GEOCON
WEST, INC.

GEOTECHNICAL
ENVIRONMENTAL
MATERIALS

GEOTECHNICAL INVESTIGATION

PROPOSED MULTI-FAMILY RESIDENTIAL DEVELOPMENT
910 SOUTH MARIPOSA STREET
BURBANK, CALIFORNIA

APN: 2443-004-017

PREPARED FOR

BUTTERFLY GARDENS, LLC
LOS ANGELES, CALIFORNIA

PROJECT NO. W1696-06-01

JANUARY 10, 2023

GEOCON
WEST, INC.
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

Project No. W1696-06-01
January 10, 2023

VIA EMAIL

Mr. Garen Gozumian
Butterfly Gardens, LLC
625 S. Hill Street Suite 249
Los Angeles, CA 90014

Subject: GEOTECHNICAL INVESTIGATION
PROPOSED 3-STORY MULTI-FAMILY RESIDENTIAL DEVELOPMENT
910 SOUTH MARIPOSA STREET
BURBANK, CALIFORNIA
APN: 2443-004-017

Dear Mr. Gozumian:

In accordance with your authorization of our proposal dated November 10, 2022, we have performed a geotechnical investigation for the proposed multi-family residential development located at 910 South Mariposa Street in the City of Burbank, California. The accompanying report presents the findings of our study and our conclusions and recommendations pertaining to the geotechnical aspects of proposed design and construction. Based on the results of our investigation, it is our opinion that the site can be developed as proposed, provided the recommendations of this report are followed and implemented during design and construction.

If you have any questions regarding this report, or if we may be of further service, please contact the undersigned.

Very truly yours,

GEOCON WEST, INC.

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GEOTECHNICAL INVESTIGATION

1. PURPOSE AND SCOPE

This report presents the results of geotechnical investigation for the proposed multi-family residential development located at 910 South Mariposa Street in the City of Burbank, California (see Vicinity Map, Figure 1). The purpose of our investigation was to evaluate the subsurface soil and geologic conditions underlying the site and, based on conditions encountered, to provide conclusions and recommendations pertaining to geotechnical aspects of proposed design and construction.

The scope of this investigation included a site reconnaissance, field exploration, laboratory testing, engineering analysis, and the preparation of this report. The site was explored on December 1, 2022, by excavating three 7-inch diameter borings to a maximum depth of approximately 55½ feet below the existing ground surface using utilizing a truck-mounted hollow-stem auger drilling machine and two 3½ inch diameter borings to a maximum depth of 15½ feet below the ground surface using manual auger equipment. The approximate locations of the exploratory borings are depicted on the Site Plan (see Figure 2). A detailed discussion of the field investigation, including boring logs, is presented in Appendix A.

Laboratory tests were performed on selected soil samples obtained during the investigation to determine pertinent physical and chemical soil properties. Appendix B presents a summary of the laboratory test results.

The recommendations presented herein are based on analysis of the data obtained during the investigation and our experience with similar soil and geologic conditions. References reviewed to prepare this report are provided in the *List of References* section.

If project details vary significantly from those described herein, Geocon should be contacted to determine the necessity for review and possible revision of this report.

2. SITE AND PROJECT DESCRIPTION

The subject site is located at 910 South Mariposa Street in the City of Burbank, California. The approximately one-acre site is currently being used to stable horses and is occupied by covered stable areas, horse corrals, and several single-story structures. The parcel is bounded by another commercial structure to the north, by a powerline easement to the east, horse corral structure to the south, and South Mariposa Street and single-family residential structures to the west. The site is relatively level, with no pronounced highs or lows. Surface water drainage at the site appears to be by sheet flow along the existing ground contours to the city streets or local area drains.

Based on the information provided by the Client, it is our understanding that the proposed development will consist of several three-story townhouse structures that will be constructed at or near present site grade. The proposed site conditions are depicted on the Site Plan (see Figure 2).

Based on the preliminary nature of the design at this time, wall and column loads were not available. It is anticipated that column loads for the three-story residential structures will be up to 200 kips. It is anticipated that wall loads will be up to 2.5 kips per linear foot.

Once the design phase and foundation loading configuration proceeds to a more finalized plan, the recommendations within this report should be reviewed and revised, if necessary. Any changes in the design, location or elevation of any structure, as outlined in this report, should be reviewed by this office. Geocon should be contacted to determine the necessity for review and possible revision of this report.

3. GEOLOGIC SETTING

The site is located in the southeastern portion of the San Fernando Valley, an alluvial-filled basin approximately 23 miles wide and 12 miles long (Hitchcock and Wills, 2000). The alluvium within the San Fernando Valley is mainly derived from the Santa Monica Mountains to the south-southwest, the Verdugo Mountains to the northeast, the Simi Hills to the northwest, and the San Gabriel Mountains to the northeast. The channelized Los Angeles River is located approximately 100 feet south of the site. Locally, the site is situated on the Los Angeles River flood plain and, based on published geologic maps, the site is underlain by late Pleistocene to early Holocene alluvial deposits. Regionally, the site is located in the southern portion of the Transverse Ranges geomorphic province. This province is characterized by east-west trending geologic structures such as the nearby Santa Monica Mountains and the east-west trending active San Fernando Fault Zone.

4. SOIL AND GEOLOGIC CONDITIONS

Based on our field investigation and published geologic maps of the area, the site is underlain by artificial fill and late Pleistocene to early Holocene age alluvial deposits (CGS, 2012). Detailed stratigraphic profiles of the materials encountered at the site are provided on the boring logs in Appendix A.

4.1 Artificial Fill

Artificial fill was encountered in our explorations to a maximum depth of 9 feet below existing ground surface. The artificial fill generally consists of olive brown to yellowish brown sandy silt and silty sand. The artificial fill is characterized as fine- to medium-grained, slightly moist to moist, and loose to medium dense, or soft to firm. The fill is likely the result of past grading or construction activities at the site. Deeper fill may exist between excavations and in other portions of the site that were not directly explored.

4.2 Alluvium

Late Pleistocene to early Holocene age alluvium was encountered beneath the fill. The alluvium generally consists of brown to grayish brown, gray, or olive brown interbedded silt and sand with varying amounts of silt and fine to coarse gravel. Borings B1 and B2 encountered very dense poorly graded to well-graded sand at depths below approximately 25 to 26 feet to the bottom of borings. The alluvial soils are characterized as slightly moist to moist and very loose to very dense or very soft to hard.

5. GROUNDWATER

The Seismic Hazard Evaluation Report for the Burbank Quadrangle (California Division of Mines and Geology [CDMG], 1998) indicates the historically highest groundwater level in the area is approximately 20 feet beneath the existing ground surface. Groundwater information presented in this document is generated from data collected in the early 1900's to the late 1990s. However, more recent information from the City of Burbank Safety Element (2013) indicates that groundwater extraction has resulted in lower groundwater depths and concludes, based on the last 60 years of groundwater monitoring well data, that groundwater levels are expected to remain deeper than 50 feet beneath the ground surface in the vicinity of the site. Consequently, based on current groundwater management practices, current and future groundwater levels are not expected to reach historic high levels.

Groundwater was not encountered in our borings, drilled to a maximum depth of approximately 55½ feet below the existing ground surface. Based on the reported historic high groundwater levels in the site vicinity (CDMG, 1998), the lack of groundwater in our borings, and the depth of proposed construction, static groundwater is neither expected to be encountered during construction, nor have a detrimental effect on the project. However, it is not uncommon for groundwater levels to vary seasonally or for groundwater seepage conditions to develop where none previously existed, especially in impermeable fine-grained soils which are heavily irrigated or after seasonal rainfall. In addition, recent requirements for stormwater infiltration could result in shallower seepage conditions in the immediate site vicinity. Proper surface drainage of irrigation and precipitation will be critical for future performance of the project. Recommendations for drainage are provided in the S*ite Drainage and Moisture Protection* section of this report (see Section 7.19).

6. GEOLOGIC HAZARDS

6.1 Surface Fault Rupture

The numerous faults in Southern California include Holocene-active, pre-Holocene, and inactive faults. The criteria for these major groups are based on criteria developed by the California Geological Survey (CGS, formerly known as CDMG) for the Alquist-Priolo Earthquake Fault Zone Program (CGS, 2018). By definition, a Holocene-active fault is one that has had surface displacement within Holocene time (about the last 11,700 years). A pre-Holocene fault has demonstrated surface displacement during Quaternary time (approximately the last 1.6 million years) but has had no known Holocene movement. Faults that have not moved in the last 1.6 million years are considered inactive.

The site is not within a state-designated Alquist-Priolo Earthquake Fault Zone for surface fault rupture hazards (CDMG, 1979; CGS, 2022a, 2022b). No Holocene-active or pre-Holocene faults with the potential for surface fault rupture are known to pass directly beneath the site. Therefore, the potential for surface rupture due to faulting occurring beneath the site during the design life of the proposed development is considered low. However, the site is located in the seismically active Southern California region and could be subjected to moderate to strong ground shaking in the event of an earthquake on one of the many active Southern California faults. The faults in the vicinity of the site are shown in Figure 3, Regional Fault Map.

The closest surface trace of an active fault to the site is the Verdugo Fault located approximately 2.6 miles to the northeast (CDMG, 1979; USGS, 2006; Ziony and Jones, 1989). Other nearby active faults are the Hollywood Fault, an unnamed fault, the Raymond Fault, the Santa Monica Fault, the San Fernando Fault Zone, and the Newport-Inglewood Fault Zone located approximately 3.1 miles south, 3.1 miles west-northwest, 5.2 miles southeast, 7.3 miles southwest, 7.9 miles north and 8.0 miles southwest of the site, respectively (USGS, 2006; Ziony and Jones, 1989). The active San Andreas Fault Zone is located approximately 29 miles northeast of the site (USGS, 2006).

Several buried thrust faults, commonly referred to as blind thrusts, underlie the Los Angeles Basin and the San Fernando Valley at depth. These faults are not exposed at the ground surface and are typically identified at depths greater than 3.0 kilometers. The October 1, 1987 M_w 5.9 Whittier Narrows earthquake and the January 17, 1994 M_w 6.7 Northridge earthquake were a result of movement on the Puente Hills Blind Thrust and the Northridge Thrust, respectively. These thrust faults and others in the Southern California area are not exposed at the surface and do not present a potential surface fault rupture hazard at the site; however, these deep thrust faults are considered active features capable of generating future earthquakes that could result in moderate to significant ground shaking at the site.

6.2 Seismicity

As with all of Southern California, the site has experienced historic earthquakes from various regional faults. The seismicity of the region surrounding the site was formulated based on research of an electronic database of earthquake data. The epicenters of recorded earthquakes with magnitudes equal to or greater than 5.0 in the site vicinity are depicted on Figure 4, Regional Seismicity Map. A partial list of moderate to major magnitude earthquakes that have occurred in the Southern California area within the last 100 years is included in the following table.

LIST OF HISTORIC EARTHQUAKES

Earthquake (Oldest to Youngest)	Date of Earthquake	Magnitude	Distance to Epicenter (Miles)	Direction to Epicenter
Near Redlands	July 23, 1923	6.3	62	E
Long Beach	March 10, 1933	6.4	42	SE
Tehachapi	July 21, 1952	7.5	71	NW
San Fernando	February 9, 1971	6.6	18	NNW
Whittier Narrows	October 1, 1987	5.9	15	ESE
Sierra Madre	June 28, 1991	5.8	19	ENE
Landers	June 28, 1992	7.3	107	E
Big Bear	June 28, 1992	6.4	85	E
Northridge	January 17, 1994	6.7	13	WNW
Hector Mine	October 16, 1999	7.1	120	ENE
Ridgecrest	July 5, 2019	7.1	118	NNE

The site could be subjected to strong ground shaking in the event of an earthquake. However, this hazard is common in Southern California and the effects of ground shaking can be minimized if the proposed structures are designed and constructed in conformance with current building codes and engineering practices.

6.3 Seismic Design Criteria

The following table summarizes the site-specific design criteria obtained from the 2022 California Building Code (CBC; Based on the 2021 International Building Code [IBC] and ASCE 7-16), Chapter 16 Structural Design, Section 1613 Earthquake Loads. The data was calculated using the online application *U.S. Seismic Design Maps*, provided by the Structural Engineers Association of California (SEAOC). The short spectral response uses a period of 0.2 second. We evaluated the Site Class based on the discussion in Section 1613.2.2 of the 2022 CBC and Table 20.3-1 of ASCE 7-16. The values presented below are for the risk-targeted maximum considered earthquake (MCE_R).

Although there are liquefiable underlying the site, we expect the building possesses a fundamental period of less than 0.5 seconds; therefore, a site response analysis is not anticipated to be required in accordance with ASCE 7-16, Section 20.3.1.

2022 CBC SEISMIC DESIGN PARAMETERS

Parameter	Value	2022 CBC Reference
Site Class	D	Section 1613.2.2
MCE_R Ground Motion Spectral Response Acceleration – Class B (short), S_S	2.1g	Figure 1613.2.1(1)
MCE_R Ground Motion Spectral Response Acceleration – Class B (1 sec), S_1	0.745g	Figure 1613.2.1(2)
Site Coefficient, F_A	1	Table 1613.2.3(1)
Site Coefficient, F_V	1.7	Table 1613.2.3(2)
Site Class Modified MCE_R Spectral Response Acceleration (short), S_{MS}	2.1g	Section 1613.2.3 (Eqn 16-36)
Site Class Modified MCE_R Spectral Response Acceleration – (1 sec), S_{M1}	1.267g*	Section 1613.2.3 (Eqn 16-37)
5% Damped Design Spectral Response Acceleration (short), S_{DS}	1.4g	Section 1613.2.4 (Eqn 16-38)
5% Damped Design Spectral Response Acceleration (1 sec), S_{D1}	0.845g*	Section 1613.2.4 (Eqn 16-39)
*Per Supplement 3 of ASCE7-16, a ground motion hazard analysis (GMHA) shall be performed for projects on Site Class "D" sites with 1-second spectral acceleration (S_1) greater than or equal to 0.2g, which is true for this site. However, Supplement 3 of ASCE 7-16 provides an exception stating that that the GMHA may be waived provided that the parameter S_{M1} is increased by 50% for all applications of S_{M1}. The values for parameters S_{M1} and S_{D1} presented above have **not** been increased in accordance with Supplement 3 of ASCE 7-16.		

The table below presents the mapped maximum considered geometric mean (MCE_G) seismic design parameters for projects located in Seismic Design Categories of D through F in accordance with ASCE 7-16.

ASCE 7-16 PEAK GROUND ACCELERATION

Parameter	Value	ASCE 7-16 Reference
Mapped MCE_G Peak Ground Acceleration, PGA	0.894g	Figure 22-9
Site Coefficient, F_{PGA}	1.1	Table 11.8-1
Site Class Modified MCE_G Peak Ground Acceleration, PGA_M	0.983g	Section 11.8.3 (Eqn 11.8-1)

The Maximum Considered Earthquake Ground Motion (MCE) is the level of ground motion that has a 2 percent chance of exceedance in 50 years, with a statistical return period of 2,475 years. According to the 2022 California Building Code and ASCE 7-16, the MCE is to be utilized for the evaluation of liquefaction, lateral spreading, seismic settlements, and it is our understanding that the intent of the Building Code is to maintain "Life Safety" during a MCE event. The Design Earthquake Ground Motion (DE) is the level of ground motion that has a 10 percent chance of exceedance in 50 years, with a statistical return period of 475 years.

Deaggregation of the MCE peak ground acceleration was performed using the USGS online Unified Hazard Tool, 2014 Conterminous U.S. Dynamic edition (v4.2.0). The result of the deaggregation analysis indicates that the predominant earthquake contributing to the MCE peak ground acceleration is characterized as a 6.94 magnitude event occurring at a hypocentral distance of 9.05 kilometers from the site.

Deaggregation was also performed for the Design Earthquake (DE) peak ground acceleration, and the result of the analysis indicates that the predominant earthquake contributing to the DE peak ground acceleration is characterized as a 6.81 magnitude occurring at a hypocentral distance of 13.02 kilometers from the site.

Conformance to the criteria in the above tables for seismic design does not constitute any kind of guarantee or assurance that significant structural damage or ground failure will not occur if a large earthquake occurs. The primary goal of seismic design is to protect life, not to avoid all damage, since such design may be economically prohibitive.

6.4 Liquefaction Potential

Liquefaction is a phenomenon in which loose, saturated, relatively cohesionless soil deposits lose shear strength during strong ground motions. Primary factors controlling liquefaction include intensity and duration of ground motion, gradation characteristics of the subsurface soils, in-situ stress conditions, and the depth to groundwater. Liquefaction is typified by a loss of shear strength in the liquefied layers due to rapid increases in pore water pressure generated by earthquake accelerations.

The current standard of practice, as outlined in the "Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Liquefaction in California" and "Special Publication 117A, Guidelines for Evaluating and Mitigating Seismic Hazards in California" requires liquefaction analysis to a depth of 50 feet below the lowest portion of the proposed structure. Liquefaction typically occurs in areas where the soils below the water table are composed of poorly consolidated, fine- to medium-grained, primarily sandy soil. In addition to the requisite soil conditions, the ground acceleration and duration of the earthquake must also be of a sufficient level to induce liquefaction.

A review of the State of California Seismic Hazard Zone Map for the Burbank Quadrangle (CDMG, 1999) indicates that the site is located within an area identified as having a potential for liquefaction. Also, according to the City of Burbank Safety Element (2013), the site is located within an area identified as having a potential for liquefaction. The reported historic high ground level is at a depth of approximately 20 feet beneath the existing ground surface (CDMG, 1998).

As indicated in the *Groundwater* section of this report (see Section 5), based on current groundwater management practices, current and future groundwater levels are not expected to reach historic high levels. In addition, the City of Burbank Safety Element (2013) reports that groundwater extraction has resulted in lower groundwater depths and concludes, based on the last 60 years of groundwater monitoring well data, that groundwater levels are not expected to return to historic high levels.

Liquefaction analysis of the soils underlying the site was performed using an updated version of the spreadsheet template LIQ2_30.WQ1 developed by Thomas F. Blake (1996). This program utilizes the 1996 NCEER method of analysis. This semi-empirical method is based on a correlation between values of Standard Penetration Test (SPT) resistance and field performance data. In order to supplement the SPT blow count data, select California Modified Sampler blow count data were converted to equivalent SPT blow counts based on a correlation factor of 0.55 (Rogers, 2006).

The liquefaction analysis was performed for a Design Earthquake level by using a historic high groundwater table of 20 feet below the ground surface, a magnitude 6.81 earthquake, and a peak horizontal acceleration of 0.656g (⅔PGA_M). The enclosed liquefaction analyses, included herein for borings B1and B2, indicate that the alluvial soils below the historic high groundwater level could be susceptible to up to 0.6 inch and 0.3 inch, respectively, of liquefaction settlement during Design Earthquake ground motion (see enclosed calculation sheets, Figures 5 through 8).

It is our understanding that the intent of the Building Code is to maintain “Life Safety” during Maximum Considered Earthquake level events. Therefore, additional analysis was performed to evaluate the potential for liquefaction during a MCE event. The structural engineer should evaluate the proposed structure for the anticipated MCE liquefaction induced settlements and verify that anticipated deformations would not cause the foundation system to lose the ability to support the gravity loads and/or cause collapse of the structure.

The liquefaction analysis was also performed for the Maximum Considered Earthquake level by using a historic high groundwater table of 50 feet below the ground surface, a magnitude 6.94 earthquake, and a peak horizontal acceleration of 0.983g (PGA_M). The enclosed liquefaction analysis, included herein for borings B1 and B2, indicate that the alluvial soils below the historic high groundwater level could be susceptible up to 0.6 inch and 0.3 inch, respectively, of liquefaction settlement during Maximum Considered Earthquake ground motion (see enclosed calculation sheets, Figures 9 through 12).

6.5 Seismically Induced Dry Settlement

Dynamic compaction of dry and loose sands may occur during a major earthquake. Typically, settlements occur in thick beds of such soils. The seismically induced settlement calculations were performed in accordance with the American Society of Civil Engineers, Technical Engineering and Design Guides as adapted from the US Army Corps of Engineers, No. 9.

The calculations provided herein for borings B1 and B2 indicate that the alluvial soils could be susceptible to approximately 0.13 and 0.27 inch, respectively, of seismically induced dry settlement as a result of the Design Earthquake peak ground acceleration (⅔PGA_M).

The calculations provided herein for borings B1 and B2 indicate that the alluvial soils could be prone to approximately 0.35 inch and 1.73 inches, respectively, of seismically induced dry settlement as a result of the Maximum Considered Earthquake ground acceleration (PGA_M).

Calculations of the anticipated seismically induced dry settlements are provided as Figures 13 through 16.

6.6 Lateral Spreading

Lateral spread typically occurs where an unconfined slope is present or where liquefiable soils are located on a gently sloping ground surface. The existing drainage channel is a concrete lined channel. Due to the relatively level ground surface at the site and the confined configuration of the channel, the potential for lateral spreading is considered low.

6.7 Slope Stability

The topography at the site is relatively level and the topography in the immediate site vicinity slopes gently to the south-southeast. The City of Burbank Safety Element (2013) and the County of Los Angeles Safety Element (Leighton, 1990) indicate that the site is not located within an area identified as having a potential for slope stability hazards. Additionally, the State of California Seismic Hazard Zones Map for the Burbank Quadrangle (CDMG, 1999) indicates that site is not located within an area identified as having a potential for seismic slope instability. There are no known landslides near the site, nor is the site in the path of any known or potential landslides. Therefore, the potential for slope stability hazards to adversely affect the proposed development is considered low.

6.8 Earthquake-Induced Flooding

Earthquake-induced flooding is inundation caused by failure of dams or other water-retaining structures due to earthquakes. The Los Angeles County Safety Element (Leighton, 1990) indicates that the site is located within the Hansen Dam inundation area. However, this reservoir, as well as others in California, are continually monitored by various governmental agencies (such as the State of California Division of Safety of Dams and the U.S. Army Corps of Engineers) to guard against the threat of dam failure. Current design, construction practices, and ongoing programs of review, modification, or total reconstruction of existing dams are intended to ensure that all dams are capable of withstanding the maximum considered earthquake (MCE) for the site. Therefore, the potential for inundation at the site as a result of an earthquake-induced dam failure is considered low.

6.9 Tsunamis, Seiches, and Flooding

The site is not located within a coastal area. Therefore, tsunamis are not considered a significant hazard at the site.

Seiches are large waves generated in enclosed bodies of water in response to ground shaking. No major water-retaining structures are located immediately up gradient from the project site. Therefore, flooding resulting from a seismically induced seiche is considered unlikely.

The site is within an area of minimal flooding (Zone X) as defined by the Federal Emergency Management Agency (FEMA, 2022; LACDPW, 2022b).

6.10 Oil Fields & Methane Potential

Based on a review of the California Geologic Energy Management Division (CalGEM) Well Finder Website, the site is not located within an oil field and there are no oil or gas wells documented at the site or within -¼-mile of the site (CalGEM, 2022). However, due to the voluntary nature of record reporting by the oil well drilling companies, wells may be improperly located or not shown on the location map and undocumented wells could be encountered during construction. Any wells encountered will need to be properly abandoned in accordance with the current requirements of the CalGEM.

Since the site is not located within the boundaries of a known oil field, the potential for the presence of methane or other volatile gases at the site is considered low. However, should it be determined that a methane study is required for the proposed development it is recommended that a qualified methane consultant be retained to perform the study and provide mitigation measures as necessary.

6.11 Subsidence

Subsidence occurs when a large portion of land is displaced vertically, usually due to the withdrawal of groundwater, oil, or natural gas. Soils that are particularly subject to subsidence include those with high silt or clay content. The site is not located within an area of known ground subsidence (USGS, 2022). No large-scale extraction of groundwater, gas, oil, or geothermal energy is occurring or planned at the site or in the general site vicinity. There appears to be little or no potential for ground subsidence due to withdrawal of fluids or gases at the site.

7. CONCLUSIONS AND RECOMMENDATIONS

7.1 General

7.1.1 It is our opinion that neither soil nor geologic conditions were encountered during the investigation that would preclude the construction of the proposed structure provided the recommendations presented herein are followed and implemented during design and construction.

7.1.2 Up to 9 feet of artificial fill was encountered during site exploration. The existing fill encountered is believed to be the result of past grading and construction activities at the site. Deeper fill may exist in other areas of the site that were not directly explored. Future demolition of the existing structures which occupy the site will likely disturb the upper few feet of soil. It is our opinion that the existing fill, in its present condition, is not suitable for direct support of proposed foundations, slabs, or additional fill. The existing fill and site soils are suitable for re-use as engineered fill provided the recommendations in the *Grading* section of this report are followed (see Section 7.4).

7.1.3 The enclosed seismically-induced settlement analyses indicate that the alluvial soils underlying the site could be susceptible to up to 0.73 inch of total settlement as a result of the Design Earthquake peak ground acceleration ($\frac{2}{3}PGA_M$). Differential settlement at the foundation level is anticipated to be less than 0.37 inch over a distance of 20 feet. The foundation design recommendations presented herein are intended to reduce the effects of settlement on proposed improvements.

7.1.4 The results of laboratory testing indicate that the existing upper site soils in the are moderately compressible, which in its current condition could yield excessive static and differential settlements when subject to foundation loading. The grading and foundation recommendations presented herein are intended to mitigate the effects of settlement on the proposed structure.

7.1.5 Based on these considerations, as a minimum, it is recommended that the upper 5 feet of existing earth materials from existing grade and within the proposed building footprint areas be excavated and properly compacted for foundation and slab support. Deeper excavations should be conducted to remove any encountered existing artificial fill or soft soils as necessary at the direction of the Geotechnical Engineer (a representative of Geocon). The Client and grading contractor should be aware that the encountered existing artificial fill is 9 feet deep below the existing ground surface in Boring 5. Proposed building foundations should be underlain by a minimum of 3 feet of newly placed engineered fill. The excavation should extend laterally a minimum distance of 3 feet beyond the building footprint area, including building appurtenances, or a distance equal to the depth of fill below the foundation, whichever is greater. The limits of existing fill and/or soft soil removal will be verified by the Geocon representative during site grading activities. Recommendations for earthwork are provided in the *Grading* section of this report (see Section 7.4).

7.1.6 Additional grading should be conducted as necessary to maintain the required 3 feet of newly placed engineered fill below foundations. The grading contractor should verify all bottom of footing elevations prior to commencement of grading activities to ensure that grading is conducted deep enough to provide the required three foot of engineering fill below foundations.

7.1.7 Prior to placing any fill, the upper twelve inches of the excavation bottom must be proof-rolled with heavy equipment in the presence of the Geotechnical Engineer (a representative of Geocon).

7.1.8 Subsequent to the recommended grading, the proposed structure may be supported on a mat foundation system or a post-tensioned foundation system deriving support exclusively in newly placed engineered fill. Recommendations for the design of a mat foundation system are provided in Section 7.6, and recommendations for the design of a post-tensioned foundation system are provided in Section 7.7.

7.1.9 It is recommended that flexible utility connections be utilized for all rigid utilities to minimize or prevent damage to utilities from minor differential movements.

7.1.10 All excavations must be observed and approved in writing by the Geotechnical Engineer (a representative of Geocon). There is a potential for localized areas of soft soils to be exposed at the excavation bottom. It is recommended that the entire excavation bottom be proof-rolled and stabilized as necessary prior to placement of engineered fill. Prior to placing any fill, the excavation must be observed and approved in writing by the Geotechnical Engineer (a representative of Geocon). If determined to be excessively soft, stabilization of the bottom of the excavation may be required in order to provide a firm working surface upon which engineered fill can be placed and heavy equipment can operate. Recommendations for earthwork and soil stabilization are provided in the *Grading* section of this report (see Section 7.4).

7.1.11 It is anticipated that stable excavations for the recommended grading associated with the proposed structures can be achieved with sloping measures. However, if excavations in close proximity to an adjacent property line and/or structure are required, special excavation measures, such as slot-cutting or shoring, may be necessary in order to maintain lateral support of offsite improvements. Excavation recommendations are provided in the *Temporary Excavations* section of this report (Section 7.17).

7.1.12 Foundations for small outlying structures, such as block walls up to 6 feet in height, planter walls or trash enclosures, which will not be tied to the proposed structure, may be supported on conventional foundations deriving support on a minimum of 12 inches of newly placed engineered fill, which extends laterally at least 12 inches beyond the foundation area. Where excavation and compaction cannot be performed, such as adjacent to property lines, foundations may be deepened as necessary to maintain a minimum 12-inch embedment into the undisturbed alluvial soils. If the soils exposed in the excavation bottom are soft or loose, compaction of the soils will be required prior to placing steel or concrete. Compaction of the foundation excavation bottom is typically accomplished with a compaction wheel or mechanical whacker and must be observed and approved by a Geocon representative.

7.1.13 Where new paving is to be placed, it is recommended that all existing fill and soft soils be excavated and properly compacted for paving support. The client should be aware that excavation and compaction of all existing fill and soft soils in the area of new paving is not required; however, paving constructed over existing uncertified fill or unsuitable soil may experience increased settlement and/or cracking, and may therefore have a shorter design life and increased maintenance costs. As a minimum, the upper 12 inches of subgrade soil should be scarified and properly compacted for paving support. Paving recommendations are provided in *Preliminary Pavement Recommendations* section of this report (see Section 7.12).

7.1.14 Based on the results of percolation testing performed at the site, stormwater infiltration system is considered feasible for this project. A summary of the percolation test results is provided in the *Stormwater Infiltration* section of this report (see Section 7.18).

7.1.15 Once the design and foundation loading configuration for the proposed structure proceeds to a more finalized plan, the recommendations within this report should be reviewed and revised, if necessary. Based on the final foundation loading configurations, the potential for settlement should be re-evaluated by this office.

7.1.16 Any changes in the design, location or elevation, as outlined in this report, should be reviewed by this office. Geocon should be contacted to determine the necessity for review and possible revision of this report.

7.1.17 The most recent ASTM standards apply to this project and must be utilized, even if older ASTM standards are indicated in this report.

7.2 Soil and Excavation Characteristics

7.2.1 The in-situ soils can be excavated with moderate effort using conventional excavation equipment. Caving should be anticipated in unshored excavations, especially where granular soils are present.

7.2.2 It is the responsibility of the contractor to ensure that all excavations and trenches are properly shored and maintained in accordance with applicable OSHA rules and regulations to maintain safety and maintain the stability of existing adjacent improvements.

7.2.3 All onsite excavations must be conducted in such a manner that potential surcharges from existing structures, construction equipment, and vehicle loads are resisted. The surcharge area may be defined by a 1:1 projection down and away from the bottom of an existing foundation or vehicle load. Penetrations below this 1:1 projection will require special excavation measures such as sloping or shoring. Excavation recommendations are provided in the *Temporary Excavations* section of this report (see Section 7.17).

7.2.4 The soils encountered at foundation levels are considered to be “non-expansive” (EI < 20) as defined by 2022 California Building Code (CBC) Section 1803.5.3. Recommendations presented herein assume that the foundations and slabs will derive support in these materials.

7.3 Minimum Resistivity, pH and Water-Soluble Sulfate

7.3.1 Potential of Hydrogen (pH) and resistivity testing as well as chloride content testing were previously performed on representative samples of soil to generally evaluate the corrosion potential to surface utilities. The tests were performed in accordance with California Test Method Nos. 643 and 422 and indicate that the soils are considered "severely corrosive" with respect to corrosion of buried ferrous metals on site. The results are presented in Appendix B (Figure B29) and should be considered for design of underground structures. Due to the corrosive potential of the soils, it is recommended that PVC, ABS or other approved plastic piping be utilized in lieu of cast-iron when in direct contact with the site soils.

7.3.2 Laboratory tests were performed on representative samples of the site materials to measure the percentage of water-soluble sulfate content. Results from the laboratory water-soluble sulfate tests are presented in Appendix B (Figure B29) and indicate that the on-site materials possess a sulfate exposure class of "S0" to concrete structures as defined by 2022 CBC Section 1904 and ACI 318 Table 19.3.1.1.

7.3.3 Geocon West, Inc. does not practice in the field of corrosion engineering. If corrosion sensitive improvements are planned, it is recommended that a corrosion engineer be retained to evaluate corrosion test results and incorporate the necessary precautions to avoid premature corrosion on buried metal pipes and concrete structures in direct contact with the soils.

7.4 Grading

7.4.1 Grading is anticipated to include preparation of building pads, excavation of site soils for proposed foundations and utility trenches and placement of backfill for utility trenches.

7.4.2 Earthwork should be observed, and compacted fill tested by representatives of Geocon West, Inc. The existing fill and alluvial soil encountered during exploration is suitable for re-use as engineered fill, provided any encountered oversize material (greater than 6 inches) and any encountered deleterious debris are removed.

7.4.3 A preconstruction conference should be held at the site prior to the beginning of grading operations with the owner, contractor, civil engineer, geotechnical engineer, and, if applicable, building official in attendance. Special soil handling requirements can be discussed at that time.

7.4.4 Grading should commence with the removal of all existing vegetation and existing improvements from the area to be graded. Deleterious debris such as wood and root structures should be exported from the site and should not be mixed with the fill soils. Asphalt and concrete should not be mixed with the fill soils unless approved by the Geotechnical Engineer. All existing underground improvements planned for removal should be completely excavated and the resulting depressions properly backfilled in accordance with the procedures described herein. Once a clean excavation bottom has been established it must be observed and approved in writing by the Geotechnical Engineer (a representative of Geocon West, Inc.).

7.4.5 As a minimum, it is recommended that the upper 5 feet of existing earth materials from existing grade and within the proposed building footprint area be excavated and properly compacted for foundation and slab support. Deeper excavations should be conducted as necessary to remove deeper artificial fill or soft alluvial soil at the direction of the Geotechnical Engineer (a representative of Geocon). The Client and grading contractor should be aware that the encountered existing artificial fill is 9 feet deep below the existing ground surface in Boring 5. Proposed building foundations should be underlain by a minimum of 3 feet of newly placed engineered fill. The engineered fill blanket should extend laterally a minimum distance of 3 feet beyond the building footprint areas, including building appurtenances, or a distance equal to the depth of fill below the foundation, whichever is greater. The limits of existing fill and/or soft soil removal will be verified by the Geocon representative during site grading activities.

7.4.6 Additional grading should be conducted as necessary to maintain the required 3 feet of newly placed engineered fill below foundations. The grading contractor should verify all bottom of footing elevations prior to commencement of grading activities to ensure that grading is conducted deep enough to provide the required three foot of engineering fill below foundations.

7.4.7 Prior to placing any fill, the excavation bottom must be proof-rolled with heavy equipment in the presence of the Geotechnical Engineer (a representative of Geocon) and approved in writing.

7.4.8 Bottom stabilization, if necessary, may be achieved placing a thin lift of 3- to 6-inch-diameter crushed angular rock into the soft excavation bottom. The use of crushed concrete will also be acceptable. The crushed rock should be spread thinly across the excavation bottom and pressed into the soils by track rolling or wheel rolling with heavy equipment. It is very important that voids between the rock fragments are not created so the rock must be thoroughly pressed or blended into the soils. All subgrade soils must be properly compacted and proof-rolled in the presence of the Geotechnical Engineer (a representative of Geocon West, Inc.).

7.4.9 An additional method of subgrade stabilization would be to place a minimum 12-inch thick layer of aggregate base over Tensar InterAx NX850 geogrid or equivalent extruded (nonwoven) geotextile. The Tensar geogrids should be installed throughout and should overlap in accordance with the manufacturer's recommendations. Prior to placing the geogrid, excessively soft or wet materials should be removed, and the resulting excavation bottom should be free of loose material. Non-vibratory compaction methods should be used for compaction of the base material. The aggregate base should be compacted to a dry density of at least 90 percent of the laboratory maximum density near the optimum moisture. If pumping of the subgrade continues, a thicker layer of aggregate base may be placed. It is very important that subgrade stabilization be performed uniformly across the entire excavation bottom.

7.4.10 Subsequent to the recommended grading, the proposed structures may be supported on mat foundations or post-tensioned foundation systems deriving support in newly placed engineered fill.

7.4.11 All fill and backfill soils should be placed in horizontal loose layers approximately 6 to 8 inches thick, moisture conditioned to near optimum moisture content and properly compacted to 90 percent of the laboratory maximum dry density in accordance with ASTM D 1557 (latest edition).

7.4.12 Foundations for small outlying structures, such as block walls up to 6 feet high, planter walls or trash enclosures, which will not be tied to the proposed building, may be supported on conventional foundations deriving support on a minimum of 12 inches of newly placed engineered fill which extends laterally at least 12 inches beyond the foundation area. Where excavation and proper compaction cannot be performed, foundations may derive support directly in the undisturbed alluvium, and should be deepened as necessary to maintain a minimum 12-inch embedment into the recommended bearing materials. If the soils exposed in the excavation bottom are soft or loose, compaction of the soils will be required prior to placing steel or concrete. Compaction of the foundation excavation bottom is typically accomplished with a compaction wheel or mechanical whacker and must be observed and approved by a Geocon representative.

7.4.13 All imported fill shall be observed, tested, and approved by Geocon West, Inc. prior to bringing soil to the site. Rocks larger than 6 inches in diameter shall not be used in the fill. Import soils used as structural fill should have an expansion index less than 20 and corrosivity properties that are equally or less detrimental to that of the existing onsite soils (see Figures B29). Import soils placed in the building area should be placed uniformly across the building pad or in a manner that is approved by the Geotechnical Engineer (a representative of Geocon).

7.4.14. Where new paving is to be placed, it is recommended that unsuitable or soft existing fill and alluvial soils be excavated and properly compacted for paving support. As a minimum, the upper 12 inches of subgrade soil should be scarified, moisture conditioned to near optimum moisture content, and compacted to at least 95 percent relative compaction for paving support. Paving recommendations are provided in *Preliminary Pavement Recommendations* section of this report (see Section 7.12).

7.4.15 It is recommended that flexible utility connections be utilized for all rigid utilities to minimize or prevent damage to utilities from minor differential movements. Utility trenches should be properly backfilled in accordance with the following requirements. The pipe should be bedded with clean sands (Sand Equivalent greater than 30) to a depth of at least 1 foot over the pipe, and the bedding material must be inspected and approved in writing by the Geotechnical Engineer (a representative of Geocon). The use of gravel is not acceptable unless used in conjunction with filter fabric to prevent the gravel from having direct contact with soil. The remainder of the trench backfill may be derived from onsite soil or approved import soil, compacted as necessary, until the required compaction is obtained. The use of minimum 2-sack slurry as backfill is also acceptable. Prior to placing any bedding materials or pipes, the excavation bottom must be observed and approved in writing by the Geotechnical Engineer (a representative of Geocon).

7.4.16 All trench and foundation excavation bottoms must be observed and approved in writing by the Geotechnical Engineer (a representative of Geocon), prior to placing bedding materials, fill, steel, gravel, or concrete.

7.5 Shrinkage

7.5.1 Shrinkage results when a volume of material removed at one density is compacted to a higher density. A shrinkage factor of approximately 25 percent should be anticipated when excavating and compacting the upper 5 feet of existing earth materials on the site to an average relative compaction of 92 percent. The grading contractor should verify shrinkage and earthwork yardage estimates.

7.5.2 If import soils will be utilized in the building pad, the soils must be placed uniformly and at equal thickness at the direction of the Geotechnical Engineer (a representative of Geocon West, Inc.). Soils can be borrowed from non-building pad areas and later replaced with imported soils.

7.6 Mat Foundation Design

7.6.1 The recommended maximum allowable bearing value is 3,500 pounds per square foot (psf). The allowable bearing pressure may be increased by up to one-third for transient loads due to wind or seismic forces.

7.6.2 A vertical modulus of subgrade reaction of 75 pounds per cubic inch may be used in the design of mat foundations deriving support in newly placed engineered fill. This value is a unit value for use with a 1-foot square footing. The modulus should be reduced in accordance with the following equation when used with larger foundations:

$$K_R = K\left[\frac{B+1}{2B}\right]^2$$

where: K_R = reduced subgrade modulus
K = unit subgrade modulus
B = foundation width (in feet)

7.6.3 The thickness of and reinforcement for the mat foundation should be designed by the project structural engineer.

7.6.4 For seismic design purposes, a coefficient of friction of 0.4 may be utilized between the concrete mat and alluvium without a moisture barrier, and 0.15 for slabs underlain by a moisture barrier.

7.6.5 The subgrade should be maintained at near optimum moisture content prior to and at the time of concrete placement.

7.6.6 Foundation excavations should be observed and approved in writing by the Geotechnical Engineer (a representative of Geocon West, Inc.), prior to the placement of reinforcing steel and concrete to verify that the exposed soil conditions are consistent with those anticipated. If unanticipated soil conditions are encountered, foundation modifications may be required.

7.6.7 This office should be provided a copy of the final construction plans so that the recommendations presented herein could be properly reviewed and revised if necessary.

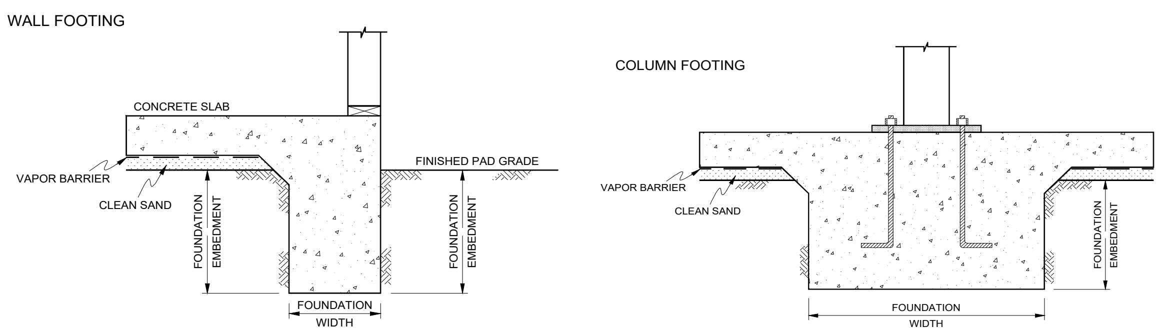
7.7 Post-Tensioned Foundation Recommendations

7.7.1 The post-tensioned foundation system should be designed by a structural engineer experienced in post-tensioned slab design and design criteria of the Post-Tensioning Institute (PTI) DC 10.5-12 *Standard Requirements for Design and Analysis of Shallow Post-Tensioned Concrete Foundations on Expansive Soils* or *WRI/CRSI Design of Slab-on-Ground Foundations*, as required by the 2022 California Building Code (CBC Section 1808.6.2). Although this procedure was developed for expansive soil conditions, we understand it can also be used to reduce the potential for foundation distress due to differential settlement. The post-tensioned design should incorporate the geotechnical parameters presented in the following table, which are based on the guidelines presented in the PTI DC 10.5 design manual.

POST-TENSIONED FOUNDATION SYSTEM DESIGN PARAMETERS

Post-Tensioning Institute (PTI) DC 10.5-12 Design Parameters for Foundation Category Type I	Value
Thornthwaite Index	-20
Equilibrium Suction	3.9
Edge Lift Moisture Variation Distance, e_M (feet)	5.3
Edge Lift, y_M (inches)	1.1
Center Lift Moisture Variation Distance, e_M (feet)	9.0
Center Lift, y_M (inches)	0.47

7.7.2 The foundations for the post-tensioned slabs should be embedded in accordance with the recommendations of the structural engineer. If a post-tensioned foundation system is planned, the foundation should possess a thickened edge with a minimum width of 12 inches and extend below the clean sand or crushed rock layer. A graphic depicting the foundation embedment is provided below.



7.7.3 If the structural engineer proposes a post-tensioned foundation design method other than PTI DC 10.5:

- The deflection criteria presented in the above table are still applicable.
- Interior stiffener beams should be used.
- The width of the perimeter foundations should be at least 12 inches.
- The perimeter footing embedment depths should be at least 24 inches. The embedment depths should be measured from the lowest adjacent pad grade.

7.7.4 During the construction of the post-tension foundation system, the concrete should be placed monolithically. Under no circumstances should cold joints form between the footings/grade beams and the slab during the construction of the post-tension foundation system unless specifically designed by the structural engineer.

7.7.5 Our experience indicates post-tensioned slabs may be susceptible to excessive edge lift, regardless of the underlying soil conditions. Placing reinforcing steel at the bottom of the perimeter footings and the interior stiffener beams may mitigate this potential. The structural engineer should design the foundation system to reduce the potential of edge lift occurring for the proposed structures. Interior stiffening beams should be incorporated into the design of the foundation system in accordance with the PTI design procedures.

7.7.6 Post-tensioned foundations may be designed for an allowable soil bearing pressure of 3,500 psf (dead plus live load). This bearing pressure may be increased by one-third for transient loads due to wind or seismic forces.

7.7.7 Isolated footings, if present, should have a minimum embedment depth and width of 24 inches. The use of isolated footings, which are located beyond the perimeter of the building and support structural elements connected to the building, are not recommended. If this condition cannot be avoided, the isolated footings should be connected to the building foundation system with grade beams. In addition, consideration should be given to connecting patio slabs, which exceed 5 feet in width, to the building foundation to reduce the potential for future separation to occur.

7.7.8 The recommendations of this report are intended to reduce the potential for cracking of slabs and foundations due to expansive soil (if present) and/or differential settlement of fill soil with varying thicknesses. However, even with the incorporation of the recommendations presented herein, foundations, stucco walls, and slabs-on-grade placed on such conditions may still exhibit some cracking due to soil movement and/or shrinkage. The occurrence of concrete shrinkage cracks is independent of the supporting soil characteristics. Their occurrence may be reduced by limiting the slump of the concrete, proper concrete placement and curing, and by the placement of crack control joints at periodic intervals, in particular, where re-entrant slab corners occur.

7.7.9 Special subgrade presaturation is not deemed necessary prior to placing concrete; however, the exposed foundation and slab subgrade soil should be moisture conditioned, as necessary, to maintain a moist condition as would be expected in any such concrete placement.

7.7.10 Foundation excavations should be observed by the Geotechnical Engineer (a representative of Geocon West, Inc.) prior to the placement of reinforcing steel and concrete to check that the exposed soil conditions are consistent with those expected and have been extended to appropriate bearing strata. If unexpected soil conditions are encountered, foundation modifications may be required.

7.7.11 Geocon should be consulted to provide additional design parameters as required by the structural engineer.

7.8 Foundation Settlement

7.8.1 The enclosed seismically-induced settlement analysis indicates that the site soils could be susceptible to up to 0.73 inch of total settlement as a result of the Design Earthquake peak ground acceleration (⅔PGA_M). The differential settlement at the foundation level is anticipated to be less than 0.37 inch over a distance of 20 feet. These settlements are in addition to the static settlements indicated below and must be considered in the structural design.

7.8.2 The maximum expected static settlement for a structure supported on a mat foundation system or a post-tensioned foundation system deriving support in the recommended bearing materials and designed with a maximum bearing pressure of 3,500 psf is estimated to be less than 1 inch and occur below the heaviest loaded structural element. Settlement of the foundation system is expected to occur on initial application of loading. Differential settlement is expected to be less than ½ inch over a distance of 20 feet.

7.8.3 Based on seismic considerations, the proposed structure should be designed for a combined static and seismically induced differential settlement of 0.87 inch over a distance of 20 feet.

7.8.4 It is recommended that flexible utility connections be utilized for all rigid utilities to minimize or prevent damage to utilities from minor differential movements.

7.8.5 Once the design and foundation loading configurations for the proposed structure proceeds to a more finalized plan, the estimated settlements presented in this report should be reviewed and revised, if necessary. If the final foundation loading configurations are greater than the assumed loading conditions, the potential for settlement should be reevaluated by this office.

7.9 Miscellaneous Foundations

7.9.1 Foundations for small outlying structures, such as block walls up to 6 feet in height, planter walls or trash enclosures, which will not be structurally supported by the proposed building, may be supported on conventional foundations deriving support on a minimum of 12 inches of newly placed engineered fill which extends laterally at least 12 inches beyond the foundation area. Where excavation and compaction cannot be performed, such as adjacent to property lines, foundations may bear in the undisturbed alluvial soils, and should be deepened as necessary to maintain a minimum 12-inch embedment into the recommended bearing materials.

7.9.2 If the soils exposed in the excavation bottom are soft, compaction of the soft soils will be required prior to placing steel or concrete. Compaction of the foundation excavation bottom is typically accomplished with a compaction wheel or mechanical whacker and must be observed and approved by a Geocon representative. Miscellaneous foundations may be designed for a bearing value of 1,500 psf and should be a minimum of 12 inches in width, 18 inches in depth below the lowest adjacent grade and 12 inches into the recommended bearing material. The allowable bearing pressure may be increased by up to one-third for transient loads due to wind or seismic forces.

7.9.3 Foundation excavations should be observed and approved in writing by the Geotechnical Engineer (a representative of Geocon West, Inc.), prior to the placement of reinforcing steel and concrete to verify that the excavations and exposed soil conditions are consistent with those anticipated.

7.10 Lateral Design

7.10.1 Resistance to lateral loading may be provided by friction acting at the base of foundations, slabs and by passive earth pressure. An allowable coefficient of friction of 0.4 may be used with the dead load forces in the competent alluvial soils or properly compacted engineered fill.

7.10.2 Passive earth pressure for the sides of foundations and slabs poured against competent alluvial soils or properly compacted engineered fill may be computed as an equivalent fluid having a density of 250 pcf with a maximum earth pressure of 2,500 psf. When combining passive and friction for lateral resistance, the passive component should be reduced by one-third.

7.11 Concrete Slabs-on-Grade

7.11.1 Concrete slabs-on-grade subject to vehicle loading should be designed in accordance with the recommendations in the *Preliminary Pavement Recommendations* section of this report (Section 7.12).

7.11.2 Slabs-on-grade at the ground surface that may receive moisture-sensitive floor coverings or may be used to store moisture-sensitive materials should be underlain by a vapor retarder placed directly beneath the slab. The vapor retarder and acceptable permeance should be specified by the project architect or developer based on the type of floor covering that will be installed. The vapor retarder design should be consistent with the guidelines presented in Section 9.3 of the American Concrete Institute's (ACI) Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials (ACI 302.2R-06) and should be installed in general conformance with ASTM E 1643 (latest edition) and the manufacturer's recommendations. A minimum thickness of 15 mils extruded polyolefin plastic is recommended; vapor retarders which contain recycled content or woven materials are not recommended. The vapor retarder should have a permeance of less than 0.01 perms demonstrated by testing before and after mandatory conditioning. The vapor retarder should be installed in direct contact with the concrete slab with proper perimeter seal. If the California Green Building Code requirements apply to this project, the vapor retarder should be underlain by 4 inches of clean aggregate. It is important that the vapor retarder be puncture resistant since it will be in direct contact with angular gravel. As an alternative to the clean aggregate suggested in the California Green Building Code, it is our opinion that the concrete slab-on-grade may be underlain by a vapor retarder over 4 inches of clean sand (sand equivalent greater than 30), since the sand will serve a capillary break and will minimize the potential for punctures and damage to the vapor barrier.

7.11.3 For seismic design purposes, a coefficient of friction of 0.4 may be utilized between concrete slabs and subgrade soils without a moisture barrier, and 0.15 for slabs underlain by a moisture barrier.

7.11.4 Exterior slabs, not subject to traffic loads, should be at least 4 inches thick and reinforced with No. 3 steel reinforcing bars placed 18 inches on center in both horizontal directions, positioned near the slab midpoint. Prior to construction of slabs, the upper 12 inches of subgrade should be moistened to near optimum moisture content and properly compacted to at least 95 percent relative compaction, as determined by ASTM Test Method D 1557 (latest edition). Crack control joints should be spaced at intervals not greater than 10 feet and should be constructed using saw-cuts or other methods as soon as practical following concrete placement. Crack control joints should extend a minimum depth of ¼ the slab thickness. The project structural engineer should design construction joints as necessary.

7.11.5 The moisture content of the slab subgrade should be maintained and sprinkled as necessary to maintain a moist condition as would be expected in any concrete placement.

7.11.6 The recommendations of this report are intended to reduce the potential for cracking of slabs due to settlement. However, even with the incorporation of the recommendations presented herein, foundations, stucco walls, and slabs-on-grade may exhibit some cracking due to minor soil movement and/or concrete shrinkage. The occurrence of concrete shrinkage cracks is independent of the supporting soil characteristics. Their occurrence may be reduced and/or controlled by limiting the slump of the concrete, proper concrete placement and curing, and by the placement of crack control joints at periodic intervals, in particular, where re-entrant slab corners occur.

7.12 Preliminary Pavement Recommendations

7.12.1 Where new paving is to be placed, it is recommended that all existing fill and soft, unsuitable soils be excavated and properly compacted for paving support. The client should be aware that excavation and compaction of all soft, unsuitable soils in the area of new paving is not required, however, paving constructed over existing unsuitable soils may experience increased settlement and/or cracking, and may therefore have a shorter design life and increased maintenance costs. As a minimum, the upper 12 inches of paving subgrade should be scarified, moisture conditioned to near optimum moisture content, and properly compacted to at least 95 percent relative compaction, as determined by ASTM Test Method D 1557 (latest edition).

7.12.2 The following pavement sections are based on an assumed R-Value of 20. Once site grading activities are complete, it is recommended that laboratory testing confirm the properties of the soils serving as paving subgrade prior to placing pavement.

7.12.3 The Traffic Indices listed below are estimates. Geocon does not practice in the field of traffic engineering. The actual Traffic Index for each area should be determined by the project civil engineer. If pavement sections for Traffic Indices other than those listed below are required, Geocon should be contacted to provide additional recommendations. Pavement thicknesses were determined following procedures outlined in the *California Highway Design Manual* (Caltrans). It is anticipated that the majority of traffic will consist of automobile and large truck traffic.

PRELIMINARY PAVEMENT DESIGN SECTIONS

Location	Estimated Traffic Index (TI)	Asphalt Concrete (inches)	Class 2 Aggregate Base (inches)
Automobile Parking and Driveways	4.0	3.0	4.0
Trash Truck & Fire Lanes	7.0	4.0	12.0

7.12.4 Asphalt concrete should conform to Section 203-6 of the "*Standard Specifications for Public Works Construction"* (Green Book). Class 2 aggregate base materials should conform to Section 26-1.02A of the "*Standard Specifications of the State of California, Department of Transportation"* (Caltrans). The use of Crushed Miscellaneous Base in lieu of Class 2 aggregate base is acceptable. Crushed Miscellaneous Base should conform to Section 200-2.4 of the "*Standard Specifications for Public Works Construction"* (Green Book).

7.12.5 Unless specifically designed and evaluated by the project structural engineer, where exterior concrete paving will be utilized for support of vehicles, it is recommended that the concrete be a minimum of 5 inches thick and be reinforced with No. 3 steel reinforcing bars placed 18 inches on center in both horizontal directions. Concrete paving supporting vehicular traffic should be underlain by a minimum of 12 inches properly compacted subgrade soil. The subgrade and base materials should be compacted to 95 percent relative compaction, as determined by ASTM Test Method D 1557 (latest edition).

7.12.6 The performance of pavements is highly dependent upon providing positive surface drainage away from the edge of pavements. Ponding of water on or adjacent to the pavement will likely result in saturation of the subgrade materials and subsequent cracking, subsidence and pavement distress. If planters are planned adjacent to paving, it is recommended that the perimeter curb be extended at least 12 inches below the bottom of the aggregate base to minimize the introduction of water beneath the paving.

7.13 Retaining Wall Design

7.13.1 The recommendations presented below are generally applicable to the design of rigid concrete or masonry retaining walls having a maximum height of 5 feet. In the event that walls significantly higher than 5 feet are planned, Geocon should be contacted for additional recommendations.

7.13.2 Retaining wall foundations may be designed in accordance with the recommendations provided in the *Mat Foundation Design* section of this report (see Section 7.6).

7.13.3 Retaining walls with a level backfill surface that are not restrained at the top should be designed utilizing a triangular distribution of pressure (active pressure). Restrained walls are those that are not allowed to rotate more than 0.001H (where H equals the height of the retaining portion of the wall in feet) at the top of the wall. Where walls are restrained from movement at the top, walls may be designed utilizing a triangular distribution of pressure (at-rest pressure). The table below presents recommended pressures to be used in retaining wall design, assuming that proper drainage will be maintained.

RETAINING WALL WITH LEVEL BACKFILL SURFACE

HEIGHT OF RETAINING WALL (Feet)	ACTIVE PRESSURE EQUIVALENT FLUID PRESSURE (Pounds Per Cubic Foot)	AT-REST PRESSURE EQUIVALENT FLUID PRESSURE (Pounds Per Cubic Foot)
Up to 5	30	61

7.13.4 The wall pressures provided above assume that the proposed retaining walls will support relatively undisturbed alluvial soils or engineered fill derived from onsite soils. If import soil will be used to backfill proposed retaining walls, revised earth pressures may be required to account for the geotechnical properties of the import soil used as engineered fill. This should be evaluated once the use of import soil is established. All imported fill shall be observed, tested, and approved by Geocon West, Inc. prior to bringing soil to the site.

7.13.5 The wall pressures provided above assume that the retaining wall will be properly drained preventing the buildup of hydrostatic pressure. If retaining wall drainage is not implemented, the equivalent fluid pressure to be used in design of undrained, restrained walls is 100 pcf for the full height of the wall. The value includes hydrostatic pressures plus buoyant lateral earth pressures. If a partially drained wall is proposed, Geocon should be contacted to provide additional recommendations.

7.13.6 Additional active pressure should be added for a surcharge condition due to sloping ground, vehicular traffic or adjacent structures and should be designed for each condition as the project progresses.

7.13.7 It is recommended that line-load surcharges from adjacent wall footings, use horizontal pressures generated from NAV-FAC DM 7.2. The governing equations are:

$$For\ {}^{x}/_{H} \leq 0.4$$

$$\sigma_H(z) = \frac{0.20 \times \left(\frac{z}{H}\right)}{\left[0.16 + \left(\frac{z}{H}\right)^2\right]^2} \times \frac{Q_L}{H}$$

and

$$For\ {}^{x}/_{H} > 0.4$$

$$\sigma_H(z) = \frac{1.28 \times \left(\frac{x}{H}\right)^2 \times \left(\frac{z}{H}\right)}{\left[\left(\frac{x}{H}\right)^2 + \left(\frac{z}{H}\right)^2\right]^2} \times \frac{Q_L}{H}$$

where *x* is the distance from the face of the excavation or wall to the vertical line-load, *H* is the distance from the bottom of the footing to the bottom of excavation or wall, *z* is the depth at which the horizontal pressure is desired, Q_L is the vertical line-load and $\sigma_H(z)$ is the horizontal pressure at depth *z.*

7.13.8 It is recommended that vertical point-loads, from construction equipment outriggers or adjacent building columns use horizontal pressures generated from NAV-FAC DM 7.2. The governing equations are:

$$For\ {}^{x}/_{H} \leq 0.4$$

$$\sigma_H(z) = \frac{0.28 \times \left(\frac{z}{H}\right)^2}{\left[0.16 + \left(\frac{z}{H}\right)^2\right]^3} \times \frac{Q_P}{H^2}$$

and

$$For\ {}^{x}/_{H} > 0.4$$

$$\sigma_H(z) = \frac{1.77 \times \left(\frac{x}{H}\right)^2 \times \left(\frac{z}{H}\right)^2}{\left[\left(\frac{x}{H}\right)^2 + \left(\frac{z}{H}\right)^2\right]^3} \times \frac{Q_P}{H^2}$$

then

$$\sigma'_H\,(z) = \sigma_H(z)cos^2(1.1\theta)$$

where *x* is the distance from the face of the excavation/wall to the vertical point-load, *H* is distance from the outrigger/bottom of column footing to the bottom of excavation, *z* is the depth at which the horizontal pressure is desired, Q_P is the vertical point-load, $\sigma_H(z)$ is the horizontal pressure at depth *z*, θ is the angle between a line perpendicular to the excavation/wall and a line from the point-load to location on the excavation/wall where the surcharge is being evaluated, and $\sigma_H(z)$ is the horizontal pressure at depth *z.*

7.13.9 In addition to the recommended earth pressure, the upper 10 feet of the retaining wall adjacent to the street or driveway areas should be designed to resist a uniform lateral pressure of 100 psf, acting as a result of an assumed 300 psf surcharge behind the shoring due to normal street traffic. If the traffic is kept back at least 10 feet from the wall, the traffic surcharge may be neglected.

7.13.10 Seismic lateral forces will be required for any retaining walls in excess of 6 feet. Recommendations for seismic lateral forces will be provided under separate cover, if necessary.

7.14 Retaining Wall Drainage

7.14.1 Unless designed for hydrostatic pressures, retaining walls should be provided with a drainage system. At the base of the drain system, a subdrain covered with a minimum of 12 inches of gravel should be installed, and a compacted fill blanket or other seal placed at the surface (see Figure 17). The clean bottom and subdrain pipe, behind a retaining wall, should be observed by the Geotechnical Engineer (a representative of Geocon), prior to placement of gravel or compacting backfill.

7.14.2 As an alternative, a plastic drainage composite such as Miradrain or equivalent may be installed in continuous, 4-foot wide columns along the entire back face of the wall, at 8 feet on center. The top of these drainage composite columns should terminate approximately 18 inches below the ground surface, where either hardscape or a minimum of 18 inches of relatively cohesive material should be placed as a cap (see Figure 18). These vertical columns of drainage material would then be connected at the bottom of the wall to a 4-inch subdrain pipe.

7.14.3 Subdrainage pipes at the base of the retaining wall drainage system should outlet to an acceptable location via controlled drainage structures. Drainage should not be allowed to flow uncontrolled over descending slopes.

7.14.4 Moisture affecting below grade walls is one of the most common post-construction complaints. Poorly applied or omitted waterproofing can lead to efflorescence or standing water. Particular care should be taken in the design and installation of waterproofing to avoid moisture problems, or actual water seepage into the structure through any normal shrinkage cracks which may develop in the concrete walls, floor slab, foundations and/or construction joints. The design and inspection of the waterproofing is not the responsibility of the geotechnical engineer. A waterproofing consultant should be retained in order to recommend a product or method which would provide protection to subterranean walls, floor slabs and foundations.

7.15 Elevator Pit Design

7.15.1 The elevator pit slab and retaining wall should be designed by the project structural engineer. Elevator pit walls may be designed in accordance with the recommendations in the *Mat Foundation Design* and *Retaining Wall Design* sections of this report (see Sections 7.6 and 7.13).

7.15.2 Additional active pressure should be added for a surcharge condition due to sloping ground, vehicular traffic or adjacent foundations and should be designed for each condition as the project progresses.

7.15.3 If retaining wall drainage is to be provided, the drainage system should be designed in accordance with the *Retaining Wall Drainage* section of this report (see Section 7.14).

7.15.4 Subdrainage pipes at the base of the retaining wall drainage system should outlet to a location acceptable to the building official.

7.15.5 It is suggested that the exterior walls and slab be waterproofed to prevent excessive moisture inside of the elevator pit. Waterproofing design and installation is not the responsibility of the geotechnical engineer.

7.16 Elevator Piston

7.16.1 If a plunger-type elevator piston is installed for this project, a deep drilled excavation will be required. It is important to verify that the drilled excavation is not situated immediately adjacent to a foundation or shoring pile, or the drilled excavation could compromise the existing foundation support or pile support, especially if the drilling is performed subsequent to the foundation or pile construction.

7.16.2 Casing will be required since caving is expected in the drilled excavation, and the contractor should be prepared to use casing and should have it readily available at the commencement of drilling activities. Continuous observation of the drilling and installation of the elevator piston by the Geotechnical Engineer (a representative of Geocon West, Inc.) is required.

7.16.3 The annular space between the piston casing and drilled excavation wall should be filled with a minimum of 1½-sack slurry pumped from the bottom up. As an alternative, pea gravel may be utilized. The use of soil to backfill the annular space is not acceptable.

7.17 Temporary Excavations

7.17.1 Excavations up to 9 feet in height may be required during grading activities. The excavations are expected to expose artificial fill and alluvium, which are suitable for vertical excavations up to 5 feet in height where loose soils or caving sands are not present, and where not surcharged by adjacent traffic or structures.

7.17.2 Vertical excavations, greater than 5 feet or where surcharged by existing structures, will require sloping or shoring measures in order to provide a stable excavation. Where sufficient space is available, temporary unsurcharged embankments could be sloped back at a uniform 1:1 (H:V) slope gradient or flatter up to maximum height of 10 feet. A uniform slope does not have a vertical portion. Where space is limited, special excavation measures will be required.

7.17.3 If excavations in close proximity to an adjacent property line and/or structure are required, special excavation measures may be necessary in order to maintain lateral support of offsite improvements. If special excavation measures are required, the recommendations will be provided under separate cover.

7.17.4 Where temporary construction slopes are utilized, the top of the slope should be barricaded to prevent vehicles and storage loads at the top of the slope within a horizontal distance equal to the height of the slope. If the temporary construction slopes are to be maintained during the rainy season, berms are suggested along the tops of the slopes where necessary to prevent runoff water from entering the excavation and eroding the slope faces. Geocon personnel should inspect the soils exposed in the cut slopes during excavation so that modifications of the slopes can be made if variations in the soil conditions occur. All excavations should be stabilized within 30 days of initial excavation.

7.18 Stormwater Infiltration

7.18.1 During the December 1, 2022 site exploration, boring B2 was utilized to perform percolation testing. The boring was advanced to a depth of approximately 55 feet below the ground surface and then backfilled to the depth listed in the table below. Slotted casing was placed in the boring, and the annular space between the casing and excavation was filled with gravel. The boring was then filled with water to pre-saturate the soils. The casing was refilled with water, and percolation test readings were performed after repeated flooding of the cased excavation. Based on the test results, the measured infiltration rate and design infiltration rate, for the earth materials encountered, are provided in the following table. These values have been calculated in accordance with the Small Diameter Boring Infiltration Test Procedure in the County of Los Angeles Department of Public Works GMED *Guidelines for Geotechnical Investigation and Reporting, Low Impact Development Stormwater Infiltration* (June 2021). Percolation test field data and calculation of the measured infiltration rate and design infiltration rate are provided on Figure 19.

Boring	Soil Type	Infiltration Depth (ft)	Measured Infiltration Rate (in / hour)	Design Infiltration Rate (in / hour)
B2	SP	20– 30	10.62	3.54

7.18.2 Based on the test method utilized (Small Diameter Boring), the reduction factor RF_t may be taken as 1.0 in the infiltration system design. Based on the number of tests performed and consistency of the soils throughout the site, it is suggested that the reduction factor RF_v be taken as 1.0. In addition, provided proper maintenance is performed to minimize long-term siltation and plugging, the reduction factor RF_s may be taken as 1.0. Additional reduction factors may be required and should be applied by the engineer in responsible charge of the design of the stormwater infiltration system and based on applicable guidelines.

7.18.3 The results of the percolation testing indicate that the soils at depths in the above table are conducive to infiltration. It is our opinion that the soil zone encountered at the depth and location as listed in the table above are suitable for infiltration of stormwater.

7.18.4 It is our further opinion that infiltration of stormwater and will not induce excessive hydro-consolidation (see Figures B12 through B15), will not create a perched groundwater condition, will not affect soil structure interaction of existing or proposed foundations due to expansive soils, will not saturate soils supported by existing or proposed retaining walls, and will not increase the potential for liquefaction. Resulting settlements are anticipated to be less than ¼ inch, if any.

7.18.5 The infiltration system must be located such that the closest distance between an adjacent foundation is at least 15 feet in all directions from the zone of saturation. The zone of saturation may be assumed to project downward from the discharge of the infiltration facility at a gradient of 1:1. Additional property line or foundation setbacks may be required by the governing jurisdiction and should be incorporated into the stormwater infiltration system design as necessary.

7.18.6 Where the 15-foot horizontal setback cannot be maintained between the infiltration system and an adjacent footing, and the infiltration system penetrates below the foundation influence line, the proposed stormwater infiltration system must be designed to resist the surcharge from the adjacent foundation. The foundation surcharge line may be assumed to project down away from the bottom of the foundation at a 1:1 gradient. The stormwater infiltration system must still be sufficiently deep to maintain the 15-foot vertical offset between the bottom of the footing and the zone of saturation.

7.18.7 Subsequent to the placement of the infiltration system, it is acceptable to backfill the resulting void space between the excavation sidewalls and the infiltration system with minimum two-sack slurry provided the slurry is not placed in the infiltration zone. It is recommended that pea gravel be utilized adjacent to the infiltration zone so communication of water to the soil is not hindered.

7.18.8 Due to the preliminary nature of the project at this time, the type of stormwater infiltration system and location of the stormwater infiltration systems has not yet been determined. The design drawings should be reviewed and approved by the Geotechnical Engineer. The installation of the stormwater infiltration system should be observed and approved by the Geotechnical Engineer (a representative of Geocon).

7.19 Site Drainage and Moisture Protection

7.19.1 Proper surface drainage is critical to the future performance of the project. Uncontrolled infiltration of irrigation excess and storm runoff into the foundation supporting soils can adversely affect the performance of the planned improvements. Saturation of a soil can cause it to lose internal shear strength and increase its compressibility, resulting in a change in the original designed engineering properties. Proper drainage in building areas should be maintained at all times.

7.19.2 All site drainage should be collected and controlled in non-erosive drainage devices. Drainage should not be allowed to pond anywhere on the site, and especially not against any foundation or retaining wall. The site should be graded and maintained such that surface drainage is directed away from structures in accordance with 2022 CBC 1804.4 or other applicable standards. In addition, drainage should not be allowed to flow uncontrolled over any descending slope. Discharge from downspouts, roof drains and scuppers are not recommended onto unprotected soils within five feet of the building perimeter. Planters which are located adjacent to foundations should be sealed to prevent moisture intrusion into the soils providing foundation support. Landscape irrigation is not recommended within five feet of the building perimeter footings except when enclosed in protected planters.

7.19.3 Positive site drainage should be provided away from structures, pavement, and the tops of slopes to swales or other controlled drainage structures. The building pad and pavement areas should be fine graded such that water is not allowed to pond.

7.19.4 Landscaping planters immediately adjacent to paved areas are not recommended due to the potential for surface or irrigation water to infiltrate the pavement's subgrade and base course. Either a subdrain, which collects excess irrigation water and transmits it to drainage structures, or an impervious above-grade planter boxes should be used. In addition, where landscaping is planned adjacent to the pavement, it is recommended that consideration be given to providing a cutoff wall along the edge of the pavement that extends at least 12 inches below the base material.

7.20 Plan Review

7.20.1 Grading, foundation, and shoring plans should be reviewed by the Geotechnical Engineer prior to finalization to verify that the plans have been prepared in substantial conformance with the recommendations of this report and to provide additional analyses or recommendations, if necessary.

LIMITATIONS AND UNIFORMITY OF CONDITIONS

1. The recommendations of this report pertain only to the site investigated and are based upon the assumption that the soil conditions do not deviate from those disclosed in the investigation. If any variations or undesirable conditions are encountered during construction, or if the proposed construction will differ from that anticipated herein, Geocon West, Inc. should be notified so that supplemental recommendations can be given. The evaluation or identification of the potential presence of hazardous or corrosive materials was not part of the scope of services provided by Geocon West, Inc.

2. This report is issued with the understanding that it is the responsibility of the owner, or of his 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 plans, and the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations in the field.

3. The findings of this report are valid as of the date of this report. However, changes in the conditions of a property can occur with the passage of time, whether they are due to natural processes or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of three years.

4. The firm that performed the geotechnical investigation for the project should be retained to provide testing and observation services during construction to provide continuity of geotechnical interpretation and to check that the recommendations presented for geotechnical aspects of site development are incorporated during site grading, construction of improvements, and excavation of foundations. If another geotechnical firm is selected to perform the testing and observation services during construction operations, that firm should prepare a letter indicating their intent to assume the responsibilities of project geotechnical engineer of record. A copy of the letter should be provided to the regulatory agency for their records. In addition, that firm should provide revised recommendations concerning the geotechnical aspects of the proposed development, or a written acknowledgement of their concurrence with the recommendations presented in our report. They should also perform additional analyses deemed necessary to assume the role of Geotechnical Engineer of Record.

LIST OF REFERENCES

Burbank, City of, 2013, *Burbank 2035 General Plan.*

California Division of Mines and Geology, 1999; *State of California Seismic Hazard Zones, Burbank Quadrangle,* Official Map, Released: March 25, 1999.

California Division of Mines and Geology, 1998, *Seismic Hazard Evaluation of the Burbank 7.5-Minute Quadrangle, Los Angeles County, California,* Open File Report 98-07.

California Division of Mines and Geology, 1979, *State of California Special Studies Zones, Burbank Quadrangle, Official Map*, Effective: January 1, 1979.

California Geologic Energy Management Division, 2022, Geologic Energy Management Division Resources Well Finder, http://maps.conservation.ca.gov.doggr/index.html#close.

California Geological Survey, 2022a, CGS Information Warehouse, Regulatory Map Portal, http://maps.conservation.ca.gov/cgs/informationwarehouse/index.html?map=regulatorymaps.

California Geological Survey, 2022b, Earthquake Zones of Required Investigation, https://maps.conservation.ca.gov/cgs/EQZApp/app/.

California Geological Survey, 2018, *Earthquake Fault Zones, A Guide for Government Agencies, Property Owners/Developers, and Geoscience Practitioners for Assessing Fault Rupture Hazards in California,* Special Publication 42, Revised 2018.

California Geological Survey, 2012, *Geologic Compilation of Quaternary Surficial Deposits in Southern California, Los Angeles 30' X 60' Quadrangle, A Project for the Department of Water Resources by the California Geological Survey*, Compiled from existing sources by Trinda L. Bedrossian, CEG and Peter D. Roffers, CGS Special Report 217, Plate 9, Scale 1:100,000.

Dibblee, T. W., Jr., 1991, *Geologic Map of the Hollywood and Burbank (South ½) Quadrangles, Los Angeles County, California,* Dibblee Foundation Map # DF-30.

FEMA, 2022, Online Flood Hazard Maps, http://www.esri.com/hazards/index.html.

Jennings, C. W. and Bryant, W. A., 2010, *Fault Activity Map of California,* California Geological Survey Geologic Data Map No. 6.

Hitchcock, C. S. and Wells, C. J., 2000, *Quaternary Geology of the San Fernando Valley, Los Angeles, California*, California Division of Mines and Geology Map Sheet 50.

Leighton and Associates, Inc., 1990, *Technical Appendix to the Safety Element of the Los Angeles County General Plan, Hazard Reduction in Los Angeles County*.

Los Angeles County, Department of Public Works (LACDPW), 2022a, Ground Water Wells Website, http://dpw.lacounty.gov/general/wells.

Los Angeles County Department of Public Works (LACDPW), 2022b, Flood Zone Determination Website, http://pw.lacounty.gov/floodzone.

LIST OF REFERENCES (Continued)

Toppozada, T., Branum, D., Petersen, M, Hallstrom, C., and Reichle, M., 2000, *Epicenters and Areas Damaged by M> 5 California Earthquakes, 1800 – 1999,* California Geological Survey, Map Sheet 49.

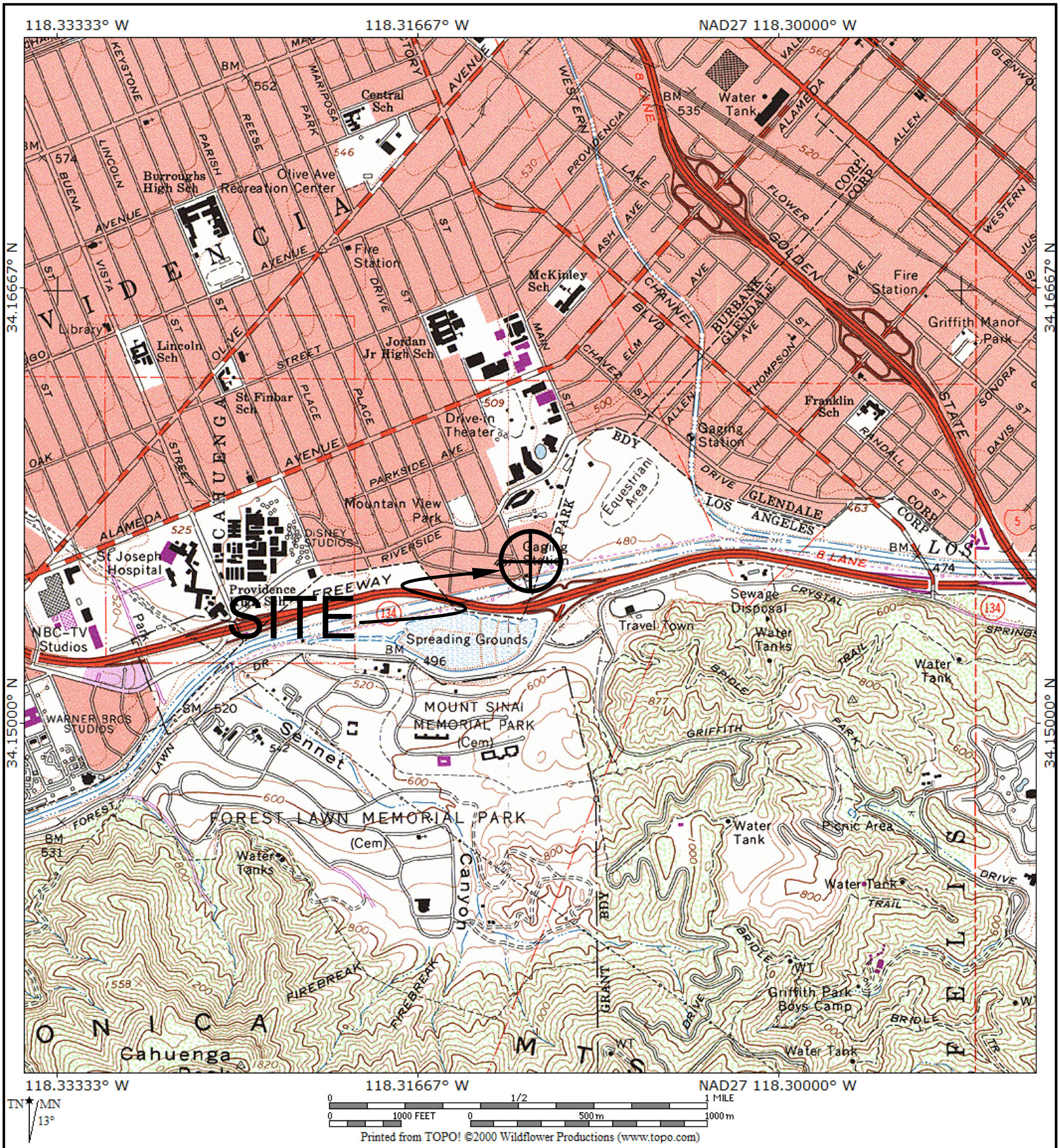
U.S. Geological Survey, 2022, Areas of Land Subsidence in California Website, https://ca.water.usgs.gov/land_subsidence/california-subsidence-areas.html

U.S. Geological Survey and California Geological Survey, 2006, *Quaternary Fault and Fold Database for the United States,* USGS web site: http//earthquake.usgs.gov/hazards/qfaults/.

U.S. Geological Survey, 1972, *Burbank 7.5-Minute Topographic Map.*

Upper Los Angeles River Area Watermaster, 2017, *Annual Report, Watermaster Service in the Upper Los Angeles River Area (ULARA), Los Angeles County, California, 2015-16 Water Year, October 1, 2015 – September 30, 2016*, dated December 2017.

Ziony, J. I., and Jones, L. M., 1989, *Map Showing Late Quaternary Faults and 1978–1984 Seismicity of the Los Angeles Region, California*, U.S. Geological Survey Miscellaneous Field Studies Map MF-1964.



REFERENCE: U.S.G.S. TOPOGRAPHIC MAPS, 7.5 MINUTE SERIES, BURBANK, CA QUADRANGLE

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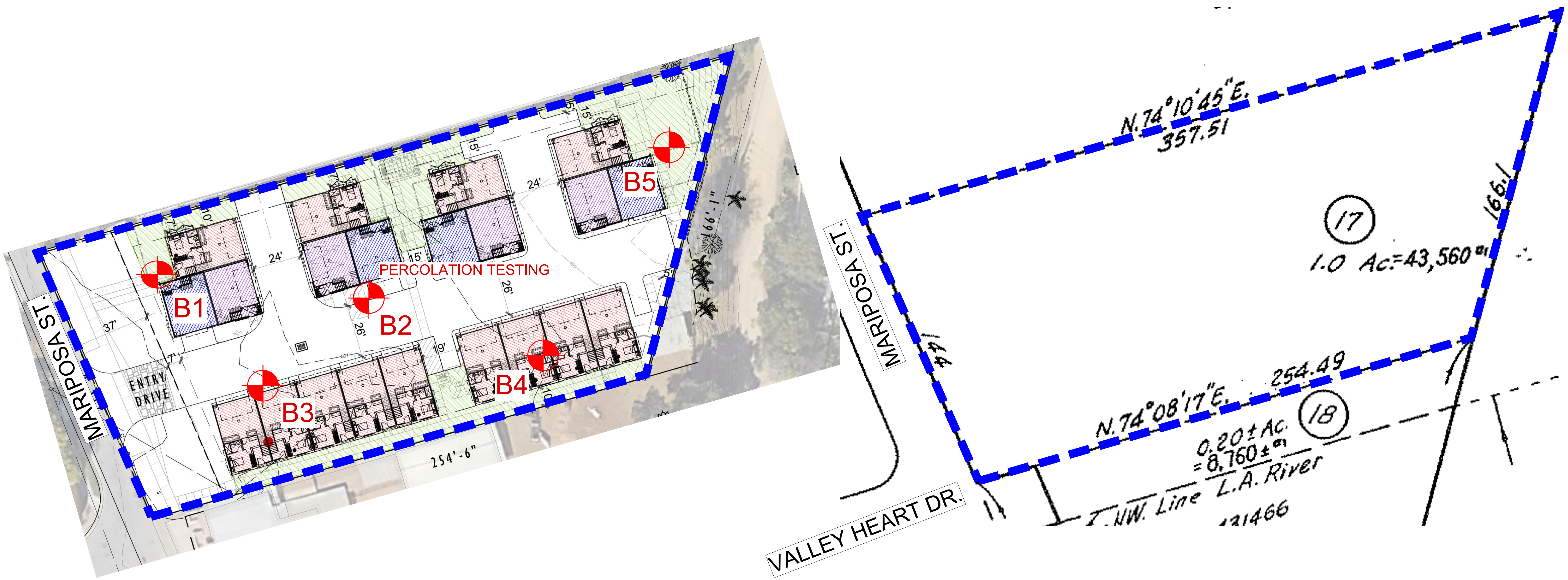
VICINITY MAP

910 SOUTH MARIPOSA STREET BURBANK, CALIFORNIA

DRAFTED BY: RA	CHECKED BY: SFK	JAN. 2023	PROJECT NO. W1696-06-01	FIG. 1



Legend

- B5 Boring Locations
- Limit of Proposed Improvements

0 50' 100'

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DRAFTED BY: JJK | CHECKED BY: HHD

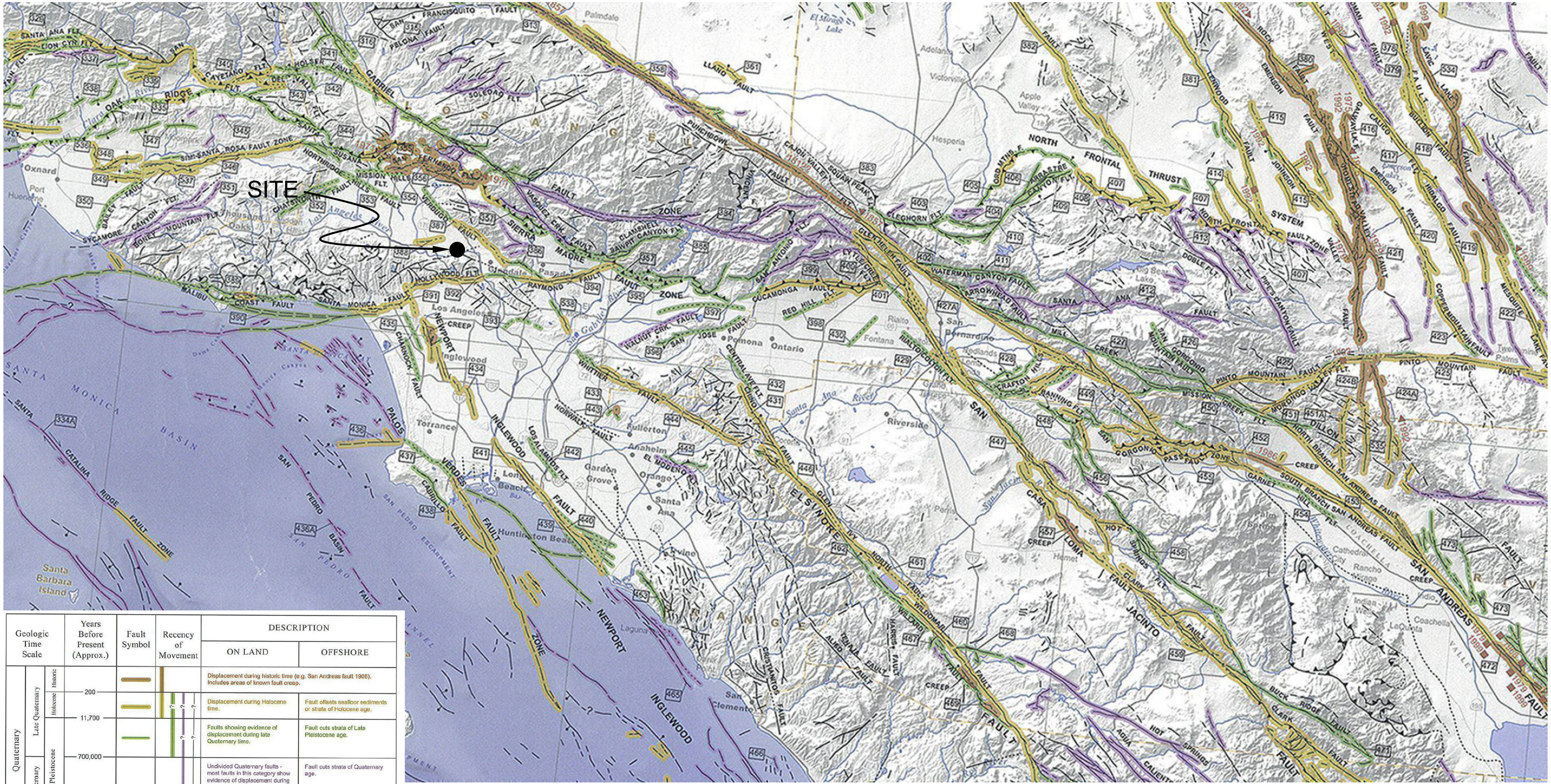
SITE PLAN

910 SOUTH MARIPOSA STREET

BURBANK, CALIFORNIA

JAN. 2023 | PROJECT NO: W1696-06-01 | FIG. 2

Reference: Jennings, C.W. and Bryant, W. A., 2010, Fault Activity Map of California, California Geological Survey Geologic Data Map No. 6.



Geologic Time Scale			Years Before Present (Approx.)	Fault Symbol	Recency of Movement	DESCRIPTION: ON LAND	DESCRIPTION: OFFSHORE
Quaternary	Late Quaternary	Historic	200			Displacement during historic time (e.g. San Andreas fault 1906). Includes areas of known fault creep.	
Quaternary	Late Quaternary	Holocene	11,700			Displacement during Holocene time.	Fault offsets seafloor sediments or strata of Holocene age.
Quaternary	Late Quaternary	Pleistocene	700,000			Faults showing evidence of displacement during late Quaternary time.	Fault cuts strata of Late Pleistocene age.
Quaternary	Early Quaternary	Pleistocene	1,600,000*			Undivided Quaternary faults - most faults in this category show evidence of displacement during the last 1,600,000 years; possible exceptions are faults which displace rocks of undifferentiated Plio-Pleistocene age.	Fault cuts strata of Quaternary age.
Pre-Quaternary			4.5 billion (Age of Earth)			Faults without recognized Quaternary displacement or showing evidence of no displacement during Quaternary time. Not necessarily inactive.	Fault cuts strata of Pliocene or older age.

* Quaternary now recognized as extending to 2.6 Ma (Walker and Geissman, 2009). Quaternary faults in this map were established using the previous 1.6 Ma criterion.

0 12 24 Miles

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DRAFTED BY: RA | CHECKED BY: SFK

REGIONAL FAULT MAP

910 SOUTH MARIPOSA STREET
BURBANK, CALIFORNIA

JAN. 2023 | PROJECT NO. W1696-06-01 | FIG. 3

Reference: Toppozada, T., Branum, D., Petersen, M., Hallstrom, C., Cramer, C., and Reichle, M., 2000, Epicenters and Areas Damaged by M≥5 California Earthquakes, 1800 - 1999, California Geological Survey, Map Sheet 49.

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REGIONAL SEISMICITY MAP

910 SOUTH MARIPOSA STREET

BURBANK, CALIFORNIA

DRAFTED BY: RA	CHECKED BY: SFK

JAN. 2023	PROJECT NO. W1696-06-01	FIG.4

GEOCON

EMPIRICAL ESTIMATION OF LIQUEFACTION POTENTIAL
DESIGN EARTHQUAKE

NCEER (1996) METHOD W 2001 UPDATES

EARTHQUAKE INFORMATION:

Earthquake Magnitude:	6.81
Peak Horiz. Acceleration PGA_M (g):	0.983
2/3 PGA_M (g):	0.656
Magnitude Scaling Factor:	1.280
Historic High Groundwater:	20.0
Groundwater Depth During Exploration:	100.0

ENERGY & ROD CORRECTIONS:

Energy Correction (CE) for N60:	1.25
Rod Len.Corr.(CR) (0-no or 1-yes):	1
Bore Dia. Corr. (CB):	1.00
Sampler Corr. (CS):	1.20
Use Ksigma (0-no or 1-yes):	1

LIQUEFACTION CALCULATIONS:

Unit Wt. Water (pcf):	62.4

Depth to Base (ft)	Total Unit Wt. (pcf)	Water (0 or 1)	FIELD SPT (N)	Depth of SPT (ft)	Liq.Sus. (0 or 1)	-200 (%)	Est. Dr (%)	CN Factor	Corrected (N1)60	Eff. Unit Wt. (psf)	Resist. CRR 7.5	rd Factor	Induced CSR	Liquefac. Safe.Fact.
1.0	93.4	0	4.0	5.0	1	63	45	1.700	14.2	93.4	0.152	1.000	0.426	--
2.0	93.4	0	4.0	5.0	1	63	45	1.700	14.2	93.4	0.152	0.998	0.426	--
3.0	93.4	0	4.0	5.0	1	63	45	1.700	14.2	93.4	0.152	0.996	0.425	--
4.0	100.1	0	4.0	5.0	1	63	45	1.700	14.2	100.1	0.152	0.994	0.424	--
5.0	100.1	0	4.0	5.0	1	63	45	1.700	14.2	100.1	0.152	0.991	0.423	--
6.0	100.1	0	4.0	5.0	1	63	45	1.700	14.2	100.1	0.152	0.989	0.422	--
7.0	100.1	0	4.0	5.0	1	63	45	1.700	14.2	100.1	0.152	0.987	0.421	--
8.0	100.1	0	4.0	5.0	1	63	45	1.690	14.1	100.1	0.151	0.985	0.420	--
9.0	100.1	0	9.0	10.0	1	19	61	1.585	20.7	100.1	0.224	0.982	0.419	--
10.0	100.1	0	9.0	10.0	1	19	61	1.498	19.7	100.1	0.212	0.980	0.418	--
11.0	100.1	0	9.0	10.0	1	19	61	1.423	18.9	100.1	0.202	0.978	0.417	--
12.0	100.1	0	9.0	10.0	1	19	61	1.359	18.2	100.1	0.194	0.976	0.416	--
13.0	99.6	0	15.4	12.5	1	55	76	1.302	32.1	99.6	Infin.	0.974	0.415	--
14.0	99.6	0	15.4	12.5	1	55	76	1.253	31.0	99.6	Infin.	0.972	0.414	--
15.0	99.3	0	12.0	15.0	1	22	65	1.208	23.1	99.3	0.259	0.970	0.413	--
16.0	99.3	0	12.0	15.0	1	22	65	1.168	22.5	99.3	0.249	0.967	0.412	--
17.0	99.3	0	12.0	15.0	1	22	65	1.132	21.9	99.3	0.241	0.965	0.411	--
18.5	99.3	0	12.0	15.0	1	22	65	1.091	21.2	99.3	0.232	0.962	0.410	--
19.0	99.3	0	10.0	20.0	1	9	56	1.076	15.3	99.3	0.163	0.960	0.409	--
20.0	99.3	1	10.0	20.0	1	9	56	1.041	14.8	36.9	0.158	0.958	0.415	0.49
21.0	99.3	1	10.0	20.0	1	9	56	1.015	14.4	36.9	0.154	0.956	0.427	0.46
22.0	99.3	1	10.0	20.0	1	9	56	0.991	14.1	36.9	0.151	0.953	0.438	0.44
23.0	115.2	1	32.5	22.5	1	5	99	0.967	43.7	52.8	Infin.	0.950	0.449	Non-Liq.
24.0	115.2	1	32.5	22.5	1	5	99	0.943	42.6	52.8	Infin.	0.947	0.458	Non-Liq.
25.0	115.2	1	25.0	25.0	1	5	86	0.921	33.0	52.8	Infin.	0.944	0.467	Non-Liq.
26.0	115.2	1	25.0	25.0	1	5	86	0.900	32.2	52.8	Infin.	0.940	0.475	Non-Liq.
27.0	121.2	1	55.0	27.5	1	5	125	0.880	71.1	58.8	Infin.	0.936	0.483	Non-Liq.
28.0	121.2	1	55.0	27.5	1	5	125	0.861	69.5	58.8	Infin.	0.932	0.489	Non-Liq.
29.0	121.2	1	55.0	27.5	1	5	125	0.843	68.1	58.8	Infin.	0.928	0.495	Non-Liq.
30.0	121.2	1	55.0	27.5	1	5	125	0.826	66.7	58.8	Infin.	0.923	0.501	Non-Liq.
31.0	118.6	1	100.0	30.0	1	5	166	0.810	121.6	56.2	Infin.	0.918	0.505	Non-Liq.
32.0	118.6	1	100.0	30.0	1	5	166	0.796	119.3	56.2	Infin.	0.912	0.509	Non-Liq.
33.0	118.6	1	100.0	30.0	1	5	166	0.782	117.3	56.2	Infin.	0.907	0.513	Non-Liq.
34.0	118.6	1	100.0	30.0	1	5	166	0.769	115.3	56.2	Infin.	0.900	0.516	Non-Liq.
35.0	118.6	1	100.0	30.0	1	5	166	0.756	113.4	56.2	Infin.	0.894	0.518	Non-Liq.
36.0	118.6	1	100.0	35.0	1	5	161	0.744	111.6	56.2	Infin.	0.887	0.520	Non-Liq.
37.0	118.6	1	100.0	35.0	1	5	161	0.733	109.9	56.2	Infin.	0.880	0.521	Non-Liq.
38.0	118.6	1	100.0	35.0	1	5	161	0.722	108.2	56.2	Infin.	0.872	0.522	Non-Liq.
39.0	104.0	1	100.0	35.0	1	5	161	0.712	106.8	41.6	Infin.	0.864	0.522	Non-Liq.
40.0	104.0	1	100.0	35.0	1	5	161	0.703	105.4	41.6	Infin.	0.855	0.523	Non-Liq.
41.0	104.0	1	100.0	40.0	1	5	156	0.694	104.2	41.6	Infin.	0.846	0.523	Non-Liq.
42.0	104.0	1	100.0	40.0	1	5	156	0.686	102.9	41.6	Infin.	0.837	0.522	Non-Liq.
43.0	104.0	1	100.0	40.0	1	5	156	0.678	101.8	41.6	Infin.	0.828	0.521	Non-Liq.
44.0	104.0	1	100.0	40.0	1	5	156	0.671	100.6	41.6	Infin.	0.818	0.520	Non-Liq.
45.0	104.0	1	100.0	40.0	1	5	156	0.663	99.5	41.6	Infin.	0.808	0.518	Non-Liq.
46.0	104.0	1	100.0	45.0	1	5	153	0.656	98.4	41.6	Infin.	0.798	0.516	Non-Liq.
47.0	104.0	1	100.0	45.0	1	5	153	0.649	97.4	41.6	Infin.	0.788	0.514	Non-Liq.
48.0	104.0	1	100.0	45.0	1	5	153	0.643	96.4	41.6	Infin.	0.778	0.511	Non-Liq.
49.0	104.0	1	100.0	45.0	1	5	153	0.636	95.4	41.6	Infin.	0.768	0.509	Non-Liq.
50.0	104.0	1	100.0	45.0	1	5	153	0.630	94.5	41.6	Infin.	0.757	0.506	Non-Liq.

GEOCON

Project Name : 910 S Mariposa
Project No : W1696-06-01
Boring : B1

LIQUEFACTION SETTLEMENT ANALYSIS
DESIGN EARTHQUAKE

NCEER (1996) METHOD W 2001 UPDATES
EARTHQUAKE INFORMATION:

Earthquake Magnitude:	6.81
PGA_M (g):	0.983
2/3 PGA_M (g):	0.66
Magnitude Scaling Factor:	1.280
Historic High Groundwater:	20.0
Groundwater @ Exploration:	100.0

DEPTH TO BASE	BLOW COUNT N	WET DENSITY (PCF)	TOTAL STRESS O (TSF)	EFFECT STRESS O' (TSF)	REL. DEN. Dr (%)	ADJUST BLOWS (N1)60	Tav/σ'$_o$	LIQUEFACTION SAFETY FACTOR	VOL. STRAIN [e$_{15}$} (%)	EQ. SETTLE. Pe (in.)
1.0	4	93.4	0.023	0.023	45	14	0.426	--	0.00	0.00
2.0	4	93.4	0.070	0.070	45	14	0.426	--	0.00	0.00
3.0	4	93.4	0.117	0.117	45	14	0.426	--	0.00	0.00
4.0	4	100.1	0.165	0.165	45	14	0.426	--	0.00	0.00
5.0	4	100.1	0.215	0.215	45	14	0.426	--	0.00	0.00
6.0	4	100.1	0.265	0.265	45	14	0.426	--	0.00	0.00
7.0	4	100.1	0.315	0.315	45	14	0.426	--	0.00	0.00
8.0	4	100.1	0.365	0.365	45	14	0.426	--	0.00	0.00
9.0	9	100.1	0.415	0.415	61	21	0.426	--	0.00	0.00
10.0	9	100.1	0.465	0.465	61	20	0.426	--	0.00	0.00
11.0	9	100.1	0.515	0.515	61	19	0.426	--	0.00	0.00
12.0	9	100.1	0.566	0.566	61	18	0.426	--	0.00	0.00
13.0	15	99.6	0.615	0.615	76	32	0.426	--	0.00	0.00
14.0	15	99.6	0.665	0.665	76	31	0.426	--	0.00	0.00
15.0	12	99.3	0.715	0.715	65	23	0.426	--	0.00	0.00
16.0	12	99.3	0.765	0.765	65	22	0.426	--	0.00	0.00
17.0	12	99.3	0.814	0.814	65	22	0.426	--	0.00	0.00
18.5	12	99.3	0.876	0.876	65	21	0.426	--	0.00	0.00
19.0	10	99.3	0.901	0.901	56	15	0.426	--	0.00	0.00
20.0	10	99.3	0.963	0.948	56	15	0.433	0.49	1.80	0.22
21.0	10	99.3	1.013	0.966	56	14	0.447	0.46	1.80	0.22
22.0	10	99.3	1.063	0.985	56	14	0.460	0.44	1.80	0.22
23.0	32	115.2	1.116	1.007	99	44	0.472	Non-Liq.	0.00	0.00
24.0	32	115.2	1.174	1.033	99	43	0.484	Non-Liq.	0.00	0.00
25.0	25	115.2	1.231	1.060	86	33	0.495	Non-Liq.	0.00	0.00
26.0	25	115.2	1.289	1.086	86	32	0.506	Non-Liq.	0.00	0.00
27.0	55	121.2	1.348	1.114	125	71	0.516	Non-Liq.	0.00	0.00
28.0	55	121.2	1.409	1.143	125	70	0.525	Non-Liq.	0.00	0.00
29.0	55	121.2	1.469	1.173	125	68	0.534	Non-Liq.	0.00	0.00
30.0	55	121.2	1.530	1.202	125	67	0.542	Non-Liq.	0.00	0.00
31.0	100	118.6	1.590	1.231	166	122	0.550	Non-Liq.	0.00	0.00
32.0	100	118.6	1.649	1.259	166	119	0.558	Non-Liq.	0.00	0.00
33.0	100	118.6	1.708	1.287	166	117	0.566	Non-Liq.	0.00	0.00
34.0	100	118.6	1.768	1.315	166	115	0.573	Non-Liq.	0.00	0.00
35.0	100	118.6	1.827	1.343	166	113	0.580	Non-Liq.	0.00	0.00
36.0	100	118.6	1.886	1.372	161	112	0.586	Non-Liq.	0.00	0.00
37.0	100	118.6	1.946	1.400	161	110	0.592	Non-Liq.	0.00	0.00
38.0	100	118.6	2.005	1.428	161	108	0.598	Non-Liq.	0.00	0.00
39.0	100	104.0	2.061	1.452	161	107	0.605	Non-Liq.	0.00	0.00
40.0	100	104.0	2.113	1.473	161	105	0.611	Non-Liq.	0.00	0.00
41.0	100	104.0	2.165	1.494	156	104	0.618	Non-Liq.	0.00	0.00
42.0	100	104.0	2.217	1.515	156	103	0.624	Non-Liq.	0.00	0.00
43.0	100	104.0	2.269	1.535	156	102	0.630	Non-Liq.	0.00	0.00
44.0	100	104.0	2.321	1.556	156	101	0.636	Non-Liq.	0.00	0.00
45.0	100	104.0	2.373	1.577	156	100	0.641	Non-Liq.	0.00	0.00
46.0	100	104.0	2.425	1.598	153	98	0.647	Non-Liq.	0.00	0.00
47.0	100	104.0	2.477	1.619	153	97	0.652	Non-Liq.	0.00	0.00
48.0	100	104.0	2.529	1.639	153	96	0.657	Non-Liq.	0.00	0.00
49.0	100	104.0	2.581	1.660	153	95	0.662	Non-Liq.	0.00	0.00
50.0	100	104.0	2.633	1.681	153	94	0.667	Non-Liq.	0.00	0.00

TOTAL SETTLEMENT = 0.6 INCHES

Figure 6

Project Name : 910 S. Mariposa St
Project No : W1696-06-01
Boring : B2

EMPIRICAL ESTIMATION OF LIQUEFACTION POTENTIAL
DESIGN EARTHQUAKE

NCEER (1996) METHOD W 2001 UPDATES

EARTHQUAKE INFORMATION:

Earthquake Magnitude:	6.81
Peak Horiz. Acceleration PGA_M (g):	0.983
2/3 PGA_M (g):	0.656
Magnitude Scaling Factor:	1.280
Historic High Groundwater:	20.0
Groundwater Depth During Exploration:	100.0

ENERGY & ROD CORRECTIONS:

Energy Correction (CE) for N60:	1.25
Rod Len.Corr.(CR) (0-no or 1-yes):	1
Bore Dia. Corr. (CB):	1.00
Sampler Corr. (CS):	1.20
Use Ksigma (0-no or 1-yes):	1

LIQUEFACTION CALCULATIONS:

Unit Wt. Water (pcf): 62.4

Depth to Base (ft)	Total Unit Wt. (pcf)	Water (0 or 1)	FIELD SPT (N)	Depth of SPT (ft)	Liq.Sus. (0 or 1)	-200 (%)	Est. Dr (%)	CN Factor	Corrected (N1)60	Eff. Unit Wt. (psf)	Resist. CRR 7.5	rd Factor	Induced CSR	Liquefac. Safe.Fact.
1.0	85.2	0	4.0	5.0	1	61	45	1.700	14.2	85.2	0.152	1.000	0.426	--
2.0	85.2	0	4.0	5.0	1	61	45	1.700	14.2	85.2	0.152	0.998	0.426	--
3.0	85.2	0	4.0	5.0	1	61	45	1.700	14.2	85.2	0.152	0.996	0.425	--
4.0	85.2	0	4.0	5.0	1	61	45	1.700	14.2	85.2	0.152	0.994	0.424	--
5.0	85.2	0	4.0	5.0	1	61	45	1.700	14.2	85.2	0.152	0.991	0.423	--
6.0	85.2	0	4.0	5.0	1	61	45	1.700	14.2	85.2	0.152	0.989	0.422	--
7.5	85.2	0	4.0	5.0	1	61	45	1.700	14.2	85.2	0.152	0.986	0.420	--
8.0	85.2	0	4.0	5.0	1	61	45	1.700	14.2	85.2	0.152	0.984	0.419	--
9.0	85.2	0	4.0	5.0	1	61	45	1.698	14.2	85.2	0.152	0.982	0.419	--
10.0	79.4	0	7.0	10.0	1	6	55	1.609	12.8	79.4	0.138	0.980	0.418	--
11.0	79.4	0	7.0	10.0	1	6	55	1.535	12.2	79.4	0.133	0.978	0.417	--
12.0	96.4	0	9.0	12.0	1	73	60	1.464	22.8	96.4	0.254	0.976	0.416	--
13.0	96.4	0	9.0	12.0	1	73	60	1.397	22.0	96.4	0.242	0.974	0.415	--
14.0	96.4	0	9.0	12.0	1	73	60	1.338	21.3	96.4	0.232	0.972	0.414	--
15.0	96.4	0	9.0	12.0	1	73	60	1.286	20.6	96.4	0.223	0.970	0.413	--
16.0	96.4	0	2.0	17.5	1	65	26	1.239	8.8	96.4	0.103	0.967	0.412	--
17.0	96.4	0	2.0	17.5	1	65	26	1.198	8.7	96.4	0.102	0.965	0.411	--
18.0	96.4	0	2.0	17.5	1	30	26	1.160	8.1	96.4	0.097	0.963	0.410	--
19.0	107.0	0	12.1	20.0	1	30	63	1.124	25.8	107.0	0.308	0.961	0.409	--
20.0	107.0	1	12.1	20.0	1	30	63	1.089	25.1	44.6	0.294	0.958	0.416	0.91
21.0	107.0	1	12.1	20.0	1	30	63	1.057	24.5	44.6	0.283	0.956	0.429	0.84
22.0	114.1	1	24.0	22.5	1	5	87	1.027	34.3	51.7	Infin.	0.953	0.441	Non-Liq.
23.0	114.1	1	24.0	22.5	1	5	87	0.999	33.4	51.7	Infin.	0.950	0.452	Non-Liq.
24.0	114.1	1	24.0	22.5	1	5	87	0.973	32.5	51.7	Infin.	0.947	0.462	Non-Liq.
25.0	114.1	1	24.0	22.5	1	5	87	0.949	31.7	51.7	Infin.	0.944	0.472	Non-Liq.
26.0	114.1	1	55.0	25.0	1	5	129	0.926	73.0	51.7	Infin.	0.940	0.481	Non-Liq.
27.0	114.1	1	55.0	25.0	1	5	129	0.905	71.3	51.7	Infin.	0.936	0.489	Non-Liq.
28.0	114.1	1	49.0	27.5	1		120	0.885	63.7	51.7	Infin.	0.932	0.496	Non-Liq.
29.0	114.1	1	49.0	27.5	1		120	0.867	62.4	51.7	Infin.	0.928	0.503	Non-Liq.
30.0	114.1	1	49.0	27.5	1		120	0.850	61.2	51.7	Infin.	0.923	0.509	Non-Liq.
31.0	120.7	1	49.0	27.5	1		120	0.833	60.0	58.3	Infin.	0.918	0.514	Non-Liq.
32.0	120.7	1	49.0	27.5	1		120	0.817	58.8	58.3	Infin.	0.912	0.518	Non-Liq.
33.0	120.7	1	31.0	32.5	1		92	0.802	37.3	58.3	Infin.	0.907	0.522	Non-Liq.
34.0	120.7	1	31.0	32.5	1		92	0.787	36.6	58.3	Infin.	0.900	0.525	Non-Liq.
35.0	120.7	1	31.0	32.5	1		92	0.773	36.0	58.3	Infin.	0.894	0.527	Non-Liq.
36.0	120.7	1	31.0	32.5	1		92	0.760	35.4	58.3	Infin.	0.887	0.529	Non-Liq.
37.0	120.7	1	31.0	32.5	1		92	0.748	34.8	58.3	Infin.	0.880	0.530	Non-Liq.
38.0	105.2	1	41.0	37.5	1		103	0.737	45.3	42.8	Infin.	0.872	0.531	Non-Liq.
39.0	105.2	1	41.0	37.5	1		103	0.727	44.7	42.8	Infin.	0.864	0.532	Non-Liq.
40.0	105.2	1	41.0	37.5	1		103	0.717	44.1	42.8	Infin.	0.855	0.532	Non-Liq.
41.0	105.2	1	41.0	37.5	1		103	0.708	43.6	42.8	Infin.	0.846	0.532	Non-Liq.
42.0	105.2	1	41.0	37.5	1		103	0.700	43.0	42.8	Infin.	0.837	0.532	Non-Liq.
43.0	109.5	1	64.0	42.5	1		126	0.691	66.3	47.1	Infin.	0.828	0.531	Non-Liq.
44.0	109.5	1	64.0	42.5	1		126	0.682	65.5	47.1	Infin.	0.818	0.529	Non-Liq.
45.0	109.5	1	64.0	42.5	1		126	0.674	64.7	47.1	Infin.	0.808	0.527	Non-Liq.
46.0	109.5	1	64.0	42.5	1		126	0.666	64.0	47.1	Infin.	0.798	0.525	Non-Liq.
47.0	109.5	1	64.0	42.5	1		126	0.659	63.2	47.1	Infin.	0.788	0.522	Non-Liq.
48.0	132.6	1	100.0	47.5	1		153	0.651	97.6	70.2	Infin.	0.778	0.518	Non-Liq.
49.0	132.6	1	100.0	47.5	1		153	0.642	96.3	70.2	Infin.	0.768	0.514	Non-Liq.
50.0	132.6	1	100.0	47.5	1		153	0.634	95.1	70.2	Infin.	0.757	0.509	Non-Liq.

GEOCON

Project Name : 910 S. Mariposa St
Project No : W1696-06-01
Boring : B2

LIQUEFACTION SETTLEMENT ANALYSIS
DESIGN EARTHQUAKE

NCEER (1996) METHOD W 2001 UPDATES
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Groundwater @ Exploration:	100.0

DEPTH TO BASE	BLOW COUNT N	WET DENSITY (PCF)	TOTAL STRESS O (TSF)	EFFECT STRESS O' (TSF)	REL. DEN. Dr (%)	ADJUST BLOWS (N1)60	Tav/σ'o	LIQUEFACTION SAFETY FACTOR	VOL. STRAIN [e_{15}} (%)	EQ. SETTLE. Pe (in.)
1.0	4	85.2	0.021	0.021	45	14	0.426	--	0.00	0.00
2.0	4	85.2	0.064	0.064	45	14	0.426	--	0.00	0.00
3.0	4	85.2	0.107	0.107	45	14	0.426	--	0.00	0.00
4.0	4	85.2	0.149	0.149	45	14	0.426	--	0.00	0.00
5.0	4	85.2	0.192	0.192	45	14	0.426	--	0.00	0.00
6.0	4	85.2	0.234	0.234	45	14	0.426	--	0.00	0.00
7.5	4	85.2	0.288	0.288	45	14	0.426	--	0.00	0.00
8.0	4	85.2	0.309	0.309	45	14	0.426	--	0.00	0.00
9.0	4	85.2	0.362	0.362	45	14	0.426	--	0.00	0.00
10.0	7	79.4	0.403	0.403	55	13	0.426	--	0.00	0.00
11.0	7	79.4	0.443	0.443	55	12	0.426	--	0.00	0.00
12.0	9	96.4	0.487	0.487	60	23	0.426	--	0.00	0.00
13.0	9	96.4	0.535	0.535	60	22	0.426	--	0.00	0.00
14.0	9	96.4	0.583	0.583	60	21	0.426	--	0.00	0.00
15.0	9	96.4	0.632	0.632	60	21	0.426	--	0.00	0.00
16.0	2	96.4	0.680	0.680	26	9	0.426	--	0.00	0.00
17.0	2	96.4	0.728	0.728	26	9	0.426	--	0.00	0.00
18.0	2	96.4	0.776	0.776	26	8	0.426	--	0.00	0.00
19.0	12	107.0	0.827	0.827	63	26	0.426	--	0.00	0.00
20.0	12	107.0	0.880	0.865	63	25	0.434	0.91	1.00	0.12
21.0	12	107.0	0.934	0.887	63	25	0.449	0.84	1.30	0.16
22.0	24	114.1	0.989	0.911	87	34	0.463	Non-Liq.	0.00	0.00
23.0	24	114.1	1.046	0.937	87	33	0.476	Non-Liq.	0.00	0.00
24.0	24	114.1	1.103	0.963	87	32	0.488	Non-Liq.	0.00	0.00
25.0	24	114.1	1.160	0.989	87	32	0.500	Non-Liq.	0.00	0.00
26.0	55	114.1	1.217	1.015	129	73	0.511	Non-Liq.	0.00	0.00
27.0	55	114.1	1.274	1.040	129	71	0.522	Non-Liq.	0.00	0.00
28.0	49	114.1	1.332	1.066	120	64	0.532	Non-Liq.	0.00	0.00
29.0	49	114.1	1.389	1.092	120	62	0.542	Non-Liq.	0.00	0.00
30.0	49	114.1	1.446	1.118	120	61	0.551	Non-Liq.	0.00	0.00
31.0	49	120.7	1.504	1.146	120	60	0.560	Non-Liq.	0.00	0.00
32.0	49	120.7	1.565	1.175	120	59	0.568	Non-Liq.	0.00	0.00
33.0	31	120.7	1.625	1.204	92	37	0.575	Non-Liq.	0.00	0.00
34.0	31	120.7	1.685	1.233	92	37	0.583	Non-Liq.	0.00	0.00
35.0	31	120.7	1.746	1.262	92	36	0.589	Non-Liq.	0.00	0.00
36.0	31	120.7	1.806	1.291	92	35	0.596	Non-Liq.	0.00	0.00
37.0	31	120.7	1.866	1.320	92	35	0.602	Non-Liq.	0.00	0.00
38.0	41	105.2	1.923	1.346	103	45	0.609	Non-Liq.	0.00	0.00
39.0	41	105.2	1.976	1.367	103	45	0.616	Non-Liq.	0.00	0.00
40.0	41	105.2	2.028	1.389	103	44	0.622	Non-Liq.	0.00	0.00
41.0	41	105.2	2.081	1.410	103	44	0.629	Non-Liq.	0.00	0.00
42.0	41	105.2	2.133	1.431	103	43	0.635	Non-Liq.	0.00	0.00
43.0	64	109.5	2.187	1.454	126	66	0.641	Non-Liq.	0.00	0.00
44.0	64	109.5	2.242	1.477	126	66	0.647	Non-Liq.	0.00	0.00
45.0	64	109.5	2.296	1.501	126	65	0.652	Non-Liq.	0.00	0.00
46.0	64	109.5	2.351	1.524	126	64	0.657	Non-Liq.	0.00	0.00
47.0	64	109.5	2.406	1.548	126	63	0.662	Non-Liq.	0.00	0.00
48.0	100	132.6	2.467	1.577	153	98	0.666	Non-Liq.	0.00	0.00
49.0	100	132.6	2.533	1.612	153	96	0.669	Non-Liq.	0.00	0.00
50.0	100	132.6	2.599	1.648	153	95	0.672	Non-Liq.	0.00	0.00

TOTAL SETTLEMENT = 0.3 INCHES

Figure 8

GEOCON

Project Name : 910 S Mariposa
Project No : W1696-06-01
Boring : B1

EMPIRICAL ESTIMATION OF LIQUEFACTION POTENTIAL
MAXIMUM CONSIDERED EARTHQUAKE

NCEER (1996) METHOD W 2001 UPDATES

EARTHQUAKE INFORMATION:

Earthquake Magnitude:	6.94
Peak Horiz. Acceleration PGA_M (g):	0.983
Magnitude Scaling Factor:	1.219
Historic High Groundwater:	20.0
Groundwater Depth During Exploration:	100.0

ENERGY & ROD CORRECTIONS:

Energy Correction (CE) for N60:	1.25
Rod Len.Corr.(CR) (0-no or 1-yes):	1
Bore Dia. Corr. (CB):	1.00
Sampler Corr. (CS):	1.20
Use Ksigma (0-no or 1-yes):	1

LIQUEFACTION CALCULATIONS:

Unit Wt. Water (pcf):	62.4

Depth to Base (ft)	Total Unit Wt. (pcf)	Water (0 or 1)	Field SPT (N)	Depth of SPT (ft)	Liq.Sus. (0 or 1)	-200 (%)	Est. Dr (%)	CN Factor	Corrected (N1)60cs	Eff. Unit Wt. (psf)	Resist. CRR 7.5	rd Factor	Induced CSR	Liquefac. Safe.Fact.
1.0	93.4	0	4.0	5.0	1	63	45	1.700	14.2	93.4	0.152	1.000	0.639	--
2.0	93.4	0	4.0	5.0	1	63	45	1.700	14.2	93.4	0.152	0.998	0.638	--
3.0	93.4	0	4.0	5.0	1	63	45	1.700	14.2	93.4	0.152	0.996	0.636	--
4.0	100.1	0	4.0	5.0	1	63	45	1.700	14.2	100.1	0.152	0.994	0.635	--
5.0	100.1	0	4.0	5.0	1	63	45	1.700	14.2	100.1	0.152	0.991	0.633	--
6.0	100.1	0	4.0	5.0	1	63	45	1.700	14.2	100.1	0.152	0.989	0.632	--
7.0	100.1	0	4.0	5.0	1	63	45	1.700	14.2	100.1	0.152	0.987	0.631	--
8.0	100.1	0	4.0	5.0	1	63	45	1.690	14.1	100.1	0.151	0.985	0.629	--
9.0	100.1	0	9.0	10.0	1	19	61	1.585	20.7	100.1	0.224	0.982	0.628	--
10.0	100.1	0	9.0	10.0	1	19	61	1.498	19.7	100.1	0.212	0.980	0.626	--
11.0	100.1	0	9.0	10.0	1	19	61	1.423	18.9	100.1	0.202	0.978	0.625	--
12.0	100.1	0	9.0	10.0	1	19	61	1.359	18.2	100.1	0.194	0.976	0.624	--
13.0	99.6	0	15.4	12.5	1	55	76	1.302	32.1	99.6	Infin.	0.974	0.622	--
14.0	99.6	0	15.4	12.5	1	55	76	1.253	31.0	99.6	Infin.	0.972	0.621	--
15.0	99.3	0	12.0	15.0	1	22	65	1.208	23.1	99.3	0.259	0.970	0.620	--
16.0	99.3	0	12.0	15.0	1	22	65	1.168	22.5	99.3	0.249	0.967	0.618	--
17.0	99.3	0	12.0	15.0	1	22	65	1.132	21.9	99.3	0.241	0.965	0.617	--
18.5	99.3	0	12.0	15.0	1	22	65	1.091	21.2	99.3	0.232	0.962	0.615	--
19.0	99.3	0	10.0	20.0	1	9	56	1.076	15.3	99.3	0.163	0.960	0.613	--
20.0	99.3	1	10.0	20.0	1	9	56	1.041	14.8	36.9	0.158	0.958	0.622	0.31
21.0	99.3	1	10.0	20.0	1	9	56	1.015	14.4	36.9	0.154	0.956	0.640	0.29
22.0	99.3	1	10.0	20.0	1	9	56	0.991	14.1	36.9	0.151	0.953	0.657	0.28
23.0	115.2	1	32.5	22.5	1	5	99	0.967	43.7	52.8	Infin.	0.950	0.673	Non-Liq.
24.0	115.2	1	32.5	22.5	1	5	99	0.943	42.6	52.8	Infin.	0.947	0.687	Non-Liq.
25.0	115.2	1	25.0	25.0	1	5	86	0.921	33.0	52.8	Infin.	0.944	0.700	Non-Liq.
26.0	115.2	1	25.0	25.0	1	5	86	0.900	32.2	52.8	Infin.	0.940	0.713	Non-Liq.
27.0	121.2	1	55.0	27.5	1	5	125	0.880	71.1	58.8	Infin.	0.936	0.724	Non-Liq.
28.0	121.2	1	55.0	27.5	1	5	125	0.861	69.5	58.8	Infin.	0.932	0.734	Non-Liq.
29.0	121.2	1	55.0	27.5	1	5	125	0.843	68.1	58.8	Infin.	0.928	0.743	Non-Liq.
30.0	121.2	1	55.0	27.5	1	5	125	0.826	66.7	58.8	Infin.	0.923	0.750	Non-Liq.
31.0	118.6	1	100.0	30.0	1	5	166	0.810	121.6	56.2	Infin.	0.918	0.757	Non-Liq.
32.0	118.6	1	100.0	30.0	1	5	166	0.796	119.3	56.2	Infin.	0.912	0.764	Non-Liq.
33.0	118.6	1	100.0	30.0	1	5	166	0.782	117.3	56.2	Infin.	0.907	0.769	Non-Liq.
34.0	118.6	1	100.0	30.0	1	5	166	0.769	115.3	56.2	Infin.	0.900	0.773	Non-Liq.
35.0	118.6	1	100.0	30.0	1	5	166	0.756	113.4	56.2	Infin.	0.894	0.777	Non-Liq.
36.0	118.6	1	100.0	35.0	1	5	161	0.744	111.6	56.2	Infin.	0.887	0.779	Non-Liq.
37.0	118.6	1	100.0	35.0	1	5	161	0.733	109.9	56.2	Infin.	0.880	0.781	Non-Liq.
38.0	118.6	1	100.0	35.0	1	5	161	0.722	108.2	56.2	Infin.	0.872	0.782	Non-Liq.
39.0	104.0	1	100.0	35.0	1	5	161	0.712	106.8	41.6	Infin.	0.864	0.783	Non-Liq.
40.0	104.0	1	100.0	35.0	1	5	161	0.703	105.4	41.6	Infin.	0.855	0.784	Non-Liq.
41.0	104.0	1	100.0	40.0	1	5	156	0.694	104.2	41.6	Infin.	0.846	0.784	Non-Liq.
42.0	104.0	1	100.0	40.0	1	5	156	0.686	102.9	41.6	Infin.	0.837	0.783	Non-Liq.
43.0	104.0	1	100.0	40.0	1	5	156	0.678	101.8	41.6	Infin.	0.828	0.782	Non-Liq.
44.0	104.0	1	100.0	40.0	1	5	156	0.671	100.6	41.6	Infin.	0.818	0.780	Non-Liq.
45.0	104.0	1	100.0	40.0	1	5	156	0.663	99.5	41.6	Infin.	0.808	0.777	Non-Liq.
46.0	104.0	1	100.0	45.0	1	5	153	0.656	98.4	41.6	Infin.	0.798	0.774	Non-Liq.
47.0	104.0	1	100.0	45.0	1	5	153	0.649	97.4	41.6	Infin.	0.788	0.771	Non-Liq.
48.0	104.0	1	100.0	45.0	1	5	153	0.643	96.4	41.6	Infin.	0.778	0.767	Non-Liq.
49.0	104.0	1	100.0	45.0	1	5	153	0.636	95.4	41.6	Infin.	0.768	0.762	Non-Liq.
50.0	104.0	1	100.0	45.0	1	5	153	0.630	94.5	41.6	Infin.	0.757	0.758	Non-Liq.
51.0	104.0	1	100.0	45.0	1	5	153	0.624	93.5	41.6	Infin.	0.747	0.753	Non-Liq.
52.0	104.0	1	100.0	45.0	1	5	153	0.618	92.6	41.6	Infin.	0.737	0.748	Non-Liq.
53.0	104.0	1	100.0	45.0	1	5	153	0.612	91.8	41.6	Infin.	0.727	0.743	Non-Liq.
54.0	104.0	1	100.0	45.0	1	5	153	0.606	90.9	41.6	Infin.	0.717	0.738	Non-Liq.
55.0	104.0	1	100.0	45.0	1	5	153	0.601	90.1	41.6	Infin.	0.708	0.733	Non-Liq.
56.0	104.0	1	100.0	45.0	1	5	153	0.595	89.3	41.6	Infin.	0.698	0.728	Non-Liq.
57.0	104.0	1	100.0	45.0	1	5	153	0.590	88.5	41.6	Infin.	0.689	0.722	Non-Liq.
58.0	104.0	1	100.0	45.0	1	5	153	0.585	87.8	41.6	Infin.	0.680	0.717	Non-Liq.
59.0	104.0	1	100.0	45.0	1	5	153	0.580	87.0	41.6	Infin.	0.671	0.712	Non-Liq.
60.0	104.0	1	100.0	45.0	1	5	153	0.575	86.3	41.6	Infin.	0.663	0.707	Non-Liq.
61.0	104.0	1	100.0	45.0	1	5	153	0.571	85.6	41.6	Infin.	0.655	0.702	Non-Liq.
62.0	104.0	1	100.0	45.0	1	5	153	0.566	84.9	41.6	Infin.	0.647	0.697	Non-Liq.
63.0	104.0	1	100.0	45.0	1	5	153	0.562	84.3	41.6	Infin.	0.639	0.693	Non-Liq.
64.0	104.0	1	100.0	45.0	1	5	153	0.557	83.6	41.6	Infin.	0.632	0.688	Non-Liq.
65.0	104.0	1	100.0	45.0	1	5	153	0.553	83.0	41.6	Infin.	0.625	0.684	Non-Liq.
66.0	104.0	1	100.0	45.0	1	5	153	0.549	82.3	41.6	Infin.	0.618	0.680	Non-Liq.
67.0	104.0	1	100.0	45.0	1	5	153	0.545	81.7	41.6	Infin.	0.612	0.676	Non-Liq.
68.0	104.0	1	100.0	45.0	1	5	153	0.541	81.1	41.6	Infin.	0.606	0.672	Non-Liq.
69.0	104.0	1	100.0	45.0	1	5	153	0.537	80.5	41.6	Infin.	0.600	0.669	Non-Liq.
70.0	104.0	1	100.0	45.0	1	5	153	0.533	80.0	41.6	Infin.	0.594	0.665	Non-Liq.

Figure 9

GEOCON

Project Name : 910 S Mariposa
Project No : W1696-06-01
Boring : B1

LIQUEFACTION SETTLEMENT ANALYSIS
MAXIMUM CONSIDERED EARTHQUAKE

NCEER (1996) METHOD W 2001 UPDATES
EARTHQUAKE INFORMATION:

Earthquake Magnitude:	6.94
PGA_M (g):	0.983
Magnitude Scaling Factor:	1.219
Historic High Groundwater:	20.0
Groundwater @ Exploration:	100.0

DEPTH TO BASE	BLOW COUNT N	WET DENSITY (PCF)	TOTAL STRESS O (TSF)	EFFECT STRESS O' (TSF)	REL. DEN. Dr (%)	ADJUST BLOWS (N1)60	Tav/σ'_o	LIQUEFACTION SAFETY FACTOR	VOL. STRAIN [e_{15}} (%)	EQ. SETTLE. Pe (in.)
1.0	4	93.4	0.023	0.023	45	14	0.639	--	0.00	0.00
2.0	4	93.4	0.070	0.070	45	14	0.639	--	0.00	0.00
3.0	4	93.4	0.117	0.117	45	14	0.639	--	0.00	0.00
4.0	4	100.1	0.165	0.165	45	14	0.639	--	0.00	0.00
5.0	4	100.1	0.215	0.215	45	14	0.639	--	0.00	0.00
6.0	4	100.1	0.265	0.265	45	14	0.639	--	0.00	0.00
7.0	4	100.1	0.315	0.315	45	14	0.639	--	0.00	0.00
8.0	4	100.1	0.365	0.365	45	14	0.639	--	0.00	0.00
9.0	9	100.1	0.415	0.415	61	21	0.639	--	0.00	0.00
10.0	9	100.1	0.465	0.465	61	20	0.639	--	0.00	0.00
11.0	9	100.1	0.515	0.515	61	19	0.639	--	0.00	0.00
12.0	9	100.1	0.566	0.566	61	18	0.639	--	0.00	0.00
13.0	15	99.6	0.615	0.615	76	32	0.639	--	0.00	0.00
14.0	15	99.6	0.665	0.665	76	31	0.639	--	0.00	0.00
15.0	12	99.3	0.715	0.715	65	23	0.639	--	0.00	0.00
16.0	12	99.3	0.765	0.765	65	22	0.639	--	0.00	0.00
17.0	12	99.3	0.814	0.814	65	22	0.639	--	0.00	0.00
18.5	12	99.3	0.876	0.876	65	21	0.639	--	0.00	0.00
19.0	10	99.3	0.901	0.901	56	15	0.639	--	0.00	0.00
20.0	10	99.3	0.963	0.948	56	15	0.649	0.31	1.80	0.22
21.0	10	99.3	1.013	0.966	56	14	0.670	0.29	1.80	0.22
22.0	10	99.3	1.063	0.985	56	14	0.690	0.28	1.80	0.22
23.0	32	115.2	1.116	1.007	99	44	0.708	Non-Liq.	0.00	0.00
24.0	32	115.2	1.174	1.033	99	43	0.726	Non-Liq.	0.00	0.00
25.0	25	115.2	1.231	1.060	86	33	0.742	Non-Liq.	0.00	0.00
26.0	25	115.2	1.289	1.086	86	32	0.758	Non-Liq.	0.00	0.00
27.0	55	121.2	1.348	1.114	125	71	0.773	Non-Liq.	0.00	0.00
28.0	55	121.2	1.409	1.143	125	70	0.787	Non-Liq.	0.00	0.00
29.0	55	121.2	1.469	1.173	125	68	0.800	Non-Liq.	0.00	0.00
30.0	55	121.2	1.530	1.202	125	67	0.813	Non-Liq.	0.00	0.00
31.0	100	118.6	1.590	1.231	166	122	0.825	Non-Liq.	0.00	0.00
32.0	100	118.6	1.649	1.259	166	119	0.837	Non-Liq.	0.00	0.00
33.0	100	118.6	1.708	1.287	166	117	0.848	Non-Liq.	0.00	0.00
34.0	100	118.6	1.768	1.315	166	115	0.859	Non-Liq.	0.00	0.00
35.0	100	118.6	1.827	1.343	166	113	0.869	Non-Liq.	0.00	0.00
36.0	100	118.6	1.886	1.372	161	112	0.879	Non-Liq.	0.00	0.00
37.0	100	118.6	1.946	1.400	161	110	0.888	Non-Liq.	0.00	0.00
38.0	100	118.6	2.005	1.428	161	108	0.897	Non-Liq.	0.00	0.00
39.0	100	104.0	2.061	1.452	161	107	0.907	Non-Liq.	0.00	0.00
40.0	100	104.0	2.113	1.473	161	105	0.916	Non-Liq.	0.00	0.00
41.0	100	104.0	2.165	1.494	156	104	0.926	Non-Liq.	0.00	0.00
42.0	100	104.0	2.217	1.515	156	103	0.935	Non-Liq.	0.00	0.00
43.0	100	104.0	2.269	1.535	156	102	0.944	Non-Liq.	0.00	0.00
44.0	100	104.0	2.321	1.556	156	101	0.953	Non-Liq.	0.00	0.00
45.0	100	104.0	2.373	1.577	156	100	0.961	Non-Liq.	0.00	0.00
46.0	100	104.0	2.425	1.598	153	98	0.970	Non-Liq.	0.00	0.00
47.0	100	104.0	2.477	1.619	153	97	0.978	Non-Liq.	0.00	0.00
48.0	100	104.0	2.529	1.639	153	96	0.986	Non-Liq.	0.00	0.00
49.0	100	104.0	2.581	1.660	153	95	0.993	Non-Liq.	0.00	0.00
50.0	100	104.0	2.633	1.681	153	94	1.001	Non-Liq.	0.00	0.00

TOTAL SETTLEMENT = 0.6 INCHES

Project Name : 910 S. Mariposa St
Project No : W1696-06-01
Boring : B2

GEOCON

EMPIRICAL ESTIMATION OF LIQUEFACTION POTENTIAL
MAXIMUM CONSIDERED EARTHQUAKE

NCEER (1996) METHOD W 2001 UPDATES

EARTHQUAKE INFORMATION:

Earthquake Magnitude:	6.94
Peak Horiz. Acceleration PGA_M (g):	0.983
Magnitude Scaling Factor:	1.219
Historic High Groundwater:	20.0
Groundwater Depth During Exploration:	100.0

ENERGY & ROD CORRECTIONS:

Energy Correction (CE) for N60:	1.25
Rod Len.Corr.(CR) (0-no or 1-yes):	1
Bore Dia. Corr. (CB):	1.00
Sampler Corr. (CS):	1.20
Use Ksigma (0-no or 1-yes):	1

LIQUEFACTION CALCULATIONS:

Unit Wt. Water (pcf):	62.4

Depth to Base (ft)	Total Unit Wt. (pcf)	Water (0 or 1)	Field SPT (N)	Depth of SPT (ft)	Liq.Sus. (0 or 1)	-200 (%)	Est. Dr (%)	CN Factor	Corrected (N1)60cs	Eff. Unit Wt. (psf)	Resist. CRR 7.5	rd Factor	Induced CSR	Liquefac. Safe.Fact.
1.0	85.2	0	4.0	5.0	1	61	45	1.700	14.2	85.2	0.152	1.000	0.639	--
2.0	85.2	0	4.0	5.0	1	61	45	1.700	14.2	85.2	0.152	0.998	0.638	--
3.0	85.2	0	4.0	5.0	1	61	45	1.700	14.2	85.2	0.152	0.996	0.636	--
4.0	85.2	0	4.0	5.0	1	61	45	1.700	14.2	85.2	0.152	0.994	0.635	--
5.0	85.2	0	4.0	5.0	1	61	45	1.700	14.2	85.2	0.152	0.991	0.633	--
6.0	85.2	0	4.0	5.0	1	61	45	1.700	14.2	85.2	0.152	0.989	0.632	--
7.5	85.2	0	4.0	5.0	1	61	45	1.700	14.2	85.2	0.152	0.986	0.630	--
8.0	85.2	0	4.0	5.0	1	61	45	1.700	14.2	85.2	0.152	0.984	0.629	--
9.0	85.2	0	4.0	5.0	1	61	45	1.698	14.2	85.2	0.152	0.982	0.628	--
10.0	79.4	0	7.0	10.0	1	6	55	1.609	12.8	79.4	0.138	0.980	0.626	--
11.0	79.4	0	7.0	10.0	1	6	55	1.535	12.2	79.4	0.133	0.978	0.625	--
12.0	96.4	0	9.0	12.0	1	73	60	1.464	22.8	96.4	0.254	0.976	0.624	--
13.0	96.4	0	9.0	12.0	1	73	60	1.397	22.0	96.4	0.242	0.974	0.622	--
14.0	96.4	0	9.0	12.0	1	73	60	1.338	21.3	96.4	0.232	0.972	0.621	--
15.0	96.4	0	9.0	12.0	1	73	60	1.286	20.6	96.4	0.223	0.970	0.620	--
16.0	96.4	0	2.0	17.5	1	65	26	1.239	8.8	96.4	0.103	0.967	0.618	--
17.0	96.4	0	2.0	17.5	1	65	26	1.198	8.7	96.4	0.102	0.965	0.617	--
18.0	96.4	0	2.0	17.5	1	30	26	1.160	8.1	96.4	0.097	0.963	0.615	--
19.0	107.0	0	12.1	20.0	1	30	63	1.124	25.8	107.0	0.308	0.961	0.614	--
20.0	107.0	1	12.1	20.0	1	30	63	1.089	25.1	44.6	0.294	0.958	0.623	0.58
21.0	107.0	1	12.1	20.0	1	30	63	1.057	24.5	44.6	0.283	0.956	0.643	0.54
22.0	114.1	1	24.0	22.5	1	5	87	1.027	34.3	51.7	Infin.	0.953	0.661	Non-Liq.
23.0	114.1	1	24.0	22.5	1	5	87	0.999	33.4	51.7	Infin.	0.950	0.678	Non-Liq.
24.0	114.1	1	24.0	22.5	1	5	87	0.973	32.5	51.7	Infin.	0.947	0.693	Non-Liq.
25.0	114.1	1	24.0	22.5	1	5	87	0.949	31.7	51.7	Infin.	0.944	0.707	Non-Liq.
26.0	114.1	1	55.0	25.0	1	5	129	0.926	73.0	51.7	Infin.	0.940	0.721	Non-Liq.
27.0	114.1	1	55.0	25.0	1	5	129	0.905	71.3	51.7	Infin.	0.936	0.733	Non-Liq.
28.0	114.1	1	49.0	27.5	1	0	120	0.885	63.7	51.7	Infin.	0.932	0.744	Non-Liq.
29.0	114.1	1	49.0	27.5	1	0	120	0.867	62.4	51.7	Infin.	0.928	0.754	Non-Liq.
30.0	114.1	1	49.0	27.5	1	0	120	0.850	61.2	51.7	Infin.	0.923	0.763	Non-Liq.
31.0	120.7	1	49.0	27.5	1	0	120	0.833	60.0	58.3	Infin.	0.918	0.770	Non-Liq.
32.0	120.7	1	49.0	27.5	1	0	120	0.817	58.8	58.3	Infin.	0.912	0.777	Non-Liq.
33.0	120.7	1	31.0	32.5	1	0	92	0.802	37.3	58.3	Infin.	0.907	0.782	Non-Liq.
34.0	120.7	1	31.0	32.5	1	0	92	0.787	36.6	58.3	Infin.	0.900	0.786	Non-Liq.
35.0	120.7	1	31.0	32.5	1	0	92	0.773	36.0	58.3	Infin.	0.894	0.790	Non-Liq.
36.0	120.7	1	31.0	32.5	1	0	92	0.760	35.4	58.3	Infin.	0.887	0.793	Non-Liq.
37.0	120.7	1	31.0	32.5	1	0	92	0.748	34.8	58.3	Infin.	0.880	0.794	Non-Liq.
38.0	105.2	1	41.0	37.5	1	0	103	0.737	45.3	42.8	Infin.	0.872	0.796	Non-Liq.
39.0	105.2	1	41.0	37.5	1	0	103	0.727	44.7	42.8	Infin.	0.864	0.797	Non-Liq.
40.0	105.2	1	41.0	37.5	1	0	103	0.717	44.1	42.8	Infin.	0.855	0.798	Non-Liq.
41.0	105.2	1	41.0	37.5	1	0	103	0.708	43.6	42.8	Infin.	0.846	0.798	Non-Liq.
42.0	105.2	1	41.0	37.5	1	0	103	0.700	43.0	42.8	Infin.	0.837	0.797	Non-Liq.
43.0	109.5	1	64.0	42.5	1	0	126	0.691	66.3	47.1	Infin.	0.828	0.796	Non-Liq.
44.0	109.5	1	64.0	42.5	1	0	126	0.682	65.5	47.1	Infin.	0.818	0.793	Non-Liq.
45.0	109.5	1	64.0	42.5	1	0	126	0.674	64.7	47.1	Infin.	0.808	0.790	Non-Liq.
46.0	109.5	1	64.0	42.5	1	0	126	0.666	64.0	47.1	Infin.	0.798	0.787	Non-Liq.
47.0	109.5	1	64.0	42.5	1	0	126	0.659	63.2	47.1	Infin.	0.788	0.783	Non-Liq.
48.0	132.6	1	100.0	47.5	1	0	153	0.651	97.6	70.2	Infin.	0.778	0.777	Non-Liq.
49.0	132.6	1	100.0	47.5	1	0	153	0.642	96.3	70.2	Infin.	0.768	0.771	Non-Liq.
50.0	132.6	1	100.0	47.5	1	0	153	0.634	95.1	70.2	Infin.	0.757	0.764	Non-Liq.
51.0	132.6	1	100.0	47.5	1	0	153	0.626	93.9	70.2	Infin.	0.747	0.756	Non-Liq.
52.0	132.6	1	100.0	47.5	1	0	153	0.618	92.7	70.2	Infin.	0.737	0.749	Non-Liq.
53.0	132.6	1	100.0	47.5	1	0	153	0.611	91.6	70.2	Infin.	0.727	0.742	Non-Liq.
54.0	132.6	1	100.0	47.5	1	0	153	0.604	90.6	70.2	Infin.	0.717	0.734	Non-Liq.
55.0	132.6	1	100.0	47.5	1	0	153	0.597	89.5	70.2	Infin.	0.708	0.727	Non-Liq.
56.0	132.6	1	100.0	55.0	1	0	146	0.590	88.5	70.2	Infin.	0.698	0.720	Non-Liq.
57.0	132.6	1	100.0	55.0	1	0	146	0.584	87.6	70.2	Infin.	0.689	0.712	Non-Liq.
58.0	109.9	1	100.0	55.0	1	0	146	0.578	86.7	47.5	Infin.	0.680	0.706	Non-Liq.
59.0	109.9	1	100.0	55.0	1	0	146	0.573	86.0	47.5	Infin.	0.671	0.701	Non-Liq.
60.0	109.9	1	100.0	55.0	1	0	146	0.568	85.2	47.5	Infin.	0.663	0.695	Non-Liq.
61.0	109.9	1	100.0	55.0	1	0	146	0.563	84.5	47.5	Infin.	0.655	0.690	Non-Liq.
62.0	109.9	1	100.0	55.0	1	0	146	0.559	83.8	47.5	Infin.	0.647	0.685	Non-Liq.
63.0	109.9	1	100.0	55.0	1	0	146	0.554	83.1	47.5	Infin.	0.639	0.680	Non-Liq.
64.0	109.9	1	100.0	55.0	1	0	146	0.550	82.5	47.5	Infin.	0.632	0.676	Non-Liq.
65.0	109.9	1	100.0	55.0	1	0	146	0.545	81.8	47.5	Infin.	0.625	0.671	Non-Liq.
66.0	109.9	1	100.0	55.0	1	0	146	0.541	81.2	47.5	Infin.	0.618	0.667	Non-Liq.
67.0	109.9	1	100.0	55.0	1	0	146	0.537	80.6	47.5	Infin.	0.612	0.662	Non-Liq.
68.0	109.9	1	100.0	55.0	1	0	146	0.533	80.0	47.5	Infin.	0.606	0.658	Non-Liq.
69.0	109.9	1	100.0	55.0	1	0	146	0.529	79.4	47.5	Infin.	0.600	0.655	Non-Liq.
70.0	109.9	1	100.0	55.0	1	0	146	0.525	78.8	47.5	Infin.	0.594	0.651	Non-Liq.

GEOCON

Project Name : 910 S. Mariposa St
Project No : W1696-06-01
Boring : B2

LIQUEFACTION SETTLEMENT ANALYSIS
MAXIMUM CONSIDERED EARTHQUAKE

NCEER (1996) METHOD W 2001 UPDATES
EARTHQUAKE INFORMATION:

Earthquake Magnitude:	6.94
PGA_M (g):	0.983
Magnitude Scaling Factor:	1.219
Historic High Groundwater:	20.0
Groundwater @ Exploration:	100.0

DEPTH TO BASE	BLOW COUNT N	WET DENSITY (PCF)	TOTAL STRESS O (TSF)	EFFECT STRESS O' (TSF)	REL. DEN. Dr (%)	ADJUST BLOWS (N1)60	Tav/σ'$_o$	LIQUEFACTION SAFETY FACTOR	VOL. STRAIN [e_{15}} (%)	EQ. SETTLE. Pe (in.)
1.0	4	85.2	0.021	0.021	45	14	0.639	--	0.00	0.00
2.0	4	85.2	0.064	0.064	45	14	0.639	--	0.00	0.00
3.0	4	85.2	0.107	0.107	45	14	0.639	--	0.00	0.00
4.0	4	85.2	0.149	0.149	45	14	0.639	--	0.00	0.00
5.0	4	85.2	0.192	0.192	45	14	0.639	--	0.00	0.00
6.0	4	85.2	0.234	0.234	45	14	0.639	--	0.00	0.00
7.5	4	85.2	0.288	0.288	45	14	0.639	--	0.00	0.00
8.0	4	85.2	0.309	0.309	45	14	0.639	--	0.00	0.00
9.0	4	85.2	0.362	0.362	45	14	0.639	--	0.00	0.00
10.0	7	79.4	0.403	0.403	55	13	0.639	--	0.00	0.00
11.0	7	79.4	0.443	0.443	55	12	0.639	--	0.00	0.00
12.0	9	96.4	0.487	0.487	60	23	0.639	--	0.00	0.00
13.0	9	96.4	0.535	0.535	60	22	0.639	--	0.00	0.00
14.0	9	96.4	0.583	0.583	60	21	0.639	--	0.00	0.00
15.0	9	96.4	0.632	0.632	60	21	0.639	--	0.00	0.00
16.0	2	96.4	0.680	0.680	26	9	0.639	--	0.00	0.00
17.0	2	96.4	0.728	0.728	26	9	0.639	--	0.00	0.00
18.0	2	96.4	0.776	0.776	26	8	0.639	--	0.00	0.00
19.0	12	107.0	0.827	0.827	63	26	0.639	--	0.00	0.00
20.0	12	107.0	0.880	0.865	63	25	0.650	0.58	1.10	0.13
21.0	12	107.0	0.934	0.887	63	25	0.673	0.54	1.30	0.16
22.0	24	114.1	0.989	0.911	87	34	0.694	Non-Liq.	0.00	0.00
23.0	24	114.1	1.046	0.937	87	33	0.713	Non-Liq.	0.00	0.00
24.0	24	114.1	1.103	0.963	87	32	0.732	Non-Liq.	0.00	0.00
25.0	24	114.1	1.160	0.989	87	32	0.750	Non-Liq.	0.00	0.00
26.0	55	114.1	1.217	1.015	129	73	0.767	Non-Liq.	0.00	0.00
27.0	55	114.1	1.274	1.040	129	71	0.783	Non-Liq.	0.00	0.00
28.0	49	114.1	1.332	1.066	120	64	0.798	Non-Liq.	0.00	0.00
29.0	49	114.1	1.389	1.092	120	62	0.812	Non-Liq.	0.00	0.00
30.0	49	114.1	1.446	1.118	120	61	0.826	Non-Liq.	0.00	0.00
31.0	49	120.7	1.504	1.146	120	60	0.839	Non-Liq.	0.00	0.00
32.0	49	120.7	1.565	1.175	120	59	0.851	Non-Liq.	0.00	0.00
33.0	31	120.7	1.625	1.204	92	37	0.863	Non-Liq.	0.00	0.00
34.0	31	120.7	1.685	1.233	92	37	0.873	Non-Liq.	0.00	0.00
35.0	31	120.7	1.746	1.262	92	36	0.884	Non-Liq.	0.00	0.00
36.0	31	120.7	1.806	1.291	92	35	0.894	Non-Liq.	0.00	0.00
37.0	31	120.7	1.866	1.320	92	35	0.903	Non-Liq.	0.00	0.00
38.0	41	105.2	1.923	1.346	103	45	0.913	Non-Liq.	0.00	0.00
39.0	41	105.2	1.976	1.367	103	45	0.923	Non-Liq.	0.00	0.00
40.0	41	105.2	2.028	1.389	103	44	0.933	Non-Liq.	0.00	0.00
41.0	41	105.2	2.081	1.410	103	44	0.943	Non-Liq.	0.00	0.00
42.0	41	105.2	2.133	1.431	103	43	0.952	Non-Liq.	0.00	0.00
43.0	64	109.5	2.187	1.454	126	66	0.961	Non-Liq.	0.00	0.00
44.0	64	109.5	2.242	1.477	126	66	0.970	Non-Liq.	0.00	0.00
45.0	64	109.5	2.296	1.501	126	65	0.978	Non-Liq.	0.00	0.00
46.0	64	109.5	2.351	1.524	126	64	0.985	Non-Liq.	0.00	0.00
47.0	64	109.5	2.406	1.548	126	63	0.993	Non-Liq.	0.00	0.00
48.0	100	132.6	2.467	1.577	153	98	0.999	Non-Liq.	0.00	0.00
49.0	100	132.6	2.533	1.612	153	96	1.004	Non-Liq.	0.00	0.00
50.0	100	132.6	2.599	1.648	153	95	1.008	Non-Liq.	0.00	0.00

TOTAL SETTLEMENT = 0.3 INCHES

GEOCON

TECHNICAL ENGINEERING AND DESIGN GUIDES AS ADAPTED FROM THE US ARMY CORPS OF ENGINEERS, NO. 9
EVALUATION OF EARTHQUAKE-INDUCED SETTLEMENTS IN DRY SANDY SOILS
DESIGN EARTHQUAKE

DE EARTHQUAKE INFORMATION:

Earthquake Magnitude:	6.81
Peak Horiz. Acceleration (g):	0.656

Fig 4.1 Fig 4.2 Fig 4.4

Depth of Base of Strata (ft)	Thickness of Layer (ft)	Depth of Mid-point of Layer (ft)	Soil Unit Weight (pcf)	Overburden Pressure at Mid-point (tsf)	Mean Effective Pressure at Mid-point (tsf)	Average Cyclic Shear Stress [Tav]	Field SPT [N]	Correction Factor [Cer]	Relative Density [Dr] (%)	Correction Factor [Cn]	Corrected [N1]60	rd Factor	Maximum Shear Mod. [Gmax] (tsf)	[yeff]*[Geff] [Gmax]	yeff Shear Strain	[yeff]*100%	Volumetric Strain M7.5 [E15] (%)	Number of Strain Cycles [Nc]	Corrected Vol. Strains [Ec]	Estimated Settlement [S] (inches)
1.0	1.0	0.5	93.4	0.02	0.02	0.010	4	1.25	44.6	1.7	14.2	1.0	135.3	7.28E-05	1.40E-04	0.014	2.12E-02	9.4	1.72E-02	Grading
2.0	1.0	1.5	93.4	0.07	0.05	0.030	4	1.25	44.6	1.7	14.2	1.0	234.4	1.24E-04	2.30E-04	0.023	3.47E-02	9.4	2.82E-02	Grading
3.0	1.0	2.5	93.4	0.12	0.08	0.050	4	1.25	44.6	1.7	14.2	1.0	302.6	1.57E-04	2.30E-04	0.023	3.47E-02	9.4	2.82E-02	Grading
4.0	1.0	3.5	100.1	0.17	0.11	0.070	4	1.25	44.6	1.7	14.2	1.0	359.9	1.83E-04	1.70E-04	0.017	2.57E-02	9.4	2.08E-02	Grading
5.0	1.0	4.5	100.1	0.22	0.14	0.092	4	1.25	44.6	1.7	14.2	1.0	410.8	2.04E-04	8.10E-04	0.081	1.22E-01	9.4	9.92E-02	Grading
6.0	1.0	5.5	100.1	0.27	0.18	0.113	4	1.25	44.6	1.7	14.2	1.0	456.1	2.23E-04	8.10E-04	0.081	1.22E-01	9.4	9.92E-02	Grading
7.0	1.0	6.5	100.1	0.32	0.21	0.134	4	1.25	44.6	1.7	14.2	1.0	497.3	2.38E-04	4.50E-04	0.045	6.80E-02	9.4	5.51E-02	0.01
8.0	1.0	7.5	100.1	0.37	0.24	0.155	4	1.25	44.6	1.7	14.1	1.0	534.6	2.52E-04	4.50E-04	0.045	6.83E-02	9.4	5.54E-02	0.01
9.0	1.0	8.5	100.1	0.42	0.28	0.176	9	1.25	60.9	1.6	20.7	1.0	647.0	2.32E-04	4.50E-04	0.045	4.33E-02	9.4	3.51E-02	0.01
10.0	1.0	9.5	100.1	0.47	0.31	0.197	9	1.25	60.9	1.5	19.7	1.0	674.2	2.45E-04	4.50E-04	0.045	4.58E-02	9.4	3.71E-02	0.01
11.0	1.0	10.5	100.1	0.52	0.35	0.217	9	1.25	60.9	1.4	18.9	1.0	699.6	2.57E-04	4.50E-04	0.045	4.82E-02	9.4	3.91E-02	0.01
12.0	1.0	11.5	100.1	0.57	0.38	0.238	9	1.25	60.9	1.4	18.2	1.0	723.7	2.68E-04	4.50E-04	0.045	5.04E-02	9.4	4.09E-02	0.01
13.0	1.0	12.5	99.6	0.62	0.41	0.258	15.4	1.25	75.9	1.3	32.1	1.0	912.0	2.27E-04	4.50E-04	0.045	2.55E-02	9.4	2.07E-02	0.00
14.0	1.0	13.5	99.6	0.67	0.45	0.278	15.4	1.25	75.9	1.3	31.0	1.0	937.9	2.35E-04	4.50E-04	0.045	2.66E-02	9.4	2.15E-02	0.01
15.0	1.0	14.5	99.3	0.71	0.48	0.298	12	1.25	65.0	1.2	23.1	1.0	881.1	2.64E-04	4.50E-04	0.045	3.78E-02	9.4	3.07E-02	0.01
16.0	1.0	15.5	99.3	0.76	0.51	0.318	12	1.25	65.0	1.2	22.5	1.0	902.8	2.71E-04	3.70E-04	0.037	3.22E-02	9.4	2.61E-02	0.01
17.0	1.0	16.5	99.3	0.81	0.55	0.338	12	1.25	65.0	1.1	21.9	1.0	923.7	2.77E-04	3.70E-04	0.037	3.32E-02	9.4	2.69E-02	0.01
18.5	1.5	17.8	99.3	0.88	0.59	0.362	12	1.25	65.0	1.1	21.2	1.0	948.7	2.84E-04	3.70E-04	0.037	3.44E-02	9.4	2.79E-02	0.01
19.0	0.5	18.8	99.3	0.93	0.62	0.381	10	1.25	55.7	1.1	15.3	1.0	873.1	3.21E-04	7.10E-04	0.071	9.83E-02	9.4	7.97E-02	0.01
20.0	1.0	19.5	99.3	0.96	0.65	0.395	10	1.25	55.7	1.0	14.8	1.0	881.1	3.26E-04	7.10E-04	0.071	1.02E-01	9.4	8.28E-02	0.02
21.0	1.0	20.5	99.3	1.01	0.68	0.414	10	1.25	55.7	1.0	14.4	1.0	896.2	3.32E-04	7.10E-04	0.071	1.05E-01	9.4	8.53E-02	0.00
22.0	1.0	21.5	99.3	1.06	0.71	0.433	10	1.25	55.7	1.0	14.1	1.0	910.9	3.37E-04	7.10E-04	0.071	1.08E-01	9.4	8.76E-02	0.00
23.0	1.0	22.5	115.2	1.12	0.75	0.453	32.45	1.25	98.8	1.0	43.7	0.9	1361.2	2.33E-04	3.70E-04	0.037	1.45E-02	9.4	1.18E-02	0.00
24.0	1.0	23.5	115.2	1.17	0.79	0.474	32.45	1.25	98.8	0.9	42.6	0.9	1384.3	2.37E-04	3.70E-04	0.037	1.49E-02	9.4	1.21E-02	0.00
25.0	1.0	24.5	115.2	1.23	0.83	0.495	25	1.25	85.6	0.9	33.0	0.9	1302.1	2.60E-04	3.70E-04	0.037	2.03E-02	9.4	1.65E-02	0.00
26.0	1.0	25.5	115.2	1.29	0.86	0.516	25	1.25	85.6	0.9	32.2	0.9	1322.1	2.64E-04	3.70E-04	0.037	2.09E-02	9.4	1.69E-02	0.00
27.0	1.0	26.5	121.2	1.35	0.90	0.537	55	1.25	124.5	0.9	71.1	0.9	1759.8	2.04E-04	3.70E-04	0.037	8.08E-03	9.4	6.55E-03	0.00
28.0	1.0	27.5	121.2	1.41	0.94	0.558	55	1.25	124.5	0.9	69.5	0.9	1785.8	2.07E-04	3.70E-04	0.037	8.29E-03	9.4	6.72E-03	0.00
29.0	1.0	28.5	121.2	1.47	0.98	0.579	55	1.25	124.5	0.8	68.1	0.9	1811.0	2.09E-04	3.70E-04	0.037	8.51E-03	9.4	6.90E-03	0.00
30.0	1.0	29.5	121.2	1.53	1.02	0.600	55	1.25	124.5	0.8	66.7	0.9	1835.6	2.12E-04	3.00E-04	0.030	7.07E-03	9.4	5.73E-03	0.00
31.0	1.0	30.5	118.6	1.59	1.07	0.620	100	1.25	165.6	0.8	121.6	0.9	2285.3	1.74E-04	1.30E-04	0.013	1.49E-03	9.4	1.21E-03	0.00
32.0	1.0	31.5	118.6	1.65	1.10	0.639	100	1.25	165.6	0.8	119.3	0.9	2313.3	1.76E-04	1.30E-04	0.013	1.52E-03	9.4	1.24E-03	0.00
33.0	1.0	32.5	118.6	1.71	1.14	0.659	100	1.25	165.6	0.8	117.3	0.9	2340.8	1.77E-04	1.30E-04	0.013	1.56E-03	9.4	1.26E-03	0.00
34.0	1.0	33.5	118.6	1.77	1.18	0.677	100	1.25	165.6	0.8	115.3	0.9	2367.5	1.79E-04	1.30E-04	0.013	1.59E-03	9.4	1.29E-03	0.00
35.0	1.0	34.5	118.6	1.83	1.22	0.696	100	1.25	165.6	0.8	113.4	0.9	2393.7	1.80E-04	1.30E-04	0.013	1.62E-03	9.4	1.31E-03	0.00
36.0	1.0	35.5	118.6	1.89	1.26	0.714	100	1.25	160.6	0.7	111.6	0.9	2419.3	1.81E-04	1.30E-04	0.013	1.65E-03	9.4	1.34E-03	0.00
37.0	1.0	36.5	118.6	1.95	1.30	0.732	100	1.25	160.6	0.7	109.9	0.9	2444.4	1.82E-04	1.30E-04	0.013	1.68E-03	9.4	1.36E-03	0.00
38.0	1.0	37.5	118.6	2.00	1.34	0.749	100	1.25	160.6	0.7	108.2	0.9	2469.0	1.83E-04	1.30E-04	0.013	1.71E-03	9.4	1.39E-03	0.00
39.0	1.0	38.5	104.0	2.06	1.38	0.765	100	1.25	160.6	0.7	106.8	0.9	2491.6	1.84E-04	1.30E-04	0.013	1.74E-03	9.4	1.41E-03	0.00
40.0	1.0	39.5	104.0	2.11	1.42	0.779	100	1.25	160.6	0.7	105.4	0.9	2512.4	1.84E-04	1.30E-04	0.013	1.77E-03	9.4	1.43E-03	0.00
41.0	1.0	40.5	104.0	2.16	1.45	0.792	100	1.25	156.3	0.7	104.2	0.8	2532.9	1.84E-04	1.30E-04	0.013	1.79E-03	9.4	1.45E-03	0.00
42.0	1.0	41.5	104.0	2.22	1.49	0.806	100	1.25	156.3	0.7	102.9	0.8	2553.0	1.85E-04	1.30E-04	0.013	1.82E-03	9.4	1.48E-03	0.00
43.0	1.0	42.5	104.0	2.27	1.52	0.819	100	1.25	156.3	0.7	101.8	0.8	2572.8	1.85E-04	1.30E-04	0.013	1.85E-03	9.4	1.50E-03	0.00
44.0	1.0	43.5	104.0	2.32	1.55	0.832	100	1.25	156.3	0.7	100.6	0.8	2592.3	1.85E-04	1.30E-04	0.013	1.87E-03	9.4	1.52E-03	0.00
45.0	1.0	44.5	104.0	2.37	1.59	0.844	100	1.25	156.3	0.7	99.5	0.8	2611.5	1.85E-04	1.30E-04	0.013	1.90E-03	9.4	1.54E-03	0.00
46.0	1.0	45.5	104.0	2.42	1.62	0.856	100	1.25	153.1	0.7	98.4	0.8	2630.5	1.86E-04	1.30E-04	0.013	1.92E-03	9.4	1.56E-03	0.00
47.0	1.0	46.5	104.0	2.48	1.66	0.868	100	1.25	153.1	0.6	97.4	0.8	2649.2	1.86E-04	1.30E-04	0.013	1.95E-03	9.4	1.58E-03	0.00
48.0	1.0	47.5	104.0	2.53	1.69	0.879	100	1.25	153.1	0.6	96.4	0.8	2667.6	1.86E-04	1.30E-04	0.013	1.97E-03	9.4	1.60E-03	0.00
49.0	1.0	48.5	104.0	2.58	1.73	0.890	100	1.25	153.1	0.6	95.4	0.8	2685.7	1.86E-04	1.30E-04	0.013	1.99E-03	9.4	1.62E-03	0.00
50.0	1.0	49.5	104.0	2.63	1.76	0.901	100	1.25	153.1	0.6	94.5	0.8	2703.7	1.86E-04	1.30E-04	0.013	2.02E-03	9.4	1.64E-03	0.00

TOTAL SETTLEMENT = **0.13**

Figure 13

GEOCON

Project Name : 910 S. Mariposa St
Project No : W1696-06-01
Boring : B2

TECHNICAL ENGINEERING AND DESIGN GUIDES AS ADAPTED FROM THE US ARMY CORPS OF ENGINEERS, NO. 9
EVALUATION OF EARTHQUAKE-INDUCED SETTLEMENTS IN DRY SANDY SOILS
DESIGN EARTHQUAKE

DE EARTHQUAKE INFORMATION:

Earthquake Magnitude:	6.81
Peak Horiz. Acceleration (g):	0.656

Fig 4.1 (Relative Density) · Fig 4.2 (Correction Factor [Cn]) · Fig 4.4 (yeff)

Depth of Base of Strata (ft)	Thickness of Layer (ft)	Depth of Mid-point of Layer (ft)	Soil Unit Weight (pcf)	Overburden Pressure at Mid-point (tsf)	Mean Effective Pressure at Mid-point (tsf)	Average Cyclic Shear Stress [Tav]	Field SPT [N]	Correction Factor [Cer]	Relative Density [Dr] (%)	Correction Factor [Cn]	Corrected [N1]60	rd Factor	Maximum Shear Mod. [Gmax] (tsf)	[yeff]*[Geff] / [Gmax]	yeff Shear Strain	[yeff]*100%	Volumetric Strain M7.5 [E15] (%)	Number of Strain Cycles [Nc]	Corrected Vol. Strains [Ec]	Estimated Settlement [S] (inches)
1.0	1.0	0.5	85.2	0.02	0.01	0.009	4	1.25	45.0	1.7	14.2	1.0	129.2	6.95E-05	1.00E-04	0.010	1.51E-02	9.4	1.23E-02	Grading
2.0	1.0	1.5	85.2	0.06	0.04	0.027	4	1.25	45.0	1.7	14.2	1.0	223.9	1.18E-04	2.30E-04	0.023	3.47E-02	9.4	2.82E-02	Grading
3.0	1.0	2.5	85.2	0.11	0.07	0.045	4	1.25	45.0	1.7	14.2	1.0	289.0	1.49E-04	2.30E-04	0.023	3.47E-02	9.4	2.82E-02	Grading
4.0	1.0	3.5	85.2	0.15	0.10	0.063	4	1.25	45.0	1.7	14.2	1.0	342.0	1.73E-04	2.30E-04	0.023	3.47E-02	9.4	2.82E-02	Grading
5.0	1.0	4.5	85.2	0.19	0.13	0.082	4	1.25	45.0	1.7	14.2	1.0	387.7	1.93E-04	1.70E-04	0.017	2.57E-02	9.4	2.08E-02	Grading
6.0	1.0	5.5	85.2	0.23	0.16	0.100	4	1.25	45.0	1.7	14.2	1.0	428.7	2.09E-04	8.10E-04	0.081	1.22E-01	9.4	9.92E-02	Grading
7.5	1.5	6.8	85.2	0.29	0.19	0.122	4	1.25	45.0	1.7	14.2	1.0	474.9	2.26E-04	8.10E-04	0.081	1.22E-01	9.4	9.92E-02	0.04
8.0	0.5	7.8	85.2	0.33	0.22	0.140	4	1.25	45.0	1.7	14.2	1.0	508.9	2.38E-04	4.50E-04	0.045	6.80E-02	9.4	5.51E-02	0.01
9.0	1.0	8.5	85.2	0.36	0.24	0.153	4	1.25	45.0	1.7	14.2	1.0	532.8	2.46E-04	4.50E-04	0.045	6.81E-02	9.4	5.52E-02	0.01
10.0	1.0	9.5	79.4	0.40	0.27	0.170	7	1.25	54.9	1.6	12.8	1.0	542.9	2.64E-04	4.50E-04	0.045	7.72E-02	9.4	6.26E-02	0.02
11.0	1.0	10.5	79.4	0.44	0.30	0.187	7	1.25	54.9	1.5	12.2	1.0	560.2	2.76E-04	4.50E-04	0.045	8.16E-02	9.4	6.62E-02	0.02
12.0	1.0	11.5	96.4	0.49	0.33	0.205	9	1.25	60.5	1.5	22.8	1.0	723.9	2.31E-04	4.50E-04	0.045	3.85E-02	9.4	3.12E-02	0.01
13.0	1.0	12.5	96.4	0.54	0.36	0.225	9	1.25	60.5	1.4	22.0	1.0	749.6	2.40E-04	4.50E-04	0.045	4.02E-02	9.4	3.26E-02	0.01
14.0	1.0	13.5	96.4	0.58	0.39	0.244	9	1.25	60.5	1.3	21.3	1.0	774.1	2.49E-04	4.50E-04	0.045	4.18E-02	9.4	3.39E-02	0.01
15.0	1.0	14.5	96.4	0.63	0.42	0.264	9	1.25	60.5	1.3	20.6	1.0	797.3	2.57E-04	4.50E-04	0.045	4.34E-02	9.4	3.52E-02	0.01
16.0	1.0	15.5	96.4	0.68	0.46	0.283	2	1.25	26.1	1.2	8.8	1.0	623.2	3.48E-04	1.00E-03	0.100	2.67E-01	9.4	2.17E-01	0.05
17.0	1.0	16.5	96.4	0.73	0.49	0.302	2	1.25	26.1	1.2	8.7	1.0	641.7	3.56E-04	1.00E-03	0.100	2.72E-01	9.4	2.21E-01	0.05
18.0	1.0	17.5	96.4	0.78	0.52	0.321	2	1.25	26.1	1.2	8.1	1.0	648.5	3.69E-04	7.10E-04	0.071	2.09E-01	9.4	1.69E-01	0.04
19.0	1.0	18.5	107.0	0.83	0.55	0.341	12.1	1.25	62.6	1.1	25.8	1.0	982.8	2.55E-04	3.70E-04	0.037	2.73E-02	9.4	2.21E-02	0.01
20.0	1.0	19.5	107.0	0.88	0.59	0.361	12.1	1.25	62.6	1.1	25.1	1.0	1005.5	2.61E-04	3.70E-04	0.037	2.81E-02	9.4	2.28E-02	0.01
21.0	1.0	20.5	107.0	0.93	0.63	0.382	12.1	1.25	62.6	1.1	24.5	1.0	1027.4	2.67E-04	3.70E-04	0.037	2.90E-02	9.4	2.35E-02	0.00
22.0	1.0	21.5	114.1	0.99	0.66	0.403	24	1.25	86.5	1.0	34.3	1.0	1182.5	2.42E-04	3.70E-04	0.037	1.94E-02	9.4	1.57E-02	0.00
23.0	1.0	22.5	114.1	1.05	0.70	0.424	24	1.25	86.5	1.0	33.4	0.9	1204.8	2.47E-04	3.70E-04	0.037	2.00E-02	9.4	1.62E-02	0.00
24.0	1.0	23.5	114.1	1.10	0.74	0.446	24	1.25	86.5	1.0	32.5	0.9	1226.3	2.51E-04	3.70E-04	0.037	2.07E-02	9.4	1.68E-02	0.00
25.0	1.0	24.5	114.1	1.16	0.78	0.467	24	1.25	86.5	0.9	31.7	0.9	1247.1	2.56E-04	3.70E-04	0.037	2.13E-02	9.4	1.73E-02	0.00
26.0	1.0	25.5	114.1	1.22	0.82	0.487	55	1.25	129.3	0.9	73.0	0.9	1687.1	1.95E-04	1.60E-04	0.016	3.38E-03	9.4	2.74E-03	0.00
27.0	1.0	26.5	114.1	1.27	0.85	0.508	55	1.25	129.3	0.9	71.3	0.9	1713.1	1.98E-04	1.60E-04	0.016	3.48E-03	9.4	2.82E-03	0.00
28.0	1.0	27.5	114.1	1.33	0.89	0.528	49	1.25	119.7	0.9	63.7	0.9	1686.4	2.07E-04	3.70E-04	0.037	9.21E-03	9.4	7.47E-03	0.00
29.0	1.0	28.5	114.1	1.39	0.93	0.547	49	1.25	119.7	0.9	62.4	0.9	1710.1	2.10E-04	3.70E-04	0.037	9.45E-03	9.4	7.66E-03	0.00
30.0	1.0	29.5	114.1	1.45	0.97	0.567	49	1.25	119.7	0.8	61.2	0.9	1733.2	2.12E-04	3.70E-04	0.037	9.68E-03	9.4	7.85E-03	0.00
31.0	1.0	30.5	120.7	1.50	1.01	0.587	49	1.25	119.7	0.8	60.0	0.9	1756.4	2.14E-04	3.00E-04	0.030	8.04E-03	9.4	6.52E-03	0.00
32.0	1.0	31.5	120.7	1.56	1.05	0.607	49	1.25	119.7	0.8	58.8	0.9	1779.5	2.17E-04	3.00E-04	0.030	8.23E-03	9.4	6.67E-03	0.00
33.0	1.0	32.5	120.7	1.63	1.09	0.626	31	1.25	92.2	0.8	37.3	0.9	1558.0	2.53E-04	3.00E-04	0.030	1.42E-02	9.4	1.15E-02	0.00
34.0	1.0	33.5	120.7	1.69	1.13	0.646	31	1.25	92.2	0.8	36.6	0.9	1577.0	2.56E-04	3.00E-04	0.030	1.45E-02	9.4	1.18E-02	0.00
35.0	1.0	34.5	120.7	1.75	1.17	0.665	31	1.25	92.2	0.8	36.0	0.9	1595.7	2.58E-04	3.00E-04	0.030	1.48E-02	9.4	1.20E-02	0.00
36.0	1.0	35.5	120.7	1.81	1.21	0.684	31	1.25	92.2	0.8	35.4	0.9	1613.8	2.60E-04	3.00E-04	0.030	1.51E-02	9.4	1.23E-02	0.00
37.0	1.0	36.5	120.7	1.87	1.25	0.702	31	1.25	92.2	0.7	34.8	0.9	1631.6	2.62E-04	3.00E-04	0.030	1.54E-02	9.4	1.25E-02	0.00
38.0	1.0	37.5	105.2	1.92	1.29	0.718	41	1.25	102.8	0.7	45.3	0.9	1808.9	2.40E-04	3.00E-04	0.030	1.12E-02	9.4	9.12E-03	0.00
39.0	1.0	38.5	105.2	1.98	1.32	0.733	41	1.25	102.8	0.7	44.7	0.9	1825.2	2.40E-04	3.00E-04	0.030	1.14E-02	9.4	9.26E-03	0.00
40.0	1.0	39.5	105.2	2.03	1.36	0.748	41	1.25	102.8	0.7	44.1	0.9	1841.3	2.41E-04	3.00E-04	0.030	1.16E-02	9.4	9.41E-03	0.00
41.0	1.0	40.5	105.2	2.08	1.39	0.762	41	1.25	102.8	0.7	43.6	0.8	1857.0	2.42E-04	3.00E-04	0.030	1.18E-02	9.4	9.56E-03	0.00
42.0	1.0	41.5	105.2	2.13	1.43	0.776	41	1.25	102.8	0.7	43.0	0.8	1872.6	2.42E-04	3.00E-04	0.030	1.20E-02	9.4	9.70E-03	0.00
43.0	1.0	42.5	109.5	2.19	1.47	0.789	64	1.25	125.5	0.7	66.3	0.8	2190.3	2.10E-04	3.00E-04	0.030	7.12E-03	9.4	5.77E-03	0.00
44.0	1.0	43.5	109.5	2.24	1.50	0.803	64	1.25	125.5	0.7	65.5	0.8	2208.4	2.10E-04	3.00E-04	0.030	7.22E-03	9.4	5.86E-03	0.00
45.0	1.0	44.5	109.5	2.30	1.54	0.817	64	1.25	125.5	0.7	64.7	0.8	2226.2	2.11E-04	3.00E-04	0.030	7.33E-03	9.4	5.94E-03	0.00
46.0	1.0	45.5	109.5	2.35	1.58	0.830	64	1.25	125.5	0.7	64.0	0.8	2243.8	2.11E-04	3.00E-04	0.030	7.43E-03	9.4	6.03E-03	0.00
47.0	1.0	46.5	109.5	2.41	1.61	0.843	64	1.25	125.5	0.7	63.2	0.8	2261.1	2.11E-04	3.00E-04	0.030	7.54E-03	9.4	6.11E-03	0.00
48.0	1.0	47.5	132.6	2.47	1.65	0.858	100	1.25	153.1	0.7	97.6	0.8	2645.6	1.83E-04	1.30E-04	0.013	1.94E-03	9.4	1.57E-03	0.00
49.0	1.0	48.5	132.6	2.53	1.70	0.874	100	1.25	153.1	0.6	96.3	0.8	2669.1	1.83E-04	1.30E-04	0.013	1.97E-03	9.4	1.60E-03	0.00
50.0	1.0	49.5	132.6	2.60	1.74	0.890	100	1.25	153.1	0.6	95.1	0.8	2692.2	1.84E-04	1.30E-04	0.013	2.00E-03	9.4	1.62E-03	0.00

TOTAL SETTLEMENT = **0.27**

Figure 14

GEOCON

Project Name : 910 S Mariposa
Project No : W1696-06-01
Boring : B1

TECHNICAL ENGINEERING AND DESIGN GUIDES AS ADAPTED FROM THE US ARMY CORPS OF ENGINEERS, NO. 9
EVALUATION OF EARTHQUAKE-INDUCED SETTLEMENTS IN DRY SANDY SOILS
MAXIMUM CONSIDERED EARTHQUAKE

MCE EARTHQUAKE INFORMATION:

Earthquake Magnitude:	6.94
Peak Horiz. Acceleration (g):	0.983

Depth of Base of Strata (ft)	Thickness of Layer (ft)	Depth of Mid-point of Layer (ft)	Soil Unit Weight (pcf)	Overburden Pressure at Mid-point (tsf)	Mean Effective Pressure at Mid-point (tsf)	Average Cyclic Shear Stress [Tav]	Field SPT [N]	Correction Factor [Cer]	Fig 4.1 Relative Density [Dr] (%)	Fig 4.2 Correction Factor [Cn]	Corrected [N1]60	rd Factor	Maximum Shear Mod. [Gmax] (tsf)	[yeff]*[Geff] [Gmax]	Fig 4.4 yeff Shear Strain	[yeff]*100%	Volumetric Strain M7.5 [E15] (%)	Number of Strain Cycles [Nc]	Corrected Vol. Strains [Ec]	Estimated Settlement [S] (inches)
1.0	1.0	0.5	93.4	0.02	0.02	0.015	4	1.25	44.6	1.7	14.2	1.0	135.3	1.09E-04	2.30E-04	0.023	3.47E-02	10.4	2.94E-02	Grading
2.0	1.0	1.5	93.4	0.07	0.05	0.045	4	1.25	44.6	1.7	14.2	1.0	234.4	1.85E-04	2.30E-04	0.023	3.47E-02	10.4	2.94E-02	Grading
3.0	1.0	2.5	93.4	0.12	0.08	0.075	4	1.25	44.6	1.7	14.2	1.0	302.6	2.35E-04	3.00E-03	0.300	4.53E-01	10.4	3.84E-01	Grading
4.0	1.0	3.5	100.1	0.17	0.11	0.105	4	1.25	44.6	1.7	14.2	1.0	359.9	2.74E-04	8.10E-04	0.081	1.22E-01	10.4	1.04E-01	Grading
5.0	1.0	4.5	100.1	0.22	0.14	0.137	4	1.25	44.6	1.7	14.2	1.0	410.8	3.06E-04	5.00E-03	0.500	7.55E-01	10.4	6.40E-01	Grading
6.0	1.0	5.5	100.1	0.27	0.18	0.169	4	1.25	44.6	1.7	14.2	1.0	456.1	3.34E-04	5.00E-03	0.500	7.55E-01	10.4	6.40E-01	Grading
7.0	1.0	6.5	100.1	0.32	0.21	0.201	4	1.25	44.6	1.7	14.2	1.0	497.3	3.57E-04	1.00E-03	0.100	1.51E-01	10.4	1.28E-01	0.03
8.0	1.0	7.5	100.1	0.37	0.24	0.232	4	1.25	44.6	1.7	14.1	1.0	534.6	3.78E-04	1.00E-03	0.100	1.52E-01	10.4	1.29E-01	0.03
9.0	1.0	8.5	100.1	0.42	0.28	0.264	9	1.25	60.9	1.6	20.7	1.0	647.0	3.48E-04	1.00E-03	0.100	9.62E-02	10.4	8.15E-02	0.02
10.0	1.0	9.5	100.1	0.47	0.31	0.295	9	1.25	60.9	1.5	19.7	1.0	674.2	3.68E-04	1.00E-03	0.100	1.02E-01	10.4	8.63E-02	0.02
11.0	1.0	10.5	100.1	0.52	0.35	0.326	9	1.25	60.9	1.4	18.9	1.0	699.6	3.86E-04	1.00E-03	0.100	1.07E-01	10.4	9.07E-02	0.02
12.0	1.0	11.5	100.1	0.57	0.38	0.357	9	1.25	60.9	1.4	18.2	1.0	723.7	4.02E-04	2.70E-03	0.270	3.03E-01	10.4	2.56E-01	0.06
13.0	1.0	12.5	99.6	0.62	0.41	0.387	15.4	1.25	75.9	1.3	32.1	1.0	912.0	3.41E-04	1.00E-03	0.100	5.67E-02	10.4	4.81E-02	0.01
14.0	1.0	13.5	99.6	0.67	0.45	0.417	15.4	1.25	75.9	1.3	31.0	1.0	937.9	3.52E-04	1.00E-03	0.100	5.90E-02	10.4	5.00E-02	0.01
15.0	1.0	14.5	99.3	0.71	0.48	0.447	12	1.25	65.0	1.2	23.1	1.0	881.1	3.95E-04	1.00E-03	0.100	8.41E-02	10.4	7.13E-02	0.02
16.0	1.0	15.5	99.3	0.76	0.51	0.477	12	1.25	65.0	1.2	22.5	1.0	902.8	4.06E-04	1.20E-03	0.120	1.04E-01	10.4	8.84E-02	0.02
17.0	1.0	16.5	99.3	0.81	0.55	0.506	12	1.25	65.0	1.1	21.9	1.0	923.7	4.15E-04	1.20E-03	0.120	1.08E-01	10.4	9.12E-02	0.02
18.5	1.5	17.8	99.3	0.88	0.59	0.543	12	1.25	65.0	1.1	21.2	1.0	948.7	4.26E-04	1.20E-03	0.120	1.12E-01	10.4	9.46E-02	0.03
19.0	0.5	18.8	99.3	0.93	0.62	0.572	10	1.25	55.7	1.1	15.3	1.0	873.1	4.81E-04	1.20E-03	0.120	1.66E-01	10.4	1.41E-01	0.02
20.0	1.0	19.5	99.3	0.96	0.65	0.593	10	1.25	55.7	1.0	14.8	1.0	881.1	4.89E-04	1.20E-03	0.120	1.73E-01	10.4	1.46E-01	0.04
21.0	1.0	20.5	99.3	1.01	0.68	0.621	10	1.25	55.7	1.0	14.4	1.0	896.2	4.97E-04	1.20E-03	0.120	1.78E-01	10.4	1.51E-01	0.00
22.0	1.0	21.5	99.3	1.06	0.71	0.649	10	1.25	55.7	1.0	14.1	1.0	910.9	5.05E-04	2.20E-03	0.220	3.35E-01	10.4	2.84E-01	0.00
23.0	1.0	22.5	115.2	1.12	0.75	0.679	32.45	1.25	98.8	1.0	43.7	0.9	1361.2	3.49E-04	7.10E-04	0.071	2.78E-02	10.4	2.36E-02	0.00
24.0	1.0	23.5	115.2	1.17	0.79	0.711	32.45	1.25	98.8	0.9	42.6	0.9	1384.3	3.55E-04	7.10E-04	0.071	2.87E-02	10.4	2.43E-02	0.00
25.0	1.0	24.5	115.2	1.23	0.83	0.742	25	1.25	85.6	0.9	33.0	0.9	1302.1	3.90E-04	7.10E-04	0.071	3.89E-02	10.4	3.30E-02	0.00
26.0	1.0	25.5	115.2	1.29	0.86	0.773	25	1.25	85.6	0.9	32.2	0.9	1322.1	3.96E-04	7.10E-04	0.071	4.00E-02	10.4	3.39E-02	0.00
27.0	1.0	26.5	121.2	1.35	0.90	0.805	55	1.25	124.5	0.9	71.1	0.9	1759.8	3.06E-04	7.10E-04	0.071	1.55E-02	10.4	1.31E-02	0.00
28.0	1.0	27.5	121.2	1.41	0.94	0.837	55	1.25	124.5	0.9	69.5	0.9	1785.8	3.10E-04	7.10E-04	0.071	1.59E-02	10.4	1.35E-02	0.00
29.0	1.0	28.5	121.2	1.47	0.98	0.868	55	1.25	124.5	0.8	68.1	0.9	1811.0	3.14E-04	7.10E-04	0.071	1.63E-02	10.4	1.38E-02	0.00
30.0	1.0	29.5	121.2	1.53	1.02	0.899	55	1.25	124.5	0.8	66.7	0.9	1835.6	3.18E-04	5.20E-04	0.052	1.22E-02	10.4	1.04E-02	0.00
31.0	1.0	30.5	118.6	1.59	1.07	0.929	100	1.25	165.6	0.8	121.6	0.9	2285.3	2.61E-04	3.00E-04	0.030	3.44E-03	10.4	2.92E-03	0.00
32.0	1.0	31.5	118.6	1.65	1.10	0.959	100	1.25	165.6	0.8	119.3	0.9	2313.3	2.63E-04	3.00E-04	0.030	3.52E-03	10.4	2.98E-03	0.00
33.0	1.0	32.5	118.6	1.71	1.14	0.987	100	1.25	165.6	0.8	117.3	0.9	2340.8	2.66E-04	3.00E-04	0.030	3.59E-03	10.4	3.04E-03	0.00
34.0	1.0	33.5	118.6	1.77	1.18	1.016	100	1.25	165.6	0.8	115.3	0.9	2367.5	2.68E-04	3.00E-04	0.030	3.67E-03	10.4	3.11E-03	0.00
35.0	1.0	34.5	118.6	1.83	1.22	1.043	100	1.25	165.6	0.8	113.4	0.9	2393.7	2.70E-04	3.00E-04	0.030	3.74E-03	10.4	3.17E-03	0.00
36.0	1.0	35.5	118.6	1.89	1.26	1.070	100	1.25	160.6	0.7	111.6	0.9	2419.3	2.71E-04	3.00E-04	0.030	3.81E-03	10.4	3.23E-03	0.00
37.0	1.0	36.5	118.6	1.95	1.30	1.097	100	1.25	160.6	0.7	109.9	0.9	2444.4	2.73E-04	3.00E-04	0.030	3.88E-03	10.4	3.29E-03	0.00
38.0	1.0	37.5	118.6	2.00	1.34	1.123	100	1.25	160.6	0.7	108.2	0.9	2469.0	2.74E-04	3.00E-04	0.030	3.95E-03	10.4	3.35E-03	0.00
39.0	1.0	38.5	104.0	2.06	1.38	1.147	100	1.25	160.6	0.7	106.8	0.9	2491.6	2.75E-04	3.00E-04	0.030	4.02E-03	10.4	3.41E-03	0.00
40.0	1.0	39.5	104.0	2.11	1.42	1.168	100	1.25	160.6	0.7	105.4	0.9	2512.4	2.76E-04	3.00E-04	0.030	4.08E-03	10.4	3.46E-03	0.00
41.0	1.0	40.5	104.0	2.16	1.45	1.188	100	1.25	156.3	0.7	104.2	0.8	2532.9	2.77E-04	3.00E-04	0.030	4.14E-03	10.4	3.51E-03	0.00
42.0	1.0	41.5	104.0	2.22	1.49	1.208	100	1.25	156.3	0.7	102.9	0.8	2553.0	2.77E-04	3.00E-04	0.030	4.20E-03	10.4	3.56E-03	0.00
43.0	1.0	42.5	104.0	2.27	1.52	1.228	100	1.25	156.3	0.7	101.8	0.8	2572.8	2.77E-04	3.00E-04	0.030	4.26E-03	10.4	3.61E-03	0.00
44.0	1.0	43.5	104.0	2.32	1.55	1.247	100	1.25	156.3	0.7	100.6	0.8	2592.3	2.78E-04	3.00E-04	0.030	4.32E-03	10.4	3.66E-03	0.00
45.0	1.0	44.5	104.0	2.37	1.59	1.265	100	1.25	156.3	0.7	99.5	0.8	2611.5	2.78E-04	3.00E-04	0.030	4.37E-03	10.4	3.71E-03	0.00
46.0	1.0	45.5	104.0	2.42	1.62	1.283	100	1.25	153.1	0.7	98.4	0.8	2630.5	2.78E-04	3.00E-04	0.030	4.43E-03	10.4	3.76E-03	0.00
47.0	1.0	46.5	104.0	2.48	1.66	1.301	100	1.25	153.1	0.6	97.4	0.8	2649.2	2.78E-04	3.00E-04	0.030	4.49E-03	10.4	3.80E-03	0.00
48.0	1.0	47.5	104.0	2.53	1.69	1.318	100	1.25	153.1	0.6	96.4	0.8	2667.6	2.78E-04	3.00E-04	0.030	4.55E-03	10.4	3.85E-03	0.00
49.0	1.0	48.5	104.0	2.58	1.73	1.335	100	1.25	153.1	0.6	95.4	0.8	2685.7	2.78E-04	3.00E-04	0.030	4.60E-03	10.4	3.90E-03	0.00
50.0	1.0	49.5	104.0	2.63	1.76	1.351	100	1.25	153.1	0.6	94.5	0.8	2703.7	2.78E-04	3.00E-04	0.030	4.66E-03	10.4	3.95E-03	0.00

TOTAL SETTLEMENT = **0.35**

GEOCON

Project Name : 910 S. Mariposa St
Project No : W1696-06-01
Boring : B2

TECHNICAL ENGINEERING AND DESIGN GUIDES AS ADAPTED FROM THE US ARMY CORPS OF ENGINEERS, NO. 9
EVALUATION OF EARTHQUAKE-INDUCED SETTLEMENTS IN DRY SANDY SOILS
MAXIMUM CONSIDERED EARTHQUAKE

MCE EARTHQUAKE INFORMATION:

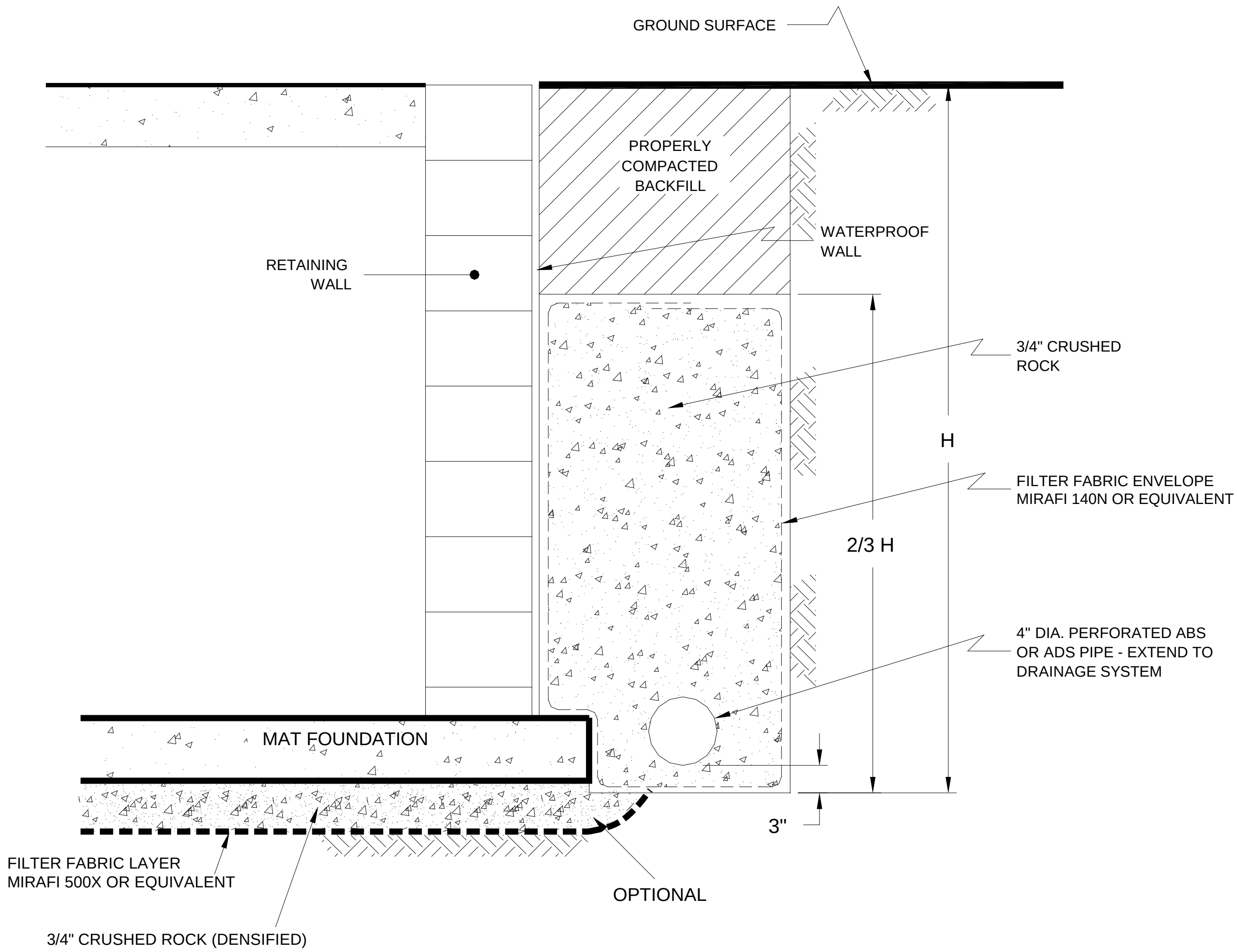
Earthquake Magnitude:	6.94
Peak Horiz. Acceleration (g):	0.983

Fig 4.1 (Relative Density) | Fig 4.2 (Correction Factor [Cn]) | Fig 4.4 (yeff Shear Strain)

Depth of Base of Strata (ft)	Thickness of Layer (ft)	Depth of Mid-point of Layer (ft)	Soil Unit Weight (pcf)	Overburden Pressure at Mid-point (tsf)	Mean Effective Pressure at Mid-point (tsf)	Average Cyclic Shear Stress [Tav]	Field SPT [N]	Correction Factor [Cer]	Relative Density [Dr] (%)	Correction Factor [Cn]	Corrected [N1]60	rd Factor	Maximum Shear Mod. [Gmax] (tsf)	[yeff]*[Geff] [Gmax]	yeff Shear Strain	[yeff]*100%	Volumetric Strain M7.5 [E15} (%)	Number of Strain Cycles [Nc]	Corrected Vol. Strains [Ec]	Estimated Settlement [S] (inches)
1.0	1.0	0.5	85.2	0.02	0.01	0.014	4	1.25	45.0	1.7	14.2	1.0	129.2	1.04E-04	2.30E-04	0.023	3.47E-02	10.4	2.94E-02	Grading
2.0	1.0	1.5	85.2	0.06	0.04	0.041	4	1.25	45.0	1.7	14.2	1.0	223.9	1.77E-04	2.30E-04	0.023	3.47E-02	10.4	2.94E-02	Grading
3.0	1.0	2.5	85.2	0.11	0.07	0.068	4	1.25	45.0	1.7	14.2	1.0	289.0	2.24E-04	3.00E-03	0.300	4.53E-01	10.4	3.84E-01	Grading
4.0	1.0	3.5	85.2	0.15	0.10	0.095	4	1.25	45.0	1.7	14.2	1.0	342.0	2.60E-04	3.00E-03	0.300	4.53E-01	10.4	3.84E-01	Grading
5.0	1.0	4.5	85.2	0.19	0.13	0.122	4	1.25	45.0	1.7	14.2	1.0	387.7	2.89E-04	8.10E-04	0.081	1.22E-01	10.4	1.04E-01	Grading
6.0	1.0	5.5	85.2	0.23	0.16	0.149	4	1.25	45.0	1.7	14.2	1.0	428.7	3.14E-04	5.00E-03	0.500	7.55E-01	10.4	6.40E-01	Grading
7.5	1.5	6.8	85.2	0.29	0.19	0.183	4	1.25	45.0	1.7	14.2	1.0	474.9	3.40E-04	5.00E-03	0.500	7.55E-01	10.4	6.40E-01	0.23
8.0	0.5	7.8	85.2	0.33	0.22	0.210	4	1.25	45.0	1.7	14.2	1.0	508.9	3.57E-04	1.00E-03	0.100	1.51E-01	10.4	1.28E-01	0.02
9.0	1.0	8.5	85.2	0.36	0.24	0.230	4	1.25	45.0	1.7	14.2	1.0	532.8	3.69E-04	1.00E-03	0.100	1.51E-01	10.4	1.28E-01	0.03
10.0	1.0	9.5	79.4	0.40	0.27	0.255	7	1.25	54.9	1.6	12.8	1.0	542.9	3.96E-04	1.00E-03	0.100	1.71E-01	10.4	1.45E-01	0.03
11.0	1.0	10.5	79.4	0.44	0.30	0.280	7	1.25	54.9	1.5	12.2	1.0	560.2	4.14E-04	2.70E-03	0.270	4.90E-01	10.4	4.15E-01	0.10
12.0	1.0	11.5	96.4	0.49	0.33	0.307	9	1.25	60.5	1.5	22.8	1.0	723.9	3.46E-04	1.00E-03	0.100	8.55E-02	10.4	7.24E-02	0.02
13.0	1.0	12.5	96.4	0.54	0.36	0.337	9	1.25	60.5	1.4	22.0	1.0	749.6	3.60E-04	1.00E-03	0.100	8.93E-02	10.4	7.57E-02	0.02
14.0	1.0	13.5	96.4	0.58	0.39	0.366	9	1.25	60.5	1.3	21.3	1.0	774.1	3.74E-04	1.00E-03	0.100	9.30E-02	10.4	7.88E-02	0.02
15.0	1.0	14.5	96.4	0.63	0.42	0.395	9	1.25	60.5	1.3	20.6	1.0	797.3	3.86E-04	1.00E-03	0.100	9.64E-02	10.4	8.17E-02	0.02
16.0	1.0	15.5	96.4	0.68	0.46	0.424	2	1.25	26.1	1.2	8.8	1.0	623.2	5.22E-04	1.00E-02	1.000	2.67E+00	10.4	2.26E+00	0.54
17.0	1.0	16.5	96.4	0.73	0.49	0.453	2	1.25	26.1	1.2	8.7	1.0	641.7	5.34E-04	1.00E-02	1.000	2.72E+00	10.4	2.30E+00	0.55
18.0	1.0	17.5	96.4	0.78	0.52	0.481	2	1.25	26.1	1.2	8.1	1.0	648.5	5.54E-04	2.20E-03	0.220	6.47E-01	10.4	5.48E-01	0.13
19.0	1.0	18.5	107.0	0.83	0.55	0.511	12.1	1.25	62.6	1.1	25.8	1.0	982.8	3.83E-04	7.10E-04	0.071	5.24E-02	10.4	4.44E-02	0.01
20.0	1.0	19.5	107.0	0.88	0.59	0.542	12.1	1.25	62.6	1.1	25.1	1.0	1005.5	3.92E-04	7.10E-04	0.071	5.40E-02	10.4	4.58E-02	0.01
21.0	1.0	20.5	107.0	0.93	0.63	0.573	12.1	1.25	62.6	1.1	24.5	1.0	1027.4	4.00E-04	1.20E-03	0.120	9.39E-02	10.4	7.96E-02	0.00
22.0	1.0	21.5	114.1	0.99	0.66	0.604	24	1.25	86.5	1.0	34.3	1.0	1182.5	3.62E-04	7.10E-04	0.071	3.72E-02	10.4	3.15E-02	0.00
23.0	1.0	22.5	114.1	1.05	0.70	0.636	24	1.25	86.5	1.0	33.4	0.9	1204.8	3.70E-04	7.10E-04	0.071	3.84E-02	10.4	3.26E-02	0.00
24.0	1.0	23.5	114.1	1.10	0.74	0.668	24	1.25	86.5	1.0	32.5	0.9	1226.3	3.77E-04	7.10E-04	0.071	3.97E-02	10.4	3.36E-02	0.00
25.0	1.0	24.5	114.1	1.16	0.78	0.699	24	1.25	86.5	0.9	31.7	0.9	1247.1	3.84E-04	7.10E-04	0.071	4.09E-02	10.4	3.47E-02	0.00
26.0	1.0	25.5	114.1	1.22	0.82	0.730	55	1.25	129.3	0.9	73.0	0.9	1687.1	2.93E-04	3.70E-04	0.037	7.83E-03	10.4	6.63E-03	0.00
27.0	1.0	26.5	114.1	1.27	0.85	0.761	55	1.25	129.3	0.9	71.3	0.9	1713.1	2.97E-04	3.70E-04	0.037	8.04E-03	10.4	6.82E-03	0.00
28.0	1.0	27.5	114.1	1.33	0.89	0.791	49	1.25	119.7	0.9	63.7	0.9	1686.4	3.10E-04	7.10E-04	0.071	1.77E-02	10.4	1.50E-02	0.00
29.0	1.0	28.5	114.1	1.39	0.93	0.821	49	1.25	119.7	0.9	62.4	0.9	1710.1	3.14E-04	7.10E-04	0.071	1.81E-02	10.4	1.54E-02	0.00
30.0	1.0	29.5	114.1	1.45	0.97	0.850	49	1.25	119.7	0.8	61.2	0.9	1733.2	3.18E-04	7.10E-04	0.071	1.86E-02	10.4	1.57E-02	0.00
31.0	1.0	30.5	120.7	1.50	1.01	0.879	49	1.25	119.7	0.8	60.0	0.9	1756.4	3.21E-04	5.20E-04	0.052	1.39E-02	10.4	1.18E-02	0.00
32.0	1.0	31.5	120.7	1.56	1.05	0.910	49	1.25	119.7	0.8	58.8	0.9	1779.5	3.25E-04	5.20E-04	0.052	1.43E-02	10.4	1.21E-02	0.00
33.0	1.0	32.5	120.7	1.63	1.09	0.939	31	1.25	92.2	0.8	37.3	0.9	1558.0	3.80E-04	5.20E-04	0.052	2.46E-02	10.4	2.09E-02	0.00
34.0	1.0	33.5	120.7	1.69	1.13	0.968	31	1.25	92.2	0.8	36.6	0.9	1577.0	3.83E-04	5.20E-04	0.052	2.52E-02	10.4	2.13E-02	0.00
35.0	1.0	34.5	120.7	1.75	1.17	0.997	31	1.25	92.2	0.8	36.0	0.9	1595.7	3.86E-04	5.20E-04	0.052	2.57E-02	10.4	2.18E-02	0.00
36.0	1.0	35.5	120.7	1.81	1.21	1.025	31	1.25	92.2	0.8	35.4	0.9	1613.8	3.89E-04	5.20E-04	0.052	2.62E-02	10.4	2.22E-02	0.00
37.0	1.0	36.5	120.7	1.87	1.25	1.052	31	1.25	92.2	0.7	34.8	0.9	1631.6	3.92E-04	5.20E-04	0.052	2.68E-02	10.4	2.27E-02	0.00
38.0	1.0	37.5	105.2	1.92	1.29	1.077	41	1.25	102.8	0.7	45.3	0.9	1808.9	3.59E-04	5.20E-04	0.052	1.95E-02	10.4	1.65E-02	0.00
39.0	1.0	38.5	105.2	1.98	1.32	1.099	41	1.25	102.8	0.7	44.7	0.9	1825.2	3.61E-04	5.20E-04	0.052	1.98E-02	10.4	1.68E-02	0.00
40.0	1.0	39.5	105.2	2.03	1.36	1.121	41	1.25	102.8	0.7	44.1	0.9	1841.3	3.62E-04	5.20E-04	0.052	2.01E-02	10.4	1.70E-02	0.00
41.0	1.0	40.5	105.2	2.08	1.39	1.142	41	1.25	102.8	0.7	43.6	0.8	1857.0	3.63E-04	5.20E-04	0.052	2.04E-02	10.4	1.73E-02	0.00
42.0	1.0	41.5	105.2	2.13	1.43	1.163	41	1.25	102.8	0.7	43.0	0.8	1872.6	3.64E-04	5.20E-04	0.052	2.07E-02	10.4	1.76E-02	0.00
43.0	1.0	42.5	109.5	2.19	1.47	1.184	64	1.25	125.5	0.7	66.3	0.8	2190.3	3.14E-04	5.20E-04	0.052	1.23E-02	10.4	1.05E-02	0.00
44.0	1.0	43.5	109.5	2.24	1.50	1.204	64	1.25	125.5	0.7	65.5	0.8	2208.4	3.15E-04	5.20E-04	0.052	1.25E-02	10.4	1.06E-02	0.00
45.0	1.0	44.5	109.5	2.30	1.54	1.225	64	1.25	125.5	0.7	64.7	0.8	2226.2	3.16E-04	5.20E-04	0.052	1.27E-02	10.4	1.08E-02	0.00
46.0	1.0	45.5	109.5	2.35	1.58	1.245	64	1.25	125.5	0.7	64.0	0.8	2243.8	3.16E-04	5.20E-04	0.052	1.29E-02	10.4	1.09E-02	0.00
47.0	1.0	46.5	109.5	2.41	1.61	1.264	64	1.25	125.5	0.7	63.2	0.8	2261.1	3.17E-04	5.20E-04	0.052	1.31E-02	10.4	1.11E-02	0.00
48.0	1.0	47.5	132.6	2.47	1.65	1.286	100	1.25	153.1	0.7	97.6	0.8	2645.6	2.74E-04	3.00E-04	0.030	4.48E-03	10.4	3.79E-03	0.00
49.0	1.0	48.5	132.6	2.53	1.70	1.310	100	1.25	153.1	0.6	96.3	0.8	2669.1	2.75E-04	3.00E-04	0.030	4.55E-03	10.4	3.86E-03	0.00
50.0	1.0	49.5	132.6	2.60	1.74	1.334	100	1.25	153.1	0.6	95.1	0.8	2692.2	2.76E-04	3.00E-04	0.030	4.62E-03	10.4	3.92E-03	0.00

TOTAL SETTLEMENT = **1.73**

Figure 16



NO SCALE

GEOCON
WEST, INC.
ENVIRONMENTAL GEOTECHNICAL MATERIALS
3303 N. SAN FERNANDO BLVD. - SUITE 100 - BURBANK, CA 91504
PHONE (818) 841-8388 - FAX (818) 841-1704

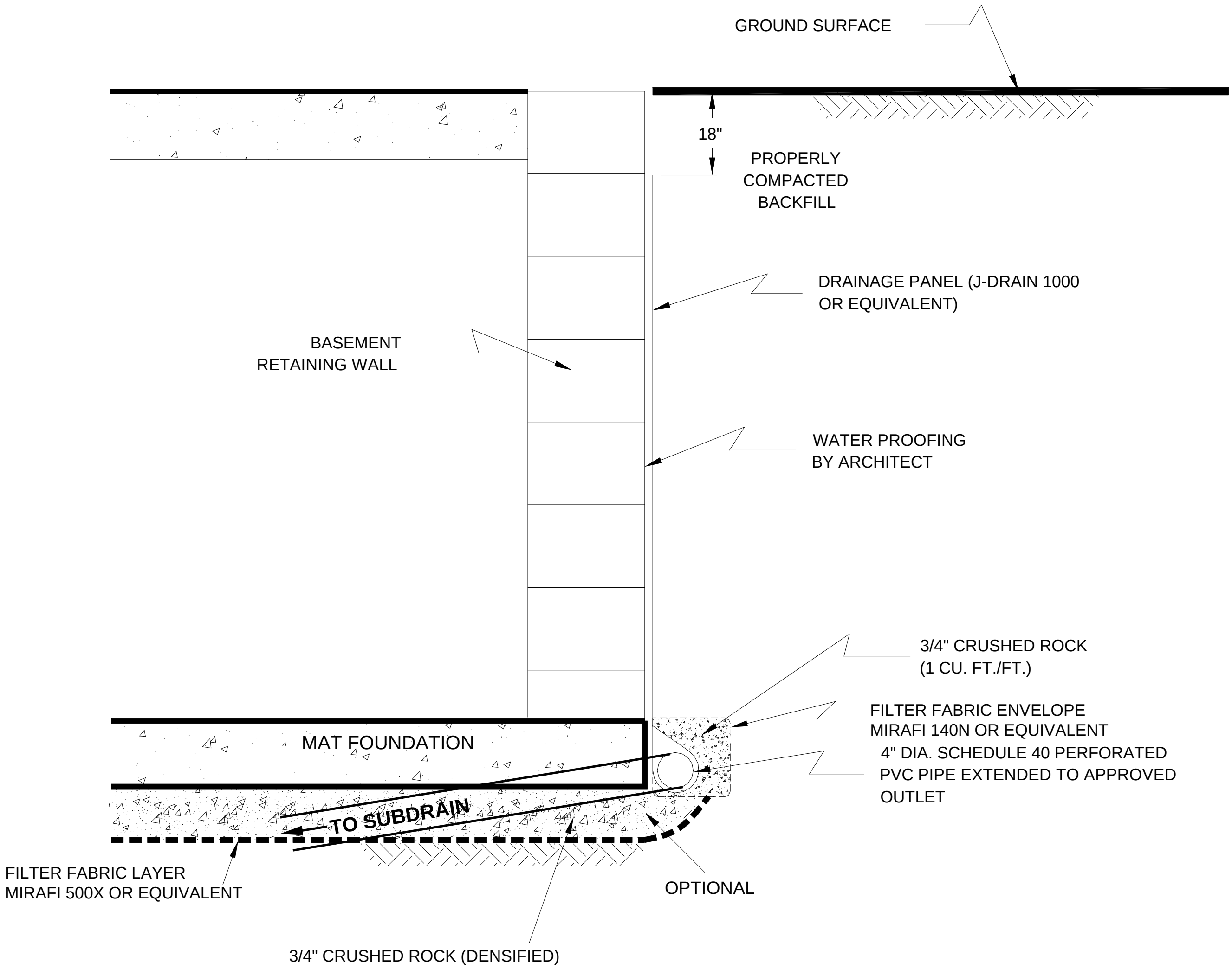
DRAFTED BY: JJK	CHECKED BY: HHD

RETAINING WALL DRAIN DETAIL

910 SOUTH MARIPOSA STREET

BURBANK, CALIFORNIA

JAN. 2023	PROJECT NO. W1696-06-01	FIG. 17



NOTE: TOP OF DRAINAGE PANEL NOT MORE THAN
18 INCHES FROM GROUND SURFACE

NO SCALE

GEOCON
WEST, INC.
ENVIRONMENTAL GEOTECHNICAL MATERIALS
3303 N. SAN FERNANDO BLVD. - SUITE 100 - BURBANK, CA 91504
PHONE (818) 841-8388 - FAX (818) 841-1704

RETAINING WALL DRAIN DETAIL

910 SOUTH MARIPOSA STREET

BURBANK, CALIFORNIA

DRAFTED BY: JJK	CHECKED BY: HHD

JAN. 2023	PROJECT NO. W1696-06-01	FIG. 18

BORING PERCOLATION TEST FIELD LOG

Date:	Thursday, December 1, 2022	**Boring/Test Number:**	B2
Project Number:	W1696-06-01	**Diameter of Boring:**	8 inches
Project Location:	910 S. Mariposa St	**Diameter of Casing:**	2 inches
Earth Description:	SM	**Depth of Boring:**	30 feet
Tested By:	MR	**Depth to Invert of BMP:**	20 feet
Liquid Description:	Water	**Depth to Water Table:**	>60 feet
Measurement Method:	Sounder	**Depth to Initial Water Depth (d_1):**	180 inches
Start Time for Pre-Soak:	9:30 AM	**Water Remaining in Boring (Y/N):**	No
Start Time for Standard:	10:30 AM	**Standard Time Interval Between Readings:**	10 min

Reading Number	Time Start (hh:mm)	Time End (hh:mm)	Elapsed Time Δtime (min)	Water Drop During Standard Time Interval, Δd (in)	Soil Description Notes Comments
1	10:30 AM	10:40 AM	10	109.4	
2	11:00 AM	11:10 AM	10	112.4	
3	11:30 AM	11:40 AM	10	109.1	
4	12:00 PM	12:10 PM	10	111.4	
5	12:30 PM	12:40 PM	10	109.3	
6	1:00 PM	1:10 PM	10	108.5	Stabilized Readings
7	1:30 PM	1:40 PM	10	107.6	Achieved with Readings
8	2:00 PM	2:10 PM	10	107.9	6, 7, and 8

MEASURED PERCOLATION RATE & DESIGN INFILTRATION RATE CALCULATIONS*

* Calculations Below Based on Stabilized Readings Only

Boring Radius, r: 4 inches

Test Section Height, h: 120.0 inches

$$Test\ Section\ Surface\ Area, A = 2\pi rh + \pi r^2$$

A = **3066** in^2

$$Discharged\ Water\ Volume, V = \pi r^2 \Delta d$$

$$Percolation\ Rate = \left(\frac{V/A}{\Delta T}\right)$$

Reading 6	V =	**5453**	in^3	Percolation Rate =	**10.67**	inches/hour
Reading 7	V =	**5411**	in^3	Percolation Rate =	**10.59**	inches/hour
Reading 8	V =	**5423**	in^3	Percolation Rate =	**10.61**	inches/hour

Measured Percolation Rate = **10.62** inches/hour

Reduction Factors

Small Diameter Boring, RF_t = 1

Site Variability, RF_v = 1

Long Term Siltation, RF_s = 1

$$Total\ Reduction\ Factor, RF = RF_t + RF_v + RF_s$$

Total Reduction Factor = 3

Design Infiltration Rate

$$Design\ Infiltration\ Rate = Measured\ Percolation\ Rate\ /RF$$

Design Infiltration Rate = **3.54** inches/hour

FIGURE 19

APPENDIX A

APPENDIX A

FIELD INVESTIGATION

The site was explored on December 1, 2022, by excavating three 7-inch diameter borings to a maximum depth of approximately 55½ feet below the existing ground surface using utilizing a truck-mounted hollow-stem auger drilling machine and two 3½ inch diameter borings to a maximum depth of 15½ feet below the ground surface using manual auger equipment. Representative and relatively undisturbed samples were obtained by driving a 3-inch, O. D., California Modified Sampler into the "undisturbed" soil mass with blows from a 140-pound auto-hammer falling 30 inches truck-mounted auger borings and with blows from a slide hammer for the manual auger borings. The California Modified Sampler was equipped with 1-inch by 2³/₈-inch diameter brass sampler rings to facilitate soil removal and testing. Bulk samples were obtained. Standard Penetration Tests were performed in borings B1 and B2.

The soil conditions encountered in the borings were visually examined, classified and logged in general accordance with the Unified Soil Classification System (USCS). The logs of the borings are presented on Figures A1 through A5. The logs depict the soil and geologic conditions encountered and the depth at which samples were obtained. The logs also include our interpretation of the conditions between sampling intervals. Therefore, the logs contain both observed and interpreted data. We determined the lines designating the interface between soil materials on the logs using visual observations, penetration rates, excavation characteristics and other factors. The transition between materials may be abrupt or gradual. Where applicable, the logs were revised based on subsequent laboratory testing. The locations of the borings are shown on Figure 2.

BORING 1

ELEV. (MSL.) **- -** DATE COMPLETED **12/01/2022**

EQUIPMENT **HOLLOW STEM AUGER** BY: **JJK**

DEPTH IN FEET	SAMPLE NO.	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0			**ARTIFICIAL FILL** Sandy Silt, soft, slightly moist, olive brown, fine-grained.			
2	B1@2'			9	90.5	3.3
		ML	**ALLUVIUM** Sandy Silt, soft, slightly moist, olive brown, fine-grained.			
4	B1@5'		- trace medium-grained sand	4		
8	B1@7.5'		- stiff	25	97.7	2.5
		SM	Silty Sand, loose, slightly moist, light gray with reddish brown oxidation staining, fine-grained.			
10	B1@10'			9		
12	B1@12.5'	ML	Sandy Silt, stiff, slightly moist, olive gray and light reddish brown, fine-grained.	28	93.1	7.0
14	B1@14.5'	SM	Silty Sand, firm, slightly moist, olive gray with light reddish brown oxidation stains, fine-grained.	12		
18	B1@17.5'			20	80.1	24.0
20	B1@19.5'	SP-SM	Sand with Silt, poorly graded, loose, slightly moist, light gray with light reddish brown oxidation stains, fine-grained.	10		
22	B1@22.5'	SP	Sand, poorly graded, medium dense, slightly moist, light gray with light reddish brown oxidation, fine-grained, trace coarse-grained.	59	112.5	2.4
24	B1@25'		- no coarse-grained	25		
26			- very dense, gray, trace medium- to coarse-grained			
28	B1@27.5'			50 (4")	118.8	2.0

W1696-06-01 BORING LOGS.GPJ

Figure A1,
Log of Boring 1, Page 1 of 2

SAMPLE SYMBOLS		
☐ ... SAMPLING UNSUCCESSFUL	◧ ... STANDARD PENETRATION TEST	■ ... DRIVE SAMPLE (UNDISTURBED)
⊠ ... DISTURBED OR BAG SAMPLE	◪ ... CHUNK SAMPLE	▼ ... WATER TABLE OR SEEPAGE

BORING 1

ELEV. (MSL.) - - DATE COMPLETED 12/01/2022

EQUIPMENT HOLLOW STEM AUGER BY: JJK

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
30	B1@30'				- some medium- to coarse-grained, trace fine gravel	50 (4")		
32	B1@32.5'				- increase in coarse-grained, trace medium-grained and fine gravel	50 (5")	116.0	2.2
34	B1@35'				- decrease in coarse-grained, increase in fine-grained	50 (6")		
36				SP				
38	B1@37.5'				- increase in medium-grained, trace coarse-grained and fine gravel	50 (4")	101.9	2.1
40	B1@40'				- no recovery	50 (6")		
42	B1@42.5'				- no recovery	50 (4")		
44	B1@45'					50 (1")		

Total depth of boring: 45.5 feet
Fill to 3 feet.
No groundwater encountered.
Backfilled with soil cuttings and tamped.

*Penetration resistance for 140-pound hammer falling 30 inches by auto-hammer.
NOTE: The stratification lines presented herein represent the approximate boundary between earth types; the transitions may be gradual.

Figure A1,
Log of Boring 1, Page 2 of 2

W1696-06-01 BORING LOGS.GPJ

SAMPLE SYMBOLS			
	... SAMPLING UNSUCCESSFUL	... STANDARD PENETRATION TEST	... DRIVE SAMPLE (UNDISTURBED)
	... DISTURBED OR BAG SAMPLE	... CHUNK SAMPLE	... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

BORING 2

ELEV. (MSL.) - - DATE COMPLETED 12/01/2022

EQUIPMENT HOLLOW STEM AUGER BY: JJK

DEPTH IN FEET	SAMPLE NO.	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0			**ARTIFICIAL FILL** Sandy Silt, firm, slightly moist, olive brown.			
2	B2@2.5'		- loose, fine-grained, no recovery	9		
4		ML	**ALLUVIUM** Sandy Silt, soft, slightly moist to moist, olive gray.			
6	B2@4'			4		
8	B2@7.5'		- brown	22	74.5	14.5
10	B2@10'	SP-SM	Sand with Silt, poorly graded, loose, slightly moist, gray with reddish brown oxidation stains, fine-grained.	7	76.3	4.0
12	B2@12'	ML	Silt with Sand, firm, slightly moist, olive brown with reddish brown oxidation staining, fine-grained.	9		
14	B2@15'		- stiff	23	92.0	4.8
16		ML	Sandy Silt, very soft, moist, dark gray.			
18	B2@17.5'			2		
		SM	Silty Sand, very loose, slightly moist, gray and reddish brown, fine-grained.			
20	B2@20'		- medium dense, grades coarser	22	102.7	4.2
		ML	Silt, stiff, moist, dark olive brown with oxidation staining.			
22	B2@22.5'	SP	Sand, poorly graded, medium dense, slightly moist, gray with reddish brown oxidation staining, fine-grained, some medium gravel, trace coarse-grained.	24		
24	B2@25'		- very dense, gray and olive gray, no medium- to coarse-grained	50 (6")	110.6	3.1
26						
28	B2@27.5'		- medium dense, light gray with reddish brown staining, some medium-grained, trace coarse-grained and fine gravel	49		

Figure A2,
Log of Boring 2, Page 1 of 3

W1696-06-01 BORING LOGS.GPJ

SAMPLE SYMBOLS

- ... SAMPLING UNSUCCESSFUL
- ... STANDARD PENETRATION TEST
- ... DRIVE SAMPLE (UNDISTURBED)
- ... DISTURBED OR BAG SAMPLE
- ... CHUNK SAMPLE
- ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. W1696-06-01

BORING 2

ELEV. (MSL.) - - DATE COMPLETED 12/01/2022

EQUIPMENT HOLLOW STEM AUGER BY: JJK

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
30	B2@30'			SP	- slightly moist to moist, dark gray, fine-grained, some medium- to coarse-grained	74	117.4	2.8
32	B2@32.5'				- some fine to coarse gravel	31		
				ML	Silt, hard, moist, dark olive brown.			
34								
	B2@35'			SP	Sand, poorly graded, very dense, slightly moist, gray, fine-grained, trace coarse gravel.	50 (3")	102.3	2.8
36								
38	B2@37.5'			SP	Sand with Gravel, poorly graded, dense, slightly moist, gray, coarse-grained, fine gravel and medium-grained.	41		
40	B2@40'			SP	Sand, poorly graded, very dense, slightly moist, light gray, fine-grained.	50 (4")	106.3	3.1
					- very dense, slightly moist to moist			
42					- some medium- to coarse-grained, fine gravel			
	B2@42.5'					65		
44				SW	Sand, well-graded, very dense, slightly moist to moist, gray, fine- to coarse-grained, some fine to coarse gravel.			
	B2@45'					50 (5")	130.8	1.3
46								
48	B2@47.5'				- coarse gravel	50 (4")		
50	B2@50'				- no recovery	50 (3")	107.4	2.3
52								
54								
	B2@55'				- no recovery	50 (3")		

Total depth of boring: 55.5 feet
Fill to 3 feet.
No groundwater encountered.
Percolation testing performed.
Backfilled with soil cuttings and tamped.

*Penetration resistance for 140-pound hammer falling 30 inches by

W1696-06-01 BORING LOGS.GPJ

Figure A2,
Log of Boring 2, Page 2 of 3

SAMPLE SYMBOLS			
	... SAMPLING UNSUCCESSFUL	... STANDARD PENETRATION TEST	... DRIVE SAMPLE (UNDISTURBED)
	... DISTURBED OR BAG SAMPLE	... CHUNK SAMPLE	... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**BORING 2** ELEV. (MSL.) **- -** DATE COMPLETED **12/01/2022** EQUIPMENT **HOLLOW STEM AUGER** BY: **JJK**	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
					auto-hammer. NOTE: The stratification lines presented herein represent the approximate boundary between earth types; the transitions may be gradual.			

Figure A2,
Log of Boring 2, Page 3 of 3

W1696-06-01 BORING LOGS.GPJ

SAMPLE SYMBOLS			
	... SAMPLING UNSUCCESSFUL	... STANDARD PENETRATION TEST	... DRIVE SAMPLE (UNDISTURBED)
	... DISTURBED OR BAG SAMPLE	... CHUNK SAMPLE	... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. W1696-06-01

BORING 3

ELEV. (MSL.) **- -** DATE COMPLETED **12/01/2022**

EQUIPMENT **HOLLOW STEM AUGER** BY: **JJK**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0–2					**ARTIFICIAL FILL** Sandy Silt, firm, moist, olive brown.			
2	B3@2.5'				**ALLUVIUM** Sandy Silt, soft, slightly moist to moist, olive brown, fine-grained.	9	87.2	4.8
4–6	B3@5'			ML	- lense of dark grayish brown	9	90.0	19.9
8	B3@7.5'				- firm, slightly moist, gray to olive gray	21	96.4	11.8
10–12	B3@10'			SM	Silty Sand, medium dense, slightly moist, light gray with slight reddish brown oxidation staining, fine-grained.	21	99.0	4.1
14–18	B3@15'			ML	Sandy Silt, firm, slightly moist to moist, light gray with light reddish brown oxidation staining, fine-grained.	24	93.5	3.8
				ML	Silt with Sand, stiff, moist, olive brown with gray and reddish brown oxidation staining.			
20	B3@20'			SP-SM	Sand with Silt, poorly graded, medium dense, slightly moist, olive gray, fine-grained, trace medium- to coarse-grained.	31	105.1	5.1

Total depth of boring: 20.5 feet
Fill to 2 feet.
No groundwater encountered.
Backfilled with soil cuttings and tamped.

*Penetration resistance for 140-pound hammer falling 30 inches by auto-hammer.
NOTE: The stratification lines presented herein represent the approximate boundary between earth types; the transitions may be gradual.

W1696-06-01 BORING LOGS.GPJ

Figure A3,
Log of Boring 3, Page 1 of 1

SAMPLE SYMBOLS			
	... SAMPLING UNSUCCESSFUL	... STANDARD PENETRATION TEST	... DRIVE SAMPLE (UNDISTURBED)
	... DISTURBED OR BAG SAMPLE	... CHUNK SAMPLE	... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. W1696-06-01

BORING 4

ELEV. (MSL.) - - DATE COMPLETED 12/01/2022

EQUIPMENT HAND AUGER BY: JJK

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	BULK 0-4.5'				**ARTIFICIAL FILL** Silty Sand, poorly graded, medium dense, slightly moist, light olive brown, fine-grained, trace medium-grained.			
2								
	B4@3'						84.8	20.3
4								
6	B4@6'				**ALLUVIUM** Sand with SIlt, poorly graded, medium dense, slightly moist, light gray to light olive brown, fine-grained, trace oxidation.		91.1	7.6
				SP-SM				
8								
10	B4@10'				- increase in sand and oxidation		92.2	4.1

Total depth of boring: 10.5 feet
Fill to 5 feet.
No groundwater encountered.
Backfilled with soil cuttings and tamped.

NOTE: The stratification lines presented herein represent the approximate boundary between earth types; the transitions may be gradual.

Figure A4,
Log of Boring 4, Page 1 of 1

W1696-06-01 BORING LOGS.GPJ

SAMPLE SYMBOLS			
	... SAMPLING UNSUCCESSFUL	... STANDARD PENETRATION TEST	... DRIVE SAMPLE (UNDISTURBED)
	... DISTURBED OR BAG SAMPLE	... CHUNK SAMPLE	... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. W1696-06-01

BORING 5

ELEV. (MSL.) - - DATE COMPLETED 12/01/2022

EQUIPMENT HAND AUGER BY: JJK

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	BULK 0-5'				**ARTIFICIAL FILL** Silty Sand, poorly graded, loose, slightly moist, yellowish brown, fine-grained, trace medium- to coarse-grained.			
2								
	B5@3'				- medium dense, brown, roots and rootlets, trace fine gravel		82.8	12.9
4								
6	B5@5.5'						108.6	7.7
8					- coarse gravel			
10	B5@9.5'				**ALLUVIUM** Silty Sand, poorly graded, medium dense, slightly moist, gray and light olive brown, fine-grained, root, trace rootlets.		95.1	6.5
12	B5@12'			SM	- light olive brown and gray with oxidation mottles - olive brown		89.4	6.7
14								
	B5@15'				- gray to olive brown with oxidation, trace roots		91.2	13.9

Total depth of boring: 15.5 feet
Fill to 9 feet.
No groundwater encountered.
Backfilled with soil cuttings and tamped.

NOTE: The stratification lines presented herein represent the approximate boundary between earth types; the transitions may be gradual.

W1696-06-01 BORING LOGS.GPJ

Figure A5,
Log of Boring 5, Page 1 of 1

SAMPLE SYMBOLS			
	... SAMPLING UNSUCCESSFUL	... STANDARD PENETRATION TEST	... DRIVE SAMPLE (UNDISTURBED)
	... DISTURBED OR BAG SAMPLE	... CHUNK SAMPLE	... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

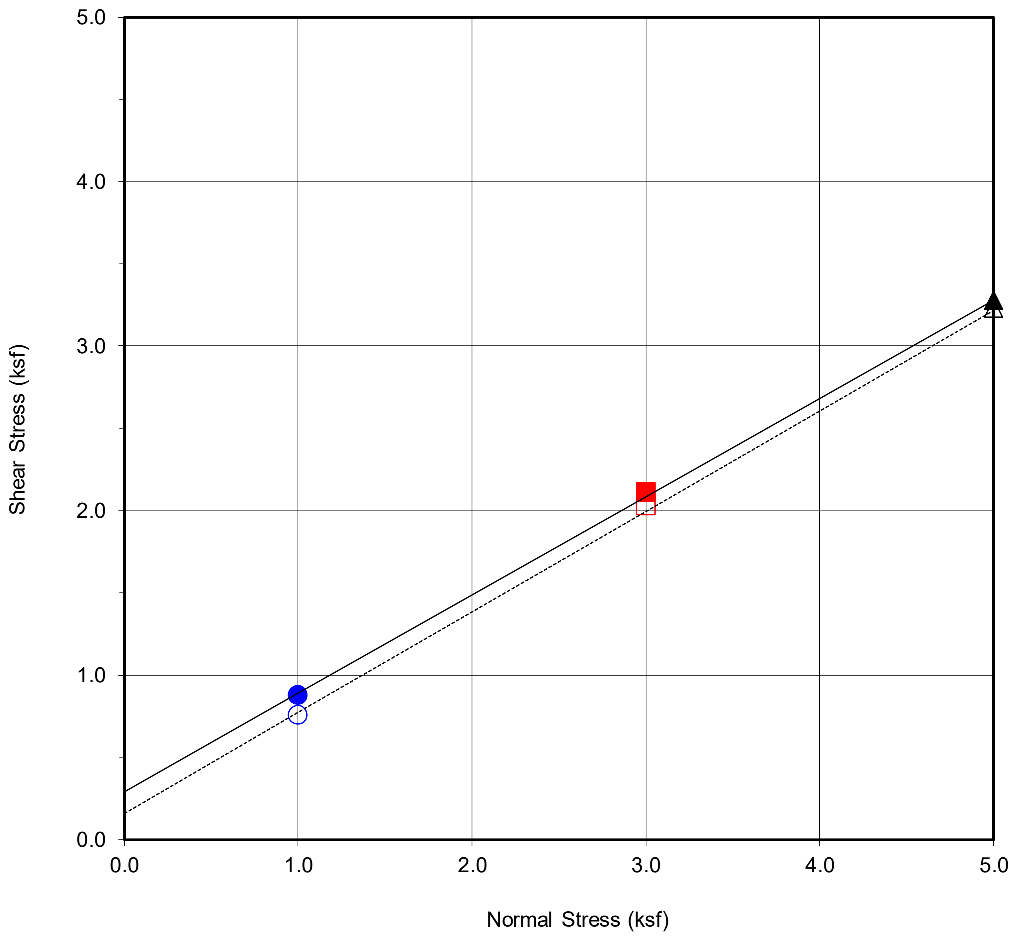
GEOCON

APPENDIX B

APPENDIX B

LABORATORY TESTING

Laboratory tests were performed in accordance with generally accepted test methods of the International ASTM, or other suggested procedures. Selected samples were tested for direct shear strength, grain size, consolidation and expansion characteristics, corrosivity, in-place dry density and moisture content. The results of the laboratory tests are summarized in Figures B1 through B29. The in-place dry density and moisture content of the samples tested are presented on the boring logs, Appendix A.



Boring No.	B1
Sample No.	B1@0-5'
Depth (ft)	0-5
Sample Type:	Bulk

Soil Identification:		
Sandy Silt (ML)		
Strength Parameters		
	C (psf)	ϕ (°)
Peak	293	31
Ultimate	162	31

Normal Stress (kip/ft2)	1	3	5
Peak Shear Stress (kip/ft²)	● 0.88	■ 2.11	▲ 3.26
Shear Stress @ End of Test (ksf)	○ 0.76	□ 2.03	△ 3.20
Deformation Rate (in./min.)	0.05	0.05	0.05
Initial Sample Height (in.)	1.0	1.0	1.0
Ring Inside Diameter (in.)	2.375	2.375	2.375
Initial Moisture Content (%)	32.7	18.4	19.9
Initial Dry Density (pcf)	79.7	87.3	90.2
Initial Degree of Saturation (%)	79.1	53.4	61.9
Soil Height Before Shearing (in.)	1.2	1.2	1.2
Final Moisture Content (%)	39.4	29.1	25.7

GEOCON

DIRECT SHEAR TEST RESULTS

Consolidated Drained ASTM D-3080

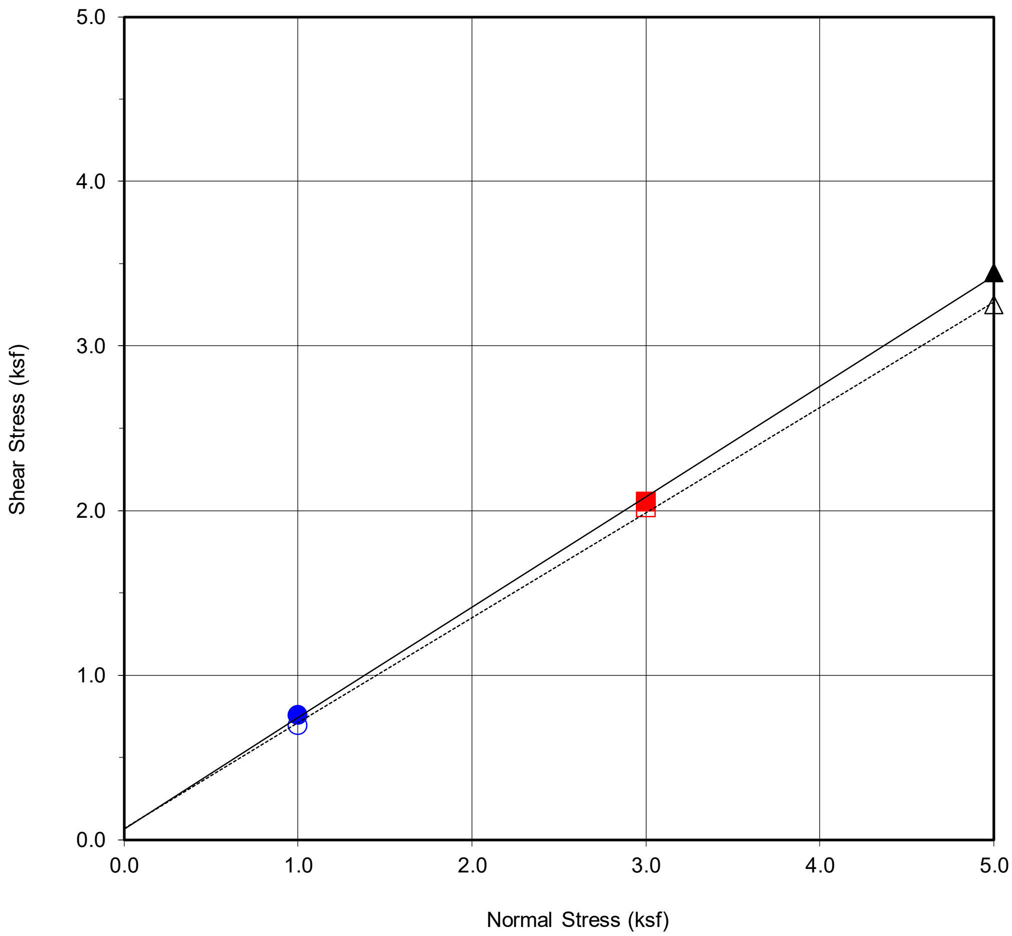
Checked by: JJK

Project No.: W1696-06-01

910 SOUTH MARIPOSA STREET
BURBANK, CALIFORNIA

JAN. 2023

Figure B1



Boring No.	**B3**
Sample No.	**B3@5'**
Depth (ft)	**5**
Sample Type:	Ring

Soil Identification:		
Sandy Silt (ML)		
Strength Parameters		
	C (psf)	φ (°)
Peak	68	34
Ultimate	71	33

Normal Stress (kip/ft2)	1	3	5
Peak Shear Stress (kip/ft²)	● 0.76	■ 2.05	▲ 3.44
Shear Stress @ End of Test (ksf)	○ 0.70	□ 2.02	△ 3.25
Deformation Rate (in./min.)	0.05	0.05	0.05
Initial Sample Height (in.)	1.0	1.0	1.0
Ring Inside Diameter (in.)	2.375	2.375	2.375
Initial Moisture Content (%)	32.7	18.4	19.9
Initial Dry Density (pcf)	79.7	87.3	90.2
Initial Degree of Saturation (%)	79.1	53.4	61.9
Soil Height Before Shearing (in.)	1.2	1.2	1.2
Final Moisture Content (%)	39.4	29.1	25.7

GEOCON

DIRECT SHEAR TEST RESULTS

Consolidated Drained ASTM D-3080

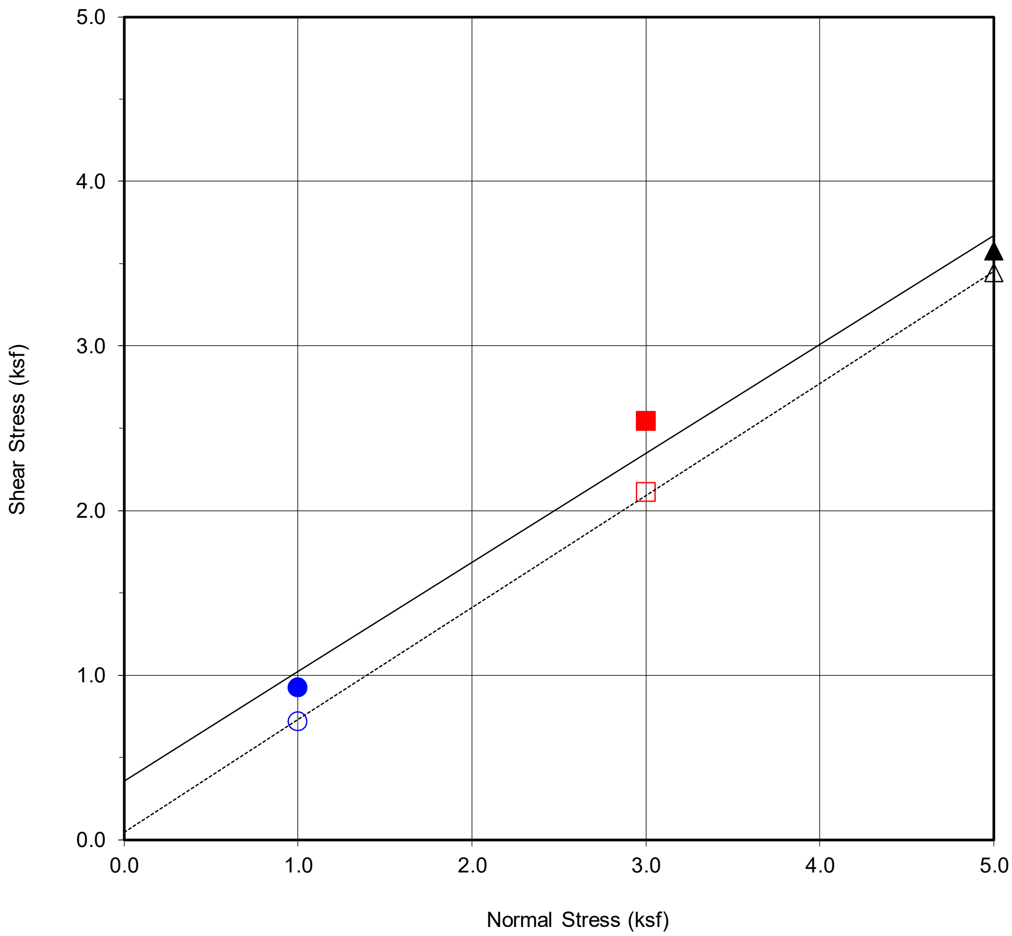
Checked by: JJK

Project No.: W1696-06-01

910 SOUTH MARIPOSA STREET
BURBANK, CALIFORNIA

JAN. 2023

Figure B2



Boring No.	B4
Sample No.	B4@6'
Depth (ft)	6
Sample Type:	Ring

Soil Identification:		
Sand w/ Silt (SP-SM)		
Strength Parameters		
	C (psf)	ϕ (^{o})
Peak	359	34
Ultimate	49	34

Normal Stress (kip/ft2)	1	3	5
Peak Shear Stress (kip/ft²)	● 0.92	■ 2.54	▲ 3.58
Shear Stress @ End of Test (ksf)	○ 0.72	□ 2.11	△ 3.44
Deformation Rate (in./min.)	0.05	0.05	0.05
Initial Sample Height (in.)	1.0	1.0	1.0
Ring Inside Diameter (in.)	2.375	2.375	2.375
Initial Moisture Content (%)	6.0	6.3	7.6
Initial Dry Density (pcf)	91.3	89.8	93.2
Initial Degree of Saturation (%)	19.2	19.5	25.2
Soil Height Before Shearing (in.)	1.2	1.2	1.2
Final Moisture Content (%)	26.2	26.3	26.2

GEOCON

DIRECT SHEAR TEST RESULTS

Consolidated Drained ASTM D-3080

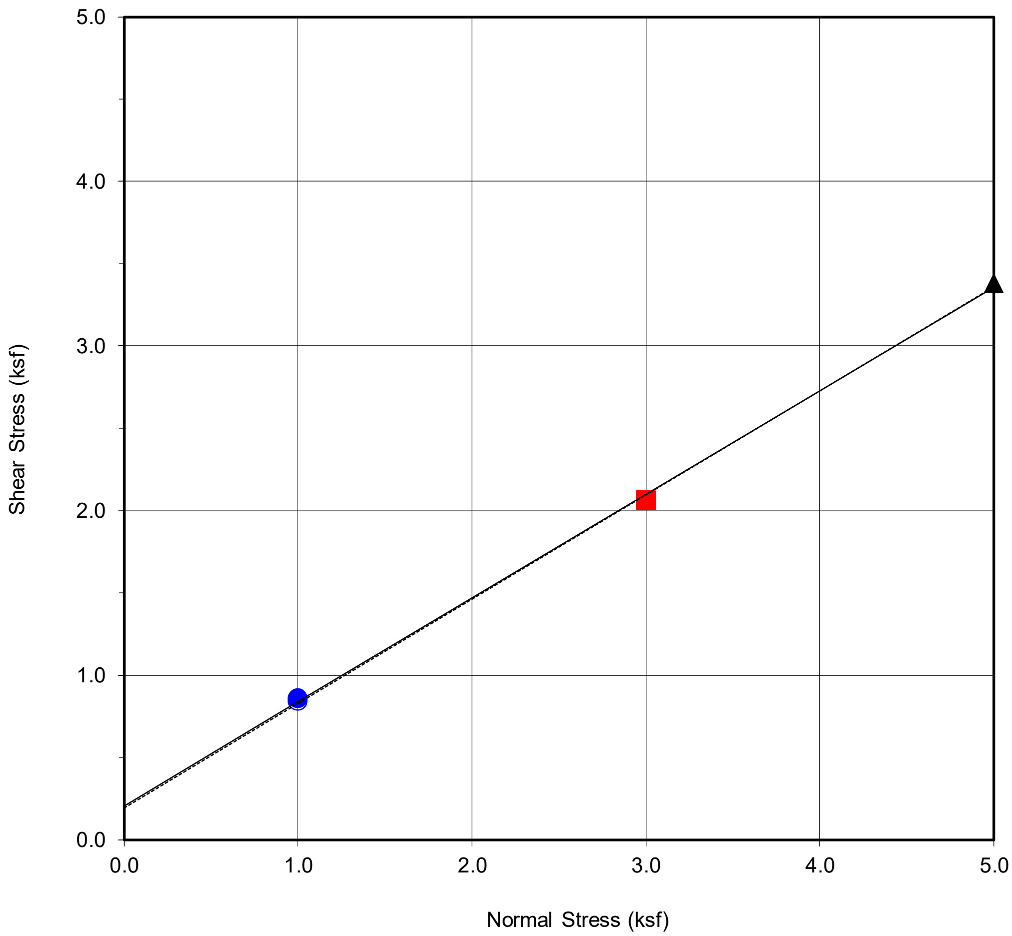
Checked by: JJK

Project No.: W1696-06-01

910 SOUTH MARIPOSA STREET
BURBANK, CALIFORNIA

JAN. 2023

Figure B3



Boring No.	B5
Sample No.	B5@3'
Depth (ft)	3
Sample Type:	Ring

Soil Identification:		
Silty Sand (SM)		
Strength Parameters		
	C (psf)	ϕ (°)
Peak	208	32
Ultimate	194	32

Normal Stress (kip/ft2)	1	3	5
Peak Shear Stress (kip/ft²)	● 0.86	■ 2.06	▲ 3.38
Shear Stress @ End of Test (ksf)	○ 0.84	□ 2.06	△ 3.38
Deformation Rate (in./min.)	0.05	0.05	0.05
Initial Sample Height (in.)	1.0	1.0	1.0
Ring Inside Diameter (in.)	2.375	2.375	2.375
Initial Moisture Content (%)	13.3	13.5	12.9
Initial Dry Density (pcf)	78.1	82.9	87.8
Initial Degree of Saturation (%)	31.1	35.2	38.0
Soil Height Before Shearing (in.)	1.2	1.2	1.2
Final Moisture Content (%)	28.5	25.0	22.9

GEOCON

DIRECT SHEAR TEST RESULTS

Consolidated Drained ASTM D-3080

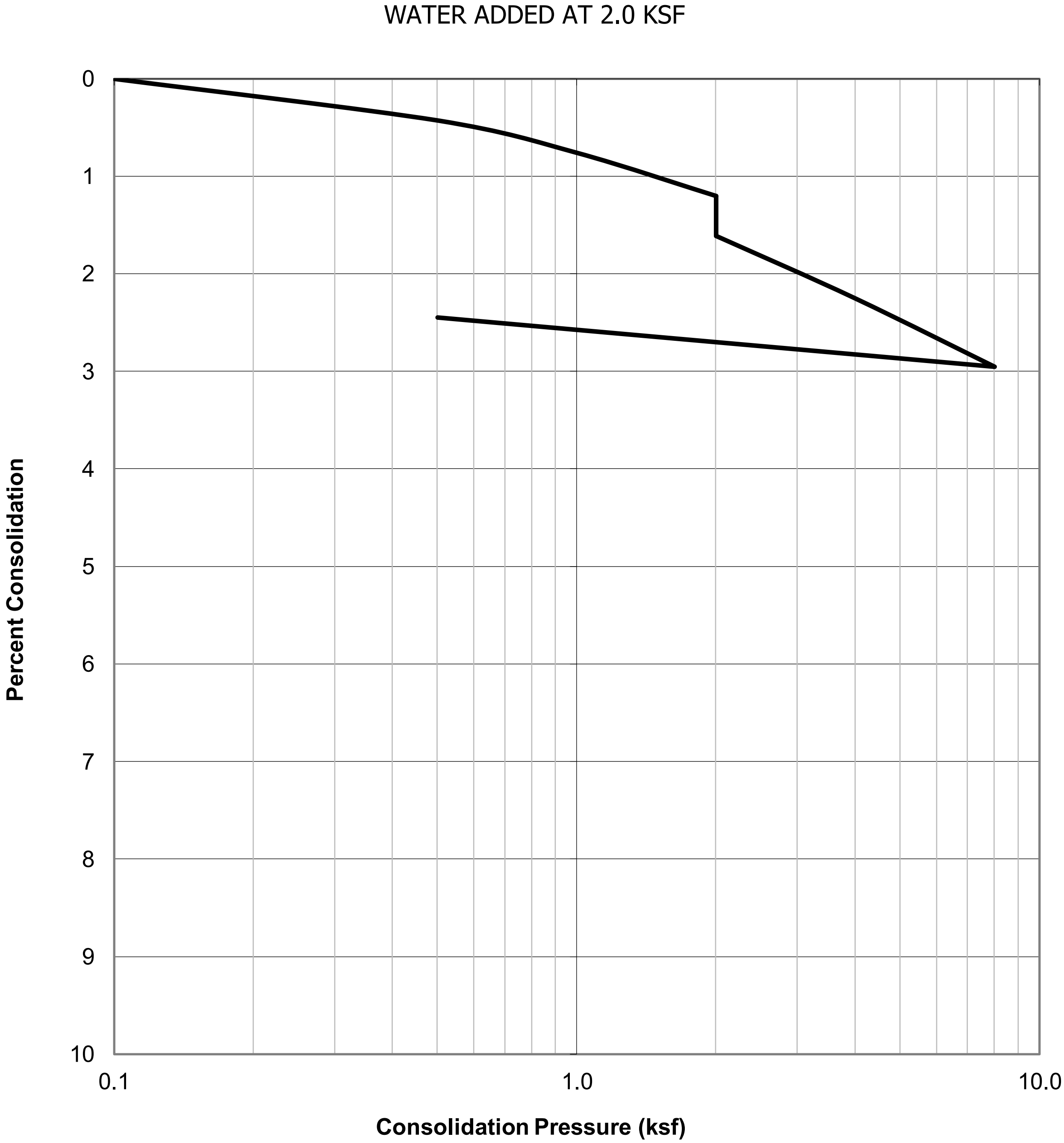
Checked by: JJK

Project No.: W1696-06-01

910 SOUTH MARIPOSA STREET
BURBANK, CALIFORNIA

JAN. 2023

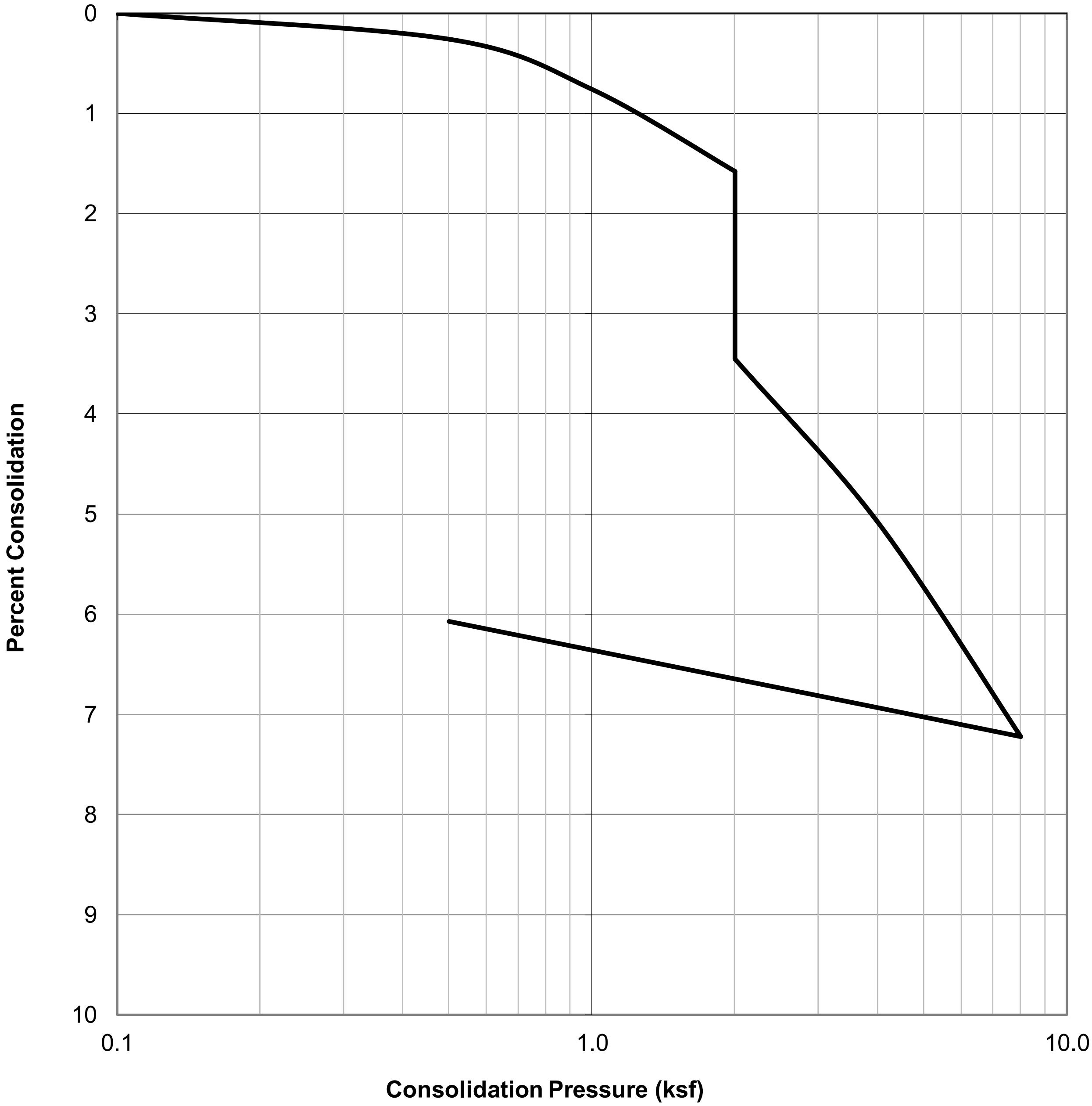
Figure B4



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B1@7.5	Sandy Silt (ML)	94.1	2.5	23.6

GEOCON	**CONSOLIDATION TEST RESULTS** ASTM D-2435	Project No.: W1696-06-01
		910 SOUTH MARIPOSA STREET BURBANK, CALIFORNIA
	Checked by: JJK	JAN. 2023 Figure B5

WATER ADDED AT 2.0 KSF



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B1@12.5	Sandy Silt (ML)	82.0	7.0	31.9

GEOCON

CONSOLIDATION TEST RESULTS

ASTM D-2435

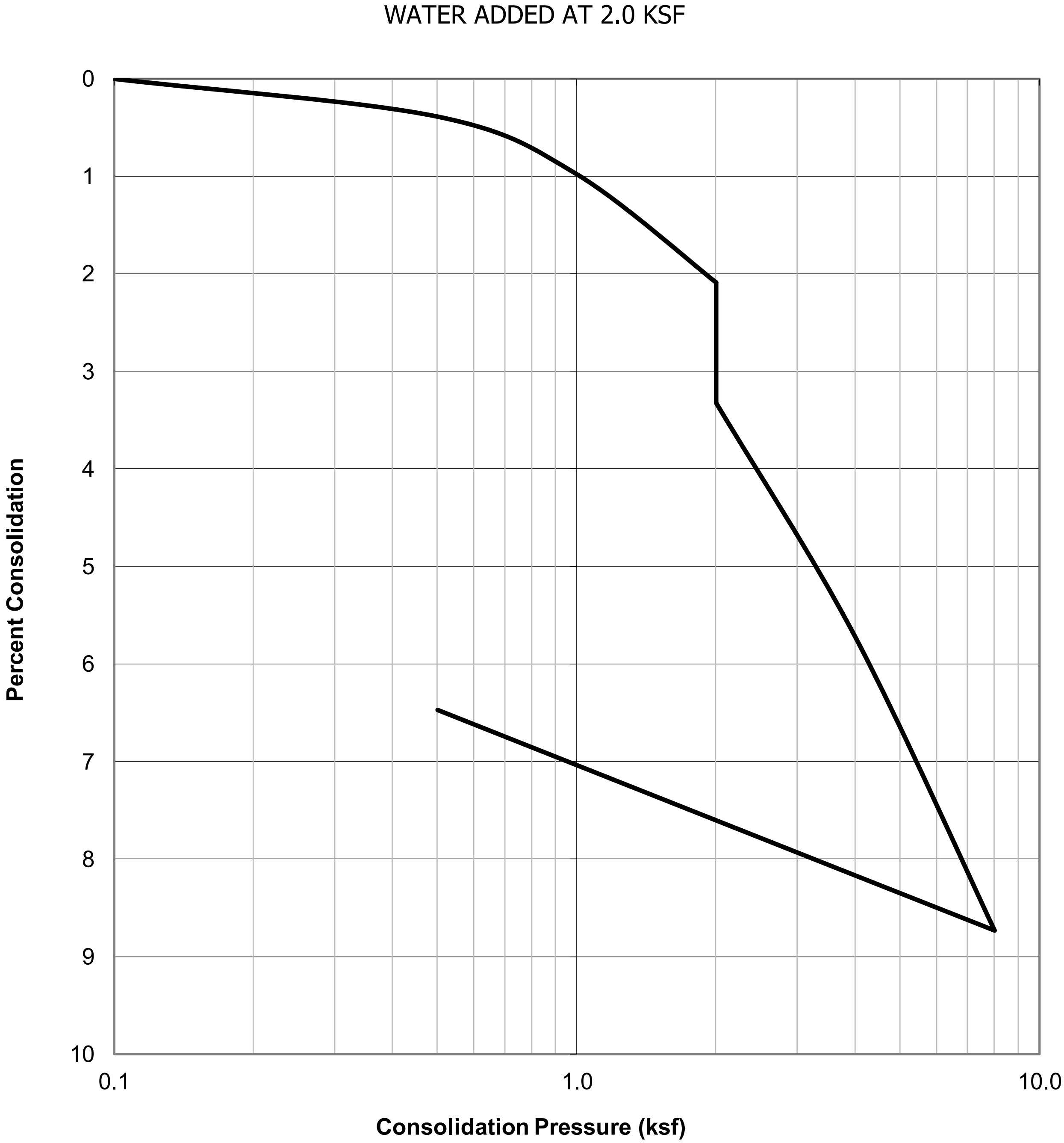
Checked by: JJK

Project No.: W1696-06-01

910 SOUTH MARIPOSA STREET
BURBANK, CALIFORNIA

JAN. 2023

Figure B6



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B1@17.5	Silty Sand (SM)	76.4	17.0	37.5

GEOCON

CONSOLIDATION TEST RESULTS

ASTM D-2435

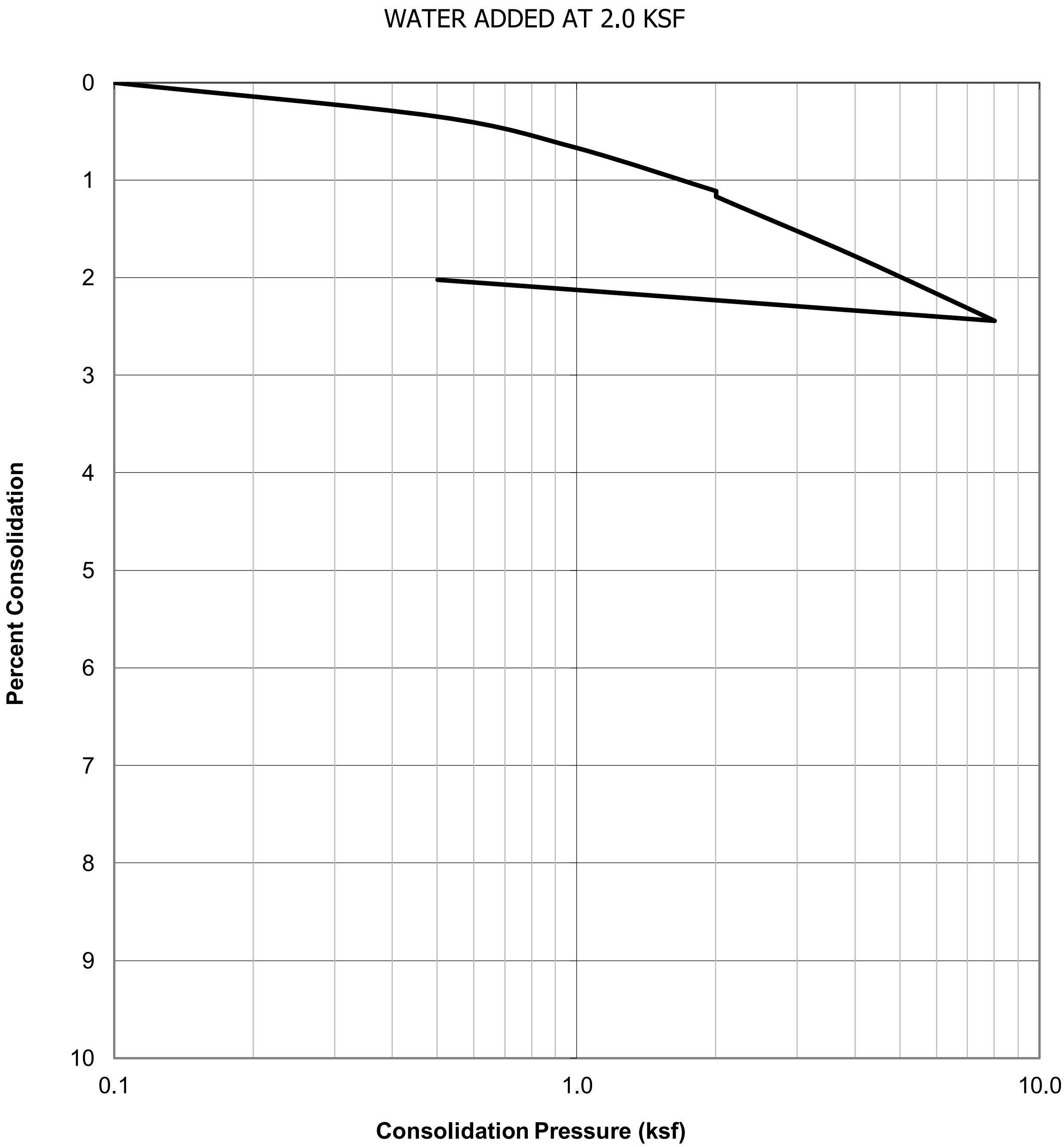
Checked by: JJK

Project No.: W1696-06-01

910 SOUTH MARIPOSA STREET
BURBANK, CALIFORNIA

JAN. 2023

Figure B7



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B1@22.5	Sand (SP)	109.3	2.4	17.7

GEOCON

CONSOLIDATION TEST RESULTS

ASTM D-2435

Checked by: JJK

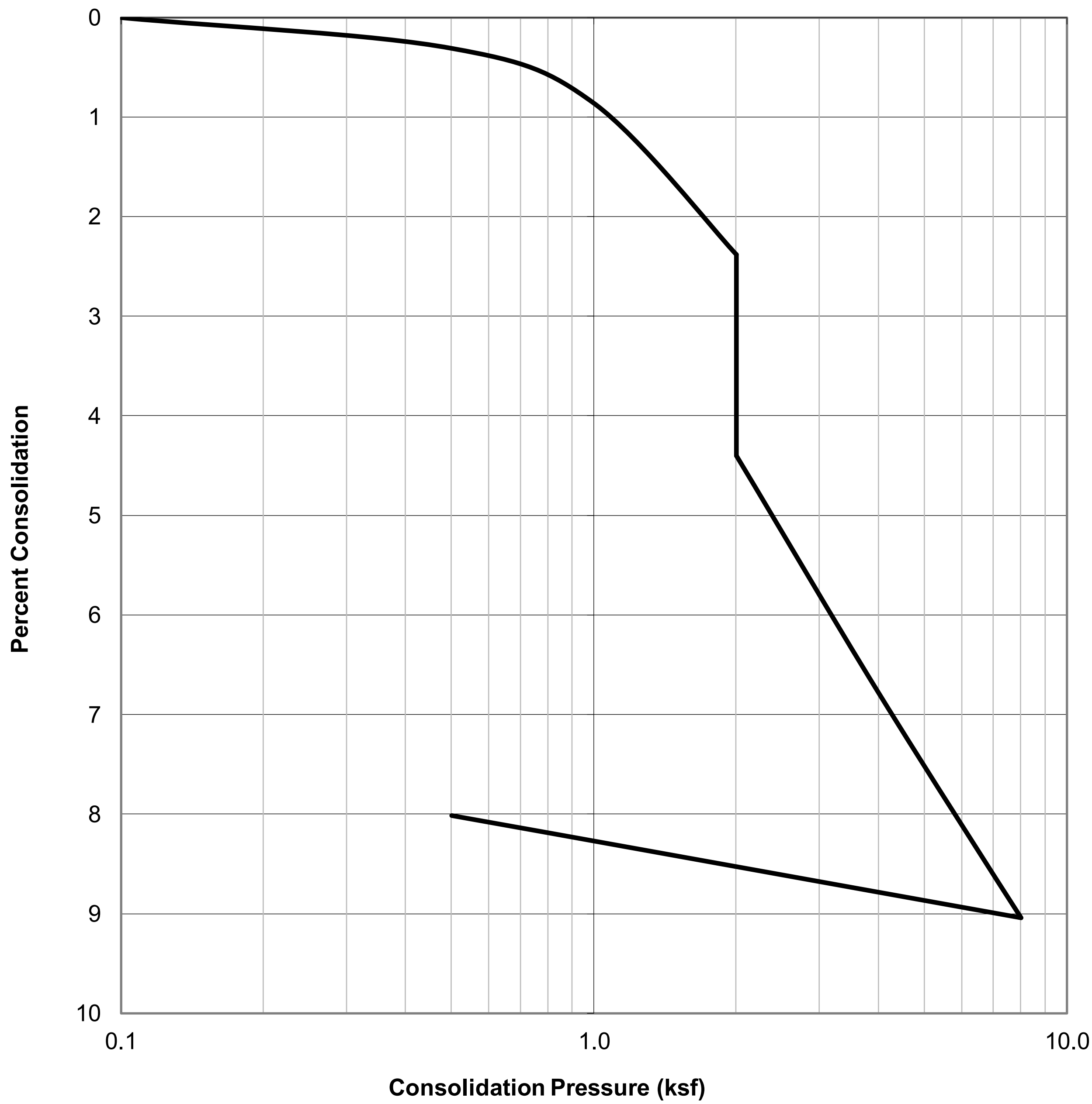
Project No.: W1696-06-01

910 SOUTH MARIPOSA STREET
BURBANK, CALIFORNIA

JAN. 2023

Figure B8

WATER ADDED AT 2.0 KSF



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B2@7.5	Sandy Silt (ML)	88.3	14.5	25.4

GEOCON

CONSOLIDATION TEST RESULTS

ASTM D-2435

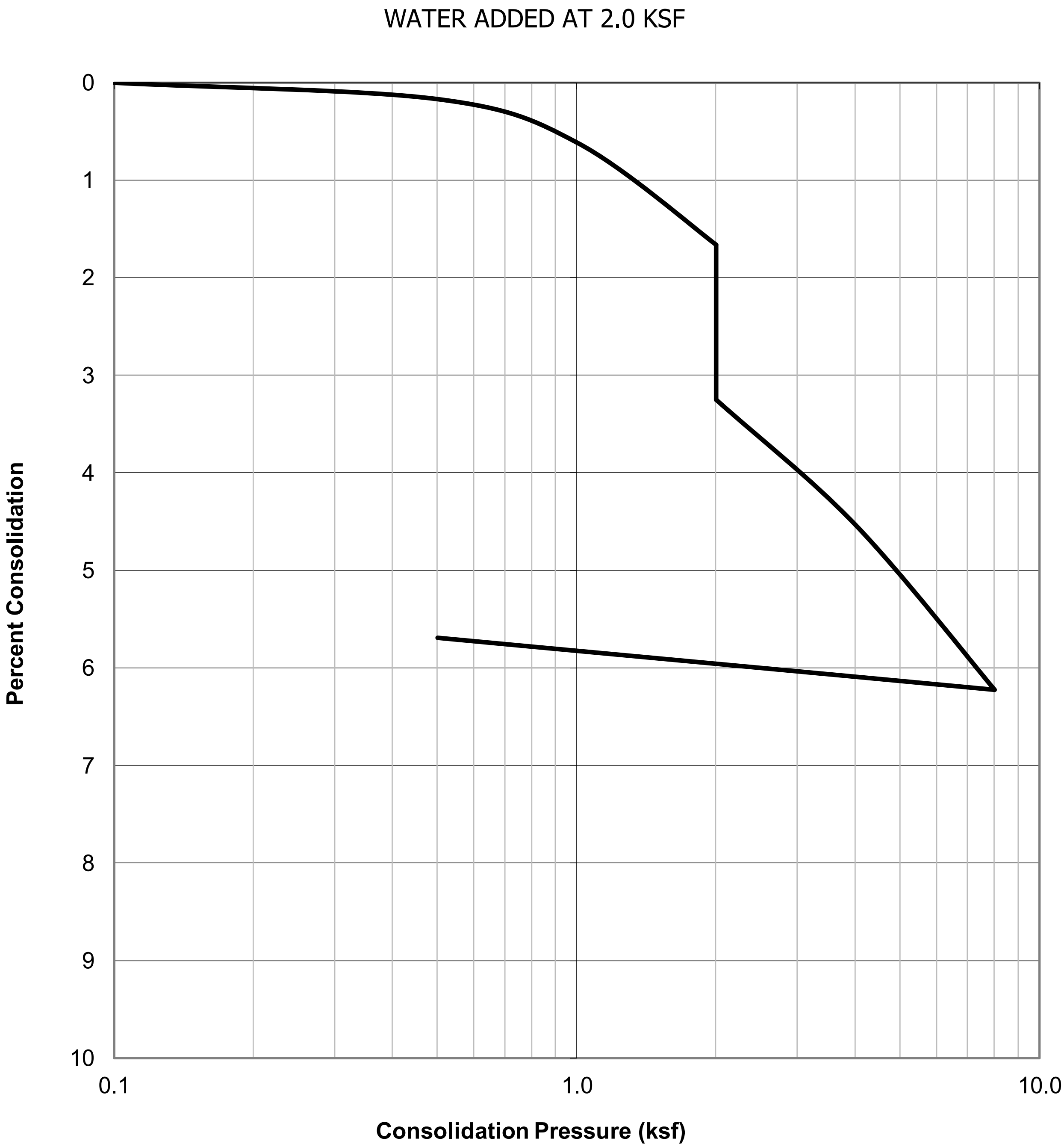
Checked by: JJK

Project No.: W1696-06-01

910 SOUTH MARIPOSA STREET
BURBANK, CALIFORNIA

JAN. 2023

Figure B9



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B2@10	Sand w/ Silt (SP-SM)	83.2	4.0	29.0

GEOCON

CONSOLIDATION TEST RESULTS

ASTM D-2435

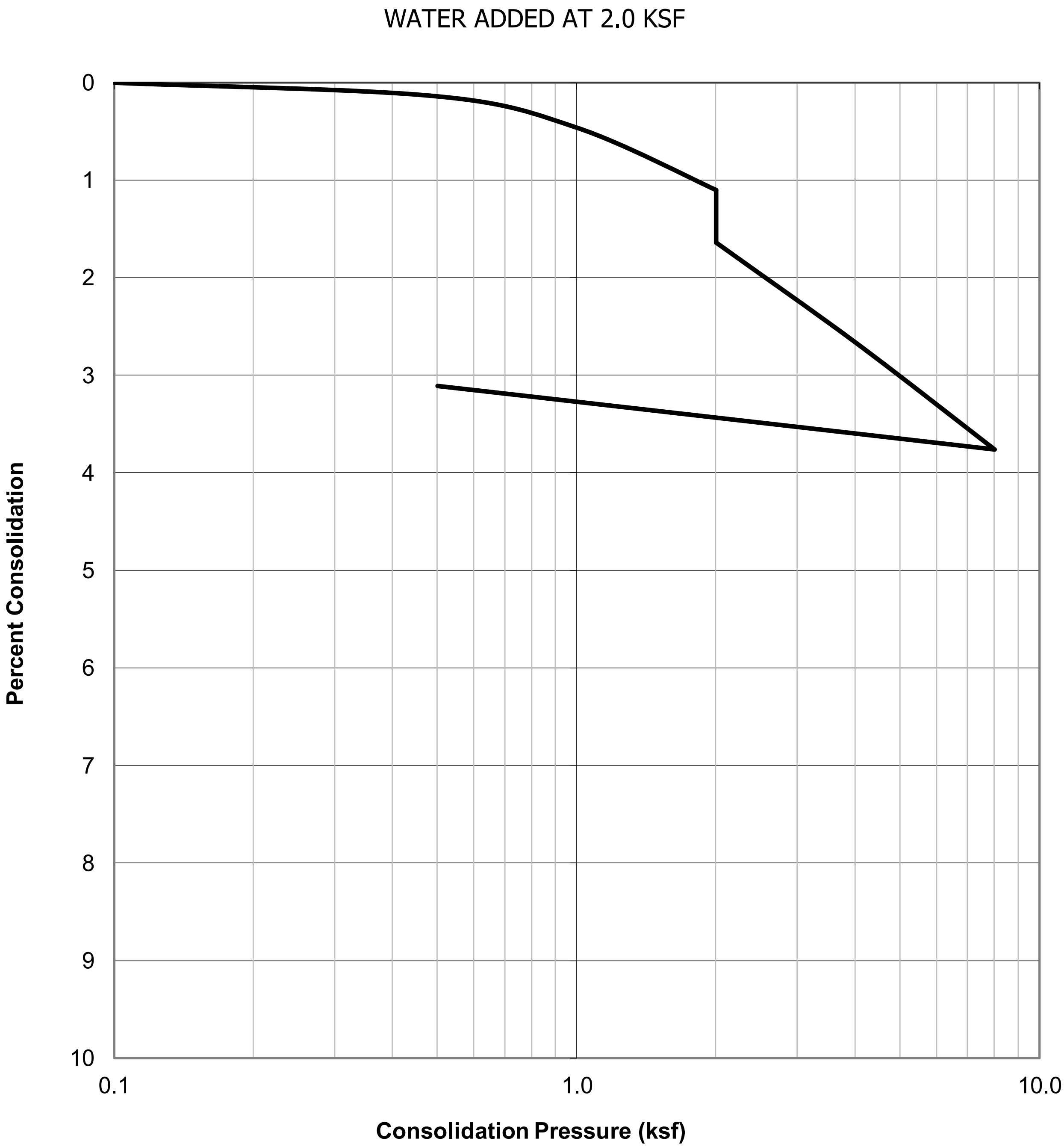
Checked by: JJK

Project No.: W1696-06-01

910 SOUTH MARIPOSA STREET
BURBANK, CALIFORNIA

JAN. 2023

Figure B10



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B2@15	Silt w/ Sand (ML)	87.9	4.8	28.2

GEOCON

CONSOLIDATION TEST RESULTS

ASTM D-2435

Checked by: JJK

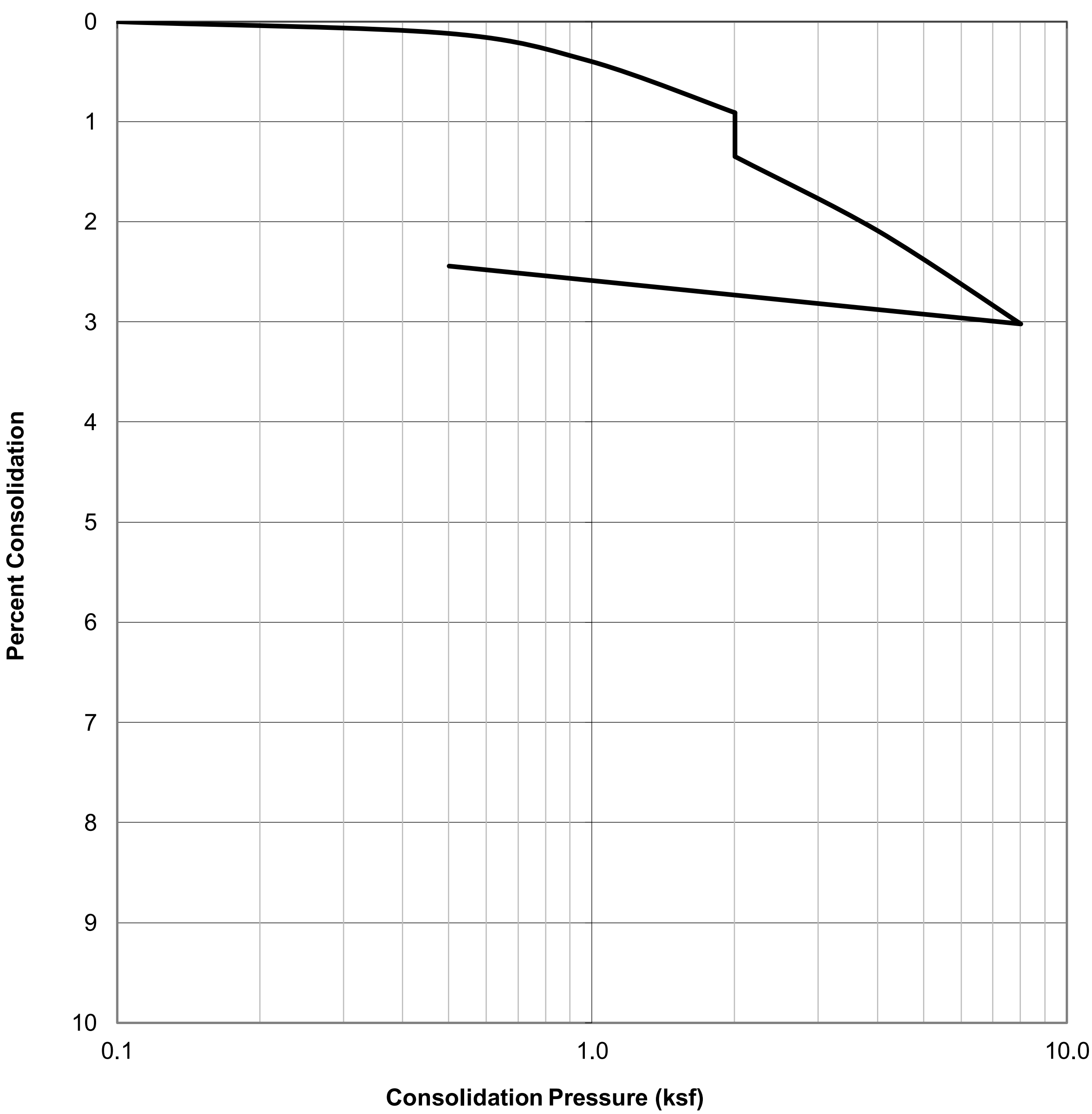
Project No.: W1696-06-01

910 SOUTH MARIPOSA STREET
BURBANK, CALIFORNIA

JAN. 2023

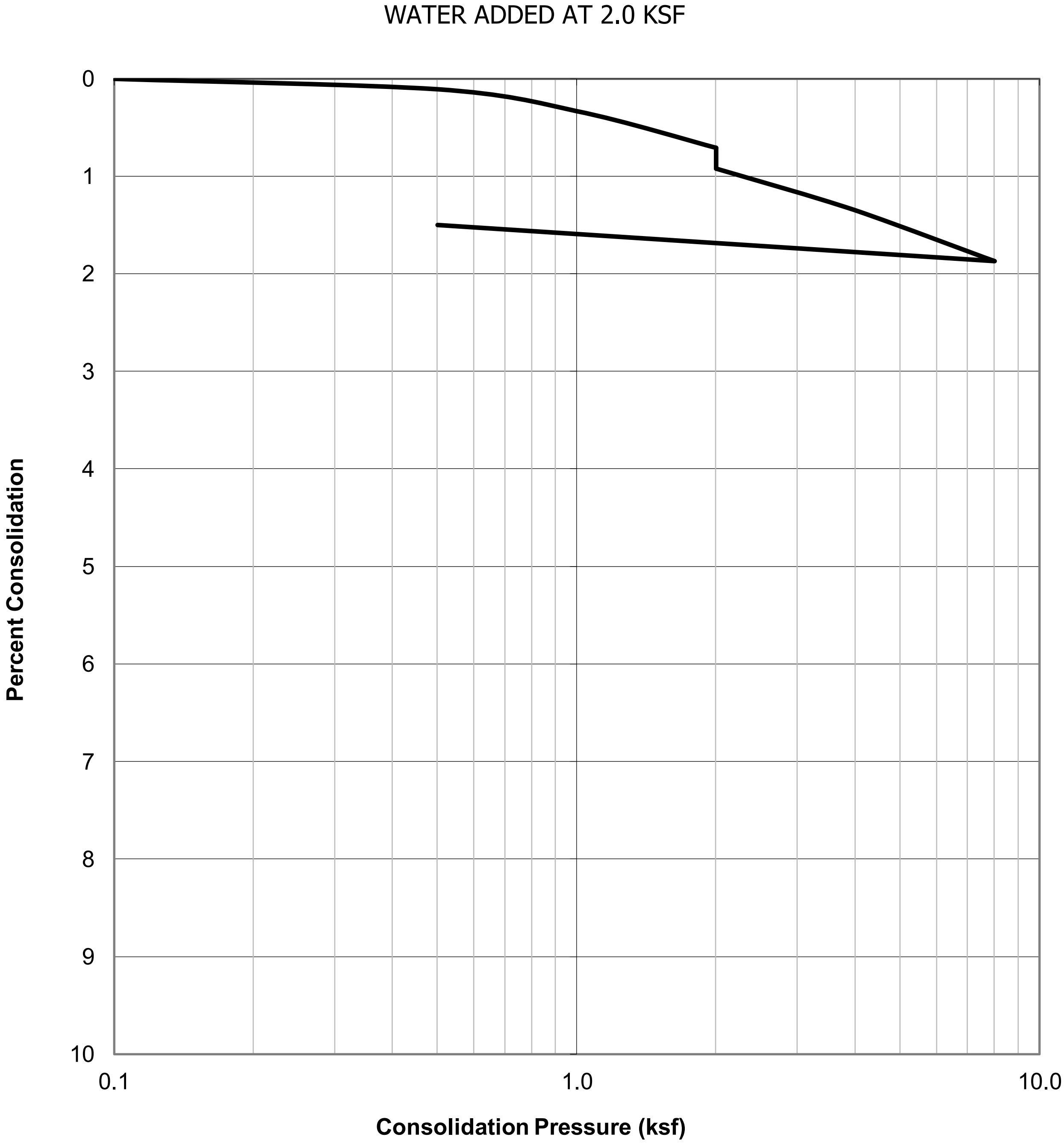
Figure B11

WATER ADDED AT 2.0 KSF



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B2@20	Silty Sand (SM)	93.9	4.2	22.9

GEOCON	**CONSOLIDATION TEST RESULTS** ASTM D-2435	Project No.: W1696-06-01
		910 SOUTH MARIPOSA STREET BURBANK, CALIFORNIA
	Checked by: JJK	JAN. 2023 Figure B12



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B2@25	Sand (SP)	103.7	3.1	19.3

GEOCON

CONSOLIDATION TEST RESULTS

ASTM D-2435

Checked by: JJK

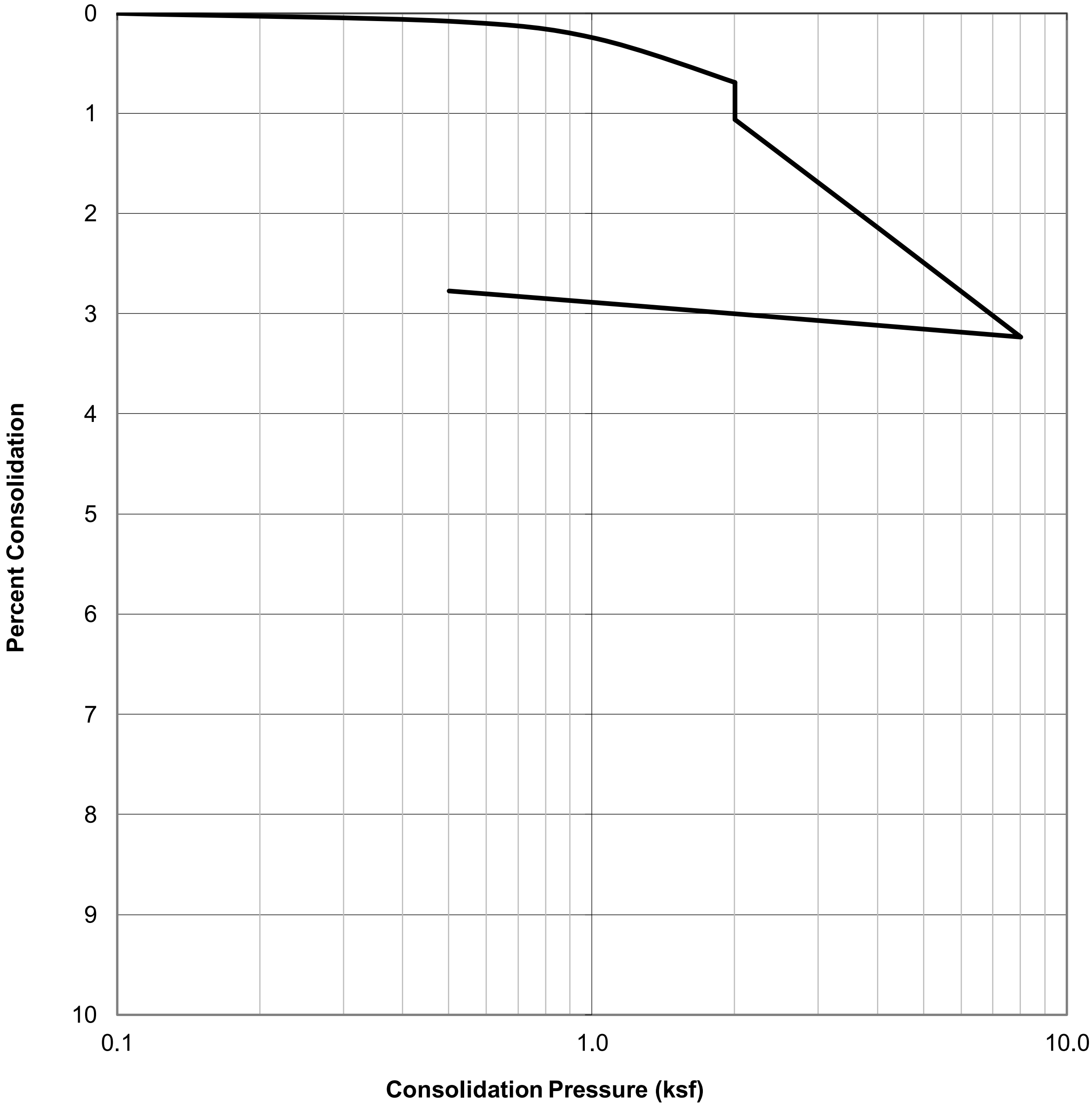
Project No.: W1696-06-01

910 SOUTH MARIPOSA STREET
BURBANK, CALIFORNIA

JAN. 2023

Figure B13

WATER ADDED AT 2.0 KSF



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B2@30	Sand (SP)	105.4	2.8	16.6

GEOCON

CONSOLIDATION TEST RESULTS

ASTM D-2435

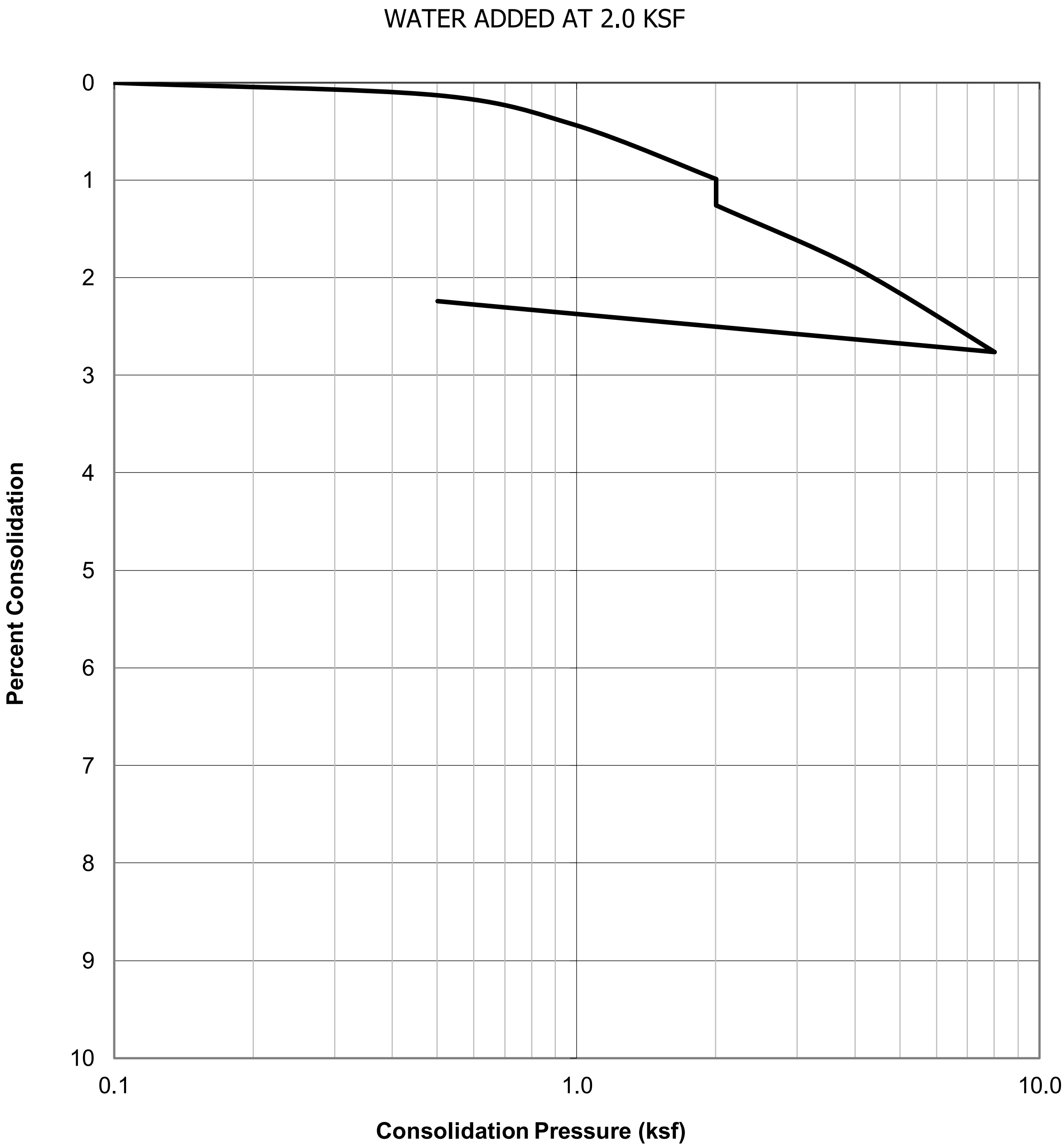
Checked by: JJK

Project No.: W1696-06-01

910 SOUTH MARIPOSA STREET
BURBANK, CALIFORNIA

JAN. 2023

Figure B14



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B2@35	Sand (SP)	98.4	2.8	22.1

GEOCON

CONSOLIDATION TEST RESULTS

ASTM D-2435

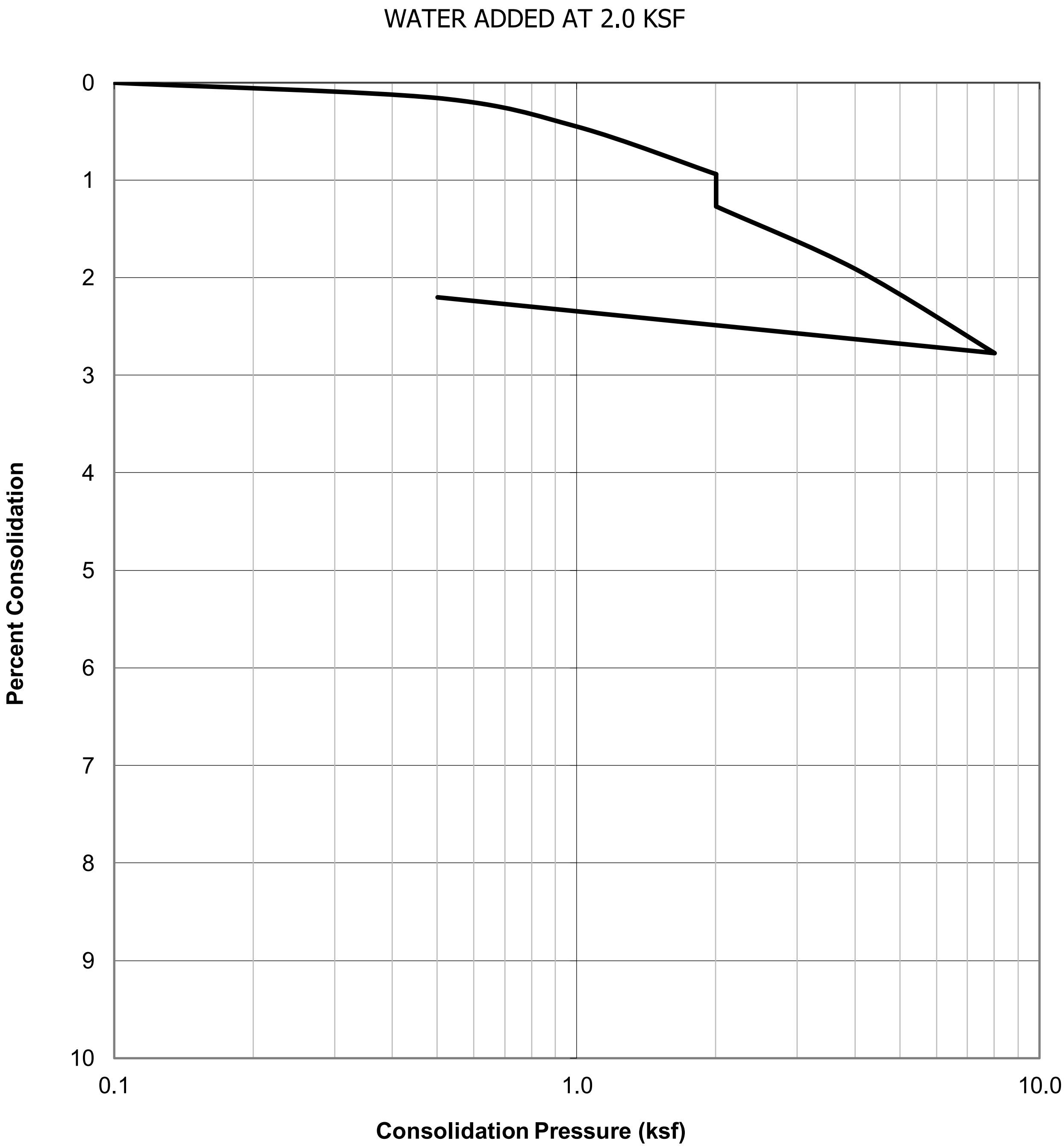
Checked by: JJK

Project No.: W1696-06-01

910 SOUTH MARIPOSA STREET
BURBANK, CALIFORNIA

JAN. 2023

Figure B15



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B3@10	Silty Sand (SM)	96.2	4.1	23.8

GEOCON

CONSOLIDATION TEST RESULTS

ASTM D-2435

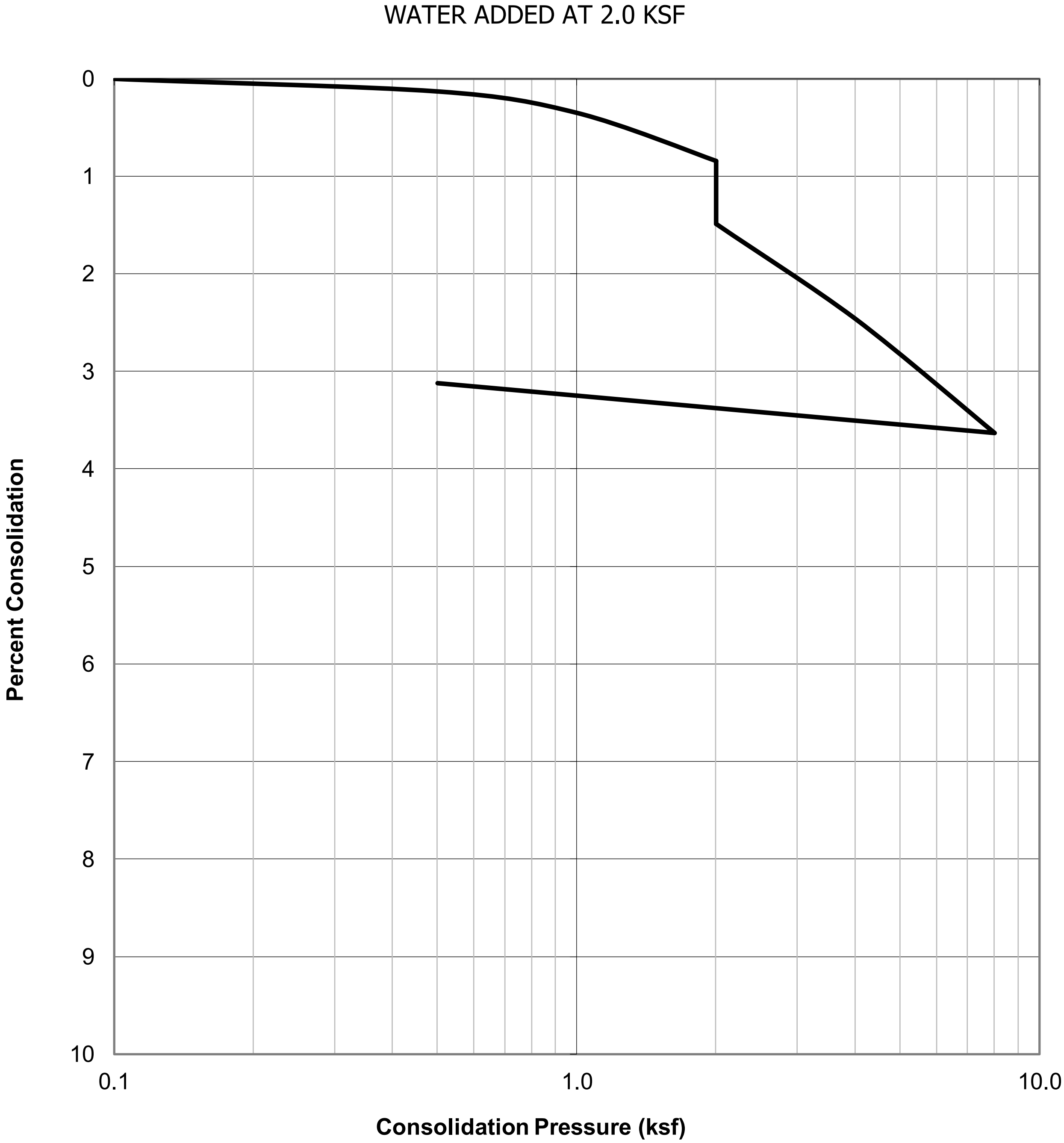
Checked by: JJK

Project No.: W1696-06-01

910 SOUTH MARIPOSA STREET
BURBANK, CALIFORNIA

JAN. 2023

Figure B16



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B3@20	Sand w/ Silt (SP-SM)	97.5	5.1	18.7

GEOCON

CONSOLIDATION TEST RESULTS

ASTM D-2435

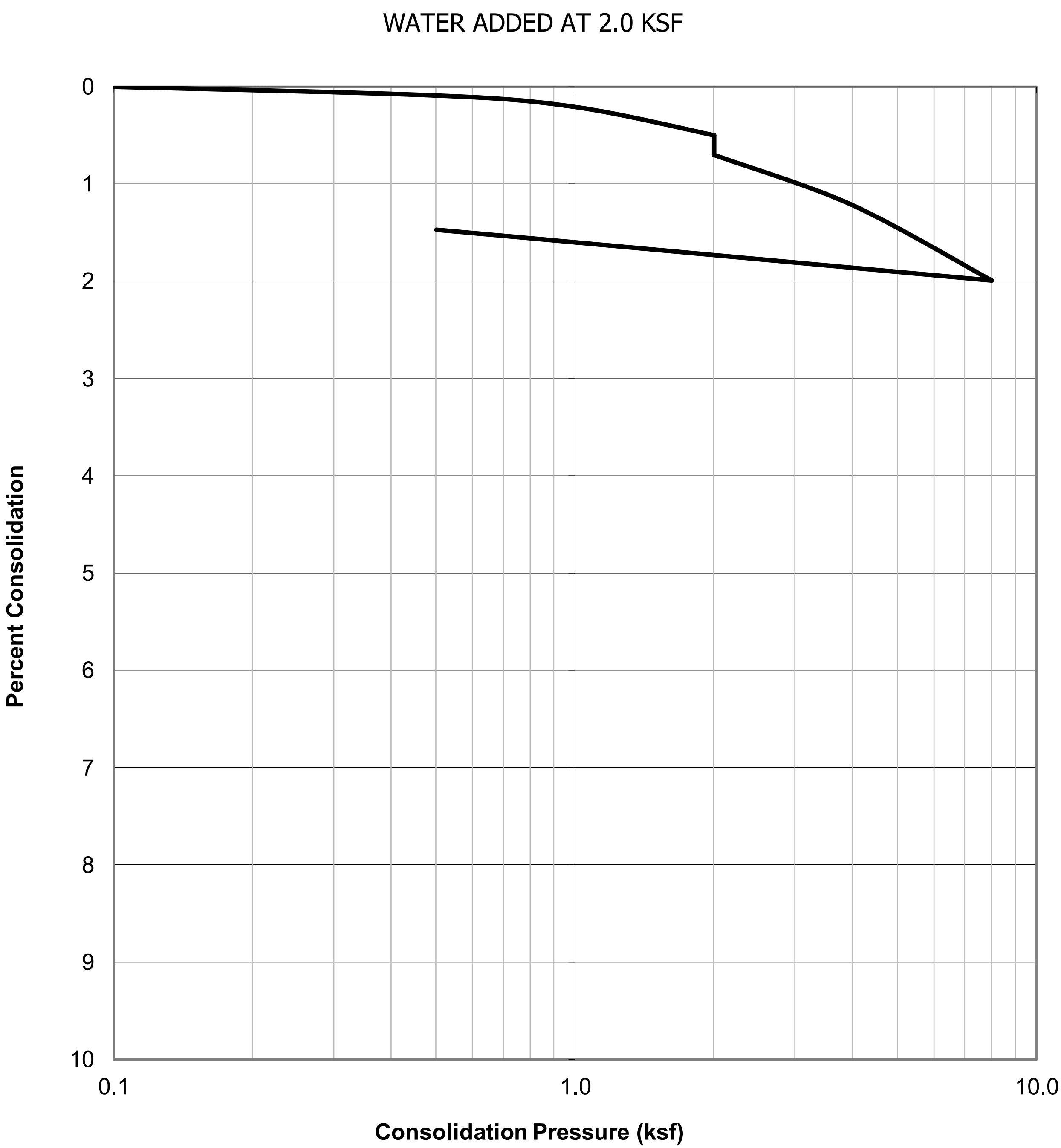
Checked by: JJK

Project No.: W1696-06-01

910 SOUTH MARIPOSA STREET
BURBANK, CALIFORNIA

JAN. 2023

Figure B17



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B4@6	Sand w/ Silt (SP-SM)	93.5	3.9	24.4

GEOCON

CONSOLIDATION TEST RESULTS

ASTM D-2435

Checked by: JJK

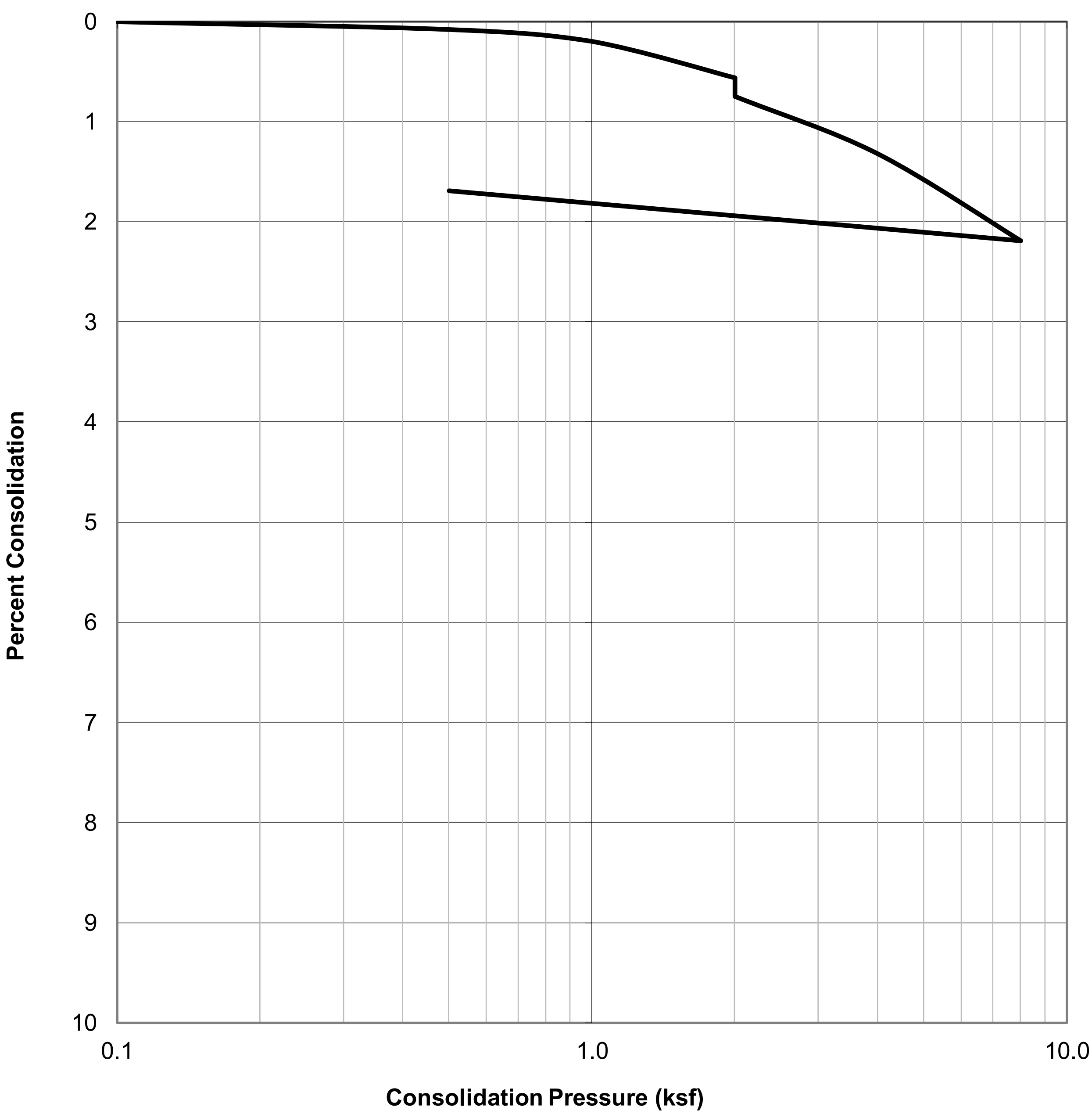
Project No.: W1696-06-01

910 SOUTH MARIPOSA STREET
BURBANK, CALIFORNIA

JAN. 2023

Figure B18

WATER ADDED AT 2.0 KSF



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B4@10	Sand w/ Silt (SP-SM)	91.2	4.1	26.9

GEOCON

CONSOLIDATION TEST RESULTS

ASTM D-2435

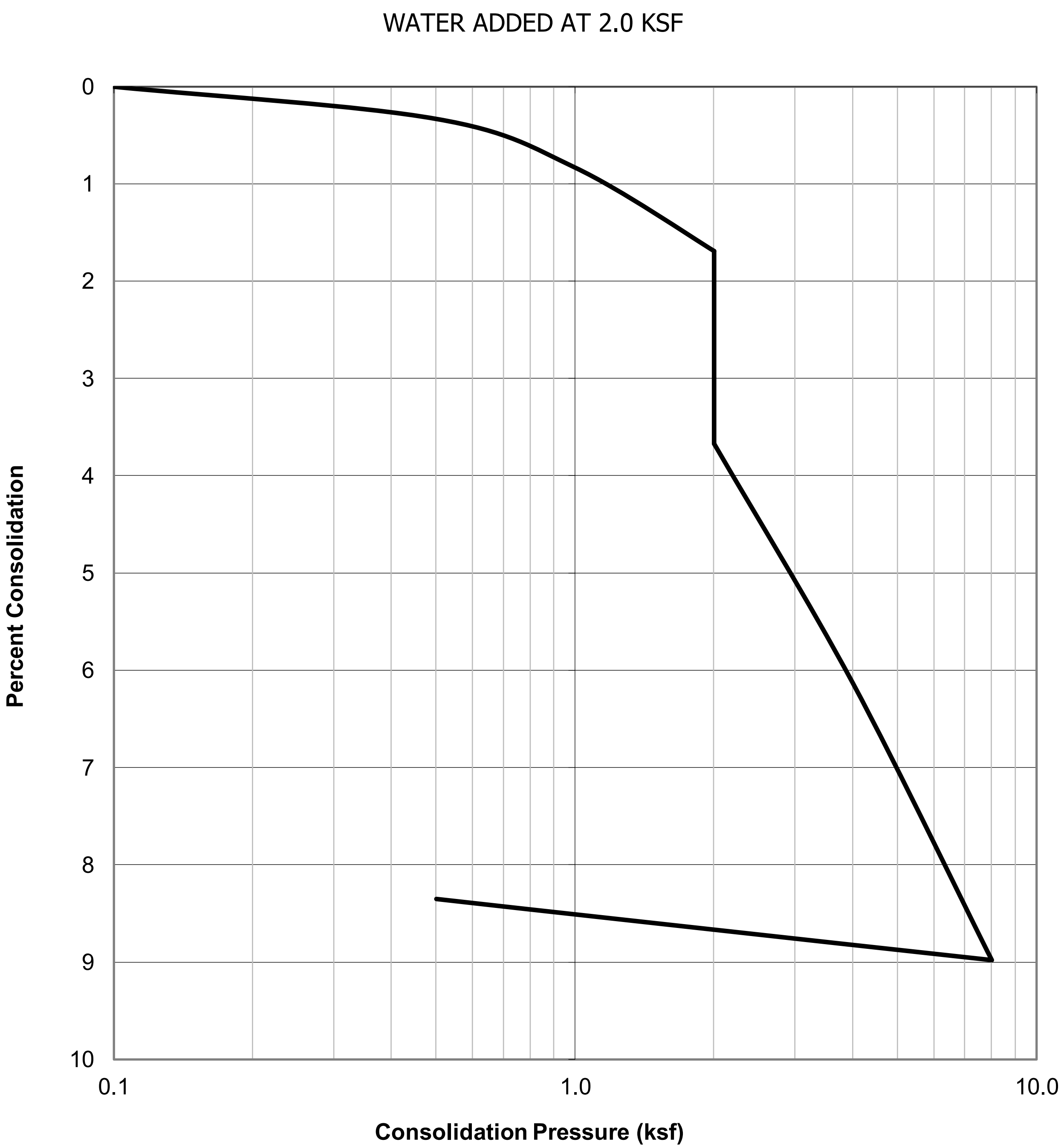
Checked by: JJK

Project No.: W1696-06-01

910 SOUTH MARIPOSA STREET
BURBANK, CALIFORNIA

JAN. 2023

Figure B19



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B5@5.5	Silty Sand (SM)	100.5	7.7	19.0

GEOCON

CONSOLIDATION TEST RESULTS

ASTM D-2435

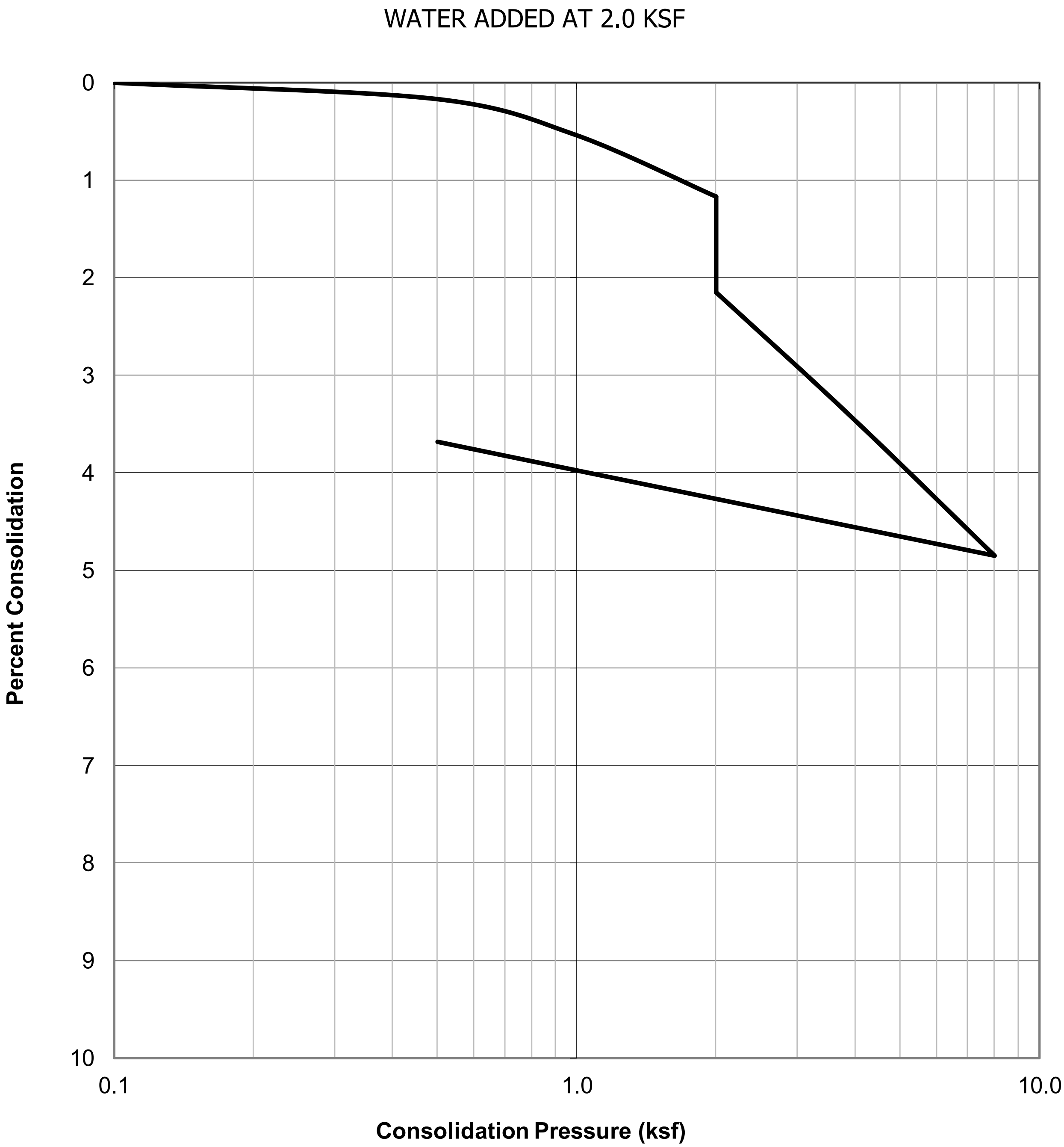
Checked by: JJK

Project No.: W1696-06-01

910 SOUTH MARIPOSA STREET
BURBANK, CALIFORNIA

JAN. 2023

Figure B20



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B5@9.5	Silty Sand (SM)	90.4	6.5	26.5

GEOCON

CONSOLIDATION TEST RESULTS

ASTM D-2435

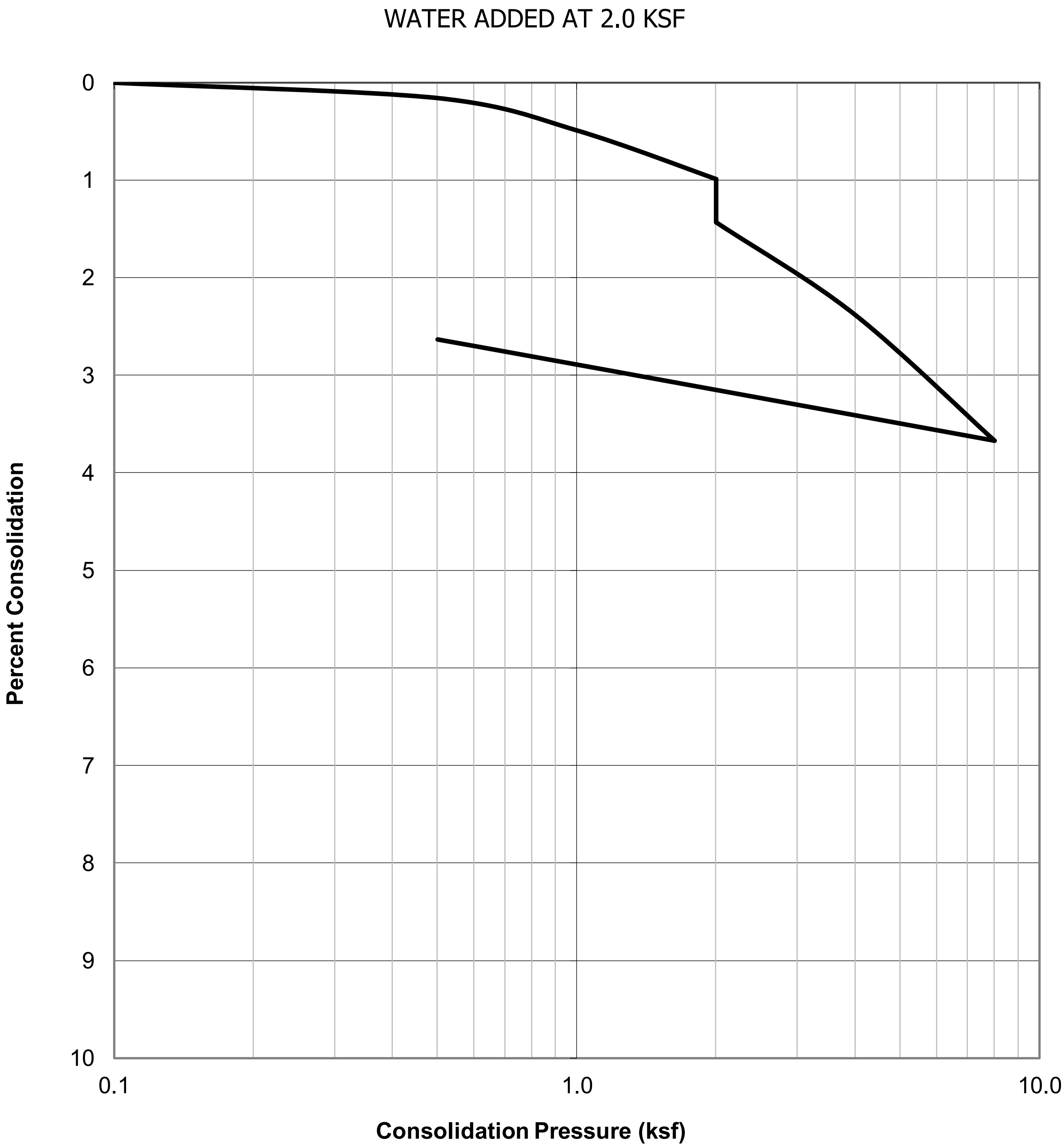
Checked by: JJK

Project No.: W1696-06-01

910 SOUTH MARIPOSA STREET
BURBANK, CALIFORNIA

JAN. 2023

Figure B21



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B5@12	Silty Sand (SM)	86.2	6.7	29.8

GEOCON

CONSOLIDATION TEST RESULTS

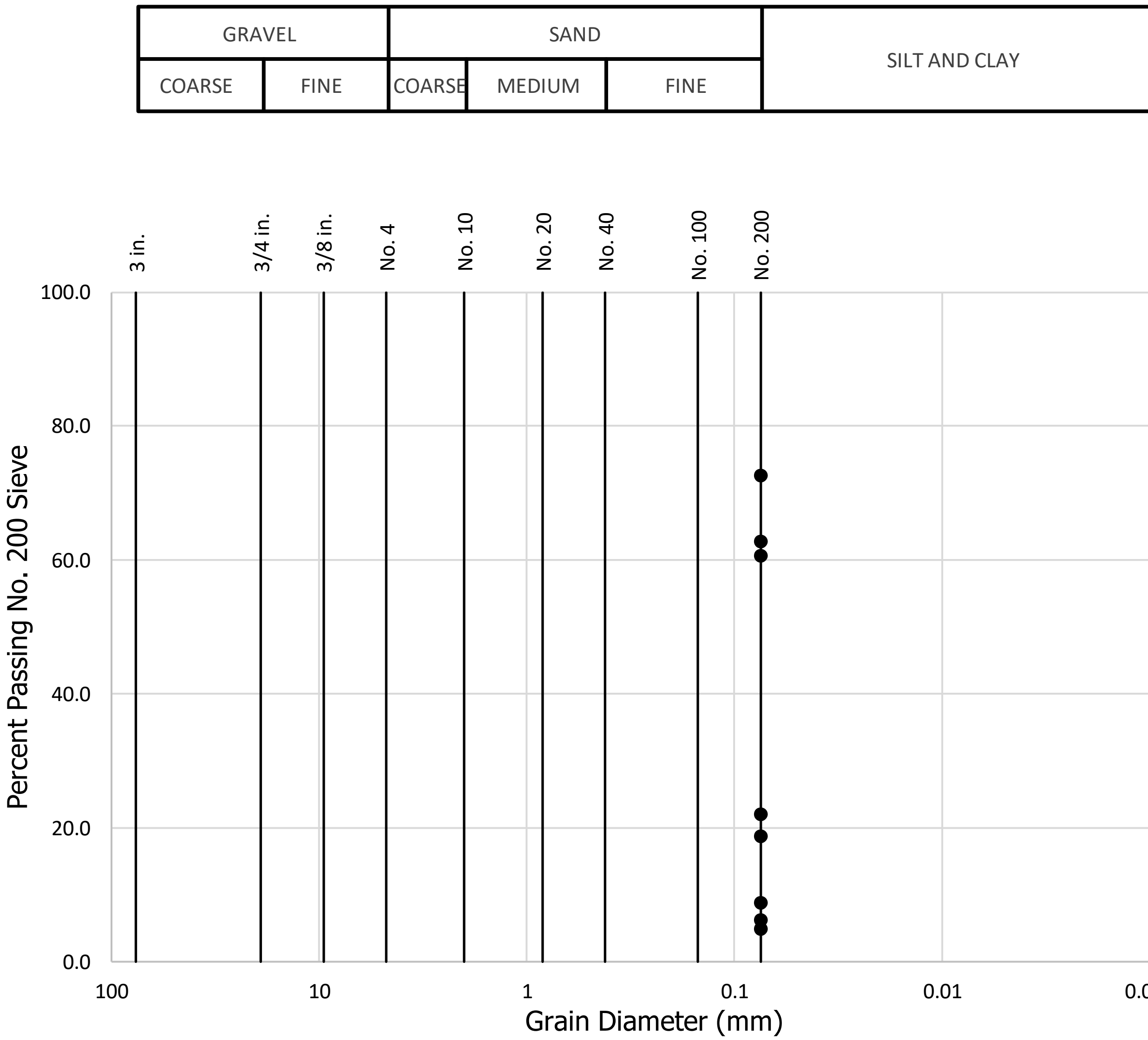
ASTM D-2435

Checked by: JJK

Project No.: W1696-06-01

910 SOUTH MARIPOSA STREET
BURBANK, CALIFORNIA

JAN. 2023



Sample No.	Percent Passing No. 200 Sieve
B1 @ 5'	62.8
B1 @ 10'	18.7
B1 @ 14.5'	22.1
B1 @ 19.5'	8.8
B1 @ 25'	4.9
B2 @ 4'	60.7
B2 @ 10'	6.2
B2 @ 12'	72.7

GEOCON

GRAIN SIZE ANALYSIS

ASTM D-1140

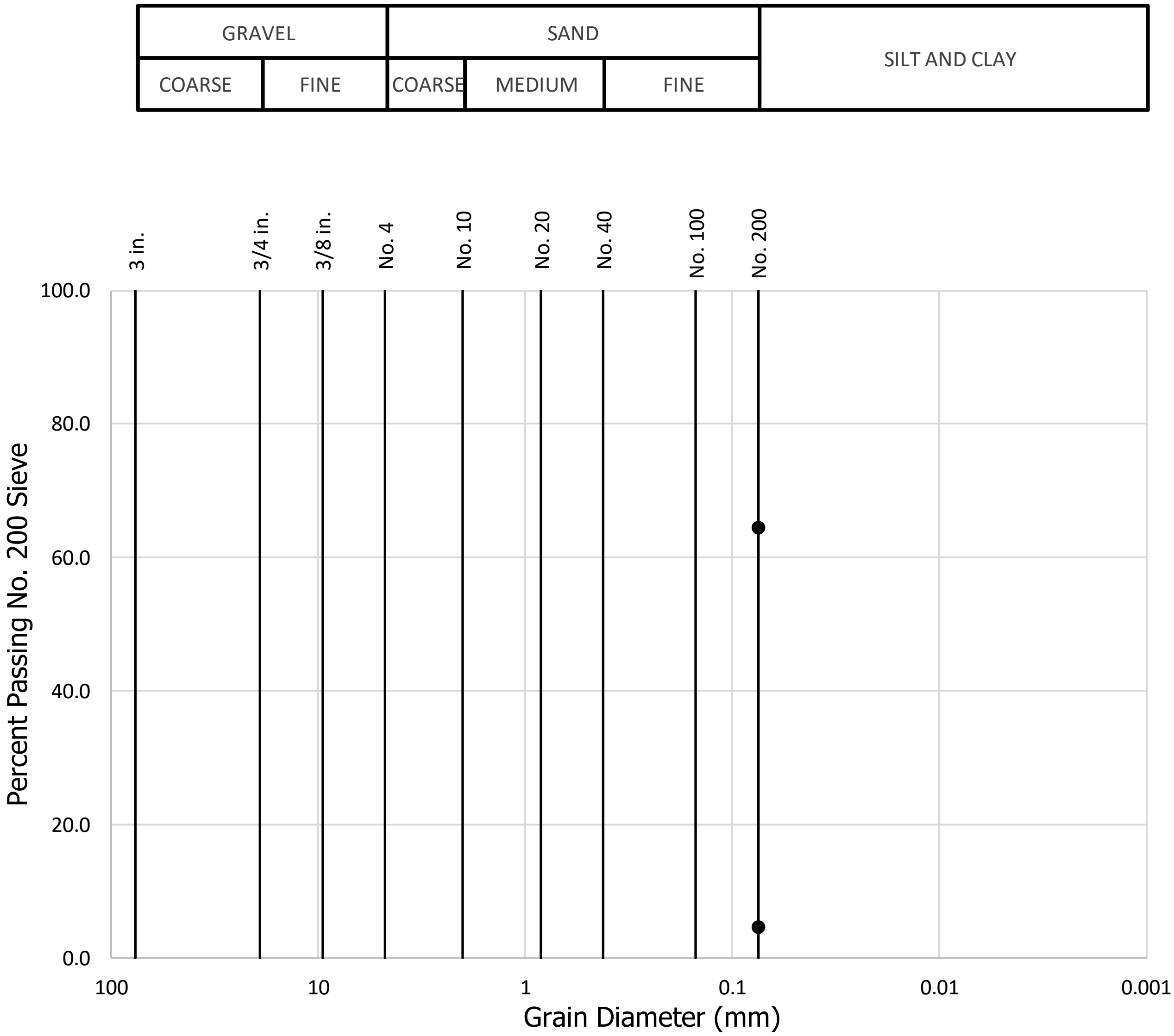
Checked by: JJK

Project No.: W1696-06-01

910 SOUTH MARIPOSA STREET
BURBANK, CALIFORNIA

JAN. 2023

Figure B23



Sample No.	Percent Passing No. 200 Sieve
B2 @ 17.5'	64.5
B2 @ 22.5'	4.6

GEOCON

GRAIN SIZE ANALYSIS

ASTM D-1140

Checked by: JJK

Project No.: W1696-06-01

910 SOUTH MARIPOSA STREET
BURBANK, CALIFORNIA

JAN. 2023

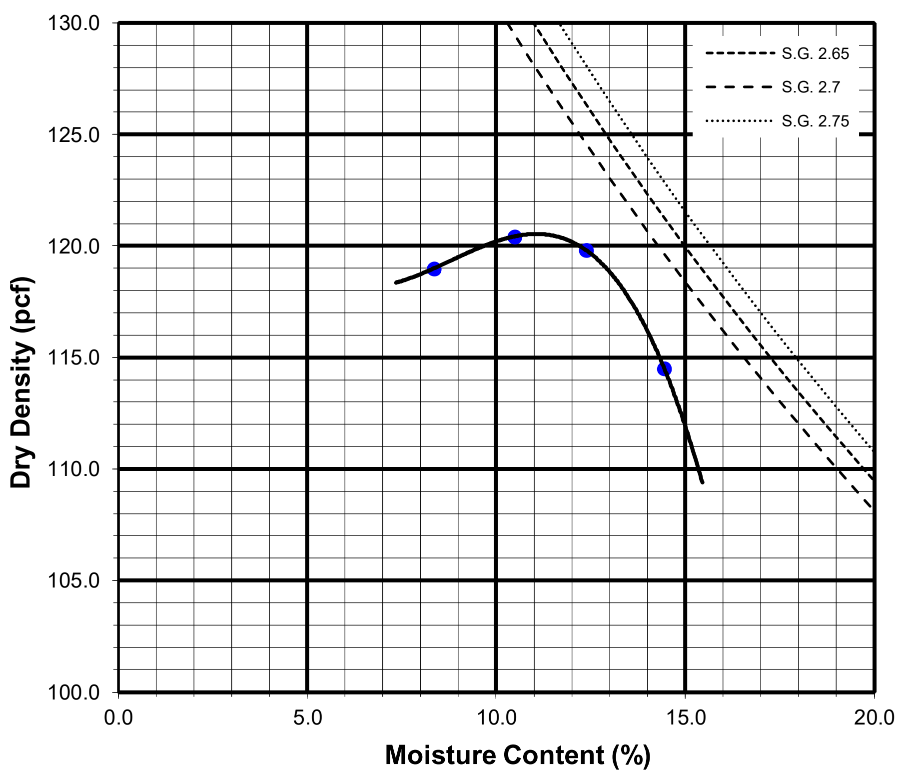
Figure B24

Sample No:

B1@0-5'	Sandy Silt (ML)

TEST NO.		1	2	3	4	5	6
Wt. Compacted Soil + Mold	(g)	6155	6218	6242	6187		
Weight of Mold	(g)	4208	4208	4208	4208		
Net Weight of Soil	(g)	1948	2010	2034	1979		
Wet Weight of Soil + Cont.	(g)	649.3	704.4	646.9	675.5		
Dry Weight of Soil + Cont.	(g)	608.9	650.3	589.5	606.2		
Weight of Container	(g)	124.8	134.0	125.2	126.5		
Moisture Content	(%)	8.4	10.5	12.4	14.4		
Wet Density	(pcf)	128.9	133.0	134.6	131.0		
Dry Density	(pcf)	119.0	120.4	119.8	114.5		

Maximum Dry Density (pcf)	**121.0**	**Optimum Moisture Content (%)**	**11.5**



Preparation Method: A

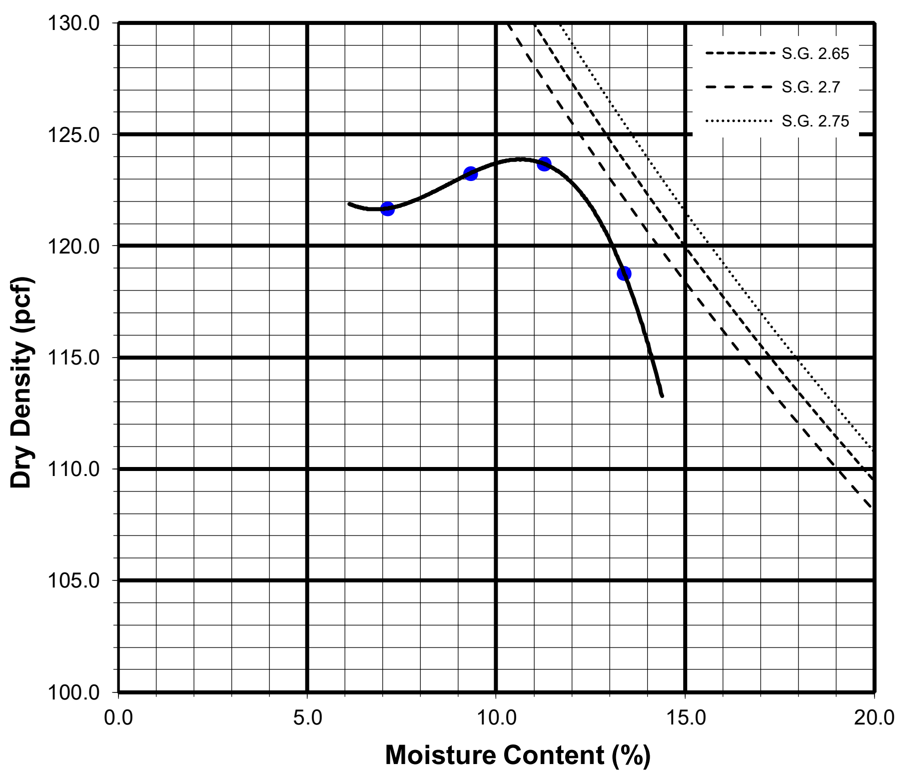
GEOCON	**COMPACTION CHARACTERISTICS USING MODIFIED EFFORT TEST RESULTS** ASTM D-1557	Project No.: W1696-06-01
		910 SOUTH MARIPOSA STREET BURBANK, CALIFORNIA
	Checked by: JJK	JAN. 2023 Figure B25

Sample No:

B4+B5@0-5'	Silty Sand (SM)

TEST NO.		1	2	3	4	5	6
Wt. Compacted Soil + Mold	(g)	6177	6243	6287	6242		
Weight of Mold	(g)	4208	4208	4208	4208		
Net Weight of Soil	(g)	1969	2035	2079	2034		
Wet Weight of Soil + Cont.	(g)	735.4	722.7	680.3	707.3		
Dry Weight of Soil + Cont.	(g)	696.2	673.8	624.2	639.9		
Weight of Container	(g)	145.2	148.3	125.8	136.3		
Moisture Content	(%)	7.1	9.3	11.3	13.4		
Wet Density	(pcf)	130.3	134.7	137.6	134.7		
Dry Density	(pcf)	121.7	123.3	123.7	118.8		

Maximum Dry Density (pcf)	**124.0**	**Optimum Moisture Content (%)**	**10.5**



Preparation Method: A

GEOCON

COMPACTION CHARACTERISTICS USING MODIFIED EFFORT TEST RESULTS

ASTM D-1557

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Figure B26

B1@0-5'

MOLDED SPECIMEN		BEFORE TEST	AFTER TEST
Specimen Diameter	(in.)	4.0	4.0
Specimen Height	(in.)	1.0	1.0
Wt. Comp. Soil + Mold	(gm)	758.9	761.4
Wt. of Mold	(gm)	367.5	367.5
Specific Gravity	(Assumed)	2.7	2.7
Wet Wt. of Soil + Cont.	(gm)	491.9	761.4
Dry Wt. of Soil + Cont.	(gm)	461.7	352.0
Wt. of Container	(gm)	191.9	367.5
Moisture Content	(%)	11.2	11.9
Wet Density	(pcf)	118.1	118.7
Dry Density	(pcf)	106.2	106.0
Void Ratio		0.6	0.6
Total Porosity		0.4	0.4
Pore Volume	(cc)	76.6	76.6
Degree of Saturation	(%) [S_{meas}]	51.8	54.7

Date	Time	Pressure (psi)	Elapsed Time (min)	Dial Readings (in.)
12/14/2022	10:00	1.0	0	0.286
12/14/2022	10:10	1.0	10	0.285
Add Distilled Water to the Specimen				
12/15/2022	10:00	1.0	1430	0.285
12/15/2022	11:00	1.0	1490	0.285

Expansion Index (EI meas) =	0
Expansion Index (Report) =	**0**

Expansion Index, EI_{50}	CBC CLASSIFICATION *	UBC CLASSIFICATION **
0-20	Non-Expansive	Very Low
21-50	Expansive	Low
51-90	Expansive	Medium
91-130	Expansive	High
>130	Expansive	Very High

* Reference: 2019 California Building Code, Section 1803.5.3
** Reference: 1997 Uniform Building Code, Table 18-I-B.

GEOCON

EXPANSION INDEX TEST RESULTS
ASTM D-4829

Checked by: JJK

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Figure B27

B4+B5@0-5'

MOLDED SPECIMEN		BEFORE TEST	AFTER TEST
Specimen Diameter	(in.)	4.0	4.0
Specimen Height	(in.)	1.0	1.0
Wt. Comp. Soil + Mold	(gm)	770.9	784.9
Wt. of Mold	(gm)	368.0	368.0
Specific Gravity	(Assumed)	2.7	2.7
Wet Wt. of Soil + Cont.	(gm)	491.9	784.9
Dry Wt. of Soil + Cont.	(gm)	465.9	367.9
Wt. of Container	(gm)	191.9	368.0
Moisture Content	(%)	9.5	13.3
Wet Density	(pcf)	121.5	125.6
Dry Density	(pcf)	111.0	110.8
Void Ratio		0.5	0.5
Total Porosity		0.3	0.3
Pore Volume	(cc)	70.7	70.7
Degree of Saturation	(%) [S_{meas}]	49.8	69.3

Date	Time	Pressure (psi)	Elapsed Time (min)	Dial Readings (in.)
12/13/2022	10:00	1.0	0	0.303
12/13/2022	10:10	1.0	10	0.3015
Add Distilled Water to the Specimen				
12/14/2022	10:00	1.0	1430	0.3015
12/14/2022	11:00	1.0	1490	0.3015

Expansion Index (EI meas) =	0
Expansion Index (Report) =	**0**

Expansion Index, EI_{50}	CBC CLASSIFICATION *	UBC CLASSIFICATION **
0-20	Non-Expansive	Very Low
21-50	Expansive	Low
51-90	Expansive	Medium
91-130	Expansive	High
>130	Expansive	Very High

* Reference: 2019 California Building Code, Section 1803.5.3

** Reference: 1997 Uniform Building Code, Table 18-I-B.

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EXPANSION INDEX TEST RESULTS

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Figure B28

SUMMARY OF LABORATORY
POTENTIAL OF HYDROGEN (pH) AND RESISTIVITY TEST RESULTS
AASHTO T289 ASTM D4972 and AASHTO T288 ASTM G187

Sample No.	pH	Resistivity (ohm centimeters)
B2@0-5'	8.3	690 (Severely Corrosive)

SUMMARY OF LABORATORY CHLORIDE CONTENT TEST RESULTS
AASHTO T291 ASTM C1218

Sample No.	Chloride Ion Content (%)
B2@0-5'	0.039

SUMMARY OF LABORATORY WATER SOLUBLE SULFATE TEST RESULTS
AASHTO T290 ASTM C1580

Sample No.	Water Soluble Sulfate (% SO_4)	Sulfate Exposure
B2@0-5'	0.027	S0

GEOCON

CORROSIVITY TEST RESULTS

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Figure B29