GEOCON
WEST, INC.

GEOTECHNICAL
ENVIRONMENTAL
MATERIALS

PRELIMINARY GEOTECHNICAL INVESTIGATION

PROPOSED INDUSTRIAL DEVELOPMENT
565 ACRES
APPLE VALLEY, CALIFORNIA

APNS: 0463-201-20; -32; -42; -56
0462-241-02; -03; -06; -07; -11; -13; -19; -26; -39; -40
0463-242-02; -05
0463-243-20; -25

PREPARED FOR

UNCOMMON DEVELOPERS
LOS ANGELES, CALIFORNIA

PROJECT NO. W1523-99-01

MARCH 29, 2022

GEOCON
WEST, INC.
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

Project No. W1523-06-01
March 29, 2022

Mr. Idan Perlman
Uncommon Developers
9220 Winnetka Avenue
Los Angeles, CA 91311

Subject: PRELIMINARY GEOTECHNICAL INVESTIGATION
PROPOSED INDUSTRIAL DEVELOPMENT
565 ACRES, APPLE VALLEY, CALIFORNIA
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0463-242-02; -05
0463-243-20; -25

Dear Mr. Perlman:

In accordance with your authorization of our proposal dated February 8, 2022, we have performed a preliminary geotechnical investigation for the proposed industrial development located within the city of Apple Valley, California. The accompanying report presents the findings of our study and our conclusions and recommendations pertaining to the geotechnical aspects of proposed design and construction. Based on the results of our investigation, it is our opinion that the site can be developed as proposed, provided the recommendations of this report are followed and implemented during design and construction.

The primary intent of this study was to address potential geologic hazards and geotechnical conditions that could impact the project. A design level geotechnical study will be required once a conceptual site plan is available in order to provide updated geotechnical recommendations for design and construction.

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

Very truly yours,

GEOCON WEST, INC.

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PRELIMINARY GEOTECHNICAL INVESTIGATION

1. PURPOSE AND SCOPE

This report presents the results of a preliminary geotechnical investigation for the proposed industrial development located within the City of Apple Valley, 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 preliminary conclusions and recommendations pertaining to the geotechnical aspects of proposed design and construction. A design level geotechnical study will be required once a conceptual site plan is available in order to provide updated geotechnical recommendations for design and construction.

The scope of this investigation included a site reconnaissance, field exploration, laboratory testing, engineering analysis, and the preparation of this report. The site was explored on February 18, 2022 by excavating nine 8-inch diameter borings to a depth of up to approximately 24½ feet below the existing ground surface using a truck-mounted hollow-stem auger drilling machine. Refusal was encountered in two of the borings at depths of 9½ and 19½ feet. In addition, twenty test pits were excavated on March 2 and 3, 2022 to depths of up to approximately 9½ feet below the existing ground surface using a backhoe. The locations of the exploratory excavations are depicted on the Site Plan (see Figure 2). A detailed discussion of the field investigation, including test pit and 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 consists of 19 parcels covering 565 acres in the City of Apple Valley, California. Each of the parcels consist of vacant undeveloped land with limited access via dirt roads. The project area is bounded by Quarry Road to the north, by Hudson Road and Fairview Mountain to the east, by Los Padres Road to the south, and by Central Road to the west. The project dips gently to the west at a grade of about 2%. Surface water drainage appears to follow contours toward the west. Vegetation onsite consists of native grasses, shrubs, and Joshua trees.

Based on the information provided by the Client, it is our understanding that the proposed project will consist of several commercial or industrial structures constructed at or near the existing site grade. The design team is also considering subterranean or partial subterranean parking features under the proposed structures. At this time there is no preliminary layout or site configuration available. The existing site conditions are depicted on the Site Plan (see Figure 2).

Based on the preliminary nature of the design at this time, wall and column loads were not available. This proposal has assumed that column loads for the proposed structures will be up to 300 kips, and wall loads will be up to 3 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 southwestern portion of the Mojave Desert, approximately 20 miles northeast of the San Gabriel Mountains. The Mojave Desert province is bounded by the Garlock Fault on the north, and the northwest trending San Andreas Fault Zone and Transverse Ranges on the southwest, and extends east to the California-Nevada border. The province is characterized by broad alluviated basins that are for the most part derived from the adjacent uplands. The site is underlain by alluvial fan deposits incised by stream wash deposits, consisting of sediment derived from the surrounding mountains and corresponding drainage systems (Hernandez and Tan, 2007).

4. SOIL AND GEOLOGIC CONDITIONS

Based on our field investigation and published geologic maps of the area, the site is underlain by Holocene age wash deposits and Holocene to Pleistocene age alluvial fan deposits (Hernandez and Tan, 2007). Detailed stratigraphic profiles of the materials encountered at the site are provided on the test pit and boring logs in Appendix A.

4.1 Alluvial Wash Deposits

Holocene age alluvial wash deposits were encountered at the ground surface in test pits 4 through 9. The wash deposits generally consist of light brown to brown well-graded sand, poorly graded sand, and silty sand with varying amounts of gravel and cobbles (up to 12” in diameter). The wash deposits are characterized as dry to moist and loose.

4.2 Young Alluvial Fan Deposits

Holocene age alluvial fan deposits were encountered at the surface in test pits 1, 2, and 10 through 21 and in borings 2 and 8. The alluvium was encountered to a maximum depth of approximately 5½ feet and consists of light brown to brown, poorly to well-graded sand and silty sand with varying amounts of silt, gravel, and cobbles up to 10” in diameter. The alluvium is characterized as dry to slightly moist and loose to medium dense.

4.3 Older Alluvial Fan Deposits

Pleistocene age older alluvial fan deposits were encountered in the borings below the young alluvial fan deposits and wash deposits and at the ground surface in borings 1, 3 through 7 and 9. The older alluvial fan deposits are generally composed of light brown to brown, reddish brown or light gray to grayish brown poorly graded to well-graded sand and silty sand with varying amounts of gravel and cobbles (up to 10” in diameter). The older alluvial fan deposits are characterized as dry to slightly moist and medium dense to very dense and are locally highly cemented.

5. GROUNDWATER

Review of the California Department of Water Resources (CDWR) Water Data Library website (CDWR, 2022) shows two wells (345956N1171659W001 and 345919N1171573W001) in the property vicinity. Groundwater levels were last measured in these wells on May 14, 1957 when the depth to groundwater was at 61.5 and 86.7 feet below the existing ground surface. Also, information provided in the Apple Valley General Plan (2007) indicate groundwater beneath the site and in the immediate area has historically been greater than 50 feet beneath the ground surface.

Groundwater was not encountered in our borings or test pits excavated to a maximum depth of 24½ feet beneath the existing ground surface. Considering the lack of groundwater in our explorations, the reported historic high groundwater levels (CDWR, 2022; Apple Valley, 2007), and the depth of the proposed construction, static groundwater is not anticipated to impact the proposed development. 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 7.17).

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 (CDMG, 1979; CGS, 2016; CGS, 2022b) 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 a Holocene-active fault to the site is the Helendale-South Lockhart Fault Zone, located approximately 1.3 miles to the northeast (CGS, 2016). Other nearby active faults are the North Frontal Thrust System, the Lenwood-Lockhart Fault Zone, and the Camp Rock-Emerson-Copper Mountain Fault Zone located approximately 11.2 miles south, 16 miles east-northeast, and 22 miles northeast of the site, respectively (USGS, 2006). The active San Andreas Fault Zone is located approximately 28 miles southwest of the site (USGS, 2006).

Published geologic maps (Hernandez and Tan, 2007) indicate there is an unnamed pre-Holocene fault mapped as traversing the northwest portion of the property. This fault has not been included in an Alquist-Priolo Earthquake Fault Zone for surface fault rupture hazards (CGS, 2016). Based on the current data, this fault is not considered active and is not anticipated to impact the site.

Several buried thrust faults, commonly referred to as blind thrusts, underlie the Southern California area 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 greater 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	42	S
Long Beach	March 10, 1933	6.4	82	SW
Tehachapi	July 21, 1952	7.5	108	WNW
San Fernando	February 9, 1971	6.6	71	W
Whittier Narrows	October 1, 1987	5.9	64	SW
Sierra Madre	June 28, 1991	5.8	53	WSW
Landers	June 28, 1992	7.3	50	ESE
Big Bear	June 28, 1992	6.4	34	SE
Northridge	January 17, 1994	6.7	83	WSW
Hector Mine	October 16, 1999	7.1	51	E
Ridgecrest	July 5, 2019	7.1	84	NNW

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 on the following page 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	1.037g	Figure 1613.2.1(1)
MCE_R Ground Motion Spectral Response Acceleration – Class B (1 sec), S_1	0.397g	Figure 1613.2.1(2)
Site Coefficient, F_A	1.085	Table 1613.2.3(1)
Site Coefficient, F_V	1.903*	Table 1613.2.3(2)
Site Class Modified MCE_R Spectral Response Acceleration (short), S_{MS}	1.125g	Section 1613.2.3 (Eqn 16-36)
Site Class Modified MCE_R Spectral Response Acceleration – (1 sec), S_{M1}	0.755g*	Section 1613.2.3 (Eqn 16-37)
5% Damped Design Spectral Response Acceleration (short), S_{DS}	0.75g	Section 1613.2.4 (Eqn 16-38)
5% Damped Design Spectral Response Acceleration (1 sec), S_{D1}	0.503g*	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 (MCE_G) seismic design parameters for projects located in Seismic Design Categories of D through F in accordance with ASCE 7-16.

ASCE 7-16 PEAK GROUND ACCELERATION

Parameter	Value	ASCE 7-16 Reference
Mapped MCE_G Peak Ground Acceleration, PGA	0.445	Figure 22-9
Site Coefficient, F_{PGA}	1.155	Table 11.8-1
Site Class Modified MCE_G Peak Ground Acceleration, PGA_M	0.514g	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 6.76 magnitude event occurring at a hypocentral distance of 19.9 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 6.83 magnitude occurring at a hypocentral distance of 28.74 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 Apple Valley North quadrangle has not been evaluated for liquefaction hazard. However, the historic high groundwater level in the vicinity of the site is at a depth of greater than 50 feet (CDWR, 2022; Apple Valley, 2007). The City of Apple Valley General Plan (2007) indicates the project is not located within an area designated as having potential for liquefaction. Additionally, the Pleistocene age older alluvial fan deposits, located at shallow depths across the property, are well consolidated and not prone to liquefaction. Based on these considerations, the potential for liquefaction and associated ground deformations beneath the site is considered very low.

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 Pleistocene age older alluvial fan deposits, located at shallow depths across the property, are well consolidated and would not be prone to dry seismically induced settlements. As the project progresses and the building configuration for the proposed development is finalized, dry seismically induced settlement analyses should be performed where proposed structures will be underlain by young alluvial wash deposits.

6.6 Slope Stability

The topography at the site is relatively level and the topography in the immediate site vicinity slopes gently to the west at a grade of approximately 2%. The Apple Valley General Plan (2007) indicates the site is not located within a "hillside and mountainous area" or within an area identified as having a potential for slope instability. There are no known landslides near the site, nor is the site in the path of any known or potential landslides. Therefore, the potential for slope stability hazards to adversely affect the proposed development is considered low.

6.7 Earthquake-Induced Flooding

Earthquake-induced flooding is inundation caused by failure of dams or other water-retaining structures due to earthquakes. The City of Apple Valley General Plan (2007) and the San Bernardino County Safety Element (2010a) indicate the project property is not located within an area of possible inundation due to a seismically induced dam failure.

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 seismic-induced seiche is considered unlikely.

The site is located within a Zone D flood hazard area. As defined by the Federal Emergency Management Agency (FEMA, 2022), Zone D represents areas of undetermined flood hazards. Therefore, the potential for flooding at the site cannot be determined.

6.9 Oil Fields & Methane Potential

Based on a review of the California Geologic Energy Management Division (CalGEM) Well Finder Website, the site is not located within an oil field and active oil or gas wells are not documented in the immediate site vicinity (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.

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

6.10 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 known 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 This evaluation report is not a comprehensive geotechnical investigation report. The evaluation report provides our opinion regarding the site conditions and geotechnical aspects of proposed design and construction based on available published information and subsurface information collected during our limited site exploration. Once the configuration of the proposed improvements is finalized, additional exploration, laboratory testing, and engineering analyses will be required to prepare a comprehensive geotechnical investigation report. 7.1.1 Artificial fill was not encountered during the site investigation. However, existing fill may exist in other areas of the site that were not directly explored. The existing site soils encountered during our limited investigation are suitable for re-use as engineered fill provided the recommendations in the *Grading* section of this report are followed (see Section 7.4).

7.1.2 Groundwater was not encountered during site exploration and the historic high groundwater table is sufficiently deep that it not expected to be encountered during construction. However, local seepage could be encountered during excavation of subterranean features, especially if conducted during the rainy season.

7.1.3 Based on our observations onsite and our knowledge of the geologic setting, cobbles should be anticipated during earthwork at the subject site. Additionally, occasional boulders may be encountered in the existing fill or alluvial soils. The contractor should be prepared for difficult excavation conditions. The presence of these materials and their impact on construction methods and equipment selection should be considered by both the developer and contractor prior to construction.

7.1.4 Screening of the earth materials will likely be required to remove oversize (greater than 6 inches) rock, prior to placement and compaction. Generation of oversized material (greater than 6 inches) should be anticipated.

7.1.5 The upper young alluvial soils consist primarily of loose silty sand with an increase in density with depth. Based on laboratory testing (see Figures B11 to B23), the upper alluvial soils may be subject to excessive hydro-collapse upon saturation. Hydro-consolidation is the tendency of a soil structure to collapse upon saturation, resulting in the overall settlement of the effected soils and any overlying soils, foundations, or improvements supported therein. The recommendations in this report are intended to reduce the effects of collapsible soils beneath the foundation systems.

7.1.6 Based on the potential for hydro-consolidation, maintaining proper surface drainage is critical to future performance of foundations and paving. Recommendations for drainage are provided in the S*urface Drainage* section of this report (see Section 7.17).

7.1.7 Based on these considerations, a conventional spread foundation system is considered feasible for support of the proposed structures. The excavation bottom and all foundation excavations must be observed and approved in writing by the Geotechnical Engineer prior to placement of fill, waterproofing, reinforcing steel or concrete. Recommendations for the design of the foundation system are provided in Section 7.6 of this report.

7.1.8 If proposed structures will be underlain or partially underlain by young alluvial wash deposits, an evaluation of potential seismically induced settlements should be performed. Where improvements will transition across geologic units (alluvial wash to older alluvium), the potential for differential settlement must also be evaluated. Additional grading may be required to reduce the effects of differential settlement on the proposed structures. Alternatively, a reinforced concrete mat foundation system may be recommended where differential settlements are significant. Once the configuration of the proposed structures is finalized, a comprehensive geotechnical investigation should be prepared with specific recommendations for each building or parcel.

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

7.1.10 For subterranean construction, the proposed structures may be supported on a conventional foundation system deriving support in the competent older alluvium generally found at and below a depth of 10 feet below the existing ground surface. Foundations should be deepened as necessary to penetrate through soft or unsuitable soils at the direction of the Geotechnical Engineer.

7.1.11 Due to the granular nature of the soils, moderate to excessive caving is anticipated during excavation activities. The contractor should be aware that formwork may be required to prevent caving of shallow spread foundation excavations.

7.1.12 Excavations up to approximately 15 feet in vertical height are anticipated for construction of the subterranean features, including foundation excavations. It is anticipated that stable excavations can be achieved with sloping measures. However, if excavations in close proximity to an adjacent property line and/or structure are required, special excavation measures may be necessary in order to maintain lateral support of offsite improvements. Excavation recommendations are provided in the *Temporary Excavations* section of this report (Section 7.15).

7.1.13 Due to the nature of the proposed design and intent for subterranean features, waterproofing of subterranean walls and slabs is recommended. 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.

7.1.14 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 alluvial soils and should be deepened as necessary to maintain a minimum 12-inch embedment into the recommended bearing materials. Compaction of the exposed soils in the excavation bottom 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.

7.1.15 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).

7.1.16 Based on the results of percolation testing performed at the site, a stormwater infiltration system is considered feasible for this project. Infiltration recommendations are provided in the *Stormwater Infiltration* section of this report (see Section 7.16).

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

7.1.18 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. Caving should be anticipated in unshored excavations, due to the granular nature of the onsite soils. Formwork may be required to prevent caving of foundation excavations. The older alluvium is moderately to highly cemented and should be rippable with conventional equipment; however, concretions or well cemented layers may be encountered in the older alluvium which could make excavation of subterranean features difficult. Coring or jack-hammering may be required if concretions are encountered and the contractor should be prepared for these conditions. In addition, due to the presence of cobbles and possible boulders, the contractor should be prepared for difficult excavation conditions during drilling and earthwork activities.

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

7.2.3 All onsite excavations must be conducted in such a manner that potential surcharges from existing structures, construction equipment, and vehicle loads are resisted. The surcharge area may be defined by a 1:1 projection down and away from the bottom of an existing foundation or vehicle load. Penetrations below this 1:1 projection will require special excavation measures such as sloping or shoring. Excavation recommendations are provided in the *Temporary Excavations* section of this report (see Section 7.15).

7.2.4 The upper 5 feet of existing site soils encountered during this investigation are primarily granular in nature and are considered to have a “very low” expansive potential and would be classified as “non-expansive” based on the 2019 California Building Code (CBC) Section 1803.5.3. Recommendations presented herein assume that the building foundations and slabs will derive support in these materials.

7.2.5 Expansion Index testing during the design-level report and/or subsequent to grading of the building pads should be considered to confirm the characteristics of the soil providing foundation and slab support.

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 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 “severely corrosive” with respect to corrosion of buried ferrous metals on site. The results are presented in Appendix B (Figures B29 and B30) 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 (Figures B29 and B30) 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 avoid premature corrosion of buried metal pipes and concrete structures in direct contact with the soils.

7.4 Grading

7.4.1 Grading is anticipated to include preparation of the building pad or excavation of site soils for the proposed subterranean features, excavation of site soils for proposed foundations and utility trenches, as well as placement of backfill for walls, ramps, and trenches.

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, if applicable, building official in attendance. Special soil handling requirements can be discussed at that time.

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

7.4.4 Generation of oversized material (greater than 6 inches) should be anticipated. Screening of the earth materials will likely be required to remove rocks greater than 4 feet, prior to placement and compaction. The contractor should be prepared for difficult excavation conditions. The presence of these materials and their impact on construction methods and equipment selection should be considered by both the owner and contractor prior to construction.

7.4.5 Rocks larger than 6 inches but less than 4 feet in maximum dimension may be incorporated into the engineered fill provided the oversized material (larger than 6 inches) is placed so that voids between the rocks are not created. It is recommended that placement of oversized materials be performed in non-building areas, if available. Consideration should be given to placing oversized material at least 3 feet below the deepest foundation or utility.

7.4.6 The acceptability of placing rock materials greater than 4 feet in maximum dimension shall be evaluated during grading as specific cases arise and shall be approved in writing by the Geotechnical Engineer prior to placement.

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

7.4.8 For on-grade construction, as a minimum, it is recommended that the upper 5 feet of existing earth materials within the proposed building footprint area be excavated and properly compacted for foundation and slab support. Deeper excavations should be conducted as needed to remove any encountered fill or soft soils as necessary at the direction of the Geotechnical Engineer (a representative of Geocon). Proposed building foundations should be underlain by a minimum of 3 feet of newly placed engineered fill. The excavation should extend laterally a minimum distance of 3 feet beyond the building footprint areas, including building appurtenances, or a distance equal to the depth of fill below the foundation, whichever is greater. The limits of existing fill and/or soft soil removal will be verified by the Geocon representative during site grading activities.

7.4.9 Subsequent to the recommended grading, the proposed on-grade structures may be supported on conventional shallow spread foundations deriving support in newly placed engineered fill. All excavations must be observed and approved in writing by the Geotechnical Engineer (a representative of Geocon) prior to placing fill.

7.4.10 For subterranean construction, the proposed structures may be supported on a conventional spread foundation system bearing in competent undisturbed older alluvium generally found at and below a depth of 10 feet below the existing ground surface.

7.4.11 It is recommended that the subgrade exposed at all excavation bottoms be proof rolled with heavy equipment to reduce compressibility. All excavation bottoms must be approved in writing by the Geotechnical Engineer (a representative of Geocon) prior to placing fill or construction materials.

7.4.12 Stable excavations for the recommended grading can be achieved with sloping measures where properly line setbacks allow. However, if excavations in close proximity to an adjacent property line and/or structure are required, special excavation measures may be necessary in order to maintain lateral support of offsite improvements. Excavation recommendations are provided in the *Temporary Excavations* section of this report (see Section 7.15).

7.4.13 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 at least 90 percent relative compaction, as determined by ASTM Test Method D 1557 (latest edition).

7.4.14 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 structures, may be supported on conventional foundations deriving support on a minimum of 12 inches of newly placed engineered fill which extends laterally at least 12 inches beyond the foundation area. Where excavation and compaction cannot be performed, such as adjacent to property lines, foundations may be deepened as necessary to maintain a minimum 18-inch embedment below the ground surface, and a minimum 12-inch embedment into the undisturbed alluvial soils. If the soils exposed in the excavation bottom are soft or loose, compaction of the soils will be required prior to placing steel or concrete. Compaction of the foundation excavation bottom is typically accomplished with a compaction wheel or mechanical whacker and must be observed and approved by a Geocon representative.

7.4.15 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. As a minimum, the upper 12 inches of subgrade soil should be scarified, moisture conditioned to near optimum moisture content, and properly compacted to a minimum of 95 percent of the laboratory maximum dry density in accordance with ASTM D 1557 (latest edition). *Preliminary Pavement Recommendations* section of this report (see Section 7.11).

7.4.16 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 or equal to 20 and soil corrosivity properties that are equally or less detrimental to that of the existing onsite soils (see Figures B29 and 30). Imported soil placed in building pad areas must be placed uniformly across the pad at the direction of the Geotechnical Engineer (a representative of Geocon).

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

7.4.18 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, pipes, fill, steel, gravel, or concrete.

7.5 Shrinkage

7.5.1 Shrinkage results when a volume of material removed at one density is compacted to a higher density. A shrinkage factor between 5 and 15 percent should be anticipated when excavating and compacting the upper 5 feet of existing earth materials on the site to an average relative compaction of 92 percent. The shrinkage factor does not include the removal of oversized material.

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

7.6 Conventional Foundation Design

7.6.1 If proposed structures will be underlain or partially underlain by young alluvial wash deposits, an evaluation of potential seismically induced settlements should be performed. Where improvements will transition across geologic units (alluvial wash to older alluvium), the potential for differential settlement should also be evaluated. Additional grading may be required to reduce the effects of differential settlement on the proposed structures. Alternatively, a reinforced concrete mat foundation system may be recommended where differential settlements are significant. If needed, recommendations for the design and construction of a mat foundation will be provided under separate cover. Once the configuration of the proposed structures is finalized, a comprehensive geotechnical investigation should be prepared with specific recommendations for each building or parcel. 7.6.1 Due to the granular nature of the soils, moderate to excessive caving is anticipated during excavation activities. The contractor should be aware that formwork may be required to prevent caving of shallow spread foundation excavations.

7.6.2 A conventional shallow spread foundation system may be utilized for support of the proposed structure provided foundations derive support in newly placed engineered fill or undisturbed older alluvium generally found at and below a depth of 10 feet below the ground surface. Where foundations will derive support in newly placed engineered fill, proposed foundations should be underlain by a minimum of 3 feet of newly placed engineered fill. All foundation excavations must be observed and approved by the Geotechnical Engineer (a representative of Geocon), prior to placing steel or concrete.

7.6.3 Continuous footings may be designed for an allowable bearing capacity of 2,500 pounds per square foot (psf), and should be a minimum of 12 inches in width, 18 inches in depth below the lowest adjacent grade, and 12 inches into the recommended bearing material.

7.6.4 Isolated spread foundations may be designed for an allowable bearing capacity of 2,000 psf, and should be a minimum of 24 inches in width, 18 inches in depth below the lowest adjacent grade, and 12 inches into the recommended bearing material.

7.6.5 The allowable soil bearing pressure may be increased by 400 psf and 800 psf for each additional foot of foundation width and depth, respectively, up to a maximum allowable soil bearing pressure of 3,500 psf.

7.6.6 The allowable bearing pressures may be increased by one-third for transient loads due to wind or seismic forces.

7.6.7 If depth increases are utilized for the exterior wall footings, this office should be provided a copy of the final construction plans so that the excavation recommendations presented herein could be properly reviewed and revised if necessary. Additional grading should be conducted as needed in order to maintain the recommended 3-foot-thick blanket of engineered fill below proposed on-grade foundations.

7.6.8 Continuous footings should be reinforced with four No. 4 steel reinforcing bars, two placed near the top of the footing and two near the bottom. Reinforcement for spread footings should be designed by the project structural engineer.

7.6.9 The above foundation dimensions and minimum reinforcement recommendations are based on soil conditions and building code requirements only, and are not intended to be used in lieu of those required for structural purposes.

7.6.10 No special subgrade presaturation is required prior to placement of concrete. However, the slab and foundation subgrade should be sprinkled as necessary; to maintain a moist condition as would be expected in any concrete placement.

7.6.11 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. If unanticipated soil conditions are encountered, foundation modifications may be required.

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

7.7 Foundation Settlement

7.7.1 The maximum expected static settlement for a structure supported on a conventional foundation system deriving support in the recommended bearing materials and designed with a maximum bearing pressure of 3,500 psf is estimated to be less than 1 inch and occur below the heaviest loaded structural element. Settlement of the foundation system is expected to occur on initial application of loading. Differential settlement is not expected to exceed ½ inch over a distance of 20 feet or between adjacent foundations.

7.7.2 If proposed structures will be underlain or partially underlain by young alluvial wash deposits, an evaluation of potential seismically induced settlements should be performed. Where improvements will transition across geologic units (alluvial wash to older alluvium), the potential for differential settlement should also be evaluated. Once the configuration of the proposed structures is finalized, a comprehensive geotechnical investigation should be prepared with specific recommendations for each building or parcel.

7.7.3 Once the design and foundation loading configurations for the proposed structures proceed 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 structures, 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, and should be deepened as necessary to maintain a minimum 18-inch embedment below the ground surface, and a minimum 12-inch embedment into the undisturbed alluvial soils.

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,18 inches in depth below the lowest adjacent grade and 12 inches into the recommended bearing material. The allowable bearing pressure may be increased by up to one-third for transient loads due to wind or seismic forces.

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

7.9 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 0.40 may be used with the dead load forces in the undisturbed alluvial soils or engineered fill.

7.9.2 Passive earth pressure for the sides of foundations and slabs poured against the alluvial soils or properly compacted engineered fill may be computed as an equivalent fluid having a density of 270 pcf with a maximum earth pressure of 2,700 pcf. When combining passive and friction for lateral resistance, the passive component should be reduced by one-third.

7.10 Concrete Slabs-on-Grade

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

7.10.2 Subsequent to the recommended grading, concrete slabs-on-grade for structures, not subject to vehicle loading, should be a minimum of 4 inches thick and minimum slab reinforcement should consist of No. 3 steel reinforcing bars placed 18 inches on center in both horizontal directions. Steel reinforcing should be positioned vertically near the slab midpoint.

7.10.3 Slabs-on-grade 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. 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.

7.10.4 For seismic design purposes, a coefficient of friction of 0.40 may be utilized between concrete slabs and subgrade soils without a moisture barrier, and 0.15 for slabs underlain by a moisture barrier.

7.10.5 Exterior slabs for walkways or flatwork, 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.

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

7.11 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 12 inches of paving subgrade should be scarified, moisture conditioned to near optimum moisture content, and properly compacted to at least 95 percent relative compaction, as determined by ASTM Test Method D 1557 (latest edition).

7.11.2 The following pavement sections are based on an assumed R-Value of 30. 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	10.0

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 6 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 compaction, as 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 12 feet. In the event that walls significantly higher than 12 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 *Conventional 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). Restrained walls are those that are not allowed to rotate more than 0.001H (where H equals the height of the retaining portion of the wall in feet) at the top of the wall. Where walls are restrained from movement at the top, walls may be designed utilizing a triangular distribution of pressure (at-rest pressure). The table below presents recommended pressures to be used in retaining wall design, assuming that proper drainage will be maintained.

RETAINING WALL WITH LEVEL BACKFILL SURFACE

HEIGHT OF RETAINING WALL (Feet)	ACTIVE PRESSURE EQUIVALENT FLUID PRESSURE (Pounds Per Cubic Foot)	AT-REST PRESSURE EQUIVALENT FLUID PRESSURE (Pounds Per Cubic Foot)
Up to 12	44	57

7.12.4 The wall pressures provided above assume that the proposed retaining walls will support relatively undisturbed alluvial soils or engineered fill derived from onsite soil. If import soil is used to backfill proposed walls, revised earth pressures may be required to account for the geotechnical properties of the soil placed as engineered fill. This should be evaluated once the use of import soil is established and once the geotechnical characteristics of the engineered backfill soils can be further evaluated.

7.12.5 The wall pressures provided above assume that the retaining wall will be properly drained preventing the buildup of hydrostatic pressure. If retaining wall drainage is not implemented, the equivalent fluid pressure to be used in design of undrained walls is 92 pcf. The value includes hydrostatic pressures plus buoyant lateral earth pressures.

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

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

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

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

and

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

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

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

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

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

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

and

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

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

then

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

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

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

7.12.10 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 4 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 5). 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 6). These vertical columns of drainage material would then be connected at the bottom of the wall to a 4-inch subdrain pipe.

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

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

7.15 Temporary Excavations

7.15.1 Excavations of up to 15 feet in height may be required during construction activities, including foundation excavations. Due to the granular nature of the soils, moderate to excessive caving should be anticipated in vertical excavations. The contractor may attempt vertical excavations less than 5 feet; however, it is likely that sloping measures will be required to maintain a stable excavation. The contractor should be prepared for caving, sloughing, and raveling in open excavations. Due to the granular nature of soils and potential for caving, the contractor should also be prepared to form foundation excavations at the excavation bottom. In addition, due to the presence of cobbles, the contractor should be prepared for difficult excavation conditions.

7.15.2 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 slopes could be sloped back at a uniform 1:1 slope gradient or flatter up to maximum height of 7 feet; or at a uniform 1½:1 slope gradient or flatter to a maximum height of 15 feet. A uniform slope does not have a vertical portion.

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

7.15.4 Where temporary construction slopes are utilized, the top of the slope should be barricaded to prevent vehicles and storage loads at the top of the slope within a horizontal distance equal to the height of the slope. If the temporary 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.

7.16 Stormwater Infiltration

7.16.1 During the February 18, 2022 site exploration, boring B2 was utilized to perform percolation testing. The boring was over excavated to collect soil samples and backfilled to the invert elevation with a bentonite seal placed at the bottom of the test elevation. Slotted casing was placed in the boring, and the annular space between the casing and excavation was filled with gravel. The boring was then filled with water to pre-saturate the soils. The casing was refilled with water and percolation test readings were performed after repeated flooding of the cased excavation. Based on the test results, the average infiltration rate (adjusted percolation rate), for the earth materials encountered, is provided in the following table. The field-measured percolation rate has been adjusted to infiltration rates in accordance with the County of San Bernardino Technical Guidance Document for Water Quality Management Plans (June 2013). Additional correction factors may be required and should be applied by the engineer in responsible charge of the design of the stormwater infiltration system and based on applicable guidelines. Percolation test field data and calculation of the measured percolation rate and design infiltration rate are provided on Figure 7.

Boring	Soil Type	Infiltration Depth (ft)	Average Infiltration Rate (in / hour)
B2	SP	1-5	2.91

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

7.16.3 At this time, the location of the proposed stormwater infiltration system and the horizontal offset distance of the infiltration system to the proposed structures is unknown. Due to the presence of hydro-collapsible soils, it is recommended that the proposed infiltration system be located a minimum distance of 40 feet from proposed structures and 15 feet from proposed site improvements in order to reduce the potential for induced settlements to adversely impact the development. Provided these offsets are maintained, there is a very low potential for infiltration-related soil settlement to adversely affect the proposed structures; some settlement may occur locally within the area of the infiltration system. The civil engineer should also evaluate the impact on surface drainage should some soil settlement occur locally within the area of the infiltration system. It is suggested that flexible connections be utilized between the storm drain pipes and infiltration chambers. The project owner should understand that it is not our intent to completely prevent any soil settlement and associated distress of the overlying pavement as a result of stormwater infiltration as doing so would be prohibitive to the proposed project.

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

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

7.17 Surface Drainage

7.17.1 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.

7.17.2 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.

7.17.3 Positive site drainage should be provided away from structures, pavement, and the tops of slopes to swales or other controlled drainage structures.

7.17.4 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 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.

7.18 Plan Review

7.18.1 Grading, foundation, and shoring plans (if applicable) 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.

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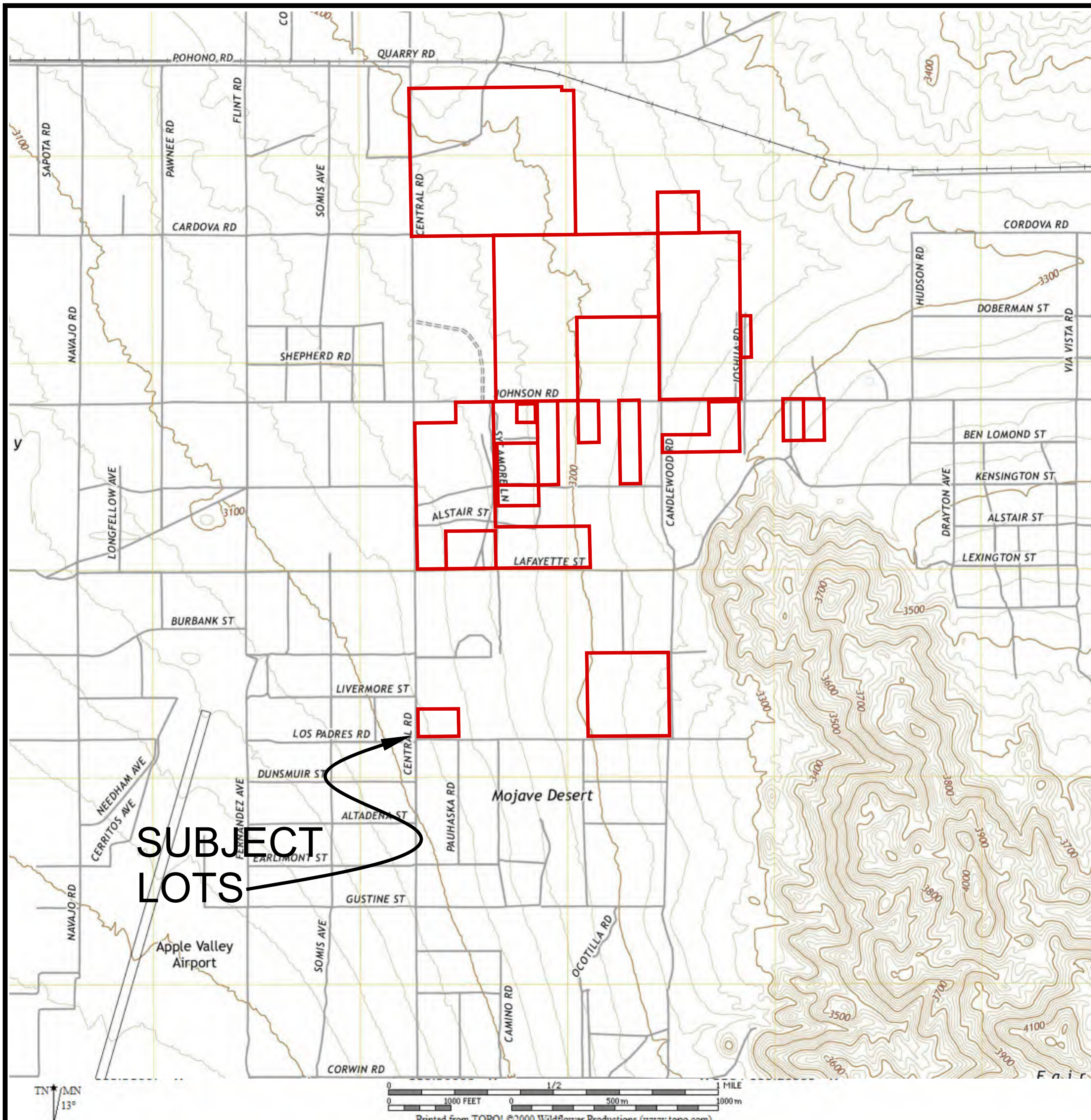

REFERENCE: U.S.G.S. TOPOGRAPHIC MAPS, 7.5 MINUTE SERIES, APPLE VALLEY NORTH, CA QUADRANGLE

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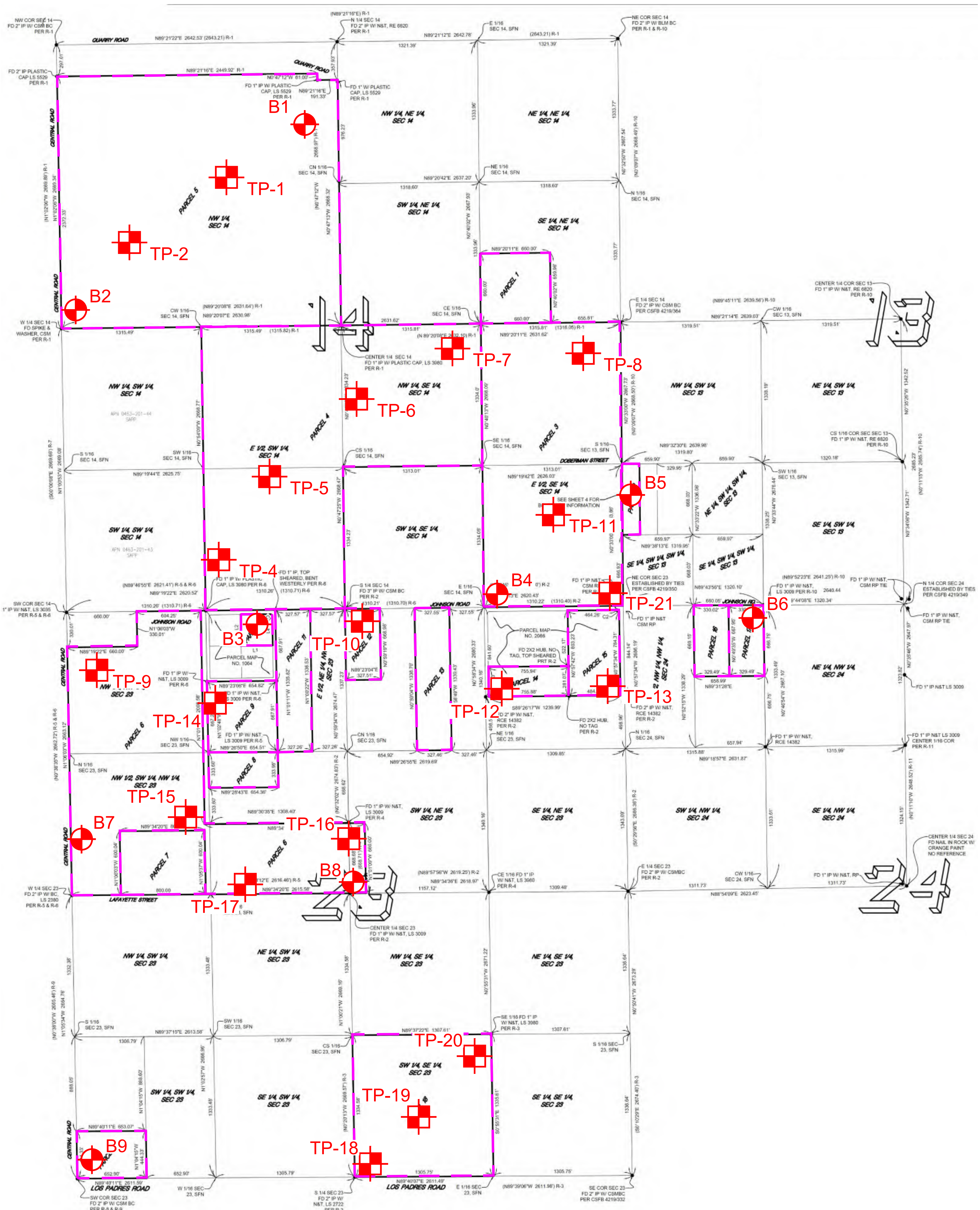
DRAFTED BY: JAO | CHECKED BY: SFK

VICINITY MAP

565 ACRES

APPLE VALLEY, CALIFORNIA

MARCH 2022	PROJECT NO. W1523-99-01	FIG. 1



LEGEND

Approximate Location of Subject Property

B9 Approximate Location of Boring

TP-21 Approximate Location of Test Pit

0 1,000' 2,000'

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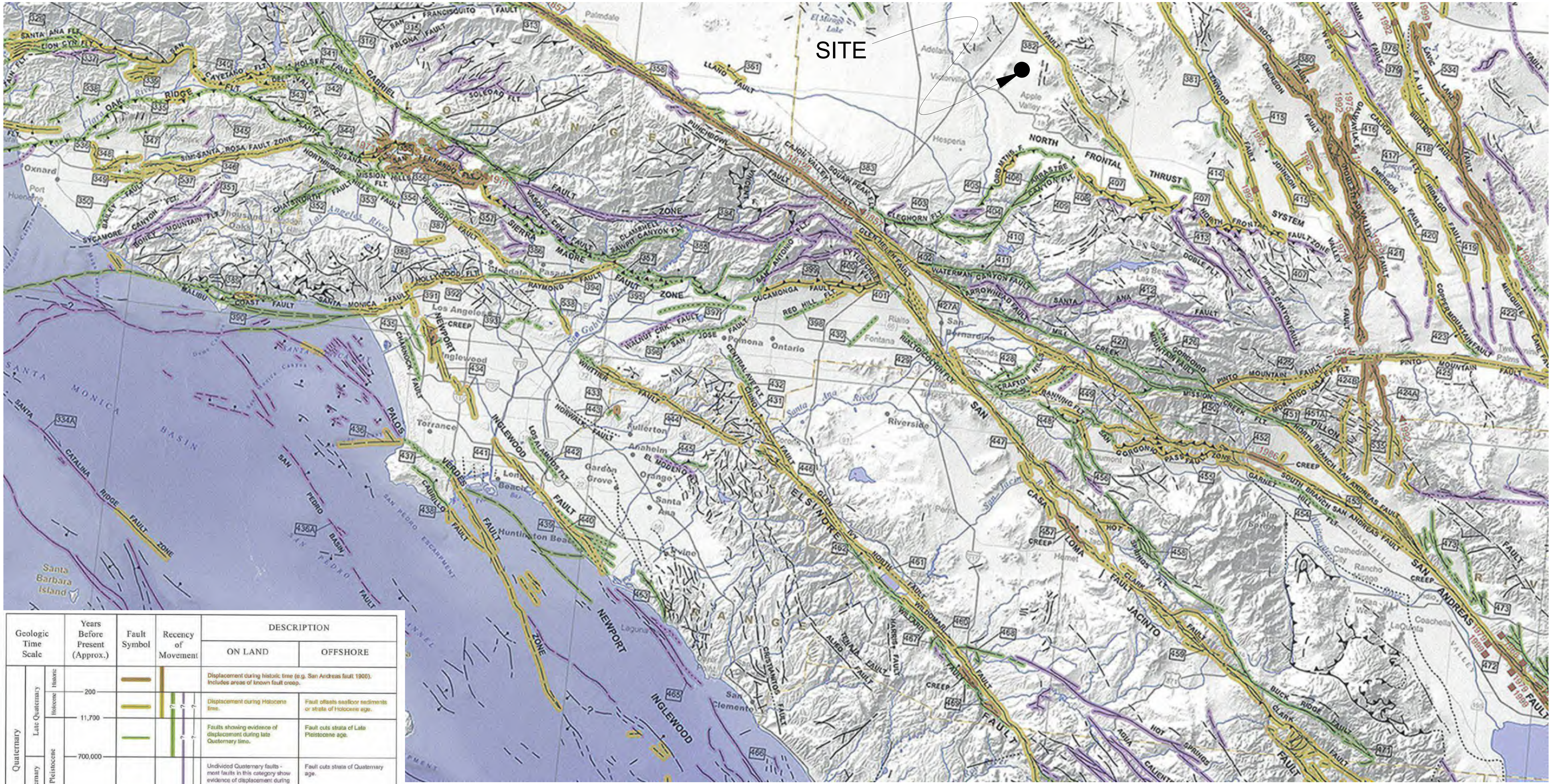
SITE PLAN

565 ACRES
APPLE VALLEY, CALIFORNIA

MARCH 2022	PROJECT NO. W1523-99-01	FIG. 2

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



Geologic Time Scale			Years Before Present (Approx.)	Fault Symbol	Recency of Movement	DESCRIPTION: ON LAND	DESCRIPTION: OFFSHORE
Quaternary	Late Quaternary	Historic				Displacement during historic time (e.g. San Andreas fault 1906). Includes areas of known fault creep.	
		Holocene	200		?	Displacement during Holocene time.	Fault offsets seafloor sediments or strata of Holocene age.
		Pleistocene	11,700		?	Faults showing evidence of displacement during late Quaternary time.	Fault cuts strata of Late Pleistocene age.
	Early Quaternary		700,000		?	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			1,600,000* — 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.

N

0 12 24 Miles

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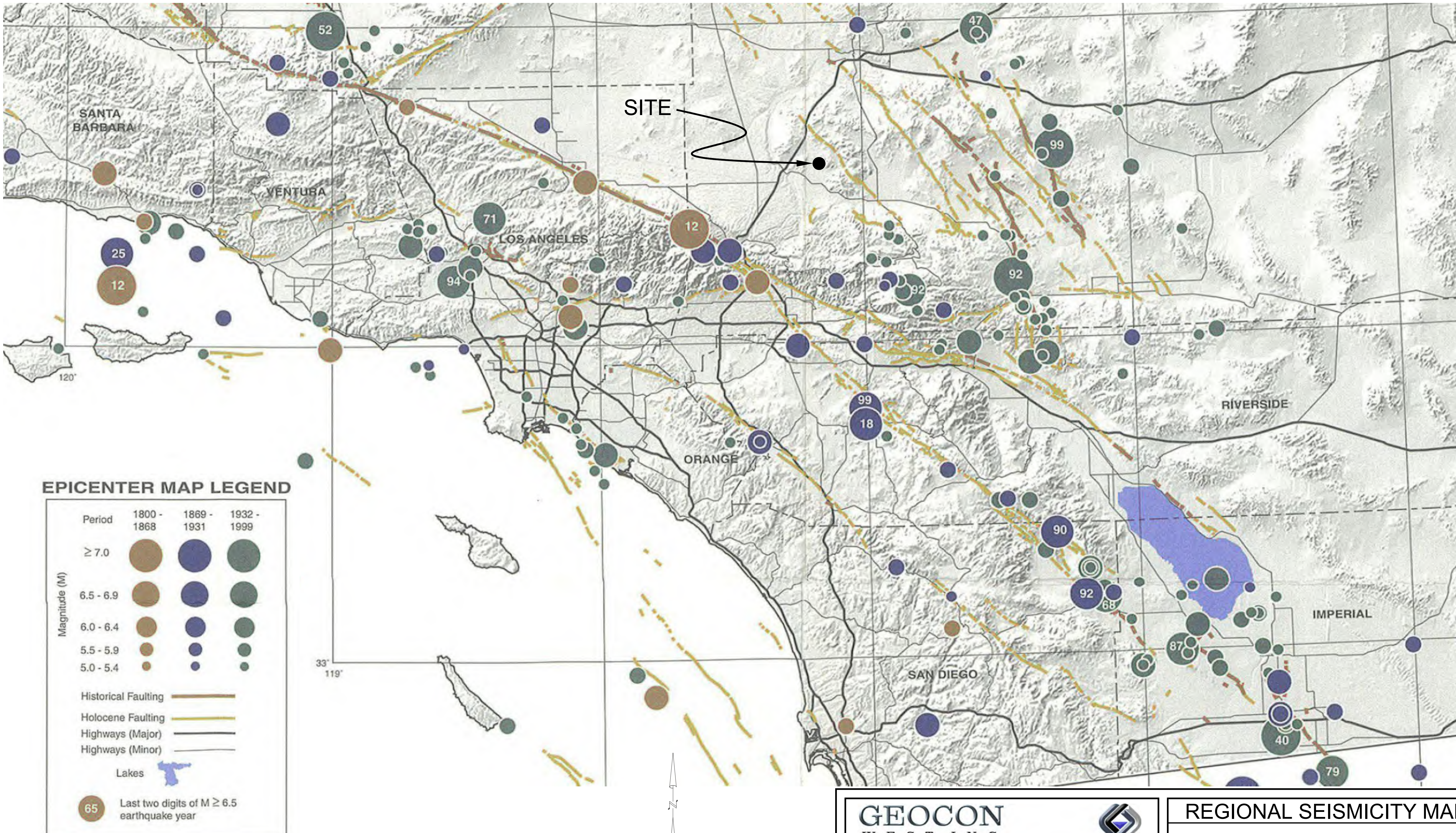
REGIONAL FAULT MAP

565 ACRES
APPLE VALLEY, CALIFORNIA

MARCH 2022 | PROJECT NO. W1523-99-01 | FIG. 3



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

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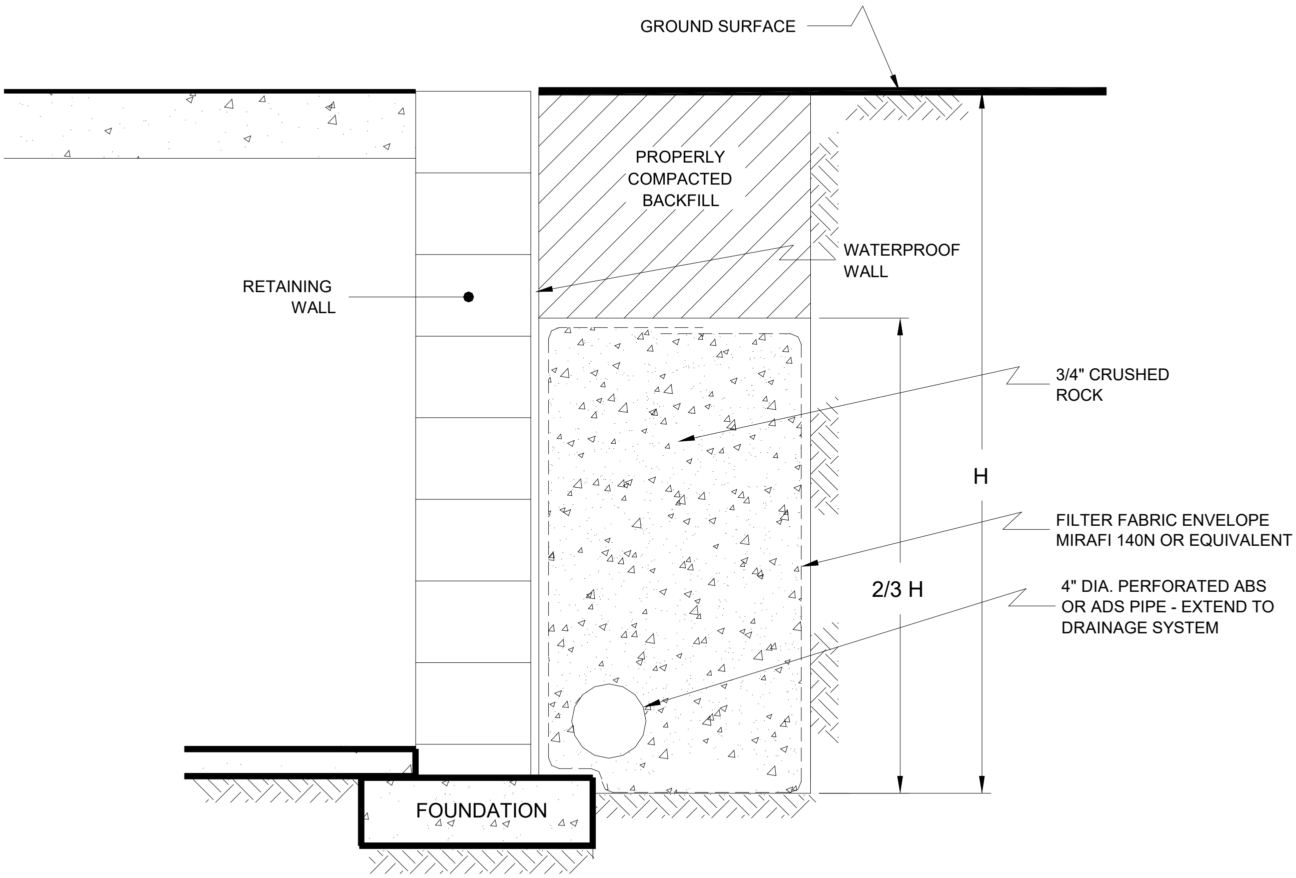
REGIONAL SEISMICITY MAP

565 ACRES
APPLE VALLEY, CALIFORNIA

MARCH 2022 | PROJECT NO. W1523-99-01 | FIG.4



NO SCALE

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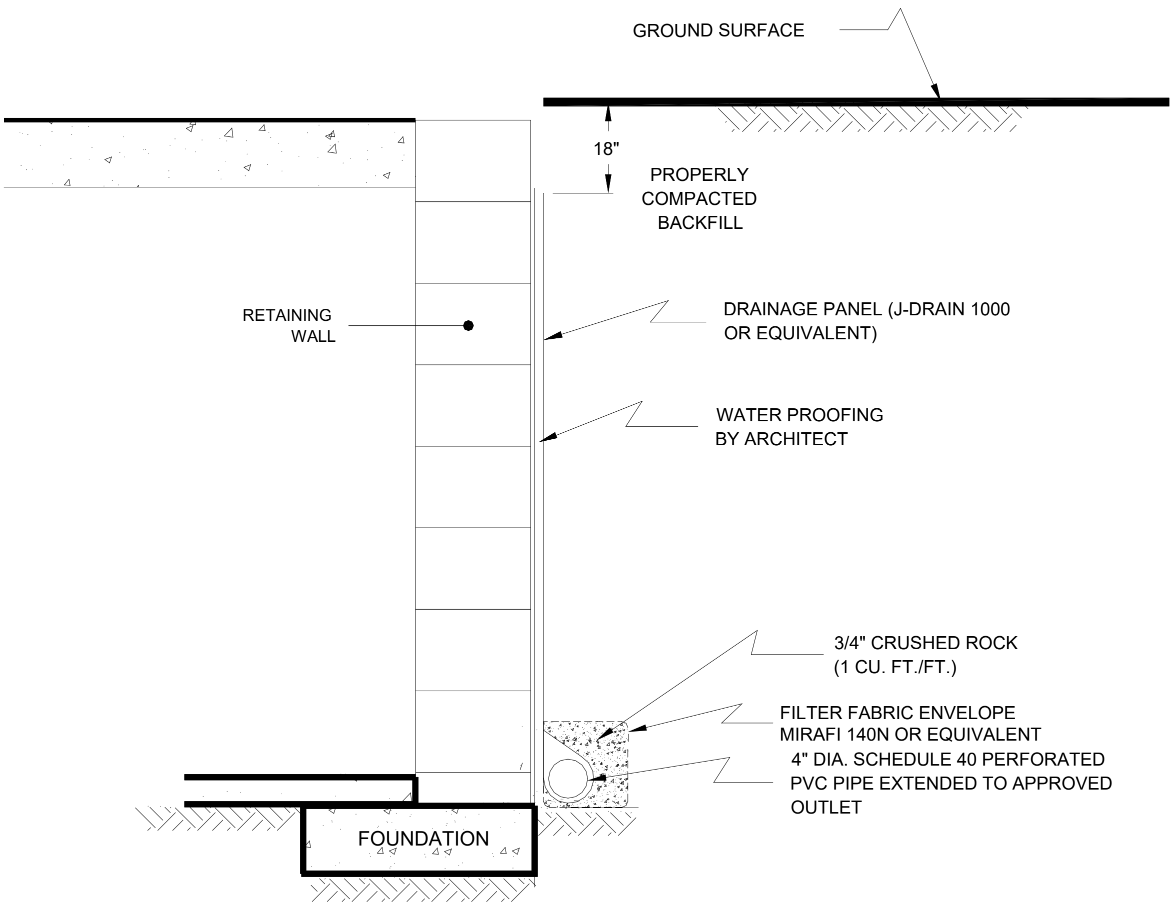
RETAINING WALL DRAIN DETAIL

565 ACRES
APPLE VALLEY, CALIFORNIA

MARCH 2022 | PROJECT NO. W1523-99-01 | FIG. 5



NO SCALE

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RETAINING WALL DRAIN DETAIL

565 ACRES
APPLE VALLEY, CALIFORNIA

MARCH 2022	PROJECT NO. W1523-99-01	FIG. 6

PERCOLATION TEST DATA SHEET

Project:	565 Acres		Project No:	W1523-99-01		Date:	7/30/2021
Test Hole No:		B2	Tested By:	JMH			
Depth of Test Hole, D_T:		5	USCS Soil Classification:		SP		
Test Hole Dimensions (inches)					Length	Width	
Diameter (if round) =		8	Sides (if rectangular) =		---	---	

Sandy Soil Criteria Test*

Trial No.	Start Time	Stop Time	Δt Time Interval (min)	D_0 Initial Depth to Water (in)	D_f Final Depth to Water (in)	ΔD Change in Water Level (in)	Greater than or Equal to 6"? (y/n)
1	10:00	10:25	25	12.0	60.0	48.0	y
2	10:30	10:55	25	12.0	60.0	48.0	y

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements, taken every 10 minutes. Otherwise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25".

Trial No.	Start Time	Stop Time	Δt Time Interval (min)	D_0 Initial Depth to Water (in)	D_f Final Depth to Water (in)	ΔD Change in Water Level (in)	Percolation Rate (min/in)
1	12:00	12:10	10	12.0	30.1	18.1	795
2	12:15	12:25	10	12.0	27.7	15.7	916
3	12:30	12:40	10	12.0	24.6	12.6	1143
4	12:45	12:55	10	12.0	23.4	11.4	1263
5	13:00	13:10	10	12.0	23.2	11.2	1290
6	13:15	13:25	10	12.0	22.8	10.8	1333
7							
8							

Infiltration Rate Calculation:

Time Interval, Δt =	10	minutes	Ho =	48.0	inches
Final Depth to Water, Df =	22.8	inches	Hf =	37.2	inches
Test Hole Radius, r =	4	inches	ΔH =	10.8	inches
Initial Depth to Water, Do =	12.0	inches	Havg =	42.6	inches
Total Depth of Test Hole, DT =	60.0	inches			

$$I_t = \frac{\Delta H(60r)}{\Delta t(r + 2H_{avg})}$$

Infiltration Rate, It = **2.91** inches/hour

Figure 7

APPENDIX A

APPENDIX A

FIELD INVESTIGATION

The site was explored on February 18, 2022 by excavating nine 8-inch diameter borings to a depth of up to approximately 24½ feet below the existing ground surface using a truck-mounted hollow-stem auger drilling machine. Refusal was encountered in two of the borings at depths of 9½ and 19½ feet. In addition, twenty test pits were excavated on March 2 and 3, 2022 to depths of up to approximately 9½ feet below the existing ground surface using a backhoe. 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 within the hollow stem auger drilling machine borings. The California Modified Sampler was equipped with 1-inch by 2³/₈-inch diameter brass sampler rings to facilitate soil removal and testing. Bulk samples were also 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 test pits and borings are presented on Figures A1 through A29. 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 test pits and borings are shown on Figure 2.

TEST PIT 1

ELEV. (MSL.) - - DATE COMPLETED 3/2/22-3/3/22

EQUIPMENT BACKHOE BY: JMH

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SP	**ALLUVIUM** Sand, poorly graded, loose, dry, light brown, fine- to medium-grained, some coarse-grained and silt.			
2				SM	**OLDER ALLUVIUM** Silty Sand, poorly graded, dense, dry, reddish brown, fine- to coarse-grained, some gravel.			
4				SW	Sand, well-graded, dense, dry, reddish brown, fine- to coarse-grained, some gravel (to 1"), trace silt.			
				SP	Sand, poorly graded, very dense, dry, light gray, fine- to medium-grained, well-cemented.			

Total depth of boring: 5.5 feet
No fill.
No groundwater encountered.
Backfilled with soil cuttings and tamped.

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

Figure A1,
Log of Test Pit 1, Page 1 of 1

W1523-99-01 TEST PIT 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. W1523-99-01

TEST PIT 2

ELEV. (MSL.) - -   DATE COMPLETED 3/2/22-3/3/22

EQUIPMENT BACKHOE   BY: JMH

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0 2				SW	**ALLUVIUM** Sand, well-graded, loose, dry, light brown, fine- to coarse-grained.			
4				SP	**OLDER ALLUVIUM** Sand, poorly graded, very dense, dry, light gray, fine- to medium-grained, some cobbles (to 10").			
					Total depth of boring: 5 feet No fill. No groundwater encountered. Backfilled with soil cuttings and tamped. NOTE: The stratification lines presented herein represent the approximate boundary between earth types; the transitions may be gradual.			

Figure A2,
Log of Test Pit 2, Page 1 of 1

W1523-99-01 TEST PIT 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

TEST PIT 4

ELEV. (MSL.) - - DATE COMPLETED 3/2/22-3/3/22

EQUIPMENT BACKHOE BY: JMH

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0 – 5.5				SW	**WASH DEPOSITS** Sand, well-graded, loose, dry, light brown, fine- to coarse-grained, some fine gravel (to 1"), trace silt.			
5.5 – 8				SM	**OLDER ALLUVIUM** Silty Sand, poorly graded, medium dense, dry, brown to light brown, fine- to medium-grained, slightly cemented, some cobbles (to 8").			

Total depth of boring: 8 feet
No fill.
No groundwater encountered.
Backfilled with soil cuttings and tamped.

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

Figure A3,
Log of Test Pit 4, Page 1 of 1

W1523-99-01 TEST PIT 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.

TEST PIT 5

ELEV. (MSL.) - - DATE COMPLETED 3/2/22-3/3/22

EQUIPMENT BACKHOE BY: JMH

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0 – 6				SW	**WASH DEPOSITS** Sand, well-graded, loose, dry, brown, fine- to coarse-grained, some fine gravel (to 1") and cobbles (to 10"), trace silt.			
					Total depth of boring: 6 feet No fill. No groundwater encountered. Backfilled with soil cuttings and tamped. NOTE: The stratification lines presented herein represent the approximate boundary between earth types; the transitions may be gradual.			

Figure A4,
Log of Test Pit 5, Page 1 of 1

W1523-99-01 TEST PIT 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

TEST PIT 6

ELEV. (MSL.) **- -** DATE COMPLETED **3/2/22-3/3/22**

EQUIPMENT **BACKHOE** BY: **JMH**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0 – 3				SW	**WASH DEPOSITS** Sand, well-graded, loose, dry, brown, fine- to coarse-grained, some fine gravel (to 1").			
3 – 5				SW	Sand with Gravel, well-graded, loose, dry, brown, fine- to coarse-grained, fine to coarse gravel, some cobbles (to 12").			

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

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

Figure A5,
Log of Test Pit 6, Page 1 of 1

W1523-99-01 TEST PIT 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. W1523-99-01

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TEST PIT 7 ELEV. (MSL.) - - DATE COMPLETED 3/2/22-3/3/22 EQUIPMENT BACKHOE BY: JMH	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0 – 5.5				SM	**WASH DEPOSITS** Silty Sand, poorly graded, loose, dry, light brown, fine-grained, some medium-grained and fine gravel, trace cobbles (to 6").			
5.5 – 6				SP	Sand, poorly graded, loose, dry, light brown, fine- to medium-grained, some gravel (to 3"), trace silt.			

Total depth of boring: 6 feet
No fill.
No groundwater encountered.
Backfilled with soil cuttings and tamped.

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

Figure A6,
Log of Test Pit 7, Page 1 of 1

W1523-99-01 TEST PIT 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

TEST PIT 8

ELEV. (MSL.) - - DATE COMPLETED 3/2/22-3/3/22

EQUIPMENT BACKHOE BY: JMH

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0 – 6				SW	**WASH DEPOSITS** Sand, well-graded, loose, dry, light brown, fine- to coarse-grained, some gravel (to 2") and cobbles (to 10").			
6					Total depth of boring: 6 feet No fill. No groundwater encountered. Backfilled with soil cuttings and tamped. NOTE: The stratification lines presented herein represent the approximate boundary between earth types; the transitions may be gradual.			

Figure A7,
Log of Test Pit 8, Page 1 of 1

W1523-99-01 TEST PIT 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.

TEST PIT 9

ELEV. (MSL.) - - DATE COMPLETED 3/2/22-3/3/22

EQUIPMENT BACKHOE BY: JMH

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0 – 2				SW	**WASH DEPOSITS** Sand, well-graded, loose, dry, light brown to brown, fine- to coarse-grained.			
2 – 3				SM	Silty Sand, poorly graded, loose, moist, brown, fine- to medium-grained.			
3 – 6				SW	Sand, well-graded, loose, slightly moist, brown, fine- to coarse-grained, some gravel (to 1/2").			

Total depth of boring: 6 feet
No fill.
No groundwater encountered.
Backfilled with soil cuttings and tamped.

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

Figure A8,
Log of Test Pit 9, Page 1 of 1

W1523-99-01 TEST PIT 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. W1523-99-01

TEST PIT 10

ELEV. (MSL.) - - DATE COMPLETED 3/2/22-3/3/22

EQUIPMENT BACKHOE BY: JMH

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0 – 2				SP	**ALLUVIUM** Silty Sand, poorly graded, loose, slightly moist, brown, fine- to medium-grained.			
2 – 7				SM	**OLDER ALLUVIUM** Silty Sand, poorly graded, very dense, slightly moist, brown to reddish brown, fine- to medium-grained, calcium stringers throughout.			
7 – 8				SP	Sand, poorly graded, very dense, dry, light gray, fine- to medium-grained, highly cemented.			

Total depth of boring: 8 feet
No fill.
No groundwater encountered.
Backfilled with soil cuttings and tamped.

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

Figure A9,
Log of Test Pit 10, Page 1 of 1

W1523-99-01 TEST PIT 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.

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TEST PIT 11

ELEV. (MSL.) - - DATE COMPLETED 3/2/22-3/3/22

EQUIPMENT BACKHOE BY: JMH

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0 – 2 –				SP	**ALLUVIUM** Sand, poorly graded, medium dense, dry, brown, fine- to medium-grained.			
4 –				SP	**OLDER ALLUVIUM** Sand, poorly graded, very dense, dry, light gray, fine- to medium-grained, highly cemented.			

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

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

Figure A10,
Log of Test Pit 11, Page 1 of 1

W1523-99-01 TEST PIT 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. W1523-99-01

TEST PIT 12

ELEV. (MSL.) - - DATE COMPLETED 3/2/22-3/3/22

EQUIPMENT BACKHOE BY: JMH

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0 – 1.5				SP	**ALLUVIUM** Sand, poorly graded, loose to medium dense, dry, brown, fine- to medium-grained, trace coarse-grained, some silt.			
1.5 – 5				SM	**OLDER ALLUVIUM** Silty Sand, poorly graded, very dense, dry, reddish brown, fine- to medium-grained, calcium stringers throughout, slightly cemented, some granitic gravel (to 3").			
5 – 8				SP	Sand, poorly graded, very dense, dry, light gray, fine- to medium-grained, highly cemented.			

Refusal at 8 feet.
No fill.
No groundwater encountered.
Backfilled with soil cuttings and tamped.

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

Figure A11,
Log of Test Pit 12, Page 1 of 1

W1523-99-01 TEST PIT 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

TEST PIT 13

ELEV. (MSL.) - - DATE COMPLETED 3/2/22-3/3/22

EQUIPMENT BACKHOE BY: JMH

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SP	**ALLUVIUM** Sand, poorly graded, loose, dry, light brown, fine- to medium-grained, trace silt.			
2				SP	**OLDER ALLUVIUM** Sand, poorly graded, very dense, dry, light gray, fine- to medium-grained, highly cemented.			
4								

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

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

Figure A12,
Log of Test Pit 13, Page 1 of 1

W1523-99-01 TEST PIT 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.

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TEST PIT 14 ELEV. (MSL.) **- -** DATE COMPLETED **3/2/22-3/3/22** EQUIPMENT **BACKHOE** BY: **JMH**	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SW	**ALLUVIUM** Sand, well-graded, loose to medium dense, dry, brown, fine- to coarse-grained, some fine gravel (to 1").			
2 4 6				SM	**OLDER ALLUVIUM** Silty Sand, poorly graded, very dense, reddish brown, slightly moist, fine- to medium-grained, slightly cemented.			
8				SP	Sand, poorly graded, very dense, light gray, fine- to medium-grained, highly cemented.			

Total depth of boring: 9.5 feet
No fill.
No groundwater encountered.
Backfilled with soil cuttings and tamped.

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

Figure A13,
Log of Test Pit 14, Page 1 of 1

W1523-99-01 TEST PIT 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. W1523-99-01

TEST PIT 15

ELEV. (MSL.) - - DATE COMPLETED 3/2/22-3/3/22

EQUIPMENT BACKHOE BY: JMH

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SP	**ALLUVIUM** Sand, poorly graded, loose to medium dense, slightly moist, brown, fine- to coarse-grained, some fine gravel (to 1").			
2				SM	**OLDER ALLUVIUM** Silty Sand, poorly graded, dense, slightly moist, reddish brown, fine- to medium-grained, calcium stringers throughout, slightly cemented.			
4				SP	Sand, poorly graded, very dense, dry, light grayish brown, fine- to medium-grained, highly cemented.			

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

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

Figure A14,
Log of Test Pit 15, Page 1 of 1

W1523-99-01 TEST PIT 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.

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PROJECT NO. W1523-99-01

TEST PIT 16

ELEV. (MSL.) - - DATE COMPLETED 3/2/22-3/3/22

EQUIPMENT BACKHOE BY: JMH

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0 – 3.5				SP	**ALLUVIUM** Sand, poorly graded, medium dense, dry, light brown, fine- to medium-grained, some fine gravel.			
3.5 – 6				SP	**OLDER ALLUVIUM** Sand, poorly graded, very dense, dry, light grayish brown, fine- to medium-grained, highly cemented.			

Total depth of boring: 6 feet
No fill.
No groundwater encountered.
Backfilled with soil cuttings and tamped.

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

Figure A15,
Log of Test Pit 16, Page 1 of 1

W1523-99-01 TEST PIT 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.

TEST PIT 17

ELEV. (MSL.) - - DATE COMPLETED 3/2/22-3/3/22

EQUIPMENT **BACKHOE** BY: **JMH**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0 – 2				SM	**ALLUVIUM** Silty Sand, poorly graded, loose to medium dense, slightly moist, brown, fine-grained, some medium-grained.			
2 – 5				SM	**OLDER ALLUVIUM** Silty Sand, poorly graded, dense to very dense, slightly moist, reddish brown, fine-grained, some medium-grained and granitic gravel (to 3").			
					Total depth of boring: 5 feet No fill. No groundwater encountered. Backfilled with soil cuttings and tamped. NOTE: The stratification lines presented herein represent the approximate boundary between earth types; the transitions may be gradual.			

Figure A16,
Log of Test Pit 17, Page 1 of 1

W1523-99-01 TEST PIT 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.

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TEST PIT 18 ELEV. (MSL.) - - DATE COMPLETED 3/2/22-3/3/22 EQUIPMENT BACKHOE BY: JMH	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**ALLUVIUM** Silty Sand, poorly graded, medium dense, slightly moist, light brown, fine-grained.			
2				SP	**OLDER ALLUVIUM** Sand, poorly graded, very dense, dry, light grayish brown, fine- to medium-grained, highly cemented.			
4								

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

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

Figure A17,
Log of Test Pit 18, Page 1 of 1

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

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

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DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TEST PIT 19 ELEV. (MSL.) - - DATE COMPLETED 3/2/22-3/3/22 EQUIPMENT BACKHOE BY: JMH	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0 2 4				SW	**ALLUVIUM** Sand, well-graded, loose, slightly moist, brown, fine- to coarse-grained, some gravel (to 3") and cobbles (to 10"), trace silt and rootelts (to 3'). - decrease in silt			
					Total depth of boring: 5 feet No fill. No groundwater encountered. Backfilled with soil cuttings and tamped. NOTE: The stratification lines presented herein represent the approximate boundary between earth types; the transitions may be gradual.			

Figure A18,
Log of Test Pit 19, Page 1 of 1

W1523-99-01 TEST PIT LOGS.GPJ

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

PROJECT NO. W1523-99-01

TEST PIT 20

ELEV. (MSL.) - - DATE COMPLETED 3/2/22-3/3/22

EQUIPMENT BACKHOE BY: JMH

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SM	**ALLUVIUM** Silty Sand, poorly graded, medium dense, slightly moist, brown, fine-grained, some medium-grained and fine gravel (to 1/2").			
2 4				SP	**OLDER ALLUVIUM** Sand, poorly graded, very dense, dry, light grayish brown, fine- to medium-grained, highly cemented, trace oxidation staining.			

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

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

Figure A19,
Log of Test Pit 20, Page 1 of 1

W1523-99-01 TEST PIT 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. W1523-99-01

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	TEST PIT 21 ELEV. (MSL.) - - DATE COMPLETED 3/2/22-3/3/22 EQUIPMENT BACKHOE BY: JMH	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SP	**ALLUVIUM** Sand, poorly graded, loose, brown, dry, fine- to medium-grained, some silt.			
2				SM	**OLDER ALLUVIUM** Silty Sand, poorly graded, medium dense to dense, dry, reddish brown, fine- to medium-grained, calcium stringers throughout, slightly cemented.			
4				SP	Sand, poorly graded, very dense, dry, light grayish brown, fine- to medium-grained, highly cemented.			

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

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

Figure A20,
Log of Test Pit 21, Page 1 of 1

W1523-99-01 TEST PIT 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 1

ELEV. (MSL.) - - DATE COMPLETED 02/18/2021

EQUIPMENT HOLLOW STEM AUGER BY: JMH

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' B1@1'			SM	**OLDER ALLUVIUM** Silty Sand with Gravel, poorly graded, very dense, dry, reddish brown, fine- to medium-grained.	50 (6")		
2								
4	B1@4.5'				- light brown	50 (5")	164.0	7.5
6								
8	B1@9'				- cobbles	50 (3")	120.8	3.7

Refusal at 9.5 feet.
No fill.
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.

W1523-99-01 BORING LOGS.GPJ

Figure A21,
Log of Boring 1, Page 1 of 1

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

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

BORING 2

ELEV. (MSL.) - - DATE COMPLETED 02/18/2021

EQUIPMENT HOLLOW STEM AUGER BY: JMH

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'				**ALLUVIUM** Sand, well-graded, medium dense, dry, light brown, fine- to coarse-grained, trace gravel.			
2	B2@2'			SW		26	109.0	4.7
4								
	B2@5'					40	107.2	10.9
6					**OLDER ALLUVIUM** Sand, well-graded, medium dense, dry, light brown, fine- to coarse-grained, trace gravel.			
8				SW				
10	B2@10'				- brown	50 (5")	114.9	3.3
12								
					Gravel with Sand, poorly graded, very dense, dry, gray, fine- to coarse-grained, fine gravel.			
14	B2@14'					50 (4")		
16				GP				
18								
	B2@19'				- no recovery			

Refusal at 19.5 feet.
No fill.
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.

W1523-99-01 BORING LOGS.GPJ

Figure A22,
Log of Boring 2, Page 1 of 1

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

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

PROJECT NO. W1523-99-01

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING 3 ELEV. (MSL.) - - DATE COMPLETED 02/18/2021 EQUIPMENT HOLLOW STEM AUGER BY: JMH	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0					**OLDER ALLUVIUM** Silty Sand, poorly graded, very dense, dry, dark reddish brown, fine- to medium-grained, well-cemented.			
2	B3@2'			SM		50 (3")	116.4	8.5
4	B3@4'				- light brown, fine-grained	50 (6")	92.3	13.0
					Sand, poorly graded, very dense, dry, light brown, fine- to medium-grained.			
6								
8				SP				
10	B3@9.5'					50 (2")	109.2	7.1
12								
14					Sand, well-graded, very dense, dry, light brown, fine- to coarse-grained, some gravel.			
	B3@15'					50 (5")	126.9	1.8
16				SW				
18					Sand, poorly graded, very dense, dry, light brown, fine- to medium-grained.			
	B3@19'			SP		50 (5")	100.0	8.1

Total depth of boring: 19.5 feet
No fill.
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 A23,
Log of Boring 3, Page 1 of 1

W1523-99-01 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 4

ELEV. (MSL.) - - DATE COMPLETED 02/18/2021

EQUIPMENT HOLLOW STEM AUGER BY: JMH

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					**OLDER ALLUVIUM** Sand, poorly graded, very dense, dry, light reddish brown, fine- to medium-grained, well-cemented.			
2	B4@1.5'					50 (6")	108.8	5.0
4	B4@4'				- light brown	50 (6")	105.1	5.2
6				SP				
8								
10	B4@9'					50 (2")	107.4	2.8
12								
14	B4@14.5'				Sand, well-graded, very dense, dry, light brown, fine- to coarse-grained.	50 (6")		
16				SW				
18	B4@19'					50 (2")	76.8	6.0

Total depth of boring: 19.5 feet
No fill.
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 A24,
Log of Boring 4, Page 1 of 1

W1523-99-01 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. W1523-99-01

BORING 5

ELEV. (MSL.) - - DATE COMPLETED 02/18/2021

EQUIPMENT HOLLOW STEM AUGER BY: JMH

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					**OLDER ALLUVIUM** Sand, poorly graded, very dense, dry, light grayish brown, fine-grained, some medium-grained, well-cemented.			
2	B5@1.5'					50 (6")	92.9	5.2
4	B5@4.5'				- white	50 (6")	84.7	6.9
6								
8								
10	B5@9.5'				- light brown	50 (3")	119.8	2.4
12				SP				
14	B5@14'				- some fine gravel	50 (5")	108.3	4.4
16								
18								
20	B5@19'					50 (6")	92.4	15.5
22								
24	B5@24'					50 (2")	111.9	2.5

Total depth of boring: 24.5 feet
No fill.
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.

W1523-99-01 BORING LOGS.GPJ

Figure A25,
Log of Boring 5, Page 1 of 1

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

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

PROJECT NO. W1523-99-01

BORING 6

ELEV. (MSL.) - - DATE COMPLETED 02/18/2021

EQUIPMENT HOLLOW STEM AUGER BY: JMH

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'				**OLDER ALLUVIUM** Sand, poorly graded, very dense, dry, light brown, fine- to medium-grained, well-cemented.			
2	B6@2'					50 (6")	110.1	4.3
4	B6@4'					50 (6")	146.4	3.7
6	B6@6'				- no recovery	50 (2")		
8				SP				
10	B6@9.5'				- trace coarse-grained	50 (5")	126.4	1.9
12								
14	B6@14'					50 (5")	94.5	4.2
16								
18								
	B6@19'				- no recovery	50 (2")	121.5	2.0

Total depth of boring: 19.5 feet
No fill.
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.

W1523-99-01 BORING LOGS.GPJ

Figure A26,
Log of Boring 6, Page 1 of 1

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

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

GEOCON

BORING 7

ELEV. (MSL.) - - DATE COMPLETED 02/18/2021

EQUIPMENT HOLLOW STEM AUGER BY: JMH

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					**OLDER ALLUVIUM**			
	B7@1'			SP	Sand, poorly graded, very dense, dry, brown, fine-grained, trace medium-grained, some silt.	50 (6")	121.5	2.0
4	B7@4'				- light brown, fine- to medium-grained	50 (6")	101.6	4.5
10	B7@9.5'				- some coarse-grained	50 (3")	117.3	4.6
14	B7@14.5'			SW	Sand, well-graded, very dense, dry, light brown, fine- to coarse-grained, trace silt.	50 (6")	115.8	3.6
18					- some fine gravel			
20	B7@19.5'					50 (6")	115.6	3.7

Refusal at 20 feet.
No fill.
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.

W1523-99-01 BORING LOGS.GPJ

Figure A27,
Log of Boring 7, Page 1 of 1

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

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

PROJECT NO. W1523-99-01

BORING 8

ELEV. (MSL.) - - DATE COMPLETED 02/18/2021

EQUIPMENT HOLLOW STEM AUGER BY: JMH

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'			SM	**ALLUVIUM** Silty Sand, poorly graded, very dense, dry, light brown, fine-grained, trace medium-grained.			
2	B8@1.5'					50 (2")	96.7	9.1
				SP	**OLDER ALLUVIUM** Sand, poorly graded, very dense, dry, light brown, fine- to medium-grained, well cemented.			
4	B8@4'					50 (6")	101.1	6.0
6								
8								
	B8@9'				- no cementation	50 (5")	120.0	3.4
10								
12								
14	B8@14'				- fine-grained, trace medium-grained	50 (3")	109.1	5.3
16								
18								
	B8@19'					50 (5")	114.5	6.1
20				SW	Sand, well-graded, very dense, dry, light brown, fine- to coarse-grained, some fine gravel.			
22								
24	B8@24'				- no recovery	50 (1")		

Total depth of boring: 24.5 feet
No fill.
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

W1523-99-01 BORING LOGS.GPJ

Figure A28,
Log of Boring 8, 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.

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DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING 8 ELEV. (MSL.) - - DATE COMPLETED 02/18/2021 EQUIPMENT HOLLOW STEM AUGER BY: JMH	PENETRATION RESISTANCE (BLOWS/FT*)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
					boundary between earth types; the transitions may be gradual.			

Figure A28,
Log of Boring 8, Page 2 of 2

W1523-99-01 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. W1523-99-01

BORING 9

ELEV. (MSL.) - - DATE COMPLETED 02/18/2021

EQUIPMENT HOLLOW STEM AUGER BY: JMH

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'			SP	**OLDER ALLUVIUM** Sand, poorly grded, medium dense, dry, light reddish brown, fine- to medium-grained.			
2	B9@2'					28	102.1	12.0
5	B9@5'				- very dense, trace silt, slightly moist	50 (5")	116.6	3.7
9	B9@9'					50 (6")	117.2	2.7
14	B9@14'					50 (6")	109.2	4.9
19	B9@19'					50 (5")	128.4	2.5
21				SM	Silty Sand, poorly graded, very dense, slightly moist, light brown, fine- to medium-grained, calcium stringers throughout.			
24	B9@24'						116.8	4.1

Total depth of boring: 24.5 feet
No fill.
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.

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Figure A29,
Log of Boring 9, Page 1 of 1

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

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

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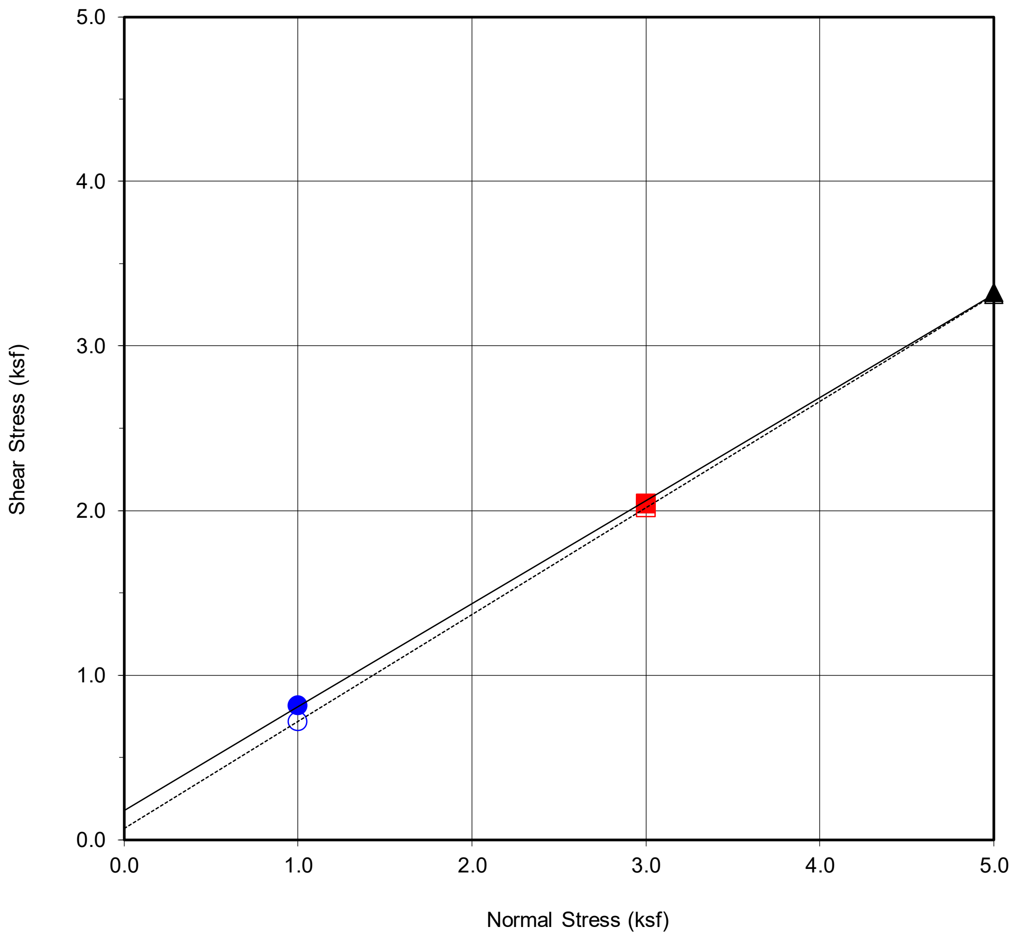
APPENDIX B

APPENDIX B

LABORATORY TESTING

Laboratory tests were performed in accordance with generally accepted test methods of the “American Society of Testing and Materials (ASTM)”, or other suggested procedures. Selected samples were tested for direct shear strength, consolidation characteristics, maximum dry density, corrosivity, in-place dry density and moisture content. The results of the laboratory tests are summarized in Figures B1 through B30. The in-place dry density and moisture content of the samples tested are presented on the boring logs, Appendix A.



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

Soil Identification:		
Silty Sand with Gravel (SM)		
Strength Parameters		
	C (psf)	ϕ (^{o})
Peak	179	32.1
Ultimate	72	32.9

Normal Stress (kip/ft2)	1	3	5
Peak Shear Stress (kip/ft²)	● 0.82	■ 2.04	▲ 3.32
Shear Stress @ End of Test (ksf)	○ 0.72	□ 2.02	△ 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 (%)	8.0	7.9	7.9
Initial Dry Density (pcf)	117.0	117.0	117.0
Initial Degree of Saturation (%)	48.9	48.5	48.3
Soil Height Before Shearing (in.)	1.2	1.2	1.2
Final Moisture Content (%)	16.4	15.2	15.3

GEOCON

DIRECT SHEAR TEST RESULTS

Consolidated Drained ASTM D-3080

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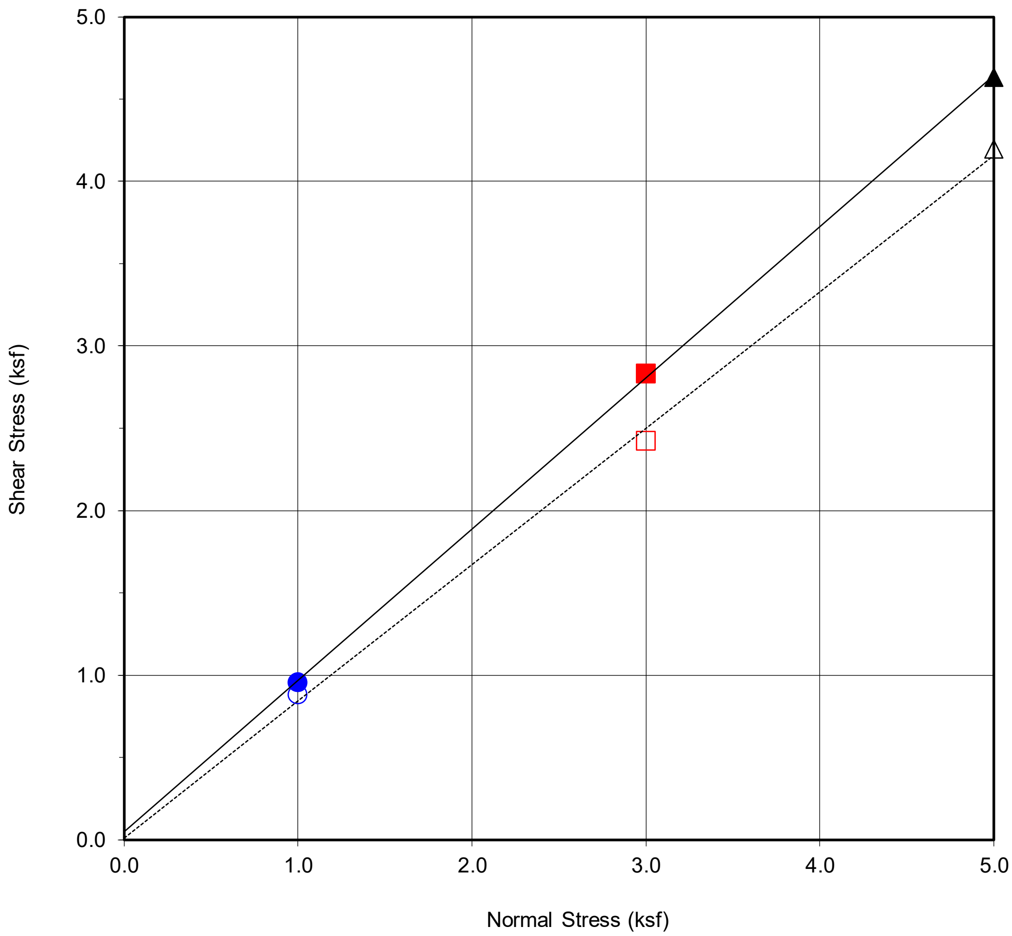
Figure B1



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

Soil Identification:		
Well Graded Sand (SW)		
Strength Parameters		
	C (psf)	ϕ (°)
Peak	49	42.6
Ultimate	14	39.7

Normal Stress (kip/ft2)	1	3	5
Peak Shear Stress (kip/ft²)	● 0.96	■ 2.83	▲ 4.63
Shear Stress @ End of Test (ksf)	○ 0.88	□ 2.42	△ 4.20
Deformation Rate (in./min.)	0.05	0.05	0.05
Initial Sample Height (in.)	1.0	1.0	1.0
Ring Inside Diameter (in.)	2.375	2.375	2.375
Initial Moisture Content (%)	7.6	7.6	7.6
Initial Dry Density (pcf)	118.0	118.0	118.0
Initial Degree of Saturation (%)	48.2	48.1	47.9
Soil Height Before Shearing (in.)	1.2	1.2	1.2
Final Moisture Content (%)	12.7	12.7	12.3

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DIRECT SHEAR TEST RESULTS

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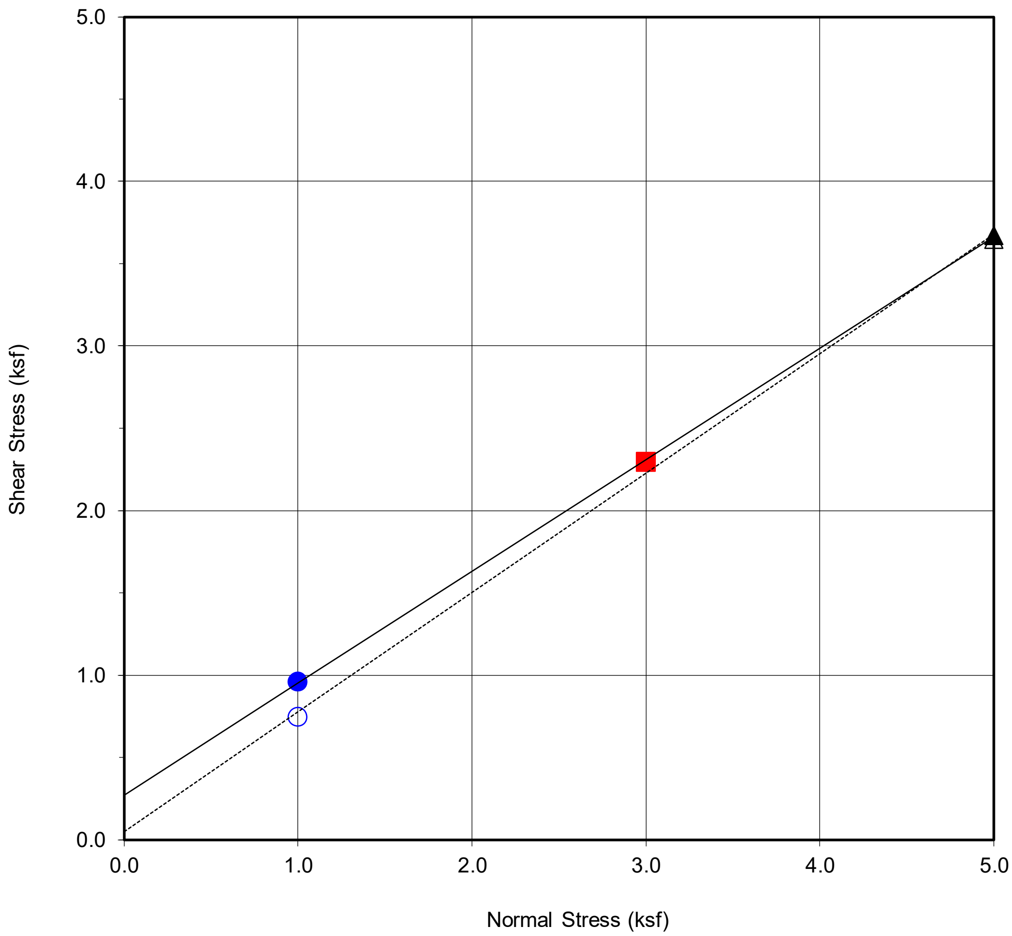
Figure B2



Boring No.	**B8**
Sample No.	**B8@0-5'**
Depth (ft)	**0-5'**
Sample Type:	Bulk

Soil Identification:

Silty Sand (SM)

Strength Parameters

	C (psf)	ϕ (°)
Peak	274	34.1
Ultimate	50	36.0

Normal Stress (kip/ft2)	1	3	5
Peak Shear Stress (kip/ft²)	● 0.96	■ 2.29	▲ 3.67
Shear Stress @ End of Test (ksf)	○ 0.74	□ 2.29	△ 3.65
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 (%)	8.1	8.2	8.2
Initial Dry Density (pcf)	118.0	118.0	118.0
Initial Degree of Saturation (%)	51.3	51.8	51.6
Soil Height Before Shearing (in.)	1.2	1.2	1.2
Final Moisture Content (%)	15.1	14.7	14.1

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DIRECT SHEAR TEST RESULTS

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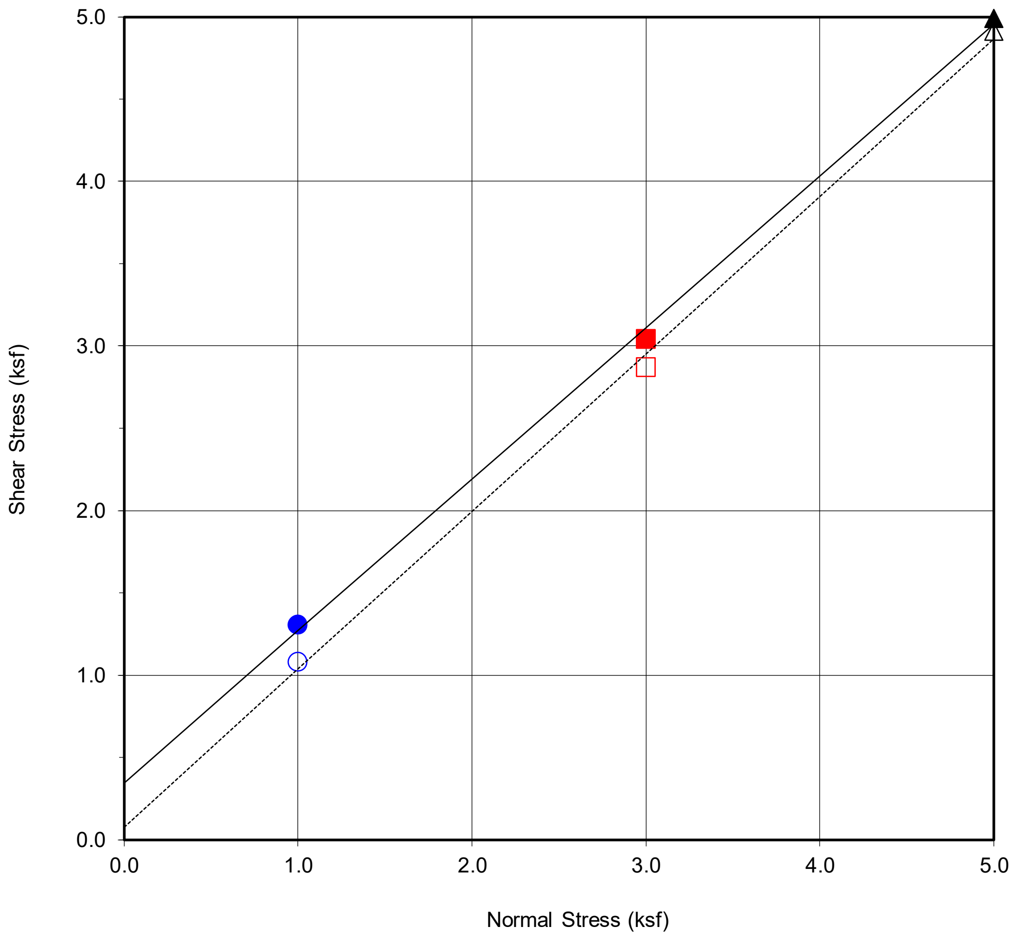
Figure B3



Boring No.	**B2**
Sample No.	**B2@2'**
Depth (ft)	**2**
Sample Type:	Ring

Soil Identification:		
Well Graded Sand (SW)		
Strength Parameters		
	C (psf)	ϕ (°)
Peak	348	42.7
Ultimate	80	43.8

Normal Stress (kip/ft2)	1	3	5
Peak Shear Stress (kip/ft²)	● 1.30	■ 3.04	▲ 4.99
Shear Stress @ End of Test (ksf)	○ 1.08	□ 2.87	△ 4.91
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 (%)	4.7	4.7	5.6
Initial Dry Density (pcf)	108.7	109.7	108.3
Initial Degree of Saturation (%)	23.2	23.4	27.1
Soil Height Before Shearing (in.)	1.2	1.2	1.2
Final Moisture Content (%)	15.4	15.5	13.8

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DIRECT SHEAR TEST RESULTS

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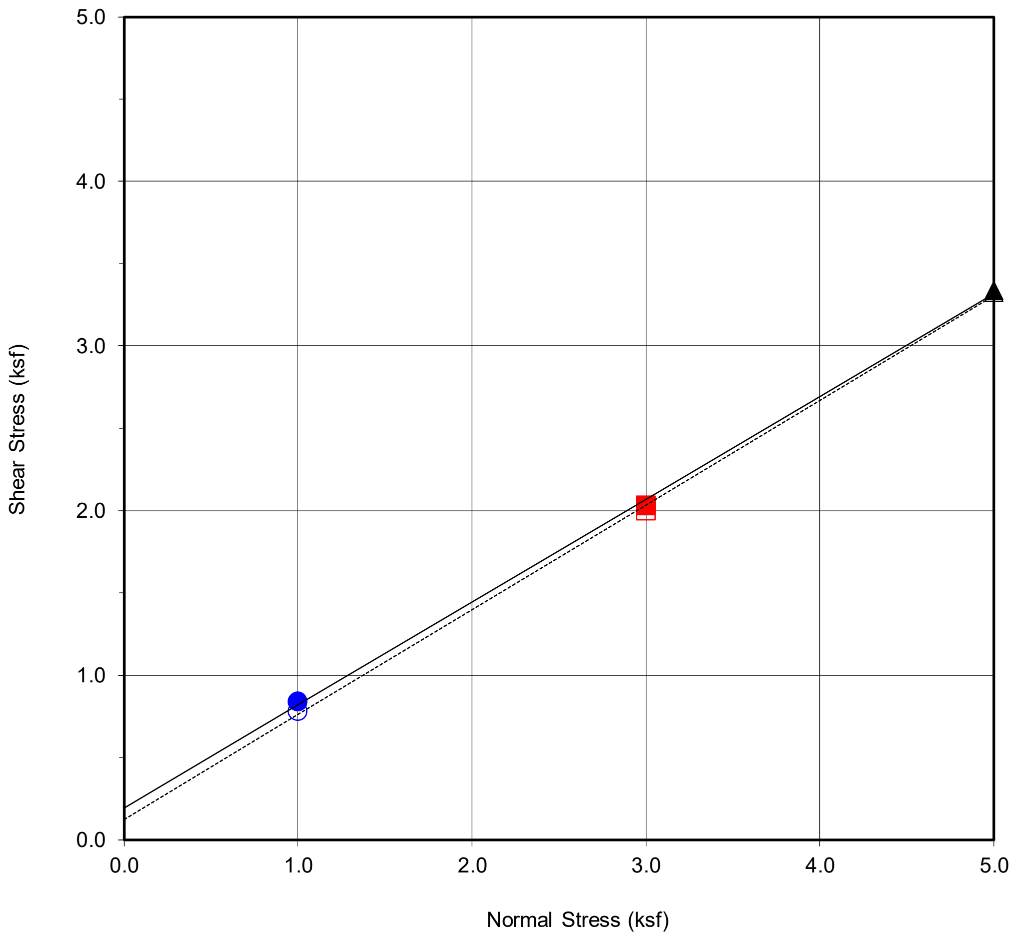
Figure B4



Boring No.	**B3**
Sample No.	**B3@4'**
Depth (ft)	**4**
Sample Type:	Ring

Normal Stress (kip/ft2)	1	3	5
Peak Shear Stress (kip/ft²)	● 0.84	■ 2.03	▲ 3.34
Shear Stress @ End of Test (ksf)	○ 0.78	□ 2.00	△ 3.32
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 (%)	13.0	10.6	12.0
Initial Dry Density (pcf)	92.4	93.1	90.9
Initial Degree of Saturation (%)	42.5	35.3	38.0
Soil Height Before Shearing (in.)	1.2	1.2	1.2
Final Moisture Content (%)	25.0	20.5	20.1

Soil Identification:

Silty Sand (SM)

Strength Parameters

	C (psf)	ϕ (°)
Peak	197	32.0
Ultimate	127	32.5

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DIRECT SHEAR TEST RESULTS

Consolidated Drained ASTM D-3080

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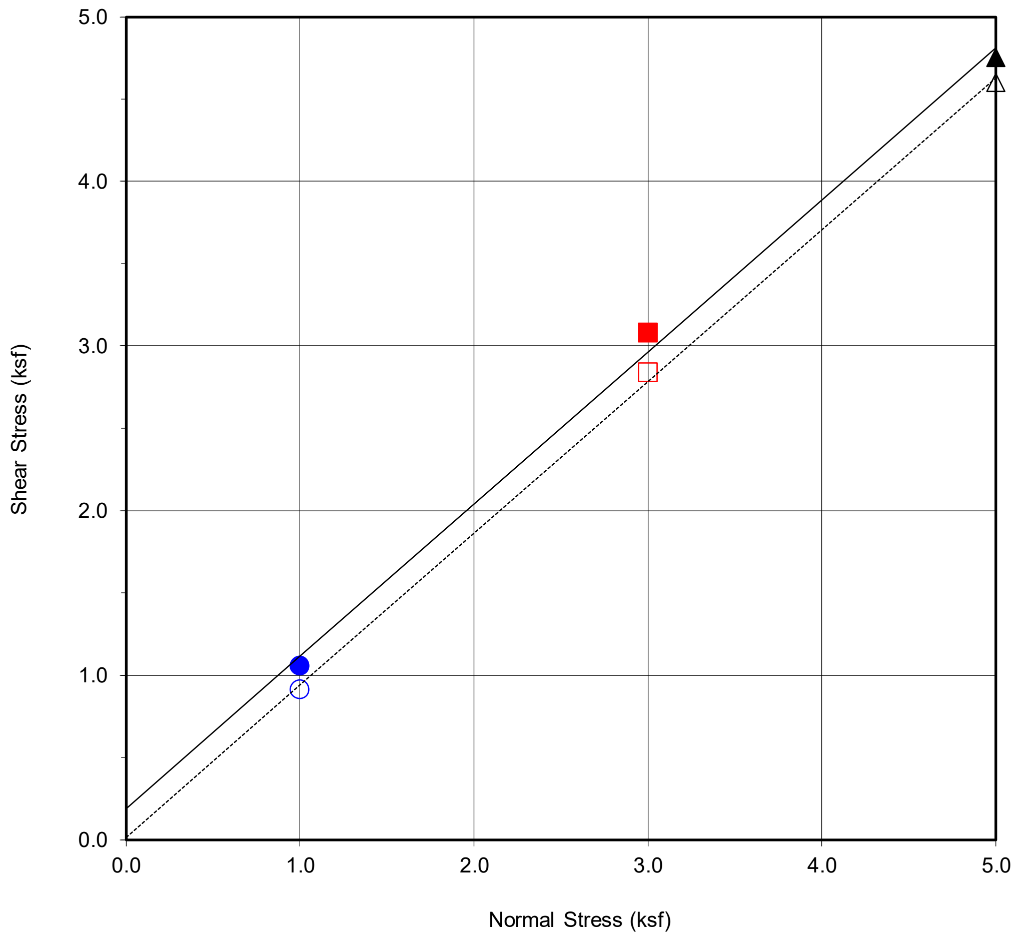
Figure B5



Boring No.	**B4**
Sample No.	**B4@1.5'**
Depth (ft)	**1.5**
Sample Type:	Ring

Soil Identification:		
Poorly Graded Sand (SP)		
Strength Parameters		
	C (psf)	ϕ (°)
Peak	191	42.7
Ultimate	18	42.7

Normal Stress (kip/ft2)	1	3	5
Peak Shear Stress (kip/ft²)	● 1.06	■ 3.08	▲ 4.75
Shear Stress @ End of Test (ksf)	○ 0.91	□ 2.84	△ 4.60
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 (%)	5.6	4.1	5.0
Initial Dry Density (pcf)	105.5	107.0	108.1
Initial Degree of Saturation (%)	25.1	19.3	23.9
Soil Height Before Shearing (in.)	1.2	1.2	1.2
Final Moisture Content (%)	16.4	13.9	13.6

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DIRECT SHEAR TEST RESULTS

Consolidated Drained ASTM D-3080

Checked by: JMH

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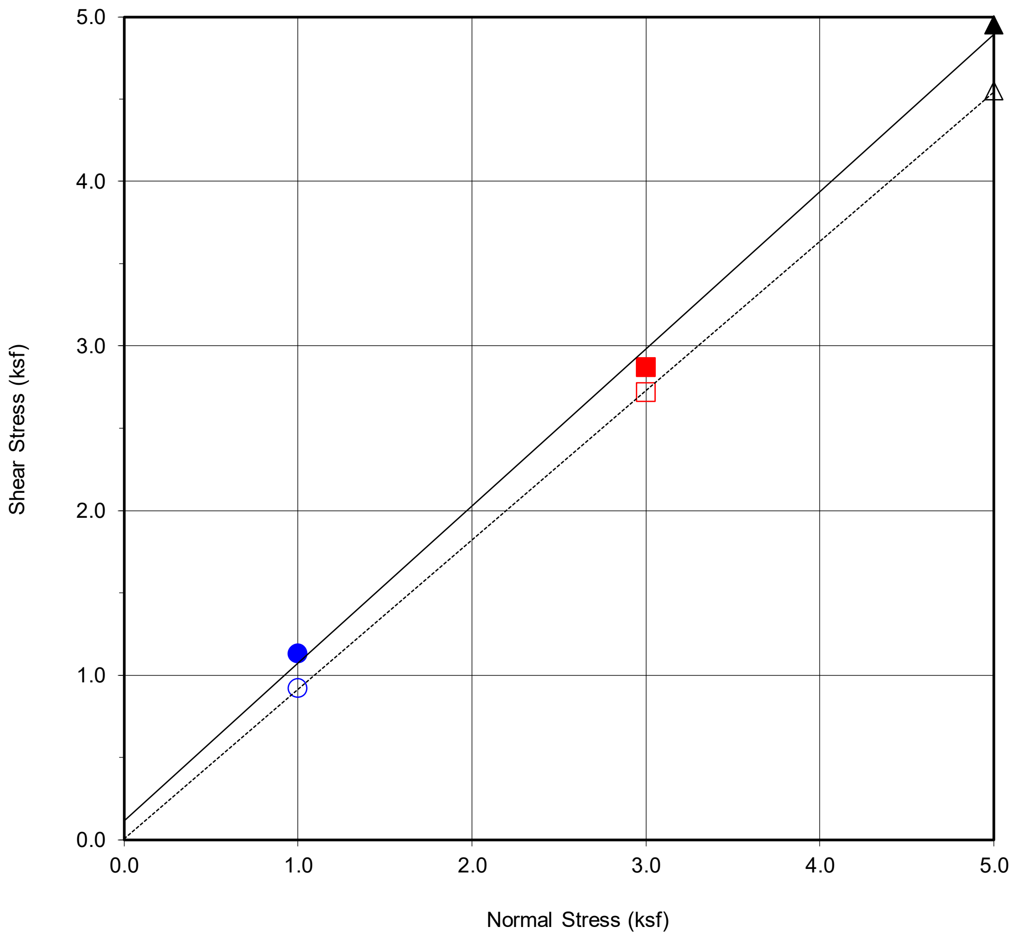
Figure B6



Boring No.	**B5**
Sample No.	**B5@4.5'**
Depth (ft)	**4.5**
Sample Type:	Ring

Soil Identification:		
Poorly Graded Sand (SP)		
Strength Parameters		
	C (psf)	ϕ (^{o})
Peak	118	43.7
Ultimate	7	42.2

Normal Stress (kip/ft2)	1	3	5
Peak Shear Stress (kip/ft²)	● 1.13	■ 2.87	▲ 4.95
Shear Stress @ End of Test (ksf)	○ 0.92	□ 2.72	△ 4.55
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 (%)	-0.4	2.3	6.9
Initial Dry Density (pcf)	87.9	82.9	88.2
Initial Degree of Saturation (%)	-1.3	6.1	20.4
Soil Height Before Shearing (in.)	1.2	1.2	1.2
Final Moisture Content (%)	28.3	29.1	25.0

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DIRECT SHEAR TEST RESULTS

Consolidated Drained ASTM D-3080

Checked by: JMH

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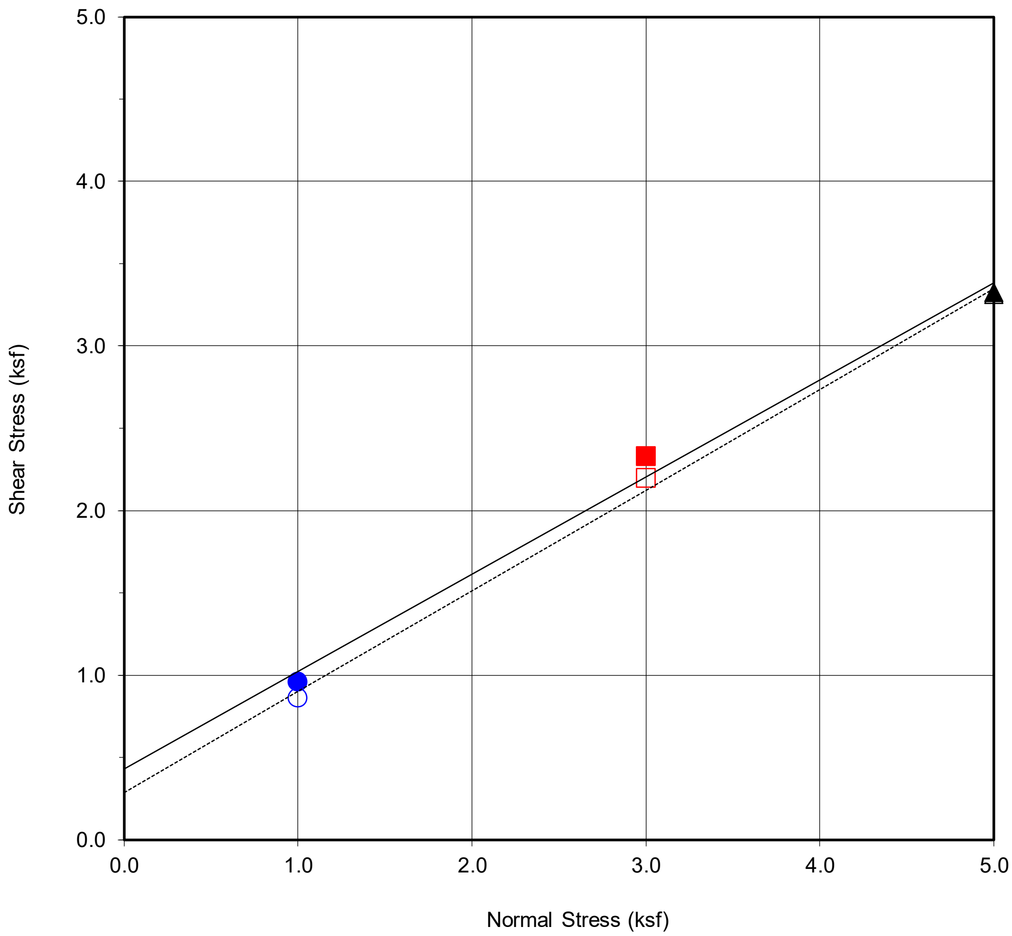
Figure B7



Boring No.	**B6**
Sample No.	**B6@2'**
Depth (ft)	**2**
Sample Type:	Ring

Soil Identification:		
Well Cemented Sand (SP)		
Strength Parameters		
	C (psf)	ϕ (°)
Peak	431	30.6
Ultimate	288	31.5

Normal Stress (kip/ft2)	1	3	5
Peak Shear Stress (kip/ft²)	● 0.96	■ 2.33	▲ 3.32
Shear Stress @ End of Test (ksf)	○ 0.86	□ 2.20	△ 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 (%)	5.3	4.3	7.4
Initial Dry Density (pcf)	106.9	109.4	103.6
Initial Degree of Saturation (%)	25.0	21.6	31.6
Soil Height Before Shearing (in.)	1.2	1.2	1.2
Final Moisture Content (%)	14.1	13.2	16.6

GEOCON

DIRECT SHEAR TEST RESULTS

Consolidated Drained ASTM D-3080

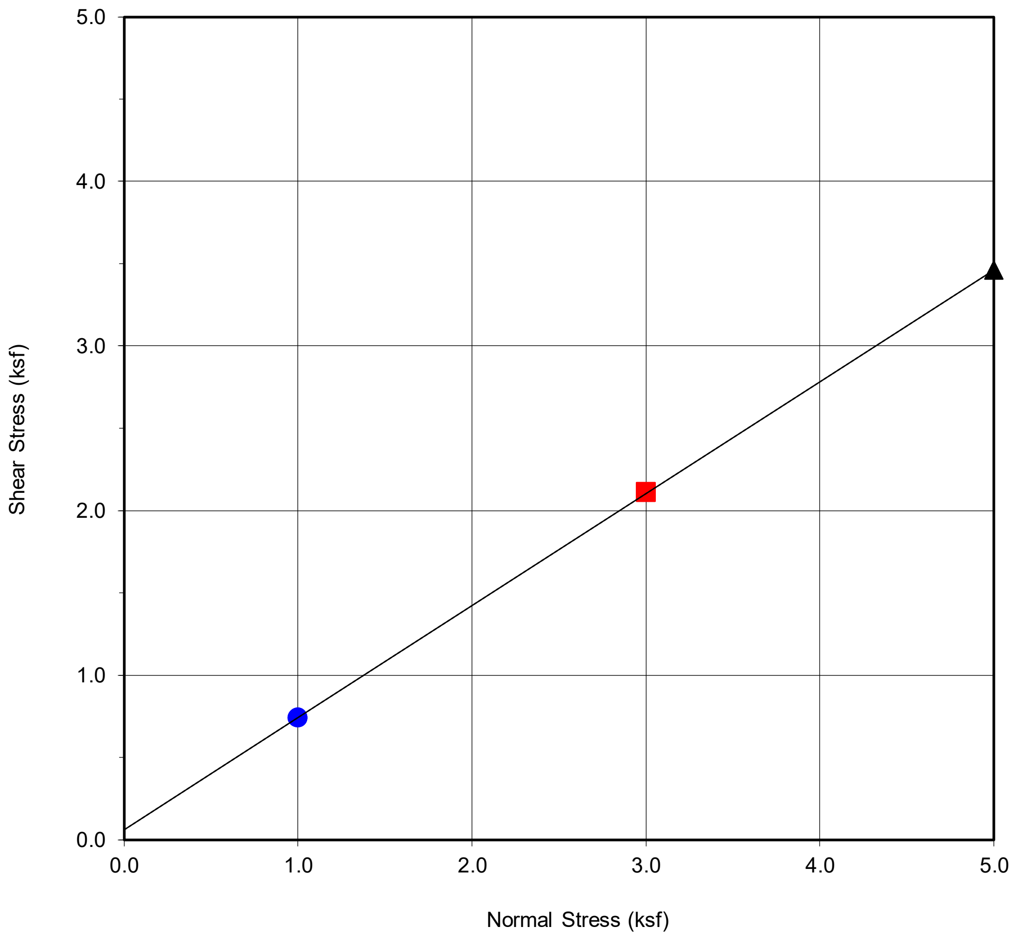
Checked by: JMH

Project No.: W1523-99-01

565 ACRES
APPLE VALLEY, CALIFORNIA

MARCH 2022

Figure B8



Boring No.	**B8**
Sample No.	**B8@1.5'**
Depth (ft)	**1.5**
Sample Type:	Ring

Soil Identification:		
Silty Sand (SM)		
Strength Parameters		
	C (psf)	ϕ (°)
Peak	63	34.2
Ultimate	63	34.2

Normal Stress (kip/ft2)	1	3	5
Peak Shear Stress (kip/ft²)	● 0.74	■ 2.11	▲ 3.46
Shear Stress @ End of Test (ksf)	○ 0.74	□ 2.11	△ 3.46
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 (%)	9.1	13.9	8.1
Initial Dry Density (pcf)	97.0	90.1	96.2
Initial Degree of Saturation (%)	33.4	43.0	29.1
Soil Height Before Shearing (in.)	1.2	1.2	1.2
Final Moisture Content (%)	16.9	18.8	15.9

GEOCON

DIRECT SHEAR TEST RESULTS

Consolidated Drained ASTM D-3080

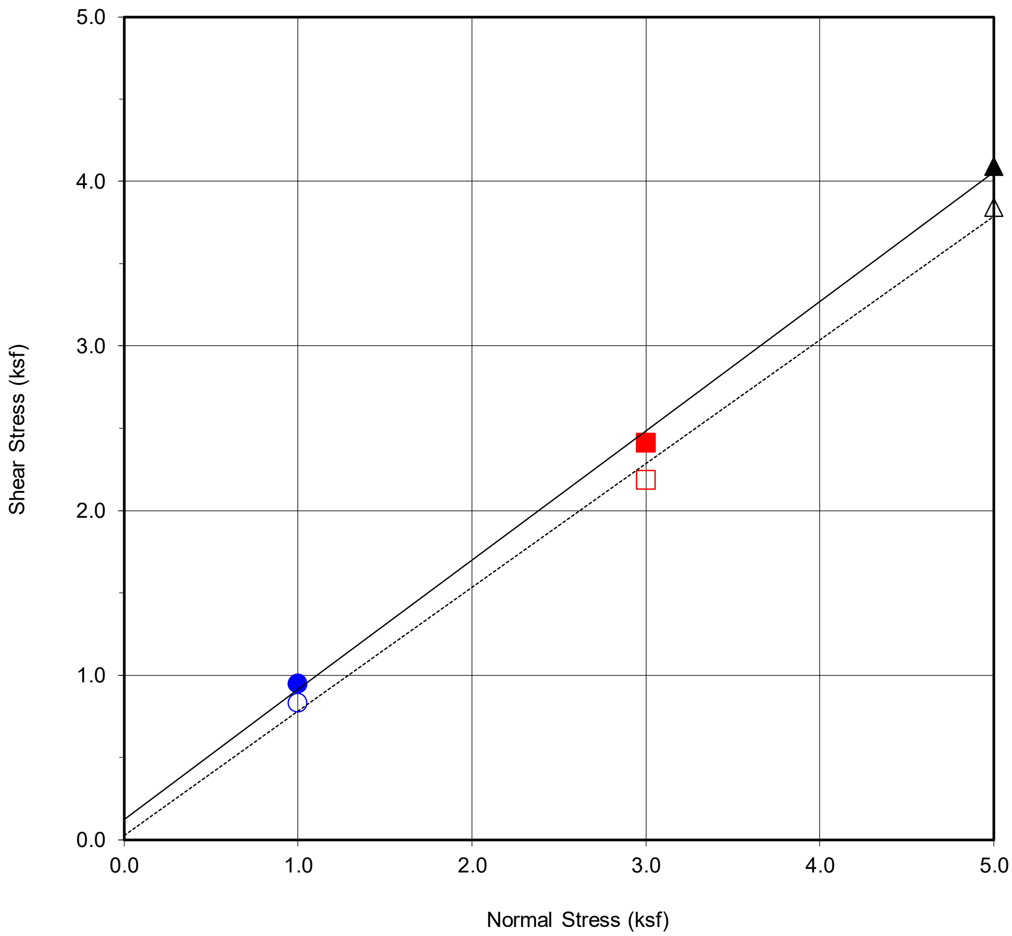
Checked by: JMH

Project No.: W1523-99-01

565 ACRES
APPLE VALLEY, CALIFORNIA

MARCH 2022

Figure B9



Boring No.	B9
Sample No.	B9@2'
Depth (ft)	2
Sample Type:	Ring

Soil Identification:		
Poorly Graded Sand (SP)		
Strength Parameters		
	C (psf)	ϕ (°)
Peak	126	38.2
Ultimate	27	37.0

Normal Stress (kip/ft2)	1	3	5
Peak Shear Stress (kip/ft²)	● 0.95	■ 2.41	▲ 4.09
Shear Stress @ End of Test (ksf)	○ 0.83	□ 2.18	△ 3.84
Deformation Rate (in./min.)	0.05	0.05	0.05
Initial Sample Height (in.)	1.0	1.0	1.0
Ring Inside Diameter (in.)	2.375	2.375	2.375
Initial Moisture Content (%)	6.4	7.1	7.1
Initial Dry Density (pcf)	105.9	107.7	105.3
Initial Degree of Saturation (%)	29.3	33.8	31.8
Soil Height Before Shearing (in.)	1.2	1.2	1.2
Final Moisture Content (%)	12.9	12.0	12.2

GEOCON

DIRECT SHEAR TEST RESULTS

Consolidated Drained ASTM D-3080

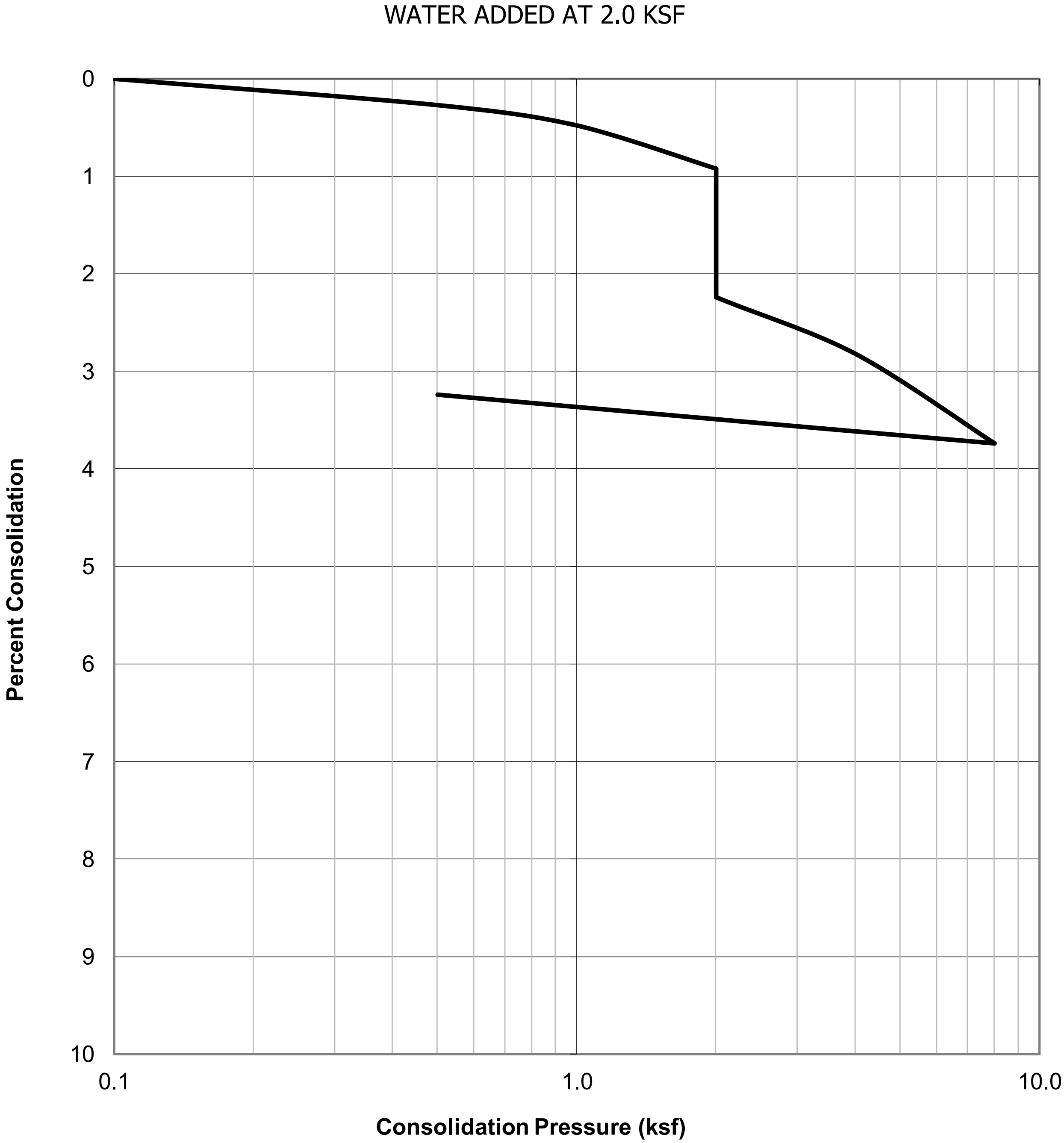
Checked by: JMH

Project No.: W1523-99-01

565 ACRES
APPLE VALLEY, CALIFORNIA

MARCH 2022

Figure B10



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B2@5	Well Graded Sand (SW)	105.7	10.9	24.9

GEOCON

CONSOLIDATION TEST RESULTS

ASTM D-2435

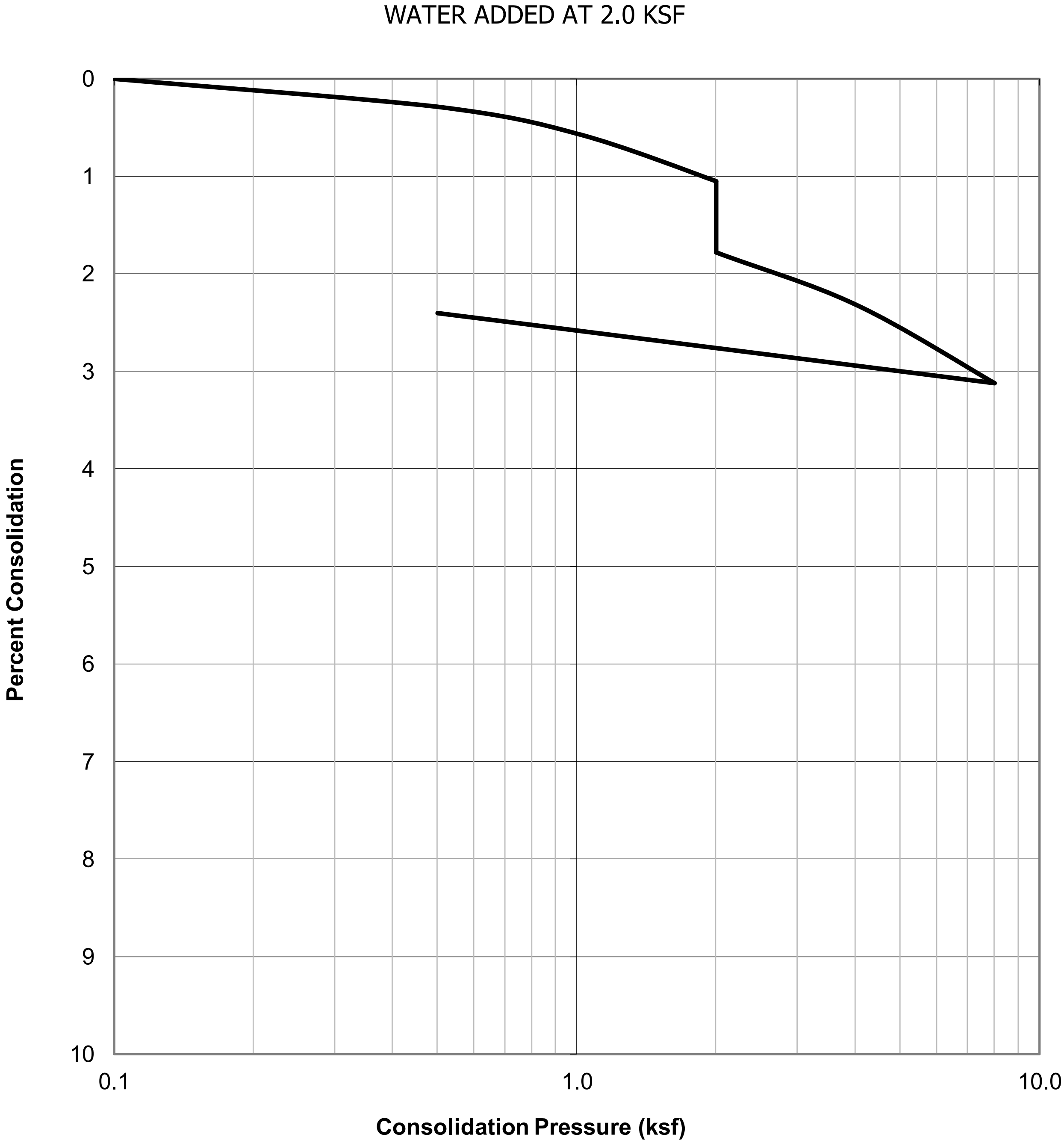
Checked by: JMH

Project No.: W1523-99-01

565 ACRES
APPLE VALLEY, CALIFORNIA

MARCH 2022

Figure B11



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B2@10	Well Graded Sand (SW)	113.1	3.3	15.8

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CONSOLIDATION TEST RESULTS

ASTM D-2435

Checked by: JMH

Project No.: W1523-99-01

565 ACRES
APPLE VALLEY, CALIFORNIA

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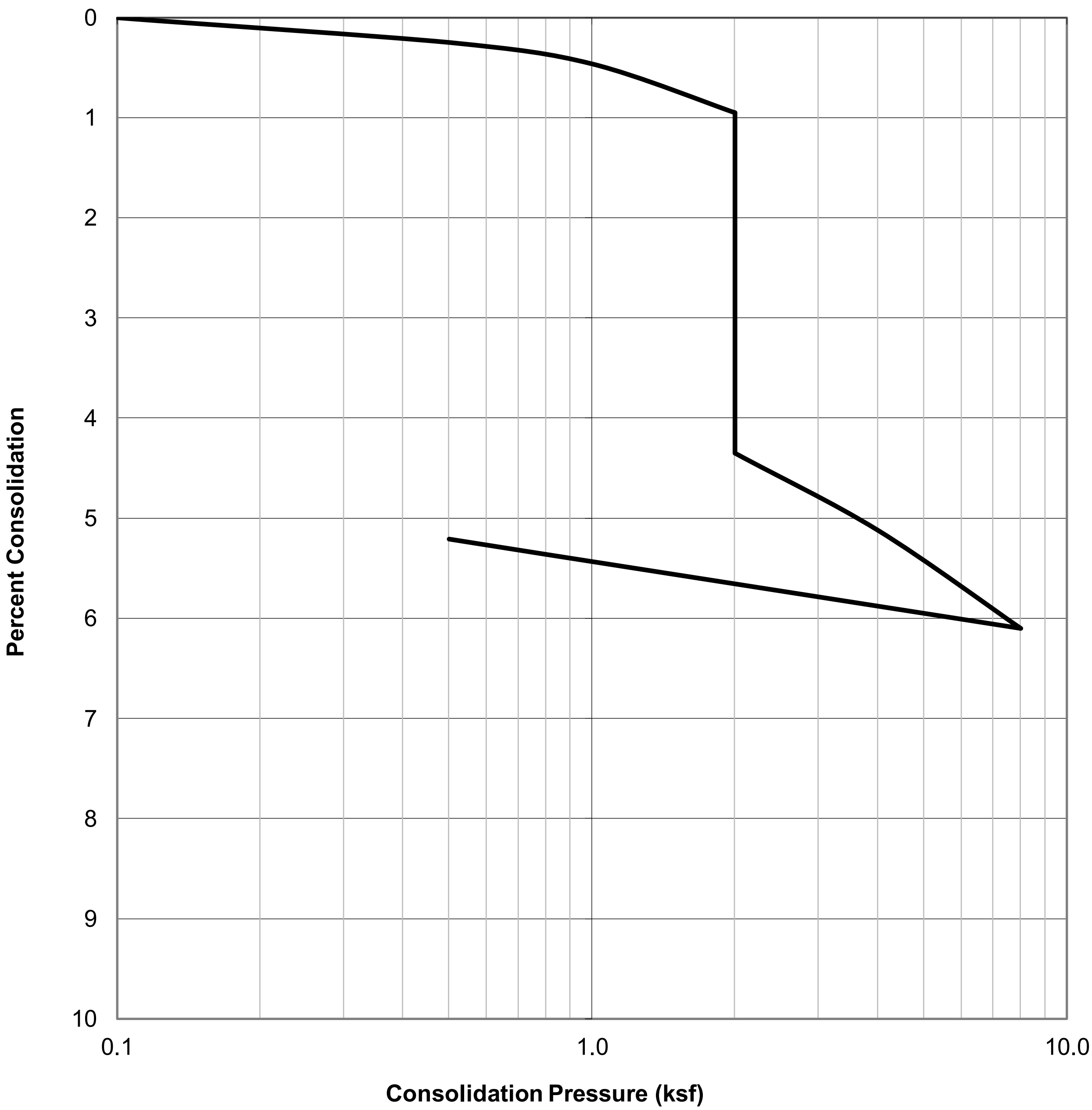
Figure B12

WATER ADDED AT 2.0 KSF



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B3@2	Silty Sand (SM)	108.8	8.5	16.5

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CONSOLIDATION TEST RESULTS

ASTM D-2435

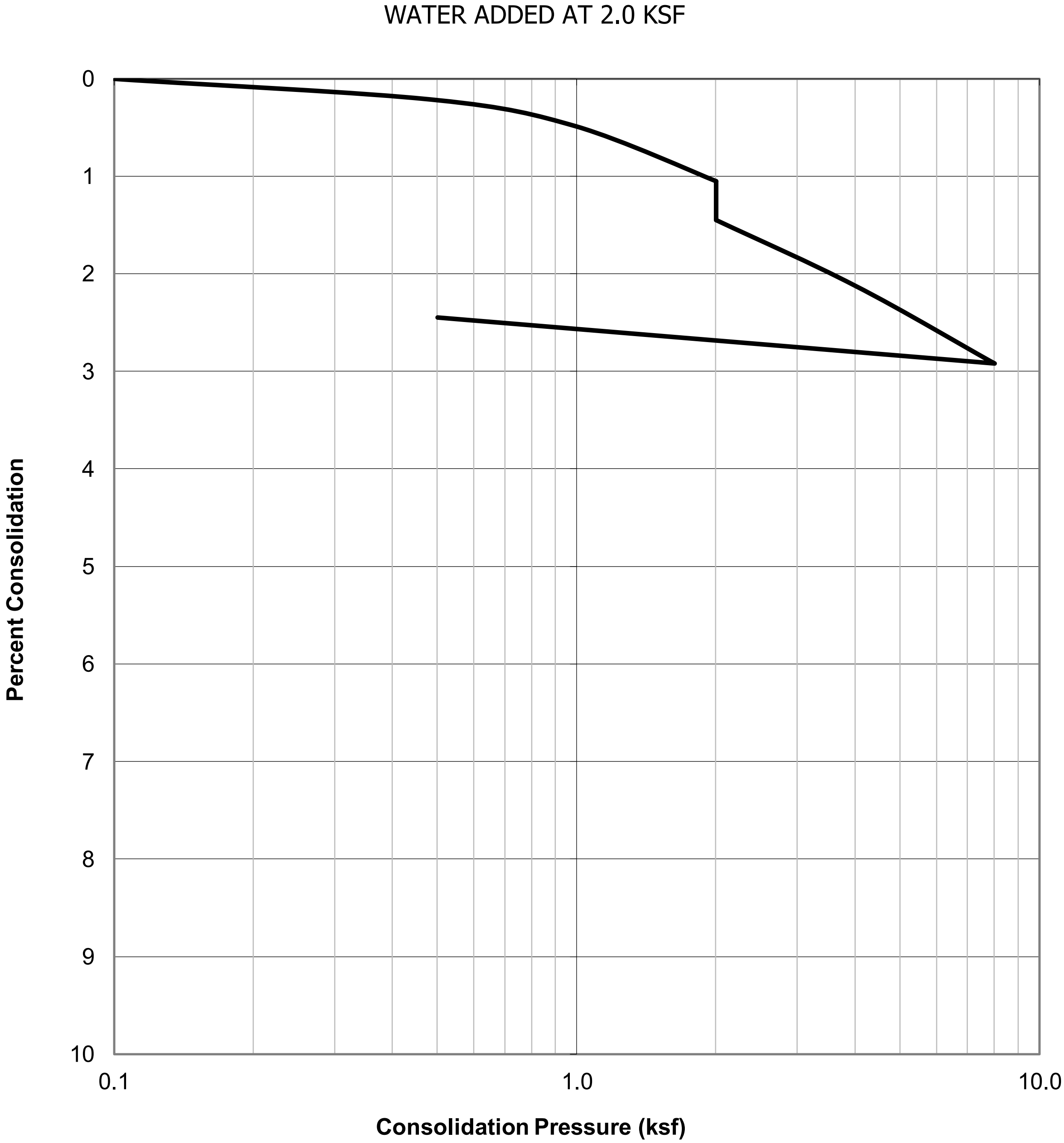
Checked by: JMH

Project No.: W1523-99-01

565 ACRES
APPLE VALLEY, CALIFORNIA

MARCH 2022

Figure B13



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B3@9.5	Brown Silty Sand (SM)	98.4	7.1	17.1

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CONSOLIDATION TEST RESULTS

ASTM D-2435

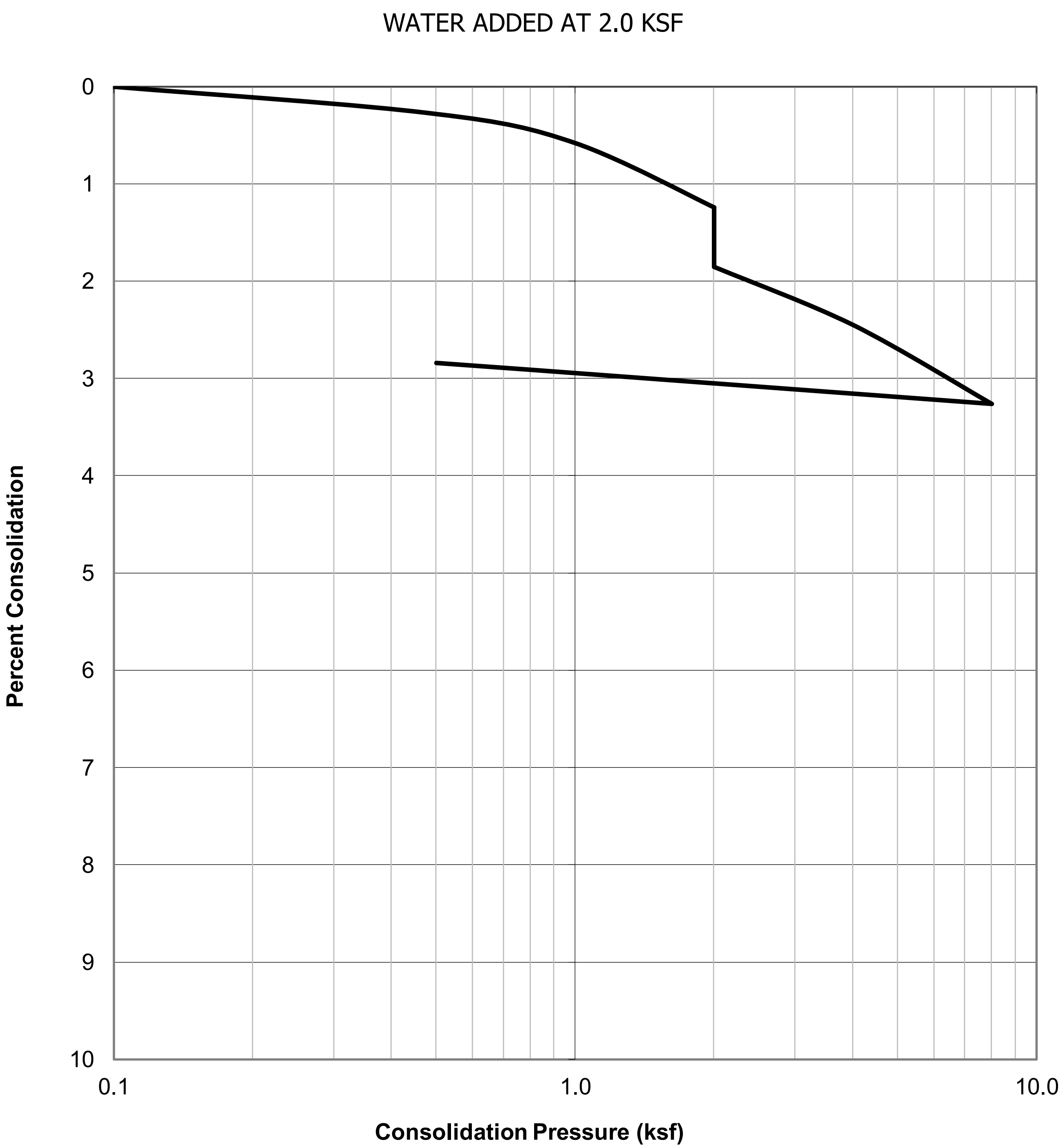
Checked by: JMH

Project No.: W1523-99-01

565 ACRES
APPLE VALLEY, CALIFORNIA

MARCH 2022

Figure B14



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B3@19	Poorly Graded Sand (SP)	92.0	8.1	22.1

GEOCON

CONSOLIDATION TEST RESULTS

ASTM D-2435

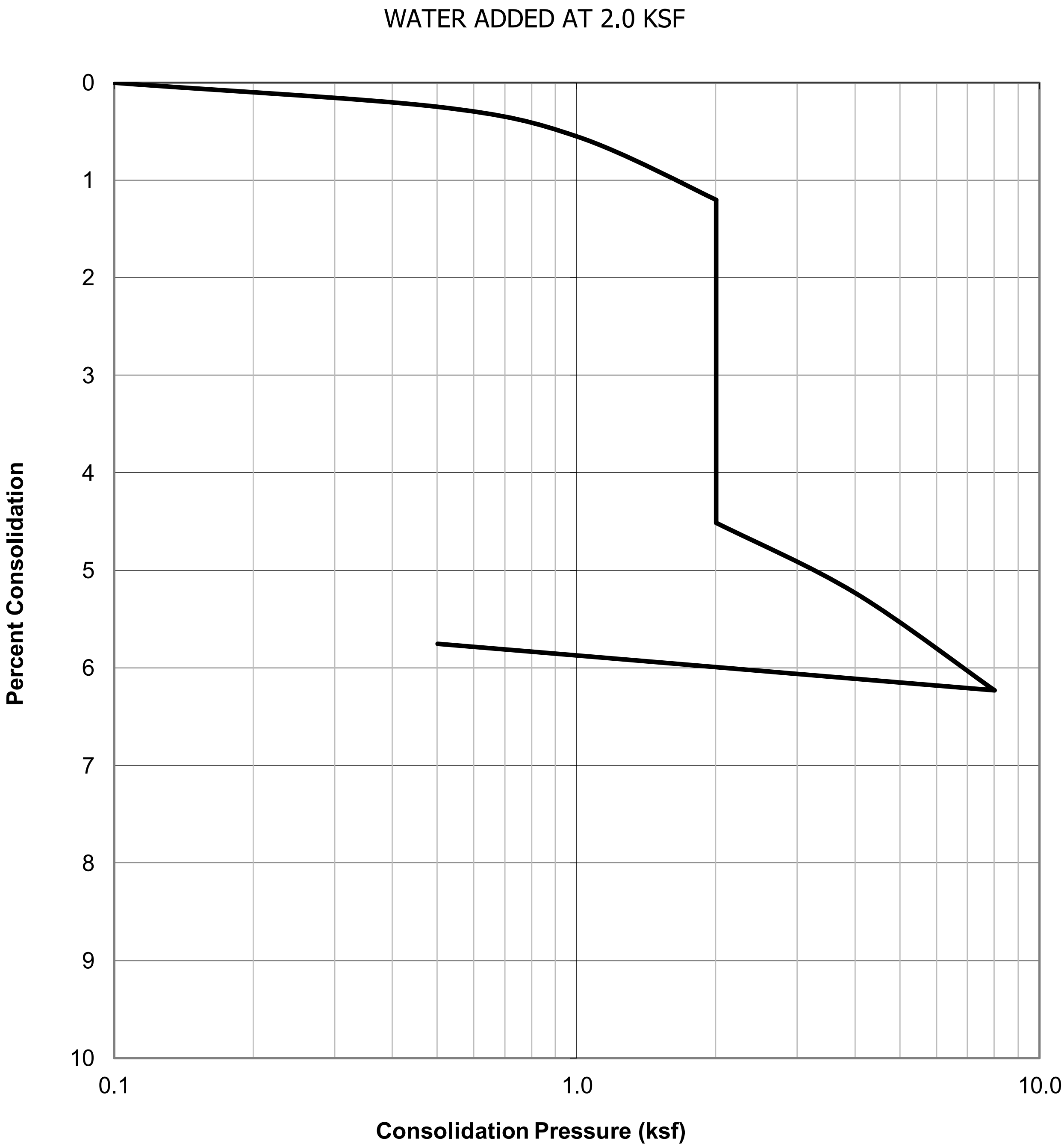
Checked by: JMH

Project No.: W1523-99-01

565 ACRES
APPLE VALLEY, CALIFORNIA

MARCH 2022

Figure B15



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B5@1.5	Poorly Graded Sand (SP)	96.5	5.2	18.0

GEOCON

CONSOLIDATION TEST RESULTS

ASTM D-2435

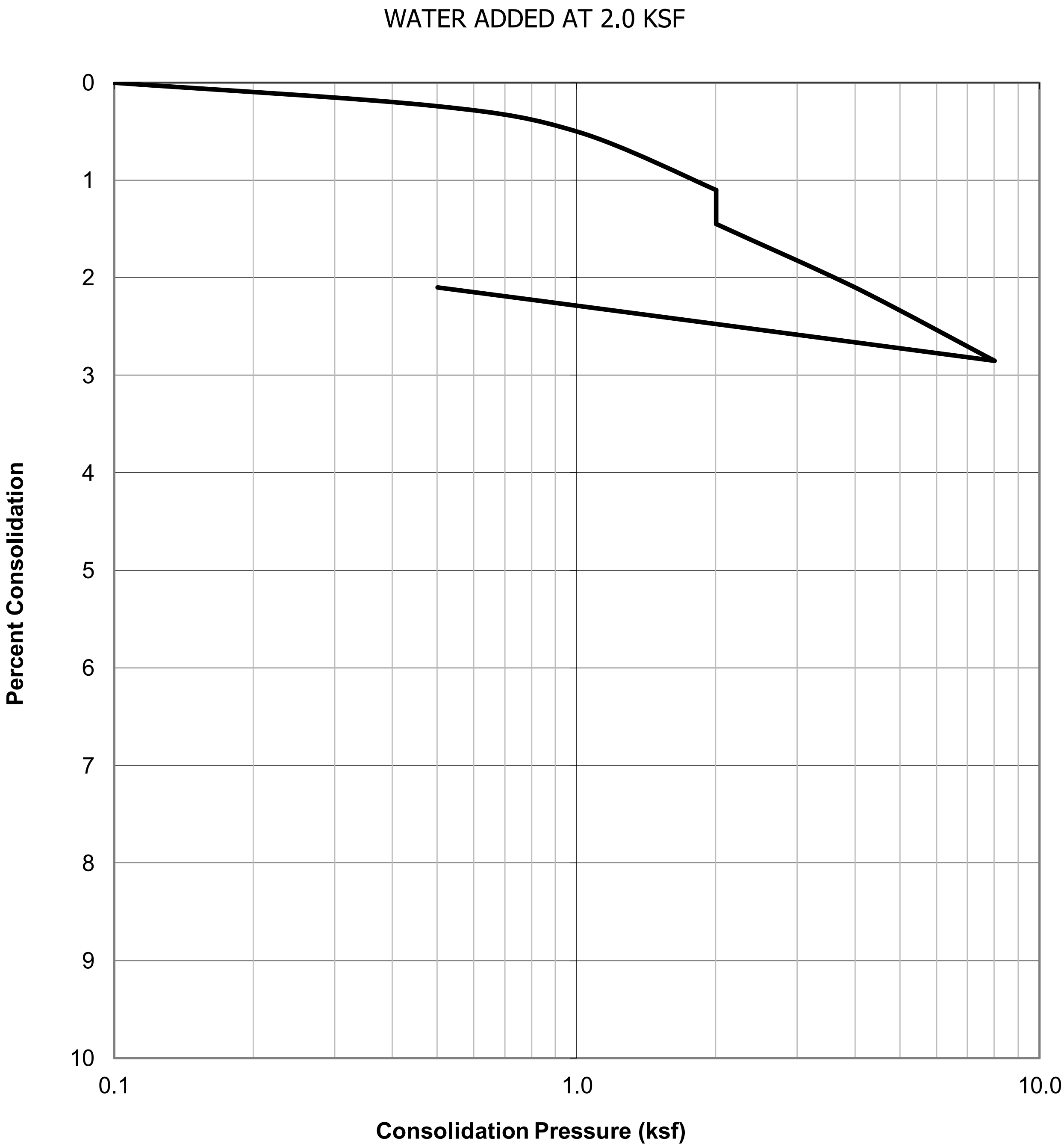
Checked by: JMH

Project No.: W1523-99-01

565 ACRES
APPLE VALLEY, CALIFORNIA

MARCH 2022

Figure B16



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B5@14	Poorly Graded Sand (SP)	92.8	8.8	19.5

GEOCON

CONSOLIDATION TEST RESULTS

ASTM D-2435

Checked by: JMH

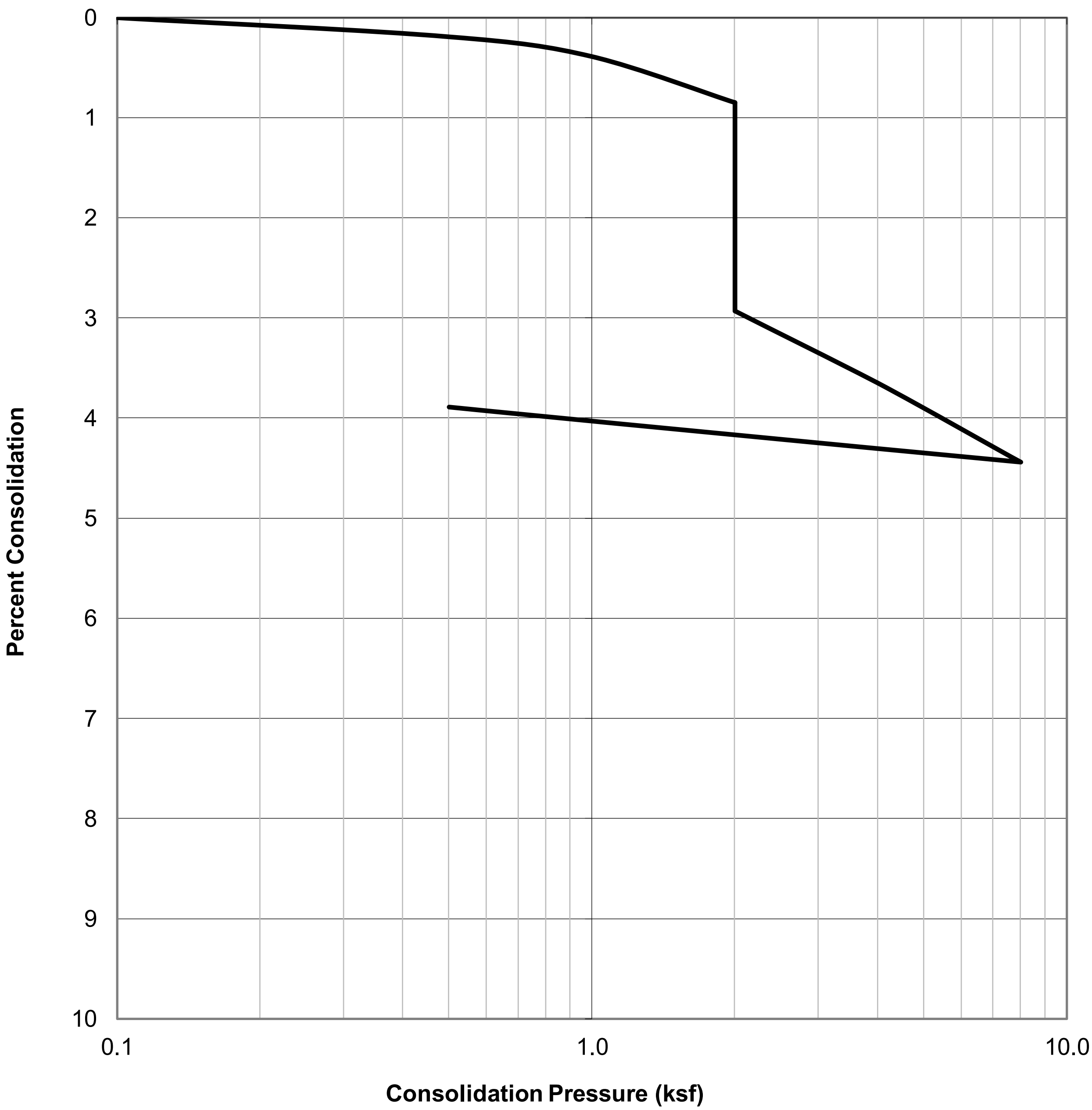
Project No.: W1523-99-01

565 ACRES
APPLE VALLEY, CALIFORNIA

MARCH 2022

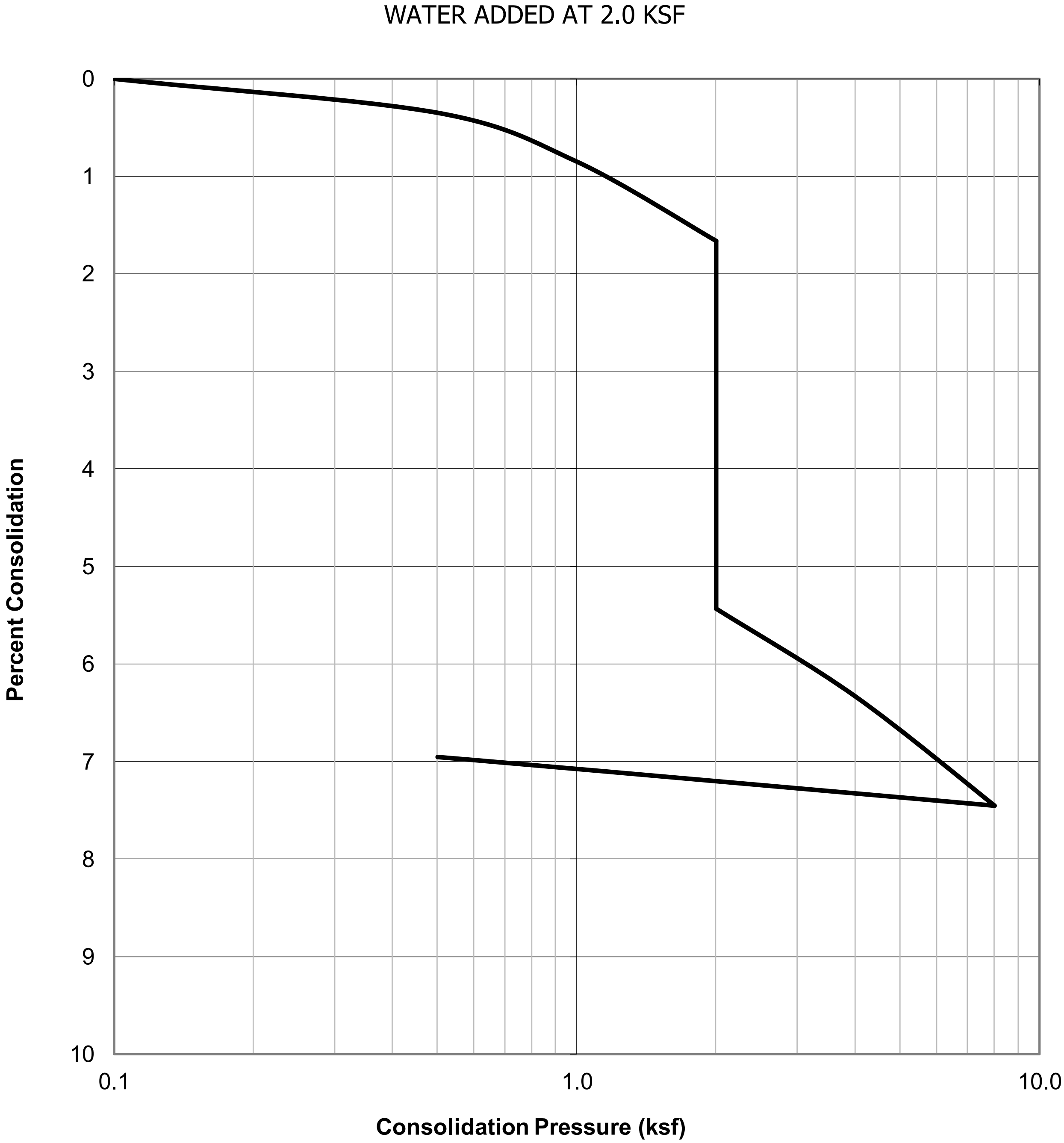
Figure B17

WATER ADDED AT 2.0 KSF



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B6@4	Light Brown Silty Sand (SM)	103.1	3.7	16.4

GEOCON	CONSOLIDATION TEST RESULTS ASTM D-2435	Project No.: W1523-99-01
		565 ACRES APPLE VALLEY, CALIFORNIA
	Checked by: JMH	MARCH 2022 Figure B18



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B7@4	Brown Silty Sand (SM)	99.1	4.5	14.8

GEOCON

CONSOLIDATION TEST RESULTS

ASTM D-2435

Checked by: JMH

Project No.: W1523-99-01

565 ACRES
APPLE VALLEY, CALIFORNIA

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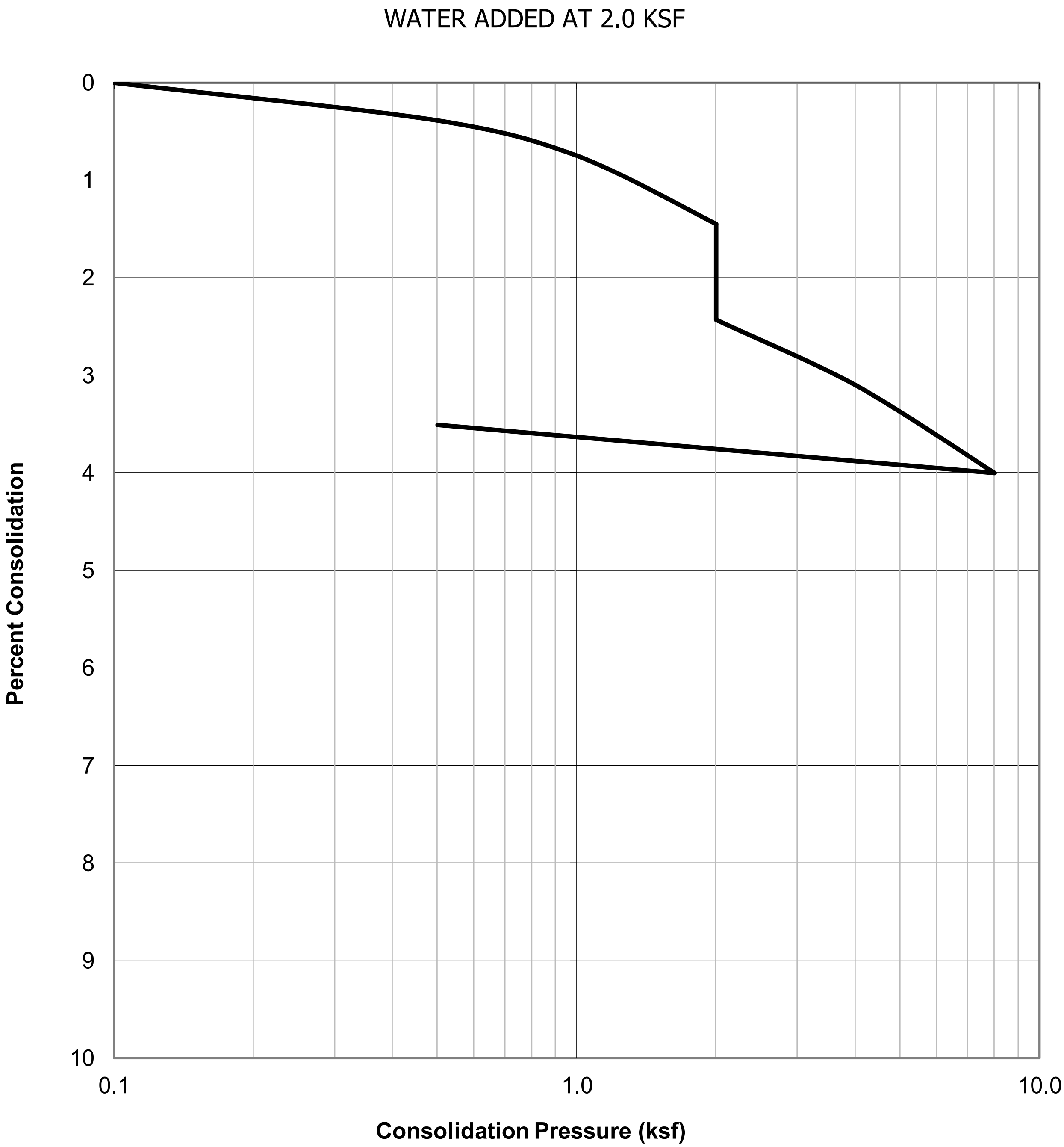
Figure B19



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B7@14.5	Well Graded Sand (SW)	111.8	3.6	13.9

GEOCON

CONSOLIDATION TEST RESULTS

ASTM D-2435

Checked by: JMH

Project No.: W1523-99-01

565 ACRES
APPLE VALLEY, CALIFORNIA

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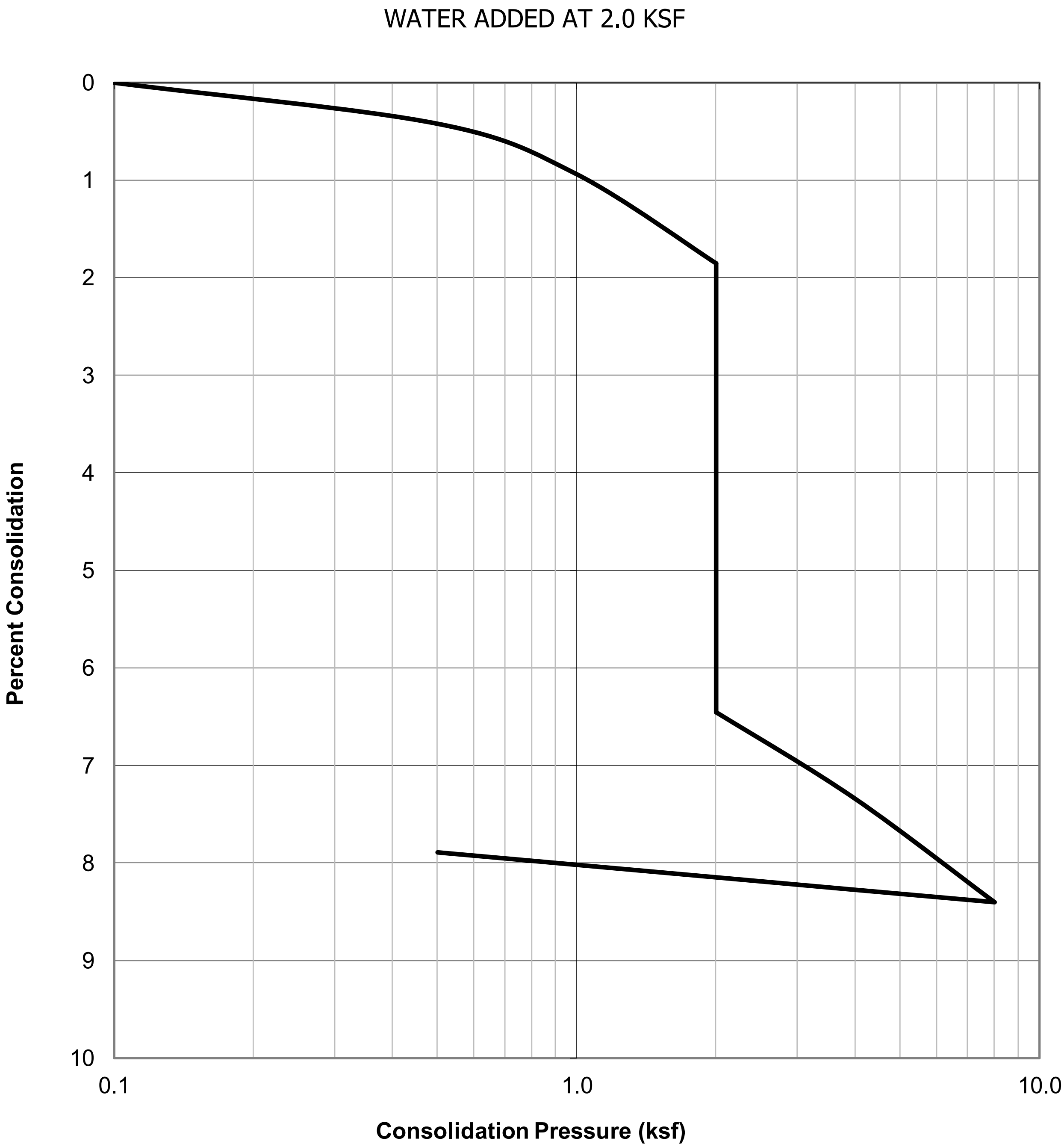
Figure B20



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B8@4	Poorly Graded Sand (SP)	92.7	6.0	15.9

GEOCON

CONSOLIDATION TEST RESULTS

ASTM D-2435

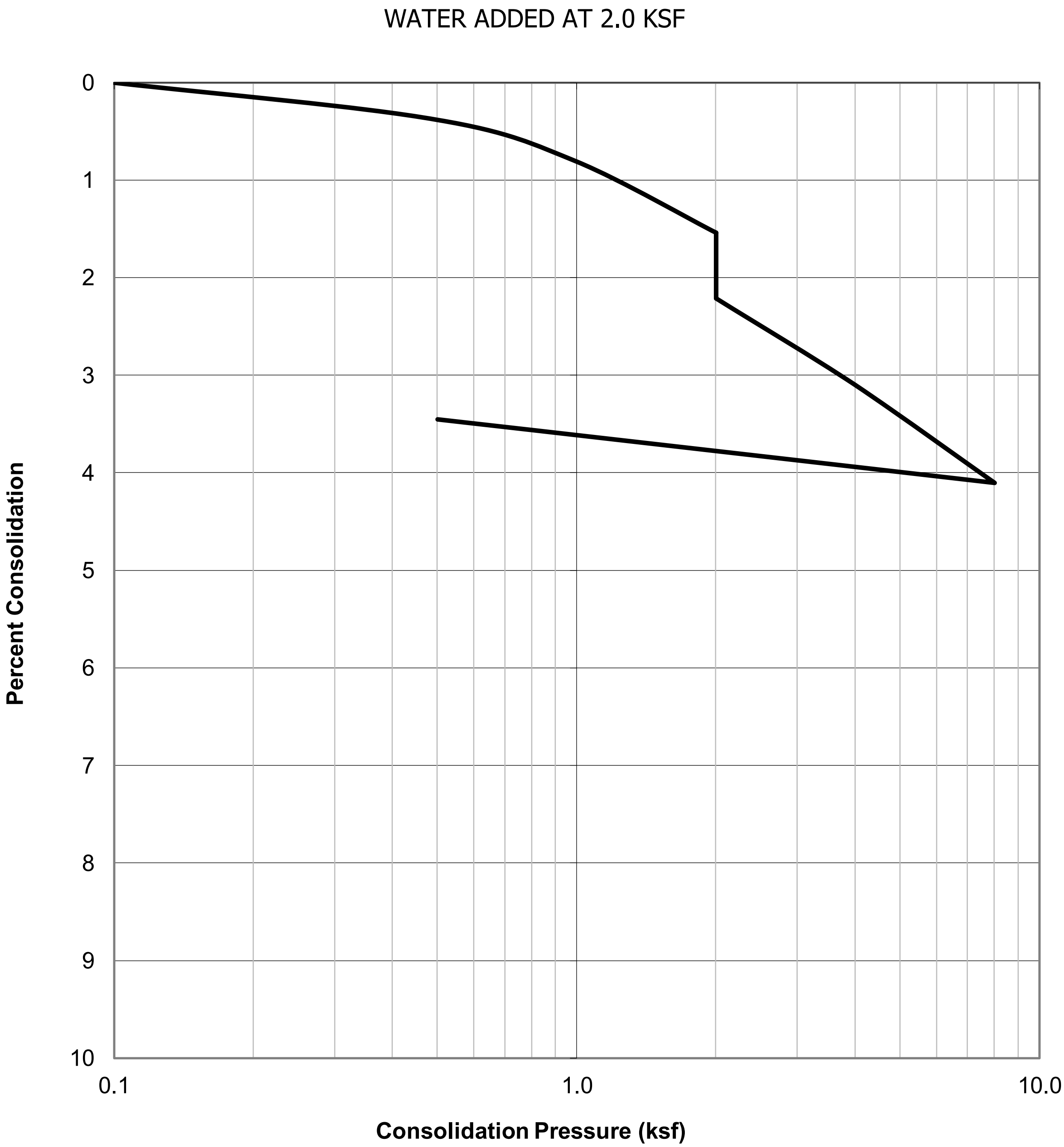
Checked by: JMH

Project No.: W1523-99-01

565 ACRES
APPLE VALLEY, CALIFORNIA

MARCH 2022

Figure B21



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B8@14	Poorly Graded Sand (SP)	106.7	5.3	14.6

GEOCON

CONSOLIDATION TEST RESULTS

ASTM D-2435

Checked by: JMH

Project No.: W1523-99-01

565 ACRES
APPLE VALLEY, CALIFORNIA

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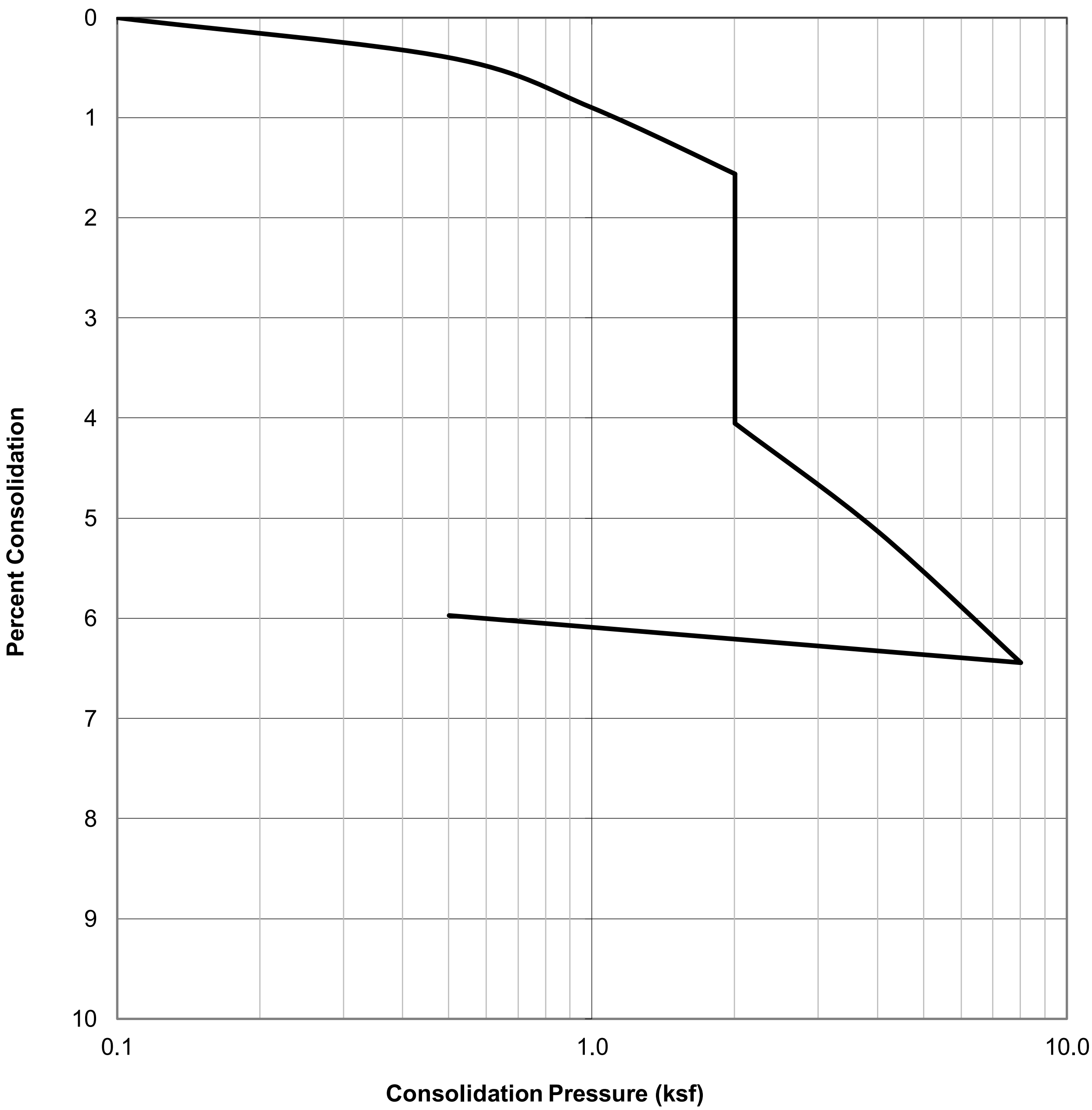
Figure B22

WATER ADDED AT 2.0 KSF



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B9@5	Poorly Graded Sand (SP)	112.2	3.7	13.9

GEOCON

CONSOLIDATION TEST RESULTS

ASTM D-2435

Checked by: JMH

Project No.: W1523-99-01

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Figure B23

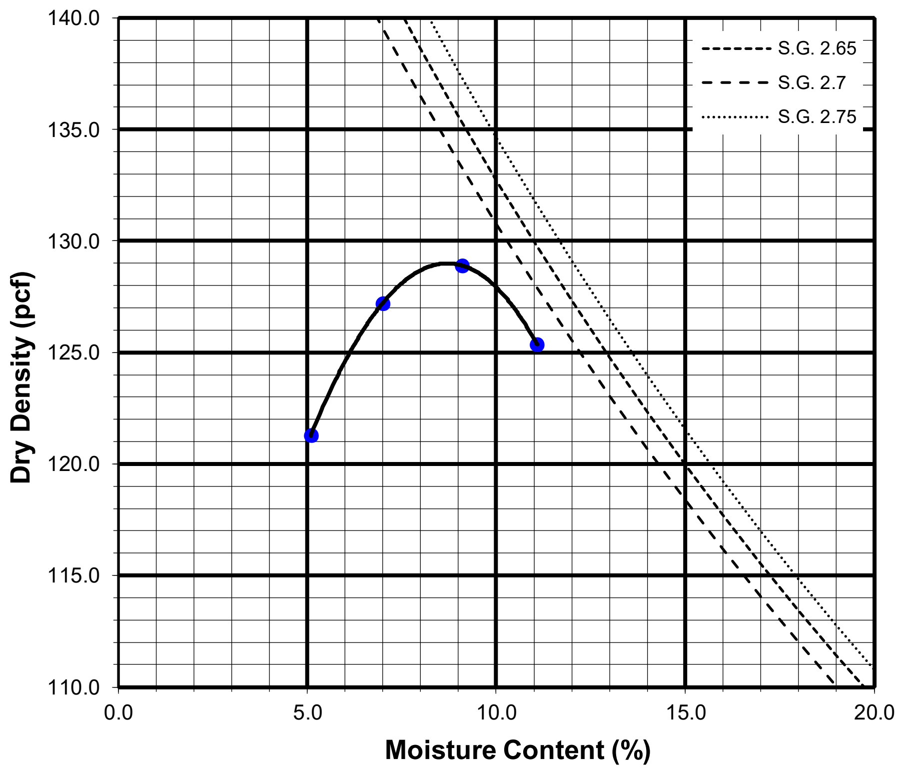
Sample No:

B1@0-5'	Light Reddish Brown Poorly Graded Sand with Gravel (SP)

TEST NO.		1	2	3	4	5	6
Wt. Compacted Soil + Mold	(g)	6027	6157	6225	6204		
Weight of Mold	(g)	4107	4107	4107	4107		
Net Weight of Soil	(g)	1919	2050	2118	2097		
Wet Weight of Soil + Cont.	(g)	608.4	712.1	688.0	702.7		
Dry Weight of Soil + Cont.	(g)	586.1	674.5	642.0	645.1		
Weight of Container	(g)	148.4	136.7	136.2	125.3		
Moisture Content	(%)	5.1	7.0	9.1	11.1		
Wet Density	(pcf)	127.5	136.1	140.6	139.2		
Dry Density	(pcf)	121.3	127.2	128.9	125.4		

Maximum Dry Density (pcf)	**129.5**
Bulk Specific Gravity (dry)	**2.65**
Corrected Maximum Dry Density (pcf)	**133.0**

Optimum Moisture Content (%)	**8.5**
Oversized Fraction (%)	**12.0**
Corrected Moisture Content (%)	**7.5**



Preparation Method: A

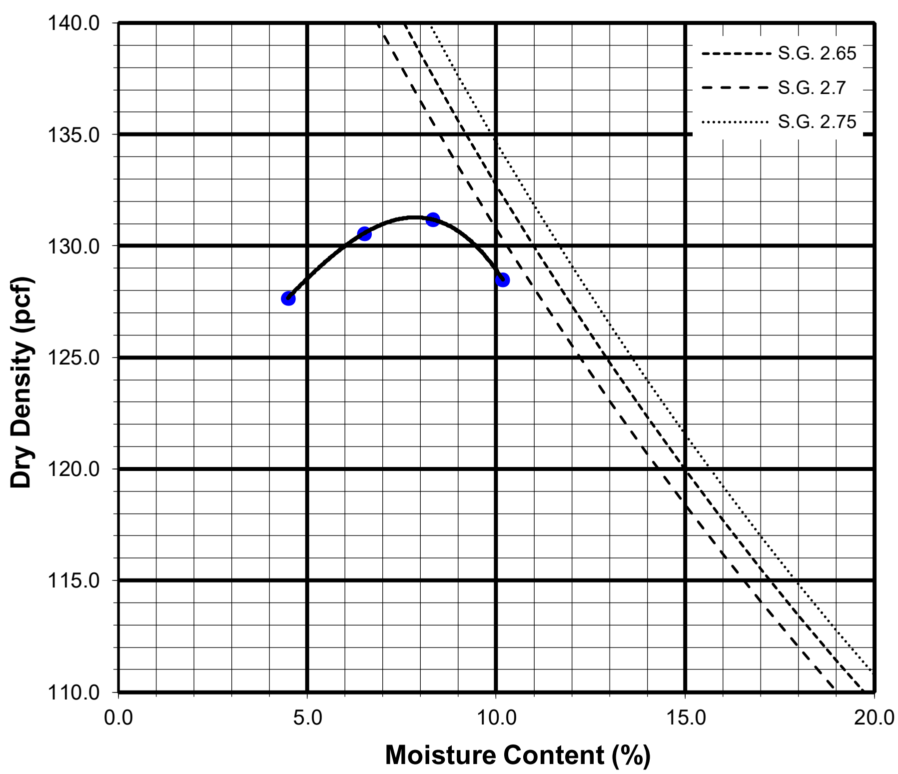
GEOCON	**COMPACTION CHARACTERISTICS USING MODIFIED EFFORT TEST RESULTS** ASTM D-1557	Project No.: W1523-99-01
		565 ACRES APPLE VALLEY, CALIFORNIA
	Checked by: JMH	MARCH 2022 Figure B24

Sample No:

B2@0-5'	Light Brown Poorly Graded Sand with Gravel (SP)

TEST NO.		1	2	3	4	5	6
Wt. Compacted Soil + Mold	(g)	6116	6201	6247	6239		
Weight of Mold	(g)	4107	4107	4107	4107		
Net Weight of Soil	(g)	2009	2094	2140	2132		
Wet Weight of Soil + Cont.	(g)	656.8	753.0	652.7	638.7		
Dry Weight of Soil + Cont.	(g)	634.3	716.0	613.0	591.5		
Weight of Container	(g)	133.1	146.8	135.3	127.3		
Moisture Content	(%)	4.5	6.5	8.3	10.2		
Wet Density	(pcf)	133.4	139.0	142.1	141.6		
Dry Density	(pcf)	127.7	130.6	131.2	128.5		

Maximum Dry Density (pcf)	**131.5**	**Optimum Moisture Content (%)**	**7.5**
Bulk Specific Gravity (dry)	**2.65**	**Oversized Fraction (%)**	**17.0**
Corrected Maximum Dry Density (pcf)	**136.0**	**Corrected Moisture Content (%)**	**6.0**



Preparation Method: A

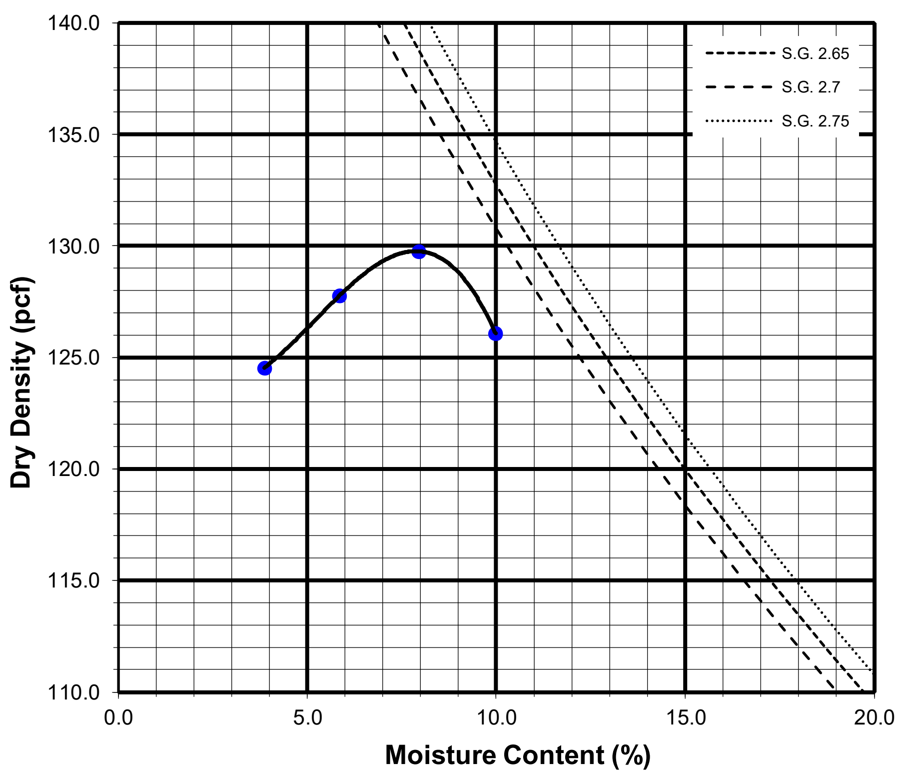
GEOCON	**COMPACTION CHARACTERISTICS USING MODIFIED EFFORT TEST RESULTS** ASTM D-1557	Project No.: W1523-99-01
		565 ACRES APPLE VALLEY, CALIFORNIA
	Checked by: JMH	MARCH 2022 Figure B25

Sample No:

B6@0-5'	Light Brown Poorly Graded Sand (SP)

TEST NO.		1	2	3	4	5	6
Wt. Compacted Soil + Mold	(g)	6061	6150	6223	6202		
Weight of Mold	(g)	4107	4107	4107	4107		
Net Weight of Soil	(g)	1954	2043	2116	2095		
Wet Weight of Soil + Cont.	(g)	733.2	738.2	661.4	720.7		
Dry Weight of Soil + Cont.	(g)	711.3	705.5	623.6	668.5		
Weight of Container	(g)	144.6	146.7	147.3	145.4		
Moisture Content	(%)	3.9	5.9	7.9	10.0		
Wet Density	(pcf)	129.3	135.2	140.1	138.7		
Dry Density	(pcf)	124.5	127.8	129.8	126.1		

Maximum Dry Density (pcf)	**130.0**	**Optimum Moisture Content (%)**	**8.0**



Preparation Method: A

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COMPACTION CHARACTERISTICS USING MODIFIED EFFORT TEST RESULTS

ASTM D-1557

Checked by: JMH

Project No.: W1523-99-01

565 ACRES
APPLE VALLEY, CALIFORNIA

MARCH 2022

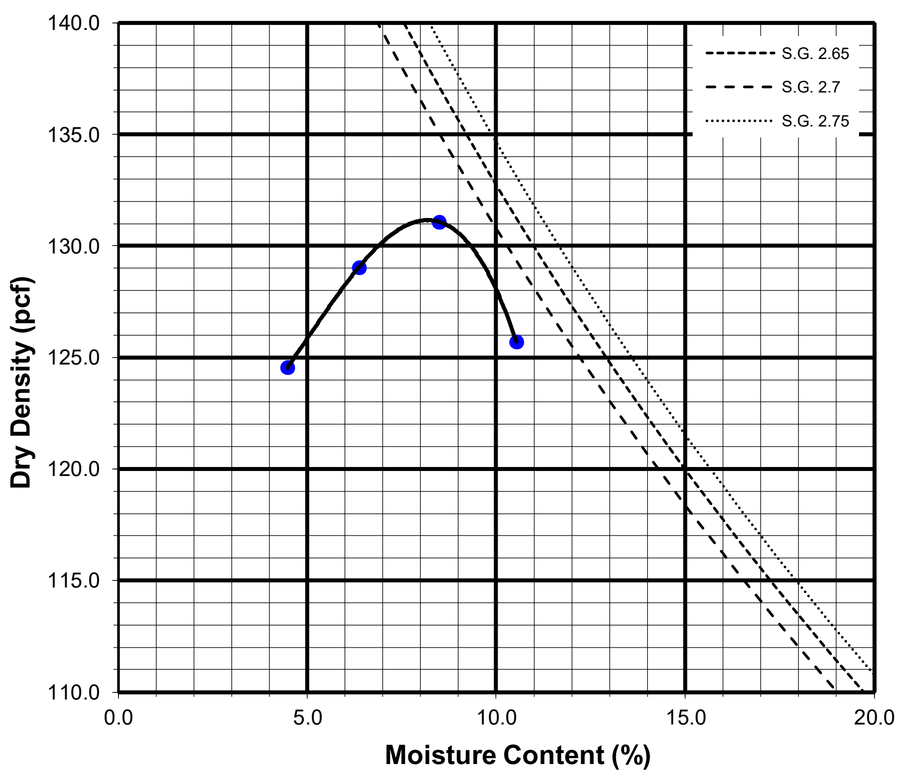
Figure B26

Sample No:

B8@0-5'	Light Brown Silty Sand (SM)

TEST NO.		1	2	3	4	5	6
Wt. Compacted Soil + Mold	(g)	6073	6181	6255	6206		
Weight of Mold	(g)	4107	4107	4107	4107		
Net Weight of Soil	(g)	1966	2074	2148	2099		
Wet Weight of Soil + Cont.	(g)	721.4	734.6	741.8	727.6		
Dry Weight of Soil + Cont.	(g)	696.8	698.6	693.6	672.3		
Weight of Container	(g)	147.6	133.6	126.0	147.3		
Moisture Content	(%)	4.5	6.4	8.5	10.5		
Wet Density	(pcf)	130.1	137.3	142.2	138.9		
Dry Density	(pcf)	124.6	129.1	131.1	125.7		

Maximum Dry Density (pcf)	**131.5**	**Optimum Moisture Content (%)**	**8.0**



Preparation Method: A

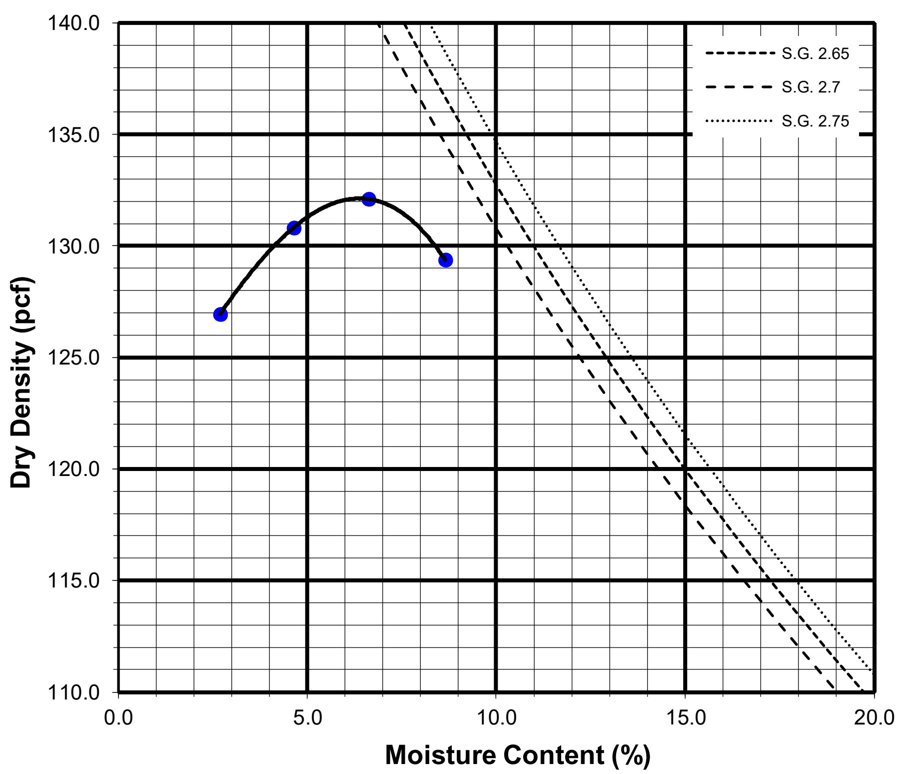
GEOCON	**COMPACTION CHARACTERISTICS USING MODIFIED EFFORT TEST RESULTS** ASTM D-1557	Project No.: W1523-99-01
		565 ACRES APPLE VALLEY, CALIFORNIA
	Checked by: JMH	MARCH 2022 Figure B27

Sample No:

B9@0-5'	Light Reddish Brown Poorly Graded Sand (SP)

TEST NO.		1	2	3	4	5	6
Wt. Compacted Soil + Mold	(g)	6077	6175	6235	6230		
Weight of Mold	(g)	4107	4107	4107	4107		
Net Weight of Soil	(g)	1969	2068	2128	2123		
Wet Weight of Soil + Cont.	(g)	649.1	716.0	683.5	726.3		
Dry Weight of Soil + Cont.	(g)	635.9	690.8	649.5	678.5		
Weight of Container	(g)	146.8	147.9	136.5	125.9		
Moisture Content	(%)	2.7	4.6	6.6	8.7		
Wet Density	(pcf)	130.4	136.9	140.9	140.6		
Dry Density	(pcf)	126.9	130.8	132.1	129.4		

Maximum Dry Density (pcf)	132.0	Optimum Moisture Content (%)	6.0



Preparation Method: A

COMPACTION CHARACTERISTICS USING MODIFIED EFFORT TEST RESULTS

ASTM D-1557

Checked by: JMH

GEOCON

Project No.: W1523-99-01

565 ACRES
APPLE VALLEY, CALIFORNIA

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Figure B28

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

Sample No.	**pH**	**Resistivity (ohm centimeters)**
B1 @ 0-5'	8.5	150 (Severely Corrosive)
B2 @ 0-5'	7.9	9200 (Moderately Corrosive)
B6 @ 0-5'	9.3	5000 (Moderately Corrosive)

SUMMARY OF LABORATORY CHLORIDE CONTENT TEST RESULTS
EPA NO. 325.3

Sample No.	Chloride Ion Content (%)
B1@0-5'	0.411
B2@0-5'	0.009
B6@0-5'	0.011

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

Sample No.	**Water Soluble Sulfate (% SQ_4)**	**Sulfate Exposure***
B1@0-5'	0.046	S0
B2@0-5'	0.000	S0
B6@0-5'	0.000	S0

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

Sample No.	pH	Resistivity (ohm centimeters)
B8 @ 0-5'	8.2	3000 (Moderately Corrosive)
B9 @ 0-5'	8.3	9700 (Moderately Corrosive)

SUMMARY OF LABORATORY CHLORIDE CONTENT TEST RESULTS
EPA NO. 325.3

Sample No.	Chloride Ion Content (%)
B8@0-5'	0.006
B9@0-5'	0.011

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

Sample No.	Water Soluble Sulfate (% SQ_4)	Sulfate Exposure*
B8@0-5'	0.000	S0
B9@0-5'	0.000	S0

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CORROSIVITY TEST RESULTS

Checked by: JMH

Project No.: W1523-99-01

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APPLE VALLEY, CALIFORNIA

MARCH 2022

Figure B30