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Appendix 3.4A

Geotechnical Engineering Report

Prairie Song Reliability Project

Geotechnical Engineering Report

May 14, 2025 | Terracon Project No. LA245085

Prepared for:

Prairie Song Reliability Project, LLC
[redacted]

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March 25, 2025, revised April 11, 2025, May 14, 2025

Prairie Song Reliability, LLC
[redacted]

Attn: [redacted]
E: [redacted]

Re: Geotechnical Engineering Report
Prairie Song Reliability Project
Acton, Los Angeles County, California
Terracon Project No. LA245085

Dear Mr. Lehman:

We have completed the scope of Geotechnical Engineering services for the above referenced project in general accordance with Terracon Proposal No. PLA245085 dated May 15, 2024, between Prairie Song Reliability, LLC and Terracon Consultants, Inc. (Terracon). This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of pavements and foundations for the proposed Battery Energy Storage Systems (BESS) and substation facility.

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

REGISTERED PROFESSIONAL ENGINEER
JOSHUA R. MORGAN
C 86032
CIVIL
STATE OF CALIFORNIA

Janna Valdez, E.I.T.
Senior Staff Engineer

Joshua R. Morgan, P.E.
Department Regional Manager

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Note: This report was originally delivered in a web-based format. **Blue 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 Terracon logo will bring you back to this page. For more interactive features, please view your project online at client.terracon.com.

Refer to each individual Attachment for a listing of contents.

Introduction

This report presents the results of our subsurface exploration and Geotechnical Engineering services performed for the proposed Battery Energy Storage System (BESS) and Substation facility to be located north and south of Soledad Canyon Road in Acton, Los Angeles County, California. The purpose of these services was to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil conditions
- Groundwater conditions
- Seismic site classification per CBC
- Site preparation and earthwork
- Foundation design and construction
- Access roadway design and construction
- Infiltration design rates

The geotechnical engineering Scope of Services for this project included the advancement of test borings, electrical resistivity testing, laboratory testing, engineering analysis, and preparation of this report. The geotechnical engineering Scope of Services for our current scope of work included the following:

- Fifteen (15) soil test borings to approximately 21 to 51.5 below ground surface (bgs) in the proposed BESS areas
- Two (2) soil test borings to approximately 51.5 feet bgs in the proposed substation area
- Two (2) soil test borings to approximately 21.5 feet bgs in the proposed Operations and Maintenance (O&M) building area
- Seven (7) soil test borings to approximately 51.5 feet bgs along the transmission line
- Four (4) percolation tests at approximately 3 and 5 feet bgs in the proposed basin area
- Corrosion testing on soil samples obtained from seven (7) locations
- Field electrical resistivity tests at seven (7) locations
- Lab thermal resistivity testing on soil samples obtained from four (4) locations.

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

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
Previous Submittals	A letter titled "Geotechnical Percolation Test Letter Prairie Song Reliability Project " was provided to Prairie Song Reliability Project, LLC by Terracon on January 22, 2025. The letter describes the percolation test procedures and results that was conducted by Terracon for the design of the proposed basin. Recommendations and limitations for stormwater management provided in the referenced letter remain valid and applicable for the proposed project except where superseded or identified herein.
Information Provided	An email request for proposal was provided by Matt McCaffrey on March 29, 2024. A site boundary Google Earth file and a conceptual site plan for the proposed BESS and substation was provided at the time of the request. Subsequently, a Google Earth file of the proposed overhead transmission line was provided on November 22, 2024.
Project Description	The project consists of a proposed BESS, substation, stormwater basin, O&M Building, two 40k gal water tanks (estimated to be 16 feet tall by 33 feet in diameter), and transmission line. Based on our review of the conceptual site plan, the project parcel will encompass an approximate footprint of 65 acres. The BESS and substation facility will encompass an approximate footprint of 35 and 6 acres, respectively. Furthermore, an approximately 2 miles overhead 500 kV transmission line will connect with the proposed substation.
Proposed Foundation Structure	We anticipate that the proposed BESS will consist of battery storage units supported by mat foundations, driven piles, or drilled shafts. We anticipate the substation will include control room building, self-contained structures, and other substation elements to be supported on shallow spread footings, equipment slabs-on-grade/mat foundations, and/or drilled shafts. We anticipate that the proposed O&M building and water tanks will be supported by a spread footing foundation system with concrete slabs on grade. We anticipate that the overhead transmission line will be supported on drilled shaft foundations.

<table>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>Maximum Loads</td><td>Structural loads for the BESS, substation, and O&M structures were provided and are listed below:
<u>BESS:</u>
■ BESS enclosure pads: 1000 to 1200 psf contact pressure
■ BESS Axial Load: 94 kips
■ BESS Shear Load: 79 kips
<u>Substation:</u>
■ GSU Foundation: 2,000 to 2,500 psf
■ Control Room: 1 to 3 kips per linear foot (klf)
■ Tubular steel (A-frames) – drilled piers:
o Substation Axial Load: 120 kips
o Substation Shear Load: 30 kips
■ Other steel – drilled piers:
o Substation Axial Load: 15 kips
o Substation Shear Load: 5 kips
<u>O&M Building:</u>
■ O&M Building Walls: 1 to 3 kips klf
■ O&M columns: 30 to 60 kips
Structural loads for the transmission line and water tank structures were not provided and have been estimated below:
<u>Transmission Line:</u>
■ Axial: less than 10 kips
■ Shear: less than 5 kips
<u>Water tanks:</u>
■ 1,000 psf contact pressure</td></tr>
</table>

Item	Description
Grading/Slopes	The site has a slight slope, on the order of 5%. We assume that the site will be terraced, and minimal grading will be used to level the site. ■ We anticipate that the battery containers, water tanks, and O&M building will generally follow the existing site grades with cut/fill on the order of 1 to 2 feet to bring the site to finished grades. ■ We anticipate cut/fill on the order of 3 to 4 feet to bring the substation area to finish grade Furthermore, a 3H:1V to 5H:1V slope is located south of the southern perimeter of the site descending towards the existing train tracks and W Carson Mesa Road. We assume that the proposed structures will have a set setback distance, sufficient enough that slope stability analysis is not required for the site. Details of required setbacks are included in this report.
Infiltration System	We understand that an infiltration system consisting of an underground retention/detention basin will be planned on-site. A percolation test letter was provided previously.
Access Roadways	We understand that access road cross sections used for construction of the project will be the responsibility of Prairie Song Reliability Project. We anticipate low-volume access roads will have a maximum vehicle load of 10,000 lbs. and will travel over the access roads only once per week during operation. Moreover, we anticipate all-weather access roads will be required to access the project substation. Such roads should be designed to support a firetruck weighing approximately 75,000 lbs. Furthermore, based on input from the client, approximately 80,000 to 90,000 lbs trucks and cranes will travel through the access roads every 5 years.

Terracon should be notified if any of the above information is inconsistent with the planned construction, especially the grading limits, as modifications to our recommendations may be necessary.

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 is located north and south of Soledad Canyon Road in Acton, Los Angeles County, California. The project site encompasses a total area of approximately 65 acres. The coordinates of the approximate center of the site are 34.4858° N, 118.1383° W.
Existing Improvements	The site is primarily in an undeveloped state, with several residential properties dispersed across the area. Located approximately 100 feet from the proposed BESS development, an existing railroad traverses parallel to the southern perimeter of the property.
Current Ground Cover	The majority of the surface of the site is covered by exposed soils with dense desert vegetation.
Existing Topography	The parcels north and south of Soledad Canyon Rd have an approximately 4% slope increasing from the southwest to the northeast direction. The approximate elevations of the site range from 2,980 to 3,140. The proposed transmission line will traverse flat terrains and rolling hill topographies and the elevation at the proposed towers ranges from 3010 to 3125 feet.

Geotechnical Characterization

Subsurface Conditions

We have developed a general characterization of the subsurface conditions based upon our review of the subsurface exploration, laboratory data, geologic setting and our understanding of the project. This characterization, termed GeoModel, forms the basis of our geotechnical calculations and evaluation of the site. Conditions observed at each exploration point are indicated on the individual logs. The individual logs can be found in the Exploration Results and the GeoModel can be found in the Figures attachment of this report.

As part of our analyses, we identified the following model layers within the subsurface profile. For a more detailed view of the model layer depths at each boring location, refer to the GeoModel.

Model Layer	Layer Name	Consistency/Density
1	Sand with varying amounts of silt, clay, and gravel	loose to medium dense
2	Sand with varying amounts of silt, clay, and gravel	medium dense to very dense

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

Lab Results

Laboratory tests were conducted on selected soil samples and the test results are presented in the Exploration Results section and on the boring logs. Atterberg limit test results indicate that the on-site soils generally have low plasticity or are non-plastic. Consolidation tests indicated that the silty sand soils encountered at an approximate depth of 5 feet bgs have a moderate collapse potential when saturated under normal footing loads of 2,000 psf. Maximum density/optimum moisture content testing conducted in accordance with ASTM D1557 (Modified Proctor) indicate that near surface soils tested have maximum dry densities ranging from 133.3 to 136.3 pounds per cubic feet (pcf) and optimum water contents ranging from 7.8 to 8.4 percent. California Bearing Ratio (CBR) testing of the near surface soils indicated a CBR value of 10. Direct shear testing results on sandy samples are tabulated below:

Boring ID	Depth (feet)	Description	Peak Friction Angle (°)	Peak Cohesion (psf)
BESS-4	5	Silty Sand	32°	130
BESS-8	10	Silty Sand	27°	600
BESS-14	5	Poorly Graded Sand with Silt	27°	260
TL-2	10	Silty Sand	42°	0
TL-3	2.5	Silty Sand	27°	350
TL-5	7.5	Silty Sand	35°	220
TL-6	5	Silty Sand	31°	240

Groundwater

The borings were advanced using a hollow-stem-auger technique that allowed short term groundwater observations to be made while drilling. Groundwater seepage was not encountered during drilling or for the short duration the boring remained open. These observations represent groundwater conditions at the time of field exploration and may not be indicative of other times, or at other locations.

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. Therefore, groundwater levels during construction or at other times in the life of the structure may be higher or lower than expected.

According to data collected from the Water Data Library for the State of California from a nearby well, located approximately 0.5 miles north of the site in State Well Number 05N12W28F001S, historic groundwater levels around November 30, 1965, were recorded at greater than 100 feet bgs.[1] Recent publicly available data (within the last 20 years) is not available within a 1-mile radius from the site boundary. As such, groundwater is not anticipated to occur within the depth of excavations or foundation installations at the site.

Seismic Site Class

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.

Description	Value
BESS Area	
2022 California Building Code Site Classification (CBC)[1]	C[2]
Site Latitude (°N)	34.4834
Site Longitude (°W)	118.1383
S_S Spectral Acceleration for a 0.2-Second Period	1.689

[1] California Department of Water Resources. (https://wdl.water.ca.gov/WaterDataLibrary/GroundWaterLevel.aspx?StateWellNumber=05N12W28F001S&SiteCode=344881N1181435W001)

Description	Value
S_1 Spectral Acceleration for a 1-Second Period	0.698
F_a Site Coefficient for a 0.2-Second Period	1.2
F_v Site Coefficient for a 1-Second Period	1.4
TL-1	
2022 California Building Code Site Classification (CBC)[1]	C[2]
Site Latitude (°N)	34.4818
Site Longitude (°W)	118.1378
S_s Spectral Acceleration for a 0.2-Second Period	1.677
S_1 Spectral Acceleration for a 1-Second Period	0.692
F_a Site Coefficient for a 0.2-Second Period	1.2
F_v Site Coefficient for a 1-Second Period	1.4
TL-2	
2022 California Building Code Site Classification (CBC)[1]	C[2]
Site Latitude (°N)	34.4808
Site Longitude (°W)	118.1379
S_s Spectral Acceleration for a 0.2-Second Period	1.668
S_1 Spectral Acceleration for a 1-Second Period	0.688
F_a Site Coefficient for a 0.2-Second Period	1.2
F_v Site Coefficient for a 1-Second Period	1.4
TL-3	
2022 California Building Code Site Classification (CBC)[1]	C[2]
Site Latitude (°N)	34.4802
Site Longitude (°W)	118.1350
S_s Spectral Acceleration for a 0.2-Second Period	1.672
S_1 Spectral Acceleration for a 1-Second Period	0.69
F_a Site Coefficient for a 0.2-Second Period	1.2
F_v Site Coefficient for a 1-Second Period	1.4
TL-4	
2022 California Building Code Site Classification (CBC)[1]	C[2]
Site Latitude (°N)	34.4802
Site Longitude (°W)	118.1328
S_s Spectral Acceleration for a 0.2-Second Period	1.681

Description	Value
S_1 Spectral Acceleration for a 1-Second Period	0.694
F_a Site Coefficient for a 0.2-Second Period	1.2
F_v Site Coefficient for a 1-Second Period	1.4
TL-5	
2022 California Building Code Site Classification (CBC)[1]	C[2]
Site Latitude (°N)	34.4832
Site Longitude (°W)	118.1322
S_s Spectral Acceleration for a 0.2-Second Period	1.71
S_1 Spectral Acceleration for a 1-Second Period	0.707
F_a Site Coefficient for a 0.2-Second Period	1.2
F_v Site Coefficient for a 1-Second Period	1.4
TL-6	
2022 California Building Code Site Classification (CBC)[1]	C[2]
Site Latitude (°N)	34.4823
Site Longitude (°W)	118.1278
S_s Spectral Acceleration for a 0.2-Second Period	1.719
S_1 Spectral Acceleration for a 1-Second Period	0.711
F_a Site Coefficient for a 0.2-Second Period	1.2
F_v Site Coefficient for a 1-Second Period	1.4
TL-7	
2022 California Building Code Site Classification (CBC)[1]	C[2]
Site Latitude (°N)	34.4846
Site Longitude (°W)	118.1332
S_s Spectral Acceleration for a 0.2-Second Period	1.719
S_1 Spectral Acceleration for a 1-Second Period	0.711
F_a Site Coefficient for a 0.2-Second Period	1.2
F_v Site Coefficient for a 1-Second Period	1.4

1. Seismic site classification in general accordance with the *2022 California Building Code*.
2. The 2022 California Building Code (CBC) requires a site soil profile determination extending to a depth of 100 feet for seismic site classification. The current scope does not include the 100-foot soil profile determination. Borings were extended to a maximum depth of 51½ feet, and this seismic site class definition considers that similar or denser soils continue below the maximum depth of the subsurface exploration. It is an acceptable practice in Southern California to analyze the upper 50 feet and assume the lower 50 feet to be similar. Additional exploration to deeper depths would be required to confirm the conditions below the current depth of exploration.

Faulting and Estimated Ground Motions

The site is located in Southern California, which is a seismically active area. The type and magnitude of seismic hazards affecting the site are dependent on the distance to causative faults, the intensity, and the magnitude of the seismic event. As calculated using the USGS Unified Hazard Tool, the fault which is considered to have the most significant effect at the site from a design standpoint and its maximum credible earthquake and proximity to the site are tabulated below:

Location	Fault	Magnitude	Distance (kilometers)
BESS and substation areas	San Andreas (Mojave S)	7.82	8.71
TL-1A		7.92	7.96
TL-2			
TL-3		7.94	8.02
TL-4		7.93	7.60
TL-5		7.93	8.60
TL-6		7.93	7.50
TL-7		7.93	7.51

Based on the USGS Design Maps Summary Report, using the American Society of Civil Engineers (ASCE 7-16) standard, the peak ground acceleration (PGA_M) at the project site is shown in the table below. In addition, based on the USGS Unified Hazard Tool, the mean magnitude at the project is also shown in the table below. Furthermore, the site is not located within an Alquist-Priolo Earthquake Fault Zone based on our review of the State Fault Hazard Maps.[2]

[2] California Geological Survey. https://maps.conservation.ca.gov/cgs/informationwarehouse.

Location	PGA_M	Mean Magnitude
BESS and substation areas	0.883	7.81
TL-1A	0.877	7.76
TL-2	0.873	7.76
TL-3	0.875	7.81
TL-4	0.879	7.9
TL-5	0.893	7.82
TL-6	0.898	7.82
TL-7	0.898	7.82

Liquefaction

Liquefaction is a mode of ground failure that results when a saturated soil loses substantial strength in response to earthquake shaking. Liquefaction is typically a hazard where loose sand or non-plastic silt soils exist below groundwater but may also occur with sensitive plastic silt or clay below groundwater. The California Geological Survey (CGS) has designated certain areas within the state 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 relatively shallow groundwater.

The proposed BESS and substation are not located within a liquefaction hazard zone as designated by the CGS. However, a portion of the proposed transmission line is located within a liquefaction hazard zone. In particular, borings TL-1, TL-2, TL-3, TL-4 and TL-6 are located within a liquefaction hazard zone. As such liquefaction hazard analysis is included for the proposed T-line locations in the following section.

Liquefaction Analysis

Our explorations indicate the native soils encountered in exploratory borings generally consisted of loose to very dense sand to the maximum exploration depth of 51½ feet bgs. Groundwater was not encountered in borings while drilling and the recorded historical groundwater depth is more than 100 feet bgs.

To evaluate the presence of liquefiable soils and determine the amount of settlement of saturated/unsaturated soils during seismic shaking, we performed liquefaction analysis in accordance with the DMG Special Publication 117.

We utilized the software "LiquefyPro" by CivilTech Software, using soil from boring TL-2. A Peak Ground Acceleration (PGAM) of 0.873g and assumed a magnitude of 7.76 were used. Settlement analysis used the Tokimatsu, M-correction method. The fines percentage were corrected for liquefaction using the Idriss/Seed method. For this analysis a groundwater depth of 100 feet has been utilized.

Based on the depth to groundwater liquefaction hazard risk is considered low. Results and calculations for the liquefaction analysis are included in the Supporting Documents section of this report.

Seismic Settlement

Based on the calculation results, the seismically induced settlement of dry sands which typically occurred in the upper 5 to 10 feet is estimated to be on the order of 1¼ inch. Differential seismic settlement can be taken as one-half of the total seismic settlement.

Corrosivity

The table below lists the results of laboratory soluble sulfate, soluble chloride, electrical resistivity, and pH testing. The 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	Sample Depth (feet)	Soluble Sulfate (mg/kg)	Sulfides (mg/kg)	Chloride (mg/kg)	Red-Ox Potential (mV)	Electrical Resistivity **(Ω**-cm)	pH
BESS-2	0-2	1.6	Nil	5.8	+278	10,250	7.1
BESS-8	0-2.5	9.7	Nil	7.7	+290	8,140	7.4
BESS-14	0-2.5	6.5	Nil	6.2	+282	5,230	7.7
SUB-2	0-2.5	4.1	Nil	6.6	+291	6,840	7.3
TL-1	0-5	9.2	Nil	6.5	+288	18,100	7.7
TL-3	0-5	2.4	Nil	6.5	+288	13,070	7.1
TL-6	0-5	0.2	Nil	5.4	+293	21,110	7.0

Results of soluble sulfate testing indicate samples of the on-site soils tested possess negligible sulfate concentrations when classified in accordance with Table 19.3.1.1 of the ACI Design Manual. Concrete should be designed in accordance with the exposure class S0 provisions of the ACI Design Manual, Section 318, Chapter 19.

Electrical Resistivity Testing

Terracon performed field measurements of soil electrical resistivity for the support of grounding design. Soil resistivity data was obtained from two test arrays at three (3) locations each in the proposed BESS, one (1) location in the substation area, and at three (3) locations along the proposed transmission line for a total of seven (7) locations. At one of the test locations, ER-7, Terracon attempted to collect soil electrical resistivity readings, but the soil was too loose for electrode contact, and no repeatable readings were collected. The client was notified that no testing was obtained at this location. The approximate locations of the test arrays are shown in the Exploration Plan. Each testing was performed in general accordance with Wenner Array (4-pin) method per ASTM G57. This method was performed in with IEEE Standard 81, IEEE Guide for Measuring Earth Resistivity, Ground Impedance and Earth Surface Potentials of a Ground System. The test in the proposed locations included perpendicular arrays, North-South and East-West, with "a" spacings 2, 4, 6, 8, 12, 20, 30, 50, 70, 100, and 150 feet. For test locations in the BESS and substation areas, soil resistivity readings were also collected at 300 feet "a" spacing. The "a" spacing is generally considered to be the depth of influence of the test. The electrical resistivity test results are presented in Exploration Results.

Thermal Resistivity Testing

Terracon subcontracted Geotherm USA to perform laboratory thermal resistivity testing. Testing was conducted on four (4) bulk samples at the project site from a depth of 0 to 5 feet bgs. Three (3) samples were collected from the proposed BESS and one (1) sample was collected from the substation area. The tests were conducted on soil samples remolded to 90% (as determined by ASTM D1557) of the material's maximum dry density. Dry out curves targeted the higher of either the in-situ moisture content of the optimum moisture content as determined by ASTM D1557, totally dry condition, and two intermediate points. The thermal resistivity test results are presented in Exploration Results.

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.

We anticipate that the proposed BESS will consist of battery storage units supported by driven steel piles or mat foundations and other appurtenant electrical equipment supported on mat or drilled shaft foundations. We anticipate the substation structures will be supported on drilled piers or mat foundations. We anticipate that the proposed O&M building and water tanks will be supported on shallow concrete foundations.

We anticipate that the proposed transmission line will be supported by drilled shaft foundations.

To create a uniform bearing stratum, shallow concrete footings should bear on engineered fill extending to a minimum depth of 1 foot below the bottom of foundations, or 3 feet below existing grades, whichever is greater within the BESS, substation, and water tank areas. Grading should incorporate the limits of the overexcavation plus a lateral distance of 1 feet beyond the outside edge of perimeter footings.

The majority of the site indicates medium dense to very dense soils near the surface. However, potentially compressible soils, which show significant tendency for hydro-compaction when elevated in moisture content, will require particular attention in the design and construction near the O&M Building location. Within the O&M area we recommend engineered fill extend to a minimum depth of 3 feet below bottom of foundations or 5 feet below existing site grades.

Overexcavation and replacement is not required for support of drilled shaft or driven pile foundations.

Estimated movements described in this report are based on effective drainage for the life of the structure and cannot be relied upon if effective drainage is not maintained. Exposed ground, extending at least 10 feet from the perimeter, should be sloped a minimum of 5% away from the building to provide positive drainage away from the structure. Grades around the structure should be periodically inspected and adjusted as part of the structure's maintenance program.

Based on the findings summarized in this report, it is our professional opinion that the proposed construction will not be subjected to a hazard from settlement, slippage, or landslide, provided the recommendations of our report are incorporated into the proposed construction. It is also our opinion that the proposed construction will not adversely affect the geologic stability of the site or adjacent properties provided the recommendations contained in our report are incorporated into the proposed construction.

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 (presented in the Exploration Results), engineering analyses, and our current understanding of the proposed project. The General Comments section provides an understanding of the report limitations.

Earthwork

The following presents recommendations for site preparation, excavation, subgrade preparation, and placement of engineered fills on the project. The recommendations presented for the design and construction of foundations are contingent upon following the recommendations outlined in this section.

Earthwork on the project should be observed and evaluated by a geotechnical engineer. If a geotechnical engineer other than Terracon is selected to perform the observations and testing during construction, they will assume the role of Geotechnical Engineer of Record. The evaluation of earthwork should include observation and testing of engineered fill, subgrade preparation, foundation of bearing soils, and other geotechnical conditions exposed during construction of the project.

An on-site, pre-job meeting with the owner, the contractor and the Geotechnical Engineer should occur prior to all grading-related operations. Observation, testing, documentation, and reporting of the grading operation should be performed by the Geotechnical Engineer of Record. A final compaction report should be issued by the Geotechnical Engineer of Record at the completion of the grading operation. Interim reports may be issued according to project requirements. Operations undertaken at the site without the Geotechnical Engineer present may result in exclusions of affected areas from compaction reports for the project.

Grading of the subject site should be performed, at a minimum, in accordance with these recommendations and with applicable portions of the current version of CBC. The following recommendations are presented for your assistance in establishing proper grading criteria.

Site Preparation

Prior to placing fill, existing vegetation, debris, and other deleterious materials should be removed from proposed foundation and roadway areas. Exposed surfaces within these areas 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 structures.

We recommend stripping topsoil to depths that expose soils with less than 3 percent organics and no roots having a diameter greater than 1/8 inch. While the depth of the unsuitable soils should be expected to vary, the thickness of the top soil layer may be estimated to range between 6 and 12 inches for construction budgeting purposes. The thickness of the top soil layer was not determined during our field exploration. Therefore, the actual depth of stripping should be verified by engineering observations made during the grading operations at the project. Exposed surfaces should be free of mounds and depressions which could prevent uniform compaction.

Stripped materials consisting of vegetation and organic materials should be wasted from the site or used to revegetate landscaped areas or exposed slopes after completion of grading operations. If it is necessary to dispose of organic materials on site, they should be placed in non-structural areas, and in fill sections not exceeding 5 feet in height.

Although no evidence of fills, utilities, or underground facilities such as septic tanks, cesspools, or 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.

Subgrade Preparation

The proposed structures may be supported by a shallow concrete foundation system bearing on engineered fill, driven piles, or drilled shafts foundation.

To create a uniform bearing stratum, shallow concrete footings should bear on engineered fill extending to a minimum depth of 1 foot below the bottom of foundations, or 3 feet below existing grades, whichever is greater within the BESS, substation, and water tank areas . Grading should incorporate the limits of the overexcavation plus a lateral distance of 1 feet beyond the outside edge of perimeter footings.

The majority of the site indicates medium dense to very dense soils near the surface. However, potentially compressible soils, which show significant tendency for hydro-compaction when elevated in moisture content, will require particular attention in the design and construction near the O&M Building location. Within the O&M area we recommend engineered fill extend to a minimum depth of 3 feet below bottom of foundations or 5 feet below existing site grades.

Overexcavation and replacement is not required for support of drilled shaft or driven pile foundations.

Large gravels and cobble materials may be encountered at proposed excavation depths. If such conditions are encountered, any cobbles or boulders should be removed and be replaced a minimum of 12 inches below foundation bearing depths with engineered fill.

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

All 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 structural fill soils should then be placed to the proposed design grade and the moisture content and compaction of subgrade soils should be maintained until foundation or pavement construction.

Based upon the subsurface conditions determined from the geotechnical exploration, subgrade soils exposed during construction are anticipated to be relatively workable; however, the workability of the subgrade 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. However, as excavations extend deeper into very dense soils additional excavation effort and larger equipment may be required. Very dense and gravelly soils was encountered in multiple borings. The owner should consider obtaining unit pricing for difficult excavations prior to the start of the project

The subgrade soils exposed during construction are expected to be relatively stable. However, the stability of the subgrade may also be affected by precipitation, repetitive construction traffic or other factors.

The bottom of excavations should be thoroughly cleaned of loose soils and disturbed materials prior to backfill placement and/or construction.

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

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.

Site Slopes

Based on the existing site grades, we expect that up to 10 feet of cut:fill with 2H:1V (horizontal:vertical) slopes will be placed around the site interior and boundary.

These new fill materials should possess a minimum friction angle of 32 degrees and cohesion of 100 psf from slope stability standpoint. For permanent slopes in compacted fill areas, recommended maximum configurations for on-site materials are as follows.

Maximum Slope Configuration (Height equal or less than 10 feet)	
Inclination (horizontal:vertical)	Slope Treatment
5:1 to 2:1	Re-vegetate
More steep than 2:1	Stability analysis or structural retaining wall required

We expect slopes with this configuration to be resistant to erosion and stable against circular failure. The face of all slopes should be compacted to the minimum specification for fill embankments. No tracking of fill material on the slope is allowed. Fill slopes can be over-built with compacted material and trimmed to final configurations. If any slope in fill will exceed 20 feet in height, the grading design should include mid-height benches to intercept surface drainage and divert flow from the face of the embankment.

The Geotechnical Engineer of Record should be provided with proposed grading plans and cross sections and the anticipated height of fills and cuts for review prior to the start of construction. Based on preliminary analysis, placing up to 10 feet of new fill above the existing site soils to construct the BESS/Substation pads will result in estimated settlements of less than 1/2 inch. The majority of this settlement is expected to occur over a short period of time during the construction.

If fill is placed in areas of the site where existing slopes are steeper than 5H:1V, the area should be benched to reduce the potential for slippage between existing slopes and fills. Benches should be wide enough to accommodate compaction and earth moving equipment, and to allow placement of horizontal lifts of fill.

If foundations are determined to be setback a distance less than H/2 or 15 feet (whichever is less for structures located below slope) or H/3 or 40 feet (whichever is less for structures located atop slopes), then the Geotechnical Engineer of Record should be notified as additional evaluations may be required.

Fill Material and Placement

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

Clean on-site soils (provided they are screened for oversized particles with dimensions larger than 3 inches) or approved imported materials may be used as fill materials for the following:

- general site grading
- foundation areas
- exterior slab areas
- foundation backfill
- roadway areas

Imported soils for use as fill material within proposed structure areas should conform to low volume change materials as indicated in the following specifications:

Gradation	Percent Finer by Weight (ASTM C 136)
3″	100
No. 4 Sieve	50-100
No. 200 Sieve	40(max)

- Liquid Limit .... 30 (max)

- Plasticity Index .... 10 (max)
- Maximum Expansion Index* .... 20 (max)

*ASTM D4829

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

Recommended compaction and moisture content criteria for engineered fill materials are as follows:

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
Approved on-site or imported fill soils:			
Beneath foundations[1]:	90%	0%	+3%
Utility trenches (structural areas)[1]:	90%	0%	+3%
Utility trenches (landscape areas):	90%	0%	+3%
Fill greater than 5 feet in depth	95%	0%	+3%
Exterior Slabs:	90%	0%	+3%
Miscellaneous backfill:	90%	0%	+3%
Aggregate base:	95%	0%	+3%

1. Upper 12 inches should be compacted to 95% beneath foundation, pavement, and structural areas. Low-volume change imported soils should be used in lightly loaded equipment areas.

Utility Trench Backfill

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.

Trench excavation should not be conducted below a downward 1:1 projection from existing foundations without engineering review of shoring requirements and geotechnical observation during construction.

A non-expansive granular material with a sand equivalent greater than 30 should be used for bedding and shading of utilities, unless allowed or specified otherwise by the utility manufacturer.

On-site materials are considered suitable for backfill of utility and pipe trenches from 1 foot above the top of the pipe to the final ground surface, provided the material is free of organic matter and deleterious substances. Imported low volume change soils should be used for trench backfill in structural areas.

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 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

All grades must provide effective drainage away from the proposed structures during and after construction and should be maintained throughout the life of the structure. Water retained next to the structures result in soil movements greater than those discussed in this report. Greater movements can result in unacceptable differential foundation movements causing cracked slabs and walls.

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

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

Earthwork Construction Considerations

Upon completion of filling and grading, care should be taken to maintain the subgrade water content prior to construction of roadways. Construction traffic over the completed subgrades 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. Water collecting over or adjacent to construction areas should be removed. If the subgrade desiccates, saturates, or is disturbed, the affected material should be removed, or the materials should be scarified, moisture conditioned, and recompacted prior to roadway construction.

Construction site safety is the sole responsibility of the contractor who controls the means, methods, and sequencing of construction operations. Under no circumstances shall the information provided herein be interpreted to mean Terracon is assuming responsibility for construction site safety, or the contractor's activities; such responsibility shall neither be implied nor inferred.

Should unstable subgrade conditions develop stabilization measures will need to be employed. Stabilization measures may include placement of aggregate base and multi-axial geogrid. Use of lime, fly ash, kiln dust or cement could also be considered as a stabilization technique. Laboratory evaluation is recommended to determine the effect of chemical stabilization on subgrade soils prior to construction.

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.

The individual contractor(s) is responsible for designing and constructing stable, temporary excavations as required to maintain stability of both the excavation sides and bottom. Excavations should be sloped or shored in the interest of safety following local, and federal regulations, including current Occupational Safety and Health Administration (OSHA) excavation and trench safety standards.

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, as recommended 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 structure areas and 5,000 square feet in roadway areas. Where not specified by local ordinance, one density and water content test should be performed for every 50 linear feet of compacted utility trench backfill. This testing frequency criteria may be adjusted during construction as specified by the geotechnical engineer of record.

In areas of foundation excavations, the bearing subgrade should be evaluated by the Geotechnical Engineer. If unanticipated conditions are observed, 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

We anticipate that the proposed BESS and substation equipment, water tanks, and O&M building may be supported on either spread footings, slab-on grade, or mat foundations.

Recommendations for foundation for the proposed structures and related structural elements are presented in the following paragraphs.

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

Shallow Foundation Design Recommendations

Item	Description
Foundation System	Spread footings, slab on grade, mat foundation
Maximum Net Allowable Bearing Pressure	3,000 psf up to 8 feet wide 2,000 psf up to 14 feet wide

Item	Description
(1-inch settlement)[1, 2]	1,500 psf up to 22 feet wide 1,250 psf up to 32 feet wide 1,200 psf up to 35 feet wide
Required Bearing Stratum [3]	■ Engineered fill extending to a minimum of 1 foot below the bottom of foundations, or 3 feet below existing grade, whichever is greater for the BESS, substation, and water tank areas. ■ Engineered fill extending to a minimum of 3 feet below the bottom of foundations, or 5 feet below existing grade, whichever is greater for the O&M building area.
Design Modulus of Subgrade Reaction, k[3]	200 pounds per square inch per inch (psi/in) The modulus was obtained 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.
Modulus Correction Factor[3]	$k_c = k\,[(B+1)/2B)]^2$
Minimum Embedment Below Finished Grade	18 inches
Minimum Dimensions	Square footings and mats: 24 inches Strip footings: 18 inches
Ultimate Passive Resistance[4]	360 pcf
Ultimate Coefficient of Sliding Friction[5]	0.4
Estimated Total Settlement from Structural Loads	About 1 inch
Estimated Differential Settlement	About 1/2 of total settlement over a horizontal distance of 40 feet

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. These bearing pressures can be increased by 1/3 for transient loads unless those loads have been factored to account for transient conditions.
2. Unsuitable or soft soils should be overexcavated and replaced per the recommendations presented in Earthwork.
3. k values should be reduced to account for dimensional effects of largely loaded areas. Where k_c is the corrected or design modulus value and B is the mat width in feet.

Item	Description

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.

Settlement calculations were performed utilizing Westergaard and Hough's methods[3] to estimate the static settlement for various foundations widths with an allowable settlement of 1-inch.

Finished grade is defined as the lowest adjacent grade within five feet of the foundation for perimeter (or exterior) footings.

The allowable foundation bearing pressure applies to dead loads plus design live load conditions. The design bearing pressure may be increased by one-third when considering total loads that include wind or seismic conditions. The weight of foundation concrete below grade may be neglected in dead load computations.

Foundation should be reinforced as necessary to reduce the potential for distress caused by differential foundation movement. Foundation excavations should be observed by the geotechnical engineer. If the soil conditions encountered differ significantly from those presented in this report, supplemental recommendation will be required.

Lateral Earth Pressures

Design Parameters

For engineered fill comprised of on-site soils or imported low volume change materials above any free water surface, recommended equivalent fluid pressure of unrestrained foundation elements are:

Item	Recommended Value
Active Case	31 psf/ft
Passive Case	390 psf/ft
At-Rest Case	47 psf/ft

[3] *FHWA Geotechnical Engineering Circular No. 6 – Shallow Foundations, FHWA – SA-02-054*

Coefficient of Friction	0.35

1. The values are based on engineered fill materials used as backfill.
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. Use of passive earth pressures require the sides of the excavation for the foundation to be nearly vertical and the concrete placed neat against these vertical faces or that the foundation forms be removed and compacted engineered fill be placed against the vertical foundation face.
4. 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.
5. Passive pressure and sliding friction may be combined to resist sliding provided that either the passive pressure or frictional resistance (adhesion) is reduced by 50 percent.

The lateral earth pressures herein do not include any factor of safety and are not applicable for submerged soils/hydrostatic loading. Additional recommendations may be necessary if such conditions are to be included in the design.

Fill against foundation walls should be compacted to densities specified in the Earthwork section of this report. Compaction of each lift adjacent to walls should be accomplished with hand-operated tampers of other lightweight compactors.

Deep Foundations

Drilled Shaft Design Recommendations

Proposed substation and BESS electrical equipment and transmission line poles may be supported on drilled shaft piers. Total required embedment of the drilled shaft should be determined by the structural engineer based on structural loading and parameters provided in this report.

It should be noted that the transmission line borings were located in accessible areas, however there are rolling hills between the test locations. Subsurface conditions in these hills are anticipated to be more dense than what was encountered in the lower flat areas and may contain cobbles or shallow bedrock outcrops. The owner should consider getting unit rates for rock coring or difficult drilling costs associated with tower locations sited in the hills.

Drilled Shaft Axial Loading

Allowable skin friction and total capacity charts are attached to our Supporting Information section at the end of this report. The values presented for allowable side friction and end bearing include a factor of safety of 2.5.

Drilled piers should have a minimum (center-to-center) spacing of three diameters. Closer spacing may require a reduction in axial load capacity. Axial capacity reduction can be determined by comparing the allowable axial capacity determined from the sum of individual piers in a group versus the capacity calculated using the perimeter and base of the pier group acting as a unit. The lesser of the two capacities should be used in design.

The allowable uplift capacities should only be based on the side friction of the shaft; however, the weight of the foundation should be added to these values to obtain the actual allowable uplift capacities for drilled shafts. Tensile reinforcement should extend to the bottom of shafts subjected to uplift loading.

Drilled Shaft Lateral Loading – LPILE Parameters

Based on our review of the subsurface conditions in the area of the substation, BESS and transmission line, our laboratory testing, and the Standard Penetration Test (SPT) results, engineering properties have been estimated for the soils conditions as shown in the following table. A depth of neglect based on anticipated disturbance, shrinkage, or scour during the design life off the piers should be considered due to utilities construction and grading around the piers. Due to potential for disturbance within the upper soils around the shaft, lateral and axial capacity of soils within the upper 2 feet should be neglected. This depth of neglect should be provided by the designer and verified by the civil engineer.

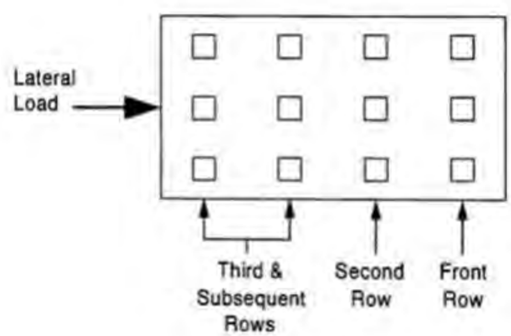
Recommended geotechnical parameters for lateral load analyses by others of drilled shaft foundations have been developed for use in the LPILE computer program. The following table summarizes input values for use in LPILE analyses. LPILE estimated values of k_h and ε_{50} may be used. Since deflection or a service limit criterion will most likely control lateral capacity design, no safety/resistance factor is included with the parameters.

Stratigraphy[1]		L-Pile Soil Model	ϕ (°)[2]	MFAD Modulus of Deformation (ksi)	γ' (pcf)[2]
Layer	Depth Below Finished Grade (feet)				
1	2	Sand	32	1.35	120
	10				
2	10	Sand	34	1.98	110
	20				
3	20	Sand	40	3.60	120
	50				

1. See Subsurface Profile in Geotechnical Characterization for more details on Stratigraphy.
2. Definition of terms:
   ϕ: Internal friction angle
   γ: Effective unit weight

The load capacities provided herein are based on the stresses induced in the supporting soil strata. The structural capacity of the shafts/piles should be checked to assure they can safely accommodate the combined stresses induced by axial and lateral forces. Lateral deflections of shafts/piles should be evaluated using an appropriate analysis method, and will depend upon the pile's diameter, length, configuration, stiffness and "fixed head" or "free head" condition. We can provide additional analyses and estimates of lateral deflections for specific loading conditions upon request. The load-carrying capacity of shafts/piles may be increased by increasing the diameter and/or length.

When piers are used in groups, the lateral capacities of the piers in the second, third, and subsequent rows of the group should be reduced as compared to the capacity of a single, independent pier. Guidance for applying p-multiplier factors to the p values in the p-y curves for each row of pier foundations within a pier group are as follows:



1. Front row: Pm = 0.8
2. Second row: Pm = 0.4
3. Third and subsequent row: Pm= 0.3

For the case of a single row of piers supporting a laterally loaded grade beam, group action for lateral resistance of piers would need to be considered when spacing is less than five pier diameters (measured center-to-center). However, spacing closer than 3D (where D is the diameter of the pier) is not recommended due to the potential for the installation of a new pier disturbing an adjacent installed pier, likely resulting in axial capacity reduction.

Drilled Shaft Construction Considerations

Due to presence of sandy soils, caving of soils within the drilled shaft excavations should be anticipated. We do not anticipate drilled shafts to extend below the depth of groundwater. However, if foundation concrete cannot be placed in dry conditions, a tremie should be used for concrete placement. Temporary steel casing will likely be required to properly drill and clean shafts prior to concrete placement. Gravelly soils were encountered in multiple borings on-site. Therefore, as drilled shafts extend below 10 feet, heavy duty rock bit or coring may be required to advance drilled shafts

The drilling speed should be reduced as necessary to minimize vibration and caving of the silty sand materials. The contractor should be prepared to use casing or other approved means to prevent caving. The contractor should review the boring logs to make sure they are familiar with the anticipated subsurface conditions prior to beginning construction of the deep foundations.

In the event drilled hole walls slough during drilling, temporary steel casing may be required to properly drilled shafts prior to concrete placement. We recommend the use of slurry drilling methods with polymers method to keep the solids in suspension during the drilling. Drilled shaft foundation concrete should be placed within 6 inches of the shaft base of the slurry-filled excavation immediately after completion of drilling and cleaning. The tremie should remain inserted several feet into the fresh concrete as it displaces the slurry upward and until placement is complete. The slurry should have a sand content no greater than 1% at the time concrete placement commences. The maximum unit weight of the slurry should be established in consultation with the Geotechnical Engineer.

As an alternative to temporary casing, the shaft excavation may be backfilled with a slurry mix in order to help stabilize sloughing sidewalls of the excavation, allowed to dry, and re-drilled through the backfill. The slurry mix design should be submitted to the Geotechnical Engineer for review and approval.

Drilled shaft foundation concrete should be placed immediately after completion of drilling and cleaning. Due to potential sloughing and raveling, foundation concrete quantities may exceed calculated geometric volumes.

If casing is used for drilled shaft construction, it should be withdrawn in a slow continuous manner maintaining a sufficient head of concrete to prevent infiltration of water or the creation of voids in shaft concrete. Shaft concrete should have a relatively high fluidity when placed in cased shaft holes or through a tremie. Shaft concrete with slump in the range of 6 to 8 inches is recommended.

Foundation concrete should be placed immediately after completion of drilling and cleaning. Closely spaced shafts should be drilled and filled alternatively, allowing the concrete to set at least eight hours before drilling the adjacent shaft. All excavations should be filled with concrete as soon after drilling as possible. In no event should shaft holes be left open overnight.

We recommend that all drilled shaft installations be observed on a full-time basis by an experienced geotechnical engineer in order to evaluate that the soils encountered are consistent with the recommended design parameters. If the subsurface soil conditions encountered differ significantly from those presented in this report, supplemental recommendations will be required. The Geotechnical Engineer should observe the installation of drilled piers to verify the soil conditions and the diameter and depth of piers. Drilled piers should be constructed true and plumb.

Free-fall concrete placement in drilled piers will only be acceptable if provisions are taken to avoid striking the concrete on the sides of the hole or reinforcing steel. The use of a bottom-dump hopper, or an "elephant's trunk" discharging near the bottom of the hole where concrete segregation will be minimized, is recommended.

Drilled pier end bearing surfaces must be thoroughly cleaned prior to concrete placement. A representative of the Geotechnical Engineer should inspect the bearing surface and foundation pier configuration. If the subsurface soil conditions encountered differ significantly from those presented in this report, supplemental recommendations will be required.

The contractor should check for gas and/or oxygen deficiency before any workers enter the excavation for observation and manual cleanup. All necessary monitoring and safety precautions as required by OSHA, State or local codes should be strictly enforced.

Driven Pile Design Parameters

Proposed battery storage units can be supported on driven steel W-section foundations (assumed to be W6x9 or similar) in general accordance with the following sections.

The design capacity of a single-driven pile is a function of several factors including:

- Size and type of pile;
- Type and capacity of pile installation equipment;
- Pile integrity after installation; and
- Engineering properties of the subsurface soils.

Based on specific conditions encountered on site, the soils are generally considered drivable for pile installation. The most effective means of verifying pile drivability and capacities for either tension or lateral loads is through pile load tests. Pile foundation design parameters have been based upon correlated capacities utilizing soil strength criteria determined from the soil borings and laboratory testing.

The tables below neglect a depth of 2 feet for axial and lateral resistance. This neglect is estimated based on our experience and accounts for depth of scour and/or disturbance from utilities near the piles. Depth of neglect should be verified and adjusted by the design engineer based on the scour analysis. Allowable capacities were based on a minimum factor-of-safety (FOS) of 2.0 for skin friction and 3.0 for end bearing

Description	Top Depth / Bottom Depth	Total Unit Weight (pcf)	Allowable Compression Unit Skin friction (psf)[1]	Allowable Bearing Pressure (psf)[2]
Stratum 1	2 / 10	120	90	8,000

Description	Top Depth Bottom Depth	Total Unit Weight (pcf)	Allowable Compression Unit Skin friction (psf)[1]	Allowable Bearing Pressure (psf)[2]
Stratum 2	10 20	110	300	25,000

1. Allowable uplift capacity is on the order of 70% of the compression capacity values in the table. The values provided should be multiplied by the box perimeter of the pile times the depth. The box perimeter is considered two times the width of the flange plus two times the depth of the web.
2. The values provided should be multiplied by the box area of the pile and be used for compression resistance only.

Recommended soil parameters for lateral load analysis of driven pile foundations have been developed for use in LPILE computer programs. Engineering properties have been estimated as outlined below:

Description	Top Depth Bottom Depth	Effective Unit Weight (pcf)	L-PILE/ GROUP Soil Type	ϕ (°)
Stratum 1	1 10	120	Sand	32
Stratum 2	10 20	110	Sand	34

Driven Piles Construction Considerations

Based on the field exploration and laboratory testing, it is our opinion that the soils on the site are suitable for pile installation into native soils.

A geotechnical engineer should be engaged to make periodic observations of pile driving operations during construction. Each pile should be observed and checked for buckling, crimping and alignment in addition to recording penetration resistance, depth of embedment, and general pile driving operations.

As part of the overall quality control program, the time rate of installation (seconds per foot of embedment) should be recorded during production post driving. As a direct extension of the design process, additional "proof" testing should be performed on a representative number of production posts that do not meet the minimum installation rate criteria outlined in this report.

Gravel-Surfaced Drives and Parking

Roadway designs are provided for the traffic conditions and pavement life conditions as noted in the Project Description and in the following sections of this report. A critical aspect of pavement performance is site preparation. Roadway sections noted in this section are contingent upon the site being adequately prepared. Additionally, our recommendations are based on Chapter 4 Low-Volume Road Design found in AASHTO 1993.

Roadway Subgrades

For this analysis, the laboratory CBR value result of 10 was used.

Design Parameters

We understand unpaved access roads are planned throughout the site. The unpaved road sections for post-construction use have been developed under the following assumptions:

Aggregate Roadway Design Parameters		
Parameter	Design Value	Comments
Traffic Loading	5,000 ESALs [1]	Assumed
Design Life	40 years	Assumed
Design CBR	10	Assumed
Resilient Modulus	11,150 psi (all-weather)	Based on CBR of 10
Aggregate Base Elastic Modulus	36,000 psi	Assumed
Allowable Rut Depth	2.0 inches	Assumed
Design Serviceability Loss	2.5	Assumed
Vehicle Tire Pressure	80 psi	Assumed

1. ESAL = 18 kips Equivalent Single Axle Load

Access Road Sections

As a minimum, we recommend the following options for unpaved access roads:

Typical Unpaved Road Section – Post Construction Traffic	
Base Course Thickness (inches)	Traffic (ESALs)
5[1, 2]	5,000

1. Minimum section thickness is anticipated to support fire trucks and pick-up trucks associated with on-going maintenance. Trucks containing heavy equipment may require localized repairs.
2. Base materials shall consist of Class II Base meeting requirements of the Caltrans Standard Specifications.

Roadway section should be constructed over a minimum of 12 inches of scarified, moisture conditioned, and compacted native soils to 95% of the maximum dry density using ASTM D1557. The recommended thicknesses should be measured after full compaction. The width of the roadway should extend a minimum distance of 1 foot on each side of the desired surface width.

Aggregate materials should conform to the specifications of Class II aggregate base in accordance with the requirements and specifications of the State of California Department of Transportation (Caltrans), or other approved local governing specifications.

Positive drainage should be provided during construction and maintained throughout the life of the roadways. Proposed roadway design should maintain the integrity of the road and eliminate ponding.

Roadway Design and Construction Considerations

Regardless of the design, un-surfaced roadways will display varying levels of wear and deterioration. We recommend an implementation of a site inspection program at a frequency of at least once per year to verify the adequacy of the roadways. Preventative measures should be applied as needed for erosion control and re-grading. An initial site inspection should be completed approximately three months following construction.

Preventative maintenance should be planned and provided for through an on-going management program to enhance future roadway performance. Preventative maintenance activities are intended to slow the rate of deterioration, and to preserve the roadway investment.

Surfacing materials should not be placed when the surface is wet. Surface drainage should be provided away from the edge of roadways to reduce lateral moisture transmission into the subgrade.

If rut depths become excessive as construction work progresses, re-grading and re-compaction should be performed as necessary. Care should be taken to reduce or eliminate trafficking of the unpaved access road when the subgrade is wet as this will result in accelerated rutting conditions. Scarification, moisture treatment as necessary, and re-compaction of the roadways will likely be necessary as the roadways deteriorate.

Materials and construction of roadways for the project should be in accordance with the requirements and specifications of the California Department of Transportation or the applicable local governing body.

Pavements

General Pavement Comments

Based on input from the design team, the entrance to the substation will be paved with asphalt. Asphalt 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

A sample was tested for CBR at the site and resulted in a CBR value of 10. An equivalent R-value of 48 was considered and used to calculate the asphalt concrete pavement thickness sections. R-value testing should be completed prior to pavement construction to verify the design R-value.

The structural sections are predicated upon proper compaction of the utility trench backfills and the subgrade soil preparation 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.

Assuming the pavement subgrades will be prepared as recommended within this report, the following pavement sections should be considered minimums for this project for the traffic indices assumed in the table below. As more specific traffic information becomes available, we should be contacted to reevaluate the pavement calculations.

Pavement Section Thicknesses

The following table provides our opinion of minimum thickness for AC sections:

Pavement Type	Recommended Pavement Section Thickness [1] (inches)	
	TI = 5	TI = 7
Asphaltic Concrete[2]	3 inches	4 inches
	3 inches Class II Aggregate Base	5 inches Class II Aggregate Base

1. The individual and total material thickness values presented herein represent minimum thickness values, not averages.
2. All materials should meet the Caltrans Standard Specifications for Highway Construction.

These pavement sections are considered minimal sections based upon the expected traffic and the existing subgrade conditions. However, they are expected to function with periodic maintenance and overlays if good drainage is provided and maintained.

Subsequent to clearing, grubbing, and removal of topsoil, subgrade soils beneath all pavements should be scarified, moisture conditioned, and compacted to a minimum depth of 10 inches. All materials should meet the CALTRANS Standard Specifications for Highway Construction. Aggregate base materials should meet the gradation and quality requirement of Class 2 Aggregate Base (¾ inch maximum) in Caltrans Standard Specifications, latest edition, Sections 25 through 29.

Parking areas for heavy vehicles, concentrated turn areas, and start/stop maneuvers could require thicker pavement sections. Edge restraints (i.e. concrete curbs or aggregate shoulders) should be planned along curves and areas of maneuvering vehicles.

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 upkeep should be anticipated. 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. Pavement care consists of both localized (e.g., crack and joint sealing and patching) and global maintenance (e.g., surface sealing). Additional engineering consultation 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%.
- Subgrade and pavement surfaces should have a minimum 2% slope to promote proper surface drainage.
- Install pavement drainage systems surrounding areas anticipated for frequent wetting.
- Seal cracks immediately.

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. 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. Geotechnical contractor 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 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.

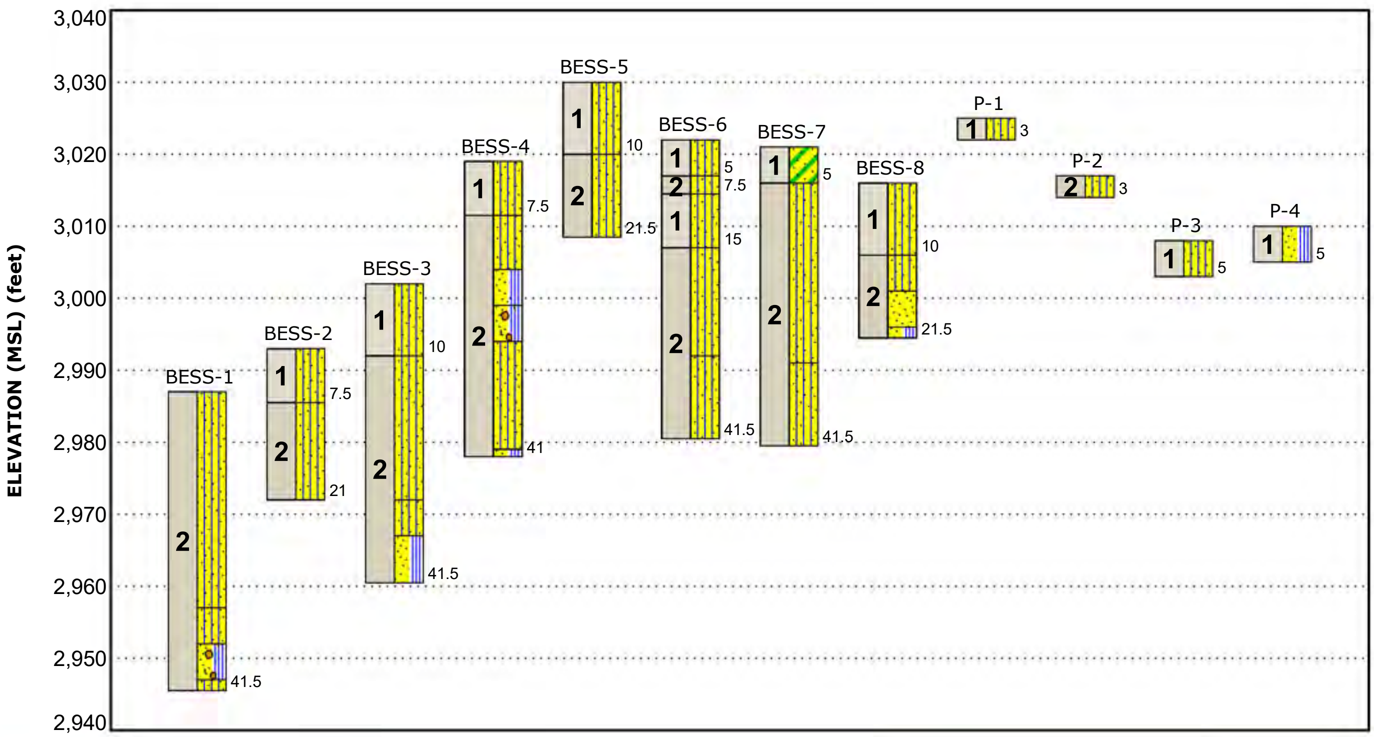
Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly effect excavation 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. Construction and site development have the potential to affect adjacent properties. Such impacts can include damages due to vibration, modification of groundwater/surface water flow during construction, foundation movement due to undermining or subsidence from excavation, as well as noise or air quality concerns. Evaluation of these items on nearby properties are commonly associated with contractor means and methods and are not addressed in this report. The owner and contractor should consider a preconstruction/precondition survey of surrounding development. 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.

Figures

Contents:

145 W Walnut St
Carson, CA

GeoModel



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	Sand	Sand with varying amounts of silt, clay, and gravel; loose to medium dense
2	Sand	Sand with varying amount of silt, clay, and gravel; medium dense to very dense

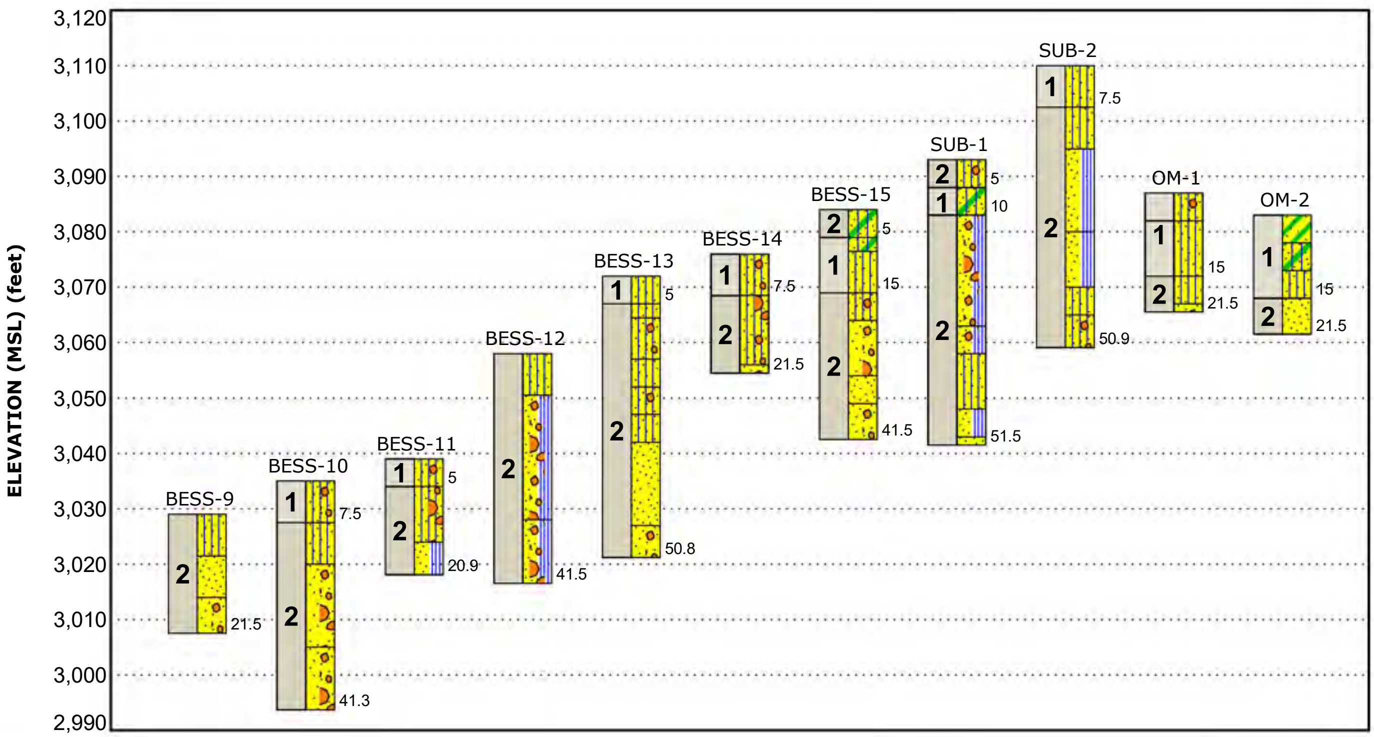
Legend

- Silty Sand
- Poorly-graded Sand with Silt
- Poorly-graded Sand
- Poorly-graded Sand with Silt and Gravel
- Clayey Sand

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project. Numbers adjacent to soil column indicate depth below ground surface.

Terracon
145 W Walnut St
Carson, CA

GeoModel



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	Sand	Sand with varying amounts of silt, clay, and gravel; loose to medium dense
2	Sand	Sand with varying amount of silt, clay, and gravel; medium dense to very dense

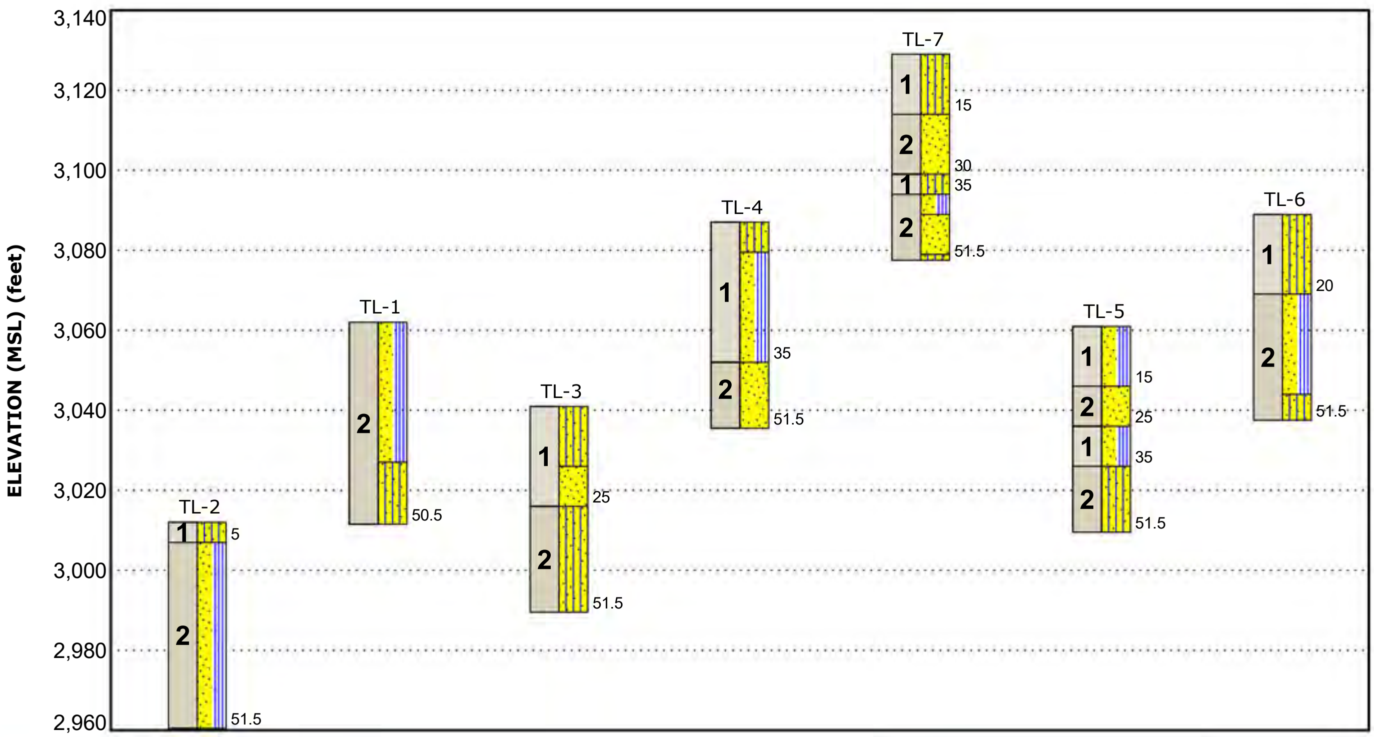
Legend

- Silty Sand
- Poorly-graded Sand
- Poorly-graded Sand with Gravel
- Silty Sand with Gravel
- Poorly-graded Sand with Silt
- Poorly-graded Sand with Silt and Gravel
- Silty Clayey Sand
- Clayey Sand

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project. Numbers adjacent to soil column indicate depth below ground surface.

Terracon
145 W Walnut St
Carson, CA

GeoModel



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Model Layer	Layer Name	General Description
1	Sand	Sand with varying amounts of silt, clay, and gravel; loose to medium dense
2	Sand	Sand with varying amount of silt, clay, and gravel; medium dense to very dense

Legend

- Poorly-graded Sand with Silt
- Silty Sand
- Poorly-graded Sand

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project. Numbers adjacent to soil column indicate depth below ground surface.

Attachments

Exploration and Testing Procedures

Field Exploration

Number of Borings	Approximate Boring Depth (feet)	Location
15	21 to 51.5	Proposed BESS Area
2	51.5	Proposed Substation Area
2	21.5	Proposed O&M Building Area
4	3 and 5	Proposed Infiltration Area
7	50.5 and 51.5	Proposed Transmission Line

Boring Layout and Elevations: Terracon personnel provided the boring layout using handheld GPS equipment (estimated horizontal accuracy of about ±10 feet) and referencing existing site features. Approximate ground surface elevations were estimated using Google Earth. If elevations and a more precise boring layout are desired, we recommend borings be surveyed.

Subsurface Exploration Procedures: We advanced the borings with a track-mounted drill rig using continuous hollow stem flight. Four samples were obtained in the upper 10 feet of each boring and at intervals of 5 feet thereafter. Test samples were collected during drilling in general accordance with the appropriate ASTM methods using Standard Penetration Testing (SPT) and sampling using either standard split-spoon or Modified California samplers. A sampling spoon was driven into the ground by a 140-pound automatic hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration was recorded as the Standard Penetration Test (SPT) resistance value, also referred to as N-values. The N-values are indicated on the boring logs at the test depths. The samples were placed in appropriate containers, taken to our soil laboratory for testing, and classified by a geotechnical engineer.

For safety purposes and as required by Los Angeles County, all borings were backfilled with grout after their completion.

We also observed the boreholes while drilling and at the completion of drilling for the presence of groundwater. Groundwater was not encountered at the time of drilling.

The sampling depths, penetration distances, and other sampling information was recorded on the field boring logs. The samples were placed in appropriate containers and taken to our soil laboratory for testing and classification by a Geotechnical Engineer. Our exploration team prepared field boring logs as part of the drilling operations. These field logs included visual classifications of the materials observed during drilling and our interpretation of the subsurface conditions between samples. Final boring logs were 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.

Electrical Resistivity Testing: Soil electrical resistivity data was be obtained in accordance with ASTM G57 Standard Test Method for Field Measurement of Soil Resistivity Using the Wenner Four-Electrode Method. At the test location, two near perpendicular lines was tested. Electrode “a” spacings are summarized in the following table. Electrode spacing was adjusted to conform to site conditions.

No. of Test Locations	Electrode “a” Spacing (feet)	Planned Location
7	2, 4, 6, 8, 12, 20, 30, 50, 70, 100, 150 and 300 feet	Proposed BESS and Substation Areas

Laboratory Testing

The project engineer reviewed the field data and assigned laboratory tests. The laboratory testing program included the following types of tests:

- Moisture Content
- Dry Unit Weight
- Atterberg Limits
- Compaction
- Swell Consolidation Test
- Direct Shear
- Corrosivity
- Thermal Resistivity
- California Bearing Ratio

The laboratory testing program often included examination of soil samples by an engineer. Based on the results of our field and laboratory programs, we described and classified the soil samples in accordance with the Unified Soil Classification System.

Site Location and Exploration Plans

Contents:

Site Location

Note to Preparer: This is a large table with outside borders. Just click inside the table above this text box, then paste your GIS Toolbox image.

When paragraph markers are turned on, you may notice a line of hidden text above and outside the table – please leave that alone. Limit editing to inside the table.

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

MAP PROVIDED BY MICROSOFT BING MAPS

Exploration Plan

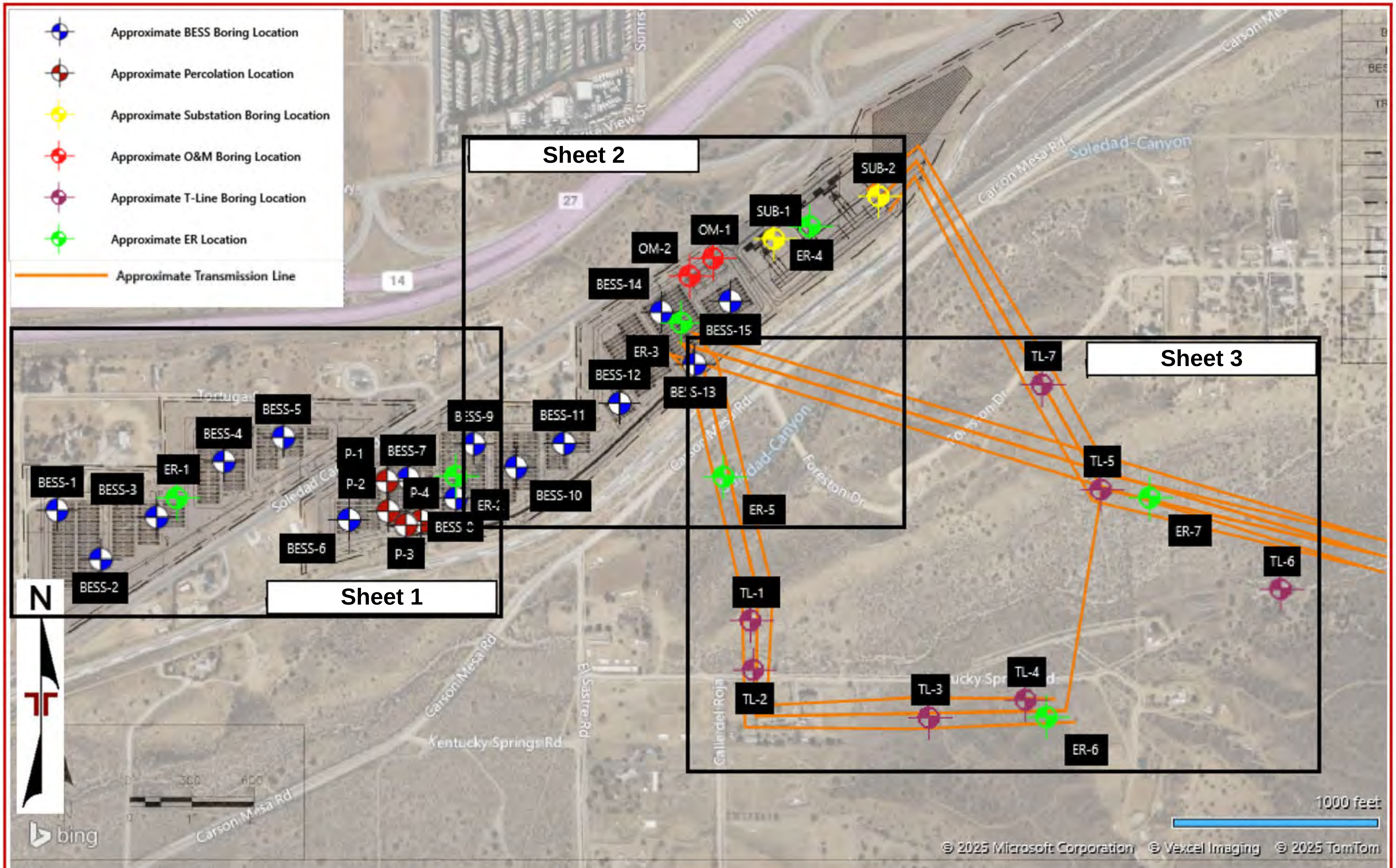


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

Sheet 1 Exploration Plan - BESS and Substation Locations

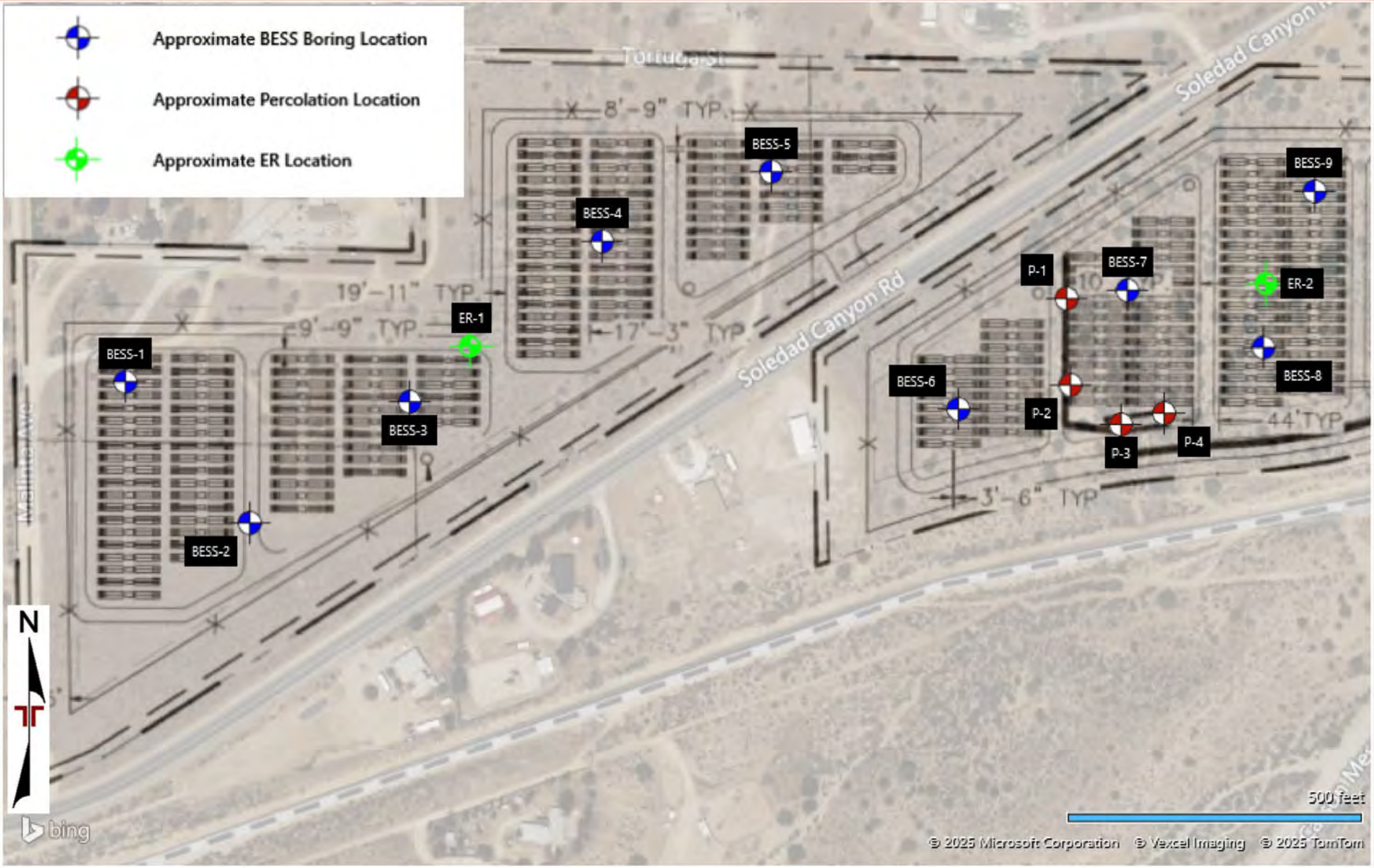


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

Sheet 2 Exploration Plan - BESS and Substation Locations

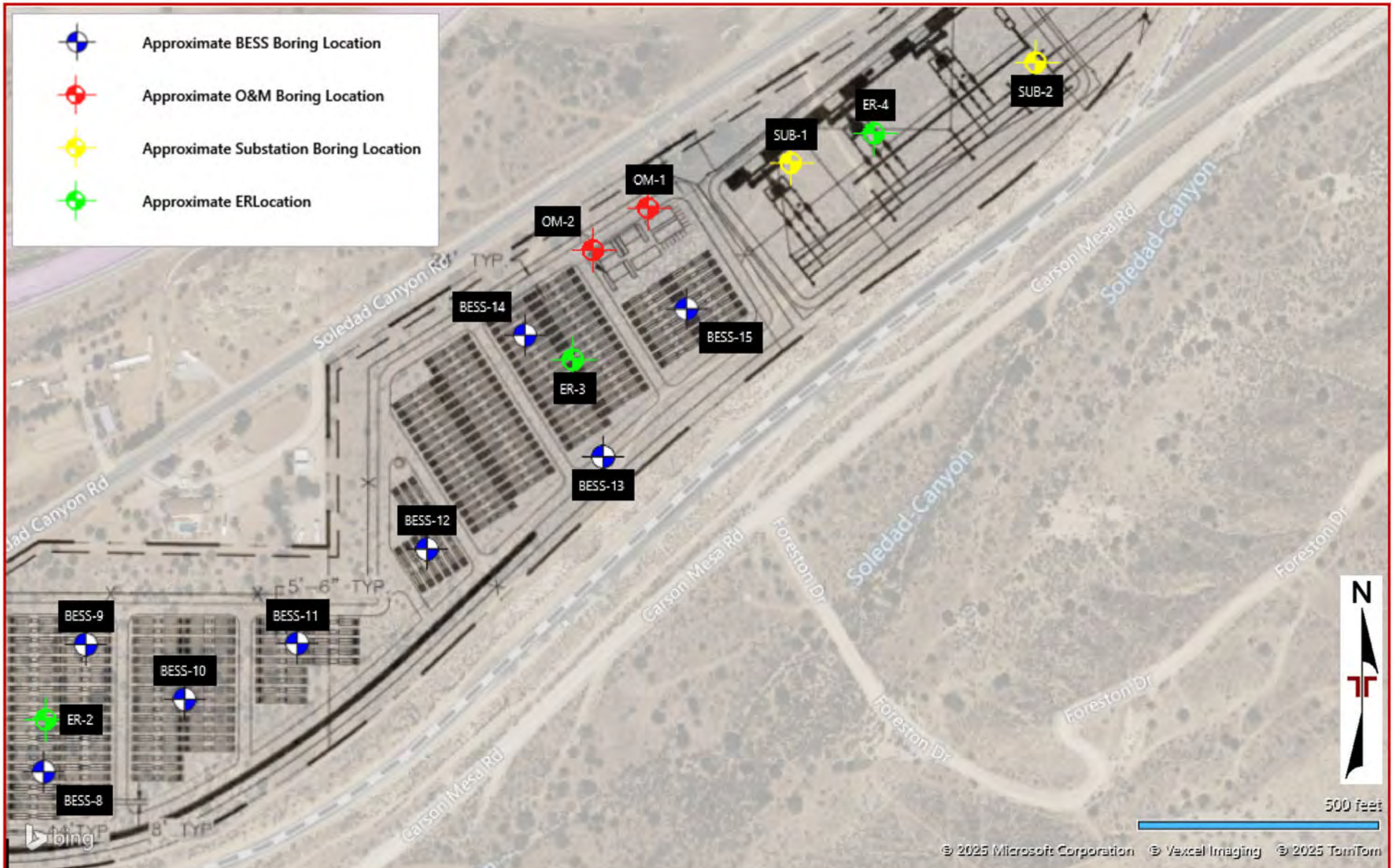


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

Sheet 3 - Exploration Plan - T-Line Exploration Locations

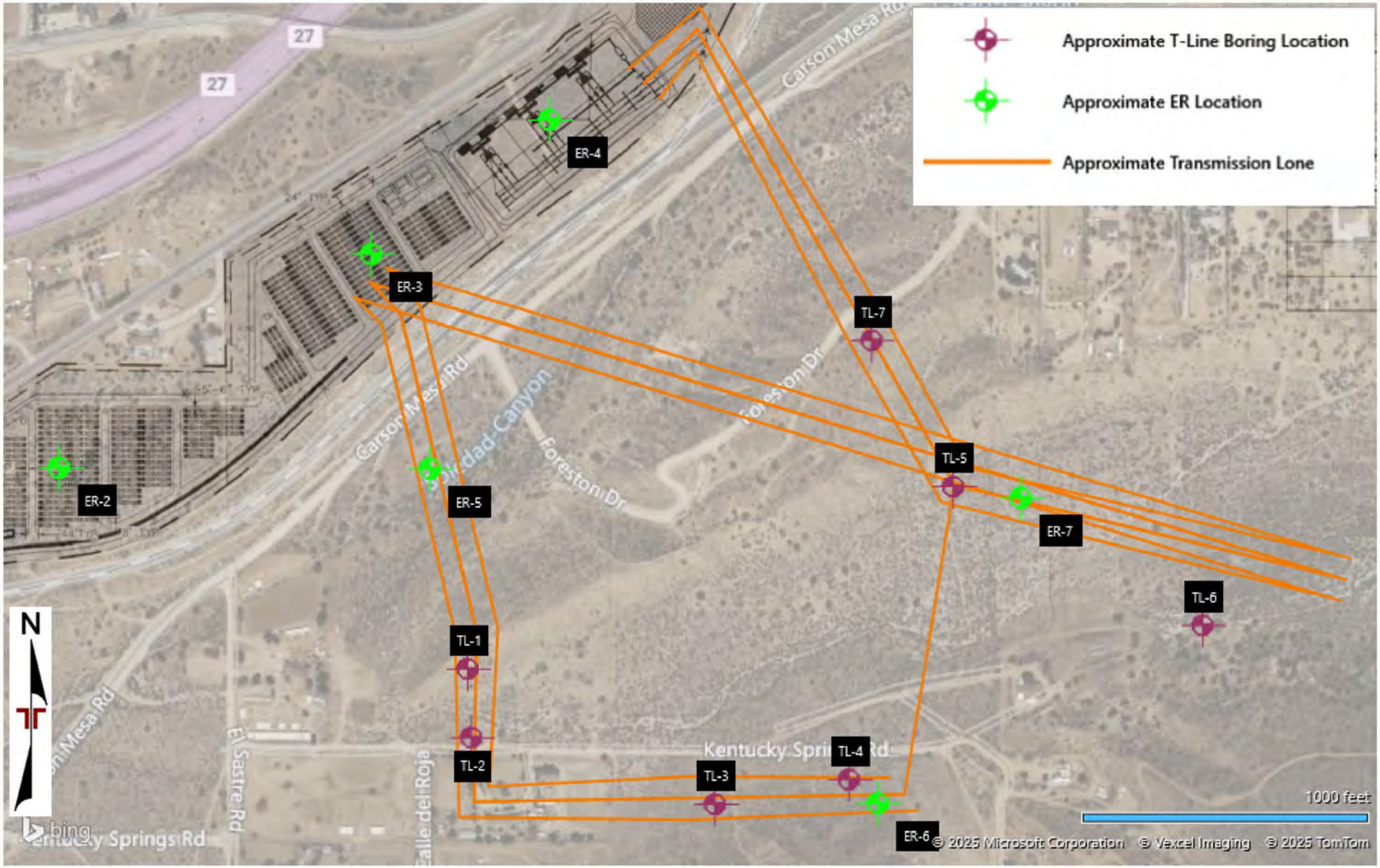


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

Exploration and Laboratory Results

Contents:

Terracon
145 W Walnut St
Carson, CA

Boring Log No. BESS-1

Location: See Exploration Plan

Latitude: 34.4829° Longitude: -118.1491°

Model Layer	Depth (Ft.)	Description	Sample Depth (Ft.)	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
2		**SILTY SAND (SM)**, trace gravel, light brown						
		very dense	2.5	15-50/4"	2.3 / 3.3	119		32
			5	15-39-30 N=69				
		dense	7.5	16-28-31	2.0	123		
		very dense	10	16-23-30 N=53			20-17-3	25
		medium dense	15	10-21-33	0.9	109		
		very dense	20	14-25-26 N=51				
		brown	25	17-29-35 N=64				
	30.0							

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.

Elevation Reference: Elevations obtained from Google Earth

Water Level Observations
Groundwater not encountered

Notes

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
D-50

Hammer Type
Automatic

Driller
Terracon

Logged by
AT

Boring Started
12-24-2024

Boring Completed
12-24-2024

Terracon
145 W Walnut St
Carson, CA

Boring Log No. BESS-1

Location: See Exploration Plan

Latitude: 34.4829° Longitude: -118.1491°

Model Layer	Depth (Ft.)	Description	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
2		**SILTY SAND (SM)**, brown, very dense			X	23-27-33 N=60				
	35.0	**POORLY GRADED SAND WITH SILT (SP-SM)**, trace gravel and clay, light brown, very dense	35		X	22-29-36 N=65				
	40.0	**SILTY SAND (SM)**, trace gravel, brown, very dense	40		X	20-25-26 N=51				
	41.5	***Boring Terminated at 41.5 Feet***								

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.

Elevation Reference: Elevations obtained from Google Earth

Notes

Water Level Observations
Groundwater not encountered

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
D-50

Hammer Type
Automatic

Driller
Terracon

Logged by
AT

Boring Started
12-24-2024

Boring Completed
12-24-2024

Boring Log No. BESS-2

Location: See Exploration Plan

Latitude: 34.4823° Longitude: -118.1484°

Model Layer	Depth (Ft.)	Description	Sample Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
1		**SILTY SAND (SM)**, reddish brown	~1		Hand sample					
1		medium dense	2–3.5		SPT	6-8-8 N=16				
1		brown	5–6.5		Ring	11-17-20	2.1	119		
2	7.5	dense	7.5–9		SPT	9-14-18 N=32				26
2			10–11.5		Ring	28-38-42	0.7	118		
2			15–16.5		SPT	9-15-17 N=32				
2	21.0	very dense	20–21		Ring	34-50/6"	1.8	106		

Boring Terminated at 21 Feet

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.

Elevation Reference: Elevations obtained from Google Earth

Water Level Observations
Groundwater not encountered

Notes

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
D-50

Hammer Type
Automatic

Driller
Terracon

Logged by
JB

Boring Started
01-08-2025

Boring Completed
01-08-2025

Terracon
145 W Walnut St
Carson, CA

Boring Log No. BESS-3

Location: See Exploration Plan

Latitude: 34.4828° Longitude: -118.1475°

Model Layer	Depth (Ft.)	Description	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
1		**SILTY SAND (SM)**, trace gravel, light brown								
		medium dense				11-15-18	2.7	122		
			5			10-11-12 N=23				
						11-11-17	1.6	117		
2	10.0	dense	10			15-16-23 N=39				
		very dense	15			23-38-50/5"	1.2	122		
		dense	20			14-16-19 N=35				
			25			16-20-27 N=47				
	30.0		30							

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.

Elevation Reference: Elevations obtained from Google Earth

Notes

Water Level Observations
Groundwater not encountered

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
D-50

Hammer Type
Automatic

Driller
Terracon

Logged by
AT

Boring Started
12-24-2024

Boring Completed
12-24-2024

Boring Log No. BESS-3

Location: See Exploration Plan

Latitude: 34.4828° Longitude: -118.1475°

Model Layer	Graphic Log	Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
2		**SILTY SAND (SM)**, brown, very dense			X	19-28-38 N=66				
		35.0	35							
		POORLY GRADED SAND WITH SILT (SP-SM), trace gravel, brown, very dense			X	23-25-27 N=52				
		light brown	40		X	26-36-46 N=82				
		41.5								
		Boring Terminated at 41.5 Feet								

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.

Elevation Reference: Elevations obtained from Google Earth

Notes

Water Level Observations
Groundwater not encountered

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
D-50

Hammer Type
Automatic

Driller
Terracon

Logged by
AT

Boring Started
12-24-2024

Boring Completed
12-24-2024

Terracon
145 W Walnut St
Carson, CA

Boring Log No. BESS-4

Location: See Exploration Plan

Latitude: 34.4836° Longitude: -118.1464°

Model Layer	Depth (Ft.)	Material Description	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
1		**SILTY SAND (SM)**, reddish brown			Grab				18-15-3	18
		medium dense			SPT	8-9-9 N=18				
			5		Ring	11-18-17	2.5	121		
2	7.5	dense			SPT	14-29-30 N=59				
			10		Ring	23-43-50/5"	4.6	118		
	15.0	**POORLY GRADED SAND WITH SILT (SP-SM)**, brown, dense	15		SPT	6-14-18 N=32			NP	11
	20.0	**POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM)**, light brown, very dense	20		Ring	35-50/4"	2.7	104		
	25.0	**SILTY SAND (SM)**, brown, very dense	25		SPT	26-50/5"				
	30.0		30							

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.

Elevation Reference: Elevations obtained from Google Earth

Notes

Water Level Observations
Groundwater not encountered

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
CME-75

Hammer Type
Automatic

Driller
2R

Logged by
JB

Boring Started
01-08-2025

Boring Completed
01-08-2025

Terracon
145 W Walnut St
Carson, CA

Boring Log No. BESS-4

Location: See Exploration Plan

Latitude: 34.4836° Longitude: -118.1464°

Model Layer	Graphic Log	Depth (Ft.)	Description	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
2			**SILTY SAND (SM)**, trace gravel, brown, very loose			X	17-34-37 N=71				
				35		X	32-50/6"				
		40.0	**POORLY GRADED SAND WITH SILT (SP-SM)**, brown, very dense	40		X	28-50/6"				
		41.0	***Boring Terminated at 41 Feet***								

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.

Elevation Reference: Elevations obtained from Google Earth

Notes

Water Level Observations
Groundwater not encountered

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
CME-75

Hammer Type
Automatic

Driller
2R

Logged by
JB

Boring Started
01-08-2025

Boring Completed
01-08-2025

Terracon
145 W Walnut St
Carson, CA

Boring Log No. BESS-5

Location: See Exploration Plan

Latitude: 34.4839° Longitude: -118.1454°

Model Layer	Depth (Ft.)	Material Description	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
1		**SILTY SAND (SM)**, brown								
		medium dense				8-16-19	1.5			17
							1.6			
			5			6-9-10 N=19				
						6-9-17	1.9	104		
2	10.0	very dense	10			20-32-35 N=67				
		dense	15			18-26-29	2.8	121		
	21.5		20			12-15-17 N=32				

Boring Terminated at 21.5 Feet

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.

Elevation Reference: Elevations obtained from Google Earth

Notes

Water Level Observations
Groundwater not encountered

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
6-Tech

Hammer Type
Automatic

Driller
Terracon

Logged by
JB

Boring Started
01-06-2025

Boring Completed
01-06-2025

Terracon
145 W Walnut St
Carson, CA

Boring Log No. BESS-6

Location: See Exploration Plan

Latitude: 34.4828° Longitude: -118.1444°

Model Layer	Depth (Ft.)	Material Description	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
1		**SILTY SAND (SM)**, light brown, trace gravel			Grab					
		medium dense	2.5		SPT	5-9-13 N=22				
2	5.0	brown, dense	5		Ring	50/6"	6.2	106		
1	7.5	light brown, medium dense	7.5		SPT	6-8-10 N=18				
			10		Ring	11-18-20	1.0			
2	15.0	dense	15		SPT	16-21-22 N=43				
			20		SPT	16-21-24 N=45			NP	16
			25		Ring	24-50/6"	1.4	111		
	30.0		30							

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.

Elevation Reference: Elevations obtained from Google Earth

Water Level Observations
Groundwater not encountered

Drill Rig
6-Tech

Hammer Type
Automatic

Driller
Terracon

Notes

Advancement Method
Hollow Stem Auger

Logged by
JB

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Boring Started
01-06-2025

Boring Completed
01-06-2025

Terracon
145 W Walnut St
Carson, CA

Boring Log No. BESS-6

Location: See Exploration Plan

Latitude: 34.4828° Longitude: -118.1444°

Model Layer	Graphic Log	Depth (Ft.) / Description	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
2		**SILTY SAND (SM)**, light brown, very dense			X	18-35-36 N=71				
			35		X	20-29-22 N=51				
		dense	40		X	13-13-19 N=32				
		41.5								

Boring Terminated at 41.5 Feet

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.

Elevation Reference: Elevations obtained from Google Earth

Notes

Water Level Observations
Groundwater not encountered

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
6-Tech

Hammer Type
Automatic

Driller
Terracon

Logged by
JB

Boring Started
01-06-2025

Boring Completed
01-06-2025

Terracon
145 W Walnut St
Carson, CA

Boring Log No. BESS-7

Location: See Exploration Plan

Latitude: 34.4834° Longitude: -118.1434°

Model Layer	Depth (Ft.)	Description	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
1		**CLAYEY SAND (SC)**, trace gravel, light brown								
		medium dense				19-23-33	2.2	125	27-15-12	31
	5.0		5							
2		**SILTY SAND (SM)**, trace gravel, brown, dense				18-21-29 N=50				
		medium dense				10-26-25	1.1	106		
		dense	10			15-19-23 N=42				
		very dense	15			31-50/5"	2.1	118		
			20			21-31-38 N=69				
			25			26-28-38 N=66				
	30.0		30							

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.

Elevation Reference: Elevations obtained from Google Earth

Water Level Observations
Groundwater not encountered

Notes

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
D-50

Hammer Type
Automatic

Driller
Terracon

Logged by
AT

Boring Started
12-23-2024

Boring Completed
12-23-2024

Terracon
145 W Walnut St
Carson, CA

Boring Log No. BESS-7

Location: See Exploration Plan

Latitude: 34.4834° Longitude: -118.1434°

Model Layer	Graphic Log	Depth (Ft.) / Description	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
2		**SILTY SAND (SM)**, trace gravel, brown, very dense				21-26-36 N=62				
			35			20-35-38 N=73				
		41.5	40			30-37-45 N=82				
		Boring Terminated at 41.5 Feet								

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.

Elevation Reference: Elevations obtained from Google Earth

Notes

Water Level Observations
Groundwater not encountered

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
D-50

Hammer Type
Automatic

Driller
Terracon

Logged by
AT

Boring Started
12-23-2024

Boring Completed
12-23-2024

Terracon
145 W Walnut St
Carson, CA

Boring Log No. BESS-8

Location: See Exploration Plan

Latitude: 34.4831° Longitude: -118.1427°

Model Layer	Depth (Ft.)	Material Description	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
1		**SILTY SAND (SM)**, brown								
					Grab					
		medium dense			SPT	11-10-11 N=21			19-16-3	26
		trace gravel	5		Ring	8-15-16	2.4	115		
		medium dense			SPT	9-10-16 N=26				
2	10.0	dense	10		Ring	12-37-48	2.7	116		
	15.0	**POORLY GRADED SAND (SP)**, trace gravel and silt, light brown, very dense	15		SPT	19-28-33 N=61				
	20.0	**POORLY GRADED SAND WITH SILT (SP-SM)**, brown, dense	20		Ring	20-48-40	1.4			
	21.5	***Boring Terminated at 21.5 Feet***								

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.

Elevation Reference: Elevations obtained from Google Earth

Notes

Water Level Observations
Groundwater not encountered

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
D-50

Hammer Type
Automatic

Driller
Terracon

Logged by
OW

Boring Started
12-20-2024

Boring Completed
12-20-2024

Terracon
145 W Walnut St
Carson, CA

Boring Log No. BESS-9

Location: See Exploration Plan

Latitude: 34.4838° Longitude: -118.1424°

Model Layer	Depth (Ft.)	Material Description	Sample Depth (Ft.)	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
2	0.0–7.5	**SILTY SAND (SM)**, brown to light brown; very dense		33-37-50/5"	3.2	125		
			5	30-49-50/4"				
	7.5–15.0	**POORLY GRADED SAND (SP)**, trace silt, trace gravel, brown, dense		24-49-46	1.2	122		
		light brown	10	11-14-24 N=38				
	15.0–21.5	**POORLY GRADED SAND WITH GRAVEL (SP)**, trace silt, light brown, very dense	15	24-48-50/4"	2.1	117		
			20	32-35-35 N=70				

Boring Terminated at 21.5 Feet

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.

Elevation Reference: Elevations obtained from Google Earth

Notes

Water Level Observations
Groundwater not encountered

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
D-50

Hammer Type
Automatic

Driller
Terracon

Logged by
OW

Boring Started
12-20-2024

Boring Completed
12-20-2024

Terracon
145 W Walnut St
Carson, CA

Boring Log No. BESS-10

Location: See Exploration Plan

Latitude: 34.4835° Longitude: -118.1417°

Model Layer	Depth (Ft.)	Material Description	Sample Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
1		**SILTY SAND WITH GRAVEL (SM)**, brown	~1		Grab					36
		medium dense	2.5–4		SPT	8-11-11 N=22				
			5–6.5		Ring	13-23-25	2.2	115		
2	7.5	**SILTY SAND (SM)**, trace gravel, brown, very dense	7.5–9		SPT	18-32-42 N=74			NP	26
		dense	10–11.5		Ring	23-28-33	3.3	111		
	15.0	**POORLY GRADED SAND WITH GRAVEL (SP)**, trace silt, light brown, very dense	15–16.5		SPT	12-28-39 N=67				
		dense	20–21.5		Ring	24-35-48	1.3			
			25–26.5		SPT	43-28-34 N=62				
	30.0									

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.

Elevation Reference: Elevations obtained from Google Earth

Notes

Water Level Observations
Groundwater not encountered

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
D-50

Hammer Type
Automatic

Driller
Terracon

Logged by
OW

Boring Started
12-20-2024

Boring Completed
12-20-2024

Terracon
145 W Walnut St
Carson, CA

Boring Log No. BESS-10

Location: See Exploration Plan

Latitude: 34.4835° Longitude: -118.1417°

Model Layer	Graphic Log	Depth (Ft.) / Material Description	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
2		**POORLY GRADED SAND WITH GRAVEL (SP)**, trace silt, light brown, very dense			X	29-46-50/4"				
			35		X	28-33-38 N=71				
		41.3	40		X	31-48-50/4"				
		Boring Terminated at 41.3 Feet								

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.

Elevation Reference: Elevations obtained from Google Earth

Notes

Water Level Observations
Groundwater not encountered

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
D-50

Hammer Type
Automatic

Driller
Terracon

Logged by
OW

Boring Started
12-20-2024

Boring Completed
12-20-2024

Terracon
145 W Walnut St
Carson, CA

Boring Log No. BESS-11

Location: See Exploration Plan

Latitude: 34.4838° Longitude: -118.1409°

Model Layer	Depth (Ft.)	Description	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
1		**SILTY SAND WITH GRAVEL (SM)**, light brown								
		medium dense				9-23-24	1.1	124	NP	19
2	5.0	very dense	5			50/6"				
						36-50/6"	2.4			
			10			17-24-36 N=60				
	15.0	**POORLY GRADED SAND WITH SILT (SP-SM)**, brown, dense	15			17-22-50/6"	1.3	110		
	20.9	very dense	20			40-50/5"				

Boring Terminated at 20.9 Feet

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.

Elevation Reference: Elevations obtained from Google Earth

Notes

Water Level Observations
Groundwater not encountered

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
D-50

Hammer Type
Automatic

Driller
Terracon

Logged by
OW

Boring Started
12-19-2024

Boring Completed
12-19-2024

Boring Log No. BESS-12

Location: See Exploration Plan

Latitude: 34.4843° Longitude: -118.1400°

Model Layer	Depth (Ft.)	Description	Sample Depth (Ft.)	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
2		**SILTY SAND (SM)**, trace gravel, light brown	~1	Hand					
		very dense	2.5		24-26-47 N=73				
		dense	5		26-41-42	3.9	123		
	7.5	**POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM)**, light brown, medium dense	7.5		8-11-15 N=26				
			10		6-18-21	0.9			
		dense	15		11-15-16 N=31				
			20		14-30-42	1.8	106		
		very dense	25		30-35-42 N=77				
	30.0								

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.

Elevation Reference: Elevations obtained from Google Earth

Notes

Water Level Observations
Groundwater not encountered

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
D-50

Hammer Type
Automatic

Driller
Terracon

Logged by
AT

Boring Started
12-23-2024

Boring Completed
12-23-2024

Terracon
145 W Walnut St
Carson, CA

Boring Log No. BESS-12

Location: See Exploration Plan

Latitude: 34.4843° Longitude: -118.1400°

Model Layer	Graphic Log	Depth (Ft.)	Description	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
2			**POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM)**, light brown, very dense			X	21-31-43 N=74				
				35		X	19-35-42 N=77				
		41.5		40		X	21-47-50/6"				
			Boring Terminated at 41.5 Feet								

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.

Elevation Reference: Elevations obtained from Google Earth

Notes

Water Level Observations
Groundwater not encountered

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
D-50

Hammer Type
Automatic

Driller
Terracon

Logged by
AT

Boring Started
12-23-2024

Boring Completed
12-23-2024

Terracon
145 W Walnut St
Carson, CA

Boring Log No. BESS-13

Location: See Exploration Plan

Latitude: 34.4850° Longitude: -118.1389°

Model Layer	Depth (Ft.)	Description	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
1		**SILTY SAND (SM)**, brown								
		medium dense				22-28-25	2.1 2.7	130		41
2	5.0	dense	5			7-17-18 N=35				
	7.5	**SILTY SAND WITH GRAVEL (SM)**, light brown, dense				7-18-46	1.2	106		
			10			8-14-18 N=32			NP	12
	15.0	**SILTY SAND (SM)**, trace gravel, brown, very dense	15			50/6"	1.4	115		
	20.0	**SILTY SAND WITH GRAVEL (SM)**, brown, dense	20			9-17-21 N=38				
	25.0	**SILTY SAND (SM)**, trace gravel, brown, dense	25			17-42-37	2.8	111		
	30.0		30							

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.

Elevation Reference: Elevations obtained from Google Earth

Water Level Observations
Groundwater not encountered

Drill Rig
D-50

Hammer Type
Automatic

Driller
Terracon

Notes

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Logged by
OW

Boring Started
12-19-2024

Boring Completed
12-19-2024

Terracon
145 W Walnut St
Carson, CA

Boring Log No. BESS-13

Location: See Exploration Plan

Latitude: 34.4850° Longitude: -118.1389°

Model Layer	Graphic Log	Depth (Ft.) / Material Description	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
2		**POORLY GRADED SAND (SP)**, trace silt and gravel, light brown, very dense			X	14-41-18 N=59				
			35		X	15-23-29 N=52				
			40		X	24-50/5"				
		45.0 **POORLY GRADED SAND WITH GRAVEL (SP)**, light brown, very dense	45		X	20-35-40 N=75				
		50.8	50		X	29-50/4"				

Boring Terminated at 50.8 Feet

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.

Elevation Reference: Elevations obtained from Google Earth

Notes

Water Level Observations
Groundwater not encountered

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
D-50

Hammer Type
Automatic

Driller
Terracon

Logged by
OW

Boring Started
12-19-2024

Boring Completed
12-19-2024

Terracon
145 W Walnut St
Carson, CA

Boring Log No. BESS-14

Location: See Exploration Plan

Latitude: 34.4854° Longitude: -118.1394°

Model Layer	Graphic Log	Depth (Ft.) / Description	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
1		**SILTY SAND WITH GRAVEL (SM)**, brown			Grab					
		loose			SPT	3-5-4 N=9				
		medium dense	5		Ring	8-10-13	3.5	119		
2		7.5 dense			SPT	7-12-24 N=36				32
		medium dense	10		Ring	12-23-18	4.2	113		
		dense	15		SPT	8-18-19 N=37				
		20.0 **POORLY GRADED SAND WITH GRAVEL (SP)**, trace silt, brown, dense	20		Ring	14-30-31	1.4	113		
		21.5 ***Boring Terminated at 21.5 Feet***								

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.

Elevation Reference: Elevations obtained from Google Earth

Water Level Observations
Groundwater not encountered

Drill Rig
D-50

Hammer Type
Automatic

Driller
Terracon

Notes

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Logged by
OW

Boring Started
12-18-2024

Boring Completed
12-18-2024

Terracon
145 W Walnut St
Carson, CA

Boring Log No. BESS-15

Location: See Exploration Plan

Latitude: 34.4857° Longitude: -118.1383°

Model Layer	Depth (Ft.)	Material Description	Sample Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
2		**SILTY CLAYEY SAND (SC-SM)**, brown								
		very dense				37-50/5"	2.1	124	21-15-6	41
1	5.0	medium dense	5			4-4-6 N=10				
	7.5	**SILTY SAND (SM)**, brown, medium dense				10-24-28	2.6	112		
			10			11-8-8 N=16				
2	15.0	**SILTY SAND WITH GRAVEL (SM)**, brown, medium dense	15			8-19-26	3.1	104		
	20.0	**POORLY GRADED SAND WITH GRAVEL (SP)**, trace silt, brown, dense	20			8-14-26 N=40				
		very dense	25			7-25-32				
	30.0		30							

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.

Elevation Reference: Elevations obtained from Google Earth

Notes

Water Level Observations
Groundwater not encountered

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
D-50

Hammer Type
Automatic

Driller
Terracon

Logged by
OW

Boring Started
12-19-2024

Boring Completed
12-19-2024

Terracon
145 W Walnut St
Carson, CA

Boring Log No. BESS-15

Location: See Exploration Plan

Latitude: 34.4857° Longitude: -118.1383°

Model Layer	Graphic Log	Depth (Ft.)	Description	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
2			**POORLY GRADED SAND (SP)**, trace silt, light brown, very dense			X	18-31-31 N=62				
		35.0	**POORLY GRADED SAND WITH GRAVEL (SP)**, trace silt, light brown and white, very dense	35		X	24-50/6"				
		41.5		40		X	34-44-48 N=92				
			Boring Terminated at 41.5 Feet								

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.

Elevation Reference: Elevations obtained from Google Earth

Water Level Observations
Groundwater not encountered

Notes

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
D-50

Hammer Type
Automatic

Driller
Terracon

Logged by
OW

Boring Started
12-19-2024

Boring Completed
12-19-2024

145 W Walnut St
Carson, CA

Boring Log No. SUB-1

Location: See Exploration Plan

Latitude: 34.4865° Longitude: -118.1375°

Model Layer	Depth (Ft.)	Material Description	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
2		**SILTY SAND WITH GRAVEL (SM)**, brown					2.3			28
		dense				21-28-32	2.1	125		
	5.0		5							
1		**SILTY CLAYEY SAND (SC-SM)**, light brown, dense				15-15-19 N=34			19-15-4	20
		brown, medium dense				13-16-17	1.4	109		
	10.0		10							
2		**POORLY GRADED SAND WITH SILT (SP-SM)**, trace gravel, light brown to brown, medium dense				8-11-14 N=25				10
			15			17-24-32	1.1	109		
		light brown and white, very dense	20			15-41-32 N=73				
			25			15-24-32 N=56				
	30.0		30							

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.

Elevation Reference: Elevations obtained from Google Earth

Notes

Water Level Observations
Groundwater not encountered

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
D-50

Hammer Type
Automatic

Driller
Terracon

Logged by
OW

Boring Started
12-18-2024

Boring Completed
12-18-2024

Terracon
145 W Walnut St
Carson, CA

Boring Log No. SUB-1

Location: See Exploration Plan

Latitude: 34.4865° Longitude: -118.1375°

Model Layer	Graphic Log	Depth (Ft.)	Description	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
2			**POORLY GRADED SAND WITH SILT (SP-SM)**, trace gravel, brown, very dense			X	21-23-35 N=58				
		35.0	**SILTY SAND (SM)**, trace gravel, brown, very dense	35		X	30-33-48 N=81				
				40		X	21-26-34 N=60				
		45.0	**POORLY GRADED SAND WITH SILT (SP-SM)**, trace gravel, gray and brown, very dense	45		X	22-44-50/4"				
		50.0	**POORLY GRADED SAND (SP)**, trace silt and gravel, light brown, dense	50		X	11-19-26 N=45				
		51.5	***Boring Terminated at 51.5 Feet***								

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.

Elevation Reference: Elevations obtained from Google Earth

Notes

Water Level Observations
Groundwater not encountered

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
D-50

Hammer Type
Automatic

Driller
Terracon

Logged by
OW

Boring Started
12-18-2024

Boring Completed
12-18-2024

Terracon
145 W Walnut St
Carson, CA

Boring Log No. SUB-2

Location: See Exploration Plan

Latitude: 34.4871° Longitude: -118.1358°

Model Layer	Depth (Ft.)	Material Description	Sample Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
1		**SILTY SAND (SM)**, trace gravel, brown			Grab					
		medium dense	2.5		Split spoon	6-11-10 N=21				20
			5		Ring	10-10-24	1.7	110		
	7.5	very dense	7.5		Split spoon	24-28-30 N=58				
		medium dense	10		Ring	12-25-28	1.1	109		
2	15.0	**POORLY GRADED SAND WITH SILT (SP-SM)**, trace gravel, light brown, dense	15		Split spoon	14-18-20 N=38				11
		medium dense	20		Ring	12-20-31	1.8	112		
		dense	25		Split spoon	15-24-26 N=50				
	30.0		30							

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.

Elevation Reference: Elevations obtained from Google Earth

Notes

Water Level Observations
Groundwater not encountered

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
D-50

Hammer Type
Automatic

Driller
Terracon

Logged by
OW

Boring Started
12-19-2024

Boring Completed
12-19-2024

Terracon
145 W Walnut St
Carson, CA

Boring Log No. SUB-2

Location: See Exploration Plan

Latitude: 34.4871° Longitude: -118.1358°

Model Layer	Depth (Ft.)	Material Description	Sample Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
2		**POORLY GRADED SAND WITH SILT (SP-SM)**, trace gravel, light brown, very dense			X	19-29-50/4"				
			35		X	28-34-39 N=73				
	40.0	**SILTY SAND (SM)**, brown and gray, very dense	40		X	18-38-48 N=86				
	45.0	**SILTY SAND WITH GRAVEL (SM)**, reddish brown, very dense	45		X	29-34-50/5"				
	50.9		50		X	25-50/5"				

Boring Terminated at 50.9 Feet

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.

Elevation Reference: Elevations obtained from Google Earth

Notes

Water Level Observations
Groundwater not encountered

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
D-50

Hammer Type
Automatic

Driller
Terracon

Logged by
OW

Boring Started
12-19-2024

Boring Completed
12-19-2024

Terracon
145 W Walnut St
Carson, CA

Boring Log No. OM-1

Location: See Exploration Plan

Latitude: 34.4863° Longitude: -118.1385°

Model Layer	Depth (Ft.)	Description	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
1		**SILTY SAND WITH GRAVEL (SM)**, brown								
		medium dense				25-25-30	7.0	124	33-16-17	50
	5.0	**SILTY SAND (SM)**, trace gravel, loose	5			6-4-4 N=8				
						5-8-8	4.2	116		
			10			4-4-5 N=9				
2	15.0	medium dense	15			7-12-18	3.8	113		
	20.0	**POORLY GRADED SAND WITH GRAVEL (SP)**, trace silt, brown, dense	20			19-19-20 N=39				
	21.5	***Boring Terminated at 21.5 Feet***								

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.

Elevation Reference: Elevations obtained from Google Earth

Notes

Water Level Observations
Groundwater not encountered

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
D-50

Hammer Type
Automatic

Driller
Terracon

Logged by
OW

Boring Started
12-18-2024

Boring Completed
12-18-2024

Boring Log No. OM-2

Location: See Exploration Plan

Latitude: 34.4860° Longitude: -118.1389°

Model Layer	Depth (Ft.)	Description	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
1	0.0–5.0	**CLAYEY SAND (SC)**, trace gravel, brown					
		loose	2-2-4 N=6				30
	5.0–10.0	**SILTY CLAYEY SAND (SC-SM)**, brown, loose	5-5-9	4.4	105		
			6-7-9 N=16			21-17-4	44
	10.0–15.0	**SILTY SAND (SM)**, brown, medium dense	9-10-12	2.5	110		
2	15.0–21.5	**POORLY GRADED SAND (SP)**, trace silt, light brown, medium dense	3-6-10 N=16				
		dense	46-46-37	3.0	118		

Boring Terminated at 21.5 Feet

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.

Elevation Reference: Elevations obtained from Google Earth

Notes

Water Level Observations
Groundwater not encountered

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
D-50

Hammer Type
Automatic

Driller
Terracon

Logged by
OW

Boring Started
12-18-2024

Boring Completed
12-18-2024

Terracon
145 W Walnut St
Carson, CA

Boring Log No. TL-1

Location: See Exploration Plan

Latitude: 34.4818° Longitude: -118.1378°

Model Layer	Depth (Ft.) / Material Description	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
1	**SILTY SAND (SM)**, light brown								
	medium dense				12-11-10	1.1	111		14
		5			4-5-6 N=11	1.6	116		
					10-18-25				
2	very dense	10			6-23-28 N=51				
		15			20-50/5"	2.6	112		
		20			16-36-44 N=80				
		25			8-40-23 N=63				
		30							

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

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
D-50

Hammer Type
Automatic

Driller
Terracon

Logged by
OW

Boring Started
01-08-2025

Boring Completed
01-08-2025

Terracon
145 W Walnut St
Carson, CA

Boring Log No. TL-1A

Location: See Exploration Plan

Latitude: 34.4818° Longitude: -118.1378°

Model Layer	Graphic Log	Depth (Ft.)	Material Description	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
2			**POORLY GRADED SAND WITH SILT (SP-SM)**, brown, very dense			X	25-37-27 N=64				
		35.0	**SILTY SAND (SM)**, brown, very dense	35		X	12-34-50/4"				
				40		X	25-50/6"				
				45		X	28-50/6"				
		50.5		50		X	50/6"				
			Boring Terminated at 50.5 Feet								

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

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
D-50

Hammer Type
Automatic

Driller
Terracon

Logged by
OW

Boring Started
01-08-2025

Boring Completed
01-08-2025

Terracon
145 W Walnut St
Carson, CA

Boring Log No. TL-2

Location: See Exploration Plan

Latitude: 34.4808° Longitude: -118.1379°

Model Layer	Depth (Ft.)	Material Description	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
1		**SILTY SAND (SM)**, medium brown							24
		loose			4-4-4 N=8			NP	
	5.0	**POORLY GRADED SAND WITH SILT (SP-SM)**, medium brown, medium dense			8-8-11	1.6			
					3-5-6 N=11				
					9-12-12	1.4			
2					10-10-10 N=20				
		dense			16-27-35	1.2	108		
		medium dense			12-13-15 N=28				

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

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
D-50

Hammer Type
Automatic

Driller
Terracon

Logged by
JB

Boring Started
01-20-2025

Boring Completed
01-20-2025

Terracon
145 W Walnut St
Carson, CA

Boring Log No. TL-2

Location: See Exploration Plan

Latitude: 34.4808° Longitude: -118.1379°

Model Layer	Graphic Log	Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
2		**POORLY GRADED SAND WITH SILT (SP-SM)**, medium brown, dense				16-19-22 N=41				
			35			8-20-26 N=46				
			40			8-14-19 N=33				10
			45			14-18-19 N=37				
		medium dense	50			13-14-13 N=27				
		51.5								
		Boring Terminated at 51.5 Feet								

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

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
D-50

Hammer Type
Automatic

Driller
Terracon

Logged by
JB

Boring Started
01-20-2025

Boring Completed
01-20-2025

Prairie Song Reliability Project
Soledad Canyon Rd | Acton, Los Angeles County, California
Terracon Project No. LA245085

Terracon
145 W Walnut St
Carson, CA

Boring Log No. TL-3

Location: See Exploration Plan

Latitude: 34.4838° Longitude: -118.1348°

Model Layer	Depth (Ft.)	Material Description	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
1	0.0	**SILTY SAND (SM)**, medium brown					
1	2.5	loose	5-5-8	6.3	116		26
1	5		4-4-4 N=8			20-19-1	
1	7.5	medium dense	8-12-12	6.4	118		
1	10		4-6-5 N=11				
1	15.0	**POORLY GRADED SAND WITH SILT (SP-SM)**, brown, medium dense	13-17-18	14.5	117		
1	20		5-7-6 N=13			NP	6
2	25.0	**SILTY SAND (SM)**, medium brown, dense; very dense	11-50/3"				
2	30						

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.

Water Level Observations
Groundwater not encountered

Notes

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
D-50

Hammer Type
Automatic

Driller
Terracon

Logged by
JB

Boring Started
01-20-2025

Boring Completed
01-20-2025

Terracon
145 W Walnut St
Carson, CA

Boring Log No. TL-3

Location: See Exploration Plan

Latitude: 34.4838° Longitude: -118.1348°

Model Layer	Depth (Ft.)	Description	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
2		**SILTY SAND (SM)**, medium brown, very dense *(continued)*			X	16-22-24 N=46				
			35		X	20-28-28 N=56				
			40		X	16-21-21 N=42				
			45		X	24-50/6"				
	51.5		50		X	31-42-40 N=82				
		Boring Terminated at 51.5 Feet								

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

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
D-50

Hammer Type
Automatic

Driller
Terracon

Logged by
JB

Boring Started
01-20-2025

Boring Completed
01-20-2025

Terracon
145 W Walnut St
Carson, CA

Boring Log No. TL-4

Location: See Exploration Plan

Latitude: 34.4802° Longitude: -118.1336°

Model Layer	Depth (Ft.)	Material Description	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
1	0	**SILTY SAND (SM)**, medium brown	Grab				NP	
		loose	SPT	3-4-3 N=7				
	5		Ring	5-6-9	3.0	109		
	7.5	**POORLY GRADED SAND WITH SILT (SP-SM)**, light brown, medium dense	SPT	4-5-5 N=10				
	10	loose	Ring	4-7-10	14.0	116		
	15	medium dense	SPT	7-11-16 N=27				
2	20	very dense	Ring	50/6"	4.9	107		
	25		SPT	15-17-44 N=61				
	30							

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.

Water Level Observations
Groundwater not encountered

Notes

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
D-50

Hammer Type
Automatic

Driller
Terracon

Logged by
JB

Boring Started
01-20-2025

Boring Completed
01-20-2025

Terracon
145 W Walnut St
Carson, CA

Boring Log No. TL-4

Location: See Exploration Plan

Latitude: 34.4802° Longitude: -118.1336°

Model Layer	Graphic Log	Depth (Ft.)	Description	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
2			**POORLY GRADED SAND WITH SILT (SP-SM)**, light brown, medium dense			X	13-13-15 N=28				
				35		X	14-19-21 N=40				6
			very dense	40		X	17-38-40 N=78				
				45		X	16-27-29 N=56				
		51.5		50		X	17-25-28 N=53				
			Boring Terminated at 51.5 Feet								

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

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
D-50

Hammer Type
Automatic

Driller
Terracon

Logged by
JB

Boring Started
01-20-2025

Boring Completed
01-20-2025

Terracon
145 W Walnut St
Carson, CA

Boring Log No. TL-5

Location: See Exploration Plan

Latitude: 34.4832° Longitude: -118.1323°

Model Layer	Depth (Ft.)	Material Description	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
1		**SILTY SAND (SM)**, brown					
		loose	2-2-5	4.8	102	NP	13
		medium dense	4-5-6 N=11				
			3-10-14	3.9	111		
			8-7-11 N=18				
2	15.0	**POORLY GRADED SAND (SP)**, trace silt, light brown, medium dense	13-20-23	7.2	120		
		very dense	39-37-21 N=58				
	25.0	**POORLY GRADED SAND WITH SILT (SP-SM)**, brown, medium dense	8-9-9 N=18				

Depth scale (Ft.): 5, 10, 15, 20, 25, 30

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

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
D-50

Hammer Type
Automatic

Driller
Terracon

Logged by
JB

Boring Started
01-21-2025

Boring Completed
01-21-2025

Terracon
145 W Walnut St
Carson, CA

Boring Log No. TL-5

Location: See Exploration Plan

Latitude: 34.4832° Longitude: -118.1323°

Model Layer	Graphic Log	Depth (Ft.) / Description	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
2		**POORLY GRADED SAND WITH SILT (SP-SM)**, brown, medium dense			X	9-11-10 N=21				
		35.0								
		SILTY SAND (SM), medium brown, medium dense	35		X	7-10-10 N=20				
		dense	40		X	7-15-15 N=30				
			45		X	10-13-17 N=30				
			50		X	16-19-21 N=40				
		51.5								
		Boring Terminated at 51.5 Feet								

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

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
D-50

Hammer Type
Automatic

Driller
Terracon

Logged by
JB

Boring Started
01-21-2025

Boring Completed
01-21-2025

Terracon
145 W Walnut St
Carson, CA

Boring Log No. TL-6

Location: See Exploration Plan

Latitude: 34.4819° Longitude: -118.1290°

Model Layer	Depth (Ft.)	Description	Sample Depth (Ft.)	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
1		**SILTY SAND (SM)**, brown	0-2	Grab				NP	
		medium dense	2.5-4	SPT	4-6-6 N=12				
			5-6.5	Ring	8-13-16	2.2	117		
			7.5-9	SPT	5-7-7 N=14				23
			10-11.5	Ring	6-8-12	4.1	118		
			15-16.5	SPT	4-8-8 N=16				
	20.0								
2		**POORLY GRADED SAND WITH SILT (SP-SM)**, medium brown, medium dense	20-21.5	Ring	10-20-20	4.1	124		
		dense	25-26.5	SPT	6-16-21 N=37				
	30								

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

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
D-50

Hammer Type
Automatic

Driller
Terracon

Logged by
JB

Boring Started
01-21-2025

Boring Completed
01-21-2025

Terracon
145 W Walnut St
Carson, CA

Boring Log No. TL-6

Location: See Exploration Plan

Latitude: 34.4819° Longitude: -118.1290°

Model Layer	Depth (Ft.)	Description	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
2		**POORLY GRADED SAND WITH SILT (SP-SM)**, medium brown, medium dense *(continued)*				16-21-27 N=48				
			35			21-21-27 N=48				
		very dense	40			26-50/6"				
	45.0	**SILTY SAND (SM)**, brown, very dense	45			16-22-29 N=51				28
	51.5		50			14-22-32 N=54				
		Boring Terminated at 51.5 Feet								

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

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
D-50

Hammer Type
Automatic

Driller
Terracon

Logged by
JB

Boring Started
01-21-2025

Boring Completed
01-21-2025

Terracon
145 W Walnut St
Carson, CA

Boring Log No. TL-7

Location: See Exploration Plan

Latitude: 34.4846° Longitude: -118.1332°

Model Layer	Depth (Ft.)	Material Description	Sample Depth (Ft.)	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
1		**SILTY SAND (SM)**, brown						
		medium dense	2.5-4.0	12-20-20	3.5	124	18-17-1	27
			5.0-6.5	6-7-9 N=16				
			7.5-9.0	10-18-21	1.9	112		
			10.0-11.5	6-11-14 N=25				
2	15.0	**POORLY GRADED SAND WITH SILT (SP-SM)**, light brown, dense	15.0-16.5	13-30-40	5.3	109		
			20.0-21.5	13-15-18 N=33				6
			25.0-26.5	15-21-21 N=42				
	30.0							

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

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
D-50

Hammer Type
Automatic

Driller
Terracon

Logged by
JB

Boring Started
01-21-2025

Boring Completed
01-21-2025

Terracon
145 W Walnut St
Carson, CA

Boring Log No. TL-7

Location: See Exploration Plan

Latitude: 34.4846° Longitude: -118.1332°

Model Layer	Graphic Log	Depth (Ft.)	Description	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
1			**SILTY SAND (SM)**, medium brown, dense			X	13-16-18 N=34				
		35.0									
2			**POORLY GRADED SAND WITH SILT (SP-SM)**, light brown, dense	35		X	16-23-23 N=46				
		40.0									
			SILTY CLAY (SM), brown, very dense	40		X	13-28-29 N=57				
			dense	45		X	13-27-19 N=46				
			very dense	50		X	18-28-29 N=57				
		51.5									
			Boring Terminated at 51.5 Feet								

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

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
D-50

Hammer Type
Automatic

Driller
Terracon

Logged by
JB

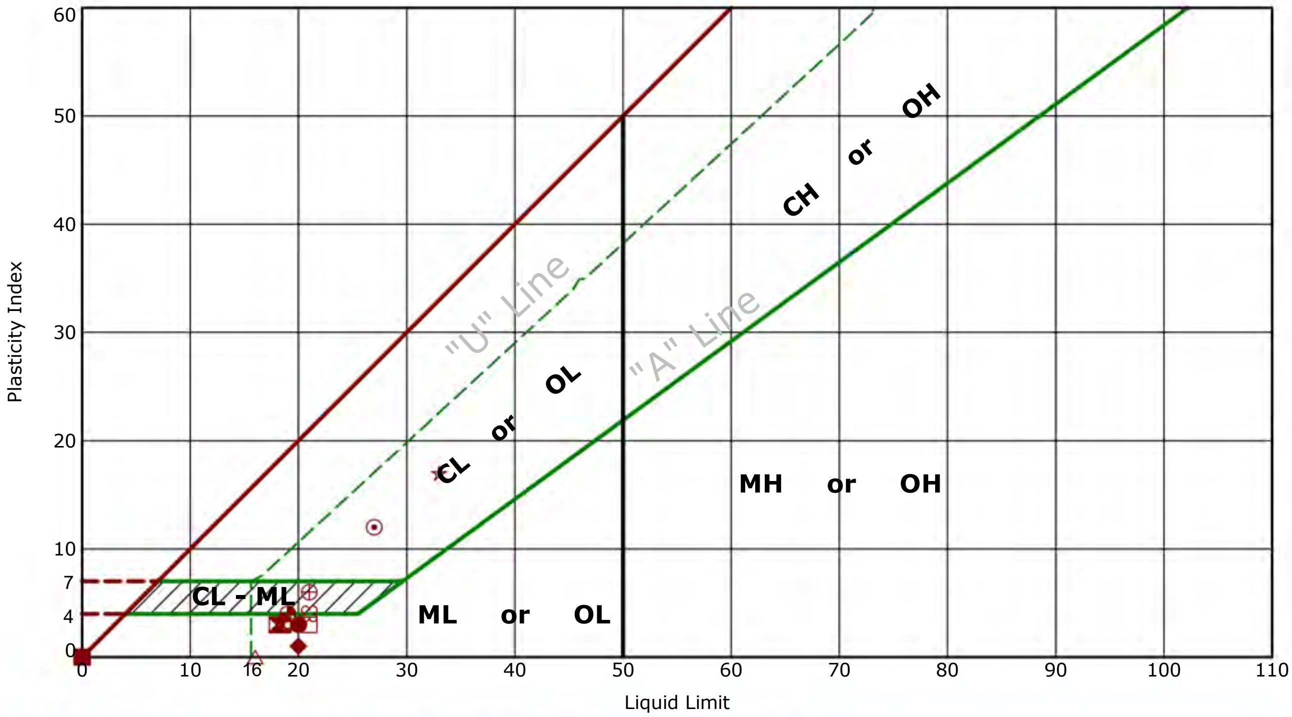
Boring Started
01-21-2025

Boring Completed
01-21-2025

Terracon
145 W Walnut St
Carson, CA

Atterberg Limit Results

ASTM D4318

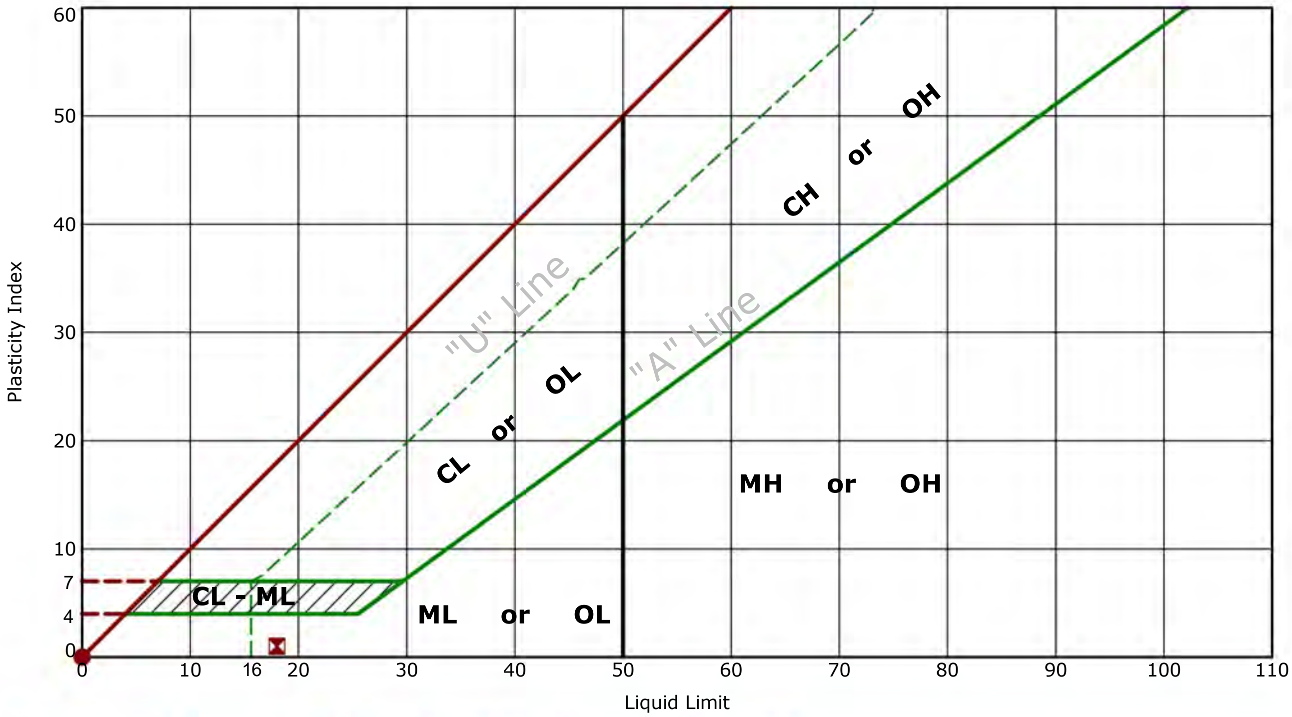


	Boring ID	Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	BESS-1	10 - 11.5	20	17	3	25.2	SM	SILTY SAND
⊠	BESS-4	0 - 2.5	18	15	3	18.2	SM	SILTY SAND
▲	BESS-4	15 - 16.5	NP	NP	NP	11.2	SM	SILTY SAND
★	BESS-6	20 - 21.5	NP	NP	NP	15.6	SM	SILTY SAND
⊙	BESS-7	0 - 5	27	15	12	30.5	SC	CLAYEY SAND
✿	BESS-8	2.5 - 4	19	16	3	25.6	SM	SILTY SAND
○	BESS-10	7.5 - 9	NP	NP	NP	26.4	SM	SILTY SAND
△	BESS-11	0 - 5	16	16	NP	18.6	SM	SILTY SAND with GRAVE
⊗	BESS-13	10 - 11.5	NP	NP	NP	12.1	SM	SILTY SAND with GRAVELL
⊕	BESS-15	0 - 5	21	15	6	41.0	SC-SM	SILTY, CLAYEY SAND
□	P-1	0 - 1.5	21	18	3	27.3	SC-SM	Silty Clayey Sand
●	P-4	0 - 2.5	NP	NP	NP	9.1	SP	Poorly Graded Sand
●	SUB-1	5 - 6.5	19	15	4	19.9	SC-SM	SILTY, CLAYEY SAND
☆	OM-1	0 - 5	33	16	17	49.9	SC	CLAYEY SAND
✿	OM-2	7.5 - 9	21	17	4	44.2	SC-SM	SILTY, CLAYEY SAND
■	TL-2	2.5 - 4	NP	NP	NP		SM	SILTY SAND
◆	TL-3	5 - 6.5	20	19	1		SM	SILTY SAND
◇	TL-3	20 - 21.5	NP	NP	NP	6.2	SP-SM	POORLY GRADED SAND with SILT
×	TL-4	0 - 2	NP	NP	NP		SM	SILTY SAND
✖	TL-5	0 - 5	NP	NP	NP	12.9	SM	SILTY SAND

Terracon
145 W Walnut St
Carson, CA

Atterberg Limit Results

ASTM D4318

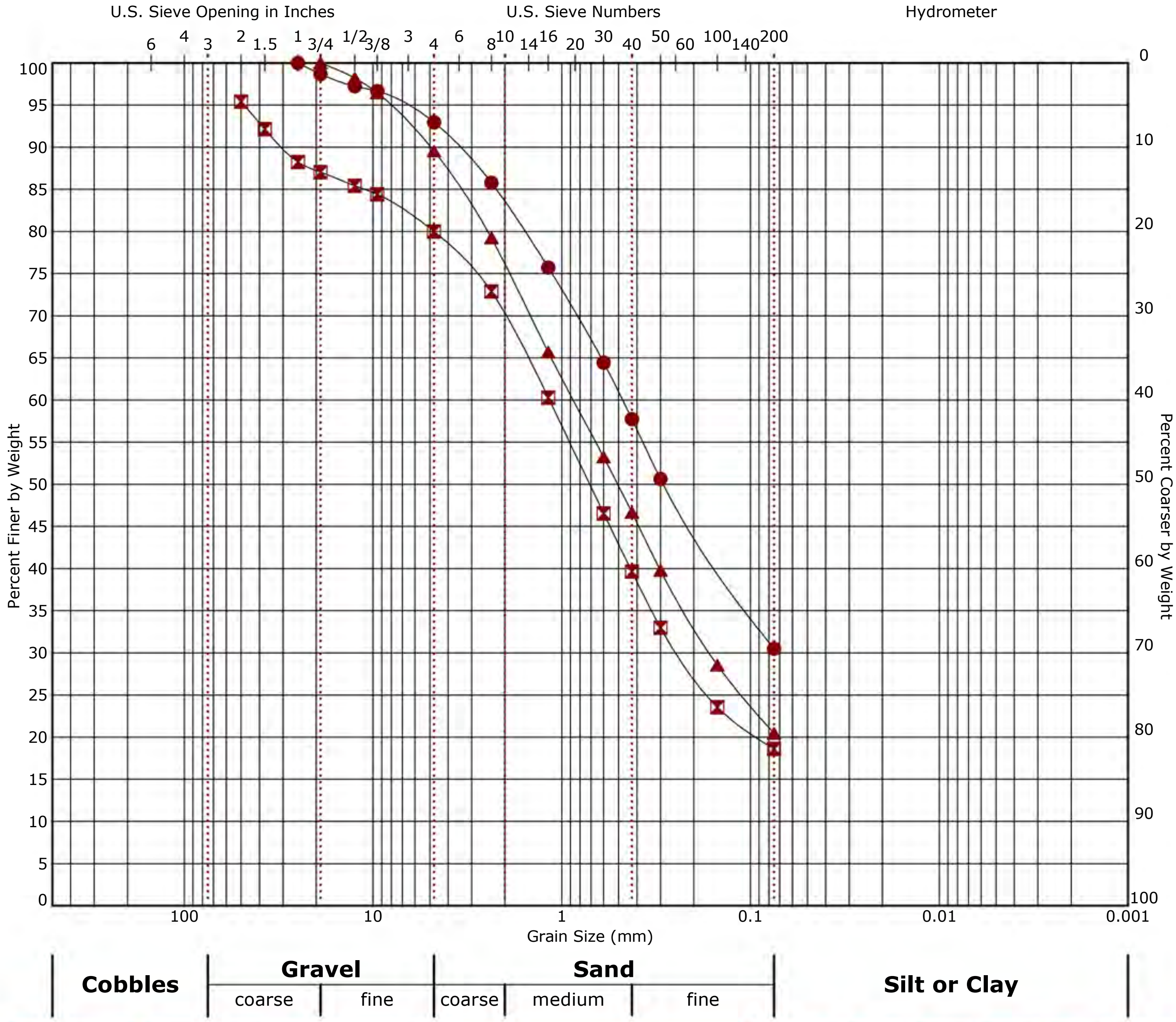


	Boring ID	Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	TL-6	0 - 2	NP	NP	NP		SM	SILTY SAND
⊠	TL-7	0 - 5	18	17	1	27.4	SM	SILTY SAND

Terracon
145 W Walnut St
Carson, CA

Grain Size Distribution

ASTM D422 / ASTM C136 / AASHTO T27



Boring ID	Depth (Ft)	Description	USCS	LL	PL	PI	Cc	Cu
● BESS-7	0 - 5	CLAYEY SAND	SC	27	15	12		
⊠ BESS-11	0 - 5	SILTY SAND with GRAVEL	SM	16	16	NP		
▲ SUB-2	2.5 - 4	SILTY SAND	SM					

Boring ID	Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Fines	%Silt	%Clay
● BESS-7	0 - 5	25	0.477			0.0	7.0	62.5	30.5		
⊠ BESS-11	0 - 5	50	1.163	0.241			15.4	61.4	18.6		
▲ SUB-2	2.5 - 4	19	0.867	0.164		0.0	10.5	69.1	20.4		

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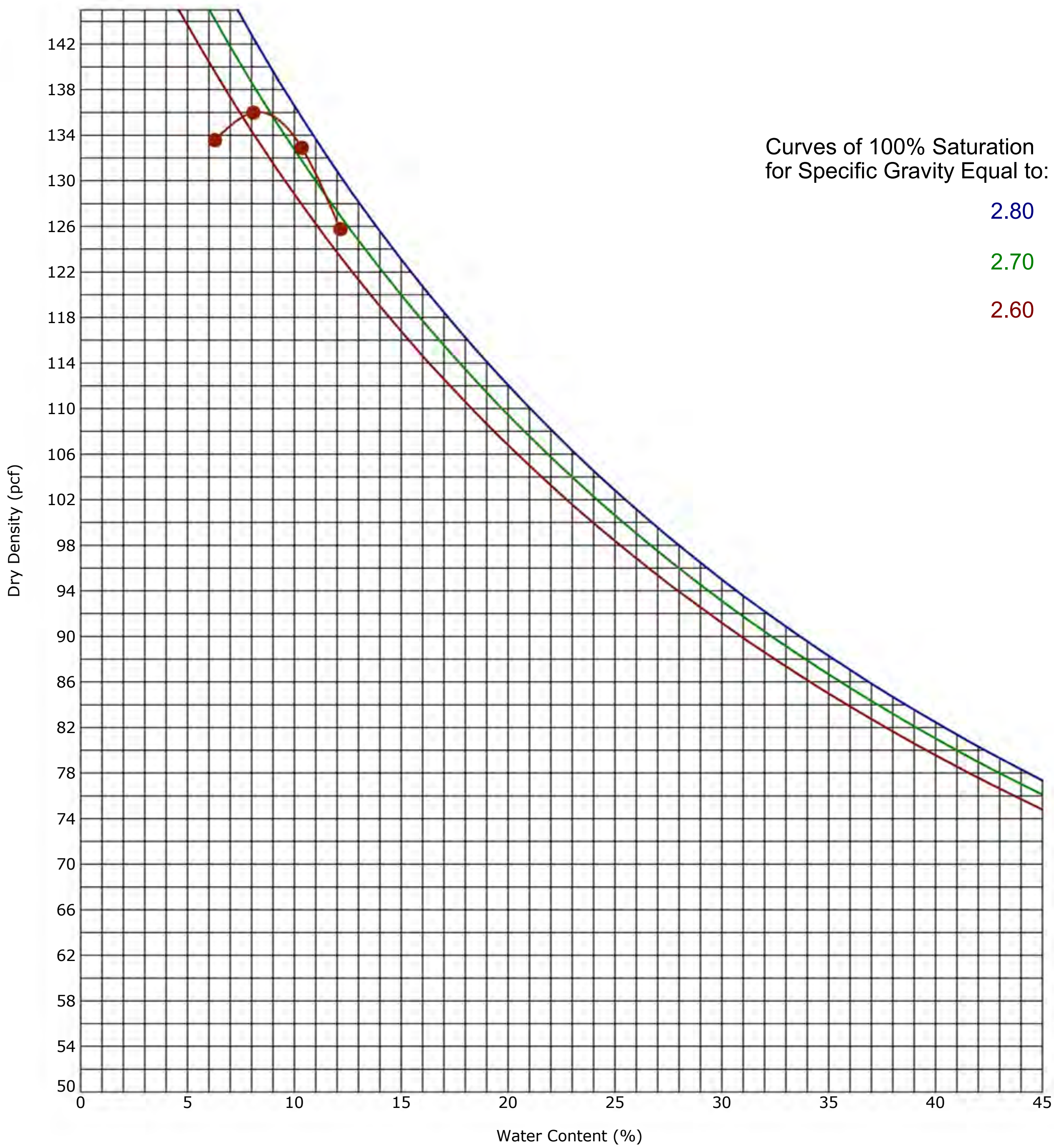
Carson, CA

Moisture-Density Relationship

ASTM D1557-Method A

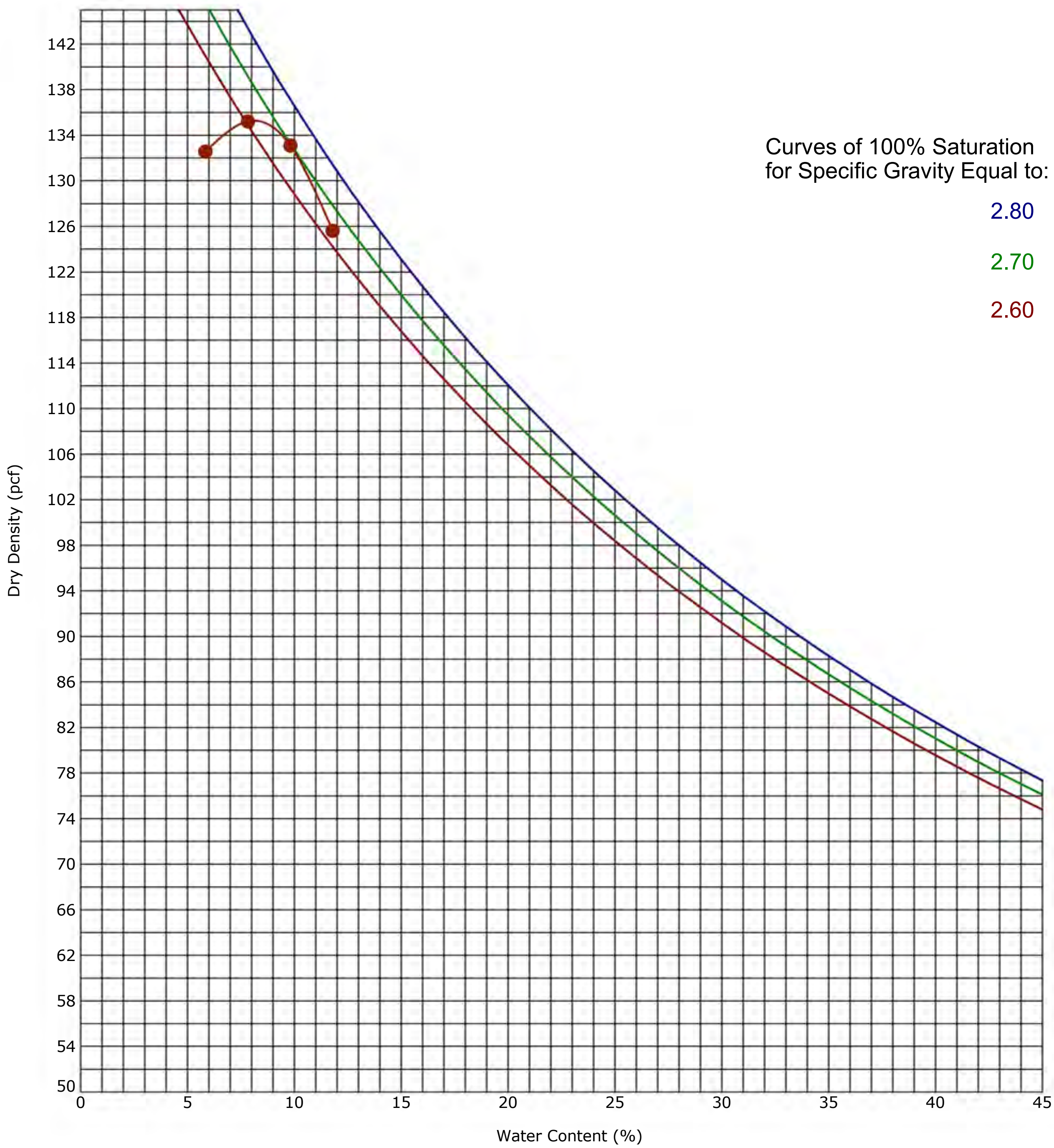


Boring ID	Depth (Ft)	Description of Materials
BESS-1	0 - 5	SILTY SAND

Fines (%)	Fraction > mm size	LL	PL	PI	Test Method	Maximum Dry Density (pcf)	Optimum Water Content (%)
32					ASTM D1557-Method A	136.0	8.3

Moisture-Density Relationship

ASTM D1557-Method A



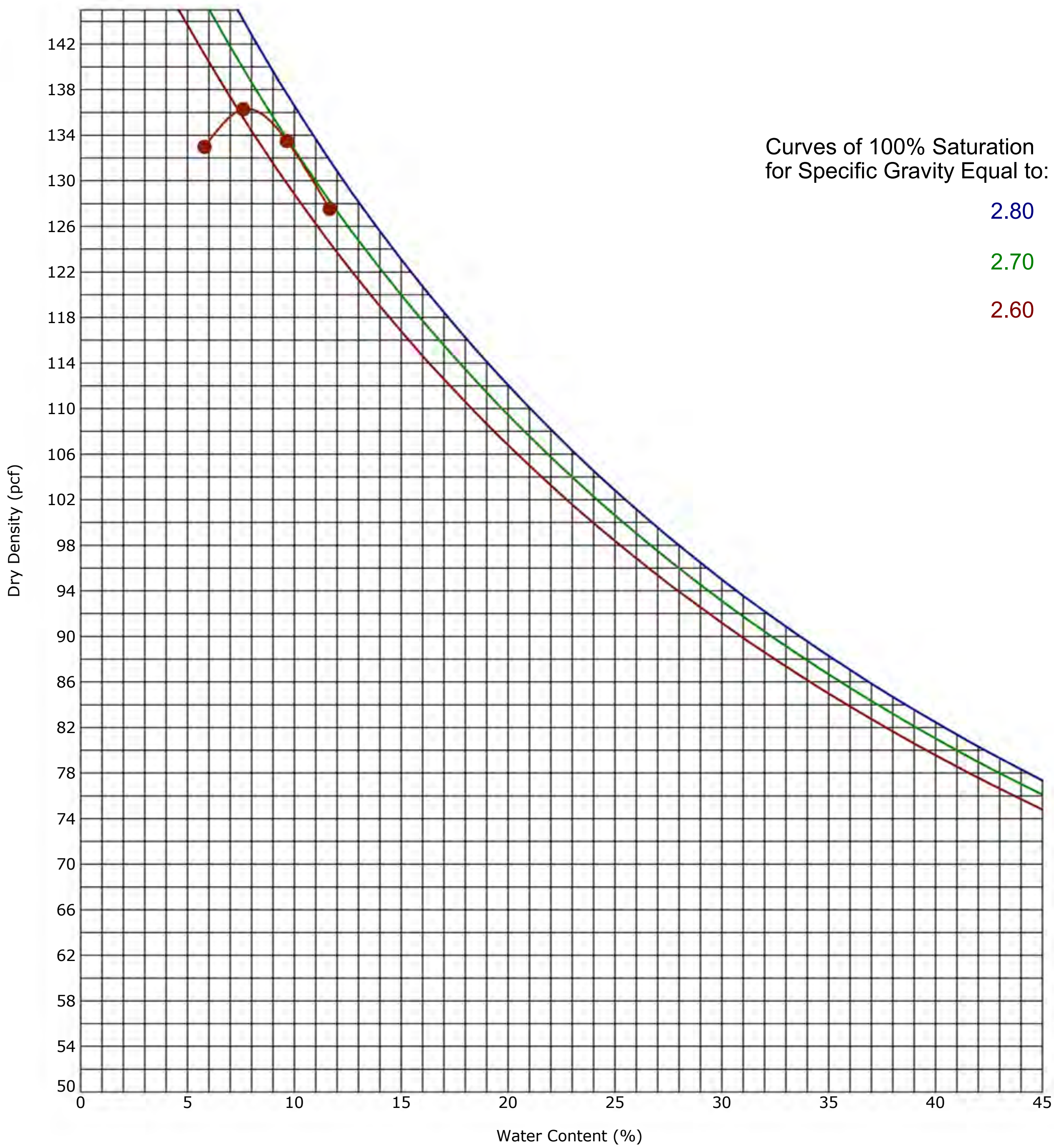
Boring ID	Depth (Ft)	Description of Materials
BESS-3	0 - 5	SILTY SAND

Fines (%)	Fraction > mm size	LL	PL	PI	Test Method	Maximum Dry Density (pcf)	Optimum Water Content (%)
					ASTM D1557-Method A	135.3	8.1

Terracon
145 W Walnut St
Carson, CA

Moisture-Density Relationship

ASTM D1557-Method A



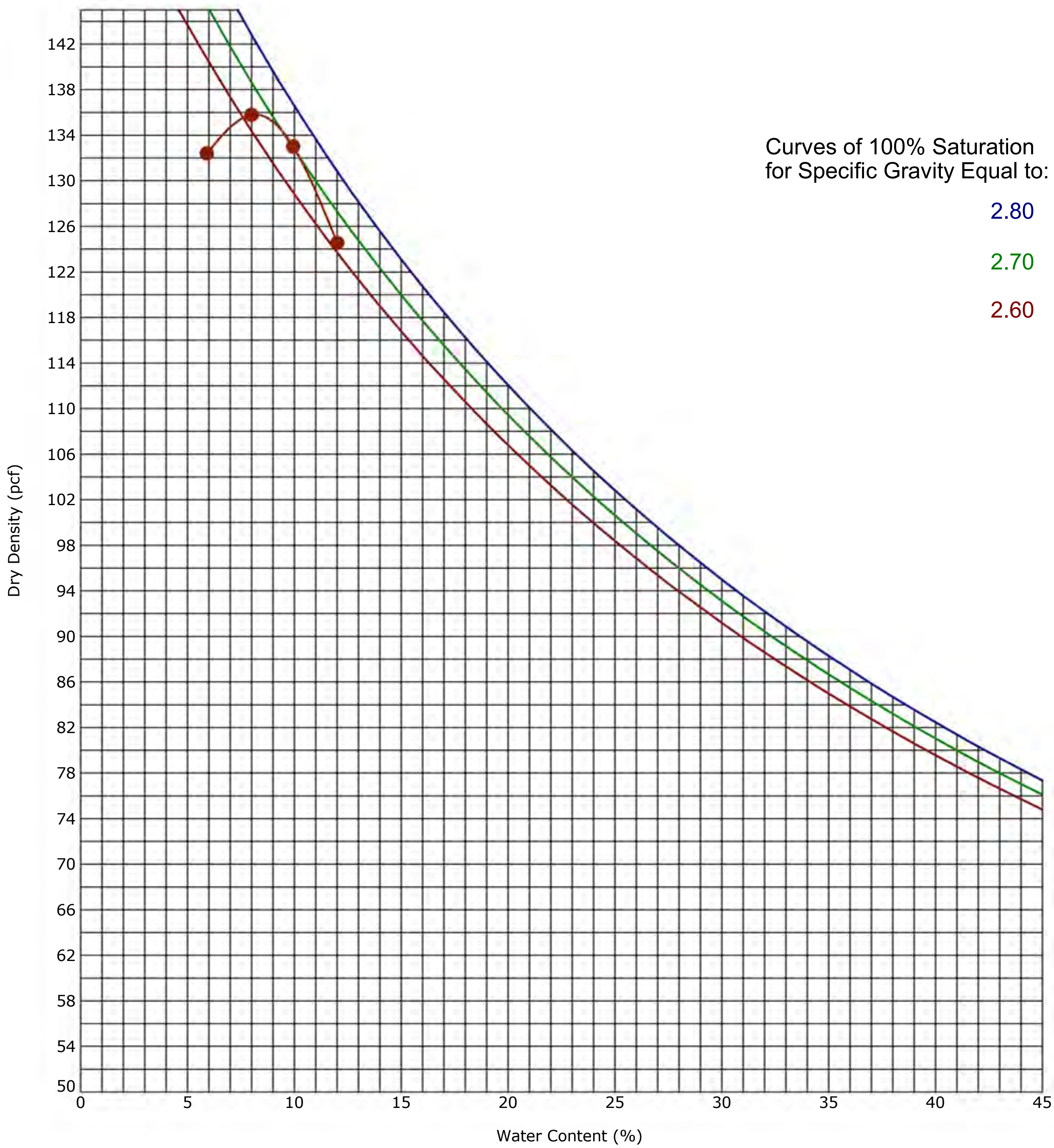
Boring ID	Depth (Ft)	Description of Materials
BESS-5	0 - 5	SILTY SAND

Fines (%)	Fraction > mm size	LL	PL	PI	Test Method	Maximum Dry Density (pcf)	Optimum Water Content (%)
17					ASTM D1557-Method A	136.3	7.8

Terracon
145 W Walnut St
Carson, CA

Moisture-Density Relationship

ASTM D1557-Method A



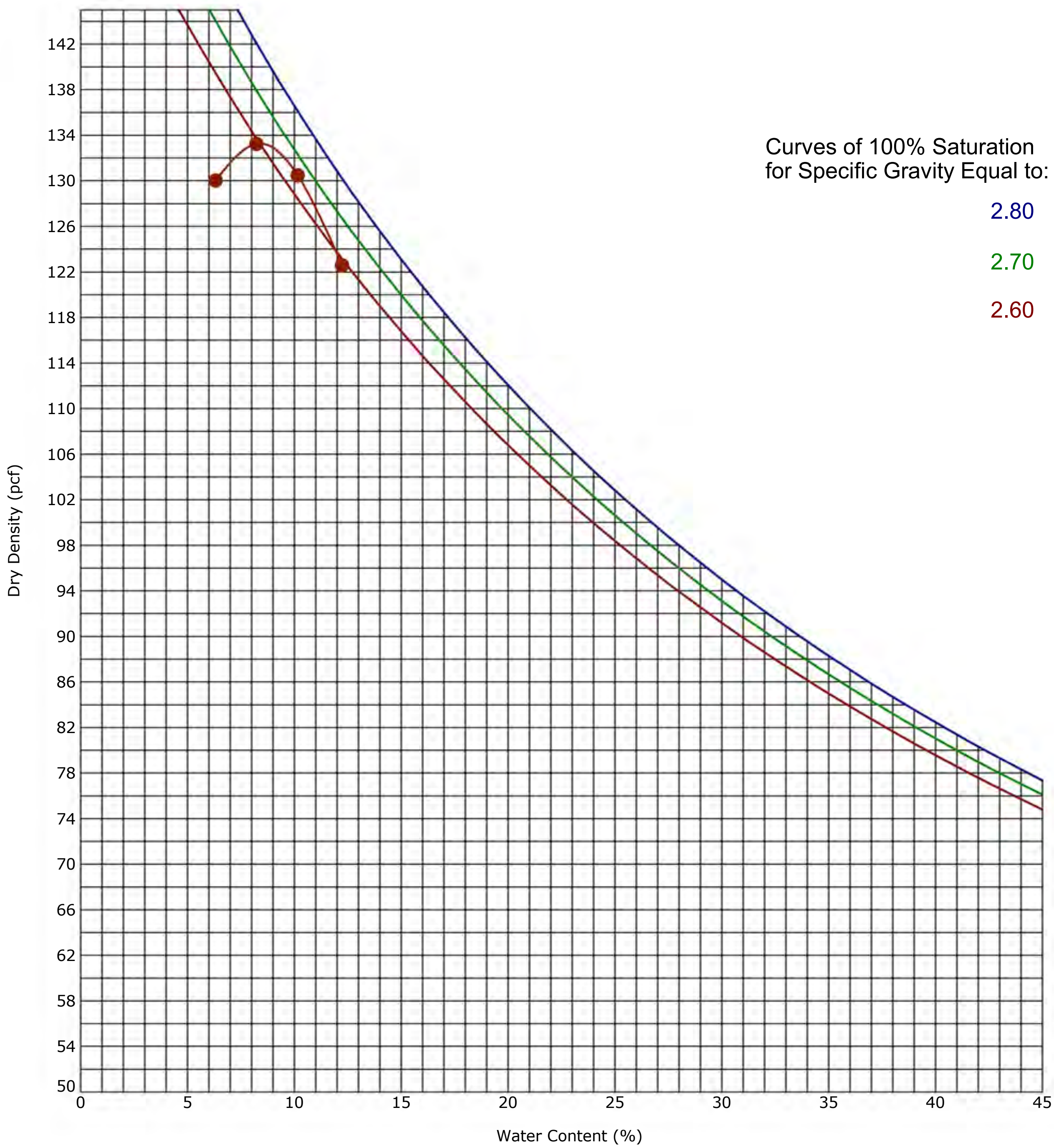
Boring ID	Depth (Ft)	Description of Materials
BESS-13	0 - 5	SILTY SAND

Fines (%)	Fraction > mm size	LL	PL	PI	Test Method	Maximum Dry Density (pcf)	Optimum Water Content (%)
41					ASTM D1557-Method A	135.8	8.2

145 W Walnut St
Carson, CA

Moisture-Density Relationship

ASTM D1557-Method A



Boring ID	Depth (Ft)	Description of Materials
SUB-1	0 - 5	SILTY SAND with GRAVEL

Fines (%)	Fraction > mm size	LL	PL	PI	Test Method	Maximum Dry Density (pcf)	Optimum Water Content (%)
28					ASTM D1557-Method A	133.3	8.4

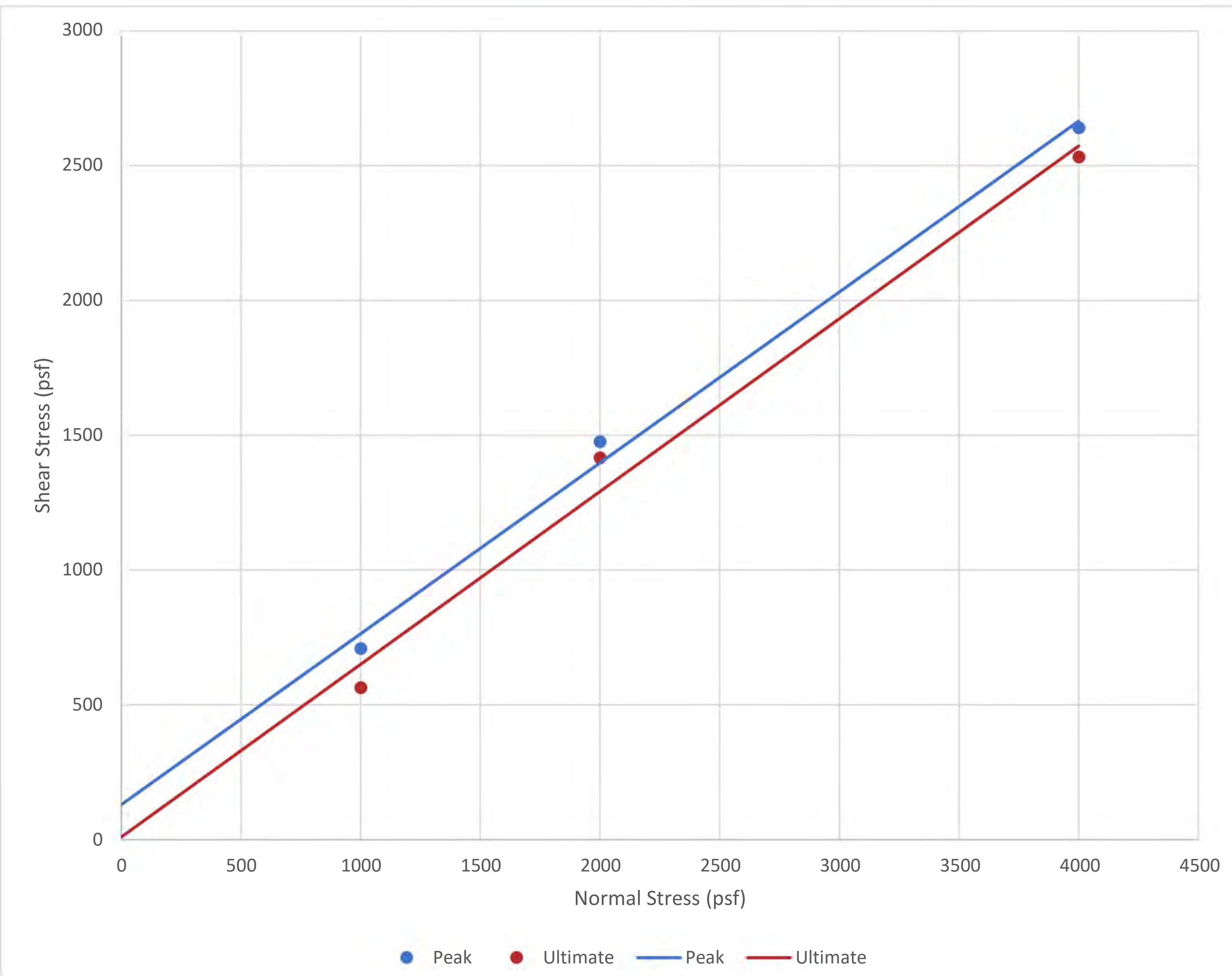
Terracon
145 W Walnut St.
Gardena, CA

Direct Shear Test

ASTM D3080

Boring ID	Depth (ft)	Description	USCS	γ_d (pcf)	W(%)
BESS-4	5	Silty Sand	SM	121	2.5

Normal Stress (psf)	Peak Shear Stress (psf)	Ultimate Shear Stress (psf)	Peak		Ultimate	
			φ°	C (psf)	φ°	C (psf)
1000	708	564	**32.0**	**130**	**33.0**	**10**
2000	1476	1416				
4000	2640	2532				



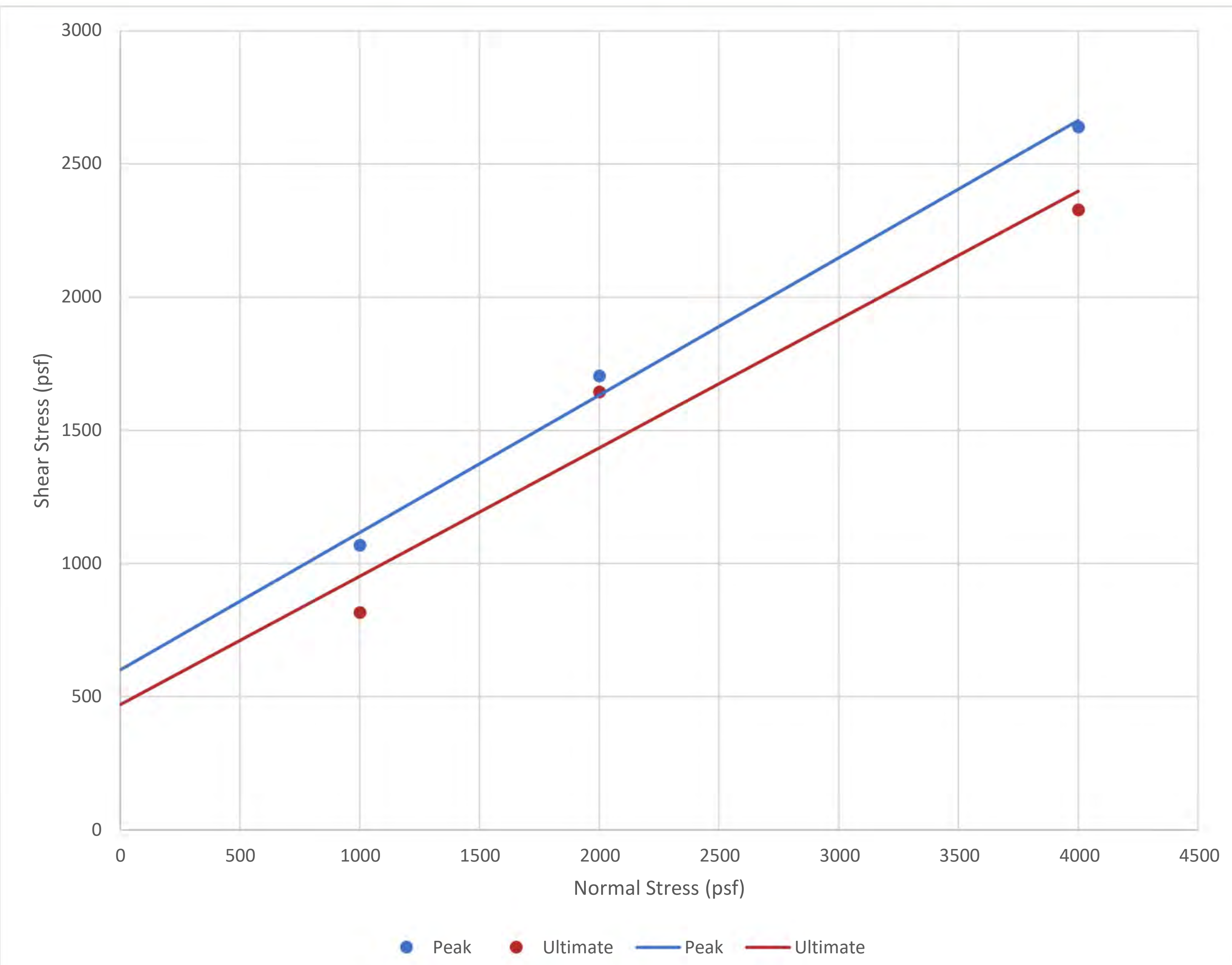
145 W Walnut St.
Gardena, CA

Direct Shear Test

ASTM D3080

Boring ID	Depth (ft)	Description	USCS	γ_d (pcf)	W(%)
BESS-8	10	Silty Sand	SM	116	2.7

Normal Stress (psf)	Peak Shear Stress (psf)	Ultimate Shear Stress (psf)	Peak		Ultimate	
			φ°	C (psf)	φ°	C (psf)
1000	1068	816	27.0	600	26.0	470
2000	1704	1644				
4000	2640	2328				



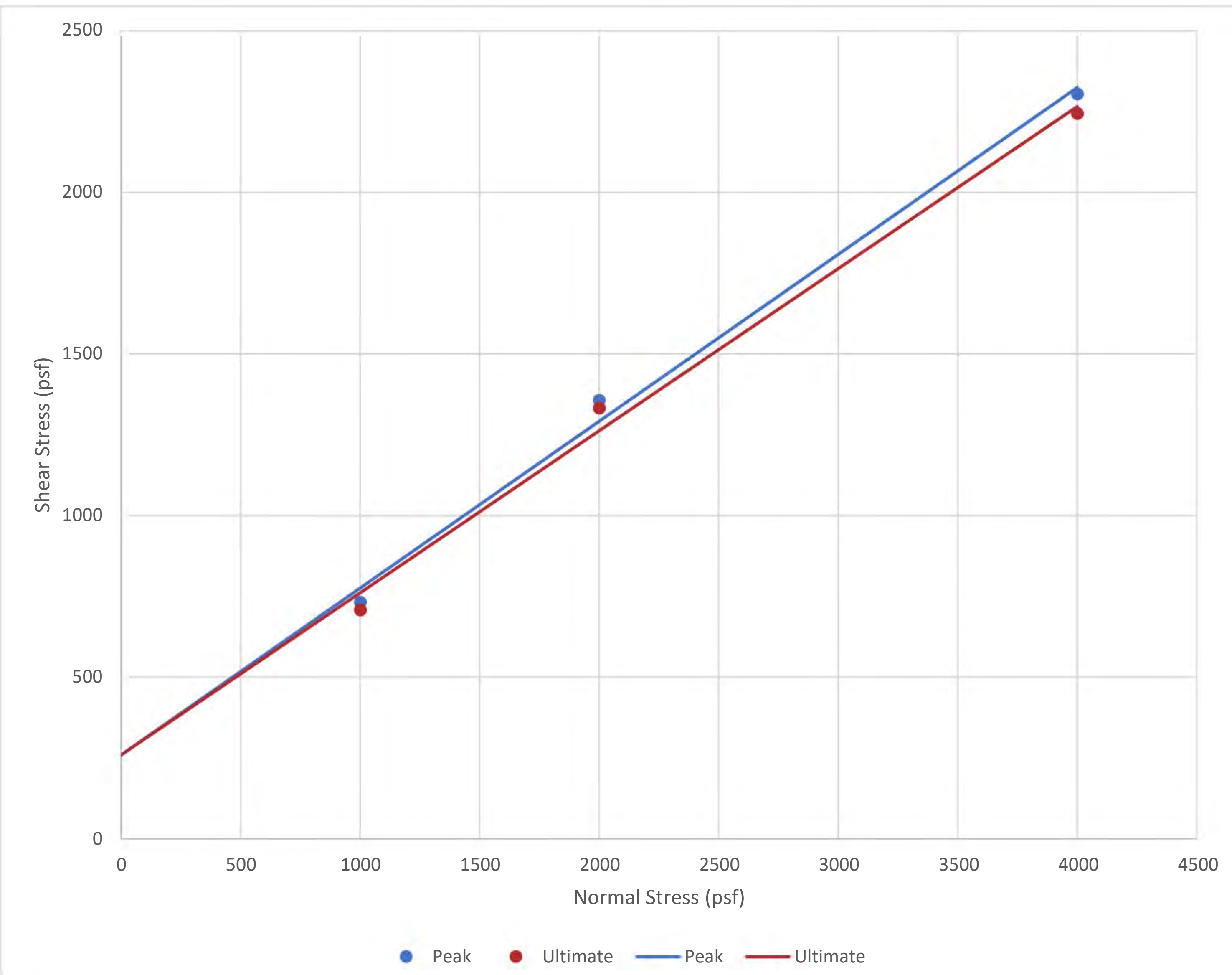
Terracon
145 W Walnut St.
Gardena, CA

Direct Shear Test

ASTM D3080

Boring ID	Depth (ft)	Description	USCS	γ_d (pcf)	W(%)
BESS-14	5	Silty Sand with Gravel	SM	119	3.5

Normal Stress (psf)	Peak Shear Stress (psf)	Ultimate Shear Stress (psf)	Peak		Ultimate	
			φ°	C (psf)	φ°	C (psf)
1000	732	708	**27.0**	**260**	**27.0**	**250**
2000	1356	1332				
4000	2304	2244				



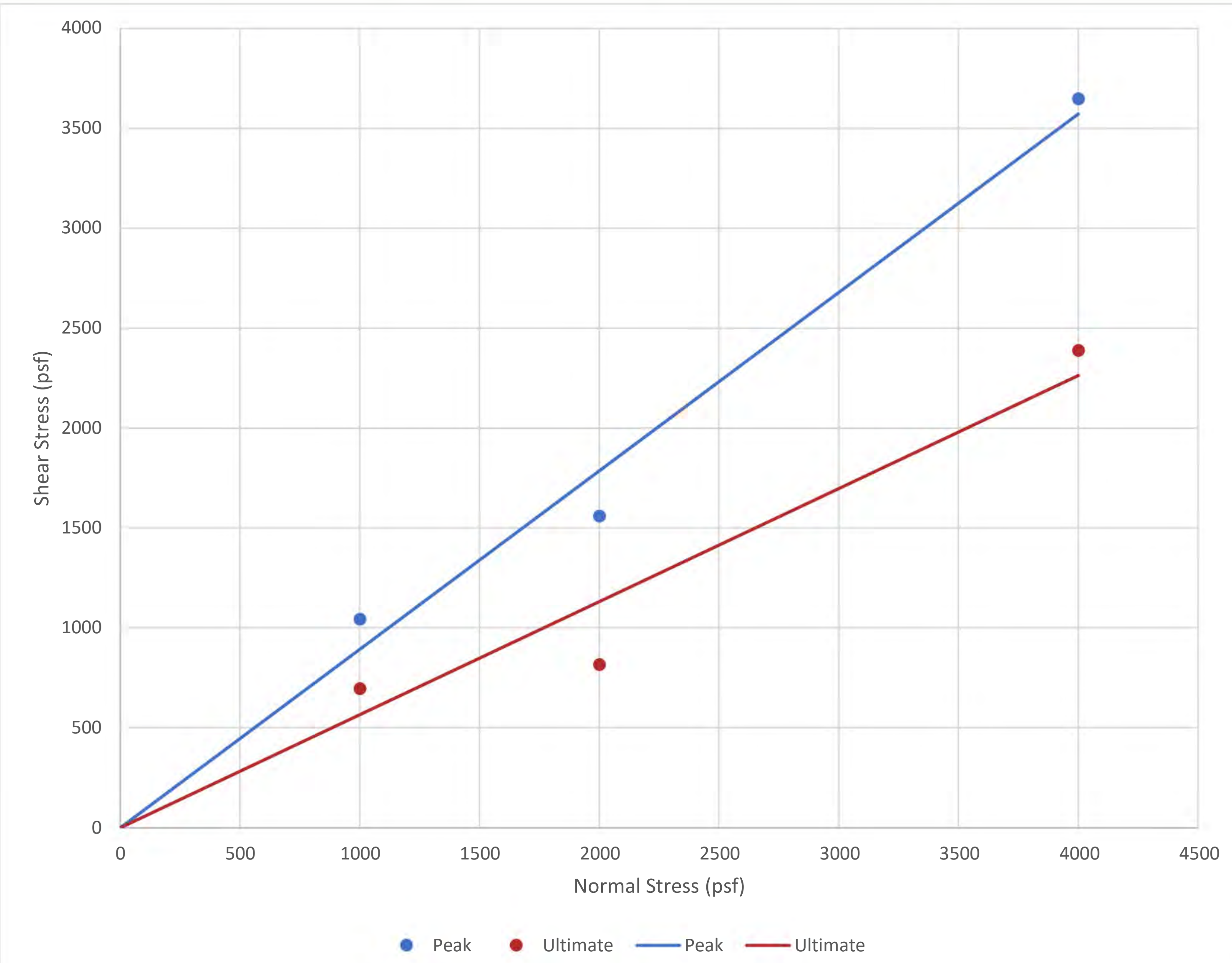
145 W Walnut St.
Gardena, CA

Direct Shear Test

ASTM D3080

Boring ID	Depth (ft)	Description	USCS	γ_d (pcf)	W(%)
TL-2	10	Silty Sand	SM		1.4

Normal Stress (psf)	Peak Shear Stress (psf)	Ultimate Shear Stress (psf)	Peak		Ultimate	
			φ°	C (psf)	φ°	C (psf)
1000	1044	696	**42.0**	**0**	**31.0**	**0**
2000	1560	816				
4000	3648	2388				



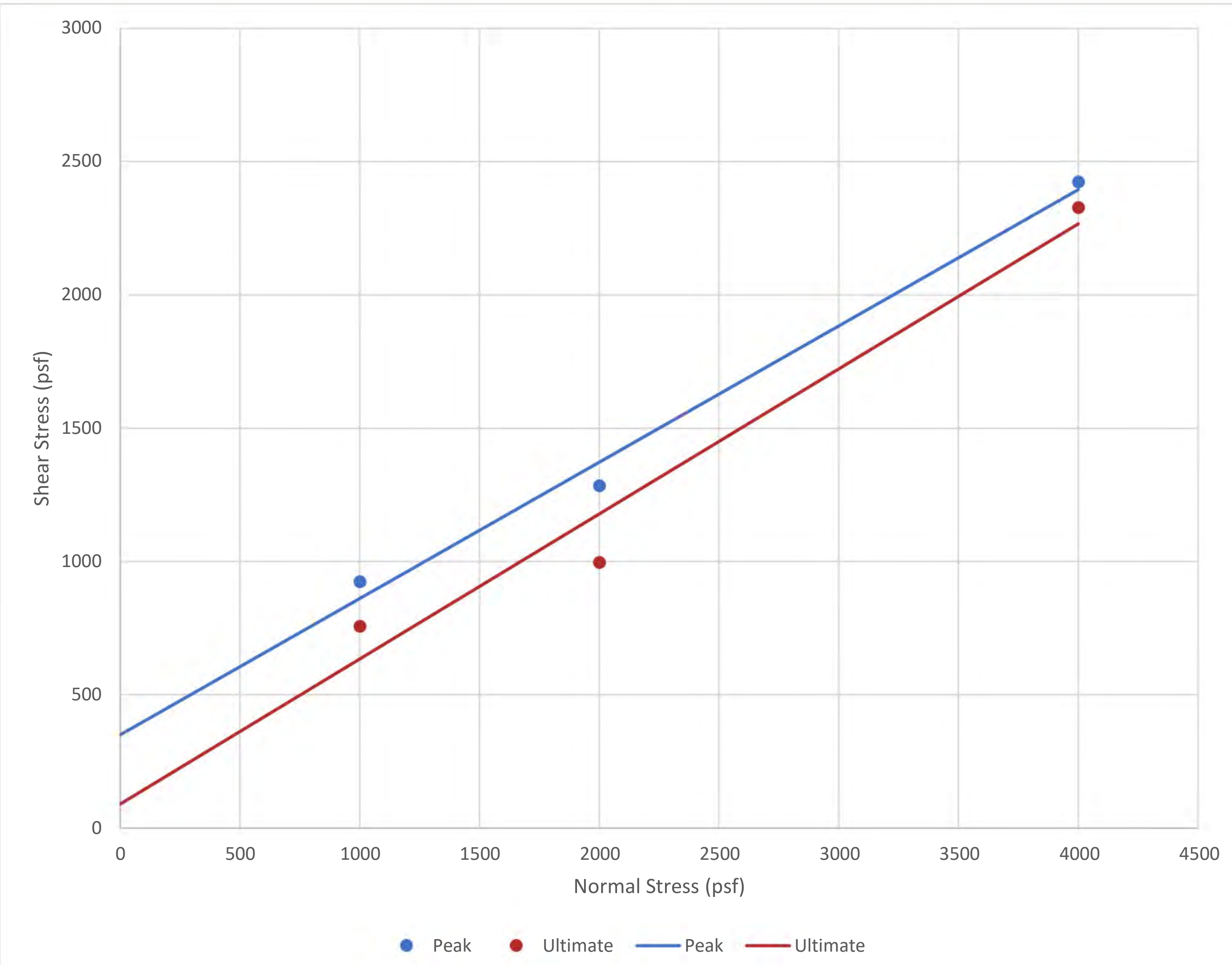
Terracon
145 W Walnut St.
Gardena, CA

Direct Shear Test

ASTM D3080

Boring ID	Depth (ft)	Description	USCS	γ_d (pcf)	W(%)
TL-3	2.5	Silty Sand	SM	116	6.3

Normal Stress (psf)	Peak Shear Stress (psf)	Ultimate Shear Stress (psf)	Peak		Ultimate	
			φ°	C (psf)	φ°	C (psf)
1000	924	756	**27.0**	**350**	**29.0**	**90**
2000	1284	996				
4000	2424	2328				



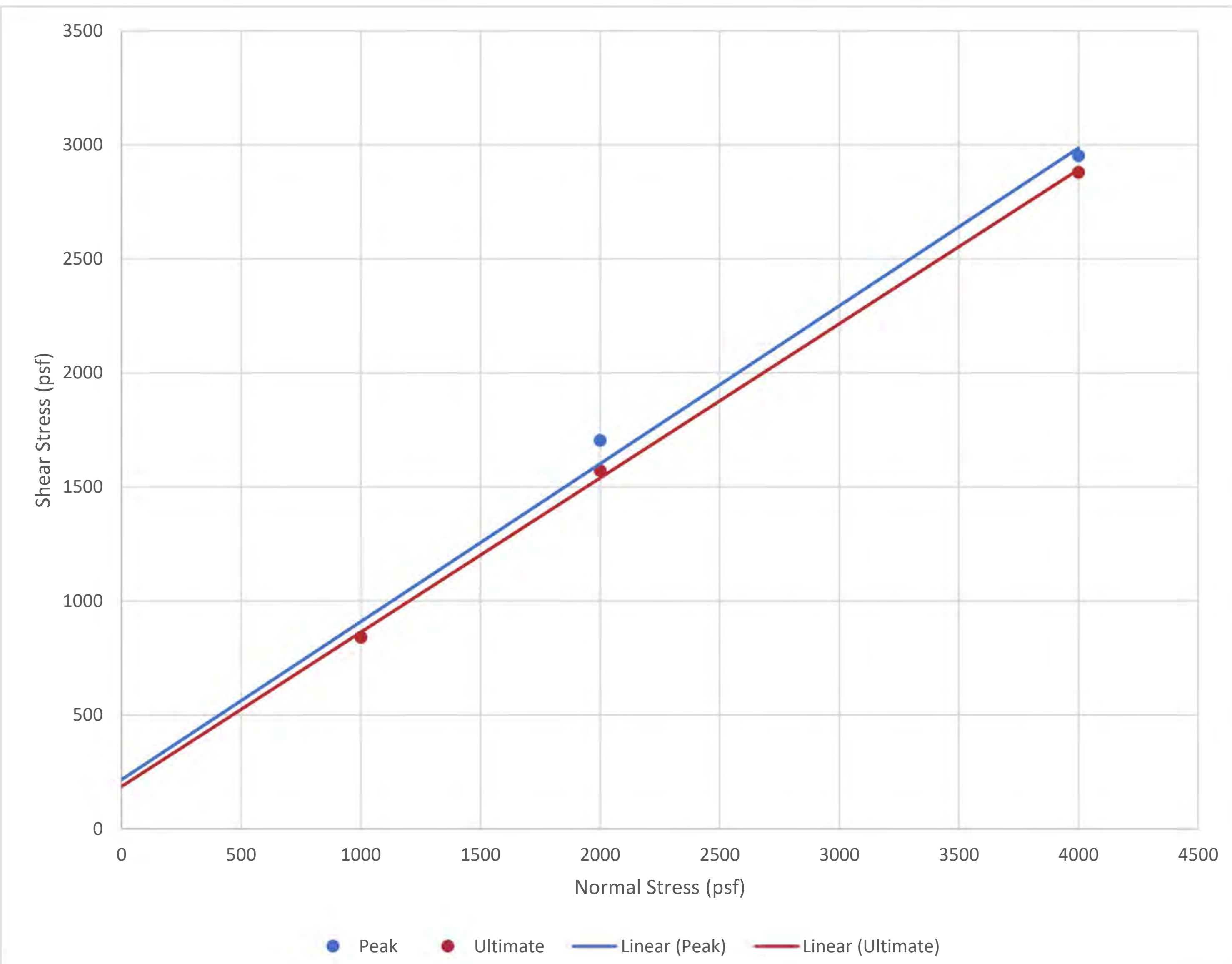
Terracon
145 W Walnut St.
Gardena, CA

Direct Shear Test

ASTM D3080

Boring ID	Depth (ft)	Description	USCS	γ_d (pcf)	W(%)
TL-5	7.5	Silty Sand	SM	111	3.9

Normal Stress (psf)	Peak Shear Stress (psf)	Ultimate Shear Stress (psf)	Peak		Ultimate	
			φ°	C (psf)	φ°	C (psf)
1000	840	840	35.0	220	34.0	190
2000	1704	1572				
4000	2952	2880				



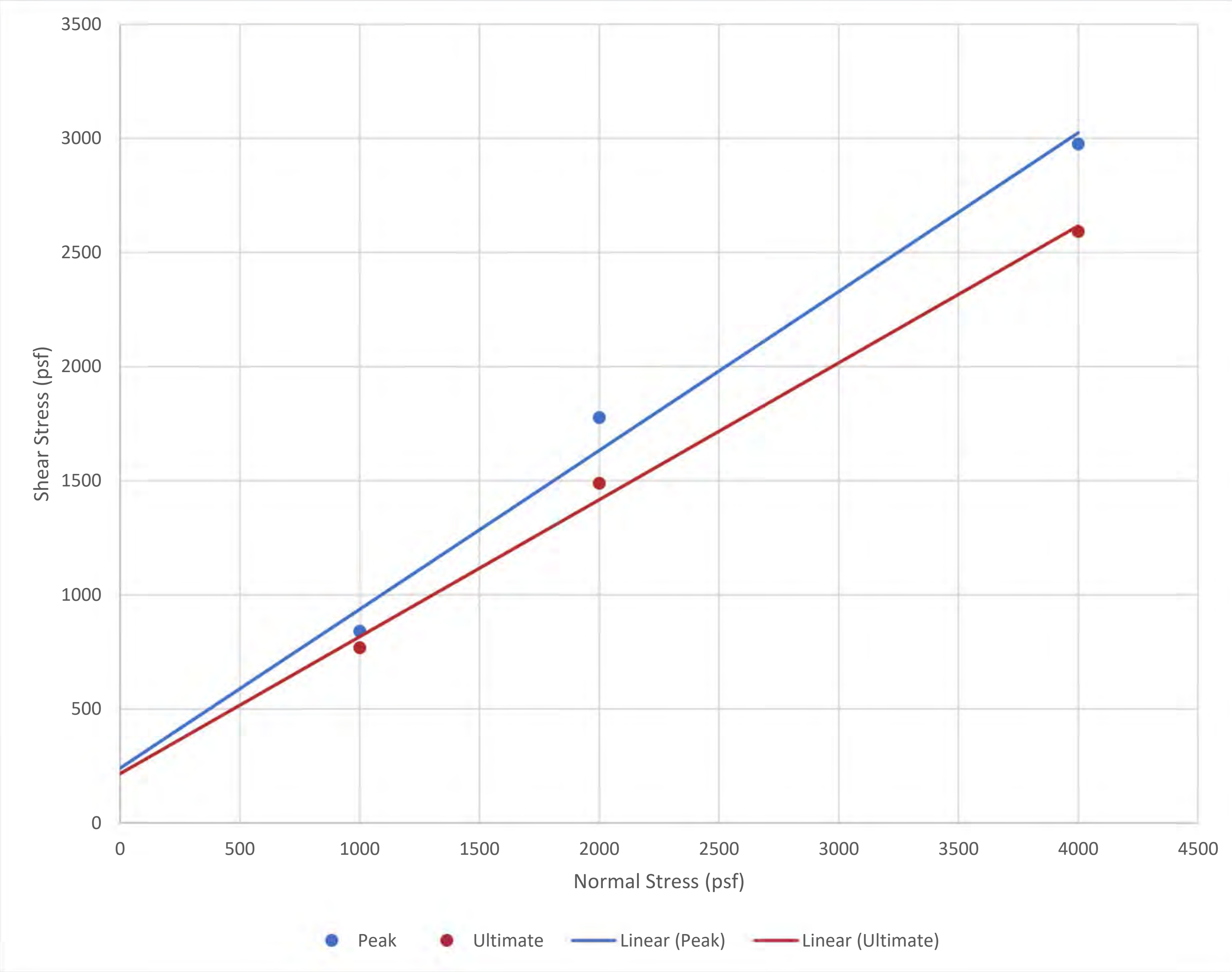
Terracon
145 W Walnut St.
Gardena, CA

Direct Shear Test

ASTM D3080

Boring ID	Depth (ft)	Description	USCS	γ_d (pcf)	W(%)
TL-6	5	Silty Sand	SM	117	2.2

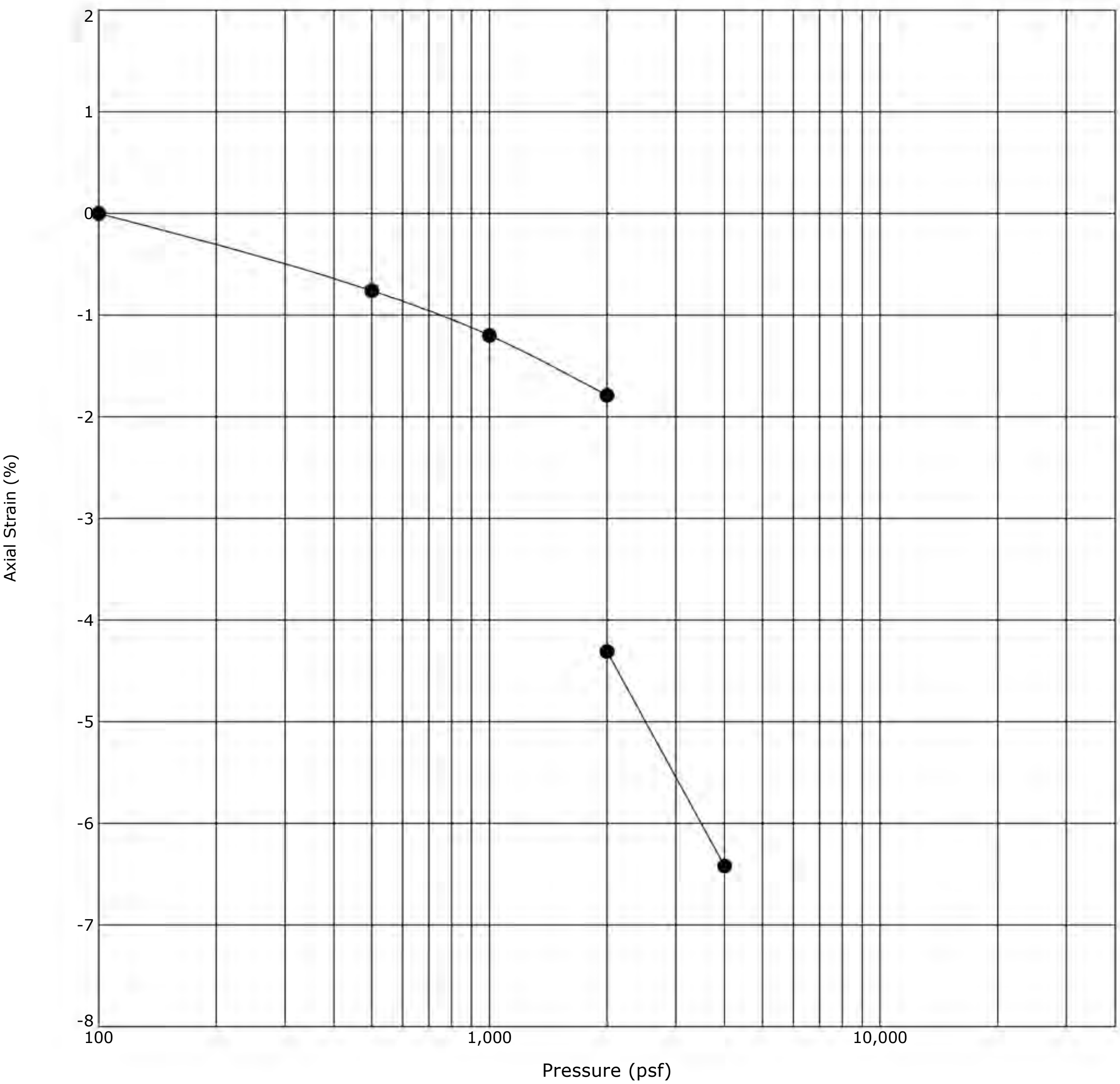
Normal Stress (psf)	Peak Shear Stress (psf)	Ultimate Shear Stress (psf)	Peak		Ultimate	
			φ°	C (psf)	φ°	C (psf)
1000	840	768	35.0	240	31.0	220
2000	1776	1488				
4000	2976	2592				



Terracon
145 W Walnut St
Carson, CA

One-Dimensional Swell or Collapse

ASTM D4546



	Boring ID	Depth (Ft)	Description	USCS	γ_d(pcf)	WC (%)
●	OM-2	5 - 6.5	CLAYEY SAND	SC	105	4.4

Notes: Water added at 200 pcf

TRANSMITTAL LETTER

DATE: January 31, 2025

ATTENTION: **Janna Valdez**

TO: Terracon - Carson
145 W Walnut Street
Carson, CA 90248

SUBJECT: Laboratory Test Data
Prairie Song Reliability Project
Keegan Labs #25-0016
Terracon - Carson #LA245085

COMMENTS: Enclosed are the results for the subject project.

Dr. James T. Keegan
President and Founder

465 W Alvarado St., Pomona, CA 91768
Phone: 951-203-6581

Table 1 - Laboratory Tests on Soil Samples

Terracon - Carson
Prairie Song Reliability Project
Keegan Labs #25-0016, Your #LA245085
31-Jan-25

Sample ID			BESS-2 @ 0-2'	BESS-8 @ 0-2.5'	BESS-14 @ 0-2.5'	SUB-2 @ 0-2.5'	TL-1 @ 0-5'
Resistivity		Units					
saturated		ohm-cm	10,250	8,140	5,230	6,840	18,100
pH			7.1	7.4	7.7	7.3	7.7
Electrical Conductivity		mS/cm	0.02	0.05	0.05	0.04	0.03
Chemical Analyses (Total Salts)							
Cations							
sodium	Na^{1+}	mg/kg	6.1	4.4	5.7	6.0	6.0
ammonium	NH_4^{1+}	mg/kg	0.3	1.0	0.5	0.4	0.4
potassium	K^{1+}	mg/kg	1.7	26	17	5.4	5.4
magnesium	Mg^{2+}	mg/kg	1.5	2.3	3.9	0.7	0.9
calcium	Ca^{2+}	mg/kg	9.4	19	18	20	5.8
Anions							
carbonate	CO_3^{2-}	mg/kg	ND	ND	ND	ND	ND
bicarbonate	HCO_3^{1-}	mg/kg	12	49	61	43	6.1
fluoride	F^{1-}	mg/kg	4.5	5.1	4.8	4.7	4.4
chloride	Cl^{1-}	mg/kg	5.8	7.7	6.2	6.6	6.5
nitrate	NO_3^{1-}	mg/kg	6.3	7.8	7.1	7.4	6.3
phosphate	PO_4^{3-}	mg/kg	8.0	9.3	7.1	7.7	5.7
sulfate	SO_4^{2-}	mg/kg	1.6	9.7	6.5	4.1	9.2
Other Tests							
sulfide	S^{2-}	mg/kg	ND	ND	ND	ND	ND
Redox		mV	278	290	282	291	288
% Moisture	H_2O	%	na	na	na	na	na

For test methods refer to Laboratory Test Methods attachment
Conductivity in millisiemens/cm and chemical analyses were made on a 1:5 soil-to-water extract.
mg/kg = milligrams per kilogram (parts per million) of dry soil.
ND = not detected
na = not analyzed

465 W Alvarado St., Pomona, CA 91768
Phone: 951-203-6581

Table 1 - Laboratory Tests on Soil Samples

Terracon - Carson
Prairie Song Reliability Project
Keegan Labs #25-0016, Your #LA245085
31-Jan-25

Sample ID			TL-3 @ 0-5'	TL-6 @ 0-5'
Resistivity		Units		
saturated		ohm-cm	13,070	21,110
pH			7.1	7.0
Electrical Conductivity		mS/cm	0.02	0.02
Chemical Analyses (Total Salts)				
Cations				
sodium	Na^{1+}	mg/kg	3.8	4.2
ammonium	NH_4^{1+}	mg/kg	0.3	0.3
potassium	K^{1+}	mg/kg	9.6	4.4
magnesium	Mg^{2+}	mg/kg	1.5	1.3
calcium	Ca^{2+}	mg/kg	2.7	4.4
Anions				
carbonate	CO_3^{2-}	mg/kg	ND	ND
bicarbonate	HCO_3^{1-}	mg/kg	12	6.1
fluoride	F^{1-}	mg/kg	4.5	4.5
chloride	Cl^{1-}	mg/kg	6.5	5.4
nitrate	NO_3^{1-}	mg/kg	6.5	5.8
phosphate	PO_4^{3-}	mg/kg	8.0	6.4
sulfate	SO_4^{2-}	mg/kg	2.4	0.2
Other Tests				
sulfide	S^{2-}	mg/kg	ND	ND
Redox		mV	288	293
% Moisture	H_2O	%	na	na

For test methods refer to Laboratory Test Methods attachment
Conductivity in millisiemens/cm and chemical analyses were made on a 1:5 soil-to-water extract.
mg/kg = milligrams per kilogram (parts per million) of dry soil.
ND = not detected
na = not analyzed

465 W Alvarado St., Pomona, CA 91768
Phone: 951-203-6581

LABORATORY TEST METHODS

DATE: January 1, 2024

LABORATORY TESTS	METHODS	RELEVANT ALTERNATE METHODS
Electrical Resistivity of Soil	ASTM G-187	ASTM G-57, AASHTO T288
Minimum Electrical Resistivity	CTM 643	AASHTO T-288
pH of Soil	ASTM G-51	CTM 643, SMWW-H*, ASSHTO T289
Anions in Water*	ASTM D4327	EPA 300, EPA 353.2, EPA 325.1, ASTM D516, SMWW 4500B
Cations in Water*	ASTM D6919	EPA 300
Chloride and Sulfate in Soil	CTM 422 & 417	ASSHTO T290 & T291
Alkalinity of Water*	ASTM D1067	SMWW 2320, EPA 305.1
Total Acidity/Alkalinity*	NIST RP539	
Sulfide (qualitative)	AWWA C-105	
Sulfide (quantitative)	ASTM D4658	EPA 376.2
Thermal Conductivity of Soil	ASTM D5334	
Oxidation/Reduction (Redox)	ASTM G200	
Linear Polarization	ASTM-G59	
MIC Bacteria in Soil	MICkit 5**	

*Adapted for soil
**Propietary testing kit manufactured by BTI-Products

465 W Alvarado St., Pomona, CA 91768
Phone: 951-203-6581

21239 FM529 Rd., Bldg F
Cypress, TX 77433
Office: 291-985-9344
info@geothermusa.com
http://www.geothermusa.com

REV01: Change project name from [redacted] BESS to Prairie Song Reliability Project
March 5, 2025

Terracon
145 W. Walnut Street
Carson, CA 90248
Attn: Janna Valdez

Thermal Resistivity Report
Prairie Song Reliability Project – Acton, CA (Project No. LA245085)

The following is the report of thermal dryout characterization tests conducted on four (4) bulk samples of native soil from the referenced project sent to our laboratory.

Thermal Resistivity Tests: The samples were tested at the 'optimum' moisture content and at 90% of the modified Proctor dry density ***provided by Terracon***. The tests were conducted in accordance with the **IEEE standard 442-2017**. The results are tabulated below and the thermal dry out curves are presented in **Figures 1 to 4.**

Sample ID, Description, Thermal Resistivity, Moisture Content and Density

Sample ID	Depth (ft)	Effort (%)	Description (Terracon)	Thermal Resistivity (°C-cm/W)		Moisture Content (%)	Dry Density (lb/ft^3)
				Wet	Dry		
BESS-01	0 - 5	90	Silty Sand	69	148	8	121
BESS-05	0 - 5	90	Silty Sand	65	136	8	123
BESS-13	0 - 5	90	Silty Sand	67	151	8	121
SUB-01	0 - 5	90	Silty Sand with Gravel	68	144	8	120

Comments: The thermal characteristic depicted in the dryout curves apply for the soils at their respective test dry density.

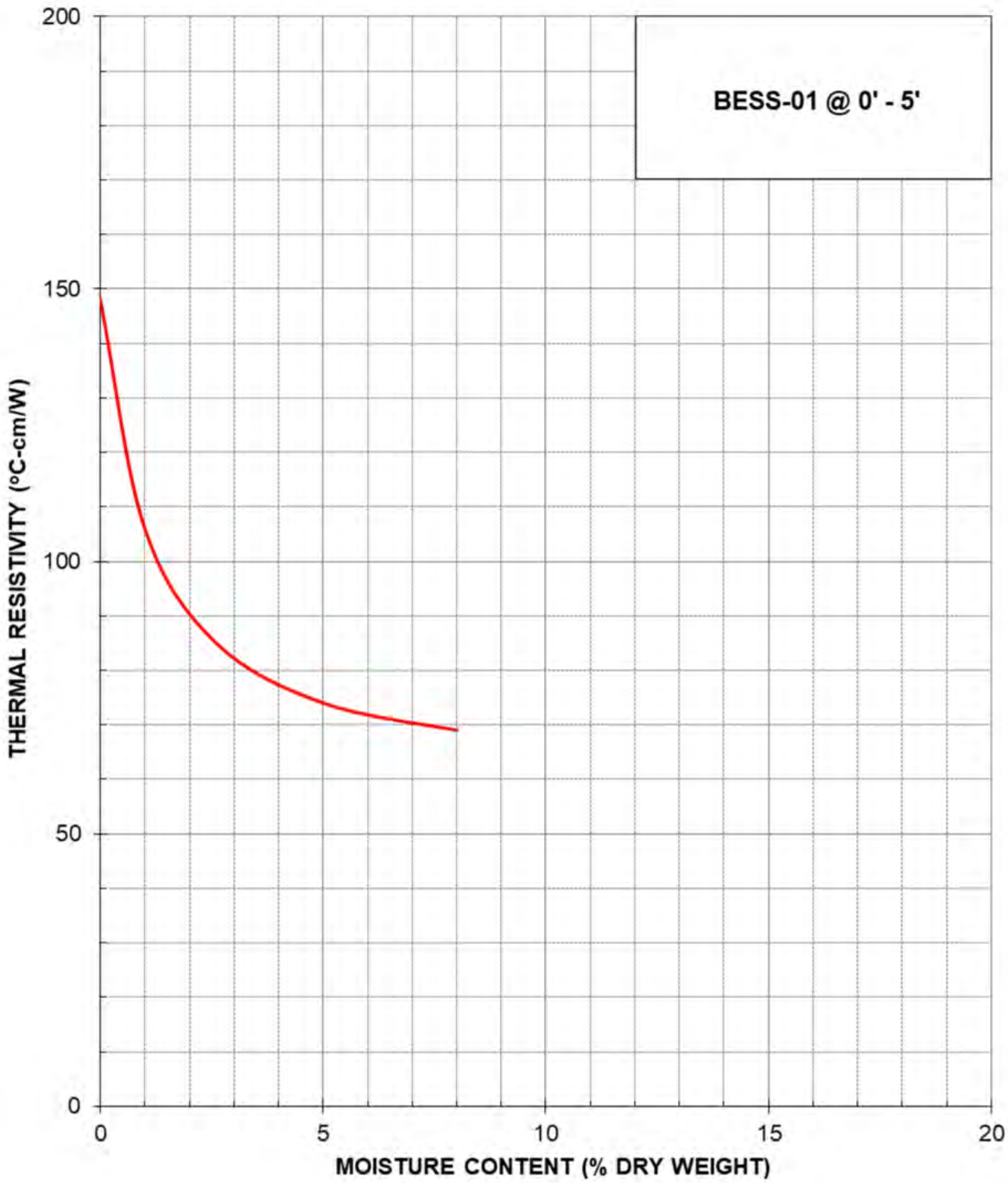
Please contact us if you have any questions or if we can be of further assistance.

Geotherm USA, LLC

Nimesh Patel

Geotherm

THERMAL DRYOUT CURVE



Terracon (Project No. LA245085)

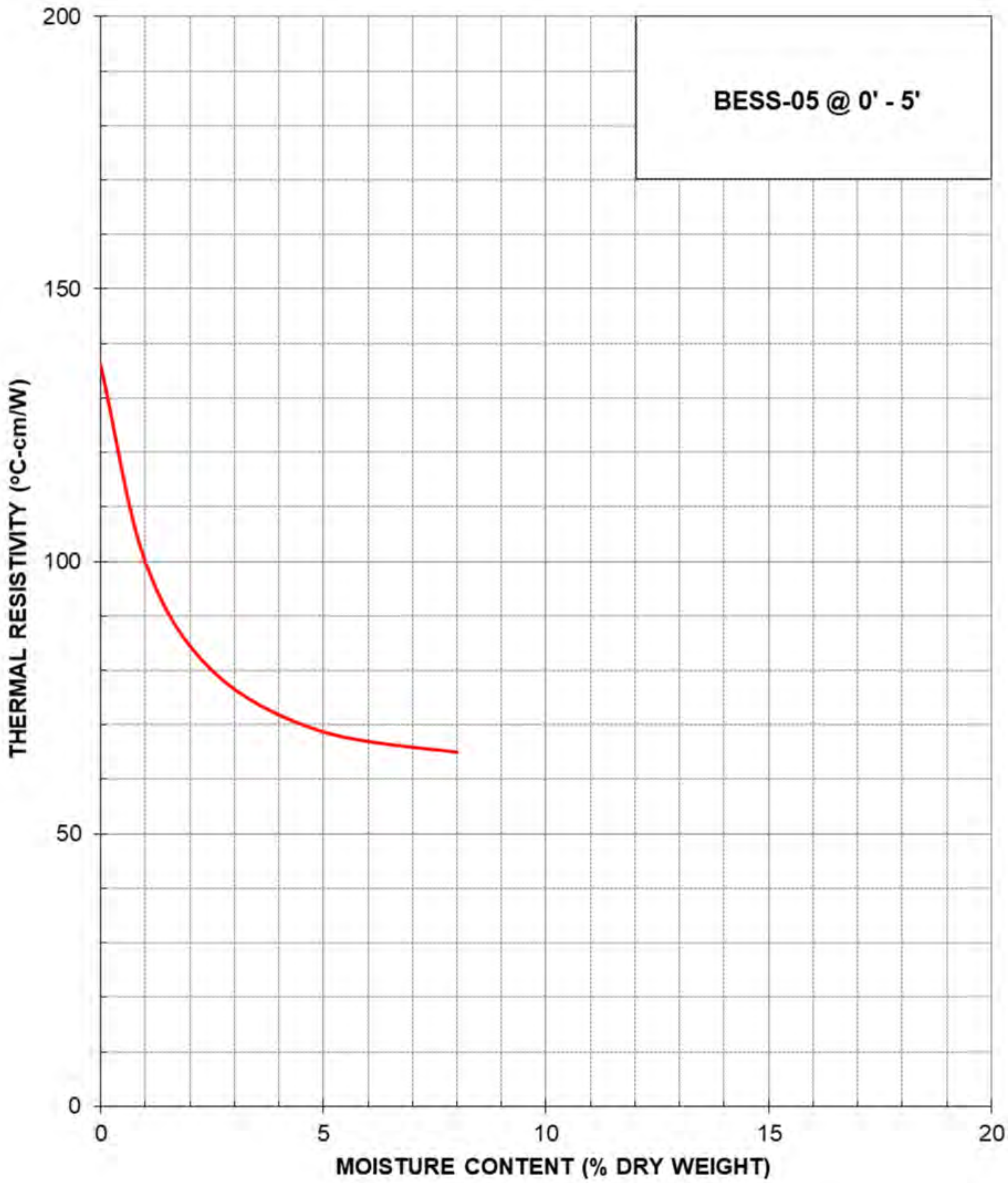
Prairie Song Reliability Project – Acton, CA

Thermal Resistivity Report

March 2023 **Figure 1**

Geotherm

THERMAL DRYOUT CURVE



Terracon (Project No. LA245085)

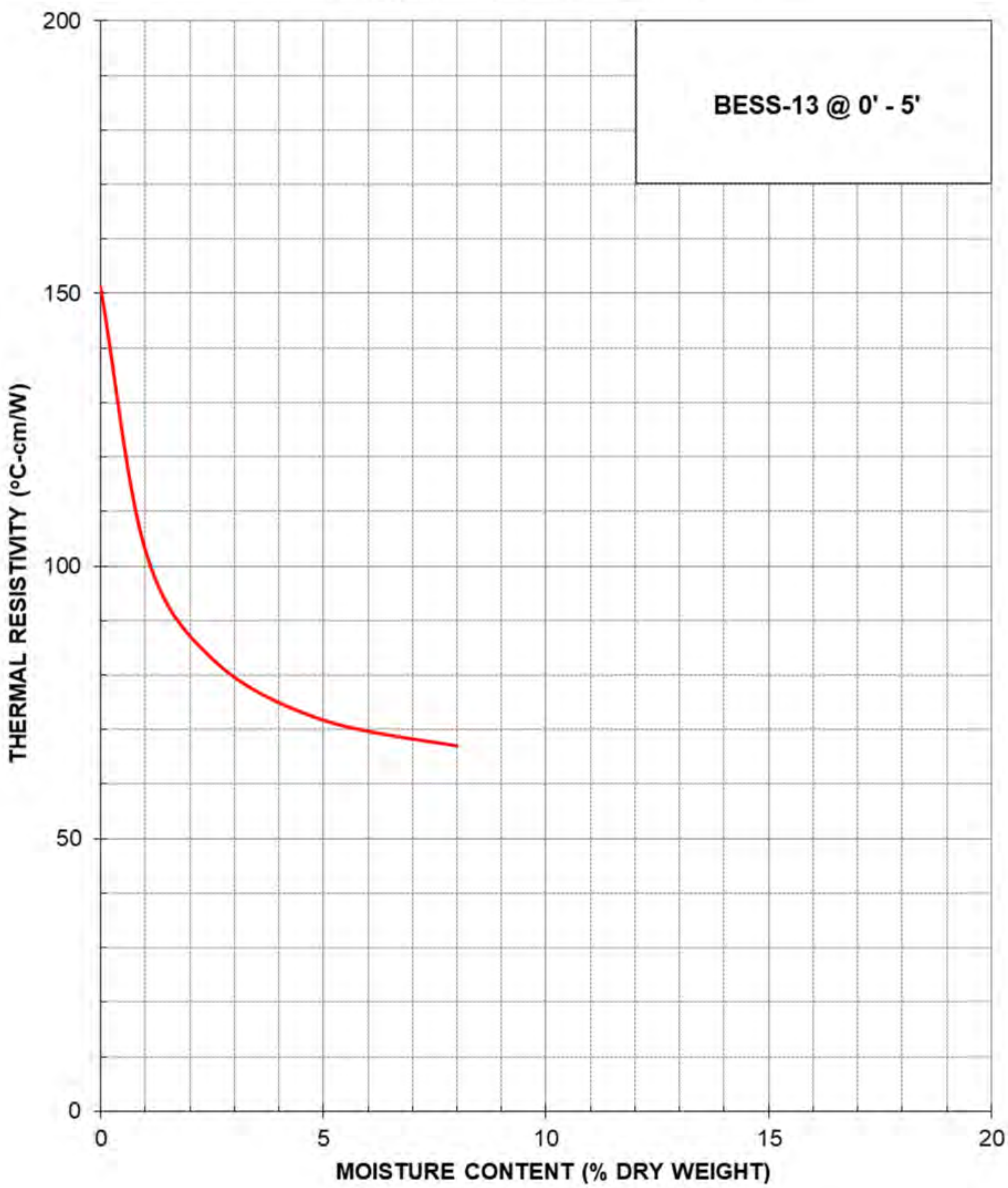
Prairie Song Reliability Project – Acton, CA

Thermal Resistivity Report

March 2023 **Figure 2**

Geotherm

THERMAL DRYOUT CURVE



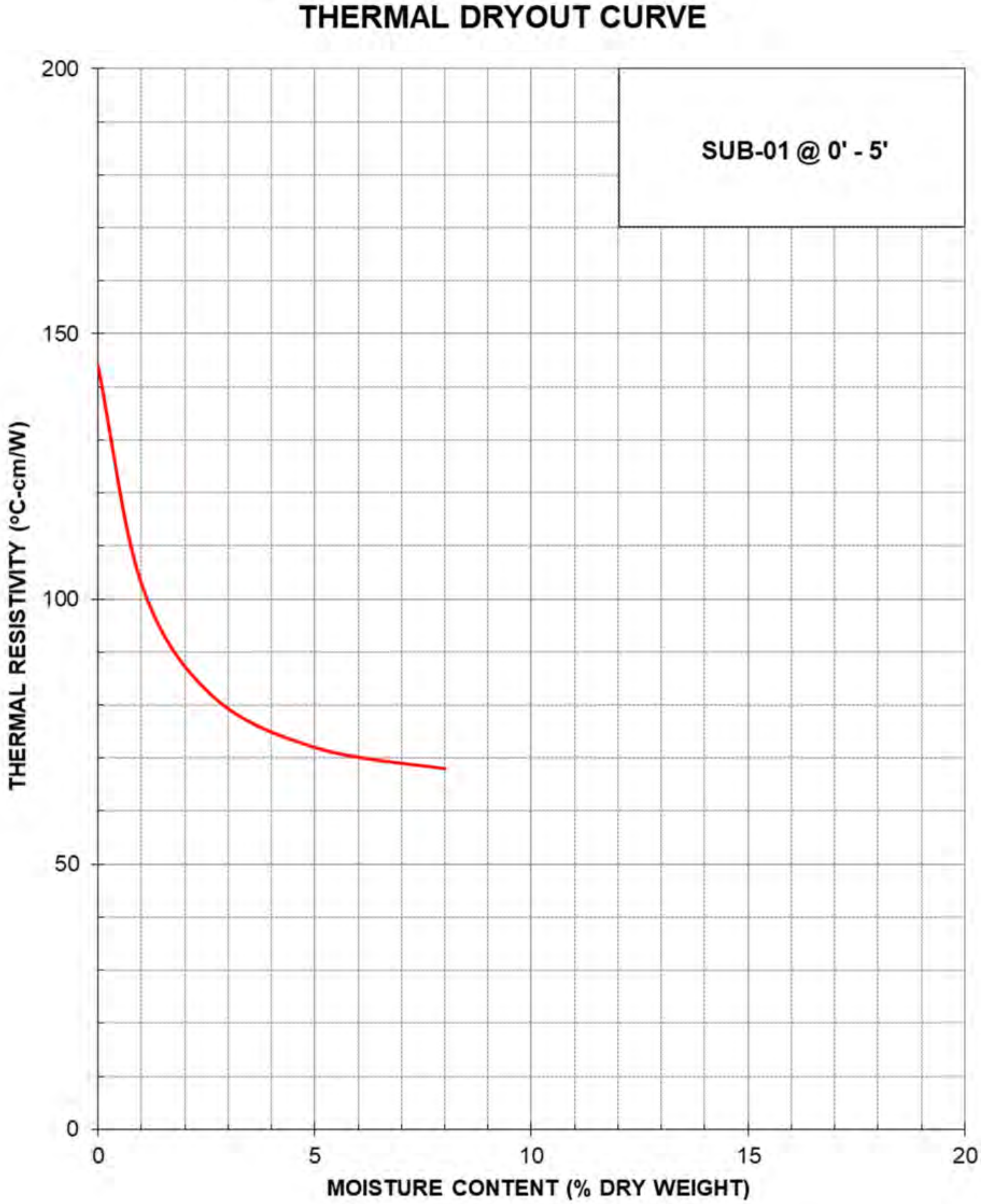
Terracon (Project No. LA245085)

Prairie Song Reliability Project – Acton, CA

Thermal Resistivity Report

March 2023 **Figure 3**

Geotherm



Terracon (Project No. LA245085)

Prairie Song Reliability Project – Acton, CA

Thermal Resistivity Report

March 2023 **Figure 4**

AP Engineering and Testing, Inc.
DBE|MBE|SBE
2607 Pomona Boulevard | Pomona, CA 91768
t. 909.869.6316 | f. 909.869.6318 | www.aplaboratory.com

CALIFORNIA BEARING RATIO (CBR)
OF LABORATORY-COMPACTED SOIL
ASTM D 1883

Project Name:	Prairie Song Reliability Project	Tested By :	SM	Date	01/23/25
Project No. :	LA245085	Input By:	JP	Date	01/27/25
Boring No.:	BESS-3	Checked By:	AP	Date	05/05/25
Sample No.:	-				
Depth (ft.) :	0-5				
Soil Description :	Silty, Clayey Sand				

SAMPLE DESCRIPTION BEFORE SOAKING

Mold Number	D
Blows Per Layer	8
Wt of Wet Soil & Mold (gm)	12065.5
Weight of Mold (gm)	7823
Weight of Wet Soil (gm)	4243
Mold Volume (cu.ft)	0.0750
Container No.	
Wet Wt. Soil + Container (gm)	666.49
Dry Wt. Soil + Container (gm)	649.74
Wt. Container (gm)	451.71
Moisture Content (%)	8.46
Wet Density (pcf)	124.7
Dry Density (pcf)	115.0

SAMPLE PREPARATION

Wt of Hammer (Lbs)	10
No. of Layers	5
No. of Blows/Layer	8
Drop Height (inches)	18
Surcharge Weight (Lbs)	10
Max. Dry Density (pcf)*	135.2
Molded Relative Comp (%)	85.0
Req'd % Moisture	8.0
No. of Trials	1
% Retained 3/4" Sieve	0.00%

**Note: Max. dry density provided by Terracon*

DEFORMATION DURING SOAKING PERIOD

Sample Length (inch) 4.584

DATE	TIME	Mold No.: D	
		Dial Rdgs	Swell (in)
02/06/25	16:40	0.0760	
02/07/25	08:10	0.0790	
02/10/25	08:10	0.0800	0.0040
Percent Swell/Collapse (+/-)			0.09

AFTER SOAKING

Mold Number	D
Wt. of Wet Soil + Mold (gm)	12322
Weight of Mold (gm)	7823
Weight of Wet Soil (gm)	4499
Final Sample Volume (cu.ft)	0.0751
Container No.	
Wet Wt. Soil + Container (gm)	699.01
Dry Wt. Soil + Container (gm)	671.98
Wt. Container (gm)	493.58
Mosture Content (%)	15.2
Wet Density (pcf)	132.1
After Test Dry Density (pcf)	114.7

TEST LOAD DATA

Piston Diameter (inches): 1.954

Penetration	Mold No.: D	
(inch)	LOAD (lb)	Stress (psi)
0.000	0	0.00
0.025	54	18.01
0.050	80	26.68
0.075	94	31.35
0.100	104	34.68
0.125	119	39.68
0.150	135	45.02
0.175	152	50.69
0.200	166	55.36
0.225	179	59.69
0.250	190	63.36
0.275	202	67.36
0.300	212	70.70
0.325	222	74.03
0.350	232	77.37
0.375	242	80.70
0.400	252	84.04
0.425	263	87.70
0.450	274	91.37
0.475	285	95.04
0.500	296	98.71

TEST RESULTS

CBR @ .1": 3

CBR @ .2": 4

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CALIFORNIA BEARING RATIO (CBR)
OF LABORATORY-COMPACTED SOIL
ASTM D 1883

Project Name: Prairie Song Reliability Project
Project No. : LA245085
Boring No.: BESS-3
Sample No.: -
Depth (ft.) : 0-5
Soil Description : Silty, Clayey Sand

Tested By : SM — Date 01/23/25
Input By: JP — Date 01/27/25
Checked By: AP — Date 05/05/25

SAMPLE DESCRIPTION BEFORE SOAKING

Mold Number	E
Blows Per Layer	10
Wt of Wet Soil & Mold (gm)	12298
Weight of Mold (gm)	7812.5
Weight of Wet Soil (gm)	4486
Mold Volume (cu.ft)	0.0750
Container No.	
Wet Wt. Soil + Container (gm)	666.49
Dry Wt. Soil + Container (gm)	649.74
Wt. Container (gm)	451.71
Moisture Content (%)	8.46
Wet Density (pcf)	131.8
Dry Density (pcf)	121.6

SAMPLE PREPARATION

Wt of Hammer (Lbs)	10
No. of Layers	5
No. of Blows/Layer	10
Drop Height (inches)	18
Surcharge Weight (Lbs)	10
Max. Dry Density (pcf)*	135.2
Molded Relative Comp (%)	89.9
Req'd % Moisture	8.0
No. of Trials	1
% Retained 3/4" Sieve	0.00%

**Note: Max. dry density provided by Terracon*

DEFORMATION DURING SOAKING PERIOD

Sample Length (inch) 4.584

DATE	TIME	Mold No.: E	
		Dial Rdgs	Swell (in)
02/06/25	16:40	0.0820	
02/07/25	08:10	0.0850	
02/10/25	08:10	0.0850	0.0030
Percent Swell/Collapse (+/-)			0.07

AFTER SOAKING

Mold Number	E
Wt. of Wet Soil + Mold (gm)	12456
Weight of Mold (gm)	7813
Weight of Wet Soil (gm)	4644
Final Sample Volume (cu.ft)	0.0750
Container No.	
Wet Wt. Soil + Container (gm)	641.39
Dry Wt. Soil + Container (gm)	591.39
Wt. Container (gm)	143.91
Mosture Content (%)	11.2
Wet Density (pcf)	136.4
After Test Dry Density (pcf)	122.7

TEST LOAD DATA

Piston Diameter (inches): 1.954

Penetration	Mold No.: E	
(inch)	LOAD (lb)	Stress (psi)
0.000	0	0.00
0.025	82	27.34
0.050	129	43.02
0.075	154	51.35
0.100	172	57.36
0.125	185	61.69
0.150	195	65.03
0.175	207	69.03
0.200	218	72.70
0.225	230	76.70
0.250	241	80.37
0.275	251	83.70
0.300	260	86.70
0.325	271	90.37
0.350	280	93.37
0.375	290	96.71
0.400	300	100.04
0.425	313	104.38
0.450	323	107.71
0.475	334	111.38
0.500	346	115.38

TEST RESULTS

CBR @ .1": 6

CBR @ .2": 5

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CALIFORNIA BEARING RATIO (CBR)
OF LABORATORY-COMPACTED SOIL
ASTM D 1883

Project Name:	Prairie Song Reliability Project	Tested By :	SM	Date	01/23/25
Project No. :	LA245085	Input By:	JP	Date	01/27/25
Boring No.:	BESS-3	Checked By:	AP	Date	05/05/25
Sample No.:	-				
Depth (ft.) :	0-5				
Soil Description :	Silty, Clayey Sand				

SAMPLE DESCRIPTION BEFORE SOAKING

Mold Number	F
Blows Per Layer	25
Wt of Wet Soil & Mold (gm)	12527
Weight of Mold (gm)	7786
Weight of Wet Soil (gm)	4741
Mold Volume (cu.ft)	0.0750
Container No.	
Wet Wt. Soil + Container (gm)	666.49
Dry Wt. Soil + Container (gm)	649.74
Wt. Container (gm)	451.71
Moisture Content (%)	8.46
Wet Density (pcf)	139.4
Dry Density (pcf)	128.5

SAMPLE PREPARATION

Wt of Hammer (Lbs)	10
No. of Layers	5
No. of Blows/Layer	25
Drop Height (inches)	18
Surcharge Weight (Lbs)	10
Max. Dry Density (pcf)*	135.2
Molded Relative Comp (%)	95.0
Req'd % Moisture	8.0
No. of Trials	1
% Retained 3/4" Sieve	0.00%

**Note: Max. dry density provided by Terracon*

DEFORMATION DURING SOAKING PERIOD

Sample Length (inch) 4.584

DATE	TIME	Mold No.: F	
		Dial Rdgs	Swell (in)
02/06/25	16:40	0.1090	
02/07/25	08:10	0.1040	
02/10/25	08:10	0.1100	0.0010
Percent Swell/Collapse (+/-)			0.02

AFTER SOAKING

Mold Number	F
Wt. of Wet Soil + Mold (gm)	12593
Weight of Mold (gm)	7786
Weight of Wet Soil (gm)	4807
Final Sample Volume (cu.ft)	0.0750
Container No.	
Wet Wt. Soil + Container (gm)	683.73
Dry Wt. Soil + Container (gm)	640.42
Wt. Container (gm)	151.00
Mosture Content (%)	8.8
Wet Density (pcf)	141.3
After Test Dry Density (pcf)	129.8

TEST LOAD DATA

Piston Diameter (inches): 1.954

Penetration (inch)	Mold No.: F LOAD (lb)	Stress (psi)
0.000	0	0.00
0.025	47	15.67
0.050	103	34.35
0.075	163	54.36
0.100	235	78.37
0.125	312	104.04
0.150	385	128.39
0.175	448	149.40
0.200	501	167.07
0.225	536	178.74
0.250	551	183.74
0.275	560	186.75
0.300	576	192.08
0.325	605	201.75
0.350	640	213.42
0.375	674	224.76
0.400	714	238.10
0.425	759	253.11
0.450	807	269.11
0.475	860	286.79
0.500	913	304.46

TEST RESULTS

CBR @ .1": 10

CBR @ .2": 12

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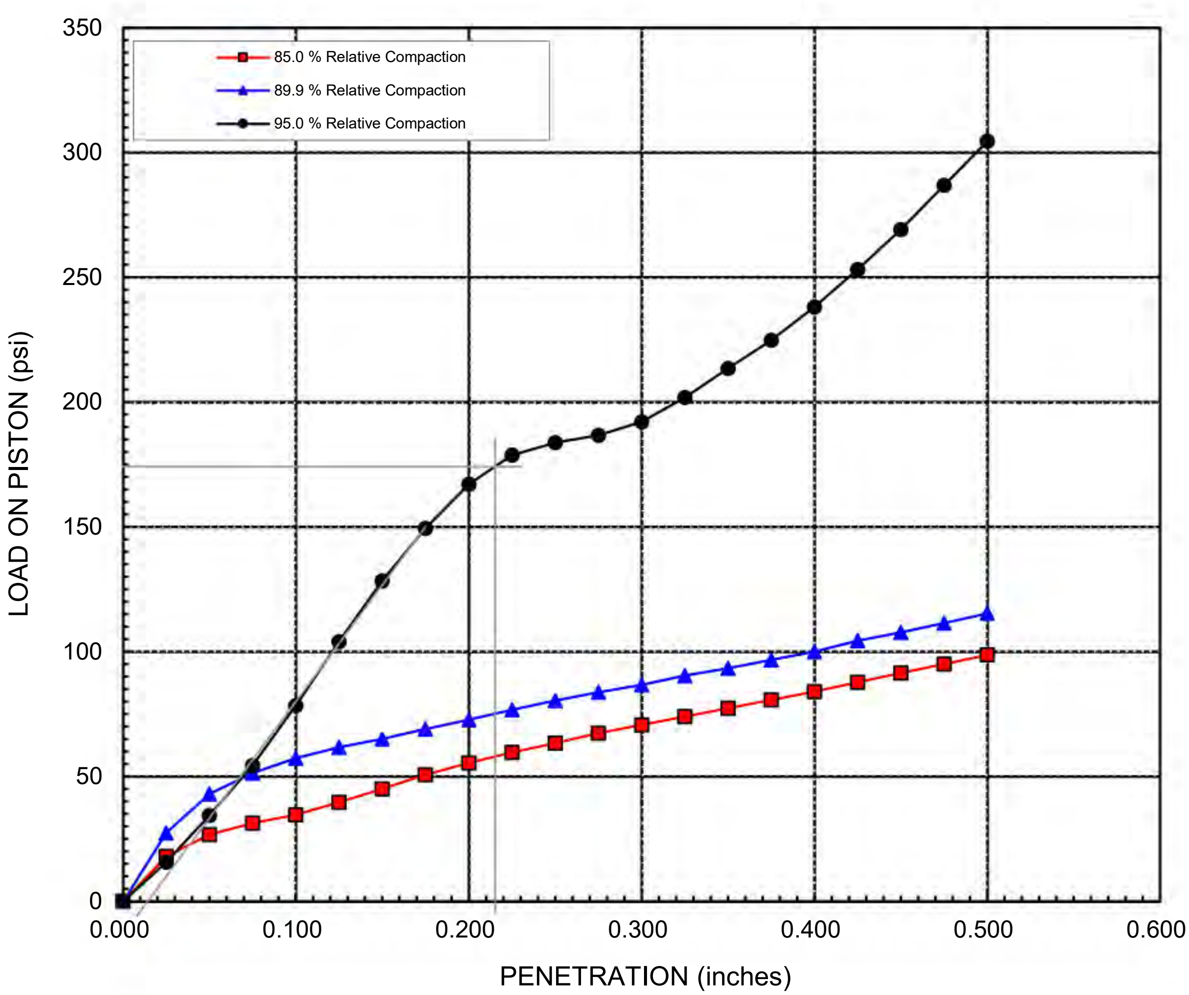
CALIFORNIA BEARING RATIO (CBR) OF LABORATORY-COMPACTED SOIL ASTM D 1883

Project Name:	Prairie Song Reliability Project	Tested By :	SM	Date:	01/23/25
Project No. :	LA245085	Data Input By:	JP	Date:	01/27/25
Boring No.:	BESS-3	Checked By:	AP	Date:	05/05/25
Sample No.:	-				
Depth (ft.) :	0-5				
Soil Description :	Silty, Clayey Sand				



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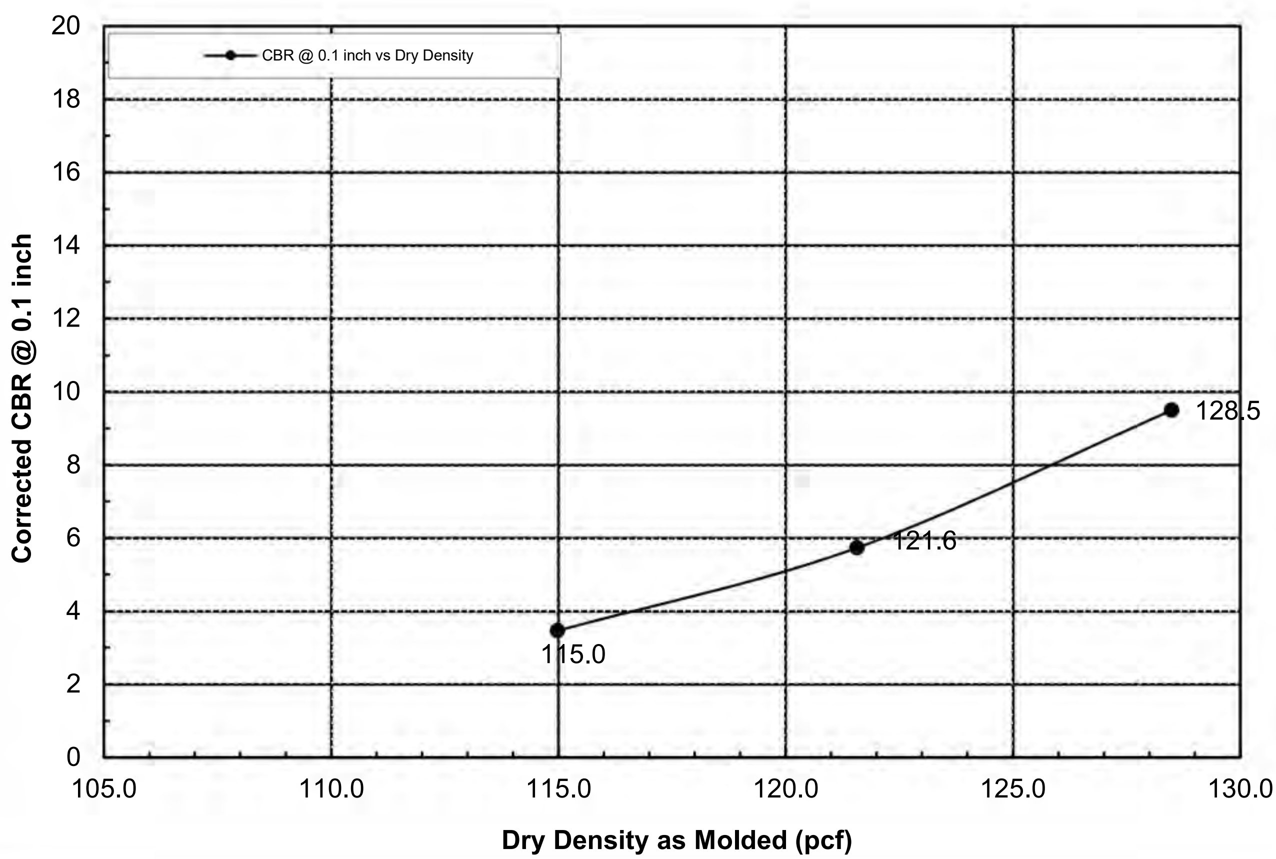
CALIFORNIA BEARING RATIO (CBR)
OF LABORATORY-COMPACTED SOIL
ASTM D 1883

Project Name:	Prairie Song Reliability Project	Tested By :	SM	Date:	01/23/25
Project No. :	LA245085	Data Input By:	JP	Date:	01/27/25
Boring No.:	BESS-3	Checked By:	AP	Date:	05/05/25
Sample No.:	-				
Depth (ft.) :	0-5				
Soil Description :	Silty, Clayey Sand				

TEST RESULTS

Dry Density (pcf)	Maximum Dry Density by ASTM D 1557 (pcf)	Relative Compaction (%)	Blow Per Layer	CBR @0.1"	CBR @0.2"
115.0	135.2	85.0	8	3	4
121.6	135.2	89.9	10	6	5
128.5	135.2	95.0	25	10	12

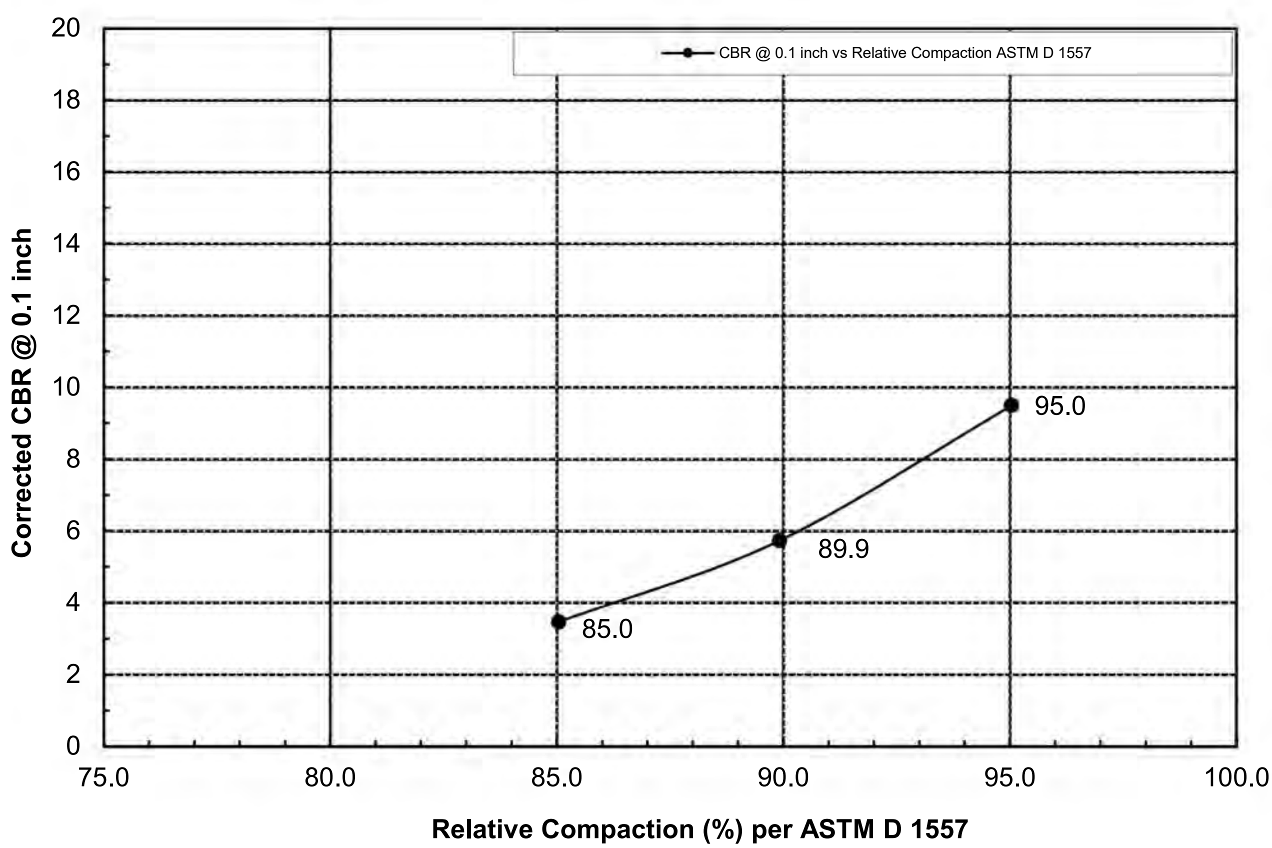


CALIFORNIA BEARING RATIO (CBR) OF LABORATORY-COMPACTED SOIL ASTM D 1883

Project Name:	Prairie Song Reliability Project	Tested By :	SM	Date:	01/23/25
Project No. :	LA245085	Data Input By:	JP	Date:	01/27/25
Boring No.:	BESS-3	Checked By:	AP	Date:	05/05/25
Sample No.:	-				
Depth (ft.) :	0-5				
Soil Description :	Silty, Clayey Sand				

TEST RESULTS

Dry Density (pcf)	Maximum Dry Density by ASTM D 1557 (pcf)	Relative Compaction (%)	Blow Per Layer	CBR @0.1"	CBR @0.2"
115.0	135.2	85.0	8	3	4
121.6	135.2	89.9	10	6	5
128.5	135.2	95.0	25	10	12



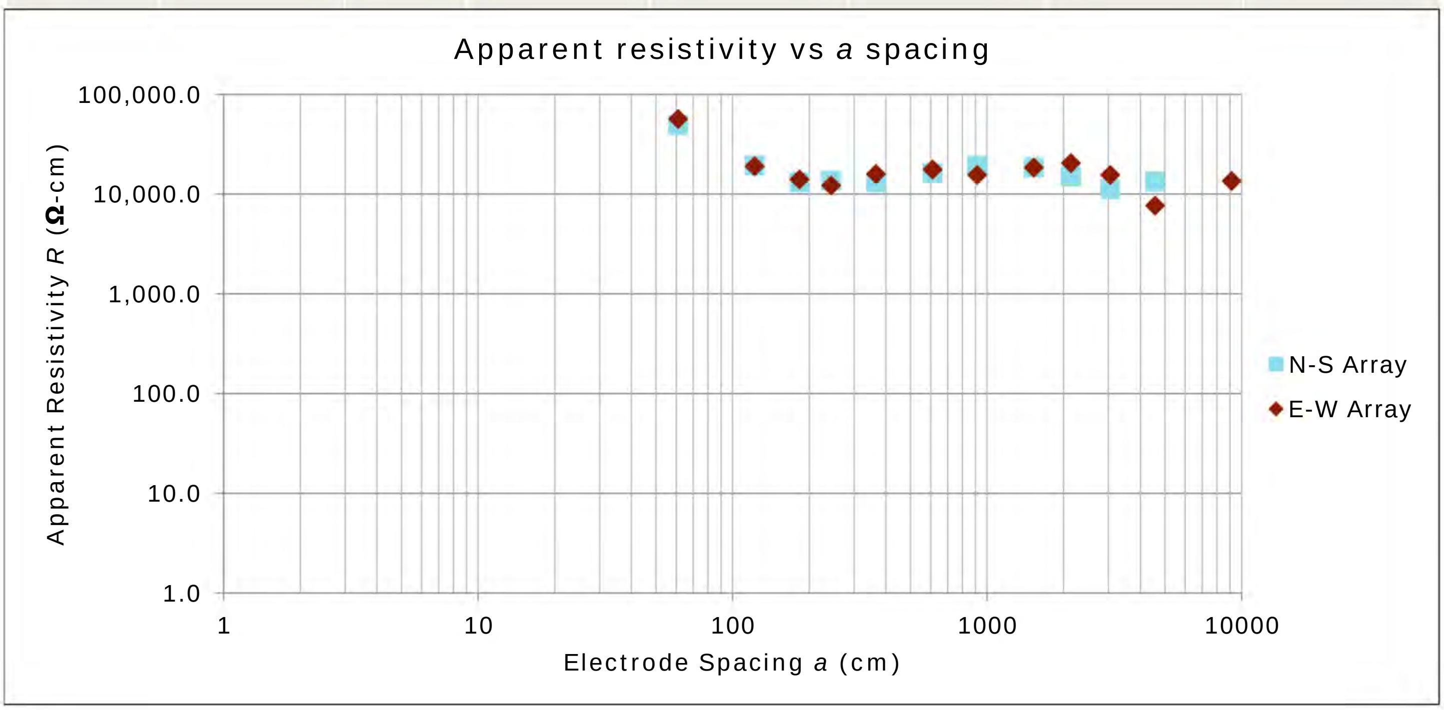
FIELD ELECTRICAL RESISTIVITY TEST DATA
Prairie Song Reliability Project | Acton, California
Terracon Project No. LA245085

Array Loc.	ER-1 (34.4831, -118.1471)		
Instrument	MiniSting	Weather	Sunny
Serial #	SZ107129	Ground Cond.	Semi-Compacted Soil
Cal. Check	August 28, 2025	Tested By	AL/OW
Test Date	December 12, 2024	Method	Wenner 4-pin (ASTM G57-06 (2012); IEEE 81-2012)
Notes & Conflicts	Site Limitation on the N-S Array due to highway		

Apparent resistivity ρ is calculated as :

$$\rho = \frac{4\pi a R}{1 + \frac{2a}{\sqrt{a^2+4b^2}} - \frac{a}{\sqrt{a^2+b^2}}}$$

Electrode Spacing *a*		Electrode Depth *b*		N-S Test		E-W Test	
(feet)	(centimeters)	(inches)	(centimeters)	Measured Resistance *R* Ω	Apparent Resistivity *ρ* (Ω-cm)	Measured Resistance *R* Ω	Apparent Resistivity *ρ* (Ω-cm)
2	61	2	5	128	49470	147	56960
4	122	2	3	25	19380	25	19010
6	183	2	5	11	13190	12	14070
8	244	2	5	8.9	13650	8.0	12270
12	366	2	5	5.7	13220	6.9	15990
20	610	2	5	4.3	16380	4.6	17760
30	914	3	8	3.3	19230	2.7	15570
50	1524	3	8	1.9	18610	1.9	18470
70	2134	3	8	1.1	15030	1.5	20480
100	3048	6	15	0.59	11310	0.82	15660
150	4572	6	15	0.47	13490	0.27	7680
300	9144	6	15			0.24	13550



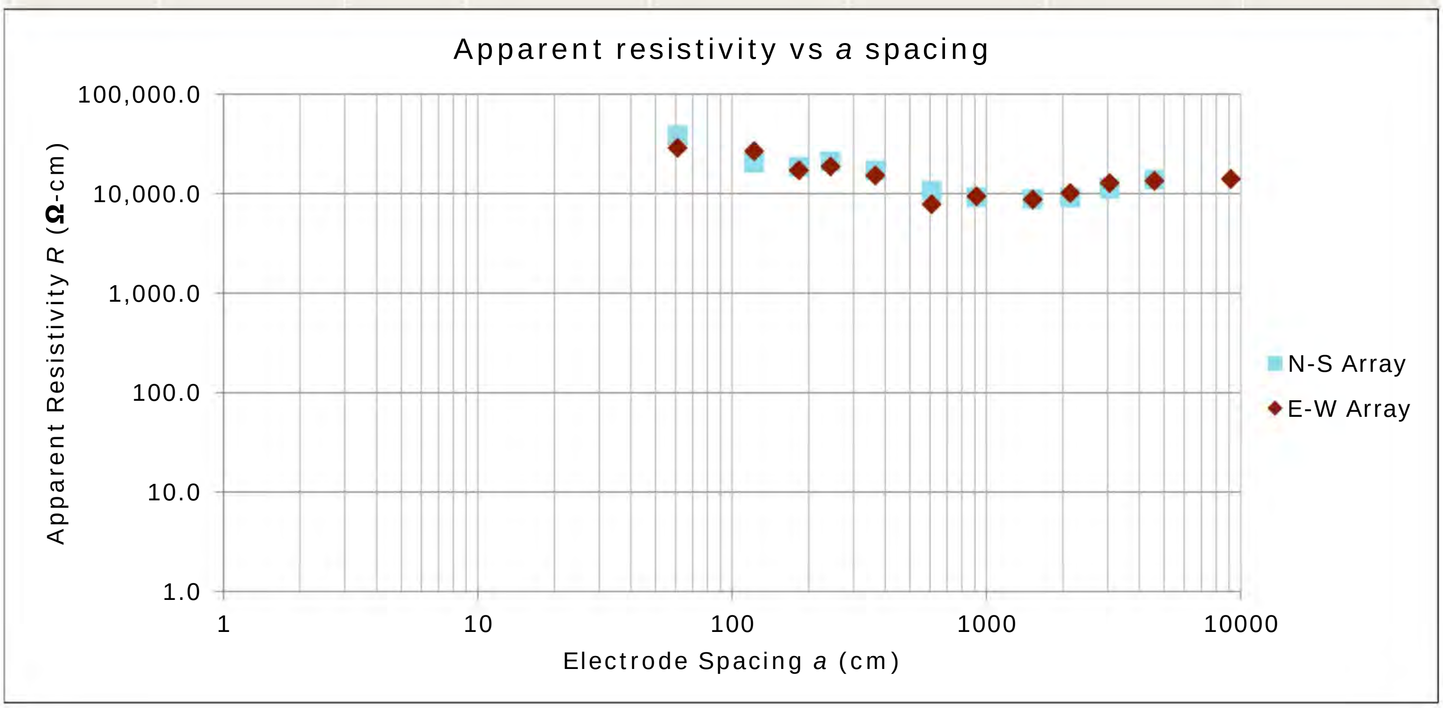
FIELD ELECTRICAL RESISTIVITY TEST DATA
Prairie Song Reliability Project | Acton, California
Terracon Project No. LA245085

Array Loc.	ER-2 (34.4834, -118.1426)		
Instrument	MiniSting	Weather	Sunny
Serial #	SZ107129	Ground Cond.	Loose Soild
Cal. Check	August 28, 2025	Tested By	AL/OW
Test Date	December 11, 2024	Method	Wenner 4-pin (ASTM G57-06 (2012); IEEE 81-2012)
Notes & Conflicts	Site Limitation on the N-S Array due to highway		

Apparent resistivity ρ is calculated as :

$$\rho = \frac{4\pi a R}{1 + \frac{2a}{\sqrt{a^2 + 4b^2}} - \frac{a}{\sqrt{a^2 + b^2}}}$$

Electrode Spacing *a*		Electrode Depth *b*		N-S Test		E-W Test	
(feet)	(centimeters)	(inches)	(centimeters)	Measured Resistance *R* Ω	Apparent Resistivity ρ (Ω-cm)	Measured Resistance *R* Ω	Apparent Resistivity ρ (Ω-cm)
2	61	2	5	100	38710	75	28990
4	122	2	5	27	20570	35	26890
6	183	2	5	16	18640	15	17220
8	244	2	5	14	21220	12	18870
12	366	2	5	7.5	17140	6.6	15290
20	610	2	5	2.8	10590	2.0	7840
30	914	3	8	1.6	9240	1.6	9460
50	1524	3	8	0.92	8810	0.92	8790
70	2134	3	8	0.68	9130	0.76	10150
100	3048	6	15	0.59	11240	0.67	12770
150	4572	6	15	0.48	13830	0.47	13450
300	9144	6	15			0.25	14090



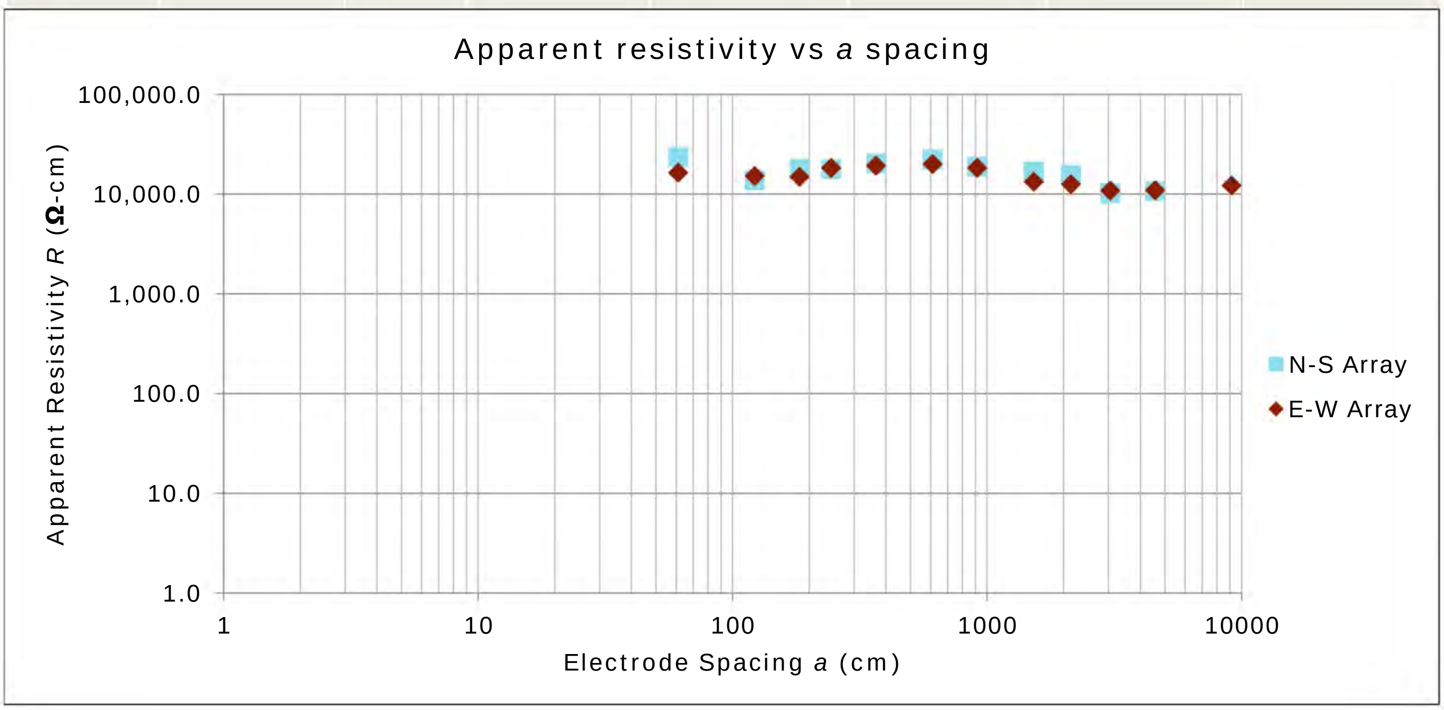
FIELD ELECTRICAL RESISTIVITY TEST DATA
Prairie Song Reliability Project | Acton, California
Terracon Project No. LA245085

Array Loc.	ER-3 (34.4854, -118.1390)		
Instrument	MiniSting	Weather	Sunny
Serial #	SZ107129	Ground Cond.	Semi-Compacted Soil
Cal. Check	August 28, 2025	Tested By	AL/OW
Test Date	December 11, 2024	Method	Wenner 4-pin (ASTM G57-06 (2012); IEEE 81-2012)
Notes & Conflicts	Site Limitation on the N-S Array due to roads		

Apparent resistivity ρ is calculated as :

$$\rho = \frac{4\pi aR}{1 + \frac{2a}{\sqrt{a^2 + 4b^2}} - \frac{a}{\sqrt{a^2 + b^2}}}$$

Electrode Spacing *a*		Electrode Depth *b*		N-S Test		E-W Test	
(feet)	(centimeters)	(inches)	(centimeters)	Measured Resistance *R* Ω	Apparent Resistivity *ρ* (Ω-cm)	Measured Resistance *R* Ω	Apparent Resistivity *ρ* (Ω-cm)
2	61	2	5	61	23530	43	16500
4	122	2	3	18	13790	20	15330
6	183	2	5	16	17970	13	14910
8	244	2	5	12	17780	12	18440
12	366	2	5	8.9	20410	8.4	19310
20	610	2	5	5.8	22340	5.2	20030
30	914	3	8	3.3	18980	3.2	18310
50	1524	3	8	1.8	16880	1.4	13400
70	2134	3	8	1.2	15670	0.94	12640
100	3048	6	15	0.54	10330	0.57	10840
150	4572	6	15	0.38	10800	0.38	10990
300	9144	6	15			0.21	12250



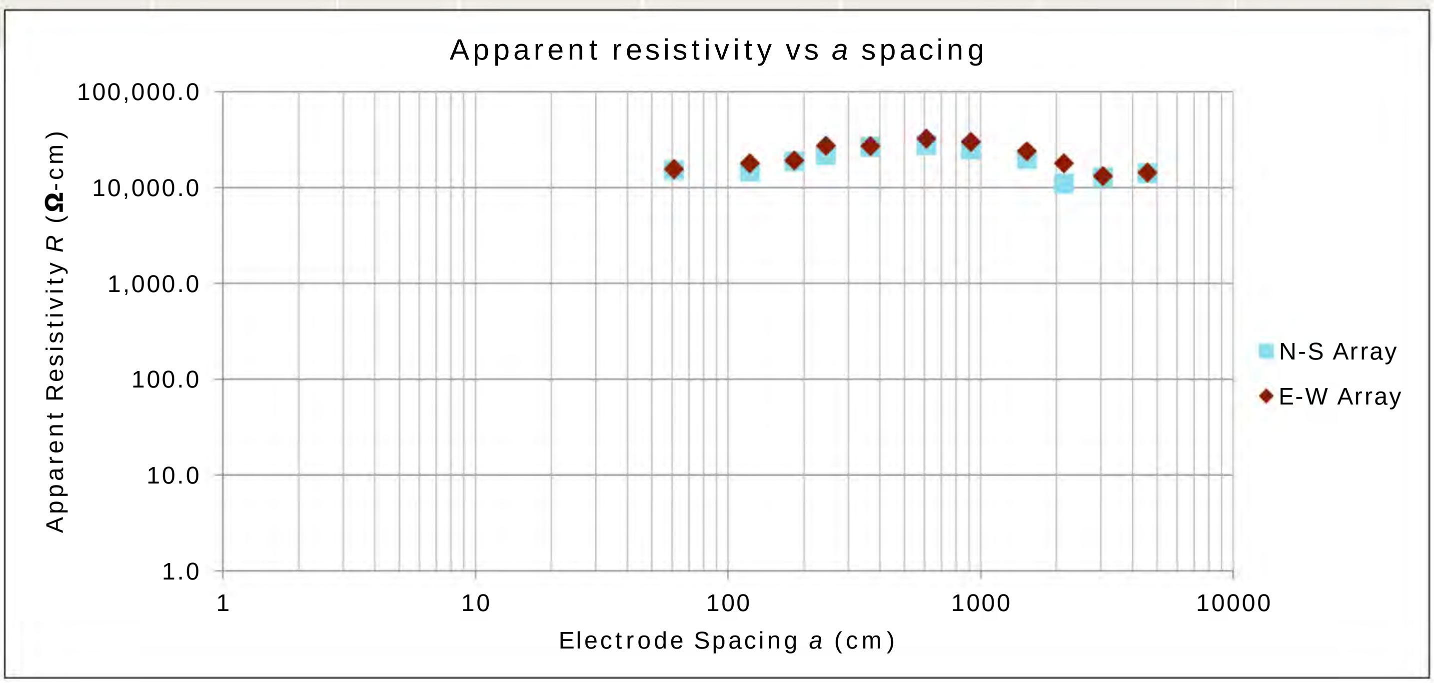
FIELD ELECTRICAL RESISTIVITY TEST DATA
Prairie Song Reliability Project | Acton, California
Terracon Project No. LA245085

Array Loc.	ER-4 (34.4867, -118.1370)		
Instrument	MiniSting	Weather	Sunny
Serial #	SZ107129	Ground Cond.	Loose Soild
Cal. Check	August 28, 2025	Tested By	AL/OW
Test Date	December 11, 2024	Method	Wenner 4-pin (ASTM G57-06 (2012); IEEE 81-2012)
Notes & Conflicts	Site Limitation on the both arrays due to a sloped terrain on the south side and thick vegetation on east side		

Apparent resistivity ρ is calculated as :

$$\rho = \frac{4\pi a R}{1 + \frac{2a}{\sqrt{a^2+4b^2}} - \frac{a}{\sqrt{a^2+b^2}}}$$

Electrode Spacing *a*		Electrode Depth *b*		N-S Test		E-W Test	
(feet)	(centimeters)	(inches)	(centimeters)	Measured Resistance *R*	Apparent Resistivity ρ	Measured Resistance *R*	Apparent Resistivity ρ
				Ω	(Ω-cm)	Ω	(Ω-cm)
2	61	2	5	39	15170	40	15640
4	122	2	5	19	14670	23	18010
6	183	2	5	16	18860	17	19160
8	244	2	5	14	21710	18	27450
12	366	2	5	12	26570	12	27210
20	610	2	5	7.3	27920	8.5	32490
30	914	3	8	4.4	25050	5.2	29940
50	1524	3	8	2.1	19900	2.5	24110
70	2134	3	8	0.82	11030	1.34	17990
100	3048	6	15	0.67	12800	0.69	13200
150	4572	6	15	0.49	14090	0.50	14410
300	9144	6	15				



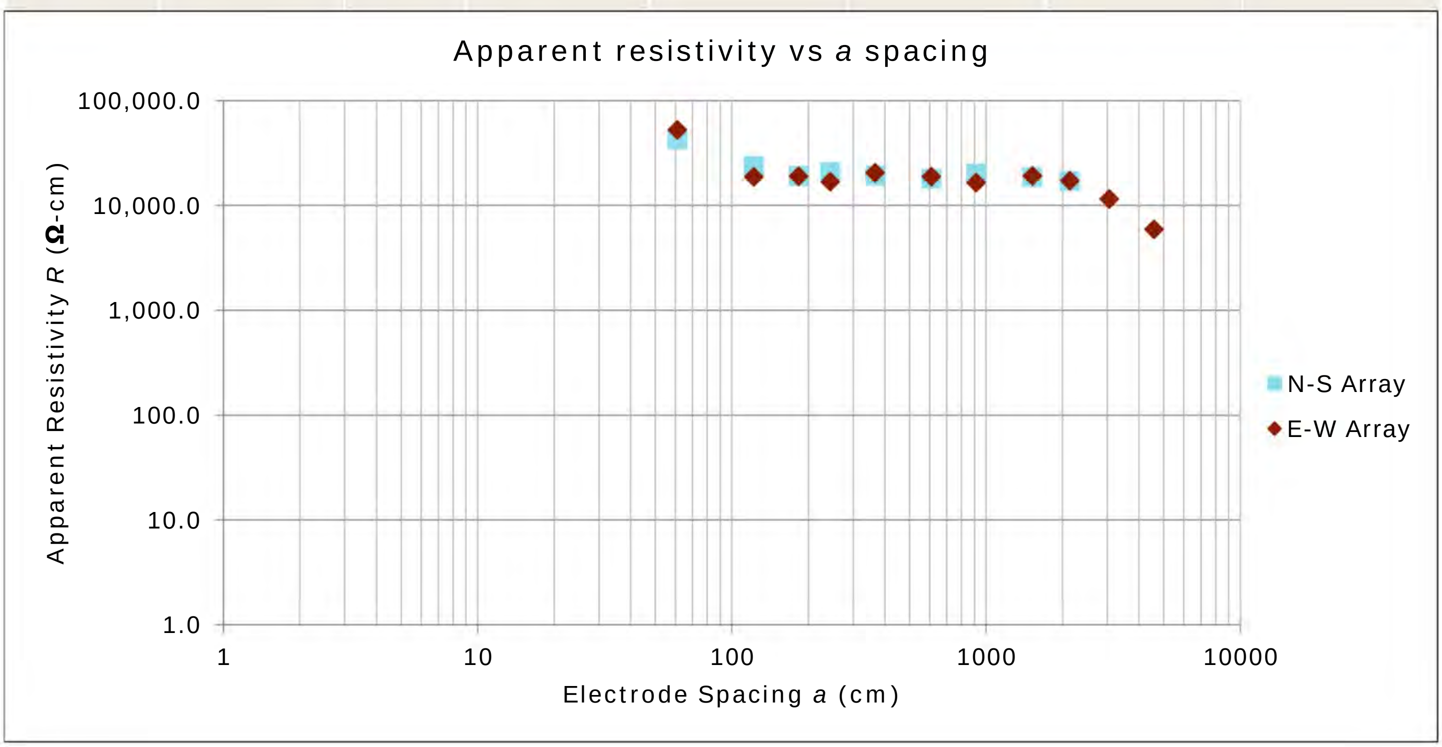
FIELD ELECTRICAL RESISTIVITY TEST DATA
Prairie Song Reliability Project | Acton, California
Terracon Project No. LA245085

Array Loc.	ER-5 (34.4834, -118.1383)		
Instrument	MiniSting	Weather	Sunny
Serial #	SZ107129	Ground Cond.	Burrowed Ground
Cal. Check	August 28, 2025	Tested By	AL/OW
Test Date	December 12, 2024	Method	Wenner 4-pin (ASTM G57-06 (2012); IEEE 81-2012)
Notes & Conflicts	Site Limitation on the N-S Array due to road in the north and wash in the south		

Apparent resistivity ρ is calculated as :

$$\rho = \frac{4\pi a R}{1 + \frac{2a}{\sqrt{a^2 + 4b^2}} - \frac{a}{\sqrt{a^2 + b^2}}}$$

Electrode Spacing *a*		Electrode Depth *b*		N-S Test		E-W Test	
(feet)	(centimeters)	(inches)	(centimeters)	Measured Resistance *R* Ω	Apparent Resistivity *ρ* (Ω-cm)	Measured Resistance *R* Ω	Apparent Resistivity *ρ* (Ω-cm)
2	61	2	5	111	43120	136	52580
4	122	2	5	31	23790	24	18750
6	183	2	5	17	19090	17	19050
8	244	2	5	14	20870	11	16920
12	366	2	5	8.4	19310	8.9	20580
20	610	2	5	4.7	17990	4.9	18930
30	914	3	8	3.5	20250	2.9	16490
50	1524	3	8	2.0	18810	2.0	19120
70	2134	3	8	1.3	17080	1.3	17280
100	3048	6	15			0.60	11510
150	4572	6	15			0.21	5930



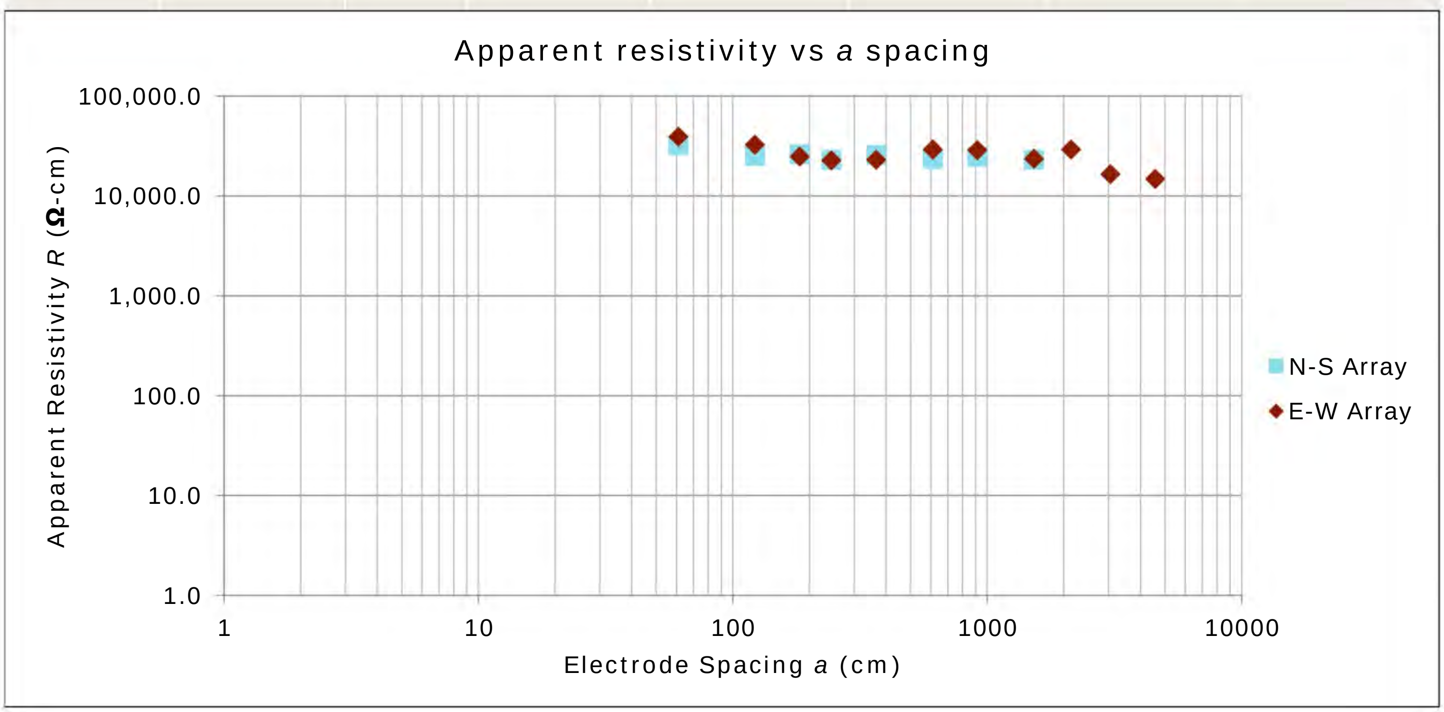
FIELD ELECTRICAL RESISTIVITY TEST DATA
Prairie Song Reliability Project | Acton, California
Terracon Project No. LA245085

Array Loc.	ER-6 (34.4802, -118.1332)		
Instrument	MiniSting	Weather	Sunny
Serial #	SZ107129	Ground Cond.	Semi-Compacted Soil
Cal. Check	August 28, 2025	Tested By	AL/OW
Test Date	December 13, 2024	Method	Wenner 4-pin (ASTM G57-06 (2012); IEEE 81-2012)
Notes & Conflicts	Site Limitation on the N-S Array due to road in the north and descending slope in the south		

Apparent resistivity ρ is calculated as :

$$\rho = \frac{4\pi a R}{1 + \frac{2a}{\sqrt{a^2 + 4b^2}} - \frac{a}{\sqrt{a^2 + b^2}}}$$

Electrode Spacing a		Electrode Depth b		N-S Test		E-W Test	
(feet)	(centimeters)	(inches)	(centimeters)	Measured Resistance R Ω	Apparent Resistivity ρ (Ω-cm)	Measured Resistance R Ω	Apparent Resistivity ρ (Ω-cm)
2	61	2	5	83	32320	101	39120
4	122	2	3	33	25240	43	32640
6	183	2	5	23	26140	22	24870
8	244	2	5	15	22980	15	22650
12	366	2	5	11	25650	10	22950
20	610	2	5	6.1	23520	7.6	29170
30	914	3	8	4.3	24580	5.0	28640
50	1524	3	8	2.4	22960	2.5	23470
70	2134	3	8			2.2	29260
100	3048	6	15			0.86	16480
150	4572	6	15			0.51	14750



Supporting Information

Contents:

Note: All attachments are one page unless noted above.

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LIQUEFACTION ANALYSIS SUMMARY

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Input File Name: C:\Users\sdhital\OneDrive - Terracon Consultants Inc\Desktop\New folder\LA245085 Prairie Song Reliability - TL-2.liq
Title: LA245085
Subtitle: Prairie Song Reliability Project

Surface Elev.=3011
Hole No.=TL-2
Depth of Hole= 51.50 ft
Water Table during Earthquake= 100.00 ft
Water Table during In-Situ Testing= 100.00 ft
Max. Acceleration= 0.87 g
Earthquake Magnitude= 7.76

Input Data:
Surface Elev.=3011
Hole No.=TL-2
Depth of Hole=51.50 ft
Water Table during Earthquake= 100.00 ft
Water Table during In-Situ Testing= 100.00 ft
Max. Acceleration=0.87 g
Earthquake Magnitude=7.76
No-Liquefiable Soils: Based on Analysis

1. SPT or BPT Calculation.
2. Settlement Analysis Method: Ishihara / Yoshimine
3. Fines Correction for Liquefaction: Idriss/Seed
4. Fine Correction for Settlement: During Liquefaction*
5. Settlement Calculation in: All zones*
6. Hammer Energy Ratio,   Ce = 1.42
7. Borehole Diameter,   Cb= 1.15
8. Sampling Method,   Cs= 1.2
9. User request factor of safety (apply to CSR) ,   User= 1.3
   Plot two CSR (fs1=1, fs2=User)
10. Use Curve Smoothing: Yes*
* Recommended Options

In-Situ Test Data:

Depth ft	SPT	gamma pcf	Fines %
2.50	8.00	120.00	24.00
5.00	12.00	120.00	24.00
7.50	11.00	120.00	10.00
10.00	15.00	115.00	10.00
15.00	20.00	110.00	10.00
20.00	40.00	110.00	10.00
25.00	28.00	120.00	10.00
30.00	41.00	120.00	10.00
35.00	46.00	120.00	10.00
40.00	33.00	120.00	10.00
45.00	37.00	120.00	10.00
50.00	27.00	120.00	10.00

Output Results:

Settlement of Saturated Sands=0.00 in.
Settlement of Unsaturated Sands=1.31 in.
Total Settlement of Saturated and Unsaturated Sands=1.31 in.
Differential Settlement=0.655 to 0.865 in.

Depth ft	CRRm	CSRfs	F.S.	S_sat. in.	S_dry in.	S_all in.
2.50	0.28	0.56	5.00	0.00	1.31	1.31
3.00	0.33	0.56	5.00	0.00	1.30	1.30
3.50	1.83	0.56	5.00	0.00	1.29	1.29
4.00	1.83	0.56	5.00	0.00	1.26	1.26
4.50	1.83	0.56	5.00	0.00	1.25	1.25
5.00	1.83	0.56	5.00	0.00	1.24	1.24
5.50	1.83	0.56	5.00	0.00	1.24	1.24
6.00	1.83	0.56	5.00	0.00	1.23	1.23
6.50	1.83	0.56	5.00	0.00	1.22	1.22
7.00	0.34	0.56	5.00	0.00	1.18	1.18
7.50	0.28	0.56	5.00	0.00	1.10	1.10
8.00	0.30	0.56	5.00	0.00	1.01	1.01
8.50	1.83	0.56	5.00	0.00	0.93	0.93
9.00	1.83	0.56	5.00	0.00	0.86	0.86
9.50	1.83	0.55	5.00	0.00	0.80	0.80
10.00	1.83	0.55	5.00	0.00	0.78	0.78
10.50	1.83	0.55	5.00	0.00	0.77	0.77
11.00	1.83	0.55	5.00	0.00	0.76	0.76
11.50	1.83	0.55	5.00	0.00	0.75	0.75
12.00	1.83	0.55	5.00	0.00	0.74	0.74
12.50	1.83	0.55	5.00	0.00	0.73	0.73
13.00	1.83	0.55	5.00	0.00	0.71	0.71
13.50	1.83	0.55	5.00	0.00	0.70	0.70

14.00	1.83	0.55	5.00	0.00	0.69	0.69
14.50	1.83	0.55	5.00	0.00	0.67	0.67
15.00	1.83	0.55	5.00	0.00	0.66	0.66
15.50	1.83	0.55	5.00	0.00	0.65	0.65
16.00	1.83	0.55	5.00	0.00	0.64	0.64
16.50	1.83	0.55	5.00	0.00	0.63	0.63
17.00	1.83	0.54	5.00	0.00	0.62	0.62
17.50	1.83	0.54	5.00	0.00	0.61	0.61
18.00	1.83	0.54	5.00	0.00	0.60	0.60
18.50	1.83	0.54	5.00	0.00	0.59	0.59
19.00	1.83	0.54	5.00	0.00	0.58	0.58
19.50	1.83	0.54	5.00	0.00	0.57	0.57
20.00	1.83	0.54	5.00	0.00	0.56	0.56
20.50	1.83	0.54	5.00	0.00	0.55	0.55
21.00	1.83	0.54	5.00	0.00	0.54	0.54
21.50	1.83	0.54	5.00	0.00	0.54	0.54
22.00	1.83	0.54	5.00	0.00	0.53	0.53
22.50	1.83	0.54	5.00	0.00	0.53	0.53
23.00	1.83	0.54	5.00	0.00	0.52	0.52
23.50	1.83	0.54	5.00	0.00	0.51	0.51
24.00	1.83	0.54	5.00	0.00	0.51	0.51
24.50	1.83	0.54	5.00	0.00	0.50	0.50
25.00	1.83	0.53	5.00	0.00	0.49	0.49
25.50	1.83	0.53	5.00	0.00	0.48	0.48
26.00	1.83	0.53	5.00	0.00	0.48	0.48
26.50	1.83	0.53	5.00	0.00	0.47	0.47
27.00	1.83	0.53	5.00	0.00	0.46	0.46
27.50	1.83	0.53	5.00	0.00	0.45	0.45
28.00	1.83	0.53	5.00	0.00	0.44	0.44
28.50	1.84	0.53	5.00	0.00	0.44	0.44
29.00	1.83	0.53	5.00	0.00	0.43	0.43
29.50	1.83	0.53	5.00	0.00	0.42	0.42
30.00	1.82	0.53	5.00	0.00	0.42	0.42
30.50	1.82	0.53	5.00	0.00	0.41	0.41
31.00	1.81	0.52	5.00	0.00	0.40	0.40
31.50	1.81	0.52	5.00	0.00	0.39	0.39
32.00	1.80	0.52	5.00	0.00	0.38	0.38
32.50	1.80	0.52	5.00	0.00	0.38	0.38
33.00	1.79	0.51	5.00	0.00	0.37	0.37
33.50	1.79	0.51	5.00	0.00	0.36	0.36
34.00	1.78	0.51	5.00	0.00	0.35	0.35
34.50	1.78	0.51	5.00	0.00	0.35	0.35
35.00	1.77	0.50	5.00	0.00	0.34	0.34
35.50	1.77	0.50	5.00	0.00	0.33	0.33
36.00	1.76	0.50	5.00	0.00	0.32	0.32
36.50	1.76	0.50	5.00	0.00	0.31	0.31
37.00	1.75	0.50	5.00	0.00	0.30	0.30
37.50	1.75	0.49	5.00	0.00	0.29	0.29
38.00	1.74	0.49	5.00	0.00	0.28	0.28
38.50	1.74	0.49	5.00	0.00	0.27	0.27

39.00	1.73	0.49	5.00	0.00	0.26	0.26
39.50	1.73	0.48	5.00	0.00	0.25	0.25
40.00	1.72	0.48	5.00	0.00	0.23	0.23
40.50	1.72	0.48	5.00	0.00	0.22	0.22
41.00	1.72	0.48	5.00	0.00	0.21	0.21
41.50	1.71	0.47	5.00	0.00	0.19	0.19
42.00	1.71	0.47	5.00	0.00	0.18	0.18
42.50	1.70	0.47	5.00	0.00	0.17	0.17
43.00	1.70	0.47	5.00	0.00	0.17	0.17
43.50	1.69	0.47	5.00	0.00	0.16	0.16
44.00	1.69	0.46	5.00	0.00	0.15	0.15
44.50	1.68	0.46	5.00	0.00	0.15	0.15
45.00	1.68	0.46	5.00	0.00	0.14	0.14
45.50	1.68	0.46	5.00	0.00	0.13	0.13
46.00	1.67	0.45	5.00	0.00	0.12	0.12
46.50	1.67	0.45	5.00	0.00	0.12	0.12
47.00	1.66	0.45	5.00	0.00	0.11	0.11
47.50	1.66	0.45	5.00	0.00	0.10	0.10
48.00	1.65	0.44	5.00	0.00	0.09	0.09
48.50	1.65	0.44	5.00	0.00	0.08	0.08
49.00	1.65	0.44	5.00	0.00	0.07	0.07
49.50	1.64	0.44	5.00	0.00	0.06	0.06
50.00	1.64	0.44	5.00	0.00	0.05	0.05
50.50	1.63	0.43	5.00	0.00	0.03	0.03
51.00	1.63	0.43	5.00	0.00	0.02	0.02
51.50	1.63	0.43	5.00	0.00	0.00	0.00

* F.S.<1, Liquefaction Potential Zone
(F.S. is limited to 5, CRR is limited to 2, CSR is limited to 2)

Units: Unit: qc, fs, Stress or Pressure = atm (1.0581tsf); Unit Weight = pcf; Depth = ft; Settlement = in.

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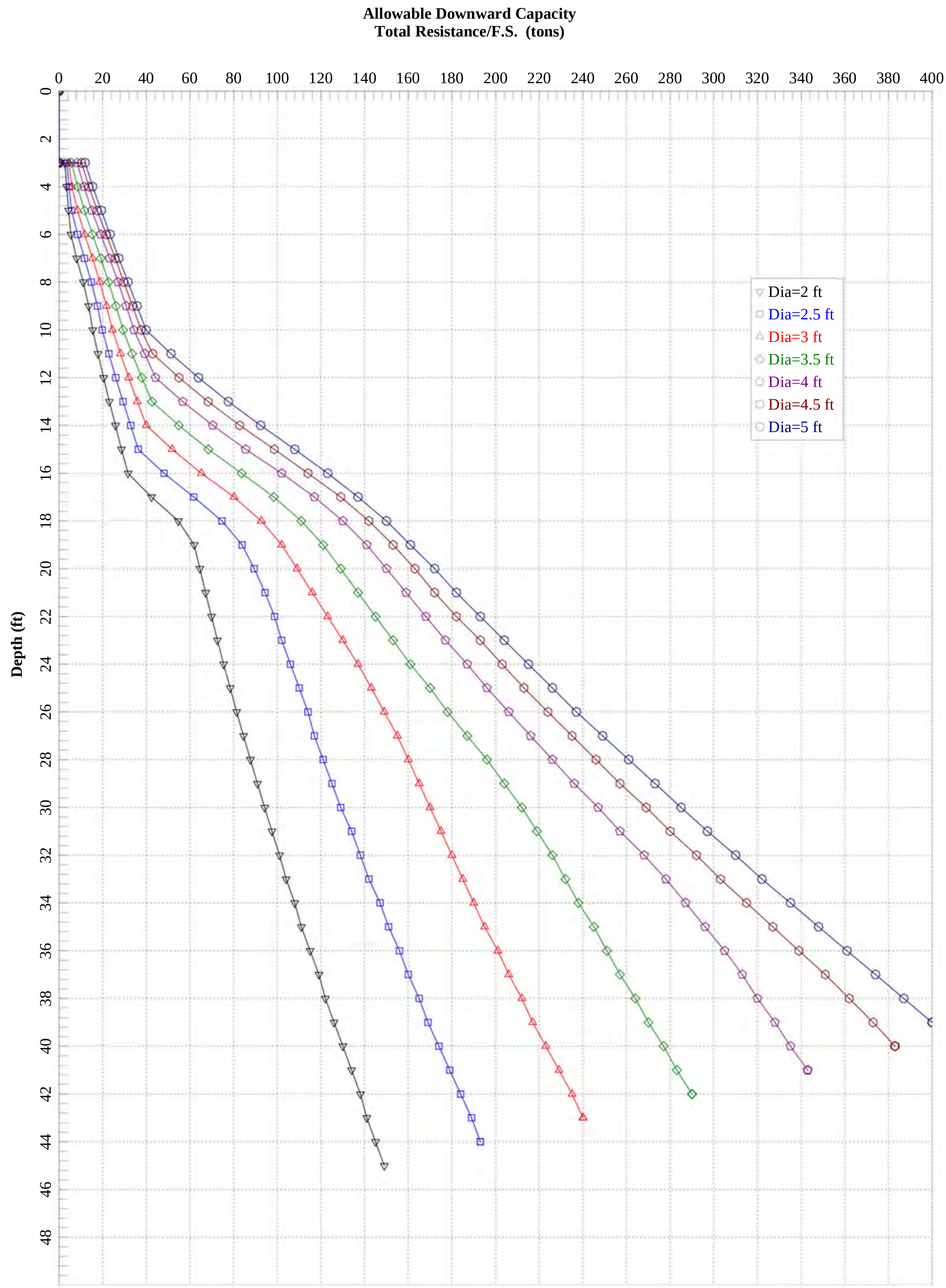
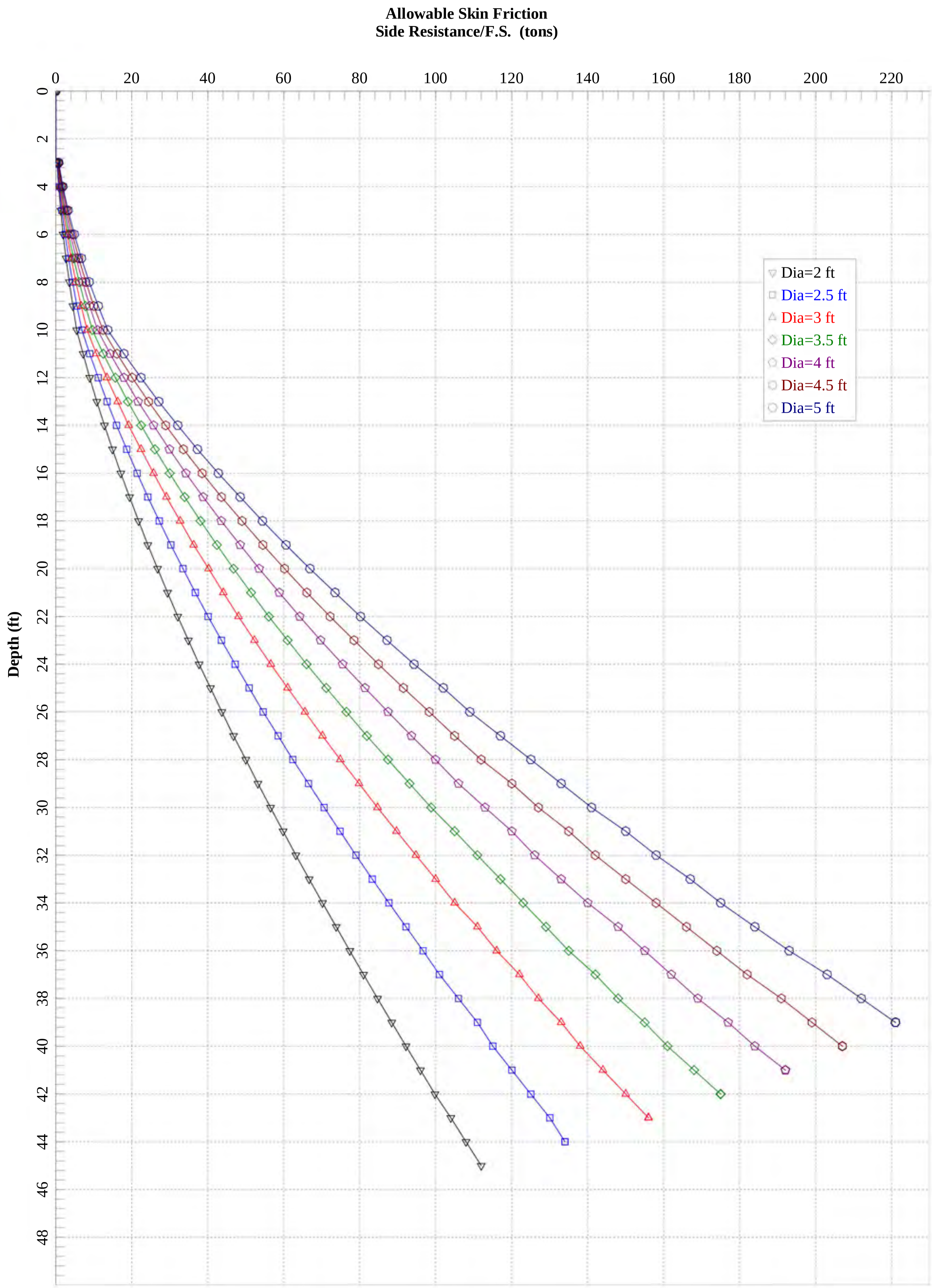
1 atm (atmosphere) = 1 tsf (ton/ft2)

CRRm	Cyclic resistance ratio from soils
CSRsf	Cyclic stress ratio induced by a given earthquake (with user request factor of safety)
F.S.	Factor of Safety against liquefaction, F.S.=CRRm/CSRsf
S_sat	Settlement from saturated sands
S_dry	Settlement from Unsaturated Sands
S_all	Total Settlement from Saturated and Unsaturated Sands
NoLiq	No-Liquefy Soils



Allowable Downward Capacity
Total Resistance/F.S. (tons)
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400
Depth (ft)
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48
Dia=2 ft
Dia=2.5 ft
Dia=3 ft
Dia=3.5 ft
Dia=4 ft
Dia=4.5 ft
Dia=5 ft



Allowable Skin Friction
Side Resistance/F.S. (tons)
0
20
40
60
80
100
120
140
160
180
200
220
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
44
46
48
Dia=2 ft
Dia=2.5 ft
Dia=3 ft
Dia=3.5 ft
Dia=4 ft
Dia=4.5 ft
Dia=5 ft

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

SAMPLING		
Auger	Shelby Tube	Split Spoon
Rock Core	Macro Core	Modified Dames & Moore Ring Sampler
Grab Sample	No Recovery	Modified California Ring Sampler

WATER LEVEL

- Water Initially Encountered
- Water Level After a Specified Period of Time
- Water Level After a Specified Period of Time

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

(HP)	Hand Penetrometer
(T)	Torvane
(b/f)	Standard Penetration Test (blows per foot)
N	N value
(PID)	Photo-Ionization Detector
(OVA)	Organic Vapor Analyzer
(WOH)	Weight of Hammer

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

LOCATION AND ELEVATION NOTES

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. 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 Includes gravels, sands and silts.			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, psf**	**Standard Penetration or N-Value Blows/Ft.**	**Ring Sampler Blows/Ft.**
Very Loose	0 - 3	0 - 6	Very Soft	less than 500	0 - 1	< 3
Loose	4 - 9	7 - 18	Soft	500 to 1,000	2 - 4	3 - 4
Medium Dense	10 - 29	19 - 58	Medium-Stiff	1,000 to 2,000	4 - 8	5 - 9
Dense	30 - 50	59 - 98	Stiff	2,000 to 4,000	8 - 15	10 - 18
Very Dense	> 50	≥ 99	Very Stiff	4,000 to 8,000	15 - 30	19 - 42
			Hard	> 8,000	> 30	> 42

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 15
With	15 - 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

Major Component of Sample	Particle Size
Boulders	Over 12 in. (300 mm)
Cobbles	12 in. to 3 in. (300mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm
Silt or Clay	Passing #200 sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 5
With	5 - 12
Modifier	> 12

PLASTICITY DESCRIPTION

Term	Plasticity Index
Non-plastic	0
Low	1 - 10
Medium	11 - 30
High	> 30

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 above "A" line [J]	CL	Lean clay [K, L, M]
			PI < 4 or plots below "A" line [J]	ML	Silt [K, L, M]
		Organic:	$\frac{LL\ oven\ dried}{LL\ not\ dried} < 0.75$	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:	$\frac{LL\ oven\ dried}{LL\ not\ dried} < 0.75$	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] $Cu = D_{60}/D_{10}$ $\qquad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
[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.