DATE:
June 7, 2023
Update June 20, 2024

PROJECT NUMBER:
SL09618-6

CLIENT:
Morro 94, LLC &
Curry Parkway LP
Attn: Rob Solley, Steve Gallegos and
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PROJECT NAME:
3300 Panorama Drive
APN: 065-038-001
Morro Bay, California

ENGINEERING GEOLOGY INVESTIGATION UPDATE

1.0 INTRODUCTION

This report presents the results of the geologic investigation for the proposed residential development to be located at 3300 Panorama Drive, APN: 065-038-001, Morro Bay, California. See Figure 1: Area Location Map for the general location of the project area, (USGS, 2021). The purpose of this update is to include revisions of the proposed project size and scope.

1.1 Site Description

The proposed project is located at 35.4054397 degrees north latitude and -120.8641032 degrees west longitude. The property is approximately 9 acres in size, irregular in shape and is bound by Panorama Drive to the south and Whidbey Street to the north. The project property will hereafter be referred to as the "Site."

The project area was a Defense Fuel Point tank facility. The tank farm consisted of two tanks, associated pipelines, as well as operations buildings. The tanks were surrounded by concrete covered berms. It's our understanding that the fuel tanks and pipelines have been removed. In addition, the concrete covering has been removed, but the surrounding berms remain. The operation buildings are still located on site.

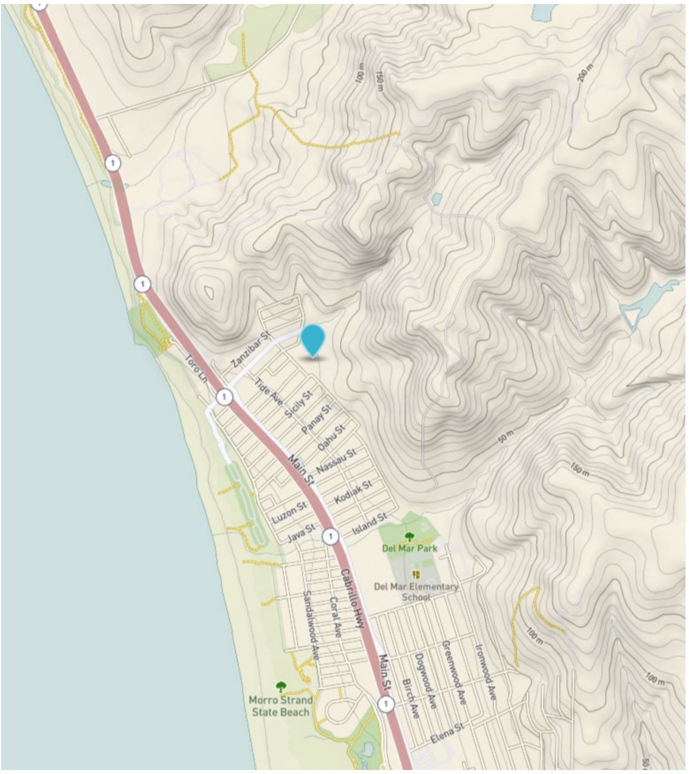

Figure 1: Area Location Map

The Site is covered with seasonal grasses and assorted pine trees. Site drainage follows the topography to the west toward an existing drainage gully and south towards Panorama Drive. See Figure 2: Site Plan, provided by RRM Design Group, for the proposed development limits.

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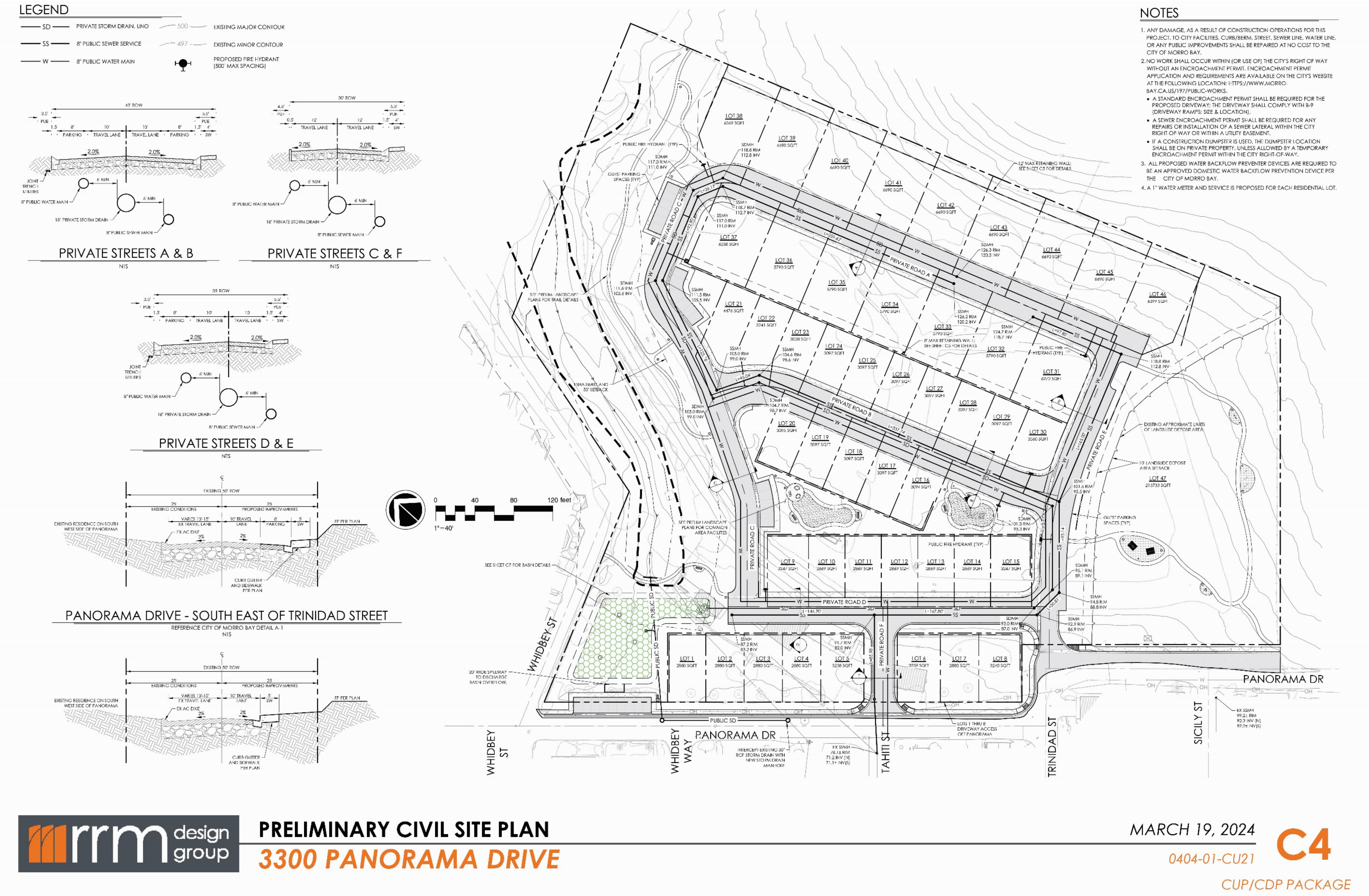

NOTES

1. ANY DAMAGE, AS A RESULT OF CONSTRUCTION OPERATIONS FOR THIS PROJECT, TO CITY FACILITIES, CURB/BERM, STREET, SEWER LINE, WATER LINE, OR ANY PUBLIC IMPROVEMENTS SHALL BE REPAIRED AT NO COST TO THE CITY OF MORRO BAY.
2. NO WORK SHALL OCCUR WITHIN (OR USE OF) THE CITY'S RIGHT OF WAY WITHOUT AN ENCROACHMENT PERMIT. ENCROACHMENT PERMIT APPLICATION AND REQUIREMENTS ARE AVAILABLE ON THE CITY'S WEBSITE AT THE FOLLOWING LOCATION: HTTPS://WWW.MORRO-BAY.CA.US/197/PUBLIC-WORKS.
   - A STANDARD ENCROACHMENT PERMIT SHALL BE REQUIRED FOR THE PROPOSED DRIVEWAY; THE DRIVEWAY SHALL COMPLY WITH B-9 (DRIVEWAY RAMPS: SIZE & LOCATION).
   - A SEWER ENCROACHMENT PERMIT SHALL BE REQUIRED FOR ANY REPAIRS OR INSTALLATION OF A SEWER LATERAL WITHIN THE CITY RIGHT-OF-WAY OR WITHIN A UTILITY EASEMENT.
   - IF A CONSTRUCTION DUMPSTER IS USED, THE DUMPSTER LOCATION SHALL BE ON PRIVATE PROPERTY, UNLESS ALLOWED BY A TEMPORARY ENCROACHMENT PERMIT WITHIN THE CITY RIGHT-OF-WAY.
3. ALL PROPOSED WATER BACKFLOW PREVENTER DEVICES ARE REQUIRED TO BE AN APPROVED DOMESTIC WATER BACKFLOW PREVENTION DEVICE PER THE CITY OF MORRO BAY.
4. A 1" WATER METER AND SERVICE IS PROPOSED FOR EACH RESIDENTIAL LOT.

Figure 2: Preliminary Site Plan (RRM Design Group, 2024)

1.2 Project Description

The project is to consist of 46 lots varying from 2,880 to 6,690 square feet in size with associated roadways and stormwater retention basin. Grading quantities are proposed to consist of approximately 13,800 cubic yards of cut and approximately 57,125 cubic yards of fill. Retaining walls are anticipated as part of the project. It is anticipated the proposed structures will utilize slab-on-grade and/or raised wood lower floor systems.

2.0 PURPOSE AND SCOPE

The purpose of this investigation was to evaluate engineering geologic hazards at the Site and to develop conclusions and recommendations regarding site development. The scope of this investigation consisted of:

1. Review of historical aerial photographs, pertinent published and unpublished geotechnical studies and literature, and geologic maps for the subject project area.

2. A field study consisting of site reconnaissance and subsurface exploration including exploratory borings and trenches in order to formulate a description of the sub-surface conditions at the Site.

3. A review of regional faulting and seismicity hazards.

4. A review of landslide potential, surface and groundwater conditions, and liquefaction hazards.

5. Development of recommendations for site preparation.

6. Preparation of this report that summarizes our findings, conclusions, and recommendations regarding engineering geology aspects of the project.

3.0 GEOLOGIC RECOMMENDATIONS

The proposed development is geologically suitable provided that the recommendations provided herein are implemented. The following are recommended for implementation at the Site.

1. It is recommended that new development not be located on identified landslide deposits. In addition, it is recommended that a 10-foot buffer from landslide deposits be implemented for proposed structures. Graded lots may extend within the 10-buffer provided that proposed structures are located outside the buffer. It is recommended that grading and roadways not extend within the limits of the landslide deposits.

2. It is recommended that numerical slope stability analyses be conducted on cut and fill slopes constructed steeper than 2-to-1 (horizontal to vertical). Locally steeper slopes may be allowed depending on the results of a slope stability analysis. It is recommended that erosion control measures and revegetation of slopes be implemented immediately after the completion of grading.

3. Isolated seepage within formational units should be anticipated. Surface drainage facilities (graded swales, gutters, positive grades, etc.) are recommended at the base of cut slopes that allow surfacing water to be transferred away from the base of the slope. The project designer is recommended to offer specific design criteria for mitigation of water drainage behind walls and other areas of the site. This is especially imperative upslope of retaining walls for residences. Subsurface drainage systems should not be connected into conduit from surface drains and should not connect to downspout drainage pipes.

4. Surface drainage should be controlled to prevent concentrated water-flow discharge onto either natural or constructed slopes. Surface drainage gradients should be planned to prevent ponding and promote drainage of surface water away from building foundations, edges of pavements and sidewalks or natural or man-made slopes. For soil areas we recommend that a minimum of two (2) percent gradient be maintained.

5. Gully erosion is observed in the southern portion of the Site. The gully extends upslope offsite. Concentrated drainage from this gully should be directed away from proposed development.

6. Excavation, fill, and construction activities should be in accordance with appropriate codes and ordinances of the City of Morro Bay. In addition, unusual subsurface conditions encountered during grading such as springs or fill material should be brought to the attention of the Engineering Geologist and Soils Engineer.

7. Rock rip-rap is recommended for concentrated drainage outfall locations that do not discharge onto paved or exposed rock surfaces. It is recommended that geotextile fabric (Enkamat 7010 or similar) be placed underneath the rip-rap and installed per the manufacturer’s recommendations.

8. Gutters are recommended to be installed along all sloped rooflines. Gutter downspouts should not allow concentrated drainage to discharge near the residence foundations but rather should convey the water in solid piping away from the residence and toward drainage facilities.

4.0 ENGINEERING GEOLOGY

4.1 Regional Geology

The Site is located in the vicinity of the San Luis Range of the Coast Range Geomorphic Province of California. The Coast Ranges lie between the Pacific Ocean and the Sacramento-San Joaquin Valley and trend northwesterly along the California Coast for approximately 600 miles between Santa Maria and the Oregon border.

Regionally, the Site is located on the Cambrian Slab composed of a large, thick block of Cretaceous age sediments that are surrounded by Franciscan Formation rocks. The Cambrian Slab extends from the Los Osos fault south of the property and northward to San Simeon Creek.

4.2 Local Geology

Locally, the site is located within landslide deposits, alluvium or colluvium overlying Franciscan Complex units as depicted on Plate 1A, Site Engineering Geology Map. Hall and Prior, 1975, Dibblee, 2006 and Wiegers, 2016 mapped the Site as underlain by Holocene age Landslide Deposits (Qls), Holocene age Alluvial Deposits (Qal, Qa, Qya), and Cretaceous to Jurassic age Franciscan Complex (KJfme, Sp, Kfm) units. Information derived from subsurface exploration was used to classify subsurface soil and formational units and to supplement geologic mapping.

Previous site investigations were performed at the tank farm including: Environmental Quality Survey (Environmental Chemical Corporation (ECC), 1991 and Site Assessment/Groundwater Monitoring Report (Groundwater Technology, Inc., 1994). Forty (40) soil borings were completed as part of Environmental Quality Survey in 1991. The locations of the borings (SB1 through SB40) as well as cross sections are presented in Appendix B. An additional, six (6) borings were drilling for groundwater sampling as part of the Site Assessment/Groundwater Monitoring Report in 1994.

The field investigation for the project was performed on January 24, 2022 and January 28, 2022 consisted of advancing seven (7) exploratory borings varying from 15 feet below ground surface to a maximum depth of 60 feet bgs. In addition, on February 9, 2022, seven (7) exploratory trenches were excavated to a depth of 9 to 11 feet bgs. See Plate 1A for current boring and trench locations. Boring and trench logs are presented in Appendix A. Boring SB40 from the referenced Environmental Quality Survey (ECC, 1991) is included on Plate 1A and within the boring logs in Appendix A.

Figure 3: Geologic Map (Hall and Prior, 1975)

4.2.1 Surficial Soils

Alluvial Deposits (Qya)
Alluvial Deposits were encountered throughout the majority of the western and southern portion of the Site. The Alluvial Deposits at the site consists of grayish brown clayey sand to dark yellowish brown to dark brown sandy clay with gravel observed in a slightly moist to moist and stiff to very stiff condition. Alluvial Deposits were observed within borings B-1 through B-3 and B-5 through B-7 to various depths of 24 feet in boring B-2 to 57 feet in boring B-6. Previous boring SB40 encountered alluvial deposits to a maximum depth of 60 feet bgs. Alluvial deposits were also encountered within trench T-5 to the termination depth of 10 feet bgs. Plate 1A depicts the extents of the Alluvial Deposits at the Site.

Colluvial Deposits (Qc)
Colluvial Deposits were observed overlying the Franciscan Complex upslope of the tank pads in the northern portion of the site (in the area mapped as KJfm on Plate 1A although the colluvium is not depicted on the map). Colluvial Deposits were observed within trench T-4 and T-6 to a depth of 3 to 5 feet below ground surface. The Colluvial Deposits at the site consists of dark reddish brown sandy clay observed in a slightly moist condition.

Landslide Deposits (Qls)

Landslide Deposits are mapped through the upper portion of the site. Hall and Prior, 1975, Dibblee, 2006 and Wiegers, 2016 map the site was underlain by a large landslide complex. Landslide Deposits were observed within trenches T-4 through T-6 to a depth of 6 feet below ground surface. The Landslide Deposits at the site consists of light brown to very dark grayish brown sandy clay with gravel and cobbles of Franciscan Complex observed in a dry to slightly moist and loose condition. Caliche was observed throughout. Plate 1A depicts the extents of the Landslide Deposits at the Site. An additional discussion of the landslide potential is presented in Section 4.5.

4.2.2 Formational Units

Franciscan Complex (KJfm)

The Franciscan Complex mélange (KJfm) is mapped on the rock ridge along the northern property boundary. Wiegers, 2016 describes the Franciscan Complex as “Chaotic mixture of fragmented, fault-bounded, metamorphosed rock masses embedded in a penetratively sheared matrix of argillite and crushed metasandstone. Penetrative deformation of the matrix postdates metamorphism of enclosed rock masses. Individual rock masses range from less than a meter to kilometers in scale and include altered mafic volcanic rocks (greenstone), chert, serpentinite, high-grade blueschist, graywacke, and conglomerate.” The Franciscan Complex was observed within trenches T-4 and T-6 underlying the colluvium. The Franciscan Complex at the site consists of metavolcanic rock, graywacke sandstone and serpentinite observed to be massive, highly fractured, moderately to severely weathered and moderately hard. Plate 1A depicts the extents of the Franciscan Complex (KJfm) at the Site.

4.3 Surface and Ground Water Conditions

Surface drainage follows the topography west toward an existing drainage gully and south toward Panorama Drive. Surface drainage should be directed away from proposed structures and slopes. No springs or seeps were observed at the project. Groundwater was not observed within the trenches or borings at the time of this investigation, however groundwater elevations may vary seasonally. Groundwater was encountered from 20 to 30 feet bgs in the referenced Site Assessment (GTI, 1994).

4.4 Active Faulting and Coseismic Deformation

Many faults are mapped of varying types, lengths, and age. An active fault is one that shows evidence of displacement within the last 11,000 years (Recent epoch). A fault which displaces deposits of late Pleistocene age (500,000 to 11,000 years) but with no evidence of Recent movement is termed potentially active. Inactive fault is one that displace rocks of early Pleistocene or older (500,000 years or older).

Similar to the general area, the Site can be affected by moderate to major earthquakes centered on one of the known large, Holocene active faults listed in Table No. 1. Moment magnitudes are expressed, although any event on these faults could result in moderate to severe ground shaking at the subject property.

Table 1: Distance and Moment Magnitude of Closest Faults

Closest Active Faults to Site	Approximate Distance (miles)	Moment Magnitude (Mw)
Hosgri Fault Zone	8.0	7.3
Los Osos Fault Zone	11.0	6.8
San Andreas	39.5	6.9

The closest known active portion of a Holocene age fault is an active portion of the Hosgri Fault Zone that is located approximately 8.0 miles southwest of the Site (Jennings, 2010). Plate 3 is a Regional Fault Map for the area. The San Andreas fault is the most likely active fault to produce ground shaking at the Site although it is not expected to generate the highest ground accelerations because of its distance from the Site.

4.4.1 Cambria Fault

The Cambria fault is in the vicinity of the Site and can be considered part of the Oceanic fault at its southern end near the City of San Luis Obispo, California. Plate 3 depicts the location of the Cambria fault (Jennings, 2010). The Cambria fault becomes indistinct north of San Simeon Creek. Splays of the Cambria fault break Pliocene (5 to 2 million years before present) strata east of the town of Cambria, but there is no known breakage of Holocene rocks by the Cambria fault. The Cambria fault is complicated by the intersection of many older shear zones from the Franciscan mélange with the fault zone.

Jennings, 2010 classifies the majority of this fault as Quaternary active, showing evidence of displacement during late Quaternary time (between 700,000 years before present to 10,000 years before present). The most northerly extent of Quaternary faulting on the Cambria fault depicted on Jennings's map is present only to the town of Cambria. North of the town of Cambria, the Cambria fault is depicted as a concealed fault without recognized Quaternary displacement.

Hart et al., 1985 describes the Cambria fault as a vertical to steeply dipping, southwest-dipping, normal fault in Cretaceous sedimentary units. Additionally, the fault is poorly defined and may offset late Pleistocene terrace deposits (more than 125,000 years old) and may be concealed locally by younger terrace deposits, Quaternary landslides, and Holocene alluvium. Hall and Prior, 1975 mapped splays of the Cambria fault 800 feet northwest of the Site bounding the Serpentinite unit (see Figure 3). Wiegers, 2016 mapped splays of the Cambria fault 600 feet northwest of the Site.

4.5 Landslides

Hall and Prior, 1975, Dibblee, 2006 and Wiegers, 2016 map a large landslide complex within and immediately south at the Site. During site mapping and review of recent (Plate 4) and historical aerial photography from 1937 (Figure 4) and 1963 (Figure 5), the site is located at the base of a bowl shape with serpentinite outcrops forming the head scape at the top. The landslide complex is identified as the Panay Landslide. A Structural and Kinematic Analysis of the Panay Landslide was performed by Gary Mann (Gary Mann, 1997). The referenced study identified significant reactivation of the landslide in 1982-83, 1994-95 and 1997-98 during periods of significant rainfall events. Reactivation was observed as creep in lieu of large-scale gross failure, however damages included deformation of the asphalt as well as breaking underground utilities. Based on this, the Panay Landslide is considered active. Various trenches were excavated throughout the southern portion of the site to identify the limits of landslide deposits. Landslide deposits were observed within boring B-4 and trenches T-2 and T-3. Landslide deposits were not identified within trenches T-1, T-4 and T-7. Conservative landslide extents were identified and staked in the field. These points were surveyed and are accurately plotted on Plate 1A. This contact line was then compared with the landslide extents identified in the referenced Structural and Kinematic Analysis of the Panay Landslide. Our conclusion of the landslide extents match with the extents identified in the previous study. Appendix B depicts the landslide extents mapped during the referenced Structural and Kinematic Analysis of the Panay Landslide (Mann, 1997).

It is recommended that new development not be located on identified landslide deposits. In addition, it is recommended that a 10-foot buffer from landslide deposits be implemented for proposed structures. Graded lots may extend within the 10-buffer provided that proposed structures are located outside the buffer. It is recommended that grading and roadways not extend within the limits of the landslide deposits.

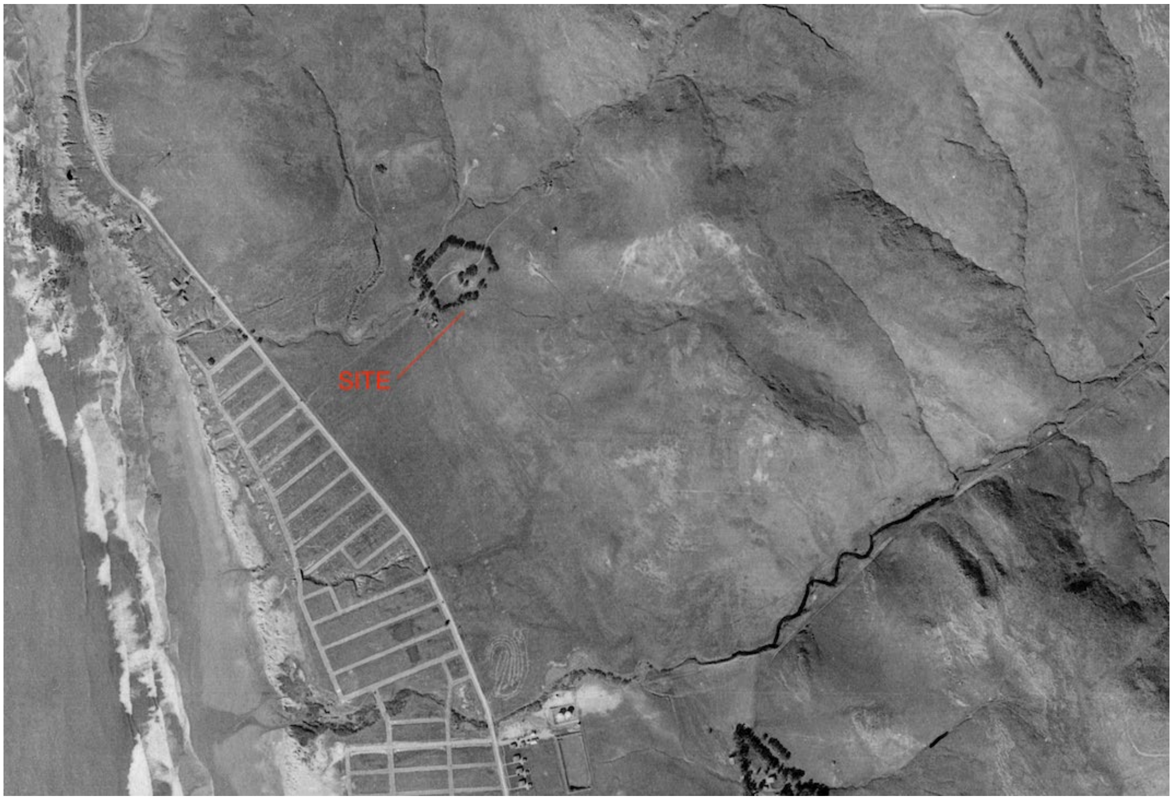

Figure 4: Historical Aerial Photograph (1937)

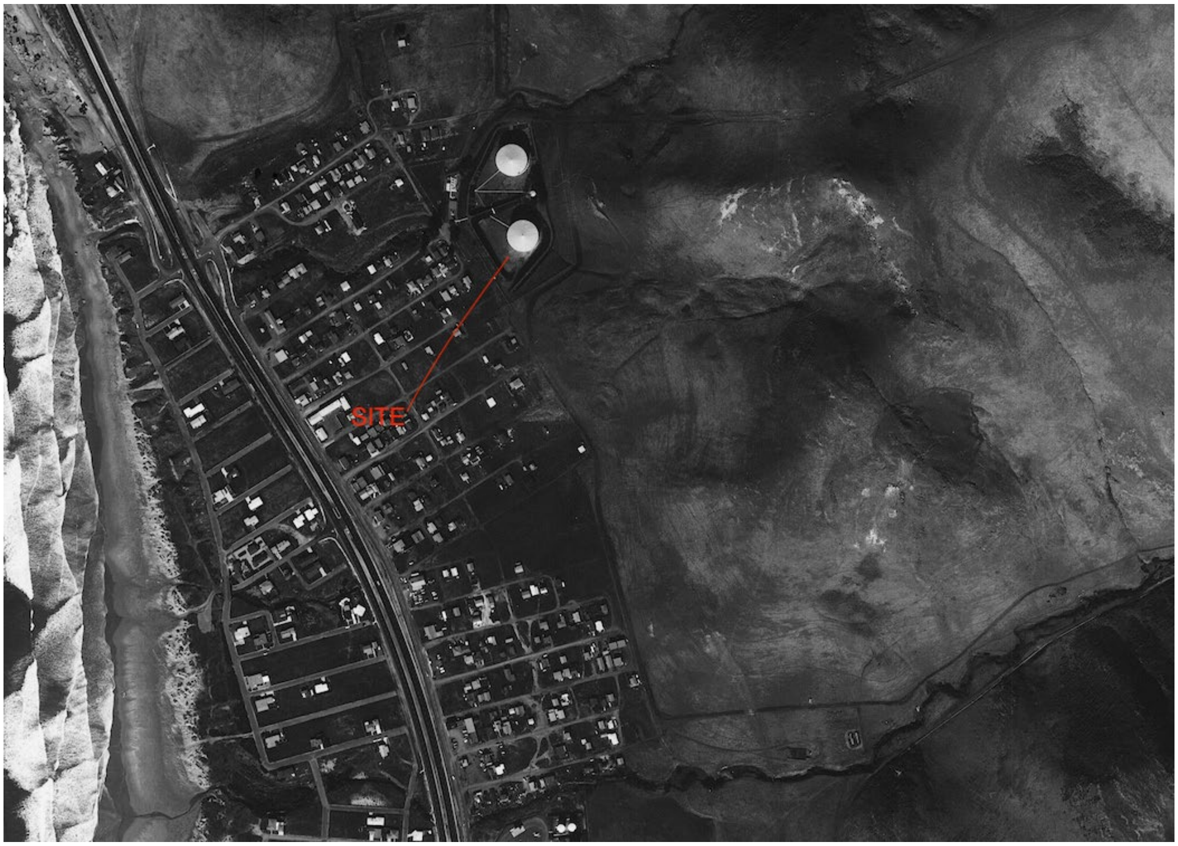

Figure 5: Historical Aerial Photograph (1963)

Figure 6: Photograph of the Site with the head scarp on the hills in the background (looking east)

Hall and Prior, 1975 and Wiegers, 2016 also map an additional landslide east of the northern portion of the Site within the existing drainage gully. A surficial instability is observed within the 1963 aerial photograph. The landslide does not extend within the property boundaries. Reactivation of these landslide deposits in the future would mobilize material to the north into the existing drainage gully and not toward the site. Therefore, there is a low potential for this landslide to affect the proposed development.

4.6 Flooding and Severe Erosion

The lower portion and west side of the site is located within the 100-year or 500-year flood zone based on Federal Emergency Management Agency flood zone maps, see Figure 7 (FEMA, 2017). It is recommended that the project be designed above the minimum flood elevation.

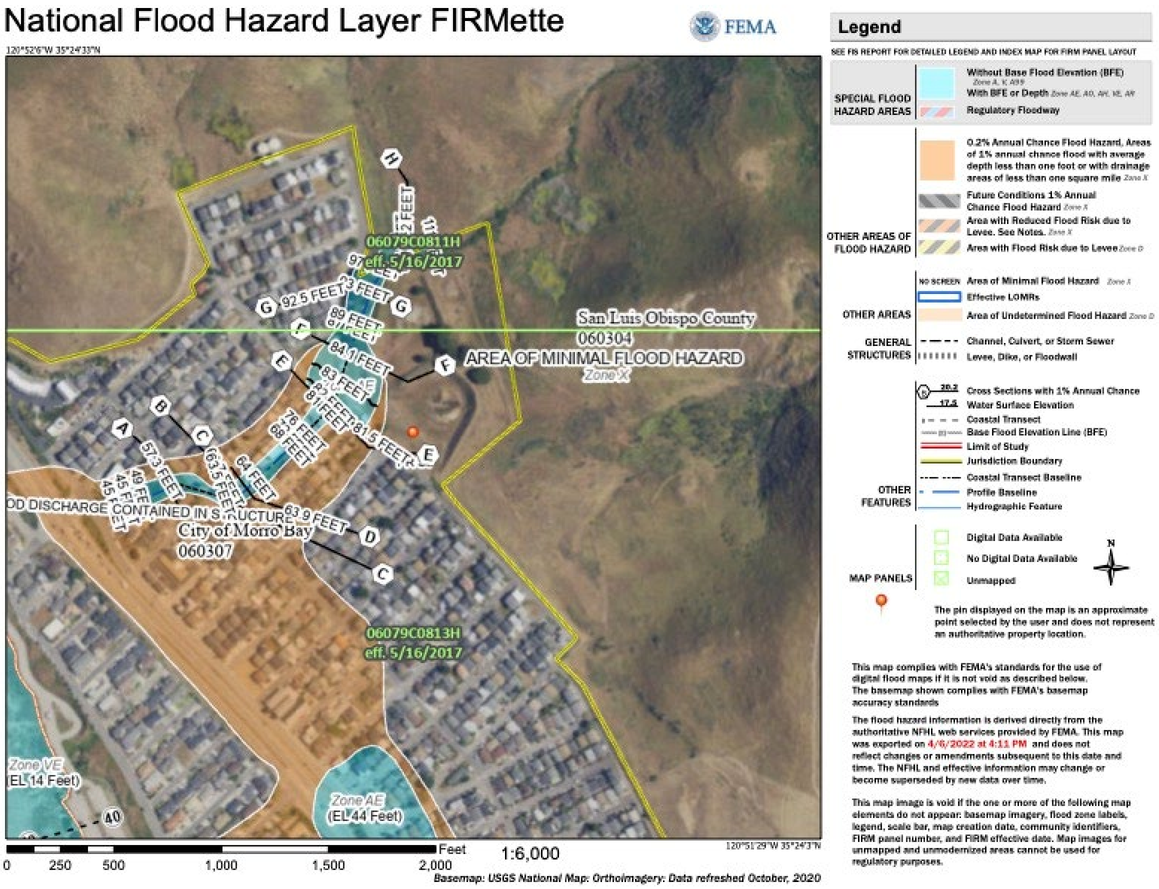

Figure 7: Area Flood Map (FEMA, 2017)

The surficial and formational deposits are subject to erosion where not covered with vegetation or hardscape. The potential for severe erosion is considered low provided that vegetation and erosion control measures are implemented immediately after the completion of grading.

4.7 On-site Septic Systems

No septic systems are proposed. It is our understanding that the project will utilize a community sewer system.

4.8 Hydrocollapse of Alluvial Fan Soils

The potential for hydrocollapse of subsurface materials is considered low due to the absence of alluvial fan material at the Site.

5.0 SISMOLOGY AND CALCULATION OF EARTHQUAKE GROUND MOTION

5.1 Seismic Hazard Analysis and Structural Building Design Parameters

Estimating the design ground motions at the Site depends on many factors including the distance from the Site to known active faults; the expected magnitude and rate of recurrence of seismic events produced on such faults; the source-to-site ground motion attenuation characteristics; and the Site soil profile characteristics. According to section 1613 of the 2019 CBC (CBSC, 2019), all structures and portions of structures should be designed to resist the effects of seismic loadings caused by earthquake ground motions in accordance with the ASCE 7: Minimum Design Loads for Buildings and Other Structures, hereafter referred to as ASCE 7-16 (ASCE, 2016). The Site soil profile classification (Site Class) can be determined by the average soil properties in the upper 100 feet of the Site profile and the criteria provided in Table 20.3-1 of ASCE 7-16.

Spectral response accelerations and peak ground accelerations, provided in this report were obtained using the computer-based Seismic Design Maps tool available from the Structural Engineers Association of California (SEAOC, 2019). This program utilizes the methods developed in ASCE 7-16 in conjunction with user-inputted Site location to calculate seismic design parameters and response spectra (both for period and displacement) for soil profile Site Classes A through E.

Site coordinates of 35.4054397 degrees north latitude and -120.8641032 degrees west longitude were used in the web-based probabilistic seismic hazard analysis (SEAOC, 2019). Based on the results from the in-situ tests performed during the field investigation, the Site was defined as Site Class D, “Stiff Soil” profile per ASCE7-16, Chapter 20. Relevant seismic design parameters obtained from the program area summarized in Table 2: Seismic Design Parameters.

Table 2: Seismic Design Parameters

Site Class	**D “Stiff Soil”**
Seismic Design Category	**D**
1-Second Period Design Spectral Response Acceleration, S_{D1}	**(See Note 1)**
Short-Period Design Spectral Response Acceleration, S_{DS}	**0.775**
Site Specific MCE Peak Ground Acceleration, PGA_M	**0.516g**

Note 1: It is assumed that this design-period acceleration will not be required for the project.

6.0 LIQUEFACTION

Due to the densities and presence of clay within the surface material, the liquefaction potential at the Site is considered low.

7.0 TSUNAMIS AND SEICHES

Tsunamis and seiches are two types of water waves that are generated by earthquake events. Tsunamis are broad-wavelength ocean waves and seiches are standing waves within confined bodies of water, typically reservoirs. As the property is at an elevation over 80 feet and distance to the Pacific Ocean, the potential for a tsunami to affect the Site is low.

Flooding associated with a seismic event (seiche) is considered low due to the absence of a body of water upslope of the property.

8.0 HAZARDS FROM GEOLOGIC MATERIALS

8.1 Expansive Soils

The potential for expansive soil at the Site is very high based on laboratory testing from the concurrent Soils Engineering Report, expansion index of 141. The foundation recommendations for expansive soils should be incorporated into the design.

8.2 Naturally Occurring Asbestos

There is a moderate to high potential for natural occurring asbestos to be present at the property due to the presence of Franciscan Complex units. Naturally occurring asbestos is associated with serpentinite rock units within the Franciscan Complex. Serpentinite was observed within outcrops. Testing can be performed to verify the presence/absence of naturally occurring asbestos. In lieu of testing, an Asbestos Health and Safety Program and Asbestos Dust Mitigation Plan could be developed in accordance with Air Pollution Control District.

8.3 Radon and Other Hazardous Gases

The potential for radon or other hazardous gases is low due to the absence of Monterey Formation formational units and other identified radon producing formations.

9.0 GRADING OPERATIONS, CUT AND FULL, SUBDRAINS

Based on the presence of alluvial deposits encountered at the site, it is anticipated that the foundations will be excavated into over excavated engineered fill. Conventional grading equipment may be used for excavations, however hard rock conditions should be anticipated. The Soils Engineering Report provides additional foundation and construction recommendations. Based on the field investigation, subdrains are not anticipated at this time, however this may be reevaluated at the time of construction.

Construction inspections and testing during all grading and excavating operations should be performed by the project Soils Engineer/Engineering Geologist. Section 1705.6 of the 2019 CBC (CBSC, 2019) requires the following inspections by the Soils Engineer/Engineering Geologist as shown in Table 3: Required Verification and Inspections of Soils:

Table 3: Required Verification and Inspections of Soils

Verification and Inspection Task	Continuous During Task Listed	Periodically During Task Listed
1. Verify materials below footings are adequate to achieve the design bearing capacity.	-	X
2. Verify excavations are extended to proper depth and have reached proper material.	-	X
3. Perform classification and testing of controlled fill materials.	-	X
4. Verify use of proper materials, densities and lift thicknesses during placement and compaction of controlled fill.	X	-
5. Prior to placement of controlled fill, observe sub-grade and verify that site has been prepared properly.	-	X

10.0 ADDITIONAL SERVICES

The recommendations contained in this report are based on exploratory borings and trenches and on the continuity of the sub-surface conditions encountered. It is assumed that GeoSolutions, Inc. will be retained to perform the following services:

1. Consultation during plan development.
2. A preliminary plan review regarding the locations of proposed improvements and development once grading and drainage plans are available.
3. Final plan review of final grading and drainage documents prior to construction.

4. Additionally, construction observation by the Engineering Geologist and/or Soils Engineer may be necessary to verify sub-surface conditions during excavation activities.

11.0 LIMITATIONS AND UNIFORMITY OF CONDITIONS

The recommendations of this report are based upon the assumption that the soil conditions do not deviate from those disclosed during our study. Should any variations or undesirable conditions be encountered during the development of the Site, GeoSolutions, Inc. should be notified immediately and GeoSolutions, Inc. will provide supplemental recommendations as dictated by the field conditions.

This report is issued with the understanding that it is the responsibility of the owner or his/her representative to ensure that the information and recommendations contained herein are brought to the attention of the architect and engineer for the project, and incorporated into the project plans and specifications. The owner or his/her representative is responsible to ensure that the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations in the field.

As of the present date, the findings of this report are valid for the property studied. With the passage of time, changes in the conditions of a property can occur whether they are due to natural processes or to the works of man on this or adjacent properties. Therefore, this report should not be relied upon after a period of 3 years without our review nor should it be used or is it applicable for any properties other than those studied. However, many events such as floods, earthquakes, grading of the adjacent properties and building and municipal code changes could render sections of this report invalid in less than 3 years.

Thank you for the opportunity to have been of service in preparing this report. If you have any questions or require additional assistance, please feel free to contact the undersigned at (805) 543-8539.

Sincerely,
GeoSolutions, Inc.

Jeffrey Pfost, CEG 2493
Principal Engineering Geologist

PROFESSIONAL GEOLOGIST
JEFFREY PFOST
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CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

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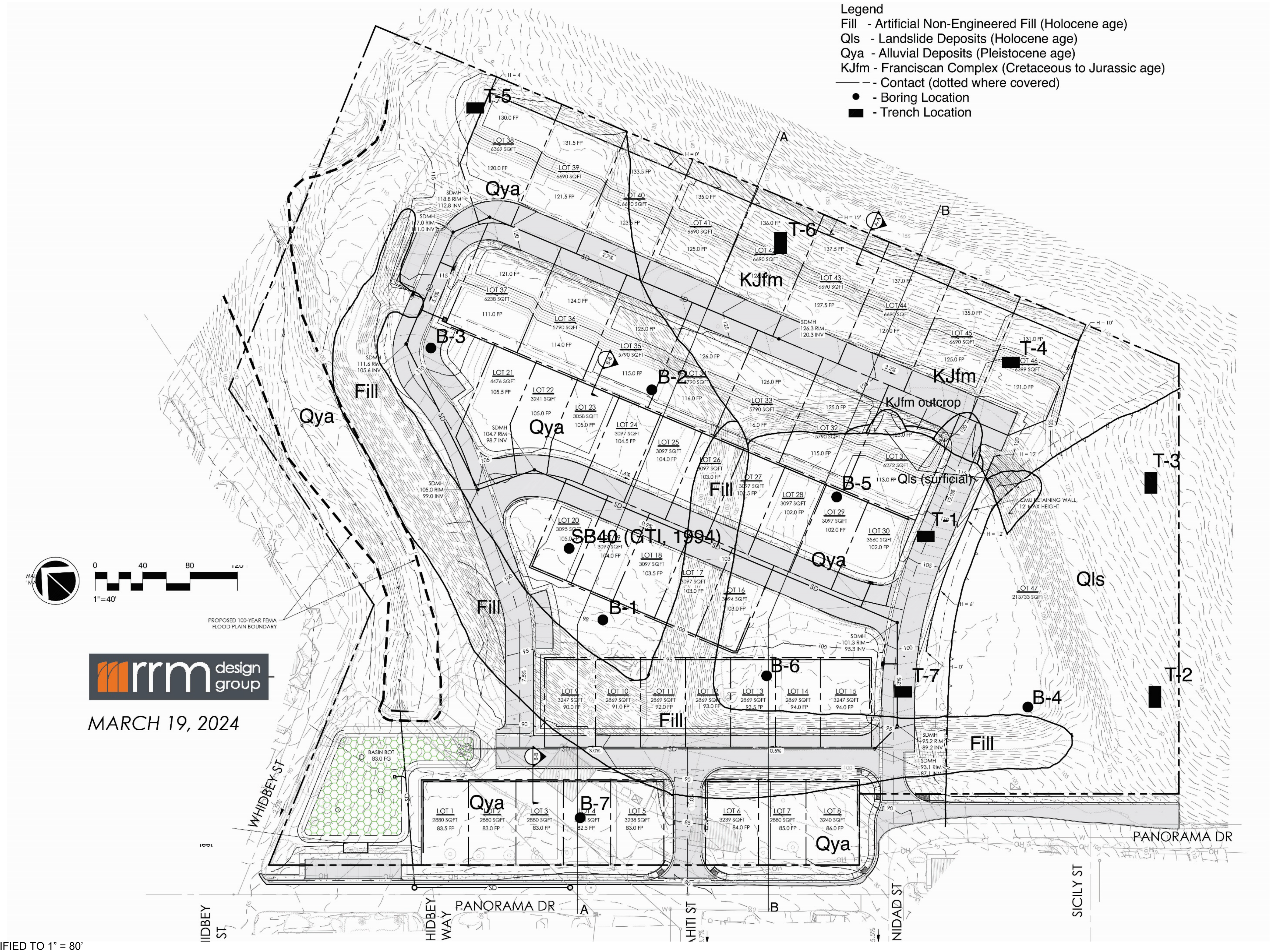
PLATES

Plate 1A, 1B, 1C - Site Engineering Geologic Map and Site Cross Sections
Plate 2A, 2B – Regional Geologic Map, Wiegers, 2016
Plate 3 – Regional Fault Map, Jennings, 2010
Plate 4 – Aerial Photograph, 2021



ORIGINAL SCALE MODIFIED TO 1" = 80'

PLATE
1A

PROJECT
SL09618-6

SITE ENGINEERING GEOLOGY MAP

3300 PANORAMA DRIVE, APN:065-038-001
MORRO BAY, CALIFORNIA

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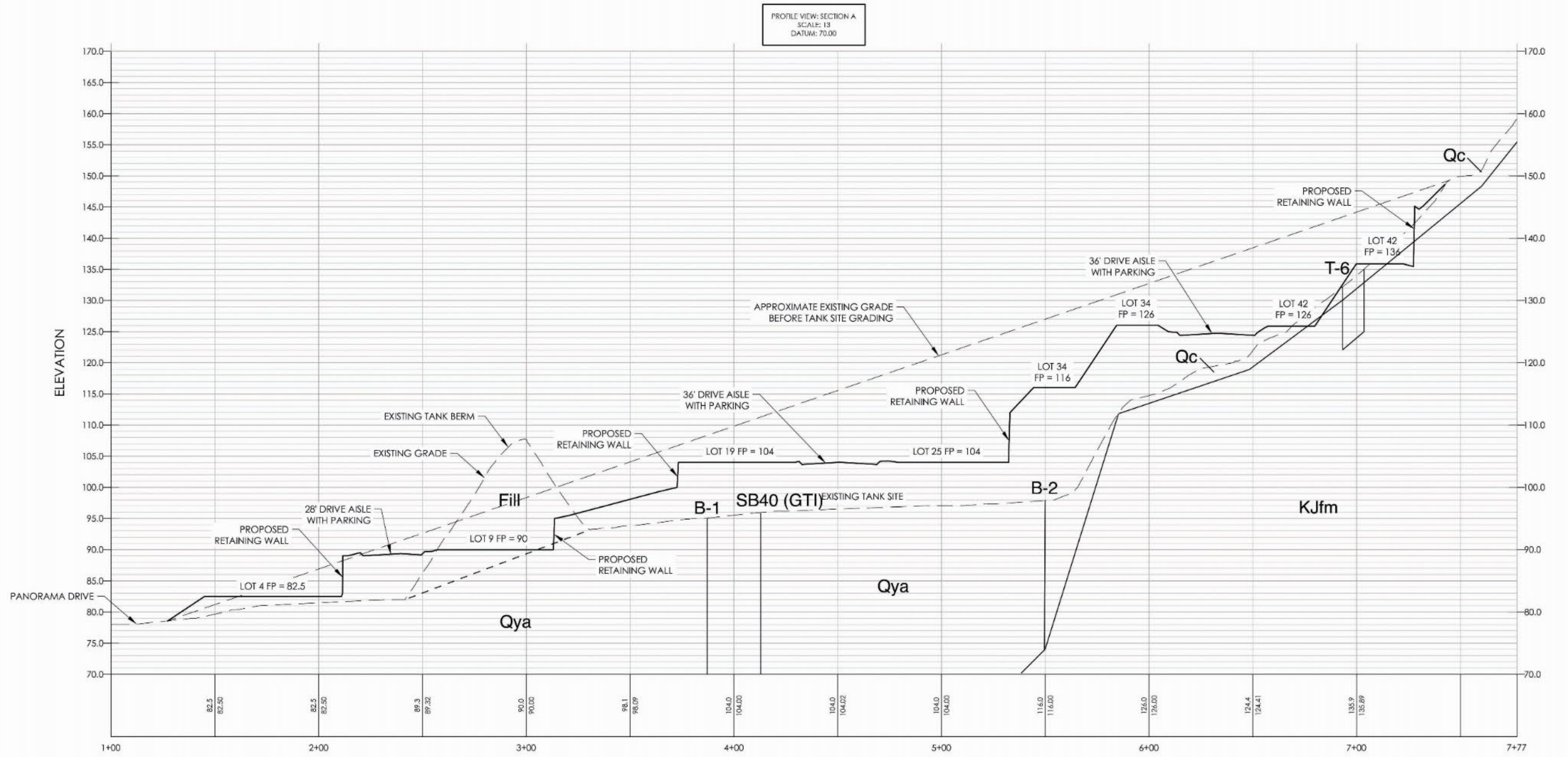
P: 805-543-8539



PROPOSED SITE SECTION A

1" = 30' HORIZONTAL SCALE
1" = 10' VERTICAL SCALE

rrm design group

MARCH 19, 2024

Legend
Fill - Fill (Holocene age)
Qc - Colluvium (Holocene age)
Qya - Alluvial Deposits (Pleistocene age)
KJfm - Franciscan Complex (Cretaceous to Jurassic age)
—— - Contact

ORIGINAL SCALE MODIFIED TO 1" = 80'

PLATE
1B

PROJECT
SL09618-6

SITE CROSS SECTION A-A'

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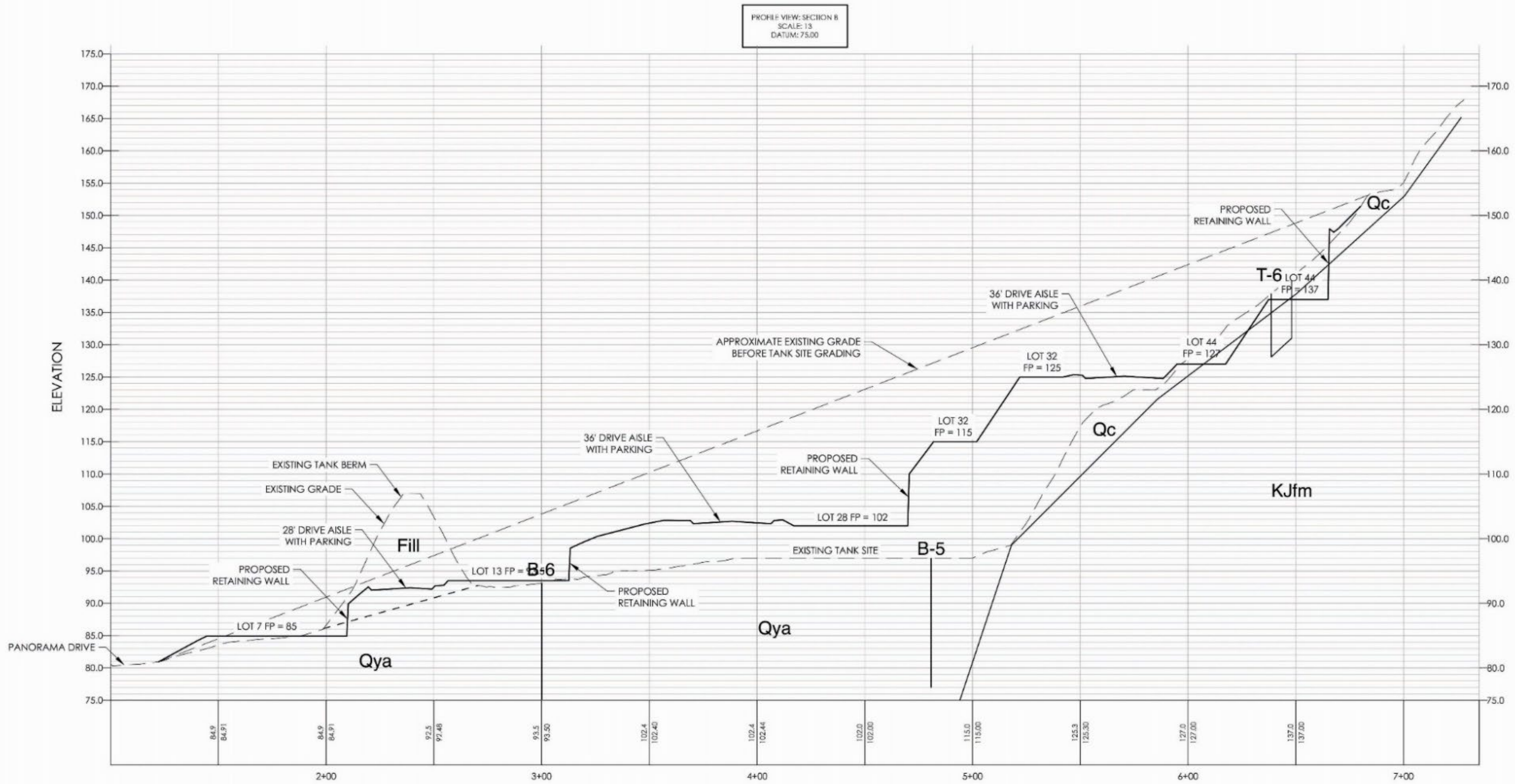

PROPOSED SITE SECTION B

1" = 30' HORIZONTAL SCALE
1" = 10' VERTICAL SCALE

rrm design group

MARCH 19, 2024

Legend
Fill - Fill (Holocene age)
Qc - Colluvium (Holocene age)
Qya - Alluvial Deposits (Pleistocene age)
KJfm - Franciscan Complex (Cretaceous to Jurassic age)
—— - Contact

ORIGINAL SCALE MODIFIED TO 1" = 80'

PLATE
1C

PROJECT
SL09618-6

SITE CROSS SECTION B-B'

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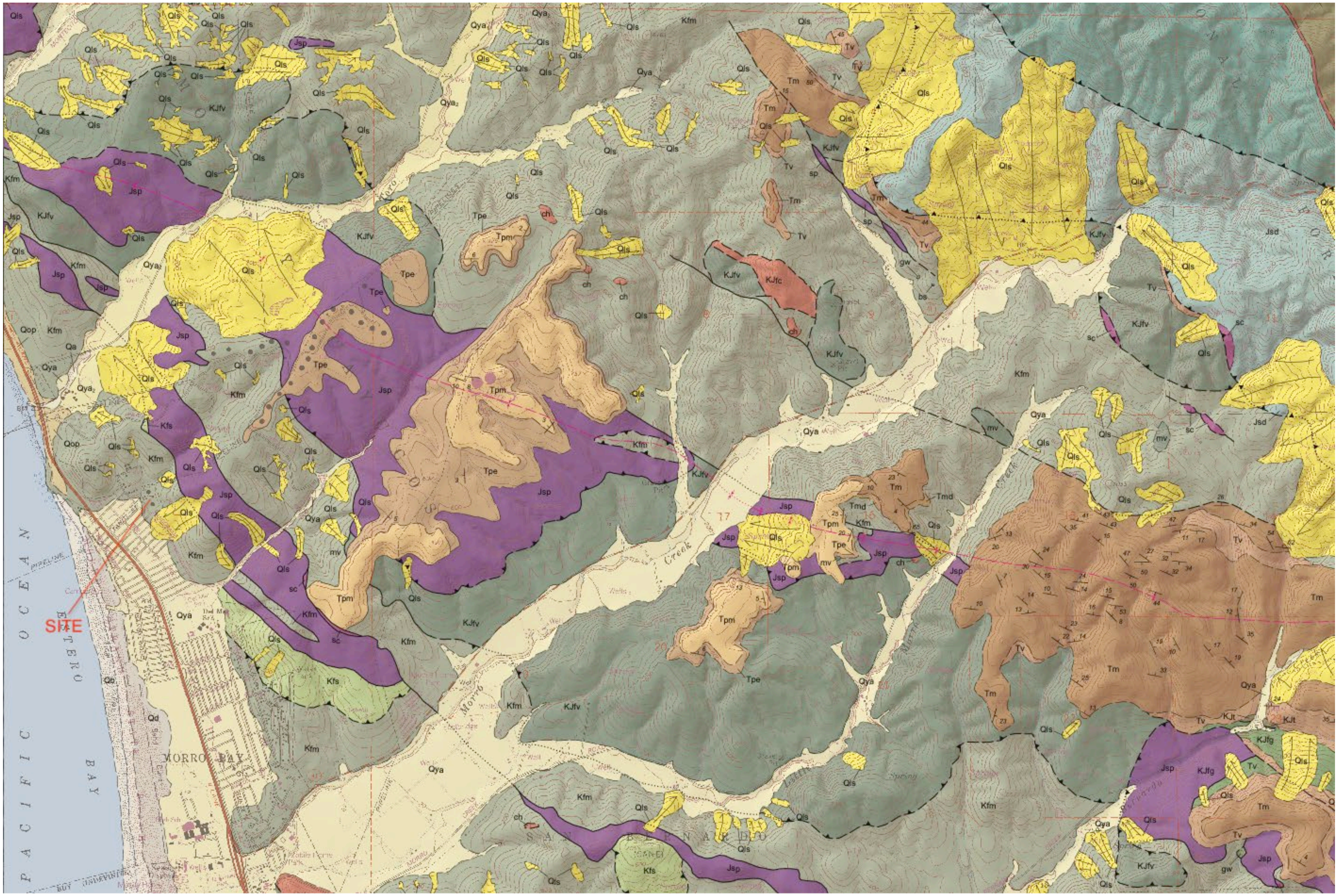

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REGIONAL GEOLOGY MAP (Wiegers, 2016)

3300 PANORAMA DRIVE, APN: 065-038-001
MORRO BAY, CALIFORNIA

PLATE
2A

PROJECT NO:
SL09618-5

Qb	**Beach and active dune deposits (late Holocene)**—Unconsolidated, mostly fine- and medium-grained sand accumulated along the coastline; includes scattered cobbles.
Qd	**Dune sands (late Holocene)**—Unconsolidated, well-sorted white to brown windblown sand. Forms active dunes behind modern beaches.
Qa	**Alluvial flood plain and channel deposits (late Holocene)**—Active stream channel and recently active flood-plain deposits. Consist of unconsolidated, silty sand and sandy gravel with cobbles, scattered boulders with occasional lenses of silty clay.
Qls	**Landslide deposits (Holocene to late Pleistocene)**—Includes comparatively shallow earth flow and debris slide deposits consisting of fragmented bedrock and soil mixtures, and deep rock slides of relatively intact bedrock displaced along rotational or translational slip surfaces. Most prevalent in ophiolitic serpentinite along the Oceanic Fault and in Franciscan melange.
Qya	**Young alluvial flood-plain deposits, undivided (Holocene to late Pleistocene)**—Unconsolidated sand, silt and clay-bearing alluvium deposited on flood-plains and along valley floors. Surfaces on young deposits are undissected and lack soil development. Surfaces on older deposits are slightly dissected and display weak soil development. Locally divided by relative age (2 = youngest, 1 = oldest):
Qya_2	**Young alluvial valley deposits, Unit 2**
Qya_1	**Young alluvial valley deposits, Unit 1**
Qop	**Old paralic deposits (late Pleistocene)**—Marine terrace deposits consisting of beach and nearshore sands and gravels covered by colluvium and alluvium. These deposits rest on an emergent wave-cut platform preserved by regional uplift just north of Morro Bay. Marine deposits consist of well-sorted sand and gravel locally containing fossils and shell fragments. Overlying non-marine cover consists of poorly-sorted sand, silt, gravel and clay deposited by slope wash and alluvial processes. Estimated age of the wave-cut platform is 120 ka (Hanson and others, 1994).

TERTIARY ROCKS

	Pismo Formation (late Pliocene to late Miocene)
Tpm	**Miguelito Member**—Brown to buff interbedded siltstone and claystone, moderately resistant, well –bedded, beds generally 2 to 4 inches thick. Locally includes beds and lenses of siliceous and dolomitic siltstone, opaline shale, porcelaneous shale, thin-bedded chert, diatomaceous shale, diatomite, friable and locally bituminous sandstone and locally conglomeratic or tuffaceous near base. (Hall and others, 1979).
Tpe	**Edna Member**—Poorly to moderately well indurated, brown to gray, fine- to medium-grained arkosic sandstone. Locally interbedded with yellow claystone. Contains 35% to 80% quartz, 5% to 15% feldspar, up to 40% silt-sized particles (Hall, 1979).
	Monterey Formation (late to middle Miocene)
Tm	**Siltstone and mudstone member**—Brown to buff, thin- to thick-bedded, calcareous and porcelaneous mudstone (Sieders, 1992) and siltstone, blocky dolomitic claystone and siliceous siltstone (Hall and others, 1979). Includes lenses of dolomite, interbedded cherty shale and graded sandstone beds. Locally tuffaceous. Weathers to a light gray rock of low density locally called "chalk rock."
Tmd	**Dolomitic siltstone**—Local dolomitic siltstone with some opaline chert.
Tmt	**Tuffaceous mudstone and tuff member**—Light gray, thin- to thick bedded, interbedded with some dark gray calcareous mudstone.
Tdb	**Diabase and basalt (middle Miocene)**—Dark olive-gray, fine- to medium grained, spheroidally weathered, diabase and basalt. Occurs as sills and dikes in the Rincon shale and as possible extrusive flows that might be interbedded locally with tuffaceous sediments in the base of the Monterey Formation. Locally exhibits weakly developed pillow structure.
Tr	**Rincon Shale (early Miocene and Oligocene)**—Dark brown to orange brown siltstone and silty claystone, poorly- to well-bedded, weathers white to light brown. Locally contains zones of dolomite. Lithologically similar to rocks that have been assigned to the lower part of the Monterey Formation but contains fossils known to be older (Hall and Prior, 1975). Differentiated from Monterey Formation by absence of chert and pocelaneous shale.
Tv	**Vaqueros Sandstone (Oligocene)**—Gray to brown, medium- to coarse-grained arkosic sandstone. Includes pebbly sandstone and sandy and pebbly limestone. Poorly indurated to hard, with a silty, calcareous matrix. Some beds are hard and resistant due to abundant calcite cement. Clasts are well-rounded to subrounded with a typical composition of 50% to 90% quartz, less than 10% to 30% feldspar, 5% to 35% rock fragments. Contains fossiliferous zones with oyster shells up to 17 cm.
Tcg	**Unnamed conglomerate (Oligocene)**—Massive matrix-supported, non-marine pebble, cobble and boulder conglomerate and pebbly sandstone. Clasts are subrounded to subangular and range in size from pebbles to boulders as much as 6 feet in diameter. Large clasts are mostly feldspathic biotitic sandstone derived from the Atascadero Formation. Much of the pebble and small cobble fraction is composed of volcanic porphyry and other resistant rock types likely reworked from Atascadero conglomerates. Smaller clasts include chert, mafic volcanic rock and graywacke likely derived from Franciscan mélange. These deposits were deposited in a high-energy alluvial fan environment near source areas of rapidly uplifted Mesozoic rocks. Some poorly-sorted zones with subangular boulders appear to be debris flow deposits. Mapped as the Lospe Formation by Hall and others (1975). Similar in age and type to the Sespe Formation in the southern Coast Ranges.
	Cambria Felsite (Oligocene)
Tf	**Felsite**—Light gray and grayish orange crystalline felsite, commonly flow-layered with phenocrysts of quartz and plagioclase. Forms resistant ridges and volcanic plugs and domes (Hall and others 1979).
Tft	**Tuff**—Light gray, orange and pale green tuff, lapilli tuff and tuff breccia. Locally contains reworked fragments of Franciscan blueschist, graywacke and ophiolitic serpentinite.

Franciscan Complex

Kfm	**Mélange (Late Cretaceous)**—Chaotic mixture of fragmented, fault-bounded, metamorphosed rock masses embedded in a penetratively sheared matrix of argillite and crushed metasandstone. Penetrative deformation of the matrix postdates metamorphism of enclosed rock masses. Individual rock masses range from less than a meter to kilometers in scale and include altered mafic volcanic rocks (greenstone), chert, serpentinite, high-grade blueschist, graywacke, and conglomerate. Greenstone, chert, and serpentinite blocks are probably derived from the Coast Range Ophiolite and were emplaced and interleaved in the matrix during subduction. Small pods mapped locally are designated with abbreviated labels as follows: **mv** – metavolcanic rock **sp** – serpentinite **ch** – chert **bs** – blueschist **gw** – graywacke
	Larger slabs and blocks enclosed in mélange consist of the following:
Kfs	**Sandstone of Cambria (Late Cretaceous)**—Light gray, fine- to coarse-grained, medium-bedded arkose and arkosic wacke interbedded with brown to black micaceous siltstone. Unit is more coherent and less sheared and fractured than other Franciscan units. Contains Late Cretaceous foraminifera and pollen (Graymer and others, 2014)
KJfg	**Graywacke and Metagraywacke (Cretaceous and Jurassic?)**—Brown to greenish gray, fine- to medium-grained, massive- to thin-bedded graywacke sandstone interbedded with shale and siltstone. Composed of 60% to 70% quartz; 20% to 30% feldspar, 5% biotite and 10% shale fragments embedded in a muddy matrix (Hall and Prior, 1975). Rocks are generally moderately to intensely sheared, often obscuring original stratification. This unit lacks exotic blocks characteristic of mélange. Locally includes conglomerate beds with clasts of chert, sandstone and metavolcanic rock.
KJfc	**Chert (Cretaceous and Jurassic)**—Red and green radiolarian chert associated with greenstone. Commonly veined and recrystallized, locally bleached to yellow or white. Deposited in deep oceanic setting on greenstone prior to influx of sandstone and shale. Locally interbedded with thin layers of argillite.
KJfv	**Metavolcanic rocks (greenstone) (Cretaceous? and Jurassic)**—Primarily metamorphosed basalt and diabase. Includes massive to pillowed basalt flows, breccia and tuff. Commonly deeply weathered and extensively sheared, with intermingled pods of chert. Considered to be tectonic blocks incorporated into mélange derived from the upper part of Jurassic ophiolite.

Great Valley Complex - Great Valley Sequence

	Atascadero Formation (Late Cretaceous)
Ka	**Sandstone member**—Light gray to dark olive gray, thin to thick-bedded turbidite sandstone with interbedded siltstone, mudstone and conglomerate. Unit structurally overlies Franciscan rocks and the Toro Formation and is internally disrupted by faulting and shearing. Sandstones typically consist of quartz (30-40%), feldspars (30-50%), volcanic and lithic debris (10-30%) and biotite (2 -10%) Hart (1976).
Kac	**Conglomerate member**—Very thick bedded pebble, cobble and boulder conglomerate. Clast composition predominantly includes silicic volcanic rocks, quartzite and granitic rocks. Unit lacks Franciscan debris.
	Toro Formation (Early Cretaceous and Late Jurassic)
KJt	**Shale and sandstone member**—Thin-bedded, greenish brown to brown micaceous shale interbedded with thin sandstone beds. Sandstone occurs rarely in beds up to 5 meters thick. Contains calcareous lenses and concretions. Buchia fragments occur locally in thin sandstone beds (Hall and Prior, 1975). Depositionally overlies chert and basalt of the Coast Range Ophiolite.
KJtc	**Conglomerate member**—Lenses of pebble and cobble conglomerate deposited as channel fills on submarine fans. Moderately well sorted. Contains well rounded clasts of chert (60 - 70%), quartzite (10 – 30%) with minor sandstone and mudstone clasts (Seiders, 1982).
KJtl	**Limestone**—Lenses of light to medium gray microcrystalline limestone. Locally contains shell fragments. Lenses are up to 10m thick (Seiders, 1982).

Great Valley Complex - Coast Range Ophiolite

Jch	**Chert (Jurassic)**—Brownish black to olive brown impure chert. Beds 2 to 15 cm thick intercalated with black, flaky, siliceous shale partings. Rock breaks into blocky, joint-bounded blocks with black manganese oxide coatings on some surface. Depositional on basaltic dike-and-sill complex. Overlain by marine shales of the Toro Formation.
Jbd	**Basalt and Intrusive Dike-and-Sill Complex (Jurassic)**—Dark brown extrusive basalt breccia and pillow lava intruded by diabase dikes and sills (oceanic crust remnant). Extensive fracturing and deep weathering typically obscures original structure of basalt. Intrusive dikes and sills are composed primarily of diabase, basalt, gabbro and quartz gabbro. Dikes and sills are locally more voluminous than host basalts and are considered to be feeders to overlying extrusive basalts. (Oceanic crust fragment of Page, 1972.)
Jsd	**Serpentinite and Intrusive Dike-and-Sill Complex (Jurassic)**—Serpentinite extensively intruded by altered diabase dikes and sills (mantle remnant). Relict minerals and textures of peridotite locally present where serpentinization is incomplete. Intrusive dikes and sills are primarily diabase typically altered to hydrous calcium aluminum silicates. Unit is in fault contact with overlying basalt dike-and-sill complex. Dikes and sills considered to be feeders to overlying extrusive basalts. Unit is tectonically underlain by Franciscan mélange. (Mantle fragment of Page, 1972.)
Jsp	**Serpentinized Ultramafic Rocks (Jurassic)**—Pervasively sheared serpentinite occurring as lenticular fault-bounded bodies in Franciscan mélange. Considered to be dismembered bodies of the Coast Range Ophiolite tectonically interleaved with mélange during subduction and entrained along faults. Locally altered to:
sc	**Silica-carbonate rock**—Hydrothermally altered serpentinite, composed of quartz and carbonate mineral assemblages. Relatively resistant, outcropping as craggy knobs.

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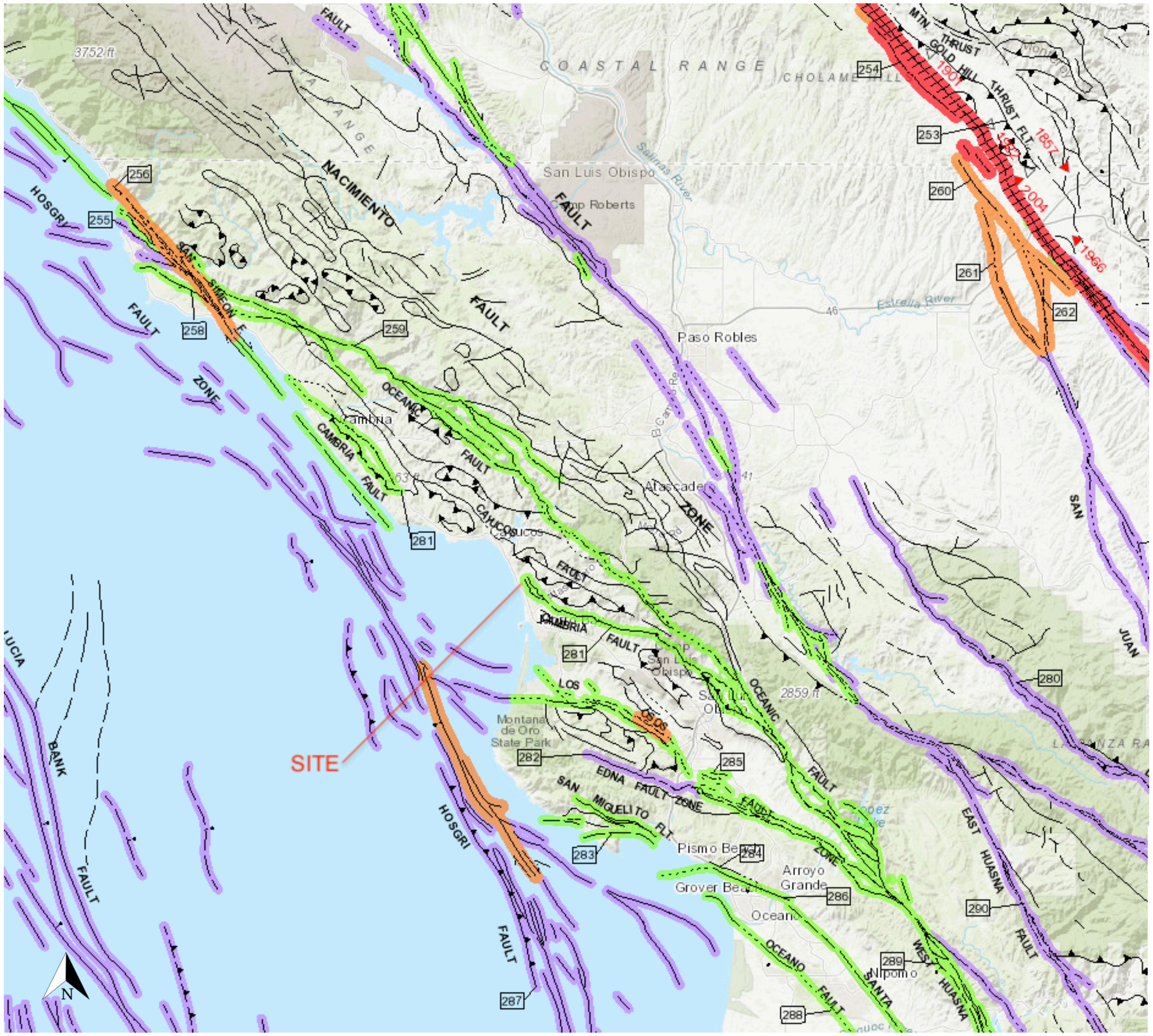
REGIONAL GEOLOGY LEGEND (Wiegers, 2016)

3300 PANORAMA DRIVE, APN: 065-038-001
MORRO BAY, CALIFORNIA

PLATE
2B

PROJECT NO:
SL09618-5



FAULT CLASSIFICATION COLOR CODE
(Indicating Recency of Movement)

Fault along which historic (last 200 years) displacement has occurred.

1906 ▶ ◀ 1906
1838 ▷ ◁ 1838

A triangle to the right or left of the date indicates termination point of observed surface displacement. Solid red triangle indicates known location of rupture termination point. Open black triangle indicates uncertain or estimated location of rupture termination point.

▶ 1951 ◀

Date bracketed by triangles indicates local fault break.

1992

No triangle by date indicates an intermediate point along faultbreak.

CREEP

Fault that exhibits fault creep slippage. Hachures indicate linear extent of fault creep. Annotation (creep with leader) indicates representative locations where fault creep has been observed and recorded.

1969
1968 ■ ■ 1968

Square on fault indicates where fault creep slippage has occured that has been triggered by an earthquake on some other fault. Date of causative earthquake indicated. Squares to right and left of date indicate terminal points between which triggered creep slippage has occurred (creep either continuous or intermittent between these end points).

Holocene fault displacement (during past 11,700 years) without historic record.

Late Quaternary fault displacement (during past 700,000 years).

Quaternary fault (age undifferentiated).

Pre-Quaternary fault (older that 1.6 million years) or fault without recognized Quaternary displacement.

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REGIONAL FAULT MAP (Jennings, 2010)

3300 PANORAMA DRIVE, APN: 065-038-001
MORRO BAY, CALIFORNIA

PLATE
3

PROJECT NO:
SL09618-5

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AERIAL PHOTOGRAPH (Google, 2022)

3300 PANORAMA DRIVE, APN: 065-038-001
MORRO BAY, CALIFORNIA

PLATE
4

PROJECT NO:
SL09618-5

APPENDIX A

Boring Logs

Trench Logs

GEO SOLUTIONS

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Phone: 805-543-8539
1021 Tama Lane, Ste 105, Santa Maria, CA 93455
Phone: 805-614-6333
201 S. Milpas St, Ste 103, Santa Barbara, CA 93103
Phone: 805-966-2200

BORING LOG

BORING NO. **B-1**
JOB NO. **SL09618-4**

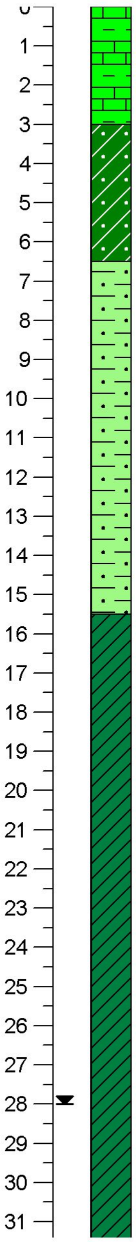
PROJECT INFORMATION

PROJECT: **3300 Panorama Dr**
DRILLING LOCATION: **See Figure 3: Field Investigation**
DATE DRILLED: **January 24, 2022**
LOGGED BY: **D. Wordeman**

DRILLING INFORMATION

DRILL RIG: **CME 55**
HOLE DIAMETER: **8 Inches**
SAMPLING METHOD: **SPT and CA**
APPROX. ELEVATION: **Not Recorded**

Depth of Groundwater: **28 Feet** Boring Terminated: **50 Feet** Page 1 of 2



DEPTH	USCS	SOIL DESCRIPTION	SAMPLE ID	SAMPLERS TYPE	N (BLOWS / FT)	(N1) 60	MOISTURE CONTENT (%)	FINES CONTENT (%)	PLASTICITY INDEX (PI)	EXPANSION INDEX (EI)	OPTIMUM WATER CONTENT (%)	MAXIMUM DRY DENSITY (pcf)	COHESION, C (psf)	FRICTION ANGLE, (degrees)
0	CH	Sandy Fat CLAY: dark grayish brown, with gravels, slightly moist												
2			A					63.9	40	62				
3	CH	Sandy CLAY with Gravel: dark brown, slightly moist, hard												
4			CA		46	60								
5			B											
7	SC	Clayey SAND: dark reddish brown, with gravel, slightly moist												
8			C											
9			SPT		32	62	11.2							
10		-very dense												
14			SPT		50/6"		10.7							
15	CL	CLAY with Gravel: dark reddish brown, slightly moist												
19		-very stiff	SPT		28	34	17.0							
24			SPT		31	33	16.4							
25		-hard												
28	▼													
29		-very stiff	SPT		21	19	17.2							

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BORING LOG

BORING NO. **B-1**
JOB NO. **SL09618-4**

PROJECT INFORMATION

PROJECT: **3300 Panorama Dr**
DRILLING LOCATION: **See Figure 3: Field Investigation**
DATE DRILLED: **January 24, 2022**
LOGGED BY: **D. Wordeman**

DRILLING INFORMATION

DRILL RIG: **CME 55**
HOLE DIAMETER: **8 Inches**
SAMPLING METHOD: **SPT and CA**
APPROX. ELEVATION: **Not Recorded**

Depth of Groundwater: **28 Feet**
Boring Terminated: **50 Feet**
Page 2 of 2

DEPTH	LITHOLOGY	USCS	SOIL DESCRIPTION	SAMPLE ID	SAMPLERS TYPE	N (BLOWS / FT)	(N1) 60	MOISTURE CONTENT (%)	FINES CONTENT (%)	PLASTICITY INDEX (PI)	EXPANSION INDEX (EI)	OPTIMUM WATER CONTENT (%)	MAXIMUM DRY DENSITY (pcf)	COHESION, C (psf)	FRICTION ANGLE, (degrees)
32	▨														
33	▨		-stiff												
34	▨			SPT	☒	14	11	20.1							
35	▨														
36	▨														
37	▨														
38	▨														
39	▨			SPT	☒	50	35	26.7							
40	▨		-hard												
41	▨														
42	▨														
43	▨		-very stiff												
44	▨			SPT	☒	17	11	26.3							
45	▨														
46	▨														
47	▨														
48	▨														
49	▒	SC-SM	Poorly Graded SAND: light brown, fine grain, saturated, dense	SPT	☒	54	33	21.0							
50															
51															
52															
53															
54															
55															
56															
57															
58															
59															
60															

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Phone: 805-966-2200

BORING LOG

BORING NO. B-2
JOB NO. SL09618-4

PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	**3300 Panorama Dr**	DRILL RIG:	**CME 55**
DRILLING LOCATION:	**See Figure 3: Field Investigation**	HOLE DIAMETER:	**8 Inches**
DATE DRILLED:	**January 25, 2022**	SAMPLING METHOD:	**SPT**
LOGGED BY:	**D. Wordeman**	APPROX. ELEVATION:	**Not Recorded**

Depth of Groundwater: **Not Encountered** Boring Terminated: **40 Feet** Page 1 of 2

DEPTH	LITHOLOGY	USCS	SOIL DESCRIPTION	SAMPLE ID	SAMPLERS TYPE	N (BLOWS / FT)	(N1) 60	MOISTURE CONTENT (%)	FINES CONTENT (%)	PLASTICITY INDEX (PI)	EXPANSION INDEX (EI)	OPTIMUM WATER CONTENT (%)	MAXIMUM DRY DENSITY (pcf)	COHESION, C (psf)	FRICTION ANGLE, (degrees)
0	▨	CH	Sandy CLAY with Gravel: dark brown, slightly moist												
3	▨		-many gravels												
4	▨		(serpentinite cobbles), hard	SPT	▩	40	78								
6	▨	CL	Sandy CLAY with Gravel: dark reddish brown, slightly moist												
10	▨		-hard												
13	▨	CL	CLAY: mottled light yellowish brown and light grayish brown, slightly moist, hard												
14	▨			SPT	▩	35	57								
16	▨			D	▨										
24	▨	SC	Clayey SAND: serpentinite, Franciscan, very dense	SPT	▩	50/6"									
26	▨			E	▨										
30	▨														

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Phone: 805-966-2200

BORING LOG

BORING NO. **B-2**
JOB NO. **SL09618-4**

PROJECT INFORMATION

PROJECT: **3300 Panorama Dr**
DRILLING LOCATION: **See Figure 3: Field Investigation**
DATE DRILLED: **January 25, 2022**
LOGGED BY: **D. Wordeman**

DRILLING INFORMATION

DRILL RIG: **CME 55**
HOLE DIAMETER: **8 Inches**
SAMPLING METHOD: **SPT**
APPROX. ELEVATION: **Not Recorded**

Depth of Groundwater: **Not Encountered**
Boring Terminated: **40 Feet**
Page 1 of 2

DEPTH	LITHOLOGY	USCS	SOIL DESCRIPTION	SAMPLE ID	SAMPLERS TYPE	N (BLOWS / FT)	(N1) 60	MOISTURE CONTENT (%)	FINES CONTENT (%)	PLASTICITY INDEX (PI)	EXPANSION INDEX (EI)	OPTIMUM WATER CONTENT (%)	MAXIMUM DRY DENSITY (pcf)	COHESION, C (psf)	FRICTION ANGLE, (degrees)
31	🟩														
32	🟩														
33	🟩														
34	🟩			SPT	▨	70	77								
35	🟩														
36	🟩		-very dense												
37	🟩														
38	🟩														
39	🟩			SPT	▨	50/6"									
40															
41															
42															
43															
44															
45															
46															
47															
48															
49															
50															
51															
52															
53															
54															
55															
56															
57															
58															
59															
60															

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Phone: 805-966-2200

BORING LOG

BORING NO. **B-3**
JOB NO. **SL09618-4**

PROJECT INFORMATION

PROJECT: **3300 Panorama Dr**
DRILLING LOCATION: **See Figure 3: Field Investigation**
DATE DRILLED: **January 25, 2022**
LOGGED BY: **D. Wordeman**

DRILLING INFORMATION

DRILL RIG: **CME 55**
HOLE DIAMETER: **8 Inches**
SAMPLING METHOD: **SPT and CA**
APPROX. ELEVATION: **Not Recorded**

Depth of Groundwater: **Not Encountered**
Boring Terminated: **15 Feet**
Page 1 of 1

DEPTH	LITHOLOGY	USCS	SOIL DESCRIPTION	SAMPLE ID	SAMPLERS TYPE	N (BLOWS / FT)	(N1) 60	MOISTURE CONTENT (%)	FINES CONTENT (%)	PLASTICITY INDEX (PI)	EXPANSION INDEX (EI)	OPTIMUM WATER CONTENT (%)	MAXIMUM DRY DENSITY (pcf)	COHESION, C (psf)	FRICTION ANGLE, (degrees)
0		SC	Clayey SAND: light brown, with gravels, dry												
1		SC	Clayey SAND: dark reddish brown, with some gravel, slightly moist												
3		CH	Sandy CLAY: dark brown, with many gravels, slightly moist, hard												
4		CH	Sandy CLAY: dark reddish brown, with gravels, slightly moist	SPT		38	50								
9				SPT		12	23								
10			-very stiff												
13			-cobbles												
14				SPT		18	29								
15															

GEO SOLUTIONS

220 High Street, San Luis Obispo, CA 93401
Phone: 805-543-8539
1021 Tama Lane, Ste 105, Santa Maria, CA 93455
Phone: 805-614-6333
201 S. Milpas St, Ste 103, Santa Barbara, CA 93103
Phone: 805-966-2200

BORING LOG

BORING NO. B-4
JOB NO. SL09618-4

PROJECT INFORMATION

PROJECT: **3300 Panorama Dr**
DRILLING LOCATION: **See Figure 3: Field Investigation**
DATE DRILLED: **January 25, 2022**
LOGGED BY: **D. Wordeman**

DRILLING INFORMATION

DRILL RIG: **CME 55**
HOLE DIAMETER: **8 Inches**
SAMPLING METHOD: **SPT and CA**
APPROX. ELEVATION: **Not Recorded**

Depth of Groundwater: **Not Encountered**
Boring Terminated: **15 Feet**
Page 1 of 1

DEPTH	LITHOLOGY	USCS	SOIL DESCRIPTION	SAMPLE ID	SAMPLERS TYPE	N (BLOWS / FT)	(N1) 60	MOISTURE CONTENT (%)	FINES CONTENT (%)	PLASTICITY INDEX (PI)	EXPANSION INDEX (EI)	OPTIMUM WATER CONTENT (%)	MAXIMUM DRY DENSITY (pcf)	COHESION, C (psf)	FRICTION ANGLE, (degrees)
0		CH	Sandy CLAY: light yellowish brown, with gravels, slightly moist												
2				F					68.7	61	141				
3			-cobbles												
4				CA		40	52							535	38.6
6			-hard												
6		CH	Sandy CLAY: medium brown, with gravels, slightly moist, very stiff												
8		CL	Sandy CLAY: light yellowish brown, with gravels, slightly moist												
9				SPT		28	55								
13			-hard												
14				SPT		34	56								
15															

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1021 Tama Lane, Ste 105, Santa Maria, CA 93455
Phone: 805-614-6333
201 S. Milpas St, Ste 103, Santa Barbara, CA 93103
Phone: 805-966-2200

BORING LOG

BORING NO. B-5
JOB NO. SL09618-4

PROJECT INFORMATION

PROJECT: **3300 Panorama Dr**
DRILLING LOCATION: **See Figure 3: Field Investigation**
DATE DRILLED: **January 25, 2022**
LOGGED BY: **D. Wordeman**

DRILLING INFORMATION

DRILL RIG: **CME 55**
HOLE DIAMETER: **8 Inches**
SAMPLING METHOD: **SPT and CA**
APPROX. ELEVATION: **Not Recorded**

Depth of Groundwater: **Not Encountered**
Boring Terminated: **20 Feet**
Page 1 of 1

DEPTH	LITHOLOGY	USCS	SOIL DESCRIPTION	SAMPLE ID	SAMPLERS TYPE	N (BLOWS / FT)	(N1) 60	MOISTURE CONTENT (%)	FINES CONTENT (%)	PLASTICITY INDEX (PI)	EXPANSION INDEX (EI)	OPTIMUM WATER CONTENT (%)	MAXIMUM DRY DENSITY (pcf)	COHESION, C (psf)	FRICTION ANGLE, (degrees)
0			Asphalt/Base												
1		CH	Fat CLAY: very dark grayish brown, moist												
2				G					73.3	43	78			10	11.4
4				CA		26	34								
5			-slightly moist, very stiff												
6		CL	Sandy CLAY: dark brown, with gravels, slightly moist												
9				SPT		21	41								
10			-very stiff												
14			-very stiff	SPT		29	47								
19			-very stiff	SPT		22	27								
20															

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

GEO SOLUTIONS

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201 S. Milpas St, Ste 103, Santa Barbara, CA 93103
Phone: 805-966-2200

BORING LOG

BORING NO. B-6
JOB NO. SL09618-4

PROJECT INFORMATION

PROJECT: **3300 Panorama Dr**
DRILLING LOCATION: **See Figure 3: Field Investigation**
DATE DRILLED: **January 28, 2022**
LOGGED BY: **D. Wordeman**

DRILLING INFORMATION

DRILL RIG: **CME 55**
HOLE DIAMETER: **8 Inches**
SAMPLING METHOD: **SPT**
APPROX. ELEVATION: **Not Recorded**

Depth of Groundwater: **Not Encountered** Boring Terminated: **60 Feet** Page 1 of 2

DEPTH	LITHOLOGY	USCS	SOIL DESCRIPTION	SAMPLE ID	SAMPLERS TYPE	N (BLOWS / FT)	(N1) 60	MOISTURE CONTENT (%)	FINES CONTENT (%)	PLASTICITY INDEX (PI)	EXPANSION INDEX (EI)	OPTIMUM WATER CONTENT (%)	MAXIMUM DRY DENSITY (pcf)	COHESION, C (psf)	FRICTION ANGLE, (degrees)
0		CH	Sandy CLAY: dark brown, with gravels, slightly moist												
3		CH	Fat CLAY: very dark brown, with some gravels, slightly moist, stiff												
4				SPT	▨	9	18	32.0							
5				F	▨										
8		CL	Sandy CLAY: dark reddish brown, with some gravels, slightly moist												
9				SPT	▨	20	39	17.8							
10			-very stiff												
14				SPT	▨	31	51	15.2							
15			-hard												
19			-dry and gravels												
20		CL	Sandy CLAY: dark reddish brown, with gravels, dry												
23			-caliche in sample												
24			-hard	SPT	▨	32	34	15.8							
25			-hard drilling												
26–30															

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Phone: 805-614-6333
201 S. Milpas St, Ste 103, Santa Barbara, CA 93103
Phone: 805-966-2200

BORING LOG

BORING NO. B-6
JOB NO. SL09618-4

PROJECT INFORMATION

PROJECT: **3300 Panorama Dr**
DRILLING LOCATION: **See Figure 3: Field Investigation**
DATE DRILLED: **January 28, 2022**
LOGGED BY: **D. Wordeman**

DRILLING INFORMATION

DRILL RIG: **CME 55**
HOLE DIAMETER: **8 Inches**
SAMPLING METHOD: **SPT**
APPROX. ELEVATION: **Not Recorded**

Depth of Groundwater: **Not Encountered**
Boring Terminated: **60 Feet**
Page 1 of 2

DEPTH	LITHOLOGY	USCS	SOIL DESCRIPTION	SAMPLE ID	SAMPLERS TYPE	N (BLOWS / FT)	(N1) 60	MOISTURE CONTENT (%)	FINES CONTENT (%)	PLASTICITY INDEX (PI)	EXPANSION INDEX (EI)	OPTIMUM WATER CONTENT (%)	MAXIMUM DRY DENSITY (pcf)	COHESION, C (psf)	FRICTION ANGLE, (degrees)
31															
34				SPT	▨	35	28	17.6							
37			-lots of serpentine, hard												
44				SPT	▨	23	15	18.2							
45			-very stiff												
49			-very soft drilling												
53		SC-SM	Poorly Graded SAND: dark brown, slightly moist, very dense												
54				SPT	▨	50/6"		10.2							
57		SC	Sandstone: graywacke, very fine grained sand, light yellowish brown, Franciscan												
59				SPT	▨	50/5"		7.9							
60															

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Phone: 805-966-2200

BORING LOG

BORING NO. B-7
JOB NO. SL09618-4

PROJECT INFORMATION

PROJECT: **3300 Panorama Dr**
DRILLING LOCATION: **See Figure 3: Field Investigation**
DATE DRILLED: **January 28, 2022**
LOGGED BY: **D. Wordeman**

DRILLING INFORMATION

DRILL RIG: **CME 55**
HOLE DIAMETER: **8 Inches**
SAMPLING METHOD: **SPT**
APPROX. ELEVATION: **Not Recorded**

Depth of Groundwater: **Not Encountered**
Boring Terminated: **15 Feet**
Page 1 of 1

DEPTH	LITHOLOGY	USCS	SOIL DESCRIPTION	SAMPLE ID	SAMPLERS TYPE	N (BLOWS / FT)	(N1) 60	MOISTURE CONTENT (%)	FINES CONTENT (%)	PLASTICITY INDEX (PI)	EXPANSION INDEX (EI)	OPTIMUM WATER CONTENT (%)	MAXIMUM DRY DENSITY (pcf)	COHESION, C (psf)	FRICTION ANGLE, (degrees)
0		CH	Sandy CLAY: light yellowish brown, slightly moist												
2				G											
4			-very stiff	SPT		25	49								
9				SPT		22	43								
11			-very stiff												
14			-some gravels, hard	SPT		37	61								
15															

0
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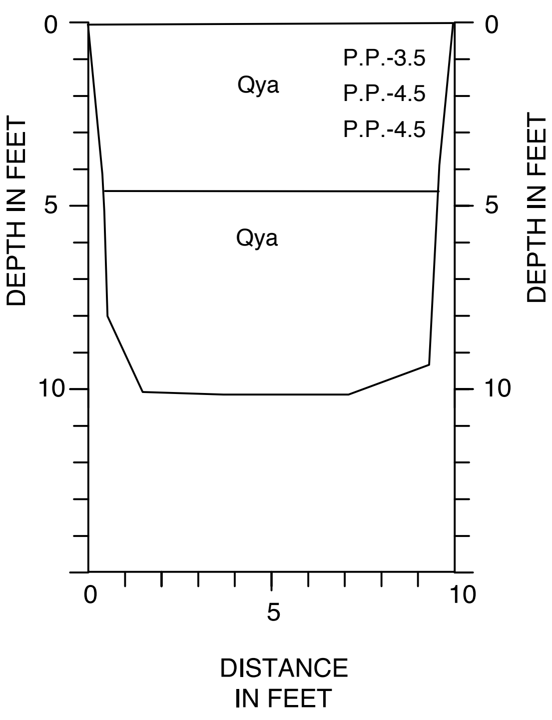
31

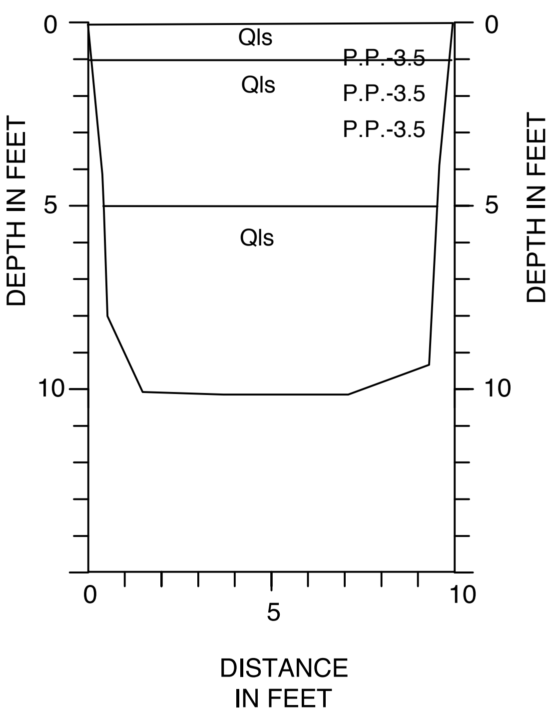
T-1
TD@10.0 FT.



ALLUVIAL DEPOSITS (Qya)
Light brown CLAY, highly sheared, caliche, moist

ALLUVIAL DEPOSITS (Qya)
Reddish brown sandy CLAYEY, slightly moist

T-2
TD@10.0 FT.

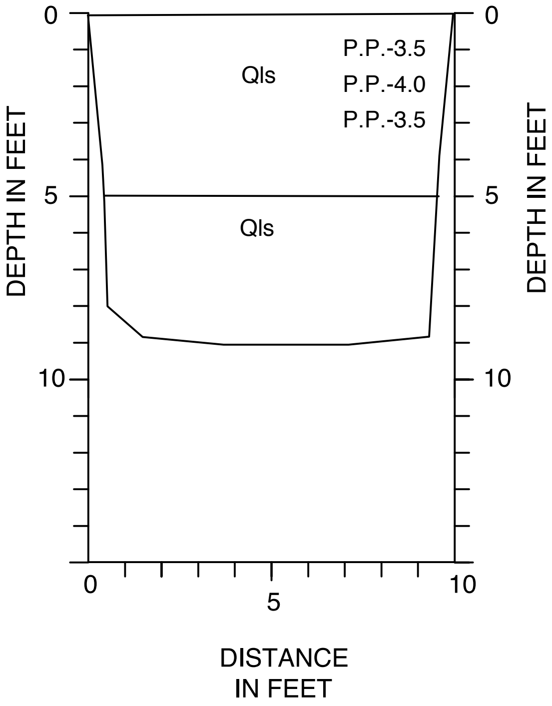


LANDSLIDE DEPOSITS (Qls)
Light brown sandy CLAY, loose, dry

LANDSLIDE DEPOSITS (Qls)
Very dark grayish brown sandy CLAY, slightly moist, loose, cobbles at base

LANDSLIDE DEPOSITS (Qls)
Light brown sandy CLAY with gravels, dry to slightly moist, caliche, moderately sheared

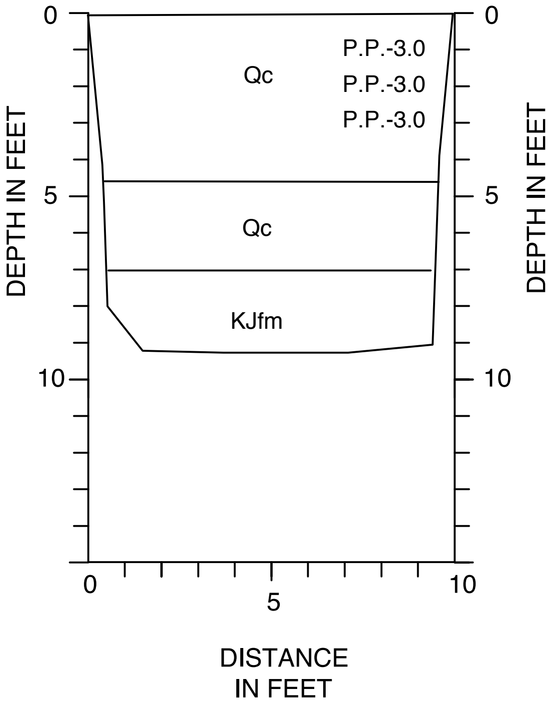
T-3
TD@9.0 FT.



LANDSLIDE DEPOSITS (Qls)
Very dark grayish brown sandy CLAY, slightly moist, caliche from 3-5'

LANDSLIDE DEPOSITS (Qls)
Light brown sandy CLAY with gravel, dry to slightly moist, caliche

T-4
TD@9.0 FT.



COLLUVIUM (Qc)
Dark reddish brown CLAY, slightly moist

COLLUVIUM (Qc)
Light yellowish brown fat CLAY, slightly moist

FRANCISCAN COMPLEX (KJfm)
White to light grayish brown metavolcanic, severely to moderately weathered, dry, caliche, moderately hard

LOGS
T-1-T-4

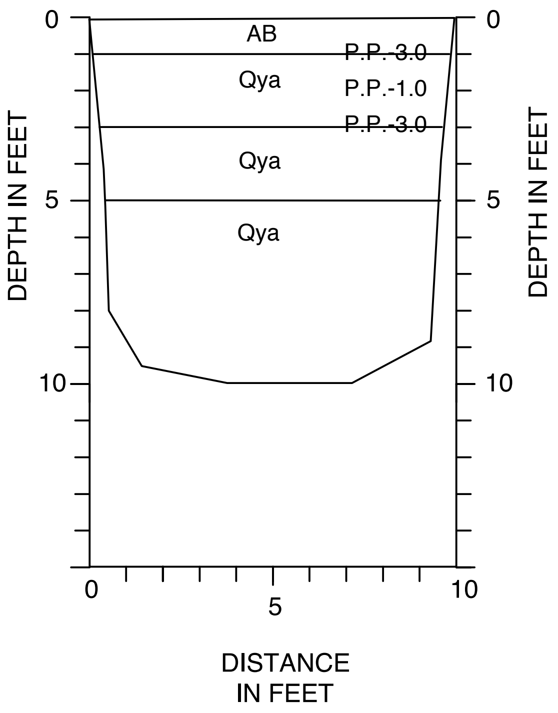
PROJECT
SL09618-5

TRENCH LOGS

3300 PANORAMA DRIVE, APN:065-038-001
MORRO BAY, CALIFORNIA

GeoSolutions, Inc.
220 High Street
San Luis Obispo, CA 93401
P: 805-543-8539

T-5
TD@10.0 FT.



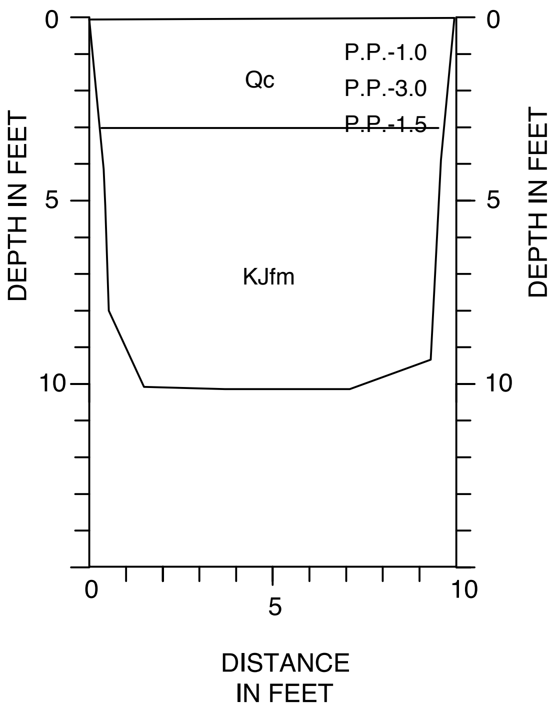
White aggregate base

ALLUVIAL DEPOSITS (Qya)
Reddish brown sandy CLAY, slightly moist

ALLUVIAL DEPOSITS (Qya)
Light brown fat CLAY, slightly moist

ALLUVIAL DEPOSITS (Qya)
Light olive brown to dark brown sandy CLAY, dry to slightly moist, firm

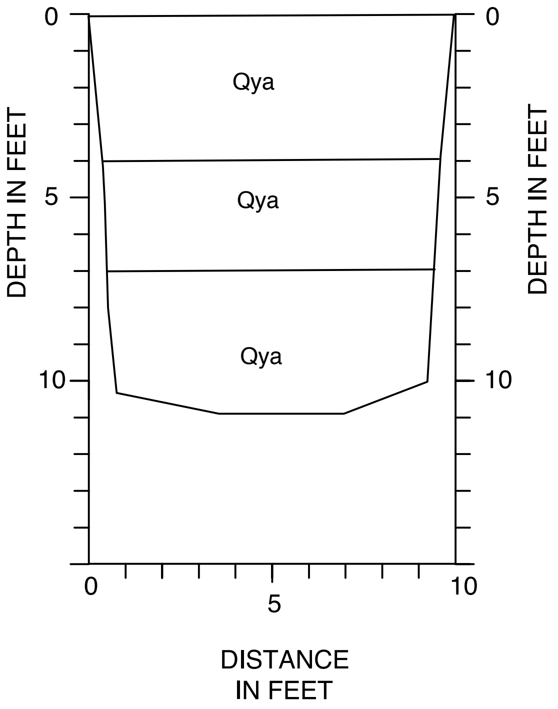
T-6
TD@10.0 FT.



COLLUVIUM (Qc)
Reddish brown sandy CLAY, slightly moist

FRANCISCAN COMPLEX (KJfm)
Light gray to light brown metavolcanic, severely weathered, moderately soft, slightly moist, dense at 8'

T-7
TD@11.0 FT.



ALLUVIAL DEPOSITS (Qya)
Dark brown sandy CLAY, slightly moist, caliche in upper 1'

ALLUVIAL DEPOSITS (Qya)
Light brown to olive brown sandy CLAY, slightly moist`

ALLUVIAL DEPOSITS (Qya)
Light olive brown to dark brown sandy CLAY, dry to slightly moist, firm

LOGS
T-5-T-7

PROJECT
SL09618-5

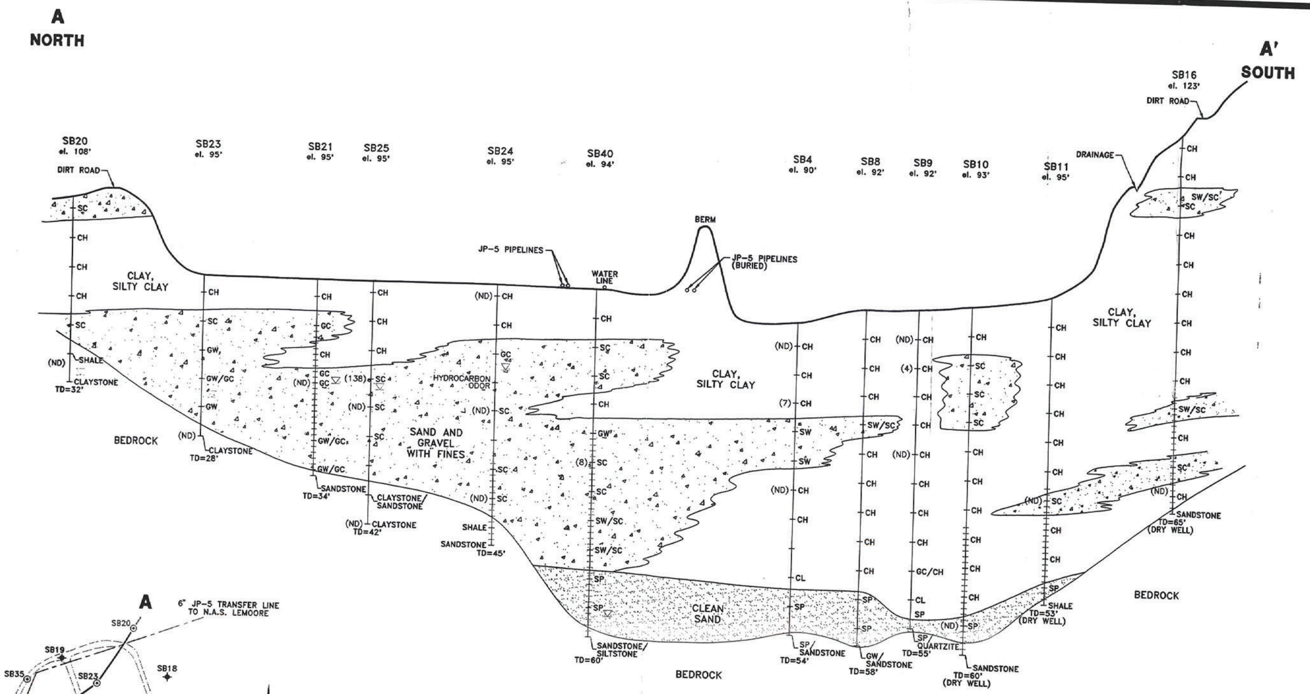
TRENCH LOGS
3300 PANORAMA DRIVE, APN:065-038-001
MORRO BAY, CALIFORNIA

GeoSolutions, Inc.
220 High Street
San Luis Obispo, CA 93401
P: 805-543-8539

APPENDIX B

Geologic Cross Section A-A’ (GTI, 1994)
Geologic Cross Section B-B’ (GTI, 1994)
Boring Log SB-40

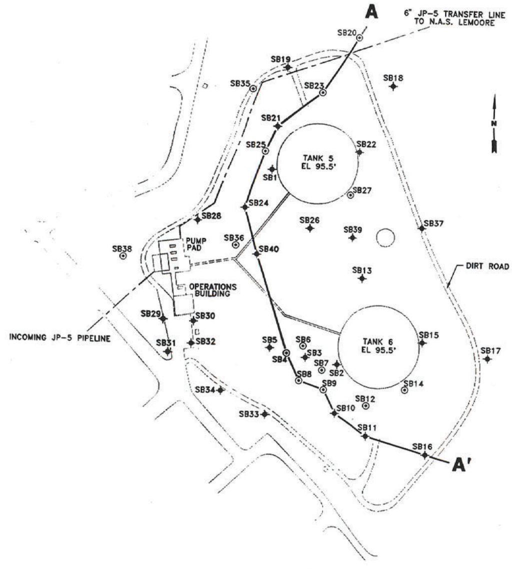
C:\CLIENTS\GSI\ESTERO\1096CSA Groundwater Technology, Inc



HORIZONTAL SCALE: 20 0 20 40

VERTICAL SCALE: 10 0 10 20

SCALE FEET



CROSS SECTION INDEX MAP

100 0 100 200

SCALE FEET

LEGEND

CH	CLAY, SILTY CLAY OF HIGH PLASTICITY
CL	CLAY, SILTY CLAY OF LOW PLASTICITY
SC	CLAYEY SAND
GC	CLAYEY GRAVEL
GW	GRAVEL, WELL GRADED
SW	SAND, WELL GRADED
SP	SAND, POORLY GRADED
~	SOIL CONTACT, APPROXIMATE
▽	WATER LEVEL
( )	HYDROCARBON CONCENTRATION (mg/kg, ND = NOT DETECTED)
✦	SOIL BORING, CONVERTED TO MONITORING WELL
⊙	SOIL BORING
╪	WELL SCREEN INTERVAL

GENERAL NOTE:

1. A – A' CROSS SECTION INDEX MAP WELL LOCATIONS DETERMINED BY 1991 EEC SITE SURVEY (ENVIRONMENTAL QUALITY SURVEY; FINAL REPORT, ECC, DATED JULY 1991)

NO.	DATE	BY	REVISION

SIGNATURE	DATE
PDG MGR:	
PROJECT ENGR:	
PROJECT MGR:	
CLIENT:	

GROUNDWATER TECHNOLOGY
4820 McGRATH STREET, SUITE 100
VENTURA, CALIFORNIA (805) 644-9811

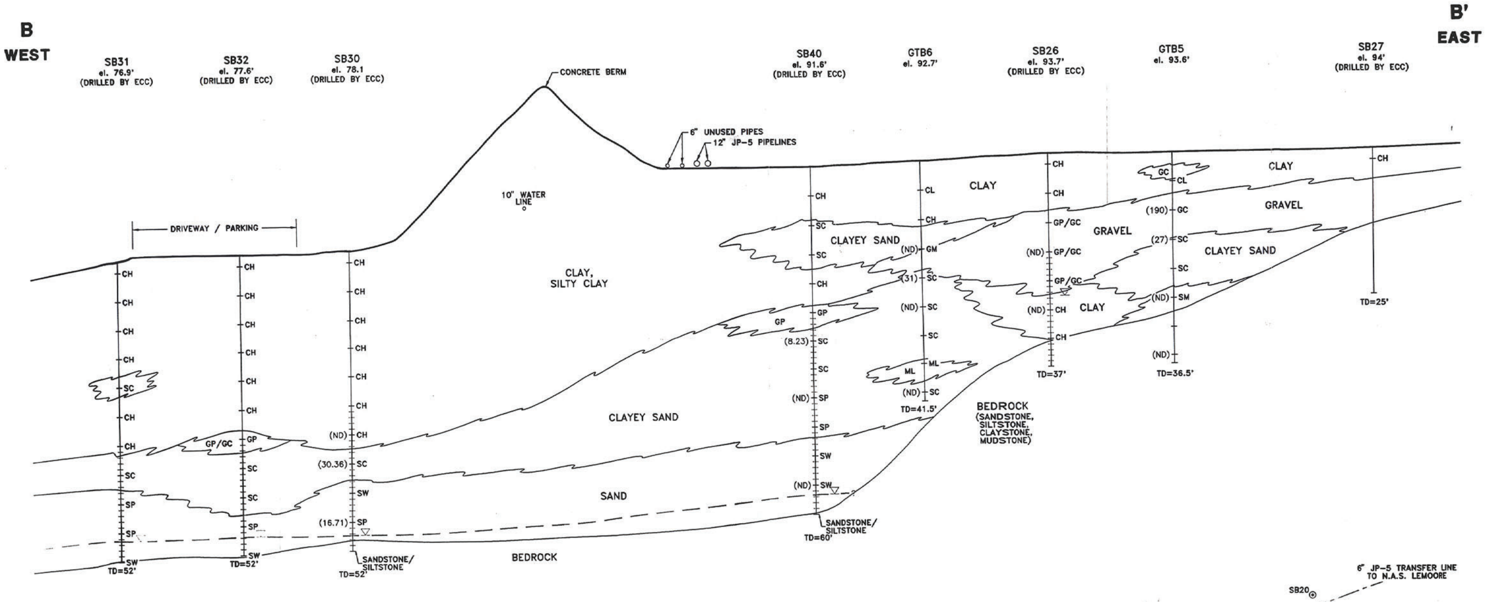
DFSP ESTERO BAY TANK FARM

ESTERO BAY, CALIFORNIA

GEOLOGIC CROSS SECTION A - A'

DESIGNED BY: SAC	DETAILED BY: AJK	CHECKED BY: MMcC
DATE: 5/27/94	FILE: 1096CSA (1:1)	
PROJECT NO.:	CONTRACT:	
DRAWING: 4	REVISION: –	

C:\CLIENTS\GSI\ESTERO\1096CSB Groundwater Technology, Inc



HORIZONTAL SCALE: 20 0 20 40

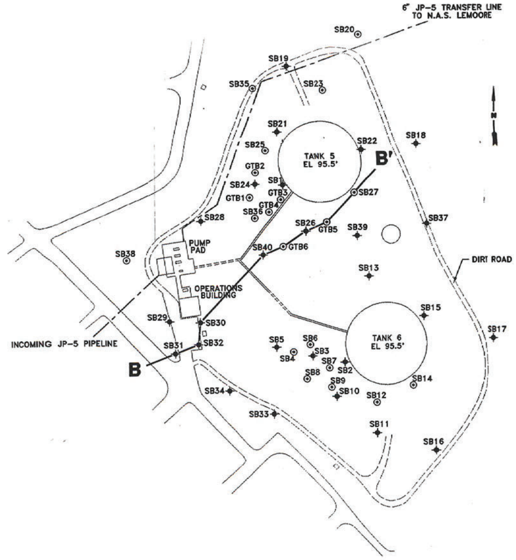
VERTICAL SCALE: 10 0 10 20

SCALE FEET

LEGEND

CH	CLAY, SILTY CLAY OF HIGH PLASTICITY
CL	CLAY, SILTY CLAY OF LOW PLASTICITY
SC	CLAYEY SAND
SP	SAND, POORLY GRADED
SW	SAND, WELL GRADED
SM	SILTY SAND
GP	GRAVEL, POORLY GRADED
GC	CLAYEY GRAVEL
GM	SILTY GRAVEL
ML	SANDY SILT
~	SOIL CONTACT, APPROXIMATE
▽	APPROXIMATE STATIC GROUNDWATER LEVEL (MEASURED 4/6/94)
( )	HYDROCARBON CONCENTRATION (mg/kg, ND = NOT DETECTED)

✦	SOIL BORING, CONVERTED TO MONITORING WELL
⊙	SOIL BORING
╪	WELL SCREEN INTERVAL



CROSS SECTION INDEX MAP

100 0 100 200

SCALE FEET

NO.	DATE	BY	REVISION

SIGNATURE	DATE
PDG MGR:	
PROJECT ENGR:	
PROJECT MGR:	
CLIENT:	

GROUNDWATER TECHNOLOGY
4820 McGRATH STREET, SUITE 100
VENTURA, CALIFORNIA (805) 644-9811

DFSP ESTERO BAY TANK FARM

ESTERO BAY, CALIFORNIA

GEOLOGIC CROSS SECTION B - B'

DESIGNED BY:	DETAILED BY:	CHECKED BY:
KJS	AJK	MMcC

DATE: 5/27/94

FILE: 1096CSB (1:1)

PROJECT NO.:

CONTRACT:

DRAWING: 5

REVISION: –

CC

Well Drilling Log

ect No. 5129 Well No. 5129122553B40

ect Name and Location: DFSP- Estero Bay, Morro Bay, CA

nship: 29S Range: 10E

mpler CarolAnnWolfgang No. Of Samples 12

SS

ze and Type of Casing PVC, 2"

er Elevation: First — Completion — 24 Hrs —

pe of Seal Bentonite From 22.0 To 19.0

Drilling Company Pacific Geoscience

Driller Russ Hallew Cert. No. C57-417431

Drilling Equipment Mobile B53

Date and Time Started: 12.28.90 @1000

Date and Time Finished 12.28.90 @1330

Total Depth 60.0 Completion Depth 60.0

Drilling Method Hollow Stem Boring Diameter 6"

Type of Perforation 1/4' From 30.0 To 25.0

Pack Size and Type Sand From 60.0 To 22.0

epth eet)	Description	USCS Symb.	Lith	Plazom. Install.	H2O Con.	Estimated %			Remarks: Drill Rate. Odor. Sampl
						GR	SA	FI	
.0	FAT SANDY CLAY~ brown; homogenous; v. hard consistency; slickensides; maroon weathering; max size <1/2" subangular chlorite; sand is fine, rounded; fines of high plasticity; high toughness; no dilatancy	CH			dry	<1	30	70	001 16 26 38
.0	CLAYEY SAND~ brown; homogenous; v. hard consistency; rust stains; slickensides; sand is fine, rounded; fines of high plasticity; high toughness; no dilatancy; shale; max size ~1/4" (subangular)	SC			dry	5	60	35	002 22 37 43
5.0	CLAYEY SAND w/GRAVEL~ fines of high plasticity; high toughness; no dilatancy; sand is fine, rounded; overall brown; homogenous; v. hard consistency; slickensides; 2" max size	SC			dry	40	40	20	003 15 50/5

gineer/Geologist CarolAnnWolfgang

Checked By Paul

C

9250

Well Drilling Log

ect No. 5129 Well No. 5129102185B40
ject Name and Location:
nship: Range:
mpler No. Of Samples
SS
e and Type of Casing
er Elevation: First Completion 24 Hrs
pe of Seal From To

Drilling Company
Driller Cert. No.
Drilling Equipment
Date and Time Started:
Date and Time Finished
Total Depth Completion Depth
Drilling Method Boring Diameter
Type of Perforation From To
Pack Size and Type From To

pth eet)	Description	USCS Symb.	Lith	Plazom. Install.	H_2O Con.	Estimated % GR	SA	FI	Remarks: Drill Rate. Odor. Sampl
	chlorite, shale ~ clasts are, subrounded → subangular								
.0	FAT SANDY CLAY ~ more gravel at bottom of sample, slickensides; maroon, gold, grey mottling; white (calc) strings; brown overall; max size ~1"; subrounded shale; sand is fine, rounded; clay is of high plasticity; high toughness, no dilatancy.	CH			dry	15	30	55	004 15 35 50/1"
5.0	POORLY GRADED GRAVEL ~ max size ~3". clasts of shale, angular → subangular (sample consisted of 80% slough from working the auger ~ actual samples very small)	GP			dry	90	10	-	005 5 7 12 very difficult to auger ~ took 1½ to pass this depth – pulled completely out of hole & re-entered

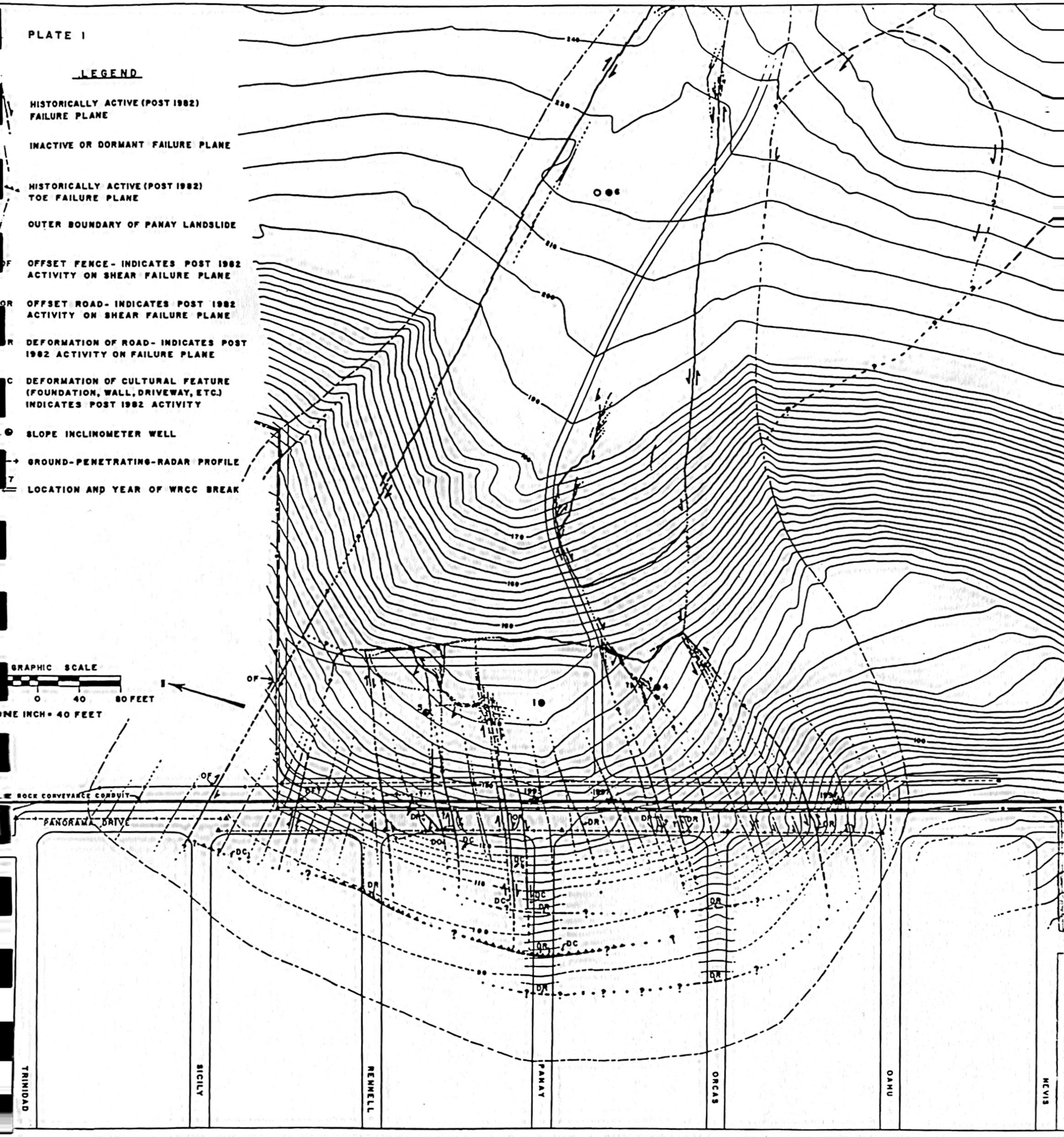
gineer/Geologist

Checked By

APPENDIX C

Partial Map of Historically Active and Dormant Deformational Structures in the Panay Landslide Zone
(Mann, 1997)

PLATE I



TIAL MAP OF HISTORICALLY ACTIVE AND DORMANT DEFORMATIONAL STRUCTURES IN THE PANAY LANDSLIDE ZONE, MORRO BAY, SAN LUIS OBISPO COUN

VEYED, MAPPED, COMPILED AND DRAFTED BY MANN UNDERGROUND IMAGING