GEOTECHNICAL DESIGN REPORT

Avila Beach Drive at US 101 Interchange Improvements

County of San Luis Obispo, California

05-SLO-101-PM 20.9 – 21.3
05-1G4801 – 0515000038

Yeh Project No.: 216-423

May 17, 2023

Prepared for:
Wallace Group, Inc.
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Attn: Mr. Jorge Aguilar, P.E.

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Yeh and Associates, Inc.
Geotechnical • Geological • Construction Services

May 17, 2023 Project No. 216-423

Wallace Group, Inc.
612 Clarion Court
San Luis Obispo, California 93401

Attn: Mr. Jorge Aguilar, P.E.

Subject: Geotechnical Design Report, Avila Beach Drive at US 101 Interchange Improvements, 05-SLO-101- PM 20.9 – 21.3, 05-1G4800 - 0515000038, San Luis Obispo County, California

Dear Mr. Aguilar:

Yeh and Associates, Inc. is pleased to submit this Geotechnical Design Report for the design of improvements at the Avila Beach Drive and US 101 Interchange in San Luis Obispo County, California. This report was prepared in accordance with the terms of agreement between Yeh and Associates and Wallace Group dated August 3, 2017. This report was prepared in general accordance with Caltrans guidelines for Geotechnical Design Reports (Caltrans 2021) and presents the results of our geotechnical evaluation of the site as input to the final design of the project. Included in this report is a discussion of the site conditions, the geologic conditions, seismicity and faulting, as well as geotechnical considerations and recommendations regarding earthwork, corrosion, culverts, stormwater infiltration, and pavement design. Yeh will prepare a separate foundation report for earth retaining structures for the proposed retaining walls.

Primary geotechnical considerations associated with the project include:

- Twelve borings were drilled at the site to depths of 3.5 to 40.6 feet below the road surface on September 16 through 18, 2019. Three additional borings were drilled at to depths of 5.5 to 15 feet below the ground surface on March 26, 2021. The borings encountered very loose to very dense or very stiff to hard fill to the maximum depths explored. Groundwater was not encountered during Yeh's 2019 and 2021 field exploration programs and is not anticipated to be encountered within the depths of excavation planned for the project.
- Yeh performed infiltration testing in seven of the borings on September 20, 2019 and March 29, 2021 following the field exploration programs. Test results indicate variable potential for infiltration of stormwater at the site that is largely related to the subsurface stratigraphy.
- The site is within a seismically active region of California. The design of the improvements to new and existing structures will need to consider seismic data in accordance with Caltrans design guidelines and methods. The design earthquake is a

mean magnitude 6.69 event with a mean site to source distance of 19.9 miles (32.1 kilometers) resulting in a design peak ground acceleration of approximately 0.39g, corresponding to a 5-percent in 50 years probability of exceedance (975-year return period).

- Bulk soil samples were tested for R-value for use in pavement design for the project. A design R-value of 45 was used to calculate the hot mix asphalt concrete pavement design sections.
- Embankments and slopes at the site are vulnerable to erosion. Existing slopes below the overcrossing and along roadways have eroded where soil and rocks have collected at the back of curbs and are overflowing into roadways. Designers should include shoulders along roadways that are wide enough to catch debris and curb heights that will contain eroded material.
- The geotechnical design report has been reviewed by Caltrans on two occasions during the design process. Comments and responses are provided in Appendix D of this report. It is our understanding that comments have been addressed and that no additional revisions will be required by Caltrans.

We appreciate the opportunity to be of service. Please contact Judd King at 805-481-9590 x285 or jking@yeh-eng.com if you have questions or require additional information.

Sincerely,
YEH AND ASSOCIATES, INC.

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1. INTRODUCTION

Wallace Group retained Yeh and Associates to provide geotechnical services for the design of improvements to the Avila Beach Drive at US 101 Interchange (05-SLO-101-PM 20.9 -21.3, 05-1G4800 - 0515000038) at US 101 in San Luis Obispo County, California. The County of San Luis Obispo has identified the US 101 at Avila Beach Drive interchange southbound ramp intersection and Shell Beach Road as a capital improvement project to improve traffic flow. The project proposes to improve the intersections of Avila Beach Drive, Shell Beach Road, and US 101 southbound ramps, as well as provide access to a proposed park and ride lot west of the interchange. The location of the interchange site is shown on Figure 1. Yeh prepared a *Preliminary Geotechnical Design Report* (PGDR) for the project in 2018 (Yeh 2018). Recommendations presented in this report supersede those in the PGDR. The geotechnical evaluation for this report consisted of a program of project coordination, review of existing geotechnical data, field reconnaissance and exploration, infiltration testing, laboratory testing, and analyses. Geotechnical recommendations are provided for the design of the embankments and cut slopes, corrosion, culverts, stormwater infiltration, and pavement design. Geotechnical recommendation for the proposed retaining walls were provided in a *Foundation Report* (Yeh 2022) provided under separate cover.

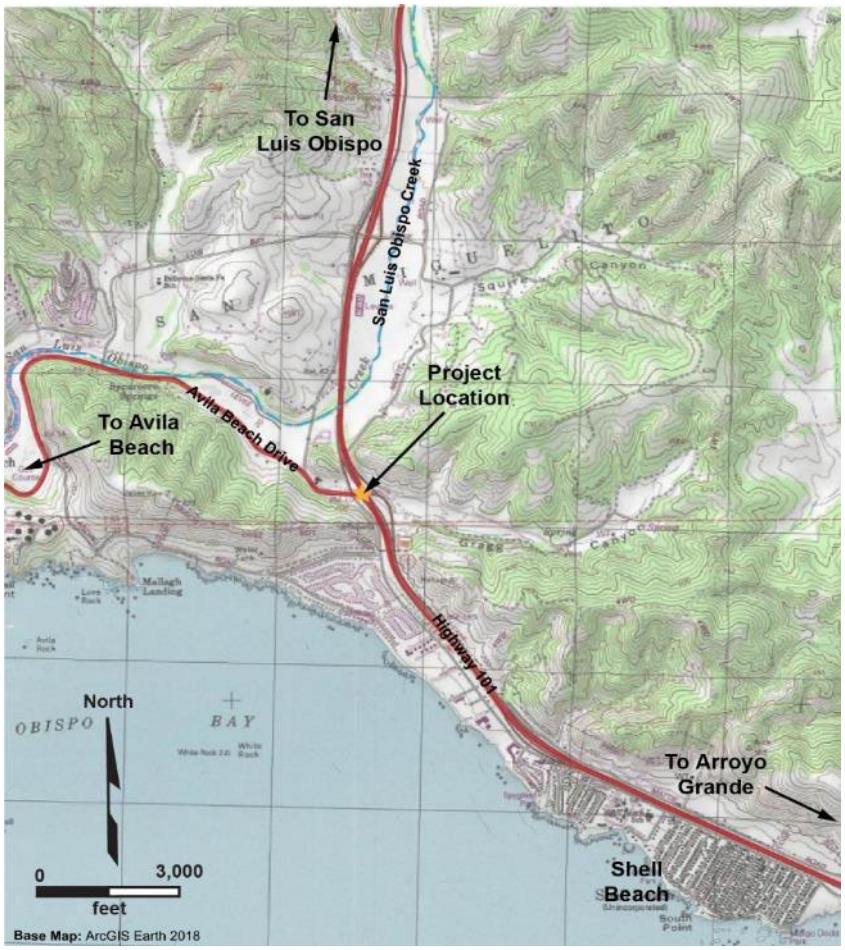


Figure 1: Project Location Map

2. PROJECT DESCRIPTION

2.1 EXISTING FACILITY

The Avila Beach Drive interchange consists of left and right undercrossing bridges on US 101 with a southbound ramp configuration and a controlled stop northbound ramp configuration that connects to the highway via Monte Road about 1,200 feet north of the undercrossing. The undercrossings (Avila Road UC, Bridge No. 49-0191L/R) are 3-span structures that were built in 1964 and are at an average elevation of about 114 feet. Caltrans added an additional southbound lane adjacent to the number 1 lane in 2009. The embankment end slopes are unpaved with a slope ratio of approximately 1.5:1 (horizontal to vertical) and the embankment side slopes between the highway mainlines and ramps have a slope ratio of about 2:1 or flatter. Avila Beach Drive runs west from the northbound off-ramp and is two lanes wide beneath the undercrossing at approximately elevation 97 feet. Elevations in this report reference North American Vertical Datum of 1988 (NAVD-88) unless otherwise noted. The road provides access to Avila Beach, Port San Luis, Diablo Canyon Power Plant, as well as multiple commercial, residential, and recreational areas along the road to Avila Beach. Shell Beach Road is a frontage route on the west side of US 101 that terminates at the intersection of Avila Beach Drive and the southbound off-ramp. Shell Beach Road connects the residential and commercial areas of Shell Beach and Pismo Beach to Avila Beach and other locations along Avila Beach Drive.

2.2 PROPOSED IMPROVEMENTS

The proposed project will improve the northbound and southbound ramp intersections of the US101/Avila Beach Drive interchange to address traffic operational deficiencies and improve multimodal access. This includes rerouting of the north and southbound off-ramps which will incorporate a roundabout at the intersection of Shell Beach Road, Avila Beach Drive, and the southbound on and off-ramps (WG 2021c). The roadway improvements will include the design of new asphalt concrete pavement, sidewalks, a pathway under the freeway overcrossing on the north side of Avila Beach Drive, surface drainage, stormwater infiltration, as well as a Park and Ride – RTA bus stop facility at the southwest corner of the intersection of Avila Beach Drive and Shell Beach Road. Anticipated grading will include cuts up to 5 feet and fills up to 10 feet to construct the proposed improvements Two retaining walls (Retaining Wall “N1” and Retaining Wall (“W1”) will be constructed to support the roadway improvements. Temporary cuts will be made to construct the walls. Retaining Wall W1 will be located between the southbound US 101 onramp and southbound US 101. Retaining Wall N1 will be located on the north side of Avila Beach Drive beneath the Avila Beach Drive UC and wraps westward around the embankment between the proposed realigned southbound off-ramp and southbound US 101. These walls are addressed in a foundation report (Yeh 2022) provided under separate cover.

2.3 Pertinent Reports and Investigations

The following reports, maps, plans, and documents were reviewed for this project in addition to our site reconnaissance.

- *Project Study Report – Project Development Support (PSR-PDS) and Plans*, California Department of Transportation, May 2016.
- *Avila Road UC (Widen) Second Supplemental Structure Foundation Report,* Bridge No. 49-191L, California Department of Transportation, October 11, 2005
- *Avila Road UC (Widen) Final Foundation Report*, Bridge No. 49-0191L, California Department of Transportation, January 26, 2004.
- *Avila Road UC (Widen) Supplemental Final Foundation Report*, Bridge No. 49-0191L, California Department of Transportation, July 14, 2004
- *Avila Road UC Left Bridge (Widen) Log of Test Borings*, California Department of Transportation, January 26, 2004.
- *Avila Road UC (Widen) Preliminary Seismic Design Recommendations*, Bridge No. 49-191L, California Department of Transportation, March 23, 2001.
- *Convert to Freeway Plans for State Highway 101 between North Pismo Separation and 1.0 Mile South of Santa Fe Bridge*, California Department of Transportation, April 1, 1963.
- *As-built Plans and Log of Test Borings: Plans for Construction on State Highway in San Luis Obispo County between North Pismo Separation in Pismo Beach and 1.0 Mile South of Santa Fe Bridge*, California Department of Transportation, April 1, 1963.
- *Foundation Study, Avila Road UC (BR 49-0191 L & R)*, California Department of Transportation, October 10, 1961.

3. Geotechnical Exploration and Testing

3.1 Subsurface Exploration

Yeh subcontracted S/G Drilling Company of Lompoc, California to perform the drilling for the project. S/G used a CME-85 truck-mounted drill rig equipped with 8-inch diameter hollow stem augers to advance twelve borings between September 16 and 18, 2019 and three borings on March 26, 2021. The logs of the borings and collected field data are presented in Appendix A. The boring locations are shown on Plate 1 and summarized in Table 1. Brush clearing for location access was performed prior to the 2021 borings.

Table 1: Subsurface Investigation Summary

Boring No.	Adjacent Project Component	Project Center Line Station/Offset	Approx. Ground Surface El. (ft)	Approx. Depth (ft)	Date Completed
19IN-01	Infiltration Basin	35' Lt. Sta. 611+61 "R-22a" Line	104.0	11.5	09/17/2019
19IN-02	Infiltration Basin	39' Rt. Sta. 213+26 "SBR" Line	99.5	5.4	09/17/2019
19IN-03	Infiltration Basin	117' Rt. Sta. 115+98 "AV1" Line	89.5	6.5	09/16/2019
19IN-04	Infiltration Basin	71' Rt. Sta. 114+50 "AV1" Line	78.0	3.5	09/16/2019
19IN-05	Infiltration Basin	43' Rt. Sta. 114+98 "AV1" Line	77.5	10.0	09/18/2019
21IN-01	Infiltration Basin	37' Rt. Sta. 115+51 "AV1" Line	80.5	15.0	03/26/2021
21IN-02	Infiltration Basin	36' Rt. Sta. 116+41 "AV1" Line	80.5	10.0	03/26/2021
21IN-03	Infiltration Basin	45' Rt. Sta. 117+25 "AV1" Line	80.0	5.5	03/26/2021
19P-01	Roundabout/ Shell Beach Road	20' Lt. Sta. 214+12 "SBR" Line	96.5	6.5	09/16/2019
19P-02	Roundabout/ US-101 Southbound Off-Ramp	20' Rt. Sta. 500+41 "R-23a" Line	97.0	6.5	09/17/2019
19P-03	US-101 Southbound Off-Ramp	18' Rt. Sta. 502+39 "R-23a" Line	96.5	5.5	09/17/2019
19P-04	US-101 Southbound On-Ramp	5' Lt. Sta. 212+01 "SBR" Line	103.0	6.5	09/16/2019
19W-01	Wall W1	119' Lt. Sta. 119+92 "AV1" Line	113.0	35.1	09/18/2019
19W-02	Wall W1	63' Rt. Sta. 611+78 "R-22a" Line	124.0	40.0	09/17/2019
19W-03	Wall N1	1' Lt. Sta. 609+60 "R-22a" Line	116.0	40.6	09/16/2019

Yeh collected bulk and drive samples for subsequent lab testing, recorded blow counts (N-values) for the driven samples and prepared a field log of subsurface conditions encountered. Sampling within the borings was performed by driving a modified California samplers and standard penetration test (SPT) split spoon samplers at approximate 5-foot intervals or as selected for the boring. The drill rig's automatic hammer had an estimated hammer efficiency of 75%. The SPT sampler has a 2-inch outside diameter, 1-3/8-inch inside diameter and is equipped for but was used without liners. The modified California sampler has a 3-inch outside diameter, 2-3/8-inch inside diameter and was used with 1-inch-high brass liners. Drive samples were collected using a 140-pound automatic trip hammer in accordance with ASTM 1586, the Standard Penetration Test. Bulk samples were collected from the augers as the borings were advanced. Pocket penetrometer tests were performed in the field on the trimmed end of selected samples to help estimate the undrained shear strength of cohesive materials. The penetrometer was pushed to the designated penetration and the shear strength was read from

the spring scale on the device. The undrained shear strength results from the pocket penetrometer tests are noted on the logs in Appendix A.

Upon completion, borings 19IN-04, 19P-01 through 19P-04, and 19W-01 through 19W-03 were backfilled with either cement slurry or native material from the auger cuttings (as noted on the logs in Appendix A). Borings 19IN-01 through 19IN-03, 19IN-05, and 21IN-01 through 21IN-03 were instrumented for infiltration testing. The infiltration test apparatuses consisted of 2-inch PVC well casing installed to varying depths as well as pea gravel placed within the bottom 2 feet of the boring. Infiltration test materials and dimensions shown on the infiltration test data sheets in Appendix C. A discussion of the infiltration testing performed following the field exploration is presented in Section 3.4.

3.2 Laboratory Testing

Laboratory testing was performed on selected samples recovered from the field exploration programs. Tests for moisture content, unit weight, gradation, Atterberg limits, unit weight versus moisture content relation by the modified Proctor test, as well as pH and resistivity were performed at the Yeh office and laboratory in Grover Beach, California. Tests for R-value as well as soluble sulfates and chlorides were performed by Cooper Testing Laboratory in Palo Alto, California. Tests for triaxial compressive strength using triaxial compressive strength using consolidated undrained (CU) loading were performed at the GEO-E lab at the Cal Poly Civil Engineering Department in San Luis Obispo, California. Testing was performed in accordance with applicable ASTM or Caltrans standards. Laboratory test results are presented in Appendix B.

3.3 Site Reconnaissance

Yeh and Associates performed site reconnaissance on October 19, 2016, March 29, 2018, and September 16, 2019. The site reconnaissance included observation of slope and pavement conditions, as well as observation of the proposed project layout as it relates to the existing topography, infrastructure, and proposed alternatives.

3.4 Infiltration Testing

Borings 19IN-01 through 19IN-03, 19IN-05, and 21IN-01 through 21IN-03 were pre-saturated following drilling and construction of the infiltration test apparatuses. Boring 19IN-04 was not tested due to auger refusal encountered at the proposed testing depth. The borings that were tested were allowed to pre-saturate for approximately 48 to 96 hours. Following pre-saturation, Yeh performed both constant head and falling head infiltration testing in each of the infiltration test borings on September 20, 2019. Testing was performed in general accordance

with County of San Luis Obispo Post Construction Requirements Handbook (SLOCO 2017) testing methodology. Constant head infiltration testing consisted of adding a measured volume of water to the borings to maintain a constant head for approximately 30 minutes. Falling head infiltration testing consisted of measuring the rate of water level fall for a minimum of 3 hours or when the water within the boring drained at least four times (so that up to four sets of readings were taken). Infiltration test data and results are presented in Appendix C.

3.5 Previous Geotechnical Investigations

As-built Log of Test Borings (LOTB's) and Foundation Reports from the climbing lane widening project (Caltrans 2009), as well as the 1963 (Caltrans 1963a, b) freeway project, were used to supplement the data from Yeh's 2019 field exploration program and summarize subsurface conditions at the project site. Caltrans conducted a foundation investigation in November 2003 consisting of two rotary wash borings. Data from the 2003 investigation were included on the LOTB's for the climbing lane project (Caltrans 2006 and 2009). Prior to the 2003 investigation, Caltrans conducted a foundation investigation in May 1961 consisting of one rotary wash boring, three 2-1/4-inch cone penetrometer borings, and seven 1-inch soil tubes. The data from the 1961 investigation were included on the as-built LOTBs for Caltrans' 2009 project. As-built LOTBs for the widening project show that the top of bedrock elevation is highly variable at the project site. Elevations and locations of the historical borings are presented on the as-built LOTBs on Plate 3.

4. Geotechnical Conditions

4.1 Regional and Site Geology

The project is located within the Coast Ranges geomorphic province, which extends from the Transverse Ranges in southern California to the Klamath Mountains in northern California and into Oregon. The province is characterized by north-northwest trending mountain ranges bounded by the Pacific Ocean to the west and the Central Valley to the east. The basal units are predominantly composed of Jurassic- and Cretaceous-age rocks with Tertiary- to Holocene-age rocks commonly overlying the older formations along the flanks and foothills of those ranges. Quaternary sediments are found within intervening drainages, valleys, and coastal areas.

Figure 2 presents the regional geology in the site vicinity, as mapped by Wiegers and Gutierrez (2011). The project area is underlain by bedrock of the upper Pliocene- to lower Miocene-age Miguelito and Squire members of the Pismo formation that are within the southern margin of the Pismo Syncline. Holocene- to Pleistocene-age young alluvial valley deposits are also mapped in the area. The Miguelito member (Tpm) of the Pismo formation is described as brown to buff interbedded siltstone and claystone that is moderately resistant and well-bedded (with beds generally 2 to 4 inches thick). The Squire member (Tps) of the Pismo formation is described as massive, white, calcareous, quartzose to arkosic, silty sandstone. The young alluvial valley deposits (Qya_2) are described as unconsolidated sand, silt, and clay deposited on flood plains and along valley floors. The Qya_2 unit is locally divided by relative age with the youngest unit mapped at the project location.

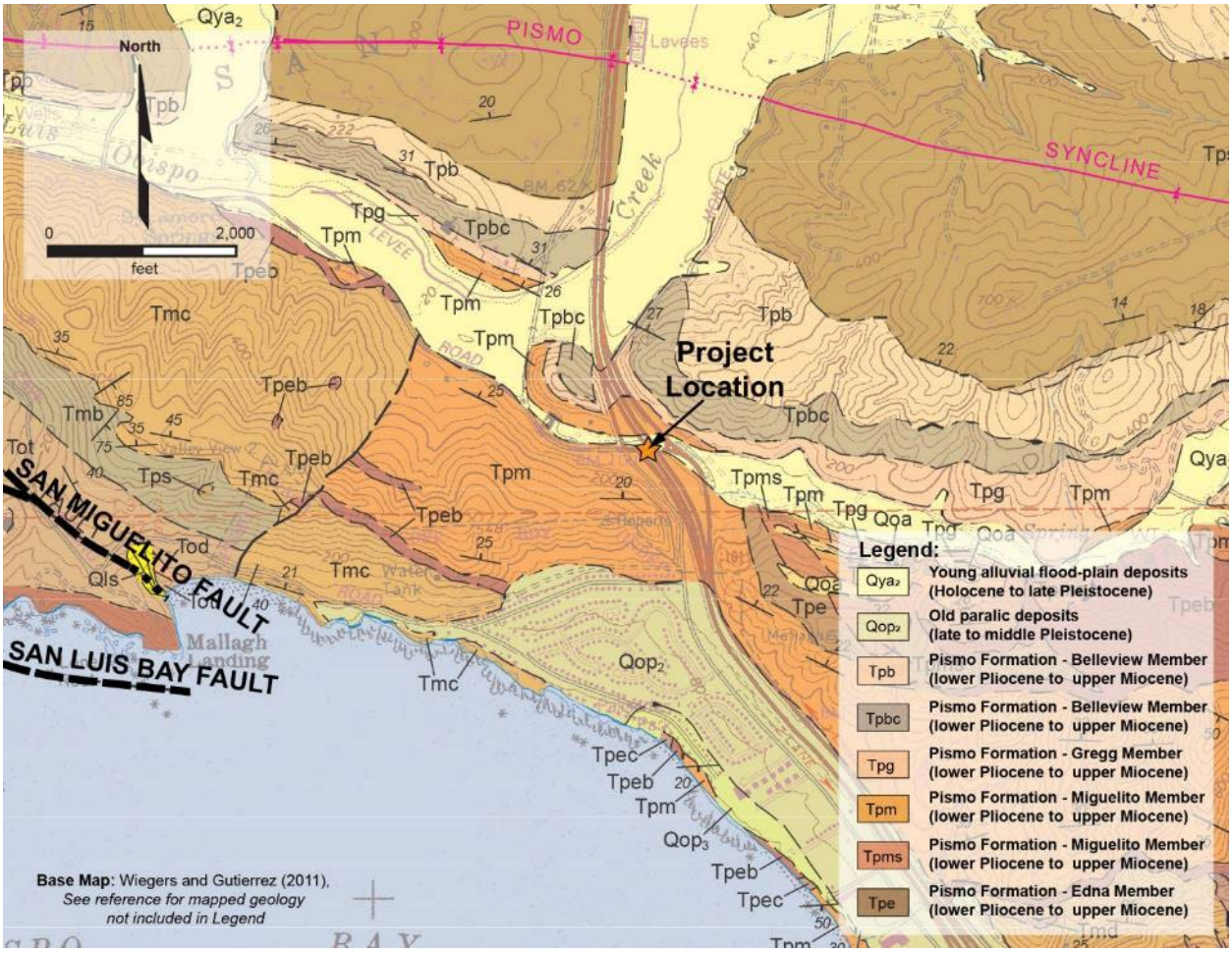


Figure 2: Geologic Map (Wiegers and Gutierrez 2011)

4.2 Surface Conditions

4.2.1 Site Topography and Drainage

The highway in this area of western San Luis Obispo County is characterized by a narrow, gently sloping terrace between the Pacific Ocean and the San Luis Range adjacent to the San Luis Obispo Creek drainage area. The highway was constructed in an area where a through cut transitions to a deep fill within an alluvial valley connected to San Luis Obispo Creek. The highway and Shell Beach Road slopes to the north at grades of 4 to 8 percent in the project vicinity. Hills in undeveloped areas are covered with grasses and brush. Agricultural fields are present northwest of the project area in the alluvial valleys. San Luis Obispo Creek crosses US 101 approximately 1,600 feet north of the undercrossing at the San Luis Obispo Creek Bridge. Surface drainage through the site is generally controlled by drainage inlets along the roadways and culverts beneath the existing embankments that eventually enter the San Luis Obispo Creek drainage.

Evidence of global or deep-seated slope instability or slopes prone to rockfall was not observed for embankments and cut slopes within the project site. An unnamed drainage is located at the toe of the embankment approximately 30 to 40 feet below the north end of the northbound off-ramp. The embankment end slope supporting the roadway is inclined between 1.5h:1v and 1h:1v and shows evidence of erosion. Cut slopes in the area are also prone to surficial instability and erosion evidenced by sloughed material collecting at the back of curbs and overflowing on to roadways.

4.2.2 Prior Land Use and Construction History

The existing US 101 freeway alignment and Avila Beach Drive interchange has undergone a series of improvements since the early 1900's. Prior to the 1950's, the roadway more closely followed the natural terrain and Avila Beach Drive was a segment of the main route to connect Shell Beach to San Luis Obispo. A four-lane divided highway was constructed in the 1950's at the current location of US 101, east of Avila Beach Drive and Shell Beach Road. A dedicated at-grade connection was made to connect the highway to Avila Beach Drive.

The divided highway was converted to a freeway in the early 1960's. Construction included filling the alluvial valley at the interchange location with material from adjacent cut slopes and building the Avila Beach Drive undercrossing left and right bridges. As-built plans for Caltrans Contract No. 05-039814 (Caltrans 1963b), show that 40-foot-deep vertical sand drains were constructed below highway embankments approximately between stations 413+50 and 416+50, and 45-foot-deep sand drains were constructed approximately between stations

428+50 to 431+50. A 10-foot-thick surcharge was placed over the treated area between stations 413+50 and 416+50. The surcharge was placed to consolidate the underlying young alluvial material below the freeway embankments. No reports were available that described the results of the pre-consolidation of the treated areas.

A construction report (Caltrans 1964) stated that the fill material underlying the bridge site at footing level is composed entirely of rocky fill material from adjacent hillside excavation. Approximately 47 feet of fill overlies original ground at Abutment 1 (south abutment), 30 feet at the bents and 35 feet at Abutment 4 (north abutment). Difficult drilling conditions were encountered during predrilling for pile installation. Several boulder-size rocks were hit and could not be removed, resulting in numerous holes drilled out of position that required enlargement of the footing to incorporate the misaligned piles.

The Final Structure Foundation Report (Caltrans 2004b) for the left bridge widening recommended that a heavier H-pile section or cast steel driving points be used for the driven piles. Pre-drilling was not recommended for pile installation through the rocky fill material. Pile driving records indicate that piles were installed to approximate depths of 78 to 82 feet below the foundations for the abutments and 62 to 65 feet at the bents (Caltrans 2008).

4.2.3 Human-Made and Natural Features of Engineering and Construction Significance

The following human-made features could impact the design of the project:

- Existing embankments were constructed with rocky fill material derived from adjacent cut slopes. Difficult excavation and drilling conditions were experienced during the construction of the bridge foundations in the 1960's and 2006, and similar conditions are anticipated for excavations extending below grade. Excavations for roadways, culverts, and soil nail walls are expected to encounter the existing fill and possibly the underlying bedrock. Excavations into the fill could be prone to sloughing and widening due to the size of rocks and boulders used to construct the embankments for the highway.
- The previous alignment of Avila Beach Drive underlies portions of the project specifically in the Park and Ride lot where underground infiltration basins are planned. Auger refusal was encountered in borings in this area (19IN-03 and 19IN-04) where the roadbed was found 3 to 6 feet below the existing ground surface. The presence of the abandoned roadbed and potential for bedrock below the roadbed will reduce the effectiveness of infiltration in this area and the stormwater infiltration system should be designed to either avoid this area or accommodate the subsurface conditions. Plate 2 presents a subsurface profile at the proposed infiltration area below the Park and Ride Lot.

- The embankments were constructed atop soft alluvial material that could be subject to consolidation under increased loading. Sand drains in conjunction with surcharge fills were used in the area (where up to 60 feet of fill was placed to construct the highway in the early 1960's). Settlement of the existing embankments is not anticipated for the project.
- Utilities and drainage structures located throughout the project area could conflict with project improvements and staging. Water mains, high-pressure gas mains, oil pipelines, electrical lines, and communication lines are all present. Difficult excavation and variable locations of these utilities were discovered by MGE Underground during potholing of these utilities.

4.3 Subsurface Conditions

The subsurface conditions encountered at the project site are described below based on Yeh's 2019 field exploration program as well as previous data from Caltrans for the original 1964 construction and 2009 widening of the Avila Beach Undercrossing. Subsurface conditions at the site consisted of units of roadway material, artificial fill (Af), young alluvial valley deposits (Qya_2), old alluvial valley deposits (Qoa), and the Miguelito Member of the Pismo Formation (Tpm). Artificial fill was the only unit encountered in the borings drilled by Yeh. However, other units were identified in previous explorations as well as from Yeh's site reconnaissance and are included in the following description of the subsurface conditions.

Roadway Material. Roadway material was encountered from the ground surface in Yeh's 2019 borings 19P-01, 19P-04, and 19W-03. The roadway material consisted of approximately 4 to 5 inches of asphalt concrete overlying approximately 4 to 6 inches of aggregate base. Artificial fill was encountered below the roadway material in borings 19P-01, 19P-04, and 19W-03.

Artificial Fill (Af). Artificial fill was encountered in borings drilled in 2003 for the Caltrans climbing lane project to depths of approximately 35 to 47 feet below the ground surface (elevations 62 to 67 feet). The fill was originally placed during construction of the freeway in the 1960s and consisted of medium dense to dense clayey gravel (GC), poorly to well-graded gravel with silt and sand (GP-GM, GW-GM), and well-graded sand with gravel (SW) with lenses of medium dense silty sand (SM) and stiff lean clay (CL). Shale and sandstone cobbles to 6 inches in dimension and sandstone boulders up to 2 feet in dimension were encountered in the fill. The cobbles and boulders were described as moderately to intensely weathered, and soft to moderately hard.

Artificial fill was also encountered below the roadway material in Yeh's 2019 borings 19P-01, 19P-04, and 19W-03, as well as from the ground surface in borings 19IN-01 through 19IN-05, 19P-02, 19P-03, 19W-01, 19W-02, and 21IN-01 through 21IN-03. The unit consisted of medium dense to dense well-graded gravel with clay and sand (GW-GC), very dense silty to clayey gravel with sand

(GM, GC), very dense poorly to well-graded sand with varying amounts of silt, clay, and gravel (SW-SM, SP-SC), very loose to very dense silty to clayey sand with varying amounts of gravel (SM, SC), and very stiff to hard sandy lean to fat clay with varying amounts of gravel (CL, CH). The fill was encountered to the maximum depths explored, approximately 3.5 to 41.5 feet below the ground surface in the borings drilled by Yeh.

Young Alluvial Valley Deposits (Qya_2). Young alluvial valley deposits were encountered below the artificial fill in the 2003 Caltrans borings to depths of approximately 61 to 83 feet (to elevations 31 to 36 feet). The young alluvial valley deposits consisted of loose to medium dense silt with varying amounts of sand (ML) as well as silty sand with varying amounts of gravel (SM). The unit also included interbedded lenses of very soft to compact silty to clayey sand with varying amounts of gravel (SM, SC) and silty clay with varying amounts of sand (CL-ML).

Pismo Formation – Miguelito Member (Tpm). Shale and sandstone bedrock units of the Pismo Formation (Miguelito member) were encountered below the artificial fill and alluvium in the 2003 Caltrans borings to the maximum depth explored, approximately 92 to 109 feet below the existing ground surface. Exposures of this material were observed on cut slopes adjacent to the project site. The bedrock was logged as fresh, hard, slightly fractured sandstone. The original foundation study noted the erratic nature and elevations of the bedrock and the difficulty estimating pile tip elevations with the intention of driving the piles to bedrock (Caltrans 1961). Various units of the Pismo Formation are also present on cut slopes adjacent to the interchange.

A summary of the laboratory test results performed by Yeh for the geologic units is presented in Table 2:

Table 2: Geotechnical Properties Laboratory Test Summary[1]

Geologic Unit	Locations Encountered	Dry Unit Wt. (pcf)	Moisture Content (%)	Particle Size Analyses (%G, %S, %F)	Atterberg Limits LL, PI	Corrosion pH, ρ (Ω-cm)	Strength Parameters	Other
Artificial Fill (Af)	19IN-01 to 05 19P-01 to 04 19W-01 to 03 21IN-01 to 03	73 - 103	6 - 27	1 - 70 G 24 - 76 S 6 - 40 F	25 - 47 LL 8 - 17 PI	pH = 3.98 - 6.88 ρ = 656 – 11,303	S_{PP} = 1.25 - >4.5 ksf ϕ'_{CU} = 26 - 49° c'_{CU}= 0.16 - 0.8 ksf	$\gamma_{D,MAX}$ = 92 - 108 pcf w_{opt} = 16 - 21% R-Value = 39, 46, 46, 50 SO_4^{2-}= 4,885 mg/kg Cl^- = 14 mg/kg

4.4 GROUNDWATER

Groundwater was measured at approximately elevation 70 feet (27 feet below Avila Beach Drive) on December 11, 2003 (Caltrans 2006) and at approximately elevation 45 feet (52 feet below Avila Beach Drive) on May 25, 1961 (Caltrans 1961). Groundwater was not encountered during Yeh's September 2019 field exploration program. Groundwater and soil moisture conditions will vary seasonally and with changes in storm runoff, irrigation, groundwater pumping, and stream flow. Yeh did not observe any springs in the project site during our site visits.

4.5 CORROSION

Corrosion tests were performed on selected soil samples from Caltrans' 2003 subsurface exploration as well as Yeh's 2019 subsurface exploration program in accordance with Caltrans test methods. According to the Caltrans *Corrosion Guidelines* (Caltrans 2021b), soil with minimum resistivities less than 1,500 Ω-cm should be tested for soluble sulfates and chlorides. Results for this testing are presented in Appendix C and in Table 3 below.

[1] Geotechnical properties are noted for dry unit weight (γ_d) and moisture content (w_o); particle size as percent gravel (G), sand size (S) and fines content (F); electrical resistivity (ρ) in ohm-centimeters (Ω-cm), soluble sulfates (SO_4^{2-}) and soluble chlorides (Cl^-); Atterberg liquid limit (LL) and plasticity index (PI); shear strength (S) in kips per square foot measured by pocket penetrometer (pp), torvane (tv) or unconsolidated undrained (uu) tests; friction angle (ϕ) or cohesion (c) in kips per square foot measured from direct shear - peak (ds) or consolidated undrained (cu) tests; permeability (k).

Table 3: Soil Corrosion Test Summary

Boring No.	Elevation (ft)	Minimum Resistivity (Ohm-cm)	pH	Chloride Content (mg/kg)	Sulfate Content (mg/kg)	Corrosive (Yes/No)
B-1-03	59.4	--	--	--	2,407	Yes
B-2-03	86.3	--	4.50	--	--	Yes
B-2-03	106.0	--	4.10	--	--	Yes
19IN-01	94.0	4,438	5.50	--	--	Yes
19IN-02	98.0	777	3.98	See Note 1	See Note 1	Yes
19IN-05	74.5	3,116	4.33	--	--	Yes
19P-01	96.5	14,234	6.35	--	--	No
19P-02	97.0	6,698	6.12	--	--	No
19P-03	92.0	4,346	6.34	--	--	No
19P-04	103.0	11,303	6.61	--	--	No
19W-01	94.5	656	6.88	14	4,885	Yes
19W-02	105.5	1,968	6.08	--	--	No
19W-02	115.5	1,842	5.51	--	--	No
19W-02	122	1,169	5.49	--	--	No
19W-03	116	3,087	6.58	--	--	No
1. Not able to be tested due to gravel/rock size						

For structural elements, Caltrans considers a site to be corrosive if one or more of the following conditions exist for the representative soil samples taken at the site: *Chloride concentration is greater than or equal to 500 ppm, sulfate concentration is greater than or equal to 1,500 ppm, or the pH is 5.5 or less* (Caltrans 2021b). Based on Caltrans test methods and standards, the sulfate content and pH results for the 2003 subsurface samples, as well as pH results for three of the 2019 subsurface samples, indicate that the soils tested are corrosive and corrosion mitigation is required. Design of the project should consider corrosivity test results using Caltrans design standards.

4.6 Seismic Information

4.6.1 Site Seismic and Ground Motion Parameters

Table 4 presents seismic data that can used to evaluate the project area. Figure 3 presents the design acceleration response spectrum (ARS) for the site estimated using ARS Online and guidelines set forth in Appendix B of the Caltrans (2019a) *Seismic Design Criteria*. The shear wave velocity for the site was estimated to be approximately 972 feet per second (296 meters per second), corresponding to Site Class D defined in Appendix B of the *Seismic Design Criteria* (Caltrans 2019a). The shear wave velocity estimate is based on subsurface exploration field blow counts and classifications for the soil the site from borings performed by both Yeh (current study) and Caltrans (2006) in conjunction with Caltrans' *Seismic Design Criteria*

(Caltrans 2019a) and Caltrans' *Geotechnical Manual Design Response Spectrum* (Caltrans 2021c) for estimation of shear wave velocity.

Table 4: Recommended Ground Motion Parameters for Geotechnical Design

Project Component ID	Site Parameters			Design Ground Motion Parameters (Return Period = 975 years)		
	Locations		Shear Wave Velocity V_{S30} (m/sec)	Horizontal Peak Ground Acceleration (HPGA) (g)	Mean Earthquake M, Moment Magnitude	Mean Site-to-Fault Source Distance R, (km)
	Latitude, degrees	Longitude, degrees				
Avila Beach Drive Interchange Improvements	35.1798	-120.6997	296	0.39	6.69	32.1

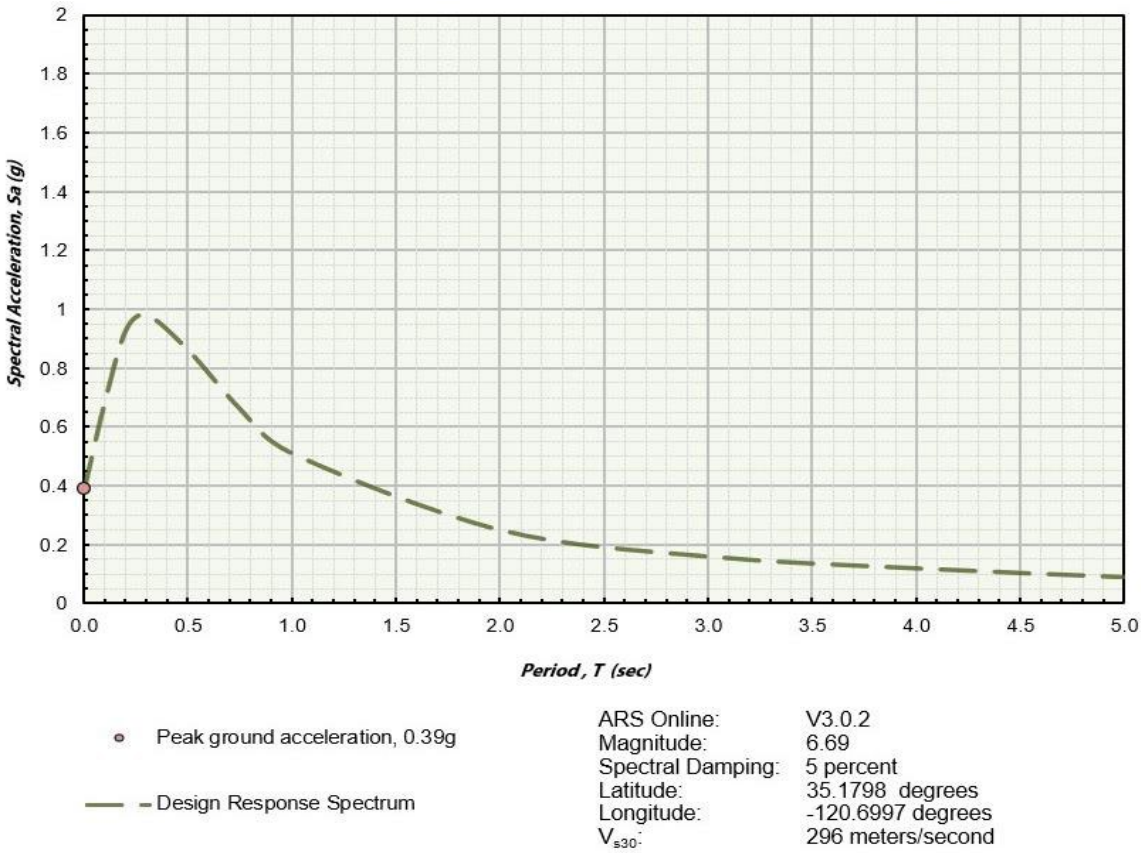


Figure 3: Caltrans ARS Curve

4.6.2 FAULT RUPTURE

The project site is not mapped within an Alquist-Priolo Fault Zone and there are no faults mapped crossing the project site. The site is also not within 1,000 feet of an unzoned fault that

is Holocene or younger in age. Therefore, there is a low potential for fault rupture to impact the site and ground surface rupture does not need to be considered for the design of this project.

4.6.3 LIQUEFACTION

The project site is predominantly underlain by dense silty sand and clayey gravel fill to depths of about 35 to 47 feet below the ground surface (approximately elevation 62 to 67 feet) and above the groundwater table (at approximately elevation 70 feet). Layers of silt and loose sandy conditions associated with young alluvial deposits were found below the groundwater table between depths of approximately 45 to 80 feet below the ground surface (approximately elevations 69.4 to 34.4 feet) (Caltrans 2006). Potential liquefaction hazards for the project site were assessed using NCEER procedures (Youd and Idriss 2001).

The medium dense to dense fill is not considered vulnerable to liquefaction based on Yeh's analyses. Silt and sandy layers within the alluvium located between the artificial fill and underlying sandstone bedrock are potentially liquefiable. Case studies (Ishihara 1985) have shown that if a layer of non-liquefiable soil overlying a layer of liquefiable material is thick enough, the potential for the liquefiable layer to manifest at the surface and affect surface improvements decreases as the thickness of the overburden layer increases. The layer of artificial fill is considered thick enough such that the potential for surface manifestation and effect on near surface structures is low (Ishihara 1985). The potential for liquefaction to affect surface improvements and shallow foundations for structures is considered to be low, and no special recommendations are needed for design to address liquefaction or seismic settlement related hazards for such structures or improvements.

4.7 NATURALLY OCCURRING ASBESTOS

Naturally occurring asbestos (NOA) is associated with serpentinite in San Luis Obispo County. There are no known serpentinite rocks or materials present at this site, and the site is not in an area mapped to have NOA materials (SLOCO APCD 2017). There is low potential for NOA to be encountered during the project, and no special mitigation to address NOA is necessary.

5. GEOTECHNICAL DESIGN RECOMMENDATIONS

5.1 EARTHWORK

Standard Specifications refers to the 2022 edition of the Standard Specifications published by the California Department of Transportation (Caltrans 2022b).

5.1.1 General

Site preparation and fill placement for embankments and the approaches should generally be performed according to Section 16, Clearing and Grubbing, and Section 19, Earthwork, of the *Standard Specifications*. Excess fill or cut material should be disposed of offsite, unless an onsite location has been identified for placement of excess fill on the project plans. Temporary excavations should conform to OSHA and/or Caltrans Trenching and Shoring Manual requirements.

5.1.2 Preparation of Fill Areas

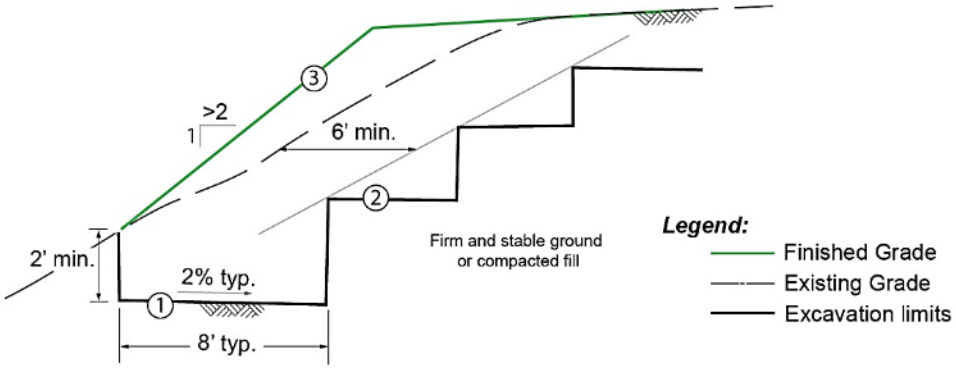
Prior to the placement of fill for new roadways beyond areas of existing roadways soil and rock should be reprocessed to a depth of 1.5 feet below proposed subgrade. The exposed surface should be scarified to a depth of 6 inches and recompacted to a minimum of 95 percent relative compaction prior to placing additional fill for embankments and improvements.

5.1.3 Reuse of Excavated On-site Material

On-site soil removed from excavations can be reused as borrow for general embankment, non-critical areas of construction, and roadway areas. Excavated on-site material should not be considered suitable for use as select material for Class II aggregate base, aggregate, pipe bedding or pipe zone material, structure backfill, or paving. Pulverized asphalt concrete and aggregate base may be used as aggregate base in Park-n-Ride lot. Contractor submittals for structure backfill materials and other specified materials should be addressed at the time of construction.

5.1.4 Embankments

New and widened embankments up to 5 feet may be needed for the interchange improvements. A detail for a typical embankment widening is shown on Figure 4. Where embankments will be widened, the new fill should be keyed into the existing slope such that at least the outer 6-feet of the existing embankment is removed per *Standard Specifications*. The base key should be deepened if needed to excavate the base into firm and stable material, or below the minimum depth of removal recommended for building or pavement areas in this report. The extent of removal shown in Figure 4 and potential impacts to the travelled way should be considered in the traffic staging plans. Embankment fill slopes should be designed to a ratio of 2h:1v or flatter and constructed in accordance with the *Standard Specifications*. Graded slopes should be stabilized with erosion control measures as discussed in Section 5.1.7 of this report. Fill slopes can be steepened by using internal geosynthetic reinforcement, retaining walls, and/or select backfill. If steeper slopes are needed, Yeh should be contacted to provide additional evaluation and recommendations for the slope design.



Notes:
1. When placing fill on slopes 20 percent or steeper, excavate approximately 8-foot wide base key at toe of proposed fill. Excavate bottom of the key to at least 2 feet below existing grade or to firm material and slope bottom at 2 percent into existing slope. When placing fill on slopes 20 percent or flatter, excavate approximately 8-foot wide bench at toe of proposed fill and slope bottom at 2 percent into existing slope.

2. Compact and place fill per *Standard Specifications*. Remove at least the outer 6 feet of the existing slope while the fill is placed. Excavated material can be worked into the fill as the work progresss.

3. Place compacted fill to beyond finished grade line and cut back to finished grade to expose compact fill on the slope face.

Figure 4: Embankment Grading

5.1.5 CUTS AND EXCAVATIONS

Permanent cut slopes can be designed at an inclination of 1.5h:1v for flatter. If steeper slopes are needed, Yeh should be contacted to provide additional evaluation and recommendations for the slope design. Temporary excavation recommendations are presented in Section 7.3.

5.1.6 EARTHWORK FACTORS

Earthwork factors[2] were estimated for the subsurface conditions encountered at the site. The subgrade material generally consisted of fill comprised of loose to medium dense clayey sand, clayey sand with gravel, and clayey gravel. Disturbance to drive samples occurs due to compaction of samples during driving, loosening of soils when recovering the sampler from the drill hole, and during trimming in the laboratory. Differences in the soil density occur in areas that have been previously graded (the existing road subgrade), rodent borrows (particularly within the upper 2 feet of a site), and inherent differences in soil type and consistency. Variable

[2] The earthwork factor represents the ratio of the existing in-situ unit weight of the soil before construction to the unit weight of the same soil after compaction. For example, an earthwork factor of 0.95 represents a 5 percent loss in the volume of soil following compaction. An earthwork factor of 1.05 represents a 5 percent gain in volume of the soil or pavement following compaction due to bulking of a relatively dense material.

densities were also recorded on obtained samples from the field exploration which could be attributed to the rocky nature of the fill that was placed.

A 5 percent loss in volume (shrinkage), or an average earthwork factor of 95 percent, should be used for the upper 5 feet of material in areas of undisturbed ground or existing subgrade to account for losses due to existing fill conditions, grubbing, rodent burrows, and compaction to 95 percent. The earthwork factors are approximate and should be checked and adjusted as needed as the grading work progresses to properly balance earthwork operations.

5.1.7 Erosion and Drainage Considerations

Existing slopes at the site vary from about 1.5h:1v to nearly flat. All slopes were generally covered in vegetation except for the 1.5h:1v embankment end slopes beneath the two undercrossings and the 1h:1v to 1.5h:1v slope adjacent and below the northbound off-ramp. Evidence of erosion is present at these slopes beneath the two undercrossings and adjacent to the northbound off-ramp. Eroded material has overtopped the curb along Avila Beach Drive along most of the undercrossing. Catchment for eroded material should be incorporated into the design of the roadways. Slopes should be designed such that they do not terminate at the edge of pavement or at the back of curbs. Minimum two-foot-wide shoulders behind curbs and edge of pavement are recommended to provide for catchment of eroded material from cut slopes. Design of the project should account for erosion to impact other improvements such as guardrails, drainage inlets, and shoulders.

Drainage should be provided such that surface water does not run over slopes or pond on pavements. Concentrated flows and runoff should not be permitted to discharge on slopes. Down drains, solid pipes, or lined ditches should be provided to carry water to slope bases. Energy dissipation and erosion control devices should be provided at the outlet of drainpipes and in areas of concentrated runoff to reduce the potential for erosion. Landscaping and maintenance of graded areas and slopes should be provided to assist the establishment of vegetation and reduce the potential for erosion.

5.2 Culverts, Utilities, and Pipes

All the drainage improvements planned for the project including inlets, headwalls, and culverts less than 3 feet in diameter do not require specific foundation recommendations and should be designed and constructed in accordance with 2022 Caltrans *Standard Specifications* and *Standard Plans*. Yeh is unaware of any culverts that will be larger than 3 feet in diameter. Culverts that are larger than 3 feet should be evaluated with respect to foundation support for the proposed culvert and backfill material.

Corrosion test results for the 2003 climbing lane project (Caltrans 2004a, b) and results from this study indicate that the soil and rock at the site is corrosive to construction materials (see Section 4.5). The design engineer should select culvert materials appropriate for the corrosive soil and rock conditions found at the site based on corrosivity test data. Alternative culvert materials can be evaluated by the design engineer using Altpipe V7.0[3].

5.3 Stormwater Infiltration

Infiltration test results are presented in Table 5. Three stormwater basins are planned within the project area. One basin is planned on the southwest and southeast quadrants of the interchange in Caltrans right-of-way and two basins are planned below the proposed Park-and-Ride area in the San Luis Obispo County right-of-way. One of the basins below the park-and-ride lot will be used to infiltrate water. Variable subsurface conditions were encountered in the area of the County's proposed Park and Ride lot. Plate 2 presents an interpreted subsurface profile across the area where infiltration is planned. The area of fill immediately adjacent to Avila Beach Drive will provide better infiltration than the area closest to the ascending slope south of the site. Infiltration testing was performed as input to the design of stormwater control measures (SCM's) for the project. Site specific testing was performed in borings 19IN-01, 02, 03, and 05, as well as 21IN-01, 02, and 03. Constant head and 12-inch equivalent infiltration rates are summarized in Table 5.

Table 5: Estimated Infiltration Rates

Boring	Depth of Test (ft)	Constant Head (gal/hr)	Equivalent 12-inch diameter Falling Head (in/hr)
19IN-01	9.5	4	0.47
19IN-02	4.9	5	0.85
19IN-03	4.4	12	0.67
19IN-05	10	69	25.11
21IN-01	15	49	173.2
21IN-02	10	23	4.95
21IN-03	5.5	5	1.02

[3] https://altpipe.dot.ca.gov/altpipe/

Bioswales and underground infiltrators are likely to be used to infiltrate stormwater for this project. Soil encountered in borings for the project are predominantly clayey sand with gravel, silty gravel, and sandy fat clay. The clay soil and underlying dense material encountered is likely contributing to the lower rates for three of the four borings tested. The design engineer should consider the location of infiltration and the suitability of subsurface material to infiltrate stormwater. Adjustment of the infiltration zone location should be considered to more effectively utilize the higher infiltration rates of the fill found in boring 19IN-05 and 21IN-01.

The performance of low-impact design features or stormwater control measures (SCMs) can be affected by the various environmental factors and properties. The designer of the SCMs should apply appropriate reduction factors to the reported infiltration rates. Compaction of soil below an SCM can lead to a reduction of infiltration rates. Open ditches, bioswales, infiltrators or drywells can become clogged with silt and organic matter resulting in reduced infiltration performance. The system designer should consider the impacts of the construction and long-term maintenance considerations for the SCM's. Yeh recommends preparation of a Standard Special Provision to address earthwork below and adjacent to SCM areas that directs the contractor to not compact soil below the bottom of SCM areas.

Bioswales should include provisions to reduce the potential for infiltration of stormwater below the roadway or into the subgrade. Typical provisions for reducing the impact of SCM's on improvements include deepened curbs and impermeable liners along the bioswale margins. Bioswale plans and specifications should be reviewed by a geotechnical professional during the design process. Infiltration of stormwater should not be done adjacent to structures, near foundations, or above slopes. Special considerations should be made if stormwater infiltration will be designed below pavement areas or use of permeable pavements are planned.

5.4 Pavement Design

5.4.1 Existing Conditions

Photos showing the typical surface pavement conditions observed at Avila Beach Drive are presented in Figure 5. The exposed pavement surface consists of asphalt concrete and was in poor to fair condition at the time of Yeh's site reconnaissance. The pavement on the ramps generally contained a rough pavement surface; low to moderate developed longitudinal, transverse, block, and edge cracking; and localized fatigue cracking, raveling, patches and deteriorating potholes. Pavement on Avila Beach Drive was more recently surfaced (date unknown) with a chip seal and is showing less signs of wear and deterioration than the ramps or other areas of the project site.

As-built pavement information from the climbing lane project (Caltrans 2009) indicates that main line pavement consists of approximately 0.75 feet of asphalt concrete (open grade, Type A and Type B) underlain by 0.66 feet of cement treated base, underlain by 1-foot of aggregate subgrade. Structural sections for the ramps, Avila Beach Drive, or Shell Beach Road were not available in the reviewed documents.

Figure 5: Pavement Conditions: Avila Beach Drive Interchange

Top Left to Bottom Right: Southbound Off-ramp, Northbound Off-ramp, Undercrossing Looking East, Undercrossing Looking Southwest

5.4.2 SUBGRADE PREPARATION

Subgrade for new roadways should be prepared and conform as described in Section 19 of the Caltrans Standard Specifications. The upper 4 feet of subgrade below new pavement should have a minimum R-value of 45. Import material should also have minimum R-value of 45 in areas placed within the upper 4 feet of subgrade. Compaction of subgrade should conform to the requirements described in Section 19-5.03 of the *Standard Specifications*.

5.4.3 PAVEMENT SECTIONS

Structural section recommendations were calculated based on Caltrans design procedures in Chapter 600 of the *Highway Design Manual* (HDM) (Caltrans 2018) considering the following assumptions and Traffic Index (TI) values shown on the plans (WG 2021c):

- 20-year design life;
- Minimum Traffic Index (TI) of 12.5 for the US 101 on and off-ramps;
- Minimum Traffic Index (TI) of 9.0 for Avila Beach Drive and
- Minimum Traffic Index (TI) of 7.5 for Shell Beach Road;
- Minimum Traffic Index (TI) of 5.0 for the Park and Ride Lot; and
- A selected subgrade R-value of 45 based on laboratory test results that included R-values of 39, 46, 46, and 50.

Table 6 presents the estimated thicknesses for 1- and 2-layer structural sections. Calculations are provided in Appendix E. The estimated thicknesses assume that the structural section will be placed on compacted subgrade prepared in accordance with *Standard Specifications*. Calculations for pavement sections are attached.

Table 6: Pavement Design Sections

Traffic Index (TI)	Section[4]	Pavement Thicknesses	
		Hot Mix Asphalt (HMA) Thickness (feet)	Aggregate Base (AB) Thickness (feet)
5.0 (Park and Ride Lot)	1-layer	0.40	--
	2-layer	0.25	0.35
7.5 (Shell Beach Road)	1-layer	0.65	--
	2-layer	0.35	0.55
9.0 (Avila Beach Drive)	1-layer	0.80	--
	2-layer	0.45	0.65
12.5 (On and Off-Ramps)	1-layer	1.10	--
	2-layer	0.65	1.00

[4] 1-Layer: Full depth Hot Mix Asphalt (HMA)
2-Layer: HMA over aggregate base (AB)

Base course materials should consist of Class 2 aggregate base per the *Standard Specifications*. Hot mix asphalt (HMA) should consist of Type A conforming to Section 39, "Asphalt Concrete," of the *Standard Specifications*, with asphalt binder grade PG 64-10.

5.4.4 Gravel Parking Lot

The gravel parking lot adjacent to the paved Park and Ride Lot should be surfaced with a minimum of 0.5 feet of Class 2 Aggregate Base. A prefabricated geo-web paving structure will be placed over the aggregate base and backfilled with a minimum of 2 inches of drainage rock.

5.5 Material Sources

Sourcing of project materials can be supplied by several local commercial sources. Prior to submitting bids and scheduling construction, contractors should verify the availability of materials from suppliers and ability to achieve requirements of the Caltrans *Standard Specifications*.

5.6 Material Disposal

Excess fill or cut material should be hauled off-site for proper disposal, unless an on-site location has been specifically identified for placement of excess fill on the project plans. Material disposal may be subject to requirements due to potential for hazardous materials. See Section 7.5, Hazardous Waste Considerations.

5.7 Construction Monitoring and Instrumentation

Geotechnical personnel should observe grading operations during construction on behalf of the owner to have reasonable certainty that fill placement and compaction is being performed according to the recommendations of this report and project specifications. Field density testing should be performed to help evaluate the compaction and moisture content of the materials being placed.

Fill and aggregates delivered to the site and excavated onsite soil that will be reused as fill or backfill, should be sampled and tested for conformance with gradation and quality requirements for the project or submittals reviewed for conformance. The frequency and locations of the tests should be at the discretion of the geotechnical personnel. The project specifications should include provisions for the contractor to allow for testing and to provide any shoring, ingress-egress, or traffic control needed to safely perform the testing at the locations and depths needed.

6. NOTES FOR SPECIFICATIONS

Section 19-5 of the *Standard Specifications* requires that material achieve compaction of a minimum of 95 percent relative compaction to a depth of 2.5 feet below finished grade for the width of the traveled way. Section 5.1 of this report provides guidance on preparation of areas to receive fill that includes reprocessing of soil and rock to a depth of 1.5 feet below subgrade. Pulverized asphalt concrete and aggregate base may be used as Class III aggregate base in the Park-n-Ride lot or as shoulder backing. These recommendations should be incorporated and added into the project *Special Provisions*.

7. NOTES FOR CONSTRUCTION

7.1 GROUNDWATER CONSIDERATIONS

Groundwater conditions are discussed in Section 4.4 of this report. Groundwater is not expected to be encountered during the proposed grading or excavations for embankments and culverts at the interchange based on the reviewed geotechnical data. Yeh did not observe any springs or seepage on slopes during site visits. No special measures with respect to groundwater are considered necessary for excavations with depths of 20 feet or less at the interchange based on the reviewed data.

7.2 EXISTING FACILITIES

Abandonment and/or relocation of existing culverts may be necessary for embankment construction and should be performed in accordance with the Caltrans *Standard Specifications*. Several utilities are present along Shell Beach Road and intersect Avila Beach Drive within the project site. These include petroleum pipelines, high pressure gas mains, and water mains. Special measures may be required by utility owners for constructing embankments or other improvements over or near these facilities.

7.3 TEMPORARY EXCAVATIONS

Temporary slopes should be braced or sloped according to the requirements of OSHA. We expect the soil within temporary excavations will generally consist of existing fill and dense to very dense gravel and clayey sand fill, which can be classified as Type C soil. Type C soil can be sloped to 1.5:1 for slope heights up to 20 feet. The design of temporary slopes or shoring systems needed for construction is the responsibility of the contractor. The slope inclination used for the construction of temporary slopes will be determined by the contractor's competent person per OSHA guidelines and the subsurface conditions encountered at the time of construction. Slopes or shoring systems exceeding 20 feet in height are not addressed by OSHA and should be designed by a qualified registered professional. If needed, the contractor

should submit an excavation and shoring plan for slopes more than 20 feet in height for review by the geotechnical professional prior to beginning the excavation.

7.4 Excavation Characteristics

The soil encountered within the anticipated depths of excavation consisted of sand and gravel with varying amounts of silt, clay, and cobbles. Cobbles and boulders are exposed on the embankment slopes and were found during potholing of utilities and will likely be encountered during excavation. There may also be boulders buried within the fill. We anticipate that the soil encountered can be excavated with conventional heavy-duty excavation-type equipment typically used for highway construction, such as suitably sized backhoes, excavators, and dozers. Project Special Provisions should clarify the anticipated materials that could be encountered in excavations.

7.5 Hazardous Waste Considerations

A Preliminary Site Investigation (PSI) was prepared by Padre Associates, Inc. (Padre 2019) for Yeh and Associates (see Appendix D) to assess the potential for shallow soil at the project site to contain aerially deposited lead (ADL) and determine its potential for re-use or disposal. Based on the Padre (2019) report, shallow soil at the site can be considered “Clean Soil” and may be reused at the site with no restrictions. Additionally, Yeh is unaware of any previous documented land use in the project vicinity or other potential contamination of hazardous waste based on the information reviewed.

7.6 Differing Site Conditions

The conclusions and recommendations submitted in this report are based upon the data obtained from field reconnaissance, subsurface exploration, and existing reports and data. Boring logs and LOTB sheets indicate subsurface conditions at specific locations at the time of drilling to the depth explored. Boring logs do not necessarily reflect the variations that may exist between the locations. If there are any changes in the site conditions, Yeh should review those changes and provide additional recommendations in writing, if needed.

8. Limitations

This study has been conducted in general accordance with currently accepted geotechnical practices in this area for use by Wallace Group for design. The conclusions and recommendations submitted in this report are based upon the data obtained from field reconnaissance, drilling and sampling, and our understanding of the proposed project and type of construction described in this report. If there are any changes in the project or site conditions, Yeh should review those changes and provide additional recommendations, if

needed. Any modifications to the recommendations of this report or approval of changes made to the project should not be considered valid unless they are made in writing. The report and drawings contained in this report are intended for design-input; and are not intended to act as construction drawings or specifications.

Site conditions will vary between points of observation or sampling, seasonally, and with time. The nature and extent of subsurface variations across the site may not become evident until excavation is performed. If during construction, fill, soil, or water conditions appear to be different from those described herein, Yeh should be advised and provided the opportunity to evaluate those conditions and provide additional recommendations, if necessary. The geotechnical professional should observe portions of the construction and site conditions, such as excavations, exposed subgrades, and earthwork, to evaluate whether or not the conditions encountered are consistent with those assumed for design, and to provide additional recommendations during construction, if needed.

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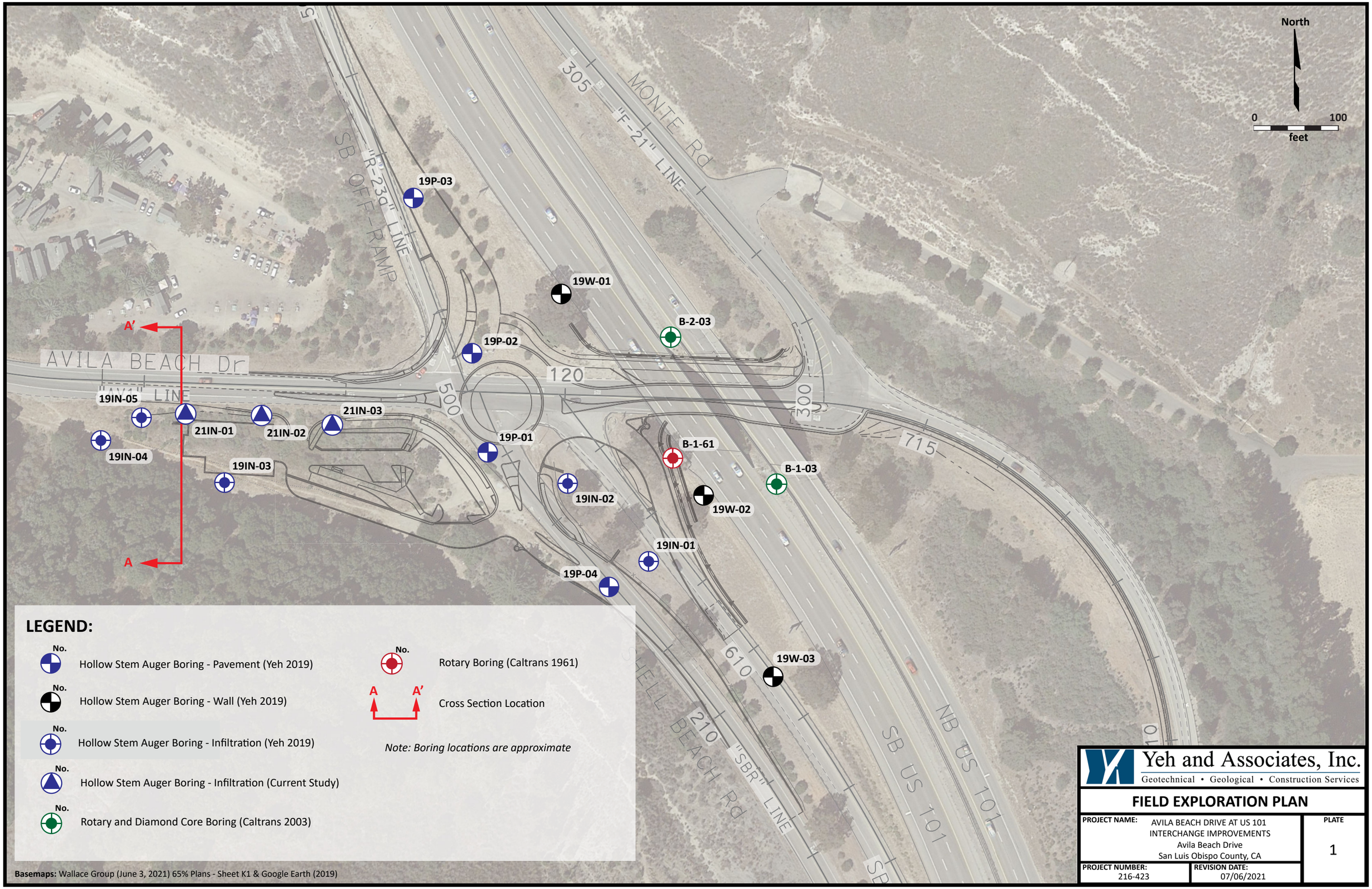

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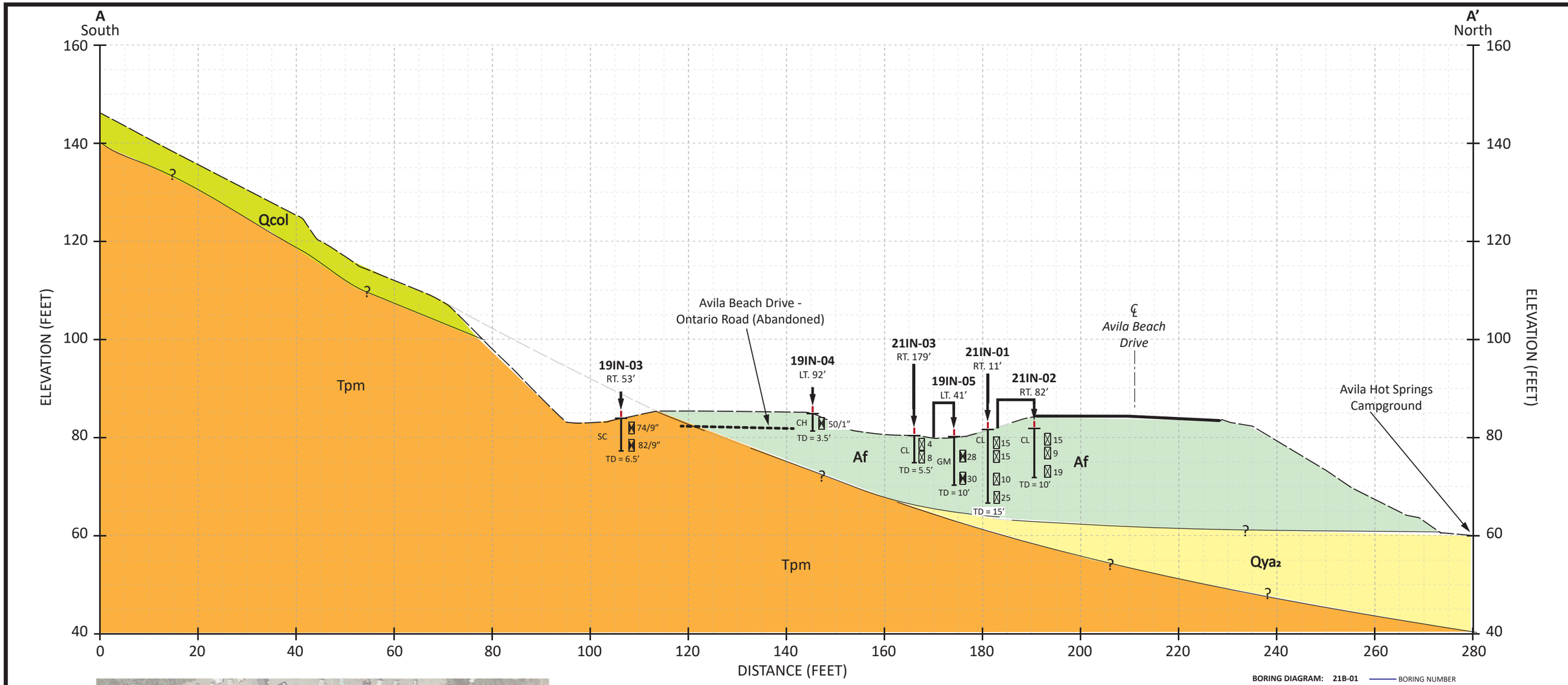
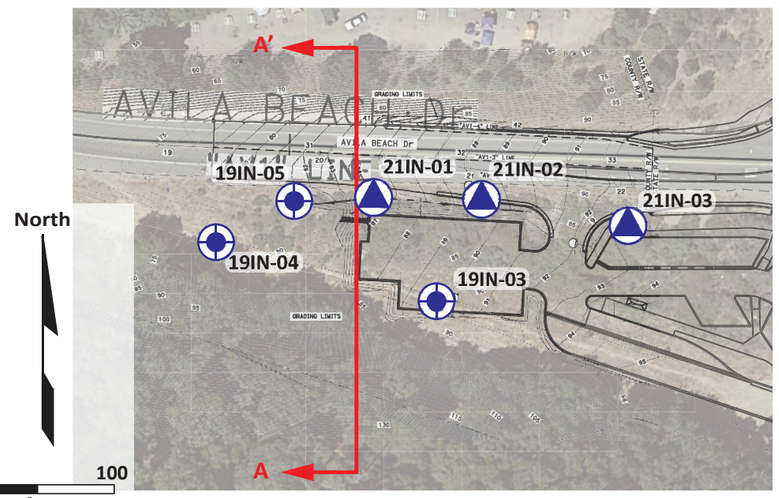
FIELD EXPLORATION PLAN

PROJECT NAME:	AVILA BEACH DRIVE AT US 101 INTERCHANGE IMPROVEMENTS Avila Beach Drive San Luis Obispo County, CA	PLATE 1
PROJECT NUMBER: 216-423	REVISION DATE: 07/06/2021	





Base Map: Wallace Group (June 3, 2021) 65% Plans - Sheets K1 and G1 & Google Earth (2019)

LEGEND:

Af

Artificial Fill: loose to medium dense silty and clayey SAND with varying amounts of GRAVEL (Sandstone gravel clasts)

Qcol

Colluvium: loose to medium dense silty and clayey SAND with varying amounts of GRAVEL (Siltstone, Claystone gravel clasts)

Qya₂

Young Alluvial Valley Deposits: unconsolidated sand silt and clay deposited in flood plains and along valley floors

Tpm

Pismo Formation (Miguelito Member): Interbedded siltstone and claystone, well-bedded with 2 to 4 inch thick beds with local lenses of siliceous and dolomitic siltstone.

See text and logs of exploration for description of subsurface conditions. All boundaries and locations are approximate.

Geologic contact, queried where uncertain

Interpreted groundwater surface during drilling, queried where uncertain

Groundwater level encountered during drilling

BORING DIAGRAM: 21B-01 RT. 20'

- BORING NUMBER
- OFFSET FROM SECTION LINE
- EXISTING GROUND SURFACE
- FIELD N-VALUE IN BLOWS PER FOOT
- 2.5" OD MODIFED CALIFORNIA SAMPLER
- LITHOLOGIC CONTACT
- 2" OD SPT SAMPLER
- USCS SOIL CLASSIFICATION
- SHELBY TUBE SAMPLER
- TOTAL DEPTH EXPLORED

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PLAN AND INTERPRETED SUBSURFACE PROFILE

PROJECT NAME: AVILA BEACH DRIVE AT US 101 INTERCHANGE IMPROVEMENTS Avila Beach Drive San Luis Obispo County, CA	PLATE 2
PROJECT NUMBER: 216-423	REVISION DATE: 07/06/2021

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
05	SLO	101	20.9/21.3	113	124

GEOTECHNICAL PROFESSIONAL — DATE 3-2-2022

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — JUDD J. KING — No. 2903 — GEOTECHNICAL — STATE OF CALIFORNIA

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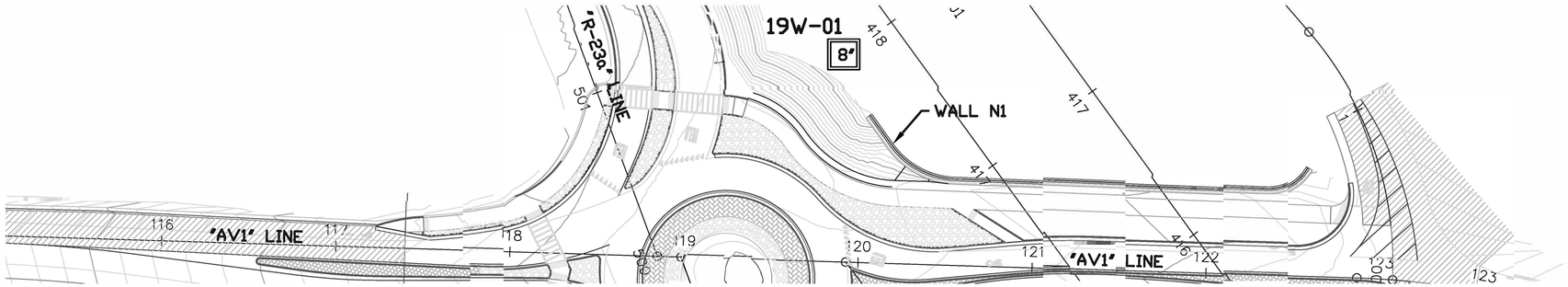
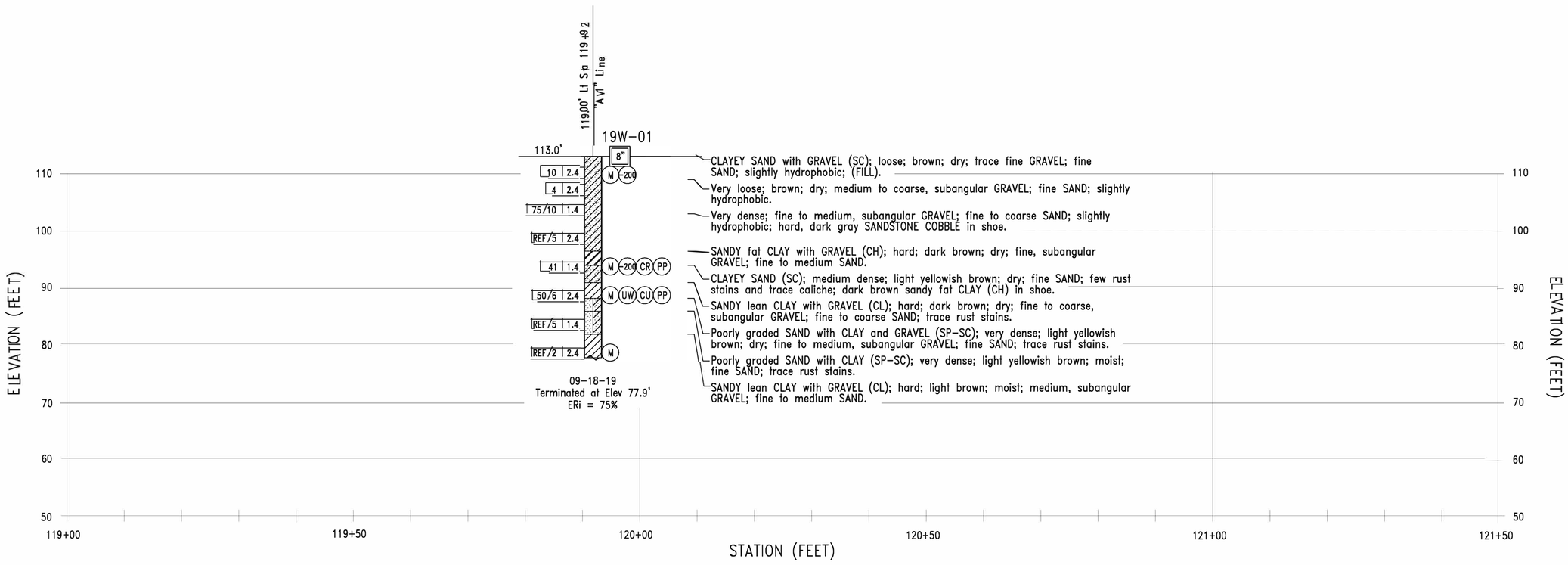
YEH AND ASSOCIATES, INC.
391 FRONT STREET, SUITE D
GROVER BEACH, CA

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS
976 OSOS STREET, ROOM 206
SAN LUIS OBISPO, CA 93408

PLAN:
1" = 40'





NOTES:

1. Auger borings excavated with a CME-85 drill rig equipped with 8-inch hollow stem augers and an automatic trip hammer weighing 140 pounds falling 30 inches with estimated 75% efficiency.
2. "1.4" Standard Penetration Test (SPT) sampler has a 1-3/8 inch inside diameter and a 2 inch outside diameter.
3. "2.4" Modified California sampler has a 2-3/8 inch inside diameter and a 3 inch outside diameter with brass liners.
4. "ref/#" indicates drive exceeded 50 blows during initial 6-inch seating.
5. "##/##" indicates partial drive having number of blows over depth interval noted.
6. All blow counts are uncorrected field blow counts.
7. See 2018 Caltrans Standard Plans A10F, A10G, and A10H for legend of soil and rock classification and boring notations.
8. This Log of Test Borings (LOTB) was prepared in accordance with the Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010).

PROFILE:
Hor. 1" = 10'
Vert. 1" = 10'

SAYGUNN LOW DESIGN OVERSIGHT	DRAWN	BY J. CRAVENS	J. CRAVENS/J. KING FIELD INVESTIGATOR	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	ERIC FREDERICKSON PROJECT ENGINEER	BRIDGE No. 49E0028 POST MILE R21.13	RETAINING WALL No. 1 ("N1") LOG OF TEST BORINGS (1 OF 1)
X SIGN OFF DATE	CHECKED	BY J. KING	9/16/2019 TO 9/18/2019 DATE				

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REVISION 4/19/2018)

DATE PLOTTED => 7/12/2021 TIME PLOTTED => 2:39 PM
FILE => 216-423 DRAFT LOTB.dwg USERNAME => Jcravens
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: X
PROJECT NUMBER & PHASE: X
CONTRACT No.: 05-1G4801

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES				SHEET	OF
3/2/22				8	11

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
05	SLO	101	20.9/21.3	121	124

GEOTECHNICAL PROFESSIONAL — 3-2-2022 DATE

REGISTERED PROFESSIONAL ENGINEER — JUDD J. KING No. 2903 GEOTECHNICAL STATE OF CALIFORNIA

PLANS APPROVAL DATE

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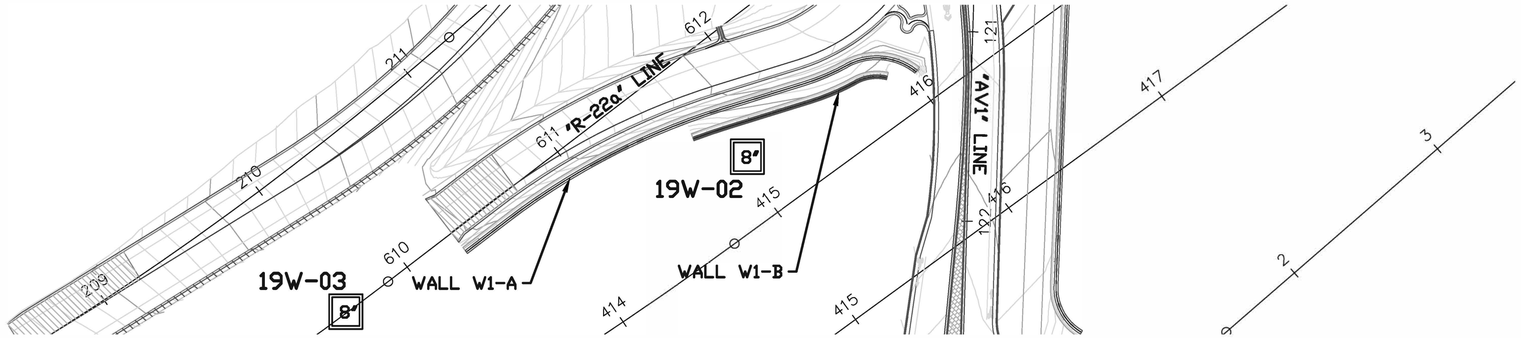
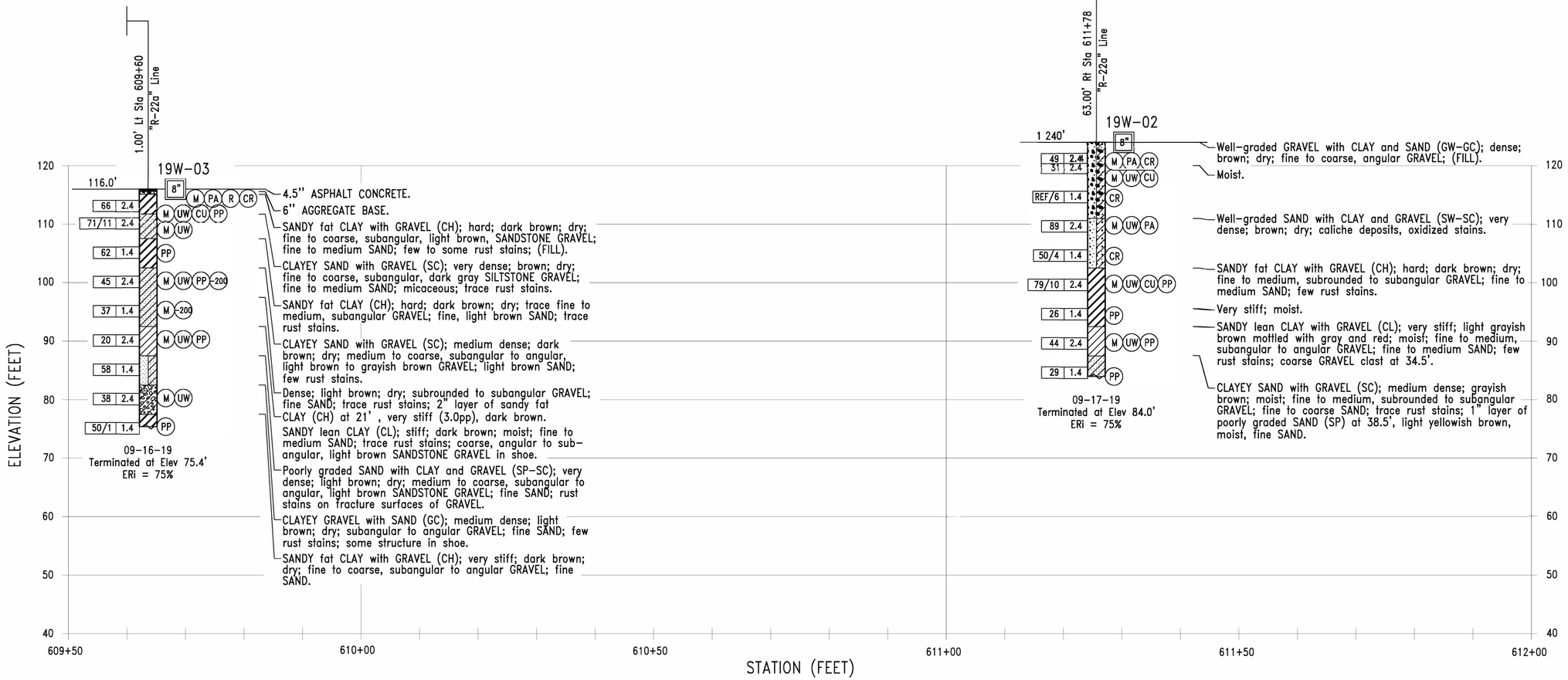
GROVER BEACH, CA

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS
976 OSOS STREET, ROOM 206
SAN LUIS OBISPO, CA 93408

PLAN:
1" = 40'





PROFILE:
Hor. 1" = 10'
Vert. 1" = 10'

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8. This Log of Test Borings (LOTB) was prepared in accordance with the Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010).

SAYGUNN LOW DESIGN OVERSIGHT	DRAWN	BY J. CRAVENS	J. CRAVENS/J. KING FIELD INVESTIGATOR		PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	ERIC FREDERICKSON PROJECT ENGINEER	BRIDGE No. 49E0028 POST MILE R21.13	RETAINING WALL No. 2 ("W1") LOG OF TEST BORINGS (1 OF 1)
X SIGN OFF DATE	CHECKED	BY J. KING	9/16/2019 TO 9/18/2019 DATE					

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DATE PLOTTED => 7/12/2021 FILE => 216-423 DRAFT LOTB.dwg
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ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3
UNIT: X PROJECT NUMBER & PHASE: X CONTRACT No.: 05-1G4801
DISREGARD PRINTS BEARING EARLIER REVISION DATES
REVISION DATES 3/2/22
SHEET 7 OF 10

As Built LOTB

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
05	SLO	101	R31.5/R35.4	103	105

Caltrans Metric

Michael S. Finegan 4-25-05
REGISTERED CIVIL ENGINEER

8-21-06
PLANS APPROVAL DATE

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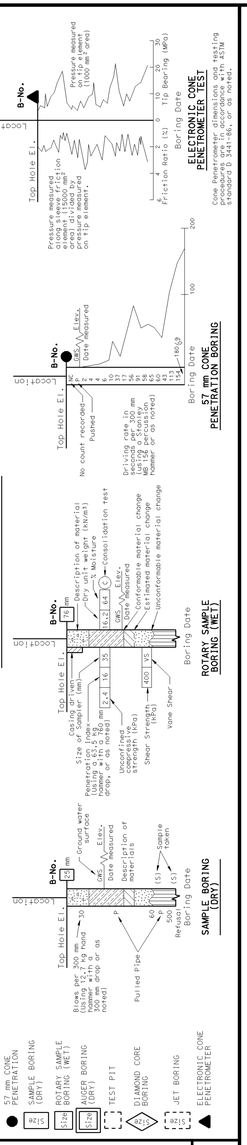
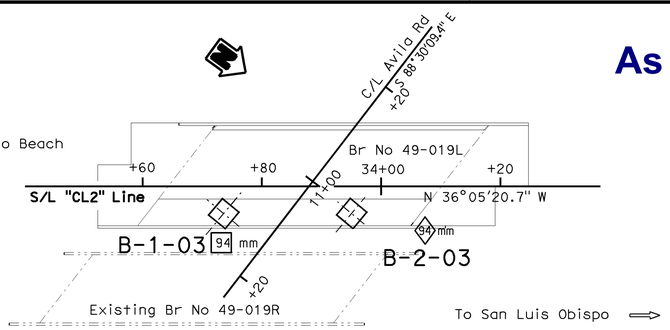
REGISTERED PROFESSIONAL ENGINEER — Michael S. Finegan — No. C50138 — Exp. 6-30-05 — CIVIL — STATE OF CALIFORNIA

Caltrans web site, go to: http://www.dot.ca.gov

CONTRACT NO: 05-485604
TRANSFER DATE: 11-09-2009
FIELD CORRECTION DATE: 5-4-2009
CORRECTIONS TRANSFERED BY: AV
FIELD CORRECTIONS BY: Nicholas Helsdorf

NO AS BUILT CORRECTIONS





BENCH MARK

PM 21.14, Std C/L Ref. Mon, stamped 6-17

Elev. 32.067

PLAN

1:500

GEOTECHNICAL SERVICES - DIVISION OF ENGINEERING SERVICES

As-Built Log of Test Borings sheet is considered an information document only. As such, the State of California registration seal with signature, license number and registration certificate expiration date confirm that this is a true and accurate copy of the original document. It does not attest to the accuracy or validity of the information contained in the original document. This drawing is available and presented only for the convenience of any bidder, contractor or other interested party.

DIST.	COUNTY	ROUTE	POST MILES - TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
05	SLO	101	20.9/21.3	X	X

REGISTERED ENGINEER - CIVIL — 3-2-22 DATE

AVILA BEACH DRIVE AT US 101 INTERCHANGE

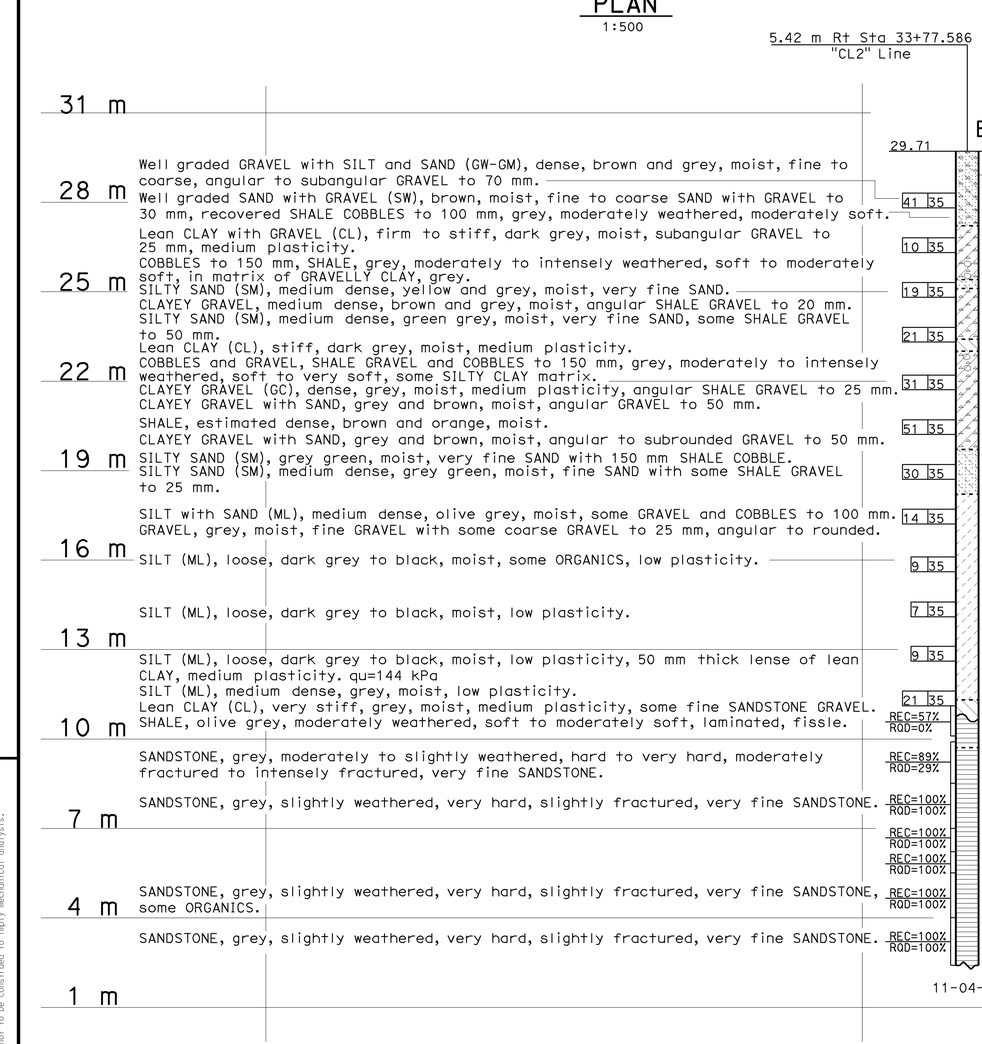
RETAINING WALL NO. 1 ("N1")/RETAINING WALL NO. 2 ("W1")

As-Built Vertical Datum: — Datum Conversion:

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA

CU: 05 EA: 05-1G4801 — BRIDGE NO. 49-E0027/49E-0028

REGISTERED PROFESSIONAL ENGINEER — JUDD J. KING — No. 2903 — GEOTECHNICAL — STATE OF CALIFORNIA



PROFILE

HOR. 1:500
VER. 1:100

32+60 33+60 34+40 35+40

ENGINEERING SERVICES	GEOTECHNICAL SERVICES
DRAWN BY	F. Nguyen 03/04
CHECKED BY	M. Finegan

FIELD INVESTIGATION BY: M. Finegan

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
DIVISION OF STRUCTURES
STRUCTURE DESIGN 7

CU 05
EA 485611

BRIDGE NO. 49-0191L
KILOMETER POST 33.9

AVILA RD UC - LEFT BRIDGE (WIDEN)

LOG OF TEST BORINGS 1 OF 3

OGS GEOLOGIST LOG OF TEST BORINGS SHEET (METRIC) (REV. 3/02)

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY): 4-15-04 | 5-11-04 | 4-15-05 | 6-27-05 | 2-27-06

SHEET 16 OF 18

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CORRECTIONS TRANSFERED BY: AV
FIELD CORRECTIONS BY: Nicholas Helsdorf

TRANSFER DATE: 11-09-2009
FIELD CORRECTION DATE: 5-4-2009

CONTRACT No: 05-485604

NO AS BUILT CORRECTIONS

WEATHERING DESCRIPTORS

Modified from United States Bureau of Reclamation, Engineering Geology Field Manual.

Descriptors		Diagnostic features: Chemical weathering-Discoloration and/or oxidation		Diagnostic features: Mechanical weathering-Grain boundary conditions (disaggregation) primarily for granitics and some coarse-grained sediments	Diagnostic features: Texture and solutioning		General characteristics (strength, excavation, etc.)§
Alphanumeric descriptor	Descriptive term	Body of rock	Fracture surfaces†		Texture	Solutioning	
W1	Fresh	No discoloration, not oxidized.	No discoloration or oxidation.	No separation, intact (tight).	No change.	No solutioning.	Hammer rings when crystalline rocks are struck. Almost always rock excavation except for naturally weak or weakly cemented rocks such as siltstones or shales.
W2	Slightly weathered to fresh○						
W3	Slightly weathered	Discoloration or oxidation is limited to surface of, or short distance from, fractures; some feldspar crystals are dull.	Minor to complete discoloration or oxidation of most surfaces.	No visible separation, intact (tight).	Preserved.	Minor leaching of some soluble minerals may be noted.	Hammer rings when crystalline rocks are struck. Body of rock not weakened. With few exceptions, such as siltstones or shales, classified as rock excavation.
W4	Moderately to slightly weathered○						
W5	Moderately weathered	Discoloration or oxidation extends from fractures usually throughout; Fe-Mg minerals are "rusty," feldspar crystals are "cloudy."	All fracture surfaces are discolored or oxidized.	Partial separation of boundaries visible.	Generally preserved.	Soluble minerals may be mostly leached.	Hammer does not ring when rock is struck. Body of rock is slightly weakened. Depending on fracturing, usually is rock excavation except in naturally weak rocks such as siltstones or shales.
W6	Intensely to moderately weathered○						
W7	Intensely weathered	Discoloration or oxidation throughout; all feldspars and Fe-Mg minerals are altered to clay to some extent; or chemical alteration produces in-situ disaggregation, see grain boundary conditions.	All fracture surfaces are discolored or oxidized, surfaces friable.	Partial separation, rock is friable; in semiarid conditions granitics are disaggregated.	Texture altered by chemical disintegration (hydration, argillation).	Leaching of soluble minerals may be complete.	Dull sound when struck with hammer, usually can be broken with moderate to heavy manual pressure or by light hammer blow without reference to planes of weakness such as incipient or hairline fractures, or veinlets. Rock is significantly weakened. Usually common excavation.
W8	Very intensely weathered						
W9	Decomposed	Discolored or oxidized throughout, but resistant minerals such as quartz may be unaltered; all feldspars and Fe-Mg minerals are completely altered to clay.		Complete separation of grain boundaries (disaggregated).	Resembles a soil, partial or complete remnant rock structure may be preserved; leaching of soluble minerals usually complete.		Can be granulated by hand. Always common excavation. Resistant minerals such as quartz may be present as "stringers" or "dikes."

Note: This chart and its horizontal categories are more readily applied to rocks with feldspars and mafic minerals. Weathering in various sedimentary rocks, particularly limestones and poorly indurated sediments, will not always fit the categories established. This chart and weathering categories may have to be modified for particular site conditions or alteration such as hydrothermal effects; however, the basic framework and similar descriptors are to be used.

○ Combination descriptors are permissible where equal distribution of both weathering characteristics are present over significant intervals or where characteristics present are "in between" the diagnostic feature. However, dual descriptors should not be used where significant, identifiable zones can be delineated. When given as a range only two adjacent terms may be combined. "Decomposed to slightly weathered," or "moderately weathered to fresh" are not acceptable.

† Does not include directional weathering along shears or faults and their associated features. For example, a shear zone that carried weathering to great depths into a fresh rock mass would not require the rock mass to be classified as weathered.

§ These are generalizations and should not be used as diagnostic features for weathering or excavation classification. These characteristics vary to a large extent based on naturally weak materials or cementation and type of excavation.

FRACTURE DENSITY

Modified from United States Bureau of Reclamation, Engineering Geology Field Manual.

FRACTURE DENSITY- Based on the spacing of all natural fractures in an exposure or core recovery lengths in boreholes; excludes mechanical breaks, shears, and shear zones; however, shear-disturbed zones (fracturing outside the shear) are included. Descriptors for fracture density apply to all rock exposures such as tunnel walls, dozer trenches, outcrops, or foundation cut slopes and inverts, as well as boreholes. Descriptive criteria presented below are based on borehole cores where lengths are measured along the core axis, for other exposures the criteria is distance measured between fractures (size of blocks).

UNFRACTURED (FD0): No fractures.

VERY SLIGHTLY FRACTURED (FD1): Core recovered mostly in lengths greater than 1 m.

SLIGHTLY TO VERY SLIGHTLY FRACTURED (FD2)*

SLIGHTLY FRACTURED (FD3): Core recovered mostly in lengths from 300 to 1000 mm, with few scattered lengths less than 300 mm or greater than 1000 mm.

MODERATELY TO SLIGHTLY FRACTURED (FD4)*

MODERATELY FRACTURED (FD5): Core recovered mostly in 100 to 300 mm lengths with most lengths about 200 mm.

INTENSELY TO MODERATELY FRACTURED (FD6)*

INTENSELY FRACTURED (FD7): Lengths average from 30 to 100 mm with scattered fragmented intervals. Core recovered mostly in lengths less than 100 mm.

VERY INTENSELY TO INTENSELY FRACTURED (FD8)*

VERY INTENSELY FRACTURED (FD9): Core recovered mostly as chips and fragments with a few scattered short core lengths.

* Combinations of fracture densities (e.g. very intensely to intensely fractured, or moderately to slightly fractured) are used where equal distribution of both fracture density characteristics are present over a significant interval or exposure, or where characteristics are "in between" the descriptor definitions.

ROCK HARDNESS DESCRIPTORS

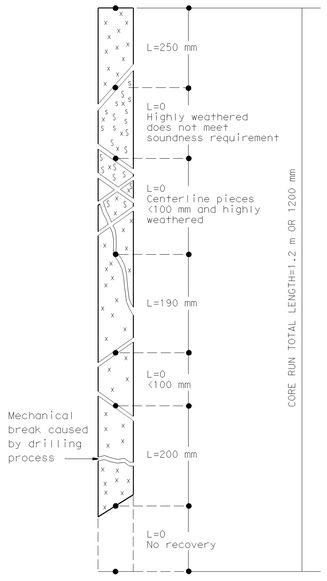
Alphanumeric Descriptor	Descriptor	Criteria
H1	Extremely hard	Core, fragment, or exposure cannot be scratched with knife or sharp pick; can only be chipped with repeated heavy hammer blows.
H2	Very hard	Cannot be scratched with knife of sharp pick. Core or fragment breaks with repeated heavy hammer blows.
H3	Hard	Can be scratched with knife or sharp pick with difficulty (heavy pressure). Heavy hammer blow required to break specimen.
H4	Moderately hard	Can be scratched with knife or sharp pick with light or moderate pressure. Core or fragment breaks with moderate hammer blow.
H5	Moderately soft	Can be grooved 2 mm deep by knife or sharp pick with moderate or heavy pressure. Core or fragment breaks with light hammer blow or heavy manual pressure.
H6	Soft	Can be grooved or gouged easily by knife or sharp pick with light pressure, can be scratched with fingernail. Breaks with light to moderate manual pressure.
H7	Very soft	Can be readily indented, grooved or gouged with fingernail, or carved with a knife. Breaks with light manual pressure.

Any bedrock unit softer than H7, very soft, is to be described using ASTM D-2488 consistency descriptors.

Note: Although "sharp pick" is included in these definitions, descriptions of ability to be scratched, grooved or gouged by a knife is the preferred criteria.

Modified from United States Bureau of Reclamation, Engineering Geology Field Manual.

ROCK QUALITY DESIGNATION (RQD) & PERCENT RECOVERY (REC) LOGGING



RQD (ROCK QUALITY DESIGNATION)	DESCRIPTION OF ROCK QUALITY
0 - 25%	VERY POOR
25 - 50%	POOR
50 - 75%	FAIR
75 - 90%	GOOD
90 - 100%	EXCELLENT

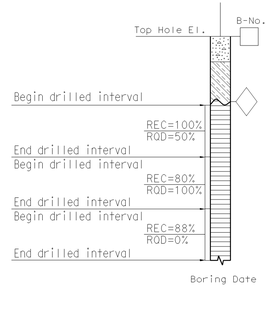
REC = Percent Core Recovery

$$REC = \frac{\sum \text{Length of all core pieces}}{\text{Total core run length}}$$

$$RQD = \frac{\sum \text{Length of sound core pieces} \geq 100\text{ mm}}{\text{Total core run length}}$$

$$RQD = \frac{250+190+200}{1200} \times 100\%$$

RQD = 53% (fair)



(No Scale)
After Deere & Deere, 1989

BEDDING, FOLIATION, OR FLOW TEXTURE DESCRIPTORS

Descriptors	Thickness / Spacing
Massive	Greater than 3 m
Very thickly (bedded, foliated, or banded)	1 to 3 m
Thickly	300 mm to 1 m
Moderately	100 to 300 mm
Thinly	30 to 100 mm
Very thinly	10 to 30 mm
Laminated (intensely foliated or banded)	Less than 10 mm

Modified from United States Bureau of Reclamation, Engineering Geology Field Manual.

JUDD J. KING
No. 2903
GEOTECHNICAL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

GEOTECHNICAL SERVICES - DIVISION OF ENGINEERING SERVICES

As-Built Log of Test Borings sheet is considered an information document only. As such, the State of California registration seal with signature, license number and registration certificate expiration date confirm that this is a true and accurate copy of the original document. It does not attest to the accuracy or validity of the information contained in the original document. This drawing is available and presented only for the convenience of any bidder, contractor or other interested party.

DIST.	COUNTY	ROUTE	POST MILES - TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
05	SLO	101	20.9/21.3	X	X

REGISTERED ENGINEER - CIVIL — 3-2-22 DATE

AVILA BEACH DRIVE AT US 101 INTERCHANGE

RETAINING WALL NO. 1 ("N1")/RETAINING WALL NO. 2 ("W1")

As-Built Vertical Datum: | Datum Conversion:

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA

CU: 05 EA: 05-1G4801 | BRIDGE NO. 49-E0027/49E-0028

Caltrans Metric

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
05	SLO	101	R31.5/R35.4	104	105

Michael S. Finegan 4-25-05
REGISTERED CIVIL ENGINEER

8-21-06
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Michael S. Finegan No. C50138 Exp. 6-30-05 CIVIL STATE OF CALIFORNIA

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ENGINEERING SERVICE CENTER	GEOTECHNICAL SERVICES
PREPARED BY	F. Nguyen 03/04
CHECKED BY	M. Finegan

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURE DESIGN 7

BRIDGE NO. 49-0191L
KILOMETER POST 33.9

AVILA RD UC - LEFT BRIDGE (WIDEN)
LOG OF TEST BORINGS 2 OF 3

OSF GEOLOGIST LOG OF TEST BORINGS SHEET (METRIC) (REV. 5/2003)

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

CU 05
EA 485611

DISREGARD PRINTS BEARING EARLIER REVISION DATES

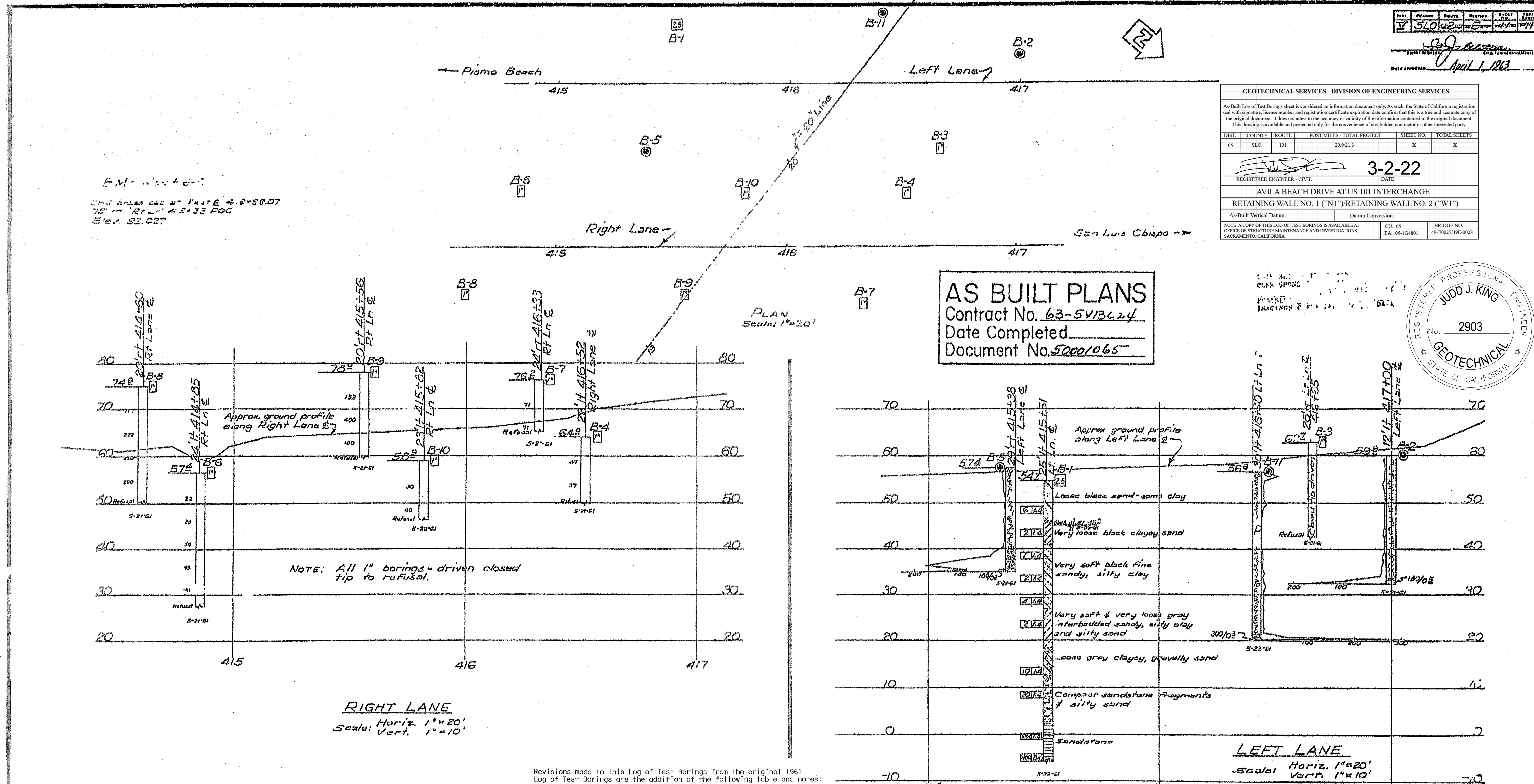
REVISION DATES (PRELIMINARY STAGE ONLY): 4-15-05, 2-27-06

SHEET 17 OF 18

FILE => 49-0191-z-lotb2.dgn

USERNAME => avolde2 DATE PLOTTED => 10-NOV-2009 TIME PLOTTED => 12:20

Plate 1 - As Built LOTB



FED. ROAD DIV. No.	STATE	PROJ. No.	FISCAL YEAR	SHEET No.	TOTAL SHEETS
7	CAL.			162	177

Date approved April 1, 1963

GEOTECHNICAL SERVICES - DIVISION OF ENGINEERING SERVICES

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DIST.	COUNTY	ROUTE	POST MILES - TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
05	SLO	101	20.9/21.3	X	X

REGISTERED ENGINEER - CIVIL — DATE 3-2-22

AVILA BEACH DRIVE AT US 101 INTERCHANGE

RETAINING WALL NO. 1 ("N1")/RETAINING WALL NO. 2 ("W1")

As-Built Vertical Datum: — Datum Conversion:

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA — CU: 05 EA: 05-1G4801 — BRIDGE NO. 49-E0027/49E-0028

REGISTERED PROFESSIONAL ENGINEER — JUDD J. KING — No. 2903 — GEOTECHNICAL — STATE OF CALIFORNIA

AS BUILT PLANS
Contract No. 63-5V13C24
Date Completed
Document No. 50001065

BRIDGE DEPARTMENT

FIELD STUDY: H. Showler 5-61
DRAWN: H. Darr 7-61
CHECKED: W. Showler 10-61

CLASSIFICATION OF MATERIAL BASED ON STANDARD GRADE SIZE LIMITS

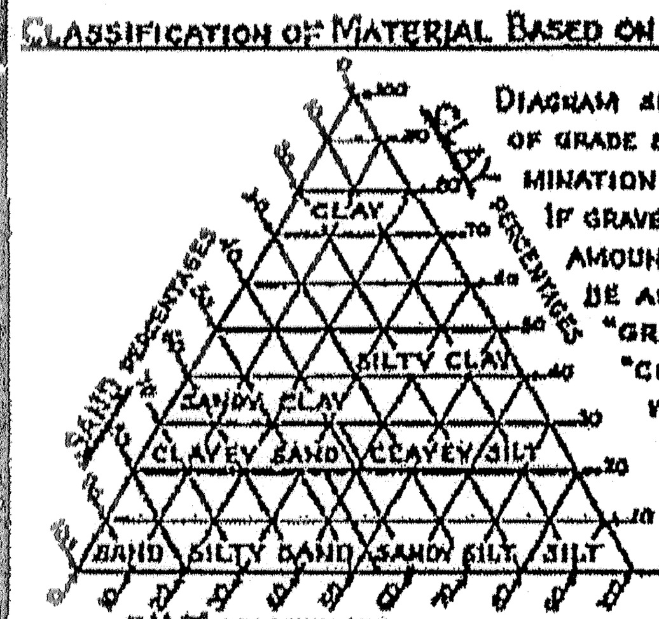

Diagram showing the basis for estimates of grade size distribution used in determination of class names. If gravel is present in appreciable amounts the term "gravelly" may be added to the class name, viz. "gravelly sand." The terms "coarse," "medium" and "fine" when used to describe sand, silt and gravel refer to standard grade size limits.

LEGEND OF EARTH MATERIALS

- Gravel
- Sand
- Silt
- Clay
- Sandy Clay or Clayey Sand
- Sandy Silt or Silty Sand
- Silty Clay or Clayey Silt
- Peat and/or Organic Matter
- Fill Material
- Igneous Rock
- Sedimentary Rock
- Metamorphic Rock

Revisions made to this Log of Test Borings from the original 1961 Log of Test Borings are the addition of the following table and notes:

BORING	STATION	OFFSET FROM "CL2" LINE
B-1	33+68.099	11.378 m LT
B-2	34+11.466	7.835 m LT
B-3	34+06.777	4.402 m RT
B-4	33+96.727	10.485 m RT
B-5	33+63.881	5.055 m RT
B-6	33+47.794	10.579 m RT
B-7	33+91.045	24.832 m RT
B-8	33+40.131	23.966 m RT
B-9	33+69.535	23.809 m RT
B-10	33+77.428	10.644 m RT
B-11	33+92.211	13.076 m LT

Notes:

1. See the General Plan and/or Foundation Plan for Metric Stationing.
2. Structure Design produced the data presented in the table above. The data are the metric locations for the As-Built Test Borings referenced to the proposed new structure location. This table is presented on the As-Built Log of Test Boring sheet for the convenience of any bidder, contractor or other interested party.

To accompany plans dated 8-21-06

DIVISION OF ENGINEERING SERVICES - GEOTECHNICAL SERVICES

As-Built Log of Test Borings sheet is considered an informational document only. As such, the State of California registration seal with signature, license number and registration certificate expiration date confirm that this is a true and accurate copy of the original document. This drawing is available and presented only for the convenience of any bidder, contractor or other interested party.

DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
05	SLO	101	R31.5/R35.4	105	105

REGISTERED CIVIL ENGINEER — DATE 4/25/05

AVILA RD UC - LEFT BRIDGE (WIDEN)

LOG OF TEST BORINGS 3 OF 3

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA — CU: 05 EA: 485611 — BRIDGE No. 49-0191L — Sheet 18 of 18

REGISTERED PROFESSIONAL ENGINEER — Michael S. Finegan — No. C50138 — Exp. 6-30-05 — CIVIL — STATE OF CALIFORNIA

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NOTE

Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

AVILA ROAD UNDERCROSSING

LOG OF TEST BORINGS

SCALE As shown — BRIDGE 49-191 R/L — FILE — DRAWING C-49191-11

PR-49191-5

162

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.

49-0191-z-lotb3.tif

APPENDIX A - BORING LOGS

GROUP SYMBOLS AND NAMES

Graphic / Symbol	Group Names
GW	Well-graded GRAVEL Well-graded GRAVEL with SAND
GP	Poorly graded GRAVEL Poorly graded GRAVEL with SAND
GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND
GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GP-GM	Poorly graded GRAVEL with SILT Poorly graded GRAVEL with SILT and SAND
GP-GC	Poorly graded GRAVEL with CLAY (or SILTY CLAY) Poorly graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GM	SILTY GRAVEL SILTY GRAVEL with SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND
SW	Well-graded SAND Well-graded SAND with GRAVEL
SP	Poorly graded SAND Poorly graded SAND with GRAVEL
SW-SM	Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL
SW-SC	Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SP-SM	Poorly graded SAND with SILT Poorly graded SAND with SILT and GRAVEL
SP-SC	Poorly graded SAND with CLAY (or SILTY CLAY) Poorly graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SM	SILTY SAND SILTY SAND with GRAVEL
SC	CLAYEY SAND CLAYEY SAND with GRAVEL
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL
PT	PEAT
	COBBLES COBBLES and BOULDERS BOULDERS

Graphic / Symbol	Group Names
CL	Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
CL-ML	SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
OL	ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
OL	ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
CH	Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
MH	Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
OH	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
OH	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY elastic ELASTIC SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
OL/OH	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND

FIELD AND LABORATORY TESTS

C	Consolidation (ASTM D2435)
CL	Collapse Potential (ASTM D5333)
CP	Compaction Curve (ASTM D1557)
CR	Corrosion, Sulfates, Chlorides (CTM 643; ASTM D4972, ASTM G187, ASTM D4327)
CU	Consolidated Undrained Triaxial (ASTM D4767)
DS	Direct Shear (ASTM D3080)
EI	Expansion Index (ASTM D4829)
M	Moisture Content (ASTM D2216)
OC	Organic Content (ASTM D2974)
P	Permeability (ASTM 5084)
PA	Particle Size Analysis (ASTM D422-63 [2007])
PI	Liquid Limit, Plastic Limit, Plasticity Index (ASTM D4318)
PL	Point Load Index (ASTM D5731)
PM	Pressure Meter
PP	Pocket Penetrometer
R	R-Value (CTM 301)
SE	Sand Equivalent (CTM 217)
SG	Specific Gravity (AASHTO T 100)
SL	Shrinkage Limit (ASTM D427)
SW	Swell Potential (ASTM D4546)
TV	Pocket Torvane
UC	Unconfined Compression - Soil (ASTM D2166) Unconfined Compression - Rock (ASTM D7012)
UU	Unconsolidated Undrained Triaxial (ASTM D2850)
UW	Unit Weight (ASTM D4767, ASTM D7263)
VS	Vane Shear (AASHTO T 223-96 [2004])
-200	200 Wash (ASTM D1140)

SAMPLER GRAPHIC SYMBOLS

- Standard Penetration Test (SPT) (2" O.D.)
- Standard California Sampler (2.5" O.D.)
- Modified California Sampler (3" O.D.)
- Shelby Tube
- Piston Sampler
- Rock Core
- Grab Sample
- Bulk Sample
- Other (see remarks)

DRILLING METHOD SYMBOLS

- Auger Drilling
- Rotary Drilling
- Dynamic Cone or Hand Driven
- Diamond Core

WATER LEVEL SYMBOLS

- First Water Level Reading (during drilling)
- Static Water Level Reading (short-term)
- Static Water Level Reading (long-term)

Yeh and Associates, Inc.
Geotechnical • Geological • Construction Services

REPORT TITLE
LEGEND FOR SOIL CLASSIFICATION

PROJECT NAME
Avila Beach Drive at US 101 Interchange Improvements

DATE
11/7/2019

SHEET
1 of 1

LOGGED BY	BEGIN DATE	COMPLETION DATE	HAMMER TYPE	BORING NUMBER
J. Cravens	**9-17-19**	**9-17-19**	**140-lb Automatic Trip**	**19IN-01**
FINAL BY			BOREHOLE LOCATION (Lat/Long or North/East and Datum)	SURFACE ELEVATION
J. King			**--/--**	**104.0 ft**
DRILLING METHOD			BOREHOLE LOCATION (Offset, Station, Line)	WEATHER NOTES
8" Hollow Stem Auger			**35' Lt. Sta. 611+61, "R-22a" Line**	**Sunny, hot, breezy**
DRILLER			LOCATION DESCRIPTION	BACKFILLED WITH
S/G Drilling Co.			**177' S of Hwy 101 SB on-ramp entrance sign, 15.3' E of EP of Hwy 101 SB on-ramp**	**Infiltration test**
DRILL RIG			GROUNDWATER READINGS DURING DRILLING AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
CME-85			**Not Encountered**	**11.5 ft**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (ksf)	Drilling Method	Casing Depth	Remarks
	0		Well-graded SAND with SILT and GRAVEL (SW-SM); very dense; light brown to dark gray; dry; subangular to angular, dark gray SILTSTONE GRAVEL; fine SAND; trace cementation; some structure in shoe; (FILL).		I										CP ($\gamma_{D,MAX}$ = 92 pcf, w_{OPT} = 21%)
102	2				32	27 38 42	80	67		19					PA (44% G, 44% S, 12% F)
100	4		SANDY lean CLAY (CL); hard; light brown; dry; trace fine GRAVEL; fine SAND; light brown to gray SANDSTONE COBBLE in shoe.												Rig chatter at ~4.5'
	5				33	27 50/6"	50/6"	92		18	103				
98	6														
	7		SANDY lean CLAY with GRAVEL (CL); hard; light brown; dry; dark gray to light brown, angular SANDSTONE GRAVEL; fine SAND.												
96	8														
	9														
94	10				34	13 32 38	70	69				>4.5PP			CR (pH = 5.50, r = 4,438 ohm-cm)
	11														
92	12		Bottom of borehole at 11.5 ft bgs												
	13		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010) except as noted on the Soil or Rock Legend or below.												
90	14														
	15														
88	16														
	17														
86	18														
	19														
84	20														
	21														
82	22														
	23														
80	24														
	25														

Yeh and Associates, Inc.
Geotechnical • Geological • Construction Services

PROJECT NAME	**Avila Beach Drive at US 101 Interchange Improvements**
PROJECT NUMBER	**216-423**
BORING NUMBER	**19IN-01**
REVISION DATE	**11/7/2019**
SHEET	**1 of 1**

5 BR - STANDARD 216-423 BORING LOGS.GPJ CALIFORNIA YEH LIBRARY (YEH V2 APRIL 2019)_7.GLB 12/6/19

LOGGED BY	BEGIN DATE	COMPLETION DATE	HAMMER TYPE	BORING NUMBER
J. Cravens	**9-17-19**	**9-17-19**	**140-lb Automatic Trip**	**19IN-02**
FINAL BY			BOREHOLE LOCATION (Lat/Long or North/East and Datum)	SURFACE ELEVATION
J. King			**--/--**	**99.5 ft**
DRILLING METHOD			BOREHOLE LOCATION (Offset, Station, Line)	WEATHER NOTES
8" Hollow Stem Auger			**39' Rt. Sta. 213+26, "SBR" Line**	**Sunny, hot, breezy**
DRILLER			LOCATION DESCRIPTION	BACKFILLED WITH
S/G Drilling Co.			**40' S of Hwy 101 SB on-ramp entrance sign, 33.5' W of EP of Hwy 101 SB on-ramp**	**Infiltration test**
DRILL RIG			GROUNDWATER READINGS DURING DRILLING AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
CME-85			**Not Encountered**	**5.4 ft**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (ksf)	Drilling Method	Casing Depth	Remarks
	0		Well-graded GRAVEL with CLAY and SAND (GW-GC); medium dense; dark brown; dry; fine to medium GRAVEL; (FILL).		J										
98	2		Light brown; medium to coarse, subangular SANDSTONE GRAVEL; fine SAND.		35	13 14 9	23	67		10					PA (50% G, 43% S, 7% F) CR (pH = 3.98, r = 777 ohm-cm)
96	4		CLAYEY SAND (SC); very dense; light brown; dry; fine to medium, subangular GRAVEL; fine to medium SAND.												
	5				36	50/5"	Ref/5"	20		12					-200 (7% G, 58% S, 35% F)
94	6		Bottom of borehole at 5.4 ft bgs												
	7		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010) except as noted on the Soil or Rock Legend or below.												
92	8														
	9														
90	10														
	11														
88	12														
	13														
86	14														
	15														
84	16														
	17														
82	18														
	19														
80	20														
	21														
78	22														
	23														
76	24														
	25														

5 BR - STANDARD 216-423 BORING LOGS.GPJ CALIFORNIA YEH LIBRARY (YEH V2 APRIL 2019)_7.GLB 12/6/19

Yeh and Associates, Inc.
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PROJECT NAME	**Avila Beach Drive at US 101 Interchange Improvements**
PROJECT NUMBER	**216-423**
BORING NUMBER	**19IN-02**
REVISION DATE	**11/7/2019**
SHEET	**1 of 1**

LOGGED BY	BEGIN DATE	COMPLETION DATE	HAMMER TYPE	BORING NUMBER
J. Cravens	**9-16-19**	**9-16-19**	**140-lb Automatic Trip**	**19IN-03**
FINAL BY			BOREHOLE LOCATION (Lat/Long or North/East and Datum)	SURFACE ELEVATION
J. King			**--/--**	**89.5 ft**
DRILLING METHOD			BOREHOLE LOCATION (Offset, Station, Line)	WEATHER NOTES
8" Hollow Stem Auger			**117' Rt. Sta. 115+98, "AV1" Line**	**Sunny, warm, slight breeze**
DRILLER			LOCATION DESCRIPTION	BACKFILLED WITH
S/G Drilling Co.			**150.4' E of 19IN-04, 22.3' W of high pressure gas line sign**	**Infiltration test**
DRILL RIG			GROUNDWATER READINGS DURING DRILLING AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
CME-85			**Not Encountered**	**6.5 ft**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (ksf)	Drilling Method	Casing Depth	Remarks
	0														
	1		CLAYEY SAND (SC); very dense; light yellowish brown; dry; trace GRAVEL; fine SAND; trace rust stains; coarse, subangular GRANITIC GRAVEL in shoe; (FILL).		E										CP ($\gamma_{D,MAX}$ = 108 pcf, w_{OPT} = 16%)
88	2				17	10 24 50/3"	74/9"	60		14	95				-200 (1% G, 59% S, 40% F)
	3														
86	4		CLAYEY SAND with GRAVEL (SC); very dense; light brown; dry; subrounded to anguklar GRAVEL; fine SAND; few rust stains; asphalt in shoe.												Rig chatter at ~4'
	5				18	24 32 50/3"	82/9"	87		16	75				
84	6														
	7		Bottom of borehole at 6.5 ft bgs												Rig chatter and grinding noises at ~6.5'. Auger refusal on asphalt (from old Avila Beach Drive alignment) at 6.5'. Drill rig pulled forward 1' to try to redrill, auger refusal on asphalt again at 6.5'.
82	8		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010) except as noted on the Soil or Rock Legend or below.												
	9														
80	10														
	11														
78	12														
	13														
76	14														
	15														
74	16														
	17														
72	18														
	19														
70	20														
	21														
68	22														
	23														
66	24														
	25														

Yeh and Associates, Inc.
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PROJECT NAME	**Avila Beach Drive at US 101 Interchange Improvements**
PROJECT NUMBER	**216-423**
BORING NUMBER	**19IN-03**
REVISION DATE	**11/7/2019**
SHEET	**1 of 1**

5 BR - STANDARD 216-423 BORING LOGS.GPJ CALIFORNIA YEH LIBRARY (YEH V2 APRIL 2019)_7.GLB 12/6/19

LOGGED BY	BEGIN DATE	COMPLETION DATE	HAMMER TYPE	BORING NUMBER
J. Cravens	**9-16-19**	**9-16-19**	**140-lb Automatic Trip**	**19IN-04**
FINAL BY			BOREHOLE LOCATION (Lat/Long or North/East and Datum)	SURFACE ELEVATION
J. King			**--/--**	**78.0 ft**
DRILLING METHOD			BOREHOLE LOCATION (Offset, Station, Line)	WEATHER NOTES
8" Hollow Stem Auger			**71' Rt. Sta. 114+50, "AV1" Line**	**Sunny, warm, breezy**
DRILLER			LOCATION DESCRIPTION	BACKFILLED WITH
S/G Drilling Co.			**41' E of power pole, 49.9' S of EP of Avila Beach Dr.**	**Infiltration test**
DRILL RIG			GROUNDWATER READINGS DURING DRILLING AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
CME-85			**Not Encountered**	**3.5 ft**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (ksf)	Drilling Method	Casing Depth	Remarks
	0		SANDY fat CLAY with GRAVEL (CH); very stiff; dark brown; dry; fine to medium, subangular GRAVEL; fine SAND; asphalt in shoe; (FILL).		D										
	1				14	24	50/1"	14							
76	2					50/1"						3.0PP			
	3														
74	4		Bottom of borehole at 3.5 ft bgs												Rig chatter and grinding noises at ~3.5'
	5														
72	6		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010) except as noted on the Soil or Rock Legend or below.												
	7														
70	8														
	9														
68	10														
	11														
66	12														
	13														
64	14														
	15														
62	16														
	17														
60	18														
	19														
58	20														
	21														
56	22														
	23														
54	24														
	25														

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PROJECT NAME	**Avila Beach Drive at US 101 Interchange Improvements**
PROJECT NUMBER	**216-423**
BORING NUMBER	**19IN-04**
REVISION DATE	**11/7/2019**
SHEET	**1 of 1**

5 BR - STANDARD 216-423 BORING LOGS.GPJ CALIFORNIA YEH LIBRARY (YEH V2 APRIL 2019)_7.GLB 12/6/19

LOGGED BY	BEGIN DATE	COMPLETION DATE	HAMMER TYPE	BORING NUMBER
J. Cravens	**9-18-19**	**9-18-19**	**140-lb Automatic Trip**	**19IN-05**
FINAL BY			BOREHOLE LOCATION (Lat/Long or North/East and Datum)	SURFACE ELEVATION
J. King			**--/--**	**77.5 ft**
DRILLING METHOD			BOREHOLE LOCATION (Offset, Station, Line)	WEATHER NOTES
8" Hollow Stem Auger			**43' Rt. Sta. 114+98, "AV1" Line**	**Sunny, warm, breezy**
DRILLER			LOCATION DESCRIPTION	BACKFILLED WITH
S/G Drilling Co.			**89.2' E of power pole, 21' S of EP of Avila Beach Dr.**	**Infiltration test**
DRILL RIG			GROUNDWATER READINGS DURING DRILLING AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
CME-85			**Not Encountered**	**10.0 ft**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (ksf)	Drilling Method	Casing Depth	Remarks
	0		SILTY GRAVEL with SAND (GM); medium dense; dark brown; dry; medium to coarse, subangular to angular, light orangish brown SANDSTONE GRAVEL; fine to coarse SAND; (FILL).		L										
76	2														
	3														
74	4				43	9 14 14	28	61		18	73	>4.5PP			-200 (41% G, 33% S, 26% F) PI (47 LL, 30 PL, 17 PI) CR (pH = 4.33, r = 3,116 ohm-cm)
	5														
72	6														
	7														
70	8														
	9		Moist; angular, gray, fine-grained SANDSTONE COBBLE in shoe, with oxidation on fracture surfaces.		44	7 14 16	30	56		17	96	4.5PP			
68	10		Bottom of borehole at 10.0 ft bgs												
	11														
66	12		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010) except as noted on the Soil or Rock Legend or below.												
	13														
64	14														
	15														
62	16														
	17														
60	18														
	19														
58	20														
	21														
56	22														
	23														
54	24														
	25														

5 BR - STANDARD 216-423 BORING LOGS.GPJ CALIFORNIA YEH LIBRARY (YEH V2 APRIL 2019)_7.GLB 12/6/19

Yeh and Associates, Inc.
Geotechnical • Geological • Construction Services

PROJECT NAME	**Avila Beach Drive at US 101 Interchange Improvements**
PROJECT NUMBER	**216-423**
BORING NUMBER	**19IN-05**
REVISION DATE	**11/7/2019**
SHEET	**1 of 1**

LOGGED BY	BEGIN DATE	COMPLETION DATE	HAMMER TYPE	BORING NUMBER
J. Garcia	3-26-21	3-26-21	140-lb Automatic Trip	21IN-01
FINAL BY			BOREHOLE LOCATION (Lat/Long or North/East and Datum)	SURFACE ELEVATION
J. King			--/--	80.5 ft
DRILLING METHOD			BOREHOLE LOCATION (Offset, Station, Line)	WEATHER NOTES
8" Hollow Stem Auger			37' Rt. Sta. 115+51, "AV1" Line	Clear, sunny
DRILLER			LOCATION DESCRIPTION	BACKFILLED WITH
S/G Drilling Co.			10' S of Avila Beach Drive, 58' E of pipeline stake	Infiltration Test
DRILL RIG			GROUNDWATER READINGS DURING DRILLING AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
CME-85			Not Encountered	15.0 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (ksf)	Drilling Method	Casing Depth	Remarks
	0		SILTY SAND (SM); medium dense; brown; moist; trace fine GRAVEL; rootlets; (ARTIFICIAL FILL).												
79	2														
	3			X	1	8 8 7	15	6							
77	4														
	5		Trace subangular to subrounded GRAVEL.	X	2	4 4 11	15	39							
75	6														
	7														
73	8														
	9														
71	10		Loose.	X	3	1 2 8	10	50							
	11														
69	12														
	13														
67	14		Medium dense.	X	4	14 17 8	25	11							
	15		Bottom of borehole at 15.0 ft bgs												
65	16														
	17		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010) except as noted on the Soil or Rock Legend or below.												
63	18														
	19														
61	20														
	21														
59	22														
	23														
57	24														
	25														

5 BR - STANDARD 216-423 BORING LOGS.GPJ CALIFORNIA YEH LIBRARY (YEH V3 APRIL 2020).GLB 4/14/21

Yeh and Associates, Inc.
Geotechnical • Geological • Construction Services

PROJECT NAME	Avila Beach Drive at US 101 Interchange Improvements
PROJECT NUMBER	216-423
BORING NUMBER	21IN-01
REVISION DATE	4/14/2021
SHEET	1 of 1

LOGGED BY	BEGIN DATE	COMPLETION DATE	HAMMER TYPE	BORING NUMBER
J. Garcia	**3-26-21**	**3-26-21**	**140-lb Automatic Trip**	**21IN-02**
FINAL BY			BOREHOLE LOCATION (Lat/Long or North/East and Datum)	SURFACE ELEVATION
J. King			**--/--**	**80.5 ft**
DRILLING METHOD			BOREHOLE LOCATION (Offset, Station, Line)	WEATHER NOTES
8" Hollow Stem Auger			**36' Rt. Sta. 116+41, "AV1" Line**	**Clear, sunny**
DRILLER			LOCATION DESCRIPTION	BACKFILLED WITH
S/G Drilling Co.			**8' S of Avila Beach Drive, 31' W of Pipeline Stake**	**Infiltration Test**
DRILL RIG			GROUNDWATER READINGS DURING DRILLING AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
CME-85			**Not Encountered**	**10.0 ft**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (ksf)	Drilling Method	Casing Depth	Remarks
	0		CLAYEY SAND (SC); medium dense; brown; moist; (ARTIFICIAL FILL).												
79	2														
	3			X	5	5 7 8	15	33							
77	4														
	5		Loose; trace subangular GRAVEL.	X	6	5 6 3	9	50							
75	6														
	7														
73	8														
	9		Medium dense.	X	7	9 12 7	19	17							
71	10		Bottom of borehole at 10.0 ft bgs												
	11														
69	12		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010) except as noted on the Soil or Rock Legend or below.												
	13														
67	14														
	15														
65	16														
	17														
63	18														
	19														
61	20														
	21														
59	22														
	23														
57	24														
	25														

Yeh and Associates, Inc.
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PROJECT NAME	**Avila Beach Drive at US 101 Interchange Improvements**
PROJECT NUMBER	**216-423**
BORING NUMBER	**21IN-02**
REVISION DATE	**4/14/2021**
SHEET	**1 of 1**

5 BR - STANDARD 216-423 BORING LOGS.GPJ CALIFORNIA YEH LIBRARY (YEH V3 APRIL 2020).GLB 4/14/21

LOGGED BY	BEGIN DATE	COMPLETION DATE	HAMMER TYPE	BORING NUMBER
J. Garcia	**3-26-21**	**3-26-21**	**140-lb Automatic Trip**	**21IN-03**
FINAL BY			BOREHOLE LOCATION (Lat/Long or North/East and Datum)	SURFACE ELEVATION
J. King			**--/--**	**80.0 ft**
DRILLING METHOD			BOREHOLE LOCATION (Offset, Station, Line)	WEATHER NOTES
8" Hollow Stem Auger			**45' Rt. Sta. 117+25, "AV1" Line**	**Clear, sunny**
DRILLER			LOCATION DESCRIPTION	BACKFILLED WITH
S/G Drilling Co.			**25' S of Avila Beach Drive, 35' E of drain**	**Infiltration Test**
DRILL RIG			GROUNDWATER READINGS DURING DRILLING AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
CME-85			**Not Encountered**	**5.5 ft**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (ksf)	Drilling Method	Casing Depth	Remarks
80	0														
	1		SANDY lean CLAY (CL); soft; brown to dark brown; moist; trace organcis, rootlets; (ARTIFICIAL FILL).												
78	2														
	3				8	3 2 2	4	56							
76	4														
	5		CLAYEY SAND (SC); loose; brown; moist; trace fine SAND.		9	3 5 3	8	39							
74	6		Bottom of borehole at 5.5 ft bgs												
	7														
72	8		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010) except as noted on the Soil or Rock Legend or below.												
	9														
70	10														
	11														
68	12														
	13														
66	14														
	15														
64	16														
	17														
62	18														
	19														
60	20														
	21														
58	22														
	23														
56	24														
	25														

5 BR - STANDARD 216-423 BORING LOGS.GPJ CALIFORNIA YEH LIBRARY (YEH V3 APRIL 2020).GLB 4/14/21

Yeh and Associates, Inc.
Geotechnical • Geological • Construction Services

PROJECT NAME	**Avila Beach Drive at US 101 Interchange Improvements**
PROJECT NUMBER	**216-423**
BORING NUMBER	**21IN-03**
REVISION DATE	**4/14/2021**
SHEET	**1 of 1**

LOGGED BY	BEGIN DATE	COMPLETION DATE	HAMMER TYPE	BORING NUMBER
J. Cravens	**9-16-19**	**9-16-19**	**140-lb Automatic Trip**	**19P-01**
FINAL BY			BOREHOLE LOCATION (Lat/Long or North/East and Datum)	SURFACE ELEVATION
J. King			**--/--**	**96.5 ft**
DRILLING METHOD			BOREHOLE LOCATION (Offset, Station, Line)	WEATHER NOTES
8" Hollow Stem Auger			**20' Lt. Sta. 214+12, "SBR" Line**	**Sunny, warm, slight breeze**
DRILLER			LOCATION DESCRIPTION	BACKFILLED WITH
S/G Drilling Co.			**Shell Beach Rd. ~71.5' S of intersection with Avila Beach Dr., 8.5' E of EP**	**Mortar mix concrete, AC patch with rapid set concrete**
DRILL RIG			GROUNDWATER READINGS DURING DRILLING AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
CME-85			**Not Encountered**	**6.5 ft**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (ksf)	Drilling Method	Casing Depth	Remarks
	0		4" ASPHALT CONCRETE.		B					10					-200 (6% G, 59% S, 35% F)
	1		5" AGGREGATE BASE.												PI (25 LL, 17 PL, 8 PI)
95	2		CLAYEY SAND (SC); very dense; brown; dry; subrounded to subangular GRAVEL; fine SAND; seams of dark gray sandy lean CLAY (CL); (FILL).		10	50/6"	Ref/6"	100		22	84				CR (pH = 6.35, r = 14,234 ohm-cm)
	3														R (R-Value = 46)
93	4														
	5		CLAYEY GRAVEL with SAND (GC); very dense; brown; dry; coarse, subangular to angular, light brown to gray SANDSTONE GRAVEL; fine to medium SAND; few rust stains.		11	15 40 50/3"	90/9"	80		20	102				
91	6														
	7		Bottom of borehole at 6.5 ft bgs												
89	8		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010) except as noted on the Soil or Rock Legend or below.												
	9														
87	10														
	11														
85	12														
	13														
83	14														
	15														
81	16														
	17														
79	18														
	19														
77	20														
	21														
75	22														
	23														
73	24														
	25														

5 BR - STANDARD 216-423 BORING LOGS.GPJ CALIFORNIA YEH LIBRARY (YEH V2 APRIL 2019)_7.GLB 12/6/19

Yeh and Associates, Inc.
Geotechnical • Geological • Construction Services

PROJECT NAME	**Avila Beach Drive at US 101 Interchange Improvements**
PROJECT NUMBER	**216-423**
BORING NUMBER	**19P-01**
REVISION DATE	**11/7/2019**
SHEET	**1 of 1**

LOGGED BY	BEGIN DATE	COMPLETION DATE	HAMMER TYPE	BORING NUMBER
J. Cravens	**9-17-19**	**9-17-19**	**140-lb Automatic Trip**	**19P-02**
FINAL BY			BOREHOLE LOCATION (Lat/Long or North/East and Datum)	SURFACE ELEVATION
J. King			**--/--**	**97.0 ft**
DRILLING METHOD			BOREHOLE LOCATION (Offset, Station, Line)	WEATHER NOTES
8" Hollow Stem Auger			**20' Rt. Sta. 500+41, "R-23a" Line**	**Sunny, hot, breezy**
DRILLER			LOCATION DESCRIPTION	BACKFILLED WITH
S/G Drilling Co.			**18.4' E of EP of Hwy 101 SB off-ramp, 19.5' N of intersection of Hwy 101 SB off-ramp and Avila Beach Dr.**	**Native**
DRILL RIG			GROUNDWATER READINGS DURING DRILLING AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
CME-85			**Not Encountered**	**6.5 ft**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (ksf)	Drilling Method	Casing Depth	Remarks
	0														
	1		CLAYEY SAND with GRAVEL (SC); dense; brown; dry; fine to medium, subrounded to subangular GRAVEL; fine to coarse SAND; Slightly hydrophobic; COBBLE in shoe; (FILL).		H					10					-200 (24% G, 51% S, 26% F) PI (34 LL, 22 PL, 12 PI) CR (pH = 6.12, r = 6,698 ohm-cm)
95	2														
	3				30	16 20 41	61	83		18	92				
93	4														
	5		SILTY SAND with GRAVEL (SM); dense; brown mottled with dark gray; dry to moist; coarse, subangular, gray SANDSTONE GRAVEL; subangular COBBLES; little caliche and few rust stains.		31	19 27 41	68	83		15	101				
91	6														
	7		Bottom of borehole at 6.5 ft bgs												
89	8														
	9		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010) except as noted on the Soil or Rock Legend or below.												
87	10														
	11														
85	12														
	13														
83	14														
	15														
81	16														
	17														
79	18														
	19														
77	20														
	21														
75	22														
	23														
73	24														
	25														

5 BR - STANDARD 216-423 BORING LOGS.GPJ CALIFORNIA YEH LIBRARY (YEH V2 APRIL 2019)_7.GLB 12/6/19

Yeh and Associates, Inc.
Geotechnical • Geological • Construction Services

PROJECT NAME	**Avila Beach Drive at US 101 Interchange Improvements**
PROJECT NUMBER	**216-423**
BORING NUMBER	**19P-02**
REVISION DATE	**11/7/2019**
SHEET	**1 of 1**

LOGGED BY	BEGIN DATE	COMPLETION DATE	HAMMER TYPE	BORING NUMBER
J. Cravens	**9-17-19**	**9-17-19**	**140-lb Automatic Trip**	**19P-03**
FINAL BY			BOREHOLE LOCATION (Lat/Long or North/East and Datum)	SURFACE ELEVATION
J. King			**--/--**	**96.5 ft**
DRILLING METHOD			BOREHOLE LOCATION (Offset, Station, Line)	WEATHER NOTES
8" Hollow Stem Auger			**18' Rt. Sta. 502+39, "R-23a" Line**	**Sunny, hot, slight breeze**
DRILLER			LOCATION DESCRIPTION	BACKFILLED WITH
S/G Drilling Co.			**15.9' E of EP of Hwy 101 SB off-ramp, 220.5' N of intersection of Hwy 101 SB off-ramp and Avila Beach Dr.**	**Native**
DRILL RIG			GROUNDWATER READINGS DURING DRILLING AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
CME-85			**Not Encountered**	**5.5 ft**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (ksf)	Drilling Method	Casing Depth	Remarks
	0		CLAYEY SAND (SC); very dense; light yellowish brown; dry; fine SAND; trace to few rust stains; little cementation; (FILL).		G					6					-200 (3% G, 60% S, 37% F) PI (28 LL, 17 PL, 11 PI) R (R-Value = 39)
95	2				28	17 50/6"	50/6"	75		9	92				
93	4														
	5				29	50/6"	Ref/6"	83		7	90				CR (pH = 6.34, r = 4,346 ohm-cm)
91	6		Bottom of borehole at 5.5 ft bgs												
89	8		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010) except as noted on the Soil or Rock Legend or below.												
87	10														
85	12														
83	14														
81	16														
79	18														
77	20														
75	22														
73	24														
	25														

5 BR - STANDARD 216-423 BORING LOGS.GPJ CALIFORNIA YEH LIBRARY (YEH V2 APRIL 2019)_7.GLB 12/6/19

Yeh and Associates, Inc.
Geotechnical • Geological • Construction Services

PROJECT NAME	**Avila Beach Drive at US 101 Interchange Improvements**
PROJECT NUMBER	**216-423**
BORING NUMBER	**19P-03**
REVISION DATE	**11/7/2019**
SHEET	**1 of 1**

LOGGED BY	BEGIN DATE	COMPLETION DATE	HAMMER TYPE	BORING NUMBER
J. Cravens	**9-16-19**	**9-16-19**	**140-lb Automatic Trip**	**19P-04**
FINAL BY			BOREHOLE LOCATION (Lat/Long or North/East and Datum)	SURFACE ELEVATION
J. King			**--/--**	**103.0 ft**
DRILLING METHOD			BOREHOLE LOCATION (Offset, Station, Line)	WEATHER NOTES
8" Hollow Stem Auger			**5' Lt. Sta. 212+01, "SBR" Line**	**Sunny, warm, breezy**
DRILLER			LOCATION DESCRIPTION	BACKFILLED WITH
S/G Drilling Co.			**Shell Beach Rd. ~282.5' S of intersection with Avila Beach Drive, 7.5' E of EP**	**Mortar mix concrete, AC patch with rapid set concrete**
DRILL RIG			GROUNDWATER READINGS DURING DRILLING AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
CME-85			**Not Encountered**	**6.5 ft**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (ksf)	Drilling Method	Casing Depth	Remarks
	0		5" ASPHALT CONCRETE.		C					11					-200 (9% G, 56% S, 35% F)
	1		4" AGGREGATE BASE.												PI (29 LL, 17 PL, 12 PI)
			CLAYEY SAND (SC); dense; dark brown; dry; medium to coarse, subangular to angular, light brown and gray SANDSTONE GRAVEL; fine to medium SAND; few rust stains; (FILL).												CR (pH = 6.61, r = 11,303 ohm-cm)
101	2				12	21	58	100		19	92	>4.5PP			R (R-Value = 50)
	3					29									
						29									
99	4														
	5		CLAYEY GRAVEL with SAND (GC); medium dense; brown and dark gray; dry; coarse, subangular to angular SANDSTONE and SILTSTONE GRAVEL; fine SAND; few to some rust stains on fracture surfaces.		13	12	25	89		19	94				
97	6					16									
						19									
	7		Bottom of borehole at 6.5 ft bgs												
95	8														
	9		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010) except as noted on the Soil or Rock Legend or below.												
93	10														
	11														
91	12														
	13														
89	14														
	15														
87	16														
	17														
85	18														
	19														
83	20														
	21														
81	22														
	23														
79	24														
	25														

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PROJECT NAME	**Avila Beach Drive at US 101 Interchange Improvements**
PROJECT NUMBER	**216-423**
BORING NUMBER	**19P-04**
REVISION DATE	**11/7/2019**
SHEET	**1 of 1**

5 BR - STANDARD 216-423 BORING LOGS.GPJ CALIFORNIA YEH LIBRARY (YEH V2 APRIL 2019)_7.GLB 12/6/19

LOGGED BY	BEGIN DATE	COMPLETION DATE	HAMMER TYPE	BORING NUMBER
J. Cravens	**9-18-19**	**9-18-19**	**140-lb Automatic Trip**	**19W-01**
FINAL BY			BOREHOLE LOCATION (Lat/Long or North/East and Datum)	SURFACE ELEVATION
J. King			**--/--**	**113.0 ft**
DRILLING METHOD			BOREHOLE LOCATION (Offset, Station, Line)	WEATHER NOTES
8" Hollow Stem Auger			**119' Lt. Sta. 119+92, "AV1" Line**	**Sunny, cool, breezy**
DRILLER			LOCATION DESCRIPTION	BACKFILLED WITH
S/G Drilling Co.			**62.8' N of conrete barrier for undercrossing, 6.4' W of guardrail**	**Portland cement grout**
DRILL RIG			GROUNDWATER READINGS DURING DRILLING AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
CME-85			**Not Encountered**	**35.1 ft**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (ksf)	Drilling Method	Casing Depth	Remarks
	0		CLAYEY SAND with GRAVEL (SC); loose; brown; dry; trace fine GRAVEL; fine SAND; slightly hydrophobic; (FILL).		K										
111	2				36	10 6 4	10	11		8					-200 (19% G, 55% S, 26% F)
109	4		Very loose; brown; dry; medium to coarse, subangular GRAVEL; fine SAND; slightly hydrophobic.												
	5				37	3 2 2	4	44							
107	6														
	7														
105	8														
	9				38	6 25 50/4"	75/10"100								
103	10		Very dense; fine to medium, subangular GRAVEL; fine to coarse SAND; slightly hydrophobic; hard, dark gray SANDSTONE COBBLE in shoe.												
	11														
101	12														
	13														Minor rig chatter at ~13'
99	14				--	50/5"	Ref/5"	0							
	15														
97	16														Ittermittent rig chatter from ~16' to ~19.5'
	17		SANDY fat CLAY with GRAVEL (CH); hard; dark brown; dry; fine, subangular GRAVEL; fine to medium SAND.												
95	18														
	19				39	13 15 26	41	67		8		>4.5PP			-200 (1% G, 76% S, 22% F) CR (pH = 6.88, r = 656 ohm-cm, SO_4^{2-} = 4,885 mg/kg, Cl^- = 14 mg/kg)
93	20		CLAYEY SAND (SC); medium dense; light yellowish brown; dry; fine SAND; few rust stains and trace caliche; dark brown sandy fat CLAY (CH) in shoe.												
	21														
91	22		SANDY lean CLAY with GRAVEL (CL); hard; dark brown; dry; fine to coarse, subangular GRAVEL; fine to coarse SAND; trace rust stains.												
	23														
89	24				40	28 50/6"	50/6"	75		15	99	>4.5PP			CU
	25														

(continued)

5 BR - STANDARD 216-423 BORING LOGS.GPJ CALIFORNIA YEH LIBRARY (YEH V2 APRIL 2019)_7.GLB 12/6/19

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PROJECT NAME	**Avila Beach Drive at US 101 Interchange Improvements**
PROJECT NUMBER	**216-423**
BORING NUMBER	**19W-01**
REVISION DATE	**11/7/2019**
SHEET	**1 of 2**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (ksf)	Drilling Method	Casing Depth	Remarks
	25		Poorly graded SAND with CLAY and GRAVEL (SP-SC); very dense; light yellowish brown; dry; fine to medium, subangular GRAVEL; fine SAND; trace rust stains.												
87	26														Rig chatter at ~26'
	27		Poorly graded SAND with CLAY (SP-SC); very dense; light yellowish brown; moist; fine SAND; trace rust stains.												
85	28														
	29				41	50/5"	Ref/5"	40							
83	30														
	31		SANDY lean CLAY with GRAVEL (CL); hard; light brown; moist; medium, subangular GRAVEL; fine to medium SAND.												Rig chatter at ~31'
81	32														
	33														
79	34				42	50/2"	Ref/2"	25		7					
	35														Rig chatter at ~35'. Auger refusal at ~35.1'
77	36		Bottom of borehole at 35.1 ft bgs												
	37		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010) except as noted on the Soil or Rock Legend or below.												
75	38														
	39														
73	40														
	41														
71	42														
	43														
69	44														
	45														
67	46														
	47														
65	48														
	49														
63	50														
	51														
61	52														
	53														
59	54														
	55														

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PROJECT NAME	**Avila Beach Drive at US 101 Interchange Improvements**
PROJECT NUMBER	**216-423**
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5 BR - STANDARD 216-423 BORING LOGS.GPJ CALIFORNIA YEH LIBRARY (YEH V2 APRIL 2019)_7.GLB 12/6/19

LOGGED BY	BEGIN DATE	COMPLETION DATE	HAMMER TYPE	BORING NUMBER
J. King/J. Cravens	9-17-19	9-17-19	140-lb Automatic Trip	19W-02
FINAL BY			BOREHOLE LOCATION (Lat/Long or North/East and Datum)	SURFACE ELEVATION
J. King			--/--	124.0 ft
DRILLING METHOD			BOREHOLE LOCATION (Offset, Station, Line)	WEATHER NOTES
8" Hollow Stem Auger			63' Rt. Sta. 611+78, "R-22a" Line	Clear, warm
DRILLER			LOCATION DESCRIPTION	BACKFILLED WITH
S/G Drilling Co.			Shoulder of SB Hwy 101 10' W of EP, 40' S of abutment	6-sack cement slurry
DRILL RIG			GROUNDWATER READINGS DURING DRILLING AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
CME-85			Not Encountered	40.0 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (ksf)	Drilling Method	Casing Depth	Remarks
	0		Well-graded GRAVEL with CLAY and SAND (GW-GC); dense; brown; dry; fine to coarse, angular GRAVEL; (FILL).		F										
122	2				19	8 20 29	49	78		17					PA (70% G, 24% S, 6% F) CR (pH = 5.49, r = 1,169 ohm-cm)
120	4		Moist.		20	17 18 13	31	89		18	82				CU
118	6														
116	8				21	50/6"	Ref/6"	100							CR (pH = 5.51, r = 1,842 ohm-cm)
114	10														
112	12														
110	14		Well-graded SAND with CLAY and GRAVEL (SW-SC); very dense; brown; dry; caliche deposits, oxidized stains.		22	46 39 50	89	89		17	85				PA (44% G, 44% S, 12% F)
108	16														
106	18				23	31 50/4"	50/4"	100							CR (pH = 6.08, r = 1,968 ohm-cm)
104	20														
102	22		SANDY fat CLAY with GRAVEL (CH); hard; dark brown; dry; fine to medium, subrounded to subangular GRAVEL; fine to medium SAND; few rust stains.												
100	24				24	31 29 50/4"	79/10"	69		12	95	>4.5PP			CU
	25														

(continued)

5 BR - STANDARD 216-423 BORING LOGS.GPJ CALIFORNIA YEH LIBRARY (YEH V2 APRIL 2019)_7.GLB 12/6/19

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PROJECT NAME	
Avila Beach Drive at US 101 Interchange Improvements	
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ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (ksf)	Drilling Method	Casing Depth	Remarks
	25		SANDY fat CLAY with GRAVEL (CH) *(continued)*.												
98	26														
	27														Rig chatter at ~27'
96	28														
	29		Very stiff; moist.		25	10 12 14	26	97				2.75PP			
94	30														
	31														
92	32		SANDY lean CLAY with GRAVEL (CL); very stiff; light grayish brown mtottled with gray and red; moist; fine to medium, subangular to angular GRAVEL; fine to medium SAND; few rust stains; coarse GRAVEL clast at 34.5'.												Rig chatter at ~31.5'
	33														
90	34				26	11 18 26	44	50		26	91	2.5PP			
	35														
88	36														
	37		CLAYEY SAND with GRAVEL (SC); medium dense; grayish brown; moist; fine to medium, subrounded to subangular GRAVEL; fine to coarse SAND; trace rust stains; 1" layer of poorly graded SAND (SP) at 38.5', light yellowish brown, moist, fine SAND.												
86	38														
	39				27	12 12 17	29	100				2.0PP			
84	40		Bottom of borehole at 40.0 ft bgs												
	41														
82	42		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010) except as noted on the Soil or Rock Legend or below.												
	43														
80	44														
	45														
78	46														
	47														
76	48														
	49														
74	50														
	51														
72	52														
	53														
70	54														
	55														

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PROJECT NAME
Avila Beach Drive at US 101 Interchange Improvements

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216-423

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19W-02

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5 BR - STANDARD 216-423 BORING LOGS.GPJ CALIFORNIA YEH LIBRARY (YEH V2 APRIL 2019)_7.GLB 12/6/19

LOGGED BY	BEGIN DATE	COMPLETION DATE	HAMMER TYPE	BORING NUMBER
J. Cravens	9-16-19	9-16-19	140-lb Automatic Trip	19W-03
FINAL BY			BOREHOLE LOCATION (Lat/Long or North/East and Datum)	SURFACE ELEVATION
J. King			--/--	116.0 ft
DRILLING METHOD			BOREHOLE LOCATION (Offset, Station, Line)	WEATHER NOTES
8" Hollow Stem Auger			1' Lt. Sta. 609+60, "R-22a" Line	Sunny, cool
DRILLER			LOCATION DESCRIPTION	BACKFILLED WITH
S/G Drilling Co.			SB on-ramp of Hwy 101 384' S of Hwy 101 SB entrance sign, 4.5' W of EP	6-sack cement slurry
DRILL RIG			GROUNDWATER READINGS DURING DRILLING AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
CME-85			Not Encountered	40.6 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (ksf)	Drilling Method	Casing Depth	Remarks
	0		4.5" ASPHALT CONCRETE.		A					7					PA (9% G, 33% S, 57% F)
			6" AGGREGATE BASE.												CR (pH = 6.58, r = 3,087 ohm-cm)
	1		SANDY fat CLAY with GRAVEL (CH); hard; dark brown; dry; fine to coarse, subangular, light brown, SANDSTONE GRAVEL; fine to medium SAND; few to some rust stains; (FILL).												R (R-Value = 46)
114	2				1	15 31 35	66	89		21	95	>4.5PP			CU
	3														
112	4														
	5		CLAYEY SAND with GRAVEL (SC); very dense; brown; dry; fine to coarse, subangular, dark gray SILTSTONE GRAVEL; fine to medium SAND; micaceous; trace rust stains.		2	19 21 50/5"	71/11"	89		17	91				
110	6														
	7														
108	8														Rig chatter at ~8
	9		SANDY fat CLAY (CH); hard; dark brown; dry; trace fine to medium, subangular GRAVEL; fine, light brown SAND; trace rust stains.												
106	10				3	12 32 30	62	83				>4.5PP			
	11														
104	12														
	13														Rig chatter at ~13'
102	14		CLAYEY SAND with GRAVEL (SC); medium dense; dark brown; dry; medium to coarse, subangular to angular, light brown to grayish brown GRAVEL; light brown SAND; few rust stains.												
	15				4	15 17 28	45	86		17	94	>4.5PP			-200 (36% G, 50% S, 15% F)
100	16														
	17														
98	18														
	19		Dense; light brown; dry; subrounded to subangular GRAVEL; fine SAND; trace rust stians; 2" layer of sandy fat CLAY (CH) at 21' , very stiff (3.0pp), dark brown.												
96	20				5	3 8 29	37	78		15					-200 (26% G, 61% S, 12% F)
	21														
94	22														
	23														Rig chatter at ~23'
92	24		SANDY lean CLAY (CL); stiff; dark brown; moist; fine to medium SAND; trace rust stains; coarse, angular to subangular, light brown SANDSTONE GRAVEL in												
	25														

(continued)

5 BR - STANDARD 216-423 BORING LOGS.GPJ CALIFORNIA YEH LIBRARY (YEH V2 APRIL 2019)_7.GLB 12/6/19

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PROJECT NAME	Avila Beach Drive at US 101 Interchange Improvements
PROJECT NUMBER	216-423
BORING NUMBER	19W-03
REVISION DATE	11/7/2019
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ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (ksf)	Drilling Method	Casing Depth	Remarks
	25		shoe.												
90	26		SANDY lean CLAY (CL) *(continued)*.		6	5 8 12	20	56		25	92	1.25PP			
	27														
88	28														
	29		Poorly graded SAND with CLAY and GRAVEL (SP-SC); very dense; light brown; dry; medium to coarse, subangular to angular, light brown SANDSTONE GRAVEL; fine SAND; rust stains on fracture surfaces of GRAVEL.												
86	30				7	13 25 33	58	78							
	31														
84	32														
	33														
82	34		CLAYEY GRAVEL with SAND (GC); medium dense; light brown; dry; subangular to angular GRAVEL; fine SAND; few rust stains; some structure in shoe.												
	35				8	11 17 21	38	67		27	86				
80	36														
	37														
78	38														
	39		SANDY fat CLAY with GRAVEL (CH); very stiff; dark brown; dry; fine to coarse, subangular to angular GRAVEL; fine SAND.												
76	40				9	16 50/1"	50/1"	100				3.0PP			
	41		Bottom of borehole at 40.6 ft bgs												
74	42														
	43		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010) except as noted on the Soil or Rock Legend or below.												
72	44														
	45														
70	46														
	47														
68	48														
	49														
66	50														
	51														
64	52														
	53														
62	54														
	55														

5 BR - STANDARD 216-423 BORING LOGS.GPJ CALIFORNIA YEH LIBRARY (YEH V2 APRIL 2019)_7.GLB 12/6/19

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Avila Beach Drive at US 101 Interchange Improvements

PROJECT NUMBER
216-423

BORING NUMBER
19W-03

REVISION DATE
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APPENDIX B - LABORATORY TEST RESULTS

SUMMARY OF LABORATORY TEST RESULTS

Sample Information						Gradation			Atterberg		Corrosion				Compaction				
Boring No.	Sample No.	Depth (ft)	Sample Type	Dry Density, γ_d (pcf)	Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)	Plasticity Index (PI)	Liquid Limit (LL)	pH	Resistivity (Ω-cm)	SO_4^{2-} (mg/kg)	Cl^- (mg/kg)	Max. Dry Density, $\gamma_{d,MAX}$ (pcf)	Optimum Moisture Content (%)	R-Value	Expansion Index	USCS Classification
19IN-01	I	0.0	BULK	--	--	--	--	--	--	--	--	--	--	--	92	21	--	--	Well-graded SAND with SILT and GRAVEL (SW-SM)
19IN-01	32	2.0	MCAL	--	19	44	44	12	--	--	--	--	--	--	--	--	--	--	Well-graded SAND with SILT and GRAVEL (SW-SM)
19IN-01	33	5.0	MCAL	103	18	--	--	--	--	--	--	--	--	--	--	--	--	--	Lean CLAY (CL)
19IN-01	34	10.0	SPT	--	--	--	--	--	--	--	5.50	4,438	--	--	--	--	--	--	SANDY lean CLAY with GRAVEL (CL)
19IN-02	35	2.0	MCAL	--	10	50	43	7	--	--	3.98	777	--	--	--	--	--	--	Well-graded GRAVEL with CLAY and SAND (GW-GC)
19IN-02	36	5.0	GRAB	--	12	7	58	35	--	--	--	--	--	--	--	--	--	--	CLAYEY SAND (SC)
19IN-03	E	0.0	BULK	--	--	--	--	--	--	--	--	--	--	--	108	16	--	--	CLAYEY SAND (SC)
19IN-03	17	2.0	MCAL	95	14	1	59	40	--	--	--	--	--	--	--	--	--	--	CLAYEY SAND (SC)
19IN-03	18	5.0	MCAL	75	16	--	--	--	--	--	--	--	--	--	--	--	--	--	CLAYEY SAND (SC)
19IN-04	14	2.0	MCAL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	SANDY fat CLAY with GRAVEL (CH)
19IN-05	43	3.5	MCAL	73	18	41	33	26	17	47	4.33	3,116	--	--	--	--	--	--	SANDY lean CLAY with GRAVEL (CL)
19IN-05	44	8.5	MCAL	96	17	--	--	--	--	--	--	--	--	--	--	--	--	--	SANDY lean CLAY with GRAVEL (CL)
19P-01	B	0.0	BULK	--	10	6	59	35	8	25	6.35	14,234	--	--	--	--	46	--	CLAYEY SAND (SC)
19P-01	10	2.0	MCAL	84	22	--	--	--	--	--	--	--	--	--	--	--	--	--	CLAYEY SAND (SC)
19P-01	11	5.0	MCAL	102	20	--	--	--	--	--	--	--	--	--	--	--	--	--	CLAYEY GRAVEL (GC)
19P-02	H	0.0	BULK	--	10	24	51	26	12	34	6.12	6,698	--	--	--	--	--	--	CLAYEY SAND with GRAVEL (SC)
19P-02	30	2.0	MCAL	92	18	--	--	--	--	--	--	--	--	--	--	--	--	--	CLAYEY SAND with GRAVEL (SC)
19P-02	31	5.0	MCAL	101	15	--	--	--	--	--	--	--	--	--	--	--	--	--	SILTY SAND (SM)
19P-03	G	0.0	BULK	--	6	3	60	37	11	28	--	--	--	--	--	--	39	--	CLAYEY SAND (SC)
19P-03	28	2.0	MCAL	92	9	--	--	--	--	--	--	--	--	--	--	--	--	--	CLAYEY SAND (SC)

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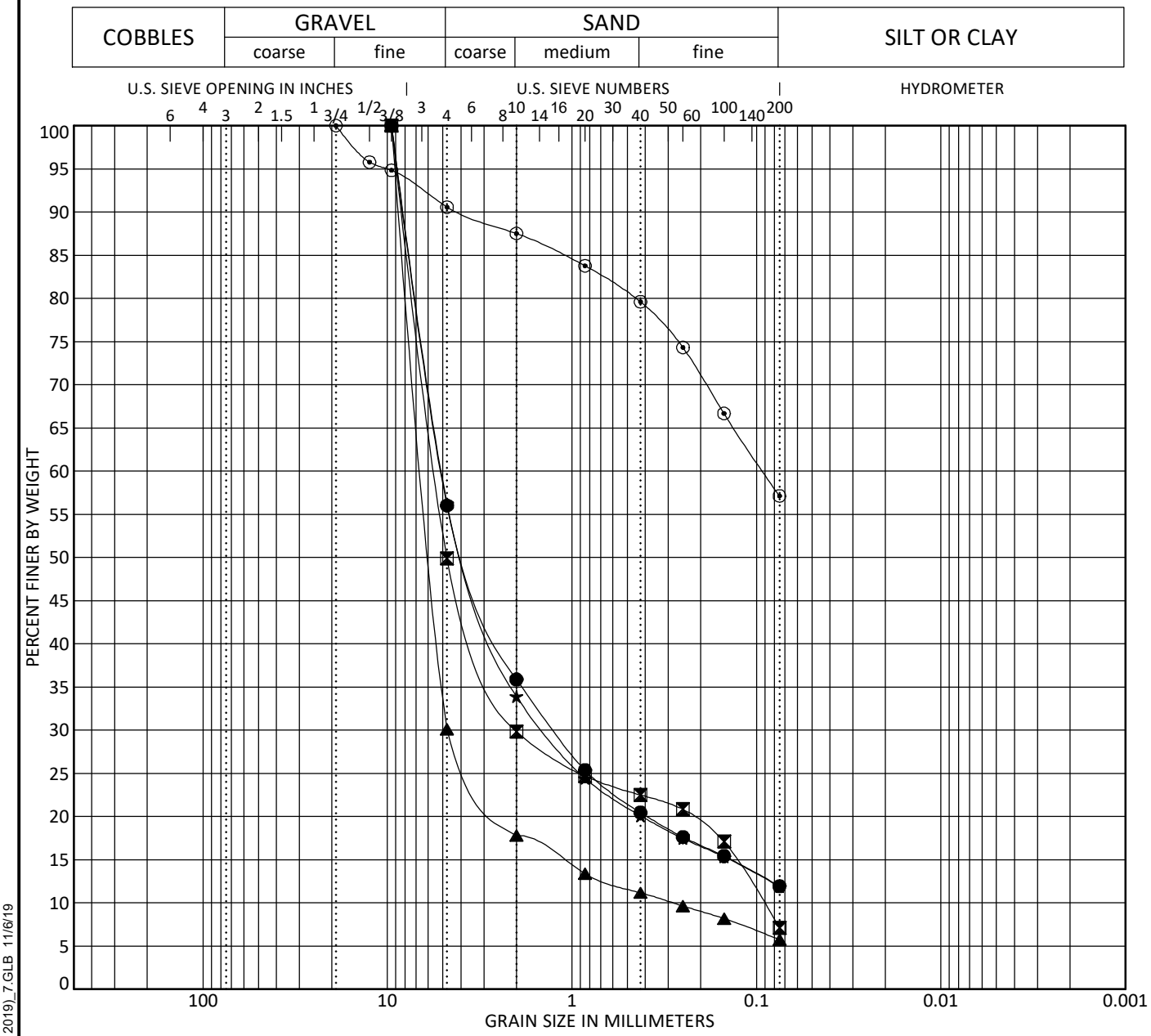
PROJECT NAME **Avila Beach Drive at US 101 Interchange Improvements**	
PROJECT NO. **216-423**	REVISION DATE **11-7-19**
PROJECT MANAGER **J. King**	PREPARED BY **R. Hooke**
CHECKED BY **J. Cravens**	SHEET **1 of 3**

SUMMARY OF LABORATORY TEST RESULTS

Sample Information						Gradation			Atterberg		Corrosion				Compaction				
Boring No.	Sample No.	Depth (ft)	Sample Type	Dry Density, γ_d (pcf)	Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)	Plasticity Index (PI)	Liquid Limit (LL)	pH	Resistivity (Ω-cm)	SO_4^{2-} (mg/kg)	Cl^- (mg/kg)	Max. Dry Density, $\gamma_{d,MAX}$ (pcf)	Optimum Moisture Content (%)	R-Value	Expansion Index	USCS Classification
19P-03	29	5.0	MCAL	90	7	--	--	--	--	--	6.34	4,346	--	--	--	--	--	--	CLAYEY SAND (SC)
19P-04	C	0.0	BULK	--	11	9	56	35	12	29	6.61	11,303	--	--	--	--	50	--	CLAYEY SAND (SC)
19P-04	12	2.0	MCAL	92	19	--	--	--	--	--	--	--	--	--	--	--	--	--	CLAYEY SAND (SC)
19P-04	13	5.0	MCAL	94	19	--	--	--	--	--	--	--	--	--	--	--	--	--	CLAYEY GRAVEL with SAND (GC)
19W-01	36	2.0	GRAB	--	8	19	55	26	--	--	--	--	--	--	--	--	--	--	CLAYEY SAND with GRAVEL (SC)
19W-01	39	18.5	SPT	--	8	1	76	22	--	--	6.88	656	4,885	14	--	--	--	--	CLAYEY SAND (SC)
19W-01	40	23.5	MCAL	99	15	--	--	--	--	--	--	--	--	--	--	--	--	--	SANDY lean CLAY with GRAVEL (CL)
19W-01	42	33.5	MCAL	--	7	--	--	--	--	--	--	--	--	--	--	--	--	--	SANDY lean CLAY with GRAVEL (CL)
19W-02	19	2.0	MCAL	--	17	70	24	6	--	--	5.49	1,169	--	--	--	--	--	--	Well-graded GRAVEL with CLAY and SAND (GW-GC)
19W-02	20	3.5	MCAL	82	18	--	--	--	--	--	--	--	--	--	--	--	--	--	Well-graded GRAVEL with CLAY and SAND (GW-GC)
19W-02	21	8.5	SPT	--	--	--	--	--	--	--	5.51	1,842	--	--	--	--	--	--	Well-graded GRAVEL with CLAY and SAND (GW-GC)
19W-02	22	13.5	MCAL	85	17	44	44	12	--	--	--	--	--	--	--	--	--	--	Well-graded SAND with CLAY and GRAVEL (SW-SC)
19W-02	23	18.5	SPT	--	--	--	--	--	--	--	6.08	1,968	--	--	--	--	--	--	Well-graded SAND with CLAY and GRAVEL (SW-SC)
19W-02	24	23.5	MCAL	95	12	--	--	--	--	--	--	--	--	--	--	--	--	--	SANDY fat CLAY with GRAVEL (CH)
19W-02	26	33.5	MCAL	91	26	--	--	--	--	--	--	--	--	--	--	--	--	--	SANDY lean CLAY with GRAVEL (CL)
19W-03	A	0.0	BULK	--	7	9	33	57	--	--	6.58	3,087	--	--	--	--	46	--	SANDY fat CLAY (CH)
19W-03	1	2.0	MCAL	95	21	--	--	--	--	--	--	--	--	--	--	--	--	--	SANDY fat CLAY (CH)
19W-03	2	5.0	MCAL	91	17	--	--	--	--	--	--	--	--	--	--	--	--	--	CLAYEY SAND (SC)
19W-03	4	15.0	MCAL	94	17	36	50	15	--	--	--	--	--	--	--	--	--	--	CLAYEY SAND with GRAVEL (SC)
19W-03	5	20.0	SPT	--	15	26	61	12	--	--	--	--	--	--	--	--	--	--	CLAYEY SAND with GRAVEL (SC)

SUMMARY OF LABORATORY TEST RESULTS

Sample Information						Gradation			Atterberg		Corrosion				Compaction				
Boring No.	Sample No.	Depth (ft)	Sample Type	Dry Density, γ_d (pcf)	Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)	Plasticity Index (PI)	Liquid Limit (LL)	pH	Resistivity (Ω-cm)	SO_4^{2-} (mg/kg)	Cl^- (mg/kg)	Max. Dry Density, $\gamma_{d,MAX}$ (pcf)	Optimum Moisture Content (%)	R-Value	Expansion Index	USCS Classification
19W-03	6	25.0	MCAL	92	25	--	--	--	--	--	--	--	--	--	--	--	--	--	SANDY lean CLAY (CL)
19W-03	8	35.0	MCAL	86	27	--	--	--	--	--	--	--	--	--	--	--	--	--	CLAYEY GRAVEL (GC)
19W-03	9	40.0	SPT	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	SANDY fat CLAY with GRAVEL (CH)



Specimen Identification			Classification	LL	PL	PI	Cc	Cu
●	19IN-01	2.0 ft	Well-graded SAND with SILT and GRAVEL (SW-SM)	--	--	--	--	98.79
⊠	19IN-02	2.0 ft	Well-graded GRAVEL with CLAY and SAND (GW-GC)	--	--	--	--	59.57
▲	19W-02	2.0 ft	Well-graded GRAVEL with CLAY and SAND (GW-GC)	--	--	--	--	22.43
★	19W-02	13.5 ft	Well-graded SAND with CLAY and GRAVEL (SW-SC)	--	--	--	--	97.60
⊙	19W-03	0.0 ft	SANDY fat CLAY (CH)	--	--	--	--	--

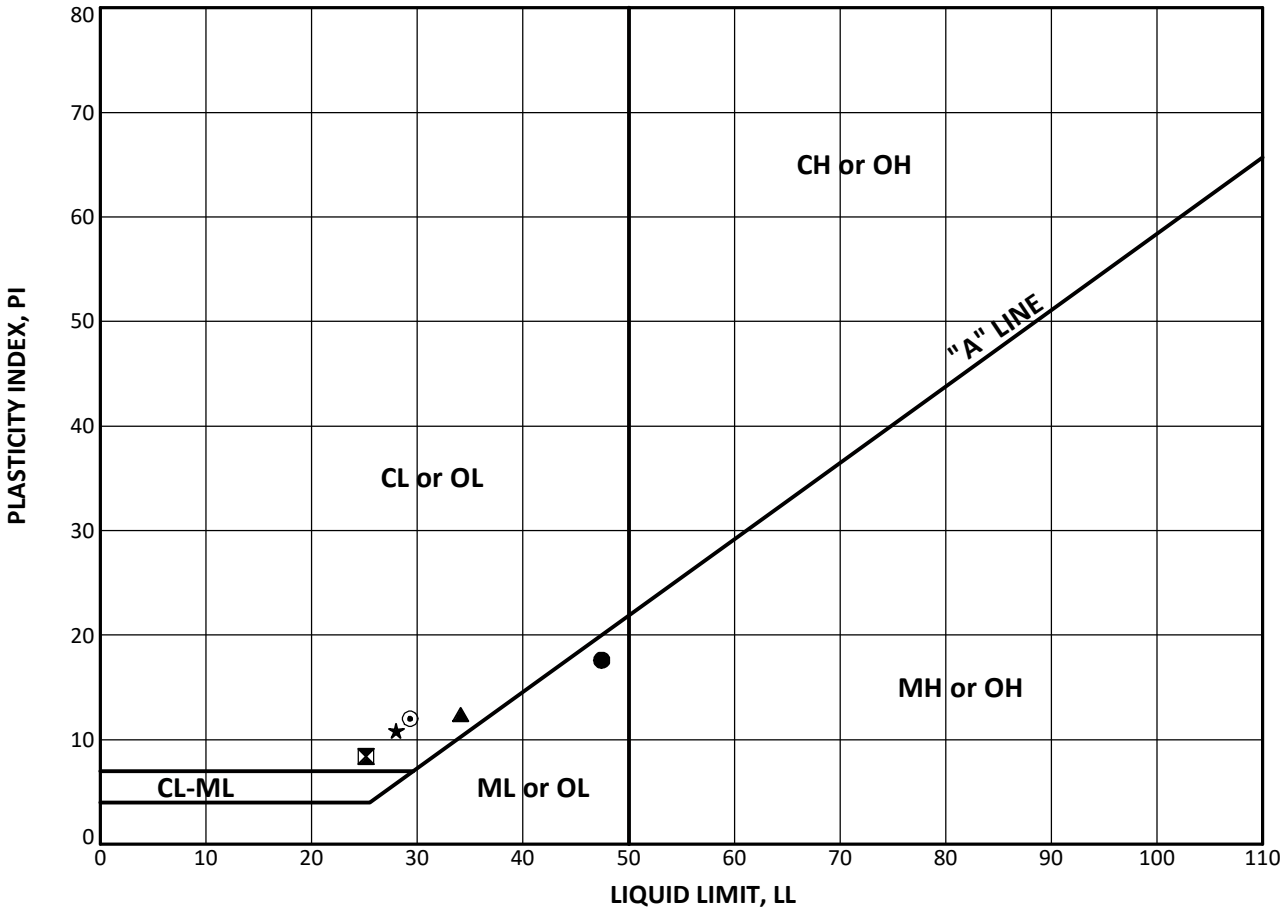
Specimen Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	19IN-01	2.0 ft	9.5	5.058	1.24	--	44.0	44.1	11.9	
⊠	19IN-02	2.0 ft	9.5	5.464	2.015	0.092	50.1	42.8	7.1	
▲	19W-02	2.0 ft	9.5	6.389	4.715	0.285	69.9	24.4	5.7	
★	19W-02	13.5 ft	9.5	5.043	1.408	--	43.8	44.4	11.9	
⊙	19W-03	0.0 ft	19	0.092		--	9.4	33.4	57.1	

Yeh and Associates, Inc.
Geotechnical • Geological • Construction Services

GRAIN SIZE DISTRIBUTION

PROJECT NAME	PROJECT NO.
Avila Beach Drive at US 101 Interchange Improvements	216-423
REVISION DATE: 11-4-19	PROJECT MANAGER: J. King
PREPARED BY: R. Hooke	CHECKED BY: J. Cravens
SHEET: 1 of 1	

YEH SIEVE 216-423 BORING LOGS.GPJ CALIFORNIA YEH LIBRARY (YEH V2 APRIL 2019)_7.GLB 11/6/19



Boring Number	Sample ID	Depth (ft)	Test Symbol	MC (%)	Fines (%)	LL	PL	PI	Classification
19IN-05	43	3.5	●	18	35	47	30	17	SANDY lean CLAY with GRAVEL (CL)
19P-01	B	0.0	⊠	10	35	25	17	8	CLAYEY SAND (SC)
19P-02	H	0.0	▲	10	35	34	22	12	CLAYEY SAND with GRAVEL (SC)
19P-03	G	0.0	★	6	35	28	17	11	CLAYEY SAND (SC)
19P-04	C	0.0	⊙	11	35	29	17	12	CLAYEY SAND (SC)

YEH ATTERBERG 216-423 BORING LOGS.GPJ CALIFORNIA YEH LIBRARY (YEH V2 APRIL 2019)_7.GLB 11/6/19

Yeh and Associates, Inc.
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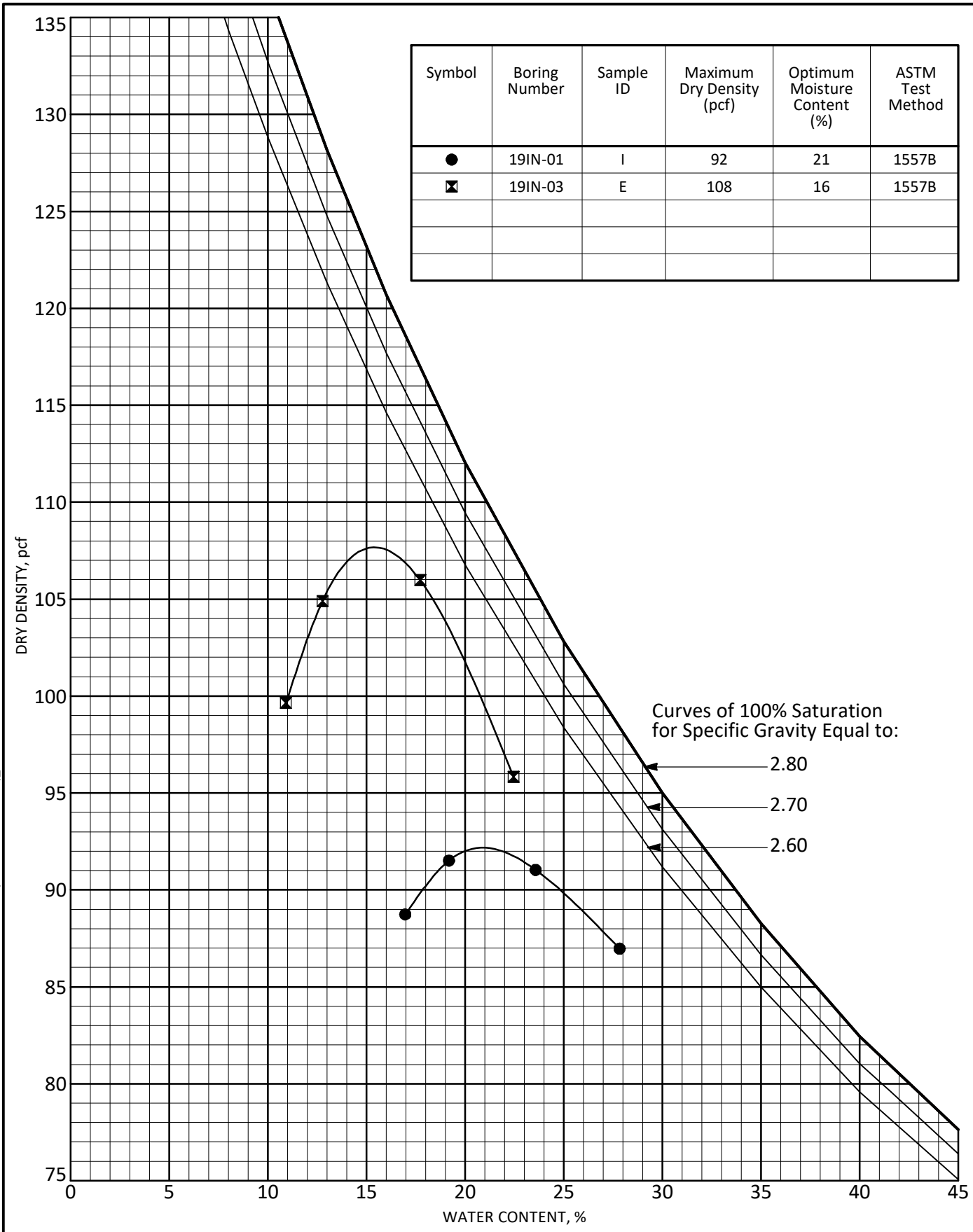
ATTERBERG LIMITS

PROJECT NAME: Avila Beach Drive at US 101 Interchange Improvements	PROJECT NO.: 216-423
REVISION DATE: 11-4-19	PROJECT MANAGER: J. King
PREPARED BY: R. Hooke	CHECKED BY: J. Cravens
	SHEET: 1 of 1

Symbol	Boring Number	Sample ID	Maximum Dry Density (pcf)	Optimum Moisture Content (%)	ASTM Test Method
●	19IN-01	I	92	21	1557B
⊠	19IN-03	E	108	16	1557B



MOISTURE-DENSITY RELATIONSHIP

Yeh and Associates, Inc.
Geotechnical • Geological • Construction Services

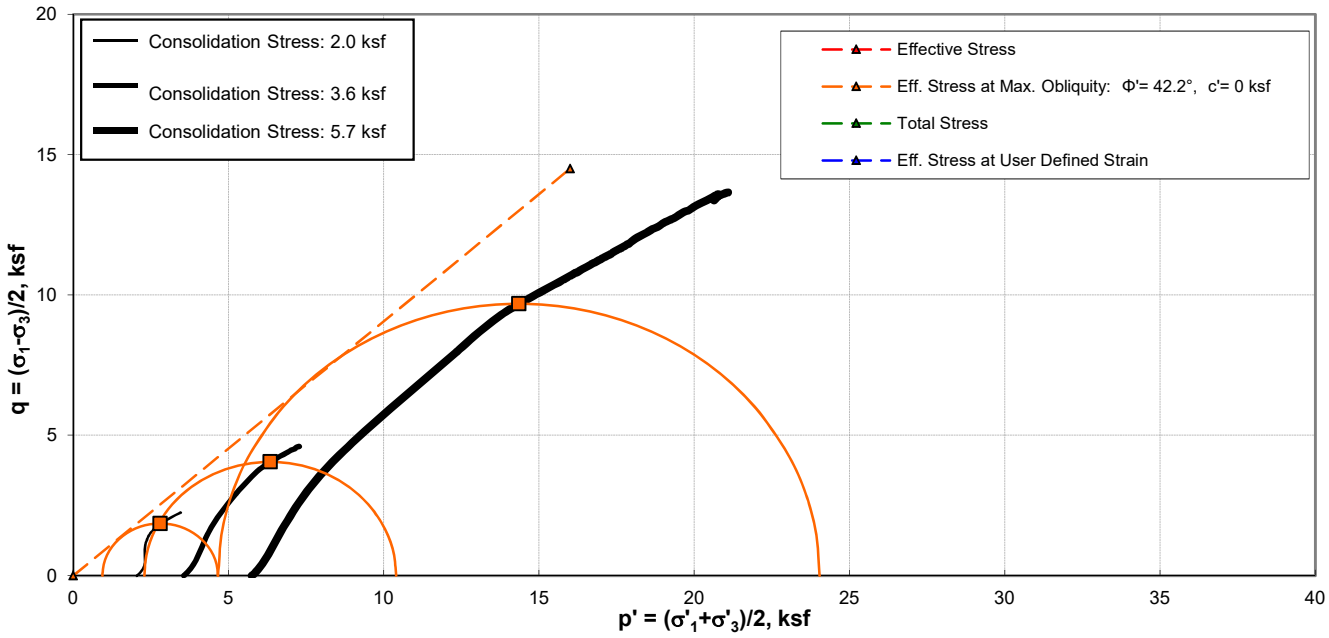
PROJECT NAME: Avila Beach Drive at US 101 Interchange Improvements	PROJECT NO.: 216-423
REVISION DATE: 11-4-19	PROJECT MANAGER: J. King
PREPARED BY: R. Hooke	CHECKED BY: J. Cravens
	SHEET: 1 of 1

YEH COMPACTION 5-CURVE 216-423 BORING LOGS.GPJ CALIFORNIA YEH LIBRARY (YEH V2 APRIL 2019)_7.GLB 11/6/19

Corrosivity Tests Summary

CTL # 687-083 **Date:** 11/22/2019 **Tested By:** PJ **Checked:** PJ
Client: Yeh and Associates **Project:** Avila Beach Road Interchange **Proj. No:** 216-423
Remarks:

Sample Location or ID			Resistivity @ 15.5 °C (Ohm-cm)			Chloride	Sulfate		pH	ORP (Redox)		Sulfide	Moisture	Soil Visual Description
			As Rec.	Min	Sat.	mg/kg	mg/kg	%				Qualitative	At Test	
						Dry Wt.	Dry Wt.	Dry Wt.		E_H (mv)	At Test	by Lead	%	
Boring	Sample, No.	Depth, ft.	ASTM G57	Cal 643	ASTM G57	ASTM D4327	ASTM D4327	ASTM D4327	ASTM G51	ASTM G200	Temp °C	Acetate Paper	ASTM D2216	
19W-01	39	18.5	-	-	-	14	4,885	0.4885	-	-	-	-	6.2	Light Yellowish Brown Clayey SAND (SC)



SAMPLE ID

Boring Number	19W-01
Sample Number	40
Specimen Depth	23.5 ft
USCS Classification	Sandy lean CLAY with GRAVEL (CL), brown

INITIAL

Trial ID	A	B	C
Water Content, %	14.9%	21.6%	21.0%
Dry Unit Weight, pcf	99.3	106.4	107.4
Saturation, %	58%	100%	100%
Void Ratio	0.70	0.58	0.57
Diameter, in	2.42	2.37	2.38
Height, in	5.00	4.87	4.77

PRE-SHEAR

Water Content, %	21.6%	21.0%	20.6%
Dry Unit Weight, pcf	106.4	107.4	108.3
Saturation, %	100%	100%	100%
Void Ratio	0.58	0.57	0.56

REMARKS

Test Method: ASTM 4767 (modified for staged testing)
Project: Avila Beach Road Interchange
Tested by: N. Derbidge GEOE Lab
Checked by: J. King Yeh and Associates

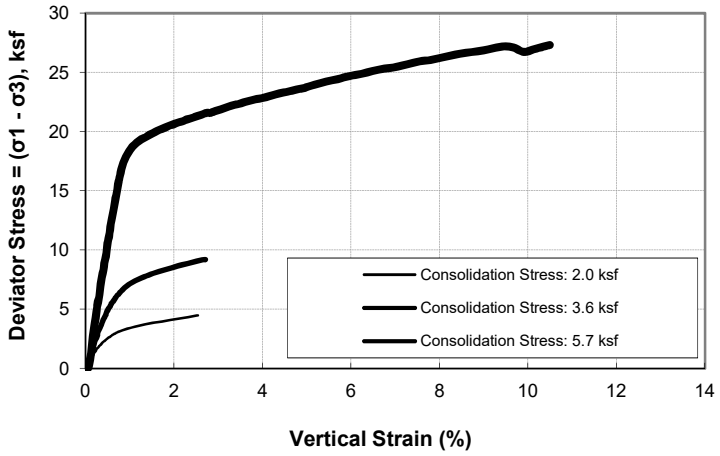
CLASSIFICATION

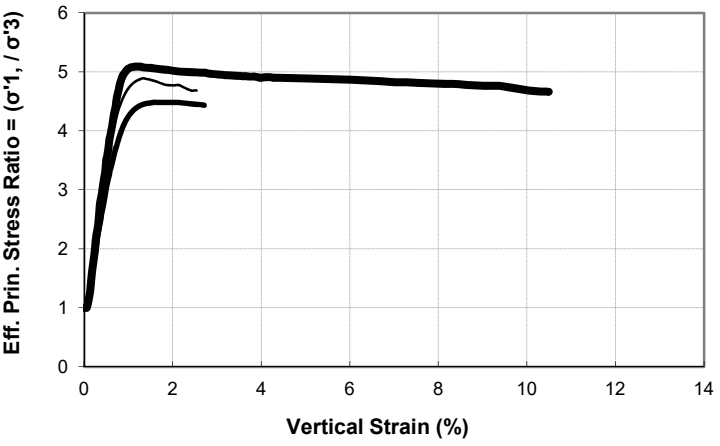
Trial ID	A	B	C
Liquid Limit	---	---	---
Plastic Limit	---	---	---
Plastic Index	---	---	---
Passing #4 (4.75 mm)	---	---	---
Passing #200 (0.075 mm)	---	---	---
Estimated Gs	2.70	2.70	2.70

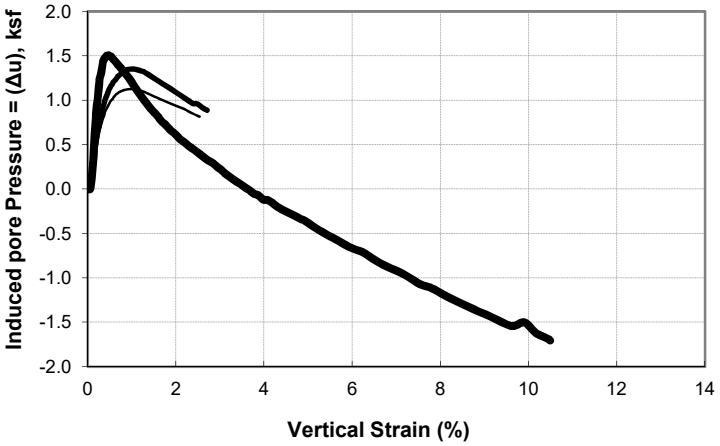
TEST SUMMARY

Trial ID	A	B	C
B-Parameter	0.98	0.98	0.98
t_{50}, minutes	N/A	N/A	N/A
Strain Rate, %/min	0.02	0.02	0.02
Cell Pressure, ksf	10.7	12.3	14.4
Back Pressure, ksf	8.7	8.7	8.7
Consolidation Stress, ksf	2.0	3.6	5.7
Deviator Stress @ Failure, ksf	3.7	8.0	19.1
Axial Strain @ Failure, %	1.3	1.6	1.3
σ'_{1F}, ksf	4.6	10.3	23.8
σ'_{3F}, ksf	0.9	2.3	4.7
Tested By:	ND	ND	ND
Date Tested:	10/3/19	10/4/19	10/10/19

CONSOLIDATED UNDRAINED TRIAXIAL TEST

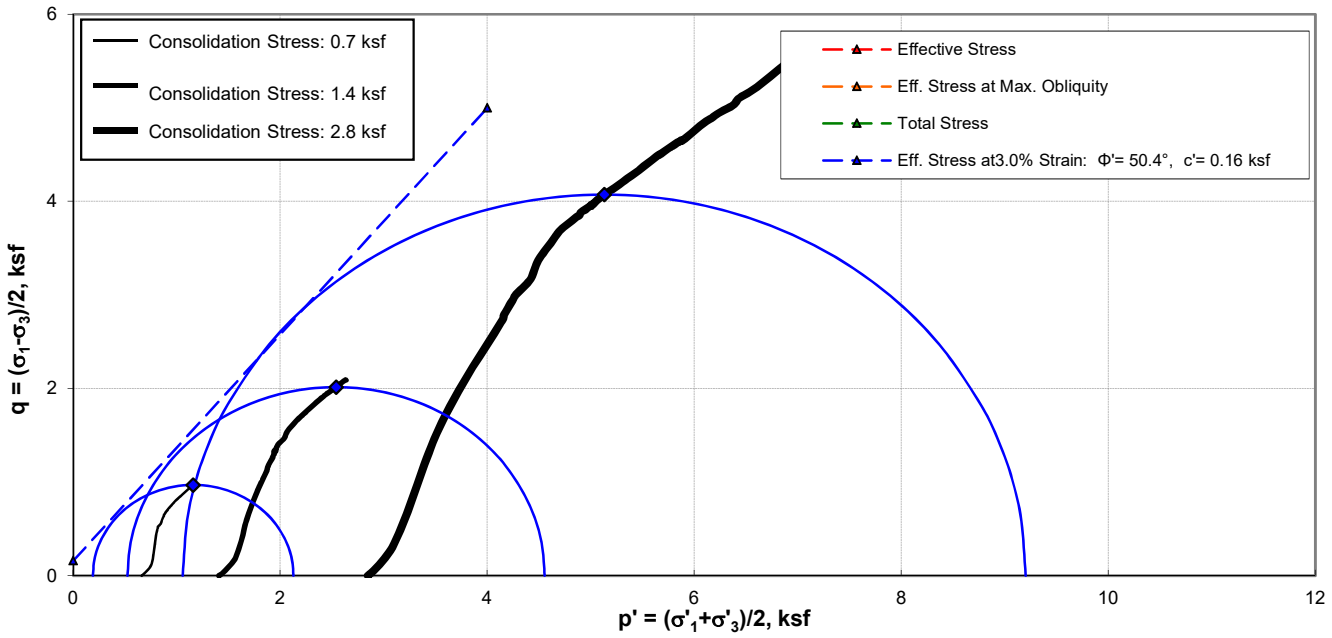






A	19W-01	#40	23.5 ft	Sandy lean CLAY with GRAVEL (CL), brown
B	19W-01	#40	23.5 ft	
C	19W-01	#40	23.5 ft	

CONSOLIDATED UNDRAINED TRIAXIAL TEST



SAMPLE ID

Boring Number	19W-02
Sample Number	20
Specimen Depth	3.5 ft
USCS Classification	Well-graded GRAVEL with CLAY and SAND (GW-GC), dark brown

INITIAL

Trial ID	A	B	C
Water Content, %	17.7%	30.4%	28.9%
Dry Unit Weight, pcf	82.4	92.6	94.6
Saturation, %	46%	100%	100%
Void Ratio	1.05	0.82	0.78
Diameter, in	2.42	2.32	2.33
Height, in	5.00	4.86	4.72

PRE-SHEAR

Water Content, %	30.4%	28.9%	27.8%
Dry Unit Weight, pcf	92.6	94.6	96.3
Saturation, %	100%	100%	100%
Void Ratio	0.82	0.78	0.75

REMARKS

Test Method: ASTM 4767 (modified for staged testing)
Project: Avila Beach Road Interchange
Tested by: N. Derbidge Cal Poly GEOE Lab
Checked by: J. King, Yeh and Associates

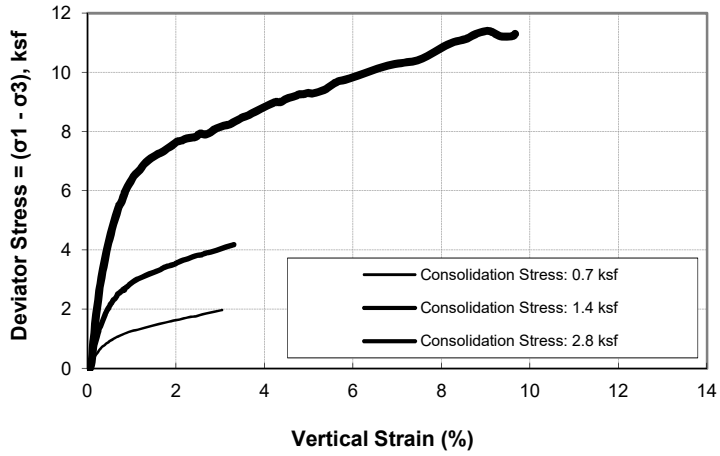
CLASSIFICATION

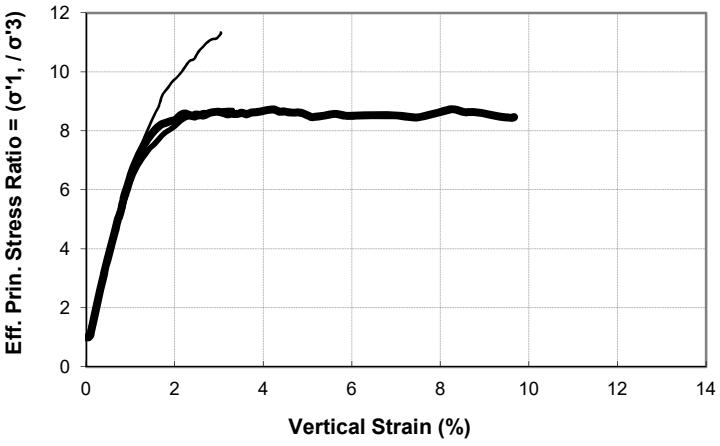
Trial ID	A	B	C
Liquid Limit	---	---	---
Plastic Limit	---	---	---
Plastic Index	---	---	---
Passing #4 (4.75 mm)	---	---	---
Passing #200 (0.075 mm)	---	---	---
Estimated Gs	2.70	2.70	2.70

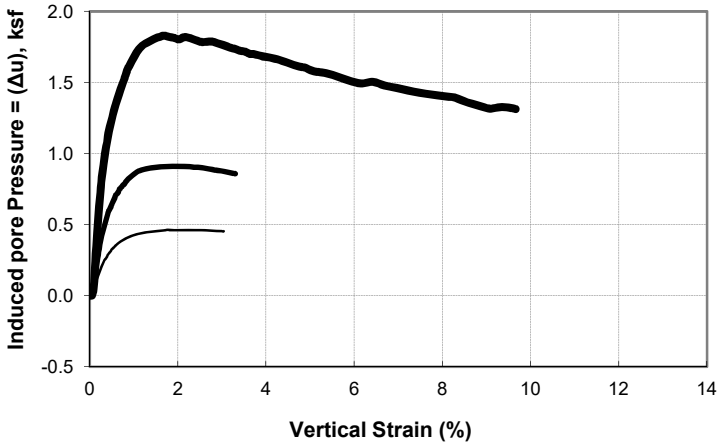
TEST SUMMARY

Trial ID	A	B	C
B-Parameter	0.98	0.98	0.98
t_{50}, minutes	N/A	N/A	N/A
Strain Rate, %/min	0.02	0.02	0.02
Cell Pressure, ksf	9.3	10.1	11.6
Back Pressure, ksf	8.7	8.7	8.7
Consolidation Stress, ksf	0.7	1.4	2.8
Deviator Stress @ Failure, ksf	1.9	4.0	8.0
Axial Strain @ Failure, %	2.9	3.0	3.0
σ'_{1F}, ksf	2.1	4.5	9.1
σ'_{3F}, ksf	0.2	0.5	1.1
Tested By:	ND	ND	ND
Date Tested:	10/2/19	10/7/19	10/9/19

CONSOLIDATED UNDRAINED TRIAXIAL TEST

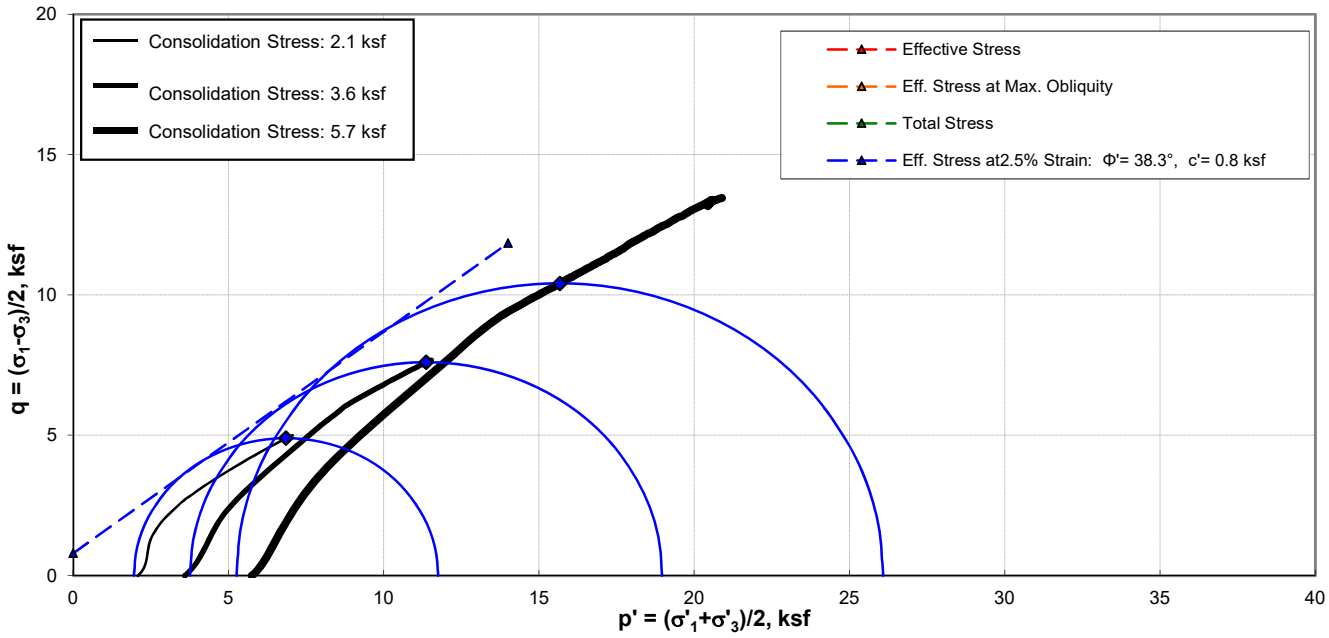






A	19W-02	#20	3.5 ft	Well-graded GRAVEL with CLAY and SAND (GW-GC), dark brown
B	19W-02	#20	3.5 ft	
C	19W-02	#20	3.5 ft	

CONSOLIDATED UNDRAINED TRIAXIAL TEST



SAMPLE ID

Boring Number	19W-02
Sample Number	24
Specimen Depth	23.5 ft
USCS Classification	Sandy fat CLAY with GRAVEL (CH), dark brown

INITIAL

Trial ID	A	B	C
Water Content, %	11.7%	25.3%	25.0%
Dry Unit Weight, pcf	94.9	100.1	100.6
Saturation, %	41%	100%	100%
Void Ratio	0.78	0.68	0.68
Diameter, in	2.42	2.38	2.40
Height, in	5.00	4.89	4.79

PRE-SHEAR

Water Content, %	25.3%	25.0%	24.7%
Dry Unit Weight, pcf	100.1	100.6	101.0
Saturation, %	100%	100%	100%
Void Ratio	0.68	0.68	0.67

REMARKS

Test Method: ASTM 4767 (modified for staged testing)
Project: Avila Beach Road Interchange
Tested by: N. Derbidge, Cal Poly GEOE Lab
Checked by: J. King, Yeh and Associates

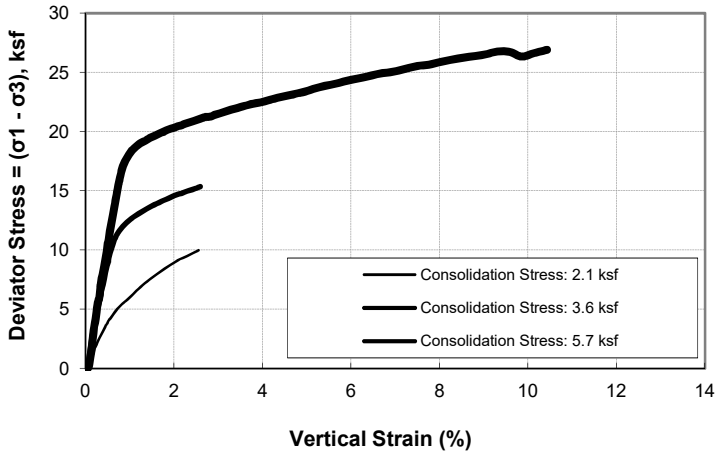
CLASSIFICATION

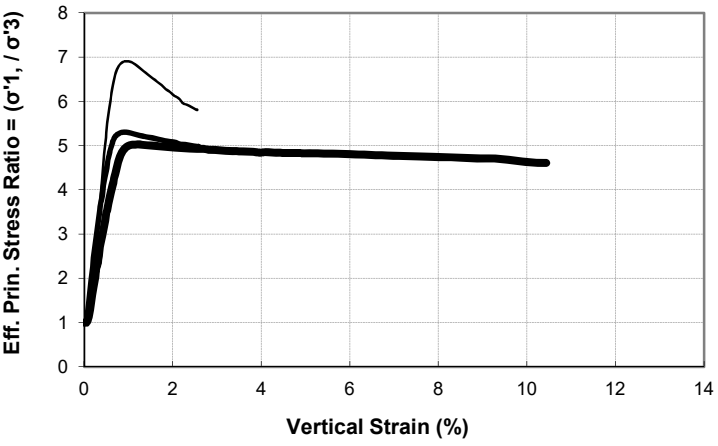
Trial ID	A	B	C
Liquid Limit	---	---	---
Plastic Limit	---	---	---
Plastic Index	---	---	---
Passing #4 (4.75 mm)	---	---	---
Passing #200 (0.075 mm)	---	---	---
Estimated Gs	2.70	2.70	2.70

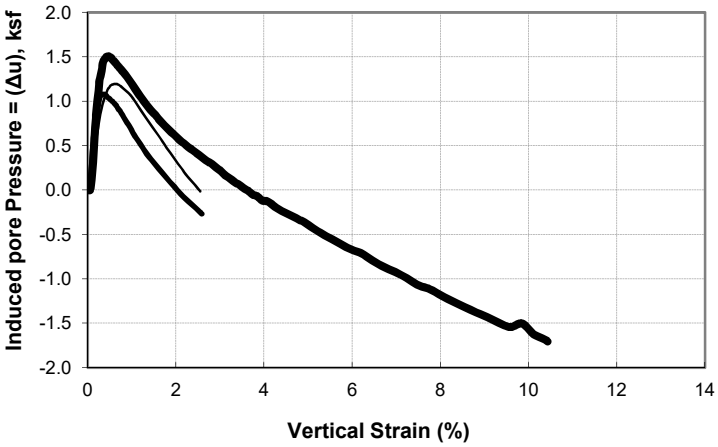
TEST SUMMARY

Trial ID	A	B	C
B-Parameter	0.98	0.98	0.98
t_{50}, minutes	N/A	N/A	N/A
Strain Rate, %/min	0.02	0.02	0.02
Cell Pressure, ksf	10.7	12.2	14.4
Back Pressure, ksf	8.7	8.7	8.7
Consolidation Stress, ksf	2.1	3.6	5.7
Deviator Stress @ Failure, ksf	9.7	15.0	20.6
Axial Strain @ Failure, %	2.5	2.5	2.4
σ'_{1F}, ksf	11.6	18.8	25.8
σ'_{3F}, ksf	2.0	3.8	5.3
Tested By:	ND	ND	ND
Date Tested:	10/3/19	10/7/19	10/9/19

CONSOLIDATED UNDRAINED TRIAXIAL TEST

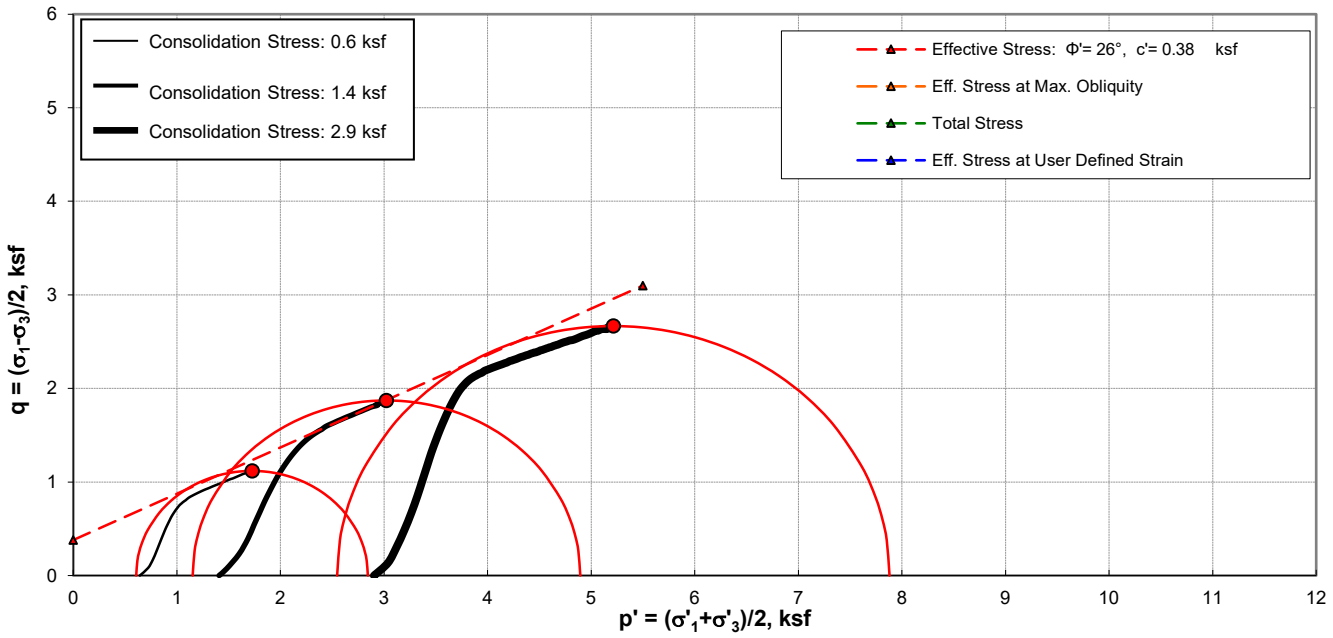






A	19W-02	#24	23.5 ft	Sandy fat CLAY with GRAVEL (CH), dark brown
B	19W-02	#24	23.5 ft	
C	19W-02	#24	23.5 ft	

CONSOLIDATED UNDRAINED TRIAXIAL TEST



SAMPLE ID

Boring Number	19W-03
Sample Number	1
Specimen Depth	2.0 ft
USCS Classification	Sandy fat CLAY (CH), dark brown

INITIAL

Trial ID	A	B	C
Water Content, %	21.2%	29.6%	29.2%
Dry Unit Weight, pcf	94.6	93.6	94.2
Saturation, %	73%	100%	100%
Void Ratio	0.78	0.80	0.79
Diameter, in	2.42	2.46	2.49
Height, in	5.00	4.87	4.74

PRE-SHEAR

Water Content, %	29.6%	29.2%	28.8%
Dry Unit Weight, pcf	93.6	94.2	94.8
Saturation, %	100%	100%	100%
Void Ratio	0.80	0.79	0.78

REMARKS

Test Method: ASTM 4767 (modified for staged testing)
Project: Avila Beach Road Interchange

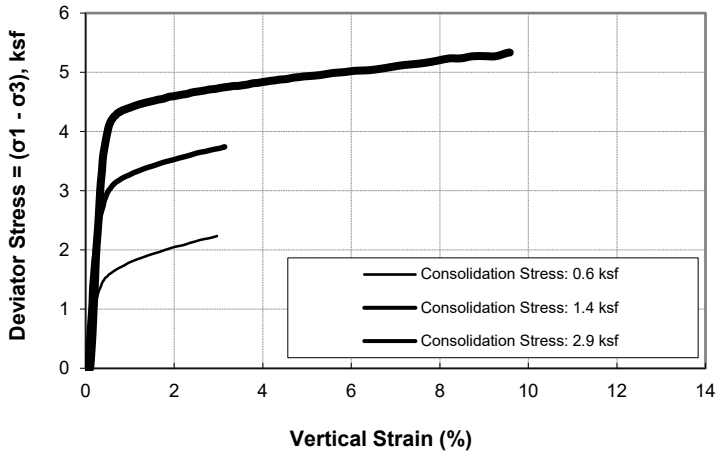
CLASSIFICATION

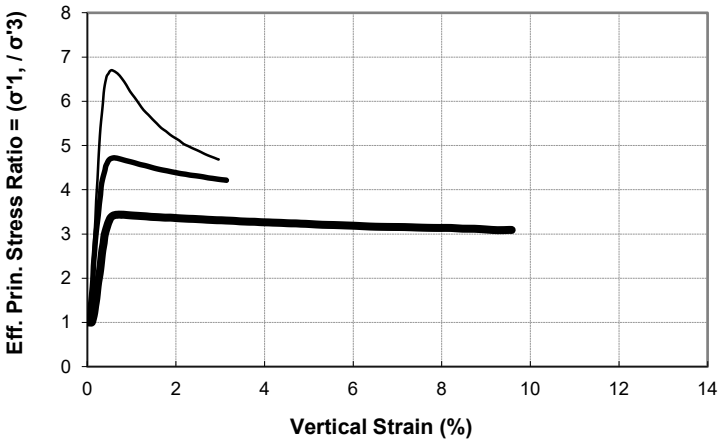
Trial ID	A	B	C
Liquid Limit	---	---	---
Plastic Limit	---	---	---
Plastic Index	---	---	---
Passing #4 (4.75 mm)	---	---	---
Passing #200 (0.075 mm)	---	---	---
Estimated Gs	2.70	2.70	2.70

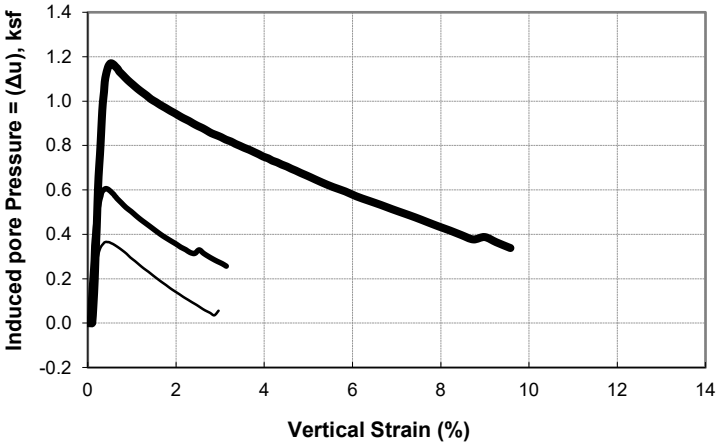
TEST SUMMARY

Trial ID	A	B	C
B-Parameter	0.98	0.98	0.98
t_{50}, minutes	N/A	N/A	N/A
Strain Rate, %/min	0.02	0.02	0.02
Cell Pressure, ksf	9.3	10.1	11.6
Back Pressure, ksf	8.7	8.7	8.7
Consolidation Stress, ksf	0.6	1.4	2.9
Deviator Stress @ Failure, ksf	2.2	3.7	5.3
Axial Strain @ Failure, %	3.0	3.1	9.6
σ'_{1F}, ksf	2.8	4.8	7.8
σ'_{3F}, ksf	0.6	1.2	2.5
Tested By:	ND	ND	ND
Date Tested:	10/3/19	10/4/19	10/10/19

CONSOLIDATED UNDRAINED TRIAXIAL TEST







A	19W-03	#1	2.0 ft	Sandy fat CLAY (CH), dark brown
B	19W-03	#1	2.0 ft	
C	19W-03	#1	2.0 ft	

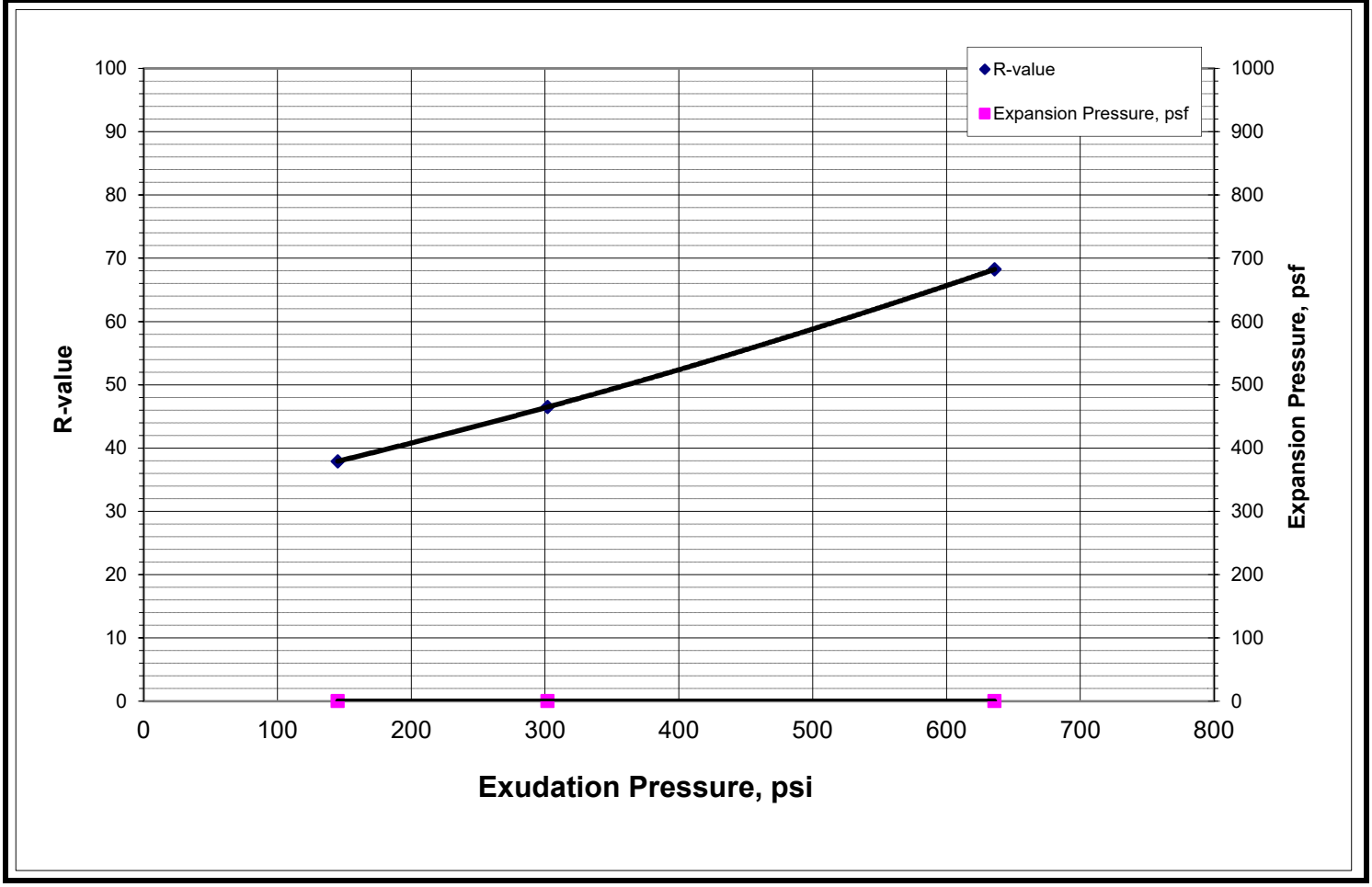
CONSOLIDATED UNDRAINED TRIAXIAL TEST

R-value Test Report (Caltrans 301)

Job No.:	687-082	**Date:**	10/07/19	**Initial Moisture,**	13.0
Client:	Yeh & Associates	**Tested**	PJ	**R-value**	**46**
Project:	216-423	**Reduced**	RU		
Sample	19P-01 B @ 0-5'	**Checked**	DC	**Expansion Pressure**	**0** psf
Soil Type:	Brown Clayey SAND				

Specimen Number	A	B	C	D
Exudation Pressure, psi	145	636	302	
Prepaired Weight, grams	1200	1200	1200	
Final Water Added, grams/cc	50	20	30	
Weight of Soil & Mold, grams	3248	3106	3177	
Weight of Mold, grams	2083	2074	2093	
Height After Compaction, in.	2.76	2.37	2.52	
Moisture Content, %	17.7	14.8	15.8	
Dry Density, pcf	108.8	115.0	112.6	
Expansion Pressure, psf	0	0	0	
Stabilometer @ 1000				
Stabilometer @ 2000	92	36	70	
Turns Displacement	3.86	3.56	3.70	
R-value	38	68	46	

Remarks:

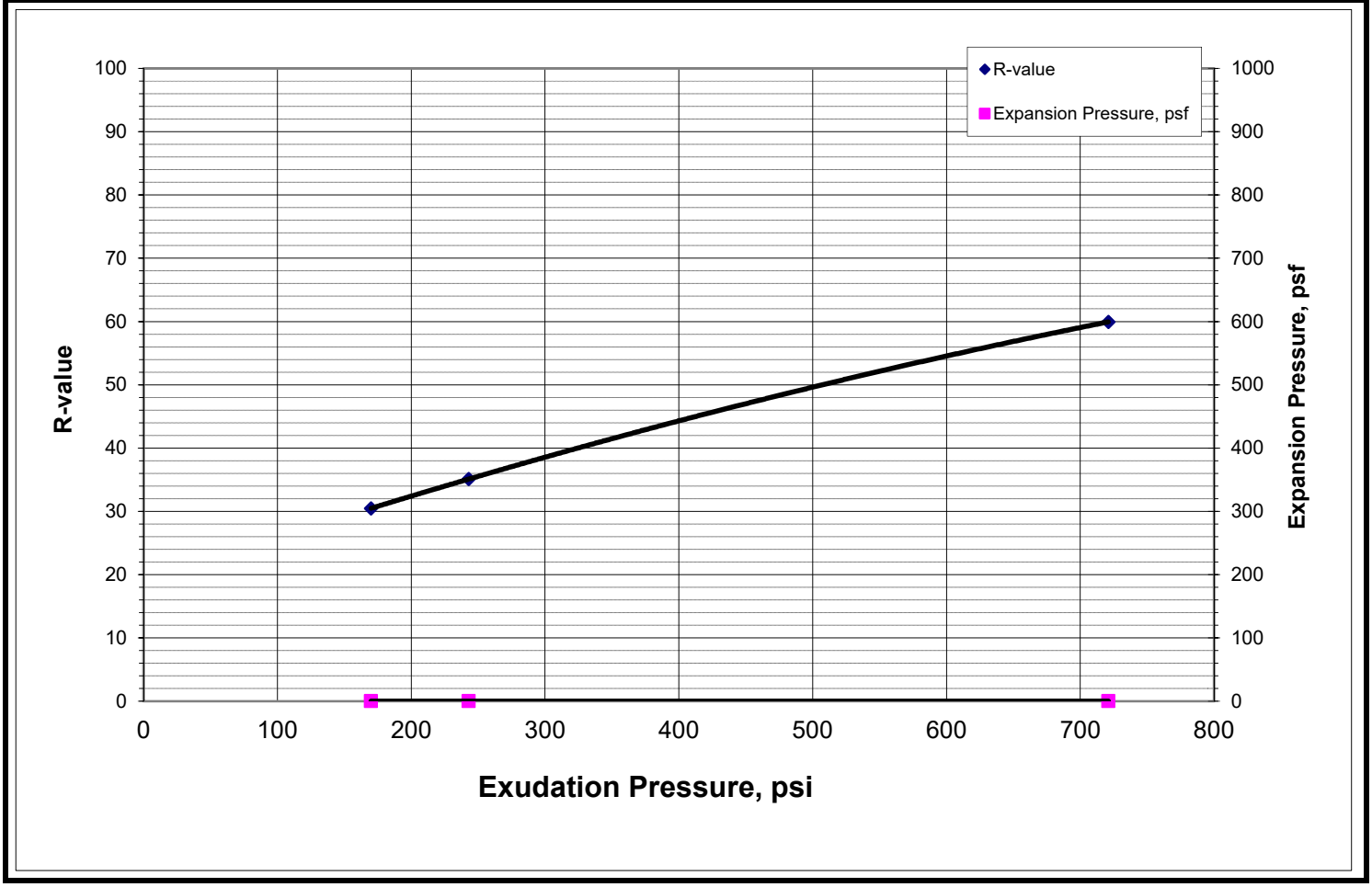


R-value Test Report (Caltrans 301)

Job No.:	687-082	**Date:**	10/08/19	**Initial Moisture,**	7.6
Client:	Yeh & Associates	**Tested**	PJ	**R-value**	**39**
Project:	216-423	**Reduced**	RU		
Sample	19P-03 G @ 0-5'	**Checked**	DC	**Expansion Pressure**	**0** psf
Soil Type:	Yellowish Brown Clayey SAND				

Specimen Number	A	B	C	D
Exudation Pressure, psi	243	170	721	
Prepaired Weight, grams	1200	1200	1200	
Final Water Added, grams/cc	75	90	60	
Weight of Soil & Mold, grams	3214	3210	3234	
Weight of Mold, grams	2074	2083	2099	
Height After Compaction, in.	2.64	2.60	2.60	
Moisture Content, %	14.3	15.6	12.9	
Dry Density, pcf	114.5	113.6	117.2	
Expansion Pressure, psf	0	0	0	
Stabilometer @ 1000				
Stabilometer @ 2000	88	92	50	
Turns Displacement	4.32	4.62	4.06	
R-value	35	30	60	

Remarks:

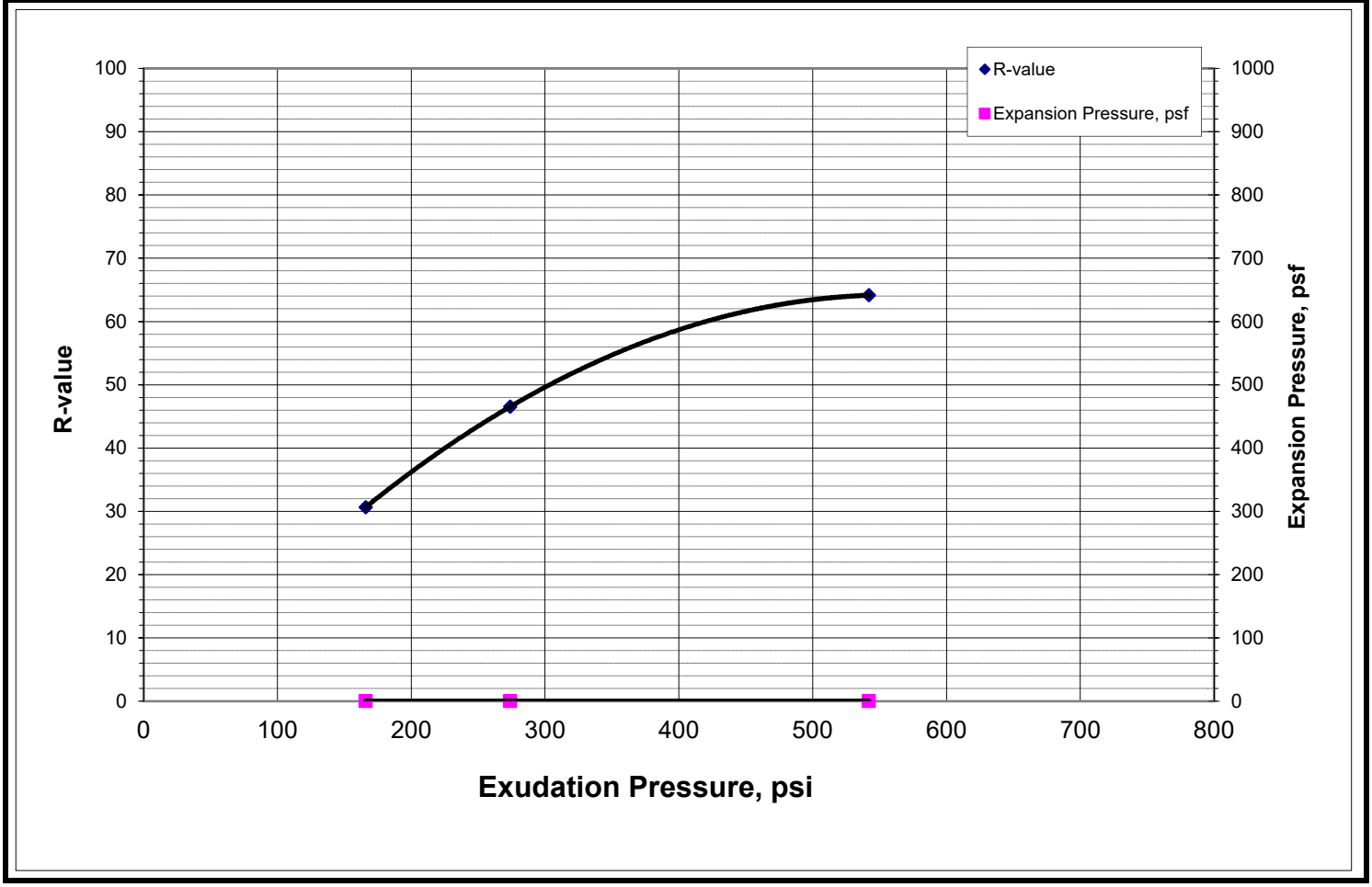


R-value Test Report (Caltrans 301)

Job No.:	687-082	**Date:**	10/07/19	**Initial Moisture,**	12.5
Client:	Yeh & Associates	**Tested**	PJ	**R-value**	**50**
Project:	216-723	**Reduced**	RU		
Sample	19P-04 C @ 0-5'	**Checked**	DC	**Expansion Pressure**	**0** psf
Soil Type:	Dark Brown Clayey SAND				

Specimen Number	A	B	C	D
Exudation Pressure, psi	166	542	274	
Prepaired Weight, grams	1200	1200	1200	
Final Water Added, grams/cc	95	35	40	
Weight of Soil & Mold, grams	3133	3151	3191	
Weight of Mold, grams	2097	2082	2096	
Height After Compaction, in.	2.57	2.50	2.58	
Moisture Content, %	21.5	15.8	16.3	
Dry Density, pcf	100.6	111.9	110.6	
Expansion Pressure, psf	0	0	0	
Stabilometer @ 1000				
Stabilometer @ 2000	100	48	74	
Turns Displacement	3.62	3.26	3.62	
R-value	31	64	47	

Remarks:

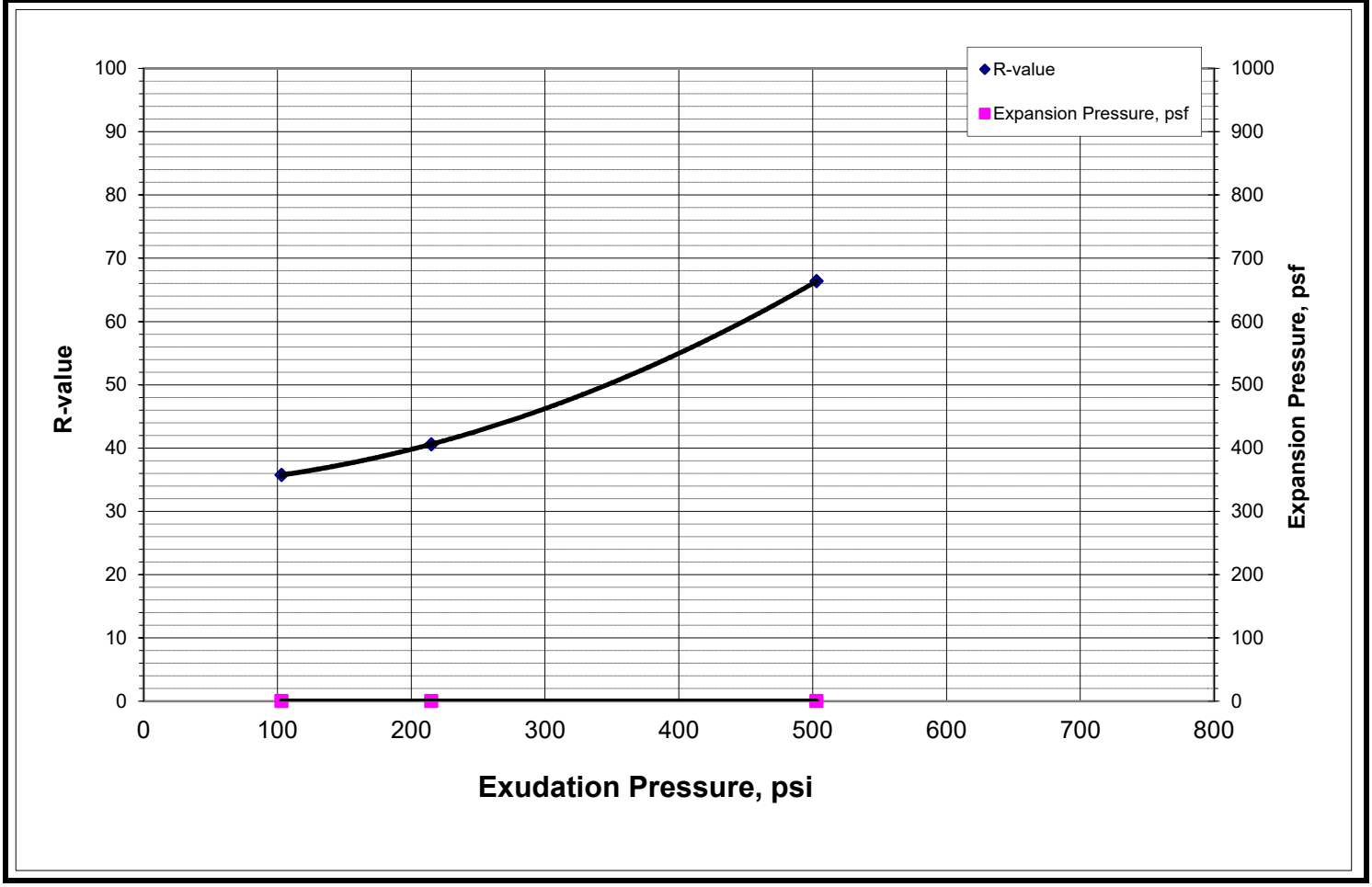


R-value Test Report (Caltrans 301)

Job No.:	687-082	**Date:**	10/08/19	**Initial Moisture,**	11.1
Client:	Yeh & Associates	**Tested**	PJ	**R-value**	**46**
Project:	216-423	**Reduced**	RU		
Sample	19W-03 A @ 0-5'	**Checked**	DC	**Expansion Pressure**	**0** psf
Soil Type:	Brown sandy fat CLAY				

Specimen Number	A	B	C	D
Exudation Pressure, psi	215	103	503	
Prepaired Weight, grams	1200	1200	1200	
Final Water Added, grams/cc	50	60	40	
Weight of Soil & Mold, grams	3197	3220	3183	
Weight of Mold, grams	2082	2097	2097	
Height After Compaction, in.	2.61	2.68	2.52	
Moisture Content, %	15.7	16.6	14.8	
Dry Density, pcf	111.9	108.9	113.8	
Expansion Pressure, psf	0	0	0	
Stabilometer @ 1000				
Stabilometer @ 2000	82	90	40	
Turns Displacement	3.88	4.14	3.80	
R-value	41	36	66	

Remarks:



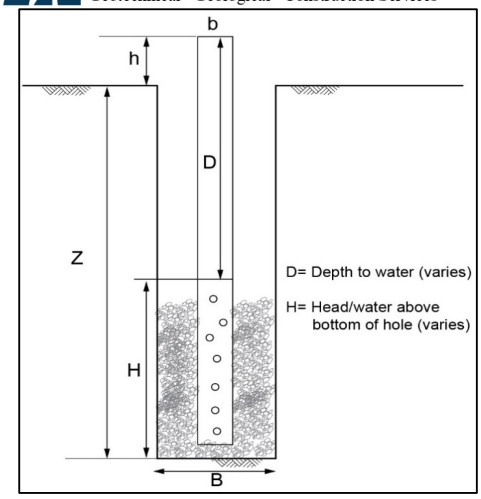
APPENDIX C - INFILTRATION TESTS

Infiltration Test

References: Native Soil Assessment for Small Infiltration-Based Stormwater Control Measures, Central Coast LID Initiative, December 2013
Caltrans Test 749 and 750

Yeh and Associates, Inc.
Geotechnical • Geological • Construction Services

Project No.:	216-423	**Percolation Test No.:**	19IN-01
Project Name:	Avila Beach IC	**Surface Elevation (ft):**	104
Project MGR:	J. King	**Completion Depth, Z (ft):**	9.5
Tested By:	R. Hooke/J. Cravens	**Pipe Above Grade, h (ft)**	1.4
Excavation Method:	8" HSA	**Pipe Diameter, b (in)**	2
Weather:	Sunny, Hot	**Hole Diameter, B (in):**	8
Installation Date:	9/17/2019	**Backfill**	Native
Test Date:	9/20/2019		



Constant Head Test Data	
Time (min)	30
Volume of Water (gal)	1.8
Volume of Water(in^3)	416
Rate (gal/hr)	3.6
Rate (in^3/hr)	832

Test Notes
Maintained head of approximately 6 inches during test
Approximately 6.5 gallons of water used to saturate test hole

Falling Head Percolation Test Data Table

Time	H (inches)	Δ (inches)	ΔT (minutes)	R (min/inch)
11:07	42.0	0.0	---	---
11:41	40.8	1.2	34	28.33
11:59	40.2	0.6	18	30.00
12:13	40.0	0.2	14	58.33
12:23	39.7	0.2	10	41.67
14:22	37.2	2.5	119	47.22
15:08	36.0	1.2	46	38.33
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Average Percolation Rate, R:	42.41	Minutes/Inch
Average Percolation Rate, R:	1.41	Inches/Hour
Equivalent Unlined 12-inch diameter Test Rate:	127.65	Minutes/Inch
Equivalent Unlined 12-inch diameter Test Rate:	0.47	Inches/Hour

LEGEND:
H = Water head in test hole
Δ = Drop in water level between observations
T = Time interval between observations
R = Percolation Rate

Infiltration Test

References: Native Soil Assessment for Small Infiltration-Based Stormwater Control Measures, Central Coast LID Initiative, December 2013
Caltrans Test 749 and 750

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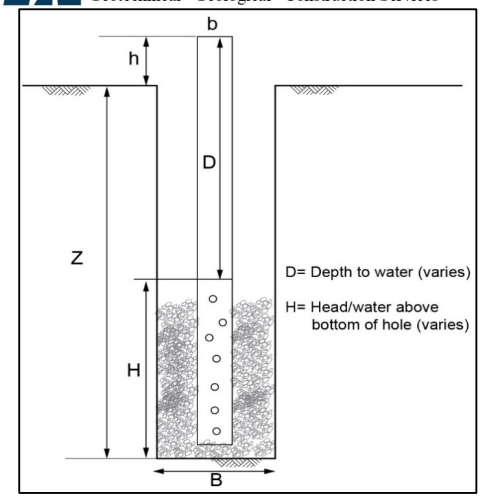
Project No.:	216-423	**Percolation Test No.:**	19IN-02
Project Name:	Avila Beach IC	**Surface Elevation (ft):**	99.5
Project MGR:	J. King	**Completion Depth, Z (ft):**	4.92
Tested By:	R. Hooke/J. Cravens	**Pipe Above Grade, h (ft)**	1.2
Excavation Method:	8" HSA	**Pipe Diameter, b (in)**	2
Weather:	Sunny, Warm	**Hole Diameter, B (in):**	8
Installation Date:	9/17/2019	**Backfill**	Native
Test Date:	9/20/2019		



Constant Head Test Data	
Time (min)	30
Volume of Water (gal)	2.4
Volume of Water(in^3)	554
Rate (gal/hr)	4.8
Rate (in^3/hr)	1109

Test Notes
Maintained head of approximately 6 inches during test
Approximately 3.5 gallons of water used to saturate test hole

Falling Head Percolation Test Data Table

Time	H (inches)	Δ (inches)	ΔT (minutes)	R (min/inch)
11:47	43.1	0.0	---	---
11:58	40.1	3.0	11	3.67
12:07	38.3	1.8	9	5.00
12:19	34.7	3.6	12	3.33
14:20	23.9	10.8	121	11.20
15:03	22.7	1.2	43	35.83
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Average Percolation Rate, R:	23.52	Minutes/Inch
Average Percolation Rate, R:	2.55	Inches/Hour
Equivalent Unlined 12-inch diameter Test Rate:	70.80	Minutes/Inch
Equivalent Unlined 12-inch diameter Test Rate:	0.85	Inches/Hour

LEGEND:
H = Water head in test hole
Δ = Drop in water level between observations
T = Time interval between observations
R = Percolation Rate

Infiltration Test

References: Native Soil Assessment for Small Infiltration-Based Stormwater Control Measures, Central Coast LID Initiative, December 2013
Caltrans Test 749 and 750

Yeh and Associates, Inc.
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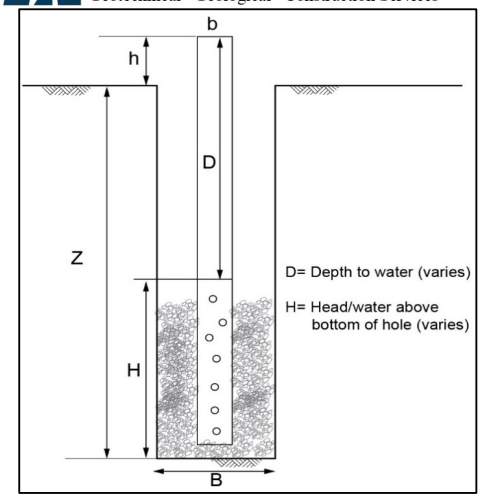
Project No.:	216-423	**Percolation Test No.:**	19IN-03
Project Name:	Avila Beach IC	**Surface Elevation (ft):**	89.5
Project MGR:	J. King	**Completion Depth, Z (ft):**	4.17
Tested By:	R. Hooke/J. Cravens	**Pipe Above Grade, h (ft)**	0.8
Excavation Method:	8" HSA	**Pipe Diameter, b (in)**	2
Weather:	Sunny, Warm	**Hole Diameter, B (in):**	8
Installation Date:	9/16/2019	**Backfill**	Native
Test Date:	9/20/2019		



Constant Head Test Data	
Time (min)	25
Volume of Water (gal)	5.2
Volume of Water(in^3)	1201
Rate (gal/hr)	12.5
Rate (in^3/hr)	2883

Test Notes
Maintained head of approximately 6 inches during test
Approximately 13 gallons of water used to saturate test hole

Falling Head Percolation Test Data Table

Time	H (inches)	Δ (inches)	ΔT (minutes)	R (min/inch)
10:22	41.0	0.0	---	---
10:52	37.1	4.0	30	7.58
11:22	35.0	2.0	30	14.71
11:53	34.1	1.0	31	32.29
12:22	33.0	1.1	29	26.85
14:15	29.0	4.0	113	28.54
15:18	27.0	2.0	63	30.88
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Average Percolation Rate, R:	29.64	Minutes/Inch
Average Percolation Rate, R:	2.02	Inches/Hour
Equivalent Unlined 12-inch diameter Test Rate:	89.22	Minutes/Inch
Equivalent Unlined 12-inch diameter Test Rate:	0.67	Inches/Hour

LEGEND:
H = Water head in test hole
Δ = Drop in water level between observations
T = Time interval between observations
R = Percolation Rate

Infiltration Test

References: Native Soil Assessment for Small Infiltration-Based Stormwater Control Measures, Central Coast LID Initiative, December 2013
Caltrans Test 749 and 750

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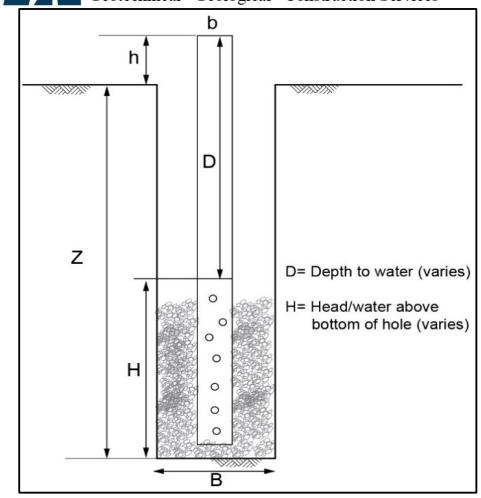
Project No.:	216-423	**Percolation Test No.:**	19IN-05
Project Name:	Avila Beach IC	**Surface Elevation (ft):**	77.5
Project MGR:	J. King	**Completion Depth, Z (ft):**	10
Tested By:	R. Hooke/J. Cravens	**Pipe Above Grade, h (ft)**	0.5
Excavation Method:	8" HSA	**Pipe Diameter, b (in)**	2
Weather:	Sunny, Hot	**Hole Diameter, B (in):**	8
Installation Date:	9/18/2019	**Backfill**	Native
Test Date:	9/20/2019		



Constant Head Test Data	
Time (min)	30
Volume of Water (gal)	34.6
Volume of Water(in^3)	7993
Rate (gal/hr)	69.2
Rate (in^3/hr)	15985

Test Notes
Maintained head of approximately 6 inches during test
Approximately 14 gallons of water used to saturate test hole
Hole dry at time of test

Falling Head Percolation Test Data Table

Time	H (inches)	Δ (inches)	ΔT (minutes)	R (min/inch)
9:22	15.6	0.0	---	---
9:23	10.8	4.8	1	0.21
9:24	8.4	2.4	1	0.42
9:25	7.2	1.2	1	0.83
9:26	DRY	DRY	DRY	DRY
9:36	12.0	0.0	---	---
9:37	10.8	1.2	1	0.83
9:38	9.6	1.2	1	0.83
9:39	8.4	1.2	1	0.83
9:40	DRY	DRY	DRY	DRY
9:44	12.6	0.0	---	---
9:45	11.4	1.2	1	0.83
9:46	10.2	1.2	1	0.83
9:47	9.0	1.2	1	0.83
9:48	7.2	1.8	1	0.56
9:49	DRY	DRY	DRY	DRY
9:56	13.2	0.0	---	---
9:57	12.0	1.2	1	0.83
9:58	10.8	1.2	1	0.83
9:59	9.6	1.2	1	0.83
10:00	8.4	1.2	1	0.83
10:01	7.2	6.0	1	0.17

Average Percolation Rate, R:	0.80	Minutes/Inch
Average Percolation Rate, R:	75.43	Inches/Hour
Equivalent Unlined 12-inch diameter Test Rate:	2.39	Minutes/Inch
Equivalent Unlined 12-inch diameter Test Rate:	25.06	Inches/Hour

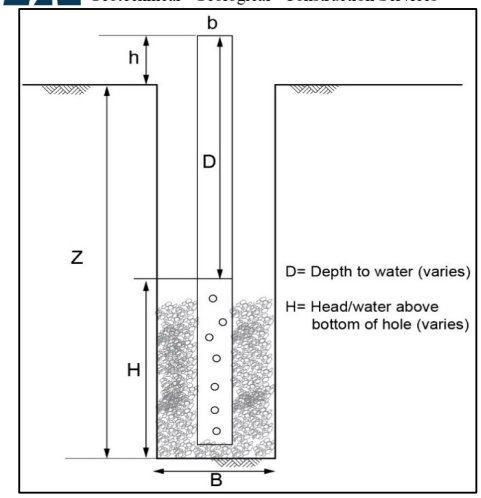
LEGEND:
H = Water head in test hole
Δ = Drop in water level between observations
T = Time interval between observations
R = Percolation Rate

Infiltration Test

References: Native Soil Assessment for Small Infiltration-Based Stormwater Control Measures, Central Coast LID Initiative, December 2013
Caltrans Test 749 and 750

Yeh and Associates, Inc.
Geotechnical • Geological • Construction Services

Project No.:	216-423	**Percolation Test No.:**	21I-01
Project Name:	Avila Beach IC	**Surface Elevation (ft):**	80.5
Project MGR:	J. King	**Completion Depth, Z (ft):**	14.5
Tested By:	J. Garcia	**Pipe Above Grade, h (ft)**	0
Excavation Method:	8" HSA	**Pipe Diameter, b (in)**	2
Weather:	sunny, warm	**Hole Diameter, B (in):**	8
Installation Date:	3/26/2021	**Backfill**	Native
Test Date:	3/29/2021		



Constant Head Test Data	
Time (min)	30
Volume of Water (gal)	24.4
Volume of Water(in^3)	5636
Rate (gal/hr)	48.8
Rate (in^3/hr)	11273

Test Notes
21.6 inches of head maintained during test
Approximately 15 gallons of water used to saturate test hole
Hole dry at time of test

Falling Head Percolation Test Data Table

Time	H (inches)	Δ (inches)	ΔT (minutes)	R (min/inch)
10:39	24.0	0.0	---	---
10:41	DRY	DRY	DRY	DRY
10:42	21.6	0.0	---	---
10:44	4.8	16.8	2	0.12
10:45	DRY	DRY	DRY	DRY
10:46	24.0	0.0	---	---
10:48	6.0	18.0	2	0.11
10:49	DRY	DRY	DRY	DRY
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Average Percolation Rate, R:	0.12	Minutes/Inch
Average Percolation Rate, R:	521.38	Inches/Hour
Equivalent Unlined 12-inch diameter Test Rate:	0.35	Minutes/Inch
Equivalent Unlined 12-inch diameter Test Rate:	173.20	Inches/Hour

LEGEND:
H = Water head in test hole
Δ = Drop in water level between observations
T = Time interval between observations
R = Percolation Rate

Infiltration Test

References: Native Soil Assessment for Small Infiltration-Based Stormwater Control Measures, Central Coast LID Initiative, December 2013
Caltrans Test 749 and 750

Yeh and Associates, Inc.
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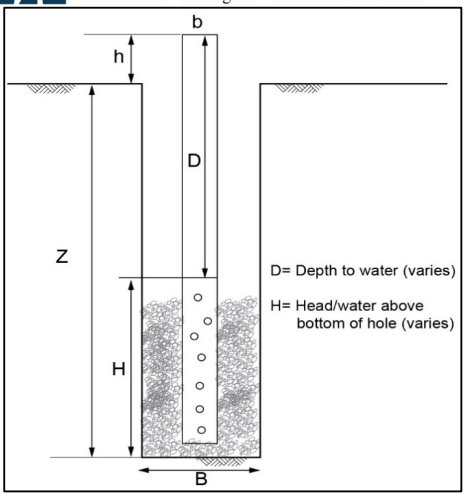
Project No.:	216-423	**Percolation Test No.:**	21I-02
Project Name:	Avila Beach IC	**Surface Elevation (ft):**	80.5
Project MGR:	J. King	**Completion Depth, Z (ft):**	9.7
Tested By:	J. Garcia	**Pipe Above Grade, h (ft)**	0.00
Excavation Method:	8" HSA	**Pipe Diameter, b (in)**	2
Weather:	sunny, warm	**Hole Diameter, B (in):**	8
Installation Date:	3/26/2021	**Backfill**	Native
Test Date:	3/29/2021		



Constant Head Test Data	
Time (min)	30
Volume of Water (gal)	11.3
Volume of Water(in^3)	2610
Rate (gal/hr)	22.6
Rate (in^3/hr)	5221

Test Notes

Maintained 20.4 inches of head
Approximately 15 gallons of water used to saturate test hole
Hole dry at time of test

Falling Head Percolation Test Data Table

Time	H (inches)	Δ (inches)	ΔT (minutes)	R (min/inch)
11:34	21.6	0.0	---	---
11:37	15.6	6.0	3	0.50
11:42	12.0	3.6	5	1.39
11:46	9.6	2.4	4	1.67
11:52	8.4	1.2	6	5.00
12:00	6.0	2.4	8	3.33
12:10	DRY	DRY	DRY	DRY
12:13	20.4	0.0	---	---
12:21	10.8	9.6	8	0.83
12:34	7.2	3.6	13	3.61
12:43	4.8	2.4	9	3.75
12:56	1.2	3.6	13	3.61
13:00	DRY	DRY	DRY	DRY
13:06	20.4	0.0	---	---
13:16	9.6	10.8	10	0.93
13:26	7.2	2.4	10	4.17
13:36	3.6	3.6	10	2.78
13:46	1.2	2.4	10	4.17
13:56	0.0	1.2	10	8.33
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Average Percolation Rate, R:	4.03	Minutes/Inch
Average Percolation Rate, R:	14.90	Inches/Hour
Equivalent Unlined 12-inch diameter Test Rate:	12.12	Minutes/Inch
Equivalent Unlined 12-inch diameter Test Rate:	4.95	Inches/Hour

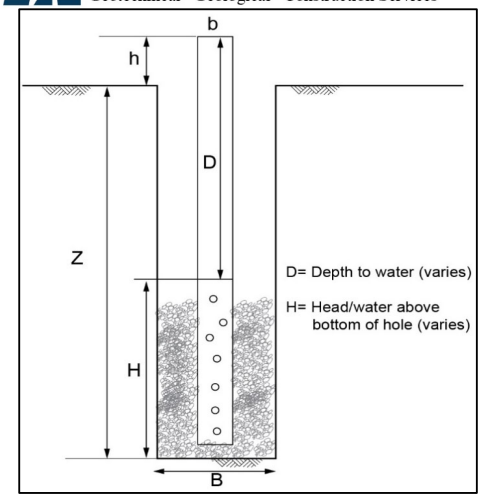
LEGEND:
H = Water head in test hole
Δ = Drop in water level between observations
T = Time interval between observations
R = Percolation Rate

Infiltration Test

References: Native Soil Assessment for Small Infiltration-Based Stormwater Control Measures, Central Coast LID Initiative, December 2013
Caltrans Test 749 and 750

Yeh and Associates, Inc.
Geotechnical • Geological • Construction Services

Project No.:	216-423	**Percolation Test No.:**	21I-03
Project Name:	Avila Beach IC	**Surface Elevation (ft):**	80
Project MGR:	J. King	**Completion Depth, Z (ft):**	5.1
Tested By:	J. Garcia	**Pipe Above Grade, h (ft)**	0.3
Excavation Method:	8" HSA	**Pipe Diameter, b (in)**	2
Weather:	clear, sunny	**Hole Diameter, B (in):**	8
Installation Date:	3/26/2021	**Backfill**	Native
Test Date:	3/29/2021		



Constant Head Test Data	
Time (min)	30
Volume of Water (gal)	2.5
Volume of Water(in^3)	578
Rate (gal/hr)	5.0
Rate (in^3/hr)	1155

Test Notes
Maintained head of approximately 6 inches during test
Approximately 15 gallons of water used to saturate test hole
Hole dry at time of test

Falling Head Percolation Test Data Table

Time	H (inches)	Δ (inches)	ΔT (minutes)	R (min/inch)
15:40	9.0	0.0	---	---
15:50	7.8	1.2	10	8.33
16:00	5.4	2.4	10	4.17
16:10	4.8	0.6	10	16.67
16:25	4.2	0.6	15	25.00
16:33	DRY	DRY	DRY	DRY
16:36	10.2	0.0	---	---
16:44	7.8	2.4	8	3.33
16:54	6.6	1.2	10	8.33
17:04	5.4	1.2	10	8.33
17:15	4.8	0.6	11	18.33
17:26	4.2	0.6	11	18.33
17:35	DRY	DRY	DRY	DRY
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Average Percolation Rate, R:	19.58	Minutes/Inch
Average Percolation Rate, R:	3.06	Inches/Hour
Equivalent Unlined 12-inch diameter Test Rate:	58.95	Minutes/Inch
Equivalent Unlined 12-inch diameter Test Rate:	1.02	Inches/Hour

LEGEND:
H = Water head in test hole
Δ = Drop in water level between observations
T = Time interval between observations
R = Percolation Rate

APPENDIX D - AERIALLY DEPOSITED LEAD INVESTIGATION - PADRE

padre associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

REPORT OF FINDINGS
PRELIMINARY SITE INVESTIGATION
AVILA BEACH DRIVE / U.S. HIGHWAY 101 INTERCHANGE IMPROVEMENT PROJECT
05-SLO-101-PM R21.1 05-1G4800 - 0515000038
SAN LUIS OBISPO COUNTY, CALIFORNIA

Prepared for:
Yeh and Associates, Inc.

April 2019

369 Pacific Street ■ San Luis Obispo, California 93401 ■ (805) 786-2650 ■ www.padreinc.com

padre associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

April 25, 2019
Project No. 1601-3091

Yeh and Associates, Inc.
391 Front Street, Suite D
Grover Beach, California 93433

Attention: Mr. Judd King. P.E., G.E.

Subject: Report of Findings, Preliminary Site Investigation, Avila Beach Drive / U.S. Highway 101 Interchange Improvement Project, 05-SLO-101-PM R21.1 05-1G4800-0515000038, San Luis Obispo County, California

Dear Mr. King:

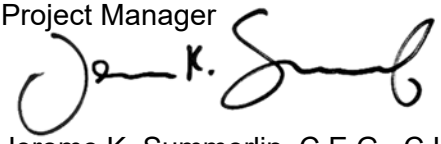
Padre Associates, Inc. (Padre), on behalf of Yeh and Associates, Inc. (Yeh), has prepared this report of findings documenting and summarizing the results of the Preliminary Site Investigation at the Avila Beach Drive / U.S. Highway 101 Interchange Improvement Project located in San Luis Obispo County, California.

If you have any questions or comments, please contact Mr. Robert Vander Weele at (805) 786-2650, ext. 34 or rvanderweele@padreinc.com.

Sincerely,

PADRE ASSOCIATES, INC.

Robert Vander Weele, P.G.
Project Manager



Jerome K. Summerlin, C.E.G., C.Hg.
President

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TABLES

PLATES

APPENDICES

1.0 INTRODUCTION

Padre Associates, Inc. (Padre), on behalf of Yeh and Associates Inc. (Yeh), has prepared this report of findings documenting and summarizing the Preliminary Site Investigation (PSI) completed at the Avila Beach Drive / U.S. Highway 101 Interchange Improvement Project (Project), located in San Luis Obispo County, California (Project Site). The location of the Project Site is presented on Plate 1 - Site Location Map. The layout of the Project Site and the drill hole locations are presented on Plate 2 - Site Plan Showing Assessment Locations.

1.1 PSI OBJECTIVE

The objective of the PSI was to assess the shallow soils within the area of the Project Site that area within the State of California Right-of-Way (State Right-of-Way) that are proposed to be disturbed by grading activities for the presence of aerially deposited lead (ADL), and to compare the results of soil sample analytical results to applicable regulatory thresholds regarding handling and re-use/disposal.

1.2 REPORT ORGANIZATION

This report is organized as follows: Section 2.0 presents background information for the Project Site, including a description of the site and geologic conditions; Section 3.0 provides a discussion of current California ADL regulations; Section 4.0 presents the methodology for the PSI activities at the Project Site; Section 5.0 provides a summary of the findings; Section 6.0 provides a summary of statistical analysis performed on the laboratory analytical results. Section 7.0 presents Padre's conclusions and recommendations regarding the soil conditions encountered at the Project Site; Section 8.0 includes Padre's statement of limitations; and, Section 9.0 provides the documents referenced within this report.

This report includes three appendices. Drill hole logs are included as Appendix A. Laboratory analytical reports, chain-of-custody (COC) documentation are included as Appendix B and Statistical Analysis Output is provided in Appendix C.

2.0 BACKGROUND

2.1 SITE DESCRIPTION

The Project Site is located within the central coastal area of San Luis Obispo County, approximately 0.25 miles north of Pismo Beach city limits (refer to Plate 1 – Site Location Map). The topography of the Project Site in the area of the Project Site ranges from gently to moderately sloping terrain surround by steeply sloping terrain. Elevation at the Project Site ranges of approximately 100 feet above mean sea level (MSL) to approximately 160 feet above MSL.

The Project Site is located between the communities of Avila Beach and the city of Pismo Beach in San Luis Obispo County, California. The area of the Project Site consists of a north-bound overpass and a southbound overpass with on and off ramps connecting the U.S. Highway 101 with Avila Beach Drive and Shell Beach Road. Padre understands that San Luis Obispo County proposes to replace the current intersection with a roundabout and upgrade the on and off ramps to U.S. Highway 101.

According to a review of the 1965 United States Geological Survey (U.S.G.S) 7.5-minute Quadrangle for Pismo Beach (USGS, 1965) the current configuration of the subject intersection has been present since at least 1965.

2.2 GEOLOGY

The Project Site is located within the southern portion of the Coast Ranges Geological Province on the southwestern margin of the San Luis Range. The San Luis Range is a prominent west-northwest trending topographic and structural high that is one of several structural blocks of the Los Osos / Santa Maria tectonic domain. The Project Site is directly underlain by unconsolidated sediments and bedrock. Holocene to late Pleistocene age unconsolidated alluvial deposits, consisting of mixtures of gravel, sand, silt, and clay, of the San Luis Creek and Gragg Canyon floodplains underlay the extreme northern portion of the Project Site and a small portion of the Project Site near the overpasses (Wigers, 2011). Bedrock units of the Belleview member of the Pismo Formation underlay a majority of the Project Site. The Belleview member consist of light-gray, bedded resistant sandstone and interbedded siltstone (Wigers, 2011).

The Project Site is not located within a groundwater basin identified by the State of California Department of Water Resources (DWR, 2016).

3.0 DTSC / CALTRANS AGREEMENT

The California Environmental Protection Agency (Cal-EPA), Department of Toxic Substances Control (DTSC) in an agreement with the California Department of Transportation (CalTrans), *Soil Management Agreement for Aerially Deposited Lead-Contaminated Soils* (DTSC / CalTrans Agreement) dated June 28, 2016 defines ADL-contaminated soil (ADL-Contaminated Soil) as follows:

> *Soil whose only constituent of concern that poses an unacceptable risk to human health or the environment is lead, primarily from exhaust emissions from the operation of motor vehicles, in concentrations greater than considered appropriate for unrestricted use by DTSC (currently 80 milligrams per kilogram [mg/kg] total lead based on a 95 percent upper confidence limit [UCL]) and/or 5 mg/l extractable lead based on a 95 percent UCL, as determined by the CAL Waste Extraction Test (CAL-WET).*

The DTSC for the purpose of the DTSC / CalTrans Agreement defines clean soil (Clean Soil) as follows:

> *For purposes of this agreement, clean soil is defined as soil not containing total lead over 80 mg/kg based on a 95 percent UCL or soluble lead over 5 mg/l based on a 95 percent UCL as determined by the CAL-WET and not containing other constituents at levels that would pose an unacceptable risk to human health or the environment or be unacceptable to the Regional Water Quality Control Board with jurisdiction.*

3.1 DTSC MINIMUM COVER REQUIREMENTS FOR ADL-CONTAMINATED SOIL

The following table list the DTSC's minimum cover requirements for ADL-Contaminated Soil reuse within the State Right-of-Way.

Soluble Lead Concentrations*	Total Lead Concentration*	Minimum Cover Requirements
<5 mg/L CAL-WET	<320 mg/kg	No cover requirements
>5 mg/L CAL-WET and ≤1.5 mg/L Di-WET	>320 mg/kg and ≤1,600 mg/kg	Must be placed under a one-foot Clean Soil cover
>1.5 mg/L Di-WET and ≤1.5 mg/L Di-WET	>1,600 mg/kg and ≤3,200 mg/kg	Must be placed under a pavement structure
>150 mg/L Di-WET	>3,200 mg/kg	Subject to full regulation as hazardous waste

Notes:
CAL-WET – Standard California Waste Extraction Test
DI-WET - Modified California Waste Extraction Test
* - Concentrations based on a 95% UCL

4.0 PSI METHODOLOGY

4.1 PRE-FIELD ACTIVITIES

4.1.1 Technical Work Plan and Site Health and Safety Plan

Padre prepared a Technical Work Plan (TWP) for the PSI activities completed at the Project Site dated July 16, 2018 (Padre, 2018). The TWP provided the planned PSI methodology, proposed drill hole locations and a laboratory analytical program.

Padre prepared and implemented a Site-Specific Health and Safety Plan (HASP) for the subject PSI activities. The HASP included the procedures, equipment, and materials/supplies utilized to protect worker and community health and safety during the course of the field activities.

4.1.2 Permitting

Yeh obtained an encroachment permit from CalTrans Region 5 to complete the subject PSI activities within the State Right-of-Way.

Because groundwater was not anticipated to be encountered and the drill holes were not proposed to be completed as groundwater monitoring wells, groundwater monitoring well construction permits were not required to be obtained from the San Luis Obispo County Environmental Health Services (SLOEHS).

4.1.3 Underground Service Alert and Private Utility Locator

The locations of the PSI activities were marked with white paint, and Underground Service Alert (USA) was contacted at least 48-hours prior to the commencement of ground disturbance activities.

4.2 DRILL HOLES ADVANCEMENT AND SOIL SAMPLE COLLECTION

On July 25, 2018 and January 11, 2019, Padre manually advanced a total of 23 hand augered drill holes at the Project Site using a hand-auger kit (refer to Plate 2). Soil samples were collected from drill holes HA1, HA2, HA4, HA5, HA10 and HA14 through HA23 at the ground surface and at the approximate depths of 1.0 foot and 2.0 feet. Due to practical hand auger refusal, soil samples were collected at the locations of drill holes HA6, HA7, HA8, HA9, HA11, HA12 and HA13 at the surface and at the approximate depth of 1.0 foot, and at the locations of drill hole HA3 at the surface and the approximate depths of 1.0-foot and 1.75-feet. All 23 drill holes were backfilled with soil cuttings following the completion of soil sample collection activities.

Soil samples collected during the course of the hand-auger drill hole advancement activities were collected by Padre directly from the hand auger bucket into 8-oz laboratory provided glass sample jars and immediately placed on ice. Soil samples were logged in the field by Padre using the Unified Soil Classification System (USCS).

4.2.1 Decontamination Procedures

Field sampling equipment was cleaned before use, between sample collection locations, and after the completion of fieldwork. Cleaning procedures consisted of a non-phosphate detergent wash, two rinses with tap water, and a final de-ionized water rinse.

4.2.2 Survey

Latitude and longitude for each drill hole location were recorded using a hand-held global positioning (GPS) unit with submeter accuracy. Elevation data for the drill holes were not recorded. The drill hole location data is presented in Table 1.

4.3 LABORATORY ANALYTICAL PROGRAM

Padre submitted a total of 57 soil samples to Advanced Technology Laboratories, Inc. (ATL) located in Signal Hill, California. ATL is certified by the State of California Department of Public Health to perform the required analysis. All of the soil samples were chemically analyzed for the presence of the total lead by U.S. Environmental Protection Agency (EPA) Method 6010.

A total of 13 soil samples were further chemically analyzed for Soluble Threshold Limit Concentration (STLC) by CAL-WET. Six of the 13 soil samples were further analyzed by the Toxicity Characteristic Leaching Procedure (TCLP). Select soil samples were additionally analyzed for pH by U.S. EPA method 9045C. The soil samples not analyzed were placed on hold for future analyses if needed.

4.4 QUALITY ASSURANCE / QUALITY CONTROL

The Quality Assurance/Quality Control (QA/QC) procedures were utilized in both sample collection and chemical analyses. The purpose of the QA/QC procedures was to ensure the reliability and compatibility of all data generated during the sampling program.

4.4.1 Field QA/QC Procedures

Field QA/QC procedures were performed during the sampling program and consisted of the following measures:

- Daily information regarding sample collection was recorded on drill hole logs. Sample types, sample identification numbers, and sample times were collected and recorded on drill hole logs;
    - Chain of custody (COC) records were utilized to document sample collection and submittal to the laboratory for analyses. A COC record accompanied all samples submitted for chemical analyses.

4.4.2 Laboratory QA/QC Procedures

Laboratory QA/QC procedures included the following:

- Chemical analyses were performed within the required holding time for all samples;
    - A state-certified hazardous waste testing laboratory conducted the required analyses; and
    - The laboratory provided the following information for each sample:
        - Method blank data;
        - Surrogate recovery, instrument tuning, and calibration data; and
        - Signed laboratory reports including the sample designation, date of sample collection, date of sample analysis, laboratory analytical method employed, sample volume, and the minimum reporting limit (RL).

5.0 RESULTS AND DISCUSSION

5.1 FIELD OBSERVATIONS

Padre visually observed the soil samples collected and soil cuttings generated during the course of the PSI activities. The maximum depth of hand auger advancement activities completed at the Project Site was to approximately 2.25 feet. Drill hole logs are included as Appendix A – Drill Hole Logs.

Soils encountered at the locations of drill holes HA1 through HA10 and HA12 through HA23 consisted primarily of silt, sandy silt, and silty sand with angular to subangular gravel. Base rock was encountered at the location of HA-11. Practical refusal was encountered at the locations of drill hole HA3, HA6, HA7, HA9, HA11, HA12, and HA13. Refusal on bedrock material was encountered at the locations of drill holes HA7 and HA8. No chemical odors or staining were indicated at any of the 23 drill hole locations. Additionally, groundwater was not encountered in any of the drill holes advanced at the Project Site.

5.2 LABORATORY ANALYTICAL RESULTS

Total lead concentrations were indicated in the soil samples chemically analyzed at concentrations ranging from 1.4 milligrams per kilogram (mg/kg) (HA11-1') to 300 mg/kg (HA9-0'). Thirteen of 57 soil samples chemically analyzed were indicated with total lead concentrations exceeding ten times the STLC value of 5 milligrams per liter (mg/L) at concentrations ranging from 63 mg/kg (HA20-0') to 300 mg/kg (HA9-0'). Three of the 13 soil samples chemically analyzed for STLC by CAL-WET were indicated with concentrations of soluble lead in excess of the STLC value of 5 mg/L at concentrations of 7.0 mg/L (HA3-1'), 9.5 mg/L (HA3-0'), and 15 mg/L (HA9-0'). Six of 57 soil samples chemically analyzed were indicated with total lead concentrations exceeding twenty times the TCLP value of 5 milligrams per liter (mg/L) at concentrations ranging from 110 mg/kg (HA22-0') to 300 mg/kg (HA9-0'). None of the six samples chemically analyzed by the TCLP method were indicated with soluble lead concentrations above the laboratory reporting limit of 0.25 mg/kg with the exception of sample HA9-0', which was indicated at a concentration of 0.33 mg/kg, therefore additional analysis by DI-WET was not necessary at this time.

Refer to Table 2 for a summary of soil sample analytical results. A site plan showing the drill hole locations is presented as Plate 2. Refer to Appendix B for laboratory analytical reports and COC documentation for soil samples collected during the course of the PSI activities at the Project Site. Provided below is a summary of the laboratory analytical results for soil samples chemically analyzed as part of the PSI analytical program.

5.3 QUALITY ASSURANCE / QUALITY CONTROL

Standard QA/QC field procedures and laboratory procedures were developed and implemented as part of the PSI activities completed at the Project Site. The primary quality control feature utilized was data validation. The data from each of the chemical analyses were evaluated in the following areas: data completeness; holding times; blanks; system monitoring compounds (surrogates); laboratory control standards; and compound identification and quantification. Overall, the data quality is acceptable, and the collected data support the project data quality objectives.

6.0 STATISTICAL EVALUATION

6.1 STATISTICAL EVALUATION METHODS

Per the DTSC / CalTrans Agreement and the direction of Caltrans in an email dated April 2, 2019 (CalTrans, 2019) the chemical analytical results for soil samples collected from all 23 drill holes were evaluated statistically using the U.S. EPA's statistical analysis software ProUCL Version 5.1 (ProUCL) to appropriately categorize the ADL containing soil for on-site re-use or offsite disposal. Statistical analysis using ProUCL is preferred by the DTSC for evaluating contaminant statistics. The ProUCL calculation outputs are provided in Appendix C.

6.1.1 Statistical Evaluation of Total Lead Results

All 57 total lead results were included in the data set for the statistical analysis to calculate the 95% Upper Confidence Limit (UCL) for total lead. Assuming a Gamma distribution the 95% UCL for total lead was calculated to be 52.61 mg/kg.

6.1.2 Statistical Evaluation of STLC Lead Results

To statistically evaluate the STLC lead results, the 13 STLC lead results and 44 of the total lead results were included in the data set calculate the 95% UCL STLC lead. Prior to the statistical analysis the total lead concentrations that were indicated at concentrations below 50 mg/kg (44 results) were assigned solubility values equal to 10% of their indicated total lead concentrations to approximate 100 % lead solubility. Assuming a Gamma distribution the 95% UCL for STLC lead was calculated to be 2.88 mg/L.

7.0 SUMMARY AND CONCLUSIONS

At the request of Yeh, Padre conducted PSI activities at the Project Site to evaluate the soil for potential ADL-Contaminated Soil. Based on the results of field activities, laboratory chemical analysis of the soil samples collected during the course of the PSI, and statistical analysis, Padre makes the following conclusions:

- Based on a comparison of the results of the statistical analysis to the DTSC / CalTrans Agreement soil at the Project Site contains soil with a calculated 95% UCL for total lead less than 80 mg/kg and calculated 95% UCL for STLC lead less than 5 mg/L therefore is defined as Clean Soil and may be reused onsite with no restrictions.
- A sample from HA22-1' was indicated with a pH of 4.7, which is slightly below the DTSC level of 5.0 for ADL-Contaminated Soil reuse. However, the elevated pH concentration was indicated in only one soil sample and is not likely representative of the Project Site soils. Additionally, based on the statistical analysis Project Site soil are defined as Clean Soil.

7.1 RECOMMENDATIONS

Based on the results of the statistical analysis requested by Caltrans Padre does not recommend further assessment at this time.

8.0 LIMITATIONS

This report has been prepared for the sole benefit of the County of San Luis Obispo, Wallace Group, and Yeh and Associates, Inc. No other persons may rely on the findings of this report without the expressed written consent of the client and Padre Associates, Inc.

In performing our professional services, we have attempted to apply present engineering and scientific judgment and use a level of effort consistent with the standard of practice measured on the date of work and in locale of the Project Site for similar type studies. Padre Associates, Inc. makes no warranty, express or implied.

The analyses and interpretations presented in this report have been developed based on the results from soil sampling at discrete locations at the Project Site, and the results from the laboratory analyses of the soil samples. It should be recognized that contamination can vary between sampling locations and between areas. Additionally, it should be noted that the DTSC may require additional soil sample collection and chemical analysis prior to ADL-Contaminated Soil reuse at the Project Site.

9.0 REFERENCES

California Department of Transportation, 2019, *Email regarding Avila Beach Drive and US 101 Interchange Project - Draft ISA Report,* Dated April 2.

California Department of Water Resources, 2003, *California's Groundwater, Bulletin 118 – Update 2016*, dated December 22, 2016.

California Environmental Protection Agency, Department of Toxic Substances Control, 2016, *Docket No. ESPO-SMA 15/16-001, Soil Management Agreement for Aerially Deposited Lead-Contaminated Soils*, dated June 28.

Wigers, Mark O. 2011, *Preliminary Geologic Map of the Pismo Beach 7.5' Quadrangle San Luis Obispo County, California*, Scale 1:24,000.

Padre Associates, Inc., 2018, *Technical Work Plan / Site Health and Safety Plan, - Preliminary Site Investigation, Avila Beach Drive / U.S. Highway 101 Interchange Improvement Project, San Luis Obispo County, California*, dated October 16.

U.S. Geological Survey, 1965, *7.5-Minute Topographic Map Series, Pismo Quadrangle, California – San Luis Obispo County,* Scale 1:24,000.

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TABLES

Table 1
Summary of Assessment Survey Data
Avila Beach Drive / U.S. Highway 101 Interchange Improvement Project
San Luis Obispo County, Califnornia

Assessment Location ID	Latitude	Longitude	Elevation (feet AMSL)
HA-1	35.1796840	-120.7019371	--
HA-2	35.1796730	-120.7005221	--
HA-3	35.1793300	-120.7001260	--
HA-4	35.1798722	-120.7006073	--
HA-5	35.1798631	-120.7003690	--
HA-6	35.1796293	-120.7001211	--
HA-7	35.1812480	-120.7010680	--
HA-8	35.1805914	-120.7007560	--
HA-9	35.1792370	-120.6993621	--
HA-10	35.1764010	-120.6973673	--
HA-11	35.1774901	-120.6974680	--
HA-12	35.1781421	-120.6976184	--
HA-13	35.1791344	-120.6978010	--
HA-14	35.1796951	-120.6987051	--
HA-15	35.1798862	-120.6991190	--
HA-16	35.1794616	-120.7002996	--
HA-17	35.1792902	-120.7002031	--
HA-18	35.1791676	-120.6998822	--
HA-19	35.1789865	-120.6996906	--
HA-20	35.1796840	-120.6998090	--
HA-21	35.1794607	-120.6995070	--
HA-22	35.1793166	-120.6993718	--
HA-23	35.1790727	-120.6991650	--

Notes:
-- = Not Surveyed or Not Available
Recorded using a GPS submeter
Vertical Datum = NDGV 29
Horizontal Datum = NAD 27

Table 2
Summary of Soil Sample Analytical Results
Avila Beach Drive / U.S. Highway 101 Interchange Improvement Project
San Luis Obispo County, California

Sample ID	Date Collected	Total Lead	STLC Lead	TCLP Lead	pH
HA1-0'	7/25/2018	***140***	2.8	<0.25	--
HA1-1'	7/25/2018	***92***	3.6	--	--
HA1-2'	7/26/2018	27	--	--	--
HA2-0'	7/25/2018	65	1.9	--	--
HA2-1'	7/25/2018	74	1.7	--	--
HA2-2'	7/26/2018	18	--	--	--
HA3-0'	7/25/2018	***190***	***9.5***	<0.25	--
HA3-1'	7/25/2018	***150***	***7.0***	<0.25	--
HA3-1.75'	7/26/2018	37	--	--	--
HA4-0'	7/25/2018	24	--	--	--
HA4-1'	7/25/2018	31	--	--	--
HA5-0'	7/25/2018	45	--	--	--
HA5-1'	7/25/2018	32	--	--	--
HA6-0'	7/25/2018	27	--	--	--
HA6-1'	7/25/2018	4.7	--	--	--
HA7-0'	7/25/2018	39	--	--	--
HA7-1'	7/25/2018	1.7	--	--	--
HA8-0'	7/25/2018	6.2	--	--	--
HA8-1'	7/25/2018	1.9	--	--	--
HA9-0'	7/25/2018	***300***	***15***	0.33	--
HA9-1'	7/25/2018	14	--	--	--
HA10-0'	7/25/2018	42	--	--	--
HA10-1'	7/25/2018	41	--	--	--
HA11-0'	7/25/2018	3.2	--	--	--
HA11-1'	7/25/2018	1.4	--	--	--
HA12-0'	7/25/2018	31	--	--	--
HA12-1'	7/25/2018	4.8	--	--	--
HA13-0'	7/25/2018	6.0	--	--	--
HA13-1'	7/25/2018	1.5	--	--	--
HA14-0'	7/25/2018	8.0	--	--	--
HA14-1'	7/25/2018	0.84J	--	--	--
HA15-0'	7/25/2018	21	--	--	--
HA15-1'	7/25/2018	18	--	--	--
HA16-0'	1/11/2019	4.0	--	--	--
HA16-1'	1/11/2019	5.3	--	--	--
HA16-2'	1/11/2019	5.9	--	--	--
HA17-0'	1/11/2019	4.7	--	--	--
HA17-1'	1/11/2019	6.1	--	--	--
HA17-2'	1/11/2019	3.5	--	--	--
HA18-0'	1/11/2019	32	--	--	--
HA18-1'	1/11/2019	71.0	2.4	--	6.3
HA18-2'	1/11/2019	41	--	--	--
HA19-0'	1/11/2019	26	--	--	--
HA19-1'	1/11/2019	31	--	--	--
HA19-2'	1/11/2019	1.8	--	--	--
HA20-0'	1/11/2019	63	2.2	--	--
HA20-1'	1/11/2019	12	--	--	--
HA20-2	1/11/2019	22	--	--	--
HA21-0'	1/11/2019	66	2.5	--	--
HA21-1'	1/11/2019	28	--	--	--
HA21-2'	1/11/2019	2.6	--	--	--

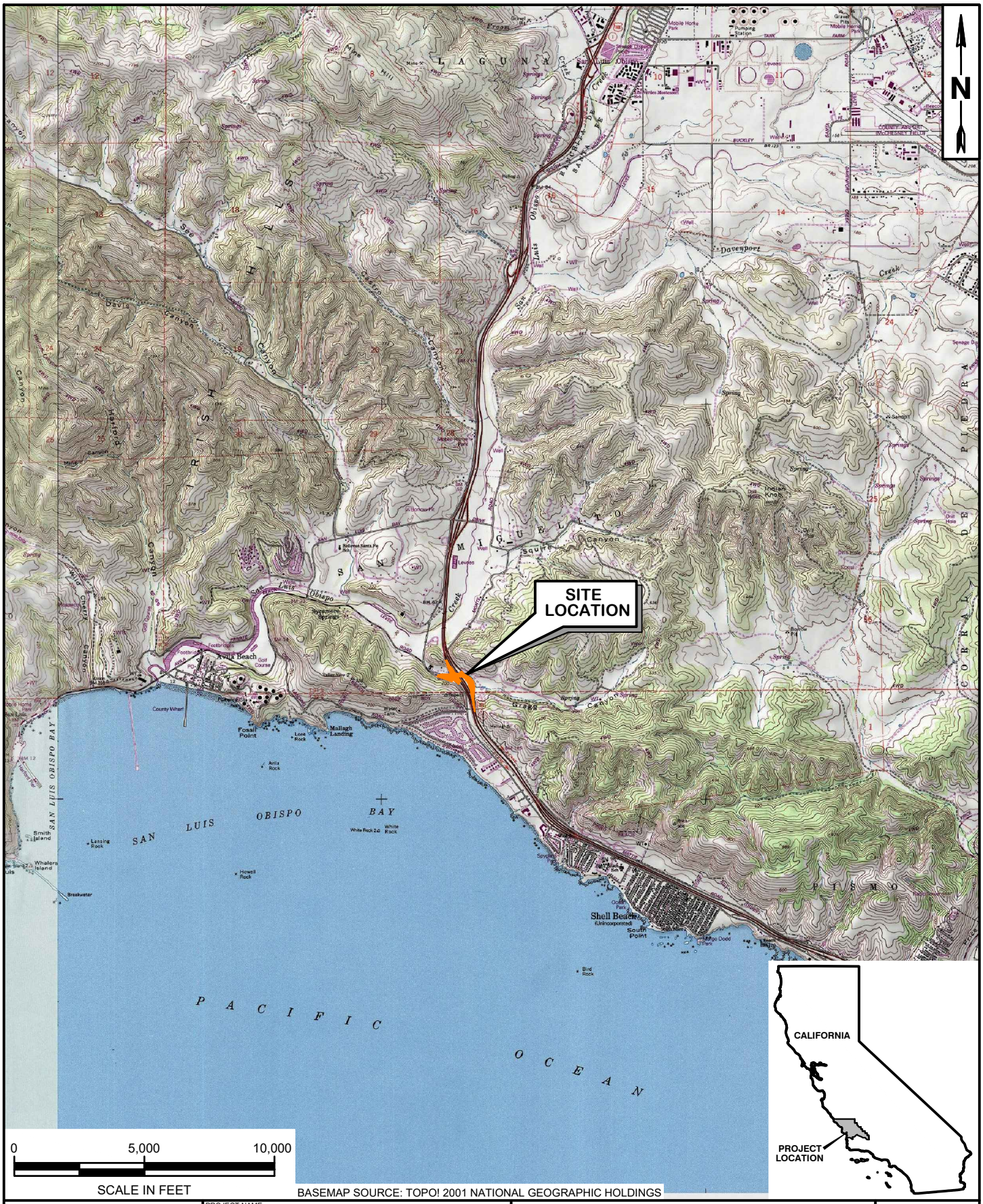
Table 2
Summary of Soil Sample Analytical Results
Avila Beach Drive / U.S. Highway 101 Interchange Improvement Project
San Luis Obispo County, California

Sample ID	Date Collected	Total Lead	STLC Lead	TCLP Lead	pH
HA22-0'	1/11/2019	***110***	2.3	<0.25	--
HA22-1'	1/11/2019	***120***	2.3	<0.25	4.7
HA22-2'	1/11/2019	12	--	--	--
HA23-0'	1/11/2019	76	2.4	--	--
HA23-1'	1/11/2019	11	--	--	--
HA23-2'	1/11/2019	14	--	--	--

DTSC Residential Land Use Level		80	--	--	--
Waste Characterization	**TTLC**	1,000	--	--	--
	STLC	--	5	--	--
	TCLP	--	--	5	--

Notes:
All results in milligrams per kilogram (mg/kg), except STLC and TCLP results in milligrams per liter (mg/L)
ADL = Aerially Deposited Lead
DTSC = California Department of Toxic Substances Control
J = Estimated value; results are less than the reporting limit and above the detection limit.
STLC = Soluble Threshold Limit Concentration
TTLC = Total Threshold Limit Concentration
TCLP = Toxicity Characteristic Leaching Procedure
Bold and Italicized = Result that exceeds the DTSC Residential Land Use Level
5 = Result that exceeds TTLC and/or STLC
<15 = Not detected with reporting limit shown
-- = Not established or available / Constituent not analyzed

PLATES



padre associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

PROJECT NAME:
Avila Beach Drive / U.S. Highway 101 Interchange Improvement Project
San Luis Obispo County, CA

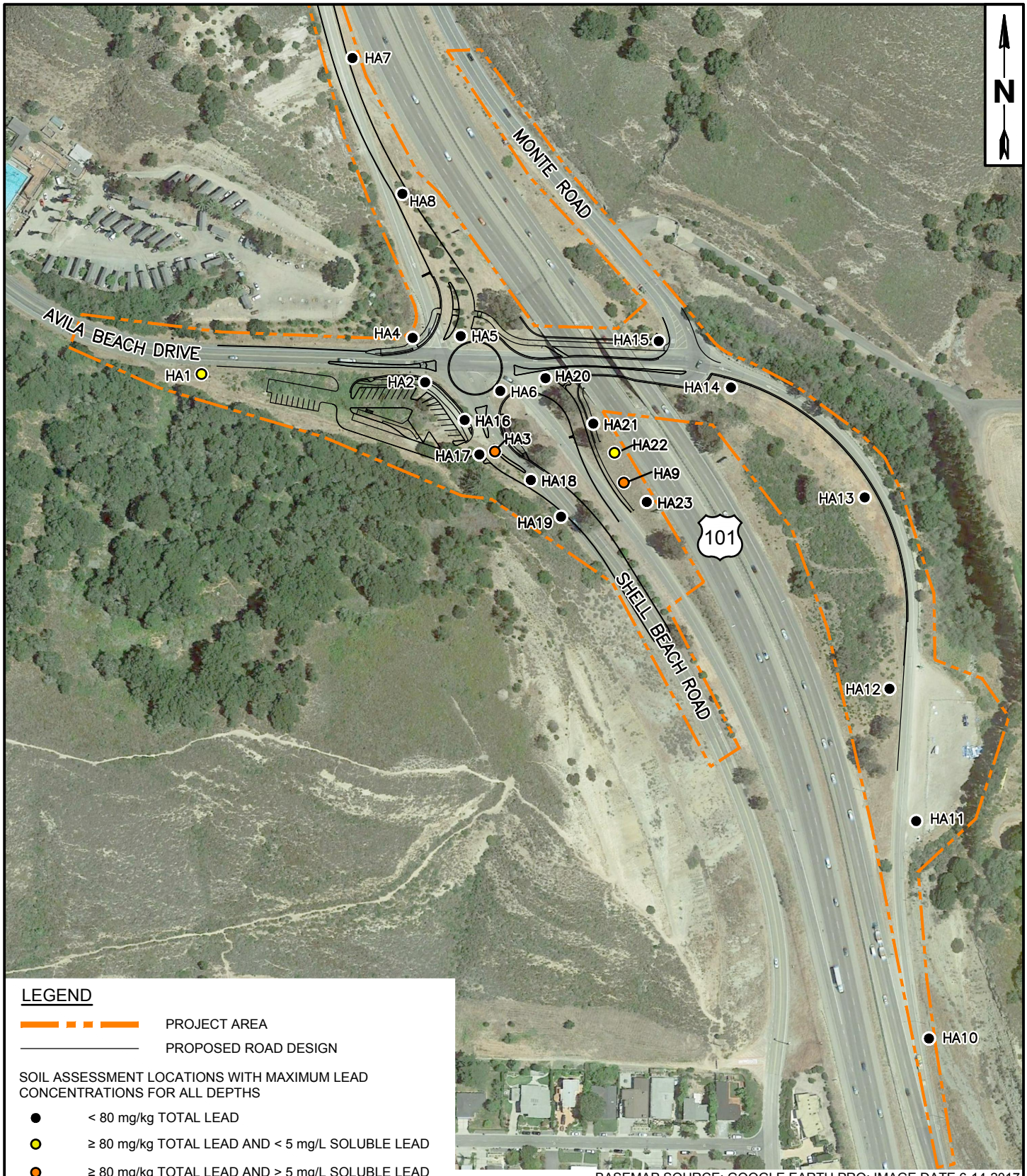
PROJECT NUMBER: 1601-3091

DATE: April 2019

SITE LOCATION MAP

PLATE 1

Z:\Current Projects\1601-3091 Yeh and Associates Avila Beach Drive ADL\Graphics\Avila Beach Drive AOI.dwg, 4/10/2019 4:24:33 PM



LEGEND

PROJECT AREA

PROPOSED ROAD DESIGN

SOIL ASSESSMENT LOCATIONS WITH MAXIMUM LEAD CONCENTRATIONS FOR ALL DEPTHS

- < 80 mg/kg TOTAL LEAD
- ≥ 80 mg/kg TOTAL LEAD AND < 5 mg/L SOLUBLE LEAD
- ≥ 80 mg/kg TOTAL LEAD AND > 5 mg/L SOLUBLE LEAD

NOTES:

1. mg/L = MILLIGRAMS PER LITER
2. mg/kg = MILLIGRAMS PER KILOGRAMS

BASEMAP SOURCE: GOOGLE EARTH PRO; IMAGE DATE 6-14-2017

0 250 500

SCALE IN FEET

padre associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

PROJECT NAME:
Avila Beach Drive / U.S. Highway 101 Interchange Improvement Project
San Luis Obispo County, CA

PROJECT NUMBER: 1601-3091

DATE: April 2019

SITE PLAN SHOWING ASSESSMENT LOCATIONS

PLATE 2

Z:\Current Projects\1601-3091 Yeh and Associates Avila Beach Drive ADL\Graphics\Avila Beach Drive AOI.dwg, 4/12/2019 10:43:47 AM

APPENDIX A
DRILL HOLE LOGS

January 2019
Project No. 1601-3091

padre associates, inc.
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ELEVATION, ft MSL / DEPTH, ft	USCS MATERIAL SYMBOL	SAMPLE ID	SAMPLE INTERVAL	SURFACE ELEVATION: ft +/- (relative datum MSL) NORTHING: 35.180 EASTING: -120.702 COORDINATE SYSTEM: NAD83 SP Ca Zn 5, ft MATERIAL DESCRIPTION
		HA1-0'		SILT (ML), dark grayish brown (10YR 4/2), silt with angular medium gravel, dry, no staining or odor
1		HA1-1'		
				With fine sand and angular medium gravel, sightly moist
2		HA1-2'		
3				
4				

DRILLING DATE: 7/25/2018
DEPTH TO GROUNDWATER: Not Encountered
COMPLETION DEPTH: 2.25 ft

DRILLING/SAMPLING METHOD: Hand-Auger
DRILLING COMPANY: Padre Associates, Inc.
LOGGED BY: R. Vander Weele P.G.
CHECKED BY: R. Vander Weele P.G.

Z:\GINT\1-PADRE GINT PROJECTS\1601-3091 AVILA BEACH DR\1601-3091-AVILA BEACH STREET.GPJ 1/30/19 03:08 p, Template: PADRE_HA_PID_NOTPH

LOG OF HAND-AUGER HA1

Avila Beach Drive / U.S. Highway 101 Interchange Improvement Project
San Luis Opispo County, California

January 2019
Project No. 1601-3091

padre associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

SURFACE ELEVATION: ft +/- (relative datum MSL)
NORTHING: 35.180
EASTING: -120.701
COORDINATE SYSTEM: NAD83 SP Ca Zn 5, ft

ELEVATION, ft MSL / DEPTH, ft	USCS MATERIAL SYMBOL	SAMPLE ID	SAMPLE INTERVAL	MATERIAL DESCRIPTION
		HA2-0'		SILT with sand (ML), brown (10YR 4/3), with medium angular gravel, dry, soft, no staining or odor
1		HA2-1'		No sand or gravel, dark yellowish brown (10YR 4/6)
2		HA2-2'		
3				
4				

DRILLING DATE: 7/25/2018
DEPTH TO GROUNDWATER: Not Encountered
COMPLETION DEPTH: 2.25 ft

DRILLING/SAMPLING METHOD: Hand-Auger
DRILLING COMPANY: Padre Associates, Inc.
LOGGED BY: R. Vander Weele P.G.
CHECKED BY: R. Vander Weele P.G.

Z:\GINT\1-PADRE GINT PROJECTS\1601-3091 AVILA BEACH DR\1601-3091-AVILA BEACH STREET.GPJ 1/30/19 03:08 p, Template: PADRE_HA_PID_NOTPH

LOG OF HAND-AUGER HA2

Avila Beach Drive / U.S. Highway 101 Interchange Improvement Project
San Luis Opispo County, California

January 2019
Project No. 1601-3091

padre associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

SURFACE ELEVATION: ft +/- (relative datum MSL)
NORTHING: 35.179
EASTING: -120.700
COORDINATE SYSTEM: NAD83 SP Ca Zn 5, ft

ELEVATION, ft MSL / DEPTH, ft	USCS MATERIAL SYMBOL	SAMPLE ID	SAMPLE INTERVAL	MATERIAL DESCRIPTION
0		HA3-0'		SILT with sand (ML), grayish brown (10YR 4/2), coarse angular gravel, soft, no staining or odor
1		HA3-1'		
		HA3-1.75'		
2				Refusal at 2 feet
3				
4				

DRILLING DATE: 7/25/2018
DEPTH TO GROUNDWATER: Not Encountered
COMPLETION DEPTH: 2.00 ft

DRILLING/SAMPLING METHOD: Hand-Auger
DRILLING COMPANY: Padre Associates, Inc.
LOGGED BY: K. Gularte
CHECKED BY: R. Vander Weele P.G.

Z:\GINT\1-PADRE GINT PROJECTS\1601-3091 AVILA BEACH DR\1601-3091-AVILA BEACH STREET.GPJ 1/30/19 03:08 p, Template: PADRE_HA_PID_NOTPH

LOG OF HAND-AUGER HA3

Avila Beach Drive / U.S. Highway 101 Interchange Improvement Project
San Luis Opispo County, California

January 2019
Project No. 1601-3091

padre associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

ELEVATION, ft MSL DEPTH, ft	USCS MATERIAL SYMBOL	SAMPLE ID	SAMPLE INTERVAL	SURFACE ELEVATION: ft +/- (relative datum MSL) NORTHING: 35.180 EASTING: -120.701 COORDINATE SYSTEM: NAD83 SP Ca Zn 5, ft MATERIAL DESCRIPTION
		HA4-0'		SILT with sand (ML), dark yellowish brown (10YR 4/4), silt with fine sand and angular medium gravel, dry, soft, no staining or odor
1		HA4-1'		
2		HA4-2'		
3				
4				

DRILLING DATE: 7/25/2018
DEPTH TO GROUNDWATER: Not Encountered
COMPLETION DEPTH: 2.25 ft

DRILLING/SAMPLING METHOD: Hand-Auger
DRILLING COMPANY: Padre Associates, Inc.
LOGGED BY: R. Vander Weele P.G.
CHECKED BY: R. Vander Weele P.G.

Z:\GINT\1-PADRE GINT PROJECTS\1601-3091 AVILA BEACH DR\1601-3091-AVILA BEACH STREET.GPJ 1/30/19 03:08 p, Template: PADRE_HA_PID_NOTPH

LOG OF HAND-AUGER HA4

Avila Beach Drive / U.S. Highway 101 Interchange Improvement Project
San Luis Opispo County, California

January 2019
Project No. 1601-3091

padre associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

ELEVATION, ft MSL DEPTH, ft	USCS MATERIAL SYMBOL	SAMPLE ID	SAMPLE INTERVAL	SURFACE ELEVATION: ft +/- (relative datum MSL) NORTHING: 35.180 EASTING: -120.700 COORDINATE SYSTEM: NAD83 SP Ca Zn 5, ft MATERIAL DESCRIPTION
		HA5-0'		SILT with sand (ML), dark yellowish brown (10YR 4/4), silt with fine sand and medium angular gravel, no staining or odor
1		HA5-1'		Very dark grayish brown (10YR 3/2), organic soil
				SAND (SP), brown (10YR 4/3), fine sand with silt, slightly moist, medium dense, no staining or odor
2		HA5-2'		
3				
4				

Z:\GINT\1-PADRE GINT PROJECTS\1601-3091 AVILA BEACH DR\1601-3091-AVILA BEACH STREET.GPJ 1/30/19 03:08 p, Template: PADRE_HA_PID_NOTPH

DRILLING DATE: 7/25/2018
DEPTH TO GROUNDWATER: Not Encountered
COMPLETION DEPTH: 2.25 ft

DRILLING/SAMPLING METHOD: Hand-Auger
DRILLING COMPANY: Padre Associates, Inc.
LOGGED BY: R. Vander Weele P.G.
CHECKED BY: R. Vander Weele P.G.

LOG OF HAND-AUGER HA5

Avila Beach Drive / U.S. Highway 101 Interchange Improvement Project
San Luis Opispo County, California

January 2019
Project No. 1601-3091

padre associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

SURFACE ELEVATION: ft +/- (relative datum MSL)
NORTHING: 35.180
EASTING: -120.700
COORDINATE SYSTEM: NAD83 SP Ca Zn 5, ft

ELEVATION, ft MSL / DEPTH, ft	USCS MATERIAL SYMBOL	SAMPLE ID	SAMPLE INTERVAL	MATERIAL DESCRIPTION
		HA6-0'		SILT with sand (ML), yellowish brown (10YR 5/4), fine angular gravel, hard, no staining or odor
1		HA6-1'		Practical refusal at 1.25 feet
2				
3				
4				

DRILLING DATE: 7/25/2018
DEPTH TO GROUNDWATER: Not Encountered
COMPLETION DEPTH: 1.25 ft

DRILLING/SAMPLING METHOD: Hand-Auger
DRILLING COMPANY: Padre Associates, Inc.
LOGGED BY: R. Vander Weele P.G.,K. Gularte
CHECKED BY: R. Vander Weele P.G.

Z:\GINT\1-PADRE GINT PROJECTS\1601-3091 AVILA BEACH DR\1601-3091-AVILA BEACH STREET.GPJ 1/30/19 03:08 p, Template: PADRE_HA_PID_NOTPH

LOG OF HAND-AUGER HA6

Avila Beach Drive / U.S. Highway 101 Interchange Improvement Project
San Luis Opispo County, California

January 2019
Project No. 1601-3091

padre associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

ELEVATION, ft MSL / DEPTH, ft	USCS MATERIAL SYMBOL	SAMPLE ID	SAMPLE INTERVAL	SURFACE ELEVATION: ft +/- (relative datum MSL) NORTHING: 35.181 EASTING: -120.701 COORDINATE SYSTEM: NAD83 SP Ca Zn 5, ft MATERIAL DESCRIPTION
		HA7-0'		SILT with sand (ML), dark yellowish brown (10YR 4/4), silt with fine sand and trace fine angular gravel, dry, soft, no staining or odor
1		HA7-1'		
				Refusal on bedrock at 1.5 feet
2				
3				
4				

DRILLING DATE: 7/25/2018
DEPTH TO GROUNDWATER: Not Encountered
COMPLETION DEPTH: 1.50 ft

DRILLING/SAMPLING METHOD: Hand-Auger
DRILLING COMPANY: Padre Associates, Inc.
LOGGED BY: R. Vander Weele P.G.
CHECKED BY: R. Vander Weele P.G.

Z:\GINT\1-PADRE GINT PROJECTS\1601-3091 AVILA BEACH DR\1601-3091-AVILA BEACH STREET.GPJ 1/30/19 03:08 p, Template: PADRE_HA_PID_NOTPH

LOG OF HAND-AUGER HA7

Avila Beach Drive / U.S. Highway 101 Interchange Improvement Project
San Luis Opispo County, California

January 2019
Project No. 1601-3091

padre associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

ELEVATION, ft MSL / DEPTH, ft	USCS MATERIAL SYMBOL	SAMPLE ID	SAMPLE INTERVAL	SURFACE ELEVATION: ft +/- (relative datum MSL) NORTHING: 35.181 EASTING: -120.701 COORDINATE SYSTEM: NAD83 SP Ca Zn 5, ft MATERIAL DESCRIPTION
		HA8-0'		Silty SAND (SM), very pale brown (10YR 7/3), fine sand and silt, dry, soft, no staining or odor
				Dense
1		HA8-1'		Very dense
				Refusal on bedrock at 1.5 feet
2				
3				
4				

DRILLING DATE: 7/25/2018
DEPTH TO GROUNDWATER: Not Encountered
COMPLETION DEPTH: 1.50 ft

DRILLING/SAMPLING METHOD: Hand-Auger
DRILLING COMPANY: Padre Associates, Inc.
LOGGED BY: R. Vander Weele P.G.
CHECKED BY: R. Vander Weele P.G.

Z:\GINT\1-PADRE GINT PROJECTS\1601-3091 AVILA BEACH DR\1601-3091-AVILA BEACH STREET.GPJ 1/30/19 03:08 p, Template: PADRE_HA_PID_NOTPH

LOG OF HAND-AUGER HA8

Avila Beach Drive / U.S. Highway 101 Interchange Improvement Project
San Luis Opispo County, California

January 2019
Project No. 1601-3091

padre associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

ELEVATION, ft MSL / DEPTH, ft	USCS MATERIAL SYMBOL	SAMPLE ID	SAMPLE INTERVAL	SURFACE ELEVATION: ft +/- (relative datum MSL) NORTHING: 35.179 EASTING: -120.699 COORDINATE SYSTEM: NAD83 SP Ca Zn 5, ft MATERIAL DESCRIPTION
		HA9-0'		SILT with sand (ML), brown (10YR 4/3), medium angular gravel, soft, dry, no staining or odor
1		HA9-1'		With coarse gravel
				Refusal on large loose gravel at 1.5 feet
2				
3				
4				

Z:\GINT\1-PADRE GINT PROJECTS\1601-3091 AVILA BEACH DR\1601-3091-AVILA BEACH STREET.GPJ 1/30/19 03:08 p, Template: PADRE_HA_PID_NOTPH

DRILLING DATE: 7/25/2018
DEPTH TO GROUNDWATER: Not Encountered
COMPLETION DEPTH: 1.50 ft

DRILLING/SAMPLING METHOD: Hand-Auger
DRILLING COMPANY: Padre Associates, Inc.
LOGGED BY: K. Gularte
CHECKED BY: R. Vander Weele P.G.

LOG OF HAND-AUGER HA9

Avila Beach Drive / U.S. Highway 101 Interchange Improvement Project
San Luis Opispo County, California

January 2019
Project No. 1601-3091

padre associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

SURFACE ELEVATION: ft +/- (relative datum MSL)
NORTHING: 35.176
EASTING: -120.697
COORDINATE SYSTEM: NAD83 SP Ca Zn 5, ft

ELEVATION, ft MSL / DEPTH, ft	USCS MATERIAL SYMBOL	SAMPLE ID	SAMPLE INTERVAL	MATERIAL DESCRIPTION
		HA10-0'		Gravelly SILT (ML), brown (10YR 5/3), silt and medium to large angular gravel,soft, dry, no staining or odor
1		HA10-1'		
2		HA10-2'		
3				
4				

DRILLING DATE: 7/25/2018
DEPTH TO GROUNDWATER: Not Encountered
COMPLETION DEPTH: 2.25 ft

DRILLING/SAMPLING METHOD: Hand-Auger
DRILLING COMPANY: Padre Associates, Inc.
LOGGED BY: R. Vander Weele P.G.
CHECKED BY: R. Vander Weele P.G.

Z:\GINT\1-PADRE GINT PROJECTS\1601-3091 AVILA BEACH DR\1601-3091-AVILA BEACH STREET.GPJ 1/30/19 03:08 p, Template: PADRE_HA_PID_NOTPH

LOG OF HAND-AUGER HA10

Avila Beach Drive / U.S. Highway 101 Interchange Improvement Project
San Luis Opispo County, California

January 2019
Project No. 1601-3091

padre associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

ELEVATION, ft MSL DEPTH, ft	USCS MATERIAL SYMBOL	SAMPLE ID	SAMPLE INTERVAL	SURFACE ELEVATION: ft +/- (relative datum MSL) NORTHING: 35.177 EASTING: -120.697 COORDINATE SYSTEM: NAD83 SP Ca Zn 5, ft MATERIAL DESCRIPTION
		HA11-0'		Base rock
1		HA11-1'		Less gravel
				Refusal on large gravel at 1.25 feet
2				
3				
4				

Z:\GINT\1-PADRE GINT PROJECTS\1601-3091 AVILA BEACH DR\1601-3091-AVILA BEACH STREET.GPJ 1/30/19 03:08 p, Template: PADRE_HA_PID_NOTPH

DRILLING DATE: 7/25/2018
DEPTH TO GROUNDWATER: Not Encountered
COMPLETION DEPTH: 1.25 ft

DRILLING/SAMPLING METHOD: Hand-Auger
DRILLING COMPANY: Padre Associates, Inc.
LOGGED BY: R. Vander Weele P.G.
CHECKED BY: R. Vander Weele P.G.

LOG OF HAND-AUGER HA11

Avila Beach Drive / U.S. Highway 101 Interchange Improvement Project
San Luis Opispo County, California

January 2019
Project No. 1601-3091

padre associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

SURFACE ELEVATION: ft +/- (relative datum MSL)
NORTHING: 35.178
EASTING: -120.698
COORDINATE SYSTEM: NAD83 SP Ca Zn 5, ft

ELEVATION, ft MSL / DEPTH, ft	USCS MATERIAL SYMBOL	SAMPLE ID	SAMPLE INTERVAL	MATERIAL DESCRIPTION
		HA12-0'		SILT (ML), brown (10YR 4/3), soft, dry, medium angular gravel, no staining or odor
1		HA12-1'		With coarse gravel
				Refusal on large gravel at 1.25 feet
2				
3				
4				

DRILLING DATE: 7/25/2018
DEPTH TO GROUNDWATER: Not Encountered
COMPLETION DEPTH: 1.25 ft

DRILLING/SAMPLING METHOD: Hand-Auger
DRILLING COMPANY: Padre Associates, Inc.
LOGGED BY: R. Vander Weele P.G.
CHECKED BY: R. Vander Weele P.G.

Z:\GINT\1-PADRE GINT PROJECTS\1601-3091 AVILA BEACH DR\1601-3091-AVILA BEACH STREET.GPJ 1/30/19 03:08 p, Template: PADRE_HA_PID_NOTPH

LOG OF HAND-AUGER HA12

Avila Beach Drive / U.S. Highway 101 Interchange Improvement Project
San Luis Opispo County, California

January 2019
Project No. 1601-3091

padre associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

ELEVATION, ft MSL / DEPTH, ft	USCS MATERIAL SYMBOL	SAMPLE ID	SAMPLE INTERVAL	SURFACE ELEVATION: ft +/- (relative datum MSL) NORTHING: 35.179 EASTING: -120.698 COORDINATE SYSTEM: NAD83 SP Ca Zn 5, ft MATERIAL DESCRIPTION
		HA13-0'		Sandy SILT (ML), brown (10YR 5/3), silt and fine sand with large to medium angular gravel, medium stiff, dry, no staining or odor
1		HA13-1'		
		HA13-1.75'		
				Refusal on large gravel at 1.75 feet
2				
3				
4				

DRILLING DATE: 7/25/2018
DEPTH TO GROUNDWATER: Not Encountered
COMPLETION DEPTH: 1.75 ft

DRILLING/SAMPLING METHOD: Hand-Auger
DRILLING COMPANY: Padre Associates, Inc.
LOGGED BY: R. Vander Weele P.G.
CHECKED BY: R. Vander Weele P.G.

Z:\GINT\1-PADRE GINT PROJECTS\1601-3091 AVILA BEACH DR\1601-3091-AVILA BEACH STREET.GPJ 1/30/19 03:08 p, Template: PADRE_HA_PID_NOTPH

LOG OF HAND-AUGER HA13

Avila Beach Drive / U.S. Highway 101 Interchange Improvement Project
San Luis Opispo County, California

January 2019
Project No. 1601-3091

padre associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

ELEVATION, ft MSL / DEPTH, ft	USCS MATERIAL SYMBOL	SAMPLE ID	SAMPLE INTERVAL	SURFACE ELEVATION: ft +/- (relative datum MSL) NORTHING: 35.180 EASTING: -120.699 COORDINATE SYSTEM: NAD83 SP Ca Zn 5, ft MATERIAL DESCRIPTION
		HA14-0'		SILT with sand (ML), very dark grayish brown (10YR 3/2), very fine grained sand, soft, no staining or odor
1		HA14-1'		
				Light olive brown (2.5Y 5/3)
2		HA14-2'		
3				
4				

DRILLING DATE: 7/25/2018
DEPTH TO GROUNDWATER: Not Encountered
COMPLETION DEPTH: 2.25 ft

DRILLING/SAMPLING METHOD: Hand-Auger
DRILLING COMPANY: Padre Associates, Inc.
LOGGED BY: R. Vander Weele P.G.
CHECKED BY: R. Vander Weele P.G.

Z:\GINT\1-PADRE GINT PROJECTS\1601-3091 AVILA BEACH DR\1601-3091-AVILA BEACH STREET.GPJ 1/30/19 03:08 p, Template: PADRE_HA_PID_NOTPH

LOG OF HAND-AUGER HA14

Avila Beach Drive / U.S. Highway 101 Interchange Improvement Project
San Luis Opispo County, California

January 2019
Project No. 1601-3091

padre associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

ELEVATION, ft MSL / DEPTH, ft	USCS MATERIAL SYMBOL	SAMPLE ID	SAMPLE INTERVAL	SURFACE ELEVATION: ft +/- (relative datum MSL) NORTHING: 35.180 EASTING: -120.699 COORDINATE SYSTEM: NAD83 SP Ca Zn 5, ft MATERIAL DESCRIPTION
		HA15-0'		Silty SAND (SM), pale brown (10YR 6/3), fine sand and silt, medium dense, dry, no staining or odor
1		HA15-1'		
2		HA15-2'		Brown (10YR 4/3)
3				
4				

Z:\GINT\1-PADRE GINT PROJECTS\1601-3091 AVILA BEACH DR\1601-3091-AVILA BEACH STREET.GPJ 1/30/19 03:08 p, Template: PADRE_HA_PID_NOTPH

DRILLING DATE: 7/25/2018
DEPTH TO GROUNDWATER: Not Encountered
COMPLETION DEPTH: 2.25 ft

DRILLING/SAMPLING METHOD: Hand-Auger
DRILLING COMPANY: Padre Associates, Inc.
LOGGED BY: R. Vander Weele P.G.
CHECKED BY: R. Vander Weele P.G.

LOG OF HAND-AUGER HA15

Avila Beach Drive / U.S. Highway 101 Interchange Improvement Project
San Luis Opispo County, California

January 2019
Project No. 1601-3091

padre associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

ELEVATION, ft MSL / DEPTH, ft	USCS MATERIAL SYMBOL	SAMPLE ID	SAMPLE INTERVAL	SURFACE ELEVATION: ft +/- (relative datum MSL) NORTHING: 35.179 EASTING: -120.700 COORDINATE SYSTEM: NAD83 SP Ca Zn 5, ft MATERIAL DESCRIPTION
		HA16-0'		Silty SAND (SM), loose, brown (10YR 5/3), dry, fine grained and silt with gravel, no staining or odor
1		HA16-1'		
2		HA16-2'		
3				
4				

DRILLING DATE: 1/11/2019
DEPTH TO GROUNDWATER: Not Encountered
COMPLETION DEPTH: 2.25 ft

DRILLING/SAMPLING METHOD: Hand-Auger
DRILLING COMPANY: Padre Associates, Inc.
LOGGED BY: A. Arellano
CHECKED BY: R. Vander Weele P.G.

Z:\GINT\1-PADRE GINT PROJECTS\1601-3091 AVILA BEACH DR\1601-3091-AVILA BEACH STREET.GPJ 1/30/19 03:08 p, Template: PADRE_HA_PID_NOTPH

LOG OF HAND-AUGER HA16

Avila Beach Drive / U.S. Highway 101 Interchange Improvement Project
San Luis Opispo County, California

January 2019
Project No. 1601-3091

padre associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

ELEVATION, ft MSL / DEPTH, ft	USCS MATERIAL SYMBOL	SAMPLE ID	SAMPLE INTERVAL	SURFACE ELEVATION: ft +/- (relative datum MSL) NORTHING: 35.179 EASTING: -120.700 COORDINATE SYSTEM: NAD83 SP Ca Zn 5, ft MATERIAL DESCRIPTION
		HA17-0'		Silty SAND (SM), brown (10YR 4/3), fine grained and silt, subangular gravel, loose, slightly moist, moist, no staining or odors
1		HA17-1'		Brown (10YR 5/3), trace subangular gravel
2		HA17-2'		
3				
4				

Z:\GINT\1-PADRE GINT PROJECTS\1601-3091 AVILA BEACH DR\1601-3091-AVILA BEACH STREET.GPJ 1/30/19 03:08 p, Template: PADRE_HA_PID_NOTPH

DRILLING DATE: 1/11/2019
DEPTH TO GROUNDWATER: Not Encountered
COMPLETION DEPTH: 2.25 ft

DRILLING/SAMPLING METHOD: Hand-Auger
DRILLING COMPANY: Padre Associates, Inc.
LOGGED BY: A. Arellano
CHECKED BY: R. Vander Weele P.G.

LOG OF HAND-AUGER HA17

Avila Beach Drive / U.S. Highway 101 Interchange Improvement Project
San Luis Opispo County, California

January 2019
Project No. 1601-3091

padre associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

ELEVATION, ft MSL / DEPTH, ft	USCS MATERIAL SYMBOL	SAMPLE ID	SAMPLE INTERVAL	SURFACE ELEVATION: ft +/- (relative datum MSL) NORTHING: 35.179 EASTING: -120.700 COORDINATE SYSTEM: NAD83 SP Ca Zn 5, ft MATERIAL DESCRIPTION
		HA18-0'		Silty SAND (SM), very dark gray (10YR 3/1), moist, fine grained and silt with subangular gravel, moist, no staining or odors
1		HA18-1'		Dark grayish brown (10YR 4/2), slightly moist
2		HA18-2'		
3				
4				

Z:\GINT\1-PADRE GINT PROJECTS\1601-3091 AVILA BEACH DR\1601-3091-AVILA BEACH STREET.GPJ 1/30/19 03:08 p, Template: PADRE_HA_PID_NOTPH

DRILLING DATE: 1/11/2019
DEPTH TO GROUNDWATER: Not Encountered
COMPLETION DEPTH: 2.25 ft

DRILLING/SAMPLING METHOD: Hand-Auger
DRILLING COMPANY: Padre Associates, Inc.
LOGGED BY: A. Arellano
CHECKED BY: R. Vander Weele P.G.

LOG OF HAND-AUGER HA18

Avila Beach Drive / U.S. Highway 101 Interchange Improvement Project
San Luis Opispo County, California

January 2019
Project No. 1601-3091

padre associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

ELEVATION, ft MSL / DEPTH, ft	USCS MATERIAL SYMBOL	SAMPLE ID	SAMPLE INTERVAL	MATERIAL DESCRIPTION
				SURFACE ELEVATION: ft +/- (relative datum MSL) NORTHING: 35.179 EASTING: -120.700 COORDINATE SYSTEM: NAD83 SP Ca Zn 5, ft
		HA19-0'		Silty SAND (SM), very dark brown (10YR 2/2), fine grained sand and silt with trace subangular gravel, slightly moist, no staining or odors
1		HA19-1'		Very dark grayish brown (10YR 3/2)
2		HA19-2'		SAND with gravel (SP), light olive brown (2.5Y 5/3), medium grained sand with subangular gravel, moist, no staining or odors
3				
4				

Z:\GINT\1-PADRE GINT PROJECTS\1601-3091 AVILA BEACH DR\1601-3091-AVILA BEACH STREET.GPJ 1/30/19 03:08 p, Template: PADRE_HA_PID_NOTPH

DRILLING DATE: 1/11/2019
DEPTH TO GROUNDWATER: Not Encountered
COMPLETION DEPTH: 2.25 ft

DRILLING/SAMPLING METHOD: Hand-Auger
DRILLING COMPANY: Padre Associates, Inc.
LOGGED BY: A. Arellano
CHECKED BY: R. Vander Weele P.G.

LOG OF HAND-AUGER HA19

Avila Beach Drive / U.S. Highway 101 Interchange Improvement Project
San Luis Opispo County, California

January 2019
Project No. 1601-3091

padre associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

SURFACE ELEVATION: ft +/- (relative datum MSL)
NORTHING: 35.180
EASTING: -120.700
COORDINATE SYSTEM: NAD83 SP Ca Zn 5, ft

ELEVATION, ft MSL / DEPTH, ft	USCS MATERIAL SYMBOL	SAMPLE ID	SAMPLE INTERVAL	MATERIAL DESCRIPTION
		HA20-0'		Silty SAND (SM), brown (10YR 5/3), fine grained sand and silt with subangular gravel, dry, loose, no staining or odors
1		HA20-1'		Dark yellowish brown (10YR 4/4)
2		HA20-2'		Wood fragments
3				
4				

DRILLING DATE: 1/11/2019
DEPTH TO GROUNDWATER: Not Encountered
COMPLETION DEPTH: 2.25 ft

DRILLING/SAMPLING METHOD: Hand-Auger
DRILLING COMPANY: Padre Associates, Inc.
LOGGED BY: A. Arellano
CHECKED BY: R. Vander Weele P.G.

Z:\GINT\1-PADRE GINT PROJECTS\1601-3091 AVILA BEACH DR\1601-3091-AVILA BEACH STREET.GPJ 1/30/19 03:08 p, Template: PADRE_HA_PID_NOTPH

LOG OF HAND-AUGER HA20

Avila Beach Drive / U.S. Highway 101 Interchange Improvement Project
San Luis Opispo County, California

January 2019
Project No. 1601-3091

padre associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

ELEVATION, ft MSL / DEPTH, ft	USCS MATERIAL SYMBOL	SAMPLE ID	SAMPLE INTERVAL	MATERIAL DESCRIPTION
		HA21-0'		SURFACE ELEVATION: ft +/- (relative datum MSL) NORTHING: 35.179 EASTING: -120.700 COORDINATE SYSTEM: NAD83 SP Ca Zn 5, ft Silty SAND (SM), very dark grayish brown (10YR 3/2), fine grained sand and silt with trace subangular gravel, slightly moist, no staining or odors
1		HA21-1'		
2		HA21-2'		Pale brown (10YR 6/3), dry
3				
4				

Z:\GINT\1-PADRE GINT PROJECTS\1601-3091 AVILA BEACH DR\1601-3091-AVILA BEACH STREET.GPJ 1/30/19 03:08 p, Template: PADRE_HA_PID_NOTPH

DRILLING DATE: 1/11/2019
DEPTH TO GROUNDWATER: Not Encountered
COMPLETION DEPTH: 2.25 ft

DRILLING/SAMPLING METHOD: Hand-Auger
DRILLING COMPANY: Padre Associates, Inc.
LOGGED BY: A. Arellano
CHECKED BY: R. Vander Weele P.G.

LOG OF HAND-AUGER HA21

Avila Beach Drive / U.S. Highway 101 Interchange Improvement Project
San Luis Opispo County, California

January 2019
Project No. 1601-3091

padre associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

ELEVATION, ft MSL / DEPTH, ft	USCS MATERIAL SYMBOL	SAMPLE ID	SAMPLE INTERVAL	SURFACE ELEVATION: ft +/- (relative datum MSL) NORTHING: 35.179 EASTING: -120.699 COORDINATE SYSTEM: NAD83 SP Ca Zn 5, ft MATERIAL DESCRIPTION
		HA22-0'		Silty SAND (SM), very dark grayish brown (10YR 3/2), fine grained sand and silt with trace subangular gravel, slightly moist, no staining or odors
1		HA22-1'		Brown (10YR 5/3), dry, increase in gravel
2		HA22-2'		Brown (10YR 4/3)
3				
4				

Z:\GINT\1-PADRE GINT PROJECTS\1601-3091 AVILA BEACH DR\1601-3091-AVILA BEACH STREET.GPJ 1/30/19 03:08 p, Template: PADRE_HA_PID_NOTPH

DRILLING DATE: 1/11/2019
DEPTH TO GROUNDWATER: Not Encountered
COMPLETION DEPTH: 2.25 ft

DRILLING/SAMPLING METHOD: Hand-Auger
DRILLING COMPANY: Padre Associates, Inc.
LOGGED BY: A. Arellano
CHECKED BY: R. Vander Weele P.G.

LOG OF HAND-AUGER HA22

Avila Beach Drive / U.S. Highway 101 Interchange Improvement Project
San Luis Opispo County, California

January 2019
Project No. 1601-3091

padre associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

ELEVATION, ft MSL / DEPTH, ft	USCS MATERIAL SYMBOL	SAMPLE ID	SAMPLE INTERVAL	SURFACE ELEVATION: ft +/- (relative datum MSL) NORTHING: 35.179 EASTING: -120.699 COORDINATE SYSTEM: NAD83 SP Ca Zn 5, ft MATERIAL DESCRIPTION
		HA22-0'		Silty SAND (SM), very dark grayish brown (10YR 3/2), fined grained sand and silt with trace subangular gravel, moist, no staining or odors
1		HA22-1'		
2		HA22-2'		Very dark gray (10YR 3/1), slightly moist
3				
4				

Z:\GINT\1-PADRE GINT PROJECTS\1601-3091 AVILA BEACH DR\1601-3091-AVILA BEACH STREET.GPJ 1/30/19 03:08 p, Template: PADRE_HA_PID_NOTPH

DRILLING DATE: 1/11/2019
DEPTH TO GROUNDWATER: Not Encountered
COMPLETION DEPTH: 2.25 ft

DRILLING/SAMPLING METHOD: Hand-Auger
DRILLING COMPANY: Padre Associates, Inc.
LOGGED BY: A. Arellano
CHECKED BY: R. Vander Weele P.G.

LOG OF HAND-AUGER HA23

Avila Beach Drive / U.S. Highway 101 Interchange Improvement Project
San Luis Opispo County, California

APPENDIX B
LABORATORY ANALYTICAL REPORT AND CHAIN-OF-CUSTODY DOCUMENTATION

ADVANCED TECHNOLOGY LABORATORIES

August 03, 2018

Eric Snelling and Robert Vander Weele
Padre Associates, Inc.
369 Pacific Street
San Luis Obispo, CA 93401
Tel: (805) 786-2650
Fax:(805) 786-2651

ELAP No.: 1838
CSDLAC No.: 10196
ORELAP No.: CA300003

Re: ATL Work Order Number : 1802729
Client Reference : 1601-3091 - ADL Soil Sampling

Enclosed are the results for sample(s) received on July 27, 2018 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated on the enclosed chain of custody in accordance with applicable laboratory certifications. The laboratory results contained in this report specifically pertains to the sample(s) submitted.

Thank you for the opportunity to serve the needs of your company. If you have any questions, please feel free to contact me or your Project Manager.

Sincerely,

Eddie Rodriguez
Laboratory Director

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091 - ADL Soil Sampling
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 08/03/2018

SUMMARY OF SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
HA1-0'	1802729-01	Soil	7/25/18 8:25	7/27/18 9:08
HA1-1'	1802729-02	Soil	7/25/18 8:35	7/27/18 9:08
HA2-0'	1802729-04	Soil	7/25/18 8:55	7/27/18 9:08
HA2-1'	1802729-05	Soil	7/25/18 9:05	7/27/18 9:08
HA3-0'	1802729-07	Soil	7/25/18 9:20	7/27/18 9:08
HA3-1'	1802729-08	Soil	7/25/18 9:25	7/27/18 9:08
HA4-0'	1802729-10	Soil	7/25/18 9:51	7/27/18 9:08
HA4-1'	1802729-11	Soil	7/25/18 9:55	7/27/18 9:08
HA5-0'	1802729-13	Soil	7/25/18 10:05	7/27/18 9:08
HA5-1'	1802729-14	Soil	7/25/18 10:09	7/27/18 9:08
HA6-0'	1802729-16	Soil	7/25/18 10:30	7/27/18 9:08
HA6-1'	1802729-17	Soil	7/25/18 10:40	7/27/18 9:08
HA7-0'	1802729-18	Soil	7/25/18 11:00	7/27/18 9:08
HA7-1'	1802729-19	Soil	7/25/18 11:03	7/27/18 9:08
HA8-0'	1802729-20	Soil	7/25/18 11:15	7/27/18 9:08
HA8-1'	1802729-21	Soil	7/25/18 11:17	7/27/18 9:08
HA9-0'	1802729-22	Soil	7/25/18 12:10	7/27/18 9:08
HA9-1'	1802729-23	Soil	7/25/18 12:15	7/27/18 9:08
HA10-0'	1802729-24	Soil	7/25/18 12:38	7/27/18 9:08
HA10-1'	1802729-25	Soil	7/25/18 12:42	7/27/18 9:08
HA11-0'	1802729-27	Soil	7/25/18 12:55	7/27/18 9:08
HA11-1'	1802729-28	Soil	7/25/18 13:15	7/27/18 9:08
HA12-0'	1802729-29	Soil	7/25/18 13:30	7/27/18 9:08
HA12-1'	1802729-30	Soil	7/25/18 13:35	7/27/18 9:08
HA13-0'	1802729-32	Soil	7/25/18 13:55	7/27/18 9:08
HA13-1'	1802729-33	Soil	7/25/18 14:00	7/27/18 9:08
HA14-0'	1802729-35	Soil	7/25/18 14:25	7/27/18 9:08
HA14-1'	1802729-36	Soil	7/25/18 14:30	7/27/18 9:08
HA15-0'	1802729-37	Soil	7/25/18 14:40	7/27/18 9:08
HA15-1'	1802729-38	Soil	7/25/18 14:42	7/27/18 9:08

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091 - ADL Soil Sampling
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 08/03/2018

CASE NARRATIVE

Results were J-flagged. "J" is used to flag those results that are between the PQL (Practical Quantitation Limit) and the calculated MDL (Method Detection Limit). Results that are "J" flagged are estimated values since it becomes difficult to accurately quantitate the analyte near the MDL.

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091 - ADL Soil Sampling
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 08/03/2018

Total Metals by ICP-AES EPA 6010B

Analyte: Lead **Analyst: GO**

Laboratory ID	Client Sample ID	Result	Units	PQL	MDL	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
1802729-01	HA1-0'	**140**	mg/kg	1.0	0.18	1	B8G0792	07/31/2018	07/31/18 16:14	
1802729-02	HA1-1'	**92**	mg/kg	1.0	0.18	1	B8G0792	07/31/2018	07/31/18 16:18	
1802729-04	HA2-0'	**65**	mg/kg	1.0	0.18	1	B8G0792	07/31/2018	07/31/18 16:22	
1802729-05	HA2-1'	**74**	mg/kg	1.0	0.18	1	B8G0792	07/31/2018	07/31/18 16:23	
1802729-07	HA3-0'	**190**	mg/kg	1.0	0.18	1	B8G0792	07/31/2018	07/31/18 16:24	
1802729-08	HA3-1'	**150**	mg/kg	1.0	0.18	1	B8G0792	07/31/2018	07/31/18 16:25	
1802729-10	HA4-0'	**24**	mg/kg	1.0	0.18	1	B8G0792	07/31/2018	07/31/18 16:26	
1802729-11	HA4-1'	**31**	mg/kg	1.0	0.18	1	B8G0792	07/31/2018	07/31/18 16:27	
1802729-13	HA5-0'	**45**	mg/kg	1.0	0.18	1	B8G0792	07/31/2018	07/31/18 16:28	
1802729-14	HA5-1'	**32**	mg/kg	1.0	0.18	1	B8G0792	07/31/2018	07/31/18 16:29	
1802729-16	HA6-0'	**27**	mg/kg	1.0	0.18	1	B8G0792	07/31/2018	07/31/18 16:31	
1802729-17	HA6-1'	**4.7**	mg/kg	1.0	0.18	1	B8G0792	07/31/2018	07/31/18 16:32	
1802729-18	HA7-0'	**39**	mg/kg	1.0	0.18	1	B8G0792	07/31/2018	07/31/18 16:35	
1802729-19	HA7-1'	**1.7**	mg/kg	1.0	0.18	1	B8G0792	07/31/2018	07/31/18 16:36	
1802729-20	HA8-0'	**6.2**	mg/kg	1.0	0.18	1	B8G0792	07/31/2018	07/31/18 16:38	
1802729-21	HA8-1'	**1.9**	mg/kg	1.0	0.18	1	B8G0792	07/31/2018	07/31/18 16:39	
1802729-22	HA9-0'	**300**	mg/kg	1.0	0.18	1	B8G0792	07/31/2018	07/31/18 16:40	
1802729-23	HA9-1'	**14**	mg/kg	1.0	0.18	1	B8G0792	07/31/2018	07/31/18 16:41	
1802729-24	HA10-0'	**42**	mg/kg	1.0	0.18	1	B8G0792	07/31/2018	07/31/18 16:42	
1802729-25	HA10-1'	**41**	mg/kg	1.0	0.18	1	B8G0792	07/31/2018	07/31/18 16:43	
1802729-27	HA11-0'	**3.2**	mg/kg	1.0	0.18	1	B8G0793	07/31/2018	07/31/18 15:56	
1802729-28	HA11-1'	**1.4**	mg/kg	1.0	0.18	1	B8G0793	07/31/2018	07/31/18 15:59	
1802729-29	HA12-0'	**31**	mg/kg	1.0	0.18	1	B8G0793	07/31/2018	07/31/18 16:01	
1802729-30	HA12-1'	**4.8**	mg/kg	1.0	0.18	1	B8G0793	07/31/2018	07/31/18 16:02	
1802729-32	HA13-0'	**6.0**	mg/kg	1.0	0.18	1	B8G0793	07/31/2018	07/31/18 16:03	
1802729-33	HA13-1'	**1.5**	mg/kg	1.0	0.18	1	B8G0793	07/31/2018	07/31/18 16:04	
1802729-35	HA14-0'	**8.0**	mg/kg	1.0	0.18	1	B8G0793	07/31/2018	07/31/18 16:08	
1802729-36	HA14-1'	**0.84**	mg/kg	1.0	0.18	1	B8G0793	07/31/2018	07/31/18 16:09	J
1802729-37	HA15-0'	**21**	mg/kg	1.0	0.18	1	B8G0793	07/31/2018	07/31/18 16:10	
1802729-38	HA15-1'	**18**	mg/kg	1.0	0.18	1	B8G0793	07/31/2018	07/31/18 16:11	

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091 - ADL Soil Sampling
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 08/03/2018

QUALITY CONTROL SECTION

Total Metals by ICP-AES EPA 6010B - Quality Control

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B8G0792 - EPA 3050B_S										
Blank (B8G0792-BLK1)						Prepared: 7/31/2018 Analyzed: 7/31/2018				
Lead	ND	1.0	0.18							
LCS (B8G0792-BS1)						Prepared: 7/31/2018 Analyzed: 7/31/2018				
Lead	46.6442	1.0	0.18	50.0000		93.3	80 - 120			
Matrix Spike (B8G0792-MS1)			**Source: 1802729-01**			Prepared: 7/31/2018 Analyzed: 7/31/2018				
Lead	191.174	1.0	0.18	124.378	142.452	39.2	36 - 121			
Matrix Spike Dup (B8G0792-MSD1)			**Source: 1802729-01**			Prepared: 7/31/2018 Analyzed: 7/31/2018				
Lead	179.563	1.0	0.18	124.378	142.452	29.8	36 - 121	6.26	20	M1

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091 - ADL Soil Sampling
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 08/03/2018

Total Metals by ICP-AES EPA 6010B - Quality Control

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B8G0793 - EPA 3050B_S										
Blank (B8G0793-BLK1)						Prepared: 7/31/2018 Analyzed: 7/31/2018				
Lead	ND	1.0	0.18							
LCS (B8G0793-BS1)						Prepared: 7/31/2018 Analyzed: 7/31/2018				
Lead	50.1898	1.0	0.18	50.0000		100	80 - 120			
Matrix Spike (B8G0793-MS1)			**Source: 1802729-27**			Prepared: 7/31/2018 Analyzed: 7/31/2018				
Lead	87.8217	1.0	0.18	124.378	3.20297	68.0	36 - 121			
Matrix Spike Dup (B8G0793-MSD1)			**Source: 1802729-27**			Prepared: 7/31/2018 Analyzed: 7/31/2018				
Lead	84.3628	1.0	0.18	125.000	3.20297	64.9	36 - 121	4.02	20	

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091 - ADL Soil Sampling
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 08/03/2018

Notes and Definitions

M1	Matrix spike recovery outside of acceptance limit. The analytical batch was validated by the laboratory control sample.
J	Analyte detected below the Practical Quantitation Limit but above or equal to the Method Detection Limit. Result is an estimated concentration.
ND	Analyte is not detected at or above the Practical Quantitation Limit (PQL). When client requests quantitation against MDL, analyte is not detected at or above the Method Detection Limit (MDL)
PQL	Practical Quantitation Limit
MDL	Method Detection Limit
NR	Not Reported
RPD	Relative Percent Difference
CA2	CA-ELAP (CDPH)
OR1	OR-NELAP (OSPHL)

Notes:
(1) The reported MDL and PQL are based on prep ratio variation and analytical dilution.
(2) The suffix [2C] of specific analytes signifies that the reported result is taken from the instrument's second column.
(3) Results are wet unless otherwise specified.

padre associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

CHAIN OF CUSTODY RECORD

Client Name/Account #: Padre Associates, Inc.
Address/City/State/Zip: 369 Pacific Street, San Luis Obispo, California 93401
Telephone Number: 805.786.2650 Fax No.: 805.786.2651
Project No. / Name: 1601-3091 - ADL Soil Sampling
Report To: Eric Snelling esnelling@padreinc.com and Robert Vander Weele rvanderweele@padreinc.com

Sampler(s):
Invoice To: Padre Associates, Inc.

ANALYSIS REQUIRED

	Sample ID / Description (1602729)	Date Sampled	Time Sampled	No. of Containers	Sample Matrix	Preservative	Container Type	Total Lead (7420)	Hold	NOTES
-01	HA1-0'	7/25/18	0825	1	S. I	ICE	4oz jar	X		
-02	HA1-1'		0835					X		
-03	HA1-2'		0840						X	
-04	HA2-0'		0855					X		
-05	HA2-1'		0905					X		
-06	HA2-2'		0910						X	
-07	HA3-0'		0920					X		
-08	HA3-1'		0925					X		
-09	HA3-1.75'		0930						X	
-10	HA4-0'		0951					X		
-11	HA4-1'		0955					X		
12	HA4-2'		1000						X	
13	HA5-0		1005					X		
-14	HA5-1'		1009					X		
-15	HA5-2'		1015						X	
-16	HA6-0'		1030					X		
-17	HA6-1'		1040					X		

Special Instructions: 1) Notify client prior to running STLC and TCLP; 2) report MDL and MRL; 3) Low MRLs
Please contact Robert Vander Weele at (805) 788-5605 w/ questions.

Laboratory Comments:
Temperature Upon Receipt: 8.0 °C
VOCs Free of Headspac Y N

Relinquished by:	Date	Time	Received by:	Date	Time
	7/26/18	0900	MFR-072	7/27/18	0905
Relinquished by:	Date	Time	Received by:	Date	Time

Turn Around Time (Check)
same day ☐ 72 hours ☐
24 hours ☐ 5 days ☐
48 hours ☐ normal ☒

padre associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

CHAIN OF CUSTODY RECORD

Client Name/Account #: Padre Associates, Inc.
Address/City/State/Zip: 369 Pacific Street, San Luis Obispo, California 93401
Telephone Number: 805.786.2650 Fax No.: 805.786.2651
Project No. / Name: 1601-3091 - ADL Soil Sampling
Report To: Eric Snelling esnelling@padreinc.com and Robert Vander Weele rvanderweele@padreinc.com

Sampler(s):
Invoice To: Padre Associates, Inc.

	Sample ID / Description (160229)	Date Sampled	Time Sampled	No. of Containers	Sample Matrix	Preservative	Container Type	ANALYSIS REQUIRED: Total Lead (7420)	Half Pb													NOTES
-18	HA7 - 0'	7/25/16	1100	1	Soil	ICE	40z jar	X														
-19	HA7 - 1'		1103					X														
-20	HA8 - 0'		1115					X														
-21	HA8 - 1'		1117					X														
-22	HA9 - 0'		1210					X														
-23	HA9 - 1'		1215					X														
-24	HA10 - 0'		1235					X														
-25	HA10 - 1'		1240					X														
-26	HA10 - 2'		1250						X													
-27	HA11 - 0'		1255					X														
-28	HA11 - 1'		1315					X														
-29	HA12 - 0'		1330					X														
-30	HA12 - 1'		1335					X														
-31	HA12 - 2'		1345						X													
-32	HA13 - 0'		1355					X														
-33	HA13 - 1'		1400					X														
-34	HA13 - 1.75		1408						X													

Special Instructions: 1) Notify client prior to running STLC and TCLP; 2) report MDL and MRL; 3) Low MRLs
Please contact Robert Vander Weele at (805) 715-3605 w/ questions.

Laboratory Comments:
Temperature Upon Receipt: 6.0°C
VOCs Free of Headspace Y N

Relinquished by:	Date	Time	Received by:	Date	Time
	7/26/16	0900		7/27/16	0908
Relinquished by:	Date	Time	Received by:	Date	Time

Turn Around Time (Check)
same day ☐ 72 hours ☐
24 hours ☐ 5 days ☐
48 hours ☐ normal ☒

padre associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

CHAIN OF CUSTODY RECORD

Client Name/Account #: Padre Associates, Inc.
Address/City/State/Zip: 369 Pacific Street, San Luis Obispo, California 93401
Telephone Number: 805.786.2650 Fax No.: 805.786.2651
Project No. / Name: 1601-3091 - ADL Soil Sampling
Report To: Eric Snelling esnelling@padreinc.com and Robert Vander Weele rvanderweele@padreinc.com

Sampler(s):
Invoice To: Padre Associates, Inc.

	Sample ID / Description (1602729)	Date Sampled	Time Sampled	No. of Containers	Sample Matrix	Preservative	Container Type	ANALYSIS REQUIRED: Total Lead (7420)	ANALYSIS REQUIRED: Hold	NOTES
-35.	HA14 - 0'	7/25/18	1425	1	Soil	Ice	4oz	X		
-36.	HA14 - 1'	"	1430	"	"	"	"	X		
-37.	HA15 - 0'	"	1440	"	"	"	"	X		
-38.	HA15 - 1'	"	1445	"	"	"	"	X		
-39	HA15 - 2'	"	1450	"	"	"	"		X	

Special Instructions: 1) Notify client prior to running STLC and TCLP; 2) report MDL and MRL; 3) Low MRLs
Please Contact Robert Vander-Weele at (805) 788-8605 w/ questions.

Laboratory Comments:
Temperature Upon Receipt: 8.0°C
VOCs Free of Headspac Y N

Relinquished by:	Date	Time	Received by:	Date	Time
	7/26/18	0900		7/27/18	0900
Relinquished by:	Date	Time	Received by:	Date	Time

Turn Around Time (Check)
same day ☐ 72 hours ☐
24 hours ☐ 5 days ☐
48 hours ☐ normal ☒

Rachelle Arada

From: Eric Snelling <esnelling@padreinc.com>
Sent: Friday, July 27, 2018 11:35 AM
To: Rachelle Arada; Robert Vander Weele
Cc: Marnellie Ramos; Dominic Mata; Ludy Carrillo; Evelyn Romualdo; customer.relations@atlglobal.com
Subject: RE: 1601-3091 - ADL Soil Sampling

I'll send you the credit card authorization today.
6010 is fine.
Thanks,
Eric

From: Rachelle Arada <Rachelle@atlglobal.com>
Sent: Friday, July 27, 2018 10:56 AM
To: Eric Snelling <esnelling@padreinc.com>; Robert Vander Weele <rvanderweele@PadreInc.com>
Cc: Marnellie Ramos <Marnellie@atlglobal.com>; Dominic Mata <dominic@atlglobal.com>; Ludy Carrillo <Ludy@atlglobal.com>; Evelyn Romualdo <Evelyn@atlglobal.com>; customer.relations@atlglobal.com
Subject: 1601-3091 - ADL Soil Sampling

Good morning Eric and Robert,

We received the samples for the above project and wanted to find out if we can use EPA Method 6010 instead of 7420 for total lead analysis. Here is a copy of the COC and our reporting limits for your reference.

In addition, it showed in our system that this is the first work order for Padre Associates. As a company policy, new clients are required COD payment for the first work order. For your convenience, we also accept credit card; if you prefer to use this service, please complete the attached credit card form and email it back. Thanks.

Rachelle Arada | Client Services Manager
ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Avenue, Signal Hill CA 90755 | http://www.atlglobal.com
O: 562.989.4045 ext 237 | M: 562.508.7798 | F: 562.989.6348

Laboratory Excellence Defined

August 13, 2018

Eric Snelling and Robert Vander Weele
Padre Associates, Inc.
369 Pacific Street
San Luis Obispo, CA 93401
Tel: (805) 786-2650
Fax:(805) 786-2651

ELAP No.: 1838
CSDLAC No.: 10196
ORELAP No.: CA300003

Re: ATL Work Order Number : 1802729
Client Reference : 1601-3091 - ADL Soil Sampling

Enclosed are the results for sample(s) received on July 27, 2018 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated on the enclosed chain of custody in accordance with applicable laboratory certifications. The laboratory results contained in this report specifically pertains to the sample(s) submitted.

Thank you for the opportunity to serve the needs of your company. If you have any questions, please feel free to contact me or your Project Manager.

Sincerely,

Eddie Rodriguez
Laboratory Director

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091 - ADL Soil Sampling
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 08/13/2018

SUMMARY OF SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
HA1-0'	1802729-01	Soil	7/25/18 8:25	7/27/18 9:08
HA1-1'	1802729-02	Soil	7/25/18 8:35	7/27/18 9:08
HA1-2'	1802729-03	Soil	7/25/18 8:40	7/27/18 9:08
HA2-0'	1802729-04	Soil	7/25/18 8:55	7/27/18 9:08
HA2-1'	1802729-05	Soil	7/25/18 9:05	7/27/18 9:08
HA2-2'	1802729-06	Soil	7/25/18 9:10	7/27/18 9:08
HA3-0'	1802729-07	Soil	7/25/18 9:20	7/27/18 9:08
HA3-1'	1802729-08	Soil	7/25/18 9:25	7/27/18 9:08
HA3-1.75'	1802729-09	Soil	7/25/18 9:30	7/27/18 9:08
HA9-0'	1802729-22	Soil	7/25/18 12:10	7/27/18 9:08

CASE NARRATIVE

Results were J-flagged. "J" is used to flag those results that are between the PQL (Practical Quantitation Limit) and the calculated MDL (Method Detection Limit). Results that are "J" flagged are estimated values since it becomes difficult to accurately quantitate the analyte near the MDL.

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091 - ADL Soil Sampling
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 08/13/2018

Client Sample ID HA1-0'

Lab ID: 1802729-01

TCLP Metals by ICP-AES EPA 6010B — **Analyst: GO**

Analyte	Result (mg/L)	PQL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	ND	0.25	5	B8H0263	08/09/2018	08/10/18 11:33	D1

STLC Metals by ICP-AES by EPA 6010B — **Analyst: GO**

Analyte	Result (mg/L)	PQL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**2.8**	1.0	20	B8H0330	08/10/2018	08/13/18 11:17	D1

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091 - ADL Soil Sampling
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 08/13/2018

Client Sample ID HA1-1'

Lab ID: 1802729-02

STLC Metals by ICP-AES by EPA 6010B

Analyst: GO

Analyte	Result (mg/L)	PQL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**3.6**	1.0	20	B8H0330	08/10/2018	08/13/18 11:18	D1

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091 - ADL Soil Sampling
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 08/13/2018

Client Sample ID HA1-2'

Lab ID: 1802729-03

Total Metals by ICP-AES EPA 6010B

Analyst: GO

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**27**	1.0	0.18	1	B8H0226	08/08/2018	08/09/18 10:00	

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091 - ADL Soil Sampling
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 08/13/2018

Client Sample ID HA2-0'

Lab ID: 1802729-04

STLC Metals by ICP-AES by EPA 6010B **Analyst: GO**

Analyte	Result (mg/L)	PQL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**1.9**	1.0	20	B8H0330	08/10/2018	08/13/18 11:20	D1

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091 - ADL Soil Sampling
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 08/13/2018

Client Sample ID HA2-1'

Lab ID: 1802729-05

STLC Metals by ICP-AES by EPA 6010B

Analyst: GO

Analyte	Result (mg/L)	PQL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**1.7**	1.0	20	B8H0330	08/10/2018	08/13/18 11:21	D1

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091 - ADL Soil Sampling
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 08/13/2018

Client Sample ID HA2-2'

Lab ID: 1802729-06

Total Metals by ICP-AES EPA 6010B

Analyst: GO

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**18**	1.0	0.18	1	B8H0226	08/08/2018	08/09/18 10:06	

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091 - ADL Soil Sampling
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 08/13/2018

Client Sample ID HA3-0'

Lab ID: 1802729-07

TCLP Metals by ICP-AES EPA 6010B — **Analyst: GO**

Analyte	Result (mg/L)	PQL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	ND	0.25	5	B8H0263	08/09/2018	08/10/18 11:34	D1

STLC Metals by ICP-AES by EPA 6010B — **Analyst: GO**

Analyte	Result (mg/L)	PQL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**9.5**	1.0	20	B8H0330	08/10/2018	08/13/18 11:23	D1

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091 - ADL Soil Sampling
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 08/13/2018

Client Sample ID HA3-1'

Lab ID: 1802729-08

TCLP Metals by ICP-AES EPA 6010B — **Analyst: GO**

Analyte	Result (mg/L)	PQL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	ND	0.25	5	B8H0263	08/09/2018	08/10/18 11:36	D1

STLC Metals by ICP-AES by EPA 6010B — **Analyst: GO**

Analyte	Result (mg/L)	PQL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**7.0**	1.0	20	B8H0330	08/10/2018	08/13/18 11:24	D1

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091 - ADL Soil Sampling
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 08/13/2018

Client Sample ID HA3-1.75'

Lab ID: 1802729-09

Total Metals by ICP-AES EPA 6010B **Analyst: GO**

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**37**	1.0	0.18	1	B8H0226	08/08/2018	08/09/18 10:07	

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091 - ADL Soil Sampling
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 08/13/2018

Client Sample ID HA9-0'

Lab ID: 1802729-22

TCLP Metals by ICP-AES EPA 6010B — **Analyst: GO**

Analyte	Result (mg/L)	PQL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**0.33**	0.25	5	B8H0263	08/09/2018	08/10/18 11:37	D1

STLC Metals by ICP-AES by EPA 6010B — **Analyst: GO**

Analyte	Result (mg/L)	PQL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**15**	1.0	20	B8H0330	08/10/2018	08/13/18 11:26	D1

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091 - ADL Soil Sampling
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 08/13/2018

QUALITY CONTROL SECTION

Total Metals by ICP-AES EPA 6010B - Quality Control

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B8H0226 - EPA 3050B_S										
Blank (B8H0226-BLK1)					Prepared: 8/8/2018 Analyzed: 8/9/2018					
Lead	ND	1.0	0.18							
LCS (B8H0226-BS1)					Prepared: 8/8/2018 Analyzed: 8/9/2018					
Lead	49.1378	1.0	0.18	50.0000		98.3	80 - 120			
Matrix Spike (B8H0226-MS1)			**Source: 1802729-03**		Prepared: 8/8/2018 Analyzed: 8/9/2018					
Lead	108.908	1.0	0.18	125.000	26.7536	65.7	36 - 121			
Matrix Spike Dup (B8H0226-MSD1)			**Source: 1802729-03**		Prepared: 8/8/2018 Analyzed: 8/9/2018					
Lead	98.9772	1.0	0.18	125.000	26.7536	57.8	36 - 121	9.55	20	

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091 - ADL Soil Sampling
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 08/13/2018

TCLP Metals by ICP-AES EPA 6010B - Quality Control

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B8H0263 - EPA 3010A_S										
Blank (B8H0263-BLK1)					Prepared: 8/9/2018 Analyzed: 8/10/2018					
Lead	ND	0.050	0.0047							
LCS (B8H0263-BS1)					Prepared: 8/9/2018 Analyzed: 8/10/2018					
Lead	0.803700	0.050	0.0047	1.00000		80.4	80 - 120			
Matrix Spike (B8H0263-MS1)			**Source: 1802729-22**		Prepared: 8/9/2018 Analyzed: 8/10/2018					
Lead	2.63696	0.25	0.024	2.50000	0.325395	92.5	76 - 108			
Matrix Spike Dup (B8H0263-MSD1)			**Source: 1802729-22**		Prepared: 8/9/2018 Analyzed: 8/10/2018					
Lead	2.60411	0.25	0.024	2.50000	0.325395	91.1	76 - 108	1.25	20	

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091 - ADL Soil Sampling
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 08/13/2018

STLC Metals by ICP-AES by EPA 6010B - Quality Control

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B8H0330 - STLC_S Extraction										
Blank (B8H0330-BLK1)					Prepared: 8/10/2018 Analyzed: 8/13/2018					
Lead	ND	1.0	0.094							
LCS (B8H0330-BS1)					Prepared: 8/10/2018 Analyzed: 8/13/2018					
Lead	1.77662			2.00000		88.8	80 - 120			
Matrix Spike (B8H0330-MS1)			**Source: 1802400-07**		Prepared: 8/10/2018 Analyzed: 8/13/2018					
Lead	8.70226			2.50000	6.92947	70.9	44 - 130			
Matrix Spike Dup (B8H0330-MSD1)			**Source: 1802400-07**		Prepared: 8/10/2018 Analyzed: 8/13/2018					
Lead	8.29419			2.50000	6.92947	54.6	44 - 130	4.80	20	

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091 - ADL Soil Sampling
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 08/13/2018

Notes and Definitions

D1	Sample required dilution due to possible matrix interference.
ND	Analyte is not detected at or above the Practical Quantitation Limit (PQL). When client requests quantitation against MDL, analyte is not detected at or above the Method Detection Limit (MDL)
PQL	Practical Quantitation Limit
MDL	Method Detection Limit
NR	Not Reported
RPD	Relative Percent Difference
CA2	CA-ELAP (CDPH)
OR1	OR-NELAP (OSPHL)

Notes:
(1) The reported MDL and PQL are based on prep ratio variation and analytical dilution.
(2) The suffix [2C] of specific analytes signifies that the reported result is taken from the instrument's second column.
(3) Results are wet unless otherwise specified.

Dominic Mata

From: Robert Vander Weele [rvanderweele@PadreInc.com]
Sent: Monday, August 06, 2018 11:54 AM
To: Dominic Mata
Cc: customer.relations@atlglobal.com; Eric Snelling
Subject: RE: Results/Receipt - 1601-3091 - ADL Soil Sampling (ATL# 1802729)

Hi Dominic,

Please run the following samples for the indicated lead solubility analyses:

Solubility
1802729-01 (HA1-0') – STLC and TCLP
1802729-02 (HA1-1') – STLC
1802729-04 (HA2-0') – STLC
1802729-05 (HA2-1') – STLC
1802729-07 (HA3-0') – STLC and TCLP
1802729-08 (HA3-1') – STLC and TCLP
1802729-22 (HA3-0') – STLC and TCLP

In addition, please run the following samples that are on hold for total lead by EPA method 6010B:

Total Lead for Vertical Delineation
1802729-03 (HA1-2')
1802729-06 (HA2-2')
1802729-09 (HA3-2')

Thanks,
Robert

Robert Vander Weele P.G. 8241
Project Manager / Geologist
Padre Associates, Inc.
369 Pacific Street
San Luis Obispo, CA 93401
Tel: 805 786-2650 Ext. 34
Fax: 805 786-2651

From: Dominic Mata <dominic@atlglobal.com>
Sent: Friday, August 03, 2018 3:01 PM
To: Eric Snelling <esnelling@padreinc.com>; Robert Vander Weele <rvanderweele@PadreInc.com>
Cc: customer.relations@atlglobal.com
Subject: Results/Receipt - 1601-3091 - ADL Soil Sampling (ATL# 1802729)

Good afternoon Eric/Robert,

Please find your results and credit card receipt for the above project attached. If I can further assist, please let me know.

Thanks,

ADVANCED TECHNOLOGY LABORATORIES

January 21, 2019

Eric Snelling and Robert Vander Weele
Padre Associates, Inc.
369 Pacific Street
San Luis Obispo, CA 93401
Tel: (805) 786-2650
Fax:(805) 786-2651

ELAP No.: 1838
CSDLAC No.: 10196
ORELAP No.: CA300003

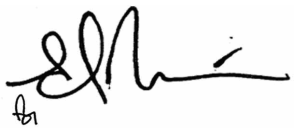
Re: ATL Work Order Number : 1900169

Client Reference : 1601-3091/ Avila Beach Drive/U.S. 101 Interchange Project

Enclosed are the results for sample(s) received on January 15, 2019 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated on the enclosed chain of custody in accordance with applicable laboratory certifications. The laboratory results contained in this report specifically pertains to the sample(s) submitted.

Thank you for the opportunity to serve the needs of your company. If you have any questions, please feel free to contact me or your Project Manager.

Sincerely,



Eddie Rodriguez
Laboratory Director

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091/ Avila Beach Drive/U.S. 101 Ir
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 01/21/2019

SUMMARY OF SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
HA16-0	1900169-01	Soil	1/11/19 8:50	1/15/19 9:45
HA16-1	1900169-02	Soil	1/11/19 8:55	1/15/19 9:45
HA17-0	1900169-04	Soil	1/11/19 9:08	1/15/19 9:45
HA17-1	1900169-05	Soil	1/11/19 9:12	1/15/19 9:45
HA18-0	1900169-07	Soil	1/11/19 9:30	1/15/19 9:45
HA18-1	1900169-08	Soil	1/11/19 9:33	1/15/19 9:45
HA19-0	1900169-10	Soil	1/11/19 9:44	1/15/19 9:45
HA19-1	1900169-11	Soil	1/11/19 9:48	1/15/19 9:45
HA20-0	1900169-13	Soil	1/11/19 10:23	1/15/19 9:45
HA20-1	1900169-14	Soil	1/11/19 10:26	1/15/19 9:45
HA21-0	1900169-16	Soil	1/11/19 10:38	1/15/19 9:45
HA21-1	1900169-17	Soil	1/11/19 10:40	1/15/19 9:45
HA22-0	1900169-19	Soil	1/11/19 10:52	1/15/19 9:45
HA22-1	1900169-20	Soil	1/11/19 10:54	1/15/19 9:45
HA23-0	1900169-22	Soil	1/11/19 11:05	1/15/19 9:45
HA23-1	1900169-23	Soil	1/11/19 11:07	1/15/19 9:45

CASE NARRATIVE

Results were J-flagged. "J" is used to flag those results that are between the PQL (Practical Quantitation Limit) and the calculated MDL (Method Detection Limit). Results that are "J" flagged are estimated values since it becomes difficult to accurately quantitate the analyte near the MDL.

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091/ Avila Beach Drive/U.S. 101 Ir
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 01/21/2019

Client Sample ID HA16-0

Lab ID: 1900169-01

Total Metals by ICP-AES EPA 6010B

Analyst: GO

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**4.0**	1.0	0.18	1	B9A0384	01/17/2019	01/17/19 11:19	

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091/ Avila Beach Drive/U.S. 101 Ir
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 01/21/2019

Client Sample ID HA16-1

Lab ID: 1900169-02

Total Metals by ICP-AES EPA 6010B

Analyst: GO

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**5.3**	1.0	0.18	1	B9A0384	01/17/2019	01/17/19 11:23	

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091/ Avila Beach Drive/U.S. 101 Ir
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 01/21/2019

Client Sample ID HA17-0

Lab ID: 1900169-04

Total Metals by ICP-AES EPA 6010B

Analyst: GO

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**4.7**	1.0	0.18	1	B9A0384	01/17/2019	01/17/19 11:24	

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091/ Avila Beach Drive/U.S. 101 Ir
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 01/21/2019

Client Sample ID HA17-1

Lab ID: 1900169-05

Total Metals by ICP-AES EPA 6010B

Analyst: GO

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**6.1**	1.0	0.18	1	B9A0384	01/17/2019	01/17/19 11:25	

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091/ Avila Beach Drive/U.S. 101 Ir
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 01/21/2019

Client Sample ID HA18-0

Lab ID: 1900169-07

Total Metals by ICP-AES EPA 6010B

Analyst: GO

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**32**	1.0	0.18	1	B9A0384	01/17/2019	01/17/19 11:26	

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091/ Avila Beach Drive/U.S. 101 Ir
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 01/21/2019

Client Sample ID HA18-1

Lab ID: 1900169-08

Total Metals by ICP-AES EPA 6010B

Analyst: GO

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**71**	2.0	0.36	2	B9A0384	01/17/2019	01/17/19 11:46	D5

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091/ Avila Beach Drive/U.S. 101 Ir
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 01/21/2019

Client Sample ID HA19-0

Lab ID: 1900169-10

Total Metals by ICP-AES EPA 6010B

Analyst: GO

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**26**	1.0	0.18	1	B9A0384	01/17/2019	01/17/19 11:32	

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091/ Avila Beach Drive/U.S. 101 Ir
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 01/21/2019

Client Sample ID HA19-1

Lab ID: 1900169-11

Total Metals by ICP-AES EPA 6010B

Analyst: GO

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**31**	1.0	0.18	1	B9A0384	01/17/2019	01/17/19 11:34	

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091/ Avila Beach Drive/U.S. 101 Ir
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 01/21/2019

Client Sample ID HA20-0

Lab ID: 1900169-13

Total Metals by ICP-AES EPA 6010B

Analyst: GO

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**63**	1.0	0.18	1	B9A0384	01/17/2019	01/17/19 11:35	

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091/ Avila Beach Drive/U.S. 101 Ir
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 01/21/2019

Client Sample ID HA20-1

Lab ID: 1900169-14

Total Metals by ICP-AES EPA 6010B

Analyst: GO

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**12**	1.0	0.18	1	B9A0384	01/17/2019	01/17/19 11:36	

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091/ Avila Beach Drive/U.S. 101 Ir
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 01/21/2019

Client Sample ID HA21-0

Lab ID: 1900169-16

Total Metals by ICP-AES EPA 6010B

Analyst: GO

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**66**	1.0	0.18	1	B9A0384	01/17/2019	01/17/19 11:37	

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091/ Avila Beach Drive/U.S. 101 Ir
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 01/21/2019

Client Sample ID HA21-1

Lab ID: 1900169-17

Total Metals by ICP-AES EPA 6010B

Analyst: GO

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**28**	2.0	0.36	2	B9A0384	01/17/2019	01/17/19 11:47	D5

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091/ Avila Beach Drive/U.S. 101 Ir
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 01/21/2019

Client Sample ID HA22-0

Lab ID: 1900169-19

Total Metals by ICP-AES EPA 6010B

Analyst: GO

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**110**	1.0	0.18	1	B9A0384	01/17/2019	01/17/19 11:39	

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091/ Avila Beach Drive/U.S. 101 Ir
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 01/21/2019

Client Sample ID HA22-1

Lab ID: 1900169-20

Total Metals by ICP-AES EPA 6010B

Analyst: GO

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**120**	1.0	0.18	1	B9A0384	01/17/2019	01/17/19 11:40	

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091/ Avila Beach Drive/U.S. 101 Ir
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 01/21/2019

Client Sample ID HA23-0

Lab ID: 1900169-22

Total Metals by ICP-AES EPA 6010B

Analyst: GO

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**76**	1.0	0.18	1	B9A0384	01/17/2019	01/17/19 11:41	

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091/ Avila Beach Drive/U.S. 101 Ir
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 01/21/2019

Client Sample ID HA23-1

Lab ID: 1900169-23

Total Metals by ICP-AES EPA 6010B

Analyst: GO

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**11**	1.0	0.18	1	B9A0384	01/17/2019	01/17/19 11:45	

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091/ Avila Beach Drive/U.S. 101 Ir
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 01/21/2019

QUALITY CONTROL SECTION

Total Metals by ICP-AES EPA 6010B - Quality Control

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B9A0384 - EPA 3050B_S										
Blank (B9A0384-BLK1)					Prepared: 1/17/2019 Analyzed: 1/17/2019					
Lead	0.194738	1.0	0.18							J
LCS (B9A0384-BS1)					Prepared: 1/17/2019 Analyzed: 1/17/2019					
Lead	46.1714	1.0	0.18	50.0000		92.3	80 - 120			
Matrix Spike (B9A0384-MS1)			**Source: 1900169-01**		Prepared: 1/17/2019 Analyzed: 1/17/2019					
Lead	89.2146	1.0	0.18	124.378	3.98880	68.5	29 - 126			
Matrix Spike Dup (B9A0384-MSD1)			**Source: 1900169-01**		Prepared: 1/17/2019 Analyzed: 1/17/2019					
Lead	82.6805	1.0	0.18	124.378	3.98880	63.3	29 - 126	7.60	20	

Certificate of Analysis

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369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 01/21/2019

Notes and Definitions

J	Analyte detected below the Practical Quantitation Limit but above or equal to the Method Detection Limit. Result is an estimated concentration.
D5	Sample diluted due to failing internal standard in the original run.
ND	Analyte is not detected at or above the Practical Quantitation Limit (PQL). When client requests quantitation against MDL, analyte is not detected at or above the Method Detection Limit (MDL)
PQL	Practical Quantitation Limit
MDL	Method Detection Limit
NR	Not Reported
RPD	Relative Percent Difference
CA2	CA-ELAP (CDPH)
OR1	OR-NELAP (OSPHL)

Notes:
(1) The reported MDL and PQL are based on prep ratio variation and analytical dilution.
(2) The suffix [2C] of specific analytes signifies that the reported result is taken from the instrument's second column.
(3) Results are wet unless otherwise specified.

padre associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

CHAIN OF CUSTODY RECORD

Client Name/Account #: Padre Associates, Inc.
Address: 369 Pacific Street
City/State/Zip: San Luis Obispo, California 93401
Telephone Number: 805.786.2650 **Fax No.:** 805.786.2651
Project No. / Name: 1601-3091/ Avila Beach Drive/U.S. 101 Interchange Project
Laboratory: Advanced Technolgy Laboratories
Report To: Eric Snelling (esnelling@padreinc.com);Robert Vanderweele (rvanderweele@padreinc.com)

Sampler: Adam Arellano
Darin Brebes

Invoice To: Padre Associates, Inc.
1861 Knoll Drive
Ventura, CA 93003

	1900169 Sample ID / Description	Date Sampled	Time Sampled	No. of Containers	Sample Matrix	Preservative	Container Type	ANALYSIS REQUIRED: Total Lead by EPA 6010B								Notes:
-01	HA16-0	1-11-19	0850	1	Soil	Ice	GJ	X								
-02	HA16-1		0855													
-03	HA16-2		0903													Hold
-04	HA17-0		0908													
-05	HA17-1		0912													
-06	HA17-2		0917													Hold
-07	HA18-0		0930													
-08	HA18-1		0935													
-09	HA18-2		0938													Hold
-10	HA19-0		0944													
-11	HA19-1	↓	0948	↓	↓	↓	↓	↓								

Special Instructions:
1. Send all reports to San Luis Obispo office address. Invoice to Ventura address.
2. Please combine results and COC into one final pdf document when e-mailed.
3. Analyze all blanks.

Turn Around Time (Check)
- Same Day ☐
- 24 Hours ☐
- 48 Hours ☐
- 3 Days ☐
- 5 Days ☐

Comments: Standard TAT

Relinquished by:	Date	Time	Shipped via:	Date	Time
[signature]	1-14-19	1300	UPS	1-14-19	
Relinquished by:	**Date**	**Time**	**Received by:**	**Date**	**Time**
			[signature] Brebes	1/15/19	0945

5.2 ice

padre associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

CHAIN OF CUSTODY RECORD

Client Name/Account #: Padre Associates, Inc.
Address: 369 Pacific Street
City/State/Zip: San Luis Obispo, California 93401
Telephone Number: 805.786.2650 **Fax No.:** 805.786.2651
Project No. / Name: 1601-3091/ Avila Beach Drive/U.S. 101 Interchange Project
Laboratory: Advanced Technolgy Laboratories
Report To: Eric Snelling (esnelling@padreinc.com);Robert Vanderweele (rvanderweele@padreinc.com)

Sampler: Adam Arellano
Darin Brebes

Invoice To: Padre Associates, Inc.
1861 Knoll Drive
Ventura, CA 93003

	1900169 Sample ID / Description	Date Sampled	Time Sampled	No. of Containers	Sample Matrix	Preservative	Container Type	ANALYSIS REQUIRED: Total Lead by EPA 6010B							Notes:
-12	HA19-2	1-11-19	0954	1	Soil	Ice	GJ	X							HOLD
-13	HA20-0	"	1023	"	"	"	"	"							
-14	HA20-1	"	1026	"	"	"	"	"							
-15	HA20-2	"	1030	"	"	"	"	"							HOLD
-16	HA21-0	"	1038	"	"	"	"	"							
-17	HA21-1	"	1040	"	"	"	"	"							
-18	HA21-2	"	1044	"	"	"	"	"							HOLD
-19	HA22-0	"	1052	"	"	"	"	"							
-20	HA22-1	"	1054	"	"	"	"	"							
-21	HA22-2	"	1057	"	"	"	"	"							HOLD
-22	HA23-0	"	1105	"	"	"	"	"							

Special Instructions:
1. Send all reports to San Luis Obispo office address. Invoice to Ventura address.
2. Please combine results and COC into one final pdf document when e-mailed.
3. Analyze all blanks.

Turn Around Time (Check)
Same Day ☐
24 Hours ☐
48 Hours ☐
3 Days ☐
5 Days ☐

Comments: Standard TAT

Relinquished by:	Date	Time	Shipped via:	Date	Time
[signature]	1-14-19	1300	UPS	1-14-19	
Relinquished by:	Date	Time	Received by:	Date	Time
			Steph Brien	1/15/19	0945

padre associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

CHAIN OF CUSTODY RECORD

Client Name/Account #: Padre Associates, Inc.
Address: 369 Pacific Street
City/State/Zip: San Luis Obispo, California 93401
Telephone Number: 805.786.2650 **Fax No.:** 805.786.2651
Project No. / Name: 1601-3091/ Avila Beach Drive/U.S. 101 Interchange Project
Laboratory: Advanced Technolgy Laboratories
Report To: Eric Snelling (esnelling@padreinc.com);Robert Vanderweele (rvanderweele@padreinc.com)

Sampler: Adam Arellano
Darin Brebes

Invoice To: Padre Associates, Inc.
1861 Knoll Drive
Ventura, CA 93003

	1900169 Sample ID / Description	Date Sampled	Time Sampled	No. of Containers	Sample Matrix	Preservative	Container Type	ANALYSIS REQUIRED: Total Lead by EPA 6010B							Notes:
-23	HA23-1	1-11-19	1107	1	Soil	Ice	GS	X							
-24	HA23-2	1-11-19	1110	1	Soil	Ice	GS	X							6010

Special Instructions:
1. Send all reports to San Luis Obispo office address. Invoice to Ventura address.
2. Please combine results and COC into one final pdf document when e-mailed.
3. Analyze all blanks.

Turn Around Time (Check)
- Same Day ☐
- 24 Hours ☐
- 48 Hours ☐
- 3 Days ☐
- 5 Days ☐

Comments: Standard TAT

Relinquished by:	Date	Time	Shipped via:	Date	Time
[signature]	1-14-19	1300	UPS	1-14-19	
Relinquished by:	Date	Time	Received by:	Date	Time
			[signature]	1/15/19	0945

January 29, 2019

Eric Snelling and Robert Vander Weele
Padre Associates, Inc.
369 Pacific Street
San Luis Obispo, CA 93401
Tel: (805) 786-2650
Fax:(805) 786-2651

ELAP No.: 1838
CSDLAC No.: 10196
ORELAP No.: CA300003

Re: ATL Work Order Number : 1900169

Client Reference : 1601-3091/ Avila Beach Drive/U.S. 101 Interchange Project

Enclosed are the results for sample(s) received on January 15, 2019 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated on the enclosed chain of custody in accordance with applicable laboratory certifications. The laboratory results contained in this report specifically pertains to the sample(s) submitted.

Thank you for the opportunity to serve the needs of your company. If you have any questions, please feel free to contact me or your Project Manager.

Sincerely,

Eddie Rodriguez
Laboratory Director

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091/ Avila Beach Drive/U.S. 101 Ir
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 01/29/2019

SUMMARY OF SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
HA18-1	1900169-08	Soil	1/11/19 9:33	1/15/19 9:45
HA18-2	1900169-09	Soil	1/11/19 9:38	1/15/19 9:45
HA20-0	1900169-13	Soil	1/11/19 10:23	1/15/19 9:45
HA21-0	1900169-16	Soil	1/11/19 10:38	1/15/19 9:45
HA22-0	1900169-19	Soil	1/11/19 10:52	1/15/19 9:45
HA22-1	1900169-20	Soil	1/11/19 10:54	1/15/19 9:45
HA22-2	1900169-21	Soil	1/11/19 10:57	1/15/19 9:45
HA23-0	1900169-22	Soil	1/11/19 11:05	1/15/19 9:45

CASE NARRATIVE

Results were J-flagged. "J" is used to flag those results that are between the PQL (Practical Quantitation Limit) and the calculated MDL (Method Detection Limit). Results that are "J" flagged are estimated values since it becomes difficult to accurately quantitate the analyte near the MDL.

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091/ Avila Beach Drive/U.S. 101 Ir
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 01/29/2019

Client Sample ID HA18-1

Lab ID: 1900169-08

STLC Metals by ICP-AES by EPA 6010B — **Analyst: KEK**

Analyte	Result (mg/L)	PQL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**2.4**	1.0	20	B9A0626	01/28/2019	01/28/19 11:48	D1

pH by EPA 9045C — **Analyst: LV**

Analyte	Result (pH Units)	PQL (pH Units)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
pH	**6.3**	0.10	1	B9A0572	01/25/2019	01/25/19 16:00	

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091/ Avila Beach Drive/U.S. 101 Ir
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 01/29/2019

Client Sample ID HA18-2

Lab ID: 1900169-09

Total Metals by ICP-AES EPA 6010B

Analyst: GO

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**41**	1.0	0.18	1	B9A0622	01/28/2019	01/28/19 17:13	

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091/ Avila Beach Drive/U.S. 101 Ir
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 01/29/2019

Client Sample ID HA20-0

Lab ID: 1900169-13

STLC Metals by ICP-AES by EPA 6010B **Analyst: KEK**

Analyte	Result (mg/L)	PQL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**2.2**	1.0	20	B9A0626	01/28/2019	01/28/19 11:49	D1

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091/ Avila Beach Drive/U.S. 101 Ir
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 01/29/2019

Client Sample ID HA21-0

Lab ID: 1900169-16

STLC Metals by ICP-AES by EPA 6010B **Analyst: KEK**

Analyte	Result (mg/L)	PQL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**2.5**	1.0	20	B9A0626	01/28/2019	01/28/19 11:50	D1

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091/ Avila Beach Drive/U.S. 101 Ir
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 01/29/2019

Client Sample ID HA22-0

Lab ID: 1900169-19

TCLP Metals by ICP-AES EPA 6010B — **Analyst: KEK**

Analyte	Result (mg/L)	PQL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	ND	0.25	5	B9A0615	01/26/2019	01/28/19 13:24	D1

STLC Metals by ICP-AES by EPA 6010B — **Analyst: KEK**

Analyte	Result (mg/L)	PQL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**2.3**	1.0	20	B9A0626	01/28/2019	01/28/19 11:52	D1

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091/ Avila Beach Drive/U.S. 101 Ir
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 01/29/2019

Client Sample ID HA22-1

Lab ID: 1900169-20

TCLP Metals by ICP-AES EPA 6010B

Analyst: KEK

Analyte	Result (mg/L)	PQL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	ND	0.25	5	B9A0615	01/26/2019	01/28/19 13:25	D1

STLC Metals by ICP-AES by EPA 6010B

Analyst: KEK

Analyte	Result (mg/L)	PQL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**2.3**	1.0	20	B9A0626	01/28/2019	01/28/19 11:53	D1

pH by EPA 9045C

Analyst: LV

Analyte	Result (pH Units)	PQL (pH Units)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
pH	**4.7**	0.10	1	B9A0572	01/25/2019	01/25/19 16:00	

Certificate of Analysis

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369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 01/29/2019

Client Sample ID HA22-2

Lab ID: 1900169-21

Total Metals by ICP-AES EPA 6010B

Analyst: GO

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**12**	1.0	0.18	1	B9A0622	01/28/2019	01/28/19 17:14	

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091/ Avila Beach Drive/U.S. 101 Ir
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 01/29/2019

Client Sample ID HA23-0

Lab ID: 1900169-22

STLC Metals by ICP-AES by EPA 6010B **Analyst: KEK**

Analyte	Result (mg/L)	PQL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**2.4**	1.0	20	B9A0626	01/28/2019	01/28/19 11:54	D1

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091/ Avila Beach Drive/U.S. 101 Ir
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 01/29/2019

QUALITY CONTROL SECTION

Total Metals by ICP-AES EPA 6010B - Quality Control

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B9A0622 - EPA 3050B_S										
Blank (B9A0622-BLK1)					Prepared: 1/28/2019 Analyzed: 1/28/2019					
Lead	ND	1.0	0.18							
LCS (B9A0622-BS1)					Prepared: 1/28/2019 Analyzed: 1/28/2019					
Lead	44.7790	1.0	0.18	50.0000		89.6	80 - 120			
Duplicate (B9A0622-DUP1)			**Source: 1900295-01**		Prepared: 1/28/2019 Analyzed: 1/28/2019					
Lead	ND	12	2.2		ND			NR	20	
Duplicate (B9A0622-DUP2)			**Source: 1900296-01**		Prepared: 1/28/2019 Analyzed: 1/28/2019					
Lead	ND	5.9	1.1		4.10602			NR	20	

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091/ Avila Beach Drive/U.S. 101 Ir
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 01/29/2019

TCLP Metals by ICP-AES EPA 6010B - Quality Control

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B9A0615 - EPA 3010A_S										
Blank (B9A0615-BLK1)					Prepared: 1/26/2019 Analyzed: 1/28/2019					
Lead	ND	0.050	0.0047							
Blank (B9A0615-BLK2)					Prepared: 1/26/2019 Analyzed: 1/28/2019					
Lead	ND	0.050	0.0047							
LCS (B9A0615-BS1)					Prepared: 1/26/2019 Analyzed: 1/28/2019					
Lead	0.889770	0.050	0.0047	1.00000		89.0	80 - 120			
Duplicate (B9A0615-DUP1)			**Source: 1804945-03**		Prepared: 1/26/2019 Analyzed: 1/28/2019					
Lead	0.078072	0.25	0.024		0.076824			1.61	20	
Duplicate (B9A0615-DUP2)			**Source: 1900051-11**		Prepared: 1/26/2019 Analyzed: 1/28/2019					
Lead	0.066839	0.25	0.024		0.066593			0.368	20	
Matrix Spike (B9A0615-MS1)			**Source: 1804945-03**		Prepared: 1/26/2019 Analyzed: 1/28/2019					
Lead	2.25198	0.25	0.024	2.50000	0.076824	87.0	59 - 123			
Matrix Spike (B9A0615-MS2)			**Source: 1900051-11**		Prepared: 1/26/2019 Analyzed: 1/28/2019					
Lead	2.42582	0.25	0.024	2.50000	0.066593	94.4	59 - 123			
Matrix Spike Dup (B9A0615-MSD1)			**Source: 1804945-03**		Prepared: 1/26/2019 Analyzed: 1/28/2019					
Lead	2.21634	0.25	0.024	2.50000	0.076824	85.6	59 - 123	1.59	20	

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091/ Avila Beach Drive/U.S. 101 Ir
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 01/29/2019

STLC Metals by ICP-AES by EPA 6010B - Quality Control

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B9A0626 - STLC_S Extraction										
Blank (B9A0626-BLK1)					Prepared: 1/28/2019 Analyzed: 1/28/2019					
Lead	ND	1.0	0.094							
Blank (B9A0626-BLK2)					Prepared: 1/28/2019 Analyzed: 1/28/2019					
Lead	ND	1.0	0.094							
LCS (B9A0626-BS1)					Prepared: 1/28/2019 Analyzed: 1/28/2019					
Lead	1.84792			2.00000		92.4	80 - 120			
Duplicate (B9A0626-DUP1)			**Source: 1804130-11RE1**		Prepared: 1/28/2019 Analyzed: 1/28/2019					
Lead	7.90756	1.0	0.094		7.33438			7.52	20	
Duplicate (B9A0626-DUP2)			**Source: 1900095-07**		Prepared: 1/28/2019 Analyzed: 1/28/2019					
Lead	2.71824	1.0	0.094		2.93111			7.54	20	
Duplicate (B9A0626-DUP3)			**Source: 1900275-03**		Prepared: 1/28/2019 Analyzed: 1/28/2019					
Lead	ND	1.0	0.094		ND			NR	20	
Matrix Spike (B9A0626-MS1)			**Source: 1804130-11RE1**		Prepared: 1/28/2019 Analyzed: 1/28/2019					
Lead	9.03725			2.50000	7.33438	68.1	70 - 130			M1
Matrix Spike (B9A0626-MS2)			**Source: 1900095-07**		Prepared: 1/28/2019 Analyzed: 1/28/2019					
Lead	4.91191			2.50000	2.93111	79.2	70 - 130			
Matrix Spike Dup (B9A0626-MSD1)			**Source: 1804130-11RE1**		Prepared: 1/28/2019 Analyzed: 1/28/2019					
Lead	9.18115			2.50000	7.33438	73.9	70 - 130	1.58	20	

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091/ Avila Beach Drive/U.S. 101 Ir
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 01/29/2019

pH by EPA 9045C - Quality Control

Analyte	Result (pH Units)	PQL (pH Units)	MDL (pH Units)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B9A0572 - Prep_WC1_S										
Duplicate (B9A0572-DUP1)			**Source: 1900260-04**		Prepared: 1/25/2019 Analyzed: 1/25/2019					
pH	7.67000	0.10	0.10		7.81000			1.81	20	

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091/ Avila Beach Drive/U.S. 101 Ir
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 01/29/2019

Notes and Definitions

M1	Matrix spike recovery outside of acceptance limit. The analytical batch was validated by the laboratory control sample.
D1	Sample required dilution due to possible matrix interference.
ND	Analyte is not detected at or above the Practical Quantitation Limit (PQL). When client requests quantitation against MDL, analyte is not detected at or above the Method Detection Limit (MDL)
PQL	Practical Quantitation Limit
MDL	Method Detection Limit
NR	Not Reported
RPD	Relative Percent Difference
CA2	CA-ELAP (CDPH)
OR1	OR-NELAP (OSPHL)

Notes:
(1) The reported MDL and PQL are based on prep ratio variation and analytical dilution.
(2) The suffix [2C] of specific analytes signifies that the reported result is taken from the instrument's second column.
(3) Results are wet unless otherwise specified.

Dominic Mata

From: Robert Vander Weele <rvanderweele@PadreInc.com>
Sent: Tuesday, January 22, 2019 11:06 AM
To: Dominic Mata
Subject: Re: Results/Invoice - 1601-3091 - Avila Beach Drive/U.S. 101 Interchange (ATL# 1900169)

Hi Dominic,

Please add the following analysis to the work order:

STLC Analysis for lead
- HA18-1
- HA20-0
- HA21-0
- HA22-0
- HA22-1
- HA23-0

TCLP Analysis for Lead
- HA22-0
- HA22-1

Total Lead
- HA18-2
- HA22-2

Thanks,
Robert

Robert Vander Weele P.G.
Project Manager
Padre Associates, Inc.
Mobile: 805 748-8605

From: Dominic Mata <dominic@atlglobal.com>
Sent: Monday, January 21, 2019 3:47 PM
To: Eric Snelling; Robert Vander Weele
Cc: customer.relations@atlglobal.com
Subject: Results/Invoice - 1601-3091 - Avila Beach Drive/U.S. 101 Interchange (ATL# 1900169)

Good afternoon Eric/Robert,

Please find your results and invoice for the above project attached. If I can further assist, please let me know.

Thanks,

Dominic Mata

From: Robert Vander Weele <rvanderweele@PadreInc.com>
Sent: Thursday, January 24, 2019 11:24 AM
To: Dominic Mata
Cc: Carmen Aguila; customer.relations@atlglobal.com
Subject: RE: Results/Invoice - 1601-3091 - Avila Beach Drive/U.S. 101 Interchange (ATL# 1900169)

Hi Dominic,

Please run the following samples for pH by method 9045C (3-day TAT):

- HA18-1
- HA22-1

Thanks,
Robert

Robert Vander Weele P.G. 8241
Project Manager / Geologist
Padre Associates, Inc.
369 Pacific Street
San Luis Obispo, CA 93401
Tel: 805 786-2650 Ext. 34
Fax: 805 786-2651

From: Dominic Mata <dominic@atlglobal.com>
Sent: Thursday, January 24, 2019 10:47 AM
To: Robert Vander Weele <rvanderweele@PadreInc.com>
Cc: Carmen Aguila <Carmen@atlglobal.com>; customer.relations@atlglobal.com
Subject: RE: Results/Invoice - 1601-3091 - Avila Beach Drive/U.S. 101 Interchange (ATL# 1900169)

Hi Robert,

Based on your Preferred Price Guide, results by Tuesday would be a 3-day TAT which is a 25% surcharge. If I can further assist, please let me know.

Dominic

From: Robert Vander Weele <rvanderweele@PadreInc.com>
Sent: Thursday, January 24, 2019 10:36 AM
To: Dominic Mata <dominic@atlglobal.com>
Cc: Carmen Aguila <Carmen@atlglobal.com>; customer.relations@atlglobal.com
Subject: RE: Results/Invoice - 1601-3091 - Avila Beach Drive/U.S. 101 Interchange (ATL# 1900169)

Is this cost for standard TAT? What would the cost be to have the data by next Tuesday?

ADVANCED TECHNOLOGY LABORATORIES

April 08, 2019

Eric Snelling and Robert Vander Weele
Padre Associates, Inc.
369 Pacific Street
San Luis Obispo, CA 93401
Tel: (805) 786-2650
Fax:(805) 786-2651

ELAP No.: 1838
CSDLAC No.: 10196
ORELAP No.: CA300003

Re: ATL Work Order Number : 1900169

Client Reference : 1601-3091/ Avila Beach Drive/U.S. 101 Interchange Project

Enclosed are the results for sample(s) received on January 15, 2019 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated on the enclosed chain of custody in accordance with applicable laboratory certifications. The laboratory results contained in this report specifically pertains to the sample(s) submitted.

Thank you for the opportunity to serve the needs of your company. If you have any questions, please feel free to contact me or your Project Manager.

Sincerely,

Eddie Rodriguez
Laboratory Director

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091/ Avila Beach Drive/U.S. 101 Ir
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 04/08/2019

SUMMARY OF SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
HA16-2	1900169-03	Soil	1/11/19 9:03	1/15/19 9:45
HA17-2	1900169-06	Soil	1/11/19 9:17	1/15/19 9:45
HA19-2	1900169-12	Soil	1/11/19 9:54	1/15/19 9:45
HA20-2	1900169-15	Soil	1/11/19 10:30	1/15/19 9:45
HA21-2	1900169-18	Soil	1/11/19 10:44	1/15/19 9:45
HA23-2	1900169-24	Soil	1/11/19 11:10	1/15/19 9:45

CASE NARRATIVE

Results were J-flagged. "J" is used to flag those results that are between the PQL (Practical Quantitation Limit) and the calculated MDL (Method Detection Limit). Results that are "J" flagged are estimated values since it becomes difficult to accurately quantitate the analyte near the MDL.

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091/ Avila Beach Drive/U.S. 101 Ir
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 04/08/2019

Client Sample ID HA16-2

Lab ID: 1900169-03

Total Metals by ICP-AES EPA 6010B

Analyst: GO

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**5.9**	1.0	0.18	1	B9D0302	04/06/2019	04/08/19 11:28	

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091/ Avila Beach Drive/U.S. 101 Ir
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 04/08/2019

Client Sample ID HA17-2

Lab ID: 1900169-06

Total Metals by ICP-AES EPA 6010B

Analyst: GO

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**3.5**	1.0	0.18	1	B9D0302	04/06/2019	04/08/19 11:32	

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091/ Avila Beach Drive/U.S. 101 Ir
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 04/08/2019

Client Sample ID HA19-2

Lab ID: 1900169-12

Total Metals by ICP-AES EPA 6010B

Analyst: GO

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**1.8**	1.0	0.18	1	B9D0302	04/06/2019	04/08/19 11:33	

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091/ Avila Beach Drive/U.S. 101 Ir
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 04/08/2019

Client Sample ID HA20-2

Lab ID: 1900169-15

Total Metals by ICP-AES EPA 6010B

Analyst: GO

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**22**	1.0	0.18	1	B9D0302	04/06/2019	04/08/19 11:34	

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091/ Avila Beach Drive/U.S. 101 Ir
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 04/08/2019

Client Sample ID HA21-2

Lab ID: 1900169-18

Total Metals by ICP-AES EPA 6010B

Analyst: GO

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**2.6**	1.0	0.18	1	B9D0302	04/06/2019	04/08/19 11:38	

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091/ Avila Beach Drive/U.S. 101 Ir
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 04/08/2019

Client Sample ID HA23-2

Lab ID: 1900169-24

Total Metals by ICP-AES EPA 6010B

Analyst: GO

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**14**	1.0	0.18	1	B9D0302	04/06/2019	04/08/19 11:39	

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091/ Avila Beach Drive/U.S. 101 Ir
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 04/08/2019

QUALITY CONTROL SECTION

Total Metals by ICP-AES EPA 6010B - Quality Control

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B9D0302 - EPA 3050B_S										
Blank (B9D0302-BLK1)					Prepared: 4/6/2019 Analyzed: 4/8/2019					
Lead	ND	1.0	0.18							
LCS (B9D0302-BS1)					Prepared: 4/6/2019 Analyzed: 4/8/2019					
Lead	43.5967	1.0	0.18	50.0000		87.2	80 - 120			
Matrix Spike (B9D0302-MS1)			**Source: 1900169-03**		Prepared: 4/6/2019 Analyzed: 4/8/2019					
Lead	85.3342	1.0	0.18	125.000	5.92083	63.5	29 - 126			
Matrix Spike Dup (B9D0302-MSD1)			**Source: 1900169-03**		Prepared: 4/6/2019 Analyzed: 4/8/2019					
Lead	89.0203	1.0	0.18	125.000	5.92083	66.5	29 - 126	4.23	20	

Certificate of Analysis

Padre Associates, Inc.	Project Number : 1601-3091/ Avila Beach Drive/U.S. 101 Ir
369 Pacific Street	Report To : Eric Snelling and Robert Vander Weele
San Luis Obispo , CA 93401	Reported : 04/08/2019

Notes and Definitions

ND	Analyte is not detected at or above the Practical Quantitation Limit (PQL). When client requests quantitation against MDL, analyte is not detected at or above the Method Detection Limit (MDL)
PQL	Practical Quantitation Limit
MDL	Method Detection Limit
NR	Not Reported
RPD	Relative Percent Difference
CA2	CA-ELAP (CDPH)
OR1	OR-NELAP (OSPHL)

Notes:
(1) The reported MDL and PQL are based on prep ratio variation and analytical dilution.
(2) The suffix [2C] of specific analytes signifies that the reported result is taken from the instrument's second column.
(3) Results are wet unless otherwise specified.

Dominic Mata

From: Eric Snelling <esnelling@padreinc.com>
Sent: Friday, April 5, 2019 4:08 PM
To: Dominic Mata
Cc: Robert Vander Weele; Carmen Aguila; customer.relations@atlglobal.com
Subject: RE: Add'l Results/Invoice - 1601-3091 - Avila Beach Drive/U.S. 101 Interchange (ATL# 1900169)

Dominic:
Please analyze the following samples that were previously on hold from Order No. 1900169: -03, -06, -12, -15, -18, and -24.
Please analyze these samples for total lead by EPA 6010B on a 24-hr. rush TAT.
Thanks,
Eric Snelling

Eric Snelling | Principal
Padre Associates, Inc.
369 Pacific Street
San Luis Obispo, CA 93401
(805) 786-2650, ext. 12
Fax (805) 786-2651
Cell (805) 878-6479
esnelling@padreinc.com
www.padreinc.com

From: Dominic Mata <Dominic.Mata@atlglobal.com>
Sent: Friday, April 05, 2019 12:39 PM
To: Eric Snelling <esnelling@padreinc.com>
Cc: Robert Vander Weele <rvanderweele@PadreInc.com>; Carmen Aguila <Carmen.Aguila@atlglobal.com>; customer.relations@atlglobal.com
Subject: RE: Add'l Results/Invoice - 1601-3091 - Avila Beach Drive/U.S. 101 Interchange (ATL# 1900169)

Hi Eric,

Our standard TAT is 5-days. However we do offer 4, 3, 2, or 1-day Rush TATs.

Dominic

From: Eric Snelling <esnelling@padreinc.com>
Sent: Friday, April 5, 2019 12:27 PM
To: Dominic Mata <Dominic.Mata@atlglobal.com>
Cc: Robert Vander Weele <rvanderweele@PadreInc.com>; Carmen Aguila <Carmen.Aguila@atlglobal.com>; customer.relations@atlglobal.com
Subject: RE: Add'l Results/Invoice - 1601-3091 - Avila Beach Drive/U.S. 101 Interchange (ATL# 1900169)

Thanks, please remind me - what the turn-around would be for additional total lead analyses?

APPENDIX C
STATISTICAL ANALYSIS OUTPUT

UCL Statistics for Uncensored Full Data Sets

User Selected Options	
Date/Time of Computation	ProUCL 5.14/9/2019 10:03:20 AM
From File	total_lead-data set_a.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Total Lead

General Statistics

Total Number of Observations	57	Number of Distinct Observations	48
		Number of Missing Observations	0
Minimum	0.84	Mean	39.77
Maximum	300	Median	24
SD	53.96	Std. Error of Mean	7.147
Coefficient of Variation	1.357	Skewness	2.768

Normal GOF Test

Shapiro Wilk Test Statistic	0.696	**Shapiro Wilk GOF Test**
5% Shapiro Wilk P Value	6.328E-15	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.238	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.117	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	51.73	95% Adjusted-CLT UCL (Chen-1995)	54.33
		95% Modified-t UCL (Johnson-1978)	52.16

Gamma GOF Test

A-D Test Statistic	0.558	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.794	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.104	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.123	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.735	k star (bias corrected MLE)	0.708
Theta hat (MLE)	54.09	Theta star (bias corrected MLE)	56.15
nu hat (MLE)	83.83	nu star (bias corrected)	80.75
MLE Mean (bias corrected)	39.77	MLE Sd (bias corrected)	47.26
		Approximate Chi Square Value (0.05)	61.04
Adjusted Level of Significance	0.0458	Adjusted Chi Square Value	60.6

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	52.61	95% Adjusted Gamma UCL (use when n<50)	53

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.966	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk P Value	0.224	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.1	**Lilliefors Lognormal GOF Test**

55	5% Lilliefors Critical Value					0.117	Data appear Lognormal at 5% Significance Level					
56	**Data appear Lognormal at 5% Significance Level**											
57												
58	**Lognormal Statistics**											
59	Minimum of Logged Data					-0.174	Mean of logged Data					2.867
60	Maximum of Logged Data					5.704	SD of logged Data					1.412
61												
62	**Assuming Lognormal Distribution**											
63	95% H-UCL					83.59	90% Chebyshev (MVUE) UCL					79.96
64	95% Chebyshev (MVUE) UCL					95.32	97.5% Chebyshev (MVUE) UCL					116.6
65	99% Chebyshev (MVUE) UCL					158.5						
66												
67	**Nonparametric Distribution Free UCL Statistics**											
68	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
69												
70	**Nonparametric Distribution Free UCLs**											
71	95% CLT UCL					51.53	95% Jackknife UCL					51.73
72	95% Standard Bootstrap UCL					51.38	95% Bootstrap-t UCL					55.87
73	95% Hall's Bootstrap UCL					57.46	95% Percentile Bootstrap UCL					52.2
74	95% BCA Bootstrap UCL					54.26						
75	90% Chebyshev(Mean, Sd) UCL					61.21	95% Chebyshev(Mean, Sd) UCL					70.93
76	97.5% Chebyshev(Mean, Sd) UCL					84.41	99% Chebyshev(Mean, Sd) UCL					110.9
77												
78	**Suggested UCL to Use**											
79	95% Approximate Gamma UCL					52.61						
80												
81	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
82	Recommendations are based upon data size, data distribution, and skewness.											
83	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
84	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
85												

UCL Statistics for Uncensored Full Data Sets

User Selected Options	
Date/Time of Computation	ProUCL 5.14/10/2019 8:43:16 PM
From File	STLC_lead-data set_a.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

STLC Lead

General Statistics

Total Number of Observations	57	Number of Distinct Observations	43
		Number of Missing Observations	0
Minimum	0.084	Mean	2.291
Maximum	15	Median	2.1
SD	2.455	Std. Error of Mean	0.325
Coefficient of Variation	1.071	Skewness	3.043

Normal GOF Test

Shapiro Wilk Test Statistic	0.724	**Shapiro Wilk GOF Test**
5% Shapiro Wilk P Value	1.085E-13	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.184	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.117	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	2.835	95% Adjusted-CLT UCL (Chen-1995)	2.966
		95% Modified-t UCL (Johnson-1978)	2.857

Gamma GOF Test

A-D Test Statistic	0.812	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.777	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.102	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.121	Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.087	k star (bias corrected MLE)	1.042
Theta hat (MLE)	2.107	Theta star (bias corrected MLE)	2.2
nu hat (MLE)	124	nu star (bias corrected)	118.8
MLE Mean (bias corrected)	2.291	MLE Sd (bias corrected)	2.245
		Approximate Chi Square Value (0.05)	94.6
Adjusted Level of Significance	0.0458	Adjusted Chi Square Value	94.04

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	2.877	95% Adjusted Gamma UCL (use when n<50)	2.894

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.937	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk P Value	0.00771	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.159	**Lilliefors Lognormal GOF Test**

55	5% Lilliefors Critical Value					0.117	Data Not Lognormal at 5% Significance Level					
56	**Data Not Lognormal at 5% Significance Level**											
57												
58	**Lognormal Statistics**											
59	Minimum of Logged Data					-2.477	Mean of logged Data					0.303
60	Maximum of Logged Data					2.708	SD of logged Data					1.155
61												
62	**Assuming Lognormal Distribution**											
63	95% H-UCL					3.926	90% Chebyshev (MVUE) UCL					4.049
64	95% Chebyshev (MVUE) UCL					4.71	97.5% Chebyshev (MVUE) UCL					5.629
65	99% Chebyshev (MVUE) UCL					7.433						
66												
67	**Nonparametric Distribution Free UCL Statistics**											
68	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
69												
70	**Nonparametric Distribution Free UCLs**											
71	95% CLT UCL					2.826	95% Jackknife UCL					2.835
72	95% Standard Bootstrap UCL					2.835	95% Bootstrap-t UCL					3.08
73	95% Hall's Bootstrap UCL					3.46	95% Percentile Bootstrap UCL					2.829
74	95% BCA Bootstrap UCL					2.983						
75	90% Chebyshev(Mean, Sd) UCL					3.267	95% Chebyshev(Mean, Sd) UCL					3.709
76	97.5% Chebyshev(Mean, Sd) UCL					4.322	99% Chebyshev(Mean, Sd) UCL					5.527
77												
78	**Suggested UCL to Use**											
79	95% Approximate Gamma UCL					2.877						
80												
81	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
82	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
83												
84	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
85	Recommendations are based upon data size, data distribution, and skewness.											
86	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
87	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
88												

APPENDIX E - CALCULATIONS

Yeh and Associates, Inc.
Geotechnical • Geological • Construction Services

Project No. **216-423**
Project: **Avila Beach Drive Interchange Improvements**
Comments: **Caltrans Borings**
Performed by: **J. Cravens**
Reference: Youd et al (2001), "Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshops on Evaluation of Liquefaction Resistance of Soils".

Enter Data in **RED** Bold Spaces

γ_w	Magnitude (Mw)	MSF	a_{max} (g)	Hammer Efficiency	Atmospheric Pressure (100 =metric, 2000=English)
62.4	6.7	1.34	0.39	75	2000

Drill Hole	Top Depth (ft)	Depth to GWT (ft)	Surface Water Depth (ft)	Sample Depth (ft)	Unit Wt. (pcf)	Lined ? (1=Yes, 2= No)	Sample OD (in)	Nfield	Field SPT N_{60}	Nspt (for Cetin)	(12) (N'60)cs	N'60	σ ' (psf)	fines	CSR	Liquefied Residual Strength	Friction Angle (degrees)	F.S.	Soil Type
B-1-03	5.6	27.6	0	6.6	110	2	2	41	51	41	80	77	726	10	0.50	--	46	Non-Liq	SW
	10.5	27.6	0	11.5	110	2	2	10	13	10	15	14	1265	10	0.17	--	--	Non-Liq	CL
	15.5	27.6	0	16.5	110	2	2	19	24	19	28	25	1815	15	0.34	--	33	Non-Liq	SM
	20.4	27.6	0	21.4	110	2	2	21	26	21	30	28	2354	15	0.43	--	--	Non-Liq	CL
	25.3	27.6	0	26.3	110	2	2	31	39	31	40	37	2893	15	0.50	--	36	Non-Liq	SM
	30.2	27.6	0	31.2	110	2	2	51	64	51	62	57	3207	15	0.50	64608	41	4.40	GC
	35.1	27.6	0	36.1	110	2	2	30	38	30	37	34	3441	15	0.50	5431	36	2.65	SM
	40.1	27.6	0	41.1	110	2	2	14	18	14	17	15	3679	15	0.19	725	31	1.14	ML
	45.0	27.6	0	46	110	2	2	9	11	9	11	10	3912	15	0.11	398	29	0.73	ML
	49.9	27.6	0	50.9	110	2	2	7	9	7	8	7	4145	15	0.09	318	29	0.53	ML
B-2-03	5.0	44.5	0	6	110	2	2	3	4	3	6	6	660	5	0.08	--	28	Non-Liq	GP
	10.0	44.5	0	11	110	2	2	12	15	12	18	17	1210	5	0.19	--	31	Non-Liq	SW
	15.0	44.5	0	16	110	2	2	21	26	21	29	29	1760	5	0.43	--	34	Non-Liq	GP
	20.0	44.5	0	21	110	2	2	35	44	35	50	46	2310	15	0.50	--	39	Non-Liq	SM
	25.0	44.5	0	26	110	2	2	40	50	40	50	48	2860	10	0.50	--	39	Non-Liq	GP-GM
	30.0	44.5	0	31	110	2	2	13	16	13	16	14	3410	15	0.17	--	31	Non-Liq	SM
	35.0	44.5	0	36	110	2	2	50	63	50	63	53	3960	80	0.50	--	40	Non-Liq	SPg
	40.0	44.5	0	41	110	2	2	10	13	10	11	10	4510	15	0.12	--	29	Non-Liq	SM
	45.0	44.5	0	46	110	2	2	17	21	17	18	16	4966	15	0.19	930	31	1.63	SM
	50.0	44.5	0	51	110	2	2	8	10	8	9	7	5204	15	0.09	369	29	0.72	ML

Note: No correction for gravel because interbeds of sand are noted.

Clean sands: 1% Fines
Borderline clean/dirty sands: 8% Fines
Dirty sands: 15% fines
Unless measured in laboratory

Yeh and Associates, Inc.
Geotechnical • Geological • Construction Services

Project No. **216-423**
Project: **Avila Beach Drive Interchange Improvements**
Comments: **Yeh Borings**
Performed by: **J. Cravens**
Reference: Youd et al (2001), "Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshops on Evaluation of Liquefaction Resistance of Soils".

Enter Data in **RED** Bold Spaces

γ_w	Magnitude (Mw)	MSF	a_{max} (g)	Hammer Efficiency	Atmospheric Pressure (100 =metric, 2000=English)
62.4	6.7	1.34	0.39	75	2000

Drill Hole	Top Depth (ft)	Depth to GWT (ft)	Surface Water Depth (ft)	Sample Depth (ft)	Unit Wt. (pcf)	Lined ? (1=Yes, 2= No)	Sample OD (in)	Nfield	Field SPT N_{60}	Nspt (for Cetin)	(12) (N'60)cs	N'60	σ ' (psf)	fines	CSR	Liquefied Residual Strength	Friction Angle (degrees)	F.S.	Soil Type
19W-01	2	43	0	3	110	1	3	10	8	7	15	13	330	26	0.17	--	30	Non-Liq	SC
	5	43	0	6	110	1	3	4	3	3	6	4	660	26	0.08	--	28	Non-Liq	SC
	8.5	43	0	9.5	110	2	2	100	125	100	173	156	1045	26	0.50	--	66	Non-Liq	SC
	13.5	43	0	14.5	110	1	3	100	83	67	89	79	1595	26	0.50	--	47	Non-Liq	SC
	18.5	43	0	19.5	110	2	2	41	51	41	56	50	2145	22	0.50	--	40	Non-Liq	SC
	23.5	43	0	24.5	110	1	3	100	83	67	79	68	2695	50	0.50	--	--	Non-Liq	CL
	28.5	43	0	29.5	110	2	2	100	125	100	116	112	3245	8	0.50	--	55	Non-Liq	SP-SC
	33.5	43	0	34.5	110	1	3	100	83	67	71	60	3795	50	0.50	--	--	Non-Liq	CL
19W-02	2	54	0	3	97	1	3	49	41	33	63	61	290	6	0.50	--	42	Non-Liq	GW-GC
	3.5	54	0	4.5	97	1	3	31	26	21	40	39	435	6	0.50	--	37	Non-Liq	GW-GC
	8.5	54	0	9.5	97	2	2	100	125	100	170	166	919	6	0.50	--	68	Non-Liq	GW-GC
	13.5	54	0	14.5	99	1	3	89	74	59	78	74	1442	12	0.50	--	46	Non-Liq	SW-SC
	18.5	54	0	19.5	99	2	2	100	125	100	136	129	1939	12	0.50	--	59	Non-Liq	SW-SC
	23.5	54	0	24.5	106	1	3	100	83	67	81	69	2607	50	0.50	--	--	Non-Liq	CH
	28.5	54	0	29.5	106	2	2	26	33	26	36	30	3127	50	0.50	--	--	Non-Liq	CH
	33.5	54	0	34.5	115	1	3	44	37	29	31	26	3956	50	0.50	--	--	Non-Liq	CL
	38.5	54	0	39.5	110	2	2	29	36	29	32	30	4345	15	0.50	--	34	Non-Liq	SC
19W-03	2	46	0	3	115	1	3	66	55	44	96	83	345	57	0.50	--	--	Non-Liq	CH
	4.5	46	0	5.5	106	1	3	100	83	67	123	116	586	15	0.50	--	56	Non-Liq	SC
	8.5	46	0	9.5	110	2	2	62	78	62	112	96	1045	50	0.50	--	--	Non-Liq	CH
	13.5	46	0	14.5	110	1	3	45	38	30	39	36	1595	15	0.50	--	36	Non-Liq	SC
	18.5	46	0	19.5	110	2	2	37	46	37	48	46	2145	12	0.50	--	38	Non-Liq	SC
	23.5	46	0	24.5	115	1	3	20	17	13	17	13	2818	50	0.18	--	--	Non-Liq	CL
	28.5	46	0	29.5	110	2	2	58	73	58	67	65	3245	8	0.50	--	43	Non-Liq	SP-SC
	33.5	46	0	34.5	109	1	3	38	32	25	25	23	3768	15	0.29	--	33	Non-Liq	GC
	38.5	46	0	39.5	110	2	2	100	125	100	118	102	4345	50	0.50	--	--	Non-Liq	CH

Note: No correction for gravel because interbeds of sand are noted.

Clean sands: 1% Fines
Borderline clean/dirty sands: 8% Fines
Dirty sands: 15% fines
Unless measured in laboratory

Yeh and Associates, Inc.
Geotechnical • Geological • Construction Services

Flexible Pavement Thickness Design - Spreadsheet

Client Name:	Wallace Group GDR Calcs
Project Number:	216-423
Project Name:	Avila Beach Drive at US 101 Interchange Improvements
Date:	September 28, 2022
Location:	Avila Beach, CA

Ref. *Caltrans Highway Design Manual, Section 630-4, November 2018*
Subgrade Enhancement Geosynthetic Design and Construction Guide, January 14, 2013

per Caltrans thicnkesses are rounded to nearest 0.05 ft. Values midway between the 0.05' increment are rounded up. Recommended min. AC thickness is 0.25'. Caltrans uses a min. 0.15' AC thickness. Caltrans uses a min. 0.35' AB or AS thickness. Subgrade R-values should be limited to no more than 50.

Enter design-life for TI (if >20 special enhancements apply, see below)

20

Enter Upto 3 values of T.I

1	5
2	9
3	12.5

Enter R values:

Subgrade:	45
Agg. Base	78
Agg. Subbase	60

Min thickness of AB Layer:

0.35

Thickness in feet	T.I. =	5	GE_{min}=	0.88	
	Full Depth AC	AC/AB	AC/AB/ASB	ATPB	CTPB
Thickness of AC	0.40	0.25	0.25	0.25	0.25
Thickness of TPB	-	-	-	0.25	0.35
Thickness of AB	-	0.35	0.35	0.35	0.35
Thickness of ASB	-	-	0.35	0.35	0.35
GE	1.01	1.02	1.37	1.72	1.96

Thickness in feet	T.I. =	9	GE_{min}=	1.58	
	Full Depth AC	AC/AB	AC/AB/ASB	ATPB	CTPB
Thickness of AC	0.80	0.45	0.45	0.55	0.55
Thickness of TPB	-	-	-	0.25	0.35
Thickness of AB	-	0.65	0.45	0.35	0.35
Thickness of ASB	-	-	0.35	0.35	0.35
GE	1.72	1.57	1.70	2.15	2.39

Thickness in feet	T.I. =	12.5	GE_{min}=	2.20	
	Full Depth AC	AC/AB	AC/AB/ASB	ATPB	CTPB
Thickness of AC	1.10	0.65	0.65	0.80	0.80
Thickness of TPB	-	-	-	0.25	0.35
Thickness of AB	-	1.00	0.65	0.35	0.35
Thickness of ASB	-	-	0.40	0.35	0.35
GE	2.26	2.21	2.22	2.57	2.81

Yeh and Associates, Inc.
Geotechnical • Geological • Construction Services

Flexible Pavement Thickness Design - Spreadsheet

Client Name:	Wallace Group GDR Calcs
Project Number:	216-423
Project Name:	Avila Beach Drive at US 101 Interchange Improvements
Date:	September 28, 2022
Location:	Avila Beach, CA

Ref. *Caltrans Highway Design Manual, Section 630-4, November 2018*
Subgrade Enhancement Geosynthetic Design and Construction Guide, January 14, 2013

per Caltrans thicnkesses are rounded to nearest 0.05 ft. Values midway between the 0.05' increment are rounded up. Recommended min. AC thickness is 0.25'. Caltrans uses a min. 0.15' AC thickness. Caltrans uses a min. 0.35' AB or AS thickness. Subgrade R-values should be limited to no more than 50.

Enter design-life for TI (if >20 special enhancements apply, see below)

20

Enter Upto 3 values of T.I

1	7.5
2	9
3	12.5

Enter R values:

Subgrade:	45
Agg. Base	78
Agg. Subbase	60

Min thickness of AB Layer:

0.35

Thickness in feet	T.I. =	7.5	GE_{min}=	1.32	
	Full Depth AC	AC/AB	AC/AB/ASB	ATPB	CTPB
Thickness of AC	0.65	0.35	0.35	0.45	0.45
Thickness of TPB	-	-	-	0.25	0.35
Thickness of AB	-	0.55	0.40	0.35	0.35
Thickness of ASB	-	-	0.35	0.35	0.35
GE	1.43	1.31	1.49	2.02	2.26

Thickness in feet	T.I. =	9	GE_{min}=	1.58	
	Full Depth AC	AC/AB	AC/AB/ASB	ATPB	CTPB
Thickness of AC	0.80	0.45	0.45	0.55	0.55
Thickness of TPB	-	-	-	0.25	0.35
Thickness of AB	-	0.65	0.45	0.35	0.35
Thickness of ASB	-	-	0.35	0.35	0.35
GE	1.72	1.57	1.70	2.15	2.39

Thickness in feet	T.I. =	12.5	GE_{min}=	2.20	
	Full Depth AC	AC/AB	AC/AB/ASB	ATPB	CTPB
Thickness of AC	1.10	0.65	0.65	0.80	0.80
Thickness of TPB	-	-	-	0.25	0.35
Thickness of AB	-	1.00	0.65	0.35	0.35
Thickness of ASB	-	-	0.40	0.35	0.35
GE	2.26	2.21	2.22	2.57	2.81

APPENDIX F - RESPONSE TO CALTRANS COMMENTS

Draft Type Selection Report, Field Infiltration Testing Memo, and Foundation Review Comment Sheet

May 18, 2021

EA: **05-1G480_**
CO-Rte-KP (PM): **SLO-101-PM 17.9/21.5** *Proj. NAME*: **Avila Ramps Roundabouts**
PROJECT MANAGER: **Paul Valadao (916) 763-9123**

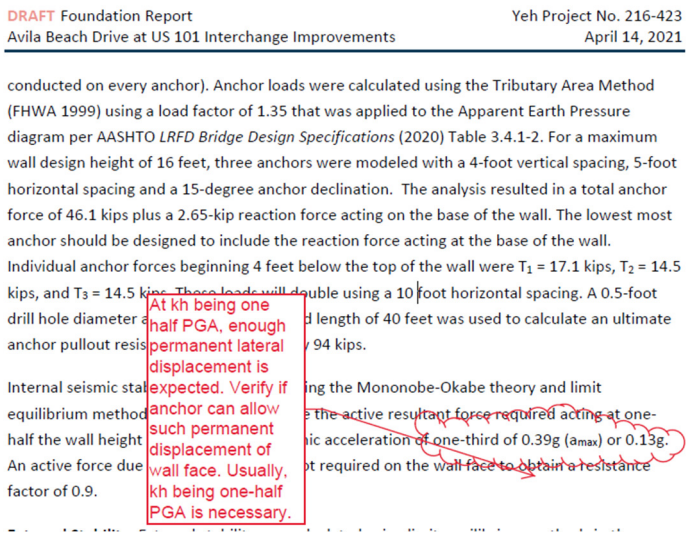
REVIEWED BY: **K.D. Cook/ R. Atilano**
FUNCTIONAL UNIT: **Headquarters Geotechnical Design**

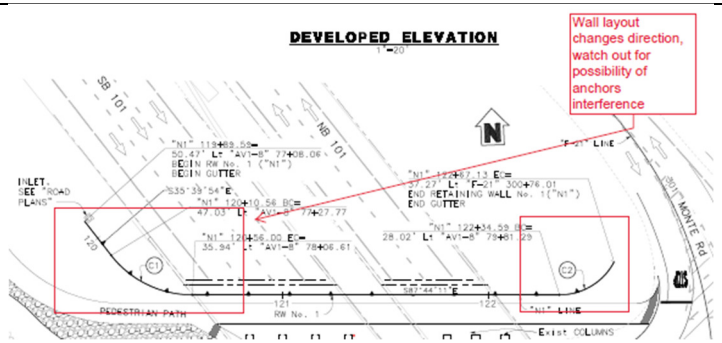
Page/Sheet No. ↓	Section	Paragraph ↓	Comment	Response (Yeh and Associates, J. King, J. Cravens)
i	Cover letter		The report is dated April 14, 2021; therefore, it falls under the criteria of the Foundation Reports of Earth Retaining Systems (ERS) January 2021 and not the 2017 edition of the same. Please revise the report accordingly.	Yeh updated the report for the January 2021 ERS Report Guidelines.
1	Introduction	1	Please provide a copy for review of the DRAFT Geotechnical Design Report (Yeh, 2020) "provided under separate" as referred to in the report.	Yeh revised the DRAFT Geotechnical Design Report on July 8, 2021 per 65% design plans and provided a copy to Wallace Group.
1	References	1	This may be omitted, references are listed later in the report.	Yeh omitted this section
2	Proposed Improvements	2	Type selection report notes that the maximum wall height is 15 feet for retaining wall N1 and a combined maximum height of 26 feet for retaining wall W1. FR mentions different heights. Revise if needed.	Yeh revised this section
3	Exceptions	1	If no exceptions, omit this section.	Yeh omitted this section
4	Exploration Drilling		Please identify and reference the Caltrans Encroachment Permit under which the work was	Yeh included the Caltrans Encroachment Permit number in this section.

			conducted.	
4	Exploration Drilling		Please identify, reference, and provide a copy of the County of San Luis Obispo Health Agency, Well Permit which the borings were drilled and abandoned (grouted) under.	Yeh included the Well Permit numbers in this section and will provide copies of the approved Well Permits in an appendix to the Foundation Report.
5	Laboratory Testing	1	Revise the 4th sentence as needed.	Yeh revised sentence 4.
11	Groundwater Conditions	1	What is the design groundwater elevation? A groundwater elevation was assumed for liquefaction calculations and should be included in the report.	Yeh added the design groundwater elevation to the liquefaction section.
12	Ground Rupture	1	Please include a statement that the site is not within 1000 feet of a Holocene age fault in accordance with the Caltrans Fault Rupture element (2017) of the Geotechnical Manual.	Yeh added a statement in this section.
13	Liquefaction	1	Suggest revising the first sentence, it is not clear where the silt and loose sands are located in relation to the groundwater table and dense soils.	Yeh revised the first sentence.
13	Liquefaction	1	What are the vertical limits (depth or elevation) of the liquefiable layer?	Yeh added limits of liquefiable layer.
13	Liquefaction	1	Suggest including a clear statement at the beginning of this section stating if liquefaction potential exists or not.	Comment noted. Statement included at end of section.
13	Liquefaction	2	Suggest removing mention of non-liquefiable soils from this section.	Added note that soil is not considered vulnerable to liquefaction "based on Yeh's analyses".
15	Geotechnical Recommendations		Replace "Finished Grade" with the elevation at finished grade.	Replaced "finished grade" with "finished grade elevation"
15	Geotechnical Recommendations		The 2003 LOTBs and 2019 borings show blow counts, and current lab data, that suggest a higher friction angle. What is the basis of the 30-degree friction angle?	Artificial fill material within the active zone of the proposed earth retaining structures was found to be variable in consistency. An effective friction angle of 30 degrees was estimated based on the variable conditions of the materials.
15	Geotechnical Recommendations	4	What is the seismic displacement associated with the horizontal ground acceleration?	The horizontal ground acceleration is associated with 2 inches of lateral displacement. Yeh clarified this in the report.
	Appendix A – Boring Logs		Please provide the Borehole Locations, either Latitude – Longitude, or Line Station and offset.	Yeh added borehole Line/Station/Offset to the boring logs.
			Please provide all calculations along with the revised	Yeh provided geotechnical calculations

			report for review.	associated with the recommendations provided in the Foundation Report. Structural design recommendations and calculations for the Earth Retaining Structures will be provided by Mark Thomas.
			Updated report guidelines may be found here: https://dot.ca.gov/programs/engineering-services/manuals/geotechnical-manual	

REVIEWED BY: **Reza Erfanian**
FUNCTIONAL UNIT: **Headquarters Structures Design (DES OSFP)**

Page/Sheet No. ↓	Section	Paragraph ↓	Comment	Response
16	Foundation Report		 See attached '216-423 DRAFT Avila Beach Dr Interchange Foundation Report 04-14-2021, GW Comnts.pdf'	Mark Thomas is providing structural design recommendations and calculations for the wall design.

General Plan	Type Selection Report		 See attached 'Draft Type Selection Report - Avila Beach Dr_Ret Walls 4-16-21, GW Comnts.pdf'	N/A to the Foundation Report

Office of Special Funded Projects
Comment & Response Form

(Revised 08/2011)

General Project Information (OSFP Liaison to complete)		**Review Phase** (OSFP Liaison to complete)	**Reviewer Information** (Reviewer Liaison to complete)	
Dist:		☐ PSR/PDS (Review No.)	Reviewer Name:	**Sungro Cho**
Proj ID (Phase):		☐ APS/PSR (Review No.)	Functional Unit:	**OGDW**
Project Name:	**Avila Beach Drive IC Improvements**	☐ APS/PR (Review No.)	Cost Center:	**59-3660**
OSFP Liaison:		☐ Type Selection	Phone Number:	**(805) 549-3194**
Phone:		☐ 65% PS&E Unchecked Details	e-mail:	**sungro.cho@dot.ca.gov**
E-mail:		PS&E (Review No. 1)	Date of Review:	**8/20/2021**
		☐ Construction	Structure Name*:	
		☐ Other:	Br No*:	
			(*Use if necessary to when comment sheets are by individual structure)	

Consultant Information (to be filled in by Consultant)

Note 1: Abbreviations for Typical Documents (if Abbr. is not below, type in the document type)					
P=Structure Plans	SP=Special Provisions	FR=Foundation Rpt	DC=Design Calcs	TS=Type Sel. Report	QCC=Quant. Check Calcs
RP=Road Plans	E=Estimate	H=Hydraulics Rpt	CC=Check Calcs	QC=Quant. Calcs	

✓= Comment Resolved
(for Reviewer's use)

Submittal Data (Reviewer to complete)

Project ID: Reviewer: Str Name*:

Date of Review: Functional Unit: Br No*. *=if applicable

#	Doc. (See Note 1)	Page, Section, or SSP	Review Comments	Consultant Responses	✓

Consultant Structure Lead (First and Last Name)	Structure Consultant Firm	Phone Number	E-mail	Response Date
Judd King	**Yeh and Associates**	**805-801-6416**	**jking@yeh-eng.com**	**9-9-2021**

#	Doc. (See Note 1)	Page, Section, or SSP	Review Comments	Consultant Responses	✓
1	FR	general	Please update the report with 2021ERS report Guidelines (See table of contents) For example, Physical setting in the draft foundation report is no longer used in the 2021 guidelines.	Yeh will update the Foundation Report to match the heading organization from the 2021 ERS Report Guidelines. Additional pertinent information not specified in the guidelines is provided as input to the geotechnical design and analyses.	
2	FR	Page 11	Groundwater condition. Please describe the design groundwater table that is used to your engineering analysis. e.g. "*The design groundwater table elevation for engineering analysis is 70 feet."*	Groundwater Conditions are described in the report (on the referenced Page 11). Elevation 70 feet is the highest groundwater elevation recorded at the site based on previous boring data from Caltrans. The design groundwater elevation used in the liquefaction analyses is stated in the liquefaction section of the report.	
3	FR	Page 12	We don't require active and potentially active faults information since probabilistic analysis is used to determine the seismic parameters. Recommend removing the "Table 2: Active and potentially active faults"	Yeh will remove the Fault ID table.	
4	FR	Page 12	7.3 Dynamic Analysis and Seismic Data Please describe how to estimate the Vs30. e.g. "*Based on available subsurface information and Standard Penetration Test (SPT) correlations for determining shear wave velocity, the time-average shear wave velocity (VS30) for the upper 100 feet of soil at the site is estimated to be 972 ft/sec."*	Yeh will include pertinent references used in Yeh's shear wave velocity estimation. Appendix A of *Caltrans Methodology for Developing Design Response Spectrum for use in Seismic Design Recommendations,* issued November 2012 is the specific document we used in estimating Vs30 based on subsurface data and SPT correlations.	

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RP=Road Plans	E=Estimate	H=Hydraulics Rpt	CC=Check Calcs	QC=Quant. Calcs	

✓= Comment Resolved
(for Reviewer's use)

Submittal Data (Reviewer to complete)

Project ID: Reviewer: Str Name*:

Date of Review: Functional Unit: Br No*. *=if applicable

#	Doc. (See Note 1)	Page, Section, or SSP	Review Comments	Consultant Responses	✓
5	FR	Page 13	ARS curve is not required for retaining wall design. Recommend removing the Figure 5.	Comment noted. The ARS curve is provided as a basis for the seismic design. It is provided as additional pertinent design information.	
6	FR	Page 17	Table 6, Geotech is not recommending the ground anchor vertical and horizontal spacing, and foundation soil factored nominal bearing resistance for facing. Instead, need to provide the apparent earth pressures (AEP) for wall (active, and passive). Please estimate the AEP or since soil properties are provided, let structure estimate them. e.g. *"To determine lateral pressures for the soldier pile wall, Figure 3.11.5.7-1 (b) of section 3.11.5.7 – Apparent Earth Pressures (AEP) for Anchored Walls (active and passive) from AASHTO LRFD Bridge Design Specifications, Eighth Edition, shall be used."*	Tables for Ground Anchor and Soil Nail Walls do include columns with recommendations for "maximum Ground Anchor Vertical Spacing", "Maximum Ground Anchor Horizontal Spacing", and "Foundation Soil Factored Nominal Bearing Resistance for Facing". Updated values will be provided in the final version of the FR. Geotechnical design properties were provided in the Foundation Report for the structure designer for use with estimating the AEP. Yeh will clarify the AASHTO LRFD Bridge Design AEP figure 3.11.5.7-1(b) should be used in the design.	
7	65% plans	Sheet No, 119	"Soil Design Parameters" Kh in the plan is 0.13. Please make sure that the soil parameters in the plan are the ones provided in the Foundation Report.	Plans will be updated	
8	65% plans	Sheet No, 132	Please add approximate location of proof test nail in the plan. FR, page 19 , 10.2 Retaining wall w1 described that "wall layout plan and elevation view should show locations of proof test nails in locations provided by geotechnical	Plans will be updated	

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RP=Road Plans	E=Estimate	H=Hydraulics Rpt	CC=Check Calcs	QC=Quant. Calcs	

✓= Comment Resolved (for Reviewer's use)

Submittal Data (Reviewer to complete)

Project ID: Reviewer: Str Name*:

Date of Review: Functional Unit: Br No*. *=if applicable

#	Doc. (See Note 1)	Page, Section, or SSP	Review Comments	Consultant Responses	✓
			engineer. Plans should show at least 0.08N proof test nails where N is the number of production nails in each wall zone".		
9	Geotech Design Report	general	Same comments as # 1. Please update the report with 2021Geotechnical Design report Guidelines (See table of contents) https://des.onramp.dot.ca.gov/downloads/des/files/gs/Geotechnical%20Manual/202102-GM-GeotechnicalDesignReports-a11y.pdf For example, Physical setting in the draft GDR is no longer used in the 2021 guidelines.	Yeh will update the Geotechnical Design Report to match the heading organization from the 2021 GDR Guidelines. Additional pertinent information not specified in the guidelines is provided as input to the geotechnical design and analyses.	
10	Geotech Design Report	Page 16	"Dynamic Analysis and Seismic Data" Same comments as # 4 and 5	Yeh will include pertinent references used in Yeh's shear wave velocity estimation. The ARS curve is provided as a basis for the seismic design. It is provided as additional pertinent design information.	

Note 1: Abbreviations for Typical Documents (if Abbr. is not below, type in the document type)					
P=Structure Plans	SP=Special Provisions	FR=Foundation Rpt	DC=Design Calcs	TS=Type Sel. Report	QCC=Quant. Check Calcs
RP=Road Plans	E=Estimate	H=Hydraulics Rpt	CC=Check Calcs	QC=Quant. Calcs	

✓= Comment Resolved
(for Reviewer's use)

OSFP Rev Form 12/2010

Draft Geotechnical Design Report & Updated Draft Foundation Report Review Comment-Response Sheet

May 18, 2022

EA: **05-1G480_**
CO-Rte-KP (PM): **SLO-101-PM 17.9/21.5** *Proj. NAME:* **Avila Ramps Roundabouts**
PROJECT MANAGER: **Paul Valadao (916) 763-9123**

REVIEWED BY: **Md Zahangir Alam**
FUNCTIONAL UNIT: **Office of Geotechnical Design-West, Branch E**

Page/Sheet No. ↓	**Section**	**Paragraph** ↓	**Comment**	**Response**
	FR/Cover Sheet, Cover Letter and Header		1. From cover sheet, it is not possible to identify whether this foundation report is for bridge, retaining wall or other Structure. As per the Foundation Reports for ERS module, cover of the report must include structure name and number. If you do not have this info, please include "Retaining Walls (N1 and W1). For example, Foundation Report for Retaining Walls (N1 and W1). This is also applicable to subject in cover letter and header on all pages. 2. Please use total project PM xx/xx to match with the plans.	Yeh will add "Retaining Walls N1 and W1" to title sheet and include PM 20.9/21.3 to the Cover Sheet – *Completed 9-23-22*
P-1	FR/Section 1		Please revise the section name to just "Introduction". Please indicate the latest plans/layouts that were used to prepare this report.	Section will be renamed "Introduction". Plans are referenced in Section 2 – *Completed 9-23-22*
P-2	FR/Section 2.1		Please provide the vertical datum reference for the "elevation 97 feet".	Yeh will provide datum to NAVD88 – *Completed 9-23-22*
P-2	FR/Section 2.2		1. Figure 2 indicates WG 2021b and 2021c; however, 3rd line indicates WG 2021a and	1. No change needed

			2021c. Please check and correct, if needed. 2. Please provide project vertical datum reference. For example, "All elevations referenced within this report are based on the North American Vertical Datum of 1988 (NAVD 88), unless otherwise noted." 3. What does MT stand for?	2. Yeh will provide datum – *Completed 9-23-22* 3. "(MT 2022)" is a reference citation, Mark Thomas (MT) will be defined in the Section and is included in the references section – *Completed 9-23-22*
P-3	FR/Table 1		Based on the station no., the length of wall W1-A and W1-B is approximately 183.81 feet and 126.26 feet respectively. Please check and update. Also, as per the module, begin and end should include northing/easting or latitude/longitude not Sta. number, offset and reference line.	Yeh will check wall lengths. Refer to project plans for wall locations and with respect these data will not be included in the report. – *Completed 9-23-22*
P-4	FR/Section 3		Section 3 and Section 8 has same name but contains different information. This is misleading. Please move all information of Section 3 to Section 15 Reference.	Comment Noted – with respect no change will be made to the format and layout
P-4	FR/Section 4		Please revise the section name to "Geotechnical Investigation".	Comment noted. The use of the word "investigation" in reports is against Yeh company policy for liability reasons. With respect, no change considered necessary.
P-4	FR/Section 4.2		1. Borings' name does not follow the Caltrans Logging manual. For example, the boring name should be A-19-001 through A-19-003. Please update the borings' name all over the report. 2. Please indicate that as-built LOTBs were also reviewed as part of geotechnical investigation.	1. Comment noted. Boring numbering will not be changed. 2. Yeh will note the review of the as-built LOTBs in this section. – Completed 9-23-22
P-5	FR/Section 4.2/Figure 3		It seems like boring 19W-01 and 19W-03 were drilled away from retaining wall line. Please provide clarification/justification in the write up.	Walls are located on an area with existing steep slopes which made locating borings along the exact alignment impractical. Walls will be in artificial fill and we judged the boring locations selected by Yeh in

				combination with existing subsurface information provided by Caltrans borings sufficient to characterize the subsurface conditions.
P-6	FR/Table 2		1. Please indicate which boring is associated with retaining wall N1 and W1. 2. Please indicate in the write up that borings' information is presented in Table 2. 3. Please attach hammer efficiency data in an Appendix. 4. Please include sta. no., offset, reference line or northing/easting or latitude/longitude info for each boring.	1. Comment noted 2. Comment noted 3. A hammer efficiency of 75% was used for the rig. The hammer efficiency documentation is not available as the drilling company is no longer in business and the drill rig has been sold out of state. A hammer efficiency of 75% for an automatic hammer is considered reasonable. 4. Comment noted. Refer to LOTB for locations of borings.
P-6	FR/Section 5		Please revise the section name to "Laboratory Testing Program".	Comment noted. Section will be renamed to "Laboratory Testing Program" – *Completed 9-23-22*
P-8	FR/Section 6.1.1		As per ERS module, this section is not needed. For consistency with the latest guideline, we recommend deleting this section.	Commend noted. Yeh clarified this information in our September 9, 2021 response to a previous Caltrans review. Yeh included this information as pertinent input to the geotechnical design and analyses. Faulting and seismicity are important contextual information for seismic data and design. With respect, this section will not be changed.
P-9	FR/Section 6.3	2nd	Please include corresponding elevations of fill.	Yeh will add elevations to the "Artificial Fill" section. – *Completed 9-23-22*
P-10	FR/Section 6.3	1st	There is a typo in 4th sentence "Sand (ML). Please check and revise.	With respect, the sentence does not contain a typo. The full description says "silt with varying amounts of sand (ML)" The description was from the 2003 Caltrans borings.
P-10	FR/Section 7		Please rename the section to only "Groundwater". If possible, please include a	Section will be renamed to "Groundwater" Yeh will include table for groundwater data

			table for groundwater measurements as per the ERS module. Is there any historical groundwater data based on Geotracker, DWR etc.? If so, we suggest including that information. Though it is in liquefaction section, please add a statement of design groundwater elevation and depth here as well.	based on borings drilled. There was no pertinent data from Geotracker or DWR for this location. – *Completed 9-23-22* This section is for presentation of data similar to the Subsurface Conditions section. Design information is including in subsequent sections of the report. Yeh's policy is to reduce redundancy of presentation of data in reports to avoid errors and discrepancies of data. With respect, the design groundwater elevation will not be included in this section.
P-11	FR/Section 8, last 3 bullet items		These are good information; however, these do not belong to As-Built Data. Please move these bullet items to "Notes for Construction".	Comment noted – with respect this section will remain.
P-11	FR/Section 9		1. Please rename the section to just "Corrosion". 2. Please update corrosion guideline to 2021, and minimum resistivity from 1,100 to 1,500 ohm-cm.	1. Section 9 is named "Corrosion". 2. Yeh will update to the 2021 Corrosion Guidelines *Completed 9-23-22*
P-12	FR/Section 9	Last para	1. Please update sulfate concentration from 2,000 ppm to 1,500 ppm. 2. Not only 2003 but also 2019 test results indicate soil are corrosive. Please revise the statement. 3. Since minimum resistivity at elevation of 122 in 19W-02 is less than 1,500 ohm-cm, you may consider performing chloride and sulfate at this depth. 4. In Table 3, please add a column of Corrosive (Yes or No). 5. In table 3, please include test method (ASTM or CTM) for each test. Based on the corrosion test summary (under Appendix), it seems like tests are performed as per ASTM. Caltrans corrosion guideline is based on CTM. So, corrosion tests should be performed as per CTM method not	1. Yeh will revise 2. Yeh will revise 3. Comment noted. 4. Yeh will add column 5. Comment noted. The soil is considered corrosive. Additional testing is not considered necessary or that it would change the conclusion and subsequent recommendations.

			ASTM.	
P-12	FR/Section 10		Please rename the section to "Seismic Information."	Comment noted. Section will be renamed to "Seismic Information". *Completed 9-23-22*
P-12 and 13	FR/Section 10.1		1. Please rename the section to "Ground Motion Hazard." 2. Please attach Vs30 calculations in the appendix. 3. Please update Design Response Spectrum 2012 to 2021 and please check Vs30 calculation as per this new guideline. 4. Please attach ARS online output in an Appendix. Mean magnitude and site to source distance is not matching. Please check. 5. Please add a sentence of kh value.	1. Section will be renamed to "Ground Motion Hazard". 2. Comment Noted 3. Comment Noted 4. Plot on Figure 5 of report is a direct output of ARS online data and including the output data is redundant and not considered necessary. Mean magnitude and site to source distance match our output data from ARS online. 5. Design kh and associated discussions for each wall are provided in Section 11.3. Yeh will reference Section 11.3 in Section 10.1
P-13	FR/Section 10.2		• Please rename this section to "Surface Fault Rupture".	Section will be renamed to "Surface Fault Rupture" – *Completed 9-23-22*
P-13 and 14	FR/Section 10.3		1. Please indicate that the calculation is attached is Appendix. 2. Please do not use "considered to be low". As per liquefaction module, use the liquefaction potential does not exist.	1. Yeh will include reference to calculations – *Completed 9-23-22* 2. Comment noted. With respect, we will leave this statement as-is. Use of absolute or certainty such as "liquefaction potential does not exist" is against Yeh internal risk management policy.
P-14	FR		Please include *10.3 Seismic Slope Stability* and *10.4 Tsunami Risk* as pre the ERS module.	Seismic slope stability for the proposed retaining walls is included in the external stability recommendations in Section 11.2. Tsunami Risk is noted in the FR for ERS

				guidelines as to be included "if applicable". Tsunami risk is not applicable at this project site. No section for Tsunami will be included
P-15	FR/Section 11.1		1. CA amendment to AASHTO does not have 3.11 Section. So, please refer only AASHTO 8th Edition for 3.11.5.7.1-1(b). 2. How are the soil parameters calculated? Please provide calculation. We recommend Caltrans' Soil Correlations module for calculating soil parameters. Also, it is not recommended cohesion value for cohesionless soils. Either do not use cohesion or provide justification for using cohesion value in the analysis.	1. Yeh will update and reference AASHTO only in this sentence. *Completed 9-23-22* 2. Parameters are based on boring logs and laboratory test data. The material tested (Clayey Sand with Gravel) has cohesion per our test results and soil classifications. Selected soil parameters are considered applicable for this project site.
P-15	FR/Section 11.2.1		1. Please indicate what is the pressure distribution used for 85 psf and 38.33 psf. 2. Please indicate what is the kh value used for seismic stability and how it is selected. Based on the results in Appendix C, it seems like kh = 0.43 is used. Based on the ARS, PGA is 0.39g. As per the Geotechnical manual for Ground anchor walls, Kh is either ½ of PGA or 1/3 of PGA depending on the acceptable displacement.	1. Yeh will clarify. These data were provided by the structure designer (MTCO) – *Completed 9-23-22* 2. Kh and selection process is described in Section 11.3. Yeh will clarify and include the equation for Kh0=Kh (see paragraph 1 of Section 11.3.1) in this section for Wall N1 which is designed for zero displacement per the project's structural designer. We used a generalized limit equilibrium method to determine kh based on preferred wall displacement. Section 11.3 describes this methodology that is provided in AASHTO. With respect, this section will remain as-is.
P-16	FR/Table 5		1. Determination of minimum unbonded length is not clear. As per the Geotechnical manual for ground anchors, "*The minimum anchor unbonded length is the distance from wall face to the failure surface plus a minimum distance between potential*	1. The minimum unbonded length was determined per the geotechnical manual and consideration of a potential failure plane. 15 feet is sufficient. 2. Comment noted. With respect these

			failure surface and frontal anchor bond zone, 5 feet or H/5, whichever is greater." Is the 5 feet added in the minimum unbonded length? Please confirm. 2. Please provide the bearing resistance calculation in the Appendix.	calculations are considered excessive – a bearing capacity for the footing of the concrete facing of 3ksf is considered adequate.
P-16	FR/11.2.2		Please indicate the value of kh used for the analysis.	Kh and selection process is described in Section 11.3.
P-17	FR/Table 6		Please provide the calculation of nominal pull resistance in the appendix.	Input assumptions included in Table 6. – *Completed 9-28-22*
P-18	FR/11.3.1		1. Please provide the kh calculation. See comment no. on P-15. 2. Please provide SLIDE last output for the seismic earth pressure calculation and please present the calculation on how 140 psf is estimated as well. AASHTO has specific guidelines (Appendix A11). 3. Seismic earth pressure distribution should be selected as per the above (A11) procedure. Please check and confirm.	1. Kh calculation is provided in appendix C page C-3. 2. SLIDE Output is provided in Appendix C page C-10. GLE method is referenced in AASHTO Appendix A11, see A11.3.3. 3. See comment 2. *Completed 9-28-22*
P-19	FR/Section 12		Please follow the Caltrans "Notes of Specifications" module.	Comment noted. Yeh has already provided input to the project specifications. See SSP's for the project.
P-20	FR/Section 13.1		Please check whether soil Type is B or C. Based on GDR, Type is C which is more accurate.	Yeh will update. Type C is considered appropriate.
	FR/Legend for Soil Classification		As per Caltrans logging manual, it is missing some info (e.g., apparent density, consistency etc.). Please include this information. A 2nd sheet can be used for legend.	Comment noted.
	FR/Boring Logs		i. Please follow Caltrans Logging Manual. For example, ii. lat/long or north/east is missing for borehole location, iii. Some apparent densities are not matching. Fyi, apparent density is based on N60 not field SPT.	i. Comment noted ii. Comment noted iii. Comment noted. With respect, the boring logs represent the recorded field conditions. Consistency is based upon blow counts (coarse grained material) and pocket

			iv. Even with the presence moisture, same layers are called dry. This should be moist not dry. v. Sandy Fat Clay/Sandy Lean Clay layer is called dry. Typically, clay layer has in-situ moisture, so these clay layers may be moist. vi. Same layers have gravel, but gravel description is missing. vii. Where there are Fat clay, it is suggested to perform at least few Atterberg Limits test to confirm. viii. Hammer energy efficiency is missing on the logs. ix. We can only use "with gravel" if the gravel percentage is greater than 15%. In 19W-03@1' depth, gravel percentage is 9% but the layer is called Sandy Fat Clay with Gravel?	penetrometer (fine grained soil). This is consistent with standards of practice. iv. Comment noted. v. Comment noted. vi. Comment noted vii. Comment noted. viii. Comment noted. ix. Comment noted.
	FR/LOTB		As per the ERS module, LOTBs should be attached with the report. As-Built LOTBS and Boring records are attached; however, no current LOTBs are found in the report. Please include LOTBs.	Yeh will include LOTBs in appendix for the final report. LOTB's are developed with the plans and are not included in earlier versions of the report as the layout may change or adjust based upon design.
	FR/Summary of Laboratory Test Results		No test results are presented at depth of 40' in 19W-03. If there are no tests conducted, then delete this row.	Comment noted.
	FR/Corrosivity Tests Summary		Please complete the table and see comments P-12, FR/Section 9 regarding ASTM and CTM.	Comment noted.
	FR/R-value Test		Is there any reason for R-value test result that is attached in FR?	Comment noted. The test result was a part of the overall project.
	FR/General/Wall N1		1. Please include that "Determination of anchor pullout resistance and corresponding anchor bond length are the Contractor's responsibility. 2. Since bond length is contractor's	1. Yeh provided comment. *Completed 9-28-22* 2. Note was provided on outputs in Appendix C.

			responsibility, please remove the column of bond length in the stability analysis results (Appendix C).	
	FR/General/Wall W1		As per the Caltrans soil nail walls module, please remove the column of bond strength in the stability analysis results (Appendix C).	We did not see this requirement in the soil nail walls module. Bond strength is included in the tables required per the manual. Comment noted.
	FR/General		As per the Foundation Reports for ERS module, "Prepare a separate foundation report for each ERS". Please add a statement in the cover letter why (i.e., Caltrans approval etc.) multiple ERS are placed in one report. Was it approved by Caltrans?	One report will be submitted.
	FR/General		What is the appropriate project name?	See front cover of project plans. We will include pertinent information on the cover of the FR as noted. – *Completed 9-23-22*
	FR/General		Please change all AASHTO (2020) reference to AASHTO (2017). Caltrans still use AASHTO 8th Edition (2017).	Yeh will revise. – *Completed 9-28-22*
	FR/General		What is the lateral displacement for ground anchor wall?	Zero displacement. See Section 11.3.1
	GDR/Cover Sheet and Cover Letter		Please use total project PM xx/xx.	Cover sheet will be revised.
P-ii	GDR		Please check mean magnitude and site to source distance and correct accordingly.	Comment noted. Mean magnitude and site to source distance values in report match our output data from ARS online
P-2	GDR/Section 2		1. As per latest Caltrans GDR guideline (2021), project description is a part of Introduction. If possible, consider revising the format. 2. Please include the project datum reference.	1. Comment noted. 2. Yeh will include datum – *Completed 9-28-22*
P-3	GDR/Table 1		Since no recommendations for ERS will be provided in the GDR and a separate report has been prepared for ERS, we recommend deleting ESR info from Table 1. Instead of ERS info, if	Yeh will delete Table 1 – *Completed 9-28-22*

			possible, please include other improvements info (e.g., slopes) in Table 1.	
P-3	GDR/Section 2.3		This section is from old GDR guideline. The least guideline does not have this section. We suggest deleting this section. This information can be provided under reference.	Comment noted. No change will be implemented at this final report.
P-4	GDR/Section 3		Please rename to "Geotechnical Investigation".	Comment noted. The use of the word "investigation" in reports is against Yeh company policy for liability reasons. With respect, no change considered necessary.
P-4	GDR/Section 3.1 and Table 2		For borehole name, please follow the Caltrans logging manual. For example, 19W-01 should be A-19-001. Please update the borings' name all over the report. If possible, please rename the table name to "Borehole Summary List".	Comment noted. Boring names will not be updated. Yeh will update Table 2 caption to "Borehole Summary List"
P-5	GDR/Section 3.1		Please indicate the hammer efficiency and also attach hammer calibration data in the appendix.	A hammer efficiency of 75% was used for the rig. The hammer efficiency documentation is not available as the drilling company is no longer in business and the drill rig has been sold out of state. A hammer efficiency of 75% for an automatic hammer is considered reasonable.
P-6	GDR/Section 3.4		As per Caltrans Stormwater manual (2022), "California Test Method (CTM) 749 and CTM 750 were previously used, however, those standards are no longer maintained by Caltrans and are not recommended to be performed by Caltrans personnel. Use of CTM 749 and 750 requires an exception to policy." So, either remove the CTM 749 and 750 reference from the section or include an exception to policy, if obtained.	Yeh will revise and reference the test methodology in the San Luis Obispo County Post Construction Stormwater Low Impact Design Manual Appendix D-1. – *Completed 9-28-22.* https://www.slocounty.ca.gov/Departments/Planning-Building/Forms-Documents/Stormwater-Forms-and-Documents/Post-Construction-Stormwater-Management/Stormwater-Post-Construction-Documents/San-Luis-Obispo-County-Low-Impact-Development-Hand.pdf
P-11	GDR/Section 4.3	2nd	Please include corresponding elevations of fill.	Comment noted

P-12	GDR/Section 4.4		If possible, please include a table for groundwater measurements as per the ERS module. Is there any historical groundwater data based on Geotracker, DWR etc.? If so, we suggest including those data. Please add a stamen of design groundwater depth and elevation.	Comment noted.
P-12 and 13	GDR/Section 4.5 and table 4		1. Please update corrosion guideline to 2021, and minimum resistivity from 1,100 to 1,500 ohm-cm. 2. Please update sulfate concentration from 2,000 ppm to 1,500 ppm. 3. Not only 2003 but also 2019 test results indicate soil are corrosive. Please revise the statement. 4. Since minimum resistivity at elevation of 122 in 19W-02 is less than 1,500 ohm-cm, you may consider performing chloride and sulfate at this depth. 5. In Table 4, please add a column of Corrosive (Yes or No). 6. In table 4, please include test method (ASTM or CTM) for each test. Based on the corrosion test summary (under appendix), it seems like tests are performed as per ASTM. Caltrans corrosion guideline is based on CTM. So, corrosion tests should be performed as per CTM method not ASTM.	1. Yeh will update to current corrosion guidelines 2. Yeh will update 3. Yeh states that 2019 data is also corrosive. No revision needed 4. Comment noted 5. Yeh will add column 6. Comment noted The soil is considered corrosive. Additional testing is not considered necessary or that it would change the conclusion and subsequent recommendations. *Completed 9-28-22*
P-13	GDR/Section 4.6		• Please rename to "Seismic Hazards"	Comment noted. Section name will be updated.
P-13	GDR/Section 4.6.1		1. Please refer to Table 5. 2. Please attach Vs30 calculations in the appendix. 3. Please update Design Response Spectrum 2012 to 2021 and please check Vs30 calculation as per this new guideline.	1. Yeh will update reference to Table 5 not Table 4 – *Completed 9-28-22* 2. Comment noted. – Calculations are represented in the curve in Figure 3 3. Yeh will check and update to 2021 – *Completed 9-28-22*

			Please attach ARS online output in an Appendix. Mean magnitude and site to source distance is not matching. Please check. • Please add a sentence of kh value.	4. Plot on Figure 3 of report is a direct output of ARS online data. Including output data is redundant. Mean magnitude and site to source distance match our output data from ARS online 5. Kh value not applicable to the improvements in this report. Design kh and associated discussions for each wall are provided in Section 11.3 of the Foundation Report
P-15	GDR/Section 4.6.2		Please also include not within 1,000 feet of an unzoned fault that is Holocene or younger in age.	Yeh will revise. – *Completed 9-28-22*
P-15	GDR/Section 4.6.3		1. Please indicate that the calculation is attached is Appendix and include the calculation in an appendix. 2. Please do not use "considered to be low". As per liquefaction module, use the liquefaction potential does not exist.	1. Calculations provided in Appendix D 2. Comment noted. With respect, we will leave this statement as-is. Use of absolute or certainty such as "liquefaction potential does not exist" is against Yeh internal risk management policy.
P-15	GDR		As per the GDR module, *Analysis and Design* Section is missing. This section mainly includes design information provided by other design team members, Soil Engineering properties, geotechnical model and analyses etc. We suggest to incorporate these information.	Comment Noted. With respect, this section is not applicable to the improvements in this report. Some analysis discussion provided in recommendations section
P-16	GDR/Section 5.1.4		Please address embankment stability and settlement. If needed, please perform slope stability analysis using and present FOS under static and seismic conditions. Please provide settlement calculations and Stability analysis in an appendix.	Comment noted. With respect, this report is for the proposed improvements not the existing structure/embankments. There are no proposed embankments greater than 5 feet, and our experience has shown this typical detail is sufficient for minor embankment grading. Slope stability analyses for the proposed retaining walls and associated embankments are provided in the Foundation Report.

P-17	GDR/Section 5.1.5		Please indicate that 1.5:1 cut slope will be stable. If needed, perform slope stability analysis.	See sheets X-5 to X-7. Cut slopes have been designed to 2:1 and are considered stable. Our experience has shown that cut slopes in similar material are stable when cut at 1.5:1 or flatter.
P-19	GDR/Section 5.3		Please refer to Table 6. Also, refer previous comment about CTM 749.	Yeh will refer to Table 6 instead of Table 5. Comment noted. – *Completed 9-28-22*
P-22/23	GDR/Section 5.4.3		1. Please refer to Table 7. 2. Please update to Caltrans Highway Design manual to 2020. 3. Please attach pavement section calculations in an appendix and indicate in the body of the report. 4. Binder selection should be based on Table 632.1 of HDM, 2020. Please check and update, if necessary.	1. Yeh will refer to Table 7 instead of Table 6 2. Note HDM in 2020 uses a different calculation approach that does not apply to this project. Methods for calculation of flexible pavement sections were performed per the HDM 2018 3. Yeh will attach pavement calculations 4. Yeh will check binder vs 2020 HDM. PG64-10 is typical in this region.
P-24	GDR/Section 6		Please follow Caltrans "Notes for Specifications" guideline.	Comment noted. Review and comments were provided during project specification preparation.
P-24	GDR/Section		Caltrans GDR module does not have "Notes for Constructions". Please rename this section as Construction Recommendations or Construction Considerations etc.	Comment noted. Section will be renamed if appropriate.
	GDR/Plate 2		Cross-Section material type (SM, CL etc.) is not matching with boring logs. Please check and update accordingly.	Comment noted. Cross-section is not intended to replace the boring logs. A subsurface cross-section is intended to generalize the profile of materials encountered for visual interpretation. Hence the note "See text and logs of exploration for description of subsurface conditions. All boundaries and locations are approximate."
	GDR/Boring Logs and legend		Please follow Caltrans logging manual. Refer FR comments on boring logs and legend. Please	Comment noted. Yeh will update if appropriate.

			check and correct accordingly, if there is any inconsistency. Just as an example, boring log 19IN-05 classify as Silty Gravel with Sand (GW); however, Atterberg Limits test indicates Sandy Lean Clay with Gravel (CL) which is not accurate etc.	
	GDR/Moisture-Density Test		Moisture-Density test was performed as per ASTM 1557B. However, Caltrans do not use ASTM for moisture-density test. Test should be performed as per CTM.	Comment noted. With respect, ASTM D1557B is used extensively throughout the United States, and it is a test to determine the maximum dry density. CTM 216 is used for density control of fills and was not considered appropriate for our analyses.
	GDR/General		Based on the 95% plans (sheet nos. 97-108). However, no discussion/recommendations were provided in the GDR. Please clarify. If needed, please include discussion and recommendations on sign foundations.	Comment noted. Signs will use Caltrans Standard Plans. Sign foundations that would require geotechnical input such as those included in S sheets in the 2018 Standard Plans are not being used on this project. No comment in report considered necessary as the lack of comment should have indicated that no sign foundations are needing geotechnical input.
	95% Plans – Sheet 139		LOTB does not match with the Errata (2022) sheet. For LOTB, please follow Caltrans logging manual (2010) and Errata (2022) and update accordingly.	Comment noted. LOTB sheets will remain as prepared.
	95% Plans – Sheet 144		Sheet indicates $\Delta kae = 0.44$. However, we did not find this value in the FR. This value should come from FR.	This will be removed from the plans as that value was not used in the structure design.
	95% Plans – Sheet 149		LOTB does not match with the Errata (2022) sheet. For LOTB, please follow Caltrans logging manual (2010) and Errata (2022) and update accordingly.	Comment noted. LOTB sheets will remain as prepared.
	95% Plans – Sheet 143 to 148		We did not find location of proof test nail. If it is added, please inform the sheet #. Otherwise, please include.	See sheet 146. Proof test nails are identified in both the legend and on the Developed Mirror Elevation.
	95% Plans		Please include total project PM xx/xx.	