

**DATE:**

September 9, 2022

**PROJECT NUMBER:**

SL12170-2

**CLIENT:**

Cambria CSD  
PO Box 65  
Cambria, CA 93428

**PROJECT NAME:**

Cambria Skatepark  
1001 Main Street  
APN: 013-101-072  
Cambria area,  
San Luis Obispo County  
California

### 1.0 INTRODUCTION

This report presents the results of the geologic investigation for the proposed skatepark to be located at 1001 Main Street, APN: 013-101-072, in the Cambria area of San Luis Obispo County, California. See Figure 1: Area Location Map for the general location of the project area.

### 1.1 Site Description

1001 Main Street is located at 35.565308 degrees north latitude and -121.096806 degrees west longitude at a general elevation of 32 feet above mean sea level. The parcel is 1.42 acres in size with Main Street forming the southern property boundary. The project property will hereafter be referred to as the "Site."

The Site is situated on a relatively flat area at the toe of a hill side slope. Surface drainage follows the topography to the southwest and flows towards Main Street. An existing paved area and dirt parking area currently occupy the Site.

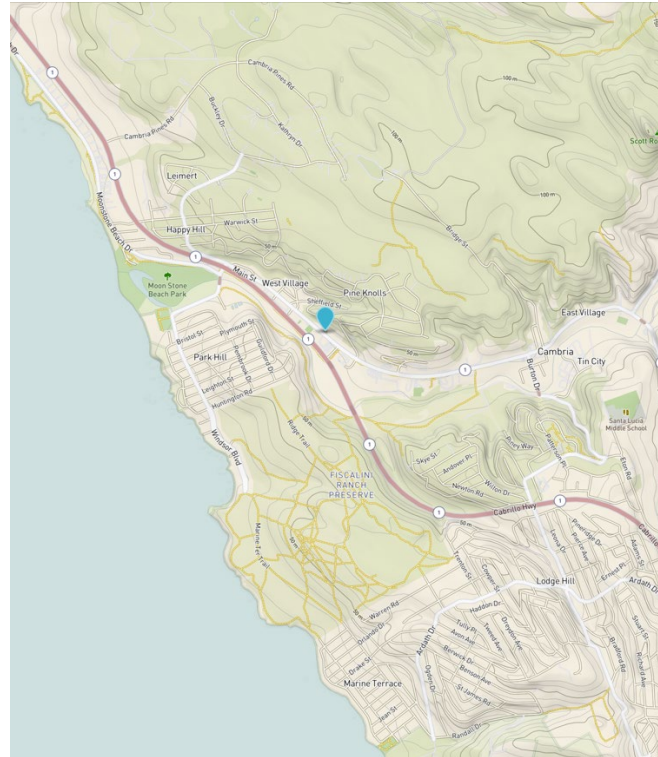


Figure 1: Area Location Map

### 1.2 Project Description

It is our understanding the project is to consist of a concrete skate park at the current paved area. It is our understanding that no structures are proposed at this time. Grading quantities are unknown at the time of this report, however are anticipated to be minor. Retaining walls are not anticipated as part of this project.

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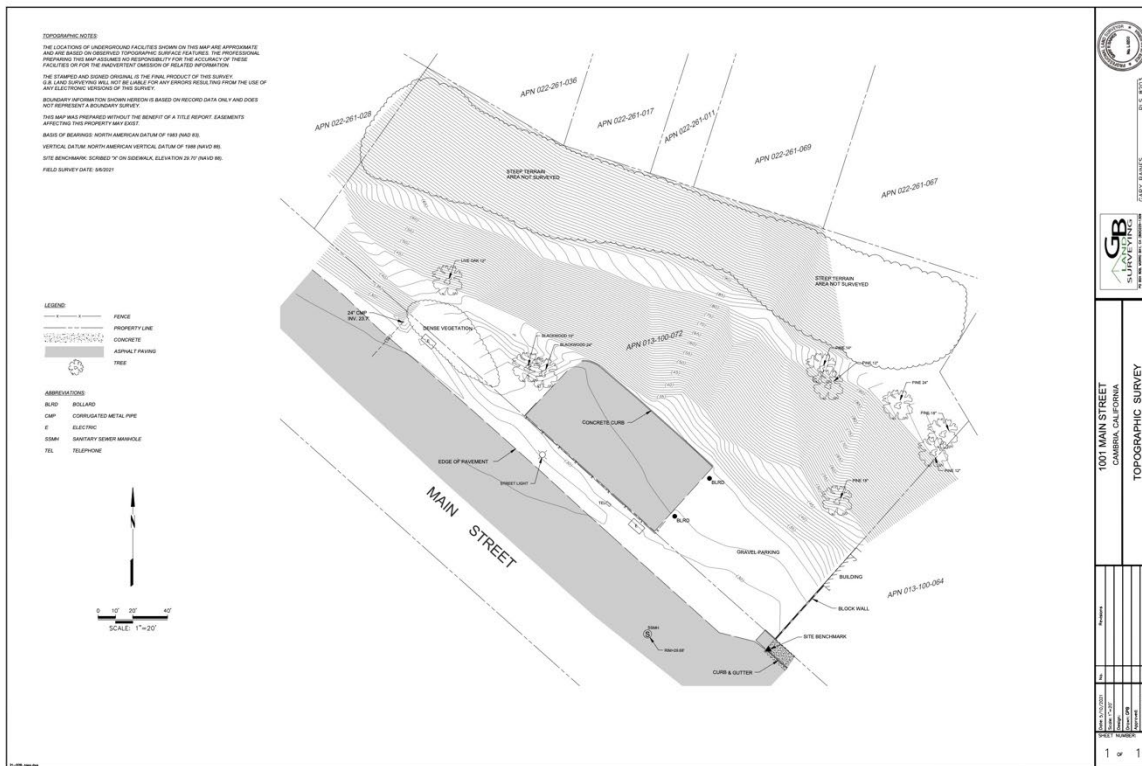


Figure 2: Topographic Survey (GB Land Surveying, 2021)

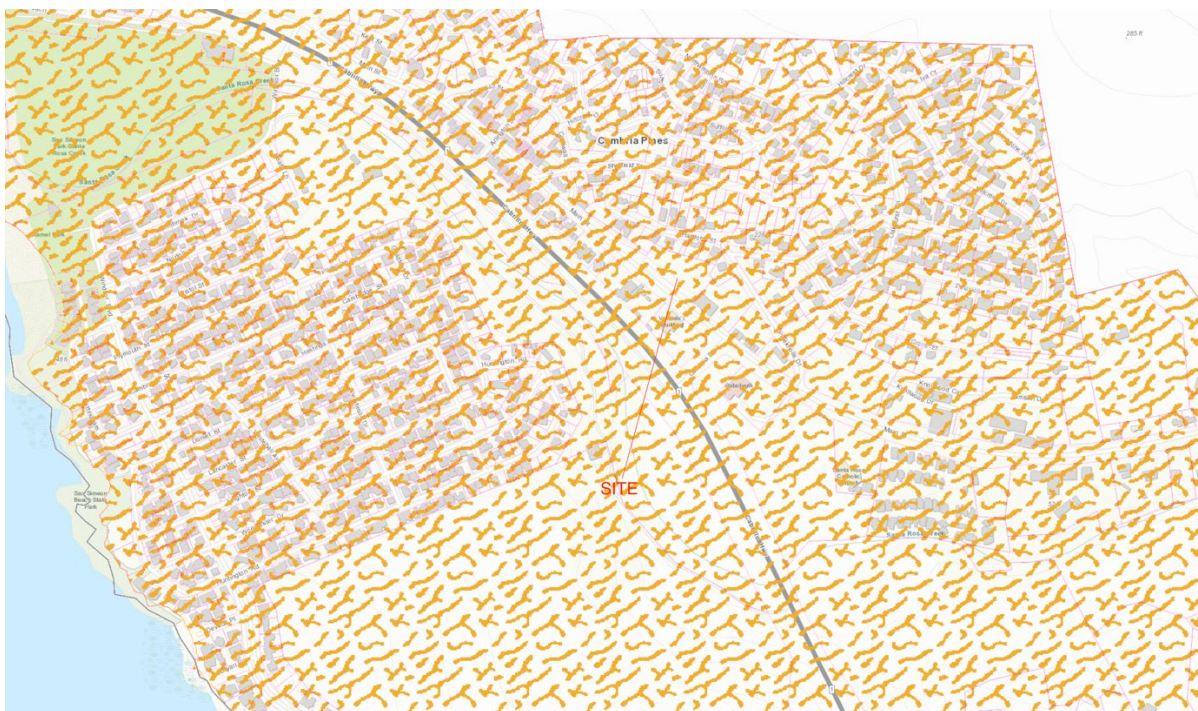


Figure 3: Geologic Study Area Map (San Luis Obispo County Land Use View)

## 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 to supplement the previous subsurface exploration performed for the referenced Soils Engineering Report 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 anticipated that the proposed skatepark will be founded within over excavated engineered fill.
2. It is recommended that a chain link fence be placed along the base of the slope to act as a debris fence to catch falling rocks/talus. The chain-link fence should extend behind the proposed skatepark and parking lot area. Periodic maintenance will be required to clear talus accumulation along the fence line.
3. It is recommended that numerical slope stability analyses be conducted on cut/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.
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. Excavation, fill, and construction activities should be in accordance with appropriate codes and ordinances of the County of San Luis Obispo. 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.
6. 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.

7. 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 Complex rocks. The Cambrian Slab extends from the Los Osos fault south and northward to the Oceanic Fault.

### 4.2 Local Geology

Locally, the site is located within Unnamed Sedimentary Rocks as depicted on Plate 1A, Site Engineering Geology Map. Hall, 1974 and Dibblee, 2007 mapped the Site as underlain by Cretaceous age Unnamed Sedimentary Rocks (Ks/Kss) units.

Two exploratory borings were previously drilled for the referenced Soils Engineering Report (GeoSolutions, 2021) within the existing parking lot and adjacent to the existing paved area to a maximum depth of 5 feet below ground surface. Information derived from subsurface exploration was used to classify subsurface soil and formational units and to supplement geologic mapping.

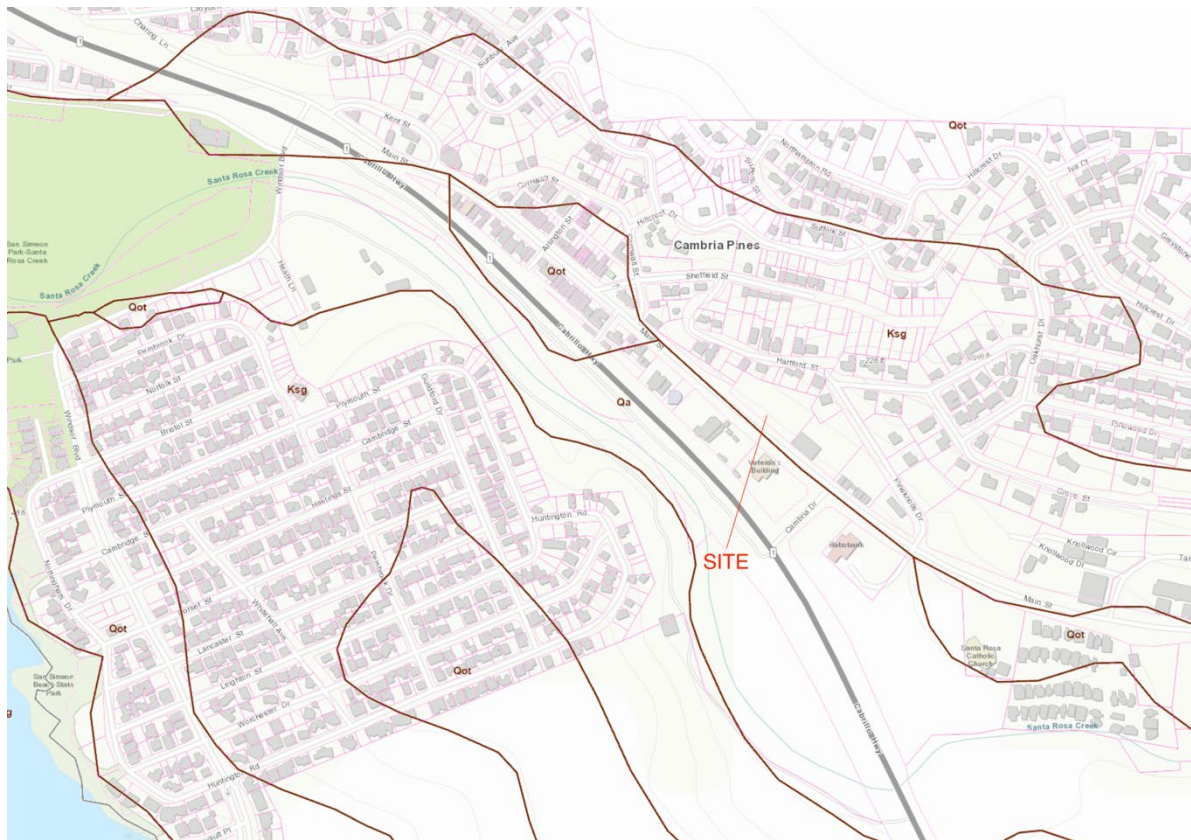


Figure 4: Geologic Map (County of San Luis Obispo Land Use View)

#### 4.2.1 Surficial Soil

##### **Colluvium (Qc)**

Surface deposits are observed overlying the Unnamed Sedimentary Rock formational material to a maximum depth of 4 feet below existing grade. These deposits are termed colluvium. The colluvium at the site was observed to consist of dark brown to yellowish brown clayey sand with gravel observed to be dry to slightly moist and loose to slightly dense. Plate 1A depicts surface soil in the lower area and where colluvium has accumulated at the base of the slope into thick talus slopes (mapped as talus). The colluvium was observed to be 4 feet thick within borings B-1 and B-2 from the referenced Soils Engineering Report (GeoSolutions, 2021). Boring logs are presented in Appendix A. No structures are proposed at this time, however it is anticipated that the concrete skatepark improvement will be founded on over excavated engineered fill comprised of colluvial deposits.

#### 4.2.2 Formational Units

##### **Unnamed Sedimentary Rocks (Ks)**

Hall, 1974 maps the Site as within Unnamed Sedimentary Rocks (Ks). Hall, 1974 describes the Unnamed Sedimentary Rocks as "Feldspathic greywacke or arkosic wacke sandstone and interbedded greenish-brown or black micaceous shale and siltstone. Thick-bedded tan to dark-brown medium-grained sandstone composed of quartz, 50% to 70%; altered plagioclase and K-feldspar, 20% to 30%; claystone, chert fragments, and biotite, 2% to 7%." The Unnamed Sedimentary Rocks was encountered within both borings at a depth of 4 feet below ground surface and within outcrops along the slope face. The Unnamed Sedimentary Rocks at the site was

observed to consist of light brown to light gray medium-grained sandstone observed to be massive, moderately fractured, moderately hard and slightly to moderately weathered. Boring logs are presented in Appendix A.

### 4.3 Surface and Ground Water Conditions

Surface drainage follows the topography to the southwest and flows towards Main Street. Surface drainage should be directed away from proposed improvements. No springs or seeps were observed at the project. Groundwater was not observed within either previous exploratory boring, however groundwater elevations may vary seasonally.

### 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)
San Simeon Fault	7.0	7.3
Los Osos Fault	28.0	6.8
San Andreas	42.5	6.9

The closest known active portion of a Holocene age fault is an active portion of the San Simeon fault that is located approximately 7.0 miles northwest 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 Zone 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 emplacement related shear zones within the Franciscan mélangé along 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, 1974 mapped splays of the Cambria fault approximately 1.0 mile northeast of the property (see Plate 2).

#### 4.5 Landslides

San Luis Obispo County Safety Element and Land Use View depict the Site within a low to moderate landslide area (see Figure 5). Hall, 1974 and Dibblee, 2007 did not map landslides in the immediate vicinity of the property. Hall, 1974 mapped the closest landslide 1.2 miles northeast of the property. During site mapping and review of aerial photography (1937, 1949, 1956, 1982, current), landslides were not observed at the Site. Plate 4 presents a current aerial photograph. There appears to be a low potential for large-scale landslide to affect the proposed improvements, however there is a high potential for erosion of the slope. This erosion results in a large accumulation of talus (debris) at the base of the slope. Talus is currently observed at the base of the slope and mapped on Plate 1A. There is also a rockfall potential to affect the proposed improvements. It is recommended that a chain link fence be placed along the base of the slope to act as a debris fence to catch falling rocks/talus. The chain-link fence should extend behind the proposed skatepark and parking lot area. Periodic maintenance will be required to clear talus accumulation along the fence line.

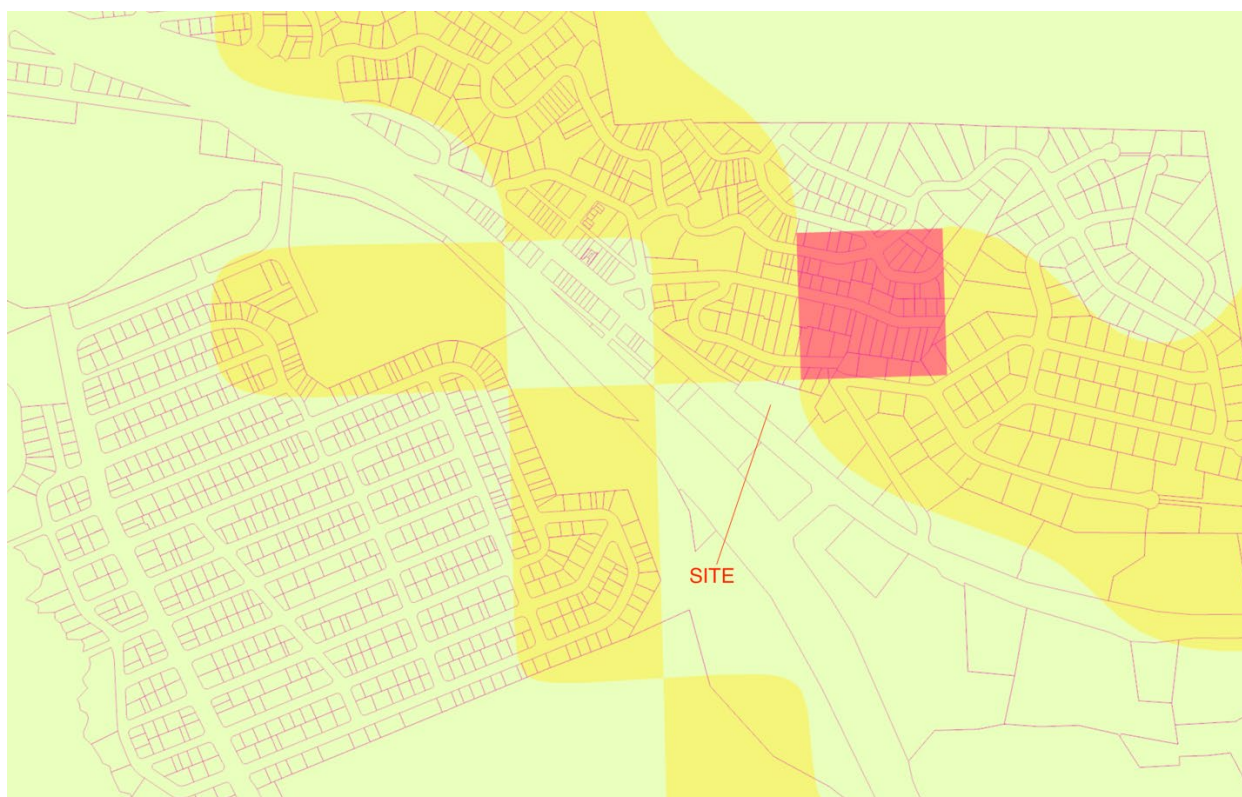


Figure 5: Landslide Potential Map (County of San Luis Obispo Land Use View)



Figure 6: Historical Aerial Photograph (1956)

#### **4.6 Flooding and Severe Erosion**

The majority 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 improvements be designed above the minimum flood elevation.



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, 2022). 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 35.565308 degrees north latitude and -121.096806 degrees west longitude were used in the web-based probabilistic seismic hazard analysis (SEAOC, 2022). Based on the results from the in-situ tests performed during the field investigation, the Site was defined as **Site Class C**, “Very Dense Soil and Soft Rock” profile per ASCE7-16, Chapter 20. Relevant seismic design parameters obtained from the program are summarized in Table 2: Seismic Design Parameters

**Table 2: Seismic Design Parameters**

<b>Site Class</b>	<b>C “Very Dense Soil and Soft Rock”</b>
<b>Seismic Design Category</b>	<b>D</b>
<b>1-Second Period Design Spectral Response Acceleration, <math>S_{D1}</math></b>	<b>(See Note 1)</b>
<b>Short-Period Design Spectral Response Acceleration, <math>S_{DS}</math></b>	<b>0.981g</b>
<b>Site Specific MCE Peak Ground Acceleration, <math>PGA_M</math></b>	<b>0.664g</b>

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

## 6.0 LIQUEFACTION

Liquefaction occurs when saturated cohesionless soils lose shear strength due to earthquake shaking. Ground motion from an earthquake may induce cyclic reversals of shear stresses of large amplitude. Lateral and vertical movement of the soil mass combined with the loss of bearing strength can result from this phenomenon. Liquefaction potential of soil deposits during earthquake activity depends on soil type, void ratio, groundwater conditions, the duration of shaking, and confining pressures on the potentially liquefiable soil unit. Fine, poorly graded loose sand, shallow groundwater, high intensity earthquakes, and long duration of ground shaking are the principal factors leading to liquefaction.

As the underlying material encountered at the Site was weathered rock rather than soil, there is no potential for liquefaction, seismically induced settlement or differential settlement. Rock material differs from soil in that it cannot be saturated, cohesion is considered infinite and relative density is not applicable. Assuming the rock material encountered at the Site accurately represents these conditions, liquefaction potential does not apply.

## 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. The Tsunami Inundation Map for Emergency Planning (State of California, 2021) depicts the Site outside the tsunami inundation zone. As the property is at an elevation over 30 feet, 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 low based on previous laboratory testing for the referenced Soils Engineering Report.

### 8.2 Naturally Occurring Asbestos

As Franciscan Complex material was not observed at the site, there is a low potential for naturally occurring asbestos at the property.

### 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 FILL, SUBDRAINS

It is anticipated that proposed improvements will be founded on over excavated engineered fill. Conventional grading equipment may be used for excavations. The Soils Engineering Report provides additional construction recommendations. Based on the field investigation, subdrains are not anticipated.

Construction inspections and testing during all grading and excavating operations should be performed by the project Soils Engineer/Engineering Geologist. Section 1705.6A of the 2016 CBC (CBSC, 2016) 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 previous exploratory borings 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 plan review of final grading and drainage documents prior to construction.
3. Additionally, construction observation by the Engineering Geologist and/or Soils Engineer may be necessary to verify sub-surface conditions during excavation activities.
4. Final grading report and as-built map in accordance with County Guidelines for Engineering Geology Reports, Item 29 (San Luis Obispo County Department of Planning and Building, 2016).

#### 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.

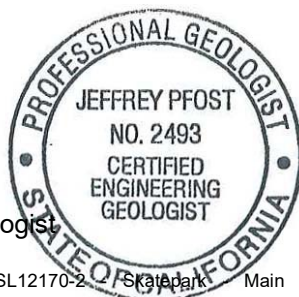
As of the present date, the findings of this report are valid for the property studied. With the passage of time, changes in the conditions of a property can occur whether they are due to natural processes or to the works of man on this or adjacent properties. Therefore, this report should not be relied 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 Pfof, CEG 2493  
Principal Engineering Geologist



## REFERENCES

- Aerial Photographs: 1937- Flight AXH-1937, Frame 507 & 508 scale 1:20,000. 1949- Flight AXH-1949, Frame 8F-3 & 8F-4, scale 1:20,000. 1956- Flight AXH-1956, Frame 6R-204 & 6R-205, scale 1:20,000. 1982- Flight NOS-82-EC, Frame 8885 & 8886, scale 1:42,000.
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- Dibblee, T.W. and Minch, J.A., 2007, *Geologic Map of the Cambria Quadrangle*, San Luis Obispo County, California: Dibblee Geological Foundation, Dibblee Foundation Map DF-364, scale 1:24,000.
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- GB Land Surveying, 2021, Topographic Survey, 1001 Main Street, Cambria, California, job 21-029, dated May 10, 2021.
- GeoSolutions, Inc., 2021, Soils Engineering Report, Main Street Skate Park, APN: 013-101-072, Cambria Area, San Luis Obispo County, California, project SL12170-1, dated August 17, 2021.
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## PLATES

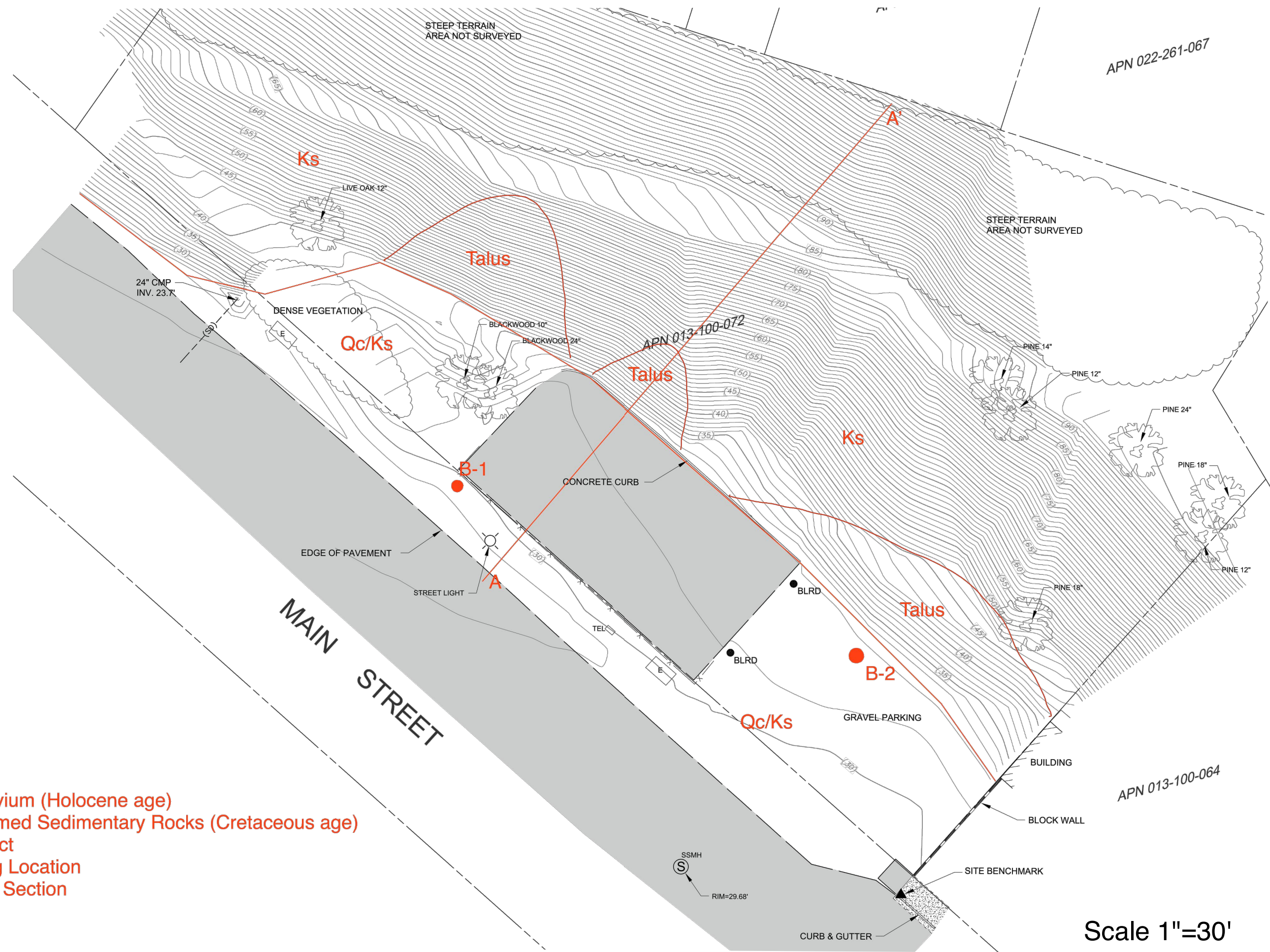
Plate 1A, 1B - Site Engineering Geologic Map and Cross Section

Plate 2A, 2B – Regional Geologic Map, Hall, 1974

Plate 3 – Regional Fault Map, Jennings, 2010

Plate 4 – Aerial Photograph

- Legend**
- Qc - Colluvium (Holocene age)
  - Ks - Unnamed Sedimentary Rocks (Cretaceous age)
  - - Contact
  - - Boring Location
  - A A' - Cross Section

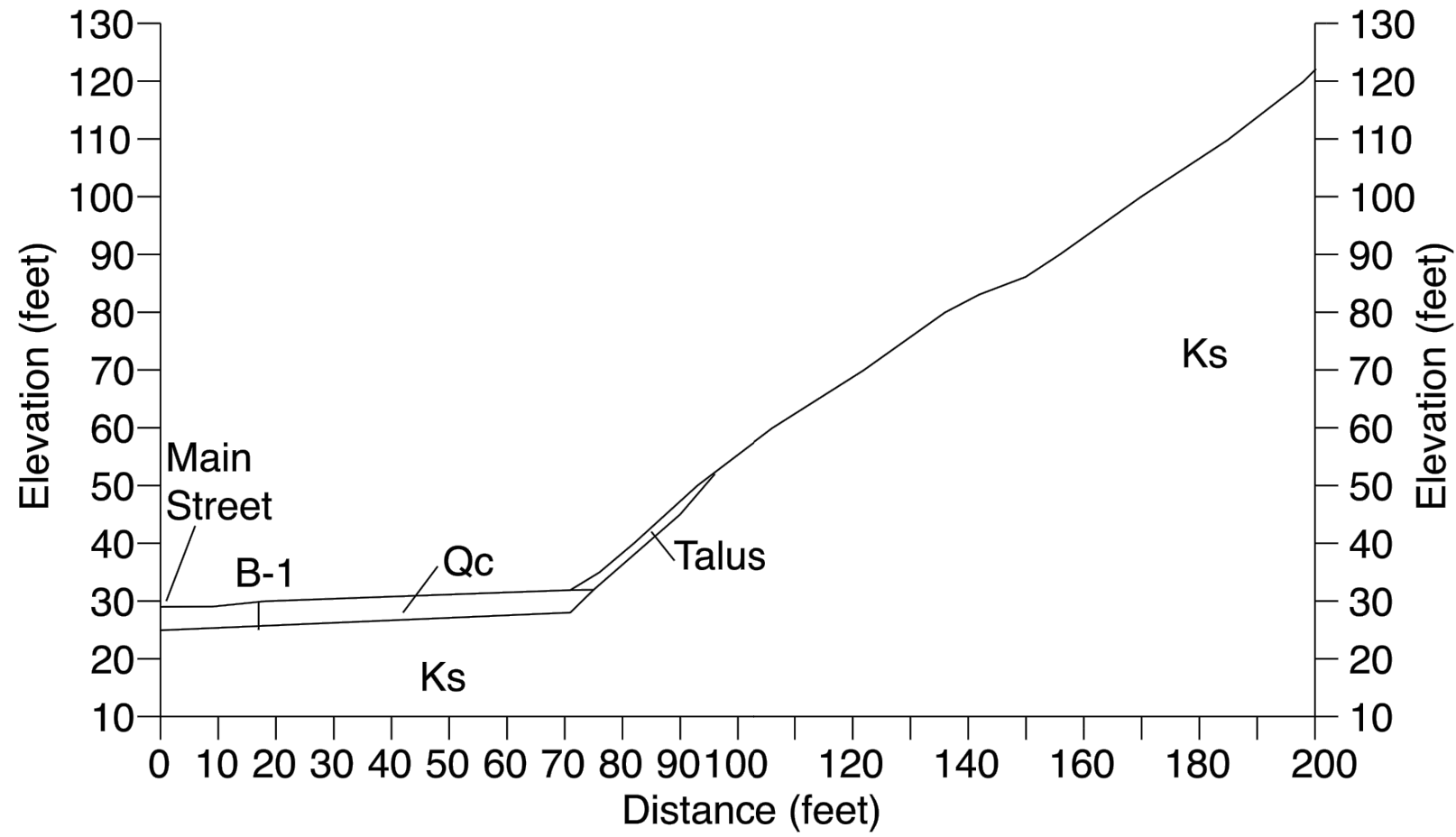


Scale 1"=30'

PLATE  
1A  
PROJECT  
SL12170-2

**SITE ENGINEERING GEOLOGY MAP**  
1001 MAIN STREET, APN: 013-101-072  
CAMBRIA AREA, SAN LUIS OBISPO COUNTY, CALIFORNIA

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



Scale  
1" = 30'

Legend  
 Qc - Colluvium (Holocene age)  
 Ks - Unnamed Sedimentary Rocks (Cretaceous age)  
 — - Contact



**GeoSolutions, Inc.**

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**REGIONAL GEOLOGY MAP (Hall, 1974)**

1001 MAIN STREET, APN: 013-101-072  
 CAMBRIA AREA, SAN LUIS OBISPO COUNTY, CA

**PLATE**  
 2A

**PROJECT NO:**  
 SL12170-2

EXPLANATION

**Quaternary**

**Alluvial deposits**  
 Cobble-pebble gravel, sand, silt, and clay

**Landslide deposits**  
 Composed of rock and mudflow debris that moved downslope by gravity. Lithology dependent on source material. Not all landslide deposits are shown in areas where Franciscan rocks crop out or where too small to map. Q1(a), dominantly serpentinite debris

**Terrace deposits**  
 Composed of stream and marine terrace deposits. Stream terrace deposits consist of unconsolidated cobble-pebble gravel, sand, silt, and some clay. Approximately 3 to 10 feet thick. Marine terrace deposits consist of loosely consolidated white to buff sandstone and conglomerate. Clasts abundant to angular, as large as four feet in diameter; consist of Franciscan rocks, Cambria Felsite, or Monterey Shale. In older marine terrace deposits strata are relatively flat lying or dip as much as 20 degrees. Marine terrace deposits occur at elevations of 50 to 100 feet and near 200, 400, and 600 feet. Approximately 2 to 10 feet thick. Ages unknown, but inferred to be Pleistocene and Holocene. Marine terrace deposits near Cayuse are late Pleistocene, 130,000-230,000 and 140,000 ±30,000 B.P. (Valentine, 1958; Veoh and Valentine, 1967). Youngest marine terrace deposits and some stream deposits are presumably Holocene

**UNCONFORMITY**

**Lower part of Pismo Formation**

Tp1, light-weight moderately well-indurated porous white diatomaceous siltstone or diatomite. Maximum thickness approximately 20 feet.

Tp2, porcellanite, claystone, and light brown thin- to thick-bedded chert. Approximately 50 feet thick.

Tp3, well-indurated, poorly bedded, angular fracturing white claystone and siltstone. Approximately 200 feet thick.

Tp4, light-brown pebble and cobble conglomerate. Clasts of Cambria Felsite and Franciscan chert pebbles. Coarse-grained arkosic sandstone matrix. Thickness 10 to 40 feet.

Tp5, poorly to moderately well-indurated orange-brown to light-brown sandstone. Fine- to medium-grained arkosic sandstone, locally interbedded with yellow claystone. Consists of quartz, 80% feldspar, 15%, and fragments of siltstone, 5%. Contains a few well-rounded chert pebbles and granules. Approximately 200 feet thick.

Fossils present are: *Astrorhynchus* (?) sp. (UCLA loc. no. 5928), *Chione* cf. *C. semillanensis* Nonland (UCLA loc. nos. 5928, 5930), and *Leptostrophia discus* (Conrad) (UCLA loc. nos. 5929, 5930).

Probably equivalent in age to parts of Eden and Miguelito Members of the Pismo Formation (Hall, 1973a, b). Mohlon or questionably Delmonitian. Marine

**UNCONFORMITY**

**Monterey Formation**

Tm, resistant hard siliceous shale and interbedded chert. Dark brown, weathers white. Less than 100 feet thick. Presumably Lulisan or Mohlon. Marine.

Tm1, diabase and basaltic rocks occurring as sills and flows in the basal part of Monterey Formation and as dikes in that unit and older formations. Brown to black, medium- to coarse-grained, usually deeply and spherulitically weathering diabase. Composition variable; lots of sodic plagioclase (An33 to An62), 40% to 50% of rock; clinopyroxene, 10% to 18%. The remaining 30% to 50% of the rock is a groundmass of plagioclase microclasts, altered olivine, and mafic minerals. Maximum thickness approximately 250 feet. Probably equivalent in age to the diabase within the Obispo Formation (Hall and Corbett, 1967; Hall, 1973b).

Tm2, basal member; interbedded siltstone, tuffaceous siltstone, claystone, and minor amounts of semilithified shale; contains dolomitic or calcareous siltstone beds 1/2 to 2 feet thick, and minor amounts of fine-grained sandstone. Thin beds of chert rare or absent. White when weathered, brown or grey when fresh; black where adjacent to diabase. Orange dolomitic or calcareous rocks occur as pods or lenses throughout. Basal 50 to 70 feet consist of white-weathering brown tuffaceous claystone or siltstone, perhaps lithologically equivalent to the Rincon Shale. Locally a 3-inch- to 1-foot-thick glauconitic sandstone occurs at the base. Maximum thickness is between 1000 and 1800 feet in the Cypress Mountain quadrangle and 700 to 1000 feet thick in the Cambria quadrangle. The general absence of chert and porcellanaceous shale beds in this member differentiates it from the basal member of the Monterey Formation south of Morro Bay (Hall, 1973b). The unit is lithologically similar to the Sandholzt Member of the Monterey Formation in the nearby Adelaida quadrangle (Durham, 1948). However, the inclusion by Durham (1948, 1949) of cherty and dolomitic rocks in the upper part of his Sandholzt Member differs from the Sandholzt Formation as originally described by Thorup (1941, 1942). There is also close lithologic similarity with the Relizian Point Sand Formation of Woodring and Bromley (1950), mapped in the Arroyo Grande (Hall, 1973d) and Nipone (Hall and Corbett, 1967) quadrangles. Fossils include *Delastoepecton peghami* (Gabb) (UCLA loc. nos. 6072, 6074) and *Miocene* ? sp. (UCLA loc. no. 6074). *Agilis ramosa* (Gabb), in the collection of A. Fitzhugh of Cambria, is from 3/10 mi. south of Fitzhugh Ranch in sec. 4, T. 28 S., R. 10 E., approximately 800 feet above the base of the member. Megafossils suggest a Saucian or Relizian age. Bathyal foraminiferal fauna from the rocks of similar lithology in the nearby Adelaida quadrangle are of Relizian and Lulisan age (Smith and Durham, 1968). Marine.

Tm3, extremely fine-grained white to grey hard buff, maximum thickness of approximately 200 feet. Large fragments of pumice, common in the Obispo huff, are absent. Probably in part the age equivalent of the Obispo Formation--Relizian

**Obispo Formation**

Crystal-bearing vitric huff (see Hall and others, 1966; Surdam and Hall, 1966; Hall and Corbett, 1967; Surdam and others, 1970). Groundmass, up to 90% of the rock, consists of glass shards, pumice, and microcrinite. Unidentified zeolites and clay minerals. About 10% of rock mass composed of mineral grains, 0.01 to 0.05 mm in size, consisting of subhedral to euhedral quartz and feldspar in roughly equal proportions or 80% feldspar and 20% quartz. Less than 1% biotite present. Claystone and *Baculites* sp. fragments are present locally. Near Green Valley (Cambria quadrangle) the huff thins eastward and grades into a tuffaceous sandstone. Approximately 250 feet thick (Turner, 1970)

**Rincon Shale**

Light brown to white-weathering siltstone or claystone containing some yellow or orange dolomitic or calcareous siltstone. Approximately 80 feet thick. Zemonian and Saucian (S. Prior, personal communication, 1973). Marine

**Vaqueros Sandstone**

Light-brown coloraceous arkosic sandstone. Moderately well indurated and fairly well sorted, medium to coarse grained, and generally without distinct bedding. Sandstone is composed of quartz, 50% to 80%; feldspar, 15% to 30%; and lithic fragments, 5% to 35%. Locally, 2% to 50% of the mineral grains are glauconitic. Thickness 100 to 800 feet. Lower part of formation is commonly a poorly sorted, yellowish-brown conglomerate consisting of silty sand, chert pebbles, clasts of Cambria Felsite, and shell fragments. Northeast of Coast Union High School (Cambria quadrangle), 92% of the clasts of conglomerate are Cambria Felsite; 5% are Franciscan chert pebbles; locally in this area the arkosic lithic sandstone is composed of a large percentage of barrosic fragments. Near Green Valley (Cambria quadrangle) the basal part of the Vaqueros intertongues with green sandstone and red clay of the Lope Formation. Fossils include *Crossostrea* cf. *C. eldridgei* (Arnold) (UCLA loc. no. 6071); *Crossostrea eldridgei* vancouver (Loel and Corey), *Crossostrea titan* subitina (Loel and Corey), and *Crossostrea vancouverensis* (Loel and Corey) (UCLA loc. nos. 5933); *Lyrasteria* for *Hexastrophia* *manalis* (Conrad) (UCLA loc. nos. 5931, 6068, 6069, 6073); *Verticostrea perini* (Arnold) (UCLA loc. nos. 5935, 6068, 6069, 6070); *Leptostrophia andersoni* (Arnold) (UCLA loc. no. 5936); *Ctenostrophia exasperata* (Arnold) (UCLA loc. nos. 5932, 6071); *Melolichia yancouverensis* Loel and Corey (UCLA loc. nos. 5931, 5932, 5938); *Melolichia* cf. *M. leaei* Grant (UCLA loc. no. 5932); *Panopaea generosa* (Gould), *Melithae* *sanctae-catharinae* (Arnold) (UCLA loc. no. 5933); *Smithostrophia hamlini* (Arnold) (UCLA loc. no. 5933); *Cancellaria* cf. *C. bellingeri* Anderson (UCLA loc. no. 5933); *Balanus* sp. (UCLA loc. no. 6071); *Echinolophos* ? sp. (UCLA loc. no. 6069). Oligocene (Zemonian) or "Vaqueros" Stage. Marine

**Lope Formation**

Green and red conglomerate, sandstone, and silty claystone. Conglomerate is composed of 1% to 10% cobbles and boulders and roughly 65% pebbles in a poorly sorted sandy matrix. Clasts in the basal 50 feet have the following percentage composition: diachite, similar in lithology to that of the Morro Rock - Loyal Hill volcanic rock complex, 10 to 40; chert, 25 to 30; vesicular basalt, 10 to 20; and Franciscan graywacke and metabasaltic rocks, 1 to 20. Upper 550 feet consist of lenticular beds of conglomerate, tuffaceous conglomerate, and red and green claystone. In the Cypress Mountain quadrangle the formation consists of approximately 400 feet of poorly sorted massive green or, less commonly, red conglomerate. Clasts have a percentage composition of: Franciscan graywacke, 40 to 55; chert, 10 to 30; metabasaltic rocks, 20; serpentinite, 5; and blueschist, less than 1. Clasts of Cambria Felsite, which underlies conglomerate, rare or absent. Maximum thickness is approximately 600 feet. Age presumably Oligocene (below the Oligocene Vaqueros Sandstone). If diachite clasts are from the Morro Rock - Loyal Hill volcanic complex, the Lope would be younger than the 22 to 26 m.y. (Turner, 1973) age of that complex. Nonmarine

**UNCONFORMITY**

**Cambria Felsite**

Tc, hard rhyolite-dacite grayish-white crystalline felsite and some soft white poorly exposed huff. Three to 30% of the rock is composed of phenocrysts of quartz, oligoclase, and biotite groundmass aphanitic. Generally without bedding features or preferred orientation of phenocrysts. Where stratified, huff beds are less than a foot to more than two feet thick; biotite flakes are partially aligned. Flow-banding locally common in felsite. Locally a networked soft huff within the formation contains clasts of Franciscan graywacke, 70% chert, 20% and blueschist, 10%; possibly part of the Lope Formation. Approximately 350 feet thick.

Tc1, reddish-brown to black, massive basalt.

Named and first described by Ernst and Hall (1974). Type section is near Cambria at Scott Rock, approximately 4000 feet northwest of Coast Union High School, Cambria quadrangle. Reference sections are along Santa Rosa Creek (California State Highway 41), approximately 4000 feet east of Coast Union High School and the west-central part of sec. 34, T. 27 S., R. 10 E., Cypress Mountain quadrangle. Age presumably Oligocene

**UNCONFORMITY**

**Unnamed sedimentary rocks**

Feldspathic graywacke or arkosic wacke sandstone and interbedded greenish- to brown or black micaceous shale and siltstone. Thick-bedded to thin-bedded dark-brown medium-grained sandstone composed of quartz, 30% to 70%; altered plagioclase and feldspar, 20% to 30%; claystone, chert fragments, and biotite, 2% to 7%. Convolute and cross bedding or lamination and graded bedding locally common. Lithologically similar to Tullahoma (1944) loess formation (Hall, 1973c). Type III graywacke of Hall (1969). Probably the same unit as the unnamed sedimentary rocks in Fort San Luis quadrangle (Hall, 1973b). Exposed thickness in area is approximately 6000 feet. Late Cretaceous (Hall, 1969). Marine

**Toro Formation**

Interbedded shale or claystone and sandstone. Dominantly thin-bedded greenish-brown or brown micaceous shale; contains calcareous lenses and concretions. Sandstone is composed of quartz, 60%; plagioclase, 20% to 30%; orthoclase, 5% and lithic fragments, biotite, and hornblende, 5%. Assigned to Toro Formation by Fairbanks (1946) and Page (1970, 1972). In Monrovia by Tallentire (1944) and Hall (1969). Retention of formal name "Toro" seems warranted because of priority. Type section is along Toro Creek, sections 22, 27, and 33, T. 28 S., R. 11 E., Morro Bay North quadrangle. Formation well exposed near Clearing Creek, southeastern Cypress Mountain and southwestern York Mountain quadrangles. Exposed thickness more than 1500 feet; elsewhere in the region more than 2100 feet. Late Jurassic and Early Cretaceous (Fairbanks, 1946; Page, 1972). Marine

**Serpentinite and serpentinitized ultrabasic rocks**

**Franciscan rocks**

KJfg, very fine-grained graywacke or claystone and greenish-brown graywacke. Easily weathered relatively soft sandstone. Composed of quartz, 60% to 70%; plagioclase, 15% to 25%; feldspar, 2% to 25%; biotite, 2% to 25% and rock fragments of dark-gray siltstone. Sandstone is commonly massive and shatter, but locally it is well bedded or interbedded with siltstone. Exotic fragments or clasts absent or rare.

KJfsw, metvolcanic rocks, gneiss, and some weathered diabase commonly associated with red chert (q1). Contacts between the metvolcanic rocks and other units of the Franciscan rocks are everywhere inferred to be faults.

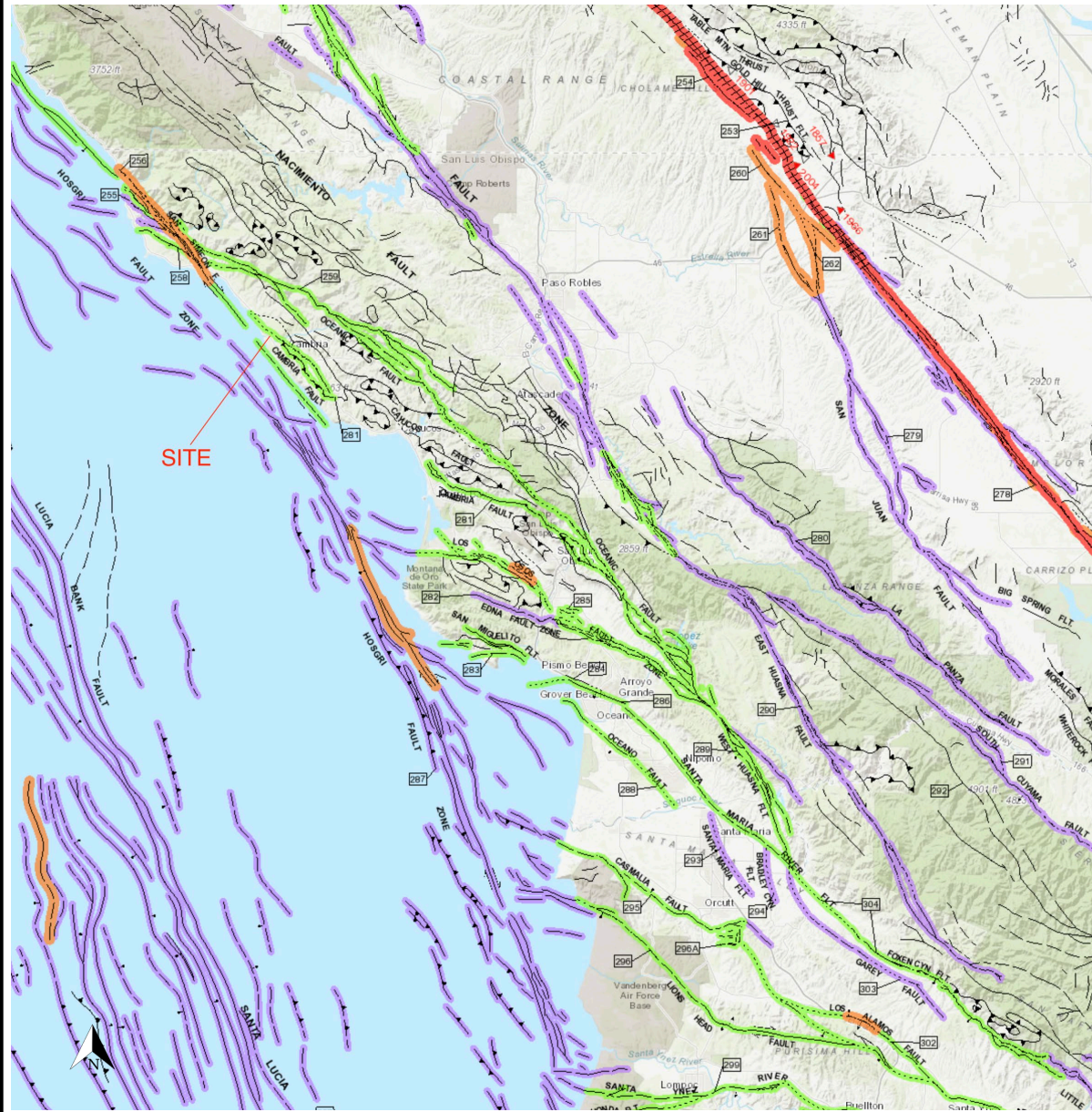
KJfme, mélange of graywacke (q1), pervasively altered and in large part composed of sheared greenish-black claystone. Includes exotic fragments or clasts of conglomerate (q1), blueschist (q1), schist (q1); metvolcanic rocks or gneiss (q1); white, red, or green chert (q1); serpentinite (q1); shale (q1); siliceo-carbonate rocks (q1); and opalite (q1).

No stratigraphic order can be determined for the mélange, metvolcanic rocks, and graywacke. Because the mélange contains exotic fragments or clasts of blueschist and schist and is pervasively sheared, the inference could be made that the age of tectonism of the Franciscan mélange is older than the other units of the Franciscan rocks that lack such clasts. If, however, the graywacke, metvolcanic rocks, and chert clasts are from the KJfg and KJfsw, then the age of tectonism would be younger than all of the Franciscan rocks. The Franciscan rocks are probably of Jurassic or Cretaceous age













**GeoSolutions, Inc.**  
 220 High Street  
 San Luis Obispo, CA 93401  
 (805) 543-8539

**REGIONAL GEOLOGY LEGEND (Hall, 1974)**  
 1001 MAIN STREET, APN: 013-101-072  
 CAMBRIA AREA, SAN LUIS OBISPO COUNTY, CA

**PLATE**  
 2B  
**PROJECT NO:**  
 SL12170-2



**FAULT CLASSIFICATION COLOR CODE**  
(Indicating Recency of Movement)

-  Fault along which historic (last 200 years) displacement has occurred.
-  1908  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.
-  1968  1968  
Square on fault indicates where fault creep slippage has occurred 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 than 1.6 million years) or fault without recognized Quaternary displacement.

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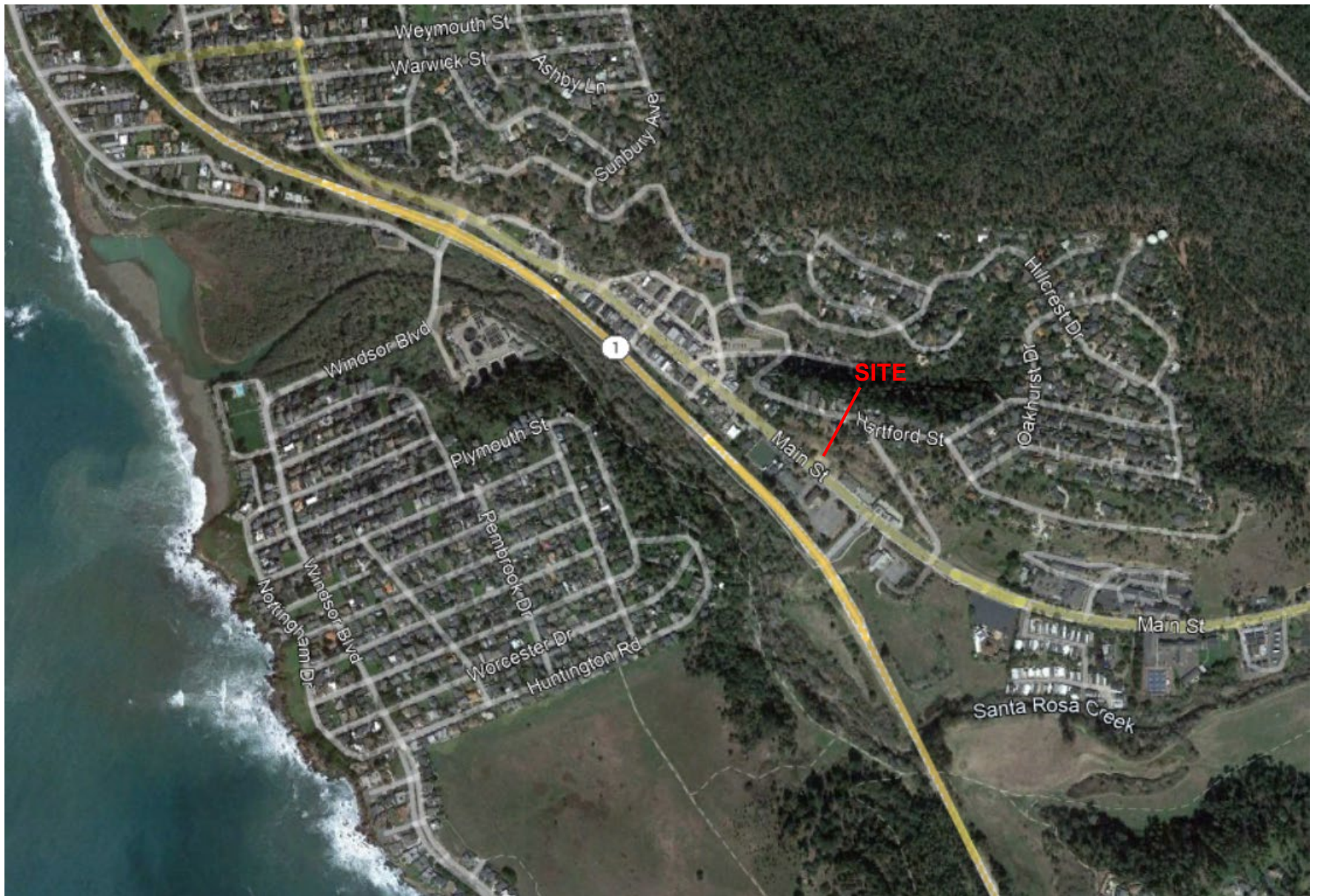
**REGIONAL FAULT MAP (Jennings, 2010)**

1001 MAIN STREET, APN: 013-101-072  
CAMBRIA AREA, SAN LUIS OBISPO COUNTY, CA

**PLATE**

3

**PROJECT NO:**  
SL12170-2



**GeoSolutions, Inc.**

220 High Street  
San Luis Obispo, California 93401  
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**AERIAL PHOTOGRAPH (Google, 2022)**

1001 MAIN STREET, APN: 013-101-072  
CAMBRIA AREA, SAN LUIS OBISPO COUNTY, CA

**PLATE**

4

**PROJECT NO:**

SL12170-2

## APPENDIX A

Boring Logs



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

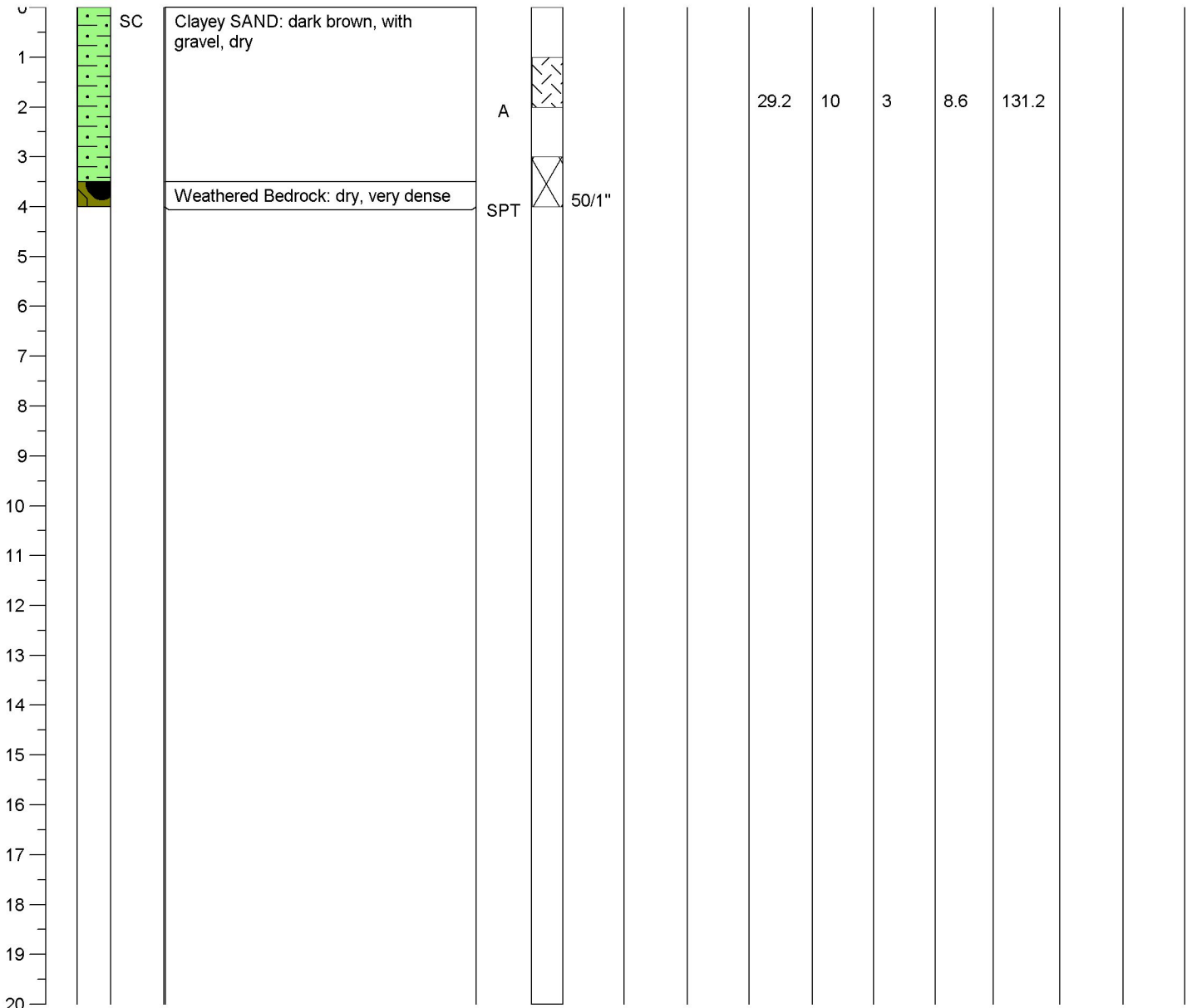
# BORING LOG

**BORING NO. B-1**  
**JOB NO. SL12170-1**

PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	<b>Cambria Skatepark</b>	DRILL RIG:	<b>Mobile B-24</b>
DRILLING LOCATION:	<b>See Figure, Field Investigation</b>	HOLE DIAMETER:	<b>6 Inches</b>
DATE DRILLED:	<b>July 14, 2021</b>	SAMPLING METHOD:	<b>SPT</b>
LOGGED BY:	<b>G. Vine</b>	APPROX. ELEVATION:	<b>Not Recorded</b>

Depth of Groundwater: **Not Encountered**      Boring Terminated: **4 Feet**      Page 1 of 1

DEPTH	LITHOLOGY	USCS	SOIL DESCRIPTION	SAMPLE ID	SAMPLERS TYPE	N (BLOWS / FT)	(N) 60	MOISTURE CONTENT (%)	FINES CONTENT (%)	PLASTICITY INDEX (PI)	EXPANSION INDEX (EI)	OPTIMUM WATER CONTENT (%)	MAXIMUM DRY DENSITY (pcf)	COHESION, C (psf)	FRICION ANGLE, (degrees)
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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-2**  
**JOB NO. SL12170-1**

PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	<b>Cambria Skatepark</b>	DRILL RIG:	<b>Mobile B-24</b>
DRILLING LOCATION:	<b>See Figure, Field Investigation</b>	HOLE DIAMETER:	<b>6 Inches</b>
DATE DRILLED:	<b>July 14, 2021</b>	SAMPLING METHOD:	<b>SPT</b>
LOGGED BY:	<b>G. Vine</b>	APPROX. ELEVATION:	<b>Not Recorded</b>

Depth of Groundwater: **Not Encountered**      Boring Terminated: **4 Feet**      Page 1 of 1

DEPTH	LITHOLOGY	USCS	SOIL DESCRIPTION	SAMPLE ID	SAMPLERS TYPE	N (BLOWS / FT)	(N) 60	MOISTURE CONTENT (%)	FINES CONTENT (%)	PLASTICITY INDEX (PI)	EXPANSION INDEX (EI)	OPTIMUM WATER CONTENT (%)	MAXIMUM DRY DENSITY (pcf)	COHESION, C (psf)	FRICION ANGLE, (degrees)
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