CEQA Level Geotechnical Study

Sienna Solar

Lucerne Valley, San Bernardino County, California

July 29, 2022

Terracon Project No. LA225044

Prepared for:

8minute Energy

San Francisco, California

Prepared by:

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July 29, 2022

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Re: CEQA Level Geotechnical Study
Sienna Solar
Lucerne Valley, San Bernardino County, California
Terracon Project No. LA225044

Dear Mr. Tuniki:

We have prepared this California Environmental Quality Act (CEQA) Level Geotechnical Study to provide support documentation for the "Environmental Checklist Form" in accordance with the CEQA Guidelines for the proposed Sienna Solar development, located west of Barstow Road and North of Old Woman Springs Road in Lucerne Valley, San Bernardino County, California.

Our report includes data from the U.S. Department of Agriculture for the soils found on site Although the site is not within a state- or county-designated earthquake fault zone, the site is within a seismically active region. The report therefore summarizes important fault information in the area of your project and discusses potential geotechnical/geologic concerns, such as fault rupture, liquefaction and erosion. This report does not include specific mitigation recommendations other than those already stated in our prior geotechnical report.

Purpose and Scope of Work

Throughout April 2022, a geotechnical investigation for the proposed project was performed. The purpose of this investigation was to explore and evaluate the geotechnical engineering conditions at the subject site and to provide appropriate geotechnical engineering recommendations. The results of our geotechnical investigation and our geologic evaluation for CEQA study are presented in this report. Terracon's geotechnical engineering scope of work for this project included the following:

- Site reconnaissance and examination of existing conditions
- Marking exploration locations and notifying Underground Service Alert in accordance with State requirements
- Drilling and sampling of thirty-nine (39) soil test borings
- Excavation and logging of five (5) geologic trenches
- Laboratory testing of soil samples
- Evaluation of geotechnical properties of soils pertinent to the CEQA Guidelines

- Evaluation of geologic hazards typically addressed in CEQA documents, including seismic shaking, surface fault rupture, liquefaction, landslides, erosion, unstable geologic units (including evaluation of surface fissures), expansive soils, and capacity of native soils for wastewater/storm water infiltration
- Development of 2019 California Building Code (CBC) seismic design parameters
- Evaluation of the geotechnical engineering/geologic data to develop preliminary recommendations for site grading/preparation and mitigation of potential geologic and geotechnical constraints

Site Description

The proposed project site is located west of Barstow Road and North of Old Woman Springs Road in Lucerne Valley, San Bernardino County, California. The project site boundary is irregularly shaped and occupies an approximate area of 1,850 acres. The GPS coordinates for the approximate center of the project site are 34.50076°N, 116.90145°W. The proposed 200 MWAC photovoltaic solar farm is to be developed using single-axis tracker photovoltaic (PV) arrays and includes a substation in the northern most parcel. At the time of our investigation, the site generally consisted of undeveloped land with sparse to moderate desert vegetation.

Field Investigation

Terracon advanced hollow stem auger soil borings, test pits, and trenches as outlined in the table below:

Number of Explorations	Depth (feet)	Planned Location
37 borings	21½	Array areas
2 borings	51½	Substation Areas
37 test pits	10	Array Areas
5 trenches	5	Geologic Trenches

The test pits are redundant data for the purposes of this report. As such, logs of the test pits are not included.

Terracon personnel provided the layout of the explorations. Coordinates were obtained with a handheld GPS unit (estimated horizontal accuracy of about ±10 feet) and approximate elevations were obtained by interpolation from Google Earth.

We advanced the borings with a truck-mounted drill rig using continuous hollow stem flight augers. Four driven samples were obtained in the upper 10 feet of each boring and at intervals of 5 feet thereafter. Soil sampling was performed using split-barrel sampling procedures. In the split-barrel sampling procedure, a standard 2-inch outer diameter split-barrel sampling spoon is driven into

the ground by a 140-pound automatic hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration is recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the test depths. A 2.5-inch O.D. split-barrel Modified California sampling spoon with 2.0-inch I.D. tube lined sampler was also used for sampling. The Modified California split-barrel sampling procedures are similar to standard split spoon sampling procedure; however, blow counts are typically recorded for 6-inch intervals for a total of 12 inches of penetration. Groundwater was not encountered during the field exploration.

The test pits were excavated with a rubber-tire backhoe with a 3-foot-wide bucket. Bulk samples were obtained from the test pits.

For safety purposes, all borings and test pits were backfilled with soil cuttings after their completion. It is possible that some settlement of the backfilled material may occur. Our firm does not monitor boring locations for surface settlement. This is deemed to be and is accepted to be the responsibility of our client.

The sampling depths, penetration distances, and other sampling information was recorded on the field boring and test pit logs. The samples were placed in appropriate containers and taken to our soil laboratory for testing and classification by a Geotechnical Engineer. Our exploration team prepared field boring and test pit logs as part of the drilling operations. These field logs included visual classifications of the materials encountered during drilling and excavation, and our interpretation of the subsurface conditions between samples. Final boring and test pit logs were prepared from the field logs. The final boring and test pit logs represent the Geotechnical Engineer's interpretation of the field logs and include modifications based on observations and tests of the samples in our laboratory.

Laboratory Soil Testing

The project engineer reviewed the field data and assigned various laboratory tests to better understand the engineering properties of the various soil strata as necessary for this project. The following laboratory tests were performed on samples collected at the site:

- ASTM D2216 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
- ASTM D7263 Standard Test Methods for Laboratory Determination of Density (Unit Weight) of Soil Specimens
- ASTM D4318 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- ASTM D1140 Standard Test Methods for Determining the Amount of Material Finer than 75-µm (No. 200) Sieve in Soils by Washing

- ASTM D2435 Standard Test Methods for One-Dimensional Consolidation Properties of Soils Using Incremental Loading
- ASTM D3080 Standard Test Method for Direct Shear Test of Soils Under Consolidated Drained Conditions
- ASTM D698 Moisture Density Relationship using Standard Effort (Standard Proctor)

Summaries of laboratory test results are presented on the boring logs and in the attachments of this report. Atterberg limit test results indicate that the on-site soils generally are medium to high plasticity clayey soils. Laboratory Moisture-Density test (Modified Proctor) results indicate that the near surface sand materials have a maximum dry-density ranging between approximately 94.4 pcf and 127.2 pcf with a corresponding optimum moisture content ranging between 9.6% and 24%. Laboratory Moisture-Density test (Modified Proctor) results indicate that the near surface clay materials have a maximum dry-density ranging between approximately 95.3 pcf and 114.8 pcf with a corresponding optimum moisture content ranging between 13.8% and 25%. Direct Shear testing indicates the sand soil samples have an effective internal angle of friction of 30 to 42 degrees with an effective cohesion of 216 to 648 psf. Direct Shear testing indicates the clay soil samples have an effective internal angle of friction of 13 to 27 degrees with an effective cohesion of 564 to 1536 psf.

Site Geology and Subsurface Soil Conditions

The site is located within the Mojave Desert geomorphic province. The Mojave Desert province is bounded on the southwest by the San Andreas fault and the Transverse Ranges (locally San Bernardino Mountains) and on the northeast by the Garlock fault. The Mojave Desert is an ancient feature formed in response to the inception of movement on the San Andreas and Garlock faults. The region is characterized by broad alluviated basins that conceal the previously mountainous topography.

The Mojave Desert includes various closed basins, or basins with internal drainage, referred to as dry lakes. Lucerne Valley includes a large closed basin referred to as Lucerne Valley playa. It is normally dry but surface water perches on the playa after rain events. All of the subject property of this investigation is located east and southeast of the playa.

The westerly parcels are located immediately east of the playa and are mapped as Holocene-age (recent) “clay” by Dibblee (1964A, 1964B). A Geologic Index Map is attached. The ground surface tends to be light in color but the soils are mixtures of clay and silt.

Most of the easterly parcels are mapped as Holocene-age “alluvium” by Dibblee. Geologic mapping and trenching conducted during this investigation found that the “alluvium” in the northeasterly site parcels includes a degraded desert pavement of Pleistocene age, and so the northeasterly parcels are largely underlain by older alluvium.

The southerly parcels are all mapped by Dibblee as Holocene-age alluvium. Observations of soils within trenches in this area are consistent with a Holocene-age assignment.

Based on the results of the borings, onsite soils generally consist of medium stiff to very stiff lean clay/fat clay with varying amounts of silt and sand to the maximum depth explored of 51.5 feet bgs.

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

Soils

Based on soils mapping published by the U.S. Department of Agriculture (2022), the project site is underlain by several USDA soils types including Bousic Clay, Dune Land, Glendale Variant Silt Loam, Joshua Loam, Kimberlina Loamy Fine Sand, Lavic Loamy Fine Sand, Peterman Clay, and Playas. These soils vary in depth, depending on slope aspect (with deeper soils occurring on areas of lower gradient), degree of permeability (with less permeable soils derived from parent materials/bedrock having clay-forming mineralogies) and susceptibility to erosion.

The following table summarizes the USDA properties for soils units identified on the site. The unit numbers correspond to the areas shown on the attached USDA Soils Map.

Summary of USDA Soil Properties					
Unit Name	**Map Unit**	**Acres % of Site**	**Surface Water Management**	**Subsurface Water Management**	**Erosion Hazard (Road, Trail)**
Bousic Clay	104	33.6	Not Rated	Not Rated	Slight
Dune Land	123	1.1	Not Rated	Not Rated	Not Rated
Glendale Variant Silt Loam, Saline-Alkali	125	25.2	Not Rated	Not Rated	Slight
Joshua Loam	135	0.3	Somewhat Limited	Very Limited	Moderate
Kimberlina Loamy Fine Sand	137	15.2	Not Rated	Not Rated	Slight
Lavic Loamy Fine Sand	140	0.3	Not Rated	Not Rated	Moderate
Peterman Clay	154	24.1	Not Rated	Not Rated	Slight
Playas	156	0.2	Not Rated	Not Rated	Not Rated

The rating for surface water management is based on the soil properties that affect the capacity of the soil to convey water across the landscape. The term "somewhat limited" for surface water management rating indicates that the soil has features that are moderately favorable for the

specified use and that limitations can be overcome or minimized by planning, design or installation.

The rating for subsurface water management is based on the soil properties that affect the capacity of the soil to be drained. The term "very limited" for subsurface water management indicates that the soil has features that are unfavorable for the specified use. Poor performance can be expected.

The ratings for erosion hazard indicate the hazard of soil loss from unsurfaced roads and trails. The term "slight" indicates that the no erosion is likely. The term "moderate" indicates that some erosion is likely.

Erosional features related to subsidence cracking (fissures) occur across the site and these are discussed later.

Mineral Resources

The aggregate resource potential for the area of the site is addressed in a report titled, "Mineral Land Classification of Concrete Resources in the Barstow-Victorville Area" (CDMG, 1993). This report addresses the sand and gravel resource potential according to the presence or absence of significant sand and gravel deposits for use in construction-grade aggregate. The resource quality of surrounding lands was reported according to the following Mineral Resource Zone (MRZ) classification system:

MRZ-1: Areas where adequate information indicates that no significant mineral deposits are present, or where it is judged that little likelihood exists for their presence.

MRZ-2: Areas where adequate information indicates mineral deposits are present, or where it is judged that a high likelihood for their presence exists.

MRZ-3: Areas containing mineral deposits, the significance of which cannot be evaluated from available data.

MRZ-4: Areas where available information is inadequate for assignment to any other MRZ.

The site is situated in primarily alluvial terrain. No economically significant sources of aggregate material were observed within the site. The project site is placed within MRZ-3a defined as "may contain significant aggregate deposits". No aggregate mining currently occurs in similar geologic terrain in the immediate project vicinity. Our assessment of the geology and soils in trenches and borings is that no economically significant aggregate resources exist on the site currently and are not expected to be economical in the foreseeable future. Aggregates are commercially available from quarries along Meridian Road and along the front of the San Bernardino Mountains at a minimum..

The mineral resource potential for the area of the site is addressed in a report titled, "Mineral Land Classification of a Part of Southwestern San Bernardino County: The Big Bear Lake-Lucerne Valley Area, California" (CDMG, 1994). This report addresses the mineral resource potential according to the presence or absence of significant metallic or industrial mineral deposits. The resource quality of surrounding lands was reported according to the following MRZ classification system:

MRZ-1: Areas where adequate information indicates that no significant mineral deposits are present, or where it is judged that little likelihood exists for their presence.

MRZ-2: Areas where adequate information indicates mineral deposits are present, or where it is judged that a high likelihood for their presence exists.

MRZ-3: Areas containing mineral deposits, the significance of which cannot be evaluated from available data.

MRZ-4: Areas where available information is inadequate for assignment to any other MRZ.

No economically significant sources of metallic or industrial materials were observed within the site. The project site is placed within MRZ-4, defined as "unknown mineral resource significance". As the project area is not presently used for mineral resource extraction and does not contain identified mineral sources, the proposed project will not result in the loss of availability of any known mineral resources. Thus, no significant impacts are anticipated.

Regional Groundwater

According to the California Department of Water Resources, the site is located within the Lucerne Valley basin, part of the Colorado River Hydrologic Region. Large areas within the basin are irrigated for alfalfa (Schaefer, 1978) and cannabis. Irrigation of fields by groundwater extraction has occurred for greater than 100 years.

Significant declines in groundwater levels in wells were reported in the basin as early as 1917 (Schaefer, 1978). The reported decline was at least 40 feet as of 1954, and at least an additional 60 feet as of 1976, for a total of at least 100 feet of decline as of 1976 (Schaefer, 1978). Long-term hydrographs of wells in the basin in the general area of the site (Mojave Water Agency, 2005) for the years 1953 to 2003 show water level declines of approximately 80 feet during that period.

Declines in groundwater levels that have occurred in Lucerne Valley are considered sufficient to cause subsidence and associated subsidence fissuring. The hazards of subsidence and ground fissuring are addressed later in this report.

Local Groundwater

Groundwater was not observed in the borings while drilling or for the short duration they could remain open. These observations represent groundwater conditions at the time of the field exploration and may not be indicative of other times, or at other locations.

In clayey soils with low permeability, the accurate determination of groundwater level may not be possible without long term observation. Long term observation after drilling could not be performed as borings were backfilled immediately upon completion due to safety concerns. Groundwater levels can best be determined by implementation of a groundwater monitoring plan.

Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff and other factors not evident at the time the borings were performed. Therefore, groundwater levels during construction or at other times in the life of the structure may be higher or lower than the levels indicated on the boring logs. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

Seismic Design Parameters

The 2019 California Building Code (CBC) Seismic Design Parameters have been generated using the SEAOC/OSHPD Seismic Design Maps Tool. This web-based software application calculates seismic design parameters in accordance with ASCE 7-16 and 2019 CBC. The 2019 CBC requires that a site-specific ground motion study be performed in accordance with Section 11.4.8 of ASCE 7-16 for Site Class D sites with a mapped S_1 value greater than or equal 0.2.

However, Section 11.4.8 of ASCE 7-16 includes an exception from such analysis for specific structures on Site Class D sites. The commentary for Section 11 of ASCE 7-16 (Page 534 of Section C11 of ASCE 7-16) states that “In general, this exception effectively limits the requirements for site-specific hazard analysis to very tall and or flexible structures at Site Class D sites.” Based on our understanding of the proposed structures, it is our assumption that the exception in Section 11.4.8 applies to the proposed project. However, the structural engineer should verify the applicability of this exception.

Based on this exception, the spectral response accelerations for the substation area presented below were calculated using the site coefficients (F_a and F_v) from Tables 1613.2.3(1) and 1613.2.3(2) presented in Section 16.4.4 of the 2019 CBC.

Description	Substation Area
2019 California Building Code Site Classification (CBC) [1]	D [2]
Site Latitude (°N)	34.5226
Site Longitude (°W)	116.8946

Description	Substation Area
S_s Spectral Acceleration for a 0.2-Second Period	1.179
S_1 Spectral Acceleration for a 1-Second Period	0.418
F_a Site Coefficient for a 0.2-Second Period	1.029
F_v Site Coefficient for a 1-Second Period	1.884
Project Site Mean Magnitude[4]	6.40
Modified Peak Ground Acceleration (PGA_m)[5]	0.547

1. Seismic site classification in general accordance with the *2019 California Building Code*.
2. The 2019 California Building Code (CBC) requires a site soil profile determination extending to a depth of 100 feet for seismic site classification. The current scope does not include the required 100-foot soil profile determination. Borings were extended to a maximum depth of 51½ feet, and this seismic site class definition considers that similar or denser soils continue below the maximum depth of the subsurface exploration. Additional exploration to deeper depths would be required to confirm the conditions below the current depth of exploration.

Regional Seismicity

The site is located in the southern California, which is a seismically active area. The type and magnitude of seismic hazards affecting the site are dependent on the distance to causative faults, the intensity, and the magnitude of the seismic event. As calculated using the USGS Unified Hazard Tool, an unnamed gridded point source that is considered to have the most significant effect at the site from a design standpoint has a maximum magnitude of 5.49 and is located approximately 6 kilometers from the site. Nearby USGS mapped faults include the Helendale fault at 10 kilometers and Lenwood-Lockhart at 12 kilometers distance from the site.

Based on the USGS Design Maps Summary Report, using the American Society of Civil Engineers (ASCE 7-16) standard, the design peak ground acceleration (PGA_M) for the project site is 0.547g. Based on the USGS Unified Hazard Tool, design ground motions are controlled by seismic sources with modal magnitudes between 5.5 and 7.4 .

Fault Rupture

The site is not located within an Alquist-Priolo Special Studies Fault Zone (CDMG, 2002b). As noted above, the nearest active fault (unnamed grid source) is located approximately 6 kilometers from the site. Based on the distance to the site from known (USGS) active faults at site, it is our opinion that the potential for surface fault rupture to occur on the project site is low.

Liquefaction

Liquefaction is a mode of ground failure that results when a saturated soil loses substantial strength in response to earthquake shaking. Liquefaction is typically a hazard where loose sand

or non-plastic silt soils exist below groundwater but may also occur with sensitive plastic silt or clay below groundwater. The California Geological Survey (CGS) has designated certain areas within the state as potential liquefaction hazard zones. These are areas considered at a risk of liquefaction-related ground failure during a seismic event, based upon mapped surficial deposits and the presence of relatively shallow groundwater. The project site is not mapped within a liquefaction hazard potential area as designated by the CGS, as their mapping efforts have not reached the region of the site. The site is not included within a liquefaction hazard zone designated by San Bernardino County on their Geologic Hazard Overlay Maps.

The substation portion of the proposed project is located on Pleistocene-age alluvium as evidenced by the petrocalcic layer observed in Geologic Trench 1, and the presence of the degraded desert pavement (geomorphic surface). Pleistocene-age alluvium is not considered to be susceptible to liquefaction due to its age and density. Based on the encountered subsurface conditions and depth of groundwater, we conclude that the potential for liquefaction at the proposed substation location is very low. Other geologic hazards related to liquefaction, such as lateral spreading, are also considered very low.

Strong Ground Shaking

The site could be subjected to strong ground shaking from earthquakes on local to distant sources during the life span of the project. Faulting and ground motion parameters for the site are addressed above. Mitigation of strong ground shaking is typically provided by designing structures in accordance with the latest addition of the California Building Code.

Ground Fissuring and Subsidence

Ground fissuring attributed to past groundwater withdrawal is apparent on many of the parcels. In areas where the slope of the ground surface is slight, including the project area, narrow ground cracks (less than 2 mm wide) can channel surface water for long distances. This channeling can erode the upper soils and create wider/deeper fissures. At the site, we observed fissures up to approximately 5 feet wide and 4 feet deep on parcels that have had no apparent agricultural use. Some parcels are in current or recent use for alfalfa production. These parcels have apparently been flattened to facilitate “flood” irrigation. Evidence for prior fissuring is not evident on the parcels in current use for agriculture.

As part of this investigation, we reviewed readily available aerial photographs (Fairchild Collection, US Department of Agriculture and hsitoricaerials.com). A list of these photographs is attached. These aerials cover large portions of the site and date back to 1945. Based on our review, the parcels that are currently in agricultural use generally exhibit fissuring prior to agricultural use, as observed on the 1945 range of available photography. Some parcels were in agricultural use prior to the 1945 aerial photography and so no inference can be made about fissuring relative to 1945 from the photography. It should be noted that some of the parcels along

the northern, eastern and southern sides of the project do not exhibit fissuring visible on aerial photography but do exhibit incipient fissuring visible on the ground.

Subsurface Investigation of Fissuring

A subsurface investigation of ground fissuring was conducted to evaluate the presence or absence of subsurface voids. Significant voids in the subsurface could be expected to reduce the capacities of the driven solar piles.

Five geologic trenches were excavated with a rubber-tire backhoe. The trenches were limited to 5 feet in depth or less due to sidewall stability concerns. The trenches were placed at a high angle across fissures in various states of maturity, including incipient cracks, open (eroded) fissures, and one filled, mounded fissure. The trenches were extended laterally to traverse the entire width of cracking associated with each feature, so the trenches varied in length. The trenches were entered, the trench walls were cleaned with hand tools, and the walls were logged by a Certified Engineering Geologist (CEG). Observations made of each trench are discussed below. The trench logs are attached to this report. All trenches were placed across fissure features observed during prior geologic field reconnaissance by the CEG.

Geologic Trench 1 (GT-1) was placed across incipient, nearly east-west trending, cracking observed near the location of the proposed substation on the Luisa parcel (APN 045-239-108). This location is characterized by a degraded desert pavement (closely-packed pebbles on the ground surface) of suspected Pleistocene age. Desert pavements characteristically are ancient features (Pleistocene age). Observation of the soils in the trench confirmed the Pleistocene age, as a well-developed petrocalcic layer (abundant secondary carbonate accumulation) was present. The fissure at the surface was locally 3 to 4 inches wide and quickly narrowed downward to about 2mm within about 2 feet of the surface. This feature is referred to as incipient because very little erosion had occurred along it.

Geologic Trench 2 (GT-2) was placed across incipient, N69W-trending, cracking observed on a Luisa parcel (APN 045-239-109) adjacent to the substation parcel. This location is southwest of the limit of the degraded desert pavement (closely-packed pebbles on the ground surface) of suspected Pleistocene age. Observation of the soils in the trench confirmed the Pleistocene age, as a well-developed layer with carbonate nodules (abundant secondary carbonate accumulation) was present. The pavement at this location is apparently completely degraded. The fissure at the surface was locally 24 inches wide and quickly narrowed downward to about 1mm within about 2 feet of the surface. This feature is referred to as incipient because very little erosion had occurred along it, and it was not laterally extensive.

Geologic Trenches GT-1 and GT-2 exposed ancient soils (Pleistocene age). The cracking observed is minor and considered incipient, as little erosion had occurred. The cracking observed in these soils is characterized as subsidence cracking.

Geologic Trench 3 (GT-3) was placed across a mature N20W-trending filled fissure observed on the Dalugdugan parcel (APN 045-211-219), southwest of the intersection of Lincoln Road, south of Granite Road. Extensive mature (eroded) ground fissuring is prominent on both sides of Lincoln Road south of Granite Road. Fissuring up to approximately 4 feet deep was observed on both sides of the road. GT-3 was placed across a prominent filled fissure characterized by a vegetated ridge approximately 1 to 2 feet high and approximately 4 feet wide. The ridge is considered to be a result of windblown sand filling a prior fissure, allowing vegetation to establish, then collecting more windblown sand. The main fissure associated with the mound was a filled fissure approximately 1 ½ inches wide extending to about 3 feet below ground surface. A few other minor fissures of 1 inch to 1 mm wide were observed, all of which narrowed to 1 mm within 3 feet of the surface. Carbonate nodules (secondary carbonate accumulation) were observed in the lowermost layer but no confidence as to Pleistocene age could be made. This feature is referred to as mature because it is infilled. It extends at least 500 feet northward to Granite Road. It is one of a subparallel series of approximate N20W-trending fissures extending north and south of Granite Road.

Geologic Trench 4 (GT-4) was placed across a N70E-trending fissure observed on the Abel parcel (APN 045-211-317), northeast of the intersection of Lincoln Road and Cambria Road. This parcel is characterized by large, open fissures with moderate vegetation established in them. Fissuring up to approximately 4 feet deep was observed on this parcel. GT-4 was placed across a prominent vegetational lineament with no surface fissuring. This feature was selected for trenching based on the strong linearity and the observation that it crosses various open fissures to the northeast of the trench location. It was postulated to be a man-made trench based on its linearity. Only two narrow (1-2 mm) fissures were observed in the trench. No evidence of prior erosion was found at this location. This feature is not considered to be man-made (trench) because no backfill of any trench was observed. This feature appears to absent from 1952 imagery but is partially visible on 1969 imagery. The nature of this feature is unknown, but it is preliminarily considered to be subsidence cracking.

Geologic Trench 5 (GT-5) was placed across a N80W-trending fissure observed on the Young parcel (APN 045-212-148), south of Cambria Road. This parcel is characterized by some small open fissures and some incipient fissures with little to no vegetation established in them. This parcel has apparently been graded or plowed for past agricultural use, resulting in large areas with little to no vegetation. At GT-5, 2 sets of minor open fissures trending roughly N80W were observed. All but one fissure were logged as diminishing in width to 1-2 mm at a shallow depth. One wider fissure (1 inch) was observed to extend to about 4 feet deep, terminating at a sand bed.

Based on our subsurface observation of fissures using the geologic trenches, the fissuring is generally narrow (1 - 2 mm wide) at depths greater than approximately 2 to 3 feet. Significant fissures apparently do not extend deeper than 2 to 3 feet below the surface. Therefore, it does

not appear that subsurface fissuring jeopardizes the stability of the proposed PV piles or substation structures, except where large open fissures exist. The large fissures are created by surficial erosion through an initially narrow fissure, creating the widened fissures that are common at the site. Where significant open fissures exist, we recommend grading including removal/excavations and backfill to provide suitable subsurface conditions to support the proposed element onsite. Grading and installation of surface drainage improvements is expected to mitigate erosion that previously caused enhancement of fissures.

Subsidence

It should be recognized that Lucerne Valley has experienced subsidence due to groundwater withdrawal. The presence or absence of subsidence has been investigated using standard survey methods, GPS data, and InSAR (Interferometric Synthetic Aperture Radar) (Sneed and others, 2003; Brandt and Sneed, 2021). The combined subsidence during the period from1992 to 2019 is estimated to be approximately 14 inches in parts of the Lucerne Valley basin (Brandt and Sneed, 2021). Since the available data may not capture all of the subsidence that has occurred, the actual subsidence may be greater.

Ground subsidence can occur when groundwater levels decline significantly. When the fluid pressure in an aquifer decreases due to groundwater withdrawal, the sediment can compact. This compaction is generally permanent; however, the compaction/subsidence may not occur contemporaneously with the decline in water levels – it may be delayed. Fissuring often is associated with localized differential compaction of unconsolidated sediment. Fissures formed by this mechanism are caused by the stretching of the aquifer-system structure owing to the bending of the overlying sediment of the differentially compacting zone (Sneed and others, 2003, citing Holzer, 1984).

The observed fissuring on the site parcels is considered to be the result of subsidence. Subsidence is expected to continue. The amount and location of expected subsidence cannot be reliably predicted with the information that is currently available. Future subsidence may negatively impact level-sensitive structures such as gravity flow pipelines but the proposed solar development is expected to have a low sensitivity to future subsidence. The approximate boundary of the US Geological Survey subsidence zone relative to the project area is shown on the Geologic Index Map attached. Based on our field observations, the extent of subsidence cracking is larger than shown by the US Geological Survey.

Most of the shallow site soils are cohesive, commonly with some expansion potential as shown by the laboratory testing. Some of the parcels in the western portion exhibit polygonal cracking consistent with expansive soils. Distinguishing shrink-swell polygonal cracking from subsidence cracking is problematic and was not attempted during this investigation. We acknowledge that some of the fissures observed on the site may result from erosion of polygonal-type cracking associated with expansive soils. For this project, this distinction is unimportant.

The existing eroded fissures present a hazard to site development. Mass grading of these erosional features will be needed at the site. Improvements to drainage such as detention basins, berms other measures will be required to improve and maintain adequate drainage for the project.

Slope Stability and Landslides

The site is relatively flat and there are no slopes near the site. According to the County of San Bernardino General Plan (2010), the site is not located within an area identified as having a potential for slope instability. The site is situated in relatively flat-lying terrain that lacks significant natural relief or slopes. Therefore, the potential for landslide or slope instability is considered low and it is not necessary to perform a slope stability analysis.

Erosion

The majority of the site contains fine grained soils which are potentially susceptible to erosion or the loss of topsoil where slopes are present. However, the site is relatively flat, and there are no slopes near the site vicinity; furthermore, the majority of the native soils at the site are considered slightly susceptible to erosion, based on data available from the USDA (2022) The existing eroded ground fissures across many of the parcels are related to subsidence cracking and are evidence that uncontrolled runoff across relatively flat terrain can create significant erosion. Improvements to drainage, such as detention basins and berms are likely needed to mitigate the future potential of erosion to the project.

Expansive Soil Potential

Atterberg limit test results indicate that the on-site soils are generally medium to high plasticity clayey soils. Therefore, expansive soils should be anticipated during construction. Polygonal cracking that is a characteristic of playa clays was observed on some of the westerly parcels, confirming the presence of expansive clays..Expansive soils can be mitigated by incorporating structural reinforcement in foundations and slabs, by avoidance, or by removal.

Wastewater and Infiltration

Due to the clayey nature of the onsite soils, the use of septic tanks or other wastewater disposal systems, as well as infiltration systems for stormwater management, may not be feasible to service the subject project. The capacity of site soils to infiltrate storm water flows will be addressed in project-specific investigations, if necessary.

Off-Site Impacts

Potential geotechnical impacts to off-site areas are not anticipated due to requirements regarding grading permitting, erosion control and avoidance of non-permitted disturbance to off-site areas required by local regulations. The flat-lying character of the site and adjacent topography precludes slope effects to off-site or adjacent properties.

Conclusions

Based on the findings of this CEQA Level Geotechnical Study, a completed CEQA questionnaire for the Geology and Soils Section has been included in the attachments.

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

Sincerely,
Terracon Consultants, Inc.

PROFESSIONAL GEOLOGIST
JAY J. MARTIN
No. EG1529
Exp. 8-31-2022
STATE OF CALIFORNIA

Abigail K. McCranie, E.I.T.
Staff Engineer

Jay J. Martin, C.E.G
Principal Geologist

REFERENCES

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AERIAL PHOTOGRAPHS REVIEWED

Fairchild Collection, Black and White Aerial Photograph, July 19, 1973, Flight No. 3358, Frame 61.

Fairchild Collection, Black and White Aerial Photograph, October 7, 1995, Flight No. 6877, Frame 23.

Fairchild Collection, Black and White Aerial Photograph, October 7, 1995, Flight No. 6877, Frame 23.

Fairchild Collection, Black and White Aerial Photograph, July 19, 1973, Flight No. 3358, Frame 61.

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ATTACHMENTS

SITE LOCATION PLAN

Sienna Solar - CEQA Report ■ Lucerne Valley, CA
July 28, 2022 ■ Terracon Project No. LA225044

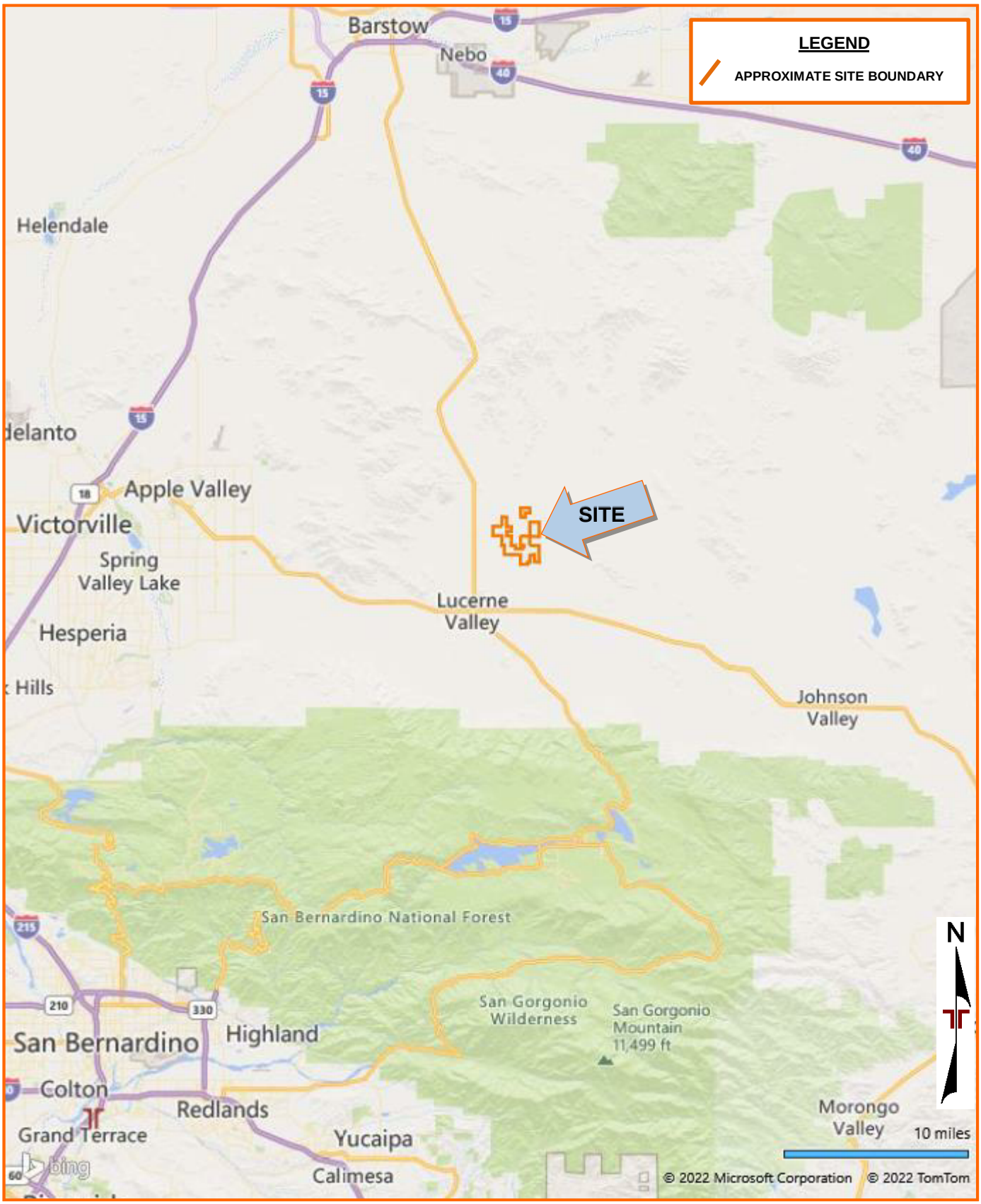


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS
NOT INTENDED FOR CONSTRUCTION PURPOSES

EXPLORATION PLAN

Sienna Solar - CEQA Report ■ Lucerne Valley, CA

July 28, 2022 ■ Terracon Project No. LA225044

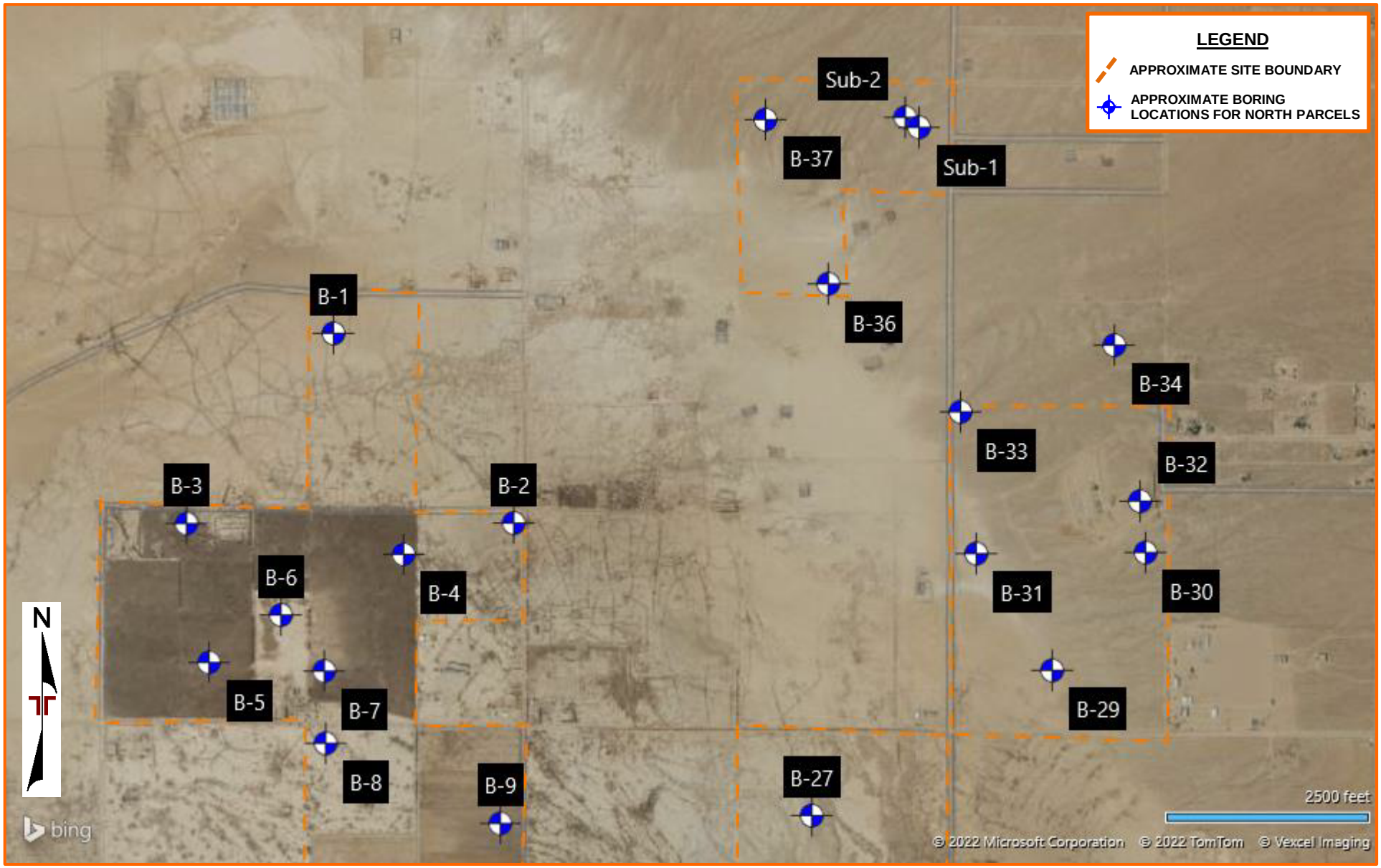


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

EXPLORATION PLAN

Sienna Solar - CEQA Report ■ Lucerne Valley, CA

July 28, 2022 ■ Terracon Project No. LA225044

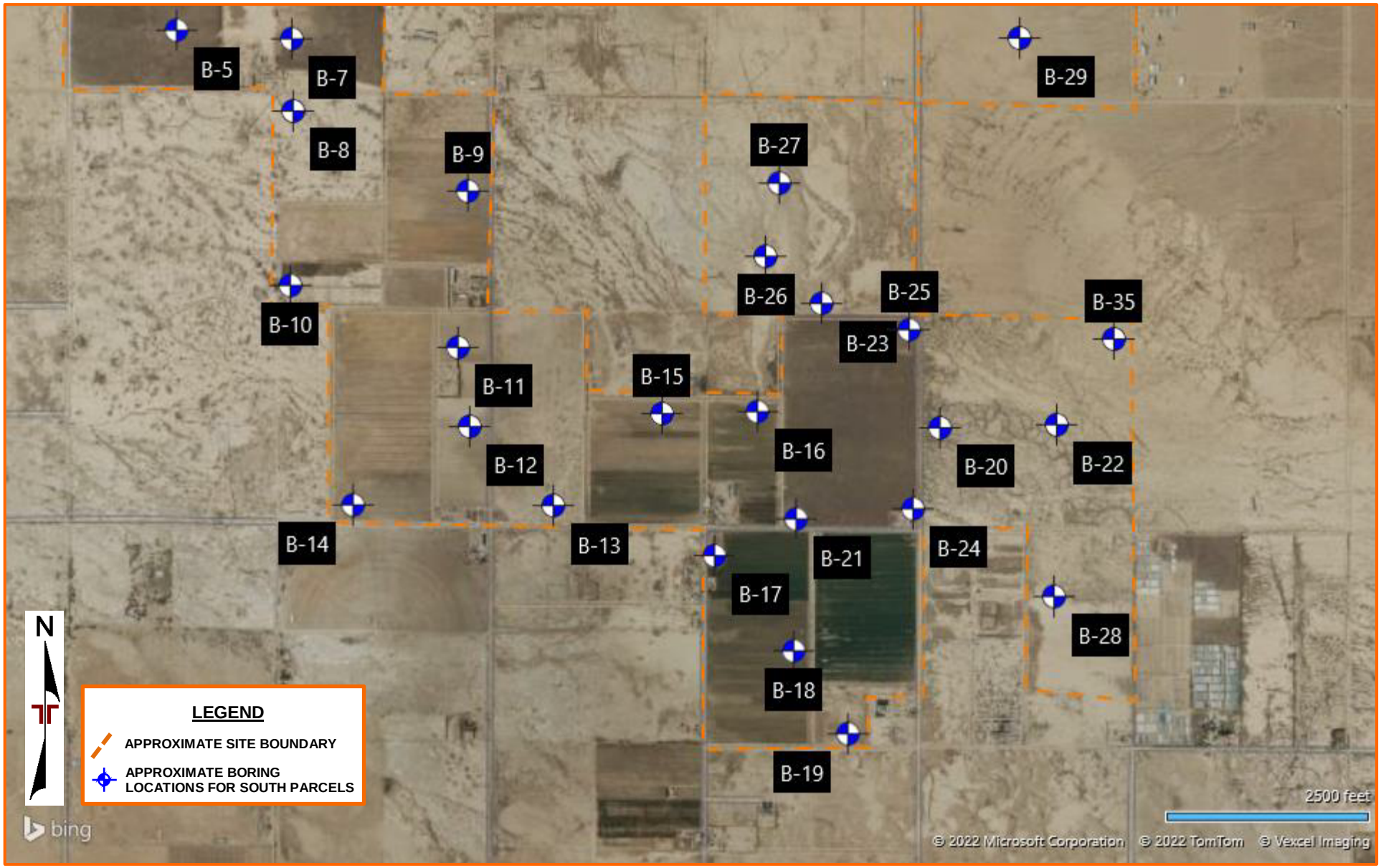
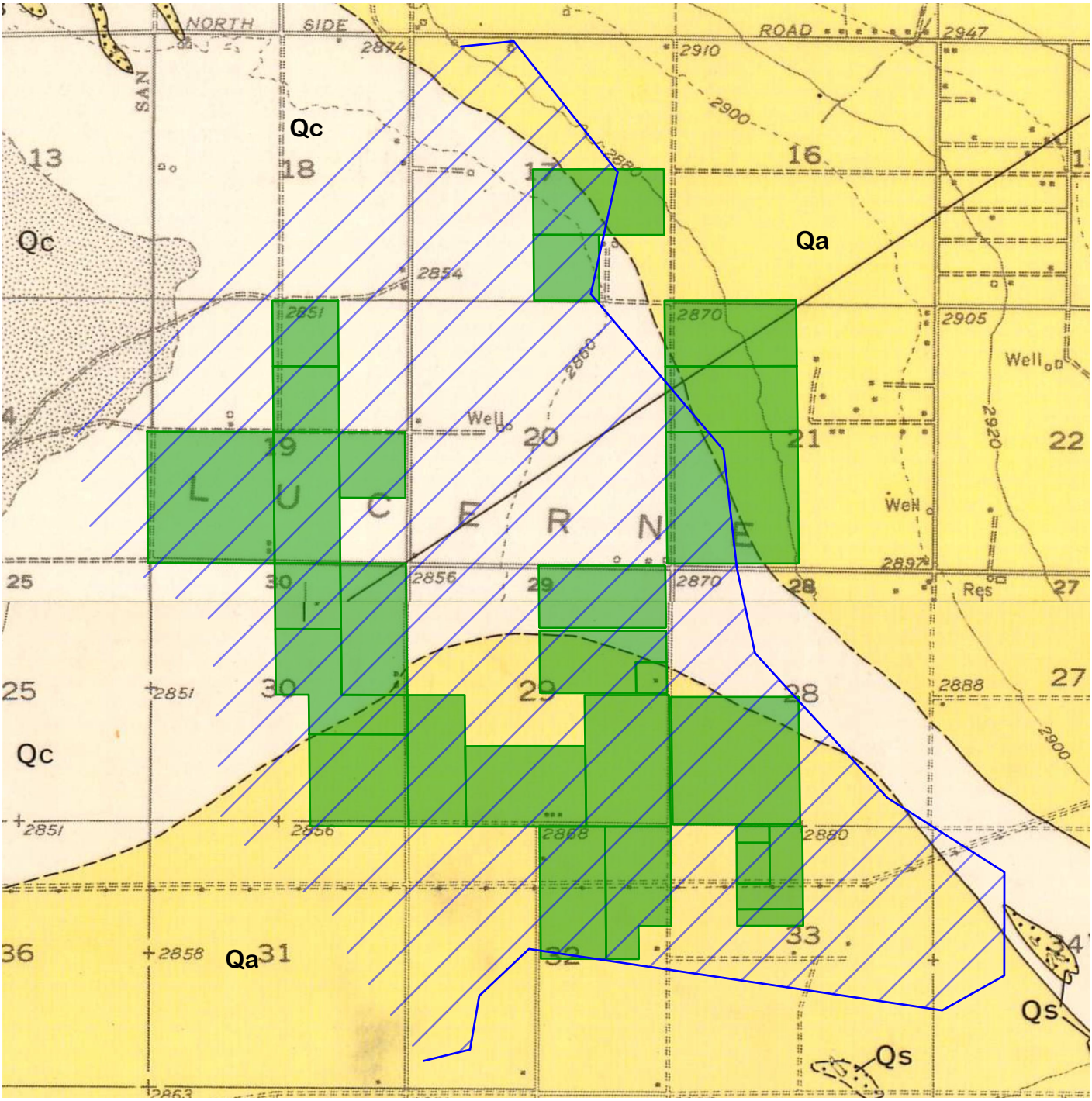


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

GEOLOGIC INDEX MAP

Sienna Solar - CEQA Report ■ Lucerne Valley, CA
July 26, 2022 ■ Terracon Project No. LA225044



GEOLOGY:

Qc	Clay
Qa	Alluvium
Qs	Sand

Subsidence Zone per Brandt and Sneed (2021)

Sienna Project Parcels

SCALE
0 1500 3000 6000
(1 inch = 3000 feet)

N

Base Map: Dibblee (1964A and 1964B)

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

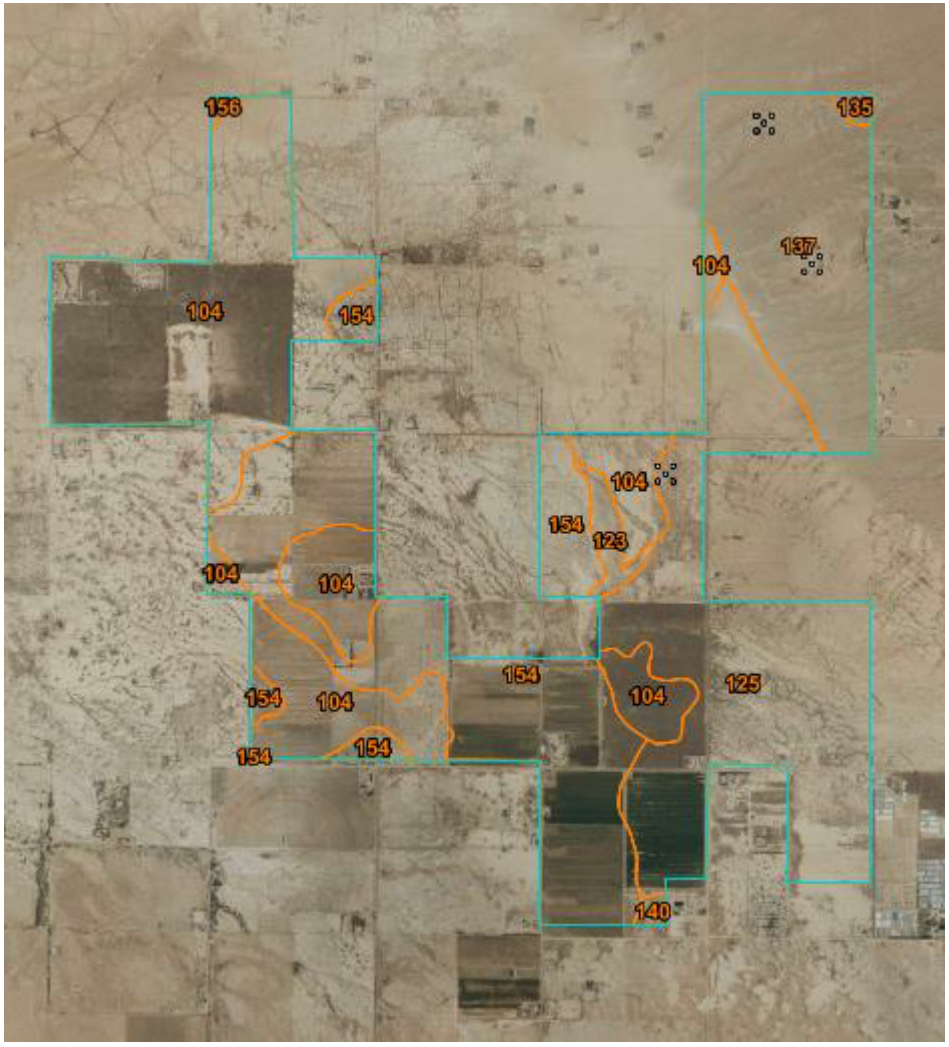
This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Bernardino County, California, Mojave River Area
Survey Area Data: Version 13, Sep 13, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 27, 2021—May 27, 2021

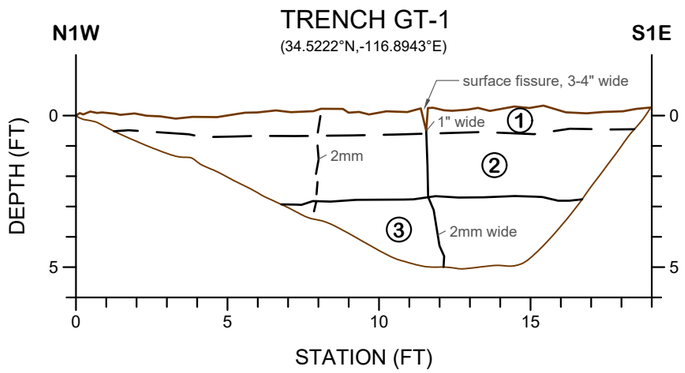
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

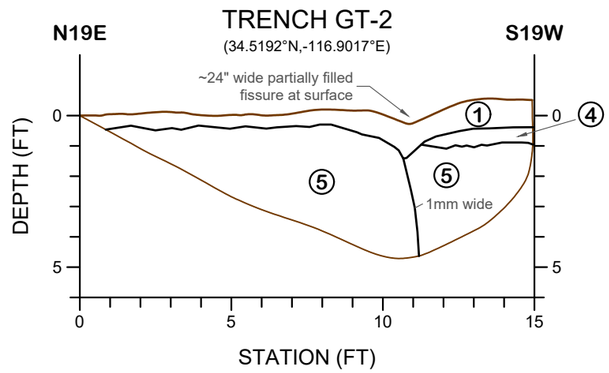


Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
104	BOUSIC CLAY	594.0	33.6%
123	DUNE LAND	20.1	1.1%
125	GLENDALE VARIANT SILT LOAM, SALINE-ALKALI	446.5	25.2%
135	JOSHUA LOAM, 2 TO 5 PERCENT SLOPES	5.3	0.3%
137	KIMBERLINA LOAMY FINE SAND, COOL, 0 TO 2 PERCENT SLOPES	269.7	15.2%
140	LAVIC LOAMY FINE SAND	5.1	0.3%
154	PETERMAN CLAY	426.3	24.1%
156	PLAYAS	3.2	0.2%
Totals for Area of Interest		**1,770.2**	**100.0%**

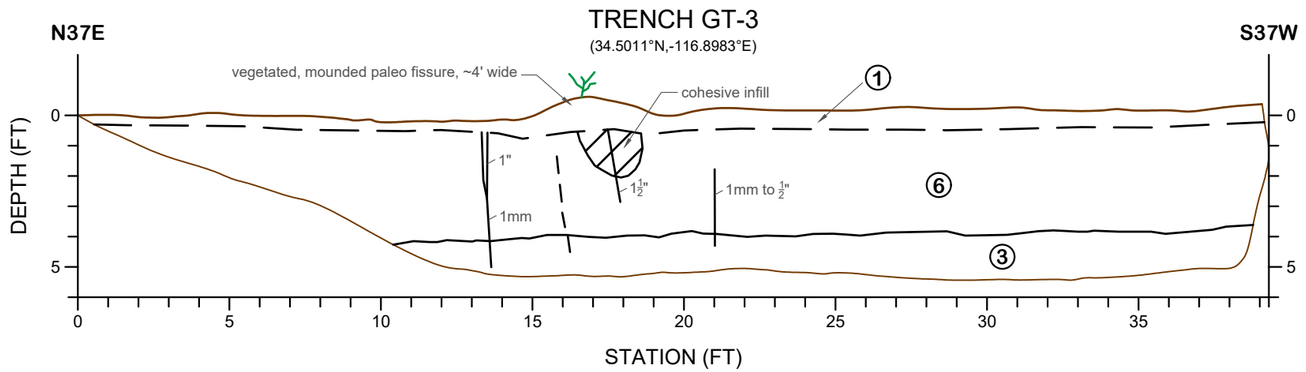
Terracon GeoReport

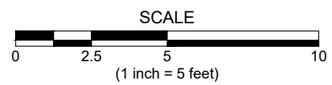


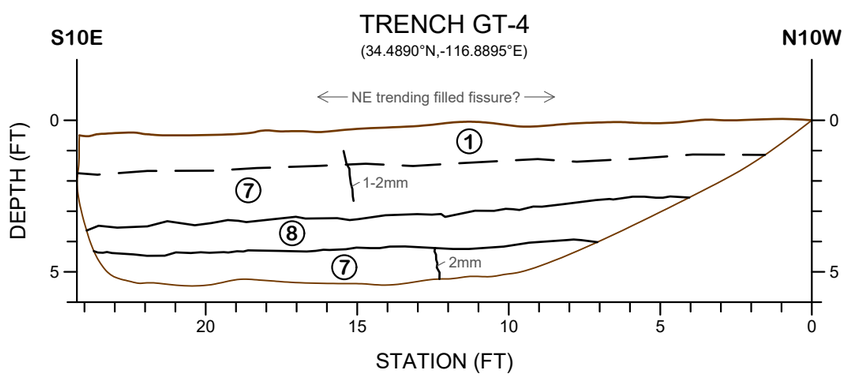


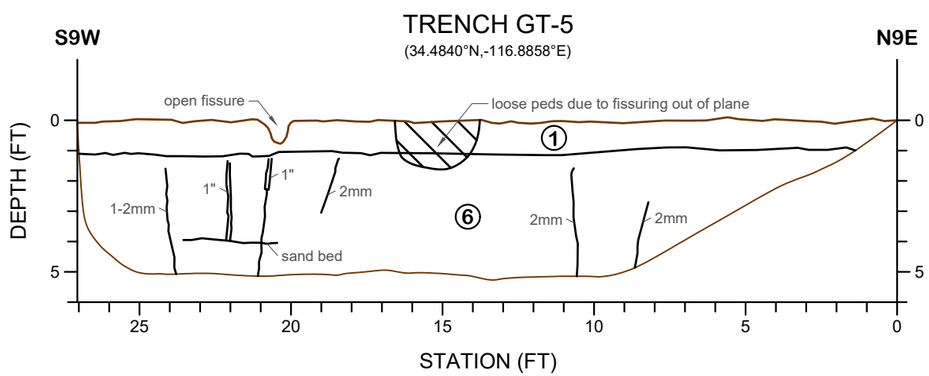
GEOLOGY:

1. Silty sand (SM), fine to medium, bioturbated (topsoil)
2. Silty sand (SM), fine to medium, carbonate nodules
3. Sand (SP), fine to coarse, hard, abundant carbonate (petrocalcic)
4. Sand (SP), fine to medium, bedded
5. Clayey sand (SC), fine to medium, carbonate nodules
6. Silty sand (SM), fine to medium
7. Sandy silt (ML)
8. Silt (ML), laminated









BORING LOG NO. B-01

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.5154° Longitude: -116.9184°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), brown								
	medium dense				7-20-21	17	107		
	5.0	5							
	SILTY CLAY (CL-ML), trace sand, brown, medium stiff				4-4-2 N=6				92
	very stiff				7-9-13	18	113		
	stiff	10			3-3-6 N=9				
	15.0	15							
	LEAN CLAY (CL), trace sand, brown, stiff				4-5-8	35	83		
		20			4-4-6 N=10				
	21.5								
	Boring Terminated at 21.5 Feet								

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-11-2022 | Boring Completed: 04-11-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. B-02

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.509° Longitude: -116.911°

DEPTH	GRAPHIC LOG	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
0	**SILT WITH SAND (ML)**, brown						45-28-17	84
2.5	**LEAN CLAY (CL)**, trace sand, brown, medium stiff			4-4-4 N=8				
5	very stiff			8-10-13	21	97		
	medium stiff			3-2-3 N=5				
10	brown and grayish brown, stiff			3-6-8	29	89		
15	trace gravel, grayish brown			3-4-6 N=10				
20				5-7-10	37	83		
21.5	***Boring Terminated at 21.5 Feet***							

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-12-2022 | Boring Completed: 04-12-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. B-03

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.509° Longitude: -116.9244°

DEPTH	GRAPHIC LOG		SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
0		**SILTY CLAYEY SAND (SC-SM)**, brown						
2.5		**CLAYEY SAND (SC)**, light brown to brown, dense		18-26-35	18	109		
5		stiff		4-4-5 N=9				
7.5		**SILTY SAND (SM)**, medium dense		8-10-11	19	97		
10		**SILTY CLAY (CL-ML)**, brown, medium stiff		3-3-4 N=7				
15		gray and brown, very stiff		6-16-20	25	96		
20		**LEAN CLAY (CL)**, trace sand, light brown, medium stiff		3-4-4 N=8				
21.5		***Boring Terminated at 21.5 Feet***						

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-11-2022 | Boring Completed: 04-11-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. B-04

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.508° Longitude: -116.9155°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	LEAN CLAY (CL), trace sand, brown								
	medium stiff				3-2-2 N=4				
	very stiff	5			5-9-12	16	92		
	medium stiff				4-3-3 N=6				
	grayish brown, very stiff	10			5-8-14	22	97		
	15.0								
	FAT CLAY WITH SAND (CH), grayish green to grayish brown, medium stiff	15			4-3-3 N=6			50-19-31	76
	20.0								
	LEAN CLAY (CL), stiff	20			4-5-8 N=13				
	21.5								
	Boring Terminated at 21.5 Feet								

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-12-2022 | Boring Completed: 04-12-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. B-05

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.5043° Longitude: -116.9235°

DEPTH	GRAPHIC LOG		WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		CLAYEY SAND (SC), light brown							
		medium dense			7-11-14	15	96		
5		loose			6-4-5 N=9			48-23-25	
7.5									
		LEAN CLAY (CL), trace sand, brown, very stiff			6-10-15	23	96		
10.0									
10		**SILTY CLAYEY SAND (SC-SM)**, white and brown, loose			5-3-4 N=7				
15.0									
15		**LEAN CLAY (CL)**, brown, very stiff			6-9-11	23	97		
		medium stiff			3-3-5 N=8				
20									
21.5		***Boring Terminated at 21.5 Feet***							

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-12-2022 | Boring Completed: 04-12-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. B-06

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.5059° Longitude: -116.9206°

DEPTH	GRAPHIC LOG	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
0							
	SILTY SAND (SM), trace gravel, light brown						
2.5							
	LEAN CLAY WITH SAND (CL), trace sand, brown, medium stiff		4-4-4 N=8				
5	light brown to brown, very stiff		7-11-17	23	91		
	with sand, light brown, stiff		5-6-7 N=13			36-19-17	71
10	very stiff		5-10-19	20	100		
15	light brown, medium stiff		2-3-3 N=6				
20	stiff		4-6-8 N=14				
21.5							
	Boring Terminated at 21.5 Feet						

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-12-2022 | Boring Completed: 04-12-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. B-07

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.504° Longitude: -116.9188°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	CLAYEY SAND (SC), brown								
	2.5								
	LEAN CLAY (CL), trace sand, brown, very stiff				6-8-12	20	91		
	medium stiff	5			3-2-3 N=5				
	very stiff				5-8-12	24	93		
	medium stiff	10			3-4-4 N=8				
	grayish brown, stiff	15			4-7-7	36	84		
	medium stiff	20			3-4-4 N=8				
	21.5								
	Boring Terminated at 21.5 Feet								

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-12-2022 | Boring Completed: 04-12-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. B-08

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.5016° Longitude: -116.9187°

DEPTH	GRAPHIC LOG		WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		SILTY SAND (SM), trace gravel, light brown							
2.5		**SANDY LEAN CLAY (CL)**, brown, very stiff			8-11-7 N=18				69
5					8-12-18	21	85		
		medium stiff			3-3-3 N=6				
10		trace gravel, very stiff			6-9-14	27	100		
15		medium stiff			3-2-3 N=5				
20		stiff			4-5-7 N=12				
21.5		***Boring Terminated at 21.5 Feet***							

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-12-2022 | Boring Completed: 04-12-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. B-09

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.4989° Longitude: -116.9116°

GRAPHIC LOG	DEPTH	DESCRIPTION	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		SANDY LEAN CLAY (CL), trace gravel, light brown							40-22-18	59
	2.5	**ELASTIC SILT (MH)**, trace gravel, brown, very stiff				9-9-12	20	83		
		soft	5			3-2-2 N=4			69-36-33	
		brown and white, very stiff				7-9-15	23	74		
		grayish white	10			8-8-11 N=19				
	15.0	**LEAN CLAY (CL)**, trace sand, grayish green, stiff	15			4-7-11	40	69		
		trace gravel, grayish green to grayish brown, medium stiff	20			3-2-4 N=6				
	21.5	***Boring Terminated at 21.5 Feet***								

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-12-2022 | Boring Completed: 04-12-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. B-10

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.4957° Longitude: -116.9188°

DEPTH	GRAPHIC LOG		WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		SILTY CLAY WITH SAND (CL-ML), brown							
		medium stiff			2-3-2 N=5				71
5.0		**LEAN CLAY (CL)**, trace sand, brown, stiff			3-5-9	33	96		
5		grayish brown, medium stiff			3-2-4 N=6				
10		trace gravel, brown, stiff			4-5-9	31	80		
15		medium stiff			3-4-5 N=9				
20					4-5-2	26	97		
21.5		***Boring Terminated at 21.5 Feet***							

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-12-2022 | Boring Completed: 04-12-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. B-11

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.4936° Longitude: -116.912°

DEPTH	GRAPHIC LOG		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		SILTY SAND (SM), trace gravel, light brown								
		medium dense				6-8-12	22	84		
5.0		**FAT CLAY (CH)**, trace sand, brown, very stiff	5			6-8-11 N=19				
		trace gravel				6-11-22	32	87		
		stiff	10			5-6-8 N=14			80-35-45	
15.0		**LEAN CLAY (CL)**, trace sand, brown, very stiff	15			5-8-14	28	93		
		medium stiff	20			2-2-3 N=5				
21.5		***Boring Terminated at 21.5 Feet***								

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-12-2022 | Boring Completed: 04-12-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. B-12

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.4909° Longitude: -116.9115°

DEPTH	GRAPHIC LOG		FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
0		**SILTY SAND (SM)**, trace gravel, light brown					
		loose	4-3-5 N=8				
5.0		**LEAN CLAY WITH SAND (CL)**, trace gravel, brown, stiff	4-6-8	22	76		
7.5		**SILTY CLAYEY SAND (SC-SM)**, trace gravel, brown, loose	4-4-5 N=9				
10.0		**LEAN CLAY (CL)**, trace sand, brown, very stiff	7-11-20	28	89		
		trace gravel, grayish brown	6-8-11 N=19				
		brown, stiff	5-7-10	32	88		
21.5		***Boring Terminated at 21.5 Feet***					

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-12-2022 | Boring Completed: 04-12-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. B-13

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.4883° Longitude: -116.9081°

DEPTH	GRAPHIC LOG	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
0							
	SILTY SAND (SM), trace gravel, light brown						
	loose		9-6-6	12	74		
5	very loose		2-2-1 N=3				
7.5							
	SILTY CLAY (CL-ML), trace sand and gravel, light brown, medium stiff		7-8-8	14	83		
10			3-3-4 N=7				88
15.0							
	LEAN CLAY (CL), trace sand, brown, very stiff		5-8-15	28	87		
15							
	stiff						
20			5-5-9 N=14				
21.5							
	Boring Terminated at 21.5 Feet						

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-13-2022 | Boring Completed: 04-13-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. B-14

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.4883° Longitude: -116.9163°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	CLAYEY SAND (SC), trace gravel, light brown								
	loose			X	3-3-4 N=7			42-23-19	
	5.0	5							
	SILTY CLAYEY SAND (SC-SM), trace gravel, light brown, loose				4-7-8	13	98		
				X	4-5-4 N=9				
	brown, medium dense	10			8-15-23	18	108		
	loose	15		X	6-4-2 N=6				
	20.0	20							
	LEAN CLAY (CL), trace gravel, brown, very stiff			X	5-9-11 N=20				
	21.5								
	Boring Terminated at 21.5 Feet								

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-13-2022 | Boring Completed: 04-13-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. B-15

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.4914° Longitude: -116.9036°

DEPTH	GRAPHIC LOG		WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		LEAN CLAY WITH SAND (CL), trace gravel, light brown						41-23-18	72
		hard			10-34-50/5"	28	67		
5.0		**LEAN CLAY (CL)**, trace sand, white to light brown, stiff			5-5-4 N=9				
		brown			7-6-9	33	82		
10					3-4-5 N=9				
15		brown to grayish brown, very stiff			5-8-14	32	84		
		stiff			5-5-7 N=12				
21.5		***Boring Terminated at 21.5 Feet***							

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-13-2022 | Boring Completed: 04-13-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. B-16

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.4914° Longitude: -116.8997°

DEPTH	GRAPHIC LOG		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		SILTY SAND (SM), trace gravel, light brown								
2.5										
		SILTY CLAY WITH SAND (CL-ML), white and brown, hard				8-33-31 N=64				77
			5			13-21-22	24	77		
		stiff				3-4-6 N=10				
10.0			10							
		LEAN CLAY (CL), trace sand, brown, very stiff				4-7-12	28	92		
		stiff	15			4-5-8 N=13				
		grayish brown, very stiff	20			4-13-20 N=33	2	114		
21.5										
		Boring Terminated at 21.5 Feet								

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-13-2022 | Boring Completed: 04-13-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. B-17

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.4866° Longitude: -116.9015°

DEPTH	GRAPHIC LOG		WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		SILTY SAND (SM), trace gravel, light brown							
		very dense			15-50/6"	11	86		
5.0		**SILTY CLAYEY SAND (SC-SM)**, grayish white, medium dense			5-7-4 N=11				
		grayish green			5-9-12	38	63		
10.0		**LEAN CLAY (CL)**, trace sand, brown, medium stiff			3-3-5 N=8				
		very stiff			5-11-15	22	102		
		grayish brown							
21.5		***Boring Terminated at 21.5 Feet***							

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-13-2022 | Boring Completed: 04-13-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. B-18

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.4834° Longitude: -116.8982°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), brown								
	medium dense				3-7-13 N=20				
	5.0	5							
	SILTY CLAYEY SAND (SC-SM), trace gravel, gray, medium dense				12-17-20	23	79		
	7.5								
	SILTY CLAY (CL-ML), trace sand, grayish green, very stiff				5-7-8 N=15				93
		10			8-13-17	29	72		
	15.0	15							
	CLAYEY SAND (SC), grayish brown to brown, medium dense				5-6-6 N=12				35
	light brown	20			7-14-23	30	88		
	21.5								
	Boring Terminated at 21.5 Feet								

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-13-2022 | Boring Completed: 04-13-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. B-19

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.4806° Longitude: -116.896°

DEPTH	GRAPHIC LOG		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		SILTY SAND (SM), trace gravel								
		medium dense				8-11-13	8	95		
5.0		**SILTY CLAYEY SAND (SC-SM)**, gray, loose	5			3-4-5 N=9				
		grayish white, medium dense				11-17-24	23	87		
10.0		**SILTY CLAY (CL-ML)**, gray, very stiff	10			5-7-9 N=16				
		grayish green	15			6-15-26	17	108		
20.0		**LEAN CLAY (CL)**, brown, medium stiff	20			3-3-4 N=7				
21.5		***Boring Terminated at 21.5 Feet***								

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-14-2022 | Boring Completed: 04-14-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. B-20

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.4909° Longitude: -116.8922°

DEPTH	GRAPHIC LOG		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
0		**CLAYEY SAND (SC)**, light brown								
		medium dense				8-8-9 N=17			43-24-19	
		dense	5			9-27-38	10	84		
7.5		**SILTY CLAYEY SAND (SC-SM)**, grayish green, medium dense				6-6-5 N=11				
			10			7-12-16	26	73		
15.0		**LEAN CLAY (CL)**, trace sand, grayish green, very stiff	15			7-9-15 N=24				
		hard	20			10-13-31 N=44	25	89		96
21.5		***Boring Terminated at 21.5 Feet***								

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-13-2022 | Boring Completed: 04-13-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. B-21

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.4878° Longitude: -116.8981°

DEPTH	GRAPHIC LOG		WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		SILTY SAND (SM), trace gravel, light brown							
2.5		**SILTY CLAYEY SAND (SC-SM)**, light brown, medium dense			9-18-27	12	92		
5.0		**SILTY SAND (SM)**, white to light brown, dense			11-15-19 N=34				
7.5		**SILTY CLAYEY SAND (SC-SM)**, trace gravel, grayish brown, medium dense			7-15-18	34	65		
					5-4-6 N=10				
15.0		**LEAN CLAY (CL)**, trace sand, brown, hard			11-28-25				
		grayish brown, very stiff			6-9-12 N=21				
21.5		***Boring Terminated at 21.5 Feet***							

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-13-2022 | Boring Completed: 04-13-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. B-22

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.491° Longitude: -116.8875°

DEPTH	GRAPHIC LOG	DESCRIPTION	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		SILTY SAND (SM), trace gravel, light brown								
		medium dense				6-6-8 N=14				
5.0		**SILTY CLAYEY SAND (SC-SM)**, light brown, dense	5			16-18-42	8	101		
		medium dense				11-9-11 N=20				
9.0		**LEAN CLAY (CL)**, light brown, hard								
		gray	10			12-23-34	20	105		
14.0		**ELASTIC SILT (MH)**, trace sand, gray, very stiff								
		brown	15			6-8-8 N=16			74-35-39	
		trace gravel, white and brown	20			8-13-19	26	70		
21.5		***Boring Terminated at 21.5 Feet***								

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-14-2022 | Boring Completed: 04-14-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. B-23

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.4951° Longitude: -116.8971°

DEPTH	GRAPHIC LOG		WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		LEAN CLAY WITH SAND (CL), trace gravel, light brown						34-17-17	80
		hard			13-25-42	12	83		
5					15-17-25 N=42				
7.5		**LEAN CLAY (CL)**, brown, very stiff			8-15-24	28	73		
10					7-8-12 N=20				
15		grayish green, hard			16-29-38	23	87		
20		brown, stiff			5-7-6 N=13				
21.5		***Boring Terminated at 21.5 Feet***							

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-14-2022 | Boring Completed: 04-14-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. B-24

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.4882° Longitude: -116.8933°

DEPTH	GRAPHIC LOG		WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		SILTY SAND (SM), trace gravel, light brown							
		medium dense			7-9-13 N=22				
5		white to grayish white, dense			4-22-44	13	89		
		grayish white to gray, medium dense			7-6-7 N=13				
10.0									
10		**SILTY CLAYEY SAND (SC-SM)**, grayish green, medium dense			7-16-24	24	81		
15.0									
15		**LEAN CLAY (CL)**, trace sand, grayish brown, stiff			7-7-7 N=14				
		very stiff							
20					6-14-24 N=38				
21.5		***Boring Terminated at 21.5 Feet***							

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-13-2022 | Boring Completed: 04-13-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. B-25

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.4942° Longitude: -116.8935°

DEPTH	GRAPHIC LOG		WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		SILTY SAND (SM), brown							
2.5									
		SILTY CLAYEY SAND (SC-SM), brown, medium dense			16-17-25	12	91		
5		dense			12-16-19 N=35				
					12-27-33	29	76		
10.0									
10		**LEAN CLAY (CL)**, trace sand, grayish brown, very stiff			7-8-10 N=18				
15		hard			7-16-27	29	94		
20		medium stiff			3-2-3 N=5				
21.5		***Boring Terminated at 21.5 Feet***							

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-13-2022 | Boring Completed: 04-13-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. B-26

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.4967° Longitude: -116.8994°

DEPTH	GRAPHIC LOG		WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		SILTY SAND (SM), trace gravel, light brown							
2.5		**SILTY CLAYEY SAND (SC-SM)**, light brown, medium dense			5-6-11 N=17				
5.0		**SILT (ML)**, trace sand and gravel, light brown, stiff			11-20-20	14	80		
		gray			5-6-5 N=11				90
10.0		**SILTY CLAY (CL-ML)**, green and brown, very stiff			8-12-15	22	93		
		trace gravel, gray, stiff			3-4-5 N=9				
		grayish green, very stiff			5-13-17	23	94		
21.5		***Boring Terminated at 21.5 Feet***							

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-14-2022 | Boring Completed: 04-14-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. B-27

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.4992° Longitude: -116.8988°

DEPTH	GRAPHIC LOG		WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		LEAN CLAY (CL), trace gravel, light brown						48-25-23	96
		trace sand, hard			14-24-22	16	76		
5		gray, stiff			5-4-4 N=8				
7.5									
		FAT CLAY (CH), trace sand, brown, very stiff			5-8-14	24	86		
10		grayish brown			4-5-5 N=10			63-29-34	
15.0									
15		**LEAN CLAY (CL)**, trace sand and gravel, brown, very stiff			6-8-12	24	87		
20		grayish brown			2-4-5 N=9				
21.5									
		Boring Terminated at 21.5 Feet							

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-14-2022 | Boring Completed: 04-14-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. B-28

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.4852° Longitude: -116.8876°

DEPTH	GRAPHIC LOG		WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		SILTY SAND (SM), light brown							
		medium dense			5-5-7 N=12				
4.0		**LEAN CLAY (CL)**, trace sand, brown							
5		very stiff			12-15-22	17	83		
		stiff			4-6-6 N=12				
10.0									
10		**SILTY CLAYEY SAND (SC-SM)**, grayish brown to light brown, medium dense			10-19-23	19	83		
15.0									
15		**SILTY CLAY WITH SAND (CL-ML)**, brown, stiff			5-7-6 N=13				82
		light brown, hard							
20					14-22-27	15	95		
21.5		***Boring Terminated at 21.5 Feet***							

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-14-2022 | Boring Completed: 04-14-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. B-29

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.5041° Longitude: -116.889°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SANDY LEAN CLAY (CL), trace gravel, brown to tan								
	hard				4-22-37	7	114		
	stiff	5			6-6-4 N=10				
	brown, hard				24-38-49	9	113		
		10			7-14-18 N=32				
		15			11-19-28	6	111		
	20.0	20			11-24-50/6"				
	CLAYEY SAND (SC), brown, very dense 21.5								
	Boring Terminated at 21.5 Feet								

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-07-2022 | Boring Completed: 04-07-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. B-30

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.508° Longitude: -116.8852°

DEPTH	GRAPHIC LOG		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		SILTY SAND (SM), trace gravel, tan								
		dense				19-19-17 N=36				31
5.0		**SANDY LEAN CLAY (CL)**, brown, hard	5			18-48-50/6"	11	114		
						17-30-43 N=73				
			10			30-50/4"	6	114		
15.0		**POORLY GRADED SAND (SP)**, trace gravel, brown, very dense	15			25-31-31 N=62				
			20			23-50/3"				
20.8		***Boring Terminated at 20.75 Feet***								

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-07-2022 | Boring Completed: 04-07-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. B-31

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.508° Longitude: -116.8921°

DEPTH	GRAPHIC LOG	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
0							
						37-22-15	75
2.5							
			9-11-22	10	91		
5			8-8-8 N=16				
			18-16-19	5	107		
10			4-8-7 N=15				
15.0							
			11-25-39	12	113		
20.0							
			14-16-18 N=34				
21.5							

LEAN CLAY WITH SAND (CL), trace gravel, tan

POORLY GRADED SAND WITH CLAY (SP-SC), trace gravel, tan, medium dense

LEAN CLAY (CL), trace sand, brown, hard

POORLY GRADED SAND (SP), trace gravel, brown, medium dense

Boring Terminated at 21.5 Feet

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-07-2022 | Boring Completed: 04-07-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. B-32

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.5098° Longitude: -116.8854°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	CLAYEY SAND (SC), trace gravel, tan								
	dense				11-16-20 N=36				
	brown, very dense	5			3-29-50/4"	5	115		
	dense				13-13-17 N=30				
	very dense	10			20-50/5"	6	121		
	20.0	15			23-27-27 N=54				
	SANDY LEAN CLAY (CL), hard 20.9	20			15-50/5"	8	105		
	Boring Terminated at 20.9 Feet								

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-07-2022 | Boring Completed: 04-07-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. B-33

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.5128° Longitude: -116.8927°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	CLAYEY SAND (SC), trace gravel, tan							33-18-15	28
	medium dense				9-13-17	6	102		
	brown	5			7-8-10 N=18				
					11-24-27	3	99		
		10			1-8-9 N=17				
	15.0								
	POORLY GRADED SAND WITH SILT (SP-SM), brown, very dense	15			24-50/6"	3	113		
	medium dense	20			11-13-14 N=27				
	21.5								
	Boring Terminated at 21.5 Feet								

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-07-2022 | Boring Completed: 04-07-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. B-34

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.515° Longitude: -116.8864°

DEPTH	GRAPHIC LOG	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
0							
	CLAYEY SAND (SC), tan						
2.5							
	SANDY LEAN CLAY (CL), trace gravel, tan, hard		13-17-16 N=33				
	brown		19-26-32	3	113		
			11-17-20 N=37				
10.0							
	CLAYEY SAND (SC), brown, very dense		14-50/4"	11	106		
	medium dense		9-11-13 N=24				
20.0							
	SANDY LEAN CLAY (CL), brown, hard		12-39-50/6"				
21.5							
	Boring Terminated at 21.5 Feet						

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-07-2022 | Boring Completed: 04-07-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. B-35

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.4939° Longitude: -116.8851°

DEPTH	GRAPHIC LOG		WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		SILTY SAND (SM), light brown							
		loose			3-6-11	23	73		
5.0		**SILTY CLAYEY SAND (SC-SM)**, light brown to brown, dense			11-15-19 N=34				
		white to gray			29-44-39	12	92		
		grayish brown, medium dense			9-8-8 N=16				
15.0		**LEAN CLAY WITH SAND (CL)**, brown, very stiff			6-13-20	23	96		
		trace gravel, grayish brown, hard			10-13-21 N=34				
21.5		***Boring Terminated at 21.5 Feet***							

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-14-2022 | Boring Completed: 04-14-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. B-36

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.5171° Longitude: -116.8981°

DEPTH	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
POORLY GRADED SAND WITH SILT (SP-SM), trace gravel, tan with silt, light brown, medium dense					6-7-8 N=15				
5.0		5							
SANDY SILT (ML), brown, very stiff					6-14-25	18	90		
7.5									
CLAYEY SAND (SC), brown, medium dense					14-16-12 N=28				
		10			6-16-24	13	116		
15.0		15							
SILTY SAND (SM), brown, medium dense					8-10-13 N=23			NP	19
very dense		20			20-50/5"	10	110		
20.9									
Boring Terminated at 20.9 Feet									

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-07-2022 | Boring Completed: 04-07-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. B-37

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.5226° Longitude: -116.9007°

DEPTH	GRAPHIC LOG	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
0						NP	14
			11-24-50/6"	3	116		
5			11-12-8 N=20				
			11-19-20	8	99		
10			7-9-10 N=19				22
15			6-23-31	30	94		
20			9-12-13 N=25				
21.5							

SILTY SAND (SM), tan

brown, very dense

medium dense

Boring Terminated at 21.5 Feet

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-07-2022 | Boring Completed: 04-07-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. SUB-1

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.5224° Longitude: -116.8944°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	CLAYEY SAND (SC), trace gravel, tan							44-19-25	36
	brown, very dense				10-21-50/4"	10	105		
	medium dense	5			5-6-9 N=15			59-20-39	
	dense	10			12-15-15 N=30				
	dense	15			13-26-50/6"	10	114		
		20			12-17-21 N=38				25
		25							

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-07-2022 | Boring Completed: 04-07-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. SUB-1

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.5224° Longitude: -116.8944°

GRAPHIC LOG	DEPTH		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		CLAYEY SAND (SC), trace gravel, tan *(continued)*				13-14-29 N=43				
		very dense	30			44-50/4"				
			35			50/6"				14
			40			16-20-42 N=62				
	45.0									
		SILTY SAND (SM), trace gravel, brown, dense	45			8-12-18 N=30				34
	50.0		50							

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-07-2022 | Boring Completed: 04-07-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. SUB-1

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 34.5224° Longitude: -116.8944° DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	POORLY GRADED SAND WITH GRAVEL (SP), brown, dense				19-25-35 N=60				
	51.5 ***Boring Terminated at 51.5 Feet***								

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-07-2022 | Boring Completed: 04-07-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. SUB-2

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

LOCATION See Exploration Plan

Latitude: 34.5227° Longitude: -116.895°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	CLAYEY SAND (SC), trace gravel, tan							55-28-27	41
	tan and brown, medium dense				9-14-13 N=27				
	dense	5			9-28-34	13	102		
	trace gravel, reddish brown, medium dense				8-13-14 N=27			35-16-19	14
	dense	10			24-50/4"	9	107		
	trace cobbles	15			50/1"				
		20			18-20-20 N=40				
		25							

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-07-2022 | Boring Completed: 04-07-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. SUB-2

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 34.5227° Longitude: -116.895° DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	CLAYEY SAND (SC), trace gravel, tan *(continued)* very dense				50/2"				44
		30			30-50/4"				
	reddish brown and white, dense	35			16-18-18 N=36				24
	trace clay, grayish brown, medium dense	40			15-10-11 N=21				
		45			14-13-13 N=26				
		50							

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

Boring Started: 04-07-2022 | Boring Completed: 04-07-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

BORING LOG NO. SUB-2

PROJECT: Sienna Solar

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 34.5227° Longitude: -116.895° DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	CLAYEY SAND (SC), trace gravel, tan *(continued)* dense 51.5				8-16-22 N=38				
	Boring Terminated at 51.5 Feet								

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1421 Edinger Ave, Ste C
Tustin, CA

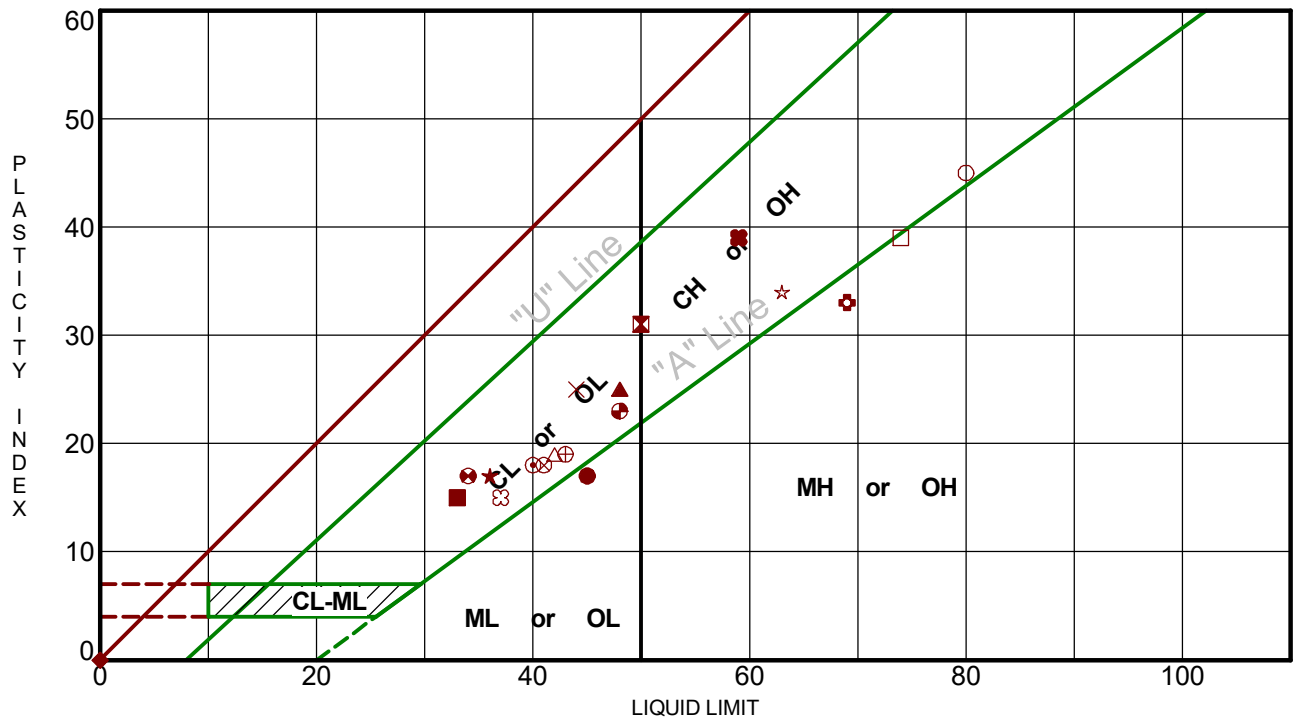
Boring Started: 04-07-2022 | Boring Completed: 04-07-2022

Drill Rig: D90 | Driller: Terracon

Project No.: 60225032

ATTERBERG LIMITS RESULTS

ASTM D4318



Boring ID		Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	B-02	0 - 2.5	45	28	17	84.3	ML	SILT with SAND
⊠	B-04	15 - 16.5	50	19	31	76.5	CH	FAT CLAY with SAND
▲	B-05	5 - 6.5	48	23	25		SC	CLAYEY SAND
★	B-06	7.5 - 9	36	19	17	70.7	CL	LEAN CLAY with SAND
⊙	B-09	0 - 2.5	40	22	18	58.8	CL	SANDY LEAN CLAY
✿	B-09	5 - 6.5	69	36	33		MH	ELASTIC SILT
○	B-11	10 - 11.5	80	35	45		CH	FAT CLAY
△	B-14	2.5 - 4	42	23	19		SC	CLAYEY SAND
⊗	B-15	0 - 2.5	41	23	18	72.3	CL	LEAN CLAY WITH SAND
⊕	B-20	0 - 5	43	24	19		SC	CLAYEY SAND
□	B-22	15 - 16.5	74	35	39		MH	ELASTIC SILT
⊛	B-23	0 - 2.5	34	17	17	79.5	CL	LEAN CLAY WITH SAND
◕	B-27	0 - 2.5	48	25	23	96.3	CL	LEAN CLAY
☆	B-27	10 - 11.5	63	29	34		CH	FAT CLAY
❀	B-31	0 - 2.5	37	22	15	75.0	CL	LEAN CLAY with SAND
■	B-33	0 - 2.5	33	18	15	28.3	SC	CLAYEY SAND
◆	B-36	15 - 16.5	NP	NP	NP	19.0	SM	SILTY SAND
◇	B-37	0 - 2.5	NP	NP	NP	13.7	SM	SILTY SAND
×	SUB-1	0 - 2.5	44	19	25	36.0	SC	CLAYEY SAND
✖	SUB-1	5 - 6.5	59	20	39		SC	CLAYEY SAND

PROJECT: Sienna Solar

PROJECT NUMBER: 60225032

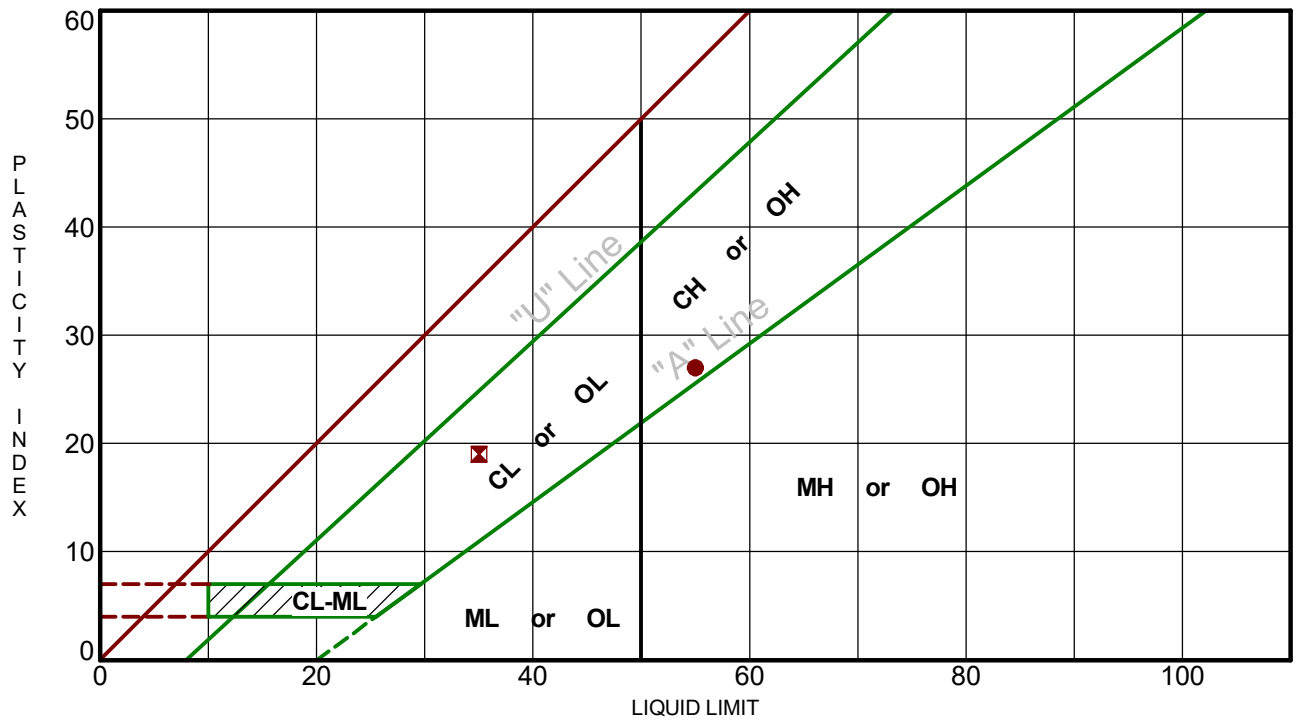
SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

Terracon
23041 Avenida De La Carlota Ste 350
Laguna Hills, CA

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

ATTERBERG LIMITS RESULTS

ASTM D4318



Boring ID		Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	SUB-2	0 - 2.5	55	28	27	41.3	SC	CLAYEY SAND
⊠	SUB-2	7.5 - 9	35	16	19	13.9	SC	CLAYEY SAND

PROJECT: Sienna Solar

PROJECT NUMBER: 60225032

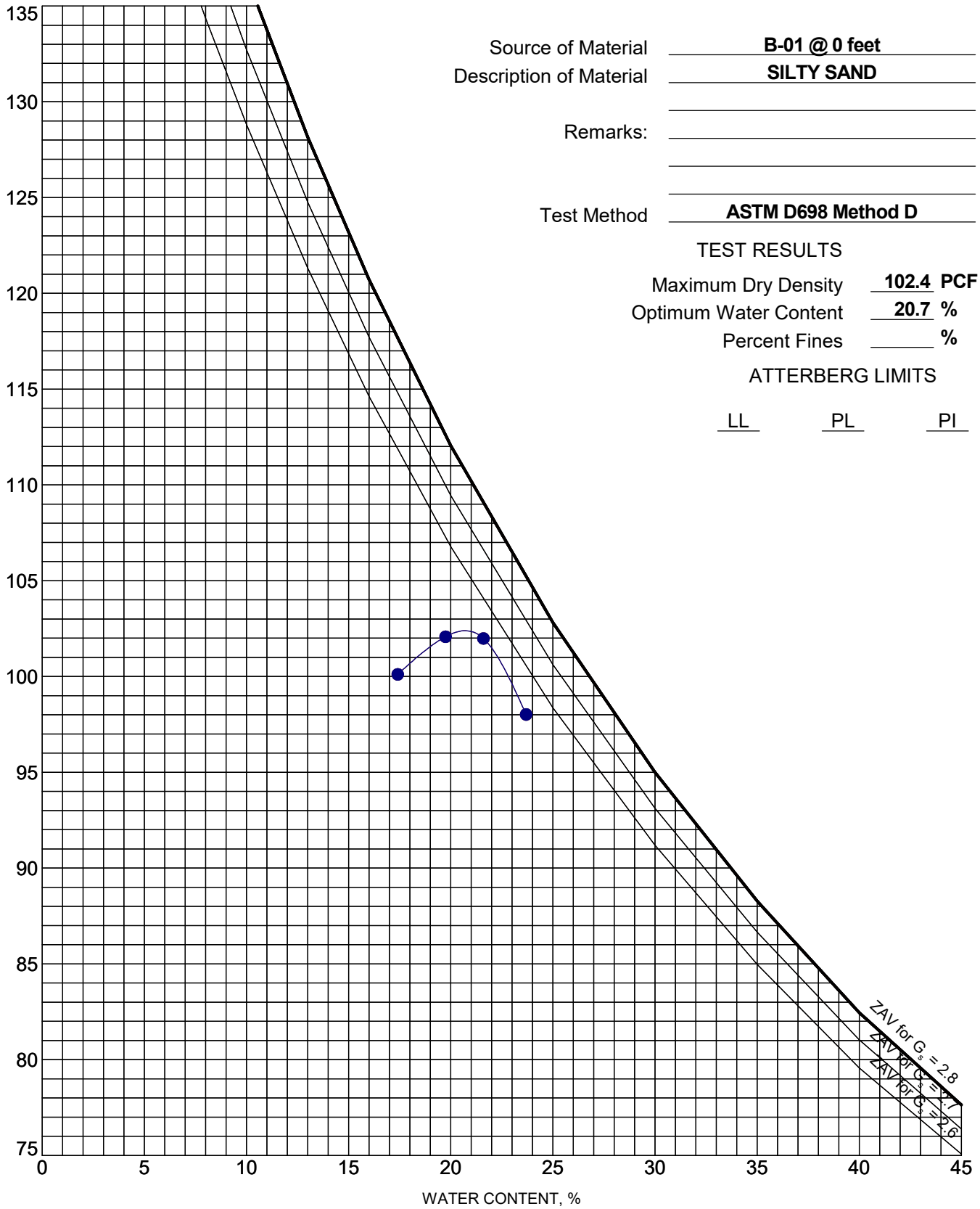
SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

Terracon
23041 Avenida De La Carlota Ste 350
Laguna Hills, CA

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557



Source of Material: **B-01 @ 0 feet**

Description of Material: **SILTY SAND**

Remarks:

Test Method: **ASTM D698 Method D**

TEST RESULTS

Maximum Dry Density	**102.4**	**PCF**
Optimum Water Content	**20.7**	**%**
Percent Fines		**%**

ATTERBERG LIMITS

LL	PL	PI

PROJECT: Sienna Solar

PROJECT NUMBER: 60225032

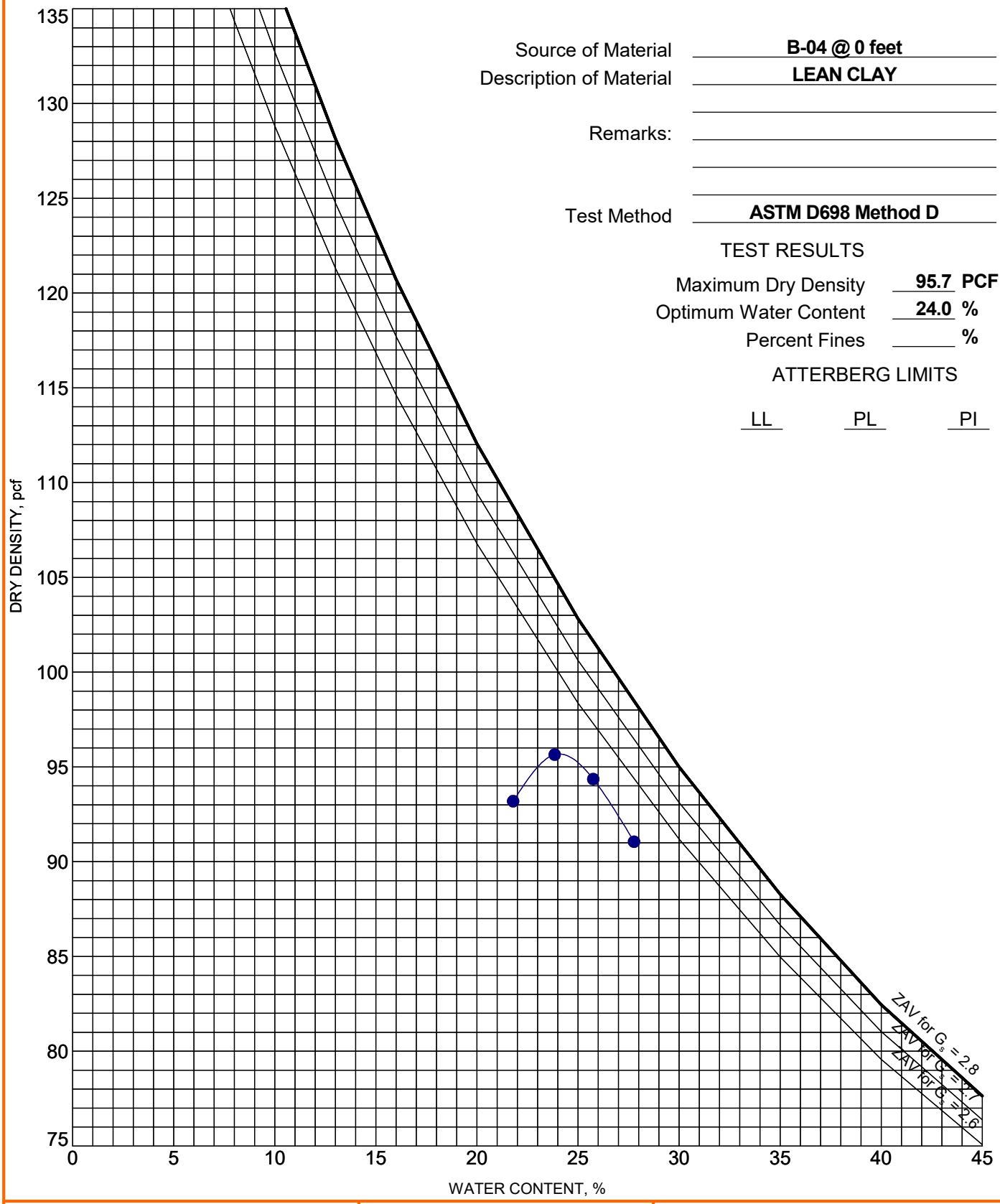
SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

Terracon
23041 Avenida De La Carlota Ste 350
Laguna Hills, CA

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557



Source of Material: **B-04 @ 0 feet**

Description of Material: **LEAN CLAY**

Remarks:

Test Method: **ASTM D698 Method D**

TEST RESULTS

Maximum Dry Density	**95.7**	**PCF**
Optimum Water Content	**24.0**	**%**
Percent Fines		**%**

ATTERBERG LIMITS

LL	PL	PI

PROJECT: Sienna Solar

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

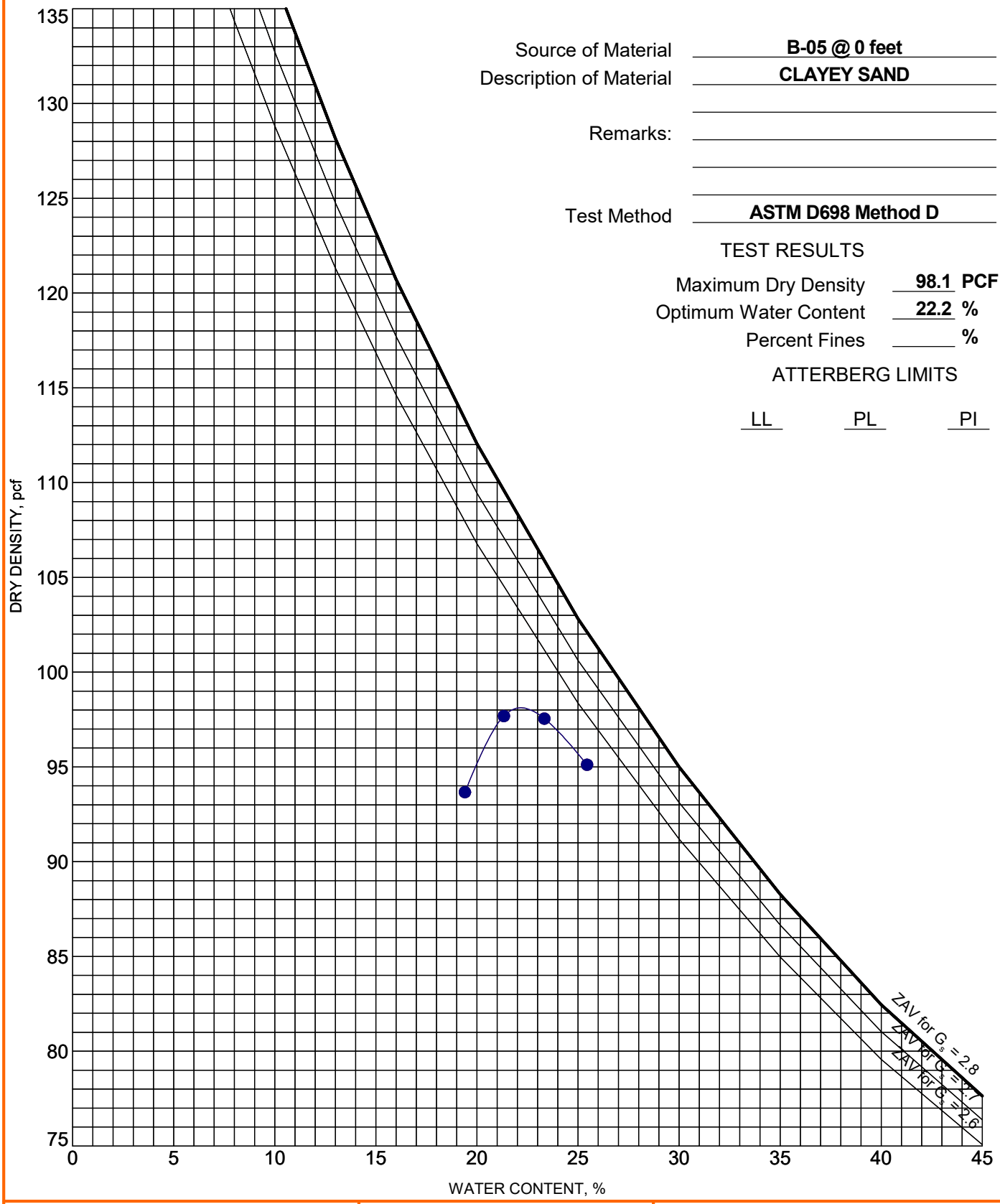
Terracon
23041 Avenida De La Carlota Ste 350
Laguna Hills, CA

PROJECT NUMBER: 60225032

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557



Source of Material	**B-05 @ 0 feet**
Description of Material	**CLAYEY SAND**
Remarks:	
Test Method	**ASTM D698 Method D**

TEST RESULTS

Maximum Dry Density	**98.1**	**PCF**
Optimum Water Content	**22.2**	**%**
Percent Fines		**%**

ATTERBERG LIMITS

LL	PL	PI

PROJECT: Sienna Solar

PROJECT NUMBER: 60225032

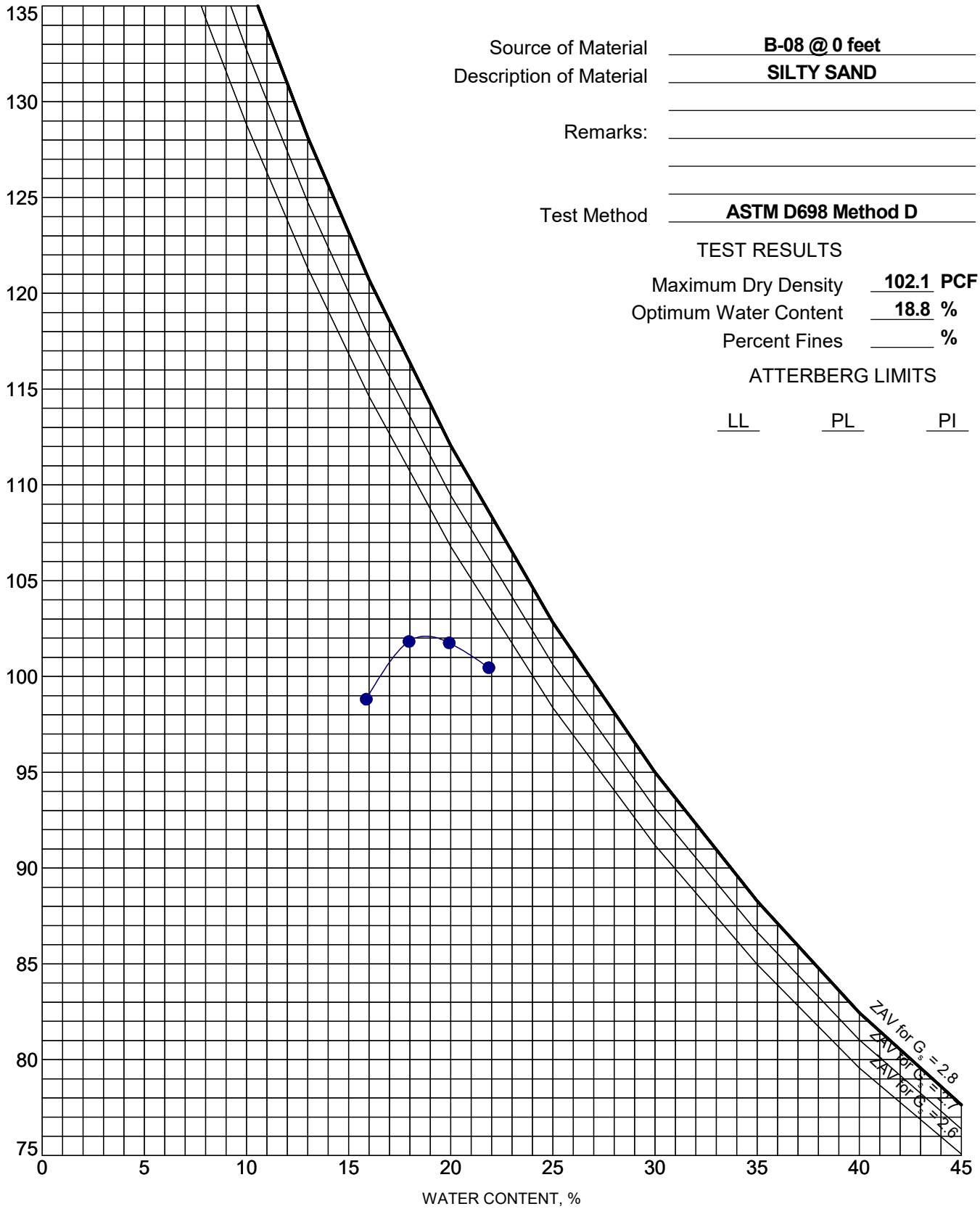
SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

Terracon
23041 Avenida De La Carlota Ste 350
Laguna Hills, CA

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557



Source of Material: **B-08 @ 0 feet**

Description of Material: **SILTY SAND**

Remarks:

Test Method: **ASTM D698 Method D**

TEST RESULTS

Maximum Dry Density	**102.1**	**PCF**
Optimum Water Content	**18.8**	**%**
Percent Fines		**%**

ATTERBERG LIMITS

LL	PL	PI

PROJECT: Sienna Solar

PROJECT NUMBER: 60225032

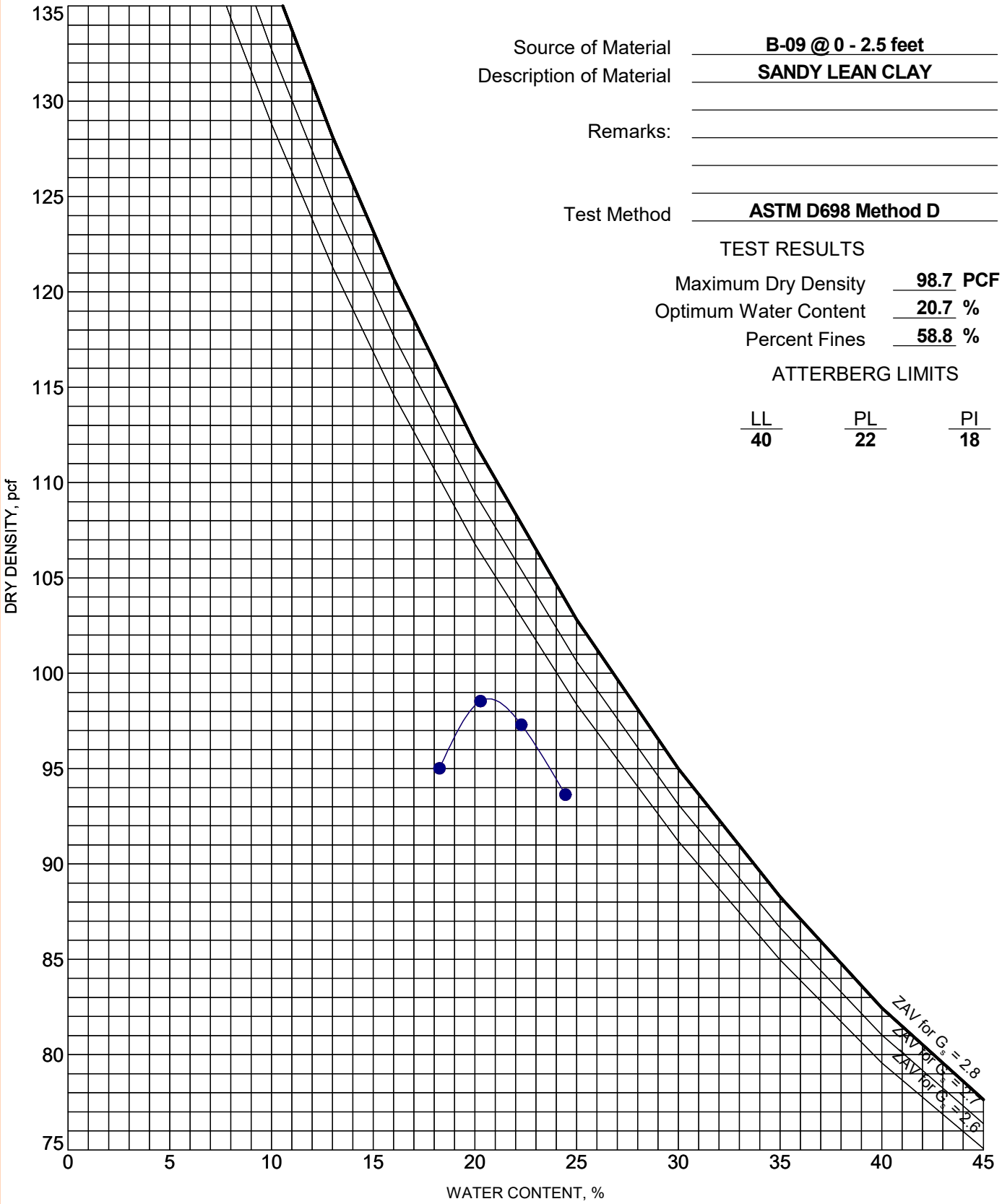
SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

Terracon
23041 Avenida De La Carlota Ste 350
Laguna Hills, CA

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557



Source of Material	**B-09 @ 0 - 2.5 feet**
Description of Material	**SANDY LEAN CLAY**
Remarks:	
Test Method	**ASTM D698 Method D**

TEST RESULTS

Maximum Dry Density	**98.7**	**PCF**
Optimum Water Content	**20.7**	**%**
Percent Fines	**58.8**	**%**

ATTERBERG LIMITS

LL	PL	PI
40	**22**	**18**

PROJECT: Sienna Solar

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

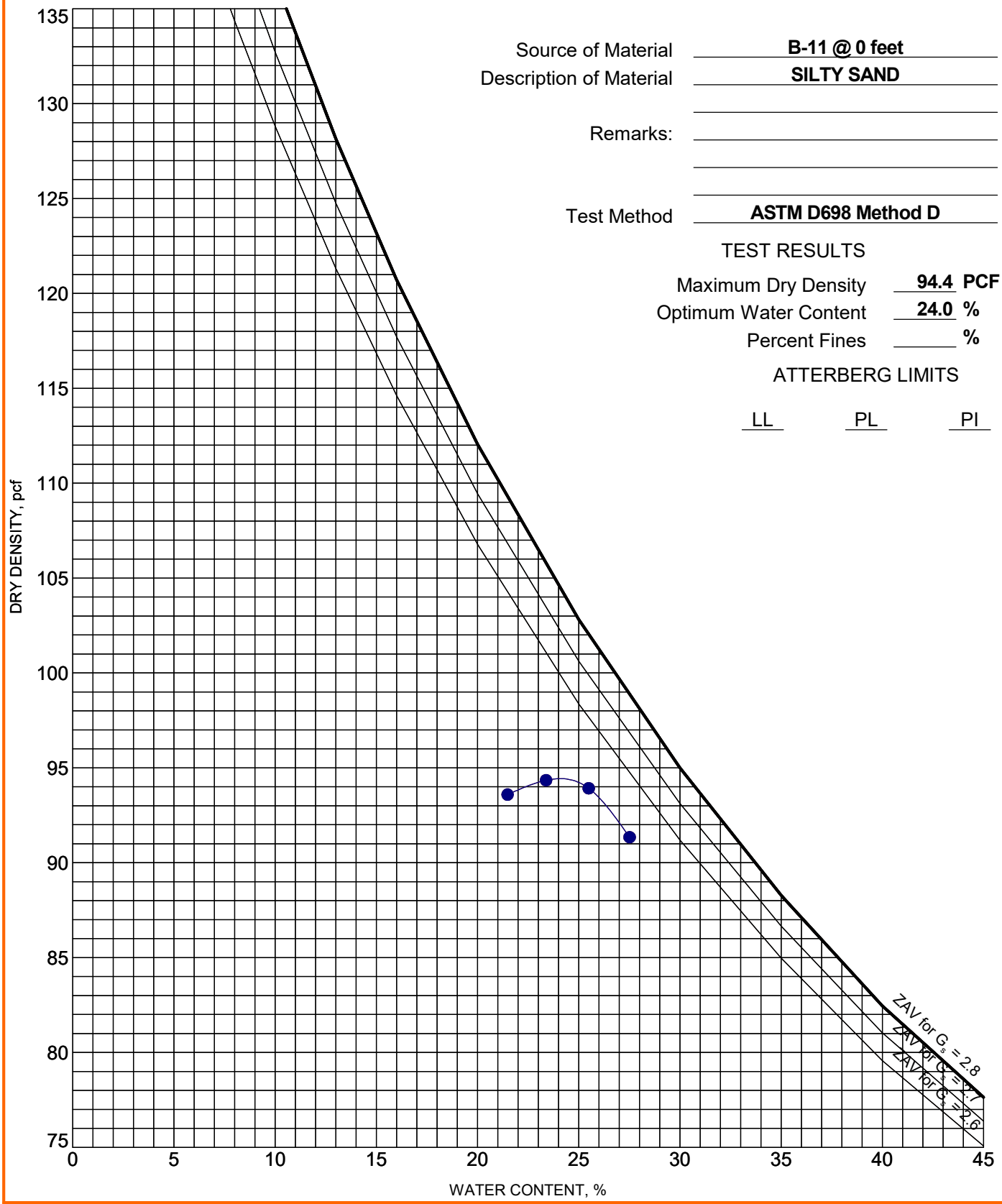
Terracon
23041 Avenida De La Carlota Ste 350
Laguna Hills, CA

PROJECT NUMBER: 60225032

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557



Source of Material: **B-11 @ 0 feet**

Description of Material: **SILTY SAND**

Remarks:

Test Method: **ASTM D698 Method D**

TEST RESULTS

Maximum Dry Density	**94.4**	**PCF**
Optimum Water Content	**24.0**	**%**
Percent Fines		**%**

ATTERBERG LIMITS

LL	PL	PI

PROJECT: Sienna Solar

PROJECT NUMBER: 60225032

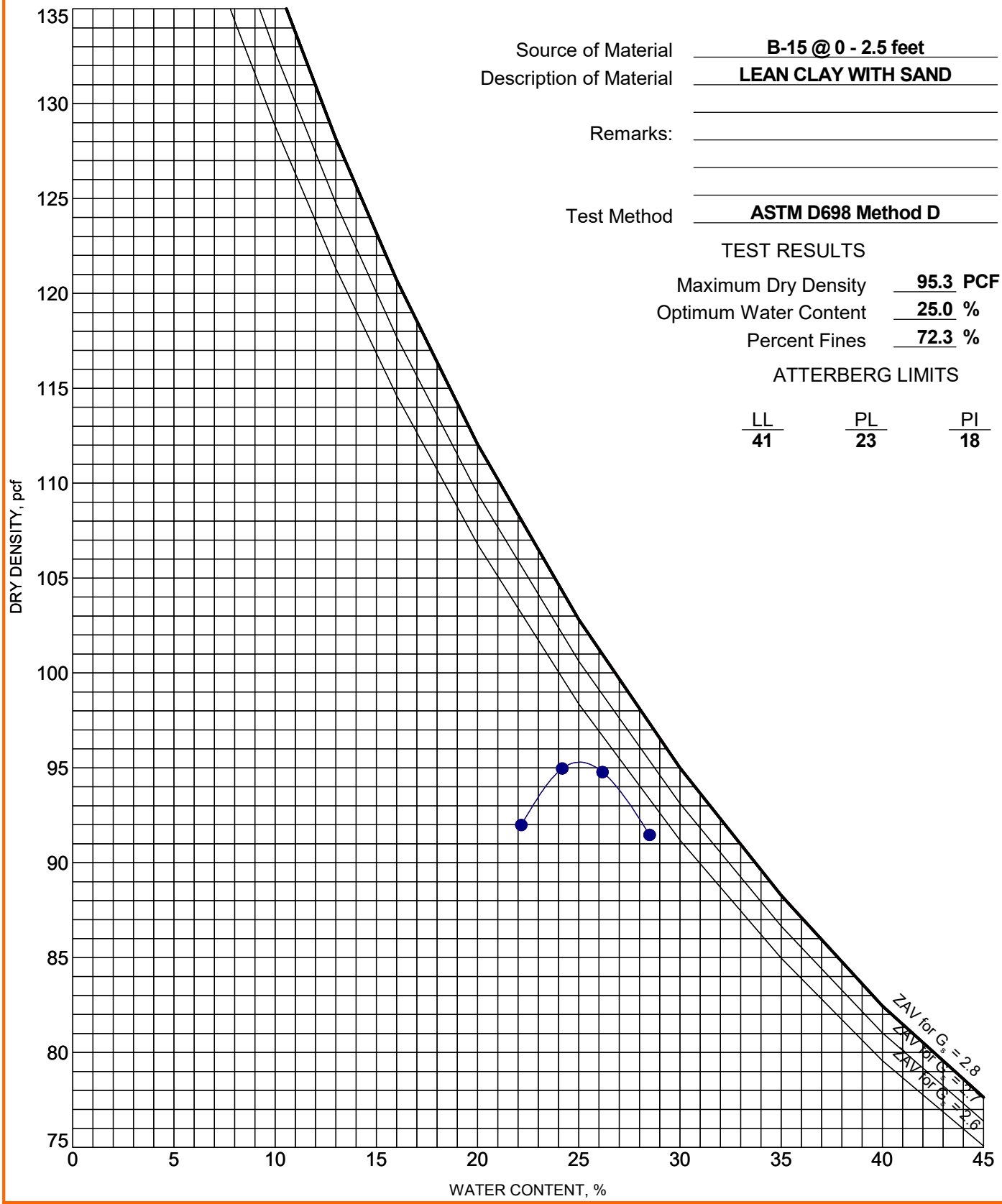
SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

Terracon
23041 Avenida De La Carlota Ste 350
Laguna Hills, CA

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557



Source of Material	**B-15 @ 0 - 2.5 feet**
Description of Material	**LEAN CLAY WITH SAND**
Remarks:	
Test Method	**ASTM D698 Method D**

TEST RESULTS

Maximum Dry Density	**95.3**	**PCF**
Optimum Water Content	**25.0**	**%**
Percent Fines	**72.3**	**%**

ATTERBERG LIMITS

LL	PL	PI
41	**23**	**18**

PROJECT: Sienna Solar

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

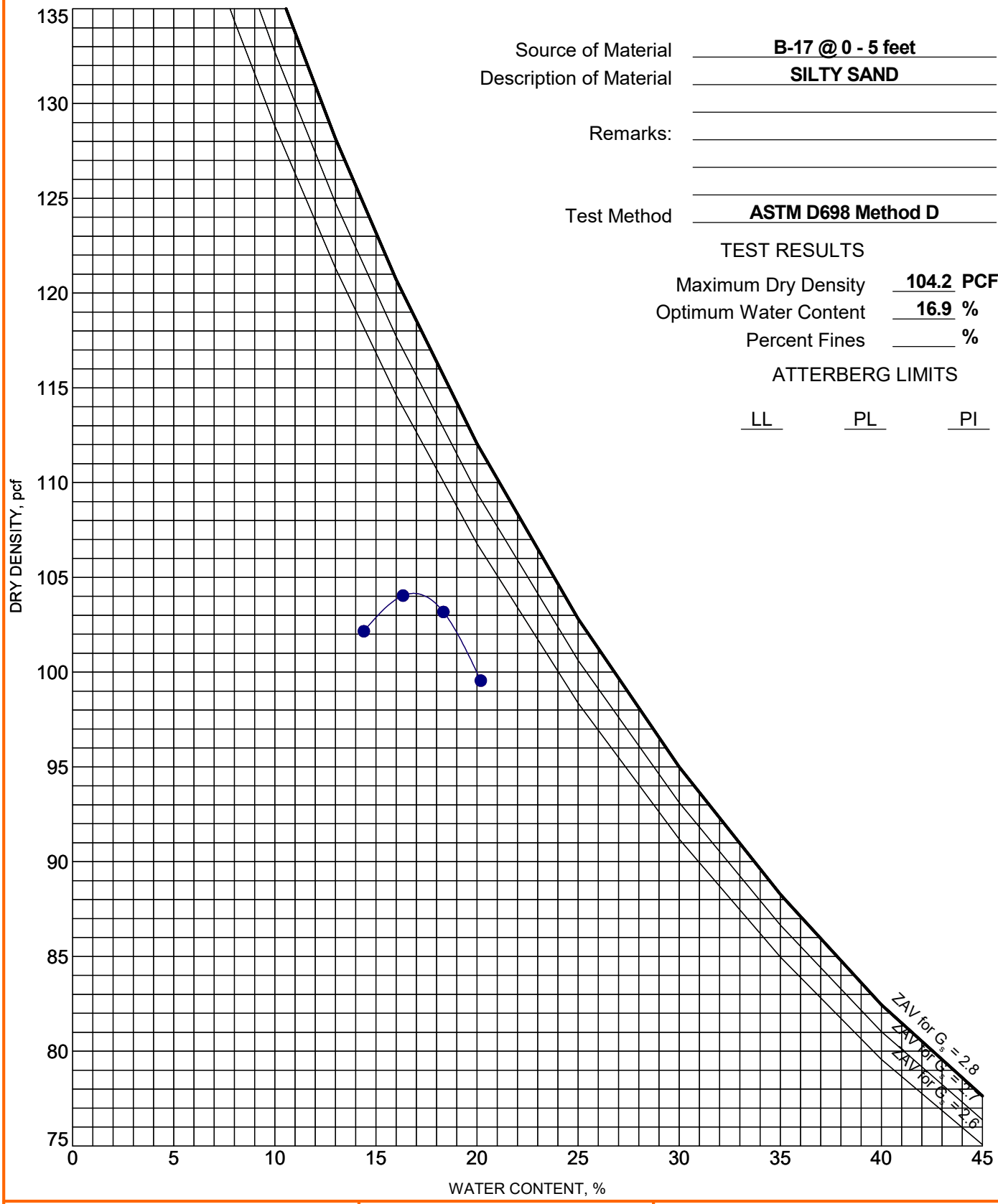
Terracon
23041 Avenida De La Carlota Ste 350
Laguna Hills, CA

PROJECT NUMBER: 60225032

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557



Source of Material: **B-17 @ 0 - 5 feet**

Description of Material: **SILTY SAND**

Remarks:

Test Method: **ASTM D698 Method D**

TEST RESULTS

Maximum Dry Density	**104.2**	**PCF**
Optimum Water Content	**16.9**	**%**
Percent Fines		**%**

ATTERBERG LIMITS

LL	PL	PI

PROJECT: Sienna Solar

PROJECT NUMBER: 60225032

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

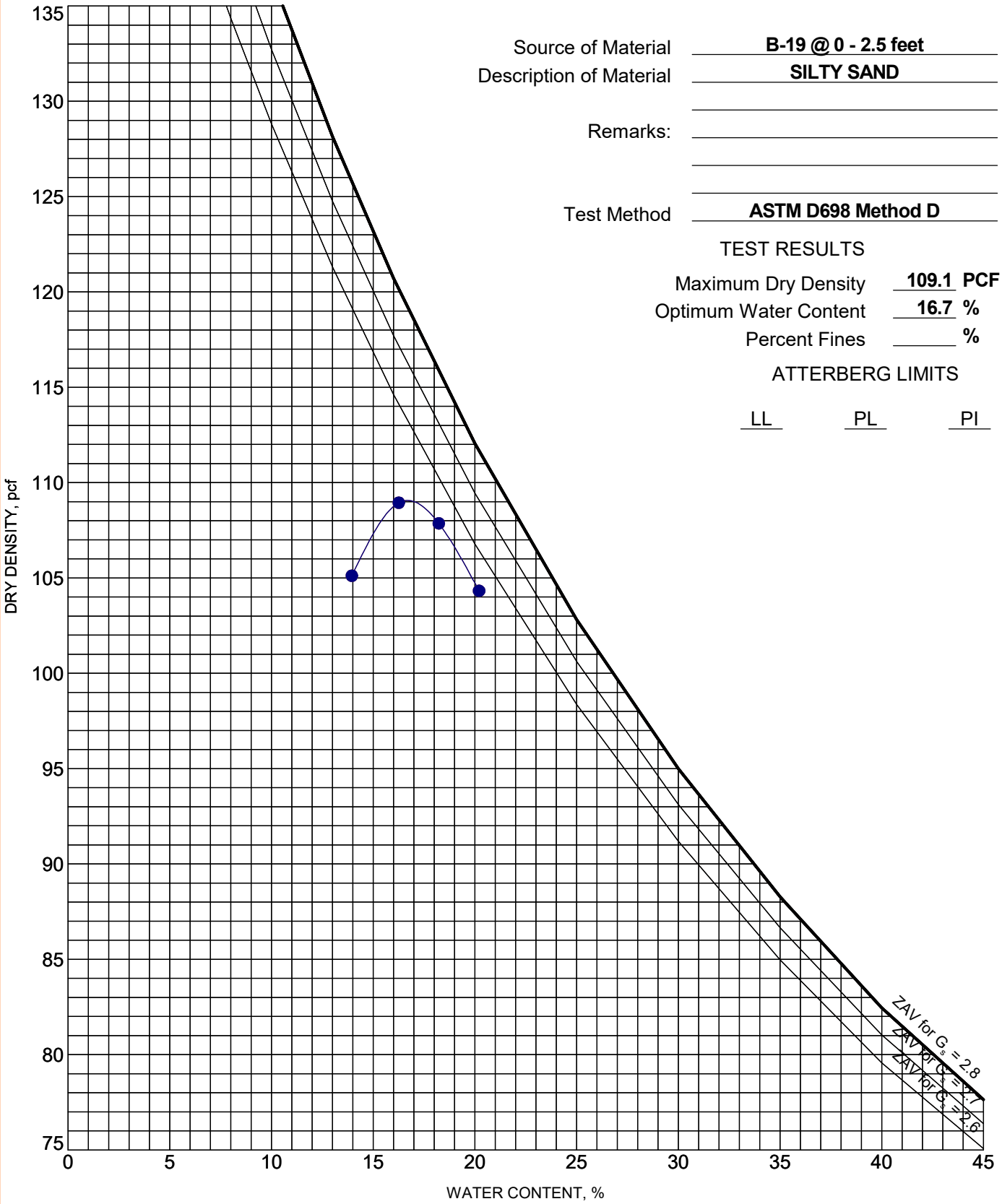
Terracon
23041 Avenida De La Carlota Ste 350
Laguna Hills, CA

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. COMPACTION - V2 60225032 SIENNA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 6/28/22

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557



Source of Material	**B-19 @ 0 - 2.5 feet**
Description of Material	**SILTY SAND**
Remarks:	
Test Method	**ASTM D698 Method D**

TEST RESULTS

Maximum Dry Density	**109.1**	**PCF**
Optimum Water Content	**16.7**	**%**
Percent Fines		**%**

ATTERBERG LIMITS

LL	PL	PI

PROJECT: Sienna Solar

PROJECT NUMBER: 60225032

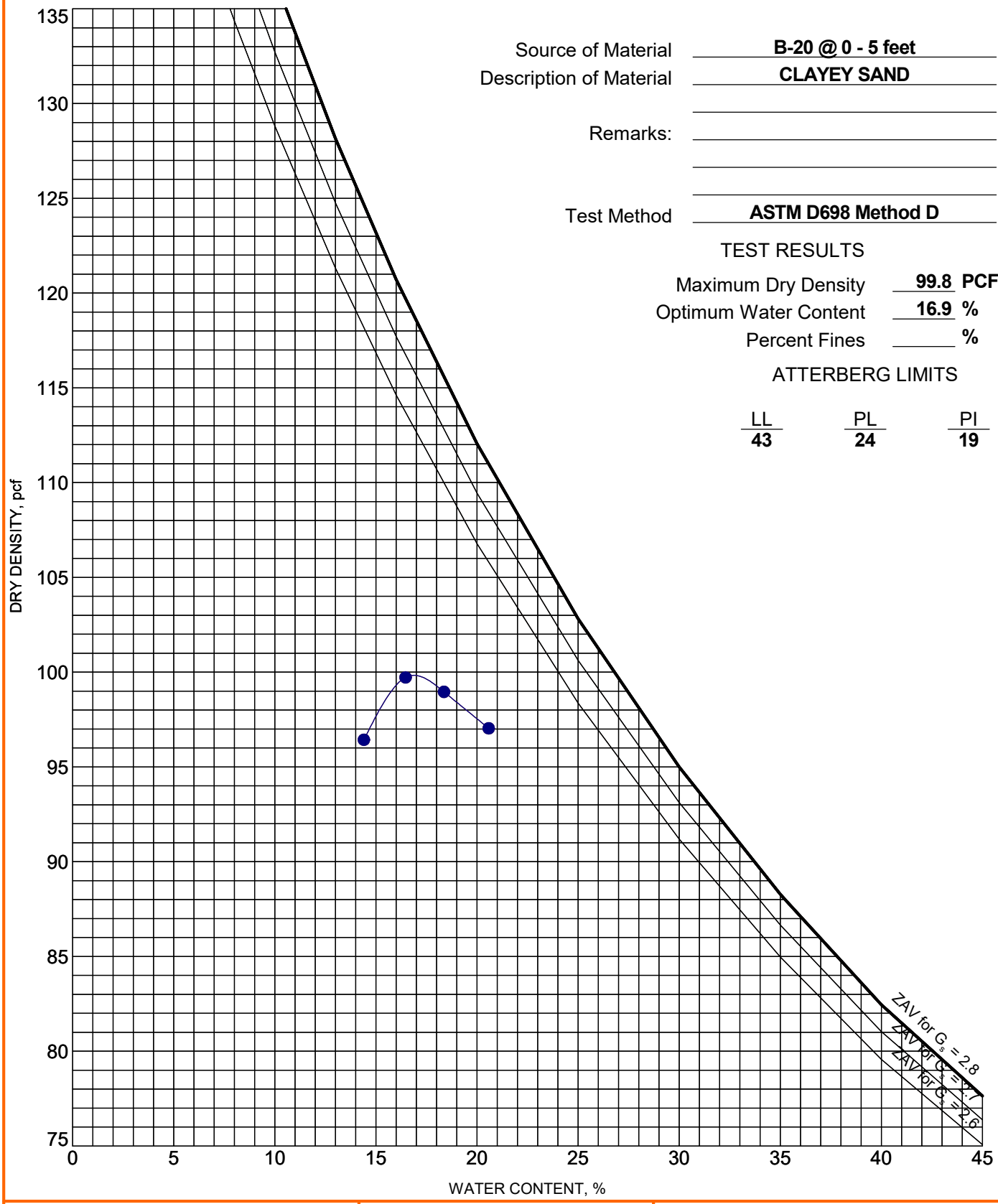
SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

Terracon
23041 Avenida De La Carlota Ste 350
Laguna Hills, CA

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557



Source of Material	**B-20 @ 0 - 5 feet**
Description of Material	**CLAYEY SAND**
Remarks:	
Test Method	**ASTM D698 Method D**

TEST RESULTS

Maximum Dry Density	**99.8**	**PCF**
Optimum Water Content	**16.9**	**%**
Percent Fines		**%**

ATTERBERG LIMITS

LL	PL	PI
43	**24**	**19**

PROJECT: Sienna Solar

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

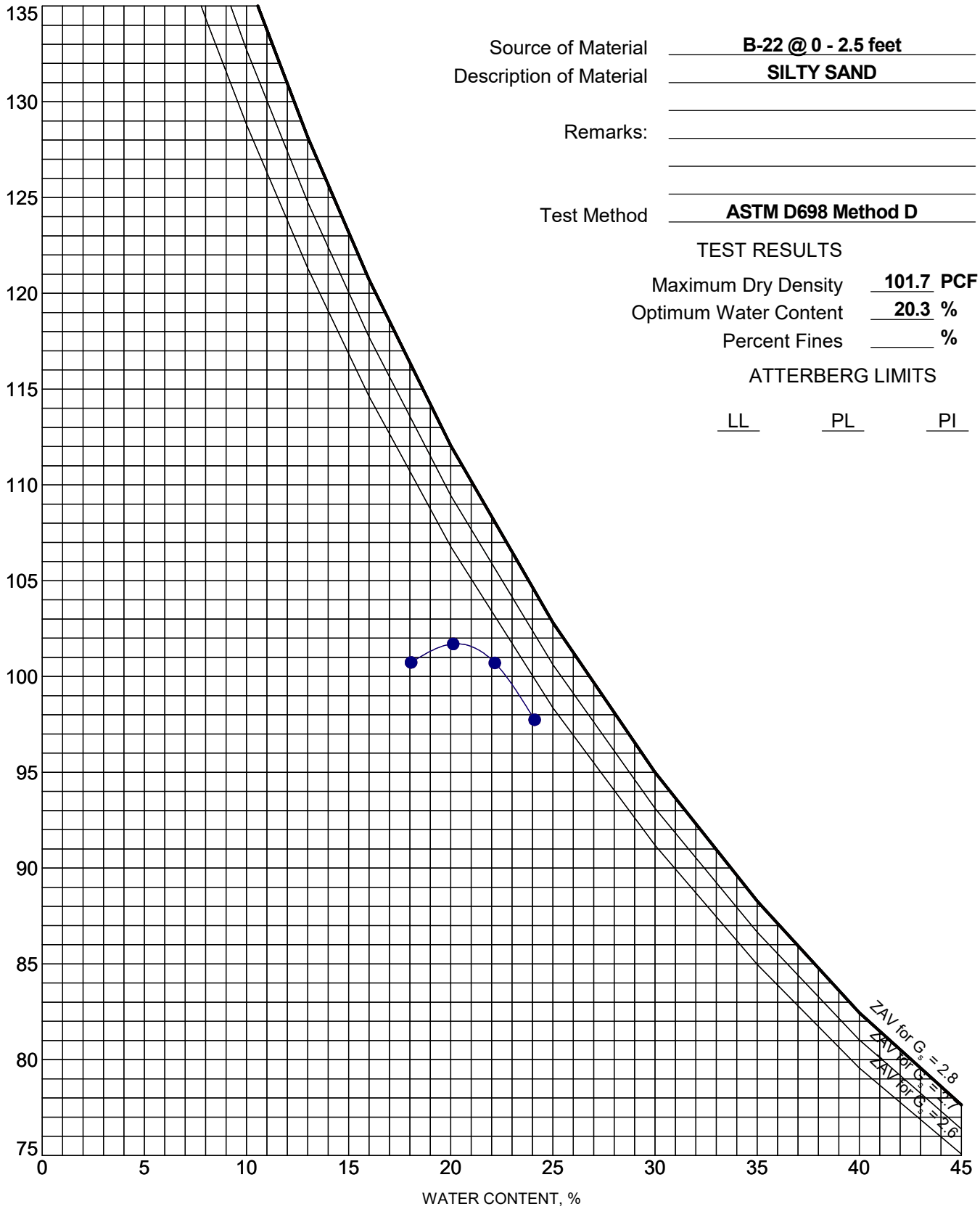
Terracon
23041 Avenida De La Carlota Ste 350
Laguna Hills, CA

PROJECT NUMBER: 60225032

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557



Source of Material: **B-22 @ 0 - 2.5 feet**

Description of Material: **SILTY SAND**

Remarks:

Test Method: **ASTM D698 Method D**

TEST RESULTS

Maximum Dry Density	**101.7**	**PCF**
Optimum Water Content	**20.3**	**%**
Percent Fines		**%**

ATTERBERG LIMITS

LL	PL	PI

PROJECT: Sienna Solar

PROJECT NUMBER: 60225032

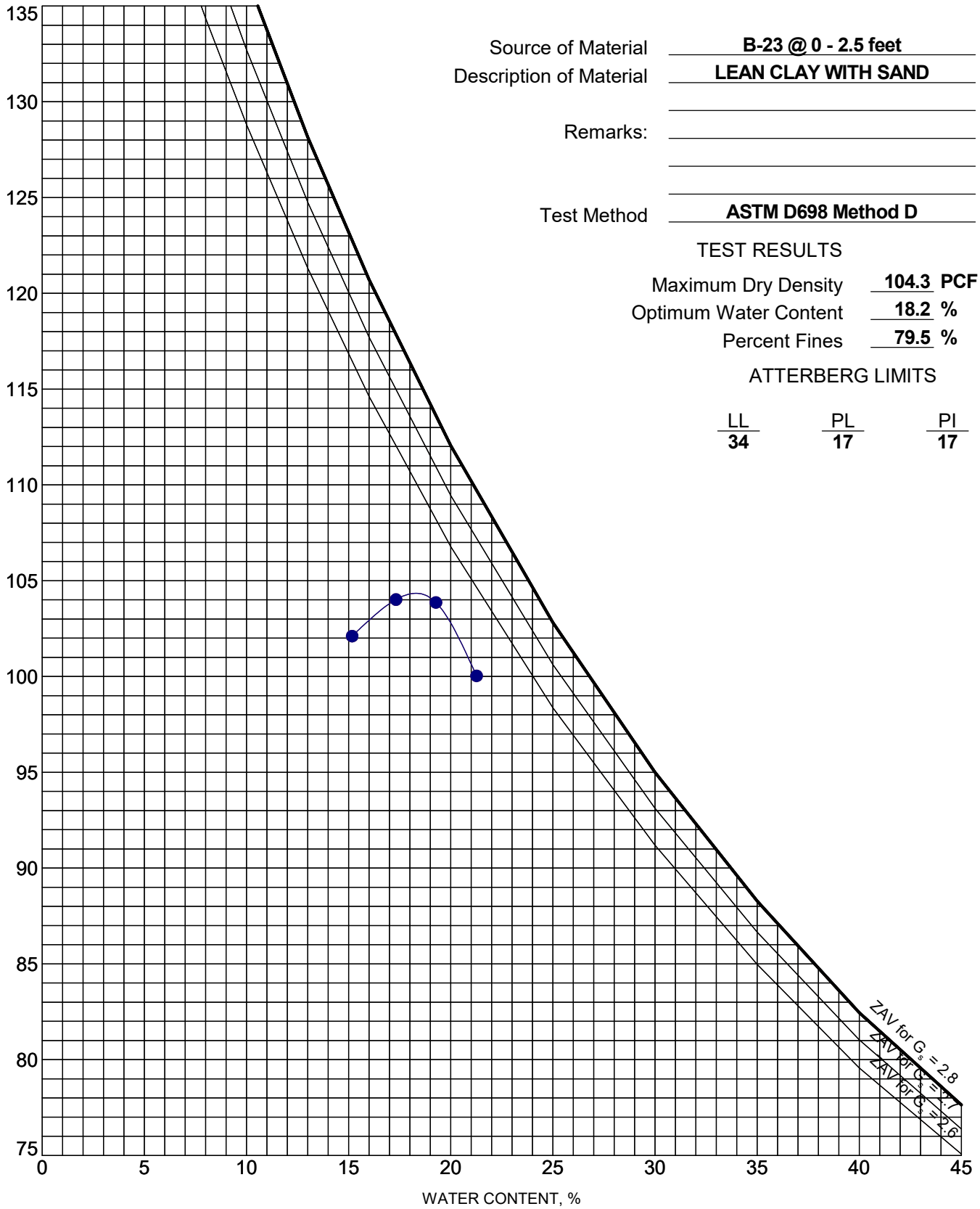
SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

Terracon
23041 Avenida De La Carlota Ste 350
Laguna Hills, CA

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557



Source of Material	**B-23 @ 0 - 2.5 feet**
Description of Material	**LEAN CLAY WITH SAND**
Remarks:	
Test Method	**ASTM D698 Method D**

TEST RESULTS

Maximum Dry Density	**104.3 PCF**
Optimum Water Content	**18.2 %**
Percent Fines	**79.5 %**

ATTERBERG LIMITS

LL	PL	PI
34	**17**	**17**

PROJECT: Sienna Solar

SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

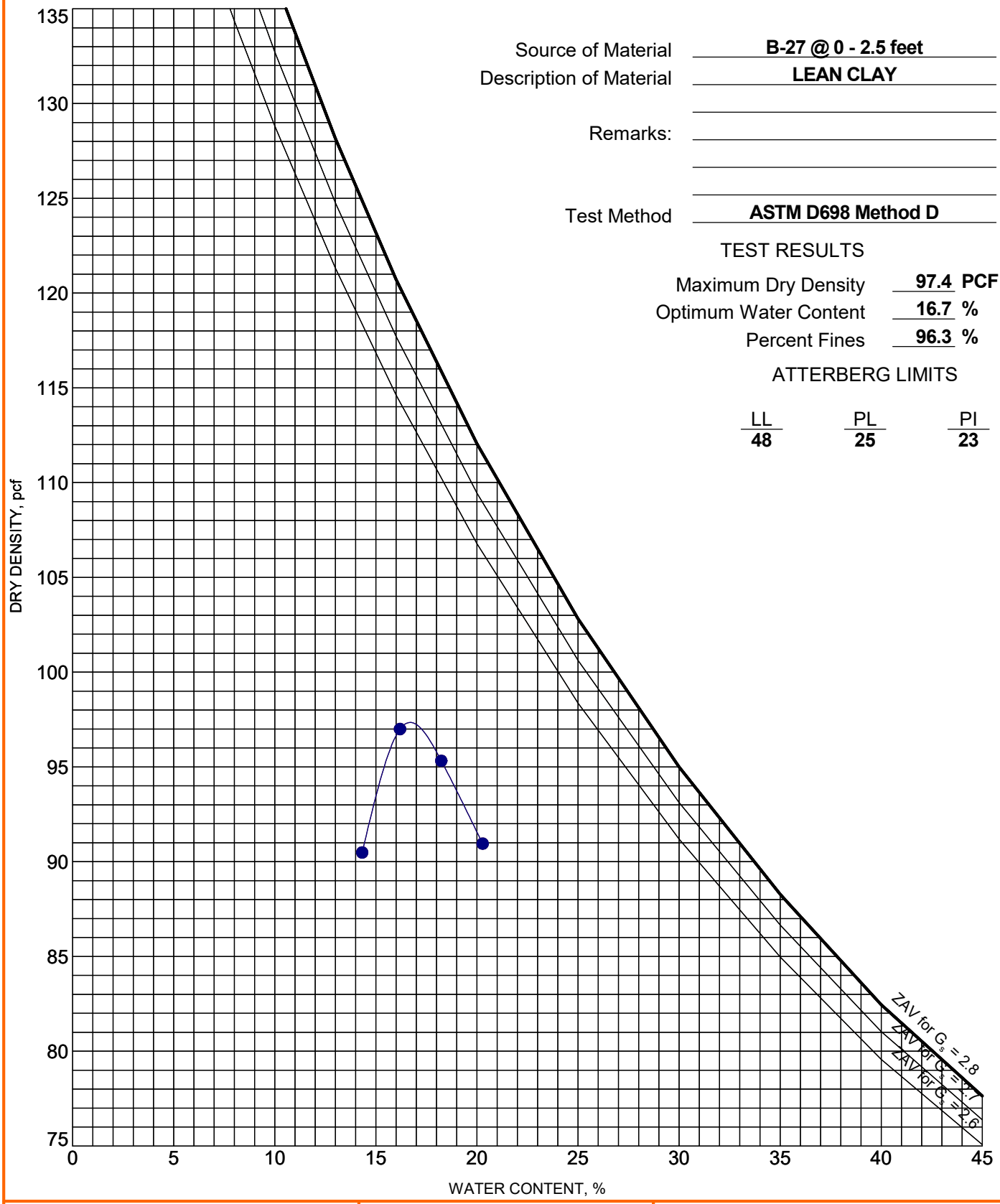
Terracon
23041 Avenida De La Carlota Ste 350
Laguna Hills, CA

PROJECT NUMBER: 60225032

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557



Source of Material	**B-27 @ 0 - 2.5 feet**
Description of Material	**LEAN CLAY**
Remarks:	
Test Method	**ASTM D698 Method D**

TEST RESULTS

Maximum Dry Density	**97.4 PCF**
Optimum Water Content	**16.7 %**
Percent Fines	**96.3 %**

ATTERBERG LIMITS

LL	PL	PI
48	**25**	**23**

PROJECT: Sienna Solar

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SITE: Barstow Rd and North of Old Woman Springs Rd
Lucerne Valley, CA

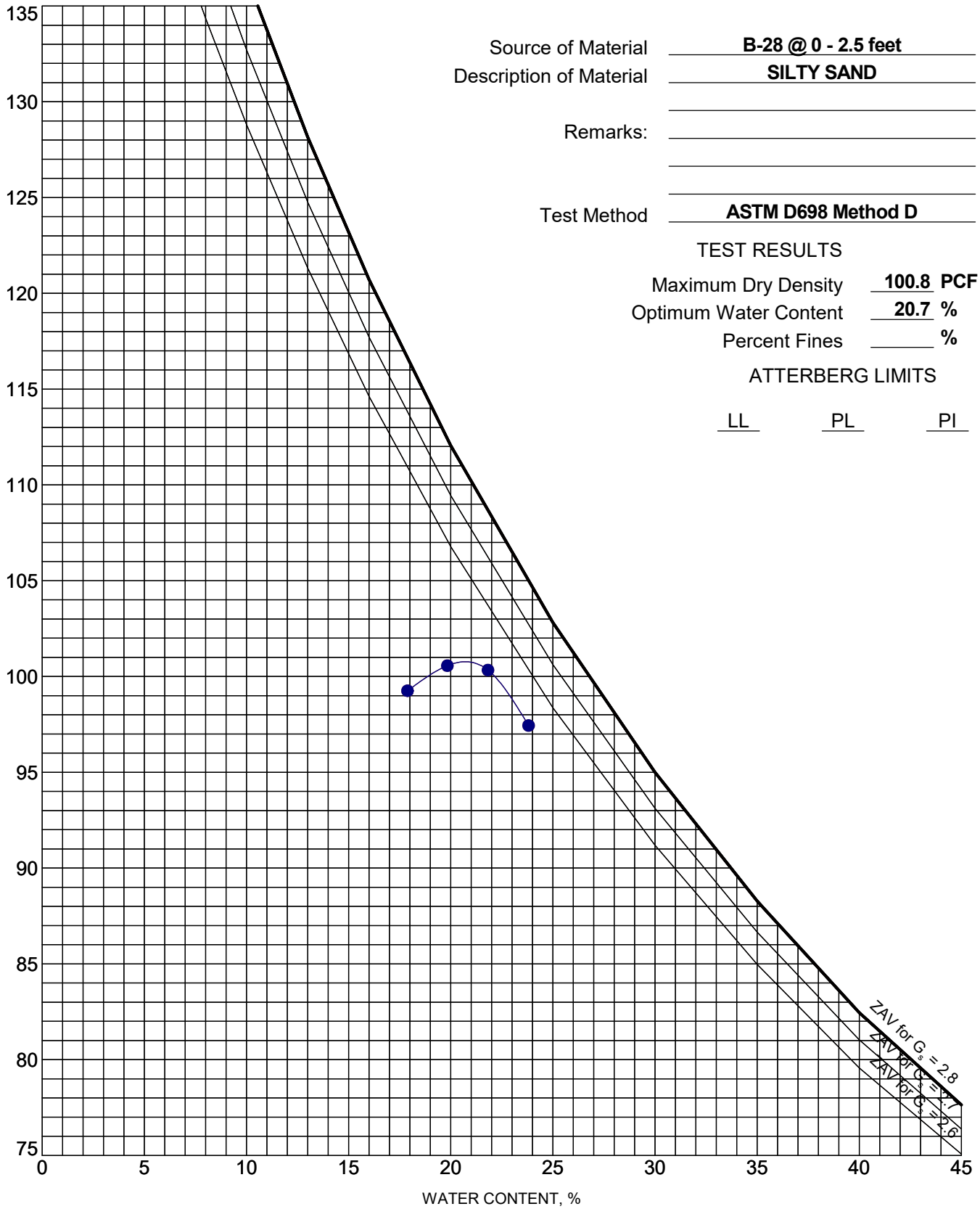
Terracon
23041 Avenida De La Carlota Ste 350
Laguna Hills, CA

CLIENT: 8 Minute Energy Renewables
San Francisco, CA

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. COMPACTION - V2 60225032 SIENNA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 6/28/22

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557



Source of Material: **B-28 @ 0 - 2.5 feet**

Description of Material: **SILTY SAND**

Remarks:

Test Method: **ASTM D698 Method D**

TEST RESULTS

Maximum Dry Density	**100.8**	**PCF**
Optimum Water Content	**20.7**	**%**
Percent Fines		**%**

ATTERBERG LIMITS

LL	PL	PI

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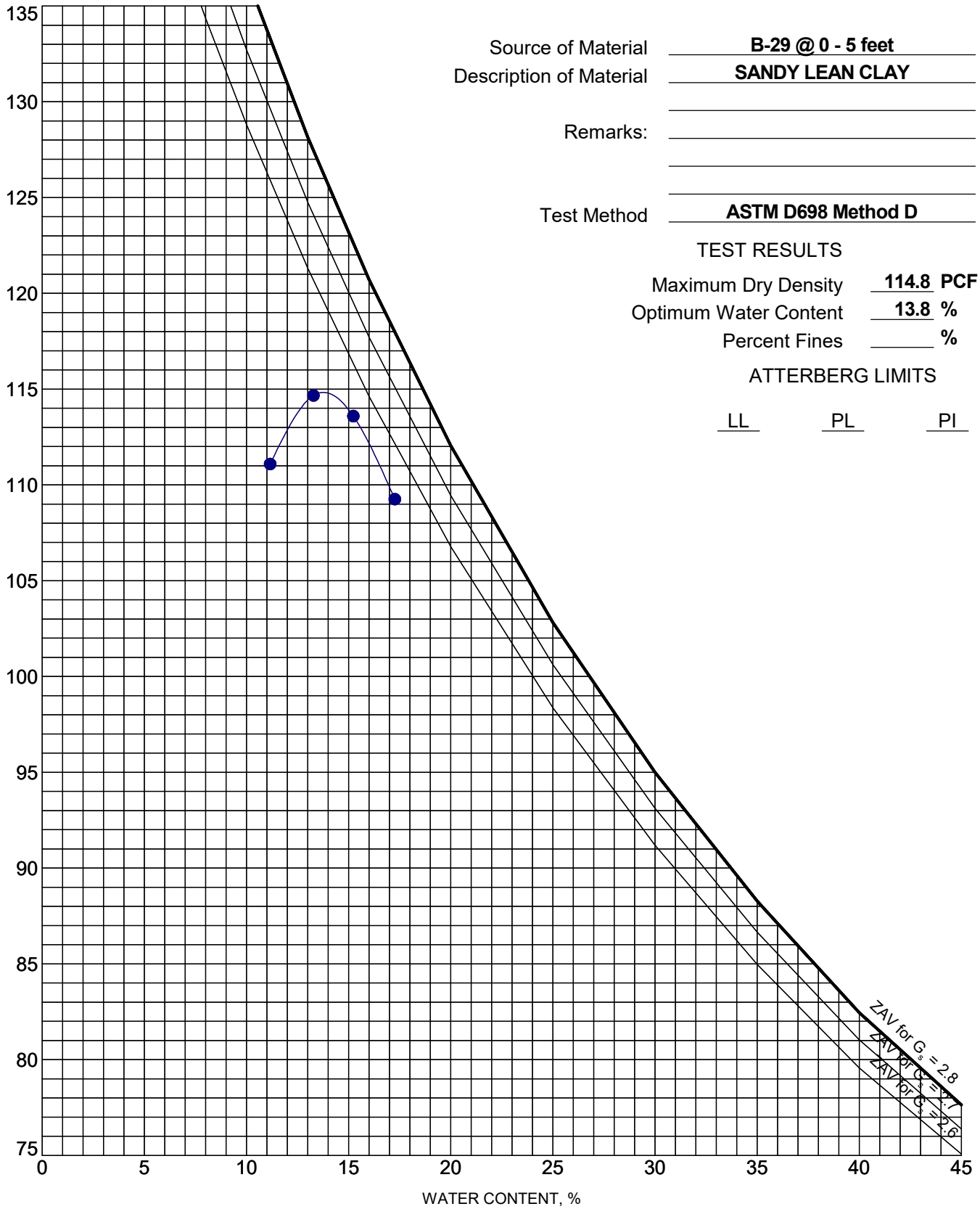
MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557



Source of Material	**B-29 @ 0 - 5 feet**
Description of Material	**SANDY LEAN CLAY**
Remarks:	
Test Method	**ASTM D698 Method D**

TEST RESULTS

Maximum Dry Density	**114.8**	**PCF**
Optimum Water Content	**13.8**	**%**
Percent Fines		**%**

ATTERBERG LIMITS

LL	PL	PI

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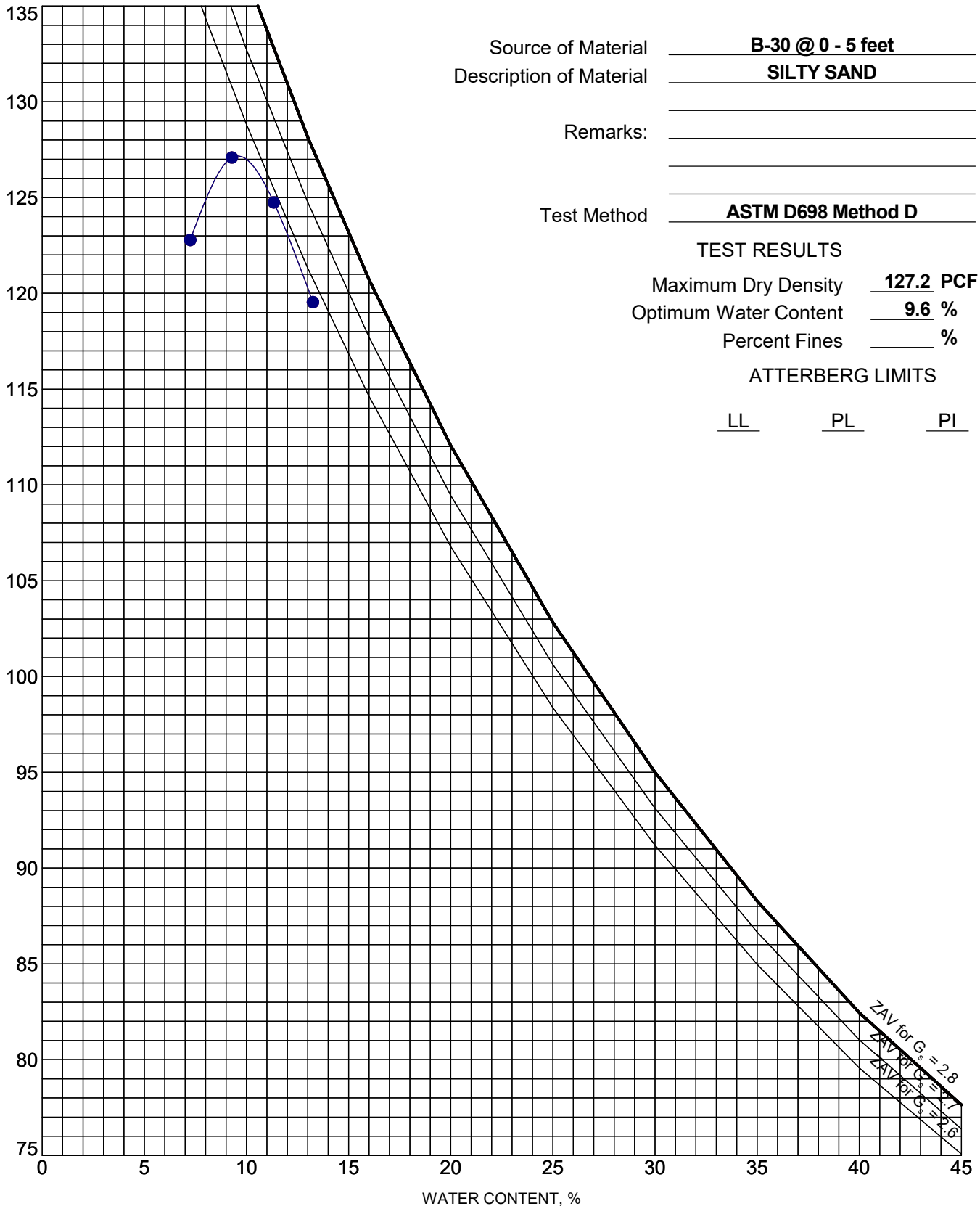
MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557



Source of Material	**B-30 @ 0 - 5 feet**
Description of Material	**SILTY SAND**
Remarks:	
Test Method	**ASTM D698 Method D**

TEST RESULTS

Maximum Dry Density	**127.2**	**PCF**
Optimum Water Content	**9.6**	**%**
Percent Fines		**%**

ATTERBERG LIMITS

LL	PL	PI

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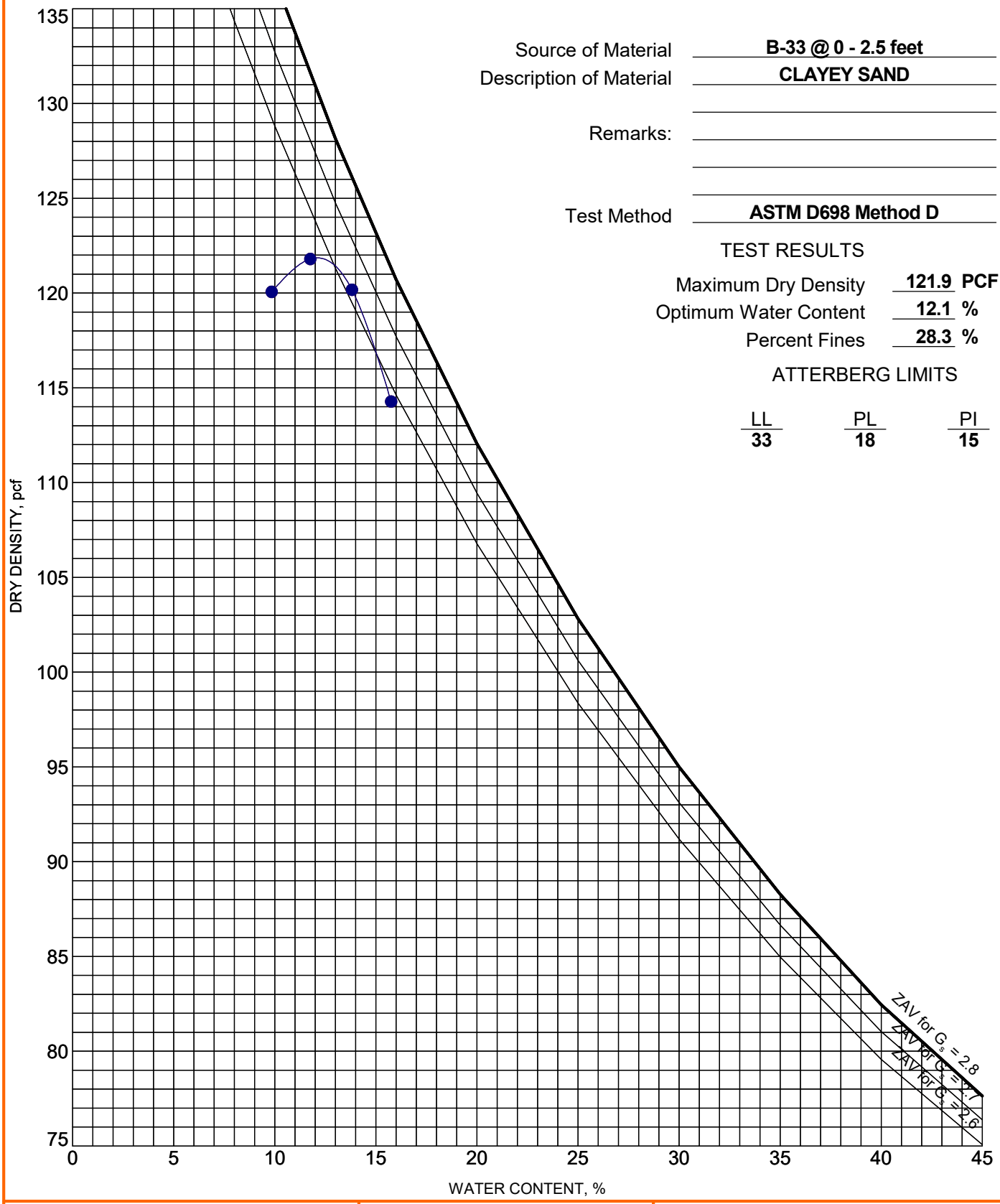
MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557



Source of Material	**B-33 @ 0 - 2.5 feet**
Description of Material	**CLAYEY SAND**
Remarks:	
Test Method	**ASTM D698 Method D**

TEST RESULTS

Maximum Dry Density	**121.9 PCF**
Optimum Water Content	**12.1 %**
Percent Fines	**28.3 %**

ATTERBERG LIMITS

LL	PL	PI
33	**18**	**15**

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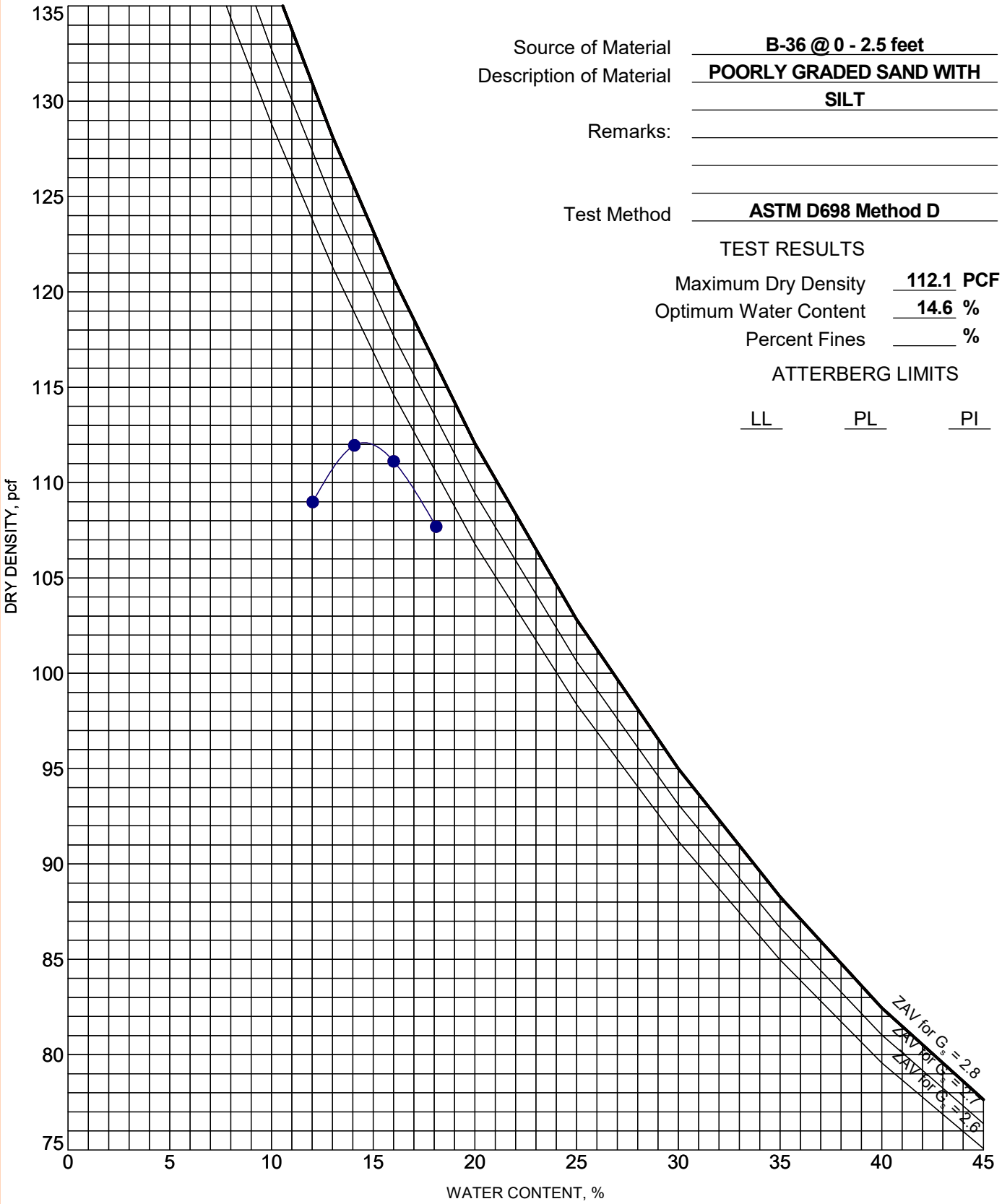
MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557



Source of Material	**B-36 @ 0 - 2.5 feet**
Description of Material	**POORLY GRADED SAND WITH SILT**
Remarks:	
Test Method	**ASTM D698 Method D**

TEST RESULTS

Maximum Dry Density	**112.1**	**PCF**
Optimum Water Content	**14.6**	**%**
Percent Fines		**%**

ATTERBERG LIMITS

LL	PL	PI

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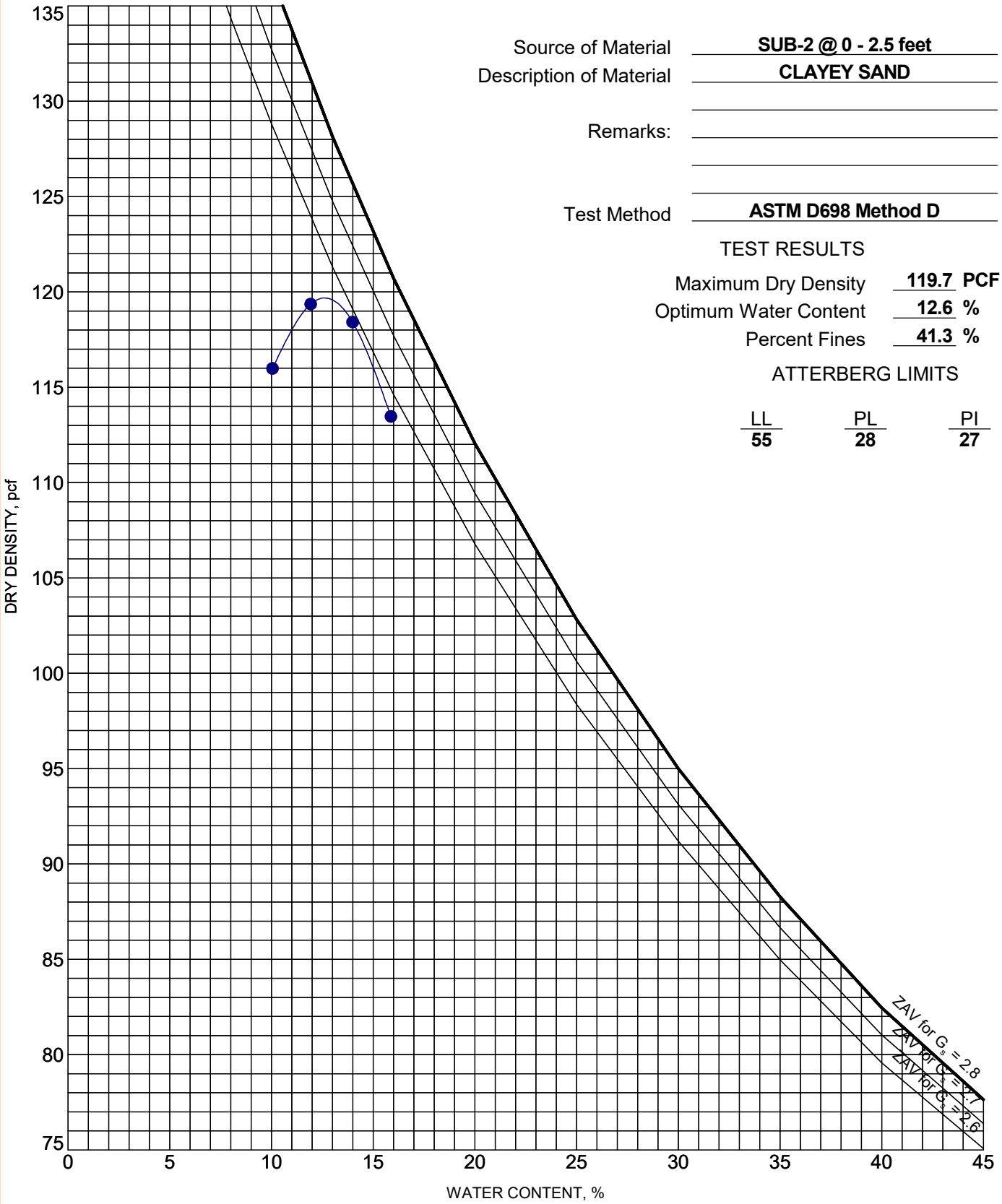
MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557



Source of Material	**SUB-2 @ 0 - 2.5 feet**
Description of Material	**CLAYEY SAND**
Remarks:	
Test Method	**ASTM D698 Method D**

TEST RESULTS

Maximum Dry Density	**119.7 PCF**
Optimum Water Content	**12.6 %**
Percent Fines	**41.3 %**

ATTERBERG LIMITS

LL	PL	PI
55	**28**	**27**

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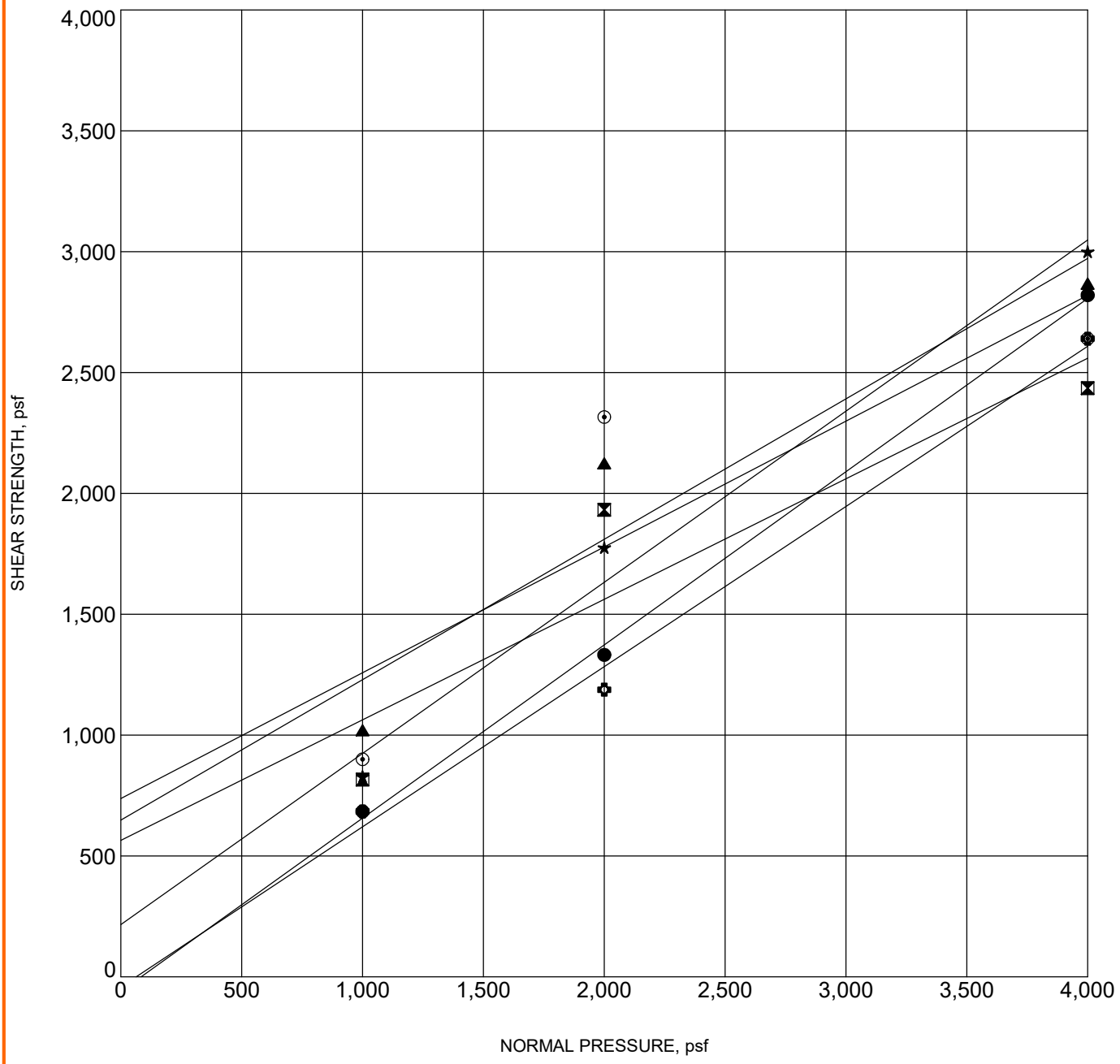
San Francisco, CA

DIRECT SHEAR TEST ASTM D3080



Specimen Identification			Classification	γ_d, pcf	WC,%	c, psf	$\phi°$
●	B-03	7.5ft	CLAYEY SAND (SC)	97	19	0	35
⊠	B-08	10.0ft	SANDY LEAN CLAY (CL)	100	27	564	27
▲	B-14	10.0ft	SILTY CLAYEY SAND (SC-SM)	108	18	648	30
★	B-19	7.5ft	SILTY CLAYEY SAND (SC-SM)	87	23	216	35
⊙	B-29	7.5ft	SANDY LEAN CLAY (CL)	113	9	738	27
✿	B-35	7.5ft	SILTY CLAYEY SAND (SC-SM)	92	12	0	33

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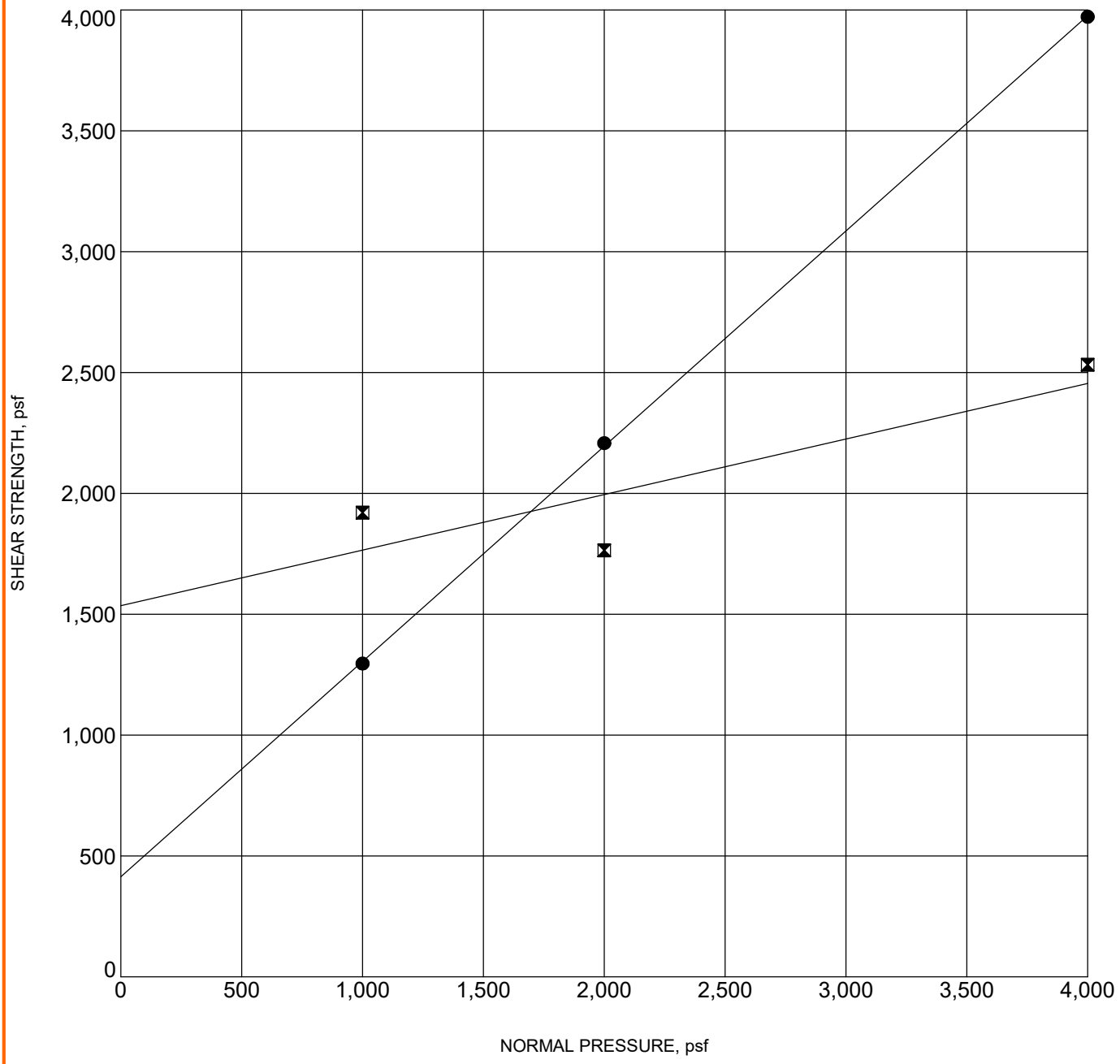
DIRECT SHEAR TEST ASTM D3080



Specimen Identification			Classification	γ_d, pcf	WC,%	c, psf	$\phi°$
●	B-36	10.0ft	CLAYEY SAND (SC)	116	13	414	42
⊠	SUB-2	10.0ft	SANDY LEAN CLAY (CL)	107	9	1536	13

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GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

Sienna Solar ■ Lucerne Valley, CA

Terracon Project No. 60225032

SAMPLING

- Auger Cuttings
- Modified Dames & Moore Ring Sampler
- Grab Sample
- No Recovery
- Standard Penetration Test

WATER LEVEL

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

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

FIELD TESTS

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

DESCRIPTIVE SOIL CLASSIFICATION

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

LOCATION AND ELEVATION NOTES

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

STRENGTH TERMS

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

RELEVANCE OF SOIL BORING LOG

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

UNIFIED SOIL CLASSIFICATION SYSTEM

Terracon GeoReport

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

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

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

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

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

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

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

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

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

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

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

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

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

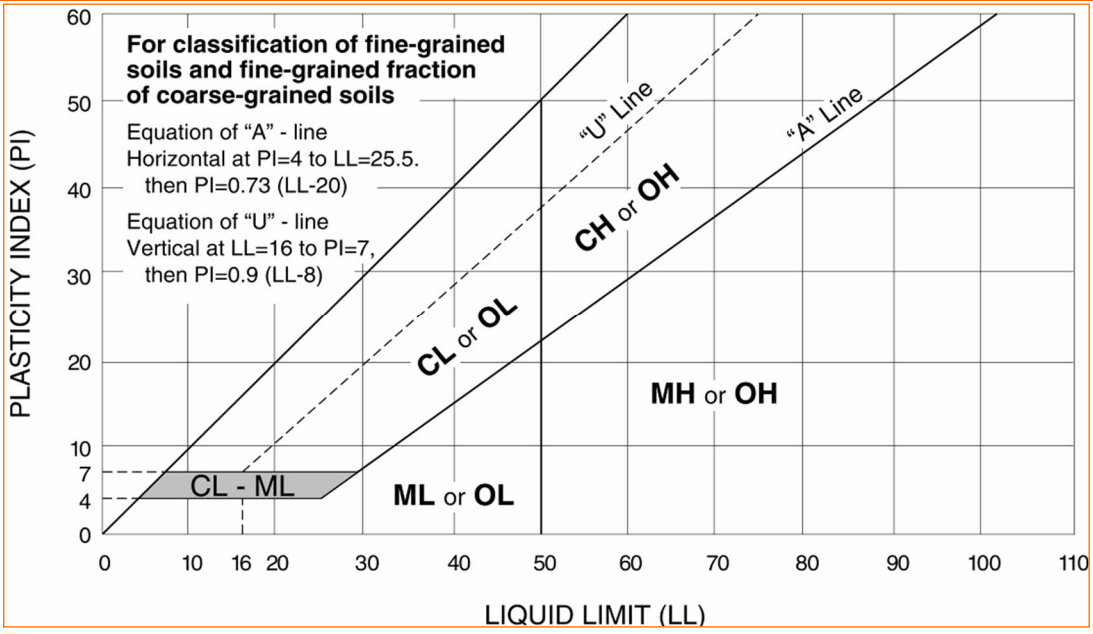
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

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

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

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

[Q] PI plots below "A" line.



	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
VI. GEOLOGY AND SOILS. Would the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☒	☐
ii) Strong seismic ground shaking?	☐	☐	☒	☐
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☒	☐
iv) Landslides?	☐	☐	☒	☐
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☒	☐
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☒	☐	☐
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	☐	☒	☐	☐
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☒	☐	☐	☐