action

Contractor to Certify either A or B:

____ A. We have verified that the material or equipment contained in this submittal meets all requirements, including coordination with all related work, as specified (no exceptions).

____ B. We have verified that the material or equipment contained in this submittal meets all the requirements specified, except for the following (or attached) deviations: _____

Certified By: _____ _____
Contractor's Signature Date Signed

END OF SECTION 00652

Section 00654

REQUEST FOR INFORMATION

Owner: **San Lorenzo Valley Water District**

Project: **Quail Hollow Pipeline Replacement**

Contractor: _____

Project No: _____

Date: _____

RFI No. _____

RFI DATA/INFORMATION		
Originator	**Date Transmitted:**	
Directed To:	**Date Received:**	
Drawing Reference:	**Date Reply Transmitted:**	
Specification Section:	**Date Reply Received:**	
Subject:		
Date Reply Required:		
Message:		
Originator:		**Date**
Reply:		
Reply By:	**Firm**	**Date:**

END OF SECTION 00654

SECTION 00656

AUTHORIZATION OF ENGINEERING COSTS FOR EVALUATION OF SUBSITUTES AND EQUALS

To: _____ Date: _____
Contractor

PROJECT NAME: **Quail Hollow Pipeline Replacement**

We have received a submittal for _____ on _____. The equipment submitted is being substituted as being "equal" to the equipment originally specified. Per the General Conditions or the Contract Documents, the Contractor shall pay for the San Lorenzo Valley Water District (SLVWD) effort in establishing the quality of the submitted equipment and the suitability for the intended purpose. The estimated time to review this submittal is hours at an hourly rate of $_____ Dollars, for a total cost of $_____ dollars. Before any work can be done on this review submittal, a signed copy of this authorization form must be received from the Contractor by SLVWD. The starting date for the submittal review shall be the date that SLVWD receives the signed authorization from the Contractor.

_____
San Lorenzo Valley Water District, GM

APPROVED:

_____
Contractor

_____
Date

Distribution of Executed Document: SLVWD, District Manager
Schaaf & Wheeler, Engineer
Contractor

END OF SECTION 00656

SECTION 00658

AUTHORIZATION OF ENGINEERING COSTS FOR REDESIGN DUE TO SUBSTITUTIONS AND EQUALS

To: _____ Date: _____
Contractor

PROJECT NAME: **Quail Hollow Pipeline Replacement**

As a result of the contractor's request to use the substitution (or equal) titled _____, the following redesign is required to adjoining and/or related Work shown on the Plans and referred to in the Specifications as _____.
The cost of the required engineering redesign work is detailed as follows:

Work Description	**Labor Hours**	**Hourly Rate**	**Total Cost**
1.		$	$
2.		$	$
3.		$	$
4.		$	$
TOTAL AUTHORIZED AMOUNT……..$			

Before any work can be completed on this redesign effort, a signed copy of this authorization form must be received from the Contractor by SLVWD. The starting date for this redesign shall be the date that SLVWD receives the signed authorization from the Contractor.

_____
San Lorenzo Valley Water District, GM

APPROVED:

_____
Contractor

_____
Date

Distribution of Executed Document: SLVWD, District Manager
Schaaf & Wheeler, Engineer
Contractor

END OF SECTION 00658

SECTION 00660

CONTRACTOR RELEASE

Description of Contract: **Quail Hollow Pipeline Replacement**

Name of Contractor: _____

Period Work Performed: _____

The above-named Contractor hereby acknowledges payment in full for all compensation of whatever nature due the Contractor for all labor and materials furnished and for all work performed on the above-referenced project for the period specified above with the exception of contract retention amounts and disputed claims specifically shown below.

RETENTION AMOUNT FOR THIS PERIOD: $_____

DISPUTED CLAIMS

DESCRIPTION OF CLAIM	AMOUNT CLAIMED

The Contractor further expressly waives and releases any claim the Contractor may have, of whatever type or nature, for the period specified which is not shown as a retention amount or a disputed claim on this form. This release and waiver has been made voluntarily by Contractor without any fraud, duress, or undue influence by any person or entity.

Contractor further certifies, warrants, and represents that all bills for labor, materials, and work due Subcontractors for the specified period have been paid in full and that the parties signing below on behalf of Contractor have express authority to execute this release.

Dated: _____

_____
(Print Name of Contractor)

_____
(Describe Entity: Partnership, Corporation, etc.)

By: _____

By: _____

By: _____

END OF SECTION 00660

SECTION 00686

UNCONDITIONAL RELEASE AND CERTIFICATE OF FINAL PAYMENT

To: San Lorenzo Valley Water District
13060 CA-9
Boulder Creek, CA 95006

Project No. _____

Contract Dated _____

CONTRACTOR:

Name: _____

Address: _____

DESCRIPTION OF PROJECT: Quail Hollow Pipeline Replacement. The project consists of replacing 7,455 LF of 6-inch water main in Quail Hollow Road with a 12-inch water main, along with the associated water services, hydrants, valves and other appurtenances.

DESCRIPTION OF SITE (LOCATION): Unincorporated Santa Cruz County

With reference to said Contract, as amended, between the undersigned Contractor and SLVWD, the Undersigned hereby certifies and represents that it has made full payment of all costs, charges, and expenses incurred by it or on its behalf for work, labor, services, materials, and equipment supplied to the foregoing site and/or used in connection with its work under said Contract.

The undersigned further certifies that to its best knowledge and belief, each of its subcontractors and material suppliers has made full payment of all costs, charges, and expenses incurred by them or on their behalf for work, labor, services, materials, and equipment supplied to the foregoing site and/or used by them in connection with the Undersigned's work under said Contract.

In consideration of $_____ as final payment under the Contract, the Undersigned hereby unconditionally and forever discharges, waives, and releases SLVWD and the site and property from all claims, stop notices, liens, bond rights, and obligations and rights of every nature arising out of or in connection with the performance of the said Contract and all amendments thereto except as set forth below:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

NOTE: *If none, write "NONE" in space above. (Any claims excepted must be described and the specific amount claimed must be set forth.)*

Unless any claims, stop notices, liens, bond rights, and obligations or rights are described and the specific amounts claimed, are described in the space above, Contractor certifies that there are none.

As additional consideration for the final payment, the Contractor agrees to indemnify and hold harmless SLVWD from and against all costs, losses, damages, claims, causes of action, judgments, and expenses, including attorney's fees arising out of or in connection with claims against SLVWD which arise out of the performance of the Work under the Contract and which may be asserted by the Contractor or any of its suppliers, subcontractors of any tier or any of their representatives, officers, agents, or employees, except for those claims listed above.

The foregoing shall not relieve the Undersigned of its obligations under the provisions of said Contract, as amended, which by their nature survive completion of the work including, without limitation, warranties, guarantees, and indemnities.

Executed this _____ day of _____, 20__.

_____
(Name of Contractor)

By: _____

Title: _____

(Attach Notary Acknowledgement)

Distribution:

Original - County Recorder
Copy - Contractor

END OF SECTION 00686

RECORDING REQUESTED BY:

San Lorenzo Valley Water District

WHEN RECORDED RETURN TO:

San Lorenzo Valley Water District
13060 CA-9
Boulder Creek, California 95006

MAIL TAX STATEMENTS TO:

NO FEE REQUIRED PER GOVERNMENT CODE SECTION 27383

SECTION 00687

NOTICE OF COMPLETION

To: _____ Date: _____

_____

_____ Project No.: _____

Owner: San Lorenzo Valley Water District
13060 CA-9
Boulder Creek, CA 95006

Date of Completion: _____

OWNER'S ESTATE OF INTEREST:

Easement _____ Fee Title _____ Encroachment Permit _____

Other (describe) _____

_____

CONTRACTOR FOR WORK OF IMPROVEMENT AS A WHOLE:

Name: _____

Address: _____

TITLE OF PROJECT: **Quail Hollow Pipeline Replacement**

DESCRIPTION OF PROJECT: Replace 7,455 LF of existing water mains with fittings, Valves and domestic services in Quail Hollow Road

LEGAL DESCRIPTION OF SITE: Quail Hollow Road in unincorporated Santa Cruz County

ADDRESS OF THE SITES: Quail Hollow Road between Cumora Lane and West Zayante Road within unincorporated Santa Cruz County

_____

_____

_____

This Notice is given for (check one):

- ☐ Completion of the work of improvement as a whole.
- ☐ Completion of a contract for a particular portion of the work of improvement (per Cal. Civ. Code § 8186).

If this notice is given only of completion of a contract for a particular portion of the work of improvement, the name and address of the direct contractor under that contract is:

_____

Final payment will be made to the above contractor on or after thirty-five (35) calendar days from the recording date of this Notice of Completion, except where otherwise provided for by law.

VERIFICATION

I, the undersigned state that I am the _____ of the San Lorenzo Valley Water District, the public agency authorizing the Work of Improvement referred to in the foregoing Notice of Completion; that I have executed such Notice of Completion on behalf of such public agency and likewise make this verification on behalf of said public agency; and that I have read said Notice of Completion and know the contents thereof and the facts therein stated are true of my own knowledge.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

_____
Date and Place

_____
Rick Rogers, District Manager
San Lorenzo Valley Water District
13060 CA-9, Boulder Creek, California 95006

Distribution:

Original - County Recorder
Copy - Contractor

END OF SECTION 00687

SECTION 00692

CONDITIONAL WAIVER AND RELEASE UPON PROGRESS PAYMENT

California Civil Code Section 8132

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

Identifying Information

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: _____

Through Date: _____

Conditional Waiver and Release

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

Maker of Check: _____

Amount of Check: $ _____

Check Payable to: _____

Exceptions

This document does not affect any of the following:

(1) Retentions.

(2) Extras for which the claimant has not received payment.

(3) The following progress payments for which the claimant has previously given a conditional waiver and release but has not received payment:

Date(s) of waiver and release: _____

Amount(s) of unpaid progress payment(s): _____

(4) Contract rights, including:

(A) a right based on rescission, abandonment, or breach of contract, and

(B) the right to recover compensation for work not compensated by the payment.

SIGNATURE

Claimant's Signature: _____

Claimant's Title:_____

Date of Signature:_____

Note: Where the claimant is required to execute a waiver and release in exchange for or in order to induce the payment of a progress payment and the claimant is not, in fact, paid in exchange for the waiver and release or a single payee check or joint payee check is given in exchange for the waiver and release, the waiver and release shall follow substantially this form. This form of release complies with the requirements of California Civil Code Section 8132.

The Contractor is required to obtain from each subcontractor and supplier this conditional waiver and release of claims for each preliminary notice received by SLVWD. Final payment shall be held in abeyance pending receipt of release of claims from all subcontractors or suppliers.

Alternatively, the final payment will be made by check payable to the Contractor and subcontractor or supplier to the extent the subcontractor or supplier has not been paid as shown on the preliminary notice.

END OF SECTION 00692

SECTION 00693

UNCONDITIONAL WAIVER AND RELEASE UPON PROGRESS PAYMENT

California Civil Code Section 8134

NOTICE TO CLAIMANT: THIS DOCUMENT WAIVES AND RELEASES LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS UNCONDITIONALLY AND STATES THAT YOU HAVE BEEN PAID FOR GIVING UP THOSE RIGHTS. THIS DOCUMENT IS ENFORCEABLE AGAINST YOU IF YOU SIGN IT, EVEN IF YOU HAVE NOT BEEN PAID. IF YOU HAVE NOT BEEN PAID, USE A CONDITIONAL WAIVER AND RELEASE FORM.

Identifying Information

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: _____

Through Date: _____

Unconditional Waiver and Release

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

$_____

Exceptions

This document does not affect any of the following:

(1) Retentions.

(2) Extras for which the claimant has not received payment.

(3) Contract rights, including:

(A) a right based on rescission, abandonment, or breach of contract, and

(B) the right to recover compensation for work not compensated by the payment.

SIGNATURE

Claimant's Signature: _____

Claimant's Title:_____

Date of Signature:_____

Where the claimant is required to execute a waiver and release in exchange for, or in order to induce the payment of, a progress payment and the claimant asserts in the waiver it has, in fact, been paid the progress payment, the waiver and release shall follow substantially this form. This form of release complies with the requirements of California Civil Code Section 8134.

The Contractor is required to obtain from each subcontractor and supplier this unconditional waiver and release of claims for each preliminary notice received by SLVWD. Final payment shall be held in abeyance pending receipt of release of claims from all subcontractors or suppliers.

Alternatively, the final payment will be made by check payable to the Contractor and subcontractor or supplier to the extent the subcontractor or supplier has not been paid as shown on the preliminary notice.

END OF SECTION 00693

SECTION 00694

CONDITIONAL WAIVER AND RELEASE UPON FINAL PAYMENT

California Civil Code Section 8136

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

Identifying Information

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: _____

Conditional Waiver and Release

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

Maker of Check: _____

Amount of Check: $_____

Check Payable to: _____

Exceptions

This document does not affect any of the following:

_____

_____

_____

Disputed claims for extras in the amount of: $_____

SIGNATURE

Claimant's Signature: _____

Claimant's Title:_____

Date of Signature:_____

Notice: Where the claimant is required to execute a waiver and release in exchange for, or in order to induce the payment of, a final payment and the claimant is not, in fact, paid in exchange for the waiver and release or a single payee check or joint payee check is given in exchange for the waiver and release, the waiver and release shall follow substantially this form. This form of release complies with the requirements of California Civil Code Section 8136.

The Contractor is required to obtain from each subcontractor and supplier this conditional waiver and release of claims for each preliminary notice received by SLVWD. Final payment shall be held in abeyance pending receipt of release of claims from all subcontractors or suppliers.

Alternatively, the final payment will be made by check payable to the Contractor and subcontractor or supplier to the extent the subcontractor or supplier has not been paid as shown on the preliminary notice.

END OF SECTION 00694

SECTION 00695

UNCONDITIONAL WAIVER AND RELEASE UPON FINAL PAYMENT

California Civil Code Section 8138

NOTICE TO CLAIMANT: THIS DOCUMENT WAIVES AND RELEASES LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS UNCONDITIONALLY AND STATES THAT YOU HAVE BEEN PAID FOR GIVING UP THOSE RIGHTS. THIS DOCUMENT IS ENFORCEABLE AGAINST YOU IF YOU SIGN IT, EVEN IF YOU HAVE NOT BEEN PAID. IF YOU HAVE NOT BEEN PAID, USE A CONDITIONAL WAIVER AND RELEASE FORM.

Identifying Information

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: _____

Unconditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. The claimant has been paid in full.

Exceptions

This document does not affect any of the following:

_____

_____

_____

Disputed claims for extras in the amount of: $_____

SIGNATURE

Claimant's Signature: _____

Claimant's Title:_____

Date of Signature:_____

Where the claimant is required to execute a waiver and release in exchange for, or in order to induce the payment of, a progress payment and the claimant asserts in the waiver it has, in fact, been paid the final payment, the waiver and release shall follow substantially this form. This form of release complies with the requirements of California Civil Code Section 8138.

The Contractor is required to obtain from each subcontractor and supplier this unconditional waiver and release of claims for each preliminary notice received by SLVWD. Final payment shall be held in abeyance pending receipt of release of claims from all subcontractors or suppliers.

Alternatively, the final payment will be made by check payable to the Contractor and subcontractor or supplier to the extent the subcontractor or supplier has not been paid as shown on the preliminary notice.

END OF SECTION 00695

SECTION 00700

GENERAL CONDITIONS

LIST OF ARTICLES

ARTICLE 1 – DEFINITIONS

1.1 Terms used in the Contract Documents are defined herein. The terms shall have the meanings described which shall be applicable to both the singular and plural thereof.

1.2 Addenda. Written or graphic instructed issued prior to execution of the Contract Agreement which modify or interpret the Contract Documents.

1.3 Bid. The offer or proposal of the Bidder submitted in the prescribed form setting forth the prices for the Work to be performed.

1.4 Bidder. Any person, firm, corporation, or organization submitting a Bid or Proposal for the Work.

1.5 Bonds. Bid, performance, and payment bonds, and other instruments of security furnished by the Contractor and his surety in accordance with the Contract Documents.

1.6 Change Order. A written order to the Contractor signed by SLVWD ordering and authorizing an addition, deletion, or revision in the Work, or an adjustment in the Contract Price or the Contract Time.

1.7 Contract Agreement. The Contract Documents form the Contract Agreement. The Contract Agreement represents the entire and integrated agreement between the parties hereto and supersedes all prior negotiations, representations, or agreements, either written or oral. The Contract Agreement may be amended or modified after execution only by a Modification. References herein to the Contract or the Agreement, or the Form of Agreement, shall be understood to mean and refer to the Contract Agreement.

1.8 Contract Documents. The Contract Documents consist of the Contract Agreement, notices, instructions, and forms issued to Bidders in the Bidding Requirements for the submittal of Bids, the Contractor's Bid, the Bid security, the Notice of Award, the Notice to Proceed, the Notice to Construct, if any, the Conditions of the Contract (General, Supplementary, and other Conditions), the Bonds, the Drawings, the Specifications, all Addenda, and all Modifications.

1.9 Contract Price. The total moneys payable to the Contractor under the Contract Documents.

1.10 Contract Time. The number of days for completion of the Work, or the date upon which the Work shall be completed and ready for use by SLVWD, as stated in the executed Contract Agreement.

1.10.1 Substantial Completion. The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of the Engineer, the Work is sufficiently complete, in accordance with the

Contract Documents, so that the Work can be utilized for the purposes for which it is intended.

1.10.2 Final Completion. The time at which the entirety of the Work is complete and ready for final payment, in accordance with the contract documents.

1.11 Contractor. The Contractor is the person, firm, corporation, or organization identified as such in the Contract Agreement and is referred to throughout the Contract Documents as if singular in number and masculine in gender. The term Contractor means the Contractor or his/her authorized representative.

1.12 Day and Days. The term Day shall mean calendar day, the term Calendar Days shall mean consecutive calendar days, and the term Work Days shall mean consecutive calendar days excluding Saturdays, Sundays, and legal holidays, unless otherwise stated or specified.

1.13 District Biologist. District Biologist of San Lorenzo Valley Water District, SLVWD or an authorized representative.

1.14 District Engineer. District Engineer of San Lorenzo Valley Water District, SLVWD or an authorized representative.

1.15 DIR. California Department of Industrial Relations.

1.16 Drawings. The Drawings or exact reproductions thereof which show the scope and character of the Work to be performed and which have been approved by SLVWD, and are referred to in the Contract Documents. The terms Drawing, Plan, and Plans have the same meaning as the term Drawings unless otherwise stated or specified.

1.17 Engineer. The term Engineer shall mean the person or firm appointed by SLVWD to undertake the duties and powers assigned to the Engineer by these Specifications acting directly or through authorized representatives. The term Engineer is referred to throughout the Contract Documents as if singular in number and masculine in gender, and means the Engineer or his authorized representative, including the Engineer's employees, agents, and consultants. (See Section 00800.)

1.18 Field Order. A Field Order is a written order issued by SLVWD to the Contractor which clarifies or interprets the Contract Documents pursuant to Paragraph 3.2, or orders minor changes or alterations in the Work pursuant to Paragraph 16.6.

1.19 Force Account Work: Work ordered on a construction project without an existing agreement on its cost, and performed with the understanding that the Contractor will bill the Owner according to the cost of the labor, materials and equipment, plus a certain percentage for overhead and profit.

1.20 Inspector. The Inspector is the authorized agent of SLVWD acting as the designee of the District Engineer, limited in each case to the duties entrusted

to him by SLVWD. The term Inspector applies to all Inspectors appointed by SLVWD. (See Section 00800)

1.21 Milestone. A principle event in the performance of the Work that the Contract requires the Contractor to achieve by an intermediate completion date or by a time prior to Substantial Completion of all the Work.

1.22 Modification. A Modification is a written amendment to the Contract Agreement signed by both parties, a Change Order, or a Field Order.

1.23 Notice of Award. The written notice by SLVWD to the Contractor that the Contractor is the successful Bidder and that, upon compliance with the conditions precedent to be fulfilled by the Contractor within the stated time, SLVWD will execute the Contract Agreement.

1.24 Notice to Construct. The written notice by SLVWD to the Contractor authorizing the Contractor to begin the physical installation of the particular material or equipment covered by such notice.

1.25 Notice to Proceed. The written notice by SLVWD to the Contractor authorizing him to proceed with the Work and establishing the date of commencement of the Work.

1.26 Owner. The Owner is the San Lorenzo Valley Water District (SLVWD) and is referred to throughout the Contract Documents as if singular in number and masculine in gender. The terms Owner and SLVWD mean the Owner or his authorized representative, and includes the Owner's employees, agents, and consultants. (See Section 00800.)

1.27 Project. The Project is the total construction designed for or by the Owner of which the Work performed or constructed under the Contract Documents may be the whole or a part.

1.28 Shop Drawings. All drawings, diagrams, illustrations, schedules, performance charts, brochures, and other data which are prepared by the Contractor or any Subcontractor, manufacturer, supplier, or distributor and which illustrate the equipment, material, or some portion of the Work.

1.29 Samples. Samples are physical examples furnished by the Contractor to illustrate materials, equipment, or workmanship, and to establish standards by which the Work will be judged.

1.30 Specifications. The Specifications include the Bidding Requirements, the Contract Forms, the Conditions of the Contract (General, Supplementary, and other Conditions), and the Divisions and Sections of the Specifications.

1.31 Subcontractor and Sub-subcontractor. The terms Subcontractor and Sub-subcontractor are referred to throughout the Contract Documents as if each were singular in number and masculine in gender, and means a Subcontractor or Sub-subcontractor or an authorized representative thereof. A Subcontractor is a person, firm, corporation, or organization who has a

direct contract with the Contractor to perform any of the Work at the site. A Sub-subcontractor is a person, firm, corporation, or organization who has a direct or indirect contract with a Subcontractor to perform any of the Work at the site.

1.32 Supplier. Any person, firm, corporation, or organization who supplies materials or equipment for the Work, including that fabricated to a special design, and may also be a Subcontractor or a Sub-subcontractor.

1.33 Surety. The term Surety is the person, firm, corporation, or organization that joins with the Contractor in assuming the liability for the faithful performance of the Work and for the payment of all obligations pertaining to the Work in accordance with the Contract Documents by issuing the Bonds required by the Contract Documents or by law.

1.34 Work. The term Work includes all labor, materials, equipment, and incidentals necessary to produce the construction required by the Contract Documents and any and all obligations, duties, and responsibilities necessary to the successful completion of the construction assigned to or undertaken by the Contractor under the Contract Documents.

ARTICLE 2 – PRELIMINARY MATTERS

2.1 Award. The award of the Contract Agreement, if awarded, will be to the eligible, lowest responsive responsible Bidder. No Notice of Award will be given until SLVWD has concluded such investigations as it deems necessary to establish the responsibility, qualifications, and financial ability of the Bidders to do the Work in accordance with the Contract Documents to the satisfaction of SLVWD within the time prescribed. SLVWD reserves the right to reject the Bid of any Bidder who does not pass such investigation to SLVWD's satisfaction. If the Contract Agreement is awarded, SLVWD will give the successful Bidder a Notice of Award within time period prescribed in Notice Inviting Bids after the opening of the Bids and no Bidder may withdraw his Bid for a period of time as prescribed in Notice Inviting Bids after the date set for the receipt of Bids unless other time periods are stated in the Bidding Requirements or elsewhere in the Contract Documents.

2.2 Execution of Contract Agreement. The Contract Agreement and such other Contract Documents are practicable shall be suitably identified as agreed by the parties and signed by SLVWD and the Contractor. The Contract Agreement shall be executed within the time period prescribed in Notice Inviting Bids of the Notice of Award unless otherwise provided in the Bidding Requirements or elsewhere in the Contract Documents. SLVWD will hold the Original Agreement and the Contractor shall receive a copy of the Agreement and such other Contract Documents. The Contract Agreement shall be executed in the form adopted or directed by SLVWD.

2.3 Delivery of Bonds and Insurance Endorsements. Simultaneously with the execution of the Contract Agreement, the Contractor shall deliver to SLVWD the required Bonds and Insurance Endorsements.

2.4 Forfeiture of Bid Security. Failure of the successful Bidder to whom a Notice of Award is tendered to execute the Contract Agreement and deliver the Bonds and other documents required of him at the time of execution within the time limit provided in the Contract Documents shall be just cause for SLVWD to annul the Notice of Award and declare the Bid and any security therefore forfeited.

2.5 Copies of Documents. SLVWD will furnish to the Contractor copies of the Specifications and Drawings as are reasonably necessary for the execution of the Work. Upon request, additional copies will be furnished at the cost of reproduction and handling as determined at the sole discretion of SLVWD.

2.6 Progress Schedule. Simultaneously with the execution of the Contract Agreement, the Contractor shall submit to SLVWD for approval as estimated progress schedule in chart form indicating the date that each part or brand of the Work will be started and completed including, where applicable, the continuance of operations as provided in Paragraph 12.10, and indicating a schedule of the required submittals including shop drawings, samples, lists of materials and equipment, equipment data, and instruction manuals. The schedule shall conform to the Work and the Contract Time, shall be subdivided and coordinated to the schedule of values, and shall be subject to such revisions SLVWD may require for his approval. The Contractor shall revise the approved progress schedule at monthly intervals, the revised schedules in the same form as the original approved schedule and concurrent with the time periods covered by applications for progress payments. Each revised schedule shall indicate the Work actually accomplished during the time period and the schedule for performance of the remaining Work. Each revised schedule shall be submitted to SLVWD for approval simultaneously with the Contractor's application for progress payment for the same time period, and shall be subject to such revisions SLVWD may require for his approval. SLVWD's approval of revised progress schedules will be a condition precedent to the approval of the Contractor's applications for progress payments.

2.7 Schedule of Values. Simultaneously with the execution of the Contract Agreement, the Contractor shall submit a schedule of values as required by Paragraph 20.1 for use in progress payments. When directed by SLVWD, the Contractor shall submit to SLVWD for approval a revised schedule of values coordinated to the revised progress schedules required under Paragraph 2.6 and pertinent requirements of Supplementary Conditions.

2.8 Insurance. Before execution of the Contract Agreement, the Contractor shall deliver to SLVWD the certificates and Proof of Insurance as required by Article 6.

2.9 Preconstruction Conference. Before the Work is started, a conference will be held to review the progress schedule and the schedule of values, to establish procedures for handling the required submittals and for processing applications for payment, and to establish a working understanding between the parties as to the Project and the Work. Present at the conference shall be SLVWD, the Engineer, and the Contractor and his Superintendent.

2.10 Verification. Before undertaking the Work, the Contractor shall carefully study and compare the Contract Documents for any discrepancies, inconsistencies, ambiguities, conflicts, or other errors in them or between the Contract Documents and the site conditions, and check and verify all figures, dimensions, and quantities shown thereon and all field measurements and actual site conditions, and shall bear all costs for any error in the Work resulting from his failure to so compare and verify. He shall at once report in writing to SLVWD any error in which he may discover and shall not perform or construct any of the Work affected thereby until an interpretation or clarification has been issued pursuant to Paragraph 32. The Contractor assumes full responsibility for having familiarized himself with the nature and extent of the Contract Documents, the Work, locality, and local conditions that may in any manner affect the Work to be done, and represents that he has visited the site and correlated his observations with the requirements of the Contract Documents.

2.11 Qualifications of Subcontractors and Suppliers.

2.11.1 Listing. The listing of Subcontractors shall be submitted with the Bid as required by the instructions to Bidders and the Bid Form.

2.11.2 Revision of Listing. No change or revision shall be made to the list nor shall any other Subcontractor, person, or organization not named in the accepted list be employed on or for the Work without SLVWD's consent, the issuance of an appropriate Modification, and at no additional cost to SLVWD.

2.12 Starting the Work. The Contractor shall start the Work not later than the date stated in the Notice to Proceed, which date will be the first day of the Contract Time. Unless otherwise provided in the Bidding Requirements, the date so stated for the Work to start will be the tenth day from the date of the Notice to Proceed. SLVWD reserves the right to delay issuance of the Notice to Proceed for a period not to exceed sixty (60) calendar days after the date the Contract Agreement is executed, unless otherwise provided in the Bidding Requirements, and no additional payment will be made to the Contractor on account of such delay.

2.13 Contractor's License. Contractor shall possess a Class 'A' Contractor's License at the time of bid submission and award of the Contract, unless otherwise specified in the Invitation to Bidders. Contractor shall fill out and execute the Contractor's Licensing Statement. (See Section 00020 and 00406.)

2.14 Registration with DIR. Subcontractors must be registered with the DIR and have paid the annual fee pursuant to Section 1725.5 of the California Labor Code.

ARTICLE 3 – INTENT AND INTERPRETATION OF CONTRACT DOCUMENTS

3.1 Intent of the Contract Documents. The Contract Documents are complementary and what is called for by one is as binding as if called for by

all. Any Work that may be reasonably inferred from the Drawings or Specifications as being required to produce the intended result shall be provided by the Contractor whether or not it is specifically called for. The Contractor shall furnish and pay for all labor, supervision, materials, equipment, transportation, construction equipment and machinery, tools, appliances, water, fuel, power, energy, light, heat, utilities, telephone and communications, temporary and sanitary facilities, storage, protection, safety provisions, and all other facilities, services, and incidentals of any nature whatsoever necessary for the satisfactory and acceptable execution, testing, initial operation, and completion of the Work in accordance with the Contract Documents, ready for use, occupancy or operation by SLVWD.

3.2 Interpretations. Written clarifications of interpretations necessary for the proper execution or progress of the Work, in the form of drawings or otherwise, will be issued with reasonable promptness by SLVWD and in accordance with any schedule agreed upon. Such clarifications or interpretations shall be consistent with or reasonably inferable from the intent of the Contract Documents and shall become a part thereof, and may be affected by Field Order. If the Contractor believes that a written clarification or interpretation entitles him to an increase in the Contract Price or an extension of the Contract Time, he may make a claim therefore as provided in Paragraph 16.4.

Pursuant to this section of the General Conditions, the Contractor shall use the Request for Clarification Form, included herein (at the end of the General Conditions section), for submittal of inquiries and requests for information or clarification of the Contract Documents.

3.3 Organization of Drawings and Specifications. Except where a particular item or type of equipment is specified or otherwise required to be assembled of various components under the coordination and responsibility of one manufacturer or supplier (sometimes referred to or specified as until responsibility), the organization of the Specifications into Division, Sections, Articles, and paragraphs, the listing of the Work included and not included in the various sections of the Specifications, and the arrangement of the Drawings shall not control the Contractor in dividing the Work among Subcontractors nor establish the extent of Work to be performed by any trade.

3.3.1 Drawings. Scale dimensions on Drawings shall govern where figured dimensions are not indicated. Figured dimensions on Drawings shall govern over scale dimensions, and detailed Drawings shall govern over general Drawings.

3.3.2 Specification Titling and Arrangement. The Article and paragraph titles and other identifications of subject matter in the Specifications are intended as an aid in locating and recognizing various requirements. Except where titling forms are part of the text, such as the beginning words of a sentence or establishes the subject of an Article or paragraph, the titles are subordinate to and do not define, limit, or otherwise restrict the Specifications test. Underlining or capitalizing of words in the text does not

signify or mean that such words convey special or unique meanings having precedence over any other part of the Contract Documents. The Specification text shall govern over titling and shall be understood to be and interpreted as a whole. The order of Articles, paragraphs, and subparagraphs is established by the alpha-numeric or similar system employed in the text.

3.3.3 Specification Language. Words or phrases requiring an action or performance, such as perform, provide, install, furnish, erect, connect, test, operate, and adjust, shall be understood to include the meaning of the phrase "The Contractor shall" unless otherwise specified. The requirements of the Drawings and Specifications apply to all Work of the same type, kind, and class even though the word "all" may not be stated. The usage and meaning of various words and phrases employed in the Specifications and herein are as follows, and shall be understood to apply to the future, present, and past tenses according to the context.

3.3.3.1 References to Drawings. The words indicated, shown, detailed, noted, scheduled, illustrated, and words of like import shall mean that reference is made to the Drawings unless stated otherwise.

3.3.3.2 Directives. The words directed, direction, designated, selected, and words and phrases of like import shall mean that the direction, designation, selection, or like action of SLVWD is intended unless stated otherwise.

3.3.3.3 Submittals. The words submit, submittal, submission, and words of like import shall be understood to include the meaning of the phrase "Submit to SLVWD for approval" unless stated otherwise.

3.3.3.4 Equals and Approvals. The words equal, approved equal, equivalent, and words and phrases of like import shall be understood to be followed by the expression "in the opinion of SLVWD" unless stated otherwise. The words approval, acceptable, acceptance, satisfaction, and words of like import shall mean that the approval, acceptance, or satisfaction of SLVWD is intended unless stated otherwise.

3.3.3.5 Perform. The word perform shall mean that the Contractor shall perform all operations required to complete the mentioned action or Work in accordance with the intent of the Contract Documents.

3.3.3.6 Provide. The word provide shall mean that the Contractor shall furnish and install the mentioned Work, complete in place, connected, and ready for use by SLVWD in accordance with the intent of the Contract Documents, except the words providing and provided may mean "contingent upon" and the phrase "as provided in" may mean "in accordance with" where such is the context.

3.3.3.7 Required. The word required and words of like import shall mean "as required to complete the Work" and "as required by SLVWD" according to the context, unless stated otherwise.

3.3.3.8 Technical Words. Work, materials, or equipment described in words which so applied have a well-known trade or technical meaning shall be deemed to refer to such recognized meanings.

3.4 Reference or Standard Specifications. Specifying in the Contract Documents by reference to standard or reference type specification documents or to another part of the Contract Documents shall have the same force and effect as if the document or portion referred to were exactly repeated at the place where reference is made. In case of conflict between any applicable code, law, ordinance, rule, regulation, or order and the referenced standard or reference Specification Documents, the Contractor shall conform to the most restrictive requirement provided such conformance is lawful. Standard or reference Specification Documents incorporated into the Contract Documents by reference shall be those in effect on the date shown at the end of the Notice Inviting Bids. The Contractor, Subcontractors, Sub-subcontractors, and suppliers of materials and equipment for the Work shall be fully familiar with the referenced documents. Abbreviations specified to indicate or identify standard or reference specification documents, such as ASTM, ANSI, AWWA, and ASME, shall be interpreted according to their well-known technical and trade meanings and usage.

Work conducted in conjunction with the Contract shall conform to the requirements of the Caltrans Standard Specifications, latest edition, unless otherwise indicated or directed in the Contract Documents included herewith.

3.5 Precedence of Documents: It is the intent of the Contract Documents to provide the SLVWD with complete and fully operational facilities as indicated and specified. All information conveyed by the Contract Documents shall be construed to that effect, and shall be performed to that effect.

To the fullest extent reasonably possible, all provisions of the Contract Documents shall apply to performance of the Work; provided, however, that in resolving conflicts, errors, omissions, or discrepancies in any of the Contract Documents, the order of precedence shall be as follows:

- Permits;
- Applicable Codes;
- Change Orders;
- Approved Revisions to the Contract Documents;
- Addenda;
- Supplementary Conditions;
- Contract Agreement;
- Invitation to Bidders;
- California State Requirements/Supplementary General Conditions;
- General Conditions;
- Technical Plans and Drawings;
- Technical Specifications;
- Standard Drawings;

- SLVWD Standard Specifications and Drawings;
- Referenced Standard Specifications and Drawings.

ARTICLE 4 – TIME

4.1 Time Limits. All time limits stated in the Contract Documents are of the essence of the Contract Agreement.

4.2 Time of Performance. The Contractor shall construct and complete the Work, including final clean up, final inspection, and final acceptance of the Work, within the Contract Time. It is expressly understood and agreed, by and between SLVWD and the Contractor, that the Contract Time for the completion of the Work is a reasonable time, taking into consideration the average climatic and economic conditions and other factors prevailing in the locality of the Work. (See Section 00800)

4.3 Extension of Contract Time. If the Work is not completed within the Contract Time and any previously authorized extensions thereof, SLVWD may extend the Contract Time at his discretion and, if so extended, the Contractor shall pay to SLVWD all or any part, as SLVWD may deem just and proper, of the actual costs incurred by SLVWD due to such extension and that are directly related to the Work including the cost of additional engineering, consultant or professional services, tests, inspections, painting inspections, supervision, administration, and other incidental and overhead expenses, and the Change Order authorizing such extension of the Contract Time will effect an appropriate reduction in the Contract Price.

4.4 Delays and Liquidated Damages. If the Work is not completed within the Contract Time, or within any period of authorized extension thereof, it shall be understood and agreed that SLVWD will suffer damage solely by reason of delay. Since it is impractical and infeasible to determine the amount of actual damage, it is agreed that the Contractor shall pay to SLVWD, as fixed and liquidated damages and not as a penalty, the amount stated in the Contract Agreement, unless otherwise provided or agreed by the parties. Payment shall be made for each calendar day of delay until the Work is completed and accepted; and the Contractor and his surety shall be liable for the amount thereof, except the Contractor will not be charged liquidated damages because of any delays in the completion of the Work due to unforeseeable causes beyond their control and without the fault or negligence of the Contractor including, but not restricted to, acts of God or of the Public enemy, acts of the Government, acts of SLVWD including any preference, priority, or allocation order duly issued by SLVWD, acts of another contractor in the performance of a contract with SLVWD, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and unusually severe weather. The Contractor shall, within ten (10) work days from the beginning of any such delay, notify SLVWD in writing of the cause of the delay, whereupon SLVWD will ascertain the facts and the extent of the delay and extend the time for completing the Work when in SLVWD's judgment the findings of fact justify such an extension, and SLVWD's findings of fact thereby shall be final and conclusive on the parties hereto. It is understood and agreed that such liquidated damage provision does not limit SLVWD with respect to any other damage capable of ascertainment. The Contractor hereby acknowledges and agrees that the Engineer and other

professionals, consultants, and specialists appointed or employed by SLVWD for the Work will suffer damages as a result of any unauthorized delay in completion of the Work and accepts the liability and responsibility for these damages as damage to SLVWD that is capable of ascertainment.

ARTICLE 5 – LANDS, CONDITIONS, AND LAYOUT

5.1 Land and Rights-of-Way. SLVWD will furnish and pay for the land, easements, and rights-of-way for the facilities to be installed. The Contractor shall obtain consents from the property owners, make all necessary arrangements, and pay all costs for additional land areas or access required by him during the course of construction outside the limits of the land, easements, and rights-of-way furnished by SLVWD, without liability to SLVWD.

5.2 Data Furnished by SLVWD. Upon written request, SLVWD will furnish to the Contractor a copy of all available boundary surveys and subsurface investigations. (See Section 00800.)

5.3 Subsurface Conditions. Documents and drawings pertaining to subsurface conditions at the site(s) are listed in the Supplemental Conditions. Neither SLVWD or the Engineer warrant or guarantee the accuracy or adequacy of any such report or any data, statements, opinions, recommendations, or conclusions therein, nor shall SLVWD or the Engineer be responsible or liable for any loss sustained by the Contractor because of any variance between the conditions indicated in or deduced by the Contractor from such a report or the Contract Documents and the actual conditions encountered in the Work. The Contractor shall make such subsurface investigations he/she may require to establish the true nature of the subsurface conditions affecting the Work, the difficulties which may be encountered (including subsurface rock or other obstacles), and the de-watering or other operations which may be required to complete the Work. No additions or extra payment will be made to the Contractor on account of any subsurface conditions whether or not known or latent, including rock. This paragraph shall be construed in accordance with Public Contract Code Section 7104 and Government Code Section 4215; to the extent such provisions may apply.

5.4 Environmental Conditions. Documents pertaining to environmental conditions at the site(s) are listed in the Supplemental Conditions. Neither SLVWD or the Engineer warrant or guarantee the accuracy or adequacy of any such report or any data, statements, opinions, recommendations, or conclusions therein, nor shall SLVWD or the Engineer be responsible or liable for any loss sustained by the Contractor because of any variance between the conditions indicated in or deduced by the Contractor from such a report or the Contract Documents and the actual conditions encountered in the Work. The Contractor shall make such additional investigations he/she may require to establish the true nature of the conditions affecting the Work.

5.5 Laying Out the Work. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall

be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

5.6 Preparation. Prior to setting out the work, the Contractor shall have all utility lines located and marked in the field and shall have all right-of-ways cleared, graded, and ready for construction activities.

ARTICLE 6 – BONDS, INSURANCE, AND INDEMNITY

6.1 Bonds. The Contractor shall furnish performance and payment Bonds for the faithful performance and payment of all his obligations under the Contract Documents. Each Bond shall be in penal sums at least equal to the Contract Price unless otherwise stated in the Bidding Requirements, and in such form and with such sureties as are acceptable to SLVWD. Prior to execution of the Contract Agreement SLVWD may require the Contractor to furnish other Bonds in such form and with such sureties as SLVWD may require. Sureties, to be acceptable to SLVWD, shall be legally authorized to do business in the State and jurisdiction where the Work is to be constructed and shall have assets that exceed its liabilities in an amount equal to, or in excess of, the amount of the bond. Bonds shall be duly executed by a responsible corporate surety, authorized to issue such bonds in the State of California and secured through an authorized agent with an office in California. The bidder shall also be required to submit along with the proposal and bond the following documents:

a) The original, or a certified copy, of the unrevoked appointment, power of attorney, bylaws, or other instrument entitling or authorizing the person who executed the bond to do so.

b) A certified copy of the authority of the insurer by the Insurance Commissioner.

c) Proof that the Surety is named in the current list of “Surety Companies Acceptable on Federal Bonds” as published by the United States Treasury Department.

d) Proof that the Surety has an “A” policyholder’s rating and a financial rating of at least Class VII in accordance with the most current rating by A.M. Best Company.

The performance bond shall remain in full force and effect for the entire guarantee period as provided in Paragraphs 19.1 and 19.2. If such Bonds are required by written instructions given prior to the opening of Bids, the premiums shall be paid by the Contractor; if subsequent thereto, they will be paid by SLVWD. If at any time a surety on any such Bond is declared bankrupt or loses its right to do business in the State or jurisdiction in which the Work is to be performed or is removed from the list of Surety Companies

Acceptable on Federal Bonds, the Contractor, within ten (10) work days after notice by SLVWD to do so, shall substitute an acceptable Bond or Bonds in such form and sum and signed by such other surety or sureties as may be satisfactory to SLVWD. The premium on such Bond or Bonds shall be paid by the Contractor. No further payments shall be deemed due nor shall be made to the Contractor until the new surety or sureties shall have furnished an acceptable Bond or Bonds to SLVWD.

6.2 Insurance. No Work shall be done under these Contract Documents unless there is in full force and effect during and until final acceptance of the Work, and thereafter as provided in subparagraph 6.2.1, all the insurance required to be furnished by the Contractor under this Article. The Contractor shall procure and maintain insurance against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the work hereunder by the Contractor, his agents, representatives, employees, or subcontractors. Nothing herein contained shall be construed as limiting in any way the extent to which the Contractor may be held responsible for payment of damages to persons or property resulting from his operations or the operations of any Subcontractor or Sub-subcontractor under him.

6.2.1 Carriers and Evidence. All insurance policies shall be with such insurance carriers and in such form as is satisfactory to and approved by SLVWD. The Insurance is to be placed with insurers with a current A.M. Best rating of no less than A: VII, unless otherwise acceptable to SLVWD. Contractor shall file with SLVWD a Certificate of Insurance for each policy required of him, and shall submit the actual insurance policies to SLVWD for inspection if requested or so required herein. Any insurance bearing on the adequacy of performance shall be maintained by the Contractor after final acceptance of the Work for the entire guarantee period as provided in Paragraphs 19.1 and 19.2. If the Contractor fails to maintain the required insurance, in whole or in part, SLVWD may secure and pay the premiums for such insurance and the Contractor shall pay to SLVWD such premium costs SLVWD may so incur in accordance with Paragraph 20.12.

6.2.2 Additional Insureds, Primary Insurance. SLVWD, its officers, officials, directors, employees, and volunteers shall be included as an additional insured in all insurance policies to be maintained by the Contractor, including comprehensive general liability and auto policies with respect to liability arising out of automobiles owned, leased, hired, or borrowed by or on behalf of the Contractor, and with respect to liability arising out of work or operations performed by or on behalf of the Contractor including materials, parts, or equipment furnished in connection with such work or operations. Such other persons or organizations as SLVWD may designate shall also be included as additional insureds. General liability coverage can be provided in the form of an endorsement to the Contractor's insurance (at least as broad as ISO Form CG 20 10 (11/85) or both CG 20 10 and CG 20 37 forms if later revisions used). The insurance afforded to the additional insureds shall be primary as respect to SLVWD, its officers, officials, directors, employees, and volunteers. If the additional insureds have other insurance which might be applicable to any loss, the insurance to be maintained by the Contractor shall be primary and the amount of the insurance to be maintained by the Contractor shall not be reduced or prorated by the

existence of such other insurance. Any insurance or self insurance maintained by SLVWD, its officers, officials, directors, employees, and volunteers shall be excess of the Contractor's insurance and shall not contribute with it. Exclusions in the insurance policies to be maintained by the Contractor are subject to the approval of SLVWD.

6.2.3 Noncancellation Clause and Renewals. All insurance policies required of the Contractor shall contain or be endorsed to contain a provision that the coverage afforded under the policies will not be canceled or changed until at least thirty (30) calendar days' prior written notice (ten (10) days for non-payment) has been given to SLVWD by registered or certified mail. Exact copies of renewal policies or endorsement extensions of previous policies shall be delivered to SLVWD by the Contractor prior to the expiration date of any of the insurance.

6.2.4 Indemnification. The Contractor shall indemnify, defend, and save harmless SLVWD, its officers, officials, directors, employees, and volunteers and each of them from and against all losses and all claims, demands, payments, suits, actions, recoveries, and judgments of every nature and description brought or recovered against any of them by reason of any act or omission of the Contractor, his agents or employees, or of any Subcontractor or Sub-subcontractor relating to or arising out of the execution of the Work, excepting that caused by the active negligence, sole negligence, or willful misconduct of SLVWD. The Contractor shall maintain and pay for such insurance as will protect SLVWD from any and all contingent liability under the Contract Agreement and a copy of such insurance policy shall be filed with SLVWD.

6.2.5 Workers' Compensation and Employer's Liability Insurance. The Contractor shall maintain or cause to be maintained an adequate workers' compensation insurance, including occupational disease provisions, under the laws of the State where the Work is located and employer's general liability insurance for the benefit of his employees and the employees of any Subcontractor or Sub-subcontractor under him not protected by such compensation laws. The Contractor shall maintain Workers' Compensation insurance as required by the State of California, with statutory limits, and Employer's Liability insurance with limits of no less than those stated in the Supplementary Conditions per accident for bodily injury or disease. The workers' compensation insurance shall include an All States endorsement, a voluntary compensation endorsement, a marine workers and a longshoreman's and harbor workers endorsement where applicable to the Work, and an endorsement waiving subrogation against the Contractor and SLVWD for all work performed by the Contractor, its employees, agents, and subcontractors.

The Contractor shall execute the Contractor's Certificate Regarding Workers' Compensation pursuant to Section 1881 of the California Labor Code. (See Section 00662.)

6.2.6 Public Liability and Property Damage Insurance. The Contractor shall maintain or cause to be maintained public liability and property damage insurance in commercial general liability policy form to protect the Contractor against claims or loss from liability imposed by law from damages which

may arise out of or result from the Contractor's operations under the Contract Agreement, whether such operations be by himself or by any Subcontractor or any Sub-subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable, on account of bodily injury, sickness, or disease, including death resulting therefrom, suffered or alleged to have been suffered by any person or persons resulting directly or indirectly from said operations, and against claims or loss from liability imposed by law for damage to any property caused directly or indirectly by said operations, which insurance shall also cover accidents arising out of the use and operation of automobiles, trucks, and other vehicles on or for the Work whether or not owned by those performing said operations and, further, shall include operations and premises coverage, contractual liability and indemnification agreement coverage, and products and completed operations coverage. The insurance required of the Contractor under this subparagraph shall remain in full force and effect for the entire time of the Contractor's guarantee. Unless otherwise stated in the Supplementary Conditions, the coverage amount of said insurance shall be not less than the following:

Commercial General Liability: Insurance Services Office Form CG 00 01, including products and completed operations, with limits of no less than those stated in the Supplementary Conditions per occurrence for bodily injury, personal injury, and property damage. If a general aggregate limit applies, either the general aggregate limit shall apply separately to this project/location or the general aggregate limit shall be twice the required occurrence limit.

Auto Liability: Insurance Services Office Form Number CA 0001 covering Code 1 (any auto), with limits no less than those stated in the Supplementary Conditions per accident for bodily injury and property damage.

Contractor’s Pollution Legal Liability and/or Asbestos Legal Liability and/or Errors and Omissions (if the project involves environmental hazards) with limits no less than those stated in the Supplementary Conditions per occurrence or claim, and in policy aggregate.

6.2.7 Property Insurance. The Contractor shall maintain or cause to be maintained, until the Work is accepted by SLVWD, Builders’ Risk “All-Risk” Completed Value Insurance coverage including earthquake and flood upon the entire Work and including completed Work, Work in progress, and materials and equipment in transit or storage for the Work, to the full value thereof and no coinsurance penalty provisions. Contractor may submit evidence of Builder’s Risk insurance in the form of Course of Construction coverage. Such coverage shall name SLVWD as loss payee as their loss may appear. This insurance shall include the interests of SLVWD, the Contractor, and the Subcontractors and Sub-subcontractors in the Work. Such insurance may have a deductible clause with a maximum Five-Thousand Dollar ($5,000) deductible unless otherwise stated in the Supplementary Conditions. Any insured loss is to be adjusted with SLVWD and made payable to SLVWD as trustee for the insureds as their interests may appear. SLVWD and the Contractor waive all rights against each other for damages caused by fire or other perils to the extent covered by

insurance provided under this subparagraph, except such rights as they may have to the proceeds of such insurance held by SLVWD as trustee. The Contractor shall require similar waivers by Subcontractors and Sub-subcontractors. If after such loss no other special agreement is made, replacement of damaged Work may be covered by an appropriate Change Order. Under the contract documents, the property insurance shall include coverage against the perils of flood and earthquake. (See Section 00800.)

If the project does not involve new or major reconstruction, at the option of SLVWD, an Installation Floater may be acceptable. For such projects, a Property Installation Floater shall be obtained that provides for the improvement, remodel, modification, alteration, conversion or adjustment to existing buildings, structures, processes, machinery and equipment. The Property Installation Floater shall provide property damage coverage for any building, structure, machinery, or equipment damaged, impaired, broken or destroyed during the performance of the Work, including during transit, installation, and testing at SLVWD's site.

6.2.7.1 Responsibility for Work.

1) Contractor shall be responsible for and shall bear any and all risk of loss or damage to Work in progress, all materials delivered to the site and all materials and equipment until completion and acceptance of the Work, unless such loss or damage results from the sole active negligence of SLVWD, or its representatives, and as otherwise hereinafter provided for in Paragraphs 6.2.7.1.2 and 6.2.7.1.3.

2) As provided in Section 7105 of the California Public Contract Code, the Contractor shall not be responsible for the cost of repairing or restoring damage to Work determined to have been approximately caused by an Act of God, in excess of five percent (5%) of the contract price, provided that the Work damaged was built in accordance with accepted and applicable building standards and the plans and specifications as set forth in this Contract.

   The Contractor shall obtain insurance to indemnify SLVWD for any damage to the Work caused by an Act of God if the premium of said insurance coverage is called for as a separate bid item in the Schedule of Quantities and Prices.

   The Contractor's Installation All Risk Insurance shall be provided covering value of the Work and all materials and equipment to be incorporated therein while at the site and during inland transit insuring to the replacement value, subject to the deductible not to exceed $5,000 for any single loss. This insurance shall also contain an insurer's waiver of subrogation against SLVWD. This insurance shall specifically cover losses due to earthquake.

3) As provided in Section 7105 of the California Public Contract Code, the term "Acts of God" shall include only the following occurrences or conditions and effects: earthquakes in excess of a magnitude of 3.5 on a Richter Scale and tidal waves.

4) Pursuant to provisions of Section 7105 of the Public Contract Code SLVWD reserves the right to make changes in this Contract in the course of construction to bring the completed improvements into compliance with environmental requirements or standards established by State or Federal statutes and regulations enacted after this Contract has been awarded or entered into. In such cases, the Contractor shall be paid for the changes in accordance with the provisions of the Contract governing payments for changes in the Work, or if such relevant provisions are not set forth in this Contract, payment shall be as agreed to by the parties pursuant to procedures under this Contract. SLVWD further reserves the right to terminate the contract pursuant to provisions provided herein for environmental considerations as may be allowed under Section 7105.

6.3 Loss of Use Insurance. SLVWD may purchase and maintain such insurance as will insure SLVWD against loss of use of SLVWD's property due to fire or other hazards or permits, however caused.

6.4 Loss or Damage and Indemnity Agreement. The Contractor shall be responsible for any liability imposed by law for any damage to the Work or any part thereof or to any of the materials or other things used in performing the Work or for injury to any person or persons or for any property damage. The Contractor shall indemnify and hold SLVWD, its officers, officials, directors, employees, and volunteers and each of them harmless against any and all liability, claims, loss or injury, including costs, expenses, and attorney's fees incurred in the defense of same, arising from any allegation, whether groundless or not, of damage or injury to any person or property resulting from the performance of the Work or from any material used in the Work or from any condition of the Work or Work site, or from any cause whatsoever during the process of the Work. Said indemnity includes acts of passive negligence of SLVWD, its officers, officials, directors, employees, or volunteers. This indemnity agreement does not extend to one whose sole negligence or willful misconduct caused injury or damage.

6.5 Nonlimitation of Indemnity Agreements. The indemnification obligations of the Contractor under the Contract Documents 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 or Sub-subcontractor of any tier under workers' compensation acts, disability benefit acts, or other employee benefit acts.

6.6 Occurrence Coverage. Coverage required by this Contract shall be occurrence coverage.

6.7 Deductibles and Self-Insured Retentions: Any deductibles or self-insured retentions must be declared to and approved by SLVWD. At the option of SLVWD, either: the insurer shall reduce or eliminate such deductibles or self-insured retentions as respects SLVWD, its officers, officials, directors, employees, and volunteers; or the Contractor shall provide a financial guarantee satisfactory to SLVWD guaranteeing payment of losses and related investigations, claim administration, and defense expenses.

6.8 Waiver of Subrogation. 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 affect this waiver of subrogation.

6.9 Subcontractors. Contractor shall require and verify that all subcontractors maintain insurance meeting all of the requirements stated herein unless otherwise agreed to in writing by SLVWD prior to commencement of work by such subcontractor.

6.10 Verification of Coverage. Contractor shall furnish SLVWD with original certificates and amendatory endorsements, or copies of the applicable insurance language, effecting coverage required by this Contract. All certificates and endorsements are to be received and approved by SLVWD before work commences. However, failure to obtain the required documents prior to the work beginning shall not waive the Contractor's obligation to provide them. SLVWD reserves the right to require complete, certified copies of all required insurance policies, including endorsements, required by these specifications, at any time.

ARTICLE 7 – SUPERVISION AND SUPERINTENDENCE

7.1 Contractor's Supervision. The Contractor shall supervise and direct the Work efficiently and with his best skill and attention. He shall be solely responsible for means, methods, techniques, procedures, and sequences of construction. The Contractor shall coordinate all parts of the Work and shall be responsible to see that the finished Work complies accurately with the Contract Documents.

7.2 Superintendent. The Contractor shall keep on the Work at all times during its progress a competent resident English-speaking Superintendent satisfactory to SLVWD, who shall not be replaced without ten (10) work days' written notice to SLVWD except under extraordinary circumstances. The Superintendent shall be the Contractor's representative at the site and shall have the authority to act on behalf of the Contractor. All communications, instructions, and directions given to the Superintendent shall be as binding as if given to the Contractor. Whenever the Contractor or the Superintendent is not present on a part of the Work where SLVWD wishes to give orders or directions, the orders or directions shall be received and obeyed by the Foreman in charge of that part of the Work the same as if the order or direction had been given to the Contractor or the Superintendent. Any order or direction given by SLVWD not otherwise required to be in writing will be given or confirmed in writing upon request of the Contractor.

ARTICLE 8 – CONSTRUCTION PROCEDURES AND PROTECTION

8.1 Contractor's Plant and Equipment. The Contractor shall furnish sufficient plant and equipment as necessary to perform the Work in a manner satisfactory to SLVWD and in accordance with the Contract Documents, types and designs that comply with the requirements of Article 13 and with the requirements prescribed by laws, ordinances, codes, rules, regulations,

and orders pertaining to wind and seismic forces at the place of the Project. Construction equipment or machinery that at any time produces unsatisfactory results shall be promptly repaired or replace by the Contractor and as SLVWD may require.

8.2 Use of Site. The Contractor shall confine his equipment, the storage of materials and equipment, and the operations of those directly and indirectly employed by him to areas permitted by law, ordinances, permits, and the Contract Documents, and shall not unreasonably encumber the site with materials and equipment. Nothing in the Contract Documents shall grant to the Contractor exclusive occupancy of the site of the Work and Project.

8.3 Overloading. No part of the Work or new and existing structures, scaffolding, shoring, sheeting, construction machinery and equipment, or other permanent and temporary facilities shall be loaded with weights or subjected to stresses or pressures that endanger any of them. The Contractor shall bear the cost of correcting damage caused by overloading or excessive stresses or pressures.

8.4 Use of Explosives. The use of explosives for any and all purposes is not permitted for the Work under this Contract.

8.5 Cutting and Patching. The Contractor shall perform all cutting, fitting, or patching of the Work that may be required to make its several parts fit together properly and satisfactorily, and shall not endanger any Work, structures, adjacent property, workmen, or the public by cutting, excavating, or otherwise altering the Work or any part of it. The Contractor shall restore all such cut or patched Work and improvements as approved by SLVWD.

8.6 Verification of Installed Work. The Contractor shall correct all defects in installed Work of the Contract before subsequent related or connected Work is applied or installed. Where the Contract Documents require a material or item of equipment to be applied or installed under the supervision, inspection, or direction of the supplier or manufacturer, or his representative, the supplier, manufacturer, or his representative shall inspect the applicable installed Work and issue a letter to SLVWD stating the corrections required to or approval of the installed Work before his material or equipment is installed or applied.

8.7 Manufacturers' Instructions. Unless otherwise provided in the Contract Documents, the Contractor shall apply, install, erect, connect, use, clean, condition, and operate manufactured articles, materials, and equipment in accordance with the various manufacturers' instructions including those in the instruction manuals required in Paragraph 12.7 and other instructions required in Paragraph 12.8. The Contractor shall compare the requirements of the various manufacturers' instructions with the requirements of the Contract Documents, shall promptly notify SLVWD in writing of any difference between such requirements, and shall not proceed with any of the Work affected by such differences until an interpretation or clarification is issued pursuant to Paragraph 3.2. The Contractor shall bear all costs for any error in the Work resulting from his failure to so compare the various requirements and notify SLVWD of any such differences.

8.8 Public Convenience. The Contractor shall at all times so conduct his operations as to ensure the least possible obstruction and inconvenience to traffic and the general public and the residents in the vicinity of the Work, to protect persons and property, and to preserve access to driveways, houses, and buildings. The Contractor shall have under construction no greater amount of Work than he can properly perform with due regard to the rights of the public, and shall not create any public nuisance. No road, street, or highway shall be closed to the public except with the permission of the proper authorities. Where existing streets are not available as detours, the Contractor shall permit traffic to safely pass through the Work with as little delay and inconvenience as possible, unless otherwise authorized by SLVWD. When a section of new surfacing, paving, or a traffic structure intended for public use has been completed, it shall be opened for use at the request of SLVWD. The Contractor shall furnish competent flagmen whose sole duty shall be the directing of traffic through or around the Work when ordered by SLVWD, required by public authorities having jurisdiction, or required by law. At no time shall the Contractor prevent free access to fire hydrants, water and gas main valves, manholes or vaults, or other utility facilities. The Contractor shall make temporary provisions to ensure the use of walkways and sidewalks and the proper functioning of gutters, sewer and storm drain inlets, and ditches, which shall not be obstructed.

8.9 Protection. The Contractor shall take all precautions and furnish and maintain protection to prevent damage, injury, or loss to all employees and workmen on the Work and all other persons who may be affected thereby; all the Work and all materials and equipment to be incorporated therein, whether in storage on or off the site, under the care, custody or control of the Contractor or any of his Subcontractors or Sub-subcontractors; and other improvements and property at the site or where Work is to be performed including buildings, trees and plants, pole lines, fences, guard rails, guide posts, culvert and project markers, signs, structures, conduits, pipe lines, and improvements within or adjacent to streets, rights-of-way, or easements, except those items required to be removed by the Contractor in the Contract Documents. The Contractor's protection shall include all the safety precautions required under Article 13 and other necessary forms of protection, and the notification of SLVWD of utilities and adjacent property.

8.9.1 Utilities and Substructures. The indication of the type and approximate location of existing utilities and substructures in the Contract Documents represents a diligent search of known records, but the accuracy and completeness of such indications are not warranted by SLVWD or the Engineer and utility structures and services not so indicated may exist. Before commencing any excavations, the Contractor shall investigate, determine the actual locations, and protect the indicated utilities and structures, shall determine the existence, position, and ownership of other utilities and substructures in the site or where the Work is to be performed by communication with such owners, search of records, or otherwise, and shall protect all such utilities and substructures. SLVWD has indicated on the Plans and Specifications with reasonable accuracy the location of main or trunk line utilities located on the site of project. The Contractor shall be compensated for reasonable costs of locating and repairing any such facilities if not located with reasonable accuracy unless Contractor has failed to exercise reasonable care. Contractor shall not be assessed liquidated damages for delay caused by the failure of SLVWD to provide for the

removal, relocation, or protection of such utilities not identified in the Plans and Specifications. The Contractor shall verify the actual location and depth by "pot holing" of each utility. This paragraph shall be construed in accordance with Government Code Section 4215.

8.9.2 Maintenance of Facilities. Unless otherwise provided in the Contract Documents or otherwise cared for by SLVWD thereof, all water, gas, oil, or irrigation drainage lines and house connection lines, sprinkling systems, and other subsurface, surface and overhead structures of any nature along the Work shall be maintained by the Contractor at his expense, and shall not be disturbed, disconnected, or damaged by him during the progress of the Work. The Contractor shall install temporary pipes of adequate size to carry off sewage from any sewer facilities cut off by construction operations. Installation of temporary pipes shall be made immediately upon cutting of the existing facility, and no sewage shall be allowed to flow from any severed facility upon the ground surface or in the trench excavation. Pipe used in temporary sewers may be clay, metal, concrete, PVC or HDPE. Before completion of Work, the Contractor shall replace all severed connections and restore to operating order the existing sanitary facilities with matching materials and construction. No liquid from any severed facility shall be allowed to flow upon the ground surface or in any excavation.

8.9.3 Restoration and Repair. Except for those improvements and facilities required to be permanently removed by the Contract Documents, the Contractor shall make satisfactory and acceptable arrangements with the appropriate owners and, at his expense, shall repair and restore all improvements, structures, property, utilities, and facilities disturbed, disconnected, or damaged as a result or consequent of his Work or the operations of those for whom he is responsible or liable, including that caused by trespass of any of them with or without his knowledge or consent, or by the transporting of workmen, materials, or equipment to or from the site.

8.9.4 Protection of Workers in Trench Excavations. (See California State Requirements, Section 00800CA, Paragraph L.)

8.10 Utilities.

8.10.1 Water Supply. The Contractor shall not draw water from any fire hydrant or service, nor operate any valve or control of any water system without the written permission of SLVWD thereof, and a copy of each written permission shall be filed with SLVWD. Water use shall be metered through a hydrant meter, service meter or temporary meter, as directed by the Owner.

8.10.2 Temporary Utility Interruptions. If the temporary interruption of utility services is necessary for the prosecution of the Work, the Contractor shall make all arrangements with the utility owners and pay all fees and charges levied by them for the interruptions, and shall notify the affected users at least forty-eight (48) hours in advance of the probable duration of interruption unless such notice is given by the appropriate utility owner.

8.10.3 Temporary Removal or Maintenance. If it should be necessary to move or temporarily maintain the property of any public utility or other property, the cost of which because of the terms of any franchise or for any other reason must be borne by SLVWD thereof, such owner will, upon proper application

by the Contractor, be notified by SLVWD to move or temporarily maintain such property until after the expiration of the time required for the Work. SLVWD, public authorities having jurisdiction, and SLVWDs of public utilities and franchises shall have access to any street, alley, right-of-way, or easement for the purpose of maintaining or of making repairs or changes in property made necessary by the Work.

ARTICLE 9 – LABOR, MATERIALS, AND EQUIPMENT

9.1 Workman. The Contractor shall at all times enforce strict discipline and good order among his employees and those of any Subcontractor or Sub-subcontractor, and shall not employ on the Work any unfit person or anyone not skilled and experienced in the assigned task. All Superintendents and foremen shall be English-speaking. Any Superintendent, foreman, laborer, or other person employed on the Work who fails or refuses to perform the Work in the manner required by the Contract Documents shall be discharged immediately and such person shall not again be employed on the Work. When required in writing by SLVWD, the Contractor, Subcontractor, or Sub-subcontractor shall discharge any person who is, in the opinion of SLVWD, incompetent, unfaithful, disorderly, or otherwise unsatisfactory. Such discharge shall not be the basis of any claim for compensation or damages against SLVWD or the Engineer.

9.2 Workmanship. The quality of workmanship produced by skilled, knowledgeable, and experienced journeymen mechanics and artisans is required for the Work; Particular attention shall be given to the appearance and finish of exposed Work. The decision of SLVWD with regard to the quality and adequacy of workmanship shall be final and binding.

9.3 Materials and Equipment. All materials and equipment incorporated in the Work shall be new unless otherwise specified. Materials and equipment not covered by detailed requirements in the Contract Documents shall be of the best commercial quality, suitable for the purpose intended, and approved by SLVWD prior to use in the Work. The Contractor shall provide proper storage facilities and exercise such measures as will ensure the preservation of the required quality and fitness of all materials and equipment. Materials or equipment not conforming to the requirements of the Contract Documents shall be rejected and immediately removed from the site of the Work. Materials, supplies, or equipment to be incorporated into the Work shall not be purchased by the Contractor or any Subcontractor or Sub-subcontractor subject to a chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller.

9.3.1 Plurality of Terms. Where materials or equipment are referred to in the singular number, it is intended unless otherwise limited that such reference shall be applied to as much material or equipment as is required to complete the Work.

9.3.2 Optional Materials. Where any material or equipment item is specified by two or more manufacturer's name or proprietary identifications, the Contract may provide any one of the materials or equipment so specified. Only one brand, kind, or make of material or equipment shall be used for each specific purpose throughout the Work notwithstanding that similar material or

equipment of two or more manufacturers may be specified for the same purpose.

9.3.3 Space Requirements and Arrangement. The Contractor shall ensure that the materials and equipment to be furnished fit the space available, and shall make the necessary field measurements to ascertain space requirements including those for connections. If material or equipment requiring arrangement or connections different from those required by the Contract Documents is approved by SLVWD, the Contractor shall bear all costs for installing the material or equipment and for changes to adjoining or related Work SLVWD may require.

9.3.4 Materials Furnished by SLVWD. Material or equipment to be furnished by SLVWD will be supplied in accordance with the Specifications.

9.4 Substitutions and Equals. References in the Contract Documents to any material, item of equipment, or type of construction by manufacturer's name, make, catalog number, or other proprietary identification shall be interpreted as establishing a standard of quality. If the Contractor wishes to furnish or use a proposed substitute or equal material, item of equipment, or type of construction, he shall make written application to SLVWD for approval, certifying in writing that the proposed substitute or equal will perform adequately the duties imposed by the general design, be similar and of equal substance to that specified, and be suited to the same use and capable of performing the same function as that specified, and stating all variations in costs pertaining to the application. No proposed substitute or equal shall be ordered or installed without the written approval of SLVWD, and it shall be understood and agreed that the decision of SLVWD in this matter shall be final and binding.

Prior to the receipt of Bids, requests for consideration of proposed substitute or equal materials or equipment shall comply with the Bidding Requirements. After receipt of Bids, if the Contractor should wish to propose a substitute or equal item for any specified by brand or trade name, within five (5) work days after issuance of the Notice of Award, he shall in writing notify SLVWD of his intent to do so and at that time submit to SLVWD an itemized list of the item or items he proposes setting forth the various manufacturers' names and such other information he has available. Unless this notification is given within the time stated, the Contractor shall provide only the items specified by brand or trade name. If notification is so given to SLVWD, within thirty-five (35) work days after issuance of the Notice of Award, the Contractor shall supply data to SLVWD to substantiate the proposed substitution or equal. SLVWD will then decide whether the proposed substitution or equal is in fact equal in quality and utility to the specified trade or brand name items. It is agreed that the decision of SLVWD in this matter shall be final.

9.4.1 Use of Approved Substitutions or Equals. The Contractor's use of approved substitutions or equals shall in no way relieve the Contractor from compliance with the Contract Documents. The Contractor shall bear all extra expense resulting from providing or using approved substitutions or equals where they affect the adjoining or related Work, including the expense of required engineering, redesigning, drafting, and permits where

necessary, whether SLVWD's approval is given before or after receipt of Bids.

The Contractor shall approve engineering costs for review and evaluation of substitutions or equals prior to the performance of the engineering work using the form titled, “Authorization of Engineering Costs for Evaluation of Substitutions and Equals”, bound herein (at the end of the General Conditions section of these Specifications). SLVWD’s Representative will not perform the submittal review until the authorization form is signed and returned by the Contractor. If the Contractor does not provide this authorization, the submittal will be rejected.

The Contractor shall approve engineering costs associated with redesign of adjoining or related Work caused by substitutions or equals prior to the performance of the engineering work using the form titled “Authorization of Engineering Costs for Redesign Due to Substitutions or Equals”, bound herein (at the end of the General Conditions section of these Specifications). SLVWD’s Representative will not perform the redesign until the authorization form is signed and returned by the Contractor. If the Contractor does not provide the required authorization, the submittal which created the need for redesign will be requested.

SLVWD, at its own discretion, will deduct the authorized costs from the Contractor’s monthly progress payment or will require direct payment of the authorized amounts by the Contractor to SLVWD’s Representative providing the evaluation and/or redesign services.

9.4.2 Unauthorized Substitutions. If substitute materials or equipment are installed without SLVWD’s approval, the Contractor shall remove the unauthorized materials or equipment and install those required by the Contract Documents at his expense.

ARTICLE 10 – SUBCONTRACTORS

10.1 Responsibility for Subcontractors. The Contractor shall be fully responsible for all acts and omissions of his Subcontractors, Sub-subcontractors, and of persons directly or indirectly employed by them and of persons for whose acts any of them may be liable to the same extent that he is responsible for the acts and omissions of persons directly employed by him. Under these Contract Documents, no Subcontractor or Sub-subcontractor will be recognized as such, and all persons and organizations engaged by the Contractor for the furnishing or installing of any part of the Work, either at the site or elsewhere, are considered as and agreed to be employees of the Contractor except with regard to insurance as provided in Article 6 and except with regard to payment as provided in Article 20. Nothing in the Contract Documents shall create any contractual relationship between any Subcontractor, Sub-subcontractor, or any person directly or indirectly employed by them, and SLVWD and the Engineer. The Contractor will be responsible for ensuring that the Subcontractor and any Sub-Subcontractor is registered with the DIR as required by Section 1725.5 of the California Labor Code.

10.2 Extent of Subcontracting. It is SLVWD's intent that the Work shall be performed and constructed by a Contractor who is staffed and equipped to construct the major portion of the Work with his own directly employed personnel and with the minimum feasible subcontracting. Subcontracting may be permitted by SLVWD to such extent as is shown to be necessary or advantageous to the Contractor without injury to the intent and interest of SLVWD.

10.3 Subcontractual Relations. All Work, performed for the Contractor by a Subcontractor shall be pursuant to an appropriate agreement between the Contractor (and where appropriate between Subcontractor and Sub-contractor) which shall contain provisions that: (a) protect and preserve the rights of SLVWD and the Engineer with respect to the Work to be performed under the subcontract so that the Subcontracting thereof will not prejudice such rights; (b) require that such Work be performed in accordance with the requirements of the Contract Documents; (c) require under each subcontract to which the Contractor is a party the submission to the Contractor of applications for payment and claims for additional costs, extension of time, damages for delay or otherwise with respect to the subcontracted portions of the Work (via any Subcontractor or Sub-subcontractor where appropriate) in sufficient time that the Contractor may apply for payment in accordance with Article 20 and comply in accordance with the Contract Documents for like claims by the Contractor upon SLVWD; (d) waive all rights the contracting parties may have against one another for damages caused by fire or other perils covered by the property insurance except such rights as they may have to the proceeds of such insurance held by SLVWD as trustee as provided in subparagraph 6.2.7; and (e) obligate each Subcontractor specifically to consent to the provisions of this Paragraph 10.3.

ARTICLE 11 – LAWS AND REGULATIONS

11.1 Governing Law. The Contract Documents shall be governed by the law of the place of the Project.

11.2 Compliance. The Contractor shall inform himself/herself of all laws, ordinances, codes, rules, and regulations in any manner affecting those employed on the Work, or the materials used in the Work, or in any way affecting the conduct of the Work, and of all orders and decrees of bodies or tribunals having any jurisdiction or authority over the Work. He shall at all times himself give all notices and observe and comply with, and shall require all his agents, employees, Subcontractors, and Sub-subcontractors to observe and comply with all such applicable laws, ordinances, rules, regulations, orders, and decrees in effect or which may become effective before completion and acceptance of the Work; and shall protect and indemnify SLVWD and the Engineer against any claim of liability arising from or based upon the violation of any such law, ordinance, code, rule, regulation, order, or decree, whether by himself, his employees, or his Subcontractors or Sub-subcontractors, or any other person or organization employed for or upon the Work. If the Contractor observes that any requirement of the Contract Documents is at variance with such laws, ordinances, codes, rules, regulations, orders, or decrees, he shall promptly notify SLVWD in writing and shall not proceed with any Work affected by such variance without SLVWD's written instructions or the issuance of an appropriate Modification.

11.3 Permits, Fees, and Taxes. Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for all permits, governmental fees, and licenses necessary for the execution and completion of the Work. The Contractor shall pay all sales, consumer, use, and other taxes required by law including all taxes properly assessed against his equipment or property used in connection with the Work. All such costs shall be included in the bid prices.

11.4 Provisions of Law Deemed Inserted. Each and every provision of law required by law to be inserted in the Contract Documents shall be deemed to be inserted and the Contract Documents shall be read and enforced as though it were included. If through mistake or otherwise any such provision is not inserted, or is not correctly inserted, then upon application of either party to the Contract Agreement, the Contract Documents will be physically amended to make such insertion or correction and an appropriate Modification will be issued.

11.6 Validity of Agreement. The invalidity in whole or in part of any provision of this Agreement, by operation of law or judicial decree, shall not void or affect the validity of any other provision of this Agreement.

ARTICLE 12 – SUBMITTALS

12.1.1 General. Unless otherwise specified or directed by SLVWD, the Contractor shall submit to SLVWD for his review and approval all shop drawings, samples, materials lists, equipment, date, instruction manuals, record documents, manufacturers' equipment manuals, and other submittals required by the Contract Documents and herein, or subsequently as covered by Modifications. Submittals and their contents shall be properly prepared, identified, and transmitted as provided herein or as SLVWD may otherwise direct. Except for record documents and instructional manuals for operation and maintenance, submittal shall be approved before the material or equipment covered by the submittal is delivered to the site. The progress schedule required under Paragraph 2.6 shall be coordinated to this requirement.

Pursuant to this section of the General Conditions, the Contractor shall use the Transmittal Form, included herewith (located at the end of the General Conditions section), for submittal of shop drawings to the SLVWD. The procedures governing shop drawing submittal is contained in these General Conditions. Failure to comply with all requirements specified herein will constitute grounds for return of the shop drawings for proper re-submittal. The Contractor shall sequentially number each submittal. The Contractor may, within five (5) working days of the Notice of Award, submit to the Engineer an alternate Transmittal Form for review and approval for use under this Contract. The Engineer shall have the sole right for determination of the Transmittal Form to be used, and the Contractor shall use the form designated for use by the Engineer.

12.1.1 Deviations. At the time of the submission, the Contractor shall give notice in writing in the submittal of any deviation from the requirements of the Contract Documents. The deviations shall be clearly indicated or described, including all other changes required to correlate the Work. The Contractor

shall state in writing all variation in costs occasioned by the deviations and his assumption of the cost of all related changes if the deviation is approved.

12.1.2 Schedule of Submittals. The progress schedule required under Paragraph 2.6 shall allow not less than twenty (20) working days for the review of submittals, not including the time necessary for delivery or mailing, and shall cause no delay in the Work or the work of any other contractor. Extension of the Contract Time will not be granted because of the Contractor's failure to make timely and correctly prepared and presented submittals with allowance for the checking and review periods.

12.1.3 Method of Submittal. The Contractor shall deliver submittals by means of dated, signed, and sequence numbered transmittals on the Contractor's letterhead, identifying as to initial or resubmittal status, and fully describing the submittal contents. Submittals are not acceptable directly from Subcontractors, suppliers, or manufacturers. In each transmittal the Contractor shall state the Drawing numbers and Specification Sections, Articles, and paragraphs to which the submittal pertains; accompanying data sheets, catalogs, and brochures shall be identified in the same manner, and where several types or models are contained, the Contractor shall delete non-applicable portions or specifically indicate which portions are intended and applicable.

12.1.4 Contractor’s Review and Approval. Every submittal of shop drawings, samples, materials lists, equipment data, instruction manuals, and other submittals upon which the proper execution of the Work is dependent shall bear the Contractor's review and approval stamp certifying that the Contractor (a) has reviewed, checked, and approved the submittal and has coordinated the contents with the requirements of the Work and the Contract Documents including related Work, (b) has determined and verified all quantities, field measurements, field construction criteria, materials, equipment, catalog numbers, and similar data, or will do so, and (c) states the Work covered by the submittal is recommended by the Contractor and the Contractor's guarantee will fully apply thereto. The Contractor's stamp shall be dated and signed by the Contractor in every case. It is expected that the Contractor will prepare his submittals in such a manner that he is able to obtain a submittal approval by the second submission. SLVWD reserves the right to deduct moneys from the amounts due to Contractor to cover the cost of the Engineer's review time beyond the second submission.

12.1.5 Corrections and Resubmittals. The Contractor shall make all required corrections and shall resubmit the required number of corrected submittals until approved. The Contractor shall direct specific attention in writing to revisions other than the corrections called for on previous submittals, and shall state in writing all variations in costs and his assumption of the cost of related changes the same as is required for deviations in subparagraph 12.1.1. Identify each resubmittal with number of the original submittal followed by consecutive letters starting with "A" for first resubmittal, "B" for second resubmittal, etc.

12.1.6 Check of Returned Submittals. The Contractor shall check submittals returned to him for correction and ascertain if the corrections result in extra cost to him above that included under the Contract Documents, and shall

give written notice to SLVWD within five (5) work days if, in his opinion, such extra cost results from corrections. By failing to so notify SLVWD or by starting any Work covered by a submittal, the Contractor waives all claims for extra costs resulting from required corrections.

12.1.7 Review and Approval. Submittals will be reviewed with reasonable promptness, but only for conformance with the design concept of the Project and with the information given in the Contract Documents. The approval of a separate item as such will not indicate approval of the assembly in which the item functions. The approval of submittals shall not relieve the Contractor of responsibility for any deviation from the requirements of the Contract Documents or for any revision in resubmittals unless the Contractor has given notice in writing of the deviation or revision at the time of submission or resubmission and written approval has been given to the specific deviation or revision, nor shall any approval relieve the Contractor of responsibility for errors or omissions in the submittals or for the accuracy of dimensions and quantities, the adequacy of connections, and the proper and acceptable fitting, execution, and completion of the Work.

12.1.8 Incomplete Submittals, including those not correctly transmitted, not correctly titled and identified, or not bearing the Contractor's review and approval stamp, will be returned to the Contractor without review.

12.1.9 Conformance. No Work represented by required submittals shall be purchased or commenced until the applicable submittal has been approved. Work shall conform to the approved submittals and all other requirements of the Contract Documents unless subsequently revised by an appropriate Modification, in which case the Contractor shall prepare and submit revised submittals as may be required. The Contractor shall not proceed with any related Work which may be affected by the Work covered under submittals until the applicable submittals have been approved, particularly where piping, machinery, and equipment and the required arrangements and clearances are involved.

12.1.10 Interrelated Submittals. Except where the preparation of a submittal is dependent upon the approval of a prior submittal, all submittals pertaining to the same class or portion of the Work shall be submitted simultaneously.

12.2 Shop Drawings. Each submittal shall be complete with respect to dimensions, design criteria, materials, connections, bases, foundations, anchors, and the like, and shall be accompanied by technical and performance data as necessary to fully illustrate the information in the shop drawings. Unless otherwise specified, each submittal shall include one set of reproducible digital copies.

12.3 Samples. Unless otherwise specified, each submittal shall include two (2) sets of samples. One set of approved samples and all disapproved samples will be returned to the Contractor. Samples of value retained by SLVWD will be returned to the Contractor after completion of the Work if the Contractor's first transmittal for the sample requests its return. Approved samples of manufactured items returned to the Contractor may be installed in the Work

if the location is recorded and the samples bear temporary identification as such.

12.4 Materials Furnished Under Standard Specifications. For materials specified by reference to standard or reference specifications, the Contractor shall prepare and submit for approval a list of such materials by manufacturer's names and identifications to the extent requested by SLVWD.

12.5 Material Lists. For each item listed, the Contractor shall include the manufacturer's name and address, trade or brand name, local supplier's name and address, catalog numbers and cuts, brochures, terms and conditions of manufacturer's guarantee and warranty, other information to fully describe the item, and supplementary information as may be required for approval. Cuts, brochures, and data shall be marked to indicate the items proposed and the intended use.

12.6 Equipment Data. The Contractor shall submit complete technical and catalog data for every item of mechanical and electrical equipment and machinery to be incorporated in the Work, including components. Submittal copies shall be bound, indexed, and contain information as required in Paragraph 12.5 for submittal of materials lists and shall further include specific information on performance and operating curves and data, ratings, capacities, characteristics, efficiencies, and other data to fully illustrate and describe the items as may be specified or required for approval. Data shall be submitted in sets covering complete systems or functioning units.

12.7 Instruction Manuals. The Contractor shall obtain data from the various manufacturers and submit instruction manuals covering all mechanical equipment and machinery installed in the Work.

12.7.1 Contents. Each manual shall have an index listing the contents. Information in the manuals shall include not less than (a) general, introduction and overall equipment description, purpose, functions, and simplified theory of operation, (b) specifications, installation instructions, procedures, sequences, and precautions, including tolerances for level, horizontal, and vertical alignment, (d) grouting requirements including grout spaces and materials, (e) list showing lubricants for each item of mechanical equipment, approximate quantities needed per year, and recommended lubrication intervals; where possible, types of lubricants shall be consolidated with equipment manufacturers' approval to minimize the number of different lubricants required for plant maintenance, (f) startup and beginning operation procedures, (g) operational procedures, (h) shut down procedures, (I) short and long term inactivation procedures, (j) maintenance, calibration, and repair instruction, (k) parts lists and spare parts recommendations, (1) lists of all special tools, instruments, accessories, and special lifting and handling devices required for periodic maintenance, repair, adjustment, and calibration, and (m) other information as may be specified or required for approval.

12.7.2 Format and Organization.

a. Use drawings and pictorials to illustrate the printed text as necessary to fully present the information.

b. Where information covers a family of similar items of equipment, identify the applicable portions by heavy weighted arrows, boxes or circles, or strike-out the inapplicable information. Non-conforming data are not acceptable and will be returned for rework and resubmittal.

c. Contractor shall incorporate into books all Manufacturers' Equipment Manuals including those specified in pertinent Sections of the Specifications. These books shall be organized by Equipment Class in same manner and sequence as the Specifications, i.e. Mechanical, Electrical, Instrumentation, etc. Book size and quantity shall be sufficient for inclusion of all data, and be of type and quality hereinafter specified in Article 12.7.3.

d. Within each book of manuals, provide a Table of Contents for that book. If more than one book is necessary for a Class of Equipment, place a complete Table of Contents for that Class of Equipment within each book of that Class.

e. In addition, an overall Index of Contents shall be prepared in ten (10) sets and submitted separately to SLVWD for his insertion in his Operation and Maintenance Manuals.

f. When a manufacturer's manual exceeds one (1) inch in thickness and is bound as specified in Article 12.7.3 it need not be rebound within another book, but the Overall Index shall refer to it by title and indicate that it is bound separately.

12.7.3 Manual Binding.

a. Bind all boocks in sturdy hard covers fastened to provide full view of contents on each page, and ease of making content additions or replacements. No book shall be more than four (4) inches thick. Manuals less than one (1) inch thick shall be bound in substantial three-ring loose leaf binders; others shall have covers secured by operable locking-bars to permit full view opening with contents bound by hinged interfacing pairs of three-ring binding posts, Model S70468-12 by McBee, Springfield, MO., or Model 745483 by Inter-City, St. Louis, Mo., or equal.

b. Permanently label face of cover and bound edge of each book "MANUFACTURERS' INSTRUCTION MANUAL," and indicate Class of Equipment, i.e., Mechanical, Electrical, Instrumentation, etc. or name specific equipment if a single unit is contained. Where more than one book is needed for a Class of Equipment or a single specific equipment unit, number books consecutively BOOK I, BOOK II, etc.

c. If more than one Class of Equipment is contained in a book, separate each class with a tabbed stiff divider insert page.

d. Prior to purchase or delivery, submit samples of each intended type of binder and obtain approval from SLVWD.

12.7.4 Manual Submittals. Submittals shall include two (2) copies of each manual, one of which will be returned to the Contractor marked to show the required

corrections or approval. When approved, the Contractor shall deliver ten (10) copies to SLVWD unless otherwise specified.

12.8. Manufacturers' Instructions. In addition to the instructions submitted under Paragraph 12.7, the Contractor shall submit manufacturers' instructions to the extent specified or requested by SLVWD for his determination of their adequacy and approval. When approved, the Contractor shall distribute copies to all those involved with the instructions.

12.9 Tools, Accessories, Spare Parts, and Maintenance Materials. The Contractor shall furnish and deliver all special tools, instruments, accessories, spare parts, and maintenance materials required by the Contract Documents, and shall furnish and deliver the special tools, instruments, accessories, and special lifting and handling devices shown in the instruction manuals approved under Paragraph 12.7. Unless otherwise specified or directed by SLVWD, the items shall be delivered to SLVWD, with the Contractor's written transmittal accompanying each shipment, in the manufacturers' original containers labeled to describe the contents and the equipment for which it is furnished. The Contractor shall deliver a copy of each transmittal to the Engineer for record purposes.

12.10 Continuance of Operations. The Contractor shall arrange and schedule the Work in such manner as to ensure that all existing utility treatment or disposal operations and facilities are maintained in operation and in no way disrupted or disabled as a result of the Work. The Contractor shall submit for approval a written plan and description of the proposed schedule, methods, and facilities to be employed in conforming to this requirement.

12.11 Record Drawings and Specifications. The Contractor shall maintain one record copy of all Drawings, Specifications, Addenda, Modifications, approved submittals, correspondence, and transmittals at the site in good order and readily available to SLVWD, the Engineer, and the Inspector. The Record Drawings shall be clearly and correctly marked and the Record Specifications annotated by the Contractor to show all changes made during the construction process at the time the changed Work is installed. No such changes shall be made in the Work unless previously authorized by a Modification or by specific approval of deviations or revisions in submittals.

12.11.1 Buried and Concealed Work. The Contractor shall record the precise location of all piping, conduits, ducts, cables, and like Work that is buried, embedded in concrete or masonry, or concealed in wood or metal framed walls and structures at the time such Work is installed and prior to concealment. Each feature of the concealed Work, such as the beginning and end of straight runs, radius center point of curved runs, angles, connections, plugged tees or other fittings for future connections, and like items shall be accurately located by not less than two dimensions to permanent structures. The depth below finish grade, slab, or paving shall be noted for buried pipe, conduit, or ducts at the beginning and end of straight grade runs and at all grade change points, excepting sewer or drain lines run between manholes. Should the Contractor fail to record such buried or concealed Work, he shall uncover the unrecorded Work to the extent required by SLVWD and shall satisfactorily restore and reconstruct the removed Work with no change in the Contract Price or the Contract Time.

12.11.2 Delivery. Upon completion and prior to final inspection of the Work, the Contractor shall submit the Record Drawings and Specifications to SLVWD for review, and shall make such revisions or corrections as may be necessary for them to be a true, complete, and accurate record of the Work in the opinion of SLVWD. When approved, the Contractor shall deliver the Record Drawings and Specifications to SLVWD.

12.12 Revision of Submittals. Whenever a Modification causes a change to the information contained in previously approved submittals, the Contractor shall submit information and data corresponding to the changed requirements for approval. After completion of the operational test required in Paragraph 17.4, the Contractor shall submit revised or additional information and data for the instruction manuals and equipment data as SLVWD may require. Revision submittals shall be submitted following the procedures required for previously approved submittals.

ARTICLE 13 – SAFETY PRECAUTIONS AND EMERGENCIES

13.1 Contractor's Responsibility for Safety. The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. This requirement will apply continuously twenty-four (24) hours a day every day until final acceptance of the Work and shall not be limited to normal working hours. The duties of SLVWD, Engineer and Inspector do not include review of the adequacy of the Contractor's safety measures in, on, or about the site and vicinity.

13.2 Safety Officer. The Contractor shall designate a responsible member of his organization at the site whose duty shall be the prevention of hazards and accidents. This person shall be the Contractor's Superintendent unless otherwise designated in writing by the Contractor to SLVWD.

13.3 Safety Measures. The Contractor shall comply with all laws, ordinances, codes, rules, regulations and lawful orders of any public authority having jurisdiction for the safety of persons or property or to protect them from damage, injury or loss. The Contractor shall comply with the "Manual of Accident Prevention in Construction" published by the Associated General Contractors of America, Inc., including the recommendations for safe construction methods and the requirements for the guarding of machinery and equipment therein, to the extent that the provisions of the manual are not in conflict with applicable laws, ordinances, rules, regulations, and orders. The Contractor shall maintain copies of all documents mentioned or referenced in this paragraph readily available at the site until the Work is completed.

13.4 Warnings and Barricades. The Contractor shall provide and maintain barricades, guards, temporary bridges and walkways, watchmen, night lights and danger signals illuminated from sunset to sunrise, and all other necessary appliances and safeguards to protect the Work, life, property, the public, excavations, equipment, and materials. Barricades shall be of substantial construction and shall be painted such as to increase their visibility at night. Suitable warning signs shall be so placed and illuminated at night as to show in advance where construction, barricades, or detours exist. Guard rails shall be provided for bridges and walkways over or

adjoining excavations, shafts, and other openings and locations where injury may occur.

13.5 Fire Prevention. The Contractor's Safety Officer shall inspect the entire Work and site, including storage areas, at frequent intervals to verify that fire prevention measures are constantly enforced.

13.5.1 Fire Extinguishers and Hoses. The Contractor shall furnish and maintain fully charged fire extinguishers of the appropriate type, supplements with temporary fire hoses wherever an adequate water supply exists, at the places where burning, welding, or other operations that may cause a fire are being performed.

13.5.2 Flammable or Toxic Materials. Only a working supply of flammable or toxic materials shall be permitted in or on any of the permanent structures and improvements, and shall be removed therefrom at the end of each day's operations. The Contractor shall store flammable or toxic materials and waste separate from the Work and stored materials for the Work in a manner that prevents spontaneous combustion or dispersion, and none shall be placed in any sewer or drain piping nor buried on SLVWD's property.

13.6 Safety Helmets, Clothing, and Equipment. The Contractor shall not permit any person for whom he is responsible or liable to enter or remain on the site of the Work unless the person is equipped with and wearing a safety helmet and other protective clothing and safety equipment conforming to the requirements of Paragraph 13.3, and shall discharge from the site all persons not so equipped. The Contractor shall post conspicuous signs at appropriate locations warning the public and persons engaged upon the Work of this requirement. The Contractor shall furnish for their temporary use such safety helmets, protective clothing, and safety equipment as SLVWD, the Engineer, or their representatives may request of him.

13.7 Hazardous Areas. The Contractor shall not permit or allow any person or persons to enter any pipe or space containing hazardous or noxious substances person for whom he is responsible or liable to enter or remain on the site of the Work unless the person is equipped with and wearing a safety helmet and other protective clothing and safety equipment conforming to the requirements of Paragraph 13.3, and shall discharge from the site all persons not so equipped. The Contractor shall post conspicuous signs at appropriate locations warning the public and persons engaged upon the Work of this requirement. The Contractor shall furnish for their temporary use such safety helmets, protective clothing, and safety equipment as SLVWD, the Engineer, or their representatives may request of him.

13.8 Emergencies.

13.8.1 Work During an Emergency. The Contract shall perform any and all operations and shall furnish any materials and equipment necessary during an emergency endangering life or property and, in all cases, shall notify SLVWD of the emergency as soon as practicable, but shall not wait for instruction before proceeding to properly protect both life and property. Any additional compensation or extension of Contract Time claimed by the Con-

tractor on account of an emergency shall be applied for as provided in Paragraph 16.4.

13.8.2 Representatives for Emergencies. The Contractor shall file with SLVWD a written list giving the names, addresses, and telephone numbers of at least two of his representatives who can be contacted at any time in case of emergency. The representatives shall be fully authorized and equipped to correct any unsafe or inconvenient conditions on short notice. The Contractor shall promptly notify SLVWD of all changes in the listing.

ARTICLE 14 – SEPARATE CONTRACTS

14.1 Award of Separate Contracts. SLVWD reserves the right to award other contracts in connection with other portions of the Project. When separate contracts are awarded for different portions of the Project, "the Contractor" in the contract documents in each case shall be the contractor who signs each separate contract. The Contractor shall not cause any unnecessary hindrance or delay to any other contractor working on the Project. If the performance of any contract for the Project is likely to be interfered with by the simultaneous execution of some other separate contract or contracts, SLVWD will decide which contractor may proceed. SLVWD shall not be responsible for any damages suffered or extra costs incurred by the Contractor resulting directly or indirectly from the award or performance or attempted performance of any other separate contract or contracts on the Project, or caused by any decision or omission of SLVWD respecting the order of precedence in the performance of the separate contracts awarded for completion of the Project. Any costs caused by defective or ill-timed work shall be borne by the contractor responsible therefore.

14.2 Mutual Responsibility of Contractors. The Contract shall cooperate with other contractors with regard to storage of materials and execution of their work, and shall coordinate with them with respect to construction scheduling and sequence of operations, all subject to the approval of SLVWD. The Contractor shall properly connect his Work to the work of separate contractors, and shall inspect the work of other contractors affecting his Work and promptly report to SLVWD in writing any irregularities or defects in the separate contract work which renders it unsuitable for reception or connection of his Work. Failure of the Contractor to inspect and report shall constitute an acceptance of the other contractor's work as fit and proper to receive his Work, except as to defects which may develop in the other separate contractor's work after the execution of the Contractor's Work.

Each Contractor shall monitor the schedule and progress of each other Contractor whose work affects his own work, and shall be responsible for giving timely notice to SLVWD of potential problems of interface so that SLVWD can mitigate the issue.

14.3 Cutting and Patching Under Separate Contracts. The Contractor shall be responsible for any cutting, fitting, and patching that may be required to complete his Work except as otherwise specifically provided in the Contract Documents. The Contractor shall not endanger any work of any other contractor by cutting, excavating, or otherwise altering any work and shall

not cut or alter the work of any other contractor except with the written consent of SLVWD.

14.4 Claims Between Separate Contractors. Should the Contractor cause damage to the work or property of any separate contractor on the Project, the Contractor shall, upon due notice, settle with such other contractor by agreement or arbitration, if he will so settle. If such separate contractor sues SLVWD or initiates an arbitration proceeding on account of any damage alleged to have been so sustained, SLVWD will notify the Contractor who shall defend such proceedings at the Contractor's expense, and if any judgment or award against SLVWD arises therefrom, the Contractor shall pay or satisfy it and shall, as provided in Paragraph 20.12, pay SLVWD for all attorneys' fees, court or arbitration costs, and additional administrative, professional, consultant, inspection, testing, and other service costs which SLVWD has incurred.

ARTICLE 15 – SLVWD'S AND ENGINEER'S STATUS DURING CONSTRUCTION

15.1 Authority of SLVWD. SLVWD shall have the authority to enforce compliance with the Contract Documents. On all questions relating to quantities, the acceptability of materials, equipment, or Work, the adequacy of the performance of the Work, and the interpretation of the Drawings and Specifications, the decision of SLVWD is final and binding and shall be precedent to any payment under the Contract Agreement unless otherwise provided in the Contract Documents. SLVWD shall have the authority to stop the Work or any part thereof as may be necessary to ensure the proper execution of the Work, to disapprove of or reject Work which is defective, to require the uncovering and inspection or testing of Work as provided in Paragraph 17.5, to require re-examination of Work as provided in Paragraph 18.4, to issue interpretations and clarifications as provided in Paragraph 3.2, to order minor changes or alterations in the Work as provided in Paragraph 16.6, and other authority as provided elsewhere in the Contract Documents. SLVWD shall not be liable for the results of any ruling, interpretation, or decision rendered or request, demand, instruction, or order issued by him in good faith. The Contractor shall promptly comply with request, demands, instructions, and orders from SLVWD.

15.2 Engineer's Observation of the Work. The Engineer will make periodic observations of the progress and quality of the executed Work and will determine, in general, if the Work is proceeding in accordance with the Contract Documents. The Engineer will not be required to make exhaustive or continuous observations to check the quality or quantity of the Work. Neither observations by the Engineer nor inspections, tests, or approvals by persons other than the Contractor shall relieve the Contractor from his obligations to perform and construct the Work in accordance with the requirements of the Contract Documents. SLVWD will inform the Contractor in writing of other duties of the Engineer under the Contract Documents, if any.

15.3 Limitations On Responsibility. SLVWD and the Engineer will not be responsible for construction means, methods, techniques, procedures, sequences, or the safety precautions and programs incident thereto, or for the acts or omissions of the Contractor or any Subcontractor,

Sub-subcontractor, or any of their agents or employees, or any other persons performing any of the Work, or for the Contractor's failure to perform and construct the Work in accordance with the Contract Documents. Neither the Engineer's authority to act under the Contract Documents nor any decision made by him in good faith either to exercise or not exercise such authority shall give rise to any duty or responsibility of the Engineer to the Contractor, any Subcontractor or Sub-subcontractor, any of their agents or employees, or any other person performing any of the Work, nor shall anything in the Contract Documents create any contractual relationship between any of them and the Engineer.

15.4 Protests. If the Contractor considers any Work requested or ordered of him to be outside the requirements of the Contract Documents, or considers any request, demand, instruction, order, ruling, or decision of SLVWD to be unfair, he shall, within ten (10) work days after any such request, demand, instruction, order, ruling, or decision is made or given, file a written protest with SLVWD stating clearly and in detail his objections and the reasons therefore. Except for written protests as are made of record in the manner and within the time stated herein, the Contractor shall be deemed to have waived and does hereby waive all grounds for protests or objections to such requests, demands, instructions, orders, rulings, or decisions. SLVWD will issue a written decision regarding each protest so filed with reasonable promptness.

ARTICLE 16 – CHANGES IN THE WORK

16.1 Change Orders. Without invalidating the Contract Agreement and without notice to sureties or insurers, SLVWD may, at any time, order additions, deletions, or revisions in the Work; these will be authorized by Change Order. The Contractor shall comply promptly with the requirements of all executed Change Orders. The Work involved in Change Orders shall be executed under the applicable conditions and requirements of the Contract Documents. If any Change Order causes an increase or decrease in the Contract Price or an extension or shortening of the Contract Time, an equitable adjustment will be made and included in the Change Order. Additional or extra Work performed by the Contractor without authorization of a Change Order will not entitle the Contractor to an increase in the Contract Price or an extension of the Contract Time, except as provided in subparagraph 13.8.1 for emergencies and in Paragraph 18.4 for the re-examination of Work.

16.2 Valuation of Change Orders. When required by SLVWD, the Contractor shall submit in the form prescribed by SLVWD an itemized cost breakdown with supporting data of the quantities and prices used by him in computing the value of any change that may be ordered. The cost or credit to SLVWD resulting from a change in the Work will be determined by one or more of the following methods: (a) by an acceptable lump sum proposal from the Contractor, (b) by unit prices accepted by SLVWD and stated in the Contract Documents or unit prices subsequently fixed by agreement between the parties, (c) by cost and a mutually acceptable fixed amount for overhead and profit, or (d) by force account when directed in writing and administered by SLVWD. Under the methods described in (c) and (d), the Contractor shall maintain an accurate written daily direct cost record pertaining to such

ordered Work in the form and detail acceptable to SLVWD. The Contractor shall certify each daily record to be true and correct, and shall furnish copies to SLVWD as the ordered Work progresses. The direct costs so recorded shall include only the labor cost for workmen and foremen (payroll taxes and assessments, fringe benefits, employer's contributions, workers' compensation coverage, withholdings required by law, and other verified direct labor costs included), the cost of materials and equipment delivered and installed in such Work as substantiated by appropriate documents, the cost of construction machinery and equipment based on fair rental values acceptable to SLVWD, and the cost of incidentals directly related to such Work. The direct costs shall not include any labor or office costs pertaining to the Contractor, his superintendents, his office staff and office facilities, or anyone not directly employed on such Work, nor the premium costs for bonds or insurance other than workers' compensation insurance, nor the cost or rental of small tools as all such indirect costs form a part of the Contractor's overhead expense. Under the method described in (d), the maximum percentage which will be allowed for the Contractor's combined overhead and profit will be: (1) for all such Work done by his own organization, the Contractor may add up to ten (10) percent of his actual net increase in cost, and two (2) percent for all such Work done by Subcontractors, each Subcontractor may add up to ten (10) percent of his actual net increase in costs for combined overhead and profit and the Contractor may add up to five (5) percent of the Subcontractor's total for his combined overhead and profit. The amount of credit to be allowed by the Contractor to SLVWD for any such change which results in a net decrease in cost will be the amount of the actual net decrease as determined by SLVWD taking into consideration adjustments for overhead and profit as determined herein, plus deductions for combined overhead and profit as computed in (1) and (2) above. When both additions and credits are involved in any one change, the combined overhead and profit shall be figured on the basis of the net difference.

16.3 Notice to Sureties. The Contractor shall notify his sureties and the carriers of the insurance furnished and maintained by him of any changes affecting the general scope of the Work or change in the Contract Price, and the amount of the applicable Bonds and the coverage of the insurance shall be adjusted accordingly. The Contractor shall furnish proof of such adjustments to SLVWD.

16.4 Contractor's Claims. If the Contractor wishes to make a claim for a change in the Contract Price or the Contract Time, the Contractor shall give SLVWD written notice thereof within ten (10) work days after the occurrence of the event giving rise to such claim. This notice shall be given by the Contractor before proceeding to execute the Work covered by the claim except in an emergency endangering life or property. No such claim shall be valid unless so made. Any change in the Contract Price or the Contract Time resulting from a claim that is approved by SLVWD will be authorized by Change Order.

16.5 Adjustment of Unit Prices. If unit prices are stated in the Contract Documents or subsequently agreed upon, and if the quantities originally contemplated are so changed (by 30% or greater quantity change) in a proposed Change Order such that application of the agreed unit prices to

the quantities of Work proposed will create a hardship on SLVWD or the Contractor, the applicable unit prices will be equitably adjusted to prevent such hardship by negotiation or by force account.

16.6 Minor Changes. SLVWD may issue written Field Orders or other written orders that authorize minor changes or alterations in the Work consistent with the overall intent of the Contract Documents that do not involve an adjustment in the Contract Price or an extension of the Contract Time. Such orders shall be binding on the Contractor and he shall carry out such orders promptly. If the Contractor believes any minor change or alteration ordered by SLVWD entitles him to an increase in the Contract Price or an extension of the Contract Time, he may make a claim therefore as provided in Paragraph 16.4.

16.7 Information Revisions Caused by Change Orders. As provided in Paragraph 12.12, whenever a Change Order or other Modification causes a change in the information contained in previously approved submittals, the Contractor shall include in the itemized breakdown required of him under Paragraph 16.2 all costs for preparing and submitting revised information and submittals corresponding to the changed requirements. If the Change Order or other Modification causes no change in such information or submittals, the Contractor shall so certify in writing in his itemized breakdown.

16.8 Change Order Procedure. The following procedure will be followed in issuing a change order.

16.8.1 The Inspector identifies the need for a change in plans.

16.8.2 The Inspector discusses the required change with the Engineer and Contractor.

16.8.3 The Engineer prepares a detailed description of the Work required, including any additional drawings, and prepares a change order in the required format.

16.8.4 The change order is provided to the Contractor for his review and negotiation of the price for the change.

16.8.5 The Engineer and Contractor agree on the Work to be performed and price for doing the Work. Each signs the change order, indicating that both agree as to the terms of performing the required change.

16.8.6 The Engineer submits the change order to the SLVWD through the designated SLVWD Representative.

16.8.7 If the SLVWD Staff concurs with the change order, it is submitted to the General Manager for approval and signature if the change order involves a change in a price that is within the General Manager's approval authority. If the change order involves a change in price that is greater than the General Manager's approval authority, it will be submitted to the Board of Directors for approval. If the Board of Directors approves, the General Manager signs the change order, authorizing the change to be implemented.

16.9 Field Order Procedure. The following procedure will be followed in issuing a field order.

16.9.1 Inspector identifies the need for a field order change.

16.9.2 The Inspector discusses the required change with the Engineer and Contractor.

16.9.3 The Inspector prepares a detailed written description of the minor changes or alterations in the work.

16.9.4 The Contractor reviews field order.

16.9.5 The Inspector and Contractor agree on field order work to be performed. Each signs the field order, indicating that both agree as to the terms of performing the required changes.

16.9.6 General Manager signs the field order authorizing the change to be implemented.

ARTICLE 17 – ACCESS, INSPECTIONS, AND TESTS

17.1 Access to the Work and Records. SLVWD, the Engineer, the Inspector, and the representatives of any Federal, State, or other public body or authority having jurisdiction of the Project shall have, at all times and for any purpose, immediate access to the Work and the premises used by the Contractor for the Work and shall have access to the places where materials or equipment are being fabricated, manufactured, or produced for the Work. To the extent requested by SLVWD, the Contractor shall furnish access to the purchase orders and records, invoices, bills of lading, payroll records, and other documents and records pertaining to the Work, or shall furnish certified true copies thereof at his expense.

17.2 Inspection. SLVWD will furnish inspection of the Work at no cost to the Contractor except as provided in Paragraphs 4.3, 14.4, 17.5, 17.6, 18.1, and 21.2, and except for inspections required to be furnished and paid for by the Contractor elsewhere in the Contract Documents. All Work shall be performed and constructed under the inspection of the Inspector unless waived in writing by SLVWD in each case or exempted wholly or in part from inspection elsewhere in the Contract Documents. Any Work requiring such inspection that is performed or constructed in the absence of the Inspector shall be considered defective and is subject to rejection. The Contractor shall give written notice to SLVWD at least five (5) work days in advance of the performance of any part of the Work requiring special inspection by someone other than the Inspector and shall state the probable duration of the required special inspection. Inspection of any material or equipment at the factory or shop will not constitute an acceptance. The Inspector is authorized to suspend any part or all of the Work, by notice to the Contractor confirmed in writing, when a question arises as to whether the materials or equipment being installed or the methods or workmanship being used comply with the Contract Documents until such question is decided by SLVWD. The Inspector is not authorized to accept or reject any Work, to modify or change any requirement of the Contract Documents, to advise or instruct the Contractor or his employees as to the prosecution of the Work,

to perform any duty or service for the Contractor, or relieve the Contractor of the obligation to fulfill any conditions and requirements of the Contract Documents.

17.3 Testing. All Work, materials, and equipment to be performed and constructed by the Contractor are subject to testing for compliance with the Contract Documents and shall be tested when required by the Contract Documents. The Contractor shall give SLVWD timely written notice of the dates and times that testing is to be performed at the site or the place of manufacture or fabrication. All tests are subject to the observation of the Engineer and approval of SLVWD and shall be performed as directed by SLVWD unless otherwise provided in the Contract Documents. Materials or equipment required to be tested prior to installation shall not be installed until SLVWD has approved the test results and the tested material or equipment in writing. Under these Contract Documents, the Contractor shall employ the services and pay the costs of tests performed by a testing laboratory or agency for field slump tests, concrete strength, optimum moisture, soil compaction tests, and painting/crating in the field and at the shop. The Contractor shall bear all other testing costs. The Contractor shall pay SLVWD, in accordance with Paragraph 20.12, any cost SLVWD incurs for test where the tested material or equipment fails the test and for retesting caused by failure disclosed in previous tests.

17.3.1 Contractor's Testing Agency. If materials or equipment are required to be tested by a testing laboratory or agency employed by the Contractor, the testing laboratory or agency shall be satisfactory to and approved by SLVWD. The Contractor shall deliver five (5) certified copies of each test report to SLVWD unless otherwise specified.

17.3.2 Test Samples. The Contractor, at his expense, shall furnish samples of materials to be tested in sufficient time before use to allow for testing and to cause no delay in the Work.

17.3.3 Test Costs. The Contractor shall bear all testing costs unless otherwise provided in the Contract Documents.

17.4 Operational Tests. After the Work is completed and as one of the precedents to final inspection, the Contractor shall perform operational tests as required by the Contract Documents and as required to demonstrate to SLVWD the correct and proper operation of the various facilities forming a part of the Work including but not limited to the correct sequences of operation and the satisfactory performance of all components. The Contractor shall repair, replace, adjust, or otherwise correct the improper operation of any system or component and all faulty or defective Work as SLVWD may require for his approval. Based upon the operational tests results, the Contractor shall prepare and submit revised or additional information and data for the previously approved submittals as required by SLVWD and as provided in Paragraph 12.12. Each operational test shall be performed continuously for not less than 168 hours (7 days).

17.5 Uncovering the Work. Any Work that is covered by the Contractor before required inspections or tests are performed or approvals are given shall be uncovered by the Contractor to the extent directed by SLVWD, and the Contractor shall bear all the expense for uncovering, exposure, inspection, testing, and of satisfactory reconstruction.

17.6 Inspections, Tests, and Approvals Required By Others. If the laws, ordinances, rules, regulations, or orders of any public body or authority having jurisdiction require any Work to be specifically inspected, tested, or approved by someone other than the Contractor, SLVWD, the Engineer, or the Inspector, the Contractor shall give all required notices and make all required arrangements therefore, and shall deliver to SLVWD certificates of inspection, testing, or approval issued by the applicable public bodies or authorities having jurisdiction. The cost of all such inspections, tests, and approvals shall be borne by the Contractor unless otherwise provided in the Contract Documents.

17.7 Soil Compaction Testing. The Contractor shall employ the services and pay the costs of tests performed by a testing laboratory for optimum moisture and soil compaction tests in the field.

ARTICLE 18 – DEFECTIVE WORK

18.1 Correction of Defective Work. All Work, material, or equipment that is unsatisfactory, faulty, incomplete, or does not conform to the Contract Documents, or does not meet the requirements of any inspection, test, or approval is defective. If the Work or any part thereof is found to be defective, whether or not manufactured, fabricated, installed, completed, or overlooked and accepted by SLVWD, the Contractor shall, promptly and in accordance with the written instructions of SLVWD and within the reasonable time limits stated therein, either correct such defective Work or, if it has been rejected by SLVWD, remove it from the site and replace it with non-defective and conforming Work. The Contractor shall bear all costs for the correction or removal and replacement of defective Work and all additional direct and indirect costs SLVWD may incur on account of defective Work including the costs of additional administrative, professional, consultant, inspection, testing, and other services. If such additional costs are incurred by SLVWD prior to the making of final payment, a Change Order will be issued to effect a reduction in the Contract Price in the amount of SLVWD's additional costs; otherwise, the Contractor shall pay the amount to SLVWD in accordance with Paragraph 20.12. The Contractor shall also bear all costs of making good all Work and the work and property of separate contractors, SLVWD, and others that is destroyed or damaged by his correction or removal and replacement of his defective Work.

18.2 SLVWD's Right to Correct Defective Work. If the Contractor fails to correct or remove and replace defective Work in accordance with the requirements of Paragraph 18.1, SLVWD may correct or remove and replace it without prejudice to any other remedy SLVWD may have, and SLVWD may store the removed materials or equipment at the expense of the Contractor. If the Contractor does not pay the cost of such removal and storage within ten (10) days thereafter, SLVWD may upon ten (10) additional days' written notice sell such removed Work at auction or private sale and shall account for the net proceeds or deficit thereof, after deducting all expenses SLVWD may incur from such removal, storage, or sale. If SLVWD corrects or removes and replaces defective Work prior to the making of final payment, one or more Change Orders will be issued to effect appropriate reductions in the Contract Price for all costs and expenses incurred by SLVWD in the correction or removal and replacement of defective Work, adjusted to account for the net proceeds or deficit of said auction or sale, if any, and all

additional costs SLVWD may incur on account of defective Work as provided in Paragraph 18.1; otherwise, the Contractor shall pay to SLVWD the amount of all such costs and expenses incurred by SLVWD adjusted to account for the net proceeds or deficit of said auction or sale, if any, in accordance with Paragraph 20.12.

18.3 SLVWD's Right to Accept Defective Work. SLVWD may accept defective Work instead of requiring its correction or removal and replacement. In such case, if acceptance occurs prior to the making of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents, including appropriate reduction in the Contract Price covering the value of such accepted defective Work and the additional costs SLVWD may incur on account of such defective Work as provided in Paragraph 18.1; or, if the acceptance occurs after the making of final payment, the amount that would have been the reduction in the Contract Price prior to the making of the final payment shall be paid by the Contractor to SLVWD in accordance with Paragraph 20.12.

18.4 Re-Examination of Work. If SLVWD, at any time prior to the final acceptance of the Work, orders reexamination of Work completed, including the uncovering, removing, exposing, dismantling, inspecting, or testing of Work covered by such order, the Contractor shall promptly comply with the order. If the Work so re-examined is defective, the Contractor shall correct or remove and replace it with nondefective and conforming Work in accordance with all the provisions of Paragraph 18.1 and also shall bear the cost of the satisfactory reconstruction of the Work. If the Work so re-examined is not defective or if any defective or deficient condition discovered was caused by a separate Contractor employed on the Project, the Contractor shall satisfactorily reconstruct the Work as ordered by SLVWD and, if claim is made as provided in Paragraph 16.4, a Change Order will be issued to compensate the Contractor for his Work under such order, valuated as provided in Paragraph 16.2, and to effect an appropriate adjustment of the Contract Time.

ARTICLE 19 – GUARANTEES AND WARRANTIES

19.1 Contractor's Guarantee. The Contractor shall warrant and guarantee the entire Work and all parts thereof, including that performed and constructed by Subcontractors, Sub-subcontractors, and others employed directly or indirectly on and for the Work, against faulty or defective materials, equipment, or workmanship for a period of one (1) year from the date of SLVWD's written final acceptance of the Work or such longer period of time as may be prescribed by law or by the terms of any special guarantee or warranty required by the Contract Documents.

19.2 Bonds and Insurance. The performance bond and the public liability and property damage insurance required of the Contractor in Article 6 shall remain in full force and effect for the entire time of the Contractor's guarantee.

19.3 Corrections During Guarantee Period. The Contractor's correction of defective Work during the guarantee period shall be in accordance with all the provisions of Paragraph 18.1 or SLVWD may correct or accept it as provided in Paragraphs 18.2 and 18.3.

19.4 Guarantee of Work on Property of Others. The Contractor's guarantee shall cover and include any of the Work installed on property not owned by SLVWD, whether public or private, and shall include the repair of damage to improvements and existing conditions on such other property caused by settlement or otherwise resulting from the Contractor's operations unless the owner of such other property shall in writing release SLVWD from liability and responsibility for Work or damage therefrom on such other property.

19.5 Manufacturer's Warranties. As a precedent to final inspection, the Contractor shall deliver to SLVWD all the manufacturers' warranties required by the Contract Documents, with SLVWD named as beneficiary. In addition, for all equipment and machinery bearing a manufacturer's warranty that extends for a longer period of time than the Contractor's guarantee, the Contractor shall secure and deliver the warranties to SLVWD in the same manner.

ARTICLE 20 – PAYMENTS AND COMPLETION

20.1 Schedule of Values. Prior to applying for the first progress payment, the Contractor shall submit to SLVWD for approval, in the form directed by or acceptable to SLVWD, a complete schedule of the values of the various portions of the Work, including quantities and unit prices if required by SLVWD, aggregating the Contract Price (except in cases and to the extent that accepted unit prices form the basis for payment). The schedule shall subdivide the Work into component parts in sufficient detail to serve as the basis for progress payments during construction, to coordinate with the progress schedule required under Paragraph 2.6, to form the basis for possible change orders or field orders and shall be supported by such data to substantiate its correctness as SLVWD may require. Each item in the Schedule of Values shall include its proper share of overhead and profit. An unbalanced breakdown providing for overpayment to the Contractor on items of Work performed during the initial phases of the Work, such as mobilization, will not be approved. The Schedule of Values, when approved by SLVWD, shall be used only as a basis for the Contractor's applications for payment and not for additions to or deductions from the Contract Price.

20.2 Contractor's Certification. All applications for payment shall contain the Contractor's certification that all his labor for the period for which payment is claimed has been paid, including all amounts to the account of such labor lawfully required to be allocated, withheld, or set aside, and that he has assured himself and represents that all labor on the account of Subcontractors or Sub-subcontractors for which payment amounts are claimed has also been paid.

20.3 Contractor's Warranty of Title. The Contractor warrants and guarantees that title to all Work, materials, and equipment covered by an application for payment, whether incorporated in the Work or not, will have passed to SLVWD prior to the making of the application for payment, free and clear of all liens, claims, security interests or encumbrances (hereafter in these General Conditions referred to as "liens"); and that no Work, materials, or equipment covered by an application for payment will have been acquired by the Contractor or by any other person performing the Work at the site or furnishing materials and equipment for the Work, subject to an agreement under which an interest therein or encumbrance thereon is retained by the seller or otherwise imposed by the Contractor or such other person.

20.4 Progress Payments. Unless otherwise provided in the Contract Documents, at least four (4) work days before each progress payment application falls due, but not more often than once a month, the Contractor shall submit to SLVWD for review the itemized progress payment application in the form required by SLVWD, filled out and signed by the Contractor and supported by such data substantiating the Contractor's right to payment as SLVWD may require. Any progress payment application not accompanied by the revised progress schedule required of the Contractor in Paragraph 2.6 will be returned to the Contractor. Progress payments shall be made in accordance with the withholding requirements of Public Contract Code Section 9203.

Pursuant to Section 20104.50 of the California Public Contract Code, upon receipt of a payment request, SLVWD shall review such request as soon as practicable after receipt for the purpose of determining that the payment request is a proper payment request. 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) days after receipt. The returned request shall be accompanied by a document setting forth in writing the reasons why the payment request is not proper. If SLVWD fails to make any progress payment within thirty (30) days after receipt of an undisputed and properly submitted payment request, SLVWD shall pay interest to the Contractor equivalent to the legal rate set forth in subdivision (a) of Section 685.010 of the California Code of Civil Procedure. A “progress payment” includes all payments due to the Contractor, except that portion of the final payment designated by this Agreement as retention earnings. A payment request shall be considered properly executed if funds are available for payment of the payment request and payment is not delayed due to an audit inquiry by a financial officer of SLVWD.

Pursuant to Section 10262 of the California Public Contract Code and section 7108.5 of the California Business and Professions Code, the Contractor shall pay its Subcontractors, within seven (7) days of receipt of each progress payment, the respective amounts allowed the Contractor on account of the work performed by its Subcontractors, to the extent of each Subcontractor's interest therein.

20.4.1 Progress Payment for Materials and Equipment. If an application requests payment on account of imperishable materials or equipment not incorporated in the Work but delivered and suitably stored at the site, or at some other location approved by SLVWD and agreed to in writing, the application shall be accompanied by such bills of sale, data, and other procedures satisfactory to SLVWD as will establish SLVWD's title to such materials or equipment or otherwise protect SLVWD's interest including applicable liability and property insurance and transportation to the site. Payment on account of such materials or equipment will not include any amount for the Contractor's overhead or profit or relieve the Contractor of his obligation to protect and install such materials or equipment in accordance with the Contract Documents and for the restoration of damaged or defective Work.

20.4.2 Retention. SLVWD will retain a portion of the amount otherwise due the Contractor. Unless otherwise provided in the Contract Agreement or

subsequently agreed by the parties, SLVWD will retain an amount equal to five percent (5%) of the estimated value of the actual Work completed and five percent (5%) of the value of material delivered on the ground or stored subject to, or under the control of, SLVWD and unused.

20.4.3 Approval of Progress Payments. Upon receipt of an application for progress payment, the application shall be reviewed by SLVWD as soon as practicable after receipt for the purpose of determining that the payment application is a proper payment application. Any payment application determined not to be a proper payment application suitable for payment shall be returned to the Contractor as soon as practicable, but not later than seven (7) calendar days, after receipt. An application returned pursuant to this paragraph shall be accompanied by a document setting forth in writing the reasons why the payment application is not proper. SLVWD shall make any progress payment within 30 days after receipt of an undisputed and properly submitted payment request from the Contractor. The number of days available to SLVWD to make a payment without incurring interest equivalent to the legal rate set forth in subdivision (a) of Section 685.010 of the Code of Civil Procedure shall be reduced by the number of days by which SLVWD exceeds the seven (7) calendar day return requirement set forth in this paragraph.

20.4.4 Each application for progress payment shall be accompanied by the following. Progress Payment Applications not accompanied by Items 1, 2, 3, and 4 below will be returned to the Contractor.

1. Progress Report – A narrative summary indicating the status of the Work performed and other pertinent activities including the actual percentage of Work completed, an estimate of the percentage of Work to be completed in the succeeding month, a revised CPM schedule, problem areas and manpower used by trade and hours. If the Work has fallen behind the schedule, the Contractor shall state how the time is to be made up to remain on schedule.

2. Record Drawings and Specifications – Submit changes during previous month. These may be photocopies of the Specifications or bluelines of the drawing sheets changed.

3. Certified Payrolls – Submit copies of certified payroll including fringe benefit statements for each employee during the progress period. The Contractor and each Subcontractor must comply with Sections 1776 and 1771.4(a)(3)(A) of the Labor Code regarding payroll records.

4. Progress Photographs:

   a. General - Provide photographs of the site and construction throughout the progress of Work, acceptable to SLVWD. Photographs shall be taken on the cutoff date for each application for payment and at the beginning and completion of each of the following elements of Work:

      1. Prior to Work
      2. Final Completion

In addition, the Engineer may request up to five (5) photographs of various views (non-aerial) in any one (1) month of progress or problem areas.

b. Photographs. Digital photographs in RAW, TIFF, or JPG format will be required. Provide 3 CDs or DVDs of the photographs.

c. Technique. Provide factual presentation. In each photograph include an object of known size to determine size of object being photographed. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion. Any photograph which is not clear and distinct, double exposed, over exposed, etc. shall be retaken.

d. Views. Provide photographs from two (2) views at each element of Work. The Engineer will select the various viewpoints for photography.

e. Submittals. Contractor shall deliver the photographs with each application for payment. The photographs will be dated by the Photographer.

20.5 Withholding of Payments.

20.5.1 Right to Withhold. SLVWD may refuse to approve any payment because of subsequently discovered evidence or the results of subsequent inspection or tests, nullify any such payment previously approved to such extent as may be necessary in the opinion of SLVWD to protect SLVWD from loss because: (a) the Work is defective, (b) third party claims have been filed or there is reasonable evidence indicating probable filing of such claims, (c) the Contract Price has been reduced because of Change Orders, (d) of the Contractor's failure to make payment properly to Subcontractors or for labor, materials, or equipment, (e) of damage to another contractor or to the property of others caused by the Contractor, (f) of reasonable doubt that the Work can be completed for the unpaid balance of the Contract Price, (g) of reasonable indication that the Work will not be completed within the Contract Time, (h) of the Contractor's neglect or unsatisfactory prosecution of the Work including failure to clean up, (i) SLVWD has been required to correct defective Work as provided in Paragraph 18.2 or to finish the Work as provided in Paragraph 21.2, (j) of insurance premium costs SLVWD has incurred by the Contractor's failure to maintain the insurance required of him, (k) of reasonable doubt as to the Contractor's warranty of title required under Paragraph 20.3, (l) of payments due SLVWD from the Contractor, or (m) of provisions of law that enable or require SLVWD to withhold such payments in whole or in part. When the grounds for withholding payments are removed, payment will be made for amounts withheld because of them to the extent the Contractor is entitled to payment.

20.5.2 SLVWD's Right To Apply Withheld Payments. SLVWD may, but is not obligated to the Contractor, his surety or sureties, or any third party, to apply the amounts withheld pursuant to subparagraph 20.5.1 to the payment of any and all claims which are grounds for such withholding. In so doing, SLVWD shall be deemed the agent of the Contractor and any payments so made by SLVWD shall be considered as a payment made under the Contract Agreement by SLVWD to the Contractor and SLVWD shall not be

liable to the Contractor for such payment made in good faith. Such payment by SLVWD may be made without prior judicial determination of the claim or claims. SLVWD will render to the Contractor a proper accounting of such funds disbursed on behalf of the Contractor.

20.6 Payments to Subcontractors. The Contractor shall pay each Subcontractor, upon receipt of payment from SLVWD, an amount equal to the percentage of completion allowed to the Contractor on account of such Subcontractor's Work, less the percentage retained from payments to the Contractor. The Contractor shall also require each Subcontractor to make similar payments to his Sub-subcontractors. If SLVWD refuses or fails to approve an application for payment for any cause which is the fault of the Contractor and not the fault of a particular Subcontractor, the Contractor shall pay that Subcontractor on demand, made at any time after SLVWD's approval for payment should otherwise have been issued, for his Work to the extent completed less the retained percentage. The Contractor shall pay each Subcontractor a just share of any insurance moneys received by the Contractor under subparagraph 6.2.7, and he shall require each Subcontractor to make similar payment to his Sub-subcontractors. Neither SLVWD nor the Engineer shall have any obligation to pay or to see to the payment of any moneys to any Subcontractor or Sub-subcontractor except as may otherwise be required by law.

20.7 Final Inspection and Acceptance. Upon written notice from the Contractor that the entire Work required by the Contract Documents is complete and that all submittals required of him are made, and after the Contractor has delivered the Bonds, certificates in inspection, proof of insurance, guarantees, warranties, releases, and other documents, all as required by the Contract Documents or by law, a post construction conference will be held to review the Work and resolve any unsettled matters. Present at the conference shall be SLVWD, the Engineer, the Inspector, the Contractor, and the Superintendent. Following this conference, the Engineer will make a final inspection with SLVWD and the Contractor, and SLVWD will notify the Contractor in writing of any particulars in which this inspection reveals that the Work is defective, and will also notify the Contractor in writing of any deficiencies in the submittals and other documents required of him. The Contractor promptly shall make such corrections as are necessary to remedy all defects or deficiencies. After the Contractor has completed any such corrections to the satisfaction of SLVWD, SLVWD will issue a written final acceptance of the Work and file any notice of completion required by law or otherwise.

20.8 Application for Final Payment. After issuance of SLVWD’s final written acceptance, the Contractor may make application for final payment following the procedure for progress payments. Neither the final payment nor the remaining retained percentage shall become due unless the application for final payment is accompanied by such supporting data as SLVWD may require, together with complete and legally effective releases or waivers, satisfactory to SLVWD, of all liens arising out of the Contract Documents and the labor and services performed and the material and equipment furnished thereunder. In lieu thereof and as approved by SLVWD, the Contractor may furnish receipts or releases in full; an affidavit of the Contractor that the releases and receipts include all labor, services, material, and equipment for which a lien could be filed, and that all payrolls, material, and equipment bills, and other indebtedness connected with the Work for which SLVWD or his property might in any way be responsible, have been

paid or otherwise satisfied; and consent of Surety, if any, to final payment. If any Subcontractor, Sub-subcontractor, or supplier fails or refuses to furnish a release or receipt in full, the Contractor may furnish a Bond satisfactory to SLVWD to indemnify him against any such lien. If any such lien remains unsatisfied after all payments are made, the Contractor or his surety shall pay to SLVWD all moneys SLVWD may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

A. The Contractor must obtain an unconditional waiver and release of claims upon final payment from all suppliers and subcontractors which have filed preliminary notices with SLVWD.

B. The Contractor must obtain in writing releases from each owner of real property from which the Contractor has obtained permission to use land. Such release shall state that the land is returned to the property owner in an acceptable condition. Similar releases must be obtained from owners of property disturbed by the Contractor from which the Contractor has not obtained permission to use or enter; except that releases are limited to restoration of land to original lines and grades, restoration of vegetation, and removal of waste material.

THE APPLICATION FOR FINAL PAYMENT SHALL INCLUDE FROM THE CONTRACTOR A SIGNED RELEASE AND CERTIFICATE OF FINAL PAYMENT FORM AS INCLUDED HEREIN. (See Release and Certificate of Final Payment, Section 00686.)

20.9 Approval of Final Payment. SLVWD will, within ten (10) work days after the Contractor has fulfilled and satisfied all the requirements of Paragraph 20.8, indicate in writing his approval of payment or will return the application to the Contractor, indicating in writing his reasons for refusing to approve final payment, in which case the Contractor shall make the necessary corrections and resubmit the application. SLVWD, within the time period stated in the Supplementary Conditions, Section 00800, will pay the Contractor the amount so approved unless a longer period of time is prescribed by law or required for the lawful filing and publishing of Notices of Completion and the expiration of any lien periods thereof. (See Supplementary Conditions, Section 00800)

20.10 Continuing Obligation of the Contractor. The Contractor's obligation to perform and complete the Work in accordance with the Contract Documents is and shall be absolute. Neither the observation during construction and final inspection of the Work by SLVWD and the Engineer, nor any payment by SLVWD to the Contractor under the Contract Documents, nor any use or occupancy of the Work or any part thereof by SLVWD, nor any act of acceptance by SLVWD, nor any failure to do so, nor any correction of defective Work by SLVWD shall constitute acceptance of Work not in accordance with the Contract Documents.

20.11 Release of Claims. Contractor shall, before being entitled to final payment, also execute and file with SLVWD a release upon the form provided by SLVWD, releasing SLVWD from all claims or liability relating to undisputed contract amounts or work performed in relation to such amounts. However, any payment, final or otherwise, shall not release the Contractor or his sureties from any obligations under the Contract Documents or the performance bond or payment bond. The making of final payment by SLVWD shall not constitute a waiver of claims by SLVWD for unsettled liens,

from faulty or defective Work appearing after final acceptance of the Work by SLVWD, from failure of the Work to comply with the requirement of the Contract Documents, or from the terms of any special guarantees or warranties required by the Contract Documents.

20.12 Contractor's Payment to SLVWD. The Contractor shall pay to SLVWD all moneys so required of him under the provisions of the Contract Documents. If any such payments are required prior to final payment, an appropriate Change Order will be issued and, as provided in subparagraph 20.5.1, the amount of such payments may be withheld from payments due the Contractor. If the payments then or then after due the Contractor are insufficient to cover any payments due SLVWD from the Contractor, or if the amount of such payment due SLVWD is determined after the making of final payment, the difference in the amounts of the payments or the amount so determined shall be paid by the Contractor to SLVWD. The obligation of the Contractor to pay the moneys due SLVWD from him shall specifically bind the Contractor's sureties, assigns, executors, administrators, and heirs to his obligation to so pay SLVWD.

20.13 Interest. Any moneys not paid when due to either party under this Contract Agreement shall bear interest at the maximum legal rate in force at the place of the Project.

20.14 Nonreceipt of Payment. The Contract shall notify SLVWD in writing of any approved progress payment not received by him within five (5) work days after the date the payment should properly have been paid to him. In the absence of such written notice in each case, the Contractor hereby agrees and waives his right under Paragraph 21.5 to terminate the Contract Agreement or stop the Work on account of nonpayment by SLVWD and further waives his right under Paragraph 20.13 to interest on the amount of any such payment not received by him.

20.15 False Claim Act. The Contractor certifies that he will not make any false claims pursuant to Government Code Section 12650 *et seq*.

20.16 Compliance with Law. Notwithstanding anything to the contrary in the foregoing provisions, this Article 20 shall be interpreted in accordance with Public Contract Code Section 7107.

ARTICLE 21 – SUSPENSION AND TERMINATION

21.1 Suspension of Work. SLVWD, at any time and without cause, may suspend the Work or any part thereof by notice in writing to the Contractor. Unless otherwise provided in the Contract Documents, the Contractor shall have no claim for damages or compensation on account of such suspension unless he makes a claim therefore as provided in Paragraph 16.4, but the Contractor will be allowed an extension of the Contract Time to complete the Work and an appropriate Change Order will be issued. The Contractor shall resume the Work when so notified in writing by SLVWD.

21.2 Suspension of Contract Agreement. If the Contractor abandons the Work, or if he is adjudged a bankrupt or insolvent, or if he makes a general assignment for the benefit of his creditors, or if a trustee or receiver is appointed for the Contractor or for any of his property, or if he files a petition to take advantage of any debtor's act or to reorganize under bankruptcy or similar laws, or if he persistently fails to supply sufficient skilled

superintendence and workmen or suitable materials or equipment, or if he persistently fails to make prompt payments to Subcontractors or for labor, materials or equipment, or if he disregards laws, ordinances, rules, regulations, or orders of any public body having jurisdiction, or if he disregards the authority of SLVWD, or neglects to prosecute the Work in accordance with the Contract Documents including requirements of the progress schedule, or if he fails to promptly comply with the requirements of any Change Order, or if he assigns this Contract Agreement otherwise than herein provided, or if SLVWD at any time is of the opinion that the performance of the Work is unnecessarily or unreasonably delayed or that the Contractor is willfully violating any of the provisions of the Contract Documents or is executing the same in bad faith, or if the Work is not fully completed within the Contract Time and any authorized extensions thereof, or if SLVWD is of the opinion that the Work cannot be completed for the unpaid balance of the Contract Price or will not be completed within the Contract Time, or if the Contractor otherwise violates any provisions of the Contract Documents, then SLVWD may, without prejudice to any other right or remedy and by means of written notice to the Contractor and his surety, instruct the Contractor to discontinue all Work or any part thereof under the Contract Agreement or terminate the services of the Contractor. The Contractor, under a written instruction to discontinue, shall not resume any of the Work except by written notice from SLVWD. In either such case, SLVWD may take possession of the Work and Project and of all materials, equipment, plant, tools, supplies, construction machinery and equipment, and property of every kind thereon owned and furnished by the Contractor for the purpose of the Work, and finish the Work by whatever method SLVWD may deem expedient. The Contractor shall not be entitled to receive any further payment after the date of said written notice from SLVWD unless instructed in writing by SLVWD to resume any part of the Work, or until the Work is finished by SLVWD if SLVWD so elects. If the unpaid balance of the Contract Price exceeds the direct and indirect costs to SLVWD of finishing the Work, including compensation for additional administrative, consultant, professional, testing, and inspection services, such excess will be paid to the Contractor. If such costs to SLVWD exceed such unpaid balance, the Contractor, in accordance with Paragraph 20.12, shall pay the difference to SLVWD.

21.3 Contractor's Continuing Liability. When the Contractor's services have been discontinued or terminated as provided in Paragraph 21.2, said discontinuance or termination shall not affect any rights of SLVWD against the Contractor then existing or which may then after accrue. Any retention or payment of moneys by SLVWD due the Contractor will not release the Contractor from liability.

21.4 Termination of Contract Agreement. Upon seven (7) calendar days written notice to the Contractor, SLVWD may, without cause and without prejudice to any other right or remedy, elect to abandon the Work and terminate the Contract Agreement. In such case, the total compensation to be paid to the Contractor shall be determined on the basis of the components stated in Section 8-1.14(E) of the California Department of Transportation's Standard Specifications dated 2010, a copy of which is provided in Section 00700A.

21.5 Stopping Work or Termination by Contractor. If, through no fault, act, or omission of the Contractor, Subcontractor, Sub-subcontractor, or their agents or employees, or any other person performing any of the Work under a contract with the Contractor, the Work is suspended for a period of more than ninety (90) calendar days by SLVWD (except as provided in Paragraph

23.6 for Federal hindrance), or under an order of any court or other public authority having jurisdiction, or SLVWD fails to act on any application for progress payment within thirty (30) calendar days after it is submitted, or SLVWD fails to pay the Contractor any progress payment sum approved by SLVWD within forty-five (45) calendar days of its approval, or SLVWD fails to pay the Contractor any sum awarded by arbitrators within sixty (60) calendar days of its approval and presentation, then the Contractor may, upon fourteen (14) calendar days written notice to SLVWD, terminate the Contract Agreement and recover from SLVWD payment for all Work satisfactorily executed and for any proven loss sustained upon any materials, equipment, tools, and construction equipment and machinery, including reasonable profit and damages. In addition and in lieu of terminating the Contract Agreement, if SLVWD has failed to act on an application for progress payment or has failed to make any progress payment as aforesaid, the Contractor may, upon fourteen (14) calendar days written notice to SLVWD, stop the Work until he has been paid all amounts then correctly due him, in which event and upon resumption of the Work, an appropriate Change Order will be issued for adjusting the Contract Price or extending the Contract Time, or both, to compensate for the costs and delays attributable to such storage of the Work.

21.6 Continuing Liability of Sureties. Termination of the contract shall not relieve the surety or sureties from obligations for any just claims arising out of the Work performed.

ARTICLE 22 – ARBITRATION

22.1 Resolution of Certain Disputes. See California State Requirements, Section 00800CA, Paragraph O.

22.2 Payment of Undisputed Amounts. SLVWD shall be entitled to withhold any disputed unpaid contract amount, which would otherwise be due and payable after the filing of any claim by the Contractor pursuant to Article 22 of the General Conditions, pending final resolution of the claim.

22.3 Waiver of Rights. Except as set forth in this Article 22, or as otherwise provided under state law, it is understood and agreed by the parties that all rights any of them may have to arbitration for settling of disputes, claims, and other matters arising out of or relating to this Contract Agreement, or the breach thereof, are hereby specifically waived by all of them.

ARTICLE 23 – MISCELLANEOUS PROVISIONS

23.1 Successors and Assigns. SLVWD and the Contractor each binds himself, his partners, successors, assigns, and legal representatives to the other party hereto and to the partners, successors, assigns, and legal representatives of such other party in respect to all covenants, agreements, and obligations contained in the Contract Documents. Neither party to the Contract Agreement shall assign the Contract Agreement or sublet it as a whole without the written consent of the other, nor shall the Contractor assign any moneys due or to become due to him hereunder without the previous written consent of SLVWD.

23.2 Written Notice. Written notice shall be deemed to have been duly served if delivered in person to the individual or member of the firm or to an officer of the corporation for whom it was intended on the date of delivery, or if

delivered at or sent by registered or certified mail to the last business address known to him who gives the notice on the third business day after it is deposited in the mail, or if delivered to the Project Superintendent on the date of delivery. The address given in the Contractor's Bid on which the Contract Agreement is founded is hereby designated as the place to which all notices, letters, and other communications to the Contractor shall be mailed or delivered, except that said address may be changed by the Contractor by notifying SLVWD in writing. This shall not preclude the service of any notice, letter, or other communication upon the Contractor personally.

23.3 Communications. SLVWD will issue all communications to the Contractor and the Contractor shall deliver all communications to SLVWD unless otherwise provided in the Contract Documents or directed by SLVWD.

23.4 Rights and Remedies. The duties and obligations imposed by the Contract Documents and the rights and remedies available thereunder and, in particular but without limitation, the warranties, guarantees, and obligations imposed upon the Contractor by subparagraph 6.2.4 and by Paragraphs 6.4, 19.1, and 20.3 and the rights and remedies available to SLVWD and the Engineer thereunder, shall be in addition to and not a limitation of any otherwise imposed or available by law, by special guarantee or warranty, or by other provisions of the Contract Documents.

23.5 Royalties and Patents. Unless otherwise specifically stipulated elsewhere in the Contract Documents, the Contractor shall pay and, in particular but without limitation, the warranties, guarantees and obligations imposed upon the Contractor by subparagraph 6.2.4 and by Paragraphs 6.4, 19.1, and 20.3 and the rights and remedies available to SLVWD and the Engineer thereunder, shall be in addition to and not a limitation of any otherwise imposed or available by law, by special guarantee or warranty, or by other provisions of the Contract Documents.

23.6 Federal Hindrance. In entering into this Contract Agreement, it is clearly understood by all parties hereto that conditions may subsequently arise resulting from, connected with, or growing out of any war in which the United States may be engaged, or any national emergency or condition created directly or indirectly by or for the national defense or national interests, and which are entirely beyond the control of either party, that may hinder, delay, or render impossible the performance of this Contract Agreement in accordance with its terms and conditions. It is therefore mutually understood and agreed, anything herein contained to the contrary notwithstanding, that in the event the Contractor shall be prevented from performing the Work or any part thereof by reasons of the conditions above stated, the Contractor shall notify SLVWD in writing of his inability to perform, stating in full the reason therefore and the probable duration of such inability. If required, he shall also submit proof or evidence in support of his claim of inability to perform. If it shall appear to the satisfaction of SLVWD that the cause of inability to perform arose after the Contract Agreement was entered into and is beyond the control of the Contractor, SLVWD may, (a) if lawfully within its power, remove the cause which prevents performance; or (b) suspend this Contract Agreement until the cause of inability to perform is removed; or (c) with the consent of the Contractor, renegotiate or amend this Contract Agreement by extending the time of performance or by making the changes in the character of the Work, or in the materials or equipment required in order to enable performance of

the Work; or (d) waive performance of that part of the Work which is impossible, or supply substitute materials for those unavailable, and where this remedy is resorted to, the payment due the Contractor will be reduced to the extent of the Work not required to be performed, based so far as is practicable upon unit prices bid, by an appropriate Change Order. If none of the foregoing procedures are adopted by SLVWD within thirty (30) calendar days after SLVWD is satisfied and so finds that the Contractor is unable to perform for the reasons above stated, then either party hereto may, without incurring any liability, elect to declare this Contract Agreement terminated upon the ground of impossibility of performance. Upon such termination, the Contractor will be paid as provided in Paragraph 21.4 for termination of the Contract Agreement.

23.7 Oral Agreements. No oral order, objection, claim, or notice by any party to the others shall affect or modify any of the terms or obligations contained in any of the Contract Documents, and none of the provisions of the Contract Documents shall be held to be waived or modified by reason of any act whatsoever, other than by a definitely agreed waiver or modification thereof in writing, and no evidence shall be introduced in any proceeding of any other waiver or modification.

23.8 Work in Jurisdiction of Others. Where any of the Work is adjacent to or crosses highways, railroads, streets, utilities, property, right-of-ways, or easements under the jurisdiction of Federal, State, County, City, or other public agency, public utility, or private entity from whom SLVWD has not obtained permits, the Contractor shall secure written permission from the proper authority and furnish bonds and insurance and pay all fees and charges as the proper authority may require for permission before executing such Work. A copy of each written permission shall be filed with SLVWD before such Work is begun. The Contractor shall repair or replace all existing construction damaged in the execution of the Work to the satisfaction of the proper authority, and shall furnish to SLVWD a release from the proper authority prior to final inspection of the Work.

23.9 Cash Allowances. When included in the Contract Documents, the Contractor shall include in his Bid and the Contract Price the cash allowances stated in the Contract Documents.

23.9.1 Cash Allowances for Permits. These stated allowances represent the estimated permit fee(s) payable to government agencies as required to perform the Work. The Contractor's costs for labor, overhead, profit, and other expenses required to obtain the cash allowance permits shall be included in the Contract Price since they are not included in the cash allowance estimates.

23.9.2 Cash Allowances for Materials and Equipment. These stated allowances represent the net cost estimate of the materials and equipment delivered and unloaded at the site, and all applicable taxes. The Contractor's handling costs on the site, labor, installation costs, overhead, profit, and other expenses contemplated for the cash allowance material and equipment shall be included in the Contract Price since they are not included in the cash allowance estimates. The Contractor shall purchase the cash allowance materials and equipment as directed by SLVWD on the basis of the lowest responsive bid of at least three competitive bids. If the actual cost of the materials and equipment approved by SLVWD delivered and unloaded at

the site, and all applicable taxes, is more or less than the cash allowance estimates, the Contract Price will be adjusted accordingly by Change Order.

23.10 Ownership of Documents and Models. All Drawings, Specifications, and copies thereof furnished to or obtained by the Contractor, and all models pertaining to the Work are and shall remain the property of SLVWD or the Engineer as they may agree. They shall not be used by the Contractor on any other project and, with the exception of one (1) contract set of Drawings and Specifications to be retained by the Contractor, shall be returned, on request and as directed, prior to final acceptance of the Work.

23.11 Use of Completed Portions. SLVWD shall have the right, upon written notice to the Contractor, to take possession or occupancy of and use any completed or partially completed portions of the Work, notwithstanding that the time for completing the entire Work or such portions may not have expired; but such taking possession or occupy and use shall not be deemed a waiver of any requirement of the Contract Documents or a waiver or acceptance of any Work not completed in accordance with the Contract Documents. If such prior possession, occupy, or use increases the cost of or delays the completion of uncompleted Work, or causes repair or refinishing of completed Work, the Contractor shall be entitled to such extra compensation or extension of time, or both, as agreed by SLVWD and an appropriate Change Order will be issued. The Contractor will not be required to perform housekeeping obligations in or bear utility costs for buildings or structures to the extent so occupied or used by SLVWD. If SLVWD takes possession of and places any of the machinery or equipment of the Work into continuing operation consonant with its intended final service or purpose and for his beneficial use, the period of the Contractor's guarantee, solely with respect to such machinery or equipment, shall begin on the first day of such beneficial use by SLVWD and SLVWD will bear the utility and maintenance costs for such beneficial use. Prior to SLVWD taking possession, occupancy, or use of any portion of the Work, but not as a condition or precedent to SLVWD's right thereto, SLVWD and the Contractor shall jointly inspect and determine the condition and completeness of the involved portions of the Work, shall agree upon appropriate procedures and other pertinent matters including the payment or apportioning of utility costs, and shall execute a memorandum recording the inspection determination and the procedures and matters agreed. Such possession, occupancy, or use by SLVWD under this paragraph shall not entitle the Contractor to claim or receive payment of any amounts retained or withheld by SLVWD pursuant to subparagraphs 20.4.2 and 20.5.1 unless otherwise agreed by the parties.

23.12 Cleaning Up. The Contractor shall at all times during the Work keep the site and premises, adjoining property, and public property free from accumulations of waste materials, rubbish, and other debris resulting from the Work, and at the completion of the Work shall remove all waste materials, rubbish, and debris from and about the site and premises as well as all tools, construction equipment and machinery, and surplus materials, and shall leave the site and premises clean and ready for occupancy by SLVWD. The Contractor shall restore to their original condition those portions of the site not designated for alteration by the Contract Documents. Paved walkways, parking areas, and roadways shall be swept and broomed clean. Cleaning up operations shall include the removal and disposal of earth that is contaminated and the filling of resulting excavations with sound compacted earth as directed and approved by SLVWD. Contamination

includes the earth in areas used for disposal of waste concrete, mortar, plaster, masonry, and like materials'; areas in which washing out concrete and plaster mixers or washing of tools and like cleaning operations have been performed; areas that have been oiled, paved, or chemically treated; and areas where waste oils, solvents, paints, solutions, or similar materials of a penetrating nature have been incorporated into the soil. SLVWD will determine the contaminated earth areas. No waste material shall be buried or disposed of on SLVWD's property unless so permitted in the Contract Documents or approved in writing by SLVWD. Before the Contractor applies for final inspection and acceptance of the Work, all items of Work shall be complete, ready to operate, and in a clean condition as determined by SLVWD.

23.13 SLVWD's Right to Clean Up. If the Contractor fails to satisfactorily clean up or if a dispute arises between the Contractor and any separate contractor as to their responsibility for cleaning up, SLVWD may clean up and charge the cost thereof to the Contractor for his failure, or to the several Contractors as SLVWD shall determine to be just.

23.14 Certificates. Each certificate, required under the Contract Documents shall be signed by the individual, office, or agent lawfully authorized to execute the certificate, and such authority shall be cited in the certificate by title, description, or other acceptable evidence. All certificates shall be sworn and notarized as to the correctness and validity of the contents, and duplicate copies shall be notarized to be true copies.

23.15 Excavations; Discovery of Hazardous Conditions.

See California State Requirements, Section 00800CA, Paragraph P.

23.16 California State Codes. The Contractor shall comply with all requirements of Section 00800CA which outlines particular State of California laws.

23.16.1 Wage Rates. See California State Requirements, Section 00800CA, Paragraph A.

a. Working Hours. See California State Requirements, Section 00800CA, Paragraph D.

b. Apprentices. See California State Requirements, Section 00800CA, Paragraph C.

c. Payroll Records. See California State Requirements, Section 00800CA, Paragraph K.

d. Ineligible Subcontractors. See California State Requirements, Section 00800CA, Subparagraph A.3.

e. Penalties. See California State Requirements, Section 00800CA, Paragraph A.2.

23.16.2 Safety Orders. The California Construction Safety Orders in effect during the Work shall apply continuously until final acceptance of the Work.

23.16.3 Subcontractors. See California State Requirements, Section 00800CA, Paragraph R.

23.17 Substitution of Securities for Monies Withheld to Ensure Performance of Contractor. See California State Requirements, Section 00800CA, Paragraph I.

23.18 No Discrimination. Contractor shall not discriminate in the employment of persons upon the Contract Work because of their race, religious creed, color, national origin, ancestry, physical handicap, medical condition, marital status, sexual orientation, gender, or sex of such persons. Contractor shall cause an identical clause to be included in every subcontract for Contract Work.

23.20 Copyrights and Patents. The Contractor shall and does hereby hold and save SLVWD harmless from liability of any nature and kind, including costs and expenses, for or on account of any copyrighted or uncopyrighted composition, secret process, patented or unpatented invention, article or appliance, manufactured, furnished or used by him in the performance of this Contract, including their use by SLVWD unless otherwise specifically stipulated in this Contract.

23.21 Anti-Trust Claims. In entering into this Contract or a subcontract to supply goods, services, or material pursuant to this Contract, the Contractor or Subcontractor offers and agrees to assign to SLVWD all rights, title, and interest in and to and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Section 15) or under the Cartwright Act (Chapter 2 (commencing with Section 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from the purchase of goods, services, or materials pursuant to the Contract or the subcontract. This assignment shall be made and become effective at the time SLVWD tenders final payment to the Contractor, without further acknowledgment by the parties.

23.22 Attorneys' Fees. In the event any legal action is commenced to enforce or interpret the terms and conditions of this Agreement, the prevailing party shall, in addition to any other costs and relief, be entitled to reasonable attorneys' fees.

23.23 Notice of Third Party Claims. SLVWD will timely notify Contractor in the event that a claim is filed by a third party which is related to the Contract. SLVWD will notify Contractor of such claim within ten (10) business days from the date on which SLVWD is made aware of the claims. SLVWD may recover reasonable costs incurred in providing such notification.

END OF SECTION 00700

SECTION 00700A

REFERENCED PROVISIONS OF SECTION 8-1.14 OF CALTRANS' STANDARD SPECIFICATIONS ISSUED 2010 (as referenced in General Conditions Section 21.4)

8-1.14 CONTRACT TERMINATION

8-1.14E Payment Adjustment for Termination

If the Department issues a termination notice, the Engineer determines payment for termination based on the following:

1. Direct cost for the work:
    - 1.1. Including:
        - 1.1.1. Mobilization.
        - 1.1.2. Demobilization.
        - 1.1.3. Securing the job site for termination.
        - 1.1.4. Losses from the sale of materials.
    - 1.2. Not including:
        - 1.2.1. Cost of materials you keep.
        - 1.2.2. Profit realized from the sale of materials.
        - 1.2.3. Cost of material damaged by:
            - 1.2.3.1. Act of God.
            - 1.2.3.2. Act of a public enemy.
            - 1.2.3.3. Fire.
            - 1.2.3.4. Flood.
            - 1.2.3.5. Governor-declared state of emergency.
            - 1.2.3.6. Landslide.
            - 1.2.3.7. Tsunami.
        - 1.2.4. Other credits.
2. Cost of remedial work, as estimated by the Engineer, is not reimbursed.
3. Allowance for profit not to exceed 4 percent of the cost of the work. Prove a likelihood of having made a profit had the Contract not been terminated.
4. Material handling costs for material returned to the vendor or disposed of as ordered.
5. Costs in determining the payment adjustment due to the termination, excluding attorney fees and litigation costs.

Termination of the Contract does not relieve the surety of its obligation for any just claims arising out of the work performed.

END OF SECTION 00700A

SECTION 00800

SUPPLEMENTARY CONDITIONS

MODIFICATION OF THE GENERAL CONDITIONS

A. General. These Supplementary Conditions form a part of and modify the preceding General Conditions. Provisions and requirements of the General Conditions not so modified shall remain in full force and effect.

B. Modifications. The Articles, paragraphs, and subparagraphs mentioned are those of the General Conditions (Section 00700).

1. Paragraph 1.17 – Engineer. Under these Contract Documents, the Engineer is designated as Schaaf & Wheeler, Consulting Civil Engineers, acting through its authorized representative.

2. Paragraph 4.2 – Time of Performance. Add the following:

   4.2.1 District non-working holidays:
   Day before New Year's Day (December 31)
   New Year's Day (January 1)
   Martin Luther King's Birthday (third Monday in January)
   Presidents Day (third Monday in February)
   Memorial Day (last Monday in May)
   Independence Day (July 4)
   Labor Day (first Monday in September)
   Veterans Day (November 11)
   Thanksgiving Day (fourth Thursday in November)
   Friday after Thanksgiving
   Day before Christmas (December 24)
   Christmas Day (December 25)

   4.2.2 Inclement weather days for Felton, CA, defined as rainfall at the site greater than one-tenth inch during a twenty-four hour period and which prevents or impedes proper construction at the site, occur on average:

JAN – 7	FEB – 7	MAR – 9	APR – 5	MAY – 2	JUN – 1
JUL – 0	AUG – 0	SEP – 1	OCT – 2	NOV – 7	DEC – 8

3. Paragraph 5.3 – Subsurface Conditions. The following documents pertain to subsurface conditions and utilities:

   a. Document: Geotechnical Design Report, SLVWD 2019 Waterline Project, CE&G DOCUMENT NO.: 191110.001, prepared by Cal Engineering & Geology, January 30, 2020. Pertains to: subsurface soil conditions. Availability: Included in technical specifications appendix.

4. Paragraph 5.3 – Environmental Conditions. The following documents pertain to environmental conditions:
   a. Document: Initial Study and Mitigated Negative Declaration for the Quail Hollow Pipeline Replacement Project, prepared by Denise Duffy & Associates, November 2020, adopted February 2020. Pertains to: required environmental mitigation, monitoring and reporting for the project.

5. Paragraph 6.2 – Insurance. The additional insureds and insurance coverage limits required by Paragraph 6.2 of the General Conditions shall be as follows. Where greater amounts are required by Laws and Regulations, provide the greater amount.

a. Additional Insureds: In addition to Owner, include the following additional insureds as required under Paragraph 6.2.2 of the General Conditions:

1. Schaaf & Wheeler (Owner's Engineer)
3. Cal Engineering & Geology (Owner's Geotechnical Consultant)
4. Owner's Construction Manager (to be determined prior to award)

b. Workers' Compensation, and related coverages under Paragraph 6.2.5 of the General Conditions:

State:	Statutory
Federal, if applicable (e.g., Longshoreman's):	Statutory
Employer's Liability:	
Bodily injury, each accident	$ 1,000,000.00
Bodily injury by disease, each employee	$ 1,000,000.00
Bodily injury/disease aggregate	$ 1,000,000.00
Foreign voluntary worker compensation	Statutory

c. Contractor's Commercial General Liability under Paragraphs 6.2.6 of the General Conditions:

General Aggregate	$ 1,000,000.00
Products - Completed Operations Aggregate	$ 1,000,000.00
Personal and Advertising Injury	$ 1,000,000.00
Each Occurrence (Bodily Injury and Property Damage)	$ 1,000,000.00

d. Automobile Liability under Paragraph 6.2.6 of the General Conditions:

Bodily Injury:

Each person	$ 1,000,000.00
Each accident	$ 1,000,000.00

Property Damage:

Each accident	$ 1,000,000.00

e. Contractor's Professional Liability:

Each Claim	$ 1,000,000.00
Annual Aggregate	$ 1,000,000.00

f. Contractor's Pollution Liability under Paragraph 6.2.6 of the General Conditions:

Each Occurrence	$ _____
General Aggregate	$ _____

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

g. Deductible limit for Builders' Risk "All-Risk" Completed Value Insurance under Paragraph 6.2.7 of the General Conditions: Not more than $5,000.

6. Paragraph 8.10.1 - Water Supply. Add the following: Contractor is responsible for securing and paying District for construction water supply.

7. Paragraph 14.1 – Separate Contracts. The following Work by other Contractors may occur at the site(s) of the Work: None is scheduled.

8. Paragraph 20.9 – Approval of Final Payment. Add the following: The application will be returned if the items in Paragraph 20.8 are not submitted with the final application for payment. The Contractor may make application for final payment upon obtaining unconditional releases of claims from each sub-contractor or supplier for each preliminary notice submitted to SLVWD. After the work is complete and SLVWD receives unconditional releases from all subcontractors and suppliers, SLVWD will file a Notice of Completion with the County Recorder. After thirty-five (35) calendar days have elapsed following recording of such notice, final payment will be made to the Contractor.

END OF SECTION 00800

SECTION 00800CA

CALIFORNIA STATE REQUIREMENTS

CALIFORNIA STATE REQUIREMENTS

A. State Wage Determinations:

1. As required by Sections 1770 *et seq.* of the California Labor Code, the Contractor shall pay not less than the prevailing rate of per diem wages as determined by the Director of the California Department of Industrial Relations ("DIR"). SLVWD has obtained from the Director of the DIR the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime work in the locality in which the Public Work is to be performed for each craft, classification or type of workman needed to execute this Contract. Copies of the wage determination are on file and may be obtained by interested parties at the office of SLVWD or may be obtained from the State of California, Division of Labor Statistics and Research at (415) 557-0561. The Contractor shall post a copy of such determination at each job site.

2. The Contractor and all Subcontractors shall comply with all applicable requirements and provisions of the Labor Code, including Sections 1775 and 1776. The Contractor shall forfeit, as a penalty to SLVWD, two-hundred dollars ($200.00), for each calendar day, or portion thereof, for each workman paid less than stipulated prevailing rates for Work done under the Contract Agreement by him, or any Subcontractor under him, in violation of the provisions of the California Labor Code. Copies of these wage determinations shall be posted and maintained at the job site by the successful bidding Contractor.

3. The Contractor shall not perform the Work with a subcontractor who is ineligible to perform work on a public works project in accordance with the requirements of Sections 1777.1 and 1777.7 of the California Labor Code.

B. Workers' Compensation:

1. In accordance with the provisions of Section 3700 of the California Labor Code, the Contractor shall secure the payment of compensation to his employees.

2. Prior to beginning work under the Contract, the Contractor shall sign and file with SLVWD the following certification:

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

3. Notwithstanding the foregoing provisions, before the Contract is executed on behalf of SLVWD, a bidder to whom a Contract has been awarded shall furnish satisfactory

evidence that it has secured in the manner required and provided by law the payment of workers' compensation.

C. Apprentices on Public Works Contracts:

1. The Contractor shall confirm to all the requirements of Sections 1777.5 and 1777.6 of the California Labor Code concerning the employment of apprentices by the Contractor or any Subcontractor under him. The Contractor shall provide SLVWD with a copy of the contract award information at the time that information is submitted to the applicable apprenticeship program. Within sixty (60) days after concluding the work pursuant to this Contract, the Contractor shall submit, and require each Subcontractor under him to submit, to SLVWD and the apprenticeship program a verified statement of the journeyman and apprentice hours performed on the Contract.

2. Section 1777.5 requires that every apprentice employed upon public works shall be paid the prevailing rate of per diem wages for apprentices in the trade to which he or she is registered and shall be employed only at the work of the craft or trade to which he or she is registered.

3. Only apprentices, as defined in section 3077 of the Labor Code, who are in training under the apprenticeship standards that have been approved by the Chief of the Division of Apprenticeship Standards and who are parties to written apprentice agreements under Chapter 4 (commencing with Section 3070) of Division 3 are eligible to be employed at the apprentice wage rate on public works. The employment and training of each apprentice shall be in accordance with either of the following:

   a. The apprenticeship standards and apprentice agreements under which he or she is training.

   b. The rules and regulations of the California Apprenticeship Council.

4. When the Contractor, or any subcontractor under him, employs workers in any apprenticeable craft or trade to perform Work, the Contractor and subcontractor shall employ apprentices in at least the ratio set forth in Labor Code section 1777.5 and may apply to any apprenticeship program in the craft or trade that can provide apprentices to the site of the public work for a certificate approving the Contractor under the apprenticeship standards for the employment and training of apprentices in the area or industry affected.

5. Prior to commencing Work on the Contract, the Contractor and/or subcontractor shall submit contract award information to an applicable apprenticeship program that can supply apprentices to the site of the Work. The information submitted shall include an estimate of the journeyman hours to be performed under the Contract, the number of apprentices proposed to be employed, and the approximate dates the apprentices would be employed. A copy of this information shall also be submitted to the Owner.

6. Within 60 days after concluding Work on the Contract, the Contractor and any subcontractors shall submit to the Owner, and to the apprenticeship program a verified statement of the journeyman and apprentice hours performed on the Contract. The information submitted pursuant to this section GC 7-2 shall be public.

7. If the Contractor, in performing any of the Work under the Contract, employs journeymen or apprentices in any apprenticeable craft or trade, then the Contractor shall contribute to the California Apprenticeship Council the same amount that the director determines is the prevailing amount of apprenticeship training contributions in the area of the site of the Work. The Contractor may take as a credit for payments to the council any amounts paid by Contractor to an approved apprenticeship program that can supply apprentices to the Site of the Work. The Contractor may add the amount of the contributions in computing his or her Bid for the Contract.

8. Contractor and any subcontractor under him shall comply with the requirements of Sections 1777.5 and 1777.6 in the employment of apprentices. The Contractor has the responsibility of compliance with these requirements for all apprenticeable occupations.

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

D. Working Hours: The Contractor shall comply with all applicable provisions of Section 1810 to 1815, inclusive, of the California Labor Code relating to working hours. The time of service of any laborer, workman, or mechanic employed on the Work shall be limited and restricted to eight (8) hours during any one (1) calendar day and forty (40) hours in any one (1) calendar week, except as otherwise provided in said sections. The Contractor shall forfeit to SLVWD as a penalty, twenty-five dollars ($25.00) for each laborer, worker, or mechanic employed in the execution of the Work by him or any Subcontractor under him for each calendar day during which such laborer, worker, or mechanic 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 provisions of the California Labor Code, unless such worker receives compensation for all hours worked in excess of eight (8) hours per day, at not less than 1-1/2 times the basic rate of pay.

E. Contractor Not Responsible For Damage Resulting From Certain Acts of God: As provided in Section 7105 of the California Pubic Contract Code, the Contractor shall not be responsible for the cost of repairing or restoring damage to the Work which damage is determined to have been proximately caused by an Act to God, in excess to five percent (5%) to the contracted amount, provided, that the Work damaged was built in accordance with accepted and applicable building standards and the plans and specifications of SLVWD. The Contractor shall obtain insurance to indemnify SLVWD for any damage to the Work caused by an Act of God if the insurance premium is a separate bid item in the bidding schedule for the Work. For purposes of this Section, the term “Acts of God” shall include only the following occurrences or conditions and effects: earthquakes in excess of a magnitude of 3.5 on the Richter Scale and tidal waves.

F. Notice of Completion: In accordance with the Sections 8182 of the California Civil Code, within fifteen (15) days after date of acceptance of the Work and after Owner receives an unconditional waiver and release form from all subcontractors and suppliers, SLVWD will file, in the County Recorder's office, a Notice of Completion of the Work.

G. Unpaid Claims: If at any time prior to the expiration of the period of service of a stop notice, there is served upon SLVWD a stop notice as provided in Section 3179 and 3210 of the California Civil Code, SLVWD shall, until the discharge thereof, withhold from the monies under its control so much of said monies due or to become due to the Contractor under this Contract as shall be sufficient to answer the claim stated until such stop notice and to provide for the reasonable cost of any litigation thereunder provided that if SLVWD shall, in its discretion, permit Contractor to file with SLVWD the bond referred to in Section 3196 of the Civil Code of the State of California, said monies shall not thereafter be withheld on account of such stop notice.

H. Concrete Forms, Falsework, and Shoring: This Contractor shall comply fully with the requirements of Section 1717 of the Construction Safety Orders, State of California, Department of Industrial Relations, regarding the design of concrete forms, falsework and shoring, and the inspection of same prior to placement of concrete. Where the said Section 1717 requires the services of a civil engineer registered in the State of California to approve design calculations and working drawings of the falsework or shoring system, or to inspect such system prior to placement of concrete, the Contractor shall employ a registered civil engineer for these purposes, and all costs therefore shall be included in the price named in the Contract for completion of the Work as set forth in the Contract Documents.

I. Retainage from Monthly Payments: Pursuant to Section 22300 of the California Public Contract Code, the Contractor may substitute securities for any money withheld by SLVWD to insure performance under the Contract. At the request and expense of the Contractor, securities equivalent to the amount withheld shall be deposited with SLVWD or with a state or federally chartered bank in California as the escrow agent, who shall return such securities to the Contractor upon satisfactory completion of the Contract. Alternatively, the Contractor may request and SLVWD shall make payment of retentions earned directly to the escrow agent at the expense of the Contractor. At the expense of the Contractor, the Contractor may direct the investment of the payments into securities and the Contractor shall receive the interest earned on the investments upon the same terms provided for in Section 22300 for securities deposited by the Contractor. Upon satisfactory completion of the Contract, the Contractor shall receive from the escrow agent all securities, interest, and payments received by the escrow agent from SLVWD, pursuant to the terms of Section 22300. Securities eligible for investment under Section 22300 shall include those listed in Section 16430 of the Government Code, bank or savings and loan certificates of deposit, interest-bearing demand deposit accounts, standby letters of credit, or any other security mutually agreed to the Contractor and SLVWD. The Contractor shall be the beneficial owner of any securities substituted for moneys withheld and shall receive any interest thereon. If the Contractor elects to receive interest on moneys withheld in retention by SLVWD, the Contractor shall, at the request of any Subcontractor performing more than five percent (5%) of the Contractor's total bid, make that option available to the Subcontractor regarding any moneys withheld in retention by the Contractor from the Subcontractor. If the Contractor elects to receive interest on any moneys withheld in retention by SLVWD, then a Subcontractor performing more than five percent (5%) of the

Contractor's total bid shall receive the identical rate of interest received by the Contractor on any retention moneys withheld from the Subcontractor by the Contractor, less any actual pro rata costs associated with administering and calculating that interest. In the event that the interest is a fluctuating rate, the rate for the Subcontractor shall be determined by calculating the interest rate paid during the time that retentions were withheld from the Subcontractor. If the Contractor elects to substitute securities in lieu of retention, then, by mutual consent of the Contractor and the Subcontractor, the Subcontractor may substitute securities in exchange for the release of moneys held in retention by the Contractor. The mandatory escrow agreement is included in these Contract Documents at Section 00630. SLVWD will not certify that the Contract has been satisfactorily completed until at least 30 days after filing by SLVWD of a Notice of Completion.

J. Public Works Contractors; Assignment to Awarding Body: In accordance with Section 7103.5 of the California Public Contract Code, the Contractor and Subcontractors shall conform to the following requirements. In entering into a public works Contract or a subcontract to supply goods, services, or materials pursuant to a public works Contract, the Contractor or subcontractor offers and agrees to assign to the awarding body all 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 the subcontract. This assignment shall be made and become effective at the time the awarding body tenders final payment to the Contractor, without further acknowledgment by the parties.

K. Payroll Records; Retention; Inspection; Noncompliance Penalties; Rules and Regulations:

1. In accordance with Section 1776 of the California Labor Code, the Contractor and each Subcontractor shall keep an accurate payroll record, showing the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and the actual per diem wages paid to each, journeyman, apprentice, worker, or other employee employed by him or her in connection with the work pursuant to the Contract. The certified payroll records shall be on forms provided by the Division of Labor Standards Enforcement or shall contain the same information as the forms provided by the division. In accordance with Section 1771.4 of the California Labor Code, each Contractor and Subcontractor shall furnish payroll records directly to the Labor Commission at least monthly and in a format prescribed by the Labor Commissioner. The payroll records may consist of printouts of payroll data that are maintained as computer records, if the printouts contain the same information as the forms provided by the division and the printouts are verified in the manner specified in subdivision (a) of Section 1776 of the Labor Code. Each payroll record shall contain or be verified by a written declaration that is made under penalty of perjury, stating both of the following: (1) the information contained in the payroll record is true and correct and (2) the employer has complied with the requirements of Sections 1771, 1811, and 1815 for any work performed by his or her employees on the public works project.

2. The payroll records enumerated under Paragraph K.1 shall be certified and shall be available for inspection at all reasonable hours at the principal office of the Contractor on the following basis:

   a. A certified copy of all employees' payroll records shall be made available for inspection or furnished to the employee or his or her authorized representative on request, and will accompany each progress payment to Owner.

   b. A certified copy of all payroll records enumerated in Paragraph K.1 shall be made available for inspection or furnished upon request to a representative of SLVWD, the Division of Labor Standards Enforcement, and the Division of Apprenticeship Standards of the Department of Industrial Relations in compliance with Section 1776 of the California Labor Code and other relevant state law.

   c. A certified copy of all payroll records enumerated in Paragraph K.1 shall be made available upon request by the public for inspection or copies thereof made; provided, however, that a request by the public shall be made through either the body awarding the Contract, the Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement. If the requested payroll records have not been provided pursuant to Paragraph K.1(b) the requesting party shall, prior to being provided the records, reimburse the costs of preparation by the Contractor, Subcontractors, and the entity through which the request was made. The public shall not be given access to the records at the principal office of the Contractor.

3. The Contractor and Subcontractors shall file a certified copy of the records, enumerated in Paragraph K.1 with the entity that requested the records within ten (10) work days after receipt of a written request.

4. Any copy of records made available for inspection as copies and furnished upon request to the public or any public agency by SLVWD, the Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement shall be marked or obliterated in such a manner as to prevent disclosure of an individual's name, address, and social security number. The name and address of the Contractor awarded the Contract or the Subcontractor performing the Contract shall not be marked or obliterated.

5. The Contractor shall inform SLVWD of the location of the records enumerated under Paragraph K.1 including the street address, city and county, and shall, within five (5) working days, provide a notice of change of location and address.

6. The Contractor or Subcontractor shall have ten (10) work days in which to comply subsequent to receipt of written notice requesting the records enumerated under Paragraph K.1. In the event that the Contractor or Subcontractor fails to comply within the 10-workday period, he or she shall, as a penalty to SLVWD, forfeit one-hundred dollars ($100.00) for each calendar day, or portion thereof, for each worker, until strict compliance is effectuated. Upon the request of the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement, these penalties shall be withheld from progress payments then due. The Contractor shall

not be subject to a penalty assessment pursuant to this Paragraph K.6 due to the failure of a Subcontractor to comply with this Section K.

7. Contractor shall cause an identical clause to be included in every subcontract for work pursuant to this Contract.

L. Protection of Workers in Trench Excavations: As required by Section 6705 of the California Labor Code and in addition thereto, whenever work under the Contract that is over twenty-five thousand dollars ($25,000) involves the excavation of any trench or trenches five (5) feet or more in depth, the Contractor shall submit for acceptance by SLVWD or by a registered civil or structural engineer, employed by SLVWD, to whom authority to accept has been delegated, in advance of excavation, a detailed plan showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during excavation, of such trench or trenches. If such plan varies from the shoring system standards established by the Construction Safety Orders of the Division of Occupational Safety and Health, the plan shall be prepared by a registered civil or structural engineer employed by the Contractor, and all costs therefore shall be included in the price named in the Contract for completion of the Work as set forth in the Contract Documents. Nothing in this Section shall be deemed to allow the use of a shoring, sloping, or other protective system less effective than that required by the Construction Safety Orders. Nothing in this Section shall be construed to impose tort liability on SLVWD, the Engineer, or any of their directors, officers, agents, representatives, or employees. The California Construction Safety Orders in effect during the Work shall apply continuously until final acceptance of the Work.

M. Removal, Relocation, or Protection of Existing Utilities:

1. In accordance with the provisions of Section 4215 of the California Government Code, any Contract to which a public agency as defined in Section 4401 is a party, the public agency shall assume the responsibility, between the parties to the Contract, for the timely removal, relocation, or protection of existing main or trunk line utility facilities located on the site of any construction project that is a subject of the Contract, if such utilities are not identified by the public agency in the plans and specifications made a part of the invitation for bids. The agency will compensate Contractor for the costs of locating, repairing damage not due to the failure of the Contractor to exercise reasonable care, and removing or relocating such utility facilities not indicated in the plans and specifications with reasonable accuracy and for equipment on the project necessarily idled during such work.

2. The Contractor shall not be assessed liquidated damages for delay in completion of the project, when such delay was caused by the failure of the public agency or the owner of the utility to provide for removal or relocation of such utility facilities.

3. Nothing herein shall be deemed to require the public agency to indicate the presence of existing service laterals or appurtenances when the presence of such utilities on the site of the construction project can be inferred from the presence of other visible facilities, such as buildings, meter and junction boxes, on or adjacent to the site of construction; provided, however, nothing herein shall relieve the public agency from identifying main or trunk lines in the plans and specifications.

4. If the Contractor while performing the Contract discovers utility facilities not identified by the public agency in the Contract plans and specifications, it shall immediately notify the public agency and utility in writing.

5. The public utility, where they are the owner, shall have the sole discretion to perform such repair or relocation work or permit the Contractor to do such repair or relocation work at a reasonable price.

N. Contractor License Requirements: In accordance with Section 7028.15 of the California Business and Professions Code, a licensed Contractor shall not submit a bid to a public agency unless his or her Contractor's license number and expiration date appears clearly on the bid. Any bid not containing this information, or a bid containing information which is subsequently proven false, shall be considered non-responsive and shall be rejected by the public agency.

O. Resolution of Construction Claims:

1. In accordance with Section 20104 *et seq*. of the California Public Contract Code. This paragraph O applies to all claims of $375,000 or less which arise between the Contractor and SLVWD under this Contract for

   a. A time extension;

   b. Payment of money or damages arising from work done by or on behalf of the Contractor pursuant to this Contract and payment of which is not otherwise expressly provided for as the Contractor is not otherwise entitled; or

   c. An amount the payment of which is disputed by SLVWD.

2. For any claim set out in Paragraph O1.a, b. or c. above the following requirements apply:

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

   b. For claims of less than fifty thousand dollars ($50,000), SLVWD shall respond in writing to any written claim within forty-five (45) calendar days of receipt of the claim, or may request, in writing, within thirty (30) calendar days of receipt of the claim, any additional documentation supporting the claim or relating to defenses or claims SLVWD may have against the Contractor.

      If additional information is thereafter required, it shall be requested and provided pursuant to this subdivision, upon mutual agreement of SLVWD and the Contractor.

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

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

   If additional information is therefore required, it shall be requested and provided pursuant to this subdivision, upon mutual agreement of SLVWD and the Contractor.

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

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

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

3. The following procedures are established for all civil actions filed to resolve claims subject to this article:

   a. Within sixty (60) calendar days, but no earlier than thirty (30) calendar days, following the filing or responsive pleadings, the court shall submit the matter to nonbinding mediation unless waived by mutual stipulation of both parties. The mediation process shall provide for the selection within fifteen (15) calendar days by both parties of a disinterested third person as mediator, shall be commenced within thirty (30) calendar days of the submittal, and shall be concluded within fifteen (15) calendar days from the commencement of the mediation unless a time requirement is extended upon a good cause showing to the court. If the parties fail to select a mediator within the fifteen (15) calendar day period, any party may petition the court to appoint the mediator.

b. If the matter remains in dispute, the case shall be submitted to judicial arbitration pursuant to Chapter 2.5 (commencing with Section 1141.10) of Title 3 of Part 3 of the Code of Civil Procedure, notwithstanding Section 1141.11 of that code. The Civil Discovery Act (Title 4 (commencing with Section 2016.101) or Part 4 of the Code of Civil Procedure) shall apply to any proceeding brought under this subdivision consistent with the rules pertaining to judicial arbitration.

   Upon stipulation of the parties, arbitrators appointed for purposes of this Paragraph O.3 shall be experienced in construction law, and, upon stipulation of the parties, mediators and arbitrators shall be paid necessary and reasonable hourly rates of pay not to exceed their customary rate, and such fees and expenses shall be paid equally by the parties, except in case of arbitration where the arbitrator, for good cause, determines a different division. In no event shall these fees or expenses be paid by state or county funds.

   In addition to Chapter 2.5 (commencing with Section 1141.10) of Title 3 of Part 3 of the Code of Civil Procedure, any party who after receiving an arbitration award requests a trial de novo but does not obtain a more favorable judgment shall, in addition to payment of costs and fees under that chapter, pay the attorney's fees of the other party arising out of the trial de novo.

4. SLVWD shall not fail to pay money to any portion of a claim which is undisputed except as otherwise provided in this Contract.

5. In any suit filed under Section 20104.4 of the California Public Contract Code SLVWD shall pay interest at the legal rate on any arbitration award or judgment. The interest shall begin to accrue on the date the suit is filed in a court of law.

P. Digging trenches or excavations; notice on discovery of hazardous waste or other unusual conditions; investigations; change orders; effect on Contract. Pursuant Section 7104 of the California Public Contract Code, if this Contract involves digging trenches or other excavations that extend deeper than four (4) feet below the surface, the following shall apply:

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

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

2. Subsurface or latent physical conditions at the site differing from those indicated by information about the site made available to bidders prior to the deadline for submitting bids.

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

4. SLVWD shall promptly investigate the conditions, and if it finds that the conditions do materially so differ, or do involve hazardous waste, and cause a decrease or increase in the Contractor's cost of, or the time required for, performance of any part of the work shall issue a change order under the procedures described in the Contract.

5. In the event that a dispute arises between SLVWD 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 the time required for, performance of any part of the work, the Contractor shall not be excused from any scheduled completion date provided for by the Contract, but shall proceed with all Work to be performed under the Contract. The Contractor shall retain any and all rights provided either by Contract or by law which pertain to the resolution of disputes and protests between the contracting parties.

Q. Retention Proceeds; Withholding; Disbursement. In accordance with Section 7107 of the Public Contracts Code with respect to all Contracts entered into on or after January 1, 1993 relating to the construction of any public work of improvement the following shall apply:

1. The retention proceeds withheld from any payment by SLVWD from the original Contractor, or by the original Contractor from any subcontractor, shall be subject to this paragraph Q.

2. The retention will be paid 60 calendar days "after" the date when Notice of Completion was filed with the County Recorder's Office. In the event of a dispute between SLVWD and the original Contractor, SLVWD may withhold from the final payment an amount not to exceed one hundred and fifty percent (150%) of the disputed amount. For the purposes of this paragraph, "completion" means any of the following:

   a. The occupation, beneficial use, and enjoyment of a work of improvement, excluding any operation only for testing, startup, or commissioning, by SLVWD, accompanied by cessation of labor on the work of improvements.

   b. The acceptance by SLVWD of the work of improvement.

   c. After the commencement of a work of improvement, a cessation of labor on the work of improvement for a continuous period of 100 calendar days or more, due to factors beyond the control of the Contractor.

   d. After the commencement of a work of improvement, a cessation of labor on the work of improvement for a continuous period of 30 calendar days or more, if SLVWD files for record a notice of cessation or a notice of completion.

3. Subject to subparagraph 4, within seven (7) days from the time that all or any portion of the retention proceeds are received by the original Contractor, the original Contractor shall pay each of its subcontractors from whom retention has been withheld, each Subcontractor's share of the retention received. However, if a retention payment received by the original Contractor is specifically designated for a

particular Subcontractor, payment of the retention shall be made to the designated Subcontractor, if the payment is consistent with the terms of the subcontract.

4. The original Contractor may withhold from a Subcontractor its portion of the retention proceeds if a bona fide dispute exists between the Subcontractor and the original Contractor. The amount withheld from the retention payment shall not exceed one hundred and fifty percent (150%) of the estimated value of the disputed amount.

5. In the event that retention payments are not made within the time periods required by this paragraph Q, SLVWD or original Contractor shall be subject to a charge of two percent (2%) per month on the improperly withheld amount, in lieu of any interest otherwise due. Additionally, in any action for the collection of funds wrongfully withheld, the prevailing party shall be entitled to attorney's fees and costs.

6. Any attempted waiver of the provisions of this section shall be void as against the public policy of this state.

R. Subcontrators.

1. In compliance with the California Public Contract Code Section 4100 *et seq*., each bidder shall state in his bid the name and business address of each subcontractor who will perform work or a labor or render services to the Contractor in or about the construction of the Work in an amount in excess of one-half of one percent (0.5%) of the total bid amount, and the portion of the Work which will be done by each subcontractor.

2. Each portion of the Work shall be performed by an organization equipped and experienced to do the Work in the particular field, and no portion of the Work shall be reserved by the bidder or Contractor to himself unless he is so equipped and experienced.

3. Not more than one (1) subcontractor shall be listed for the same portion of the Work.

4. If a particular portion of the Work would be modified by an alternative bid or work in a bid item required by the bid, the bidder shall separately identify such portions of the Work, and list the subcontractors appropriately where they differ from those listed for the basic Work.

5. The substitution of Subcontractors shall comply with California Public Contract Code Sections 4107 and 4107.5. Prior to SLVWD approving Contractor's request for substitution, SLVWD shall give written notice to the listed Subcontractor of the Contractor's request and the reasons for the request. The listed Subcontractor will have five (5) days to submit written objections. Failure of the listed Subcontractor to submit written objections constitutes the listed Subcontractor's consent to the substitution. Requirements of General Conditions, Paragraph 2.11 and 10.2 shall also govern except where differing, in which instances the requirement of this Paragraph shall govern.

S. Notification of Third-Party Claim.

1. SLVWD shall notify the Contractor of the receipt of any third-party claim relating to the Contract within ten (10) work days of SLVWD's receipt of such claim.

2. SLVWD shall be entitled to recover its reasonable costs in providing the notification pursuant to this Paragraph S.

T. State Audit. The Contract shall be subject to the examination and audit of the State Auditor, at the request of SLVWD or as part of any audit of SLVWD, for a period of three (3) years after final payment under the Contract. The contracting parties shall be subject to that examination and audit.

U. Information Pursuant to California Labor Code Section 2810.

1. The Contractor shall complete and submit section 00648 pursuant to California Labor Code Section 2810. This form is a portion of the Contract Documents.

2. Any material change to the terms and conditions of the Contract shall be in writing, in a single document, and contain all of the provisions listed in Section 00648 that are affected by the change.

V. Public Works Contractor Registration Program: In compliance with Section 1725.5 of the California Labor Code, Contractor must be, and must require all Subcontractors be, registered with the DIR prior to execution of the Contract Agreement. Contractor and all Subcontractors who bid or work on, and/or who are awarded the Contract Agreement, must be registered with and pay an annual fee to the DIR. Neither Contractor nor any Subcontractors may be listed on the Bid Proposal unless registered with the DIR pursuant to Section 1725.5 of the Labor Code. Neither Contractor nor any Subcontractors may be awarded the Contract Agreement unless registered with the DIR pursuant to Section 1725.5 of the Labor Code. The project is subject to compliance monitoring and enforcement by the DIR. Contractor shall submit proof of current DIR registration, and shall require all Subcontractors to submit proof of current DIR registration, to SLVWD prior to commencing work on the project.

END OF SECTION 00800CA

SECTION 01 10 00

SUMMARY OF THE WORK

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Description of Work

B. Contractor Use of Site

C. Owner Use of Facilities

D. Project Meetings

1.02 DESCRIPTION OF WORK

A. The project generally consists of providing new water mains and residential water services in Quail Hollow Road with associated fittings, valves and hydrants, and abandoning the existing water main in-place, as shown on the project plans and detailed in the technical specifications. Provide 7,460 LF of 12-inch ductile iron pipe water main, 12 fire hydrants and four (4) residential water services. Provide one new air relief valve station. Provide traffic control during the work and repaving of the streets.

1.03 CONTRACTOR USE OF SITE

A. Quail Hollow Road is a county road. Encroachment permit is limited to the right-of-way width.

B. Project is within the Sand Hills Habitat, so parking and laydown areas are limited to paved surfaces. Refer to the Project Mitigation, Monitoring and Reporting Plan provided in the Appendix.

C. Contractor shall coordinate any additional staging and storage areas per Section 01 55 00.

1.04 OWNER USE OF FACILITIES

A. Maintain service to existing customers during the work. Coordinate with District staff for scheduled outages.

1.05 PROJECT MEETINGS

A. Preconstruction Conference:

1. Prior to the commencement of Work at the site, one preconstruction conference will be held at a mutually agreed time and place which shall be attended by the Contractor's Project Manager, its Superintendent, and its Subcontractors as the Contractor deems appropriate. Other attendees will be:
   a. Engineer.

b. Representatives of Owner.
c. Representatives of Property Owner.
d. Governmental representatives as appropriate.
e. Others as requested by Engineer, Contractor, or Owner.

2. The purpose of the conference is to designate responsible personnel and establish a working relationship. Matters requiring coordination will be discussed and procedures for handling such matters established. The complete agenda will be furnished to the Contractor prior to the meeting date. However, the Contractor should be prepared to discuss all of the items listed below.
   a. Status of Contractor's insurance and bonds.
   b. Contractor's tentative schedules.
   c. Processing applications for payment.
   d. Maintaining record documents.
   e. Critical work sequencing.
   f. Field decisions and Change Orders.
   g. Use of project site, office and storage areas, security, housekeeping, and Owner's needs.
   h. Major equipment deliveries and priorities.
   i. Contractor's assignments for safety and first aid.
   j. The Engineer will preside at the preconstruction conference and will arrange for keeping and distributing the minutes to all persons in attendance.
   k. The Contractor and its Subcontractors should plan on the conference taking 2 hours.

B. Progress Meetings:

1. The Contractor shall attend regular on-site progress meetings at least weekly -and at other times as requested by Engineer or as required by progress of the Work. The Contractor, Engineer, and all Subcontractors active on the site must attend each meeting. Contractor may at its discretion request attendance by representatives of its Suppliers, manufacturers, and other Subcontractors.
2. The Engineer shall preside at the meetings and will arrange for keeping and distributing the minutes. The purpose of the meetings will be to review the progress of the Work, maintain coordination of efforts, discuss changes in scheduling, and resolve other problems which may develop. During each meeting, the Contractor is required to present any issues which may impact his work, with a view to resolve these issues expeditiously.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 20 00

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Methods of Measurement

B. Description of Bid Items

1.02 METHODS OF MEASUREMENT

A. Materials and items of work which are to be paid for on the basis of measurement shall be measured in accordance with the method stipulated in the particular sections involved. In determining quantities, all measurements shall be made in a horizontal plane unless otherwise specified.

B. Measurements shall be in accordance with U.S. Standard Measures. A pound is an avoirdupois pound. A ton is 2,000 pounds avoirdupois. The unit of liquid measure is the U.S. gallon. The unit of length is feet. The unit of volume is cubic yards.

C. Material not used from a transporting vehicle shall be determined by the ENGINEER and deducted from the certified tag.

D. When material is to be measured and paid for on a volume basis and it would be impractical to determine the volume, or when requested by the CONTRACTOR in writing and approved by the ENGINEER in writing, the material will be weighed and converted to volume measurement for payment purposes. Factors for conversion from weight measurement to volume measurement will be determined by the ENGINEER and shall be agreed to by the CONTRACTOR before such method of measurement of pay quantities will be adopted.

E. Full compensation for all expense involved in conforming to the above requirements for measuring and weighing materials shall be considered as included in the unit prices paid for the materials being measured or weighed and no additional allowances will be made therefore.

F. Quantities of material wasted or disposed of in a manner not called for under the Contract; or rejected loads of material, including material rejected after it has been placed by reason of failure of the CONTRACTOR to conform to the provisions of the Contract; or material not unloaded from the transporting vehicle; or material placed outside the lines indicated on the plans or given by the ENGINEER; or material remaining on hand after completion of the Contract, will not be paid for and such quantities will not be included in the final total quantities. No compensation will be allowed for hauling rejected material.

G. Bid items include all work necessary to complete the specific item described and not otherwise included in other bid items. The CONTRACTOR shall include in each bid item

all costs required to construct the work in accordance with the Contract Documents and as identified below.

1.03 DESCRIPTION OF BID ITEMS

A. Bid Item 1: Mobilization/Demobilization.

1. The lump sum bid price for this item shall constitute full compensation for mobilization and demobilization including but not limited to equipment shipping and delivery, equipment set up, materials shipping and delivery, utility coordination, permitting including the Santa Cruz County Construction Permit, removal of equipment, and project closeout. The Mobilization/Demobilization bid item shall not be in excess of five percent (5%) of the total bid schedule. Twenty-five percent (25%) of the total Mobilization/Demobilization bid price shall be considered the cost of Demobilization and will not be paid until completion of the work.

B. Bid Item 2: Sheeting, Shoring and Bracing.

1. The lump sum bid price for this item shall constitute full compensation for all material, labor, equipment, tools, and services necessary to provide sheeting, shoring and bracing of excavations, trenches and grading as required in the Contract Documents. Cost shall include any engineering or geotechnical investigations performed by the CONTRACTOR.

C. Bid Item 3: Traffic Control

1. The lump sum bid price for this item shall constitute full compensation for all material, labor, equipment, tools, and services necessary to provide traffic control for the Work as required in the Contract Documents. Price shall include, but is not limited to, signage, flagmen, lights and barricades.

D. Bid Item 4: 12” Ductile Iron Water Main.

1. The unit price per linear foot shall constitute full compensation for all material, labor, equipment, tools, and services necessary to provide 12-inch ductile iron water main. Price shall include, but is not limited to, pipe, fittings, thrust restraints, temporary caps or plugs, disinfection, pressure testing, final connection to system, excavation, backfill, compaction, repaving and all other work or appurtenances required for a complete installation.
2. Price shall include tee fittings for fire hydrant laterals and flushing inlet laterals.
3. Include the cost of hydrant laterals and hydrant gate valves in the bid item for hydrants.
4. Include the cost of flushing inlet laterals and gate valves in the bid item for hydrants.
5. Measurement shall be along the final installed alignment, as measured in the field.

E. Bid Item 5: Connect to existing 12” HDPE Pipe (Cumora Lane).

1. The unit price per hot tap shall constitute full compensation for all material, labor, equipment, tools, and services necessary to provide a 10-inch on 12-inch hot tap of the existing HDPE water main near Cumora Lane. Price shall include, but is not limited to, tapping saddle, gate valve, 10 to 12 inch reducer, valve can, excavation, thrust restraint, backfill, compaction, repaving and all other work or appurtenances required for a complete installation.

F. Bid item 6: Connect to existing 12” DIP Pipe (W. Zayante).

1. The unit price per valve shall constitute full compensation for all material, labor, equipment, tools, and services necessary to connect the new 12-inch water main to the existing 12-inch water main in West Zayante Road. Price shall include, but is not limited to, tee, gate valves, valve cans, flexible couplings, excavation, thrust restraint, backfill, compaction, repaving and all other work or appurtenances required for a complete installation.

G. Bid Item 7: 1" Residential Service.

1. The unit bid price per service shall constitute full compensation for all material, labor, equipment, tools, and services necessary to replace existing water service laterals and meters. Price shall include, but is not limited to, tapping saddle, corporation stop, PE water service lateral, meter setter or angle stop, meter box, excavation, backfill, compaction, repaving and all other work or appurtenances required for a complete installation.
2. Item includes customer notifications with signage and door hangers.
3. Owner shall furnish replacement water meters, if needed.

H. Bid Item 8: 2" Air-Vac Valve.

1. The unit price per valve shall constitute full compensation for all material, labor, equipment, tools, and services necessary to provide a combination air-relief and vacuum breaker valve as shown on the Drawings. Price shall include, but not be limited to, tapping saddle, corporation stop, piping, concrete pedestal, valves, enclosure, excavation, backfill, compaction, repaving and all other work or appurtenances required for a complete installation.

I. Bid Item 9: Fire Hydrants.

1. The unit bid price per hydrant shall constitute full compensation for all material, labor, equipment, tools, and services necessary to provide a fire hydrant. Price shall include, but not be limited to, tee fitting, gate valve, ductile iron hydrant lateral, hydrant bury, break-away check valve, residential hydrant, concrete support block and collar, excavation, backfill, compaction, repaving and all other work or appurtenances required for a complete installation.

J. Bid Item 10: Abandon 6" AC Water Main in Quail Hollow Road

1. The lump sum bid price shall constitute full compensation for all material, labor, equipment, tools, and services necessary to abandon existing 6-inch Asbestos Cement water main as shown on the Drawings. Price shall include, but not be limited to, plugs, caps, fittings, grout, excavation, backfill, compaction, repaving and all other work or appurtenances required for a complete installation.
2. Item also includes removal of existing hydrants.

K. Bid Item 11: Additional AC Paving

1. The unit bid price per square yard shall constitute full compensation for all material, labor, equipment, tools, and services necessary to provide additional asphalt concrete paving, 4-inches thick, outside the limits of the T-cut for trench restoration.
2. Measurement shall be in-place limits of the additional pavement (length x width).
3. This Bid Item establishes a unit rate for additional unforeseen work.

L. Bid Item 12: Permits Allowance

1. This allowance is for the reimbursement of the permit fees charged by the County of Santa Cruz for Encroachment Permits. The value of this allowance is pre-entered in the Bid Form.
2. Payment under this item shall be for the actual cost of the permit fees, as reflected on the issuing agency invoices. Contractor's costs with respect to obtaining permits shall be included under other Bid items, as applicable.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 30 00

CONTRACTOR SUBMITTALS

PART 1 - GENERAL

1.01 GENERAL

A. Wherever submittals are required hereunder, all such submittals by the Contractor shall be submitted to the Engineer.

B. Prior to receiving Notice to Proceed, the Contractor shall submit a Site Specific Safety Plan addressing the requirements of Article 13 of the General Conditions.

C. Within 14 days after the date of commencement as stated in the Notice to Proceed or at Preconstruction Conference, whichever occurs earliest, the Contractor shall submit the following items to the Engineer for review:

1. A preliminary schedule of Shop Drawings, Samples, and proposed Substitutes ("Or-Equal") submittals listed in the Bid.
2. A list of all permits and licenses the Contractor shall obtain indicating the agency required to grant the permit and the expected date of submittal for the permit and required date for receipt of the permit.

1.02 PRECONSTRUCTION CONFERENCE SUBMITTALS

A. At the preconstruction conference referred to in Section 01100, “Summary of Work,” the Contractor shall submit the following items to the Engineer for review:

1. A preliminary schedule of Shop Drawings, Samples, and proposed Substitute ("Or-Equal") submittals listed in the Bid.
2. A list of all permits and licenses the Contractor shall obtain indicating the agency required to grant the permit, the expected date of submittal for the permit, and required date for receipt of the permit.
3. Construction schedule for entire project.
4. A preliminary schedule of values for lump sum pay items.

1.03 SHOP DRAWINGS

A. Shop drawings may be submitted electronically (.pdf format print or scan) via e-mail. If submitting by e-mail, confirm the receipt of large file attachments. The term "Shop Drawings" as used herein shall be understood to include detail design calculations, shop drawings, fabrication, and installation drawings, erection drawings, lists, graphs, catalog sheets, data sheets, and similar items. Whenever the Contractor is required to submit design calculations as part of a submittal, such calculations shall bear the signature and seal of an Engineer registered in the appropriate engineering branch and in the State of California, unless otherwise directed.

B. Wherever hard copy original submittals are called for in the Contract Documents or required by the Engineer, the Contractor shall furnish to the Engineer for review, 8 copies of each shop drawing submittal.

C. Normally, a separate transmittal form shall be used for each specific item or class of material or equipment for which a submittal is required. Transmittal of a submittal of various items using a single transmittal form will be permitted only when the items taken together constitute a manufacturer's "package" or are so functionally related that expediency indicates review of the group or package as a whole. A multiple-page submittal shall be collated into sets, and each set shall be stapled or bound, as appropriate, prior to transmittal to the Engineer.

D. Except as may otherwise be indicated herein, the Engineer will return each submittal to the Contractor with its comments noted thereon, within 7 working days following their receipt by the Engineer. It is considered reasonable that the Contractor shall make a complete and acceptable submittal to the Engineer by the second submission of a submittal item. The OWNER reserves the right to withhold monies due to the Contractor to cover additional costs of the Engineer's review beyond the second submittal. The Engineer's maximum review period for each submittal, including all resubmittals, will be 7 working days per submittal. In other words, for a submittal that requires two resubmittals before it is complete, the maximum review period for that submittal could be 14 working days. No extension of Contract Time will be granted for delays due to resubmittals that are reviewed within the number of days specified.

E. If a submittal is returned to the Contractor marked "NO EXCEPTIONS TAKEN," no revisions are required.

F. If a submittal is returned to the Contractor marked "MAKE CORRECTIONS NOTED," the noted revisions must be made but resubmission of said submittal will not be required.

G. If a submittal is returned to the Contractor marked "REVISE AND RESUBMIT," the Contractor shall revise said submittal and shall resubmit the required number of copies of said revised submittal to the Engineer.

H. If a submittal is returned to the Contractor marked "REJECTED-RESUBMIT," the Contractor shall revise said submittal and shall resubmit the required number of copies of said revised submittal to the Engineer.

I. Submittals which are for information only or which must be reviewed and approved by a permitting jurisdiction will be marked “RECEIPT ACKNOWLEDGED” by the Engineer.

J. Fabrication of an item shall be commenced only after the Engineer has reviewed the pertinent submittals and returned copies to the Contractor marked either “NO EXCEPTIONS TAKEN” or “MAKE CORRECTIONS NOTED.” Corrections indicated on submittals shall be considered as changes necessary to meet the requirements of the Contract Documents and shall not be taken as the basis for changes to the contract requirements.

K. All Contractor shop drawings submittals shall be carefully reviewed by an authorized representative of the Contractor, prior to submittal to the Engineer. Each submittal shall be dated, signed, and certified by the Contractor, as being correct and in strict conformance

with the Contract Documents. In the case of shop drawings, each sheet shall be so dated, signed, and certified. No consideration for review by the Engineer of any Contractor submittals will be made for any items which have not been so certified by the Contractor. All non-certified submittals will be returned to the Contractor without action taken by the Engineer, and any delays caused thereby shall be the total responsibility of the Contractor.

L. The Engineer's review of Contractor shop drawings submittals shall not relieve the Contractor of the entire responsibility for the correctness of details and dimensions. The Contractor shall assume all responsibility and risk for any misfits due to any errors in Contractor submittals. The Contractor shall be responsible for the dimensions and the design of connections between provided items (parts must fit together) and for the anchorage of supplied equipment when not detailed on the design drawings.

1.04 CONTRACTOR'S SCHEDULE

A. Prepare construction schedule showing sequence of activities and proposed shutdowns.

B. Submit a preliminary construction schedule not later than the Pre Construction Meeting.

C. Update construction schedule on monthly basis and submit with request for Progress Payment.

1.05 RECORD DRAWINGS

A. The Contractor shall keep and maintain, at the job site, one record set of Drawings. On these, it shall mark all project conditions, locations, configurations, and any other changes or deviations which may vary from the details represented on the original Contract Drawings, including buried or concealed construction and utility features which are revealed during the course of construction. Special attention shall be given to recording the horizontal and vertical location of all buried utilities that differ from the locations indicated, or which were not indicated on the Contract Drawings. Said record drawings shall be supplemented by any detailed sketches as necessary or directed to indicate, fully, the WORK as actually constructed. These master record drawings of the Contractor's representation of as-built conditions, including all revisions made necessary by addenda and change orders shall be maintained up-to-date during the progress of the WORK. Copies of the modified record drawings shall be submitted on completion of WORK.

B. Record drawings shall be accessible to the Engineer at all times during the construction period. Owner may hold a progress payment amount of $5,000 until Contract Record Drawings are up-to-date.

C. Final payment will not be acted upon until the Contractor’s record drawings have been prepared and delivered to the Engineer. Said up-to date record drawings shall be in the form of a set of Contract Documents prints with any changes from the original Contract Documents carefully plotted on the prints in red ink.

D. Upon substantial completion of the WORK and prior to final acceptance, the Contractor shall finalize and deliver a complete set of record drawings to the Engineer for transmittal to the OWNER, conforming to the construction records of the Contractor. This set of drawings shall consist of corrected drawings showing the reported location of the WORK. The information submitted by the Contractor and incorporated by the Engineer into the

Record Drawings will be assumed to be correct, and the Contractor shall be responsible for the accuracy of such information, and for any errors or omissions which may appear on the Record Drawings as a result.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 41 00

REFERENCE STANDARDS

PART 1 - GENERAL

1.01 GENERAL

A. Titles of Sections and Paragraphs

1. Captions accompanying specification sections and paragraphs are for convenience of reference only, and do not form a part of the Specifications.

B. Applicable Publications

1. Whenever in these Specifications references are made to published specifications, codes, standards, or other requirements, it shall be understood that wherever no date is specified, only the latest specifications, standards, or requirements of the respective issuing agencies which have been published as of the date that the Work is advertised for bids, shall apply; except to the extent that said standards or requirements may be in conflict with applicable laws, ordinances, or governing codes. No requirements set forth herein or shown on the Drawings shall be waived because of any provision of, or omission from, said standards or requirements.

C. Specialists, Assignments

1. In certain instances, specification text requires (or implies) that specific work is to be assigned to specialists or expert entities, who must be engaged for the performance of that work. Such assignments shall be recognized as special requirements over which the Contractor has no choice or option. These requirements shall not be interpreted so as to conflict with the enforcement of building codes and similar regulations governing the Work; also they are not intended to interfere with local union jurisdiction settlements and similar conventions. Such assignments are intended to establish which party or entity involved in a specific unit of work is recognized as "expert" for the indicated construction processes or operations. Nevertheless, the final responsibility for fulfillment of the entire set of contract requirements remains with the Contractor.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Without limiting the generality of other requirements of the Specifications, all work specified herein shall conform to or exceed the requirements of applicable codes and the applicable requirements of the following documents.

B. All Work within this Project is subject to the requirements of the California Building Standards Code. The latest edition of the code as approved by California Building Standards Commission and used by the local agency as of the date that the Work is advertised for bids, or as adopted by the agency having jurisdiction, shall apply to the Work herein, including all addenda, modifications, amendments, or other lawful changes thereto. References herein to:

1. "Building Code" or "Uniform Building Code" shall mean the California Building Code;

2. "Mechanical Code' or "Uniform Mechanical Code" shall mean the California Mechanical Code;
3. "Plumbing Code' or "Uniform Plumbing Code" shall mean the California Plumbing Code;
4. “Fire Code" or "Uniform Fire Code," shall mean the California Fire Code;
5. "Electric Code" or "National Electric Code (NEC)" shall mean the California Electrical Code.

C. In case of conflict between codes, reference standards, drawings and the other Contract Documents, the most stringent requirements shall govern. All conflicts shall be brought to the attention of the Engineer for clarification and directions prior to ordering or providing any materials or furnishing labor. The Contractor shall bid for the most stringent requirements.

D. The Contractor shall construct the Work specified herein in accordance with the requirements of the Contract Documents and the referenced portions of those referenced codes, standards, and specifications listed herein.

1. References in the Contract Documents to "CALTRANS Standard Specifications" shall mean the State of California Department of Transportation Standard Specifications and Standard Plans. The Contractor should be prepared to distinguish between these two references.
2. References herein to "OSHA Regulations for Construction" shall mean Title 29, Part 1926, Construction Safety and Health Regulations, Code of Federal Regulations (OSHA), including all changes and amendments thereto.
3. References herein to "OSHA Standards" shall mean Title 29, Part 1910, Occupational Safety and Health Standards, Code of Federal Regulations (OSHA), including all changes and amendments thereto.
4. Applicable Safety Standards
5. References herein to "Cal-OSHA" shall mean State of California Department of Industrial Relations, Construction Safety Orders, as amended to date, and all changes and amendments thereto.
6. Accessibility requirements shall conform to Title 24 of the California Administration Code and ADA Guidelines.

1.03 REGULATIONS RELATED TO CONSTRUCTION ACTIVITIES.

A. The Contractor is responsible that all Work included in the Contract Documents, regardless if shown or not, shall comply with all EPA, OSHA, RCRA, NFPA, and any other Federal, State, and Local Regulations governing construction activities, as referenced in Section 00700, General Conditions, and Section 00800CA, California State Requirements.

1.04 REGULATIONS RELATED TO HAZARDOUS MATERIALS

A. The Contractor is responsible that all Work included in the Contract Documents, regardless if shown or not, shall comply with all EPA, OSHA, RCRA, NFPA, and any other Federal, State, and Local Regulations governing the storage and conveyance of hazardous materials, including petroleum products.

B. Where no specific regulations exist, all chemical, hazardous, and petroleum product piping and storage in underground locations must be installed with double containment piping and tanks, or in separate concrete trenches and vaults, or with an approved lining which cannot be penetrated by the chemicals, unless waived in writing by the OWNER.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 42 00

ABBREVIATIONS OF INSTITUTIONS

PART 1 - GENERAL

1.01 GENERAL

A. Wherever in these Specifications references are made to the standards, specifications, or other published data of the various international, national, regional, or local organizations, such organizations may be referred to by their acronym or abbreviation only. As a guide to the user of these Specifications, the following acronyms or abbreviations which may appear in these Specifications shall have the meanings indicated herein.

1.02 ABBREVIATIONS

AAMA	Architectural Aluminum Manufacturer's Association
AAR	Association of American Railroads
AASHTO	American Association of State Highway and Transportation Officials
AATCC	American Association of Textile Chemists and Colorists
ACI	American Concrete Institute
AFBMA	Anti-Friction Bearing Manufacturer's Association, Inc.
AGA	American Gas Association
AGMA	American Gear Manufacturers Association
AHAM	Association of Home Appliance Manufacturers
AI	The Asphalt Institute
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AMCA	Air Moving and Conditioning Association
ANS-	American Nuclear Society
ANSI	American National Standards Institute, Inc.

APA	American Plywood Association
API	American Petroleum Institute
APWA	American Public Works Association
ASA	Acoustical Society of America
ASAE	American Society of Agricultural Engineers
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engineers
ASLE	American Society of Lubricating Engineers
ASME	American Society of Mechanical Engineers
ASQC	American Society for Quality Control
ASSE	American Society of Sanitary Engineers
ASTM	American Society for Testing and Materials
AWPA	American Wood Preservers Association
AWPI	American Wood Preservers Institute
AWS	American Welding Society
AWWA	American Water Works Association
BBC	Basic Building Code, Building Officials and Code Administrators International
BHMA	Builders Hardware Manufacturer's Association
CBM	Certified Ballast Manufacturers
CEMA	Conveyors Equipment Manufacturer's Association
CGA	Compressed Gas Association
CLPCA	California Lathing and Plastering Contractors Association
CLFMI	Chain Link Fence Manufacturer's Institute
CMA	Concrete Masonry Association
CRSI	Concrete Reinforcing Steel Institute

DCDMA	Diamond Core Drill Manufacturer's Association
EIA	Electronic Industries Association
ETL	Electrical Test Laboratories
EPA	Environmental Protection Agency
FM	Factory Mutual System
FPL	Forest Products Laboratory
HI	Hydronics Institute
APMO	International Association of Plumbing and Mechanical Officials
ICBO	International Conference of Building Officials
IEEE	Institute of Electrical and Electronics Engineers
IES	Illuminating Engineering Society
IME	Institute of Makers of Explosives
IP	Institute of Petroleum (London)
IPC	Institute of Printed Circuits
IPCEA	Insulated Power Cable Engineers Association
ISA	Instrument Society of America
ISO	International Organization for Standardization
ITE	Institute of Traffic Engineers
MBMA	Metal Building Manufacturer's Association
MPTA	Mechanical Power Transmission Association
MSS	Manufacturers Standardization Society
MTI	Marine Testing Institute
NAAMM	National Association of Architectural Metal Manufacturer's
NACE	National Association of Corrosion Engineers
NBS	National Bureau of Standards
NCCLS	National Committee for Clinical Laboratory Standards

NEC	National Electrical Code
NEMA	National Electrical Manufacturer's Association
NFPA	National Fire Protection Association
NFPA	National Forest Products Association
NLGI	National Lubricating Grease Institute
NMA	National Microfilm Association
NSF	National Sanitation Foundation
NWMA	National Woodwork Manufacturers Association
OSHA	Occupational Safety and Health Administration
PCA	Portland Cement Association
PPI	Plastics Pipe Institute
RCRA	Resource Conservation and Recovery Act
RIS	Redwood Inspection Service
RVIA	Recreational Vehicle Industry Association
RWMA	Resistance Welder Manufacturer's Association
SAE	Society of Automotive Engineers
SAMA	Scientific Apparatus Makers Association
SMA	Screen Manufacturers Association
SMACCNA	Sheet Metal and Air Conditioning Contractors National Association
SPI	Society of the Plastics Industry, Inc.
SPIB	Southern Pine Inspection Bureau
SPR	Simplified Practice Recommendation
SSA	Swedish Standards Association
SSBC	Southern Standard Building Code, Southern Building Code Congress
SSPC	Steel Structures Painting Council
SSPWC	Standard Specifications for Public Works Construction

TAPPI	Technical Association of the Pulp and Paper Industry
TFI	The Fertilizer Institute
UBC	Uniform Building Code
UL	Underwriters Laboratories, Inc.
WCLIB	West Coast Lumber Inspection Bureau
WCRSI	Western Concrete Reinforcing Steel Institute
WEF	Water Environment Federation
WIC	Woodwork Institute of California
WRI	Wire Reinforcement Institute, Inc.
WWPA	Western Wood Products Association

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 53 00

PROTECTION OF EXISTING FACILITIES

PART 1 - GENERAL

1.01 GENERAL

A. The Contractor shall protect all existing utilities and improvements not designated for removal and shall restore damaged or temporarily relocated utilities and improvements to a condition equal to or better than they were prior to such damage or temporary relocation, all in accordance with requirements of the Contract Documents.

B. The Contractor shall verify the exact locations and depths of existing utilities shown that will be affected by the work. Contractor shall make exploratory excavations as necessary to confirm locations shown. The depths shown for existing underground utilities are based on record drawings, limited potholing, and survey information, and are approximate only (± 1 foot vertical and ± 5 feet horizontal). Where the depths are not shown, no such information was obtained during design. When such exploratory excavations show the utility location as shown to be in error, the Contractor shall immediately notify the Engineer when existing utilities are not as shown on the drawings.

C. Prior to any excavation in the vicinity of any existing underground facilities, including all water, sewer, storm drain, gas, petroleum products, or other pipelines; all buried electric power, communications, or television cables; all traffic signal and street lighting facilities; and all roadway and state highway rights-of-way the Contractor shall notify the respective authorities representing the owners or agencies responsible for such facilities. The Contractor shall also notify Underground Service Alert-North at 1-800-227-2600 at least 2 days, but no more than 14 days, prior to such excavation.

D. Contractor shall photograph and document all project sites before and after construction. Contractor shall provide the Engineer with site pictures before work begins. Contractor shall provide the Engineer with photographs of completed work before requesting final payment.

1.02 PROTECTION OF STREET OR ROADWAY MARKERS AND MONUMENTS

A. The Contractor shall not destroy, remove, or otherwise disturb any existing survey markers or other existing street or roadway markers without proper authorization. No pavement breaking or excavation shall be started until all survey or other permanent marker points that will be disturbed by the construction operations have been properly referenced. All survey markers or points disturbed by the Contractor shall be restored accurately after all street or roadway resurfacing has been completed.

1.03 RESTORATION OF PAVEMENT

A. General: All paved areas including asphaltic concrete berms cut or damaged during construction shall be replaced with similar materials and of at least equal thickness to match the existing adjacent undisturbed areas. All pavements which are subject to partial

removal shall be neatly saw cut in straight lines. All pavement restoration shall conform to the requirements of the Santa Cruz County Encroachment Permit.

B. Temporary Resurfacing: Wherever required by the public authorities having jurisdiction, the Contractor shall place temporary surfacing promptly after backfilling and shall maintain such surfacing for the period of time fixed by said authorities before proceeding with the final restoration of improvements. Temporary surfacing shall be replaced with permanent pavement within no more than 5 days after completion of work in an area. At no time shall the Contractor have more than 2,000 feet of trench with temporary surfacing.

C. Restoration of Sidewalks or Private Driveways: Wherever sidewalks or private roads have been removed for purposes of construction, the Contractor shall place suitable temporary sidewalks or roadways promptly after backfilling and shall maintain them in satisfactory condition for the period of time fixed by the authorities having jurisdiction over the affected portions before proceeding with the final restoration or, if no such period of times is so fixed, the Contractor shall maintain said temporary sidewalks or roadways until the final restoration thereof has been made.

1.04 EXISTING UTILITIES AND IMPROVEMENTS

A. General

1. The Contractor shall protect all Underground Utilities and other improvements which may be impaired during construction operations. It shall be the Contractor's responsibility to ascertain the actual location of all existing utilities and other improvements that will be encountered in its construction operations, and to see that such utilities or other improvements are adequately protected from damage due to such operations. The Contractor shall take all possible precautions for the protection of unforeseen utility lines to provide for uninterrupted service and to provide such special protection as may be necessary. The following clearances shall be met for gas mains and electric lines encountered:
   a. Five feet from power pole to edge of straight trench.
   b. Three feet from edge of slope for sloped trench.
   c. Five feet from anchor blocks.
   d. Three feet from edge of gas main to edge of pipeline.
   e. One foot minimum crossing of gas main with pipeline.
   f. A minimum of ten radial feet from the conductors on overhead power lines.
2. Clearances to be met for telephone are the following:
   a. Five feet for anchor blocks and telephone poles.
   b. Three feet for sloped trench.

B. Utilities to be Moved:

1. In case it shall be necessary to move the property of any public utility or franchise holder, such utility company or franchise holder will, upon request of the Contractor, be notified by the Owner to move such property within a specified reasonable time. When utility lines that are to be removed are encountered within the area of operations, the Contractor shall notify the Engineer a sufficient time in advance for the necessary measures to be taken to prevent interruption of service.

C. Where the proper completion of the Work requires the temporary or permanent removal and/or relocation of an existing utility or other improvement which is indicated, the

Contractor shall remove and, without unnecessary delay, temporarily replace or relocate such utility or improvement in a manner satisfactory to the Engineer and the owner of the facility. In all cases of such temporary removal or relocation, restoration to former location shall be accomplished by the Contractor in a manner that will restore or replace the utility or improvement as nearly as possible to its former locations and to as good or better condition than found prior to removal. The Contractor shall arrange with the utility for utility poles to be moved whenever any of the clearances described above cannot be maintained. Contractor shall pay for such utility pole relocation. No extra compensation shall be paid to the Contractor for movement of utility poles.

D. Owner's Right of Access:

1. The right is reserved to the Owner and to the owners of public utilities and franchises to enter at any time upon any public street, alley, right-of-way, or easement for the purpose of making changes in their property made necessary by the Work of this Contract.

E. Underground Utilities Indicated:

1. Existing utility lines that are indicated or the locations of which are made known to the Contractor prior to excavation and that are to be retained, and all utility lines that are constructed during excavation operations shall be protected from damage during excavation and backfilling and, if damaged, shall be immediately repaired or replaced by the Contractor.

F. Underground Utilities Not Indicated:

1. In the event that the Contractor damages any existing utility lines that are not indicated or the locations of which are not made known to the Contractor prior to excavation, a written report thereof shall be made immediately to the Engineer.

G. Approval of Repairs:

1. All repairs to a damaged utility or improvement are subject to inspection and approval by an authorized representative of the utility or improvement owner before being concealed by backfill or other work.

H. Maintaining in Service:

1. All oil and gasoline pipelines, power, and telephone or the communication cable ducts, gas and water mains, irrigation lines, sewer lines, storm drain lines, poles, and overhead power and communication wires and cables encountered along the line of the Work shall remain continuously in service during all the operations under the Contract, unless other arrangements satisfactory to the Engineer are made with the owner of said pipelines, duct, main, irrigation line, sewer, storm drain, pole, or wire or cable. The Contractor shall be responsible for all damage due to its operations, and the provisions of this Section shall not be abated even in the event such damage occurs after backfilling or is not discovered until after completion of the backfilling.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 55 00

SITE ACCESS AND STORAGE

PART 1 - GENERAL

1.01 HAUL ROADWAYS

A. The Contractor shall make its own investigation of the condition of available public and private roads and of clearances, restrictions, bridge load limits, and other limitations affecting transportation and ingress and egress to the site of the Work.

B. Provide traffic control as specified in Section 01 57 00.

1.02 CONTRACTOR'S WORK AND STORAGE AREA

A. The Contractor shall make its own arrangements for any necessary off-site storage or shop areas necessary for the proper execution of the Work.

B. Contractor shall be responsible for the security of its equipment, materials, and facilities stored in the temporary staging and storage areas.

C. Contractor shall not use temporary staging and storage areas for maintenance of vehicles and equipment used in constructing the Work without prior approval by the Owner.

D. Project is within the Sand Hills Habitat, so parking and laydown areas are limited to paved surfaces. Refer to the Project Mitigation, Monitoring and Reporting Plan provided in the Appendix.

1.03 PARKING

A. The Contractor shall direct its employees to park in areas that do not interfere with traffic or access to the adjacent parcels. Parking on unpaved areas is prohibited.

B. Traffic and parking areas shall be maintained in a sound condition, free of excavated material, construction equipment, mud, and construction materials. The Contractor shall repair breaks, potholes, low areas which collect standing water, and other deficiencies.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 56 00

TEMPORARY ENVIRONMENTAL CONTROLS

PART 1 - GENERAL

1.01 EXPLOSIVES AND BLASTING

A. The use of explosives on the Work will not be permitted.

1.02 DUST AND MUD ABATEMENT

A. The Contractor shall furnish all labor, equipment, and means required and shall carry out effective measures wherever and as often as necessary to prevent its operation from producing dust and/or mud in amounts damaging to property, cultivated vegetation, or domestic animals, or causing a nuisance to persons living in or occupying buildings in the vicinity. The Contractor shall be responsible for any damage resulting from any dust and/or mud originating from its operations. The dust or mud abatement measures shall be continued until the Contractor is relieved of further responsibility by the Engineer.

1.03 RUBBISH CONTROL

A. During the progress of the Work, the Contractor shall keep the site of the Work and other areas used by it in a neat and clean condition, and free from any accumulation of rubbish. The Contractor shall dispose of all rubbish and waste materials of any nature occurring at the Work site and shall establish regular intervals of collection and disposal of such materials and waste. The Contractor shall also keep its haul roads free from dirt, rubbish, and unnecessary obstructions resulting from its operations. Disposal of all rubbish and surplus materials shall be off the site of construction in accordance with local codes and ordinances governing locations and methods of disposal, and in conformance with all applicable safety laws, and to the particular requirements of Part 1926 of the OSHA Safety and Health Standards for Construction.

1.04 SANITATION

A. Toilet Facilities: Fixed or portable chemical toilets shall be provided wherever needed for the use of employees. Toilets at construction job sites shall conform to the requirements of Part 1926 of the OSHA Standards for Construction.

B. Sanitary and Other Organic Wastes: The Contractor shall establish a regular daily collection of all sanitary and organic wastes. All wastes and refuse from sanitary facilities provided by the Contractor or organic material wastes from any other source related to the Contractor's operations shall be disposed of away from the site in a manner satisfactory to the Engineer and in accordance with all laws and regulations pertaining thereto.

1.05 CHEMICALS

A. All chemicals used during project construction or furnished for project operation, whether defoliant, soil sterilant, herbicide, pesticide, disinfectant, polymer, reactant or of other

classification, shall show approval of either the U.S. Environmental Protection Agency or the U.S. Department of Agriculture. Use of all such chemicals and disposal of residues shall be in strict accordance with the printed instructions of the manufacturer.

B. All chemicals used during the project construction or furnished for project operation, whether defoliant, soil sterilant, herbicide, pesticide, fertilizer, disinfectants, polymers, reactants, fuel, oil, hydraulic fluid, detergent, paint, solvent, glue, or any other classification, shall be stored within a containment area that minimizes contact of the chemicals and the storage containers with surface waters. The Contractor shall notify the Engineer to determine if the surface water has been contaminated or may be allowed to be discharged to the storm drains or stream channels. If the surface water flows have become contaminated due to contact with the chemicals or the storage containers, the Contractor shall provide for removal and/or treatment of the surface water flows at no additional costs to the Owner. If spills occur in the containment area, the Contractor shall immediately notify the Engineer and contain and cleanup the spill to prevent spilled material from entering storm drains, stream channels, or groundwater or from being absorbed by the underlying pavement or soil.

1.06 TRENCH SPOILS DISPOSAL

A. All trench spoils shall be hauled in trucks fitted with tarps and tailgates. Contractor shall provide photographic documentation of compliance for all loads.

B. All trench spoils shall be disposed of at suitable sites retained by the Contractor and in compliance with fill and grading permits, copies of which shall be provided to the Engineer.

C. If disposing of trench spoils on private property, Contractor shall provide a release of liability from property owner upon construction completion.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 57 00

TRAFFIC REGULATION

PART 1 - GENERAL

1.01 TRAFFIC CONTROL REQUIREMENTS

A. Traffic control plans shall comply with the encroachment permit issued by the County of Santa Cruz.

B. Contractor shall supply and install all traffic control devices (including all warning, regulatory and guide signs) as required in Section 7-1.08, "Public Convenience," 7-1.09, "Public Safety," and 12, "Construction area Traffic Control Devices," of the CALTRANS Standard Specifications.

C. Contractor shall furnish traffic control plans for approval by County of Santa Cruz Public Works a minimum of two (2) full working days prior to the preconstruction meeting. The traffic control plans must be approved by the County prior to any installation of traffic control devices. Submit a copy of the plans to the Engineer "For Information Only".

D. The traffic control plans shall be to scale and complete for each significant portion of the work requiring lane closures, traffic detours and/or restriction of traffic movements. The traffic control plans shall indicate the work area, all proposed signs, the spacing and location of all traffic control devices (arrow boards, flagmen, barricades, cones, pylon construction markers, etc.) the limits of proposed parking prohibitions, and the width and location of any rerouted traffic lanes.

E. All open trenches must be adequately delineated by use of acceptable warning signs and devices during non-construction hours. The Contractor shall devise a typical plan indicating the type and spacing of barricades, signs, arrow boards, warning lights, pylon construction markers, construction tape, etc. to be used during non-construction hours. This plan must be submitted to the Engineer at the preconstruction meeting for review and approval.

F. It is imperative that field traffic control be handled in such a manner as to adequately and safely direct all traffic movements in the project area. The Contractor shall not be allowed to proceed with construction at any time that, in the opinion of the Engineer, traffic control is inadequate to meet the field conditions. Traffic control measures, in addition to those indicated on the approved traffic control plans may be required as field conditions dictate.

1.02 TEMPORARY CROSSINGS

A. General:

1. Continuous, unobstructed, safe, and adequate pedestrian and vehicular access shall be provided to fire hydrants, commercial, agricultural and industrial establishments, churches, schools, parking lots, service stations, motels, fire and police stations, and hospitals. Safe and adequate public transportation stops and pedestrian crossings at intervals not exceeding 500 feet shall be provided. The Contractor shall cooperate with

parties involved in the delivery of mail and removal of trash and garbage so as to maintain existing schedules for such services. Vehicular access to residential driveways shall be maintained to the property line except when necessary construction precludes such access for reasonable periods of time.

B. Temporary Bridges:

1. Wherever necessary, the Contractor shall provide suitable temporary bridges or steel plates over unfilled excavations. All such bridges or steel plates shall be maintained in service until access is provided across the backfilled excavation. Temporary bridges or steel plates for street and highway crossing shall conform to the requirements of the authority having jurisdiction in each case, and the Contractor shall adopt designs furnished by said authority for such bridges or steel plates, or shall submit designs to said authority for approval, as may be required. If Contractor does not consider temporary bridge or steel plates necessary. Contractor shall secure written approval to omit the steel plates from the Engineer prior to excavation

1.03 STREET USE

A. Nothing herein shall be construed to entitle the Contractor to the exclusive use of any public street, alleyway, or parking area during the performance of the Work hereunder, and it shall so conduct its operations as not to interfere unnecessarily with the authorized work of utility companies or other agencies in such streets, alleyways, or parking areas. No street shall be closed to the public without first obtaining permission of the Engineer and proper governmental authority. Where excavation is being performed in primary streets or highways, one lane in each direction shall be kept open to traffic at all times unless otherwise indicated. Toe boards shall be provided to retain excavated material if required by the Engineer or the agency having jurisdiction over the street or highway. Fire hydrants on or adjacent to the Work shall be kept accessible to firefighting equipment at all times. Temporary provisions shall be made by the Contractor to assure the use of sidewalks and the proper functioning of all gutters, storm drain inlets, and other drainage facilities.

B. Do not block driveway access to adjacent properties without the consent of the affected landowner.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 57 20

EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

1.01 SECTION INCLDUES

A. General erosion and sediment controls and other control-related practices. Provide and maintain erosion and sediment controls until the site is finally stabilized or as directed by Engineer. Contractor shall prepare, submit and obtain SWPPP permit from State. Contractor shall prepare and submit all required documentation to State and Owner throughout project duration.

B. Filter Fabric Fences:

1. Type 1: Temporary filter fabric fences for erosion and sediment control in non-channelized flow areas.
2. Type 2: Temporary reinforced filter fabric fences for erosion and sediment control in channelized flow areas.
3. Straw Bale Fence.
4. Dust controls are specified in Section 01 56 00 – Temporary Facilities and Controls.

1.02 REFERENCES

A. National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities, Order No. 2009-0009-DWQ, NPDES No. CAS000002, State Water Resources Control Board

B. Stormwater Best Management Practice Handbook, Construction, California Stormwater Quality Association (CASQA), January 2003

C. Caltrans Storm Water Quality Handbook, Construction Site Best Management Practices Manual, March 1, 2003

D. ASTM:

1. D3786 - Standard Test Method for Hydraulic Bursting Strength for Knitted Goods and Nonwoven Fabrics.
2. D4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.

1.03 SYSTEM DESCRIPTIONS

A. Filter Fabric Fence Type 1 and Type 2: Install to allow surface or channel runoff percolation through fabric in sheet-flow manner and to retain and accumulate sediment. Maintain Filter Fabric Fences to remain in proper position and configuration at all times.

B. Straw Bale Fence: Install to allow surface runoff percolation through straw in sheet-flow manner and to retain and accumulate sediment. Maintain Straw Bale Fence to remain in proper position and configuration at all times.

1.04 SUBMITTALS

A. Follow Section 01 30 00 – Contractor Submittals.

B. Submit manufacturer's catalog sheets and other product data on filter fabric and wire fencing.

C. Submit the Storm Water Pollution Prevention Plan (SWPPP) prior to Notice to Proceed.

D. Submit documentation verifying SWPPP compliance, including periodic inspection records and post-rain event reports. Contractor shall maintain SWPPP documentation on construction site and make available for review by Owner when requested.

PART 2 - PRODUCTS

2.01 EROSION CONTROL PRODUCTS AND SYSTEMS

A. Sandbags: Polypropylene, polyethylene, or polyamide woven fabric, with minimum unit weight of 4 ounces per square yard, Muller burst strength exceeding 300 psi, and ultraviolet stability exceeding 70 percent. Fill bags with bank-run sand.

B. Standpipe for Sediment Pump Pits: Galvanized round culvert pipe or round PVC pipe, minimum of 12-inch and a maximum of 24-inch diameter, perforate at 6 to 12 inch centers around circumference.

C. Sediment Pump Pit Aggregate: Nominal 2-inch diameter river gravel.

D. Portable Sediment Tank System: Standard 55-gallon steel or plastic drums, free of hazardous material contamination.

E. Shop or field fabricate tanks in series with main inlet pipe, inter-tank pipes and discharge pipes, using quantities sufficient to collect sediments from discharge water.

F. Straw: Standard-baled agricultural hay bound by wire, nylon, or polypropylene rope. Do not use jute or cotton binding.

G. Straw Bale Stakes (applicable where bales are on soil): No. 3 diameter concrete reinforcing bars, deformed or smooth at Contractor's option, length as required for minimum 8 inch bury and full height bales.

H. Filter Fabric: Mirafi, Inc., Synthetic Industries, or equivalent following Section 31 05 19.13.

1. Woven or nonwoven geotextile filter fabric made of either polypropylene, polyethylene, ethylene, or polyamide material, in continuous rolls of longest practical length.
2. Grab Strength: 100 psi in any principal direction (ASTM D-4632), Mullen burst strength >200 psi (ASTM D-3786), and equivalent opening size between 50 and 140.
3. Furnish ultraviolet inhibitors and stabilizers for minimum 6 months of expected usable construction life at temperature range of 0 degrees F to 120 degrees F.

I. Wire Fencing: Woven galvanized steel wire, 14 gauge by 6 inch square mesh spacing, minimum 24 inch roll or sheet width of longest practical length.

J. Fence Stakes: Nominal 2 by 2 inch moisture-resistant treated wood; length as required for minimum 8 inch bury and full height of filter fabric.

2.02 EXECUTION

2.03 GENERAL

A. Do not clear, grub or rough cut until erosion and sediment controls are in place, other than site work specifically directed by Engineer to allow surveying and soil testing.

B. Maintain existing erosion and sediment controls, if any, until directed by Engineer to remove and dispose of existing controls.

C. Prohibit equipment and vehicles from maneuvering on areas outside of dedicated rights-of-way and easements for construction. Immediately repair damage, caused by construction traffic, to erosion and sediment control systems.

2.04 INSPECTION AND REPAIR

A. Inspect erosion and sedimentation controls daily during periods of prolonged rainfall, at end of rainfall period, and minimum once each week.

B. Repair or replace damaged sections immediately.

C. Remove eroded and sedimented products when silt reaches a depth one-third the height of the control or 6 inches, whichever is less.

2.05 FILTER FABRIC FENCES

A. Layout fence lines with wood stakes.

B. Fence Type 1:

1. Install stakes 3 feet on center maximum and firmly embed minimum 8 inches in soil. If filter fabric is factory preassembled with support netting, then maximum support spacing is 8 feet. Install wood stakes at a slight angle toward the source of anticipated runoff.
2. Trench in the toe of the fence lines so the downward face of the trenches are flat and perpendicular to direction of flow. V trench configuration as shown on Drawings may also be used.
3. Lay fabric along edges of trenches in longest practical continuous runs to minimize joints. Make joints only at a support post. Splice with minimum 6-inch overlap and seal securely.
4. Staple filter fabric to stakes at maximum 3 inches on center. Extend fabric minimum 18 inches and maximum 36 inches above natural ground.
5. Backfill and compact trench.

C. Fence Type 2:

D. Layout fences same as for Type 1.

E. Install stakes at 6 feet on center maximum and at each joint in wire fence, firmly embedded 1-foot minimum, and inclined it as for Type 1.

F. Tie wire fence to stakes with wire at 6 inches on center maximum. Overlap joints minimum one bay of mesh.

G. Install trench same as for Type 1.

H. Fasten filter fabric wire fence with tie wires at 3 inches on center maximum.

I. Layout fabric same as for Type 1. Fasten to wire fence with wire ties at 3 inches on center maximum and, if applicable, to stakes above top of wire fence it as for Type 1.

J. Backfill and compact trench.

2.06 STRAW BALE FENCES

A. Install bales in a row with ends tightly abutting adjacent bales. Place bales with bindings parallel to ground surface. Where bales are installed on soil:

1. Embed bales in soil 4 inches minimum.
2. Anchor bales with 2 stakes driven into soil, with top end of stake flush with top of bales. Angle the first stake in each bale toward previously laid bale to force bales together.
3. Fill gaps between bales with straw to prevent water from escaping between bales. Wedge carefully to not separate bales.

2.07 STREET AND SIDEWALK CLEANING

A. Keep areas clean of construction debris and mud carried by construction vehicles and equipment.

B. In lieu of or in addition to stabilized construction exits, shovel or sweep pavements as required to keep areas clean. Do not hose or sweep debris and mud off street into adjacent areas, except, hose sidewalks during off-peak hours, after sweeping.

2.08 WASTE COLLECTION AREAS

A. Prevent water runoff from passing through waste collection areas, and prevent water runoff from waste collection areas migrating outside collection areas.

2.09 EQUIPMENT MAINTENANCE AND REPAIR

A. Confine maintenance and repair of construction machinery and equipment to areas specifically designated for that purpose, so fuels, lubricants, solvents, and other potential pollutants are not washed directly into receiving streams or storm water conveyance systems. Provide these areas with adequate waste disposal receptacles for liquid and solid waste. Clean and inspect maintenance areas daily.

B. Where designated equipment maintenance areas are not feasible, take precautions during each individual repair or maintenance operation to prevent potential pollutants from

washing into streams or conveyance systems. Provide temporary waste disposal receptacles.

2.10 PRODUCT STORAGE

A. Follow Sections 01 56 00 - Temporary Facilities and Controls for basic storage requirements.

B. Isolate areas where cements, solvents, paints, or other potential water pollutants are stored so they do not cause runoff pollution.

C. Store toxic products, such as pesticides, paints, and acids following manufacturer's guidelines. Protect groundwater resources from leaching, with plastic mats, packed clay, tarpaper, or other impervious materials on areas where toxic products are opened and stored.

2.11 WATER RUNOFF AND EROSION CONTROL

A. Control surface water, runoff, subsurface water, and water from excavations and structures to prevent damage to the Work, the site, or adjoining properties.

B. Control fill, grading and ditching to direct water away from excavations, pits, tunnels, and other construction areas, and to direct drainage to proper runoff courses to prevent erosion, sedimentation or damage.

C. Provide, operate, and maintain equipment and facilities of adequate size to control surface water.

D. Dispose of drainage water to prevent flooding, erosion, or other damage to the site or adjoining areas. Follow environmental requirements.

E. Retain existing drainage patterns external to the site by constructing temporary earth berms, sedimentation basins, retaining areas, and temporary ground cover as required to control conditions.

F. Plan and execute construction and earth work to control surface drainage from cuts and fills, and from borrow and waste disposal areas, to prevent erosion and sedimentation.
   1. Hold area of bare soil exposed at one time to a minimum.
   2. Provide temporary controls such as berms, dikes, and drains.

G. Construct fill and waste areas by selective placement to eliminate surface silts or clays which will erode.

H. Inspect earthwork periodically to detect start of erosion. Immediately apply corrective measures as required to control erosion.

I. Unless otherwise indicated, compact embankments, excavations, and trenches by mechanically blading, tamping, and rolling soil in maximum of 8-inch layers. Provide compaction density at minimum 90 percent Standard Proctor ASTM D-698-78 density. Make at least one test per 500 cubic yards of embankment.

J. Do not maneuver vehicles on areas outside of dedicated rights-of-way and easements for construction. Immediately repair damage to erosion and sedimentation control systems caused by construction traffic.

K. Do not damage existing trees intended to remain.

2.12 REMOVAL OF CONTROLS

A. Remove erosion and sediment controls when the site is finally stabilized or as directed by Engineer.

B. Dispose of sediments and waste products following Section 01 56 00 - Temporary Facilities and Controls.

END OF SECTION

SECTION 01 57 80

CONTROL OF GROUND AND SURFACE WATER

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Dewatering, depressurization, draining, and maintenance of excavations and foundation beds in dry and stable condition.

B. Protection of work against surface runoff and rising flood waters.

C. Disposal of removed water.

1.02 REFERENCES

A. ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil Aggregate Mixtures, Using 5.5-lb (2.49 kg) Rammer and 12-inch (304.8 mm) Drop.

B. Federal Regulations, 29 CFR 1926, Safety and Health Regulations for Construction, Subpart P, Excavations, Occupational Safety and Health Administration (OSHA)

C. State Water Resources Control Board, Order No. WQO-2009-009-DWQ, General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities, with Amendments

D. California Regional Water Quality Control Board, Central Coast Region, Order No. R3-2011-0223, NPDES Permit No. CAG993001, Waste Discharge Requirements, General Permit for Discharges with Low Threat to Water Quality

E. Santa Cruz County Code, Chapter 7.79, Runoff and Pollution Control

1.03 DEFINITIONS

A. Groundwater control includes both dewatering and depressurization of water-bearing soil layers.

B. Dewatering includes lowering the water table and intercepting seepage or localized perched water zones which would otherwise emerge from slopes or bottoms of excavations and disposing of removed water. Dewatering is intended to:

1. Provide a stable or relatively dry working area for material excavation and/or backfill
2. Improve excavating, hauling and screening characteristics of excavated material
3. Increase stability of excavated slopes.
4. Prevent dislocation of material from slopes or bottoms of excavations.
5. Prevent failure or heaving of the bottom of excavations.
6. Reduce lateral loads on sheeting and bracing (as applicable).

C. Depressurization includes reduction in piezometric pressure within strata not controlled by dewatering alone, as required to prevent failure or heaving of excavation bottom.

D. Excavation drainage control includes keeping excavations free of surface and seepage water.

E. Surface drainage control includes use of temporary drainage ditches and dikes and installation of temporary culverts and sump pumps with discharge lines as required to protect the Work from any source of surface water.

F. Equipment and instrumentation for monitoring and control of the dewatering system includes piezometers and monitoring wells, and devices, such as flow meters, for observing and recording flow rates.

G. Continuous groundwater control installations for linear work include well points or eductor wells at maximum 15-foot spacing or deep wells at maximum 50-foot spacing.

1.04 PERFORMANCE REQUIREMENTS

A. Review existing reports and conduct subsurface investigations, if needed, to identify groundwater conditions and to provide parameters for design, installation and operation of groundwater control systems.

B. Design a ground water control system, compatible with Federal Regulations 29 CFR Part 1926, producing the following results:

1. Effectively reduce the hydrostatic pressure affecting excavations and lower the groundwater level at least 2 feet below the bottom of excavations.
2. Develop a substantially dry and stable subgrade for subsequent construction operations.
3. Preclude damage to adjacent properties, utilities and other work.
4. Prevent the loss of fines, seepage, boils, quick condition, or softening of the foundation strata.
5. Maintain stability of sides and bottom of excavations.
6. Design of the groundwater control system shall be prepared and signed by a qualified specialist who has sufficient prior experience and knowledge to assume responsibility of an effective groundwater control system.

C. Ground water control systems may include excavation sump pumps, single- or multiple-stage well point systems, eductor and ejector-type systems, deep wells, or combinations of these equipment types. Excavation and surface drainage may also include sump pumping.

D. Locate ground water control and drainage systems to not interfere with utilities, construction operations, adjacent properties, or adjacent water wells.

E. Assume sole responsibility for ground water control systems and for loss or damage resulting from partial or complete failure of protective measures and settlement or resultant damage caused by the ground water control operations. Modify ground water control systems or operations if they cause or threaten to cause damage to new construction, existing site improvements, adjacent property, or adjacent water wells, or affect potentially contaminated areas. Repair damage caused by ground water control systems or resulting from failure of the system to protect property, as required.

F. Provide adequate number of piezometers installed at the proper locations and depths as required to record meaningful observations of the conditions affecting the excavation, adjacent structures, and water wells. For each phase of the Work, a minimum of three piezometers shall be provided along each side of the ditch excavation area.

1.05 SUBMITTALS

A. Follow Section 01 30 00 Contractor Submittals.

B. Ground Water and Surface Water Control Plan shall include:

1. Results of subsurface investigation and description of the extent and characteristics of water bearing layers subject to ground water control.
2. Names of equipment suppliers and installation Subcontractors.
3. Description of proposed ground water control systems indicating arrangement, location; depth and capacities of system components along with installation details and criteria, and operation and maintenance procedures.
4. Description of proposed monitoring and control system indicating depths and locations of piezometers and monitoring wells, monitoring installation details and criteria, type of equipment and instrumentation with pertinent data and characteristics.
5. Description of proposed filters including types, sizes, capacities and manufacturer's application recommendations.
6. Design calculations demonstrating adequacy of proposed systems for intended applications. Define potential area of influence of ground water control operation near contaminated areas.
7. Operating requirements, including piezometric control elevations for dewatering and depressurization.
8. Surface water control and drainage installations.
9. Proposed methods and locations for disposing of removed water.

C. Submit the following records upon completed installation:

1. Installation and development reports for well points, eductors, and deep wells.
2. Installation reports and baseline readings for piezometers and monitoring wells.
3. Baseline analytical test data of water from monitoring wells.
4. Initial flow rates.

D. Submit the following records on a weekly basis during water control operations:

1. Records of flow rates and piezometric elevations obtained during monitoring of dewatering and depressurization. Follow Paragraph 3.02, Requirements for Eductor, Well Points, or Deep Wells;
2. Maintenance records for ground water control installations, piezometers, and monitoring wells.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Follow requirements of agencies having jurisdiction.

B. Follow California Department of Water Resources and Santa Cruz County regulations for development, drilling, and abandonment of wells used in dewatering system.

C. Obtain permits from agencies with control over the use of groundwater and matters affecting well installation, water discharge, and use of existing storm drains and natural water sources. Review and permitting process may be lengthy. Take early action on submittal process.

D. Monitor ground water discharge for turbidity prior to discharging to local drainage ditches. Use settling tanks, stilling basins, filter bags or other measures to reduce the turbidity of discharged water to below 500 NTU.

PART 2 - PRODUCTS

2.01 EQUIPMENT AND MATERIALS

A. Equipment and materials are at the option of Contractor as necessary to achieve desired results for dewatering. Selected equipment and materials are subject to review of the Engineer through submittals required in Paragraph 1.05, Submittals.

B. Eductors, well points, or deep wells, where used, must be furnished, installed and operated by an experienced contractor regularly engaged in ground water control system design, installation and operation.

C. Furnish equipment in good repair and proper operating order.

D. Keep sufficient standby equipment and materials available to ensure continuous operation, where required.

PART 3 - EXECUTION

3.01 GROUND WATER CONTROL

A. Perform a subsurface investigation by borings as necessary to identify water bearing layers, piezometric pressures and soil parameters for design and installation of ground water control systems. Present results in the Ground Water and Surface Water Control Plan.

B. Provide labor and products to lower, control and handle ground water in a manner compatible with construction methods and site conditions. Monitor effectiveness of the installed system and its effect on adjacent property.

C. Install, operate, and maintain ground water control systems following the Ground Water and Surface Water Control Plan. Notify Engineer in writing of changes made to accommodate field conditions and changes to the Work. Prepare revised drawings and calculations with such notification.

D. Provide for continuous system operation, including nights, weekends, and holidays. Arrange for appropriate backup if electrical power is primary energy source for dewatering system.

E. Monitor operations to verify that the system lowers ground water levels at a rate required to maintain a substantially dry excavation resulting in a stable subgrade.

F. Where hydrostatic pressures in confined water bearing layers exist below excavation, depressurize those zones to eliminate risk of uplift or other instability of excavation or installed works. Define allowable piezometric elevations in the Ground Water and Surface Water Control Plan.

G. Maintain water level at a minimum of 2 feet below subgrade elevation, or to elevations indicated on Drawings, unless Engineer authorizes a higher level.

H. During backfilling, dewatering may be reduced to maintain water level a minimum of 5 feet below prevailing level of backfill. However, do not allow that water level to result in uplift pressures in excess of 80 percent of downward pressure produced by weight of structure or backfill in place.

I. Remove system upon completion of construction or when dewatering and control of surface or groundwater is no longer required.

J. Replace excavation performed for convenience of dewatering in foundation beds with materials as impermeable as original foundation material or as indicated on Drawings.

3.02 REQUIREMENTS FOR EDUCTOR, WELL POINTS, OR DEEP WELLS

A. Submit a certification that the ground water control system including eductors, well points, or deep well is in compliance with the criteria of Ground Water and Surface Water Control Plan.

B. For above-ground piping in ground water control system, include a 12-inch minimum length of clear, transparent piping between every eductor well or well point and discharge header so that discharge from each installation can be visually monitored.

C. Install sufficient piezometers or monitoring wells to ensure that all trench or shaft excavations in water bearing materials are predrained prior to excavation. Provide separate piezometers for monitoring of dewatering and for monitoring of depressurization.

D. Install piezometers or monitoring wells not less than one week in advance of beginning the associated excavation.

E. Replace installations that produce noticeable amounts of sediments after development.

F. Provide additional ground water control installations, or change the methods, in the event that the installations according to the ground water control plan does not provide satisfactory results based on the performance criteria defined by the plan and by the specification. Submit a revised plan according to Paragraph 1.06B.

3.03 MAINTENANCE AND OBSERVATION

A. Conduct a minimum of daily maintenance and observation of piezometers or monitoring wells while the ground water control installations are operating in an area. Keep system in good condition.

B. Replace damaged and destroyed piezometers or monitoring wells with new piezometers or wells within 48 hours.

C. Cut off piezometers or monitoring wells in excavation areas, where exposed, only as necessary to perform observation as excavation proceeds. Continue to maintain and make observations.

D. Remove and grout piezometers inside or outside the excavation area when ground water control operations are complete. Remove and grout monitoring wells when directed by the Engineer.

3.04 MONITORING AND RECORDING

A. Monitor and record average flow rate of operation for each deep well, or for each wellpoint or eductor header used in dewatering system. Monitor and record water level and ground water recovery. Obtain data and record daily until steady conditions are achieved, and twice weekly thereafter.

B. Observe and record elevation of water level daily as long as dewatering system is in operation, and weekly thereafter until the Work is completed or piezometers or wells are removed, except when Engineer determines that more frequent monitoring and recording are required. Follow Engineer's direction for increased monitoring and recording and take measures as necessary to ensure effective dewatering for intended purpose.

3.05 SURFACE WATER CONTROL

A. Intercept surface water and divert it away from excavations through use of dikes, ditches, curb walls, pipes, sumps or other approved means. The requirement includes temporary protective works required to protect adjoining properties from surface drainage caused by construction operations.

B. Divert surface and seepage water into sumps and pump into drainage channels, when approved by agencies having jurisdiction. Provide settling basins when required by such agencies.

END OF SECTION

SECTION 01 60 00

PRODUCTS, MATERIALS, EQUIPMENT AND SUBSTITUTIONS

PART 1 - GENERAL

1.01 DEFINITIONS

A. The word "Products," as used herein, is defined to include purchased items for incorporation into the WORK, regardless of whether specifically purchased for the project or taken from CONTRACTOR's stock of previously purchased products. The word "Materials," is defined as products which must be substantially cut, shaped, worked, mixed, finished, refined, or otherwise fabricated, processed, installed, or applied to form units of work. The word "Equipment" is defined as products with operational parts, regardless of whether motorized or manually operated, and particularly including products with service connections (wiring, piping, and other like items). Definitions in this paragraph are not intended to negate the meaning of other terms used in the Contract Documents, including "specialties," "systems," "structure," "finishes," "accessories," "furnishings," special construction," and similar terms, which are self-explanatory and have recognized meanings in the construction industry.

B. Neither "Products" nor "Materials" nor "Equipment" includes machinery and equipment used for preparation, fabrication, conveying and erection of the WORK.

1.02 QUALITY ASSURANCE

A. Source Limitations: To the greatest extent possible for each unit of work, the CONTRACTOR shall provide products, materials, and equipment of a singular generic kind from a single source.

B. Compatibility of Options: Where more than one choice is available as options for CONTRACTOR's selection of a product, material, or equipment, the CONTRACTOR shall select an option which is compatible with other products, materials, or equipment. Compatibility is a basic general requirement of product, material and equipment selections.

1.03 PRODUCT DELIVERY AND STORAGE

A. The CONTRACTOR shall deliver and store the WORK in accordance with manufacturer's written recommendations and by methods and means which will prevent damage, deterioration, and loss including theft. Delivery schedules shall be controlled to minimize long-term storage of products at site and overcrowding of construction spaces. In particular, the CONTRACTOR shall ensure coordination to ensure minimum holding or storage times for flammable, hazardous, easily damaged, or sensitive materials to deterioration, theft, and other sources of loss.

B. The CONTRACTOR shall provide a certificate of compliance for all materials to be incorporated in the Work.

1.04 TRANSPORTATION AND HANDLING

A. Products shall be transported by methods to avoid damage and shall be delivered in undamaged condition in manufacturers unopened containers and packaging.

B. The CONTRACTOR shall provide equipment and personnel to handle products, materials, and equipment, including those provided by OWNER, by methods to prevent soiling and damage.

C. The CONTRACTOR shall provide additional protection during handling to prevent marring and otherwise damaging products, packaging, and surrounding surfaces.

1.05 STORAGE AND PROTECTION

A. Products shall be stored in accordance with manufacturer's written instructions and with seals and labels intact and legible. Sensitive products shall be stored in weather-tight climate controlled enclosures and temperature and humidity ranges shall be maintained within tolerances required by manufacturer's recommendations.

B. For exterior storage of fabricated products including pipe, products shall be placed on sloped supports above ground. Products subject to deterioration, including all ferrous metals, shall be covered with impervious sheet covering and heat and ventilation shall be provided to avoid condensation. PVC pipe shall be stored to avoid prolonged exposure to sunlight.

C. Loose granular materials shall be stored on solid flat surfaces in a well-drained area and shall be prevented from mixing with foreign matter.

D. Storage shall be arranged to provide access for inspection. The CONTRACTOR shall periodically inspect to assure products are undamaged and are maintained under required conditions.

E. Storage shall be arranged in a manner to provide access for maintenance of stored items and for inspection.

F. The CONTRACTOR shall comply with manufacturer's product storage requirements and recommendations.

G. The CONTRACTOR shall maintain manufacturer-required environmental conditions continually.

H. The CONTRACTOR shall ensure that surfaces of products exposed to the elements are not adversely affected and that weathering of finishes does not occur.

I. For mechanical and electrical equipment, the CONTRACTOR shall provide a copy of the manufacturer's service instructions with each item and the exterior of the package shall contain notice that instructions are included.

J. Products shall be serviced on a regularly scheduled basis, and a log of services shall be maintained and submitted as a record document prior to acceptance by the OWNER in accordance with the Contract Documents.

1.06 PROPOSED SUBSTITUTES OR "OR-EQUAL" ITEM

A. Whenever materials or equipment are indicated in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the naming of the item is intended to establish the type, function, and quality required. If the name is followed by the words "or equal" indicating that a substitution is permitted, materials or equipment of other suppliers may be accepted if sufficient information is submitted by the CONTRACTOR to allow the ENGINEER to determine that the material or equipment proposed is equivalent or equal to that named, subject to the following requirements:

1. The burden of proof as to the type, function, and quality of any such substitute product, material or equipment shall be upon the CONTRACTOR.
2. The ENGINEER will be the sole judge as to the type, function, and quality of any such substitute and the ENGINEER'S decision shall be final.
3. The ENGINEER may require the CONTRACTOR to furnish at the CONTRACTOR'S expense additional data about the proposed substitute.
4. The OWNER may require the CONTRACTOR to furnish at the CONTRACTOR'S expense a special performance guarantee or other surety with respect to any substitute.
5. Acceptance by the ENGINEER of a substitute item proposed by the CONTRACTOR shall not relieve the CONTRACTOR of the responsibility for full compliance with the Contract Documents and for adequacy of the substitute.
6. The CONTRACTOR shall be responsible for resultant changes including design and construction changes and all additional costs resulting from the changes which the accepted substitution requires in the CONTRACTOR'S WORK, the WORK of its subcontractors and of other contractors, and shall effect such changes without cost to the OWNER.

B. The procedure for review by the ENGINEER will include the following:

1. If the CONTRACTOR wishes to provide a substitute item, the CONTRACTOR shall make written application to the ENGINEER on a "Substitution Request Form."
2. Unless otherwise provided by law or authorized in writing by the ENGINEER, the "Substitution Request Form(s)" shall be submitted within the 14 days after award of the Contract.
3. Wherever a proposed substitute item has not been requested as specified herein, or wherever the submission of a proposed substitute material or equipment has been judged to be unacceptable by the ENGINEER, the CONTRACTOR shall provide the material or equipment indicated in the Contract Documents.
4. The CONTRACTOR shall certify that the proposed substitute will perform adequately the functions and achieve the results called for by the general design, and be similar and of equal substance to that indicated, and be suited to the same use as that specified.
5. The ENGINEER will evaluate each proposed substitute within a reasonable period of time.
6. As applicable, no shop drawing submittals shall be made for a substitute item nor shall any substitute item be ordered, installed, or utilized without the ENGINEER'S prior written acceptance of the CONTRACTOR'S "Substitution Request Form."
7. The ENGINEER will record the time required by the ENGINEER in evaluating substitutions proposed by the CONTRACTOR and in making changes by the CONTRACTOR in the Contract Documents occasioned thereby. Whether or not the ENGINEER accepts a proposed substitute, the CONTRACTOR shall reimburse the OWNER for the charges of the ENGINEER for evaluating each proposed substitute.

C. The CONTRACTOR's "Substitution Request Forms" shall contain the following statements and information which shall be considered by the ENGINEER in evaluating the proposed substitution:

1. The evaluation and acceptance of the proposed substitute will not prejudice the CONTRACTOR's achievement of substantial completion on time.
2. Whether or not acceptance of the substitute for use in the WORK will require a change in any of the Contract Documents to adopt the design to the proposed substitute.
3. whether or not incorporation or use of the substitute in connection with the WORK is subject to payment of any license fee or royalty.
4. All variations of the proposed substitute from the items originally specified will be identified.
5. Available maintenance, repair, and replacement service will be indicated. The manufacturer shall have a local service agency (within 50 miles of the site) which maintains properly trained personnel and adequate spare parts and is able to respond and complete repairs within 24 hours.
6. Itemized estimate of all costs that will result directly or indirectly from acceptance of such substitute, including cost of redesign and claims of other contractors affected by the resulting change.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 70 00

PROJECT CLOSEOUT

PART 1 - GENERAL

1.01 FINAL CLEANUP

A. The Contractor shall promptly remove from the vicinity of the completed work, all rubbish, unused materials, concrete forms, construction equipment, and temporary structures and facilities used during construction. Final acceptance of the Work by the Owner will be withheld until the Contractor has satisfactorily complied with the foregoing requirements for final cleanup of the project site.

1.02 CLOSEOUT TIMETABLE

A. The Contractor shall establish a date for acceptance of work. The date shall be established not less than one week prior to beginning any of the foregoing items, to allow the Owner, the Engineer, and their authorized representatives sufficient time to schedule attendance at such activities.

1.03 FINAL SUBMITTALS

A. The Contractor, prior to requesting final payment, shall obtain and submit the following items to the Engineer for transmittal to the Owner:

1. Written guarantees, where required.
2. Operating manuals and instructions.
3. Maintenance stock items; spare parts; special tools.
4. Completed record drawings.
5. Geospatially referenced locations of all installed facilities and equipment (i.e., GPS data)
6. Certificates of inspection and acceptance by local governing agencies having jurisdiction.
7. Releases from all parties who are entitled to claims against the subject project, property, or improvement pursuant to the provisions of law.

1.04 MAINTENANCE AND GUARANTEE

A. The Contractor shall comply with the warranty requirements contained in the Construction Contract.

B. Replacement of earth fill or backfill, where it has settled below the required finish elevations, shall be considered as a part of such required repair work, and any repair or resurfacing constructed by the Contractor which becomes necessary by reason of such settlement shall likewise be considered as a part of such required repair work unless the Contractor shall have obtained a statement in writing from the affected private owner or public agency releasing the Owner from further responsibility in connection with such repair or resurfacing.

C. The Contractor shall make all repairs and replacements promptly upon receipt of written order from the Owner. If the Contractor fails to make such repairs or replacements promptly, the Owner reserves the right to do the Work and the Contractor and his surety shall be liable to the Owner for the cost thereof.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 71 23

FIELD ENGINEERING

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section includes field engineering to establish lines and grades for the work.

1.02 QUALITY CONTROL

A. Contractor shall Employ a State of California Licensed Land Surveyor acceptable to engineer. Surveyor shall be responsible for completion of the following:

1. Recovering control points established by District.
2. Verifying benchmarks furnished by District.
3. Establishing temporary benchmarks and construction control points.
4. Recording location(s) and elevation(s) of temporary benchmarks and construction control points.
5. Setting stakes for grading and fill placement, slopes, and inverts.
6. Survey cross-sections of completed excavations.

B. The survey activities shall be performed under direct supervision of the Licensed Land Surveyor.

1.03 SUBMITTALS

A. Submit the name, address, and telephone number of Surveyor before starting survey work.

B. On request, submit documentation verifying accuracy of survey work.

C. Submit 3 original copies of certificate, signed by surveyor and sealed, stating that horizontal and vertical control lines, elevations, and benchmarks follow contract documents.

1.04 PROJECT RECORD DOCUMENTS

A. Maintain a complete and accurate log of control and survey work as it progresses.

B. Submit Record Documents following section 01 70 00 - Project Closeout.

1. Record, on as-built drawings, locations where pipeline alignments changed.
2. Provide certified site survey to 0.01 foot precision of buildings, structures, pads and benchmarks signed by the professional land surveyor.

1.05 EXAMINATION

A. Contractor or Contractor's surveyor shall establish benchmarks, control points, lines and elevations prior to starting work. Notify engineer immediately of discrepancies discovered between stated attributes of owner-furnished data and surveyor's verification.

1.06 SURVEY REFERENCE POINTS

A. Control datum for survey is that indicated on the Drawings.

B. Contractor is required to establish its own control and references points as required to properly lay out the work.

C. Locate and protect benchmarks, control points, lines and elevations prior to starting site work. Preserve permanent reference points during construction.

D. Notify Engineer 48 hours in advance of need for relocation of reference points due to changes in grades or other reasons.

E. Report promptly to Engineer the loss or destruction of reference points.

F. Reestablishment of permanent reference points disturbed by contractor's operations shall be at the Contractor's expense.

1.07 SURVEY REQUIREMENTS

A. Utilize recognized engineering survey practices.

B. Establish a minimum of 2 permanent benchmarks on site, referenced to established control points. Record locations, with horizontal and vertical data, on record documents.

C. Establish elevations, lines and levels to provide appropriate controls for the work. Locate and lay out by instrumentation and similar appropriate means.

D. Periodically verify layouts by same means.

E. Utilize the project-specific coordinate system as defined on the drawings.

1.08 CONSTRUCTION STAKES, LINES AND GRADES

A. Execute the work in accordance with the lines and grades indicated.

B. Make distances and measurements on horizontal planes, except elevations and structural dimensions.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 78 00

OPERATIONS AND MAINTENANCE DATA

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Preparation and submittal of Operation and Maintenance Manuals.

1.02 SUBMITTALS

A. Submit Operation and Maintenance Manuals as part of the shop drawing approval process.

B. Make additions and revisions to the Manuals in accordance with Engineer's review comments.

C. Submit four (4) complete Manuals for each piece of equipment or system after shop drawing approval.

1.03 OPERATION AND MAINTENANCE MANUALS

A. Preparation:

1. Provide Operations and Maintenance Manuals in 3-ring binders with rigid covers. Utilize tab sheets to organize information.

B. Contents of Operation and Maintenance Manuals:

1. Cover Page: Equipment name, equipment tag number, project name, Owner's name, appropriate date.
2. Table of Contents: General description of information provided within each tab section.
3. Lubrication Information: Required lubricants and lubrication schedules.
4. Control Diagrams:
   a. Internal and connection wiring, including logic diagrams, wiring diagrams for control panels, ladder logic for computer based systems, and connections between existing systems and new additions, and adjustments such as calibrations and set points for relays, and control or alarm contact settings.
5. Start-up Procedures: Recommendations for installation, adjustment, calibration, and troubleshooting.
6. Operating Procedures:
   a. Step-by-step procedures for starting, operating, and stopping equipment under specified modes of operation.
   b. Include safety precautions and emergency operating shutdown instructions.
7. Preventative Maintenance Procedures: Recommended steps and schedules for maintaining equipment.
8. Overhaul Instructions: Directions for disassembly, inspection, repair and reassembly of the equipment; safety precautions; and recommended tolerances, critical bolt torques, and special tools that are required.

9. Parts List: Generic title and identification number of each component part of equipment; include bearing manufacturer, model and ball or roller pass frequencies for every bearing.
10. Spare Parts List: Recommended number of parts to be stored at the site and special storage precautions.
11. Drawings: Exploded view or plan and section views with detailed callouts.
12. Provide electrical and instrumentation schematic record drawings.
13. Provide approved shop and fabrication drawings.
14. Source (Factory) Quality Control Test Results: Provide copies of factory test reports as specified in the applicable equipment section.
15. Field Quality Control Test Results: After field testing is completed, insert field test reports as specified in the applicable equipment section.
16. Equipment Summary Form: Completed form in the format attached at the end of this Section. Insert Equipment Summary Form after the tab sheet of each equipment section. The manufacturer's standard form will not be acceptable.
17. Manufacturer's Warranty Documents: Provide copies of standard warranty documents with the initial O&M Manual submittal. Submit equipment specific warranties (listing serial numbers and expiration dates) at project close-out.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (Not Used)

END OF SECTION

EQUIPMENT SUMMARY FORM

1. EQUIPMENT ITEM_____

2. MANUFACTURER _____

3. EQUIPMENT IDENTIFICATION NUMBER(S)_____

_____

4. LOCATION OF EQUIPMENT_____

5. NAMEPLATE DATA -
   - Horsepower_____
   - Amperage_____
   - Voltage_____
   - Service Factor (S.F.)_____
   - Speed_____
   - Enclosure Type_____
   - Capacity_____
   - Other_____

6. MANUFACTURER'S LOCAL REPRESENTATIVE

   Name_____

   Address_____

   Telephone Number_____

7. MAINTENANCE REQUIREMENTS_____

_____

_____

8. LUBRICANT LIST_____

_____

9. SPARE PARTS (recommendations)_____

_____

10. COMMENTS_____

_____

_____

_____

SECTION 02 01 00

EXISTING FACILITIES

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section includes requirements for connection to and abandonment of existing facilities.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. All related work specified elsewhere, or in other codes or standards, will be as last revised, unless a specific date of issuance is called out in opposition to later revision date(s).

B. Other sections of the technical specifications, not referenced below, shall also apply to the extent required for proper performance of this work.

1.	Abandonment of Pipelines	02 22 20
2.	Trenching, Backfilling, and Compacting:	31 23 00
3.	Manual Valves:	33 12 16

1.03 SUBMITTALS

A. Submit a connection plan detailing the schedule and methods for transitioning from existing to new facilities.

1.04 CONDITION OF EXISTING FACILITIES

A. The Owner does not warranty the condition, size, material, and location of existing facilities.

1.05 LOCATION

A. The Contractor shall be responsible for potholing and verifying in advance the location of all existing pipelines as shown on the plans. Discrepancies shall be reported to the Engineer, prior to the fabrication of, or purchase of material affected by the discrepancy.

1.06 PROTECTION OF EXISTING UTILITIES AND FACILITIES

A. The Contractor shall be responsible for the care and protection of all existing sewer pipe, water pipe, gas mains, culverts, power or communications lines, sidewalks, curbs, pavement, or other facilities and structures that may be encountered in or near the area of the work.

B. It shall be the duty of the Contractor to notify Underground Service Alert and each agency of jurisdiction and make arrangements for locating their facilities prior to beginning construction.

C. In the event of damage to any existing facilities during the progress of the work, the Contractor shall pay for the cost of all repairs and protection to said facilities. The Contractor's work may be stopped until repair operations are complete.

1.07 PROTECTION OF LANDSCAPING

A. The Contractor shall be responsible for the protection of all the trees, shrubs, irrigation systems, fences, and other landscape items adjacent to or within the work area, unless they are directed to do otherwise on the plans.

B. In the event of damage to landscape items, the Contractor shall replace the damaged items to the satisfaction of the Engineer and the Owner, or pay damages to the property Owner as directed by the Owner.

C. When the proposed pipeline is to be within planted or other improved areas in public or private easements, the Contractor shall restore such areas to the original condition after completion of the work. This restoration shall include grading, a placement of 5 inches of good topsoil, re-sodding, and replacement of all landscape items indicated.

D. If the Contractor does not proceed with the restoration after completion of the work or does not complete the restoration in a satisfactory manner, the Engineer reserves the right to have the work done and to charge the Contractor for the actual cost of the restoration including all labor, material, and overhead required for restoration.

1.08 PERMITS

A. All work shall conform to the specifications and requirements of the State of California Department of Transportation, the County of Santa Cruz, or the other affected agencies involved. The Contractor shall keep a copy of all the required permits in the job site and comply with all the terms and conditions of said permits. Permits shall also include any related to the abandonment of an existing water or sewer pipe.

PART 2 - MATERIALS

All materials used in making the connection or removing the facility from service shall conform to the applicable sections of these specifications.

2.01 GROUT

A. Grout used for plugging abandoned facilities shall be Portland cement grout per Section 03 30 00

2.02 CONCRETE

A. Concrete used for the replacement of damaged or removed facilities shall be in accordance with Section 03 30 00 and shall match the mix design of the existing facility and per the requirement of the jurisdictional agency.

PART 3 - EXECUTION

3.01 CONNECTION TO EXISTING FACILITIES

A. All connections shall be made by the Contractor unless shown otherwise on the plans or specified herein.

B. If multiple connections to the water system are anticipated, the Contractor shall submit a connection plan developed with the intent of minimizing the down time to customers.

C. When customers are affected, the Contractor shall notify the Owner a minimum of seven working days before the time of any proposed shutdown of existing mains or services. The Owner's inspector may postpone or reschedule any shutdown operation if for any reason he feels that the Contractor is improperly prepared with competent personnel, equipment, or materials to proceed with the connection work.

D. When no customers are affected, the Contractor shall notify the Owner a minimum of two working days before the time of any proposed shutdown of existing mains or services. The Owner's inspector may postpone or reschedule any shutdown operation if for any reason he feels that the Contractor is improperly prepared with competent personnel, equipment, or materials to proceed with the connection work.

E. Connections shall be made only in the presence of the Owner or Owner's inspector, and no connection work shall proceed until the Engineer has given notice to proceed. If progress is inadequate during the connection operations to complete the connection in the time specified, the Engineer shall order necessary corrective measures. All costs for corrective measures shall be paid by the Contractor.

F. The Contractor shall furnish all pipe and materials including furnishing all labor and equipment necessary to make the connections, all required excavation, backfill, pavement replacement, lights, and barricades, and may be required to include a water truck, high line hose, and fittings as part of this equipment for making the connections. In addition, the Contractor shall assist the Owner in alleviating any hardship incurred during the shutdown for connections. Standby equipment or materials may be required by the Engineer.

G. The Contractor shall de-water existing mains, as required, in the presence of the Owner's inspector.

H. New pipelines shall not be connected to existing facilities until the new pipelines have been successfully tested and accepted by the Owner.

3.02 REMOVAL FROM SERVICE OF EXISTING MAINS AND APPURTENANCES

A. Existing mains and appurtenances shall be removed from service at the locations shown on the plans or as directed by the Engineer.

B. Pipelines abandoned in place shall be drained and then sealed at each end with grout plugs. Grout shall extend a minimum of 12-inches into the pipeline and fully encase the end of the pipe.

C. Existing pipe and appurtenances removed from the ground will require backfill and repair of surface in accordance with Section 31 23 00.

D. Removed pipe and appurtenances shall be temporarily stockpiled on the job in a location that will not disrupt traffic or be a safety hazard, disposed of in a proper manner (as determined by the Engineer). The Contractor shall remove and dispose of all removed pipe at his own expense to a landfill permitted to accept such materials.

E. Before excavating for installing mains that are to replace existing pipes and/or services, the Contractor shall make proper provisions for the maintenance and continuation of service as directed by the Engineer unless otherwise specified.

F. If the meter box is to be removed from an abandoned water service, the service line is to be removed and the corporation stop closed and capped. If there is no corporation stop on the service, the adapter is to be removed and a brass plug is to be installed in the service saddle.

G. Asbestos Cement Pipe (ACP) shall be cut, removed and disposed of in a proper manner. The Contractor shall be responsible for the proper manifesting of any and all ACP at an authorized disposal site.

3.03 CUTTING AND RESTORING STREET SURFACING.

A. In cutting or breaking up street surfacing, the Contractor shall not use equipment that will damage adjacent pavement.

B. All asphalt and/or Portland cement concrete surfaces shall be scored with sawing equipment of a type meeting the approval of the Owner; providing however, that any cement concrete base under an asphaltic mix surface will not be required to be scored by sawing. Existing paving surfaces shall be sawcut back beyond the edges of the trenches to form neat square cuts before repaving is commenced.

C. Pavement, sidewalks, curbs, or gutters removed or destroyed in connection with performance of the work shall be saw cut to the nearest score marks, if any, and shall be replaced with pavement sidewalks, curbs, or gutters of the same kind, or better by the Contractor in accordance with the latest specifications, rules, and regulations and subject to the inspection of the agency having jurisdiction over the street or highway.

D. Aggregate base shall be placed beneath the restored pavement to the thickness required by the agency having jurisdiction.

END OF SECTION

SECTION 03 10 00

CONCRETE FORMS AND ACCESSORIES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Section Includes: Formwork for concrete, with shoring, bracing and anchorage.

B. Related Sections:
1. Section 03 20 00 - Concrete Reinforcement
2. Section 03 30 00 - Cast-in-Place Concrete

1.02 REFERENCES

A. American Concrete Institute (ACI):
1. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.
2. ACI 301 - Specifications for Structural Concrete for Buildings.
3. ACI 318 - Building Code Requirements for Structural Concrete and Commentary.
4. ACI 347 - Guide to Formwork for Concrete.
5. ASTM International (ASTM):
6. ASTM C31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
7. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
8. ASTM D994 - Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
9. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

1.03 SUBMITTALS

A. Section 01 30 00 – Contractor Submittals, for submittal procedures

B. Product Data: Provide data on formwork release agent or form liner proposed for use with each formed surface.

C. Formwork Facing Materials: Data on form-facing materials proposed for smooth-form finish if different from that specified in Article 2.02.

D. Construction and Contraction Joints: Location of construction and contraction joints proposed if different from those indicated in the Contract Documents.

E. Testing for Formwork Removal: Data on method for determining strength of concrete for removal of formwork when a method other than field-cured cylinders (ASTM C31 and ASTM C39) is proposed.

F. Formwork Removal Plans: Detail plans for formwork removal operations when removal of forms at concrete strengths lower than that specified in Article 3.08 is proposed.

1.04 QUALITY ASSURANCE

A. Codes and Standards: Comply with the provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified.

1. California Building Code, current governing edition.
2. ACI 318.
3. ACI 347.

PART 2 - PRODUCTS

2.01 FORMWORK - GENERAL

A. Maximum deflection of facing materials reflected on concrete surfaces exposed to public view shall be 1/240 of the span between structural members of the formwork.

B. Formed Construction and Contraction Joints

1. Locate and form construction joints that least impair strength of the structure and meet the requirements of Section 033000 - Cast-in-Place Concrete, Article 3.05.
2. Unless otherwise specified or permitted, locate and detail formed construction joints to the following requirements:
   a. Locate joints in walls and columns at the tops of footings or slabs; and
   b. Make joints perpendicular to the main reinforcement.
3. Provide keyways where indicated on Contract Documents. Unless otherwise specified, longitudinal keyways indicated on the Contract Documents, shall be a minimum of 1-1/2 in. deep in joints in walls and between walls and slabs or footings.
4. Provide construction and contraction joints where indicated on the Contract Documents. Submit for acceptance the location of construction and contraction joints differing from those indicated on the Contract Documents.

2.02 FORM MATERIALS

A. Form-facing materials: Materials for form faces in contact with concrete shall meet the requirements of "Concrete Finishing" Section 033000 - Cast-in-Place Concrete and the following requirements unless otherwise specified in Contract Documents.

1. For smooth-form finish, use plywood, tempered concrete-form-grade hardboard, metal, plastic, paper, or other acceptable materials capable of producing the desired finish for form-facing materials. Form-facing materials shall produce a smooth, uniform texture on the concrete. Do not use form-facing materials with raised grain, torn surfaces, worn edges, dents, or other defects that will impair the texture of concrete surfaces. Facing materials shall be supported with studs or other backing

capable of maintaining deflections within the tolerances specified in Article 2.01 herein.

2.03 FORMWORK ACCESSORIES

A. Use commercially manufactured accessories for formwork accessories that are partially or wholly embedded in concrete, including ties and hangers. Do not use nonfabricated wire form ties.

2.04 FORMWORK RELEASE AGENT

A. Use commercially manufactured formwork release agents that prevent formwork absorption of moisture, prevent bond with concrete, and do not stain the concrete surfaces.

2.05 EXPANSION JOINT FILLER

A. Premolded expansion joint filler shall conform to ASTM D994 or ASTM D1751.

2.06 FABRICATION AND MANUFACTURE

A. Formwork shall be tight to prevent loss of mortar from concrete.

B. Place 3/4 inch chamfer strips in the corners of formwork to produce beveled edges on permanently exposed surfaces unless otherwise specified. Do not bevel reentrant corners or edges of formed joints of concrete unless specified in the Contract Documents.

C. Inspect formwork and remove deleterious material immediately before concrete is placed. Provide temporary openings where needed at the base of column and wall formwork to facilitate cleaning and inspection.

D. Fabricate form ties so ends or end fasteners can be removed with minimum spalling at the faces of concrete.

PART 3 - EXECUTION

3.01 EARTH FORMS

A. Where sides of excavations have been cut neat and accurate to size for pouring of concrete directly against the excavation, forms for footings will not be required. Remove loose soil prior to placing concrete.

3.02 CONSTRUCTION AND ERECTION OF FORMWORK

A. At construction joints, lap contact surface of the form sheathing for flush surfaces exposed to view over the hardened concrete in the previous placement. Ensure formwork is sealed against hardened concrete to prevent offsets or loss of mortar at construction joints and to maintain a true surface.

B. Provide positive means of adjustment (such as wedges or jacks) of shores and struts. Do not make adjustments in the formwork after concrete has reached its time of initial setting. Brace formwork securely against lateral deflection and lateral instability.

C. Fasten form wedges in place after final adjustment of forms and before concrete placement.

D. Anchor formwork to shores, supporting surfaces, or members to prevent upward or lateral movement of the formwork system during concrete placement. Form supports shall be placed on adequate foundations and have sufficient strength and bracing to prevent settlement or distortion from the weight of the concrete or other cause. Support shall rest on double wedged shim, or other approved means, so that the forms will be maintained at the proper grade.

E. Provide runways for moving equipment and support runways directly on the formwork or structural member without resting on the reinforcing steel.

F. All formed joints on concrete surfaces to be exposed shall be taped and shall align so joints will not be apparent on the concrete surfaces.

G. Any movement or bellying of forms during construction shall be considered just cause for their removal and, in addition, the concrete work so affected.

H. Bolts, rods, or other approved devices shall be used for internal form ties and shall be of sufficient quantities to prevent spreading of the forms. The ties shall be placed at least 1 inch away from the finished surface of the concrete. Bolts and rods that are to be completely withdrawn shall be coated with grease.

I. Boards or other form materials that have been damaged or checked or warped prior to placing of concrete shall be removed from the forms and replaced with approved materials or otherwise corrected to the satisfaction of the engineer.

J. Assign a sufficient number of men to keep watch on and maintain the forms during placing of concrete. Satisfactorily remedy any displacement or looseness of forms or reinforcement before placing of concrete. No form shall be moved or altered except as may be specifically directed.

3.03 APPLICATION - FORM RELEASE AGENT

A. Cover surfaces of formwork with an acceptable material that will prevent bond with the concrete. A field-applied formwork release agent or a factory-applied liner may be used. If a formwork release agent is used, apply to the surfaces of the formwork in accordance with the manufacturer's recommendations before placing reinforcing steel. Do not allow formwork release agent to puddle in the forms. Do not allow formwork release agent to contact reinforcing steel or hardened concrete against which fresh concrete is to be placed.

3.04 INSERTS, EMBEDDED PARTS, AND OPENINGS

A. Position and support expansion joint materials, waterstops, and other embedded items to prevent displacement. Fill voids in sleeves, inserts, and anchor slots temporarily with readily removable material to prevent entry of concrete into voids.

B. Place sleeves, inserts, anchors, and embedded items required for adjoining work or for support of adjoining work before concrete placement.

3.05 FORM CLEANING

A. Clean surfaces of formwork and embedded materials of mortar, grout, and foreign materials before concrete is placed.

3.06 FORMWORK TOLERANCES

A. Unless otherwise specified in the Contract Documents, construct formwork so concrete surfaces conform to the tolerance limits of ACI 117. The class of surface shall conform to Article 2.02 herein.

B. To maintain specified tolerances, camber formwork to compensate for anticipated deflections in formwork during concrete placement. Set formwork and intermediate screed strips for slabs accurately to produce designated elevations and contours of the finished surface before removal of formwork. Ensure that edge forms and screed strips are strong enough to support vibrating screeds or roller pipe screeds when the finish specified requires the use of such equipment.

C. When formwork is cambered, set screeds to the same camber to maintain specified concrete thickness.

3.07 FIELD QUALITY CONTROL

A. The Contractor shall verify accuracy of items, furnished under other sections of these specifications and installed under this section.

3.08 FORM REMOVAL

A. Remove top forms on sloping surfaces of concrete as soon as removal will not allow concrete to sag. Perform needed repairs or treatment required at once and follow immediately with specified curing.

B. Do not damage concrete during removal of formwork for columns, walls, slabs, sides of beams, and other parts not supporting the weight of the concrete. Perform needed repair and treatment required on vertical surfaces at once and follow immediately with specified curing.

C. Vertical forms shall remain on columns, walls, pilasters for at least seven 7 days after the last concrete and until concrete has attained 3000 psi minimum per Article 3.08D and the Engineer responsible for design of the formwork has approved removal.

D. Contractor shall request to have field cured compression test specimen taken where it is planned to remove formwork and shoring sooner than indicated above and submit detailed plans for review and acceptance. Mold cylinders in accordance with ASTM

C31, and cure them under the same conditions for moisture and temperature as used for the concrete they represent. Test cylinders in accordance with ASTM C39.

E. In removing plywood forms, no metal pinch bars shall be used and special care to be taken in stripping. Start at top edge or vertical corner where it is possible to insert wooden wedges. Wedging shall be done gradually and shall be accompanied by light tapping of the plywood panels to crack them loose. Do not remove forms with a single jerk after it has been started at one end.

F. Nothing herein shall be construed as relieving the Contractor of any responsibility of the safety of the structure.

END OF SECTION

SECTION 03 20 00

CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
1. Reinforcing steel for concrete and masonry.
2. Supports and accessories for steel reinforcement.

B. Related Sections:
1. Section 03 10 00 - Concrete Forms and Accessories
2. Section 03 30 00 - Cast-in-Place Concrete

1.02 REFERENCES

A. American Concrete Institute (ACI):
1. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.
2. ACI 301 - Specifications for Structural Concrete for Buildings.
3. ACI 318 - Building Code Requirements for Structural Concrete and Commentary.
4. ACI SP-66 - ACI Detailing Manual.

B. ASTM International (ASTM):
1. ASTM A82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
2. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
3. ASTM A184 - Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement.
4. ASTM A185 - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
5. ASTM A615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
6. ASTM A 641 - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
7. ASTM A706 - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
8. ASTM A767 - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
9. ASTM A775 - Standard Specification for Epoxy-Coated Steel Reinforcing Bars.
10. ASTM A780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.

11. ASTM A884 - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement.
12. ASTM A934 - Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars.
13. ASTM D3963 - Standard Specification for Fabrication and Jobsite Handling of Epoxy Coated Reinforcing Steel Bars.
14. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection and/or Testing.

C. American Welding Society (AWS):
1. AWS D1.4 - Structural Welding Code - Reinforcing Steel.

D. Concrete Reinforcing Steel Institute (CRSI):
1. CRSI (DA4) - Manual of Standard Practice.

1.03 SUBMITTALS

A. See Section 01 30 00 – Contractor Submittals, for submittal procedures.

B. Shop Drawings (Placing drawings)
1. Comply with requirements of ACI SP-66. Shop drawings shall also show details for congested areas and connections. Shop drawings used in field must be reviewed copies.

C. Product Data
1. Manufacturer's catalog sheets including instructions for use and description of application and ICC/IAPMO evaluation report shall be provided on each of the following items intended for use on project:
   a. Mechanical anchorage devices for splices.

D. Mill Certificates
1. The Contractor shall provide Mill Certificates for each size of bar for each heat to be used on project and certify that reinforcing steel supplied for this project meet or exceed specified requirements.
2. Mill Certificates shall include name of mill, date of rolling, date of shipping to fabricator and shall be signed by fabricator certifying that each material complies with or exceeds the specified requirements. A Mill Certificate shall be furnished with each lot of material delivered to the project and the lot shall be clearly identified in the Certificate.
3. When Mill Certificates cannot be provided, the Contractor shall hire a professional testing laboratory to verify compliance and provide laboratory test reports. The Contractor shall pay for the cost of testing.

E. Laboratory Test Reports
1. Laboratory test reports shall be signed by a principal of the testing agency who is a registered Civil Engineer in the State of California.

2. When required by other portions of these specifications, laboratory test reports shall be submitted for each size of bar tested for each heat to show compliance with appropriate ASTM Standards and these specifications.

F. Welder's Certificates and WPS: Submit description of reinforcement weld locations, welding procedures, and welder certification when welding is permitted.

1.04 QUALITY ASSURANCE

A. Perform work of this section in accordance with the current governing edition of CBC, ACI 301, ACI SP-66, ACI 318, and AWS D1.4 except as modified by the contract documents.

B. Sampling and Testing:

1. General
   a. If the Owner's agent, through oversight or otherwise, has accepted material or work which is defective or contrary to specifications, this material or work, regardless of state of completion, may be rejected.
   b. Testing agencies shall meet the requirements of ASTM E329. Testing agencies shall be accepted by the Architect/Engineer before performing any work.
2. Testing responsibilities of Contractor:
   a. Submit data on qualifications of proposed testing agency for acceptance. Use of testing services will not relieve the Contractor of the responsibility to furnish materials and construction in compliance with the Contract Documents.
   b. Cooperate with and notify owner's agent at least 24 hours in advance of inspections required and shall provide samples, test pieces, and facilities for inspection at no cost to the owner.
   c. Identify each lot of fabricated reinforcing steel to be shipped to the site by assigning an individual lot number that identifies steel by heat number and shall be tagged in such a manner that each such lot can be accurately identified at the job site.
   d. Remove all unidentified reinforcing steel, anchorage assemblies and bar couplers received at the site.

1.05 STORAGE OF MATERIALS

A. Store reinforcement during fabrication and at site to avoid excessive rusting or coating with grease, oil, soil, or other objectionable materials. Epoxy-coated and galvanized reinforcement shall be handled and stored by methods that will not damage the coating. Bundles shall not be dropped or dragged. Reinforcing steel shall be transported and stored in a manner that will not damage any applied coating. Since the epoxy coating is flammable, the coated reinforcement shall not be exposed to any fire or flame.

1.06 SEQUENCING AND SCHEDULING

A. Coordinate work with all trades so as not to interfere with the work of other trades. Bring interferences between trades to Architect's/Engineer's attention and resolve before any concrete is placed.

PART 2 - PRODUCTS

2.01 REINFORCING BARS

A. Reinforcing Steel:
1. Bars for reinforcement shall conform to the requirements of ASTM A706.
2. ASTM A615, Grade 60 bars may be substituted if the actual yield strength based on mill tests does not exceed the specified yield strength by more than 18,000 psi (retest shall not exceed this value by more than an additional 3,000 psi) and the ratio of the actual ultimate tensile stress to the actual tensile yield strength is not less than 1.25.
3. Uncoated steel unless noted otherwise.

2.02 WELDING ELECTRODES

A. Welding electrodes shall be per Table 5-1 of AWS D1.4.

2.03 MECHANICAL COUPLING DEVICES

A. Mechanical coupling devices shall develop 125 percent of the minimum yield strength of the bars spliced.

2.04 REINFORCEMENT ACCESSORIES

A. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement. Reinforcement supports shall conform to the requirements of ACI 301.

2.05 OTHER MATERIALS

A. All other materials, not specifically described by these specifications but required for complete and proper placement of reinforcement shall be new, first quality of their respective kinds, and subject to the approval of the Architect/Engineer.

2.06 FABRICATION

A. Welding of reinforcement is permitted only with the specific approval of Engineer. Perform welding in accordance with AWS D1.4. Do not weld crossing bars (tack welds) for assembly of reinforcement, supports, or embedded items.

PART 3 - EXECUTION

3.01 EXISTING CONDITIONS

A. Prior to all work of the section, carefully inspect the installed work of other trades and verify that all work is sufficiently complete to permit the start of work under this section and that the completed work of this section will be in complete accordance with the original design and the reviewed shop drawings. In the event of discrepancy, immediately notify the Architect/Engineer in writing.

B. In the event conduits, pipes, inserts, sleeves, or any other items interfere with placing the reinforcement as indicated on the drawings or approved shop drawings, or as otherwise required, immediately notify the Architect/Engineer and obtain approval on procedure before placement of reinforcement is started.

3.02 BENDING

A. Bends for reinforcing steel shall be made in accordance with ACI 301 and ACI 318. Bend bar sizes No. 3 through 5 cold only one time, provided reinforcing bar temperature is above 32 degree F. Do not field bend reinforcing steel in a manner that will injure material, cause the bars to be bent on too tight a radius, or that is not indicated as allowed on drawings or permitted by Engineer. Do not straighten bent or kinked bars for use on project without permission of Engineer. Replace bars with kinks or bends not shown on the drawings.

3.03 PLACING

A. All reinforcement shall be placed in strict conformance with the requirements of the Contract Drawings, both as to location, position and spacing of members. It shall be supported and secured against displacement by the use of adequate and proper wire supporting and spacing devices, tie wires, etc. so that it will remain in its proper position in the finished structure. Reinforcement may not be wet set in concrete pours.

B. Tolerances: Do not exceed the placing tolerances specified in ACI 117 before concrete is placed. Placing tolerances shall not reduce cover requirements except as specified in ACI 117.

C. Minimum concrete cover for reinforcement shall be as indicated in the Contract Drawings. Where less than 3" cover is noted and concrete will be placed against soil, increase the section thickness to attain 3" cover.

D. Preserve clear space between parallel bars of not less than 1 1/2 times the nominal diameter of round bars and in no case let the clear distance be less than 1 1/2 inches nor less than 1-1/3 times the maximum size of aggregate for concrete. Lap splices shall be contact lap splices in accordance with ACI 318 unless noted otherwise on the Contract Drawings. Bars shall be wired together at laps. Wherever possible, stagger splices in adjacent bars. Butt splices shall be accomplished by mechanical anchorage devices. Stagger these devices 2', unless noted otherwise on the Contract Documents.

E. Bars shall not be cut by gas torch.

3.04 CLEANING REINFORCEMENT

A. Take all means necessary to ensure that steel reinforcement, at the time concrete is placed around it, is completely free from rust, soil, loose mill scale, oil, paint and all coatings which will destroy or reduce the bond between steel and concrete.

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
1. Cast-in-place structural concrete.
2. Grouting under base plates.

B. Related Sections
1. Section 03 10 00 - Concrete Forms and Accessories
2. Section 03 20 00 - Concrete Reinforcement
3. Section 31 23 23 - Structural Excavation

1.02 REFERENCES

A. American Concrete Institute (ACI):
1. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.
2. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
3. ACI 301 - Specifications for Structural Concrete for Buildings.
4. ACI 302.1R - Guide for Concrete Floor and Slab Construction.
5. ACI 306.1 - Cold Weather Concreting.
6. ACI 308R - Guide to Curing Concrete.
7. ACI 318 - Building Code Requirements for Structural Concrete and Commentary.

B. ASTM International (ASTM):
1. ASTM C31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field
2. ASTM C33 - Standard Specification for Concrete Aggregates.
3. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
4. ASTM C42 - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
5. ASTM C94 - Standard Specification for Ready-Mixed Concrete.
6. ASTM C143 - Standard Test Method for Slump of Hydraulic-Cement Concrete.
7. ASTM C150 - Standard Specification for Portland Cement.
8. ASTM C157 - Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete.
9. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete.

10. ASTM C173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
11. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
12. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
13. ASTM C330 - Standard Specification for Lightweight Aggregates for Structural Concrete.
14. ASTM C494 - Standard Specification for Chemical Admixtures for Concrete.
15. ASTM C567 - Standard Test Method for Determining Density of Structural Lightweight Concrete
16. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
17. ASTM C881 - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
18. ASTM C 979 - Standard Specification for Pigments for Integrally Colored Concrete.
19. ASTM C1077 - Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.
20. ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
21. ASTM C1116 - Standard Specification for Fiber-Reinforced Concrete.
22. ASTM C1218 - Standard Test Method for Water-Soluble Chloride in Mortar and Concrete.
23. ASTM C1602 - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete.
24. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
25. ASTM D4832 - Standard Test Method for Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders.
26. ASTM E154 - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.
27. ASTM E1155 - Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers.
28. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

1.03 SUBMITTALS

A. See Section 01 30 00 – Contractor Submittals, for submittal procedures.

B. Product Data

1. Manufacturer's catalog sheets including instructions for use and description of application shall be provided on each of the following materials:
   a. Epoxies
   b. Grout
   c. Admixtures

d. Curing Compounds
e. Chemical Hardener
f. Adhesive Anchoring System

C. Mix Designs

1. Mix designs shall be submitted for each class of concrete on the job and shall show names and brands of all materials, proportions, slump, strength, gradation of coarse and fine aggregates, and location to be used on job. Field test records or test data that is used to establish the average compressive strength of the mixture shall be submitted.

D. Concrete Placement Schedule: The Contractor shall submit a concrete placement schedule which shall show all proposed construction joint locations, limits of each placement sequence, order of placement and type of joint proposed at each joint location.

E. Samples: Submit to testing agency of Owner's choice sample of materials as specified and as otherwise required by Architect/Engineer, including names, sources and descriptions. Select samples to fairly represent average quality and grading of aggregates proposed for the work.

F. Certificates of Compliance

1. The Contractor shall provide Certificate of Compliance for each type of aggregate, cementitious material and admixture to be used in each class of concrete or a Certificate of Compliance for each class of concrete.
2. Certificates of Compliance for cementitious materials shall include type, manufacturing location, shipping location ; for aggregates: type, pit or quarry location, producers' name, grading, specific gravities and certification evidence not more than 90 days old; for admixtures: type, brand name, producer, manufacturer's technical data sheet, and certification data; and for water: source of supply that are used in each class of concrete and shall be signed by the concrete supplier certifying that each material item complies with, or exceeds the specified requirements. Certificates of Compliance shall be furnished 60 days in advance of any concrete pours.
3. When Certificates of Compliance cannot be provided, the Contractor shall hire a professional testing laboratory to verify compliance of each type of material to be used in each Class of Concrete. The cost of testing shall be paid for by the Contractor.

G. Weight and Batch Tags:

1. The special inspector shall be provided with a weight and batch tag upon delivery of each load of concrete.

1.04 QUALITY ASSURANCE

A. Comply with the provisions of the current governing CBC, ACI 301, and ASTM C94 except where more stringent requirements are shown or specified.

B. Sampling, Testing and Inspection:

1. General:
   a. If the Owner's agent, through oversight or otherwise, has accepted material or work which is defective or contrary to specifications, this material or work, regardless of state of completion, may be rejected.

b. Testing agencies shall meet the requirements of ASTM C1077. Testing agencies shall be accepted by the Architect/Engineer before performing any work.

2. Contractor:
   a. The Contractor shall cooperate with and notify Owner's agent at least 24 hours in advance of inspection required and shall provide samples and facilities for inspection without extra charge.
   b. The Contractor shall provide and maintain adequate facilities on the project site for safe storage and initial curing of concrete test specimens as required by ASTM C31 for the sole use of the testing agency.
   c. Each mix design shall be verified by trial batch tests or field test records and certified to by a principal of the laboratory who is a registered Civil Engineer in the State of California and submitted to the Architect/Engineer for review. Agency field test records, in order to be acceptable, must satisfy the requirement of ACI 318 section 5.3 otherwise trial mixture meeting the requirements of ACI 318 Section 5.3 shall be made. The Contractor shall submit data on qualifications of proposed testing agency for acceptance and hire the accepted testing agency to provide trial mixture test data for each type of concrete on the job.
   d. Prior to placing any concrete, a trial batch of each Class of concrete shall be prepared using the design mix proposed for the project. From the trial batch, specimens for determining the "Drying Shrinkage" shall be prepared by the Owner's agent.

1.05 SEQUENCING AND SCHEDULING

A. Obtain information and instructions from other trades and suppliers in ample time to schedule and coordinate the installation of items furnished by them to be embedded in concrete so provision for their work can be made without delaying the project.

B. Perform any coring and infill of cored holes that were required by failed test results from test panels, failure or delay in complying with these requirements, at no cost to Owner.

PART 2 - PRODUCTS

2.01 FORMWORK

A. Comply with requirements of Section 03 10 00.

2.02 REINFORCEMENT

A. Comply with requirements of Section 03 20 00.

2.03 CEMENTITITIOUS MATERIALS

A. Cement: ASTM C 150, Type II portland type.

B. Fly Ash: ASTM C618, Class C.
   1. Fly ash may substitute for portland cement up to a maximum of 25% of total cementitious materials by weight (if used, a minimum of 15% of the total cementitious materials by weight.)

a. Substitutions that combine fly ash and ground granulated blast-furnace slag are limited to a combined total of 50% of the total cementitious material by weight with fly ash no more than 25% of the total cementitious materials by weight.
b. Reduce slag and fly ash substitution rates by at least 50% for cold weather concreting as defined in ACI 306.1.

C. Ground-granulated Blast-furnace Slag: ASTM C989 grades 100 or 120
1. Ground-granulated Blast-furnace Slag may substitute for portland cement up to a maximum of 50% of the total cementitious material by weight.

D. Use cementitious materials that are of the same brand and type and from the same plant of manufacture as the cementitious materials used in the concrete represented by the submitted field test records or used in the trial mixtures.

E. Color Additives: ASTM C 979, synthetic or natural mineral-oxide pigments or liquid coloring admixtures, temperature stable and nonfading.

2.04 AGGREGATES

A. Aggregates for hardrock concrete shall conform to ASTM C33.

B. Aggregates used for entire project shall be obtained from the same sources and have the same size ranges as the aggregates used in the concrete represented by submitted historical data or used in trial mixtures.

2.05 WATER

A. Mixing Water for concrete shall be clean and free from deleterious amounts of acids, alkalis or organic materials.

2.06 CHEMICAL ADMIXTURES

A. Do not use chemicals that contain calcium chloride or will result in total soluble chloride ions in hardened concrete at ages from 28 to 42 days contributed from water, aggregates, cementitious materials, and admixtures in excess of 0.15 percent by weight of cement. Measure water-soluble chloride-ion content in accordance with ASTM C1218. Admixtures containing chloride salts shall not be used where concrete is poured on top of the metal deck. Calcium chloride or any admixture containing chloride ions shall not be used in drilled piers.

B. Air Entrainment Admixture: ASTM C260.
1. Acceptable Products subjected to compliance with requirements:
a. Sika Aer; Sika Corporation.
b. MB-VR or MB-AE; Master Builders.
c. Darex AEA; W.R. Grace.

C. High Range Water Reducing and Retarding Admixture: ASTM C 494 Type G.

D. High Range Water Reducing Admixture (Super Plasticizer): ASTM C494 Type F.
1. Acceptable Products subjected to compliance with requirements:
a. WRDA19; W.R. Grace..

b. Sikament; Sika Chemical Corporation..
c. Pozzolith 400; Master Builders..

E. Water Reducing and Retarding Admixture: ASTM C494 Type D.
1. Acceptable Products subjected to compliance with requirements:
a. Pozzolith 300-R; Master Builders.
b. Daratard; W.R. Grace.
c. Plastiment; Sika Chemical Corporation.

F. Water Reducing Admixture: ASTM C494 Type A.
1. Acceptable Products subjected to compliance with requirements:
a. Eucon WR-75; Euclid Chemical Company.
b. Pozzolith 344; Master Builders.
c. Plastocrete 160; Sika Chemical Corporation.

G. Admixtures used in concrete shall be the same as those used in the concrete represented by the submitted field test records or used in the trial mixtures.

2.07 ACCESSORY MATERIALS

A. Non-Shrink Grout:
1. ASTM C1107 Grade B or C, pre-mixed, high strength, Metallic or non-metallic flowable grout, which does not shrink as it cures. Water-soluable chloride ion content of grout less than 0.06 percent chloride ion by weight of cement when tested in accordance with ATM C1218.
a. Minimum Compressive Strength at 7 Days: 5000 psi.
b. Subject to compliance with requirements provide one of the following:
1) Metallic:
a) Embeco 636; Master Builders.
b) Sikagrout 212; Sika Chemical Company.
c) Metallic Spec. Grout; The Burke Company.
2) Non-Metallic:
a) Masterflow 928; Master Builders.
b) Sonogrout 10K; Sonneborn-Contech.
c) Sure-Grip High Performance Grout; Dayton Superior Corporation.

B. Waterproofing Paper: ASTM C171.

C. Liquid Membrane Curing Compound: ASTM C309 or ASTM C1315.

D. Post-installed anchoring systems:
1. Adhesive anchoring system
a. Adhesive anchoring system shall be HILTI-HY 150 MAX-SD (ESR-3013) or approved equal with a current ICC/IAPMO evaluation report.
2. Expansion anchors and screw anchors
a. Expansion anchors shall be HILTI KWIK BOLT TZ (ESR-1917), or approved equal with a current ICC/IAPMO evaluation report. Screw anchors shall be Simpson Titen HD (ESR-2713) or approved equal with a current ICC/IAPMO evaluation report.

2.08 BONDING AND JOINTING PRODUCTS

A. Epoxy Bonding System: Epoxies shall be a two component material for use on dry or damp surfaces and shall conform to the requirements of ASTM C881. Epoxy bonding agents and adhesives shall be used in strict accordance with manufacturer's recommendations.

1. Acceptable Products subjected to compliance with requirements:
   a. Sikadur Armatec 110; Sika Chemical Corporation or equal.

B. Joint Filler: Nonextruding, resilient asphalt impregnated fiberboard or felt, complying with ASTM D 1751, and width/depth as indicated.

2.09 CONCRETE MIX DESIGN

A. Admixtures: Where admixtures are used they shall be added as recommended in ACI 211.1 for normal weight concrete and at rates recommended by manufacturer. Admixtures are subject to the engineer's review.

B. Normal Weight Concrete Mix Requirements:

1. Shall be made with aggregates for hardrock concrete.
2. Minimum Compressive Strength, f'c, when tested in accordance with ASTM C39 at 28 days: As scheduled below.
3. Minimum Cementitious Material Content:
   a. For concrete used in floors and slab-on-grades, cementitious material content shall not be less than indicated in following table:

Nominal maximum size of aggregate, in	Minimum cementitious material content, sacks
1-1/2	6
1	6
3/4	6
1/2	6.5

4. Maximum Water-Cement Ratio: As scheduled below. Significant volume of liquid admixtures should be considered as part of the mixing water.
5. Maximum Aggregate Size: Nominal maximum size of coarse aggregate shall not exceed three-fourths of the minimum clear spacing between reinforcing bars, one-fifth of the narrowest dimension between sides of forms, or one-third of the thickness of slabs or toppings.

Concrete Class	Minimum 28-day Compressive Strength f'c	Maximum Water/ Cementitious Material Ratio	
		Non-Air Entrained	Air Entrained
Class A	3000 psi	0.55	0.55
Lean Concrete (CLSM)/(CDF)	300 psi		

C. Controlled Low Strength Material (CLSM)/Controlled Density Fill (CDF) Mix Requirements:

1. Shall be made with aggregates conforming to ASTM C33.
2. Minimum Compressive Strength, f'c, when tested in accordance with ASTM D4832 at 28 days: As scheduled above.
3. Minimum Cementitious Material Content: 2 sacks.
4. Maximum Water-Cement Ratio: Sufficient to produce a fluid workable mixture without seggregation of the aggregate when placed.

D. Concrete Mix Designs: The following table presents a schedule of classes of concrete, maximum aggregate, maximum slump and air content for each type of concrete, which shall be as follows:

Concrete Element	Class of Concrete	Max. Size Aggregate	Max./Min Slump (inch) at point of discharge
Foundation Walls and footings	A	1-1/2	3/1
Slabs on Grade and Mat Slab	A	1	4/1
Structural Backfill	Lean	1-1/2	6/1
Yard Concrete Walks & Curbs	F	3/4	4/1

E. Determine the slump by ASTM C143. Slump shall not exceed 3" for any concrete placement where top of surface slopes more than 2%. When use of a Type I or II plasticizing admixture conforming to ASTM C1017 or when a Type F or G high-range water-reducing admixture conforming to ASTM C494 is permitted to increase the slump of concrete, concrete shall have a slump of 2 to 4 in. before the admixture is added and a maximum slump of 8 in. at the point of delivery after the admixture is added unless otherwise specified.

F. Add an air entraining agent to the concrete to provide specified amounts of entrained air per table below unless noted otherwise. Measure air content at the point of delivery in accordance with ASTM C173. Tolerance is plus/minus 1.5% . For specified compressive strengths above 5000 psi, the air contents indicated in the following table may be reduced by 1%.

Nominal maximum aggregate size, in	Air content, Percent
1/2	7
3/4	6
1	6
1-1/2	5.5

2.10 MIXING

A. Use ready-mixing concrete complying with ASTM C94 and with the requirements of Contract Documents. Mix for a period of not less than ten (10) minutes; at least three (3) minutes of mixing period shall be immediately prior to discharging at the job.

B. CLSM shall be placed in the work within 3 hours after introduction of the cement to the aggregates.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.02 WEATHER REQUIREMENTS

A. Reinforcement, forms and ground which concrete will contact shall be completely free of frost.

B. When the average of the highest and lowest temperature during the period from midnight to midnight is expected to drop below 40 °F for more than three successive days, deliver concrete to meet the following minimum temperatures immediately after placement:

1. 55 °F for sections less than 12 in. in the least dimension;
2. 50 °F for sections 12 to 36 in. in the least dimension;
3. 45 °F for sections 36 to 72 in. in the least dimension; and
4. 40 °F for sections greater than 72 in. in the least dimension.

C. The temperature of concrete as placed shall not exceed these values by more than 20 °F. These minimum requirements may be terminated when temperatures above 50 °F occur during more than half of any 24 h duration.

D. The temperature of concrete as placed shall not exceed 90 °F .When temperature of steel reinforcement, Embedments, or forms is greater than 120 ºF, fog steel reinforcement, Embedments, and forms with water immediately before placing concrete. Remove standing water before placing concrete.

E. Do not begin to place or continue to place concrete while rain, sleet, or snow is falling unless adequate protection is provided and, when required, acceptance of protection is obtained. Do not allow rain water to increase mixing water or to damage the surface of the concrete.

3.03 CONVEYING AND PLACING CONCRETE

A. All concrete shall be mixed, delivered and discharged in accordance with the requirements of ASTM C94. All concrete shall be placed, finished and cured and all other pertinent construction practices shall be in accordance with the requirements of ACI 301.

B. Notify Architect/Engineer not less than 48 hours prior to commencement of placement operations.

C. Before placing, clean mixing and conveying equipment, clean forms and space to be occupied by concrete and wet forms. Remove ground water until completion of work.

D. Place no concrete in any unit of work until all formwork has been completely constructed, all reinforcements secured in place, all items to be built into concrete are in place, and form ties at constructions joints tightened.

E. Slabs and beams shall not be subjected to occupant or storage loads exceeding 20 psf until specified strength is reached (28 days minimum).

F. Concrete shall be placed so that a uniform appearance of surfaces will be obtained. The concrete will be free of all rock pockets, honeycombs and voids.

G. The subgrade must be moist when the concrete is placed for floor slab to prevent excessive loss of water from the concrete mix.

H. Pumping of concrete may require admixtures to increase slump beyond the maximum slump listed. Admixtures are subject to the engineer's review.

I. Carry on concreting, once started, as a continuous operation until the section of approved size and shape is completed. Make pour cut-offs of approved detail and location.

J. Handle concrete as rapidly as practicable from mixer to place of deposit by methods which prevent separation or loss of ingredients. Deposit as nearly as practicable in final position to avoid rehandling or flowing. Do not drop concrete freely where reinforcing bars will cause segregation, impact the soil face of excavations nor drop freely more than eight feet. Use hoppers, chutes or trunks of varying length so that the free unconfined fall of concrete shall not exceed eight feet. Deposit to maintain a plastic surface approximately horizontal. In walls, deposit in horizontal layers not over eighteen inches deep. In pouring columns, walls or thin sections of considerable heights, use openings in forms, elephant trunks, tremies or other approved devices which permit concrete to be placed without segregation or accumulation of hardened concrete on forms or metal reinforcement above the level of the concrete. Install so concrete will be dropped vertically.

K. Consolidating: All concrete shall be placed with mechanical vibration unless noted otherwise. Employ as many vibrators and tampers as necessary to secure the desired results. Minimum: one per each 20 cubic yards of concrete placed per hour. Eliminate the following practices: Pushing of concrete with vibrator; external vibration of forms; allowing vibrator to vibrate against reinforcing steel where steel projects into green concrete; allowing vibrator to vibrate contact faces of forms. Vibrators shall function at a minimum frequency of 3600 cycles per minute when submerged in concrete. Supplement vibration by forking and spading along the surfaces of the forms and between reinforcing whenever flow is restricted. Drilled piers shall be vibrated only to a depth of 3 times the pier diameter measured from the top of pier.

3.04 CONSTRUCTION JOINTS

A. Location and details of construction joints shall be as indicated on drawings, specified, or as approved by the Architect/Engineer. Locate so as not to impair the strength of the structure.

B. Sandblast all construction joints using coarse sand or waterblast to clean and roughen entire surface of joint, exposing coarse aggregate solidly embedded in mortar matrix uniformly. Clean forms and reinforcing of drippings. Clear away debris by compressed air.

3.05 CONCRETE FINISHING

A. Finishing Formed Surfaces: Finish per requirements of ACI 301.

1. Use grout-cleaned finish for permanently exposed formed surfaces except foundation surfaces and smooth-rubbed finish for exposed foundation surfaces.
2. Use medium broom finish for the surface finish of all slabs.

B. Finishing Unformed Surfaces: Finish per requirements of ACI 301. Start finishing after bleeding of concrete is finished. The presence of bleed water is detected visually but when concrete surface is getting dry fast and rate of evaporation is so high, place a clear plastic sheet over a section of the concrete to block evaporation and to allow observation of bleeding.

C. Measure slabs for slabs-on-ground to verify compliance with the tolerance requirements of ACI 117 as specified below:
1. 1/4 inch in 10 ft in accordance with the "10-ft straight edge method" in ACI 117.

3.06 CONTROL JOINTS

A. Control joints shall be made by sawcutting slab with the Soff-Cut system or approved equal as soon as the surface is firm enough so that it will not be damaged by the blade, usually within 2 to 4 hours after final finishing (no later than 8 hours after placement). Cut 1/4 depth of slab thickness not less than 1 inch.

3.07 CURING AND PROTECTION

A. Comply with requirements of ACI 301. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at above 50 F for the period of time necessary for hydration of cement and hardening of concrete.
1. Normal concrete: At least the first 7 days after placement.
2. High early strength concrete: At least the first 3 days after placement.

C. Curing methods shall comply with ACI 308R.

D. Curing compounds conforming to ASTM C309 or ASTM C1315 shall be applied in accordance with the recommendations of the manufacturer and shall not be used on any surface against which additional concrete or other cementitious finishing materials are to be bonded, where epoxy flooring is called for, where concrete topping is to receive waterproofing membrane, where not recommended by integral color maker, nor on surfaces where such curing is prohibited by the project specifications.

E. Unformed concrete surfaces: Start curing as soon as the bleed water sheen has disappeared and before surface is dry.
1. Initial Curing: If surface drying starts before initial set of concrete, keep concrete continuously moist up to final set of concrete by fog spray. Time of initial set is also known as the vibration limit where concrete cannot be properly consolidated after reaching initial set. Before initial set, the concrete is not stiff enough to support the weight of a finisher or finishing machine. Water from fogging should be removed or allowed to evaporate before finishing.
2. Final Curing: Begin immediately after finishing. If finishing is completed but concrete has not reached final set, keep concrete continuously moist by fog spray, a liquid-

applied evaporation reducer spray, or liquid membrane-forming curing compound spray. Water from fogging should be removed or allowed to evaporate before finishing. After final set of concrete, curing shall be accomplished by one of the following materials or method:

a. Ponding, continuous fogging, or continuous sprinkling;
b. Application of a curing compound.
c. Application of mats or fabric kept continuously wet.
d. Application of sheet materials conforming to ASTM C171.
e. Other moisture-retaining covering as reviewed by Architect/Engineer.

F. Formed concrete surfaces: Steel forms and all wood forms in contact with the concrete shall be kept wet until they are removed. After formwork removal cure concrete by one of the method in final curing.

G. Remove protection in such a manner that the maximum decrease in temperature measured at the surface of the concrete in a 24 hr period shall not exceed the following:

1. 50 °F for sections less than 12 in. in the least dimension;
2. 40 °F for sections from 12 to 36 in. in the least dimension;
3. 30 ºF for sections 36 to 72 in. in the least dimension; or
4. 20 ºF for sections greater than 72 in. in the least dimension.

H. Measure concrete temperature using a method acceptable to the Architect/Engineer, and record the concrete temperature. When the surface temperature of the concrete is within 20 °F of the ambient or surrounding temperature, protection measures may be removed.

3.08 PATCHING AND CLEANING

A. After forms are removed, remove projecting fins, form ties, nails, etc. not necessary for the work or cut back one inch from the surface. Joint marks and fins in exposed work shall be smoothed off and cleaned as directed by the Architect/Engineer.

B. Repair defects in concrete work as directed by the Engineer and per ACI 301. Chip voids and stone pockets to a depth of one inch or more as required to remove all unsound material. Voids, surface irregularities, chipped areas, etc., shall be filled by patching, gunite or rubbing, as directed by the Architect/Engineer. Repaired surfaces shall duplicate appearance of unpatched work.

C. Clean exposed concrete surfaces and adjoining work stained by leakage of concrete to approval of Architect/Engineer.

3.09 CLEANUP

A. Clean up all concrete and cement work on completion of this portion of the work, except protective coatings or building papers shall remain until floors have completely cured or until interior partitions are to be installed.

3.10 GROUTING

A. Bearing plates and channels: The space between plates and channels bearing against masonry or concrete shall be filled with grout when required by the Engineer. The grout

shall be mixed and placed in strict accordance with manufacturer's instructions. Care shall be taken in the grouting to ensure that there are no voids or air pockets, and that there is full bearing between the bearing plates and channels and the grout.

3.11 POST INSTALLED ANCHORS

A. Installation of anchors and adhesive including drilling, cleaning of holes and torque shall be in accordance with the current ICC/IAPMO evaluation report. Post installed anchors shall be used only in applications permitted by the Evaluation Report. Anchors shall use washer sized to prevent crushing of the attached member at installation torque.

3.12 FIELD QUALITY CONTROL

A. Engineer Review: The Engineer or Owner’s Inspector shall inspect the surfaces between plates and channels, bearing on masonry and concrete to determine if grouting of space is necessary. If grouting of space is necessary, the Owner's Inspector shall inspect the grouting procedure.

B. Acceptance of concrete strength:

1. Standard molded and cured strength specimens: Test results from standard molded and cured test cylinders shall be evaluated separately for each specified concrete mixture. For evaluation, each specified mixture shall be represented by at least five tests. The strength level of concrete will be considered satisfactory when the averages of all sets of three consecutive compressive strength test results molded and cured in accordance with the requirements of ASTM C31 equal or exceed f'c and no individual strength test result falls below f'c by more than 500 psi when f'c is 5000 psi or less, or by more than 0.10f'c when f'c is more than 5000 psi.
2. Core tests: Where required by the Engineer, cores shall be obtained in accordance with ASTM C42. The location of cores shall be determined by the Engineer. If, before testing, cores show evidence of having been damaged subsequent to or during removal from the structure, replacement cores shall be taken. Strength level of concrete in the area represented by core tests will be considered adequate when the average compressive strength of the cores is equal to at least 85% of f'c, and if no single core is less than 75% of the specified compressive strength f'c .

C. When the strength of field-cured cylinders is less than 85% of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing in-place concrete.

D. Field Acceptance of concrete: Concrete within the specified limits of air-entrainment, slump and temperature shall not be used in the work.

E. Additional Tests: The Owner's agent will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure or deficiencies in protection and curing has occured, as directed by Engineer. Owner's agent may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42, or by other methods as directed. Contractor shall pay for such tests conducted, other additional testing as may be required, and cost of repairing areas of structure tested when unacceptable concrete is verified.

3.13 DEFECTIVE CONCRETE

A. General: Work considered to be defective may be ordered by the Architect/Engineer to be replaced in which case the Contractor shall remove the defective work at his expense. Work considered to be defective shall include, but not be limited to, the following:

1. Concrete in which defective or inadequate reinforcing steel has been placed.
2. Concrete in incorrectly formed, or not conforming to details and dimensions on the drawings or with the intent of these documents, or concrete the surfaces of which are out of plumb or level.
3. Concrete below specified strength.
4. Concrete not meeting the maximum allowable drying shrinkage requirements.
5. Concrete containing wood, cloth, or other foreign matter, rock pockets, voids, honeycombs, cracks or cold joints not scheduled or indicated on the drawings.

3.14 CORRECTION OF DEFECTIVE WORK

A. The Contractor shall, at his expense, make all such corrections and alleviation measures as directed by the Engineer.

B. Concrete work containing rock pockets, voids, honeycombs, cracks or cold joints not scheduled or indicated on the drawings, shall be chipped out until all unconsolidated material is removed.

C. Secure approval of chipped-out areas before patching. Patch per ACI 301-latest governing edition.

END OF SECTION

SECTION 22 05 53

UNDERGROUND FACILITIES IDENTIFICATION

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section describes special identification, markings, materials and their installation procedures for underground water facilities.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. All related work specified elsewhere, or in other codes or standards, will be as last revised, unless a specific date of issuance is called out in opposition to later revision date(s).

B. Other sections of the technical specifications, not referenced below, shall also apply to the extent required for proper performance of this work.

1.	Ductile Iron Pipe and Fittings:	33 11 13.15
2.	HDPE Pipe and Fittings:	33 11 13.23
3.	Automatic Valves:	40 92 13
4.	Manual Valves:	33 12 16
5.	Fire Hydrants:	40 05 81.13

1.03 APPROVED MANUFACTURERS

A. Warning Tape and Pipe Sleeves
1. Griffolyn, Division of Reef Industries
2. Terra Tape, Division of Reef Industries
3. T. Christy Enterprises, Inc.

B. Witness Markers
1. Carsonite Water line Markers
2. Or approved equal

1.04 IDENTIFICATION

A. Ductile iron pipe (DIP) shall be encased within an 8-mil polyethylene sleeve per Section 33 11 13.15. Sleeves for potable water pipe shall be blue with the words “POTABLE WATER” or “DOMESTIC WATER” stenciled in 2-inch black letters.

B. HDPE pipe carrying potable water shall be black with blue stripe(s), or shall be installed with a blue 8-mil polyethylene sleeve as for DIP.

C. PVC pipe carrying potable water shall be blue in color or shall be installed with a blue 8-mil polyethylene sleeve as for DIP.

D. All water service lateral lines shall be colored polyethylene, colored PVC or encased within a color-coded 8-mil polyethylene sleeve. Pipe or sleeve shall be blue in color for all domestic water services.

1.05 VALVE BOXES

A. Valve boxes for domestic water systems shall be as specified in Section 33 12 16.

B. All valve boxes installed in unpaved areas (open space areas) shall be marked with a witness pole, in addition to the above referenced markings.

1.06 COLOR AND PAINTING SCHEDULE

A. Comply with the APWA Uniform Color Code for underground utilities.

B. Domestic water facilities shall be blue, with the exception of fire hydrants which shall be painted as specified in Section 40 05 81.13. Witness poles for domestic water lines, valves and appurtenances shall be blue.

PART 2 - MATERIALS

2.01 BURIED PIPING WARNING TAPE

A. Plastic warning tape shall be an inert plastic film specifically formulated for prolonged underground use. The minimum thickness shall be 4 mils and the minimum width of the tape shall be 6 inches. Printing shall be a minimum of 2-inch block letters.

B. Warning tape for domestic water pipelines shall be blue with black printing having the words "CAUTION: DOMESTIC WATER-LINE BURIED BELOW."

PART 3 - EXECUTION

3.01 INSTALLATION OF PIPE WARNING TAPE

A. Warning tapes shall be installed a minimum 1-foot above and centered on the pipe. The warning tape shall be installed continuously for the length of the pipe and shall be fastened to valve stem casings or other vertical appurtenances by plastic adhesive tape.

3.02 INSTALLATION OF WITNESS MARKERS

A. Witness markers shall be installed over pipe in unpaved open-space areas at intervals not greater than 200 feet. Place markers at appurtenances, including but not limited to valves, air release/vacuum breaks, dead ends, inflection points and tees.

B. Witness markers shall be embedded into the soil at least 18-inches and shall be equipped with a barb or other such device to secure it in the surrounding soil.

END OF SECTION

SECTION 22 11 13

BRASS, AND BRONZE PIPE FITTINGS AND APPURTENANCES

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section includes materials and installation of brass, and bronze pipe, fittings and appurtenances.

B. Service laterals shall be polyethylene per Section 33 11 13.23.

1.02 APPROVED MANUFACTURERS

A. All materials shall be the appropriate model number specified as manufactured by the companies listed herein or approved equal.

B. Service Saddle
1. Ford
2. Jones
3. Mueller
4. A.Y. McDonald

C. Corporation Stop
1. Ford
2. Jones
3. Mueller
4. A.Y. McDonald

D. Meter/Angle Stop
1. Ford
2. Jones
3. Mueller
4. A.Y. McDonald

E. Insulating Pipe Bushings, Unions, or Couplings
1. Watts
2. Smith Blair
3. Pipe Seal and Insulator Company

PART 2 - MATERIALS

2.01 BRASS PIPE, NIPPLES, AND FITTINGS

A. Short threaded nipples, brass pipe and fittings shall conform to ASTM B 43, regular wall thickness, except that nipples and pipe of sizes 1-inch and smaller shall be extra strong. Threads shall conform to ANSI B2.1.

2.02 BRONZE APPURTENANCES

A. All items specified herein shall be manufactured of bronze conforming to ASTM B 62, "Composition Brass or Ounce Metal Castings."

B. All size service saddles shall be of the double-strap type for any type of pipe. The straps (or bails) shall be flat and shall be manufactured of bronze for ACP and of stainless steel for C900 PVC and ductile iron pipe. The body shall be manufactured of bronze and shall be tapped for an iron pipe thread. The seal with the pipe shall be effected with either a rubber gasket or an O-ring.

C. Corporation stops shall be ball valve type and shall be manufactured of bronze. The inlet fitting shall be a male iron pipe thread when used with saddle and the outlet connection shall be a compression type.

D. Copper setters shall be for 1-inch and 2-inch meter sizes or as approved by the Engineer and using lead free solder. The inlet and outlet service line connections shall be for 1-inch services and for horizontal connections using compression type connections. A dual purpose type connection may be used for the outlet service line connection. The meter connection shall have a key type inlet and outlet valve. When using a copper setter that is sized larger than the meter, use appropriate adaptors as approved by the Engineer. Copper setters shall be 15-inches in height with a lock wing.

PART 3 - EXECUTION

3.01 SERVICE SADDLE

A. The service saddle shall be no closer than 18 inches to a valve, coupling, joint, or fitting.

B. The surface of the pipe shall be filed to remove all loose material and to provide a hard, clean surface before placing the service saddle.

C. The service saddle shall be tightened per manufacturer’s recommendation. Care shall be used to prevent damage or distortion of either the corporation stop or service saddle by over tightening.

D. The tap into the pipe shall be made in accordance with the pipe manufacturer's recommendation.

3.02 INSTALLING FLANGE BOLTS AND NUTS

A. Lubricate bolt threads with anti-seize compound prior to installation.

B. Set flanged pipe with the flange bolt holes straddling the pipe horizontal and vertical centerlines.

3.03 INSULATING BUSHINGS AND UNIONS

A. Pipe or fittings made of nonferrous metals shall be isolated from ferrous metals by nylon insulating pipe bushings, union, or couplings.

3.04 BACKFILL MATERIAL

A. The pipe zone material for all service laterals shall be compacted sand per Section 31 23 00.

END OF SECTION

SECTION 22 11 19

CHLORINATION OF DOMESTIC WATER MAINS AND SERVICES FOR DISINFECTION

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section describes requirements for disinfection of domestic water mains, services, appurtenances and connections by chlorination and all requirements for bacterial testing of the facilities, and obtaining subsequent clearances for operations issued by the District and all state and local health agencies having jurisdiction.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. All related work specified elsewhere, or in other codes or standards, will be as last revised, unless a specific date of issuance is called out in opposition to later revision date(s).

B. Other sections of the technical specifications, not referenced below, shall also apply to the extent required for proper performance of this work.

1. General Piping Requirements: 33 11 00

1.03 REFERENCED STANDARD

A. All domestic water mains, water services, attached appurtenances, and connections, if any, shall be disinfected in accordance with AWWA C601, C651-14 and as specified herein.

1.04 APPLICATION

A. Before being placed in service or connected to existing facilities, all facilities shall be disinfected using hypochlorite (chlorine). Chlorine may be applied by direct liquid chlorine feed, or calcium hypochlorite tablets per AWWA C651.

1.05 RETESTING

A. Retesting of the system may be required if 15 days have passed between the date of testing and acceptance by the District, or as required by the District.

1.06 SUBMITTALS

A. The Contractor shall submit a Disinfection Plan per Section 01 30 00. The Disinfection Plan shall address trench treatment, flushing, chlorination, sampling and bacteriological testing procedures, and dechlorination procedures per Section 22 11 23 and AWWA C651. The Contractor shall submit this plan 7 working days prior to beginning this work.

PART 2 - MATERIALS

2.01 HYPOCHLORITE TABLETS

A. Calcium hypochlorite or sodium hypochlorite tablets shall have an average weight of 0.009 pounds each and shall contain not less than 70% of available chlorine.

2.02 LIQUID CHLORINE

A. Liquid Chlorine shall conform to AWWA C651 4.1.1 or AWWA C651 4.1.2.

PART 3 - EXECUTION

3.01 PROCEDURE

A. Contractor shall notify the District two (2) working days prior to chlorination of facilities.

B. All required corporation stops and other plumbing materials necessary for chlorination or flushing of the main shall be installed by and at the expense of the contractor.

C. All mains shall be thoroughly flushed prior to disinfection. Only the direct chlorine gas fuel method shall be used if contaminating material has entered the line.

D. Every service connection served by a main being disinfected shall be tightly shutoff at the curb stop before water is turned into the main. Care shall be taken to expel all air from the main and services during the filling operation.

E. Clean all pipe, fittings and valves and swab with chlorine disinfection prior to assembly.

F. Water shall be fed slowly into the pipeline with chlorine applied in amounts to produce a dosage of not less than 50 ppm nor more than 100 ppm in all sections of the pipeline and appurtenances.

G. Open and close valves in lines being disinfected several times during the contact period to disinfect gates.

H. Treated water shall be retained in the system for a minimum of 24 hours and shall contain a chlorine residual of not less than 25 ppm at the end of the retention period in all sections being disinfected.

3.02 CONCURRENT TESTING

A. Disinfecting the mains and appurtenances, hydrostatic testing, and preliminary retention may run concurrently for the required 24-hour period, but in the event there is leakage and repairs are necessary, additional disinfection shall be made by injection of chlorine solution into the line as provided hereinafter.

3.03 ADDITIONAL DISINFECTION

A. If the tests are not satisfactory the contractor shall provide additional disinfection as required by AWWA C651.

3.04 FLUSHING

A. After chlorination, the water shall be flushed from the line, in accordance with AWWA C651, at its extremities until the replacement water tests are equal chemically and bacteriologically to those of the permanent source of supply. The chlorinated water may be used later for testing other lines, or if not so used, shall be disposed of by the contractor, as designated in AWWA C651, Section 6.2. The contractor shall be responsible for all costs to dechlorinate the water and shall obtain all permits before discharging water into storm drain or watercourse. Discharging shall be in accordance with State and local regulations. The District will not be responsible for loss or damage resulting from such disposal.

3.05 BACTERIOLOGICAL TESTING

A. The sampling and bacteriological testing of newly installed facilities shall be by District personnel. Contractor shall provide access and facilitate sampling as required.

B. All mains and services must successfully pass bacteriological tests prior to connecting to the existing system. Services must be tested per the following procedure. A minimum of 10 percent of water services or 1 water service lateral, which ever is greater, must be tested. If this first water service test fails, then a minimum of 20 percent of water services or 2 water service laterals, whichever is greater, must be tested.

3.06 CUTTING INTO EXISTING MAINS

A. Following the opening of an existing domestic water main, the interior of all accessible pipes and fittings shall be swabbed with a hypochlorite solution. The drained portion of the existing line and any new section shall be flushed from two directions toward the cut-in, if possible.

B. Opening of any existing main shall be overseen by District personnel. Contractor shall coordinate scheduling to accommodate District staff requirements.

END OF SECTION

SECTION 31 23 00

TRENCHING, BACKFILLING AND COMPACTING

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section includes materials, testing, and installation for trench excavation, backfilling, and compacting.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. All related work specified elsewhere, or in other codes or standards, will be as last revised, unless a specific date of issuance is called out in opposition to later revision date(s).

B. Other sections of the technical specifications, not referenced below, shall also apply to the extent required for proper performance of this work.

C. All work shall comply with the requirements of the Santa Cruz County Encroachment Permit.

1.03 TESTING FOR COMPACTION

A. Determine the density of soil in place by the use of a sand cone, drive tube, or nuclear tester.

B. Determine laboratory moisture-density relations of existing soils by ASTM D 1557.

C. Determine the relative density of cohesionless soils by ASTM D 2049.

D. Sample backfill materials by ASTM D 75.

E. Express "relative compaction" as the ratio, expressed as a percentage of the in place dry density to the laboratory maximum dry density.

F. Compaction shall be deemed to comply with the specifications when no test falls below the specified relative compaction.

G. The Owner will secure the service of a soils tester and pay the cost of initial testing. The Contractor will be responsible for the cost of all retests in failed areas. Test results will be furnished by the Owner's tester.

1.04 DEFINITIONS

A. Pavement Zone. The pavement zone includes the asphalt concrete and aggregate base pavement section placed over the trench backfill.

B. Street Zone. The street zone is the top 18 inches of the trench or depth determined by the jurisdictional agency immediately below the pavement zone in paved areas.

C. Trench Zone. The trench zone includes the portion of the trench from the top of the pipe zone to the bottom of the street zone in paved areas or to the existing surface in unpaved areas.

D. Pipe Zone. The pipe zone shall include the full width of trench from the bottom of the pipe or conduit to a horizontal level 12 inches above the top of the pipe. Where multiple pipes or conduits are placed in the same trench, the pipe zone shall extend from the bottom of the lowest pipes to a horizontal level 12 inches above the top of the highest or topmost pipe.

E. Pipe Bedding. The pipe bedding shall be defined as a layer of material immediately below the bottom of the pipe or conduit and extending over the full trench width in which the pipe is bedded. Thickness of pipe bedding shall be as shown on the drawings or as described in these specifications for the particular type of pipe installed.

1.05 EXCESS EXCAVATED MATERIAL

A. The Contractor shall make the necessary arrangements for and shall remove and dispose of all excess excavated material unless indicated differently in the special provisions for any job.

B. It is the intent of these specifications that all surplus material not required for backfill or fill shall be properly disposed of by the Contractor at his expense at a proper disposal site.

C. No excavated material shall be deposited on private property unless written permission from the owner thereof is secured by the Contractor. Before the Owner will accept the work, the Contractor shall file a written release signed by all property owners with whom he has entered into agreements for disposing excess excavated material, absolving the Owner from any liability connected therewith.

D. The Contractor shall obtain a haul route permit from the County of Santa Cruz.

1.06 SAFETY

A. All excavations shall be performed, protected, and supported as required for safety and in the manner set forth in the operation rules, orders, and regulations prescribed by the Division of Industrial Safety of the State of California.

B. Barriers shall be placed at each end of all excavations and at such places as may be necessary along excavations to warn all pedestrians and vehicular traffic of such excavations. Lights shall also be placed along excavations from sunset each day to sunrise of the next day until such excavation is entirely refilled.

C. No trench or excavation shall remain open during non-working hours. The trench or excavation shall be covered with steel plates, spiked in place, or secured with temporary A.C. pavement around the edges, or backfilled. A security fence shall be installed around the work area during non-working hours.

D. The Contractor shall notify the Owner of all work-related accidents which may occur to persons or property at or near the project site, and shall provide the Owner with a copy of all accident reports. All accident reports shall be signed by the Contractor or its authorized

representative and submitted to the Owner's authorized representative within twenty-four (24) hours of the accident's occurrence.

1.07 ACCESS

A. Unobstructed access must be provided to all driveways, water valves, hydrants, or other property or facilities that require routine use.

1.08 PERMITS

A. All work shall conform to the specifications and requirements of the State of California Department of Transportation, the County of Santa Cruz, and/or other agencies involved. The Contractor shall keep a copy of all the required permits in the job site and comply with all the terms and conditions of said permits.

1.09 SLOPE PROTECTION

A. Slope protection shall be installed where shown on the plans. The installation of the slope protection shall be considered a part of the work, and the Contractor shall include the expense in his cost.

PART 2 - PRODUCTS

2.01 NATIVE EARTH MATERIAL

A. Native earth, segregated from topsoil and free of deleterious material, may be used as sand bedding for pipelines.

2.02 IMPORTED BACKFILL MATERIAL

A. Whenever the excavated material is not suitable for backfill, the Contractor shall arrange for and furnish suitable imported backfill material that is capable of attaining the required relative density.

B. The Contractor shall dispose of the excess trench excavation as specified in the preceding section. Backfilling with imported material shall be done in accordance with the methods described herein.

2.03 GRANULAR MATERIAL

A. Granular material shall be defined as soil having a minimum sand equivalent of 30 as determined in accordance with State of California, Division of Highways, Test "California 217," with not more than 20% passing a 200-mesh sieve.

2.04 IMPORTED SAND

A. Imported sand for pipe bedding shall have a minimum sand equivalent of 30 per State of California, Division of Highways, Test "California 217" with 100% passing a 3/8 inch sieve and not more than 20% passing a 200-mesh sieve. Certification that the sand meets this requirement shall be provided.

2.05 CRUSHED ROCK AND GRAVEL

A. Crushed rock shall be the product of crushing rock or gravel. Fifty percent of the particles retained on a 3/8 inch sieve shall have their entire surface area composed of faces resulting from fracture due to mechanical crushing. Not over 5% shall be particles that show no faces resulting from crushing. Less than 10% of the particles that pass the 3/8 inch sieve and are retained on the No. 4 sieve shall be weatherworn particles. Gravel shall not be added to crushed rock.

B. Gravel shall be defined as particles that show no evidence of mechanical crushing, are fully weatherworn, and are rounded. For pipe bedding, where gravel is specified, crushed rock may be substituted or added.

C. Where crushed rock or gravel is specified in the bedding details on the plans, the material shall have the following gradations:

Sieve Size	1-1/2 Inch Max % Passing	1-inch Max % Passing	¾ Inch Max % Passing
2”	100		
1-1/2”	90 – 100	100	
1”	20 – 55	90 – 100	100
¾”	0 – 15	60 – 80	90-100
½”	-	-	30 – 60
3/8”	0 –5	0 – 15	0 – 20
No. 4	-	0 – 5	0 – 5
No. 8	-	-	-

2.06 SAND-CEMENT SLURRY

A. 1-Sack sand cement slurry shall consist of one sack (94 pounds) of Portland cement per cubic yard of sand and sufficient moisture for workability.

B. 2-Sack sand cement slurry shall consist of two sacks (188 pounds) of Portland cement per cubic yard of sand and sufficient moisture for workability.

2.07 AGGREGATE BASE AND SUBBASE

A. Aggregate base shall be Class 2 Aggregate Base (AB) as specified in Section 26 of the Standard Specifications, State of California, Department of Transportation, 2018 edition, 1-1/2 inch maximum unless otherwise indicated on the Drawings.

2.08 ASPHALT CONCRETE

A. Asphalt concrete pavement shall be Type A Hot Mix Asphalt specified in Section 39 of the Standard Specifications, State of California, Department of Transportation, 2015 edition.

B. All asphalt concrete shall conform to the requirements of the Santa Cruz County Specifications, Standard Drawings and Encroachment Permit.

PART 3 - EXECUTION

3.01 COMPACTION REQUIREMENTS

A. Compaction tests shall be performed at random depths and at 200-foot intervals and as directed by the Engineer.

B. If the backfill fails to meet the specified relative compaction requirements, the Contractor shall rework the backfill until the requirements are met. The Contractor shall make all necessary excavations for density tests as directed by the Engineer. The compaction requirements of the County of Santa Cruz or Caltrans shall prevail in all public roads. The Contractor will be responsible for the cost of all additional compaction tests in the reworked areas.

C. Unless otherwise shown on the drawings or otherwise described in the specifications for the particular type of pipe installed, relative compaction in pipe trenches shall be as described below:

1. Pipe zone and pipe base: 95% relative compaction
2. Trench zone not beneath paving: 95% relative compaction
3. Trench zone to street zone in paved areas: 95% relative compaction
4. Street zone in paved areas: per agency requirements or 95% relative compaction. The most stringent agency requirements shall prevail
5. Rock refill material for foundation stabilization: 90% relative density
6. Rock refill for over excavation: 90% relative density

3.02 MATERIAL REPLACEMENT

A. Removal and replacement of any trench and backfill material which does not meet the specifications shall be the Contractor's responsibility.

3.03 CLEARING AND GRUBBING

A. Areas where work is to be performed shall be cleared of all trees, shrubs, rubbish, and other objectionable material of any kind which, if left in place, would interfere with the proper performance or completion of the contemplated work, would impair its subsequent use, or would form obstructions therein.

B. Organic material from clearing and grubbing operations will not be incorporated in the trench backfill.

C. Organic material from clearing and grubbing operations will be disposed of at a proper waste disposal facility.

3.04 SIDEWALK, PAVEMENT, AND CURB REMOVAL

A. Saw cut bituminous or concrete pavements regardless of their thickness, and curbs and sidewalks prior to excavation for the structure in accordance with the requirements of the County of Santa Cruz or agency having jurisdiction. Curbs and sidewalks that are damaged in the course of construction are to be cut and removed from joint to joint.

B. Haul removed pavement and concrete materials from the site to a proper disposal facility. These materials are not permitted for use as trench backfill. If the material to be removed exceeds 50 cubic yards, the Contractor shall obtain a haul route permit from the County of Santa Cruz.

3.05 TRENCHING AND TUNNELING

A. Excavation for pipe, fittings, and appurtenances shall be open trench to the depth and in the direction necessary for the proper installation of the facilities as shown on the plans.

B. Trench banks shall be kept as near to vertical as possible and shall be properly braced and sheeted.

C. Horizontal directional drilling, where used, shall be per Section 33 05 23.

D. Tunneling will not be permitted.

E. The use of a jack and bore may be employed for crossings.

3.06 BRACING

A. The Contractor's design and installation of bracing and shoring shall be consistent with the rules, orders, and regulations of the State of California Construction Safety Orders.

B. Excavations shall be so braced, sheeted, and supported that they will be safe such that the walls of the excavation will not slide or settle and all existing improvements of any kind, either on public or private property, will be fully protected from damage.

C. The sheeting, shoring, and bracing shall be arranged so as not to place any stress on portions of the completed work until the general construction thereof has proceeded far enough to provide ample strength.

D. Care shall be exercised in the drawing or removal of sheeting, shoring, bracing, and timbering to prevent the caving or collapse of the excavation faces being supported.

3.07 TRENCH WIDTHS

A. Excavation and trenching shall be true to line so that a clear space of not more than 8 inches or less than 6 inches in width is provided on each side of the largest outside diameter of the pipe in place measured at a point 12 inches above the top of the pipe. For the purpose of this article, the largest outside diameter shall be the outside diameter of the bell on bell and spigot pipe or the pipe collar.

B. All trenching and excavations shall conform to the requirements of the Santa Cruz County Encroachment Permit.

C. Where the trench width, measured at a point 12 inches above the top of the bell of the pipe, is wider than the maximum set forth above, the trench area around the pipe shall be backfilled with crushed rock, Class B concrete, or slurry to form a cradle for the pipe at the discretion of the Engineer.

3.08 LENGTH OF OPEN TRENCH

A. The maximum allowable length of open trench shall be 400 feet, or the distance necessary to accommodate the amount of pipe installed in a single day, whichever is less. Within developed areas, the length of open trench may be restricted as determined by the encroachment permit from the County of Santa Cruz or agency having jurisdiction.

3.09 GRADE

A. Excavate the trench to the lines and grades shown on the drawings with allowance for pipe thickness and for pipe base or special bedding.

B. The trench bottom shall be graded to provide a smooth, firm, and stable foundation that is free from rocks and other obstructions and shall be at a reasonably uniform grade.

3.10 CORRECTION OF OVER EXCAVATION

A. Where excavation is inadvertently carried below the design trench depth, suitable provision shall be made by the Contractor to adjust the excavation, as directed by the Engineer, to meet requirements incurred by the deeper excavation.

B. Over excavations shall be corrected by backfilling with approved bedding material, graded crushed rock or gravel and shall be compacted to provide a firm and unyielding subgrade or foundation, as directed by the Engineer.

3.11 DEWATERING

A. The Contractor shall provide and maintain at all times during construction ample means and devices with which to promptly remove and properly dispose of all water from any source entering the excavations or other parts of the work. De-watering shall be done by methods that will ensure a dry excavation and preservation of the final lines and grades of the bottoms of excavations. Dewatering methods may include well points, sump points, suitable rock or gravel placed below the required bedding for drainage and pumping, temporary pipelines, and other means, all subject to the approval of the Engineer. Water shall be discharged in accordance with the requirements of the project's NPDES permit.

B. In no event shall the sanitary sewer system be used as drains for dewatering the construction trenches.

C. Dewatering shall commence when groundwater is first encountered and shall be continuous until such times as water can be allowed to rise. No concrete shall be poured in water, nor shall water be allowed to rise around the concrete or mortar until it has set at least eight hours.

3.12 FOUNDATION STABILIZATION

A. Whenever the trench bottom does not afford a sufficiently solid and stable base to support the pipe or appurtenances, the Contractor shall excavate to a depth below the design trench bottom, as directed by the Engineer, and the trench bottom shall be backfilled with 3/4-inch rock and compacted to provide uniform support and a firm foundation.

B. Where rock is encountered, it shall be removed to a depth at least 6 inches below grade and the trench shall be backfilled with 3/4-inch crushed rock to provide a compacted foundation cushion.

C. If excessively wet, soft, spongy, unstable, or similarly unsuitable material is encountered at the surface upon which the bedding material is to be placed, the unsuitable material shall be removed to a depth as determined in the field by the Engineer and replaced by crushed rock.

3.13 EXCAVATED MATERIAL

A. Excavated material shall not be stockpiled in a manner that will create an unsafe work area or obstruct sidewalks or driveways. Gutters shall be kept clear or other satisfactory measures shall be taken to maintain street or other drainage.

B. In confined work areas, the Contractor may be required to stockpile the excavated material off-site, as determined by the project permits.

3.14 PLACING PIPE BEDDING

A. Place the thickness of pipe bedding material over the full width of trench necessary to produce the required bedding thickness when the material is compacted to the specified relative density. Grade the top of the pipe bedding ahead of the pipe to provide firm, uniform support along the full length of pipe.

B. Excavate bell holes at each joint to permit assembly and inspection of the entire joint.

3.15 BACKFILLING WITHIN PIPE ZONE

A. Backfill per the detailed piping specification for the particular type of pipe and per the following.

B. After pipe has been installed in the trench, place pipe zone material simultaneously on both sides of the pipe, keeping the level of backfill the same on each side. Carefully place the material around the pipe so that the pipe barrel is completely supported and that no voids or uncompacted areas are left beneath the pipe. Use particular care in placing material on the underside of the pipe to prevent lateral movement during subsequent backfilling.

C. Compact material placed within 12 inches of the outer surface of the pipe by hand tamping only.

3.16 BACKFILL WITHIN TRENCH ZONE

A. Compact per the detailed piping specification for the particular type of pipe and per the following.

B. Push the backfill material carefully onto the backfill previously placed in the pipe zone. Do not permit free fall of the material until at least 2 feet of cover is provided over the top of the pipe. Do not drop sharp, heavy pieces of material directly onto the pipe or the tamped material around the pipe.

C. The remaining portion of the trench to the street zone or ground surface, as the case may be, shall be backfilled, compacted and/or consolidated by approved methods to obtain the specified relative compaction.

1. Compaction using vibratory equipment, tamping rollers, pneumatic tire rollers, or other mechanical tampers shall be done with the type and size of equipment necessary to accomplish the work. The backfill shall be placed in horizontal layers of such depths as are considered proper for the type of compacting equipment being used in relation to the backfill material being placed. Each layer shall be evenly spread, properly moistened, and compacted to the specified relative density. The Contractor shall repair or replace any pipe, fittings, manholes, or structures damaged by the Contractor's operations as directed by the Engineer.

2. Consolidation of backfill performed by flooding, poling, or jetting shall obtain a relative compaction of the backfill material at least equal to that specified. When flooding, poling, or jetting methods are used, material for use as backfill shall be placed and consolidated in layers not exceeding 3-feet thick. Flooding, poling, or jetting methods shall be supplemented by the use of vibratory or other compaction equipment when necessary to obtain the required relative compaction. Care shall be taken in all consolidating operations to prevent the movement or floating of the pipe. Consolidation methods shall not be used where the backfill material is not sufficiently granular to be self-draining during and after consolidation, or where foundation materials may be softened or otherwise damaged by the quantities of water applied. The Contractor shall rectify any misalignment of the pipe because of consolidation operations as directed by the Engineer.

D. If the excavated native material is too wet to achieve the required compaction, provide imported backfill or sand-cement slurry within the trench zone.

3.17 BACKFILL WITHIN STREET ZONE

A. The street zone within roadbed areas shall be compacted using approved hand, pneumatic, or mechanical type tampers to obtain the required relative compaction.

B. All work shall be done in accordance with the requirements and to the satisfaction of the County of Santa Cruz or the agency having jurisdiction.

C. Flooding and jetting will not be permitted in this Zone.

3.18 SIDEWALK, PAVEMENT, AND CURB REPLACEMENT

A. Replace bituminous and concrete pavement, curbs, and sidewalks damaged or removed during construction in accordance with the requirements of the County of Santa Cruz or the agency having jurisdiction.

3.19 SLOPE PROTECTION

A. Where cutoff walls or concrete anchors are required, they shall be in accordance with the plans, with a minimum thickness of 12 inches. The wall shall extend at least 12 inches to undisturbed material on each side of the trench as excavated. Cemented rubble and concrete surface slope protection shall be a minimum of 4-inches thick.

B. Wall or anchors shall be placed with a minimum horizontal spacing of:

1. Not over 36 feet center to center on grades 25% to 35%
2. Not over 24 feet center to center on grades 35% to 50%
3. Not over 16 feet center to center on grades 50% and over

C. Material used for construction of cutoff walls or concrete anchors shall consist of cast-in-place reinforced concrete or reinforced hollow unit masonry. When reinforced hollow unit masonry is used, all cells in the block shall be filled solidly with grout. A No. 4 reinforcing bar shall be placed in vertically in each row of cells and No. 9-gage wall mesh shall be placed in each horizontal joint. In addition, a bond beam shall be placed at the top with two No. 4 bars.

D. Where cutoff walls or concrete anchors are constructed of reinforced concrete, they shall have No. 4 reinforcing bars placed at 6-inches on center each way in the center of the wall. The bars shall extend full length and height of the wall.

END OF SECTION

SECTION 32 12 16

ASPHALT PAVING AND SEALS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

B. Asphalt Paving

C. Fog Seal

D. Slurry Seal

E. Related Sections:

1. Section 31 23 00 – Trenching, Backfilling and Compacting

1.02 REFERENCES

A. Standard Specifications, State of California, Department of Transportation (CalTrans), 2015 Edition (State Standard Specifications)

1.03 DESCRIPTION

A. The Contractor shall pave or repave all road surfaces within public Right-of -Ways, private right-of-ways, driveways, drainage courses, and other surfaces as provided for in the Contract Documents. Except as provided for in the Contract Documents, all paving materials shall be constructed of asphalt concrete or an asphaltic emulsion, with or without aggregate.

B. Paint binder (tack coat) shall be applied to the vertical surface of all structures to which new asphalt concrete will abut. Additionally, where the Contract Documents provide for the placement of new asphalt concrete over existing pavement surfaces, a tack coat shall be applied to the surface of the old pavement. Where called for in the Contract Documents, the surface of aggregate base shall receive a prime coat of liquid asphalt immediately prior to commencing paving operations.

C. Miscellaneous areas shall be those areas or structures called for in the Contract Documents to be surfaced or constructed of asphalt concrete. Such areas shall include but not be limited to, drainage ditches, equipment pads, walkways, and asphalt dikes.

D. Asphalt Dikes - Asphalt dikes shall be constructed to the line and grade provided for in the Contract Documents. Asphalt dikes whose continuous length exceeds 5 linear feet shall be constructed by the use of an extrusion machine.

1.04 FOG SEAL

A. Where provided for in the Contract Documents, the Contractor shall apply a fog seal that covers the repaved trench section and the adjacent street pavement. The Engineer shall determine the limits of the fog seal application. Such fog seal shall be constructed in accordance with the provisions of Section 37, "Bituminous Seals" of the State Standard Specifications. The exact proportion of water to asphaltic emulsion shall be determined by the Contractor up to a maximum of one part water to one part asphaltic emulsion.

1.05 SLURRY SEAL COAT

A. Where provided for in the Contract Documents, the Contractor shall construct a seal coat of asphaltic emulsion and screenings that covers the repaved trench section and the adjacent street pavement. The Engineer shall determine the limits of the seal coat application. Such seal coat shall be constructed in accordance with the provisions of Section 37, "Bituminous Seals" of the State Standard Specifications for a double seal coat. A Certificate of Compliance shall be submitted for all materials used in constructing the double seal coat.

1.06 SUBMITTALS

A. Provide submittals in accordance with Section 01 30 00, Contractor Submittals.

B. Submit certificates of compliance for materials provided under this section.

PART 2 - PRODUCTS

2.01 ASPHALT CONCRETE PAVEMENT

A. Asphalt concrete pavement shall be in accordance with the provisions of Section 39, "Hot Mix Asphalt" of the State Standard Specifications and this Section. Except as provided for in the Contract Documents, a Certificate of Compliance shall be submitted in lieu of the testing and reporting requirements of the State Standard Specifications.

B. Aggregate - Except as provided for in the Contract Documents, all asphalt concrete used in the construction of asphalt concrete pavements shall be Type "B" meeting the gradation requirements for ½-inch maximum, medium of Section 39-1.02E, "Aggregate" of the State Standard Specifications.

C. Asphalt Binder - Asphalt binder for asphalt concrete shall be a steam refined asphalt, Grade PG 64-10, conforming with the requirements of Section 92, "Asphalts" of the State Standard Specifications. The percentage of asphalt binder in asphalt concrete pavement shall be between 5-½ percent and 6 percent by weight.

D. Asphalt Concrete for Miscellaneous Areas - The gradation of aggregate for surfacing of miscellaneous areas shall be the same as for other areas. The percentage of asphalt binder shall be increased by 1-percent by weight over that percentage for asphalt concrete placed in roadways.

2.02 COLD-MIX ASPHALT CONCRETE

A. General - Cold-mix asphalt concrete used in temporary paving applications shall be a plant mixed product conforming with the requirements of this Section. Cold-mix may be supplied directly from the batch plant or stockpiled on the job-site.

B. Aggregate - Aggregate shall meet the following gradation requirements:

Sieve Size	Percentage Passing
½-inch	100
¼ - inch	95-100
No. 4	58-72
No. 8	34-48
No. 30	18-32
No. 50	13-23
No. 200	2-9

C. Asphalt Binder - Asphalt binder for cold-mix asphalt shall be Type SC-800 in accordance with the requirements of Section 93, "Liquid Asphalts" of the State Specifications. The percentage of asphalt binder shall be between 4.8 and 7.5 percent.

2.03 PAINT BINDER AND PRIME COAT

A. Paint Binder (Tack Coat) - Paint binder shall be Type RS-1 asphaltic emulsion conforming with the provisions of Section 94, "Asphaltic Emulsions" of the State Standard Specifications.

B. Prime Coat - Prime coat shall be Type SC-70 liquid asphalt conforming with the provisions of Section 93, "Liquid Asphalts" of the State Standard Specifications.

PART 3 - EXECUTION

3.01 ASPHALT PAVING

A. Upon completion of all underground construction, including but not limited to trench backfill and aggregate base, the Contractor shall construct the final asphalt concrete surface. Such asphalt concrete surface shall be of the same depth, or greater, as the existing surface material. In no case shall the new asphalt concrete be less than 2-inches in depth.

B. All valve boxes, manholes, monument boxes, and other adjustable structures shall be brought to grade prior to placing the final lift of asphalt concrete. Where the distance between the edge of the new pavement and the existing edge of pavement, existing curb or gutter lip, or asphalt dike is less than 2 linear feet, the existing pavement shall be removed and replaced to the edge of pavement, existing curb or gutter lip or asphalt dike.

C. All temporary paving material, loose aggregate base, and other deleterious material shall be removed from the trench of the underlying surface. The surface of the aggregate base or sand cement slurry backfill and all abutting surfaces shall be prepared by spraying with a paint binder at a rate of 0.25 gallons per square yard. The Contractor shall prevent overspray onto adjacent pavement surfaces and other surfaces not scheduled to be paved. Paint binder shall not be tracked out of the work area by vehicles or equipment.

D. Hot asphalt concrete shall be placed in the area to be paved and compacted by the use of rollers or vibratory plate type compaction equipment. The use of vibratory plate compaction equipment shall be limited to projects whose area totals less than 100 square feet and/or those areas where insufficient space is available for the operation of vibratory rollers. All spreading and compacting operations shall be in accordance with the provisions of Section 39, "Hot Mix Asphalt" of the State Standard Specifications except that tolerances for trench repairs will be measured by the use of a straight edge of sufficient length to span the full width of the trench plus 2-feet on each side of the trench line.

E. If the total depth of asphalt paving exceeds 2-½ inches, the asphalt shall be laid in a minimum of 2 lifts with the maximum lift equaling 2-½ inches. The minimum thickness of any lift of asphalt concrete shall be equal to twice the maximum size aggregate in the asphalt concrete mix. Each lift shall be fully compacted and finished prior to placing the next lift except that the grade tolerances shall apply for the final lift only.

F. All new asphalt concrete surfaces shall be abutted to adjoining surfaces along a neat sawcut line. In no case shall new asphalt be feathered over existing surface material, placed against damaged surfaces, or over or against any material not adequately prepared as defined herein. The final surface of the asphalt concrete shall be no more than ¼-inches above the adjacent existing surface nor shall the final surface be below the level of the adjacent surface. In areas of paving other than trench repairs, the plane of the surface shall not vary more than ¼-inches above or below the average plane of the surface when measured with an 8-foot straight edge.

G. Skin patching shall not be considered an acceptable method of achieving the tolerances herein. Skin patching is hereby defined as a mix of asphaltic concrete whose maximum aggregate size is less than or equal to the No. 4 sieve used to fill depressions in the pavement plane.

H. The final lift of asphalt concrete shall be placed in one continuous operation as the final order of work for the project. Where trenches do not form an unbroken line throughout the project, asphalt concrete may be placed in one continuous operation for each continuous trench, subject to the prior approval of the Engineer.

I. All paving not conforming with the provisions of these specifications, the Contract Documents, or any public agency having jurisdiction over the work shall be immediately removed and replaced in accordance with the provisions of these specifications, the Contract Documents, and the directions of such agencies having jurisdiction over the work.

3.02 FOG SEALING

A. Fog seal shall be constructed in accordance with the provisions of Section 37, "Bituminous Seals" of the State Standard Specifications, to the limits shown on the Drawings, listed in the Encroachment Permit, or as indicated by the Engineer.

3.03 SLURRY SEALING

A. Slurry seal coat shall be constructed in accordance with the provisions of Section 37, "Bituminous Seals" of the State Standard Specifications for a double seal coat, to the limits shown on the Drawings, listed in the Encroachment Permit, or as indicated by the Engineer.

END OF SECTION

SECTION 33 05 09.43

HOT TAP CONNECTIONS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section describes materials, requirements and procedures for hot tap (system under pressure) connections to existing distribution systems.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A.	Existing Facilities	02 01 00
B.	Chlorination of Domestic Water Mains for Disinfection	22 11 23
C.	Hydrostatic Testing of Pressure Pipelines	33 05 05.31
D.	Copper, Brass and Bronze Pipe, Fittings and Appurtenances	22 11 13
E.	Manual Valves	33 12 16

1.03 APPROVED MANUFACTURERS

A. Service Saddles and Corporation Stops
1. See Section 22 11 13

B. Tapping Sleeves
1. Mueller JCM 432

C. Tapping Valves
1. See Resilient Seated Wedge Gate Valves Section 33 12 16

D. Direct Tap
1. All taps into existing pipes will be made through a service saddle, tapping sleeve, welded nozzle or welded coupling. Taps of the same size as the pipe are not permitted. Size on size connections shall be tees. Saddles are required for all taps. Direct taps are not permitted.

PART 2 - MATERIALS

2.01 SERVICE SADDLES AND CORPORATION STOPS

A. Service saddles and corporation stops shall comply with Section 22 11 13.

2.02 TAPPING SLEEVES

A. Tapping sleeves onto pipelines 12-inch and smaller shall be full circle cast iron with mechanical joint end glands or fabricated stainless steel or as approved by District Engineer.

B. Gaskets shall be Bunz-N rubber with a wide cross section.

C. Tapping sleeves onto 14-inch and larger ACP shall be fabricated steel with mechanical joint ends. All fabricated parts shall be epoxy coated per Section 09 90 00. All bolts and trim hardware shall be Type 316 stainless steel.

2.03 TAPPING VALVES

A. Tapping valves shall be flanged resilient seat wedge gate valves per Section 33 12 16.

PART 3 - EXECUTION

3.01 NOTIFICATION

A. The contractor shall provide proper notification to the District inspector prior to making a hot tap connection.

3.02 VERIFICATION

A. The contractor shall pothole the proposed connection to verify the outside diameter, location and type of pipe to be tapped.

3.03 SURFACE PREPARATION

A. The pipe barrel to be tapped shall be thoroughly cleaned with a wire brush to provide a smooth, hard surface for the saddle, sleeve or nozzle.

3.04 SERVICE SADDLE AND CORPORATION STOP

A. Service saddles and corporation stops will be installed onto ACP, DIP or PVC mains in accordance with the manufacturer’s accordance and Section 22 11 13. The outlet shall be oriented to comply with the intended use of the service connection.

3.05 TAPPING SLEEVES

A. The tapping sleeve shall be installed in accordance with the manufacturer's instructions and to the satisfaction of the District representative.

B. The pipe barrel shall be thoroughly cleaned with a wire brush to provide a smooth, hard surface for the sleeve.

C. The sleeve shall be supported independent of the pipe during the tapping operation.

D. The sleeve shall be pressure tested in the presence of the District representative prior to tapping.

E. Thrust blocks shall be provided at the tapping sleeve per Standard Plan W-17 03 30 00.

3.06 TAPPING VALVE

A. The tapping valve shall be installed on the tapping sleeve or weld nozzle per Section 33 12 16. All flange bolts shall be Type 316 stainless steel.

3.07 HOT TAP

A. The hot tap into the existing pipe shall be made using the appropriate type of cutting machine and shell cutting bit for the material being tapped.

B. The company performing the hot tap must be approved by the District. The tapping machine shall be operated per the manufacturer's operating instructions.

C. Proper care shall be taken to prevent cutting material from entering the pipeline. The tapping coupon must be extracted.

3.08 EXTERIOR COATING REPAIR

A. The exterior bituminous or mortar coating on steel or iron pipe shall be repaired in accordance with the manufacturer's directions and/or Section 09 90 00.

3.09 DISINFECTION

A. The interior of the tapping valve and connecting piping shall be sprayed with a sodium hypochlorite solution prior to connection.

END OF SECTION

SECTION 33 11 00

GENERAL PIPING REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:
1. General requirements for piping systems, including pipe, joints, fittings, and valves.
2. Pressure testing

B. Related Sections:
1. Section 02 01 00 – Existing Facilities
2. Section 09 90 00 – Painting and Coating
3. Section 31 23 00 – Trenching, Backfilling and Compacting
4. Section 33 11 13.15 – Ductile Iron Pipe and Fittings
5. Section 33 11 13.23 – HDPE Pipe and Fittings
6. Section 33 11 13.90 – Thrust Restraint
7. Section 33 31 13 – Sanitary Sewer Pressure Piping
8. Section 33 12 16 – Manual Valves
9. Section 40 92 13 – Automatic Valves

1.02 REFERENCE STANDARDS

A. American National Standards Institute (ANSI)
1. ANSI A13.1 – Piping and Piping Systems
2. ANSI A31.1 – Power Piping ASME
3. NSF 61 – Listing of Certified Drinking Water System Components – Health Effects

B. American Society of Mechanical Engineering (ASME) – Boiler and Pressure Vessel Code

C. California Plumbing Code (CPC)

D. American Waterworks Association (AWWA)
1. AWWA C116 Protective Fusion-Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings
2. AWWA C210 – Liquid-Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines
3. AWWA C600 Installation of Ductile Iron Water Mains and Their Appurtenances
4. AWWA C605 Underground Installation of PVC and Molecularly Oriented PVC Pressure Pipe and Fittings
5. AWWA C900 PVC Pressure Pipe and Fabricated Fittings
6. AWWA C906 Polyethylene (PE) Pressure Pipe and Fittings, 4 Inch through 65 Inch

1.03 SUBMITTALS

A. Submit in accordance with Section 01 30 00.

B. Catalog cuts and product information showing materials and dimensions.

C. Hydrostatic testing plans

D. Operation and Maintenance manuals

PART 2 - MATERIALS

2.01 PIPE, FITTINGS, AND GASKETS

A. Replacement of any pipe, fitting, and gasket shall be in-kind or equal.

B. Ductile Iron Pipe and Fittings shall be as specified in Section 33 11 13.15.

C. HDPE Pressure Pipe and fittings shall be as specified in Section 33 11 13.23.

D. Mechanical joint restraints shall be EBAA Megalug or equal.

2.02 VALVES

A. Valves shall be as specified in Section 33 12 16 and Section 40 92 13.

B. Multiple brands for same type of valve will not be accepted.

2.03 BOLTED, SLEEVE-TYPE COUPLINGS

A. Couplings shall meet AWWA C19 and NSF 61.

B. Unrestrained sleeve couplings
1. Hymax
2. Romac series 501
3. Or approved equal

C. Restrained sleeve couplings
1. EBAA series 3800 Mega Coupling
2. Or approved equal

D. Flange Adapters
1. Romac series FCA
2. EBAA series 1000 EZ Flange
3. Or approved equal

E. Restrained flange adapters
1. Romac Series RFCA

2. EBAA series 2100 Megaflange
3. Or approved equal

2.04 COATINGS

A. All above-ground pipe, valves and fittings shall be epoxy-coated, colored blue for potable water service per Section 09 90 00.

B. New equipment shall receive final finish coats at the factory in accordance to AWWA C116. Each coat of paint shall be of the consistency as specified by the paint manufacturer, or thinned as necessary, and applied in accordance with the manufacturer's written instructions. Work shall be free from "runs", "bridges", "shiners", or other imperfections. Care shall be taken to obtain a uniform, unbroken coating over welds, edges and corners. Weld splatter shall be removed and all welds neutralized with thinner. Blasted surfaces shall be coated within four hours of being sandblasted. All dust shall be removed from surfaces prior to coating.

C. All surfaces to be coated or painted shall be in the specified condition to receive the material before any coating or painting is performed. Follow manufacturer's instructions. During and after final application of protective coatings, all metal surfaces shall be checked mechanically with an Elcometer, Mikrotest, or other approved dry film thickness gage to insure that the specified dry film thickness has been attained. Coating testing and repair of damages, flawed areas, holidays, or mishaps shall conform to applicable AWWA standards.

D. Care shall be taken to prevent damage to coated surfaces during shipment. Any coatings damaged during shipment shall be refinished as the original at no extra cost to the Owner.

E. Coatings shall be guaranteed for a period of one year following the date of final acceptance by the Owner.

2.05 BURIED PIPING WARNING TAPE

A. Plastic warning tape shall be an inert plastic film specifically formulated for prolonged underground use. The minimum thickness shall be 4 mils and the minimum width of the tape shall be 6 inches. Printing shall be a minimum of 2-inch block letters.

B. Warning tape for domestic water pipelines shall be blue with black printing having the words "CAUTION: DOMESTIC WATER-LINE BURIED BELOW."

PART 3 - EXECUTION

3.01 GENERAL

A. Location: Install piping to the line and grade as shown on the Drawings, except for adjustments to avoid existing features.

B. Confirm dimensions at the Project Site prior to pipe fabrication.

C. Contractor shall take all measures necessary to maintain the existing sewer mains and services in operation until completion of the pipeline construction.

3.02 PIPING INSTALLATION

A. Trenching

1. The Contractor shall bear full responsibility for safety related to his trenching operations.
2. Trenching, bedding, and backfill operations including but not limited to, pavement cutting and restoration, excavation, shoring, and steel plates shall be in accordance with Section 31 23 00. Insofar as practicable and at all times on grades in excess of 1-foot horizontal to 10-feet vertical (10 percent), trenching and pipe-laying operations shall proceed uphill from the lowest point with the bell end leading.

B. Daily Limits - The Contractor shall excavate only that length of trench in which he can safely and properly install pipe and backfill daily. No trenches may be left open when the Contractor is not actively prosecuting work related to that trench. To facilitate the prosecution of the work, the Contractor may request to use plates to cover open trenches. The use of steel plates shall be dependent upon the prior approval of the Engineer.

C. Handling and Placing

1. Handle pipe, fittings, and appurtenances in such a manner as to insure delivery to the Project Site in a sound, undamaged condition. Take particular care not to injure linings and coatings and to keep the pipe clean. Load and unload these items using hoists in a manner to avoid shock or damage. Under no circumstances shall they be dropped, skidded, or rolled against other pipe.
2. Repair damaged items to the satisfaction of the Engineer. Set aside damaged items that cannot be repaired and remove from Project site within 24 hours.
3. The Contractor shall employ such devices and equipment as will enable the pipe to be transported, stored, and installed in its final location or configuration, as provided for in the Contract Documents.
4. Pipe to be installed in trenches shall be lowered into the trench using lowering slings and other devices that will prevent an uncontrolled drop into the trench. Compacted bedding material conforming with Section 31 23 00 shall be installed in the bottom of the trench and compacted prior to placing pipe in the trench. Bell holes shall be excavated such that the pipe is fully supported by the pipe barrel. Pipe shall not be permitted to be supported solely by the bells. Where the Contract Documents call for or the Contractor elects to use sand/cement slurry backfill material, the pipe shall be supported on wooden blocks or other supports on each side of every joint. An additional block at mid-span shall be used for PVC pipe. Such blocks shall be of such dimension as to raise the pipe high enough to clear the bells and long enough to span at least 2/3 of the trench width. Wooden blocks shall be redwood or pressure treated timber.

D. Locator Wire - A wire to be used for future subsurface location shall be installed concurrent with pipe laying operations. The wire shall be a minimum of 12 gauge THW or THWN solid copper wire and shall be continuous for the entire length of pipe laid. The wire shall be secured to the pipe by either tape, mastic, or looping at a maximum interval of 12 feet. Connections between lengths of wire shall be made either by crimp connectors, or wire nut connectors. Each connection shall be at least double-wrapped with PVC electrical tape with each turn lapping the previous turn by at least 50-percent. The wire shall be brought

to the surface in each valve box with at least 2 feet of wire more than that required to reach the surface. The wire shall be protected during backfilling operations to prevent displacement or continuity breaks. Any damage to the locator wire shall be immediately repaired.

E. Installation of Pipe Warning Tape

1. Warning tapes shall be installed a minimum 1-foot above and centered on the pipe. The warning tape shall be installed continuously for the length of the pipe and shall be fastened to valve stem casings or other vertical appurtenances by plastic adhesive tape.
2. Warning tape is not required for pipes installed by trenchless methods.

F. Valves

1. Clean valves of foreign material and inspect in open and closed positions prior to installation
2. Unless otherwise indicate, install valves with operating stem vertical. Mount horizontal valves in such a manner that adequate clearance is provided for operation.
3. Clean flange faces prior to installing flanged valves. After cleaning, insert gasket and nuts, tighten progressively and uniformly. If flanges leak under pressure, loosen nuts, reseal or replace gasket, retighten nuts, and retest joints.
4. Test valves in same manner as specified for piping systems. Protect parts of valves that could be damaged during pipeline test. Joints shall be watertight at specified test pressures. Repair any damage to valves.

G. Bolting Procedures

1. Description - All fittings, joints, assemblies, valves, and miscellaneous special fittings shall be installed in accordance with this Section. The required torque shall be as specified in the Contract Documents, the referenced specifications, and the manufacturer's recommendations.
2. Contractor shall have a calibrated torque wrench on site at all times.
3. Procedure
   a. The pipe and fitting (or fittings) shall be carefully aligned using slings, blocks, jacks, or other means necessary to establish and maintain the correct alignment. Under no circumstances shall the bolts be used to achieve the correct alignment. As the bolts are inserted through the flange the gasket shall be inserted between the mating faces of the fitting and pipe.
   b. After taking up the free slack in the nuts, the Contractor shall tighten each bolt in opposing succession taking multiple passes to achieve the proper torque. Opposing succession is hereby defined as tightening the first nut then the nut diametrically opposed to the first and proceeding either clockwise or counterclockwise in this manner around the circumference of the joint until the required torque is achieved. In no case shall the Contractor tighten the nuts in direct sequence or over-tighten any nut with respect to its opposing mate.
   c. During the tightening operation and again upon completion of the tightening operation, the space between the mating faces of the fitting and pipe shall be inspected for evidence of non-parallel assembly. The tolerance for parallel assembly shall be 1/16-inches for mechanical joint faces and 1/32-inches for flanged faces. Other fittings and faces shall be within the tolerance recommended by the manufacturer. If the space is non-parallel in excess of such tolerance, the joint shall be completely disassembled and the installation repeated. The gasket

shall be inspected for damage prior to retightening the bolts. If the mating faces of the fitting and pipe cannot be brought into parallel alignment the joint shall be disassembled, the pipe removed, the gasket replaced, and the assembly repeated.

d. Upon completion of the bolting operation between elements of the fittings and joints, the Contractor shall tighten all thrust restraint gripping surfaces in the same manner of opposing succession. The thrust restraining follower gland shall be tightened to the recommended torque as recommended by the manufacturer. The twist-off nut shall be considered as a safety mechanism to prevent damage from excessive torsional forces. The shear capability shall not be used in lieu of proper tightening, including the use of limiting torque wrenches.

e. All bolts on the fittings or joint, including those of the thrust restraining devices, shall be subject to a torque test by the Engineer. If any bolts are found to be under- or over-torqued or in any way evidencing damage, the Engineer may direct their readjustment or replacement in accordance with the provisions of this Section.

f. Upon completion of the bolting operation, all buried fittings shall receive a liberal coating of bitumastic type material (Protecto Wrap 160/160H, Tapecoat Brush-Applied Coating, Christy's HD-50 Coal Tar Coating, or approved substitute). This coating shall be thoroughly worked into the spaces between joint faces, under and around bolts and nuts, and on all surfaces that will be in soil contact. The coating shall be allowed to attain an initial set prior to commencing any backfill operations and in no case shall backfill operations commence less than 1-hour after coating is completed.

3.03 HYDROSTATIC PRESSURE TESTING

A. Upon completion of pipeline construction, the Contractor shall fill the pipeline with water from an approved source. All work involved in hydrostatic testing of pipelines shall conform to the requirements of AWWA C600, AWWA C605 and the provisions of the Contract Documents.

B. The Contractor shall provide all pumps, fittings, labor, equipment, and materials and all assistance necessary, including but not limited to, temporary thrust restraint and connection to the supplying water source for the hydrostatic testing of all pipelines. Hydrostatic testing shall be performed in the presence of the Owner's Inspector. Test pressures shall be a minimum of 250 psi or 150-percent of the service pressure for the pipeline, whichever is the greater.

C. Test pressures shall be held for a minimum of 2 hours or that period of time provided for in the Contract Documents. During the hydrostatic test the pressure shall not be allowed to vary more than 5 psi above or below the required test pressure. Pressure variances outside the allowable range shall be considered a failed test. Tests shall not be held against closed line valves without the prior approval of the Engineer and all hydrant valves shall be open. Where service lines have been installed prior to conducting the hydrostatic test, the service line to the meter stop shall be included in the test. An additional allowance of 0.0078 gph/inch of service line diameter may be included for each service line included in the hydrostatic test in the calculation of allowable leakage in such cases.

D. Upon completion of pipeline construction all pressure pipelines shall be hydrostatically tested and observed for leaks. The Contractor shall schedule the hydrostatic test with the Engineer at least two (2) days in advance of the test. The pipelines or pump suction barrels shall be filled and carefully brought to the test pressure. Failure of any portion of the system

shall be cause for rejection and the Contractor shall promptly identify and correct the deficiencies causing the failure. The hydrostatic test shall be repeated until a satisfactory test is achieved. All visible leaks shall be promptly repaired regardless of the actual leakage measured.

E. This procedure shall be followed until an acceptable test is achieved. The Contractor may be charged for the Engineer's time for reinspection for all tests after the first retest in accordance with the General Conditions.

F. Allowable Leakage - The allowable leakage will be calculated by the following formula:

$L_a = (LD\sqrt{P})/148{,}000$

where: L_a = Allowable leakage

L = Length of the pipe run

D = Nominal diameter of the pipe in inches

P = Test pressure

G. Flanged above-grade pipe shall have no leakage allowance. Contractor shall correct all visible leakage.

H. The allowable leakage for differing lengths of pipe runs and higher test pressures will be provided for in the Contract Documents or by direction of the Engineer. The allowable leakage for test sections of differing diameters will be calculated as the sum of the computed leakage for each size.

I. Equipment - The Contractor shall provide a test pump capable of supplying 250 psi static pressure, a means of adding replacement water during the test, and gauges and meters to monitor the pressure and replacement water used.

END OF SECTION

SECTION 33 11 13.15

DUCTILE IRON PIPE AND FITTINGS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section includes materials, installation, and testing of ductile-iron pipe and fittings.

B. Related sections:
1. Section 01 57 80 – Control of Ground and Surface Water
2. Section 31 23 00 – Trenching, Backfilling and Compaction
3. Section 33 11 00 - General Piping Requirements
4. Section 33 12 16 – Manual Valves

1.02 REFERENCED CODES AND STANDARDS

A. American Water Works Association (AWWA), latest edition:
1. C104 – Cement Mortar Lining for Ductile-Iron Pipe and Fittings
2. C105 – Polyethylene Encasement for Ductile –Iron Pipe Systems
3. C110 – Ductile-Iron and Gray-Iron Fittings
4. C111 – Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
5. C115 – Flanged Ductile-Iron Pipe With Ductile-Iron or Gray-Iron Threaded Flanges
6. C150 – Thickness Design of Ductile Iron Pipe
7. C151 – Ductile-Iron Pipe, Centrifugally Cast
8. C600 – Installation of Ductile-Iron Water Mains and Their Appurtenances
9. C606 – Grooved and Shouldered Joints

B. NSF International
1. 60 – Drinking Water Treatment Chemicals – Health Effects
2. 61 – Drinking Water System Components – Health Effects

1.03 APPROVED MANUFACTURERS

A. Fittings
1. US Pipe
2. Tyler
3. Sigma
4. Or equal

B. Pipe
1. U.S. Pipe
2. Pacific States

3. American Pipe
4. Or approved equal

C. Gaskets
1. Tripac 2000
2. US Pipe
3. John Crane Co.
4. Or equal

1.04 USE OF GRAY-IRON FITTINGS

A. Gray-iron fittings may not be substituted for ductile-iron.

1.05 SUBMITTALS

A. Contractor shall provide submittals for review and approval by the Engineer in accordance with Section 01 30 00.

B. Provide shop drawings or catalog cuts for all work and materials included in this Section.

PART 2 - PRODUCTS

2.01 DUCTILE-IRON PIPE

A. Pressure class or thickness class of DIP shall be determined by the design method detailed in AWWA C150 the "Thickness Design Method."

B. Ductile-iron pipe shall be manufactured in accordance with AWWA C151.

C. All ductile-iron pipe shall be pressure class 350 for bell and spigot pipe. Flanged pipe shall be thickness class 53 unless indicated otherwise.

D. All ductile iron pipe and fittings shall be cement-mortar lined in accordance with AWWA C104..

E. All buried ductile iron pipe shall have a factory applied bituminous coating of not less than 1 mil. in thickness.

F. All exposed above-grade ductile iron pipe shall be epoxy-coated per Section 09 90 00.

G. Unless otherwise called out on the plans, a "push-on" type joint shall be used. The joint dimensions and gasket shall be as specified in AWWA C111.

H. Where restrained joints are called, push-on joints shall be restrained with locking gasket rated for 250 psi operating pressure for DIP.

I. Flanges for ductile-iron pipe shall be the "screwed-on" type in accordance with AWWA C115.

J. Outlets for DIP shall be as follows:

1. 2” or smaller: bronze service saddle
2. 2-1/2”: tapped tee or service saddle
3. 4” to 8”and larger: D.I. tee fitting or service saddle
4. 12” and larger D.I. tee fitting

2.02 DUCTILE-IRON FITTINGS FOR PVC AND DUCTILE IRON PIPE

A. Except as otherwise indicated on the drawings, all fittings on pipelines and piping assemblies shall be manufactured of ductile iron in accordance with the provisions of AWWA C110 and C153. Buried fittings shall be cement-mortar lined and bituminous coated. Above-grade fittings shall be coated with 100% solids epoxy, and lined with either cement-mortar or 100% solids epoxy meeting NSF 61.

B. The body of the fitting shall be free of blows, sand pits, abrasions deeper than 10 percent of the material thickness, cracks, and other defects that adversely affect the performance of the fitting under pressure in-situ or the corrosion potential of that fitting. Likewise the coatings shall be free of chips, holes, abrasions, and scratches that reduce the thickness of the coating below the tolerances specified herein.

C. Evidence of such defects or damage shall be cause for rejection of the fitting and the Contractor shall replace such defective or damaged fittings at no cost to the Owner.

D. Push-on to push-on fittings shall not be used unless restraints are provided as described below.

E. Restrained fittings shall be used where a thrust block is not specified. Where restrained joints are called, pipe-to-pipe push-on joints shall be restrained with locking gasket rated for 250 psi operating pressure for DIP. Push-on joints at fittings shall be restrained with a mechanical type bell restraint for C-900 PVC pipe. Mechanical joint restraints shall be EBAA IRON, INC., MEGALUG, UNIFLANGE Series 1400, or approved equal. Flanged fittings may be used.

F. Unless otherwise indicated on the drawings, all fittings with flanged ends shall be ductile iron class 150. The gasket surface shall have a serrated finish of approximately 16 serrations per inch, approximately 1/32-inch deep, with serrations in either a concentric or spiral pattern. All flanges shall be flat faced. In addition, all flanges shall meet the following tolerances:

1. Bolt circle drilling ±1/16 inch
2. Bolt hole spacing ±1/32 inch
3. Eccentricity of bolt circle and ±1/32 inch
4. Maximum facing with respect to bore ±1/32 inch

2.03 JOINTS

A. Joints on fittings used in subsurface installations of transmission and distribution pipelines shall be mechanical joint or flanged type, as provided for in the Contract Documents, conforming to the requirements of AWWA C111. In piping assemblies, both subsurface and above grade, the joints shall be either mechanical joint or flange type conforming with the requirements of AWWA C110, C111, and C153 as provided for in the Contract Documents.

B. Mechanical Joints - Each mechanical joint shall be supplied with an SBR gasket. The retainer or follower gland shall be replaced with a thrust restraining follower gland in accordance with the provisions of Section 33 11 13.90, Thrust Restraint.

2.04 GASKETS

A. Gaskets for flanged joints shall be 1/8-inch thick, cloth-inserted rubber. Full face type gaskets with pre-punched holes shall be used where both flanges are flat face. Ring gaskets, 1/8-inch thick vulcanized butadiene rubber (SBR) or neoprene rubber gasket conforming with the provisions of AWWA C110, extending to the inner edge of the bolts may be used where a raised face flange is present.

B. Rubber gaskets for push-on and mechanical joints shall be vulcanized butadiene rubber (SBR) manufactured in accordance with AWWA C111.

2.05 BOLTS AND NUTS

A. All bolts and nuts shall be:

1. High-strength, low carbon steel conforming with ASTM A307, galvanized after fabrication, or
2. Type 316 stainless steel conforming to ASTM F593 G or H for bolts, and ASTM F594 with Tripac 2000 Blue Coating for nuts.

B. Mechanical joint bolts (tee bolts) shall be 3/4-inches in diameter and be furnished for each joint in accordance with AWWA C110, AWWA C111, and AWWA C153.

C. The length of each bolt or stud shall be such that between 1/4 inch and 3/8 inch will project through the nut when drawn tight.

D. All bolts and nuts which are not type 316 SS shall be coated with Christy HD-50 Bituminous Coal-Tar Coating after installation.

2.06 PLASTIC FILM WRAP

A. All ductile-iron pipe and fittings buried underground shall be protected with plastic film wrap in accordance with AWWA C105, unless noted otherwise below. Wrap shall be a loose polyethylene tube, either 8-mil thickness of linear low-density PE or 4-mil thickness of high-density cross-laminated PE. All joints between plastic tubes shall be wrapped with 2-inch-wide polyethylene adhesive tape, Polyken 900, Scotch wrap 50, or approved equal.

2.07 LUBRICANTS

A. Lubricant for pipe insertion shall be NSF food grade and biodegradable.

2.08 EPOXY COATING SYSTEM

A. Epoxy lining and coating of valves shall be per AWWA C550 and Section 33 12 16 Manual Valves. All valves shall be lined and coated by manufacturer.

B. Surfaces to be epoxy coated shall follow the surface preparation requirements as recommended by the manufacturer.

C. Surfaces shall be coated with organic zinc primer to a dry film thickness of 3 mils.

D. Apply two coats of epoxy paint (4 mils each) to the primed surface. The manufacturer's recommended drying time between coats shall be followed.

E. Prepare multiple-component coatings using all of the contents of the container for each component as packaged by the paint manufacturer. Do not use partial batches. Do not use multiple-component coatings that have been mixed beyond their pot life. Provide small quantity kits for touch up painting and for painting other small areas. Mix only the components specified and furnished by the paint manufacturer. Do not intermix additional components for reasons of color or otherwise, even within the same generic type of coating.

PART 3 - EXECUTION

3.01 GENERAL

A. Ductile-iron pipe and ductile iron fittings shall be installed in accordance with the applicable Sections of AWWA C600 and as specified herein.

3.02 TRENCHING, BACKFILLING, AND COMPACTING

A. Trenching, backfilling, and compacting shall be in accordance with Section 31 23 00 and as specified herein.

B. Backfill within the pipe zone, including the pipe base, shall be imported sand placed and compacted in accordance with Section 31 23 00.

C. Backfill within the trench zone shall be native earth backfill placed and compacted in accordance with Section 31 23 00.

3.03 PLACEMENT OF PIPE IN TRENCH

A. Lay pipes uphill if the grade exceeds 10%.

B. The radius of curvature of the trench shall determine the maximum length of pipe section that can be used without exceeding the allowable deflection at a joint. Combined deflections at rubber gasket, restrained joint, deflection coupling or flexible coupling joints shall not exceed 2 degrees or that recommended by the manufacturer, if smaller.

C. The manufacturer's printed installation guide outlining the radius of curvature that can be negotiated with pipe sections of various length and the deflection couplings shall be followed if applicable.

D. The pipe shall be laid true to the line and grade shown on the plans within acceptable tolerances. The tolerance on grade is 1 inch. The tolerance on line is 2 inches.

E. Pipe shall not be stabbed past the pipe manufacturer’s pipe insertion line. Contractor shall mark new insertion lines where original spigot end is cut off.

F. Wrap ductile-iron pipe and fittings with plastic film wrap in accordance with AWWA C105.

G. Fittings shall be supported independently of the pipe.

H. Until thrust blocks and supports are poured, fittings shall be temporarily supported by placing wooden skids under the bells so that the pipe is not subjected to the weight of the fitting.

I. All exposed flanges and other metal surfaces and all damaged coatings shall be coated after assembly with a mastic, 3M, Minnesota Mining and Manufacturing EC 244, or an approved equal. Stainless steel bolts shall not be coated.

J. Where locking gaskets are used to restrain push-on joints, the pipe bell shall be stenciled "Locking Gasket."

3.04 MECHANICAL JOINTS

A. Mechanical joints shall be installed in accordance with the manufacturer's recommendation and Section 33 11 00. The fitting shall be thoroughly cleaned of all dirt, debris, or other deleterious material and inspected prior to incorporation into the work.

B. The pipe end shall be beveled with a grinding tool or rasp file to facilitate the assembly of the joint. The restraining follower gland shall be slipped over the end of the pipe followed by the gasket. The Contractor shall take care that the restraining follower gland and gasket are installed in the correct alignment and that the gasket is not forced onto the pipe or otherwise damaged.

C. The pipe end shall then be inserted into the joint to the tolerance required by AWWA C110, C111, and C153. The pipe shall be aligned as straight as field conditions permit but in no case shall the pipe be deflected in excess of 3 degrees (5/8-inch per foot) or that maximum deflection recommended by the manufacturer, whichever is the lesser. The gasket shall then be inserted into the gasket seat taking care not to force or otherwise damage the gasket. Once the gasket is fully and evenly seated in the gasket space, the follower gland shall be aligned with the mating face of the fitting and the bolts inserted and the nuts threaded onto the bolts.

D. All bolting shall be performed in accordance with the provisions of Section 33 11 00, General Piping Requirements.

3.05 FLANGED JOINTS

A. Flanged joints shall be installed in accordance with the manufacturer's recommendation and Section 33 11 00. The fitting shall be thoroughly cleaned of all dirt, debris, or other deleterious material and inspected prior to incorporation into the work.

B. The pipe and fitting shall be carefully aligned using slings, blocks, jacks, or other means necessary to establish and maintain the correct alignment. Under no circumstances shall the bolts be used to achieve the correct alignment. As the bolts are inserted through the flange the gasket shall be inserted between the mating faces of the fitting and pipe.

C. Bolt holes of flanges shall straddle the horizontal and vertical centerlines of the pipe run.

D. Clean flanges by wire brushing before installing gasket.

E. Clean flange bolts and nuts by wire brushing, lubricate threads with anti-seize compound, and tighten nuts uniformly and progressively. Between 1/4 inch and 3/8 inch shall project through the nut when drawn tight.

F. All bolting shall be performed in accordance with the provisions of Section 33 11 00, General Piping Requirements.

G. If flanges leak under pressure testing, loosen or remove the nuts and bolts, reseat or replace the gasket, reinstall or retighten the bolts and nuts, and retest the joints. Joints shall be watertight.

3.06 ANCHORS AND THRUST BLOCKS

A. Concrete anchors and thrust blocks shall be poured against wetted undisturbed soil in accordance with Section 33 11 13.90 and as shown on the Drawings.

3.07 PIPE SUPPORT

A. All exposed pipe shall be supported as detailed in the plans.

3.08 TESTING

A. All pressure piping shall be hydrostatically pressure tested in accordance with Section 33 11 00.

3.09 TAPPING

A. Direct tapping of DIP shall not be allowed. All taps shall include a saddle with two-straps.

END OF SECTION

SECTION 33 11 13.15

HIGH DENSITY POLYETHYLENE PIPE AND FITTINGS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section includes materials, installation, and testing of high density polyethylene (HDPE) pipe and fittings.

B. Related sections:

1. Section 01 57 80 – Control of Ground and Surface Water
2. Section 31 23 00 – Trenching, Backfilling and Compaction
3. Section 33 11 00 - General Piping Requirements
4. Section 33 12 16 – Manual Valves

1.02 REFERENCED CODES AND STANDARDS

A. American Water Works Association (AWWA), latest edition:

1. C901 – Polyethylene (PE) Pressure Pipe and Fittings, 3/4 inch (19 mm) through 3 inch (76 mm) for Water Service
2. C906 – Polyethylene (PE) Pressure Pipe and Fittings, 4 inches (100 mm) through 63 inches (1575 mm) for Water Distribution and Transmission
3. M55 – Manual of Water Supply Practices, PE Pipe Design and Installation.

B. American Society of Testing and Materials (ASTM), latest edition:

1. D2737 – Standard Specification for Polyethylene (PE) Plastic Tubing.
2. D2774 – Standard Practice for Underground Installation of Thermoplastic Pressure Pipe.
3. D3261 – Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Fittings.
4. D3350 – Standard Specification for Polyethylene Plastics Pipe and Fittings Material.
5. D4976 – Standard Specification for Polyethylene Plastics Molding and Extrusion Materials
6. F714 – Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.
7. F2164 - Standard Practice for Field Leak Testing of Polyethylene (PE) Pressure Piping Systems Using Hydrostatic Pressure.
8. F2206 – Standard Specification for Fabricated Fittings of Butt-Fused Polyethylene (PE) Plastic Pipe, Fittings, Sheet Stock, Plate Stock, or Block Stock.
9. F2620 – Standard practice for Heat Fusion Joining of Polyethylene Pipe and Fittings.

C. NSF International

1. 61 – Drinking Water System Components – Health Effects

D. Plastics Pipe Institute (PPI):

1. PPI Handbook of Polyethylene Pipe – 2009 (2nd Edition).
2. TR-33 – Generic Butt Fusion Joining Procedure for Polyethylene Gas Pipe.
3. TN-42 – Recommended Minimum Training Guidelines for PE Pipe Butt Fusion Joining Operators for Municipal and Industrial Projects.

1.03 SUBMITTALS

1. Submit manufacturers product data per the requirements of Section 01 30 00.
2. Submit certification and/or training records demonstrating that the pipe fusing personnel have been trained to install the product(s) provided.

1.04 QUALITY ASSURANCE

A. Perform polyethylene (PE) pipe jointing employing only personnel trained in the use of butt-fusion equipment, electrofusion equipment (if required to perform the Work) and recommended methods for new pipe connections. Ensure personnel directly involved with installing the new pipe receive training in the proper methods for handling and installing the PE pipe. Conduct training employing qualified representatives of the polyethylene pipe manufacturer.

1.05 WARRANTY

A. Warrant that the equipment used in this Work, where covered by patents or license agreements, is furnished in accordance with such agreements and that all applicable royalties and fees applicable to such license agreements have been included in the bid price given for this Work. No additional payment shall be awarded for such costs submitted after receipt of the bids.

1.06 DELIVERY, STORAGE AND HANDLING

A. Transport, handle, and store pipe and fittings as recommended by the manufacturer. Handle pipe in accordance with PPI "Handbook of Polyethylene Pipe, Chapter 2" using approved strapping and equipment rated for the loads encountered. Do not use chains, wire rope, forklifts or other methods or equipment that may gouge or damage the pipe or endanger persons or property. Conduct field storage in compliance with AWWA Manual of Practice M55, Chapter 7.

B. If new pipe and fittings become damaged before or during installation, make repairs as recommended by the manufacturer, or, where directed by the Owner, replace the damaged materials at no additional expense to the Owner before proceeding with the Work.

1. If any gouges, scrapes, or other damage to the pipe results in loss of 10% of the pipe wall thickness at any point, cut out and remove that length containing the damage or do not use that that piece of pipe.

C. Deliver, store and handle other materials as required to prevent damage.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Water service laterals: Furnish high-density polyethylene (HDPE) plastic tubing meeting the applicable requirements of ASTM F714 PE plastic pipe (SDR-PR), ASTM D4976 and ASTM D3350.

1. Provide polyethylene tubing made of HDPE material having a material designation of PE 4710.
2. HDPE material shall have a minimum cell classification of PE445574C/E.
3. The minimum wall thickness of the HDPE tubing shall meet the requirements for DR 9, unless indicated otherwise on the Drawings.
4. Tubing shall be Copper Tubing Size (CTS) unless indicated otherwise on the drawings.

B. Provide pipe sizes as indicated on the Drawings.

C. Provide only pipe and fittings made of virgin material. No rework, except that obtained from the manufacturer's own production of the same formulation, shall be permitted. Use only resin compounds in the manufacture of HDPE pipe in accordance with the requirements of ASTM D3350.

D. Furnish pipe and fittings that are homogenous throughout and free of visible cracks, holes, foreign material, blisters, or other deleterious faults.

E. Material color shall be black with blue stripe indicating potable water.

F. Fittings: Provide fittings, where and if required, conforming to the requirements specified below and fabricated in the pipe manufacturer's factory or other approved manufacturer of high density polyethylene fittings (elbows and laterals). Remove the interior joint beads in the finished fittings prior to shipment by grinding or cutting to produce a smooth interior surface (maximum 1/16-inch protrusion, with no rough or jagged edges or undercuts). Provide elbows, where required, of the long radius design. Lateral fittings may use fiberglass wrap to provide the necessary reinforcement.

1. Butt Fusion Fittings: Make fittings from HDPE material having a minimum material designation code of PE 3608, with a minimum cell classification as noted in Paragraph 2.01A above. Provide butt fusion fittings meeting the requirements of ASTM D3261. Molded and fabricated fittings shall have a pressure rating equal to the pipe unless otherwise specified or shown on the Drawings.
   a. Provide markings on molded fittings in compliance with the requirements of ASTM D3261.
   b. Mark fabricated fittings in accordance with ASTM F2206.
   c. Socket fittings shall meet ASTM D2683.
2. Electrofusion Fittings: Make fittings from HDPE material having a minimum material designation code of PE 3608, with a minimum cell classification as noted in Paragraph 2.01A above.
   a. Electrofusion fittings shall have a manufacturing standard of ASTM F1055.
3. Fittings shall have a pressure rating equal to the pipe unless otherwise specified or shown on the Drawings.

PART 3 - EXECUTION

3.01 PIPE INSTALLATION

A. Install pipe and fittings in strict accordance with the manufacturer's recommendations and instructions, the requirements of ASTM D2321, the requirements as specified in Section 33 11 00, "General Piping Requirements" of these Technical specifications and as further specified below.

B. Pipe Laying: Carefully inspect all pipes for defects before placing in the trench, or in the bore hole in the case of horizontal directional drilling. Avoid abrasion or scratching of the pipe exterior surface during installation. Unless otherwise required, lay all pipes straight between changes in grade.

C. Cutting Pipe: Whenever a standard pipe length requires cutting to fit into the line, provide for a lateral connection or to bring it to the required location, perform work in accordance with the manufacturer's instructions so as to leave a smooth, square end. Where a plain end to plain end joint occurs as a result of cutting into the pipe, install an electrofusion coupling to join the pipe sections

D. Joint Construction: Comply with the requirements in Paragraph 3.02 below.

E. Service Laterals: All service laterals shall be tapped into the main using a service saddle and corporation stop per Section 22 11 13.

F. Locating Wire: Install locating wire as specified in Section 33 11 00 on all new HDPE pipes. Attach wire to pipe using duct tape or plastic tie straps and terminate wires in a precast concrete box as shown on Drawings.

3.02 PIPE JOINING

A. Assemble and join the polyethylene pipe at the site using the butt-fusion method to provide a leak-proof joint. Threaded or solvent-cement joints and connections are not permitted. Employ and operate equipment and follow procedures for joining pipe in strict compliance with the manufacturer's recommendations and in accordance with ASTM F2620 or PPI TR-33. Use only personnel certified as fusion technicians per PPI TN-42 by a manufacturer of polyethylene pipe and/or fusing equipment to make the joints.

B. Make butt-fused joints that are in true alignment and have uniform interior and exterior rollback beads resulting from the use of proper temperature and pressure. Allow the joint adequate cooling time before removal of pressure from the fusion machine. Provide a completed fused joint that is watertight and has tensile strength equal to that of the pipe. Prior to making the subsequent joint, grind the interior joint beads smooth (maximum 1/16-inch protrusion, with no rough or jagged edges or installation of pipe.

C. Cut out defective joints and replace at no additional cost to the Owner. Do not use any section of HDPE pipe with a gash, blister, abrasion, nick, scar, or other deleterious fault greater in depth than 10 percent of the wall thickness. Remove defective pipe from the site. However, a defective area of the pipe may be cut out and the resulting section ends fusion jointed in accordance with the procedures stated above. In addition, discard and remove from the site any section of the pipe having other defects, such as concentrated ridges, discoloration, excessive spot roughness, pitting, variable wall thickness, or any other defect of manufacturing or handling as determined by the Owner.

D. Where terminal sections of pipe are joined within the pipe trench, or at the ends of directionally drilled pipe, make the connection using electrofusion couplings or connectors as manufactured by Central Plastics Electrofusion, or equal and as specified below. Provide couplings or connectors having tensile strength equivalent to or greater than that of the pipe being joined.

E. Where the new HDPE pipe is to be joined to buried pressure flow pipe, make the connection using a restrained end transition coupling. Verify the outside diameter of the existing or adjoining pipe prior to commencing work on the respective section.

F. Where fittings, including laterals, are shown on the Drawings as a required part of the installed adjoining pipeline, field join the fittings to the already installed adjoining sections of HDPE pipe using an appropriate fusion machine designed for in-trench joining, or by means of electro fusion couplings as specified above. Prior to making the closing field joint on a fitting installation, grind or cut the interior beads resulting from preceding field made joints on the fitting to the standard specified above.

G. Electrofusion: Perform electrofusion joining in accordance with the manufacturer's recommended procedure. Other acceptable electrofusion joining shall be as described in ASTM F1290 and PPI TN-34.

1. The process of electrofusion requires an electric source, a transformer (commonly called an electrofusion box) that has wire leads, a method to read electronically by laser or otherwise input the barcode of the fitting, and a fitting that is compatible with the type of electrofusion box used.
2. The electrofusion box shall be capable of reading and storing the input parameters and the fusion results for later download to a record file that is to be submitted to the owner for his records.
3. Demonstrate qualification of the fusion technician by submitting documentation of his/her electrofusion training within the past year on the same equipment proposed to be utilized for this Work.

3.03 WATER SERVICE LATERALS

A. PE Tubing for water service laterals shall be one continuous piece from the water main (corporation stop) to the water meter (angle stop or meter setter). Only welded joints shall be used if needed. Intermediate compression fittings are not allowed.

B. Provide stainless steel inserts at all compression fittings.

C. Water service laterals may be installed by:

1. Open trench method. Restore pavement as per the requirements for water mains.
2. Directional drilling.
3. Splitting of existing water service lateral. Replacement lateral must be placed into service the same day if using this method.

3.04 DISINFECTION AND TESTING

A. Flush and disinfect the installed pipe per the requirements of Section 22 11 19.

B. Pressure test the installed pipeline per the requirements of Section 33 11 00.

3.05 CORRECTIVE WORK AND CLEAN-UP

A. Correct, at the direction of the Owner, damaged pipe and all other conditions not conforming to the requirements of these Specifications found as a result of this inspection. Similarly, remove obstructions and foreign material found in pipe. Perform corrections and removals as required at no additional expense to the Owner. Where, in the opinion of the Owner, major corrective work or replacement is required, re-perform leakage test on the corrected or replaced section of pipe main.

END OF SECTION

SECTION 33 11 13.90

THRUST RESTRAINTS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section includes materials, installation, and testing of thrust restraints for ductile-iron pipe and fittings, concrete cylinder pipe and buried valves.

B. Related sections:
1. Section 03 30 00 – Cast-in-Place Concrete
2. Section 31 23 00 – Trenching, Backfilling and Compaction
3. Section 33 11 00 - General Piping Requirements
4. Section 33 11 13.15 – Ductile Iron Pipe and Fittings
5. Section 33 12 16 – Manual Valves

1.02 REFERENCED CODES AND STANDARDS

A. American Water Works Association (AWWA), latest edition:
1. C110 – Ductile-Iron and Gray-Iron Fittings
2. C111 – Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
3. C153 – Ductile-Iron Compact Fittings for Water Service
4. C115 – Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges
5. C116 – Protective Fusion-Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings
6. C213 – Fusion-Bonded Epoxy Coatings and Linings For Steel Water Pipe and Fittings
7. C219 – Bolted, Sleeve-Type Couplings for Plain-End Pipe
8. C600 – Installation of Ductile-Iron Water Mains and Their Appurtenances

B. ASTM
1. A536 – Standard Specification For Ductile Iron Castings

C. NSF International
1. 61 – Drinking Water System Components – Health Effects

1.03 REQUIREMENT

A. All pressure pipe shall be restrained against joint separation by the following methods:
1. Welded continuous pipe.
2. Bolted flanged fittings.
3. Bell and spigot joints with locking gaskets.
4. Bell and spigot joints with bell restraint harness.

5. Bell and spigot joints with concrete thrust anchors/ thrust blocks at valves and fittings, as detailed on the Drawings.
   a. If the required test pressure for the pipeline exceeds the design pressure listed in the thrust block detail on the Drawings, the Contractor bring the discrepancy to the attention of the Owner and the Engineer for clarification or revision.
6. Mechanical joint restraints at valves and fittings.
7. Concrete thrust blocks at valves and fittings where indicated on the Drawings.

B. Concrete thrust blocks shall be provided where new valves and/or fittings are added to existing bell and spigot type pipelines.

C. New ductile iron pipelines shall be fully restrained by using locking gaskets at every bell and spigot connection and mechanical restraints at every valve and/or fitting connection.

1.04 SUBMITTALS

A. Contractor shall provide submittals for review and approval by the Engineer in accordance with Section 01 30 00.

B. Provide shop drawings or catalog cuts for all materials to be included in the Work. Submittal shall include fittings, gaskets, bolts, coatings and associated hardware.

C. Provide certificate of NSF-61 compliance for gasket materials and coatings coming into contact with potable water.

PART 2 - PRODUCTS

2.01 LOCKING GASKETS

A. Rubber gaskets with embedded steel gripper teeth, rated to hold a minimum pressure of 250 psi, meeting the requirements of AWWA C111.

B. Manufacturers:
1. Field-Lok 350 Gasket as manufactured by U.S. Pipe
2. Sure Stop 350 Gasket as manufactured by McWane Ductile
3. Fast-Grip Gasket as manufactured by American Ductile Iron Pipe
4. Or approved equal

2.02 MECHANICAL JOINT RESTRAINT

A. Design
1. Restraint devices for nominal pipe sizes 3 inch through 54 inch shall consist of multiple gripping wedges incorporated into a follower gland meeting the applicable requirements of ANSI/AWWA C110.
2. The devices shall have a working pressure rating of 350 psi for 3-16 inch, 250 psi for 18-48 inch and 200 psi for the 54 inch size. Ratings are for water pressure and must include a minimum safety factor of 2 to 1 in all sizes.

3. An identification number tracing the date and location of manufacture shall be cast into each gland body.
4. Mechanical joint restraint shall require conventional tools and installation procedures per AWWA C600, while retaining full mechanical joint deflection during assembly as well as allowing joint deflection after assembly.

B. Material
1. Gland body, wedges and wedge actuating components shall be cast from grade 65-45-12 ductile iron material in accordance with ASTM A536.
2. Ductile iron gripping wedges shall be heat treated within a range of 370 to 470 BHN.
3. Three (3) test bars shall be incrementally poured per production shift as per Underwriter's Laboratory (U.L.) specifications and ASTM A536. Testing for tensile, yield and elongation shall be done in accordance with ASTM E8.
4. Chemical and nodularity tests shall be performed as recommended by the Ductile Iron Society, on a per ladle basis.

C. Manufacturer
1. Megalug Series 1100 produced by EBAA Iron Inc. or approved equal.

2.03 MECHANICAL BELL RESTRAINT

A. Design
1. Ductile iron pipe bell restraint shall consist of a wedge action restraint ring on the spigot joined to a split ductile iron ring behind the bell.
   a. The restraint ring shall have individually actuated wedges that increase their resistance to pull-out as pressure or external forces increase. The restraint ring and its wedging components shall be made of minimum grade 65-45-12 ductile iron conforming to ASTM A536.
   b. The wedges shall be heat treated to a minimum hardness of 370 BHN.
   c. Torque limiting twist off nuts shall be used to insure proper actuation of the restraining wedges.
   d. The split ring shall be made of a minimum grade of 65-45-12 ductile iron conforming to ASTM A536.
   e. The restraint devices shall be coated using thermosetting epoxy or polyester based powder coating.
   f. The connecting tie rods that join the two rings shall be made of low alloy steel that conforms to ANSI/AWWA C111/A21.11.
2. Mechanical bell restraint shall require conventional tools and installation procedures per AWWA C600.
3. The assembly shall have a rated pressure with a minimum 2 to 1 safety factor of 350 PSI in the 16-inch size and below; 250 PSI in the 18 through 36-inch sizes.

B. Manufacturer
1. Megalug Series 1700 restraint harness, manufactured by EBAA Iron, Inc. or approved equal.

2.04 RESTRAINED FLANGE ADAPTOR

A. Design

1. Restrained flange adapters shall be used in lieu of threaded, or welded, flanged spool pieces. Flange adapters shall be made of ductile iron conforming to ASTM A536 and have flange bolt circles that are compatible with ANSI/AWWA C110/A21.10.
2. Restraint for the flange adapter shall consist of a plurality of individual actuated gripping wedges to maximize restraint capability. Torque limiting actuating screws shall be used to insure proper initial set of gripping wedges.
3. The flange adapter shall be capable of deflection during assembly, or permit lengths of pipe to be field cut, to allow a minimum of 0.6" gap between the end of the pipe and the mating flange without affecting the integrity of the seal.
4. For PVC pipe, the flange adapter will have a pressure rating equal to the pipe.
5. For ductile iron pipe, the flange adapter shall have a safety factor of 2:1 minimum.
6. An identification number tracing the date and location of manufacture shall be cast into each gland body.
7. All wedge assemblies and related parts shall be coated with a minimum of two coats of liquid thermoset epoxy coating with heat cure to follow each coat.
8. All casting bodies shall have a polyester based powder coating or thermoset epoxy coating to provide corrosion, impact and UV resistance. Coatings for wetted parts shall meet NSF 61.

B. Manufacturer:
1. SERIES 2100 MEGAFLANGE adapter, as produced by EBAA Iron, Inc.
2. Restrained Flange Coupling Adaptor, as produced by ROMAC Industries.
3. Or approved equal.

2.05 SLEEVE COUPLING WITH RESTRAINT

A. Design
1. Joint Restraint to prevent axial separation shall be incorporated into the design of the sleeve or coupling used to connect two plain pipe ends.
2. Sleeve body shall be carbon steel or ductile iron.
3. The restraint mechanism shall consist of a plurality of individually actuated gripping surfaces to maximize restraint capability.
4. Torque limiting twist off nuts shall be used to insure proper actuating of the restraint devices.
5. The restraint devices shall have a polyester based powder coating or thermoset epoxy coating coated using thermosetting epoxy.
6. Ductile Iron components shall be of a minimum of 65-45-12 ductile iron meeting the requirements of ASTM A536 of the latest revision and shall be tested in accordance with the stated standard.
7. The restrained joining system shall meet the applicable requirements of AWWA C219, ANSI/AWWA C111 and ASTM D2000.

B. Manufacturer.
1. Series 3800 restrained joining system by EBAA Iron, Inc.
2. Style 400 RG by ROMAC Industries
3. Or approved equal.

PART 3 - EXECUTION

3.01 GENERAL

A. Install mechanical restraints per the manufacturer's directions, the requirements of Sections 33 11 00 and 33 11 13.15, and the requirements of AWWA C600.

3.02 THRUST BLOCKS AND THRUST ANCHORS

A. Trenching, backfilling, and compacting shall be in accordance with Section 31 23 00.

B. Excavate pipe trench and install pipeline and fittings. Tighten all fittings and connections. Brace or support pipe or fittings as needed to prevent displacement.

C. Excavate the area to receive the thrust block. Concrete anchors and thrust blocks shall be poured against wetted undisturbed soil. Where it is not practical to place the thrust block against undisturbed earth, the fill material placed between the blocks bearing surface and undisturbed soil shall be moisture conditioned and compacted to 95% modified proctor.

D. Install rebar and ties, where required on the Drawings.

E. Wet the soil without causing erosion or sloughing and place the concrete thrust block.

F. High early strength concrete may be used to allow early backfilling of the trench.

G. Do not pressure test the pipeline until the thrust block has achieved the required strength listed on the Drawings.

END OF SECTION

SECTION 33 12 16

MANUAL VALVES

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section includes materials, testing, and installation of manually operated valves.

B. Manual valves to be supplied and installed per AWWA C507 and C509, unless noted otherwise below.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. All related work specified elsewhere, or in other codes or standards, will be as last revised, unless a specific date of issuance is called out in opposition to later revision date(s).

B. Other sections of the technical specifications, not referenced below, shall also apply to the extent required for proper performance of this work.

1.	Trenching, Backfilling, and Compacting:	31 23 00
2.	Cast-In-Place Concrete:	03 30 00
3.	Painting and Coating:	09 90 00
4.	Hydrostatic Testing of Pressure Pipelines:	33 05 05.31
5.	Ductile-Iron Pipe and Fittings:	33 11 13.15
6.	Underground Facilities Identification.	33 05 26

1.03 REFERENCE STANDARDS

A. Valves shall conform, as applicable, with the latest editions of the following codes and standards.

1. AWWA C504 Rubber-Seated Butterfly Valves
2. AWWA C509 & C515 Resilient Seated Gate Valves
3. AWWA C550 Protective Interior Coatings for Valves and Hydrants
4. ASTM B62 Composition Brass or Ounce Metal Castings
   a. Ductile Iron Castings for Valves
   b. Ductile Iron Pipe Flanges
5. ASTM D 429 Tests for Rubber Property – Adhesion to Rigid Substrates

1.04 SUBMITTALS

A. Submit manufacturer's product data, shop drawings and installation instructions demonstrating compliance with the reference standards and this specification for the intended service.

B. Certified test reports shall be provided with each delivery showing that the valve(s) delivered complies with this specification.

1.05 APPROVED MANUFACTURERS

A. Gate Valves - Aboveground Smaller Than 2 Inch
   1. Red & White
   2. Milwaukee
   3. Or approved equal

B. Ball Valves Smaller than 3-inch
   1. Nibco
   2. Or approved equal

C. Resilient - Seated Gate Valves: 4 Inch through 12 Inch
   1. Clow
   2. Mueller
   3. American Flow Control (AFC)
   4. Or approved equal

D. Butterfly Valves
   1. Henry Pratt Company
   2. Dezurik
   3. American Flow Control (AFC)
   4. Or approved equal

E. Valve Boxes
   1. Christy G5 with cast iron cover
   2. Or approved equal

1.06 FLANGED END

A. All valves connecting to fittings on a main shall be flanged on at least one side and bolted to the fitting on the main.

1.07 SINGLE TYPE OF VALVE

A. The Contractor shall choose an approved valve and then use only that valve throughout the Work (i.e., only one manufacturer and model per type of valve).

1.08 BUTTERFLY VALVES

A. Butterfly valves shall only be used on lines 14 inches and larger or as specifically shown on the plans.

1.09 RESILIENT WEDGE GATE VALVES

A. Resilient gate wedge valves shall be used on all pressure class 150 lines 4 inch through 12 inch.

1.10 FIELD HYDROSTATIC TEST

A. All valves 16-inch and larger shall be field hydrostatically tested to the valves working pressure in the presence of the Owner's inspector. Each side of the valve shall be pressurized and tested independently.

PART 2 - MATERIALS

2.01 GENERAL

A. Valves shall be installed complete with operating handwheels or levers, extension stems, worm gear operators, operating nuts, and wrenches required for operation.

B. Valves shall have the name of the manufacturer and the size of the valve cast or molded onto the valve body or bonnet or shown on a permanently attached plate.

C. Valve body and trim casting shall be of domestic origin.

D. Bolts for all valves shall be 316 stainless steel. Bolts consisting of 304 stainless steel shall not be permitted.

E. Suitable valves shall be provided to connect to adjoining piping as shown on the plans.

2.02 VALVE OPERATORS

A. Butterfly Valve Operators

1. Provide lever or wrench operators having adjustable, "position indicator" for exposed butterfly valves smaller than 6 inches.
2. Provide gear operators on butterfly valves 6 inches and larger. Gear operators for valves 8-inches and larger shall be of the traveling nut type. For large valves, worm gears shall be used with the approval of the Engineer.
3. Gear operators shall be enclosed with seals provided on shafts to prevent entry of dirt and water into the operator. Gear operators for valves located above ground or in vaults and structures shall have handwheels. Minimum handwheel diameter shall be 12 inches. The operator shall contain a dial indicating the position of the valve disc or plug.
4. Gear operators for buried or submerged valves shall have 2-inch square AWWA operating nuts.
5. For buried or submerged service, provide watertight shaft seals and watertight valve and actuator cover gaskets. Provide totally enclosed operators designed for buried or submerged service.
6. Traveling nut and worm gear operators shall be of the totally enclosed design so proportioned as to permit operation of the valve under full operating head with a maximum pull of 80 pounds on the hand-wheel. Provide stop limiting devices in the operators in the open and closed positions. Operators shall be of the self-locking type to prevent the disc or plug from creeping. Design operator components between the input and the stop-limiting devices to withstand without damage a pull of 200 pounds for handwheel or chainwheel operators and an input torque of 300 foot-pounds for operating nuts when operating against the stops.
7. Operators on buried valves shall produce the required torque on the operating nut with a maximum input of 150 foot-pounds.

B. Gate Valve Operators

1. Provide hand-wheel operators for above ground gate valves. Minimum handwheel diameter shall be 12 inches.
2. Provide 2-inch AWWA operating nuts for buried and submerged valves.

C. Valve operators, handwheels, or levers shall open by turning counterclockwise.

2.03 PAINTING AND COATING

A. Coat metal valves (except bronze and stainless-steel valves) located above ground or in vaults and structures in accordance with Section 09 90 00. Apply the specified prime coat at the place of manufacture. Apply finish coat in field. Finish coat shall match the color of the adjacent piping. Coat handwheels the same as the valves.

B. Coat buried metal valves at the place of manufacture per Section 09 90 00

C. Valves 4 inches and larger shall be coated on their interior metal surfaces excluding seating areas and bronze and stainless steel pieces in accordance with AWWA C550 and these specifications. Sandblast surfaces in accordance with SSPC SP-1. Remove all protuberances which may produce pinholes in the lining. Round all sharp edges to be coated. Remove any contaminants which may prevent bonding of the lining. Coat the interior ferrous surfaces using one of the following methods:

1. Apply powdered thermosetting epoxy (3M Scotchkote 6251 Fusion Bonded Epoxy or equal) per the manufacturer's application recommendations to a thickness of 7 to 9 mils. All gaskets and seals must be removed prior to applying coating.
2. Apply two coats of catalytically setting epoxy (Tnemec Series N140, or equal) to a dry-film thickness of 7 to 9 mils total. Follow the paint manufacturer's application recommendations including minimum and maximum drying time between the required coats.

D. All valve coatings shall be factory applied or by the manufacturer’s qualified distributor. Touch up and repair of valve coatings shall be only done by authorized factory distributors.

2.04 ABOVEGROUND BALL VALVES 2 INCHES AND SMALLER

A. Aboveground threaded end ball valves, 1/4 inch through 3 inches, for water service shall be full bore port ball type having a minimum working pressure of 200 psi. Valves shall have plastic coated lever operators.

B. Materials of construction shall be as described below:

1. Body: Bronze per ASTM B 62
2. Ball: Type 316 Stainless Steel
3. Seat and Seals: Teflon
4. Stem: Bronze or Copper Silicon, per ASTM B 62, B99 (Alloy 651), B 584 or B 371 (Alloy 694)

C. Stem material shall have a minimum tensile strength of 60,000 psi and a minimum yield strength of 30,000 psi.

2.05 RESILIENT-SEATED WEDGE GATE VALVES

A. Valves shall conform to AWWA C509 and C515 and the requirements listed herein.

B. All valves shall be bubble tight at 200 psi working pressure.

C. Valves shall have non-rising low-zinc stems, opening by turning counter-clockwise and provided with 2-inch-square operating nut. Outside stem and yoke valves shall be used on backflow device shutoff valves.

D. Each valve shall have a smooth unobstructed waterway free from any sediment pockets.

E. Stuffing boxes shall be O-ring seal type with two rings located in stem.

F. Low friction torque reduction thrust bearings shall be located both above and below the stem collar.

G. Materials shall be as described below:

1. Body, Operating Nut Bonnet and Seal Plate: Cast Iron or Ductile Iron per ASTM A 126 Class B
2. Gate: Cast Iron or Ductile Iron per ASTM A 126 Class B
3. Bonnet and Seal Bolts: Type 316 Stainless Steel
4. O-Rings: Synthetic Rubber per ASTM D2000

H. All internal working parts (excluding gate) shall be all bronze containing not more than 2 percent aluminum or more than 7 percent zinc. Valve stems shall be cast or forged from bronze having a tensile strength of not less than 60,000 psi, a yield point of not less than 30,000 psi, and an elongation of not less than 10 percent in 2 inches.

I. All gates shall be encapsulated in Buna-N rubber or a nitrile elastomer.

2.06 TAPPING VALVES

A. Tapping valves shall conform with all requirements for gate valves 2 inches and larger and the additional requirements listed herein.

B. All valve ends shall be flanged. The flange on one end shall have slotted bolt holes to fit all standard tapping machines.

C. Seat rings shall be oversized to permit the use of full-size cutters.

D. Resilient wedge valves may be used as tapping valves, provided that the disk fully retracts to produce a full port opening.

2.07 BUTTERFLY VALVES

A. Butterfly valves shall conform to AWWA C504, Class 250B. Minimum working differential pressure across the valve disc shall be 250 psi unless specified otherwise on the drawing.

B. Butterfly valves shall be furnished and installed with the type of ends as shown on the plans and as herein specified. Wafer style valves will not be permitted. Valves connecting to buried fittings shall be flange by mechanical joint, where the valve is directly bolted to flanged fitting. If valve is not available with flange by mechanical joint end configurations, CONTRACTOR shall provide mechanical joint valves and fittings with mechanical restraints at no extra cost to District.

C. Each valve body shall be tested under a test pressure equal to twice its design water working pressure.

D. Valves shall be bubble tight at rated pressures and shall be satisfactory for throttling service and frequent operation after long periods of inactivity. Valve discs shall rotate 90 degrees from the full-open position to the tight-shut position.

E. Valve ends shall be flanged or mechanical joint. Flanged ends shall be compatible with ANSI B16.1 Class 125. Mechanical Joint ends shall be per AWWA C111. Mechanical Joint ends shall be mechanically restrained per Section 33 11 13.15 for specific pipe/valve size.

F. Valve shafts shall be per AWWA C504, Section 4.2.3.

G. Materials of construction shall be as described below:

1. Body: Cast Iron or Ductile Iron per ASTM A 126 Class B
2. Exposed Body Cap Screws and Bolts and Nuts: Type 316 Stainless Steel
3. Discs: Cast Iron or Ductile Iron per ASTM A 126 Class B
4. Seat: Buna-N Rubber

H. The rubber seat shall be an integral part of the valve body. Rubber seats fastened to the disc by any means shall not be permitted.

2.08 BOLTS AND NUTS FOR FLANGED VALVES

A. Bolts and nuts for flanged valves shall be Type 316 stainless steel in accordance with Section 33 11 13.15.

2.09 GASKETS

A. Gaskets for flanged end valves shall be as described in Section 33 11 13.15.

2.10 VALVE BOXES FOR BURIED VALVES

A. Valve extension pipe material shall be 8-inch PVC SDR 35 pipe.

B. Design cast iron cap to rest within a frame on a cast-in-place concrete ring surrounding the valve extension pipe; size the tapered skirt of the cap for a close fit inside the upper sleeve portion of the valve box. Caps for the domestic water system shall be circular with the word "WATER" cast on the cap. Caps for the recycled water system shall be circular with “RECYCLED” cast on the cap. Coat the cap and frame with asphalt or coat-tar paint.

2.11 EXTENSION STEMS FOR BURIED VALVE OPERATORS

A. Where the depth of the valve is such that its centerline is more than 4 feet below grade, provide operating extension stems to bring the operating nut to a point 24 to 30-inches below the surface of the ground and/or box cover.

B. Extension stems shall be steel and shall be complete with 2-inch-square operating nut.

C. Valve stem extensions shall be of a solid design (no pinned couplings permitted) with guides.

D. Valve extensions shall conform with SLVWD Standard Detail SD-1.

PART 3 - EXECUTION

3.01 JOINTS

A. Bolt holes of flanged valves shall straddle the horizontal and vertical centerlines of the pipe run to which the valves are attached. Clean flanges by wire brushing before installing flanged valves. Clean flange bolts and nuts by wire brushing, lubricate threads with oil and graphite, and tighten nuts uniformly and progressively. If flanges leak under pressure testing, loosen or remove the nuts and bolts, reseat or replace the gasket, reinstall or retighten the bolts and nuts, and retest the joints. Joints shall be watertight.

B. Clean threaded joints by wire brushing or swabbing. Apply Teflon joint compound OR Teflon tape to pipe threads before installing threaded valves. Joints shall be watertight.

C. Rubber ring grooves of valves shall be inspected before installation by the Contractor for ridges or holes that would interfere with the rubber ring. Interferences with the rubber ring shall be corrected to a satisfactory connection or the valves replaced, as required by the District. (All valves shall have the same rubber-ring groove profile as the groove of the pipe couplings furnished with the pipe.)

3.02 BUTTERFLY VALVE OPERATORS

A. Butterfly valves shall be installed with the operators on the street centerline side of the pipeline.

3.03 EXTERIOR PROTECTION

A. All exposed flanges and other metal surfaces and all damaged coatings shall be coated after assembly with bituminous mastic per Section 09 90 00 Coating of stainless-steel flange bolts is not required.

B. Wrap buried valves with 8-mil polyethylene wrap per AWWA C10

3.04 CONCRETE SUPPORTS

A. Valves shall be anchored in concrete as shown on plans.

B. Concrete supports will not be required under valves bolted to flanged fittings.

C. Until supports are poured, valves shall be temporarily supported by placing wooden skids underneath the valve so that the pipe is not subjected to the weight of the valve.

3.05 VALVE BOXES

A. Valve boxes shall be firmly supported and shall be kept centered and plumb over the operating nut of the valve.

B. Beveled sections of pipe will not be allowed at the top of the valve extension pipe. The top cut shall be square, and machine made.

C. The box cover shall be flush with the surface of the finished pavement unless otherwise indicated on the Drawings.

3.06 BACKFILL

A. All backfill within 24 inches of a valve shall be clean, washed sand.

B. Backfill is to be placed and compacted in accordance with Section 31 23 00

3.07 VALVE LEAKAGE TESTING

A. Test valves for leakage at the same time that the connecting pipelines are tested. See Section 33 11 00 for pressure testing requirements.

B. Valves shall have a pressure rating higher than or equal to the test pressure.

END OF SECTION

SECTION 33 12 19

FIRE HYDRANTS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section includes the materials, installation and testing of fire hydrants.

B. Hydrants shall be supplied and installed per SLVWD Standard Detail SD-3, AWWA C 503 and as described herein.

1.02 RELATED WORK DESCRIBED ELSEWHERE

A. All related work specified elsewhere, or in other codes or standards, will be as last revised, unless a specific date of issuance is called out in opposition to later revision date(s).

B. Other sections of the technical specifications, not referenced below, shall also apply to the extent required for proper performance of this work.

1.	Trenching, Backfilling, and Compacting:	31 23 00
2.	Concrete:	03 30 00
3.	Painting and Coating:	09 90 00
4.	General Piping Requirements:	33 11 00
5.	Ductile Iron Pipe and Fittings:	33 11 13.15
6.	Manual Valves:	33 12 16

1.03 APPROVED WET BARREL HYDRANTS

A. Clow 960

B. James Jones 3740 (Hydrant Head and Fluted Spool),

PART 2 - MATERIALS

2.01 WET BARREL HYDRANT

A. Hydrant Top Section

1. Fire hydrants shall have individual valves for each outlet opening counter clockwise. Fire hydrants shall have one 2-1/2 inch hose nozzle and one 4-1/2-inch pumper nozzle.
2. All outlets shall have National Standard Hose Threads.
3. The hydrant top section shall be manufactured of bronze conforming to ASTM B 62.
4. All interior working parts, including stems, shall be of bronze containing no more than 7% zinc or 2% aluminum.
5. Hydrants are to be provided with:
   a. 1-1/8-inch sized pentagon-shaped operating nut, and

b. 1-1/8-inch capnuts.

6. All fire hydrants shall have the name of the manufacturer cast onto the hydrant body or shown on a permanently attached plate.
7. Plastic outlet nozzle caps shall be provided for all outlets. Caps shall be securely chained to the barrel with non-kinking metal chain in a manner to permit free rotation of the cap.
8. All hydrant flanges shall be eight-hole regular, Class 125, American Standard cast iron flange drilling.

B. Bury Section

1. The bury section shall be 6-inch cast iron long radius bury elbow and shall be cement lined in conformance with Section 33 11 13.15. Bury inlet shall be 6-inch rubber-ring hub bell connection for C900 PVC pressure pipe.
2. A flanged ductile iron spool shall be installed to position the hydrant flange 4 inches above the concrete pad (finish grade).
3. All wet-barrel fire hydrant cast-iron buries are to be cement lined.
4. When using a riser spool, bolts shall be stainless steel 316, standard non-break-away.
5. Bury section outlet and riser spool flanges shall be eight-hole regular, Class 125, American Standard cast-iron flange drilling.

2.02 BREAK-AWAY CHECK VALVE

A. Break-away hydrant check valve, Clow model LP 619 or equal as approved by the Engineer. Install per the standard drawing.

2.03 VALVE

A. The shut-off valve shall be a resilient-seated gate valve per Section 33 12 16, including the valve box. Butterfly valves will not be permitted on fire hydrant laterals.

2.04 DUCTILE IRON PIPE

A. Ductile iron pipe shall be per Section 33 11 13.15.

2.05 DUCTILE IRON PIPE AND FITTINGS

A. Ductile-iron Pipe and fittings shall be in accordance with Section 33 11 13.15.

2.06 CONCRETE

A. Concrete pads and supports shall be Class B concrete conforming with Section 03 30 00.

2.07 GASKETS

A. Gaskets shall be of rubber composition per Section 33 11 13.15.

PART 3 - EXECUTION

3.01 GENERAL

A. Fire hydrant assemblies shall be installed in accordance with the standard drawing and as specified herein, and shall include the connection to the main, the fire hydrant, hydrant bury, shutoff valve, valve well and valve box, connection piping, concrete thrust blocks, and appurtenances.

B. Where hydrant is not protected by a curb, provide bollards.

3.02 LOCATION

A. Fire hydrant assemblies shall be located as shown on the plans or as approved by the District representative. The center of the fire hydrant shall be, except as otherwise approved by the District representative, located as described below:

1. Where concrete curb or asphalt concrete (A.C.) berm exists or is to be constructed, and the sidewalk is next to the property line; 1 feet 6 inches back of the back edge of the curb.
2. Where 6-foot-wide or narrower sidewalk is to be installed or exists next to the curb; 12 inches back of sidewalk edge. Where there is insufficient public right-of-way behind the sidewalk, an easement will be required. For sidewalks wider than 6 feet; 18 inches back of the curb face.
3. Where there is no curb or berm, the location shall be designated by the District representative.
4. The flange elevation at the base of the hydrant shall be set 4-inches above the curb or sidewalk, or the surrounding graded area, or as approved by the District representative. Spools additional will not be permitted when correcting the flange elevation.

3.03 TRENCHING, BACKFILLING, AND COMPACTING

A. All trenching, backfilling, compaction and other excavation shall be in accordance with Section 31 23 00.

3.04 VALVE AND VALVE BOX

A. The valve and valve box shall be installed in accordance with Section 33 12 16.

3.05 DUCTILE IRON PIPE

A. Ductile iron pipe shall be installed in conformance with Section 33 11 13.15.

3.06 CONCRETE

A. The concrete pad shall be Class B concrete and thrust blocker shall be Class A concrete and shall be placed per Section 03 30 00.

3.07 PAINTING

A. All public fire hydrants shall be painted with one prime coat and two finish coats of yellow paint at the place of manufacture. Before the fire hydrant has been installed in accordance with Section 09 90 00. A final touch-up coat shall be applied just prior to the final inspection.

3.08 TESTING

A. Test hydrants at the same time that the connecting pipeline is pressure tested. See Section 33 11 00 for pressure testing requirements.

END OF SECTION

SECTION 40 91 13

AUTOMATIC VALVES

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section describes the materials and installation of self-contained automatic control valves.

B. Items of equipment specified herein shall be the end products of a limited number of manufacturers in order to achieve standardization for operation, maintenance, spare parts, and manufacturer's service.

1.02 RELATED WORK

A.	Ductile-Iron Pipe and Fittings:	33 11 13.15
B.	Copper, Brass and Bronze Pipe, Fittings and Appurtenances:	22 11 13
C.	General Piping Requirements:	33 11 00

1.03 SUBMITTALS

A. Submit manufacturer’s data indicating the type and size of vales to be provided, and compliance with this specification.

PART 2 - MATERIALS

2.01 COMPLETE ASSEMBLIES

A. All valves shall be complete, with all necessary operating appurtenances included in the work under this section.

2.02 INTERIOR LINING AND EXTERIOR COATING

A. An epoxy coating shall be applied to internal and external ferrous valve surfaces. Coating shall be per AWWA C550 unless specified otherwise, herein.

2.03 COMBINATION AIR RELEASE AND VACUUM RELIEF VALVE

A. Combination Air release and vacuum relief valve for potable water service shall be:
1. DeZurik Apco Series 140C
2. Cla-Val Series 35
3. Or approved equal

B. Provide vent screen and cover

C. Size as shown on the Drawings

PART 3 - EXECUTION

3.01 INSTALLATION

A. Automatic control valves shall be installed above ground or within a vault to provide for adjustment, maintenance and repair. Direct burial of a control valve will not be permitted under any circumstance.

B. Automatic control valves are to be installed with ductile iron piping per Section 33 11 13.15, unless indicated differently on the Drawings.

C. Prior to purchase of material, inspect valve to confirm valve size, manufacturer, and part number.

3.02 VALVE ADJUSTMENT AND TESTING

A. All valves installed, replaced, refurbished, or adjusted shall be tested for normal operation.

B. Valves shall be readjusted if necessary, to operate at the design pressure.

END OF SECTION

APPENDIX

1. Geotechnical Design Report, SLVWD 2019 Waterline Project, CE&G Document No: 191110.001, prepared by Cal Engineering & Geology, January 2020

2. Mitigation, Monitoring and Reporting Plan for the Quail Hollow Pipeline Replacement Project, dated February 2021

Draft

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DRAFT GEOTECHNICAL DESIGN REPORT

SAN LORENZO VALLEY WATER DISTRICT 2019 WATERLINE PROJECT

CE&G DOCUMENT NO.: 191110.001

JANUARY 30, 2020

Prepared for:

Schaaf & Wheeler Consulting Civil Engineers
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1.0 INTRODUCTION

1.1 GENERAL

Cal Engineering & Geology, Inc. (CE&G) has provided geotechnical design services to Schaaf & Wheeler Consulting Civil Engineers (S&W), for the 2019 pipeline Project. The pipeline system is owned and maintained by SLVWD. The project includes five pipeline segments located in the Santa Cruz Mountains in the vicinity of Boulder Creek, California. The project sites are identified based on the roads where they are located; as follows: Hillside Drive, Sequoia Avenue, HWY 236 (Lyon Zone), California Drive, and Quail Hollow Road (Figures 1 & 2). This report has been prepared to provide geotechnical recommendations for the construction of the pipelines.

1.2 PROJECT DESCRIPTION

The project consists of 5 waterline segments, totaling approximately 17,300 lineal feet, that are to be replaced. Each pipeline segment ranges in length from 800 to 7,500 feet. Existing pipe diameters range from 2 to 12-inch pipe. It is anticipated the replacement pipes will consist of a variety of materials, including ductile iron, PVC and HDPE. Each pipe segment will generally be replaced with pipes larger than existing service pipes. Pipe replacement is anticipated to consist of open trench replacement.

1.3 PURPOSE AND SCOPE OF SERVICES

The purpose of CE&G's geotechnical investigation was to assess the existing surface and subsurface conditions along the planned pipeline alignments, develop geotechnical design recommendations, and prepare this geotechnical design report for the proposed installation of the new water pipelines.

The scope of work completed for this geotechnical investigation and report include: project coordination and consultation with SLVWD and S&W; geologic reconnaissance to observe current site conditions and to mark for USA (Underground Service Alert); subsurface exploration using a truck-mounted drill rig and hand excavation equipment; laboratory testing to determine selected engineering properties; development of geotechnical design recommendations; and the preparation of this report.

2.0 SITE DESCRIPTION

2.1 SITE DESCRIPTION

The five planned water line replacement segments are located in the central area of Santa Cruz County, in the vicinity of Boulder Creek, California. Each of the five pipeline segments vary in topographic settings and have differing site features, which are describe below.

Site specific topographic surveys were provided by (S&W) and is used as the primary base in the attached Site Plan (Figure 2).

2.1.1 Hillside Drive Alignment

The Hillside Drive alignment is located in a forested, residential area of Boulder Creek California (Figure 2A). Starting at, this segment of the pipeline extends from the intersection of Fern Drive and Reynolds Drive southwest along Reynolds drive and continues north along Hillside Drive to the intersection with Fern Drive. Existing vegetation along the roadway consists of large trees and shrubs. Residential properties along the road consist of single-family homes. Overall, the project area is on moderately steep hillside terrain that slopes to the east/northeast towards the San Lorenzo River. The elevation within the project area varies between approximately 617 and 673 feet above sea level (WGS84).

2.1.2 Sequoia Avenue Alignment

The Sequoia Avenue segment of the pipeline extends from the southern end of Sequoia Avenue across an east/west trending ridge to the northwestern end of Margaret Drive (Figure 2B). The area is densely vegetated with shrubs and trees with moderately steep terrain. The elevation within the project area varies between approximately 679 and 730 feet above sea level (WGS84).

2.1.3 Lyon Zone Alignment

The Lyon Zone segment of the pipeline begins at the intersection of Lomond Street and State Highway 9 in downtown Boulder Creek (Figure 2C). The alignment extends southwest along Lomond Street, then continues northwest along Pine Street to the intersection with HWY 236 (Big Basin Way), where it extends west/northwest to the intersection with South Redwood Drive. The alignment trends southwest along South Redwood Drive and continues along Madrone Drive. The southeastern portion of the segment is located in a residential and gently sloping area of downtown. The northwestern portion of the alignment is in moderately steep and densely vegetated terrain. The

elevation within the project area varies between approximately 492 and 680 feet above sea level (WGS84) but increase overall from southeast to northwest.

2.1.4 California Drive Alignment

This segment is in a residential area of unincorporated Ben Lomond, California. This pipeline segment extends along Middle Drive from the intersection of Riverside Drive and Middle Road to the intersection with California Drive, trends along California Drive to the intersection with Riverside Drive (Figure 2D). The topography in this area slopes gently down to the east towards the San Lorenzo River. Single family homes are located along both sides of the streets along this alignment. The elevation within the project area varies between approximately 374 feet and 400 feet above sea level (WGS84).

2.1.5 Quail Hollow Road Alignment

This segment is located along Quail Hollow Road between Cumora Lane and West Zayante Road in Felton, California (Figure 2E). The hillside areas along this segment are generally moderately vegetated with grass, shrub, and trees, with some areas along the segment that are more sparsely vegetated, with grassy land and scattered trees and shrubs. The elevation within the project area varies between approximately 344 feet and 655 feet above sea level (WGS84).

2.2 INFORMATION PROVIDED

Prior to beginning work, S&W provided a request for proposal (RFP) that contained a plan view of the five pipeline alignments to aid in developing a work plan and determine boring locations.

3.0 GEOLOGIC CONDITIONS

3.1 REGIONAL GEOLOGIC SETTING

The five pipeline alignments are located in the Santa Cruz Mountains, within the Coast Ranges geomorphic province of California (Fig. 1). This province is characterized by northwest-southeast trending mountain ranges such as the Santa Cruz Mountains and intervening valleys such as that occupied by San Francisco Bay. The Santa Cruz Mountains mark a mountain-range scale regional uplift centered on the San Andreas fault. The geologic setting is shown on our Regional Geologic Map (Figure 3).

The general vicinity of the pipeline alignments has been mapped several times, at different scales, and with different emphasis. Notable compilations include: Brabb and others (1997); Wentworth and others (1999); and Graymer and others (2006). The resulting geologic maps from these studies are in general agreement. For the purposes of this study, we reference the site geology using Brabb and others (1997).

The various pipeline segments are geographically separated and mapped within different geologic units. In the sections below, we review the dominant bedrock type in each segment's area.

3.1.1 Hillside Drive Alignment

The southern portion of the Hillside Drive alignment is in an area mapped as the Twobar Shale Member (Eocene) of the San Lorenzo Formation (Brabb and others, 1997). This unit is described as "very thin bedded and laminated olive-gray shale." The northern portion of the alignment is in an area mapped as the Rices Mudstone Member (Oligocene and Eocene) of the San Lorenzo Formation and is described as "olive-gray mudstone and massive medium light-gray, very fine- to fine-grained arkosic sandstone" (Brabb and others, 1997). The Twobar Shale and Rices Mudstone Members are shown as having been juxtaposed by the Butano Fault, which crosses the center of the Hillside Drive alignment (Brabb and others, 1997).

3.1.2 Sequoia Avenue Alignment

Brabb and others (1997) show the area of the Sequoia Avenue segment overlying southwesterly dipping Vaqueros Sandstone (Lower Miocene and Oligocene). This unit is described as "thick-bedded to massive yellowish-gray, very fine- to fine-grained arkosic sandstone containing interbeds of olive-gray shale and mudstone."

3.1.3 Lyon Zone Alignment

The Lyon Zone segment extends across three different geologic units as mapped by Brabb and others (1997). The northwestern portion of the alignment is in an area mapped as Lompico Sandstone (Middle Miocene in age), which is shown dipping to the southwest and is described as "thick-bedded to massive yellowish-gray, medium- to fine-grained calcareous arkosic sandstone." The center portion of the alignment is in an area mapped as Monterey Formation bedrock, which is shown in the site vicinity as dipping southwest and overlying the Lompico Sandstone. The Monterey Formation bedrock is described as "medium- to thick bedded and laminated olive-gray to light-gray semi-siliceous organic mudstone and sandy siltstone" (Brabb and others, 1997). The southeastern portion of the segment is shown in an area mapped as undifferentiated alluvial deposits (Holocene), which overlie both the Monterey Formation and Lompico Sandstone. The alluvium is described as "unconsolidated, heterogenous, moderately sorted silt and sand containing discontinuous lenses clay and silty clay, which locally includes large amounts of gravel" (Brabb and others, 1997).

The entire Lyon Zone segment is in an area mapped northeast of the Ben Lomond Fault (see Figure 3; Brabb and others, 1997).

3.1.4 California Drive Alignment

The California Drive segment is in an area mapped as Quaternary age, undifferentiated alluvial deposits (described above), concentrated along a valley floor. Monterey Formation bedrock (Middle Miocene) appears to underlie the alluvium (Brabb and others, 1997).

The northwest-trending Ben Lomond Fault is shown as crossing the southwestern portion of the California Drive segment (Brabb and others, 1997).

3.1.5 Quail Hollow Road Alignment

Mapping by Brabb and others (1997) show the Quail Hollow Road segment on the northeastern side of the Scotts Valley Syncline, in an area underlain by the Santa Margarita sandstone (Upper Miocene). This sandstone is described as "very thick-bedded to massive thickly cross bedded, yellowish-gray to white, friable, medium- to fine-grained arkosic sandstone" (Brabb and others, 1997). The southeastern part of the alignment is in an area mapped as northeasterly dipping Monterey Formation bedrock, described above.

3.2 GEOHAZARD MAPPING

3.2.1 State and Regional Geohazard Mapping

The California Geological Survey (CGS) has not established Seismic Hazard Zone maps for the quadrangles encompassing the project alignments, and/or has not evaluated the vicinity of the segments. This map series identifies zones of required investigation for liquefaction and landslides.

The United States Geological Survey (USGS) produced an Interactive Fault Map using their Quaternary Fault and Fold Database (USGS, 2006). This database includes of information on faults and associated folds throughout the U.S. that show geological evidence of coseismic surface deformation in large earthquakes during the past 1.6 million years. These faults and folds are divided into various categories based on evidence of their most recent movement and include: Historic (< 150 years); Latest Quaternary (< 15,000 years); Late Quaternary (< 130,000 years); Middle and Late Quaternary (< 750,000 years); and Undifferentiated Quaternary (< 1.6 million years). According the Fault Interactive Map, there are no Quaternary faults shown crossing the pipeline alignments for the Sequoia Avenue, Lyon Zone, California Drive, and Quail Hollow Road segments (Figure 4) (USGS, 2015). A splay of the Butano fault, labeled as undifferentiated Quaternary, is shown as crossing the Hillside Drive pipeline segment (see Figure 4; USGS, 2006)

3.2.2 Local Geohazard Mapping

Santa Cruz County produced maps showing Fault Zone Hazard Areas, which included review of the Butano, Sargent, Zayante, Corralitos, and San Andreas faults (County of Santa Cruz, Emergency Management GIS web page (http://www.co.santacruz.ca.us/Departments/ GeographicInformation Systems(GIS).aspx), accessed January 2020). According to Santa Cruz County, the Hillside Drive, Sequoia Avenue, California Drive, and Quail Hollow Road alignments are not in areas mapped as fault hazard zones. The Lyon Zone alignment is shown in an area mapped as lying within a 0.5-mile buffer of fault zones but not within a fault zone itself.

Santa Cruz County also produced maps showing Liquefaction Hazard Areas, which designate various liquefaction potential levels varying from low to very high potential (County of Santa Cruz, Emergency Management GIS web page (http://www.co.santacruz.ca.us/Departments/ GeographicInformation Systems(GIS).aspx), accessed January 2020). The pipeline alignments for Hillside Drive, Sequoia Avenue, and Quail Hollow Road are not shown in areas mapped as potentially

liquefiable. The eastern portion of the Lyon Zone segment as well as most of the California Drive segment are mapped in areas of moderate liquefaction potential.

The County of Santa Cruz produced landslide hazard maps in 2018, which uses Landslide Hazard Areas derived from various USGS open files and a 1975 Landslide Deposit Map of Santa Cruz County by Cooper-Clark and Associates. According to the Santa Cruz County (2018) Big Basin, Felton, and Castle Rock Ridge quad series, the five pipeline alignments are not mapped within landslide hazard zones. (County of Santa Cruz, Emergency Management GIS web page (http://www.co.santacruz.ca.us/Departments/ GeographicInformation Systems(GIS).aspx), accessed January 2020).

3.3 REGIONAL GROUNDWATER

The pipeline alignments, with the exception of Hillside Drive, are located in an area within the Santa Margarita groundwater basin. (County of Santa Cruz, Emergency Management GIS web page (http://www.co.santacruz.ca.us/Departments/ GeographicInformation Systems(GIS).aspx), accessed January 2020).

Groundwater within the hillslope areas encompassing the some of the pipeline alignments is likely variable, with the water table commonly sloping downhill toward the closest drainage axis. We did not identify long-term springs and seeps in the site vicinities, although expressions of these are likely present seasonally.

3.4 SEISMICITY

3.4.1 Active Faults

The five pipeline alignments are located within the greater San Francisco Bay Area, which is recognized as one of the more seismically active regions of California. The right-lateral strike-slip San Andreas fault system controls the northwest-southeast structural grain of the Coast Ranges and the Bay Area. The fault system marks the major boundary between two of earth's tectonic plates, the Pacific Plate on the west and the North American Plate on the east. The Pacific Plate is moving north relative to the North American plate at approximately 40 mm/yr in the Bay Area (WGCEP, 2003).

The transform boundary between these two plates has resulted in a broad zone of multiple, subparallel faults within the North American Plate, along which right-lateral strike-slip faulting predominates. In this broad transform boundary, the San Andreas Fault accommodates less than half of the average total relative plate motion. Much of the remainder in the greater South Bay Area is distributed across faults such as the San

Gregorio-Hosgri, Monte Vista-Shannon, Sargent, Berrocal, Hayward (southern segment), Calaveras, Zayante-Vergeles, and Greenville fault zones.

Since the pipeline alignments are in the seismically active San Francisco Bay Area, they will likely experience significant ground shaking from moderate or large (M_W >6.7) earthquakes on one or more of the nearby active faults during the design lifetime of the project. Some of the seismic sources in the San Francisco Bay area and their distances from the sites are summarized in Table 3-1.

Seismogenic (capable of generating significant earthquakes) earthquake faults near the site include the Zayante-Vergeles and the San Andreas fault.

Table 3-1. Distances to Selected Major Active Faults

Pipeline Segment	Fault Name	Approximate Distance and Direction from Site to the nearest Surface Fault Traces
Hillside Drive	Butano	0.0 km
	Zayante-Vergeles-Upper	4.5 km southwest
	San Andreas	8.6 km northeast
	Berrocal	10.9 km northeast
	San Gregorio	14.9 km southwest
	Monte Vista-Shannon	15.0 km northeast
	Sargent	18.2 km east-southeast
	Monterey Bay-Tularcitos	28.7 km south
	Hayward (southern segment)	35.2 km northeast
Sequoia Avenue	Zayante-Vergeles-Upper	1.3 km southwest
	Butano	2.7 km north-northeast
	San Andreas	10.6 km northeast
	Berrocal	13.4 km northeast
	San Gregorio	13.7 km southwest
	Sargent	16.8 km east
	Monte Vista-Shannon	17.2 km northeast
	Monterey Bay-Tularcitos	24.8 km south-southeast
	Hayward (southern segment)	36.7 km northeast
Lyon Zone	Zayante-Vergeles-Upper	0.6 km northeast
	Butano	5.0 km north
	San Andreas	11.7 km northeast
	San Gregorio	12.8 km southwest
	Berrocal	15.2 km northeast
	Sargent	15.8 km east-northeast
	Monte Vista-Shannon	18.7 km northeast
	Monterey Bay-Tularcitos	22.0 km south-southeast
	Hayward (southern segment)	37.5 km northeast

Table 3-1. Continued

Pipeline Segment	Fault Name	Approximate Distance and Direction from Site to the nearest Surface Fault Traces
California Drive	Zayante-Vergeles-Upper	2.7 km northeast
	Butano	9.0 km northwest
	San Andreas	12.2 km northeast
	Sargent	14.0 km northeast
	San Gregorio	15.1 km southwest
	Berrocal	16.2 km northeast
	Monterey Bay-Tularcitos	18.9 km south
	Monte Vista-Shannon	19.2 km northeast
	Hayward (southern segment)	37.2 km northeast
Quail Hollow Road	Zayante-Vergeles-Upper	2.8 km north
	San Andreas	11.2 km northeast
	Butano	11.4 km northwest
	Sargent	12.2 km northeast
	Berrocal	16.0 km northeast
	Monterey Bay-Tularcitos	16.5 km south-southwest
	San Gregorio	16.5 km southwest
	Monte Vista-Shannon	18.9 km northeast
	Hayward (southern segment)	35.7 km northeast

3.4.2 Liquefaction and Seismic Densification

Soil liquefaction is a phenomenon in which saturated, cohesionless soils (generally sands) lose their strength due to the build-up of excess pore water pressure during cyclic loading, such as that induced by earthquakes. Soils most susceptible to liquefaction are saturated, clean, loose, fine-grained sands and silts. The primary factors affecting soil liquefaction include: 1) intensity and duration of seismic shaking; 2) soil type and relative density; 3) overburden pressure; and 4) depth to ground water.

Based on subsurface information collected during this investigation, we judge the potential for liquefaction within the upper 10 feet at the sites to be moderate for the California Drive segment and eastern portion of the Lyon Zone segment due to the presence of shallow groundwater in loose to medium dense alluvial soils. We judge the potential for liquefaction within the upper 10 feet of the Hillside Drive, Sequoia Avenue, and Quail

Hollow Road segments, as well as the western portion of the Lyon Zone segment to be to be low.

Seismic densification is the densification of unsaturated, loose to medium dense granular soils due to strong vibration such as that resulting from earthquake shaking. We judge the potential for seismic densification at the pipeline alignments to be moderate for the encountered alluvial materials because they are loose to medium dense, granular, and generally unsaturated in the upper 10 feet. The uppermost sandy, weathered bedrock along the Quail Hollow Road alignment are unsaturated and granular but is judged too dense for seismic densification.

4.0 FIELD INVESTIGATIONS

4.1 SITE RECONNAISSANCE

CE&G performed geologic reconnaissance of the project site in advance of performing subsurface exploration. Site reconnaissance consisted of photographic documentation of the project pipeline alignments, identification and marking of the boring locations, and marking for USA.

4.2 SUBSURFACE EXPLORATIONS

4.2.1 Scope of Explorations

Subsurface exploration consisted of drilling 15 borings along the proposed pipeline alignments to assess the soil and/or bedrock conditions. Before drilling, CE&G marked and coordinated utility clearance through USA. The approximate locations of the borings are shown on Figures 2A through 2E.

Fourteen of the borings (B-1 through B-14) were drilled by Cenozoic Exploration, LLC., from November 18, 2019 to November 20, 2019 using a SIMCO 2400 truck-mounted drill rig equipped with 6-inch-diameter, solid flight augers. An additional boring (B-15) was drilled by a CE&G geologist on December 16, 2019 using a hand auger. The depths of each boring as well as the pipeline segment along which the borings were drilled are listed in Table 4.1 below. The ground surface conditions are also listed in the table.

Table 4.1

Pipeline Segment	Boring ID	Depth (feet)	Ground Surface Conditions
Lyon Zone	B-1	10	Asphalt Pavement (approx. 3'')
	B-2	10	Asphalt Pavement (approx. 4'')
	B-3	10	Asphalt Pavement (approx. 4'')
	B-5	10	Asphalt Pavement (approx. 3'')
Quail Hollow Road	B-6	9.5	Asphalt Pavement (approx. 5'')
	B-7	10	Asphalt Pavement (approx. 7'')
	B-8	10	Asphalt Pavement (approx. 5'')
	B-9	9.5	Asphalt Pavement (approx. 4'')
	B-10	10	Asphalt Pavement (approx. 4'')
Hillside Drive	B-11	10	Gravel
	B-12	10	Asphalt Pavement (approx. 3'')
California Drive	B-4	10	Asphalt Pavement (approx. 4'')
	B-13	10	Asphalt Pavement (approx. 3'')
	B-14	10	Asphalt Pavement (approx. 3'')
Sequoia Avenue	B-15	6.5	Topsoil & weeds

Upon completion of drilling, the boreholes were backfilled neat cement grout. The upper two feet of the boreholes were backfilled with concrete and troweled smooth to match the existing grade, where appropriate. Boring B-15 was backfilled with soil cuttings from the hand auger.

4.2.2 Logging and Sampling

The soil material encountered in the borings were logged in the field by a CE&G professional geologist. The soil was visually classified in the field, office, and laboratory according to the Unified Soil Classification System (USCS) in general accordance with ASTM D2487 and D2488.

During the drill operation, soil samples were obtained using the following sampling methods:

- California Modified (CM) Sampler; 3-inch outer diameter (O.D.), 2.5-inch inner diameter (I.D.) (ASTM D1586)
- Standard Penetration Test (SPT) Split-Spoon Sampler; 2-inch O.D., 1.375-inch I.D. (ASTM D1586)

The samplers were driven 18 inches, unless otherwise noted on the boring logs, with a 140-pound hammer dropped from a height of 30 inches. The number of blows required to drive the samplers through 6-inch intervals was recorded and are included on the boring logs in Appendix A. The number of blows on the boring logs is an uncorrected value and represents the field count.

Soil samples obtained for the borings were packaged and sealed in the field to reduce the potential for moisture loss and disturbance. The samples we taken to CE&G's local laboratory for storage and further analysis.

4.3 SOIL CONDITIONS ENCOUNTERED

Subsurface soil conditions encountered in our borings were generally consistent with regional geologic mapping. Following are descriptions of the soils encountered in our borings along each pipeline segment:

4.3.1 Hillside Drive Alignment

Borings B-11 and B-12 were drilled along this alignment. Subsurface materials encountered beneath the eastern portion of the alignment consists of approximately 5 feet of what was interpreted to be artificial fill composed of medium dense sandy silt. Underlying this fill is alluvial deposits consisting of medium dense, poorly graded sand. The materials encountered along the western portion of the alignment also consisted of artificial fill composed of medium dense sandy silt. This fill overlies colluvium, which is composed of very stiff to hard sandy lean clay with gravel.

4.3.2 Sequoia Avenue Alignment

Boring B-15 was drilled along this alignment. Subsurface materials encountered in a boring along the center of the proposed segment consist of loose, sandy silt topsoil over loose to medium dense sandy silt colluvium/residual soil, which extends to approximately 4 feet bgs where completely weathered silty sandstone was encountered.

4.3.3 Lyon Zone Alignment

Borings B-1, B-2, B-3 and B-5 were drilled along this alignment. Subsurface materials encountered beneath the center and eastern portions of the Lyon Zone segment primarily consist of alluvial deposits. Alluvium encountered near the eastern portion of the segment consists of medium dense, silty and clayey sand, whereas the alluvium encountered along the central portion of the alignment generally consists of loose to medium dense, well graded sand of granitic source with varying amounts of silt in gravel. Subsurface materials

encountered beneath the western end of the alignment consist of hard, gravely lean clay and sandy lean clay (colluvium), which overly extremely weak and highly weathered siltstone.

4.3.4 California Drive Alignment

Borings B-4, B-13 and B-14 were drilled along this alignment. Borings drilled along the eastern portion of this segment encountered alluvial soils generally consisting of medium dense sandy silt and silty sand. Very stiff lean clay was encountered in one of the eastern borings. The boring drilled along the western portion of the segment consists of alluvium composed of stiff, elastic silt to approximately 5 feet bgs. Beneath this elastic silt is loose to medium dense sandy silt and silty sand. Slightly weathered siltstone was encountered in the western boring at approximately 9.5 feet bgs, but it is unknown whether the retrieved siltstone is part of underlying bedrock or a boulder.

4.3.5 Quail Hollow Road Alignment

Borings B-6, B-7, B-8, B-9 and B-10 were drilled along this alignment. Subsurface materials encountered beneath the Quail Hollow Road segment primarily consists of medium dense to very dense silty sand and poorly graded sand. These sands are most likely representative of completely weathered bedrock from the underlying, weathered sandstone, which was encountered along the segment at depths ranging from 2 to greater than 10 feet bgs.

For a more detailed description of the materials encountered during this investigation, the boring logs and laboratory test results are included in Appendices A and B.

4.4 GROUNDWATER CONDITIONS ENCOUNTERED

Groundwater was only encountered in 2 of the 15 borings during this investigation. Groundwater was encountered in Boring B-1 at approximately 6 feet bgs and in Boring B-4 at approximately 5.5 feet bgs.

4.5 GEOTECHNICAL LABORATORY TESTING

Testing was performed to obtain information concerning the qualitative and quantitative physical properties of the subsurface soil from the samples recovered. Testing was performed by CE&G's testing laboratory in Hayward, California and Cooper Testing Laboratory in Palo Alto, California, in general conformance with the applicable ASTM and the California Department of Transportation (Caltrans) standards:

- Moisture Content and Dry Unit Weight (ASTM D2216)
- Particle Size Analysis (ASTM D422 and D1140)
- Atterberg Limits (ASTM D4318; dry method)
- Minimum Resistivity (Caltrans 643)
- pH (Caltrans 643)
- Sulfate Content (Caltrans 417)
- Chloride Content (Caltrans 422)

The results of the laboratory tests are summarized in Appendices A and B.

5.0 CONCLUSION AND DISCUSSION

The design for the proposed improvements is being completed by Schaaf & Wheeler. The primary geotechnical issues to be considered in the design of the planned improvements include the following:

- Excavatability of encountered materials;
- Shoring and excavation stability;
- Groundwater
- Effects of seismic loading and anticipated ground motions on design and performance; and
- Corrosion.

5.1 EXCAVATABILITY

Subsurface exploration was completed using solid flight augers and did not encounter auger refusal to the depths explored. Based on the subsurface exploration, we anticipate that an appropriately sized backhoe or excavator will be capable of excavating the soil and weathered bedrock underlying the project pipeline alignments in the areas explored. Medium to very dense sandstone that was encountered in our borings along Quail Hollow Road will likely require more effort if encountered in the pipeline trench excavations.

5.2 SHORING AND EXCAVATION STABILITY

The excavations for the pipelines are anticipated to extend to depths between approximately 4 and 6 feet below grade. The sides of the excavations are anticipated to be shored where required.

The soil conditions along the pipeline alignments within the anticipated trench depth of approximately 5 feet primarily consisted of sandy and silty soils of variable in consistency, from loose to medium dense to very dense, sand and silt mixtures, with some areas containing lean clays. Although some subsurface materials along the anticipated trench locations contain some cohesion and/or are likely to be stable in a temporary open trench, shoring will be required for excavations greater than 4 feet.

5.3 GROUNDWATER

Groundwater was only encountered in two of our exploratory borings, both of which were drilled in the valley alluvial deposits along the Lyon Zone and California Drive alignments.

Groundwater depths at these locations ranged from 5.5 to 6 feet bgs. There is a possibility that similar or shallower groundwater conditions will be encountered during construction within alluvial soils, especially during the winter and spring rainy season. If groundwater is encountered for any of the alignments, elevated groundwater may affect the design and construction of temporary shoring, the design and performance of the below ground structures as it pertains to the potential for buoyant uplift, and the means and methods to be considered for construction and future maintenance.

Although it is not anticipated, if high groundwater is encountered at the sites along some portions of the pipeline alignments, the excavation and possibly adjacent areas will need to be dewatered for construction and compaction of trench backfill materials.

5.4 SEISMIC LOADING

Geologic research has revealed that the proposed Quail Hollow Road, California Drive, Lyon Zone, and Sequoia Avenue alignments do not cross mapped active faults. These pipeline alignments are not expected to be damaged as a result of direct fault displacement. However, the planned Hillside Drive alignment crosses an active fault (Butano fault) that shows evidence of activity during the past 1.6 million years. Over the operational life of the Hillside Drive pipeline alignment, the pipelines are likely to be affected by seismic loading from a large earthquake. The most significant potential impacts from ground motions are displacements and possible rupturing of the pipelines due to soil softening or liquefaction of underlying cohesionless deposits.

5.4.1 Seismically Induced Displacements

Due to the flexible nature of HDPE and PVC pipe, other specific design components for seismic elements to mitigate displacements are judged to be unwarranted. For Ductile Iron Pipe, consideration should be given for flexible connections.

5.4.2 Liquefaction

We judge the potential for liquefaction within the upper 10 feet at the sites to be moderate for the California Drive segment and eastern portion of the Lyon Zone segment due to the presence of shallow groundwater in loose to medium dense alluvial soils. We judge the potential for liquefaction at Hillside Drive, Sequoia Avenue, and Quail Hollow Road segments, as well as the western portion of the Lyon Zone segment to be to be low due to the lack of encountered groundwater.

5.5 CORROSION

Corrosion testing was performed on two soil samples in general accordance with Caltrans methods. Testing results are presented below:

Table 5-1. Corrosion Testing Results

Boring (depth in feet)	Resistivity (Ohm-cm)	Chloride (mg/kg)	Sulfate (mg/kg)	pH
B-1 (3.5-5)	3378	5	98	8.6
B-10 (3.5-5)	47581	4	20	7.8

Caltrans Corrosion Guidelines, January 2015, identifies a site to be corrosive for structural elements if one or more of the following conditions exist:

- Chloride concentration is 500 ppm or greater;
- Sulfate concentration is 2000 ppm or greater;
- pH is 5.5 or less.

A minimum resistivity value for soil and/or water less than 1000 ohm-cm indicates the presence of high quantities of soluble salts and a higher propensity for corrosion. Based on the results of the laboratory testing performed, the soil sample tested had values for Chloride, Sulfate, pH that do not meet the Caltrans criteria for a corrosive site. The resistivity of the tested soil sample was above the 1000 ohm-cm threshold defined.

According to ACI 318 Section 4.3, Table 4.3.1:

- Sulfate concentration below 0.10 percent by weight (1,000 ppm) is negligible (no restrictions on concrete type)
- Water-soluble chloride content of less than 500 ppm is generally considered non-corrosive to concrete.

Based on the results of the laboratory testing performed, the soil sample tested had values for Sulfate and Chloride that do not meet ACI criteria and is considered non-corrosive to concrete.

Corrosion results are to be considered preliminary and are an indicator of potential soil corrosivity for the sample tested. Other soils or bedrock found onsite may be more, less, or of similar corrosive nature. Our scope of services does not include corrosion engineering; therefore, a detailed analysis of the corrosion tests is not included.

6.0 DESIGN AND CONSTRUCTION RECOMMENDATIONS

6.1 DESIGN GROUNDWATER LEVEL

For the design of the planned improvements, a design groundwater level of 5 feet below the ground surface is recommended for design and construction in the valley floor portions of the sites that lie within alluvial soils. The contractor and shoring designer should refer to our boring logs presented in Appendix A.

6.2 DEWATERING

Dewatering is generally not anticipated to be required since groundwater was only encountered in two of the borings at depths greater than the anticipated trenching depths. However, within the lower portion of excavations for the replacement waterlines and associated manholes within alluvial soils, especially if work is performed during the winter and spring months, groundwater could be encountered in the excavations. Dewatering, if needed, will be the responsibility of the contractor.

The area within the excavations should be dewatered to at least 3 feet below the bottom of the excavation or deeper as determined by the contractor to facilitate their operations. We recommend the contractor prepare and submit a dewatering plan prior to beginning work in this area. It is anticipated that the contractor will need to be prepared to provide a sump system as a minimum; the need for dewatering well points is not currently anticipated.

6.3 SHORING

The design of temporary excavation shoring should be made the responsibility of the contractor. Shoring design should be completed for the contractor by a qualified California-registered civil engineer and submitted to the Engineer for review and approval prior to construction. It is recommended that all temporary shoring be designed in conformance with the State of California, Department of Transportation, Trenching and Shoring Manual.

The soil conditions along the pipeline alignments within the anticipated trench depth of approximately 5 feet primarily consisted of sandy and silty soils of variable relative density/consistency, from loose to medium dense to very dense, sand and silt mixtures, with some areas containing lean clays. Although some subsurface materials along the anticipated trench locations contain some cohesion and/or are likely to be stable in a temporary open trench, shoring should still be required for excavations greater than 4 feet.

Shoring design should be based on OSHA Type C Soil. The impact of elevated groundwater conditions on the temporary shoring can be mitigated by implementing contractor-designed dewatering measures and designing the shoring to be water-tight and to account for the loading imposed by the groundwater in accordance with the recommendations provided herein.

Shoring should be designed to resist static (braced) earth pressures in combination with hydrostatic pressures where groundwater is encountered. Construction-induced vibrations should be minimized during shoring placement.

6.3.1 Lateral Earth Pressures

Static lateral earth pressure will be imposed on all shored excavations. Table 6-1 summarizes the lateral earth pressures recommended for use in design of unbraced temporary shoring. Active pressure should be assumed for conditions where the top of the wall is free to deflect up to ½ inch. Passive pressure should be ignored for a depth of 24 inches and may be utilized to resist overturning and sliding. Where structures will be located below groundwater, hydrostatic pressures should be added to the passive lateral earth pressure values shown in Table 6-1. As noted previously, the design of unbraced shoring will likely be controlled by deflections, as a result, calculations should also consider allowable ground deformations.

Table 6-1: Lateral Earth Pressures

Pressure Type	Above Groundwater Level (Equiv. Fluid Pressure)	Below Groundwater Level (Buoyant Equiv. Fluid Pressure + Hydrostatic)
Active	42 pcf	83 pcf
At-Rest	63 pcf	94 pcf
Passive	375 pcf	250 pcf

If the temporary shoring will be braced, a rectangular or trapezoidal loading diagram such as those recommended by Terzaghi & Peck, Tschebortarioff, and others (Caltrans Trenching and Shoring Manual and FHWA GEC No. 4) should be used. These methods generally correlate the earth pressure load to a percentage of the unit weight of the soil times the height of the excavation. The method and loading should be determined by the contractor and provided to the Engineer for review.

Surcharge loading from traffic on the adjacent pavement and construction equipment can be modeled as a minimum uniform ground pressure of 250 psf or higher as otherwise determined by the contractor's shoring design engineer.

6.3.2 Installation and Removal of Shoring

To reduce the potential for vibration induced settlements during construction, it is recommended that the contractor monitor the soils encountered during excavation and at a minimum avoid the generation of vibrations at locations where loose cohesionless soils are encountered. Settlement of adjacent improvements during the removal of shoring should not be allowed and should be monitored during removal.

6.4 PIPELINE DESIGN LOADS AND INSTALLATION

6.4.1 Pipe Loading

The pipe should be evaluated and designed for earth, surcharge, and hydrostatic loads, in conformance with Chapter 7 of the Plastic Pipe Institute's *Handbook of Polyethylene Pipe 2nd Edition* (PPI, 2007). Overburden loads should be calculated using the total unit weights of 130 pcf or buoyant unit weights of 67 pcf while the hydrostatic pressure should be determined based on the design groundwater level. In addition to the soil and hydrostatic loads, the pipe will be subjected to live load from vehicular traffic. At a minimum, the pipe design should assume H20 loading for vehicular traffic. The County Traffic Engineer should be consulted to determine if these loadings are appropriate.

6.4.2 Foundation Material

Foundation material should be installed where the excavation bottom is unstable (pumping subgrade, boiling, etc.) and where over excavation of the trench occurs as a result of an unstable or soft trench bottom.

Where required, foundation material should consist of a minimum of 12 inches of clean, durable, 1½-inch crushed rock wrapped in a 6 oz./sy non-woven geotextile. The geotextile shall be designed for separation, stabilization and permeability and constructed of polyester, nylon, and/or polypropylene formed into a stable network meeting the minimum parameters shown in Table 6-2.

Table 6-2 – Geotextile Fabric Requirements

Property	Test Value	Test Method
Weight	6 oz/yd^2	ASTM D5261
Grab tensile strength	150 lbs.	ASTM D4632
Puncture strength	80 lbs.	ASTM D4833
Permittivity	1.0 sec^{-1}	ASTM D4491
UV Resistance	70%	ASTM D4355

6.5 MANHOLES AND OTHER STRUCTURES

Design and construction of manholes within areas of high groundwater will require a means of preventing uplift of the manhole. This may be accomplished with an extended base around the perimeter of the manhole over which soil backfill is placed. Other means of preventing buoyancy uplift include using a cone or reducer section in the manhole and considering friction on the sides of the manhole. If the groundwater encountered during construction is found to be much higher than at the time of drilling, the potential for buoyant uplift should be reevaluated.

6.5.1 Bearing Capacity

It is recommended that the structures be designed as fully compensated structures. Fully compensated structures are those which do not result in a net increase in the load on the soil underlying the structure. If fully compensated design is not possible, the increase in earth pressure should be limited to less than 800 psf to limit total settlement and differential settlement. All permanent buried structures that extend below the design groundwater elevation should be designed with consideration of hydraulic uplift forces due to buoyancy effects.

6.5.2 Lateral Loads

In addition to hydrostatic pressure, the water pipeline should be designed to resist an at-rest lateral earth pressures of 63 pcf for soil above the design groundwater elevation and 94 pcf for soil below the groundwater elevation. These values are consistent with the lateral earth pressures previously described.

6.6 EARTHWORK

6.6.1 Excavation

We anticipate that an appropriately sized backhoe or excavator will be capable of excavating the soil and weathered bedrock underlying the project sites. Medium to very dense sandstone that was encountered in our borings along Quail Hollow Road will likely require more effort if encountered in the pipeline trenches. We note that narrower trenches and use of heavier excavating equipment will reduce excavation difficulty.

6.6.2 Subgrade Preparation

The bottom of the water line pipes will generally encounter moist, medium dense sandy and silty materials, although denser and more cohesive materials may be encountered at some locations. In the event the excavation bottom becomes unstable and difficult to achieve compaction of the backfill, the bottom of the excavation should be lined with a layer of geotextile such as Mirafi 500X (or equivalent) and then a minimum 12 inch thick layer of ¾-inch or 1-½-inch crushed rock. The crushed rock should be compacted with a manual vibratory compaction plate by making a minimum of three passes until a firm non-yielding surface is achieved.

6.6.3 Bedding and Shading

The utility pipes should be bedded in accordance with the requirements of the SLVWD. The bedding and shading material shall be a minimum 6 inches below and over the pipes and should consist of uniformly-graded sand or other material approved by the Engineer. This sand backfill shall be compacted to a minimum of 95 percent relative compaction in lifts not exceeding 8 inches in uncompacted thickness. All imported bedding and shading material should be sampled, tested and approved by the engineer prior to being transported to site.

6.6.4 Utility Trench Backfill

Following placement and compaction of sand over the pipes, Santa Cruz County design requirements indicate the remainder of the trench under County roads be backfilled with "2-Sack cement/sand slurry", also known as controlled density fill (CDF), controlled low strength material – CLSM, or flowable fill, which is comprised of cementitious material, sand, and water, and has a compressive strength between 100 and 200 psi.

Due to the low percentage of fine-grained material anticipated in excavations, the on-site sandy soil is anticipated to be suitable for use as structure backfill under Caltrans roadways

and under non-pavement areas. Imported granular backfill materials, such as aggregate base or quarry fines, may be used. Structure backfill shall be compacted to at least 95 percent relative compaction; 90 percent relative compaction under non-pavement areas. Backfill material should be placed in lifts not exceeding 8 inches in uncompacted thickness. Thinner lifts may be necessary to achieve the recommended level of compaction of the backfill due to equipment limitations. Compaction should be performed by mechanical means only. Water jetting to attain compaction shall not be permitted.

6.6.5 Import Fill

Import fill is anticipated for bedding and shading of the new pipelines as well as for pavement subgrade. All imported fill must be reviewed and approved by the geotechnical engineer prior to importation to the site. A minimum of five days will be required to evaluate and test the suitability of all planned imported materials. All imported materials should conform to the appropriate provisions of the 2018 Caltrans Standard Specifications.

The imported materials should be non-expansive and have a Plasticity Index less than 15 percent and a Liquid Limit of 30 percent or less. The imported material shall be free of organic debris or contaminated materials.

6.7 PAVEMENT REPLACEMENT

As a minimum, replacement of structural pavement sections above trenches is anticipated to be replaced in-kind, that is, with the same thickness as the existing pavement. the pavement section should meet the requirements of the County or Caltrans, as appropriate.

Pavement sections shall be placed on soil surfaces that have been prepared as outlined in the Earthwork section of this report. The full section of aggregate base as well as the upper 12 inches of subgrade soils should be compacted to a minimum of 95 percent relative compaction (ASTM D1557, latest edition).

Asphalt concrete should meet the requirements for 1/2- or 3/4-inch maximum, medium Type A Hot Mix Asphalt (asphalt concrete), Section 39, Caltrans Standard Specifications, latest edition. The Class 2 aggregate base material should conform to Section 26 of the Caltrans Standard Specifications.

6.8 TECHNICAL REVIEW AND CONSTRUCTION OBSERVATION

Prior to construction the geotechnical engineer should review the project plans for conformance with the intent of the recommendations presented in this report. The

geotechnical engineer should be contacted a minimum of 48 hours in advance of earthwork and excavation operations to observe the subsurface conditions.

7.0 LIMITATIONS

The conclusions and recommendations presented in this report are based on the information provided regarding the planned construction, and the results of the geologic mapping, subsurface exploration, and testing, combined with interpolation of the subsurface conditions between boring locations. Site conditions described in the text of this report are those existing at the time of our last field reconnaissance and are not necessarily representative of the site conditions at other times or locations. This information notwithstanding, the nature and extent of subsurface variations between borings may not become evident until construction. If variations are encountered during construction, Cal Engineering & Geology, Inc. should be notified promptly so that conditions can be reviewed and recommendations reconsidered, as appropriate.

It is the owner's responsibility to ensure that recommendations contained in this report are carried out during the construction phases of the project. This report was prepared based on preliminary design information provided which is subject to change during the design process. At approximately the 90 percent design level, Cal Engineering & Geology, Inc. should review the design assumptions made in this report and prepare addenda or memoranda as appropriate. Any modifications included in these addenda or memoranda should be carefully reviewed by the project designers to make sure that any conclusions or recommendations that are modified are accounted for in the final design of the project.

The findings of this report should be considered valid for a period of three years unless the conditions of the site change. After a period of three years, CE&G should be contacted to review the site conditions and prepare a letter regarding the applicability of this report.

This report presents the results of a geotechnical and geologic investigation only and should not be construed as an environmental audit or study. The evaluation or identification of the potential presence of hazardous materials at the site was not requested and was beyond the scope of this investigation and report.

The conclusions and recommendations contained in this report are valid only for the project described in this report. We have employed accepted geotechnical engineering procedures, and our professional opinions and conclusions are made in accordance with generally accepted geotechnical engineering principles and practices. This standard is in lieu of all other warranties, either expressed or implied.

8.0 REFERENCES

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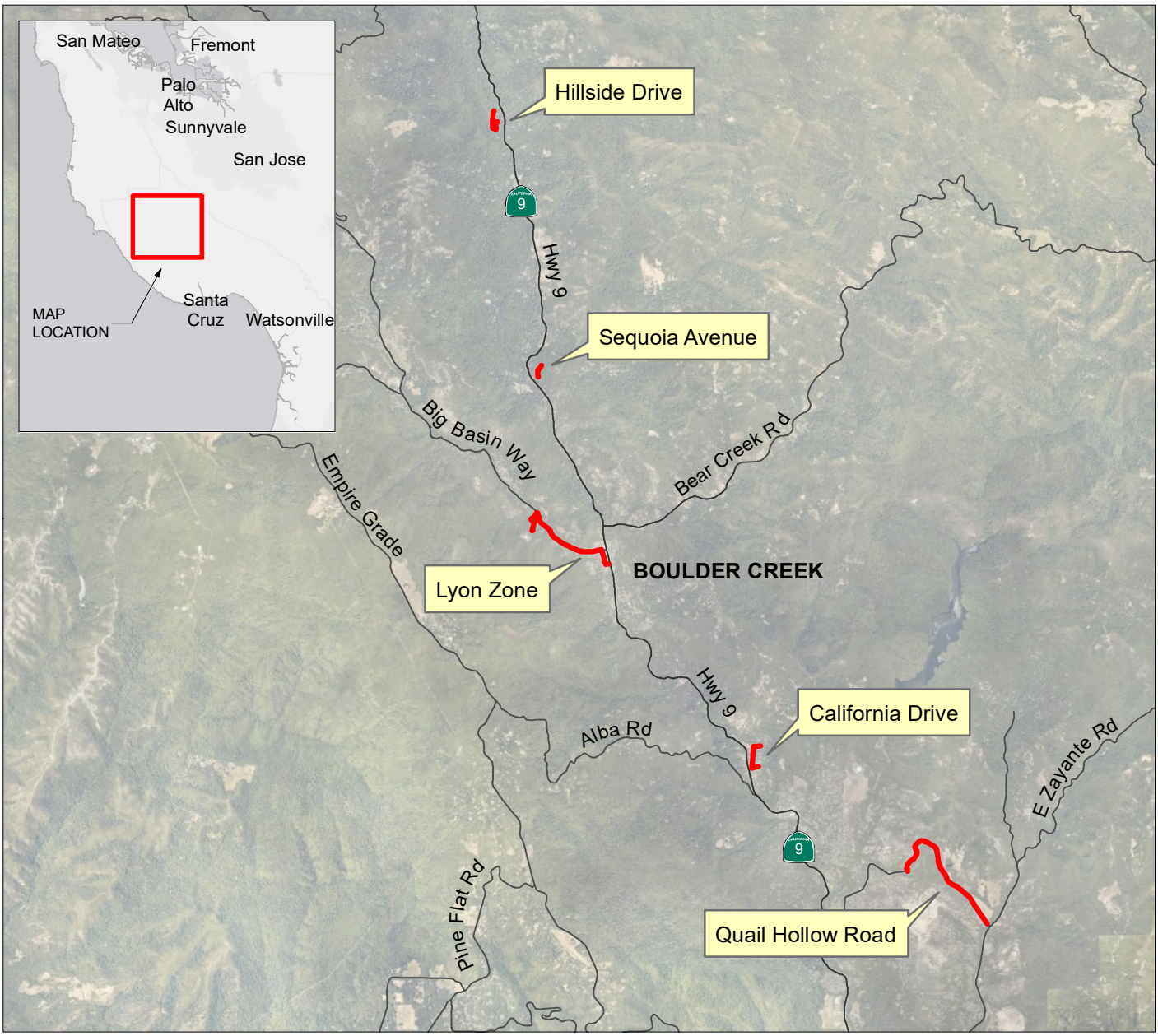
Figures



BASEMAP REFERENCE

1. ORTHOIMAGERY FROM SANTA CRUZ COUNTY, 2016.
2. STREET CENTERLINES FROM CALTRANS CALIFORNIA ROAD SYSTEM, DOWNLOADED ON 15 MAY 2016.

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SLVWD 2019 PIPELINE PROJECT
SAN LORENZO VALLEY
BOULDER CREEK, CALIFORNIA

SITE LOCATION MAP

191110	JANUARY 2020	FIGURE 1

M:\2019\191110-SchaafWheeler-SanLorenzoWDPipeline\GIS\ArcGIS\Fig1-Site-Location.mxd ; 1/24/2020; jhausen

BASEMAP REFERENCE

1. 5-FEET CONTOURS DERIVED FROM 2010 LIDAR DATA.
2. ORTHOIMAGERY FROM SANTA CRUZ COUNTY, 2016
3. PIPE ALIGNMENT LOCATIONS ARE APPRIOXIMATE.
4. PARCEL DATA FROM SANTA CRUZ GIS DATABASE, ACCESSED ONLINE ON 08/03/2018.

LEGEND

B-10 BORING LOCATIONS BY CE&G, DRILLED ON 18-20 NOV AND 16 DEC 2019

0 100 200 400 FEET

CE&G
CAL ENGINEERING & GEOLOGY
6455 Almaden Expwy.
Suite 100
San Jose, CA 95120
Phone: (408) 440-4542

SLVWD 2019 PIPELINE PROJECT
SAN LORENZO VALLEY WATER DISTRICT
SANTA CRUZ COUNTY, CALIFORNIA

HILLSIDE DRIVE

191110	JANUARY 2020	FIGURE 2A

BASEMAP REFERENCE

1. 5-FEET CONTOURS DERIVED FROM 2010 LIDAR DATA.
2. ORTHOIMAGERY FROM SANTA CRUZ COUNTY, 2016
3. PIPE ALIGNMENT LOCATIONS ARE APPRIOXIMATE.
4. PARCEL DATA FROM SANTA CRUZ GIS DATABASE, ACCESSED ONLINE ON 08/03/2018.

LEGEND

B-10 BORING LOCATIONS BY CE&G, DRILLED ON 18-20 NOV AND 16 DEC 2019

N

0 100 200 400 FEET

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SANTA CRUZ COUNTY, CALIFORNIA

SEQUOIA AVE

191110	JANUARY 2020	FIGURE 2B

M:\2019\191110-SchaafWheeler-SanLorenzoWDPipeline\GIS\ArcGIS\Fig2D-SitePlan-Sequoia-Ave.mxd; 1/28/2020; jhausen

BASEMAP REFERENCE

1. 5-FEET CONTOURS DERIVED FROM 2010 LIDAR DATA.
2. ORTHOIMAGERY FROM SANTA CRUZ COUNTY, 2016
3. PIPE ALIGNMENT LOCATIONS ARE APPRIOXIMATE.
4. PARCEL DATA FROM SANTA CRUZ GIS DATABASE, ACCESSED ONLINE ON 08/03/2018.

LEGEND

B-10 BORING LOCATIONS BY CE&G, DRILLED ON 18-20 NOV AND 16 DEC 2019

N

0 200 400 800
FEET

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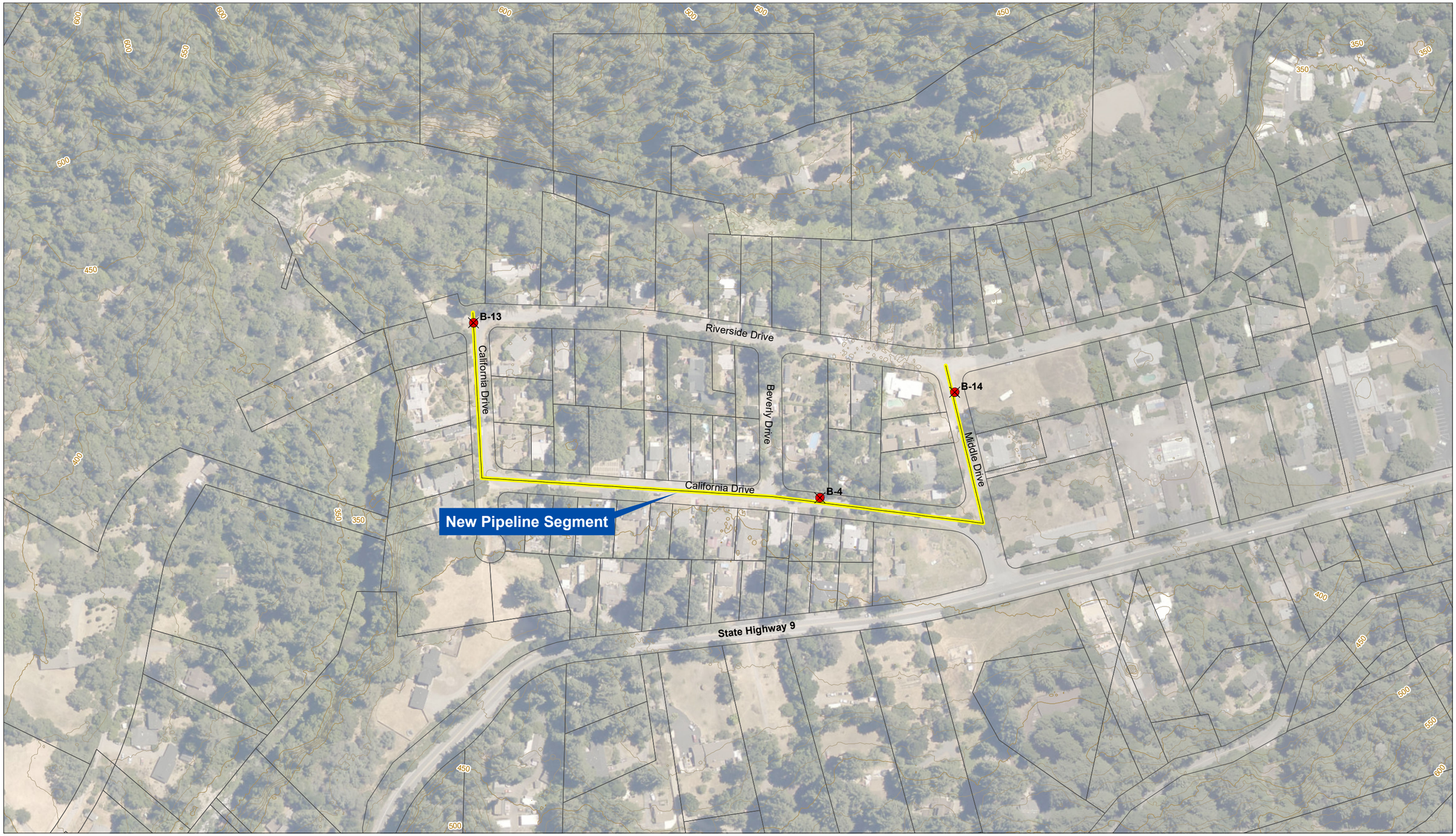
SAN LORENZO VALLEY WATER DISTRICT
SANTA CRUZ COUNTY, CALIFORNIA

LYON ZONE

191110	JANUARY 2020	FIGURE 2C

M:\2019\191110-SchaafWheeler-SanLorenzoWDPipeline\GIS\ArcGIS\Fig2C-SitePlans-Lyon-Zone.mxd: 1/28/2020; jhausen



BASEMAP REFERENCE

1. 5-FEET CONTOURS DERIVED FROM 2010 LIDAR DATA.
2. ORTHOIMAGERY FROM SANTA CRUZ COUNTY, 2016
3. PIPE ALIGNMENT LOCATIONS ARE APPRIOXIMATE.
4. PARCEL DATA FROM SANTA CRUZ GIS DATABASE, ACCESSED ONLINE ON 08/03/2018.

LEGEND

B-10 BORING LOCATIONS BY CE&G, DRILLED ON 18-20 NOV AND 16 DEC 2019

N

0 100 200 400
FEET

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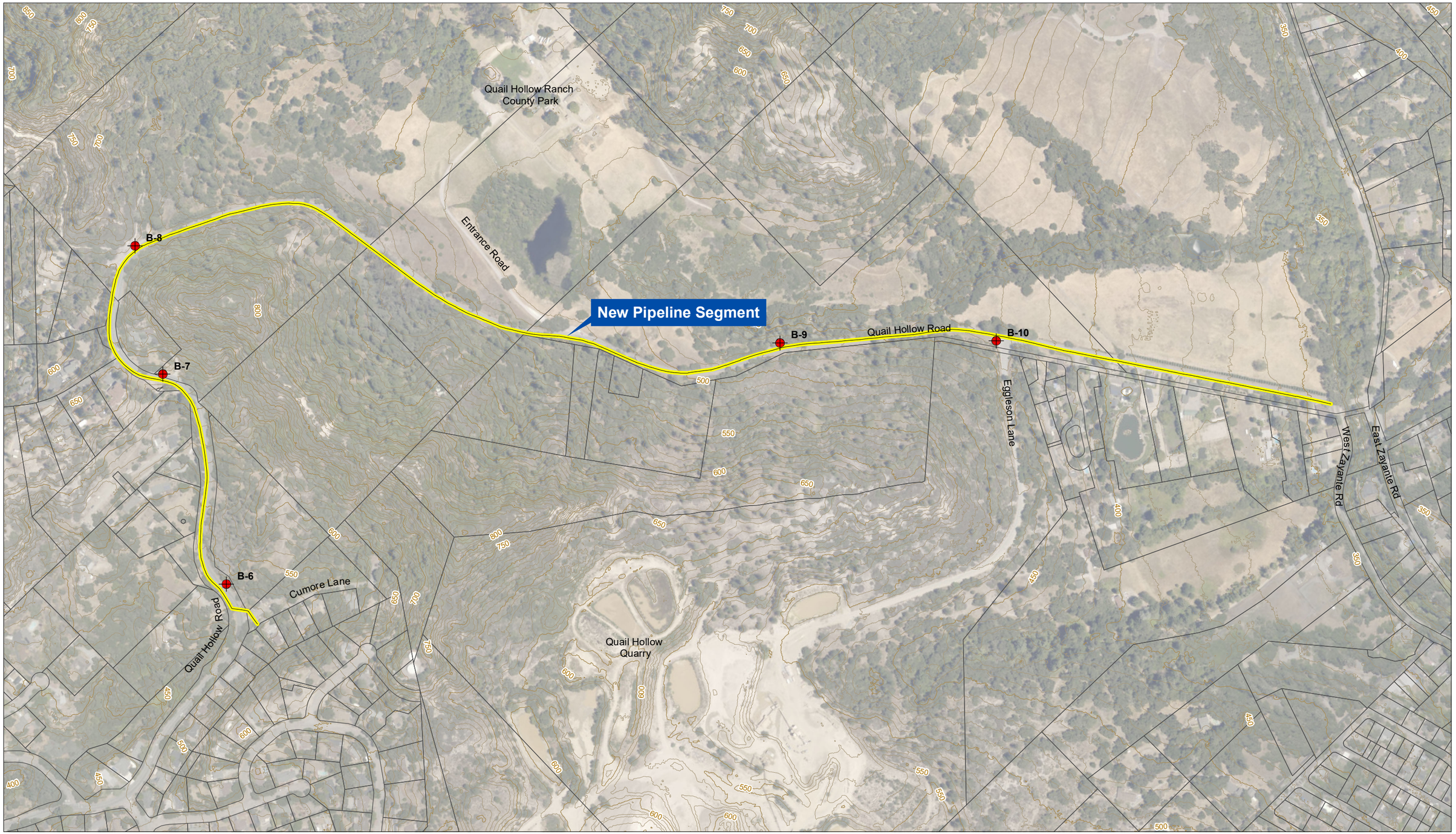
SLVWD 2019 PIPELINE PROJECT
SAN LORENZO VALLEY WATER DISTRICT
SANTA CRUZ COUNTY, CALIFORNIA

CALIFORNIA AVE

191110	JANUARY 2020	FIGURE 2D

M:\2019\191110-Schaaf\Wheeler-SanLorenzoWDPipeline\GIS\ArcGIS\Fig2D-SitePlan-California-Drive.mxd; 1/28/2020; jhausen



BASEMAP REFERENCE

1. 5-FEET CONTOURS DERIVED FROM 2010 LIDAR DATA.
2. ORTHOIMAGERY FROM SANTA CRUZ COUNTY, 2016
3. PIPE ALIGNMENT LOCATIONS ARE APPRIOXIMATE.
4. PARCEL DATA FROM SANTA CRUZ GIS DATABASE, ACCESSED ONLINE ON 08/03/2018.

LEGEND

B-10 BORING LOCATIONS BY CE&G, DRILLED ON 18-20 NOV AND 16 DEC 2019

0 200 400 800
FEET

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SAN LORENZO VALLEY WATER DISTRICT
SANTA CRUZ COUNTY, CALIFORNIA

QUAIL HOLLOW ROAD

191110	JANUARY 2020	FIGURE 2E

M:\2019\191110-SchaafWheeler-SanLorenzoWDPipeline\GIS\ArcGIS\Fig2E-SitePlans-Quail-Hollow.mxd; 1/28/2020; jhausen

MAP UNIT DESCRIPTION

Qcu	COASTAL TERRACE DEPOSITS, UNDIFFERENTIATED (PLEISTOCENE)
Qal	ALLUVIAL DEPOSITS, UNDIFFERENTIATED (HOLOCENE)
Tp	PURISIMA FORMATION (PLIOCENE AND UPPER MIOCENE)
Tsc	SANTA CRUZ MUDSTONE (UPPER MIOCENE)
Tsm	SANTA MARGARITA SANDSTONE (UPPER MIOCENE)
Tm	MONTEREY FORMATION (MIDDLE MIOCENE)
Tlo	LOMPICO SANDSTONE (MIDDLE MIOCENE)
Tvq	VAQUEROS SANDSTONE (LOWER MIOCENE AND OLIGOCENE)
Tz	ZAYANTE SANDSTONE (OLIGOCENE)
Tsl	SAN LORENZO FORMATION, UNDIVIDED (OLIGOCENE AND EOCENE)
Tsr	RICES MUDSTONE MEMBER (OLIGOCENE AND EOCENE)
Tst	TWOBAR SHALE MEMBER (EOCENE)
Tbu	BUTANO SANDSTONE (EOCENE) UPPER SANDSTONE MEMBER
Tbm	MIDDLE SILTSTONE MEMBER
Tl	LOCATELLI FORMATION
Tlss	SANDSTONE
qd	QUARTZ DIORITE (CRETACEOUS)
gd	GNEISSIC GRANODIORITE (CRETACEOUS)
hcg	HORNBLENDE-CUMMINGTONITE GABBRO (CRETACEOUS)
sch	METASEDIMENTARY ROCKS (MESOZOIC OR PALEOZOIC)
m	MARBLE (MESOZOIC OR PALEOZOIC)

CONTACT

FAULT

ANTICLINE

SYNCLINE

80 STRIKE AND DIP OF BEDS INCLINED

50 APPROXIMATE DIP OF BEDS

VERTICAL

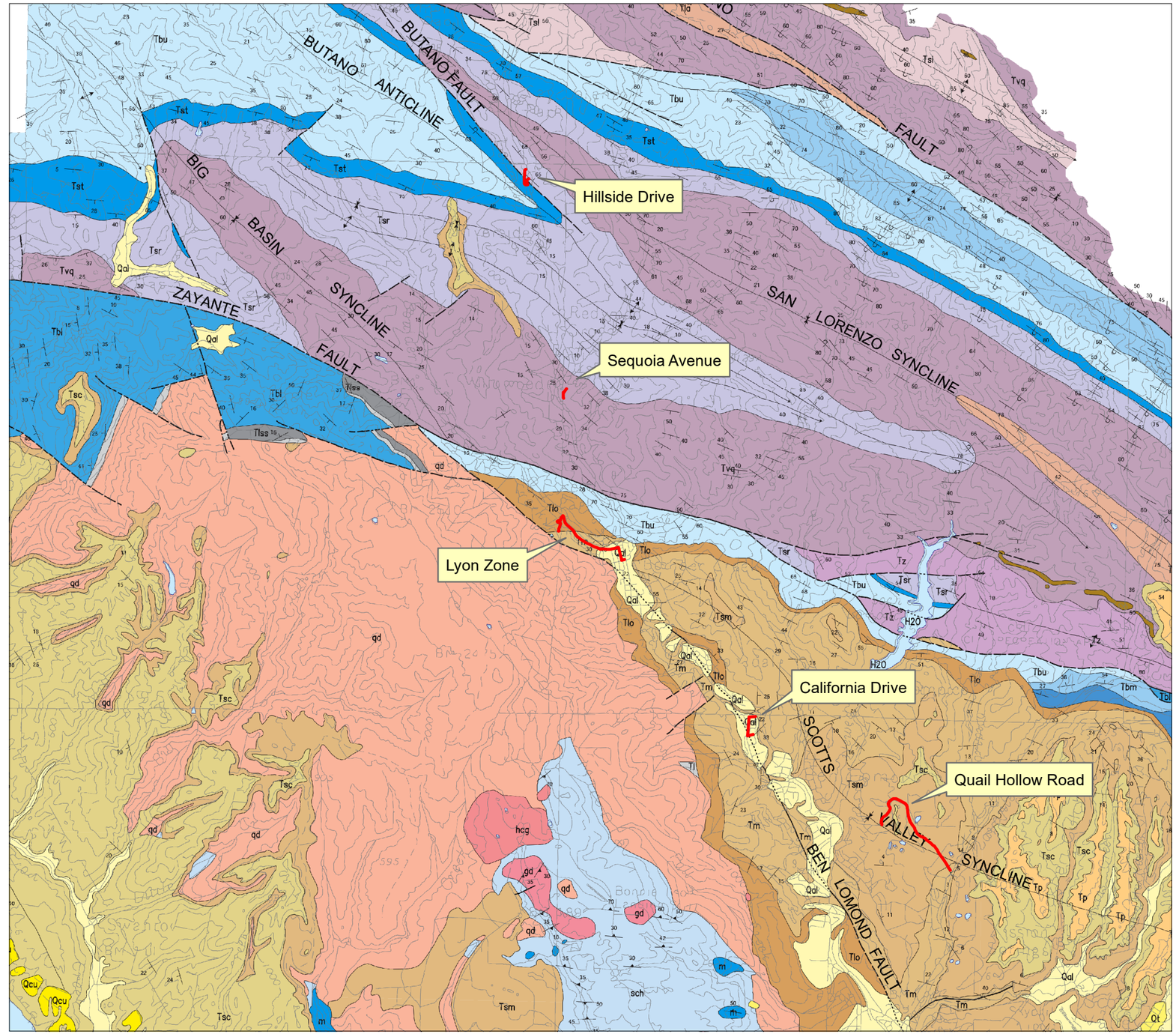
HORIZONTAL

60 OVERTURNED

20 STRIKE AND DIP OF FOLIATION

BASEMAP REFERENCE

1. REGIONAL GEOLOGY FROM BRABB ET AL. 1997.



0 0.625 1.25 2.5 MILES

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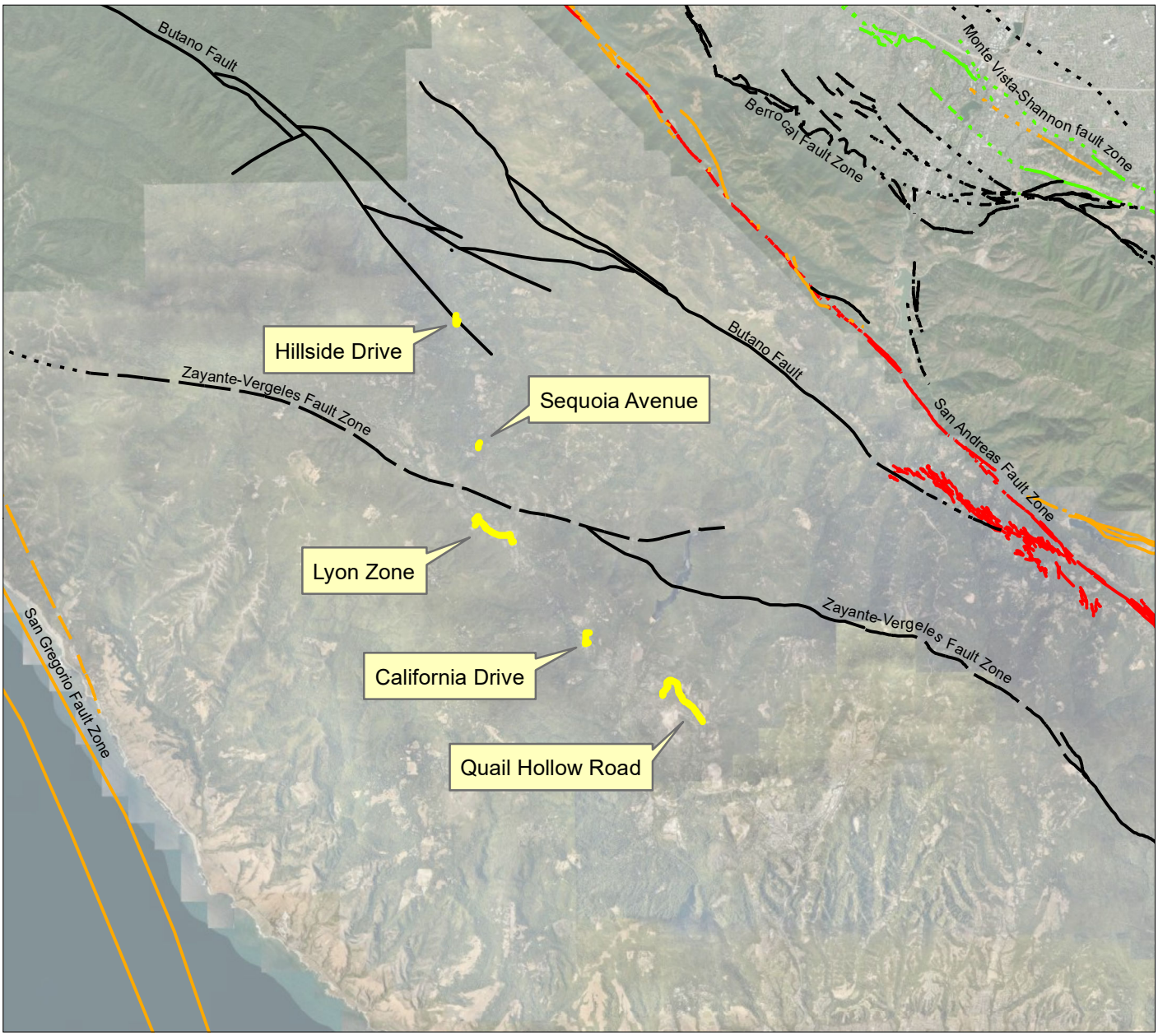
SLVWD 2019 PIPELINE PROJECT
SAN LORENZO VALLEY
BOULDER CREEK, CALIFORNIA

REGIONAL GEOLOGY MAP

191110	JANUARY 2020	FIGURE 3

M:\2019\191110-Schaaf\Wheeler-SanLorenzoWDPipeline\GIS\ArcGIS\Fig3-Regional-Geology-Large.mxd: 1/24/2020: jhausen



BASEMAP REFERENCE

1. BASEMAP FROM SANTA CRUZ COUNTY, 2016.
2. FAULT LOCATIONS FROM US GEOLOGICAL SURVEY QUATERNARY FAULT AND FOLDS DATABASE, ACCESSED ONLINE ON 12 DECEMBER 2017.

N

0 1.5 3 6
MILES

MAP UNIT DESCRIPTION

- Historical (<150 years), Well Constrained Location
- Historical (<150 years), Moderately Constrained Location
- Historical (<150 years), Inferred Location
- Latest Quaternary (<15,000 years), Well Constrained Location
- Latest Quaternary (<15,000 years), Moderately Constrained Location
- Latest Quaternary (<15,000 years), Inferred Location
- Late Quaternary (<130,000 years), Well Constrained Location
- Late Quaternary (<130,000 years), Moderately Constrained Location
- Late Quaternary (<130,000 years), Inferred Location
- Undifferentiated Quaternary (<1.6 million years), Well Constrained Location
- Undifferentiated Quaternary (<1.6 million years), Moderately Constrained Location
- Undifferentiated Quaternary (<1.6 million years), Inferred Location

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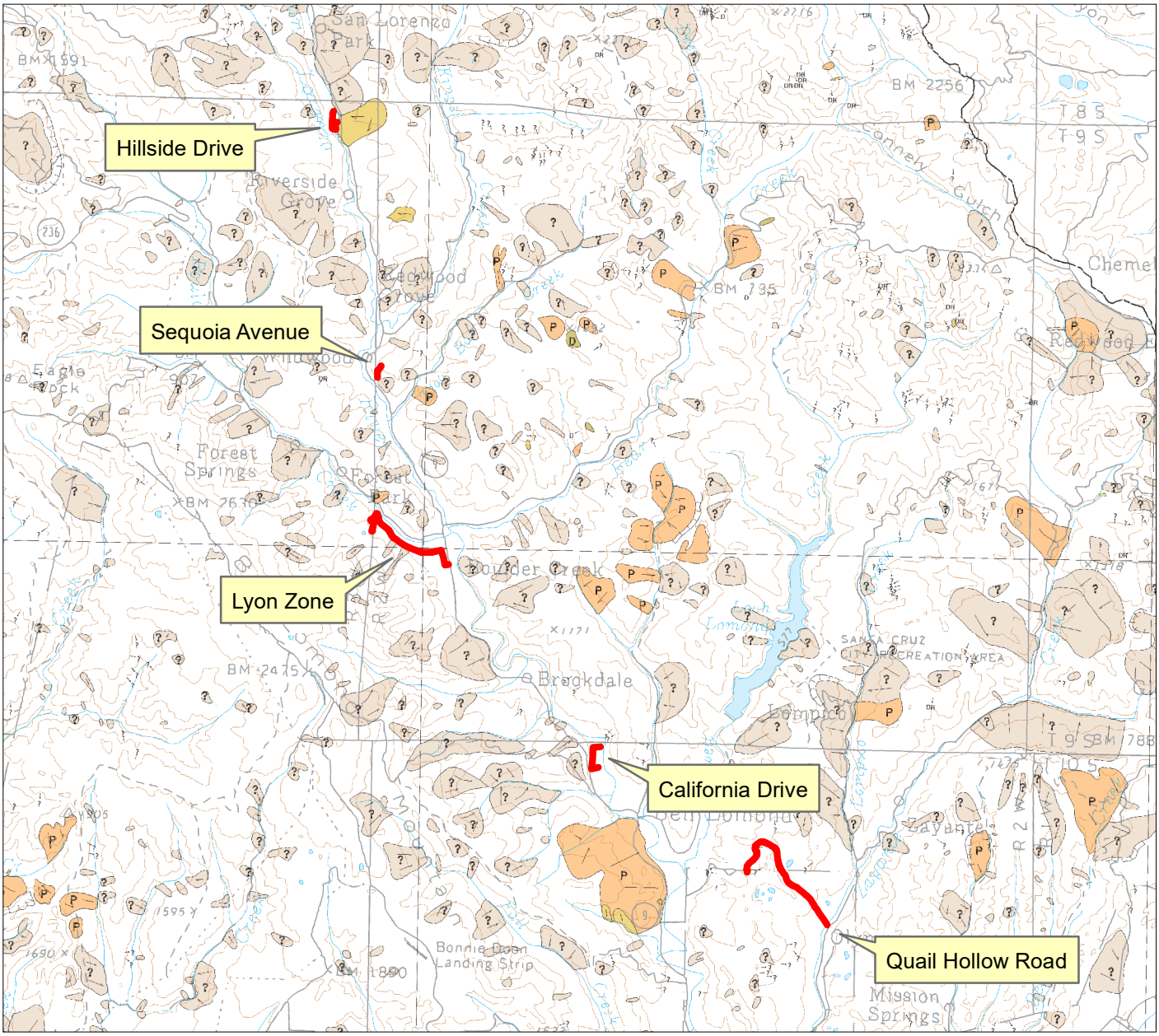
SLVWD 2019 PIPELINE PROJECT
SAN LORENZO VALLEY
BOULDER CREEK, CALIFORNIA

FAULT ACTIVITY MAP

191110	JANUARY 2020	FIGURE 4



BASEMAP REFERENCE

1. BASEMAP FROM SANTA CRUZ COUNTY, 2016.
2. LANDSLIDE DATA FROM COOPER-CLARK ET AL. 1975.

0 0.625 1.25 2.5
MILES

N

MAP UNIT DESCRIPTION

P — LARGE LANDSLIDE DEPOSIT

SMALL LANDSLIDE DEPOSIT AND GULLY

D	DEFINITE LANDSLIDE DEPOSIT
DR	DEFINTE RAPID LANDSLIDE DEPOSIT
P	PROBABLE LANDSLIDE DEPOSIT
?	QUESTIONABLE LANDSLIDE DEPOSIT
	UNATTRIBUTED LANDSLIDE DEPOSIT

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SLVWD 2019 PIPELINE PROJECT
SAN LORENZO VALLEY
BOULDER CREEK, CALIFORNIA

LANDSLIDE ACTIVITY MAP

191110	JANUARY 2020	FIGURE 5

M:\2019\191110-SchaafWheeler-SanLorenzoWDPipeline\GIS\ArcGIS\Fig5-Landslide-Activity.mxd; 1/24/2020; jhausen

Appendix A. Boring Logs

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KEY TO SYMBOLS

CLIENT Schaaf & Wheeler
PROJECT NAME San Lorenzo Valley Water District 2019 Pipeline Project
PROJECT NUMBER 191110
PROJECT LOCATION Santa Cruz County, CA

LITHOLOGIC SYMBOLS
(Unified Soil Classification System)

- ASPHALT: Asphalt
- CH: USCS High Plasticity Clay
- CL: USCS Low Plasticity Clay
- FILL: Fill (made ground)
- MH: USCS Elastic Silt
- ML: USCS Silt
- SANDSTONE: Sandstone
- SC: USCS Clayey Sand
- SILTSTONE: Siltstone
- SM: USCS Silty Sand
- SP: USCS Poorly-graded Sand
- SP-SM: USCS Poorly-graded Sand with Silt
- SW: USCS Well-graded Sand
- SW-SM: USCS Well-graded Sand with Silt

SAMPLER SYMBOLS

- California Modified Sampler
- Standard Penetration Test

WELL CONSTRUCTION SYMBOLS

ABBREVIATIONS

LL - LIQUID LIMIT (%)
PI - PLASTIC INDEX (%)
W - MOISTURE CONTENT (%)
DD - DRY DENSITY (PCF)
NP - NON PLASTIC
-200 - PERCENT PASSING NO. 200 SIEVE
PP - POCKET PENETROMETER (TSF)

TV - TORVANE
PID - PHOTOIONIZATION DETECTOR
UC - UNCONFINED COMPRESSION
ppm - PARTS PER MILLION

- Water Level at Time Drilling, or as Shown
- Water Level at End of Drilling, or as Shown
- Water Level After 24 Hours, or as Shown

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BORING NUMBER B-01

CLIENT Schaaf & Wheeler
PROJECT NAME San Lorenzo Valley Water District 2019 Pipeline Project
PROJECT NUMBER 191110
PROJECT LOCATION Santa Cruz County, CA
DATE STARTED 11/20/2019 **COMPLETED** 11/20/2019
GROUND ELEVATION 496 ft **DATUM** WGS84 **HOLE SIZE** 6" in.
DRILLING CONTRACTOR Cenozoic Exploration, LLC.
COORDINATES: **LATITUDE** 37.1242 **LONGITUDE** -122.12272
DRILLING RIG/METHOD Simco 2400/ 6-in. Solid Flight Auger
GROUNDWATER AT TIME OF DRILLING 6.0 ft / Elev 490.0 ft
LOGGED BY K. Loeb **CHECKED BY** D. Peluso
GROUNDWATER AT END OF DRILLING --- Not Measured
HAMMER TYPE 140 lb hammer with 30 in. cathead
GROUNDWATER AFTER DRILLING 8.0 ft / Elev 488.0 ft

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (FIELD VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT (%)	ATTERBERG LIMITS: PLASTIC LIMIT (%)	ATTERBERG LIMITS: PLASTICITY INDEX (%)	FINES CONTENT (%)
0.0		Asphalt Pavement (approximately 3")									
		Aggregate Base (approximately 6")									
		Silty SAND w/ Gravel (SM): dark yellowish brown, moist, dense, fine to coarse sand, angular granitic gravel up to 1.5" [Fill]									
		SIlty SAND (SM): black, moist, medium dense, fine sand [Alluvium]	CM	10-8-5		114	13				
2.5											
		Clayey SAND (SC): dark gray mottled with dark yellowish brown, moist, medium dense, fine sand, medium plasticity fines (Corrosivity test at 3.5-5 feet)	SPT	3-4-10	3.25 3.25			38	17	21	
5.0		becomes very dark gray, fine to medium sand, trace angular gravel									
		decrease in fines, fine to coarse sand, trace subrounded gravel	CM	11-12-14		127	14				
7.5		becomes wet poorly graded sand lens									
		becomes moist to wet	SPT	7-9-11							
10.0											

Bottom of borehole at 10.0 ft. Borehole backfilled with cuttings.

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BORING NUMBER B-02

CLIENT Schaaf & Wheeler
PROJECT NAME San Lorenzo Valley Water District 2019 Pipeline Project
PROJECT NUMBER 191110
PROJECT LOCATION Santa Cruz County, CA
DATE STARTED 11/20/2019 **COMPLETED** 11/20/2019
GROUND ELEVATION 527 ft **DATUM** WGS84 **HOLE SIZE** 6" in.
DRILLING CONTRACTOR Cenozoic Exploration, LLC.
COORDINATES: **LATITUDE** 37.12499 **LONGITUDE** -122.12744
DRILLING RIG/METHOD Simco 2400/ 6-in. Solid Flight Auger
GROUNDWATER AT TIME OF DRILLING --- Not Encountered
LOGGED BY K. Loeb **CHECKED BY** D. Peluso
GROUNDWATER AT END OF DRILLING --- N/A
HAMMER TYPE 140 lb hammer with 30 in. cathead
GROUNDWATER AFTER DRILLING --- N/A

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (FIELD VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT (%)	ATTERBERG LIMITS: PLASTIC LIMIT (%)	ATTERBERG LIMITS: PLASTICITY INDEX (%)	FINES CONTENT (%)
0.0		Asphalt Pavement (approximately 4")									
		Aggregate Base (approximately 6")									
		Well Graded SAND w/ Silt and Gravel (SW-SM):: dark yellowish brown, dry, dense, angular granitic gravel up to 2.5 in., fine to coarse sand [Alluvium]	CM	23-28-29			4				6
2.5		Well Graded SAND with Silt (SW): dark yellowish brown, dense, fine to coarse sand, some angular granitic gravel [Alluvium]									
			SPT	13-12-21							
5.0											
			CM	10-13-19			4				
7.5		little fine gravel									
		becomes medium dense, increase in fine sand	SPT	15-15-13							
10.0											

Bottom of borehole at 10.0 ft. Borehole backfilled with cuttings.

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BORING NUMBER B-03

CLIENT Schaaf & Wheeler
PROJECT NAME San Lorenzo Valley Water District 2019 Pipeline Project
PROJECT NUMBER 191110
PROJECT LOCATION Santa Cruz County, CA
DATE STARTED 11/20/2019 **COMPLETED** 11/20/2019
GROUND ELEVATION 551 ft **DATUM** WGS84 **HOLE SIZE** 6" in.
DRILLING CONTRACTOR Cenozoic Exploration, LLC.
COORDINATES: **LATITUDE** 37.12738 **LONGITUDE** -122.13196
DRILLING RIG/METHOD Simco 2400/ 6-in. Solid Flight Auger
GROUNDWATER AT TIME OF DRILLING --- Not Encountered
LOGGED BY K. Loeb **CHECKED BY** D. Peluso
GROUNDWATER AT END OF DRILLING --- N/A
HAMMER TYPE 140 lb hammer with 30 in. cathead
GROUNDWATER AFTER DRILLING --- N/A

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (FIELD VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT (%)	ATTERBERG LIMITS: PLASTIC LIMIT (%)	ATTERBERG LIMITS: PLASTICITY INDEX (%)	FINES CONTENT (%)
0.0		Asphalt Pavement (approximately 4")									
		Aggregate Base (approximately 6")									
		Well Graded SAND with Silt and Gravel (SW-SM): dark yellowish brown, dry, medium dense, fine to coarse sand, strong granitic clasts in borehole over 5"	CM	7-7-9			3				
2.5		Well Graded SAND (SW): dark yellowish brown, dry, medium dense, little angular granitic gravel up to 1 in.									
			SPT	5-6-5							4
5.0											
		becomes little angular/subangular granitic gravel up to 1.5", mostly fine to medium sand	CM	6-14-12			4				
7.5											
			SPT	8-5-3							
10.0											

Bottom of borehole at 10.0 ft. Borehole backfilled with cuttings.

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BORING NUMBER B-04

CLIENT Schaaf & Wheeler
PROJECT NAME San Lorenzo Valley Water District 2019 Pipeline Project
PROJECT NUMBER 191110
PROJECT LOCATION Santa Cruz County, CA
DATE STARTED 11/18/2019 **COMPLETED** 11/18/2019
GROUND ELEVATION 395 ft **DATUM** WGS84 **HOLE SIZE** 6" in.
DRILLING CONTRACTOR Cenozoic Exploration, LLC.
COORDINATES: **LATITUDE** 37.09646 **LONGITUDE** -122.09654
DRILLING RIG/METHOD Simco 2400/ 6-in. Solid Flight Auger
GROUNDWATER AT TIME OF DRILLING 5.5 ft / Elev 389.5 ft
LOGGED BY K. Loeb **CHECKED BY** D. Peluso
GROUNDWATER AT END OF DRILLING ---
HAMMER TYPE 140 lb hammer with 30 in. cathead
GROUNDWATER AFTER DRILLING 4.7 ft / Elev 390.3 ft

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (FIELD VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT (%)	ATTERBERG LIMITS: PLASTIC LIMIT (%)	ATTERBERG LIMITS: PLASTICITY INDEX (%)	FINES CONTENT (%)
0.0		Asphalt Pavement (approximately 4")									
		Aggregate Base (approximately 6")									
		Elastic SILT w/ Sand (MH): brown, moist,stiff, high plasticity, little subangular gravel up to 2" [Alluvium]	CM	5-6-7	1.5	77	38	54	37	17	74
2.5											
		becomes dark gray	SPT	2-3-4	1.5 1.5						
5.0		Sandy Elastic SILT (MH): dark gray, moist, stiff, high plasticity, fine sand									
		Clayey SAND (SC): olive gray mottled with oxidized, wet, loose, fine to medium sand									
		Sandy SILT (ML): olive, moist, medium dense, very fine sand	CM	3-5-7		102	27				
7.5											
		Silty SAND (SM): olive, wet, dense, fine to coarse granitic sand	SPT	6-20-40							
10.0		SILTSTONE (BEDROCK or BOULDER?): dark gray, dry, very weak, slightly weathered									

Bottom of borehole at 10.0 ft. Borehole backfilled with cuttings.

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BORING NUMBER B-05

CLIENT Schaaf & Wheeler
PROJECT NAME San Lorenzo Valley Water District 2019 Pipeline Project
PROJECT NUMBER 191110
PROJECT LOCATION Santa Cruz County, CA
DATE STARTED 11/20/2019 **COMPLETED** 11/20/2019
GROUND ELEVATION 685 ft **DATUM** WGS84 **HOLE SIZE** 6" in.
DRILLING CONTRACTOR Cenozoic Exploration, LLC.
COORDINATES: **LATITUDE** 37.12818 **LONGITUDE** -122.13488
DRILLING RIG/METHOD Simco 2400/ 6-in. Solid Flight Auger
GROUNDWATER AT TIME OF DRILLING --- Not Encountered
LOGGED BY K. Loeb **CHECKED BY** D. Peluso
GROUNDWATER AT END OF DRILLING --- N/A
HAMMER TYPE 140 lb hammer with 30 in. cathead
GROUNDWATER AFTER DRILLING --- N/A

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (FIELD VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT (%)	ATTERBERG LIMITS: PLASTIC LIMIT (%)	ATTERBERG LIMITS: PLASTICITY INDEX (%)	FINES CONTENT (%)
0.0		Asphalt Pavement (approximately 3")									
		Aggregate Base (approximately 3")									
		Gravelly Lean CLAY (CL): dark brown, moist, hard, angular gravel up to 2 in., trace sand and root [Colluvium]	CM	9-10-11	>4.5	81	19				66
2.5		Sandy Lean CLAY (CL): dark brown, moist, hard, trace sand and root									
		Sandstone clast, roots	SPT	5-8-7							
5.0											
		Sandy SILT (ML): olive gray mottled with dark yellowish brown, moist, hard,	CM	6-8-13							
7.5		SILTSTONE: dark yellowish brown, moist, extremely weak, highly/moderately weathered [Weathered Bedrock]									
			SPT	6-9-14							
10.0											

Bottom of borehole at 10.0 ft. Borehole backfilled with cuttings.

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BORING NUMBER B-06

CLIENT Schaaf & Wheeler
PROJECT NAME San Lorenzo Valley Water District 2019 Pipeline Project
PROJECT NUMBER 191110
PROJECT LOCATION Santa Cruz County, CA
DATE STARTED 11/18/2019 **COMPLETED** 11/18/2019
GROUND ELEVATION 525 ft **DATUM** WGS84 **HOLE SIZE** 6" in.
DRILLING CONTRACTOR Cenozoic Exploration, LLC.
COORDINATES: **LATITUDE** 37.08205 **LONGITUDE** -122.06961
DRILLING RIG/METHOD Simco 2400/ 6-in. Solid Flight Auger
GROUNDWATER AT TIME OF DRILLING --- Not Encountered
LOGGED BY K. Loeb **CHECKED BY** D. Peluso
GROUNDWATER AT END OF DRILLING --- N/A
HAMMER TYPE 140 lb hammer with 30 in. cathead
GROUNDWATER AFTER DRILLING --- N/A

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (FIELD VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT (%)	ATTERBERG LIMITS: PLASTIC LIMIT (%)	ATTERBERG LIMITS: PLASTICITY INDEX (%)	FINES CONTENT (%)
0.0		Asphalt Pavement (approximately 5")									
		Aggregate Base (approximately 7")									
		Silty SAND (SM): light gray brown, dry, medium dense, fine to medium sand, little cementation [Weathered Bedrock]	CM	7-18-21							
2.5											
		decomes dense	SPT	10-16-30							32
5.0											
		SANDSTONE: olive, dry, extremely weak, slightly weathered, friable, oxidized, fine sand [Bedrock]	CM	39-50/5"							
7.5											
		becomes pale yellow	SPT	27-50							

Bottom of borehole at 9.5 ft. Borehole backfilled with cuttings.

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BORING NUMBER B-07

CLIENT Schaaf & Wheeler
PROJECT NAME San Lorenzo Valley Water District 2019 Pipeline Project
PROJECT NUMBER 191110
PROJECT LOCATION Santa Cruz County, CA
DATE STARTED 11/18/2019 **COMPLETED** 11/18/2019
GROUND ELEVATION 630 ft **DATUM** WGS84 **HOLE SIZE** 6" in.
DRILLING CONTRACTOR Cenozoic Exploration, LLC.
COORDINATES: **LATITUDE** 37.08458 **LONGITUDE** -122.06806
DRILLING RIG/METHOD Simco 2400/ 6-in. Solid Flight Auger
GROUNDWATER AT TIME OF DRILLING --- Not Encountered
LOGGED BY K. Loeb **CHECKED BY** D. Peluso
GROUNDWATER AT END OF DRILLING --- N/A
HAMMER TYPE 140 lb hammer with 30 in. cathead
GROUNDWATER AFTER DRILLING --- N/A

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (FIELD VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT (%)	ATTERBERG LIMITS: PLASTIC LIMIT (%)	ATTERBERG LIMITS: PLASTICITY INDEX (%)	FINES CONTENT (%)
0.0		Asphalt Pavement (approximately 4")									
		Aggregate Base (approximately 6")									
		Silty SAND (SM): pale yellow, dry, medium dense, fine sand [Residual Soil]									
			CM	4-10-15		101	6				12
2.5											
			SPT	7-10-10							
5.0											
			CM	9-12-17			5				
7.5		becomes brown, moist									
			SPT	9-7-7							
10.0		SANDSTONE encountered in shoe, strong rock, fine to coarse sand, slightly weathered [Weathered Bedrock]									

Bottom of borehole at 10.0 ft. Borehole backfilled with cuttings.

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BORING NUMBER B-08

CLIENT Schaaf & Wheeler
PROJECT NAME San Lorenzo Valley Water District 2019 Pipeline Project
PROJECT NUMBER 191110
PROJECT LOCATION Santa Cruz County, CA
DATE STARTED 11/18/2019 **COMPLETED** 11/18/2019
GROUND ELEVATION 659 ft **DATUM** WGS84 **HOLE SIZE** 6" in.
DRILLING CONTRACTOR Cenozoic Exploration, LLC.
COORDINATES: **LATITUDE** 37.08592 **LONGITUDE** -122.06702
DRILLING RIG/METHOD Simco 2400/ 6-in. Solid Flight Auger
GROUNDWATER AT TIME OF DRILLING --- Not Encountered
LOGGED BY K. Loeb **CHECKED BY** D. Peluso
GROUNDWATER AT END OF DRILLING --- N/A
HAMMER TYPE 140 lb hammer with 30 in. cathead
GROUNDWATER AFTER DRILLING --- N/A

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (FIELD VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT (%)	ATTERBERG LIMITS: PLASTIC LIMIT (%)	ATTERBERG LIMITS: PLASTICITY INDEX (%)	FINES CONTENT (%)
0.0		Asphalt Pavement (approximately 5")									
		Aggregate Base (approximately 5")									
		Poorly Graded SAND (SP): light olive gray, dry, very dense, fine to medium sand [Residual Soil/Weathered Bedrock]	CM	16-22-43							4
2.5											
			SPT	17-33-50			3				
5.0											
			SPT	25-50							
7.5											
			SPT	26-40-50							
10.0											

Bottom of borehole at 10.0 ft. Borehole backfilled with cuttings.

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CAL ENGINEERING & GEOLOGY

BORING NUMBER B-09

CLIENT Schaaf & Wheeler
PROJECT NAME San Lorenzo Valley Water District 2019 Pipeline Project
PROJECT NUMBER 191110
PROJECT LOCATION Santa Cruz County, CA
DATE STARTED 11/19/2019 **COMPLETED** 11/19/2019
GROUND ELEVATION 474 ft **DATUM** WGS84 **HOLE SIZE** 6" in.
DRILLING CONTRACTOR Cenozoic Exploration, LLC.
COORDINATES: **LATITUDE** 37.07971 **LONGITUDE** -122.06109
DRILLING RIG/METHOD Simco 2400/ 6-in. Solid Flight Auger
GROUNDWATER AT TIME OF DRILLING --- Not Encountered
LOGGED BY K. Loeb **CHECKED BY** D. Peluso
GROUNDWATER AT END OF DRILLING --- N/A
HAMMER TYPE 140 lb hammer with 30 in. cathead
GROUNDWATER AFTER DRILLING --- N/A

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (FIELD VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT (%)	ATTERBERG LIMITS: PLASTIC LIMIT (%)	ATTERBERG LIMITS: PLASTICITY INDEX (%)	FINES CONTENT (%)
0.0		Asphalt Pavement (approximately 4")									
		Aggregate Base (approximately 6")									
		Silty SAND (SM): light gray, dry, dense, fine sand, possible soft sandstone [Residual Soil/Weathered Bedrock]	CM	22-24-20		108	7				23
2.5		becomes light olive brown, trace subangular gravel up to 1"									
		becomes medium dense, some oxidation	SPT	8-11-14							
5.0		Silty SAND w/ Gravel (SM): dark yellowish brown, moist, dense, fine to coarse sand									
7.5			CM	13-20-30							62
		SANDSTONE: light gray, dry, dense, fine sand [Weathered Bedrock]									

Bottom of borehole at 9.5 ft. Borehole backfilled with cuttings.

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BORING NUMBER B-10

CLIENT Schaaf & Wheeler
PROJECT NAME San Lorenzo Valley Water District 2019 Pipeline Project
PROJECT NUMBER 191110
PROJECT LOCATION Santa Cruz County, CA
DATE STARTED 11/19/2019 **COMPLETED** 11/19/2019
GROUND ELEVATION 424 ft **DATUM** WGS84 **HOLE SIZE** 6" in.
DRILLING CONTRACTOR Cenozoic Exploration, LLC.
COORDINATES: **LATITUDE** 37.07792 **LONGITUDE** -122.05874
DRILLING RIG/METHOD Simco 2400/ 6-in. Solid Flight Auger
GROUNDWATER AT TIME OF DRILLING --- Not Encountered
LOGGED BY K. Loeb **CHECKED BY** D. Peluso
GROUNDWATER AT END OF DRILLING --- N/A
HAMMER TYPE 140 lb hammer with 30 in. cathead
GROUNDWATER AFTER DRILLING --- N/A

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (FIELD VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT (%)	ATTERBERG LIMITS: PLASTIC LIMIT (%)	ATTERBERG LIMITS: PLASTICITY INDEX (%)	FINES CONTENT (%)
0.0		Asphalt Pavement (approximately 4")									
		Aggregate Base (approximately 6")									
		Silty SAND (SM): dark olive brown, dry, medium dense, fine sand [Alluvium]	CM	13-11-7			4				6
2.5											
		(Corrosivity test at 3.5 to 5 feet)									
		becomes olive brown, loose, trace roots and gravel up to 1 in.	SPT	2-3-5							
5.0											
		Poorly Graded SAND (SP): pale olive, dry, dense, fine to medium sand [Residual Soil/Weathered Bedrock]	CM	10-18-30		104	6				
7.5											
		becomes fine sand, olive									
		becomes medium sand, pale yellow	SPT	10-19-33							
10.0		Silty SAND (SM): olive brown, moist, very dense, fine sand									

Bottom of borehole at 10.0 ft. Borehole backfilled with cuttings.

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BORING NUMBER B-11

CLIENT Schaaf & Wheeler
PROJECT NAME San Lorenzo Valley Water District 2019 Pipeline Project
PROJECT NUMBER 191110
PROJECT LOCATION Santa Cruz County, CA
DATE STARTED 11/19/2019 **COMPLETED** 11/19/2019
GROUND ELEVATION 641 ft **DATUM** WGS84 **HOLE SIZE** 6" in.
DRILLING CONTRACTOR Cenozoic Exploration, LLC.
COORDINATES: **LATITUDE** 37.18308 **LONGITUDE** -122.14259
DRILLING RIG/METHOD Simco 2400/ 6-in. Solid Flight Auger
GROUNDWATER AT TIME OF DRILLING --- Not Encountered
LOGGED BY K. Loeb **CHECKED BY** D. Peluso
GROUNDWATER AT END OF DRILLING --- N/A
HAMMER TYPE 140 lb hammer with 30 in. cathead
GROUNDWATER AFTER DRILLING --- N/A

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (FIELD VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT (%)	ATTERBERG LIMITS: PLASTIC LIMIT (%)	ATTERBERG LIMITS: PLASTICITY INDEX (%)	FINES CONTENT (%)
0.0		Sandy SILT (ML): very dark gray brown, moist, medium dense, some organics, fine sand [Fill]									
			CM	5-8-11		87	13				
2.5		becomes dark yellowish brown mottled with olive, dry, trace roots									
		no mottling	SPT	5-6-7							57
5.0		Poorly Graded SAND (SP): dark yellowish brown, moist, medium dense, fine to medium sand, trace subangular gravel up to 1.5" [Alluvium]									
		lens with gravel	CM	5-10-9		106	11				
7.5		becomes fine sand									
		Poorly Graded SAND with Silt (SP-SM): dark yellowish brown, moist, medium dense, fine sand, trace fine gravel									
			SPT	4-6-8							
10.0											

Bottom of borehole at 10.0 ft. Borehole backfilled with cuttings.

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BORING NUMBER B-12

CLIENT Schaaf & Wheeler
PROJECT NAME San Lorenzo Valley Water District 2019 Pipeline Project
PROJECT NUMBER 191110
PROJECT LOCATION Santa Cruz County, CA
DATE STARTED 11/19/2019 **COMPLETED** 11/19/2019
GROUND ELEVATION 651 ft **DATUM** WGS84 **HOLE SIZE** 6" in.
DRILLING CONTRACTOR Cenozoic Exploration, LLC.
COORDINATES: **LATITUDE** 37.18344 **LONGITUDE** -122.14306
DRILLING RIG/METHOD Simco 2400/ 6-in. Solid Flight Auger
GROUNDWATER AT TIME OF DRILLING --- Not Encountered
LOGGED BY K. Loeb **CHECKED BY** D. Peluso
GROUNDWATER AT END OF DRILLING --- N/A
HAMMER TYPE 140 lb hammer with 30 in. cathead
GROUNDWATER AFTER DRILLING --- N/A

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (FIELD VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT (%)	ATTERBERG LIMITS: PLASTIC LIMIT (%)	ATTERBERG LIMITS: PLASTICITY INDEX (%)	FINES CONTENT (%)
0.0		Asphalt Pavement (approximately 3")									
		Aggregate Base (approximately 3")									
		Sandy SILT (ML): dark yellowish brown, medium dense, fine sand some angular gravel [Fill]	CM	7-7-5		75	11				74
2.5		becomes brown, roots, no gravel									
		Sandy Lean CLAY with Gravel (CL): dark yellowish brown, moist, medium dense, little friable gravel, some organics, subangular gravel up to 2.5" [Colluvium]	SPT	3-5-7							
5.0											
		becomes olive brown mottled with dark yellowish brown (oxidized), hard	CM	6-11-13	>4.5	104	19				
7.5											
10.0			SPT	6-9-13	>4.5						

becomes olive brown mottled with dark yellowish brown (oxidized), hard
Bottom of borehole at 10.0 ft. Borehole backfilled with cuttings.

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BORING NUMBER B-13

CLIENT Schaaf & Wheeler
PROJECT NAME San Lorenzo Valley Water District 2019 Pipeline Project
PROJECT NUMBER 191110
PROJECT LOCATION Santa Cruz County, CA
DATE STARTED 11/18/2019 **COMPLETED** 11/18/2019
GROUND ELEVATION 374 ft **DATUM** WGS84 **HOLE SIZE** 6" in.
DRILLING CONTRACTOR Cenozoic Exploration, LLC.
COORDINATES: **LATITUDE** 37.09854 **LONGITUDE** -122.09525
DRILLING RIG/METHOD Simco 2400/ 6-in. Solid Flight Auger
GROUNDWATER AT TIME OF DRILLING --- Not Encountered
LOGGED BY K. Loeb **CHECKED BY** D. Peluso
GROUNDWATER AT END OF DRILLING --- N/A
HAMMER TYPE 140 lb hammer with 30 in. cathead
GROUNDWATER AFTER DRILLING --- N/A

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (FIELD VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT (%)	ATTERBERG LIMITS: PLASTIC LIMIT (%)	ATTERBERG LIMITS: PLASTICITY INDEX (%)	FINES CONTENT (%)
0.0		Asphalt Pavement (approximately 3")									
		Aggregate Base (approximately 6")									
		Sandy SILT (ML): very dark gray brown, dry, medium dense, fine sand, trace roots [Alluvium]	CM	9-11-11		94	10				
2.5		Silty SAND (SM): dark yellowish brown, dry, medium dense, fine to medium sand, little subangular gravel									
		becomes dark brown, granitic sand	SPT	10-15-13							14
5.0											
		becomes dark gray, moist, fine to coarse sand, one 2" round clast	CM	15-15-17		111	14				
7.5											
		becomes olive yellow, very dense, fine sand, oxidized	SPT	17-30-40							
10.0											

Bottom of borehole at 10.0 ft. Borehole backfilled with cuttings.

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BORING NUMBER B-14

CLIENT Schaaf & Wheeler
PROJECT NAME San Lorenzo Valley Water District 2019 Pipeline Project
PROJECT NUMBER 191110
PROJECT LOCATION Santa Cruz County, CA
DATE STARTED 11/18/2019 **COMPLETED** 11/18/2019
GROUND ELEVATION 380 ft **DATUM** WGS84 **HOLE SIZE** 6" in.
DRILLING CONTRACTOR Cenozoic Exploration, LLC.
COORDINATES: **LATITUDE** 37.09567 **LONGITUDE** -122.09573
DRILLING RIG/METHOD Simco 2400/ 6-in. Solid Flight Auger
GROUNDWATER AT TIME OF DRILLING --- Not Encountered
LOGGED BY K. Loeb **CHECKED BY** D. Peluso
GROUNDWATER AT END OF DRILLING --- N/A
HAMMER TYPE 140 lb hammer with 30 in. cathead
GROUNDWATER AFTER DRILLING --- N/A

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (FIELD VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT (%)	ATTERBERG LIMITS: PLASTIC LIMIT (%)	ATTERBERG LIMITS: PLASTICITY INDEX (%)	FINES CONTENT (%)
0.0		Asphalt Pavement (approximately 3")									
		Aggregate Base (approximately 3")									
		Lean CLAY (CL): brown, moist, very stiff, roots, low plasticity [Fill]									
		Sandy Lean CLAY (CL): very dark gray, moist, very stiff, fine sand, trace coarse sand	CM	5-8-10	3.25	133	13				
2.5											
		Silty SAND (SM): dark olive brown, moist, medium dense, fine sand [Alluvium]	CM	6-7-8		103	15				
5.0		becomes dark yellowish brown, decrease in fines									
		becomes oxidized	CM	5-6-8							
7.5											
		increase in fines, light brown gray									
		Well Graded SAND (SW): dark brown/dark yellowish brown, moist, medium dense, fine to coarse granitic sand, trace subangular gravel	SPT	6-8-8							
10.0		Fat CLAY (CH): gray, moist, stiff, high plasticity									

Bottom of borehole at 10.0 ft. Borehole backfilled with cuttings.

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BORING NUMBER B-15

CLIENT Schaaf & Wheeler
PROJECT NAME San Lorenzo Valley Water District 2019 Pipeline Project
PROJECT NUMBER 191110
PROJECT LOCATION Santa Cruz County, CA
DATE STARTED 12/16/2019 **COMPLETED** 12/16/2019
GROUND ELEVATION 740 ft **DATUM** WGS84 **HOLE SIZE** 3" in.
DRILLING CONTRACTOR N/a
COORDINATES: **LATITUDE** 37.14987 **LONGITUDE** -122.13425
DRILLING RIG/METHOD Hand Augered by CE&G Staff
GROUNDWATER AT TIME OF DRILLING --- Not Encountered
LOGGED BY K. Loeb **CHECKED BY** D. Peluso
GROUNDWATER AT END OF DRILLING --- N/A
HAMMER TYPE N/A
GROUNDWATER AFTER DRILLING --- N/A

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS (FIELD VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT (%)	ATTERBERG LIMITS: PLASTIC LIMIT (%)	ATTERBERG LIMITS: PLASTICITY INDEX (%)	FINES CONTENT (%)
0.0		Sandy SILT (ML): dark brown, moist, loose, very fine sand, roots [Topsoil]									
2.5		Sandy SILT (ML): dark yellowish brown, moist, loose to medium dense, very fine sand, roots [Colluvium/Residual Soil]									
5.0		Silty SAND (SM): olive brown to dark yellowish brown, moist, medium dense, oxidized [Completely Weathered Bedrock]									

Bottom of borehole at 6.5 ft. Borehole backfilled with cuttings.

Appendix B. Laboratory Testing

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SUMMARY OF LABORATORY RESULTS

CLIENT Schaaf Wheeler **PROJECT NAME** San Lorenzo WD Pipeline

PROJECT NUMBER 191110 **PROJECT LOCATION** San Lorenzo, CA

Borehole	Depth	Date Tested	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Screen Size (mm)	%<#200 Sieve	Class-ification	Water Content (%)	Dry Density (pcf)	Satur-ation (%)	Void Ratio
B-01	2.0	12/3/2019							13.2	114.3		
B-01	7.0	12/3/2019							14.2	126.8		
B-02	2.0	12/3/2019				25	6		4.0			
B-02	6.5	12/3/2019							4.4			
B-03	1.5	12/3/2019							3.4			
B-03	3.5	12/3/2019				0.106	4	SP				
B-03	7.0	12/3/2019							3.6			
B-05	2.0	12/3/2019				0.106	66		19.2	80.6		
B-06	3.5	12/3/2019				0.106	32					
B-07	2.0	12/3/2019				0.106	12		6.3	101.4		
B-07	7.0	12/3/2019							5.1			
B-08	1.5	12/3/2019				4.75	4	SP				
B-08	3.5	12/3/2019							2.8			
B-09	2.0	12/3/2019				0.106	23		7.3	108.2		
B-09	8.5	12/3/2019				9.5	62					
B-10	2.0	12/3/2019				0.106	6		3.8			
B-10	7.0	12/3/2019							5.6	103.9		
B-11	2.0	12/3/2019							13.4	87.3		
B-11	3.5	12/3/2019				0.106	57					
B-11	7.0	12/3/2019							10.9	106.2		
B-12	2.0	12/3/2019				0.106	74		10.6	75.1		
B-12	7.0	12/3/2019							18.6	103.5		
B-14	2.0	12/3/2019							12.9	133.3		
B-14	4.5	12/3/2019							15.4	102.5		

GRAIN SIZE DISTRIBUTION

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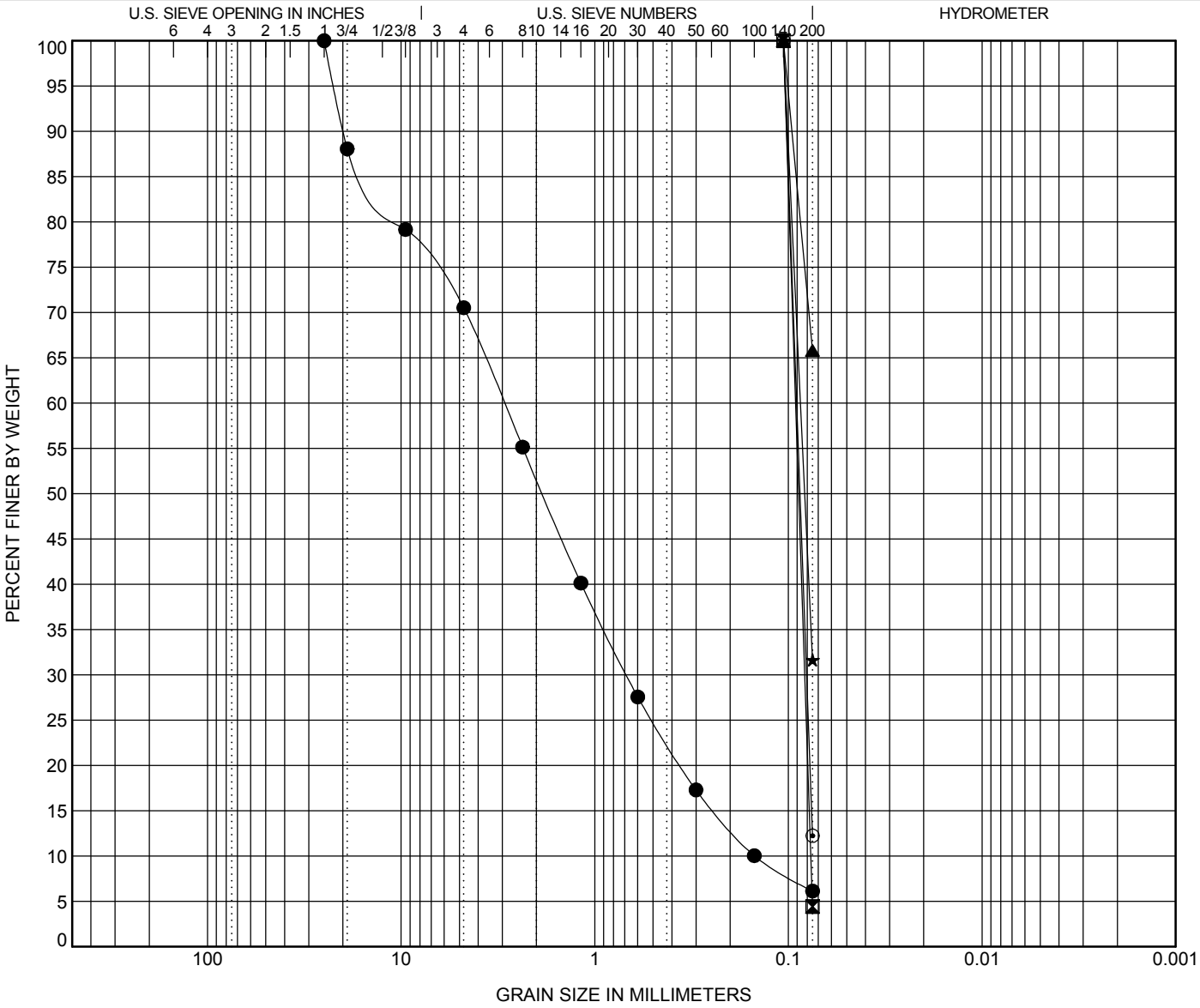
CLIENT Schaaf Wheeler **PROJECT NAME** San Lorenzo WD Pipeline

PROJECT NUMBER 191110 **PROJECT LOCATION** San Lorenzo, CA



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	DATE TESTED	Classification	LL	PL	PI	Cc	Cu
●	**B-02**	**2.0**	**12/3/2019**					**1.07**	**19.74**
⊠	**B-03**	**3.5**	**12/3/2019**	**POORLY GRADED SAND(SP)**				**0.96**	**1.20**
▲	**B-05**	**2.0**	**12/3/2019**						
★	**B-06**	**3.5**	**12/3/2019**						
⊙	**B-07**	**2.0**	**12/3/2019**					**0.96**	**1.22**

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**B-02**	**2.0**	**25**	**2.944**	**0.684**	**0.149**	**29.5**	**64.4**	**6.1**	
⊠	**B-03**	**3.5**	**0.106**	**0.092**	**0.082**	**0.077**	**0.0**	**95.6**	**4.4**	
▲	**B-05**	**2.0**	**0.106**				**0.0**	**34.2**	**65.8**	
★	**B-06**	**3.5**	**0.106**	**0.087**			**0.0**	**68.4**	**31.6**	
⊙	**B-07**	**2.0**	**0.106**	**0.091**	**0.08**		**0.0**	**87.8**	**12.2**	

GRAIN SIZE DISTRIBUTION

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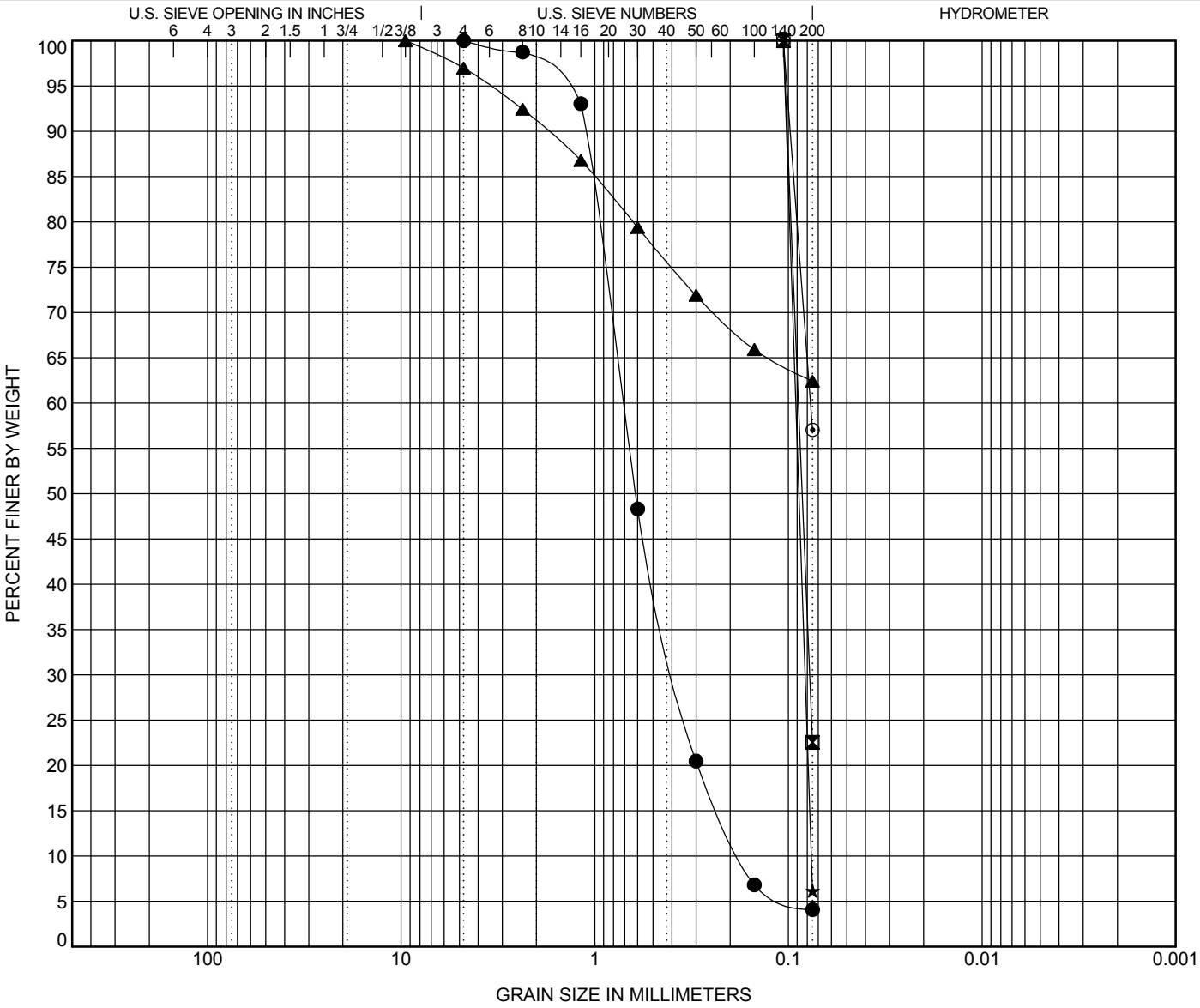
CLIENT Schaaf Wheeler **PROJECT NAME** San Lorenzo WD Pipeline

PROJECT NUMBER 191110 **PROJECT LOCATION** San Lorenzo, CA



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	DATE TESTED	Classification	LL	PL	PI	Cc	Cu
●	**B-08**	**1.5**	**12/3/2019**	**POORLY GRADED SAND(SP)**				**1.15**	**4.06**
⊠	**B-09**	**2.0**	**12/3/2019**						
▲	**B-09**	**8.5**	**12/3/2019**						
★	**B-10**	**2.0**	**12/3/2019**					**0.96**	**1.20**
⊙	**B-11**	**3.5**	**12/3/2019**						

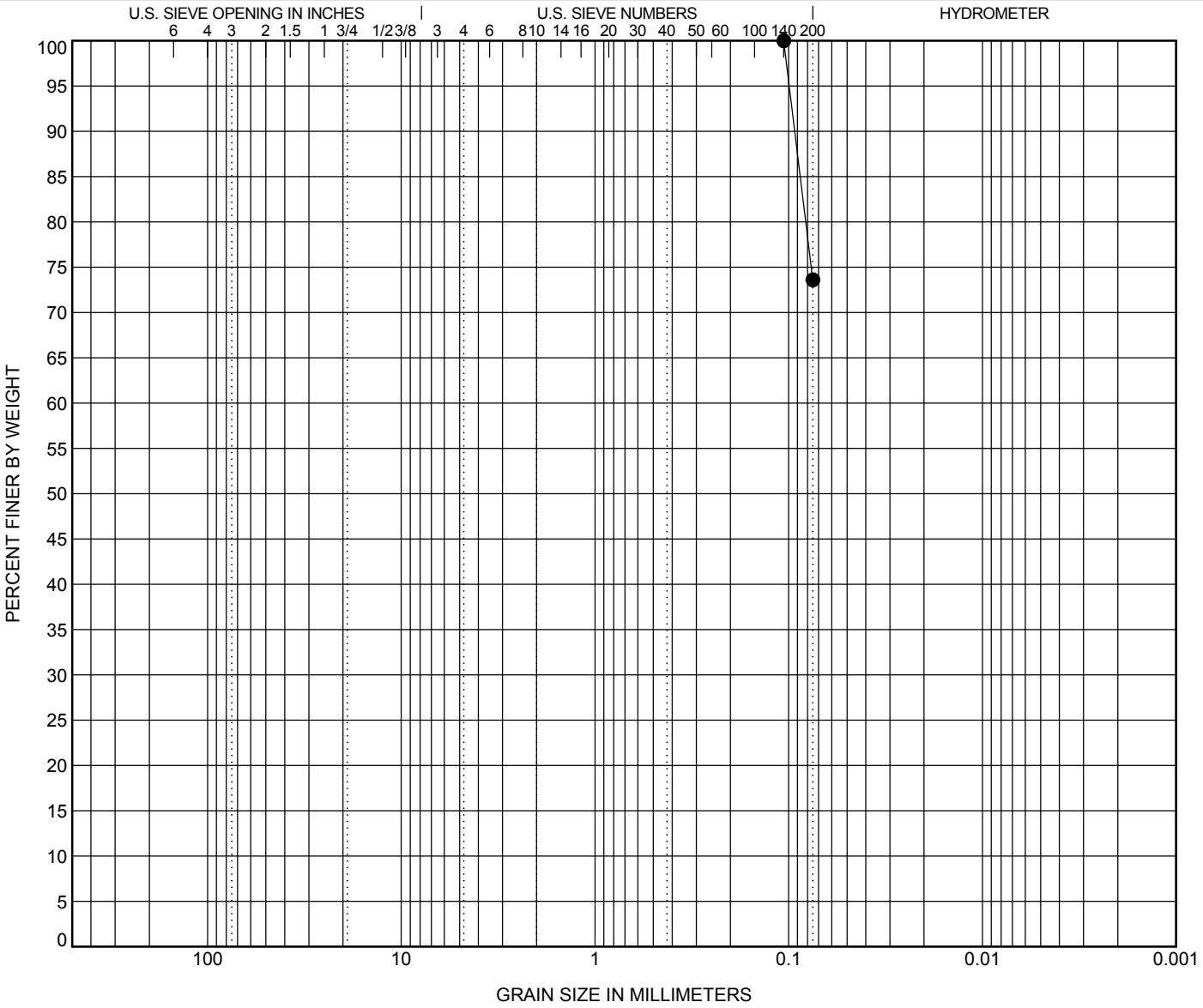
	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**B-08**	**1.5**	**4.75**	**0.716**	**0.38**	**0.176**	**0.0**	**95.9**	**4.1**	
⊠	**B-09**	**2.0**	**0.106**	**0.089**	**0.078**		**0.0**	**77.5**	**22.5**	
▲	**B-09**	**8.5**	**9.5**				**3.0**	**34.6**	**62.4**	
★	**B-10**	**2.0**	**0.106**	**0.091**	**0.082**	**0.076**	**0.0**	**93.9**	**6.1**	
⊙	**B-11**	**3.5**	**0.106**	**0.077**			**0.0**	**43.0**	**57.0**	

GRAIN SIZE DISTRIBUTION

CE&G
CAL ENGINEERING & GEOLOGY

CLIENT Schaaf Wheeler **PROJECT NAME** San Lorenzo WD Pipeline

PROJECT NUMBER 191110 **PROJECT LOCATION** San Lorenzo, CA



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	DATE TESTED	Classification	LL	PL	PI	Cc	Cu
●	**B-12**	**2.0**	**12/3/2019**						

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**B-12**	**2.0**	**0.106**				**0.0**	**26.4**	**73.6**	

COOPER TESTING LABORATORY

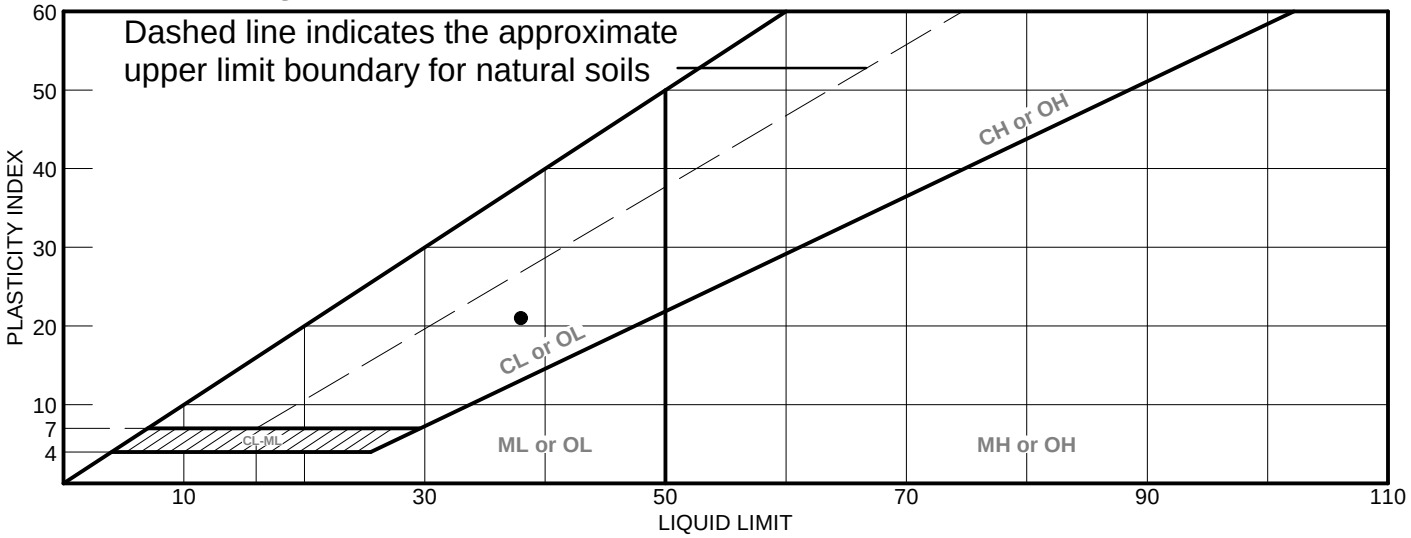
CTL # 471-290 **Date:** 12/4/2019 **Tested By:** PJ **Checked:** PJ

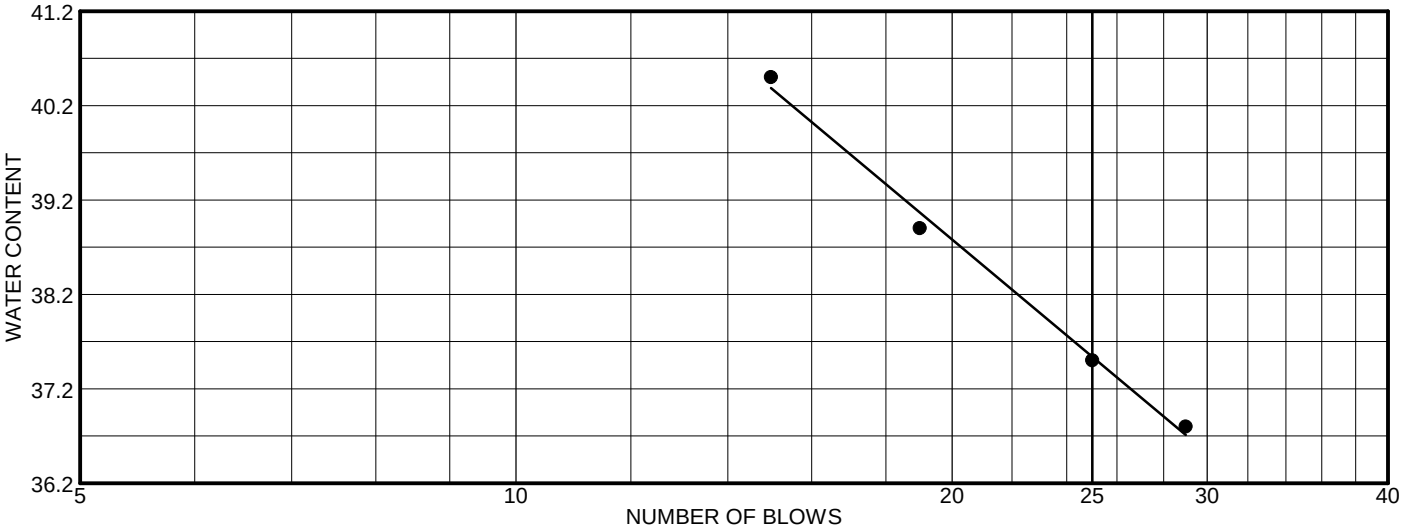
Client: Cal Engineering & Geology **Project:** SLVWD Pipeline **Proj. No:** 191110

Remarks:

Sample Location or ID			Resistivity @ 15.5 °C (Ohm-cm)			Chloride	Sulfate		pH	ORP	Moisture	Soil Visual Description
Boring	Sample, No.	Depth, ft.	As Rec.	Minimum	Saturated	mg/kg	mg/kg	%		(Redox)	At Test	
						Dry Wt.	Dry Wt.	Dry Wt.		mv	%	
			ASTM G57	Cal 643	ASTM G57	Cal 422-mod.	Cal 417-mod.	Cal 417-mod.	Cal 643	SM 2580B	ASTM D2216	
B-1	1-3	3.5-5.0	-	3378	-	5	98	0.0098	8.6	-	12.8	Dark Gray Lean Clayey SAND
B-10	10-2	3.5-5.0	-	47581	-	4	20	0.0020	7.8	-	2.6	Olive Brown SAND

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Dark Gray Lean Clayey SAND	38	17	21			

Project No. 471-290 **Client:** Cal Engineering & Geology

Project: SLVWD Pipeline - 191110

● **Source:** B-1 **Sample No.:** 1-3 **Elev./Depth:** 3.5-5'

Remarks:

●

LIQUID AND PLASTIC LIMITS TEST REPORT

COOPER TESTING LABORATORY

Figure

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MITIGATION MONITORING AND REPORTING PROGRAM
Quail Hollow Pipeline Replacement Project
February 2021

The Mitigation Monitoring and Reporting Program (MMRP) is a CEQA required component of the Mitigated Negative Declaration (MND) process for the project (CEQA Guidelines §15074). Specifically, CEQA requires that lead agencies adopting MNDs take affirmative steps to determine that approved mitigation measures are implemented subsequent to project approval (CEQA Guidelines §15074(d)).

As part of the CEQA environmental review procedures, Public Resources Code §21081.6 requires a public agency to adopt a monitoring and reporting program to ensure efficacy and enforceability of any mitigation measures applied to a proposed project. The lead agency must adopt an MMRP for mitigation measures incorporated into the project or proposed as conditions of approval. The MMRP must be designed to ensure compliance during project implementation. As stated in §21081.6(a)(1):

> "The public agency shall adopt a reporting or monitoring program for the changes made to the project or conditions of project approval, adopted in order to mitigate or avoid significant effects on the environment. The reporting or monitoring program shall be designed to ensure compliance during project implementation. For those changes which have been required or incorporated into the project at the request of a responsible agency or a public agency having jurisdiction by law over natural resources affected by the project, that agency shall, if so requested by the lead agency or a responsible agency, prepare and submit a proposed reporting or monitoring program."

Table 1 is the final MMRP matrix. The table lists each of the mitigation measures and specifies the agency responsible for implementation of the mitigation measure and the time period for implementing the mitigation measure.

Lead Agency: SLVWD
Approval by: Carly Blanchard _____ Date: 2/16/2021_____

Table 1 Mitigation Monitoring and Reporting Plan Quail Hollow Pipeline Replacement Project				
Environmental Impact	**Mitigation Measures**	**Responsible Party**	**Timing**	**Verification (name/date)**
4.5 Biological Resources				
Impacts to special-status species & habitat	MM BIO 1: In order to avoid impacts to sensitive ponderosa pine forest and special-status species (i.e. MHJB, Santa Cruz kangaroo rat, CRLF, SFDW, special-status bats, raptors and other protected avian species, Ben Lomond spineflower, Ben Lomond buckwheat, and silverleaf manzanita) present or potentially present adjacent to the project site, no work, including staging and materials storage, shall occur outside of the pavement of Quail Hollow Road.	SLVWD Construction Contractor	Prior to and during project construction	
	MM BIO 2: SLVWD shall ensure that a qualified biologist conducts an education program for all persons employed on the project prior to performing construction activities. Instruction shall consist of a presentation by the qualified biologist that includes a discussion of the biology and general behavior of any special-status species which may be in the area, how they may be encountered within the work area, and procedures to follow when they are encountered. The status of ESA- and CESA-listed species including legal protection, penalties for violations and project-specific protective management measures shall be discussed. The discussion shall also include identification of the sensitive habitats present adjacent to the project site and the measures taken to avoid impacts to these habitats. The SLVWD shall prepare and distribute wallet-sized cards or a factsheet handout containing this information for workers to carry on-site. Upon completion of the program, employees shall sign an affidavit stating they attended the program and understand all protection measures.	SLVWD, Qualified Biologist	Prior to project construction	
Impacts to special-status species & habitat - San Francisco Dusky-Footed Woodrat (SFDW)	MM BIO-3: A qualified biologist shall conduct preconstruction surveys immediately adjacent to the project site to determine if SFDW are present prior to the start of construction. The biologist shall conduct these surveys no more than two weeks prior to the beginning of construction. If SFDW nests are found, nests shall be mapped, fenced, or flagged for avoidance, and documented in pre-construction report.	SLVWD, Qualified Biologist	Two weeks or less prior to start of project construction	

Table 1 Mitigation Monitoring and Reporting Plan Quail Hollow Pipeline Replacement Project				
Environmental Impact	**Mitigation Measures**	**Responsible Party**	**Timing**	**Verification (name/date)**
Impacts to special-status species & habitat – California Red-Legged Frog	MM BIO-4: The following procedures shall be implemented to avoid "take" and ensure that impacts to CRLF are less-than-significant. a) If feasible, initial ground disturbing activities shall be conducted between May 1 and October 31 during dry weather conditions to minimize the potential for encountering listed and non-listed amphibian species. Work shall be restricted to daylight hours. b) If construction must occur between November 1 and April 30, the qualified biologist shall conduct a pre-activity clearance sweep prior to start of project activities within 48 hours after any rain events of 0.1 inch or greater or if wet conditions are present on site. The clearance survey would allow any frog, if found on-site, to leave of its own volition before any construction activities would begin. No relocation of CRLF would occur without written authorization of the U.S. Fish and Wildlife Service (USFWS), or by any individuals not specifically authorized by the USFWS for handling of CRLF. c) SLVWD or its contractor shall cover dirt or sand piles left overnight with tarps or plastic to prevent CRLF from sheltering in the material. All holes and trenches shall be inspected each morning by a biological monitor. d) All trash shall be removed from the site daily and disposed of properly to avoid attracting potential predators to the site. e) Pets shall not be permitted on-site during project activities. f) All vehicles shall be in good working condition and free of leaks. All leaks shall be contained and cleaned up immediately to reduce the potential of soil/vegetation contamination. g) All refueling, maintenance, and staging of equipment and vehicles shall occur at least 100 feet from riparian habitat or water bodies and in a location from where a spill would not drain directly toward aquatic habitat (e.g., on a slope that drains away from the water). h) A County-approved biologist shall be present on site during initial ground disturbance. If any life stage of CRLF is found, work shall cease within 100 feet of the CRLF and the USFWS shall be contacted immediately to determine the appropriate course of action.	SLVWD, Qualified Biologist Construction Contractor	Prior to & during construction	

Table 1 Mitigation Monitoring and Reporting Plan Quail Hollow Pipeline Replacement Project				
Environmental Impact	**Mitigation Measures**	**Responsible Party**	**Timing**	**Verification (name/date)**
Impacts to special-status species & habitat – Raptors and Other Protected Avian Species	MM BIO-5: If equipment staging, site preparation, grading, excavation or other project-related construction work is scheduled during the nesting season of raptors and other protected avian species, a qualified biologist shall conduct two surveys for active nests: one within 14 days prior to the beginning of project construction and one within 48 hours prior to construction. Surveys shall be conducted in all suitable habitat located adjacent to the work site and any staging, storage, and stockpile areas. Nesting seasons are typically defined as March 15 to August 30 for small bird species such as passerines and February 15 to September 15 for other raptors. The minimum survey radius surrounding the work area shall be 300 feet. If an active nest is found during surveys, the qualified biologist shall designate a protected area (while occupied) during project construction by demarking a "No Work Zone" around each nest site. The qualified biologist shall monitor the behavior of the birds (adults and young, when present) at the nest site to ensure that they are not disturbed by project construction work. Nest monitoring shall continue during construction until the young have fully fledged (have completely left the nest site and are no longer being fed by the parents), as determined by the qualified biologist.	SLVWD, Qualified Biologist	Prior to (surveys at 14 days and 48 hours prior to construction) & during construction	
Impacts to special-status species & habitat – Special-Status Bat Species	MM BIO-6: To avoid and reduce impacts to special-status bat species, if project construction is planned during the reproductive season (May 1 through September 15) SLVWD shall retain a qualified bat specialist or wildlife biologist to conduct site surveys to characterize bat utilization adjacent to the project site and potential species present (techniques utilized to be determined by the biologist) prior to construction. Based on the results of these initial surveys, one or more of the following shall occur: • If it is determined that bats are not present adjacent to the site, no additional mitigation is required. • If it is determined that bats are utilizing the trees adjacent to the site and may be impacted by the proposed project, pre-construction surveys shall be conducted within 50 feet of construction limits no more than 30 days prior to the start of construction. If, according to the bat specialist, no bats or bat signs are observed in the course of the pre-construction surveys, construction may	SLVWD, Qualified Biologist	Prior to Construction (surveys 30 days prior to construction if adjacent trees are being utilized by bats)	

Table 1 Mitigation Monitoring and Reporting Plan Quail Hollow Pipeline Replacement Project				
Environmental Impact	**Mitigation Measures**	**Responsible Party**	**Timing**	**Verification (name/date)**
	proceed. If bats and/or bat signs are observed during the pre-construction surveys, the biologist will determine if disturbance will jeopardize the roost (i.e., maternity, foraging, day, or night). • If a single bat and/or only adult bats are roosting, removal of trees, buildings, or other suitable habitat may proceed after the bats have been safely excluded from the roost. Exclusion techniques shall be determined by the biologist and would depend on the roost type. • If an active maternity roost is detected, avoidance is preferred. Work in the vicinity of the roost (buffer to be determined by biologist) shall be postponed until the biologist monitoring the roost determines that the young are no longer dependent on the roost. The monitor shall ensure that all bats have left the area of disturbance prior to initiation of pruning and/or removal of trees, if necessary, that would disturb the roost.			
4.6 Cultural Resources				
Impacts to unknown or subsurface archaeological resources	MM CR-1: The following protection measures are recommended in association with any specific requirements of Santa Cruz County and other regulatory authorities. a) The SLVWD shall note on any plans that require ground disturbing excavation that there is a potential for exposing buried cultural resources including prehistoric Native American burials. b) The SLVWD shall retain a professional archaeologist to develop an ALERT Sheet outlining the potential for the discovery of unexpected archaeological resources and protocols to deal with a discovery. The professional archaeologist shall provide the Contractor's construction crew "toolbox" sensitivity training to present the ALERT Sheet and protocols to supervisors, foreman, project managers, and non-supervisory contractor personnel. The contractor is responsible for ensuring that all workers requiring training are in attendance. c) The SLVWD shall retain a professional archaeologist on an "on-call" basis during ground disturbing construction to review, identify and evaluate cultural resources that may be inadvertently exposed during construction. The	SLVWD, Qualified Archaeologist	Prior to & during construction	

Table 1 Mitigation Monitoring and Reporting Plan Quail Hollow Pipeline Replacement Project				
Environmental Impact	**Mitigation Measures**	**Responsible Party**	**Timing**	**Verification (name/date)**
	archaeologist shall review and evaluate any discoveries to determine if they are historical resource(s) and/or unique archaeological resources under CEQA. d) The SLVWD shall retain a Native American monitor for all work within 400 feet of a water source. The Native American monitor shall be provided contact, access, and schedule information sufficient to facilitate their monitoring efforts. The professional archeologist shall communicate and coordinate with the Native American monitor regarding the recovery of any significant cultural materials that may be found in the excavated soil within this area. e) If the professional archaeologist determines that any cultural resources exposed during construction constitute a historical resource and/or unique archaeological resource under CEQA, he/she shall notify the project proponent and other appropriate parties (including the Native American monitor, as appropriate) of the evaluation and recommend mitigation measures to mitigate to a less-than significant impact in accordance with California Public Resources Code Section 15064.5. Mitigation measures may include avoidance, preservation in-place, recordation, additional archaeological testing, and data recovery, among other options. The completion of a formal Archaeological Monitoring Plan (AMP) and/or Archaeological Treatment Plan (ATP) that may include data recovery may be recommended by the professional archaeologist if significant archaeological deposits are exposed during ground disturbing construction. Development and implementation of the AMP and ATP and treatment of significant cultural resources will be determined by the SLVWD in consultation with any regulatory agencies. f) A Monitoring Closure Report shall be filed with the SLVWD at the conclusion of ground disturbing construction if archaeological and Native American monitoring of excavation was undertaken.			
Impacts to unknown human remains	MM CR-2: The treatment of human remains and any associated or unassociated funerary objects discovered during any soil-disturbing activity within the project site shall comply with applicable State laws. This shall include immediate notification of the Santa Cruz County Coroner/Medical Examiner and the SLVWD. In the event of the coroner's determination that the human remains are Native	SLVWD, County Coroner, NAHC (as needed)	During construction	

Table 1 Mitigation Monitoring and Reporting Plan Quail Hollow Pipeline Replacement Project				
Environmental Impact	**Mitigation Measures**	**Responsible Party**	**Timing**	**Verification (name/date)**
	American, notification of the Native American Heritage Commission, who shall appoint a Most Likely Descendant (MLD), is required (Public Resources Code Section 5097.98). The SLVWD, professional archaeologist, and MLD shall make all reasonable efforts to develop an agreement for the treatment, with appropriate dignity, of human remains and associated or unassociated funerary objects (CEQA Guidelines Section 15064.5(d)). The agreement should take into consideration the appropriate excavation, removal, recordation, analysis, custodianship, curation, and final disposition of the human remains and associated or unassociated funerary objects. The California Public Resources Code allows 48 hours to reach agreement on these matters. If the MLD and the other parties do not agree on the reburial method, the project will follow Public Resources Code Section 5097.98(b), which states that "...the landowner or his or her authorized representative shall reinter the human remains and items associated with Native American burials with appropriate dignity on the property in a location not subject to further subsurface disturbance."			
4.14 Noise				
Impacts related to temporary or permanent ambient noise increases	MM N-1: To reduce noise during construction, the contractor shall implement the following noise control measures: a) Construction Hours Limit. Construction shall be limited to Monday through Friday from 8:00 a.m. to 6:00 p.m., and Saturday from 9:00 AM to 6:00 PM. No noise-generating work shall occur on Sundays or federal holidays. b) Construction Staging Areas and Stationary Equipment Locations. The contractor shall select equipment staging areas and stationary noise-generating construction equipment locations as far as practicable from sensitive receptors. c) Equipment Maintenance. All contractors, as a condition of contract, shall be required to maintain and tune-up all construction equipment to minimize noise emissions. d) Idling Prohibition and Enforcement. Unnecessary idling of internal combustion engines shall be prohibited. In practice, this would mean turning off equipment if it would not be used for five or more minutes.	SLVWD Construction Contractor	Prior to & during construction	

Table 1 Mitigation Monitoring and Reporting Plan Quail Hollow Pipeline Replacement Project				
Environmental Impact	**Mitigation Measures**	**Responsible Party**	**Timing**	**Verification (name/date)**
	e) Stationary Equipment Shielding. Stationary equipment areas with appropriate acoustic shielding shall be designated on building and grading plans. Equipment and shielding shall be installed prior to construction and remain in designated location throughout construction activities. Pneumatic impact tools and equipment used at the construction site shall have intake and exhaust mufflers recommended by the manufacturers. Impact noise producing equipment (i.e., jackhammers and pavement breaker[s]) shall be equipped with noise attenuating shields, shrouds, or portable barriers or enclosures to reduce operating noise. f) Mufflers. All diesel equipment shall be operated with closed engine doors and shall be equipped with properly operating and maintained residential grade mufflers. g) Electrically Powered Tools and Facilities. Whenever feasible, electrical power shall be used to run air compressors and similar power tools rather than diesel equipment. h) Pre-Construction Notification. Prior to construction, written notification that identifies the type, duration, and frequency of construction activities shall be provided to residents within 100 feet the pipeline alignment.			
4.18 Transportation				
Impacts related to inadequate emergency access	MM TR-1: Prior to construction or the issuance of applicable permits, the contractor shall submit a Traffic Control Plan to SLVWD, the County of Santa Cruz, and any other agency with jurisdiction over roadways affected by project construction for review and approval. This plan shall: a) Describe the proposed lane closures, detours, staging areas, and routes of construction vehicles, including the timing and duration of anticipated closures. b) Describe traffic control measures that will be implemented to manage traffic and reduce potential traffic impacts in accordance with stipulations of the most recent version of the California Manual of Uniform Traffic Control Devices. Traffic control measures may include, but are not limited to, flag persons, warning signs, lights, barricades, and cones to provide safe passage of vehicles (including cars and buses) and bicycle and pedestrian traffic.	Construction Contractor	Prior to construction	

Table 1 Mitigation Monitoring and Reporting Plan Quail Hollow Pipeline Replacement Project				
Environmental Impact	**Mitigation Measures**	**Responsible Party**	**Timing**	**Verification (name/date)**
	c) Require written notification of the timing, location, and duration of construction activities, and the location of lane closures or detours (if any) to all emergency service providers (fire and police) prior to road closure. Emergency service vehicles shall be given priority for access.			