Appendix G.1

Geotechnical Report

GEOCON
WEST, INC.
GEOTECHNICAL
ENVIRONMENTAL
MATERIALS

GEOTECHNICAL INVESTIGATION

PROPOSED MULTI FAMILY RESIDENTIAL DEVELOPMENT
6728 N. SEPULVEDA BOULEVARD
6715 N. COLUMBUS AVENUE
LOS ANGELES, CALIFORNIA

TRACT: TR 24408 LOT: 1

PREPARED FOR

UNIVERSAL STANDARD HOUSING, LLC
LOS ANGELES, CALIFORNIA

PROJECT NO. W1207-06-01

REVISED FEBRUARY 25, 2022

Project No. W1207-06-01
Revised February 25, 2022

Universal Standard Housing, LLC
350 S. Grand Avenue, Suite 3050
Los Angeles, California 90071

Attention: Mr. David Mas

Subject: GEOTECHNICAL INVESTIGATION
PROPOSED MULTI FAMILY RESIDENTIAL DEVELOPMENT
6728 N. SEPULVEDA BOULEVARD & 6715 N. COLUMBUS AVENUE
LOS ANGELES, CALIFORNIA
TRACT: TR 24408, LOT: 1

Dear Mr. Mas:

In accordance with your authorization of our proposal dated January 12, 2022, we have performed a geotechnical investigation for the proposed multi-family residential development located at 6728 N. Sepulveda Boulevard & 6715 N. Columbus Avenue in the Van Nuys area of the City of Los Angeles, 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 project 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.

Petrina Zen
PE 87489

Harry Derkalousdian
PE 79694

Susan F. Kirkgard
CEG 1754

(EMAIL) Addressee

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

GEOTECHNICAL INVESTIGATION

1. PURPOSE AND SCOPE

This report presents the results of a geotechnical investigation for the proposed multi-family residential development located at 6728 N. Sepulveda Boulevard & 6715 N. Columbus Avenue in the Van Nuys area of the City of Los Angeles, California (see Vicinity Map, Figure 1). The purpose of the investigation was to evaluate subsurface soil and geologic conditions underlying the site and, based on conditions encountered, to provide conclusions and recommendations pertaining to the geotechnical aspects of 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 initially explored on July 23, 2020 by excavating three 8-inch diameter borings to depths between 40½ and 65½ feet below the existing ground surface using a truck-mounted hollow-stem auger drilling machine. Additional exploration was performed on January 27 and 28, 2022 by excavating three 8-inch diameter borings to depths ranging from 79½ to 80½ feet below the existing ground surface using a truck-mounted hollow-stem auger drilling machine. The locations of the exploratory borings are depicted on the Site Plan (see Figure 2A). 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 6728 N. Sepulveda Boulevard and 6715 N. Columbus Avenue in the Van Nuys area of the City of Los Angeles, California. The site was previously occupied by an existing multi-family structure, a recreation area, and asphalt paved parking areas. However, all site improvements have been demolished, and the site is currently a vacant dirt lot. The site is bounded by an alley way to the north, N. Sepulveda Boulevard to the west, N. Columbus Avenue to the east, and a single-story structure to the south. The site slopes very gently to the north. Surface water drainage at the site appears to be by sheet flow along the existing ground contours to the city streets.

Based on the information provided by the Client, it is our understanding that the proposed project will consist of constructing a six-story multi-family residential structure over three levels of subterranean parking (see Site Plan and Cross Sections, Figures 2A and 2B). Is anticipated that the proposed subterranean levels will extend to depths of approximately 27 feet below the existing ground surface, including foundation depths. Deeper excavations, up to 30 feet below the existing ground surface, may be locally required for proposed elevator pits.

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 proposed structure will be up to 1,100 kips, and wall loads will be up to 12 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 south-central portion of the San Fernando Valley, an alluvial-filled basin approximately 23 miles wide and 12 miles long (Hitchcock & Wills, 2000). The alluvium within the San Fernando Valley is derived from the Santa Monica Mountains to the south, the Santa Susana Mountains to the north, the Simi Hills to the west, the San Gabriel Mountains to the northeast, and the Verdugo Mountains to the east, and locally from the Los Angeles River.

4. SOIL AND GEOLOGIC CONDITIONS

Based on our field investigation and published geologic maps of the area, the site is underlain Quaternary age alluvial deposits consisting of fine-grained clay, silt and sand (Dibblee, 1991; California Geological Survey, 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 the subsurface explorations to maximum depth of 2 to $5^{1}/_{2}$ feet. The artificial consists of light brown to dark brown or yellowish brown sandy silt and silty sand that can be characterized as soft to firm or loose to medium dense, and dry to slightly moist. 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

Quaternary age alluvium was encountered in our borings beneath the artificial fill. The alluvium generally consists of yellowish brown, olive brown, and light brown to dark brown interbedded poorly graded and well-graded sand, silty sand, sandy silt and clay with varying amounts of gravel. The alluvial soils are characterized as dry to moist and loose to very dense or soft to hard.

5. GROUNDWATER

Review of the Seismic Hazard Zone Report for the Van Nuys Quadrangle (California Division of Mines and Geology [CDMG], 1997, Revised 2001) indicates the historically highest groundwater level in the area is approximately 40 feet beneath the ground surface. Groundwater information presented in this document is generated from data collected in the early 1900's to the late 1990s. Based on current groundwater basin management practices, it is unlikely that groundwater levels will ever exceed the historic high levels.

Groundwater was not encountered in our borings drilled to a maximum depth of 80½ feet below the existing ground surface. Considering the lack of groundwater in the subsurface borings at the site, and the depth of the proposed construction, it is unlikely that static groundwater will be encountered during construction. 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*urface Drainage* section of this report (see Section 7.23).

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 (CGS, 2022a and 2022b) nor a city-designated Preliminary Fault Rupture Study Area (City of Los Angeles, 2022) for surface fault rupture hazards. 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 Northridge Fault located approximately 3.0 miles to the north. Other nearby active faults are the Verdugo Fault, the Mission Hills segment of the San Fernando Fault Zone, and the Hollywood Fault located approximately 5.2 miles northeast, 5.8 miles north, and 7.9 miles south-southeast of the site, respectively (USGS, 2006; Ziony and Jones, 1989). The active San Andreas Fault Zone is located approximately 31 miles northeast of the site (USGS, 2006).

Several buried thrust faults, commonly referred to as blind thrusts, underlie the Los Angeles Basin and 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 Los Angeles 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	70	E
Long Beach	March 10, 1933	6.4	49	SE
Tehachapi	July 21, 1952	7.5	64	NW
San Fernando	February 9, 1971	6.6	15	NNE
Whittier Narrows	October 1, 1987	5.9	23	ESE
Sierra Madre	June 28, 1991	5.8	26	E
Landers	June 28, 1992	7.3	115	E
Big Bear	June 28, 1992	6.4	93	E
Northridge	January 17, 1994	6.7	5	WNW
Hector Mine	October 16, 1999	7.1	128	ENE
Ridgecrest	July 5, 2019	7.1	119	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 mitigated 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 2019 California Building Code (CBC; Based on the 2018 International Building Code [IBC] and ASCE 7-16), Chapter 16 Structural Design, Section 1613 Earthquake Loads. The data was calculated using the online application *Seismic Design Maps*, provided by OSHPD. 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 2019 CBC and Table 20.3-1 of ASCE 7-16. The values presented below are for the risk-targeted maximum considered earthquake (MCE_R).

2019 CBC SEISMIC DESIGN PARAMETERS

Parameter	Value	2019 CBC Reference
Site Class	D	Section 1613.2.2
MCE_R Ground Motion Spectral Response Acceleration – Class B (short), S_S	2.056g	Figure 1613.2.1(1)
MCE_R Ground Motion Spectral Response Acceleration – Class B (1 sec), S_1	0.733g	Figure 1613.2.1(2)
Site Coefficient, F_A	1.0	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}	2.056g	Section 1613.2.3 (Eqn 16-36)
Site Class Modified MCE_R Spectral Response Acceleration – (1 sec), S_{M1}	1.246g*	Section 1613.2.3 (Eqn 16-37)
5% Damped Design Spectral Response Acceleration (short), S_{DS}	1.371g	Section 1613.2.4 (Eqn 16-38)
5% Damped Design Spectral Response Acceleration (1 sec), S_{D1}	0.831*	Section 1613.2.4 (Eqn 16-39)

Note:
*Per Section 11.4.8 of ASCE/SEI 7-16, a ground motion hazard analysis shall be performed for projects for Site Class "E" sites with Ss greater than or equal to 1.0g and for Site Class "D" and "E" sites with S1 greater than 0.2g. Section 11.4.8 also provides exceptions which indicates that the ground motion hazard analysis may be waived provided the exceptions are followed. Using the code based values presented in the table above, in lieu of a performing a ground motion hazard analysis, requires the exceptions outlined in ASCE 7-16 Section 11.4.8 be followed.

The table below presents the mapped maximum considered geometric mean (MCEG) 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	0.855g	Figure 22-9
Site Coefficient, F_{PGA}	1.1	Table 11.8-1
Site Class Modified MCE_G Peak Ground Acceleration, PGA_M	0.941g	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 2019 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 6.79 magnitude event occurring at a hypocentral distance of 11.06 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 6.65 magnitude occurring at a hypocentral distance of 13.43 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.

The Seismic Hazards Zone Map for the Van Nuys 7.5 Minute Quadrangle (CDMG, 1998) indicates that the site is located within an area identified as having a potential for liquefaction. In addition, the County of Los Angeles Safety Element (Leighton, 1990) indicates that the site is located in an area that is identified as having a potential for liquefaction. The historic high groundwater level in the area is reported to be approximately 40 feet beneath the existing ground surface (CDMG, 1997, Revised 2001).

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 40 feet below the ground surface, a magnitude 6.65 earthquake, and a peak horizontal acceleration of 0.628g ($\frac{2}{3}PGA_M$). The enclosed liquefaction analyses, included herein for borings B4 and B6, indicate that the alluvial soils below the historic high groundwater level would be susceptible up to 1.6 and 1.8 inches, 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 40 feet below the ground surface, a magnitude 6.79 earthquake, and a peak horizontal acceleration of 0.941g (PGA_M). The enclosed liquefaction analyses, included herein for borings B4 and B6, indicate that the alluvial soils below the historic high groundwater level would be susceptible up to 2.0 inches of liquefaction settlement during Maximum Considered Earthquake ground motion (see enclosed calculation sheets, Figures 9 through 12).

6.5 Seismically Induced 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 B4 and B6 indicate that the soil above the historic high groundwater level of 40 feet could be susceptible to less than 0.1 and 0.07 inches of settlement as a result of the Design Earthquake peak ground acceleration (⅔PGA_M), respectively.

The calculations provided herein for borings B4 and B6 indicate that the soil above the historic high groundwater level of 40 feet could be susceptible to less than 0.19 and 0.17 inches of settlement as a result of the Maximum Considered Earthquake peak ground acceleration (PGA_M), respectively.

Calculation of the anticipated seismically induced settlements is provided as Figures 13 through 16.

6.6 Slope Stability

The topography at the site is flat. The site is not located within a City of Los Angeles Hillside Grading Area or a Hillside Ordinance Area (City of Los Angeles, 2022). Additionally, the site is not located within an area identified as having a potential for seismic slope instability (CDMG, 1998). 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.

6.7 Earthquake-Induced Flooding

Earthquake-induced flooding is inundation caused by failure of dams or other water-retaining structures due to earthquakes. Based on a review of the Los Angeles County Safety Element (Leighton, 1990), the site is located within a potential inundation area for an earthquake-induced dam failure from Los Angeles Reservoir, Lopez Dam, and Pacoima Reservoir. However, these reservoirs, 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 and 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 dam site. Therefore, the potential for inundation at the site as a result of an earthquake-induced dam failure is considered low.

6.8 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).

6.9 Oil Fields & Methane Potential

Review of the California Geologic Energy Management Division (CalGEM) Well Finder Website indicates that the site is not located within an oil field and oil or gas wells are not documented within a one-mile radius 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 during construction will need to be properly abandoned in accordance with the current requirements of the CalGEM.

The site is not located within the boundaries of a city-designated Methane Zone or Methane Buffer Zone (City of Los Angeles, 2022). 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 to occur 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.

6.10 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. 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 development provided the recommendations presented herein are followed and implemented during design and construction.

7.1.2 Up to 5½ feet of existing artificial fill was encountered during site exploration. The existing fill encountered is believed to be the result of past grading, construction, and demolition activities at the site. Deeper fill may exist in other areas of the site that were not directly explored. It is our opinion that the existing fill, in its present condition, is not suitable for direct support of proposed foundations or slabs. The existing fill and site soils are suitable for re-use as engineered fill provided the recommendation in the *Grading* section of this report are followed (see Section 7.4). Excavations for the subterranean levels are anticipated to penetrate through the existing artificial fill and expose undisturbed alluvial soils throughout the excavation bottom.

7.1.2 The enclosed seismically induced settlement analyses indicate that the site soils could be susceptible to approximately 1.87 inches 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 0.9 inches over a distance of 20 feet. The foundation design recommendations presented herein are intended to mitigate the effects of settlement on proposed improvements.

7.1.3 The foundation system for the proposed structure must be able to provide sufficient support for the structure and reduce the effects of differential settlement resulting from a liquefaction event. Based on these considerations, it is recommended that the proposed structure be supported on a reinforced concrete mat foundation deriving support in competent alluvial soils found at and below a depth of 25 feet below the existing ground surface. All foundation excavations must be observed and approved by the Geotechnical Engineer (a representative of Geocon), prior to placing steel or concrete. Recommendations for the design of a mat foundation system are provided in Section 7.6.

7.1.4 It should be noted that implementation of the recommendations presented herein is not intended to completely prevent damage to the structure during the occurrence of strong ground shaking as a result of nearby earthquakes. It is intended that the structure be designed in such a way that the amount of damage incurred as a result of strong ground shaking be minimized.

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

7.1.6 All excavations must be observed and approved in writing by the Geotechnical Engineer (a representative of Geocon). Prior to placing any fill, the excavation bottom must be scarified, moistened, and proof-rolled with heavy equipment in the presence of the Geotechnical Engineer (a representative of Geocon West, Inc.).

7.1.7 Excavations up to 32 feet in vertical height are anticipated for construction of the subterranean level, including foundation depths, and elevator pits. Due to the depth of the excavation and the proximity to the property lines, city streets and adjacent offsite structures and improvements, excavation of the proposed subterranean level will require sloping and/or shoring in order to provide a stable excavation. Where shoring is required it is recommended that a soldier pile shoring system be utilized. In addition, where the proposed excavation will be deeper than and adjacent to an offsite structure, the proposed shoring should be designed to resist the surcharge imposed by the adjacent offsite structure. Recommendations for shoring are provided in Section 7.18 of this report.

7.1.8 Due to the nature of the proposed design and intent for a subterranean level, waterproofing of subterranean walls and slabs is suggested. 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.

7.1.9 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, foundations may derive support directly in the competent undisturbed alluvial soils at or below a depth of 24 inches, 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.

7.1.10 Where new paving is to be placed, it is recommended that all existing fill and soft alluvial soils be excavated and properly compacted for paving support. The client should be aware that excavation and compaction of all existing fill and soft alluvial soils in the area of new paving is not required; however, paving constructed over existing uncertified fill or unsuitable alluvial 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 7.11).

7.1.11 Based on the potential for liquefaction of the site soils, stormwater infiltration is not recommended for this project. It is suggested that stormwater be retained, filtered and discharged in accordance with the requirements of the local governing agency.

7.1.12 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 reevaluated by this office.

7.1.13 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.

7.2 Soil and Excavation Characteristics

7.2.1 The in-situ soils can be excavated with moderate effort using conventional excavation equipment. Some 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 sloped, shored and maintained in accordance with applicable OSHA rules and regulations to maintain safety and maintain the stability of adjacent existing 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 and shoring. Excavation recommendations are provided in the *Temporary Excavations* section of this report (see Section 7.17).

7.2.4 The upper 5 feet of existing site soils encountered during this investigation are considered to have a "low" expansive potential (EI = 30 & 33); and are classified as "expansive" based on the 2019 California Building Code (CBC) Section 1803.5.3. At the proposed subterranean levels, the soils encountered are primarily granular in nature and are considered to be "non-expansive". The recommendations presented herein assume that proposed foundations and slabs will derive support in "low" expansive 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 performed on representative samples of on-site 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 "moderately corrosive" to "corrosive" with respect to corrosion of buried ferrous metals on site. The results are presented in Appendix B (Figure B40) 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 B40) and indicate that the on-site materials possess a sulfate exposure class of "S0" to concrete structures as defined by 2019 CBC Section 1904 and ACI 318-19 Chapter 19.

7.3.3 Geocon West, Inc. does not practice in the field of corrosion engineering and mitigation. 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 prevent premature corrosion of buried metal pipes and concrete structures in direct contact with the soils.

7.4 Grading

7.4.1 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 reuse as engineered fill, provided any encountered oversize material (greater than 6 inches) and any encountered deleterious debris are removed.

7.4.2 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 building official in attendance. Special soil handling requirements can be discussed at that time.

7.4.3 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.) and the City of Los Angeles Inspector.

7.4.4 The foundation system for the proposed structure may derive support in the competent alluvial soils found at and below a depth of 25 feet below the existing ground surface.

7.4.5 All excavations must be observed and approved in writing by the Geotechnical Engineer (a representative of Geocon). Prior to placing any fill, the excavation bottom must be scarified, moistened, and proof-rolled with heavy equipment in the presence of the Geotechnical Engineer (a representative of Geocon West, Inc.). 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.

7.4.6 If subgrade stabilization is required at the excavation bottom, tire equipment should not be allowed in the excavation bottom until it is stabilized or extensive soil disturbance could result. It is suggested that excavation and grading be performed during the summer season to promote moisture control of the soils. In addition, the use of track equipment should be considered to minimize disturbance to the soils if they become wet at the excavation bottom. 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.).

7.4.7 The City of Los Angeles Department of Building and Safety requires a minimum compactive effort of 95 percent of the laboratory maximum dry density in accordance with ASTM D 1557 (latest edition) where the soils to be utilized in the fill have less than 15 percent finer than 0.005 millimeters. Soils with more than 15 percent finer than 0.005 millimeters may be compacted to 90 percent of the laboratory maximum dry density in accordance with ASTM D 1557 (latest edition). Based on the soils encountered during this investigation, it is anticipated that 95 percent relative compaction will be required. 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 the required degree of compaction in accordance with ASTM D 1557 (latest edition).

7.4.8. Where new paving is to be placed, it is recommended that all existing fill and soft alluvium be excavated and properly compacted for paving support. As a minimum, the upper 12 inches of soil should be scarified, moisture conditioned to near optimum moisture content, and compacted to at least 95 percent relative compaction, as determined by ASTM Test Method D 1557 (latest edition). Paving recommendations are provided in *Preliminary Pavement Recommendations* section of this report (see Section 7.11).

7.4.9 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 alluvial soils at or below a depth of 24 inches, 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.

7.4.10 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. If gravel is used for trench bedding and shading (typical when seepage is present) it must be 3/16-inch rounded birds-eye rock in accordance with the City of LA plumbing department requirements. 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 (see Section 7.5). 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).

7.4.11 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. If necessary, import soils used as structural fill should have an expansion index less than 30 and corrosivity properties that are equally or less detrimental to that of the existing onsite soils (see Figure B40). 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).

7.4.12 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 Controlled Low Strength Material (CLSM)

7.5.1 Controlled Low Strength Material (CLSM) may be utilized in lieu of compacted soil as engineered fill where approved in writing by the Geotechnical Engineer. Where utilized within the City of Los Angeles use of CLSM is subject to the following requirements:

Standard Requirements

1. CLSM shall be ready-mixed by a City of Los Angeles approved batch plant;
2. CLSM shall not be placed on uncertified fill, on incompetent natural soil, nor below water;
3. CLSM shall not be placed on a sloping surface with a gradient steeper than 5:1 (horizontal to vertical);
4. Placement of the CLSM shall be under the continuous inspection of a concrete deputy inspector;

5. The excavation bottom shall be accepted by the soil engineer and the City Inspector prior to placing CLSM.

Requirements for CLSM that will be used for support of footings

1. The cement content of the CLSM shall not be less than 188 pounds per cubic yard (min. 2 sacks);
2. The excavation bottom must be level, cleaned of loose soils and approved in writing by Geocon prior to placement of the CLSM;
3. The ultimate compressive strength of the CLSM shall be no less than 100 pounds per square inch (psi) when tested on the 28th-day per ASTM D4832 (latest edition), Standard Test Method for Preparation and Testing of Controlled Low Strength Material Test Cylinders. Compression testing will be performed in accordance with ASTM C39 and City of Los Angeles requirements;
4. Samples of the CLSM will be collected during placement, a minimum of one test (two cylinders) for each 50 cubic yards or fraction thereof;
5. Overexcavation for CLSM placement shall extend laterally beyond the footprint of any proposed footings as required for placement of compacted fill, unless justified otherwise by the soil engineer that footings will have adequate vertical and horizontal bearing capacity.

7.6 Mat Foundation Design

7.6.1 It is recommended that a reinforced concrete mat foundation be utilized for support of the proposed structure. The reinforced concrete mat foundation should derive support in competent alluvial soils found at and below a depth of 25 feet below the existing ground surface.

7.6.2 The recommended maximum allowable bearing value for the design of a reinforced concrete mat foundation is 4,000 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.

7.6.3 It is recommended that a modulus of subgrade reaction of 150 pounds per cubic inch (pci) be utilized for the design of the mat foundation bearing in competent alluvial soils. This value is a unit value for use with a one-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)

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

7.6.5 For seismic design purposes, a coefficient of friction of 0.35 may be utilized between concrete slab and subgrade soils without a moisture barrier, and 0.15 for slabs underlain by a moisture barrier.

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 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 selection and 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) as well as ASTM E1745 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 is recommended. 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 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.

7.6.8 Waterproofing of subterranean walls and slabs is recommended for this project. 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.

7.6.9 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 Foundation Settlement

7.7.1 The enclosed seismically-induced settlement analyses indicate that the site soils could be susceptible to approximately 1.87 inches 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 0.9 inches 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.

7.7.2 The maximum expected static settlement for a structure supported on a reinforced concrete mat foundation with a maximum allowable bearing pressure of 4,000 psf and deriving support in the recommended bearing material 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 between the center and corner of the mat foundation. Based on seismic considerations, the proposed structure should be designed for a combined static and seismically-induced differential settlement of 1½ inches over a distance of 20 feet.

7.7.3 Once the design and foundation loading configurations for the proposed structures 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.

7.8 Miscellaneous Foundations

7.8.1 Foundations for small outlying structures, such as block walls up to 6 feet in height, planter walls or trash enclosures which will not be tied to the proposed structure may be supported on conventional foundations bearing 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 derive support in the undisturbed alluvial soils at or below a depth of 24 inches, and should be deepened as necessary to maintain a minimum 12 inch embedment into the recommended bearing materials.

7.8.2 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, 24 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.

7.8.3 Foundations supported in the upper alluvial soils, primarily above a depth of approximately 22 feet, are subject to potential settlement due to excessive hydro-consolidation of the soils upon saturation (see Figures B13 through B17). It is critical that proper drainage be maintained at all times to prevent saturation of the upper alluvial soils. Recommendations for drainage are provided in the S*urface Drainage* section of this report (see Section 7.23).

7.8.4 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.

7.9 Lateral Design

7.9.1 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 0.35 may be used with the dead load forces in the competent alluvial soils or in properly compacted engineered fill.

7.9.2 Passive earth pressure for the sides of foundations and slabs poured against properly compacted engineered fill or competent alluvial soils may be computed as an equivalent fluid having a density of 240 pcf with a maximum earth pressure of 2,400 psf. When combining passive and friction for lateral resistance, the passive component should be reduced by one-third.

7.10 Exterior Concrete Slabs-on-Grade

7.10.1 Exterior concrete slabs-on-grade at the ground surface subject to vehicle loading should be designed in accordance with the recommendations in the *Preliminary Pavement Recommendations* section of this report (Section 7.11).

7.10.2 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 one-fourth the slab thickness. The project structural engineer should design construction joints as necessary.

7.10.3 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.

7.10.4 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.

7.11 Preliminary Pavement Recommendations

7.11.1 Where new paving is to be placed, it is recommended that all existing fill and soft or unsuitable alluvial materials be excavated and properly recompacted for paving support. The client should be aware that excavation and compaction of all existing artificial fill and soft alluvium in the area of new paving is not required; however, paving constructed over existing unsuitable material may experience increased settlement and/or cracking, and may therefore have a shorter design life and increased maintenance costs. As a minimum, the upper twelve 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).

7.11.2 The following pavement sections are based on an assumed R-Value of 20. Once site grading activities are complete an R-Value should be obtained by laboratory testing to confirm the properties of the soils serving as paving subgrade, prior to placing pavement.

7.11.3 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

7.11.4 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).

7.11.5 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 of concrete 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 4 inches of aggregate base and a properly compacted subgrade. The subgrade and base material should be compacted to 95 percent relative compactions determined by ASTM Test Method D 1557 (latest edition).

7.11.6 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.

7.12 Retaining Wall Design

7.12.1 The recommendations presented below are generally applicable to the design of rigid concrete or masonry retaining walls having a maximum height of 30 feet. In the event that walls significantly higher than 30 feet are planned, Geocon should be contacted for additional recommendations.

7.12.2 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).

7.12.3 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) of 54 pcf. Calculation of the recommended retaining wall pressures is provided on Figure 17.

7.12.4 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) of 62 pcf.

7.12.5 The wall pressures provided above assume that the proposed retaining walls will support relatively undisturbed alluvial soils. If sloping techniques are to be utilized for construction of proposed walls, which would result in a wedge of engineered fill behind the retaining walls, revised earth pressures may be required, especially if the wall backfill does not consist of the existing onsite soils. This should be evaluated once the use of sloping measures is established and once the geotechnical characteristics of the engineered backfill soils can be further evaluated.

7.12.6 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 walls is 93 pcf. The value includes hydrostatic pressures plus buoyant lateral earth pressures.

7.12.7 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.

7.12.8 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.

7.12.9 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.

7.12.10 In addition to the recommended earth pressure, the upper 10 feet of the subterranean wall adjacent to the street and parking lot should be designed to resist a uniform lateral pressure of 100 psf, acting as a result of an assumed 300 psf surcharge behind the walls due to normal street traffic. If the traffic is kept back at least 10 feet from the subterranean walls, the traffic surcharge may be neglected.

7.12.11 Seismic lateral forces should be incorporated into the design as necessary, and recommendations for seismic lateral forces are presented below.

7.13 Dynamic (Seismic) Lateral Forces

7.13.1 The structural engineer should determine the seismic design category for the project in accordance with Section 1613 of the CBC. If the project possesses a seismic design category of D, E, or F, proposed retaining walls in excess of 6 feet in height should be designed with seismic lateral pressure (Section 1803.5.12 of the 2019 CBC).

7.13.2 A seismic load of 15 pcf should be used for design of walls that support more than 6 feet of backfill in accordance with Section 1803.5.12 of the 2019 CBC. The seismic load is applied as an equivalent fluid pressure along the height of the wall and the calculated loads result in a maximum load exerted at the base of the wall and zero at the top of the wall. This seismic load should be applied in addition to the active earth pressure. The earth pressure is based on half of two thirds of PGA_M calculated from ASCE 7-16 Section 11.8.3.

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 18). 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 19). These vertical columns of drainage material would then be connected at the bottom of the wall to a collection panel or a 1-cubic-foot rock pocket drained by 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 7.12).

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 or pile support, especially if the drilling is performed subsequent to the foundation or pile construction.

7.16.2 Caving may occur especially where granular soils are encountered. 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 32 feet in height will be required for excavation and construction of the subterranean level, including foundation depths, and elevator pits. The excavations are expected to expose artificial fill and alluvial soils, 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 slope gradient or flatter up to maximum height of 10 feet. A uniform slope does not have a vertical portion. Where space is limited, shoring measures will be required. *Shoring* data is provided in Section 7.18 of this report.

7.17.3 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 Shoring – Soldier Pile Design and Installation

7.18.1 The following information on the design and installation of shoring is preliminary. Review of the final shoring plans and specifications should be made by this office prior to bidding or negotiating with a shoring contractor.

7.18.2 One method of shoring would consist of steel soldier piles, placed in drilled holes and backfilled with concrete. The steel soldier piles may also be installed utilizing high frequency vibration. Where maximum excavation heights are less than 12 feet the soldier piles are typically designed as cantilevers. Where excavations exceed 12 feet or are surcharged, soldier piles may require lateral bracing utilizing drilled tie-back anchors or raker braces to maintain an economical steel beam size and prevent excessive deflection. The size of the steel beam, the need for lateral bracing, and the acceptable shoring deflection should be determined by the project shoring engineer.

7.18.3 The design embedment of the shoring pile toes must be maintained during excavation activities. The toes of the perimeter shoring piles should be deepened to take into account any required excavations necessary for grading activities, foundations, and/or adjacent drainage systems.

7.18.4 The proposed soldier piles may also be designed as permanent piles. The required pile depths, dimensions, and spacing should be determined and designed by the project structural and shoring engineers. All piles utilized for shoring can also be incorporated into a permanent retaining wall system (shotcrete wall) and should be designed in accordance with the earth pressure provided in the *Retaining Wall Design* section of this report (see Section 7.12).

7.18.5 Drilled cast-in-place soldier piles should be placed no closer than three diameters on center. The minimum diameter of the piles is 18 inches. Structural concrete should be used for the soldier piles below the excavation; lean-mix concrete may be employed above that level.

As an alternative, lean-mix concrete may be used throughout the pile where the reinforcing consists of a wideflange section. The slurry must be of sufficient strength to impart the lateral bearing pressure developed by the wideflange section to the soil. For design purposes, an allowable passive value for the soils may be assumed to be 260 psf per foot. Where piles are installed by vibration techniques, the passive pressure may be assumed to mobilize across a width equal to the two times the dimension of the beam flange. The allowable passive value may be doubled for isolated piles, spaced a minimum of three times the pile diameter. To develop the full lateral value, provisions should be implemented to assure firm contact between the soldier piles and the undisturbed alluvium.

7.18.6 Groundwater was not encountered during site exploration, and static groundwater is not expected to be encountered during construction. However, should groundwater or local seepage be encountered during pile installation, the contractor should be prepared. If more than 6 inches of water is present in the bottom of the excavation, a tremie is required to place the concrete into the bottom of the hole. A tremie should consist of a rigid, water-tight tube having a diameter of not less than 6 inches with a hopper at the top. The tube should be equipped with a device that will close the discharge end and prevent water from entering the tube while it is being charged with concrete. The tremie should be supported so as to permit free movement of the discharge end over the entire top surface of the work and to permit rapid lowering when necessary to retard or stop the flow of concrete. The discharge end should be closed at the start of the work to prevent water entering the tube and should be entirely sealed at all times, except when the concrete is being placed. The tremie tube should be kept full of concrete. The flow should be continuous until the work is completed and the resulting concrete seal should be monolithic and homogeneous. The tip of the tremie tube should always be kept about 5 feet below the surface of the concrete and definite steps and safeguards should be taken to insure that the tip of the tremie tube is never raised above the surface of the concrete.

7.18.7 A special concrete mix should be used for concrete to be placed below water. The design should provide for concrete with an unconfined compressive strength psi of 1,000 pounds per square inch (psi) over the initial job specification. An admixture that reduces the problem of segregation of paste/aggregates and dilution of paste should be included. The slump should be commensurate to any research report for the admixture, provided that it should also be the minimum for a reasonable consistency for placing when water is present.

7.18.8 Casing will likely be required since caving is expected in the granular soils, and the contractor should have casing available prior to commencement of pile excavation. When casing is used, extreme care should be employed so that the pile is not pulled apart as the casing is withdrawn. At no time should the distance between the surface of the concrete and the bottom of the casing be less than 5 feet. As an alternative, piles may be vibrated into place; however, there is always a risk that excessive vibrations in sandy soils could induce settlements and distress to adjacent offsite improvements. Continuous observation of the drilling and pouring of the piles by the Geotechnical Engineer (a representative of Geocon West, Inc.), is required.

7.18.9 If a vibratory method of solider pile installation is utilized, predrilling may be performed prior to installation of the steel beams. If predrilling is performed, it is recommended that the bore diameter be at least 2 inches smaller than the largest dimension of the pile to prevent excessive loss in the frictional component of the pile capacity. Predrilling should not be conducted below the proposed excavation bottom.

7.18.10 If a vibratory method is utilized, the owner should be aware of the potential risks associated with vibratory efforts, which typically involve inducing settlement within the vicinity of the pile which could result in a potential for damage to existing improvements in the area.

7.18.11 The level of vibration that results from the installation of the piles should not exceed a threshold where occupants of nearby structures are disturbed, despite higher vibration tolerances that a building may endure without deformation or damage. The main parameter used for vibration assessment is peak particle velocity in units of inch per second (in/sec). The acceptable range of peak particle velocity should be evaluated based on the age and condition of adjacent structures, as well as the tolerance of human response to vibration.

7.18.12 Based on Table 19 of the *Transportation and Construction Induced Vibration Guidance Manual* (Caltrans 2013), a continuous source of vibrations (ex. vibratory pile driving) which generates a maximum peak particle velocity of 0.5 in/sec is considered tolerable for modern industrial/commercial buildings and new residential structures. The Client should be aware that a lower value may be necessary if older or fragile structures are in the immediate vicinity of the site.

7.18.13 Vibrations should be monitored and record with seismographs during pile installation to detect the magnitude of vibration and oscillation experienced by adjacent structures. If the vibrations exceed the acceptable range during installation, the shoring contractor should modify the installation procedure to reduce the values to within the acceptable range. Vibration monitoring is not the responsibility of the Geotechnical Engineer.

7.18.14 Geocon does not practice in the field of vibration monitoring. If construction techniques will be implemented, it is recommended that qualified consultant be retained to provide site specific recommendations for vibration thresholds and monitoring.

7.18.15 The frictional resistance between the soldier piles and retained soil may be used to resist the vertical component of the anchor load. The coefficient of friction may be taken as 0.4 based on uniform contact between the steel beam and lean-mix concrete and retained earth. The portion of soldier piles below the plane of excavation may also be employed to resist the downward loads. The downward capacity may be determined using a frictional resistance of 650 psf per foot.

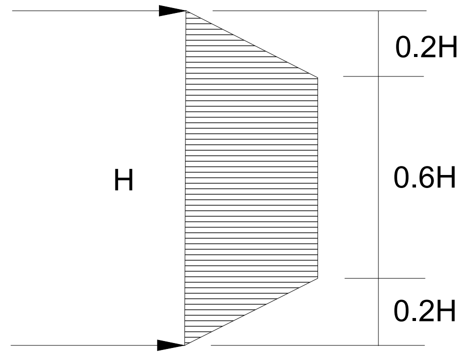
7.18.16 Due to the nature of the site soils, it is expected that continuous lagging between soldier piles will be required. However, it is recommended that the exposed soils be observed by the Geotechnical Engineer (a representative of Geocon West, Inc.), to verify the presence of any competent, cohesive soils and the areas where lagging may be omitted.

7.18.17 The time between lagging excavation and lagging placement should be as short as possible soldier piles should be designed for the full-anticipated pressures. Due to arching in the soils, the pressure on the lagging will be less. It is recommended that the lagging be designed for the full design pressure but be limited to a maximum of 400 psf.

7.18.18 For the design of unbraced shoring, it is recommended that an equivalent fluid pressure be utilized for design. A trapezoidal distribution of lateral earth pressure may be used where shoring will be restrained by bracing or tie backs. The recommended active and trapezoidal pressures are provided in the following table. A diagram depicting the trapezoidal pressure distribution of lateral earth pressure is provided below the table. Calculation of the recommended shoring pressures is provided on Figure 20.

HEIGHT OF SHORING (FEET)	**EQUIVALENT FLUID PRESSURE (Pounds Per Cubic Foot) (ACTIVE PRESSURE)**	**EQUIVALENT FLUID PRESSURE Trapezoidal (Where H is the height of the shoring in feet)**
Up to 32	42	26H

Trapezoidal Distribution of Pressure



7.18.19 Where a combination of sloped embankment and shoring is utilized, the pressure will be greater and must be determined for each combination. Additional active pressure should be added for a surcharge condition due to sloping ground, vehicular traffic, or adjacent structures and must be determined for each combination.

7.18.20 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.

7.18.21 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.*

7.18.22 In addition to the recommended earth pressure, the upper 10 feet of the shoring 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 ten feet from the shoring, the traffic surcharge may be neglected.

7.18.23 It is difficult to accurately predict the amount of deflection of a shored embankment. It should be realized that some deflection will occur. It is recommended that the deflection be minimized to prevent damage to existing structures and adjacent improvements. Where public right-of-ways are present or adjacent offsite structures do not surcharge the shoring excavation, the shoring deflection should be limited to less than 1 inch at the top of the shored embankment. Where offsite structures are within the shoring surcharge area it is recommended that the beam deflection be limited to less than ½ inch at the elevation of the adjacent offsite foundation, and no deflection at all if deflections will damage existing structures. The allowable deflection is dependent on many factors, such as the presence of structures and utilities near the top of the embankment, and will be assessed and designed by the project shoring engineer.

7.18.24 Because of the depth of the excavation, some means of monitoring the performance of the shoring system is suggested. The monitoring should consist of periodic surveying of the lateral and vertical locations of the tops of all soldier piles and the lateral movement along the entire lengths of selected soldier piles.

7.18.25 Due to the depth of the excavation and proximity to adjacent structures, it is suggested that prior to excavation the existing improvements be inspected to document the present condition. For documentation purposes, photographs should be taken of preconstruction distress conditions and level surveys of adjacent grade and pavement should be considered. During excavation activities, the adjacent structures and pavement should be periodically inspected for signs of distress. In the event that distress or settlement is noted, an investigation should be performed and corrective measures taken so that continued or worsened distress or settlement is mitigated. Documentation and monitoring of the offsite structures and improvements is not the responsibility of the geotechnical engineer.

7.19 Temporary Tie-Back Anchors

7.19.1 Temporary tie-back anchors may be used with the solider pile wall system to resist lateral loads. Post-grouted friction anchors are recommended. For design purposes, it may be assumed that the active wedge adjacent to the shoring is defined by a plane drawn 35 degrees with the vertical through the bottom plane of the excavation. Friction anchors should extend a minimum of 20 feet beyond the potentially active wedge and to greater lengths if necessary to develop the desired capacities. The locations and depths of all offsite utilities should be thoroughly checked and incorporated into the drilling angle design for the tie-back anchors.

7.19.2 The capacities of the anchors should be determined by testing of the initial anchors as outlined in a following section. Only the frictional resistance developed beyond the active wedge would be effective in resisting lateral loads. Anchors should be placed at least 6 feet on center to be considered isolated. For preliminary design purposes, it is estimated that drilled friction anchors constructed without utilizing post-grouting techniques will develop average skin frictions as follows:

- 7 feet below the top of the excavation – 950 psf
- 15 feet below the top of the excavation – 1,300 psf
- 25 feet below the top of the excavation – 1,800 psf

7.19.3 Depending on the techniques utilized, and the experience of the contractor performing the installation, a maximum allowable friction capacity of 3.1 kips per linear foot for post-grouted anchors (for a minimum 20-foot length beyond the active wedge) may be assumed for design purposes. Only the frictional resistance developed beyond the active wedge should be utilized in resisting lateral loads.

7.20 Anchor Installation

7.20.1 Tied-back anchors are typically installed between 20 and 40 degrees below the horizontal; however, occasionally alternative angles are necessary to avoid existing improvements and utilities. The locations and depths of all offsite utilities should be thoroughly checked prior to design and installation of the tie-back anchors. Caving of the anchor shafts, particularly within sand and gravel deposits or seepage zones, should be anticipated during installation and provisions should be implemented in order to minimize such caving. It is suggested that hollow-stem auger drilling equipment be used to install the anchors. The anchor shafts should be filled with concrete by pumping from the tip out, and the concrete should extend from the tip of the anchor to the active wedge. In order to minimize the chances of caving, it is recommended that the portion of the anchor shaft within the active wedge be backfilled with sand before testing the anchor. This portion of the shaft should be filled tightly and flush with the face of the excavation. The sand backfill should be placed by pumping; the sand may contain a small amount of cement to facilitate pumping.

7.21 Anchor Testing

7.21.1 All of the anchors should be tested to at least 150 percent of design load. The total deflection during this test should not exceed 12 inches. The rate of creep under the 150 percent test load should not exceed 0.1 inch over a 15-minute period in order for the anchor to be approved for the design loading.

7.21.2 At least 10 percent of the anchors should be selected for "quick" 200 percent tests and three additional anchors should be selected for 24-hour 200 percent tests. The purpose of the 200 percent tests is to verify the friction value assumed in design. The anchors should be tested to develop twice the assumed friction value. These tests should be performed prior to installation of additional tiebacks. Where satisfactory tests are not achieved on the initial anchors, the anchor diameter and/or length should be increased until satisfactory test results are obtained.

7.21.3 The total deflection during the 24-hour 200 percent test should not exceed 12 inches. During the 24-hour tests, the anchor deflection should not exceed 0.75 inches measured after the 200 percent test load is applied.

7.21.4 For the "quick" 200 percent tests, the 200 percent test load should be maintained for 30 minutes. The total deflection of the anchor during the 200 percent quick tests should not exceed 12 inches; the deflection after the 200 percent load has been applied should not exceed 0.25 inch during the 30-minute period.

7.21.5 After a satisfactory test, each anchor should be locked-off at the design load. This should be verified by rechecking the load in the anchor. The load should be within 10 percent of the design load. A representative of this firm should observe the installation and testing of the anchors.

7.22 Internal Bracing

7.22.1 Rakers may be utilized to brace the soldier piles in lieu of tieback anchors. The raker bracing could be supported laterally by temporary concrete footings (deadmen) or by the permanent, interior footings. For design of such temporary footings or deadmen, poured with the bearing surface normal to rakers inclined at 45 degrees, a bearing value of 1,500 psf may be used, provided the shallowest point of the footing is at least 1 foot below the lowest adjacent grade. The structural engineer should review the shoring plans to determine if raker footings conflict with the structural foundation system. The client should be aware that the utilization of rakers could significantly impact the construction schedule due to their intrusion into the construction site and potential interference with equipment.

7.23 Surface Drainage

7.23.1 Proper surface drainage is critical to the future performance of the project. Uncontrolled infiltration of irrigation excess and storm runoff into the 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 should be maintained at all times.

7.23.2 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 2019 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 5 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 5 feet of the building perimeter footings except when enclosed in protected planters.

7.23.3 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.

7.23.4 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.

7.24 Plan Review

7.24.1 Grading, foundation, and shoring plans should be reviewed by the Geotechnical Engineer (a representative of Geocon West, Inc.), 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.

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

California Division of Mines and Geology, 1998, *State of California, Seismic Hazard Zones, Van Nuys Quadrangle, Official Map*, Released: February 1, 1998.

California Division of Mines and Geology, 1997, *Seismic Hazard Evaluation of the Van Nuys 7.5-Minute Quadrangle, Los Angeles County, California,* Seismic Hazard Zone Report 08 (Revised 2001).

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 San Fernando and Van Nuys (North ½) Quadrangles, California*, Dibblee Geological Foundation Map DF-33.

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

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.

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

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, City of, 2022, NavigateLA website, http://navigatela.lacity.org

Los Angeles, City of, 1996, *Safety Element of the Los Angeles City General Plan*.

Los Angeles County Department of Public Works, 2022a, Ground Water Wells Website, http://dpw2.co.la.ca.us/website/wells/viewer.asp.

Los Angeles County Department of Public Works, 2022b, Flood Zone Determination Website, http://dpw.lacounty.gov/apps/wmd/floodzone/map.htm.

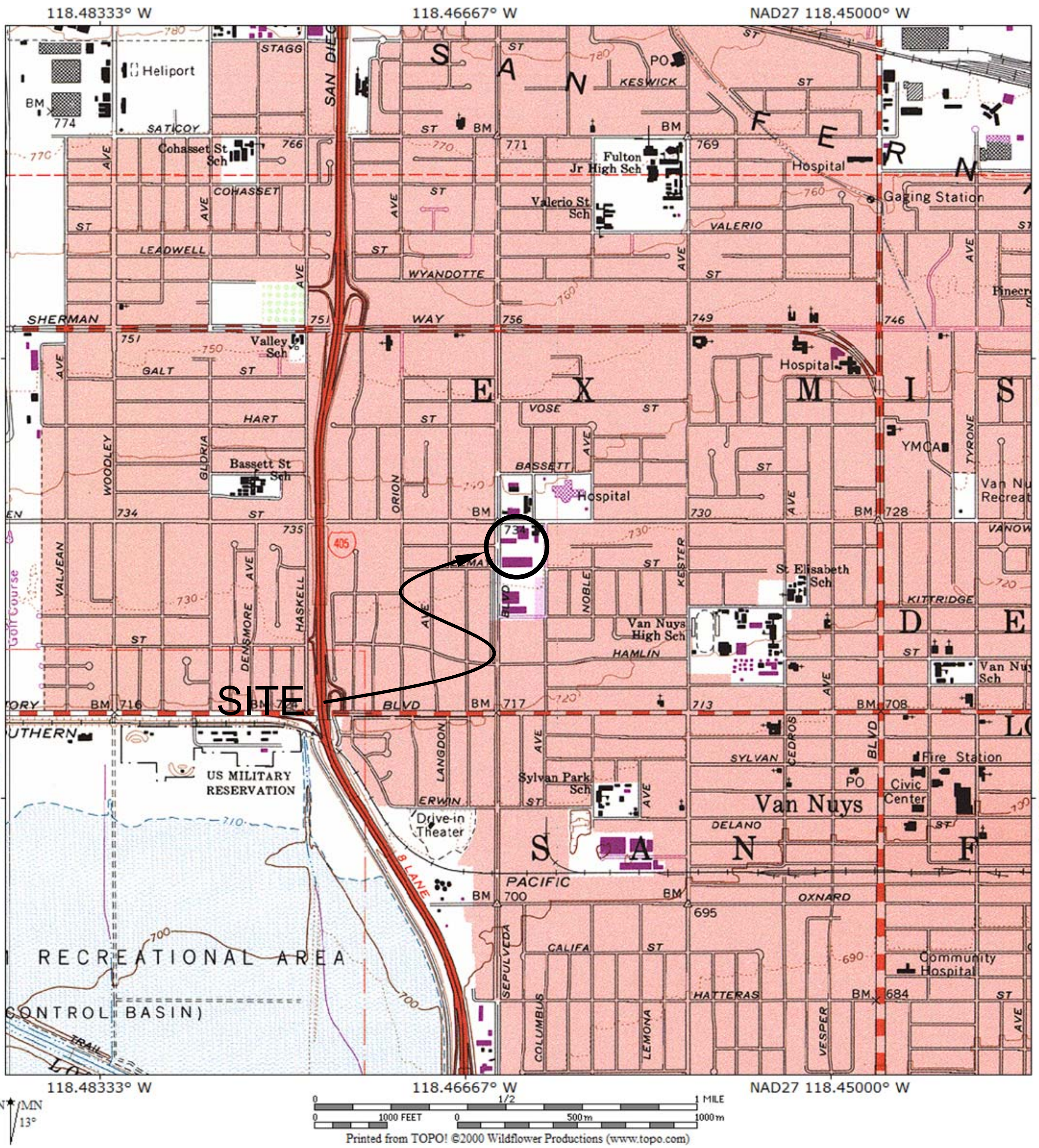
LIST OF REFERENCES

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.

United States Geological Survey, 2022, Seismic Design Maps, Web Application http://earthquake.usgs.gov/designmaps/us/application.php.

United States Geological Survey, 2006, Quaternary Fault and Fold Database of the United States, accessed February 23, 2022, https://earthquake.usgs.gov/hazards/qfaults.

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, HOLLYWOOD, CA QUADRANGLE

GEOCON WEST, INC.

ENVIRONMENTAL GEOTECHNICAL MATERIALS

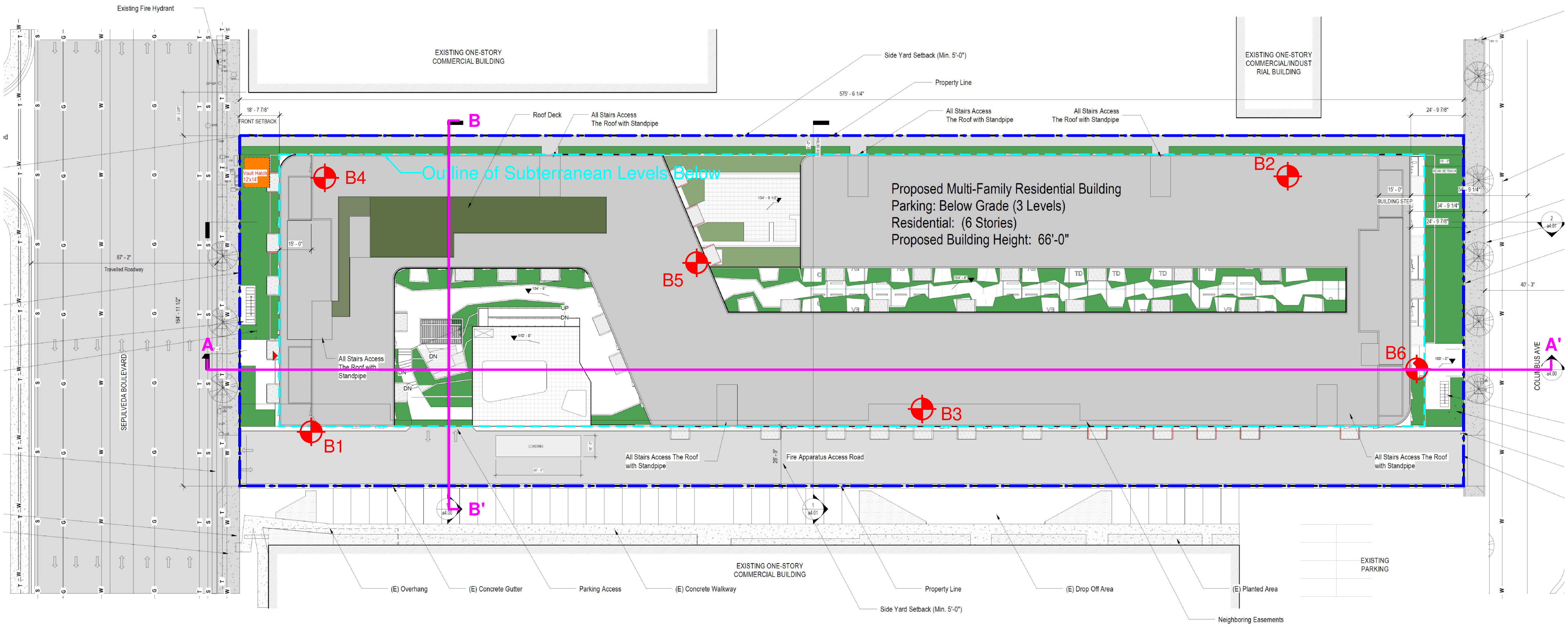
3303 N. SAN FERNANDO BLVD. - SUITE 100 - BURBANK, CA 91504

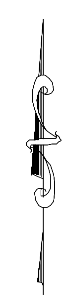
PHONE (818) 841-8388 - FAX (818) 841-1704

VICINITY MAP

6728 NORTH SEPULVEDA BOULEVARD
6715 NORTH COLUMBUS STREET
LOS ANGELES, CALIFORNIA

DRAFTED BY: RA	CHECKED BY: SFK	FEB. 2022	PROJECT NO. W1207-06-01	FIG. 1





LEGEND

- B6 — Approximate Location of Boring
- Approximate Location of Property Line

0 50' 100'

GEOCON WEST, INC.

ENVIRONMENTAL GEOTECHNICAL MATERIALS

3303 N. SAN FERNANDO BLVD. - SUITE 100 - BURBANK, CA 91504

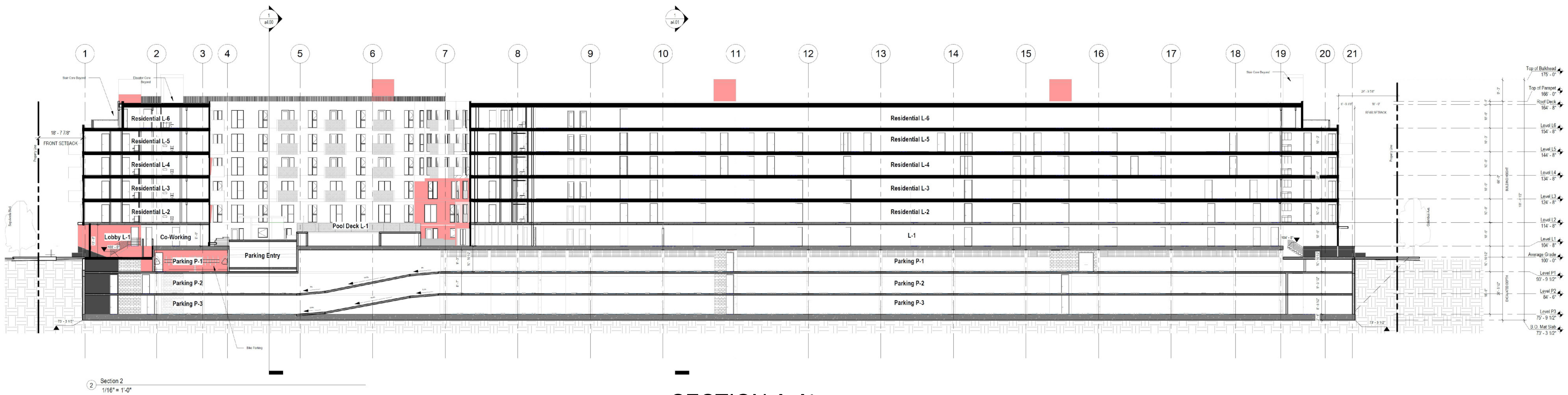
PHONE (818) 841-8388 - FAX (818) 841-1704

DRAFTED BY: PZ	CHECKED BY: HHD

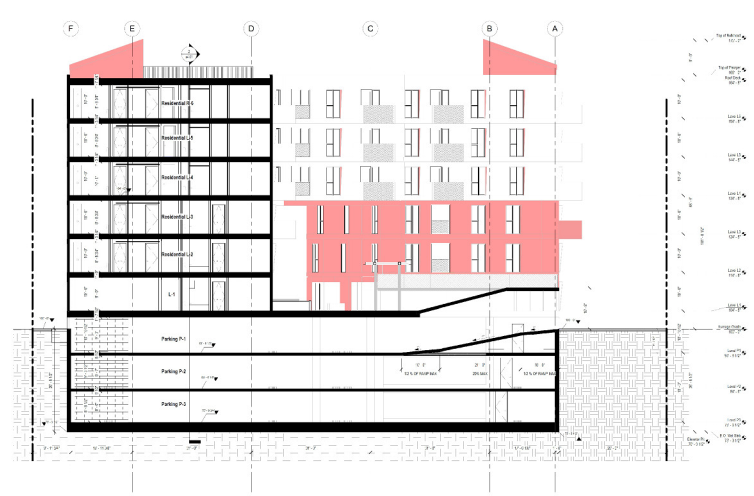
SITE PLAN

6728 NORTH SEPULVEDA BOULEVARD
6715 NORTH COLUMBUS STREET
LOS ANGELES, CALIFORNIA

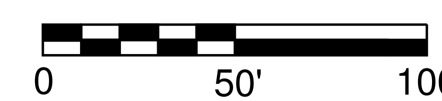
FEB. 2022	PROJECT NO. W1207-06-01	FIG. 2A



SECTION A-A'



SECTION B-B'



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

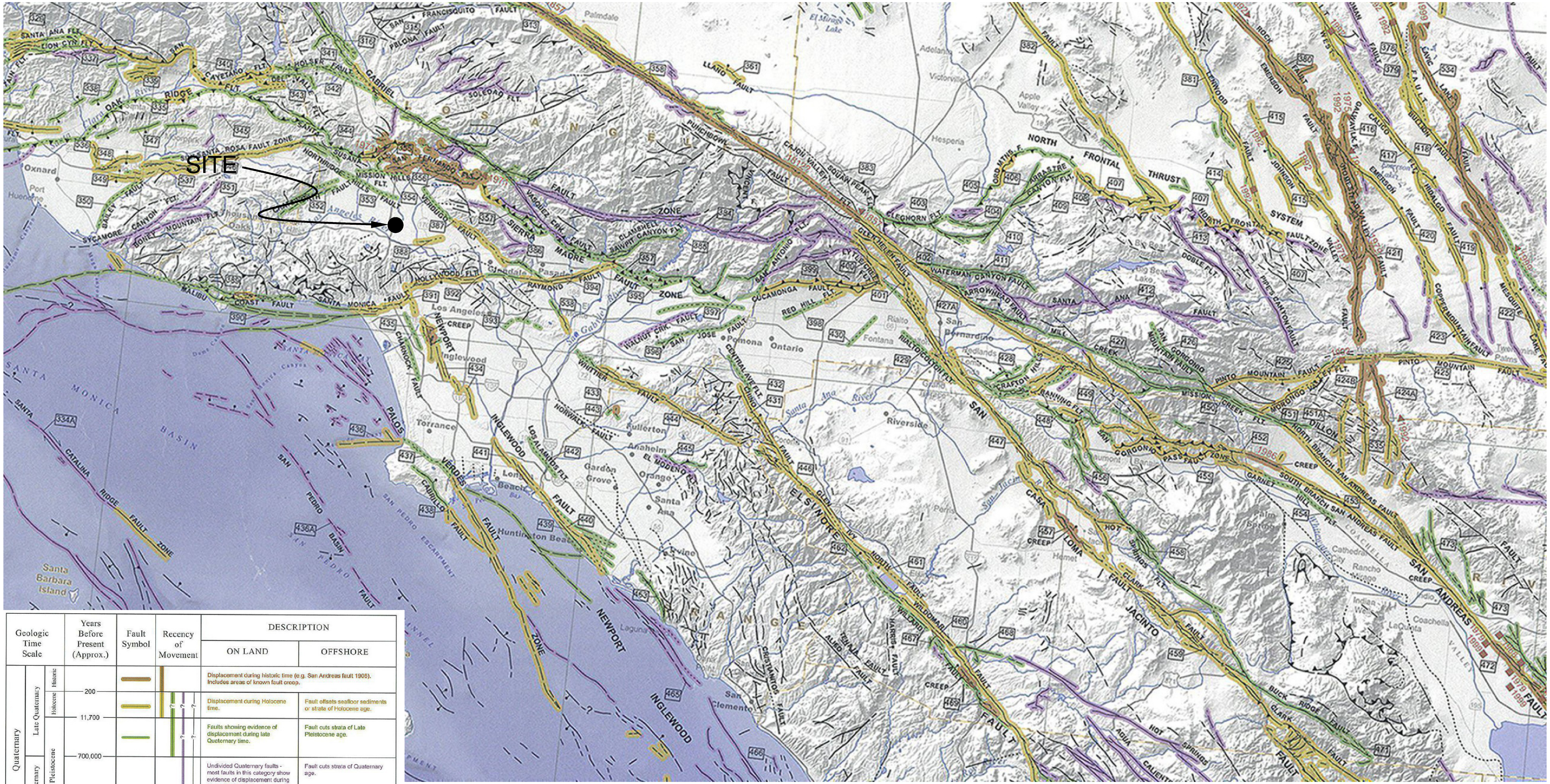
DRAFTED BY: PZ | CHECKED BY: HHD

CROSS SECTIONS

6728 NORTH SEPULVEDA BOULEVARD
6715 NORTH COLUMBUS STREET
LOS ANGELES, CALIFORNIA

FEB. 2022 | PROJECT NO. W1207-06-01 | FIG. 2B

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

GEOCON WEST, INC.

ENVIRONMENTAL GEOTECHNICAL MATERIALS

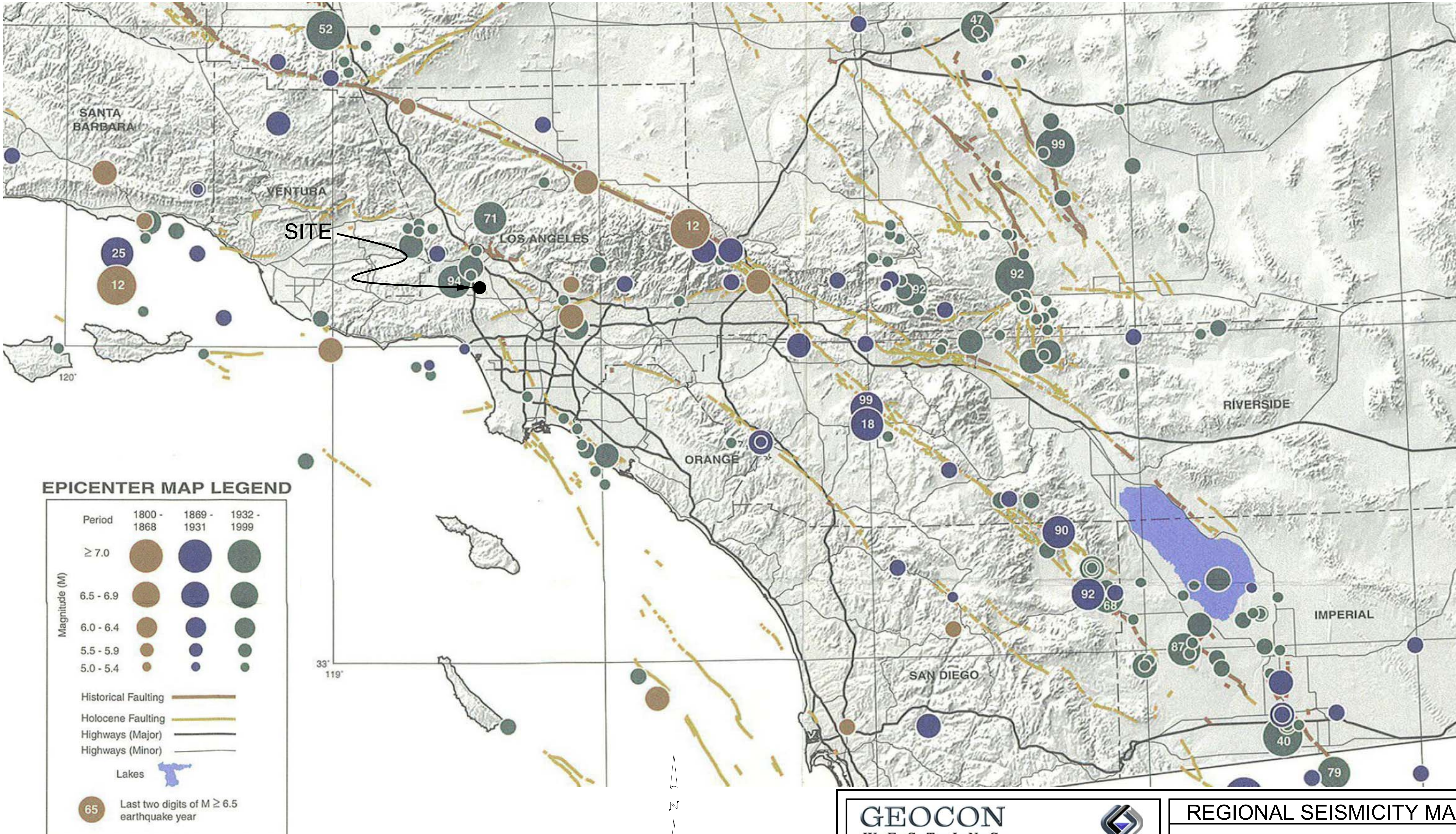
3303 N. SAN FERNANDO BLVD. - SUITE 100 - BURBANK, CA 91504
PHONE (818) 841-8388 - FAX (818) 841-1704

DRAFTED BY: RA | CHECKED BY: SFK

REGIONAL FAULT MAP

6728 NORTH SEPULVEDA BOULEVARD
6715 NORTH COLUMBUS STREET
LOS ANGELES, CALIFORNIA

FEB. 2022 | PROJECT NO. W1207-06-01 | 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.

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

REGIONAL SEISMICITY MAP

6728 NORTH SEPULVEDA BOULEVARD
6715 NORTH COLUMBUS STREET
LOS ANGELES, CALIFORNIA

DRAFTED BY: RA	CHECKED BY: SFK	FEB. 2022	PROJECT NO. W1207-06-01	FIG. 4

GEOCON

Client : 6728 N Sepulveda Blvd
File No. : W1207-06-01
Boring : 4

EMPIRICAL ESTIMATION OF LIQUEFACTION POTENTIAL
DESIGN EARTHQUAKE

NCEER (1996) METHOD

By Thomas F. Blake (1994-1996)

EARTHQUAKE INFORMATION:

Earthquake Magnitude:	6.65
Peak Horiz. Acceleration PGA_M (g):	0.941
2/3 PGA_M (g):	0.628
Calculated Mag.Wtg.Factor:	0.739
Historic High Groundwater:	40.0
Groundwater Depth During Exploration:	80.5

ENERGY & ROD CORRECTIONS:

Energy Correction (CE) for N60:	1.25
Rod Len.Corr.(CR)(0-no or 1-yes):	1.0
Bore Dia. Corr. (CB):	1.00
Sampler Corr. (CS):	1.20
Use Ksigma (0 or 1):	1.0

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	rd Factor	Induced CSR	Liquefac. Safe.Fact.
1.0	88.8	0	8.0	5.0	1		63	1.700	15.3	88.8	0.167	0.998	0.301	--
2.0	88.8	0	8.0	5.0	1		63	1.700	15.3	88.8	0.167	0.993	0.299	--
3.0	88.8	0	8.0	5.0	1		63	1.700	15.3	88.8	0.167	0.989	0.298	--
4.0	88.8	0	8.0	5.0	1		63	1.700	15.3	88.8	0.167	0.984	0.296	--
5.0	88.8	0	8.0	5.0	1		63	1.700	15.3	88.8	0.167	0.979	0.295	--
6.0	88.8	0	8.0	5.0	1		63	1.700	15.3	88.8	0.167	0.975	0.294	--
7.0	88.8	0	8.0	5.0	1		63	1.700	15.3	88.8	0.167	0.970	0.292	--
8.0	88.8	0	8.0	5.0	1		63	1.700	15.3	88.8	0.167	0.966	0.291	--
9.0	88.8	0	8.0	5.0	1		63	1.664	15.0	88.8	0.163	0.961	0.290	--
10.0	107.5	0	10.0	10.0	1		65	1.565	17.6	107.5	0.191	0.957	0.288	--
11.0	107.5	0	10.0	10.0	1		65	1.475	16.6	107.5	0.180	0.952	0.287	--
12.0	107.5	0	10.0	10.0	1		65	1.398	15.7	107.5	0.171	0.947	0.285	--
13.0	107.5	0	10.0	10.0	1		65	1.333	15.0	107.5	0.163	0.943	0.284	--
14.0	107.5	0	10.0	10.0	1		65	1.276	14.4	107.5	0.157	0.938	0.283	--
15.0	86.3	0	9.0	15.0	1		57	1.230	13.4	86.3	0.146	0.934	0.281	--
16.0	86.3	0	9.0	15.0	1		57	1.193	13.0	86.3	0.142	0.929	0.280	--
17.0	86.3	0	9.0	15.0	1		57	1.160	12.6	86.3	0.138	0.925	0.279	--
18.0	86.3	0	9.0	15.0	1		57	1.129	12.3	86.3	0.134	0.920	0.277	--
19.0	86.3	0	9.0	15.0	1		57	1.100	12.0	86.3	0.131	0.915	0.276	--
20.0	108.9	0	10.0	20.0	1		56	1.070	14.4	108.9	0.157	0.911	0.274	--
21.0	108.9	0	10.0	20.0	1		56	1.040	14.0	108.9	0.152	0.906	0.273	--
22.0	108.9	0	10.0	20.0	1		56	1.012	13.6	108.9	0.148	0.902	0.272	--
23.0	108.9	0	10.0	20.0	1		56	0.986	13.2	108.9	0.144	0.897	0.270	--
24.0	106.1	0	22.0	25.0	1		78	0.962	30.3	106.1	Infin.	0.893	0.269	--
25.0	106.1	0	22.0	25.0	1		78	0.940	29.6	106.1	0.424	0.888	0.268	--
26.0	106.1	0	22.0	25.0	1		78	0.920	29.0	106.1	0.379	0.883	0.266	--
27.0	106.1	0	22.0	25.0	1		78	0.901	28.4	106.1	0.356	0.879	0.265	--
28.0	106.1	0	22.0	25.0	1		78	0.883	27.8	106.1	0.339	0.874	0.263	--
29.0	106.1	0	22.0	25.0	1		78	0.866	27.3	106.1	0.325	0.870	0.262	--
30.0	106.6	0	12.0	30.0	1		54	0.850	15.3	106.6	0.159	0.865	0.261	--
31.5	106.6	0	12.0	30.0	1		54	0.831	15.0	106.6	0.156	0.859	0.259	--
32.0	141.4	0	9.0	32.0	1	73	46	0.822	18.1	141.4	0.186	0.855	0.258	--
33.0	141.4	0	9.0	32.0	1	73	46	0.800	17.8	141.4	0.183	0.851	0.257	--
34.0	141.4	0	9.0	32.0	1	73	46	0.783	17.6	141.4	0.181	0.847	0.255	--
35.0	141.4	0	22.0	35.0	1	73	69	0.767	32.3	141.4	Infin.	0.842	0.254	--
36.5	141.4	0	22.0	35.0	1	73	69	0.749	31.7	141.4	Infin.	0.837	0.252	--
37.0	133.4	0	13.0	37.0	1	58	52	0.742	21.5	133.4	0.214	0.832	0.251	--
38.0	133.4	0	13.0	37.0	1	58	52	0.726	21.2	133.4	0.211	0.829	0.250	--
39.0	133.4	0	13.0	37.0	1	58	52	0.714	20.9	133.4	0.208	0.824	0.248	--
40.0	133.4	1	20.0	40.0	1	58	62	0.703	28.1	71.0	0.314	0.819	0.249	1.26
41.0	133.4	1	20.0	40.0	1	58	62	0.692	27.8	71.0	0.306	0.815	0.251	1.22
42.0	133.4	1	14.0	42.0	1	57	52	0.682	21.3	71.0	0.207	0.810	0.253	0.82
43.0	133.4	1	14.0	42.0	1	57	52	0.672	21.1	71.0	0.204	0.806	0.255	0.80
44.0	133.4	1	14.0	42.0	1	57	52	0.662	20.9	71.0	0.202	0.801	0.257	0.79
45.0	138.4	1	26.0	45.0	1	18	69	0.653	28.4	76.0	0.317	0.797	0.258	1.23
46.0	138.4	1	26.0	45.0	1	18	69	0.644	28.0	76.0	0.307	0.792	0.260	1.18
47.0	138.4	1	24.0	47.0	1	18	66	0.635	25.8	76.0	0.260	0.787	0.261	1.00
48.0	138.4	1	24.0	47.0	1	18	66	0.627	25.5	76.0	0.255	0.783	0.262	0.97
49.0	138.4	1	24.0	47.0	1	18	66	0.619	25.2	76.0	0.251	0.778	0.263	0.95
50.0	129.8	1	50.0	49.5	1		93	0.611	45.9	67.4	Infin.	0.774	0.264	Non-Liq.
51.0	129.8	1	50.0	49.5	1		93	0.604	45.3	67.4	Infin.	0.769	0.265	Non-Liq.
52.0	129.8	1	90.0	52.0	1		124	0.598	80.7	67.4	Infin.	0.765	0.266	Non-Liq.
53.0	129.8	1	90.0	52.0	1		124	0.591	79.8	67.4	Infin.	0.760	0.267	Non-Liq.
54.0	129.8	1	90.0	52.0	1		124	0.585	79.0	67.4	Infin.	0.755	0.267	Non-Liq.
55.0	126.1	1	50.0	55.0	1		91	0.579	43.4	63.7	Infin.	0.751	0.268	Non-Liq.
56.0	126.1	1	50.0	55.0	1		91	0.573	43.0	63.7	Infin.	0.746	0.268	Non-Liq.
57.0	126.1	1	50.0	57.0	1		90	0.567	42.6	63.7	Infin.	0.742	0.269	Non-Liq.
58.0	126.1	1	50.0	57.0	1		90	0.562	42.2	63.7	Infin.	0.737	0.269	Non-Liq.
59.0	126.1	1	50.0	57.0	1		90	0.557	41.8	63.7	Infin.	0.733	0.269	Non-Liq.
60.0	139.9	1	50.0	60.0	1		89	0.551	41.4	77.5	Infin.	0.728	0.270	Non-Liq.
61.5	139.9	1	50.0	60.0	1		89	0.544	40.8	77.5	Infin.	0.722	0.270	Non-Liq.
62.0	115.7	1	27.0	62.0	1	9	65	0.542	22.9	53.3	0.210	0.718	0.269	0.78
63.0	115.7	1	27.0	62.0	1	9	65	0.537	22.7	53.3	0.208	0.714	0.270	0.77
64.0	115.7	1	27.0	62.0	1	9	65	0.532	22.5	53.3	0.206	0.710	0.270	0.76
65.0	115.7	1	50.0	65.0	1	9	87	0.528	40.6	53.3	Infin.	0.705	0.270	Non-Liq.
66.5	115.7	1	50.0	65.0	1	9	87	0.523	40.2	53.3	Infin.	0.699	0.270	Non-Liq.
67.0	138.2	1	26.0	67.0	1	64	63	0.521	27.3	75.8	0.271	0.695	0.269	1.01
68.0	138.2	1	26.0	67.0	1	64	63	0.515	27.1	75.8	0.267	0.691	0.269	0.99
69.0	138.2	1	26.0	67.0	1	64	63	0.511	26.9	75.8	0.264	0.687	0.269	0.98
70.0	138.2	1	50.0	69.5	1	64	86	0.506	45.0	75.8	Infin.	0.682	0.268	Non-Liq.
71.5	138.2	1	50.0	69.5	1	64	86	0.501	44.6	75.8	Infin.	0.677	0.268	Non-Liq.
72.0	122.1	1	50.0	72.0	1		85	0.499	37.4	59.7	Infin.	0.672	0.266	Non-Liq.
73.0	122.1	1	50.0	72.0	1		85	0.495	37.1	59.7	Infin.	0.669	0.267	Non-Liq.
74.0	122.1	1	50.0	74.5	1		84	0.491	36.8	59.7	Infin.	0.664	0.266	Non-Liq.
75.0	122.1	1	50.0	74.5	1		84	0.488	36.6	59.7	Infin.	0.659	0.266	Non-Liq.
76.0	122.1	1	50.0	74.5	1		84	0.484	36.3	59.7	Infin.	0.655	0.265	Non-Liq.
77.0	122.1	1	50.0	77.0	1		83	0.481	36.1	59.7	Infin.	0.650	0.265	Non-Liq.
78.0	122.1	1	50.0	77.0	1		83	0.478	35.8	59.7	Infin.	0.646	0.264	Non-Liq.
79.0	119.4	1	50.0	77.0	1		83	0.475	35.6	57.0	Infin.	0.641	0.263	Non-Liq.
80.0	119.4	1	50.0	79.5	1		83	0.472	35.4	57.0	Infin.	0.637	0.263	Non-Liq.

GEOCON

Client : 6728 N Sepulveda Blvd
File No. : W1207-06-01
Boring : 4

LIQUEFACTION SETTLEMENT ANALYSIS
DESIGN EARTHQUAKE

(SATURATED SAND AT INITIAL LIQUEFACTION CONDITION)

NCEER (1996) METHOD
EARTHQUAKE INFORMATION:

Earthquake Magnitude:	6.65
PGAM (g):	0.941
2/3 PGAM (g):	0.63
Calculated Mag.Wtg.Factor:	0.739
Historic High Groundwater:	40.0
Groundwater @ Exploration:	80.5

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	Volumetric Strain [e_{15}] (%)	EQ. SETTLE. Pe (in.)
1.0	8	88.7689	0.022	0.022	63	15	0.408	--	0.00	0.00
2.0	8	88.7689	0.067	0.067	63	15	0.408	--	0.00	0.00
3.0	8	88.7689	0.111	0.111	63	15	0.408	--	0.00	0.00
4.0	8	88.7689	0.155	0.155	63	15	0.408	--	0.00	0.00
5.0	8	88.7689	0.200	0.200	63	15	0.408	--	0.00	0.00
6.0	8	88.7689	0.244	0.244	63	15	0.408	--	0.00	0.00
7.0	8	88.7689	0.288	0.288	63	15	0.408	--	0.00	0.00
8.0	8	88.7689	0.333	0.333	63	15	0.408	--	0.00	0.00
9.0	8	88.7689	0.377	0.377	63	15	0.408	--	0.00	0.00
10.0	10	107.5359	0.426	0.426	65	18	0.408	--	0.00	0.00
11.0	10	107.5359	0.480	0.480	65	17	0.408	--	0.00	0.00
12.0	10	107.5359	0.534	0.534	65	16	0.408	--	0.00	0.00
13.0	10	107.5359	0.588	0.588	65	15	0.408	--	0.00	0.00
14.0	10	107.5359	0.641	0.641	65	14	0.408	--	0.00	0.00
15.0	9	86.2556	0.690	0.690	57	13	0.408	--	0.00	0.00
16.0	9	86.2556	0.733	0.733	57	13	0.408	--	0.00	0.00
17.0	9	86.2556	0.776	0.776	57	13	0.408	--	0.00	0.00
18.0	9	86.2556	0.819	0.819	57	12	0.408	--	0.00	0.00
19.0	9	86.2556	0.862	0.862	57	12	0.408	--	0.00	0.00
20.0	10	108.903	0.911	0.911	56	14	0.408	--	0.00	0.00
21.0	10	108.903	0.966	0.966	56	14	0.408	--	0.00	0.00
22.0	10	108.903	1.020	1.020	56	14	0.408	--	0.00	0.00
23.0	10	108.903	1.075	1.075	56	13	0.408	--	0.00	0.00
24.0	22	106.0675	1.128	1.128	78	30	0.408	--	0.00	0.00
25.0	22	106.0675	1.181	1.181	78	30	0.408	--	0.00	0.00
26.0	22	106.0675	1.234	1.234	78	29	0.408	--	0.00	0.00
27.0	22	106.0675	1.287	1.287	78	28	0.408	--	0.00	0.00
28.0	22	106.0675	1.340	1.340	78	28	0.408	--	0.00	0.00
29.0	22	106.0675	1.393	1.393	78	27	0.408	--	0.00	0.00
30.0	12	106.6494	1.447	1.447	54	15	0.408	--	0.00	0.00
31.5	12	106.6494	1.513	1.513	54	15	0.408	--	0.00	0.00
32.0	9	141.4164	1.544	1.544	46	18	0.408	--	0.00	0.00
33.0	9	141.4164	1.633	1.633	46	18	0.408	--	0.00	0.00
34.0	9	141.4164	1.703	1.703	46	18	0.408	--	0.00	0.00
35.0	22	141.4164	1.774	1.774	69	32	0.408	--	0.00	0.00
36.5	22	141.4164	1.862	1.862	69	32	0.408	--	0.00	0.00
37.0	13	133.3736	1.897	1.897	52	21	0.408	--	0.00	0.00
38.0	13	133.3736	1.980	1.980	52	21	0.408	--	0.00	0.00
39.0	13	133.3736	2.047	2.047	52	21	0.408	--	0.00	0.00
40.0	20	133.3736	2.114	2.098	62	28	0.411	1.26	0.00	0.00
41.0	20	133.3736	2.180	2.133	62	28	0.417	1.22	0.00	0.00
42.0	14	133.3736	2.247	2.169	52	21	0.423	0.82	1.40	0.17
43.0	14	133.3736	2.314	2.204	52	21	0.428	0.80	1.40	0.17
44.0	14	133.3736	2.380	2.240	52	21	0.434	0.79	1.40	0.17
45.0	26	138.4032	2.448	2.277	69	28	0.439	1.23	0.00	0.00
46.0	26	138.4032	2.517	2.315	69	28	0.444	1.18	0.00	0.00
47.0	24	138.4032	2.587	2.353	66	26	0.449	1.00	1.00	0.12
48.0	24	138.4032	2.656	2.391	66	25	0.453	0.97	1.10	0.13
49.0	24	138.4032	2.725	2.429	66	25	0.458	0.95	1.10	0.13
50.0	50	129.8364	2.792	2.464	93	46	0.462	Non-Liq.	0.00	0.00
51.0	50	129.8364	2.857	2.498	93	45	0.467	Non-Liq.	0.00	0.00
52.0	90	129.8364	2.922	2.532	124	81	0.471	Non-Liq.	0.00	0.00
53.0	90	129.8364	2.987	2.566	124	80	0.475	Non-Liq.	0.00	0.00
54.0	90	129.8364	3.052	2.599	124	79	0.479	Non-Liq.	0.00	0.00
55.0	50	126.075	3.116	2.632	91	43	0.483	Non-Liq.	0.00	0.00
56.0	50	126.075	3.179	2.664	91	43	0.487	Non-Liq.	0.00	0.00
57.0	50	126.075	3.242	2.696	90	43	0.491	Non-Liq.	0.00	0.00
58.0	50	126.075	3.305	2.728	90	42	0.494	Non-Liq.	0.00	0.00
59.0	50	126.075	3.368	2.759	90	42	0.498	Non-Liq.	0.00	0.00
60.0	50	139.874	3.434	2.795	89	41	0.501	Non-Liq.	0.00	0.00
61.5	50	139.874	3.522	2.843	89	41	0.505	Non-Liq.	0.00	0.00
62.0	27	115.662	3.554	2.860	65	23	0.507	0.78	1.30	0.08
63.0	27	115.662	3.626	2.893	65	23	0.511	0.77	1.30	0.16
64.0	27	115.662	3.684	2.919	65	23	0.515	0.76	1.30	0.16
65.0	50	115.662	3.742	2.946	87	41	0.518	Non-Liq.	0.00	0.00
66.5	50	115.662	3.814	2.979	87	40	0.522	Non-Liq.	0.00	0.00
67.0	26	138.169	3.846	2.996	63	27	0.524	1.01	1.10	0.07
68.0	26	138.169	3.932	3.043	63	27	0.527	0.99	1.10	0.13
69.0	26	138.169	4.001	3.081	63	27	0.530	0.98	1.10	0.13
70.0	50	138.169	4.070	3.119	86	45	0.532	Non-Liq.	0.00	0.00
71.5	50	138.169	4.157	3.166	86	45	0.536	Non-Liq.	0.00	0.00
72.0	50	122.1417	4.189	3.183	85	37	0.537	Non-Liq.	0.00	0.00
73.0	50	122.1417	4.265	3.220	85	37	0.540	Non-Liq.	0.00	0.00
74.0	50	122.1417	4.327	3.250	84	37	0.543	Non-Liq.	0.00	0.00
75.0	50	122.1417	4.388	3.280	84	37	0.546	Non-Liq.	0.00	0.00
76.0	50	122.1417	4.449	3.310	84	36	0.548	Non-Liq.	0.00	0.00
77.0	50	122.1417	4.510	3.340	83	36	0.551	Non-Liq.	0.00	0.00
78.0	50	122.1417	4.571	3.370	83	36	0.553	Non-Liq.	0.00	0.00
79.0	50	119.3508	4.631	3.399	83	36	0.556	Non-Liq.	0.00	0.00
80.0	50	119.3508	4.691	3.427	83	35	0.558	Non-Liq.	0.00	0.00

TOTAL SETTLEMENT = 1.6 INCHES

Figure 6

GEOCON

Client : 6728 N Sepulveda Blvd
File No. : W1207-06-01
Boring : 6

EMPIRICAL ESTIMATION OF LIQUEFACTION POTENTIAL
DESIGN EARTHQUAKE

NCEER (1996) METHOD

EARTHQUAKE INFORMATION:

Earthquake Magnitude:	6.65
Peak Horiz. Acceleration PGA_M (g):	0.941
2/3 PGA_M (g):	0.628
Calculated Mag.Wtg.Factor:	0.739
Historic High Groundwater:	40.0
Groundwater Depth During Exploration:	80.5

By Thomas F. Blake (1994-1996)

ENERGY & ROD CORRECTIONS:

Energy Correction (CE) for N60:	1.25
Rod Len.Corr.(CR)(0-no or 1-yes):	1.0
Bore Dia. Corr. (CB):	1.00
Sampler Corr. (CS):	1.20
Use Ksigma (0 or 1):	1.0

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	rd Factor	Induced CSR	Liquefac. Safe.Fact.
1.0	116.8	0	10.0	5.0	1		69	1.700	19.1	116.8	0.208	0.998	0.301	--
2.0	116.8	0	10.0	5.0	1		69	1.700	19.1	116.8	0.208	0.993	0.299	--
3.0	116.8	0	10.0	5.0	1		69	1.700	19.1	116.8	0.208	0.989	0.298	--
4.0	116.8	0	10.0	5.0	1		69	1.700	19.1	116.8	0.208	0.984	0.296	--
5.0	116.8	0	10.0	5.0	1		69	1.700	19.1	116.8	0.208	0.979	0.295	--
6.0	116.8	0	10.0	5.0	1		69	1.700	19.1	116.8	0.208	0.975	0.294	--
7.0	116.8	0	10.0	5.0	1		69	1.658	18.7	116.8	0.203	0.970	0.292	--
8.0	116.8	0	10.0	5.0	1		69	1.544	17.4	116.8	0.189	0.966	0.291	--
9.0	116.8	0	10.0	5.0	1		69	1.450	16.3	116.8	0.178	0.961	0.290	--
10.0	112.5	0	9.0	10.0	1		59	1.373	13.9	112.5	0.152	0.957	0.288	--
11.0	112.5	0	9.0	10.0	1		59	1.308	13.2	112.5	0.145	0.952	0.287	--
12.0	112.5	0	9.0	10.0	1		59	1.252	12.7	112.5	0.138	0.947	0.285	--
13.0	112.5	0	9.0	10.0	1		59	1.202	12.2	112.5	0.133	0.943	0.284	--
14.0	122.4	0	12.0	15.0	1		63	1.156	16.8	122.4	0.183	0.938	0.283	--
15.0	122.4	0	12.0	15.0	1		63	1.113	16.2	122.4	0.176	0.934	0.281	--
16.0	122.4	0	12.0	15.0	1		63	1.075	15.6	122.4	0.170	0.929	0.280	--
17.0	122.4	0	12.0	15.0	1		63	1.040	15.1	122.4	0.165	0.925	0.279	--
18.0	122.4	0	12.0	15.0	1		63	1.009	14.6	122.4	0.160	0.920	0.277	--
19.0	122.4	0	12.0	15.0	1		63	0.980	14.2	122.4	0.155	0.915	0.276	--
20.0	116.5	0	23.0	20.0	1		80	0.954	29.5	116.5	0.409	0.911	0.274	--
21.0	116.5	0	23.0	20.0	1		80	0.931	28.7	116.5	0.370	0.906	0.273	--
22.0	116.5	0	23.0	20.0	1		80	0.909	28.1	116.5	0.347	0.902	0.272	--
23.0	116.5	0	23.0	20.0	1		80	0.889	27.4	116.5	0.330	0.897	0.270	--
24.0	116.5	0	23.0	20.0	1		80	0.870	26.9	116.5	0.317	0.893	0.269	--
25.0	113.0	0	15.0	25.0	1		61	0.852	18.3	113.0	0.191	0.888	0.268	--
26.0	113.0	0	15.0	25.0	1		61	0.836	18.0	113.0	0.187	0.883	0.266	--
27.0	113.0	0	15.0	25.0	1		61	0.821	17.6	113.0	0.183	0.879	0.265	--
28.0	113.0	0	15.0	25.0	1		61	0.806	17.3	113.0	0.180	0.874	0.263	--
29.0	113.0	0	15.0	25.0	1		61	0.792	17.0	113.0	0.177	0.870	0.262	--
30.0	109.9	0	26.0	30.0	1		76	0.779	30.4	109.9	Infin.	0.865	0.261	--
31.5	109.9	0	26.0	30.0	1		76	0.764	29.8	109.9	0.420	0.859	0.259	--
32.0	130.0	0	15.0	32.0	1	79	57	0.758	24.1	130.0	0.248	0.855	0.258	--
33.0	130.0	0	15.0	32.0	1	79	57	0.741	23.7	130.0	0.243	0.851	0.257	--
34.0	130.0	0	15.0	32.0	1	79	57	0.729	23.4	130.0	0.240	0.847	0.255	--
35.0	130.0	0	18.0	35.0	1	79	60	0.717	26.4	130.0	0.279	0.842	0.254	--
36.0	130.0	0	18.0	35.0	1	79	60	0.706	26.1	130.0	0.274	0.838	0.252	--
37.0	130.0	0	24.0	37.0	1	61	68	0.695	32.0	130.0	Infin.	0.833	0.251	--
38.0	130.0	0	24.0	37.0	1	61	68	0.685	31.7	130.0	Infin.	0.829	0.250	--
39.0	130.0	0	24.0	37.0	1	61	68	0.675	31.3	130.0	Infin.	0.824	0.248	--
40.0	134.1	1	35.0	40.0	1	61	80	0.666	42.0	71.7	Infin.	0.819	0.249	Non-Liq.
41.0	134.1	1	35.0	40.0	1	61	80	0.657	41.5	71.7	Infin.	0.815	0.250	Non-Liq.
42.0	134.1	1	20.0	42.0	1	71	60	0.648	26.4	71.7	0.269	0.810	0.252	1.07
43.0	134.1	1	20.0	42.0	1	71	60	0.639	26.2	71.7	0.265	0.806	0.254	1.05
44.0	134.1	1	20.0	42.0	1	71	60	0.631	25.9	71.7	0.261	0.801	0.255	1.02
45.0	127.4	1	50.0	44.5	1	56	93	0.623	53.7	65.0	Infin.	0.797	0.256	Non-Liq.
46.0	127.4	1	50.0	44.5	1	56	93	0.616	53.2	65.0	Infin.	0.792	0.258	Non-Liq.
47.0	127.4	1	22.0	47.0	1	56	61	0.609	27.1	65.0	0.277	0.787	0.259	1.07
48.0	127.4	1	22.0	47.0	1	56	61	0.602	26.9	65.0	0.273	0.783	0.260	1.05
49.0	127.4	1	22.0	47.0	1	56	61	0.596	26.7	65.0	0.269	0.778	0.261	1.03
50.0	126.3	1	50.0	50.0	1	56	91	0.589	51.2	63.9	Infin.	0.774	0.262	Non-Liq.
51.5	126.3	1	50.0	50.0	1	56	91	0.582	50.6	63.9	Infin.	0.768	0.263	Non-Liq.
52.0	126.3	1	19.0	52.0	1	60	55	0.579	23.5	63.9	0.220	0.763	0.262	0.84
53.0	126.3	1	19.0	52.0	1	60	55	0.572	23.3	63.9	0.217	0.760	0.264	0.82
54.0	126.3	1	19.0	52.0	1	60	55	0.566	23.1	63.9	0.215	0.755	0.264	0.81
55.0	122.4	1	50.0	55.0	1	35	89	0.561	49.0	60.0	Infin.	0.751	0.265	Non-Liq.
56.0	122.4	1	50.0	55.0	1	35	89	0.556	48.7	60.0	Infin.	0.746	0.265	Non-Liq.
57.0	122.4	1	32.0	57.0	1	35	70	0.551	33.4	60.0	Infin.	0.742	0.266	Non-Liq.
58.0	122.4	1	32.0	57.0	1	35	70	0.546	33.2	60.0	Infin.	0.737	0.266	Non-Liq.
59.0	122.4	1	32.0	57.0	1	35	70	0.541	33.0	60.0	Infin.	0.733	0.266	Non-Liq.
60.0	126.4	1	39.0	60.0	1	35	77	0.536	38.4	64.0	Infin.	0.728	0.266	Non-Liq.
61.5	126.4	1	39.0	60.0	1	35	77	0.531	38.0	64.0	Infin.	0.722	0.266	Non-Liq.
62.0	126.4	1	25.0	62.0	1	73	61	0.528	26.8	64.0	0.261	0.718	0.266	0.98
63.0	126.4	1	25.0	62.0	1	73	61	0.523	26.6	64.0	0.257	0.714	0.266	0.97
64.0	126.4	1	25.0	62.0	1	73	61	0.519	26.4	64.0	0.254	0.710	0.266	0.96
65.0	134.2	1	43.0	65.0	1	34	79	0.514	39.9	71.8	Infin.	0.705	0.266	Non-Liq.
66.0	134.2	1	43.0	65.0	1	34	79	0.510	39.6	71.8	Infin.	0.701	0.266	Non-Liq.
67.0	134.2	1	35.0	67.0	1	34	71	0.506	33.3	71.8	Infin.	0.696	0.266	Non-Liq.
68.0	134.2	1	35.0	67.0	1	34	71	0.502	33.1	71.8	Infin.	0.691	0.265	Non-Liq.
69.0	117.9	1	50.0	69.5	1		84	0.498	37.3	55.5	Infin.	0.687	0.265	Non-Liq.
70.5	117.9	1	50.0	69.5	1		84	0.494	37.0	55.5	Infin.	0.681	0.264	Non-Liq.
71.0	117.9	1	50.0	69.5	1		84	0.492	36.9	55.5	Infin.	0.677	0.263	Non-Liq.
72.0	117.9	1	50.0	69.5	1		84	0.488	36.6	55.5	Infin.	0.673	0.264	Non-Liq.
73.0	121.0	1	44.0	72.0	1		78	0.484	32.0	58.6	Infin.	0.669	0.263	Non-Liq.
74.0	121.0	1	44.0	72.0	1		78	0.481	31.8	58.6	Infin.	0.664	0.263	Non-Liq.
75.0	121.0	1	50.0	75.0	1		82	0.478	35.9	58.6	Infin.	0.659	0.262	Non-Liq.
76.5	121.0	1	50.0	75.0	1		82	0.474	35.6	58.6	Infin.	0.654	0.262	Non-Liq.
77.0	130.6	1	29.0	77.0	1	64	62	0.473	27.6	68.2	0.265	0.649	0.260	1.02
78.0	130.6	1	29.0	77.0	1	64	62	0.468	27.4	68.2	0.261	0.646	0.260	1.00
79.0	130.6	1	29.0	77.0	1	64	62	0.465	27.2	68.2	0.258	0.641	0.259	1.00
80.5	130.6	1	50.0	80.0	1	64	81	0.462	41.7	68.2	Infin.	0.635	0.258	Non-Liq.

GEOCON

Client : 6728 N Sepulveda Blvd
File No. : W1207-06-01
Boring : 6

LIQUEFACTION SETTLEMENT ANALYSIS
DESIGN EARTHQUAKE

(SATURATED SAND AT INITIAL LIQUEFACTION CONDITION)

NCEER (1996) METHOD
EARTHQUAKE INFORMATION:

Earthquake Magnitude:	6.65
PGAM (g):	0.941
2/3 PGAM (g):	0.63
Calculated Mag.Wtg.Factor:	0.739
Historic High Groundwater:	40.0
Groundwater @ Exploration:	80.5

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	Volumetric Strain [e_{15}} (%)	EQ. SETTLE. Pe (in.)
1.0	10	116.8417	0.029	0.029	69	19	0.408	--	0.00	0.00
2.0	10	116.8417	0.088	0.088	69	19	0.408	--	0.00	0.00
3.0	10	116.8417	0.146	0.146	69	19	0.408	--	0.00	0.00
4.0	10	116.8417	0.204	0.204	69	19	0.408	--	0.00	0.00
5.0	10	116.8417	0.263	0.263	69	19	0.408	--	0.00	0.00
6.0	10	116.8417	0.321	0.321	69	19	0.408	--	0.00	0.00
7.0	10	116.8417	0.380	0.380	69	19	0.408	--	0.00	0.00
8.0	10	116.8417	0.438	0.438	69	17	0.408	--	0.00	0.00
9.0	10	116.8417	0.497	0.497	69	16	0.408	--	0.00	0.00
10.0	9	112.5376	0.554	0.554	59	14	0.408	--	0.00	0.00
11.0	9	112.5376	0.610	0.610	59	13	0.408	--	0.00	0.00
12.0	9	112.5376	0.666	0.666	59	13	0.408	--	0.00	0.00
13.0	9	112.5376	0.723	0.723	59	12	0.408	--	0.00	0.00
14.0	12	122.3685	0.781	0.781	63	17	0.408	--	0.00	0.00
15.0	12	122.3685	0.843	0.843	63	16	0.408	--	0.00	0.00
16.0	12	122.3685	0.904	0.904	63	16	0.408	--	0.00	0.00
17.0	12	122.3685	0.965	0.965	63	15	0.408	--	0.00	0.00
18.0	12	122.3685	1.026	1.026	63	15	0.408	--	0.00	0.00
19.0	12	122.3685	1.087	1.087	63	14	0.408	--	0.00	0.00
20.0	23	116.4828	1.147	1.147	80	29	0.408	--	0.00	0.00
21.0	23	116.4828	1.205	1.205	80	29	0.408	--	0.00	0.00
22.0	23	116.4828	1.264	1.264	80	28	0.408	--	0.00	0.00
23.0	23	116.4828	1.322	1.322	80	27	0.408	--	0.00	0.00
24.0	23	116.4828	1.380	1.380	80	27	0.408	--	0.00	0.00
25.0	15	112.9869	1.437	1.437	61	18	0.408	--	0.00	0.00
26.0	15	112.9869	1.494	1.494	61	18	0.408	--	0.00	0.00
27.0	15	112.9869	1.550	1.550	61	18	0.408	--	0.00	0.00
28.0	15	112.9869	1.607	1.607	61	17	0.408	--	0.00	0.00
29.0	15	112.9869	1.663	1.663	61	17	0.408	--	0.00	0.00
30.0	26	109.8801	1.719	1.719	76	30	0.408	--	0.00	0.00
31.5	26	109.8801	1.788	1.788	76	30	0.408	--	0.00	0.00
32.0	15	129.9684	1.818	1.818	57	24	0.408	--	0.00	0.00
33.0	15	129.9684	1.899	1.899	57	24	0.408	--	0.00	0.00
34.0	15	129.9684	1.964	1.964	57	23	0.408	--	0.00	0.00
35.0	18	129.9684	2.029	2.029	60	26	0.408	--	0.00	0.00
36.0	18	129.9684	2.094	2.094	60	26	0.408	--	0.00	0.00
37.0	24	129.9684	2.159	2.159	68	32	0.408	--	0.00	0.00
38.0	24	129.9684	2.224	2.224	68	32	0.408	--	0.00	0.00
39.0	24	129.9684	2.289	2.289	68	31	0.408	--	0.00	0.00
40.0	35	134.0658	2.355	2.339	80	42	0.411	Non-Liq.	0.00	0.00
41.0	35	134.0658	2.422	2.375	80	41	0.416	Non-Liq.	0.00	0.00
42.0	20	134.0658	2.489	2.411	60	26	0.421	1.07	0.95	0.11
43.0	20	134.0658	2.556	2.447	60	26	0.426	1.05	1.00	0.12
44.0	20	134.0658	2.623	2.483	60	26	0.431	1.02	1.00	0.12
45.0	50	127.4196	2.688	2.517	93	54	0.436	Non-Liq.	0.00	0.00
46.0	50	127.4196	2.752	2.549	93	53	0.440	Non-Liq.	0.00	0.00
47.0	22	127.4196	2.816	2.582	61	27	0.445	1.07	1.00	0.12
48.0	22	127.4196	2.880	2.614	61	27	0.449	1.05	1.00	0.12
49.0	22	127.4196	2.943	2.647	61	27	0.454	1.03	1.10	0.13
50.0	50	126.3224	3.007	2.679	91	51	0.458	Non-Liq.	0.00	0.00
51.5	50	126.3224	3.086	2.719	91	51	0.463	Non-Liq.	0.00	0.00
52.0	19	126.3224	3.117	2.735	55	23	0.465	0.84	1.30	0.08
53.0	19	126.3224	3.196	2.775	55	23	0.470	0.82	1.30	0.16
54.0	19	126.3224	3.259	2.807	55	23	0.474	0.81	1.30	0.16
55.0	50	122.4005	3.322	2.838	89	49	0.477	Non-Liq.	0.00	0.00
56.0	50	122.4005	3.383	2.868	89	49	0.481	Non-Liq.	0.00	0.00
57.0	32	122.4005	3.444	2.898	70	33	0.485	Non-Liq.	0.00	0.00
58.0	32	122.4005	3.505	2.928	70	33	0.488	Non-Liq.	0.00	0.00
59.0	32	122.4005	3.566	2.958	70	33	0.492	Non-Liq.	0.00	0.00
60.0	39	126.4446	3.629	2.989	77	38	0.495	Non-Liq.	0.00	0.00
61.5	39	126.4446	3.708	3.029	77	38	0.499	Non-Liq.	0.00	0.00
62.0	25	126.4446	3.739	3.045	61	27	0.501	0.98	1.10	0.07
63.0	25	126.4446	3.818	3.085	61	27	0.505	0.97	1.10	0.13
64.0	25	126.4446	3.881	3.117	61	26	0.508	0.96	1.10	0.13
65.0	43	134.246	3.947	3.151	79	40	0.511	Non-Liq.	0.00	0.00
66.0	43	134.246	4.014	3.187	79	40	0.514	Non-Liq.	0.00	0.00
67.0	35	134.246	4.081	3.223	71	33	0.517	Non-Liq.	0.00	0.00
68.0	35	134.246	4.148	3.259	71	33	0.519	Non-Liq.	0.00	0.00
69.0	50	117.936	4.211	3.291	84	37	0.522	Non-Liq.	0.00	0.00
70.5	50	117.936	4.285	3.325	84	37	0.526	Non-Liq.	0.00	0.00
71.0	50	117.936	4.314	3.339	84	37	0.527	Non-Liq.	0.00	0.00
72.0	50	117.936	4.388	3.374	84	37	0.531	Non-Liq.	0.00	0.00
73.0	44	120.96	4.448	3.402	78	32	0.533	Non-Liq.	0.00	0.00
74.0	44	120.96	4.508	3.432	78	32	0.536	Non-Liq.	0.00	0.00
75.0	50	120.96	4.569	3.461	82	36	0.539	Non-Liq.	0.00	0.00
76.5	50	120.96	4.644	3.498	82	36	0.542	Non-Liq.	0.00	0.00
77.0	29	130.5965	4.676	3.513	62	28	0.543	1.02	0.75	0.05
78.0	29	130.5965	4.757	3.556	62	27	0.546	1.00	1.10	0.13
79.0	29	130.5965	4.823	3.590	62	27	0.548	1.00	1.10	0.13
80.5	50	130.5965	4.904	3.633	81	42	0.551	Non-Liq.	0.00	0.00

TOTAL SETTLEMENT = 1.8 INCHES

EMPIRICAL ESTIMATION OF LIQUEFACTION POTENTIAL
MAXIMUM CONSIDERED EARTHQUAKE

NCEER (1996) METHOD

By Thomas F. Blake (1994-1996)

EARTHQUAKE INFORMATION:

Earthquake Magnitude:	6.79
Peak Horiz. Acceleration PGA_M (g):	0.941
Calculated Mag.Wtg.Factor:	0.779
Historic High Groundwater:	40.0
Groundwater Depth During Exploration:	80.5

ENERGY & ROD CORRECTIONS:

Energy Correction (CE) for N60:	1.25
Rod Len.Corr.(CR)(0-no or 1-yes):	1.0
Bore Dia. Corr. (CB):	1.00
Sampler Corr. (CS):	1.20
Use Ksigma (0 or 1):	1.0

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	rd Factor	Induced CSR	Liquefac. Safe.Fact.
1.0	88.8	0	8.0	5.0	1		63	1.700	15.3	88.8	0.167	0.998	0.475	--
2.0	88.8	0	8.0	5.0	1		63	1.700	15.3	88.8	0.167	0.993	0.473	--
3.0	88.8	0	8.0	5.0	1		63	1.700	15.3	88.8	0.167	0.989	0.471	--
4.0	88.8	0	8.0	5.0	1		63	1.700	15.3	88.8	0.167	0.984	0.469	--
5.0	88.8	0	8.0	5.0	1		63	1.700	15.3	88.8	0.167	0.979	0.467	--
6.0	88.8	0	8.0	5.0	1		63	1.700	15.3	88.8	0.167	0.975	0.464	--
7.0	88.8	0	8.0	5.0	1		63	1.700	15.3	88.8	0.167	0.970	0.462	--
8.0	88.8	0	8.0	5.0	1		63	1.700	15.3	88.8	0.167	0.966	0.460	--
9.0	88.8	0	8.0	5.0	1		63	1.664	15.0	88.8	0.163	0.961	0.458	--
10.0	107.5	0	10.0	10.0	1		65	1.565	17.6	107.5	0.191	0.957	0.456	--
11.0	107.5	0	10.0	10.0	1		65	1.475	16.6	107.5	0.180	0.952	0.454	--
12.0	107.5	0	10.0	10.0	1		65	1.398	15.7	107.5	0.171	0.947	0.451	--
13.0	107.5	0	10.0	10.0	1		65	1.333	15.0	107.5	0.163	0.943	0.449	--
14.0	107.5	0	10.0	10.0	1		65	1.276	14.4	107.5	0.157	0.938	0.447	--
15.0	86.3	0	9.0	15.0	1		57	1.230	13.4	86.3	0.146	0.934	0.445	--
16.0	86.3	0	9.0	15.0	1		57	1.193	13.0	86.3	0.142	0.929	0.443	--
17.0	86.3	0	9.0	15.0	1		57	1.160	12.6	86.3	0.138	0.925	0.441	--
18.0	86.3	0	9.0	15.0	1		57	1.129	12.3	86.3	0.134	0.920	0.438	--
19.0	86.3	0	9.0	15.0	1		57	1.100	12.0	86.3	0.131	0.915	0.436	--
20.0	108.9	0	10.0	20.0	1		56	1.070	14.4	108.9	0.157	0.911	0.434	--
21.0	108.9	0	10.0	20.0	1		56	1.040	14.0	108.9	0.152	0.906	0.432	--
22.0	108.9	0	10.0	20.0	1		56	1.012	13.6	108.9	0.148	0.902	0.430	--
23.0	108.9	0	10.0	20.0	1		56	0.986	13.2	108.9	0.144	0.897	0.427	--
24.0	106.1	0	22.0	25.0	1		78	0.962	30.3	106.1	Infin.	0.893	0.425	--
25.0	106.1	0	22.0	25.0	1		78	0.940	29.6	106.1	0.424	0.888	0.423	--
26.0	106.1	0	22.0	25.0	1		78	0.920	29.0	106.1	0.379	0.883	0.421	--
27.0	106.1	0	22.0	25.0	1		78	0.901	28.4	106.1	0.356	0.879	0.419	--
28.0	106.1	0	22.0	25.0	1		78	0.883	27.8	106.1	0.339	0.874	0.417	--
29.0	106.1	0	22.0	25.0	1		78	0.866	27.3	106.1	0.325	0.870	0.414	--
30.0	106.6	0	12.0	30.0	1		54	0.850	15.3	106.6	0.159	0.865	0.412	--
31.5	106.6	0	12.0	30.0	1		54	0.831	15.0	106.6	0.156	0.859	0.409	--
32.0	141.4	0	9.0	32.0	1	73	46	0.822	18.1	141.4	0.186	0.855	0.407	--
33.0	141.4	0	9.0	32.0	1	73	46	0.800	17.8	141.4	0.183	0.851	0.406	--
34.0	141.4	0	9.0	32.0	1	73	46	0.783	17.6	141.4	0.181	0.847	0.404	--
35.0	141.4	0	22.0	35.0	1	73	69	0.767	32.3	141.4	Infin.	0.842	0.401	--
36.5	141.4	0	22.0	35.0	1	73	69	0.749	31.7	141.4	Infin.	0.837	0.399	--
37.0	133.4	0	13.0	37.0	1	58	52	0.742	21.5	133.4	0.214	0.832	0.396	--
38.0	133.4	0	13.0	37.0	1	58	52	0.726	21.2	133.4	0.211	0.829	0.395	--
39.0	133.4	0	13.0	37.0	1	58	52	0.714	20.9	133.4	0.208	0.824	0.393	--
40.0	133.4	1	20.0	40.0	1	58	62	0.703	28.1	71.0	0.314	0.819	0.393	0.80
41.0	133.4	1	20.0	40.0	1	58	62	0.692	27.8	71.0	0.306	0.815	0.397	0.77
42.0	133.4	1	14.0	42.0	1	57	52	0.682	21.3	71.0	0.207	0.810	0.400	0.52
43.0	133.4	1	14.0	42.0	1	57	52	0.672	21.1	71.0	0.204	0.806	0.403	0.51
44.0	133.4	1	14.0	42.0	1	57	52	0.662	20.9	71.0	0.202	0.801	0.406	0.50
45.0	138.4	1	26.0	45.0	1	18	69	0.653	28.4	76.0	0.317	0.797	0.408	0.78
46.0	138.4	1	26.0	45.0	1	18	69	0.644	28.0	76.0	0.307	0.792	0.410	0.75
47.0	138.4	1	24.0	47.0	1	18	66	0.635	25.8	76.0	0.260	0.787	0.413	0.63
48.0	138.4	1	24.0	47.0	1	18	66	0.627	25.5	76.0	0.255	0.783	0.414	0.62
49.0	138.4	1	24.0	47.0	1	18	66	0.619	25.2	76.0	0.251	0.778	0.416	0.60
50.0	129.8	1	50.0	49.5	1		93	0.611	45.9	67.4	Infin.	0.774	0.418	Non-Liq.
51.0	129.8	1	50.0	49.5	1		93	0.604	45.3	67.4	Infin.	0.769	0.419	Non-Liq.
52.0	129.8	1	90.0	52.0	1		124	0.598	80.7	67.4	Infin.	0.765	0.420	Non-Liq.
53.0	129.8	1	90.0	52.0	1		124	0.591	79.8	67.4	Infin.	0.760	0.422	Non-Liq.
54.0	129.8	1	90.0	52.0	1		124	0.585	79.0	67.4	Infin.	0.755	0.423	Non-Liq.
55.0	126.1	1	50.0	55.0	1		91	0.579	43.4	63.7	Infin.	0.751	0.423	Non-Liq.
56.0	126.1	1	50.0	55.0	1		91	0.573	43.0	63.7	Infin.	0.746	0.424	Non-Liq.
57.0	126.1	1	50.0	57.0	1		90	0.567	42.6	63.7	Infin.	0.742	0.425	Non-Liq.
58.0	126.1	1	50.0	57.0	1		90	0.562	42.2	63.7	Infin.	0.737	0.426	Non-Liq.
59.0	126.1	1	50.0	57.0	1		90	0.557	41.8	63.7	Infin.	0.733	0.426	Non-Liq.
60.0	139.9	1	50.0	60.0	1		89	0.551	41.4	77.5	Infin.	0.728	0.426	Non-Liq.
61.5	139.9	1	50.0	60.0	1		89	0.544	40.8	77.5	Infin.	0.722	0.426	Non-Liq.
62.0	115.7	1	27.0	62.0	1	9	65	0.542	22.9	53.3	0.210	0.718	0.425	0.50
63.0	115.7	1	27.0	62.0	1	9	65	0.537	22.7	53.3	0.208	0.714	0.427	0.49
64.0	115.7	1	27.0	62.0	1	9	65	0.532	22.5	53.3	0.206	0.710	0.427	0.48
65.0	115.7	1	50.0	65.0	1	9	87	0.528	40.6	53.3	Infin.	0.705	0.427	Non-Liq.
66.5	115.7	1	50.0	65.0	1	9	87	0.523	40.2	53.3	Infin.	0.699	0.427	Non-Liq.
67.0	138.2	1	26.0	67.0	1	64	63	0.521	27.3	75.8	0.271	0.695	0.425	0.64
68.0	138.2	1	26.0	67.0	1	64	63	0.515	27.1	75.8	0.267	0.691	0.426	0.63
69.0	138.2	1	26.0	67.0	1	64	63	0.511	26.9	75.8	0.264	0.687	0.425	0.62
70.0	138.2	1	50.0	69.5	1	64	86	0.506	45.0	75.8	Infin.	0.682	0.424	Non-Liq.
71.5	138.2	1	50.0	69.5	1	64	86	0.501	44.6	75.8	Infin.	0.677	0.423	Non-Liq.
72.0	122.1	1	50.0	72.0	1		85	0.499	37.4	59.7	Infin.	0.672	0.421	Non-Liq.
73.0	122.1	1	50.0	72.0	1		85	0.495	37.1	59.7	Infin.	0.669	0.422	Non-Liq.
74.0	122.1	1	50.0	74.5	1		84	0.491	36.8	59.7	Infin.	0.664	0.421	Non-Liq.
75.0	122.1	1	50.0	74.5	1		84	0.488	36.6	59.7	Infin.	0.659	0.420	Non-Liq.
76.0	122.1	1	50.0	74.5	1		84	0.484	36.3	59.7	Infin.	0.655	0.419	Non-Liq.
77.0	122.1	1	50.0	77.0	1		83	0.481	36.1	59.7	Infin.	0.650	0.418	Non-Liq.
78.0	122.1	1	50.0	77.0	1		83	0.478	35.8	59.7	Infin.	0.646	0.417	Non-Liq.
79.0	119.4	1	50.0	77.0	1		83	0.475	35.6	57.0	Infin.	0.641	0.416	Non-Liq.
80.0	119.4	1	50.0	79.5	1		83	0.472	35.4	57.0	Infin.	0.637	0.415	Non-Liq.

GEOCON

Client : 6728 N Sepulveda Blvd
File No. : W1207-06-01
Boring : 4

LIQUEFACTION SETTLEMENT ANALYSIS
MAXIMUM CONSIDERED EARTHQUAKE

(SATURATED SAND AT INITIAL LIQUEFACTION CONDITION)

NCEER (1996) METHOD
EARTHQUAKE INFORMATION:

Earthquake Magnitude:	6.79
PGA_M (g):	0.941
Calculated Mag.Wtg.Factor:	0.779
Historic High Groundwater:	40.0
Groundwater @ Exploration:	80.5

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	Volumetric Strain $[e_{15}]$ (%)	EQ. SETTLE. Pe (in.)
1.0	8	88.7689	0.022	0.022	63	15	0.612	--	0.00	0.00
2.0	8	88.7689	0.067	0.067	63	15	0.612	--	0.00	0.00
3.0	8	88.7689	0.111	0.111	63	15	0.612	--	0.00	0.00
4.0	8	88.7689	0.155	0.155	63	15	0.612	--	0.00	0.00
5.0	8	88.7689	0.200	0.200	63	15	0.612	--	0.00	0.00
6.0	8	88.7689	0.244	0.244	63	15	0.612	--	0.00	0.00
7.0	8	88.7689	0.288	0.288	63	15	0.612	--	0.00	0.00
8.0	8	88.7689	0.333	0.333	63	15	0.612	--	0.00	0.00
9.0	8	88.7689	0.377	0.377	63	15	0.612	--	0.00	0.00
10.0	10	107.5359	0.426	0.426	65	18	0.612	--	0.00	0.00
11.0	10	107.5359	0.480	0.480	65	17	0.612	--	0.00	0.00
12.0	10	107.5359	0.534	0.534	65	16	0.612	--	0.00	0.00
13.0	10	107.5359	0.588	0.588	65	15	0.612	--	0.00	0.00
14.0	10	107.5359	0.641	0.641	65	14	0.612	--	0.00	0.00
15.0	9	86.2556	0.690	0.690	57	13	0.612	--	0.00	0.00
16.0	9	86.2556	0.733	0.733	57	13	0.612	--	0.00	0.00
17.0	9	86.2556	0.776	0.776	57	13	0.612	--	0.00	0.00
18.0	9	86.2556	0.819	0.819	57	12	0.612	--	0.00	0.00
19.0	9	86.2556	0.862	0.862	57	12	0.612	--	0.00	0.00
20.0	10	108.903	0.911	0.911	56	14	0.612	--	0.00	0.00
21.0	10	108.903	0.966	0.966	56	14	0.612	--	0.00	0.00
22.0	10	108.903	1.020	1.020	56	14	0.612	--	0.00	0.00
23.0	10	108.903	1.075	1.075	56	13	0.612	--	0.00	0.00
24.0	22	106.0675	1.128	1.128	78	30	0.612	--	0.00	0.00
25.0	22	106.0675	1.181	1.181	78	30	0.612	--	0.00	0.00
26.0	22	106.0675	1.234	1.234	78	29	0.612	--	0.00	0.00
27.0	22	106.0675	1.287	1.287	78	28	0.612	--	0.00	0.00
28.0	22	106.0675	1.340	1.340	78	28	0.612	--	0.00	0.00
29.0	22	106.0675	1.393	1.393	78	27	0.612	--	0.00	0.00
30.0	12	106.6494	1.447	1.447	54	15	0.612	--	0.00	0.00
31.5	12	106.6494	1.513	1.513	54	15	0.612	--	0.00	0.00
32.0	9	141.4164	1.544	1.544	46	18	0.612	--	0.00	0.00
33.0	9	141.4164	1.633	1.633	46	18	0.612	--	0.00	0.00
34.0	9	141.4164	1.703	1.703	46	18	0.612	--	0.00	0.00
35.0	22	141.4164	1.774	1.774	69	32	0.612	--	0.00	0.00
36.5	22	141.4164	1.862	1.862	69	32	0.612	--	0.00	0.00
37.0	13	133.3736	1.897	1.897	52	21	0.612	--	0.00	0.00
38.0	13	133.3736	1.980	1.980	52	21	0.612	--	0.00	0.00
39.0	13	133.3736	2.047	2.047	52	21	0.612	--	0.00	0.00
40.0	20	133.3736	2.114	2.098	62	28	0.616	0.80	0.75	0.09
41.0	20	133.3736	2.180	2.133	62	28	0.625	0.77	0.75	0.09
42.0	14	133.3736	2.247	2.169	52	21	0.634	0.52	1.40	0.17
43.0	14	133.3736	2.314	2.204	52	21	0.642	0.51	1.40	0.17
44.0	14	133.3736	2.380	2.240	52	21	0.650	0.50	1.40	0.17
45.0	26	138.4032	2.448	2.277	69	28	0.658	0.78	0.75	0.09
46.0	26	138.4032	2.517	2.315	69	28	0.665	0.75	0.75	0.09
47.0	24	138.4032	2.587	2.353	66	26	0.672	0.63	1.10	0.13
48.0	24	138.4032	2.656	2.391	66	25	0.680	0.62	1.10	0.13
49.0	24	138.4032	2.725	2.429	66	25	0.686	0.60	1.10	0.13
50.0	50	129.8364	2.792	2.464	93	46	0.693	Non-Liq.	0.00	0.00
51.0	50	129.8364	2.857	2.498	93	45	0.699	Non-Liq.	0.00	0.00
52.0	90	129.8364	2.922	2.532	124	81	0.706	Non-Liq.	0.00	0.00
53.0	90	129.8364	2.987	2.566	124	80	0.712	Non-Liq.	0.00	0.00
54.0	90	129.8364	3.052	2.599	124	79	0.718	Non-Liq.	0.00	0.00
55.0	50	126.075	3.116	2.632	91	43	0.724	Non-Liq.	0.00	0.00
56.0	50	126.075	3.179	2.664	91	43	0.730	Non-Liq.	0.00	0.00
57.0	50	126.075	3.242	2.696	90	43	0.736	Non-Liq.	0.00	0.00
58.0	50	126.075	3.305	2.728	90	42	0.741	Non-Liq.	0.00	0.00
59.0	50	126.075	3.368	2.759	90	42	0.747	Non-Liq.	0.00	0.00
60.0	50	139.874	3.434	2.795	89	41	0.752	Non-Liq.	0.00	0.00
61.5	50	139.874	3.522	2.843	89	41	0.758	Non-Liq.	0.00	0.00
62.0	27	115.662	3.554	2.860	65	23	0.760	0.50	1.30	0.08
63.0	27	115.662	3.626	2.893	65	23	0.767	0.49	1.30	0.16
64.0	27	115.662	3.684	2.919	65	23	0.772	0.48	1.30	0.16
65.0	50	115.662	3.742	2.946	87	41	0.777	Non-Liq.	0.00	0.00
66.5	50	115.662	3.814	2.979	87	40	0.783	Non-Liq.	0.00	0.00
67.0	26	138.169	3.846	2.996	63	27	0.785	0.64	1.10	0.07
68.0	26	138.169	3.932	3.043	63	27	0.790	0.63	1.10	0.13
69.0	26	138.169	4.001	3.081	63	27	0.794	0.62	1.10	0.13
70.0	50	138.169	4.070	3.119	86	45	0.798	Non-Liq.	0.00	0.00
71.5	50	138.169	4.157	3.166	86	45	0.803	Non-Liq.	0.00	0.00
72.0	50	122.1417	4.189	3.183	85	37	0.805	Non-Liq.	0.00	0.00
73.0	50	122.1417	4.265	3.220	85	37	0.810	Non-Liq.	0.00	0.00
74.0	50	122.1417	4.327	3.250	84	37	0.814	Non-Liq.	0.00	0.00
75.0	50	122.1417	4.388	3.280	84	37	0.818	Non-Liq.	0.00	0.00
76.0	50	122.1417	4.449	3.310	84	36	0.822	Non-Liq.	0.00	0.00
77.0	50	122.1417	4.510	3.340	83	36	0.826	Non-Liq.	0.00	0.00
78.0	50	122.1417	4.571	3.370	83	36	0.830	Non-Liq.	0.00	0.00
79.0	50	119.3508	4.631	3.399	83	36	0.833	Non-Liq.	0.00	0.00
80.0	50	119.3508	4.691	3.427	83	35	0.837	Non-Liq.	0.00	0.00

TOTAL SETTLEMENT = 2.0 INCHES

GEOCON

Client : 6728 N Sepulveda Blvd
File No. : W1207-06-01
Boring : 6

EMPIRICAL ESTIMATION OF LIQUEFACTION POTENTIAL
MAXIMUM CONSIDERED EARTHQUAKE

NCEER (1996) METHOD

By Thomas F. Blake (1994-1996)

EARTHQUAKE INFORMATION:

Earthquake Magnitude:	6.79
Peak Horiz. Acceleration PGA_M (g):	0.941
Calculated Mag.Wtg.Factor:	0.779
Historic High Groundwater:	40.0
Groundwater Depth During Exploration:	80.5

ENERGY & ROD CORRECTIONS:

Energy Correction (CE) for N60:	1.25
Rod Len.Corr.(CR)(0-no or 1-yes):	1.0
Bore Dia. Corr. (CB):	1.00
Sampler Corr. (CS):	1.20
Use Ksigma (0 or 1):	1.0

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	rd Factor	Induced CSR	Liquefac. Safe.Fact.
1.0	116.8	0	10.0	5.0	1		69	1.700	19.1	116.8	0.208	0.998	0.475	--
2.0	116.8	0	10.0	5.0	1		69	1.700	19.1	116.8	0.208	0.993	0.473	--
3.0	116.8	0	10.0	5.0	1		69	1.700	19.1	116.8	0.208	0.989	0.471	--
4.0	116.8	0	10.0	5.0	1		69	1.700	19.1	116.8	0.208	0.984	0.469	--
5.0	116.8	0	10.0	5.0	1		69	1.700	19.1	116.8	0.208	0.979	0.467	--
6.0	116.8	0	10.0	5.0	1		69	1.700	19.1	116.8	0.208	0.975	0.464	--
7.0	116.8	0	10.0	5.0	1		69	1.658	18.7	116.8	0.203	0.970	0.462	--
8.0	116.8	0	10.0	5.0	1		69	1.544	17.4	116.8	0.189	0.966	0.460	--
9.0	116.8	0	10.0	5.0	1		69	1.450	16.3	116.8	0.178	0.961	0.458	--
10.0	112.5	0	9.0	10.0	1		59	1.373	13.9	112.5	0.152	0.957	0.456	--
11.0	112.5	0	9.0	10.0	1		59	1.308	13.2	112.5	0.145	0.952	0.454	--
12.0	112.5	0	9.0	10.0	1		59	1.252	12.7	112.5	0.138	0.947	0.451	--
13.0	112.5	0	9.0	10.0	1		59	1.202	12.2	112.5	0.133	0.943	0.449	--
14.0	122.4	0	12.0	15.0	1		63	1.156	16.8	122.4	0.183	0.938	0.447	--
15.0	122.4	0	12.0	15.0	1		63	1.113	16.2	122.4	0.176	0.934	0.445	--
16.0	122.4	0	12.0	15.0	1		63	1.075	15.6	122.4	0.170	0.929	0.443	--
17.0	122.4	0	12.0	15.0	1		63	1.040	15.1	122.4	0.165	0.925	0.441	--
18.0	122.4	0	12.0	15.0	1		63	1.009	14.6	122.4	0.160	0.920	0.438	--
19.0	122.4	0	12.0	15.0	1		63	0.980	14.2	122.4	0.155	0.915	0.436	--
20.0	116.5	0	23.0	20.0	1		80	0.954	29.5	116.5	0.409	0.911	0.434	--
21.0	116.5	0	23.0	20.0	1		80	0.931	28.7	116.5	0.370	0.906	0.432	--
22.0	116.5	0	23.0	20.0	1		80	0.909	28.1	116.5	0.347	0.902	0.430	--
23.0	116.5	0	23.0	20.0	1		80	0.889	27.4	116.5	0.330	0.897	0.427	--
24.0	116.5	0	23.0	20.0	1		80	0.870	26.9	116.5	0.317	0.893	0.425	--
25.0	113.0	0	15.0	25.0	1		61	0.852	18.3	113.0	0.191	0.888	0.423	--
26.0	113.0	0	15.0	25.0	1		61	0.836	18.0	113.0	0.187	0.883	0.421	--
27.0	113.0	0	15.0	25.0	1		61	0.821	17.6	113.0	0.183	0.879	0.419	--
28.0	113.0	0	15.0	25.0	1		61	0.806	17.3	113.0	0.180	0.874	0.417	--
29.0	113.0	0	15.0	25.0	1		61	0.792	17.0	113.0	0.177	0.870	0.414	--
30.0	109.9	0	26.0	30.0	1		76	0.779	30.4	109.9	Infin.	0.865	0.412	--
31.5	109.9	0	26.0	30.0	1		76	0.764	29.8	109.9	0.420	0.859	0.409	--
32.0	130.0	0	15.0	32.0	1	79	57	0.758	24.1	130.0	0.248	0.855	0.407	--
33.0	130.0	0	15.0	32.0	1	79	57	0.741	23.7	130.0	0.243	0.851	0.406	--
34.0	130.0	0	15.0	32.0	1	79	57	0.729	23.4	130.0	0.240	0.847	0.404	--
35.0	130.0	0	18.0	35.0	1	79	60	0.717	26.4	130.0	0.279	0.842	0.401	--
36.0	130.0	0	18.0	35.0	1	79	60	0.706	26.1	130.0	0.274	0.838	0.399	--
37.0	130.0	0	24.0	37.0	1	61	68	0.695	32.0	130.0	Infin.	0.833	0.397	--
38.0	130.0	0	24.0	37.0	1	61	68	0.685	31.7	130.0	Infin.	0.829	0.395	--
39.0	130.0	0	24.0	37.0	1	61	68	0.675	31.3	130.0	Infin.	0.824	0.393	--
40.0	134.1	1	35.0	40.0	1	61	80	0.666	42.0	71.7	Infin.	0.819	0.393	Non-Liq.
41.0	134.1	1	35.0	40.0	1	61	80	0.657	41.5	71.7	Infin.	0.815	0.396	Non-Liq.
42.0	134.1	1	20.0	42.0	1	71	60	0.648	26.4	71.7	0.269	0.810	0.399	0.68
43.0	134.1	1	20.0	42.0	1	71	60	0.639	26.2	71.7	0.265	0.806	0.401	0.66
44.0	134.1	1	20.0	42.0	1	71	60	0.631	25.9	71.7	0.261	0.801	0.403	0.65
45.0	127.4	1	50.0	44.5	1	56	93	0.623	53.7	65.0	Infin.	0.797	0.405	Non-Liq.
46.0	127.4	1	50.0	44.5	1	56	93	0.616	53.2	65.0	Infin.	0.792	0.407	Non-Liq.
47.0	127.4	1	22.0	47.0	1	56	61	0.609	27.1	65.0	0.277	0.787	0.409	0.68
48.0	127.4	1	22.0	47.0	1	56	61	0.602	26.9	65.0	0.273	0.783	0.411	0.66
49.0	127.4	1	22.0	47.0	1	56	61	0.596	26.7	65.0	0.269	0.778	0.412	0.65
50.0	126.3	1	50.0	50.0	1	56	91	0.589	51.2	63.9	Infin.	0.774	0.414	Non-Liq.
51.5	126.3	1	50.0	50.0	1	56	91	0.582	50.6	63.9	Infin.	0.768	0.415	Non-Liq.
52.0	126.3	1	19.0	52.0	1	60	55	0.579	23.5	63.9	0.220	0.763	0.415	0.53
53.0	126.3	1	19.0	52.0	1	60	55	0.572	23.3	63.9	0.217	0.760	0.417	0.52
54.0	126.3	1	19.0	52.0	1	60	55	0.566	23.1	63.9	0.215	0.755	0.418	0.52
55.0	122.4	1	50.0	55.0	1	35	89	0.561	49.0	60.0	Infin.	0.751	0.419	Non-Liq.
56.0	122.4	1	50.0	55.0	1	35	89	0.556	48.7	60.0	Infin.	0.746	0.419	Non-Liq.
57.0	122.4	1	32.0	57.0	1	35	70	0.551	33.4	60.0	Infin.	0.742	0.420	Non-Liq.
58.0	122.4	1	32.0	57.0	1	35	70	0.546	33.2	60.0	Infin.	0.737	0.420	Non-Liq.
59.0	122.4	1	32.0	57.0	1	35	70	0.541	33.0	60.0	Infin.	0.733	0.421	Non-Liq.
60.0	126.4	1	39.0	60.0	1	35	77	0.536	38.4	64.0	Infin.	0.728	0.421	Non-Liq.
61.5	126.4	1	39.0	60.0	1	35	77	0.531	38.0	64.0	Infin.	0.722	0.421	Non-Liq.
62.0	126.4	1	25.0	62.0	1	73	61	0.528	26.8	64.0	0.261	0.718	0.420	0.62
63.0	126.4	1	25.0	62.0	1	73	61	0.523	26.6	64.0	0.257	0.714	0.421	0.61
64.0	126.4	1	25.0	62.0	1	73	61	0.519	26.4	64.0	0.254	0.710	0.421	0.60
65.0	134.2	1	43.0	65.0	1	34	79	0.514	39.9	71.8	Infin.	0.705	0.421	Non-Liq.
66.0	134.2	1	43.0	65.0	1	34	79	0.510	39.6	71.8	Infin.	0.701	0.420	Non-Liq.
67.0	134.2	1	35.0	67.0	1	34	71	0.506	33.3	71.8	Infin.	0.696	0.420	Non-Liq.
68.0	134.2	1	35.0	67.0	1	34	71	0.502	33.1	71.8	Infin.	0.691	0.419	Non-Liq.
69.0	117.9	1	50.0	69.5	1		84	0.498	37.3	55.5	Infin.	0.687	0.419	Non-Liq.
70.5	117.9	1	50.0	69.5	1		84	0.494	37.0	55.5	Infin.	0.681	0.418	Non-Liq.
71.0	117.9	1	50.0	69.5	1		84	0.492	36.9	55.5	Infin.	0.677	0.416	Non-Liq.
72.0	117.9	1	50.0	69.5	1		84	0.488	36.6	55.5	Infin.	0.673	0.417	Non-Liq.
73.0	121.0	1	44.0	72.0	1		78	0.484	32.0	58.6	Infin.	0.669	0.416	Non-Liq.
74.0	121.0	1	44.0	72.0	1		78	0.481	31.8	58.6	Infin.	0.664	0.416	Non-Liq.
75.0	121.0	1	50.0	75.0	1		82	0.478	35.9	58.6	Infin.	0.659	0.415	Non-Liq.
76.5	121.0	1	50.0	75.0	1		82	0.474	35.6	58.6	Infin.	0.654	0.414	Non-Liq.
77.0	130.6	1	29.0	77.0	1	64	62	0.473	27.6	68.2	0.265	0.649	0.412	0.64
78.0	130.6	1	29.0	77.0	1	64	62	0.468	27.4	68.2	0.261	0.646	0.412	0.63
79.0	130.6	1	29.0	77.0	1	64	62	0.465	27.2	68.2	0.258	0.641	0.410	0.63
80.5	130.6	1	50.0	80.0	1	64	81	0.462	41.7	68.2	Infin.	0.635	0.409	Non-Liq.

GEOCON

Client : 6728 N Sepulveda Blvd
File No. : W1207-06-01
Boring : 6

LIQUEFACTION SETTLEMENT ANALYSIS
MAXIMUM CONSIDERED EARTHQUAKE

(SATURATED SAND AT INITIAL LIQUEFACTION CONDITION)

NCEER (1996) METHOD
EARTHQUAKE INFORMATION:

Earthquake Magnitude:	6.79
PGA_M (g):	0.941
Calculated Mag.Wtg.Factor:	0.779
Historic High Groundwater:	40.0
Groundwater @ Exploration:	80.5

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	Volumetric Strain $[e_{15}\}$ (%)	EQ. SETTLE. Pe (in.)
1.0	10	116.8417	0.029	0.029	69	19	0.612	--	0.00	0.00
2.0	10	116.8417	0.088	0.088	69	19	0.612	--	0.00	0.00
3.0	10	116.8417	0.146	0.146	69	19	0.612	--	0.00	0.00
4.0	10	116.8417	0.204	0.204	69	19	0.612	--	0.00	0.00
5.0	10	116.8417	0.263	0.263	69	19	0.612	--	0.00	0.00
6.0	10	116.8417	0.321	0.321	69	19	0.612	--	0.00	0.00
7.0	10	116.8417	0.380	0.380	69	19	0.612	--	0.00	0.00
8.0	10	116.8417	0.438	0.438	69	17	0.612	--	0.00	0.00
9.0	10	116.8417	0.497	0.497	69	16	0.612	--	0.00	0.00
10.0	9	112.5376	0.554	0.554	59	14	0.612	--	0.00	0.00
11.0	9	112.5376	0.610	0.610	59	13	0.612	--	0.00	0.00
12.0	9	112.5376	0.666	0.666	59	13	0.612	--	0.00	0.00
13.0	9	112.5376	0.723	0.723	59	12	0.612	--	0.00	0.00
14.0	12	122.3685	0.781	0.781	63	17	0.612	--	0.00	0.00
15.0	12	122.3685	0.843	0.843	63	16	0.612	--	0.00	0.00
16.0	12	122.3685	0.904	0.904	63	16	0.612	--	0.00	0.00
17.0	12	122.3685	0.965	0.965	63	15	0.612	--	0.00	0.00
18.0	12	122.3685	1.026	1.026	63	15	0.612	--	0.00	0.00
19.0	12	122.3685	1.087	1.087	63	14	0.612	--	0.00	0.00
20.0	23	116.4828	1.147	1.147	80	29	0.612	--	0.00	0.00
21.0	23	116.4828	1.205	1.205	80	29	0.612	--	0.00	0.00
22.0	23	116.4828	1.264	1.264	80	28	0.612	--	0.00	0.00
23.0	23	116.4828	1.322	1.322	80	27	0.612	--	0.00	0.00
24.0	23	116.4828	1.380	1.380	80	27	0.612	--	0.00	0.00
25.0	15	112.9869	1.437	1.437	61	18	0.612	--	0.00	0.00
26.0	15	112.9869	1.494	1.494	61	18	0.612	--	0.00	0.00
27.0	15	112.9869	1.550	1.550	61	18	0.612	--	0.00	0.00
28.0	15	112.9869	1.607	1.607	61	17	0.612	--	0.00	0.00
29.0	15	112.9869	1.663	1.663	61	17	0.612	--	0.00	0.00
30.0	26	109.8801	1.719	1.719	76	30	0.612	--	0.00	0.00
31.5	26	109.8801	1.788	1.788	76	30	0.612	--	0.00	0.00
32.0	15	129.9684	1.818	1.818	57	24	0.612	--	0.00	0.00
33.0	15	129.9684	1.899	1.899	57	24	0.612	--	0.00	0.00
34.0	15	129.9684	1.964	1.964	57	23	0.612	--	0.00	0.00
35.0	18	129.9684	2.029	2.029	60	26	0.612	--	0.00	0.00
36.0	18	129.9684	2.094	2.094	60	26	0.612	--	0.00	0.00
37.0	24	129.9684	2.159	2.159	68	32	0.612	--	0.00	0.00
38.0	24	129.9684	2.224	2.224	68	32	0.612	--	0.00	0.00
39.0	24	129.9684	2.289	2.289	68	31	0.612	--	0.00	0.00
40.0	35	134.0658	2.355	2.339	80	42	0.616	Non-Liq.	0.00	0.00
41.0	35	134.0658	2.422	2.375	80	41	0.624	Non-Liq.	0.00	0.00
42.0	20	134.0658	2.489	2.411	60	26	0.631	0.68	1.10	0.13
43.0	20	134.0658	2.556	2.447	60	26	0.639	0.66	1.10	0.13
44.0	20	134.0658	2.623	2.483	60	26	0.646	0.65	1.10	0.13
45.0	50	127.4196	2.688	2.517	93	54	0.653	Non-Liq.	0.00	0.00
46.0	50	127.4196	2.752	2.549	93	53	0.660	Non-Liq.	0.00	0.00
47.0	22	127.4196	2.816	2.582	61	27	0.667	0.68	1.10	0.13
48.0	22	127.4196	2.880	2.614	61	27	0.674	0.66	1.10	0.13
49.0	22	127.4196	2.943	2.647	61	27	0.680	0.65	1.10	0.13
50.0	50	126.3224	3.007	2.679	91	51	0.686	Non-Liq.	0.00	0.00
51.5	50	126.3224	3.086	2.719	91	51	0.694	Non-Liq.	0.00	0.00
52.0	19	126.3224	3.117	2.735	55	23	0.697	0.53	1.30	0.08
53.0	19	126.3224	3.196	2.775	55	23	0.704	0.52	1.30	0.16
54.0	19	126.3224	3.259	2.807	55	23	0.710	0.52	1.30	0.16
55.0	50	122.4005	3.322	2.838	89	49	0.716	Non-Liq.	0.00	0.00
56.0	50	122.4005	3.383	2.868	89	49	0.721	Non-Liq.	0.00	0.00
57.0	32	122.4005	3.444	2.898	70	33	0.727	Non-Liq.	0.00	0.00
58.0	32	122.4005	3.505	2.928	70	33	0.732	Non-Liq.	0.00	0.00
59.0	32	122.4005	3.566	2.958	70	33	0.737	Non-Liq.	0.00	0.00
60.0	39	126.4446	3.629	2.989	77	38	0.743	Non-Liq.	0.00	0.00
61.5	39	126.4446	3.708	3.029	77	38	0.749	Non-Liq.	0.00	0.00
62.0	25	126.4446	3.739	3.045	61	27	0.751	0.62	1.10	0.07
63.0	25	126.4446	3.818	3.085	61	27	0.757	0.61	1.10	0.13
64.0	25	126.4446	3.881	3.117	61	26	0.762	0.60	1.10	0.13
65.0	43	134.246	3.947	3.151	79	40	0.766	Non-Liq.	0.00	0.00
66.0	43	134.246	4.014	3.187	79	40	0.770	Non-Liq.	0.00	0.00
67.0	35	134.246	4.081	3.223	71	33	0.774	Non-Liq.	0.00	0.00
68.0	35	134.246	4.148	3.259	71	33	0.779	Non-Liq.	0.00	0.00
69.0	50	117.936	4.211	3.291	84	37	0.783	Non-Liq.	0.00	0.00
70.5	50	117.936	4.285	3.325	84	37	0.788	Non-Liq.	0.00	0.00
71.0	50	117.936	4.314	3.339	84	37	0.790	Non-Liq.	0.00	0.00
72.0	50	117.936	4.388	3.374	84	37	0.795	Non-Liq.	0.00	0.00
73.0	44	120.96	4.448	3.402	78	32	0.800	Non-Liq.	0.00	0.00
74.0	44	120.96	4.508	3.432	78	32	0.804	Non-Liq.	0.00	0.00
75.0	50	120.96	4.569	3.461	82	36	0.807	Non-Liq.	0.00	0.00
76.5	50	120.96	4.644	3.498	82	36	0.812	Non-Liq.	0.00	0.00
77.0	29	130.5965	4.676	3.513	62	28	0.814	0.64	0.75	0.05
78.0	29	130.5965	4.757	3.556	62	27	0.818	0.63	1.10	0.13
79.0	29	130.5965	4.823	3.590	62	27	0.822	0.63	1.10	0.13
80.5	50	130.5965	4.904	3.633	81	42	0.826	Non-Liq.	0.00	0.00

TOTAL SETTLEMENT = 1.8 INCHES

Figure 12

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:	6.65
Peak Horiz. Acceleration (g):	0.628

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	88.8	0.02	0.01	0.009	8	1.25	63.5	1.7	15.3	1.0	135.314	6.62E-05	1.00E-04	0.010	1.38E-02	8.2879	1.06E-02	Subterranean Levels
2.0	1.0	1.5	88.8	0.07	0.04	0.027	8	1.25	63.5	1.7	15.3	1.0	234.371	1.12E-04	2.30E-04	0.023	3.17E-02	8.2879	2.43E-02	
3.0	1.0	2.5	88.8	0.11	0.07	0.045	8	1.25	63.5	1.7	15.3	1.0	302.571	1.42E-04	2.30E-04	0.023	3.17E-02	8.2879	2.43E-02	
4.0	1.0	3.5	88.8	0.16	0.10	0.063	8	1.25	63.5	1.7	15.3	1.0	358.007	1.65E-04	1.70E-04	0.017	2.34E-02	8.2879	1.80E-02	
5.0	1.0	4.5	88.8	0.20	0.13	0.081	8	1.25	63.5	1.7	15.3	1.0	405.942	1.84E-04	1.70E-04	0.017	2.34E-02	8.2879	1.80E-02	
6.0	1.0	5.5	88.8	0.24	0.16	0.099	8	1.25	63.5	1.7	15.3	1.0	448.786	1.99E-04	1.70E-04	0.017	2.34E-02	8.2879	1.80E-02	
7.0	1.0	6.5	88.8	0.29	0.19	0.117	8	1.25	63.5	1.7	15.3	1.0	487.881	2.13E-04	8.10E-04	0.081	1.12E-01	8.2879	8.55E-02	
8.0	1.0	7.5	88.8	0.33	0.22	0.135	8	1.25	63.5	1.7	15.3	1.0	524.069	2.24E-04	4.50E-04	0.045	6.21E-02	8.2879	4.75E-02	
9.0	1.0	8.5	88.8	0.38	0.25	0.153	8	1.25	63.5	1.7	15.0	1.0	553.893	2.36E-04	4.50E-04	0.045	6.37E-02	8.2879	4.88E-02	
10.0	1.0	9.5	107.5	0.43	0.29	0.172	10	1.25	65.1	1.6	17.6	1.0	621.488	2.33E-04	4.50E-04	0.045	5.24E-02	8.2879	4.02E-02	
11.0	1.0	10.5	107.5	0.48	0.32	0.194	10	1.25	65.1	1.5	16.6	1.0	646.587	2.48E-04	4.50E-04	0.045	5.63E-02	8.2879	4.31E-02	
12.0	1.0	11.5	107.5	0.53	0.36	0.215	10	1.25	65.1	1.4	15.7	0.9	669.875	2.62E-04	4.50E-04	0.045	6.00E-02	8.2879	4.60E-02	
13.0	1.0	12.5	107.5	0.59	0.39	0.236	10	1.25	65.1	1.3	15.0	0.9	691.648	2.74E-04	4.50E-04	0.045	6.36E-02	8.2879	4.87E-02	
14.0	1.0	13.5	107.5	0.64	0.43	0.257	10	1.25	65.1	1.3	14.4	0.9	712.130	2.85E-04	4.50E-04	0.045	6.70E-02	8.2879	5.13E-02	
15.0	1.0	14.5	86.3	0.69	0.46	0.276	9	1.25	56.7	1.2	13.4	0.9	721.720	2.97E-04	4.50E-04	0.045	7.28E-02	8.2879	5.57E-02	
16.0	1.0	15.5	86.3	0.73	0.49	0.292	9	1.25	56.7	1.2	13.0	0.9	736.457	3.04E-04	1.00E-03	0.100	1.68E-01	8.2879	1.28E-01	
17.0	1.0	16.5	86.3	0.78	0.52	0.308	9	1.25	56.7	1.2	12.6	0.9	750.626	3.11E-04	7.10E-04	0.071	1.23E-01	8.2879	9.44E-02	
18.0	1.0	17.5	86.3	0.82	0.55	0.324	9	1.25	56.7	1.1	12.3	0.9	764.280	3.17E-04	7.10E-04	0.071	1.27E-01	8.2879	9.75E-02	
19.0	1.0	18.5	86.3	0.86	0.58	0.340	9	1.25	56.7	1.1	12.0	0.9	777.463	3.22E-04	7.10E-04	0.071	1.31E-01	8.2879	1.01E-01	
20.0	1.0	19.5	108.9	0.91	0.61	0.358	10	1.25	56.2	1.1	14.4	0.9	849.102	3.07E-04	7.10E-04	0.071	1.06E-01	8.2879	8.08E-02	
21.0	1.0	20.5	108.9	0.97	0.65	0.378	10	1.25	56.2	1.0	14.0	0.9	865.690	3.13E-04	7.10E-04	0.071	1.09E-01	8.2879	8.37E-02	
22.0	1.0	21.5	108.9	1.02	0.68	0.398	10	1.25	56.2	1.0	13.6	0.9	881.665	3.20E-04	7.10E-04	0.071	1.13E-01	8.2879	8.65E-02	
23.0	1.0	22.5	108.9	1.07	0.72	0.417	10	1.25	56.2	1.0	13.2	0.9	897.082	3.26E-04	7.10E-04	0.071	1.17E-01	8.2879	8.92E-02	
24.0	1.0	23.5	106.1	1.13	0.76	0.436	22	1.25	78.1	1.0	30.3	0.9	1211.950	2.49E-04	3.70E-04	0.037	2.25E-02	8.2879	1.72E-02	
25.0	1.0	24.5	106.1	1.18	0.79	0.455	22	1.25	78.1	0.9	29.6	0.9	1230.649	2.53E-04	3.70E-04	0.037	2.31E-02	8.2879	1.77E-02	
26.0	1.0	25.5	106.1	1.23	0.83	0.473	22	1.25	78.1	0.9	29.0	0.9	1248.796	2.56E-04	3.70E-04	0.037	2.37E-02	8.2879	1.81E-02	
27.0	1.0	26.5	106.1	1.29	0.86	0.491	22	1.25	78.1	0.9	28.4	0.9	1266.431	2.59E-04	3.70E-04	0.037	2.43E-02	8.2879	1.86E-02	
28.0	1.0	27.5	106.1	1.34	0.90	0.508	22	1.25	78.1	0.9	27.8	0.9	1283.588	2.62E-04	3.70E-04	0.037	2.49E-02	8.2879	1.91E-02	0.00
29.0	1.0	28.5	106.1	1.39	0.93	0.526	22	1.25	78.1	0.9	27.3	0.9	1300.298	2.65E-04	3.70E-04	0.037	2.55E-02	8.2879	1.95E-02	0.00
30.0	1.0	29.5	106.6	1.45	0.97	0.543	12	1.25	54.4	0.8	15.3	0.9	1092.286	3.22E-04	7.10E-04	0.071	9.80E-02	8.2879	7.50E-02	0.02
31.5	1.5	30.8	106.6	1.51	1.01	0.564	12	1.25	54.4	0.8	15.0	0.9	1108.811	3.26E-04	5.20E-04	0.052	7.37E-02	8.2879	5.65E-02	0.02
32.0	0.5	31.8	141.4	1.57	1.05	0.582	9	1.25	46.2	0.8	18.1	0.9	1204.066	3.07E-04	5.20E-04	0.052	5.86E-02	8.2879	4.49E-02	0.01
33.0	1.0	32.5	141.4	1.62	1.09	0.599	9	1.25	46.2	0.8	17.8	0.9	1217.313	3.10E-04	5.20E-04	0.052	5.98E-02	8.2879	4.58E-02	0.01
34.0	1.0	33.5	141.4	1.69	1.14	0.622	9	1.25	46.2	0.8	17.6	0.8	1238.235	3.13E-04	5.20E-04	0.052	6.07E-02	8.2879	4.65E-02	0.01
35.0	1.0	34.5	141.4	1.77	1.18	0.644	22	1.25	69.2	0.8	32.3	0.8	1548.457	2.57E-04	3.00E-04	0.030	1.69E-02	8.2879	1.29E-02	0.00
36.5	1.5	35.8	141.4	1.85	1.24	0.671	22	1.25	69.2	0.7	31.7	0.8	1576.732	2.60E-04	3.00E-04	0.030	1.73E-02	8.2879	1.32E-02	0.00
37.0	0.5	36.8	133.4	1.92	1.29	0.691	13	1.25	52.1	0.7	21.5	0.8	1410.296	2.98E-04	3.00E-04	0.030	2.76E-02	8.2879	2.11E-02	0.00
38.0	1.0	37.5	133.4	1.97	1.32	0.706	13	1.25	52.1	0.7	21.2	0.8	1421.654	3.00E-04	3.00E-04	0.030	2.80E-02	8.2879	2.15E-02	0.01
39.0	1.0	38.5	133.4	2.04	1.37	0.725	13	1.25	52.1	0.7	20.9	0.8	1440.159	3.01E-04	5.20E-04	0.052	4.92E-02	8.2879	3.77E-02	0.01
40.0	1.0	39.5	133.4	2.11	1.41	0.744	20	1.25	62.5	0.7	28.1	0.8	1614.306	2.74E-04	3.00E-04	0.030	2.00E-02	8.2879	1.53E-02	0.00
41.0	1.0	40.5	133.4	2.17	1.46	0.762	20	1.25	62.5	0.7	27.8	0.8	1633.306	2.75E-04	3.00E-04	0.030	2.02E-02	8.2879	1.55E-02	0.00
42.0	1.0	41.5	133.4	2.24	1.50	0.780	14	1.25	51.7	0.7	21.3	0.8	1518.390	3.01E-04	5.20E-04	0.052	4.82E-02	8.2879	3.69E-02	0.00
43.0	1.0	42.5	133.4	2.31	1.55	0.797	14	1.25	51.7	0.7	21.1	0.8	1535.800	3.02E-04	5.20E-04	0.052	4.87E-02	8.2879	3.73E-02	0.00
44.0	1.0	43.5	133.4	2.37	1.59	0.814	14	1.25	51.7	0.7	20.9	0.8	1552.928	3.03E-04	5.20E-04	0.052	4.93E-02	8.2879	3.78E-02	0.00
45.0	1.0	44.5	138.4	2.44	1.64	0.831	26	1.25	69.2	0.7	28.4	0.8	1743.963	2.74E-04	3.00E-04	0.030	1.97E-02	8.2879	1.51E-02	0.00
46.0	1.0	45.5	138.4	2.51	1.68	0.849	26	1.25	69.2	0.6	28.0	0.8	1761.154	2.75E-04	3.00E-04	0.030	2.00E-02	8.2879	1.53E-02	0.00
47.0	1.0	46.5	138.4	2.58	1.73	0.865	24	1.25	65.8	0.6	25.8	0.8	1736.288	2.82E-04	3.00E-04	0.030	2.21E-02	8.2879	1.69E-02	0.00
48.0	1.0	47.5	138.4	2.65	1.77	0.882	24	1.25	65.8	0.6	25.5	0.8	1752.572	2.83E-04	3.00E-04	0.030	2.24E-02	8.2879	1.72E-02	0.00
49.0	1.0	48.5	138.4	2.72	1.82	0.898	24	1.25	65.8	0.6	25.2	0.8	1768.592	2.84E-04	3.00E-04	0.030	2.27E-02	8.2879	1.74E-02	0.00
50.0	1.0	49.5	129.8	2.79	1.87	0.913	50	1.25	93.4	0.6	45.9	0.8	2185.775	2.33E-04	3.00E-04	0.030	1.11E-02	8.2879	8.49E-03	0.00

TOTAL SETTLEMENT = **0.10**

Figure 13

GEOCON

Client : 6728 N Sepulveda Blvd
File No. : W1207-06-01
Boring : 6

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:	6.65
Peak Horiz. Acceleration (g):	0.628

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	116.8	0.03	0.02	0.012	10	1.25	69.2	1.7	19.1	1.0	167.230	7.06E-05	1.40E-04	0.014	1.48E-02	8.2879	1.13E-02	
2.0	1.0	1.5	116.8	0.09	0.06	0.036	10	1.25	69.2	1.7	19.1	1.0	289.651	1.20E-04	2.30E-04	0.023	2.43E-02	8.2879	1.86E-02	
3.0	1.0	2.5	116.8	0.15	0.10	0.060	10	1.25	69.2	1.7	19.1	1.0	373.938	1.52E-04	2.30E-04	0.023	2.43E-02	8.2879	1.86E-02	
4.0	1.0	3.5	116.8	0.20	0.14	0.083	10	1.25	69.2	1.7	19.1	1.0	442.449	1.76E-04	1.70E-04	0.017	1.79E-02	8.2879	1.37E-02	
5.0	1.0	4.5	116.8	0.26	0.18	0.107	10	1.25	69.2	1.7	19.1	1.0	501.690	1.96E-04	1.70E-04	0.017	1.79E-02	8.2879	1.37E-02	
6.0	1.0	5.5	116.8	0.32	0.22	0.131	10	1.25	69.2	1.7	19.1	1.0	554.639	2.12E-04	4.50E-04	0.045	4.75E-02	8.2879	3.64E-02	
7.0	1.0	6.5	116.8	0.38	0.25	0.154	10	1.25	69.2	1.7	18.7	1.0	597.961	2.28E-04	4.50E-04	0.045	4.89E-02	8.2879	3.75E-02	
8.0	1.0	7.5	116.8	0.44	0.29	0.178	10	1.25	69.2	1.5	17.4	1.0	627.175	2.47E-04	4.50E-04	0.045	5.33E-02	8.2879	4.08E-02	
9.0	1.0	8.5	116.8	0.50	0.33	0.201	10	1.25	69.2	1.4	16.3	1.0	653.895	2.63E-04	4.50E-04	0.045	5.75E-02	8.2879	4.40E-02	
10.0	1.0	9.5	112.5	0.55	0.37	0.224	9	1.25	59.2	1.4	13.9	1.0	654.751	2.88E-04	4.50E-04	0.045	6.96E-02	8.2879	5.33E-02	
11.0	1.0	10.5	112.5	0.61	0.41	0.246	9	1.25	59.2	1.3	13.2	1.0	676.211	3.02E-04	1.00E-03	0.100	1.64E-01	8.2879	1.26E-01	
12.0	1.0	11.5	112.5	0.67	0.45	0.268	9	1.25	59.2	1.3	12.7	0.9	696.388	3.14E-04	1.00E-03	0.100	1.73E-01	8.2879	1.32E-01	
13.0	1.0	12.5	112.5	0.72	0.48	0.290	9	1.25	59.2	1.2	12.2	0.9	715.460	3.26E-04	1.00E-03	0.100	1.82E-01	8.2879	1.39E-01	
14.0	1.0	13.5	122.4	0.78	0.52	0.313	12	1.25	62.7	1.2	16.8	0.9	828.060	2.99E-04	3.70E-04	0.037	4.57E-02	8.2879	3.50E-02	Subterranean Levels
15.0	1.0	14.5	122.4	0.84	0.56	0.337	12	1.25	62.7	1.1	16.2	0.9	849.130	3.09E-04	7.10E-04	0.071	9.17E-02	8.2879	7.02E-02	
16.0	1.0	15.5	122.4	0.90	0.61	0.360	12	1.25	62.7	1.1	15.6	0.9	869.204	3.18E-04	7.10E-04	0.071	9.56E-02	8.2879	7.32E-02	
17.0	1.0	16.5	122.4	0.97	0.65	0.383	12	1.25	62.7	1.0	15.1	0.9	888.391	3.27E-04	7.10E-04	0.071	9.95E-02	8.2879	7.62E-02	
18.0	1.0	17.5	122.4	1.03	0.69	0.406	12	1.25	62.7	1.0	14.6	0.9	906.783	3.34E-04	7.10E-04	0.071	1.03E-01	8.2879	7.90E-02	
19.0	1.0	18.5	122.4	1.09	0.73	0.429	12	1.25	62.7	1.0	14.2	0.9	924.458	3.42E-04	7.10E-04	0.071	1.07E-01	8.2879	8.18E-02	
20.0	1.0	19.5	116.5	1.15	0.77	0.451	23	1.25	80.4	1.0	29.5	0.9	1210.233	2.71E-04	3.70E-04	0.037	2.33E-02	8.2879	1.78E-02	
21.0	1.0	20.5	116.5	1.21	0.81	0.472	23	1.25	80.4	0.9	28.7	0.9	1230.378	2.75E-04	3.70E-04	0.037	2.40E-02	8.2879	1.83E-02	
22.0	1.0	21.5	116.5	1.26	0.85	0.493	23	1.25	80.4	0.9	28.1	0.9	1249.885	2.79E-04	3.70E-04	0.037	2.46E-02	8.2879	1.89E-02	
23.0	1.0	22.5	116.5	1.32	0.89	0.513	23	1.25	80.4	0.9	27.4	0.9	1268.801	2.83E-04	3.70E-04	0.037	2.53E-02	8.2879	1.94E-02	
24.0	1.0	23.5	116.5	1.38	0.92	0.534	23	1.25	80.4	0.9	26.9	0.9	1287.169	2.87E-04	3.70E-04	0.037	2.60E-02	8.2879	1.99E-02	
25.0	1.0	24.5	113.0	1.44	0.96	0.553	15	1.25	61.0	0.9	18.3	0.9	1156.376	3.27E-04	7.10E-04	0.071	7.89E-02	8.2879	6.04E-02	
26.0	1.0	25.5	113.0	1.49	1.00	0.572	15	1.25	61.0	0.8	18.0	0.9	1171.331	3.30E-04	5.20E-04	0.052	5.91E-02	8.2879	4.53E-02	
27.0	1.0	26.5	113.0	1.55	1.04	0.591	15	1.25	61.0	0.8	17.6	0.9	1185.913	3.33E-04	5.20E-04	0.052	6.05E-02	8.2879	4.63E-02	
28.0	1.0	27.5	113.0	1.61	1.08	0.609	15	1.25	61.0	0.8	17.3	0.9	1200.146	3.36E-04	5.20E-04	0.052	6.18E-02	8.2879	4.73E-02	0.01
29.0	1.0	28.5	113.0	1.66	1.11	0.628	15	1.25	61.0	0.8	17.0	0.9	1214.048	3.39E-04	5.20E-04	0.052	6.31E-02	8.2879	4.83E-02	0.01
30.0	1.0	29.5	109.9	1.72	1.15	0.645	26	1.25	76.0	0.8	30.4	0.9	1497.102	2.79E-04	3.00E-04	0.030	1.82E-02	8.2879	1.39E-02	0.00
31.5	1.5	30.8	109.9	1.79	1.20	0.666	26	1.25	76.0	0.8	29.8	0.9	1516.777	2.81E-04	3.00E-04	0.030	1.86E-02	8.2879	1.42E-02	0.01
32.0	0.5	31.8	130.0	1.85	1.24	0.684	15	1.25	56.7	0.8	24.1	0.9	1434.670	3.02E-04	5.20E-04	0.052	4.17E-02	8.2879	3.19E-02	0.00
33.0	1.0	32.5	130.0	1.89	1.27	0.699	15	1.25	56.7	0.7	23.7	0.9	1446.029	3.04E-04	5.20E-04	0.052	4.25E-02	8.2879	3.25E-02	0.01
34.0	1.0	33.5	130.0	1.96	1.31	0.719	15	1.25	56.7	0.7	23.4	0.8	1464.843	3.06E-04	5.20E-04	0.052	4.31E-02	8.2879	3.30E-02	0.01
35.0	1.0	34.5	130.0	2.02	1.36	0.738	18	1.25	59.9	0.7	26.4	0.8	1549.297	2.95E-04	3.00E-04	0.030	2.15E-02	8.2879	1.65E-02	0.00
36.0	1.0	35.5	130.0	2.09	1.40	0.757	18	1.25	59.9	0.7	26.1	0.8	1567.922	2.96E-04	3.00E-04	0.030	2.18E-02	8.2879	1.67E-02	0.00
37.0	1.0	36.5	130.0	2.15	1.44	0.775	24	1.25	67.7	0.7	32.0	0.8	1705.415	2.77E-04	3.00E-04	0.030	1.70E-02	8.2879	1.31E-02	0.00
38.0	1.0	37.5	130.0	2.22	1.49	0.794	24	1.25	67.7	0.7	31.7	0.8	1724.288	2.78E-04	3.00E-04	0.030	1.73E-02	8.2879	1.32E-02	0.00
39.0	1.0	38.5	130.0	2.28	1.53	0.811	24	1.25	67.7	0.7	31.3	0.8	1742.837	2.79E-04	3.00E-04	0.030	1.75E-02	8.2879	1.34E-02	0.00
40.0	1.0	39.5	134.1	2.35	1.57	0.829	35	1.25	79.6	0.7	42.0	0.8	1948.948	2.53E-04	3.00E-04	0.030	1.23E-02	8.2879	9.44E-03	0.00
41.0	1.0	40.5	134.1	2.42	1.62	0.847	35	1.25	79.6	0.7	41.5	0.8	1968.871	2.54E-04	3.00E-04	0.030	1.25E-02	8.2879	9.58E-03	0.00
42.0	1.0	41.5	134.1	2.48	1.66	0.864	20	1.25	59.5	0.6	26.4	0.8	1717.696	2.95E-04	3.00E-04	0.030	2.15E-02	8.2879	1.64E-02	0.00
43.0	1.0	42.5	134.1	2.55	1.71	0.882	20	1.25	59.5	0.6	26.2	0.8	1735.070	2.95E-04	3.00E-04	0.030	2.17E-02	8.2879	1.66E-02	0.00
44.0	1.0	43.5	134.1	2.62	1.75	0.898	20	1.25	59.5	0.6	25.9	0.8	1752.182	2.96E-04	3.00E-04	0.030	2.20E-02	8.2879	1.68E-02	0.00
45.0	1.0	44.5	127.4	2.68	1.80	0.914	50	1.25	92.7	0.6	53.7	0.8	2261.755	2.32E-04	3.00E-04	0.030	9.16E-03	8.2879	7.02E-03	0.00
46.0	1.0	45.5	127.4	2.75	1.84	0.929	50	1.25	92.7	0.6	53.2	0.8	2280.697	2.32E-04	3.00E-04	0.030	9.28E-03	8.2879	7.10E-03	0.00
47.0	1.0	46.5	127.4	2.81	1.88	0.943	22	1.25	60.9	0.6	27.1	0.8	1842.400	2.90E-04	3.00E-04	0.030	2.08E-02	8.2879	1.60E-02	0.00
48.0	1.0	47.5	127.4	2.87	1.93	0.957	22	1.25	60.9	0.6	26.9	0.8	1858.025	2.90E-04	3.00E-04	0.030	2.10E-02	8.2879	1.61E-02	0.00
49.0	1.0	48.5	127.4	2.94	1.97	0.970	22	1.25	60.9	0.6	26.7	0.8	1873.449	2.90E-04	3.00E-04	0.030	2.13E-02	8.2879	1.63E-02	0.00
50.0	1.0	49.5	126.3	3.00	2.01	0.984	50	1.25	90.6	0.6	51.2	0.8	2353.787	2.33E-04	1.00E-02	1.000	3.24E-01	8.2879	2.48E-01	0.00

TOTAL SETTLEMENT = **0.07**

Figure 14

GEOCON

Client : 6728 N Sepulveda Blvd
File No. : W1207-06-01
Boring : 4

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:	6.79
Peak Horiz. Acceleration (g):	0.941

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	88.8	0.02	0.01	0.014	8	1.25	63.5	1.7	15.3	1.0	135.314	9.93E-05	1.90E-04	0.019	2.62E-02	9.2675	2.11E-02	Subterranean Levels
2.0	1.0	1.5	88.8	0.07	0.04	0.041	8	1.25	63.5	1.7	15.3	1.0	234.371	1.69E-04	2.30E-04	0.023	3.17E-02	9.2675	2.55E-02	
3.0	1.0	2.5	88.8	0.11	0.07	0.068	8	1.25	63.5	1.7	15.3	1.0	302.571	2.14E-04	3.00E-03	0.300	4.14E-01	9.2675	3.33E-01	
4.0	1.0	3.5	88.8	0.16	0.10	0.095	8	1.25	63.5	1.7	15.3	1.0	358.007	2.48E-04	8.10E-04	0.081	1.12E-01	9.2675	8.99E-02	
5.0	1.0	4.5	88.8	0.20	0.13	0.122	8	1.25	63.5	1.7	15.3	1.0	405.942	2.76E-04	8.10E-04	0.081	1.12E-01	9.2675	8.99E-02	
6.0	1.0	5.5	88.8	0.24	0.16	0.149	8	1.25	63.5	1.7	15.3	1.0	448.786	2.99E-04	8.10E-04	0.081	1.12E-01	9.2675	8.99E-02	
7.0	1.0	6.5	88.8	0.29	0.19	0.176	8	1.25	63.5	1.7	15.3	1.0	487.881	3.19E-04	5.00E-03	0.500	6.90E-01	9.2675	5.55E-01	
8.0	1.0	7.5	88.8	0.33	0.22	0.202	8	1.25	63.5	1.7	15.3	1.0	524.069	3.36E-04	1.00E-03	0.100	1.38E-01	9.2675	1.11E-01	
9.0	1.0	8.5	88.8	0.38	0.25	0.229	8	1.25	63.5	1.7	15.0	1.0	553.893	3.54E-04	1.00E-03	0.100	1.42E-01	9.2675	1.14E-01	
10.0	1.0	9.5	107.5	0.43	0.29	0.258	10	1.25	65.1	1.6	17.6	1.0	621.488	3.50E-04	1.00E-03	0.100	1.17E-01	9.2675	9.38E-02	
11.0	1.0	10.5	107.5	0.48	0.32	0.290	10	1.25	65.1	1.5	16.6	1.0	646.587	3.72E-04	1.00E-03	0.100	1.25E-01	9.2675	1.01E-01	
12.0	1.0	11.5	107.5	0.53	0.36	0.322	10	1.25	65.1	1.4	15.7	0.9	669.875	3.92E-04	1.00E-03	0.100	1.33E-01	9.2675	1.07E-01	
13.0	1.0	12.5	107.5	0.59	0.39	0.354	10	1.25	65.1	1.3	15.0	0.9	691.648	4.11E-04	2.70E-03	0.270	3.81E-01	9.2675	3.07E-01	
14.0	1.0	13.5	107.5	0.64	0.43	0.385	10	1.25	65.1	1.3	14.4	0.9	712.130	4.28E-04	2.70E-03	0.270	4.02E-01	9.2675	3.24E-01	
15.0	1.0	14.5	86.3	0.69	0.46	0.413	9	1.25	56.7	1.2	13.4	0.9	721.720	4.46E-04	2.70E-03	0.270	4.37E-01	9.2675	3.52E-01	
16.0	1.0	15.5	86.3	0.73	0.49	0.438	9	1.25	56.7	1.2	13.0	0.9	736.457	4.56E-04	2.70E-03	0.270	4.53E-01	9.2675	3.65E-01	
17.0	1.0	16.5	86.3	0.78	0.52	0.462	9	1.25	56.7	1.2	12.6	0.9	750.626	4.66E-04	1.20E-03	0.120	2.08E-01	9.2675	1.68E-01	
18.0	1.0	17.5	86.3	0.82	0.55	0.486	9	1.25	56.7	1.1	12.3	0.9	764.280	4.75E-04	1.20E-03	0.120	2.15E-01	9.2675	1.73E-01	
19.0	1.0	18.5	86.3	0.86	0.58	0.510	9	1.25	56.7	1.1	12.0	0.9	777.463	4.83E-04	1.20E-03	0.120	2.22E-01	9.2675	1.79E-01	
20.0	1.0	19.5	108.9	0.91	0.61	0.537	10	1.25	56.2	1.1	14.4	0.9	849.102	4.60E-04	1.20E-03	0.120	1.78E-01	9.2675	1.44E-01	
21.0	1.0	20.5	108.9	0.97	0.65	0.567	10	1.25	56.2	1.0	14.0	0.9	865.690	4.70E-04	1.20E-03	0.120	1.85E-01	9.2675	1.49E-01	
22.0	1.0	21.5	108.9	1.02	0.68	0.596	10	1.25	56.2	1.0	13.6	0.9	881.665	4.79E-04	1.20E-03	0.120	1.91E-01	9.2675	1.54E-01	
23.0	1.0	22.5	108.9	1.07	0.72	0.626	10	1.25	56.2	1.0	13.2	0.9	897.082	4.88E-04	1.20E-03	0.120	1.97E-01	9.2675	1.59E-01	
24.0	1.0	23.5	106.1	1.13	0.76	0.654	22	1.25	78.1	1.0	30.3	0.9	1211.950	3.73E-04	7.10E-04	0.071	4.31E-02	9.2675	3.47E-02	
25.0	1.0	24.5	106.1	1.18	0.79	0.682	22	1.25	78.1	0.9	29.6	0.9	1230.649	3.79E-04	7.10E-04	0.071	4.43E-02	9.2675	3.57E-02	
26.0	1.0	25.5	106.1	1.23	0.83	0.709	22	1.25	78.1	0.9	29.0	0.9	1248.796	3.84E-04	7.10E-04	0.071	4.55E-02	9.2675	3.66E-02	
27.0	1.0	26.5	106.1	1.29	0.86	0.736	22	1.25	78.1	0.9	28.4	0.9	1266.431	3.89E-04	7.10E-04	0.071	4.66E-02	9.2675	3.75E-02	
28.0	1.0	27.5	106.1	1.34	0.90	0.762	22	1.25	78.1	0.9	27.8	0.9	1283.588	3.93E-04	7.10E-04	0.071	4.78E-02	9.2675	3.85E-02	0.01
29.0	1.0	28.5	106.1	1.39	0.93	0.788	22	1.25	78.1	0.9	27.3	0.9	1300.298	3.97E-04	7.10E-04	0.071	4.89E-02	9.2675	3.94E-02	0.01
30.0	1.0	29.5	106.6	1.45	0.97	0.814	12	1.25	54.4	0.8	15.3	0.9	1092.286	4.83E-04	1.20E-03	0.120	1.66E-01	9.2675	1.33E-01	0.03
31.5	1.5	30.8	106.6	1.51	1.01	0.846	12	1.25	54.4	0.8	15.0	0.9	1108.811	4.88E-04	8.10E-04	0.081	1.15E-01	9.2675	9.25E-02	0.03
32.0	0.5	31.8	141.4	1.57	1.05	0.873	9	1.25	46.2	0.8	18.1	0.9	1204.066	4.60E-04	8.10E-04	0.081	9.13E-02	9.2675	7.35E-02	0.01
33.0	1.0	32.5	141.4	1.62	1.09	0.898	9	1.25	46.2	0.8	17.8	0.9	1217.313	4.65E-04	8.10E-04	0.081	9.32E-02	9.2675	7.50E-02	0.02
34.0	1.0	33.5	141.4	1.69	1.14	0.932	9	1.25	46.2	0.8	17.6	0.8	1238.235	4.70E-04	8.10E-04	0.081	9.46E-02	9.2675	7.62E-02	0.02
35.0	1.0	34.5	141.4	1.77	1.18	0.965	22	1.25	69.2	0.8	32.3	0.8	1548.457	3.85E-04	5.20E-04	0.052	2.92E-02	9.2675	2.35E-02	0.01
36.5	1.5	35.8	141.4	1.85	1.24	1.005	22	1.25	69.2	0.7	31.7	0.8	1576.732	3.90E-04	5.20E-04	0.052	2.99E-02	9.2675	2.41E-02	0.01
37.0	0.5	36.8	133.4	1.92	1.29	1.037	13	1.25	52.1	0.7	21.5	0.8	1410.296	4.46E-04	8.10E-04	0.081	7.44E-02	9.2675	5.99E-02	0.01
38.0	1.0	37.5	133.4	1.97	1.32	1.058	13	1.25	52.1	0.7	21.2	0.8	1421.654	4.49E-04	8.10E-04	0.081	7.57E-02	9.2675	6.10E-02	0.01
39.0	1.0	38.5	133.4	2.04	1.37	1.087	13	1.25	52.1	0.7	20.9	0.8	1440.159	4.52E-04	8.10E-04	0.081	7.67E-02	9.2675	6.18E-02	0.01
40.0	1.0	39.5	133.4	2.11	1.41	1.115	20	1.25	62.5	0.7	28.1	0.8	1614.306	4.10E-04	8.10E-04	0.081	5.39E-02	9.2675	4.34E-02	0.01
41.0	1.0	40.5	133.4	2.17	1.46	1.142	20	1.25	62.5	0.7	27.8	0.8	1633.306	4.12E-04	8.10E-04	0.081	5.47E-02	9.2675	4.40E-02	0.00
42.0	1.0	41.5	133.4	2.24	1.50	1.169	14	1.25	51.7	0.7	21.3	0.8	1518.390	4.51E-04	8.10E-04	0.081	7.50E-02	9.2675	6.04E-02	0.00
43.0	1.0	42.5	133.4	2.31	1.55	1.195	14	1.25	51.7	0.7	21.1	0.8	1535.800	4.52E-04	8.10E-04	0.081	7.59E-02	9.2675	6.11E-02	0.00
44.0	1.0	43.5	133.4	2.37	1.59	1.221	14	1.25	51.7	0.7	20.9	0.8	1552.928	4.54E-04	8.10E-04	0.081	7.68E-02	9.2675	6.18E-02	0.00
45.0	1.0	44.5	138.4	2.44	1.64	1.247	26	1.25	69.2	0.7	28.4	0.8	1743.963	4.10E-04	8.10E-04	0.081	5.32E-02	9.2675	4.28E-02	0.00
46.0	1.0	45.5	138.4	2.51	1.68	1.272	26	1.25	69.2	0.6	28.0	0.8	1761.154	4.12E-04	8.10E-04	0.081	5.40E-02	9.2675	4.35E-02	0.00
47.0	1.0	46.5	138.4	2.58	1.73	1.297	24	1.25	65.8	0.6	25.8	0.8	1736.288	4.23E-04	8.10E-04	0.081	5.97E-02	9.2675	4.81E-02	0.00
48.0	1.0	47.5	138.4	2.65	1.77	1.322	24	1.25	65.8	0.6	25.5	0.8	1752.572	4.25E-04	8.10E-04	0.081	6.06E-02	9.2675	4.88E-02	0.00
49.0	1.0	48.5	138.4	2.72	1.82	1.346	24	1.25	65.8	0.6	25.2	0.8	1768.592	4.26E-04	8.10E-04	0.081	6.14E-02	9.2675	4.94E-02	0.00
50.0	1.0	49.5	129.8	2.79	1.87	1.368	50	1.25	93.4	0.6	45.9	0.8	2185.775	3.49E-04	5.20E-04	0.052	1.92E-02	9.2675	1.55E-02	0.00

TOTAL SETTLEMENT = **0.19**

Figure 15

GEOCON

Client : 6728 N Sepulveda Blvd
File No. : W1207-06-01
Boring : 6

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:	6.79
Peak Horiz. Acceleration (g):	0.941

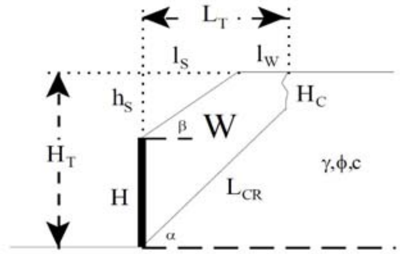
Depth of Base of Strata (ft)	Thickness of Layer (ft)	Depth of Mid-point of Layer (ft)	Soil Unit Weight (pcf)	Overburden Pressure at Mid-point (tsf)	Mean Effective Pressure at Mid-point (tsf)	Average Cyclic Shear Stress [Tav]	Field SPT [N]	Correction Factor [Cer]	Fig 4.1 Relative Density [Dr] (%)	Fig 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	116.8	0.03	0.02	0.018	10	1.25	69.2	1.7	19.1	1.0	167.230	1.06E-04	2.30E-04	0.023	2.43E-02	9.2675	1.95E-02	Subterranean Levels
2.0	1.0	1.5	116.8	0.09	0.06	0.054	10	1.25	69.2	1.7	19.1	1.0	289.651	1.80E-04	2.30E-04	0.023	2.43E-02	9.2675	1.95E-02	
3.0	1.0	2.5	116.8	0.15	0.10	0.089	10	1.25	69.2	1.7	19.1	1.0	373.938	2.27E-04	3.00E-03	0.300	3.17E-01	9.2675	2.55E-01	
4.0	1.0	3.5	116.8	0.20	0.14	0.125	10	1.25	69.2	1.7	19.1	1.0	442.449	2.64E-04	8.10E-04	0.081	8.55E-02	9.2675	6.88E-02	
5.0	1.0	4.5	116.8	0.26	0.18	0.160	10	1.25	69.2	1.7	19.1	1.0	501.690	2.94E-04	8.10E-04	0.081	8.55E-02	9.2675	6.88E-02	
6.0	1.0	5.5	116.8	0.32	0.22	0.196	10	1.25	69.2	1.7	19.1	1.0	554.639	3.18E-04	1.00E-03	0.100	1.06E-01	9.2675	8.50E-02	
7.0	1.0	6.5	116.8	0.38	0.25	0.231	10	1.25	69.2	1.7	18.7	1.0	597.961	3.42E-04	1.00E-03	0.100	1.09E-01	9.2675	8.75E-02	
8.0	1.0	7.5	116.8	0.44	0.29	0.266	10	1.25	69.2	1.5	17.4	1.0	627.175	3.70E-04	1.00E-03	0.100	1.18E-01	9.2675	9.54E-02	
9.0	1.0	8.5	116.8	0.50	0.33	0.302	10	1.25	69.2	1.4	16.3	1.0	653.895	3.95E-04	1.00E-03	0.100	1.28E-01	9.2675	1.03E-01	
10.0	1.0	9.5	112.5	0.55	0.37	0.336	9	1.25	59.2	1.4	13.9	1.0	654.751	4.32E-04	2.70E-03	0.270	4.18E-01	9.2675	3.36E-01	
11.0	1.0	10.5	112.5	0.61	0.41	0.369	9	1.25	59.2	1.3	13.2	1.0	676.211	4.52E-04	2.70E-03	0.270	4.43E-01	9.2675	3.57E-01	
12.0	1.0	11.5	112.5	0.67	0.45	0.402	9	1.25	59.2	1.3	12.7	0.9	696.388	4.71E-04	2.70E-03	0.270	4.67E-01	9.2675	3.76E-01	
13.0	1.0	12.5	112.5	0.72	0.48	0.435	9	1.25	59.2	1.2	12.2	0.9	715.460	4.88E-04	2.70E-03	0.270	4.90E-01	9.2675	3.95E-01	
14.0	1.0	13.5	122.4	0.78	0.52	0.469	12	1.25	62.7	1.2	16.8	0.9	828.060	4.48E-04	1.20E-03	0.120	1.48E-01	9.2675	1.19E-01	
15.0	1.0	14.5	122.4	0.84	0.56	0.505	12	1.25	62.7	1.1	16.2	0.9	849.130	4.63E-04	1.20E-03	0.120	1.55E-01	9.2675	1.25E-01	
16.0	1.0	15.5	122.4	0.90	0.61	0.540	12	1.25	62.7	1.1	15.6	0.9	869.204	4.77E-04	1.20E-03	0.120	1.62E-01	9.2675	1.30E-01	
17.0	1.0	16.5	122.4	0.97	0.65	0.575	12	1.25	62.7	1.0	15.1	0.9	888.391	4.90E-04	1.20E-03	0.120	1.68E-01	9.2675	1.35E-01	
18.0	1.0	17.5	122.4	1.03	0.69	0.609	12	1.25	62.7	1.0	14.6	0.9	906.783	5.01E-04	2.20E-03	0.220	3.20E-01	9.2675	2.58E-01	
19.0	1.0	18.5	122.4	1.09	0.73	0.643	12	1.25	62.7	1.0	14.2	0.9	924.458	5.12E-04	2.20E-03	0.220	3.31E-01	9.2675	2.67E-01	
20.0	1.0	19.5	116.5	1.15	0.77	0.676	23	1.25	80.4	1.0	29.5	0.9	1210.233	4.06E-04	1.20E-03	0.120	7.54E-02	9.2675	6.07E-02	
21.0	1.0	20.5	116.5	1.21	0.81	0.708	23	1.25	80.4	0.9	28.7	0.9	1230.378	4.13E-04	1.20E-03	0.120	7.77E-02	9.2675	6.25E-02	
22.0	1.0	21.5	116.5	1.26	0.85	0.739	23	1.25	80.4	0.9	28.1	0.9	1249.885	4.19E-04	1.20E-03	0.120	7.99E-02	9.2675	6.43E-02	
23.0	1.0	22.5	116.5	1.32	0.89	0.770	23	1.25	80.4	0.9	27.4	0.9	1268.801	4.25E-04	1.20E-03	0.120	8.21E-02	9.2675	6.61E-02	
24.0	1.0	23.5	116.5	1.38	0.92	0.800	23	1.25	80.4	0.9	26.9	0.9	1287.169	4.30E-04	1.20E-03	0.120	8.43E-02	9.2675	6.78E-02	
25.0	1.0	24.5	113.0	1.44	0.96	0.829	15	1.25	61.0	0.9	18.3	0.9	1156.376	4.91E-04	1.20E-03	0.120	1.33E-01	9.2675	1.07E-01	
26.0	1.0	25.5	113.0	1.49	1.00	0.858	15	1.25	61.0	0.8	18.0	0.9	1171.331	4.95E-04	8.10E-04	0.081	9.21E-02	9.2675	7.42E-02	
27.0	1.0	26.5	113.0	1.55	1.04	0.886	15	1.25	61.0	0.8	17.6	0.9	1185.913	5.00E-04	8.10E-04	0.081	9.42E-02	9.2675	7.58E-02	
28.0	1.0	27.5	113.0	1.61	1.08	0.914	15	1.25	61.0	0.8	17.3	0.9	1200.146	5.04E-04	1.30E-03	0.130	1.54E-01	9.2675	1.24E-01	0.03
29.0	1.0	28.5	113.0	1.66	1.11	0.941	15	1.25	61.0	0.8	17.0	0.9	1214.048	5.08E-04	1.30E-03	0.130	1.58E-01	9.2675	1.27E-01	0.03
30.0	1.0	29.5	109.9	1.72	1.15	0.967	26	1.25	76.0	0.8	30.4	0.9	1497.102	4.19E-04	8.10E-04	0.081	4.90E-02	9.2675	3.95E-02	0.01
31.5	1.5	30.8	109.9	1.79	1.20	0.999	26	1.25	76.0	0.8	29.8	0.9	1516.777	4.22E-04	8.10E-04	0.081	5.02E-02	9.2675	4.04E-02	0.01
32.0	0.5	31.8	130.0	1.85	1.24	1.025	15	1.25	56.7	0.8	24.1	0.9	1434.670	4.53E-04	8.10E-04	0.081	6.49E-02	9.2675	5.23E-02	0.01
33.0	1.0	32.5	130.0	1.89	1.27	1.048	15	1.25	56.7	0.7	23.7	0.9	1446.029	4.56E-04	8.10E-04	0.081	6.61E-02	9.2675	5.32E-02	0.01
34.0	1.0	33.5	130.0	1.96	1.31	1.077	15	1.25	56.7	0.7	23.4	0.8	1464.843	4.59E-04	8.10E-04	0.081	6.71E-02	9.2675	5.40E-02	0.01
35.0	1.0	34.5	130.0	2.02	1.36	1.106	18	1.25	59.9	0.7	26.4	0.8	1549.297	4.42E-04	8.10E-04	0.081	5.81E-02	9.2675	4.68E-02	0.01
36.0	1.0	35.5	130.0	2.09	1.40	1.135	18	1.25	59.9	0.7	26.1	0.8	1567.922	4.44E-04	8.10E-04	0.081	5.89E-02	9.2675	4.75E-02	0.01
37.0	1.0	36.5	130.0	2.15	1.44	1.163	24	1.25	67.7	0.7	32.0	0.8	1705.415	4.15E-04	8.10E-04	0.081	4.60E-02	9.2675	3.71E-02	0.01
38.0	1.0	37.5	130.0	2.22	1.49	1.190	24	1.25	67.7	0.7	31.7	0.8	1724.288	4.16E-04	8.10E-04	0.081	4.67E-02	9.2675	3.76E-02	0.01
39.0	1.0	38.5	130.0	2.28	1.53	1.217	24	1.25	67.7	0.7	31.3	0.8	1742.837	4.18E-04	8.10E-04	0.081	4.73E-02	9.2675	3.81E-02	0.01
40.0	1.0	39.5	134.1	2.35	1.57	1.243	35	1.25	79.6	0.7	42.0	0.8	1948.948	3.79E-04	5.20E-04	0.052	2.14E-02	9.2675	1.72E-02	0.00
41.0	1.0	40.5	134.1	2.42	1.62	1.270	35	1.25	79.6	0.7	41.5	0.8	1968.871	3.80E-04	5.20E-04	0.052	2.17E-02	9.2675	1.75E-02	0.00
42.0	1.0	41.5	134.1	2.48	1.66	1.296	20	1.25	59.5	0.6	26.4	0.8	1717.696	4.42E-04	8.10E-04	0.081	5.80E-02	9.2675	4.67E-02	0.00
43.0	1.0	42.5	134.1	2.55	1.71	1.322	20	1.25	59.5	0.6	26.2	0.8	1735.070	4.43E-04	8.10E-04	0.081	5.87E-02	9.2675	4.72E-02	0.00
44.0	1.0	43.5	134.1	2.62	1.75	1.347	20	1.25	59.5	0.6	25.9	0.8	1752.182	4.44E-04	8.10E-04	0.081	5.93E-02	9.2675	4.78E-02	0.00
45.0	1.0	44.5	127.4	2.68	1.80	1.370	50	1.25	92.7	0.6	53.7	0.8	2261.755	3.48E-04	5.20E-04	0.052	1.59E-02	9.2675	1.28E-02	0.00
46.0	1.0	45.5	127.4	2.75	1.84	1.392	50	1.25	92.7	0.6	53.2	0.8	2280.697	3.48E-04	5.20E-04	0.052	1.61E-02	9.2675	1.29E-02	0.00
47.0	1.0	46.5	127.4	2.81	1.88	1.414	22	1.25	60.9	0.6	27.1	0.8	1842.400	4.35E-04	8.10E-04	0.081	5.63E-02	9.2675	4.53E-02	0.00
48.0	1.0	47.5	127.4	2.87	1.93	1.435	22	1.25	60.9	0.6	26.9	0.8	1858.025	4.35E-04	8.10E-04	0.081	5.68E-02	9.2675	4.58E-02	0.00
49.0	1.0	48.5	127.4	2.94	1.97	1.455	22	1.25	60.9	0.6	26.7	0.8	1873.449	4.35E-04	8.10E-04	0.081	5.74E-02	9.2675	4.62E-02	0.00
50.0	1.0	49.5	126.3	3.00	2.01	1.475	50	1.25	90.6	0.6	51.2	0.8	2353.787	3.49E-04	1.00E-02	1.000	3.24E-01	9.2675	2.61E-01	0.00

TOTAL SETTLEMENT = **0.17**

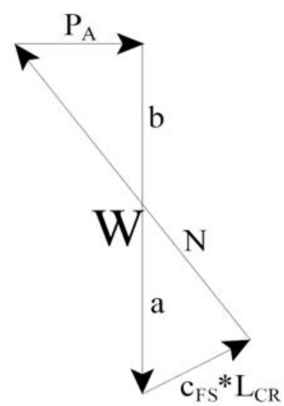
Retaining Wall Design with Transitioned Backfill
(Vector Analysis)

Input:

Retaining Wall Height	(H)	30.00 feet
Slope Angle of Backfill	(b)	0.0 degrees
Height of Slope above Wall	(h_s)	0.0 feet
Horizontal Length of Slope	(l_s)	0.0 feet
Total Height (Wall + Slope)	(H_T)	30.0 feet
Unit Weight of Retained Soils	(g)	125.0 pcf
Friction Angle of Retained Soils	(f)	30.5 degrees
Cohesion of Retained Soils	(c)	71.0 psf
Factor of Safety	(FS)	1.50
Factored Parameters:	(f_{FS})	21.4 degrees
	(c_{FS})	47.3 psf



Failure Angle (a) degrees	Height of Tension Crack (H_C) feet	Area of Wedge (A) feet^2	Weight of Wedge (W) lbs/lineal foot	Length of Failure Plane (L_{CR}) feet	a lbs/lineal foot	b lbs/lineal foot	Active Pressure (P_A) lbs/lineal foot
45	1.2	449	56152.8	40.7	4482.0	51670.8	22531.7
46	1.2	434	54230.1	40.0	4240.8	49989.3	22844.9
47	1.2	419	52370.4	39.4	4021.4	48348.9	23123.7
48	1.2	405	50569.6	38.8	3821.5	46748.1	23369.2
49	1.2	391	48824.1	38.2	3638.7	45185.5	23582.5
50	1.1	377	47130.4	37.7	3471.0	43659.3	23764.5
51	1.1	364	45485.1	37.1	3317.0	42168.1	23916.1
52	1.1	351	43885.4	36.6	3175.1	40710.3	24037.9
53	1.1	339	42328.4	36.2	3044.1	39284.3	24130.3
54	1.1	326	40811.6	35.7	2922.9	37888.7	24193.8
55	1.1	315	39332.6	35.3	2810.6	36522.0	24228.6
56	1.1	303	37889.1	34.8	2706.4	35182.7	24234.9
57	1.1	292	36478.9	34.4	2609.4	33869.5	24212.6
58	1.1	281	35100.2	34.1	2519.1	32581.1	24161.8
59	1.1	270	33751.1	33.7	2434.9	31316.2	24082.1
60	1.1	259	32429.8	33.3	2356.2	30073.6	23973.3
61	1.1	249	31134.7	33.0	2282.5	28852.2	23834.9
62	1.2	239	29864.4	32.7	2213.5	27650.8	23666.3
63	1.2	229	28617.2	32.4	2148.8	26468.4	23466.9
64	1.2	219	27391.9	32.1	2088.1	25303.8	23235.7
65	1.2	209	26187.1	31.8	2030.9	24156.2	22971.7
66	1.2	200	25001.7	31.5	1977.1	23024.6	22673.8
67	1.3	191	23834.4	31.2	1926.4	21908.0	22340.6
68	1.3	181	22684.1	31.0	1878.5	20805.6	21970.7
69	1.3	172	21549.7	30.7	1833.2	19716.5	21562.3
70	1.4	163	20430.3	30.5	1790.3	18640.0	21113.4



Design Equations (Vector Analysis):

$a = c_{FS}*L_{CR}*\sin(90+f_{FS})/\sin(a-f_{FS})$

$b = W-a$

$P_A = b*\tan(a-f_{FS})$

$EFP = 2*P_A/H^2$

Maximum Active Pressure Resultant

$P_{A,\ max}$ 24234.9 lbs/lineal foot

Equivalent Fluid Pressure (per lineal foot of wall)

$EFP = 2*P_A/H^2$

EFP 53.9 pcf 61.6 pcf

Design Wall for an Equivalent Fluid Pressure: 54 pcf 62 pcf

GEOCON WEST, INC.

ENVIRONMENTAL GEOTECHNICAL MATERIALS

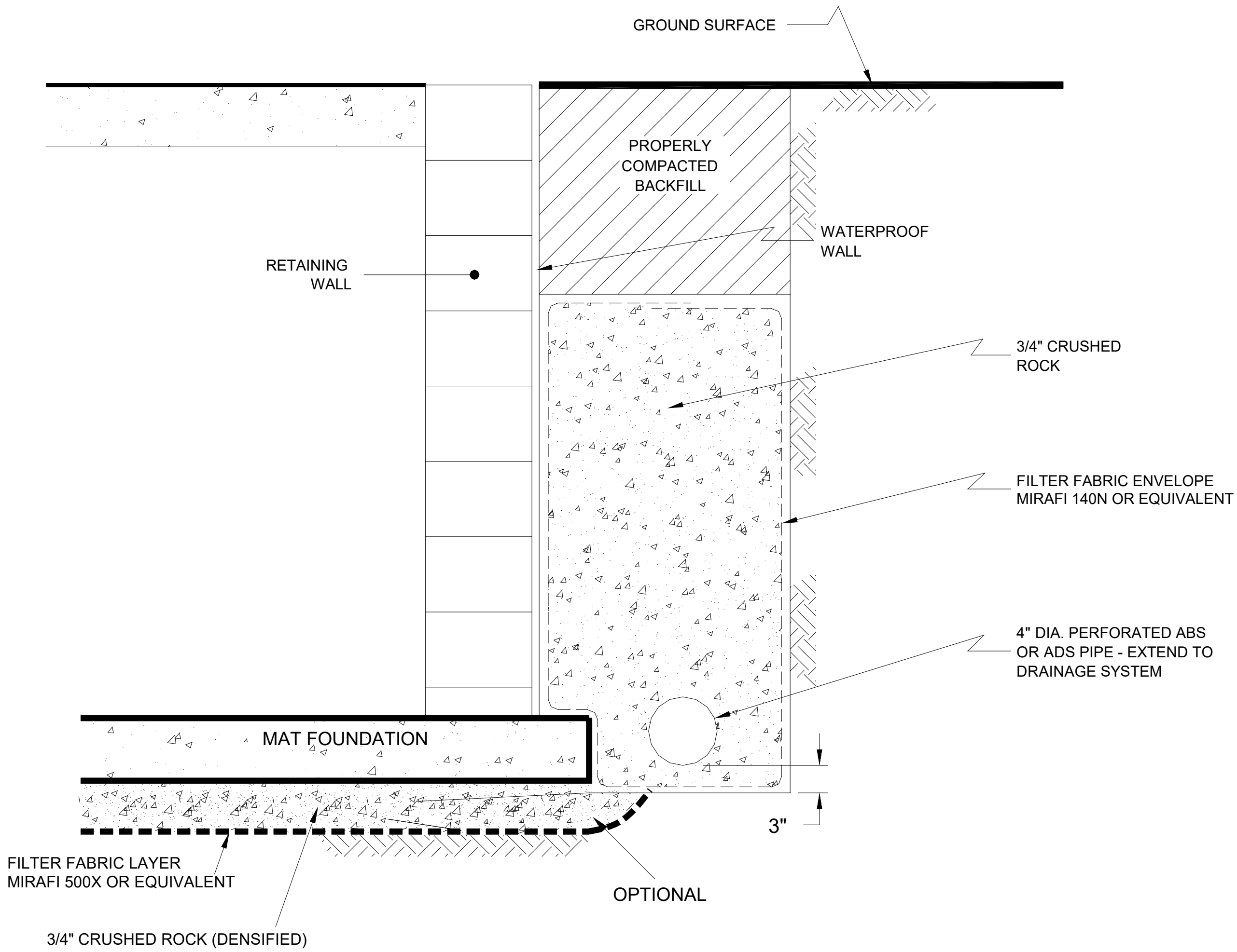
3303 N. SAN FERNANDO BLVD. - SUITE 100 - BURBANK, CA 91504
PHONE (818) 841-8388 - FAX (818) 841-1704

DRAFTED BY: PZ | CHECKED BY: HHD

RETAINING WALL PRESSURE CALCULATION

6728 NORTH SEPULVEDA BOULEVARD
6715 NORTH COLUMBUS STREET
LOS ANGELES, CALIFORNIA

FEB. 2022 | PROJECT NO. W1207-06-01 | FIG. 17



NO SCALE

GEOCON WEST, INC.

ENVIRONMENTAL GEOTECHNICAL MATERIALS

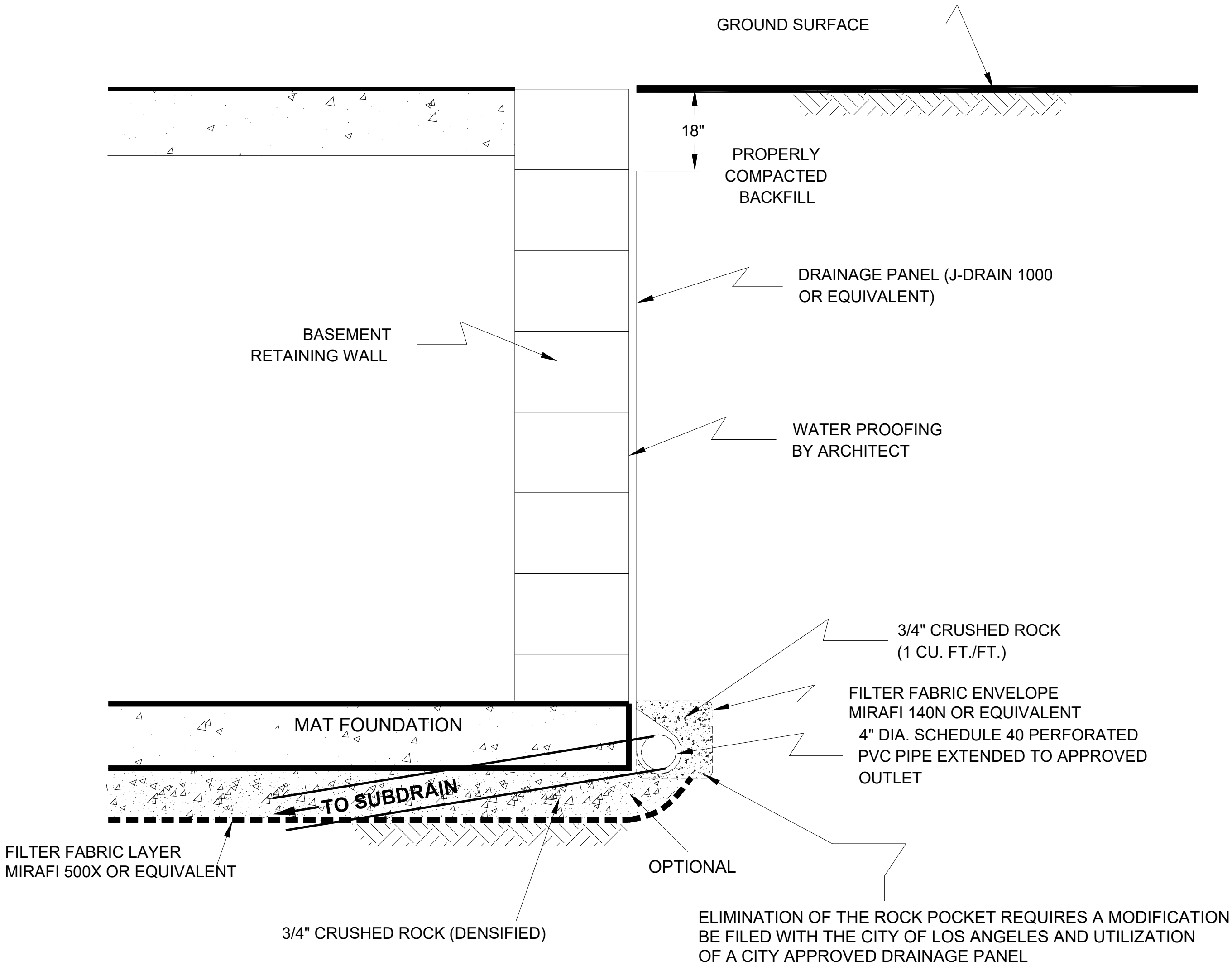
3303 N. SAN FERNANDO BLVD. - SUITE 100 - BURBANK, CA 91504

PHONE (818) 841-8388 - FAX (818) 841-1704

RETAINING WALL DRAIN DETAIL

6728 NORTH SEPULVEDA BOULEVARD
6715 NORTH COLUMBUS STREET
LOS ANGELES, CALIFORNIA

DRAFTED BY: PZ	CHECKED BY: HHD	FEB. 2022	PROJECT NO. W1207-06-01	FIG. 18



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

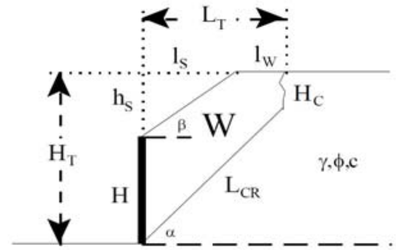
6728 NORTH SEPULVEDA BOULEVARD
6715 NORTH COLUMBUS STREET
LOS ANGELES, CALIFORNIA

DRAFTED BY: PZ	CHECKED BY: HHD	FEB. 2022	PROJECT NO. W1207-06-01	FIG. 19

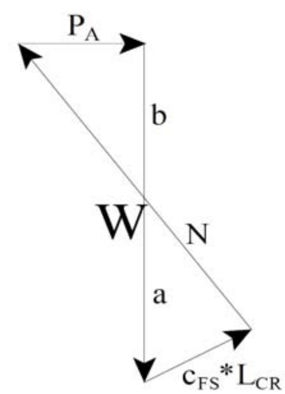
Shoring Design with Transitioned Backfill
(Vector Analysis)

Input:

Shoring Height	(H)	32.00	feet
Slope Angle of Backfill	(b)	0.0	degrees
Height of Slope above Shoring	(h_s)	0.0	feet
Horizontal Length of Slope	(l_s)	0.0	feet
Total Height (Shoring + Slope)	(H_T)	32.0	feet
Unit Weight of Retained Soils	(g)	125.0	pcf
Friction Angle of Retained Soils	(f)	31.8	degrees
Cohesion of Retained Soils	(c)	102.0	psf
Factor of Safety	(FS)	1.25	
Factored Parameters:	(f_{FS})	26.4	degrees
	(c_{FS})	81.6	psf



Failure Angle (a) degrees	Height of Tension Crack (H_C) feet	Area of Wedge (A) feet^2	Weight of Wedge (W) lbs/lineal foot	Length of Failure Plane (L_{CR}) feet	a lbs/lineal foot	b lbs/lineal foot	Active Pressure (P_A) lbs/lineal foot
45	2.6	509	63580.6	41.6	9523.4	54057.1	18210.7
46	2.5	491	61424.6	41.0	8926.8	52497.8	18711.8
47	2.4	475	59335.3	40.4	8392.1	50943.3	19166.2
48	2.4	458	57309.1	39.9	7910.7	49398.4	19575.8
49	2.3	443	55342.5	39.3	7475.7	47866.7	19942.3
50	2.3	427	53431.9	38.8	7081.2	46350.7	20267.1
51	2.2	413	51574.3	38.3	6722.2	44852.1	20551.6
52	2.2	398	49766.6	37.8	6394.5	43372.1	20796.8
53	2.2	384	48005.9	37.4	6094.4	41911.5	21003.8
54	2.1	370	46289.5	36.9	5819.0	40470.5	21173.3
55	2.1	357	44615.0	36.5	5565.6	39049.4	21306.0
56	2.1	344	42979.8	36.0	5331.8	37647.9	21402.3
57	2.1	331	41381.7	35.6	5115.7	36266.0	21462.7
58	2.1	319	39818.6	35.3	4915.5	34903.1	21487.3
59	2.1	306	38288.4	34.9	4729.6	33558.9	21476.3
60	2.1	294	36789.4	34.5	4556.7	32232.7	21429.6
61	2.1	283	35319.6	34.2	4395.6	30924.0	21347.1
62	2.1	271	33877.4	33.8	4245.2	29632.2	21228.4
63	2.2	260	32461.1	33.5	4104.5	28356.6	21073.0
64	2.2	249	31069.3	33.2	3972.7	27096.6	20880.5
65	2.2	238	29700.4	32.9	3849.0	25851.4	20649.9
66	2.3	227	28353.2	32.6	3732.7	24620.5	20380.6
67	2.3	216	27026.2	32.3	3623.1	23403.0	20071.3
68	2.4	206	25718.2	32.0	3519.7	22198.5	19720.9
69	2.4	195	24427.9	31.7	3421.9	21006.1	19328.0
70	2.5	185	23154.3	31.4	3329.1	19825.2	18891.0



Design Equations (Vector Analysis):

$a = c_{FS}*L_{CR}*\sin(90+f_{FS})/\sin(a-f_{FS})$

$b = W-a$

$P_A = b*\tan(a-f_{FS})$

$EFP = 2*P_A/H^2$

Maximum Active Pressure Resultant

$P_{A,\ max}$ 21487.3 lbs/lineal foot

Equivalent Fluid Pressure (per lineal foot of shoring)

$EFP = 2*P_A/H^2$

EFP 42.0 pcf

Design Shoring for an Equivalent Fluid Pressure: 42 pcf

GEOCON WEST, INC.

ENVIRONMENTAL GEOTECHNICAL MATERIALS

3303 N. SAN FERNANDO BLVD. - SUITE 100 - BURBANK, CA 91504

PHONE (818) 841-8388 - FAX (818) 841-1704

SHORING PRESSURE CALCULATION

6728 NORTH SEPULVEDA BOULEVARD
6715 NORTH COLUMBUS STREET
LOS ANGELES, CALIFORNIA

DRAFTED BY: PZ | CHECKED BY: HHD

FEB. 2022 | PROJECT NO. W1207-06-01 | FIG. 20

APPENDIX A

APPENDIX A

FIELD INVESTIGATION

The site was initially explored on July 23, 2020 by excavating three 8-inch diameter borings to depths between 40½ and 65½ feet below the existing ground surface using a truck-mounted hollow-stem auger drilling machine. Additional exploration was performed on January 27 and 28, 2022 by excavating three 8-inch diameter borings to depths ranging from 79½ to 80½ feet below the existing ground surface using a truck-mounted hollow-stem auger drilling machine. 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. The California Modified Sampler was equipped with 1-inch by 2³/₈-inch diameter brass sampler rings to facilitate soil removal and testing. Standard Penetration Tests (SPTs) were also performed in borings B1, B2, B4, and B6. Bulk samples were obtained.

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 A6. 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 2A.

PROJECT NO. W1207-06-01

BORING 1

ELEV. (MSL.) **--** DATE COMPLETED **7/23/2020**

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	BULK 0-5'				**ARTIFICIAL FILL** Sandy Silt, soft to firm, dry, olive brown, fine-grained, some coarse gravel.			
2								
4				SM	**ALLUVIUM** Silty Sand, loose, slightly moist, brown, fine-grained.			
	B1@5'					8		
6				CL	Clay with Sand, firm, slightly moist, brown, fine-grained.			
8	B1@7.5'					13	96.4	17.6
10	B1@10'				- soft	4		
12	B1@12.5'				- stiff, dry	24	89.3	13.1
14	B1@15'			ML	Silt with Sand, firm, soft, slightly moist, light brown, fine-grained.	6		
16								
18	B1@17.5'			ML	Sandy Silt, firm, dry, light brown, fine-grained, some roots.	21	98.5	8.4
20	B1@20'				- increase in sand content, soft, rootlets	7		
				SM	Silty Sand, medium dense, dry, light yellowish brown, fine-grained.			
22	B1@22.5'					26	99.6	5.4
24	B1@25'				- loose	10		
26								
28	B1@27.5'				- medium dense	20	91.1	13.6

Figure A1,
Log of Boring 1, Page 1 of 3

W1207-06-01 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

BORING 1

ELEV. (MSL.) -- DATE COMPLETED 7/23/2020

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'			CL	Clay, soft, moist, brown, some plasticity.	3		
32	B1@32.5'				- firm, dark brown	21	113.2	13.3
34	B1@35'				- slightly moist, some fine-grained sand, trace fine gravel	9		
36								
				SM	Silty Sand, medium dense, slightly moist, brown, fine-grained.			
38	B1@37.5'					27	121.2	13.3
40	B1@40'				- loose, slightly moist to moist, dark brown, trace coarse-grained	8		
42	B1@42.5'				- medium dense, brown, trace fine gravel	22	120.1	15.5
44	B1@45'				- loose, fine-grained	7		
46								
48	B1@47.5'			ML	Sandy Silt, stiff, moist, dark brown, fine-grained.	40	119.3	15.5
50	B1@50'			SP-SM	Sand with Silt, poorly graded, dense, moist, brown, fine-grained, trace fine to coarse gravel.	45		
52	B1@52.5'				- very dense, yellowish brown and dark brown	50 (1")	115.9	4.7
54	B1@55'				- some fine to coarse gravel	60		
56								
58								

W1207-06-01 BORING LOGS.GPJ

Figure A1,
Log of Boring 1, 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.

BORING 1

ELEV. (MSL.) -- DATE COMPLETED 7/23/2020

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 (%)
60	B1@60'			SP-SM		74		

Total depth of boring: 60.5 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 3 of 3

W1207-06-01 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 7/23/2020

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	BULK 0-5'				**AC: 3"** **ARTIFICIAL FILL** Sandy Silt, soft, slightly moist, brown, fine-grained.			
2					**ALLUVIUM** Sandy Silt, soft, slightly moist, light brown, fine-grained.			
4	B2@5'					3		
6								
8	B2@7.5'			ML	- stiff, dry	22	88.0	16.9
10	B2@10'				- increase in sand content, soft, dry to slightly moist	7		
12	B2@12.5'				- firm	16	94.3	10.3
14	B2@15'			CL	Clay with Sand, soft, slightly moist, light brown, fine-grained.	6		
16								
18	B2@17.5'			ML	Silt with Sand, firm, slightly moist, light brown, fine-grained, trace medium-grained.	19	102.1	7.9
20	B2@20'			ML	Sandy Silt, firm, slightly moist, light brown, fine-grained.	10		
22	B2@22.5'				Silty Sand, medium dense, dry to slightly moist, light yellowish brown, fine-grained.	27	102.4	5.0
24	B2@25'			SM	- trace medium- to coarse-grained	14		
26								
28	B2@27.5'					27	95.9	5.7
				ML	Sandy Silt, soft, slightly moist, light yellowish brown, fine-grained.			

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

W1207-06-01 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. W1207-06-01

BORING 2

ELEV. (MSL.) **--** DATE COMPLETED **7/23/2020**

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'			ML		7		
32	B2@32.5'			SM	Silty Sand, medium dense, slightly moist, light yellowish brown, fine-grained.	25	98.0	6.7
34–36	B2@35'			CL	Sandy Clay, soft, slightly moist to moist, brown, fine-grained.	6		
38	B2@37.5'			ML	Silt with Sand, slightly moist, brown and reddish brown, fine-grained, trace coarse-grained.	26	124.2	11.4
40	B2@40'			SC-SM	Silty Clayey Sand, loose, slightly moist, brown, fine-grained, trace medium- to coarse-grained.	10		
42	B2@42.5'			CL-ML	Sandy Silty Clay, stiff, slightly moist, brown, fine-grained.	42	123.6	10.7
44–46	B2@45'				- firm, trace coarse-grained	15		
48	B2@47.5'				- stiff	34	125.3	10.2
50	B2@50'			ML	Sandy Silt, firm, moist, brown, fine-grained.	13		
52–58	B2@55'				- increase in sand content, stiff	20		

W1207-06-01 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

BORING 2

ELEV. (MSL.) -- DATE COMPLETED 7/23/2020

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 (%)
60	B2@60'			ML	- decrease in sand content	20		
62								
64	B2@65'			SM	Silty Sand, medium dense, moist, brown, fine-grained. - increase in sand content	21		

Total depth of boring: 65.5 feet
Fill to 2 feet.
No groundwater encountered.
Backfilled with soil cuttings and tamped.
Patched with cold patch asphalt.

*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.

W1207-06-01 BORING LOGS.GPJ

Figure A2,
Log of Boring 2, Page 3 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.

PROJECT NO. W1207-06-01

BORING 3

ELEV. (MSL.) **--** DATE COMPLETED **7/23/2020**

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					**ARTIFICIAL FILL** Sandy Silt, soft, dry, brown, fine-grained, coarse gravel, small cobble-sized pieces.			
2	B3@2.5'				- stiff, light brown with dark brown, fine gravel-sized pieces of sandstone	36	92.6	13.9
4	B3@5'				- firm, dark brown, roots	20	102.3	11.6
6				ML	**ALLUVIUM** Sandy Silt, firm, dry to slightly moist, light brown, fine-grained.			
8	B3@7.5'					14	920.6	17.5
10	B3@10'			ML	Silt, soft, slightly moist to moist, light brown, trace plasticity.	11	104.1	11.4
12								
14	B3@15'			ML	Sandy Silt, firm, slightly moist, light brown, fine-grained.	20	91.1	26.6
16								
18								
20	B3@20'					25	90.1	22.9
22					Silty Sand, medium dense, dry, light yellowish brown, fine-grained.			
24	B3@25'			SM		26	96.3	7.3
26								
28								

W1207-06-01 BORING LOGS.GPJ

Figure A3,
Log of Boring 3, Page 1 of 2

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

BORING 3

ELEV. (MSL.) -- DATE COMPLETED 7/23/2020

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	B3@30'			SM	- loose, coarse-grained, fine gravel, trace coarse gravel	14	100.3	5.5
				ML	Silt, firm, moist, light brown.			
32								
34								
	B3@35'				- stiff, dark brown, trace plasticity	22	105.2	23.0
36								
38								
40	B3@40'					33	126.0	11.9

Total depth of boring: 40.5 feet
Fill to 5.5 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.

W1207-06-01 BORING LOGS.GPJ

Figure A3,
Log of Boring 3, Page 2 of 2

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

BORING 4

ELEV. (MSL.) - - DATE COMPLETED 1/27/2022

EQUIPMENT HOLLOW STEM AUGER BY: RP

DEPTH IN FEET	SAMPLE NO.	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0			**ARTIFICIAL FILL** Silty Sand, loose to medium dense, slightly moist, dark brown, fine-grained, some fine gravel.			
4		ML	**ALLUVIUM** Sandy Silt, firm, slightly moist, olive brown to yellowish brown, fine-grained.			
5	B4@5'			15	79.9	11.1
10	B4@10'		- olive brown, increase in sand, trace clay	18	96.1	11.9
15	B4@15'		- trace roots	16	76.4	12.9
20	B4@20'		- trace fine gravel	18	93.0	17.1
23		SP	Sand, poorly graded, medium dense, slightly moist, yellowish brown, fine-grained, trace silt.			
25	B4@25'			41	101.5	4.5
29		SP-SM	Sand with Silt, medium dense, slightly moist, yellowish brown, fine-grained.			

W1207-06-01 BORING LOGS.GPJ

Figure A4,
Log of Boring 4, Page 1 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

BORING 4

ELEV. (MSL.) - - DATE COMPLETED 1/27/2022

EQUIPMENT HOLLOW STEM AUGER BY: RP

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
30	B4@30'			SP-SM		21	85.8	24.3
32	B4@32'			ML	Sandy Silt with Clay, firm, slightly moist, brown, fine-grained.	9		
34								
	B4@35'				- stiff, fine- to medium-grained, increase in sand	41	123.4	14.6
36								
	B4@37'			ML	Sandy Silt, firm, slightly moist, brown, fine-grained.	13		
38								
40	B4@40'				- stiff, increase in sand, slightly porous	38	113.8	17.2
42	B4@42'				- slight increase in sand	14		
44				SM	Silty Sand, medium dense, slightly moist, brown, fine- to medium-grained.			
	B4@45'					48	124.8	10.9
46								
	B4@47'				- decrease in silt	24		
48								
50	B4@49.5'			SP	Sand with Gravel, poorly graded, very dense, slightly moist, brown, fine-grained, some coarse-grained, gravel (to 1").	50 (4")	126.3	2.8
					- gravelly			
52	B4@52'				- increase in medium-grained, decrease in gravel	90		
54	B4@54.5'			SW	Sand with Gravel, well-graded, very dense, slightly moist, brown, fine- to coarse-grained, gravel (to 1.5").	50 (4")	123.0	2.5
56					- gravelly			
	B4@57'					50 (6")		
58								
	B4@59'			SM	Silty Sand with Gravel, very dense, slightly moist, brown, fine- to	50 (5")	135.8	3.0

W1207-06-01 BORING LOGS.GPJ

Figure A4,
Log of Boring 4, 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

PROJECT NO. W1207-06-01

BORING 4

ELEV. (MSL.) - - DATE COMPLETED 1/27/2022

EQUIPMENT HOLLOW STEM AUGER BY: RP

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
60				SM	coarse-grained, gravel (to 1.5").			
62	B4@62'			SP-SM	Sand with Silt, poorly graded, medium dense, slightly moist, brown, fine-grained, trace silt.	27		
64								
	B4@65'				- very dense	50 (5")	111.0	4.2
66								
	B4@67'			ML	Sandy Silt, stiff, slightly moist, brown, fine-grained, trace clay.	26		
68								
70	B4@69.5'				- olive brown with oxidation staining, decrease in sand, some clay	50 (5")	116.5	18.6
72	B4@72'			SW	Sand, well-graded, very dense, slightly moist, brown, fine- to coarse-grained, some poorly graded sand interbeds.	50 (5")		
74	B4@74.5'					50 (5")	120.1	1.7
76								
78	B4@77'				- slight increase in medium- to coarse-grained	50 (5")		
80	B4@79.5'					50 (5")	116.1	2.8

Total depth of boring: 80 feet
Fill to 4 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.

W1207-06-01 BORING LOGS.GPJ

Figure A4,
Log of Boring 4, Page 3 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.

BORING 5

ELEV. (MSL.) - - DATE COMPLETED 1/27/2022

EQUIPMENT HOLLOW STEM AUGER BY: RP

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, loose, dry to slightly moist, yellowish brown, fine- to coarse-grained, some gravel.			
2					- brown, increase in silt			
					Sandy Silt, soft, slightly moist, brown, fine-grained.			
4								
	B5@5'			SM	**ALLUVIUM** Silty Sand, loose, slightly moist, brown to olive brown, fine-grained.	11	96.8	13.6
6								
8					- increase in silt			
10	B5@10'					16	101.4	10.9
12								
14				ML	Sandy Silt, firm, slightly moist, olive brown, fine-grained.			
	B5@15'					14	93.2	15.5
16								
18								
20	B5@20'				- yellowish brown - increase in sand	19	105.9	8.4
22				SP-SM	Sand with Silt, medium dense, slightly moist, yellowish brown, fine-grained, trace fine gravel.			
24								
	B5@25'					31	107.1	11.0
26								
28								
				ML	Sandy Silt, stiff, slightly moist, olive brown, fine-grained, some clay lens.			

Figure A5,
Log of Boring 5, Page 1 of 3

W1207-06-01 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

BORING 5

ELEV. (MSL.) - - DATE COMPLETED 1/27/2022

EQUIPMENT HOLLOW STEM AUGER BY: RP

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
30	B5@30' BULK 30-35'			ML		22	115.4	19.0
34				SM	Silty Sand, medium dense, slightly moist, brown with oxidation staining, fine-grained, some medium-grained, trace clay.			
35	B5@35'					21	81.1	35.9
39				SP	Sand, poorly graded, very dense, slightly moist, brown, fine-grained.			
40	B5@40'					52	124.0	13.8
45	B5@45'				- decrease in silt, trace gravel (to 2")	45	119.3	10.3
50	B5@50'				- very dense, slight increase in silt	50 (4")	120.2	8.8
55	B5@55'				- medium dense, olive brown with oxidation staining	30	114.3	7.8

W1207-06-01 BORING LOGS.GPJ

Figure A5,
Log of Boring 5, 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.

BORING 5

ELEV. (MSL.) - - DATE COMPLETED 1/27/2022

EQUIPMENT **HOLLOW STEM AUGER** BY: **RP**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
60	B5@60'				- dense, increase oxidation staining	71	103.8	10.1
62								
64								
	B5@65'					50 (6")	117.4	13.9
66								
68				SP				
70	B5@70'				- increase in silt, trace clay	89	116.0	15.6
72								
74								
	B5@75'					50 (3")	105.0	2.6
76					- gravelly			
78								
80	B5@79.5'					50 (4")		

Total depth of boring: 80 feet
Fill to 4.5 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 A5,
Log of Boring 5, Page 3 of 3

W1207-06-01 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. W1207-06-01

BORING 6

ELEV. (MSL.) - - DATE COMPLETED 1/28/2022

EQUIPMENT HOLLOW STEM AUGER BY: RP

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					**ASP: 4" BASE: 9"** **ARTIFICIAL FILL** Sandy Silt, firm, slightly moist, brown, fine-grained.			
2				ML	**ALLUVIUM** Sandy Silt, firm, slightly moist, yellowish brown, fine-grained, some fine gravel (to 1/2").			
4								
6	B6@5'					18	106.9	9.3
8								
10	B6@10'				- slight increase in sand, some coarse-grained, trace rootlets	17	102.4	9.9
12								
14				SM	Silty Sand, medium dense, slightly moist, brown, fine-grained, trace coarse-grained.			
16	B6@15'					22	114.9	6.5
18								
20	B6@20'			SW	Sand, well-graded, medium dense, slightly moist, light brown, fine- to coarse-grained, trace fine gravel.	43	113.2	2.9
22								
24				SP-SM	Sand with Silt, medium dense, slightly moist, light brown to yellowish brown, fine-grained, trace roots.			
26	B6@25'					27	107.3	5.3
28								

W1207-06-01 BORING LOGS.GPJ

Figure A6,
Log of Boring 6, Page 1 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

BORING 6

ELEV. (MSL.) - - DATE COMPLETED 1/28/2022

EQUIPMENT HOLLOW STEM AUGER BY: RP

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
30	B6@30'			SP-SM	- yellowish brown	47	100.9	8.9
	BULK 30-35'							
32	B6@32'			ML	Sandy Silt, firm, slightly moist, brown, fine-grained, trace clay.	15		
35	B6@35'				- stiff, brown with oxidation staining, increase in clay	34	110.8	17.3
37	B6@37'				- trace coarse-grained, increased oxidation, decrease in clay	24		
40	B6@40'				- increased sand, hard, slightly porous, trace fine gravel	65	122.1	9.8
					- yellowish brown with olive brown mottles			
42	B6@42'					20		
					- increase in sand			
44	B6@44.5'			SM	Silty Sand, very dense, slightly moist, yellowish brown with olive brown mottles, fine-grained, some oxidation staining, trace coarse-grained and gravel (to 1").	50 (5")	118.2	7.8
47	B6@47'				- medium dense, some fine gravel, increase in silt	22		
					- decrease in silt			
50	B6@50'				- dense, increase in oxidation	50 (5")	117.4	7.6
52	B6@52'			ML	Sandy Silt, stiff, slightly moist, yellowish brown with olive brown mottles, fine-grained.	19		
54	B6@55'			SM	Silty Sand, dense, slightly moist, yellowish brown with olive brown mottles, fine-grained, some oxidation staining.	50 (6")	114.5	6.9
57	B6@57'				- some medium-grained	32		
					- some coarse-grained			

W1207-06-01 BORING LOGS.GPJ

Figure A6,
Log of Boring 6, 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.

PROJECT NO. W1207-06-01

BORING 6

ELEV. (MSL.) - - DATE COMPLETED 1/28/2022

EQUIPMENT HOLLOW STEM AUGER BY: RP

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
60	B6@60'			SM		71	119.4	5.9
62	B6@62'			ML	Sandy Silt, stiff, slightly moist, olive brown with oxidation staining, fine-grained.	25		
64				SM	Silty Sand, dense, slightly moist, olive brown with oxidation staining, fine-grained, trace medium-grained.			
	B6@65'					78	120.4	11.5
66								
	B6@67'				- increase in silt	35		
68				SP-SM	Sand with Silt, poorly graded, very dense, slightly moist, yellowish brown with olive brown mottles, fine-grained.			
70	B6@69.5'					50 (5")	109.2	8.0
				SP	Sand, poorly graded, very dense, slightly moist, yellowish brown with olive brown mottles, fine-grained.			
72	B6@72'			SP-SM	Sand with Silt, poorly graded, dense, slightly moist, olive brown, fine-grained.	44		
74								
	B6@75'				- very dense, increase in sand	50 (5")	115.2	5.0
76								
	B6@77'			ML	Sandy Silt, stiff, slightly moist, brown with olive brown mottles, fine-grained.	29		
78								
80	B6@80'				- hard, olive brown with oxidation staining	50 (5")	116.5	12.1

Total depth of boring: 80.5 feet
Fill to 2 feet.
No groundwater encountered.
Backfilled with soil cuttings and tamped.
Asphalt patched.

*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.

W1207-06-01 BORING LOGS.GPJ

Figure A6,
Log of Boring 6, Page 3 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.

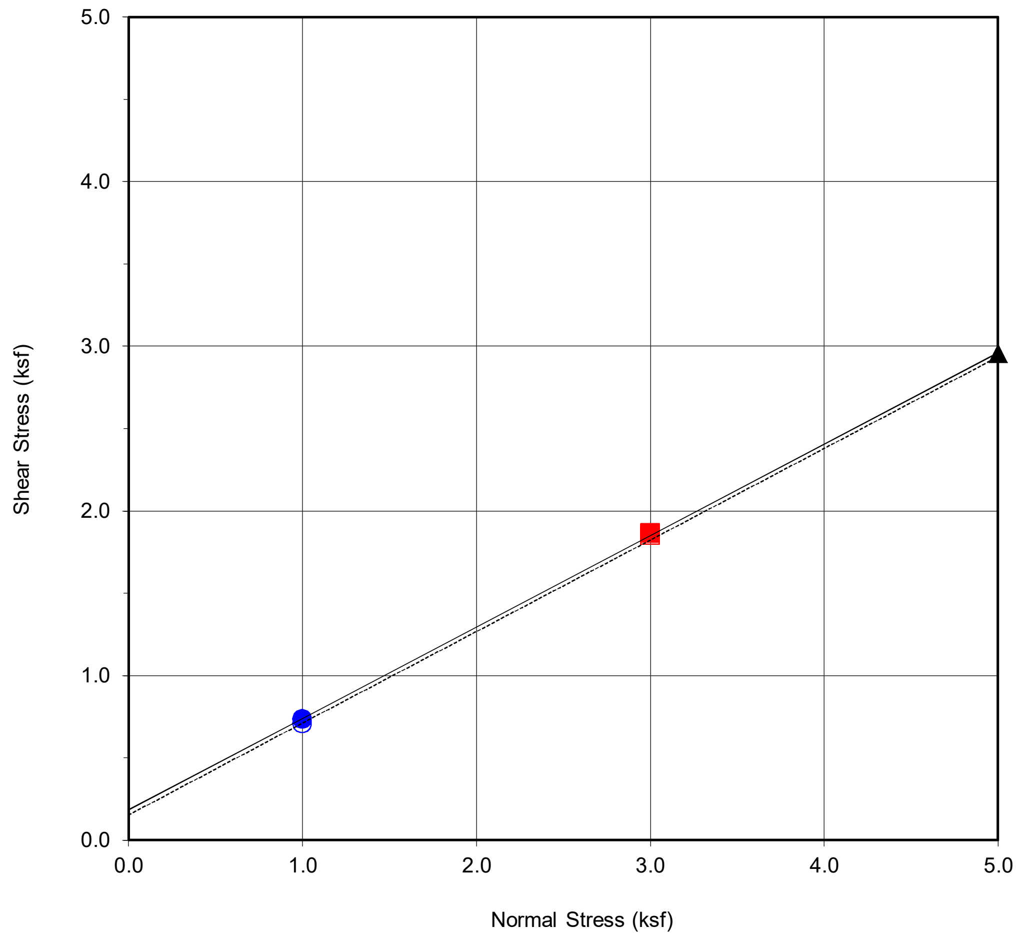
GEOCON

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, consolidation characteristics, plasticity indices, grain-size, corrosivity, in-place dry density and moisture content. The results of the laboratory tests are summarized in Figures B1 through B40. 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:	Ring

Soil Identification:		
Brown Sandy Silt (ML)		
Strength Parameters		
	C (psf)	ϕ (°)
Peak	184	29.1
Ultimate	152	29.1

Normal Stress (kip/ft2)	1	3	5
Peak Shear Stress (kip/ft²)	● 0.73	■ 1.86	▲ 2.96
Shear Stress @ End of Test (ksf)	○ 0.71	□ 1.85	△ 2.96
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 (%)	10.0	10.0	10.0
Initial Dry Density (pcf)	111.0	111.0	111.0
Initial Degree of Saturation (%)	51.9	52.1	52.2
Soil Height Before Shearing (in.)	1.2	1.2	1.2
Final Moisture Content (%)	16.7	16.1	13.4

GEOCON

DIRECT SHEAR TEST RESULTS

Consolidated Drained ASTM D-3080

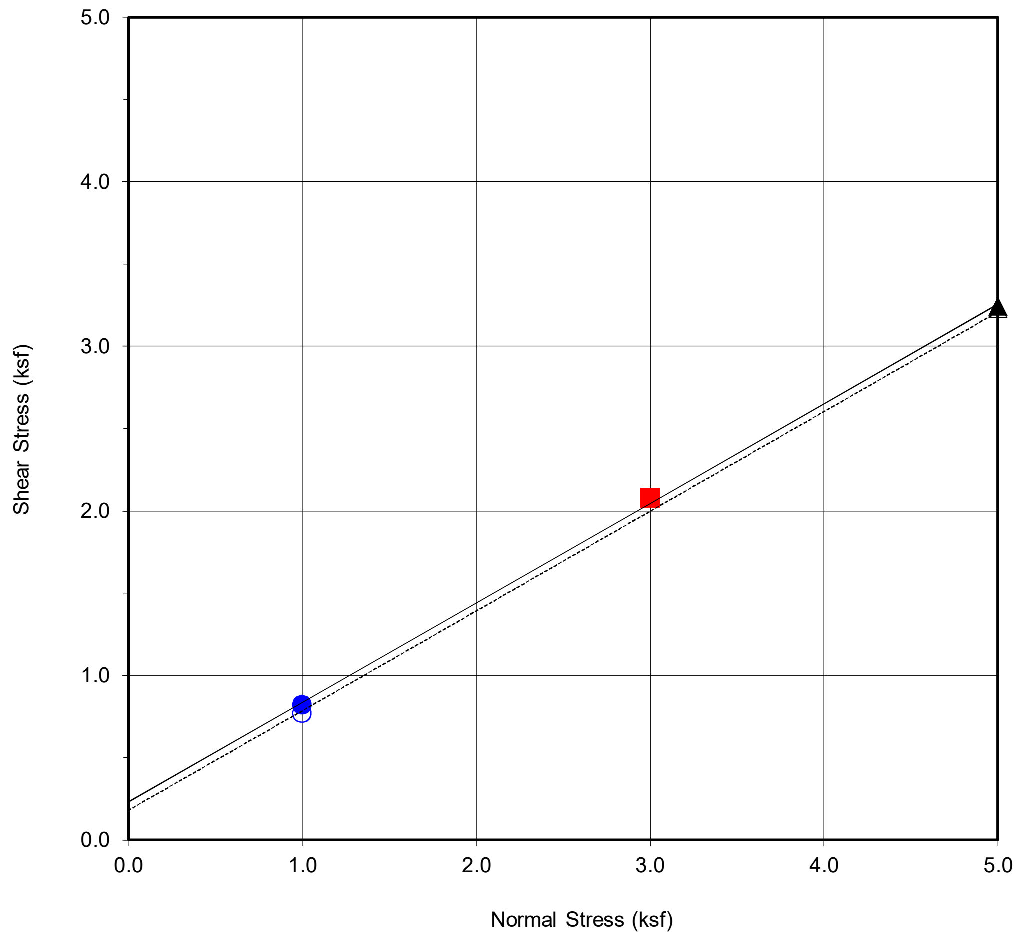
Checked by: PZ

Project No.: W1207-06-01

6728 North Sepulveda Boulevard
6715 North Columbus Avenue
Los Angeles, California

Feb. 2022

Figure B1



Boring No.	**B2**
Sample No.	**B2@0-5'**
Depth (ft)	**0-5'**
Sample Type:	Ring

Soil Identification:		
Brown Sandy Silt (ML)		
Strength Parameters		
	C (psf)	ϕ (°)
Peak	229	31.2
Ultimate	181	31.2

Normal Stress (kip/ft2)	1	3	5
Peak Shear Stress (kip/ft²)	● 0.82	■ 2.07	▲ 3.24
Shear Stress @ End of Test (ksf)	○ 0.77	□ 2.07	△ 3.23
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 (%)	10.4	10.4	10.4
Initial Dry Density (pcf)	112.0	112.0	112.0
Initial Degree of Saturation (%)	55.4	55.7	55.6
Soil Height Before Shearing (in.)	1.2	1.2	1.2
Final Moisture Content (%)	17.2	16.0	13.6

GEOCON

DIRECT SHEAR TEST RESULTS

Consolidated Drained ASTM D-3080

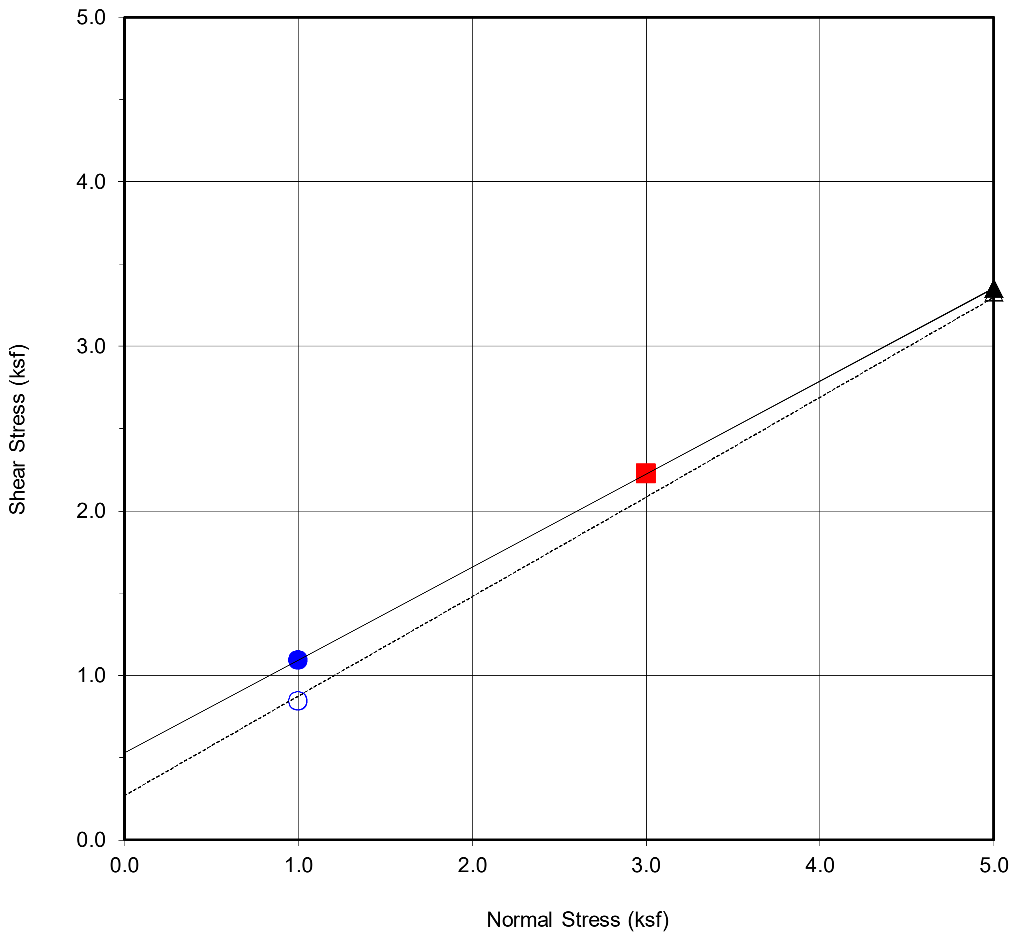
Checked by: PZ

Project No.: W1207-06-01

6728 North Sepulveda Boulevard
6715 North Columbus Avenue
Los Angeles, California

Feb. 2022

Figure B2



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

Soil Identification:		
Dark Brown Sandy Silt (ML)		
Strength Parameters		
	C (psf)	ϕ (°)
Peak	528	29.5
Ultimate	269	31.2

Normal Stress (kip/ft2)	1	3	5
Peak Shear Stress (kip/ft²)	● 1.09	■ 2.22	▲ 3.35
Shear Stress @ End of Test (ksf)	○ 0.84	□ 2.22	△ 3.33
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 (%)	11.6	11.0	10.1
Initial Dry Density (pcf)	102.5	100.9	103.3
Initial Degree of Saturation (%)	48.5	44.1	43.3
Soil Height Before Shearing (in.)	1.2	1.2	1.2
Final Moisture Content (%)	18.7	17.4	16.5

GEOCON

DIRECT SHEAR TEST RESULTS

Consolidated Drained ASTM D-3080

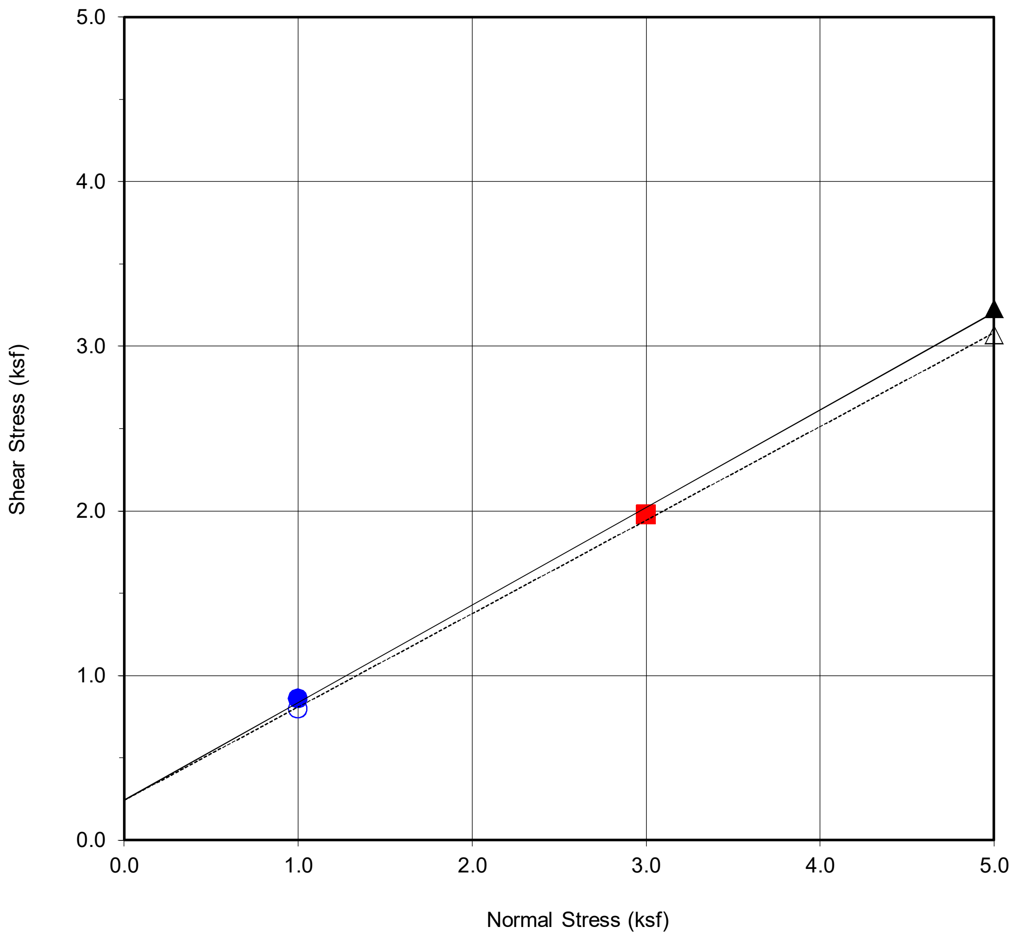
Checked by: PZ

Project No.: W1207-06-01

6728 North Sepulveda Boulevard
6715 North Columbus Avenue
Los Angeles, California

Feb. 2022

Figure B3



Boring No.	**B1**
Sample No.	**B1@7.5'**
Depth (ft)	**7.5**
Sample Type:	Ring

Normal Stress (kip/ft2)	1	3	5
Peak Shear Stress (kip/ft²)	● 0.86	■ 1.97	▲ 3.23
Shear Stress @ End of Test (ksf)	○ 0.80	□ 1.97	△ 3.07
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 (%)	16.4	-6.7	17.6
Initial Dry Density (pcf)	97.4	111.4	102.7
Initial Degree of Saturation (%)	60.5	-35.2	74.2
Soil Height Before Shearing (in.)	1.2	1.2	1.2
Final Moisture Content (%)	26.0	0.0	21.6

Soil Identification:

Brown Clay with Sand (CL)

Strength Parameters

	C (psf)	ϕ (°)
Peak	241	30.7
Ultimate	241	29.6

GEOCON

DIRECT SHEAR TEST RESULTS

Consolidated Drained ASTM D-3080

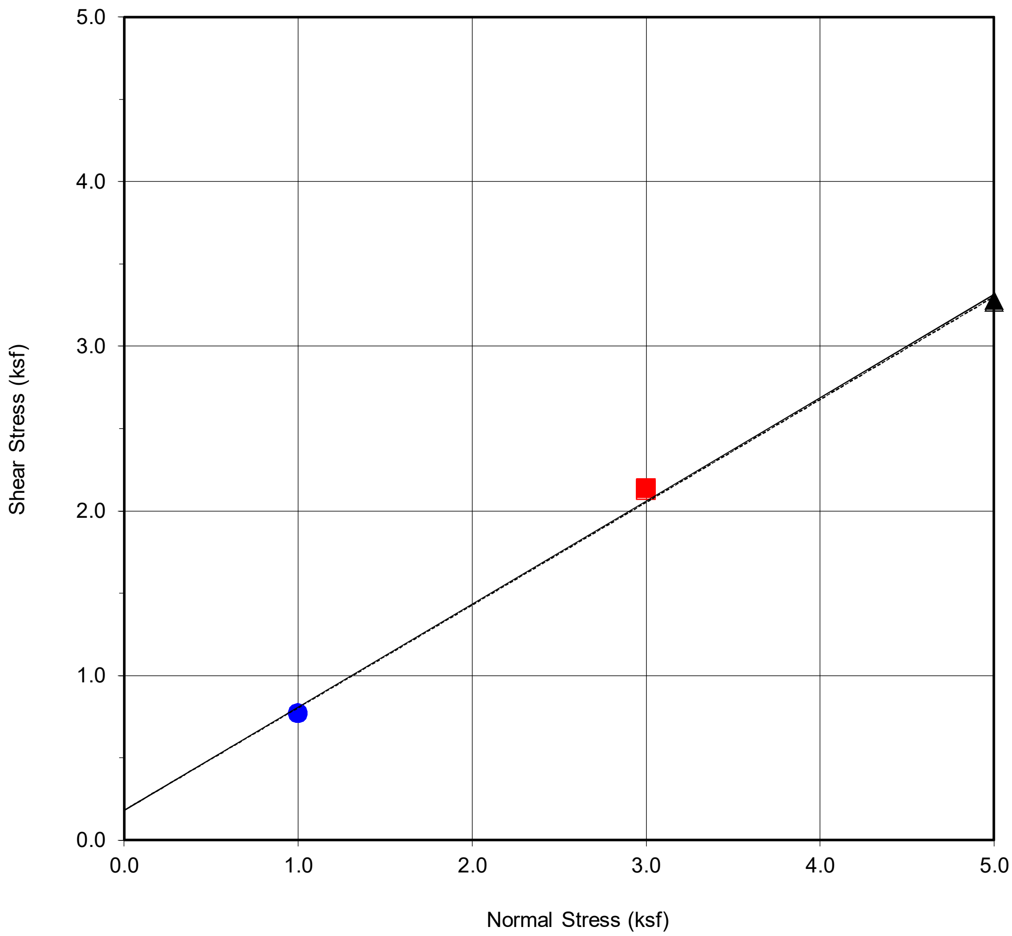
Checked by: PZ

Project No.: W1207-06-01

6728 North Sepulveda Boulevard
6715 North Columbus Avenue
Los Angeles, California

Feb. 2022

Figure B4



Boring No.	**B2**
Sample No.	**B2@7.5'**
Depth (ft)	**7.5**
Sample Type:	Ring

Soil Identification:		
Light Brown Sandy Silt (ML)		
Strength Parameters		
	C (psf)	ϕ (°)
Peak	180	32.1
Ultimate	181	32.0

Normal Stress (kip/ft2)	1	3	5
Peak Shear Stress (kip/ft²)	● 0.77	■ 2.14	▲ 3.28
Shear Stress @ End of Test (ksf)	○ 0.77	□ 2.12	△ 3.27
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 (%)	14.3	13.2	16.9
Initial Dry Density (pcf)	86.3	89.5	88.5
Initial Degree of Saturation (%)	40.6	40.3	50.3
Soil Height Before Shearing (in.)	1.2	1.2	1.2
Final Moisture Content (%)	27.5	23.9	22.2

GEOCON

DIRECT SHEAR TEST RESULTS

Consolidated Drained ASTM D-3080

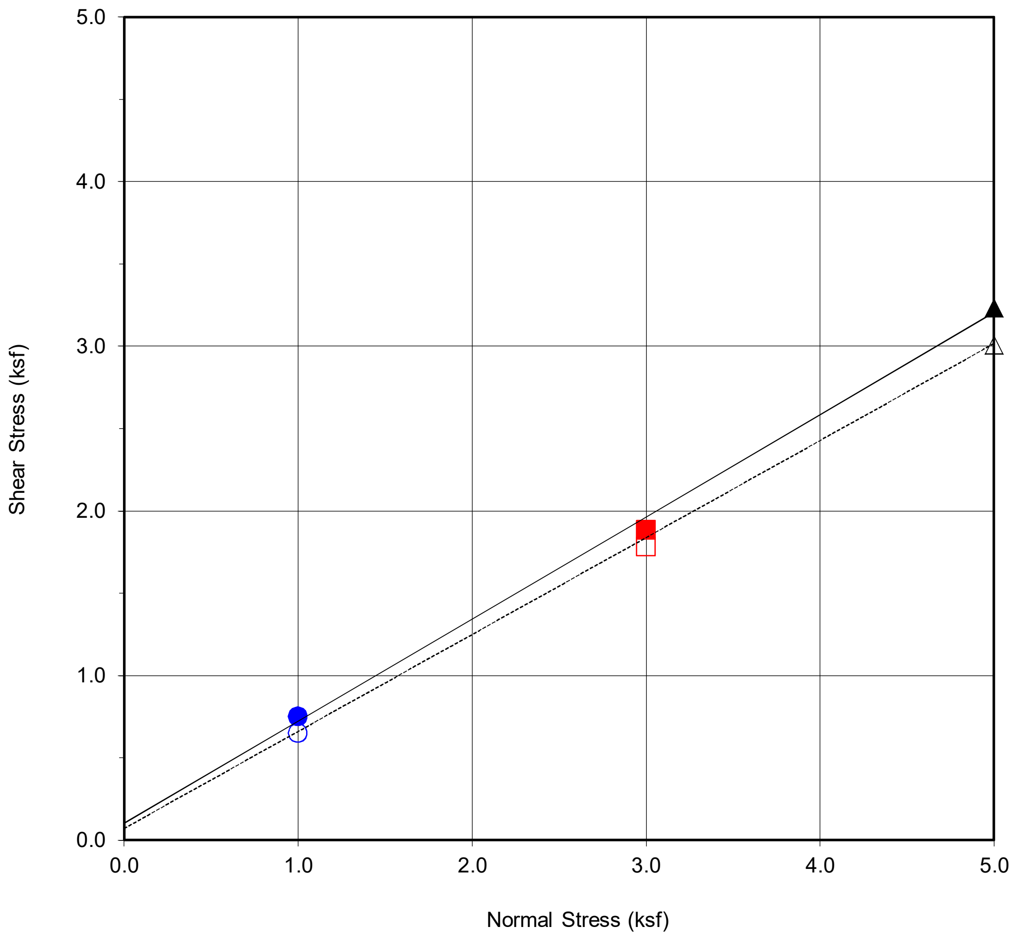
Checked by: PZ

Project No.: W1207-06-01

6728 North Sepulveda Boulevard
6715 North Columbus Avenue
Los Angeles, California

Feb. 2022

Figure B5



Boring No.	B4
Sample No.	**B4@20'**
Depth (ft)	**20**
Sample Type:	Ring

Soil Identification:		
Yellowish Brown Sandy Silt (ML)		
Strength Parameters		
	C (psf)	ϕ (°)
Peak	102	31.8
Ultimate	71	30.5

Normal Stress (kip/ft2)	1	3	5
Peak Shear Stress (kip/ft²)	● 0.75	■ 1.88	▲ 3.23
Shear Stress @ End of Test (ksf)	○ 0.65	□ 1.78	△ 3.01
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 (%)	16.7	15.8	17.1
Initial Dry Density (pcf)	82.0	88.2	93.0
Initial Degree of Saturation (%)	42.8	46.8	56.7
Soil Height Before Shearing (in.)	1.2	1.2	1.2
Final Moisture Content (%)	30.9	25.5	24.9

GEOCON

DIRECT SHEAR TEST RESULTS

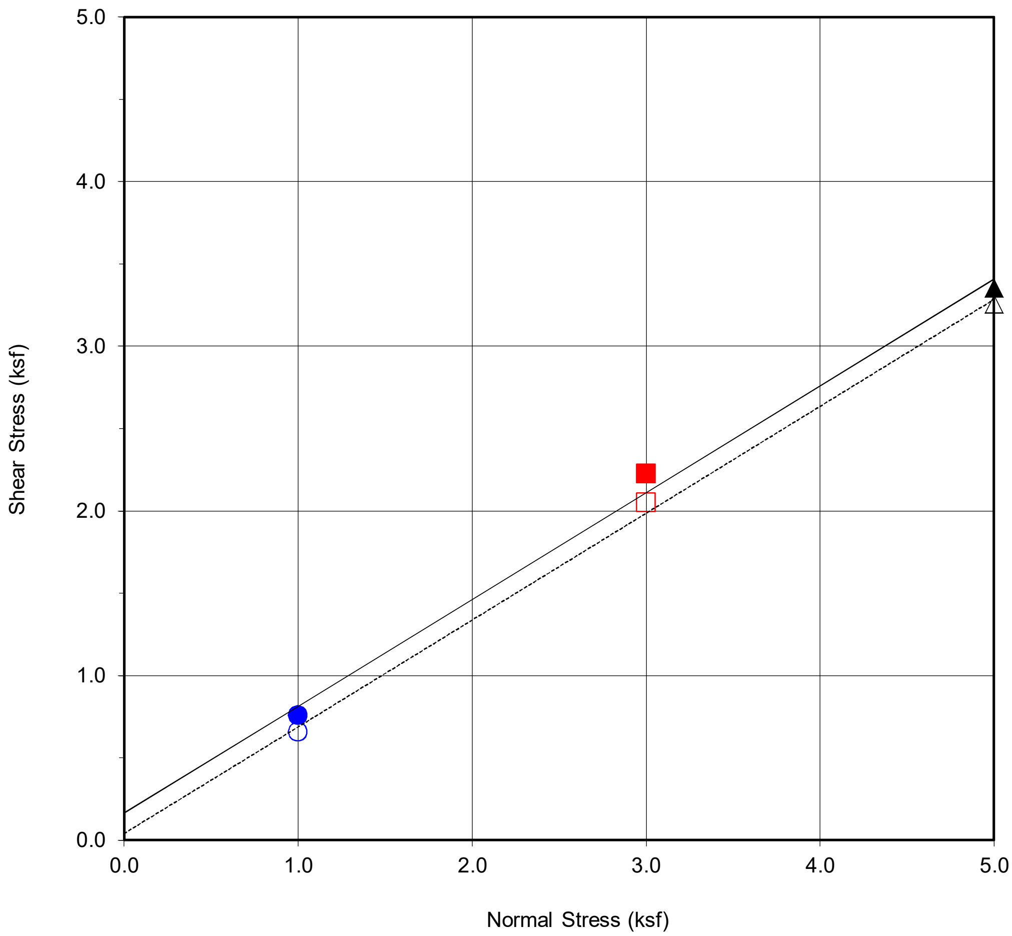
Consolidated Drained ASTM D-3080

Checked by: PZ

Project No.: W1207-06-01

6728 North Sepulveda Boulevard
6715 North Columbus Avenue
Los Angeles, California

Feb. 2022



Boring No.	B6
Sample No.	B6@25'
Depth (ft)	25
Sample Type:	Ring

Normal Stress (kip/ft2)	1	3	5
Peak Shear Stress (kip/ft²)	● 0.76	■ 2.22	▲ 3.35
Shear Stress @ End of Test (ksf)	○ 0.66	□ 2.05	△ 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 (%)	8.5	12.4	12.7
Initial Dry Density (pcf)	96.2	93.4	95.0
Initial Degree of Saturation (%)	30.6	41.7	44.3
Soil Height Before Shearing (in.)	1.2	1.2	1.2
Final Moisture Content (%)	22.3	22.3	22.9

Soil Identification:

Light Brown Sand with Silt (SP-SM)

Strength Parameters

	C (psf)	ϕ (°)
Peak	164	33.0
Ultimate	40	33.0

GEOCON

DIRECT SHEAR TEST RESULTS

Consolidated Drained ASTM D-3080

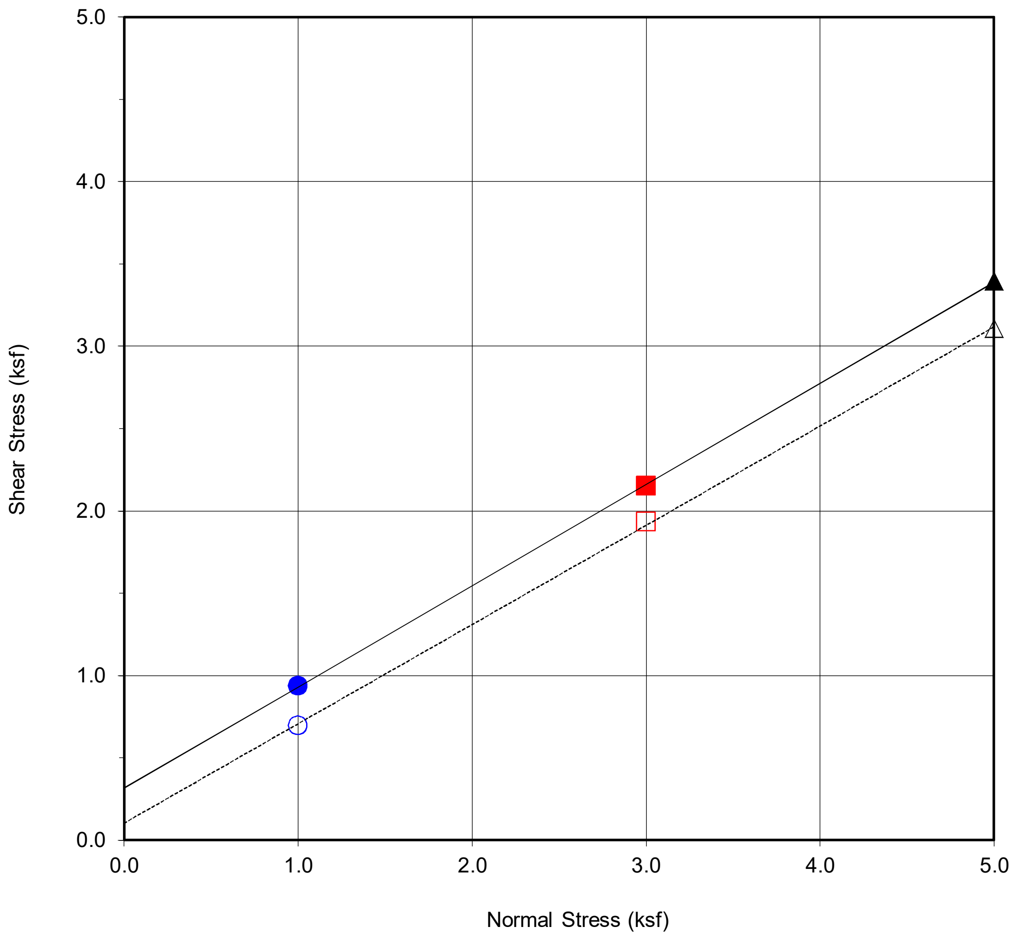
Checked by: PZ

Project No.: W1207-06-01

6728 North Sepulveda Boulevard
6715 North Columbus Avenue
Los Angeles, California

Feb. 2022

Figure B7



Boring No.	**B5**
Sample No.	**B5@30'**
Depth (ft)	**30**
Sample Type:	Ring

Soil Identification:		
Olive Brown Sandy Silt (ML)		
Strength Parameters		
	C (psf)	ϕ (°)
Peak	315	31.6
Ultimate	103	31.1

Normal Stress (kip/ft2)	1	3	5
Peak Shear Stress (kip/ft²)	● 0.94	■ 2.15	▲ 3.40
Shear Stress @ End of Test (ksf)	○ 0.70	□ 1.93	△ 3.11
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 (%)	21.3	20.5	19.5
Initial Dry Density (pcf)	106.5	107.5	110.0
Initial Degree of Saturation (%)	98.8	97.6	99.1
Soil Height Before Shearing (in.)	1.2	1.2	1.2
Final Moisture Content (%)	22.8	20.5	19.3

GEOCON

DIRECT SHEAR TEST RESULTS

Consolidated Drained ASTM D-3080

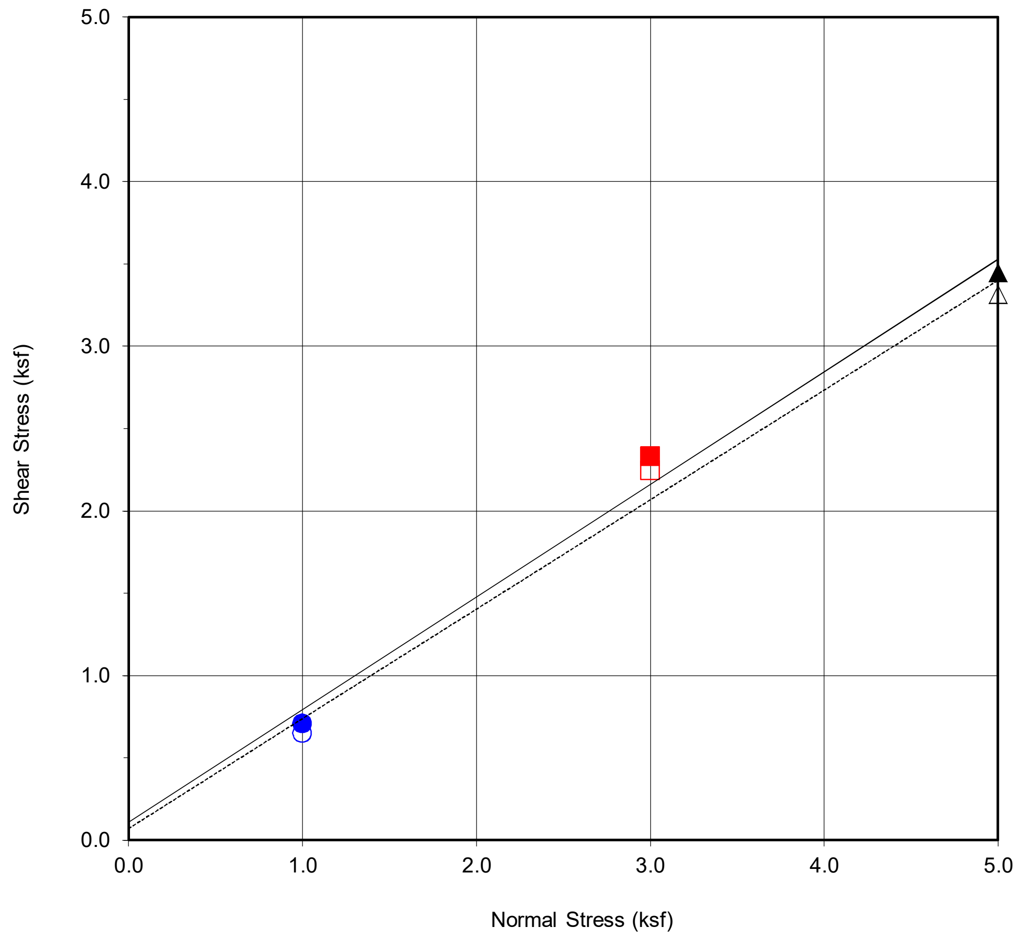
Checked by: PZ

Project No.: W1207-06-01

6728 North Sepulveda Boulevard
6715 North Columbus Avenue
Los Angeles, California

Feb. 2022

Figure B8



Boring No.	B5
Sample No.	B5@35'
Depth (ft)	35
Sample Type:	Ring

Soil Identification:		
Brown Silty Sand (SM)		
Strength Parameters		
	C (psf)	ϕ (°)
Peak	108	34.4
Ultimate	70	33.7

Normal Stress (kip/ft2)	1	3	5
Peak Shear Stress (kip/ft²)	● 0.71	■ 2.33	▲ 3.44
Shear Stress @ End of Test (ksf)	○ 0.65	□ 2.24	△ 3.31
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 (%)	14.5	10.2	12.3
Initial Dry Density (pcf)	84.3	89.2	89.4
Initial Degree of Saturation (%)	39.0	31.0	37.6
Soil Height Before Shearing (in.)	1.2	1.2	1.2
Final Moisture Content (%)	27.3	22.7	24.0

GEOCON

DIRECT SHEAR TEST RESULTS

Consolidated Drained ASTM D-3080

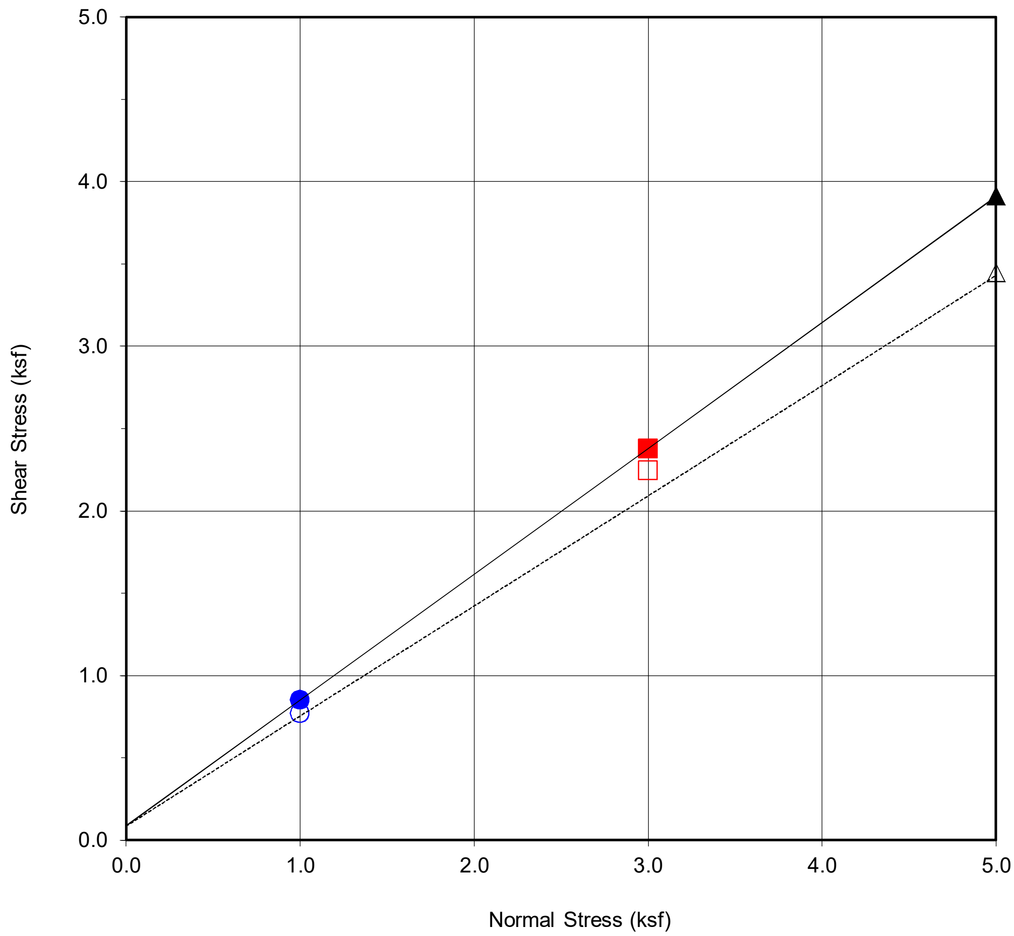
Checked by: PZ

Project No.: W1207-06-01

6728 North Sepulveda Boulevard
6715 North Columbus Avenue
Los Angeles, California

Feb. 2022

Figure B9



Boring No.	B6
Sample No.	B6@40'
Depth (ft)	40
Sample Type:	Ring

Soil Identification:		
Brown Sandy Silt (ML)		
Strength Parameters		
	C (psf)	ϕ (°)
Peak	85	37.4
Ultimate	85	33.8

Normal Stress (kip/ft2)	1	3	5
Peak Shear Stress (kip/ft²)	● 0.85	■ 2.38	▲ 3.91
Shear Stress @ End of Test (ksf)	○ 0.77	□ 2.24	△ 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 (%)	13.9	13.8	14.2
Initial Dry Density (pcf)	104.4	108.8	112.2
Initial Degree of Saturation (%)	61.2	68.1	76.3
Soil Height Before Shearing (in.)	1.2	1.2	1.2
Final Moisture Content (%)	20.3	18.5	17.6

GEOCON

DIRECT SHEAR TEST RESULTS

Consolidated Drained ASTM D-3080

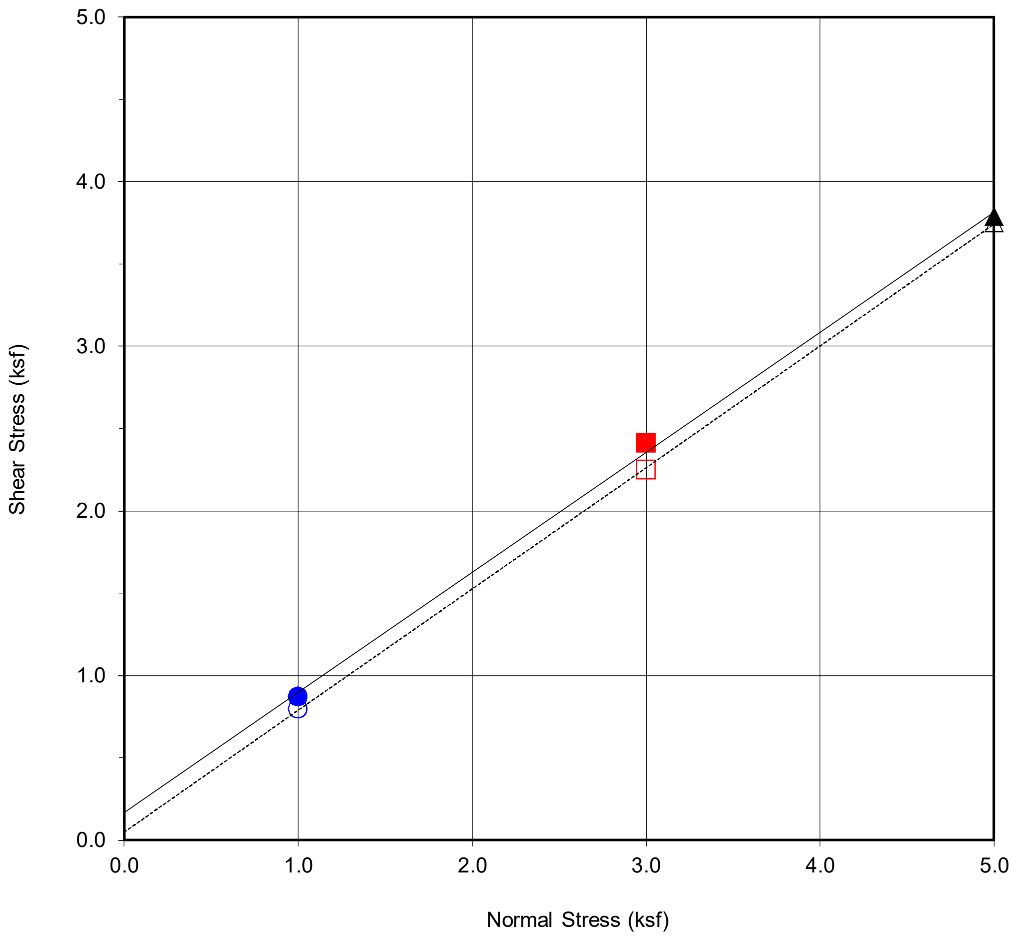
Checked by: PZ

Project No.: W1207-06-01

6728 North Sepulveda Boulevard
6715 North Columbus Avenue
Los Angeles, California

Feb. 2022

Figure B10



Boring No.	B5
Sample No.	B5@45'
Depth (ft)	45
Sample Type:	Ring

Soil Identification:		
Brown Sand (SP)		
Strength Parameters		
	C (psf)	ϕ (°)
Peak	166	36.1
Ultimate	48	36.5

Normal Stress (kip/ft2)	1	3	5
Peak Shear Stress (kip/ft²)	● 0.87	■ 2.41	▲ 3.79
Shear Stress @ End of Test (ksf)	○ 0.80	□ 2.25	△ 3.75
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 (%)	10.3	10.8	12.0
Initial Dry Density (pcf)	119.9	116.3	115.8
Initial Degree of Saturation (%)	68.2	65.0	70.8
Soil Height Before Shearing (in.)	1.2	1.2	1.2
Final Moisture Content (%)	14.8	14.4	14.4

GEOCON

DIRECT SHEAR TEST RESULTS

Consolidated Drained ASTM D-3080

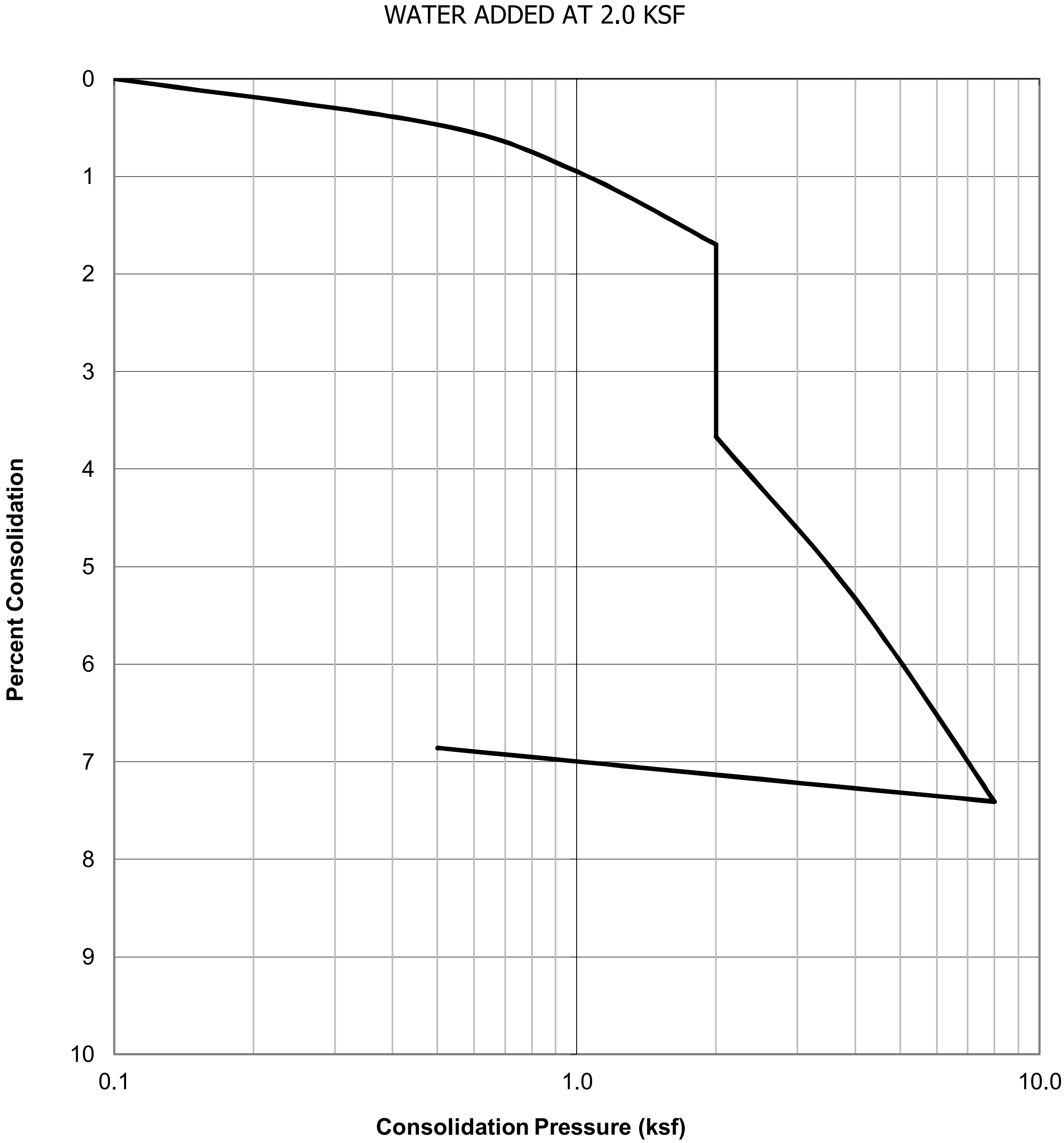
Checked by: PZ

Project No.: W1207-06-01

6728 North Sepulveda Boulevard
6715 North Columbus Avenue
Los Angeles, California

Feb. 2022

Figure B11



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B1@7.5	Brown Clay with Sand (CL)	84.3	14.9	24.2

GEOCON

CONSOLIDATION TEST RESULTS

ASTM D-2435

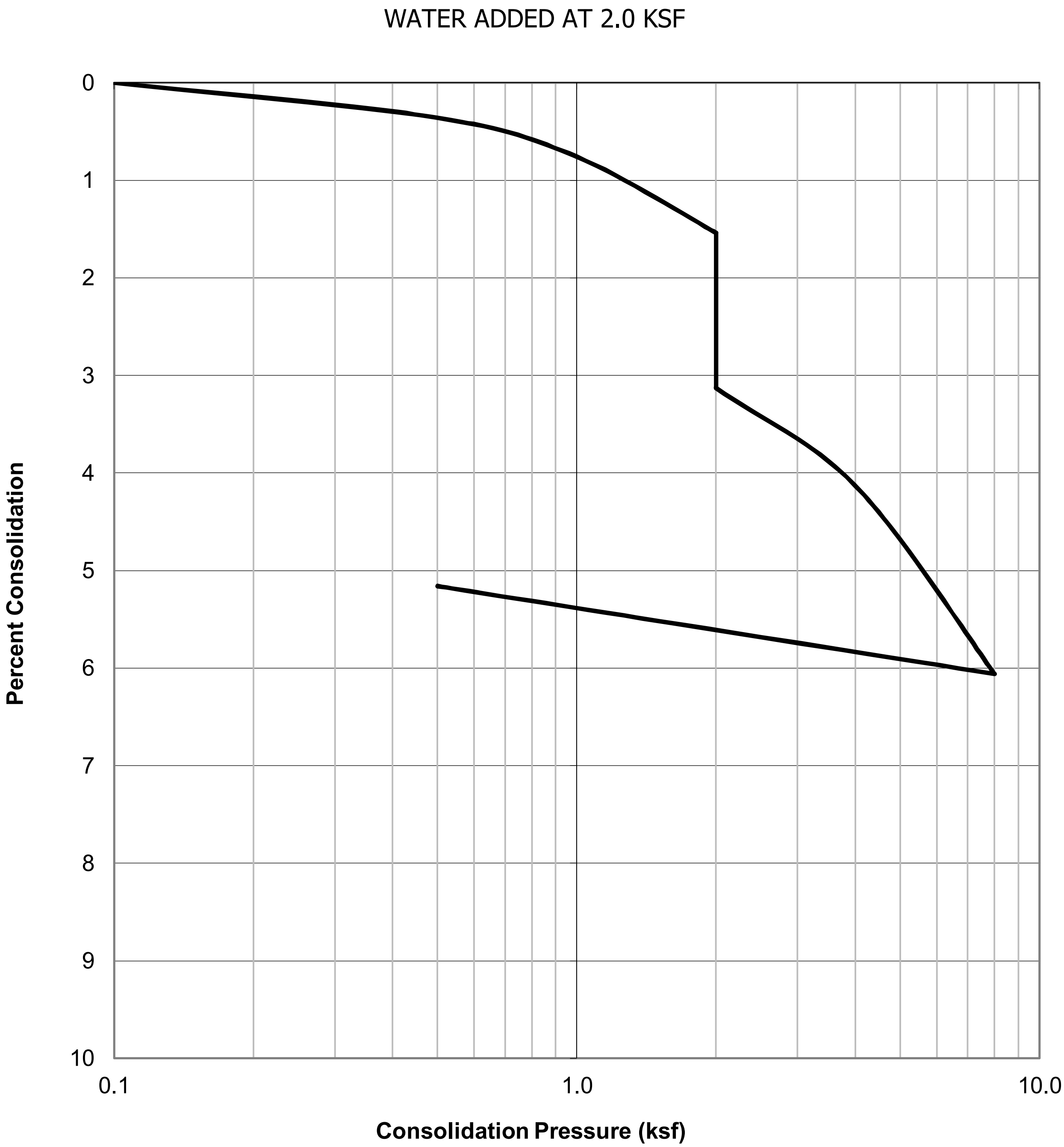
Checked by: PZ

Project No.: W1207-06-01

6728 North Sepulveda Boulevard
6715 North Columbus Avenue
Los Angeles, California

Feb. 2022

Figure B12



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B1@12.5	Brown Clay with Sand (CL)	79.0	13.1	26.9

GEOCON

CONSOLIDATION TEST RESULTS

ASTM D-2435

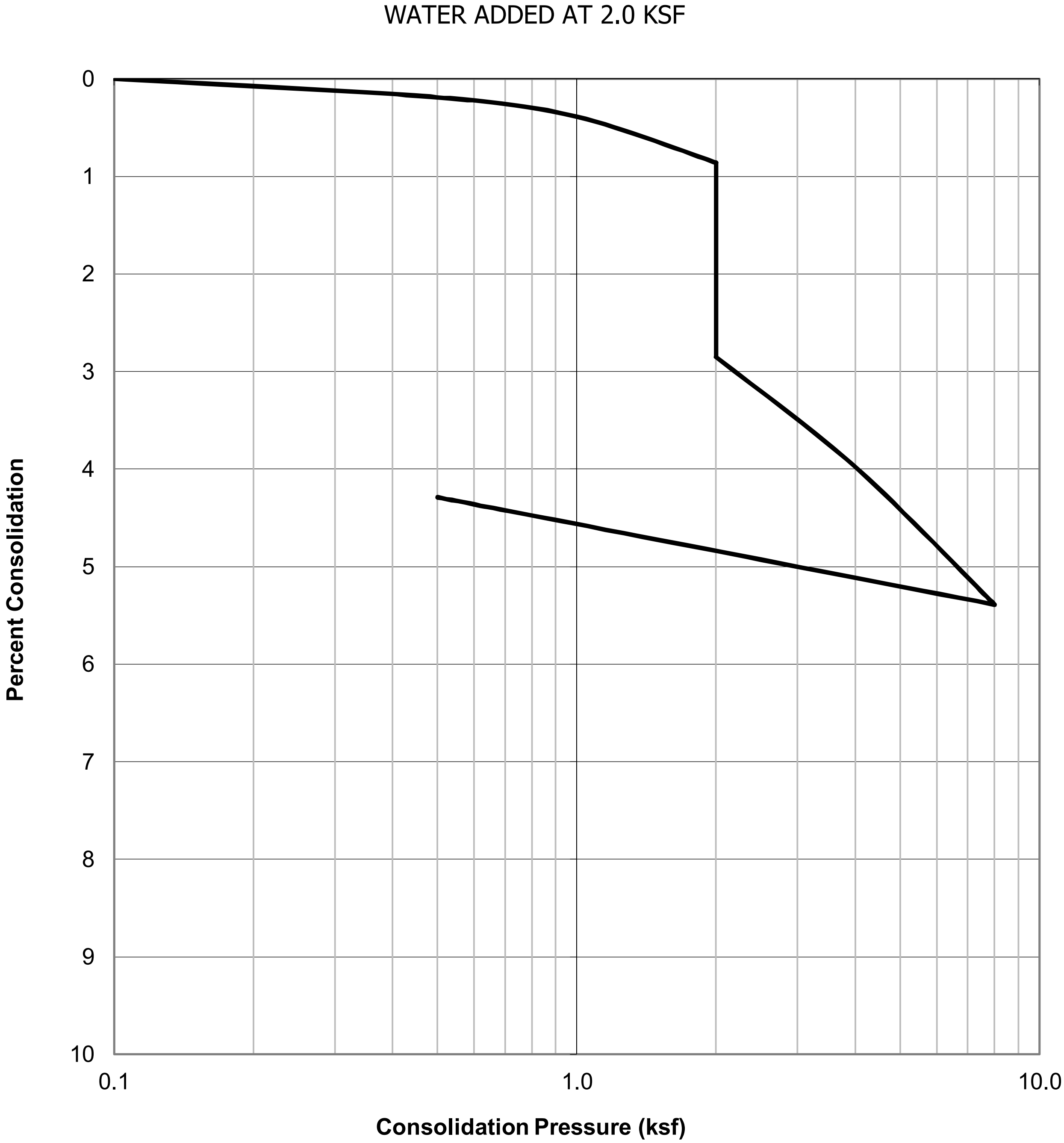
Checked by: PZ

Project No.: W1207-06-01

6728 North Sepulveda Boulevard
6715 North Columbus Avenue
Los Angeles, California

Feb. 2022

Figure B13



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B1@17.5	Light Brown Sandy Silt (ML)	92.6	8.4	21.3

GEOCON

CONSOLIDATION TEST RESULTS

ASTM D-2435

Checked by: PZ

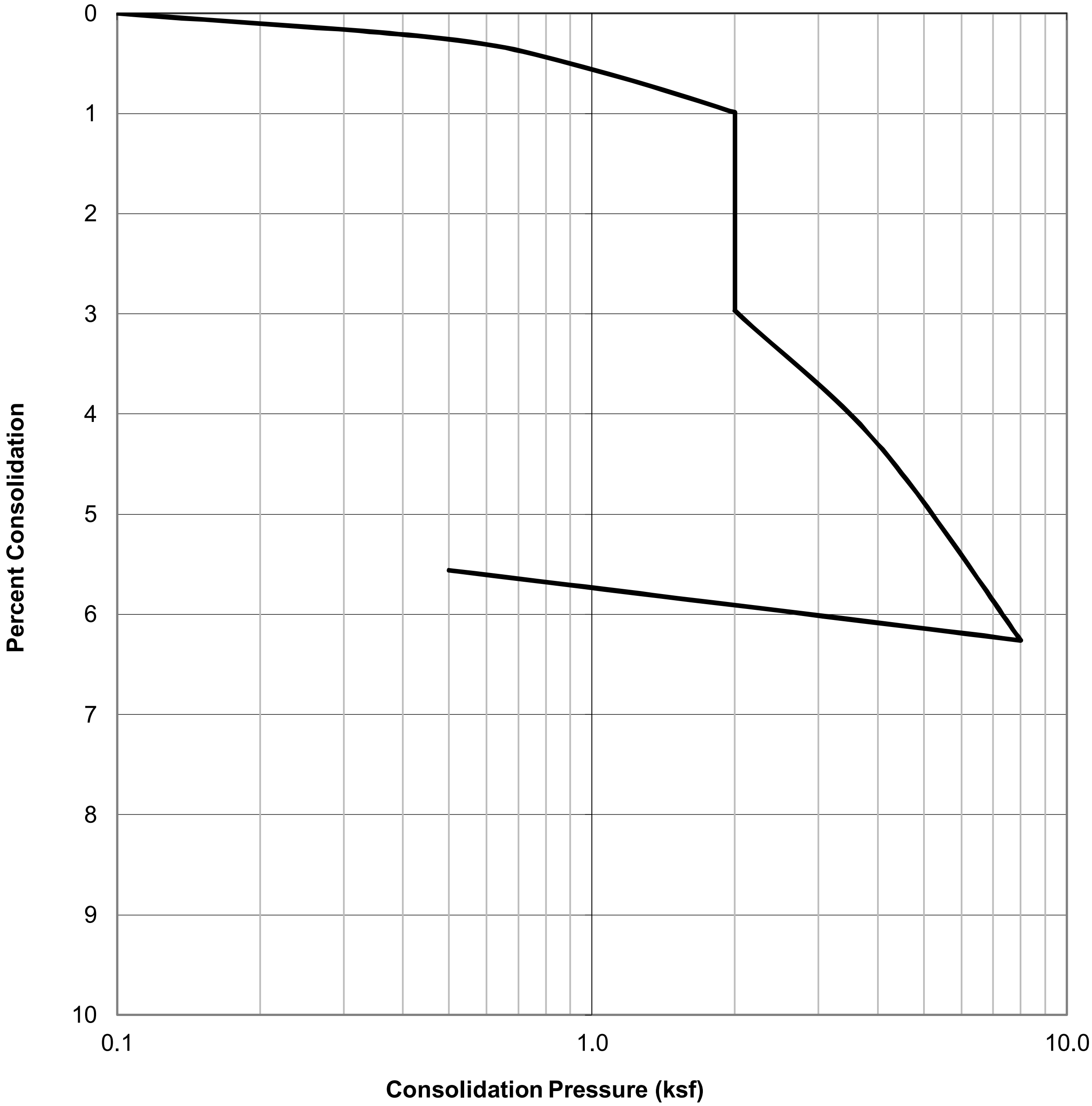
Project No.: W1207-06-01

6728 North Sepulveda Boulevard
6715 North Columbus Avenue
Los Angeles, California

Feb. 2022

Figure B14

WATER ADDED AT 2.0 KSF



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B2@17.5	Light Brown Silt with Sand (ML)	96.6	7.9	21.1

GEOCON

CONSOLIDATION TEST RESULTS

ASTM D-2435

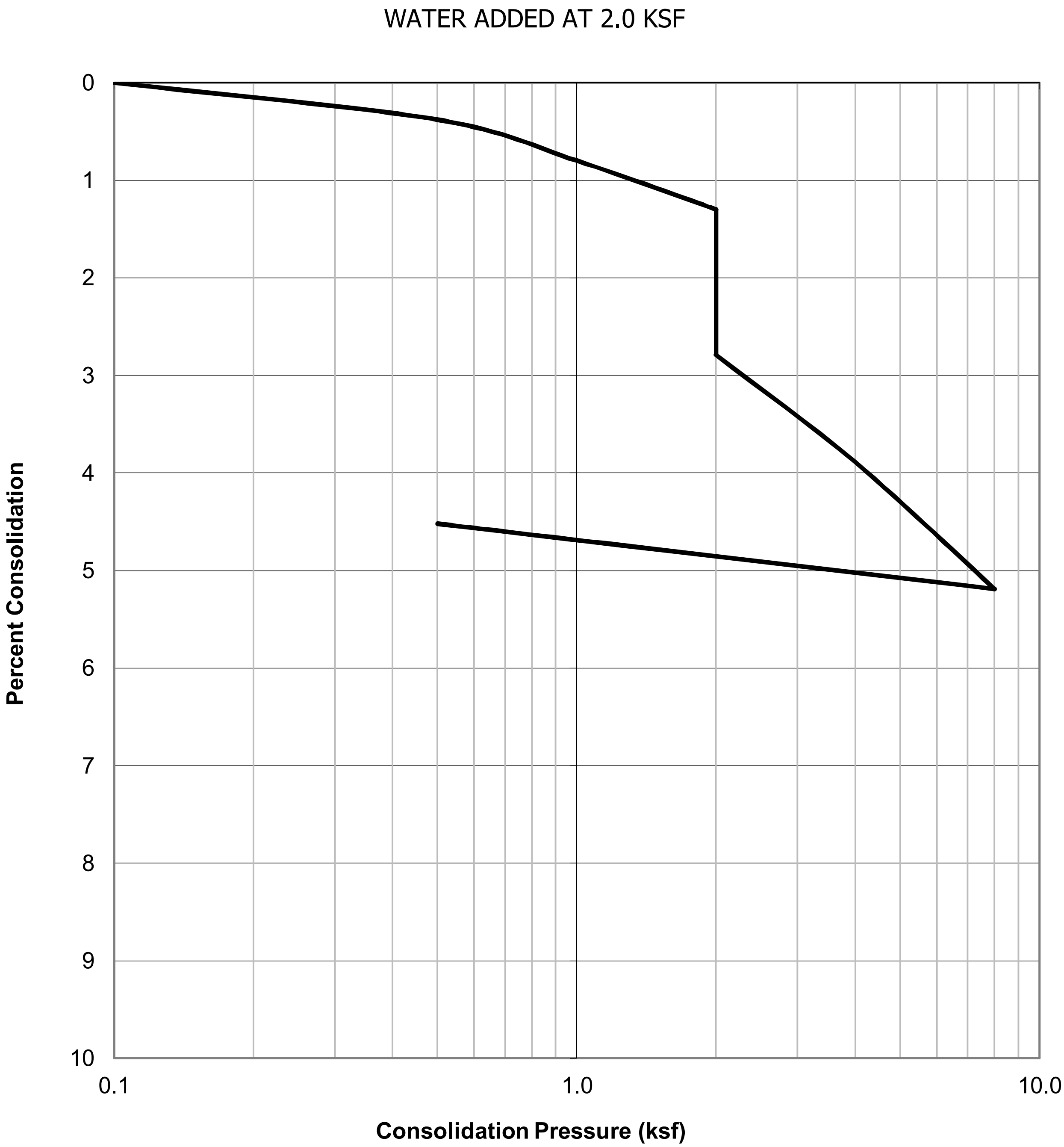
Checked by: PZ

Project No.: W1207-06-01

6728 North Sepulveda Boulevard
6715 North Columbus Avenue
Los Angeles, California

Feb. 2022

Figure B15



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B1@22.5	Light Yellowish Brown Silty Sand (SM)	94.2	5.4	23.2

GEOCON

CONSOLIDATION TEST RESULTS

ASTM D-2435

Checked by: PZ

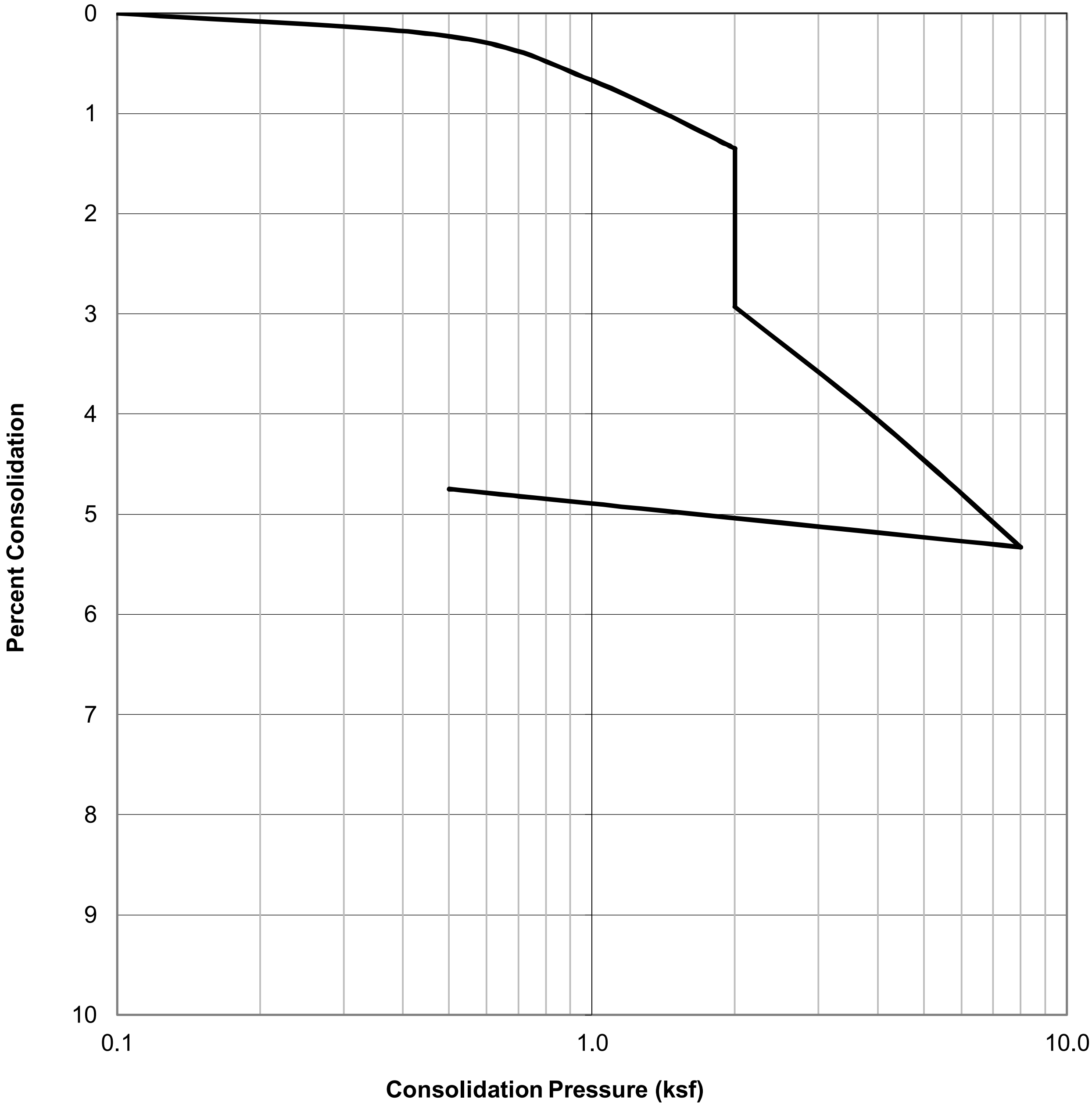
Project No.: W1207-06-01

6728 North Sepulveda Boulevard
6715 North Columbus Avenue
Los Angeles, California

Feb. 2022

Figure B16

WATER ADDED AT 2.0 KSF



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B2@22.5	Light Yellowish Brown Silty Sand (SM)	97.0	5.0	21.0

GEOCON

CONSOLIDATION TEST RESULTS

ASTM D-2435

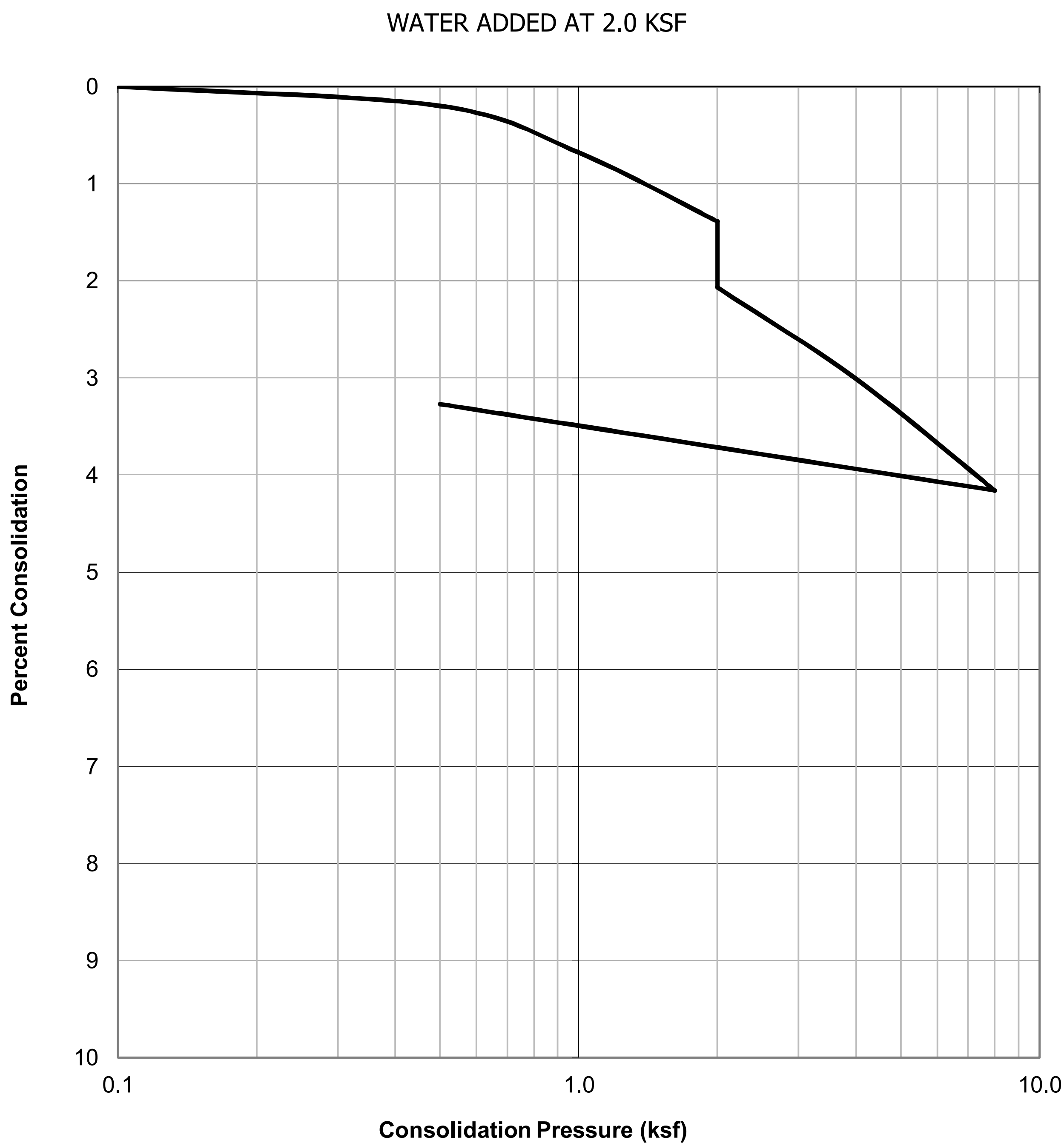
Checked by: PZ

Project No.: W1207-06-01

6728 North Sepulveda Boulevard
6715 North Columbus Avenue
Los Angeles, California

Feb. 2022

Figure B17



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B1@27.5	Light Yellowish Brown Silty Sand (SM)	91.2	13.6	27.4

GEOCON

CONSOLIDATION TEST RESULTS

ASTM D-2435

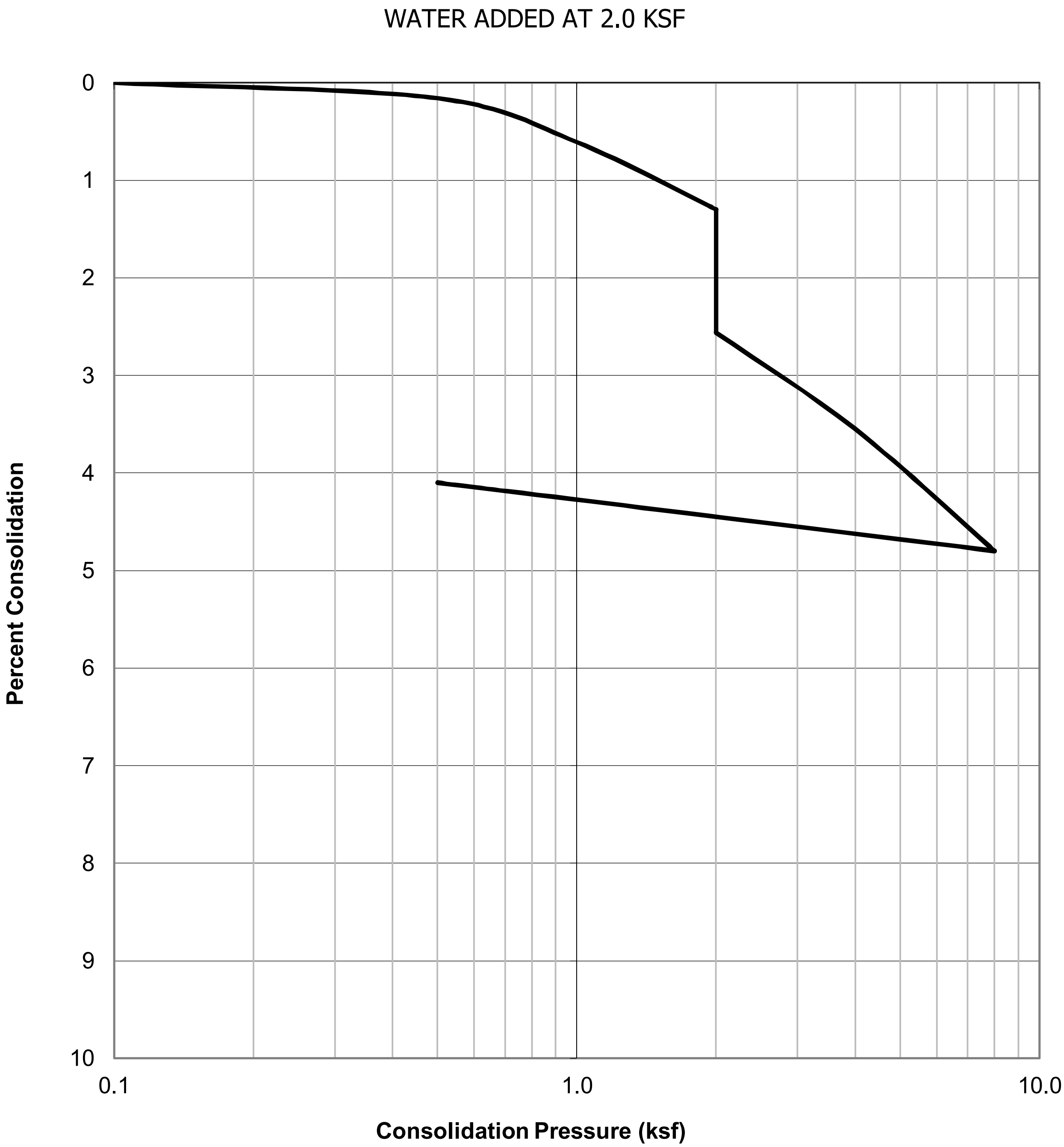
Checked by: PZ

Project No.: W1207-06-01

6728 North Sepulveda Boulevard
6715 North Columbus Avenue
Los Angeles, California

Feb. 2022

Figure B18



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B2@27.5	Light Yellowish Brown Silty Sand (SM)	88.8	5.7	26.4

GEOCON

CONSOLIDATION TEST RESULTS

ASTM D-2435

Checked by: PZ

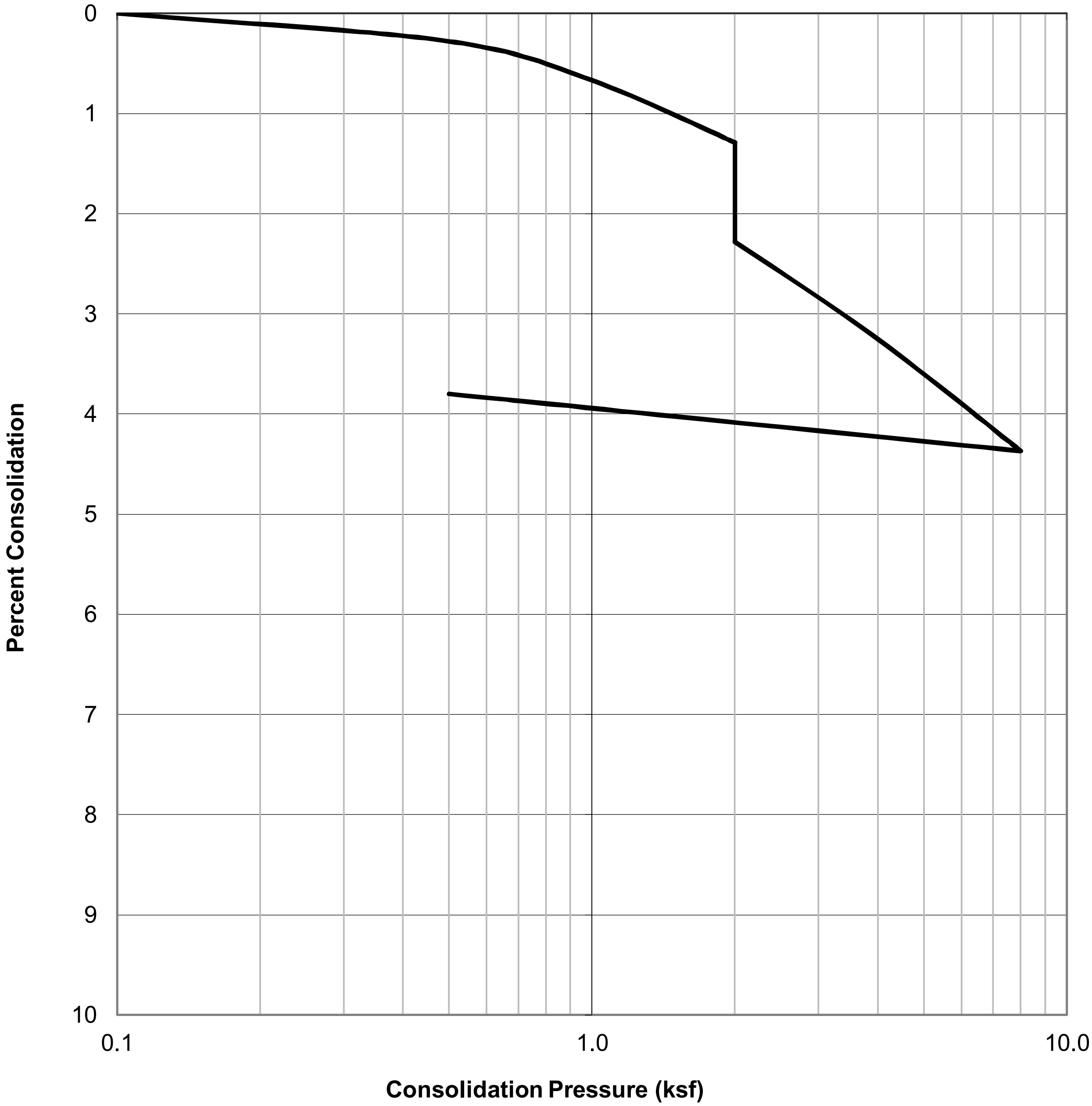
Project No.: W1207-06-01

6728 North Sepulveda Boulevard
6715 North Columbus Avenue
Los Angeles, California

Feb. 2022

Figure B19

WATER ADDED AT 2.0 KSF



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B2@32.5	Light Yellowish Brown Silty Sand (SM)	89.8	6.7	26.0

GEOCON

CONSOLIDATION TEST RESULTS

ASTM D-2435

Checked by: PZ

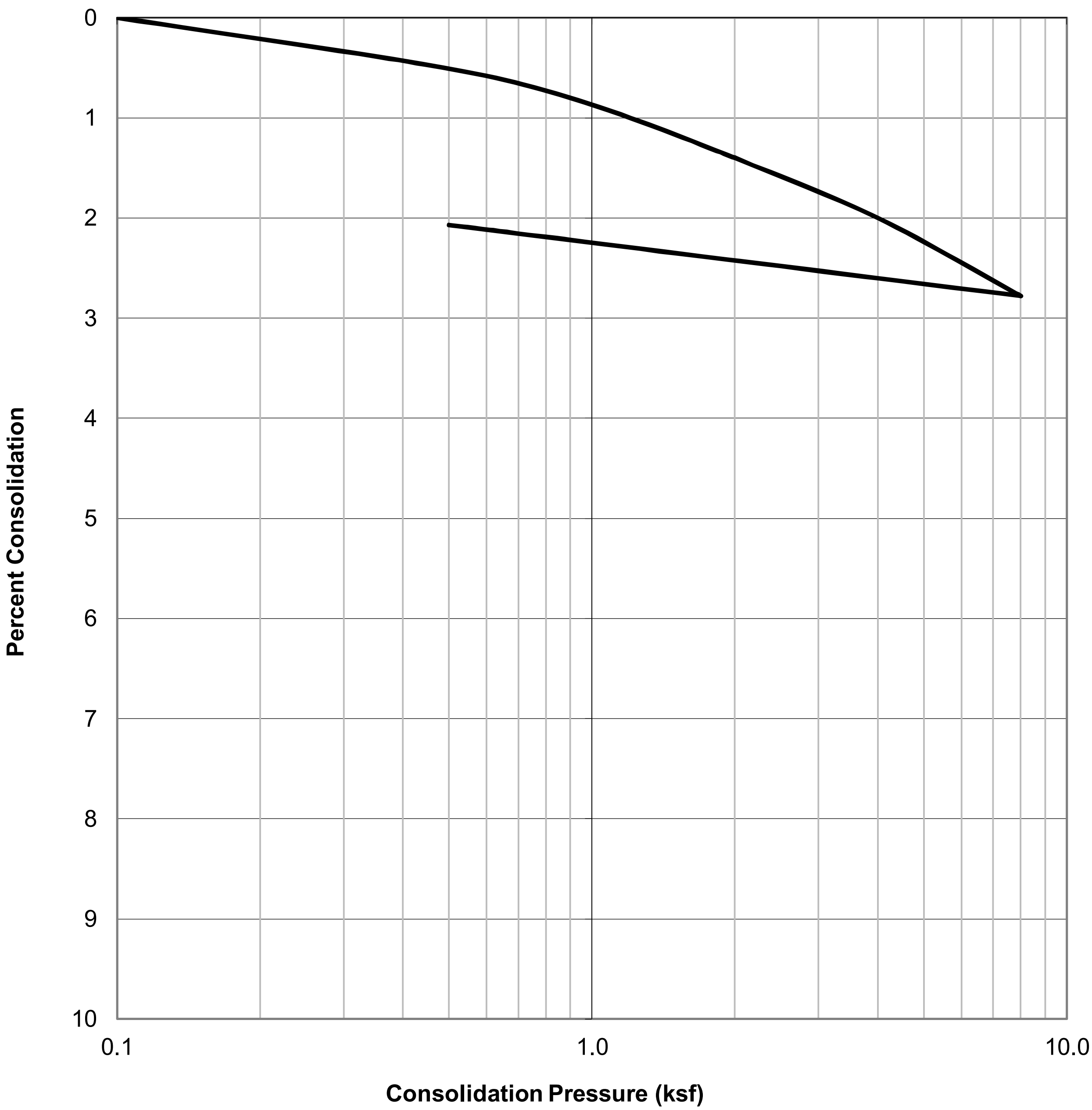
Project No.: W1207-06-01

6728 North Sepulveda Boulevard
6715 North Columbus Avenue
Los Angeles, California

Feb. 2022

Figure B20

WATER ADDED AT 2.0 KSF



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B4@35	Brown Sandy Silt (ML)	122.1	14.6	14.8

GEOCON

CONSOLIDATION TEST RESULTS

ASTM D-2435

Checked by: PZ

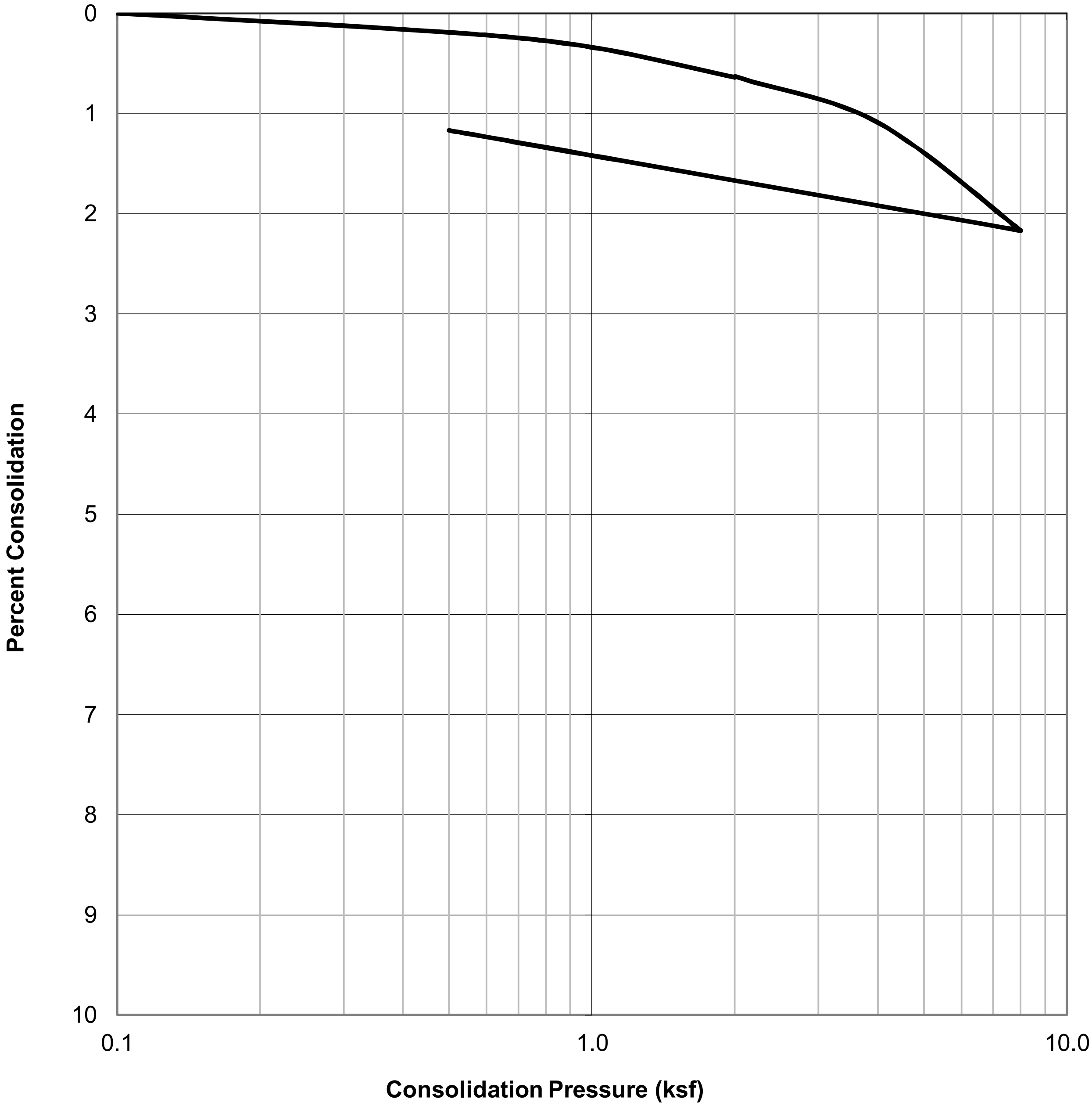
Project No.: W1207-06-01

6728 North Sepulveda Boulevard
6715 North Columbus Avenue
Los Angeles, California

Feb. 2022

Figure B21

WATER ADDED AT 2.0 KSF



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B4@40	Brown Sandy Silt (ML)	110.5	17.2	19.5

GEOCON

CONSOLIDATION TEST RESULTS

ASTM D-2435

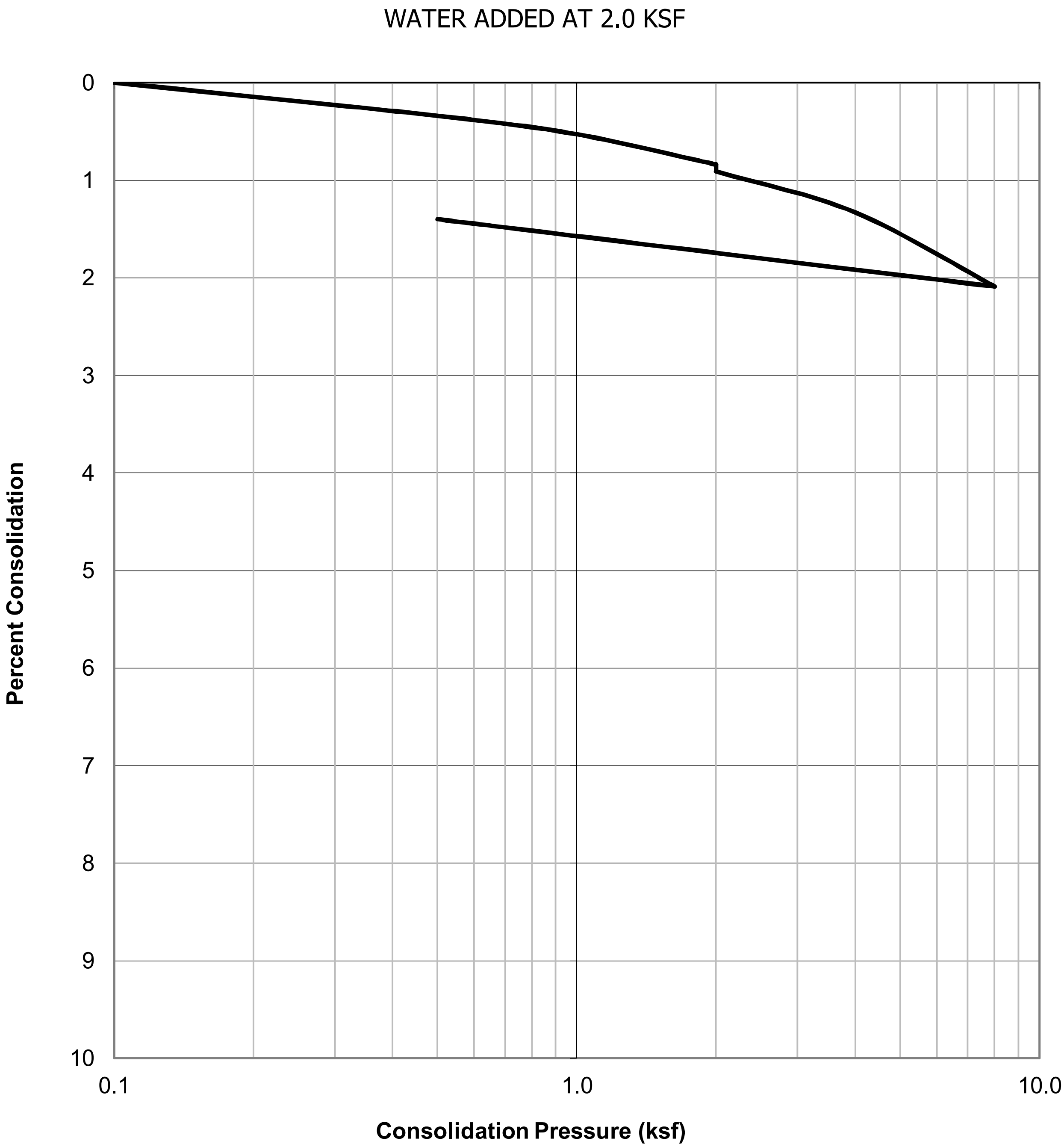
Checked by: PZ

Project No.: W1207-06-01

6728 North Sepulveda Boulevard
6715 North Columbus Avenue
Los Angeles, California

Feb. 2022

Figure B22



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B5@40	Brown Sand (SP)	121.2	13.8	15.2

GEOCON

CONSOLIDATION TEST RESULTS

ASTM D-2435

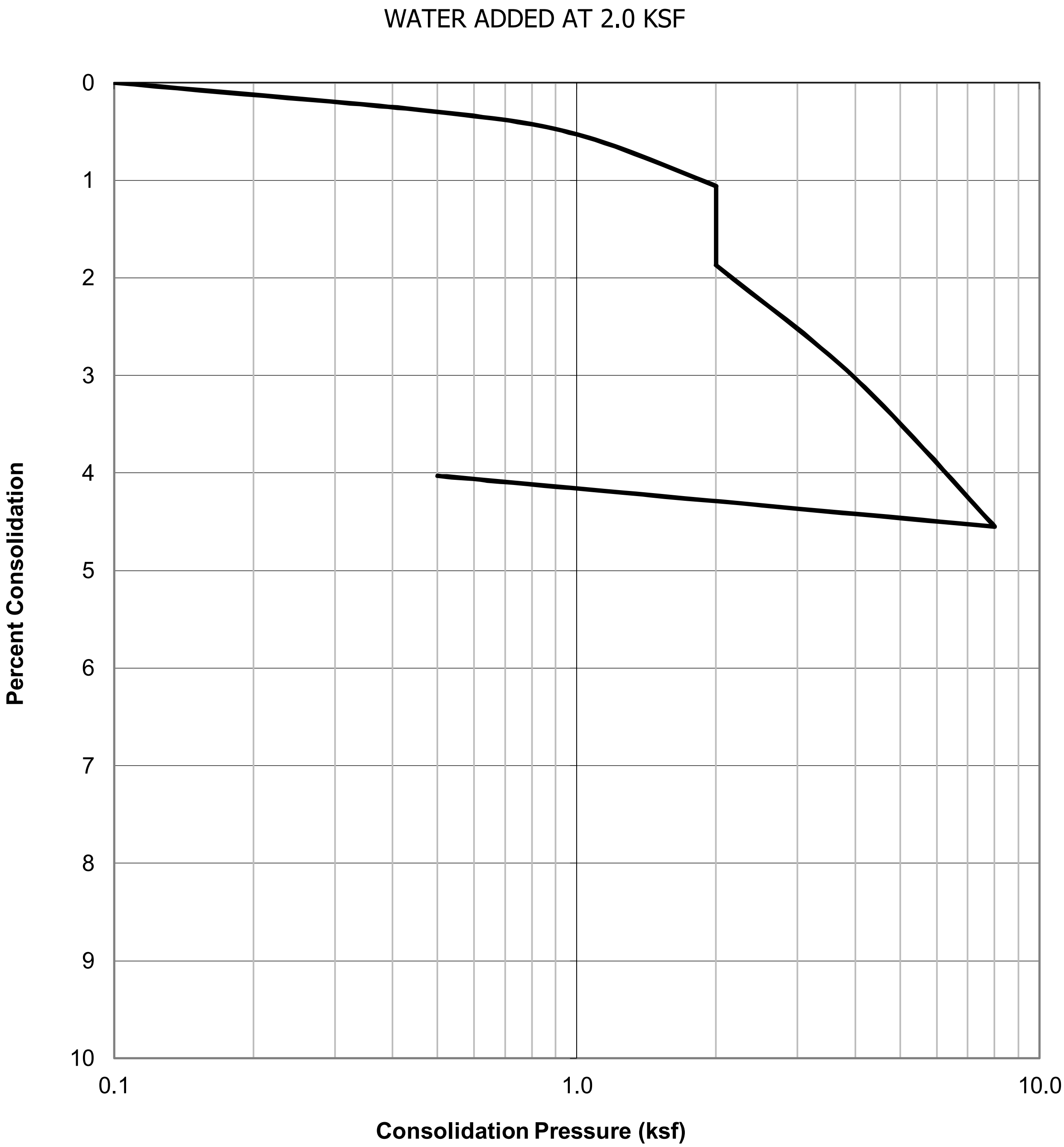
Checked by: PZ

Project No.: W1207-06-01

6728 North Sepulveda Boulevard
6715 North Columbus Avenue
Los Angeles, California

Feb. 2022

Figure B23



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B5@45	Brown Sand (SP)	119.4	9.5	13.4

GEOCON

CONSOLIDATION TEST RESULTS

ASTM D-2435

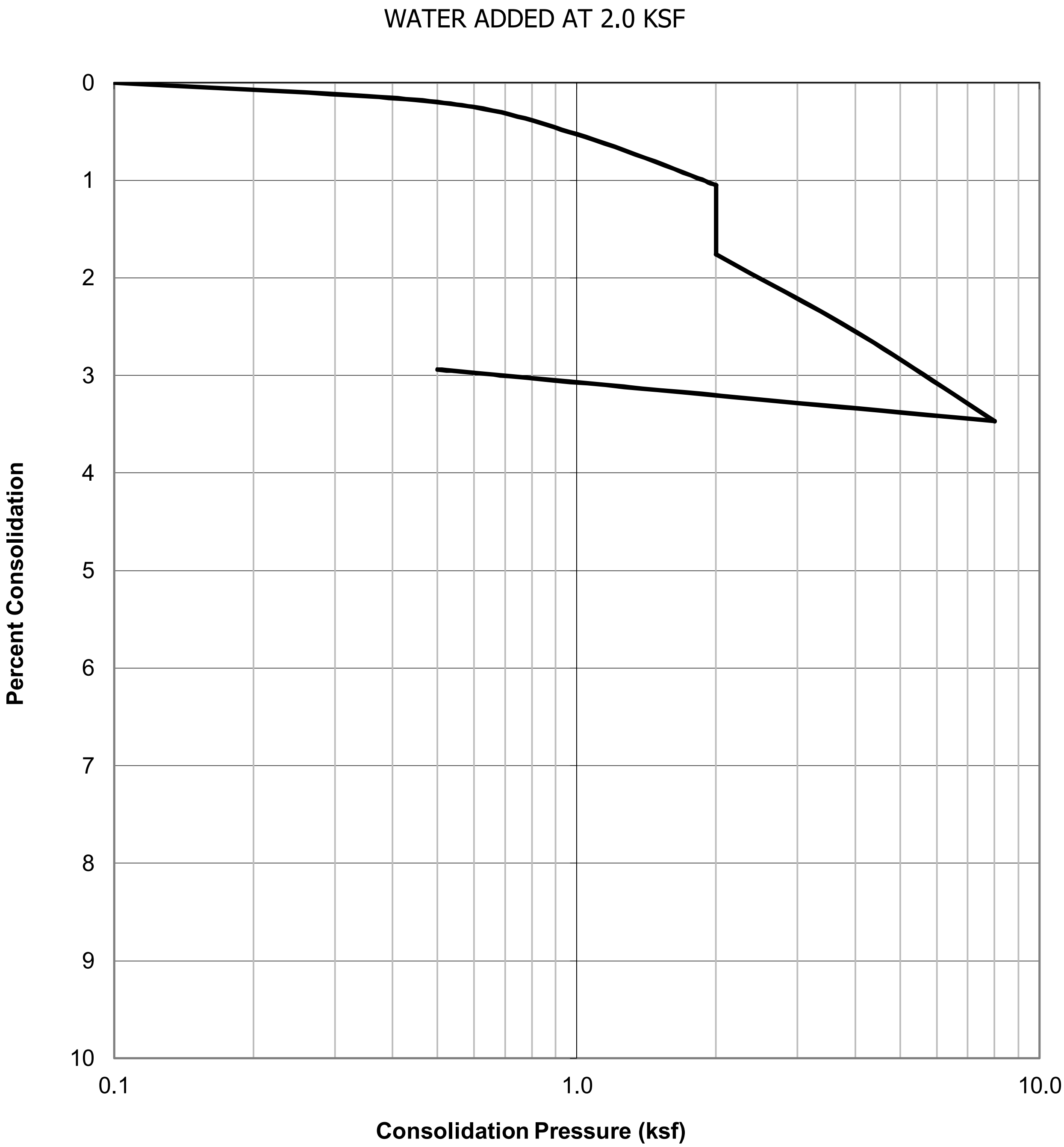
Checked by: PZ

Project No.: W1207-06-01

6728 North Sepulveda Boulevard
6715 North Columbus Avenue
Los Angeles, California

Feb. 2022

Figure B24



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B5@50	Brown Sand (SP)	112.8	8.8	17.1

GEOCON

CONSOLIDATION TEST RESULTS

ASTM D-2435

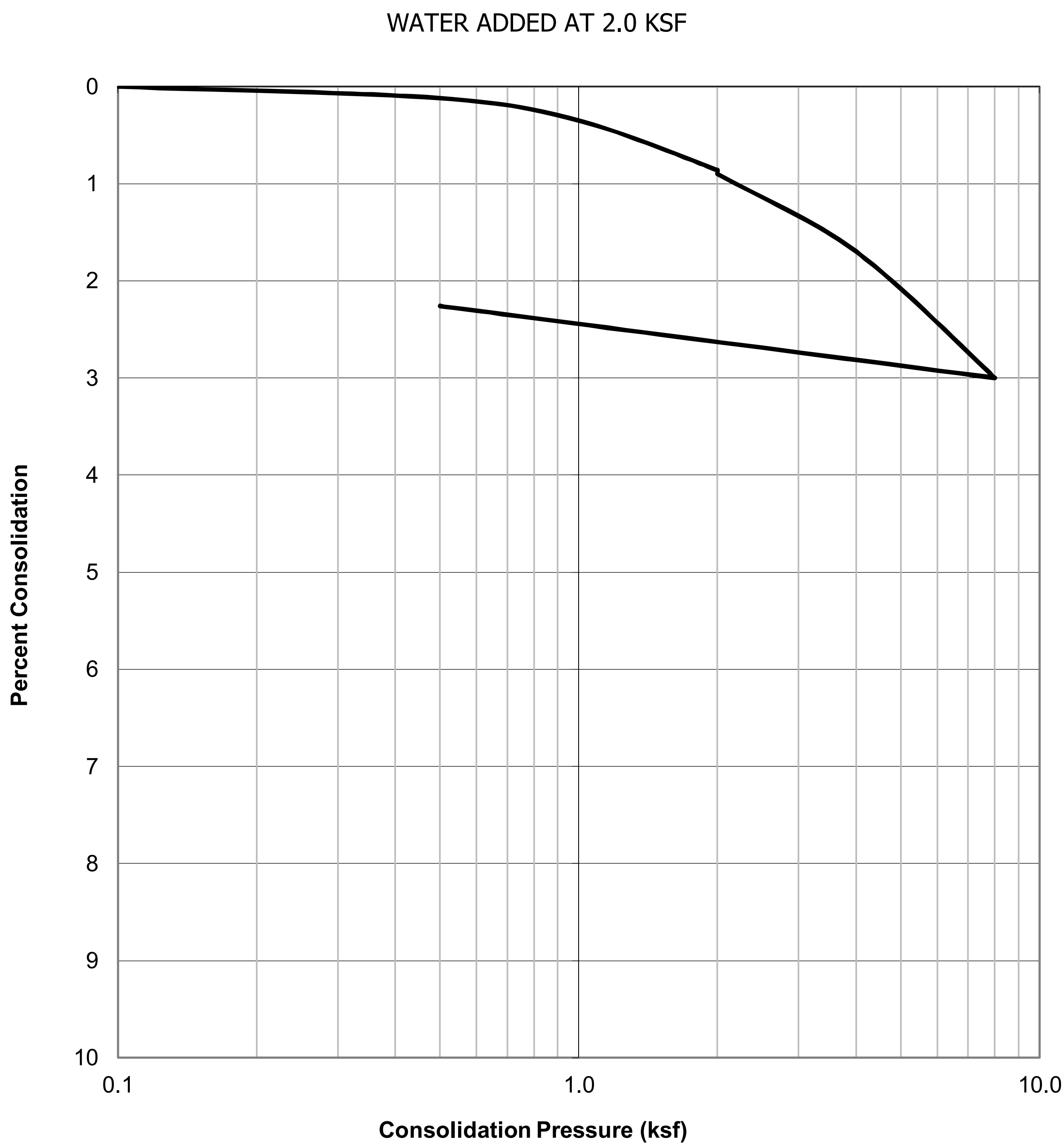
Checked by: PZ

Project No.: W1207-06-01

6728 North Sepulveda Boulevard
6715 North Columbus Avenue
Los Angeles, California

Feb. 2022

Figure B25



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B5@60	Olive Brown Sand (SP)	102.8	9.7	21.9

GEOCON

CONSOLIDATION TEST RESULTS

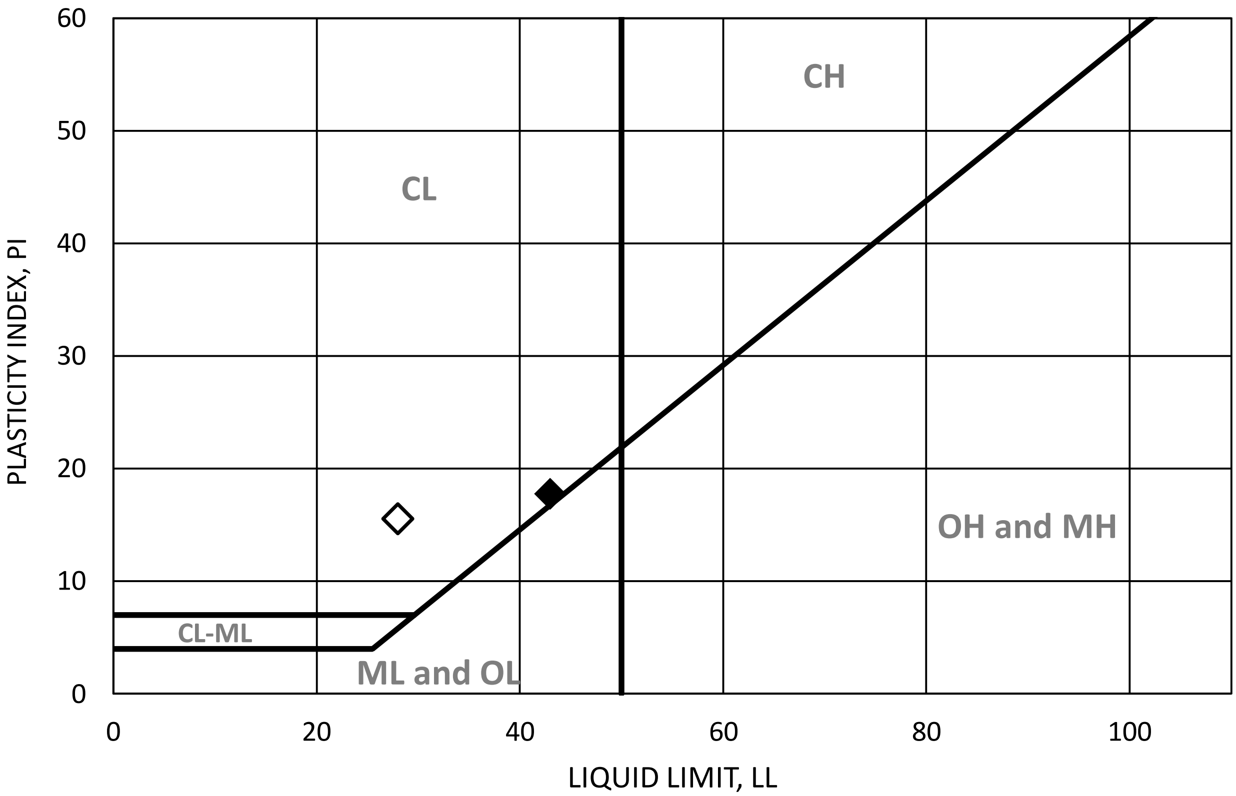
ASTM D-2435

Checked by: PZ

Project No.: W1207-06-01

6728 North Sepulveda Boulevard
6715 North Columbus Avenue
Los Angeles, California

Feb. 2022



SYMBOL	BORING	DEPTH (ft)	LL	PL	PI	MOISTURE CONTENT AT SATURATION	SOIL BEHAVIOR
■	B1	5	N/P	N/P	N/P	--	N/P
◆	B1	10	43	25	18	--	CL
▲	B1	15	N/P	N/P	N/P	--	N/P
●	B1	20	N/P	N/P	N/P	--	N/P
□	B1	25	N/P	N/P	N/P	--	N/P
◇	B1	30	28	12	16	--	CL
△	B1	35	N/P	N/P	N/P	--	N/P
○	B1	40	N/P	N/P	N/P	--	N/P

N/P = Non-Plastic

GEOCON

ATTERBERG LIMITS

ASTM D-4318

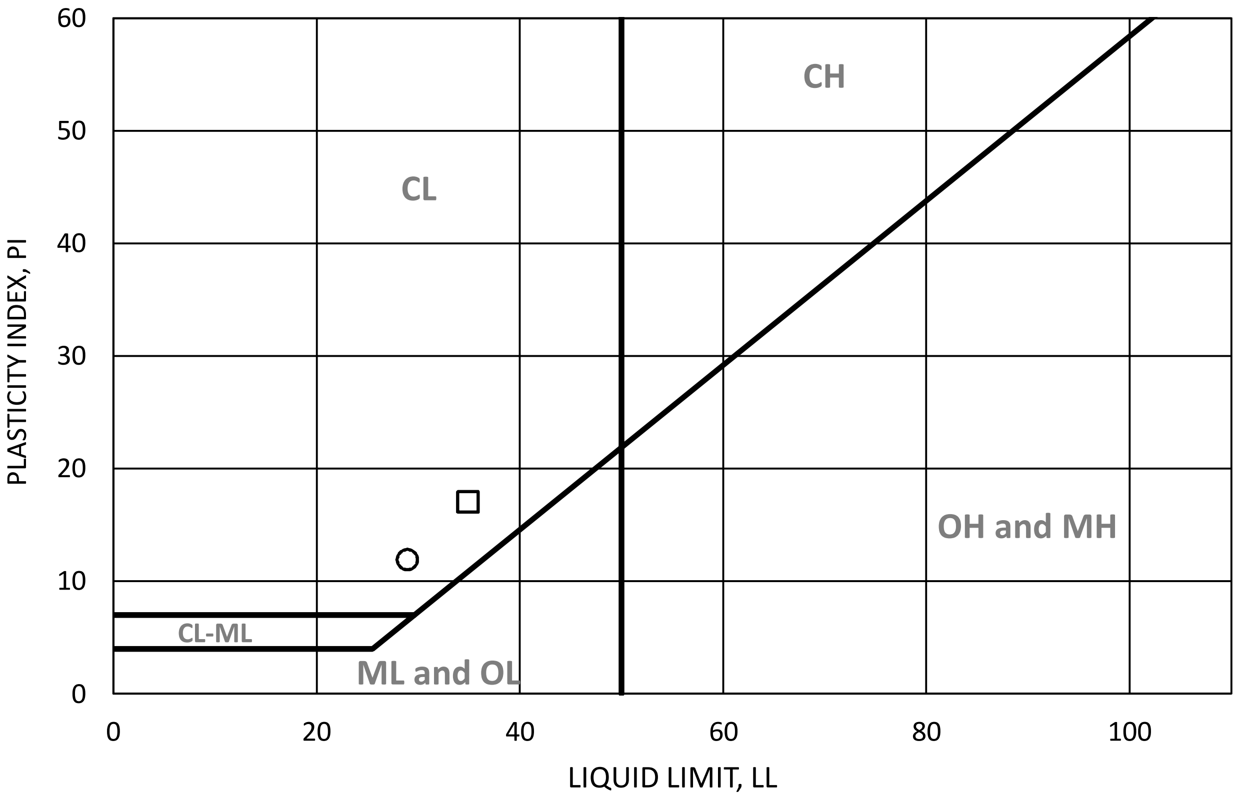
Checked by: PZ

Project No.: W1207-06-01

6728 North Sepulveda Boulevard
6715 North Columbus Avenue
Los Angeles, California

Feb. 2022

Figure B27



SYMBOL	BORING	DEPTH (ft)	LL	PL	PI	MOISTURE CONTENT AT SATURATION	SOIL BEHAVIOR
■	B1	45	N/P	N/P	N/P	--	N/P
◆	B1	50	N/P	N/P	N/P	--	N/P
▲	B2	5	N/P	N/P	N/P	--	N/P
●	B2	10	N/P	N/P	N/P	--	N/P
□	B2	15	35	18	17	--	CL
◇	B2	20	N/P	N/P	N/P	--	N/P
△	B2	25	N/P	N/P	N/P	--	N/P
○	B2	35	29	17	12	--	CL

N/P = Non-Plastic

GEOCON

ATTERBERG LIMITS

ASTM D-4318

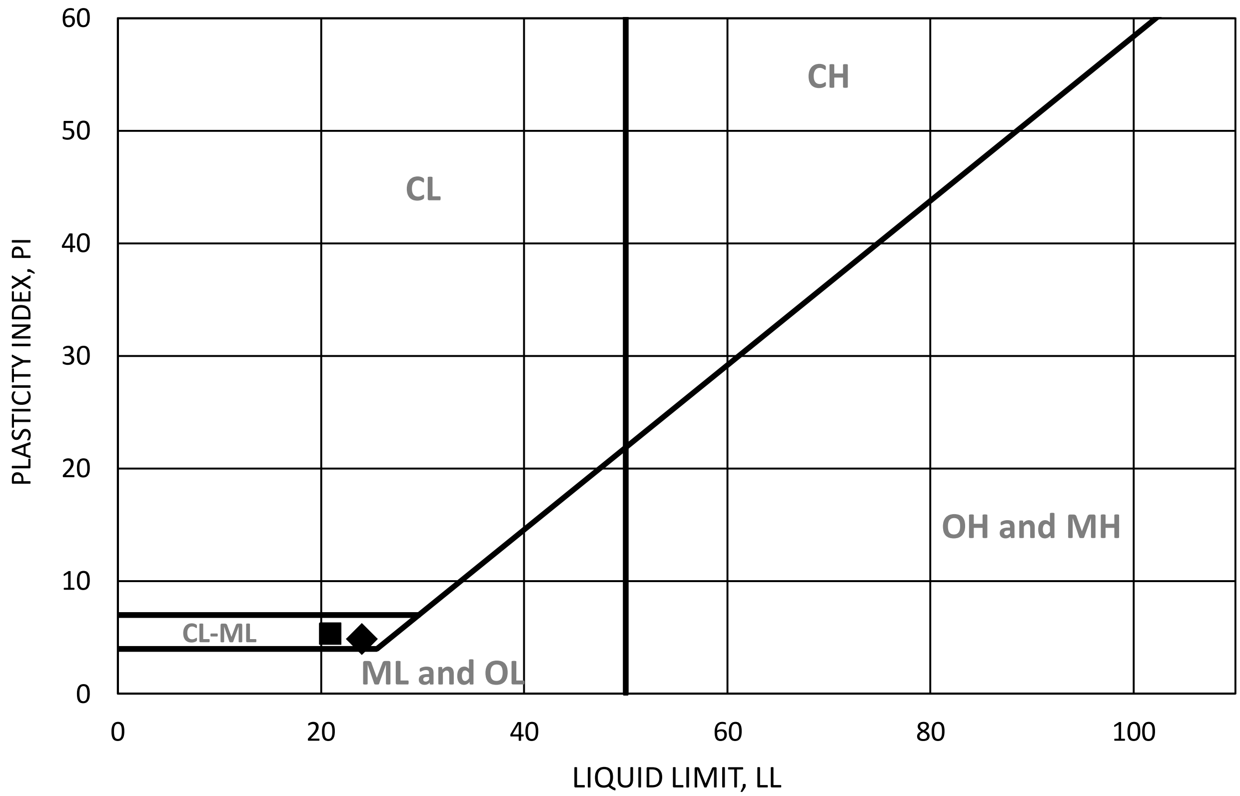
Checked by: PZ

Project No.: W1207-06-01

6728 North Sepulveda Boulevard
6715 North Columbus Avenue
Los Angeles, California

Feb. 2022

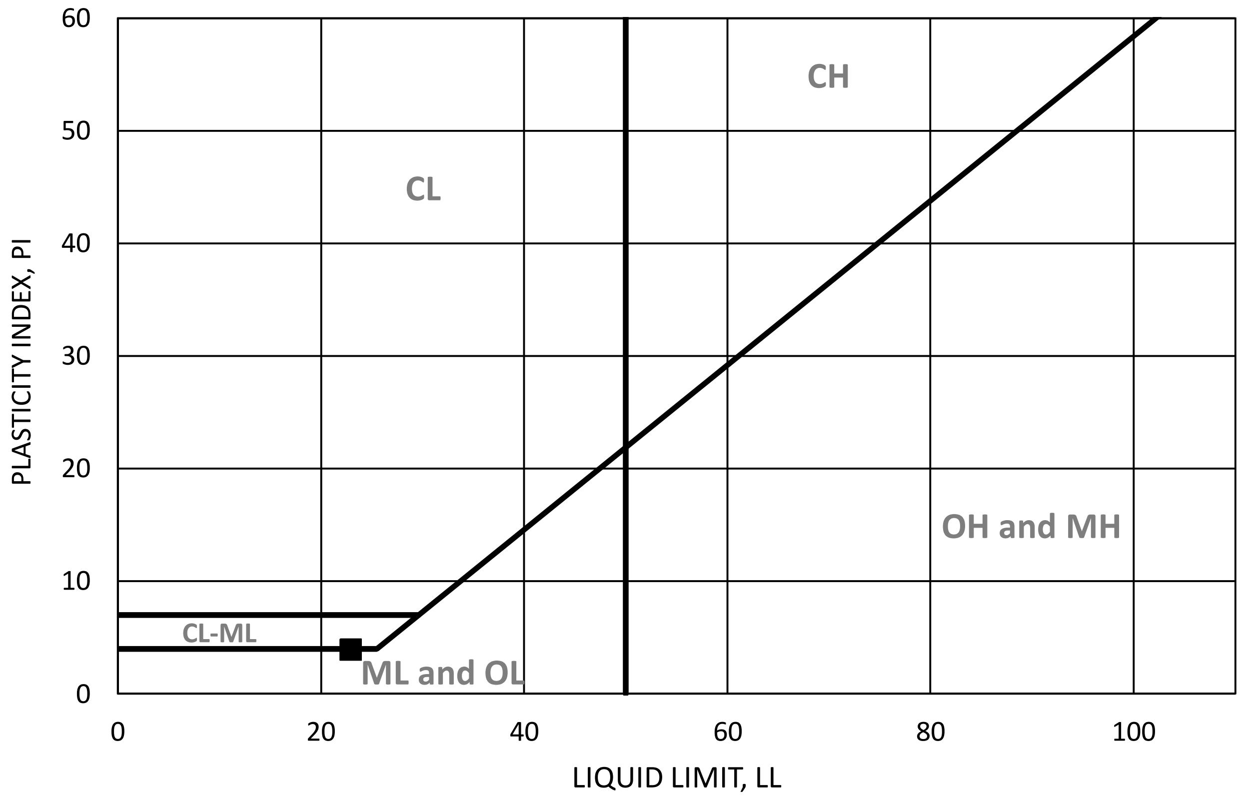
Figure B28



SYMBOL	BORING	DEPTH (ft)	LL	PL	PI	MOISTURE CONTENT AT SATURATION	SOIL BEHAVIOR
■	B2	40	21	16	5	--	CL-ML
◆	B2	45	24	19	5	--	CL-ML

N/P = Non-Plastic

GEOCON	**ATTERBERG LIMITS**	Project No.: W1207-06-01
	ASTM D-4318	6728 North Sepulveda Boulevard 6715 North Columbus Avenue Los Angeles, California
	Checked by: PZ	Feb. 2022 Figure B29



SYMBOL	BORING	DEPTH (ft)	LL	PL	PI	MOISTURE CONTENT AT SATURATION	SOIL BEHAVIOR
■	B4	42'	23	19	4	--	ML
◆	B4	67'	N/P	N/P	N/P	--	N/P
▲	B6	42'	N/P	N/P	N/P	--	N/P
●	B6	52'	N/P	N/P	N/P	--	N/P
□	B6	62'	N/P	N/P	N/P	--	N/P
◇	B6	77'	N/P	N/P	N/P	--	N/P
△							
○							

N/P = Non-Plastic

GEOCON

ATTERBERG LIMITS

ASTM D-4318

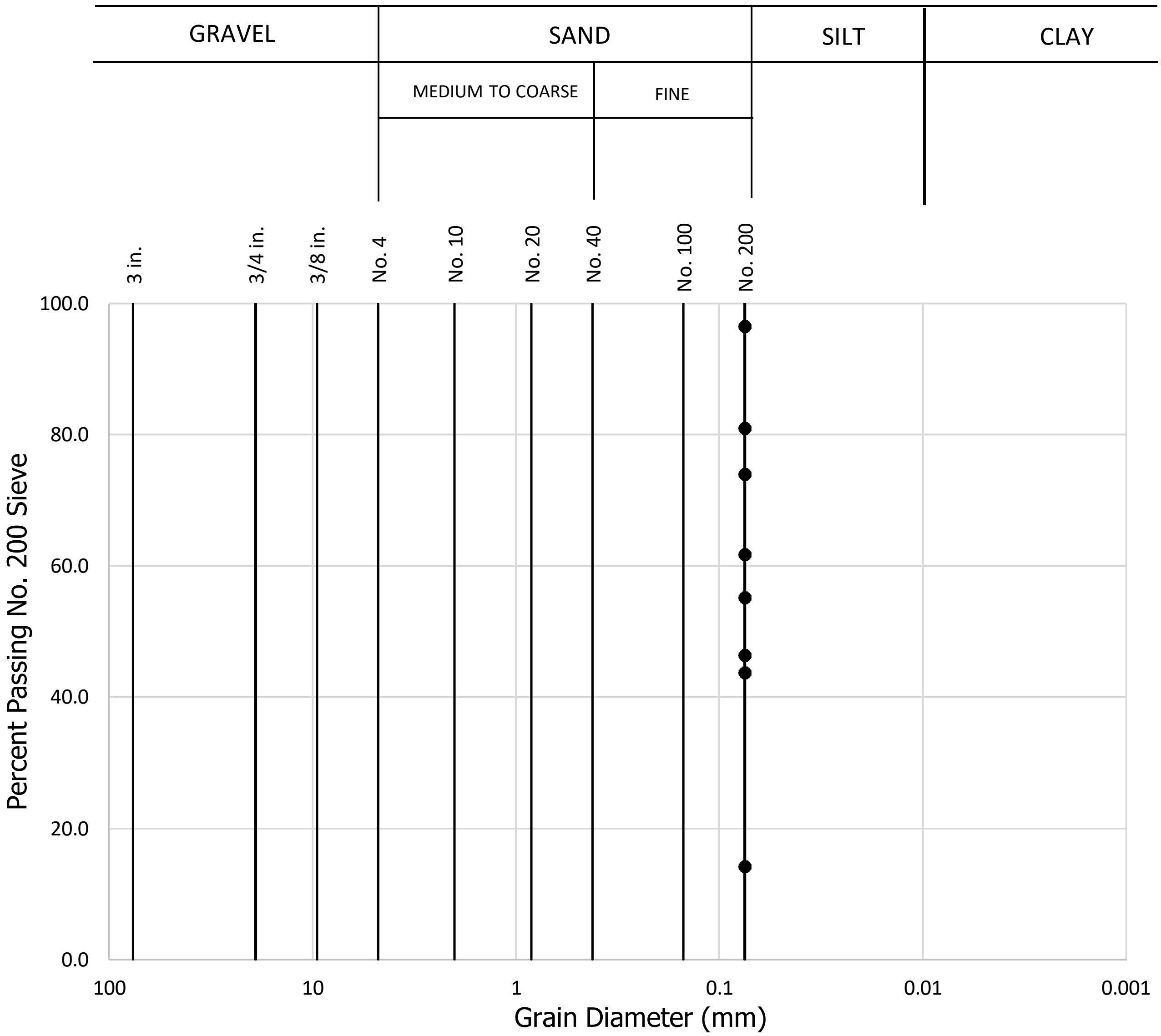
Checked by: PZ

Project No.: W1207-06-01

6728 North Sepulveda Boulevard
6715 North Columbus Avenue
Los Angeles, California

Feb. 2022

Figure B30



Sample No.	Percent Passing No. 200 Sieve
B1 @ 5'	46.4
B1 @ 10'	81.0
B1 @ 15'	74.0
B1 @ 20'	55.1
B1 @ 25'	14.2
B1 @ 30'	96.5
B1 @ 35'	61.7
B1 @ 40'	43.7

GEOCON

GRAIN SIZE ANALYSIS

ASTM D-1140

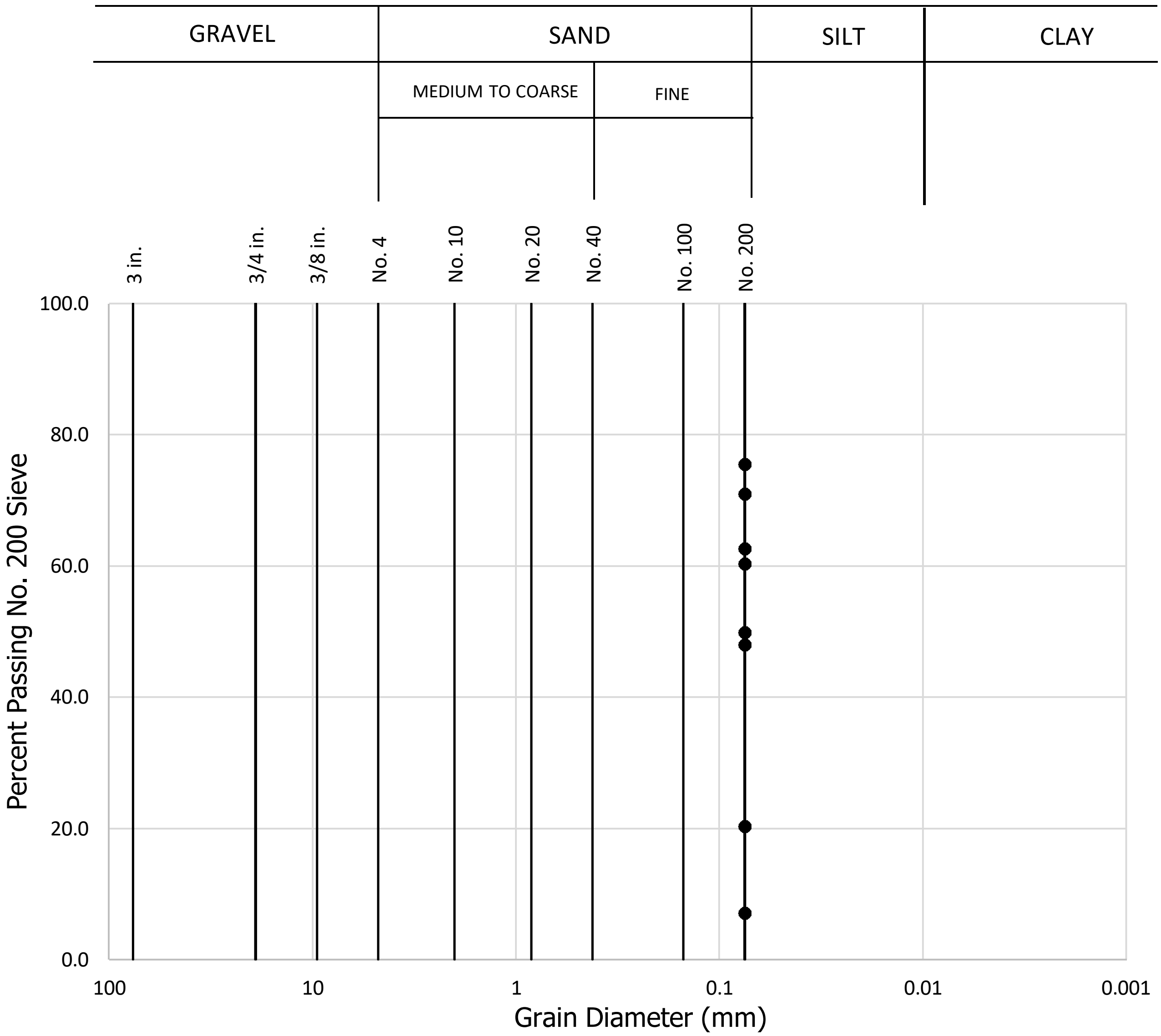
Checked by: PZ

Project No.: W1207-06-01

6728 North Sepulveda Boulevard
6715 North Columbus Avenue
Los Angeles, California

Feb. 2022

Figure B31



Sample No.	Percent Passing No. 200 Sieve
B1 @ 45'	48.0
B1 @ 50'	7.0
B2 @ 5'	62.6
B2 @ 10'	49.9
B2 @ 15'	75.5
B2 @ 20'	60.3
B2 @ 25'	20.3
B2 @ 30'	70.9

GEOCON

GRAIN SIZE ANALYSIS

ASTM D-1140

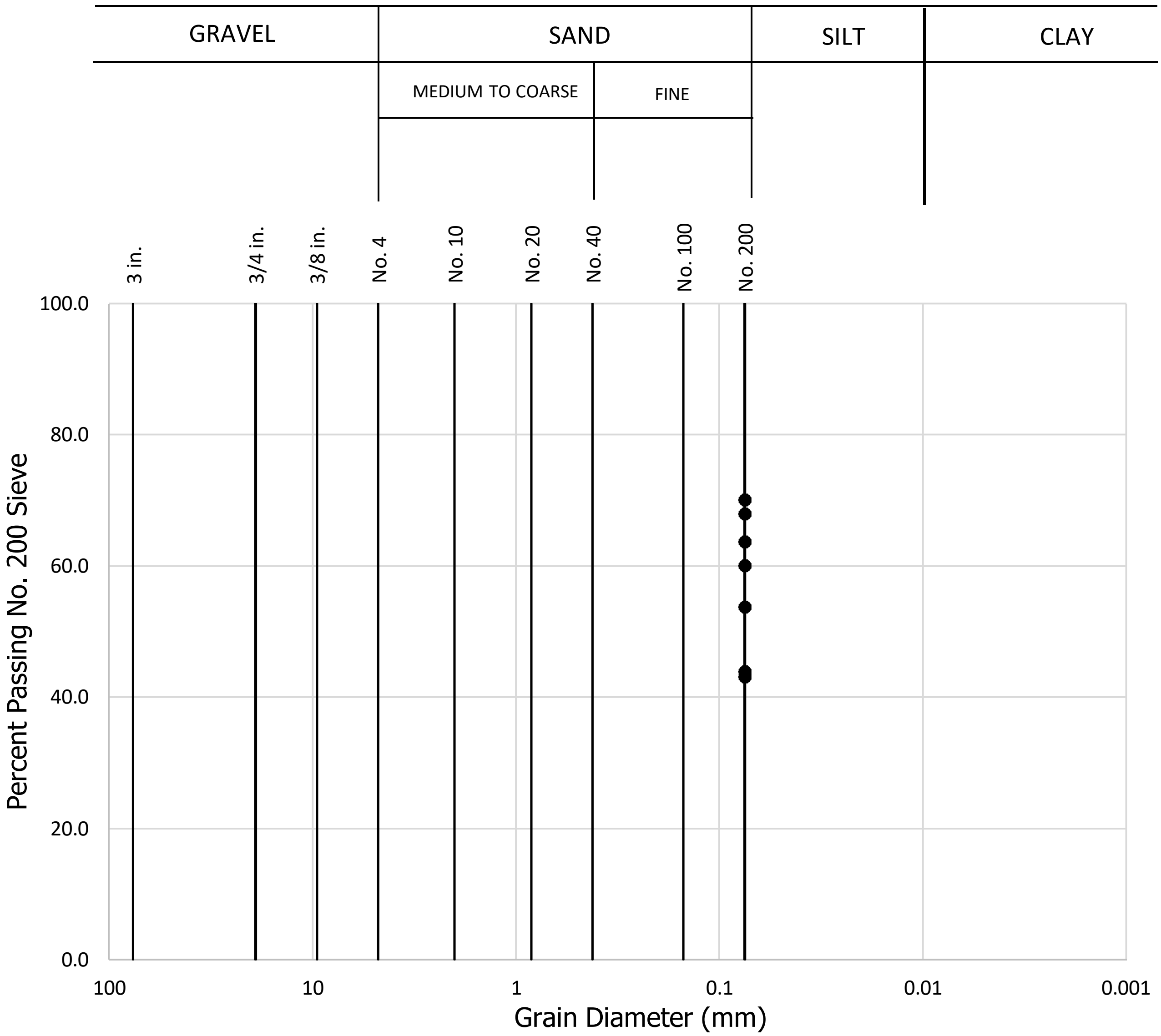
Checked by: PZ

Project No.: W1207-06-01

6728 North Sepulveda Boulevard
6715 North Columbus Avenue
Los Angeles, California

Feb. 2022

Figure B32



Sample No.	Percent Passing No. 200 Sieve
B2 @ 35'	68.0
B2 @ 40'	43.8
B2 @ 45'	63.7
B2 @ 50'	60.0
B2 @ 55'	53.7
B2 @ 60'	70.0
B2 @ 65'	43.1

GEOCON

GRAIN SIZE ANALYSIS

ASTM D-1140

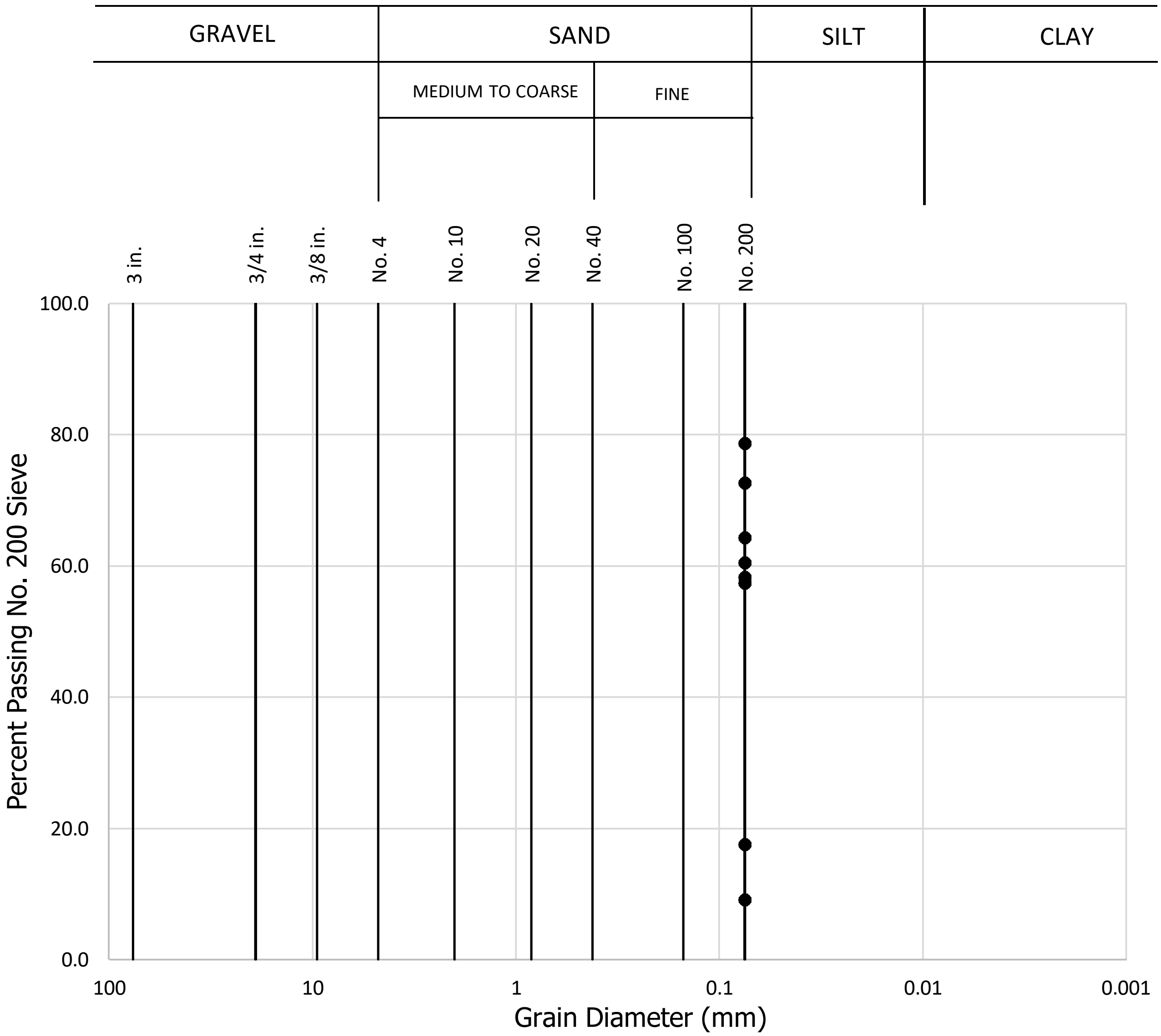
Checked by: PZ

Project No.: W1207-06-01

6728 North Sepulveda Boulevard
6715 North Columbus Avenue
Los Angeles, California

Feb. 2022

Figure B33



Sample No.	Percent Passing No. 200 Sieve
B4 @ 32'	72.6
B4 @ 37'	58.3
B4 @ 42'	57.4
B4 @ 47'	17.5
B4 @ 62'	9.1
B4 @ 67'	64.3
B6 @ 32'	78.6
B6 @ 37'	60.5

GEOCON

GRAIN SIZE ANALYSIS

ASTM D-1140

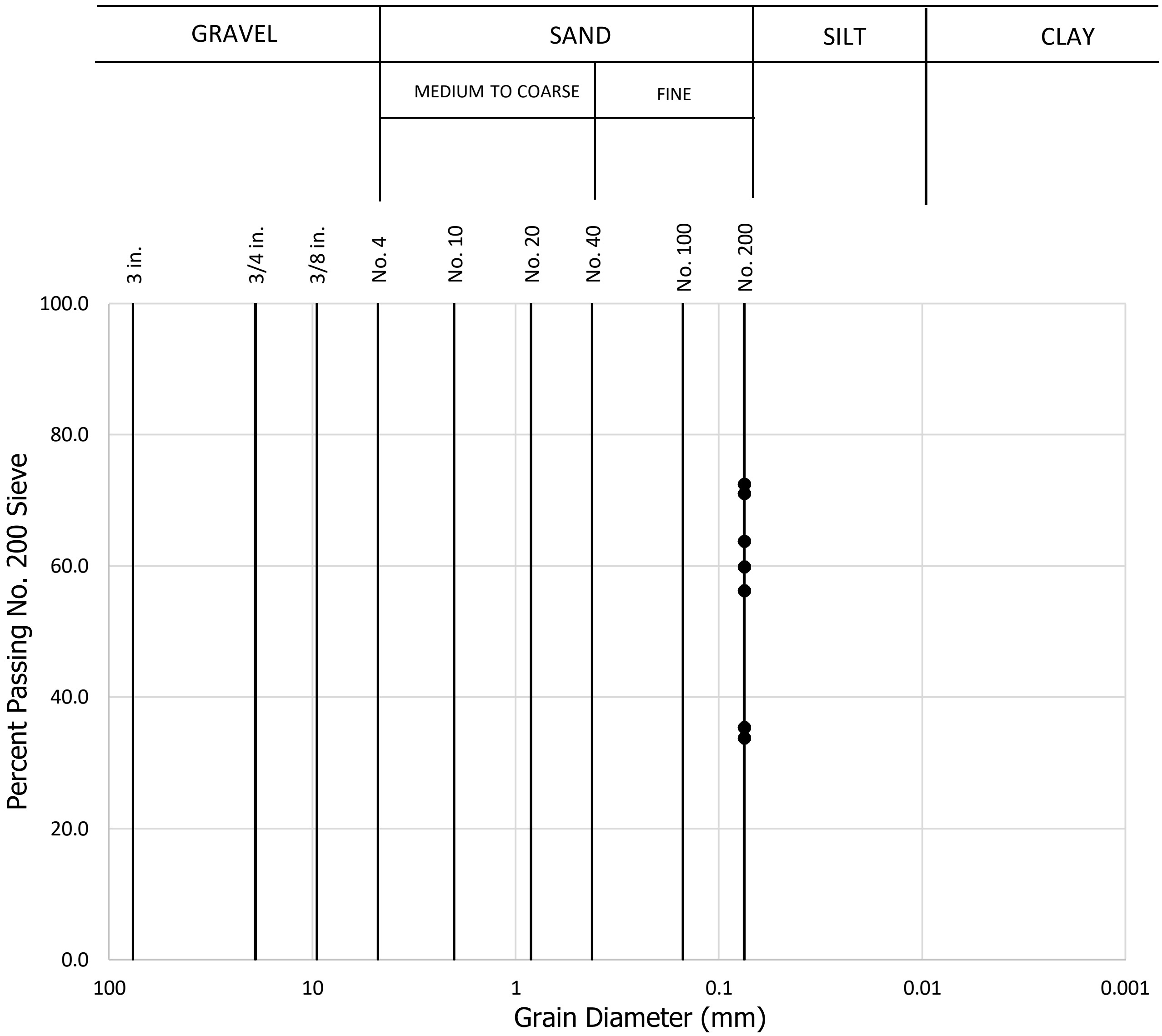
Checked by: PZ

Project No.: W1207-06-01

6728 North Sepulveda Boulevard
6715 North Columbus Avenue
Los Angeles, California

Feb. 2022

Figure B34



Sample No.	Percent Passing No. 200 Sieve
B6 @ 42'	71.0
B6 @ 47'	56.2
B6 @ 52'	59.8
B6 @ 57'	35.3
B6 @ 62'	72.5
B6 @ 67'	33.8
B6 @ 77'	63.7

GEOCON

GRAIN SIZE ANALYSIS

ASTM D-1140

Checked by: PZ

Project No.: W1207-06-01

6728 North Sepulveda Boulevard
6715 North Columbus Avenue
Los Angeles, California

Feb. 2022

Figure B35

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)	764.8	797.8
Wt. of Mold	(gm)	368.4	368.4
Specific Gravity	(Assumed)	2.7	2.7
Wet Wt. of Soil + Cont.	(gm)	486.9	797.8
Dry Wt. of Soil + Cont.	(gm)	457.9	358.1
Wt. of Container	(gm)	186.9	368.4
Moisture Content	(%)	10.7	19.9
Wet Density	(pcf)	119.6	129.4
Dry Density	(pcf)	108.0	107.9
Void Ratio		0.6	0.6
Total Porosity		0.4	0.4
Pore Volume	(cc)	74.4	80.5
Degree of Saturation	(%) [S_{meas}]	51.9	88.6

Date	Time	Pressure (psi)	Elapsed Time (min)	Dial Readings (in.)
8/3/2020	10:00	1.0	0	0.235
8/3/2020	10:10	1.0	10	0.235
Add Distilled Water to the Specimen				
8/4/2020	10:00	1.0	1430	0.2645
8/4/2020	11:00	1.0	1490	0.2645

Expansion Index (EI meas) =	29.5
Expansion Index (Report) =	**30**

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: PZ

Project No.: W1207-06-01

6728 North Sepulveda Boulevard
6715 North Columbus Avenue
Los Angeles, California

Feb. 2022

Figure B36

B2@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)	764.6	801.7
Wt. of Mold	(gm)	367.7	367.7
Specific Gravity	(Assumed)	2.7	2.7
Wet Wt. of Soil + Cont.	(gm)	498.4	801.7
Dry Wt. of Soil + Cont.	(gm)	469.7	358.8
Wt. of Container	(gm)	198.4	367.7
Moisture Content	(%)	10.6	20.9
Wet Density	(pcf)	119.7	130.8
Dry Density	(pcf)	108.2	108.1
Void Ratio		0.6	0.6
Total Porosity		0.4	0.4
Pore Volume	(cc)	74.1	80.8
Degree of Saturation	(%) [S_{meas}]	51.7	93.0

Date	Time	Pressure (psi)	Elapsed Time (min)	Dial Readings (in.)
8/3/2020	10:00	1.0	0	0.255
8/3/2020	10:10	1.0	10	0.2545
Add Distilled Water to the Specimen				
8/4/2020	10:00	1.0	1430	0.287
8/4/2020	11:00	1.0	1490	0.287

Expansion Index (EI meas) =	32.5
Expansion Index (Report) =	**33**

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: PZ

Project No.: W1207-06-01

6728 North Sepulveda Boulevard
6715 North Columbus Avenue
Los Angeles, California

Feb. 2022

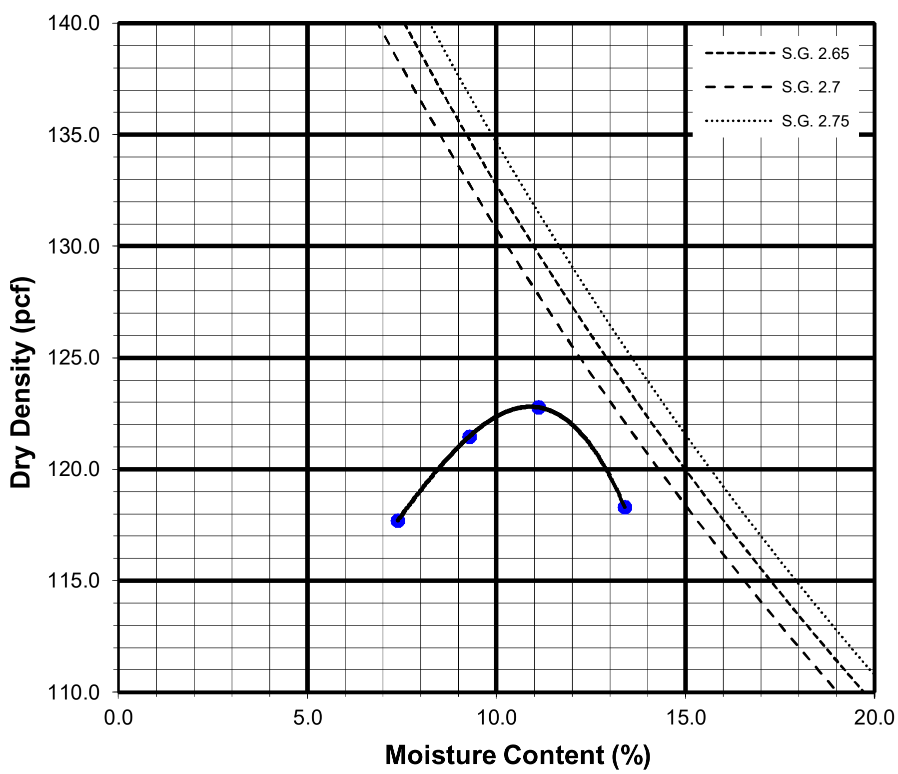
Figure B37

Sample No:

B1@0-5'	Brown Sandy Silt (ML)

TEST NO.		1	2	3	4	5	6
Wt. Compacted Soil + Mold	(g)	6049	6145	6201	6166		
Weight of Mold	(g)	4140	4140	4140	4140		
Net Weight of Soil	(g)	1909	2005	2061	2026		
Wet Weight of Soil + Cont.	(g)	623.9	679.4	741.3	669.9		
Dry Weight of Soil + Cont.	(g)	591.2	632.3	680.5	605.7		
Weight of Container	(g)	148.6	124.6	133.5	126.3		
Moisture Content	(%)	7.4	9.3	11.1	13.4		
Wet Density	(pcf)	126.4	132.7	136.4	134.1		
Dry Density	(pcf)	117.7	121.5	122.8	118.3		

Maximum Dry Density (pcf)	123.0	Optimum Moisture Content (%)	10.5



Preparation Method: A

MODIFIED COMPACTION TEST OF SOILS

ASTM D-1557

Checked by: PZ

GEOCON

Project No.: W1207-06-01

6728 North Sepulveda Boulevard
6715 North Columbus Avenue
Los Angeles, California

Feb. 2022

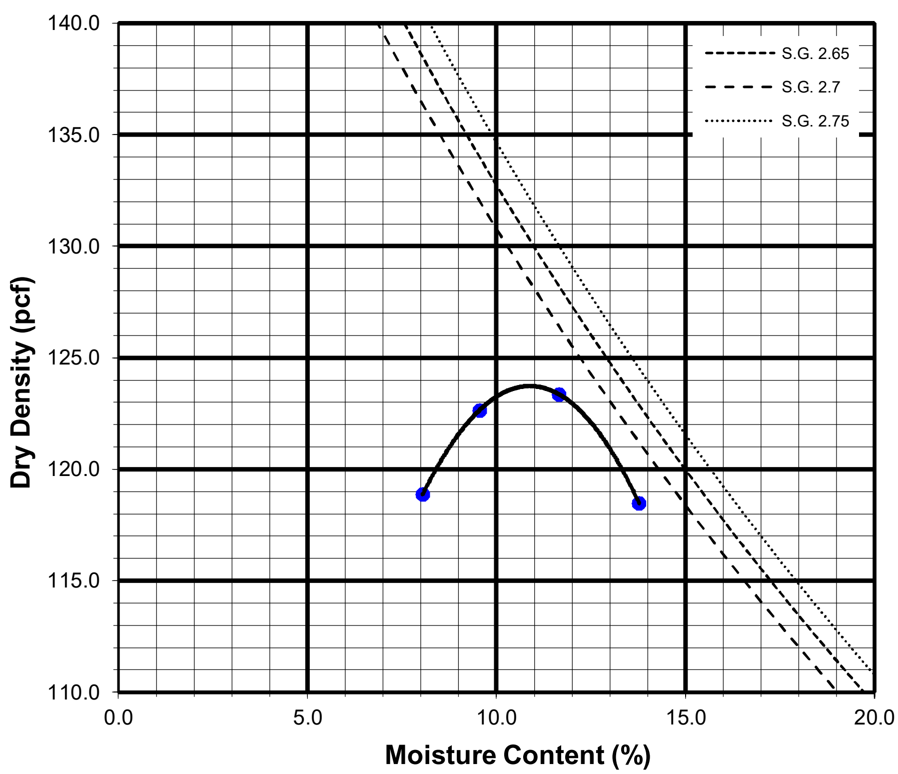
Figure B38

Sample No:

B2@0-5'	Brown Sandy Silt (ML)

TEST NO.		1	2	3	4	5	6
Wt. Compacted Soil + Mold	(g)	6080	6169	6221	6176		
Weight of Mold	(g)	4140	4140	4140	4140		
Net Weight of Soil	(g)	1940	2029	2081	2036		
Wet Weight of Soil + Cont.	(g)	610.4	691.3	732.7	723.6		
Dry Weight of Soil + Cont.	(g)	575.0	643.9	671.6	651.1		
Weight of Container	(g)	134.9	147.3	147.4	124.7		
Moisture Content	(%)	8.0	9.5	11.7	13.8		
Wet Density	(pcf)	128.4	134.3	137.7	134.8		
Dry Density	(pcf)	118.9	122.6	123.4	118.5		

Maximum Dry Density (pcf)	124.0	Optimum Moisture Content (%)	11.0



Preparation Method: A

	MODIFIED COMPACTION TEST OF SOILS ASTM D-1557	Project No.: W1207-06-01 6728 North Sepulveda Boulevard 6715 North Columbus Avenue Los Angeles, California
GEOCON	Checked by: PZ	Feb. 2022 Figure B39

SUMMARY OF LABORATORY POTENTIAL
OF HYDROGEN (pH) AND RESISTIVITY TEST RESULTS
CALIFORNIA TEST NO. 643

Sample No.	**pH**	**Resistivity (ohm centimeters)**
B1@0-5'	7.8	2000 (Corrosive)
B2@0-5'	7.3	1400 (Corrosive)
B5&B6@30-35'	8.7	2300 (Moderately Corrosive)

SUMMARY OF LABORATORY CHLORIDE CONTENT TEST RESULTS
EPA NO. 325.3

Sample No.	Chloride Ion Content (%)
B1@0-5'	0.009
B2@0-5'	0.010
B5&B6@30-35'	0.008

SUMMARY OF LABORATORY WATER SOLUBLE SULFATE TEST RESULTS
CALIFORNIA TEST NO. 417

Sample No.	**Water Soluble Sulfate (% SQ_4)**	**Sulfate Exposure***
B1@0-5'	0.000	S0
B2@0-5'	0.017	S0
B5&B6@30-35'	0.000	S0

GEOCON

CORROSIVITY TEST RESULTS

Checked by: PZ

Project No.: W1207-06-01

6728 North Sepulveda Boulevard
6715 North Columbus Avenue
Los Angeles, California

Feb. 2022