

SR101 Crossing at PAMF Preliminary Design Report

Prepared for

Mid-Peninsula Water District
04-1621-CB

November 2017



WEST YOST

ASSOCIATES
Consulting Engineers

768-14-17-01

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SR101 Crossing at PAMF

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Mid-Peninsula Water District

04-1621-CB

Project No. 768-14-17-01



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Table of Contents

Preliminary Design Report

| | |
|--|----|
| 1.0 Introduction | 1 |
| 2.0 Background | 1 |
| 3.0 Summary of Existing Data and Field Investigation Results | 3 |
| 3.1 Utilities Coordination | 3 |
| 3.2 Field Investigation Results | 4 |
| 3.3 Survey Data | 5 |
| 3.4 Geotechnical Investigation | 5 |
| 3.5 Dewatering | 6 |
| 3.6 Corrosion Control Analysis | 6 |
| 3.7 Hazardous Materials Assessment | 6 |
| 3.8 Facilities in the Flood Zone | 7 |
| 3.9 Environmental Documentation | 7 |
| 4.0 Trenchless Construction Methods | 7 |
| 4.1 Trenchless Installation Techniques | 7 |
| 4.1.1 Microtunneling | 8 |
| 4.1.2 Pilot Tube Guided Boring | 8 |
| 4.1.3 Horizontal Directional Drilling | 10 |
| 4.1.4 Axis by Vermeer | 10 |
| 4.1.5 Trenchless Construction Recommendation | 10 |
| 4.2 Launch Shaft and Receiving Shaft Locations | 10 |
| 5.0 Pipeline Alignments | 11 |
| 5.1 PAMF Property | 11 |
| 5.1.1 Alternative 1A: Trenchless Installation within Existing Easement | 15 |
| 5.1.2 Alternative 1B: Open Cut Installation within Existing Easement | 15 |
| 5.1.3 Alternative 2: Partial Installation within Existing Easement and Partial Installation within PAMF Road | 15 |
| 5.1.4 Alternative 3: Entire Installation within PAMF Loop Road | 15 |
| 5.1.5 PAMF Alignment Recommendation | 17 |
| 5.2 SR101 Crossing | 17 |
| 5.2.1 Alternative 1: Straight Across SR101 | 17 |
| 5.2.2 Alternative 2: 25 Degree Skew Across SR101 | 17 |
| 5.2.1 SR101 Crossing Alignment Recommendation | 18 |
| 5.3 Shoreway Road | 18 |
| 5.4 Existing Crossing at Sem Lane | 18 |
| 6.0 Shoreway Inter-Tie | 19 |
| 6.1 Inter-tie Design | 19 |
| 6.2 Inter-tie Placement | 20 |
| 6.2.1 Alternative 1: Within Existing Right-of-Way | 20 |
| 6.2.2 Alternative 2: Near Existing Three-Way Inter-Tie and MPWD Water Main | 20 |
| 6.2.1 Inter-tie Location Recommendation | 20 |
| 7.0 Design Criteria | 22 |

Table of Contents

| | |
|--|----|
| 7.1 Pipeline Sizing | 22 |
| 7.2 Pipe Materials | 22 |
| 7.2.1 Joints | 22 |
| 7.2.2 Fittings | 23 |
| 7.2.3 Coating and Lining | 23 |
| 7.2.4 Cathodic Protection | 23 |
| 7.3 Appurtenances and Connections | 23 |
| 7.3.1 Isolation Valves | 23 |
| 7.3.2 Air Valves | 24 |
| 7.3.3 Blow Offs | 24 |
| 7.4 Trench Design | 24 |
| 7.5 Insertion Pit Design | 24 |
| 7.6 External Loads | 25 |
| HS-20 Loads | 25 |
| 7.7 Thrust Restraint | 25 |
| 7.8 Facilities in Flood Zone | 25 |
| 7.9 Disinfection and Testing | 25 |
| 8.0 Restoration Requirements | 25 |
| 8.1 Streets and Pavement Moratoriums | 26 |
| 8.2 Utility Easements | 26 |
| 9.0 Permitting Requirements | 27 |
| 9.1 Caltrans | 27 |
| 9.2 Cities and County | 27 |
| 9.3 PAMF | 29 |
| 9.4 Dewatering Disposal | 29 |
| 9.5 State Water Resources Control Board | 29 |
| 9.6 California OSHA Division of Mining and Tunneling | 30 |
| 9.7 Public and Private Utilities | 30 |
| 9.8 Staging Areas | 30 |
| 10.0 Transportation Impacts and Mitigation | 30 |
| 10.1 Collector Streets and Major Arterials | 30 |
| 10.2 PAMF | 31 |
| 10.3 Recology San Mateo County Recycling Center | 31 |
| 10.4 Night Work | 31 |
| 11.0 Recommendation | 31 |
| 11.1 Opinion of Probable Cost | 31 |
| 11.2 Project Implementation Schedule | 32 |

Table of Contents

List of Appendices

| |
|---|
| Appendix A: Location and Limits of the Project |
| Appendix B: Geotechnical Report |
| Appendix C: Corrosion Report |
| Appendix D: Hazardous Materials Study |
| Appendix E: Estimate for Soil and Water Testing |
| Appendix F: FEMA Firm Map |
| Appendix G: PAMF Alternative Costs |
| Appendix H: PAMF Easement |
| Appendix I: 30% Cost Estimate |
| Appendix J: Schedule |

List of Tables

| | |
|--|----|
| Table 1. Utility Agencies Contacted for this Project | 3 |
| Table 2. PAMF Property Alignment Alternatives | 16 |
| Table 3. SR101 Crossing Alignment Alternatives | 18 |
| Table 4. Shoreway Inter-tie Location Alternatives..... | 20 |
| Table 5. Land Disturbance | 30 |
| Table 6. Project Implementation Schedule..... | 32 |

List of Figures

| | |
|---|----|
| Figure 1. Abandonment and New Crossing Project Location | 2 |
| Figure 2. PAMF Easement Constraints (looking west)..... | 4 |
| Figure 3. Existing Channel North of PAMF Easement | 4 |
| Figure 4. Shoreway Road Constraints (looking South) | 5 |
| Figure 5. Schematic of a Typical Microtunneling Operation (courtesy of Herrenknecht)..... | 8 |
| Figure 6. Schematic of a Typical Pilot Tube Boring Installation | 9 |
| Figure 7. Alignment Alternatives..... | 12 |
| Figure 8. PAMF Section View A-A, Shoreway Road Section View B-B..... | 13 |
| Figure 9. Shoreway Road Section View C-C, Shoreway Road Section View D-D | 14 |
| Figure 10. Existing Three-way Inter-tie on Shoreway Road..... | 19 |
| Figure 11. Alternative Shoreway Inter-tie Locations..... | 21 |
| Figure 12. City and County Limits | 28 |

Table of Contents

List of Acronyms and Abbreviations

| | |
|-----------|----------------------------------|
| AWWA | American Water Works Association |
| BFE | Base flood elevation |
| CIP | Capital Improvement Plan |
| District | Mid-Peninsula Water District |
| LF | Linear feet |
| MJA | McMillen Jacobs Associates |
| PAMF | Palo Alto Medical Foundation |
| Project | SR101 Crossing at PAMF |
| PTGB | Pilot tub guided boring |
| PVC | Polyvinylchloride |
| SFHA | Special Flood Hazard Area |
| SR101 | State Route 101 |
| SVCW | Silicon Valley Clean Water |
| West Yost | West Yost Associates |

1.0 INTRODUCTION

This report provides a basis of design for the State Route 101 (SR101) Crossing at Palo Alto Medical Foundation (PAMF) Project (Project). This report includes discussion of the following topics:

- Background
- Summary of Existing Data and Field Investigation Results
- Trenchless Construction Methods
- Pipeline Alignments
- Shoreway Inter-tie
- Design Criteria
- Restoration Requirements
- Permitting Requirements
- Transportation Impacts and Mitigation
- Recommendation

2.0 BACKGROUND

In 2014, as part of a long-term strategic planning effort, Mid-Peninsula Water District (District) undertook a comprehensive review and assessment of the condition of their water system infrastructure and facilities. This assessment resulted in the preparation of a Comprehensive Capital Improvement Program (CIP), which was adopted by the Board of Directors in May 2016.

As a result, the SR101 Crossing at PAMF Improvements CIP Project was identified as a necessary improvement to replace an old and aging water main capable of causing major disruptions on SR101 in the event of a main break. Other infrastructure improvements as a result of this project include eliminating a water main dead end, creating a looped system, improving fire flows, and constructing a new three-way inter-tie with California Water Service Company and the City of Redwood City.

The District currently operates nine separate water distribution pressure zones. Zone 1 contains two SR101 water main crossings and operates in a pressure range between 90 and 135 psi. These crossings include a 500 linear feet (LF) 12-inch asbestos cement pipe (ACP) crossing between Karen Road and Sem Lane and another 12-inch polyvinylchloride (PVC) crossing a half mile to the north near the pedestrian overpass at Oxford Court. The 12-inch ACP crossing was installed inside 36-inch steel casing in 1963. As part of the PAMF development agreement at the south end of Zone 1, the District obtained a 15-foot wide easement along the northeast side of the PAMF property in addition to a 40-foot by 40-foot area in the northeast corner to serve as a staging area for a new SR101 water crossing.

The proposed project will allow for abandonment of the aging 12-inch ACP crossing, shown on Figure 1, by relocating the crossing to the PAMF easement and installing 1,100 LF of 12-inch PVC water main. Additionally, 1,200 LF of 8-inch PVC will be installed to loop the water main to the existing system on Shoreway Road.



N:\Clients\1763 Mid Peninsula WD\14-17-01 SR101 Crossing\CAD\Figures\763 14-1701-Fig1.dwg 11/28/2017 1:37 PM egril

LEGEND

--- WATER MAIN TO BE ABANDONED

— PROPOSED WATER MAIN

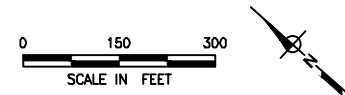


Figure 1

Abandonment and New Crossing Project Location

Mid-Peninsula Water District
SR101 Crossing at PAMF

3.0 SUMMARY OF EXISTING DATA AND FIELD INVESTIGATION RESULTS

West Yost Associates (West Yost) gathered and reviewed additional information pertinent to the pre-design of this Project. This section will present the findings of the following items:

- Utilities Coordination
- Field Investigation Results
- Survey Data
- Geotechnical Investigation
- Dewatering
- Corrosion Control Analysis
- Hazardous Materials Assessment
- Facilities in the Flood Zone
- Environmental Documentation

3.1 Utilities Coordination

West Yost is a member of USA North Design Inquiry Service which provides utility agency contact information based on the agencies' participation in USA. West Yost worked with the District to send utility map requests to agencies that were identified in the USA North Design Inquiry. Table 1 is a list of all utility agencies contacted by West Yost and the District. Information received from the utility agencies will be used in conjunction with survey data and pothole information to depict buried utilities on the drawings. Information received from utility agencies was mapped and potential conflicts of existing critical utilities will take place during design as necessary.

| Table 1. Utility Agencies Contacted for this Project | | |
|--|------------------------------------|---------------|
| Name | Type of Facility | Response |
| Level 3 Communications | Media/Communication | Maps Provided |
| MCI Worldcom (Verizon) | Media/Communications | No Conflict |
| Pacific Gas & Electric | Gas/Electric Distribution | Maps Provided |
| Wave Broadband | Media/Communication | No Conflict |
| Comcast | Media/Communication | Maps Provided |
| Kinder Morgan | Gas/Fuel/Petroleum | No Conflict |
| XO Communications | Media/Communication | Maps Provided |
| County of San Mateo | Airport Facilities, Sanitary Sewer | Maps Provided |
| City of Belmont | Sanitary Sewer, Storm Drainage | Maps Provided |
| City of San Carlos | Sanitary Sewer, Storm Drainage | Maps Provided |
| City of San Mateo | Sanitary Sewer, Storm Drainage | No Conflict |

Table 1. Utility Agencies Contacted for this Project

| Name | Type of Facility | Response |
|------------------------------|---|---------------|
| City of Redwood City | Water/Recycled Water Distribution, Sanitary Sewer, Storm Drainage | Maps Provided |
| Silicon Valley Clean Water | Sanitary Sewer | Maps Provided |
| Qwest Communications | Media/Communication | No Conflict |
| Cal Water Service | Water Distribution | Maps Provided |
| AT&T (Pacific Bell) | Media/Communication | Maps Provided |
| Caltrans District 4 | Highway | Maps Provided |
| Mid-Peninsula Water District | Water Distribution | Maps Provided |

3.2 Field Investigation Results

West Yost staff walked the alignment on September 26, 2017 to identify site constraints for a trenchless crossing of SR101 and looping connection. There are a large number of trees and electrical lighting equipment located in the PAMF easement and storm drain swales, pipes, and inlets, parallel to the easement to the south, as shown on Figure 2. An existing earthen drainage channel parallels the easement to the north, as shown on Figure 3. Additionally, there is an overhead power connection to the building directly north of the easement on the PG&E property off of Industrial Road.

Figure 2. PAMF Easement Constraints (looking west)



Figure 3. Existing Channel North of PAMF Easement



Shoreway Road is relatively narrow and includes several utilities including two Silicon Valley Clean Water (SVCW) sanitary sewer force mains (54-inch and 20-inch diameter), City of San Carlos sanitary sewer, California Water Service water distribution mains and multiple storm drains. In addition, there are above-ground electric power poles and large electric transmission towers along the east side of Shoreway Road, as shown on Figure 4.

Figure 4. Shoreway Road Constraints (looking South)



3.3 Survey Data

A topographic survey was performed along the Project alignment by Mark Thomas & Company, Inc. The survey included the full width of pavement and the existing easement through PAMF property and full width of Shoreway Road and the intersections of Karen Road and O'Neill Avenue and Shoreway Road and Sem Lane. The topographic survey is shown in the Preliminary Plan and Profile Drawings attached as Appendix A.

3.4 Geotechnical Investigation

A geotechnical investigation was performed by McMillen Jacobs Associates (MJA). A brief data report is attached in Appendix B and includes some historical information and the boring logs. Based on the field investigations, there is approximately five feet of fill over about 10 feet of young bay mud which is perched upon sandy lean clay. Groundwater is present at approximately five feet below the ground surface. A final geotechnical report will be prepared following confirmation of the project alignment.

West Yost met with MJA to discuss the preliminary results. It appears that pilot tube guided boring will be the most cost-effective method for the trenchless crossing under SR101. MJA recommended that the top of the casing be at least two feet below the bottom of the young bay mud. West Yost had a separate conversation with a tunneling contractor, who recommended that the design include three feet of clearance below the young bay mud.

3.5 Dewatering

With groundwater present at approximately five feet below the ground surface, shaft construction is anticipated to require a significant amount of dewatering. It is anticipated that the majority of open trench construction will stay within the top five feet and will require less significant dewatering.

Groundwater removed as part of construction will be discharged to the local collector sanitary sewers owned by the City of Belmont west of SR101 and the City of San Carlos east of SR101. Both cities send their sanitary sewage to SVCW for treatment. The water to be disposed of must meet the discharge limits for various constituents established by SVCW, and depending on the water quality test results received, may require pretreatment. It is anticipated that, at a minimum, a settling tank will be required to remove sediment. SVCW will require a discharge permit, and each city will require payment of discharge fees. West Yost is in contact with all agencies and will include discharge requirements in the Contract Documents and will work with the District to obtain discharge permits prior to construction.

3.6 Corrosion Control Analysis

A corrosion control analysis report prepared by JDH Corrosion Consultants, Inc. is attached in Appendix C.

In summary, the soils along the proposed alignment are considered to be “corrosive” to steel, ductile iron, and dielectric coated steel. Therefore, it is recommended to use coatings on the casings and fittings, supplemented with cathodic protection for the steel casing and the ductile iron fittings on the plastic pressure piping.

3.7 Hazardous Materials Assessment

A preliminary hazardous materials assessment review was conducted and the technical memorandum is attached in Appendix D.

In summary, the preliminary hazardous materials assessment revealed one site, near the intersection of O’Neill Avenue and Karen Lane, that has documented impacts to soil and groundwater and 13 sites that are unlikely to impact the project corridor. Shallow excavation within approximately five to seven feet of ground surface will significantly reduce the overall potential to encounter impacted soil and groundwater during construction. However, contamination may be present at shallow depths, particularly near the site with a documented impact near the project corridor.

The geotechnical engineer noted sulfurous and petroliferous odors when drilling, and noted the odors on the boring logs. Sulfurous odors could be the result of organic decay. Although it is unlikely that the sulfurous odors would cause a problem for disposal, it can be a health hazard in confined spaces. It is recommended that the Contract Documents require that an industrial engineer be on-site during work in the tunneling shafts.

The petroliferous odors could be more problematic for soil and groundwater disposal. There are two options for addressing this risk: 1) complete environmental borings and test the soils for hydrocarbons and metals and include the information in the Contract Documents; 2) Test the water available in the monitoring well installed as part of this project on the PAMF site, and include the

information in the contract documents to address groundwater and provide contingency bid items for disposal of contaminated soil and groundwater.

Completing environmental borings will reduce overall project risk. However, the young bay mud and the majority of groundwater will only be encountered during construction of the shafts for installation of the casing under SR101. The quantity of soil can be calculated, and the results of the monitoring well water could be used for permitting groundwater disposal. The costs associated with these options are included in Appendix E.

3.8 Facilities in the Flood Zone

The intersection of Sem Lane and Shoreway Road is within a Federal Emergency Management Agency (FEMA) Special Flood Hazard Area (SFHA) Zone A. These areas are subject to inundation by the one percent annual chance flood. The one percent annual chance flood (100-year flood), also known as the base flood, is the flood that has a one percent chance of being equaled or exceeded in any given year. The SFHA is the area subject to flooding by the one percent annual chance flood. Areas of Special Flood Hazard includes Zone A, among others. Zone A areas are unstudied and therefore have no determined Base Flood Elevations (BFE).

The entire remaining extent of the project area, apart from the intersection of Sem Lane and Shoreway Road, is within FEMA Zone X. In the case of this particular project area, Zone X represents areas protected by levees from the one percent annual chance or greater flood hazard. Overtopping or failure of the levee system could allow the one percent annual chance flood or greater flood hazard discharge to inundate this project area. FEMA Firm Map Number 06081C0169F shows the project area and is attached in Appendix F. No impact to the project is anticipated.

3.9 Environmental Documentation

This project includes the installation of less than 1 mile of water main piping within existing public right-of-way. Therefore, it is anticipated that this project will be Statutorily Exempt from the provisions of the California Environmental Quality Act under code §15282(k). West Yost prepared the Notice of Exemption and the District will be responsible for filing the exemption with the San Mateo County Clerk.

4.0 TRENCHLESS CONSTRUCTION METHODS

This section discusses the possible trenchless construction methods and their applicability to the project. Also discussed are the necessary launch and receiving shaft sizes and locations.

4.1 Trenchless Installation Techniques

This section outlines the applicability of the following trenchless construction methods:

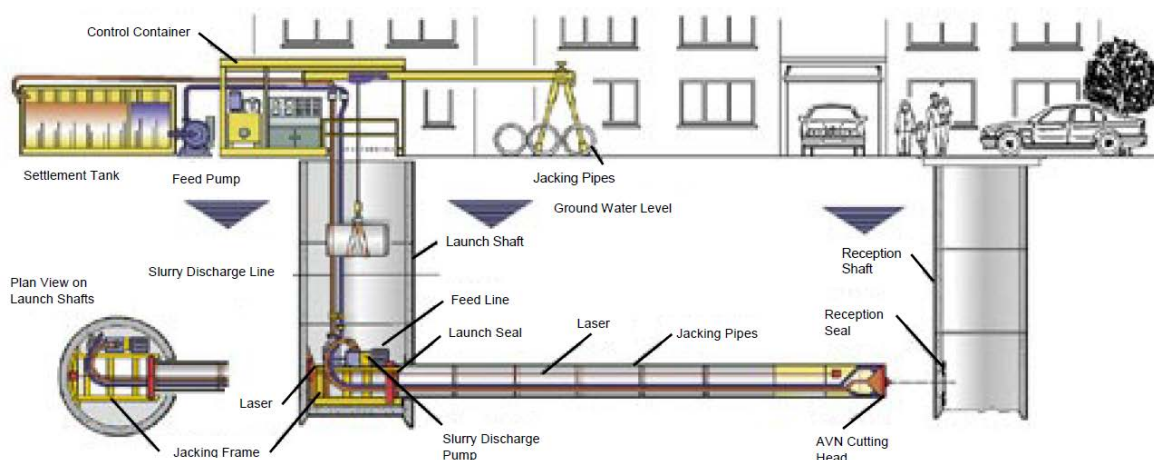
- Microtunneling
- Pilot Tube Guided Boring
- Horizontal Directional Drilling
- Axis by Vermeer

Due to the presence of ground water and soft soils, the type of trenchless construction methods considered for this project include microtunneling, pilot tube guided boring, horizontal directional drilling, and Axis by Vermeer. Each method has benefits and limitations, as well as varying lay down area requirements and associated costs.

4.1.1 Microtunneling

Microtunneling is a robotically-controlled steerable tunneling tool that allows for installation of smaller diameter casings than those installed with standard tunnel boring machines. The closed face makes microtunneling ideal in locations where there is high groundwater and running soils, but is not suited for locations with cobbles or other obstructions. The highly technical machine, and the slurry return spoils removal system makes microtunneling the most expensive trenchless construction technology. Horsepower of microtunneling machines is relative to the machine size, so smaller diameters often require intermediate jacking shafts for longer runs. See Figure 5 for a schematic of typical microtunneling operations.

Figure 5. Schematic of a Typical Microtunneling Operation (courtesy of Herrenknecht)



4.1.2 Pilot Tube Guided Boring

Pilot tube guided boring (PTGB), also known as pilot tube microtunneling, includes establishing line and grade by boring a steerable pilot tube, followed by temporary thrust casings, followed by the casing pipe. Caltrans requires that the diameter of the casing be at least four inches greater than the product pipe and the outer diameter of the restrained joint bell is approximately 16.75 to 16.97 inches, depending on manufacturer. Therefore, a minimum 22-inch casing will be required for this project. Thrust casings are available up to 22 inches diameter, so the powered cutter head will be used to enlarge the bore path for the final casing. The three-step process is shown on Figure 6.

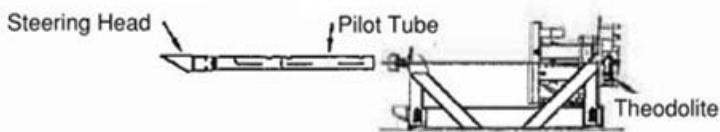
This method is limited to about 350 to 500 feet per operation depending on equipment and casing size. Because pilot tubes displace the soil as they travel, they can be used only in soft soils, usually with blow counts below 40. Additionally, PTGB methods have limited face control, and are therefore not recommended for crossings in relatively clay-free, non-cohesive granular soils (i.e., sands or gravels) that are directly connected with an unbalanced groundwater head in excess

of 5 to 10 feet. If these types of soils are encountered within the tunnel zone they could flow uncontrolled into the PTGB requiring significant mitigations to, or modifications of the project alignment. The tunnel invert will be on the order of 20 feet below ground surface, which is 15 feet deeper than the groundwater level in the area. Clayey soils were encountered at 18 to 20 feet during geotechnical borings at both ends of the SR101 crossing. There is no practical way to determine before tunneling, if there is lateral continuity of clayey soils within the planned tunnel zone below SR101. Given the geotechnical findings to date, the likelihood of encountering groundwater-charged and relatively clay-free, non-cohesive granular soils within the tunnel zone is low.

Figure 6. Schematic of a Typical Pilot Tube Boring Installation

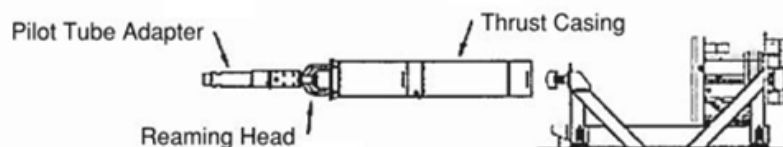
Step 1: PRECISE INSTALLATION OF PILOT TUBES

The first step is the installation of the pilot tube on line and grade.



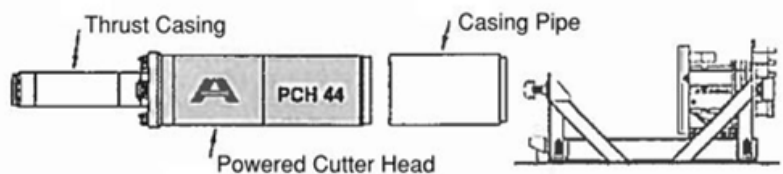
Step 2: ADVANCING THRUST CASINGS ALONG PILOT TUBE PATH

The second step is to follow the pilot tube with a reaming head, or other upsizing tool and standard thrust casing.



Step 3: INSTALLATION OF THE CASING PIPE WITH POWERED CUTTER HEAD

In the third step, the powered cutter head follows the thrust casings to increase the bore to match the casing pipe diameter.



4.1.3 [Horizontal Directional Drilling](#)

HDD is a trenchless construction method whereby a pipe is installed along an arcing or straight drill path, beginning and ending at the ground surface. The HDD pilot bore is traced along the surface with a tracking device, which allows for the installer to adjust the direction of the bore to meet contract requirements. Once the pilot bore path is complete, the tunnel is reamed in one or two more passes to obtain the necessary opening for pullback of the fusible product pipe (fusible PVC). When reaming is complete, the drill rod is attached to the PVC pipe which is then pulled back through the bore hole in one continuous operation. Young bay mud does not have enough strength to provide reactionary force necessary for steering, so HDD is not suitable for any portion of this project.

4.1.4 [Axis by Vermeer](#)

Axis by Vermeer is a non-displacement steerable boring tool that can be used for various soil conditions. The system is laser-monitored, remotely steered, and cuttings are removed by vacuum. Bore length is approximately 300-500 feet. Pipe installation with an Axis machine is similar to horizontal directional drilling in that when the cutting head is removed at the receiving shaft, a fusible PVC can be attached to the drill casings and pulled back toward the jacking shaft. The Axis installation method is best suited for installations between 10-inch diameter and 18-inch diameter, so would not be suitable for SR101 crossing due to the size of the casing required but could be considered for trenchless installation through the PAMF property.

4.1.5 [Trenchless Construction Recommendation](#)

Although groundwater will be present, the SR101 crossing tunnel operation will take place in the clay layer below the young bay mud which will mitigate the flow of water. The slurry system necessary for microtunneling requires a much larger footprint and the equipment is much more expensive. Assuming the flow of water is controlled by the clay soil below the young bay mud, pilot tube guided boring is a viable construction method for the SR101 crossing. However, there are certain limitations and risks with the use of PTGB, as described above. Given the geotechnical findings to date, the likelihood of encountering groundwater-charged and relatively clay-free, non-cohesive granular soils within the tunnel zone is low, and therefore PTGB is recommended.

If trenchless construction is preferred through the PAMF property, Axis method would be recommended; see Section 5.1 for additional discussion.

4.2 Launch Shaft and Receiving Shaft Locations

The tunneling methods presented in the above require water-tight launching and receiving shafts. The launch shaft will be located in the PAMF easement on the south side of Bayshore Freeway (SR101). The receiving shaft will be located in Shoreway Drive near the Recology San Mateo County Recycling Center (Recology).

5.0 PIPELINE ALIGNMENTS

This section describes the evaluation of the alignment along three segments of proposed project plus abandonment of the existing SR101 crossing between Sem Lane and Karen Road. The segments considered and the existing crossing include:

- PAMF Property
- SR101 Crossing
- Shoreway Road
- Existing Crossing at Sem Lane

Figure 7 shows the alternative alignments considered for the PAMF property and SR101 Crossing and subsequent Shoreway Road alignment. Additionally, Figures 8 and 9 show roadway cross-sections, as referenced on Figure 7, with existing utilities at different locations throughout the project location.

5.1 PAMF Property

Segment 1 of the proposed project consists of approximately 740 lineal feet of 12-inch diameter pipeline running within the PAMF property from the existing termination point near Industrial Road to the proposed launch shaft adjacent to SR101. Three separate alignment alternatives were considered through the PAMF property:

- Alternative 1: Installation within the existing easement
- Alternative 2: Partial installation within existing easement and partial installation within PAMF loop road
- Alternative 3: Entire installation within PAMF loop road

Figure 7 shows the plan view of the alternative alignments considered for the PAMF property.

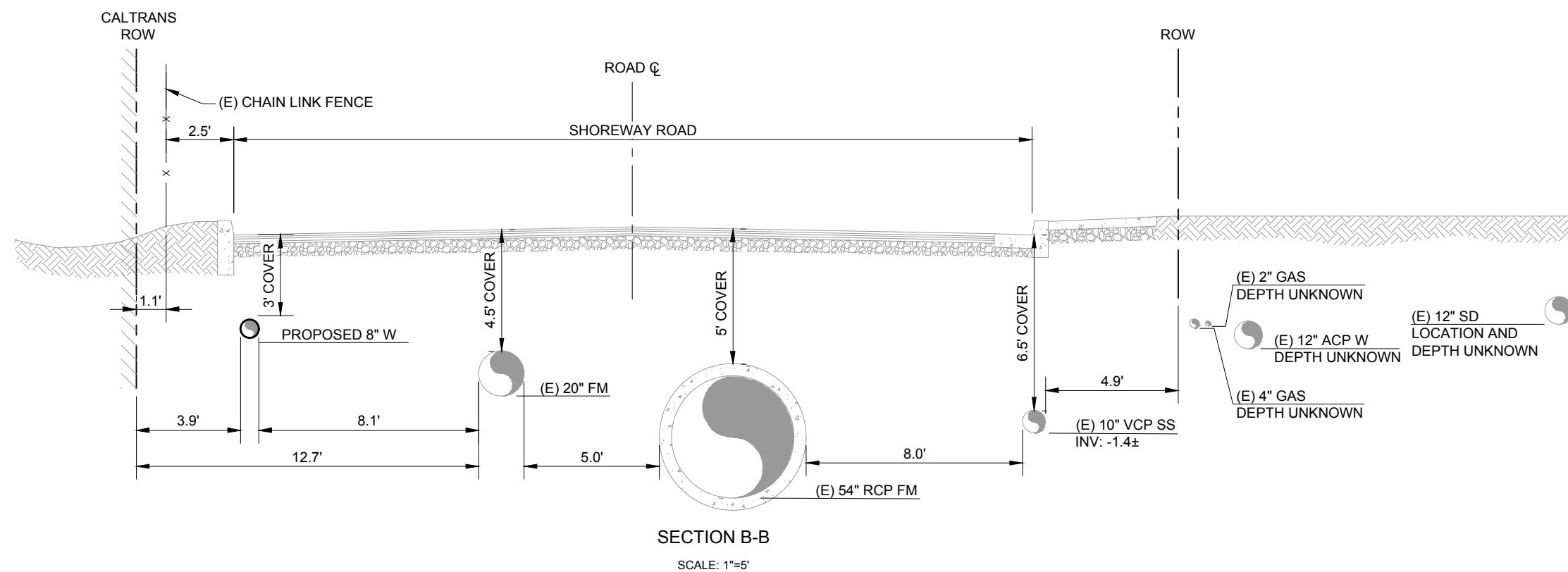
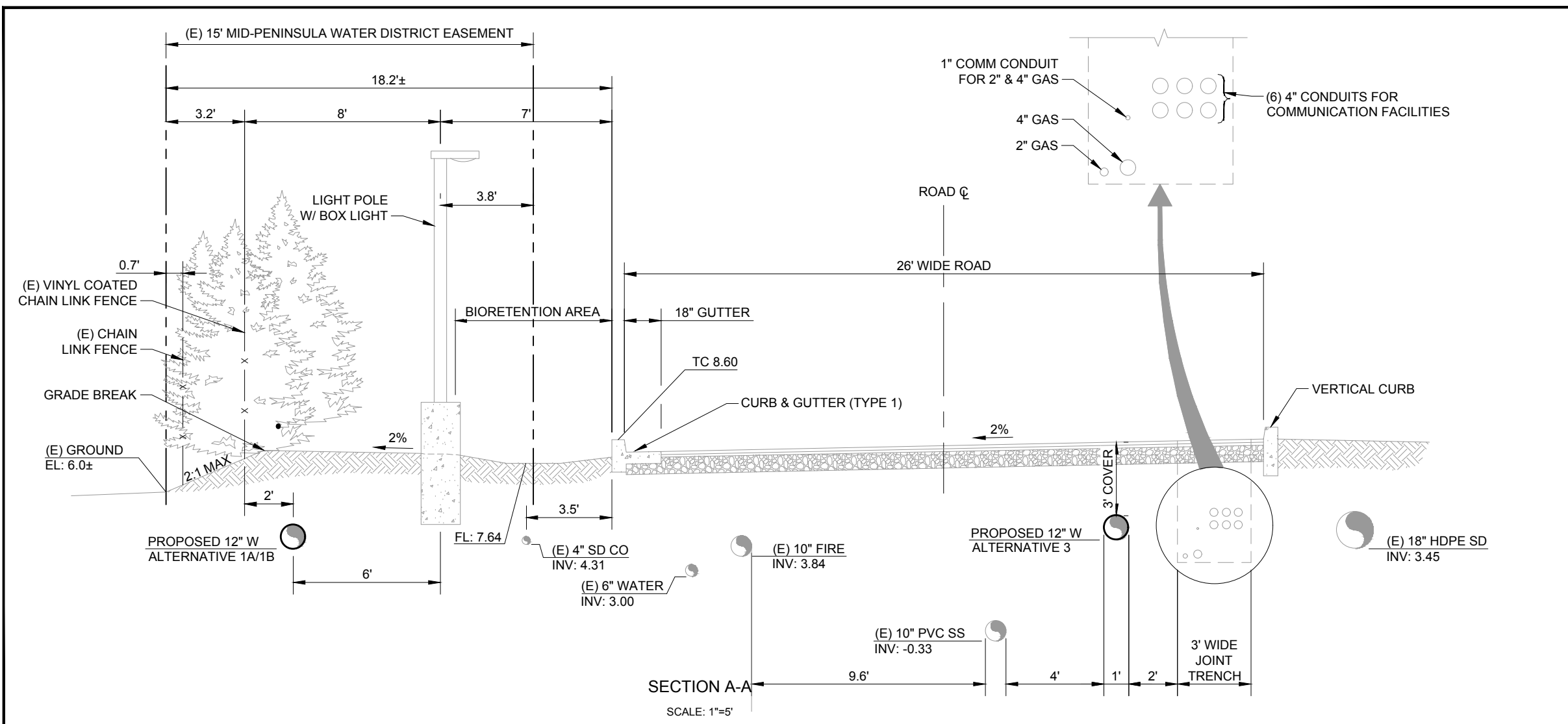
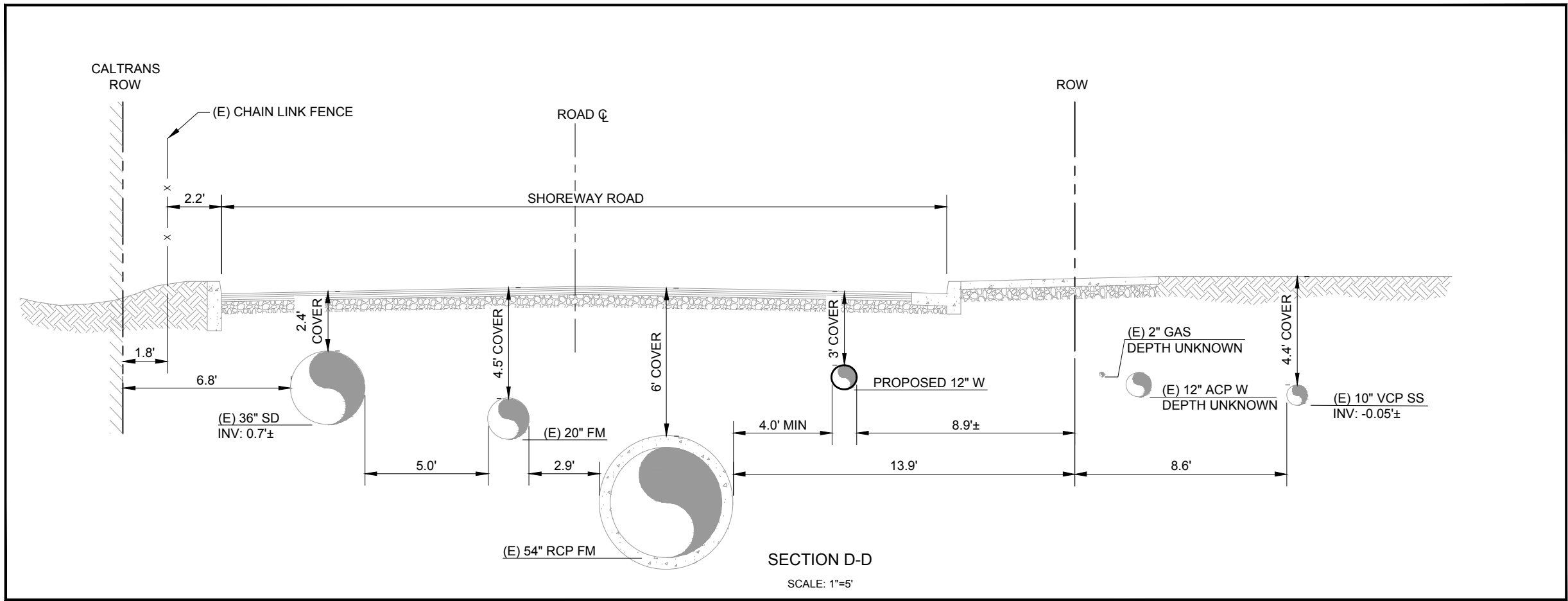
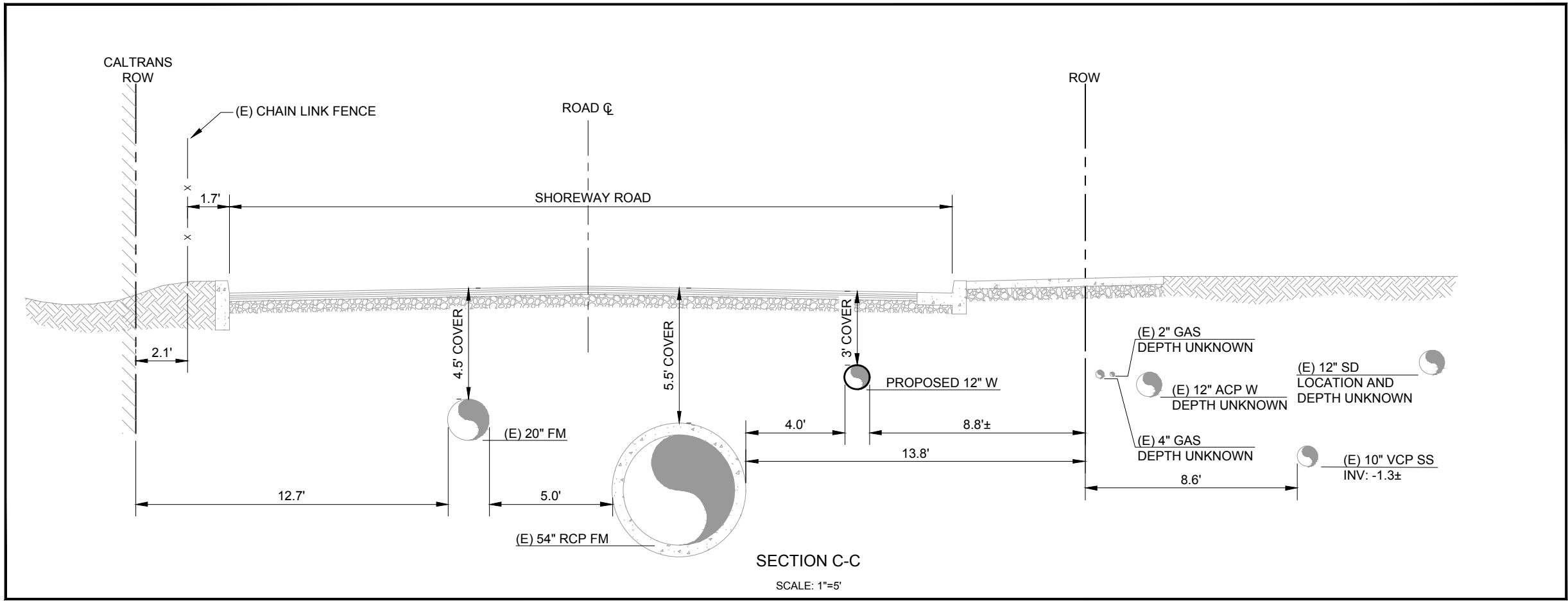


Figure 8
PAMF and Shoreway
Road Sections
Mid-Peninsula Water District
SR101 Crossing At PAMF



5.1.1 Alternative 1A: Trenchless Installation within Existing Easement

Alternative 1A includes installing the entire pipeline by trenchless method. This alternative is attractive because the water main would fit within the existing easement and causes the least amount of disturbance to the PAMF loop road. The drawbacks include deep installation of the water main and non-standard pipe material.

As discussed previously, if this segment were installed by trenchless construction, the options available would be microtunneling, pilot tube guided boring (PTGB), or Axis boring. Microtunneling would be cost prohibitive. Due to the length of the bore, in excess of 500 feet, PTGB or Axis would require an additional launch and receiving shaft. In either case, the pipe installed within the existing easement would need to be approximately 17 feet deep, similar to the SR101 crossing. Since no carrier pipe would be used in this location, PTGB would require special jacking pipe, fiberglass polymer concrete or bar wrapped concrete pipe. Pipe installed by Axis would most likely be fusible PVC. If this alternative is selected, the District prefers fusible PVC pipe material.

5.1.2 Alternative 1B: Open Cut Installation within Existing Easement

Alternative 1B includes installing the entire pipeline by open cut method. This alternative is attractive because the water main would fit within the existing easement, causes the least amount of disturbance to the PAMF loop road, and does not require pavement replacement.

The drawbacks to Alternative 1B include a constrained corridor and trees. Although there is a 15-foot easement, the corridor is constrained by nearly 60 trees, light posts, a vinyl-coated chain-link fence, and drainage facilities. For construction, approximately 35 trees would need to be removed. If the trees were to be replanted, they would be nearly on top of the new pipeline which may cause future maintenance and operational challenges. In addition, the limited space would require the vinyl fence to be removed and replaced, and the installation would require a narrow trenching tool like a ditch witch or mini excavator rather than a back hoe.

5.1.3 Alternative 2: Partial Installation within Existing Easement and Partial Installation within PAMF Road

Alternative 2 includes installing approximately half of the proposed water main in the existing easement similar to Alternative 1B and installing the other half in the PAMF loop road. The portion in the existing easement would have the same constraints as Alternative 1B, but would require removal of approximately 23 trees and about half of the vinyl chain-link fence. For this alignment, the proposed water pipe would move into the loop road beyond the termination of the existing sewer main. This alignment would require significant pavement restoration and redrafting the easement through the PAMF property.

5.1.4 Alternative 3: Entire Installation within PAMF Loop Road

Alternative 3 includes installing the entire water main, except terminal points, within the PAMF loop road. This alternative would minimize the number of trees that needed to be removed, but would have the greatest impact on the PAMF facility and require significant pavement restoration. This alignment would require a waiver from the Division of Drinking Water due to the less than 10 feet separation between the existing sanitary sewer pipe and the proposed water pipe for

approximately half of the segment. Similar to Alternative 2, this alternative would require redrafting the easement through the PAMF property.

Table 2 summarizes the benefits and drawbacks of the alignment alternatives through the PAMF property.

| Table 2. PAMF Property Alignment Alternatives | | | | | |
|--|--|--|---|----------------------------|--------------------------------|
| Alternative | Description | Benefits | Drawbacks | Approx. # of Trees Removed | Cost Difference ^(a) |
| 1A | Waterline installed trenchlessly entirely in existing easement | <ul style="list-style-type: none"> No pavement replacement required Installed within existing easement Fewest trees removed | <ul style="list-style-type: none"> Waterline installed very deep Non-standard pipe material Requires intermediate pit excavation | 7 | \$472k |
| 1B | Waterline installed entirely in existing easement | <ul style="list-style-type: none"> No pavement replacement required Installed within existing easement | <ul style="list-style-type: none"> Replanting trees close to waterline Constrained construction Removal of existing fences | 35 | \$223k |
| 2 | 1/2 waterline installed within existing easement and 1/2 installed under existing road | <ul style="list-style-type: none"> Fewer trees removed Less pavement replacement required | <ul style="list-style-type: none"> Pavement replacement required Easement modification required Partial removal of existing fence | 23 | \$225k |
| 3 | Waterline installed entirely under existing road | <ul style="list-style-type: none"> Very few trees removed | <ul style="list-style-type: none"> Largest pavement replacement required Easement modification requires major coordination with PAMF DDW waiver required | 8 | \$160k |
| ^(a) Rough costs for work between Industrial and SR101 for basic pipeline installation, tree and fence removal, and paving restoration only. See Appendix G for details. | | | | | |

5.1.5 PAMF Alignment Recommendation

It is anticipated that Alternative 3 will be the cheapest to construct and allow for easier access for operations and maintenance personnel. Therefore, Alternative 3 is recommended pending coordination and concurrence of PAMF in regard to the required easement modification.

5.2 SR101 Crossing

For the crossing underneath SR101 a steel casing will be installed using trenchless technology. As described in Section 4, pilot tube guided boring installation method is recommended. Two alignment alternatives were considered for this segment:

- Alternative 1: Straight across SR101
- Alternative 2: 25 degree skew across SR101

Figure 8 shows the plan view of the alternative alignments considered for the SR101 Crossing.

5.2.1 Alternative 1: Straight Across SR101

Alternative 1 includes installing the trenchless segment perpendicular to SR101 with a receiving shaft in the southbound lane on Shoreway Road. The existing utilities within Shoreway Road at this location are shown in the section view included on Figure 9. The receiving shaft would be located between the existing SVCW 20-inch diameter force main and Caltrans right of way. As shown on Figures 8 and 10, a storm drain also parallels Shoreway Road starting approximately 520 feet north of the perpendicular crossing and there is no room for the proposed waterline on the west side of the existing force mains. Therefore, the water main must cross the existing force mains by open cut.

The benefit of this crossing is that the trenchless length is approximately 50 feet shorter than Alternative 2 and the shaft location will have a smaller impact on the driveway serving the Recology property. The drawbacks include approximately 135 feet of additional open cut along and across Shoreway Road and crossing the two large SVCW force mains. Based on as-built records obtained from SVCW, the 20-inch diameter force main has about 4.5 feet of cover and the 54-inch diameter force main has about 5 feet of cover (assuming 6-inch wall) at this location. Depth of existing utilities will be confirmed by potholing the existing force mains. With the information currently available, and 1 foot clear vertical separation, the proposed water main would have less than 2.5 feet of cover at the crossing location, which is less than the District's standard.

5.2.2 Alternative 2: 25 Degree Skew Across SR101

Alternative 2 includes installing the trenchless SR101 crossing at a skew of about 25 degrees from perpendicular. The maximum skew allowed by Caltrans is 30 degrees without requiring a Policy Exception. The purpose of installing the water main on a skew would be to trenchlessly cross the large force mains within Shoreway Road using a single trenchless installation and avoid the gravity sanitary sewer pipe in this area. The sanitary sewer pipe alignment parallels Shoreway Road but jogs outside of the existing right-of-way approximately 120 feet from the Alternative 1 SR101 crossing, as shown on Figure 7. The receiving shaft would be located near the jog between

the existing sanitary sewer pipe and the existing 54-inch force main. The existing utilities within Shoreway Road at this location are shown in the section view included on Figure 10.

The benefit of this crossing is that it avoids the additional open cut and crossing the two SVCW force mains. The drawbacks are that the trenchless length is approximately 50 feet longer than Alternative 1 and the receiving pit location will have a larger impact to the Recology driveway.

Table 3 summarizes the benefits and drawbacks of the SR101 crossing alternative alignments.

| Table 3. SR101 Crossing Alignment Alternatives | | | | |
|---|---|--|--|--------------------------------|
| Alternative | Description | Benefits | Drawbacks | Cost Difference ^(a) |
| 1 | Trenchless bore underneath SR101 perpendicular to highway | <ul style="list-style-type: none"> • Shorter bore length • Longer open cut | <ul style="list-style-type: none"> • Potential difficulty crossing existing 54-inch force main during open cut in Shoreway Road | \$272K |
| 2 | Trenchless bore underneath SR101 installed at an angle | <ul style="list-style-type: none"> • Includes crossing existing 54-inch force main in Shoreway Road • Provides better clearance from sanitary sewer • Saves some open cut | <ul style="list-style-type: none"> • Longer bore length | \$293K |
| ^(a) Rough costs for pipeline installation between PAMF property and along the Recology site on Shoreway Drive. See Appendix G for details. | | | | |

5.2.1 SR101 Crossing Alignment Recommendation

It is anticipated that Alternative 2 will cost approximately \$21,000 more than Alternative 1, and eliminates the conflict with the sewer force mains. Therefore, Alternative 2 is recommended.

5.3 Shoreway Road

From the terminus of crossing Alternative 2, it is recommended that the proposed water main will need to be installed along the east side of Shoreway Road from the north side of Recology property to the existing inter-tie location south of Cormorant Drive, as shown on Figure 10, to avoid a 36-inch storm drain that runs along the west side of the road.

5.4 Existing Crossing at Sem Lane

The existing 12-inch ACP waterline crossing between O'Neill Avenue and Sem Lane will be disconnected from the distribution system, filled with grout, and abandoned in place. The Karen, Mezes, Arthur, South & Folger Water Main Improvements Project is under construction and will install a tee and valve connecting to the existing 12-inch ACP at the intersection of Karen Road and O'Neill Avenue. This will allow for this SR101 crossing to remain active and provide the District with SR101 crossing redundancy in Zone 1 until the PAMF crossing is installed. At this intersection, the valve will be removed and a blind flange will be installed on the tee. At the

intersection of Sem Lane and Shoreway Road the waterline will be cut and abandoned from the tee in the intersection and the valve removed. The abandonment of this pipe will require removal of a portion of the ACP which will require personal protective equipment and proper disposal.

6.0 SHOREWAY INTER-TIE

The District currently operates an emergency three-way inter-tie connection on Shoreway Road south of Cormorant Drive to connect to the City of Redwood City and California Water Service Company. The existing inter-tie is shown on Figure 10. The existing inter-tie design is substandard because it does not allow for proper meter readings due to the lack of straight pipe upstream and downstream of the meter. Typical meter manufacturer's standards call for a minimum of five times the pipe diameter in straight pipe upstream of the flow meter and approximately two times the pipe diameter downstream to ensure accurate readings.

Figure 10. Existing Three-way Inter-tie on Shoreway Road



6.1 Inter-tie Design

During a site visit conducted on September 26, 2017, District operations personnel and West Yost visited another District inter-tie location near Industrial Boulevard and Holly Street. The District is pleased with the design and performance of this inter-tie and would like to install something similar at the Shoreway inter-tie location. The footprint of this inter-tie is approximately 10 feet by 24 feet and would require a similar area at the Shoreway inter-tie location.

6.2 Inter-tie Placement

Two location alternatives were considered for the placement of the proposed 3-way inter-tie, as shown on Figure 12.

- Alternative 1: Within existing right-of-way
- Alternative 2: Near existing three-way inter-tie and existing MPWD water main

6.2.1 Alternative 1: Within Existing Right-of-Way

The right-of-way appears to be much wider south of the access driveway near the existing inter-tie location, as shown on Figure 11. This location would also allow for more straight-forward connections to the existing and proposed water main.

6.2.2 Alternative 2: Near Existing Three-Way Inter-Tie and MPWD Water Main

This alternative location places the inter-tie as close as possible to the existing location. This alternative would allow for a simple connection to the existing MPWD water main and use of the existing inter-tie connections to the Redwood City and Cal Water distribution mains. However, this alternative would require the District to secure a permanent easement from the property owner in order to construct.

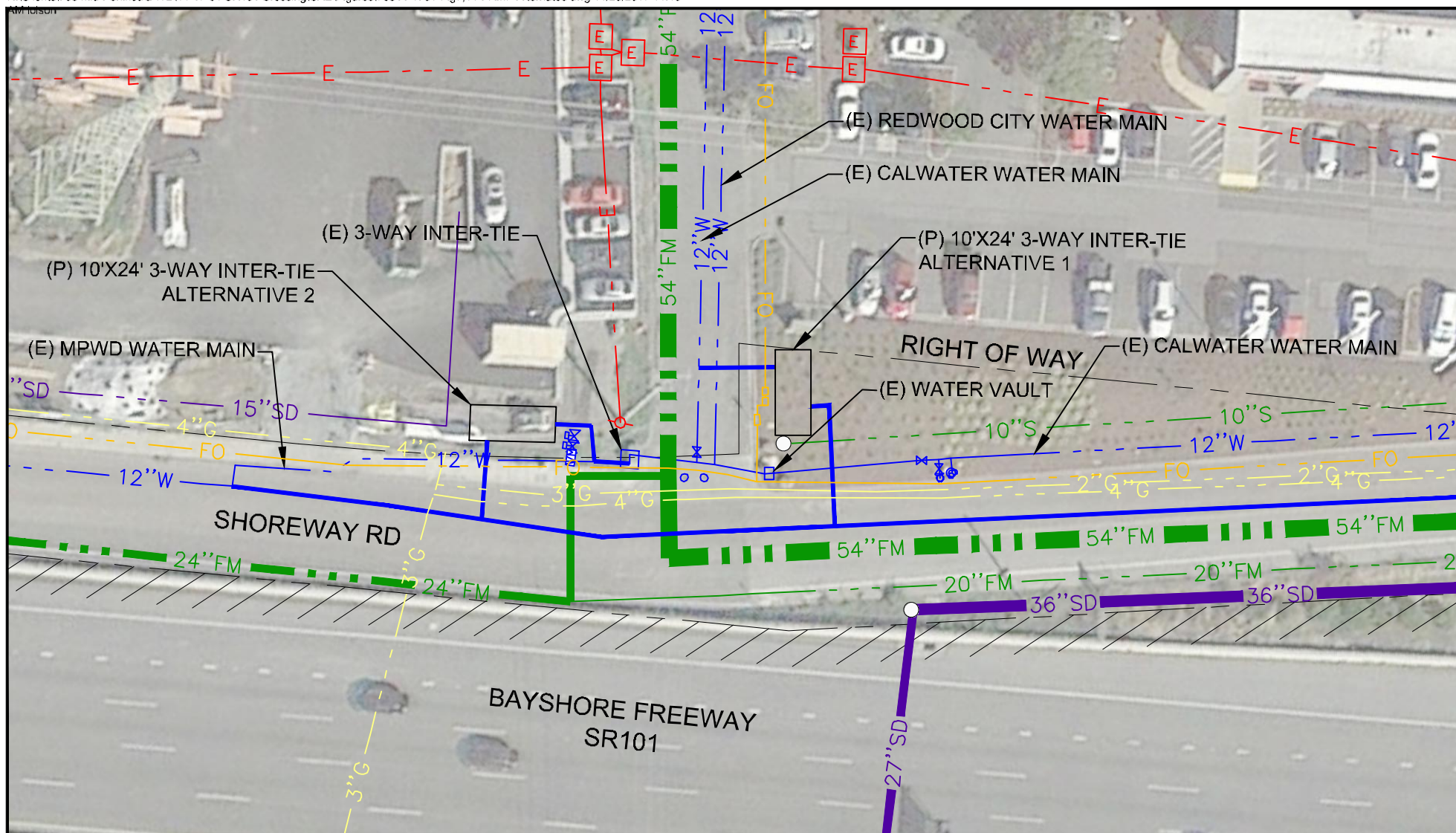
Table 4 summarizes the benefits and drawbacks of the Shoreway inter-tie location alternatives.

| Table 4. Shoreway Inter-tie Location Alternatives | | | |
|---|--|---|---|
| Alternative | Description | Benefits | Drawbacks |
| 1 | Within existing right-of-way | <ul style="list-style-type: none">• No easement necessary | <ul style="list-style-type: none">• Near a gravity sanitary sewer collection pipe |
| 2 | Near existing 3-way inter-tie and existing MPWD water main | <ul style="list-style-type: none">• Utilizes existing Cal Water and Redwood City connection to existing inter-tie | <ul style="list-style-type: none">• Requires a permanent easement |

6.2.1 Inter-tie Location Recommendation

Alternative 2 requires a permanent easement. Therefore, Alternative 1 is recommended for the inter-tie location.

AVIATION



LEGEND

Proposed Water Main

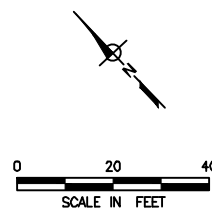


Figure 11

Shoreway Inter-tie Location Alternatives

Mid-Peninsula Water District
SR101 Crossing at PAMF

7.0 DESIGN CRITERIA

This section describes the design criteria for this Project in conformance with the District Standard Specifications and contains the following sections:

- Pipeline Sizing
- Pipeline Materials
- Appurtenances and Connections
- Trench Design
- Insertion Pit Design
- External Loads
- Thrust Restraint
- Facilities in Flood Zone
- Disinfection and Testing

7.1 Pipeline Sizing

In preparation of the CIP, which recommended the SR101 Crossing at PAMF Improvements CIP Project, the District conducted hydraulic modeling of their existing infrastructure. The modeling results were used to identify the necessary CIP projects and determine the proposed pipeline size. The pipelines for this project will be sized as follows:

- 12-inch diameter through PAMF property and under SR101 between Industrial Road and Shoreway Road.
- 8-inch diameter along Shoreway Road from the existing inter-tie south of Cormorant Drive and the SR101 crossing.

7.2 Pipe Materials

Based on the project location, soil conditions, corrosion potential and District Standard Specifications, all water mains on this project will be restrained joint PVC. PVC water mains shall conform to the applicable requirements of American Water Works Association (AWWA) C900 for Class 305 pipe having a dimension ratio (DR) of 14 and a ductile iron (DI) pipe equivalent outside diameter. Maximum length of each section of pipe shall be twenty (20) feet.

7.2.1 Joints

In conformance with District Standard Specifications, joints shall be internal restrained joints using Bulldog Technology which includes a gripping mechanism inside the bell of the joint. It is anticipated that pipe will be Eagle-Loc 900 manufactured by JM Eagle or Diamond Lok-21 manufactured by Diamond Plastics.

At fittings and tie-ins, pipe shall have restrained mechanical joints.

For mechanical joints, dimensional and material requirements for pipe ends, glands, bolts, nuts and gaskets shall conform to latest revision of ANSI A21.11 (AWWA C111).

For flange joints with adapters, ends of pipe and fittings shall be provided with flange couplings. Bolts, nuts, and gaskets for flanged connections shall conform to ANSI B16.1 and as specified in the District's Standard Specifications. All flanged connections shall use "Ring Flange-Type" gaskets as manufactured by U.S. Pipe capable of withstanding pressures up to 350 pounds per square inch.

7.2.2 Fittings

Fittings will be rated at pressures equal to or greater than the design pressure of the pipeline.

In conformance with District Standard Specifications, fittings for use on PVC pressure pipe shall be DI castings conforming to the applicable requirements of latest revision of ANSI A21.53 (AWWA C153). Joints shall be restraint (megalog). All bolt-up sets (nuts, bolts and washers) and tie rods for buried valves and fittings shall be stainless steel, ASTM A-276 type 316L. Isolated fitting and associate adjacent restraints shall be cathodically protected (including bonding all fittings, polywrap, and sacrificial anodes).

7.2.3 Coating and Lining

In conformance with District Standard Specifications, buried DI fittings and sleeves will be asphalt seal-coated and cement-mortar lined. The lining shall conform to the provisions of AWWA C104. All buried fittings shall be polywrapped per AWWA C105. All above ground fittings and couplings shall be fusion epoxy lined and coated.

7.2.4 Cathodic Protection

All metallic materials will be cathodically protected in accordance with NACE and District Standard Specifications. See Appendix C for the corrosion report.

7.3 Appurtenances and Connections

7.3.1 Isolation Valves

To assist with periodic inspection, cleaning and/or repair, isolation valves will be provided on the water main at critical facilities including SR101 and tie-in locations.

In conformance with District Standard Specifications, isolation valves for the water mains will be gate valves conforming to AWWA C509 for buried service and shall have peroxide-cured EPDM internal components, manual operators with wrench nuts, shop-applied epoxy coating conforming to the requirements of ANSI/AWWA C550, and shall comply with NSF/ANSI 61.

Isolation valves for air valve and blow off assemblies will be gate valves conforming to AWWA C509, plug valves conforming to AWWA C517, or ball valves conforming to AWWA C507. All gate, plug, and ball valves shall have peroxide-cured EPDM internal components (in place of BUNA-N), manual operators, shop-applied epoxy coating conforming to the requirements of ANSI/AWWA C550 and shall comply with NSF/ANSI 61.

7.3.2 Air Valves

Air and vacuum valves will be provided at major high points along the water main alignments as required to vent accumulated air. Locations of air and vacuum valves shall be consistent with District's Standard Specifications.

In conformance with District Standard Specifications, air and vacuum valves will conform to AWWA C512. All air and vacuum valves shall have peroxide-cured EPDM internal components (in place of BUNA-N), shop-applied epoxy coating conforming to the requirements of ANSI/AWWA C550 and shall comply with NSF/ANSI 61. Air and vacuum valve piping shall be cast iron and shall conform to ASTM A126, Class B.

7.3.3 Blow Offs

Blow offs will be provided at major low points along the water main alignments, as required. Blow offs will be located near sewer manholes whenever possible.

Blow off piping will conform to the District's Standard Specifications and will be sized to allow for a flushing velocity of the transmission main of 2.5 feet per second.

7.4 Trench Design

Depth of cover on all segments will conform to the District's standard 36-inch minimum cover for all water mains, unless specific exceptions are approved on a case by case basis. As a treated, potable utility, the water pipeline will be designed with clearances to other utilities that conform to the requirements for water line separation. The water line will generally be located at least 10 feet clear horizontally from sewer pipelines and five feet clear horizontally from storm drains and dry utilities. The water pipeline will generally be designed with one-foot vertical clearance above or below all other utility pipelines. In limited space conditions, the horizontal and vertical clearance to other utilities may be reduced to the extent allowed by District Engineering Standards as detailed in Standard Plan No. MP-20 and the State Division of Drinking Water guidelines, while considering constructability and maintainability factors.

7.5 Insertion Pit Design

The tunneling methods presented in the previous section require water tight launching and receiving shafts. The shafts may be constructed using metal caissons installed vertically with water and spoils removed with an auger or clamshell excavation bucket, or by driving sheet piles around the perimeter of a rectangular shaft. If a caisson is used for the launch shaft it should be at least 24 feet in diameter to allow the installation of full length carrier pipe (20 feet) into the casing. A standard rectangular shaft would normally be at least 14 feet wide by 36 feet long to allow for installation of 20-foot casing sections. The receiving shaft will be used to retrieve the pilot tubes, thrust casing, and cutter head all of which are designed to work in small spaces. The receiving shaft can be as small as an 8-foot diameter caisson or a 10-foot by 10-foot rectangular shaft.

To install the casing pipe three feet below the bay mud, the floor of the jacking pit will be approximately 20 feet below ground surface. To mitigate seeping soils, buoyancy, and water intrusion with a caisson, it is anticipated that a concrete slab approximately 5 feet thick will be installed in the shafts. If sheet piling is used it will most likely have to extend to approximately 15

feet below the floor of the shaft for a total of approximately 35 feet to prevent infiltration of groundwater.

The shaft design will be prepared by an engineer retained by the contractor based upon a performance specification so that the contractor can determine the most cost-effective construction. It is anticipated that the top portions of the shafts will be cut and removed to about 5 feet below ground surface and that the remainder will be abandoned in place.

7.6 External Loads

External loads to be used for the design of buried pipelines are discussed in the following sections.

HS-20 Loads

All pipelines installed as part of this project, including those installed outside of paved areas, will at a minimum be designed to carry HS-20 traffic loads. The SR101 crossing will have at least 17 feet of cover so live loads will not be transmitted to the pipeline.

7.7 Thrust Restraint

In conformance with District Standard Specifications, all portions of the proposed pipeline will be restrained. Where connections are made to the existing system, and restraint of existing pipeline is unknown, thrust blocks will be installed. Calculations for restraint shall be coordinated with the geotechnical conditions and shall include a minimum safety factor of 1.5.

7.8 Facilities in Flood Zone

Typically, air valve outlets/inlets for facilities within designated FEMA special flood hazard zones will be designed at least one foot above the 100-year Base Flood Elevation. However, since the project area is unstudied, no BFE has been determined.

Design elevation of air valve outlets/inlets will be placed 12 inches above the existing ground surface.

7.9 Disinfection and Testing

Disinfection of water main shall be in accordance with latest revision of ANSI/AWWA C651. Calcium hypochlorite tablets will be used for pipeline disinfection as specified in the District's Standard Specifications.

Pressure and leakage testing procedures shall be in accordance with the requirements of AWWA C605, Section 7.3 and the District's Standard Specifications.

8.0 RESTORATION REQUIREMENTS

The water main installation will occur within streets and utility easements on private property and restoration requirements will vary depending on the location. A description of anticipated restoration requirements is described below.

8.1 Streets and Pavement Moratoriums

Pavement restoration will be in accordance with agencies having jurisdiction. There are no known pavement moratoriums or planned pavement projects in the Project area.

8.2 Utility Easements

Surface features in utility easements on private property or other developed parcels will vary from one location to another. Specifications will require surface features on private property and within utility easements to be restored to a condition equal to or better than original condition. This may include repair or replacement of fences, private utilities, turf, other landscaping, hardscape such as concrete, pavers, PAMF loop road, and driveways, etc.

9.0 PERMITTING REQUIREMENTS

Anticipated permits that will be required are discussed in this section. Agencies or entities requiring a project permit or coordination include:

- Caltrans
- City of San Carlos
- City of Belmont
- San Mateo County
- PAMF
- Dewatering Disposal
- State Water Resources Control Board
- California OSHA Department of Mines
- Public and Private Utilities
- Private Property Easement Acquisition
- Staging Areas

9.1 Caltrans

The proposed 12-inch diameter water crossing of SR101 will require an Encroachment Permit from Caltrans District 4. To avoid the need for a Policy Exception, the boring and receiving pits will be located completely outside the Caltrans right-of-way.

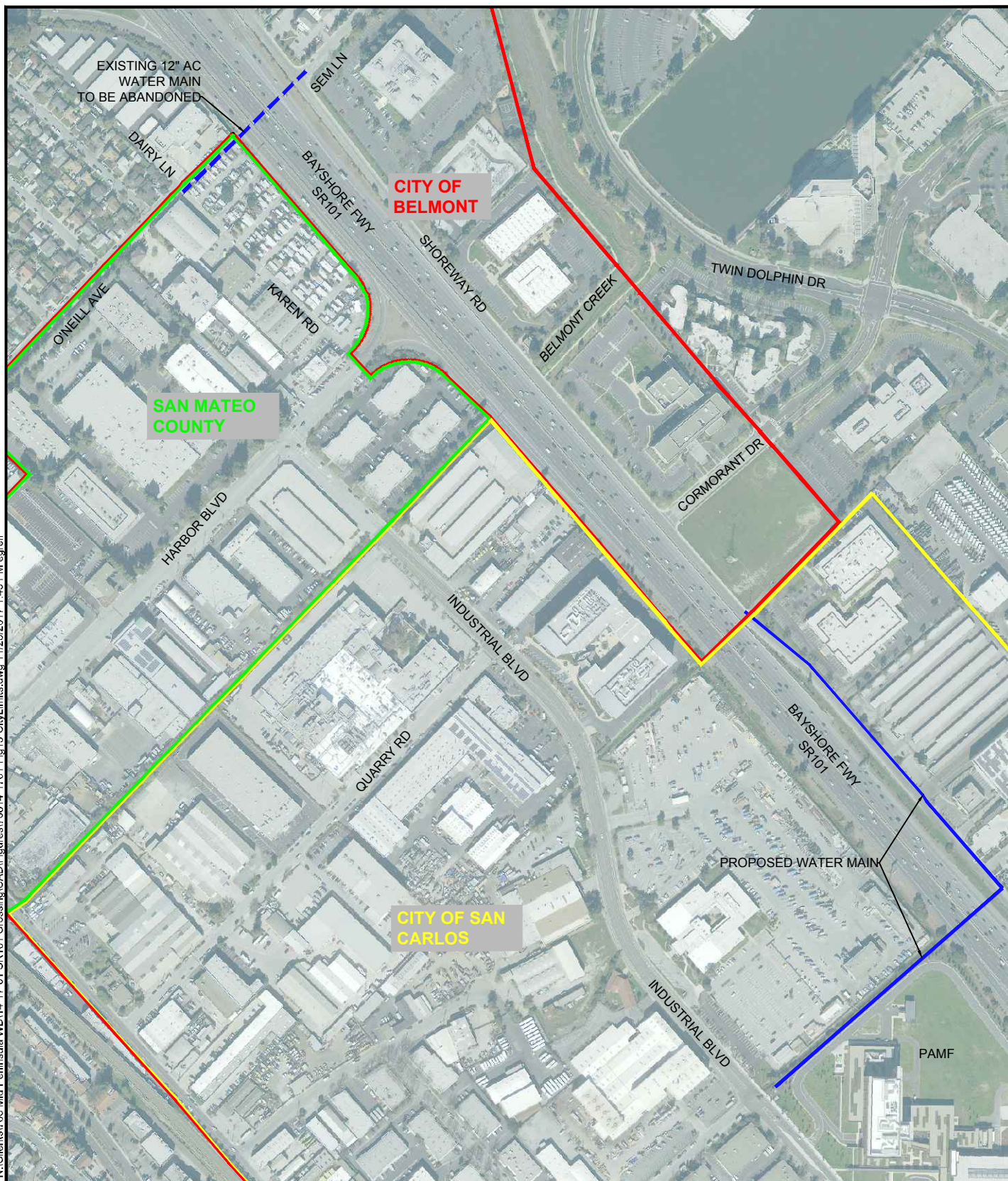
West Yost will prepare the application for the Caltrans parent permit. The contractor will be responsible for paying the necessary fees and obtaining the double permit prior to construction.

9.2 Cities and County

As shown on Figure 12, the project area overlies the Cities of Belmont and San Carlos in addition to San Mateo County. An encroachment permit from the Cities of Belmont and San Carlos will be required for work within the respective rights-of-way. Karen Road and Dairy Lane are privately owned. A permit will not be required from San Mateo County since all work in this area will take place on the District's private property.

West Yost will prepare the encroachment permit applications for the Cities. The draft permit will provide conditions of approval. The contractor will be required to prepare traffic control plans as necessary, and pay any fees prior to issuance of final encroachment permit.

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LEGEND

- Belmont City Limits
- San Carlos City Limits
- County of San Mateo Limits
- Existing 12" AC Water Main
- Proposed Water Main

PAMF PALO ALTO MEDICAL FOUNDATION



Figure 12

City and County Limits

Mid-Peninsula Water District
SR101 Crossing at PAMF

9.3 PAMF

As part of the PAMF development agreement, the District obtained a 15-foot permanent water line easement along the northerly side of the PAMF property and a permanent 40-foot by 40-foot area easement in the northeast corner for the SR101 tunnel launch shaft. The easement is attached in Appendix H. Placement of the water main in the existing easement will impact the existing facilities and landscaping on site. The existing permanent easement will require modification to follow the recommended alignment within the PAMF property. This will require coordination and concurrence with PAMF personnel. Modification of the easement will require a significant amount of time and effort from District personnel.

Additionally, a temporary construction easement may be required from PAMF for installation of the water main. West Yost will prepare and provide general descriptions for the necessary easements to the District for acquisition.

All work on the PAMF property will be coordinated with the PAMF facilities management team. The District will obtain necessary temporary construction easements and will modify the permanent pipeline easement as necessary after the final alignments have been determined.

9.4 Dewatering Disposal

Dewatering is anticipated during shaft construction. Groundwater removed as part of construction will be discharged to the local collector sanitary sewers owned by the City of Belmont west of SR101 and the City of San Carlos east of SR101. Both cities send their sanitary sewage to Silicon Valley Clean Water (SVCW) for treatment. SVCW will require a discharge permit, and each city will require payment of discharge fees. West Yost is in contact with all agencies and will include discharge requirements in the Contract Documents and will work with the District to obtain discharge permits prior to construction.

9.5 State Water Resources Control Board

Any construction, demolition, or any other activity that results in land disturbance of equal to or greater than one acre is covered under the General Permit for Discharges of Storm Water Associated with Construction Activity (Construction General Permit Order 2009-0009-DWQ). Based on the calculations shown in Table 5, the amount of land disturbance associated with this Project will be less than one acre; therefore, coverage under the Construction General Permit is not necessary. Although uploading to Storm Water Multiple Application and Report Tracking System (SMARTS) will not be required, a standard Water Pollution Control Plan will be required for the Project.

Table 5. Land Disturbance

| Description | Length, feet | Width, feet | Area, square feet |
|-------------------------|--------------|-------------|-------------------|
| PAMF Easement | 750 | 15 | 11,250 |
| Launch Easement | 40 | 40 | 1,600 |
| Receiving Shaft | 10 | 10 | 100 |
| Open trench on Shoreway | 1,270 | 4 | 5,080 |
| Inter-tie | 40 | 26 | 1,040 |
| Total, square feet | | | 19,070 |
| Total, acres | | | 0.44 |

9.6 California OSHA Division of Mining and Tunneling

A soil classification from the Division of Mining and Tunneling is required for all tunnels that exceed 30-inches in diameter or shafts that exceed 20 feet in depth. The shafts for this project are at critical depth so West Yost will request soil classification for this project.

9.7 Public and Private Utilities

There are many public and private utilities along the Project alignment. Refer to Summary of Existing Data and Field Investigation Results section for a list of existing utilities. West Yost will coordinate with existing utilities to determine if conflicts exist, and resolve these conflicts if necessary. If the contractor will be required to get a work permit from existing utility agencies, requirements will be detailed in the contract documents.

9.8 Staging Areas

The contractor will be responsible for providing staging areas where temporary construction easements provide insufficient space.

10.0 TRANSPORTATION IMPACTS AND MITIGATION

Construction of the SR101 Crossing at PAMF Improvements CIP Project will impact transportation in the surrounding areas and traffic control will be required. Impacts to streets and community amenities, and construction restrictions at night and holidays are presented in this section.

10.1 Collector Streets and Major Arterials

The Project alignment is located in commercial and industrial areas. Traffic control will be required during construction on Shoreway Road and Sem Lane. The contractor will be required to submit traffic control plans prepared by a traffic control engineer for each construction area for review and approval by the District and the respective agency (City, County, and Caltrans), prior to start of construction.

Full roadway closures within the City of Belmont are acceptable on Friday, Saturday, and Sunday from 8:00 am to 5:00 pm only. Traffic control, detour plans, and notification of all neighbors within 300 feet are required.

West Yost will coordinate with agencies to define limits and restrictions for work hours and lane and road closures.

10.2 PAMF

A portion of the Project is located within the PAMF property. Transportation impacts and mitigation requirements to this facility will be determined during design based on selected alternative. Access to local traffic will be maintained during business hours. The construction documents will provide restrictions on construction at this location.

10.3 Recology San Mateo County Recycling Center

The Recology facility on Shoreway Road operates with consistent truck traffic. Transportation impacts and mitigation requirements to this facility will be determined during design. Access to local traffic will be maintained during business hours. The construction documents will provide restrictions on construction at this location.

10.4 Night Work

Should construction require night work, West Yost will work with the Cities and District to clarify night work limits and restrictions.

11.0 RECOMMENDATION

West Yost's preliminary design recommendation is to move forward with the following project criteria:

- PAMF Alignment Alternative 3 because it is the least expensive and will create potential operations and maintenance issues associated with replanting the trees.
- SR101 Crossing Alternative 2 because it will avoid crossing over the two SVCW force mains.
- Pilot tube guided boring trenchless construction method used for the SR101 crossing because of the lower cost and smaller footprint.
- Shoreway Inter-tie location Alternative 1 because this option will avoid the need to acquire a permanent easement.

We believe that it is important that the District meet with PAMF, West Yost, and MJA prior to finalizing these decisions.

11.1 Opinion of Probable Cost

Based on the recommendations above, the project is anticipated to cost approximately \$1.84 million. This estimate does not include any dewatering costs. A detailed worksheet is included in Appendix I.

11.2 Project Implementation Schedule

Table 6 shows the anticipated project implementation milestones and schedule. The project is on track to begin construction in summer 2018. A comprehensive schedule is attached in Appendix J.

| Table 6. Project Implementation Schedule | |
|--|--------------|
| Action | Date |
| Finalize Contract Documents | May 2018 |
| Bid Opening | June 2018 |
| Begin Construction | August 2018 |
| Construction Complete | January 2019 |

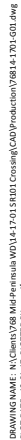
APPENDIX A

Preliminary Plans

| | | | |
|--------------|-------|--------------|-------|
| REVIEWED BY: | DATE: | REVIEWED BY: | DATE: |
| | | | |
| | | | |



FOR REDUCED ENGLISH PLANS
ORIGINAL SCALE IS IN INCHES

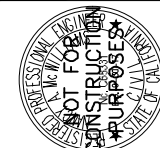


SHEET NO. TITLE

BOARD OF DIRECTORS AND STAFF

REVISIONS

| NO. | DESCRIPTION | BY | DATE | APPR'D |
|-----|-------------|----|------|--------|
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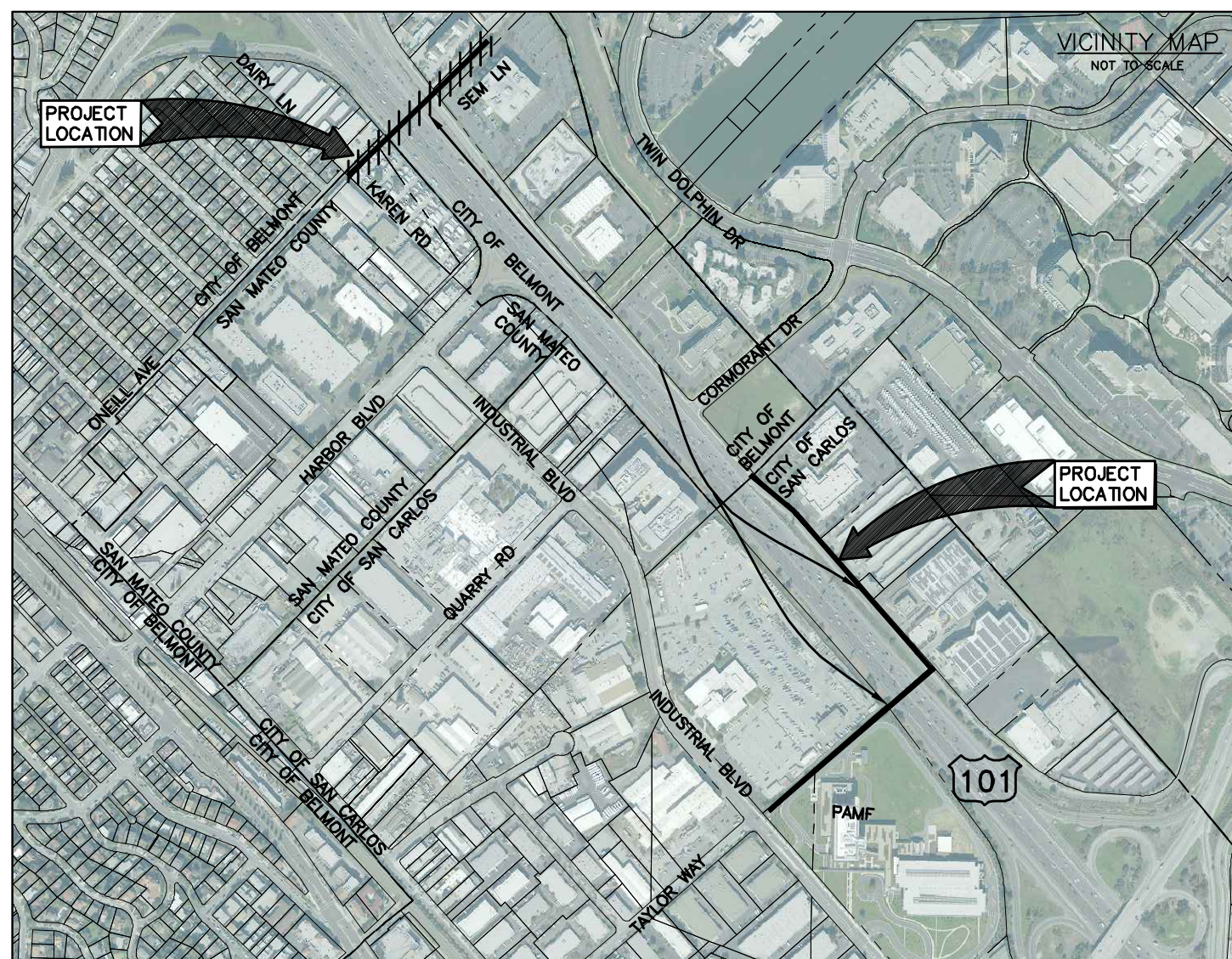
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| DRAWN: ERG | CHECKED: LCO |
| DESIGNED: NAM | APPROVED: JDG |

MID-PENINSULA WATER DISTRICT

SR101 CROSSING AT PAMF

TITLE SHEET, LOCATION MAP, VICINITY MAP,
AND SHEET INDEX

| | |
|-----------------------------|-------------------|
| DATE 08/11/17 | SCALE AS NOTED |
| PCG JOB NO. 768-14-17-01 | |
| PLAN <u>G.1</u> | |
| SHEET <u>1</u> OF <u>11</u> | |



REVIEWED AND APPROVED BY

REVIEWED AND APPROVED BY
MID-PENINSULA WATER DISTRICT

TAMMY RUDOCK, GENERAL MANAGER DATE _____

30% SUBMITTAL
NOT FOR CONSTRUCTION

| | | | |
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| REVIEWED BY: | DATE: | REVIEWED BY: | DATE: |
| | | | |
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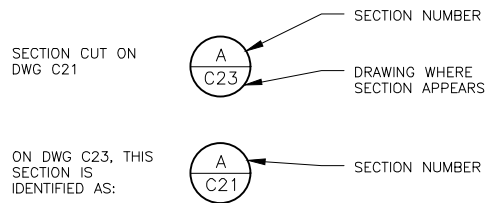
FOR REDUCED ENGLISH PLANS
ORIGINAL SCALE IS IN INCHES

DRAWING NAME: N:\Clients\768 Mid-Peninsula WD\14-17-01 SR101 Crossing\CAD\Production\76814-1701-G02.dwg
PLOT DATE: 10/18/17 PLOTTED BY: aaralf

LEGEND










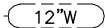

| | |
|--|--|
| | NATURAL GROUND OR GRADE |
| | COMPACTED NATIVE OR ENGINEERED FILL |
| | GRANULAR MATERIAL SUCH AS CRUSHED ROCK OR GRAVEL |
| | ASPHALT PAVEMENT (PLAN) |
| | ASPHALT PAVEMENT (SECTION) |
| | CONCRETE |
| | CLII AB |
| | EXISTING GROUND SURFACE (PAVED UNO) |
| | FENCE |
| | EXISTING GRADE CONTOURS |
| | PROPOSED GRADE CONTOURS |
| | PROPERTY LINE OR RIGHT OF WAY |
| | EDGE OF PAVEMENT |
| | EXISTING SPOT ELEVATION |
| | EXISTING TREES, SHRUBS OR HEDGE |
| | FINISH GRADE SPOT ELEVATION |
| | DEMOLISH |
| | EARTH DITCH |
| | POTHOLE LOCATION |
| | BORING/RECEIVING PIT |
| | GEOTECH BORING LOCATION |
| | EXISTING TREE |

SECTION AND DETAIL DESIGNATIONS



DETAILS ARE CROSS REFERENCED IN A SIMILAR MANNER, EXCEPT THAT DETAILS ARE IDENTIFIED BY NUMBER RATHER THAN LETTER
















LEGEND (INFRASTRUCTURE LABELS)

| | | |
|--------|---|----------------------------------|
| NEW |  | HORZ/VERT CONTROL POINT |
| |  | HORIZONTAL POINT OF INTERSECTION |
| |  | STUB OUT |
| |  | WATER |
| |  | BUTTERFLY VALVE |
| |  | GATE VALVE |
| |  | ANODE |
| |  | CATHODIC PROTECTION TEST STATION |
| |  | FIRE HYDRANT |
| FUTURE |  | FUTURE WATER |
| |  | EX WATER/GAS VALVE |

ABBREVIATIONS

| | | | | | | |
|---------|----------------------------------|-------|------------------------------------|--------|-----------------------------------|------|
| AB | AGGREGATE BASE | EC | END CURVE | MJ | MECHANICAL JOINT | SS |
| AC | ASPHALT CONCRETE | EP | EDGE OF PAVEMENT | MON | MONUMENT, MONITORING | SSB |
| ACP | ASBESTOS CEMENT PIPE | EQUIP | EQUIPMENT | MOV | MOTOR OPERATED VALVE | SSMH |
| ADJ | ADJUSTABLE | EW | EACH WAY | N | NEW, NORTH | SST |
| AFF | ABOVE FINISHED FLOOR | EX | EXISTING | N.I.C. | NOT IN CONTRACT | STA |
| AGG | AGGREGATE | EXP | EXPANSION | No., # | NUMBER | ST |
| ALT | ALTERNATIVE | FF | FINISHED FLOOR | NPT | NATIONAL PIPE THREAD TAPER | STD |
| APPROX | APPROXIMATE | FG | FINISHED GRADE | NTS | NOT TO SCALE | STL |
| ARV | AIR RELIEF VALVE | FH | FIRE HYDRANT | OC | ON CENTER | SVC |
| ASPH | ASPHALT | FCA | FLANGED COUPLING ADAPTER | OCT | OCTOBER | SW |
| BC | BEGIN CURVE | FCO | FLOOR CLEANOUT | OD | OUTSIDE DIAMETER | T |
| BD | BUILDING DRAIN | FD | FLOOR DRAIN | OH | OVERHEAD | TD |
| BF | BLIND FLANGE | FIG | FIGURE | PL | PROPERTY LINE | T&B |
| BW, BfV | BUTTERFLY VALVE | FL | FLOW LINE | PSV | PRESSURE RELIEF VALVE | TESC |
| BW | BOTH WAYS | FLM | FLANGE | PRV | PRESSURE REDUCING VALVE | |
| CAV | COMBINATION AIR VALVE | FG | FORCE MAIN | PSF | POUNDS PER SQUARE FOOT | TOC |
| CB | CATCH BASIN | FO | FIBER OPTIC | PSI | POUNDS PER SQUARE INCH | TOS |
| PDF | CONTROLLED DENSITY FILL | FRP | FIBERGLASS REINFORCED PLASTIC | PSUE | PUBLIC SERVICE & UTILITY EASEMENT | |
| CL | CAST IRON PIPE | F/C | FACE OF CURB | PT | POINT | TS |
| CL | CL CENTER LINE | FT, | FEET, FOOT | PV | PLUG VALVE | TYP |
| CLR | CLEAR | G | GAS | PVC | POLYVINYL CHLORIDE PIPE | UG |
| CLSM | CONTROL LOW STRENGTH MATERIAL | GA | GAUGE | PVM'T | PAVEMENT | UNO |
| CO | CLEAN OUT | GALV | GALVANIZED | R | RADIUS | UPRR |
| CONC | CONCRETE | GB | GRADE BREAK | RC | RELATIVE COMPACTION | VAR |
| CONN | CONNECTION | GS | GROUND SURFACE | RCP | REINFORCED CONCRETE PIPE | VCP |
| CONT | CONTINUOUS | CSP | GROUND SURFACE PROFILE | REDR | REDUCER, REDUCING | VTR |
| CMU | CONCRETE MASONRY UNIT | GV | GATE VALVE | REQ'D | REQUIRED | W |
| CS | CHLORINE SOLUTION | HC | HANDICAPPED | REIN | REINFORCING | WL |
| CTS | CATHODIC PROTECTION TEST STATION | HP | HIGH POINT IN PVM'T, HIGH PRESSURE | REV | REVISION | W/ |
| CV | CHECK VALVE | HORIZ | HORIZONTAL | RJ | RESTRAINED JOINT | W/O |
| CY | CUBIC YARDS | IE | INVERT ELEVATION | RR | RAILROAD | WS |
| D | DRAIN INLET | IN, " | INCH | RW | RECYCLED WATER | WWF |
| E | EAST, ELECTRIC | INV | INVERT | R/W | RIGHT OF WAY | WV |
| EA | EACH | IPS | IRON PIPE SIZE | S | SEWER, SOUTH, SLOPE | WWM |
| EF | EACH FACE | IRR | IRRIGATION | SA | SAMPLE | |
| DIA, Ø | DIAMETER | JT | JOINT TRENCH | SAN | SANITARY | |
| DIP | DUCTILE IRON PIPE | LAT | LATERAL | SCH | SCHEDULE | |
| D, DR | DRAIN | LF | LINEAL FEET | SCP | STEEL CYLINDER PIPE | |
| DWG | DRAWING | LGT | LIGHT | SD | STORM DRAIN | |
| DWY | DRIVEWAY | LPM | LITERS PER MINUTE | SDMH | STORM DRAIN MANHOLE | |
| EJF | EXPANSION JOINT FILLER | MAX | MAXIMUM | SEPT | SEPTEMBER | |
| EL | ELEVATION | MIN | MINIMUM | SPD | SUMP PUMP DISCHARGE | |
| ELEC | ELECTRIC | MH | MANHOLE | SQ | SQUARE | |

EXISTING

| | | | |
|---|------|-------------------------|--|
| — [12"W] — | W — | EX WATER |  EX WATER SERVICE |
| — [4"G] — | G — | EX NAT GAS |  EX POST INDICATOR VALVE |
| — [12"SS] — | S — | EX SEWER |  EX CATHODIC PROTECTION |
| — [12"SD] — | SD — | EX STORM DRAIN |  EX FIRE SERVICE CONNECTION |
| — [20"FM] — | FM — | EX FORCE MAIN |  EX CLEANOUT |
| — - - - - | E — | EX UNDERGROUND ELECTRIC |  EX WATER METER |
| — - - - - | OH — | EX OH |  EX LARGE ELEC TRANSMISSION TOWER |
| — - - - - | FO — | EX FIBER OPTIC | |
| — X — | | EX FENCE LINE | |
| — - - - - | | EX PROPERTY LINE | |
| — - - - - | | EX EDGE OF PAVEMENT | |
|  | | EX CALTRANS ROW | |
|  | | EX FIRE HYDRANT | |
|  | | EX MANHOLE | |
|  | | EX STORM DRAIN INLET | |
|  | | STREET LIGHT | |
|  | | EX WATER/GAS VALVE | |
|  | | LIGHT/ELEC POLE | |
|  | | WATER/ELEC/COMM VAULTS | |

REVIEWED AND APPROVED BY _____

REVIEWED AND APPROVED BY
MID-PENINSULA WATER DISTRICT

TAMMY RUDOCK, GENERAL MANAGER DATE

30% SUBMITTAL
NOT FOR CONSTRUCTION

REVISIONS



| | | |
|--|------------------|-----------------|
| WEST YOST  ASSOCIATES | DRAWN: | CHECKED: |
| | ERG | LCO |
| DESIGNED: | APPROVED: | |

MID-PENINSULA WATER DISTRICT

SR101 CROSSING AT PAMF

LEGEND, ABBREVIATIONS, AND DETAIL DESIGNATION

| | |
|-----------------------------|-------------------|
| DATE 08/11/17 | SCALE AS NOTED |
| PCG JOB NO. 768-14-17-01 | |
| PLAN <u>G.2</u> | |
| SHEET <u>2</u> OF <u>11</u> | |

| REVIEWED BY: | DATE: | REVIEWED BY: | DATE: |
|--------------|-------|--------------|-------|
| | | | |
| | | | |

AGENCY CONTACTS

| MUNICIPALITY/COMPANY | CONTACT | PHONE | COMMENTS |
|----------------------------|-----------------|----------------------|----------|
| AT&T | MR. BRUNO CZECH | 408-635-8881 | |
| CALIFORNIA WATER SERVICE | MR. ROD ZAVALA | 650-558-7859 | |
| CITY OF BELMONT | PHILLIP ESQUEDA | 650-595-7465 | |
| CITY OF REDWOOD CITY | KELLY YONG | 650-780-7352 | |
| CITY OF SAN CARLOS | HENRY PASCUAL | 650-802-4200 | |
| CITY OF SAN MATEO | ANN STILLMAN | 650-599-1497 | |
| COMCAST | DORI WOODSTRUP | 707-759-4078 x259 | |
| CITY OF SAN MATEO | GEORGE SKEEN | 650-522-7300 | |
| KINDER MORGAN | KARLY PAYNE | 714-560-4604 | |
| LEVEL 3 COMMUNICATIONS | CALEB KING | 918-547-0007 | |
| MCI WORLDCOM (VERIZON) | DEAN BOYERS | 469-886-4238 | |
| PG&E | BARBARA GARCIA | 408-725-2077 | |
| QWEST COMMUNICATIONS | GEORGE MCELVAIN | 720-260-2514 | |
| SILICON VALLEY CLEAN WATER | KIM HACKETT | 650-832-26217 | |
| WAVE BROADBAND | CRAIG CORDOVA | 925-459-1077 | |
| XO COMMUNICATIONS | CHAD AUHEY | 510-580-6363 | |

KEY NOTES

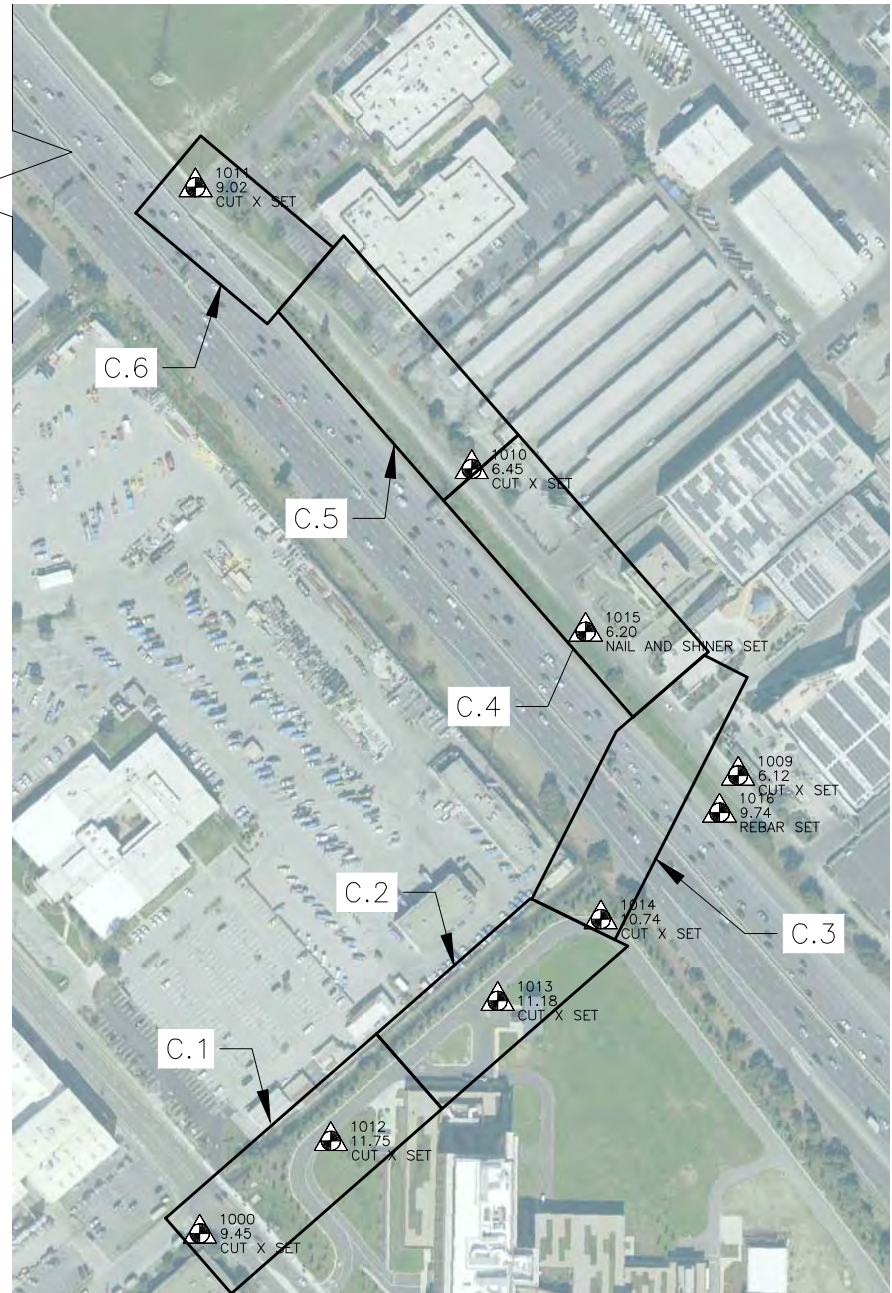
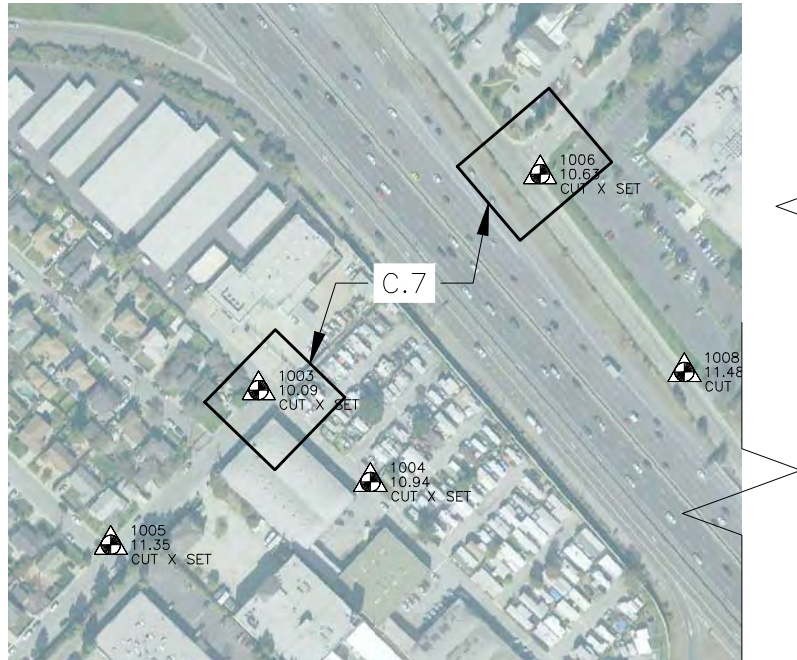
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SURVEY NOTES

COORDINATES SHOWN ARE CCS83(2011) ZONE 3, EPOCH 2010.00
ELEVATIONS SHOWN ARE NAVD88 BASED ON THE FOUND NGS BENCHMARK PID: DG6886
HAVING AN ELEVATION OF 19.59 FEET.

COORDINATES AND ELEVATIONS SHOWN ARE IN U.S. SURVEY FEET.
AN AVERAGE COMBINED FACTOR OF 0.99994 WILL BE USED FOR THIS PROJECT.

| POINT TABLE | | | | |
|-------------|------------|------------|-----------|---------------------|
| POINT # | NORTHING | EASTING | ELEVATION | DESCRIPTION |
| 1000 | 2014854.77 | 6050677.77 | 9.45 | CUT X SET |
| 1001 | 2014550.38 | 6050249.70 | 10.19 | CUT X SET |
| 1002 | 2015580.25 | 6050192.24 | 10.62 | CUT X SET |
| 1003 | 2017870.20 | 6048806.32 | 10.09 | CUT X SET |
| 1004 | 2017726.51 | 6048980.71 | 10.94 | CUT X SET |
| 1005 | 2017628.37 | 6048575.56 | 11.35 | CUT X SET |
| 1006 | 2018207.60 | 6049245.74 | 10.63 | CUT X SET |
| 1007 | 2018685.99 | 6049658.75 | 9.98 | NAIL AND SHINER FND |
| 1008 | 2017898.32 | 6049470.91 | 11.48 | CUT X SET |
| 1009 | 2015570.35 | 6051518.33 | 6.12 | CUT X SET |
| 1010 | 2016049.07 | 6051102.34 | 6.45 | CUT X SET |
| 1011 | 2016489.61 | 6050671.06 | 9.02 | CUT X SET |
| 1012 | 2014999.47 | 6050882.32 | 11.75 | CUT X SET |
| 1013 | 2015217.97 | 6051142.77 | 11.18 | CUT X SET |
| 1014 | 2015345.99 | 6051303.95 | 10.74 | CUT X SET |
| 1015 | 2015794.76 | 6051280.07 | 6.20 | NAIL AND SHINER SET |
| 1016 | 2015512.04 | 6051489.23 | 9.74 | REBAR SET |



REVIEWED AND APPROVED BY

REVIEWED AND APPROVED BY
MID-PENINSULA WATER DISTRICT

TAMMY RUDECK, GENERAL MANAGER DATE

30% SUBMITTAL
NOT FOR CONSTRUCTION

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| MID-PENINSULA WATER DISTRICT | | | | | | | | | | <div>WEST YOST ASSOCIATES</div> | | | | | | | | | | <div>PROFESSIONAL ENGINEER STATE OF CALIFORNIA LICENSE NO. 50783 NOT FOR CONSTRUCTION PURPOSES</div> | | | | | | | | | | REVISIONS | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | <div>DRAWN: ERG DESIGNED: NAM</div> <div>CHECKED: LCO APPROVED: JDC</div> | | | | | | | | | | <div>NO.</div> <div>DESCRIPTION</div> <div>BY</div> <div>DATE</div> <div>APPROV'D</div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| DATE 08/11/17 | | | | | | | | | | SCALE AS NOTED | | | | | | | | | | PCG JOB NO. 768-14-17-01 | | | | | | | | | | PLAN G.3 | | | | | | | | | | SHEET 3 OF 11 | | | | | | | | | |

FOR REDUCED ENGLISH PLANS
ORIGINAL SCALE IS IN INCHES

DRAWING NAME: N:\Clients\768 Mid-Peninsula WD\14-17-01 SR101 Crossing\CAD\Production\76814-1701-603.dwg
PLOT DATE: 10-18-17 PLOTTED BY: ezeif

- THE TYPE, LOCATION, SIZE AND DEPTH OF EXISTING UNDERGROUND UTILITIES SHOWN ON THESE PLANS WERE OBTAINED FROM SOURCES OF VARYING RELIABILITY. EFFORTS HAVE BEEN MADE TO LOCATE AND DELINEATE ALL KNOWN UNDERGROUND FACILITIES. HOWEVER, THE ENGINEER DOES NOT ASSUME RESPONSIBILITY FOR THE COMPLETENESS AND/OR ACCURACY OF THE DELINEATION OF SUCH UNDERGROUND FACILITIES, NOR FOR EXISTENCE OF OTHER BURIED OBJECTS AND/OR FACILITIES WHICH MAY BE ENCOUNTERED BUT ARE NOT SHOWN ON THESE DRAWINGS. THE CONTRACTOR SHALL EXPOSE ALL UNDERGROUND FACILITIES THAT ARE TO BE CONNECTED TO, OR THAT ARE IN THE PATH OF, THE PROPOSED IMPROVEMENTS FOR VERIFICATION OF LOCATION AND ELEVATION PRIOR TO COMMENCING CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONSTRUCTING THE WORK OF THE PROJECT PER THE IMPROVEMENT PLANS DESPITE BURIED OBJECTS OR FACILITIES WHICH WERE NOT EXPECTED TO BE ENCOUNTERED.
- ALL CONSTRUCTION MUST BE TO THE MID-PENINSULA WATER DISTRICT, CITY OF BELMONT, CITY OF SAN CARLOS, COUNTY OF SAN MATEO, AND CALTRANS STANDARDS AND ACCEPTED BY THE DISTRICT. CONTRACTOR IS RESPONSIBLE TO MAKE ALL ARRANGEMENTS FOR SITE INSPECTIONS AND ENSURE THAT ALL CURRENT STANDARDS FOR THE CITY, COUNTY, AND THE DISTRICT ARE FOLLOWED PRIOR TO BEGINNING ANY PHASE OF CONSTRUCTION WORK.
- DUST CONTROL DURING ALL PHASES OF CONSTRUCTION IS THE RESPONSIBILITY OF THE CONTRACTOR. IT IS ALSO THE CONTRACTOR'S RESPONSIBILITY TO MAINTAIN GOOD HOUSEKEEPING OF THE EXISTING IMPROVEMENTS IN THE CONSTRUCTION AREA. CONTRACTOR SHALL PROTECT EXCAVATED SOILS PER WATER POLLUTION CONTROL PLAN (WPCP) AS SPECIFIED IN THE TECHNICAL SPECIFICATIONS.
- NO ASPHALT SHALL BE DELIVERED TO THE JOB SITE AFTER 3:00 P.M. ON ANY DAY WITHOUT PRIOR APPROVAL OF THE DISTRICT. NO SLURRY SEAL SHALL BE PLACED AFTER 2:00 P.M.
- THE CONTRACTOR SHALL SUBMIT A TRAFFIC CONTROL PLAN (INCLUDING ANY STREET CLOSURE DETAILS AND DETOUR PLANS), PREPARED AND SIGNED BY A TRAFFIC ENGINEER, TO THE DISTRICT. TRAFFIC CONTROL PLAN TO BE APPROVED BY AGENCY HAVING JURISDICTION (CITY, COUNTY, CALTRANS).
- ANY DAMAGE TO EXISTING FACILITIES SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE. CONTRACTOR SHALL RESTORE ANY AND ALL PAVEMENT AND OTHER FACILITIES OUTSIDE LIMITS OF WORK AFFECTED BY THE CONSTRUCTION OPERATIONS AT NO ADDITIONAL COST. IT IS THE CONTRACTOR'S RESPONSIBILITY TO DOCUMENT EXISTING CONDITIONS PRIOR TO START OF WORK TO SUBSTANTIATE ANY PRE-EXISTING DAMAGES.
- TIE-INS ARE DIAGRAMATIC. THE CONTRACTOR SHALL NOT BE ENTITLED TO EXTRA PAYMENT IF ADDITIONAL PIPE, COUPLINGS, OR OTHER APPURTENANCES ARE REQUIRED TO COMPLETE TIE-IN.
- PIPE BEDDING AND TRENCH BACKFILL SHALL BE IN ACCORDANCE WITH DISTRICT STANDARDS
- PROCEDURES FOR ABANDONING EXISTING PIPE ARE INCLUDED IN SECTION 02111 "ABANDONMENT OF EXISTING FACILITIES"
- THE WATER SYSTEM SHALL REMAIN IN SERVICE THROUGHOUT THE PROJECT. INTERRUPTIONS TO SERVICE SHALL BE MINIMIZED AND SHALL BE COORDINATED WITH THE DISTRICT AT (650) 591-8914. THE CONTRACTOR SHALL NOT OPERATE DISTRICT OWNED VALVES AND HYDRANTS UNLESS AUTHORIZED BY THE DISTRICT.
- THE CONTRACTOR SHALL NOT OPERATE DISTRICT FACILITIES UNLESS DIRECTED BY THE DISTRICT.
- THE DISTRICT SHALL BE NOTIFIED AT LEAST 72 HOURS IN ADVANCE FOR ANY SCHEDULED TIE-INS. NO TIE-INS OR SHUTDOWNS WILL BE ALLOWED ON MONDAYS AND FRIDAYS OR THE DAY PRECEDING A HOLIDAY. ONLY TWO SHUTDOWNS PER WEEK ARE ALLOWED.
- THE CONTRACTOR SHALL DESIGNATE A PERSON TO CONTACT SHOULD PROBLEMS ARISE DURING NON-WORKING HOURS OR DAYS. THE DISTRICT SHALL BE GIVEN THAT PERSON'S NAME, PHONE NUMBER.
- WATER STRUCTURES REMOVED FROM THE GROUND NOT LIMITED TO GATE VALVES, CHECK VALVES, COPPER SERVICE LINES, ETC SHALL BE RETURNED TO THE DISTRICT. FITTINGS AND PIPE REMOVED FROM THE GROUND SHALL BECOME PROPERTY OF THE CONTRACTOR.
- DEFLECT PIPE JOINTS A MAXIMUM OF 1 DEGREE AS RECOMMENDED BY THE MANUFACTURER
- EXISTING UTILITIES SHOWN ARE BASED ON FIELD VERIFICATION AND RECORD DRAWINGS AND ARE SHOWN SCHEMATICALLY ON THE PLANS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO CONTACT USA (1-800-227-2600) AND VERIFY SAID UTILITIES.
- EXISTING WATER MAIN ELEVATIONS BASED ON NEARBY GATE VALVE NUTS ARE APPROXIMATE.
- EXISTING STORM DRAIN AND SEWER MAIN ELEVATIONS BASED ON NEARBY MANHOLE/CATCH BASIN INVERTS AND ARE APPROXIMATE.
- TIE-INS TO EXISTING WATER MAIN SHALL BE 30" MIN AWAY FROM A SLEEVE OR AS DIRECTED BY THE DISTRICT.
- SHORING IS REQUIRED FOR TRENCH DEPTHS GREATER THAN 60".
- NO BENDS OR JOINTS WITHIN 10' OF SANITARY SEWER MAIN IS ALLOWED UNLESS OTHERWISE DIRECTED BY THE DISTRICT.

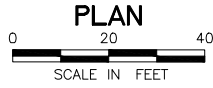
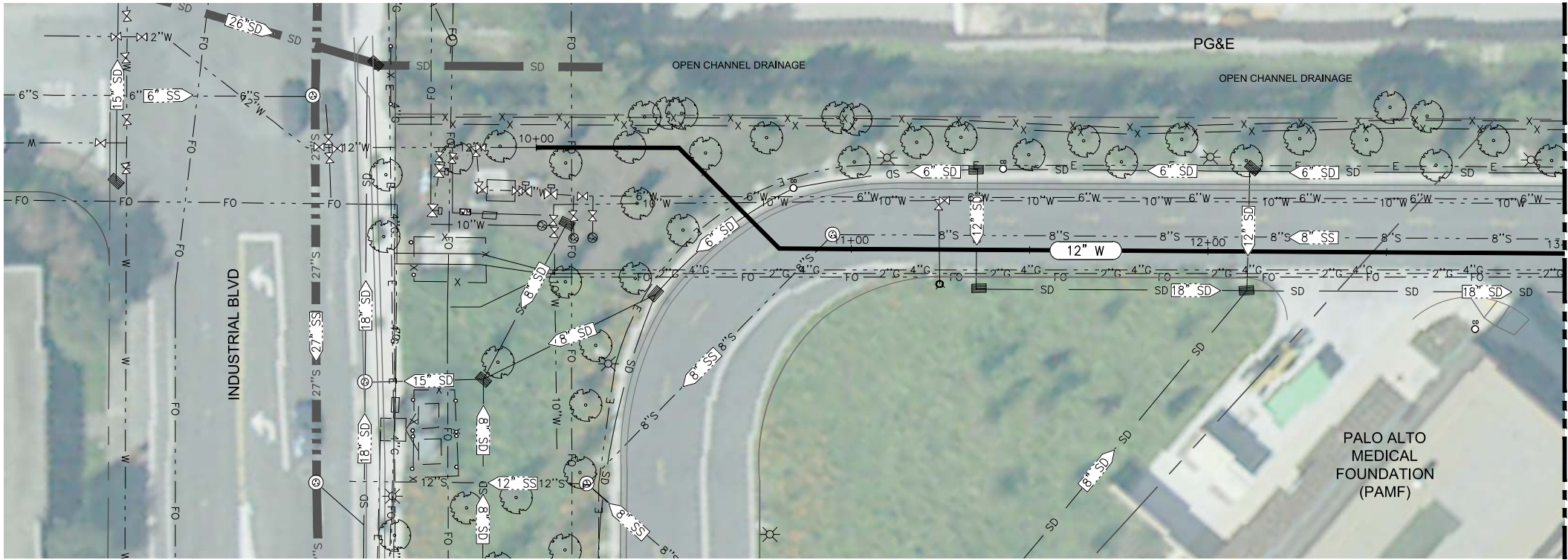
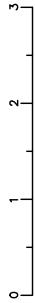
30% SUBMITTAL
NOT FOR CONSTRUCTION

| | | | | | |
|---|--|--|--|---|--|
| <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p style="text-align: center; margin: 0;">MID-PENINSULA WATER DISTRICT</p> <hr/> <p style="text-align: center; margin: 0;">SR101 CROSSING AT PAMF</p> <p style="text-align: center; margin: 0;">GENERAL NOTES</p> </div> <div style="width: 50%; text-align: right;"> <p>DATE 08/11/17</p> <p>SCALE AS NOTED</p> </div> </div> | | <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>WEST YOST</p> <p>ASSOCIATES</p> </div> <div style="text-align: center;"> <p>CHECKED:</p> <p>_____ LCO</p> </div> <div style="text-align: center;"> <p>APPROVED:</p> <p>_____ JDC</p> </div> </div> | | <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p style="text-align: center; margin: 0;">DRAWN:</p> <p style="text-align: center; margin: 0;">_____ EPG</p> <p style="text-align: center; margin: 0;">DESIGNED:</p> <p style="text-align: center; margin: 0;">_____ NAM</p> </div> <div style="width: 50%;"> <p style="text-align: center; margin: 0;">NO. NO.</p> <p style="text-align: center; margin: 0;">BY DATE</p> <p style="text-align: center; margin: 0;">APPROV'D</p> </div> </div> | |
| <p style="margin: 0;">DATE</p> <p style="margin: 0;">08/11/17</p> | | <p style="margin: 0;">SCALE</p> <p style="margin: 0;">AS NOTED</p> | | <p style="margin: 0;">NO. NO.</p> <p style="margin: 0;">BY DATE</p> <p style="margin: 0;">APPROV'D</p> | |
| <p style="margin: 0;">PCG JOB NO.</p> <p style="margin: 0;">768-14-17-01</p> | | <p style="margin: 0;">PLAN</p> <p style="margin: 0;">G.4</p> | | <p style="margin: 0;">SHEET</p> <p style="margin: 0;">4 OF 11</p> | |

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FOR REDUCED ENGLISH PLANS
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PLOT DATE: 03-16-17 PLOTTED BY: egnif



PROFILE

SCALE: H:1"=20', V:1"=4'

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REVIEWED AND APPROVED BY
MID-PENINSULA WATER DISTRICT

TAMMY RUDOCK, GENERAL MANAGER DATE

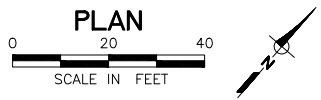
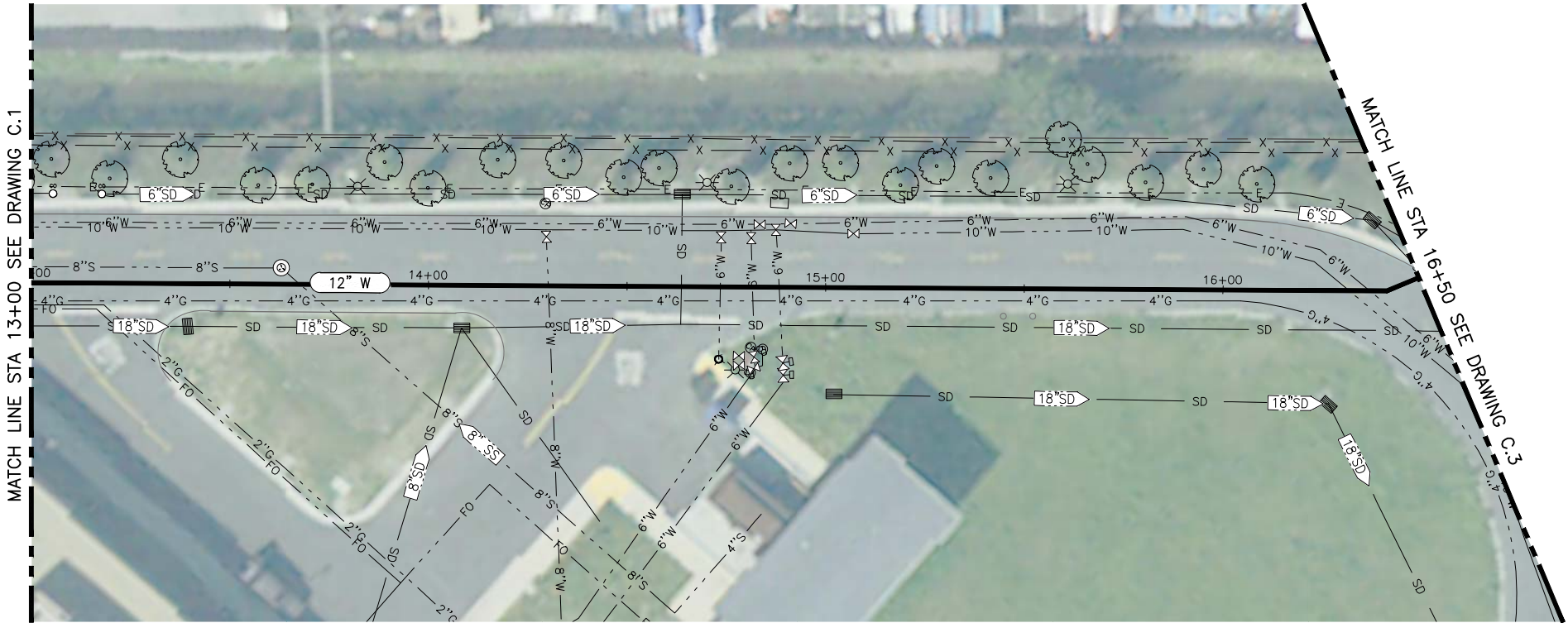
30% SUBMITTAL
NOT FOR CONSTRUCTION

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| MID-PENINSULA WATER DISTRICT | | SR101 CROSSING AT PAMF | | PLAN AND PROFILE STA 10+00 TO STA 13+00 | |
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PLOT DATE: 10-18-17 PLOTTED BY: gnhf



PROFILE
SCALE: H:1"=20', V:1"=4'

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MID-PENINSULA WATER DISTRICT

TAMMY RUDOCK, GENERAL MANAGER DATE

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NOT FOR CONSTRUCTION

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| | | PLAN | C.2 | | |
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WEST YOST ASSOCIATES

REGISTERED PROFESSIONAL ENGINEER
NO. 10000
STATE OF CALIFORNIA

DRAWN: ERG

CHECKED: LCO

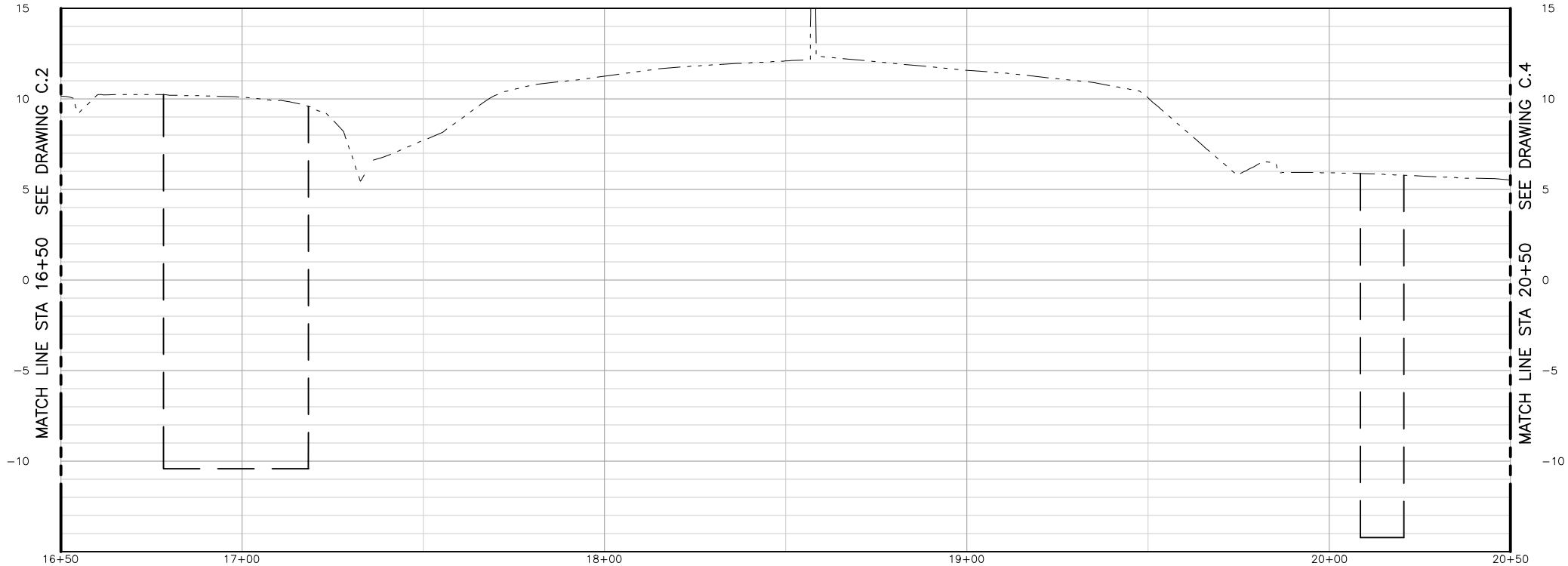
DESIGNED: NAM

APPROVED: JDC

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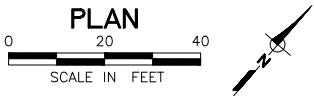
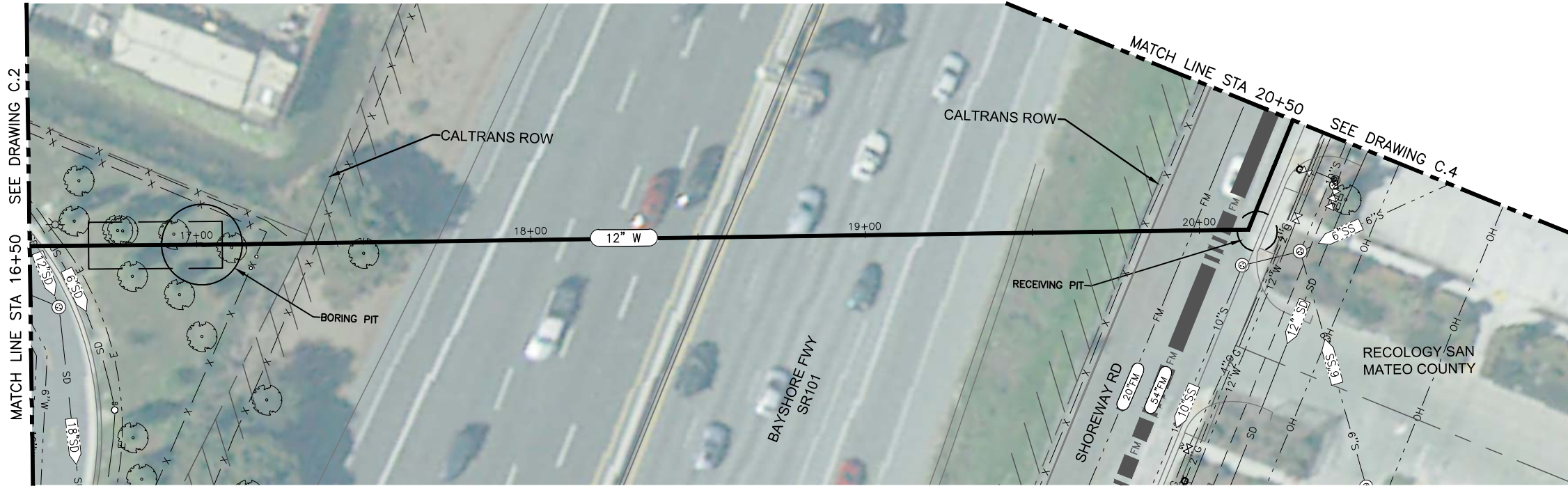
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PROFILE

SCALE: H:1"=20', V:1"=4'



PLAN

SCALE IN FEET

REVIEWED AND APPROVED BY

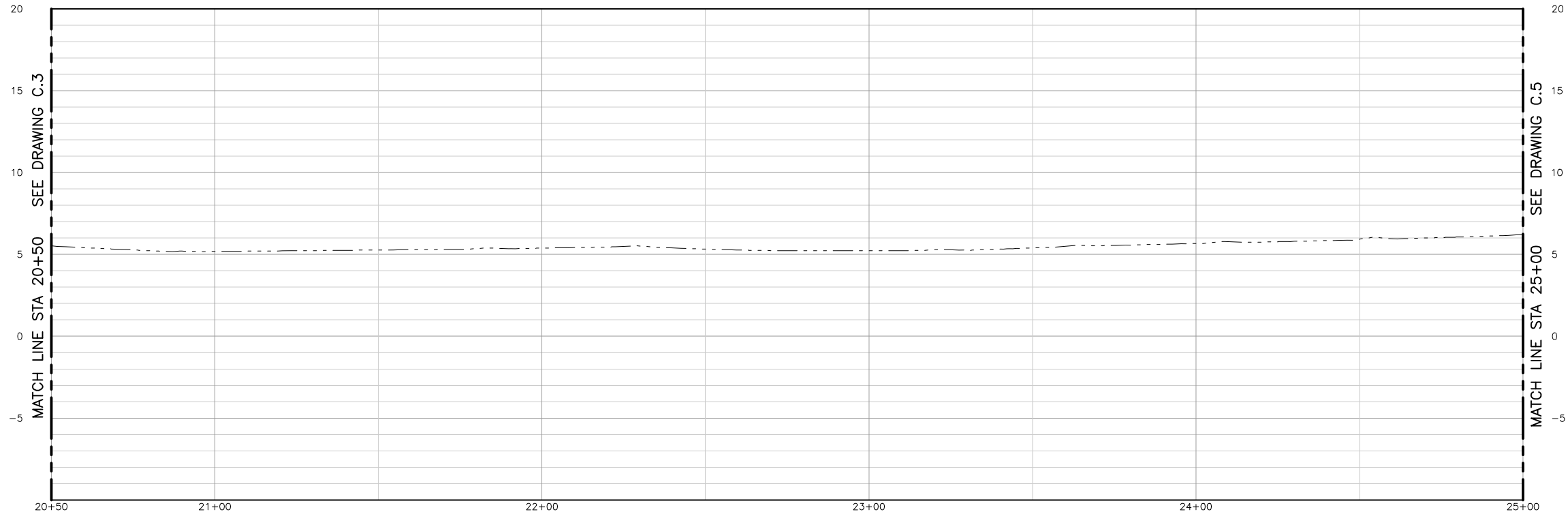
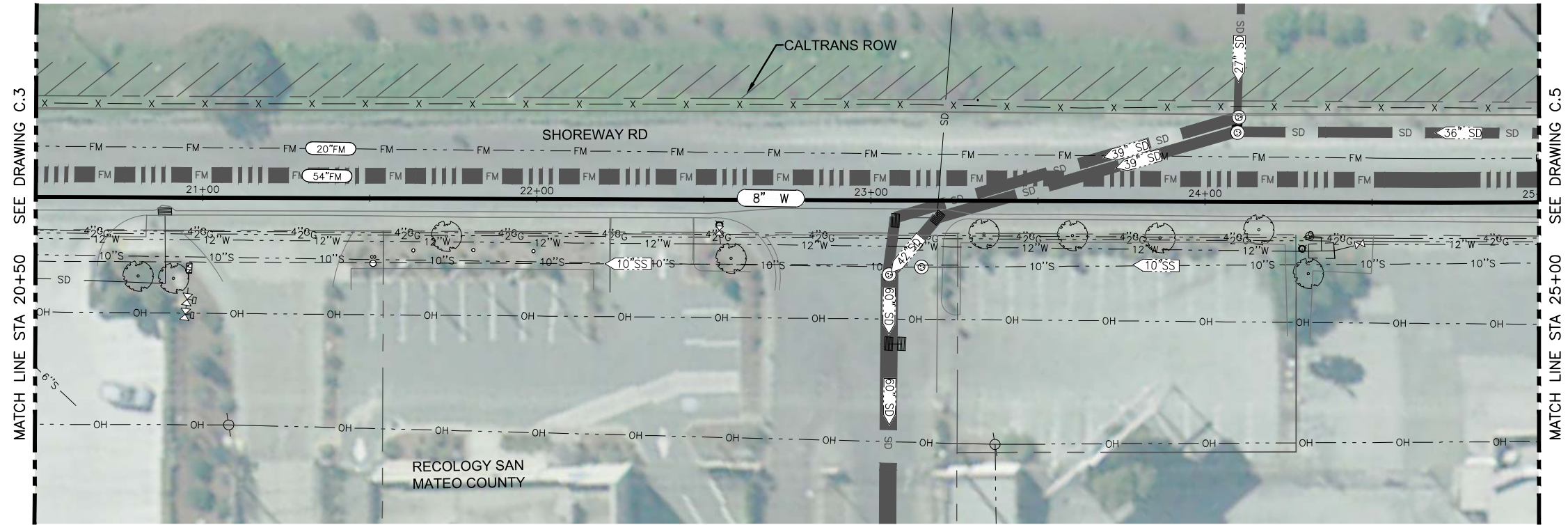
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MID-PENINSULA WATER DISTRICT

TAMMY RUDOCK, GENERAL MANAGER DATE

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| MID-PENINSULA WATER DISTRICT | | REVISIONS | |
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| PLAN AND PROFILE STA 16+50 TO STA 20+50 | | | |
| DATE | 08/11/17 | SCALE | AS NOTED |
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| PLAN | C.3 | | |
| SHEET | 7 OF 11 | | |
| DRAWN: ERG | | CHECKED: LCO | |
| DESIGNED: NAM | | APPROVED: JDC | |
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| STATE OF CALIFORNIA | | NO. | |
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MID-PENINSULA WATER DISTRICT

SR101 CROSSING AT PAMF

PLAN AND PROFILE STA 20+50 TO STA 25+00

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| DATE 08/11/17 | SCALE AS NOTED |
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MID-PENINSULA WATER DISTRICT

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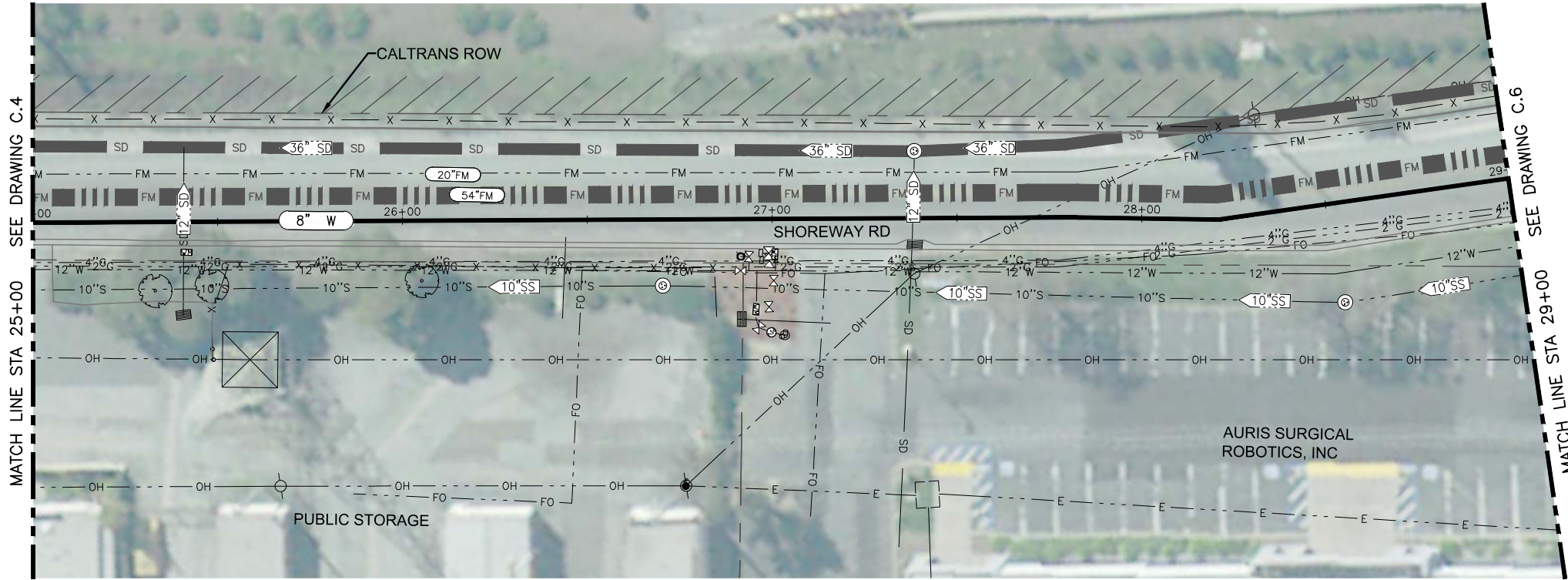
TAMMY RUDOCK, GENERAL MANAGER

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PROFILE

SCALE: H:1"=20', V:1"=4'

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MID-PENINSULA WATER DISTRICT

TAMMY RUDOCK, GENERAL MANAGER DATE

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MID-PENINSULA WATER DISTRICT

SR101 CROSSING AT PAMF

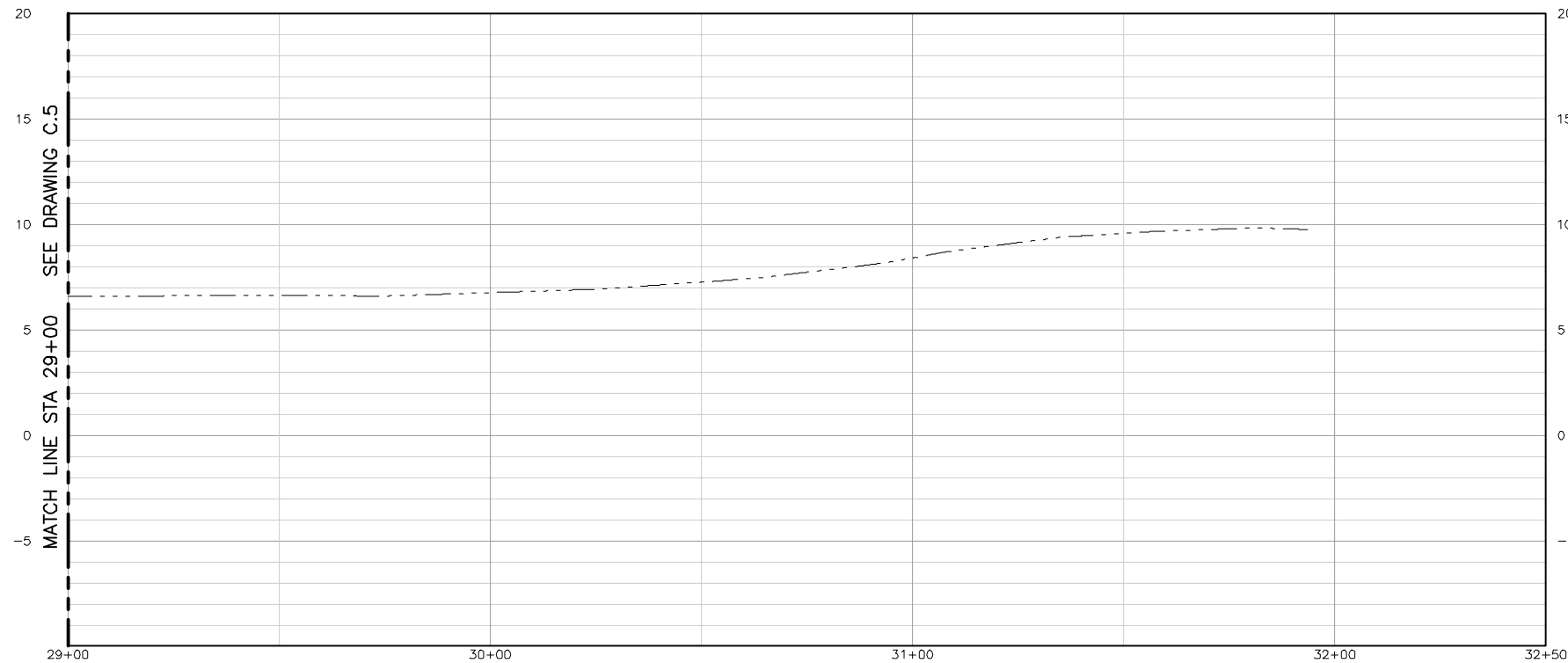
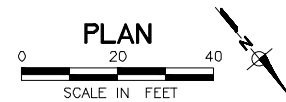
PLAN AND PROFILE STA 25+00 TO STA 29+00

DATE: 08/11/17 SCALE: AS NOTED

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PLAN: C.5
SHEET: 9 OF 11

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PROFILE

SCALE: H:1"=20', V:1"=4'

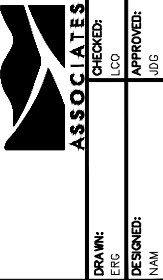
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MID-PENINSULA WATER DISTRICT

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MID-FLORIDA WATER DISTRICT

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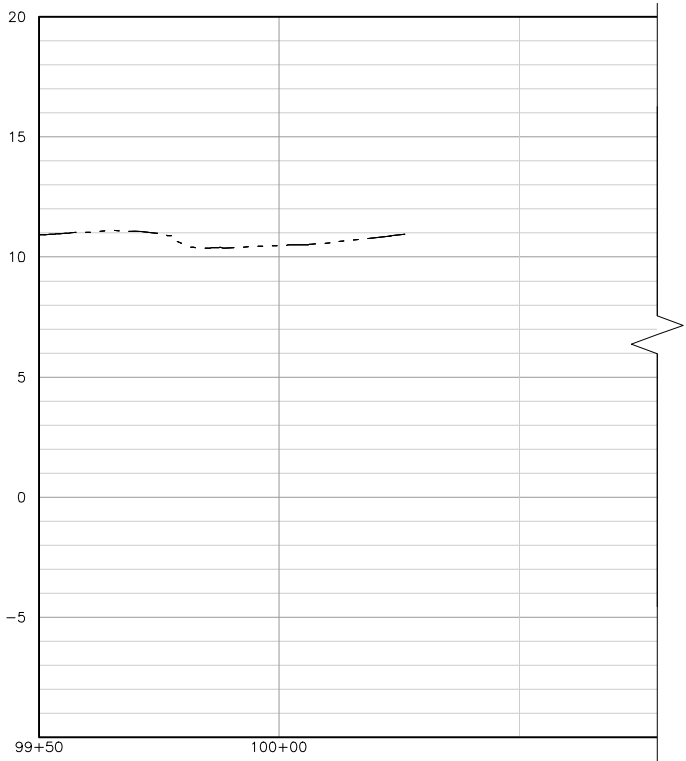
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FOR REDUCED ENGLISH PLANS
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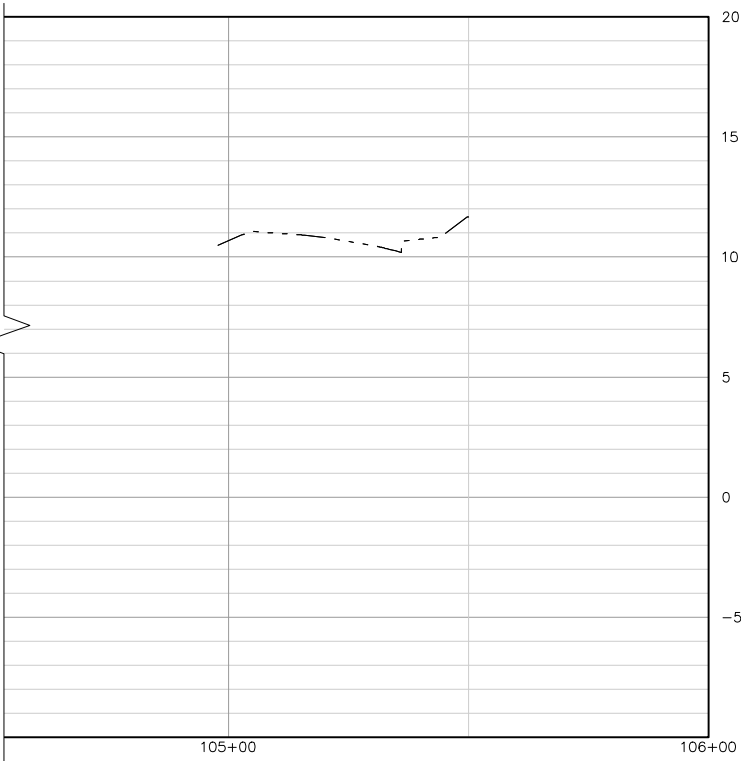
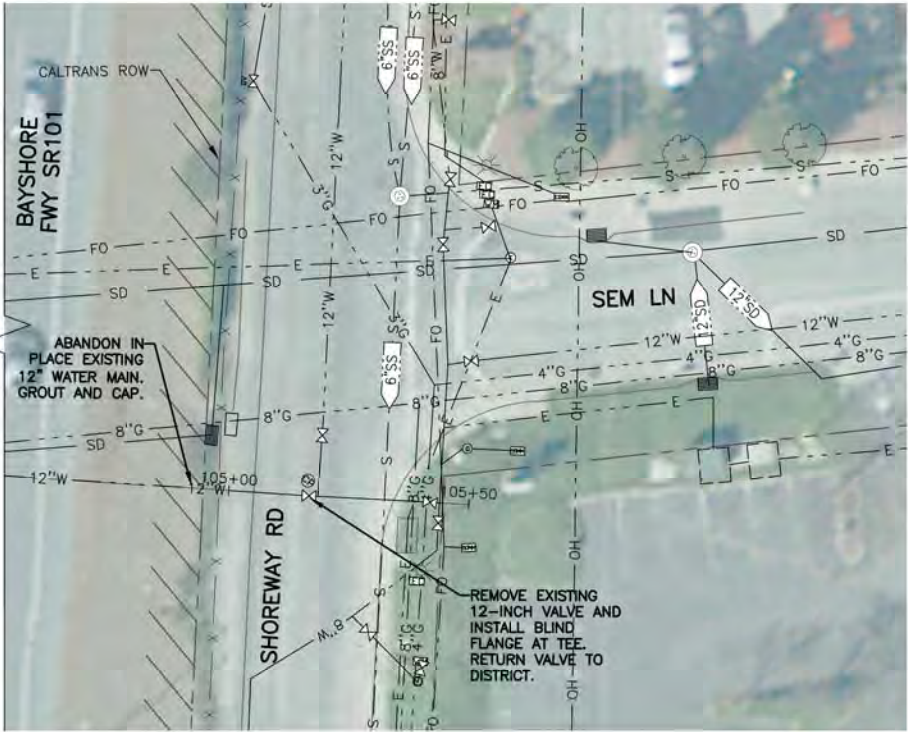
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PLOT DATE: 10-18-17 PLOTTED BY: gnhf



PROFILE

SCALE: H:1"=20', V:1"=4'

NOTE: TOTAL LENGTH OF PIPE TO
BE ABANDONED IS 517 FEET



PROFILE

SCALE: H:1"=20', V:1"=4'

NOTES

1. ALL AC PIPE WORK WILL REQUIRE PERSONAL PROTECTIVE EQUIPMENT AND PROPER DISPOSAL.

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MID-PENINSULA WATER DISTRICT

TAMMY RUDOCK, GENERAL MANAGER DATE

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REVISIONS

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| WEST YOST ASSOCIATES | CHECKED: | APPROVED: |
| | ERG | JDC |
| DRAWN: | DESIGNED: | |
| ERG | NAM | |

MID-PENINSULA WATER DISTRICT

SR101 CROSSING AT PAMF

PLAN AND PROFILE STA 99+50 TO 105+50

| | |
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| DATE | SCALE |
| 08/11/17 | AS NOTED |
| PG# JOB NO. | |
| 768-14-17-01 | |
| PLAN | C.7 |
| SHEET | 11 OF 11 |

APPENDIX B

Geotechnical Report

Geotechnical Data Report

To: Nancy McWilliams – West Yost Associates
From: Dru Nielson and Justin Reeves
Subject: Geotechnical Data Report
Mid-Peninsula Water District
SR 101 Crossing at PAMF
San Carlos, California

Date: October 20, 2017
Job No.: 5701.0

This data report presents draft geotechnical findings for the Mid-Peninsula Water District's SR 101 Crossing project located near the Palo Alto Medical Facility (PAMF) in San Carlos, California. This data report precedes the preliminary design report to the District from West Yost Associates, which will include 30% project plans.

The data report includes the following:

- This cover letter (one page)
- Vicinity and Site Map (Figure 1)
- Historic Topographic Maps and Aerial Photos (Figure 2)
- Test Boring Profile – SR 101 Crossing at PAMF (Figure 3)
- Geotracker Map (Figure 4)
- Flood Zone Hazard Map (Figure 5)
- Soil Map (Figure 6)
- Geology Map (Figure 7)
- Bay Mud Map (Figure 8)
- Liquefaction Susceptibility Map (Figure 9)
- Bay Area Faults Map (Figure 10)
- Bay Area Earthquakes Map (Figure 11)
- Seismic Shaking Map (Figure 12)
- Modified Mercalli Intensity Scale (Figure 13)
- Boring Log Legend (Figure A-1 in Appendix A)
- Four geotechnical test boring logs (Borings Logs in Figures B-1 through B-4 in Appendix B)
- Laboratory test results (Figures C-1 through C-4 in Appendix C)

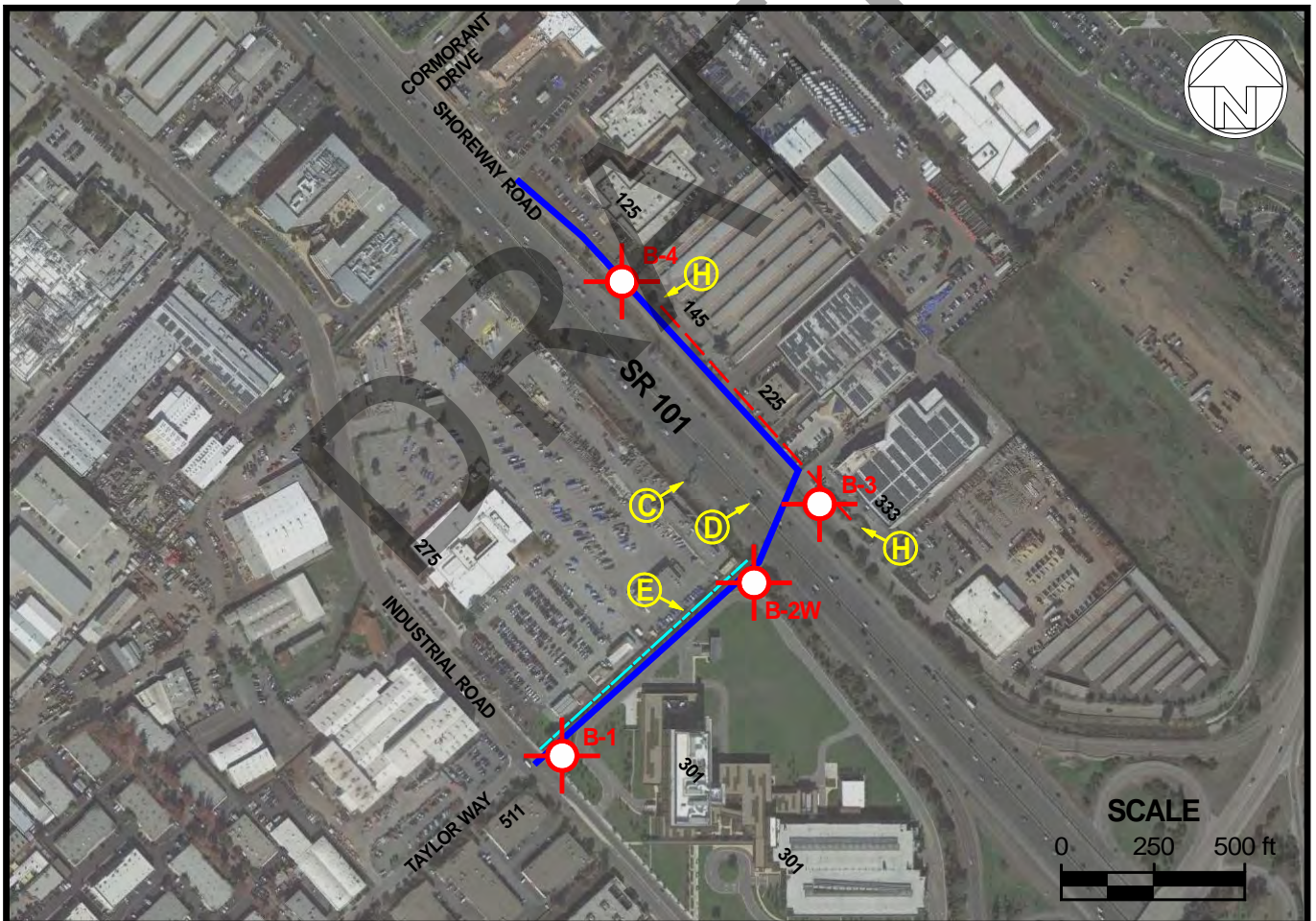
These findings, and the results of their analysis and interpretation with respect to project plans, profiles, and permitting requirements from Caltrans will be provided in a geotechnical investigation report for the project. Based on the data analysis and interpretations, the project geotechnical report will provide specific recommendations relative to (1) the trenchless method to be selected by the design team for the SR 101 crossing, and (2) shallow open-cut trenching everywhere else along the project alignment.

Based on preliminary analysis of the data, it is feasible that the trenchless crossing of SR101 can be designed to occur through stabilized portals within water-tight shafts on both sides of SR101, and within a targeted trenchless zone in stiffer soils below Young Bay Mud under SR 101 (see Figure 3). We look forward to receiving and reviewing the preliminary design report, permitting requirements of Caltrans, and to continuing to work with design team (West Yost Associates and the District) in selecting an appropriate strategy and trenchless method for the successful design, contractor bid, and construction of the project.



LEGEND:

- - Project alignment
- - Drainageway
- - Overhead power lines along Shoreway Road
- ⊕ B-1
⊕ B-2W - Test boring, "W" denotes boring completed as a groundwater level monitoring well
- ⊙ - Described in Figure 2



Maps modified from Google Earth (2017)



File No. 5701.0

October 2017

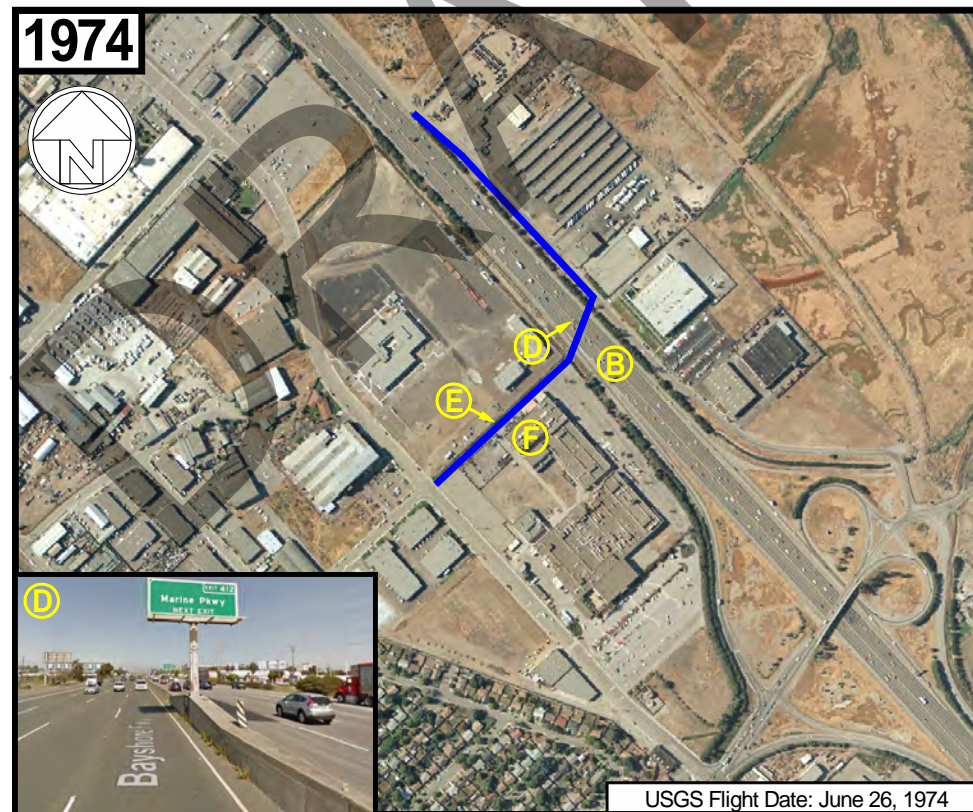
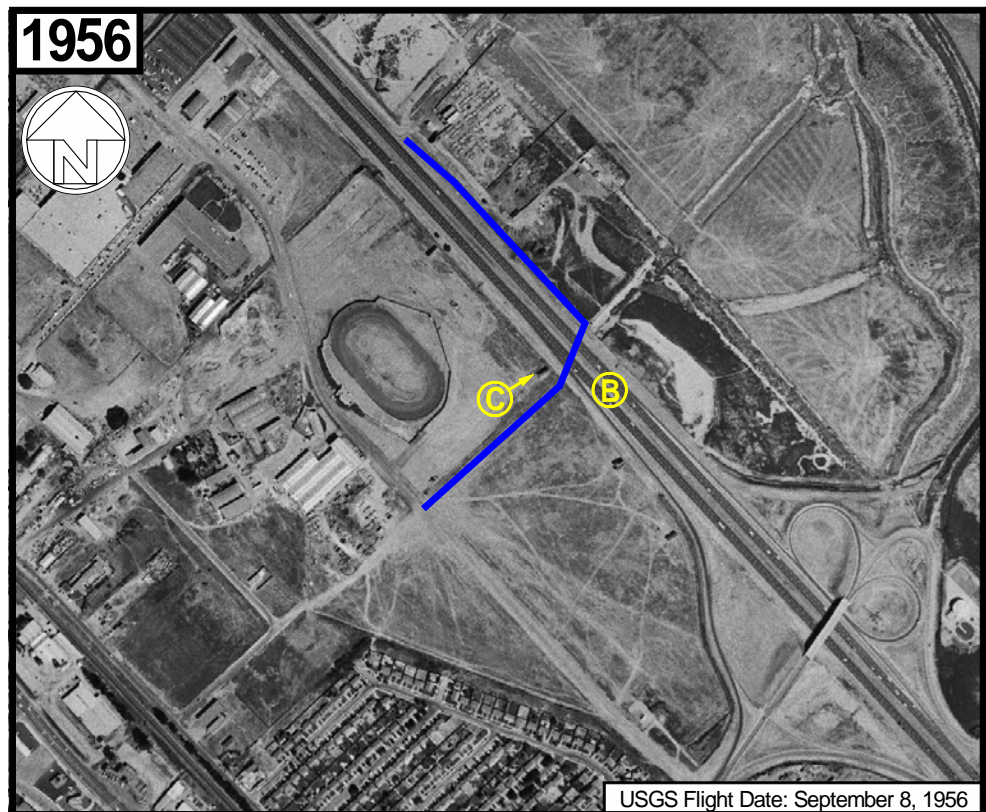
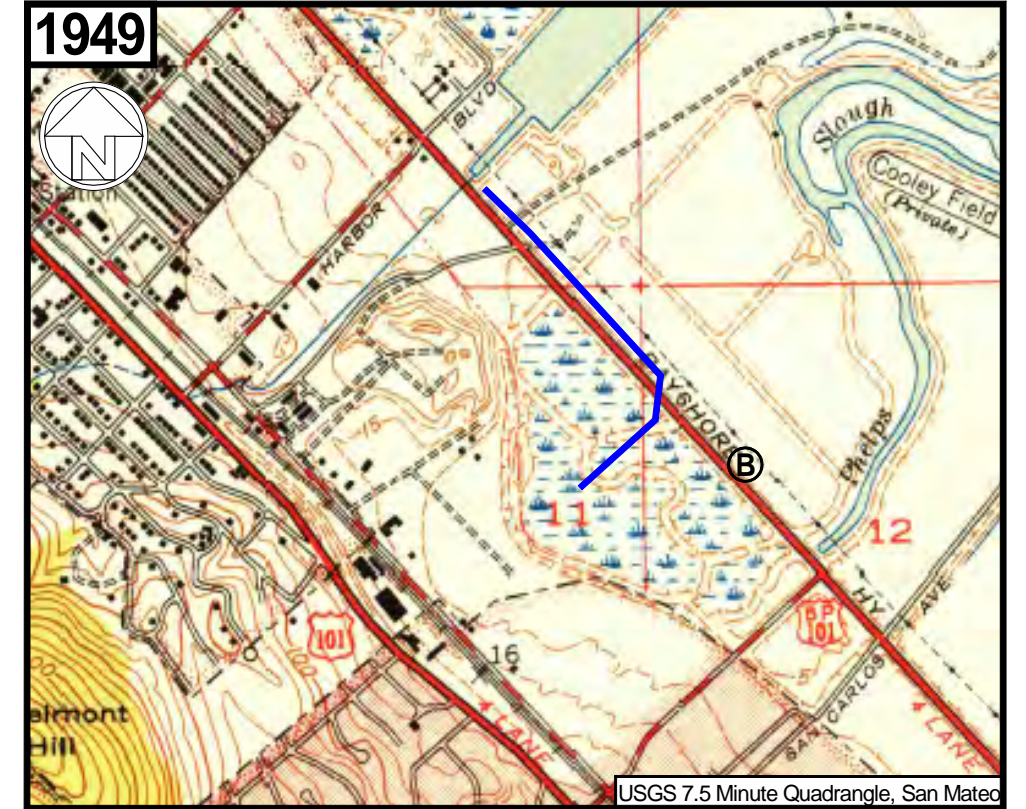
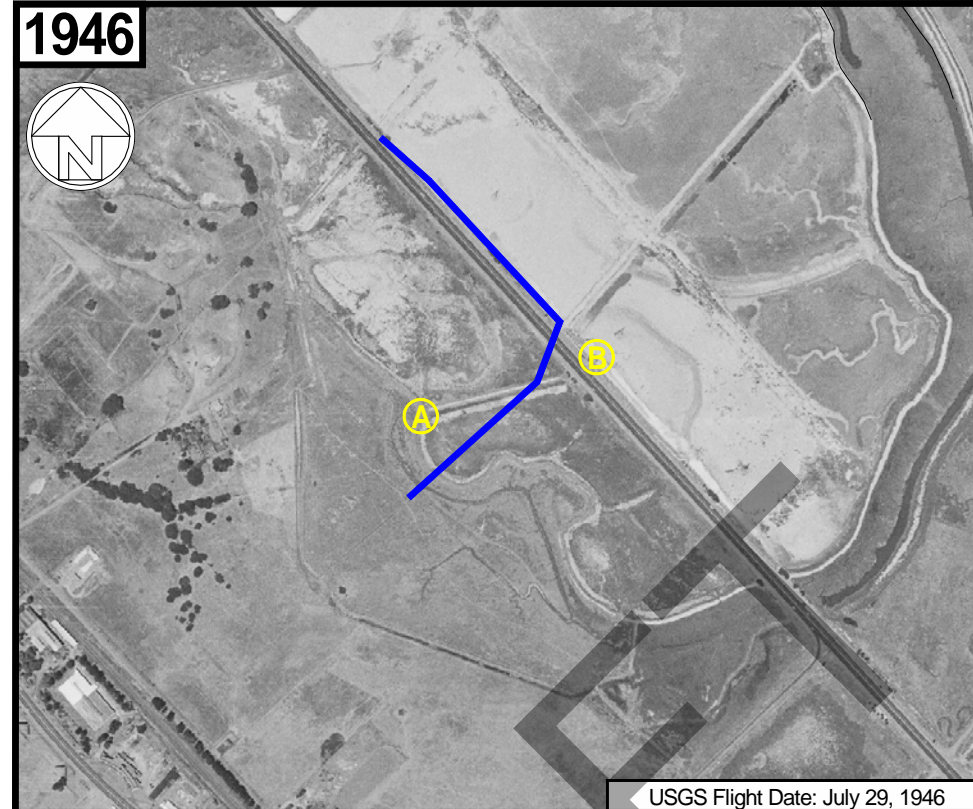
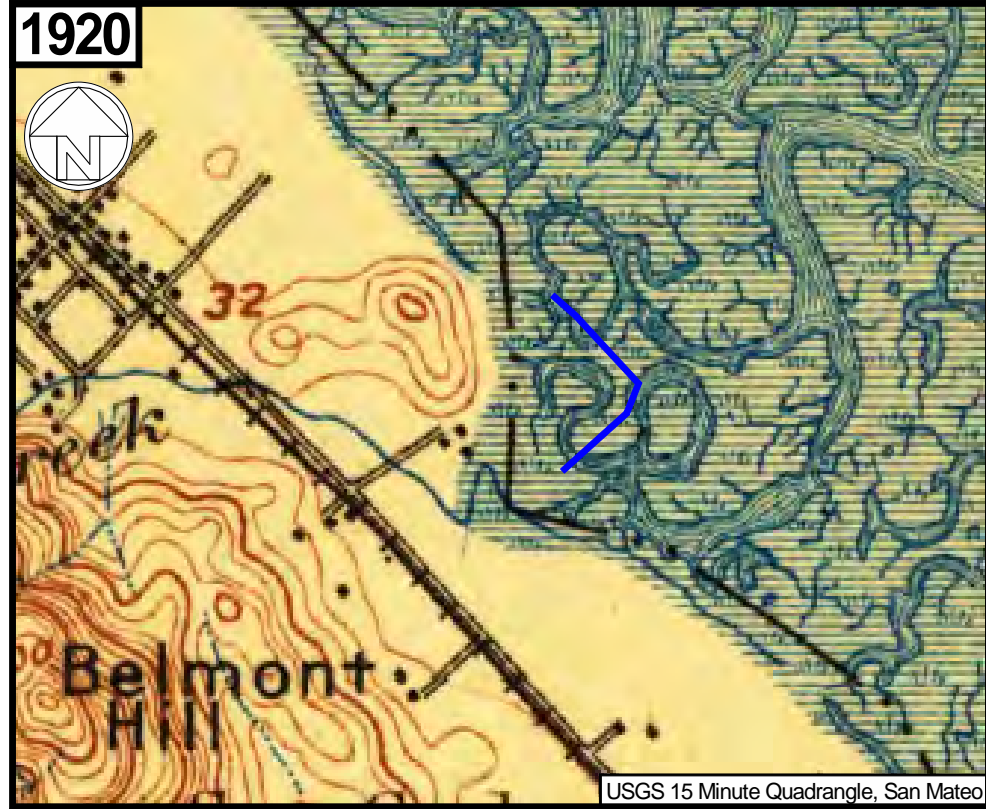
West Yost Associates

Mid-Peninsula Water District
SR 101 Crossing at PAMF
San Carlos, California

Vicinity and Site Map

Figure

1



LEGEND:

- - Project alignment
- Ⓐ - Former artificial drainage channel
- Ⓑ - Highway 101; gradually increased in width and lanes over the years
- Ⓒ - Highway signage
- Ⓓ - Highway signage
- Ⓔ - Artificial drainage channel
- Ⓕ - Structures pre-dating PAMF development
- Ⓖ - Razed and barren lot prior to PAMF development
- Ⓗ - Utility tower



File No. 57010 | October 2017

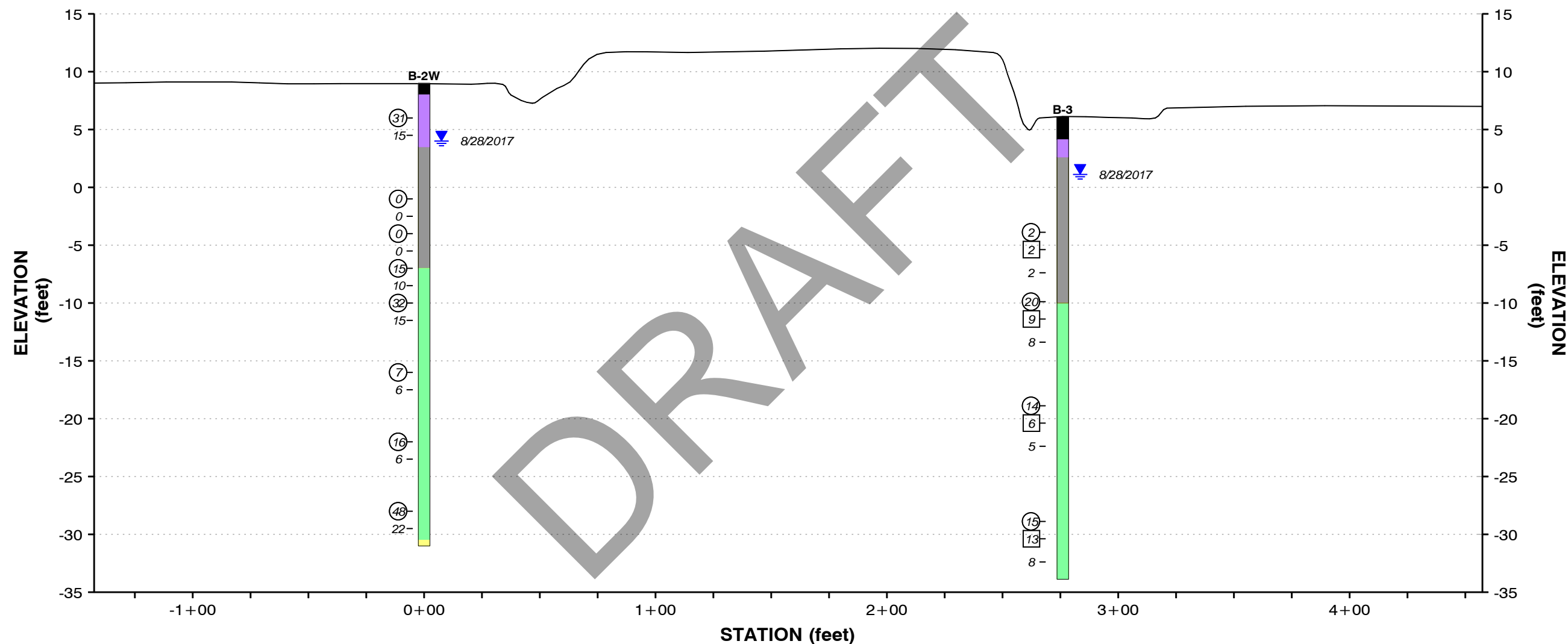
West Yost Associates

Mid-Peninsula Water District
SR 101 Crossing at PAMF
San Carlos, California

Historic Topographic Maps and Aerial Photos

Figure

2



INTERPRETIVE BORING LOG LEGEND:

| | | | |
|--|--|-----|---|
| | Pavement section or landscaping | | B-1 McMillen Jacobs Associates test boring, projected to profile as indicated (logs in Appendix B) |
| | Fill: - variable | | Groundwater level measured on date indicated (see text of report for additional measurements) |
| | Young Bay Mud - predominantly organic-rich silt and clay - cohesive, squeezing to raveling | 21- | Penetration resistance SPT "N" blow count |
| | Fine grained - predominantly clay: - cohesive, firm to raveling | 22- | Penetration resistance MCS blow count (not reduced to "N" blow count) |
| | Coarse grained - predominantly sand: - noncohesive, raveling to flowing | 23- | Penetration resistance SS blow count (not reduced to "N" blow count) |

NOTES:

1. Ground conditions and behavior illustrated in the profile are interpreted projections from boring logs provided in Appendix B.
2. Map and ground surface elevations modified from Google Earth (2017).
3. Width and placement of graphic log has been exaggerated and approximated for clarity.
4. Conditions and behaviour between borings will include stratal undulations, lensing, and lateral facies changes.
5. Ground behavior classification and descriptions are provided in Figure A-1, Appendix A.



File No. 57010

October 2017

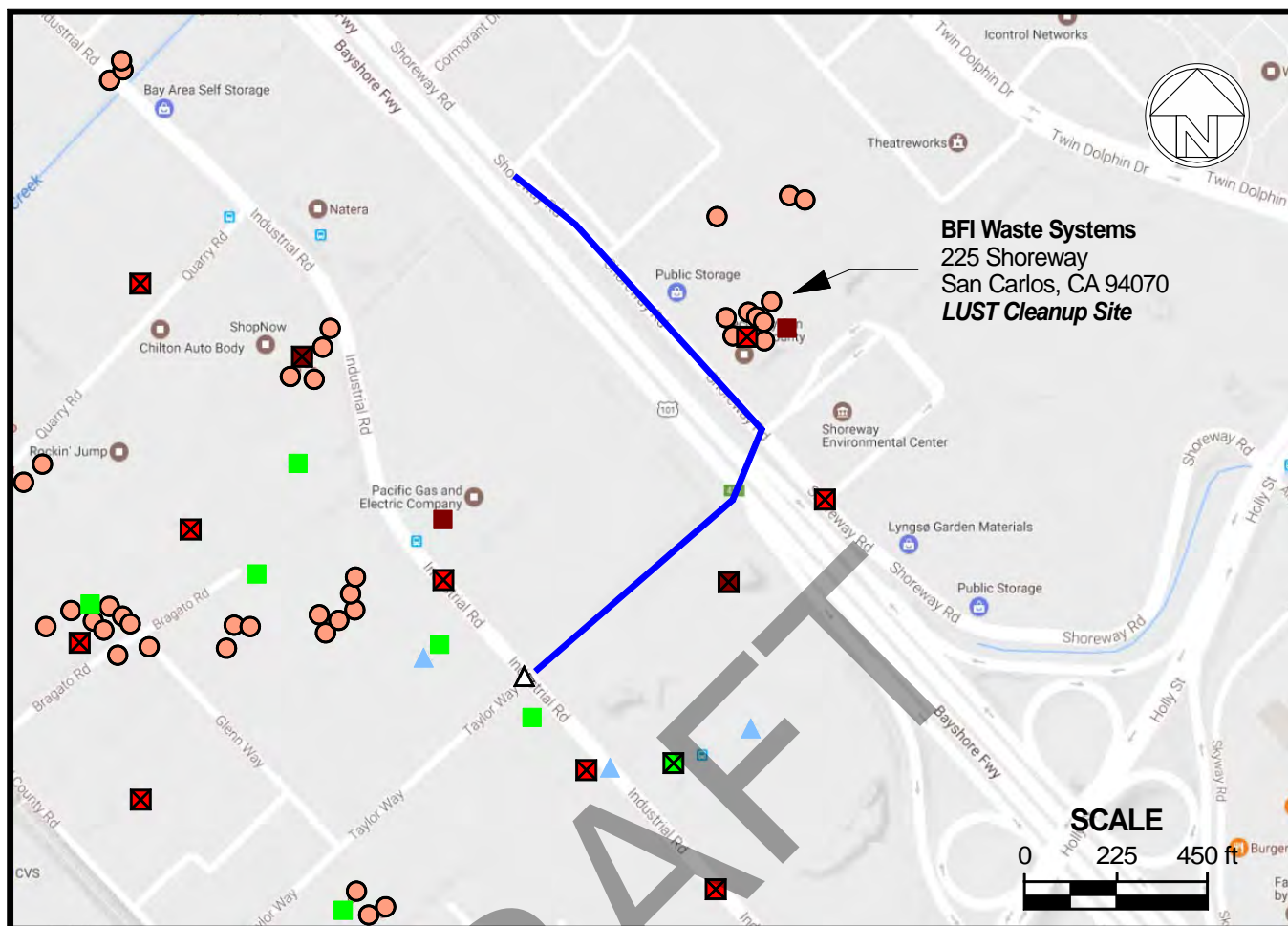
West Yost Associates

Mid-Peninsula Water District
SR 101 Crossing at PAMF
San Carlos, California

Test Boring Profile - SR 101 Crossing at PAMF

Figure

3



Modified from Geotracker (California State Water Resources Control Board, 2017)

LEGEND:

- - Project alignment
- Leaking Underground Storage Tank Cleanup Site
- Permitted Underground Storage Tank Facility
- ▲ Department of Toxic Substances Control Cleanup Site
- ▲ Department of Toxic Substances Control Hazardous Waste Permit Site
- Cleanup Program Site
- X Signifies Closed Site
- Monitoring Well

NOTES:

1. Prior to the operation of the former waste transfer station located to the north, the parcel was a storage yard with two USTs. The cleanup program encountered petroleum impacted soil and groundwater.



File No. 5701.0

October 2017

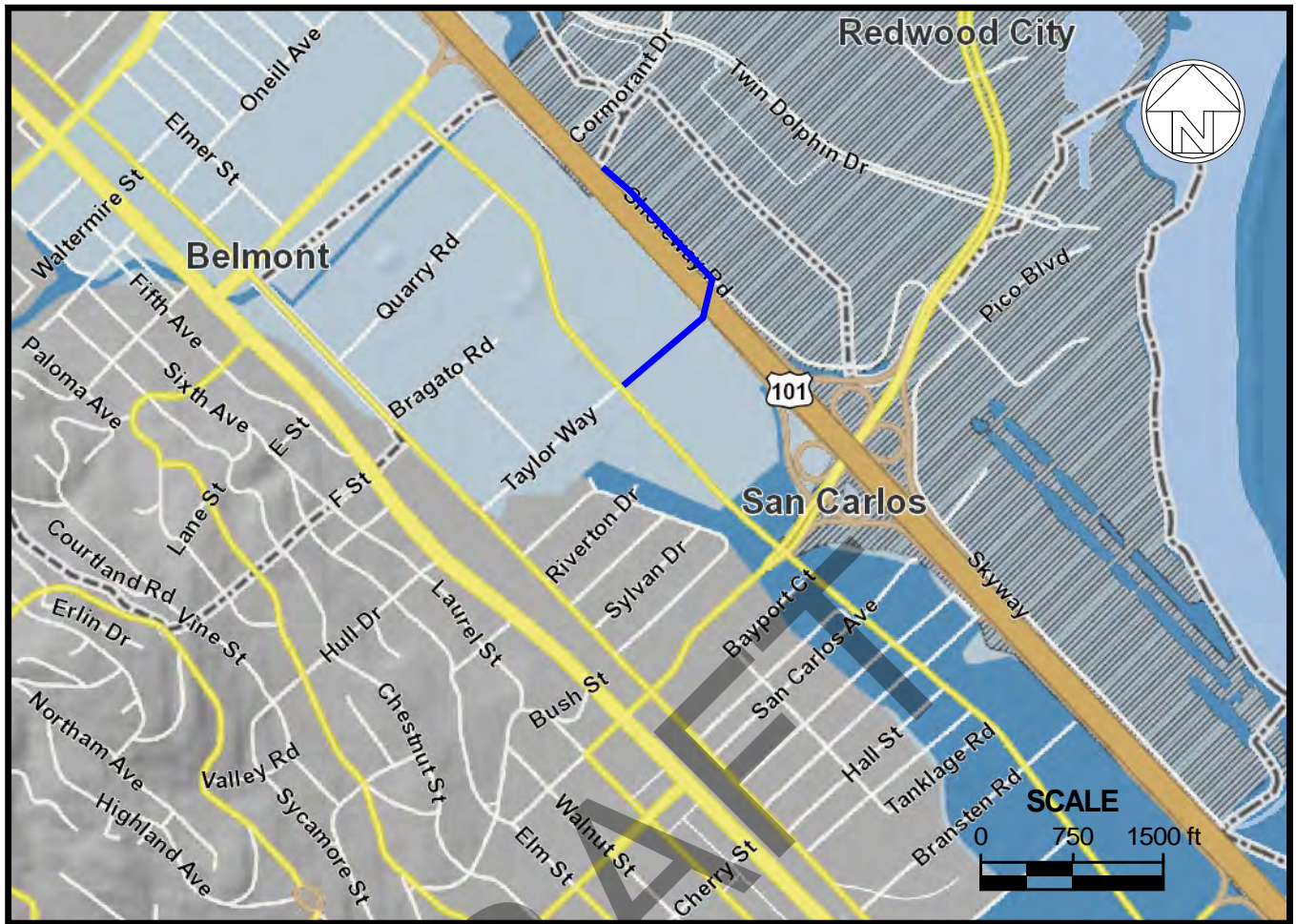
West Yost Associates

Mid-Peninsula Water District
SR 101 Crossing at PAMF
San Carlos, California

Geotracker Map

Figure

4



Map modified from Association of Bay Area Governments (ABAG, 2017)
based on Flood Zones - FEMA Q3 (2003) and DFIRM (2009)

LEGEND:

- - Project alignment
- **ZONE V** - Coastal flood zone inundated by the 1% annual chance flood with velocity hazard (wave action).
- **ZONE A** - Special flood hazard area inundated by the 1% annual chance flood.
- **ZONE X/XL** - An area determined to be outside of the 0.2% annual chance flood; and areas protected by levees from the 0.2% annual chance flood.
- **ZONE X500** - An area inundated by the 0.2% annual chance flood with average flood depths less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from the 1% annual chance flood.



File No. 5701.0

October 2017

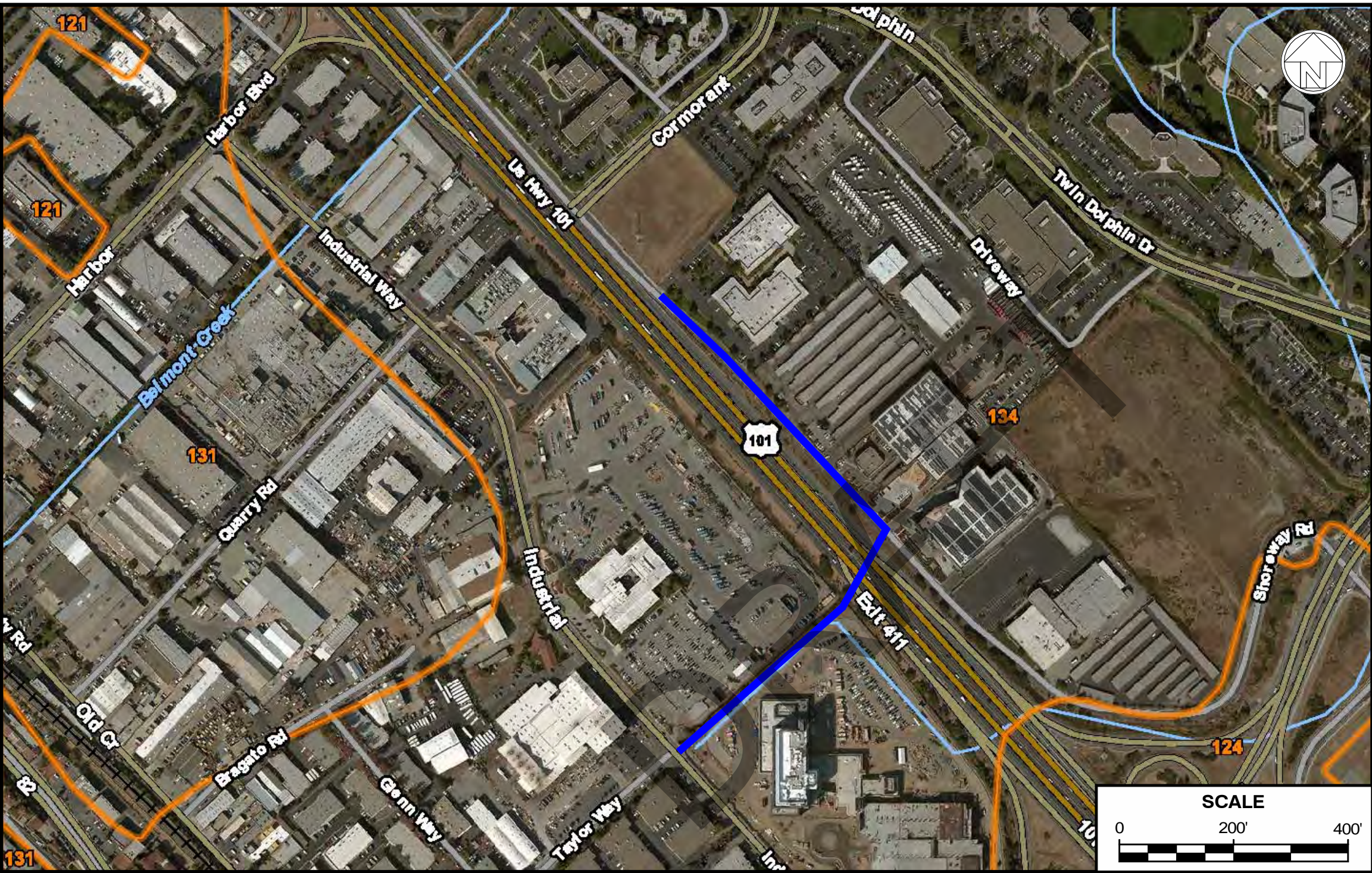
West Yost Associates

Mid-Peninsula Water District
SR 101 Crossing at PAMF
San Carlos, California

Flood Zone Hazard Map

Figure

5



Modified from U.S. Soil/Natural Resources Conservation Service (2017)

LEGEND:

 - Project Alignment

| Mapped Soil | | Below Ground Depth (in) | USCS Group Symbol | % Passing Sieve: | | Atterberg Limits | | High Water Table (ft) | Risk of Corrosion | |
|-------------|--|-------------------------|-------------------|------------------|---------|------------------|------------------|-----------------------|-------------------|----------|
| ID | Name | | | No. 4 | No. 200 | Liquid Limit | Plasticity Index | | Uncoated Steel | Concrete |
| 134 | Urban Land*-Orthents**, reclaimed complex on tidal flats | 0-40 | - | - | - | - | - | 2.5 | High | High |
| | | 40-60 | MH | 100 | 85-95 | 50-70 | 20-30 | | | |

*Urban Land - areas where > 85% of the surface area is covered by man-made features.

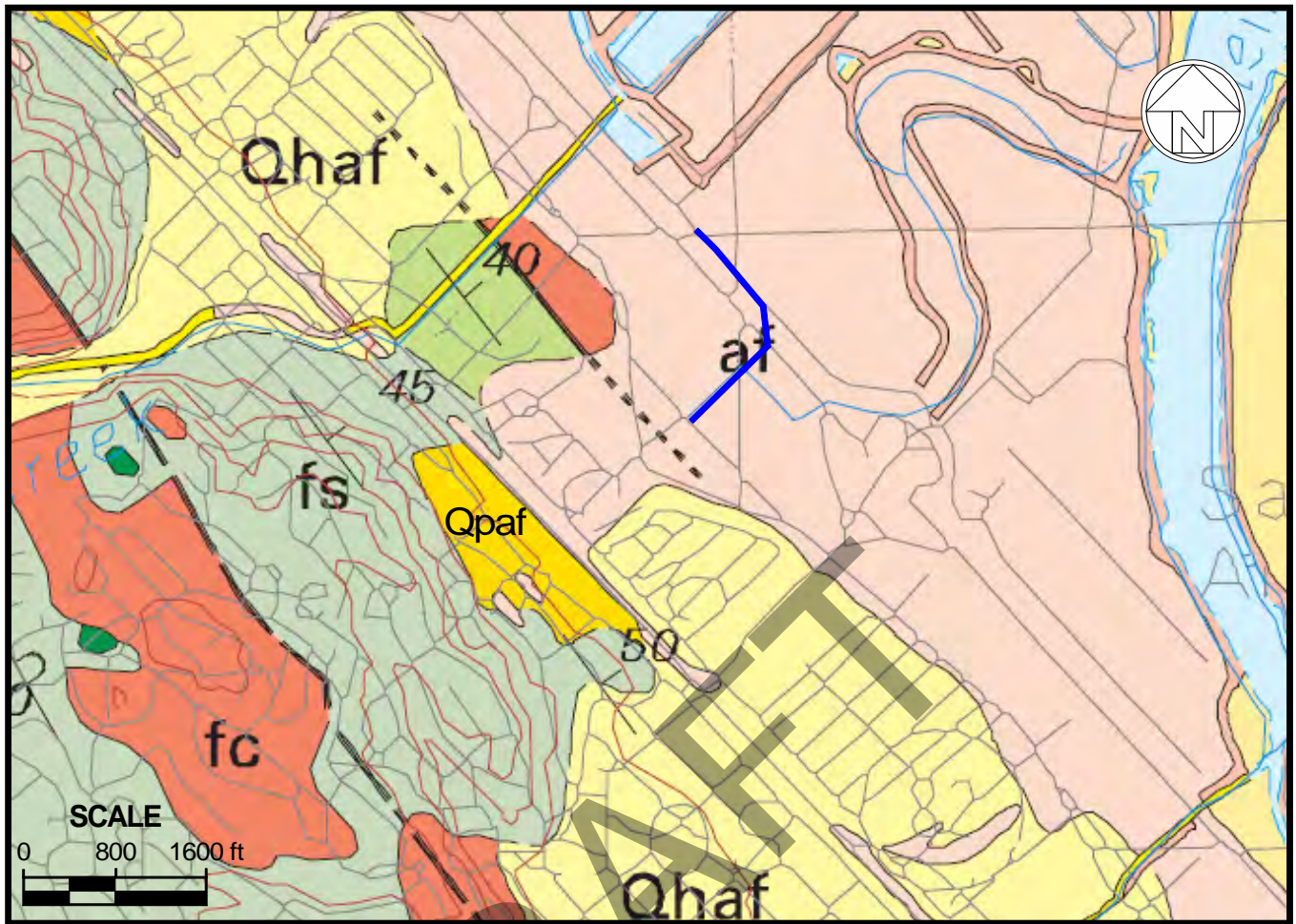
**Orthents - areas of cut and fill, where properties and characteristics are highly variable because of the differences in the kind and amount of fill material.



File No. 57010

October 2017

West Yost Associates
Mid-Peninsula Water District
SR 101 Crossing at PAMF
San Carlos, California
Soil Map



Modified from Brabb, E.E., et al., Geology of the Onshore Part of San Mateo County, California (USGS, OFR 98-137)

LEGEND:

— - Project alignment

af **Artificial Fill** - Sand, silt, clay, rock fragments, organic matter, and man-made debris in various combinations, typically placed on very soft, compressible and organic Young Bay Mud (see Figure 3). Fill made before 1965 is nearly everywhere not compacted and consists simply of dumped materials.

Qhaf **Alluvial Deposit** - Gravely and clayey sand or clayey gravel that fines upward to sandy clay.

fc **Alluvial Deposit** - Gravely sand or sandy gravel that generally grades upward to sandy or silty clay.

fcg **Chert** - Rhythmic banding of thin layers of Chert and Shale cropping out in lenticular bodies.

fs **Conglomerate** - Well-rounded pebbles and cobbles in a graywacke matrix.

Sandstone - fine to coarse grained sandstone interbedded with siltstone and shale

Franciscan
Assemblage



File No. 5701.0

October 2017

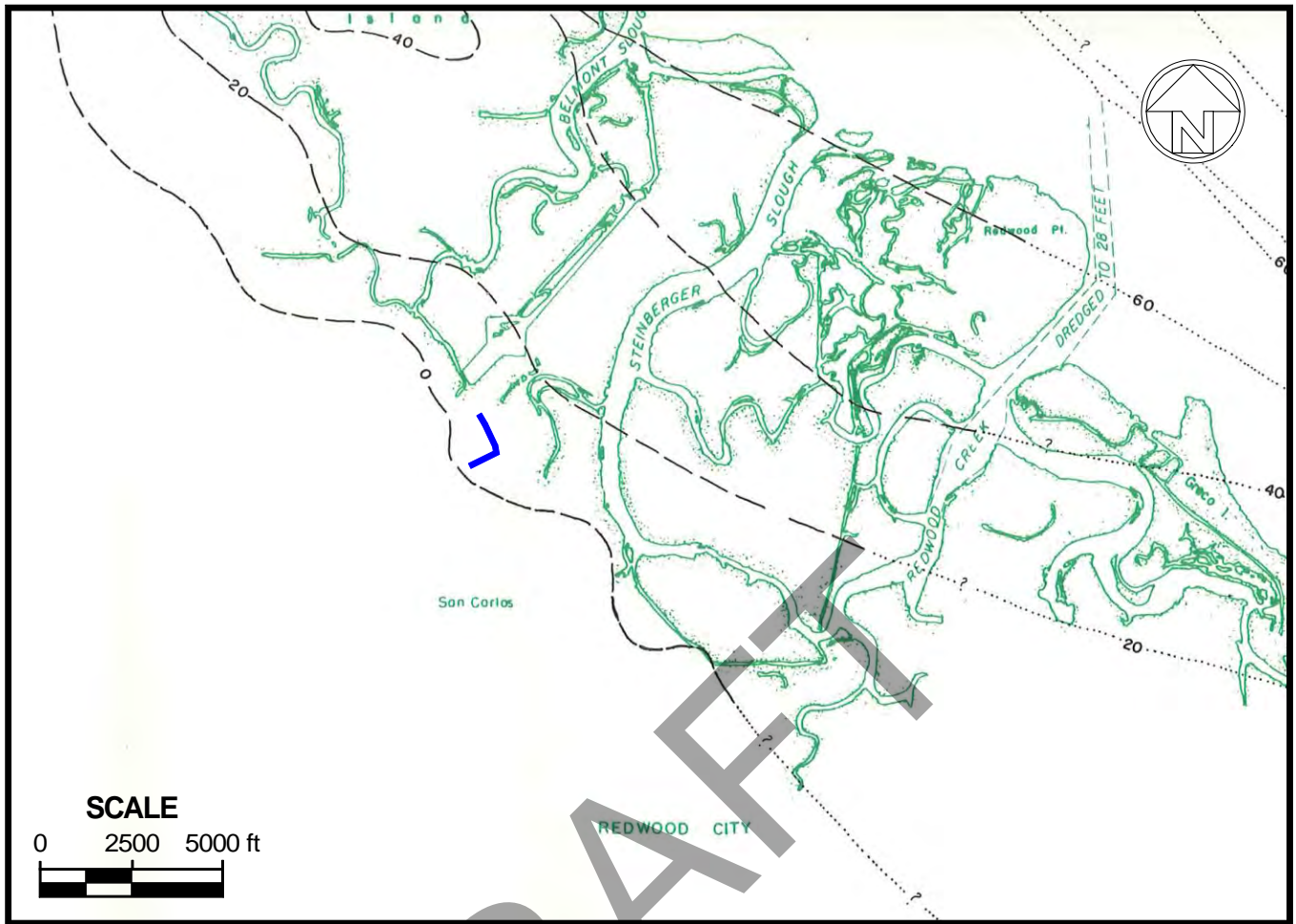
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San Carlos, California

Geology Map

Figure

7



LEGEND:

— - Project alignment

— 20 — - **Young Bay Mud thickness contours** - typically consists of very soft, organic-rich, compressible silts and clays deposited within San Francisco Bay during the last 12,000 years.



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San Carlos, California

Bay Mud Map

Figure

8



Map modified from Association of Bay Area Governments (ABAG, 2017) based on Knudsen & others (2000) and Witter & others (2006)

LEGEND:

— - Project alignment

LIQUEFACTION SUSCEPTIBILITY

- Very High
- High
- Moderate
- Low
- Very Low



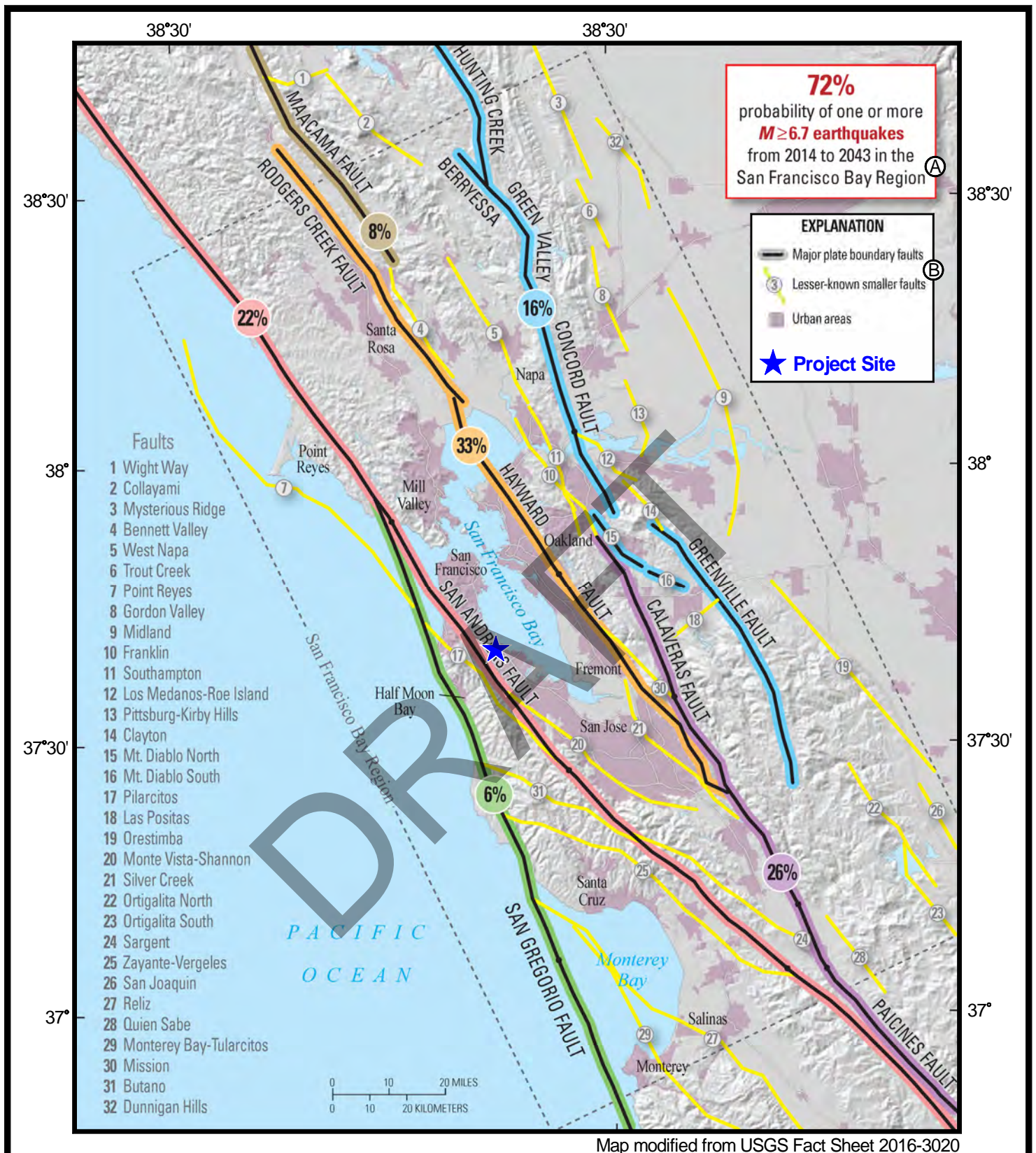
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San Carlos, California

Liquefaction Susceptibility Map

Figure

9



(A) On major plate boundary faults, lesser-known faults, and unknown faults.

(B) The probability that a M > 6.7 earthquake will involve one of the lesser known faults is 13%.



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October 2017

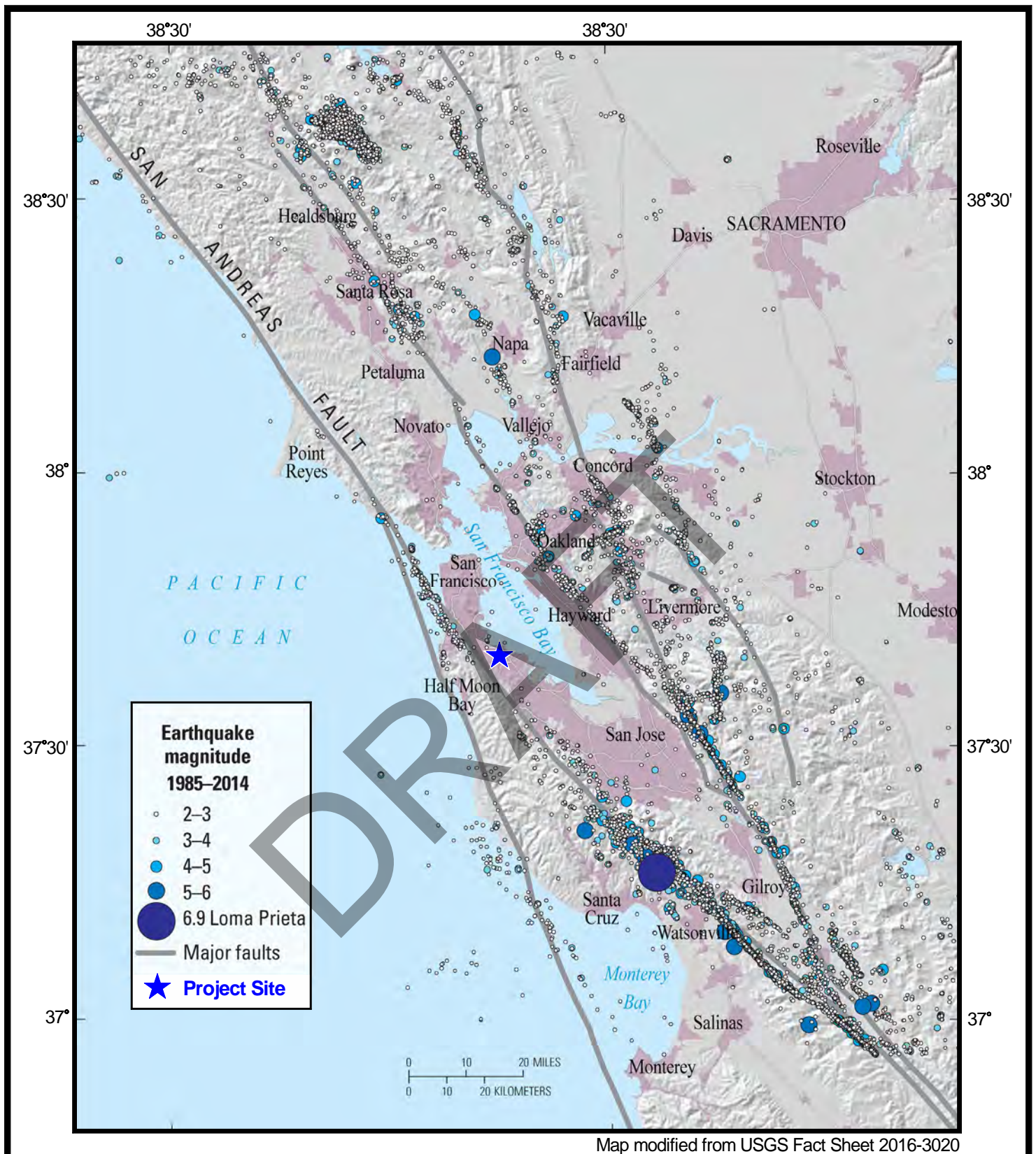
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Bay Area Faults Map

Figure

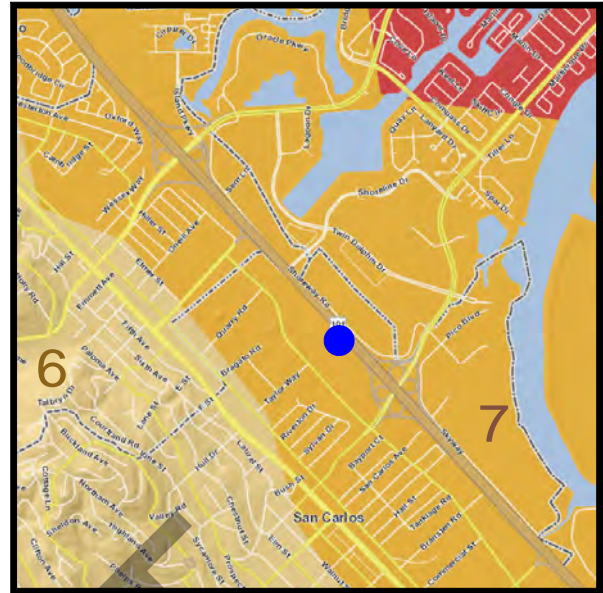
10



EARTHQUAKE SHAKING SCENARIOS



San Andreas Fault (M7.8)



Hayward Fault (M7.0)

Shaking Severity and Intensity



| | |
|--|-----------------------|
| Latitude/Longitude | N 37.516°/ W 122.260° |
| Peak Ground Acceleration: (ASCE 7-10 Figure 22-7) | 0.7 g |

U.S. Seismic Design Maps (2016 CBC, USGS 2017).

NOTES:

1. See Figure 13 for the Modified Mercalli Intensity (MMI).
2. Map modified from the Association of Bay Area Governments (ABAG 2017, last updated 2014)



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Seismic Shaking Map

Figure

12

**AVERAGE PEAK
VELOCITY
(cm/s)**

**MODIFIED MERCALLI
INTENSITY VALUE AND DESCRIPTION**

**AVERAGE PEAK
ACCELERATION
(gravity 9.80 m/s²)**

| | | |
|---------|---|---------------|
| | I. Not felt except by a very few under especially favorable circumstances. | |
| | II. Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing. | |
| | III. Felt quite noticeable indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing vehicles may rock slightly. Vibration like passing of a truck. Duration estimated. | |
| 1 - 2 | IV. During the day felt indoors by many, outdoors by few. At night some awakened. Rattling of dishes, windows, and doors; walls make creaking sounds. Hanging objects swing. Sensation like a heavy truck passing. Standing vehicles rocked noticeably. | 0.015 - 0.02g |
| 2 - 5 | V. Felt by nearly everyone, many awakened. Some dishes, windows and so on broken; cracked plaster in a few places; unstable objects overturned. Disturbances of trees, poles and other tall objects sometimes noticeable. Pendulum clocks may stop. Buildings trembled throughout. | 0.03 - 0.04g |
| 5 - 8 | VI. Felt by all, many frightened and run outdoors. Some moderately heavy furniture moved; a few instances of fallen plaster and damaged chimneys. Trees, bushes, shaken slightly to moderately. Damage slight in poorly constructed buildings. Broken dishes, glassware and some windows. Moved furnishings and overturned furniture. | 0.06 - 0.07g |
| 8 - 12 | VII. Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; chimneys cracked to considerable extent. Noticed by persons driving vehicles. Waves on ponds, lakes, running water. Broke numerous windows, heavy furniture overturned. Dislodged bricks and stones. | 0.10 - 0.15g |
| 20 - 30 | VIII. Damage slight in specially designed structures; considerable in ordinary substantial buildings with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving vehicles disturbed. | 0.25 - 0.30g |
| 45 - 55 | IX. Damage considerable in specially designed structures; well-designed frame structures thrown out-of-plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken. Reservoirs threatened. | 0.50 - 0.55g |
| > 60 | X. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Railroad rails bent. Landslides considerable from river banks and steep slopes. Shifted sand and mud. Water splashed, slopped over banks. Reservoirs greatly damaged. Open cracks in cement pavements and asphalt road surfaces. | > 0.60g |
| | XI. Few, if any, (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly. Dams, dikes, embankments severely damaged. Destroyed large well-built bridges. | |
| | XII. Damage total. Practically all works of construction damaged greatly or destroyed. Landslides, falls of rock, slumping of river banks extensive. Fault slips in firm rock, with notable horizontal vertical off-set displacements. Water channels, surface and underground disturbed and modified greatly. Waves seen on ground surfaces. | |

REFERENCE: "Earthquakes & Volcanoes," Volume 21, Number 1, 1989
"Earthquakes A Primer," Bruce A. Bolt, W.H. Freeman and Company, San Francisco, Copyright 1993.



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Figure







13

File No. 5701.0

October 2017

Modified Mercalli Intensity Scale

KEY TO TEST BORING LOGS IN APPENDIX B

-  Grab sample
 2.5" I.D./3" O.D. Modified California sampler (MCS) with steel liners
 2" I.D./2.5" O.D. Split spoon sampler (SSS)
 1.4" I.D./2" O.D. Standard Penetration Test (ASTM D1586) sampler (SPT)
 Depth of free groundwater first noted seeping into boring during drilling
 Depth of free groundwater measured in boring after drilling

| RELATIVE DENSITY | | CONSISTENCY | | |
|-------------------|--------|-----------------|--------|--------------------------------------|
| SANDS AND GRAVELS | SPT, N | SILTS AND CLAYS | SPT, N | UNCONFINED COMPRESSIVE STRENGTH, tsf |
| VERY LOOSE | 0-4 | VERY SOFT | 0-2 | 0-0.25 |
| LOOSE | 4-10 | SOFT | 2-4 | 0.25-0.50 |
| MEDIUM DENSE | 10-30 | MEDIUM STIFF | 4-8 | 0.50-1.00 |
| DENSE | 30-50 | STIFF | 8-15 | 1.00-2.00 |
| VERY DENSE | 50+ | VERY STIFF | 15-30 | 2.00-4.00 |
| | | HARD | 30+ | >4.00 |

Reference: Terzaghi, K. and Peck, R., SOIL MECHANICS IN ENGINEERING PRACTICE, 2nd ed., John Wiley and Sons, New York, 1967. Page 341 Table 45.1 and pp. 347 Table 45.2.

| CONSTITUENT DESCRIPTIONS | |
|--------------------------|--------------|
| DESCRIPTION | CRITERIA |
| TRACE | less than 5% |
| FEW | 5% to 10% |
| LITTLE | 15% to 25% |
| SOME | 30% to 45% |
| MOSTLY | 50% to 100% |

Reference: ASTM D2488, Note 15

| MOISTURE CONDITION | |
|--------------------|---|
| DESCRIPTION | CRITERIA |
| DRY | Absence of moisture, dusty, dry to the touch |
| MOIST | Damp but no visible water |
| WET | Visible free water, usually soil is below water table |

Reference: ASTM D2488, Table 3 - Criteria for Describing Moisture Condition

| GROUND BEHAVIOR | CLASSIFICATION |
|--|----------------|
| Ground that can be excavated without initial support to shallow depths (typically less than 10 feet) and where shoring can be installed before the ground starts to move. For example, unfissured hard clay when not highly overstressed. | Firm |
| Ground of which chunks or flakes begin to fall off excavation walls. If raveling starts within a few minutes of excavation then it is "fast" raveling; otherwise, it is "slow" raveling. Silts and sands with clay binder may be fast raveling. Stiff fissured clays may be slow or fast raveling depending upon the degree of overstress. | Raveling |
| Ground that squeezes or plastically extrudes into excavations without visible fracturing. Can occur at shallow to medium depth in very soft to medium stiff clay, and can occur in stiff to hard clay under high overstress. | Squeezing |
| Ground consisting of clean dry granular material (e.g., sand and gravel) that moves by gravity to its angle of repose. | Running |
| Ground in a fluid-like condition (e.g., a disturbed mixture of predominantly silt, sand and/or gravel with water), that flows across pressure gradients. | Flowing |
| Ground that expands in volume due to the absorption of water (e.g., clays). | Swelling |

Reference: Modified from Heuer, R.E., 1974, Important ground parameters in soft ground tunneling, Subsurface exploration for underground excavation and heavy construction, New England College, Henniker, New Hampshire, American Society of Civil Engineers, New York, P. 41-55.

NOTES:

- Boring locations are approximate.
- Borings were made with a Mobile B-24 drill rig using 5-inch diameter continuous flight solid stem augers or a Fraste Multidrill XL drill rig using 6-inch diameter tricone bit and rotary wash procedure as indicated in each log.
- Lines separating strata in the logs represent approximate boundaries and are dashed where strata change depth is less certain. Strata change may be gradual. See figures in Appendix C for grain size definitions and nomenclature.
- Penetration Resistance (blows/ft.) are the last 12" of an 18" drive using a 140-pound automatic hammer falling 30 inches per blow unless noted otherwise. The Penetration Resistance values noted on the logs are actual blows per foot of penetration for the respective sampler type (i.e., MCS and SSS sampler penetration resistance blow counts have not been reduced to SPT sampler "N" values).
- Where noted on the logs, slough is defined as material from the bore hole walls which ravel, runs, or flows into and partially fills the bore hole on removal of solid stem augers for sampling. The presence of slough within the bore hole has an effect on blow counts and in such cases the blow counts are not representative of undisturbed in-situ ground. Bore hole sloughing and uncased bore hole behavior in terms of stability is not the same as unshored trench wall behavior. Typically, trench wall instability will occur more readily and at much shallower depths than bore hole instability.



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Boring Log Legend

Figure

A-1

(1 of 2)

KEY TO TEST BORING LOGS IN APPENDIX B (Cont'd)

| CRITERIA FOR ASSIGNING GROUP SYMBOLS AND GROUP NAMES ^A | | | | SOIL CLASSIFICATION | |
|--|--|--|---|---------------------|-----------------------------------|
| | | | | GROUP SYMBOL | GROUP NAME ^B |
| COARSE-GRAINED SOILS More than 50% retained on No. 200 sieve | GRAVELS More than 50% of coarse fraction retained on No. 4 sieve | Clean Gravels < 5% fines ^C | $Cu \geq 4$ and $1 \leq Cc \leq 3$ ^E | GW | Well-graded gravel ^F |
| | | | $Cu < 4$ and/or $1 > Cc > 3$ ^E | GP | Poorly graded gravel ^F |
| | | Gravels with Fines > 12% fines ^C | Fines classify as ML or MH | GM | Silty gravel ^{F,G,H} |
| | | | Fines classify as CL or CH | GC | Clayey gravel ^{F,G,H} |
| | SANDS 50% or more of coarse fraction passes No. 4 sieve | Clean Sands < 5% fines ^D | $Cu \geq 6$ and $1 \leq Cc \leq 3$ ^E | SW | Well-graded sand ^I |
| | | | $Cu < 6$ and/or $1 > Cc > 3$ ^E | SP | Poorly graded sand ^I |
| | | Sands with Fines > 12% fines ^D | Fines classify as ML or MH | SM | Silty sand ^{G,H,I} |
| | | | Fines classify as CL or CH | SC | Clayey sand ^{G,H,I} |
| FINE-GRAINED SOILS 50% or more passes the No. 200 sieve | SILTS AND CLAYS Liquid limit ≤ 50 | Inorganic | PI > 7 plots on or above "A" line ^J | CL | Lean clay ^{K,L,M} |
| | | | PI < 4 plots below "A" line ^J | ML | Silt ^{K,L,M} |
| | | Organic | $\frac{\text{Liquid limit-oven dried}}{\text{Liquid limit-not dried}} < 0.75$ | OL | Organic Clay ^{K,L,M,N} |
| | | | | | Organic Silt ^{K,L,M,O} |
| | SILTS AND CLAYS Liquid limit > 50 | Inorganic | PI plots on or above "A" line | CH | Fat clay ^{K,L,M} |
| | | | PI plots below "A" line | MH | Elastic silt ^{K,L,M} |
| | | Organic | $\frac{\text{Liquid limit-oven dried}}{\text{Liquid limit-not dried}} < 0.75$ | OH | Organic Clay ^{K,L,M,P} |
| | | | | | Organic Silt ^{K,L,M,Q} |
| HIGHLY ORGANIC SOILS | | Primarily organic matter, dark color and organic odor | PT | Peat | |

NOTES:

- A** Based on the material passing the 3-in. (75mm) sieve.
- B** If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.*
- C** Gravels with 5% to 12% fines require dual symbols:
GW-GM well-graded gravel with silt
GW-GC well-graded gravel with clay
GP-GM poorly graded gravel with silt
GP-GC poorly graded gravel with clay
- D** Sands with 5% to 12% fines require dual symbols:
SW-SM well-graded sand with silt
SW-SC well-graded sand with clay
SP-SM poorly graded sand with silt
SP-SC poorly graded sand with clay
- E** $Cu = \frac{D_{60}}{D_{10}}$ $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
- F** If soil contains $\geq 15\%$ sand, add "with sand" to group name.
- G** If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.
- H** If fines are organic, add "with organic fines" to group name.
- I** If soil contains $\geq 15\%$ gravel, add "with gravel" to group name.
- J** If Atterberg limits plot in hatched area, soil is a CL-ML (silty clay).
- K** If soil contains 15% to 29% plus No. 200, add "with sand" or "with gravel", whichever is predominant.
- L** If soil contains $\geq 30\%$ plus No. 200, predominantly sand, add "sandy" to group name.
- M** If soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.
- N** PI ≥ 4 and plots on or above "A" line.
- O** PI < 4 or plots below "A" line.
- P** PI plots on or above "A" line.
- Q** PI plots below "A" line.

| PLASTICITY | | | |
|------------------|------------|--------------|----------------------------------|
| Term | PI | Dry Strength | Field Test |
| Nonplastic | 0-3 | Very low | Falls apart easily |
| Slightly plastic | 3-15 | Slight | Easily crushed with fingers |
| Medium plastic | 15-30 | Medium | Difficult to crush |
| Highly plastic | 30 or more | High | Impossible to crush with fingers |

Reference: Sowers, George F., Introductory Soil Mechanics and Foundations: Geotechnical Engineering, 4th ed., Macmillan Publishing Co., Inc., New York, 1979, Page 83 Table 2:10.

*See figures in Appendix C for grain size definitions and nomenclature. The largest particle that could have been sampled from the test borings is a function of the diameter of the boring, drill bit, and sampler. Intact cobble- and boulder-size particles, if any, are too large to have been able to retrieve from the test borings. Therefore, there may have been larger particles (e.g., cobble- and boulder-size) in the soils than were observed in samples and drill cuttings from the borings. Consequently, cobbles logged in the test borings, if any are also inferred from the drill-rig behavior during drilling and from observations of freshly-broken gravel-size particles in samples and cuttings.



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SR 101 Crossing at PAMF
San Carlos, California

Boring Log Legend

Figure

A-1

(2 of 2)

| DEPTH feet | SAMPLE NO. | TYPE | PENETRATION RESISTANCE blows/ft. | GROUNDWATER ③ | LOG OF BORING B-1 ^① | | MOISTURE % | DRY DENSITY lbs./ft. ³ | LIQUID LIMIT | PLASTICITY INDEX | GRAIN SIZE | | | UNCONFINED COMPRESSION STRENGTH kips/ft. ² | DIRECT SHEAR | |
|---------------|------------|------|--|------------------|--|--|---------------|--------------------------------------|--------------|------------------|----------------------------|---------------------------------|-----------------------------|--|--------------------|----------------------------|
| | | | | | LOCATION: 100' northeast of Industrial Rd & Taylor Wy 15' southeast of fenceline at 301 Industrial Rd (see Figure 1) | DESCRIPTION ② | | | | | Gravel % (>#4 sieve) | Sand % (#4 to #200 sieve) | Fines % (<#200 sieve) | | Cohesion p.s.f. | Internal Friction Angle |
| | | | | | | Landscaping Top Soil | | | | | | | | | | |
| 1 | | ⊗ | | | | CLAYEY SAND WITH GRAVEL (SC) - FILL - dark brown - dry - few silt | | | | | | | | | | |
| 2 | | ■ | 31 | | | SILTY CLAYEY SAND WITH GRAVEL (SM/SC) - FILL - brown - dry - little silt - gravel to at least 2" dimension - medium dense | 13 | | | | 17 | 48 | 35 | | | |
| 3 | | ■ | 15 | | | | | | | | | | | | | |
| 5 | | | | | | SILTY FAT CLAY WITH SAND (CH/MH) - YOUNG BAY MUD - dark gray - few organics - highly plastic - very soft - moist | | | | | | | | | | |
| 4 | | ■ | 4 | | | | 75 | 55 | | | | | | 1.0 | | |
| 10 | | ■ | 3 | | | SILTY FAT ORGANIC CLAY WITH SAND (CH/MH/OH) - YOUNG BAY MUD - dark gray with black mottling - highly plastic - very soft - moist to wet - sulfurous odor | | | | | | | | | | |
| 6 | | ■ | 2 | | | | | | | | | | | | | |
| 15 | | | | | | SANDY LEAN CLAY (CL) - gray - trace silt - medium plastic - medium stiff to stiff - wet | | | | | | | | | | |
| 7 | | ■ | 13 | | | | | | | | | | | | | |
| 8 | | ■ | 7 | | | | | | | | | | | | | |
| 9 | | ■ | 9 | | | | | | | | | | | | | |
| 20 | | | | | | BOTTOM OF BORING AT 20 FEET | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | | | |

NOTES

- ① Drilled 8/28/2017, using a Mobile B-24 with 5" diameter solid stem augers. See notes in Figure A-1, Appendix A.
 ② See report text and figures in Appendices A and C for definitions, lab test results, and additional soil descriptions.
 ③ Free groundwater was encountered during drilling at a depth of 15' and measured at 12' prior to boring backfilling on 8/28/2017.



File No. 5701.0

October 2017

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 SR 101 Crossing at PAMF
 San Carlos, California

Log of Boring B-1

Figure

B-1

| DEPTH feet | SAMPLE NO. | TYPE | PENETRATION RESISTANCE blows/ft. | GROUNDWATER ③ | LOG OF BORING B-2W ① | MOISTURE % | DRY DENSITY lbs./ft. ³ | LIQUID LIMIT | PLASTICITY INDEX | GRAIN SIZE | | | UNCONFINED COMPRESSION STRENGTH kips/ft. ² | DIRECT SHEAR | |
|---------------|------------|------|--|------------------|--|---------------|--------------------------------------|--------------|------------------|--------------------------|-------------------------------|---------------------------|--|--------------------|----------------------------|
| | | | | | LOCATION: 730' northeast of Industrial Rd & Taylor Wy 30' southeast of fenceline at 301 Industrial Rd (see Figure 1) | | | | | Gravel >#4 sieve % | Sand #4 to #200 sieve % | Fines <#200 sieve % | | Cohesion p.s.f. | Internal Friction Angle |
| | | | | | Landscaping Top Soil | | | | | | | | | | |
| 1 | | X | | | SANDY LEAN TO FAT CLAY WITH GRAVEL (CL/CH) - FILL - dark brown - few silt, organics - medium plastic - dry | | | | | | | | | | |
| 2 | | | 31 | | CLAYEY SANDY GRAVEL (GC) - FILL - brown - medium dense - moist - gravel to at least 1.5" dimension | | | | | | | | | | |
| 5 | | | 15 | | | | | | | | | | | | |
| 3 | | | | | SILTY FAT CLAY (CH/MH) - YOUNG BAY MUD - black and dark gray - few organics - trace sand - highly plastic - very soft - wet | | | | | | | | | | |
| 4 | | X | | | | | | | | | | | | | |
| 10 | | | 0 | | ELASTIC SILT WITH SAND (MH) and FAT ORGANIC CLAY WITH SAND (CH/OH) - YOUNG BAY MUD - dark gray with black motling - little organics - highly plastic - very soft - wet - sulfurous odor | 107 | 42 | | | | | | | 200 | 13° |
| 5 | | | 0 | | | | | | | | | | | | |
| 6 | | | 0 | | | | | 98 | 52 | | | | | | |
| 7 | | | 0 | | | 92 | 48 | | | | | | 0.9 | | |
| 15 | | | 0 | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | 17 | 83 | | |
| 9 | | | 15 | | SILTY FAT CLAY (CH/MH) - dark gray - stiff - highly plastic - wet - few thin sand lenses | 21 | 107 | | | | | | 2.5 | | |
| 10 | | | 10 | | | | | | | | | | | | |
| 11 | | | 32 | | SILTY CLAYEY SAND (SM/SC) - light brown - trace gravel - medium dense - wet | 15 | 120 | | | | 3 | 52 | 45 | 7.1 | |
| 20 | | | | | | | | | | | | | | | |
| 12 | | | 15 | | LEAN CLAY (CL) - light brown - few silt and sand - stiff - medium plastic - wet | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| 25 | | | 7 | | LEAN CLAY WITH SAND (CL) - gray and light brown with few black flecks - few silt - medium stiff - medium plastic - wet | 33 | 89 | | | | | | 2.0 | | |
| 13 | | | | | | | | | | | | | | | |
| 14 | | | 6 | | | | | | | | | | | | |
| | | | | | BORING CONTINUES AT 28 FEET ON FIGURE B-2W (2 of 2) | | | | | | | | | | |

NOTES

- ① Drilled 8/24/2017, using a Fraste Multidrill XL with a 6" diameter tricone bit and rotary wash method. See notes in Figure A-1, Appendix A.
- ② See report text and figures in Appendices A and C for definitions, lab test results, and additional soil descriptions.
- ③ Completed as a 40' deep groundwater level monitoring well. See text of report for well construction details.
- ④ Free groundwater was encountered during drilling at a depth of 5.5' and measured at 5' on 8/28/3017.



File No. 5701.0

October 2017

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SR 101 Crossing at PAMF
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Log of Boring B-2W

Figure

B-2W

(1 of 2)

| DEPTH feet | SAMPLE NO. | TYPE | PENETRATION RESISTANCE blows/ft. | GROUNDWATER | LOG OF BORING B-2W ^① | MOISTURE % | DRY DENSITY lbs./ft. ³ | LIQUID LIMIT | PLASTICITY INDEX | GRAIN SIZE | | | UNCONFINED COMPRESSIVE STRENGTH kips/ft. ² | DIRECT SHEAR | |
|---------------|------------|------|--|-------------|--|---------------|--------------------------------------|--------------|------------------|----------------------------|---------------------------------|-----------------------------|--|--------------------|----------------------------|
| | | | | | DESCRIPTION | | | | | Gravel % (>#4 sieve) | Sand % (#4 to #200 sieve) | Fines % (<#200 sieve) | | Cohesion p.s.f. | Internal Friction Angle |
| 14 | | | 6 | | BORING CONTINUED FROM 28 FEET ON FIGURE B-2W (1 of 2) | | | | | | | | | | |
| | | | | | LEAN CLAY (CL) - gray and light brown with few black flecks - few silt and sand - medium stiff - medium plastic - wet | | | | | | | | | | |
| 30 | | | | | | | | | | | | | | | |
| 15 | | | 16 | | FAT CLAY WITH SAND (CH) - dark gray - little silt - trace gravel and organics - medium stiff - highly plastic - wet | 32 | 91 | | | | | | | | |
| 16 | | | 6 | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | | | |
| 17 | | | 48 | | | 18 | 116 | | | | | | | | |
| 18 | | | 22 | | | | | | | | | | | | |
| 40 | | | | | SILTY SAND (SM) - gray - few clay - medium dense - rapid dilatancy - wet | | | | | | | | | | |
| | | | | | BOTTOM OF BORING AT 40 FEET | | | | | | | | | | |
| 45 | | | | | | | | | | | | | | | |
| 50 | | | | | | | | | | | | | | | |
| 55 | | | | | | | | | | | | | | | |

NOTES

① See notes on Figure B-2W (1 of 2)



File No. 5701.0

October 2017

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SR 101 Crossing at PAMF
San Carlos, California

Log of Boring B-2W

Figure

B-2W

(2 of 2)

| DEPTH feet | SAMPLE NO. | TYPE | PENETRATION RESISTANCE blows/ft. | GROUNDWATER ③ | LOG OF BORING B-3 ^① | | MOISTURE % | DRY DENSITY lbs./ft. ³ | LIQUID LIMIT | PLASTICITY INDEX | GRAIN SIZE | | | UNCONFINED COMPRESSIVE STRENGTH kips/ft. ² | DIRECT SHEAR | |
|---------------|------------|------|--|------------------|---|----|---------------|--------------------------------------|--------------|------------------|----------------------------|---------------------------------|-----------------------------|--|--------------------|----------------------------|
| | | | | | LOCATION: 5' northeast of SR 101 north fenceline 110' southeast of 333 Shoreway Rd north entrance (see Figure 1) | | | | | | Gravel % (>#4 sieve) | Sand % (#4 to #200 sieve) | Fines % (<#200 sieve) | | Cohesion p.s.f. | Internal Friction Angle |
| | | | | | DESCRIPTION ② | | | | | | | | | | | |
| | | | | | Shoreway Rd: 12 inches asphaltic concrete 12 inches aggregate base rock (GM) | | | | | | | | | | | |
| | | | | | SANDY LEAN TO FAT CLAY WITH GRAVEL (CL/CH) - FILL - brown - medium plastic - little silt - moist | | | | | | | | | | | |
| 1 2 | | | | | ELASTIC SILT (MH) and FAT CLAY (CH) - YOUNG BAY MUD - black and dark gray - highly plastic - few organics - very soft - trace sand - moist to wet | | | | | | | | | | | |
| 3 | | | | | | | | | 75 | 36 | | | | | | |
| 4 | | | 2 | | SILTY FAT ORGANIC CLAY WITH SAND (CH/MH/OH) - YOUNG BAY MUD - dark gray with black mottling - wet - highly plastic - sulfurous to petroliferous odor - very soft | 94 | 47 | | | | | | | 0.5 | | |
| 5 | | | 2 | | - silty sand lense to at least 3" thick | | | | | | | 24 | 76 | | | |
| 6 | | | 2 | | - silty sand lense to at least 3" thick | | | | | | | FINES 18% Silt 58% Clay | | | | |
| 7 | | | 20 | | SANDY SILTY LEAN CLAY (CL/ML) - brown - stiff - trace gravel - wet - medium plastic | 18 | 111 | | | | | 4 | 39 | 57 | 1175 | 18° |
| 8 | | | 9 | | SANDY SILTY LEAN CLAY (CL/ML) - brown - medium stiff to stiff - medium plastic - moist | | | | | | | FINES 29% Silt 28% Clay | | | | |
| 9 | | | 8 | | | | | | | | | 41 | 59 | | | |
| 10 | | | 14 | | LEAN CLAY (CL) - light brown - stiff to medium stiff - little silt - wet - medium plastic | 30 | 93 | | | | | | | 3.5 | | |
| 11 | | | 6 | | LEAN CLAY WITH SAND (CL) - light brown - medium stiff - little silt - wet - medium plastic | | | | | | | | | | | |
| | | | | | BORING CONTINUES AT 28 FEET ON FIGURE B-3 (2 of 2) | | | | | | | | | | | |

NOTES

- ① Drilled 8/28/2017, using a Mobile B-24 with 5" diameter solid stem augers. See notes in Figure A-1, Appendix A.
- ② See report text and figures in Appendices A and C for definitions, lab test results, and additional soil descriptions.
- ③ Free groundwater was encountered during drilling at a depth of 15.5' and measured at 5' prior to boring backfilling on 8/28/2017.



File No. 5701.0

October 2017

West Yost Associates

Mid-Peninsula Water District
SR 101 Crossing at PAMF
San Carlos, California

Log of Boring B-3

Figure

B-3

(1 of 2)

| DEPTH feet | SAMPLE NO. | TYPE | PENETRATION RESISTANCE blows/ft. | GROUNDWATER | LOG OF BORING B-3 ① | MOISTURE % | DRY DENSITY lbs./ft. ³ | LIQUID LIMIT | PLASTICITY INDEX | GRAIN SIZE | | | UNCONFINED COMPRESSIVE STRENGTH kips/ft. ² | DIRECT SHEAR | |
|---------------|------------|------|--|-------------|---|---------------|--------------------------------------|--------------|------------------|----------------------------|---------------------------------|-----------------------------|--|--------------------|----------------------------|
| | | | | | DESCRIPTION | | | | | Gravel % (>#4 sieve) | Sand % (#4 to #200 sieve) | Fines % (<#200 sieve) | | Cohesion p.s.f. | Internal Friction Angle |
| 11 | | | 6 | | BORING CONTINUED FROM 28 FEET ON FIGURE B-3 (1 of 2) LEAN CLAY WITH SAND (CL) - light brown - medium stiff - little silt - wet - medium plastic | | | | | | | | | | |
| 12 | | | 5 | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | | | |
| 35 | | | | | FAT CLAY WITH SAND (CH) - dark gray - stiff - little silt - highly plastic - trace gravel - wet | 25 | 102 | | | | | | | | |
| 13 | | | 15 | | | | | | | | | | | | |
| 14 | | | 13 | | | | | | | | | | | | |
| 15 | | | 8 | | - silty sand lense to at least 3" thick | | | | | | | | | | |
| 40 | | | | | BOTTOM OF BORING AT 40 FEET | | | | | | | | | | |
| 45 | | | | | | | | | | | | | | | |
| 50 | | | | | | | | | | | | | | | |
| 55 | | | | | | | | | | | | | | | |

NOTES

① See notes on Figure B-3 (1 of 2)



File No. 5701.0

October 2017

West Yost Associates

Mid-Peninsula Water District
SR 101 Crossing at PAMF
San Carlos, California

Log of Boring B-3

Figure

B-3

(2 of 2)

| DEPTH feet | SAMPLE NO. | TYPE | PENETRATION RESISTANCE blows/ft. | GROUNDWATER ③ | LOG OF BORING B-4 ^① | | MOISTURE % | DRY DENSITY lbs./ft. ³ | LIQUID LIMIT | PLASTICITY INDEX | GRAIN SIZE | | | UNCONFINED COMPRESSIVE STRENGTH kips/ft. ² | DIRECT SHEAR | |
|---------------|------------|------|--|------------------|---|--|---------------|--------------------------------------|--------------|------------------|----------------------------|---------------------------------|-----------------------------|--|--------------------|----------------------------|
| | | | | | LOCATION: 30' northeast of SR 101 north fenceline 85' southeast of 125 Shoreway Rd south entrance (see Figure 1) | | | | | | Gravel (>#4 sieve) % | Sand (#4 to #200 sieve) % | Fines (<#200 sieve) % | | Cohesion p.s.f. | Internal Friction Angle |
| | | | | | DESCRIPTION ② | | | | | | | | | | | |
| | | | | | Shoreway Rd: 12 inches asphaltic concrete 12 inches aggregate base rock (GM) | | | | | | | | | | | |
| | | | | | CLAYEY SANDY GRAVEL (GC) - FILL - brown - moist - little silt | | | | | | | | | | | |
| 1 | | X | | | SILTY FAT CLAY (CL/CH) - YOUNG BAY MUD - dark gray - very soft - few sand and organics - moist - highly plastic | | 73 | 55 | | | | | 0.9 | | | |
| 5 | | | 3 | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | |
| 3 | | | 2 | | ELASTIC SILT WITH SAND (MH) and FAT ORGANIC CLAY WITH SAND (CH/OH) - YOUNG BAY MUD - dark gray with black mottling - moist to wet - highly plastic - sulfurous odor - very soft | | | | 148 | 65 | | | | | | |
| 10 | | | | | | | | | | | | | | | | |
| 4 | | | 3 | | | | 177 | 28 | | | | | 1.0 | | | |
| 5 | | | 1 | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | | | |
| 6 | | | 25 | | SANDY LEAN CLAY (CL) - gray - medium plastic - little silt - very stiff - few gravel - wet | | 18 | 115 | | | | | | | | |
| 7 | | | 17 | | | | | | | | | | | | | |
| 20 | | | | | CLAYEY SANDY GRAVEL (GC) - brown - medium dense - little silt - wet | | | | | | | | | | | |
| | | | | | BOTTOM OF BORING AT 20 FEET | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | | | |

NOTES

- ① Drilled 8/28/2017, using a Mobile B-24 with 5" diameter solid stem augers. See notes in Figure A-1, Appendix A.
 ② See report text and figures in Appendices A and C for definitions, lab test results, and additional soil descriptions.
 ③ Free groundwater was encountered during drilling at a depth of 15' and measured at 12' prior to boring backfilling on 8/28/2017.



File No. 5701.0

October 2017

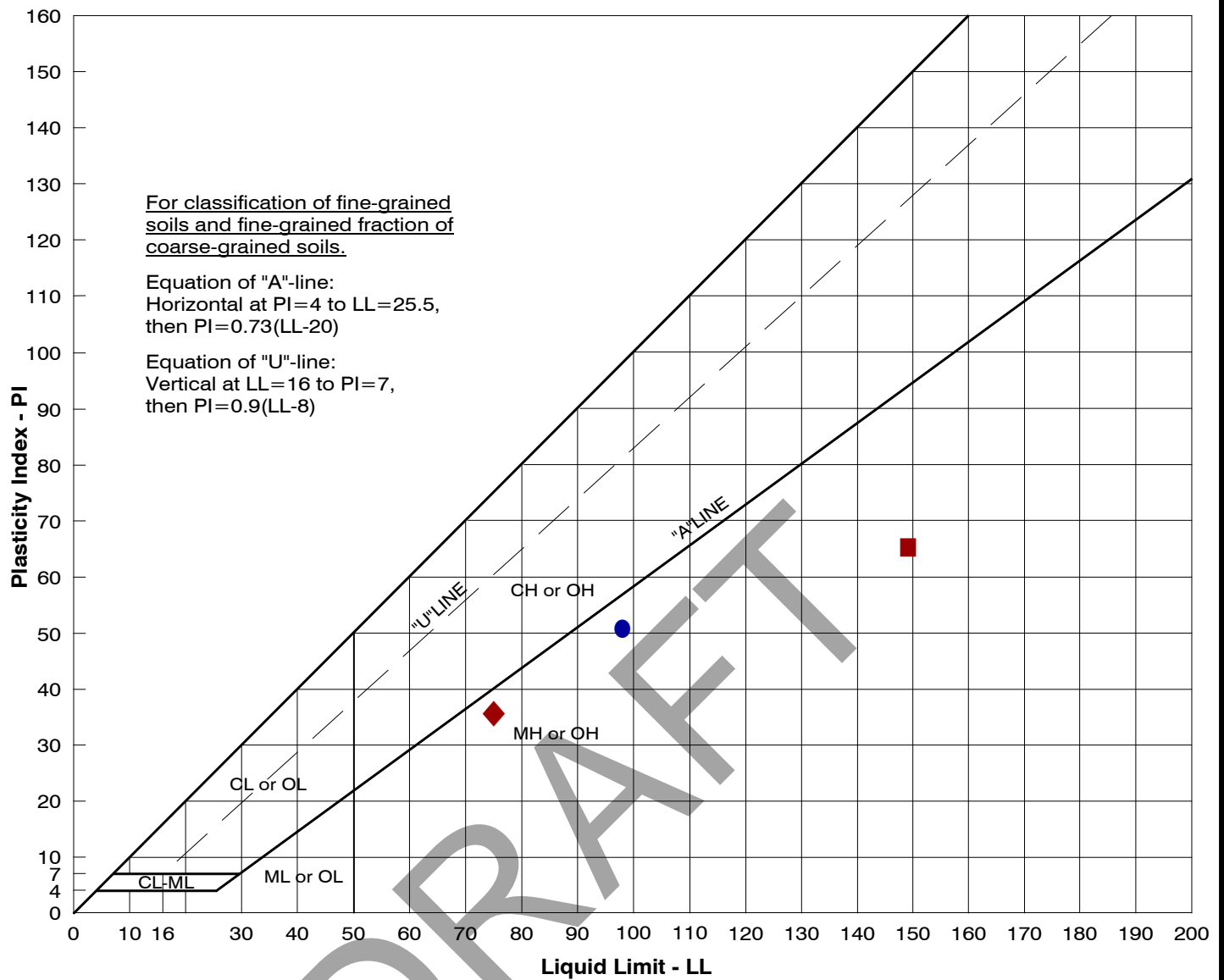
West Yost Associates

Mid-Peninsula Water District
 SR 101 Crossing at PAMF
 San Carlos, California

Log of Boring B-4

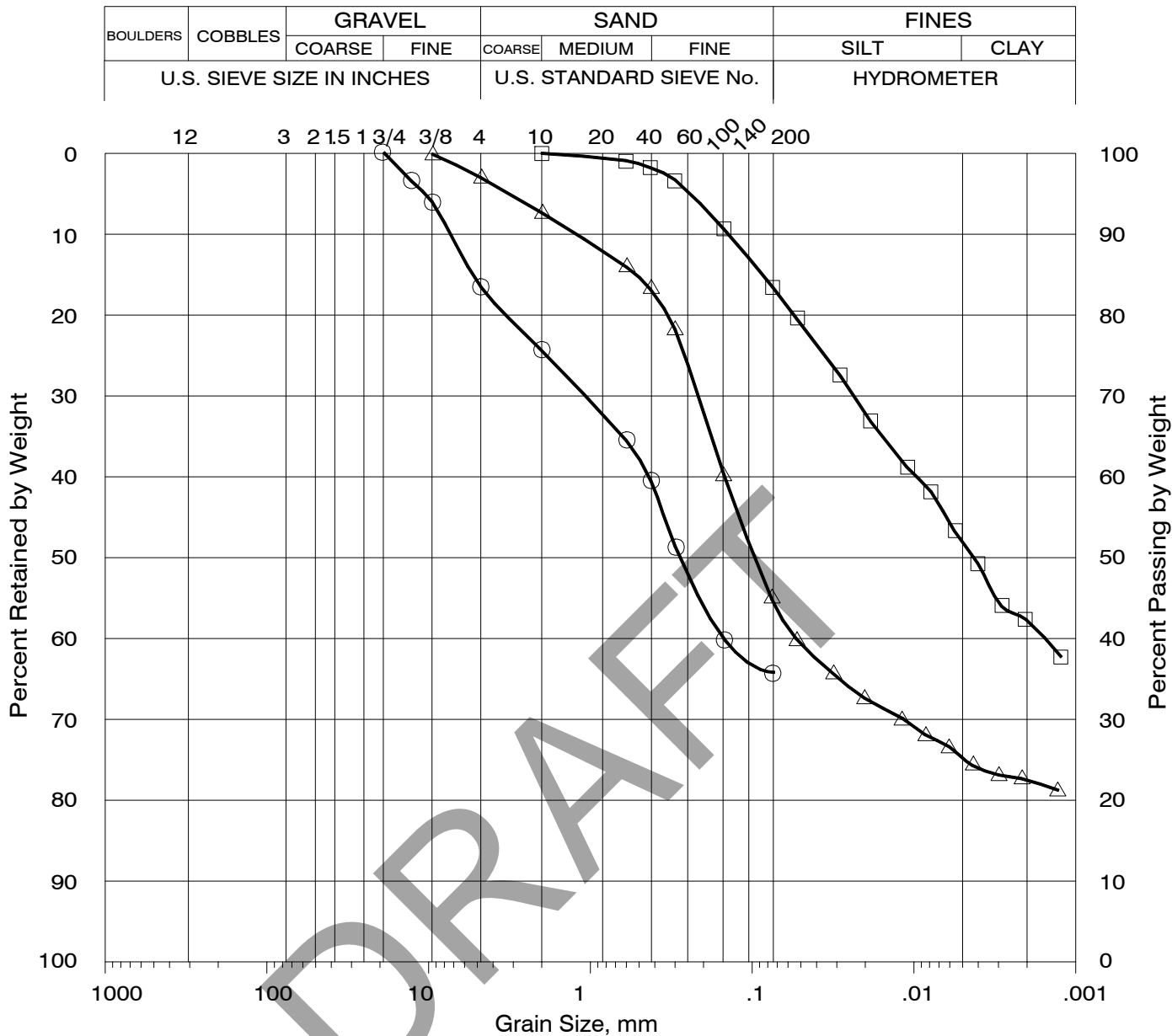
Figure

B-4



| TEST SYMBOL | SAMPLE NO. | DEPTH (ft) | LIQUID LIMIT - LL | PLASTICITY INDEX - PI | USCS GROUP SYMBOL* |
|-------------|------------|------------|-------------------|-----------------------|--------------------|
| ● | B-2W-6 | 11½-13 | 98 | 52 | MH |
| ◆ | B-3-3 | 7-7½ | 75 | 36 | MH |
| ■ | B-4-3 | 7-8 | 148 | 65 | MH |

* Classification of fines < 0.425mm



NOTE: The largest particle (grain) size that could have been sampled from our borings by our sample barrels is a function of the inside diameter of the sample barrels used (see Figure A-1). Therefore, there may be larger particles (e.g., coarse gravel, cobbles or boulders) in the soils sampled than reflected on the boring logs and grain size distribution curves provided in this report.



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San Carlos, California

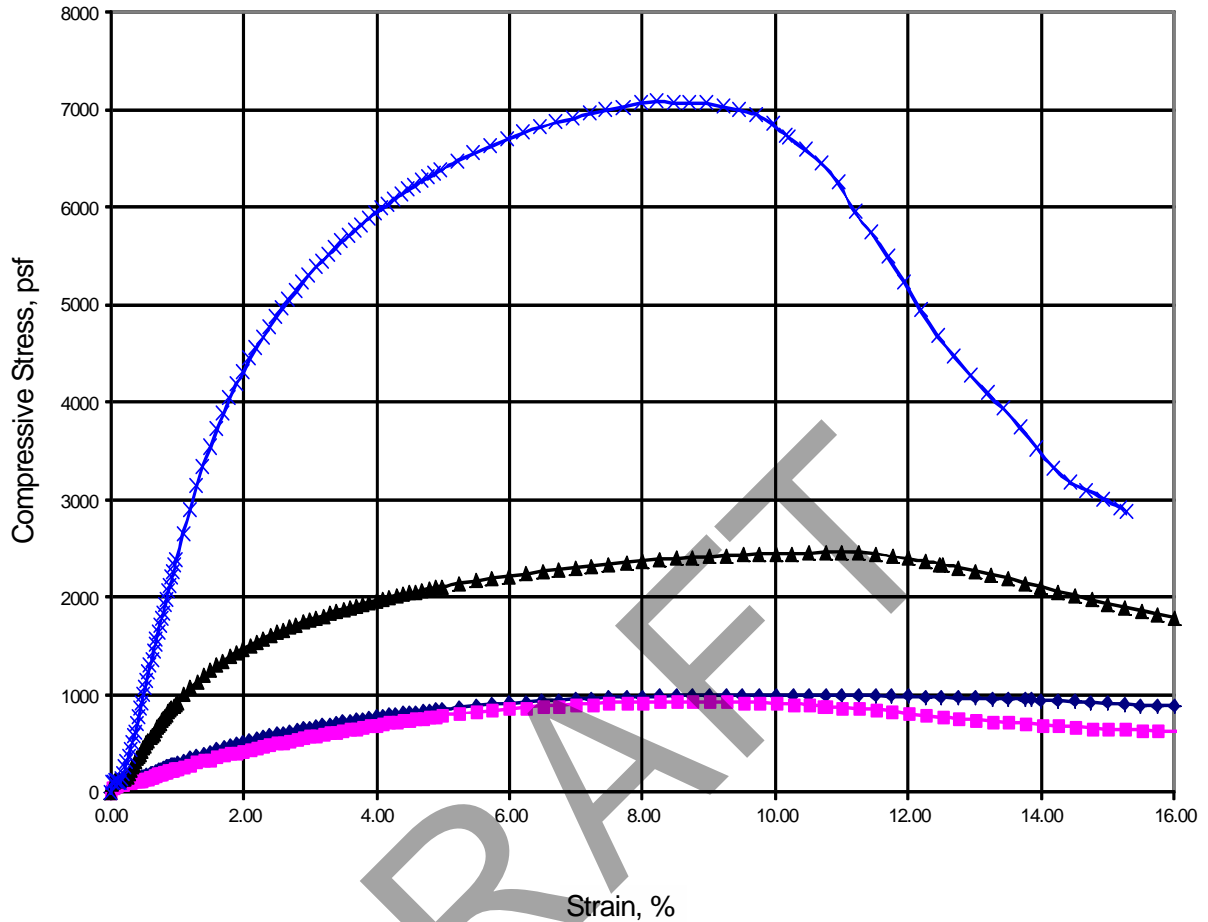
Grain Size

Figure

C-2

(1 of 2)

Unconfined Compressive Strength ASTM D2166

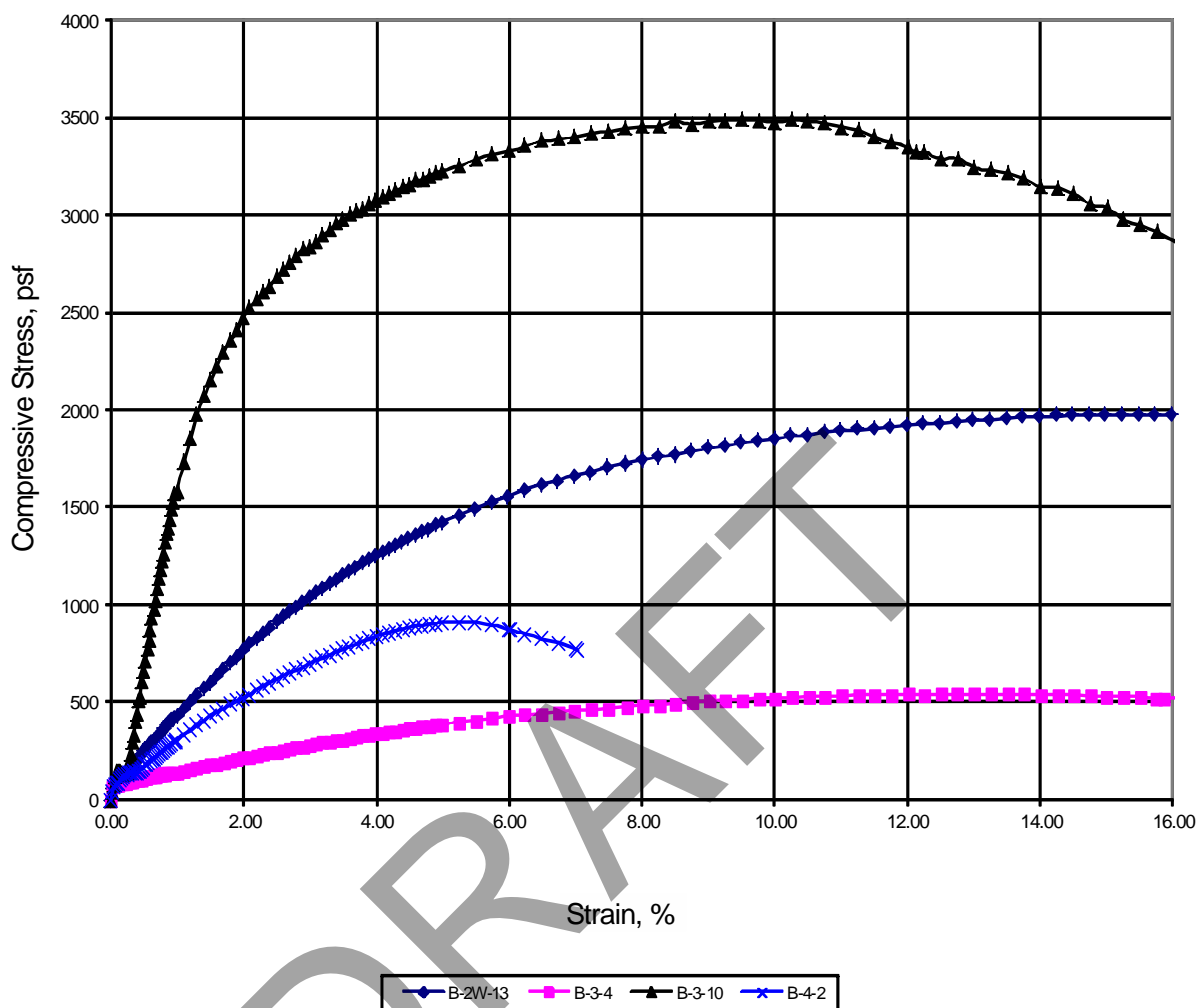


| BORING SAMPLE NO. | B-1-4 | B-2W-7 | B-2W-9 | B-2W-11 |
|--------------------------------|-------|--------|--------|---------|
| MAXIMUM UNCONFINED STRESS, psf | 1001 | 940 | 2465 | 7079 |
| %STRAIN @ PEAK STRESS | 10 | 9.0 | 11 | 8.2 |
| DEPTH, ft. | 8-9½ | 13-14½ | 16-17½ | 19-20½ |
| WATER CONTENT, % | 75 | 92 | 21 | 15 |
| DRY DENSITY, pcf | 55 | 48 | 107 | 120 |
| SATURATION, % | 98 | 98 | 100 | 100 |



Unconfined Compressive Strength

ASTM D2166



| BORING SAMPLE NO. | B-2W-13 | B-3-4 | B-3-10 | B-4-2 |
|--------------------------------|---------|--------|--------|-------|
| MAXIMUM UNCONFINED STRESS, psf | 1974 | 544 | 3486 | 915 |
| %STRAIN @ PEAK STRESS | 15 | 13 | 10 | 5 |
| DEPTH, ft. | 25-26½ | 10-11½ | 25-26½ | 5-6½ |
| WATER CONTENT, % | 33 | 94 | 30 | 73 |
| DRY DENSITY, pcf | 89 | 47 | 93 | 55 |
| SATURATION, % | 100 | 98 | 99 | 94 |



West Yost Associates

Mid-Peninsula Water District
SR 101 Crossing at PAMF
San Carlos, California

Unconfined Compression

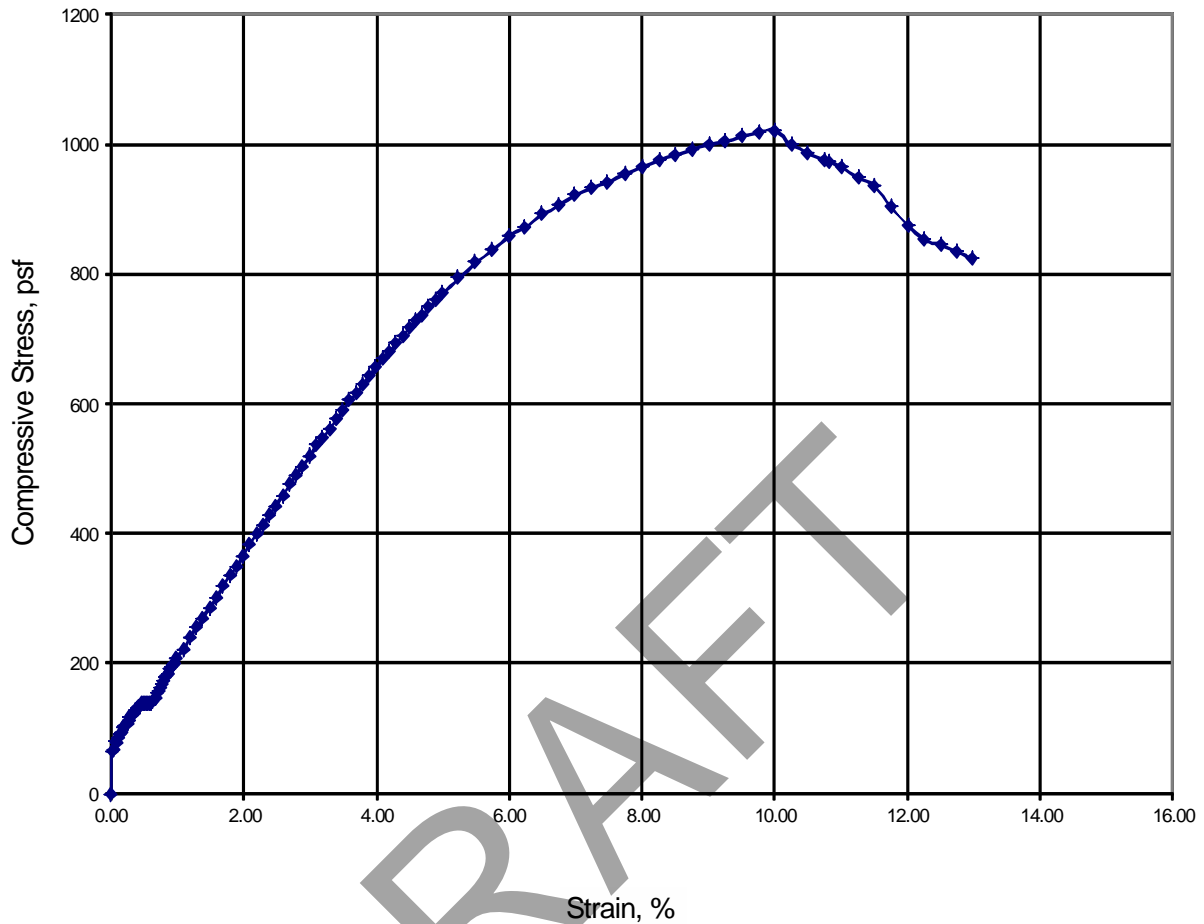
Figure

C-3

(2 of 3)

Unconfined Compressive Strength

ASTM D2166



Strain, %

—◆— B-4-4

| | |
|--------------------------------|--------|
| BORING SAMPLE NO. | B-4-4 |
| MAXIMUM UNCONFINED STRESS, psf | 1021 |
| %STRAIN @ PEAK STRESS | 10 |
| DEPTH, ft. | 11-12½ |
| WATER CONTENT, % | 177 |
| DRY DENSITY, pcf | 28 |
| SATURATION, % | 94 |



West Yost Associates

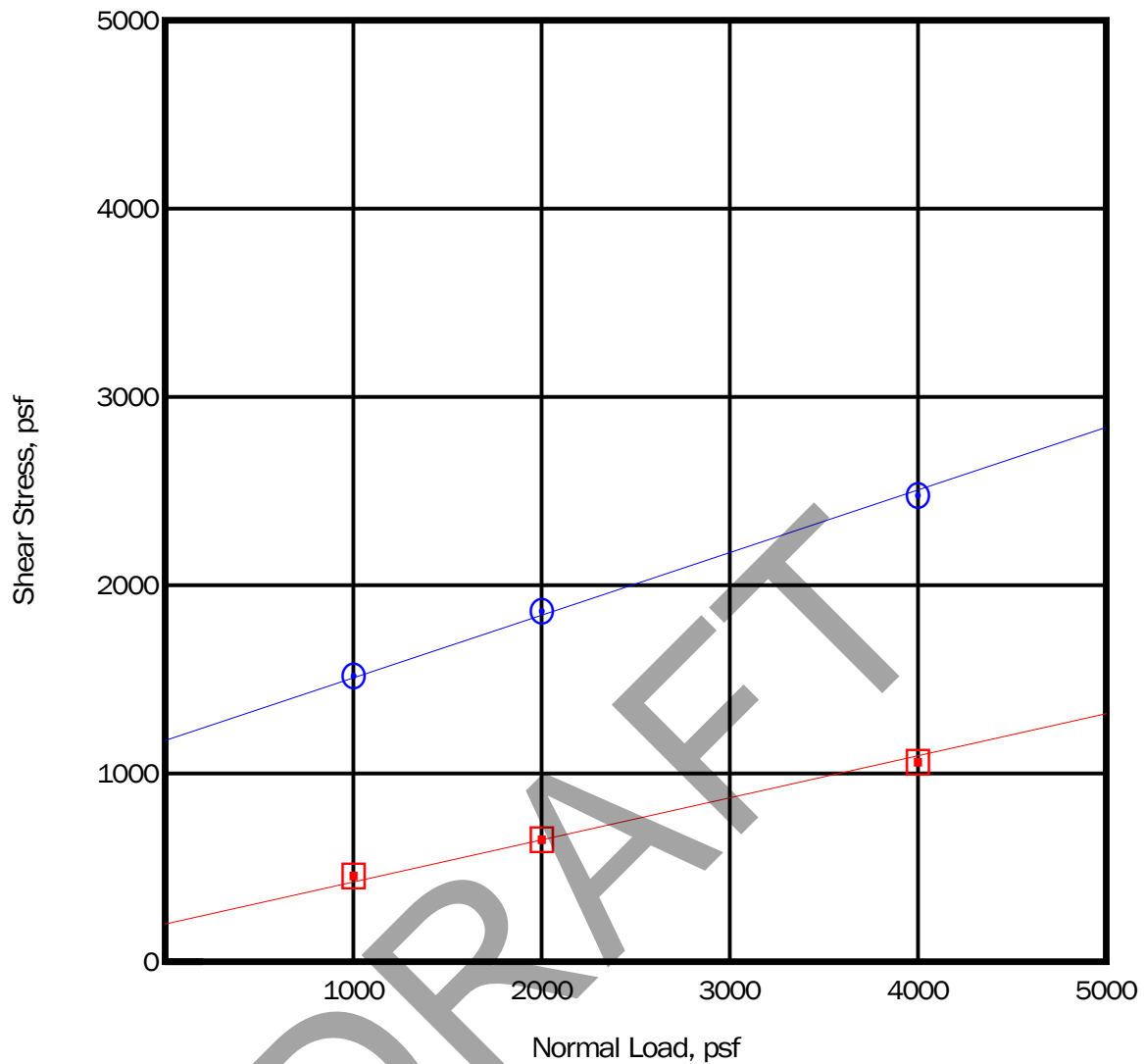
Mid-Peninsula Water District
SR 101 Crossing at PAMF
San Carlos, California

Unconfined Compression

Figure

C-3

(3 of 3)



| TEST SYMBOL | GRAPH LINE | BORING SAMPLE NO. | DEPTH (ft) | APPARENT COHESION (p.s.f.) | INTERNAL FRICTION ANGLE (degrees) | AVE. DRY DENSITY (pcf)/ MOISTURE CONTENT (%) | |
|-------------|------------|-------------------|------------|----------------------------|-----------------------------------|--|------------|
| | | | | | | BEFORE TEST | AFTER TEST |
| ■ | — | B-2W-5 | 10-11½ | 200 | 13 | 42/107 | 47/94 |
| ● | — | B-3-7 | 16-17½ | 1175 | 18 | 111/18 | 119/17 |

APPENDIX C

Corrosion Report

October 5, 2017

West Yost Associates
2020 Research Park Drive, Suite 100
Davis, CA 95618

Attention: **Ms. Lindsey Olson**
Associate Engineer I

Subject: **Soil Corrosivity Evaluation & Recommendations for Corrosion Control**
Steel Casing and PVC Pipeline
Mid-Peninsula Water District SR101 Crossing
San Carlos, CA

Dear Ms. Olson,

Pursuant to your request, **JDH Corrosion Consultants, Inc.** has conducted a corrosivity evaluation for the above referenced project site and we have provided herein recommendations for long-term corrosion control for the proposed casing and water pipeline for this Project.

Purpose

The purpose for this evaluation is to determine the corrosion potential, resulting from the soils to the steel casing and to provide recommendations for long-term corrosion control for the casing and water pipeline.

Background

The project involves the installation of a new water main from the Palo Alto Medical Foundation hospital across SR101 via a casing and then connecting to the end of existing Shoreway Intertie at 75 Shoreway Road.

Soil Testing and Analysis

Two (2) soil samples were collected from the site and they were transported to a state certified testing laboratory, **CERCO Analytical, Inc.** (certificate no. 2153) located in Concord, CA for chemical analysis. One sample was from the Shoreway Road boring B-3-11 @ 26.5 feet, while the other sample was the PAMF boring B-2W-12 @ 20.5 feet. The samples were analyzed for pH, chlorides, resistivity (@ 100% saturation), sulfates and Redox potential using ASTM test methods as detailed in the table below. The preparation of the soil samples for chemical analysis was in accordance with the applicable specifications.

Soil Analysis Test Methods

| Chemical Analysis | ASTM Method |
|-------------------|-------------|
| Chlorides | D4327 |
| pH | D4972 |
| Resistivity | G57 |
| Sulfate | D4327 |
| Redox Potential | D1498 |

The results of the chemical analysis are provided in the CERCO Analytical, Inc. reports dated October 4, 2017. The results are summarized as follows:

CERCO Analytical, Inc. Laboratory Analysis

| Chemical Analysis | Range of Results | Corrosion Classification* |
|-------------------------------|-----------------------|------------------------------------|
| Chlorides | 1,600 – 2,600 (mg/kg) | Moderately Corrosive to Corrosive* |
| pH | 7.97 – 8.12 | Non-corrosive* |
| Resistivity (100% saturation) | 100 – 150 ohms-cm | Severely Corrosive* |
| Sulfate | 120 – 150 (mg/kg) | Non-corrosive** |
| Redox Potential | 310 – 360 mV | Non-corrosive* |

* With respect to bare steel or ductile iron.

** With respect to mortar coated steel

Chemical Testing Analysis

The chemical analysis provided by **CERCO Analytical, Inc.** indicates that the soils are generally classified as “severely corrosive”. The chloride levels indicate “moderately corrosive to corrosive” conditions to steel and ductile iron and the sulfate levels indicate “non-corrosive” conditions for concrete structures placed into these soils with regard to sulfate attack. The pH of the soils is alkaline which classifies them as “non-corrosive” to buried steel and concrete structures.

In-Situ Soil Resistivity Measurements

The in-situ resistivity of the soil was measured at four (4) locations at the project site by **JDH Corrosion Consultants, Inc.** field personnel. Resistance measurements were conducted with probe spacing of 2.5, 5, 7.5, 10, and 15-feet at each location. For analysis purposes we have calculated the resistivity of soil layers 0-2.5', 2.5-5', 5-7.5', 7.5-10', and 10-15' using the Barnes Method as follows:

$$\rho_{b-a} = KR (b-a)$$

Where;

| | | |
|--------------|---|--|
| ρ_{b-a} | = | soil resistivity of layer depth b-a (ohm-cm) |
| a | = | soil depth to top layer (ft) |
| b | = | soil depth to bottom layer (ft) |
| R_a | = | soil resistance read at depth a (ohms) |
| R_b | = | soil resistance read at depth b (ohms) |
| R_{b-a} | = | resistance of soil layer from a to b (ft) |
| K | = | layer constant = $60.96\pi(b-a)$ (cm) |

$$\text{and } \frac{1}{R_{b-a}} = \frac{1}{R_a} - \frac{1}{R_b}$$

The visual diagrams below describe the Wenner 4-pin testing configuration.

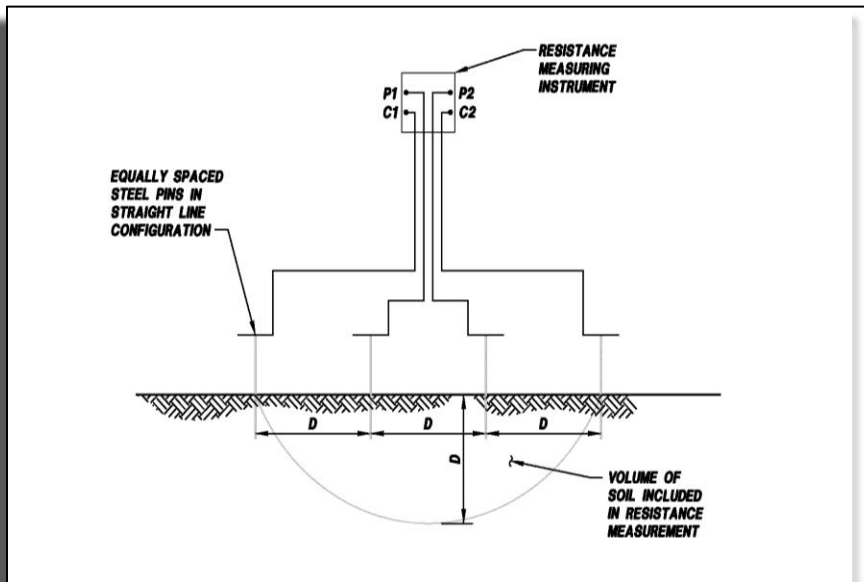


Fig 1: Wenner 4-Pin Resistivity Schematic No.1

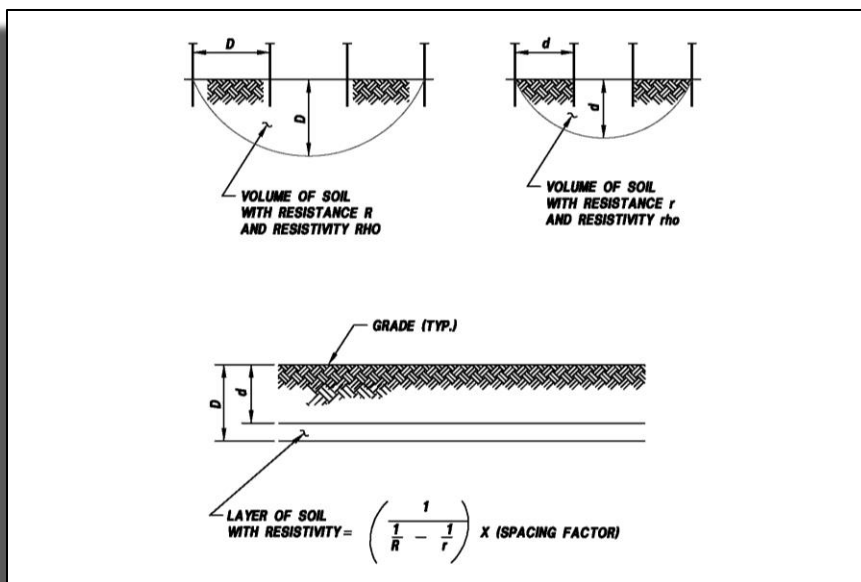


Fig 2: Illustration of Barnes Layer Calculations

In-Situ Soil Resistivity Analysis

Corrosion of a metal is an electro-chemical process and is accompanied by the flow of electric current. Resistivity is a measure of the ability of a soil to conduct an electric current and is, therefore, an important parameter in consideration of corrosion data. Soil resistivity is primarily dependent upon the chemical content and moisture content of the soil mass.

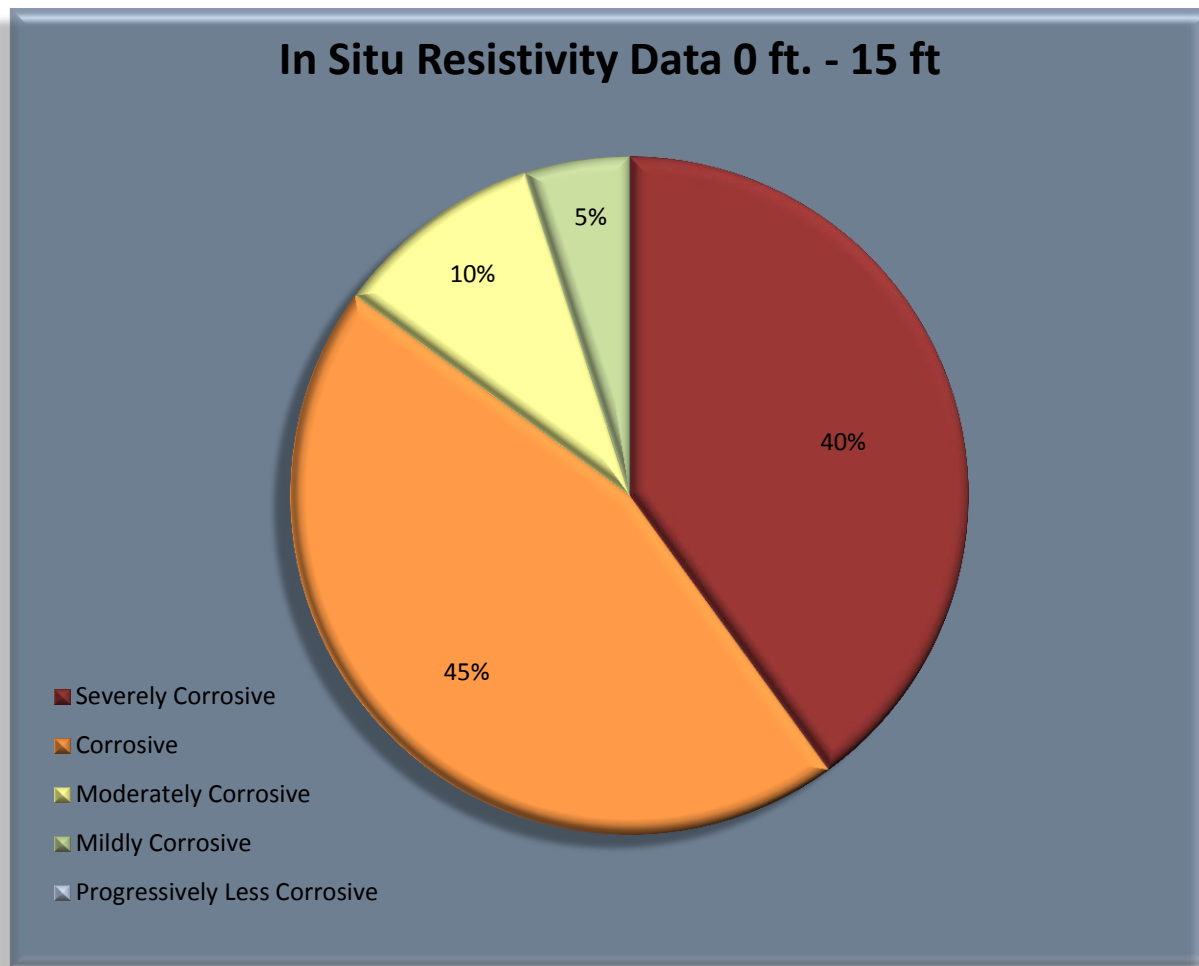
The greater the amount of chemical constituents present in the soil, the lower the resistivity will be. As moisture content increases, resistivity decreases until maximum solubility of dissolved chemicals is attained. Beyond this point, an increase in moisture content results in dilution of the chemical concentration and resistivity increases. The corrosion rate of steel in soil normally increases as resistivity decreases. Therefore, in any particular group of soils, maximum corrosion will generally occur in the lowest resistivity areas. The following classification of soil corrosivity, developed by William J. Ellis¹, is used for the analysis of the soil data for the project site.

| <u>Resistivity (Ohm-cm)</u> | <u>Corrosivity Classification</u> |
|-----------------------------|-----------------------------------|
| 0 – 500 | Very Corrosive |
| 501 – 2,000 | Corrosive |
| 2,001 – 8,000 | Moderately Corrosive |
| 8,001 – 32,000 | Mildly Corrosive |
| > 32,000 | Progressively Less Corrosive |

The above classifications are appropriate for the project site and the results are presented in the graphs below. In general, the soils are classified as “corrosive” with respect to corrosion of buried steel structures throughout the top 0 to 15 feet of the site.

Site Corrosivity Evaluation
Mid-Peninsula Water District SR101 Crossing, San Carlos, CA

The chart of the in-situ soil resistivity data for the soil layers 0 to 15 feet indicate that 40% of the soils are classified as “severely corrosive”, 45% of the soils are classified as “corrosive”, 10% of the soils are classified as “moderately corrosive” and 5% of the soils are classified as “mildly corrosive”.



Discussion

Underground Casing
Ductile Iron Fittings & Metallic Valves (On Plastic Pressure Piping)

The soils along the proposed alignment are considered to be “corrosive” to steel, ductile iron and dielectric coated steel. Therefore, we recommend the use of coatings supplemented with cathodic protection for the direct buried metallic casing and the ductile iron fittings on the plastic pressure piping.

Recommendations

Steel Casing

1. An abrasion resistant epoxy coating system such as 3M Scotchkote Abrasion Resistant Epoxy Coating (AREC) 328 should be applied to the casing pipe.
2. A sacrificial type of cathodic protection using **zinc or H-1 magnesium** anodes should be installed to protect the buried steel casings. Cathodic protection should be designed in accordance with NACE Standard SP0169-13 and applicable local standards and included with the contract documents to permit installation along with the subject pipeline. A casing test station should also be installed.

Ductile Iron Fittings & Metallic Valves (On Plastic Pressure Piping)

1. All direct buried ductile iron fittings installed on non-metallic piping shall be provided with a bituminous coating from the factory and encased in an 8-mil polyethylene bag in the field in accordance with AWWA Specification C-105. All bolts, restraining rods, etc. shall be coated with bitumastic prior to encasement in the polyethylene bag.
2. All metallic valves shall be coated from the factory (i.e. using powdered epoxy or equivalent type of coating system) and all bolts shall be coated with bitumastic in the field and the entire valve shall be encased in an 8-mil polyethylene bag in accordance with AWWA Specification C-105.
3. A sacrificial type of cathodic protection utilizing **zinc or H-1 magnesium** anodes should be installed to protect the valves and fittings. Cathodic protection should be designed in accordance with NACE Standard SP0169-13 and applicable local standards and included with the contract documents to permit installation along with the pipeline.

NOTE: NACE standards were used for the determination of appropriate corrosion control methods rather than AWWA C105/A21.5 10-point system in order to the design under NACE guidelines.

LIMITATIONS

The conclusions and recommendations contained in this report reflect the opinion of the author of this report and are based on the information and assumptions referenced herein. All services provided herein were performed by persons who are experienced and skilled in providing these types of services and in accordance with the standards of workmanship in this profession. No other warranties or guarantees either expressed or implied are provided.

We thank you for the opportunity to be of assistance on this important project. If you have any questions concerning this report or the recommendations provided herein, please feel free to contact us at (925) 927-6630.

Respectfully submitted,

Brendon Hurley

Brendon Hurley
JDH Corrosion Consultants, Inc.
Field Technician

J. Darby Howard, Jr

J. Darby Howard, Jr., P.E.
JDH Corrosion Consultants, Inc.
Principal



CC: File 17172

REFERENCES

1. Ellis, William J., Corrosion of Concrete Pipelines, Western States Corrosion Seminar, 1978
2. AWWA Manual of Water Supply Practices - M27, First Edition, External Corrosion - Introduction to Chemistry and Control (Denver, CO: 1987)
3. National Association of Corrosion Engineers, Standard Recommended Practice, SP 01-69-13, Control of External Corrosion on Underground or Submerged Pipeline

Client: JDH Corrosion Consultants, Inc.
 Client's Project No.: 17172
 Client's Project Name: West Yost - Mid Peninsula SR101 Crossing
 Date Sampled: 25-Sep-17
 Date Received: 25-Sep-17
 Matrix: Soil
 Authorization: Signed Chain of Custody

Date of Report: 4-Oct-2017

| Job/Sample No. | Sample I.D. | Redox (mV) | pH | Resistivity (As Received) (ohms-cm) | Resistivity (100% Saturation) (ohms-cm) | Sulfide (mg/kg)* | Chloride (mg/kg)* | Sulfate (mg/kg)* |
|----------------|--------------------------------|---------------|------|---|---|---------------------|----------------------|---------------------|
| 1709158-001 | B-3-11 @ 26.5' (Shoreway Side) | 360 | 8.12 | 100 | 98 | - | 2600 ⁽¹⁾ | 150 |
| 1709158-002 | B-2W-12 @ 20.5' (PAMF Side) | 310 | 7.97 | 150 | 140 | - | 1600 ⁽¹⁾ | 120 |
| | | | | | | | | |
| | | | | | | | | |
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|------------------|-------------|-------------|------------|------------|-------------|-------------|-------------|
| Method: | ASTM D1498 | ASTM D4972 | ASTM G57 | ASTM G57 | ASTM D4658M | ASTM D4327 | ASTM D4327 |
| Reporting Limit: | - | - | - | - | 50 | 15 | 15 |
| Date Analyzed: | 27-Sep-2017 | 27-Sep-2017 | 3-Oct-2017 | 3-Oct-2017 | - | 28-Sep-2017 | 27-Sep-2017 |


 Cheryl McMillen
 Laboratory Director

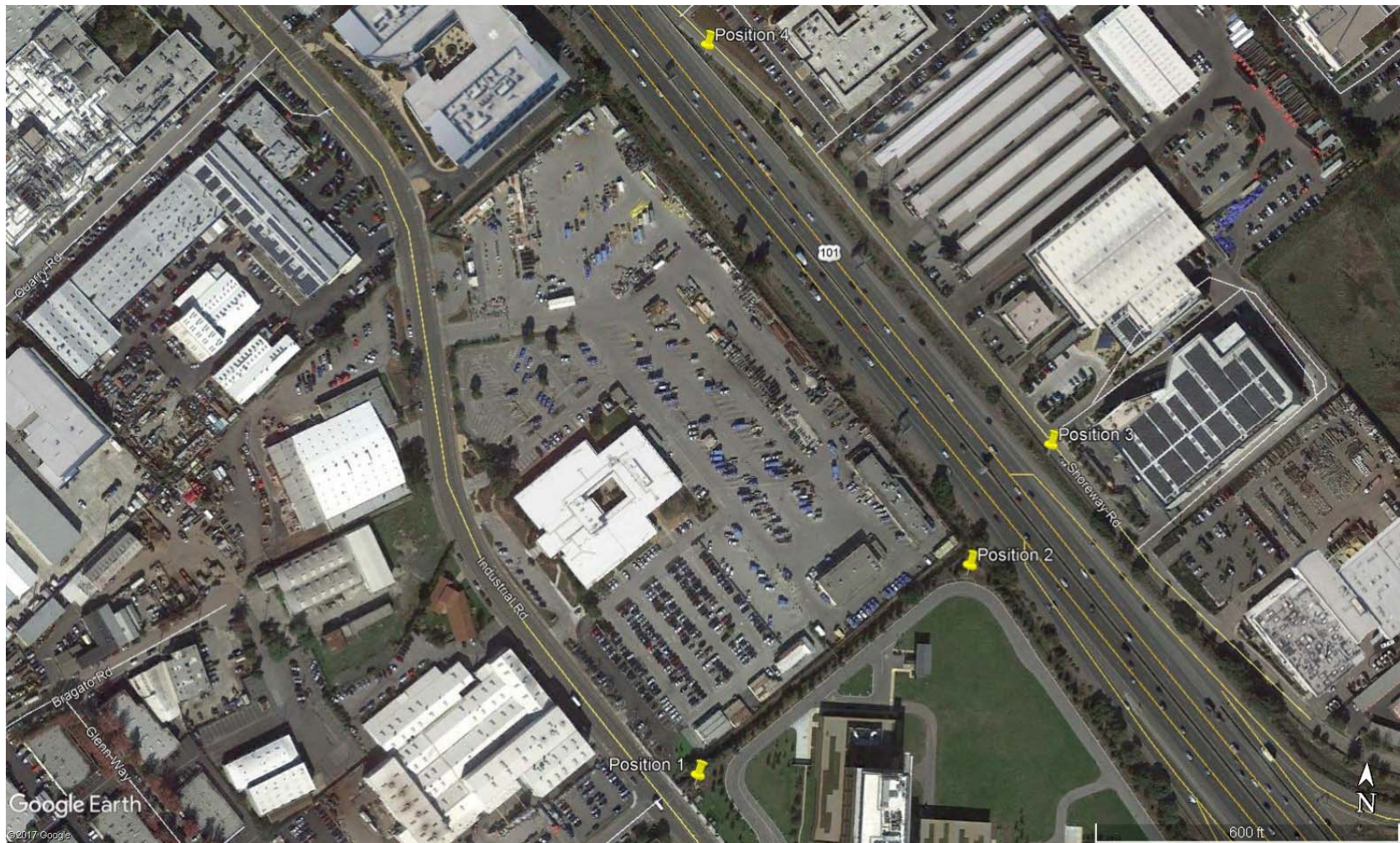
* Results Reported on "As Received" Basis

N.D. - None Detected

⁽¹⁾ Detection limit is elevated to 75 mg/kg due to dilutionQuality Control Summary - All laboratory quality control parameters were found to be within established limits

| Client: | | West Yost | | | | | | | | | | | | | | | |
|-----------|----------------------|---|------|------|------|------|-----------------------------|------|------|------|------|---|---|--------|---------|--------|--|
| Project: | | Mid Peninsula Water District SR101 Crossing | | | | | | | | | | <div><div></div>Severely Corrosive</div> <div><div></div>Corrosive</div> <div><div></div>Moderately Corrosive</div> | <div><div></div>Mildly Corrosive</div> <div><div></div>Progressively Less Corrosive</div> | | | | |
| Location: | | San Carlos, CA | | | | | | | | | | | | | | | |
| Date: | | 9/18/2017 | | | | | | | | | | | | | | | |
| Subject: | | In-Situ Soil Resistivity Data | | | | | | | | | | | | | | | |
| *Test # | Location Description | Resistance Data From AEMC Meter | | | | | Soil Resistivities (ohm-cm) | | | | | Barnes Layer Analysis (ohm-cm) | | | | | |
| | | 2.5 | 5 | 7.5 | 10 | 15 | 2.5 | 5 | 7.5 | 10 | 15 | 0-2.5' | 2.5-5' | 5-7.5' | 7.5-10" | 10-15' | |
| 1 | Position 1 | 2.90 | 1.15 | 0.61 | 0.32 | 0.12 | 1388 | 1101 | 876 | 613 | 345 | 1388 | 912 | 622 | 322 | 184 | |
| 2 | Position 2 | 3.04 | 0.72 | 0.26 | 0.12 | 0.06 | 1455 | 689 | 373 | 230 | 172 | 1455 | 452 | 195 | 107 | 115 | |
| 3 | Position 3 | 9.45 | 2.68 | 1.33 | 0.69 | 0.61 | 4524 | 2566 | 1910 | 1321 | 1752 | 4524 | 1791 | 1264 | 686 | 5038 | |
| 4 | Position 4 | 26.05 | 2.72 | 1.03 | 0.31 | 0.05 | 12471 | 2604 | 1479 | 594 | 144 | 12471 | 1454 | 794 | 212 | 57 | |

In-situ Locations



APPENDIX D

Hazardous Materials Study

TECHNICAL MEMORANDUM

DATE: September 18, 2017 Project No.: 768-14-17-01
SENT VIA: EMAIL

TO: Mr. Rene Ramirez, Operations Manager
Mid-Peninsula Water District

CC: Nancy McWilliams, PE, RCE #68331

FROM: Peter Dellavalle, PG #9189

REVIEWED BY: Andy Rodgers, CHMM # 9525

SUBJECT: Preliminary Hazardous Materials Assessment Review
Mid-Peninsula Water District SR101 Crossing

In adherence to the Mid-Peninsula Water District Capital Improvement Program (CIP), the State Route 101 (SR 101) Crossing at the Palo Alto Medical Foundation (PAMF) Improvements CIP Project is proposed to implement necessary upgrades. The scope of the project includes installation of approximately 1,200 linear feet of 8-inch diameter water main pipe along Shoreway Road, 1,100 linear feet of 12-inch diameter water main pipe crossing SR 101 at the PAMF facility, and abandonment of 500 LF of 12-inch diameter asbestos cement (AC) pipe between Karen Road and Sem Lane. The trenchless crossing under SR 101 would commence at the existing right-of-way at the edge of the PAMF facility and would extend across SR 101 to Shoreway Road in front of the Shoreway Environmental Center (recycling center). Attachment A delineates the location and limits of the project.

The excavation work for pipeline installation will occur within approximately five to seven feet of ground surface. Deeper pit excavations will be required for bore and jack trenchless installation of the pipeline under SR 101. Pits will be roughly 20 feet deep. If a caisson is used, the installation pit will be at least 24 feet in diameter located in the north-east corner of the PAMF property along the SR 101 right-of-way and adjacent to the PG&E property. The receiving pit will be approximately 10 feet by 10 feet located in Shoreway Road across SR101 from the installation pit and in front of the Recology San Mateo County Recycling Center.

West Yost Associates (West Yost) conducted a preliminary hazardous material assessment for the proposed water main alignment corridors (project corridors) to identify known or potential hazardous materials sources (sites) relevant to what may be encountered during the scope of earthwork/construction. Parcels located adjacent to the project corridor were closely evaluated for

the potential to impact trench soil and/or groundwater. Parcels located topographically upgradient and within 1,000 feet of the project corridor were also evaluated.

This report includes a discussion of the assessment results, maps showing properties with known or potential hazardous materials concerns, and details associated with the environmental records and databases search.

The review of records and databases revealed 84 cases of hazardous chemical releases on sites located within half-mile of the project corridor. Twenty (20) records of release cases (cases) are located on 14 parcels within 1,000 feet of the project corridor. Seven (7) of these cases are located on 3 parcels adjacent to the project corridor. One (1) of the cases has a “documented” impact on the project corridor.

SCOPE OF ASSESSMENT

This preliminary assessment was conducted in accordance with sections of the American Society for Testing and Materials (ASTM) Standard E1527-13, including a review of Federal, State, local database records reported by Environmental Data Resources, Inc. of Shelton, Connecticut (EDR); files maintained on the State Water Resource Control Board GeoTracker; California Department of Toxic Substances Control EnviroStor databases; and current land use designations of the subject corridor and vicinity. The information was used to identify known and potential hazardous material release sites along the project corridor.

As shown on Figure 1, West Yost mapped sites from the environmental records and database reviews. Documented releases in the vicinity of the project corridor based on EDR, GeoTracker, and EnviroStor records are mapped as points and symbolized as either open or closed cases.

West Yost categorized cases on parcels located adjacent to or within 1,000 feet the project corridor using the following designations:

- Documented impact to the project corridor;
- Potential impact to the project corridor; and
- Unlikely impact to the project corridor.

Sites with documented or potential impact to the project corridor are shown on Figure 1 and summarized below.

ASSESSMENT RESULTS

The results from the preliminary hazardous materials assessment are discussed below.

Land Uses

Current land uses in the vicinity of the project consist of industrial and professional uses. The sites discussed below are generally located within the current industrial land use designations.

Overview of Sites in the Project Area

The records and database reviews revealed 84 case records for sites located within one-half mile of the project corridor, see Figure 1. Most of the cases reviewed are “closed” regulatory cases and/or are located greater than 1,000 feet from the project corridor. West Yost concentrated the review on sites located within 1,000 feet of the project corridor, and found records of 20 cases on 14 sites with potential impacts to the project corridor. Three of the 14 sites are located adjacent to the project corridor, and one site indicates impacts to the project corridor.

Factors used to screen the 14 sites include distance to the site, geology, presumed or known depth and direction of groundwater flow, type and magnitude of hazardous material release, and relative proportions (extent and depth) of the planned construction project.

A review of properties with documented, potential and unlikely impacts is presented below.

Documented Impacts to the Project Corridor

Of the 14 sites reviewed within 1,000 feet of the project corridor, West Yost found one with record of documented impacts to the project corridor, the Brusco Property at 248 Harbor Boulevard. The Brusco Property is about 420 feet south of the existing SR 101 crossing between Karen Road and Sem Lane. This crossing will be abandoned by the project. The Brusco Property is upgradient of the Karen Road work area. Based on records of the Brusco Property reviewed, groundwater is about 5 feet below ground surface and flows to the north-northeast toward the Karen Road work area at a shallow gradient of 0.003 foot/foot.

Two light-industrial buildings are on the Brusco Property; one was built before 1956 and the other was built in 1980. According to site investigation records, numerous commercial and industrial tenants have occupied the site since 1956.

Chlorinated volatile organic compounds (VOCs) and gasoline-range petroleum hydrocarbons were detected in soil, groundwater, and soil vapor beneath the Brusco Property in 2005. Subsequent investigation by CH2M discovered a plume of VOCs extending north of the property toward the project work area. The findings indicate trichloroethylene (TCE) may be present in groundwater in a silty sand layer at concentrations up to 1,000 ug/l beneath the Karen Road work area at an approximate depth of 20 feet below surface, below the planned trench depth.

Potential Impacts to the Project Corridor

There were no sites located within 1,000 feet of the project corridor that appear to have the potential to impact the project. Potential impacts are defined by ASTM and industry practices as a potential exposure of human health and/or wildlife to hazardous substances or petroleum hydrocarbons during the project activities. Specific to this assessment, West Yost considered the potential for trenching, excavation or bore and jack activities to encounter contaminated soil and/or groundwater requiring specialized handling and disposal. Other than the Brusco Property discussed above, which has documented impacts to groundwater beneath a project work area, none of the other listed sites appear to have potential impacts to soil or groundwater within the project work areas.

Listed Sites with Unlikely Impacts to the Project Corridor

Case files for the sites listed in Table 1 were reviewed by West Yost and the sites are considered unlikely to have impacted the project corridor because the releases are limited to the release site, have been remediated, or are, in West Yost's opinion, unlikely to have affected soil and/or groundwater in project work areas to an extent requiring specialized handling and disposal.

| Table 1. Listed Sites with Unlikely Impacts to the Project Corridor | |
|--|---------------------|
| Site Name | Site Address |
| B&H Technical Ceramics | 390 Industrial Road |
| Delta Star Inc. | 270 Industrial Way |
| Peninsula Laboratories | 601 Taylor Way |
| Spacesonic | 266 Industrial Road |
| Tiegel Manufacturing | 495 Bragato Road |
| Varian EIMAC | 301 Industrial Road |
| CPI – EMIAC DIV | 301 Industrial Road |
| BFI Waste Systems | 225 Shoreway Road |
| City of Belmont – Corp Yard | 110 Sem Lane |
| Custom Photo Engraving | 350 Industrial Road |
| General Instrument | 120 Industrial Way |
| Hospital Linen | 333 Shoreway Road |
| Olympian San Carlos | 200 Industrial Way |
| PG&E | 275 Industrial Way |
| Raker Roofing | 333 O'Neill Avenue |

CONCLUSIONS

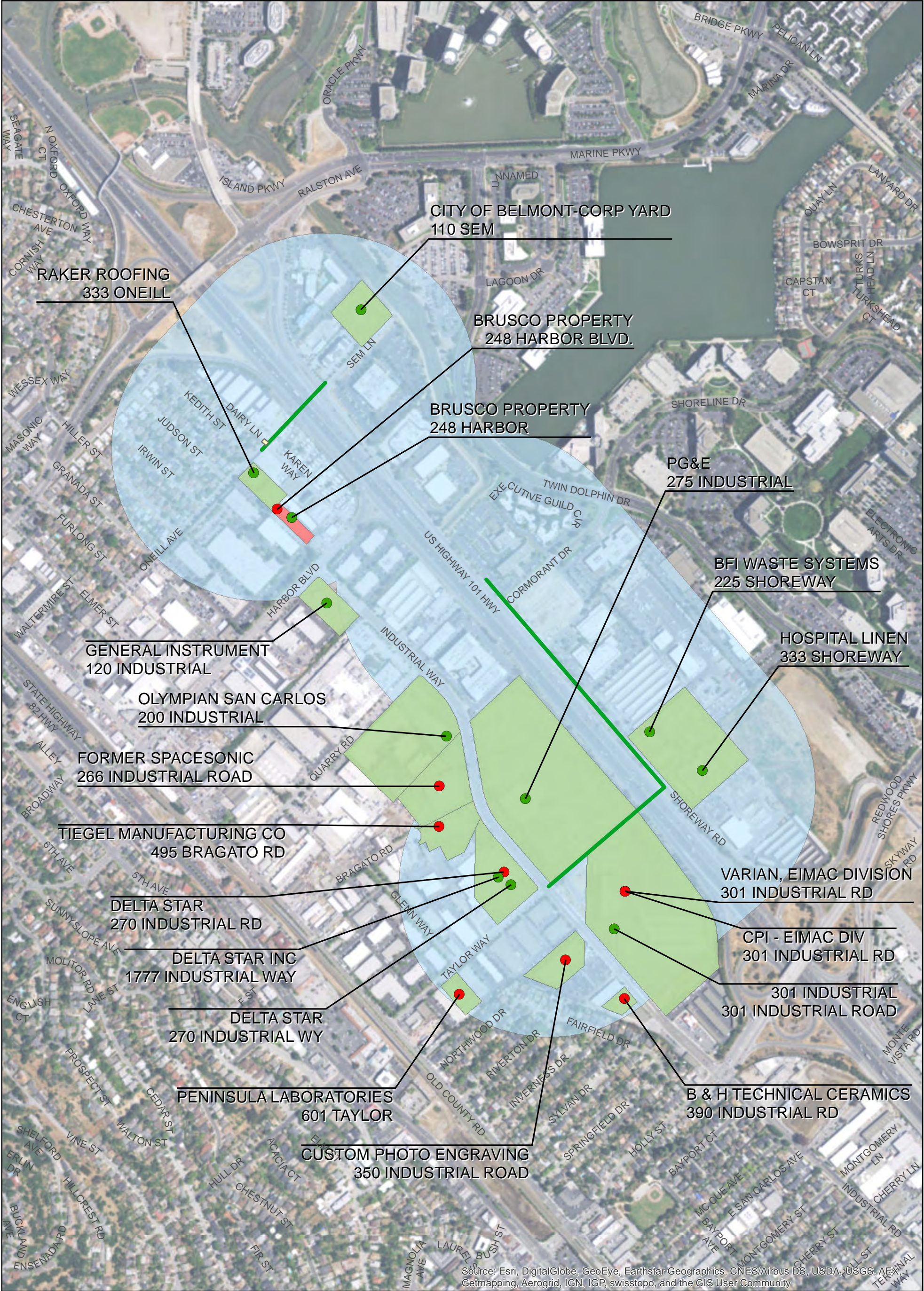
EDR, GeoTracker, and EnviroStor records reviewed for this preliminary hazardous materials assessment revealed one site, the Brusco Property, that has documented impacts to soil and groundwater in the project corridor and 13 sites that, in the opinion of West Yost, are unlikely to impact the project corridor. These sites are shown on Figure 1.

It is our understanding that most excavation work for pipeline installation will occur within approximately five to seven feet of ground surface with a few deeper excavations where bore and jack methods are planned. This shallow work will significantly reduce the overall potential to encounter impacted soil and groundwater during construction. However, undocumented contamination may be present at shallow depths, particularly near the Brusco Property and the industrial sites listed as unlikely impacts to the project corridor.

DISCLAIMER

This report contains information obtained from a variety of public and other sources. No representation or warranty regarding the accuracy, quality, suitability, reliability, or completeness of said information or the information contained in this report is made. Undiscovered or undocumented releases of hazardous substances may exist. The user shall assume full responsibility for the use of this report. No warranty or merchantability or of fitness for a particular purpose, expressed or implied, shall apply and the authors specifically disclaim the making of such warranties. In no event, shall the authors be liable to anyone for special, incidental, consequential or exemplary damages.

DRAFT



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, IGP, swisstopo, and the GIS User Community

SYMBOLLOGY

Project Corridor

Area Within 1000-Feet of Project

Documented Haz Mat Release

Closed Case

Open Case

Potential Impact to Project

Documented Impact (1)

Potential Impact (none)

Unlikely Impact (13)

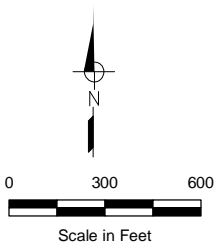


Figure1

**Map of Documented Haz Mat Releases
Preliminary Haz Mat Assessment**

Mid-Peninsula Water District
SR 101 Crossing

ATTACHMENT A

Location and Limits of the Project

DRAFT

SR 101 CROSSING AT PAMF HOSPITAL IMPROVEMENTS

PROJECT BACKGROUND

Two State Route 101 (SR 101) water main crossings exist in Zone 1 including a 500 LF 12" asbestos cement crossing between Karen Road and Sem Lane and another 12" PVC crossing a half mile to the north. The 12" AC was installed in 1963 in a 36" steel casing. As part of the PAMF development agreement at the south end of Zone 1, the District obtained a 15 ft easement along the northeast side of the PAMF property in addition to a 40 ft x 40 ft area in the northeast corner to serve as a staging area for an alternate SR 101 crossing. This project abandons the aging 12" AC crossing and relocates it to the PAMF easement with a new 1,100 LF 12" polyvinylchloride (PVC) water main. To loop the water main back to the existing water main on Shoreway Road requires the installation of an additional 1,200 LF 8" PVC. Hydraulic analysis indicates increased fire flows along Shoreway Road of approximately 200 gpm. This project will require extensive Caltrans coordination. Distribution System Analysis No. 077

PROPOSED IMPROVEMENTS

Install 1,100 LF of 12" PVC in steel casing and 1,200 LF of 8" PVC
Abandon 500 LF 12" AC
Install 2 fire hydrant assemblies, new intertie
Cathodic protection of all metallic fittings/materials

PROJECT BENEFITS

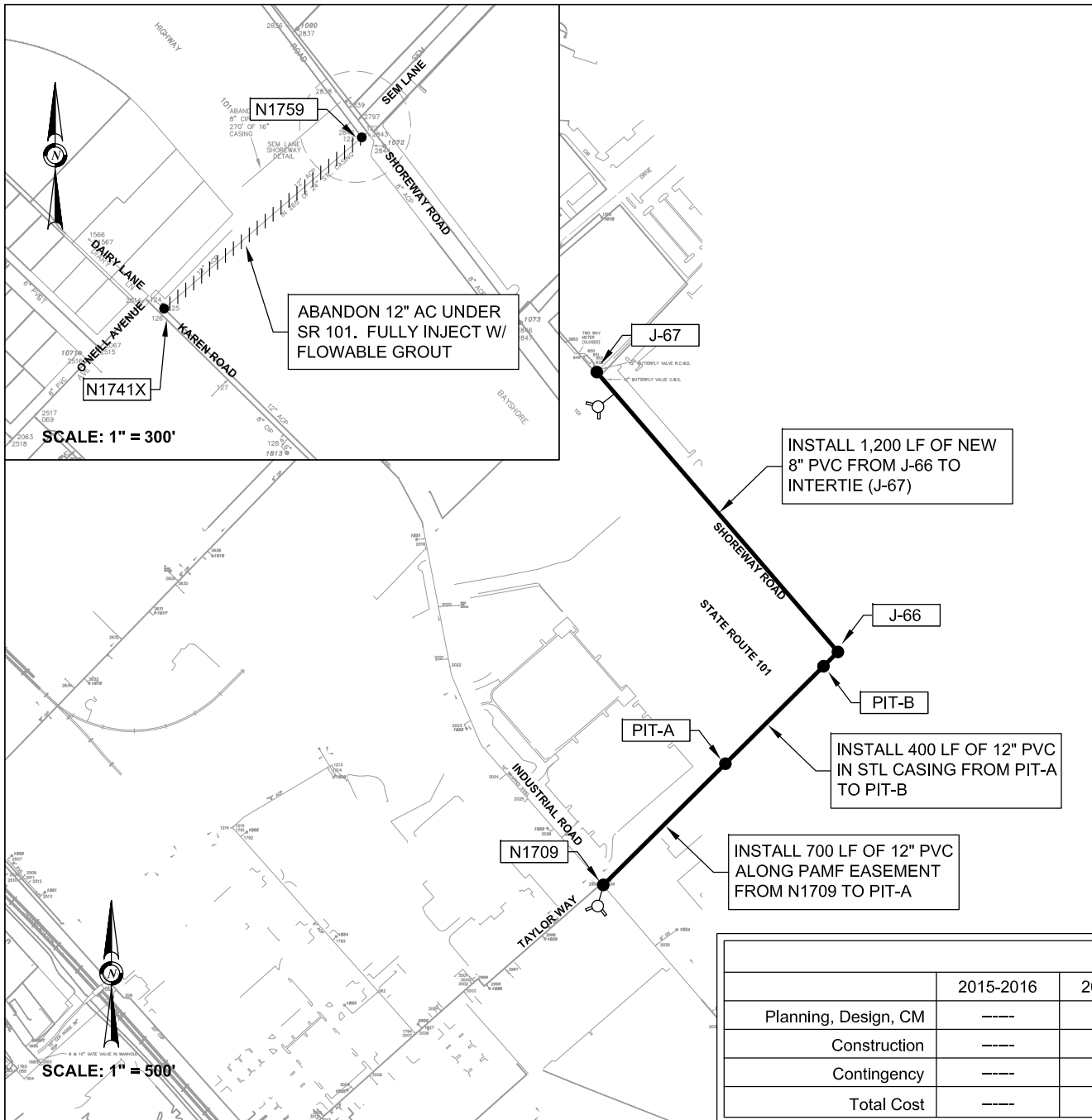
The SR 101 Crossing at PAMF Hospital Improvements replaces an old and aging water main capable of causing major disruptions on SR 101 in the event of a main break, eliminates a dead end, creates a looped system, improves fire flows, and constructs a serviceable underground inter-tie utility vault.

PROJECT BUDGET

| | |
|--|---------------------|
| 700 LF - 12" PVC @ \$300/LF | \$ 210,000 |
| 400 LF - 12" PVC SR 101 @ \$1,000/LF | \$ 400,000 |
| 1,200 LF - 8" PVC @ \$250/LF | \$ 300,000 |
| Abandon 12" - AC Crossing @ \$100,000/LS | \$ 100,000 |
| 2 Fire Hydrants @ \$15,000/EA | \$ 30,000 |
| Subtotal Construction | \$ 1,040,000 |
| Planning, Design, & Construction Support | \$ 350,000 |
| Contingency (±20%) | \$ 280,000 |
| Project Budget | \$ 1,670,000 |

EXPENDITURE SCHEDULE (2015 DOLLARS)

| | 2015-2016 | 2016-2017 | 2017-2018 | 2018-2019 | 2019-2020 | Future |
|----------------------|-----------|-----------|-----------|-----------|-----------|--------|
| Planning, Design, CM | ---- | ----- | ----- | ----- | ----- | ----- |
| Construction | ---- | ----- | ----- | ----- | ----- | ----- |
| Contingency | ---- | ----- | ----- | ----- | ----- | ----- |
| Total Cost | ---- | ----- | ----- | ----- | ----- | ----- |



Pakpour Consulting Group, Inc.
5776 Stoneridge Mall Road, Suite 320
Pleasanton, CA 94588
925.224.7717 Fax 925.224.7726
www.pcgengr.com

JOB No. 10012.07
DATE 05/28/15
SCALE AS NOTED
DRAWN: BY BL
CKD JP



MID-PENINSULA WATER DISTRICT
SAN MATEO COUNTY, CALIFORNIA
3 DAIRY LANE
BELMONT, CA 94002

CAPITAL IMPROVEMENT PROGRAM - 2015 UPDATE
SR 101 CROSSING AT PAMF HOSPITAL IMPROVEMENTS
PROJECT 15-72

SHEET X
OF X

APPENDIX E

Estimate for Soil and Water Testing



October 23, 2017

SENT VIA: EMAIL

Mr. Rene Ramirez
Operations Manager
Mid-Peninsula Water District
3 Dairy Lane
Belmont CA 94002

SUBJECT: Scope of Work: Pre-Construction Hazardous Materials Assessment,
SR101 Crossing at PAMF, Mid-Peninsula Water District

Dear Mr. Ramirez:

At the request of Mid-Peninsula Water District (District), West Yost Associates (West Yost) has prepared this scope of work and cost estimate to conduct a soil and groundwater assessment for the State Route 101 (SR101) Crossing at Palo Alto Medical Foundation (PAMF) Capital Improvement Plan (CIP) Project (Project) in San Carlos, California. The purpose of the assessment is to determine if, and at what concentrations, contamination exists within the proposed locations of caissons for an installation pit in the northeast corner of the PAMF property along the SR101 right-of-way and adjacent to the PG&E property and a receiving pit in Shoreway Road across SR101 from the installation pit in front of the Recology San Mateo County Recycling Center. This information will be utilized to develop appropriate soil and groundwater management and disposal plans.

This scope of work describes the procedures that will be used to drill and collect samples of soil within the project area. This scope of work will be used to prepare a work plan that will accompany a permit application and an environmental assessment fee to drill the exploratory borings.

BACKGROUND

West Yost conducted a preliminary hazardous material assessment for the proposed water main alignment corridors (project corridors) to identify known or potential hazardous materials sources (sites) relevant to materials that may be encountered during the scope of earthwork/construction. Parcels located adjacent to the project corridor were evaluated for the potential to impact trench soil and/or groundwater. Parcels located topographically upgradient and within 1,000 feet of the project corridor were also evaluated.

The assessment revealed one site, the Brusco Property, that has documented impacts to soil and groundwater in the project corridor and 13 sites that, in the opinion of West Yost, are unlikely to impact the project corridor (see Figure 1 of the Hazardous Materials Technical Memorandum). However, there is the possibility of undocumented or undiscovered contamination.

Observations of “petroliferous” and “sulfurous” odors were noted in geotechnical logs of borings drilled near the proposed locations of the caissons. These observations are consistent with the presence of bay mud but may also indicate the presence of chemical contamination.

SCOPE OF WORK

West Yost will direct, oversee and document the drilling and completion of up to three exploratory borings in the Project area. From each of the three borings, West Yost will collect one four-point composite soil sample.

PERMITS

West Yost will secure a drilling permit from the San Mateo County Environmental Health Department (SMCEHD), and an encroachment permit from the City of San Carlos (City). Copies of any applicable permits will be maintained on site during the work.

VEHICULAR AND PEDESTRIAN TRAFFIC CONTROL

West Yost understands that a traffic control plan will be necessary as drilling activities along Shoreway Road will be conducted in the street.

During work, West Yost will employ traffic and pedestrian control measures, including the use of delineators and staff supervision. To minimize disturbance to vehicular and pedestrian traffic, the active work area will be kept as small as possible. Active work areas will be maintained and attended until the area can be fully restored for safe passage.

UTILITY LOCATION

Underground Service Alert (USA) will be notified at least 48 hours prior to drilling. West Yost understands that Mid-Peninsula Water District and/or the City will assist in identification of utilities and subsurface features.

SITE AND PROJECT HEALTH AND SAFETY PLAN

A site- and scope-specific health and safety plan (HSP) will be prepared for implementation of the work described in this scope of work. A copy of the HSP will be included in the project work plan.

SAMPLING AND CHARACTERIZATION

Clear Heart Drilling, Inc. of Santa Rosa, California, Licenses A, B, C-57 #780357, will perform the drilling and sample collection.

Borings will be drilled to a depth of approximately 25 feet below ground surface (fbgs), or to the maximum excavation depth planned for the area around each boring.

Soil and groundwater samples will be collected in accordance with West Yost standard operating procedures. Soil samples will be collected at a minimum of every five vertical feet of lineal boring. One four-point composite soil sample will be compiled from the samples collected from each

boring. All samples will be logged and transported under chain of custody documentation for analysis.

All borings will be drilled using solid flight or hollow stem auger methods. All borings will be completed in accordance with the SMCEHD guidelines and permit conditions.

Borings will be carefully abandoned by slowly pouring $\frac{3}{8}$ -inch bentonite chips from the bottom of the boring up to 1.5 fbgs. The depth of the hole will be continually monitored during pouring to ensure bridging does not occur. If borehole walls are not stable, a tremmie pipe will be used for emplacement of bentonite. At approximately every foot of hole filled, the bentonite chips will be hydrated with clean and/or deionized water. No. 2/12 or #3 sand will be poured from 1.5 fbgs to 0.5 fbg to provide for expansion of hydrated bentonite. Asphalt will be emplaced from 0.5 fbgs to grade, and the surface will be well compacted and swept clear of debris.

STANDARD OPERATING PROCEDURES

All work will be conducted in accordance with the attached standard operating procedures (Attachment A):

- Borings will be logged in accordance with Logging Procedure.
- Organic Vapor Meter (OVM) readings will be measured during drilling in accordance with OVM Reading Procedure.
- Soil samples will be collected from the borings in accordance with Soil Sampling Procedure.

The borings will be abandoned immediately following the sampling work in accordance with County requirements (as discussed in the previous paragraph). Soil cuttings and groundwater generated from the drilling work will be collected in Department of Transportation (DOT)-approved 55-gallon drums and transported to a City corp. yard for temporary storage pending coordination of off-haul and disposal.

ANALYTICAL PROTOCOL

Selected soil samples will be analyzed for the following: total petroleum hydrocarbons (TPH) as gasoline (g), diesel (d), and motor oil (mo); volatile organic compounds (VOCs) including benzene, toluene, ethylbenzene, and xylenes (BTEX), Methyl tert-butyl ether (MTBE), and perchloroethylene (PCE); polychlorinated biphenyls (PCBs); Phenols; CAM 17 metals; organic lead; and reactivity, corrosivity, and ignitability (RCI).

A state-certified laboratory will conduct the chemical analyses.

REPORT PREPARATION

A report summarizing the field activities will be prepared and submitted to Mid-Peninsula Water District and SMCEHD. The report will include a map of sample locations, tabulated laboratory analytical results, copies of disposal correspondences, and conclusions.

Mr. Rene Ramirez
October 20, 2017
Page 4

Please call me if you have any questions about this scope of work. We appreciate the opportunity to assist the District with this project.

Sincerely,

WEST YOST ASSOCIATES

A handwritten signature in blue ink, appearing to read 'Andrew S. Rodgers', with a long horizontal stroke extending to the right.

Andrew S. Rodgers, CHMM, CPESC
Engineering Manager

A handwritten signature in blue ink, appearing to read 'Peter A. Dellevalle', with a stylized, cursive script.

Peter A. Dellevalle, PG
Principal Hydrogeologist

PD:lh

| West Yost Associates | P/V/P \$273 | EM/SM/GM II \$263 | PE/PS/PG I \$229 | ESG II \$170 | SGISA \$200 | ADM III \$114 | Labor | | Sub. CHD | Sub. McC | Sub. EHD | Sub. CSC | Sub. CTC | Costs | | |
|---|---------------------------------------|----------------------|---------------------|-----------------|----------------|------------------|-------|----------|-------------|-------------|-------------|-------------|-------------|--------------------------|-----------------|----------------|
| | | | | | | | Hours | Fee | | | | | | Sub. w/ markup 10% | Other Direct | Total Costs |
| PROJECT: SR101 Crossing | | | | | | | | | | | | | | | | |
| Task 1 | Project Planning & Permit Application | | | | | | | | | | | | | | | |
| 1.01 Permit Application (County & City) | | | 2 | | | 1 | 3 | \$ 572 | | | \$ 686 | | | \$ 755 | | \$ 1,327 |
| 1.02 Utility Clearance & Traffic Control | | | 2 | 4 | | | 6 | \$ 1,138 | | | | \$ 500 | \$ 1,110 | \$ 1,771 | | \$ 2,909 |
| Subtotal, Task 1 (hours) | 0 | 0 | 4 | 4 | 0 | 1 | 9 | | | | | | | | | |
| Subtotal, Task 1 (\$) | | | \$ 916 | \$ 680 | | \$ 114 | | \$ 1,710 | | | \$ 686 | \$ 500 | \$ 1,110 | \$ 2,526 | | \$ 4,236 |
| Task 2 | Field Investigation | | | | | | | | | | | | | | | |
| 2.01 Drilling & Sample Collection | | | 4 | 10 | | | 14 | \$ 2,616 | \$ 2,786 | \$ 1,000 | | | | \$ 4,164 | | \$ 6,780 |
| Subtotal, Task 2 (hours) | 0 | 0 | 4 | 10 | 0 | 0 | 14 | | | | | | | | | |
| Subtotal, Task 2 (\$) | | | \$ 916 | \$ 1,700 | | | | \$ 2,616 | \$ 2,786 | \$ 1,000 | | | | \$ 4,164 | | \$ 6,780 |
| Task 3 | TM | | | | | | | | | | | | | | | |
| 3.01 | 1 | 1 | 4 | 6 | 2 | 4 | 18 | \$ 3,328 | | | | | | | | \$ 3,328 |
| Subtotal, Task 3 (hours) | 1 | 1 | 4 | 6 | 2 | 4 | 18 | | | | | | | | | |
| Subtotal, Task 3 (\$) | \$ 273 | \$ 263 | \$ 916 | \$ 1,020 | \$ 400 | \$ 456 | | \$ 3,328 | | | | | | | | \$ 3,328 |
| Task 4 | PM | | | | | | | | | | | | | | | |
| 4.01 Two months PM, accouting & invoicing | 1 | 1 | 2 | | | | 4 | \$ 994 | | | | | | | | \$ 994 |
| Subtotal, Task 4 (hours) | 1 | 1 | 2 | 0 | 0 | 0 | 4 | | | | | | | | | |
| Subtotal, Task 4 (\$) | \$ 273 | \$ 263 | \$ 458 | | | | | \$ 994 | | | | | | | | \$ 994 |
| SUBTOTAL FROM ALL TASKS ABOVE (\$) | \$ 546 | \$ 526 | \$ 3,206 | \$ 3,400 | \$ 400 | \$ 570 | | \$ 8,648 | | | | | | | | \$ 15,338 |
| * 15% Contingency | \$ 82 | \$ 79 | \$ 481 | \$ 510 | \$ 60 | \$ 86 | | \$ 1,297 | | | | | | | | \$ 2,301 |
| TOTAL (hours) | 2 | 2 | 14 | 20 | 2 | 5 | 45 | | | | | | | | | |
| TOTAL (\$) | \$ 628 | \$ 605 | \$ 3,687 | \$ 3,910 | \$ 460 | \$ 656 | | \$ 9,945 | \$ 2,786 | \$ 1,000 | \$ 686 | \$ 500 | \$ 1,110 | \$ 4,460 | | \$ 17,638 |

ATTACHMENT A

LOGGING PROCEDURE

The following describes the methods used in logging and classifying soils encountered during the subsurface investigation.

Unconsolidated soil is classified and described by trained field personnel. All available information is used, including the following: soil recovered in the sampler, including the soil visible on both ends of the sample retained for possible analysis; soil cuttings generated during drilling; and the drilling contractor's observations of the drill rig's behavior.

Classification and description of unconsolidated soil is accomplished using the American Society of Testing and Materials (ASTM) Methods D2487-85 (Unified Soil Classification System (USCS)) and/or D2488-69 (Description and Identification of Soils (Visual-Manual Procedure)).

The soil classification and description is recorded on the field log sheet by field personnel and includes the following information:

1. Soil type;
2. Soil classification;
3. Soil color, including mottling;
4. Moisture content;
5. Plasticity and consistency (fine-grained material) or density (coarse-grained material);
6. Percentages of clay, silt, sand and gravel;
7. Grain size range of sands and gravels;
8. Angularity and largest diameter of gravel component;
9. Estimated permeability;
10. Odor; and
11. Any other observations which would assist in the interpretation of the depositional environment and/or differentiation between the various geologic units expected to be encountered.

In addition to the above, the ground water levels encountered during drilling and measured after the water stabilized is also recorded on the field log.

ATTACHMENT A

OVM READINGS PROCEDURE

The following describes the procedure used for monitoring volatile organic compounds during field work.

Field personnel will use an organic vapor meter (OVM) to determine the presence or absence of volatile organic compounds (VOCs) in soil samples chosen for field screening. The OVM uses a photoionization detector (PID) and is calibrated prior to field work to 100 parts per million of 1-liter of isobutylene. The OVM, which measures in parts per million by volume (ppmv), is used for qualitative, not quantitative, assessment because the correlation between the volume measurements of the OVM and the weight measurements of the laboratory instruments is not well defined.

A field screen sample is obtained from the brass tube immediately above or below the brass tube containing the sample selected for possible analysis. A clod of the soil (approximately 50 grams) to be screened is removed from the brass tube, and is placed in a Zip-Lock freezer bag and sealed.

The field screen sample is separated into several pieces in the bag and allowed to temperature equilibrate for approximately 15 to 30 minutes in the sun, allowing any VOCs which might be present in the soil to volatilize out into the bag's headspace. The OVM nozzle is then placed inside the sealed bag, by puncturing a small hole in the side of the bag, in order to measure the VOCs present, if any, in the headspace. The nozzle remains inside the bag for approximately 15 to 30 seconds or until the maximum reading has been recorded on the OVM readout panel.

The depth from which the sample came and the corresponding OVM reading is recorded on the original field log sheet. Field observations, OVM and (odor and staining) readings are used in determining which soil samples are to be analyzed in the laboratory.

ATTACHMENT A

SOIL SAMPLING PROCEDURE

The following describes soil sampling procedures that will be used by field personnel to collect, handle, and transport soil samples.

Before samples are collected, careful consideration is given to the type of analysis to be performed so that precautions are taken to prevent loss of volatile components or contamination of the sample, and to preserve the sample for subsequent analysis. All drilling and sampling equipment is steam-cleaned between boreholes to prevent cross-contamination. The sampler is washed with an EPA approved detergent (such as liquinox or trisodium phosphate) between sample collection.

Soil samples are collected at pre-specified depth intervals or at a sediment/lithologic change for hydrogeologic description and possible chemical analysis. Samples are collected using a modified California split-spoon sampler lined with 1.5-, 2- or 2.5-inch I.D. x 4- or 6-inch long steamed-cleaned or new brass tubes. The sampler is lowered into the borehole and driven 18 or 24 inches, using a 140-pound hammer. The drilling contractor provides the field personnel with the number of blows required to drive the sampler for each 6 inches of penetration.

The sampler is then extracted from the borehole and the middle or bottom brass tube is carefully removed for possible analysis. The soil material is immediately trimmed flush with the tube ends, and sealed with Teflon tape beneath polyethylene end caps. The caps are hermetically sealed to the brass tube with duct tape. The sample is then labeled to include the date, boring number, depth of sample, project number, and the field personnel's initials. The samples are put into a plastic "zip-lock" type bag and placed into an ice chest maintained below 4°C with blue ice or dry ice, for transport under chain of custody to the laboratory. The chain-of-custody form includes the project number, analysis requested, sample ID, date, time, sample matrix and the field personnel's name. The form is signed, dated and timed by each person who yields or receives the samples beginning with the field personnel and ending with the laboratory personnel.

Upon completion of soil sample collection, the boring is grouted with Portland Cement and 3 to 5% bentonite or bentonite hole plug.

ATTACHMENT A

GRAB GROUNDWATER SAMPLING PROCEDURE

The following describes water sampling procedures that will be used by field personnel to collect, handle, and transport grab groundwater samples.

Before samples are collected, careful consideration is given to the type of analysis to be performed so that precautions are taken to prevent loss of volatile components or contamination of the sample, and to preserve the sample for subsequent analysis.

Prior to sampling, water is checked for the presence of free-phase hydrocarbons. Field personnel may use an interface probe, product thickness bailer or hydrocarbon sensitive tape. Product thickness (measured to the nearest 0.01 foot) is noted on the sampling form. Water level measurements are also made using either a water level meter or the interface probe.

Water samples are collected using disposable polyethylene or steam-cleaned Teflon bailers. The water samples are decanted into the appropriate container for the analysis to be performed. Pre-preserved sample containers may be used or the analytical laboratory may add preservative to the sample upon arrival. Duplicate samples may be collected from each well as a back-up sample and/or to provide quality control. The samples are labeled to include the date, project name, well ID, preservation, and the field personnel's initials. The samples are stored in pre-cut foam protection and placed into a plastic "zip-lock" type bag and placed into an ice chest maintained below 4°C with blue ice or dry ice, for transport under chain of custody to the laboratory.

The chain-of-custody form includes the project number, analysis requested, sample ID, date, time, sample matrix and the field personnel's name. The form is signed, dated and timed by each person who yields or receives the samples beginning with the field personnel and ending with the laboratory personnel.

All sampling equipment is decontaminated and/or steam-cleaned prior to and following sampling of monitor wells to prevent cross-contamination. Non steam clean decontamination includes washing the sampler and purge equipment with an EPA approved detergent (such as liquinox or trisodium phosphate).

APPENDIX F

FEMA Firm Map

APPENDIX G

PAMF Alternative Costs

Project: SR101 Crossing at PAMF - Alternative Alignment Costs

Job No.: 768-14-17-01

Date: 10/10/2017

Calc. By: NAM

Chkd. By: JDG

| PAMF Alternative 1A | | | | | |
|---------------------|--------------------------------|---------|------|-----------|------------|
| ITEM | DESCRIPTION | QTY | UNIT | UNIT COST | TOTAL |
| 1 | Tree removal | 35 | EA | \$ 1,000 | \$ 35,000 |
| 2 | Fence Remove & Replace | 750 | LF | \$ 10 | \$ 7,500 |
| 3 | Open Cut 12-inch pipe | 750 | LF | \$ 240 | \$ 180,000 |
| SUBTOTAL | | | | | \$ 222,500 |
| PAMF Alternative 1B | | | | | |
| ITEM | DESCRIPTION | QTY | UNIT | UNIT COST | TOTAL |
| 1 | Tree removal | 7 | EA | \$ 1,000 | \$ 7,000 |
| 2 | 2nd Launch Pit | 120,000 | LS | \$ 1 | \$ 120,000 |
| 3 | 2nd Receive Pit | 75,000 | LS | \$ 1 | \$ 75,000 |
| 4 | Tunnel | 750 | LF | \$ 360 | \$ 270,000 |
| SUBTOTAL | | | | | \$ 472,000 |
| PAMF Alternative 2 | | | | | |
| ITEM | DESCRIPTION | QTY | UNIT | UNIT COST | TOTAL |
| 1 | Tree removal | 23 | EA | \$ 1,000 | \$ 23,000 |
| 2 | Fence Remove & Replace | 375 | LF | \$ 10 | \$ 3,750 |
| 3 | Open Cut 12-inch pipe easement | 375 | LF | \$ 240 | \$ 90,000 |
| 4 | Open Cut 12-inch pipe street | 375 | LF | \$ 320 | \$ 120,000 |
| 5 | Overlay | 7,000 | SF | \$ 2 | \$ 14,000 |
| SUBTOTAL | | | | | \$ 250,750 |
| PAMF Alternative 3 | | | | | |
| ITEM | DESCRIPTION | QTY | UNIT | UNIT COST | TOTAL |
| 1 | Tree removal | 8 | EA | \$ 1,000 | \$ 8,000 |
| 2 | Fence Remove & Replace | 375 | LF | \$ 10 | \$ 3,750 |
| 3 | Open Cut 12-inch pipe easement | 0 | LF | \$ 240 | \$ - |
| 4 | Open Cut 12-inch pipe street | 375 | LF | \$ 320 | \$ 120,000 |
| 5 | Overlay | 14,000 | SF | \$ 2 | \$ 28,000 |
| SUBTOTAL | | | | | \$ 159,750 |

Project: SR101 Crossing at PAMF - Alternative Alignment Costs

Job No.: 768-14-17-01

Date: 11/16/2017

Calc. By: NAM

Chkd. By: JDG

SR101 Crossing Alternative 1

| ITEM | DESCRIPTION | QTY | UNIT | UNIT COST | TOTAL |
|-----------------|----------------------|-----|------|-----------|-------------------|
| 1 | Tunnel | 265 | LF | \$ 900 | \$ 238,500 |
| 2 | Open Cut 8-inch pipe | 135 | LF | \$ 250 | \$ 33,750 |
| SUBTOTAL | | | | | \$ 272,250 |

SR101 Crossing Alternative 2

| ITEM | DESCRIPTION | QTY | UNIT | UNIT COST | TOTAL |
|-----------------|----------------------|-----|------|-----------|-------------------|
| 1 | Tunnel | 325 | LF | \$ 900 | \$ 292,500 |
| 2 | Open Cut 8-inch pipe | 0 | LF | \$ 250 | \$ - |
| SUBTOTAL | | | | | \$ 292,500 |

APPENDIX H

PAMF Easement

RECORDING REQUESTED BY AND
WHEN RECORDED, MAIL TO:

Mid-Peninsula Water District
3 Dairy Lane
P.O. Box 129
Belmont, CA 94002
Attention: General Manager

2012-098336

2:03 pm 07/12/12 AG Fee: 48.00

Count of Pages 12

Recorded in Official Records

County of San Mateo

Mark Church

Assessor-County Clerk-Recorder



SPACE ABOVE THIS LINE FOR RECORDING USE

PIPELINE EASEMENT AGREEMENT

This PIPELINE EASEMENT AGREEMENT ("Agreement"), dated as of 6/13/12, 2012 is made by and between by and between PALO ALTO MEDICAL FOUNDATION FOR HEALTHCARE, RESEARCH AND EDUCATION (SAN CARLOS CENTER), a California nonprofit, public benefit corporation ("Grantor"), and MID-PENINSULA WATER DISTRICT, a public corporation organized under the provisions of Division 12 of the Water Code of the State of California, ("Grantee") (each a "Party" and collectively, the "Parties"). **No consideration for this transfer. Document transfer fee - \$0.00**

RECITALS

- A. The Parties are executing concurrently herewith a Water Service Agreement ("WSA") providing for the design, installation and maintenance of a water system that will connect Grantor's San Carlos Center Project ("Project") to Grantee's existing water system.
- B. The WSA provides that Grantor will confer upon Grantee a non-exclusive easement along the north side of the Project for the construction, installation and maintenance of an underground water pipeline.
- C. The Parties intend that the foregoing requirement of the WSA be satisfied in accordance with the provisions, terms and conditions of this Agreement.

AGREEMENT

NOW, THEREFORE, in consideration of the foregoing recitals, the mutual covenants contained herein, and other good and valuable consideration, the receipt and adequacy of which is hereby acknowledged, the Parties agree as follows:

1. **Grant of Easement.** Grantor hereby grants to Grantee, and its successors and assigns, a perpetual, irrevocable, non-exclusive easement and right of way in gross (the "Easement") in, on, over, under, along and across that certain fifteen-foot (15') wide strip of land and that certain approximate forty-foot by forty-foot (40' x 40') area at the northeast corner of Grantor's property (collectively, the "Right of Way"), a legal description for which is set forth at **Exhibit A**, and a map of which is set forth at **Exhibit B**, attached hereto and incorporated herein,

for the purposes of laying, constructing, installing, and thereafter of operating, maintaining, inspecting, altering, improving, repairing, reconstructing, replacing, and removing an underground pipeline, meter boxes, valves, pumps, vents and related facilities (collectively, "Water Pipeline Facilities"), as needed, for the transportation of water across and through the Right of Way.

2. Ownership of Property. Grantor represents and warrants to Grantee that it owns the land within the Right of Way in fee simple, subject only to outstanding encumbrances, if any, which Grantor represents and warrants do not prevent the purposes of this Agreement, now of record in the county in which the Right of Way is located and that it acquired title to and is the current lawful owner of the land located within the Right of Way.

3. Terms and Conditions of Easement.

a. Installation During Construction of the Project. In addition to the purposes set forth above, Grantee may elect, at a time during construction of the Project that is mutually acceptable to the Parties to install a pipe, capped for future use under the terms of this Agreement if Grantee so chooses, within the Right of Way to allow Grantee to connect that pipe to Grantee's water supply system in the future without the need to excavate the entire Right of Way after completion of construction of the Project.

b. Grantee's Use. Grantee's Water Pipeline Facilities shall not interfere with Grantor's use of Grantor's property contiguous to and within the Right of Way, subject to the limits contained herein. Grantee must minimize impacts to Grantor's property whenever it engages in any activity permitted by this Agreement. In the event of any future construction, maintenance, repair, replacement or improvement to the Water Pipeline Facilities authorized by this Agreement, Grantee shall restore the surface of the property, including any landscape or paving, to the same condition it was in before such construction, maintenance, repair, replacement or improvement took place.

c. Non-Exclusive. The Easement shall be non-exclusive, except that Grantor shall not place or permit to be placed any building or other permanent structure within the Right of Way. Grantor's installation of landscape and paving within the Right of Way shall not be construed as impairing Grantee's rights hereunder. Grantor shall not conduct or permit any activity, nor grant any rights to any third party, on or in the Right of Way or the Grantor's property, that would unreasonably interfere with Grantee's use or enjoyment of the Easement and appurtenant rights granted to Grantee under this Agreement

d. Termination. If within twenty-five (25) years of the date of recordation of this Agreement, Grantee does not connect a pipeline, whether installed during construction of the Project or in the future, that makes use of the Right of Way, Grantor may request in writing to Grantee that the Easement be terminated. Upon receipt of such request, District will execute and deliver to Developer a recordable quitclaim of the Easement, and any District facilities then present within the Right of Way shall become Developer's property. Notwithstanding the foregoing, Grantee may exercise an option, in writing, under the terms of the WSA, to extend the Easement for an additional ten (10) years. If Grantee exercises that option, the Parties will execute and record a notice to that effect. If after exercising the option,

Grantee has not connected a pipeline within the additional ten (10) years, Grantor may request in writing to Grantee that the Easement be terminated. Upon receipt of such request, District will execute and deliver to Developer a recordable quitclaim of the Easement, and any District facilities then present within the Right of Way shall become Developer's property.

e. Incidental Easement Rights. The Easement includes all incidental and appurtenant surface and subsurface rights and easements of access, ingress and egress, construction, maintenance, inspection, installation, connection, repair, and replacement reasonably necessary and appropriate to the uses of the Easement, including but not limited to the rights of ingress and egress over and across adjacent portions of Grantor's property, at convenient points and in such a manner as not to impair Grantor's use of its adjacent property, for the enjoyment of the uses, rights and privileges granted under this Agreement.

4. Exercise of Rights. The rights granted hereunder to Grantee may be used and exercised by Grantee and its employees, licensees, agents, representatives, contractors, subcontractors, materialmen and consultants.

5. Grantee's Entry Upon Grantor's Property. Any entry by Grantee upon Grantor's property shall be performed with due care and in accordance with standard safety and security requirements applicable to such activities, including without limitation, complying with standard requirements to prevent injury or adverse impacts to or upon Grantor's property.

6. Indemnification and Hold Harmless. To the extent allowed by law, Grantee agrees to hold and save Grantor and its employees, agents, successors and assigns harmless from and indemnify Grantor and its employees, agents, successors and assigns against any claims, demands, damages, costs, injuries, or liabilities of any kind which may arise as the result of Grantee's exercise of its rights pursuant to this Agreement. Grantor's indemnity rights include, without limitation, its costs of defense against such claims, demands, or liability, and the right to be defended by counsel of its choice.

7. Insurance. Prior to performing any work covered by this insurance clause, Grantee or its contractors shall acquire and maintain insurance coverage during the time the work is performed with an insurer acceptable to Grantor, naming Grantor and Grantor's and its employees, agents, successors and assigns as additional insureds (excluding workers' compensation and professional liability insurance). The limits of insurance shall not limit the liability of Grantee hereunder.

a. Covered Work. The work covered by this insurance clause includes any construction, installation, operation, maintenance, inspection, alteration, improvement, repair, reconstruction, replacement or removal of Water Pipeline Facilities that involves surface disturbance exceeding an area of one cubic yard or the presence of heavy equipment at the Project site for a period of time exceeding eight (8) hours.

b. Term. Policies of insurance shall be for a period of time sufficient to encompass the work covered by this insurance clause. If Grantee fails to procure and maintain said insurance, Grantor may, but shall not be required to, procure and maintain the same, and the premiums of such insurance shall be paid by Grantee to Grantor upon demand.

c. Minimum Scope of Insurance. Grantee or its contractors shall procure the following insurance forms:

(1) Insurance Services Office (ISO) Commercial General Liability Occurrence form number CG 0001 or equivalent ISO form. A non-ISO form must be reviewed and approved by Grantor's Risk Manager prior to acceptance of the Agreement.

(2) ISO Business Auto Coverage form number CA 0001 0187 covering Automobile Liability, code 1 "any auto" and Endorsement CA 0029.

d. Minimum Limits of Insurance. Grantee or its contractors shall maintain limits no less than:

(1) Commercial General Liability: One Million Dollars (\$1,000,000) combined single limit per occurrence for bodily injury, personal injury and property damage. If Commercial General Liability Insurance of other form with general aggregate limit is used, either the general aggregate limit shall apply separately to this Agreement or the general aggregate limit shall be twice the required occurrence limit.

(2) Automobile Liability: \$1,000,000 combined single limit per accident for bodily injury or property damage.

e. Contractors. Coverages for contractors shall be subject to all of the requirements stated herein. If Grantee requires its contractors to provide insurance coverage, then Grantee shall be named as an additional insured under such policies (excluding worker's compensation and professional liability insurance).

f. Deductibles and Self-Insured Retentions. Except as otherwise provided in this Agreement, any deductibles or self-insured retentions in excess of Ten thousand dollars (\$10,000.00) must be declared to and approved by Grantor. At the option of Grantor, either the insurer shall reduce or eliminate such deductions or self-insured retentions as respects Grantor, its officials, employees and agents; or, Grantee shall procure a bond provision guaranteeing payment of losses and related investigations, claim administration and defense expenses.

g. Verification of Coverage. Grantee shall furnish Grantor with Certificates of Insurance and with original endorsements effecting coverage required by this clause. The certificate(s) and endorsement(s) for each insurance policy are to be signed by a person authorized by the insurer to bind coverage on its behalf, and shall be approved by Grantor before work commences.

8. Recording. Grantor shall record this Agreement in the Official Records of the County of San Mateo, California, and may re-record it at any time.

9. Amendments. This Agreement may only be amended in writing by an amendment hereto executed by Grantor or its successors or assigns and Grantee or its successors and assigns and recorded in the Official Records of the County of Santa Clara, California.

10. Successors and Assigns. This Agreement shall be binding upon and inure to the benefit of the respective heirs, administrators, executors, legal representatives, successors and assigns of the parties hereto.

11. Inurement, Benefit, Binding Effect. This Agreement shall inure to the benefit of and shall be binding upon the executors, administrators, heirs, successors and assigns of the parties and shall be and are covenants running with the land and equitable servitudes binding upon the Right of Way and every person having any fee, leasehold or other interest therein. The covenants and agreements of Grantor set forth in this Agreement are established for the mutual benefit of Grantee and Grantor, shall be covenants running with the land pursuant to applicable law, are intended to comply with the requirements of Section 1468 of the California Civil Code or any similar statute in effect from time to time, and will apply to and be binding on Grantor and any parties having or acquiring any right, title or interest in the Right of Way or any part thereof. This Agreement is not intended to grant rights to the public in general.

12. Governing Law. The rights and obligations of the parties and the interpretation and performance of this Agreement shall be governed by the law of the State of California, excluding its conflict of laws rules.

13. Entire Agreement. This Agreement and any agreement referenced herein constitute the entire agreement between the Parties, all oral agreements being merged herein, and supersedes all prior representations. There are no representations, agreements, arrangements, or understandings, oral or written, between or among the parties relating to the subject matter of this Agreement that are not fully expressed herein.

14. Attorneys' Fees. If the services of an attorney are required by any party to secure the performance of this Agreement or otherwise upon the breach or default of another party, or if any judicial remedy or arbitration is necessary to enforce or interpret any provision of this Agreement or the rights and duties of any person in relation thereto, the prevailing party shall be entitled to reasonable attorneys' fees, costs and other expenses, in addition to any other relief to which such party may be entitled.

15. No Waiver. Failure by either party to enforce any covenant, restriction or other provision of this Agreement or to seek redress for the breach of or default in performance under any such covenant, restriction or other provision of this Agreement shall in no way constitute a waiver of the right to enforce such covenant, restriction or provision of this Agreement or seek redress for the breach thereof. The waiver by either party hereto of a breach of any provision of this Agreement shall not be deemed a continuing waiver or a waiver of any subsequent breach of the same or any other provision hereof.

16. Severability. In the event any term or provision of this Agreement shall be held to be unenforceable for any reason whatsoever by any court of competent jurisdiction, such holding shall not invalidate or render unenforceable any other term or provision hereof.

17. Further Assurances. From and after the execution, delivery and recordation of this Agreement, each party shall cooperate with the other party in taking such actions, executing such instruments and granting such rights as may be reasonably necessary to effectuate the purposes of the parties in entering into this Agreement and to perfect the rights granted hereunder.

18. Construction/Exhibits. The captions in this Agreement are provided solely for convenience of reference and are not part of this Agreement and shall have no effect on its construction or interpretation. Unless otherwise indicated, all references to paragraphs, sections, subparagraphs and subsections are to this Agreement. All exhibits referred to in this Agreement are attached and incorporated herein by this reference.

19. Capacity. Each individual executing this Agreement in a capacity other than individually, acknowledges and warrants that he or she has full power and authority to enter into this Agreement in such other capacity and on behalf of the person or entity identified with their signature and that this Agreement shall be binding upon such person or entity.

20. Counterparts. This Agreement may be executed in two or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument. This Agreement shall not be effective until the execution and delivery between each of the parties of at least one set of counterparts. The parties authorize each other to detach and combine original signature pages and consolidate them into a single identical original. Any one of such completely executed counterparts shall be sufficient proof of this Agreement.

The Parties have executed this Agreement as of the date set forth above.

GRANTOR:

PALO ALTO MEDICAL FOUNDATION

By: 

Name: Richard Slavin, MD

Title: CEO

GRANTEE:

MID-PENINSULA WATER DISTRICT

By: 

Name: Paul R. Ryan

Title: General Manager

APPROVED AS TO FORM:

MID-PENINSULA WATER DISTRICT

By: 

Attorney for District

ACKNOWLEDGMENTS

STATE OF CALIFORNIA)
) ss.
COUNTY OF SANTA CLARA)

On JUNE 13, 2012, before me, HILDA D. ESQUIVEL, a Notary Public in and for the State of California, personally appeared RICHARD SLAVIN, who proved to me on the basis of satisfactory evidence to be the person whose name is subscribed to the within instrument, and acknowledged to me that he or she executed the same in his or her authorized capacity and that, by his or her signature on the instrument, the person or the entity upon behalf of which he or she acted, executed the instrument.

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

WITNESS my hand and official seal.



Hilda D. Esquivel
Notary Public in and for said State

STATE OF CALIFORNIA)
) ss.
COUNTY OF _____)

On _____, 2012, before me, _____, a Notary Public in and for the State of California, personally appeared _____, who proved to me on the basis of satisfactory evidence to be the person whose name is subscribed to the within instrument, and acknowledged to me that he or she executed the same in his or her authorized capacity and that, by his or her signature on the instrument, the person or the entity upon behalf of which he or she acted, executed the instrument.

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

WITNESS my hand and official seal.

Notary Public in and for said State

EXHIBIT A

LEGAL DESCRIPTION OF RIGHT OF WAY



ENGINEERS
SURVEYORS
PLANNERS

July 29, 2011

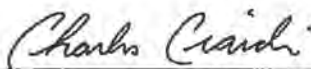
LEGAL DESCRIPTION

All that real property situate in the City of San Carlos, County of San Mateo, State of California, being a portion of Parcel 1, as said parcel is shown on that certain Parcel Map, filed for record on April 5, 1973, in Book 20 of Parcel Maps, at Page 23, in the Office of the Recorder for the County of San Mateo, State of California, being more particularly described as follows:

BEGINNING at the westerly corner of said Parcel 1 as shown on said map; thence northeasterly along the northwesterly line of said parcel, North $47^{\circ}51'36''$ East, 752.91 feet to the northerly corner of said parcel; thence southeasterly along the northeasterly line of said parcel, South $37^{\circ}56'04''$ East, 40.11 feet; thence leaving said northeasterly line, South $47^{\circ}51'36''$ West, 40.00 feet; thence North $42^{\circ}08'24''$ West, 25.00 feet; thence South $47^{\circ}51'36''$ West, 709.97 feet to a point on the southwesterly line of said parcel; thence northwesterly along said southwesterly line, North $42^{\circ}08'24''$ West, 15.00 feet to the POINT OF BEGINNING and containing an area of 12,308 square feet, more or less.

A plat showing the above-described lands is attached herein and made a part hereof.

This description was prepared by me or under my direction in conformance with the Professional Land Surveyors' Act.


Charles R. Ciardi, PLS 7321



7/29/11
Dated

END OF DESCRIPTION



TAYLOR BLVD.

INDUSTRIAL WAY

BAYSHORE HIGHWAY

POINT OF
BEGINNING

S37°56'04"E
40.11'

N47°51'36"E 752.91'

N42°08'24"W
15.00'

S47°51'36"W 709.97'

N42°08'24"W
25.00'

S47°51'36"W
40.00'

**DESCRIBED
AREA**

12,308 S.F.±

PARCEL 1

20 PM 23

N42°08'24"W 1153.65'

N37°56'04"W 739.82'

R=447.00'
Δ=33°54'48"
L=264.58'

R=553.00'
Δ=02°38'41"
L=25.53'

N46°51'36"E
476.39'

182.93'
N04°01'16"W



255 SHORELINE DR
SUITE 200
REDWOOD CITY, CA 94065
650-482-6300
650-482-6399 (FAX)

Subject _____

Job No. 20060142-10

By CRM Date 7/27/11 Chkd. CRC

SHEET 1 OF 1

2011-07-27 Plat.txt

Parcel name: Described Area

| | |
|---------------------------|------------------|
| North: 5876.1761 | East : 9308.4244 |
| Line Course: N 47-51-36 E | Length: 752.91 |
| North: 6381.3369 | East : 9866.7129 |
| Line Course: S 37-56-04 E | Length: 40.11 |
| North: 6349.7015 | East : 9891.3709 |
| Line Course: S 47-51-36 W | Length: 40.00 |
| North: 6322.8637 | East : 9861.7106 |
| Line Course: N 42-08-24 W | Length: 25.00 |
| North: 6341.4014 | East : 9844.9370 |
| Line Course: S 47-51-36 W | Length: 709.97 |
| North: 5865.0510 | East : 9318.4888 |
| Line Course: N 42-08-24 W | Length: 15.00 |
| North: 5876.1736 | East : 9308.4247 |

Perimeter: 1582.99 Area: 12,308 sq.ft. 0.28 acres

Mapcheck Closure - (Uses listed courses, radii, and deltas)

Error Closure: 0.0025 Course: S 05-56-23 E

Error North: -0.00246 East : 0.00026

Precision 1: 633,196.00



APPENDIX I

30% Cost Estimate

ENGINEER'S OPINION OF PROBABLE COSTS

Owner: Mid-Peninsula Water District
Project: SR 101 Crossing at PAMF
Percent Complete: 30%
Prepared By: LCO
Reviewed By: NAM
Date: 9/22/17



| ITEM | DESCRIPTION | QTY | UNIT | UNIT COST | TOTAL |
|------|--|--------|------|------------|------------|
| 1 | Mobilization and Demobilization | 1 | LS | \$ 70,000 | \$ 70,000 |
| 2 | Sheeting, Shoring, and Bracing | 1 | LS | \$ 25,000 | \$ 25,000 |
| 3 | Traffic Control | 1 | LS | \$ 100,000 | \$ 100,000 |
| 4 | Construct Jacking Shaft | 1 | LS | \$ 125,000 | \$ 125,000 |
| 5 | Construct Receiving Shaft | 1 | LS | \$ 75,000 | \$ 75,000 |
| 6 | Construct 24-inch Steel Casing by Pilot Tube Guided Boring (PTGB) (Assumes SR101 Crossing Alternative 2-includes carrier pipe) | 314 | LF | \$ 900 | \$ 282,600 |
| 7 | Construct 12-inch PVC through PAMF Property (Assumes PAMF Property Alternative 3) | 750 | LF | \$ 320 | \$ 240,000 |
| 8 | Remove Trees | 8 | EA | \$ 1,000 | \$ 8,000 |
| 9 | Construct 8-inch PVC Pipe by Open Cut | 1,679 | LF | \$ 250 | \$ 419,750 |
| 10 | Abandon Existing 12-inch AC SR 101 Crossing | 1 | LS | \$ 20,000 | \$ 20,000 |
| 11 | Construct Inter-tie | 1 | LS | \$ 50,000 | \$ 50,000 |
| 12 | Dewatering | 1 | LS | \$ 25,000 | \$ 25,000 |
| 13 | Pavement Restoration | 14,000 | SF | \$ 2 | \$ 28,000 |

| | |
|----------|--------------|
| SUBTOTAL | \$ 1,468,350 |
|----------|--------------|

| | |
|-------------------|------------|
| CONTINGENCY (25%) | \$ 367,088 |
|-------------------|------------|

| | |
|-----------------|--------------|
| TOTAL (rounded) | \$ 1,835,400 |
|-----------------|--------------|

Notes:

Dewatering costs not included in this estimate. Dewatering costs will be determined at a later date.

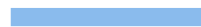
APPENDIX J

Schedule

| ID | Task Name | Duration | Start | Finish | 2nd Quarter Apr May Jun Jul Aug Sep | 3rd Quarter Oct Nov Dec | 4th Quarter Jan Feb Mar | 1st Quarter Apr May Jun Jul Aug | 2nd Quarter Sep Oct Nov Dec | 3rd Quarter Jan Feb Mar |
|----|--|------------|--------------|--------------|--|----------------------------|----------------------------|------------------------------------|--------------------------------|----------------------------|
| 1 | Notice to Proceed | 0 days | Thu 6/1/17 | Thu 6/1/17 | 6/1 | | | | | |
| 2 | Task 1. Project Management | 197.5 days | Wed 6/14/17 | Mon 3/19/18 | 6/14 | | | | | |
| 3 | Kickoff Meeting | 0 days | Wed 6/14/17 | Wed 6/14/17 | 6/14 | | | | | |
| 4 | Project Meeting | 0 days | Mon 11/6/17 | Mon 11/6/17 | | | 11/6 | | | |
| 5 | Project Meeting | 0 days | Mon 3/19/18 | Mon 3/19/18 | | | | 3/19 | | |
| 6 | Task 2. Permitting and Coordination | 4 mons | Mon 11/20/17 | Mon 3/12/18 | | | | | | |
| 7 | Task 3. Topographic Survey | 4 wks | Thu 6/29/17 | Wed 7/26/17 | 7/26 | | | | | |
| 8 | Task 4. Geotechnical Investigation | 15.5 wks | Thu 6/29/17 | Mon 10/16/17 | 10/16 | | | | | |
| 9 | Task 5. Preliminary Engineering | 102.5 days | Thu 6/29/17 | Mon 11/20/17 | | | | | | |
| 10 | Review Information | 4 wks | Thu 6/29/17 | Wed 7/26/17 | | | | | | |
| 11 | Corrosion Evaluation | 3 wks | Thu 8/10/17 | Wed 8/30/17 | | | | | | |
| 12 | Prepare 30% Drawings (Base) | 4 wks | Thu 7/27/17 | Wed 8/23/17 | | | | | | |
| 13 | Prepare Draft Report | 6 wks | Mon 9/11/17 | Mon 10/23/17 | | | 10/23 | | | |
| 14 | Review Draft Report | 2 wks | Mon 10/23/17 | Mon 11/6/17 | | | | | | |
| 15 | Prepare Final Report | 2 wks | Mon 11/6/17 | Mon 11/20/17 | | | 11/20 | | | |
| 16 | Task 6. Design Services | 125 days | Mon 11/20/17 | Mon 5/14/18 | | | | | | |
| 17 | Prepare 60% | 6 wks | Mon 11/20/17 | Mon 1/1/18 | | | 1/1 | | | |
| 18 | Review 60% | 2 wks | Mon 1/1/18 | Mon 1/15/18 | | | | | | |
| 19 | Potholing | 3 wks | Mon 1/1/18 | Mon 1/22/18 | | | | | | |
| 20 | Prepare 90% | 6 wks | Mon 1/22/18 | Mon 3/5/18 | | | 3/5 | | | |
| 21 | Review 90% | 2 wks | Mon 3/5/18 | Mon 3/19/18 | | | | | | |
| 22 | Prepare Final Draft | 4 wks | Mon 3/19/18 | Mon 4/16/18 | | | 4/16 | | | |
| 23 | Review Final Draft | 2 wks | Mon 4/16/18 | Mon 4/30/18 | | | | | | |
| 24 | Prepare Final Bid Documents | 2 wks | Mon 4/30/18 | Mon 5/14/18 | | | 5/14 | | | |
| 25 | Task 7. Bid Period Services | 20 days | Mon 5/28/18 | Mon 6/25/18 | | | | 6/25 | | |

Project: SR 101 Crossing at PAMF
Date: Sat 9/23/17

Task



Project Summary



Split



Manual Task



Milestone



Manual Summary Rollup



Summary



Deadline

