

Appendix H –
Preliminary Geotechnical
Investigation

PRELIMINARY GEOTECHNICAL SITE EVALUATION REPORT

**Prepared For
The AES Corporation**

**Proposed
Starlight Solar Project
Sand Diego County, California**

**Job No: 22-137
June 20, 2022**



BRUIN GEOTECHNICAL SERVICES, INC.
44732 Yucca Avenue
Lancaster, California 93534
www.bruingsi.net



**SOIL AND MATERIAL
TESTING AND INSPECTIONS**

June 20, 2022

Job No.: 22-137

Ms. Sara Carroll
The AES Corporation
2180 South 1300 East, Suite 600
Salt Lake City, UT 84106

Subject: Preliminary Geotechnical Site Evaluation Report for Proposed Starlight Solar Project, Jacumba Hot Springs, County of San Diego, California

Dear Ms. Carroll:

Presented herewith is the report of our geotechnical site evaluation investigation for the subject project. Our work was performed in accordance with the scope of work outlined in our original proposal dated March 17, 2022.

This report presents the results of our field investigation, laboratory testing and our engineering judgment, opinions, conclusions and recommendations pertaining to the proposed development.

It has been a pleasure to be of service to you on this project. Should you have any questions regarding the contents of this report, or should you require additional information, please contact the undersigned at (661) 273-9078.

Respectfully submitted,

BRUIN GEOTECHNICAL SERVICES, INC.

Ryan D. Duke, P.E.
RDD/mes



BRUIN GEOTECHNICAL SERVICES, INC.

44732 Yucca Avenue
Tel (661) 273-9078

Lancaster, California 93534
www.bruingsi.net

PRELIMINARY GEOTECHNICAL EVALUATION REPORT

TABLE OF CONTENTS

1.0	INTRODUCTION	3
2.0	SITE LOCATION AND DESCRIPTION	4
3.0	FLOOD HAZARD	5
4.0	POTENTIAL CONSTRUCTION	5
5.0	GEOTECHNICAL INVESTIGATION.....	5
5.1	FIELD EXPLORATION PROGRAM	6
5.2	LABORATORY TESTING	6
5.3	CORROSION AND CHEMICAL ATTACK	7
5.4	THERMAL RESISTIVITY TESTING	8
6.0	CONCLUSIONS	8
6.1	SITE AND SUBSURFACE CONDITIONS	8
6.2	GROUNDWATER CONDITIONS.....	8
7.0	SITE GEOLOGY	9
7.1	REGIONAL GEOLOGY AND SEISMIC HAZARDS ASSESSMENT.....	9
7.2	REGIONAL GEOLOGY	9
7.3	SITE GEOLOGY.....	10
7.4	SEISMIC HAZARDS ASSESSMENT.....	11
7.5	LIQUEFACTION.....	11
7.6	CBC DESIGN PARAMETERS	11
7.7	DIFFERENTIAL SOIL SETTLEMENT	12
8.0	PRELIMINARY GEOTECHNICAL RECOMMENDATIONS.....	13
8.1	DRIVEN STEEL PILES	13
8.2	CONCRETE MAT/SLAB FOUNDATIONS (BESS)	13
8.3	EARTHWORK	13
8.4	REMEDIAL GRADING FOR CONVENTIONAL SPREAD OR MAT FOUNDATIONS (AUXILIARY STRUCTURES)	13
8.5	ACCESS DRIVE AREAS	14
8.6	FILL SLOPE CONSTRUCTION AND STABILITY FOR INFILTRATION BASINS	14
8.7	TYPICAL FILL PLACEMENT AND COMPACTION REQUIREMENTS	14
8.8	NATIVE SOIL SHRINKAGE	14
8.9	FILL SLOPE CONSTRUCTION AND STABILITY.....	14
8.10	CONCRETE MAT/SLAB FOUNDATIONS.....	15
8.11	CONTINUOUS AND ISOLATED SPREAD FOUNDATIONS (PRELIMINARY)	15
8.12	MAT FOUNDATIONS	15
8.13	LATERAL EARTH PRESSURES	15
8.14	FOOTING REINFORCEMENT	16
9.0	EXCAVATIONS AND BACKFILL.....	16
9.1	EXCAVATION STABILITY	16

10.0	PRELIMINARY STRUCTURAL SECTION (FLEXIBLE PAVEMENT ENTRANCE).....	17
11.0	CONSTRUCTION CONSIDERATIONS.....	18
11.1	DRAINAGE CONSIDERATIONS.....	18
12.0	ADDITIONAL SERVICES.....	18
13.0	LIMITATIONS AND UNIFORMITY CONDITIONS.....	18
14.0	CLOSURE.....	19
15.0	REFERENCES.....	20

FIGURES	
Figure 1	Vicinity Map
Figure 2	Excavation Location Map

TABLES	
Table 1	Summary of Corrosion Test Results
Table 2	Recommended Static Lateral Earth Pressures for Footings [F1]
Table 3	L-Pile Input Parameters
Table 4	Recommended Asphalt Pavement Section Layer Thickness

APPENDIXES	
Appendix A	Excavation Logs and Classification Key
Appendix B	Laboratory Test Results
Appendix C	Corrosion Report by JDH Corrosion
Appendix D	Results from Geotherm USA
Appendix E	US Seismic Design Maps
Appendix F	General Earthwork and Grading Guidelines

PRELIMINARY GEOTECHNICAL SITE EVALUATION REPORT
STARLIGHT SOLAR PROJECT
COUNTY OF SAN DIEGO, CALIFORNIA

1.0 INTRODUCTION

This Preliminary Geotechnical Evaluation report presents the results of the limited geotechnical investigation performed by Bruin Geotechnical Services, Inc., for the potential Photovoltaic Generation or Battery Storage Facility based on the assessor's parcel maps and the Site Plan (google KMZ file) provided by the client. This report is specific to the potential developments and is intended to provide preliminary information to aid in determining if driven piles and/or conventional concrete foundations are feasible at the subject site.

Additional exploration, trenching, drilling, soil sampling, laboratory testing, and analyses are required to prepare a comprehensive "design level" geotechnical engineering report.

The following Assessors Parcels are included are included in this report:

- APN 610-120-34
- APN 612-041-02
- APN 612-060-14
- APN 612-082-12
- APN 612-100-01, 02
- APN 612-110-02, 04, 17, 18, 19, 20
- APN 612-120-01, 14
- APN 659-010-01, 15
- APN 659-020-01, 02, 05, 06, 07, 13, 23
- APN 659-030-01
- APN 659-070-08, 09, 16
- APN 659-080-01, 02, 03, 05, 06, 07, 10
- APN 659-090-06
- APN 659-130-03
- APN 659-140-01, 02

The purpose of this investigation was to evaluate the current subsurface soil conditions and to provide preliminary geotechnical recommendations relative to potential driven steel piles utilized in construction of a photovoltaic solar array or potential Battery Storage Facility (mat/slab foundations) potential soil corrosivity and thermal resistivity characteristics.

The scope of the authorized for this investigation included the following tasks:

- Performing a site reconnaissance
- Conducting a field subsurface exploration through excavations and soil sampling
- Performing laboratory soil corrosivity study on soil samples
- Performing a soil thermal analysis of the native soil samples
- Laboratory testing program of selected soil samples obtained during drilling
- Performing engineering analyses of the data obtained
- Preparing this Preliminary Geotechnical Site Evaluation Report

This study also includes a review of published and unpublished literature and geotechnical maps with respect to active and potentially active faults located in proximity to the site which may have an impact on the seismic design of the proposed development.

2.0 SITE LOCATION AND DESCRIPTION

The subject site is identified as the APNs referenced above and is located on the approximately 3,874-acre Empire Ranch property in Jacumba Springs, San Diego County, California. The northernmost portion of the site is two (2) miles south of the Interstate 8, Old Highway 80, and Campo Road (Highway 94) intersection. The southernmost portion of the site is located on the north side of the United States and Mexico International Border.

The proposed project includes two Solar Sites. Solar Site 1 is located in the northeast of the ranch and is approximately 740 acres. Solar Site 2 is located south of Solar Site 1, in the east portion of the site and is approximately 490 acres.

Solar Site 1

Solar Site 1 is primarily comprised of undeveloped land with a moderate to dense covering of vegetation. The portion south of Jewel Valley Road is developed as Empire Ranch. There appears to be graded areas for equestrian use and minor landscaped tree areas.

The Site is located in an area associated with rock outcropping.

Solar Site 2

Solar Site 2 is primarily comprised of undeveloped land with rock outcroppings similar to the rest of the site. A railroad traverses the site through the center and southwest. South of the railroad, multiple dirt roads lead to a small reservoir.

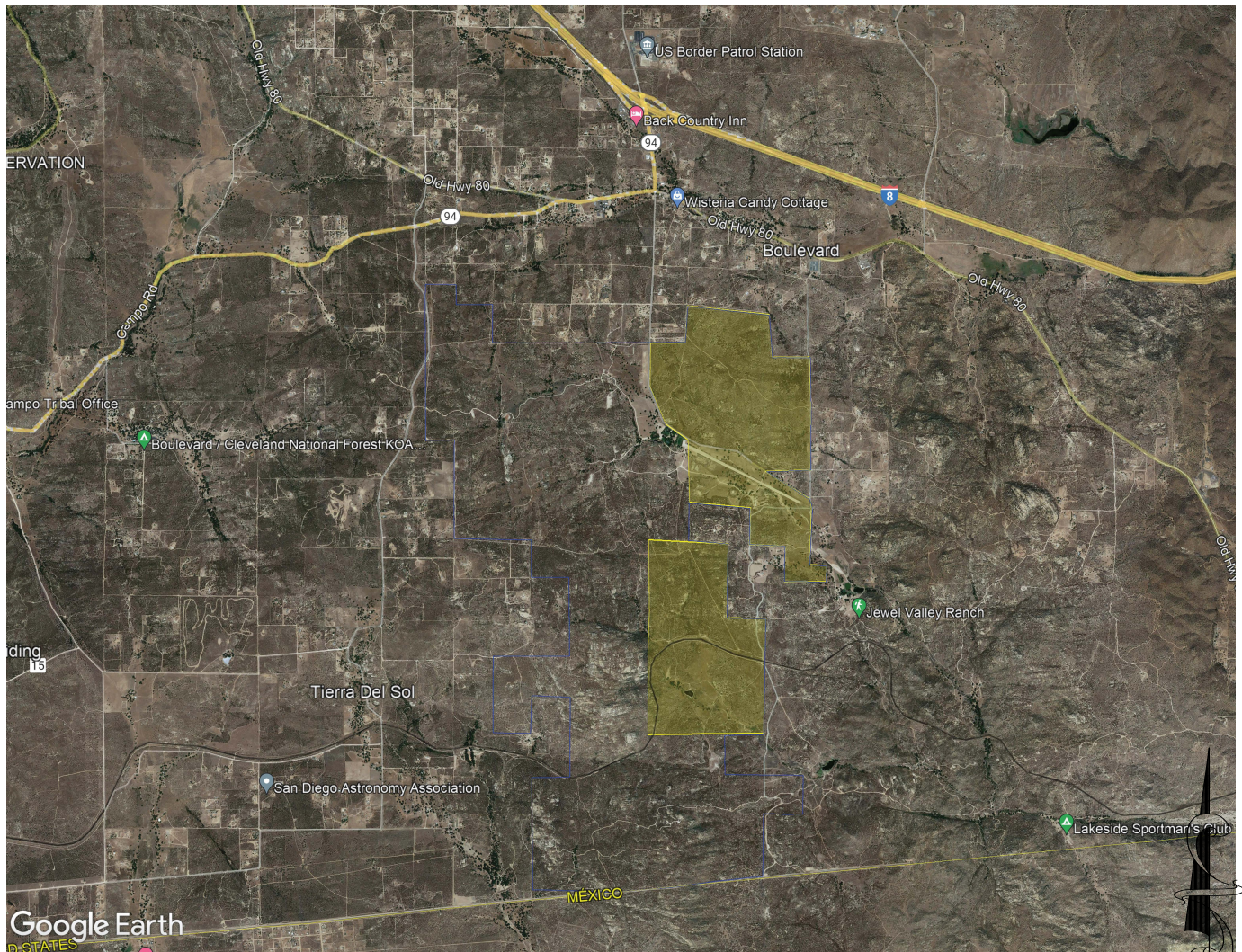
At the time of Bruin GSI's field investigation, most of the site was vacant, undeveloped land with visible rock outcropping. The vegetation consisted of a dense covering of annual weeds and shrubs with scattered trees.

The Site topography is lowest in the center between the two solar sites along a drainage course at approximately 3,450 feet above mean sea level. The elevation at Site 1 ranges from 3,450 to 3,600 feet above mean sea level with drainage toward the south (near the drainage course) and to the northwest for the remainder of the site. The elevation of Site 2 ranges from 3,450 to 3,650 with drainage to the north/northwest. The intention of the aforementioned site description is to be illustrative and is not intended for use as a legal description of the Site.

Site access is by Jewel Valley Road, which is a paved road. The general location of the subject site is shown on Figure 1.

Vicinity Map

N.T.S.



Google Earth
D: STATES



= Denotes approximate parcel boundary



Project:
Starlight Solar
Jacumba Hot Springs
San Diego County, CA

Job Number:
22-137

Figure 1

3.0 FLOOD HAZARD

Bruin GSI reviewed available data regarding the flood potential at the subject site. Based on our FEMA database research, a portion of the project site is located on map number 06073C2350F. Review of panel indicates the southern portion of the subject site (driveway approach) lies within the following Flood Zone:

Zone D

Areas in which flood hazards are undetermined, but possible.

Although the site does not have a determined flood level, multiple drainages traverse the site and may cause flooding after rain/storm.

4.0 POTENTIAL CONSTRUCTION

Based on our conversations with the client, it is our understanding that the potential project consists of a solar photovoltaic (PV) generation facility. The Project will utilize crystalline silicon, or thin film, PV technology on fixed-tilt or tracker mounting supports on single pole foundation supports (driven H-piles: W6x9, W6x12 are anticipated) with approximately five (5) feet above grade and anticipated embedment depths of six to twelve (6-12) feet, with thickened concrete mat foundations and driven H-Piles for switchgear equipment and inverter equipment. Construction may also include shallow infiltration basins throughout the Site for the purpose of percolating sheet-flow storm-drain water. The site may also be developed as a battery storage facility with mat/slab foundations supporting the batteries.

It is anticipated that the proposed earthwork will consist of clearing and grubbing of the vegetation, construction of shallow infiltration basins (less than 2-foot depth, with 4:1 slopes) and minor grading with cuts and fills of less than one (1) foot, maintaining the natural drainage through the site. Dirt or gravel drive areas for interior access are also anticipated.

Although construction details are not available at the time of writing this report, we anticipate allowable stress design loads for the posts downward (bearing) loads of approximately 4 kips, and wind uplift and lateral loads of approximately 2-3 kips for the photovoltaic array and dead loads of 2-3 kips for auxiliary structures.

5.0 GEOTECHNICAL INVESTIGATION

The geotechnical investigation included a field exploration program and a laboratory testing program. These programs were performed in accordance with our proposal for Preliminary Geotechnical Site Evaluation dated March 17, 2022. The scope of work did not include environmental assessment or investigation for the presence or absence of hazardous

substances or toxic materials in structures, soil, surface water, groundwater, or air, below or around the site.

5.1 Field Exploration Program

The field exploration program was initiated on April 12, 2022, under the technical supervision of our engineer. A total of thirty-one (31) exploratory trenches were excavated using a tractor-mounted backhoe equipped with a thirty-six-inch bucket. The trenches were advanced to maximum depths of fifteen (15) feet below ground surface (bgs). The approximate locations of the trenches within the area of the proposed construction were determined by sighting and pacing from existing site improvements, such as streets, and should be only considered accurate to the degree implied by the method used. The trench locations are shown on Figure 2.

Soil samples were obtained at various depth intervals, consisting of grab samples utilizing hand-sampling equipment.

Bulk samples were also collected at various depths from trench cuttings during excavation and represent a mixture of soils within the noted depths. The soil samples were returned to the laboratory for analysis and testing.

Final excavation logs presented in Appendix A are Bruin GSI's interpretation of the field logs prepared by our representative during excavation, as well as laboratory test results. The stratification lines represent approximate boundaries between soil types. The actual soil transitions may be gradual.

5.2 Laboratory Testing

Selected samples collected during drilling activities and field work were tested in the laboratory to assist in evaluating the engineering properties of subsurface materials deemed within the structural influence of the site. The field logs were reviewed, and the soil samples were classified in accordance with the Unified Soils Classification System and a testing program was established.

The samples were tested to determine the following:

- | | |
|--|------------------------|
| • In-situ moisture and density determination | ASTM D 2937 |
| • Consolidation potential | ASTM D 2435 |
| • Shear strength | ASTM D 3080 |
| • Expansion index | ASTM D 4829 |
| • Chemical analyses | CA 422/417/643 |
| • Thermal Resistivity | IEEE standard 442-2017 |

1. NO GRADING ASSUMED
2. APPROXIMATELY 13.25% OF TRACKERS ARE ON A SOUTH FACING SLOPE GREATER THAN 7.5%

EXISTING

 SITE BOUNDARY
 SLOPE EXCEEDANCE AREA
 ROCKY AREA
 BOLLEVAARD SUBSTATION
 ROAD RIGHT-OF-WAY

PROPOSED

Figure 1: Typical cross-section of a transmission line. The diagram shows a vertical cross-section of a transmission line with various layers and components labeled. From top to bottom: a dashed line labeled 'X' for 'FENCING'; a solid line labeled 'BUILDABLE AREA'; a solid line labeled 'BESS BOUNDARY'; a solid line labeled 'HV' for 'HV TRANSMISSION LINE'; a solid line labeled 'XPMR SKID'; a hatched area labeled 'LAYDOWN AREA'; a solid line labeled 'MV' for 'MV FEEDER'; and a solid line labeled 'UG MV FEEDER'.

PV PANELS

SYSTEM DETAILS

AC CAPACITY AT POI	20 MW
DC CAPACITY	20.59 MW
DC AC RATIO AT POI	1.25
JNKO_KMS25M-THL4-TV MODULE COUNT	47,796
STRING SIZE	28 MODULES
RTG	14.5
ROD	40.3%
GPTECH 4350 INVERTER COUNT	4
INVERTER NAMEPLATE RATING	6,350 MVA
RACKING TYPE	NEXTRACTOR
TRACKER MOTOR COUNT	610
3 STRING TRACKER ROWS	136
3 STRING TRACKER ROWS	477
BESS AC CAPACITY AT POI	17.5 MW
BESS DURATION	4
BATTERY MODULE (MANUF. MODEL)	8AM50430 SDC IHD
STRING STRING LENGTH (M OF MODULES)	13
STRINGS PER CONTAINER BOL	16.8
STRINGS PER CONTAINER BOL	19.8
CONTAINER TYPE	CEN 47 (80
CONTAINER COUNT BOL	20
CONTAINER COUNT EOL	20
BESS INVERTER NAMEPLATE	GPTECH 4200
BESS INVERTER COUNT	5
LINEAR FEET OF FENCE	16,860
FENCED ACREAGE	395
LINEAR FEET OF INTERIOR ROAD*	16,860
LINEAR FEET OF W/ CABLE	20,002
LAYDOWN AREA (ACRES)	7.0

* BASED ON PPS, MINOR CALCULATIONS, NOT FROM ORIGIN.

PE STAMP:

KEY PLAN:

REVISIONS:

NO	DATE	DESCRIPTION
1	02/24/2022	REVISED SYSTEM SIZE
2	03/04/22	MV AND SKIDS ADDED
3	03/24/2022	REVISED GEN-TIE AND MV
		CABLE ROUTING

PROJECT TITLE:	
----------------	--

STARLIGHT SOLAR

PROJECT LOCATION:

SAN DIEGO COUNTY,
CA

SHEET TITLE & DESCRIPTION								
---------------------------	--	--	--	--	--	--	--	--

PRELIMINARY SITE
PLAN

PROJ NUM:	
DES:	J. BRINEY
DWN:	J. BRINEY
CHK:	
APV:	
DATE:	03/04/22

SCALE AT 24" x 36"

1" = 400'

SHEET NO.	REV.
-----------	------

PV - E 01.01

1

PRELIMINARY
NOT FOR CONSTRUCTION

The following classification tests were performed:

- Description and Identification of Soils ASTM D 2488
- Maximum density – Optimum moisture ASTM D 1557
- Sieve Analysis of Fine and Coarse Aggregates ASTM C 136
- Sand Equivalent Value ASTM D 2419

Tabular and graphical test results are presented in Appendix B.

5.3 Corrosion and Chemical Attack

Six (6) sub-surface bulk soil samples obtained from the Site were tested to provide a preliminary screening of the potential for concrete deterioration or steel corrosion. The test results are presented below in Table 1. The soil was evaluated for minimum resistivity (ASTM 643), sulfate ion concentration (CT 417), chloride ion concentration (CT 422), and pH of soil (ASTM D 4972).

Table 1: Summary of Corrosion Test Results					
Sample Location	pH	Sulfate, mg/kg	Chloride, mg/kg	Minimum Resistivity, ohm-cm	Exposure Category
E29 @ 2-6 feet bgs	6.65	N.D.	N.D.	17,000	S0
E24 @ 2-4 feet bgs	7.22	N.D.	N.D.	21,000	S0
E15 @ 5.5 feet bgs	7.10	N.D.	N.D.	11,000	S0
E27 @ 0-5 feet bgs	7.10	N.D.	N.D.	21,000	S0
E5 @ 0-5 feet bgs	7.20	N.D.	N.D.	21,000	S0
E17 @ 0-5 feet bgs	6.98	N.D.	N.D.	42,000	S0

N.D. – None Detected

The water-soluble sulfate content severity class is considered negligible to concrete (Exposure Category per Table 4.2.1 of ACI 318-11); therefore, Type II cement should be used for design of concrete structures in contact with soil.

Representative samples of the Site soil in the vicinity have a minimum resistivity ranging from 11,000 to 42,000 ohm-cm. Buried metal conduits, ferrous metal pipes, and steel should be designed in accordance with the corrosion report recommendations provided herein or manufacturer recommendations, as applicable.

Corrosivity results should be provided to design team members for their interpretation of results relative to their specific area of design and incorporated

accordingly as deemed necessary. Results from JDH Corrosion are presented in Appendix C.

5.4 Thermal Resistivity Testing

Two (2) bulk soil samples were obtained during trenching. The soil samples are a mixture of soils within the noted depths. The maximum density/ optimum moisture determinations (ASTM D1557 test method) were performed on each sample. The data and soil samples were delivered to Geotherm USA for thermal resistivity testing (RHO), as requested by the client. The selected samples were remolded by Geotherm USA to 90% relative compaction and evaluated for thermal resistivity to determine thermal dry-out curves. Results from Geotherm USA are presented in Appendix D.

6.0 CONCLUSIONS

The following conclusions for the site are based on the results of the field exploration and laboratory testing programs and represent professional opinions.

6.1 Site and Subsurface Conditions

Native materials alluvial materials were encountered within our exploratory trenches. The subsurface soil appears relatively uniform across the subject site and the soil encountered in the exploratory trenches generally consists of poorly graded sands (SP) with occasional silty sand (SM), to the maximum depth explored of fourteen (14) feet bgs. Refusal due to bedrock material was often the reason for termination of the excavations. Refusal at five (5) feet below ground surface (bgs) was encountered in fourteen (14) of the excavations. Refusal at six to eight (6-8) feet bgs was encountered in thirteen (13) of the excavations. Three (3) of the excavations exceeded the eight (8) feet bgs and refusal was encountered at nine and one-half (9.5) feet bgs and fourteen (14) feet bgs.

The subsurface materials were noted to be dry to slightly moist. No groundwater or perched water was encountered through the depth explored (20 feet bgs).

For more detailed descriptions of the subsurface materials refer to the excavation logs in Appendix A.

6.2 Groundwater Conditions

Groundwater data on the project site location was not available, however the best quality well data for the area show that groundwater levels are located approximately twenty-five (25) feet below the ground surface. Sources reviewed included the historically highest groundwater contours prepared by State of

California Department of Water Resources SGMA electronic database. Well data was gathered from California well site Station 326402N1163812W001 and the surrounding area. Well site data is attached to this report. From 1974 through 1985, the groundwater level in the project site vicinity was unstable. Groundwater levels may gradationally rise to a level of thirty (30) feet below the ground surface and drop to levels of approximately six (6) feet below ground surface. Because of groundwater pumping in an area where water is scarce, groundwater levels and flow fluctuate drastically.

No groundwater was encountered at the site to the maximum depth explored fifteen (15) feet below ground surface.

7.0 SITE GEOLOGY

The following sections address the regional geology and seismic hazards, subsurface conditions at the subject site. This information is based on the field exploration, previous reports by this firm, and published maps and reports.

7.1 Regional Geology and Seismic Hazards Assessment

Our scope of services included a review of published maps and reports to characterize the regional geology and potential for seismic hazards.

7.2 Regional Geology

The project site is located in southeast San Diego County, which makes up part of the Peninsular Ranges geomorphic province. This province extends from the Los Angeles Basin south to Baja California and is characterized by mountain ranges as high as 11,000 feet and valleys containing coastal plains, rivers, and basins.

The Peninsular Ranges batholith in San Diego County consists of plutonic rocks of Jurassic and Cretaceous age that contains minor inclusions of metamorphosed rocks. The plutonic rocks include a group of plutons that have undergone ductile deformation and yield uranium-lead (U-Pb) ages greater than 105 Ma and a second group that is chiefly undeformed and generally younger than 105 Ma (Todd, 1995). The older, deformed plutons are pre-batholithic rocks that underlie the western and central parts of San Diego County. The structure is most noticeably shown by steeply dipping contacts, foliation, and the axial surfaces of folds. An exception to the regional structure occurs in the interior part of the large hypersthene-Tonalite pluton (the tonalite of La Posta, unit Klp) which underlies the proposed project site entirely. It is hypothesized that the hypersthene tonalite was emplaced during regional deformation but because it was stronger than the surrounding plutons, only localized deformation and marginal parts of the large pluton is deformed (Todd, 1995).

Normal faulting accompanied by a relatively small component of right lateral separation has continued through today in the Elsinore and San Jacinto fault zones. The area is seismically active and includes a series of sub-parallel faults that are located to the west of the San Andreas Fault Zone including the active San Jacinto, Elsinore, and Rose Canyon Fault Zones which each traverse throughout San Diego County. The nearest known active fault is the Elsinore fault, located approximately 10-15 miles northeast of the site, which is the dominant source of potential ground motion in the region.

Earthquake-related geologic hazards pose a significant threat to San Diego County and can impact broad regions of the county. Earthquakes produce and strong ground shaking which can result in fault rupture, and can trigger landslides, rockfalls, soil liquefaction, and seiches. The project site is located in a seismically active area typical of Southern California and likely to be subjected to a strong ground shaking due to earthquakes on nearby faults. However, no known active faults have been mapped across the subject site. According to current publications by the State of California, the project site is not located within the Alquist-Priolo special studies zone.

7.3 Site Geology

The site is located on the El Cajon United States Geological Survey (USGS) 7.5-minute topographic quadrangle. Elevations at the site range from approximately 3,400 feet in the to approximately 3,700 feet across the site and immediate vicinity. The project site, mapped by Todd, United States Geological Survey and California Geology Survey (2004), is underlain by mostly crystalline bedrock. Alluvial material is described as light brown alluvial gravel, sand and silt and emanates from streambeds, washes, and alluvial fans. The alluvium on-site consists of silty coarse-grained sand and may represent distal portions of older alluvial fan or sheet wash deposits.

Geologic mapping depicts that the site is underlain by units of the Peninsular Ranges Batholith, specifically the early cretaceous Tonalite of La Posta. This unit is described as hypersthene-biotite tonalite, quartz diorite, granodiorite, quartz monzodiorite, and quartz norite. This unit is medium grained and equigranularity with weak foliation. The unit is described as dark gray on fresh surfaces, weathers reddish or buff-gray, and typically forms boulder outcrops. The unit is homogeneous and generally inclusion free.

Because of the characteristics of the Tonalite of La Posta (Klp) unit, this rock is likely impenetrable. It appears that the unit is found at or near the surface uniformly across the site.

7.4 Seismic Hazards Assessment

The types of geologic and seismic hazards assessed include ground-surface fault rupture. Our scope of services did not include a 50-foot test boring or detailed analysis of liquefaction or dry sand settlement.

The purpose of the Alquist-Priolo Geologic Hazards Zone Act, as summarized in CDMG Special Publication 2 (SP 42), is to "prohibit the location of most structures for human occupancy across the traces of active faults and to mitigate thereby the hazard of fault-rupture." As indicated by SP 42, "the State Geologist is required to delineate "earthquake fault zones" (EFZs) along known active faults in California. Cities and counties affected by the zones must regulate certain development 'projects' within the zones. They must withhold development permits for sites within the zones until geologic investigations demonstrate that the sites are not threatened by surface displacement from future faulting.

Zones of Required Investigation referred to as "Seismic Hazard Zones" in CCR Section 3722, are areas shown on Seismic Hazard Zone Maps where Site investigations are required to determine the need for mitigation of potential liquefaction and/or earthquake-induced landslide ground displacements. The Site is not located in a Landslide and Liquefaction Seismic Hazard Zone as specified by the State of California.

7.5 Liquefaction

Earthquake-induced ground shaking can be the cause of several significant phenomena, including liquefaction of saturated fine sands and silty sands. Loose soils can transform from a solid to a liquid state as a result of increased pore pressure during seismic loading. Liquefaction results in a complete loss of strength and can cause structures to settle or even overturn if it occurs in the bearing zone. If liquefaction occurs beneath sloping ground, a phenomenon known as lateral spreading can occur. Due to the poorly sorted and coarse-grained materials that are anticipated to underlie the Site area and the absence of a shallow groundwater table, the potential for liquefaction is low. The project site has a low susceptibility to liquefaction.

7.6 CBC Design Parameters

The following coefficients have been estimated in accordance with the requirements of the 2019 CBC, utilizing the Structural Engineers Association of California and California's Office of Statewide Health Planning and Development Seismic Design Maps Application: <http://seismicmaps.org/>

The following seismic parameters are provided, based on the approximate latitude and longitude at the northwest corner of the subject site:

Latitude 32.658339°
 Longitude -116.286564°

Type	Value	Period
<i>Spectral Response Acceleration, Short Period) – S_s</i>	1.061g	0.2(sec)
<i>Spectral Response Acceleration at 1 sec. – S_1</i>	0.358g	1.0(sec)
<i>Mapped Spectral Response, Short period – S_{Ds}</i>	0.761g	0.2(sec)
<i>Mapped Spectral Response at 1 sec. – S_{D1}</i>	*	1.0(sec)
<i>Site Coefficient – F_A</i>	1.0	
<i>Site Coefficient – F_V</i>	*	
<i>Site Modified Spectral Response Acceleration, Short period – S_{MS}</i>	1.142g	
<i>Site Modified Spectral Response Acceleration, Short period – S_{M1}</i>	*	

Site Classification (2019 CBC, further defined in ASCE7-16 Chapter 20) = D Stiff Soil Risk Category I

* The actual method of seismic design should be determined by the Structural Engineer in accordance with Section 11.4.8 Site-Specific Ground Motion Procedures of the ASCE 7-16. Refer to Appendix E for the Design Maps Summary Report provided by the Structural Engineers Association of California and California's Office of Statewide Health Planning and Development website.

7.7 Differential Soil Settlement

Differential soil settlement occurs when supporting soils are not uniform in density or soil type and one portion of soil settles more than the other. When unaccounted for in design, such settlement can result in damage to structures, pavement, and subsurface utilities. Based on the subsurface data obtained during the investigation, the on-site soils are relatively uniform, consisting of predominantly medium dense soils that should not be prone to differential settlement.

Re-compaction of the upper site soils is intended to remedy the potential for surficial differential settlement due to auxiliary structures supported on non-uniform thickness of compacted fill.

Settlement of auxiliary structures founded on compacted fill will be relatively small, less than three-quarter (3/4) inch. Differential settlement is anticipated to be on the order of 50% of the total settlement in a thirty-foot (30) span. Most settlement is anticipated to take place during construction.

8.0 PRELIMINARY GEOTECHNICAL RECOMMENDATIONS

Based upon the results of our investigation, the proposed development is considered feasible from a geotechnical standpoint provided the recommendations presented herein are incorporated into the design and construction. The following preliminary geotechnical engineering recommendations are based on observations from the field investigation program and the test results and our experience with sites of similar conditions.

8.1 Driven Steel Piles

Refusal due to bedrock at a depth of five (5) feet below ground surface or less in approximately half of the exploratory excavations indicates that the site may not be suitable for driven steel piles typically used for solar arrays. Soil classification of poorly-graded sand (SP) will typically require a deeper embedment of a driven pile due to low cohesion.

8.2 Concrete Mat/Slab Foundations (BESS)

Concrete mat or slab foundations typically designed for battery storage construction appear to be feasible. Some over-excavation and recompaction should be anticipated. Preliminary corrosion results indicate negligible soluble sulfates. No special considerations for concrete regarding corrosion is necessary.

8.3 Earthwork

Earthwork is expected to be minimal. Where earthwork is required to achieve design grades, the following procedures can be expected to be implemented during site preparation. The existing vegetation and deleterious materials shall be removed from the area to be graded and shall not be incorporated into the engineered fill.

8.4 Remedial Grading for Conventional Spread or Mat Foundations (Auxiliary Structures)

Subsequent to removals of the vegetation and deleterious materials in the areas to be graded, the exposed surface may need to be removed (over-excavated) a depth of three to four (3-4) feet. The horizontal limits of the excavation typically extend a minimum of five (5) feet beyond the limits of the proposed foundations.

8.5 Access Drive Areas

Subsequent to clearing and grubbing, the site scarification of the upper twelve (12) inches of the existing native soils should be anticipated. Due to the coarse-grained soil, placement of gravel or pavement in access roads may not be necessary after grading

8.6 Fill Slope Construction and Stability for Infiltration Basins

Permanent cut slopes at infiltration basin locations should be anticipated to be constructed at a slope ratio not exceeding 4:1 (horizontal: vertical) or flatter. The slopes should be planted with native vegetation as soon as possible to minimize erosion and maintenance.

8.7 Typical Fill Placement and Compaction Requirements

Native soils may be used as engineered fill. Materials for engineered fill should be free of organic material, debris, and other deleterious substances, and should not contain rocks greater than three (3) inches in maximum dimension.

All native soil fill should be placed in eight (8) inch thick maximum lifts, moisture conditioned or air dried as necessary to achieve optimum moisture condition, and then compacted in place to a minimum relative compaction of 90% (**95% for drive areas**) as determined in accordance with ASTM D 1557 test method.

A representative of the project consultant should be present on-site during grading operations to verify proper placement and compaction of all fill, as well as to verify compliance with the other geotechnical recommendations presented herein.

8.8 Native Soil Shrinkage

Shrinkage factor is not known. However, a preliminary shrinkage factor of five to ten (5-10) percent may be utilized for earthwork quantity calculations.

During compaction, an additional one-quarter (1/4) inch to one and one-half (1.5) inches subsidence of the underlying soil is estimated.

8.9 Fill Slope Construction and Stability

It is anticipated that fill and cut slopes may be constructed at a 2:1 (horizontal to vertical) gradient or flatter. Fill slopes constructed as recommended at a slope ratio not exceeding 2:1 (horizontal: vertical), are expected to be both grossly and surficially stable and are expected to remain so under normal conditions.

Proper drainage should be planned so water is not allowed to flow over the tops of slopes. The slopes should be planted as soon as possible to minimize erosion and maintenance.

If slopes are planned steeper than 2:1, the Geotechnical Consultant shall be notified for slope stability determinations as part of a more comprehensive report.

8.10 Concrete Mat/Slab Foundations

It is our opinion that at grade structures can be supported on shallow or mat foundations after recompaction of site soils.

8.11 Continuous and Isolated Spread Foundations (Preliminary)

Continuous and isolated spread footings are anticipated to have a minimum width of twelve (12) inches and twenty-four (24) inches, respectively. The minimum depth of footing embedment should be anticipated to be eighteen (18) inches. Continuous footing foundations net allowable bearing pressure of 1,500 pounds per square foot (psf) may be used for preliminary design for budget purposes. Isolated spread footing foundations may be designed using a net allowable bearing pressure of 1,800 psf. The net allowable bearing pressure applies to the dead load plus live load (DL + LL) conditions; it may be increased by one-third ($1/3$) for wind or seismic loads.

8.12 Mat Foundations

We understand that the structures may be supported on a concrete mat foundations. The mat foundation may be designed to impose a maximum allowable pressure of 1,500 pounds per square foot (psf) dead plus live loads. This value may be increased by one-third ($1/3$) for transient loads such as seismic or wind. The concrete mat foundation should be at least twelve (12) inches thick and satisfy structural considerations.

Mat foundations values may be used for grade beams provided that the minimum embedment is eighteen (18) inches below adjacent grade.

8.13 Lateral Earth Pressures

The following earth pressure parameters for footings are anticipated. The parameters shown in Table 2 below are for drained conditions of selected non-expansive engineered fill or undisturbed native soil.

Table 2: Preliminary Static Lateral Earth Pressures for Footings [F1]	
Lateral Pressure Condition	Equivalent Fluid Density (pcf) Drained Condition
Active Pressure	34
At Rest Pressure	50
Passive Pressure	300

For stability against lateral sliding that is resisted by combined passive pressure and frictional resistance, a minimum safety factor of 2.0 is recommended. For lateral stability against seismic loading conditions, a minimum safety factor of 1.2 is recommended.

8.14 Footing Reinforcement

Reinforcement for cast-in-place foundations should be designed by the structural engineer based on the anticipated loading conditions and expansion index of the supporting soil. Preliminary expansion index for the native soil is categorized as “very low” as determined by ASTM D 4829. Foundations should be reinforced as required by the structural engineer, once a comprehensive Geotechnical Report is proposed.

9.0 EXCAVATIONS AND BACKFILL

Soil backfill around foundations or behind walls below grade should be placed in lifts not exceeding eight (8) inches, moisture conditioned to optimum moisture content and mechanically compacted to 90% relative compaction as determined by ASTM D 1557 test method. **No flooding or jetting will be allowed.**

9.1 Excavation Stability

Soils encountered in the upper five (5) feet are generally classified as Type C soils in accordance with OSHA (Occupational Safety and Health Administration). The slopes surrounding or along temporary excavations may be vertical for excavations that are less than five feet deep and exhibit no indication of potential caving but should be no steeper than 1.5 H:1V for excavations that are deeper than five (5) feet, up to a maximum depth of fifteen (15) feet. Certified trench shields or boxes may also be used to protect workers during construction in excavations that have vertical sidewalls and are greater than five (5) feet deep.

Temporary excavations for the project construction should be left open for as short a time as possible and should be protected from water runoff. In addition, equipment

and/or soil stockpiles must be maintained at least ten (10) feet away from the top of the excavations.

Because of variability in soils, Geotechnical Consultant must be afforded the opportunity to observe and document sloping and shoring conditions at the time of construction. Slope height, slope inclination, and excavation depth (including utility trench excavations) must in no case exceed those specified in local, state, or federal safety regulations, (e.g., OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926, or successor regulations).

10.0 PRELIMINARY STRUCTURAL SECTION (FLEXIBLE PAVEMENT ENTRANCE)

For project entrances that require structural paving sections, the following recommendations are provided. Asphalt concrete pavements shall be designed per the Caltrans Highway Design Manual based on R-Value and Traffic Index. An assumed R-value of the native soil of 60 was utilized for the preliminary structural pavement section. During grading as soils are mixed, soil samples should be tested for R-Value determination.

For budgetary purposes, the preliminary flexible pavement layer thickness is as follows:

Table 4: Recommended Asphalt Pavement Section Layer Thickness	
Pavement Material	Recommended Thickness (TI = 8.0)
Asphalt Concrete	5"
Class II Aggregate Base	8"
Compacted Subgrade Soils	12"

Asphalt concrete should conform to Sections 203 and 302 of the latest edition of the Standard Specifications for Public Works Construction ("Greenbook").

Class II aggregate base should conform to Section 26 of the Caltrans Standard Specifications, latest edition. The aggregate base should be compacted to at least 95% of the maximum dry density as determined by ASTM Method D 1557.

Soil samples of the exposed subgrade at entrance approaches and areas requiring flexible pavements should be obtained during construction for R-value determination and final structural section calculations. Structural pavement sections are subject to review approval of the governing agency.

11.0 CONSTRUCTION CONSIDERATIONS

Based on our field exploration program, earthwork may be performed with conventional construction equipment.

11.1 Drainage Considerations

Bruin GSI understands the proposed project incorporates the construction of shallow basins for the purposes of infiltrating runoff water. The control surface drainage in the project areas is an important design consideration. Site drainage is the responsibility of the project civil engineer. Bruin GSI recommends that final grading around shallow foundations must provide for positive and enduring drainage away from the structures, and ponding of water must not be allowed around, or near the shallow foundations, with the exception of piles erected within designated infiltration basin areas. Ground surface profiles next to the shallow foundations other than pile foundations must have at least a 2% gradient away from the structures.

Appropriate drainage considerations should be incorporated into the project design relative to all existing and proposed drainage courses by the project civil engineer. Drainage velocity reducers, swales, riprap, etc. should be implemented as determined by the project civil engineer as deemed necessary to prevent erosion and scouring.

No water should be allowed to flow over fill slopes. A berm should be constructed at the top of the fill slope to divert drainage run-off to an approved area.

Vegetation is an important factor in minimizing erosion due to sheet flow and should be planted as soon as possible. Native indigenous plants should be used to assure sustainability of vegetation during the lifetime of the project.

12.0 ADDITIONAL SERVICES

Once construction details are proved, Bruin GSI can provide a comprehensive Geotechnical Engineering Report Specific to the proposed structures. Cost estimates can be prepared if requested. Please contact our office.

13.0 LIMITATIONS AND UNIFORMITY CONDITIONS

The subsurface conditions and characteristics described herein have been projected from individual excavations placed across the subject property. Actual variations in the subsurface conditions and characteristics may occur.

Bruin GSI is providing the preliminary data in this report to aid the client in determining potential uses in regard to solar generation facilities. This preliminary report shall not be used for design and/or construction purposes. The information provided is preliminary based on the limited exploration, sampling, and data and should not be considered at a design level report.

This preliminary geotechnical evaluation report has been prepared in accordance with generally accepted practice and standards in this community at this time. No warranties, either expressed or implied, are made as to the professional advice provided under the terms of the agreement and included in this report. This report has been prepared for the exclusive use of The AES Corporation and their authorized agents. Unauthorized reproduction of any portion of this report without expressed written permission is prohibited.

If parties other than Bruin GSI are engaged to provide construction geotechnical services, they must be notified that they will be required to assume complete responsibility for the geotechnical phase of the project by concurring with the findings and recommendations in this report or providing alternate recommendations.

14.0 CLOSURE

The conclusions, recommendations, and opinions presented herein are: (1) based upon our evaluation and interpretations of the limited data obtained from our field and laboratory programs; (2) based upon an interpolation of soil conditions between and beyond the excavations; (3) are subject to confirmation.

15.0 REFERENCES

California Department of Conservation, Geologic Map of California, Online Database
<https://maps.conservation.ca.gov/cgs/gmc/>

California Department of Water Resources, 2003, California's Groundwater: California
Department of Water Resources Bulletin 118
<http://www.groundwater.water.ca.gov/bulletin118>

Desk Report for Starlight Solar Project County of San Diego, CA, Bruin Geotechnical
Services, Inc., March 14, 2022.

Department of Water Resources, Water Data Library, Website,
<http://www.water.ca.gov/waterdatalibrary/index.cfm>

Mathany, Timothy M., et al. "Groundwater-Quality Data in the Borrego Valley, Central
Desert, and Low-Use Basins of the Mojave and Sonoran Deserts Study Unit, 2008-
2010--Results from the California Gama Program." Data Series, 2012, pp. i-100.,
<https://doi.org/10.3133/ds659>.

Parsons, et. al, Status of Groundwater Quality in the Borrego Valley, Central Desert, and Low-
Use Basins of the Mojave and Sonoran Deserts Study Unit, 2014, U.S. Geological
Survey, [https://www.usgs.gov/publications/status-groundwater-quality-borrego-
valley-central-desert-and-low-use-basins-mojave-and](https://www.usgs.gov/publications/status-groundwater-quality-borrego-valley-central-desert-and-low-use-basins-mojave-and).

Todd, V.R., *Geology of the Mount Laguna Quadrangle, San Diego County, California*. Open-
File Report, 1995, <https://doi.org/10.3133/ofr95522>.

United States Geological Survey, *Preliminary Geologic Map of the El Cajon 30' x 60'
Quadrangle, Southern California*, 2004, Version 1.0

APPENDIX A

Excavation Logs and Classification Key



Client:	AES - Starlight		EXCAVATION LOG 1 Page 1 of 1
Project Location:	Lat: 32.654104° Lon: -116.286582°		
Date(s) trenched	4/12/2022		
Total Depth of Trench	8' bgs		
Trenching Equipment	Backhoe	Logged By	AM
Sampling Method(s)	Hand-Sampler	Checked By:	MS
Trench Backfill		Notes: Elevation 3363 ft.	
Project number: 22-137			

Depth	Sample	USCS	Graphic Log	Material Description	Dry Unit Weight pcf	Water Content %
		SP/SM		Moderate brown slightly silty fine to medium sand w/ coarse sand & occ #4-1/2" gravel Loose, moist		8.6
5'		SP		Pale brown slightly silty medium to coarse sand w/ fine sand & DG Very dense, slightly moist		3.2
		SP		White slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel, DG		2.6
10'						
15'				Excavation refusal @ 8' bgs No groundwater encountered No caving DG = Decomposed granite		
20'						
25'						
30'						



Client:	AES - Starlight		EXCAVATION LOG 2 Page 1 of 1
Project Location:	Lat: 32.654020° Lon: -116.284487°		
Date(s) trenched	4/12/2022		
Total Depth of Trench	3' bgs		
Trenching Equipment	Backhoe	Logged By	AM
Sampling Method(s)	Hand-Sampler	Checked By:	MS
Trench Backfill		Notes:	Elevation 3672 ft.
Project number: 22-137			

Depth	Sample	USCS	Graphic Log	Material Description	Dry Unit Weight pcf	Water Content %
		SP		Light brown slightly silty medium to coarse sand w/ fine sand & occ #4 gravel, DG Dense, moist		7.0
		SP		Pale brown slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel, DG Very dense, slightly moist		2.5
5'		SP		Pale brown slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel, DG Very dense, slightly moist		2.6
10'				Excavation refusal @ 5' bgs No groundwater encountered No caving DG = Decomposed granite		
15'						
20'						
25'						
30'						



Client:	AES - Starlight		EXCAVATION LOG 3 Page 1 of 1
Project Location:	Lat: 32.653380° Lon: -116.286024°		
Date(s) trenched	4/12/2022		
Total Depth of Trench	3' bgs		
Trenching Equipment	Backhoe	Logged By	AM
Sampling Method(s)	Hand-Sampler	Checked By:	MS
Trench Backfill		Notes:	Elevation 3646 ft.
Project number: 22-137			

Depth	Sample	USCS	Graphic Log	Material Description	Dry Unit Weight pcf	Water Content %
		SP		Moderate brown slightly silty fine to medium sand w/ coarse sand & occ #4 gravel		2.8
		SP		Light brown slightly silty medium to coarse sand w/ fine sand & occ #4 gravel, DG		2.5
		SP		White slightly silty medium to coarse sand w/ fine sand & occ #4 gravel, DG		2.6
5'				Very dense, slightly moist		
10'				Excavation refusal @ 3' bgs No groundwater encountered No caving DG = Decomposed granite		
15'						
20'						
25'						
30'						



Client:	AES - Starlight		EXCAVATION LOG 4 Page 1 of 1
Project Location:	Lat: 32.653617°		
	Lon: -116.285974°		
Date(s) trenched	4/12/2022		
Total Depth of Trench	4' bgs	Logged By	AM
Trenching Equipment	Backhoe	Checked By:	MS
Sampling Method(s)	Hand-Sampler	Notes:	Elevation 3652 ft.
Project number:	22-137	Trench Backfill	Native Cuttings

Depth	Sample	USCS	Graphic Log	Material Description	Dry Unit Weight pcf	Water Content %
		SP		Moderate brown slightly silty fine to medium sand w/ coarse sand & occ #4 gravel		
		SP		Light brown slightly silty medium to coarse sand w/ fine sand & occ #4 gravel		
				Dense, moist		
		SP		White slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel, DG		
5'				Very dense, slightly moist		
				Excavation refusal @ 4' bgs		
10'				No groundwater encountered		
				No caving		
				DG = Decomposed granite		
15'						
20'						
25'						
30'						



Client:	AES - Starlight		EXCAVATION LOG 5 Page 1 of 1
Project Location:	Lat: 32.652775° Lon: -116.286881°		
Date(s) trenched	4/12/2022		
Total Depth of Trench	6.5' bgs		
Trenching Equipment	Backhoe	Logged By	AM
Sampling Method(s)	Hand-Sampler	Checked By:	MS
Trench Backfill	Native Cuttings	Notes:	Elevation 3627 ft.

Project number: 22-137			Trench Backfill Native Cuttings			
Depth	Sample	USCS	Graphic Log	Material Description	Dry Unit Weight pcf	Water Content %
5'		SP		Moderate brown slightly silty fine to medium w/ coarse sand & occ #4 gravel		3.5
				Loose, moist		
		SP		Moderate brown slightly silty fine to medium w/ coarse sand & occ #4 gravel		
		SP		White slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel		
10'				Medium dense, slightly moist		6.5
		SP		White slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel		
				Very dense, slightly moist		
				Excavation refusal @ 6.5' bgs		
15'				No groundwater encountered		
				No caving		
				DG = Decomposed granite		
20'						
25'						
30'						



Client:	AES - Starlight		EXCAVATION LOG 6 Page 1 of 1
Project Location:	Lat: 32.652760° Lon: -116.285397°		
Date(s) trenched	4/12/2022		
Total Depth of Trench	4.5' bgs		
Trenching Equipment	Backhoe	Logged By	AM
Sampling Method(s)	Hand-Sampler	Checked By:	MS
Trench Backfill		Notes:	Elevation 3636 ft.
Project number: 22-137			

Depth	Sample	USCS	Graphic Log	Material Description	Dry Unit Weight pcf	Water Content %
		SP		Moderate brown slightly silty fine to medium sand w/ coarse sand & occ #4 gravel		
		SP		Light brown slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel, DG		5.9
				Dense, slightly moist		
		SP		White slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel, DG		
5'				Very dense, slightly moist		
10'				Excavation refusal @ 4.5' bgs No groundwater encountered No caving DG = Decomposed granite		
15'						
20'						
25'						
30'						



Client:	AES - Starlight		EXCAVATION LOG 7 Page 1 of 1
Project Location:	Lat: 32.652651° Lon: -116.284839°		
Date(s) trenched	4/12/2022		
Total Depth of Trench	7' bgs		
Trenching Equipment	Backhoe	Logged By	AM
Sampling Method(s)	Hand-Sampler	Checked By:	MS
Trench Backfill	Native Cuttings	Notes:	Elevation 3638 ft.

Project number: **22-137**

Depth	Sample	USCS	Graphic Log	Material Description	Dry Unit Weight pcf	Water Content %
		SP		Brown slightly silty fine to medium sand w/ coarse sand & occ #4-3/4" gravel		
		SP		Loose, moist		
5'		SP		Brown slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel, DG		
				Dense, slightly moist		
		SP		White slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel, DG		1.9
				Very dense, dry		
10'						
				Excavation refusal @ 7' bgs		
				No groundwater encountered		
				No caving		
15'				DG = Decomposed granite		
20'						
25'						
30'						



Client:	AES - Starlight		EXCAVATION LOG 8 Page 1 of 1
Project Location:	Lat: 32.651452°		
	Lon: -116.284173°		
Date(s) trenched	4/12/2022		
Total Depth of Trench	4' bgs	Logged By	AM
Trenching Equipment	Backhoe	Checked By:	MS
Sampling Method(s)	Hand-Sampler	Notes:	Elevation 3657 ft.
Project number:	22-137	Trench Backfill	Native Cuttings

Depth	Sample	USCS	Graphic Log	Material Description	Dry Unit Weight pcf	Water Content %
		SP		Moderate brown slightly silty fine to medium sand w/ coarse sand & occ #4 gravel		
				Loose, moist		
		SP		Light brown slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel, DG		
		SP		White slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel, DG		
5'				Very dense, slightly moist		
				Excavation refusal @ 4' bgs		
10'				No groundwater encountered		
				No caving		
				DG = Decomposed granite		
15'						
20'						
25'						
30'						



Client:	AES - Starlight		EXCAVATION LOG 9 Page 1 of 1
Project Location:	Lat: 32.651799° Lon: -116.285600°		
Date(s) trenched	4/12/2022		
Total Depth of Trench	7' bgs		
Trenching Equipment	Backhoe	Logged By	AM
Sampling Method(s)	Hand-Sampler	Checked By:	MS
Trench Backfill	Native Cuttings	Notes:	Elevation 3620 ft.

Project number: **22-137**

Depth	Sample	USCS	Graphic Log	Material Description	Dry Unit Weight pcf	Water Content %
		SP		Moderate brown slightly silty fine to medium sand Loose, moist		
		SP		Moderate brown slightly silty fine to medium sand		
5'		SP		Light brown slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel, DG Dense, slightly moist		3.4
		SP		White slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel, DG Very dense, slightly moist		
10'						
				Excavation refusal @ 7' bgs No groundwater encountered No caving		
15'				DG = Decomposed granite		
20'						
25'						
30'						



Client:	AES - Starlight		EXCAVATION LOG 10 Page 1 of 1
Project Location:	Lat: 32.651577°		
	Lon: -116.286891°		
Date(s) trenched	4/12/2022		
Total Depth of Trench	3' bgs	Logged By	AM
Trenching Equipment	Backhoe	Checked By:	MS
Sampling Method(s)	Hand-Sampler	Notes:	Elevation 3605 ft.
Project number:	22-137	Trench Backfill	Native Cuttings

Depth	Sample	USCS	Graphic Log	Material Description	Dry Unit Weight pcf	Water Content %
		SP		Moderate brown slightly silty fine to medium sand w/ coarse sand & occ #4 gravel		
		SP		Light brown slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel, DG		
		SP		White slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel, DG		
5'				Very dense, slightly moist		
10'				Excavation refusal @ 3' bgs No groundwater encountered No caving DG = Decomposed granite		
15'						
20'						
25'						
30'						



Client:	AES - Starlight		EXCAVATION LOG 11 Page 1 of 1
Project Location:	Lat: 32.650516° Lon: -116.287599°		
Date(s) trenched	4/12/2022		
Total Depth of Trench	7.5' bgs		
Trenching Equipment	Backhoe	Logged By	AM
Sampling Method(s)	Hand-Sampler	Checked By:	MS
Trench Backfill		Notes:	Elevation 3586 ft.
Project number: 22-137			

Depth	Sample	USCS	Graphic Log	Material Description	Dry Unit Weight pcf	Water Content %
5'		SP/SM		Brown slightly silty fine to medium sand w/ coarse sand Loose, moist		
		SP		Brown slightly silty fine to medium sand w/ coarse sand & occ #4-8" cobble Medium dense, moist		
		SP		White slightly silty medium to coarse sand w/ fine sand & occ #4-3/4" gravel, DG Very dense, dry		1.7
10'						
15'				Excavation refusal @ 7.5' bgs No groundwater encountered No caving DG = Decomposed granite		
20'						
25'						
30'						



Client:	AES - Starlight	EXCAVATION LOG 12 Page 1 of 1
Project Location:	Lat: 32.650533° Lon: -116.286039°	
Date(s) trenched	4/12/2022	
Total Depth of Trench	7' bgs	
Trenching Equipment	Backhoe	Logged By AM
Sampling Method(s)	Hand-Sampler	Checked By: MS
Trench Backfill Native Cuttings		Notes: Elevation 3604 ft.

Project number: **22-137**

Depth	Sample	USCS	Graphic Log	Material Description	Dry Unit Weight pcf	Water Content %
5'	SP/SM			Moderate brown slightly silty fine to medium sand w/ coarse sand & occ #4 gravel		
				Moist, loose		
	SP			Pale brown medium to coarse sand w/ fine sand & occ #4-1/2" gravel, DG		
				Dense, slightly moist		
10'	SP			White medium to coarse sand w/ fine sand & occ #4-1/2" gravel, DG		
				Very dense, slightly moist		
15'				Excavation refusal @ 7' bgs		
				No groundwater encountered		
				No caving		
				DG = Decomposed granite		
20'						
25'						
30'						



Client:	AES - Starlight		EXCAVATION LOG 13 Page 1 of 1
Project Location:	Lat: 32.650689° Lon: -116.284700°		
Date(s) trenched	4/12/2022		
Total Depth of Trench	3' bgs		
Trenching Equipment	Backhoe	Logged By	AM
Sampling Method(s)	Hand-Sampler	Checked By:	MS
Trench Backfill		Notes:	Elevation 3635 ft.
Project number: 22-137			

Depth	Sample	USCS	Graphic Log	Material Description	Dry Unit Weight pcf	Water Content %
		SP		Moderate brown slightly silty fine to medium sand w/ coarse sand & occ #4 gravel		
		SP		Light brown slightly silty medium to coarse sand w/ fine sand & occ #4-3/4" gravel, DG		
		SP		Yellowish-brown slightly silty medium to coarse sand w/ fine sand & occ #4-3/4" gravel, DG		2.1
5'				Very dense, dry		
10'				Excavation refusal @ 3' bgs No groundwater encountered No caving DG = Decomposed granite		
15'						
20'						
25'						
30'						



Client:	AES - Starlight		EXCAVATION LOG 14 Page 1 of 1
Project Location:	Lat: 32.649559° Lon: -116.288479°		
Date(s) trenched	4/12/2022		
Total Depth of Trench	4' bgs		
Trenching Equipment	Backhoe	Logged By	AM
Sampling Method(s)	Hand-Sampler	Checked By:	MS
Trench Backfill		Notes:	Elevation 3578 ft.
Project number: 22-137			

Depth	Sample	USCS	Graphic Log	Material Description	Dry Unit Weight pcf	Water Content %
		SP		Pale brown slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel, DG Dense, slightly moist		
		SP		Yellowish-brown slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel, DG Very dense, slightly moist		1.4
5'						
10'				Excavation refusal @ 4' bgs No groundwater encountered No caving DG = Decomposed granite		
15'						
20'						
25'						
30'						



Client:	AES - Starlight		EXCAVATION LOG 15 Page 1 of 1
Project	Lat: 32.649134°		
Location:	Lon: -116.287029°		
Date(s) trenched	4/12/2022		
Total Depth of Trench	5.5' bgs	Logged By	AM
Trenching Equipment	Backhoe	Checked By:	MS
Sampling Method(s)	Hand-Sampler	Notes:	Elevation 3562 ft.
Project number: 22-137		Trench Backfill	Native Cuttings

Depth	Sample	USCS	Graphic Log	Material Description	Dry Unit Weight pcf	Water Content %
		SP		Moderate brown slightly silty fine to medium sand w/ coarse sand & occ #4 gravel		
				Loose, moist		
		SP		Pale brown slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel		
				Dense, slightly moist		
5'						
		SP		White slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel, DG		
				Very dense, slightly moist		
10'				Excavation refusal @ 5.5' bgs		
				No groundwater encountered		
				No caving		
				DG = Decomposed granite		
15'						
20'						
25'						
30'						



Client:	AES - Starlight		EXCAVATION LOG 16 Page 1 of 1
Project Location:	Lat: 32.649110° Lon: -116.285868°		
Date(s) trenched	4/12/2022		
Total Depth of Trench	9.5' bgs		
Trenching Equipment	Backhoe	Logged By	AM
Sampling Method(s)	Hand-Sampler	Checked By:	MS
Trench Backfill		Notes:	Elevation 3572 ft.
Project number: 22-137			

Depth	Sample	USCS	Graphic Log	Material Description	Dry Unit Weight pcf	Water Content %
		SP		Moderate brown slightly silty fine to medium sand w/ coarse sand & occ #4-1/2" gravel Loose, moist		
5'		SP		Moderate brown slightly silty fine to medium sand w/ coarse sand & occ #4-1/2" gravel		
		SP		Pale brown medium to coarse sand w/ fine sand & occ #4-3/4" gravel, DG Dense, slightly moist		
10'		SP		Pale brown medium to coarse sand w/ fine sand & occ #4-3/4" gravel, DG Very dense, slightly moist		2.8
15'				Excavation refusal @ 9.5' bgs No groundwater encountered No caving DG = Decomposed granite		
20'						
25'						
30'						



Client:	AES - Starlight		EXCAVATION LOG 17 Page 1 of 1
Project Location:	Lat: 32.647903°		
	Lon: -116.283892°		
Date(s) trenched	4/12/2022		
Total Depth of Trench	13' bgs	Logged By	AM
Trenching Equipment	Backhoe	Checked By:	MS
Sampling Method(s)	Hand-Sampler	Notes:	Elevation 3554 ft.
Project number:	22-137	Trench Backfill	Native Cuttings

Depth	Sample	USCS	Graphic Log	Material Description	Dry Unit Weight pcf	Water Content %
5'		SP		Brown slightly silty fine to medium sand w/ coarse sand & #4 gravel Loose, slightly moist		4.3
		SP		Brown slightly silty fine to medium sand w/ coarse sand & #4 gravel		
		SP		Brown slightly silty fine to coarse sand w/ occ #4 gravel Loose, slightly moist		4.4
10'		SP		Brown slightly silty fine to coarse sand w/ occ #4-6" cobble		
		SP		Brown slightly silty medium to coarse sand w/ fine sand & occ #4-1" gravel, DG		4.2
		SP		Pale yellowish-brown slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel, DG		0.9
15'				Very dense, dry		
20'				Excavation refusal @ 13' bgs No groundwater encountered No caving DG = Decomposed granite		
25'						
30'						



Client:	AES - Starlight		EXCAVATION LOG 18 Page 1 of 1
Project Location:	Lat: 32.647868°		
	Lon: -116.285142°		
Date(s) trenched	4/12/2022		
Total Depth of Trench	4' bgs	Logged By	AM
Trenching Equipment	Backhoe	Checked By:	MS
Sampling Method(s)	Hand-Sampler	Notes:	Elevation 3544 ft.
Project number:	22-137	Trench Backfill	Native Cuttings

Depth	Sample	USCS	Graphic Log	Material Description	Dry Unit Weight pcf	Water Content %
		SP		Light brown slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel, DG		
				Dense, slightly moist		
		SP		White slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel, DG		
5'				Very dense, slightly moist		
				Excavation refusal @ 4' bgs		
10'				No groundwater encountered		
				No caving		
				DG = Decomposed granite		
15'						
20'						
25'						
30'						



Client:	AES - Starlight		EXCAVATION LOG 19 Page 1 of 1
Project Location:	Lat: 32.648340° Lon: -116.286510°		
Date(s) trenched	4/12/2022		
Total Depth of Trench	4' bgs		
Trenching Equipment	Backhoe	Logged By	AM
Sampling Method(s)	Hand-Sampler	Checked By:	MS
Trench Backfill		Notes:	Elevation 3551 ft.
Project number: 22-137			

Depth	Sample	USCS	Graphic Log	Material Description	Dry Unit Weight pcf	Water Content %
		SP		Moderate brown slightly silty fine to medium sand w/ coarse sand & occ #4-1/2" gravel		
				Loose, moist		
		SP		Light brown slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel		
		SP		White slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel		1.0
5'				Very dense, dry		
				Excavation refusal @ 4' bgs		
10'				No groundwater encountered		
				No caving		
15'						
20'						
25'						
30'						



Client:	AES - Starlight		EXCAVATION LOG 20 Page 1 of 1
Project Location:	Lat: 32.648817° Lon: -116.288034°		
Date(s) trenched	4/12/2022		
Total Depth of Trench	7' bgs		
Trenching Equipment	Backhoe	Logged By	AM
Sampling Method(s)	Hand-Sampler	Checked By:	MS
Trench Backfill	Native Cuttings	Notes:	Elevation 3565 ft.
Project number: 22-137			

Depth	Sample	USCS	Graphic Log	Material Description	Dry Unit Weight pcf	Water Content %
		SP		Moderate brown slightly silty fine to medium sand w/ coarse sand & occ #4-1/2" gravel		
		SP		Loose, moist		
		SP		Light brown slightly silty medium to coarse sand w/ fine sand & occ #4 gravel, DG		
5'				Medium dense, slightly moist		
		SP		White slightly silty medium to coarse sand w/ fine sand & occ #4 gravel, DG		
				Very dense, slightly moist		
10'						
				Excavation refusal @ 7' bgs		
				No groundwater encountered		
				No caving		
15'				DG = Decomposed granite		
20'						
25'						
30'						



Client:	AES - Starlight		EXCAVATION LOG 21 Page 1 of 1
Project Location:	Lat: 32.654100° Lon: -116.287413°		
Date(s) trenched	4/13/2022		
Total Depth of Trench	6' bgs		
Trenching Equipment	Backhoe	Logged By	AM
Sampling Method(s)	Hand-Sampler	Checked By:	MS
Trench Backfill	Native Cuttings	Notes:	Elevation 3649 ft.

Project number: **22-137**

Depth	Sample	USCS	Graphic Log	Material Description	Dry Unit Weight pcf	Water Content %
		SP/SM		Brown slightly silty fine to coarse sand w/ occ #4 gravel Medium dense, moist		7.2
5'		SM		Pale brown very silty fine to medium sand w/ coarse sand		2.2
		SM		Pale brown very silty fine to medium sand w/ coarse sand & #4-1/2" gravel Very dense, slightly moist		2.6
10'				Excavation refusal @ 6' bgs No groundwater encountered No caving		
15'						
20'						
25'						
30'						



Client:	AES - Starlight		EXCAVATION LOG 22 Page 1 of 1
Project Location:	Lat: 32.652516° Lon: -116.2879141°		
Date(s) trenched	4/12/2022		
Total Depth of Trench	5' bgs		
Trenching Equipment	Backhoe	Logged By	AM
Sampling Method(s)	Hand-Sampler	Checked By:	MS
Trench Backfill		Notes:	Elevation 3600 ft.
Project number: 22-137			

Depth	Sample	USCS	Graphic Log	Material Description	Dry Unit Weight pcf	Water Content %
		SP		Moderate brown slightly silty fine to medium sand w/ coarse sand & occ #4-1/2" gravel		
		SP		Yellowish-brown slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel, DG		
				Dense, slightly moist		
5'		SP		Light brown slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel, DG		
				Very dense, slightly moist		
10'				Excavation refusal @ 5' bgs		
				No groundwater encountered		
				No caving		
15'				DG = Decomposed granite		
20'						
25'						
30'						



Client:	AES - Starlight		EXCAVATION LOG 23 Page 1 of 1
Project Location:	Lat: 32.653827°		
	Lon: -116.290480°		
Date(s) trenched	4/12/2022		
Total Depth of Trench	6.5' bgs	Logged By	AM
Trenching Equipment	Backhoe	Checked By:	MS
Sampling Method(s)	Hand-Sampler	Notes:	Elevation 3626 ft.
Project number: 22-137		Trench Backfill	Native Cuttings

Depth	Sample	USCS	Graphic Log	Material Description	Dry Unit Weight pcf	Water Content %
		SP		Moderate brown slightly silty fine to medium sand w/ coarse sand & occ #4 gravel		
		SP		Yellowish-brown slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel, DG		9.3
5'				dense, moist		
		SP		White slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel, DG		4.0
				Very dense, slightly moist		
10'				Excavation refusal @ 6.5' bgs		
				No groundwater encountered		
				No caving		
15'				DG = Decomposed granite		
20'						
25'						
30'						



Client:	AES - Starlight	EXCAVATION LOG 24 Page 1 of 1
Project Location:	Lat: 32.652141°	
	Lon: -116.289929°	
Date(s) trenched	4/12/2022	
Total Depth of Trench	14' bgs	Logged By AM
Trenching Equipment	Backhoe	Checked By: MS
Sampling Method(s)	Hand-Sampler	Notes: Elevation 3589 ft.
Project number: 22-137		Trench Backfill Native Cuttings

Depth	Sample	USCS	Graphic Log	Material Description	Dry Unit Weight pcf	Water Content %
5'		SP		Moderate brown slightly silty fine to medium sand w/ coarse sand & occ #4-1/2" gravel Loose, moist		
		SP		Light brown slightly silty fine to medium sand w/ coarse sand & occ #4-1/2" gravel Loose, slightly moist		
10'		SP		Light brown slightly silty fine to medium sand w/ coarse sand & occ #4-1/2" gravel, DG Medium dense, slightly moist		3.5
		SP		Yellowish-brown slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel, DG Dense, slightly moist		3.0
15'		SP		Pale-brown slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel, DG Very dense, dry		2.0
20'				Excavation refusal @ 14' bgs No groundwater encountered No caving DG = Decomposed granite		
25'						
30'						



Client:	AES - Starlight		EXCAVATION LOG 25 Page 1 of 1
Project Location:	Lat: 32.650862° Lon: -116.288401°		
Date(s) trenched	4/12/2022		
Total Depth of Trench	8.5' bgs		
Trenching Equipment	Backhoe	Logged By	AM
Sampling Method(s)	Hand-Sampler	Checked By:	MS
Trench Backfill		Notes:	
Project number: 22-137		Native Cuttings	

Depth	Sample	USCS	Graphic Log	Material Description	Dry Unit Weight pcf	Water Content %
		SP		Moderate brown slightly silty fine to medium sand w/ coarse sand & occ #4 gravel Loose, moist		
5'		SP		Moderate brown slightly silty fine to medium sand w/ coarse sand & occ #4 gravel		
		SP		Pale brown slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel, DG dense, slightly moist		
		SP		White slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel, DG Very dense, slightly moist		
10'						
				Excavation refusal @ 8.5' bgs No groundwater encountered No caving DG = Decomposed granite		
15'						
20'						
25'						
30'						



Client:	AES - Starlight		EXCAVATION LOG 26 Page 1 of 1
Project Location:	Lat: 32.649304°		
	Lon: -116.289388°		
Date(s) trenched	4/12/2022		
Total Depth of Trench	6' bgs	Logged By	AM
Trenching Equipment	Backhoe	Checked By:	MS
Sampling Method(s)	Hand-Sampler	Notes:	Elevation 3564 ft.
Project number: 22-137		Trench Backfill	Native Cuttings

Depth	Sample	USCS	Graphic Log	Material Description	Dry Unit Weight pcf	Water Content %
		SP		Moderate brown slightly silty fine to medium sand w/ coarse sand & occ #4 gravel		
		SP		Light brown slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel		5.3
5'				Dense, slightly moist		
		SP		White slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel, DG		3.0
				Very dense, slightly moist		
10'				Excavation refusal @ 6' bgs		
				No groundwater encountered		
				No caving		
15'				DG = Decomposed granite		
20'						
25'						
30'						



Client:	AES - Starlight		EXCAVATION LOG 27 Page 1 of 1
Project	Lat: 32.648775°		
Location:	Lon: -116.273174°		
Date(s) trenched	4/12/2022		
Total Depth of Trench	8' bgs	Logged By	AM
Trenching Equipment	Backhoe	Checked By:	MS
Sampling Method(s)	Hand-Sampler	Notes:	Elevation 3632 ft.
Project number: 22-137		Trench Backfill	Native Cuttings

Depth	Sample	USCS	Graphic Log	Material Description	Dry Unit Weight pcf	Water Content %
5'		SP		Yellowish-brown slightly silty fine to medium sand w/ coarse sand & #4 gravel Medium dense, moist		1.0
		SP		Light yellowish-brown medium to coarse sand w/ occ #4-1/2" gravel, DG Dense, dry		
		SP		White medium to coarse sand w/ occ #4-1/2" gravel, DG Very dense, slightly moist		
10'						
15'				Excavation refusal @ 8' bgs No groundwater encountered No caving DG = Decomposed granite		
20'						
25'						
30'						



Client:	AES - Starlight		EXCAVATION LOG 28 Page 1 of 1
Project Location:	Lat: 32.648469° Lon: -116.276458°		
Date(s) trenched	4/12/2022		
Total Depth of Trench	5' bgs		
Trenching Equipment	Backhoe	Logged By	AM
Sampling Method(s)	Hand-Sampler	Checked By:	MS
Trench Backfill	Native Cuttings	Notes:	Elevation 3658
Project number: 22-137			

Depth	Sample	USCS	Graphic Log	Material Description	Dry Unit Weight pcf	Water Content %
		SP		Pale brown slightly silty medium to coarse sand w/ fine sand & occ #4-3/4" gravel		
		SP		Dense, slightly moist		
		SP		Pale brown slightly silty medium to coarse sand w/ fine sand & occ #4-3/4" gravel, DG		
5'		SP		White slightly silty medium to coarse sand w/ fine sand & occ #4-3/4" gravel, DG		2.0
				Very dense, dry		
10'				Excavation refusal @ 5' bgs		
				No groundwater encountered		
				No caving		
15'				DG = Decomposed granite		
20'						
25'						
30'						



Client:	AES - Starlight		EXCAVATION LOG 29 Page 1 of 1
Project	Lat: 32.646781°		
Location:	Lon: -116.276610°		
Date(s) trenched	4/12/2022		
Total Depth of Trench	6' bgs	Logged By	AM
Trenching Equipment	Backhoe	Checked By:	MS
Sampling Method(s)	Hand-Sampler	Notes:	Elevation 3616 ft.
Project number: 22-137		Trench Backfill	Native Cuttings

Depth	Sample	USCS	Graphic Log	Material Description	Dry Unit Weight pcf	Water Content %
		SP		Pale brown slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel, DG Dense, slightly moist		
5'		SP		White slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel, DG		
		SP		White slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel, DG Very dense, slightly moist		
10'				Excavation refusal @ 6' bgs		
				No groundwater encountered		
15'				No caving		
				DG = Decomposed granite		
20'						
25'						
30'						



Client:	AES - Starlight		EXCAVATION LOG 30 Page 1 of 1
Project Location:	Lat: 32.647190° Lon: -116.275364°		
Date(s) trenched	4/12/2022		
Total Depth of Trench	7.5' bgs		
Trenching Equipment	Backhoe	Logged By	AM
Sampling Method(s)	Hand-Sampler	Checked By:	MS
Trench Backfill		Notes:	Elevation 3600 ft.
Project number: 22-137			

Depth	Sample	USCS	Graphic Log	Material Description	Dry Unit Weight pcf	Water Content %
		SP		Light brown slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel		3.4
		SP		Dense, slightly moist		
5'		SP		White slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel		
		SP		White slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel		
		SP		Very dense, slightly moist		
		SP		White slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel		1.8
10'						
15'				Excavation refusal @ 7.5' bgs		
				No groundwater encountered		
				No caving		
20'						
25'						
30'						



Client:	AES - Starlight		EXCAVATION LOG 31 Page 1 of 1
Project Location:	Lat: 32.646651° Lon: -116.273119°		
Date(s) trenched	4/12/2022		
Total Depth of Trench	7' bgs		
Trenching Equipment	Backhoe	Logged By	AM
Sampling Method(s)	Hand-Sampler	Checked By:	MS
Trench Backfill	Native Cuttings	Notes:	Elevation 3578 ft.

Project number: **22-137**

Depth	Sample	USCS	Graphic Log	Material Description	Dry Unit Weight pcf	Water Content %
		SP		Moderate brown slightly silty fine to medium sand w/ coarse sand & occ #4 gravel		
		SP		Light brown slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel, DG		2.4
				Dense, slightly moist		
		SP		Light brown slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel, DG		2.8
5'						
		SP		Pale brown slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel, DG		
				Very dense, slightly moist		
10'						
				Excavation refusal @ 7' bgs		
				No groundwater encountered		
				No caving		
15'				DG = Decomposed granite		
20'						
25'						
30'						

APPENDIX B

Laboratory Test Results

SUMMARY OF LABORATORY TEST RESULTS

SIEVE ANALYSIS

Percent passing individual sieves

Sample I.D.	1/2"	3/8"	#4	#10	#40	#100	#200
E1@1	100	100	98	74	34	20	13
E3@1	100	100	95	69	29	14	8
E6@2	100	98	88	61	28	16	10
E2@3	100	99	89	63	25	11	6
E3@3	98	95	76	46	11	3	0
E14@4	100	100	88	49	18	7	3
E1@5	100	100	97	63	23	12	7
E2@5	100	95	73	45	14	6	3
E9@5.5	99	96	70	44	20	10	6
E5@6.5	100	99	80	45	16	7	4
E7@7	100	98	78	50	16	7	3
E11@7.5	92	88	73	50	22	10	6
E1@8	99	99	83	49	17	7	4
E17@8	100	100	97	72	24	6	2
E16@9.5	96	95	88	63	30	14	8
E17@12	100	100	98	74	28	8	4

SAND EQUIVALENT

Sample I.D.	Sand Equivalent
E2@1'	13
E3@2'	72
E21@2'	22
E31@2'	35
E13@3'	47
E17@3'	59
E5@4'	31
E28@5'	51
E26@6'	68
E23@6.5'	26
E24@12'	36
E17@13'	59

EXPANSION INDEX

Sample	Expansion Index	Classification
E1@0-5	0	Non-Expansive
E5@0-5	0	Non-Expansive
E11@0-5	0	Non-Expansive
E17@0-5	0	Non-Expansive
E21@0-5	0	Non-Expansive
E26@0-5	0	Non-Expansive
E27@0-5	0	Non-Expansive
E29@0-6	0	Non-Expansive
E30@0-5	0	Non-Expansive
E31@0-5	0	Non-Expansive

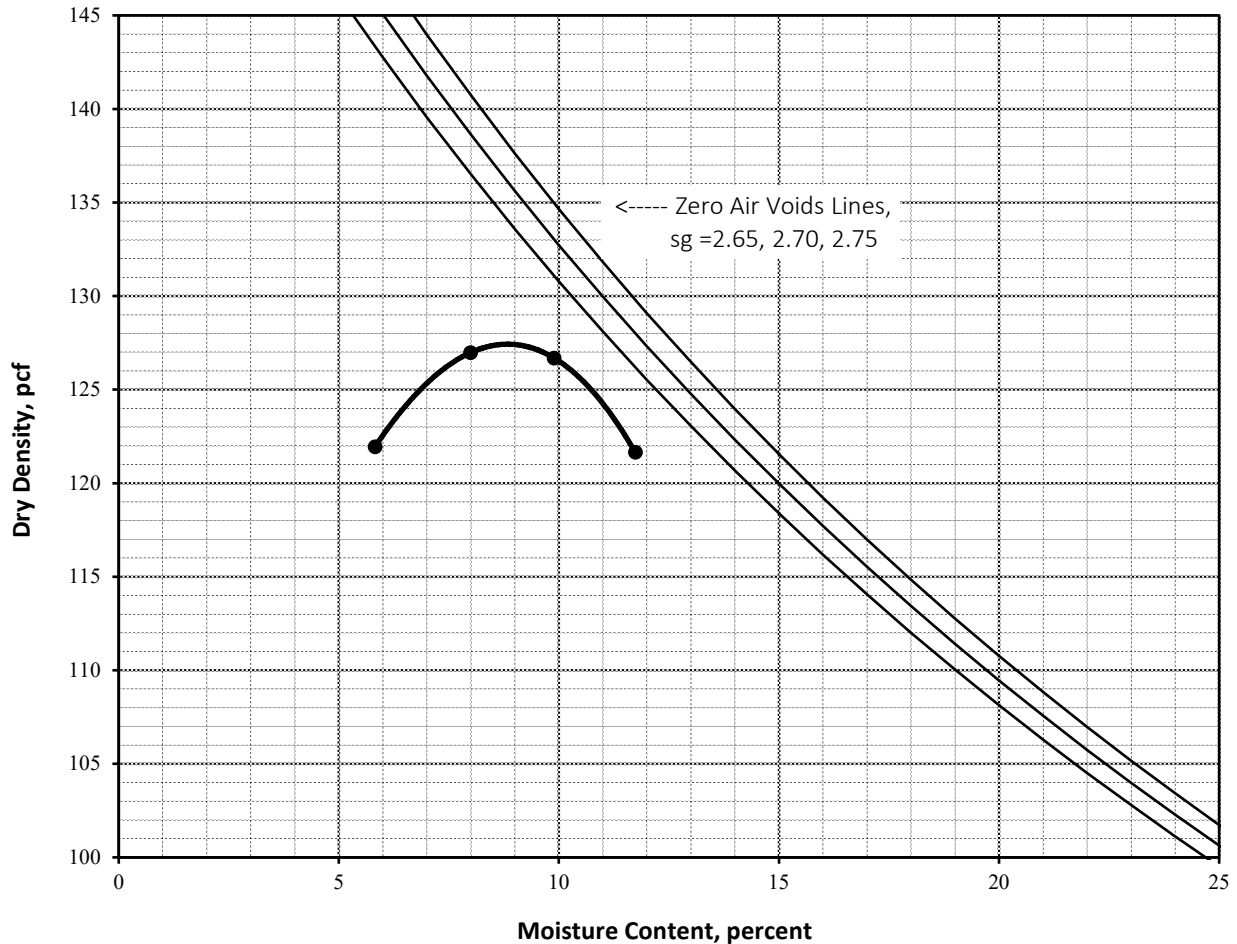
Bruin Geotechnical Services, Inc.

44732 Yucca Avenue
Lancaster, CA 93534
661-273-9078

Maximum Density/Optimum Moisture Proctor ASTM D698/D1557

Job Number:	22-137	May 3, 2022
Client:	AES - Starlight	ASTM D-1557 A
Lab ID Number:	E11	Rammer Type: 10#
Sample Location:	Bulk 0'-5'	
Description:	(SP/SM) Moderate brown slightly silty fine to medium sand w/ coarse sand & occ #4-1/2" gra	

Maximum Density:	127.5 pcf
Optimum Moisture:	9%



Bruin Geotechnical Services, Inc.

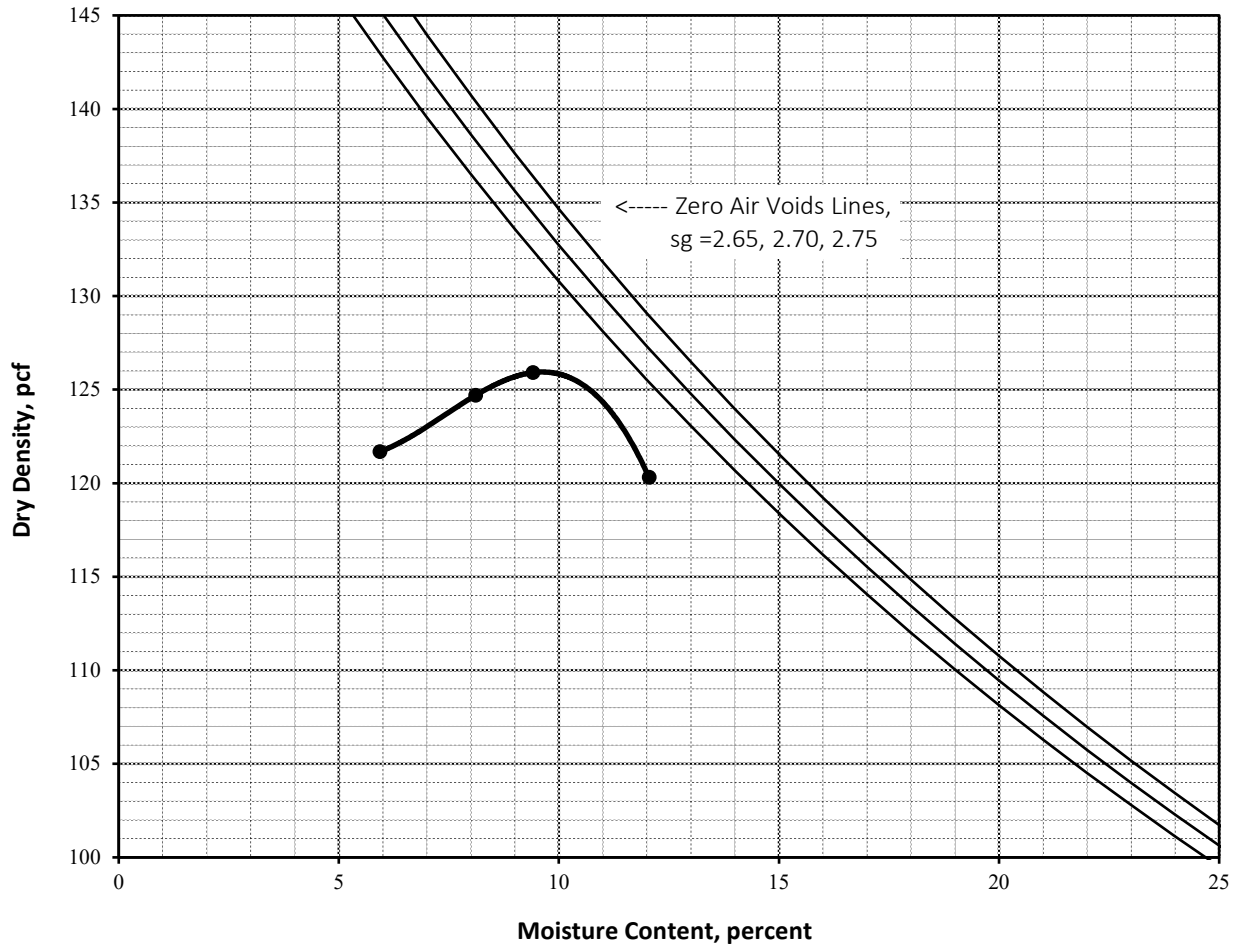
44732 Yucca Avenue
Lancaster, CA 93534
661-273-9078

Maximum Density/Optimum Moisture Proctor ASTM D698/D1557

Job Number: 22-137
Client: AES - Starlight
Lab ID Number: E11
Sample Location: Bulk 0'-5'
Description: (SP/SM) Brown slightly silty fine to medium sand w/ coarse sand

May 13, 2022
ASTM D-1557 A
Rammer Type: 10#

Maximum Density:	126 pcf
Optimum Moisture:	9.5%



Bruin Geotechnical Services, Inc.

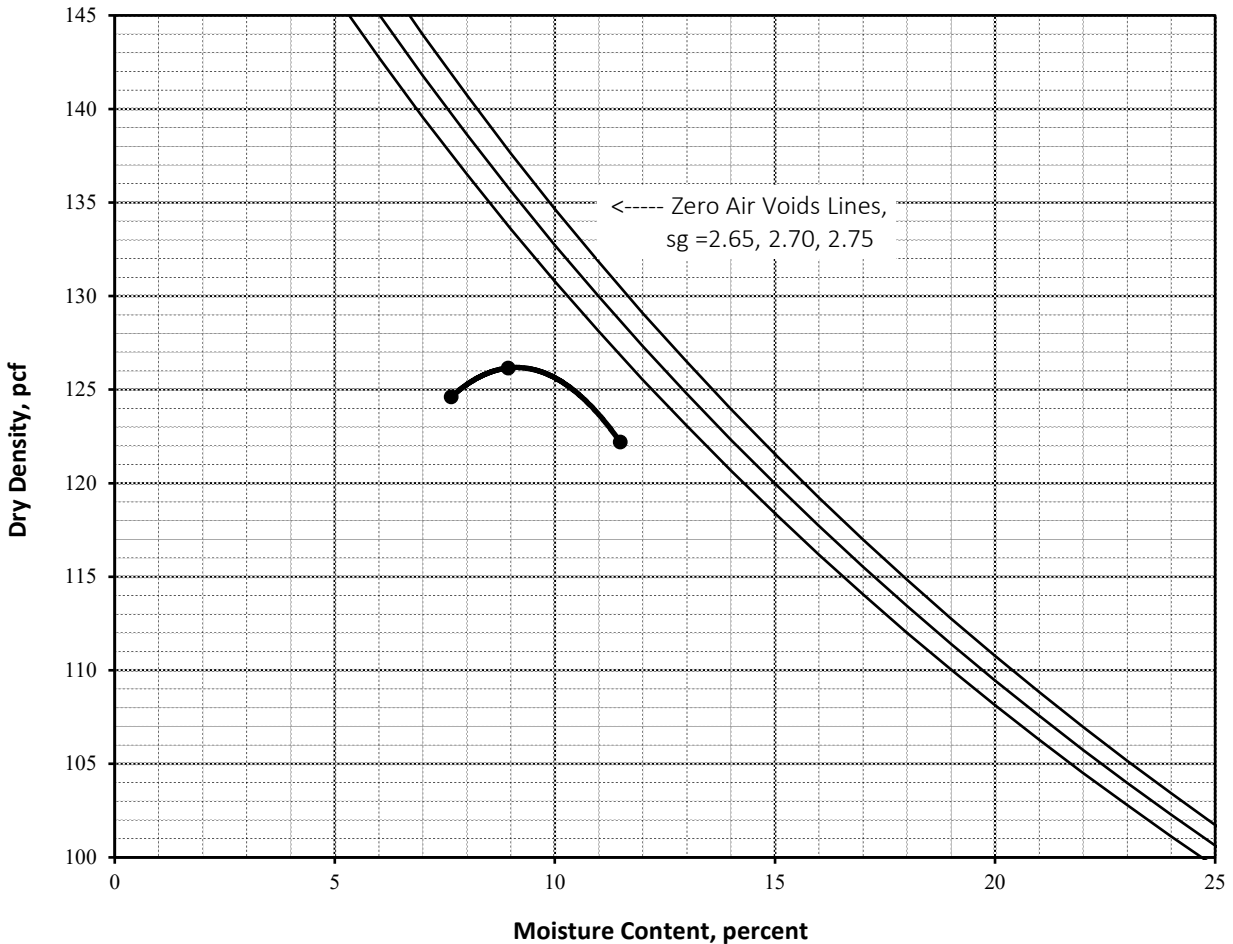
44732 Yucca Avenue
Lancaster, CA 93534
661-273-9078

Maximum Density/Optimum Moisture Proctor ASTM D698/D1557

Job Number: 22-137
Client: AES - Starlight
Lab ID Number: E26
Sample Location: Bulk 0'-5'
Description: (SP) Light brown slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel

May 10, 2022
ASTM D-1557 A
Rammer Type: 10#

Maximum Density: 126 pcf
Optimum Moisture: 9%



Bruin Geotechnical Services, Inc.

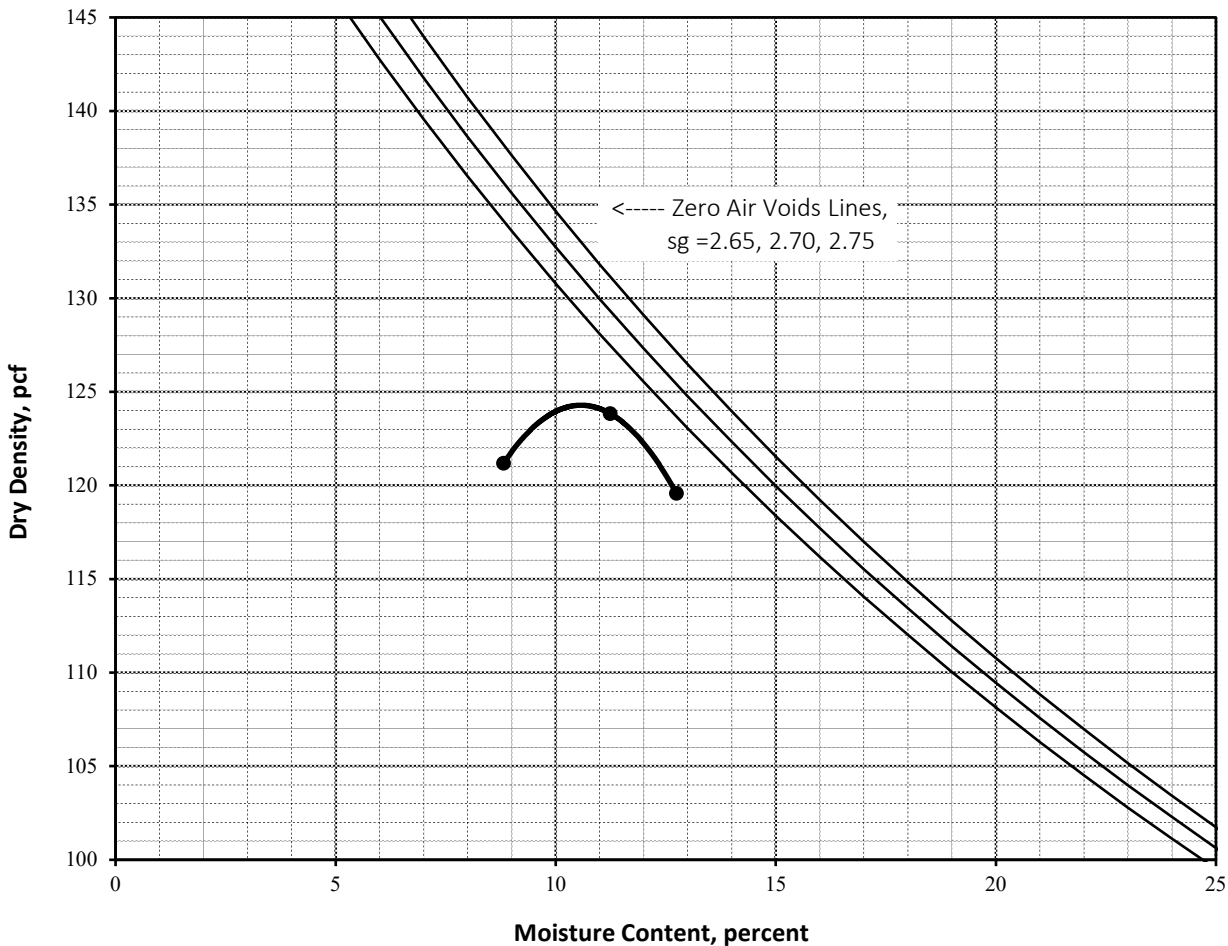
44732 Yucca Avenue
Lancaster, CA 93534
661-273-9078

Maximum Density/Optimum Moisture Proctor ASTM D698/D1557

Job Number: 22-137
Client: AES - Starlight
Lab ID Number: E31
Sample Location: Bulk 0'-5'
Description: (SP) Light brown slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel

April 28, 2022
ASTM D-1557 A
Rammer Type: 10#

Maximum Density: 124.5 pcf
Optimum Moisture: 10.5%



Bruin Geotechnical Services, Inc.

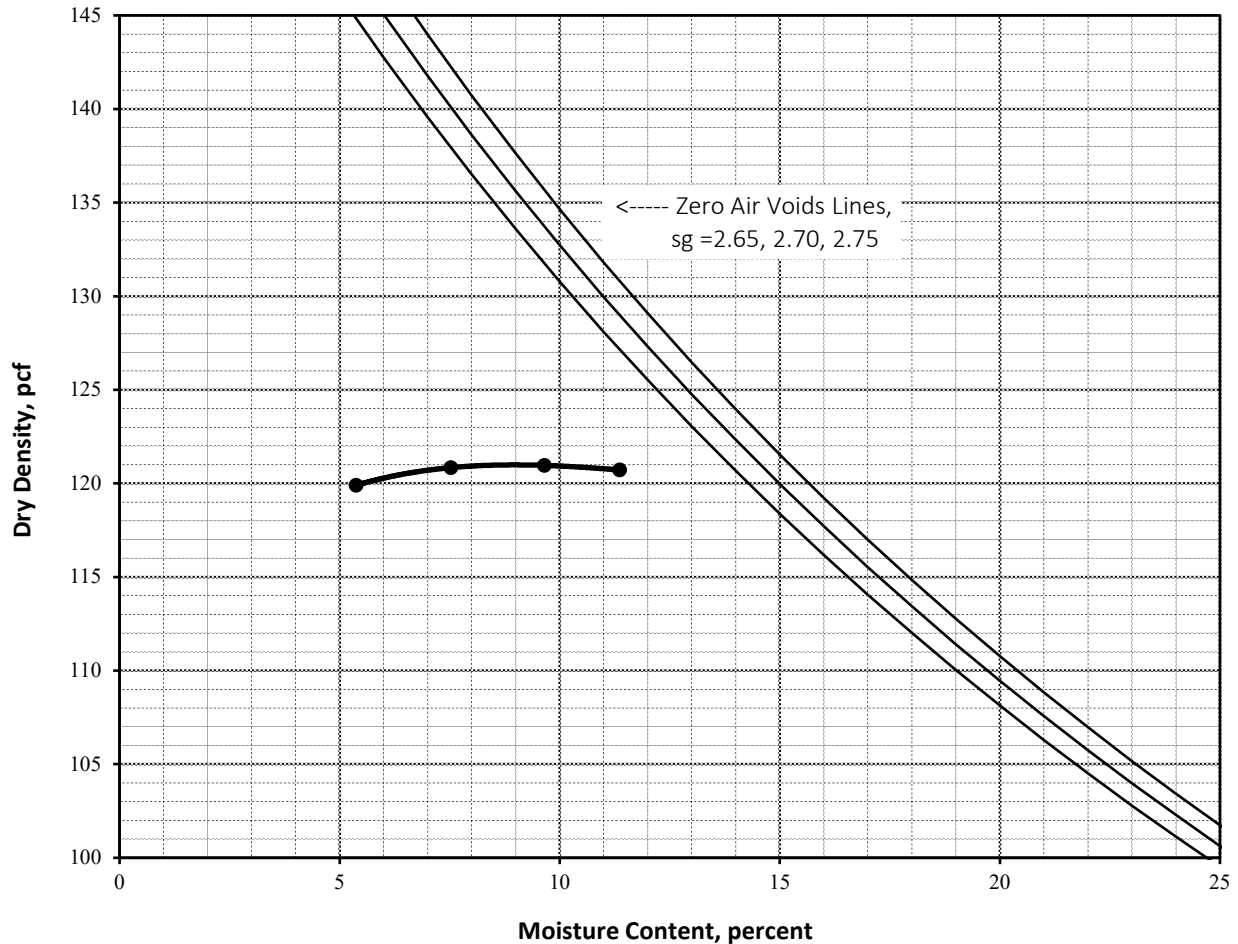
44732 Yucca Avenue
Lancaster, CA 93534
661-273-9078

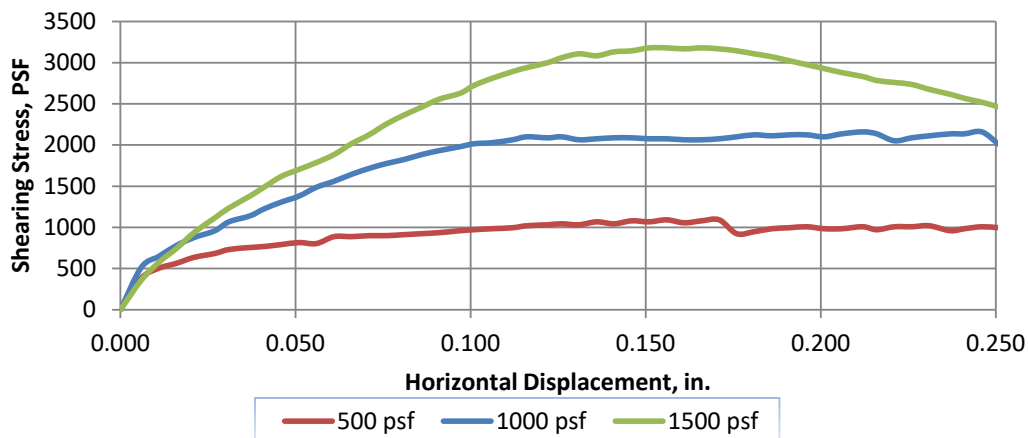
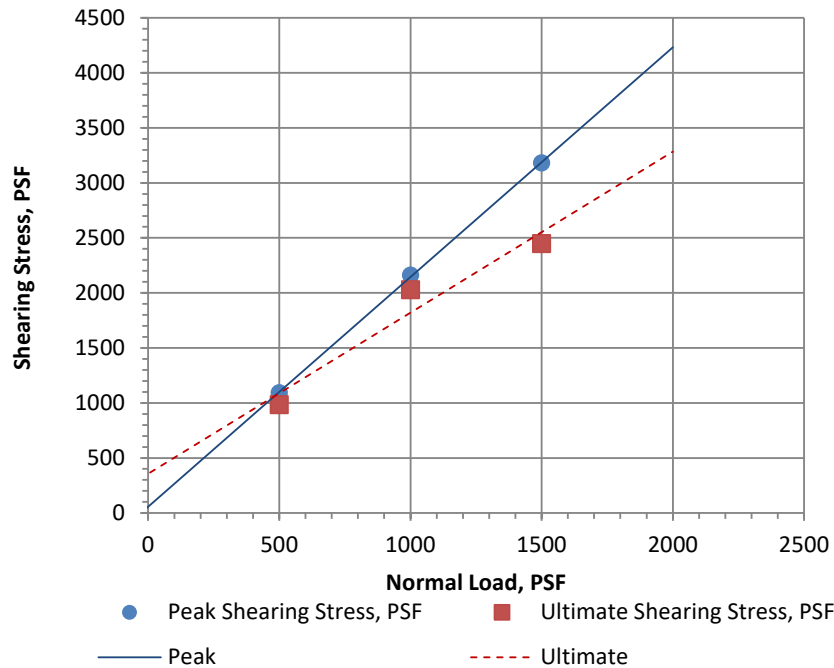
Maximum Density/Optimum Moisture Proctor ASTM D698/D1557

Job Number: 22-137
Client: AES - Starlight
Lab ID Number: E31
Sample Location: Bulk 0'-5'
Description: (SP) Moderate brown slightly silty fine to medium sand w/ coarse sand & occ #4 gravel

May 13, 2022
ASTM D-1557 A
Rammer Type: 10#

Maximum Density:	121 pcf
Optimum Moisture:	9.5%





Soil Classification: SP
 Soil Description: Light brown slightly silty medium to coarse sand w/ fine sand & occ #4-1/2" gravel

SHEAR DATA

Sample ID	Symbol	Depth, feet	Dry Density, PCF *	Average deg. of saturation %
E26	●	0-5'	113	91

* Sample remolded to 90% relative compaction as determined by ASTM D-1557 Test Method

	Peak	Ultimate
Angle of friction, (degrees)	64	56
Cohesive Strength (PSF)	56	356

Direct Shear Test

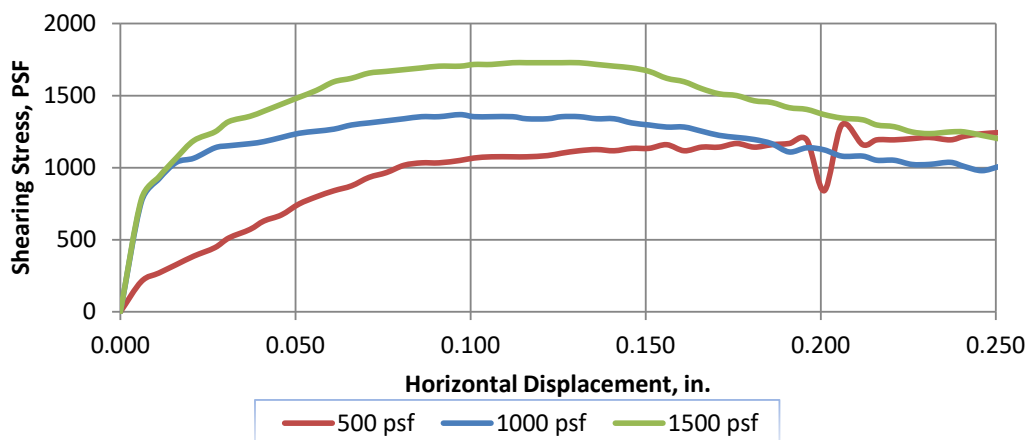
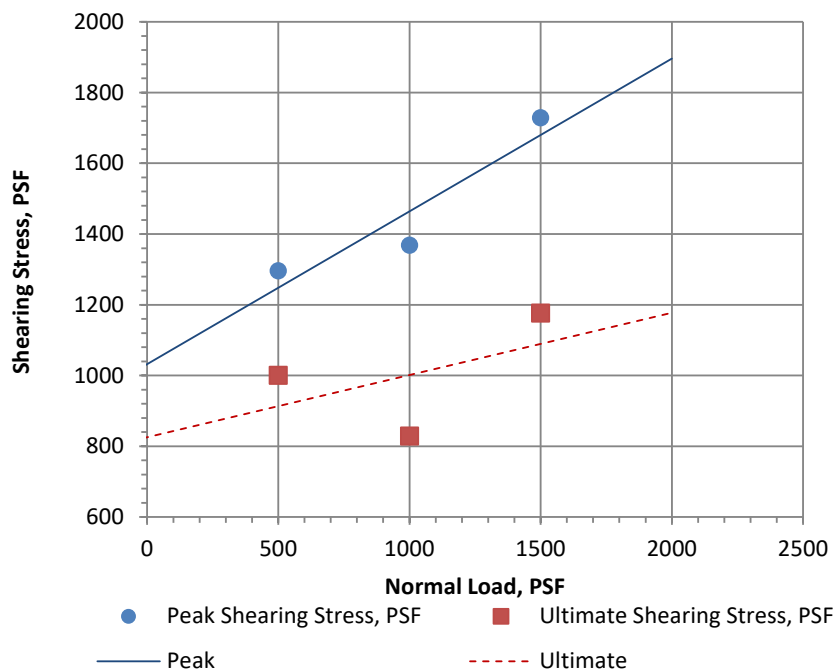
AES

Starlight Solar



5/13/2022

22-137



Soil Classification: SP
 Soil Description: Moderate brown slightly silty fine to medium sand w/ coarse sand & occ #4 gravel

SHEAR DATA

Sample ID	Symbol	Depth, feet	Dry Density, PCF *	Average deg. of saturation %
E31	●	0-5'	109	64

* Sample remolded to 90% relative compaction as determined by ASTM D-1557 Test Method

	Peak	Ultimate
Angle of friction, (degrees)	23	10
Cohesive Strength (PSF)	1032	825

Direct Shear Test

AES

Starlight Solar



5/13/2022

22-137

APPENDIX C

**Corrosion Report
JDH Corrosion**



SUBMITTED TO

JDH JOB NUMBER

June 1, 2022

Bruin Geotechnical Services, Inc.
44732 Yucca Avenue
Lancaster, CA 93534

Attention: Mr. Mark E. Stevens
Director

Subject: Preliminary Site Corrosivity Evaluation
AES Starlite
Boulevard, CA

Dear Mr. Stevens,

Pursuant to your request, **JDH Corrosion Consultants, Inc.** has conducted a preliminary broad general site corrosivity evaluation for the above referenced project site and we have provided herein recommendations for long-term corrosion control for the proposed materials of construction at this site.

Our Scope of Work included the following:

1. Chemical analysis of six soil samples from the site which were collected by Bruin Geotechnical in order to determine the appropriate corrosivity classification for this project.

SOIL TESTING AND ANALYSIS

Soil Testing Results

Six (6) soil samples from the project site were chemically analyzed for corrosivity by **CERCO Analytical**. Each sample was analyzed for chloride and sulfate concentration, pH redox and resistivity (at 100% saturation and as received). The test results are presented in a report dated May 31, 2022. The results of the chemical analysis were as follows:

Laboratory Analysis

Chemical Analysis	Range of Results	Corrosion Classification*
Chlorides	None Detected	Non-corrosive*
pH	6.65 – 7.22	Non-corrosive*
Resistivity (as received)	>80,000 ohms-cm	Non-corrosive*
Resistivity (100% Saturation)	11,000 – 42,000 ohms-cm	Mildly Corrosive to Non-corrosive*
Sulfate	None Detected	Non-corrosive**
Redox	310 – 370 mV	Mildly Corrosive*

* With respect to bare steel or ductile iron.

** With respect to mortar coated steel

Site Corrosivity Evaluation
AES-Starlite Project, Boulevard, CA

Chemical Testing Analysis

The chemical analysis provided by CERCO Analytical indicates that based on this soil data, the soils are generally classified as “mildly corrosive to non-corrosive” based on the saturated resistivity measurements. The chloride levels indicate “non-corrosive” conditions to steel and ductile iron, and the sulfate levels indicate “non-corrosive” conditions for concrete structures placed into these soils with regard to sulfate attack. The pH of the soils is alkaline which classifies them as “non-corrosive” to buried steel and concrete structures.

Reinforced Concrete Foundations

In general, due to the low levels of water-soluble sulfates found in these soils, there is no special requirement for sulfate resistant concrete to be used at this site. The type of cement used should be in accordance with 2019 California Building Code (CBC) for soils which have less than 0.10 percent by weight of water soluble sulfate (SO_4) in soil and the minimum depth of cover for the reinforcing steel should be as specified in CBC as well.

Driven H-Piles

The soils at the project site are generally considered to be “mildly corrosive to non-corrosive” to ductile/cast iron, steel and dielectric coated steel based on the saturated resistivity measurements.

Further investigations are necessary to determine the corrosion rates of steel in this soil. These will include review of geotechnical report, in-situ soil resistivity and chemical analysis of soil at pile depths, etc.

LIMITATIONS

The conclusions and recommendations contained in this report reflect the opinion of the author of this report and are based on the information and assumptions referenced herein, this report does not take grounding of the piles into consideration. All services provided herein were performed by persons who are experienced and skilled in providing these types of services and in accordance with the standards of workmanship in this profession. No other warranties or guarantees either expressed or implied are provided.

We thank you for the opportunity to be of assistance on this important project. If you have any questions concerning this report or the analysis provided herein, please feel free to contact us at (925) 927-6630.

Respectfully submitted,



Brendon Hurley
JDH CORROSION CONSULTANTS, INC.
Field Technician

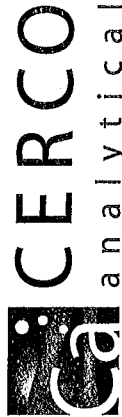
**Site Corrosivity Evaluation
AES-Starlite Project, Boulevard, CA**

Mohammed Ali

Mohammed Ali., P.E.
JDH Corrosion Consultants, Inc.
Senior Corrosion Engineer



CC: File 2022170



1100 Willow Pass Court, Suite A
Concord, CA 94520-1006
925 462 2771 Fax: 925 462 2775
www.cercoanalytical.com

Date of Report: 31-May-2022

Client: JDH Corrosion Consultants, Inc.
Client's Project No.: 2022170
Client's Project Name: Bruin Geotechnical - AES Starlight
Date Sampled: 12-May-22
Date Received: 12-May-22
Matrix: Soil
Authorization: Signed Chain of Custody

Job/Sample No.	Sample I.D.	Redox (mV)	pH	Resistivity (As Received) (ohms-cm)	Resistivity (100% Saturation) (ohms-cm)	Sulfide (mg/kg)*	Chloride (mg/kg)*	Sulfate (mg/kg)*
2205021-001	E29 @ 2'-6'	370	6.65	>80,000	17,000	-	N.D.	N.D.
2205021-002	E24 @ 2'-4'	310	7.22	>80,000	21,000	-	N.D.	N.D.
2205021-003	E15 @ 5.5'	340	7.10	>80,000	11,000	-	N.D.	N.D.
2205021-004	E27 @ 0'-5'	320	7.10	>80,000	21,000	-	N.D.	N.D.
2205021-005	E5 @ 0'-5'	330	7.20	>80,000	21,000	-	N.D.	N.D.
2205021-006	E17 @ 0'-5'	330	6.98	>80,000	42,000	-	N.D.	N.D.

Method:	ASTM D1498	ASTM D4972	ASTM G57	ASTM G57	ASTM D4658M	ASTM D4327	ASTM D4327
Reporting Limit:	-	-	-	-	50	15	15
Date Analyzed:	16-May-2022 & 20-May-2022	17-May-2022 & 20-May-2022	19-May-2022	19-May-2022	-	16-May-2022 & 25-May-2022	16-May-2022 & 25-May-2022

* Results Reported on "As Received" Basis
N.D. - None Detected

Sherri Moore
Sherri Moore
Chemist

Quality Control Summary - All laboratory quality control parameters were found to be within established limits

2205021

Page 1 of 1

Full Name	Phone (925) 927-6630	X
Mr. J. Darby Howard, Jr.	Fax (925) 927-6634	
Company and/or Mailing Address	Cell	<input checked="" type="checkbox"/>
JDH Corrosion Consultants, Inc.		
Sample Source	BRUNN SCIENTECHNICAL - AES SIAIRLIGHT	

MATRIX	DW - Drinking Water	ABBREVIATIONS	HB - Hosebib	SAMPLE RECEIPT	Total No. of Containers	<div></div>
	GW - Ground Water		PV - Petcock Valve		Rec'd Good Cond/Cold	<div></div>
	SW - Surface Water		PT - Pressure Tank		Conforms to Record	<div></div>
	WW - Waste Water		PH - Pump House		Temp. at Lab - °C	<div></div>
	Water		RR - Restroom		Sampler	<div></div>
SL - Sludge	GL - Glass					
S - Soil	PL - Plastic					
Product	ST - Sterile					

Received By:

Email Address: 9

APPENDIX D

Results from Geotherm USA



21239 FM529 Rd., Bldg. F
Cypress, TX 77433
Tel: 281-985-9344
Fax: 832-427-1752
info@geothermusa.com
<http://www.geothermusa.com>

June 1, 2022

Bruin Geotechnical Services Inc.
44732 Yucca Avenue
Lancaster, CA 93534
Attn: Mark Stevens

Re: Thermal Analysis of Native Soil Samples
AES-Starlight – San Diego County, CA (Project No. 22-137)

The following is the report of thermal dryout characterization tests conducted on two (2) samples of native soil from the referenced project sent to our laboratory.

Thermal Resistivity Tests: The samples were tested at the 'optimum' moisture content and 90% of the modified Proctor dry density ***provided by Bruin***. The tests were conducted in accordance with the IEEE standard 442-2017. The results are tabulated below and the thermal dryout curves are presented in **Figures 1 and 2**.

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

Sample ID	Depth (ft)	Description (Bruin)	Thermal Resistivity (°C-cm/W)		Moisture Content (%)	Dry Density (lb/ft³)
			Wet	Dry		
E11	0-5	Brown silty fine to medium sand	75	140	9	113
E30	0-5	Light brown fine to coarse sand with D/G	74	158	11	112

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

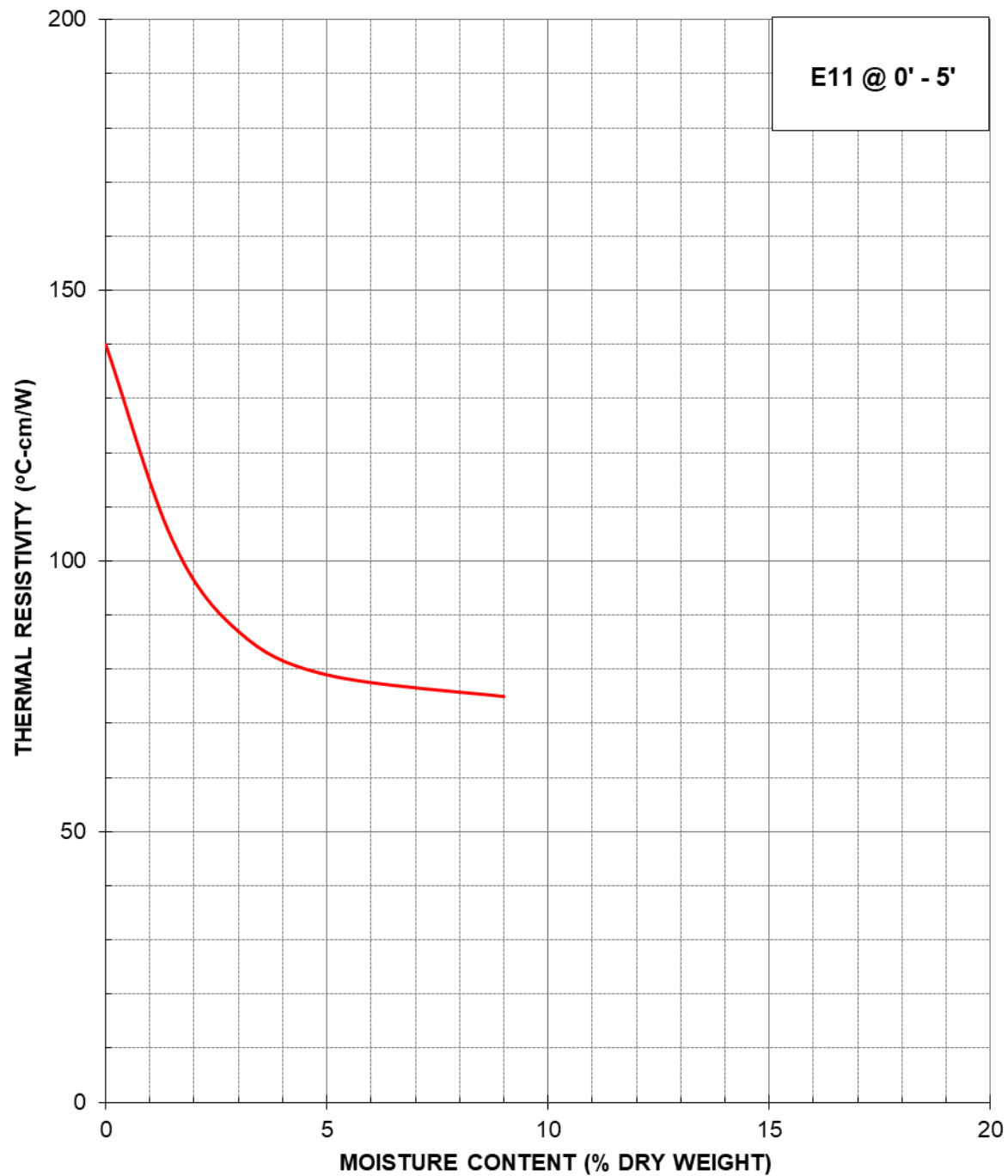
Geotherm USA

Nimesh Patel

COOL SOLUTIONS FOR UNDERGROUND POWER CABLES
THERMAL SURVEYS, CORRECTIVE BACKFILLS & INSTRUMENTATION

Serving the electric power industry since 1978

THERMAL DRYOUT CURVE



Bruin Geotechnical Services Inc. (Project # 22-137)

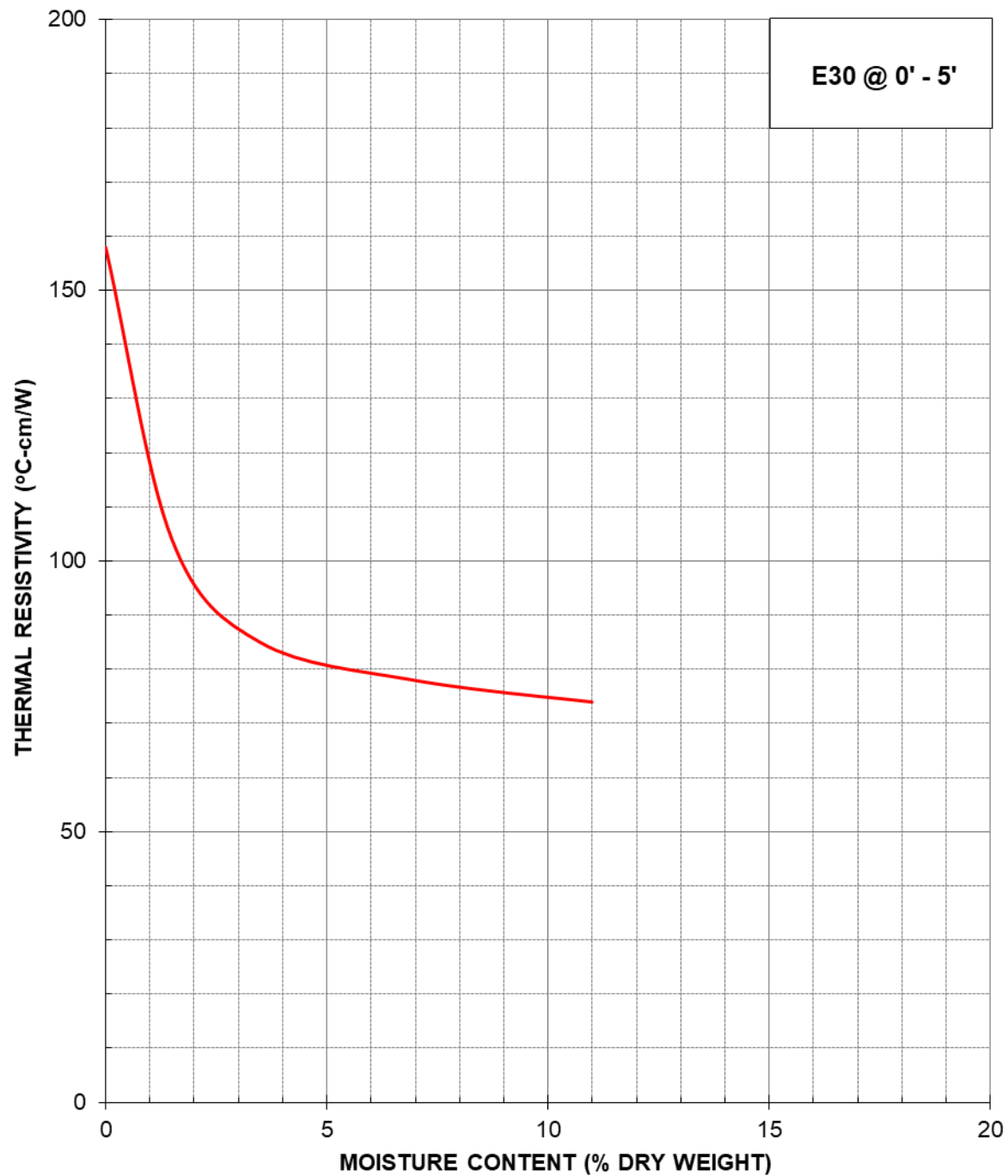
AES-Starlight – San Diego County, CA

Thermal Analysis of Native Soil Samples

June 2022

Figure 1

THERMAL DRYOUT CURVE



Bruin Geotechnical Services Inc. (Project # 22-137)

AES-Starlight – San Diego County, CA

Thermal Analysis of Native Soil Samples

June 2022

Figure 2

APPENDIX E

US Seismic Design Maps



22-137 AES Starlight Solar

Latitude, Longitude: 32.658339, -116.286564



Date	6/13/2022, 1:31:09 PM
Design Code Reference Document	ASCE7-16
Risk Category	I
Site Class	D - Stiff Soil

Type	Value	Description
S_S	1.061	MCE_R ground motion. (for 0.2 second period)
S_1	0.358	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.142	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	0.761	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1.075	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.457	MCE_G peak ground acceleration
F_{PGA}	1.143	Site amplification factor at PGA
PGA_M	0.522	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
S_{sRT}	1.061	Probabilistic risk-targeted ground motion. (0.2 second)
S_{sUH}	1.153	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
S_{sD}	1.5	Factored deterministic acceleration value. (0.2 second)
S_{1RT}	0.358	Probabilistic risk-targeted ground motion. (1.0 second)
S_{1UH}	0.386	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S_{1D}	0.6	Factored deterministic acceleration value. (1.0 second)
$PGAd$	0.5	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.921	Mapped value of the risk coefficient at short periods
C_{R1}	0.926	Mapped value of the risk coefficient at a period of 1 s

DISCLAIMER

While the information presented on this website is believed to be correct, SEAOC / OSHPD and its sponsors and contributors assume no responsibility or liability for its accuracy. The material presented in this web application should not be used or relied upon for any specific application without competent examination and verification of its accuracy, suitability and applicability by engineers or other licensed professionals. SEAOC / OSHPD do not intend that the use of this information replace the sound judgment of such competent professionals, having experience and knowledge in the field of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the results of the seismic data provided by this website. Users of the information from this website assume all liability arising from such use. Use of the output of this website does not imply approval by the governing building code bodies responsible for building code approval and interpretation for the building site described by latitude/longitude location in the search results of this website.