

Appendix 5

Geotechnical Investigation Report

**Proposed Chiquito BESS
Geotechnical Investigation
Report**



Prepared for:
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Project No. 185805178

November 15, 2021



Stantec Consulting Services Inc.
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November 15, 2021

Mr. Gabriel Wapner
Hecate Grid LLC
621 Randolph Street
Chicago, Illinois 60661

RE: **GEOTECHNICAL INVESTIGATION REPORT**
Chiquito Battery Energy Storage System Project
Near NEC of Clinton Keith Road and Grand Avenue
Wildomar, Riverside County, California

Dear Mr. Wapner:

This letter transmits Stantec Consulting Services Inc.'s (Stantec's) geotechnical investigation report for the 3.0 (+/-) acre site for a proposed battery energy storage system (BESS) development located near the northeast corner of Clinton Keith Road and Grand Avenue, in Wildomar, Riverside County, California. The purpose of this report is to evaluate the subsurface conditions and provide geotechnical recommendations for design and construction of the proposed development.

We appreciate the opportunity to work with you on this project. If you have any questions, please call us at the numbers below.

Respectfully submitted,

STANTEC CONSULTING SERVICES INC.


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Introduction
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1. INTRODUCTION

This report presents the results of Stantec's geotechnical investigation for the proposed 3.0 (+/-) acre Chiquito Battery Energy Storage System (BESS) development in Wildomar, Riverside County, California (the Site). The project location is shown on the Site Location Map, Figure 1 and the approximate area of the proposed development is shown on the Site Vicinity Map, Figure 2.

1.1 PROPOSED DEVELOPMENT

Based on similar projects, the development is expected to consist of shallow mat foundations to support the heavy equipment and shallow pad or spread footings to support light weight equipment. Preliminary development plans for the proposed project were not available at the time of this report. If actual foundation conditions differ from those indicated above, the recommendations of this report will need to be re-evaluated and are subject to change.

Given that there are no grading plans available, we have assumed that the final surface elevations will not vary significantly from existing site grades. The site grading and foundation plans should be provided to the Project Geotechnical Engineer for review. The recommendations in this report are subject to change based upon review of the site grading and foundation plans.

1.2 PURPOSE AND SCOPE OF WORK

1.2.1 Purpose

The purpose of this report is to evaluate the subsurface conditions at the Site and provide geotechnical recommendations for design and construction of the proposed project. This report has been prepared in general accordance with accepted geotechnical engineering principles and in general conformance with the approved proposal.

1.2.2 Scope of Work

Our scope of work consisted of the following:

- Perform a site reconnaissance to evaluate general geotechnical and site conditions,
- Perform a field subsurface exploration program consisting of drilling 7 hollow stem auger borings,
- Conduct field electrical resistivity testing at 4 locations,
- Perform geotechnical laboratory tests on selected samples,

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- Perform geotechnical engineering analyses, and
- Preparation of this geotechnical investigation report for the proposed project.

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Field Investigation
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2. FIELD INVESTIGATION

2.1 PRE-DRILLING PROCEDURES

DigAlert (Underground Service Alert of Southern California) was notified before commencing subsurface exploration activities to identify underground utilities that could conflict with the proposed borings. In addition, a private utility locator was retained, and the upper five feet were hand augered to clear the boring locations for potential conflicts with underground utilities.

2.2 DRILLING OPERATIONS

Seven test borings (B1 through B7) were drilled using a CME-85 drill rig equipped with hollow-stem augers (HSA) on October 7, 2021, by ABC Liovin Drilling Inc. (ABC). Soil borings were advanced to depths ranging from approximately 21.5 (HSA borings B1 through B3 and B5 through B7) to 51.5 (HSA boring B4) feet below the existing ground surface (bgs), and their approximate locations are shown on the Subsurface Exploration Map, Figure 3. Drilling refusal was encountered at a depth of approximately 20.5 feet in boring B2 and 26 feet in boring B4. The borings were logged by a Stantec field geologist, who also collected samples of the materials encountered for examination and laboratory testing.

2.3 SAMPLING

Relatively undisturbed samples were obtained from the HSA borings using a modified California (CAL) sampler, which is a ring-lined split tube sampler with a 3-inch outer diameter and 2½-inch inner diameter. CAL sampling followed ASTM D3550 (Standard Practice for Ring-Lined Barrel Sampling of Soils) procedures. Disturbed samples were obtained using a Standard Penetration Test (SPT) sampler, which is a split tube sampler with a 2-inch outer diameter and 1¾-inch inner diameter. SPTs were performed in general accordance with ASTM D1586 (Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils), and D6066 (Standard Practice for Determining the Normalized Penetration Resistance of Sands for Evaluation of Liquefaction Potential). Disturbed bulk samples were also obtained from the drill cuttings and hand auger boring.

The CAL and SPT samplers were driven with a 140-pound weight dropping 30 inches. The number of blows per 6-inch increment is noted on the boring logs. ABC provided a report (SPT, 2021) which indicates the average hammer energy efficiency on the drill rig used at the project was 71%.

Samples were classified in the field using the Unified Soil Classification System (USCS), in accordance with ASTM D2488 (Standard Practice for Description and Identification of Soils [Visual-Manual Method]) procedures. The laboratory testing confirmed or modified field classifications as necessary for presentation on the boring logs. Soil samples were removed from the samplers, placed in appropriate containers, and transported in accordance with ASTM D4220 (Standard

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Practice for Preserving and Transporting Soil Samples). Upon completion, borings were backfilled with grout. The boring logs are included in Appendix A.

2.4 SOIL ELECTRICAL RESISTIVITY TESTING

A soil electrical resistivity study was conducted by Atlas Technical Consultants (ATC), which included collection of electrical resistivity data at the site, compilation and analysis of the data collected, and preparation of the data report as included in Appendix C of this report. Specifically, ATC conducted two crossing, nearly orthogonal resistivity soundings at four locations (R-1 through R-4) onsite for a total of eight lines. The roughly northeast-southwest trending lines are given an "a" designation (e.g., R-1a) and the roughly northwest-southeast lines are given a "b" designation (e.g., R-1b). In Appendix C, Figure 2 illustrates the approximate sounding locations, and Figure 3 illustrates the conditions in the study areas. A summary of the findings is provided in Section 7.3.

The data were collected in general accordance with ASTM G57 using an Advanced Geosciences, Inc. (AGI) MiniSting earth resistivity meter and four steel electrodes in a Wenner configuration. Soil resistance measurements were collected at electrode spacing distances of 2.5, 5, 10, 20, and 50 feet, along the two lines with the middle of each sounding generally located at a common center point. The stainless-steel electrodes were hammered into place and the soils surrounding the electrodes were moistened with saline water where necessary.

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3. LABORATORY TESTING

The following laboratory tests were performed in general accordance with ASTM and California Test procedures:

Table 1. Summary of Laboratory Tests

Type of Test	ASTM Designation	Number Performed
Sieve Analysis	ASTM D422 and ASTM C136	7
#200 Wash	ASTM D1140	3
Atterberg Limits	ASTM D4318	2
Direct Shear	ASTM D3080	7
Maximum Dry Density and Optimum Moisture Content (Modified Proctor)	ASTM D1557	3
Chemical Tests for Corrosion Potential	CA DOT test methods	3
Thermal Resistivity	ASTM D5334	4

The complete laboratory report is presented in Appendix B.

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4. GEOLOGIC SETTING AND SITE CONDITIONS

4.1 REGIONAL GEOLOGY

The site is located in the Peninsular Ranges geologic province which consists of a series of ranges separated by northwest trending valleys, subparallel to faults branching from the San Andreas Fault. The Peninsular Ranges extend into lower California and are bound on the east by the Colorado Desert. The Site resides in the portion of the province drained by surface runoff toward Bear Creek.

Geologic mapping presented in the United States Geological Survey (USGS) San Bernardino & Santa Ana 30' x 60' Quadrangle (USGS, 2006) indicates the site is underlain by Quaternary Sandstone Member deposits. Literature from USGS indicates the Sandstone Member deposits consist of Pleistocene sandstone containing cobble to boulder conglomerate beds.

4.2 SURFACE CONDITIONS

The project Site is approximately 3 acres in size and is occupied by vacant land. The project Site is bound by Clinton Keith Road followed by vacant land to the southeast, Grand Avenue followed by vacant land and single-family homes to the southwest, single-family homes and vacant land to the northwest, and a retail landscape materials business to the northeast.

The Site is generally flat and slopes downward from northwest to southeast. Based on Google Earth®, the ground surface of the Site is at an approximate elevation of 1,197 to 1,202 feet (WGS84 Datum).

4.3 SUBSURFACE CONDITIONS

The materials encountered in our borings are consist of with Quaternary Young Alluvial Valley (Qyv) deposits. A brief description of the subsurface conditions is provided in this section. Detailed descriptions of the subsurface conditions are provided in the boring logs included in Appendix A.

A description of the mapped soil units is provided below.

Quaternary Young Alluvial Valley (Qyv) Deposits – The near surface soils are mapped as Quaternary Sandstone Member deposits of Pleistocene age. However, the soils appear to be young alluvial valley deposits (Qyv) of Holocene and Late Pleistocene age. The deposits encountered consist of sand with variable amounts of silt and gravel (USCS: SP-SM, SM, SC), clay with variable amounts of sand (USCS: CL), and silt with variable amounts of sand (USCS: ML) to depths ranging from 18 to 25 feet below the ground surface (bgs). The sandy deposits were medium to dense to very dense and generally dry to moist. The clay and silt deposits were low in plasticity, stiff to hard in consistency, and moist to wet.

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Heterogeneous Granitic Rocks (Khg) – Below the alluvial deposits in two soil borings (B2 and B4), cretaceous age Heterogeneous Granitic Rock (Kgh) was encountered to a depth of approximately 20.5 and 26 feet bgs, at drilling refusal. The bedrock consisted of grandiorite and was dry, hard, and slightly weathered.

Groundwater - Groundwater was encountered during this investigation in three soil borings (B4 – B6) at depths ranging from 19.5 feet to 23 feet. Historical high depth to groundwater is approximately 10 feet bgs (CGS, 2018). Groundwater in the site vicinity appears to flow to the southeast toward Murrieta Creek. Groundwater levels may fluctuate in the future due to rainfall, irrigation, broken pipes, or changes in site drainage.

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5. GEOLOGIC HAZARDS

5.1 FAULTING AND SURFACE FAULT RUPTURE

As in most parts of California, the Site is located in a seismically active area. The estimated closest distance from the Site to major nearby mapped active faults is presented in the table below.

The estimated distance of the Site to the nearest expected surface expression of an active fault is presented in the table below. The distance measurement was taken from a location in the middle of the site, which has a latitude of 33.808881°, and a longitude of -116.493477°.

Table 2. Faults in Site Vicinity

Fault	Distance (miles) ⁽¹⁾	Maximum Moment Magnitude ⁽¹⁾
Elsinore	0.4	7.9
San Jacinto	20.6	7.9
San Joaquin Hills	24.3	7.1
Chino	24.4	6.8
Newport Inglewood Connected	27.5	7.5

¹Measured from 2008 National Seismic Hazard Maps – Source Parameters Website - USGS (USGS, 2008).

The Site is not located within a currently mapped Alquist-Priolo Special Studies Fault Zone (CDMG, 2002b). As noted above, the nearest active fault is the Elsinore fault, located approximately 0.4 miles northeast of the Site. No active faults are known to underlie or project toward the site. Therefore, the probability of surface fault rupture at the site from a known active fault is considered low.

5.2 CALIFORNIA BUILDING CODE SEISMIC CRITERIA

A geologic hazard likely to affect the project is ground-shaking as a result of movement along an active fault zone in the vicinity of the Site. The seismic parameters in accordance with the 2019 California Building Code (CBC) are presented below:

Table 3. 2019 CBC Seismic Parameters and Peak Ground Acceleration

Parameter	Value
Site Coordinates	Latitude : 33.585297° Longitude : -117.254701°
Mapped Spectral Acceleration Value at Short Period: S_s	1.622g
Mapped Spectral Acceleration Value at 1-Second Period: S₁	0.604g
Seismic Site Classification	D
Short Period Site Coefficient: F_a	1.0
1-Second Period Site Coefficient: F_v	1.7
Site Class Adjusted Acceleration Value at Short Period: S_{MS}	1.622g

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Table 3. 2019 CBC Seismic Parameters and Peak Ground Acceleration

Parameter	Value
Site Class Adjusted Acceleration Value at 1-Second Period: S_{M1}	1.027g
Design Spectral Response Acceleration at Short Periods: S_{Ds}	1.082g
Design Spectral Response Acceleration at 1-Second Period: S_{D1}	0.688g
Peak Ground Acceleration adjusted for Site Class Effects: PGA_M	0.78g

ASCE 7-16 – Report generated through ASCE 7 Hazards Report website (ASCE, 2019) – accessed 11/15/21.

The values in Table 3 presume exemption 2 in Section 11.4.8 of ASCE 7-16 is applicable. If the project structural engineer determines exemption 2 does not apply, the values above will need to be reevaluated.

5.3 LIQUEFACTION AND DYNAMIC SETTLEMENT

Liquefaction is the transformation of a deposit of soil from a solid state to a liquefied state as a consequence of increased pore pressure and reduced effective stress. Often, this transformation results from the cyclic loading of an earthquake and the soil acquires “mobility” sufficient to permit both horizontal and vertical movements. Soils that are most susceptible to liquefaction are clean, loose, saturated (below groundwater), and uniformly graded sands. The vast majority of liquefaction hazards are associated with sandy soils and silty soils of low plasticity. Cohesive soils with a plasticity index (PI) greater than 7 are generally not considered susceptible to soil liquefaction, although they can be subject to cyclic softening if they are soft enough, and if the seismic demand is relatively high.

The Site is not located in a California Geological Survey Liquefaction Hazard Zone. This zone is defined as areas where historical occurrence of liquefaction, or local geological, geotechnical and groundwater conditions indicate a potential for permanent ground displacements such that mitigation would be required.

The liquefaction potential and dynamic settlement were evaluated with the LiqSVs v1.3.3.1 computer program (Geologismiki, 2018) using the SPT data. Liquefaction triggering methods developed by Idriss and Boulanger (2014) were used in our liquefaction evaluation. Our evaluation was based on the site class adjusted peak ground acceleration of 0.78g, as presented in Table 3, and an earthquake magnitude of 7.7, the modal earthquake magnitude from the 2014 USGS deaggregation website. The in-situ groundwater level of 19 feet bgs was used to evaluate the cyclic resistance ratio of the on-site soil, and the historical high groundwater depth of approximately 10 feet was used to evaluate the cyclic stress ratio for the design earthquake (CGS, 2018).

Medium dense to very dense granular soils and stiff to hard fine-grained soils are generally present from the ground surface to a depth of at least 26 feet at the site. Based on the denseness of granular soils and consistency of fine-grained soils, most of these soils in the top 26 feet are not considered susceptible to liquefaction. Our evaluation indicates that relatively significant portions of the alluvial valley deposits between 17 and 23 feet bgs are subject to liquefaction induced

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settlement. Seismic induced surface settlement is estimated to be on the order of 1.3-inches. Differential settlement over a span of approximately 30 feet is estimated to be approximately half of the total settlement. The results of the liquefaction analyses using the LiqSVs software are provided in Appendix C - Liquefaction Analyses.

5.4 LIQUEFACTION-INDUCED LATERAL SPREADING

Liquefaction induced lateral spreading can occur in areas of sloping ground, or towards a free face. Given the relatively flat topography, distance to a free face, and low liquefaction susceptibility of soils, the potential for liquefaction-induced lateral spreading is considered low.

5.5 FLOODING, TSUNAMIS AND SEICHES

The Site is located within a FEMA Flood Zone X, which is an area of minimal flood hazard (FEMA, 2008). Therefore, damage due to flooding is considered low.

The Site is not located within a Tsunami Inundation Area; therefore, damage due to tsunamis is considered low.

5.6 EXPANSIVE SOILS

The near-surface soils (upper approximate 10 feet) have a low expansion potential. Our soil classifications and laboratory test results show that the near surface (upper 10 feet) samples tested are granular with low-plasticity fines. Accordingly, mitigation for expansive soils is not considered necessary for onsite soils at this Site.

If imported soils are used for earthwork, Stantec recommends that the proposed soils be tested for expansion potential prior to import. Imported soils should be approved by the Geotechnical Engineer before being imported.

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6. CONCLUSIONS

Based on our field exploration, laboratory testing and engineering and geologic analyses, it is our opinion that the Site is suitable for construction of the proposed BESS improvements from a geotechnical engineering and engineering geology viewpoint; however, there are existing geotechnical conditions associated with the Site that warrant mitigation and/or consideration during the planning stages. The main geotechnical conclusions for the project are presented in the following paragraphs.

- Holocene and Late Pleistocene age alluvial valley deposits were encountered throughout the site and primarily consist of sand with variable amounts of silt and gravel (USCS: SP-SM, SM, SC), clay with variable amounts of sand (USCS: CL), and silt with variable amounts of sand (USCS: ML) to depths ranging from 18 to 25 feet below the ground surface (bgs). The sandy deposits were medium to dense to very dense and generally dry to moist. The clay and silt deposits were low in plasticity, stiff to hard in consistency, and moist to wet.
- Bedrock was encountered below the alluvial deposits in two soil borings (B2 and B4) at a depth of approximately 18 and 25 feet bgs. Formational material included cretaceous age Heterogeneous Granitic Rock (Kgh) and extended to drilling refusal, which was encountered at a depth of approximately 20.5 and 26 feet bgs. The bedrock consisted of grandiorite and was dry, hard, and slightly weathered.
- Groundwater was encountered during this investigation in three soil borings (B4 – B6) at depths ranging from 19.5 feet to 23 feet. Historical high depth to groundwater is approximately 10 feet bgs (CGS, 2018). Groundwater in the site vicinity appears to flow to the southeast toward Murrieta Creek. Groundwater levels may fluctuate in the future due to rainfall, irrigation, broken pipes, or changes in site drainage.
- Some clay layers between the ground surface and a depth of approximately 50 feet are potentially susceptible to seismically induced settlement. Our evaluation indicates that portions of the alluvial valley deposits between 17 and 23 feet bgs are subject to liquefaction induced settlement. Seismic induced surface settlement is estimated to be on the order of 1.3-inches. Differential settlement over a span of approximately 30 feet is estimated to be approximately half of the total settlement. The results of the liquefaction analyses using the LiqSVs software are provided in Appendix C - Liquefaction Analyses.
- A key seismic hazard for the project is ground shaking caused by regionally active faults during a seismic event. The structures are likely to experience ground shaking during their design life. Geotechnical recommendations presented in this report are intended to reduce the seismic risk to an “acceptable level”, which means a level of

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mitigation that provides reasonable protection of the public safety, though it does not necessarily ensure continued structural integrity and functionality of the project (14 CCR 3721 (a)).

- No active faults are known to underlie or project toward the site. Therefore, the probability of surface fault rupture occurring at the site from a known active fault is considered low.
- The Site is located within a FEMA Flood Zone X, which is an area with minimal flood risk (FEMA, 2008). Therefore, damage due to flooding is considered low.

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7. RECOMMENDATIONS

7.1 EARTHWORK

The following recommendations are provided regarding specific aspects of the proposed earthwork construction. These recommendations should be considered subject to revision based on Site layout, foundation loads, and additional geotechnical evaluation of the conditions observed by the Geotechnical Engineer during grading operations.

7.1.1 Site Preparation

Site preparation should begin with the removal of existing buried slabs and foundations, vegetation, highly organic soil, leach lines, septic tanks, and any other unsuitable materials, if found during grading. Existing underground utilities within the proposed construction areas, if any, should be completely removed and/or rerouted. Grading should conform to the guidelines presented in the 2019 California Building Code (CBC, 2019), as well as the pertinent requirements of the City of Wildomar and Riverside County.

7.1.2 Remedial Grading

Shallow Foundation Areas:

Existing soils should be excavated to a minimum depth of 3 feet below the bottom of the footings. The surface exposed by excavation should be scarified to a depth of 8 inches, moisture conditioned to within 3 percentage points of the optimum moisture content and compacted to 90 percent relative compaction based on the ASTM D1557 procedure. All references to optimum moisture content and relative compaction are based on this test method. Removal and replacement with compacted fill should extend at least three feet beyond the outside edge of the foundations.

The removed soils can be placed back in the excavation as compacted fill. The material should be replaced in 8-inch thick loose lifts, moisture conditioned to within 2 percentage points of optimum, and compacted to 90% relative compaction. Excavation, replacement, and compaction beneath shallow foundations should extend horizontally at least two feet beyond the outside edge of the footing areas unless constrained by property lines.

Concrete Pavement and Hardscape:

Remedial grading for pavement and hardscape areas should include removal of the existing soils to a depth of at least 12 inches below the existing ground surface or subgrade elevation, whichever is deeper. Subgrade elevation is defined as the top of soil elevation provided in the grading plan. The soil exposed at the base of the excavation should be scarified to a depth of 8

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inches, and moisture conditioned to within 2 percentage points of the optimum moisture content. Hardscape subgrade should be compacted to at least 90% relative compaction. Pavement subgrade should be compacted to at least 90% relative compaction.

Field Observations:

The Geotechnical Engineer should check the bottom of excavations. If soft, loose, or otherwise unsuitable soils are encountered, the depth of removal may need to be extended.

7.1.3 Fill Placement and Compaction

Excavated materials determined by the Geotechnical Engineer to be satisfactory can be reused as compacted fill. We anticipate that the majority of the excavated materials can be re-used as compacted fill soils. The Geotechnical Engineer should approve the fill material before placement.

Where large compaction equipment is used, such as sheep's foot or smooth drum compactors, fill should be placed in 6- to 8-inch thick loose, horizontal lifts, moisture conditioned to within 2 percentage points of the optimum moisture content and compacted to at least 90% relative compaction. Thinner lifts will be required for smaller compaction equipment. The maximum dry density and optimum moisture content for the evaluation of relative compaction should be determined in accordance with ASTM D1557.

7.1.4 Yielding Subgrade Conditions

The soil encountered at the bottom of the remedial grading excavations can exhibit "pumping" or yielding if they become saturated in response to periods of significant precipitation, such as during the winter rainy season. If this occurs, corrective measures should be performed with oversight from the Geotechnical Engineer.

In order to help stabilize the yielding subgrade soils within the bottom of the removal areas, the contractor can consider the placement of stabilization fabric or geo-grid over the yielding areas, depending on the relative severity of the yielding.

Mirafi 600X (or approved equivalent) stabilization fabric may be used for areas with low to moderate yielding conditions. Geo-grid such as Tensar TX-5 may be used for areas with moderate to severe yielding conditions. Uniform sized, ¾- to 2-inch crushed rock should be placed over the stabilization fabric or geo-grid. A 6- to 12-inch thick section of crushed rock will typically be necessary to stabilize yielding ground.

If significant voids are present in the crushed gravel, a filter fabric should be placed over the crushed gravel to prevent migration of fines into the gravel and thus potential settlement of the overlying fill. Fill soils, which should be placed and compacted in accordance with the recommendations presented herein, should then be placed over the fabric or geo-grid until

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design grades are reached. The crushed gravel and stabilization fabric or geo-grid should extend at least 5 feet laterally beyond the limits of the yielding areas.

7.1.5 Dewatering

Groundwater was encountered during this investigation in three soil borings (B4 through B6) at depths ranging from 19.5 feet to 23 feet. Given the anticipated shallow foundations, we do not anticipate that groundwater will be a significant consideration for this project.

7.1.6 Expansive Soil

The near-surface soils (approximately upper 10 feet) have a low expansion potential. Our soil classifications and laboratory test results show that the near surface (upper 10 feet) samples tested are granular with low-plasticity fines. Accordingly, mitigation for expansive soils is not considered necessary at this Site. The grading and foundation recommendations presented in this report reflect a low expansion potential.

7.1.7 Imported Material

Imported materials, if used for fill, should be predominately granular, contain no rocks or lumps greater than 3 inches in maximum dimension, and have an Expansion Index less than 20, and a Plasticity Index less than 15. Imported materials should be reviewed and approved by the Geotechnical Engineer before being brought to the Site.

7.1.8 Site Excavation Characteristics

During the recent geotechnical investigation, the soil boreholes were drilled using a truck-mounted, hollow stem auger drill rig. As the drilling was completed with moderate effort, conventional earth moving equipment should be capable of performing the excavations required for site development.

7.1.9 Oversized Material

Excavations may generate oversized material. Oversized material is defined as rocks or cemented clasts greater than 3 inches in largest dimension. Oversized material should be broken down to no greater than 3 inches in largest dimension for use in fill or be removed from the Site.

7.1.10 Temporary Excavations

The existing native soils can be considered Type C for excavation in accordance with OSHA and Cal-OSHA requirements. Temporary excavations should be shored or excavated with a slope not steeper than 1.5:1 (horizontal to vertical) in accordance with OSHA and Cal-OSHA requirements.

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The excavations should be inspected daily by the contractor's Competent Person before personnel are allowed to enter the excavation. Any zones of potential instability, sloughing or raveling should be brought to the attention of the Geotechnical Engineer and corrective action implemented before personnel begin working in the excavation. Excavated soils should not be stockpiled behind temporary excavations within a distance equal to the depth of the excavation.

The project geotechnical engineer should be notified if other surcharge loads are anticipated so that lateral load criteria can be developed for the specific situation. If temporary slopes are to be maintained during the rainy season, berms are recommended near the tops of slopes to prevent runoff water from entering the excavation and eroding the slope faces.

7.1.11 Pipelines

Typical pipe bedding as specified in the Standard Specifications for Public Works Construction (GREENBOOK) may be used. As a minimum, it is recommended that pipe be supported on at least 4 inches of granular bedding material, such as 3/4-inch rock or clean coarse sand with less than 5 percent fines and a sand equivalent of 40 or more as evaluated by ASTM D2419.

The bedding should extend from the bottom of the trench to at least 1 foot above the top of the pipe. Sand bedding should be mechanically compacted to at least 90 percent relative compaction. Jetting of sand bedding should not be permitted.

Onsite material, imported select material, or 2-sack cement/sand slurry may be used as backfill in trenches above the pipe bedding. The material selected should match the engineering characteristics of the soils adjacent to the trench. Utility trench backfill beneath structures and hardscape should be compacted to at least 90% relative compaction.

The modulus of soil reaction (E') is used to characterize the stiffness of soil backfill placed along the sides of buried flexible pipelines. For the purpose of evaluating deflection due to the load associated with trench backfill over the pipe, a value of 1,500 pounds per square inch (lbs/in²) is recommended for the general site conditions assuming granular bedding material (sand or gravel) is placed around the pipe.

7.1.12 Surface Drainage

Final surface grades around structures should be designed to collect and direct surface water away from the structure and toward appropriate drainage facilities. The ground around the structure should be graded so that surface water flows rapidly away from the structure without ponding. In general, we recommend that the ground adjacent to the structure slope away at a gradient of at least 2%. Densely vegetated areas where runoff can be impaired should have a minimum gradient of at least 5% within the first 5 feet from the structure. Roof gutters with downspouts that discharge directly into a closed drainage system are recommended on structures. Drainage patterns established at the time of fine grading should be maintained

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throughout the life of the proposed structures. Site irrigation should be limited to the minimum necessary to sustain landscape growth. Should excessive irrigation, impaired drainage, or unusually high rainfall occur, saturated zones of perched groundwater can develop. Saturated soil zones may result in increased maintenance and could impact structure stability.

7.1.13 Grading Plan Review

Stantec should review the grading plans and earthwork specifications to ascertain whether the intent of the recommendations contained in this report have been implemented, and that no revised recommendations are needed due to changes in the development scheme.

7.2 FOUNDATIONS

7.2.1 Shallow Foundations

To mitigate seismically induced settlement, we recommend the new structures should be constructed with a stiffened foundation system in combination with a recompacted fill mat. The stiffened foundation system should consist of a rigid mat, post-tensioned slab, or a waffle foundation system tied together with grade beams.

If a rigid mat foundation is used, the mat slab should extend at least 12 inches below the adjacent ground surface. The mat thickness should be determined by the structural engineer. The mat can be designed assuming an allowable bearing pressure of 2,500 pounds per square foot for dead plus live loads, with a one-third increase for all loads including wind or seismic. This allowable bearing pressure is a net value; therefore, the weight of the mat can be neglected for design purposes. The mat should be integrally connected to all portions of the structure, so the entire foundation system moves as a unit. The mat should be reinforced with top and bottom steel in both directions to allow the foundation to span local irregularities that may result from potential differential settlement. As a minimum, we recommend that the mat be reinforced with sufficient top and bottom steel to span as a simple beam an unsupported distance of at least 10 feet. The mat can be designed using a modulus of subgrade reaction, K_v1 , of 250 pounds per cubic inch. The actual modulus of subgrade reaction would need to be adjusted for the plan dimensions of the mat.

We recommend incorporating flexible utility connections to the buildings to accommodate the estimated total and differential settlements.

7.2.2 Drilled Pier Foundations

To accommodate seismically-induced settlement, we recommend all drilled pier column footings consist of reinforced concrete drilled piers having a minimum diameter or width of 2.0 feet and embedded a minimum depth of 7 feet bgs. Based on these assumptions and the anticipated subsurface conditions, an allowable bearing pressure of 4,000 psf may be used in the design. For

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resistance to transient lateral loads, such as earthquake and wind loads, the aforementioned allowable bearing capacity may be increased by one-third.

7.2.3 Foundation Settlement

The following static and seismic foundation settlements are estimated.

Static Settlement: Less than 1-inch total settlement
 ½ inch differential settlement over 30 feet

Seismic Settlement: 1.3-inches total settlement
 0.7-inches differential settlement over 30 feet

7.2.4 Lateral Resistance

Lateral loads will be resisted by friction between the bottoms of footings and passive pressure on the faces of footings and other structural elements below grade. An allowable coefficient of friction of 0.30 can be used.

Passive pressure can be computed using an equivalent fluid pressure of 360 lbs/ft³ for level ground conditions. Active pressure can be computed using an equivalent fluid pressure of 40 lbs/ft³ for level ground conditions. Reductions for sloping ground should be made. The upper 1 foot of soil should not be relied on for active or passive support unless the ground is covered with pavements or slabs.

These pressures are based on level ground conditions in front and behind the foundation with no surcharge loads within 10 feet. The earth pressures indicated above do not include a safety factor; therefore, the design should include an appropriate safety factor for the overall performance of the system.

7.2.5 Foundation Plan Review

Stantec should review the foundation plans to ascertain that the intent of the recommendations in this report has been implemented and that revised recommendations are not necessary as a result of changes after this report was completed.

7.2.6 Foundation Excavation Observations

A representative working under direct supervision of the Geotechnical Engineer should observe the foundation excavations prior to forming or placing reinforcing steel.

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7.3 CORROSION POTENTIAL

Three samples of the onsite soils were tested to provide a preliminary indication of the corrosion potential of the onsite soils. The test results are presented in Appendix B. A brief discussion of the corrosion test results is provided in the following text.

- The samples tested had a soluble sulfate concentration ranging from 33 to 45 parts per million (ppm), which indicates the samples have a low sulfate corrosion potential relative to concrete. It should be noted that soluble sulfate in the irrigation water supply, and/or the use of fertilizer may cause the sulfate content in the surficial soils to increase with time. This may result in a higher sulfate exposure than that indicated by the test results reported herein. Studies have shown that the use of improved cements in the concrete, and a low water-cement ratio will improve the resistance of the concrete to sulfate exposure.
- The samples tested had a chloride concentration ranging from 23 ppm to 62 ppm, which indicates the sample has a negligible chloride corrosion potential relative to metal.
- The samples tested had a saturated resistivity ranging from 1,715 to 2,644 ohm-cm, which indicates the samples are moderately to severely corrosive.
- The sample tested had a pH ranging from 7.7 to 8.1, which indicates the samples are slightly alkaline.

Field Wenner four-point resistivity testing was conducted by Atlas Technical Consultants (ATC) at the Site. The results of the field resistivity testing indicate variable corrosion potential in the subsurface profile (Appendix C). In general, the resistivity decreases (higher corrosion potential) with increasing water content and salt concentration. In dry arid environments like that of the Site, seasonal low moisture content in near surface soils and evapotranspiration are important factors influencing corrosion potential of the soil profile. The field data (Appendix C) indicate relatively low to moderate (1,472 to 18,009 ohm-cm) and apparent low corrosion severe potential to ferrous metal in the near surface materials to a depth of at least 20 feet (note: the depth of the measured average resistivity in the soil profile is assumed to be equivalent to the probe spacing). Laboratory testing on saturated samples showed similar corrosion potential.

Caltrans currently considers a site to be corrosive to foundation elements if one or more of the following conditions exist: Chloride concentration is greater than or equal to 500 ppm, sulfate concentration is greater than or equal to 1,500 ppm, or the pH is 5.5 or less (Caltrans, 2012).

Proposed import fill materials should be tested to evaluate their corrosion potential prior to being imported to the site.

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7.4 PRELIMINARY PAVEMENT DESIGN

7.4.1 Asphalt Concrete Pavement

Tentative driveway structural sections were developed based on the visual onsite soil classifications and an estimate of the anticipated traffic loading. The design below applies to driveway sections supported by the existing onsite soils.

An R-value of 10 has been assumed for preliminary design of pavement sections based on one laboratory test of the on-site material in the upper 5 feet. The actual R-value of the subgrade soils should be determined after grading to provide final pavement design. Flexible pavement sections have been calculated in general conformance with Caltrans guidelines. The project civil engineer and owner should review the pavement designations to determine appropriate locations for pavement thickness. Based on an assumed R-value of 10, the following pavement structural sections have been calculated.

Table 4. Flexible Pavement Sections

Traffic Type	Traffic Index	Asphalt Concrete (inches)	Aggregate Base* (inches)
Automobile Parking	5.0	3	9
Automobile Drive Lanes	5.5	3	11
Medium Truck Traffic	6.0	4	11.5
Heavy Truck Traffic	7.0	4.5	14

*Aggregate Base should conform to Class 2 Aggregate Base in accordance with the Caltrans Standard Specifications or Crushed Miscellaneous Base in accordance with the Standard Specifications for Public Works Construction.

Prior to placing base materials, the upper 12 inches of the subgrade soil should be scarified, moisture conditioned to slightly above the optimum moisture content, and recompact to a dry density of at least 95% of the laboratory maximum. The base material should also be compacted to slightly above the optimum moisture content and a dry density of at least 95% of the laboratory maximum. Asphalt concrete should be compacted to at least 95% of the laboratory Hveem density in accordance with ASTM D2726.

Rigid concrete pavement (described below) should be placed in driveway entrance aprons and trash bin loading/storage areas. Concrete pavement design is provided in the following section.

7.4.2 Concrete Pavement

Concrete pavements have been calculated in general conformance with the procedure recommended by the American Concrete Institute (ACI 330R-08) using the parameters presented in Table 5. The following design parameters were used in our analyses.

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Table 5. Concrete Pavement Parameters

Design Parameter	Value
Modulus of Subgrade Reaction (k)	50 pci
Modulus of Concrete Rupture (M_R)	550 psi
Concrete Compressive Strength	3,700 psi
Traffic Categories (TC)	A and C
Average Daily Truck Traffic (ADTT)	10 and 100

Based on the parameters above, we recommend the following minimum concrete pavement thickness.

Table 6. Recommended Concrete Pavement Sections

Traffic Type	Pavement Thickness (inches)	Aggregate Base (inches)
Automobile Parking and Driveways (TC = A)	6	6
Heavy Truck Traffic and Fire Lane Areas (TC = C)	8	6

The project civil engineer should confirm whether the assumed ADTT is appropriate for the anticipated traffic level. Concrete compressive strength for pavement should be at least 3,700 psi. Minimum reinforcement should consist of #3 bars on 24-inch centers. Crack control joints should be placed in accordance with the American Concrete Institute (ACI) guidelines.

Prior to placing concrete, the upper 12 inches of the subgrade soil should be scarified, moisture conditioned to slightly above the optimum moisture content, and recompact to a dry density of at least 95% of the laboratory maximum.

7.5 POST INVESTIGATION SERVICES

Post investigation services are an important and necessary continuation of this investigation, and it is recommended that Stantec be retained as the Geotechnical Engineer to perform such services. Final project grading and foundation plans, foundation details and specifications should be reviewed by Stantec prior to construction to ascertain that the intent of the recommendations presented herein have been applied to the design. Following review of plans and specifications, observation during construction should be performed to correlate the findings of this exploration with the actual subsurface conditions exposed.

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8. CLOSURE

Our conclusions, recommendations, and discussions presented herein are based upon an evaluation and interpretation of the findings from the field and laboratory programs, with interpolation and extrapolation of subsurface conditions between and beyond the exploration locations. This report contains information that is valid as of the report's date and to the extent directly known to Stantec. However, conditions can change with the passage of time or construction subsequent to this report's preparation that may invalidate, either partially or wholly, the conclusions and recommendations presented herein.

Inherent in most projects performed in the heterogeneous subsurface environment, continuing subsurface explorations and analyses may reveal conditions that are different than those described in this report. The findings and recommendations contained in this report were developed in accordance with generally accepted, current professional principles and practice ordinarily exercised, under similar circumstances, by geotechnical engineers and engineering geologists practicing in this locality. No other warranty, express or implied, is made.

PROPOSED CHIQUITO BESS GEOTECHNICAL INVESTIGATION REPORT

References
November 15, 2021

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PROPOSED CHIQUITO BESS GEOTECHNICAL INVESTIGATION REPORT

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November 15, 2021

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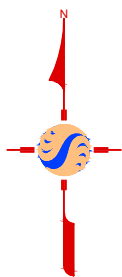
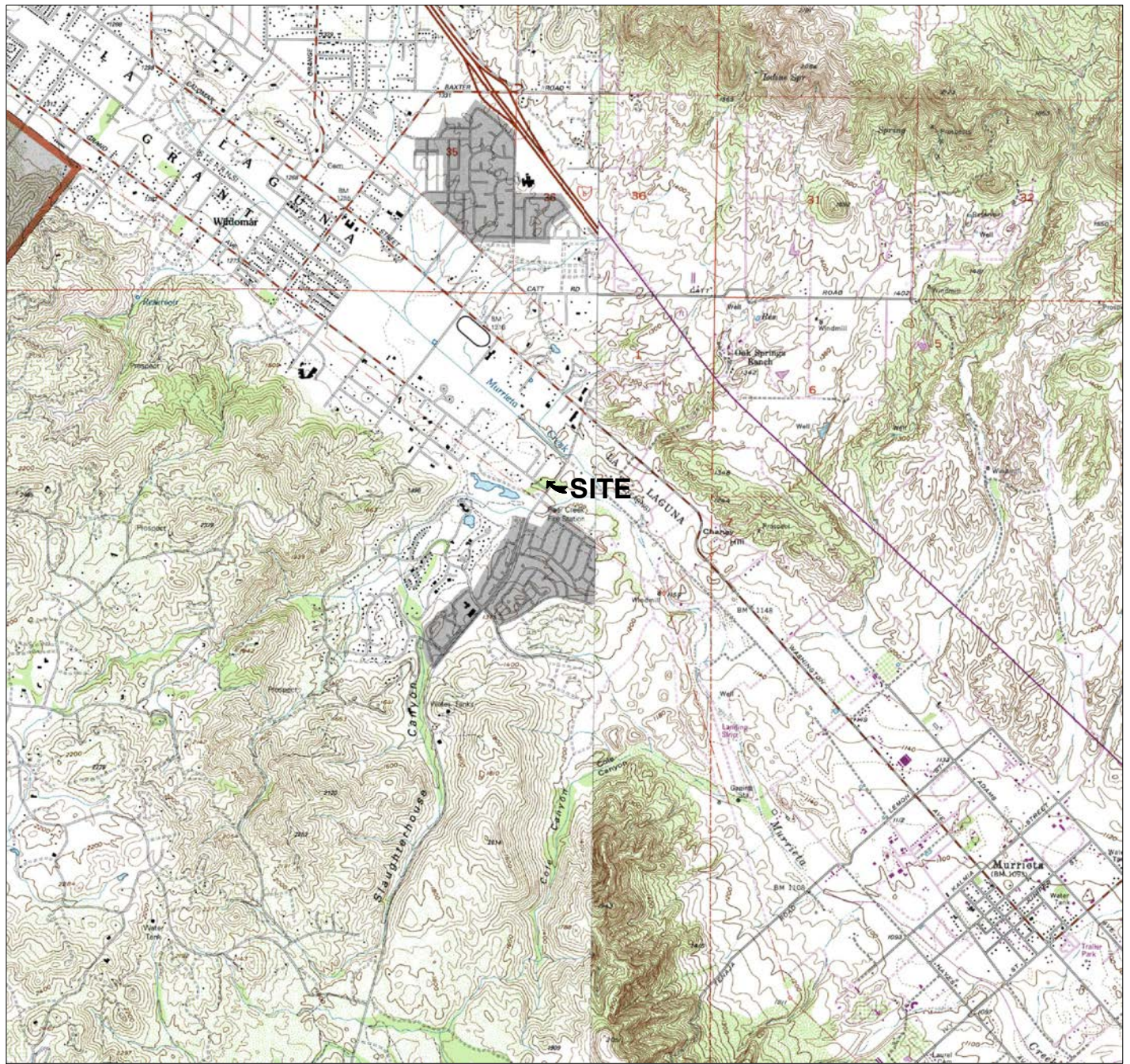
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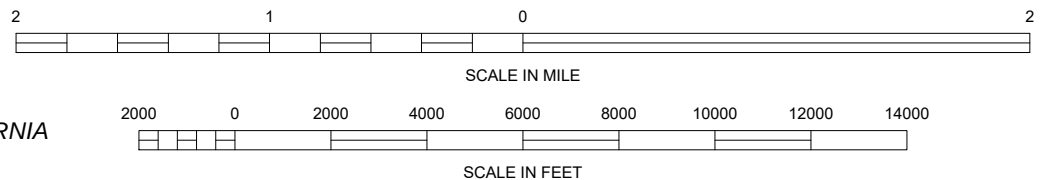
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FIGURES



CALIFORNIA



REFERENCE: USGS 7.5 X 15 MINUTE QUADRANGLE; WILDOMAR, CA 1997



735 E CARNEGIE DRIVE, SUITE 280
SAN BERNARDINO, CA 92408

PHONE: (909) 335-6116 FAX: (909) 335-6120

FOR:

CHIQUITO BATTERY ENERGY
STORAGE SYSTEM PROJECT
NEAR NEC CLINTON KEITH ROAD
AND GRAND AVENUE
WILDOMAR, CALIFORNIA

JOB NUMBER:
185805178

DRAWN BY:
JEF

CHECKED BY:
JEF

APPROVED BY:
JEF

FIGURE:

1

DATE:
11/5/2021



EXPLANATION

APPROXIMATE PROJECT BOUNDARY



0 300 600

APPROXIMATE SCALE (FEET)



735 E CARNEGIE DRIVE, SUITE 280
SAN BERNARDINO, CA 92408
PHONE: (909) 335-6116 FAX: (909) 335-6120

FOR:
CHIKUITO BATTERY ENERGY
STORAGE SYSTEM PROJECT
NEAR NEC CLINTON KEITH ROAD
AND GRAND AVENUE
WILDOMAR, CALIFORNIA

JOB NUMBER:
185805178

DRAWN BY:
JEF

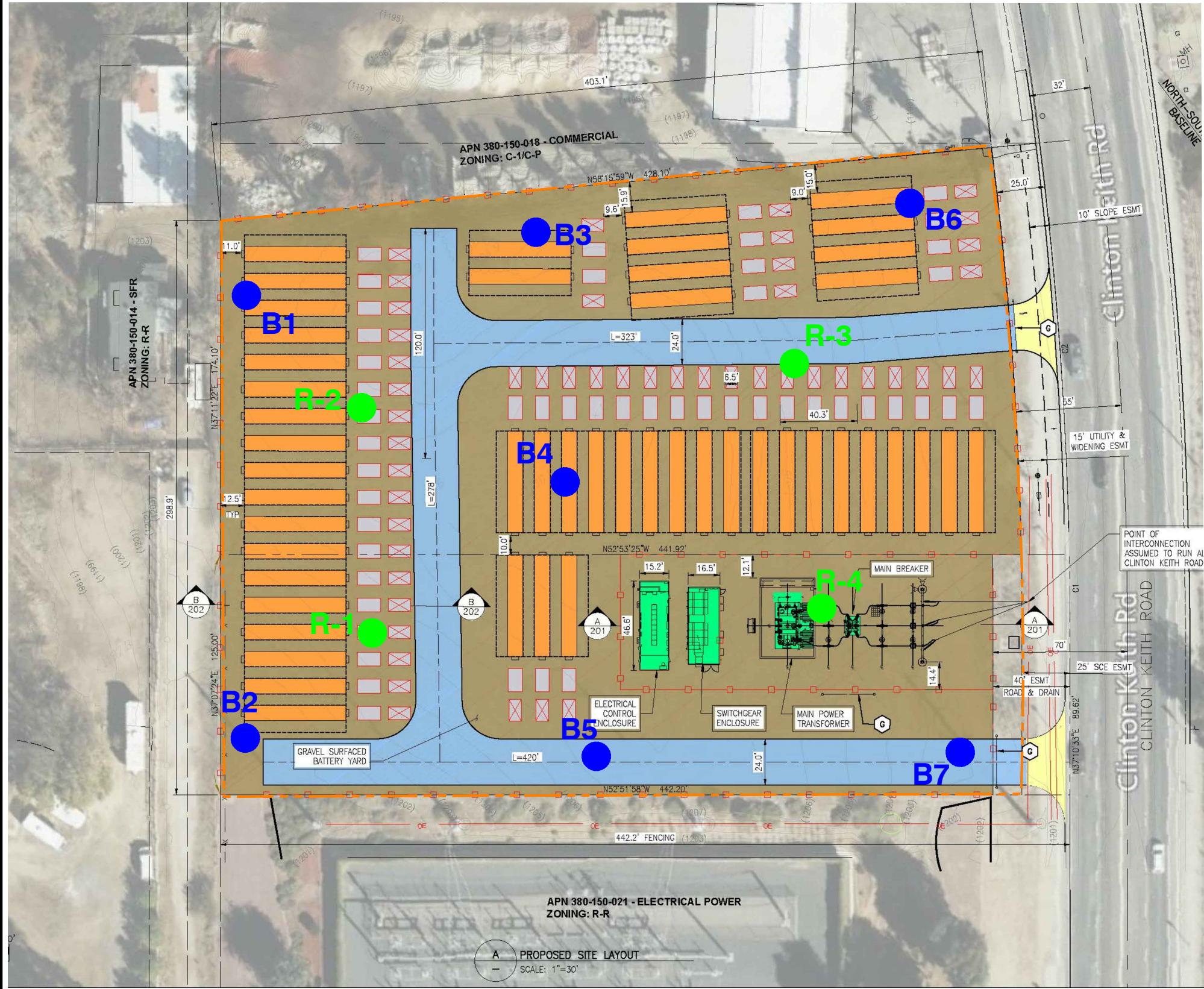
CHECKED BY:
JEF

APPROVED BY:
JEF

FIGURE:

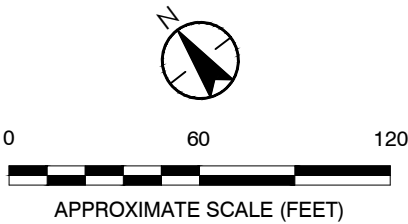
2

DATE:
11/5/2021



EXPLANATION

- APPROXIMATE PROJECT BOUNDARY
- APPROXIMATE GEOTECHNICAL SOIL BORING LOCATIONS
- APPROXIMATE ELECTRICAL RESISTIVITY TEST LOCATIONS



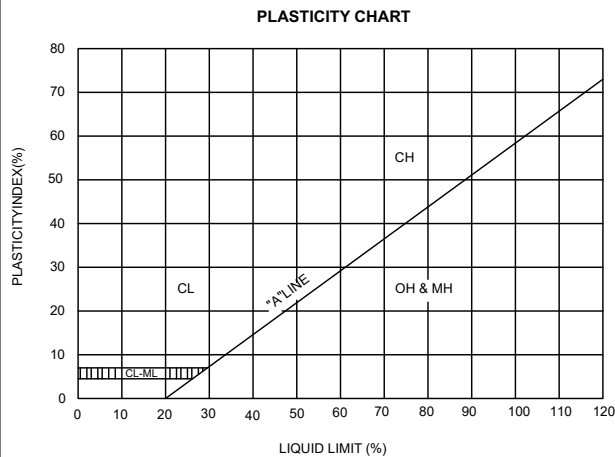
 735 E CARNEGIE DRIVE, SUITE 280 SAN BERNARDINO, CA 92408 PHONE: (909) 335-6116 FAX: (909) 335-6120	FOR: CHIQUITO BATTERY ENERGY STORAGE SYSTEM PROJECT NEAR NEC CLINTON KEITH ROAD AND GRAND AVENUE WILDOMAR, CALIFORNIA		SUBSURFACE EXPLORATION MAP		FIGURE: 3
	JOB NUMBER: 185805178	DRAWN BY: JEF	CHECKED BY: JEF	APPROVED BY: JEF	DATE: 11/5/2021

APPENDIX A BORING LOGS

UNIFIED SOIL CLASSIFICATION (ASTM D-2487)

MATERIAL TYPES	CRITERIA FOR ASSIGNING SOIL GROUP NAMES			GROUP SYMBOL	SOIL GROUP NAMES & LEGEND	
COARSE-GRAINED SOILS >50% RETAINED ON NO. 200 SIEVE	GRAVELS >50% OF COARSE FRACTION RETAINED ON NO 4. SIEVE	*CLEAN GRAVELS <5% FINES	Cu>4 AND 1<Cc<3	GW	WELL-GRADED GRAVEL	
			Cu>4 AND 1>Cc>3	GP	POORLY-GRADED GRAVEL	
		*GRAVELS WITH FINES >12% FINES	FINES CLASSIFY AS ML OR CL	GM	SILTY GRAVEL	
			FINES CLASSIFY AS CL OR CH	GC	CLAYEY GRAVEL	
	SANDS >50% OF COARSE FRACTION PASSES ON NO 4. SIEVE	*CLEAN SANDS <5% FINES	Cu>6 AND 1<Cc<3	SW	WELL-GRADED SAND	
			Cu>6 AND 1>Cc>3	SP	POORLY-GRADED SAND	
		*SANDS AND FINES >12% FINES	FINES CLASSIFY AS ML OR CL	SM	SILTY SAND	
			FINES CLASSIFY AS CL OR CH	SC	CLAYEY SAND	
FINE-GRAINED SOILS >50% PASSES NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT<50	INORGANIC	PI>7 AND PLOTS>"A" LINE	CL	LEAN CLAY	
			PI>4 AND PLOTS<"A" LINE	ML	SILT	
		ORGANIC	LL (oven dried)/LL (not dried)<0.75	OL	ORGANIC CLAY OR SILT	
	SILTS AND CLAYS LIQUID LIMIT>50	INORGANIC	PI PLOTS >"A" LINE	CH	FAT CLAY	
			PI PLOTS <"A" LINE	MH	ELASTIC SILT	
		ORGANIC	LL (oven dried)/LL (not dried)<0.75	OH	ORGANIC CLAY OR SILT	
HIGHLY ORGANIC SOILS		PRIMARILY ORGANIC MATTER, DARK IN COLOR, AND ORGANIC ODOR		PT	PEAT	

* Dual symbols required for fines content between 5% and 12%



SAMPLER TYPES

	SPT		Shelby Tube
	Modified California (2.5" I.D.)		No Recovery
	Rock Core		Grab Sample

ADDITIONAL TESTS

COR - CHEMICAL ANALYSIS (CORROSIVITY)	PI - PLASTICITY INDEX
CD - CONSOLIDATED DRAINED TRIAXIAL	EI - EXPANSION INDEX
CN - CONSOLIDATION	TC - CYCLIC TRIAXIAL
CU - CONSOLIDATED UNDRAINED TRIAXIAL	TV - TORVANE SHEAR
DS - DIRECT SHEAR	UC - UNCONFINED COMPRESSION
PP - POCKET PENETROMETER (TSF)	(1.5) - (WITH SHEAR STRENGTH IN KSF)
#200 - Percent Passing #200 SIEVE	UU - UNCONSOLIDATED UNDRAINED TRIAXIAL
RV - R-VALUE	
SA - SIEVE ANALYSIS: % PASSING	
- WATER	
- LEVEL	

PENETRATION RESISTANCE (RECORDED AS BLOWS / FOOT)				
SAND & GRAVEL		SILT & CLAY		
RELATIVE DENSITY	BLOWS/FOOT*	CONSISTENCY	BLOWS/FOOT*	STRENGTH** (KSF)
VERY LOOSE	0 - 4	VERY SOFT	0 - 2	0 - 0.25
LOOSE	4 - 10	SOFT	2 - 4	0.25 - 0.5
MEDIUM DENSE	10 - 30	MEDIUM STIFF	4 - 8	0.5-1.0
DENSE	30 - 50	STIFF	8 - 15	1.0 - 2.0
VERY DENSE	OVER 50	VERY STIFF	15 - 30	2.0 - 4.0
		HARD	OVER 30	OVER 4.0

* NUMBER OF BLOWS OF 140 LB HAMMER FALLING 30 INCHES TO DRIVE A 2 INCH O.D. (1-3/8 INCH I.D.) SPLIT-BARREL SAMPLER THE LAST 12 INCHES OF AN 18-INCH DRIVE (ASTM-1586 STANDARD PENETRATION TEST).

** UNDRAINED SHEAR STRENGTH IN KIPS/SQ. FT. AS DETERMINED BY LABORATORY TESTING OR APPROXIMATED BY THE STANDARD PENETRATION TEST, POCKET PENETROMETER, TORVANE, OR VISUAL OBSERVATION.

LEGEND TO BORING LOGS AND SOIL DESCRIPTIONS



PROJECT: **Hecate Chiquito BESS**
LOCATION: **Clinton Keith Rd & Grand Ave, Wildomar, CA**
PROJECT NUMBER: **185805178**
DRILLING: STARTED **10/7/21** COMPLETED: **10/7/21**
INSTALLATION: STARTED **10/7/21** COMPLETED: **10/7/21**
DRILLING COMPANY: **ABC Liovin**
DRILLING EQUIPMENT: **CME-75**
DRILLING METHOD: **Hollow Stem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

WELL / TEST PIT / BOREHOLE NO:

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NORTHING (ft):
LATITUDE: **33° 35' 9.03"**
GROUND ELEV (ft): **1211**
INITIAL DTW (ft): **NE**
STATIC DTW (ft): **NE**
WELL CASING DIAMETER (in): **---**
LOGGED BY: **K. Grasso**

EASTING (ft):
LONGITUDE: **117° 15' 17.94"**
TOC ELEV (ft):
BOREHOLE DEPTH (ft): **21.5**
WELL DEPTH (ft): **---**
BOREHOLE DIAMETER (in): **8**
CHECKED BY: **J. Fischer**

GEO FORM 304 HECATE_CHIQUITO_SOIL_BORING_LOGS.GPJ SECOR INTL_GDT 11/19/21

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Depth (feet)
			<u>QUATERNARY YOUNG ALLUVIAL VALLEY DEPOSITS (Q_{yy})</u>						
		SM	SILTY SAND WITH GRAVEL ; SM; 10YR 3/2 very dark grayish brown; 10% fine gravel; 59% fine to coarse grained sand; 31% fines; dry; no petroleum hydrocarbon odor (PHCO); no staining.		B-1-Bulk	MDD, CORR, TR			
					B-1-2'	SA			
5			10YR 3/3 dark brown; 10% fine gravel; 50% fine to coarse grained sand; 40% fines; moist; very dense below 5 feet.		B-1-5'		20 31 42		5
					B-1-7'	DS	24 29 50-5"		
10		CL	CLAY WITH SAND AND GRAVEL ; CL; 10YR 3/3 dark brown; 20% fine gravel; 25% fine to coarse grained sand; 55% fines; moist; very stiff; low plasticity; no PHCO; no staining.		B-1-10'		10 12 16		10
15			10% fine gravel; 10% fine to coarse grained sand; 80% fines below 15 feet.		B-1-15'		13 16 33		15
20		SM	SILTY SAND ; SM; 10YR 3/2 very dark grayish brown; 90% fine to coarse grained sand; 10% fines; moist; medium dense; no PHCO; no staining.		B-1-20'		3 5 8		20
			Hole terminated at 21.5 feet.						

PROJECT: **Hecate Chiquito BESS**
LOCATION: **Clinton Keith Rd & Grand Ave, Wildomar, CA**
PROJECT NUMBER: **185805178**

DRILLING: STARTED **10/7/21** COMPLETED: **10/7/21**
INSTALLATION: STARTED **10/7/21** COMPLETED: **10/7/21**
DRILLING COMPANY: **ABC Liovin**
DRILLING EQUIPMENT: **CME-75**
DRILLING METHOD: **Hollow Stem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

WELL / TEST PIT / BOREHOLE NO:

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NORTHING (ft):
LATITUDE: **33° 35' 7.07"**
GROUND ELEV (ft): **1205**
INITIAL DTW (ft): **NE**
STATIC DTW (ft): **NE**
WELL CASING DIAMETER (in): **---**
LOGGED BY: **K. Grasso**

EASTING (ft):
LONGITUDE: **117° 15' 19.64"**
TOC ELEV (ft):
BOREHOLE DEPTH (ft): **20.5**
WELL DEPTH (ft): **---**
BOREHOLE DIAMETER (in): **8**
CHECKED BY: **J. Fischer**

GEO FORM 304 HECATE_CHIQUITO_SOIL_BORING_LOGS.GPJ SECOR INTL_GDT 11/19/21

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Depth (feet)
			<u>QUATERNARY YOUNG ALLUVIAL VALLEY DEPOSITS (Qyv)</u>						
		SM	SILTY SAND WITH GRAVEL ; SM; 10YR 3/3 dark brown; 5% gravel; 85% fine to coarse grained sand; 10% fines; moist; no petroleum hydrocarbon odor (PHCO); no staining.		B-2-Bulk	TR			
					B-2-2'	SA			
5		CL	CLAY WITH SAND ; CL; 10YR 4/3 brown; 35% fine to medium grained sand; 65% fines; moist; hard; low plasticity; no PHCO; no staining.		B-2-5'	DS, #200, AL	11 31 50-3"		5
			CLAY WITH SAND AND GRAVEL ; 5% fine gravel; 15% fine to coarse grained sand; 80% fines; moist; very stiff below 5 feet		B-2-7'		4 10 13		
10			CLAY WITH SAND ; 10% fine to coarse grained sand; 90% fines below 10 feet		B-2-10'		7 13 28		10
15			CLAY WITH SAND AND GRAVEL ; 5% fine gravel; 15% fine to coarse grained sand; 80% fines below 15 feet		B-2-15'		6 8 16		15
			<u>HETEROGENEOUS GRANITIC ROCK (Khg)</u>						
			Grandiorite; hard; dry; slightly weathered						
20			Refusal at 20.5 feet. Hole terminated at 20.5 feet.		B-2-20'		50-2"		20

PROJECT: **Hecate Chiquito BESS**
LOCATION: **Clinton Keith Rd & Grand Ave, Wildomar, CA**
PROJECT NUMBER: **185805178**
DRILLING: STARTED **10/7/21** COMPLETED: **10/7/21**
INSTALLATION: STARTED **10/7/21** COMPLETED: **10/7/21**
DRILLING COMPANY: **ABC Liovin**
DRILLING EQUIPMENT: **CME-75**
DRILLING METHOD: **Hollow Stem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

WELL / TEST PIT / BOREHOLE NO:

B-3 PAGE 1 OF 1



NORTHING (ft):
LATITUDE: **33° 35' 8.22"**
GROUND ELEV (ft): **1207**
INITIAL DTW (ft): **NE**
STATIC DTW (ft): **NE**
WELL CASING DIAMETER (in): **---**
LOGGED BY: **K. Grasso**

EASTING (ft):
LONGITUDE: **117° 15' 16.17"**
TOC ELEV (ft):
BOREHOLE DEPTH (ft): **21.5**
WELL DEPTH (ft): **---**
BOREHOLE DIAMETER (in): **8**
CHECKED BY: **J. Fischer**

GEO FORM 304 HECATE_CHIQUITO_SOIL_BORING_LOGS.GPJ SECOR INTL_GDT 11/19/21

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Depth (feet)
			<u>QUATERNARY YOUNG ALLUVIAL VALLEY DEPOSITS (Q_{yy})</u>						
		SM	SILTY SAND WITH GRAVEL ; SM; 10YR 4/3 brown; 12% fine gravel; 58% fine to coarse grained sand; 30% fines; dry; no PHCO; no staining.		B-3-2'	SA			
5			Very dense below 5 feet		B-3-5'		18 36 50-5"		5
			2% fine gravel; 61% fine to coarse grained sand; 37% fines; medium dense below 7 feet		B-3-7'	DS, SA	12 27 33		
10		CL	CLAY TRACE SAND ; CL; 10YR 3/3 dark brown; 5% fine to medium grained sand; 95% fines; moist; very stiff; low plasticity; no PHCO; no staining.		B-3-10'		5 13 13		10
15					B-3-15'		9 23 41		15
20		SM	SILTY SAND WITH GRAVEL ; SM; 10YR 4/3 brown; 10% fine gravel; 60% fine to coarse grained sand; 30% fines; wet; very dense; no PHCO; no staining.		B-3-20'		9 25 29		20
			Hole terminated at 21.5 feet.						

PROJECT: **Hecate Chiquito BESS**
LOCATION: **Clinton Keith Rd & Grand Ave, Wildomar, CA**
PROJECT NUMBER: **185805178**

DRILLING: STARTED **10/7/21** COMPLETED: **10/7/21**
INSTALLATION: STARTED **10/7/21** COMPLETED: **10/7/21**
DRILLING COMPANY: **ABC Liovin**
DRILLING EQUIPMENT: **CME-75**
DRILLING METHOD: **Hollow Stem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

WELL / TEST PIT / BOREHOLE NO:

B-4 PAGE 1 OF 2



NORTHING (ft): EASTING (ft):
LATITUDE: **33° 35' 7.07"** LONGITUDE: **117° 15' 16.93"**
GROUND ELEV (ft): **1209** TOC ELEV (ft):
INITIAL DTW (ft): **23.0** BOREHOLE DEPTH (ft): **26.0**
STATIC DTW (ft): **23.0** WELL DEPTH (ft): ---
WELL CASING DIAMETER (in): --- BOREHOLE DIAMETER (in): **8**
LOGGED BY: **K. Grasso** CHECKED BY: **J. Fischer**

GEO FORM 304 HECATE_CHIQUITO_SOIL_BORING_LOGS.GPJ SECOR INTL_GDT 11/19/21

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Depth (feet)
			<u>QUATERNARY YOUNG ALLUVIAL VALLEY DEPOSITS (Qyv)</u>						
		SM	SILTY SAND WITH GRAVEL ; SM; 10YR 3/4 dark yellowish brown; 10% fine gravel; 70% fine to coarse grained sand; 20% fines; moist; no PHCO; no staining.		B-4-Bulk	MDD, CORR			
					B-4-2'				
5		SP-SM	POORLY GRADED SAND WITH SILT ; SP-SM; 10YR 3/3 dark brown; 10% fine gravel; 80% fine to coarse grained sand; 10% fines; moist; very dense; no PHCO; no staining.		B-4-5'	DS	15 50-6"		5
		SM	SILTY SAND TRACE GRAVEL ; SM; 5% fine gravel; 45% fine to coarse grained sand; 50% fines; moist; medium dense; no PHCO; no staining.		B-4-7'		5 10 15		
10			SILTY SAND WITH GRAVEL ; 10% fine gravel; 70% fine to coarse grained sand; 20% fines below 10 feet		B-4-10'	DS	10 18 25		10
15		CL	CLAY WITH SAND ; CL; 5% fine to coarse grained sand; 95% fines; moist; very stiff; low plasticity; no PHCO; no staining.		B-4-15'		3 5 21		15
20			5% fine gravel; 10% fine to coarse grained sand; 85% fines; stiff below 20 feet		B-4-20'		3 5 20		20

PROJECT: **Hecate Chiquito BESS**
 LOCATION: **Clinton Keith Rd & Grand Ave, Wildomar, CA**
 PROJECT NUMBER: **185805178**
 DRILLING: STARTED **10/7/21** COMPLETED: **10/7/21**
 INSTALLATION: STARTED **10/7/21** COMPLETED: **10/7/21**
 DRILLING COMPANY: **ABC Liovin**
 DRILLING EQUIPMENT: **CME-75**
 DRILLING METHOD: **Hollow Stem Auger**
 SAMPLING EQUIPMENT: **Split Spoon**

WELL / TEST PIT / BOREHOLE NO:

B-4 PAGE 2 OF 2



NORTHING (ft): EASTING (ft):
 LATITUDE: **33° 35' 7.07"** LONGITUDE: **117° 15' 16.93"**
 GROUND ELEV (ft): **1209** TOC ELEV (ft):
 INITIAL DTW (ft): **23.0** BOREHOLE DEPTH (ft): **26.0**
 STATIC DTW (ft): **23.0** WELL DEPTH (ft): ---
 WELL CASING DIAMETER (in): --- BOREHOLE DIAMETER (in): **8**
 LOGGED BY: **K. Grasso** CHECKED BY: **J. Fischer**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Depth (feet)
25			HETEROGENEOUS GRANITIC ROCK (Khg) Grandiorite; hard; dry; slightly weathered Refusal at 26 feet. Hole terminated at 26 feet.		B-4-25'		50-6"		
30									30
35									35
40									40

PROJECT: **Hecate Chiquito BESS**
LOCATION: **Clinton Keith Rd & Grand Ave, Wildomar, CA**
PROJECT NUMBER: **185805178**
DRILLING: STARTED **10/7/21** COMPLETED: **10/7/21**
INSTALLATION: STARTED **10/7/21** COMPLETED: **10/7/21**
DRILLING COMPANY: **ABC Liovin**
DRILLING EQUIPMENT: **CME-75**
DRILLING METHOD: **Hollow Stem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

WELL / TEST PIT / BOREHOLE NO:

B-5 PAGE 1 OF 1



NORTHING (ft):
LATITUDE: **33° 35' 5.85"**
GROUND ELEV (ft): **1207**
INITIAL DTW (ft): **19.6**
STATIC DTW (ft): **19.6**
WELL CASING DIAMETER (in): ---
LOGGED BY: **K. Grasso**

EASTING (ft):
LONGITUDE: **117° 15' 17.83"**
TOC ELEV (ft):
BOREHOLE DEPTH (ft): **21.5**
WELL DEPTH (ft): ---
BOREHOLE DIAMETER (in): **8**
CHECKED BY: **J. Fischer**

GEO FORM 304 HECATE_CHIQUITO_SOIL_BORING_LOGS.GPJ SECOR INTL_GDT 11/19/21

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Depth (feet)
			<u>QUATERNARY YOUNG ALLUVIAL VALLEY DEPOSITS (Q_{yy})</u>						
		ML	SILT WITH SAND ; ML; 10YR 3/3 dark brown; 2% fine gravel; 40% fine to coarse grained sand; 58% fines; dry; no PHCO; no staining.		B-5-2'	SA			
5		SC	SAND WITH CLAY AND GRAVEL ; SC; 10YR 3/2 very dark grayish brown; 5% fine gravel; 55% fine to coarse grained sand; 40% fines; moist; dense; no PHCO; no staining.		B-5-5'	#200, AL	11 21 24		5
					B-5-7'	DS	11 17 32		
10		CL	CLAY WITH SAND ; CL; 10YR 3/2 very dark grayish brown; 10% fine to medium grained sand; 90% fines; moist; very stiff; no PHCO; no staining.		B-5-10'		5 7 12		10
15					B-5-15'		9 29 50-5"		15
20			20% fine to medium grained sand; 80% fines below 20 feet		B-5-20'		7 18 50-5"		20
			Hole terminated at 21.5 feet.						

PROJECT: **Hecate Chiquito BESS**
 LOCATION: **Clinton Keith Rd & Grand Ave, Wildomar, CA**
 PROJECT NUMBER: **185805178**

DRILLING: STARTED **10/7/21** COMPLETED: **10/7/21**
 INSTALLATION: STARTED **10/7/21** COMPLETED: **10/7/21**
 DRILLING COMPANY: **ABC Liovin**
 DRILLING EQUIPMENT: **CME-75**
 DRILLING METHOD: **Hollow Stem Auger**
 SAMPLING EQUIPMENT: **Split Spoon**

WELL / TEST PIT / BOREHOLE NO:

B-6 PAGE 1 OF 1



NORTHING (ft):
 LATITUDE: **33° 35' 7.21"**
 GROUND ELEV (ft): **1204**
 INITIAL DTW (ft): **19**
 STATIC DTW (ft): **19**
 WELL CASING DIAMETER (in): **---**
 LOGGED BY: **K. Grasso**

EASTING (ft):
 LONGITUDE: **117° 15' 14.18"**
 TOC ELEV (ft):
 BOREHOLE DEPTH (ft): **21.5**
 WELL DEPTH (ft): **---**
 BOREHOLE DIAMETER (in): **8**
 CHECKED BY: **J. Fischer**

GEO FORM 304 HECATE_CHIQUITO_SOIL_BORING_LOGS.GPJ SECOR INTL_GDT 11/19/21

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Depth (feet)
			<u>QUATERNARY YOUNG ALLUVIAL VALLEY DEPOSITS (Qyv)</u>						
		SM	SILTY SAND WITH GRAVEL ; SM; 10YR 3/3 dark brown; 30% fine gravel; 49% fine to coarse grained sand; 21% fines; dry; noPHCO; no staining.		B-6-Bulk	TR			
					B-6-2'	SA			
5			Medium dense below 5 feet.		B-6-5'		12 12 9		5
		SC	CLAYEY SAND ; SC; 10YR 3/2 very dark grayish brown; 20% fine gravel; 65% fine to coarse grained sand; 15% fines; moist; medium dense; no PHCO; no staining.		B-6-7'		8 9 18		
10					B-6-10'	DS	4 9 21		10
15			10YR 3/3 dark brown; 25% gravel; 55% fine to coarse grained sand; 20% fines; dense below 15 feet.		B-6-15'		9 21 19		15
20			Medium dense below 20 feet.		B-6-20'		4 12 25		20
			Hole terminated at 21.5 feet.						

PROJECT: **Hecate Chiquito BESS**
LOCATION: **Clinton Keith Rd & Grand Ave, Wildomar, CA**
PROJECT NUMBER: **185805178**
DRILLING: STARTED **10/7/21** COMPLETED: **10/7/21**
INSTALLATION: STARTED **10/7/21** COMPLETED: **10/7/21**
DRILLING COMPANY: **ABC Liovin**
DRILLING EQUIPMENT: **CME-75**
DRILLING METHOD: **Hollow Stem Auger**
SAMPLING EQUIPMENT: **Split Spoon**

WELL / TEST PIT / BOREHOLE NO:

B-7 PAGE 1 OF 1



NORTHING (ft):
LATITUDE: **33° 35' 4.78"**
GROUND ELEV (ft): **1206**
INITIAL DTW (ft): **NE**
STATIC DTW (ft): **NE**
WELL CASING DIAMETER (in): **---**
LOGGED BY: **K. Grasso**

EASTING (ft):
LONGITUDE: **117° 15' 16.07"**
TOC ELEV (ft):
BOREHOLE DEPTH (ft): **21.5**
WELL DEPTH (ft): **---**
BOREHOLE DIAMETER (in): **8**
CHECKED BY: **J. Fischer**

GEO FORM 304 HECATE_CHIQUITO_SOIL_BORING_LOGS.GPJ SECOR INTL_GDT 11/19/21

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Geotechnical Lab Testing	Blow Count	PID Reading (ppmv)	Depth (feet)
			<u>QUATERNARY YOUNG ALLUVIAL VALLEY DEPOSITS (Q_{yy})</u>						
		SM	SILTY SAND ; SM; 10YR 4/3 brown; 11% fine gravel; 50% fine to coarse grained sand; 39% fines; dry; no PHCO; no staining.		B-7-Bulk	MDD, CORR, TR			
					B-7-1'	SA			
5		SC	CLAYEY SAND ; SC; 10YR 3/3 dark brown; 5% fine gravel; 53% fine to coarse grained sand; 42% fines; moist; dense; no PHCO; no staining. Medium dense below 7 feet		B-7-5'	#200	11 12 18		5
					B-7-7'		7 7 18		
10		CL	SANDY CLAY ; CL; 10YR 3/6 dark yellowish brown; 5% fine gravel; 35% fine to coarse grained sand; 60% fines; moist; very stiff; no PHCO; no staining.		B-7-10'		7 12 15		10
15			5% fine gravel; 15% fine to coarse grained sand; 80% fines below 15 feet		B-7-15'		5 10 27		15
20		SM	SILTY SAND WITH GRAVEL ; SM; 10YR 3/6 dark yellowish brown; 5% fine gravel; 70% fine to coarse grained sand; 25% fines; moist; very dense; no PHCO; no staining.		B-7-20'		37 50-6"		20
			Hole terminated at 21.5 feet.						

APPENDIX B

LABORATORY TEST RESULTS

Gradation Analysis

ASTM D 422

Project Name Hecate Chiquito BESS

Source Grab

Project Number 185805178

Lab ID B1-2'

Preparation Method ASTM D 1140 Method A

Particle Shape

Particle Hardness

Sample Dry Mass (g)	392.10
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Moisture Content (%)	4.1
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Date Received 10-18-2021

Preparation Date	10-21-2021
------------------	------------

Test Date 10-22-2021

Analysis based on total sample.

Sieve Size	Grams Retained	% Retained	% Passing
1/2"	0.00	0.0	100.0
3/8"	13.40	3.4	96.6
No. 4	23.70	6.0	90.5
No. 8	30.60	7.8	82.7
No. 16	45.20	11.5	71.2
No. 30	37.40	9.5	61.7
No. 50	38.80	9.9	51.8
No. 100	41.00	10.5	41.3
No. 200	38.00	9.7	31.6
Pan	124.00	31.6	---

% Gravel	9.5
----------	-----

% Sand	<u>58.9</u>
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% Sand	68.4
% Fines	31.6

Fines Classification	ML
----------------------	----

D ₁₀ (mm)	N/A
----------------------	-----

D ₃₀ (mm)	N/A
----------------------	-----

D_{30} (mm)	N/A
D_{60} (mm)	N/A

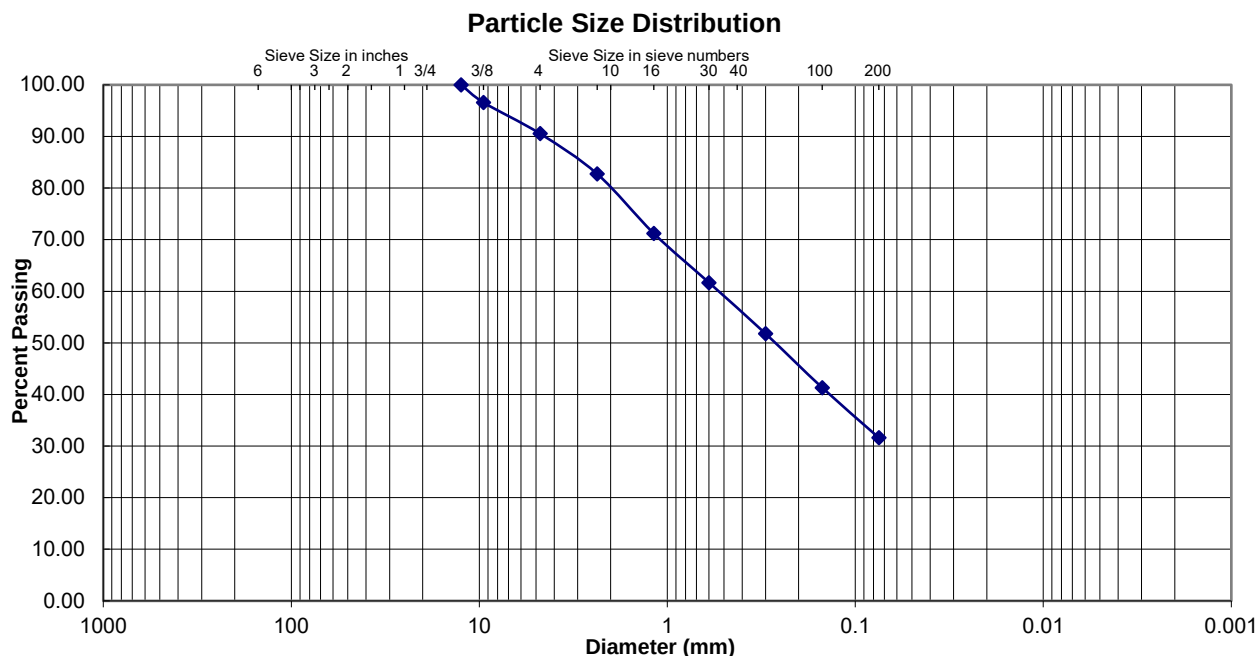
Cu N/A

Cc N/A

Classification

Silty Sand (SM)

Classification determined by ASTM D 2487. -200 material classification determined by visual assessment, ASTM D 2488.



Comments

Reviewed By JF

Gradation Analysis

ASTM D 422

Project Name Hecate Chiquito BESS

Source Grab

Project Number 185805178

Lab ID B2-2'

Preparation Method ASTM D 1140 Method A

Particle Shape

Particle Hardness

Sample Dry Mass (g)	307.90
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Moisture Content (%)	4.4
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Date Received 10-18-2021

Preparation Date 10-21-2021

Test Date 10-22-2021

Analysis based on total sample.

Sieve Size	Grams Retained	% Retained	% Passing
3/8"	0.00	0.0	100.0
No. 4	9.40	3.1	96.9
No. 8	13.70	4.4	92.5
No. 16	18.80	6.1	86.4
No. 30	22.80	7.4	79.0
No. 50	26.40	8.6	70.4
No. 100	34.00	11.0	59.4
No. 200	39.00	12.7	46.7
Pan	143.80	46.7	---

% Gravel	3.1
----------	-----

% Sand	<u>50.2</u>
--------	-------------

% Fines	46.7
---------	------

Fines Classification	ML
----------------------	----

D ₁₀ (mm)	N/A
----------------------	-----

D ₃₀ (mm)	N/A
----------------------	-----

D_{30} (mm)	N/A
D_{60} (mm)	N/A

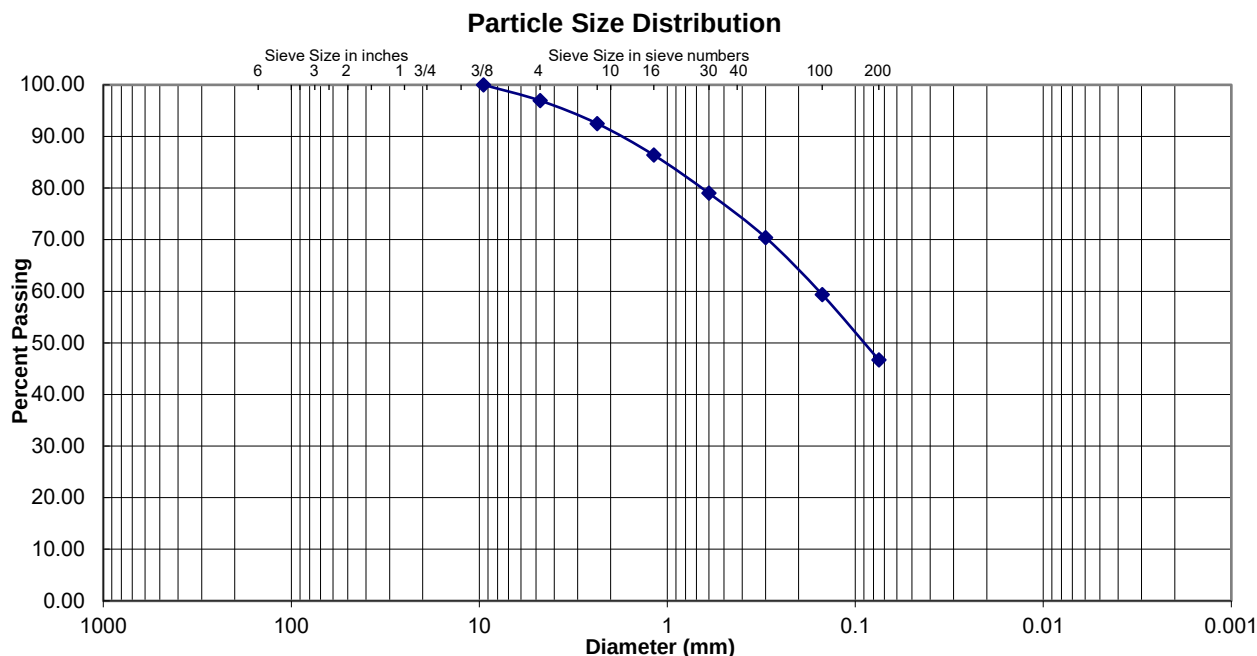
Cu N/A

C_c N/A

Classification

Silty Sand (SM)

Classification determined by ASTM D 2487. -200 material classification determined by visual assessment, ASTM D 2488.



Comments

Reviewed By _____ JF

Project Name Hecate Chiquito BESS
Source CalMod
Preparation Method ASTM D 1140 Method A

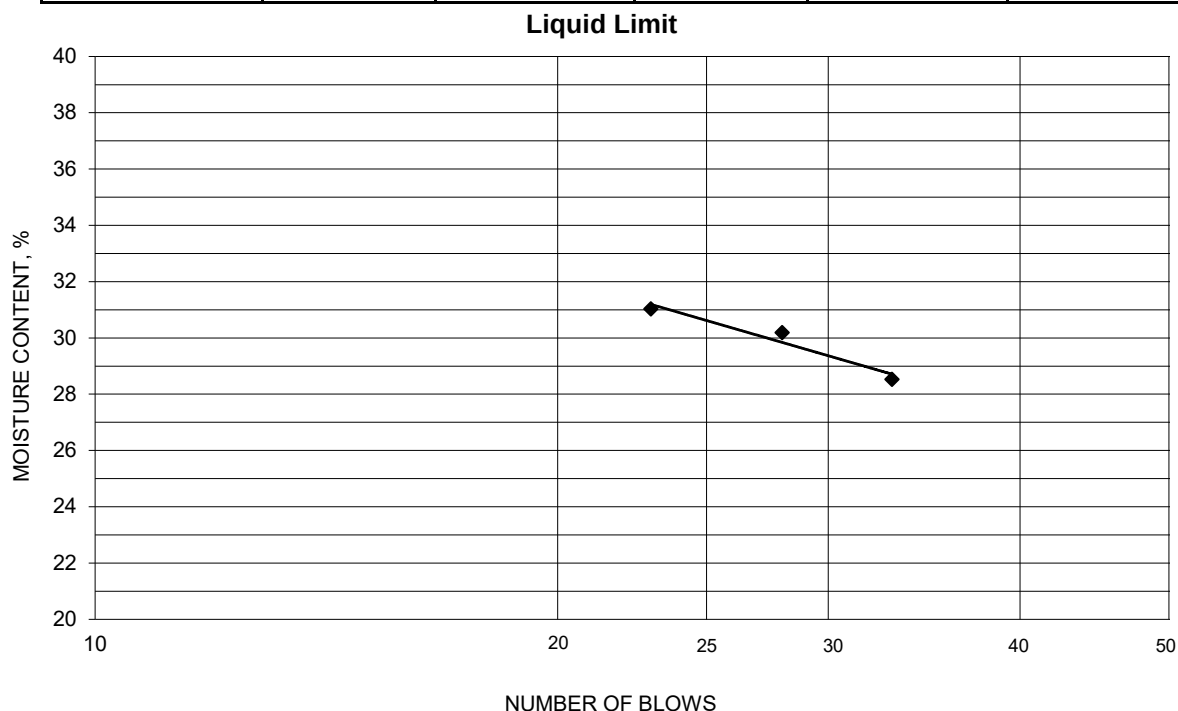
Project Number 185805178
Lab ID B2-5'
Date Received 10-18-2021
Test Date 10-21-2021

Initial Sample Wet Mass (g)	<u>231.50</u>	Moisture Content (%)	<u>9.9</u>
Initial Oven Dry Sample Mass (g)	<u>210.70</u>		
Final Oven Dry Sample Mass (g)	<u>72.80</u>		
Materials Finer Than 75µm (No. 200) Sieve (g)	<u>137.90</u>		
Percent Finer Than 75µm (No. 200) Sieve (%)	<u>65.4</u>		

Comments _____
Reviewed By JF

Project	Hecate Chiquito BESS	Project No.	185805178
Source	CalMod	Lab ID	B2-5'
Tested By	JP	Test Method	ASTM D 4318
Test Date	02-25-2021	Prepared	Dry
		% + No. 40	10
		Date Received	10-18-2021

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
17.49	16.60	13.48	33	28.5	31
19.75	18.28	13.41	28	30.2	
19.72	18.28	13.64	23	31.0	



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
19.73	18.85	13.74	17.2	17	14

Remarks: USCS Soil Type = Clay (CL)

Reviewed By JF

Project Name Hecate Chiquito BESS

 Source Grab

 Project Number 185805178

 Lab ID B3-2'

 Preparation Method ASTM D 1140 Method A

Particle Shape _____

Particle Hardness _____

 Sample Dry Mass (g) 318.70

 Moisture Content (%) 4.2

 Date Received 10-18-2021

 Preparation Date 10-21-2021

 Test Date 10-22-2021

Analysis based on total sample.

Sieve Size	Grams Retained	% Retained	% Passing
1/2"	0.00	0.0	100.0
3/8"	16.90	5.3	94.7
No. 4	20.40	6.4	88.3
No. 8	25.40	8.0	80.3
No. 16	34.60	10.9	69.5
No. 30	30.80	9.7	59.8
No. 50	32.20	10.1	49.7
No. 100	32.90	10.3	39.4
No. 200	29.70	9.3	30.1
Pan	95.80	30.1	---

 % Gravel 11.7

 % Sand 58.2

 % Fines 30.1

 Fines Classification ML

 D₁₀ (mm) N/A

 D₃₀ (mm) N/A

 D₆₀ (mm) N/A

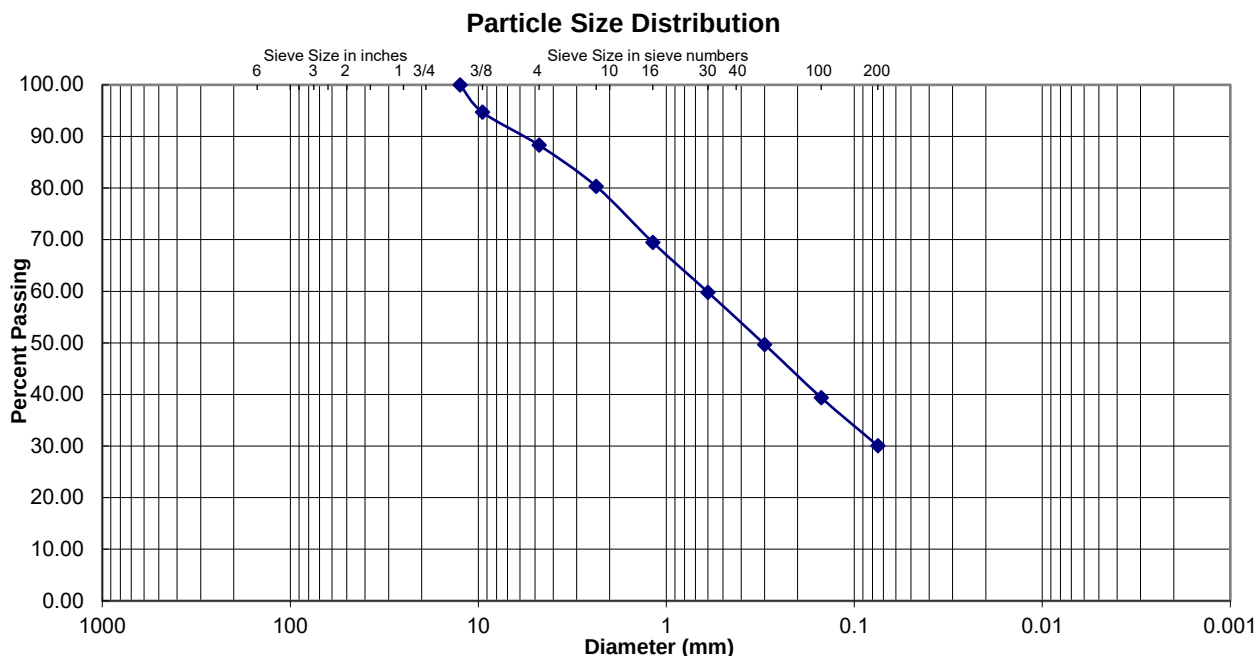
 Cu N/A

 Cc N/A

Classification

Silty Sand (SM)

Classification determined by ASTM D 2487. -200 material classification determined by visual assessment, ASTM D 2488.



Comments _____

 Reviewed By JF

Gradation Analysis

ASTM D 422

Project Name Hecate Chiquito BESS

Source	CalMod
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18
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82	82
83	83
84	84
85	85
86	86
87	87
88	88
89	89
90	90
91	91
92	92
93	93
94	94
95	95
96	96
97	97
98	98
99	99
100	100

Project Number 185805178

Lab ID B3-7'

Preparation Method ASTM D 1140 Method A

Particle Shape

Particle Hardness

Sample Dry Mass (g)	316.40
---------------------	--------

Moisture Content (%)	7.5
----------------------	-----

Date Received 10-18-2021

Expiration Date	10-21-2021
-----------------	------------

Test Date 10-22-2021

Analysis based on total sample.

Sieve Size	Grams Retained	% Retained	% Passing
3/8"	0.00	0.0	100.0
No. 4	6.70	2.1	97.9
No. 8	21.80	6.9	91.0
No. 16	32.00	10.1	80.9
No. 30	31.20	9.9	71.0
No. 50	38.10	12.0	59.0
No. 100	36.90	11.7	47.3
No. 200	33.80	10.7	36.6
Pan	115.90	36.6	---

% Gravel	2.1
----------	-----

% Sand	<u>61.3</u>
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% Fines	<u>36.6</u>
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Fines Classification	ML
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D ₁₀ (mm)	N/A
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D ₃₀ (mm)	N/A
----------------------	-----

D ₆₀ (mm)	N/A
----------------------	-----

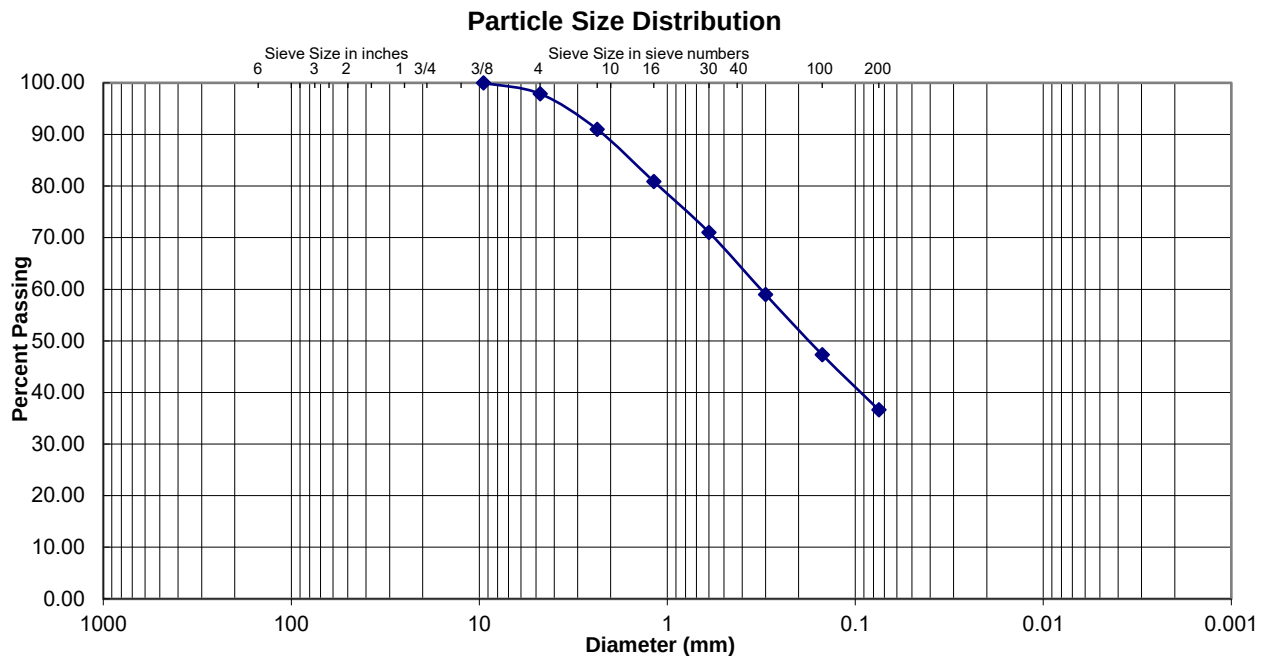
Cu N/A

Cc N/A

Classification

Silty Sand (SM)

Classification determined by ASTM D 2487. -200
material classification determined by visual assessment,
ASTM D 2488.



Comments

Reviewed By JF

Project Name Hecate Chiquito BESS

 Source Grab

 Preparation Method ASTM D 1140 Method A

Particle Shape _____

Particle Hardness _____

 Sample Dry Mass (g) 342.70

 Moisture Content (%) 5.5

 Project Number 185805178

 Lab ID B5-2'

 Date Received 10-18-2021

 Preparation Date 10-21-2021

 Test Date 10-22-2021

Analysis based on total sample.

Sieve Size	Grams Retained	% Retained	% Passing
1/2"	0.00	0.0	100.0
3/8"	4.60	1.3	98.7
No. 4	3.10	0.9	97.8
No. 8	8.20	2.4	95.4
No. 16	12.60	3.7	91.7
No. 30	16.80	4.9	86.8
No. 50	22.50	6.6	80.2
No. 100	34.10	10.0	70.3
No. 200	43.00	12.5	57.7
Pan	197.80	57.7	---

 % Gravel 2.2

 % Sand 40.0

 % Fines 57.7

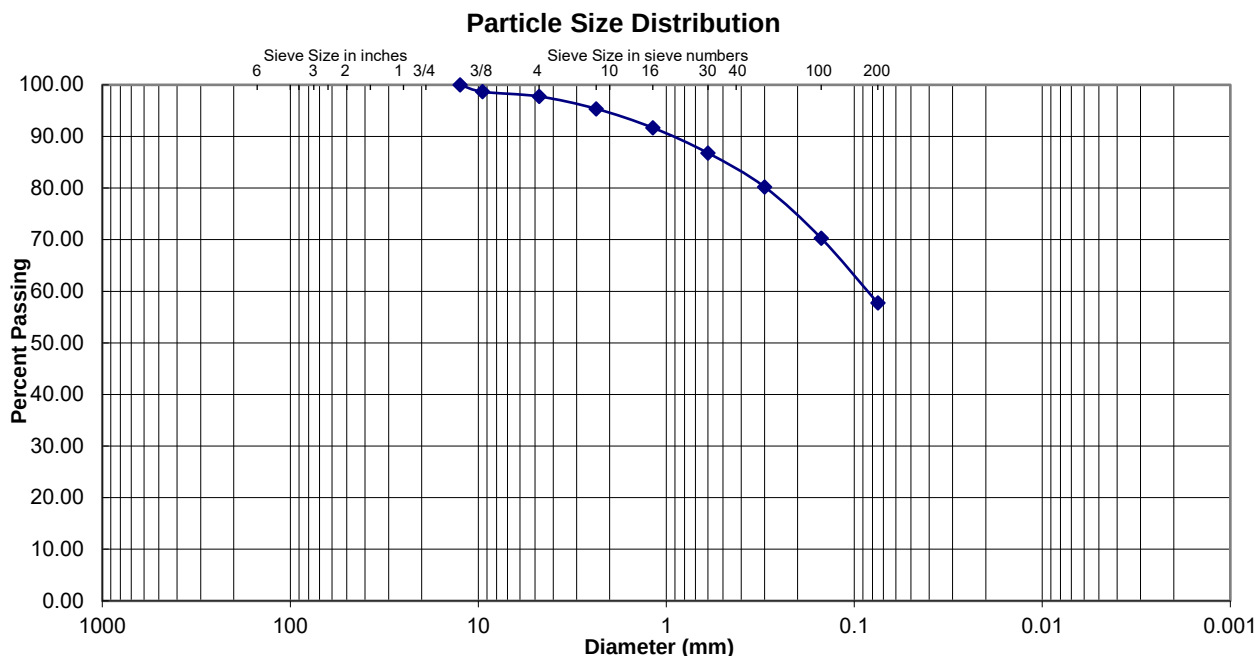
 Fines Classification ML

 D₁₀ (mm) N/A

 D₃₀ (mm) N/A

 D₆₀ (mm) N/A

 Cu N/A

 Cc N/A


Comments _____

 Reviewed By JF

Project Name Hecate Chiquito BESS
Source SPT
Preparation Method ASTM D 1140 Method A

Project Number 185805178
Lab ID B5-5'
Date Received 10-18-2021
Test Date 10-21-2021

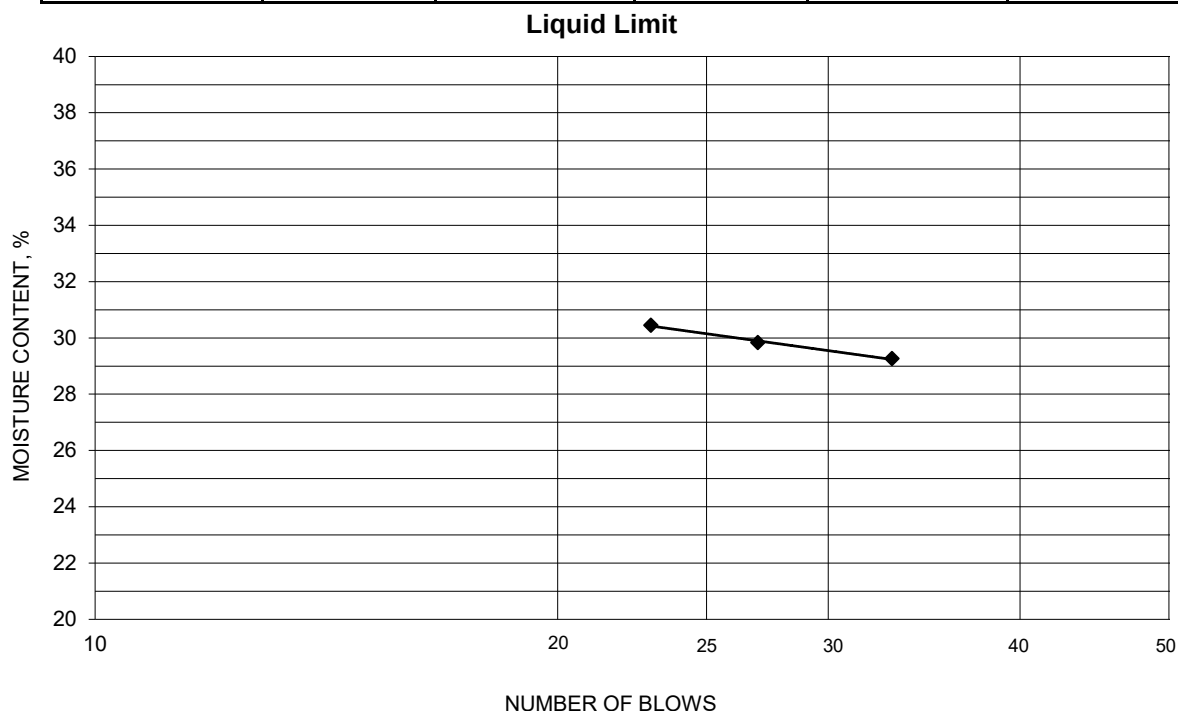
Initial Sample Wet Mass (g)	<u>240.10</u>	Moisture Content (%)	<u>15.5</u>
Initial Oven Dry Sample Mass (g)	<u>207.80</u>		
Final Oven Dry Sample Mass (g)	<u>124.70</u>		
Materials Finer Than 75µm (No. 200) Sieve (g)	<u>83.10</u>		
Percent Finer Than 75µm (No. 200) Sieve (%)	<u>40.0</u>		

Comments _____

Reviewed By JF

Project	Hecate Chiquito BESS	Project No.	185805178
Source	SPT	Lab ID	B5-5'
Tested By	JP	Test Method	ASTM D 4318
Test Date	02-25-2021	Prepared	Dry
		Date Received	10-18-2021

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Number of Blows	Water Content (%)	Liquid Limit
19.19	17.92	13.58	33	29.3	30
18.26	17.18	13.56	27	29.8	
18.63	17.43	13.49	23	30.5	



PLASTIC LIMIT AND PLASTICITY INDEX

Wet Soil and Tare Mass (g)	Dry Soil and Tare Mass (g)	Tare Mass (g)	Water Content (%)	Plastic Limit	Plasticity Index
20.48	19.30	13.43	20.1	20	10

Remarks: USCS Soil Type = Clay (CL)

Reviewed By JF

Project Name Hecate Chiquito BESS
 Source Grab

 Project Number 185805178

 Lab ID B6-2'

 Preparation Method ASTM D 1140 Method A

 Date Received 10-18-2021

Particle Shape _____

 Preparation Date 10-21-2021

Particle Hardness _____

 Test Date 10-22-2021

 Sample Dry Mass (g) 352.40

 Moisture Content (%) 4.9

Analysis based on total sample.

Sieve Size	Grams Retained	% Retained	% Passing
1"	0.00	0.0	100.0
3/4"	55.20	15.7	84.3
1/2"	22.30	6.3	78.0
3/8"	11.00	3.1	74.9
No. 4	17.60	5.0	69.9
No. 8	27.10	7.7	62.2
No. 16	34.40	9.8	52.4
No. 30	26.30	7.5	45.0
No. 50	27.80	7.9	37.1
No. 100	30.20	8.6	28.5
No. 200	27.70	7.9	20.7
Pan	72.80	20.7	---

 % Gravel 30.1

 % Sand 49.2

 % Fines 20.7

 Fines Classification ML

 D₁₀ (mm) N/A

 D₃₀ (mm) N/A

 D₆₀ (mm) N/A

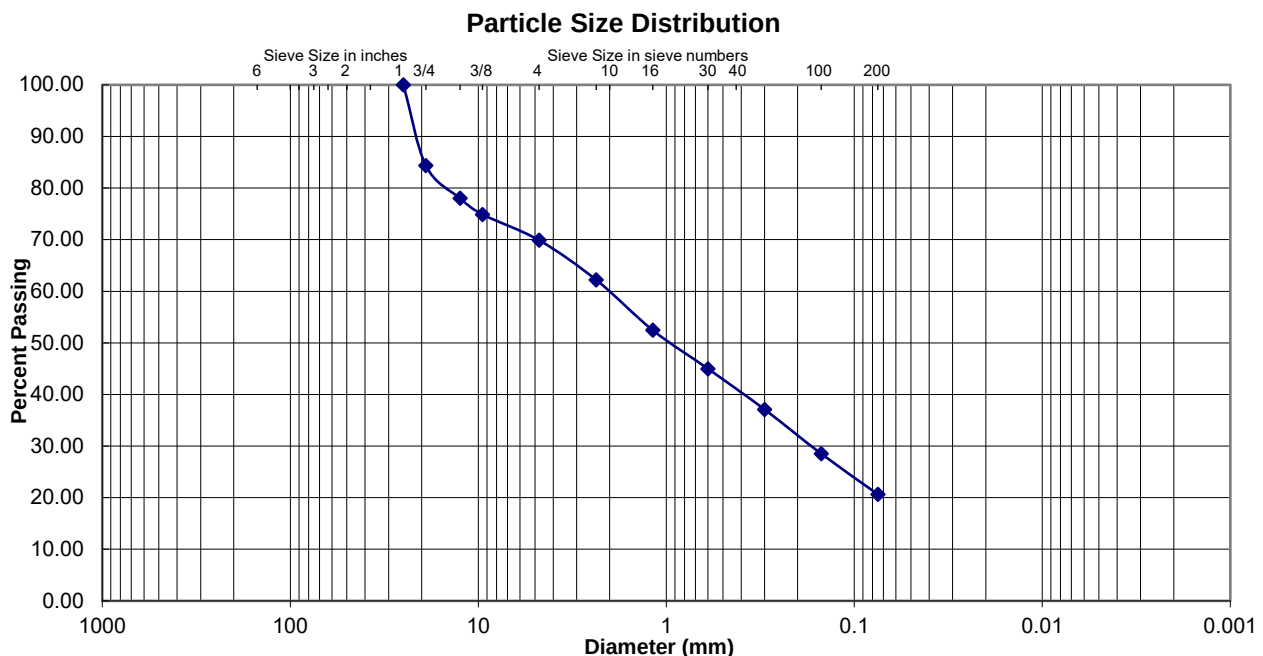
 Cu N/A

 Cc N/A

Classification

Silty Sand (SM) with Gravel

Classification determined by ASTM D 2487. -200 material classification determined by visual assessment, ASTM D 2488.



Comments _____

Reviewed By _____

Project Name Hecate Chiquito BESS
 Source Grab

 Project Number 185805178
 Lab ID B7-2'

 Preparation Method ASTM D 1140 Method A

 Date Received 10-18-2021

Particle Shape _____

 Preparation Date 10-21-2021

Particle Hardness _____

 Test Date 10-22-2021

 Sample Dry Mass (g) 369.10

 Moisture Content (%) 3.8

Analysis based on total sample.

Sieve Size	Grams Retained	% Retained	% Passing
3/4"	0.00	0.0	100.0
1/2"	29.40	8.0	92.0
3/8"	0.00	0.0	92.0
No. 4	11.70	3.2	88.9
No. 8	22.40	6.1	82.8
No. 16	44.60	12.1	70.7
No. 30	40.20	10.9	59.8
No. 50	20.90	5.7	54.2
No. 100	20.10	5.4	48.7
No. 200	35.00	9.5	39.2
Pan	144.80	39.2	---

 % Gravel 11.1
 % Sand 49.6
 % Fines 39.2
 Fines Classification ML

 D₁₀ (mm) N/A

 D₃₀ (mm) N/A

 D₆₀ (mm) N/A

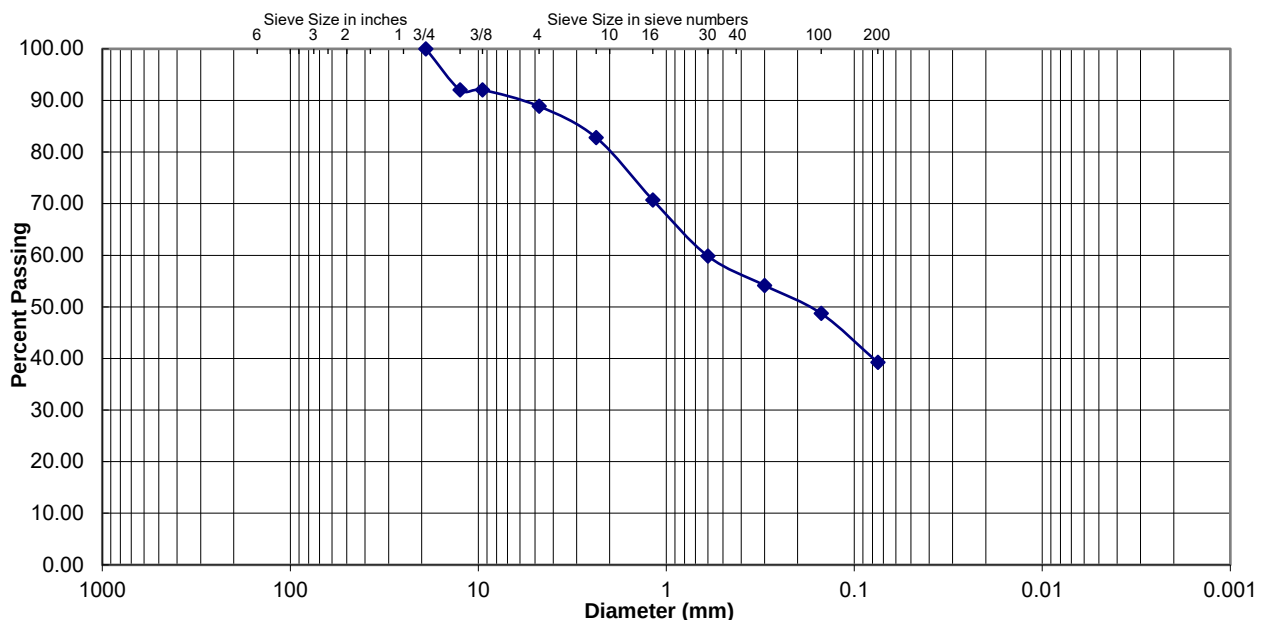
 Cu N/A

 Cc N/A

Classification

Silty Sand (SM)

Classification determined by ASTM D 2487. -200 material classification determined by visual assessment, ASTM D 2488.

Particle Size Distribution


Comments _____

Reviewed By _____



Materials Finer Than 75µm (No. 200) Sieve

ASTM D 1140

Project Name Hecate Chiquito BESS
Source SPT

Project Number 185805178
Lab ID B7-5'

Preparation Method ASTM D 1140 Method A

Date Received 10-18-2021
Test Date 10-21-2021

Initial Sample Wet Mass (g)	<u>214.50</u>	Moisture Content (%)	<u>10.5</u>
Initial Oven Dry Sample Mass (g)	<u>194.20</u>		
Final Oven Dry Sample Mass (g)	<u>113.70</u>		
Materials Finer Than 75µm (No. 200) Sieve (g)	<u>80.50</u>		
Percent Finer Than 75µm (No. 200) Sieve (%)	<u>41.5</u>		

Comments

Reviewed By

JD & S Testing

Direct Shear Moisture Content & Density

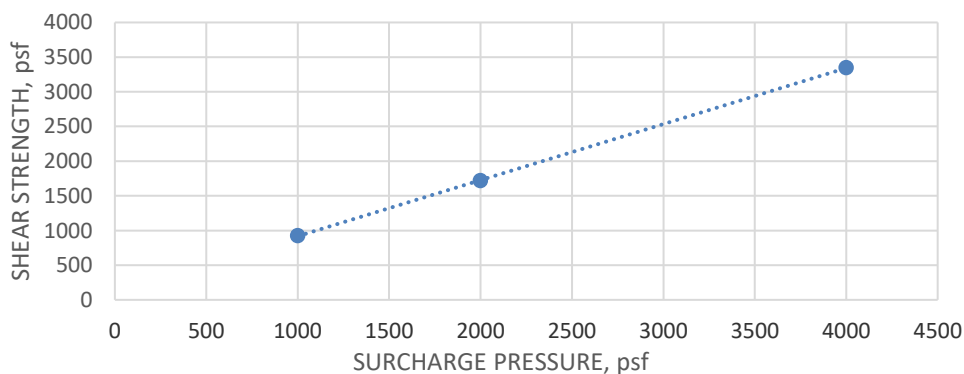
Project Name: Hecate Chiquito BESS Project Number: 185805178

Sampled By: Client Sample Date: 10/7/2021 Lab #: B1-7

Source/Location: B1-7 Tested By: JP

Description: _____ Test Date: 10/23/2021

Shearing Rate (in./min.)		0.040		
Normal Pressure (psf)		1000	2000	4000
[A]	Initial Weight of Wet Soil + Ring (0.1g)	195.1	203.1	203.6
[B]	Weight of Ring (0.1g)	45.5	44.3	45.6
[C] = [A] - [B]	Initial Weight of Wet Soil (0.1g)	149.6	158.8	158.0
[D]	Initial Reading	Time	0.0000	0.0000
		Time		
		Time		
		Time		
[E]	Final Reading	Time	0.0231	0.0148
[F] = [E] - [D]	Height Change		0.0231	0.0148
[G] = 1 - [F]	Final Height		0.9769	0.9852
Shear Strength (psf)		924	1716	3346
[H]	Final Weight of Wet Soil (0.1g)	157.1	169.6	167.8
[J]	Weight of Dry Soil (0.1g)	137.0	149.8	147.7
[K]	Specific Gravity	2.7		
[L]	Maximum Dry Density (0.1pcf)	120.4		
[M]	Initial Volume (0.01 cubic inch)	4.60	4.60	4.60
[P] = ([C] - [J]) / [J]	Initial Moisture Content (0.1%)	9.2%	6.0%	7.0%
[Q] = [C] / [M] * 3.81	Initial Wet Density (0.1pcf)	123.9	131.5	130.9
[R] = [Q] / (1 + [P])	Initial Dry Density (0.1pcf)	113.5	124.1	122.3
[S] = [P] x [K] x [R] / ([K] x 62.3) - [R]	Initial Saturation (0.1%)	56.2%	48.3%	53.7%
[T] = [R] / [L]	Initial Relative Compaction (0.1%)	94.2%	103.0%	101.6%
[U] = [M] X [G]	Final Volume (0.01 cubic inch)	4.49	4.53	4.58
[V] = ([H] - [J]) / [J]	Final Moisture Content (0.1%)	14.7%	13.2%	13.6%
[W] = [H] / [U] * 3.81	Final Wet Density (0.1pcf)	133.2	142.6	139.6
[X] = [W] / (1 + [V])	Final Dry Density (0.1pcf)	116.2	125.9	122.9
[Y] = [V] x [K] x [X] / ([K] x 62.3) - [X]	Final Saturation (0.1%)	88.4%	106.3%	99.6%
[Z] = [X] / [L]	Final Relative Compaction (0.1%)	96.4%	104.6%	102.0%



Cohesion (psf)	110
Friction Angle (degrees)	39

Remarks: _____

Reviewed by: _____

JD & S Testing

Direct Shear Moisture Content & Density

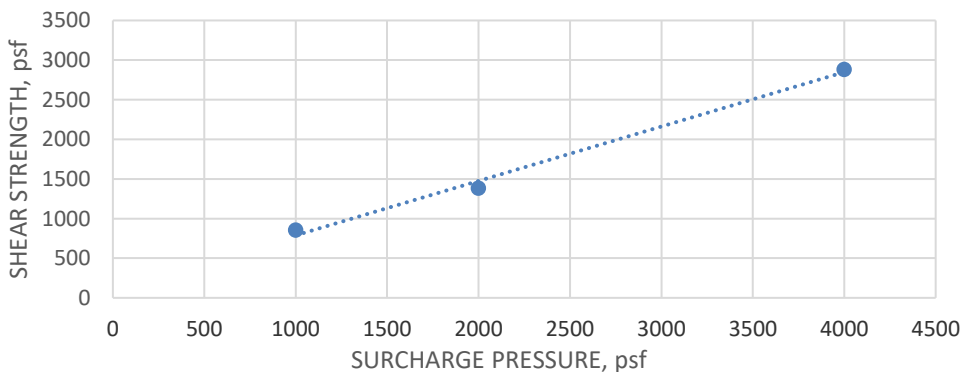
Project Name: Hecate Chiquito BESS Project Number: 185805178

Sampled By: Client Sample Date: 10/7/2021 Lab #: B2-5

Source/Location: B2-5 Tested By: JP

Description: _____ Test Date: 10/23/2021

Shearing Rate (in./min.)		0.040		
Normal Pressure (psf)		1000	2000	4000
[A]	Initial Weight of Wet Soil + Ring (0.1g)	200.7	197.9	192.7
[B]	Weight of Ring (0.1g)	45.6	45.7	45.6
[C] = [A] - [B]	Initial Weight of Wet Soil (0.1g)	155.1	152.2	147.1
[D]	Initial Reading	Time	0.0000	0.0000
		Time		
		Time		
		Time		
[E]	Final Reading	Time	0.0315	0.0052
[F] = [E] - [D]	Height Change		0.0315	0.0052
[G] = 1 - [F]	Final Height		0.9685	0.9948
Shear Strength (psf)		852	1380	2880
[H]	Final Weight of Wet Soil (0.1g)	161.8	159.6	152.4
[J]	Weight of Dry Soil (0.1g)	134.9	133.7	128.2
[K]	Specific Gravity	2.7		
[L]	Maximum Dry Density (0.1pcf)	110.0		
[M]	Initial Volume (0.01 cubic inch)	4.60	4.60	4.60
[P] = ([C] - [J]) / [J]	Initial Moisture Content (0.1%)	15.0%	13.8%	14.7%
[Q] = [C] / [M] * 3.81	Initial Wet Density (0.1pcf)	128.5	126.1	121.8
[R] = [Q] / (1 + [P])	Initial Dry Density (0.1pcf)	111.7	110.7	106.2
[S] = [P] x [K] x [R] / ([K] x 62.3) - [R]	Initial Saturation (0.1%)	92.0%	81.9%	78.2%
[T] = [R] / [L]	Initial Relative Compaction (0.1%)	101.6%	100.7%	96.5%
[U] = [M] X [G]	Final Volume (0.01 cubic inch)	4.46	4.58	4.54
[V] = ([H] - [J]) / [J]	Final Moisture Content (0.1%)	19.9%	19.4%	18.9%
[W] = [H] / [U] * 3.81	Final Wet Density (0.1pcf)	138.4	132.9	127.8
[X] = [W] / (1 + [V])	Final Dry Density (0.1pcf)	115.4	111.3	107.5
[Y] = [V] x [K] x [X] / ([K] x 62.3) - [X]	Final Saturation (0.1%)	117.5%	102.3%	90.3%
[Z] = [X] / [L]	Final Relative Compaction (0.1%)	104.9%	101.2%	97.8%



Cohesion (psf)	110
Friction Angle (degrees)	34

Remarks: _____ Reviewed by: _____

JD & S Testing

Direct Shear Moisture Content & Density

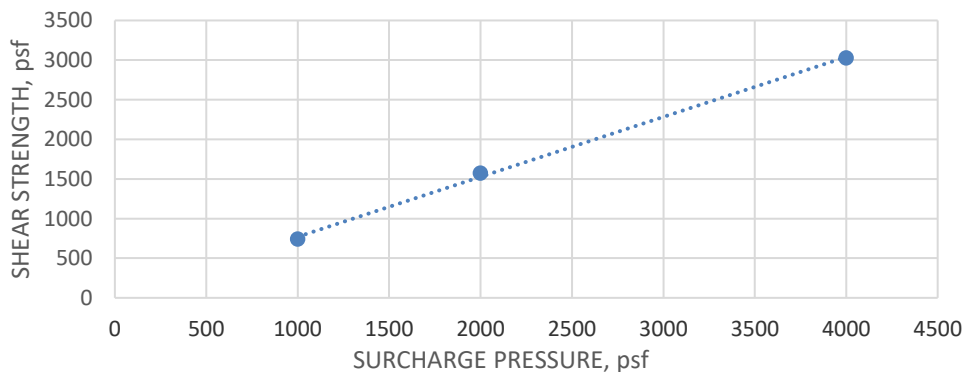
Project Name: Hecate Chiquito BESS Project Number: 185805178

Sampled By: Client Sample Date: 10/7/2021 Lab #: B3-7

Source/Location: B3-7 Tested By: JP

Description: _____ Test Date: 10/23/2021

Shearing Rate (in./min.)		0.040		
Normal Pressure (psf)		1000	2000	4000
[A]	Initial Weight of Wet Soil + Ring (0.1g)	198.7	200.7	201.6
[B]	Weight of Ring (0.1g)	45.6	46.1	45.3
[C] = [A] - [B]	Initial Weight of Wet Soil (0.1g)	153.1	154.6	156.3
[D]	Initial Reading	Time	0.0000	0.0000
		Time		
		Time		
		Time		
[E]	Final Reading	Time	0.0235	0.0141
[F] = [E] - [D]	Height Change		0.0235	0.0141
[G] = 1 - [F]	Final Height		0.9765	0.9859
Shear Strength (psf)		740	1572	3024
[H]	Final Weight of Wet Soil (0.1g)	160.8	161.6	164.3
[J]	Weight of Dry Soil (0.1g)	141.6	143.2	145.0
[K]	Specific Gravity	2.7		
[L]	Maximum Dry Density (0.1pcf)	119.1		
[M]	Initial Volume (0.01 cubic inch)	4.60	4.60	4.60
[P] = ([C] - [J]) / [J]	Initial Moisture Content (0.1%)	8.1%	8.0%	7.8%
[Q] = [C] / [M] * 3.81	Initial Wet Density (0.1pcf)	126.8	128.0	129.5
[R] = [Q] / (1 + [P])	Initial Dry Density (0.1pcf)	117.3	118.6	120.1
[S] = [P] x [K] x [R] / ([K] x 62.3) - [R]	Initial Saturation (0.1%)	54.6%	55.5%	56.6%
[T] = [R] / [L]	Initial Relative Compaction (0.1%)	98.4%	99.6%	100.8%
[U] = [M] X [G]	Final Volume (0.01 cubic inch)	4.49	4.54	4.57
[V] = ([H] - [J]) / [J]	Final Moisture Content (0.1%)	13.6%	12.8%	13.3%
[W] = [H] / [U] * 3.81	Final Wet Density (0.1pcf)	136.4	135.8	136.9
[X] = [W] / (1 + [V])	Final Dry Density (0.1pcf)	120.1	120.3	120.8
[Y] = [V] x [K] x [X] / ([K] x 62.3) - [X]	Final Saturation (0.1%)	91.4%	87.1%	91.6%
[Z] = [X] / [L]	Final Relative Compaction (0.1%)	100.8%	101.0%	101.4%



Cohesion (psf)	20
Friction Angle (degrees)	37

Remarks: _____

Reviewed by: _____

JD & S Testing

Direct Shear Moisture Content & Density

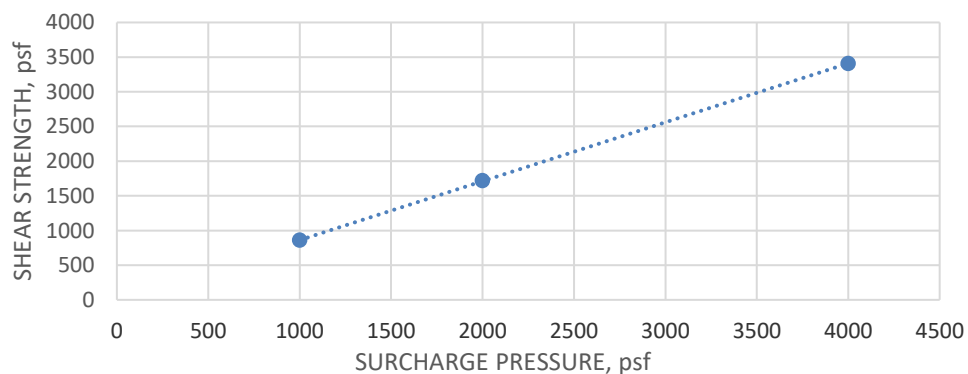
Project Name: Hecate Chiquito BESS Project Number: 185805178

Sampled By: Client Sample Date: 10/7/2021 Lab #: B4-5

Source/Location: B4-5 Tested By: JP

Description: _____ Test Date: 10/23/2021

Shearing Rate (in./min.)		0.040		
Normal Pressure (psf)		1000	2000	4000
[A]	Initial Weight of Wet Soil + Ring (0.1g)	194.2	192.6	197.5
[B]	Weight of Ring (0.1g)	43.0	42.3	46.3
[C] = [A] - [B]	Initial Weight of Wet Soil (0.1g)	151.2	150.3	151.2
[D]	Initial Reading	Time	0.0000	0.0000
		Time		
		Time		
		Time		
[E]	Final Reading	Time	0.0040	0.0052
[F] = [E] - [D]	Height Change		0.0040	0.0052
[G] = 1 - [F]	Final Height		0.9960	0.9948
Shear Strength (psf)		858	1716	3408
[H]	Final Weight of Wet Soil (0.1g)	159.3	158.1	160.3
[J]	Weight of Dry Soil (0.1g)	138.4	139.4	142.5
[K]	Specific Gravity	2.7		
[L]	Maximum Dry Density (0.1pcf)	116.5		
[M]	Initial Volume (0.01 cubic inch)	4.60	4.60	4.60
[P] = ([C] - [J]) / [J]	Initial Moisture Content (0.1%)	9.2%	7.8%	6.1%
[Q] = [C] / [M] * 3.81	Initial Wet Density (0.1pcf)	125.2	124.5	125.2
[R] = [Q] / (1 + [P])	Initial Dry Density (0.1pcf)	114.6	115.5	118.0
[S] = [P] x [K] x [R] / ([K] x 62.3) - [R]	Initial Saturation (0.1%)	58.4%	49.8%	41.1%
[T] = [R] / [L]	Initial Relative Compaction (0.1%)	98.4%	99.1%	101.3%
[U] = [M] x [G]	Final Volume (0.01 cubic inch)	4.58	4.58	4.57
[V] = ([H] - [J]) / [J]	Final Moisture Content (0.1%)	15.1%	13.4%	12.5%
[W] = [H] / [U] * 3.81	Final Wet Density (0.1pcf)	132.5	131.6	133.5
[X] = [W] / (1 + [V])	Final Dry Density (0.1pcf)	115.1	116.1	118.7
[Y] = [V] x [K] x [X] / ([K] x 62.3) - [X]	Final Saturation (0.1%)	88.3%	80.6%	80.9%
[Z] = [X] / [L]	Final Relative Compaction (0.1%)	98.8%	99.6%	101.9%



Cohesion (psf)	20
Friction Angle (degrees)	40

Remarks: _____

Reviewed by: _____

JD & S Testing

Direct Shear Moisture Content & Density

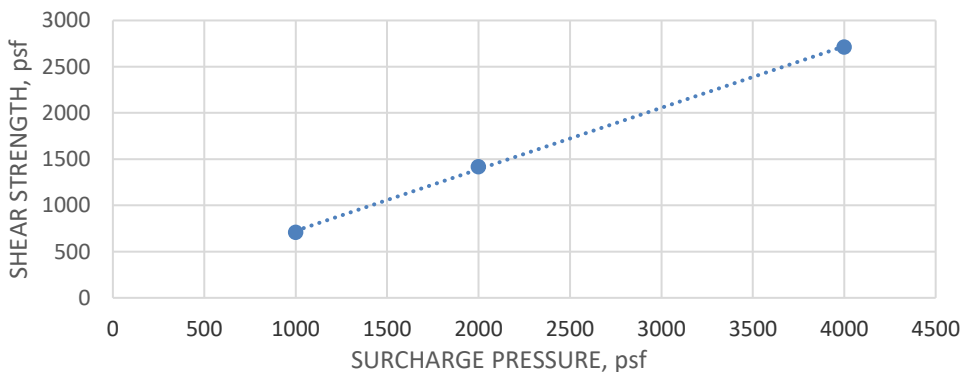
Project Name: Hecate Chiquito BESS Project Number: 185805178

Sampled By: Client Sample Date: 10/7/2021 Lab #: B4-10

Source/Location: B4-10 Tested By: JP

Description: _____ Test Date: 10/23/2021

Shearing Rate (in./min.)		0.040		
Normal Pressure (psf)		1000	2000	4000
[A]	Initial Weight of Wet Soil + Ring (0.1g)	203.4	198.2	201.4
[B]	Weight of Ring (0.1g)	45.8	45.6	45.7
[C] = [A] - [B]	Initial Weight of Wet Soil (0.1g)	157.6	152.6	155.7
[D]	Initial Reading	Time	0.0000	0.0000
		Time		
		Time		
		Time		
[E]	Final Reading	Time	0.0108	0.0018
[F] = [E] - [D]	Height Change		0.0108	0.0018
[G] = 1 - [F]	Final Height		0.9892	0.9981
Shear Strength (psf)		708	1416	2712
[H]	Final Weight of Wet Soil (0.1g)	160.9	155.8	158.0
[J]	Weight of Dry Soil (0.1g)	139.5	135.7	137.4
[K]	Specific Gravity	2.7		
[L]	Maximum Dry Density (0.1pcf)	114.4		
[M]	Initial Volume (0.01 cubic inch)	4.60	4.60	4.60
[P] = ([C] - [J]) / [J]	Initial Moisture Content (0.1%)	13.0%	12.5%	13.3%
[Q] = [C] / [M] * 3.81	Initial Wet Density (0.1pcf)	130.5	126.4	129.0
[R] = [Q] / (1 + [P])	Initial Dry Density (0.1pcf)	115.5	112.4	113.8
[S] = [P] x [K] x [R] / ([K] x 62.3) - [R]	Initial Saturation (0.1%)	86.8%	76.1%	85.2%
[T] = [R] / [L]	Initial Relative Compaction (0.1%)	101.0%	98.3%	99.5%
[U] = [M] X [G]	Final Volume (0.01 cubic inch)	4.55	4.59	4.59
[V] = ([H] - [J]) / [J]	Final Moisture Content (0.1%)	15.3%	14.8%	15.0%
[W] = [H] / [U] * 3.81	Final Wet Density (0.1pcf)	134.7	129.3	131.1
[X] = [W] / (1 + [V])	Final Dry Density (0.1pcf)	116.8	112.6	114.0
[Y] = [V] x [K] x [X] / ([K] x 62.3) - [X]	Final Saturation (0.1%)	94.1%	81.0%	85.2%
[Z] = [X] / [L]	Final Relative Compaction (0.1%)	102.1%	98.4%	99.7%



Cohesion (psf)	60
Friction Angle (degrees)	34

Remarks: _____ Reviewed by: _____

JD & S Testing

Direct Shear Moisture Content & Density

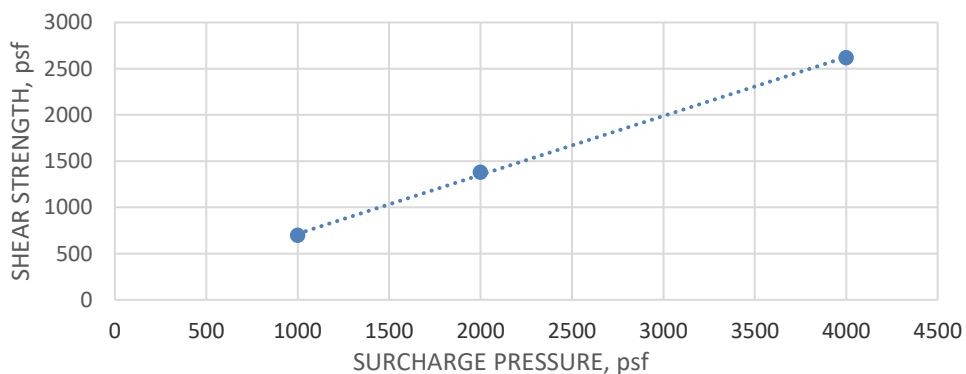
Project Name: Hecate Chiquito BESS Project Number: 185805178

Sampled By: Client Sample Date: 10/7/2021 Lab #: B5-7

Source/Location: B5-7 Tested By: JP

Description: _____ Test Date: 10/23/2021

Shearing Rate (in./min.)		0.040		
Normal Pressure (psf)		1000	2000	4000
[A]	Initial Weight of Wet Soil + Ring (0.1g)	210.3	205.9	206.0
[B]	Weight of Ring (0.1g)	46.0	46.1	44.9
[C] = [A] - [B]	Initial Weight of Wet Soil (0.1g)	164.3	159.8	161.1
[D]	Initial Reading	Time	0.0000	0.0000
		Time		
		Time		
		Time		
[E]	Final Reading	Time	0.0176	0.0169
[F] = [E] - [D]	Height Change		0.0176	0.0169
[G] = 1 - [F]	Final Height		0.9824	0.9831
Shear Strength (psf)		696	1380	2616
[H]	Final Weight of Wet Soil (0.1g)	167.4	162.5	164.1
[J]	Weight of Dry Soil (0.1g)	141.8	137.3	137.8
[K]	Specific Gravity	2.7		
[L]	Maximum Dry Density (0.1pcf)	115.6		
[M]	Initial Volume (0.01 cubic inch)	4.60	4.60	4.60
[P] = ([C] - [J]) / [J]	Initial Moisture Content (0.1%)	15.9%	16.4%	16.9%
[Q] = [C] / [M] * 3.81	Initial Wet Density (0.1pcf)	136.1	132.4	133.4
[R] = [Q] / (1 + [P])	Initial Dry Density (0.1pcf)	117.4	113.7	114.1
[S] = [P] x [K] x [R] / ([K] x 62.3) - [R]	Initial Saturation (0.1%)	114.8%	107.5%	112.7%
[T] = [R] / [L]	Initial Relative Compaction (0.1%)	101.6%	98.4%	98.8%
[U] = [M] X [G]	Final Volume (0.01 cubic inch)	4.52	4.52	4.56
[V] = ([H] - [J]) / [J]	Final Moisture Content (0.1%)	18.1%	18.4%	19.1%
[W] = [H] / [U] * 3.81	Final Wet Density (0.1pcf)	141.1	136.9	137.1
[X] = [W] / (1 + [V])	Final Dry Density (0.1pcf)	119.6	115.7	115.1
[Y] = [V] x [K] x [X] / ([K] x 62.3) - [X]	Final Saturation (0.1%)	119.8%	109.1%	111.7%
[Z] = [X] / [L]	Final Relative Compaction (0.1%)	103.4%	100.1%	99.6%



Cohesion (psf)	80
Friction Angle (degrees)	32

Remarks: _____

Reviewed by: _____

JD & S Testing

Direct Shear Moisture Content & Density

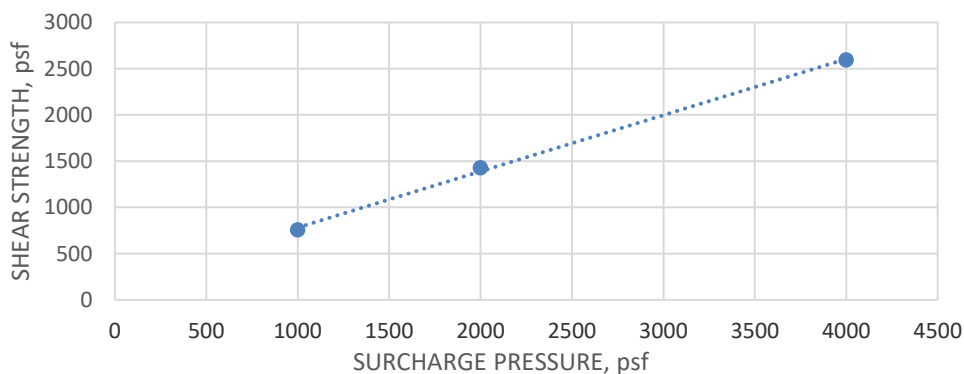
Project Name: Hecate Chiquito BESS Project Number: 185805178

Sampled By: Client Sample Date: 10/7/2021 Lab #: B6-10

Source/Location: B6-10 Tested By: JP

Description: _____ Test Date: 10/23/2021

Shearing Rate (in./min.)		0.040		
Normal Pressure (psf)		1000	2000	4000
[A]	Initial Weight of Wet Soil + Ring (0.1g)	205.8	211.3	208.4
[B]	Weight of Ring (0.1g)	46.2	45.7	45.8
[C] = [A] - [B]	Initial Weight of Wet Soil (0.1g)	159.6	165.6	162.6
[D]	Initial Reading	Time	0.0000	0.0000
		Time		
		Time		
		Time		
[E]	Final Reading	Time	0.0131	0.0070
[F] = [E] - [D]	Height Change		0.0131	0.0070
[G] = 1 - [F]	Final Height		0.9869	0.9930
Shear Strength (psf)		756	1428	2592
[H]	Final Weight of Wet Soil (0.1g)	162.0	168.1	164.1
[J]	Weight of Dry Soil (0.1g)	131.5	138.3	136.2
[K]	Specific Gravity	2.7		
[L]	Maximum Dry Density (0.1pcf)	112.5		
[M]	Initial Volume (0.01 cubic inch)	4.60	4.60	4.60
[P] = ([C] - [J]) / [J]	Initial Moisture Content (0.1%)	21.4%	19.7%	19.4%
[Q] = [C] / [M] * 3.81	Initial Wet Density (0.1pcf)	132.2	137.2	134.7
[R] = [Q] / (1 + [P])	Initial Dry Density (0.1pcf)	108.9	114.5	112.8
[S] = [P] x [K] x [R] / ([K] x 62.3) - [R]	Initial Saturation (0.1%)	128.6%	136.2%	127.2%
[T] = [R] / [L]	Initial Relative Compaction (0.1%)	96.8%	101.8%	100.2%
[U] = [M] x [G]	Final Volume (0.01 cubic inch)	4.54	4.57	4.57
[V] = ([H] - [J]) / [J]	Final Moisture Content (0.1%)	23.2%	21.5%	20.5%
[W] = [H] / [U] * 3.81	Final Wet Density (0.1pcf)	136.0	140.2	136.7
[X] = [W] / (1 + [V])	Final Dry Density (0.1pcf)	110.4	115.4	113.4
[Y] = [V] x [K] x [X] / ([K] x 62.3) - [X]	Final Saturation (0.1%)	119.5%	127.0%	114.5%
[Z] = [X] / [L]	Final Relative Compaction (0.1%)	98.1%	102.5%	100.8%



Cohesion (psf)	180
Friction Angle (degrees)	31

Remarks: _____ Reviewed by: _____

**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**COMPACTION TEST**

Client: Stantec Consulting, Inc.
 Project Name: Hecate Chiquito BESS
 Project No.: 185805178
 Boring No.: B1
 Sample Type: Bulk
 Visual Sample Description: Clayey Sand

AP Number: 21-1023
 Tested By: SM Date: 10/20/21
 Calculated By: NR Date: 10/21/21
 Checked By: AP Date: 10/21/21
 Sample Date: 10/07/21

METHOD A
 MOLD VOLUME (CU.FT) 0.0333

Compaction Method ☒ ASTM D1557
☐ ASTM D698
 Preparation Method ☐ Moist
☒ Dry

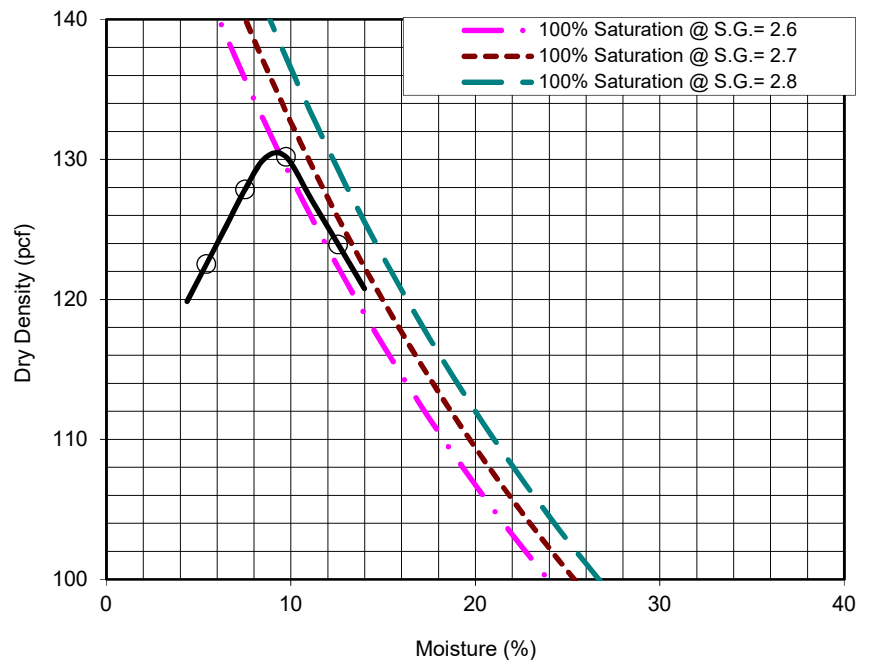
Wt. Comp. Soil + Mold (gm.)	3929	4010	3959	3803		
Wt. of Mold (gm.)	1850	1850	1850	1850		
Net Wt. of Soil (gm.)	2079	2160	2109	1953		
Container No.						
Wt. of Container (gm.)	150.06	149.83	141.31	138.32		
Wet Wt. of Soil + Cont. (gm.)	666.46	604.04	611.43	572.28		
Dry Wt. of Soil + Cont. (gm.)	630.36	563.78	558.96	549.96		
Moisture Content (%)	7.52	9.73	12.56	5.42		
Wet Density (pcf)	137.47	142.86	139.48	129.17		
Dry Density (pcf)	127.86	130.19	123.92	122.52		

Maximum Dry Density (pcf) 130.3
 Maximum Dry Density w/ Rock Correction (pcf) 131.9

Optimum Moisture Content (%) 9.1
 Optimum Moisture Content w/ Rock Correction (%) 8.6

PROCEDURE USED

- ☒ **METHOD A: Percent of Oversize:** 5.4%
 Soil Passing No. 4 (4.75 mm) Sieve
 Mold: 4 in. (101.6 mm) diameter
 Layers: 5 (Five)
 Blows per layer: 25 (twenty-five)
- ☐ **METHOD B: Percent of Oversize:** N/A
 Soil Passing 3/8 in. (9.5 mm) Sieve
 Mold: 4 in. (101.6 mm) diameter
 Layers: 5 (Five)
 Blows per layer: 25 (twenty-five)
- ☐ **METHOD C: Percent of Oversize:** N/A
 Soil Passing 3/4 in. (19.0 mm) Sieve
 Mold: 6 in. (152.4 mm) diameter
 Layers: 5 (Five)
 Blows per layer: 56 (fifty-six)



**AP Engineering and Testing, Inc.**

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Client: Stantec Consulting, Inc.
 Project Name: Hecate Chiquito BESS
 Project No.: 185805178
 Boring No.: B4
 Sample Type: Bulk
 Visual Sample Description: Clayey Sand

AP Number: 21-1023
 Tested By: SM Date: 10/20/21
 Calculated By: NR Date: 10/21/21
 Checked By: AP Date: 10/21/21
 Sample Date: 10/07/21

METHOD A
 MOLD VOLUME (CU.FT) 0.0333

Compaction Method ☒ ASTM D1557
☐ ASTM D698
 Preparation Method ☐ Moist
☒ Dry

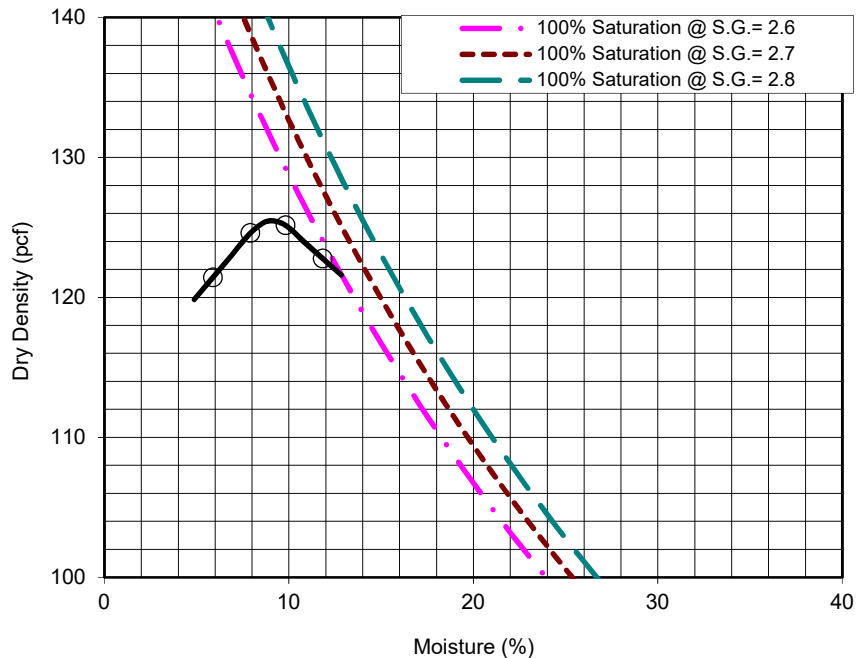
Wt. Comp. Soil + Mold (gm.)	3794	3928	3926	3883		
Wt. of Mold (gm.)	1850	1850	1850	1850		
Net Wt. of Soil (gm.)	1944	2078	2076	2033		
Container No.						
Wt. of Container (gm.)	149.89	137.87	148.11	143.51		
Wet Wt. of Soil + Cont. (gm.)	508.06	599.89	663.43	745.83		
Dry Wt. of Soil + Cont. (gm.)	488.16	558.60	608.93	701.66		
Moisture Content (%)	5.88	9.81	11.83	7.91		
Wet Density (pcf)	128.57	137.43	137.30	134.46		
Dry Density (pcf)	121.43	125.15	122.78	124.60		

Maximum Dry Density (pcf) 125.5
 Maximum Dry Density w/ Rock Correction (pcf) N/A

Optimum Moisture Content (%) 9.0
 Optimum Moisture Content w/ Rock Correction (%) N/A

PROCEDURE USED

- ☒ **METHOD A: Percent of Oversize:** 2.1%
 Soil Passing No. 4 (4.75 mm) Sieve
 Mold: 4 in. (101.6 mm) diameter
 Layers: 5 (Five)
 Blows per layer: 25 (twenty-five)
- ☐ **METHOD B: Percent of Oversize:** N/A
 Soil Passing 3/8 in. (9.5 mm) Sieve
 Mold: 4 in. (101.6 mm) diameter
 Layers: 5 (Five)
 Blows per layer: 25 (twenty-five)
- ☐ **METHOD C: Percent of Oversize:** N/A
 Soil Passing 3/4 in. (19.0 mm) Sieve
 Mold: 6 in. (152.4 mm) diameter
 Layers: 5 (Five)
 Blows per layer: 56 (fifty-six)



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t. 909.869.6316 | f. 909.869.6318 | www.aplaboratory.com**COMPACTION TEST**

Client: Stantec Consulting, Inc.
 Project Name: Hecate Chiquito BESS
 Project No.: 185805178
 Boring No.: B7
 Sample Type: Bulk
 Visual Sample Description: Sandy Clay

AP Number: 21-1023
 Tested By: SM Date: 10/20/21
 Calculated By: NR Date: 10/21/21
 Checked By: AP Date: 10/21/21
 Sample Date: 10/07/21

METHOD A
 MOLD VOLUME (CU.FT) 0.0333

Compaction Method ☒ ASTM D1557
☐ ASTM D698
 Preparation Method ☐ Moist
☒ Dry

Wt. Comp. Soil + Mold (gm.)	3885	3829	3883	3733		
Wt. of Mold (gm.)	1851	1851	1851	1851		
Net Wt. of Soil (gm.)	2035	1978	2032	1883		
Container No.						
Wt. of Container (gm.)	138.45	140.16	146.16	149.30		
Wet Wt. of Soil + Cont. (gm.)	322.42	301.27	331.92	328.04		
Dry Wt. of Soil + Cont. (gm.)	303.14	287.87	309.26	317.21		
Moisture Content (%)	11.71	9.07	13.89	6.45		
Wet Density (pcf)	134.56	130.82	134.39	124.50		
Dry Density (pcf)	120.46	119.94	118.00	116.96		

Maximum Dry Density (pcf) 120.9
 Maximum Dry Density w/ Rock Correction (pcf) N/A

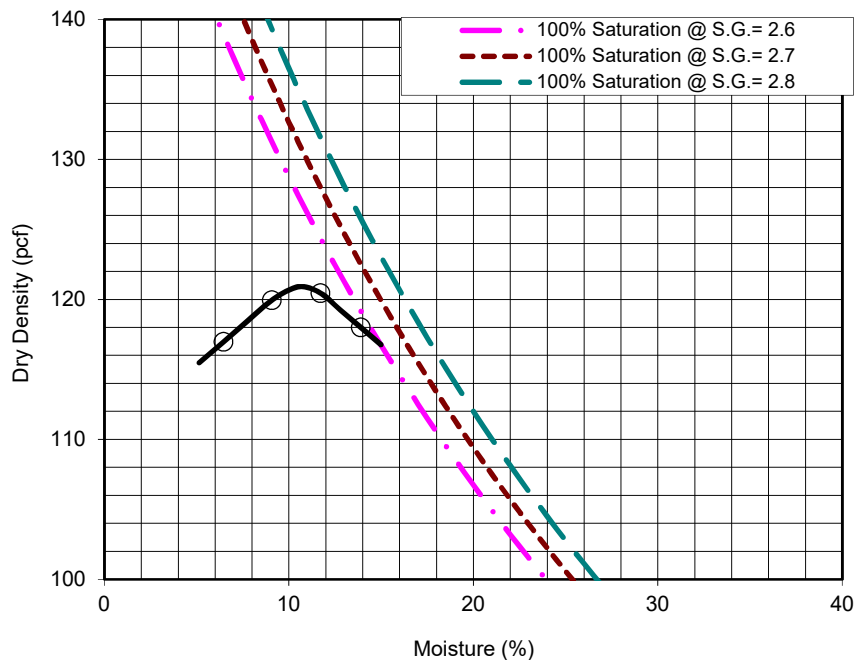
Optimum Moisture Content (%) 10.7
 Optimum Moisture Content w/ Rock Correction (%) N/A

PROCEDURE USED

☒ **METHOD A: Percent of Oversize:** 3.1%
 Soil Passing No. 4 (4.75 mm) Sieve
 Mold: 4 in. (101.6 mm) diameter
 Layers: 5 (Five)
 Blows per layer: 25 (twenty-five)

☐ **METHOD B: Percent of Oversize:** N/A
 Soil Passing 3/8 in. (9.5 mm) Sieve
 Mold: 4 in. (101.6 mm) diameter
 Layers: 5 (Five)
 Blows per layer: 25 (twenty-five)

☐ **METHOD C: Percent of Oversize:** N/A
 Soil Passing 3/4 in. (19.0 mm) Sieve
 Mold: 6 in. (152.4 mm) diameter
 Layers: 5 (Five)
 Blows per layer: 56 (fifty-six)



**AP Engineering and Testing, Inc.**

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2607 Pomona Boulevard | Pomona, CA 91768

t. 909.869.6316 | f. 909.869.6318 | www.aplaboratory.com**CORROSION TEST RESULTS**Client Name: Stantec Consulting, Inc.AP Job No.: 21-1023Project Name: Hecate Chiquito BESSDate: 10/19/21Project No.: 185805178

Boring No.	Sample Type	Sample Date	Soil Description	Minimum Resistivity (ohm-cm)	pH	Sulfate Content (ppm)	Chloride Content (ppm)
B1	Bulk	10/07/21	Clayey Sand	2,145	8.1	38	52
B4	Bulk	10/07/21	Clayey Sand	2,644	7.9	33	23
B7	Bulk	10/07/21	Sandy Clay	1,715	7.7	45	62

NOTES: Resistivity Test and pH: California Test Method 643

Sulfate Content : California Test Method 417

Chloride Content : California Test Method 422

ND = Not Detectable

NA = Not Sufficient Sample

NR = Not Requested

Jaret Fischer
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San Bernadino, CA 92408

Phone: 909-255-8209
Fax:
Other: E-REPORTS ONLY

Project: Misc. Laboratory Services - Stantec
Project Manager: Jesse Roeske
File #: B190986I

THERMAL RESISTIVITY TESTING REPORT

Our representative(s) performed work on the above referenced project. Attached you will find the corresponding inspection and/or test reports. Please refer to the attached reports for details and locations of our testing and inspection services.

Please note the below testing parameters assigned for use in Thermal Resistivity Testing, ASTM D5334:

COMPACTION

- The compaction information will either be accepted as reported by the client or verified internally for use in determining compaction and moisture percentages of the samples used to create the Thermal Dry Out Curve.

MAXIMUM PARTICLE SIZE

- Due to the sensitive nature of the thermal probe used to gather measurements, and the volume of the molding apparatus, material to be used in this test has been scalped using the NO. 10 to allow for pilot hole drilling and insertion of the thermal probe.
- A rubber pestle was used to break up aggregations so as not to alter particle sizes and misrepresent the maximum particle size of the sample.

0% MOISTURE POINT

- In an attempt to facilitate in-situ conditions the 0% moisture point was determined by molding the point at the optimum moisture content, drying the sample to constant mass, cooling in a desiccator, and subsequently testing the point for thermal resistivity instead of molding the point at 0% moisture and subsequently testing.

If there are questions concerning the attachment(s), please contact the project manager at (208) 376-4748.

Jaret Fischer
Stantec Consulting Services, Inc.-San Bernadino
735 East Carnegie Drive, Suite 280
San Bernadino, CA 92408

Phone: 909-255-8209
Fax:
Other: E-REPORTS ONLY

Project: Misc. Laboratory Services – Stantec
Project Manager: Jesse Roeske
Lab Technician: Alexander Hanle
Test Date: November 8, 2021

As requested Atlas has performed Thermal Resistivity testing on the sample referenced below. The testing was performed in accordance with current standards indicated below. The results obtained in our laboratory were as follows:

Source and Description:	The sample was collected and delivered by the client. Test results apply to the sample as received.				
Date Obtained:	October 21, 2021				
Atlas Sample ID:	8062 (B190986L)				
Client Sample ID:	185805178 – Hecate Chiquito BESS – B6				
Sampling and Preparation:	ASTM D75:		ASTM D2216:	X	Client Provided Instruction: X
Test Standard:	ASTM D5334:				

Proctor, Compaction Information

Atlas Determined Proctor Value (lbs/ft ³):	NA	Client Provided Proctor Value (lbs/ft ³):	X
ASTM D1557 (Modified Proctor, 5 Lifts):	120.9	ASTM D698 (Standard Proctor, 3 Lifts):	
Optimum Moisture (% of Sample Dry Mass):	10.7		

Requested Testing Parameters

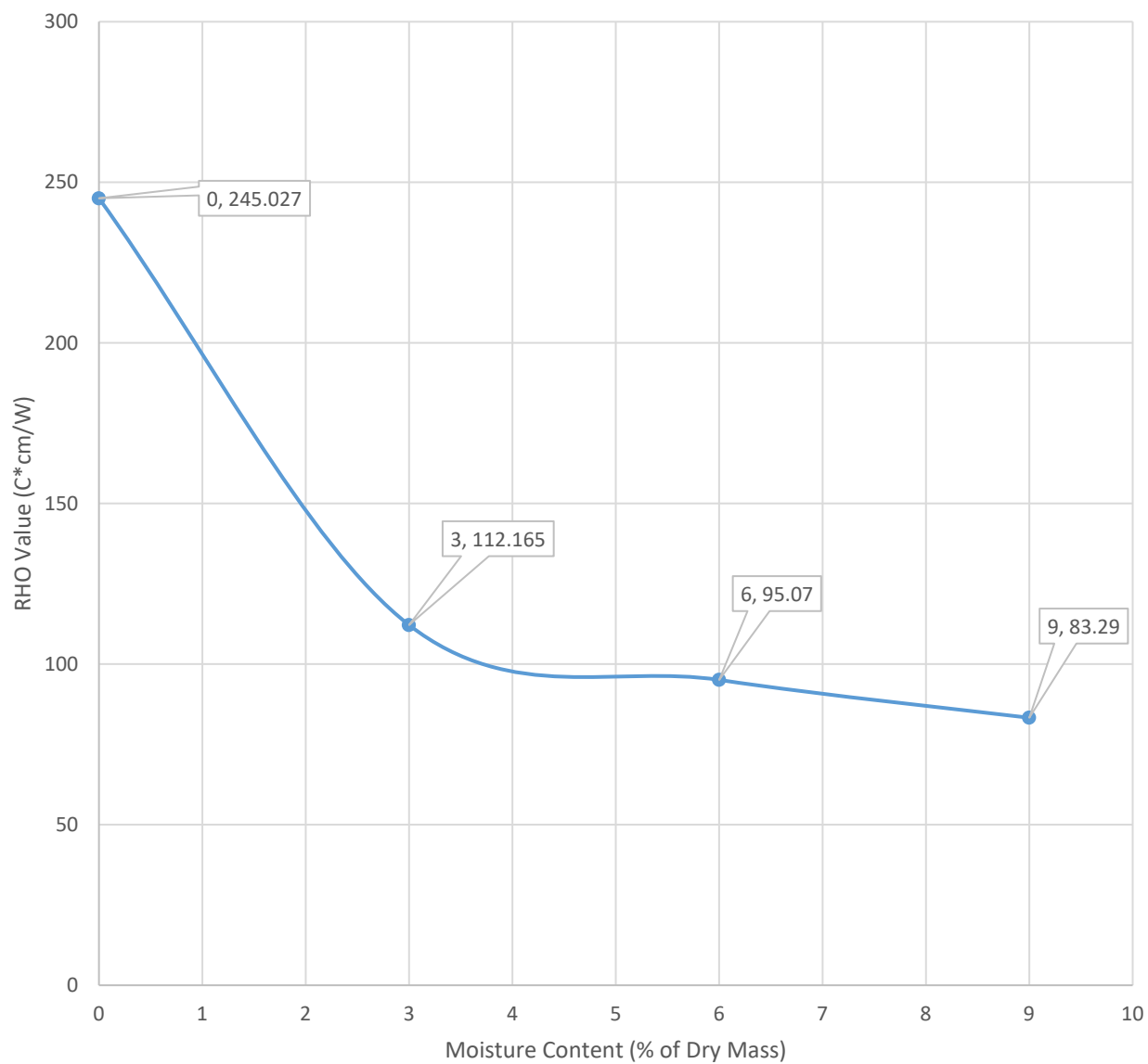
Requested Molding Dry Density (lbs/ft ³):	108.8 (±0.5 lbs/ft ³)
Requested Method Consolidation Lifts:	5
Requested Compaction % of Proctor Value:	90%
Requested Number of Tests / Moisture Points per Sample:	4

Thermal Resistivity Testing Results

Trial Number:	Moisture Content (% of Sample Dry Mass):	Thermal Resistivity (°C•cm/W)
Sample #1	0	245.027
Sample #2	3	112.165
Sample #3	6	95.0700
Sample #4	9	83.29

NOTE: Confirmation tests are conducted on previously compacted, tested specimens and are used to confirm the acceptable, reportable results of the original testing. Confirmation tests are for information only and will not be reported as acceptable, reportable values.

Hecate Chiquito BESS - B6



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If there are questions concerning this report (*B190986L-110821=L=S-Thermal218062*), please contact the project manager at (208) 376-4748.

Respectfully submitted,

ATLAS TECHNICAL CONSULTANTS



Jesse Roeske

Boise Laboratory Coordinator

Note: The recording of false, fictitious or fraudulent statements or entries on this document may be punishable as a felony under Federal Statute.
CC:

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800.376-9754 | oneatlas.com

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San Bernadino, CA 92408

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Fax:
Other: E-REPORTS ONLY

Project: Misc. Laboratory Services - Stantec
Project Manager: Jesse Roeske
File #: B190986I

THERMAL RESISTIVITY TESTING REPORT

Our representative(s) performed work on the above referenced project. Attached you will find the corresponding inspection and/or test reports. Please refer to the attached reports for details and locations of our testing and inspection services.

Please note the below testing parameters assigned for use in Thermal Resistivity Testing, ASTM D5334:

COMPACTION

- The compaction information will either be accepted as reported by the client or verified internally for use in determining compaction and moisture percentages of the samples used to create the Thermal Dry Out Curve.

MAXIMUM PARTICLE SIZE

- Due to the sensitive nature of the thermal probe used to gather measurements, and the volume of the molding apparatus, material to be used in this test has been scalped using the NO. 10 to allow for pilot hole drilling and insertion of the thermal probe.
- A rubber pestle was used to break up aggregations so as not to alter particle sizes and misrepresent the maximum particle size of the sample.

0% MOISTURE POINT

- In an attempt to facilitate in-situ conditions the 0% moisture point was determined by molding the point at the optimum moisture content, drying the sample to constant mass, cooling in a desiccator, and subsequently testing the point for thermal resistivity instead of molding the point at 0% moisture and subsequently testing.

If there are questions concerning the attachment(s), please contact the project manager at (208) 376-4748.

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Other: E-REPORTS ONLY

Project: Misc. Laboratory Services – Stantec
Project Manager: Jesse Roeske
Lab Technician: Alexander Hanle
Test Date: November 8, 2021

As requested Atlas has performed Thermal Resistivity testing on the sample referenced below. The testing was performed in accordance with current standards indicated below. The results obtained in our laboratory were as follows:

Source and Description:	The sample was collected and delivered by the client. Test results apply to the sample as received.				
Date Obtained:	October 21, 2021				
Atlas Sample ID:	8063 (B190986L)				
Client Sample ID:	185805178 – Hecate Chiquito BESS – B7				
Sampling and Preparation:	ASTM D75:		ASTM D2216:	X	Client Provided Instruction: X
Test Standard:	ASTM D5334:				

Proctor, Compaction Information

Atlas Determined Proctor Value (lbs/ft ³):	NA	Client Provided Proctor Value (lbs/ft ³):	X
ASTM D1557 (Modified Proctor, 5 Lifts):	120.9	ASTM D698 (Standard Proctor, 3 Lifts):	
Optimum Moisture (% of Sample Dry Mass):	10.7		

Requested Testing Parameters

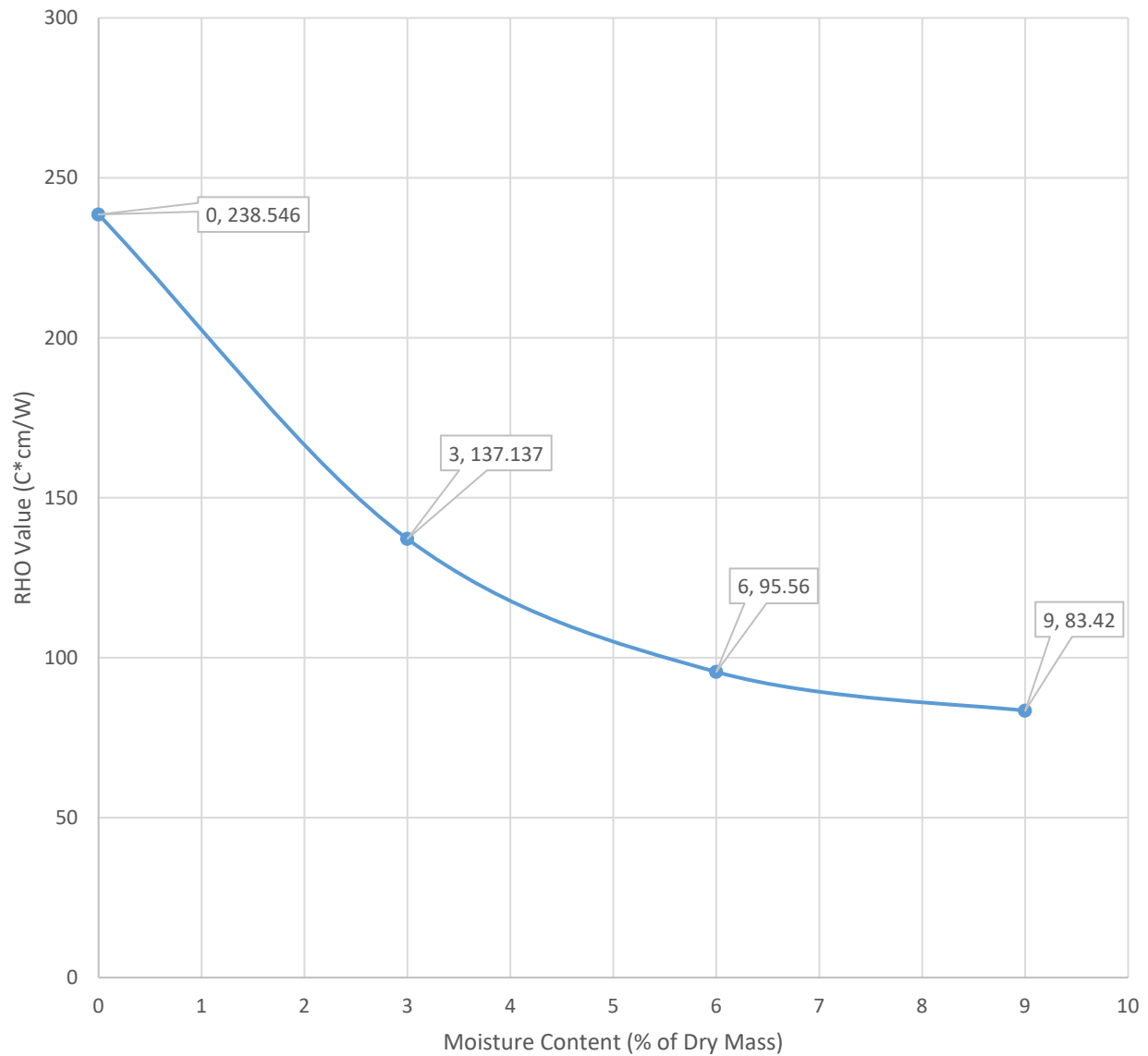
Requested Molding Dry Density (lbs/ft ³):	108.8 (±0.5 lbs/ft ³)
Requested Method Consolidation Lifts:	5
Requested Compaction % of Proctor Value:	90%
Requested Number of Tests / Moisture Points per Sample:	4

Thermal Resistivity Testing Results

Trial Number:	Moisture Content (% of Sample Dry Mass):	Thermal Resistivity (°C•cm/W)
Sample #1	0	238.546
Sample #2	3	137.137
Sample #3	6	95.560
Sample #4	9	83.420

NOTE: Confirmation tests are conducted on previously compacted, tested specimens and are used to confirm the acceptable, reportable results of the original testing. Confirmation tests are for information only and will not be reported as acceptable, reportable values.

Hecate Chiquito BESS - B7



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If there are questions concerning this report (*B190986L-110821=L=S-Thermal218063*), please contact the project manager at (208) 376-4748.

Respectfully submitted,

ATLAS TECHNICAL CONSULTANTS



Jesse Roeske

Boise Laboratory Coordinator

Note: The recording of false, fictitious or fraudulent statements or entries on this document may be punishable as a felony under Federal Statute.
CC:

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San Bernadino, CA 92408

Phone: 909-255-8209
Fax:
Other: E-REPORTS ONLY

Project: Misc. Laboratory Services - Stantec
Project Manager: Jesse Roeske
File #: B190986I

THERMAL RESISTIVITY TESTING REPORT

Our representative(s) performed work on the above referenced project. Attached you will find the corresponding inspection and/or test reports. Please refer to the attached reports for details and locations of our testing and inspection services.

Please note the below testing parameters assigned for use in Thermal Resistivity Testing, ASTM D5334:

COMPACTION

- The compaction information will either be accepted as reported by the client or verified internally for use in determining compaction and moisture percentages of the samples used to create the Thermal Dry Out Curve.

MAXIMUM PARTICLE SIZE

- Due to the sensitive nature of the thermal probe used to gather measurements, and the volume of the molding apparatus, material to be used in this test has been scalped using the NO. 10 to allow for pilot hole drilling and insertion of the thermal probe.
- A rubber pestle was used to break up aggregations so as not to alter particle sizes and misrepresent the maximum particle size of the sample.

0% MOISTURE POINT

- In an attempt to facilitate in-situ conditions the 0% moisture point was determined by molding the point at the optimum moisture content, drying the sample to constant mass, cooling in a desiccator, and subsequently testing the point for thermal resistivity instead of molding the point at 0% moisture and subsequently testing.

If there are questions concerning the attachment(s), please contact the project manager at (208) 376-4748.

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Other: E-REPORTS ONLY

Project: Misc. Laboratory Services – Stantec
Project Manager: Jesse Roeske
Lab Technician: Alexander Hanle
Test Date: November 8, 2021

As requested Atlas has performed Thermal Resistivity testing on the sample referenced below. The testing was performed in accordance with current standards indicated below. The results obtained in our laboratory were as follows:

Source and Description:	The sample was collected and delivered by the client. Test results apply to the sample as received.				
Date Obtained:	October 21, 2021				
Atlas Sample ID:	8064 (B190986L)				
Client Sample ID:	185805178 – Hecate Chiquito BESS – B1				
Sampling and Preparation:	ASTM D75:		ASTM D2216:	X	Client Provided Instruction: X
Test Standard:	ASTM D5334:				

Proctor, Compaction Information

Atlas Determined Proctor Value (lbs/ft ³):	NA	Client Provided Proctor Value (lbs/ft ³):	X
ASTM D1557 (Modified Proctor, 5 Lifts):	131.9	ASTM D698 (Standard Proctor, 3 Lifts):	
Optimum Moisture (% of Sample Dry Mass):	8.6		

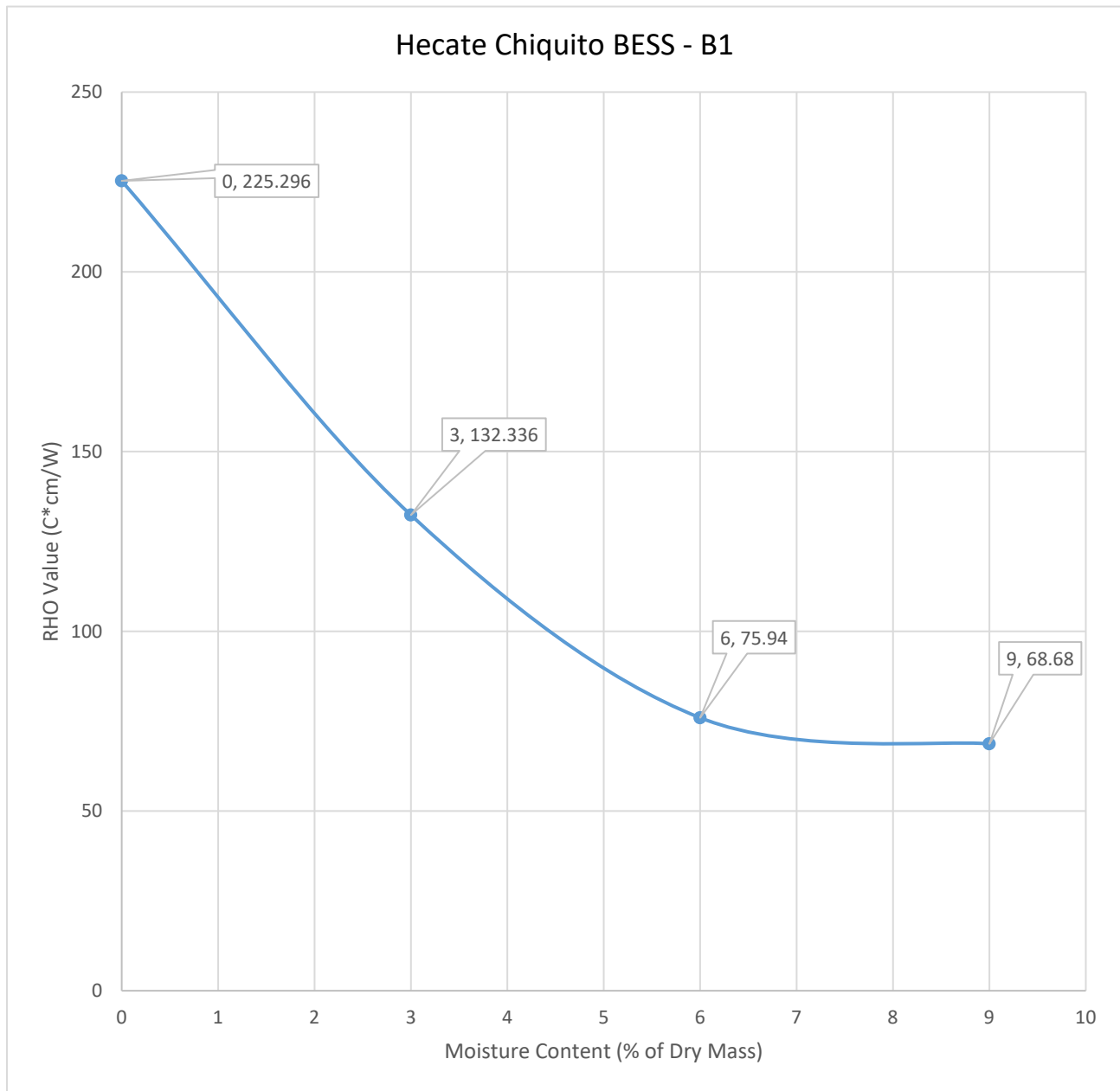
Requested Testing Parameters

Requested Molding Dry Density (lbs/ft ³):	108.8 (±0.5 lbs/ft ³)
Requested Method Consolidation Lifts:	5
Requested Compaction % of Proctor Value:	90%
Requested Number of Tests / Moisture Points per Sample:	4

Thermal Resistivity Testing Results

Trial Number:	Moisture Content (% of Sample Dry Mass):	Thermal Resistivity (°C•cm/W)
Sample #1	0	225.296
Sample #2	3	132.336
Sample #3	6	75.94
Sample #4	9	68.68

NOTE: Confirmation tests are conducted on previously compacted, tested specimens and are used to confirm the acceptable, reportable results of the original testing. Confirmation tests are for information only and will not be reported as acceptable, reportable values.



2791 S Victory View Way, Boise, ID 83709
800.376-9754 | oneatlas.com

If there are questions concerning this report (*B190986L-110821=L=S-Thermal218064*), please contact the project manager at (208) 376-4748.

Respectfully submitted,

ATLAS TECHNICAL CONSULTANTS



Jesse Roeske

Boise Laboratory Coordinator

Note: The recording of false, fictitious or fraudulent statements or entries on this document may be punishable as a felony under Federal Statute.
CC:

2791 S Victory View Way, Boise, ID 83709
800.376-9754 | oneatlas.com

Jaret Fischer
Stantec Consulting Services, Inc.-San Bernadino
735 East Carnegie Drive, Suite 280
San Bernadino, CA 92408

Phone: 909-255-8209
Fax:
Other: E-REPORTS ONLY

Project: Misc. Laboratory Services - Stantec

Project Manager: Jesse Roeske
File #: B190986I

THERMAL RESISTIVITY TESTING REPORT

Our representative(s) performed work on the above referenced project. Attached you will find the corresponding inspection and/or test reports. Please refer to the attached reports for details and locations of our testing and inspection services.

Please note the below testing parameters assigned for use in Thermal Resistivity Testing, ASTM D5334:

COMPACTION

- The compaction information will either be accepted as reported by the client or verified internally for use in determining compaction and moisture percentages of the samples used to create the Thermal Dry Out Curve.

MAXIMUM PARTICLE SIZE

- Due to the sensitive nature of the thermal probe used to gather measurements, and the volume of the molding apparatus, material to be used in this test has been scalped using the NO. 10 to allow for pilot hole drilling and insertion of the thermal probe.
- A rubber pestle was used to break up aggregations so as not to alter particle sizes and misrepresent the maximum particle size of the sample.

0% MOISTURE POINT

- In an attempt to facilitate in-situ conditions the 0% moisture point was determined by molding the point at the optimum moisture content, drying the sample to constant mass, cooling in a desiccator, and subsequently testing the point for thermal resistivity instead of molding the point at 0% moisture and subsequently testing.

If there are questions concerning the attachment(s), please contact the project manager at (208) 376-4748.

Jaret Fischer
Stantec Consulting Services, Inc.-San Bernadino
735 East Carnegie Drive, Suite 280
San Bernadino, CA 92408

Phone: 909-255-8209
Fax:
Other: E-REPORTS ONLY

Project: Misc. Laboratory Services – Stantec
Project Manager: Jesse Roeske
Lab Technician: Alexander Hanle
Test Date: November 8, 2021

As requested Atlas has performed Thermal Resistivity testing on the sample referenced below. The testing was performed in accordance with current standards indicated below. The results obtained in our laboratory were as follows:

Source and Description:	The sample was collected and delivered by the client. Test results apply to the sample as received.				
Date Obtained:	October 21, 2021				
Atlas Sample ID:	8065 (B190986L)				
Client Sample ID:	185805178 – Hecate Chiquito BESS – B2				
Sampling and Preparation:	ASTM D75:		ASTM D2216:	X	Client Provided Instruction: X
Test Standard:	ASTM D5334:				

Proctor, Compaction Information

Atlas Determined Proctor Value (lbs/ft ³):	NA	Client Provided Proctor Value (lbs/ft ³):	X
ASTM D1557 (Modified Proctor, 5 Lifts):	131.9	ASTM D698 (Standard Proctor, 3 Lifts):	
Optimum Moisture (% of Sample Dry Mass):	8.6		

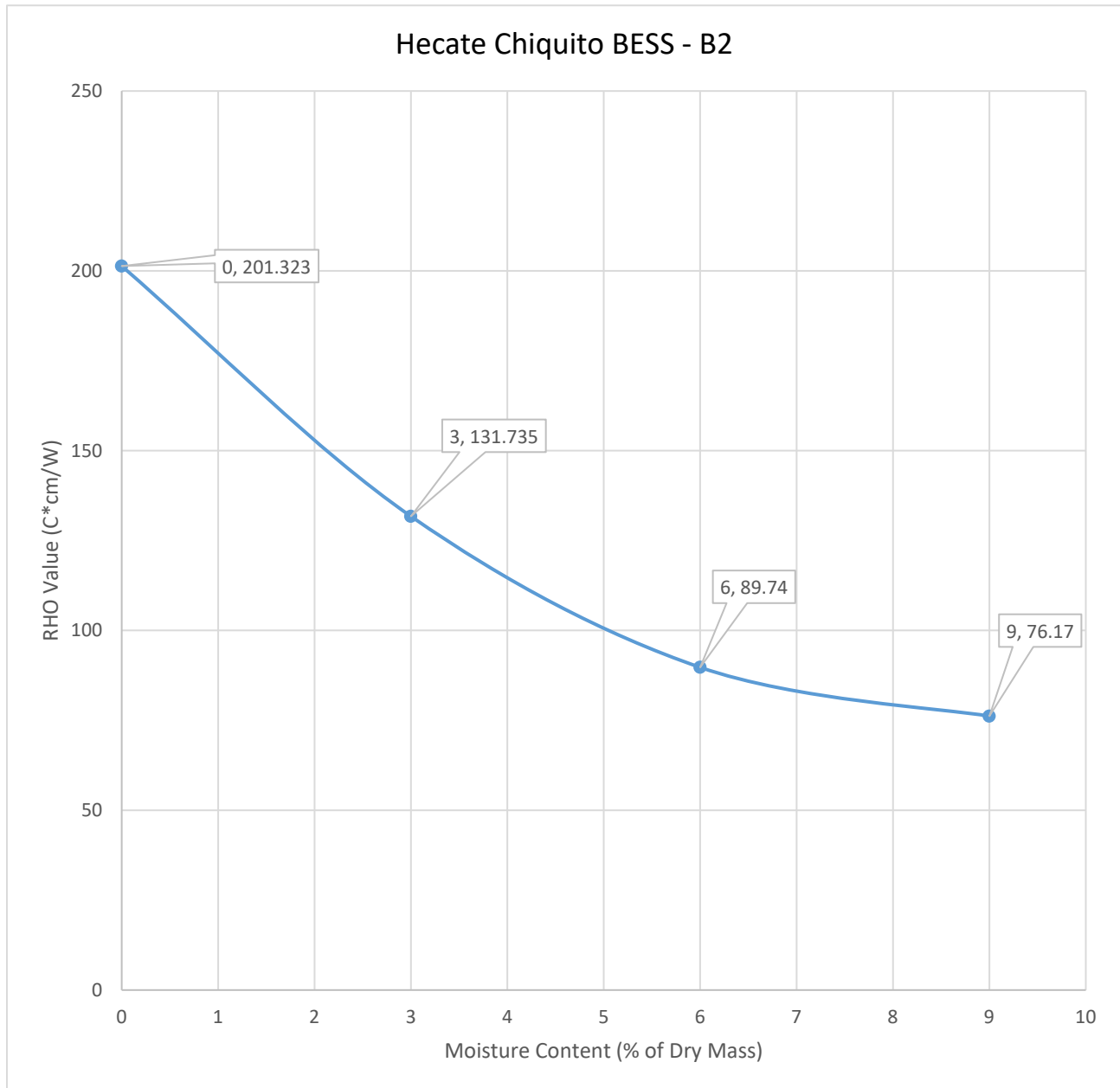
Requested Testing Parameters

Requested Molding Dry Density (lbs/ft ³):	118.7 (±0.5 lbs/ft ³)
Requested Method Consolidation Lifts:	5
Requested Compaction % of Proctor Value:	90%
Requested Number of Tests / Moisture Points per Sample:	4

Thermal Resistivity Testing Results

Trial Number:	Moisture Content (% of Sample Dry Mass):	Thermal Resistivity (°C•cm/W)
Sample #1	0	201.323
Sample #2	3	131.735
Sample #3	6	89.740
Sample #4	9	76.170

NOTE: Confirmation tests are conducted on previously compacted, tested specimens and are used to confirm the acceptable, reportable results of the original testing. Confirmation tests are for information only and will not be reported as acceptable, reportable values.



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If there are questions concerning this report (*B190986L-110821=L=S-Thermal218065*), please contact the project manager at (208) 376-4748.

Respectfully submitted,

ATLAS TECHNICAL CONSULTANTS



Jesse Roeske

Boise Laboratory Coordinator

Note: The recording of false, fictitious or fraudulent statements or entries on this document may be punishable as a felony under Federal Statute.
CC:

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APPENDIX C

SOIL ELECTRICAL RESISTIVITY TEST RESULTS



6280 Riverdale Street
San Diego, CA 92120
(877) 215-4321 | oneatlas.com

November 16, 2021

Atlas No. 121412SWG
Report No. 1

MR. JARET FISCHER
STANTEC
735 EAST CARNEGIE DRIVE, SUITE 280
SAN BERNARDINO, CA 92408

Subject: Geophysical Evaluation – Electrical Resistivity
Grand Avenue & Clinton Keith Road
Wildomar, California

Dear Mr. Fischer:

In accordance with your authorization, Atlas has performed a geophysical evaluation pertaining to a site located at Grand Avenue and Clinton Keith Road in Wildomar California (Figure 1). The purpose of our evaluation was to collect in-situ electrical resistivity measurements. Our services were conducted on October 22nd, 2021. This report presents our methodology, equipment used, analysis, and results.

Our scope of services for the project included collection of electrical resistivity data at the site, compilation of the data collected, and preparation of this data report. Specifically, we conducted four soundings at the project site (R-1 through R-4). Each sounding consisted of two orthogonal test lines with eight lines in total (R-1a, R-1b, R-2a, R-2b, R-3a, R-3b, R-4a and R-4b) at locations and electrode spacings selected by you and your office. Figure 2 illustrates the approximate sounding locations, and Figures 3a and 3b depict the general site conditions in the study area.

The data was collected in general accordance with ASTM G57 using an Advanced Geosciences, Inc. (AGI) MiniSting earth resistivity meter and four steel electrodes in a Wenner configuration. For each line, soil resistance measurements were collected at electrode spacings of 2, 4, 6, 8, 12, 20, 30 and 50 feet along the line. Stainless steel electrodes were hammered in place at your specified locations and the soils surrounding the electrodes were moistened with saline water (potable water with added table salt) to help overcome soil contact resistance.

The results of the electrical resistivity study are presented in Figures 4a and 4b. The collected measurements are generally consistent (with some slight variations) indicating that the subsurface conditions at depth are fairly uniform with respect to apparent resistivity.

The field services and geophysical analyses presented in this report have been conducted in general accordance with current practice and the standard of care exercised by consultants performing similar tasks in the project area. No warranty, express or implied, is made regarding



the conclusions presented in this report. Please also note that our evaluation was limited to measuring in-situ apparent soil resistivity at four sounding locations selected by your office.

Atlas should be contacted if the reader has questions regarding the content, interpretations presented, or completeness of this document. This report is intended exclusively for use by the client. Any use or reuse of this report by parties other than the client is undertaken at said parties' sole risk.

We appreciate the opportunity to be of service on this project. Should you have any questions related to this report, please contact the undersigned at your convenience.

Respectfully submitted,
Atlas Technical Consultants LLC

Paul W. Gresoro
Staff Geophysicist

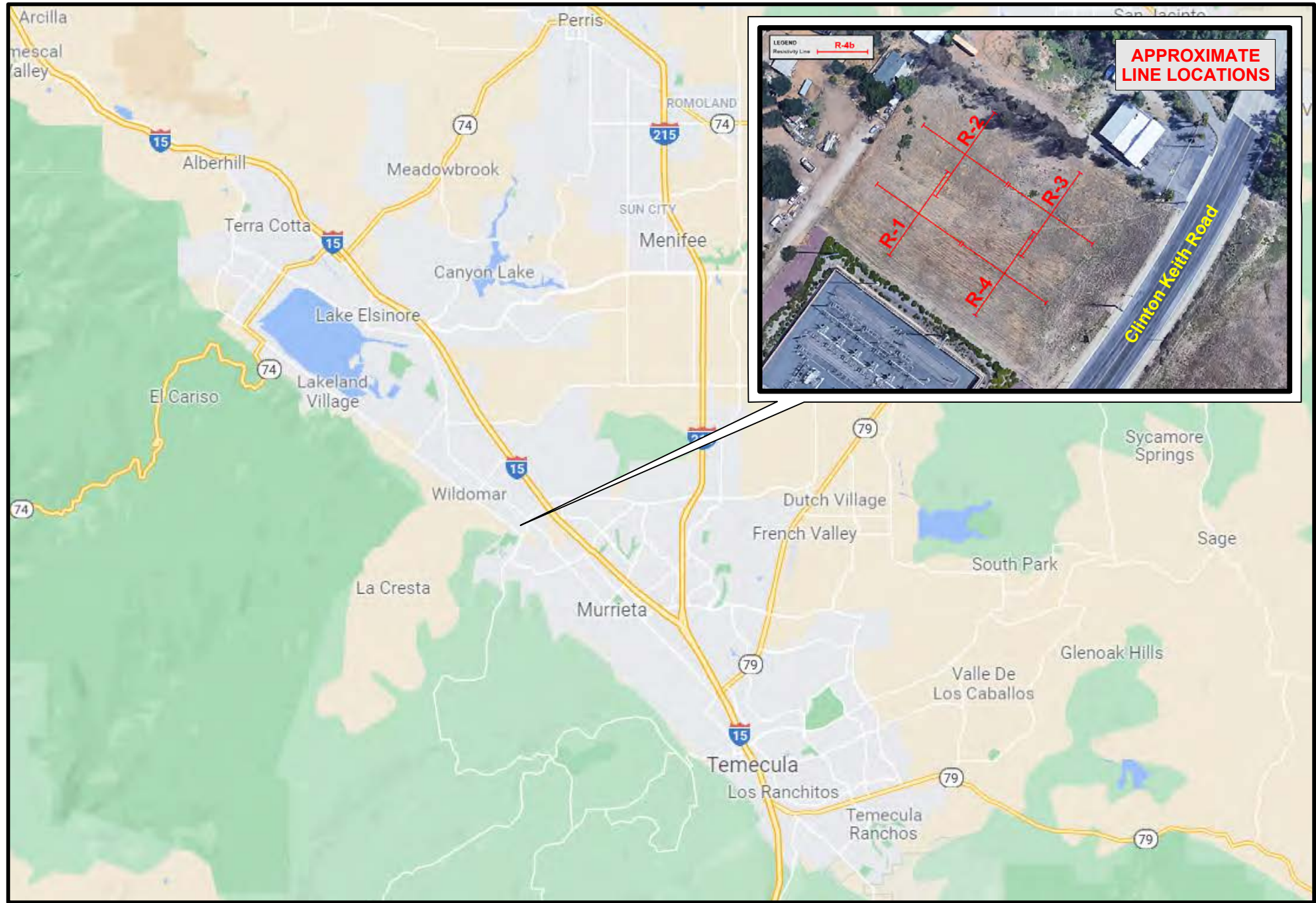
PWG/DJD/PFL/ds

Attachments: Figure 1 – Site Location Map
Figure 2 – Line Location Map
Figure 3a – Site Photographs (R-1 and R-2)
Figure 3b – Site Photographs (R-3 and R-4)
Figure 4a – Electrical Resistivity Results (R-1 and R-2)
Figure 4b – Electrical Resistivity Results (R-3 and R-4)

Distribution: Jaret.Fischer@stantec.com

Patrick F. Lehrmann, P.G., P.Gp.
Principal Geologist/Geophysicist





SITE LOCATION MAP



Grand Ave & Clinton Keith Road
Murrieta, California

Project No.: 121412SWG Date: 11/21



Figure 1



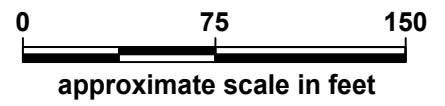
LINE LOCATION MAP

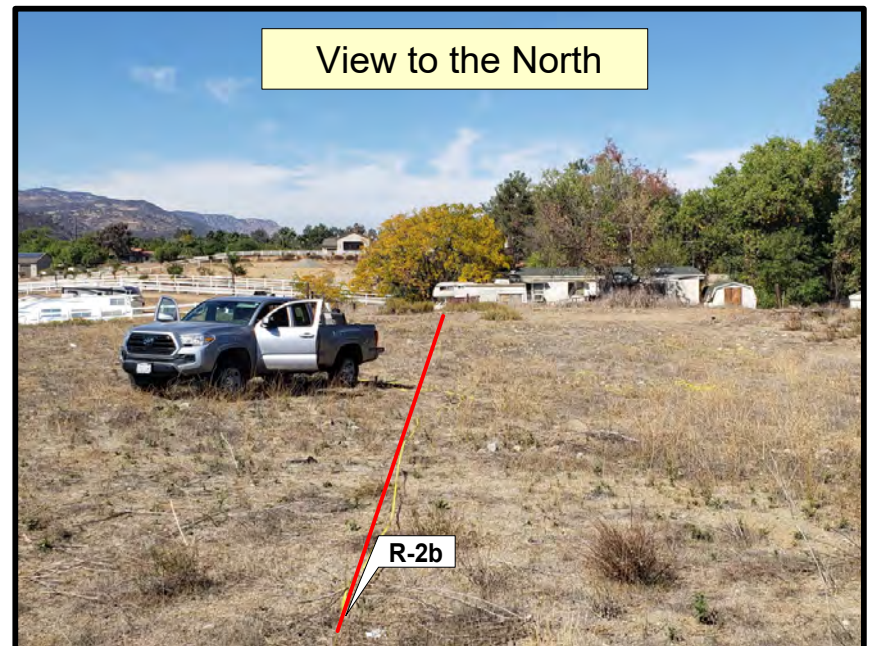
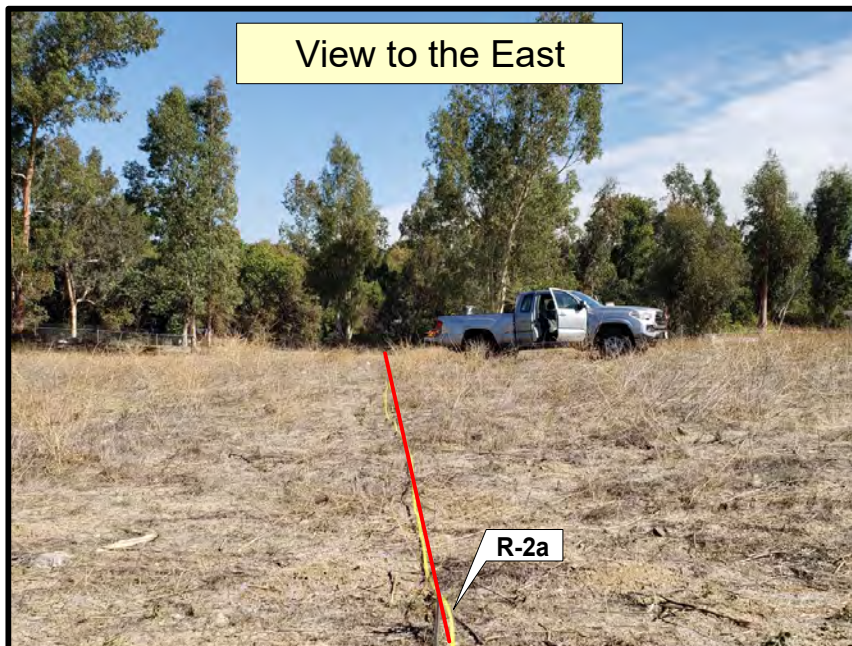
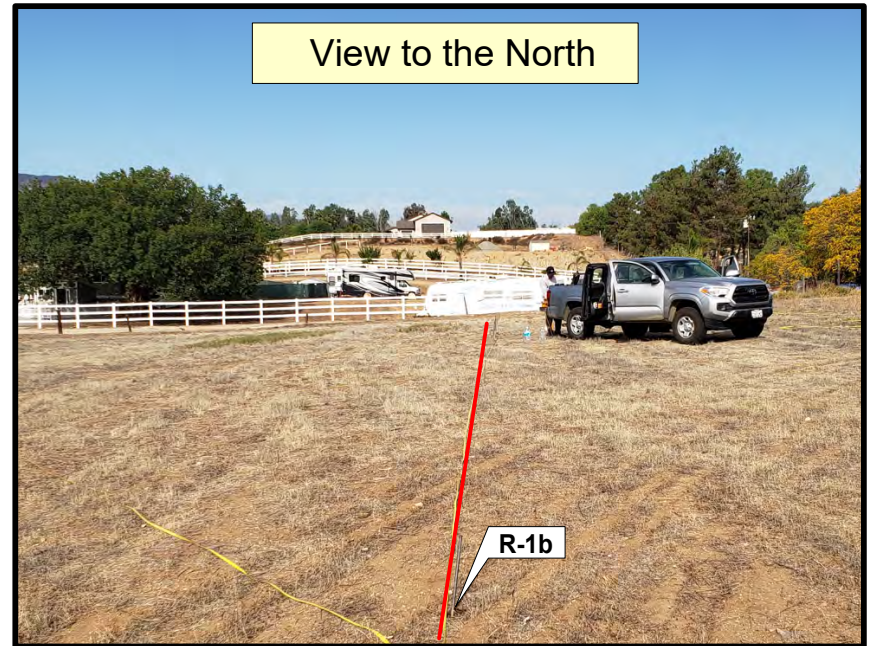
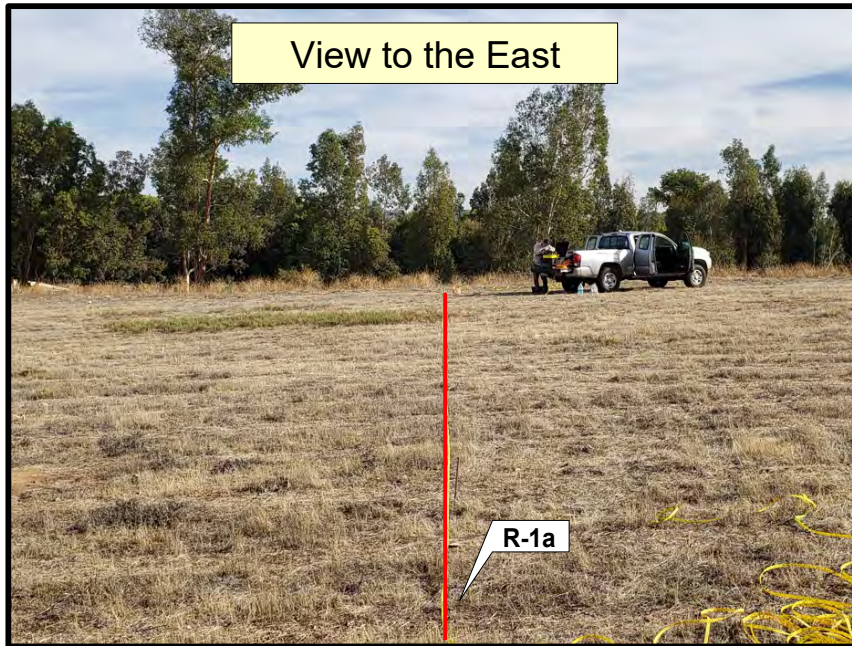


Grand Ave & Clinton Keith Road
Murrieta, California

Project No.: 121412SWG Date: 11/21

ATLAS
Figure 2





SITE PHOTOGRAPHS

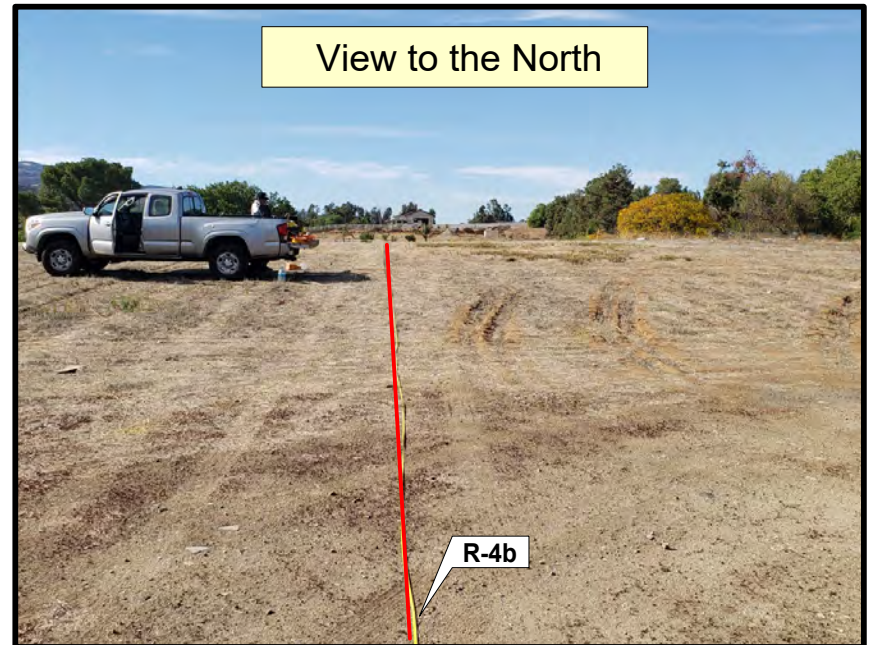
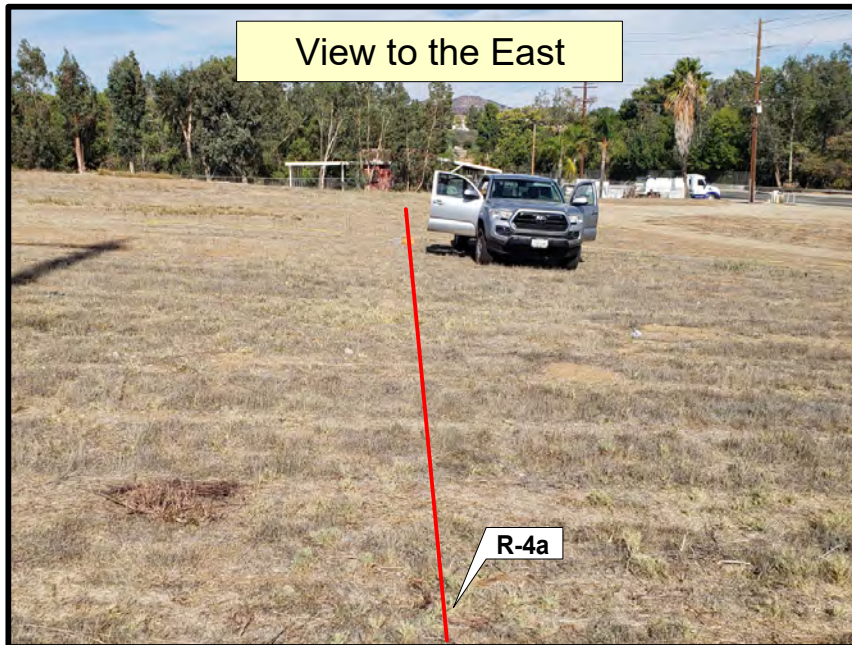
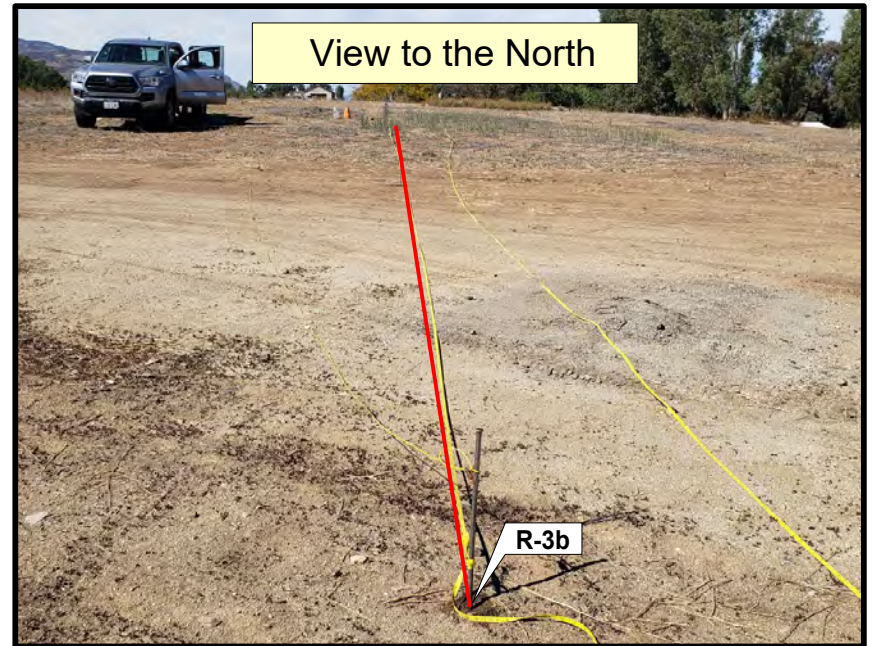
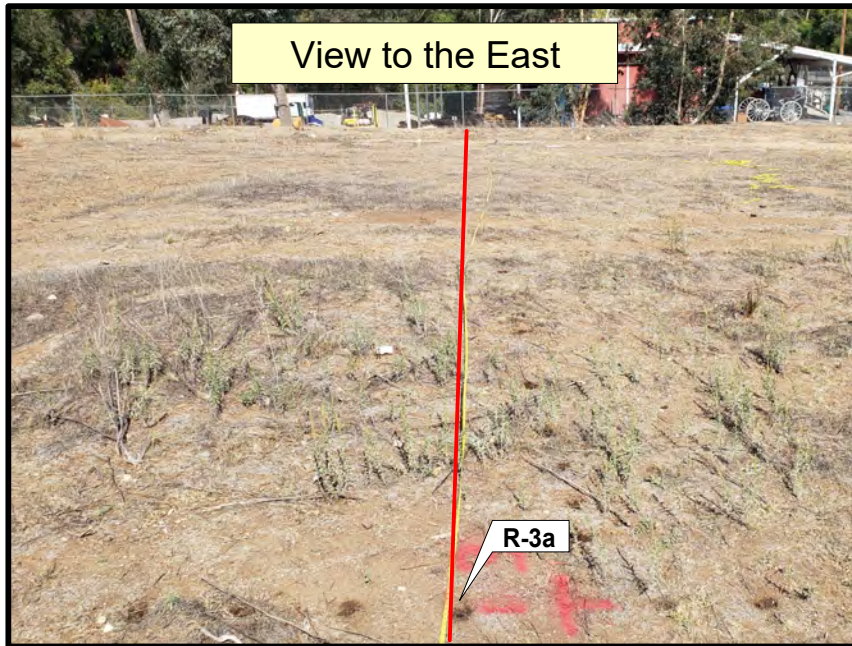
Grand Ave & Clinton Keith Road
Murrieta, California

Project No.: 121412SWG

Date: 11/21



Figure 3a



SITE PHOTOGRAPHS

Grand Ave & Clinton Keith Road
Murrieta, California

Project No.: 121412SWG

Date: 11/21



Figure 3b

Line No. Orientation	Spacing (ft)	Current (mA)	Resistance (Ohms)	Error (%)	Apparent Resistivity	
					(ohm-cm)	(ohm-ft)
R-1a	2	5.705	15.42	0.0	5906.21	193.77
E-W	4	5.466	4.42	0.1	3388.98	111.19
	6	10.65	2.92	0.1	3352.98	110.01
	8	10.74	1.99	0.0	3051.92	100.13
	12	10.93	1.10	0.1	2518.76	82.64
	20	6.603	0.54	0.2	2074.83	68.07
	30	9.904	0.33	0.3	1908.60	62.62
	50	13.75	0.24	0.3	2250.26	73.83
R-1b	2	5.633	14.09	0.0	5396.79	177.06
N-S	4	10.79	4.88	0.1	3740.60	122.72
	6	6.99	2.86	0.0	3280.59	107.63
	8	3.858	1.89	0.0	2892.59	94.90
	12	6.974	1.12	0.0	2583.10	84.75
	20	7.228	0.59	0.2	2254.09	73.95
	30	8.701	0.36	0.0	2077.51	68.16
	50	12.63	0.24	0.1	2330.69	76.47
R-2a	2	9.376	47.02	0.0	18009.73	590.87
E-W	4	9.801	17.43	0.0	13352.17	438.06
	6	9.001	5.71	0.0	6560.03	215.22
	8	11.2	2.91	0.0	4450.72	146.02
	12	5.557	0.95	0.1	2191.50	71.90
	20	6.035	0.46	0.0	1750.80	57.44
	30	7.331	0.32	0.1	1838.51	60.32
	50	9.386	0.24	0.2	2313.46	75.90
R-2b	2	7.981	37.38	0.0	14317.39	469.73
N-S	4	7.929	9.75	0.0	7471.24	245.12
	6	8.902	3.52	0.0	4044.72	132.70
	8	6.848	2.17	0.0	3321.57	108.98
	12	7.677	0.90	0.0	2072.92	68.01
	20	6.948	0.53	0.1	2036.53	66.82
	30	6.946	0.37	0.1	2097.05	68.80
	50	6.916	0.27	0.0	2598.81	85.26

**ELECTRICAL RESISTIVITY
RESULTS
(R-1 and R-2)**

Grand Ave & Clinton Keith Road
Murrieta, California

Project No.: 121412SWG

Date: 11/21



Figure 4a

Line No. Orientation	Spacing (ft)	Current (mA)	Resistance (Ohms)	Error (%)	Apparent Resistivity	
					(ohm-cm)	(ohm-ft)
R-3a	2	7.16	13.65	0.0	5228.26	171.53
E-W	4	9.038	3.47	0.0	2658.18	87.21
	6	7.052	2.13	0.1	2448.66	80.34
	8	9.801	1.35	0.1	2065.26	67.76
	12	6.287	0.75	0.1	1730.04	56.76
	20	6.523	0.44	0.2	1696.79	55.67
	30	7.878	0.31	0.2	1754.05	57.55
	50	14.26	0.24	0.1	2256.96	74.05
R-3b	2	7.415	15.08	0.0	5775.98	189.50
N-S	4	8.953	4.07	0.0	3118.57	102.32
	6	9.341	1.84	0.1	2109.69	69.22
	8	7.029	1.13	0.0	1732.79	56.85
	12	4.714	0.73	0.1	1673.27	54.90
	20	6	0.42	0.1	1592.23	52.24
	30	9.995	0.31	0.0	1780.48	58.41
	50	11.58	0.25	0.1	2396.76	78.63
R-4a	2	6.565	11.41	0.0	4370.29	143.38
E-W	4	7.283	2.26	0.0	1728.96	56.72
	6	8.999	1.52	0.1	1743.14	57.19
	8	9.584	1.06	0.1	1624.02	53.28
	12	13.32	0.71	0.1	1632.83	53.57
	20	7.515	0.40	0.0	1539.75	50.52
	30	14.87	0.29	0.1	1647.76	54.06
	50	14.08	0.21	0.2	2043.43	67.04
R-4b	2	7.349	10.45	0.0	4002.59	131.32
N-S	4	8.33	3.25	0.0	2492.71	81.78
	6	9.28	1.60	0.1	1832.76	60.13
	8	8.093	1.07	0.0	1645.47	53.99
	12	7.164	0.64	0.1	1472.88	48.32
	20	8.689	0.46	0.0	1774.93	58.23
	30	8.26	0.32	0.0	1848.85	60.66
	50	12.7	0.23	0.2	2154.50	70.69

**ELECTRICAL RESISTIVITY
RESULTS
(R-1 and R-2)**

Grand Ave & Clinton Keith Road
Murrieta, California

Project No.: 121412SWG

Date: 11/21



Figure 4b

APPENDIX D

LIQUEFACTION ANALYSIS

SPT BASED LIQUEFACTION ANALYSIS REPORT

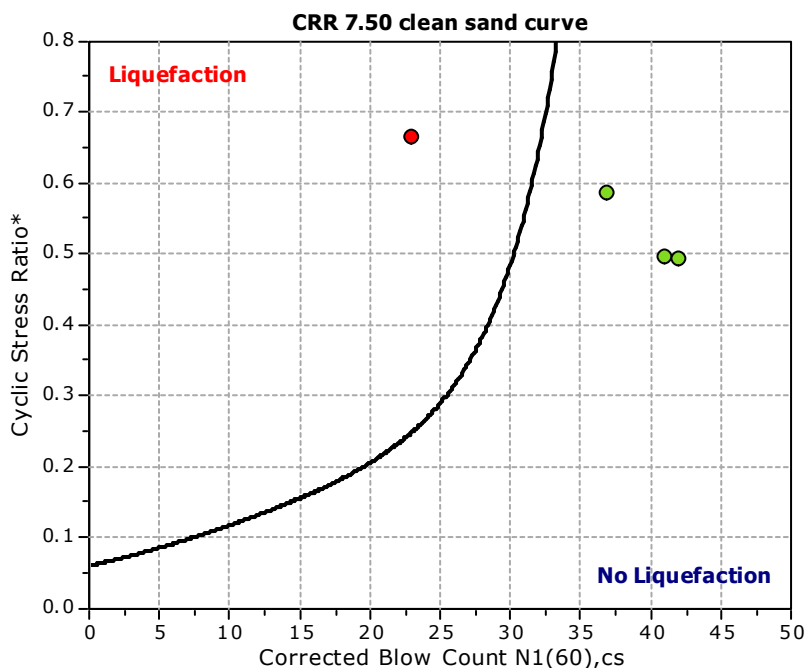
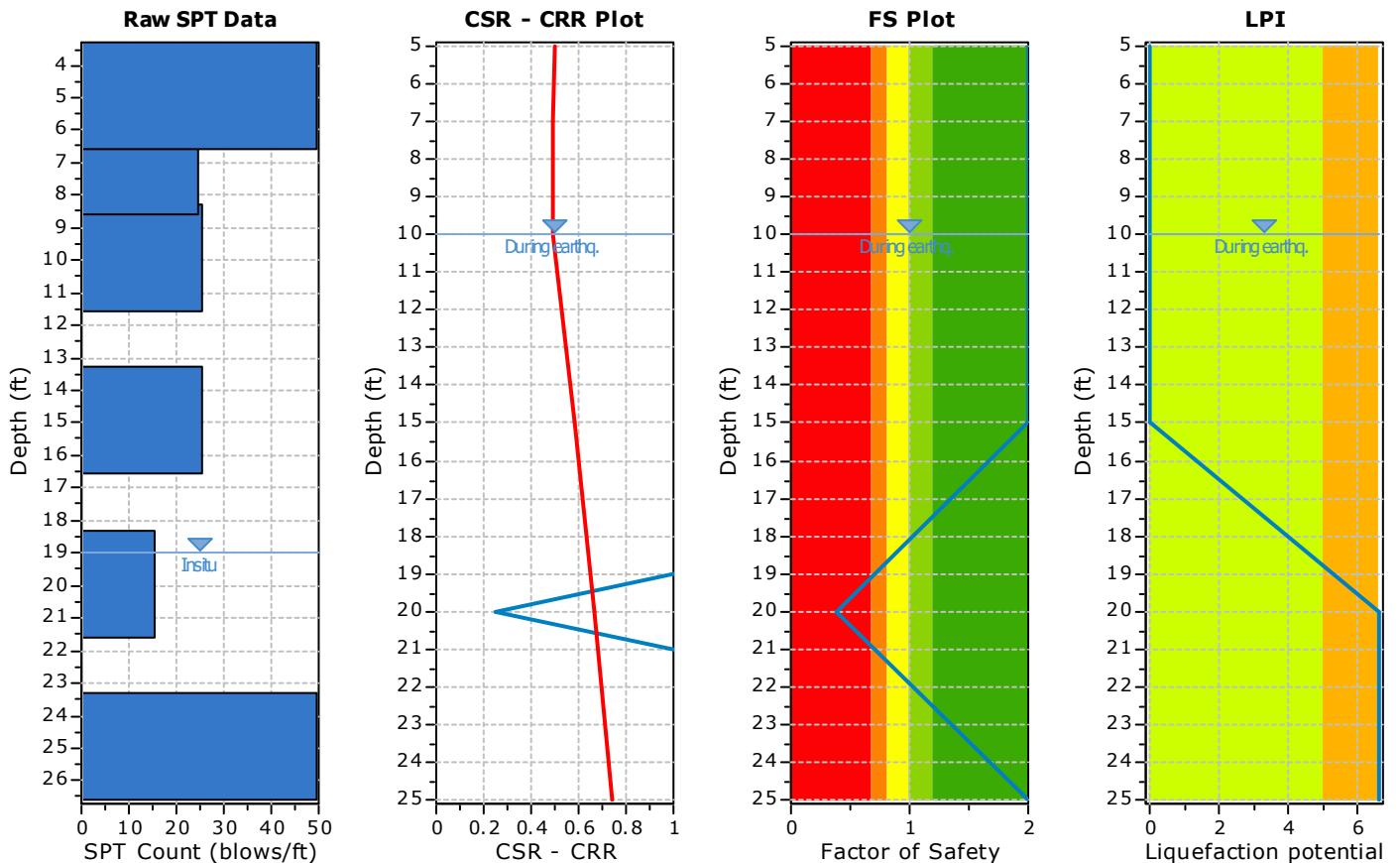
Project title : Hecate Chiquito BESS

SPT Name: B4

Location : Near NEC Clinton Keith Road and Grand Avenue, Wildomar, CA

:: Input parameters and analysis properties ::

Analysis method:	Boulanger & Idriss, 2014	G.W.T. (in-situ):	19.00 ft
Fines correction method:	Boulanger & Idriss, 2014	G.W.T. (earthq.):	10.00 ft
Sampling method:	Sampler wo liners	Earthquake magnitude M_w :	7.70
Borehole diameter:	200mm	Peak ground acceleration:	0.78 g
Rod length:	3.30 ft	Eq. external load:	0.00 tsf
Hammer energy ratio:	1.17		



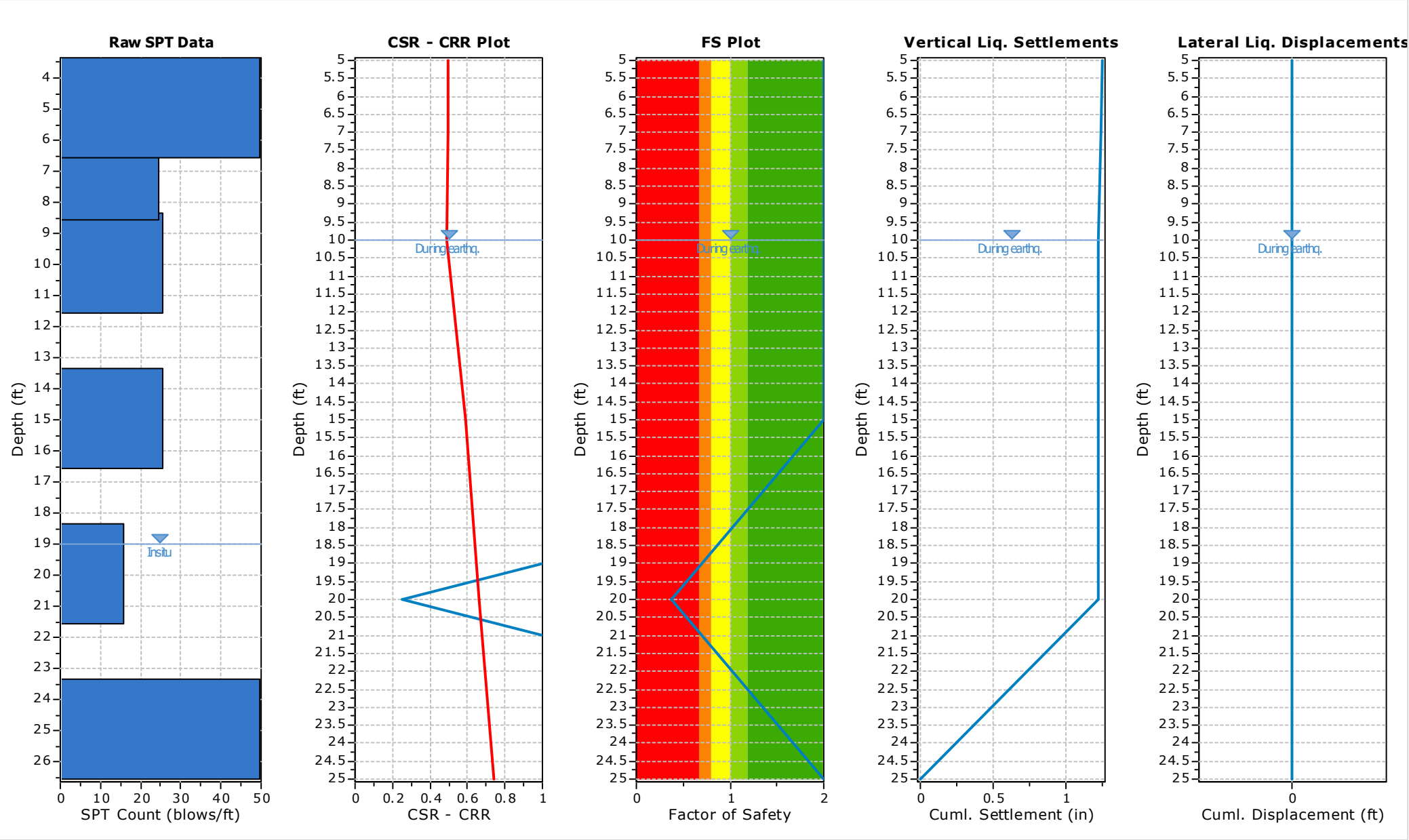
F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

:: Overall Liquefaction Assessment Analysis Plots ::



:: Field input data ::

Test Depth (ft)	SPT Field Value (blows)	Fines Content (%)	Unit Weight (pcf)	Infl. Thickness (ft)	Can Liquefy
5.00	50	0.00	130.00	5.00	No
7.00	25	0.00	120.00	2.00	No
10.00	26	0.00	120.00	5.00	Yes
15.00	26	0.00	120.00	5.00	Yes
20.00	16	0.00	115.00	5.00	Yes
25.00	50	0.00	135.00	5.00	Yes

Abbreviations

Depth: Depth at which test was performed (ft)
 SPT Field Value: Number of blows per foot
 Fines Content: Fines content at test depth (%)
 Unit Weight: Unit weight at test depth (pcf)
 Infl. Thickness: Thickness of the soil layer to be considered in settlements analysis (ft)
 Can Liquefy: User defined switch for excluding/including test depth from the analysis procedure

:: Cyclic Resistance Ratio (CRR) calculation data ::

Depth (ft)	SPT Field Value	Unit Weight (pcf)	σ_v (tsf)	u_o (tsf)	σ'_{vo} (tsf)	m	C_N	C_E	C_B	C_R	C_S	$(N_1)_{60}$	FC (%)	$\Delta(N_1)_{60}$	$(N_1)_{60cs}$	CRR _{7.5}
5.00	50	130.00	0.33	0.00	0.33	0.26	1.36	1.17	1.15	0.75	1.20	83	0.00	0.00	83	4.000
7.00	25	120.00	0.45	0.00	0.45	0.29	1.28	1.17	1.15	0.80	1.20	41	0.00	0.00	41	4.000
10.00	26	120.00	0.63	0.00	0.63	0.29	1.16	1.17	1.15	0.85	1.20	42	0.00	0.00	42	4.000
15.00	26	120.00	0.93	0.00	0.93	0.32	1.04	1.17	1.15	0.85	1.20	37	0.00	0.00	37	4.000
20.00	16	115.00	1.21	0.03	1.18	0.41	0.96	1.17	1.15	0.95	1.20	23	0.00	0.00	23	0.249
25.00	50	135.00	1.55	0.19	1.36	0.26	0.94	1.17	1.15	0.95	1.20	72	0.00	0.00	72	4.000

Abbreviations

σ_v : Total stress during SPT test (tsf)
 u_o : Water pore pressure during SPT test (tsf)
 σ'_{vo} : Effective overburden pressure during SPT test (tsf)
 m: Stress exponent normalization factor
 C_N : Overburden correction factor
 C_E : Energy correction factor
 C_B : Borehole diameter correction factor
 C_R : Rod length correction factor
 C_S : Liner correction factor
 $N_{1(60)}$: Corrected N_{SPT} to a 60% energy ratio
 $\Delta(N_1)_{60}$: Equivalent clean sand adjustment
 $N_{1(60)cs}$: Corrected $N_{1(60)}$ value for fines content
 CRR_{7.5}: Cyclic resistance ratio for M=7.5

:: Cyclic Stress Ratio calculation (CSR fully adjusted and normalized) ::

Depth (ft)	Unit Weight (pcf)	σ_{veq} (tsf)	$u_{o,eq}$ (tsf)	$\sigma'_{vo,eq}$ (tsf)	r_d	α	CSR	MSF _{max}	$(N_1)_{60cs}$	MSF	CSR _{eq,M=7.5}	$K_{\sigma_{\text{sigma}}}$	CSR*	FS
5.00	130.00	0.33	0.00	0.33	1.00	1.00	0.505	2.20	83	0.92	0.548	1.10	0.498	2.000 ●
7.00	120.00	0.45	0.00	0.45	0.99	1.00	0.503	2.20	41	0.92	0.545	1.10	0.496	2.000 ●
10.00	120.00	0.63	0.00	0.63	0.98	1.00	0.499	2.20	42	0.92	0.541	1.10	0.492	2.000 ●
15.00	120.00	0.93	0.16	0.77	0.97	1.00	0.592	2.20	37	0.92	0.642	1.09	0.587	2.000 ●
20.00	115.00	1.21	0.31	0.90	0.96	1.00	0.652	1.62	23	0.96	0.680	1.02	0.664	0.376 ●
25.00	135.00	1.55	0.47	1.08	0.94	1.00	0.682	2.20	72	0.92	0.739	0.99	0.744	2.000 ●

:: Cyclic Stress Ratio calculation (CSR fully adjusted and normalized) ::

Depth (ft)	Unit Weight (pcf)	$\sigma_{v,eq}$ (tsf)	$u_{o,eq}$ (tsf)	$\sigma'_{vo,eq}$ (tsf)	r_d	α	CSR	MSF _{max}	$(N_1)_{60cs}$	MSF	CSR _{eq,M=7.5}	$K_{\sigma gma}$	CSR*	FS
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Abbreviations

$\sigma_{v,eq}$: Total overburden pressure at test point, during earthquake (tsf)
 $u_{o,eq}$: Water pressure at test point, during earthquake (tsf)
 $\sigma'_{vo,eq}$: Effective overburden pressure, during earthquake (tsf)
 r_d : Nonlinear shear mass factor
 α : Improvement factor due to stone columns
 CSR : Cyclic Stress Ratio
 MSF : Magnitude Scaling Factor
 CSR_{eq,M=7.5}: CSR adjusted for M=7.5
 $K_{\sigma gma}$: Effective overburden stress factor
 CSR*: CSR fully adjusted (user FS applied)***
 FS: Calculated factor of safety against soil liquefaction

*** User FS: 1.00

:: Liquefaction potential according to Iwasaki ::

Depth (ft)	FS	F	wz	Thickness (ft)	I _L
5.00	2.000	0.00	9.24	2.00	0.00
7.00	2.000	0.00	8.93	2.00	0.00
10.00	2.000	0.00	8.48	3.00	0.00
15.00	2.000	0.00	7.71	5.00	0.00
20.00	0.376	0.62	6.95	5.00	6.61
25.00	2.000	0.00	6.19	5.00	0.00

Overall potential I_L : 6.61I_L = 0.00 - No liquefactionI_L between 0.00 and 5 - Liquefaction not probableI_L between 5 and 15 - Liquefaction probableI_L > 15 - Liquefaction certain**:: Vertical settlements estimation for dry sands ::**

Depth (ft)	$(N_1)_{60}$	τ_{av}	p	G_{max} (tsf)	α	b	γ	ϵ_{15}	N_c	ϵ_{Nc} (%)	Δh (ft)	ΔS (in)
5.00	83	0.16	0.22	0.91	0.14	12561.74	0.00	0.00	17.10	0.01	5.00	0.008
7.00	41	0.22	0.30	0.84	0.14	10403.13	0.00	0.00	17.10	0.03	2.00	0.016

Cumulative settlements: 0.025**Abbreviations**

τ_{av} : Average cyclic shear stress
 p: Average stress
 G_{max} : Maximum shear modulus (tsf)
 α, b : Shear strain formula variables
 γ : Average shear strain
 ϵ_{15} : Volumetric strain after 15 cycles
 N_c : Number of cycles
 ϵ_{Nc} : Volumetric strain for number of cycles N_c (%)
 Δh : Thickness of soil layer (in)
 ΔS : Settlement of soil layer (in)

:: Vertical & Lateral displacements estimation for saturated sands ::

Depth (ft)	$(N_1)_{60cs}$	γ_{lim} (%)	F_α	FS _{liq}	γ_{max} (%)	e_v (%)	dz (ft)	S_{v-1D} (in)	LDI (ft)
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:: Vertical & Lateral displacements estimation for saturated sands ::									
Depth (ft)	(N ₁) _{60cs}	Y _{lim} (%)	F _a	FS _{liq}	Y _{max} (%)	e _v (%)	dz (ft)	S _{v-1D} (in)	LDI (ft)
10.00	42	0.56	-0.96	2.000	0.00	0.00	5.00	0.000	0.00
15.00	37	1.56	-0.58	2.000	0.00	0.00	5.00	0.000	0.00
20.00	23	11.27	0.35	0.376	11.27	2.04	5.00	1.227	0.00
25.00	72	0.00	-3.47	2.000	0.00	0.00	5.00	0.000	0.00
Cumulative settlements:								1.227	0.00

Abbreviations

Y_{lim}: Limiting shear strain (%)
 F_a/N: Maximum shear strain factor
 Y_{max}: Maximum shear strain (%)
 e_v: Post liquefaction volumetric strain (%)
 S_{v-1D}: Estimated vertical settlement (in)
 LDI: Estimated lateral displacement (ft)

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