NOTICE OF SPECIAL ENGINEERING/ENVIRONMENTAL COMMITTEE MEETING
September 21, 2023

NOTICE IS HEREBY GIVEN that the San Lorenzo Valley Water District has called a Special meeting of the Engineering/Environmental Committee to be held on **Thursday, September 21, 2023, 8:45 a.m.**, SLVWD Conference Room,12788 Highway 9, Boulder Creek.

Any person in need of any reasonable modification or accommodation in order to participate in the meeting may contact the District Secretary's Office at (831) 430-4636 a minimum of 72 hours prior to the scheduled meeting.

This meeting is being conducted as an in-person meeting under the Brown Act, Government Code section 54953, and a quorum of the Committee must participate from the location(s) within the District that are identified above. Members of the public may attend the meeting at the identified location(s). Teleconferencing/videoconferencing access as set forth below is being provided as a convenience only and is not guaranteed. The meeting may continue in person even if teleconferencing/ videoconferencing capability is disrupted or unavailable.

The meeting access information is as follows:

https://us02web.zoom.us/j/85787630127?pwd=emh3d0lBd3FUcm1hNlJUbCt6Qkxkdz09

Passcode: 365892

Or One tap mobile :
+16699006833,,85787630127#,,,,*365892# US (San Jose)
+16694449171,,85787630127#,,,,*365892# US

Or Telephone:
Dial
+1 669 900 6833 US (San Jose)
+1 669 444 9171 US

Webinar ID: 857 8763 0127
Passcode: 365892

AGENDA

1. Convene Meeting/Roll Call

2. Oral Communications

This portion of the agenda is reserved for Oral Communications by the public for items which are not on the Agenda. Please understand that California law (The Brown Act) limits what the Board can do regarding issues raised during Oral Communication. No action or discussion may occur on issues outside of those already listed on today's agenda. Any person may address the Committee at this time, on any subject that lies within the jurisdiction of the District. Normally, presentations must not exceed three (3) minutes in length, and individuals may only speak once during Oral Communications. Any Director may request that the matter be placed on a future agenda or staff may be directed to provide a brief response.

3. New Business: None

Members of the public will be given the opportunity to address each scheduled item prior to Committee action. The Chairperson of the Committee may establish a time limit for members of the public to address the Committee on agendized items.

4. Unfinished Business:

Members of the public will be given the opportunity to address each scheduled item prior to Committee action. The Chairperson of the Committee may establish a time limit for members of the public to address the Committee on agendized items.

a. BRACKEN BRAE & FOREST SPRINGS BOOSTER PUMP ACOUSTIC REPORT
Discussion and possible recommendation by the Committee regarding the BB & FS Booster Pump Acoustic Report.

b. QUAIL HOLLOW ROAD PROJECT – UPDATE
Discussion by the Committee regarding the Quail Hollow Road project.

c. BROOKSIDE DRIVE STORM DAMAGE REPAIR SCHEDULE-2023 STORM DAMAGE AND CAPITAL PROJECTS LISTING
Review and discussion by the Committee regarding the Brookside Drive repair schedule and other storm damage and capital projects.

d. ENGINEERING PROJECTS UPDATE
Review and discussion by the Committee regarding projects updates.

e. ENVIRONMENTAL PROJECTS UPDATE
Review and discussion by the Committee regarding projects updates.

5. Informational Material

Here is a link to previous Engineering/Environmental Committee meeting minutes: All Engineering/Environmental Committee Meeting Minutes | San Lorenzo Valley Water District (slvwd.com)

6. Adjournment

Agenda documents, including materials related to an item on this agenda submitted to the Committee after distribution of the agenda packet, are available for public inspection and

may be reviewed at the office of the District Secretary, 13060 Highway 9, Boulder Creek, CA 95006 during normal business hours. Such documents may also be available on the District website at www.slvwd.com subject to staff's ability to post the documents before the meeting

Certification of Posting

I hereby certify that on September 19, 2023, I posted a copy of the foregoing agenda in the outside display case at the District Office, 13060 Highway 9, and at the SLVWD Boardroom, 12788 Highway 9, Boulder Creek, California, said time being at least 24 hours in advance of the special meeting of the Engineering & Environmental Committee of the San Lorenzo Valley Water District in compliance with California Government Code Section 54956.

Executed at Boulder Creek, California, on September 19, 2023.

_____
Holly B. Hossack, District Secretary

13 September 2023

Brian Cancimilla
Sandis
636 9th Street
Oakland, CA 94607
bcancimilla@sandis.net

Subject: San Lorenzo Valley Water District Pump Station Noise, Boulder Creek, CA – Pump and Equipment Noise Analysis
Salter Project 23-0358

Dear Brian:

As requested, we have analyzed noise transmission from the proposed water pump equipment to adjacent property lines. The purpose of this analysis is to quantify the equipment noise impact at nearby sensitive receivers, compare the noise levels with the applicable criteria, and propose mitigation measures as needed.

SUMMARY

To meet the County Property Line Noise Standards, our analysis indicates that it would be necessary to incorporate noise mitigation strategies. Given the current generator selection and proximity to residential property lines, we are including several preliminary recommendations and strategies that should be discussed further. Additional details are provided in the body of this letter.

CRITERIA

County Municipal Code

The County of Santa Cruz provides the following regulations for noise levels at nearby residential property lines:

13.15.030 Sound level assessment or measurement.

(A) Sound or noise level assessments or measurements made to administer and enforce this chapter shall be conducted at the position or positions along the property line of the receiving land use closest to the noise source or where the noise level is highest. If practical, the ambient noise level shall be assessed or measured at the same location along the property line with the project noise source inoperative, or the ambient noise may be estimated by performing an assessment or measurement in the same noise sphere or general area of the source but at a sufficient distance that the project noise is inaudible.

(B) When determining the effectiveness of noise mitigation measures, the standards may be applied on the receptor side of the noise barriers or other property line noise mitigation measures. [Ord. 5308 § 1, 2019].

13.15.050 General noise regulations and unlawful noise.

(B) Emergency stand-by generators shall only be operated during power outages and for other temporary purposes as defined in this chapter. In residential zone districts, an emergency stand-by generator shall be fueled by natural gas or propane, and operation is prohibited between the hours of 10:00 p.m. and 7:00 a.m. unless it is necessary for life support or to support other necessary medical needs, equipment, or medication. Residential installations shall meet the property line setbacks in the table below. A reduction of these setback requirements may be approved if noise attenuation measures are included to reduce noise levels to a maximum exterior noise level of 65 dBA at the nearest property line. In no case shall the generator be located closer than the minimum property line setbacks in the zone district.

Generator Manufacturer Specification (dBA at 23 feet)	Minimum Property Line Setback (feet)
60-61	15
62-63	20
64-65	25
66-67	30
68	35
69	40
70	45
71	50
72	55
73	60
74	65
75	70

General Plan Noise Element

Additionally, the General Plan for Santa Cruz County contains the following policies:

9.2.1 Require acoustical studies for all new development projects that may affect the existing noise environment affecting sensitive land uses and receptors and that may not conform to the Normally Acceptable Noise Exposure in Table 9-2.

Table 9-2
Acceptable through Unacceptable Ranges of Noise Exposure by Land Use*
**Outdoor noise exposure measured at the property line of receiving land use*

	LAND USE	COMMUNITY NOISE EXPOSURE DNL or CNEL, dB					
		55	60	65	70	75	80
A	Residential/Lodging – Single Family, Duplex, Mobile Home, Multi Family,						
B	Schools, Libraries, Religious Institutions, Meeting Halls, Hospitals						
C	Outdoor Sports Arena or Facility, Playgrounds, Neighborhood Parks						
D	Office Buildings, Business Commercial and Professional						
E	Industrial, Manufacturing, Utilities, Agriculture						

NORMALLY ACCEPTABLE:
Specific land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements, and can meet the indoor noise standards.

CONDITIONALLY ACCEPTABLE:
New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design to meet interior and exterior noise standards, where applicable.

NORMALLY UNACCEPTABLE:
New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design to meet interior and exterior noise standards, where applicable.

CLEARLY UNACCEPTABLE: New construction or development should generally not be undertaken.

Based on Draft General Plan Guidelines published by the California State Office of Planning and Research, 2014.

9.2.2 Require site-design and noise reduction measures for any project, including transportation projects, that would cause significant degradation of the noise environment due to project effects that could:

(a) Increase the noise level at existing noise-sensitive receptors or areas by 5 dB or more, where the post-project CNEL or DNL will remain equal to or below 60 dB

(b) Increase the noise level at existing noise-sensitive receptors or areas by 3 dB or more, where the post-project CNEL or DNL would exceed 60 dB

9.2.4 For all new commercial and industrial developments which would increase noise levels above the normally acceptable standards in Table 9-2 or the maximum allowable standards in Table 9-3, the best available control technologies shall be used to minimize noise levels. In no case shall the noise levels exceed the standards of Table 9-3.

Table 9-3
Maximum Allowable Noise Exposure
Stationary Noise Sources[1]

	Daytime[5] (7 AM to 10 PM)	Nighttime[2,5] (10 PM to 7 AM)
Hourly Leq – average hourly noise level, dB [3]	50	45
Maximum level, dB [3]	70	65
Maximum level dB – Impulsive Noise [4]	65	60

dB = decibel

(1) As determined at the property line of the receiving land use. When determining the effectiveness of noise mitigation measures, the standards may be applied on the receptor side of noise barriers or other property line noise mitigation measures

(2) Applies only where the receiving land use operate or is occupied during nighttime hours

(3) Sound level measurements shall be made with "slow" meter response

(4) Sound level measurements shall be made with "fast" meter response

(5) Allowable levels shall be raised to the ambient noise levels where the ambient levels exceed the allowable levels. Allowable levels shall be reduced 5 dB if the ambient hourly Leq is at least 10 dB lower than the allowable level.

AMBIENT NOISE MEASUREMENTS

To quantify ambient noise levels, we conducted a long-term noise measurement along the nearest adjacent residential property lines (Big Basin Way and Ridge Drive) between 24 to 29 August 2023. Figure 1 shows the measurement location and measured ambient noise levels. The noise monitors were located on trees at an approximate height of 12 feet above grade.

Table 1 summarizes measured ambient noise levels. We have used the quietest $L_{eq}(h)$[1] as the ambient.

Table 1: Measured Ambient Noise Level at Adjacent Property Lines ($L_{eq(h)}$)

Ambient Noise Level (dBA)	DNL/CNEL (dBA)	Location	Measurement Hour of Lowest Leq(h)
47	69	Big Basin Way	3:00 AM, 26 August 2023
33	58	Ridge Drive	3:00 AM, 29 August 2023

[1] Leq(h) – The equivalent steady-state A-weighted sound level that, in an hour, would contain the same acoustic energy as the time-varying sound level during that hour. This metric is typically used to describe the "average" noise level over the course of an hour.

We calculated noise levels from future equipment would increase noise levels above the normally acceptable standards in Table 9-2. Additionally, the ambient levels along Ridge Drive are 10 dB lower than the allowable levels in Table 9-3, therefore, our analysis includes recommendations to meet the modified 40 dB criterion.

ANALYSIS

We understand the project equipment will be housed in a pump structure located approximately 115 feet away from the nearest residence on Ridge Drive and 100 feet away from the nearest residence on Big Basin Way. The project equipment and cumulative estimated noise levels to the nearest property lines are summarized in Table 2 below. For our calculations, we have estimated source sound levels based on equipment specifications provided to us on 16 August 2023. We assumed "worst case" conditions where all equipment is running simultaneously for at least one hour. Sound power levels for the generator were not provided, therefore we used manufacturer's sound data from a similarly sized generator in our analysis (about 80 to 100 kW). Wall assemblies were assumed to be solid CMU blocks, with louvers and doors as shown in the elevations.

Table 2: Summary of Cumulative Project Noise Level at Property Line (including Generator)

Location	Calculated Noise Level (Hourly Leq)
North Property Line	83 dBA
South Property Line (Nearest – Ridge Drive)	57 dBA

Noise levels are primarily dominated by generator exhaust noise and radiated noise through the louver from the generator intake. Table 3 below summarizes the estimated noise levels to the nearest property lines without the generator running.

Table 3: Summary of Cumulative Project Noise Level at Property Line (without Generator)

Location	Calculated Noise Level (Hourly Leq)
North Property Line	<25 dBA
South Property Line (Nearest – Ridge Drive)	<25 dBA

Under normal conditions where the generator will not be running continuously, noise from equipment within the pump room is expected to meet the criteria.

NOISE CONTROL RECOMMENDATIONS

To reduce noise levels to meet the criteria with the generator running, we recommend implementing the following strategies:

Southern Property Line – Ridge Drive

We recommend constructing a solid barrier that is at least 7 feet tall and no farther than 7 feet from the pump enclosure walls. The barrier should enclose the pump room at all sides and have the following specifications:

- Minimum surface density of 4 psf (materials such as approximately 12-gauge steel or two layers of ¾ inch thick plywood or similar sheathing would meet this requirement). The barrier should have sound-absorptive media facing the equipment enclosure (e.g., encapsulated 2-inch thick glass fiber or mineral wool)
- Joints between sheathing layers offset by at least 16-inches
- Free of any cracks and gaps at the face
- Drainage holes/slots kept to a minimum and covered with a minimum 1psf mass-loaded vinyl flap.

The sound-reducing barriers can be pre-manufactured or field-built to specifications above. Prefabricated products include the Silent Screen Panels by Empire, Modular Acoustical Metal Panels from IMI Acoustics, or Noiseblock by Kinetics Noise Control.

Northern Property Line

We recommend implementing the following generator-specific treatments in conjunction with the 7-foot barrier.

Exhaust Noise

Select a silencer/muffler for the exhaust duct with the following minimum insertion loss values.

Table 4. Exhaust Silencer Insertion Loss Values (dB)

Frequency (Hz)	63	125	250	500	1000	2000	4000	8000
Insertion Loss (dB)	13	13	13	21	21	21	21	21

Additionally, route the exhaust such that the exit vent is positioned lower than 7 feet such that the barrier covers the line of site to the vent.

Radiated Noise (through louver)

We recommend providing an acoustic louver at the vent of the generator, options include acoustic louvers from IAC with the following minimum insertion loss values.

Table 5. Louver Insertion Loss Values (dB)

Frequency (Hz)	63	125	250	500	1000	2000	4000	8000
Minimum Insertion Loss (dB)	5	7	11	12	15	14	12	9

Pump Structure

1. To reduce reverberant noise buildup within the two rooms (pump and generator), we recommend attaching 2-inch-thick mineral wool to available wall surfaces above 3-feet AFF and ceiling surfaces. The material should have a minimum NRC of 0.85. Reverberant noise is additive to directly emitted noise from the equipment, making the cumulative levels louder unless treated. Appropriate materials include Kinetics KNP panels or IAC Acoustics Noisefoil panels.
2. Doors to the pump structure rooms (pump and generator) should be insulated metal, tight fitting to the surrounding concrete structural walls, and fully perimeter gasketed. The goal is to have doors with sound isolation performance approaching that of the surrounding concrete; we recommend sound rated door assemblies with a minimum STC[2] rating of 47, such as those by IAC Acoustics and Noise Barriers, LLC.

* * *

This concludes our review of the property line noise analysis for the San Lorenzo Valley Water District pump equipment project. Please contact us with any questions.

Best,

CHARLES M. SALTER ASSOCIATES, INC.

Matthew Hsiung
Senior Consultant

Ethan Salter, PE, LEED AP
Vice President

cc: Christopher Small (csmall@sandis.net), Mike Kuykendall (mkuykendall@sandis.net)

[2] STC (Sound Transmission Class) – A single-number rating defined in ASTM E90 that quantifies the airborne sound insulating performance of a partition under laboratory conditions. Increasing STC ratings correspond to improved airborne sound insulation.

MEMO

DATE: September 21, 2023
TO: Board of Directors, San Lorenzo Valley Water District
FROM: Rick Rogers, District Manager
SUBJECT: Quail Hollow Road 2023 Storm Damage Repairs

WRITTEN BY: Garrett Roffe, Engineering Manager

PRESENTED BY: Garrett Roffe, Engineering Manager

STAFF RECOMMENDATION

It is recommended that the Board of Directors review the background information regarding the 2023 Storm Damage Repairs, Quail Hollow Road Summary of 2023 Storm Damage Repairs (Figure 5) and Proposal for Ground Penetrating Radar data collection of Quail Hollow Road and discuss.

RECOMMENDED MOTION

None

BACKGROUND

On October 22, 2021, the Board awarded the Quail Hollow Pipeline Replacement Project to Granite Rock Company for $2,387,000.00. The project provided 7,455 LF of new 12-inch ductile iron water main in Quail Hollow Road, with associated fittings, valves, services, hydrants, and abandoning in-place the existing 6-inch water main. On December 13, 2022 the County of Santa Cruz accepted the trench paving for the new water main.

On January 17, 2023 a sinkhole developed at the entrance to Quail Hollow Ranch County Park and the County of Santa Cruz chose to proceed with an emergency repair under force account managed by the County with the following site description. “The road is settling in the Eastbound lane at this location due to underground water flow in the soil under the road. Our general scope would be (under field direction) to dewater the site by intercepting upstream surface and subsurface water, excavate roadway and determine extent of undermining, backfill voids, & restore roadway pavement.” On January 18, 2023 the County of Santa Cruz authorized Granite Rock Company to perform emergency sinkhole repairs near the entrance to Quail Hollow Ranch County Park.

On February 21, 2023 Granite Rock Company completed all punchlist items for the District’s Quail Hollow Pipeline Replacement project. On March 7, 2023 a pavement failure near Quail Hollow Circle required the County of Santa Cruz to place a single trench plate over the pavement failure at approximately 7 pm. On March 8, 2023 Granite Rock Company placed eleven additional trench plates on Quail Hollow Road starting at the intersection of Quail Hollow Circle heading easterly towards Zayante Road. On March 16, 2023 Granite Rock Company removed pavement at the pavement failure near Quail Hollow Circle and discovered a sinkhole approximately four feet wide and eight feet long on the north side of the slurry backfill. On the same day, pavement removal near 301 Quail Hollow Road exposed a sinkhole two feet wide and ten feet long on the south side of the slurry backfill. On March 16, 2023 the sinkholes were observed by County of Santa Cruz Public Works personnel and requested voids be temporarily backfilled with drain rock until permanent repairs could be completed. On March 22,

2023 Granite Rock Company placed four additional trench plates near 301 Quail Hollow Road. On March 30, 2023 the repairs to Quail Hollow Road were chosen to be classified as emergency storm damage repairs separate from the Quail Hollow Pipeline contract. On April 5, 2023 Granite Rock Company readjusted the steel trench plates, welded them together at each end and placed drain rock in a void.

On April 11, 2023 Anderson Pacific Engineering Construction Inc. was contacted to provide a time and materials, not to exceed contract for emergency repairs to Quail Hollow Road. On April 17, 2023 the trench plates were removed near Quail Hollow Circle and the slurry backfill was removed from above the new water main exposing a void extending towards the road centerline. The extents of the void appeared to comprise both lanes of Quail Hollow Road and would require a full closure of the road to complete repairs. On April 18, 2023 the County of Santa Cruz denied the proposed full closure of Quail Hollow Road for sinkhole repairs.

On April 20, 2023 an Emergency Construction Contract with Anderson Pacific Engineering Construction, Inc for time and materials not to exceed $108,000.00 was executed to explore and repair of the failed mainline trench in Quail Hollow Road, and includes, but is not limited to, provision of backfill and paving materials, excavation, evaluation of failure extent, backfill, compaction, traffic control, shoring, reestablishment of alignment of existing pipeline, and asphalt paving.

The Notice of Completion for the District's Quail Hollow Pipeline Replacement project with Granite Rock Construction was recorded with the County of Santa Cruz on May 10, 2023.

On May 25, 2023 an Emergency Construction Contract with Anderson Pacific Engineering Construction, Inc for time and materials not to

exceed $250,000.00 was executed to explore and repair of the failed mainline trench in Quail Hollow Road, and includes, but is not limited to, provision of backfill and paving materials, excavation, evaluation of failure extent, backfill, compaction, traffic control, shoring, reestablishment of alignment of existing pipeline, and asphalt paving. On June 5, 2023 Anderson Pacific Engineering Construction, Inc. began repairs of the sinkholes in Quail Hollow Road.

On August 3, 2023 the Board authorized an amendment to the existing expenditure of time and materials not to exceed $600,000.00 for exploration of the failed potable water main trench in Quail Hollow Road. To date all known sinkholes have been repaired.

Anderson Pacific completed final paving of the trench repair work in Quail Hollow Road on August 14, 2023 and August 15, 2023 and installed minor concrete rings around valve boxes on August 16, 2023 and August 17, 2023. The County of Santa Cruz performed pavement surface treatment on Quail Hollow Road August 25, 2023 & August 28, 2023.

The District has submitted to FEMA for grant funding and is awaiting obligation. The District has several experts looking at the many different aspects of the project that may have caused the sinkholes to develop in Quail Hollow Road. The Geotechnical Report indicates the native material in Quail Hollow Road near the sand quarry was soft material based on the blow counts (This is a standard penetration test where a 140-pound weight is dropped and the number of blows to advance the point one foot is counted. The more the blows the harder the soil.). The region experienced Atmospheric River rain events that caused soil failures throughout the County. At this time, the exact cause of the sinkholes is unknown.

PRIOR COMMITTEE ACTION

None

FISCAL IMPACT

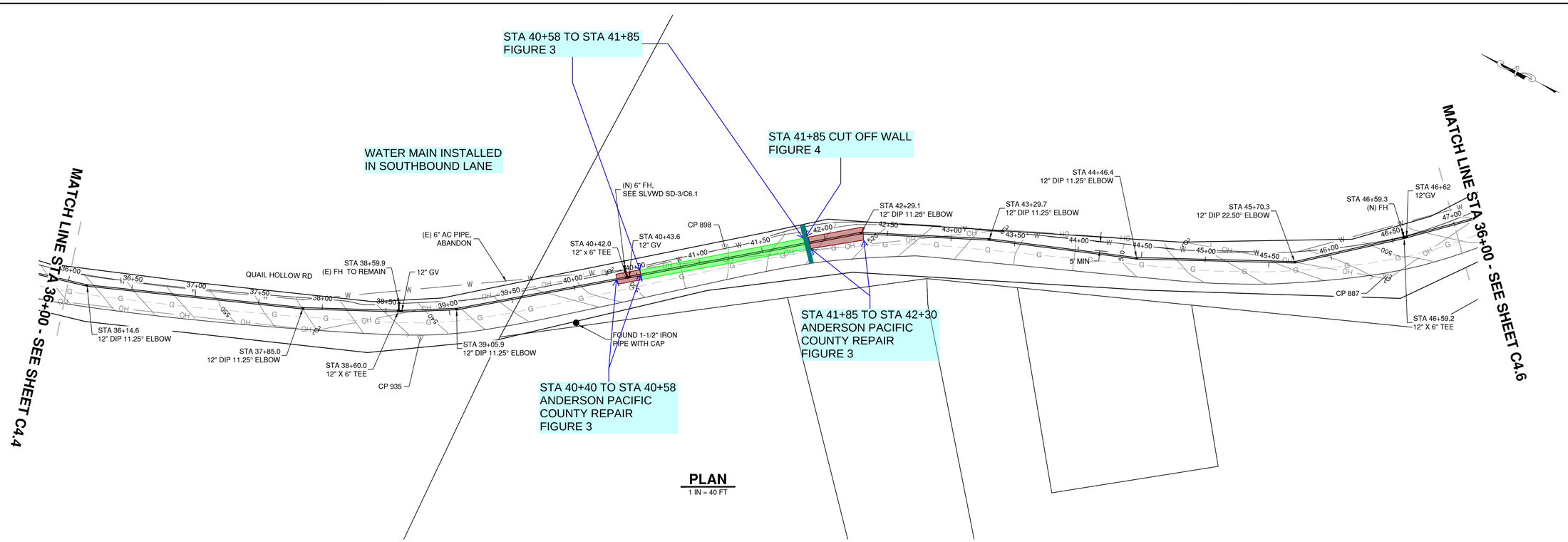
Estimated $950,000.00

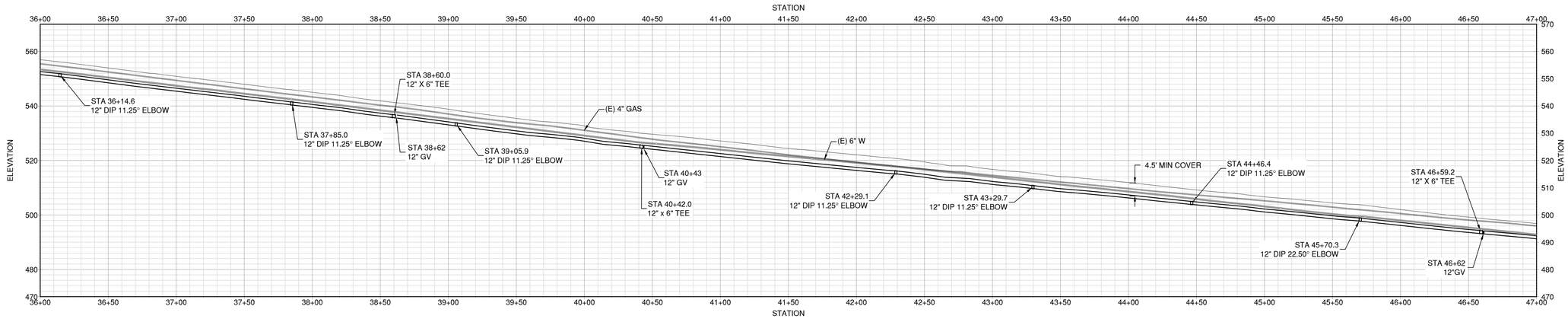
ENVIRONMENTAL IMPACT

None

ATTACHMENTS

- Quail Hollow Pipeline Replacement 07122021 8
- Quail Hollow Pipeline Replacement 07122021 10
- Quail Hollow Pipeline Replacement 07122021 11
- Figure 1 Trench Repair Detail-Slurry Bedding
- Figure 2 Cleanout and Side Drain
- Figure 3 Trench Repair Detail-Sand Bedding
- Figure 4 Cut Off Wall
- Figure 5 Quail Hollow Summary of 2023 Storm Damage Repairs
- Quail Hollow Road Contour Map
- 191110.001-SLVWD-Waterline-GeotechRpt.
- Proposal from GPRDATA for Ground Penetrating Radar Survey





PROFILE
HOR. SCALE: 1 IN = 40 FT
VER. SCALE: 1 IN = 20 FT

NOTES:
1. ALONG THE ALIGNMENT OF THE NEW WATER MAINS, ALL EXISTING WATER SERVICES, WHETHER OR NOT SHOWN ON THE DRAWINGS, SHALL BE REPLACED. REPLACEMENT SERVICES SHALL EXTEND FROM THE NEW WATER MAIN TO A NEW WATER METER. WATER METERS SHALL BE FURNISHED BY SLVWD AND INSTALLED BY THE CONTRACTOR. ALL OTHER SERVICE COMPONENTS, INCLUDING WATER METER BOX, SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR. NEW METER BOXES SHALL BE INSTALLED IN THE SAME LOCATION AS THE EXISTING UNLESS OTHERWISE INDICATED OR OTHERWISE DIRECTED BY SLVWD. NEW SERVICES SHALL BE PER SLVWD STANDARD DETAIL SD-4 OR SD-5. NEW SERVICE PIPING SHALL BE THE SAME SIZE AS THE EXISTING SERVICE PIPING EXCEPT IF THE EXISTING SERVICE PIPING IS LESS THAN 1-INCH DIAMETER. IF THE EXISTING SERVICE PIPING IS LESS THAN 1-INCH DIAMETER, NEW SERVICE PIPING SHALL BE 1-INCH DIAMETER.
2. PARCEL BOUNDARIES ARE IMPORTED FROM GIS AND FOR INFORMATION ONLY. CORNERS ARE NOT FIELD SURVEYED.
3. LOCATION OF GAS MAIN IS APPROXIMATE. PROVIDE A MIN. 5 FT SEPARATION.

0 40 80 Feet

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Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS
3 Quail Run Circle, Suite 101
Salinas, CA 93907-2348
(831) 883-4848

REGISTERED PROFESSIONAL ENGINEER
JOSEPH T. SIEBERTZ
No. 69703
CIVIL
STATE OF CALIFORNIA

PLAN & PROFILE IV
QUAIL HOLLOW ROAD
PIPELINE REPLACEMENT

San Lorenzo Valley WATER DISTRICT

DESIGNED BY:	JCT	DATE: 7/12/2021
DRAWN BY:	JCT	DATE: 7/12/2021
QC CHECKED BY:	AAS	DATE: 7/12/2021
PROJECT NO.:		
SCALE:	AS SHOWN	
SUBMITTAL:	100% SUBMITTAL	

C4.5
SHEET 8 OF 14

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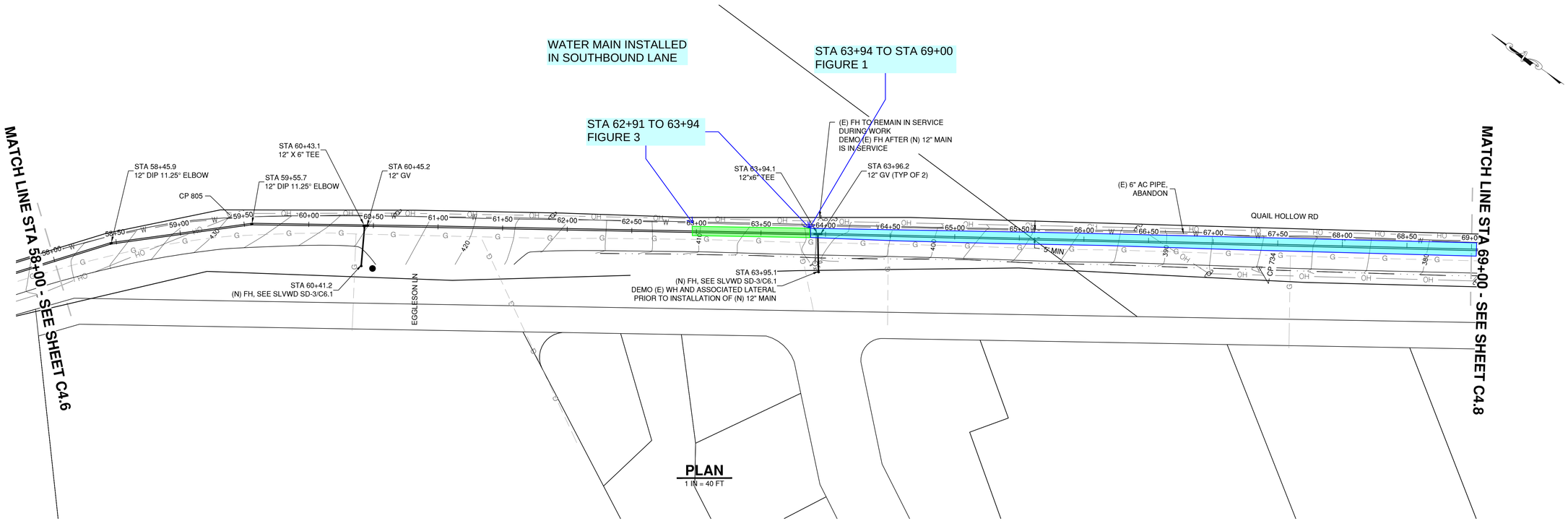

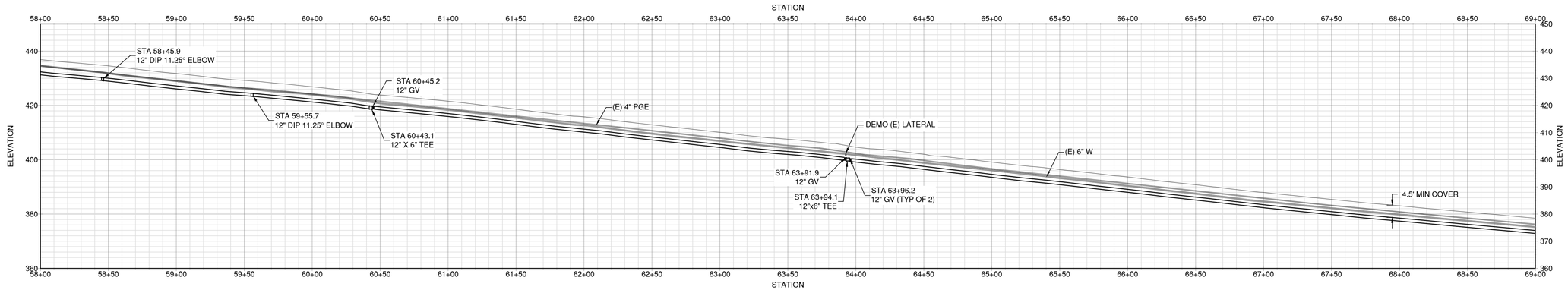

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PROFILE
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0 40 80 Feet

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5			

Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS
3 Quail Run Circle, Suite 101
Salinas, CA 93907-2348
(831) 883-4848

REGISTERED PROFESSIONAL ENGINEER JOSEPH T. SIEGBERT No. 69703 CIVIL STATE OF CALIFORNIA

PLAN & PROFILE VI

QUAIL HOLLOW ROAD PIPELINE REPLACEMENT

San Lorenzo Valley WATER DISTRICT

DESIGNED BY:	JCT	DATE: 7/12/2021
DRAWN BY:	JCT	DATE: 7/12/2021
QC CHECKED BY:	AAS	DATE: 7/12/2021
PROJECT NO.:		
SCALE:	AS SHOWN	
SUBMITTAL:	100% SUBMITTAL	

C4.7
SHEET 10 OF 14

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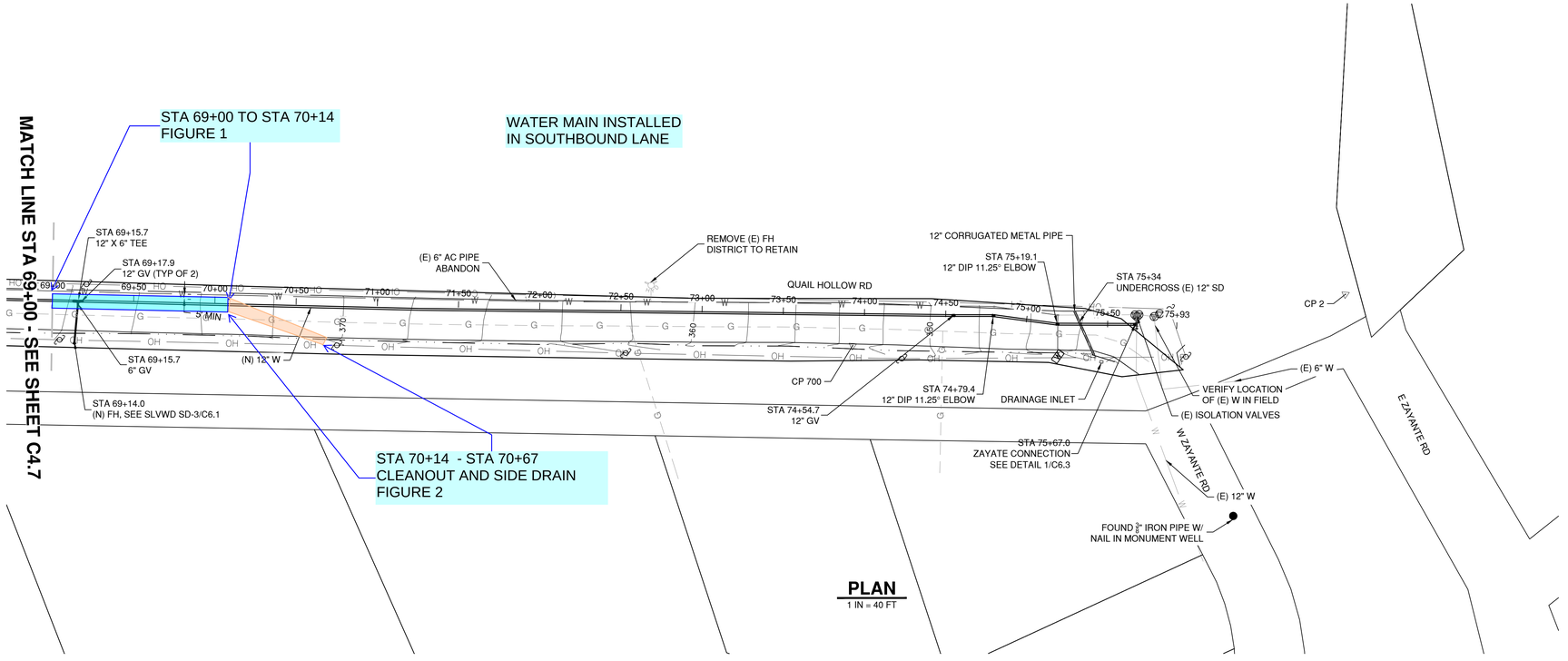
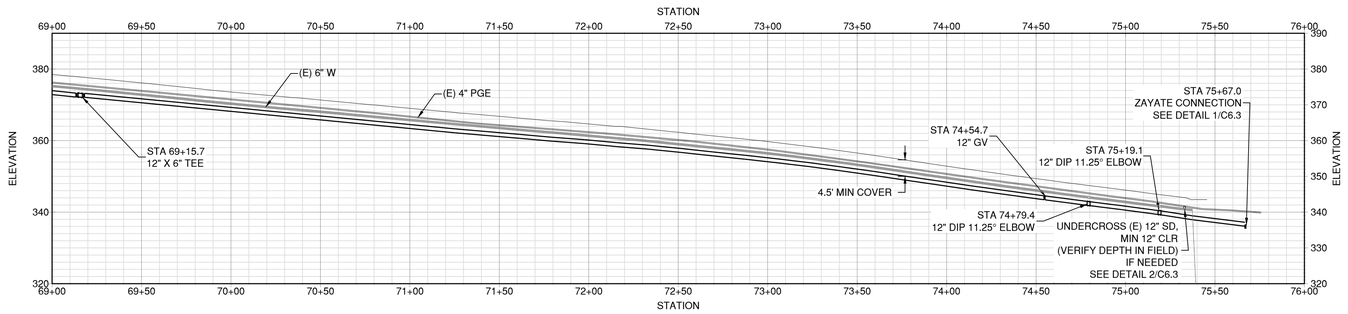


PLAN
1 IN = 40 FT



NOTES:
1. ALONG THE ALIGNMENT OF THE NEW WATER MAINS, ALL EXISTING WATER SERVICES, WHETHER OR NOT SHOWN ON THE DRAWINGS, SHALL BE REPLACED. REPLACEMENT SERVICES SHALL EXTEND FROM THE NEW WATER MAIN TO A NEW WATER METER. WATER METERS SHALL BE FURNISHED BY SLVWD AND INSTALLED BY THE CONTRACTOR. ALL OTHER SERVICE COMPONENTS, INCLUDING WATER METER BOX, SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR. NEW METER BOXES SHALL BE INSTALLED IN THE SAME LOCATION AS THE EXISTING UNLESS OTHERWISE INDICATED OR OTHERWISE DIRECTED BY SLVWD. NEW SERVICES SHALL BE PER SLVWD STANDARD DETAIL SD-4 OR SD-5. NEW SERVICE PIPING SHALL BE THE SAME SIZE AS THE EXISTING SERVICE PIPING EXCEPT IF THE EXISTING SERVICE PIPING IS LESS THAN 1-INCH DIAMETER. IF THE EXISTING SERVICE PIPING IS LESS THAN 1-INCH DIAMETER, NEW SERVICE PIPING SHALL BE 1-INCH DIAMETER.
2. PARCEL BOUNDARIES ARE IMPORTED FROM GIS AND FOR INFORMATION ONLY. CORNERS ARE NOT FIELD SURVEYED.
3. LOCATION OF GAS MAIN IS APPROXIMATE. PROVIDE A MIN. 5 FT SEPARATION.

PROFILE
HOR. SCALE: 1 IN = 40 FT
VER. SCALE: 1 IN = 20 FT

0 40 80 Feet

UNDERGROUND SERVICE ALERT
CALL: TOLL FREE
1-800
227-2600
TWO WORKING DAYS BEFORE YOU DIG

REV. NO.	DESCRIPTION	BY	DATE
1			
2			
3			
4			
5			

Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS
3 Quail Run Circle, Suite 101
Salinas, CA 93907-2348
(831) 883-4848

REGISTERED PROFESSIONAL ENGINEER JOSEPH C. SIEGBERT No. 69703 CIVIL STATE OF CALIFORNIA

PLAN & PROFILE VII

QUAIL HOLLOW ROAD PIPELINE REPLACEMENT

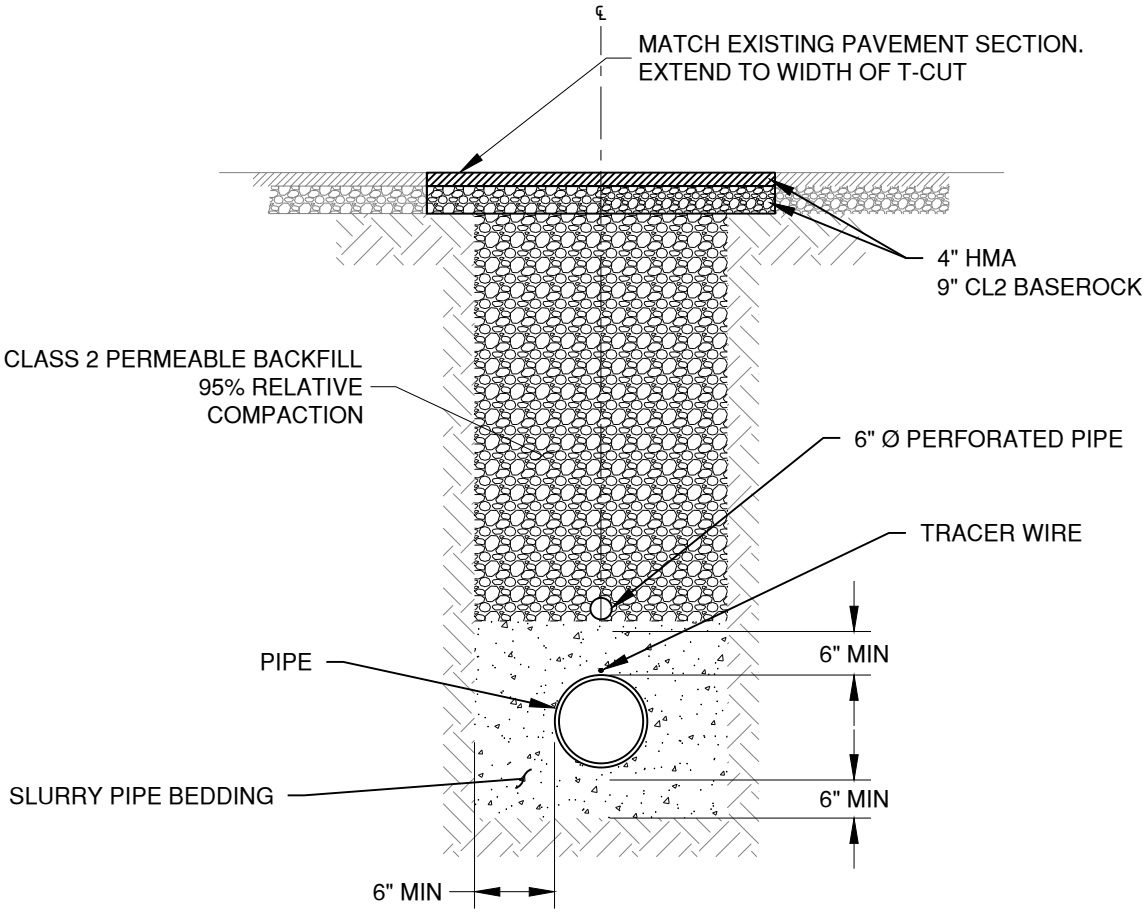
San Lorenzo Valley WATER DISTRICT

DESIGNED BY:	JCT	DATE: 7/12/2021
DRAWN BY:	JCT	DATE: 7/12/2021
QC CHECKED BY:	AAS	DATE: 7/12/2021
PROJECT NO.:		
SCALE:	AS SHOWN	
SUBMITTAL:	100% SUBMITTAL	

C4.8
SHEET 11 OF 14

C:\USERS\JTABUE\DESKTOP\SLVWD QH\QUAIL HOLLOW WORKING\SLVWD QUAILHOLLOW 12JULY2021.DWG 7/12/2021 BY JTABUE

Figure 1 - Trench Detail



NOTES:

1. FILL ALL VOIDS IN PIPE ZONE WITH SLURRY.

2. BACKFILL MATERIAL SHALL BE AS SHOWN. BACKFILL SHALL BE PLACED IN LIFTS NO GREATER THAN 8 INCHES, UNCOMPACTED. COMPACT BACKFILL LIFTS TO 95% RELATIVE COMPACTION.

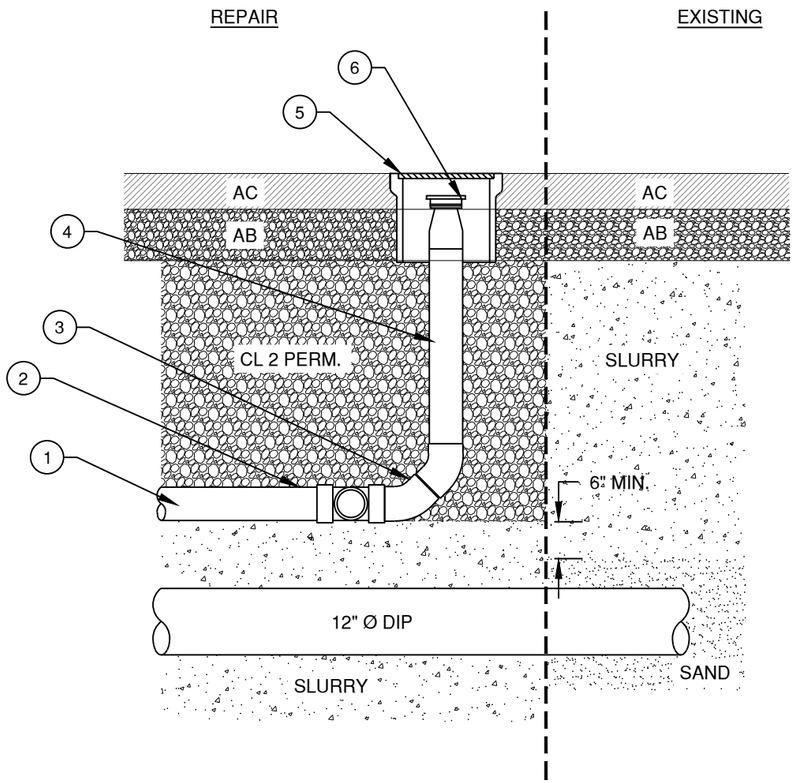
3. PERFORATED PIPE SHALL HAVE CLEANOUTS EVERY 100 LF AND TERMINAL ENDS.

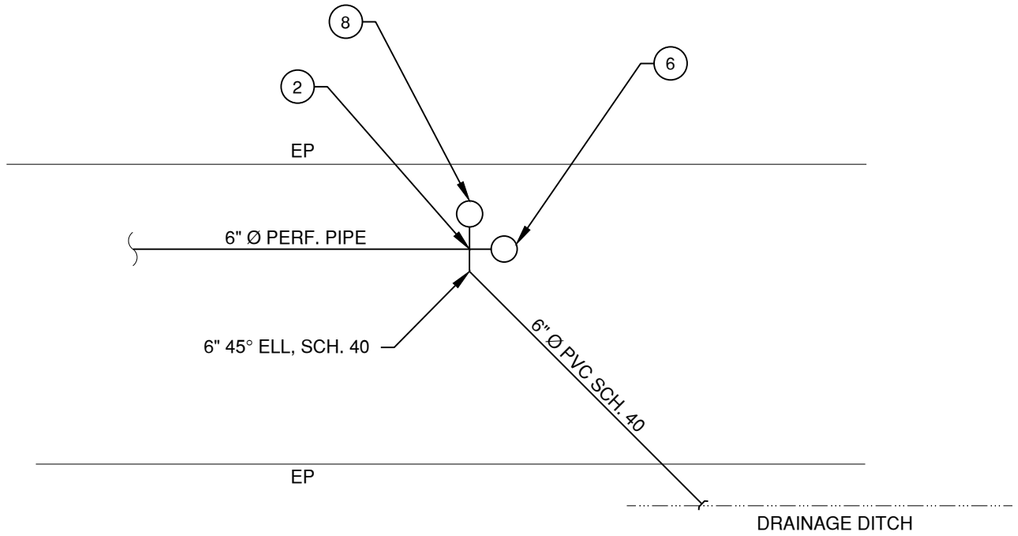
4. PAVEMENT CUTTING, RESTORATION SECTION, AND RESTORATION EXTENTS SHALL BE AS DESCRIBED IN THE COUNTY ENCROACHMENT PERMIT.

C:\USERS\JTABUE\DESKTOP\SLVWD QH\QUAIL HOLLOW WORKING\TRENCH SECTION.DWG byJTABUE 8/9/2023 8:48 AM

Schaaf & Wheeler

Figure 2





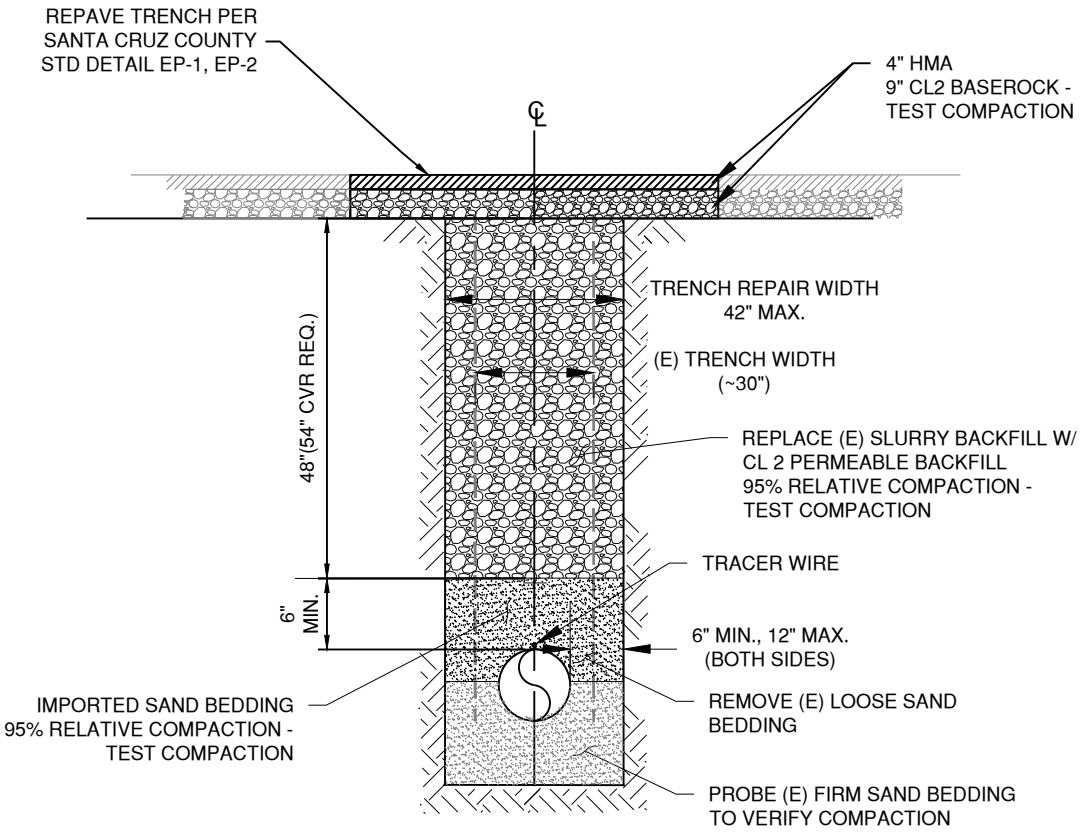
1	6" PERFORATED DRAIN PIPE
2	6" X 6" PVC CROSS
3	6" 45° ELL (TYP)
4	6" PVC, SCH 40 (TYP)
5	F8 VALVE BOX W/ V1-71C GRATE
6	4" POPPER CLEANOUT & RELIEVE VALVE, JONES STEPHENS OR EQUAL
7	6" X 4" PVC RED.
8	CLEANOUT WITH F8 VALVE BOX & F8C LID

NOT TO SCALE

C:\USERS\JTABUE\DESKTOP\SLVWD QH\QUAIL HOLLOW WORKING\TRENCH SECTION.DWG byJTABUE 7/6/2023 4:06 PM

Schaaf & Wheeler

Figure 3 - Trench Repair Detail



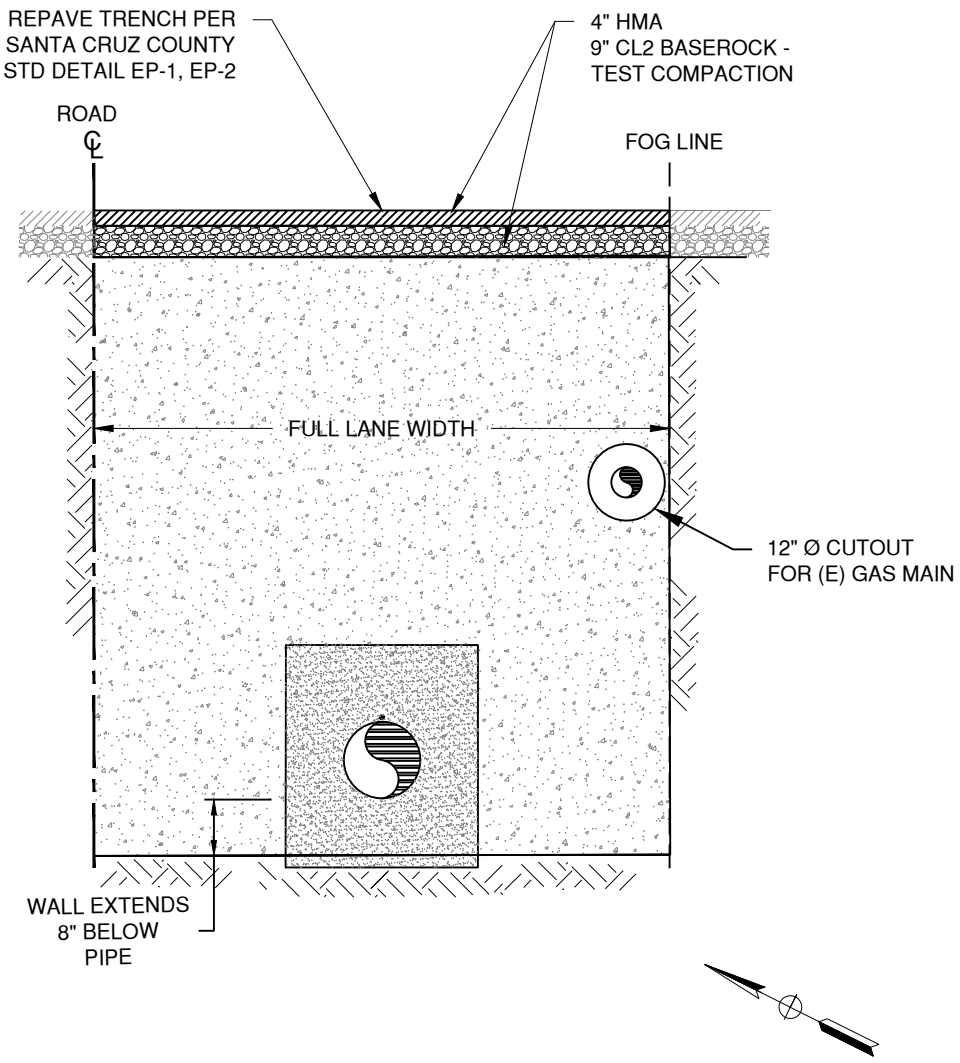
TRENCH SECTION
QUAIL HOLLOW RD STA 62+00

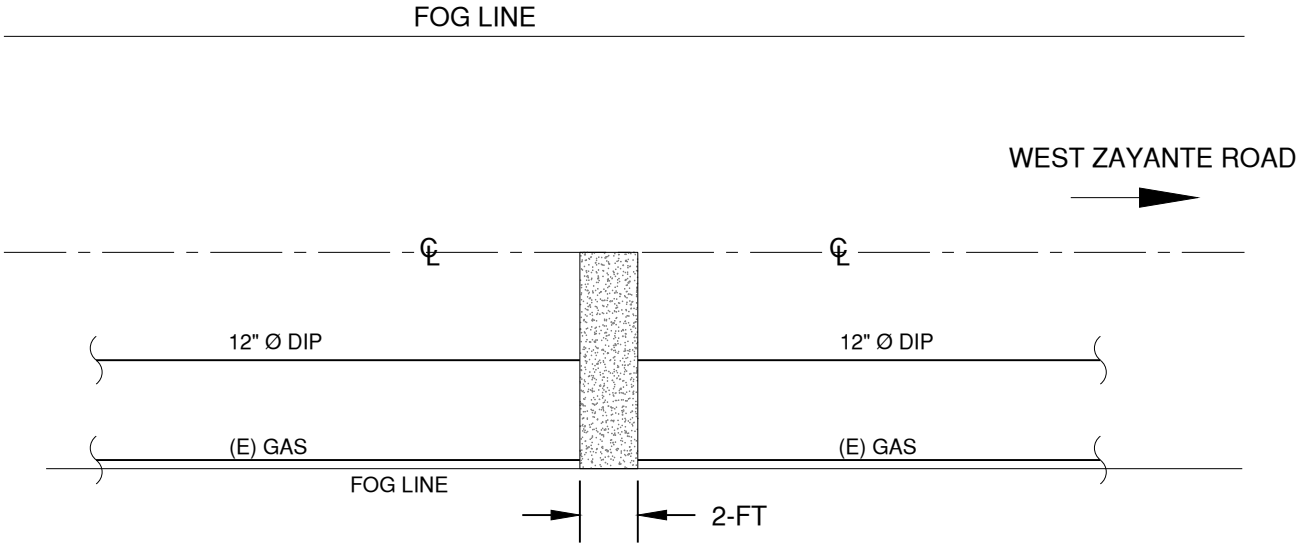
NOTE: BACKFILL AND BEDDING SHALL BE
TESTED TO VERIFY COMPACTION

C:\USERS\JTABIJE\DESKTOP\SLVWD QH\QUAIL HOLLOW WORKING\TRENCH SECTION.DWG byJTABIJE 7/27/2023 3:16 PM

Schaaf & Wheeler

Figure 4 - Cut Off Wall Detail





CUT-OFF WALL
QUAIL HOLLOW RD STA 41+85

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File: C:\Users\GarretRoffe\Desktop\Board of Directors - District Project Update\SLVWD Quail Hollow Engineering Committe Figure.dwg Date:Sep 11, 2023 - 12:29pm, GarretRoffe

EXISTING CULVERT
CONSTRUCTION PHOTOS 07/13/2022

EXISTING CULVERT CONDITION
PHOTOS 09/06/2023

QUAIL HOLLOW RANCH PARKING LOT CLOSED
HIGH WATER TABLE
PHOTO 03/16/2023

EXISTING CULVERT
CONSTRUCTION PHOTOS 08/05/2022

EXISTING CULVERT CONDITION
PHOTOS 08/23/2023

MARCH STORM DAMAGE
REPAIRED BY SLVWD & ANDERSON PACIFIC
PHOTOS 04/18/2023

ROBLES DR

EXISTING CULVERT
CONSTRUCTION PHOTOS 07/20/2022

EXISTING CULVERT CONDITION
PHOTOS 09/11/2023

CONNECT TO (E) 12" W
AT CUMORA LN

CUMORA LN

EGGLESON LN

CONNECT TO (E) 12" W
AT W ZAYANTE RD

CP 734

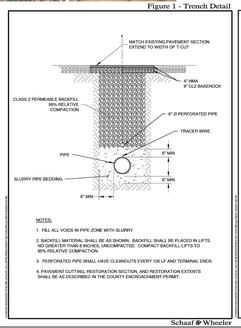
CP 700

W ZAYANTE RD

JANUARY STORM DAMAGE
REPAIRED BY SANTA CRUZ COUNTY PUBLIC WORKS DEPARTMENT & GRANITEROCK
PHOTOS 01/17/2023

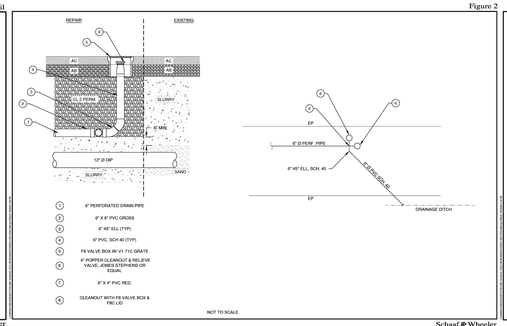
PARALLEL PG&E GAS TRENCH
HIGH WATER TABLE
PHOTOS 03/16/2023

Figure 1 - Trench Detail



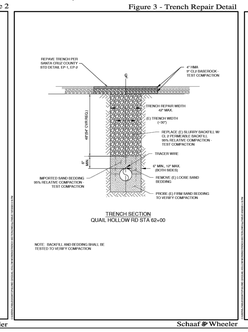
Schaaf & Wheeler

Figure 2



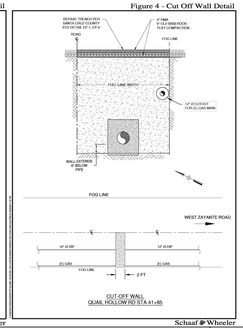
Schaaf & Wheeler

Figure 3 - Trench Repair Detail



Schaaf & Wheeler

Figure 4 - Cut Off Wall Detail



Schaaf & Wheeler

0 200 400 Feet

San Lorenzo Valley
WATER DISTRICT

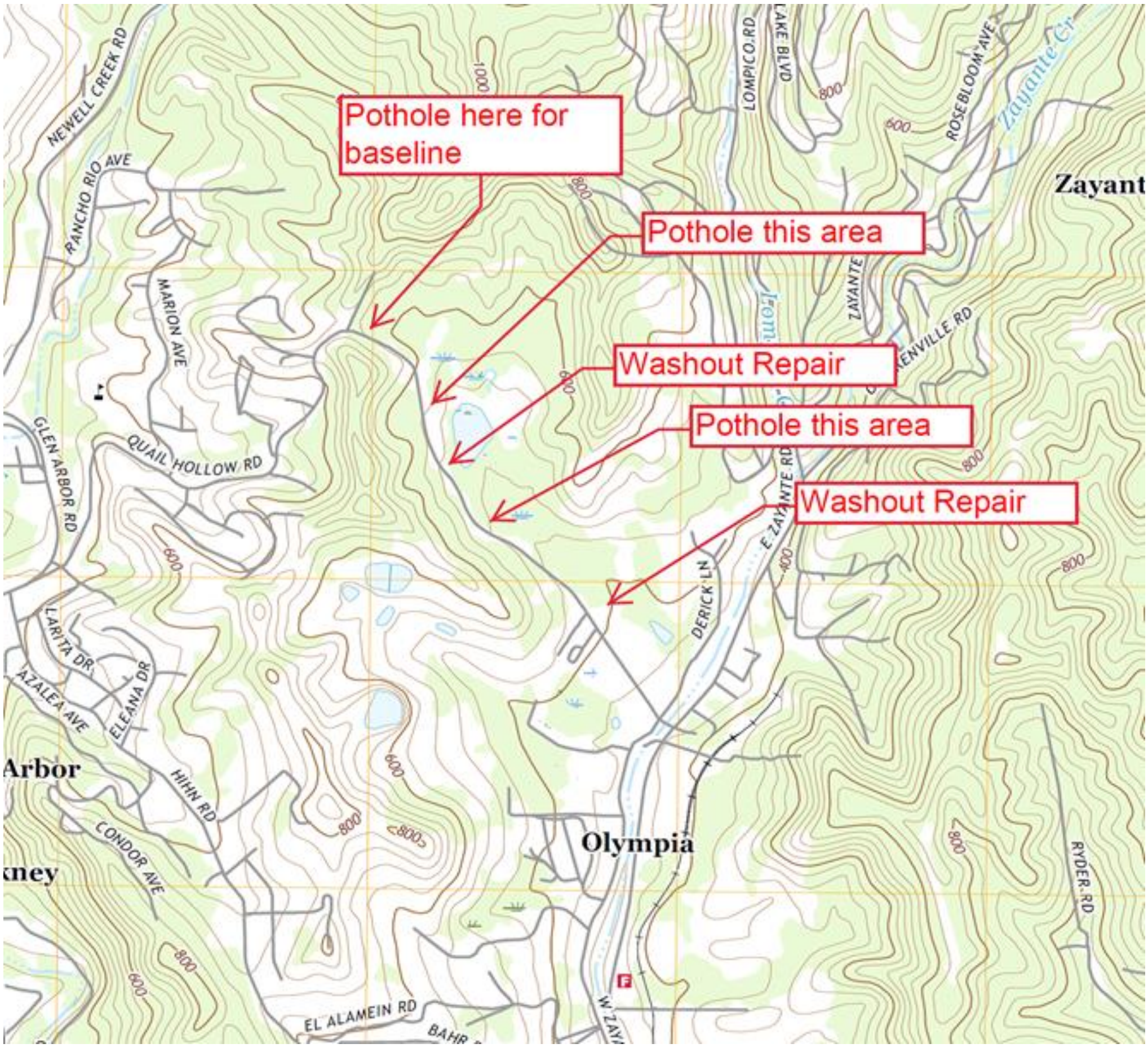
DATE:	09/14/2023
SCALE:	NTS
DRAWN BY:	GR
APPROVED BY:	RR

No.	REVISION/ISSUE	DATE	BY

SAN LORENZO VALLEY WATER DISTRICT
ENGINEERING/ENVIRONMENTAL COMMITTEE MEETING
QUAIL HOLLOW ROAD
SUMMARY OF 2023 STORM DAMAGE REPAIRS

13060 Hwy 9
Boulder Creek, CA 95006
(831) 338-2153

SHEET
FIG 5


Pothole here for baseline
Pothole this area
Washout Repair
Pothole this area
Washout Repair
NEWELL CREEK RD
RANCHO RIO AVE
MARION AVE
QUAIL HOLLOW RD
GLEN ARBOR RD
LOMPICO RD
LAKE BLVD
ROSEBLOOM AVE
Zayante Cr
ZAYANTE
KENVILLE RD
E ZAYANTE RD
DERICK LN
LARITA DR
ELEANA DR
AZALEA AVE
HIHN RD
CONDOR AVE
EL ALAMEIN RD
RYDER RD
Olympia
Arbor
1000
800
600
400

September 5, 2023

Garrett Roffe
San Lorenzo Valley Water District
groffe@slvwd.com

Dear Garrett Roffe,

GPR Data Inc. is pleased to provide the following proposal for a **ground penetrating radar (GPR) survey** to locate and map voiding in the sand bedding of an existing pipeline in the San Lorenzo Valley, CA.

GPR Data will provide experienced GPMR engineers to perform the scanning. GPR Data's services will be provided at your direction and that of your representatives.

SCOPE OF SERVICES:

A. Field work:

Use of 350 MHz ultra-wideband GPR antenna connected to a GSSI SIR4000 receiving unit to top-down survey the sand bedding around 6500’ linear feet of pipeline to locate and map voiding.

Georeferenced data collection along pipeline for post-processing and analysis.

B. Deliverable:

Data collected during field work will be reproduced and georeferenced in AutoCAD with void locations overlaid on provided plans.

See section D for sample output.

Narrative report describing the methods utilized to conduct the survey, equipment used, and an explanation of the results of the geophysical survey.

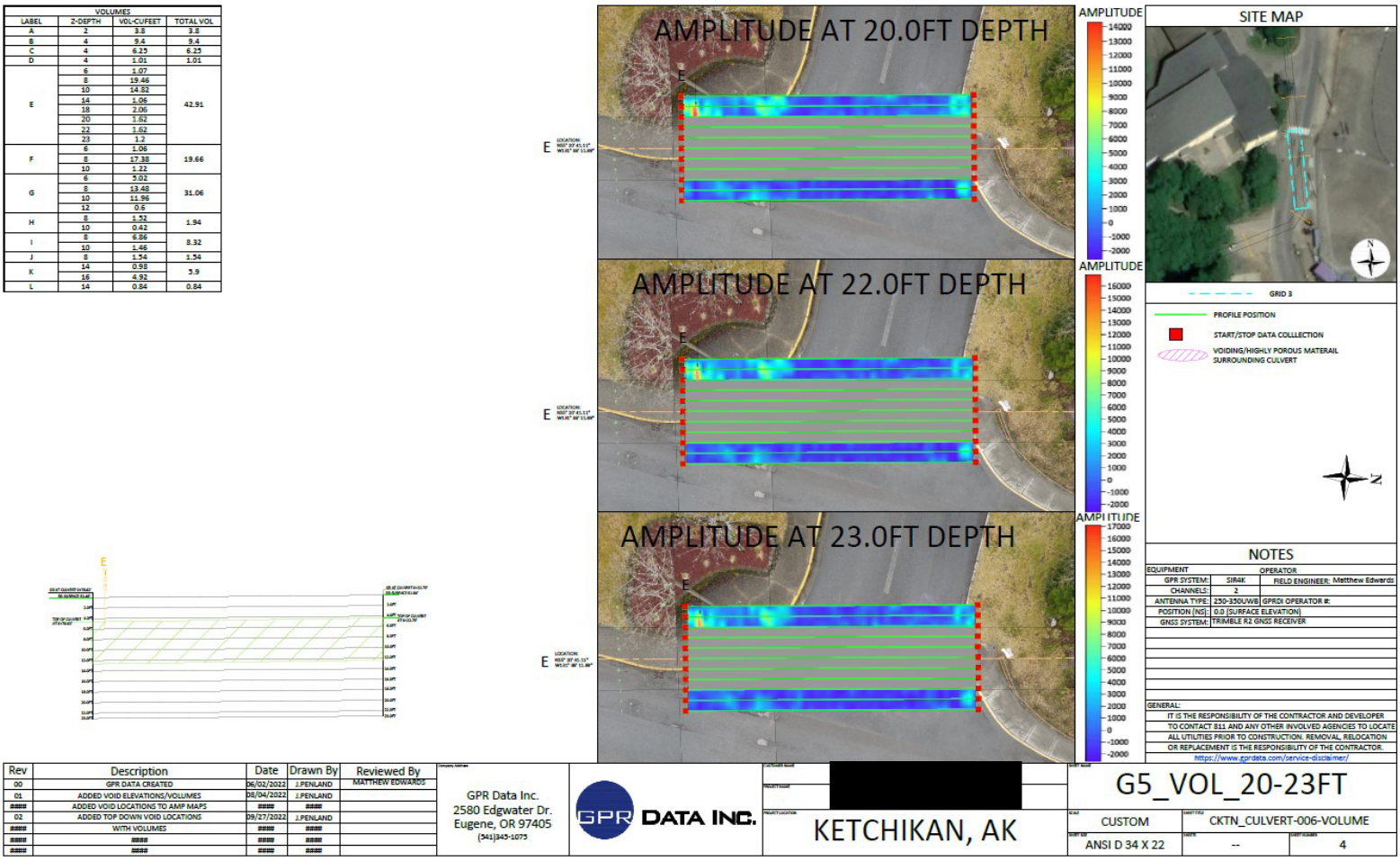
C. Additional Information:

GPR data will meet all the requirements identified in the scope of services within the reasonable considerations of access and the client's direction of scope and schedule. GPR Data understands the schedule for this scope of service to be performed and completed within the client's timeframe.

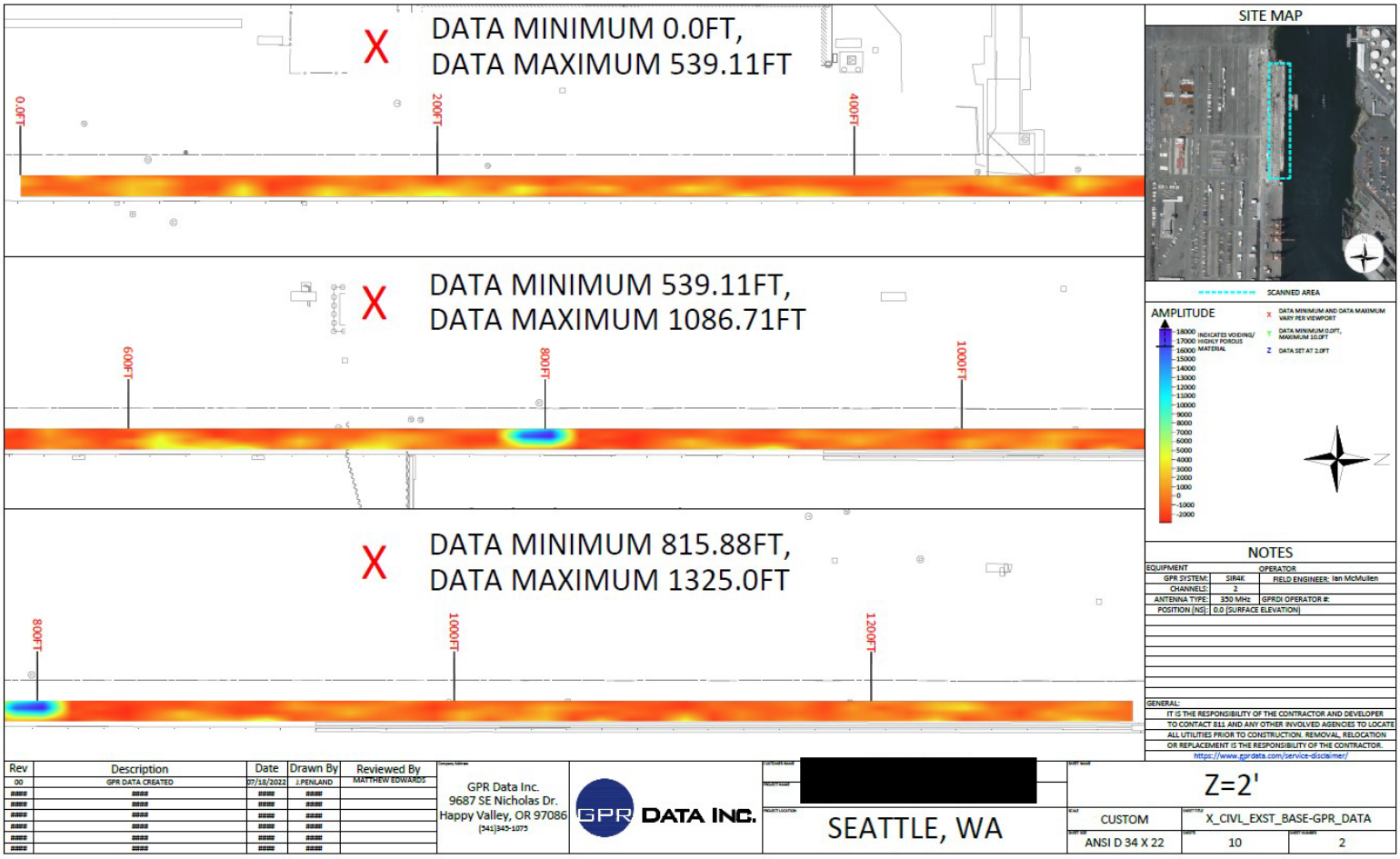
D. Sample Deliverable:

Please note that this is for demonstration only, and the final deliverable will be high quality and full resolution.

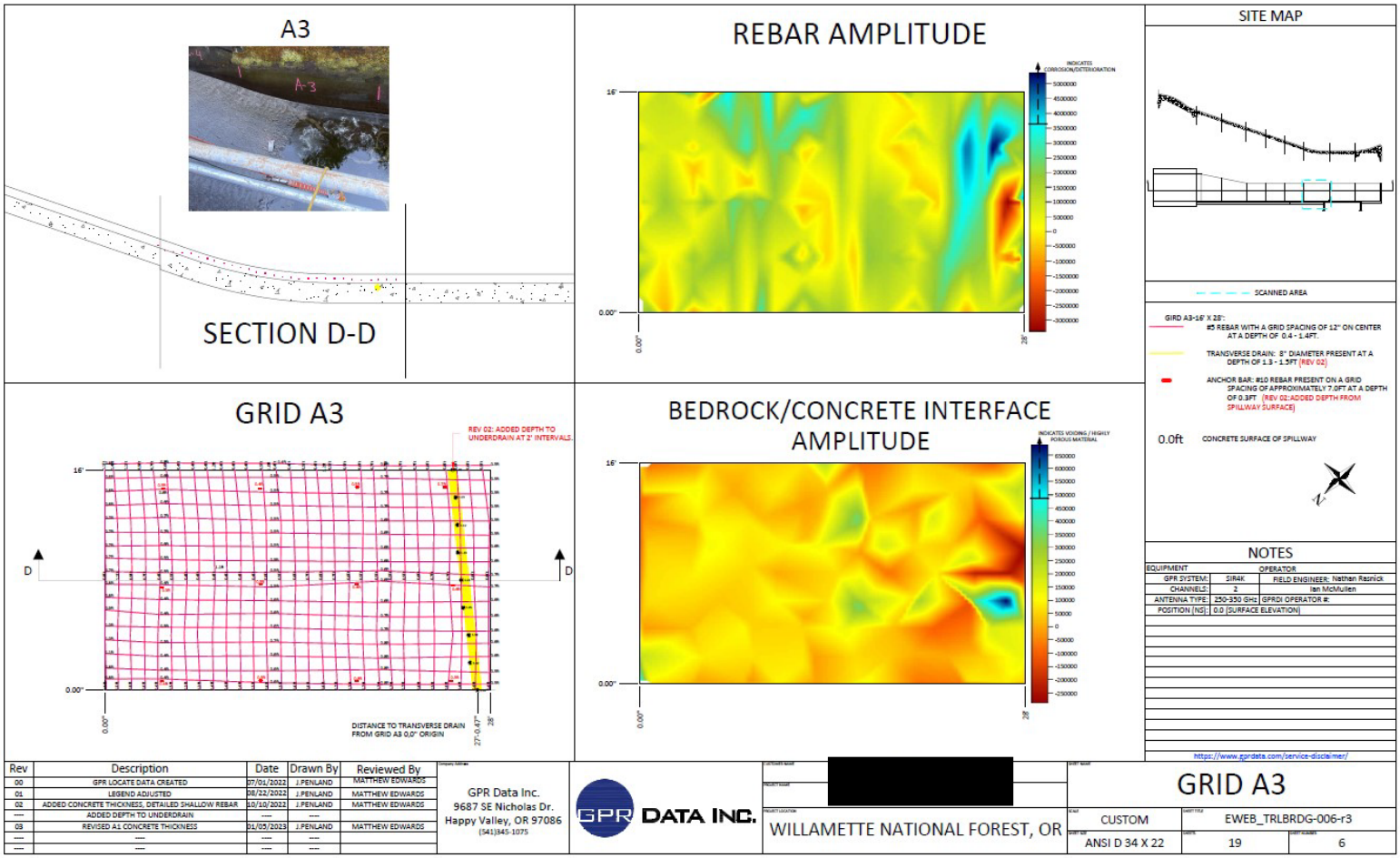
Void mapping around a culvert in Ketchikan, AK with voiding presented in 2' intervals to a depth of 23':



Void mapping at the Port of Seattle:



Void mapping under concrete spillway (bedrock/concrete interface amplitude):



SCHEDULE:

Field Work: TBD

Preliminary Site Survey Deliverable: Delivered 21 calendar days after start of field work

Final Site Survey Deliverable: Delivered 5 calendar days after review of preliminary survey by San Lorenzo Valley Water District

ESTIMATED FEES

Field work, data collection, mobilization, data processing:	$2/ft @ 6500’

Total: $13,000

Stand by time billed at **$250.00** per hour

Additional work required beyond the scope of services included in this proposal, or as caused by factors beyond GPR Data's control, will be invoiced on a time and materials basis. Additional work will not be performed without prior written authorization.

GPR Data, inc. will proceed with the work and issue reports after acceptance of this proposal or a purchase order referencing this proposal and date.

Matthew J. Edwards | President

GPR DATA INC.

O (541) 345-1075 | M (541) 228-6851
Eugene | Portland | Medford
Seattle | Las Vegas | Los Angeles

Related or Noteworthy Projects

IHNC Lock Repairs, Louisiana

Services: Scan and identify concrete voids and delaminated surfaces

Oregon Convention Center Parking Garage (Mortenson Construction), Oregon

Services: Concrete scanning, rebar, and post-tension cable identification

Union Station (City of Portland), Oregon

Services: Concrete scanning and as-built documentation.

Air Station Kodiak (U.S. Coast Guard), Alaska

Services: Locate and map subsurface hangers in concrete and asphalt for one million square feet of tarmac apron.

90/154N Bridge (WSDOT), Washington

Services: Rebar and deterioration mapping.

Siuslaw River Crossing (ODOT), Oregon

Services: Concrete scanning prior to anchor placement.

Lost Hills Oil Field (Seneca), California

Services: Subsurface void detection

Amazon Fulfillment Center (Amazon), Washington

Services: Concrete scanning and as-built drafting

8th Ave Trolley Track Locate (Historical Research Associates), Eugene Oregon

Services: Scan and map historic trolly track location in roadway

Professional References

1. Dee Watson PPE, NextEra Energy Resources, LLC., (727) 254-1826
2. Roberto Hernandez ME, United States Steel Corporation, (219) 545-3094
3. Daniel Joines PE, BP Whiting Refinery, (219) 473-3670
4. Robert Healy RM, Michels Pipeline Corporation, (425) 952-6235
5. Robert Striker PE, Gary Works United States Steel Corporation, (219) 689-4060
6. Guido Portiere PE, David Evans & Associates, (503) 480-1303
7. Scott Ratte PA, Geophysical Survey Systems Inc., (603) 893-1109
8. Chris Hunter PE, Oregon Department of Transportation ODOT, (503) 986-6936
9. Jay Williams Senior PE, Cascade Earth Sciences, (208) 388-1030
10. Randall Brooks PM, T. Lucky & Sons, (513) 353-2544
11. Dan Welch PA, Geophysical Survey Systems Inc., (603) 681-2031
12. Larry Fambrough PM, AERA Energy Inc., (661) 201-7947
13. Scott Williams CEO, Hamilton Construction Company, (541) 726-2426
14. Eric Suriano PM, DEPCOM Power Inc., (602) 510-9332
15. Alyssa Kruger PM, NextEra Energy Resources, LLC., (561) 699-2929

Matthew J. Edwards

President

matthew.edwards@gprdata.com | 541-345-1075

In addition to his vision for the company and leading the overall direction of GPR Data, Matthew is also our lead geophysicists. Matthew oversees sampling, scanning, and our state-of-the-art equipment protocols for most of our projects. He is responsible for client relationships, is an expert in complex problem resolutions, and provides the engineered solutions to meet our client's needs.

Academic Background

Master of Science Geology/Geophysics (2002) University of Oregon
B.S. Geology/Earth Science (2000) University of the Virgin Islands
Re-Certified GPMR Radar Engineer/Geophysical Investigations (2004) GSSI Inc.
Certified GPMR Geology/ Archaeology (2005) University Denver Colorado

Certifications and Skills

GPMR Sub-Surface Data Collection and Processing

- 3D GPMR Utility Scan
- Structure Scan Professional
- Bridge Concrete Deterioration Mapping
- Advanced Concrete Assessment
- Highway/ Roadbed/ Pavement Mapping
- GPMR Geology/Archaeology
- Radan Data Post Processing, GSSI Inc.

OSHA 30

AutoCAD, Autodesk

Relevant Experience

90/154N Bridge (WSDOT), Washington
Project Manager - Rebar and deterioration mapping.

Air Station Kodiak (U.S. Coast Guard), Alaska
Project Manager – Locate and map subsurface hangers on one million square feet of tarmac apron.

8th Ave Trolley Track Locate (Historical Research Associates), Eugene Oregon
Project Manager - Scan and map historic trolly track location in roadway**.**

Nathan B. Rasnick

Senior Project Manager

nathan.rasnick@gprdata.com | 805-320-2421

Nathan is a Senior Project Manager with GPR Data and heads our Las Vegas office. With 15 years of applied field experience and a background in geophysics, there is rarely a scenario he hasn't seen.

Academic Background

B.S. Communication Studies (2005) California State University
Re-Certified GPMR Radar Engineer/Geophysical Investigations (2018) GSSI Inc.

Certifications and Skills

GPMR Sub-Surface Data Collection and Processing

- 3D GPMR Utility Scan
- Structure Scan Professional
- Bridge Concrete Deterioration Mapping
- Advanced Concrete Assessment
- Highway/ Roadbed/ Pavement Mapping
- Radan Data Post Processing, GSSI Inc.
- GPMR Geology/Archaeology

OSHA 30

AutoCAD, Autodesk

Relevant Experience

IHNC Lock Repairs, Louisiana
Project Manager - Identify concrete voids and delaminated surfaces

Amazon Fulfillment Center (Amazon), Washington
Project Manager - Concrete scanning and as-built drafting

Lost Hills Oil Field (Seneca), California
Project Manager - Subsurface void detection

Billy Malone

CAD/GIS Specialist

billy.malone@gprdata.com | 254-855-1956

With a background in construction inspection, document control, and project management, Billy is uniquely suited to manage large-scale projects. His level of organization and ability to coordinate all aspects of a project help produce quality results for our clients.

Academic Background

Master of Business Administration (2010) Tarleton State University
B.S. Business Administration (2008) Tarleton State University
Re-Certified GPMR Radar Engineer/Geophysical Investigations (2018) GSSI Inc.

Certifications and Skills

GPMR Sub-Surface Data Collection and Processing

- 3D GPMR Utility Scan
- Structure Scan Professional
- Bridge Concrete Deterioration Mapping
- Advanced Concrete Assessment
- Highway/ Roadbed/ Pavement Mapping
- Radan Data Post Processing, GSSI Inc.

OSHA 30

Civil 3D, Autodesk

AutoCAD, Autodesk (Certified Professional)

Relevant Experience

Wheatridge Renewable Energy Facility (NextEra), Oregon
Project Manager - Subsurface utility locating and mapping.

Oregon Convention Center Parking Garage (Mortenson Construction), Oregon
Field Engineer - Concrete scanning, rebar, and post-tension cable identification.

Siuslaw River Crossing (ODOT), Oregon
Field Engineer - Concrete scanning prior to anchor placement.

Casey Coyle

Field Engineer/Staff Geologist

casey.coyle@gprdata.com | 541-345-1075

Casey offers a background in geology and serves as our staff geologist. Our clients say Casey's experience and professionalism add value to each project.

Academic Background

B.S. Geology (2016) University of Oregon
Re-Certified GPMR Radar Engineer/Geophysical Investigations (2018) GSSI Inc.

Certifications and Skills

GPMR Sub-Surface Data Collection and Processing

- 3D GPMR Utility Scan
- Structure Scan Professional
- Bridge Concrete Deterioration Mapping
- Advanced Concrete Assessment
- Highway/ Roadbed/ Pavement Mapping
- Radan Data Post Processing, GSSI Inc.
- GPMR Geology/Archaeology

Radiodetection Underground Cable and Pipe Locator

OSHA 10

OSHA 40 (HAZWOPER)

Relevant Experience

IHNC Lock Repairs, Louisiana
Data Analyst - Identify concrete voids and delaminated surfaces

Fort Rock Solar Project (DEPCOM), Oregon
Field Engineer - Bedrock mapping and subsurface utility locating and mapping.

Rock Springs Generation Facility (ODEC), Maryland
Field Engineer - Subsurface utility locating

Michael J. Edwards

Vice President/Data Analyst

mike.edwards@gprdata.com | 541-345-1075

With 30+ years of construction experience and 20+ years of experience with GPMR Michael pioneered many of the processes we use for subsurface utility locating. As an industry leader in GPMR data processing, Michael still serves as a critical resource for GPR Data.

Academic Background

B.S. Business Administration (1974) University Oregon
Re-Certified Certified GPMR Radar Engineer/Geophysical Investigations (2000) GSSI Inc.
Re-Certified Certified GPMR Geology/ Archaeology (2005) University Denver Colorado

Certifications and Skills

GPMR Sub-Surface Data Collection and Processing

- 3D GPMR Utility Scan
- Structure Scan Professional
- Bridge Concrete Deterioration Mapping
- Advanced Concrete Assessment
- Highway/ Roadbed/ Pavement Mapping
- GPMR Geology/Archaeology
- Radan Data Post Processing, GSSI Inc.

OSHA 30

GPR Slice, Goodman

Mapper Surfer, Golden Software

Relevant Experience

Rock Springs Generation Facility (ODEC), Maryland
Data analyst - Locate cooling pipe and identify location of leak.

Air Station Kodiak (U.S. Coast Guard), Alaska
Data Analyst - Locate and map subsurface hangers on tarmac apron.

Fort Rock Solar Project (DEPCOM), Oregon
Data Analyst - Bedrock Mapping and subsurface utility locating.

Sean Mathews

Field Engineer

sean.mathews@gprdata.com | 661-864-6915

Sean has over 5 years of structural concrete scanning and subsurface utility locating. This combined with his background in concrete construction makes him a valued asset on any project.

Academic Background

Associate of Applied Science (2012) Mt. Hood Community College
Re-Certified GPMR Radar Engineer/Geophysical Investigations (2018) GSSI Inc.

Certifications and Skills

GPMR Sub-Surface Data Collection and Processing

- 3D GPMR Utility Scan
- Structure Scan Professional
- Bridge Concrete Deterioration Mapping
- Advanced Concrete Assessment
- Highway/ Roadbed/ Pavement Mapping
- Radan Data Post Processing, GSSI Inc.

OSHA 30

Radiodetection Underground Cable and Pipe Locator

Relevant Experience

Wheatridge Renewable Energy Facility (NextEra), Oregon
Field Engineer - Subsurface utility locating and mapping.

90/154N Bridge (WSDOT), Washington
Field Engineer - Rebar and deterioration mapping.

Siuslaw River Crossing (ODOT), Oregon
Field Engineer - Concrete scanning prior to anchor placement.

Tad Letzring

Senior Field Engineer

tad.letzring@gprdata.com| 253-606-3042

Tad has over 20 years of structural NDT concrete scanning and subsurface utility locating. This, combined with his background in construction and surveying, makes him a valued asset on any project.

Academic Background

Associate of Applied Science (2001) Central Oregon Community College
Re-Certified GPMR Radar Engineer/Geophysical Investigations (2017) GSSI Inc.

Certifications and Skills

GPMR Sub-Surface Data Collection and Processing

- 3D GPMR Utility Scan
- Structure Scan Professional
- Bridge Concrete Deterioration Mapping
- Advanced Concrete Assessment
- Highway/ Roadbed/ Pavement Mapping
- Radan Data Post Processing, GSSI Inc.

OSHA 30

Radiodetection Underground Cable and Pipe Locator

Relevant Experience

Siuslaw River Crossing (ODOT), Oregon
Field Engineer - Concrete scanning prior to anchor placement.

Aeration Tank Scanning (Oregon Cherry Growers), Oregon
Field Engineer - Concrete scanning and rebar identification.

Silo Scanning (Quaker Oats), Iowa
Field Engineer - Concrete scanning and evaluation.

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
Attn: Andrew Sterbenz, P.E.
3 Quail Run Circle, Suite 101
Salinas, CA 93907-2348

Kevin Loeb, PG 9665
Project Geologist

Dan Peluso, PE 49562, GE 2367
Principle Engineer

TABLE OF CONTENTS

FIGURES

APPENDICES

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

ASTM Standard D1586, 2011, "Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils," ASTM International.

ASTM Standard D2487, 2017, " Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)," ASTM International.

ASTM Standard D2488, 2017, " Standard Practice for Description and Identification of Soils (Visual-Manual Procedures)," ASTM International.

ASTM International, 2017. Volume 04.08 Soil and Rock (I): D421-D5876.

Brabb, E.E., and others, 1997, Geologic map of Santa Cruz County, California: a digital database: U.S. Geological Survey Open-File Report 97-489.

California Department of Transportation Division of Engineering Services Materials Enginering and Testing Services Corroison and Structural Concrete Field Investigation Branch, 2015, Corrosion Guidelines, Version 2.1. January 2015.

Cooper-Clark and Associates, 1975, Preliminary map of landslide deposits in Santa Cruz County, California: unpublished consultants' report to Santa Cruz County Planning Dept. (see Roberts and Baron, 1998).

County of Santa Cruz GIS Department, http://www.co.santa-cruz.ca.us/Departments/GeographicInformationSystems(GIS).aspx, accessed January 2020).

Graymer, R.W. and others (2006), Geologic Map of the San Francisco Bay Region: U.S. Geological Survey Scientific Investigations Map 2918.

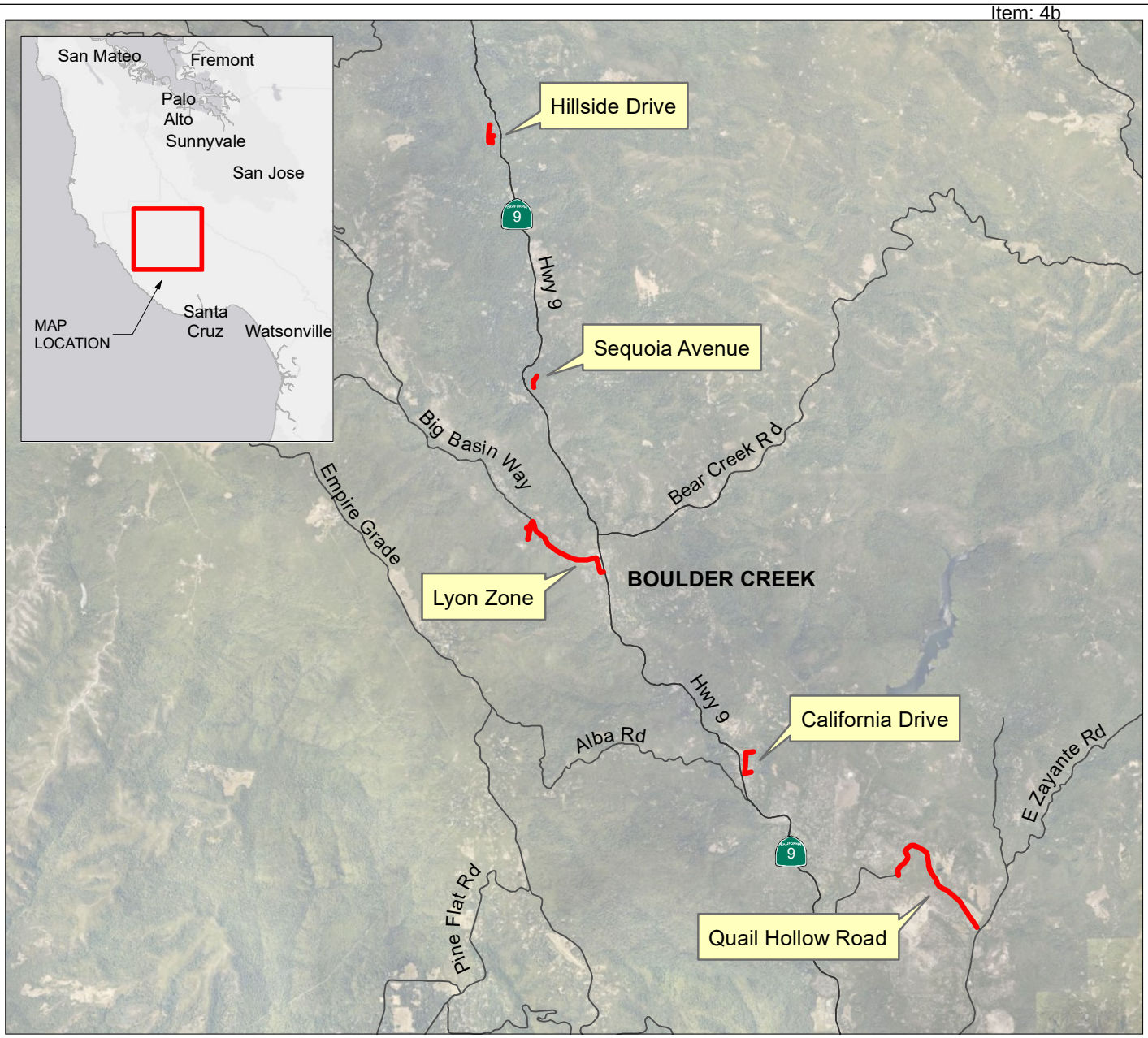
U.S. Geological Survey and California Geological Survey, 2006, Quaternary fault and fold database for the United States, accessed January 2020, from USGS web site: http//earthquake.usgs.gov/hazards/qfaults/.

Wentworth, C. M., and others, 1999, Geologic Materials of the San Francisco Bay Region. Open-File Report 97-744 Part 5, v.1.

Working Group on California Earthquake Probabilities (WGCEP), 2003, Earthquake Probabilities in the San Francisco Bay Region: 2002-2031: U.S. Geological Survey Open File Report 2003-214.

Youd, T. L., et. al. (2001). Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER/NSF. Workshops on Evaluation of Liquefaction Resistance of Soils, ASCE Journal of Geotechnical and Geoenvironmental Engineering, Vol. 127, No. 10.

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

State Highway 9

Fern Drive

Reynolds Drive

Hillside Drive

B-11

B-12

New Pipeline Segment

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

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SANTA CRUZ COUNTY, CALIFORNIA

HILLSIDE DRIVE

191110	JANUARY 2020	FIGURE 2A

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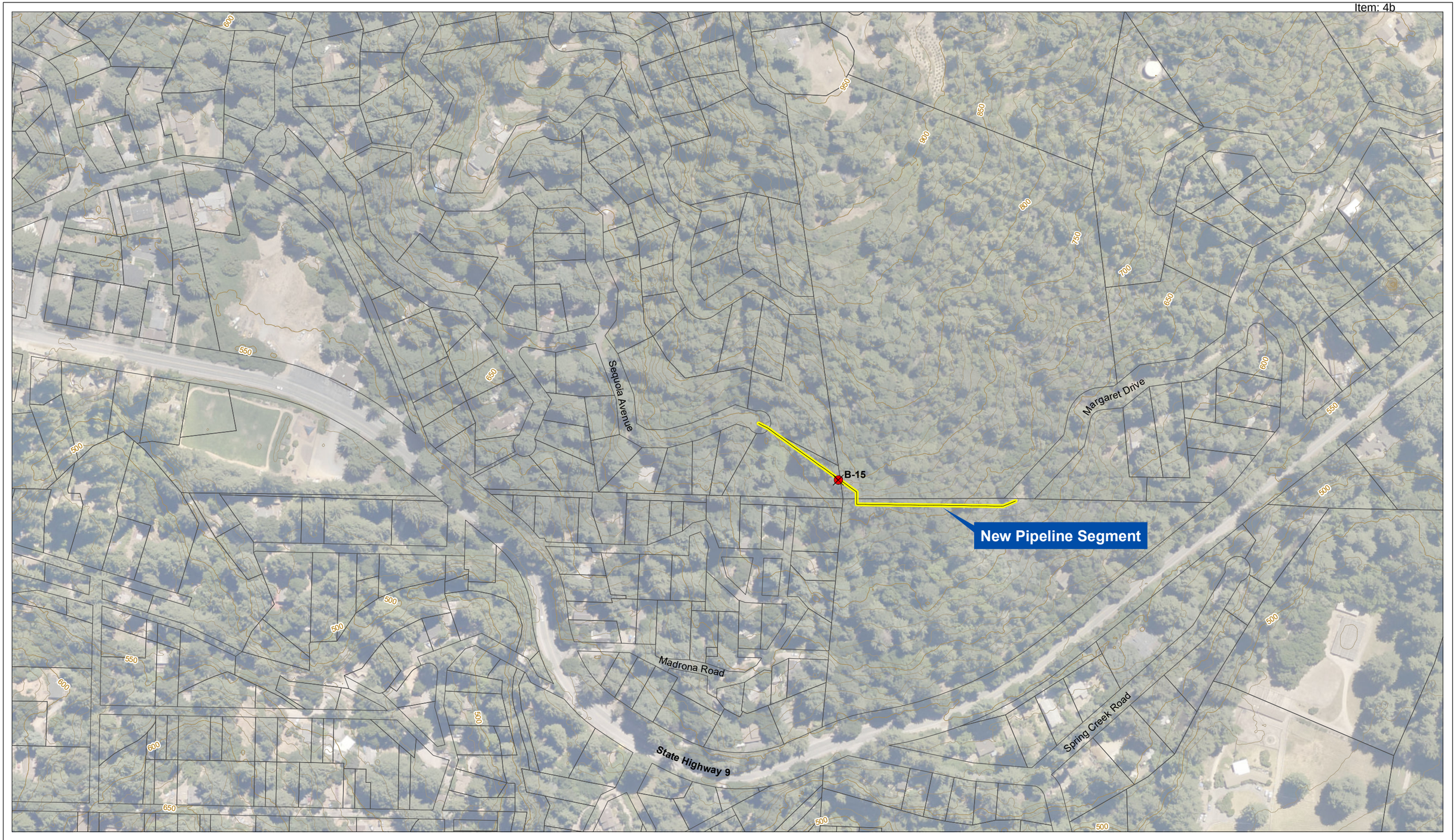

BASEMAP REFERENCE

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

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SANTA CRUZ COUNTY, CALIFORNIA

SEQUOIA AVE

191110	JANUARY 2020	FIGURE 2B

New "Lyon Zone" Pipeline Segment

Boulder Brook Drive
S. Redwood Drive
Madrone Drive
St. Francis Drive
State Highway 236
Hazel Avenue
West Park Avenue
State Highway 9
Pine Street
Laurel Street
W. Lomond Street

B-1
B-2
B-3
B-5

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

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LYON ZONE

191110	JANUARY 2020	FIGURE 2C

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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

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SAN LORENZO VALLEY WATER DISTRICT
SANTA CRUZ COUNTY, CALIFORNIA

CALIFORNIA AVE

191110	JANUARY 2020	FIGURE 2D

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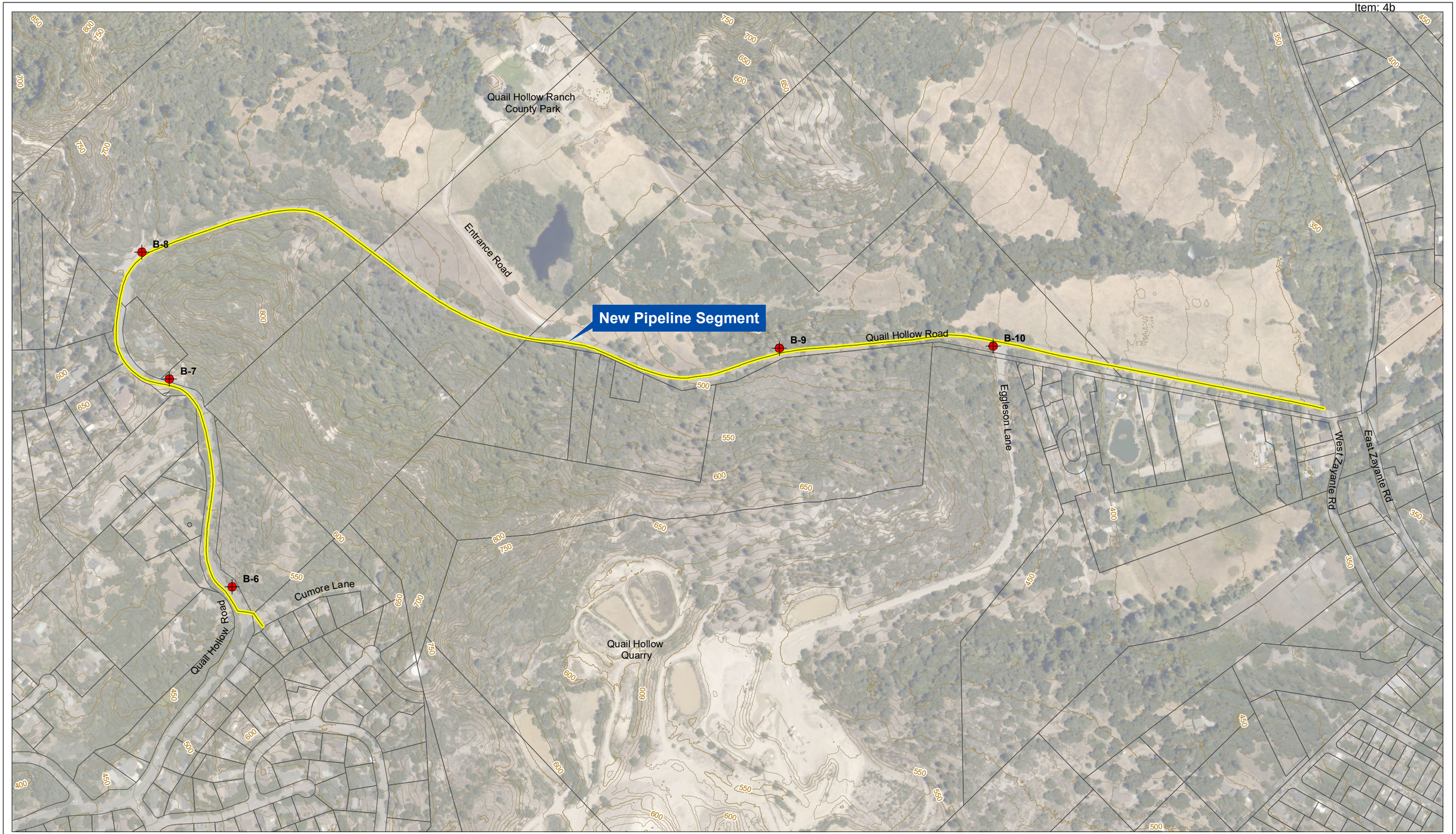

BASEMAP REFERENCE

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

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SANTA CRUZ COUNTY, CALIFORNIA

QUAIL HOLLOW ROAD

191110	JANUARY 2020	FIGURE 2E

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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

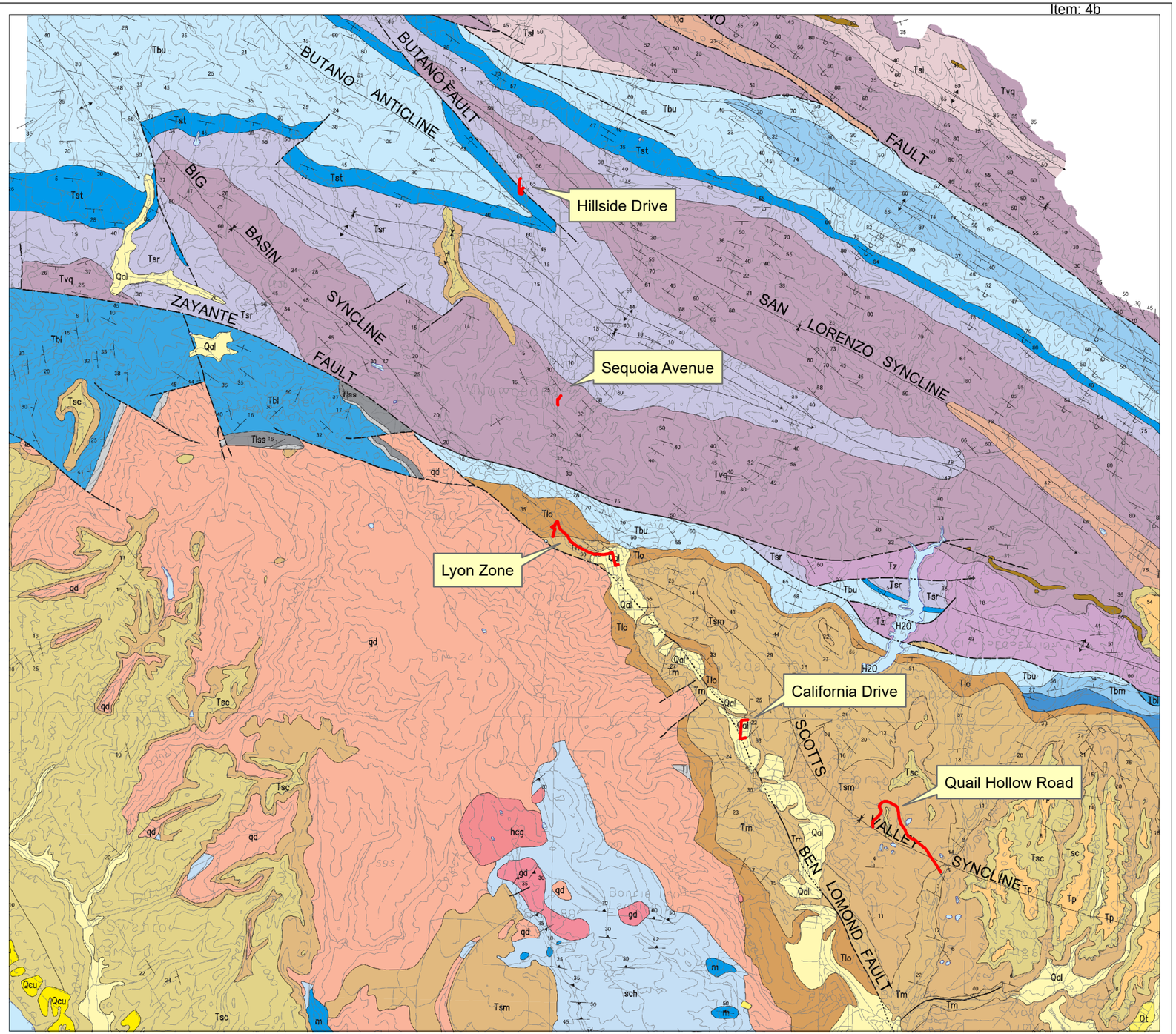
50 APPROXIMATE DIP OF BEDS

VERTICAL

HORIZONTAL

60 OVERTURNED

20 STRIKE AND DIP OF FOLIATION



BASEMAP REFERENCE

1. REGIONAL GEOLOGY FROM BRABB ET AL. 1997.

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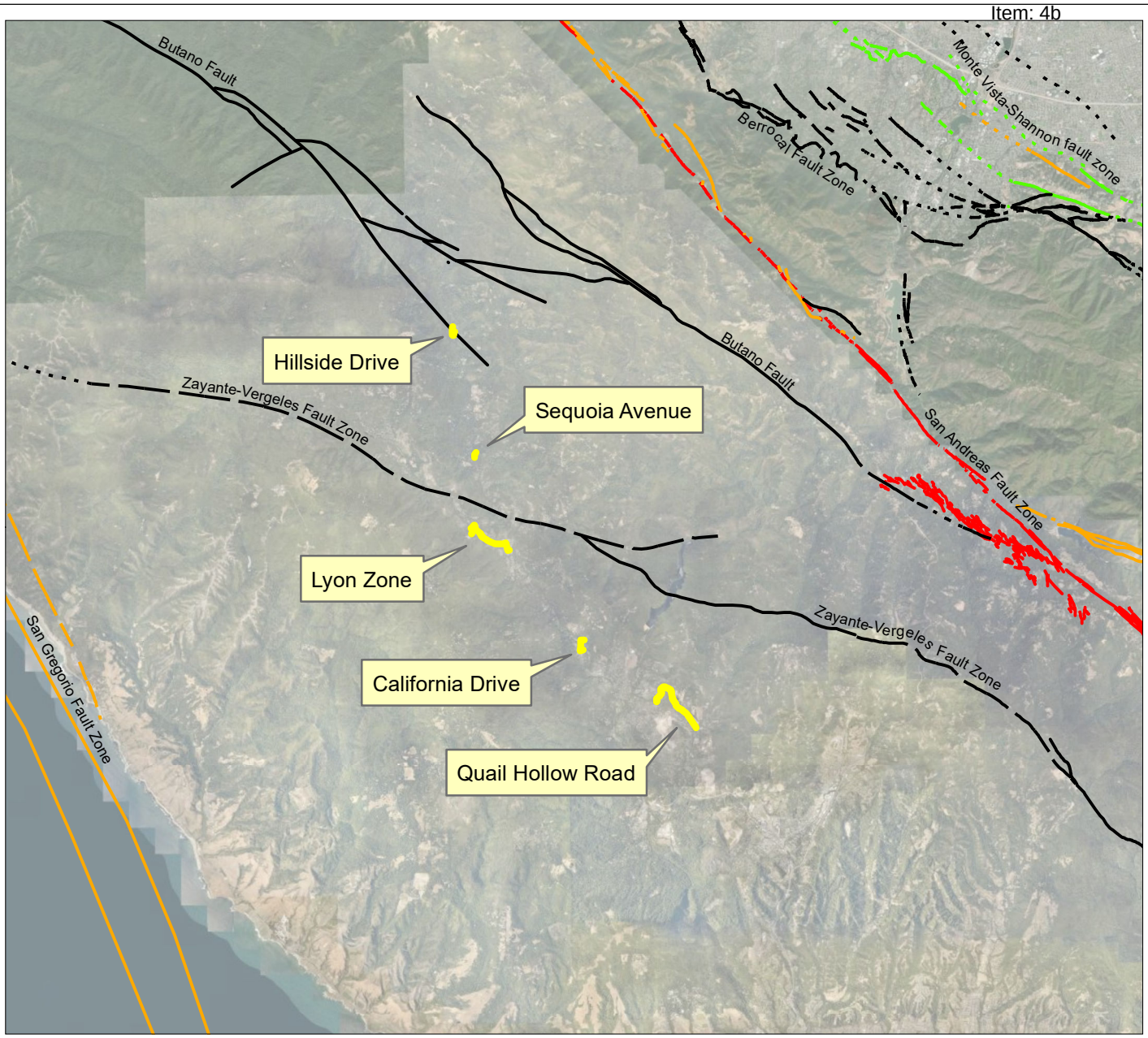
SLVWD 2019 PIPELINE PROJECT
SAN LORENZO VALLEY
BOULDER CREEK, CALIFORNIA

REGIONAL GEOLOGY MAP

191110	JANUARY 2020	FIGURE 3



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.

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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
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BOULDER CREEK, CALIFORNIA

FAULT ACTIVITY MAP

191110	JANUARY 2020	FIGURE 4

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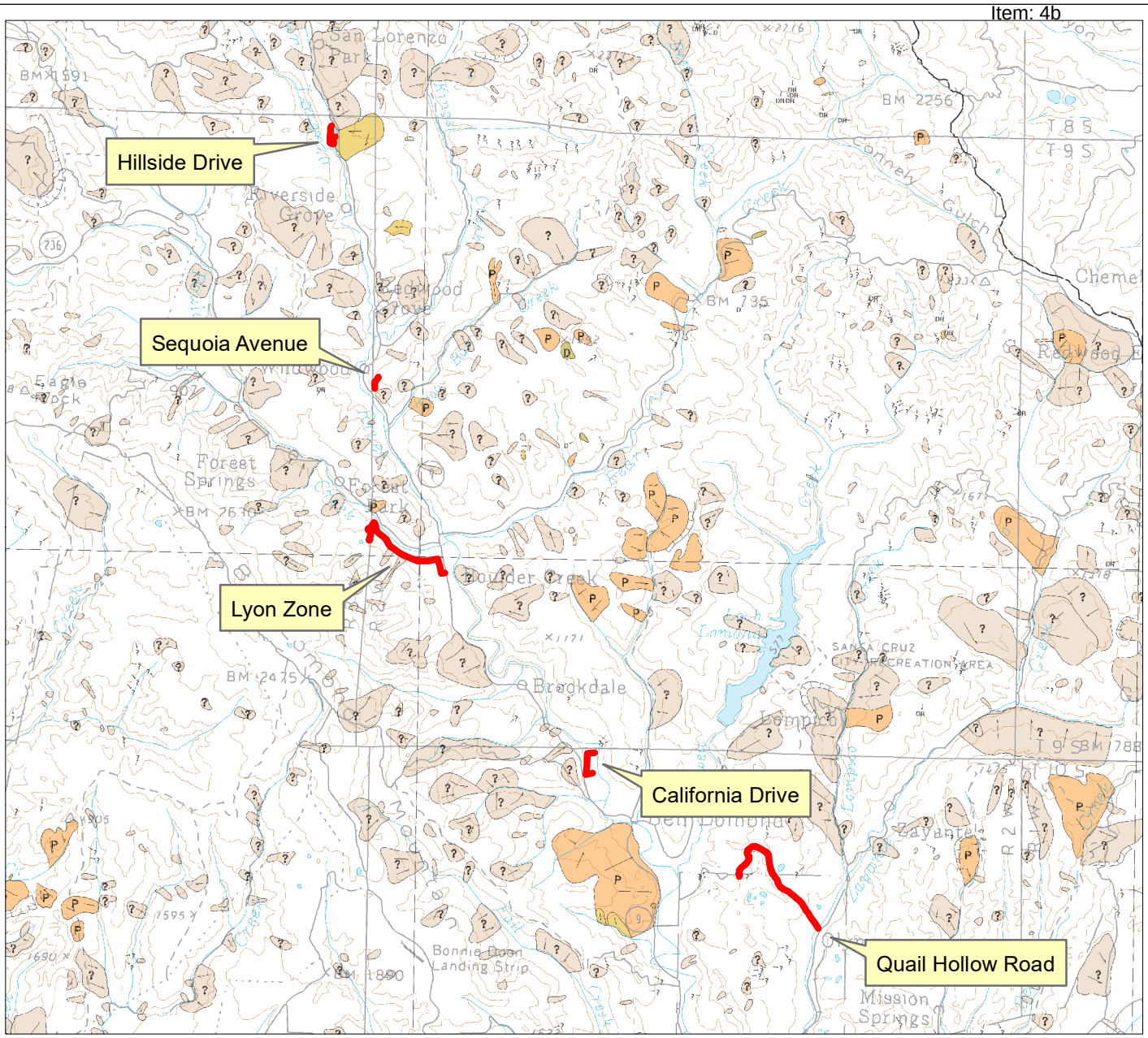

BASEMAP REFERENCE

1. BASEMAP FROM SANTA CRUZ COUNTY, 2016.
2. LANDSLIDE DATA FROM COOPER-CLARK ET AL. 1975.

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MILES

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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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BOULDER CREEK, CALIFORNIA

LANDSLIDE ACTIVITY MAP

191110	JANUARY 2020	FIGURE 5

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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

CE&G
CAL ENGINEERING & GEOLOGY

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)	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]	CM	10-8-5		114	13				
2.5	SIlty SAND (SM): black, moist, medium dense, fine sand [Alluvium]									
	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)	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						
	Sandy Elastic SILT (MH): dark gray, moist, stiff, high plasticity, fine sand			1.5						
5.0	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)	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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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)	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]									
			CM	5-10-9		106	11				
7.5		lens with gravel 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											
			SPT	6-9-13	>4.5						
10.0											

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)	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)	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]	CM	5-8-10	3.25	133	13				
2.5	Sandy Lean CLAY (CL): very dark gray, moist, very stiff, fine sand, trace coarse sand									
	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		

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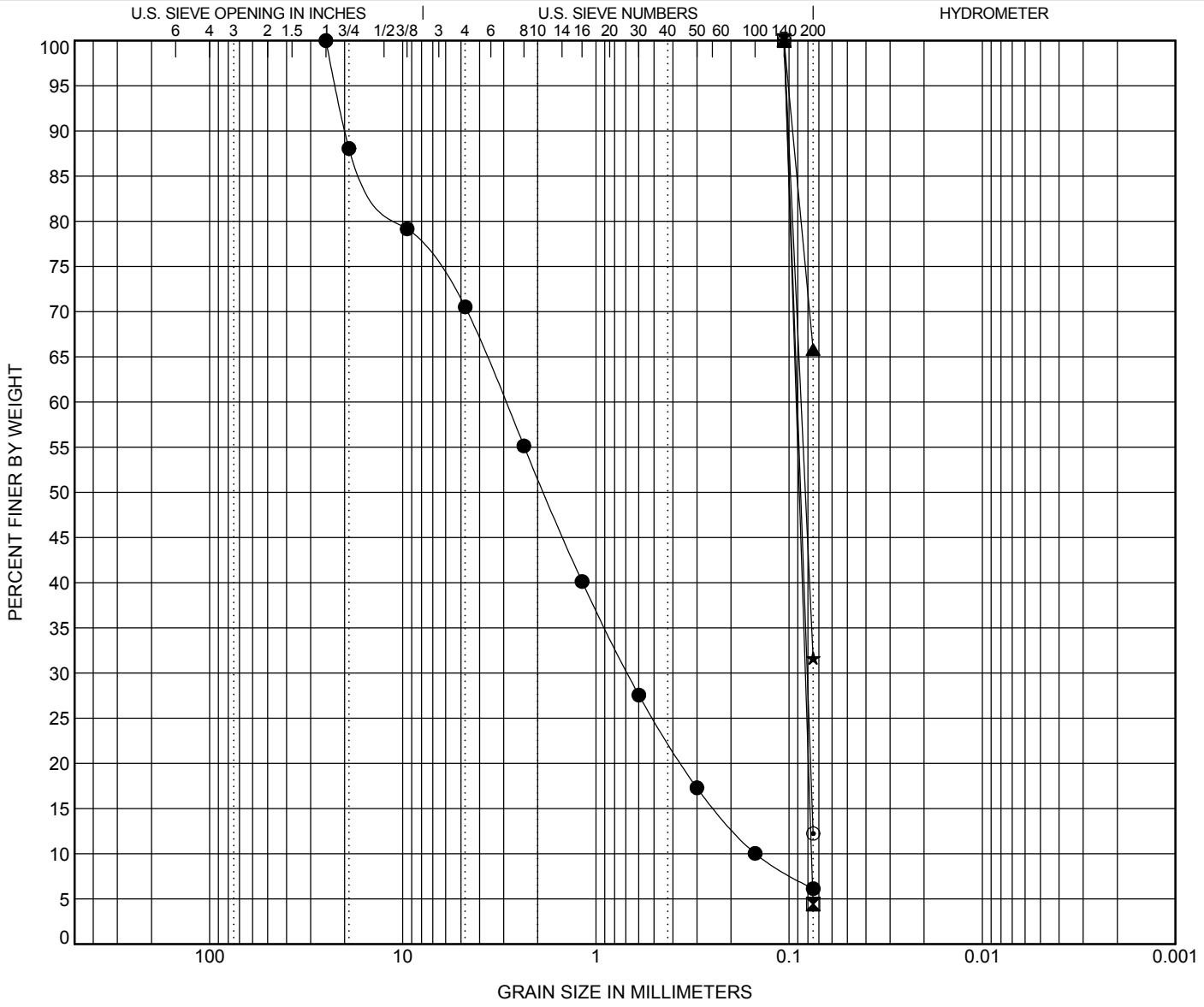
GRAIN SIZE DISTRIBUTION

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**	

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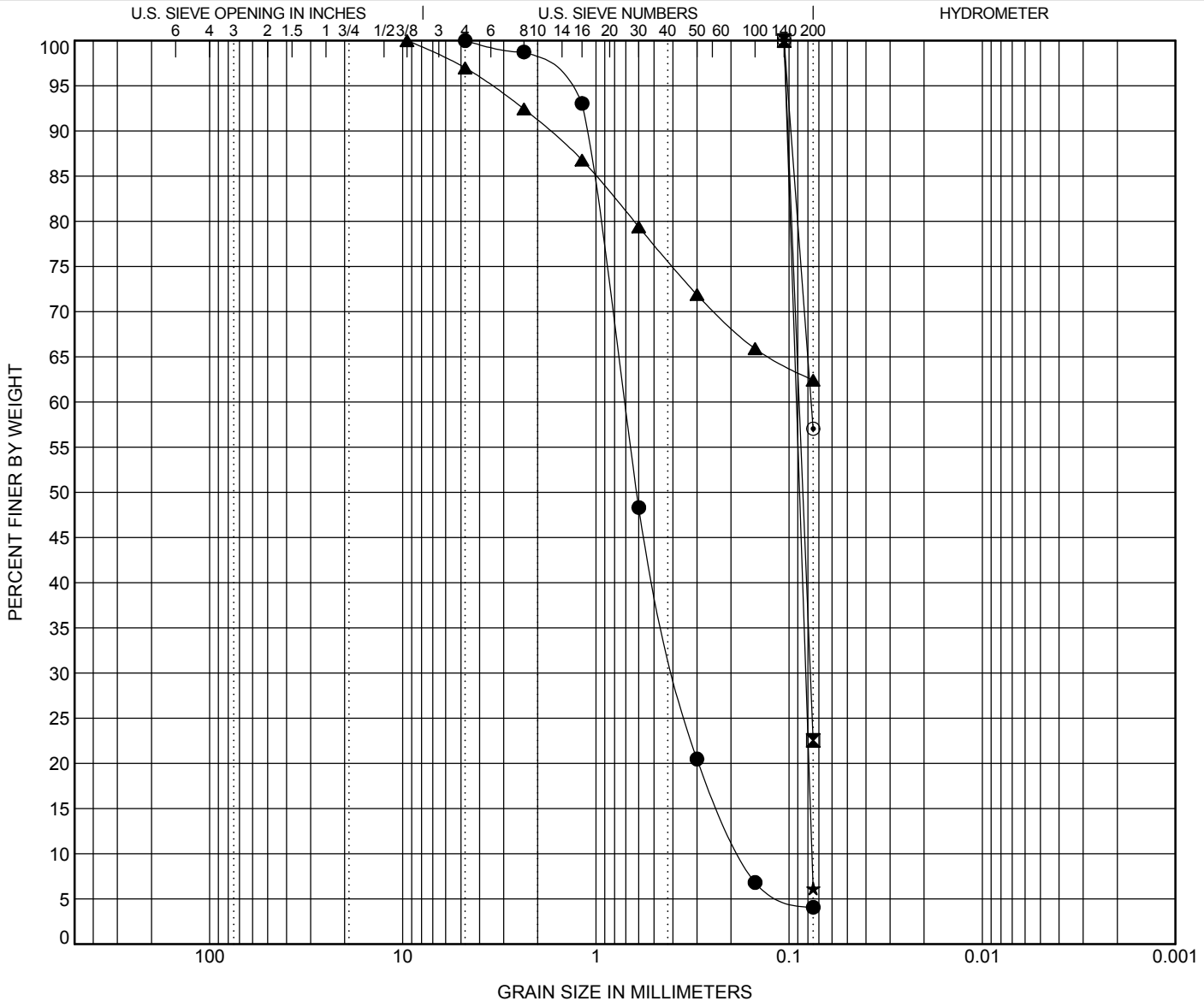
GRAIN SIZE DISTRIBUTION

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**	

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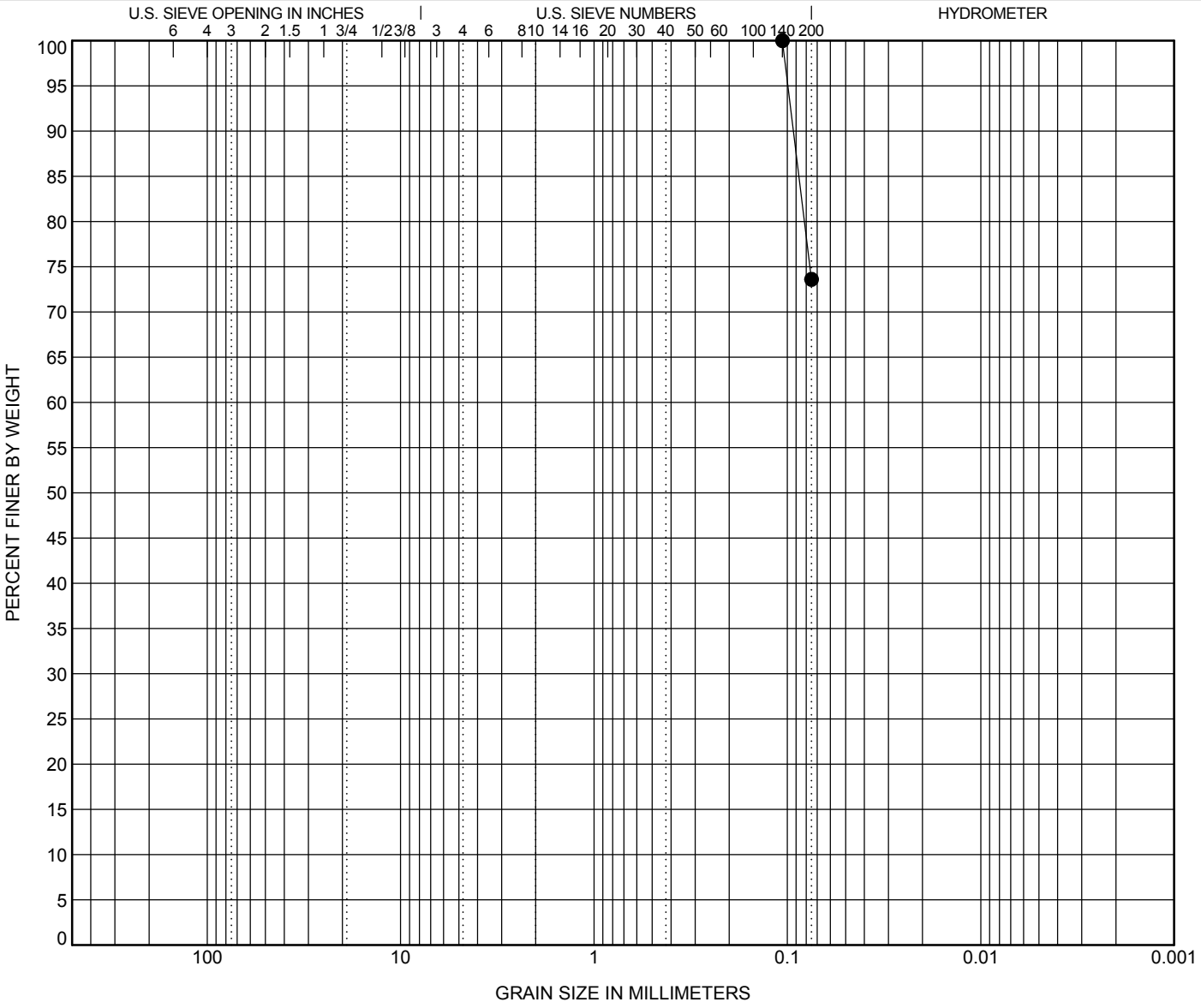
GRAIN SIZE DISTRIBUTION

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**						

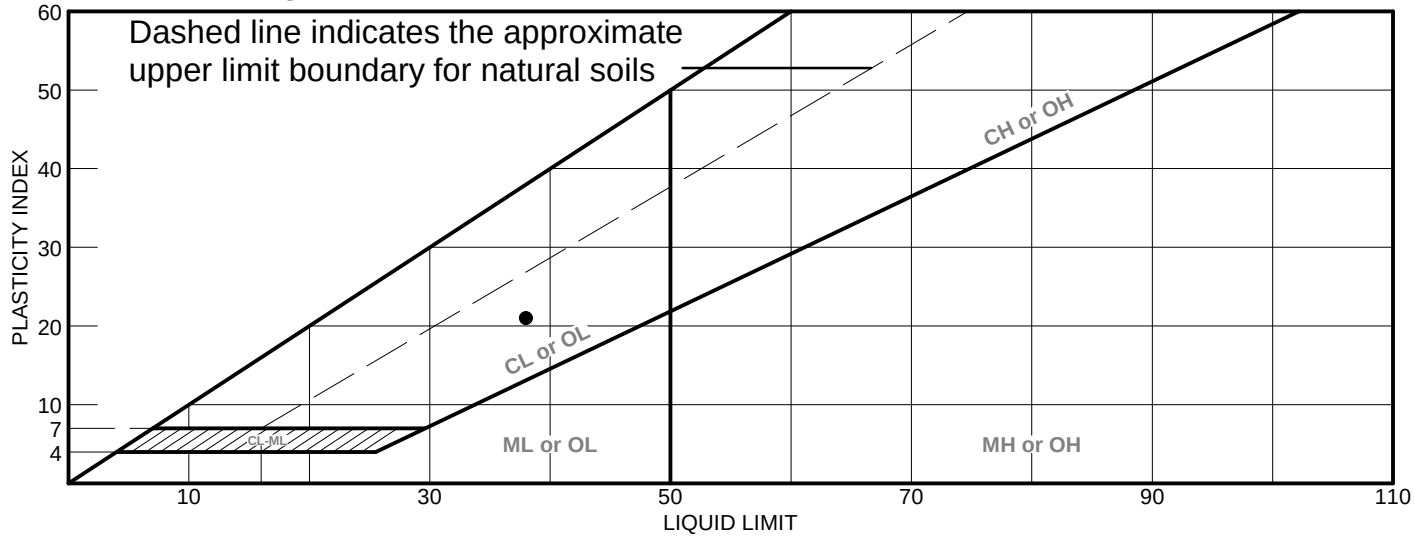
	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**B-12**	**2.0**	**0.106**				**0.0**	**26.4**	**73.6**	

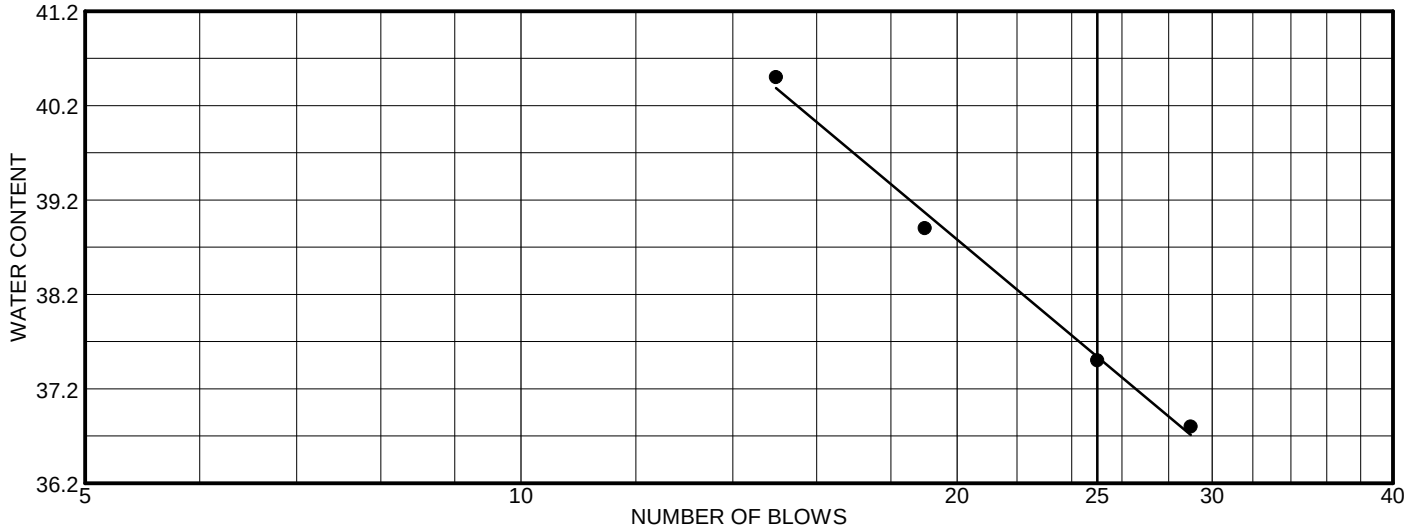
COOPER TESTING LABORATORY

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

MEMO

DATE: September 21, 2023

TO: Engineering & Environmental Committee, San Lorenzo Valley Water District

FROM: Rick Rogers, District Manager

SUBJECT: **Brookside Drive Storm Damage Repair Schedule, 2023 Storm Damage and Capital Projects Listing**

WRITTEN BY: District Manager

PRESENTED BY: District Manager

STAFF RECOMMENDATION

Staff is recommending that the Committee review the attached Brookside Drive Storm Damage Repair Scheduled, 2023 Storm Damage and Capital Projects Listing

RECOMMENDED MOTION

None

BACKGROUND

Informational only.

PRIOR COMMITTEE ACTION

None

FISCAL IMPACT

TBD

ENVIRONMENTAL IMPACT

NA

ATTACHMENTS AND RELEVANT LINKS TO DISTRICT WEBSITE

Brookside Drive Storm Damage Replacement Schedule

2023 Storm Damage Scope of Work FEMA

Budget FEMA Replacement Capital Improvement Project

Funding Opportunities for Water Main Construction

Task / Date Timeline	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24	Apr-24	May-24
Surveying										
Pipeline Route										
Environmental Review - In House										
Financing										
FEMA - Not Obligated										
USDA Grant Program Investigating										
Grants investigating										
Engineering & Design										
Award of Engineering RFP 30 Day										
Environmental										
Environmental CEQA										
CEQA RFP 30 Day										
Permitting Riparian Corridor										
Construction										
Project Bid 30 Day										
Review Funding										
Construction										

Scope of Work for New Year's Storm 2023 Emergency Projects

Bear Creek Wastewater Access Road/WWTF - *CAT B*

Damage: Flooding damaged access road to WWTP.

Permanent Repair: District staff cleared and rocked access road, and Jim Walters Tractor for Trucking of rock. System was pumped multiple times

Completed Permanent Staff Work Cost: $2000
Completed Contractor Work Cost: $1,100 (rock), $9,900 (pumping)

Bear Creek Booster *Cat F*

Damage: Storm-related power fluctuations damaged booster pump.

Permanent Repair: District Staff replaced booster pump

Completed Permanent Staff Work & Materials Cost: $18,000

Bennet Spring Raw Water Pipeline Damage - Cat B/F

Damage: Tree fall damaged approx. 1960-LF of 4" main and 4 gate valves – caused water outage to multiple customers
Completed Temporary Repair: Contractor replaced damaged pipeline with temporary HDPE pipe placed at-grade
Proposed Permanent Repair: Bury pipe to current AWWA and District standards

Completed Temporary Contractor Work Cost: $XXXXX
Completed Permanent Staff Work Cost:0
Permanent Work Cost Estimate: $800,000

Bennet Spring Generator Failure – Cat B

Damage: Flooding damaged generator

Completed Permanent Repair: Service contractor called out Watts On temporarily got generator running Need to replace generator

Completed Permanent Contractor Work Cost: $700
Completed Permanent Staff Work Cost: $815

Brookside Drive Road Washout/Pipe Damage – Cat F

Damage: Road washed out, exposing main in multiple locations; main break at west end of road.

Proposed Repair: Replace approximately 1,650-LF of exposed/damaged main with new fully restrained 8-in ductile iron pipe; to include excavation, bedding, pipe material (pipe, gaskets, bolt kits, mechanical joints as needed) and construction, valves (with valve boxes, bolt kits and gaskets), services (saddles, 1-in PE tubing, meter boxes, meters as needed), slurry backfill, paving, air relief valve at high point of project, tie-in to existing main in Redwood Drive, traffic control, and chlorination, flushing, and testing of completed main, disposal of excavation spoil and demolished existing main.

Permanent Repair Cost Estimate: $800,000

Bull Creek Raw Water Pipeline Damage – Cat B

Damage: Tree fall damaged approx. 2,600-LF of X" main, 5 gate valves, flow meter, and pressure sustaining valve, caused water outage to multiple customers

Completed Temporary Repair: Contractor Replaced damaged pressure sustaining valve, flow meter, and pipeline. Pipeline placed at grade (temporary condition).
Proposed Permanent repair: Bury pipeline to current AWWA and District standards.

Completed Temporary Contractor Work Cost: $XXXXX
Completed Temporary Staff Work Cost: $XXXXX
Estimated Permanent Repair Cost: $1M

Eckley Tank Main Break – Cat B

Damage: tree fall damaged approx. 25-LF of 2-in main

Completed Permanent Repair: District Staff replaced 25-LF of 2-in main and associated fittings

Completed Permanent Staff Work Cost: $450 + $1000 for materials

Fall Creek Intake – Cat B

Damage: Silt blocked intakes

Completed Repair: Staff cleared intakes

Completed Permanent Staff Work Cost: $400

1300 Fern Ave Main Break – Cat B

Damage: flooding damaged approx. 30-LF of 2" main

Completed Permanent Repair: District Staff replaced 30-LF of 2-in main and associated fittings

Completed Permanent Staff Work Cost: $435

Foreman Access Road Slide (Completed) – Cat A
Damage: Soil and tree debris slide blocked access road to District's Foreman Intake

Completed Emergency Repair: SLVWD contracted with Van Der Steen Engineering to clear the debris and repair access road. Work included removal of approximately 270-CY of soil, 30-CY of woody debris, including multiple fallen trees. Soil was disposed of in two separate locations; approximately 250-CY was donated to a local contractor for use in their yard at Lat 37.121779, Long -122.120430, the remaining approx. 50-CY will be trucked to ReGen Monterey's disposal site in Monterey, CA (Lat 36.713392, Long -121.770294).

Completed Work Cost: $XXXX

Foreman Intake Log Jam (Completed) – Cat A
Damage: Trees and other debris slide blocked Foreman Creek and access to District's Foreman Intake

Completed Emergency Repair: Dug out and removed by staff

Completed Work Cost: $2,650

Glen Arbor Hydrant Leak – *Cat B*
Damage: Ground motion damaged 10-LF of 2-in Hydrant service piping/this was a 2" stand pipe hydrant

Completed Emergency Repair: District staff installed new wharf head and 10' of 2" galvanized pipe

Completed Work Cost: $2,800

Huckleberry Booster Main Break (Completed) – *Cat B*
Damage: Tree fall damaged approx. 25-LF of 2-in main

Completed Emergency Repair: District staff cleared tree and replaced 25-LF of 2-in main and associated fittings

Completed Staff Work Cost: $450 + $1000 for materials

Huckleberry Island Main Failure – *Cat B/F*

Damage: Washout of an embankment caused catastrophic failure of existing 12-in main. Breaks occurred at north end of a below-grade river crossing.

Completed Temporary Work: Replace approximately 1,000-LF of existing main, including below-grade river crossing, with new 12-in HDPE pipe placed at-grade and rerouted to cross the river on an existing road bridge. Included provision and installation of new HDPE main, excavation and backfill of tie-in points, saddle tap connections at each end of the repair and a single tee connection to an existing 6-in connection, valves, fittings, traffic control, demo and removal of a portion of the existing steel main.

Proposed Permanent Repair: Construct approximately 1,000-LF of new 12-in main and one new bridge crossing. Construction of the pipeline will include delivery & placement of: pipe, valves, other fittings, gaskets, and bolt sets; work to include 12-in main and connection to existing 6-in main. Bridge crossing construction will include design of new supports and alignment, delivery & placement of: supports, flexible connections, pipe, valves, other fittings, gaskets, and bolt sets. Additional tasks will include excavation, backfill, surface restoration, testing, and connection to existing system.

Completed Temporary Contracted Work Cost: $192,790
Completed Temporary Work Staff Cost: $12,000
Permanent Work Cost Estimate: $750,000

Jaye's Timberlane Slipout – *Cat F*
Damage: Northbound lane of California Route 9 failed and slipped out into the adjacent ravine, exposing approximately 150-FL of existing main.

Proposed Repair: Caltrans will repair the roadway, including construction of a new retaining wall. SLVWD repair will consist of demolition of approximately 200-LF of existing main and construction of approximately 35-LF of new main to provide clearance for Caltrans work. Construction will include pipe, fittings, valves, hot tap of existing 6-in service to make connection to existing system, cut & cap existing main in two locations with blow-off valving, excavation, backfill, surface restoration, testing, and connection to existing system.

Completed Permanent Work Cost: $50,000

Lake Blvd Main Repair – *Cat B*

Damage: Tree fall damaged approx. 1-LF of6-in main

Completed Permanent Repair: District staff installed a repair coupling

Completed Permanent Work Cost: $800

Lompico Storage Building & Well - *Cat F*

Damage: Tree fall damaged building, PG&E power drop, building electrical connections, roof, and fencing.

Completed Permanent Repair: TBD, staff scheduled to clean up and assess April 13

Estimated Permanent Contractor (PG&E) Work Cost: $80,000
Staff Work Cost: $XXXXX

Lyon Access Road Slide - Cat B

Damage: Landslide caused complete failure of temporary access road installed after 2017 slide.

Temporary Repair:

Permanent Repair: District has a version request approved by FEMA to relocate Lyon access road. Evaluation of required slide/slope stabilization measures for tank site above slide and of the slide mass is ongoing. Temporary work listed is due to Dec 22/Jan 23 storms.

Completed Temporary Contracted Work Cost: $XXXXXX
Completed Temporary Work Staff Costs: $265

Permanent Road Relocation Work Cost Estimate: $8.4M

Lyon Treatment Plant Generator Failure – Cat B/F

Damage: Generator at Lyon WTP damaged by flooding.

Temporary Repair: Rental generator in place

Permanent Repair: Replace failed generator

Temporary Repair Staff Costs: $300
Generator Rental Costs: $XXXXXX
Permanent Repair (replacement) Cost: $25,000

Madrone Booster Flooding – Cat F

Damage: Madrone Booster Station flooded by overflow and seepage from adjacent pond to a depth of approximately 3-ft.

Proposed Repair: Provide waterproofed concrete slab to prevent water intrusion, waterproof existing CMU wall (two sides of station), construct and waterproof additional CMU wall and chain link fence

(remaining unwalled side of station), construct sump and provide pump with electrical connections, provide and construct non-flammable roof over entire station.

Contracted Cost Estimate: $132,500
Staff Costs Estimate: $13,000

Spring Booster – *Cat F*

Damage: Storm-related power fluctuations damaged booster pump.

Permanent Repair: Replace pump, materials on order

Completed Permanent Staff Work & Materials Cost: $10,000

Stewart Street Slide/Main Breaks – Cat B/F

Damage: Landslide caused 4 breaks in above-grade main. Slide is extensive, Santa Cruz County is working to determine extents, severity, and mitigation.

Temporary Repair: Construct Approximately 925-LF of temporary, at-grade HDPE pipe. Installation included provision and installation of piping, valves, and fittings, connection to existing, testing, excavation and backfill, and transfer of services from existing main to temporary main.

Proposed Permanent Repair: Subsequent to completion of Santa Cruz County slide mitigation work, provide and install approximately 925-LF of new 8-in main. Provide and install required valves, fittings, air relief valve, hydrant, and pipe anchors. Transfer services from temporary main to permanent main. Project includes excavation, backfill, surface restoration, and disposal of spoils.

Completed Temporary Contracted Work Cost: $74,059
Completed Temporary Work Staff Cost: $11,640
Permanent Work Cost Estimate: $700,000

Water System Operations – *Cat B*

Staff costs: $70,000

CAPITAL PROJECTS

SUMMARY

The Capital Improvement Projects (CIP) section is a component of the non-operating expense section of the budget. The CIP budget includes expenditures for fixed asset/equipment purchases as well as the accumulation of expenditures associated with construction projects undertaken by the District. Whenever a project is done in-house, the related labor costs will be capitalized to the project and off-set the operating expense.

The District funds capital projects by funding internally from cash reserves (pay-go), grants awarded, individual assessments or debt financing. For some of these upcoming projects, the District has leveraged grant/FEMA monies and debt financing.

The Capital Project Listing will list out project titles, project status, anticipated funding sources, and amount expected to be spent in the current budget year. Each project will be described in further detail in the Capital Project Description section.

CAPITAL PROJECTS ADDITIONAL NOTES:

Due to the CZU fires, there are still an exceptionally high amount of capital projects. The District typically has $5-10M in the budget, so these next two fiscal years are abnormal.

Funding for the projects is coming from the following sources:

- 2019 $14.5 COP – this is repaid over time through the general fund
- FEMA 75% – these are projects that are expected to receive 75% reimbursement from FEMA
    - The remaining 25% will come from the general fund
- FEMA 90% - these are the CZU related projects
    - The remaining 10% will come from the general fund, with a portion coming from the fire recovery surcharge
- 2021 $15M – this is repaid over time through the general fund
- 2021 $15M / FEMA – these are projects that are being financed long term through the loan, but will also receive FEMA reimbursement.
    - Non-FEMA projects will be repaid through the general fund.
    - FEMA projects will be repaid over time, with a portion coming from the fire recovery surcharge
- Reserves – any projects above the debt financing amount or projects that did not have a different source of funding are being paid by the general reserve funds.
    - This would include the portion FEMA does not cover.

CAPITAL PROJECT LISTING

Below is the capital project listing with estimated cost and funding source. Further in the document has the project descriptions that line up with this listing.

FY2023-2025 CAPITAL BUDGET

						ESTIMATED FUTURE YEARS			
PROJECT TYPE	**PROJECT NAME**	**STATUS**	**FUNDING**	**FY23/24 BUDGET**	**FY24/25 BUDGET**	**FY25/26**	**FY26/27**	**FY27/28**	**EST COMPLETION YR**
Tank	Redwood Park (Swim) Tank	ENGINEERING & PLANS	$14.5M COP	$ 1,100,000	$ -	$ -	$ -	$ -	2024
Enviro.	Fall Creek Fish Ladder	IN CONTRACT	$14.5M COP	$ 2,300,000	$ -	$ -	$ -	$ -	2024
Pipe	Lyon Zone Pipe	IN CONTRACT	$14.5M COP	$ 4,005,000	$ -	$ -	$ -	$ -	2024
Pipe	Hermosa Oak Fernwood Main Replacement	IN CONSTRUCTION	$15M Loan	$ 568,377	$ -	$ -	$ -	$ -	2024
Pipe	Juanita Woods Water Main Replacement	IN CONSTRUCTION	$15M Loan	$ 721,000	$ -	$ -	$ -	$ -	2024
Pipe	Zayante Drive Water Main Replacement	IN CONSTRUCTION	$15M Loan	$ 899,037	$ -	$ -	$ -	$ -	2024
Tank	Blue Ridge Tank Replacement	IN CONSTRUCTION	$15M Loan	$ 976,516	$ -	$ -	$ -	$ -	2024
Pipe	Orman Road Water Main Replacement	IN CONSTRUCTION	$15M Loan	$ 1,051,932	$ -	$ -	$ -	$ -	2024
Pipe	CZU Bennett Spring Supply /Transmission Main	FEMA/PLANNING	$15M LOAN / FEMA	$ -	$ 700,000	$ -	$ -	$ -	2025
Pipe	CZU Sweetwater Supply Line	FEMA/PLANNING	$15M LOAN / FEMA	$ -	$ -	$ 300,000	$ 1,375,000	$ -	2027
Pipe	CZU Eckley Pumping Station / Main Line	ENGINEERING & PLANS	$15M LOAN / FEMA	$ 25,000	$ 375,000	$ -	$ -	$ -	2025
Pipe	CZU Harmon Street 2"	ENGINEERING & PLANS	$15M LOAN / FEMA	$ 580,000	$ -	$ -	$ -	$ -	2024
Building & Equi	CZU Five Mile Box & Turbidity Station	ENGINEERING & PLANS	$15M LOAN / FEMA	$ 150,000	$ -	$ 500,000	$ -	$ -	2024
Pipe	CZU South Zone Distribution Piping	FEMA/PLANNING	$15M LOAN / FEMA	$ -	$ 250,000	$ 800,000	$ -	$ -	2026
Tank	CZU Big Steel Tank Piping	IN CONTRACT	$15M LOAN / FEMA	$ 1,250,000	$ -	$ -	$ -	$ -	2024
Pipe	CZU Peavine Supply	ENGINEERING & PLANS	$15M LOAN / FEMA	$ 750,000	$ 750,000	$ -	$ -	$ -	2025
Pipe	CZU Alta Via Distribution System Piping	IN CONSTRUCTION	$15M LOAN / FEMA	$ 2,100,000	$ -	$ -	$ -	$ -	2024
Pipe	CZU Big Steel Zone Piping	IN CONTRACT	$15M LOAN / FEMA	$ 1,345,000	$ -	$ -	$ -	$ -	2024
Pipe	2023 Storm - Bennet Spring Raw Water Pipeline Damange	FEMA/PLANNING	FEMA 75%	$ 150,000	$ -	$ -	$ -	$ -	2023
Pipe	2023 Storm - Bull Creek Raw Water Pipeline Damage	FEMA/PLANNING	FEMA 75%	$ 150,000	$ -	$ -	$ -	$ -	2023
Pipe	2023 Storm - Stewart Street Slide/Main Breaks	FEMA/PLANNING	FEMA 75%	$ -	$ 700,000	$ -	$ -	$ -	2025
Pump Station	2023 Storm - Madrone Booster Pump Station	IN CONTRACT	FEMA 75%	$ 140,000	$ -	$ -	$ -	$ -	2023
Pipe	2023 Storm - Huckleberry Island Main Failure	FEMA/PLANNING	FEMA 75%	$ 750,000	$ -	$ -	$ -	$ -	2024
Pipe	2023 Storm - Brookside Drive Road Washout/Pipe Damage	ENGINEERING & PLANS	FEMA 75%	$ 800,000	$ -	$ -	$ -	$ -	2024
Repair	Lyon Slide Repair (2017)	ENGINEERING & PLANS	FEMA 75%	$ 500,000	$ 5,000,000	$ 5,000,000	$ -	$ -	2026
Repair	2023 Storm - Quail Hollow Road Damage	IN CONTRACT	FEMA 75%	$ 1,000,000	$ -	$ -	$ -	$ -	2023
Repair	2023 Storm - Lyon Access Road Slide	ENGINEERING & PLANS	FEMA 75%	$ 300,000	$ 1,000,000	$ 500,000	$ -	$ -	2026
Building & Equi	CZU Lyon Wtp Accessory Building	PROCUREMENT	FEMA 90%	$ 20,000	$ -	$ -	$ -	$ -	2023
Meters	CZU Services & Water Meter Replacement	IN CONSTRUCTION	FEMA 90%	$ 20,000	$ 20,000	$ 15,000	$ -	$ -	Varies
Pipe	CZU Clear Creek 5 Mile Supply Line	FEMA/PLANNING	FEMA 90%	$ -	$ 350,000	$ 2,000,000	$ 2,000,000	$ 2,000,000	2028
Intake	CZU Foreman Creek Intake/Raw Water	IN CONTRACT	FEMA 90%	$ 1,300,000	$ -	$ -	$ -	$ -	2024
Pipe	CZU Cool Creek Intake & Piping	FEMA/PLANNING	FEMA 90%	$ -	$ 100,000	$ -	$ -	$ -	2024

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CAPITAL PROJECT LISTING

FY2023-2025 CAPITAL BUDGET

						ESTIMATED FUTURE YEARS			
PROJECT TYPE	**PROJECT NAME**	**STATUS**	**FUNDING**	**FY23/24 BUDGET**	**FY24/25 BUDGET**	**FY25/26**	**FY26/27**	**FY27/28**	**EST COMPLETION YR**
Meters	Ami Meter Grant - Route 11-14	PLANNING	GRANT	$ 200,000	$ -	$ -	$ -	$ -	2024
Consolidation	Bracken Brae/Forest Springs Consolidation	ENGINEERING & PLANS	GRANT	$ 1,800,000	$ 900,000	$ -	$ -	$ -	2024
Tank Maint.	Bear Creek Tank Coating	PRELIMINARY PLANNING	RESERVES	$ -	$ -	$ 300,000	$ -	$ -	2025
Booster	Madrone Booster Pump Redesign	PRELIMINARY PLANNING	RESERVES	$ -	$ -	$ -	$ 500,000	$ -	2026
Equip.	Dump Truck	PROCUREMENT	RESERVES	$ -	$ 100,000	$ -	$ -	$ -	2025
Pump Station	El Solyo Booster Pump Station	PRELIMINARY PLANNING	RESERVES	$ -	$ -	$ 60,000	$ -	$ -	2026
Tank	Spring Tank Recoating	PRELIMINARY PLANNING	RESERVES	$ -	$ 225,000	$ -	$ -	$ -	2025
Tank	Charlie Tank Recoating	PRELIMINARY PLANNING	RESERVES	$ -	$ 225,000	$ -	$ -	$ -	2025
Equip.	Fork Lift Quail 5	PROCUREMENT	RESERVES	$ -	$ -	$ 45,000	$ -	$ -	2026
Equip.	Quail Tank Scada Upgrade	PRELIMINARY PLANNING	RESERVES	$ -	$ -	$ 100,000	$ -	$ -	2026
Equip.	Brookdale Trtu Scada Upgrades	PRELIMINARY PLANNING	RESERVES	$ -	$ -	$ 160,000	$ -	$ -	2026
Tank	Highland Tank	PRELIMINARY PLANNING	RESERVES	$ -	$ -	$ 200,000	$ 1,500,000	$ -	2026
Meters	600 Meter Replacement Program (15/Day)	PRELIMINARY PLANNING	RESERVES	$ -	$ 236,250	$ 250,000	$ -	$ -	Varies
Tank Maint.	Brookdale Tank Coating	ENGINEERING & PLANS	RESERVES	$ 300,000	$ -	$ -	$ -	$ -	2024
Tank Maint.	Blair Tank Coating	ENGINEERING & PLANS	RESERVES	$ 325,000	$ -	$ -	$ -	$ -	2024
Study	Loch Lomond Feasibility Study	PLANNING	RESERVES	$ 100,000	$ -	$ -	$ -	$ -	2024
Pipe	Kings Creek Bridge	CALTRANS HOLD	RESERVES	$ 200,000	$ 200,000	$ -	$ -	$ -	2025
Pipe	Monaco Ln. Bridge	CALTRANS HOLD	RESERVES	$ 200,000	$ 200,000	$ -	$ -	$ -	2025
Tank	Felton Heights Tank	ENGINEERING & PLANS	RESERVES	$ 100,000	$ 500,000	$ -	$ -	$ -	2025
Facilities	Fire Hardening - Pump Stations	ENGINEERING & PLANS	Grant/Reserves 50%	$ 600,000	$ -	$ -	$ -	$ -	2024
Pipe	Highway 9 Brookdale CalTrans	ENGINEERING & PLANS	RESERVES	$ 350,000	$ -	$ -	$ -	$ -	2023
	= RESERVE PROJECT PRIORITY			**$ 27,126,862**	**$ 11,831,250**	**$ 10,230,000**	**$ 5,375,000**	**$ 2,000,000**	

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STATUS	DESCRIPTION
ENGINEERING & PLANS	PREPARING ENGINEERING DOCS - CALCULATIONS, PLANS, & SPECIFICATIONS
IN CONTRACT	PROJECT HAS BEEN AWARDED
IN CONSTRUCTION	PROJECT HAS BEGUN CONSTRUCTION
FEMA/PLANNING	PROJECT SUBMITTED TO FEMA/WAITING APPROVAL
PROCUREMENT	EQUIPMENT/VEHICLE WILL BE PROCURED
PRELIMINARY PLANNING	STAFF ARE EVALUATING PROJECT NEED AND PARAMETERS
CALTRANS HOLD	ON HOLD PENDING SCHEDULE COORDINATION WITH CALTRANS

BREAKDOWN BY FUNDING SOURCE	FY23/24 BUDGET	FY24/25 BUDGET	FY25/26	FY26/27	FY27/28
$14.5M COP	$ 6,219,214	$ -	$ -	$ -	$ -
$15M Loan	$ 2,711,152	$ -	$ -	$ -	$ -
$15M LOAN / FEMA	$ 6,200,000	$ -	$ -	$ -	$ -
FEMA 75%	$ 2,842,500	$ 5,025,000	$ 4,125,000	$ -	$ -
FEMA 90%	$ 1,206,000	$ 423,000	$ 1,813,500	$ 1,800,000	$ 1,800,000
GRANT	$ 3,416,166	$ 900,000	$ -	$ -	$ -
IN EXCESS $15M LOAN (RESERVES)	$ 1,505,710	$ 2,075,000	$ 1,600,000	$ 1,375,000	$ -
IN EXCESS $14.5M LOAN (RESERVES)	$ 69,620	$ -	$ -	$ -	$ -
RESERVES	$ 1,875,000	$ 1,686,250	$ 1,115,000	$ 2,000,000	$ -
FEMA DISTRICT COST SHARE (RESERVES)	$ 1,081,500	$ 1,722,000	$ 1,576,500	$ 200,000	$ 200,000
Total Capital Projects	**$ 27,126,862**	**$ 11,831,250**	**$ 10,230,000**	**$ 5,375,000**	**$ 2,000,000**
INFLOWS FROM CAPITAL CONTRIBUTIONS [1]					
Financed FEMA Reimbursement	$ 5,580,000	$ -	$ -	$ -	$ -
Reserve Funded FEMA Reimb.	$ 4,048,500	$ 5,448,000	$ 5,938,500	$ 1,800,000	$ 1,800,000
Grant Funded	$ 3,416,166	$ 900,000	$ -	$ -	$ -
	$ 13,044,666	$ 6,348,000	$ 5,938,500	$ 1,800,000	$ 1,800,000
EST. PHYSICAL CASH INFLOW [2]	**$ 6,977,489**	**$ 14,181,957**	**$ 7,378,500**	**$ 6,787,500**	**$ 1,800,000**

[1] This is the funding the District is expected to receive from FEMA based on total project expenses incurred in that FY. This is using accrual based accounting in which you recognize revenue/expenses in the period in which they occurred.

[2] This is the funding the District is expecting to physically receive in FEMA/Grant Reimbursements. This is using cash basis accounting in which you recognize the revenue/expenses in the period in which the cash is received or paid out.

CAPITAL PROJECT DESCRIPTIONS

PROJECT NAME	PROJECT DESCRIPTION
CZU Five Mile Box & Turbidity Station	Replace Turbidity station building and settling chamber, replace turbidity, SCADA equipment and automatic valves.
CZU Lyon WTP Accessory Building	Replace Building Container and equipment, replaced burned flygt pump, water quality sampling stations, and lawn mowers.
Fall Creek Fish Ladder	Upgrades will include reducing the jump height between the pools for fish travel, as required by State and Federal regulations and improvements to the intakes.
Brookdale TRTU SCADA Upgrades	Upgrade Brookdale RTU and 4 legacy communication sites
Dump Truck	Used purchase with low miles.
Fork Lift Quail 5	Replace old fork lift
600 Meter Replacement Program (15/day)	Replace approximately 1,000 meters in the District.
CZU Services & Water Meter Replacement	Replace 150 water meters, meter valves, house valve, meter check coupling, and service lines.
CZU Clear Creek 5 Mile supply line	Fire damaged intake structure and destroyed 5.5 MI of 8" HDPE pipeline and metering and monitoring equipment. Replace supply line, constructability study of hardening for future fire.
Lyon Zone Pipe	Construction of approximately 3,000 lineal feet of new 12-inch water main and appurtenances thereto.
CZU Alta Via Distribution System Piping	Replace 5,000 LF temporary with permanent piping to AWWA/District standards in roadway, including 38 water meter service sets and 6 fire hydrants. Requires plans & Specifications for bidding.
CZU Peavine Supply	Fire destroyed 8,000 LF of 8" HDPE above ground raw water pipeline and support structures, intake and flow/metering monitoring equipment. Replace pipeline, monitoring equipment, constructability study of hardening for future fire.
CZU Sweetwater Supply Line	Fire damaged intake structure and destroyed 1.5 MI of 8" HDPE pipeline and metering and monitoring equipment, replace supply line, constructability study Harding for future fire.

Hermosa Oak Fernwood Main Replacement	Replace 3,000 LF of 8" main, due to current leaking water main. Project will include new water service runs and fire hydrants, including isolation valving.
Juanita Woods Water Main Replacement	Replace 3,000 LF with new 8" water main and apparatuses for proper fire flow. The project will replace existing 2-inch water mains.
Orman Road Water Main Replacement	Replace 2,000 LF with new 8" water main and apparatuses. The project will replace the existing 2-inch and 1 ½-inch water main along Orman Road. Undersized water mains are the source of intermittent low water pressure, interruption of water service, and inadequate fire flow.
Zayante Drive Water Main Replacement	Replace 1,500 LF with new 8" DIP. This improvement will remove a piping restriction to the Lompico Booster increasing fire flow into the Lompico Canyon.
CZU South Zone Distribution Piping	Replace 4,000 LF temporary water distribution piping, 26 water services and meters and install underground to AWWA/District standards along Forest and Western Ave.
CZU Eckley Pumping Station / Main Line	Replace pumping station, power drop, SCADA control, Communications wire. Including engineering plans and specifications.
CZU Bennett Spring Supply /Transmission main	Replace temporary piping and install underground to AWWA/District Standards approximately 1500 lineal Feet
Kings Creek Bridge	CalTrans Required Project
Monaco Ln. Bridge	CalTrans Required Project
CZU Harmon Street 2"	Replace 1,000 LF temporary piping in accordance AWWA/District Standards
El Solyo Boster Pump Station	Replace deteriorated wood building, fire harden.
Loch Lomond Feasibility Study	Study to evaluate processing water from the Loch Lomond allotment
CZU Big Steel Tank Piping	Replace 8" HDPE water main in accordance with AWWA/District Standards and relocate to public right of way.
CZU Big Steel Zone Piping	Replace 10", and 12" piping and fittings to AWWA/District Standards.

Blue Ridge Tank Replacement	Construction of a new 64,000 gallon bolted steel tank in the Blue Ridge Zone. This project will replace the existing redwood storage tank which has reached its service life. Project includes, but not limited to site improvements, tank construction, SCADA control, and appurtenances.
Redwood Park (Swim) Tank	Construction of a new 120,000 gallon bolted steel water tank. The project includes, but is not limited to, construction of a new bolted steel water tank, SCADA control, fencing, retaining walls and a new pump station.
Felton Heights Tank (1)	The project includes but is not limited to property acquisition by easement, engineering, and 60,000 gallon water tank construction.
Highland Tank	Replace the existing 64,000 gallon redwood tank.
Blair Tank Coating	Pushed out from FY20-21 budget.
Brookdale Tank Coating	Pushed out from FY20-21 budget.
Bear Creek Tank Coating	Tank quality inspection and retrofit.
Lyon Slide Repair	Lyon Slide project may be able to have a access road put in for a significant cost reduction than originally planned.
2023 Storm - Bennet Spring Raw Water Pipeline Damange	Replace ~1,960-LF of burned raw water pipeline.
2023 Storm - Bull Creek Raw Water Pipeline Damage	Replace ~2,600-LF of burned raw water pipeline.
2023 Storm - Stewart Street Slide/Main Breaks	Replace ~925-LF of potable water pipeline damaged by landslide/washout.
2023 Storm - Madrone Booster Pump Station	Waterproofing of existing booster pump station.
2023 Storm - Huckleberry Island Main Failure	Replace ~1,000-LF of potable water pipeline to address failed river crossing.
2023 Storm - Brookside Drive Road Washout/Pipe Damage	Replace ~1,650-LF of potable water pipeline damaged by road washout.
2023 Storm - Quail Hollow Road Damage	Restore failed potable water main trench.
2023 Storm - Lyon Access Road Slide	Construct new access road on new alignment, stabilize Lyon tank site.
CZU Foreman Creek Intake/Raw Water	Erosion control and grading to protect recently installed raw water pipeline.
CZU Cool Creek Intake & Piping	Replace burned intake structure and ~250-LF of raw water pipeline.
Ami Meter Grant - Route 11-14	Replace approximately 500 meters in Routes 11-14.

Bracken Brae/Forest Springs Consolidation	Construct connection to two mutual water providers, with tanks and booster station.
Madrone Booster Pump Redesign	Optimization of pump and generator sizing.
Bear Creek Tank Assessment	Determine required repairs to tank.
Spring Tank Recoating	Rehabilitate potable water tank.
Charlie Tank Recoating	Rehabilitate potable water tank.
Quail Tank Scada Upgrade	Upgrade RTU and all communication components for the Quail zone SCADA grid.
Fire Hardening - Pump Stations	Replace station buildings and/or roofs with new non-flammable structures/roofs.
Highway 9 Brookdale CalTrans	Relocate ~400-LF of potable water pipeline to clear Caltrans repair work.
Loch Lomond Feasibility Study	The District is pursuing a feasibility study to bring its 314 AF/yr allotment of Loch Lomond Reservoir water into its system. The Loch Lomond feasibility study will analyze treatment, tie-in locations, purchasing alternatives, permitting needs, and costs.

In August District staff met with consulting grant writer Susan Robinson to discuss potential funding opportunities for Brookside Drive. A community member had recommended the District seek Water Infrastructure Finance and Innovation Act (WIFIA) assistance, Corps Water Infrastructure Financing Program (CWIFP) assistance, or EPA grants. Ms. Robinson completed a comprehensive review of these funding opportunities. Attached as exhibit x, is the overview of her findings.

Due to the community's median household income, the existence of water service in the area, and the type of work in need for the area, Brookside Drive is not eligible for most of these funding programs. At this time loan funding the State Revolving Fund seems to be the most feasible option but likely would greatly delay the project start date.

POTENTIAL FUNDING Available for Brookside Drive Water Main Construction
As of August 28, 2023

USEPA GRANTS

There are no USEPA grant funding opportunities currently open for water main projects. Below are the active USEPA grant programs:

- Multipurpose Grants to States and Tribes: This grant program provides funding to states, tribes, and territories for high priority activities that complement programs under established environmental statutes.
- Fellowships and other student programs: Grants, fellowships, and research associateships
- Air Grants and Funding: includes competitive grant funding announcements for projects and programs relating to air quality, transportation, climate change, indoor air and other related topics.
- Brownfields Grants and Funding: existing facilities where redevelopment is complicated by real or perceived contamination.
- Children's Health Grants and Funding: EPA issues competitive funding announcements for projects and programs relating to improving children's health where they live, learn and play.
- Environmental Education Grants: projects to help the public make informed decisions that affect environmental quality.
- Environmental Information Exchange Network Grant Program: provides funding to develop an Internet-based, secure network that supports the electronic collection, exchange, and integration of high-quality data.
- Environmental Justice: provides financial assistance to support community-based organizations to collaborate and partner with other stakeholders (e.g., industry, government, academia, etc.) to develop and implement solutions that will significantly address environmental and/or public health issue(s) at the local level.
- Great Lakes Funding: includes competitive grant funding for planning, research, monitoring, outreach and implementation projects in furtherance of the Great Lakes Restoration Initiative and the Great Lakes Water Quality Agreement.
- National Clean Diesel Campaign Grants and Funding: building diesel engine emission reduction programs across the country to improve air quality and protect public health.
- People, Prosperity and the Planet: college students address challenges from a wide range of categories: agriculture, built environment, materials and chemicals, energy, and water. These can be challenges found in the developed or developing world and the solutions will move us towards a sustainable future.
- Pollution Prevention Grant Program: provides matching funds to state and tribal programs to support pollution prevention and to develop State-based programs.
- Research Funding Opportunities: upcoming funding opportunities from NCER and the EPA STAR program
- Small Business Innovation Research (SBIR): competitively funds environmental technology research at small businesses.
- Office of Land and Emergency Management (OLEM) Grants and Funding: includes competitive grant funding announcements for projects and programs relating to Brownfields, Federal

Facilities Restoration and Reuse, Solid Waste management, resource conservation and recovery, Underground Storage Tanks and other related topics.

Of these, the only *potentially* relevant program is the Office of Land and Emergency Management program. The only open announcement under that program is for brownfields mitigation (not relevant).

USEPA Special Appropriation Act Projects
Through the annual appropriations process, EPA is sometimes directed to provide funding to a specific entity for particular study, purpose, or activity. These projects are not part of an established program, and EPA does not advocate or nominate drinking water, wastewater, or other water quality infrastructure projects for SAAP funding. *Potential source of funds? Perhaps this is a question for Congressman Jimmy Panetta's office as to how to get the community identified in one of EPA's appropriations. (The process of attempting to obtain an appropriation would likely delay the project start date significantly.)*

USEPA Response to Emergency Situations Affecting Public Water Systems (SDWA 1442b)
This assistance program provides grant funding for projects and activities in emergency situations affecting public water systems that are necessary for preventing, limiting, or mitigating a substantial danger to public health and that would not be taken without this emergency assistance. Eligible applicants include States or publicly owned water systems where the Administrator has made an Emergency Determination under SDWA section 1442(b). Funding Priority - Fiscal Year 2024: Funding priorities will continue to be for projects and activities in emergency situations affecting public water systems that are necessary for preventing, limiting, or mitigating a substantial danger to public health.
Since water is being delivered to the Brookside Drive community, there is no "substantial danger to public health." Therefore, the project is not eligible for this grant program.

USEPA Region 9 Grants
Upon careful review of all USEPA Region 9 grant opportunities on grants.gov, there are no grants relevant for water main construction. See website.

USEPA Drinking Water Infrastructure Resilience and Sustainability Program
The purpose of this grant program is to increase drinking water system resilience to natural hazards. Grant funding can be used to assist in the planning, design, construction, implementation, operation, or maintenance of a program or project that increases resilience to natural hazards. Funding Priority – Fiscal Year 2023: Funding priority is for projects that increase drinking water system resilience to natural hazards in underserved communities that are disadvantaged communities or communities with a population of less than 10,000 individuals. Underserved communities include those communities that: do not have household drinking water or wastewater services; are served by a public water system that violates, or exceeds a requirement of a national primary drinking water regulation issued under SDWA section 1412, including a maximum contaminant level, a treatment technique, or an action level.
The community does not meet the definition of "disadvantaged" or of "underserved." Therefore the project is not eligible for this funding source.

USDA Rural Development: Emergency Community Water Assistance Grants
To help rural residents who have experienced a significant decline in quantity or quality of water, due to an emergency event (such as drought, earthquake, hurricane or tornado), to obtain adequate quantities of water that meet the standards of the Safe Drinking Water Act.
Since there is no decline in quantity or quality of water, this grant program is not a possibility.

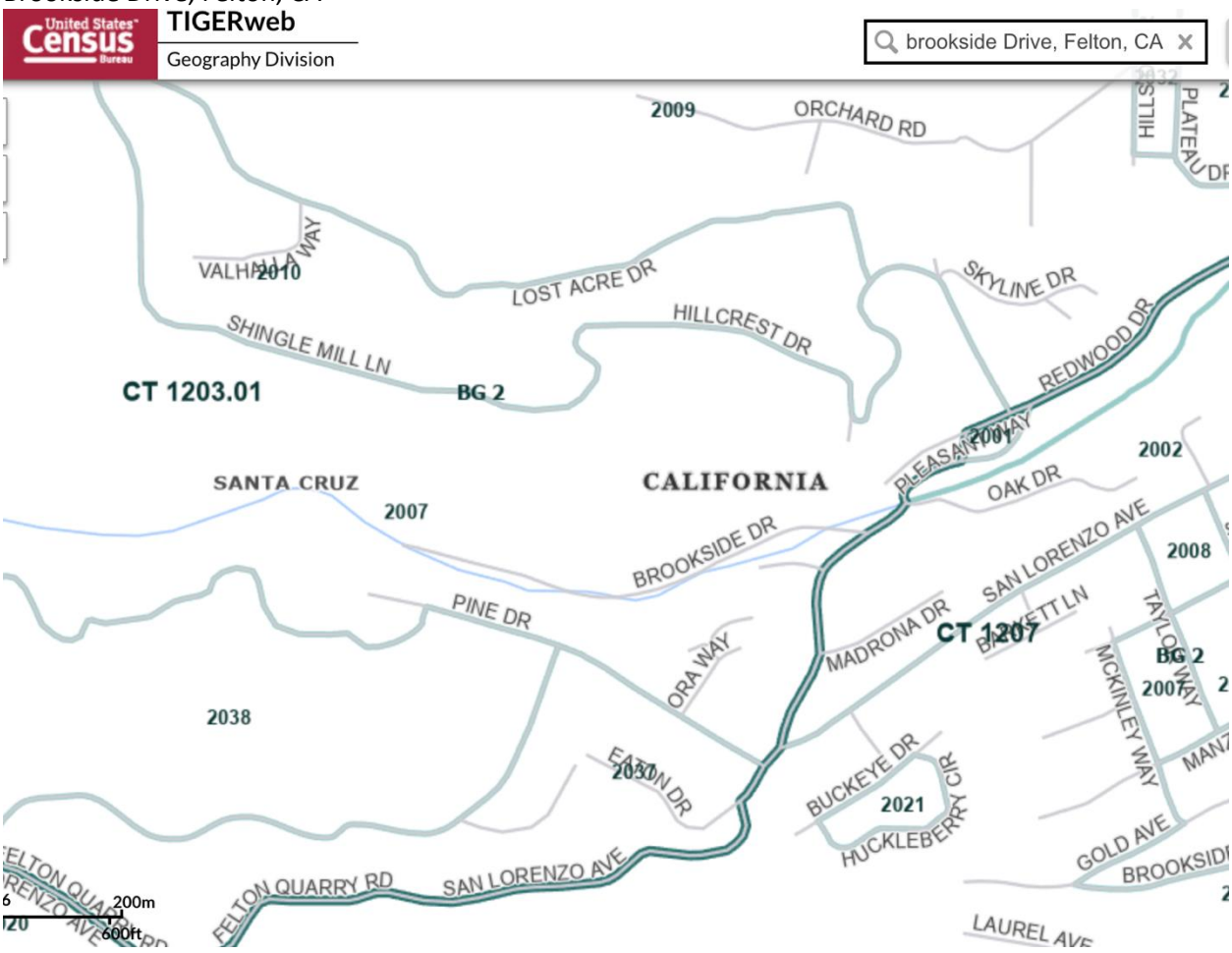
LOANS

US Army Corps: Corps Water Infrastructure Financing Program
WIFIA authorizes the Corps to provide secured (direct) loans and guaranteed loans to eligible water resources infrastructure projects. The only eligible project types are: ". . . . safety projects to maintain, upgrade, and repair dams identified in the National Inventory of Dams with a primary owner type of state, local government, public utility, or private. . .". Water main construction is not eligible.

USEPA: Water Infrastructure Finance and Innovation Act (WIFIA)
SLVWD is eligible to apply for WIFIA loans. However, the minimum project size is $5 million (for population 25,000 or less). Therefore, this project would not qualify for a WIFIA loan.

SWRCB: State Revolving Fund
SLVWD is eligible to apply for SRF loans for pipeline construction. As of January 2023: Interest rate is 2.1%. (Applying for an SRF loan would likely delay the project start date significantly.)

Brookside Drive, Felton, CA



MEMO

To: District Manager

From: Engineering Manager

Subject: District Projects Update

Date September 21, 2023

Recommendation:

It is recommended that the Board of Directors review and file the Engineering Department Status Report.

District Projects in Construction:

Alta Via Drive and Monan Way Pipelines: Construction is mostly complete on Alta Via Drive water main line, aside from the hydrant & ARV at Moonridge. Anderson Pacific completed installation of water main line and hydrant on Prospect Avenue. Installation of the water main line for Monan Way is ongoing.
Contract Completion Date: 11/10/2023

2021 CIP Pipeline Replacement Project: JMB Construction Inc. completed the concrete foundation and backfill around ring foundation for Blue Ridge Tank. Installation of160,000 gallon bolted steel tank manufactured by Superior Tank Co. started Tuesday, September 19th with 2 -3 weeks to complete assembly.

Juanita Woods Water Main Replacement main line, residential services and hydrant installations are complete, awaiting final pavement.

Orman Road Water Main Replacement has completed the main line, residential water services and hydrant installations, awaiting final pavement.

Hermosa Avenue Water Main Replacement started work with existing utility locating, layout, saw cutting and installation of new mainline.
Contract Completion Date: 1/2/2024

Fall Creek Fish Ladder: Concrete demolition is complete. Rock anchor installation and pull testing is complete. Completion of concrete work in the channel is delayed 12 days, scheduled to be completed by September 27th. Syblon Reid General Engineering Contractors has been working ten hours per day and working Saturdays to expedite the concrete placement. Concrete placement of 35 cubic yards for footings for weirs 1, 3, 5 & 6 and weir 2 stem wall completed Friday, September 1st. Concrete placement of 16 cubic yards for weir stem walls 1, 3, 4, 5, & 6 completed Thursday, September 7th. First shotcrete lift

of the vertical wall completed Saturday, September 9th. Concrete placement for the control weir footing completed Friday, September 15th. Intake casing installed up creek bank.
Contract Completion Date: 1/20/2024

Lyon & Big Steel Zone Pipeline Improvements: Monterey Peninsula Engineering are currently installing two new mains on Highway 236, Big Basin Way.
Contract Completion Date: 5/1/2024

Foreman Pipeline Access Trail Rehabilitation: McGuire and Hester are providing submittals, staff are reviewing. Schedule for construction is TBD. Changes to the design based on March 2023 site visit are being evaluated by F&L, and District staff. Revised plans will be given to MacGuire and Hester for negotiation of revised construction scope.
Contract Completion Date: TBD

District Projects in Design:

2021 FEMA Pipeline Replacement Project: Staff have prepared an RFP for the Harmon Street work, RFP is undergoing final review before publication.

Sandis is working on possible changes to the Eckley zone (Ridge Drive) portion of this project aimed at leveraging placement of the pump station proposed for the Bracken Brae & Forest Springs Consolidation project to eliminate the need for the Eckley pump station and tank. This scope change will require FEMA approval; Staff will apply for such when plans for the revised scope are completed. Staff will provide further updates on this possible elimination as plans develop.

2023 Tank Rehabilitations: Staff are developing an RFP for rehabilitation two existing storage tanks, Blair Tank and Brookdale Tank. Blair Tank rehabilitation will include repair of failing welds, recoating of interior and exterior; updating of access; replacement of outdated piping and pump station; and preparation of the tank for installation of a cathodic protection system at a later date. Brookdale Tank Rehabilitation will include recoating of interior and exterior; updating of access; and preparation of the tank for installation of a cathodic protection system at a later date. A separate RFP will be published for inspections specific to coatings. Staff anticipate publication of this RFP in November of 2023.

CA-9 Bridges 05-1H470: Staff have received a final plan set from MME and reviewed same. Staff and MME will prepare an RFP for construction of this work in coordination with Caltrans. Publication date is dependent on Caltrans schedule, not yet provided to the District.

Cross County Pipelines: Staff are exploring options for construction subsequent to Board discussion when the Peer Review was presented. Tree survey and clearing work is under way.

Consolidation of Bracken Brae and Forest Springs Mutuals: Sandis has completed the design plans and specifications, except for the hydro-booster system design for the 20 homes which are adjacent to the Forest Springs tank site and will experience low pressure without this system. Boulder Creek Fire Chief Mark Bingham has indicated fire sprinkler demand of 50 gpm at 50 psi. Sandis has completed the acoustical study of the West Park Pump Station to confirm noise mitigation criteria and to provide residents with a study showing the noise from pump operation in their neighborhood. Sandis will update the plans, specifications, and cost estimates accordingly and issue the bid package.

Felton Heights (Lost Acres Drive) Tank Project: District Staff continue to work with the property owner at the end of Lost Acre towards acquisition of necessary property and/or easements for this project; currently staff are considering a location at the end of Lost Acres Drive. Staff is coordinating survey for bidding of geotechnical investigation, and subsequent design of the new tank. Survey will be needed for execution of required easements or property purchase.

GIS System Updates: Staff continue to work on a program of field-verification of the exact location of all at-grade and above-grade district-owned facilities. This effort includes meters, backflow prevention devices, isolation valves, and all similar facilities. The project has been underway since December of 2021 and continues. Initial estimates of one-year duration have been extended due to utilization of staff and equipment needed for this effort in other, more time-sensitive, areas. Staff now anticipate completion of this effort in Spring of 2024.

Huckleberry Island Main: The temporary main is in service, work to obtain easements required for permanent repair is ongoing.

Lyon Slide/Complex Access Road: Sandis has completed the feasibility study and determined the proposed road alignment to be feasible. Sandis has provided preliminary construction documents for this proposed alignment. Staff have received communication from FEMA stating that the proposed change is acceptable. The slide reactivated due to heavy rain in January 2023, staff are coordinating with the County and the State Geological Service to determine

extent of new slide. Staff are researching any necessary measures to protect the Lyon complex and possibly include some form of slide mitigation if needed.

Redwood Park Tank Project: Paving of the pipeline construction is complete. Staff will prepare RFPs for design and construction of the tank winter 2023/ spring 2024.

Brookside Drive (Felton) Pipeline Project: Ifland Survey has completed field work and provided draft mapping documents on September 15. Staff will prepare RFPs for design and construction of the pipeline as soon as possible.

Foreman Pressure Break: Design awarded to Freyer & Laureta and contract has been approved by legal. Site meeting for kickoff of design with Freyer & Laureta scheduled for Thursday, September 21st. Staff will prepare RFPs for construction following completion of design construction documents.

Valley Gardens Housing Development: Proposal executed with Akel Engineering Group for peer review of Schaaf & Wheeler hydraulic design for Robson Homes. Robson Homes has provided a deposit to pay for the peer review.

Garrett Roffe, P.E.
Engineering Manager

DATE: 9/21/23

TO: Engineering & Environmental Committee, SLVWD

FROM: Environmental Programs Manager/Administrative Analyst

SUBJECT: Environmental Project Summary

WRITTEN BY: Carly Blanchard

PRESENTED BY: Carly Blanchard

STAFF RECOMMENDATION

It is recommended that the Engineering & Environmental Committee review this project summary.

RECOMMENDED MOTION

None

BACKGROUND

Staff have prepared the project summary to provide highlights of particular interest to the Committee.

Staff will be prepared to discuss any of the projects, to whatever depth the Committee desires.

Current Projects

1. CIP Project Permitting
    a. Lyon & Big Steel Pipeline
        i. Biologists on-call
    b. Redwood Park Tank
        i. Awaiting project start
    c. Blue Ridge Tank Replacement
        i. Biologists on-call
    d. Lyon Treatment Plant Access Road Slide (FEMA funded - 2023)
        i. Awaiting FEMA
    e. 5-mile and Peavine pipeline
        i. Tree surveys complete in May 2023
        ii. Recommendation discussed with Committee 9/14/23

f. Huckleberry Island pipeline replacement
    i. CEQA NOE to be refiled with updated easement information. Awaiting legal direction.
g. Bracken Brae & Forest Springs Consolidation
    i. Initial biological surveys completed
        a. No special status species found
h. Fuel Reduction Annual Maintenance Contract
    i. Fuel reduction contract awarded, contract in review.
i. Felton Heights Tank
    i. Environmental consultant kick-off meeting scheduled for September 2023
j. Bear Creek Estates
    i. Staff seeking alternate funding sources.
k. Alta Via
    i. Notice of Exemption (NOE) filed
    ii. FEMA meeting scheduled in September to move ahead Environmental Historic Preservation (EHP) process for cross-country section
l. Zayante drive pipeline
    i. Awaiting start date
m. Fall Creek Fish Ladder
    i. Permit extension may be needed
n. Valley Gardens will serve letter
    i. Package submitted to SANDIS Engineering for review
    ii. Staff planning to bring the recommendation to the ENV/ENG Committee
o. Orman, Hermosa, and Juanita Pipelines
    i. NOEs filed in March 2023

2. FEMA
    a. Staff working with Panorama Environmental to complete all FEMA project Environmental and Historic Preservation (EHP) reviews.
    b. Staff reviewing proposals for Public Assistance Management Services for all District FEMA projects
3. Grants
    a. State Revolving Funding (SRF) – Forest Springs
        i. Application in process for funding assistance for tank & lateral replacements

    b. USDA Rural Development Funding
        i. Staff looking into potential funding for Brookside Drive and other storm related damages through this program
4. Santa Margarita Groundwater Agency (SMGWA)
    a. Discussions with staff around future modeling in process
5. Environmental Planner Hiring
    a. 16 applications received
    b. Interviews in process
6. Pacific Gas & Electric (PGE)
    a. PGE seeking to complete tree removal around power line infrastructure on Harmon & Madrone
    b. Staff working with PGE to ensure work is completed to District standards and does not affect Sempervirens Fund easement.
7. Conjunctive Use Planning
    a. Regulatory agency permitting (including diversion permitting) in progress.
    b. Hydrologist contract awarded in August 2023
    c. Staff working on operational planning.
    d. Loch Lomond Feasibility Request for Proposals (RFP) in draft stage. Staff planning to release in September 2023.
8. Habitat Conservation Plan
    a. Staff working with consultant to move document forward based on future maintenance and projects occuring in sandhills. Update planned for Committee in October.
9. All other projects, outreach, and further project descriptions will be available in the September Environmental Status Report as part of the BoD agenda