Geotechnical Engineering Report

Ottawa Business Center Project
Victorville, San Bernardino County, California
August 24, 2021
Terracon Project No. CB215026

Prepared for:
Space Center Mira Loma, Inc.
Jurupa Valley, California

Prepared by:
Terracon Consultants, Inc.
Colton, California

August 24, 2021

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Attn: Mr. Tom Cruikshank– Sr. Vice President, Development
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Re: Geotechnical Engineering Report
Ottawa Business Center Project
Ottawa Street, East of Hesperia Road
Victorville, San Bernardino County, California
Terracon Project No. CB215026

Dear Mr. Cruikshank:

We have completed the Geotechnical Engineering services for the above referenced project. This study was performed in general accordance with Terracon Proposal No.: PCB215026 dated February 22, 2021. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations, floor slabs and pavements for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants, Inc.

Ali Tabatabaei, Ph.D., G.E.
Geotechnical Project Engineer

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Reviewed by: Garret Hubbart, P.E., G.E

REPORT TOPICS

Note: This report was originally delivered in a web-based format. Orange Bold text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the *GeoReport* logo will bring you back to this page. For more interactive features, please view your project online at client.terracon.com.

ATTACHMENTS

Note: Refer to each individual Attachment for a listing of contents.

Geotechnical Engineering Report

Ottawa Business Center Project
Ottawa Street, East of Hesperia Road
Victorville, San Bernardino County, California

Terracon Project No. CB215026

August 24, 2021

INTRODUCTION

This report presents the results of our subsurface exploration and geotechnical engineering services performed for the proposed Ottawa Business Center to be located at Ottawa Street, East of Hesperia Road in Victorville, San Bernardino County, California. The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil conditions
- Groundwater conditions and historic high groundwater
- 2019 California Building Code (CBC) seismic design parameters
- Site-specific ground motion hazard analysis in accordance with ASCE 7-16
- Seismic settlement
- Subgrade preparation/earthwork recommendations
- Foundation design and concrete slabs-on-grade
- Preliminary pavement section design
- Infiltration and drainage

The geotechnical engineering Scope of Services for this project included the advancement of twenty-four (24) test borings to depths ranging from approximately 5 to 51½ feet below existing site grades, laboratory testing, and preparation of this report.

Maps showing the site and boring locations are shown in the **Site Location** and **Exploration Plan** sections, respectively. The results of the laboratory testing performed on soil samples obtained from the site during the field exploration are included on the boring logs and/or as separate graphs in the **Exploration Results** section.

SITE CONDITIONS

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

Item	Description
Parcel Information	The project site is located north of Ottawa Street east of Hesperia Road in Victorville, San Bernardino County, California. The approximate coordinates of the site are: 34.4942°N/117.2874°W See **Site Location**
Existing Improvements	The project site is generally an undeveloped vacant parcel of land. Two typically dry arroyos traverse from the south to the north of the site. Remnants of concrete slabs are present in the northwest and northeast portions, and stockpiles of debris are present in the northwest portion of the site. The property overall is bounded by the following improvements: West side: Possible auto repair shop, materials stockpiles and vacant land, followed by Hesperia Road. North side: Miscellaneous materials storage and processing yards. East side: Railroad tracks and right of way. Residential developments further to the east. South side: Ottawa Street followed by commercial pet food manufacturing facility and vacant land.
Current Ground Cover	The site is primarily covered with native soils with a light growth of desert vegetation. Isolated stockpiled fills and concrete debris are present.
Existing Topography (from Conceptual Grading Plan)	Existing site elevations range from about 2,926 feet in the southwest portion to about 2,845 feet in the northeast.

PROJECT DESCRIPTION

Our initial understanding of the project was provided in our proposal and was discussed during project planning. A period of collaboration has transpired since the project was initiated, and our final understanding of the project conditions is as follows:

Item	Description
Proposed Development	Project plans provded for our use are titled *Ottawa Street Logistics Center, in the City of Victorville, Conceptual Grading and Drainage*, prepared by David Evans and Associates, Inc., plot date August 5, 2021. The project includes construction of a warehouse with approximate footprint area of 996,520 square feet (sf). Project will also include a rail spur (optional), truck-trailer parking, car parking, utilities, and driveways. Assume loading docks on the order of 4 feet will be included. Stormwater diversion structures such as culverts, open channels, and storm drains will also be constructed along the southern and eastern boundaries. Based on the most recently provided site plan, development will also include on-site underground storm water detention chambers in the northern and southern portions of the site. Stormwater infiltration facilities may be revised in the future.
Proposed Structures	996,520 sf warehouse facility
Building Construction	Concrete tilt-up construction founded on conventional continuous and spread footings with concrete slabs on grade.
Finished Floor Elevation	Varies from about 2,888 feet along the west side to about 2,878 along the east side.
Structural Loads (assumed)	Structural loads were not provided at the time of this report. We assume that the proposed structures will have the following loads: ■ Columns: 50 to 250 kips ■ Walls: 2 to 5 kips per linear foot (klf) ■ Slabs: 100 to 150 pounds per square foot (psf)
Grading Requirements	Grading is anticipated to consist of maximum cut and fill depths of approximately 30 feet, excluding remedial grading requirements. Fill slopes up to approximately 30 feet high with an inclination of 2:1 (horizontal:vertical) or flatter are expected along the north and east sides of the project. Smaller cut and fill slopes are expected within other areas of the site to achieve final grades.
Below Grade Structures	Culverts,underground infiltration chambers, and storm drain lines; depths range from 6 feet to 16 feet; sizes are unknown.
Infiltration Systems	Based on the recently provided site plans, underground infiltration chambers are proposed within the northern and southern portions of the site. The bottom of the underground storm drain chambers are proposed on cuts up to approximately 40 feet (chamber depth of 10 feet within proposed 30 feet of cut). A portion of the northern chamber is proposed on approximately 8 feet of fill. Due to County guidelines for placing chambers within fill, the use of this chamber for infiltration purposes should be confirmed.
Free-Standing Retaining Wall	Retaining walls with maximum heights of 6 feet are expected to be constructed as part of site development to achieve final grades along a section of the northern perimeter.

Item	Description
Pavements	Paved driveway and parking will be constru cted on site. We assume both rigid (concrete) and flexible (asphalt) pavement sections should be considered. Please confirm this assumption. Anticipated traffic indices (TIs) are as follows for asphalt pavement: ■ Auto Parking Areas: TI=5.0 ■ Drive Lanes TI=5.5 ■ Truck Parking areas: TI=7.0 ■ Truck Delivery Areas: TI=8.0 ■ The pavement design period is 20 years. Anticipated average daily truck traffic (ADTT) is as follows for concrete pavement: ■ Light Duty: ADTT=1 (Category A) ■ Medium Duty: ADTT=25 (Category B) ■ Dumpster Pad: ADTT=700 (Category C)

GEOTECHNICAL CHARACTERIZATION

Site Geology

The site is located within the Mojave Desert Geomorphic Province. The Mojave desert is bounded on the southwest by the San Andreas fault and the Transverse Ranges and on the northeast by the Garlock fault. The Mojave Desert is an ancient feature formed in response to the inception of movement on the San Andreas and Garlock faults. The region is characterized by broad alluviated basins that are burying the previously mountainous topography.

The site is located on a large alluvial fan emanating from the Transverse Ranges (San Gabriel and San Bemardino Mountains) located south of the site. The native materials at the site consist mostly of older valley fill materials that have been incised by younger drainages. The older valley fill material occupies the higher elevations of the site and has been mapped as older alluvium (Morton and Miller, 2006 and Dibblee and Minch, 2008). Based on the degree of soil development and geomorphology exhibited by the older alluvium, it is considered to be at least late Pleistocene in age. These materials as encountered in our exploratory borings and during site development of the property south of the site consist generally of interbedded sands, silty sands and gravels with some clay and silt beds.

The older alluvium has been incised by recent drainages (ephemeral stream channels) due to relative uplift and change in base level of the nearby Mojave River. These drainages occupy the lower areas of the site and include loose sands and silty sands. Access to these drainages was not permitted during our field exploration.

Subsurface Profile

We have developed a general characterization of the subsurface soil and groundwater conditions based upon our review of the data and our understanding of the geologic setting and planned construction. The following table provides our geotechnical characterization.

The geotechnical characterization forms the basis of our geotechnical calculations and evaluation of site preparation, foundation options and pavement options. As noted in **General Comments**, the characterization is based upon widely spaced exploration points across the site, and variations are likely.

Conditions encountered at each boring location are indicated on the individual boring logs shown in the **Exploration Results** section and are attached to this report. Stratification boundaries on the boring logs represent the approximate location of changes in native soil types; in situ, the transition between materials may be gradual.

Stratum	Approximate Depth to Bottom of Stratum (feet)	Material Description [1]	Consistency/Relative Density
Stratum I	51 ½	Interbeded layers of silty sand with gravel, poorly graded sand with silt, sandy silt and silty clay with sand, brown and olive gray	---

1. The soil materials encountered are not expected to experience substantial volumetric changes (shrink/swell) with fluctuations in moisture content.

Groundwater Conditions

The borings were advanced using continuous flight auger drilling techniques that allow short-term groundwater observations to be made while drilling. Groundwater was not observed within borings during the course of drilling. Our review of historical information regarding groundwater levels indicates that historical groundwater levels are deeper than 50 feet bgs. The depth to groundwater at the site is expected to be greater than or consistent with the elevation of surface flows in the nearby Mojave River and Spring Valley Lake, which is greater than 100 feet below the site. Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff and other factors not evident at the time the borings were performed.

Hydroconsolidation

To evaluate the potential deformation that may be caused by the addition of water to subsurface soils, hydroconsolidation testing was performed on a selected, representative relatively undisturbed samples (B-1 at 2.5 feet), (B-7 at 5 feet) and (B-10 at 5 feet). The results are shown

in Exploration Results section. The test results indicate collapse potentials of 1.6%, 2.75% and 1.75%, respectively for the samples tested when saturated under a confining pressure of 2,000 psf. The risk of the impacts of hydrocollapse can be reduced by removal and replacement of the upper portions of the on-site soil with engineered fill as described in the grading sections of this report.

SEISMIC CONSIDERATIONS

The seismic design requirements for buildings and other structures are based on Seismic Design Category. Site Classification is required to determine the Seismic Design Category for a structure. The Site Classification is based on the upper 100 feet of the site profile defined by a weighted average value of either shear wave velocity, standard penetration resistance, or undrained shear strength in accordance with Section 20.4 of ASCE 7 and the California Building Code (CBC). Based on the averaged results of two shear wave velocity surveys within the proposed project footprint, the shear wave velocity in the upper 100 feet is 1,161 feet/second (354 meters/second). The Seismic Site Classification is D according to ASCE 7-16. The locations of the shear wave velocity survey lines is shown on The Exploration Plan. The Seismic Shear-Wave Survey Reports (2 sheets) are attached.

Summary of Site-Specific Ground Motions

A site-specific ground motion study for the project was requested by the project team and consisted of a ground motion hazard analysis (GMHA). We performed this analysis in general conformance with Chapter 21 of ASCE 7-16. Regional seismic sources considered in our analysis included faults and gridded sources modeled in the USGS Unified Hazard Tool and nearby mapped fault zones.

The procedures outlined in ASCE 7-16 Chapters 11, 20 and 21 were utilized for preparation of site-specific spectra for the proposed project. The site is approximately 12.4 kilometers from the surface trace of the North Frontal (west) fault zone, 20.4 kilometers from the Helendale-South Lockhart fault zone, 22.8 kilometers from the Cleghorn fault and 28 kilometers from the San Andreas fault zone. A Class D soil profile condition was utilized in the analysis. We prepared deterministic and probabilistic spectra and associated limiting spectra. The site-specific response spectra in tabular and graphic forms and a discussion of methodology are included in this report.

A deterministic MCE spectrum was based on scenario M7.2 and M8.2 events on the North Frontal and San Andreas faults, respectively. The Next Generation West 2 (NGA-West 2) attenuation relations (GMPEs) used for the 2014 USGS seismic source model were applied. The equally-weighted spectral values from the attenuation relations of Abrahamson and others (ASK 2014), Boore and others (BSSA 2014), Campbell and Borzognia (CB 2014) and Chiou and Youngs (CY 2014) were used for the deterministic MCE spectrum. The MCE spectrum represents 84th-percentile, 5-percent-damped spectral response acceleration in the direction of maximum horizontal response (maximum rotated) for each period. Maximum rotated values were obtained

using the scaling factors of Shahi and Baker (2014). Adjustment to the deterministic limit spectrum is applied if necessary. The Site Class 'D' condition was modeled using V_{S30} = 354 meters/second. The deterministic spectrum is derived from the North Frontal fault values for periods from 0.0 (PGA) to 1.5 seconds and from San Andreas fault values for periods from 2 to 5 seconds.

The probabilistic MCE spectrum was developed using geomean spectral values obtained from the Unified Hazard Tool application (v4.2.0) hosted by USGS at https://earthquake.usgs.gov/hazards/interactive. The values so obtained were scaled to maximum rotated values using the factors of Shahi and Baker (2014). The probabilistic MCE spectrum was converted to risk-targeted spectra (MCE_R) using the USGS Risk-Targeted Ground Motion Calculator which applies Method 2 of ASCE 7-16, Section 21.2.2.2.

The lesser of the values at any site period from the deterministic MCE_R and MCE_R probabilistic spectra form the site-specific MCE_R spectrum.

A design response spectrum was determined according to the procedure outlined in ASCE 7-16, Section 21.3, and is equal to two-thirds of the response spectral accelerations of the site-specific MCE_R. The design spectrum is limited by a "floor" at 80 percent of spectral acceleration determined according to ASCE 7-16, Section 11.4.6. The recommended site-specific design response spectrum is attached in tabular and graphic forms.

Peak Ground Acceleration (PGA)

According to ASCE 7-16, Section 11.4.8, the site-specific geometric mean (MCE_G) PGA used for evaluation of soil effects is based on the lesser of the site-specific deterministic and probabilistic PGA values. The following table summarizes the PGA values considered for the project.

Site-Specific PGA Values	
Code-Based Geometric Mean PGA	0.550g
80 Percent of Code-Based PGA	0.440g
Probabilistic Geometric Mean PGA	0.606g
Deterministic Geometric Mean PGA	0.533g
Recommended Site-Specific PGA	0.533g

For the site-specific (MCE_G) PGA, the deterministic value is the lesser of the probabilistic and deterministic values and is greater than 80 percent of the code-based geometric mean PGA value. Therefore, we recommended a site-specific PGA value of 0.533g for evaluation of soil effects such as liquefaction or seismic settlement.

Seismic Design Parameters

The seismic design parameters, according to the 2019 California Building Code (CBC) and based on the site-specific analysis of ground motion are provided in the following table.

Description	Value
2019 California Building Code Site Classification (CBC) [1]	D [2]
Site Latitude	34.4941
Site Longitude	-117.2872
Mapped Spectral Acceleration Parameters [4]	S_S = 1.189 and S_1 = 0.458
Site Coefficients [4]	F_a = 1.025 and F_v = 1.840
Adjusted Maximum Considered Earthquake Spectral Response Parameters Design Spectral Acceleration Parameters [3]	SM_S = 1.415 and SM_1 = 1.478
Design Spectral Acceleration Parameters [3]	SD_S = 0.943 and SD_1 = 0.985
Geometric Mean Peak Ground Acceleration [3]	0.533g
De-aggregated Magnitude	7.91

1. Seismic site classification in general accordance with the 2019 California Building Code, which refers to ASCE 7-16.
2. The 2019 California Building Code (CBC) uses a site profile extending to a depth of 100 feet for seismic site classification. Shear wave geophysical surveys were performed at two locations within the project footprint and obtained data to at least 100 feet below ground surface.
3. Derived from the site-specific ground motion evaluation.
4. These values were obtained using online seismic design maps and tools provided by the USGS https://earthquake.usgs.gov/hazards/interactive.

LIQUEFACTION AND SEISMIC SETTLEMENT

Liquefaction Potential

Liquefaction is a mode of ground failure that results from the generation of high pore-water pressures during earthquake ground shaking, causing loss of shear strength, and is typically a hazard where loose sandy soils exist below groundwater. County of San Bernardino has designated certain areas as potential liquefaction hazard zones. These are areas considered at a risk of liquefaction-related ground failure during a seismic event, based upon mapped surficial deposits and the presence of a relatively shallow water table.

The subsurface materials generally consist of interbeded layers of silty sand with gravel, poorly graded sand with silt, sandy silt and silty clay with sand extending to the maximum depth of the borings approximately 51½ feet bgs. Groundwater was not encountered within borings during drilling, and has historically been deeper than 100 feet bgs.

According to the County of San Bernardino geologic hazard map, the site is not located within an area having a liquefaction potential. Based on the County mapping and encountered subsurface soils, it is our opinion that the liquefaction potential is low.

Seismic Settlement

To determine the amount of seismic settlement we utilized the software "LiquefyPro" by CivilTech Software, seismic settlement was estimated using the soil profile from exploratory boring B-13. A Peak Ground Acceleration (PGA) of 0.533g and a de-aggregated mean magnitude (Mw) of 7.91 were utilized as input into the liquefaction analysis program. Settlement analysis used the Ishihara / Yoshimine method and the fines percentage were corrected for liquefaction using the Modify Stark/Olson method. Historical high ground water of 50 feet bgs was used in the analysis.

Based on the calculation results, seismically induced settlement (dry sand settlement) is estimated to be less than 1 inch. The maximum differential seismic settlement could be on the order of half of total seismic settlement over a distance of 40 feet.

GEOTECHNICAL OVERVIEW

The site appears suitable for the proposed construction based upon geotechnical conditions encountered in the test borings, provided that the recommendations provided in this report are implemented in the design and construction phases of this project.

Geotechnical engineering recommendations for foundation systems and other earth connected phases of the project are outlined below. The recommendations contained in this report are based upon the results of field and laboratory testing, engineering analyses, and our current understanding of the proposed project.

The subsurface materials generally consist of interbeded layers of silty sand with gravel, poorly graded sand with silt, sandy silt and silty clay with sand extending to the maximum depth of the borings approximately 51½ feet bgs. Groundwater was not encountered within borings during drilling, and has historically been deeper than 50 feet bgs. On-site subsurface soils are not expected to experience substantial volumetric changes (shrink/swell) with fluctuations in moisture content.

Based on the conditions encountered, the proposed buildings can be supported on shallow foundations, such as spread footings.

Groundwater was not encountered within the borings at the time of drilling. Groundwater is not expected to affect shallow foundation construction on this site.

The **General Comments** section provides an understanding of the report limitations.

EARTHWORK

The following recommendations include site preparation, excavation, subgrade preparation and placement of engineered fills on the project. The recommendations presented for design and construction of earth supported elements including foundations, slabs, and pavements are contingent upon following the recommendations outlined in this section.

Earthwork on the project should be observed and evaluated by Terracon. The evaluation of earthwork should include observation and testing of engineered fill, subgrade preparation, foundation bearing soils, and other geotechnical conditions exposed during the construction of the project.

Site Preparation

Strip and remove existing vegetation, debris, pavements and other deleterious materials from proposed buildings and pavement areas. Exposed surfaces should be free of mounds and depressions which could prevent uniform compaction. The site should be initially graded to create a relatively level surface to receive fill and provide for a relatively uniform thickness of fill beneath proposed building structures.

Although no evidence of underground facilities such as septic tanks, cesspools, and basements, was observed during the site reconnaissance, such features could be encountered during construction. If unexpected fills, utilities, or underground facilities are encountered, such features should be removed and the excavation thoroughly cleaned prior to backfill placement and/or construction.

All younger alluvial materials (stream channel alluvium) are considered unsuitable for support of structures or pavements and should be removed to depths of competent older alluvium prior to filling. Explorations could not be completed within the younger alluvium due to access restrictions; therefore, data is not available regarding the depths of required removals. Based on our experience with the removal depths required on the adjacent projects and site geology, we expect that younger alluvial removals may need to extend to at least 10 feet below existing grade.

Subgrade Preparation

Proposed grading will result in differential fill thicknesses that vary across the building pad; therefore, a potential for differential settlement will exist. We recommend that static differential settlement not exceed 2 inches over a distance of 100 feet, across any structure area. The "structure area" includes the structure footprint and the zone of influence consisting of a 1:1 downward projection from 5 feet outside the structure footing. Based on our review the recent grading plans, critical fill differential depths are anticipated to be on the order of 30 feet over a horizontal distance of approximately 110 feet. Provided the recommendations provided herein are followed for the minimum thickness of fill beneath foundations, we estimate differential fill settlement will be less than 2 inches over 100 feet. If fill thicknesses increase over a shorter distance as a result of grading, or from a changed building layout, it may be necessary to increase the overexcavations in the cut portion of the building pad in order to construct a thicker fill mat than recommended below. A determination of specific structural pad areas that require additional subexcavation should be performed at the time of grading.

We recommend that the proposed building be supported on engineered fill extending to a minimum depth of 4 feet below the bottom of foundations, or 6 feet below existing grades, whichever is greater. Engineered fill placed beneath the entire footprint of the building should extend horizontally a minimum distance of 5 feet beyond the outside edge of perimeter footings.

Subgrade soils beneath exterior slabs and pavements should be scarified, moisture conditioned, and compacted to a minimum depth of 12 inches. The moisture content and compaction of subgrade soils should be maintained until slab or pavement construction.

Exposed areas which will receive fill, once properly cleared and benched where necessary, should be scarified to a minimum depth of 10 inches, moisture conditioned as necessary, and compacted per the compaction requirements in this report. Compacted fill soils should then be placed to the design grades, and the moisture content and compaction of soils should be maintained until slab, pavement, or proposed improvements are constructed.

Based upon the subsurface conditions determined from the geotechnical exploration, the on site soils are suitable for the proposed fill soils, and are anticipated to be relatively workable. However, the workability of the soils may be affected by precipitation, repetitive construction traffic or other factors. If unworkable conditions develop, workability may be improved by scarifying and drying.

Excavation

We anticipate that excavations for the proposed construction can be accomplished with conventional earthmoving equipment. The bottom of excavations should be thoroughly cleaned of loose soils and disturbed materials prior to backfill placement and/or construction.

Individual contractors are responsible for designing and constructing stable, temporary excavations. Excavations should be sloped or shored in the interest of safety following local, and federal regulations, including current OSHA excavation and trench safety standards.

Fill Material Types

All fill materials should be inorganic soils free of vegetation, debris, and fragments larger than three inches in size. Pea gravel or other similar non-cementitious, poorly-graded materials should not be used as fill or backfill without the prior approval of the geotechnical engineer.

Clean on-site soils or approved imported materials may be used as fill material for the following:

■ general site grading	■ foundation backfill
■ foundation areas	■ pavement areas
■ interior floor slab areas	■ exterior slab areas

If imported soils are used as fill materials to raise grades, these soils should conform to low volume change materials and should conform to the following requirements:

Gradation	**Percent Finer by Weight (ASTM C 136)**
3”	100
No. 4 Sieve	50 - 100
No. 200 Sieve	20 - 50

- Liquid Limit ..... 30 (max)
- Plasticity Index ..... 15 (max)
- Maximum Expansive Index* ..... 20 (max)

*ASTM D 4829

The contractor shall notify the Geotechnical Engineer of import sources sufficiently ahead of their use so that the sources can be observed and approved as to the physical characteristic of the import material. For all import material, the contractor shall also submit current verified reports from a recognized analytical laboratory indicating that the import has a "not applicable" (Class S0) potential for sulfate attack based upon current ACI criteria and is "mildly corrosive" to ferrous metal and copper. The reports shall be accompanied by a written statement from the contractor that the laboratory test results are representative of all import material that will be brought to the job.

Engineered fill should be placed and compacted in horizontal lifts, using equipment and procedures that will produce recommended moisture contents and densities throughout the lift. Fill lifts should not exceed 10 inches loose thickness.

Compaction Requirements

Material Type and Location	Per the Modified Proctor Test (ASTM D 1557)		
	Minimum Compaction Requirement (%)	Range of Moisture Contents for Compaction Above Optimum	
		Minimum	Maximum
On-site soils and/or low volume change imported fill:			
Beneath foundations:	90	0%	+3%
Beneath interior slabs:	90	0%	+3%
Miscellaneous backfill:	90	0%	+3%
Beneath pavements:	95	0%	+3%
Fill, deeper than 5 feet	95	0%	+3%
Utility Trenches*:	90	0%	+3%
Bottom of excavation receiving fill:	90	0%	+3%
Aggregate base (beneath pavements):	95	0%	+3%

* Upper 12 inches should be compacted to 95% within pavement and structural areas.

Utility Trenches

We anticipate that the on-site soils will provide suitable support for underground utilities and piping that may be installed. Any soft and/or unsuitable material encountered at the bottom of excavations should be removed and be replaced with an adequate bedding material. A non-expansive granular material with a sand equivalent greater than 30 is recommended for bedding and shading of utilities, unless otherwise allowed by the utility manufacturer.

On-site materials are considered suitable for backfill of utility and pipe trenches from one foot above the top of the pipe to the final ground surface, provided the material is free of organic matter and deleterious substances.

Trench backfill should be mechanically placed and compacted as discussed earlier in this report. Compaction of initial lifts should be accomplished with hand-operated tampers or other lightweight compactors. Where trenches are placed beneath slabs or footings, the backfill should satisfy the

gradation and expansion index requirements of engineered fill discussed in this report. Flooding or jetting for placement and compaction of backfill is not recommended.

Grading and Drainage

Positive drainage should be provided during construction and maintained throughout the life of the development. Infiltration of water into utility trenches or foundation excavations should be prevented during construction. Planters and other surface features which could retain water in areas adjacent to the building or pavements should be sealed or eliminated. In areas where sidewalks or paving do not immediately adjoin the structure, we recommend that protective slopes be provided with a minimum grade of approximately 5 percent for at least 10 feet from perimeter walls. Backfill against footings, exterior walls, and in utility and sprinkler line trenches should be well compacted and free of all construction debris to reduce the possibility of moisture infiltration.

We recommend a minimum horizontal setback distance of 10 feet from the perimeter of any building and the high-water elevation of the nearest storm-water retention chamber.

Roof drainage should be tied to tight lines and discharged onto pavements or into the stormdain system. Sprinkler systems and landscaped irrigation should not be installed within 5 feet of foundation walls.

Exterior Slab Design and Construction

Exterior slabs-on-grade, exterior architectural features, and utilities founded on, or in backfill may experience some movement due to the volume change of the backfill. To reduce the potential for damage caused by movement, we recommend:

- minimizing moisture increases in the backfill;
- controlling moisture-density during placement of backfill;
- using designs which allow vertical movement between the exterior features and adjoining structural elements;
- placing effective control joints on relatively close centers.

Construction Considerations

Upon completion of filling and grading, care should be taken to maintain the subgrade moisture content prior to construction of floor slabs and pavements. Construction traffic over the completed subgrade should be avoided to the extent practical. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. If the subgrade should become desiccated, saturated, or disturbed, the affected material should be removed or these materials should be scarified, moisture conditioned, and recompacted prior to floor slab and pavement construction.

Onsite soils contains zones of cohesionless sandy soils. Such soils have the tendency to cave and slough during excavations. Therefore, formwork may be needed for foundation excavations.

We recommend that the earthwork portion of this project be completed during extended periods of dry weather if possible. If earthwork is completed during the wet season (typically November through April) it may be necessary to take extra precautionary measures to protect subgrade soils. Wet season earthwork operations may require additional mitigative measures beyond that which would be expected during the drier summer and fall months. This could include diversion of surface runoff around exposed soils and draining of ponded water on the site. Once subgrades are established, it may be necessary to protect the exposed subgrade soils from construction traffic.

Construction Observation and Testing

The geotechnical engineer should be retained during the construction phase of the project to observe earthwork and to perform necessary tests and observations during subgrade preparation, proof-rolling, placement and compaction of controlled compacted fills, backfilling of excavations to the completed subgrade.

The exposed subgrade and each lift of compacted fill should be tested, evaluated, and reworked as necessary until approved by the Geotechnical Engineer prior to placement of additional lifts. Each lift of fill should be tested for density and water content at a frequency of at least one test for every 2,500 square feet of compacted fill in the building areas and 5,000 square feet in pavement areas. One density and water content test for every 50 linear feet of compacted utility trench backfill.

In areas of foundation excavations, the bearing subgrade should be evaluated under the direction of the Geotechnical Engineer. In the event that unanticipated conditions are encountered, the Geotechnical Engineer should prescribe mitigation options.

In addition to the documentation of the essential parameters necessary for construction, the continuation of the Geotechnical Engineer into the construction phase of the project provides the continuity to maintain the Geotechnical Engineer's evaluation of subsurface conditions, including assessing variations and associated design changes.

SHALLOW FOUNDATIONS

If the site has been prepared in accordance with the requirements noted in **Earthwork**, the following design parameters are applicable for shallow foundations.

Item	Description
Foundation Support	Engineered fill extending 4 feet below the bottom of foundations, or 6 feet below existing grades, whichever is greater.
Net Allowable Bearing pressure [1, 2] **(On-site soils or structural fill)**	2,200 psf
Minimum Foundation Dimensions	Columns: 24 inches Continuous: 18 inches
Minimum Footing Depth	18" below finished grade
Increments of Net Allowable Bearing Pressure	800 psf for each additional foot of depth 400 psf for each additional foot of width
Maximum Net Allowable Bearing Pressure	4,000 psf
Ultimate Passive Resistance [4]	375 pcf
Ultimate Coefficient of Sliding Friction [5]	0.36
Estimated Total Static Settlement from Structural Loads [2]	about 1 inch
Estimated Differential Settlement [2, 6]	About 1/2 of total settlement

1. The maximum net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. An appropriate factor of safety has been applied.
2. Values provided are for maximum loads noted in **Project Description**. The foundation settlement will depend upon the variations within the subsurface soil profile, the structural loading conditions, the embedment depth of the footings, the thickness of compacted fill, and the quality of the earthwork operations.
3. Unsuitable or soft soils should be over-excavated and replaced per the recommendations presented in the **Earthwork**.
4. Use of passive earth pressures requires the footing forms be removed and compacted structural fill be placed against the vertical footing face. A factor of safety of 2.0 is recommended.
5. Can be used to compute sliding resistance where foundations are placed on suitable soil/materials. Should be neglected for foundations subject to net uplift conditions. A factor of safety of 1.5 is recommended.
6. Differential settlements are as measured over a span of 40 feet.

MAT FOUNDATIONS RECOMMENDATION

If the site has been prepared in accordance with the requirements noted in **Earthwork** and the mat foundation (including post-tensioned slab) rests on minimum of 4 feet of compacted engineered fill, the following design parameters are applicable.

Mat Width (feet)	Allowable Bearing Capacity (psf) [1]	Modulus of Subgrade Reaction (Kb) (pci) [2]
5 to 15 feet	2,200	150

1. These bearing pressures can be increased by 1/3 for transient loads unless those loads have been factored to account for transient conditions.

Mat Width (feet)	Allowable Bearing Capacity (psf) [1]	Modulus of Subgrade Reaction (Kb) (pci) [2]

2. The modulus was obtained based on estimates obtained from NAVFAC 7.1 design charts. This value is for a small loaded area (1 Sq. ft or less) such as for forklift wheel loads or point loads and should be adjusted for larger loaded areas

The subgrade modulus (K_b) for the mat is affected by the size of the mat foundation and would vary according the following equation:

$$K_b = Kv_1 \times (B+1)^2 / 4B^2$$

Where: Kv_1 is the modulus of vertical subgrade reaction
B is the width of the mat foundation.

Thus, for a footing width of B = 10 ft bearing on the onsite soils, the subgrade modulus would be:

$$K_b = 150 \times (10+1)^2 / (4 \times 10^2) = 45 \text{ pci}$$

The use of a vapor retarder should be considered beneath concrete slabs on grade covered with wood, tile, carpet, or other moisture sensitive or impervious coverings, or when the slab will support equipment sensitive to moisture. When conditions warrant the use of a vapor retarder, the slab designer should refer to ACI 302 and/or ACI 360 for procedures and cautions regarding the use and placement of a vapor retarder.

Saw-cut control joints should be placed in the slab to help control the location and extent of cracking. For additional recommendations refer to the ACI Design Manual. Joints or cracks should be sealed with a water-proof, non-extruding compressible compound specifically recommended for heavy duty concrete pavement and wet environments.

Where floor slabs are tied to perimeter walls or turn-down slabs to meet structural or other construction objectives, our experience indicates differential movement between the walls and slabs will likely be observed in adjacent slab expansion joints or floor slab cracks beyond the length of the structural dowels. The Structural Engineer should account for potential differential settlement through use of sufficient control joints, appropriate reinforcing or other means.

Foundation Construction Considerations

As noted in **Earthwork**, the footing excavations should be evaluated under the direction of the Geotechnical Engineer. The base of all foundation excavations should be free of water and loose soil, prior to placing concrete. Concrete should be placed soon after excavating to reduce bearing soil disturbance. Care should be taken to prevent wetting or drying of the bearing materials during

construction. Excessively wet or dry material or any loose/disturbed material in the bottom of the footing excavations should be removed/reconditioned before foundation concrete is placed.

To ensure foundations have adequate support, special care should be taken when footings are located adjacent to trenches. The bottom of such footings should be at least 1 foot below an imaginary plane with an inclination of 1.5 horizontal to 1.0 vertical extending upward from the nearest edge of adjacent trenches.

FLOOR SLABS

DESCRIPTION	RECOMMENDATION
Interior floor system	Slab-on-grade concrete
Floor slab support	Engineered fill extending 4 feet below the bottom of associated foundations, or 6 feet below existing grades, whichever is greater.
Subbase	Minimum 4-inches of Aggregate Base
Modulus of subgrade reaction	150 pounds per square inch per inch (psi/in) (The modulus was obtained based on estimates obtained from NAVFAC 7.1 design charts). This value is for a small loaded area (1 Sq. ft or less) such as for forklift wheel loads or point loads and should be adjusted for larger loaded areas.

The use of a vapor retarder should be considered beneath concrete slabs on grade covered with wood, tile, carpet, or other moisture sensitive or impervious coverings, or when the slab will support equipment sensitive to moisture. When conditions warrant the use of a vapor retarder, the slab designer should refer to ACI 302 and/or ACI 360 for procedures and cautions regarding the use and placement of a vapor retarder.

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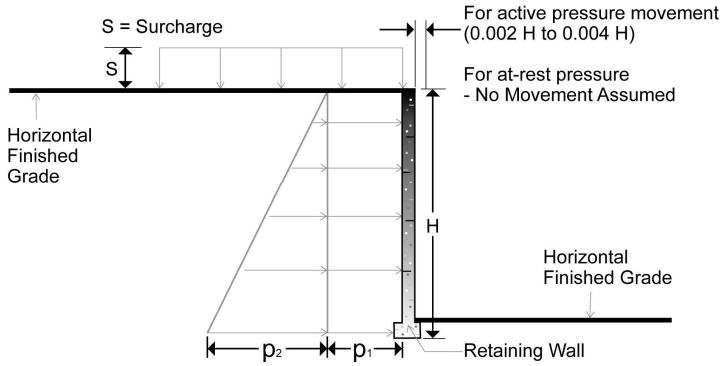
LATERAL EARTH PRESSURES

Structures with unbalanced backfill levels on opposite sides should be designed for earth pressures at least equal to values indicated in the following table. Earth pressures will be influenced by structural design of the walls, conditions of wall restraint, methods of construction and/or compaction and the strength of the materials being restrained. Two wall restraint conditions are shown in the diagram below. Active earth pressure is commonly used for design of free-standing cantilever retaining walls and assumes wall movement. The “at-rest” condition assumes no wall movement and is commonly used for basement walls, loading dock walls, or other walls restrained at the top. The recommended design lateral earth pressures do not include a factor of safety and do not provide for possible hydrostatic pressure on the walls (unless stated).



For on-site or import materials that are compacted as recommended in this report, we recommend the following preliminary lateral earth pressure parameters

Lateral Earth Pressure Design Parameters			
Earth Pressure Condition [1]	**Lateral Earth Pressure Coeficients** [2]	**Surcharge Pressure p_1 (psf)** [3, 4, 5]	**Effective Fluid Pressures (psf)** [2, 4, 5]
			Unsaturated [6]
Active (Ka)	0.33	(0.33)S	(40)psf/ft
At-Rest (Ko)	0.5	(0.5)S	(60)psf/ft
Passive (Kp)	3	(3)S	(360)psf/ft

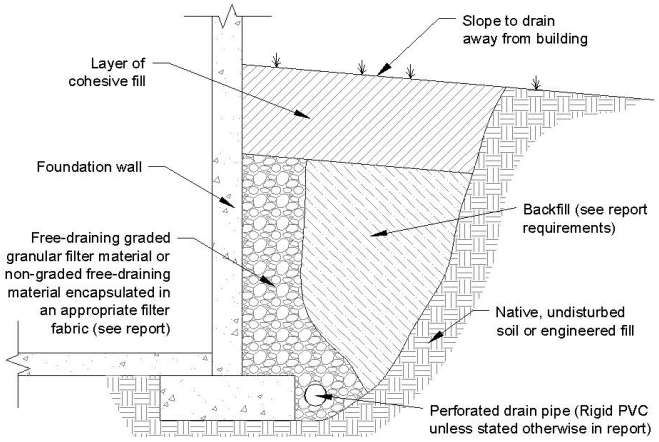
Lateral Earth Pressure Design Parameters			
Earth Pressure Condition [1]	Lateral Earth Pressure Coeficients[2]	Surcharge Pressure [3, 4, 5] p_1 (psf)	Effective Fluid Pressures (psf) [2, 4, 5]
			Unsaturated [6]

1. For active earth pressure, wall must rotate about base, with top lateral movements 0.002 H to 0.004 H, where H is wall height. For passive earth pressure, wall must move horizontally to mobilize resistance.
2. Uniform, horizontal backfill, compacted to at least 90% of the ASTM D 1557 maximum dry density, rendering a maximum unit weight of 125 pcf.
3. Uniform surcharge, where S is surcharge pressure.
4. Loading from heavy compaction equipment is not included.
5. No safety factor is included in these values.
6. To achieve "Unsaturated" conditions, follow guidelines in **Subsurface Drainage for Below-Grade Walls** below.

Backfill placed against structures should consist of granular soils. For the granular values to be valid, the granular backfill must extend out and up from the base of the wall at an angle of at least 45 and 60 degrees from vertical for the active and passive cases, respectively.

Subsurface Drainage for Below-Grade Walls

A perforated rigid plastic drain line installed behind the base of walls and extends below adjacent grade is recommended to prevent hydrostatic loading on the walls. The invert of a drain line around a below-grade building area or exterior retaining wall should be placed near foundation bearing level. The drain line should be sloped to provide positive gravity drainage to daylight or to a sump pit and pump. The drain line should be surrounded by clean, free-draining granular material having less than 5% passing the No. 200 sieve. The free-draining aggregate should be encapsulated in a filter fabric. The granular fill should extend to within 2 feet of final grade, where it should be capped with compacted cohesive fill to reduce infiltration of surface water into the drain system.



As an alternative to free-draining granular fill, a pre-fabricated drainage structure may be used. A pre-fabricated drainage structure is a plastic drainage core or mesh which is covered with filter fabric to prevent soil intrusion and is fastened to the wall prior to placing backfill.

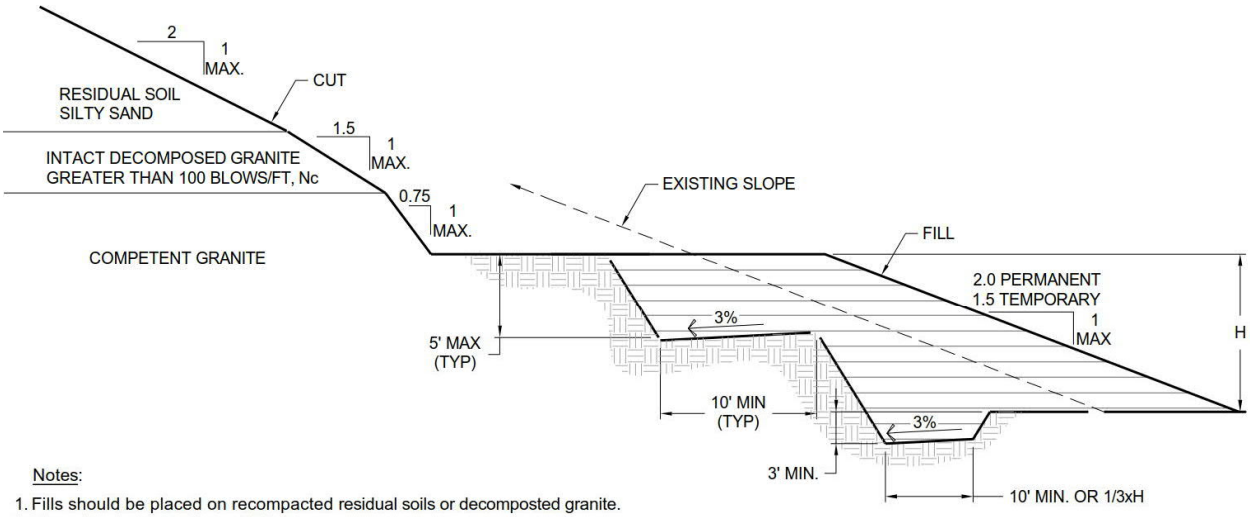
SLOPE STABILITY

Based on the development plans provided for our review, fill slopes with heights up to approximately 30 feet and an inclination of 2:1 (horizontal:vertical) or flatter are planned along the north and east sides of the project. Smaller cut and fill slopes with inclinations steeper than 2:1 are planned within other areas of the site to achieve final grades. We performed slope stability analyses on a cross section of the slope with a height of 30 feet and inclination of 2h:1v and parameters derived from our exploratory borings, experience, and laboratory tests. The analyses used the current topographic information provided, proposed slope configuration, assumed benching and removal of unsuitable soils, and estimated shear strengths for the native and proposed fill soils. The slope stability program SLIDE (version 8.06, Rocscience) was used to model the slope for static and seismic conditions. The seismic condition was modeled with a horizontal seismic load Kh = 0.18 using one-third the site specific PGA and based on the site location in a region of moderate ground-shaking potential..

The California Geological Survey (CGS) recommends minimum factors of safety for slopes. Based on the analyses, the results indicate that the slopes would have a minimum FOS against static failure of 1.5, when configured to an inclination of approximately 2h:1v and to a height of approximately 30 feet. Calculated seismic FOS is a minimum of 1.10. These static and seismic FOS values are in conformance with the CGS recommendations. We recommend that all slopes, regardless of height, be designed and constructed with an inclination of 2:1 or flatter.

Prior to placing any fill, all vegetation, topsoil, uncontrolled fill material, and any otherwise unsuitable material should be completely removed from the construction areas. Exposed surfaces should be free of mounds and depressions which could prevent uniform compaction.

After clearing, any required cuts should be made. Where fill is planned on existing slopes steeper than 5H:1V, including behind retaining walls, benches should be cut into the existing slopes prior to fill placement. Where fill placement is not behind retaining walls, the benches should be cut and keyed into underlying dense sand soil. The depth of the key should be at least 1/3 the height of the planned fill. Benches should have a minimum vertical face height of 1 foot and a maximum vertical face height of 5 feet and should be cut wide enough to accommodate the compaction equipment. This benching will help provide a positive bond between the fill and dense native soils and reduce the possibility of failure along the fill/native soil interface. Consideration should be given to overfilling the fill slopes and then cutting back to develop an adequately compacted slope face Permanent cut and fill slopes should be no steeper than 2H:1V as discussed in **Slope Stability**. Cut slopes should be evaluated by either an engineer or geologist from our office. These benching recommendations are illustrated on the following sketch.



Notes:

1. Fills should be placed on recompacted residual soils or decomposted granite.
2. Slope benches into slope at 3%.
3. The geotechnical engineer or their representative is required to review all building and grading plans prior to construction as well as observe grading operations during construction of cut/fills to determine our recommendations have been met.
4. Intermediate drainage benches shall be installed at 50 foot intervals.
5. Cut slopes at inclinations of 3/4h:1v shall be observed by a geologist/engineer from our office to verify no adverse jointing is present.
6. The on-site surface soils are cohesionless and are subject to erosion. Bare slopes shall be protected by seeding and/or erosion control blanket.
7. All other recommendations contained in this geotechnical report shall be followed.

The surface soils at the site primarily consist of sandy soils which are typically subject to significant wind/water erosion or sedimentation. The project civil engineer while developing the plans should plan to limit wind/water erosion and sedimentation during and after construction to levels acceptable to the owner.

A brow berm or drainage swale should be provided at the top of all slopes Intermediate drainage benches shall also be provided at vertical intervals in accordance with local codes. The brow berms and drainage benches shall be designed by the civil engineer to accommodate the calculated runoff. Implementing these features will limit the amount of runoff water traveling down slopes minimizing the erosion and sedimentation.

Surficial slope instability typically impacts the upper 3 to 5 feet of the subsurface profile, predominantly during extended wet periods. Regular maintenance should be anticipated to identify and address changes in natural drainage creating potential for soil creep or erosion near improvements. This includes replacing or replanting trees and grasses, as necessary, and grading the slope to reduce soil creep and erosion. If future surficial slope erosion occurs near the crest of slopes, we recommend the slope face be restored as soon as practical. We recommend irrigated landscaping be setback a minimum of 30 feet from the crest of the slopes.

Fill slopes should be re-vegetated as soon as possible after grading and protected from erosion until vegetation is established. Slope planting should consist of ground cover, shrubs, and trees possessing deep, dense root structures that require minimum irrigation. It is the responsibility of the owner to maintain such planting.

PAVEMENTS

General Pavement Comments

Pavement designs are provided for the traffic conditions and pavement life conditions as noted in **Project Description** and in the following sections of this report. A critical aspect of pavement performance is site preparation. Pavement designs noted in this section must be applied to the site which has been prepared as recommended in the **Earthwork** section.

Pavement Design Parameters

Design of asphalt concrete (AC) pavements is based on the procedures outlined in the Caltrans "Highway Design Manual for Safety Roadside Rest Areas" (Caltrans, 2016). Design of Portland cement concrete (PCC) pavements are based upon American Concrete Institute (ACI) 330R-08; "Guide for Design and Construction of Concrete Parking Lots."

During the field investigation at the site, one sample of the near surface soil taken from our borings was tested in our laboratory to determine the Hveem Stabilometer Value (R-value). The test

produced an R-value of 70, design R-value of 50 was used to calculate the AC pavement thickness sections, as Caltrans recommends the maximum R-value of 50 for subgrade. A modulus of subgrade reaction of 120 pci and a modulus of rupture of 600 psi were used for the PCC pavement designs.

The structural sections are predicated upon proper compaction of the utility trench backfills and the subgrade soils as prescribed by in **Earthwork**, with the upper 12 inches of subgrade soils and all aggregate base material brought to a minimum relative compaction of 95 percent in accordance with ASTM D 1557 prior to paving. The aggregate base should meet Caltrans requirements for Class 2 base.

The pavement designs were based upon the results of preliminary sampling and testing and should be verified by additional sampling and testing (specifically R-value testing) during construction when the actual subgrade soils are exposed. Additionally, the preliminary sections provided are minimums based on procedures previously referenced. The project civil engineer should confirm minimum Traffic Indices and sections required by local agencies or jurisdictions if applicable.

Pavement Section Thicknesses

The following table provides options for AC and PCC Sections:

Asphalt Concrete Design		
Usage	**Assumed Traffic Index**	**Recommended Structural Section**
Auto Parking Areas	5.0	3” HMA[1]/4” Class 2 AB[2]
Drive lanes	5.5	3” HMA[1]/4” Class 2 AB[2]
Truck Parking Areas	7.0	4” HMA[1]/5” Class 2 AB[2]
Truck Delivery Areas	8.0	4” HMA[1]/7” Class 2 AB[2]

1. HMA = hot mix asphalt
2. AB = aggregate base

Portland Cement Concrete Design			
Layer	**Thickness (inches)**		
	Light Duty[1]	**Medium Duty**[2]	**Dumpster Pad**[3]
PCC	5.0	6.0	7.5
Aggregate Base [4]	4.0	4.0	4.0

1. Car Parking and Access Lanes, Average Daily Truck Traffic (ADTT) = 1 (Category A).
2. Truck Parking Areas, Multiple Units, ADTT = 25 (Category B)
3. In areas of anticipated heavy traffic, fire trucks, delivery trucks, or concentrated loads (e.g., dumpster pads), and areas with repeated turning or maneuvering of heavy vehicles, ADTT = 700 (Category C).
4.

Recommended structural sections were calculated based on assumed TIs and our preliminary sampling and testing.

Terracon does not practice traffic engineering. We recommend that the project civil engineer or traffic engineer verify that the TIs and ADTT traffic indices used are appropriate for this project.

Pavement Drainage

Pavements should be sloped to provide rapid drainage of surface water. Water allowed to pond on or adjacent to the pavements could saturate the subgrade and contribute to premature pavement deterioration. In addition, the pavement subgrade should be graded to provide positive drainage within the granular base section. Appropriate sub-drainage or connection to a suitable daylight outlet should be provided to remove water from the granular subbase.

Pavement Maintenance

The pavement sections represent minimum recommended thicknesses and, as such, periodic maintenance should be anticipated. Therefore, preventive maintenance should be planned and provided for through an on-going pavement management program. Maintenance activities are intended to slow the rate of pavement deterioration and to preserve the pavement investment. Maintenance consists of both localized maintenance (e.g., crack and joint sealing and patching) and global maintenance (e.g., surface sealing). Preventive maintenance is usually the priority when implementing a pavement maintenance program. Additional engineering observation is recommended to determine the type and extent of a cost-effective program. Even with periodic maintenance, some movements and related cracking may still occur and repairs may be required.

Pavement performance is affected by its surroundings. In addition to providing preventive maintenance, the civil engineer should consider the following recommendations in the design and layout of pavements:

- Final grade adjacent to paved areas should slope down from the edges at a minimum 2 percent.
- Subgrade and pavement surfaces should have a minimum 2 percent slope to promote proper surface drainage.
- Install below pavement drainage systems surrounding areas anticipated for frequent wetting.
- Install joint sealant and seal cracks immediately.
- Seal all landscaped areas in or adjacent to pavements to reduce moisture migration to subgrade soils.
- Place compacted, low permeability backfill against the exterior side of curb and gutter.
- Place curb, gutter and/or sidewalk directly on clay subgrade soils rather than on unbound granular base course materials.

STORM WATER MANAGEMENT

Two in-situ infiltration tests (falling head borehole permeability) were performed at approximate depths of 5 and 10 feet bgs within boreholes drilled with an 8-inch diameter auger within the proposed location of the retention basin that was initially identified inthe northeast portion of the site. The current site plan depicts the use of two underground storm water retention chambers located each at the northern and southern portions of the project site. Infiltration testing should be performed at the new locations to provide infiltration test data for those locations. The objective of the testing is to provide infiltration rates for designing the proposed infiltration system. A 2-inch thick, 3/4-inch gravel layer was placed in the bottom of each boring after the borings were drilled to investigate the soil profile. Three-inch diameter perforated pipes were installed on top of the gravel layer and gravel was used to backfill between the perforated pipes and the boring sidewall. The borings were then filled with water for a pre-soak period.

At the beginning of each test, the pipes were refilled with water and readings were taken at periodic time intervals as the water level dropped. The soil at the percolation test locations was classified in the field using a visual/manual procedure. The infiltration velocity is presented as the infiltration rate and is summarized in the following table. The infiltration rates provided do not include safety factors.

Test Location	Boring Depth (ft.) [1]	Test Depth Range (ft.) [1]	Soil Type	Water Head (ft)	Percolation Rate Average (in./hr.)	Infiltration Rate Average (in./hr.) [2]
P-1	5	0 to 5	SM	5	88.75	3.56
P-2	10	5 to 10	SM	5	165.60	5.36

Test Location	Boring Depth (ft.) [1]	Test Depth Range (ft.) [1]	Soil Type	Water Head (ft)	Percolation Rate Average (in./hr.)	Infiltration Rate Average (in./hr.) [2]

1. Below existing ground surface.
2. If proposed infiltration system will mainly rely on vertical downward seepage, the correlated infiltration rates should be used.

The above infiltration rates determined by the percolation test method are based on field test results utilizing clear water. Infiltration rates can be affected by silt buildup, debris, degree of soil saturation, site variability and other factors. The rate obtained at specific location and depth is representative of the location and depth tested and may not be representative of the entire site. Application of an appropriate safety factor is prudent to account for subsoil inconsistencies, possible compaction related to site grading, and potential silting of the percolating soils, depending on the application.

The design engineer should also check with the local agency for the limitation of the infiltration rate allowed in the design. If the maximum allowable design infiltration rate is lower than the above recommended rate, the maximum allowable design infiltration rate should be used. The designer of the basins should also consider other possible site variability in the design.

The percolation tests were performed with clear water, whereas the storm water will likely not be clear, but may contain organics, fines, and grease/oil. The presence of these deleterious materials will tend to decrease the rate that water percolates from the infiltration systems. Design of the storm water infiltration systems should account for the presence of these materials and should incorporate structures/devices to remove these deleterious materials.

Based on the soils encountered in our borings, we expect the percolation rates of the soils could be different than measured in the field due to variations in fines and gravel content. The design elevation and size of the proposed infiltration system should account for this expected variability in infiltration rates.

Infiltration testing should be performed after construction of the infiltration system to verify the design infiltration rates. It should be noted that siltation and vegetation growth along with other factors may affect the infiltration rates of the infiltration areas. The actual infiltration rate may vary from the values reported here. Infiltration systems should be located at least 10 feet from any existing or proposed foundation system.

CORROSIVITY

The following table lists the laboratory electrical resistivity (standard and as-received), chlorides, soluble sulfates, and pH testing results. These values may be used to estimate potential corrosive characteristics of the on-site soils with respect to contact with the various underground materials which will be used for project construction.

Boring	Depth (feet)	Soluble Sulfate (mg/kg)	Soluble Chloride (mg/kg)	Total Salts (mg/kg)	pH	Resistivity (as-received) (Ohm-cm)	Resistivity (saturated) (Ohm-cm)
B-12	2 to 5	49	58	486	8.5	24,250	2,328

Results of soluble sulfate testing indicate samples of the on-site soils tested possess negligible sulfate concentrations when classified in accordance with Table 4.3.1 of the ACI Design Manual. Concrete should be designed in accordance with the provisions of the ACI Design Manual, Section 318, Chapter 4.

For protection against corrosion to buried metals, Terracon recommends that an experienced corrosion engineer be retained to design a suitable corrosion protection system for underground metal structures or components.

If corrosion of buried metal is critical, it should be protected using a non-corrosive backfill, wrapping, coating, sacrificial anodes, or a combination of these methods, as designed by a qualified corrosion engineer.

GENERAL COMMENTS

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Natural variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence or collaboration through this system are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client, and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly impact excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety, and cost estimating including, excavation support, and dewatering requirements/design are the responsibility of others. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

REFERENCES

Abrahamson, N.A., Walter J. Silva, and Ronnie Kamai (2014) Summary of the ASK14 Ground Motion Relation for Active Crustal Regions. Earthquake Spectra: August 2014, Vol. 30, No. 3, pp. 1025-1055.

American Society of Civil Engineers (ASCE), 2016, Minimum design loads for buildings and other structures, ASCE standard 7-16.

American Society of Civil Engineers (ASCE), 2018, Minimum design loads for buildings and other structures, ASCE standard 7-16, Supplement No. 1.

Boore, D.M., Jonathan P. Stewart, Emel Seyhan, and Gail M. Atkinson (2014) NGA-West2 Equations for Predicting PGA, PGV, and 5% Damped PSA for Shallow Crustal Earthquakes. Earthquake Spectra: August 2014, Vol. 30, No. 3, pp. 1057-1085.

Campbell, K.W. and Yousef Bozorgnia (2014) NGA-West2 Ground Motion Model for the Average Horizontal Components of PGA, PGV, and 5% Damped Linear Acceleration Response Spectra. Earthquake Spectra: August 2014, Vol. 30, No. 3, pp. 1087-1115.

Chiou, B. S. J. and Robert R. Youngs (2014) Update of the Chiou and Youngs NGA Model for the Average Horizontal Component of Peak Ground Motion and Response Spectra. Earthquake Spectra: August 2014, Vol. 30, No. 3, pp. 1117-1153.

Dibblee, T.W. and Minch, J.A., 2008, Geologic map of the Hesperia 15 minute quadrangle, San Bernardino County, California, Dibblee Geological Foundation, Dibblee Foundation Map DF-382, 1:62,500.

Morton, D.M. and Miller, F.K., 2006, Geologic map of the San Bernardino and Santa Ana 30' x 60' quadrangles, California, U.S. Geological Survey, Open-File Report OF-2006-1217, 1:100,000.

Petersen, M.D., Moschetti, M.P., Powers, P.M., Mueller, C.S., Haller, K.M., Frankel, A.D., Zeng, Yuehua, Rezaeian, Sanaz, Harmsen, S.C., Boyd, O.S., Field, Ned, Chen, Rui, Rukstales, K.S., Luco, Nico, Wheeler, R.L., Williams, R.A., and Olsen, A.H., 2014, Documentation for the 2014 update of the United States national seismic hazard maps: U.S. Geological Survey Open-File Report 2014–1091, 243 p., *https://dx.doi.org/10.3133/ofr20141091*.

Shahi, S.K. and Baker, J.W., 2014, NGA-West2 Models for Ground Motion Directionality, Earthquake Spectra vol. 30, no. 3.

USGS (United States Geological Survey), 2017. “Building Seismic Safety Council 2014 Event Set.” https://earthquake.usgs.gov/scenarios/catalog/bssc2014/.

ATTACHMENTS

EXPLORATION AND TESTING PROCEDURES

Field Exploration

Terracon conducted twenty-four (24) soil-testing borings. These borings were drilled at the locations and to depths indicated in the table below.

Boring Nos.	Boring Depth (feet) [1]	Location
B-1, B-2 and B-3	11 ½	Trailer parking
B-4	½ [2]	Auto parking
B-5 to B-12	21 ½ to 31 ½	Warehouse footprint
B-13	51 ½	Warehouse footprint
B-14, B-15	21 ½ to 31	Warehouse footprint
B-16	16 ½	Track rail spur
B-17	5	Auto parking
B-18	21 ½	Warehouse footprint
B-19	21 ½	Trailer parking
B-20 and B-21	21 ½	Warehouse footprint
B-22	5	Auto parking
B-23 (P-1)	5	Detention pond – native soils
B-24 (P-2)	10	Detention pond – native soils

1. Below ground surface.
2. Auger refusal was encountered in boring B-4.

Boring Layout and Elevations: Unless otherwise noted, Terracon personnel provided the boring layout. Coordinates were obtained with a handheld GPS unit (estimated horizontal accuracy of about ±10 feet) and approximate elevations were obtained by interpolation from the Google Earth. If elevations and a more precise boring layout are desired, we recommend borings be surveyed following completion of fieldwork.

Subsurface Exploration Procedures: We advance the borings with a truck-mounted drill rig using hollow-stem augers. Both a standard penetration test (SPT) sampler (2-inch outer diameter and 1-3/8-inch inner diameter) and a modified California ring-lined sampler (3-inch outer diameter and 2-3/8-inch inner diameter) are utilized in our investigation. The penetration resistance is recorded on the boring logs as the number of hammer blows used to advance the sampler in 6-inch increments (or less if noted). The samplers are driven with an automatic hammer that drops a 140-pound weight 30 inches for each blow. After the required seating, samplers are advanced up to 18 inches, providing up to three sets of blowcounts at each sampling interval. The sampling depths, penetration distances, and other sampling information are recorded on the field boring logs. The recorded blows are raw numbers without any corrections for hammer type (automatic vs. manual cathead) or

sampler size (ring sampler vs. SPT sampler). Relatively undisturbed and bulk samples of the soils encountered are placed in sealed containers and returned to the laboratory for testing and evaluation.

We observe and record groundwater levels during drilling and sampling. For safety purposes, all borings are backfilled with auger cuttings after their completion.

Our exploration team prepares field boring logs as part of the drilling operations. These field logs include visual classifications of the materials encountered during drilling and our interpretation of the subsurface conditions between samples. Final boring logs are prepared from the field logs. The final boring logs represent the Geotechnical Engineer's interpretation of the field logs and include modifications based on observations and tests of the samples in our laboratory.

Laboratory Testing

The project engineer reviewed the field data and assigned laboratory tests to understand the engineering properties of the various soil strata, as necessary, for this project. Procedural standards noted below are for reference to methodology in general. In some cases, variations to methods were applied because of local practice or professional judgment. Standards noted below include reference to other, related standards. Such references are not necessarily applicable to describe the specific test performed.

- Water (Moisture) Content of Soil by Mass
- Laboratory Determination of Density (Unit Weight) of Soil Specimens
- Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis
- Modified Proctor test
- Hydro-consolidation
- R-value test
- Corrosivity suite test

The laboratory testing program often included examination of soil samples by an engineer. Based on the material’s texture and plasticity, we described and classified the soil samples in accordance with the Unified Soil Classification System.

SITE LOCATION AND EXPLORATION PLANS

SITE LOCATION

Ottawa Business Center Project ■ Victorville, San Bernardino County, California
August 24, 2021 ■ Terracon Project No. CB215026

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

EXPLORATION PLAN

Ottawa Business Center Project ■ Victorville, San Bernardino County, California
August 24, 2021 ■ Terracon Project No. CB215026

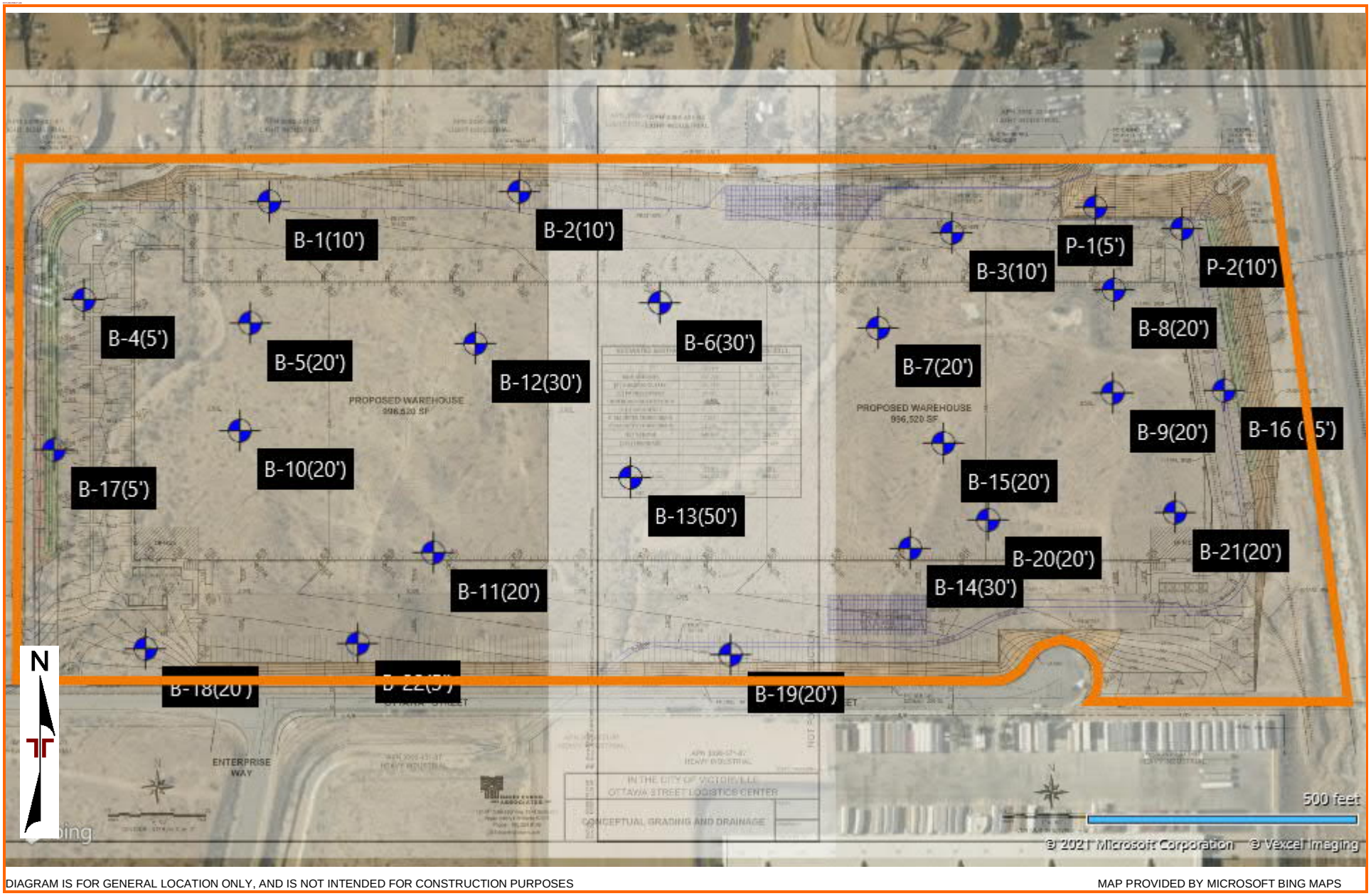


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

EXPLORATION RESULTS

BORING LOG NO. B-1

PROJECT: Warehouse, Related Site Work & Amenities

CLIENT: Space Center Mira Loma, Inc.
New York, NY

SITE: Ottawa Street & Hesperia Road
Victorville

LOCATION See Exploration Plan

Latitude: 34.4953° Longitude: -117.2891°

DEPTH	GRAPHIC LOG		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
		SILTY SAND WITH GRAVEL (SM), gravel up to 2", fine to coarse grained, yellowish brown, dense							
3.5		**POORLY GRADED SAND WITH SILT (SP-SM)**, trace gravel up to 1/4", fine to coarse grained, reddish brown, medium dense				21-31-28	2	130	18 21
			5			11-22-20	1	110	8
		dense				24-32-46	1	112	11
			10			24-37-42	2	114	7
11.5		***Boring Terminated at 11.5 Feet***							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 06-08-2021 | Boring Completed: 06-08-2021

Drill Rig: Mobile B-61 | Driller: California Pacific Drilling

Project No.: CB215026

BORING LOG NO. B-2

PROJECT: Warehouse, Related Site Work & Amenities

CLIENT: Space Center Mira Loma, Inc.
New York, NY

SITE: Ottawa Street & Hesperia Road
Victorville

LOCATION See Exploration Plan

Latitude: 34.4954° Longitude: -117.2876°

DEPTH	GRAPHIC LOG		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
		SANDY SILT (ML), trace calcite, fine grained, brown, hard							
3.0									
		SILTY SAND (SM), trace calcite, fine grained, brown, dense				15-20-40	7	114	46
			5			27-32-39	2	120	18
8.0									
		POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), gravel up to 1/2", fine to coarse grained, grayish brown, medium dense				11-21-23			7
			10			13-18-38			8
11.5									
		Boring Terminated at 11.5 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 06-08-2021 | Boring Completed: 06-08-2021

Drill Rig: Mobile B-61 | Driller: California Pacific Drilling

Project No.: CB215026

BORING LOG NO. B-3

PROJECT: Warehouse, Related Site Work & Amenities

CLIENT: Space Center Mira Loma, Inc.
New York, NY

SITE: Ottawa Street & Hesperia Road
Victorville

LOCATION See Exploration Plan

Latitude: 34.4952° Longitude: -117.285°

DEPTH	GRAPHIC LOG		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
		SILTY SAND (SM), fine to coarse grained, brown, loose							
						4-5-7	3	110	
			5			4-6-7	3	114	
7.0		4" lens of 2" gravel t 6.5'							
		SILT WITH SAND (ML), with clay and trace calcite, fine to medium grained, light olive gray, hard				12-32-32	7	92	
			10			13-26-50/3"	9	113	
11.3		***Boring Terminated at 11.25 Feet***							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 06-09-2021 | Boring Completed: 06-09-2021

Drill Rig: Mobile B-61 | Driller: California Pacific Drilling

Project No.: CB215026

BORING LOG NO. B-4

PROJECT: Warehouse, Related Site Work & Amenities

CLIENT: Space Center Mira Loma, Inc.
New York, NY

SITE: Ottawa Street & Hesperia Road
Victorville

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 34.4949° Longitude: -117.2902° DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
	0.5 **FILL - IMPORTED AGGREGATE**, with thin layers of asphalt ***Auger Refusal at 0.5 Foot***							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 06-08-2021 | Boring Completed: 06-08-2021

Drill Rig: Mobile B-61 | Driller: California Pacific Drilling

Project No.: CB215026

BORING LOG NO. B-5

PROJECT: Warehouse, Related Site Work & Amenities

CLIENT: Space Center Mira Loma, Inc.
New York, NY

SITE: Ottawa Street & Hesperia Road
Victorville

LOCATION See Exploration Plan

Latitude: 34.4947° Longitude: -117.2893°

DEPTH	GRAPHIC LOG		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
		POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), gravel up to 3", fine to coarse grained, reddish brown, very dense							
						30-50/6"	1	118	10
									18
			5			21-50/6"	2	110	11
7.7		**SILTY SAND (SM)**, trace gravel up to 1/4", fine grained, light olive brown, dense				21-28-32	2	118	13
		medium dense	10			15-29-25	4	117	25
		dense	15			13-14-16 N=30			
20.2			20						
21.5		**SANDY SILT (ML)**, fine grained, olive brown, very stiff				10-10-12	16	95	60
		Boring Terminated at 21.5 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 06-08-2021 | Boring Completed: 06-08-2021

Drill Rig: Mobile B-61 | Driller: California Pacific Drilling

Project No.: CB215026

BORING LOG NO. B-6

PROJECT: Warehouse, Related Site Work & Amenities

CLIENT: Space Center Mira Loma, Inc.
New York, NY

SITE: Ottawa Street & Hesperia Road
Victorville

LOCATION See Exploration Plan

Latitude: 34.4948° Longitude: -117.2867°

DEPTH	GRAPHIC LOG		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
		POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), gravel up to 3", fine to coarse grained, reddish brown, medium dense							
						15-22-32	1	113	9
		dense	5			14-25-38			6
		very dense				50/6"			17
10.0									
		SILTY SAND WITH GRAVEL (SM), gravel up to 1", fine to coarse grained, brown, dense	10			23-33-39	0	109	7
15.0									
		POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), gravel up to 1/2", fine to coarse grained, light brown, dense	15			19-29-36	2	111	6
		3" silt lens at 19.5' very dense	20			10-26-29 N=55			
			25			31-50/6"	3	102	7

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 06-08-2021 | Boring Completed: 06-08-2021

Drill Rig: Mobile B-61 | Driller: California Pacific Drilling

Project No.: CB215026

BORING LOG NO. B-6

PROJECT: Warehouse, Related Site Work & Amenities

CLIENT: Space Center Mira Loma, Inc.
New York, NY

SITE: Ottawa Street & Hesperia Road
Victorville

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 34.4948° Longitude: -117.2867° DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), gravel up to 1/2", fine to coarse grained, light brown, dense *(continued)* 29.0							
	SILTY SAND (SM), fine to medium grained, very dense 31.5	30			19-27-27 N=54			
	Boring Terminated at 31.5 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 06-08-2021 | Boring Completed: 06-08-2021

Drill Rig: Mobile B-61 | Driller: California Pacific Drilling

Project No.: CB215026

BORING LOG NO. B-7

PROJECT: Warehouse, Related Site Work & Amenities

CLIENT: Space Center Mira Loma, Inc.
New York, NY

SITE: Ottawa Street & Hesperia Road
Victorville

LOCATION See Exploration Plan

Latitude: 34.4947° Longitude: -117.2854°

DEPTH	GRAPHIC LOG	DESCRIPTION	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
		SILTY SAND WITH GRAVEL (SM), gravel up to 1", fine to coarse grained, brown, medium dense							
						11-13-21	2	117	22
			5			22-30-27	2	118	20
						12-17-21	1	113	6
			10			10-18-21	2	114	12
			15			13-17-11 N=28			48
16.5		**SANDY SILT (ML)**, with clay, fine grained, brown, very stiff							
			20			6-9-18	20	105	74
21.5		***Boring Terminated at 21.5 Feet***							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 06-09-2021 | Boring Completed: 06-09-2021

Drill Rig: Mobile B-61 | Driller: California Pacific Drilling

Project No.: CB215026

BORING LOG NO. B-8

PROJECT: Warehouse, Related Site Work & Amenities

CLIENT: Space Center Mira Loma, Inc.
New York, NY

SITE: Ottawa Street & Hesperia Road
Victorville

LOCATION See Exploration Plan

Latitude: 34.4949° Longitude: -117.284°

DEPTH	GRAPHIC LOG		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
		SILTY SAND WITH GRAVEL (SM), gravel up to 2", fine to coarse grained, brown, very dense							
						16-35-50/3"	2	127	28
			5			24-33-50/4"	5	129	29
6.0									
		SILT WITH SAND (ML), with clay and calcite, fine grained, light olive gray, hard				22-32-50/5"	15	103	67
10.0			10			22-50/6"	10	111	42
		SILTY SAND (SM), with clay and calcite, fine grained, light olive gray, very dense							
			15			18-38-50/5"	4	113	32
			20			9-14-22 N=36			
21.5									
		Boring Terminated at 21.5 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 06-09-2021 | Boring Completed: 06-09-2021

Drill Rig: Mobile B-61 | Driller: California Pacific Drilling

Project No.: CB215026

BORING LOG NO. B-9

PROJECT: Warehouse, Related Site Work & Amenities

CLIENT: Space Center Mira Loma, Inc.
New York, NY

SITE: Ottawa Street & Hesperia Road
Victorville

LOCATION See Exploration Plan

Latitude: 34.4944° Longitude: -117.284°

DEPTH	GRAPHIC LOG	DESCRIPTION	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
		SILTY SAND (SM), with clay, fine grained, light olive gray, very dense							
		with calcite	5			50/5"			
7.0						11-50/6"	10	69	24
		SILTY CLAY WITH SAND, light olive gray, hard				15-27-50/5"	8	116	61
10.0			10						
		SILTY SAND (SM), fine to medium grained, reddish brown, medium dense, with rust staining				26-20-32	4	127	28
		6" lens of clayey silt at 14'							
		dense	15			8-16-21 N=37			32
			20						
21.5						18-36-43	3	118	18
		Boring Terminated at 21.5 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 06-09-2021 | Boring Completed: 06-09-2021

Drill Rig: Mobile B-61 | Driller: California Pacific Drilling

Project No.: CB215026

BORING LOG NO. B-10

PROJECT: Warehouse, Related Site Work & Amenities

CLIENT: Space Center Mira Loma, Inc.
New York, NY

SITE: Ottawa Street & Hesperia Road
Victorville

LOCATION See Exploration Plan

Latitude: 34.4942° Longitude: -117.2893°

DEPTH	GRAPHIC LOG		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
		POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), gravel up to 3", fine to coarse grained, brown, dense							
						13-30-43	2	118	4
		medium dense	5			17-26-29	2	108	6
7.7									
		SILTY SAND (SM), fine grained, light olive brown, medium dense				17-24-27	4	111	29
10.0			10						
		SANDY SILT (ML), fine grained, light olive brown, hard				18-50/6"	5	110	52
15.0			15						
		SILTY SAND (SM), brown, medium dense				12-18-24	4	116	32
			20			9-10-15 N=25			49
21.5									
		Boring Terminated at 21.5 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 06-08-2021 | Boring Completed: 06-08-2021

Drill Rig: Mobile B-61 | Driller: California Pacific Drilling

Project No.: CB215026

BORING LOG NO. B-11

PROJECT: Warehouse, Related Site Work & Amenities

CLIENT: Space Center Mira Loma, Inc.
New York, NY

SITE: Ottawa Street & Hesperia Road
Victorville

LOCATION See Exploration Plan

Latitude: 34.4936° Longitude: -117.2881°

DEPTH	GRAPHIC LOG	DESCRIPTION	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
		POORLY GRADED SAND WITH SILT (SP-SM), fine to coarse grained, tan, medium dense							
						7-8-14			
			5						
		4" clay lens at 6'				6-13-34			
7.0									
		POORLY GRADED SAND (SP), fine to coarse grained, tan, dense				16-24-49			
9.5		gravel lens at 9'							
		POORLY GRADED SAND WITH GRAVEL (SP), gravel up to 2.5", fine to coarse grained, tan, very dense	10			32-50/3"			
13.0									
		SANDY SILT (ML), tan, hard	15			11-15-21 N=36			
16.3									
		SANDY LEAN CLAY (CL), tan, very stiff							
		vertical sand seam	20			12-13-16 N=29			
21.5									
		Boring Terminated at 21.5 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 06-28-2021 | Boring Completed: 06-28-2021

Drill Rig: Mobile B-61 | Driller: California Pacific Drilling

Project No.: CB215026

BORING LOG NO. B-12

PROJECT: Warehouse, Related Site Work & Amenities

CLIENT: Space Center Mira Loma, Inc.
New York, NY

SITE: Ottawa Street & Hesperia Road
Victorville

LOCATION See Exploration Plan

Latitude: 34.4946° Longitude: -117.2879°

DEPTH	GRAPHIC LOG		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
		SANDY SILT (ML), fine grained, olive, hard, with calcium throughout							
						23-42-50/5"	6	93	53
			5			18-37-50/3"	5	103	55
						17-26-50/6"	7	106	66
			10			19-50/6"	7	99	61
11.0		**SILTY SAND (SM)**, fine grained, light olive brown, very dense							
15.0		**POORLY GRADED SAND (SP)**, fine to coarse grained, light brown, dense	15			12-20-26 N=46			
			20			16-26-35			
		trace gravel up to 1"	25			9-15-17 N=32			

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 06-08-2021 | Boring Completed: 06-08-2021

Drill Rig: Mobile B-61 | Driller: California Pacific Drilling

Project No.: CB215026

BORING LOG NO. B-12

PROJECT: Warehouse, Related Site Work & Amenities

CLIENT: Space Center Mira Loma, Inc.
New York, NY

SITE: Ottawa Street & Hesperia Road
Victorville

LOCATION See Exploration Plan

Latitude: 34.4946° Longitude: -117.2879°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
	POORLY GRADED SAND (SP), fine to coarse grained, light brown, dense *(continued)*	30			10-32-50/5"			
	31.5 ***Boring Terminated at 31.42 Feet***							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 06-08-2021 | Boring Completed: 06-08-2021

Drill Rig: Mobile B-61 | Driller: California Pacific Drilling

Project No.: CB215026

BORING LOG NO. B-13

PROJECT: Warehouse, Related Site Work & Amenities

CLIENT: Space Center Mira Loma, Inc.
New York, NY

SITE: Ottawa Street & Hesperia Road
Victorville

LOCATION See Exploration Plan

Latitude: 34.4939° Longitude: -117.2869°

DEPTH	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
SILTY SAND WITH GRAVEL (SM), gravel up to 1", fine to coarse grained, reddish brown, medium dense								
3.0								
POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), gravel up to 1", fine to coarse grained, reddish brown, medium dense					8-12-15	1	119	12 17
		5			16-16-21	1	111	10
					5-8-11	3	107	7
loose		10			5-6-9	1	103	6
very dense		15			31-42-50/6"	2	119	20
20.0								
SANDY SILT (ML), fine grained, olive brown, stiff		20			4-5-6 N=11			23
24.0								
POORLY GRADED SAND WITH SILT (SP-SM), fine to medium grained, light brown, very dense		25			22-50/6"	2	101	5

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 06-08-2021 | Boring Completed: 06-08-2021

Drill Rig: Mobile B-61 | Driller: California Pacific Drilling

Project No.: CB215026

BORING LOG NO. B-13

PROJECT: Warehouse, Related Site Work & Amenities

CLIENT: Space Center Mira Loma, Inc.
New York, NY

SITE: Ottawa Street & Hesperia Road
Victorville

LOCATION See Exploration Plan

Latitude: 34.4939° Longitude: -117.2869°

DEPTH	GRAPHIC LOG		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
		POORLY GRADED SAND WITH SILT (SP-SM), fine to medium grained, light brown, very dense *(continued)*							
29.0									
		SILT WITH SAND (ML), with clay, fine grained, olive, stiff	30						
						9-6-7 N=13			85
34.0									
		SILTY CLAY WITH SAND (CL-ML), fine to coarse grained, olive, very stiff	35						
						8-12-21	29	90	90
			40						
						3-4-6 N=10			59
44.0									
		SILTY SAND (SM), fine grained, gray, very dense, with rust staining	45						
						18-50/6"	10	113	25
		with clay, dense	50						
						10-19-29 N=48			32
51.5									
		Boring Terminated at 51.5 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 06-08-2021 | Boring Completed: 06-08-2021

Drill Rig: Mobile B-61 | Driller: California Pacific Drilling

Project No.: CB215026

BORING LOG NO. B-14

PROJECT: Warehouse, Related Site Work & Amenities

CLIENT: Space Center Mira Loma, Inc.
New York, NY

SITE: Ottawa Street & Hesperia Road
Victorville

LOCATION See Exploration Plan

Latitude: 34.4936° Longitude: -117.2852°

DEPTH	GRAPHIC LOG	DESCRIPTION	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
		SILTY SAND (SM), trace gravel up to 1", fine to coarse grained, brown, medium dense							
						14-7-7			
		reddish brown, very dense	5			30-50/4"			
7.0									
		POORLY GRADED SAND WITH SILT (SP-SM), medium to coarse grained, reddish brown, very dense silt lens at 7.5'				33-50/6"			
9.5									
		POORLY GRADED SAND (SP), fine to coarse grained, reddish brown, dense	10			24-41-48			
		tan	15			25-27-36			
		trace gravel up to 1"	20			23-37-49			
		very dense	25			25-30-50/4"			

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 06-28-2021 | Boring Completed: 06-28-2021

Drill Rig: Mobile B-61 | Driller: California Pacific Drilling

Project No.: CB215026

BORING LOG NO. B-14

PROJECT: Warehouse, Related Site Work & Amenities

CLIENT: Space Center Mira Loma, Inc.
New York, NY

SITE: Ottawa Street & Hesperia Road
Victorville

LOCATION See Exploration Plan

Latitude: 34.4936° Longitude: -117.2852°

GRAPHIC LOG	DEPTH		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
		POORLY GRADED SAND (SP), fine to coarse grained, reddish brown, dense *(continued)*							
	31.0		30			33-50/6"			
		Boring Terminated at 30.99 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 06-28-2021 | Boring Completed: 06-28-2021

Drill Rig: Mobile B-61 | Driller: California Pacific Drilling

Project No.: CB215026

BORING LOG NO. B-15

PROJECT: Warehouse, Related Site Work & Amenities

CLIENT: Space Center Mira Loma, Inc.
New York, NY

SITE: Ottawa Street & Hesperia Road
Victorville

LOCATION See Exploration Plan

Latitude: 34.4941° Longitude: -117.285°

DEPTH	GRAPHIC LOG	DESCRIPTION	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
		POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), gravel up to 1", fine to coarse grained, reddish brown, dense							
						27-31-38	25	92	9
		medium dense	5			20-25-30	1	108	
						10-17-25	2	108	
			10			14-20-29	1	112	
			15			12-21-27	1	122	
		very dense	20			11-25-28 N=53			
21.5		***Boring Terminated at 21.5 Feet***							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 06-09-2021 | Boring Completed: 06-09-2021

Drill Rig: Mobile B-61 | Driller: California Pacific Drilling

Project No.: CB215026

BORING LOG NO. B-16

PROJECT: Warehouse, Related Site Work & Amenities

CLIENT: Space Center Mira Loma, Inc.
New York, NY

SITE: Ottawa Street & Hesperia Road
Victorville

LOCATION See Exploration Plan

Latitude: 34.4944° Longitude: -117.2833°

DEPTH	GRAPHIC LOG		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
		SILTY SAND (SM), trace gravel up to 1", fine to coarse grained, yellowish brown, medium dense							
						9-16-38	4	116	
			5			16-20-25	4	114	
6.0		**POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM)**, gravel up to 1/4", fine to coarse grained, brown, medium dense				14-14-18	1	110	
		dense	10			13-24-37	3	118	
12.0		**SILTY SAND (SM)**, fine grained, yellowish brown, dense							
			15			17-26-30 N=56			
16.5		***Boring Terminated at 16.5 Feet***							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 06-09-2021 | Boring Completed: 06-09-2021

Drill Rig: Mobile B-61 | Driller: California Pacific Drilling

Project No.: CB215026

BORING LOG NO. B-17

PROJECT: Warehouse, Related Site Work & Amenities

CLIENT: Space Center Mira Loma, Inc.
New York, NY

SITE: Ottawa Street & Hesperia Road
Victorville

LOCATION See Exploration Plan

Latitude: 34.4941° Longitude: -117.2905°

GRAPHIC LOG	DEPTH		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
		SILTY SAND WITH GRAVEL (SM), gravel up to 1", fine to coarse grained, brown							
	5.0	***Boring Terminated at 5 Feet***	5						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 06-08-2021 | Boring Completed: 06-08-2021

Drill Rig: Mobile B-61 | Driller: California Pacific Drilling

Project No.: CB215026

BORING LOG NO. B-18

PROJECT: Warehouse, Related Site Work & Amenities

CLIENT: Space Center Mira Loma, Inc.
New York, NY

SITE: Ottawa Street & Hesperia Road
Victorville

LOCATION See Exploration Plan

Latitude: 34.4931° Longitude: -117.2899°

DEPTH	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
SILTY SAND WITH GRAVEL (SM), gravel up to 3", fine to coarse grained, yellowish brown, medium dense								
					12-24-25	1	110	
		5			9-10-11	1	117	
					17-17-23	2	115	
		10			15-16-16	2	107	
very dense		15			18-24-30 N=54			
19.5 **SILTY SAND (SM)**, fine grained, light olive brown, very dense		20			16-35-50/5"	3	113	
21.4 ***Boring Terminated at 21.42 Feet***								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 06-08-2021 | Boring Completed: 06-08-2021

Drill Rig: Mobile B-61 | Driller: California Pacific Drilling

Project No.: CB215026

BORING LOG NO. B-19

PROJECT: Warehouse, Related Site Work & Amenities

CLIENT: Space Center Mira Loma, Inc.
New York, NY

SITE: Ottawa Street & Hesperia Road
Victorville

LOCATION See Exploration Plan

Latitude: 34.493° Longitude: -117.2863°

DEPTH	GRAPHIC LOG		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
		SILTY SAND (SM), fine to coarse grained, reddish brown, medium dense							
4.5						23-17-18			
		POORLY GRADED SAND WITH GRAVEL (SP), gravel up to 1.5", fine to coarse grained, reddish brown, medium dense	5			12-13-17			
						11-16-27			
		very dense	10			26-41-50/5"			
13.0		gravelly silt lens at 11.5'							
		SILTY SAND (SM), fine to coarse grained, tan, very dense	15			20-23-29 N=52			
18.0									
		SANDY SILT (ML), tan, very stiff	20			12-12-11 N=23			
21.5									
		Boring Terminated at 21.5 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 06-28-2021 | Boring Completed: 06-28-2021

Drill Rig: Mobile B-61 | Driller: California Pacific Drilling

Project No.: CB215026

BORING LOG NO. B-20

PROJECT: Warehouse, Related Site Work & Amenities

CLIENT: Space Center Mira Loma, Inc.
New York, NY

SITE: Ottawa Street & Hesperia Road
Victorville

LOCATION See Exploration Plan

Latitude: 34.4937° Longitude: -117.2847°

DEPTH		DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS
0	**POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM)**, gravel up to 1.5", fine to coarse grained, reddish brown, very dense			50/5"
4.5	**POORLY GRADED SAND WITH GRAVEL (SP)**, fine to coarse grained, reddish brown, medium dense	5		30-30-25
7.0	**POORLY GRADED GRAVEL WITH SILT AND SAND (GP-GM)**, gravel up to 2.5", reddish brown, very dense			50/6"
9.5	**SANDY SILT (ML)**, tan, hard	10		13-30-46
15.0	**SILTY SAND (SM)**, fine to medium grained, tan, very dense	15		16-27-28 N=55
	dense	20		17-17-28 N=45
21.5	5" silt lens at 21'			
	Boring Terminated at 21.5 Feet			

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 06-28-2021 | Boring Completed: 06-28-2021

Drill Rig: Mobile B-61 | Driller: California Pacific Drilling

Project No.: CB215026

BORING LOG NO. B-21

PROJECT: Warehouse, Related Site Work & Amenities

CLIENT: Space Center Mira Loma, Inc.
New York, NY

SITE: Ottawa Street & Hesperia Road
Victorville

LOCATION See Exploration Plan

Latitude: 34.4938° Longitude: -117.2836°

DEPTH	GRAPHIC LOG		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
		SILTY SAND (SM), fine grained, light olive gray, very dense, with calcium							
						22-33-50/5"	4	111	41
		dense	5			19-26-41	3	120	18
						12-18-41	3	103	36
9.0		**POORLY GRADED SAND WITH SILT (SP-SM)**, fine to medium grained, olive, dense	10			18-34-48	2	111	8
14.0		**SILT (ML)**, with clay, olive gray, hard, with fine sand and root hair traces	15			5-24-21	30	64	70
17.0		**SILTY SAND (SM)**, fine grained, light olive brown, very dense, with rust staining	20			18-23-30 N=53			35
21.5		***Boring Terminated at 21.5 Feet***							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 06-09-2021 | Boring Completed: 06-09-2021

Drill Rig: Mobile B-61 | Driller: California Pacific Drilling

Project No.: CB215026

BORING LOG NO. B-22

PROJECT: Warehouse, Related Site Work & Amenities

CLIENT: Space Center Mira Loma, Inc.
New York, NY

SITE: Ottawa Street & Hesperia Road
Victorville

LOCATION See Exploration Plan

Latitude: 34.4931° Longitude: -117.2886°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
	SILTY SAND WITH GRAVEL (SM), gravel up to 3", fine to coarse grained, brown, medium dense							
					18-21-21	2	109	13
	5.0	5						
	Boring Terminated at 5 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 06-08-2021 | Boring Completed: 06-08-2021

Drill Rig: Mobile B-61 | Driller: California Pacific Drilling

Project No.: CB215026

BORING LOG NO. P-1

PROJECT: Warehouse, Related Site Work & Amenities

CLIENT: Space Center Mira Loma, Inc.
New York, NY

SITE: Ottawa Street & Hesperia Road
Victorville

LOCATION See Exploration Plan

Latitude: 34.4953° Longitude: -117.2841°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
	SILTY SAND (SM), trace gravel up to 1", fine to coarse grained, brown							23
	5.2	5						
	Boring Terminated at 5.2 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 06-09-2021 | Boring Completed: 06-09-2021

Drill Rig: Mobile B-61 | Driller: California Pacific Drilling

Project No.: CB215026

BORING LOG NO. P-2

PROJECT: Warehouse, Related Site Work & Amenities

CLIENT: Space Center Mira Loma, Inc.
New York, NY

SITE: Ottawa Street & Hesperia Road
Victorville

LOCATION See Exploration Plan

Latitude: 34.4953° Longitude: -117.2837°

GRAPHIC LOG	DEPTH		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
		SILTY SAND (SM), trace gravel up to 2", fine to coarse grained, brown	5						25
	10.2	***Boring Terminated at 10.2 Feet***	10						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
6" Hollow-Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

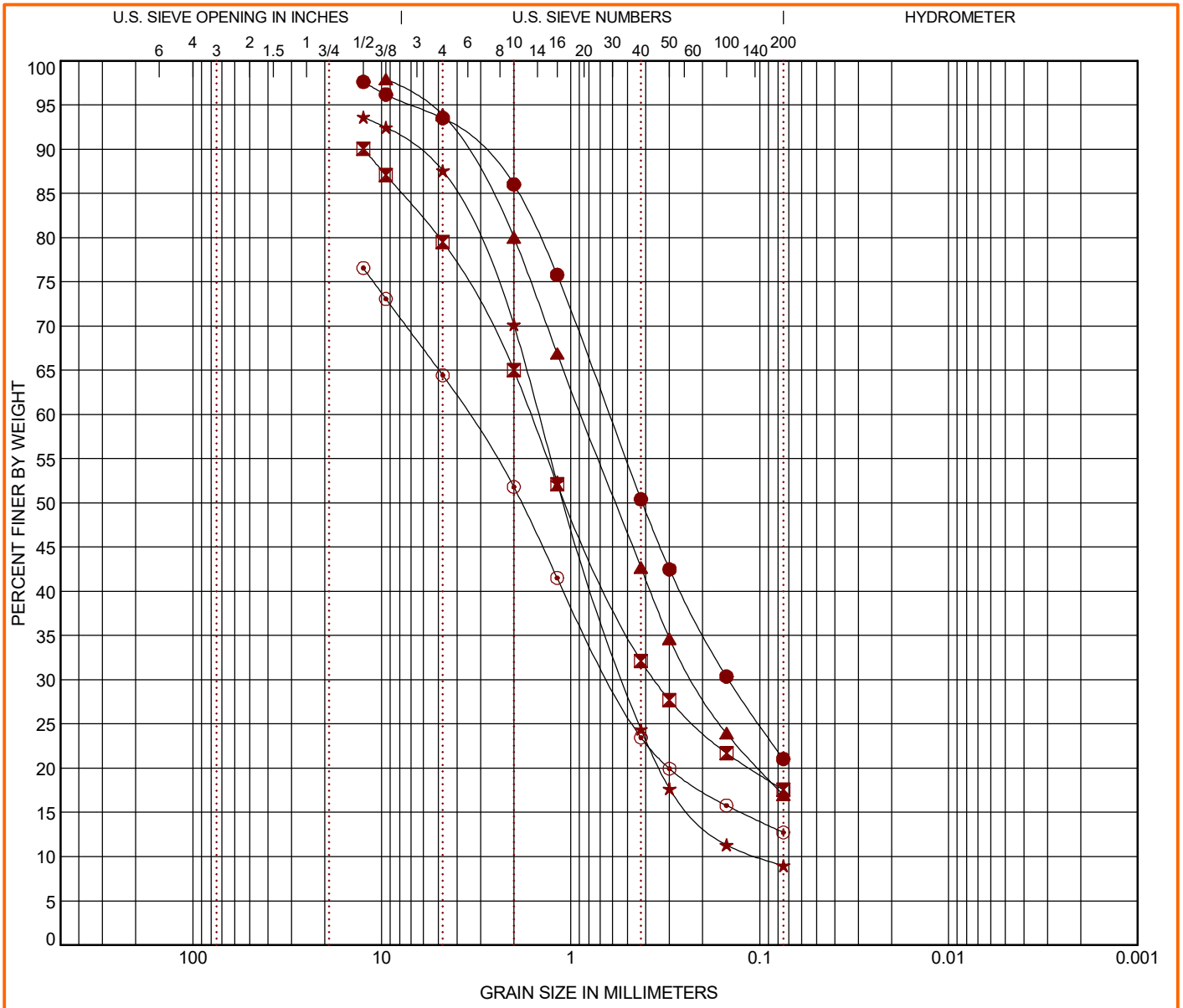
Boring Started: 06-09-2021 | Boring Completed: 06-09-2021

Drill Rig: Mobile B-61 | Driller: California Pacific Drilling

Project No.: CB215026

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID		Depth	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	B-1	2 - 5							
⊠	B-5	2 - 5							
▲	B-13	2 - 5							
★	B-15	2 - 5						1.81	14.56
⊙	B-22	2 - 5							

Boring ID		Depth	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	B-1	2 - 5	12.5	0.625	0.146			4.1	72.5		21.0	
⊠	B-5	2 - 5	12.5	1.628	0.359			10.5	62.0		17.6	
▲	B-13	2 - 5	9.5	0.882	0.222			4.1	76.9		17.0	
★	B-15	2 - 5	12.5	1.48	0.521	0.102		6.1	78.6		9.0	
⊙	B-22	2 - 5	12.5	3.504	0.615			12.1	51.7		12.7	

PROJECT: Warehouse, Related Site Work & Amenities

SITE: Ottawa Street & Hesperia Road Victorville

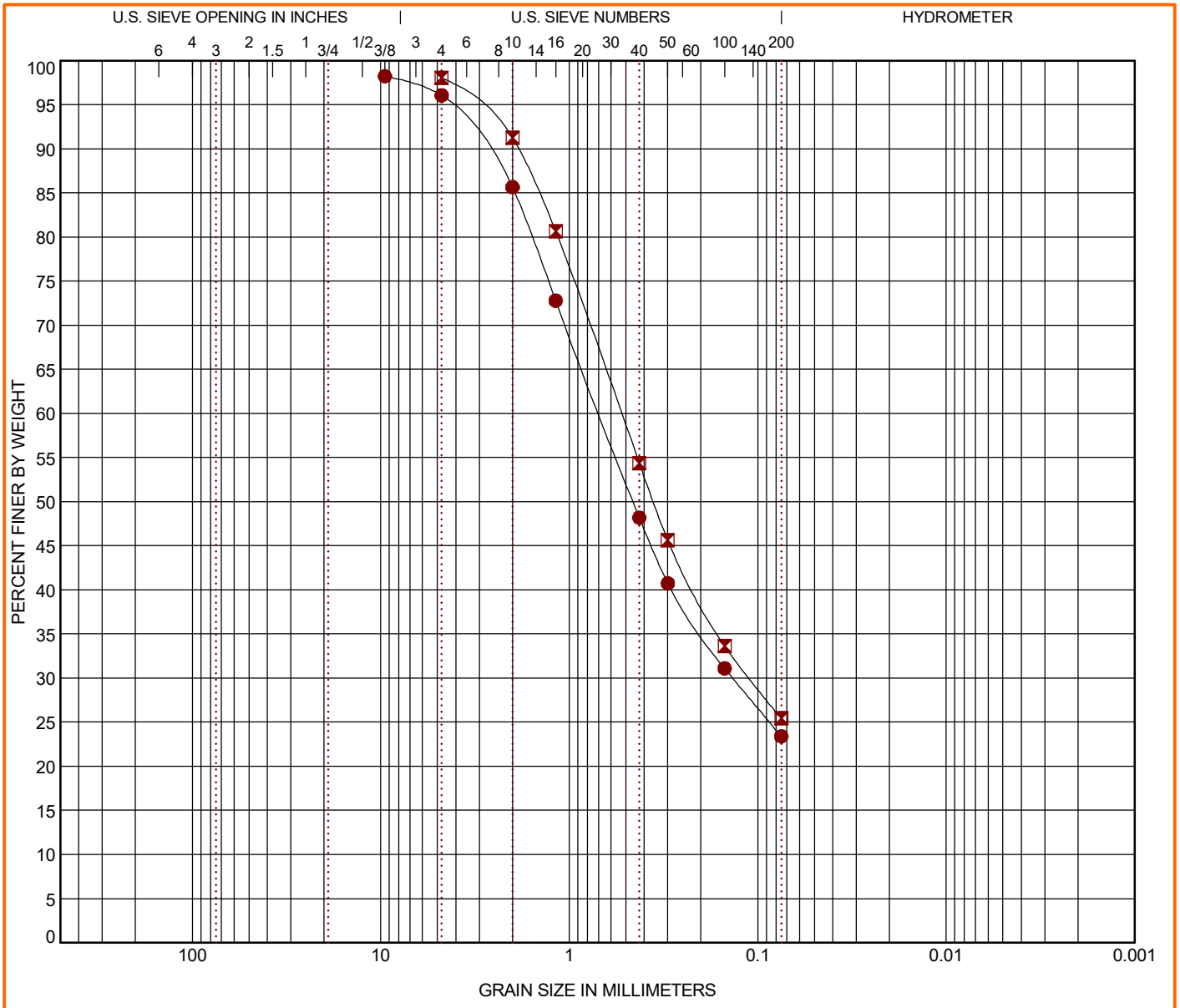
Terracon
1355 E Cooley Dr, Ste C
Colton, CA

PROJECT NUMBER: CB215026

CLIENT: Space Center Mira Loma, Inc.
New York, NY

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID		Depth	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	P-1	0 - 5							
⊠	P-2	5 - 10							

Boring ID		Depth	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	P-1	0 - 5	9.5	0.694	0.136			2.2	72.7		23.4	
⊠	P-2	5 - 10	4.75	0.529	0.11				72.6		25.4	

PROJECT: Warehouse, Related Site Work & Amenities

SITE: Ottawa Street & Hesperia Road Victorville

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

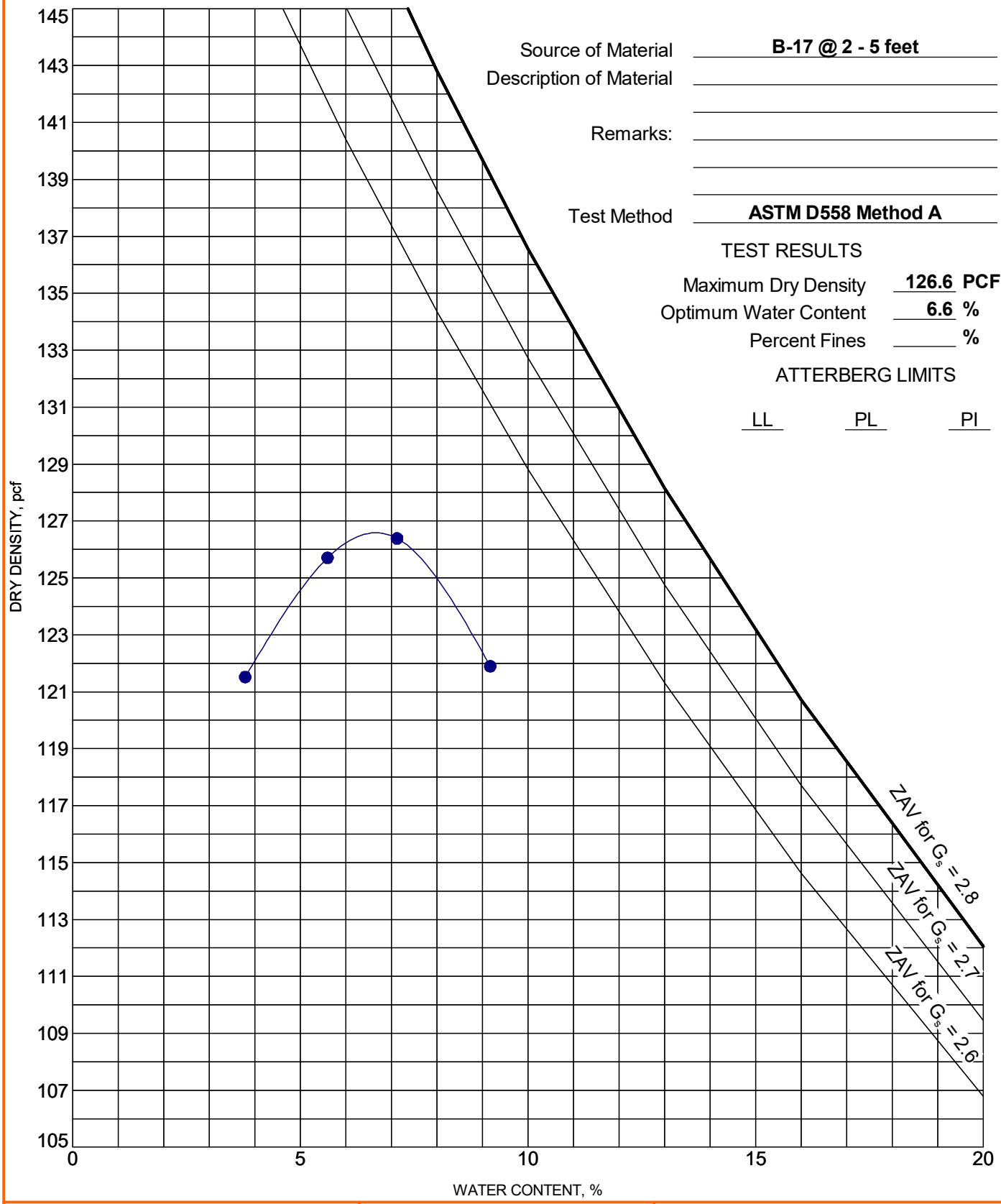
PROJECT NUMBER: CB215026

CLIENT: Space Center Mira Loma, Inc.
New York, NY

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 CB215026 WAREHOUSE, RELATE.GPJ TERRACON_DATATEMPLATE.GDT 7/22/21

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557



Source of Material: **B-17 @ 2 - 5 feet**

Description of Material:

Remarks:

Test Method: **ASTM D558 Method A**

TEST RESULTS

Maximum Dry Density	**126.6**	**PCF**
Optimum Water Content	**6.6**	**%**
Percent Fines		**%**

ATTERBERG LIMITS

LL	PL	PI

PROJECT: Warehouse, Related Site Work & Amenities

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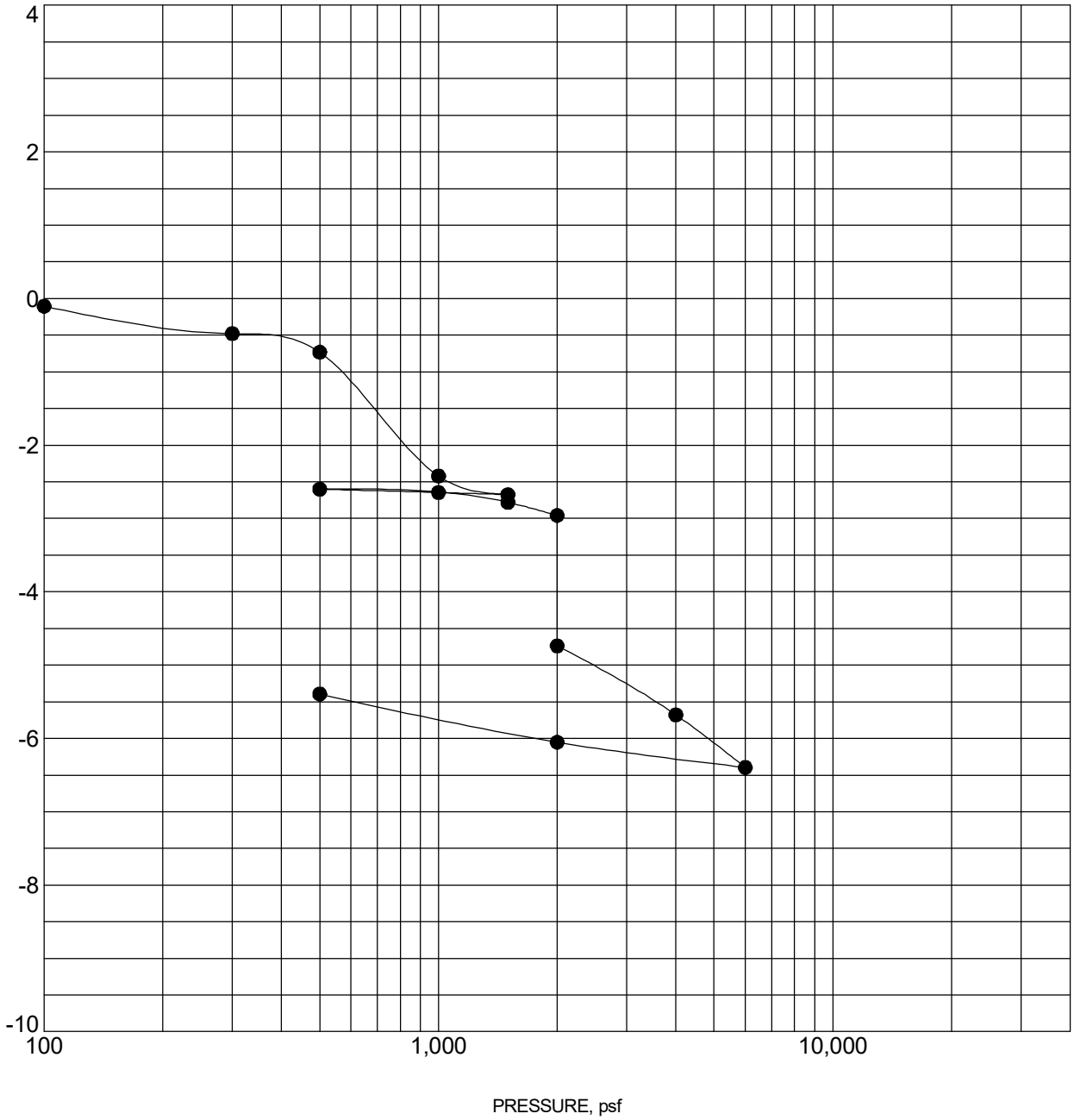
Colton, CA

PROJECT NUMBER: CB215026

CLIENT: Space Center Mira Loma, Inc.
New York, NY

SWELL CONSOLIDATION TEST

ASTM D2435



Specimen Identification			Classification	γ_d, pcf	WC, %
●	B-1	2.5 - 4 ft			

NOTES: sample was saturated at surcharge of 2,000 psf

PROJECT: Warehouse, Related Site Work & Amenities

SITE: Ottawa Street & Hesperia Road Victorville

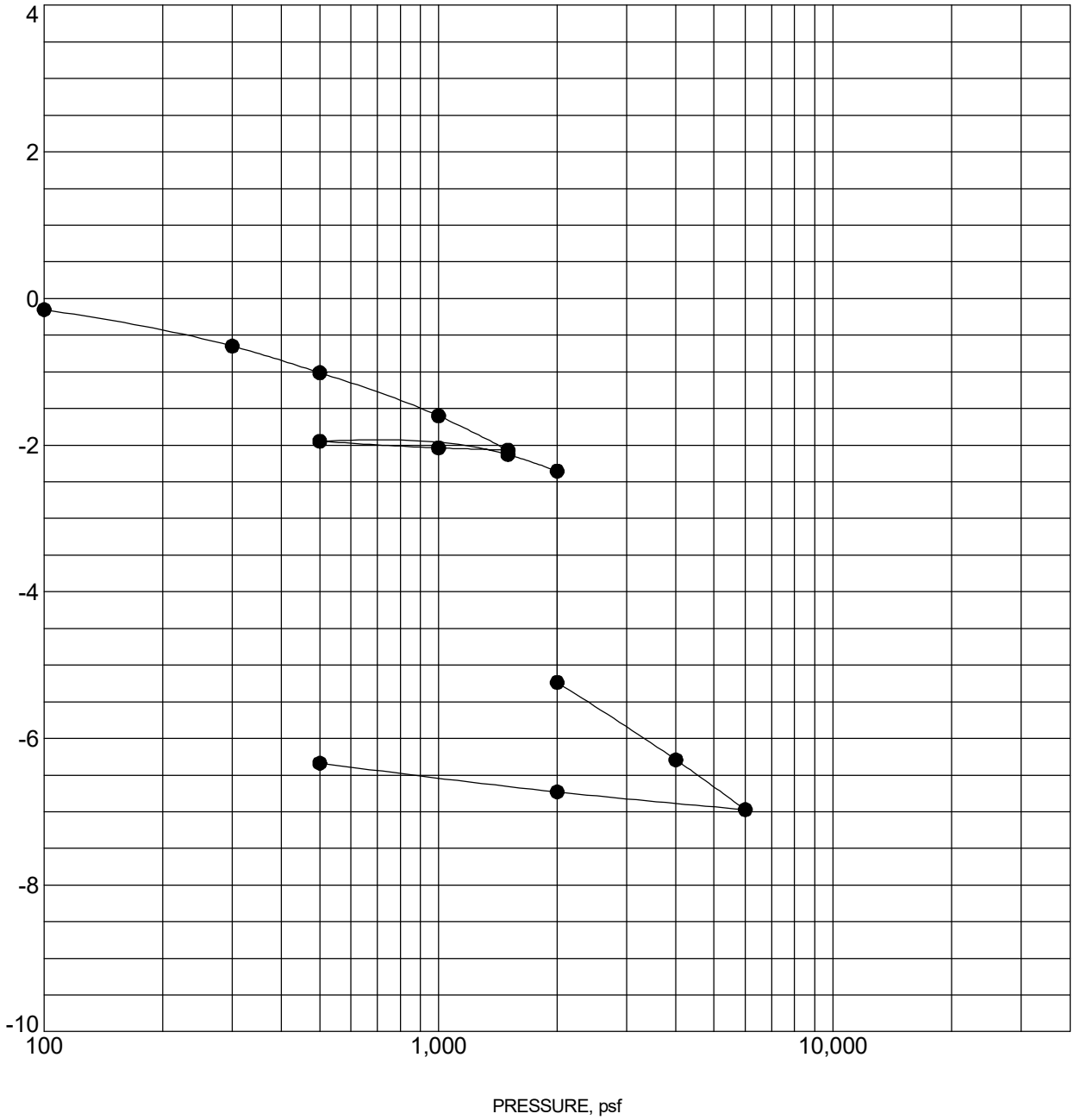
Terracon
1355 E Cooley Dr, Ste C
Colton, CA

PROJECT NUMBER: CB215026

CLIENT: Space Center Mira Loma, Inc.
New York, NY

SWELL CONSOLIDATION TEST

ASTM D2435



Specimen Identification		Classification	γ_d, pcf	WC, %
● B-7	5 - 6.5 ft			

NOTES: Sample saturated at surcharge of 2,000 psf

PROJECT: Warehouse, Related Site Work & Amenities

SITE: Ottawa Street & Hesperia Road Victorville

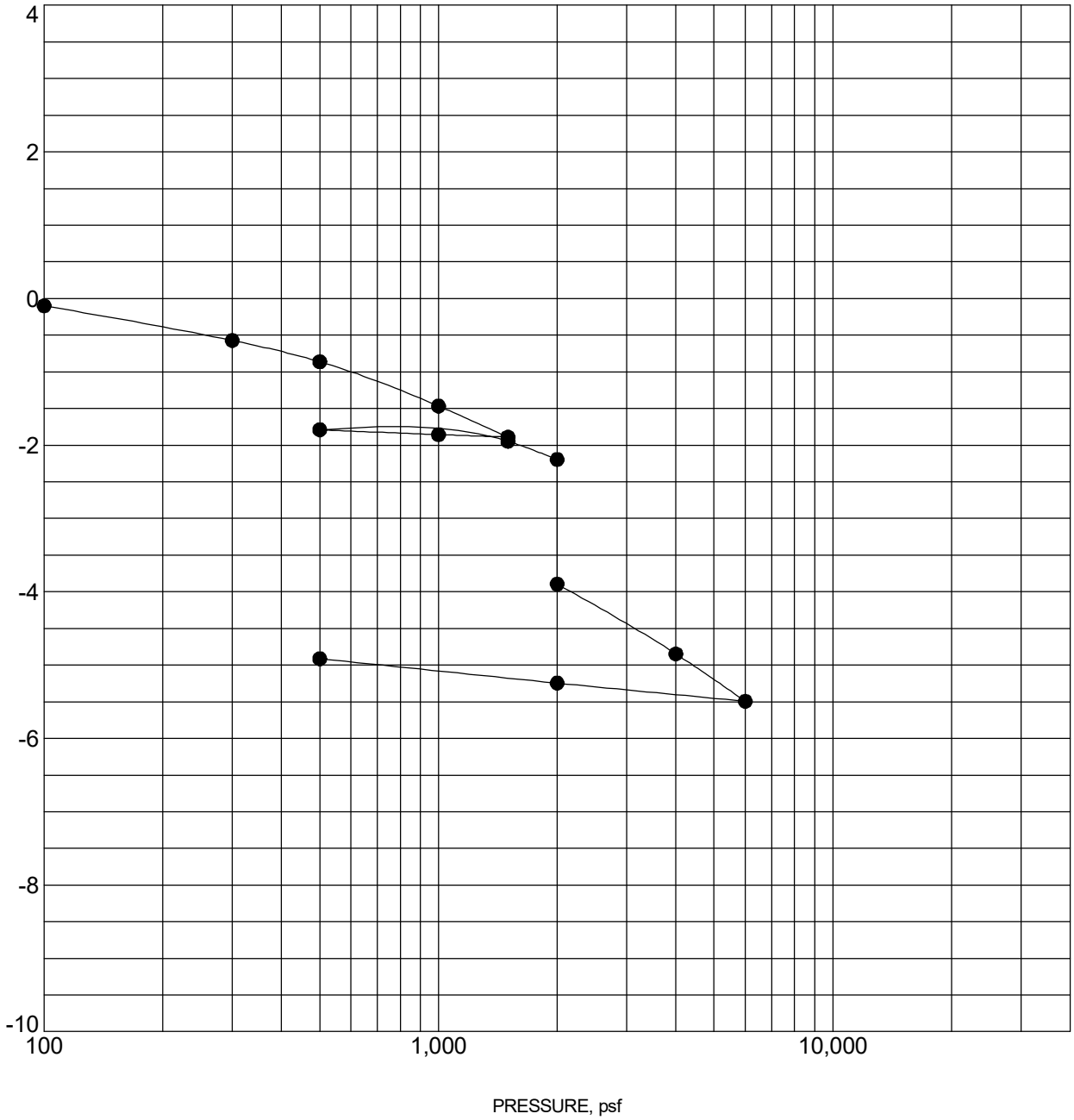
Terracon
1355 E Cooley Dr, Ste C
Colton, CA

PROJECT NUMBER: CB215026

CLIENT: Space Center Mira Loma, Inc.
New York, NY

SWELL CONSOLIDATION TEST

ASTM D2435



Specimen Identification		Classification	γ_d, pcf	WC, %
● B-10 5 - 6.5 ft				

NOTES: Sample saturated at surcharge of 2,000 psf

PROJECT: Warehouse, Related Site Work & Amenities

SITE: Ottawa Street & Hesperia Road Victorville

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

PROJECT NUMBER: CB215026

CLIENT: Space Center Mira Loma, Inc.
New York, NY

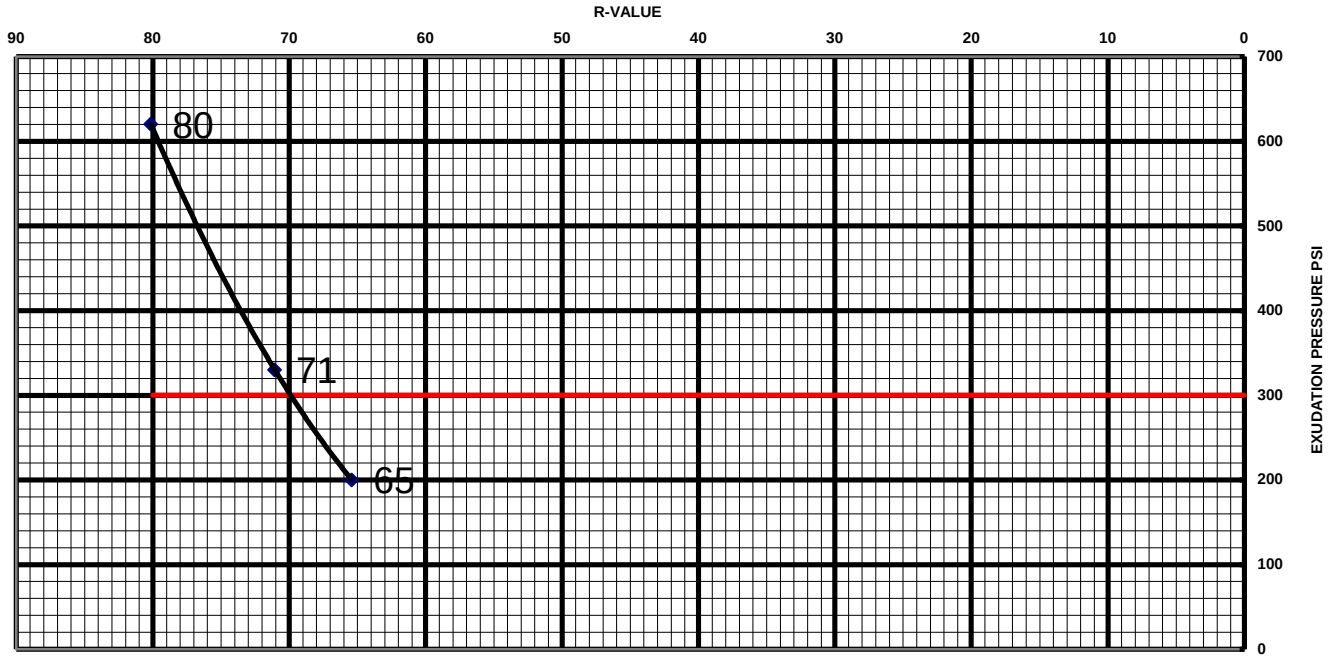
Job No. CB215026
Date. 7/13/2021

LABORATORY RECORD OF TESTS MADE ON BASE, SUBBASE, AND BASEMENT SOILS

CLIENT: **Space Center Mira Loma Inc**
PROJECT **Warehouse, Related site work, Amenities**
LOCATION:
R-VALUE # : **13A**
T.I. :

	A	B	C	D
COMPACTOR AIR PRESSURE P.S.I.	350	350	350	
INITIAL MOISTURE %	2.2	2.2	2.2	
WATER ADDED, ML	70	65	55	
WATER ADDED %	6.1	5.8	4.8	
MOISTURE AT COMPACTION %	8.3	8.0	7.0	
HEIGHT OF BRIQUETTE	2.49	2.45	2.51	
WET WEIGHT OF BRIQUETTE	1166	1147	1167	
DENSITY LB. PER CU.FT.	131.0	131.4	131.6	
STABILOMETER PH AT 1000 LBS.	21	19	13	
2000 LBS.	34	29	21	
DISPLACEMENT	4.90	4.60	4.10	
R-VALUE	65	71	80	
EXUDATION PRESSURE	200	330	620	
THICK. INDICATED BY STAB.	0.00	0.00	0.00	
EXPANSION PRESSURE	0	0	0	
THICK. INDICATED BY E.P.	0.00	0.00	0.00	

EXUDATION CHART



R-Value: **70**

750 Pilot Road, Suite F
Las Vegas, Nevada 89119
(702) 597-9393

Client
Space Center Mira Loma, Inc.
New York, NY

Project
Warehouse, Related Site Work & Amenities

Sample Submitted By: Terracon (CB) **Date Received:** 6/25/2021 **Lab No.: 21-0558**

Results of Corrosion Analysis

Sample Number	12-A
Sample Location	B-12
Sample Depth (ft.)	2.0-5.0
pH Analysis, ASTM G 51	8.50
Water Soluble Sulfate (SO4), ASTM C 1580 (mg/kg)	49
Chlorides, ASTM D 512, (mg/kg)	58
Total Salts, AWWA 2540, (mg/kg)	486
As-Received Resistivity, ASTM G 57, (ohm-cm)	24250
Saturated Minimum Resistivity, ASTM G 57, (ohm-cm)	2328

Analyzed By: Trisha Campo
Chemist

Job No.: CB215026

PERCOLATION TEST DATA

BORING NUMBER: P-1
LOT No: N/A
TRACT No: N/A

CLIENT: Space Center Mira Loma, Inc.
PROJECT: Ottowa Warehouse

DATE OF DRILLING: June 9, 2021
DATE OF PRESOAK: June 28, 2021
DATE OF TEST: June 28, 2021
TESTED BY: SP

DEPTH BEFORE (ft.): 5.0
DEPTH AFTER (ft.): 4.6
PVC PIPE DIA. (in.): 3.0
PERC HOLE DIA. (in.): 8.0

Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)	Initial Hole Depth (in.)	Final Hole Depth (in.)	Percolation Rate (in/hr)	Infiltration rate (Porchet Method) (in/hr)
110	110	3.5	63.0	59.5	60.0	55.2	32.5	2.26
7	117	4.4	17.6	13.3	60.0	55.2	113.6	4.45
5	122	5.1	14.3	9.1	60.0	55.2	109.5	4.19
10	132	5.0	20.5	15.5	60.0	55.2	93.0	3.78
10	142	4.3	19.9	15.6	60.0	55.2	93.8	3.75
10	152	6.0	21.1	15.1	60.0	55.2	90.8	3.75
10	162	4.5	19.3	14.8	60.0	55.2	88.5	3.53
10	172	5.3	20.1	14.9	60.0	55.2	89.3	3.62
10	182	4.4	19.1	14.8	60.0	55.2	88.5	3.52
				Average of last 3 readings:			88.75	3.56

Job No.: CB215026

PERCOLATION TEST DATA

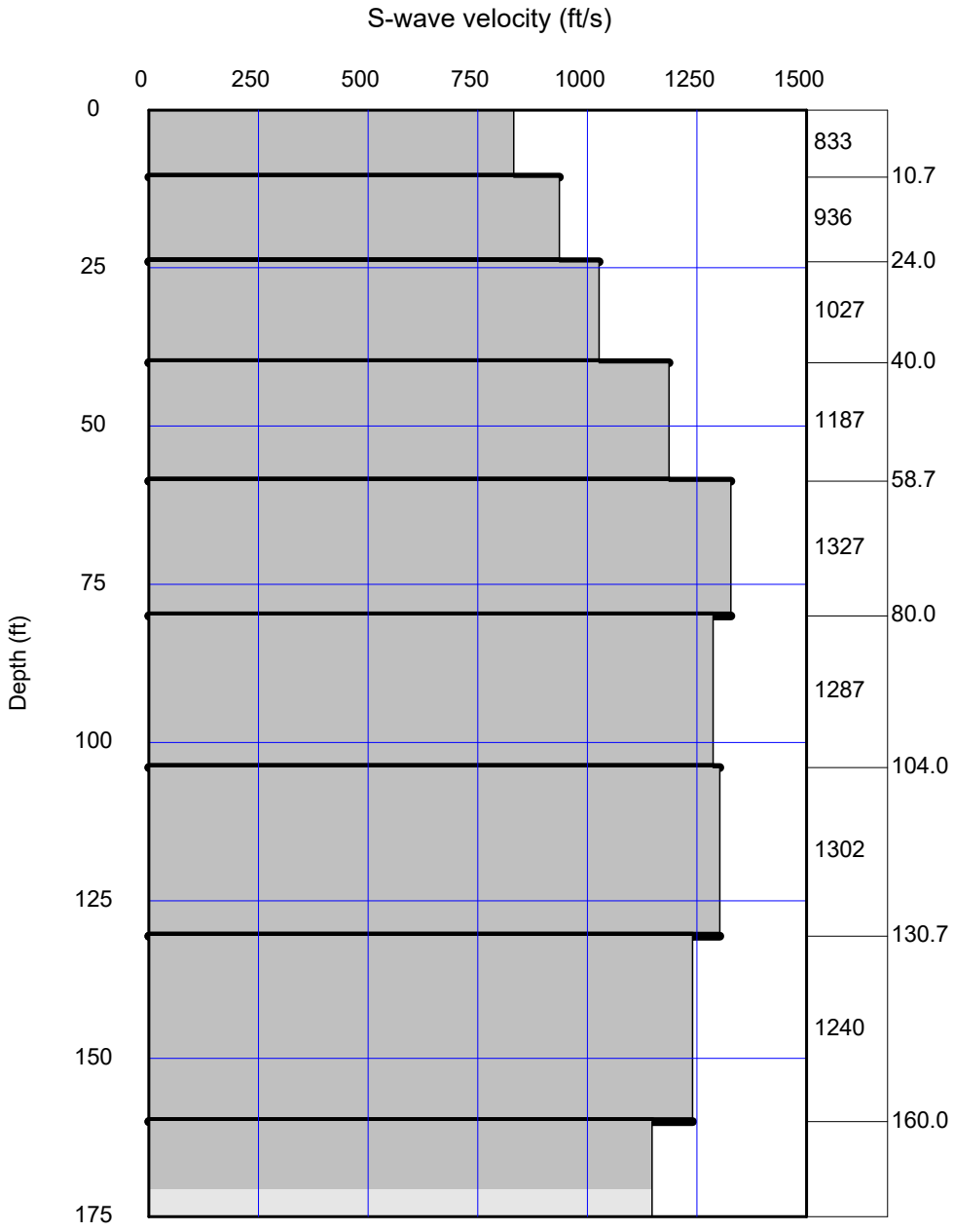
BORING NUMBER: P-2
LOT No: N/A
TRACT No: N/A

CLIENT: Space Center Mira Loma
PROJECT: Ottowa Warehouse

DATE OF DRILLING: June 9, 2021
DATE OF PRESOAK: June 28, 2021
DATE OF TEST: June 28, 2021
TESTED BY: SP

DEPTH BEFORE (ft.): 9.3
DEPTH AFTER (ft.): 8.0
PVC PIPE DIA. (in.): 3.0
PERC HOLE DIA. (in.): 8.0

Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)	Initial Hole Depth (in.)	Final Hole Depth (in.)	Percolation Rate (in/hr)	Infiltration rate (Porchet Method) (in/hr)
41	41	21.2	96.1	74.9	111.0	96.5	109.6	4.03
5	46	36.5	58.7	22.2	111.0	96.5	266.4	8.14
5	51	32.4	54.8	22.4	111.0	96.5	269.3	7.76
10	61	31.3	65.2	33.8	111.0	96.5	203.0	6.27
10	71	36.5	65.4	28.9	111.0	96.5	173.5	5.59
10	81	37.1	64.9	27.8	111.0	96.5	167.0	5.39
10	91	38.3	65.4	27.1	111.0	96.5	162.7	5.32
10	101	37.1	64.9	27.8	111.0	96.5	167.0	5.39
10	111	37.0	64.8	27.8	111.0	96.5	167.0	5.38
				Average of last 3 readings:			165.60	5.36



SHEAR-WAVE VELOCITY MODEL SW-1: Average Vs 100ft = 1,112.0 ft/sec

Site Classification (ASCE 7-16 Ch. 20)- "D" (Stiff Soil)

Client: TERRACON **Project No. CB215026**

Project Name: Space Center Project, Victorville, California

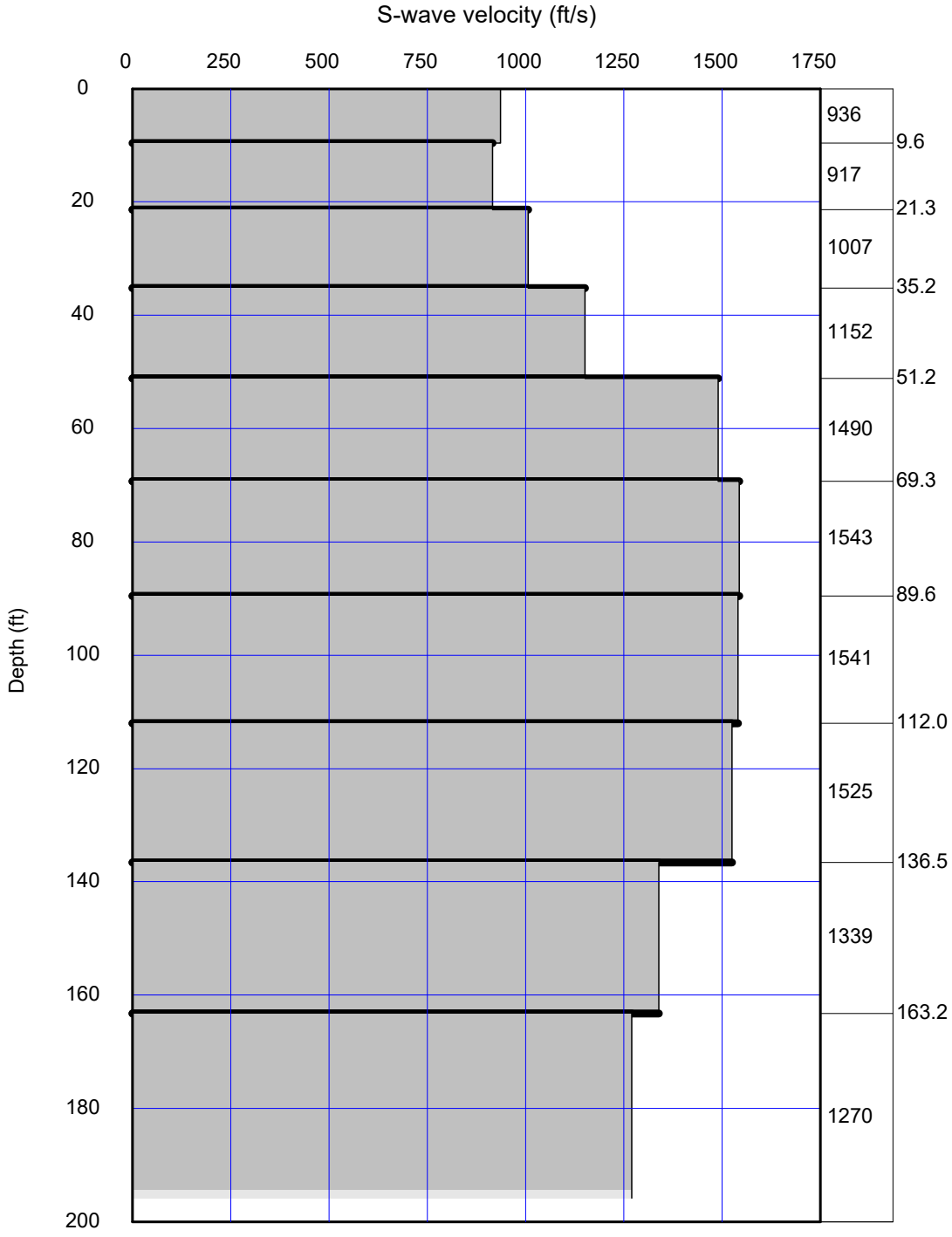
Survey Line End Coordinates: 34.49372, -117.28403 / 34.49322, -117.28396

Date: 4/28/21

TERRA GEOSCIENCES
P.O. Box 1090
Loma Linda, CA 92354

PROFESSIONAL GEOPHYSICIST
DONN C. SCHWARTZKOPF
No. 1002
STATE OF CALIFORNIA

TG Project No. 213634-1



SHEAR-WAVE VELOCITY MODEL SW-2: Average Vs 100ft = 1,208.8 ft/sec

Site Classification (ASCE 7-16 Ch. 20)- "C" (Very Dense Soil and Soft Rock)

Client: TERRACON **Project No. CB215026**

Project Name: Space Center Project, Victorville, California

Survey Line End Coordinates: 34.49473, -117.28940 / 34.49423, -117.28938

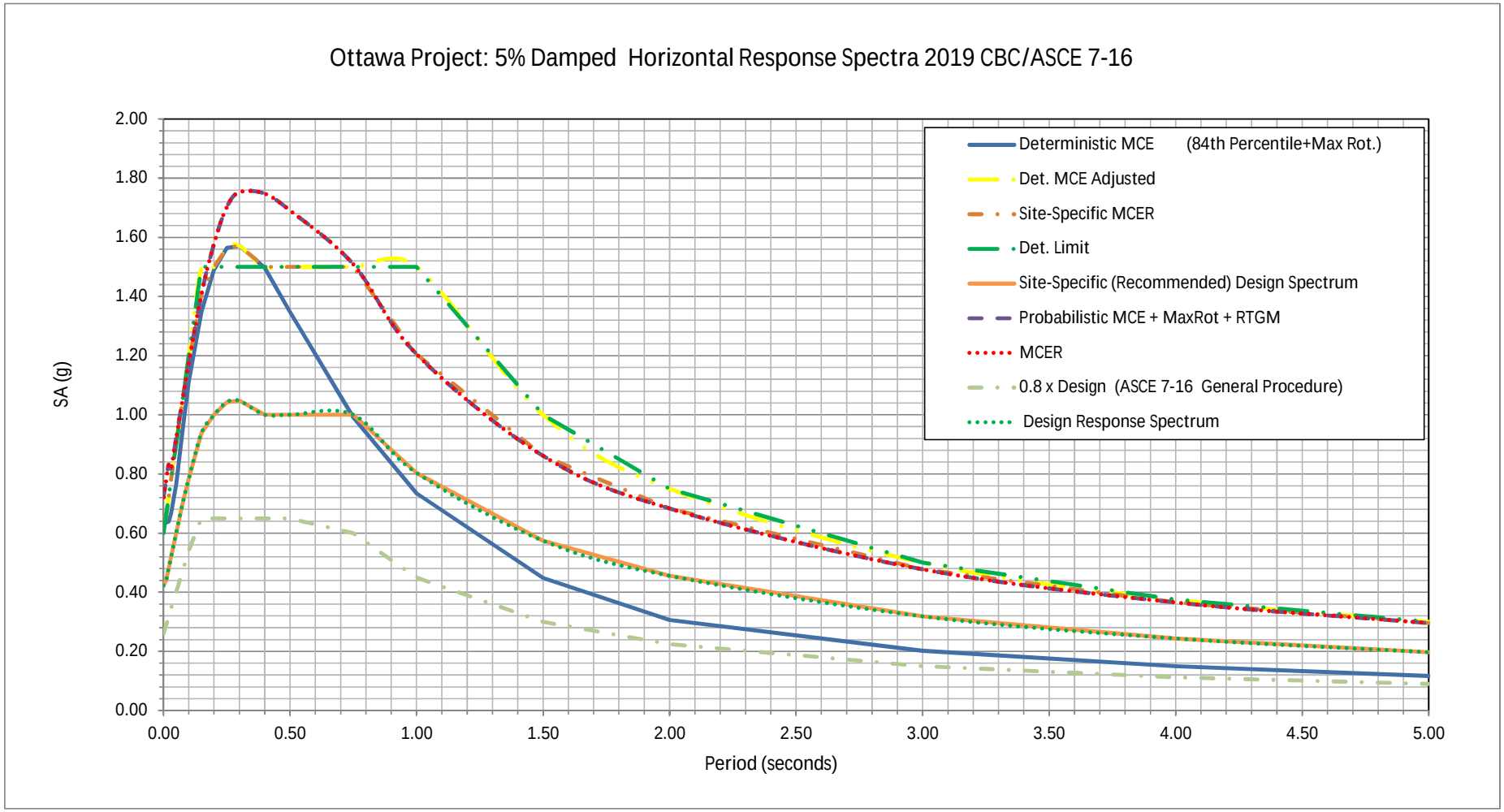
Date: 4/28/21

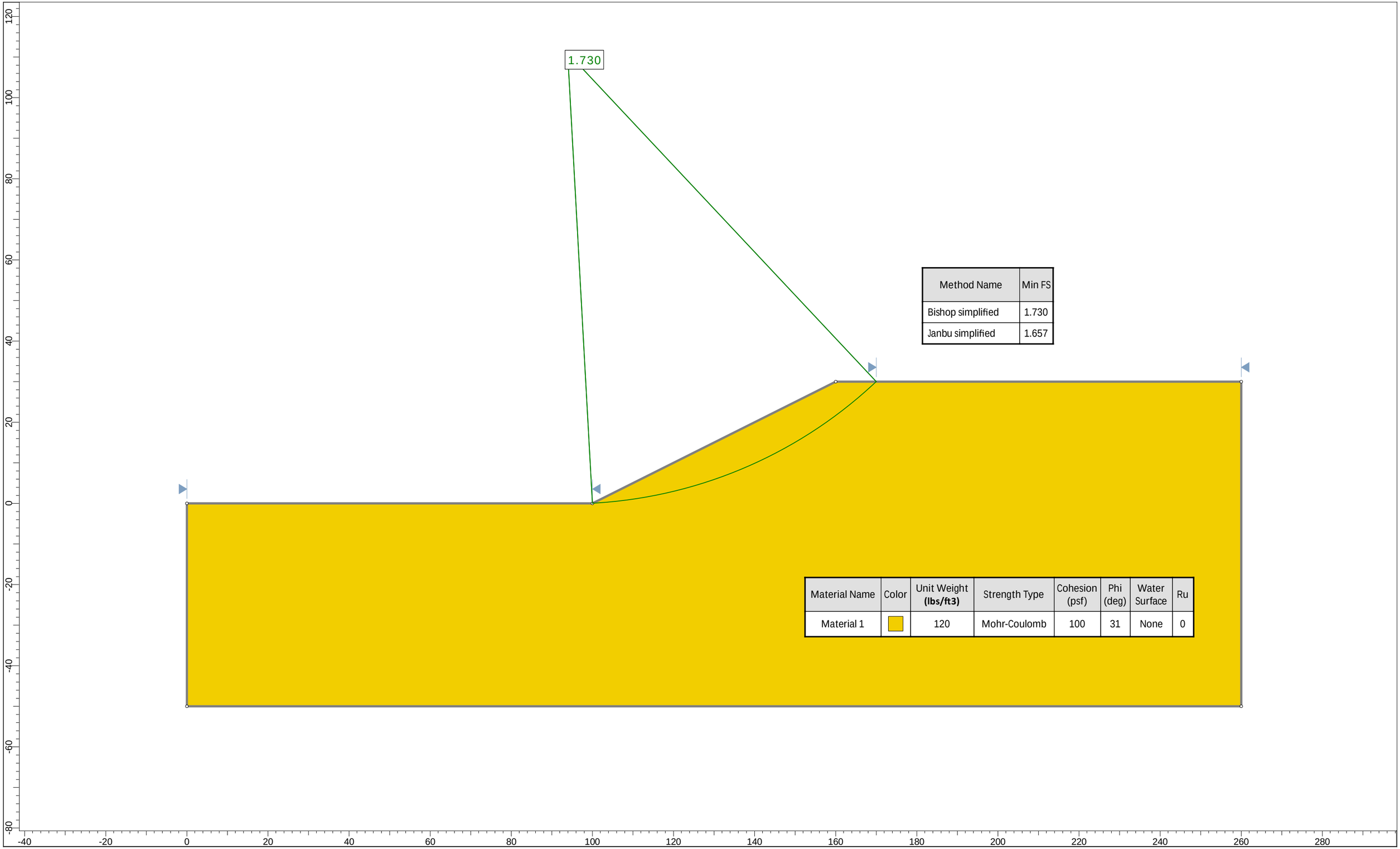
TERRA GEOSCIENCES
P.O. Box 1090
Loma Linda, CA 92354

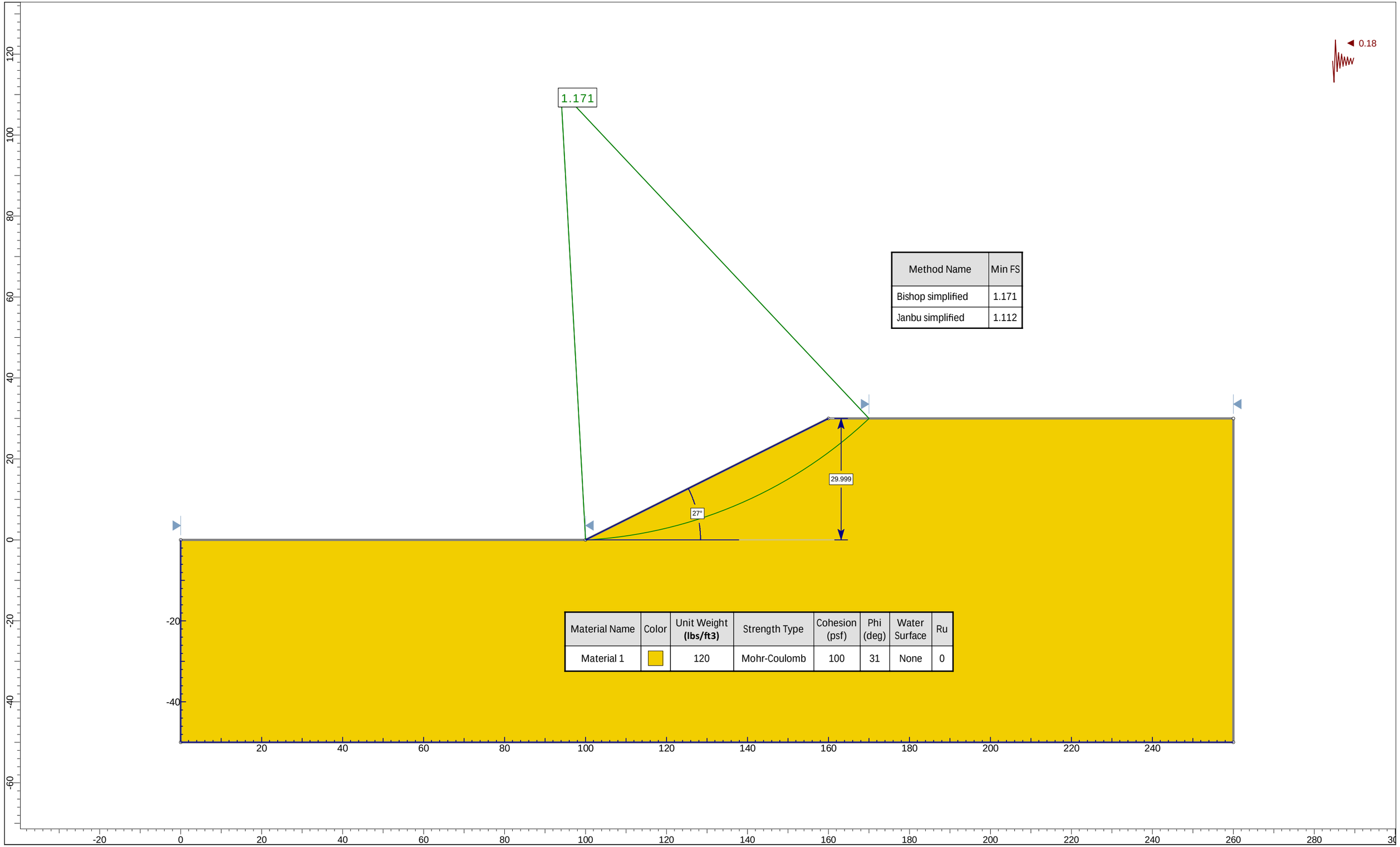
PROFESSIONAL GEOPHYSICIST
DONN C. SCHWARTZKOPF
No. 1002
STATE OF CALIFORNIA

TG Project No. 213634-1

Ottawa Project: Site-Specific Response Spectra 2019 CBC/ASCE 7-16										
Period (sec)	**Deterministic MCE (84th Percentile+Max Rot.)**	**Det. Limit**	**Det. MCE Adjusted**	**Probabilistic MCE + MaxRot + RTGM**	**MCE_R**	**Site-Specific MCE_R**	**0.8 x Design (ASCE 7-16 General Procedure)**	**Design Response Spectrum**	**Site-Specific (Recommended) Design Spectrum**	**CBC2019 'Code' Spectrum**
0.000	0.634	0.600	0.634	0.721	0.721	0.634	0.260	0.422	0.422	0.325
0.010	0.635	0.660	0.660	0.776	0.776	0.660	0.288	0.440	0.440	0.360
0.020	0.639	0.720	0.720	0.831	0.831	0.720	0.316	0.480	0.480	0.395
0.030	0.666	0.780	0.780	0.819	0.819	0.780	0.344	0.520	0.520	0.430
0.050	0.766	0.900	0.900	0.921	0.921	0.900	0.401	0.600	0.600	0.501
0.075	0.950	1.050	1.050	1.049	1.049	1.049	0.471	0.699	0.699	0.589
0.100	1.111	1.200	1.200	1.176	1.176	1.176	0.541	0.784	0.784	0.677
0.150	1.348	1.500	1.500	1.408	1.408	1.408	0.650	0.939	0.939	0.812
0.200	1.492	1.500	1.500	1.580	1.580	1.500	0.650	1.000	1.000	0.812
0.250	1.564	1.500	1.564	1.702	1.702	1.564	0.650	1.043	1.043	0.812
0.300	1.571	1.500	1.571	1.753	1.753	1.571	0.650	1.048	1.048	0.812
0.400	1.497	1.500	1.500	1.748	1.748	1.500	0.650	1.000	1.000	0.812
0.500	1.347	1.500	1.500	1.691	1.691	1.500	0.650	1.000	1.000	0.812
0.750	0.991	1.500	1.500	1.509	1.509	1.500	0.599	1.000	1.000	0.749
1.000	0.735	1.500	1.500	1.205	1.205	1.205	0.450	0.803	0.803	0.562
1.500	0.448	1.000	1.000	0.861	0.861	0.861	0.300	0.574	0.574	0.375
2.000	0.306	0.750	0.750	0.683	0.683	0.683	0.225	0.455	0.455	0.281
3.000	0.202	0.500	0.500	0.477	0.477	0.477	0.150	0.318	0.318	0.187
4.000	0.150	0.375	0.375	0.365	0.365	0.365	0.112	0.244	0.244	0.141
5.000	0.117	0.300	0.300	0.296	0.296	0.296	0.090	0.197	0.197	0.112


Ottawa Project: 5% Damped Horizontal Response Spectra 2019 CBC/ASCE 7-16
SA (g)
Period (seconds)
2.00
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
Deterministic MCE (84th Percentile+Max Rot.)
Det. MCE Adjusted
Site-Specific MCER
Det. Limit
Site-Specific (Recommended) Design Spectrum
Probabilistic MCE + MaxRot + RTGM
MCER
0.8 x Design (ASCE 7-16 General Procedure)
Design Response Spectrum


1.730
Method Name
Min FS
Bishop simplified
1.730
Janbu simplified
1.657
Material Name
Color
Unit Weight (lbs/ft3)
Strength Type
Cohesion (psf)
Phi (deg)
Water Surface
Ru
Material 1
120
Mohr-Coulomb
100
31
None
0
120
100
80
60
40
20
0
-20
-40
-60
-80
-40
-20
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280


0.18
1.171
29.999
27°
Method Name
Min FS
Bishop simplified
1.171
Janbu simplified
1.112
Material Name
Color
Unit Weight (lbs/ft3)
Strength Type
Cohesion (psf)
Phi (deg)
Water Surface
Ru
Material 1
120
Mohr-Coulomb
100
31
None
0

SUPPORTING INFORMATION

Contents:

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS
Warehouse, Related Site Work & Amenities ■ Victorville,
Terracon Project No. CB215026

Terracon GeoReport

SAMPLING

- Auger Cuttings
- Modified California Ring Sampler
- Grab Sample
- Standard Penetration Test

WATER LEVEL

- **Water Initially Encountered**
- **Water Level After a Specified Period of Time**
- **Water Level After a Specified Period of Time**
- **Cave In Encountered**

Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.

FIELD TESTS

N	**Standard Penetration Test Resistance (Blows/Ft.)**
(HP)	**Hand Penetrometer**
(T)	**Torvane**
(DCP)	**Dynamic Cone Penetrometer**
UC	**Unconfined Compressive Strength**
(PID)	**Photo-Ionization Detector**
(OVA)	**Organic Vapor Analyzer**

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification as noted on the soil boring logs is based Unified Soil Classification System. Where sufficient laboratory data exist to classify the soils consistent with ASTM D2487 "Classification of Soils for Engineering Purposes" this procedure is used. ASTM D2488 "Description and Identification of Soils (Visual-Manual Procedure)" is also used to classify the soils, particularly where insufficient laboratory data exist to classify the soils in accordance with ASTM D2487. In addition to USCS classification, coarse grained soils are classified on the basis of their in-place relative density, and fine-grained soils are classified on the basis of their consistency. See "Strength Terms" table below for details. The ASTM standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

LOCATION AND ELEVATION NOTES

Exploration point locations as shown on the Exploration Plan and as noted on the soil boring logs in the form of Latitude and Longitude are approximate. See Exploration and Testing Procedures in the report for the methods used to locate the exploration points for this project. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS

RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance			CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance			
Descriptive Term (Density)	**Standard Penetration or N-Value Blows/Ft.**	**Ring Sampler Blows/Ft.**	**Descriptive Term (Consistency)**	**Unconfined Compressive Strength Qu, (tsf)**	**Standard Penetration or N-Value Blows/Ft.**	**Ring Sampler Blows/Ft.**
Very Loose	0 - 3	0 - 6	Very Soft	less than 0.25	0 - 1	< 3
Loose	4 - 9	7 - 18	Soft	0.25 to 0.50	2 - 4	3 - 4
Medium Dense	10 - 29	19 - 58	Medium Stiff	0.50 to 1.00	4 - 8	5 - 9
Dense	30 - 50	59 - 98	Stiff	1.00 to 2.00	8 - 15	10 - 18
Very Dense	> 50	> 99	Very Stiff	2.00 to 4.00	15 - 30	19 - 42
			Hard	> 4.00	> 30	> 42

RELEVANCE OF SOIL BORING LOG

The soil boring logs contained within this document are intended for application to the project as described in this document. Use of these soil boring logs for any other purpose may not be appropriate.

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]					Soil Classification	
					Group Symbol	Group Name [B]
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	$Cu \geq 4$ and $1 \leq Cc \leq 3$ [E]		GW	Well-graded gravel [F]
			$Cu < 4$ and/or [$Cc<1$ or $Cc>3.0$] [E]		GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH		GM	Silty gravel [F, G, H]
			Fines classify as CL or CH		GC	Clayey gravel [F, G, H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	$Cu \geq 6$ and $1 \leq Cc \leq 3$ [E]		SW	Well-graded sand [I]
			$Cu < 6$ and/or [$Cc<1$ or $Cc>3.0$] [E]		SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH		SM	Silty sand [G, H, I]
			Fines classify as CL or CH		SC	Clayey sand [G, H, I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots on or above "A"		CL	Lean clay [K, L, M]
			PI < 4 or plots below "A" line [J]		ML	Silt [K, L, M]
		Organic:	Liquid limit - oven dried / Liquid limit - not dried	< 0.75	OL	Organic clay [K, L, M, N] / Organic silt [K, L, M, O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line		CH	Fat clay [K, L, M]
			PI plots below "A" line		MH	Elastic Silt [K, L, M]
		Organic:	Liquid limit - oven dried / Liquid limit - not dried	< 0.75	OH	Organic clay [K, L, M, P] / Organic silt [K, L, M, Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor				PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve.

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.