Ninyo & Moore
Geotechnical and Environmental Sciences Consultants

GEOTECHNICAL EVALUATION
TIERRA DEL SOL SOLAR PROJECT
BOULEVARD, CALIFORNIA

PREPARED FOR:
Soitec Solar Development
16550 Via Esprillo
San Diego, California 92127

PREPARED BY:
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November 9, 2012
Project No. 107418001

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November 9, 2012
Project No. 107418001

Mr. Patrick Brown
Soitec Solar Development
16550 Via Esprillo
San Diego, California 92127

Subject: Geotechnical Evaluation
Tierra Del Sol Solar Project
Boulevard, California

Dear Mr. Brown:

In accordance with your request and authorization, we are providing this geotechnical evaluation for the proposed Tierra Del Sol Solar Project in Boulevard, California. This report has been prepared in accordance with our work order dated September 27, 2012 and presents our findings, conclusions, and recommendations regarding the geotechnical aspects of the project. We appreciate the opportunity to be of service on this project.

Sincerely,
NINYO & MOORE

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1. INTRODUCTION

In accordance with your request and authorization, we have performed a geotechnical evaluation for the proposed Tierra Del Sol Solar Project in Boulevard, California (Figure 1). This report has been prepared in accordance with our September 27, 2012 work order. Presented in this report are the results of our background review, field explorations, geotechnical laboratory and thermal analysis testing, our conclusions regarding the geotechnical conditions at the site, and our recommendations for the design and earthwork construction of this project.

2. SCOPE OF SERVICES

Ninyo & Moore's scope of services for this project included review of pertinent background data, performance of a geologic reconnaissance, and engineering analysis with regard to the proposed construction. These services generally follow the scope outlined in the work order dated September 27, 2012. Specifically, we performed the following tasks:

- Reviewing background information including readily available geologic maps and topographic maps.
- Performing a site reconnaissance to observe existing conditions and mark boring and test pit locations.
- Contacting and coordinating with Underground Service Alert (USA) to clear the boring and test pit locations for potential conflicts with underground utilities.
- Performing a subsurface evaluation consisting of the drilling of 15 exploratory borings and excavating four test pits.
- Collecting representative bulk and in-place samples of the soils from the borings and test pits. The samples were then transported to our in-house geotechnical laboratory for analysis.
- Retaining a licensed geophysical subconsultant to perform a non-invasive survey of the site. Services performed by the geophysical subconsultant included five field electrical resistivity tests.
- Performing geotechnical laboratory testing on representative samples to evaluate soil parameters for design and classification purposes.

- Performing engineering analyses of the site geotechnical conditions based on data obtained from our background review, field explorations, and geotechnical and thermal analysis.
- Preparing this geotechnical evaluation report describing the findings and conclusions of our studies regarding site conditions that may affect the proposed development.

Our scope of services did not include environmental consulting services such as hazardous waste sampling or analytical testing at the site. If requested, our office can prepare a scope of services and fee proposal for those services.

3. SITE AND PROJECT DESCRIPTION

The site consists of an irregularly shaped parcel located between Tierra del Sol Road and the international border and east of Tierra del Luna in Boulevard, California (Figure 1). Approximately 420 acres in size, the site encompasses Assessor's Parcel Numbers (APN) 658-090-31, -54, and -55, and 658-120-02 and -03. The site is relatively gently rolling with elevations ranging from approximately 3,740 feet above mean sea level (MSL) in the west-central portion of the site to approximately 3,530 near the southeastern corner of the site. The site is currently undeveloped except for the remains of a residence with several out-buildings, several unpaved roads, and power line towers. A hand dug well of unknown depth is located near the residence. Several other wells are scattered across the site. Vegetation at the site consists of a moderate to dense growth of brush with moderate to large trees in the western portion of the site.

We understand that the project will include the development of a solar farm intended to provide 60 Megawatts (MW) of power. Specifically, the site will support approximately 2,538 individual concentrated photovoltaic (CPV) solar trackers. We understand that the CPV solar trackers will be supported on footings approximately 16 feet deep, comprised of 30-inch diameter auger-drilled caissons. Construction will also include inverter pads, an operations and maintenance building, fire access and service roads, and other associated improvements.

4. FIELD EXPLORATION

The field exploration for this evaluation included a subsurface exploration and geophysical surveying. A summary of the field exploration program is presented in the following sections.

4.1. Exploratory Borings and Test Pits

Our subsurface exploration was conducted on October 8, through 10 , 2012, and included drilling, logging, and sampling of 15 small-diameter borings and excavating four test pits. The borings were drilled to depths of up to approximately 19 feet using a truck-mounted drill rig equipped with 8-inch diameter, continuous-flight, hollow-stem augers. The test pits were excavated to depths of up to approximately 8½ feet using a backhoe equipped with a 36-inch bucket. Ninyo & Moore personnel logged the borings and test pits in general accordance with the Unified Soil Classification System (USCS). Representative bulk and in-place soil samples were collected at selected depths from within the exploratory borings and test pits and then returned to our in-house geotechnical laboratory for analysis. Boring and test pit logs are presented in Appendix A. The approximate locations of the borings and test pits are presented on Figure 2.

4.2. Seismic Refraction Surveys

A registered geophysical consultant was retained to perform five seismic refraction surveys across the site. The test locations were spaced to provide coverage of the project site and their approximate locations are shown on Figure 2. The test results and a description of the equipment and testing procedures used are presented in Appendix B.

4.3. Field Electrical Resistivity Surveys

A registered geophysical consultant was retained to perform five electrical resistivity surveys of the site. The test locations were spaced to provide coverage of the project site and their approximate locations are shown on Figure 2. The test results and a description of the equipment and testing procedures used are presented in Appendix B.

The in-situ field resistivity data was collected in general accordance with the ASTM International (ASTM) G 57 using a Supersting R8 Resistivity Meter and four electrodes in a Wenner configuration. Soil resistivity measurements were collected at electrode spacings of 2, 5, 10, 20, 30, and 40 feet.

In general, the field resistivity data collected are of good quality. With the exception of R-5 where values vary between orthogonal readings, the measurements collected along the orthogonal soundings were fairly consistent, indicating homogeneous conditions at depth.

5. LABORATORY TESTING

Geotechnical laboratory testing was performed on representative soil samples collected during the subsurface exploration. This testing included an evaluation of in-place moisture content and dry density, direct shear strength, modified Proctor density, soil corrosivity, R-value, and thermal resistivity. The results of the in-situ dry density and moisture content tests are presented on the boring logs in Appendix A. Descriptions of the geotechnical laboratory test methods and the results of the other laboratory tests performed are presented in Appendix C.

6. GEOLOGY AND SUBSURFACE CONDITIONS

Our findings regarding regional and site geology, rippability (excavatability), faulting and seismicity, groundwater conditions, landsliding, and flooding at the site are provided in the following sections.

6.1. Regional Geologic Setting

The project is situated in the coastal foothill section of the Peninsular Ranges Geomorphic Province. This geomorphic province encompasses an area that extends approximately 900 miles from the Transverse Ranges and the Los Angeles Basin south to the southern tip of Baja California (Norris and Webb, 1990; Harden, 1998). The province varies in width from approximately 30 to 100 miles. In general, the province consists of rugged mountains underlain by Jurassic metavolcanic and metasedimentary rocks, and Cretaceous igneous rocks of the southern California batholith.

The Peninsular Ranges Province is traversed by a group of sub-parallel faults and fault zones trending approximately northwest. Several of these faults, shown on Figure 4, are considered active faults. These include the Elsinore, San Jacinto, and San Andreas faults located northeast of the project area and the Rose Canyon, Coronado Bank, San Diego Trough, and San Clemente faults located west of the project area. The Elsinore Fault Zone, the nearest active fault system, has been mapped approximately 20 miles northeast of the project site. Major tectonic activity associated with these and other faults within this regional tectonic framework consists primarily of right-lateral, strike-slip movement.

6.2. Site Geology (Subsurface Conditions)

Based on our reconnaissance and subsurface evaluation, the site is underlain by weathered to fresh granitic rock of the Tonalite of La Posta (also referred to as the La Posta Quartz Diorite) and alluvium/colluvium. Surficial soils such as topsoil and minor fills are also present but are generally less than 2 feet thick. Generalized descriptions of the units encountered are provided in the subsequent sections. Additional descriptions of the subsurface units are provided on the exploration logs in Appendix A.

6.2.1. Topsoil

Although not mapped, topsoil is present at scattered locations across the site. These materials were encountered in borings and test pits to a depth of up to 2 feet. As encountered, the topsoil consisted of light to dark brown, dry to damp, loose, silty fine to medium sand.

6.2.2. Alluvium/Colluvium

Although not mapped, alluvium/colluvium is present at scattered locations across the site. These materials were encountered in boring B-8 to a depth of 4 feet. As encountered, the alluvium/colluvium consisted of dark brown, damp, loose, silty fine to medium sand.

6.2.3. Granitic Rock

Granitic rock of the Tonalite of La Posta has been mapped across the site and was encountered in our borings beneath the topsoil and alluvium/colluvium to the depths explored. As encountered, the granitic rock materials generally consisted of reddish brown, dry to damp, weathered granitic rock. Refusal was encountered, during drilling (using CME 75 rig), in the borings at depths ranging from approximately 7.5 feet to 19 feet. Refusal was also encountered in the test pits (using backhoe with 36-inch bucket) at depths ranging from 5 feet to 8.5 feet.

6.3. Rippability and Excavation Characteristics

Based on the results of our exploratory borings and test pits, seismic refraction traverses, and our experience with similar soils, it is our opinion that the on-site topsoil and alluvium/colluvium can be excavated using heavy-duty earthmoving equipment in good working condition. Difficult excavation or heavy ripping and drilling should be anticipated in granitic rock.

6.4. Groundwater

Groundwater was not encountered within the upper 19 feet of soil during our subsurface exploration. Based on our experience in the site area, we anticipate that, the regional groundwater elevation is at a depth greater than 30 feet. However, it should be noted that fluctuations in groundwater typically occur due to variations in precipitation, ground surface topography, subsurface stratification, irrigation, groundwater pumping and other factors.

6.5. Faulting and Seismicity

Like most of southern California, the project area is considered to be seismically active. Based on our review of the referenced geologic maps and stereoscopic aerial photographs, as well as on our geologic field mapping, the subject site is not underlain by known active or potentially active faults (i.e., faults that exhibit evidence of ground displacement in the last 11,000 years and 2,000,000 years, respectively). However, the site is located in a seismically active area, as is the majority of southern California, and the potential for strong ground motion is considered significant during the design life of the proposed structure. The nearest known active fault is the Coyote Mountain Strand of the Elsinore fault, located approximately 20 miles northeast of the site. Table 1 lists selected principal known active faults within 62 miles that may affect the subject site, the maximum moment magnitude (M_{max}) and the fault types as published for the California Geological Survey (CGS) by Cao et al. (2003). The approximate fault to site distance was calculated by the computer program FRISKSP (Blake, 2001).

Table 1 – Principal Active Faults

Fault	Distance miles [1]	Moment Magnitude/Fault Type [1,2]
Elsinore – Coyote Mountain	20	6.8/A
Elsinore - Julian	25	7.1/A
Laguna Salada	27	7.0/A
Earthquake Valley	33	6.5/B
San Jacinto – Borrego	35	6.6/A
Superstition Mountain - San Jacinto	36	6.6/A
Superstition Hills - San Jacinto	40	6.6/A
Elmore Ranch	40	6.6/B
San Jacinto – Coyote Creek	42	6.8/A
San Jacinto – Anza	47	7.2/A
Rose Canyon	48	7.2/B
Imperial	49	7.0/A
Coronado Bank	52	7.6/B
Brawley Seismic Zone	53	6.4/B
San Andreas	62	7.2/A

Notes:
[1] Blake (2001)
[2] Cao, et al. (2003)

In general, hazards associated with seismic activity include strong ground motion, ground rupture, liquefaction, and seismically induced settlement. These hazards are discussed in the following sections.

6.5.1. Strong Ground Motion

The 2010 California Building Code (CBC) recommends that the design of structures be based on the peak horizontal ground acceleration (PGA) having a 2 percent probability of exceedance in 50 years which is defined as the Maximum Considered Earthquake (MCE). The statistical return period for PGA_{MCE} is approximately 2,475 years. The Design Earthquake (PGA_{DE}) corresponds to two-thirds of the PGA_{MCE}. In evaluating the seismic hazards associated with the project site, we have selected Site Class B for the site. The Site Class selection is based on a review of standard penetration resistance from our borings. The site modified PGA_{MCE} was estimated to be 0.45g using the United States Geological Survey (USGS) (USGS, 2012) ground motion calculator (web-based) and the corresponding PGA_{DE} for the site is 0.30g.

6.5.2. Ground Rupture

Based on our review of the referenced literature and our site reconnaissance, no active faults are known to cross the project vicinity. Therefore, the potential for ground rupture due to faulting at the site is considered low. However, lurching or cracking of the ground surface as a result of nearby seismic events is possible.

6.5.3. Liquefaction and Seismically Induced Settlement

Liquefaction of cohesionless soils can be caused by strong vibratory motion due to earthquakes. Research and historical data indicate that loose granular soils and non-plastic silts that are saturated by a relatively shallow groundwater table are susceptible to liquefaction. Based on the dense nature of the underlying granitic rock, it is our opinion that liquefaction and seismically induced settlement at the site are not design considerations.

6.6. Landsliding

Based on our review of the original geotechnical evaluation for the site, other published geologic literature, and aerial photographs and our subsurface evaluation, no landslides or related features underlie or are adjacent to the subject site.

7. CONCLUSIONS

Based on our review of the referenced background data, subsurface explorations, geotechnical laboratory testing, and geophysical surveys, it is our opinion that construction of the proposed solar farm is feasible from a geotechnical standpoint provided the recommendations presented in this report are incorporated into the design and construction of the project. In general, the following conclusions were made:

- Based on the results of our field and laboratory evaluations, the site is underlain by topsoil, alluvium/colluvium, and granitic rock.
- Based on our field evaluations, it is our opinion that the topsoil and alluvium/colluvium can be excavated using heavy-duty earthmoving equipment in good working condition. Difficult excavation or heavy ripping and drilling should be anticipated in granitic rock.
- Groundwater was not encountered during our subsurface evaluation to a depth of approximately 19 feet below the ground surface. Consequently, groundwater is not anticipated to be a design consideration.
- The nearest known active fault is the Coyote Mountain Strand of the Elsinore fault, which is located approximately 20 miles northeast of the site.
- Based on the results of our limited soil corrosivity tests and Caltrans corrosion guidelines (2003), the site would not be classified as corrosive.

8. RECOMMENDATIONS

The following recommendations are provided for the design and construction of the proposed project. The proposed site improvements should be constructed in accordance with the requirements of the applicable governing agencies.

8.1. Earthwork

In general, earthwork should be performed in accordance with the recommendations presented in this report. Ninyo & Moore should be contacted for questions regarding the recommendations or guidelines presented herein.

8.1.1. Site Preparation

Site preparation should begin with the removal of existing vegetation, utility lines, and other deleterious debris from areas to be graded. Roots should be removed to such a depth that organic material is generally not present. Clearing and grubbing should extend to the outside of the proposed excavation and fill areas. The debris and unsuitable material generated during clearing and grubbing should be removed from areas to be graded and disposed of at a legal dumpsite. Soils in areas disturbed by demolition activities should be replaced as compacted fill.

8.1.2. Excavation Characteristics

As noted in previous section, the on-site topsoil and alluvium/colluvium can be excavated using heavy-duty earthmoving equipment in good working condition. Difficult drilling, excavation, and heavy ripping should be anticipated in granitic rock.

8.1.3. Remedial Grading of Surficial Soils

Surficial soils and alluvium/colluvium are relatively loose. In areas where shallow, spread footings and/or surface hardscapes may be constructed, remedial grading of these materials should be performed. Remedial grading in these locations should include the overexcavation of the existing loose site soils to a depth of 1 foot below the pavement, sidewalk, or other exterior flatwork sections and 2 feet below the bottom of structural spread footings or to a depth that exposes bedrock, whichever is shallower. The overexcavation should extend laterally a horizontal distance equal to the depth of overexcavation below the finished surface grade beyond the limits of the shallow, spread footings and/or surface hardscapes. The resulting removal surface should then be scarified approximately 8 inches, moisture-conditioned to near optimum moisture content, and recompacted to a relative compaction of 90 percent as evaluated by ASTM D 1557. The resultant excavation should then be backfilled with compacted fill derived from the on-site soils. The actual limits and depths of removals should be evaluated by Ninyo & Moore's representative in the field based on the materials exposed.

Remedial grading of the loose surficial soils is not needed for the construction or design of pile foundations. Design recommendations for the pile foundations that are presented in the following sections account for this condition.

8.1.4. Materials for Fill and Backfill

On-site soils with an organic content of generally less than 3 percent by volume (or 1 percent by weight) are considered suitable for reuse as utility trench backfill or subgrade soils for concrete pads and pavements. Fill material should generally not contain rocks or lumps over 3 inches in largest dimension, and not more than 30 percent larger than ¾ inch. Larger chunks, if generated during excavation, may be broken into acceptably sized pieces or disposed of off-site.

Although not anticipated, imported fill material should generally be granular soils with a low expansion potential (i.e., an expansion index of 50 or less as evaluated by the ASTM D 4829). Import materials should also be non-corrosive. We recommend that the imported materials satisfy the Caltrans (2003) and American Concrete Institute (ACI) 318 criteria for non-corrosive soils (i.e., soils having a chloride concentration of 500 parts per million [ppm] or less, a soluble sulfate content of approximately 0.10 percent [1,000 ppm] or less, a pH value of 5.5 or higher, or an electrical resistivity of 1,000 ohm-cm or higher). Materials for use as fill should be evaluated by Ninyo & Moore’s representative prior to filling or importing. Do not import soils that exhibit a known risk to human health, the environment, or both.

8.1.5. Compacted Fill

Prior to placement of compacted fill, the contractor should request an evaluation of the exposed ground surface by Ninyo & Moore. Unless otherwise recommended, the exposed ground surface should then be scarified to a depth of approximately 8 inches and watered or dried, as needed, to achieve generally consistent moisture contents at or near the optimum moisture content. The scarified materials should then be compacted to a relative compaction of 90 percent as evaluated by ASTM D 1557. The evaluation of compaction by Ninyo & Moore should not be considered to preclude any requirements for observation or approval by governing agencies. It is the contractor's responsibility to notify this office and the appropriate governing agency when project areas are ready for observation, and to provide reasonable time for that review.

Fill materials should be moisture-conditioned to generally above the laboratory optimum moisture content prior to placement. The optimum moisture content will vary with material type and other factors. Moisture-conditioning of fill soils should be generally consistent within the soil mass.

Prior to placement of additional compacted fill material following a delay in the grading operations, the exposed surface of previously compacted fill should be prepared to receive fill. Preparation may include scarification, moisture-conditioning, and recompaction.

Compacted fill should be placed in horizontal lifts of approximately 8 inches in loose thickness. Prior to compaction, each lift should be watered or dried as needed to achieve a moisture content generally above the laboratory optimum, mixed, and then compacted by mechanical methods to a relative compaction of 90 percent as evaluated by ASTM D 1557. Successive lifts should be treated in a like manner until the desired finished grades are achieved.

8.1.6. Temporary Excavations

For temporary excavations, we recommend that the following Occupational Safety and Health Administration (OSHA) soil classifications be used:

Topsoil and Alluvium/Colluvium	*Type C*
Granitic Rock	*Type B*

Upon making the excavations, the soil classifications and excavation performance should be evaluated in the field in accordance with the OSHA regulations. Temporary excavations should be constructed in accordance with OSHA recommendations. For trench or other excavations, OSHA requirements regarding personnel safety should be met using appropriate shoring (including trench boxes) or by laying back the slopes to a slope ratio no steeper than 1.5:1 (horizontal:vertical) in alluvium/colluvium and 1:1 in granitic rock.

Temporary excavations that encounter seepage may be shored or stabilized by placing sandbags or gravel along the base of the seepage zone. Excavations encountering seepage should be evaluated on a case-by-case basis. On-site safety of personnel is the responsibility of the contractor.

8.1.7. Drainage

Roof, pad, and slope drainage should be diverted such that runoff water is diverted away from slopes and structures to suitable discharge areas by nonerodible devices (e.g., gutters, downspouts, concrete swales, etc.). Positive drainage adjacent to structures should be established and maintained. Positive drainage may be accomplished by providing drainage away from the foundations of the structure at a gradient of 2 percent or steeper for a distance of 5 feet or more outside the building perimeter, and further maintained by a graded swale leading to an appropriate outlet, in accordance with the recommendations of the project civil engineer and/or landscape architect.

Surface drainage on the site should be provided so that water is not permitted to pond. A gradient of 2 percent or steeper should be maintained over the pad area and drainage patterns should be established to divert and remove water from the site to appropriate outlets.

Care should be taken by the contractor during final grading to preserve any berms, drainage terraces, interceptor swales or other drainage devices of a permanent nature on or adjacent to the property. Drainage patterns established at the time of final grading should be maintained for the life of the project. The property owner and the maintenance personnel should be made aware that altering drainage patterns might be detrimental to slope stability and foundation performance.

8.2. Seismic Design Parameters

The proposed improvements should be designed in accordance with the requirements of governing jurisdictions and applicable building codes. Table 2 presents the seismic design parameters for the site in accordance with CBC (2010) guidelines and mapped spectral acceleration parameters (United States Geological Survey [USGS], 2012).

Table 2 – Seismic Design Factors

Factors	Values
Site Class	B
Site Coefficient, F_a	1.0
Site Coefficient, F_v	1.0
Mapped Short Period Spectral Acceleration, S_S	1.12g
Mapped One-Second Period Spectral Acceleration, S_1	0.37g
Short Period Spectral Acceleration Adjusted For Site Class, S_{MS}	1.12g
One-Second Period Spectral Acceleration Adjusted For Site Class, S_{M1}	0.37g
Design Short Period Spectral Acceleration, S_{DS}	0.75g
Design One-Second Period Spectral Acceleration, S_{D1}	0.24g

8.3. Foundations

Based on the results of our geotechnical evaluation, the site is underlain by topsoil, alluvium/colluvium, and bedrock. The proposed operations and maintenance building and inverter pads founded in compacted fill or bedrock may be supported on shallow foundations. The proposed solar trackers founded in compacted fill or bedrock may be supported on either shallow foundations with ground anchors or cast-in-drilled-hole (CIDH) piles. Solar trackers typically impose relatively light axial loads on the foundations. We anticipate that the foundation dimensions will be generally controlled by the lateral load or uplift demand.

8.3.1. Shallow Foundations

Shallow, spread or continuous footings bearing on compacted fill or bedrock, may be designed using a net allowable bearing capacity of 3,000 pounds per square foot (psf). The allowable bearing capacity may be increased by 500 psf for every foot of increase in width or depth of the footing up to a value of 5,000 psf. These allowable bearing capacities may be increased by one-third when considering loads of short duration such as wind or seismic forces. Spread footings should be founded 24 inches or more below the lowest adjacent grade. Continuous footings should have a width of 15 inches or more and isolated footings should be 24 inches or more in width. The spread footings should be reinforced in accordance with the recommendations of the project structural engineer.

For resistance of footings to lateral loads, we recommend a passive pressure of 300 psf per foot of depth be used with a value of up to 3,000 psf. For the portion of the footings embedded in bedrock, we recommend a passive pressure of 450 psf per foot of depth be used with a value of up to 4,500 psf. This value assumes that the ground is horizontal for a distance of 10 feet, or three times the height generating the passive pressure, whichever is greater. We recommend that the upper 1 foot of soil not protected by pavement or a concrete slab be neglected when calculating passive resistance.

For frictional resistance to lateral loads, we recommend a coefficient of friction of 0.45 be used between soil and concrete. The allowable lateral resistance can be taken as the sum of the frictional resistance and passive resistance provided the passive resistance does not exceed one-half of the total allowable resistance. The passive resistance values may be increased by one-third when considering loads of short duration such as wind or seismic forces.

We estimate that the proposed structures, designed and constructed with shallow foundations as recommended herein, will undergo total settlement on the order of 1 inch. Differential settlement on the order of ½ inch over a horizontal span of 40 feet should be expected.

8.3.2. Pile Foundations

Pile foundations for the solar trackers may consist of CIDH piles. Geotechnical recommendations for this foundation option are provided below. The type, depth, and size of the foundations should be evaluated by the structural engineer based on the loading conditions, the geotechnical recommendations, and field testing. We recommend that the foundation plans and design submittal be reviewed by this office for general conformance to these recommendations prior to finalizing.

8.3.2.1. Cast-in-Drilled-Hole Piles

If selected for the project, we recommend that the pile dimensions (i.e., diameter and embedment) of CIDH foundations be evaluated by the project structural engineer using the recommendations presented herein. Based on our discussions with the designers, we understand that 30-inch-diameter, 16 feet long CIDH pile is being considered as an option. We evaluated the axial capacities (compression and uplift) of this pile using the soil parameters presented in Table 4 in the following section. Compression capacity was evaluated using frictional resistance and end bearing. Tension (uplift) capacity was evaluated using frictional resistance and weight of the pile. A factor of safety of 2.0 was used in evaluating allowable compression and uplift capacities. The results of axial pile capacity evaluation are summarized in Table 3.

Table 3 – Axial Pile Capacity Evaluation

CIDH Pile Diameter, (inches)	Pile Length, (feet)	Ultimate Downward Capacity, (kips)	Allowable Capacity, (kips)	
			Compression	Tension (Uplift)
30	16	450	225	22

Construction of CIDH piles should be observed by personnel from our offices during drilling to evaluate if the piles have been extended to the recommended depths. The drilled holes should be cleaned of loose soil and gravel. It is the contractor's responsibility to take the appropriate measures to provide for the integrity of the drilled holes and to see that the holes are cleaned and straight and that sloughed loose soil is removed from the bottom of the hole prior to the placement of concrete. Drilled CIDH piles should be checked for alignment and plumbness during installation. The amount of acceptable misalignment of a pile is approximately 3 inches from the plan location. It is usually acceptable for a pile to be out of plumb by 1 percent of the depth of the pile. The center-to-center spacing of piles should be no less than three times the nominal diameter of the pile. We recommend that special measures, such as placement of concrete by tremie method, are implemented to see that the aggregate and cement do not segregate during concrete placement. Additionally, the contractor should be prepared to encounter and address issues associated with caving soils and drilling difficulties due to the presence of buried debris.

8.3.2.2. Lateral Pile Analysis Parameters

We understand that the lateral pile analysis will be performed by the designers. For performing lateral pile capacity analysis, we recommend the use of the following parameters:

Table 4 – Axial and Lateral Analysis Input Parameters

Unit	Depth (feet)	Soil Type	Total Unit Weight (pcf)	Friction Angle	Cohesion (pcf)	Subgrade Modulus, k (pci)
Allvium/ Colluvium	0 - 4	Sand	100	28	0	25
Weathered Granitic Rock	4 - 10	Sand	115	36	0	225
Weathered Granitic Rock	10 - 20	Sand	125	38	0	225

Notes:
pcf - pounds per cubic foot
pci – pounds per cubic inch

For lateral loading, piles in a group may be considered to act individually when the center-to-center spacing is greater than 3D (where, D is the diameter of the pile) in the direction normal to loading and greater than 5D in the direction parallel to loading. The following table presents the lateral load reduction factors to be applied for various pile spacing for in-line loading.

Table 5 – Lateral Load Group Reduction Factors

Center-to-Center Pile Spacing for In-Line Loading	Reduction Factor*		
	Row 1	Row 2	Row 3 and higher
3D	0.8	0.40	0.3
5D	1.0	0.85	0.7

Note:
* Based on AASHTO LRFD Bridge Design Specifications, 5th Edition, 2010 Interim Revision

8.4. Preliminary Flexible Pavement Design

For design of flexible pavements, we have used Traffic Indices (TI) of 5, 6, and 7 to represent the volume and loading of the traffic for site pavements. If traffic loads are different from those assumed, the pavement design should be re-evaluated. Actual pavement recommendations should be based on R-value tests performed on bulk samples of the soils exposed at the finished subgrade elevations once grading operations have been performed.

The resistance (R-value) characteristics of the subgrade soils were evaluated by conducting laboratory testing on a representative soil sample obtained from our test pit. The test result indicated an R-value of 37. Due to the variability of on-site soils, we used an R-value of 30 in our analysis. The preliminary recommended flexible pavement sections are as follows:

Table 6 – Recommended Pavement Sections

Traffic Index	R-value	Asphalt Concrete (inches)	Class 2 Aggregate Base (inches)
5.0	30	3.0	5.5
6.0	30	3.5	7.5
7.0	30	4.0	9.5

We recommend that the upper 12 inches of the subgrade and aggregate base materials be compacted to 95 percent relative compaction as evaluated by ASTM D 1557. The pavement sections should provide an approximate pavement life of 20 years. If traffic loads are different from those assumed, the pavement design should be re-evaluated.

8.5. Preliminary Gravel Road Design

We understand that gravel access roads may be constructed at the site. We recommend that the gravel roads consist of 6 inches of compacted Class 2 aggregate base to handle truck and construction equipment loads during the lifespan of the project. We recommend that the upper 12 inches of the subgrade and the aggregate base materials be compacted to 95 percent relative compaction as evaluated by ASTM D 1557. Gravel access roads will require periodic maintenance.

8.6. Preliminary Dirt Road Design

We understand that dirt access roads may be constructed at the site for light trucks and maintenance vehicles. For dirt access roads, we recommend that the upper 12 inches of the subgrade be compacted to 95 percent relative compaction as evaluated by ASTM D 1557. Dirt access roads will require periodic maintenance.

8.7. Corrosion

Laboratory testing was performed on a representative sample of the on-site earth materials to evaluate pH and electrical resistivity, as well as chloride and sulfate contents. The pH and electrical resistivity tests were performed in accordance with the California Test (CT) 643 and the sulfate and chloride content tests were performed in accordance with CT 417 and CT 422, respectively. These laboratory test results are presented in Appendix C.

The results of the corrosivity testing indicated an electrical resistivity of 6,500 ohm-cm, a soil pH of 7.1, a chloride content of 75 ppm and a sulfate content of 0.003 percent (i.e., 30 ppm). Based on the Caltrans corrosion (2003) and ACI criteria, the on-site soils would not be classified as corrosive. Corrosive soils are defined as soils with more than 500 ppm chlorides, more than 0.1 percent sulfates, a pH of less than 5.5, or an electrical resistivity of 1,000 ohm-cm or less.

8.8. Concrete

Concrete in contact with soil or water that contains high concentrations of water-soluble sulfates can be subject to premature chemical and/or physical deterioration. As stated above, the soil sample tested in this evaluation indicated a water-soluble sulfate content of 0.003 percent by weight (i.e., about 30 ppm). According to ACI 318 building code, the potential for sulfate attack is negligible for a water-soluble sulfate content of less than 0.10 percent by weight (i.e., 1,000 and ppm) in soils. Therefore, the site soils may be considered to have a negligible potential for sulfate attack. However, due to the possible variability of on-site soils, consideration should be given to using Type V cement for concrete construction on site.

8.9. Pre-Construction Conference

We recommend that a pre-construction meeting be held prior to commencement of grading. The owner or his representative, the agency representatives, the architect, the civil engineer, Ninyo & Moore, and the contractor should attend to discuss the plans, the project, and the proposed construction schedule.

8.10. Plan Review and Construction Observation

The conclusions and recommendations presented in this report are based on analysis of observed conditions in widely spaced exploratory borings. If conditions are found to vary from those described in this report, Ninyo & Moore should be notified, and additional recommendations will be provided upon request. Ninyo & Moore should review the final project drawings and specifications prior to the commencement of construction. Ninyo & Moore should perform the needed observation and testing services during construction operations.

The recommendations provided in this report are based on the assumption that Ninyo & Moore will provide geotechnical observation and testing services during construction. In the event that it is decided not to utilize the services of Ninyo & Moore during construction, we request that the selected consultant provide the client with a letter (with a copy to Ninyo & Moore) indicating that they fully understand Ninyo & Moore's recommendations, and that they are in full agreement with the design parameters and recommendations contained in this report. Construction of proposed improvements should be performed by qualified subcontractors utilizing appropriate techniques and construction materials.

9. LIMITATIONS

The field evaluation, laboratory testing, and geotechnical analyses presented in this report have been conducted in general accordance with current practice and the standard of care exercised by geotechnical consultants performing similar tasks in the project area. No warranty, expressed or implied, is made regarding the conclusions, recommendations, and opinions presented in this report. There is no evaluation detailed enough to reveal every subsurface condition. Variations may exist and conditions not observed or described in this report may be encountered during construction. Uncertainties relative to subsurface conditions can be reduced through additional subsurface exploration. Additional subsurface evaluation will be performed upon request. Please also note that our evaluation was limited to assessment of the geotechnical aspects of the project, and did not include evaluation of structural issues, environmental concerns, or the presence of hazardous materials.

This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Ninyo & Moore should be contacted if the reader requires additional information or has questions regarding the content, interpretations presented, or completeness of this document.

This report is intended for design purposes only. It does not provide sufficient data to prepare an accurate bid by contractors. It is suggested that the bidders and their geotechnical consultant perform an independent evaluation of the subsurface conditions in the project areas. The independent evaluations may include, but not be limited to, review of other geotechnical reports prepared for the adjacent areas, site reconnaissance, and additional exploration and laboratory testing.

Our conclusions, recommendations, and opinions are based on an analysis of the observed site conditions. If geotechnical conditions different from those described in this report are encountered, our office should be notified, and additional recommendations, if warranted, will be provided upon request. It should be understood that the conditions of a site could change with time as a result of natural processes or the activities of man at the subject site or nearby sites. In addition, changes to the applicable laws, regulations, codes, and standards of practice may occur due to government action or the broadening of knowledge. The findings of this report may, therefore, be invalidated over time, in part or in whole, by changes over which Ninyo & Moore has no control.

This report is intended exclusively for use by the client. Any use or reuse of the findings, conclusions, and/or recommendations of this report by parties other than the client is undertaken at said parties' sole risk.

10. REFERENCES

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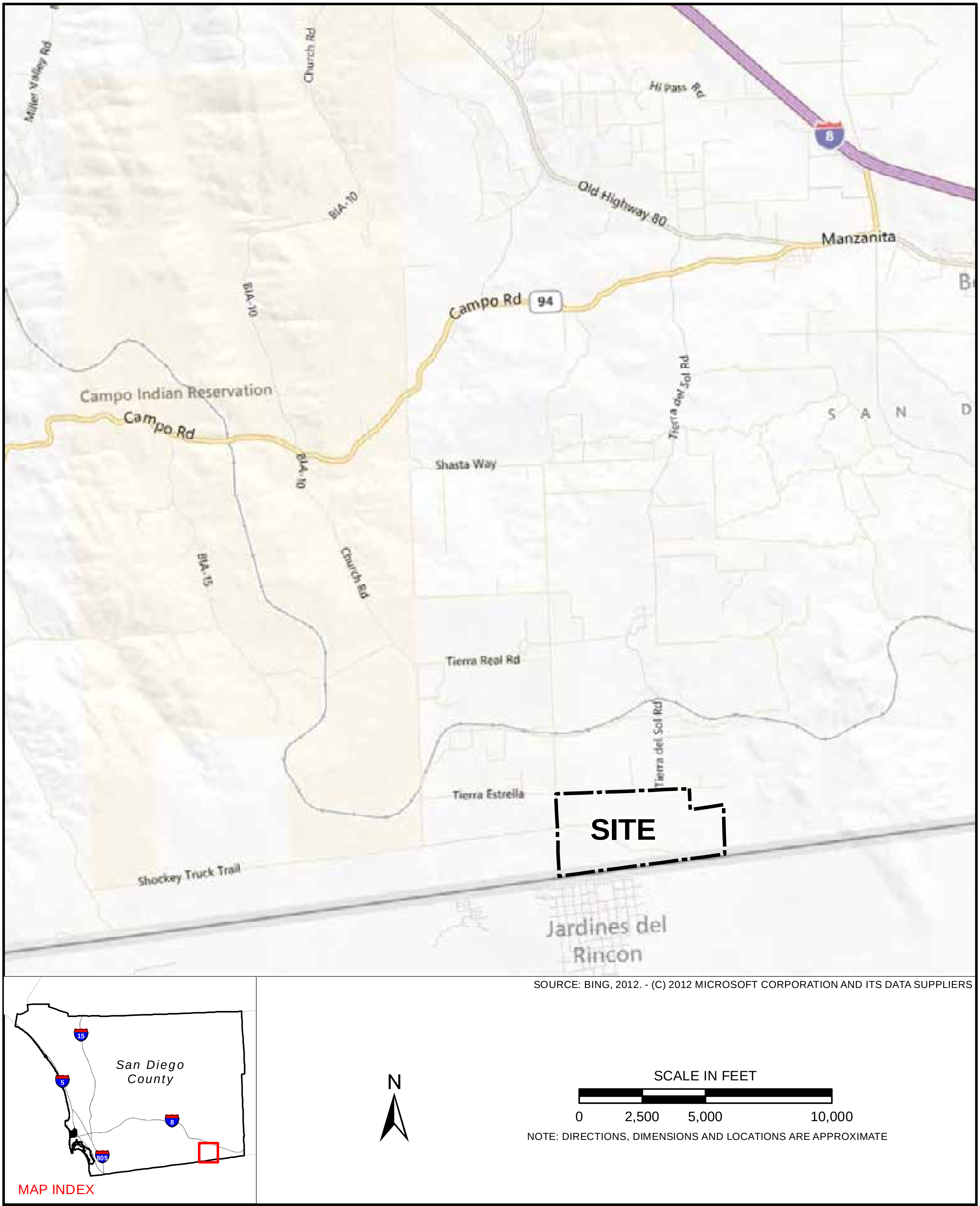
AERIAL PHOTOGRAPHS Source	Date	Flight	Numbers	Scale
United States Department of Agriculture	4-24-53	AXN-1M	215 and 216	1:20,000



SOURCE: BING, 2012. - (C) 2012 MICROSOFT CORPORATION AND ITS DATA SUPPLIERS

NOTE: DIRECTIONS, DIMENSIONS AND LOCATIONS ARE APPROXIMATE

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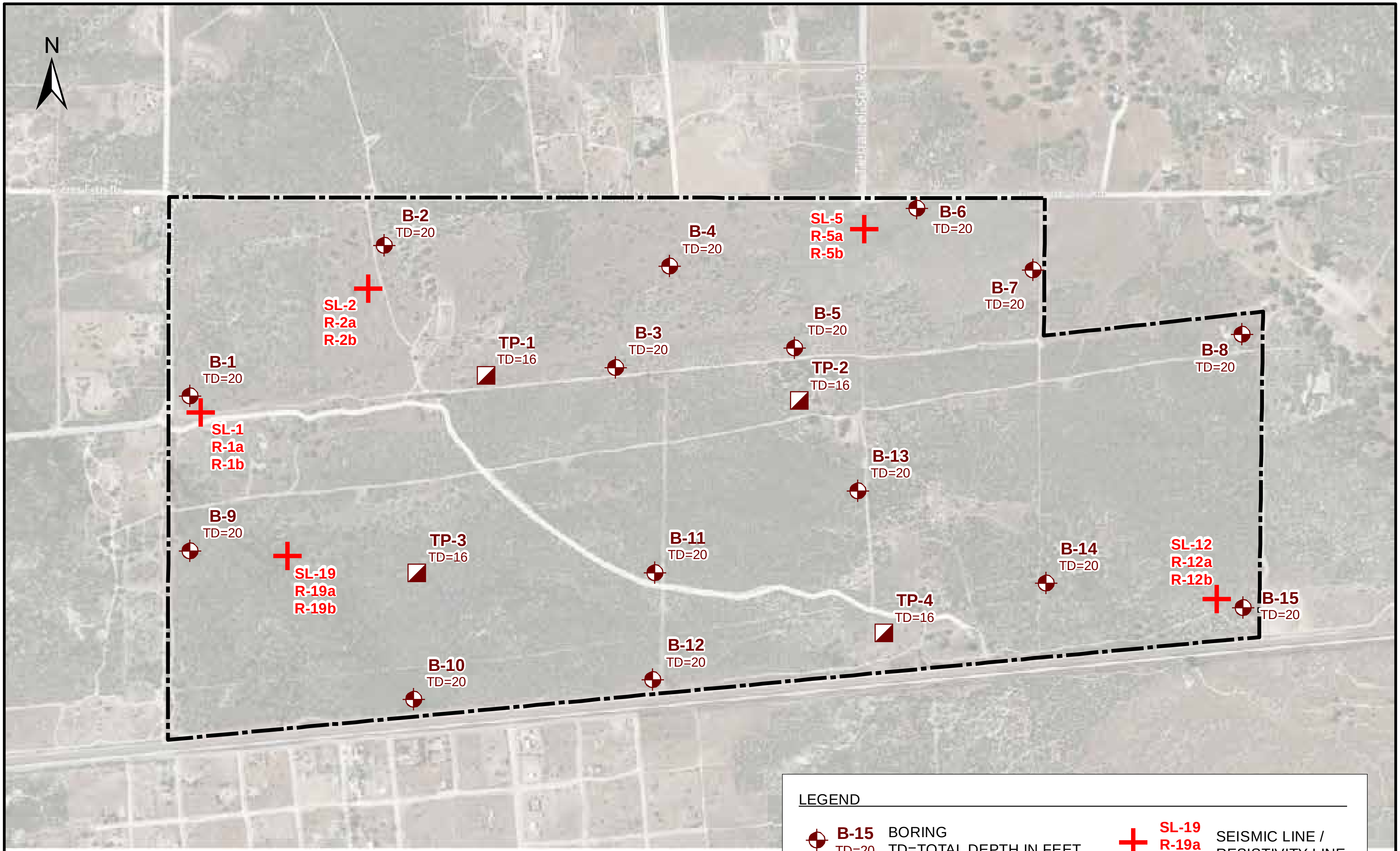
Ninyo & Moore		SITE LOCATION	FIGURE
PROJECT NO.	DATE	TIERRA DEL SOL SOLAR PROJECT BOULEVARD, CALIFORNIA	1
107418001	11/12		



SOURCE: AECOM, 2012., Aerial - Bing, 2012.

LEGEND

⊕	**B-15** TD=20	BORING TD=TOTAL DEPTH IN FEET
◪	**TP-4** TD=16	TEST PIT TD=TOTAL DEPTH IN FEET
✚	**SL-19** **R-19a** **R-19b**	SEISMIC LINE / RESISTIVITY LINE
⬚		SITE BOUNDARY

NOTE: DIRECTIONS, DIMENSIONS AND LOCATIONS ARE APPROXIMATE.

SCALE IN FEET

0 400 800 1,600

Ninyo & Moore

GEOTECHNICAL MAP

PROJECT NO.	DATE
107418001	11/12

TIERRA DEL SOL SOLAR PROJECT
BOULEVARD, CALIFORNIA

FIGURE
2

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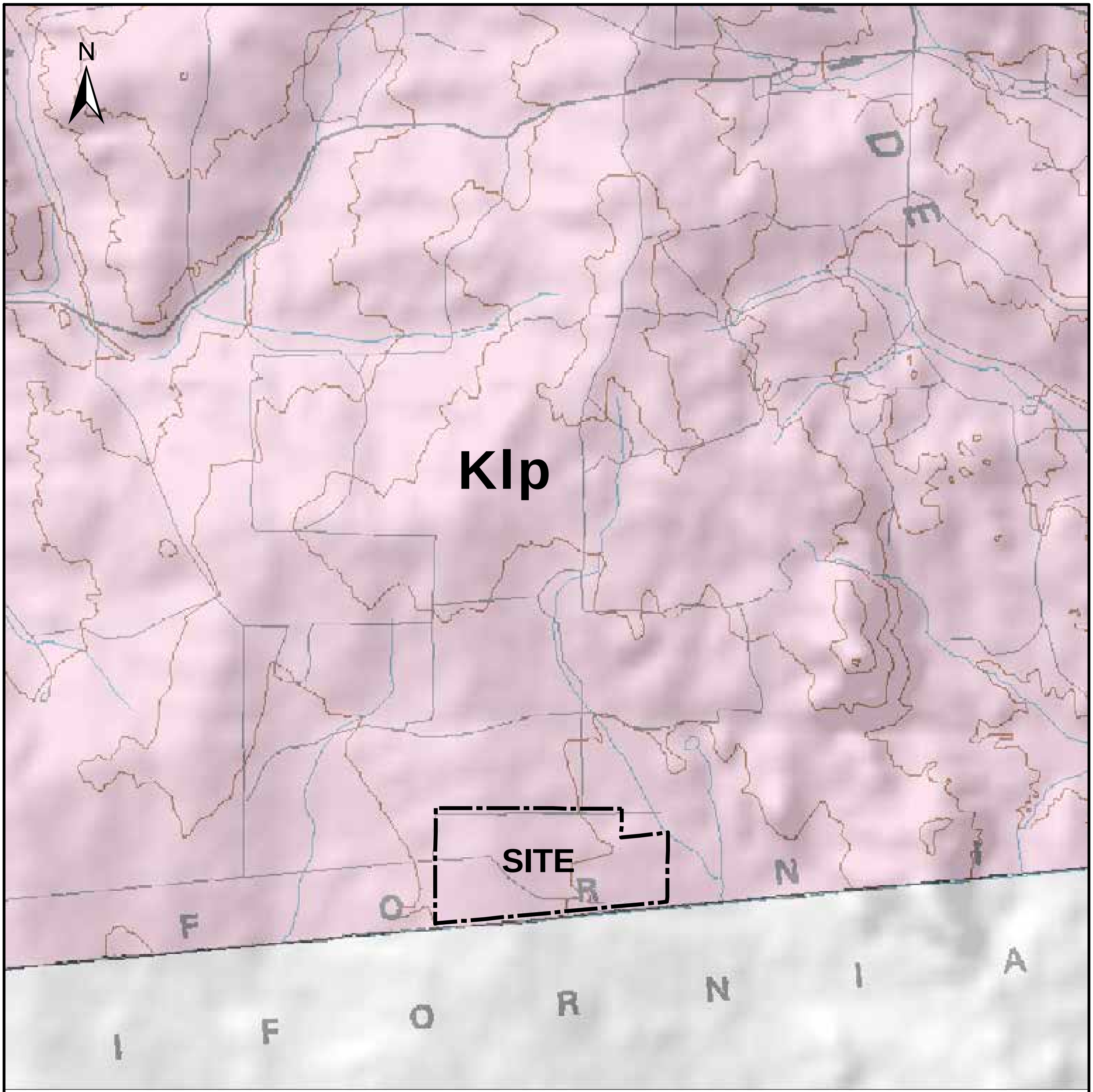

SOURCE: TODD, V. R., 2004, GEOLOGIC MAP OF THE EL CAJON 30' X 60' QUADRANGLE, SOUTHERN CALIFORNIA

LEGEND

Klp	TONALITE OF LA POSTA (EARLY AND LATE CRETACEOUS)

SCALE IN FEET

0 2,000 4,000 8,000

NOTE: DIRECTIONS, DIMENSIONS AND LOCATIONS ARE APPROXIMATE.

Ninyo & Moore

GEOLOGY

PROJECT NO.	DATE
107418001	11/12

TIERRA DEL SOL SOLAR PROJECT
BOULEVARD, CALIFORNIA

FIGURE
3

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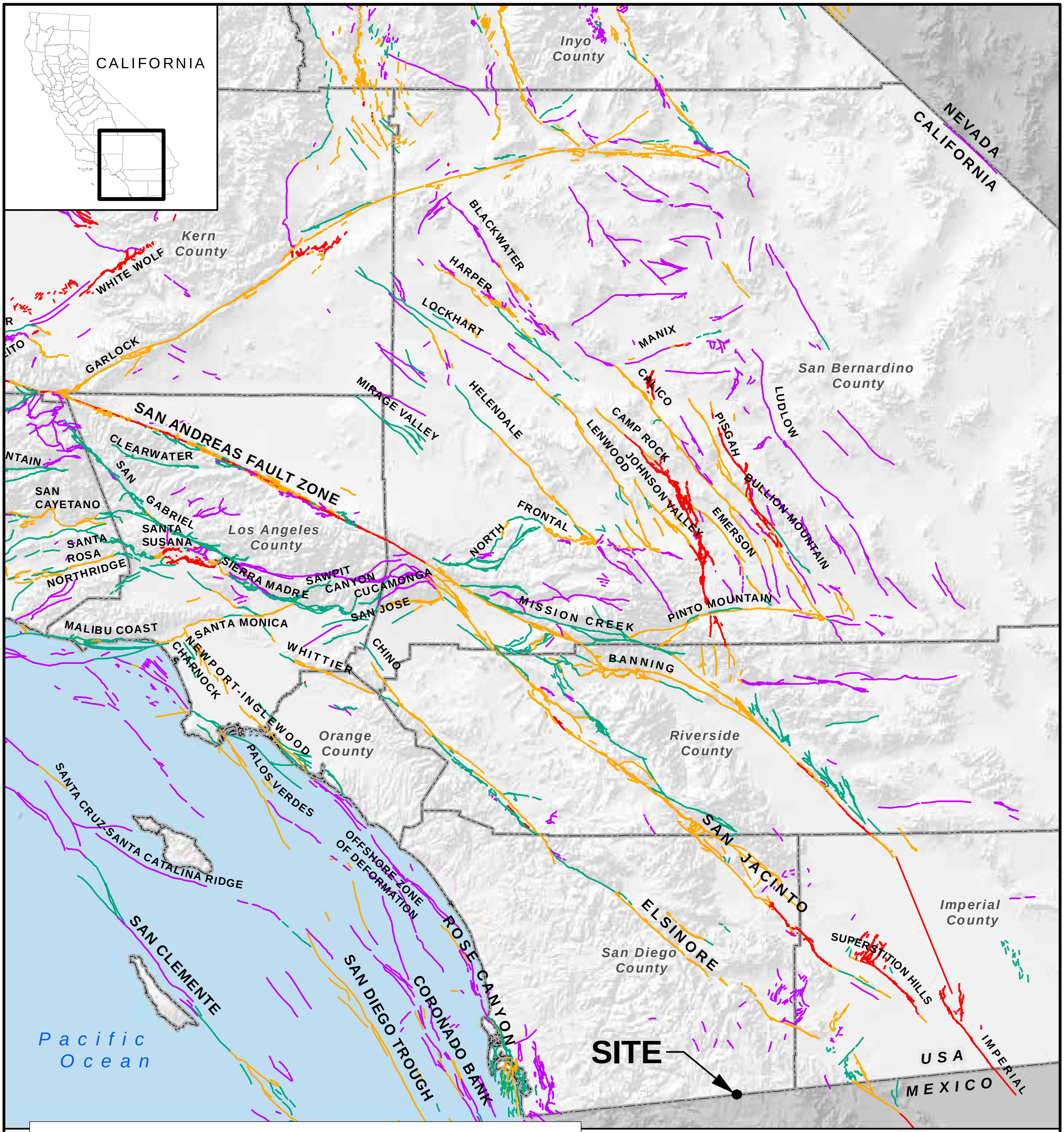

LEGEND

CALIFORNIA FAULT ACTIVITY

— HISTORICALLY ACTIVE

— HOLOCENE ACTIVE

— LATE QUATERNARY (POTENTIALLY ACTIVE)

— QUATERNARY (POTENTIALLY ACTIVE)

— STATE/COUNTY BOUNDARY

SOURCE: U.S. GEOLOGICAL SURVEY AND CALIFORNIA GEOLOGICAL SURVEY, 2006, QUATERNARY FAULT AND FOLD DATABASE FOR THE UNITED STATES.

SCALE IN MILES

0 30 60

N

NOTE: DIRECTIONS, DIMENSIONS AND LOCATIONS ARE APPROXIMATE.

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Ninyo & Moore

FAULT LOCATIONS

PROJECT NO.	DATE
107418001	11/12

TIERRA DEL SOL SOLAR PROJECT
BOULEVARD, CALIFORNIA

FIGURE

4

APPENDIX A

BORING AND TEST PIT LOGS

Field Procedure for the Collection of Disturbed Samples

Disturbed soil samples were obtained in the field using the following methods.

Bulk Samples

Bulk samples of representative earth materials were obtained from the test pit excavations. The samples were bagged and transported to the laboratory for testing.

The Standard Penetration Test Sampler

Disturbed drive samples of earth materials were obtained by means of a Standard Penetration Test sampler. The sampler is composed of a split barrel with an external diameter of 2 inches and an unlined internal diameter of 1⅜ inches. The sampler was driven into the ground 12 to 18 inches with a 140-pound hammer falling freely from a height of 30 inches in general accordance with ASTM D 1586. The blow counts were recorded for every 6 inches of penetration; the blow counts reported on the logs are those for the last 12 inches of penetration. Soil samples were observed and removed from the sampler, bagged, sealed and transported to the laboratory for testing.

Field Procedure for the Collection of Relatively Undisturbed Samples

Relatively undisturbed soil samples were obtained in the field using the Modified Split-Barrel Drive Sampler method. The sampler, with an external diameter of 3.0 inches, was lined with 1-inch long, thin brass rings with inside diameters of approximately 2.4 inches. The sample barrel was driven into the ground with the weight of a 140-pound hammer, in general accordance with ASTM D 3550. The driving weight was permitted to fall freely. The approximate length of the fall, the weight of the hammer, and the number of blows per foot of driving are presented on the boring logs as an index to the relative resistance of the materials sampled. The samples were removed from the sample barrel in the brass rings, sealed, and transported to the laboratory for testing.

BORING LOG EXPLANATION SHEET

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	
0	■							Bulk sample.
		■						Modified split-barrel drive sampler.
		☒						No recovery with modified split-barrel drive sampler.
		▮						Sample retained by others.
		◢						Standard Penetration Test (SPT).
5		◸						No recovery with a SPT.
		▯	XX/XX					Shelby tube sample. Distance pushed in inches/length of sample recovered in inches.
		◹						No recovery with Shelby tube sampler.
		▯						Continuous Push Sample.
				♀				Seepage.
10				▽				Groundwater encountered during drilling.
				▼				Groundwater measured after drilling.
						▦	SM	ALLUVIUM: Solid line denotes unit change.
								Dashed line denotes material change.
15								Attitudes: Strike/Dip b: Bedding c: Contact j: Joint f: Fracture F: Fault cs: Clay Seam s: Shear bss: Basal Slide Surface sf: Shear Fracture sz: Shear Zone sbs: Sheared Bedding Surface
20								The total depth line is a solid line that is drawn at the bottom of the boring.

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BORING LOG

EXPLANATION OF BORING LOG SYMBOLS

PROJECT NO.	DATE	FIGURE
	Rev. 01/03	

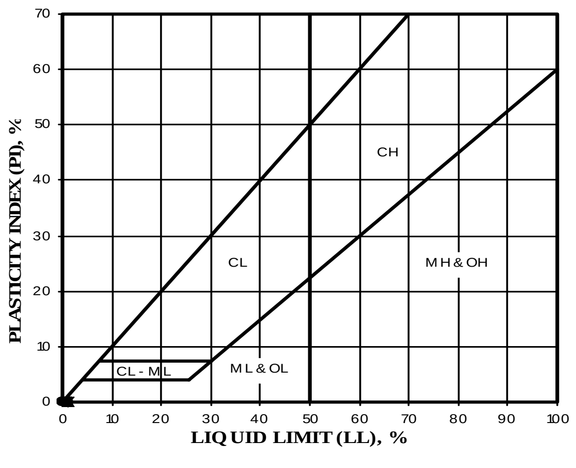
U.S.C.S. METHOD OF SOIL CLASSIFICATION

MAJOR DIVISIONS		SYMBOL	TYPICAL NAMES
COARSE-GRAINED SOILS (More than 1/2 of soil >No. 200 sieve size)	**GRAVELS (More than 1/2 of coarse fraction > No. 4 sieve size)**	GW	Well graded gravels or gravel-sand mixtures, little or no fines
		GP	Poorly graded gravels or gravel-sand mixtures, little or no fines
		GM	Silty gravels, gravel-sand-silt mixtures
		GC	Clayey gravels, gravel-sand-clay mixtures
	SANDS (More than 1/2 of coarse fraction <No. 4 sieve size)	SW	Well graded sands or gravelly sands, little or no fines
		SP	Poorly graded sands or gravelly sands, little or no fines
		SM	Silty sands, sand-silt mixtures
		SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS (More than 1/2 of soil <No. 200 sieve size)	**SILTS & CLAYS Liquid Limit <50**	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean
		OL	Organic silts and organic silty clays of low plasticity
	SILTS & CLAYS Liquid Limit >50	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
		CH	Inorganic clays of high plasticity, fat clays
		OH	Organic clays of medium to high plasticity, organic silty clays, organic silts
HIGHLY ORGANIC SOILS		Pt	Peat and other highly organic soils

GRAIN SIZE CHART

CLASSIFICATION	RANGE OF GRAIN SIZE	
	U.S. Standard Sieve Size	Grain Size in Millimeters
BOULDERS	Above 12"	Above 305
COBBLES	12" to 3"	305 to 76.2
GRAVEL **Coarse** **Fine**	3" to No. 4 3" to 3/4" 3/4" to No. 4	76.2 to 4.76 76.2 to 19.1 19.1 to 4.76
SAND **Coarse** **Medium** **Fine**	No. 4 to No. 200 No. 4 to No. 10 No. 10 to No. 40 No. 40 to No. 200	4.76 to 0.075 4.76 to 2.00 2.00 to 0.420 0.420 to 0.075
SILT & CLAY	Below No. 200	Below 0.075

PLASTICITY CHART



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U.S.C.S. METHOD OF SOIL CLASSIFICATION

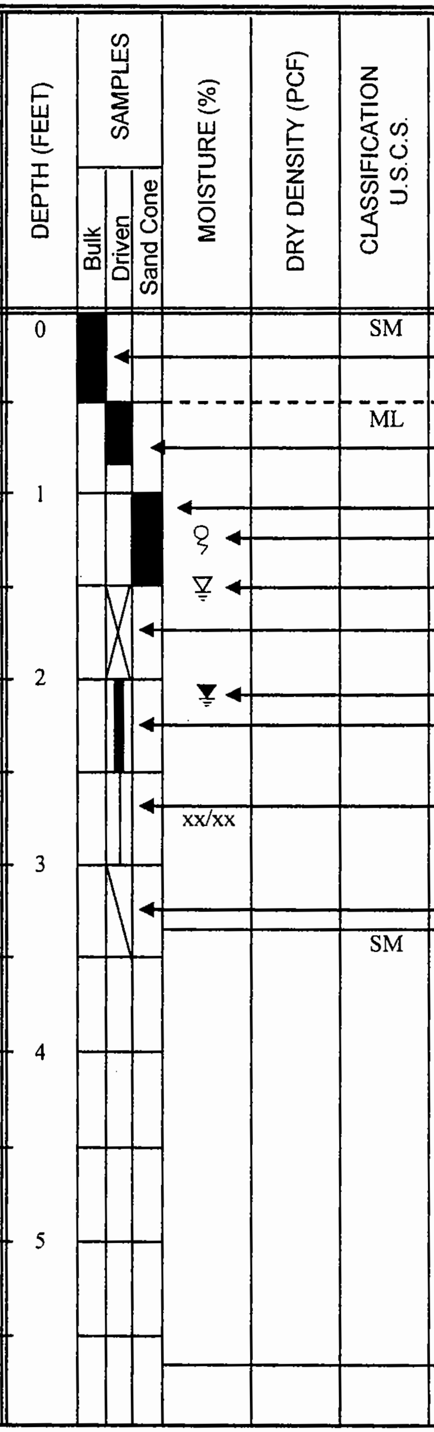
Ninyo & Moore

Explanation of Test Pit, Core, Trench and Hand Auger Log Symbols

PROJECT NO.

DATE

EXCAVATION LOG EXPLANATION SHEET



FILL:

Bulk sample.

Dashed line denotes material change.

Drive sample.

Sand cone performed.

Seepage

Groundwater encountered during excavation.

No recovery with drive sampler.

Groundwater encountered after excavation.

Sample retained by others.

Shelby tube sample. Distance pushed in inches/length of sample recovered in inches

No recovery with Shelby tube sampler.

ALLUVIUM:

Solid line denotes unit change.

Attitude: Strike/Dip
b: Bedding
c: Contact
j: Joint
f: Fracture
F: Fault
cs: Clay Seam
s: Shear
bss: Basal Slide Surface
sf: Shear Fracture
sz: Shear Zone
sbs: Sheared Bedding Surface

The total depth line is a solid line that is drawn at the bottom of the excavation log.

SCALE: 1 inch = 1 foot

FIGURE

DATE DRILLED 10/10/12 BORING NO. B-1
GROUND ELEVATION 3,560' ± (MSL) SHEET 1 OF 1
METHOD OF DRILLING 8" Diameter Hollow-Stem Auger (CME-75) (Baja Exploration)
DRIVE WEIGHT 140 lbs. (Auto-Trip) DROP 30"
SAMPLED BY AQP LOGGED BY AQP REVIEWED BY GTF

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							SM	<u>TOPSOIL</u>: Dark brown, damp, loose, silty fine to medium SAND.
								<u>GRANITIC ROCK</u>: Reddish brown, dry to damp, weathered, medium- to coarse-grained GRANITIC ROCK.
5		■	50/6"	4.9	122.5			
								Harder drilling at 6 feet.
10		◪	50/4"					
15		◪	50/4"					
								Total Depth = 16 feet. (Refusal) Groundwater not encountered during drilling. Backfilled shortly after drilling on 10/10/12. <u>Note</u>: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.
20								

Ninyo & Moore

BORING LOG
TIERRA DEL SOL SOLAR PROJECT
BOULEVARD, CALIFORNIA

PROJECT NO.	DATE	FIGURE
107418001	11/12	A-1

DATE DRILLED 10/10/12 BORING NO. B-2

GROUND ELEVATION 3,720' ± (MSL) SHEET 1 OF 1

METHOD OF DRILLING 8" Diameter Hollow-Stem Auger (CME-75) (Baja Exploration)

DRIVE WEIGHT 140 lbs. (Auto-Trip) DROP 30"

SAMPLED BY AQP LOGGED BY AQP REVIEWED BY GTF

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0						▦	SM	TOPSOIL: Light brown, dry, loose, silty fine to medium SAND.
						▨		GRANITIC ROCK: Reddish brown, dry to damp, weathered, medium- to coarse-grained GRANITIC ROCK.
5		■	50/3"	2.5		▨		
10		◣	50/3"			▨		
						▨		Harder drilling at 12 feet.
15		◣	50/3"			▨		
								Total Depth = 15.3 feet. (Refusal) Groundwater not encountered during drilling. Backfilled shortly after drilling on 10/10/12. Note: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.
20								

Ninyo & Moore

BORING LOG

TIERRA DEL SOL SOLAR PROJECT
BOULEVARD, CALIFORNIA

PROJECT NO.	DATE	FIGURE
107418001	11/12	A-2

DATE DRILLED 10/10/12 BORING NO. B-3

GROUND ELEVATION 3,790' ± (MSL) SHEET 1 OF 2

METHOD OF DRILLING 8" Diameter Hollow-Stem Auger (CME-75) (Baja Exploration)

DRIVE WEIGHT 140 lbs. (Auto-Trip) DROP 30"

SAMPLED BY AQP LOGGED BY AQP REVIEWED BY GTF

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0						▦	SM	TOPSOIL: Light brown, dry, loose, silty fine to medium SAND.
						▨		GRANITIC ROCK: Reddish brown, dry to damp, weathered, medium- to coarse-grained GRANITIC ROCK.
5		■	50/6"	3.1	111.8			
10		◤	50/4"					
15		◤	50/2"					
								Total Depth = 18 feet. (Refusal) Groundwater not encountered during drilling. Backfilled shortly after drilling on 10/10/12. Note:
20								

Ninyo & Moore

BORING LOG

TIERRA DEL SOL SOLAR PROJECT
BOULEVARD, CALIFORNIA

PROJECT NO.	DATE	FIGURE
107418001	11/12	A-3

DATE DRILLED 10/10/12 BORING NO. B-3

GROUND ELEVATION 3,790' ± (MSL) SHEET 2 OF 2

METHOD OF DRILLING 8" Diameter Hollow-Stem Auger (CME-75) (Baja Exploration)

DRIVE WEIGHT 140 lbs. (Auto-Trip) DROP 30"

SAMPLED BY AQP LOGGED BY AQP REVIEWED BY GTF

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
20								Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.
25								
30								
35								
40								

Ninyo & Moore

BORING LOG

TIERRA DEL SOL SOLAR PROJECT
BOULEVARD, CALIFORNIA

PROJECT NO.	DATE	FIGURE
107418001	11/12	A-4

DATE DRILLED 10/10/12 BORING NO. B-4

GROUND ELEVATION 3,782' ± (MSL) SHEET 1 OF 2

METHOD OF DRILLING 8" Diameter Hollow-Stem Auger (CME-75) (Baja Exploration)

DRIVE WEIGHT 140 lbs. (Auto-Trip) DROP 30"

SAMPLED BY AQP LOGGED BY AQP REVIEWED BY GTF

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0						▦	SM	TOPSOIL: Light brown, dry, loose, silty fine to medium SAND.
								GRANITIC ROCK: Reddish brown, dry to damp, weathered, medium- to coarse-grained GRANITIC ROCK.
5		■	50/5"	2.5	117.8			
10		◩	50/4"					
15		◩	50/5"					
		◩	50/4"					
								Total Depth = 18.3 feet. (Refusal) Groundwater not encountered during drilling. Backfilled shortly after drilling on 10/10/12.
20								

Ninyo & Moore

BORING LOG

TIERRA DEL SOL SOLAR PROJECT
BOULEVARD, CALIFORNIA

PROJECT NO.	DATE	FIGURE
107418001	11/12	A-5

DATE DRILLED 10/10/12 BORING NO. B-4

GROUND ELEVATION 3,782' ± (MSL) SHEET 2 OF 2

METHOD OF DRILLING 8" Diameter Hollow-Stem Auger (CME-75) (Baja Exploration)

DRIVE WEIGHT 140 lbs. (Auto-Trip) DROP 30"

SAMPLED BY AQP LOGGED BY AQP REVIEWED BY GTF

DEPTH (feet)	SAMPLES		BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
	Bulk	Driven						
20								<u>Note</u>: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.
25								
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Ninyo & Moore

BORING LOG

TIERRA DEL SOL SOLAR PROJECT
BOULEVARD, CALIFORNIA

PROJECT NO.	DATE	FIGURE
107418001	11/12	A-6

DATE DRILLED 10/10/12 BORING NO. B-5

GROUND ELEVATION 3,612' ± (MSL) SHEET 1 OF 2

METHOD OF DRILLING 8" Diameter Hollow-Stem Auger (CME-75) (Baja Exploration)

DRIVE WEIGHT 140 lbs. (Auto-Trip) DROP 30"

SAMPLED BY AQP LOGGED BY AQP REVIEWED BY GTF

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0						▦	SM	<u>TOPSOIL</u>: Light brown, dry, loose, silty fine to medium SAND.
								<u>GRANITIC ROCK</u>: Reddish brown, dry to damp, weathered, medium- to coarse-grained GRANITIC ROCK.
5		■	50/5"					
10		◤	50/4"					
15		◤	50/5"					
		◤	50/5"					
								Total Depth = 18.4 feet. (Refusal) Groundwater not encountered during drilling. Backfilled shortly after drilling on 10/10/12.
20								

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BORING LOG

TIERRA DEL SOL SOLAR PROJECT
BOULEVARD, CALIFORNIA

PROJECT NO.	DATE	FIGURE
107418001	11/12	A-7

DATE DRILLED 10/10/12 BORING NO. B-5

GROUND ELEVATION 3,612' ± (MSL) SHEET 2 OF 2

METHOD OF DRILLING 8" Diameter Hollow-Stem Auger (CME-75) (Baja Exploration)

DRIVE WEIGHT 140 lbs. (Auto-Trip) DROP 30"

SAMPLED BY AQP LOGGED BY AQP REVIEWED BY GTF

DEPTH (feet)	SAMPLES		BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	**DESCRIPTION/INTERPRETATION**
	Bulk	Driven						
20								<u>Note</u>: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.
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Ninyo & Moore

BORING LOG

TIERRA DEL SOL SOLAR PROJECT
BOULEVARD, CALIFORNIA

PROJECT NO.	DATE	FIGURE
107418001	11/12	A-8

DATE DRILLED 10/10/12 BORING NO. B-6

GROUND ELEVATION 3,620' ± (MSL) SHEET 1 OF 2

METHOD OF DRILLING 8" Diameter Hollow-Stem Auger (CME-75) (Baja Exploration)

DRIVE WEIGHT 140 lbs. (Auto-Trip) DROP 30"

SAMPLED BY AQP LOGGED BY AQP REVIEWED BY GTF

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							SM	TOPSOIL: Light brown, dry, loose, silty fine to medium SAND.
								GRANITIC ROCK: Reddish brown, dry to damp, weathered, medium- to coarse-grained GRANITIC ROCK.
5		■	50/4"	6.2	89.5			
10		◣	50/3"					
15		◣	50/5"					
		◣	50/4"					
								Total Depth = 18.8 feet. (Refusal) Groundwater not encountered during drilling. Backfilled shortly after drilling on 10/10/12.
20								

Ninyo & Moore

BORING LOG

TIERRA DEL SOL SOLAR PROJECT
BOULEVARD, CALIFORNIA

PROJECT NO.	DATE	FIGURE
107418001	11/12	A-9

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
20								Note: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.
25								
30								
35								
40								

DATE DRILLED 10/10/12 BORING NO. B-6

GROUND ELEVATION 3,620' ± (MSL) SHEET 2 OF 2

METHOD OF DRILLING 8" Diameter Hollow-Stem Auger (CME-75) (Baja Exploration)

DRIVE WEIGHT 140 lbs. (Auto-Trip) DROP 30"

SAMPLED BY AQP LOGGED BY AQP REVIEWED BY GTF

Ninyo & Moore

BORING LOG

TIERRA DEL SOL SOLAR PROJECT
BOULEVARD, CALIFORNIA

PROJECT NO.	DATE	FIGURE
107418001	11/12	A-10

DATE DRILLED 10/10/12 BORING NO. B-7

GROUND ELEVATION 3,575' ± (MSL) SHEET 1 OF 1

METHOD OF DRILLING 8" Diameter Hollow-Stem Auger (CME-75) (Baja Exploration)

DRIVE WEIGHT 140 lbs. (Auto-Trip) DROP 30"

SAMPLED BY AQP LOGGED BY AQP REVIEWED BY GTF

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							SM	TOPSOIL: Light brown, dry, loose, silty fine to medium SAND.
								GRANITIC ROCK: Reddish brown, dry to damp, weathered, medium- to coarse-grained GRANITIC ROCK.
5		■	79/9"	8.8	117.1			
10		◩	50/3"					
15		◩	50/3"					
								Total Depth = 17 feet. (Refusal) Groundwater not encountered during drilling. Backfilled shortly after drilling on 10/10/12. Note: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.
20								

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BORING LOG

TIERRA DEL SOL SOLAR PROJECT
BOULEVARD, CALIFORNIA

PROJECT NO.	DATE	FIGURE
107418001	11/12	A-11

DATE DRILLED 10/10/12 BORING NO. B-8

GROUND ELEVATION 3,545' ± (MSL) SHEET 1 OF 1

METHOD OF DRILLING 8" Diameter Hollow-Stem Auger (CME-75) (Baja Exploration)

DRIVE WEIGHT 140 lbs. (Auto-Trip) DROP 30"

SAMPLED BY AQP LOGGED BY AQP REVIEWED BY GTF

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							SM	COLLUVIUM: Dark brown, damp, loose, silty fine to medium SAND.
								GRANITIC ROCK: Reddish brown, dry to damp, weathered, medium- to coarse-grained GRANITIC ROCK.
5		■	73/10"	19.2	94.5			
								Harder drilling at 6.5 feet.
								Total Depth = 7.5 feet. (Refusal) Groundwater not encountered during drilling. Backfilled shortly after drilling on 10/10/12. Note: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.
10								
15								
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Ninyo & Moore

BORING LOG

TIERRA DEL SOL SOLAR PROJECT
BOULEVARD, CALIFORNIA

PROJECT NO.	DATE	FIGURE
107418001	11/12	A-12

DATE DRILLED 10/09/12 BORING NO. B-9

GROUND ELEVATION 3,635' ± (MSL) SHEET 1 OF 1

METHOD OF DRILLING 8" Diameter Hollow-Stem Auger (CME-75) (Baja Exploration)

DRIVE WEIGHT 140 lbs. (Auto-Trip) DROP 30"

SAMPLED BY AQP LOGGED BY AQP REVIEWED BY GTF

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							SM	<u>TOPSOIL</u>: Light brown, dry, loose, silty fine to medium SAND.
								<u>GRANITIC ROCK</u>: Reddish brown, dry to damp, weathered, medium- to coarse-grained GRANITIC ROCK.
5		■	50/2"	9.8	83.8			
								Total Depth = 9 feet. (Refusal) Groundwater not encountered during drilling. Backfilled shortly after drilling on 10/09/12. <u>Note</u>: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.
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15								
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BORING LOG

TIERRA DEL SOL SOLAR PROJECT
BOULEVARD, CALIFORNIA

PROJECT NO.	DATE	FIGURE
107418001	11/12	A-13

DATE DRILLED 10/09/12 BORING NO. B-10

GROUND ELEVATION 3,650' ± (MSL) SHEET 1 OF 2

METHOD OF DRILLING 8" Diameter Hollow-Stem Auger (CME-75) (Baja Exploration)

DRIVE WEIGHT 140 lbs. (Auto-Trip) DROP 30"

SAMPLED BY AQP LOGGED BY AQP REVIEWED BY GTF

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							SM	TOPSOIL: Light brown, dry, loose, silty fine to coarse SAND.
								GRANITIC ROCK: Reddish brown, dry to damp, weathered, medium- to coarse-grained GRANITIC ROCK.
5		◤	91/9"					
10		◤	64					
15		◤	68/11"					
		◤	50/5"					
								Total Depth = 18.9 feet. (Refusal) Groundwater not encountered during drilling. Backfilled shortly after drilling on 10/09/12.
20								

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BORING LOG

TIERRA DEL SOL SOLAR PROJECT
BOULEVARD, CALIFORNIA

PROJECT NO.	DATE	FIGURE
107418001	11/12	A-14

DATE DRILLED 10/09/12 BORING NO. B-10

GROUND ELEVATION 3,650' ± (MSL) SHEET 2 OF 2

METHOD OF DRILLING 8" Diameter Hollow-Stem Auger (CME-75) (Baja Exploration)

DRIVE WEIGHT 140 lbs. (Auto-Trip) DROP 30"

SAMPLED BY AQP LOGGED BY AQP REVIEWED BY GTF

DEPTH (feet)	SAMPLES		BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
	Bulk	Driven						
20								<u>Note</u>: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.
25								
30								
35								
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BORING LOG

TIERRA DEL SOL SOLAR PROJECT
BOULEVARD, CALIFORNIA

PROJECT NO.	DATE	FIGURE
107418001	11/12	A-15

DATE DRILLED 10/09/12 BORING NO. B-11
GROUND ELEVATION 3,655' ± (MSL) SHEET 1 OF 1
METHOD OF DRILLING 8" Diameter Hollow-Stem Auger (CME-75) (Baja Exploration)
DRIVE WEIGHT 140 lbs. (Auto-Trip) DROP 30"
SAMPLED BY AQP LOGGED BY AQP REVIEWED BY GTF

DEPTH (feet)	SAMPLES Bulk	 Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0						▦	SM	TOPSOIL: Light brown, dry, loose, silty fine to medium SAND.
								GRANITIC ROCK: Reddish brown, dry to damp, weathered, medium- to coarse-grained GRANITIC ROCK.
5		■	50/5"	2.6				
10		◩	50/5"					
15		◩	50/5"					
								Total Depth = 16 feet. (Refusal) Groundwater not encountered during drilling. Backfilled shortly after drilling on 10/09/12. Note: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.
20								

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BORING LOG

TIERRA DEL SOL SOLAR PROJECT
BOULEVARD, CALIFORNIA

PROJECT NO.	DATE	FIGURE
107418001	11/12	A-16

DATE DRILLED 10/09/12 BORING NO. B-12

GROUND ELEVATION 3,640' ± (MSL) SHEET 1 OF 1

METHOD OF DRILLING 8" Diameter Hollow-Stem Auger (CME-75) (Baja Exploration)

DRIVE WEIGHT 140 lbs. (Auto-Trip) DROP 30"

SAMPLED BY AQP LOGGED BY AQP REVIEWED BY GTF

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							SM	<u>TOPSOIL</u>: Light brown, dry, loose, silty fine to coarse SAND.
								<u>GRANITIC ROCK</u>: Reddish brown, dry to damp, weathered, medium- to coarse-grained GRANITIC ROCK.
5		◥	50/2"					
10		◥	50/4"					
15		◥	50/5"					
		◥	50/3"					
								Total Depth = 17.8 feet. (Refusal) Groundwater not encountered during drilling. Backfilled shortly after drilling on 10/09/12. <u>Note</u>: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.
20								

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BORING LOG

TIERRA DEL SOL SOLAR PROJECT
BOULEVARD, CALIFORNIA

PROJECT NO.	DATE	FIGURE
107418001	11/12	A-17

DATE DRILLED 10/10/12 BORING NO. B-13

GROUND ELEVATION 3,590' ± (MSL) SHEET 1 OF 1

METHOD OF DRILLING 8" Diameter Hollow-Stem Auger (CME-75) (Baja Exploration)

DRIVE WEIGHT 140 lbs. (Auto-Trip) DROP 30"

SAMPLED BY AQP LOGGED BY AQP REVIEWED BY GTF

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0						▦	SM	<u>TOPSOIL</u>: Light brown, dry, loose, silty fine to medium SAND.
						⁘		<u>GRANITIC ROCK</u>: Reddish brown, dry to damp, weathered, medium- to coarse-grained GRANITIC ROCK.
5		■	50/5"			⁘		
10		◩	50/3"			⁘		
								Total Depth = 11 feet. (Refusal) Groundwater not encountered during drilling. Backfilled shortly after drilling on 10/10/12. <u>Note</u>: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.
15								
20								

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BORING LOG

TIERRA DEL SOL SOLAR PROJECT
BOULEVARD, CALIFORNIA

PROJECT NO.	DATE	FIGURE
107418001	11/12	A-18

DATE DRILLED 10/09/12 BORING NO. B-14

GROUND ELEVATION 3,575' ± (MSL) SHEET 1 OF 1

METHOD OF DRILLING 8" Diameter Hollow-Stem Auger (CME-75) (Baja Exploration)

DRIVE WEIGHT 140 lbs. (Auto-Trip) DROP 30"

SAMPLED BY AQP LOGGED BY AQP REVIEWED BY GTF

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0						▦	SM	TOPSOIL: Light brown, dry, loose, silty fine to coarse SAND.
						⁘		GRANITIC ROCK: Reddish brown, dry to damp, weathered, medium- to coarse-grained GRANITIC ROCK.
5		◣	50/4"			⁘		
10		◣	50/5"			⁘		
								Total Depth = 12.5 feet. (Refusal) Groundwater not encountered during drilling. Backfilled shortly after drilling on 10/09/12. Note: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.
15								
20								

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BORING LOG

TIERRA DEL SOL SOLAR PROJECT
BOULEVARD, CALIFORNIA

PROJECT NO.	DATE	FIGURE
107418001	11/12	A-19

DATE DRILLED 10/09/12 BORING NO. B-15

GROUND ELEVATION 3,545' ± (MSL) SHEET 1 OF 2

METHOD OF DRILLING 8" Diameter Hollow-Stem Auger (CME-75) (Baja Exploration)

DRIVE WEIGHT 140 lbs. (Auto-Trip) DROP 30"

SAMPLED BY AQP LOGGED BY AQP REVIEWED BY GTF

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							SM	TOPSOIL: Light brown, dry, loose, silty fine to medium SAND.
								GRANITIC ROCK: Reddish brown, dry to damp, weathered, medium- to coarse-grained GRANITIC ROCK.
5		■	50/5"					
10		◣	50/6"					
15		◣	50/5"					
		◣	50/5"					
								Total Depth = 18.4 feet. (Refusal) Groundwater not encountered during drilling. Backfilled shortly after drilling on 10/09/12.
20								

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BORING LOG

TIERRA DEL SOL SOLAR PROJECT
BOULEVARD, CALIFORNIA

PROJECT NO.	DATE	FIGURE
107418001	11/12	A-20

DATE DRILLED 10/09/12 BORING NO. B-15

GROUND ELEVATION 3,545' ± (MSL) SHEET 2 OF 2

METHOD OF DRILLING 8" Diameter Hollow-Stem Auger (CME-75) (Baja Exploration)

DRIVE WEIGHT 140 lbs. (Auto-Trip) DROP 30"

SAMPLED BY AQP LOGGED BY AQP REVIEWED BY GTF

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
20								Note: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.
25								
30								
35								
40								

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BORING LOG

TIERRA DEL SOL SOLAR PROJECT
BOULEVARD, CALIFORNIA

PROJECT NO.	DATE	FIGURE
107418001	11/12	A-21

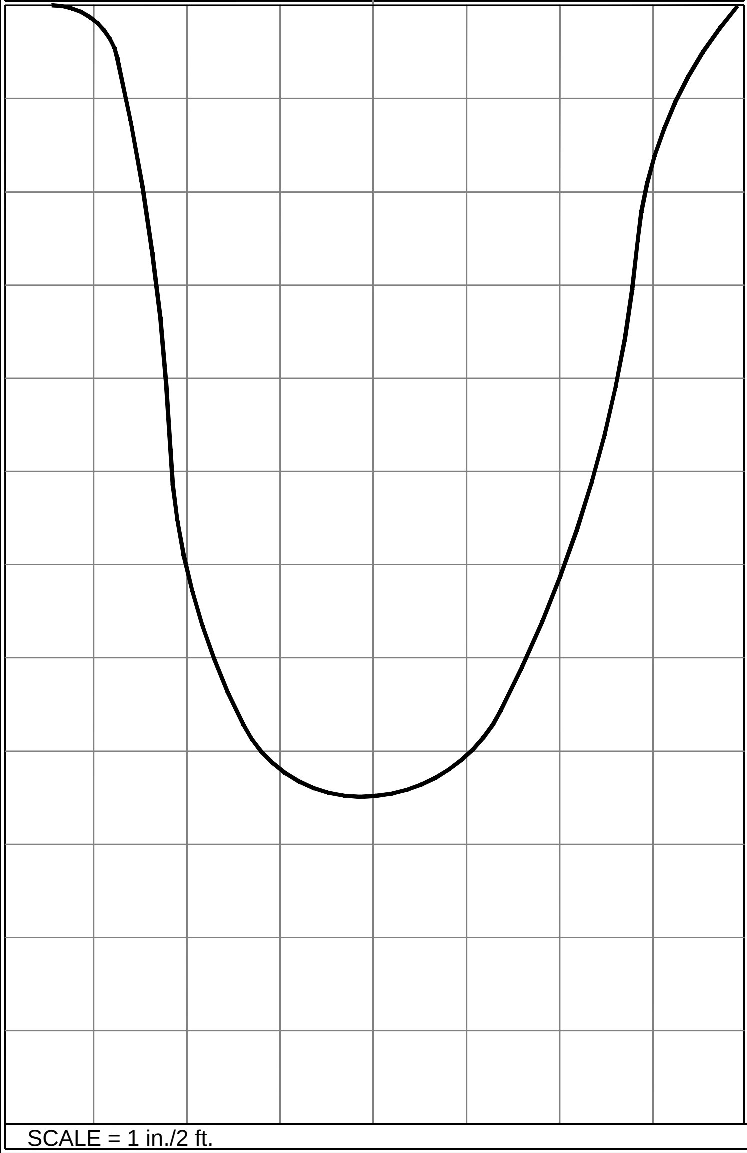
Ninyo & Moore

TEST PIT LOG

TIERRA DEL SOL SOLAR PROJECT
BOULEVARD, CALIFORNIA

PROJECT NO.	DATE
107418001	11/12

DATE EXCAVATED 10/08/12 TEST PIT NO. TP-1
GROUND ELEVATION 3,725' ± (MSL) LOGGED BY AQP
METHOD OF EXCAVATION Backhoe, 36" Bucket
LOCATION See Figure 2



SCALE = 1 in./2 ft.

DEPTH (FEET)	SAMPLES Bulk	SAMPLES Driven	SAMPLES Sand Cone	MOISTURE (%)	DRY DENSITY (PCF)	CLASSIFICATION U.S.C.S.	DESCRIPTION
0						SM	TOPSOIL: Light brown, dry, loose, silty fine to medium SAND.
							GRANITIC ROCK: Light reddish brown, dry, weathered, medium- to coarse-grained GRANITIC ROCK.
2							
4	■						
6							
							Damp; harder digging at 7.5 feet.
8							
							Total Depth = 8.5 feet. (Refusal) Groundwater not encountered during excavation. Backfilled shortly after excavating on 10/08/12. Note: Groundwater, though not encountered at the time of excavating, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.
10							
12							

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TEST PIT LOG

TIERRA DEL SOL SOLAR PROJECT
BOULEVARD, CALIFORNIA

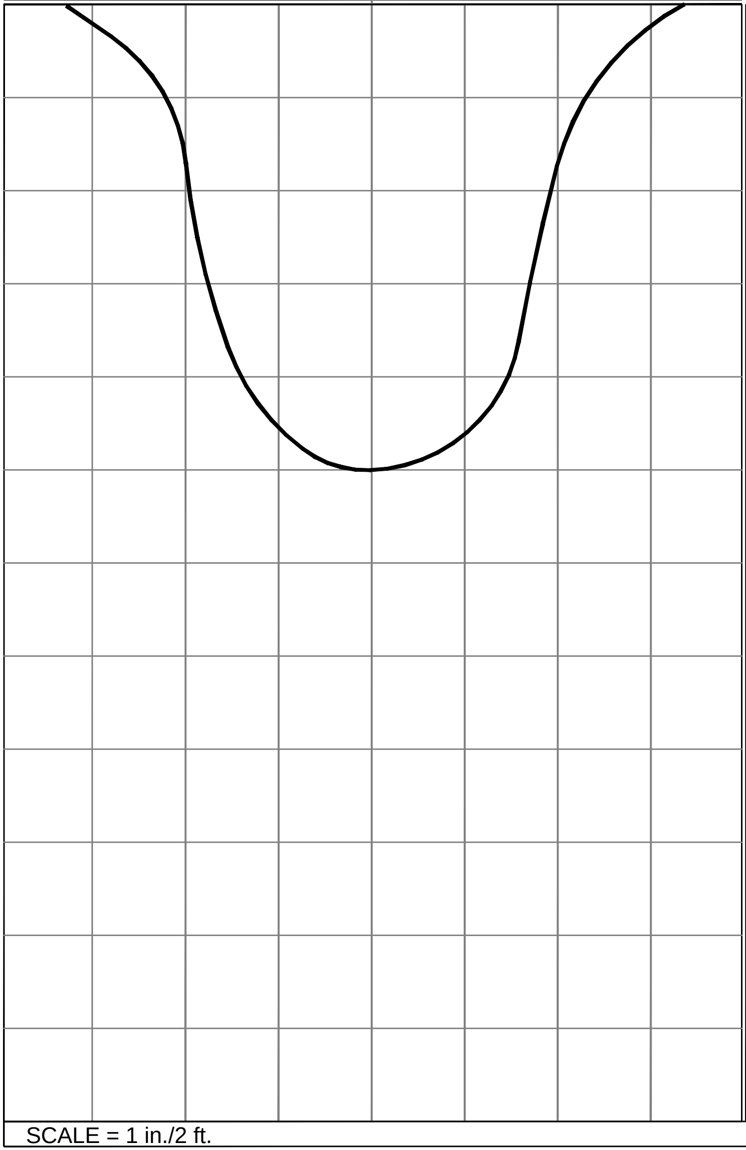
PROJECT NO.	DATE
107418001	11/12

DATE EXCAVATED 10/08/12 TEST PIT NO. TP-2

GROUND ELEVATION 3,595' ± (MSL) LOGGED BY AQP

METHOD OF EXCAVATION Backhoe, 36" Bucket

LOCATION See Figure 2



SCALE = 1 in./2 ft.

DEPTH (FEET)	SAMPLES			MOISTURE (%)	DRY DENSITY (PCF)	CLASSIFICATION U.S.C.S.	DESCRIPTION
	Bulk	Driven	Sand Cone				
0						SM	<u>TOPSOIL</u>: Light brown, dry, loose, silty fine to medium SAND.
							<u>GRANITIC ROCK</u>: Light reddish brown, dry, weathered, medium- to coarse-grained GRANITIC ROCK.
2							Harder digging at 2 feet.
4							
							Total Depth = 5 feet. (Refusal) Groundwater not encountered during excavation. Backfilled shortly after excavating on 10/08/12. <u>Note</u>: Groundwater, though not encountered at the time of excavating, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.
6							
8							
10							
12							

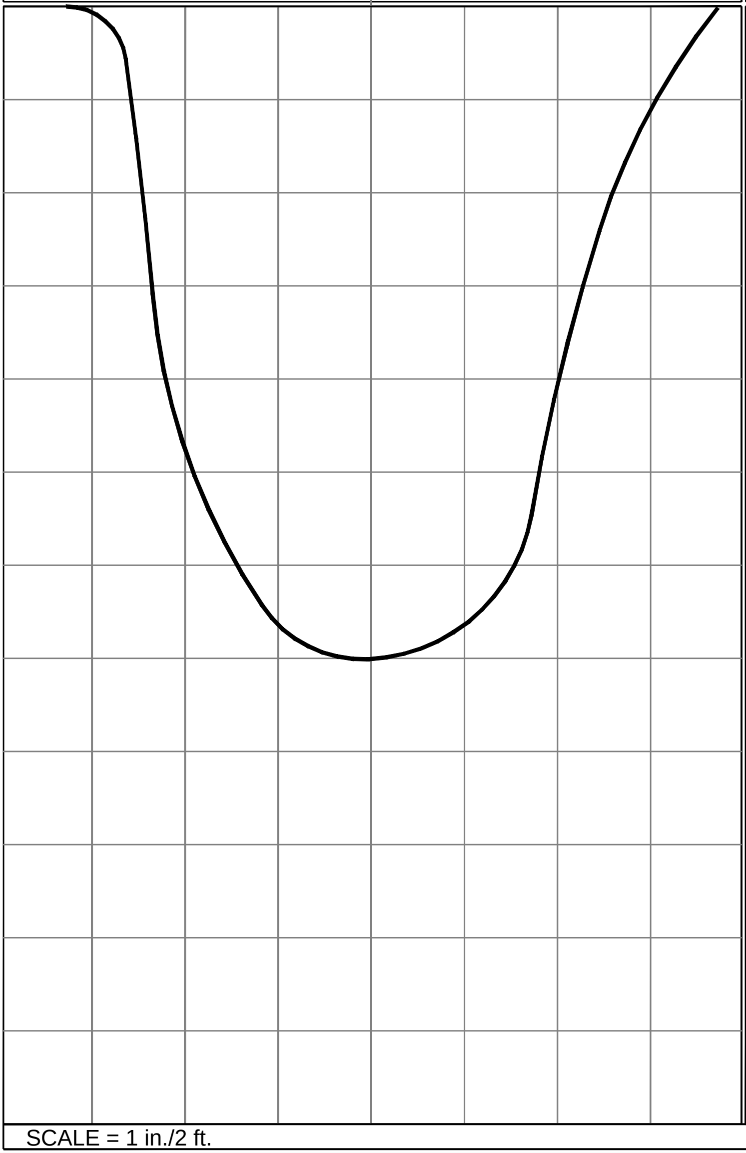
Ninyo & Moore

TEST PIT LOG

TIERRA DEL SOL SOLAR PROJECT
BOULEVARD, CALIFORNIA

PROJECT NO.	DATE
107418001	11/12

DATE EXCAVATED 10/08/12 TEST PIT NO. TP-3
GROUND ELEVATION 3,700' ± (MSL) LOGGED BY AQP
METHOD OF EXCAVATION Backhoe, 36" Bucket
LOCATION See Figure 2



DEPTH (FEET)	SAMPLES Bulk	SAMPLES Driven	SAMPLES Sand Cone	MOISTURE (%)	DRY DENSITY (PCF)	CLASSIFICATION U.S.C.S.	DESCRIPTION
0	■					SM	TOPSOIL: Light brown, dry, loose, silty fine to medium SAND.
							GRANITIC ROCK: Light reddish brown, dry, weathered, medium- to coarse-grained GRANITIC ROCK.
2							
4							
6							
							Total Depth = 7 feet. (Refusal) Groundwater not encountered during excavation. Backfilled shortly after excavating on 10/08/12. Note: Groundwater, though not encountered at the time of excavating, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.
8							
10							
12							

SCALE = 1 in./2 ft.

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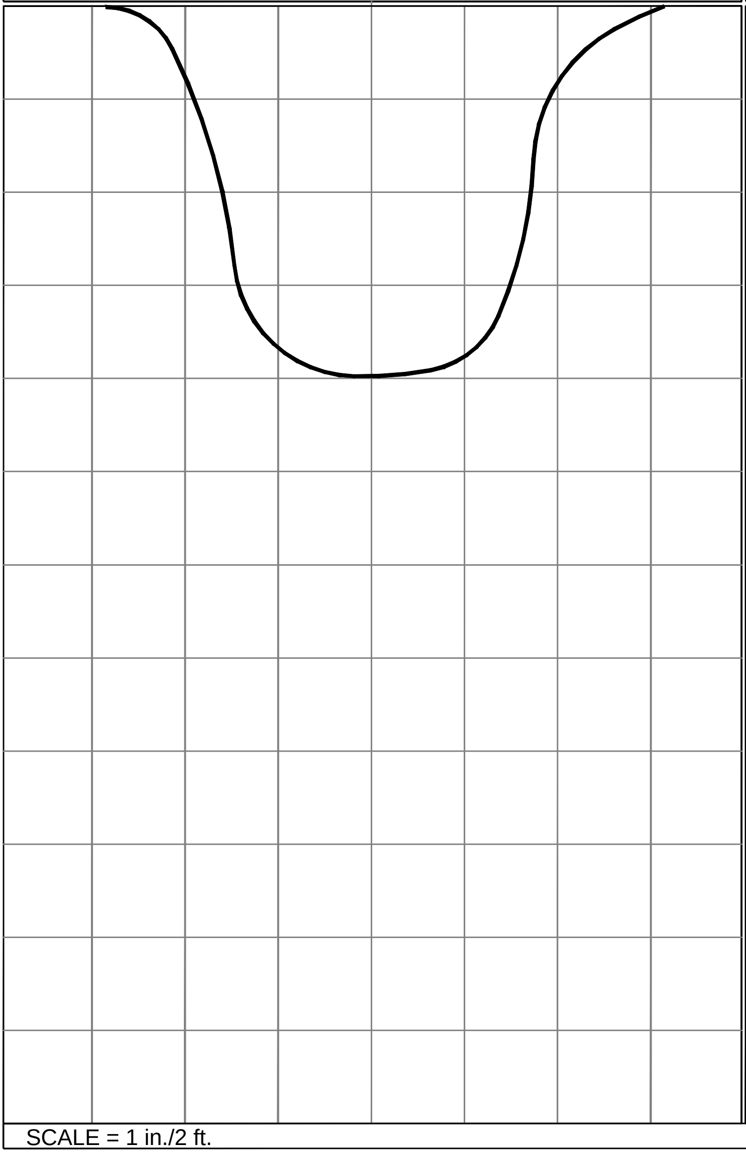
TEST PIT LOG

TIERRA DEL SOL SOLAR PROJECT
BOULEVARD, CALIFORNIA

PROJECT NO.	DATE
107418001	11/12

DATE EXCAVATED 10/08/12 TEST PIT NO. TP-4
GROUND ELEVATION 3,600' ± (MSL) LOGGED BY AQP
METHOD OF EXCAVATION Backhoe, 36" Bucket
LOCATION See Figure 2



DEPTH (FEET)	SAMPLES Bulk	Driven	Sand Cone	MOISTURE (%)	DRY DENSITY (PCF)	CLASSIFICATION U.S.C.S.	DESCRIPTION
0						SM	TOPSOIL: Light brown, dry, loose, silty fine to medium SAND.
							GRANITIC ROCK: Light reddish brown, dry, weathered, medium- to coarse-grained GRANITIC ROCK.
2							
4							Total Depth = 4 feet. (Refusal) Groundwater not encountered during excavation. Backfilled shortly after excavating on 10/08/12. Note: Groundwater, though not encountered at the time of excavating, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.
6							
8							
10							
12							

SCALE = 1 in./2 ft.

FIGURE A-25

APPENDIX B

GEOPHYSICAL EVALUATION

GEOPHYSICAL SURVEY
TIERRA DEL SOL SOLAR PROJECT
BOULEVARD, CALIFORNIA

PREPARED FOR:
Ninyo & Moore
5710 Ruffin Road
San Diego, CA 92123

PREPARED BY:
Southwest Geophysics, Inc.
8057 Raytheon Road, Suite 9
San Diego, CA 92111

November 2, 2012
Project No. 112405

SOUTHWEST
GEOPHYSICS, INC.
YOUR SUBSURFACE SOLUTION

November 2, 2012
Project No. 112405

Mr. Frank Moreland
Ninyo & Moore
5710 Ruffin Road
San Diego, CA 92123

Subject: Geophysical Survey
Tierra Del Sol Solar Project
Boulevard, California

Dear Mr. Moreland:

In accordance with your authorization, we have performed a geophysical evaluation pertaining to the property south of Tierra Del Sol Road in the Boulevard area of San Diego County, California. Specifically, our services consisted of performing five seismic P-wave refraction profiles, and electrical resistivity soundings in five test locations at the subject site. The purpose of our services was to evaluate the apparent rippability of the subsurface materials, develop a subsurface velocity model, and to collect in-situ electrical resistivity measurements for use in the design and construction of proposed improvements. This report presents our survey methodology, equipment used, analysis, and results.

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

Sincerely,
SOUTHWEST GEOPHYSICS, INC.

Patrick Lehrmann

Hans van de Vrugt

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Exp. 1/31/14
STATE OF CALIFORNIA

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1. INTRODUCTION

In accordance with your authorization, we have performed a geophysical evaluation pertaining to the property south of Tierra Del Sol Road in the Boulevard area of San Diego County, California. Specifically, our services consisted of performing five seismic P-wave refraction profiles, and electrical resistivity soundings in five test locations at the subject site. The purpose of our services was to evaluate the apparent rippability of the subsurface materials, develop a subsurface velocity model, and to collect in-situ electrical resistivity measurements for use in the design and construction of proposed improvements. This report presents our survey methodology, equipment used, analysis, and results.

2. SCOPE OF SERVICES

Our scope of services included:

- Performance of five seismic P-wave refraction profiles.
- Performance of electrical resistivity soundings in five test areas.
- Compilation and analysis of the data collected.
- Preparation of this report presenting our findings and conclusions.

3. SITE AND PROJECT DESCRIPTION

The project site is located to the south of Tierra Del Sol Road and north of the U.S./Mexico border in the Boulevard area of San Diego County (Figure 1). Terrain in the survey areas consists of relatively flat ground and small hills. Vegetation consists of annual grass, brush, and scattered trees. The general site conditions in the survey areas are depicted on Figures 2a through 2d, and 3a through 3e.

It is our understanding that your office is conducting a geotechnical evaluation for the proposed solar facility. Information acquired during our study (i.e., depth to bedrock, rippability, electrical properties, etc.) are to be used in the design and construction of the proposed improvements.

4. SURVEY METHODOLOGY

As previously indicated, the primary purpose of our services was to characterize the subsurface conditions at pre-selected locations through the collection of seismic and electrical resistivity data. The following sections provide an overview of the methodologies used during our study.

4.1. Seismic P-wave Refraction Survey

A seismic P-wave (compression wave) refraction survey was conducted at the site to evaluate the apparent rippability characteristics of the subsurface materials and to develop a subsurface velocity profile of the study area. The seismic refraction method uses first-arrival times of refracted seismic waves to estimate the thicknesses and seismic velocities of subsurface layers. Seismic P-waves generated at the surface, using a hammer and plate, are refracted at boundaries separating materials of contrasting velocities. These refracted seismic waves are then detected by a series of surface vertical component geophones, and recorded with a 24-channel Geometrics StrataView seismograph. The travel times of the seismic P-waves are used in conjunction with the shot-to-geophone distances to obtain thickness and velocity information on the subsurface materials. Five seismic profiles (labeled SL-1, SL-2, SL-5, SL-12 and SL-19) were conducted at the site. The locations and line numbers were selected by your office. Figures 2a through 2d depict the general location of the lines. Shot points were conducted at the ends and intermediate points along the lines.

The refraction method requires that subsurface velocities increase with depth. A layer having a velocity lower than that of the layer above may not be detectable by the seismic refraction method and, therefore, could lead to errors in the depth calculations of subsequent layers. In addition, lateral variations in velocity, such as those caused by core stones, dikes, etc. can result in the misinterpretation of the subsurface conditions.

In general, seismic wave velocities can be correlated to material density and/or rock hardness. The relationship between rippability and seismic velocity is empirical and assumes a homogenous mass. Localized areas of differing composition, texture, and/or structure may affect both the measured data and the actual rippability of the mass. The rippability of a mass is also dependent on the excavation equipment used and the skill and experience of the equipment operator.

The rippability values presented in Table 1 are based on our experience with similar materials and assumes that a Caterpillar D-9 dozer ripping with a single shank is used. We emphasize that the cutoffs in this classification scheme are approximate and that rock characteristics, such as fracture spacing and orientation, play a significant role in determining rock rippability. These characteristics may also vary with location and depth.

For trenching operations, the rippability values should be scaled downward. For example, velocities as low as 3,500 feet/second may indicate difficult ripping during trenching operations. In addition, the presence of boulders, which can be troublesome in a narrow trench, should be anticipated.

Table 1 – Rippability Classification

Seismic P-wave Velocity	Rippability
0 to 2,000 feet/second	Easy
2,000 to 4,000 feet/second	Moderate
4,000 to 5,500 feet/second	Difficult, Possible Blasting
5,500 to 7,000 feet/second	Very Difficult, Probable Blasting
Greater than 7,000 feet/second	Blasting Generally Required

It should be noted that the rippability cutoffs presented in Table 1 are slightly more conservative than those published in the Caterpillar Performance Handbook (Caterpillar, 2004). Accordingly, the above classification scheme should be used with discretion, and contractors should not be relieved of making their own independent evaluation of the rippability of the on-site materials prior to submitting their bids.

Collected P-wave data were processed using SIPwin (Rimrock Geophysics, 2003) and SeisOpt® Pro™ (Optim, 2008). SIPwin was used to evaluate first arrival times and SeisOpt® Pro™ was used for interpretation. SeisOpt® Pro™ uses a nonlinear optimization technique called adaptive simulated annealing. The resulting velocity models provide a tomography image of the estimated geologic conditions. Both vertical and lateral velocity information is contained in the tomography models. Changes in layer velocity are revealed as gradients rather than discrete contacts, which typically are more representative of actual conditions.

4.2. Electrical Resistivity Survey

Ten electrical resistivity soundings were performed at five test locations selected by your office. Specifically we conducted two intersecting resistivity soundings in each location. The "a" profiles (i.e., R-1a) were conducted in roughly a north-south direction and the "b" profiles (i.e., R-1b) were conducted in roughly an east-west direction. The purpose of the crossing profiles was to assess lateral variations in resistivity. Figures 2a through 2d illustrate the approximate locations of the lines.

The data were collected in general accordance with ASTM G 57 using an Advanced Geosciences, Inc. (AGI) SuperSting R8 earth resistivity meter and four stainless steel electrodes in a Wenner configuration. The SuperSting can generate up to 800 volts and 2 amps and allows for the direct measurement of resistance. Soil resistance measurements were collected at electrode spacings of approximately 2, 5, 10, 20, 30 and 40 feet. The electrodes were hammered into place. Special care was exercised to ensure firm contact with the soil. When contact resistance values were high, the electrode hole was moistened with water to improve contact with the ground.

5. RESULTS

The following is a summary of our findings:

5.1. Seismic P-wave Refraction Survey

The results of the P-wave refraction survey appear to indicate two geologic units down to the depth explored in profiles SL-1, SL-2, SL-5, and SL-12 and three geologic units down to the depth explored in profile SL-19. Based on our site observations and discussions with you, the units detected have been interpreted to be soil overlying granitic bedrock with varying degrees of weathering. Table 2 lists the approximate P-wave velocities and depths calculated from the seismic refraction traverse using the layered modeling method. Figures 4a through 4e provide both layer-based and tomography velocity models for the areas surveyed.

Table 2 – Seismic Traverse Results[1]

Traverse No. And Length	P-wave Velocity feet/second	Approximate Depth to Bottom of Layer in feet	Apparent Rippability[2]
SL-1 130 feet	V1 = 1,600 V2 = 4,793	1 – 4 ---	Easy Difficult, Possible Blasting
SL-2 130 feet	V1 = 1,325 V2 = 5,210	2 – 4 ---	Easy Difficult, Possible Blasting
SL-5 130 feet	V1 = 1,950 V2 = 4,250	3 – 5 ---	Easy Difficult, Possible Blasting
SL-12 130 feet	V1 = 1,450 V2 = 4,650	2 – 3 ---	Easy Difficult, Possible Blasting
SL-19 130 feet	V1 = 1,375 V2 = 2,975 V3 = 11,775	2 – 4 13 – 38 ---	Easy Moderate Blasting Generally Required

[1] Results based on the model generated using SIPwin, 2003
[2] Rippability criteria based on the use of a Caterpillar D-9 dozer ripping with a single shank

5.2. Electrical Resistivity Survey

The resistivity results are depicted on Figure 5. In general, the quality of the collected data is very good. The standard deviation between multiple readings is 0.1 percent or less. The measurements collected along orthogonal soundings are also fairly consistent indicating subsurface homogeneous conditions in each test location except at location R-5 where the values vary between orthogonal soundings. The cause of this variance is not known, however it is likely related to inhomogeneities in the geology.

6. LIMITATIONS

The field evaluation and geophysical analyses presented in this report have been conducted in general accordance with current practice and the standard of care exercised by consultants performing similar tasks in the project area. No warranty, expressed or implied, is made regarding the conclusions and opinions presented in this report. There is no evaluation detailed enough to reveal every subsurface condition. Variations may exist and conditions not observed or described in this report may be present. Uncertainties relative to subsurface conditions can be reduced through additional subsurface exploration. Additional subsurface surveying will be performed upon request.

This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Southwest Geophysics, Inc. should be contacted if the reader requires additional information or has questions regarding the content, interpretations presented, or completeness of this document. This report is intended exclusively for use by the client. Any use or reuse of the findings, conclusions, and/or recommendations of this report by parties other than the client is undertaken at said parties' sole risk.

7. SELECTED REFERENCES

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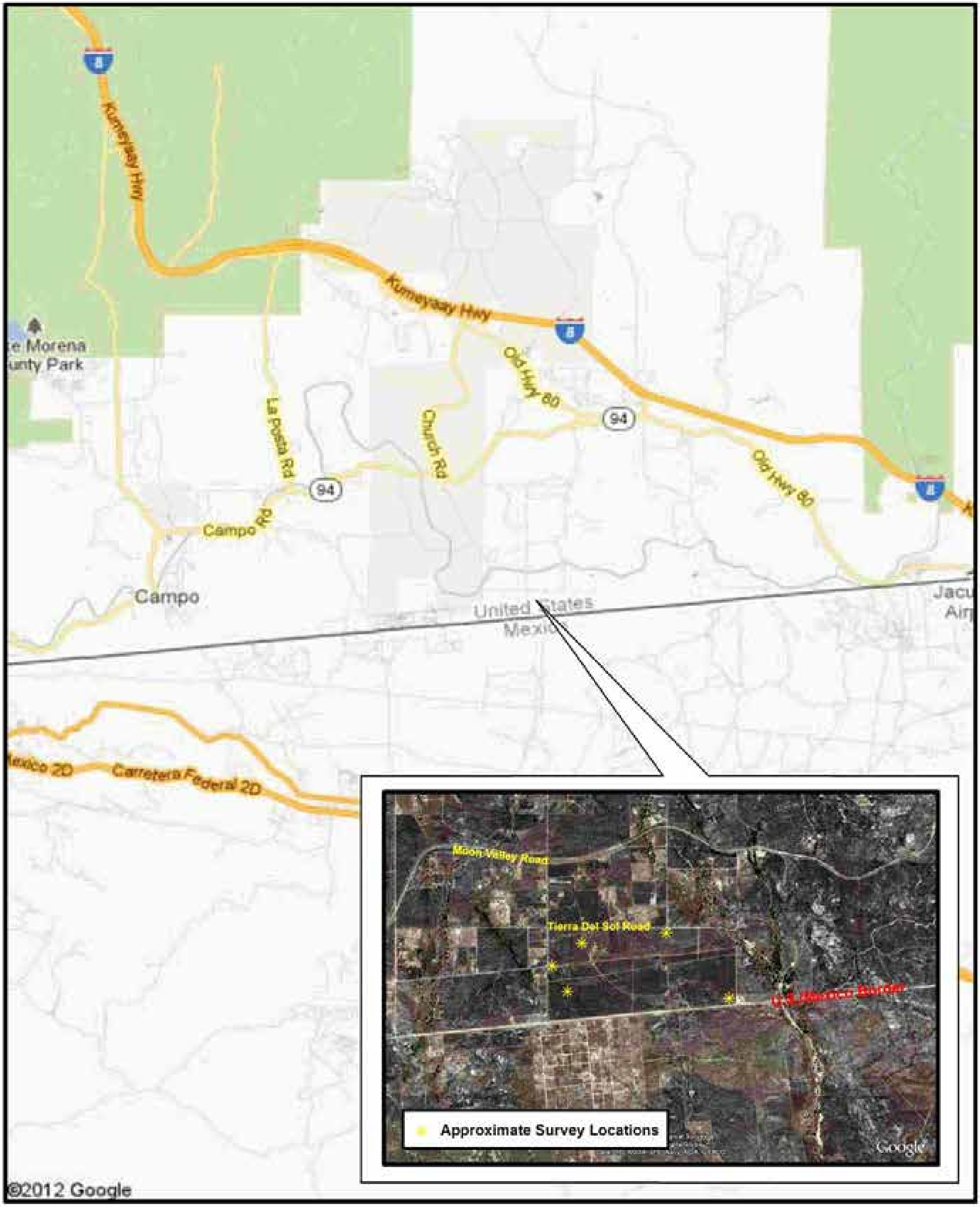


SITE LOCATION MAP

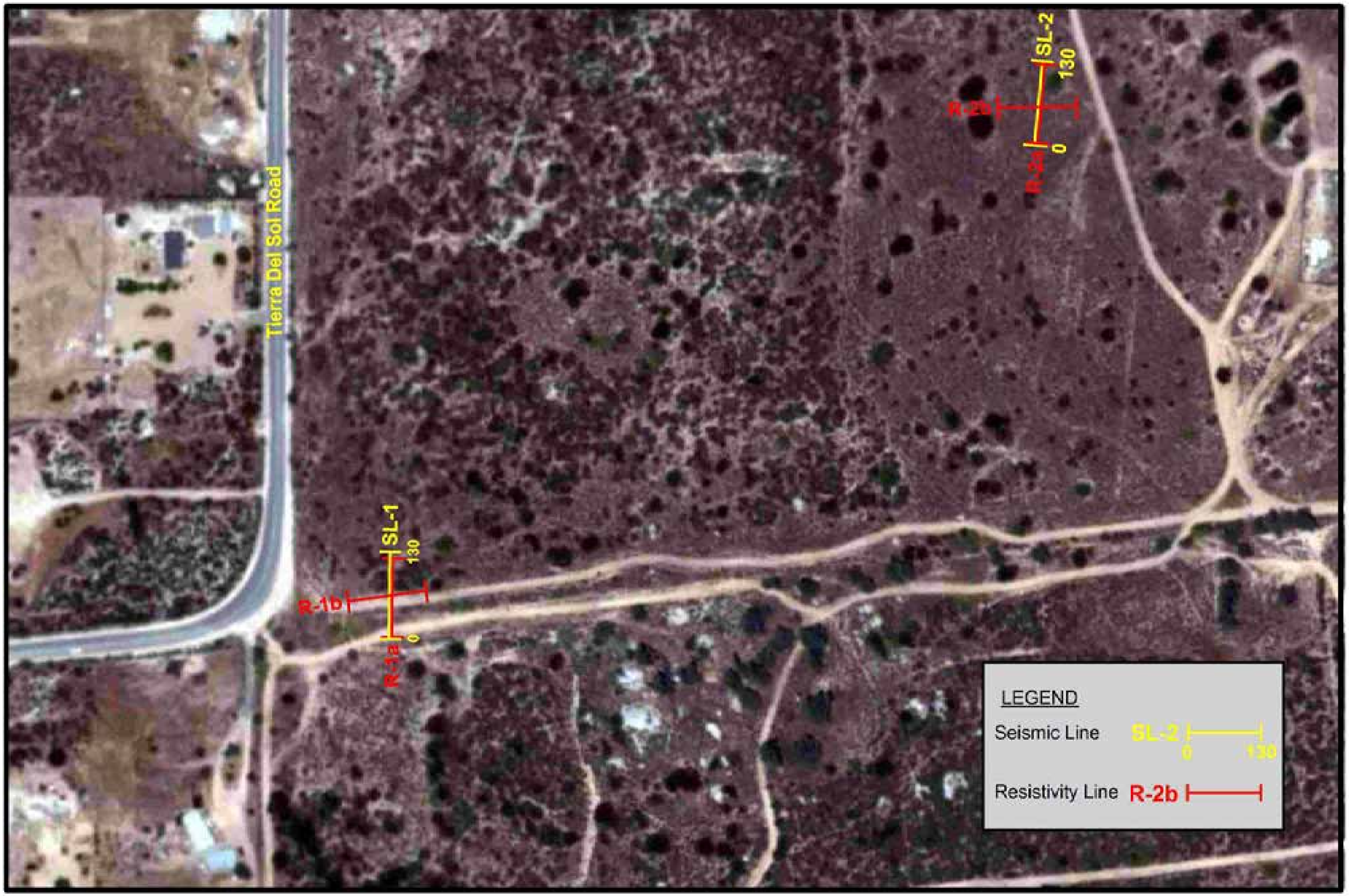
Tierra Del Sol Solar Project
Boulevard, California

Project No.: 112405

Date: 11/12

SOUTHWEST
GEOPHYSICS INC.

Figure 1



LINE LOCATION MAP

N

Tierra Del Sol Solar Project
Boulevard, California

Project No.: 112405

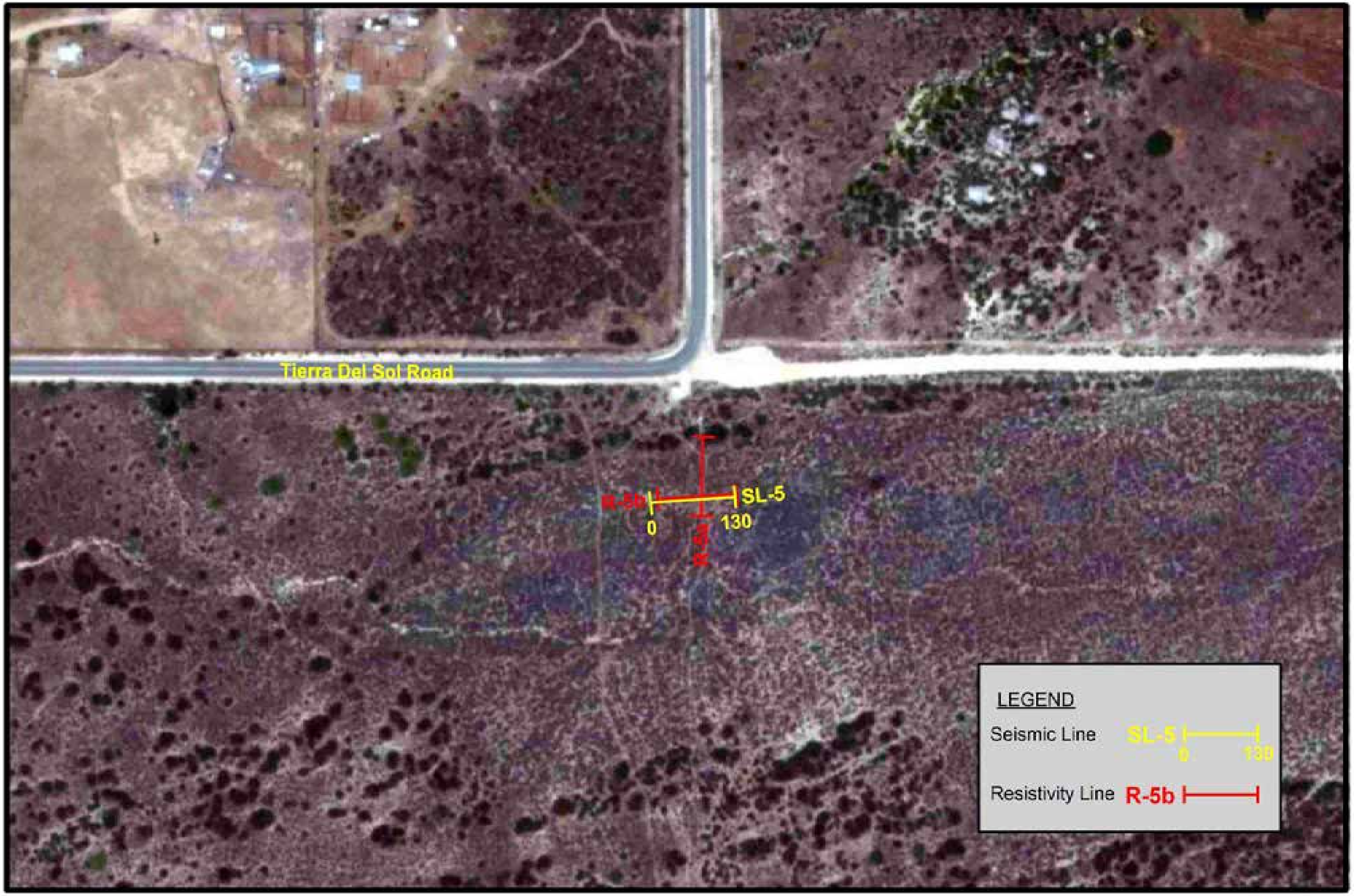
Date: 11/12

SOUTHWEST GEOPHYSICS INC.

Figure 2a

0 200 400

approximate scale in feet



LINE LOCATION MAP

N

Tierra Del Sol Road
Boulevard, California

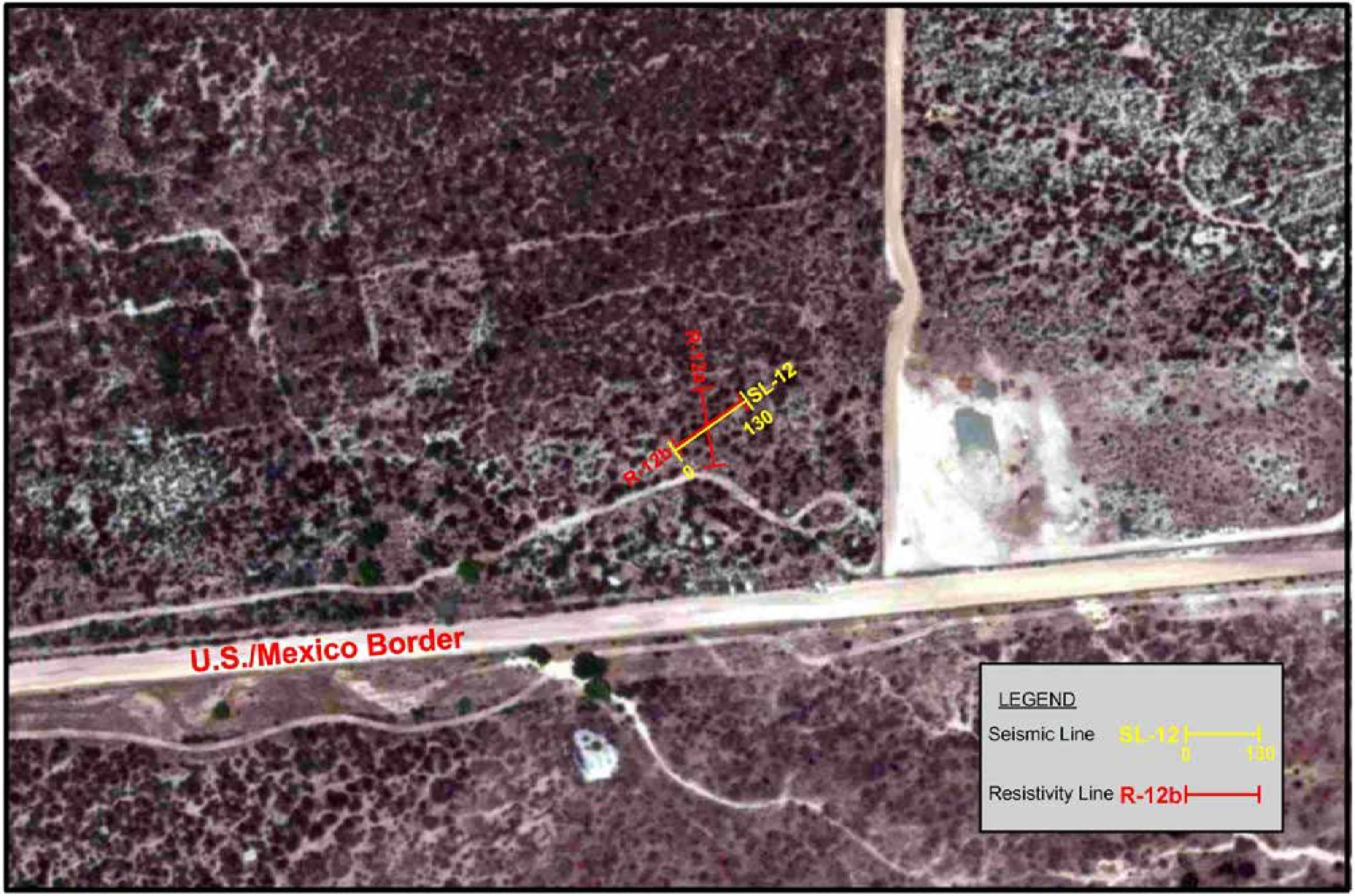
Project No.: 112405

Date: 11/12

SOUTHWEST GEOPHYSICS INC.

Figure 2b

0 200 400
approximate scale in feet



LINE LOCATION MAP

N

Tierra Del Sol Solar Project
Boulevard, California

Project No.: 112405

Date: 11/12

SOUTHWEST
GEOPHYSICS INC.

Figure 2c

0 200 400
approximate scale in feet

LINE LOCATION MAP

N

Tierra Del Sol Solar Project
Boulevard, California

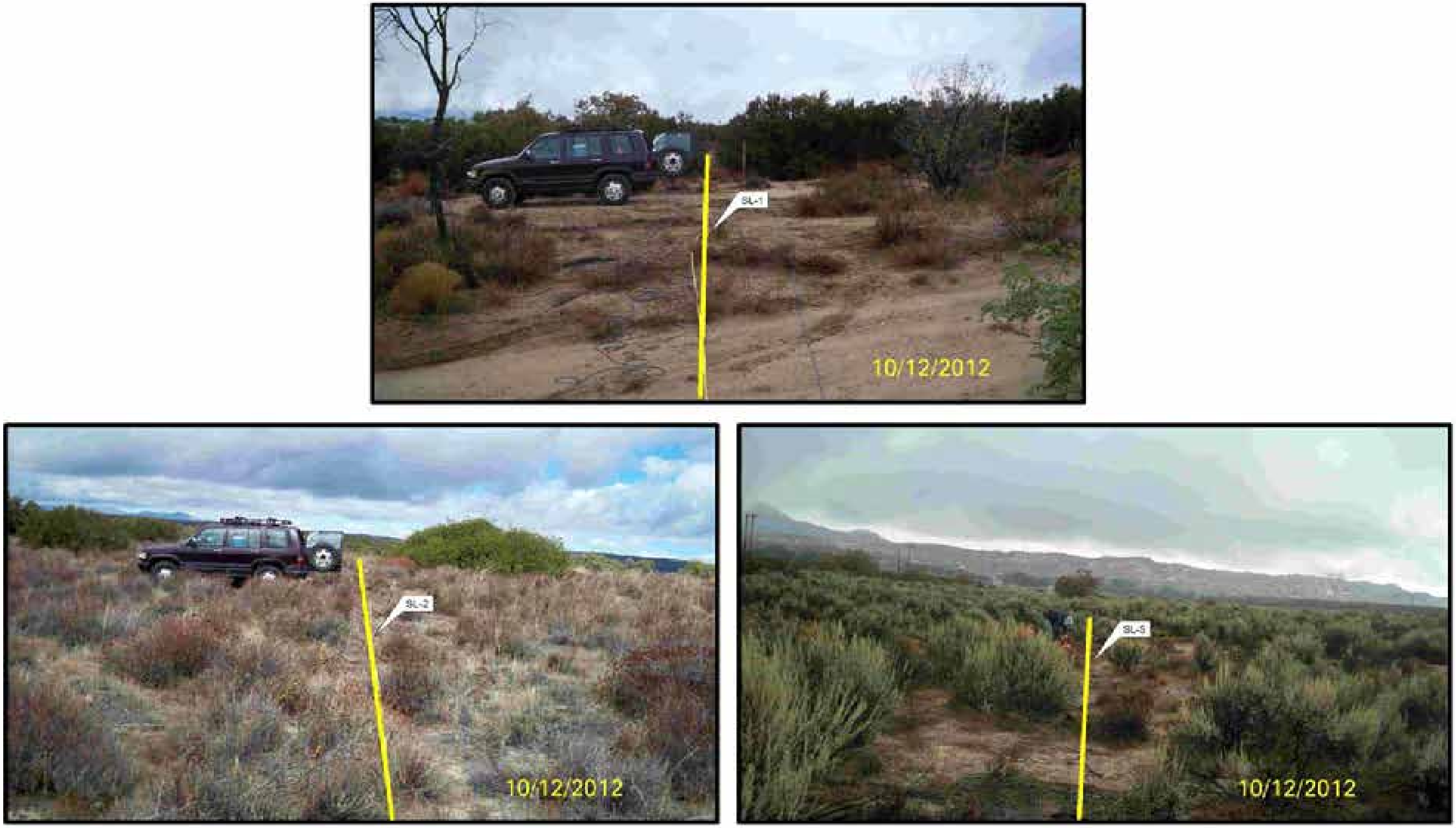
Project No.: 112405

Date: 11/12

SOUTHWEST
GEOPHYSICS INC.

Figure 2d

0 200 400
approximate scale in feet



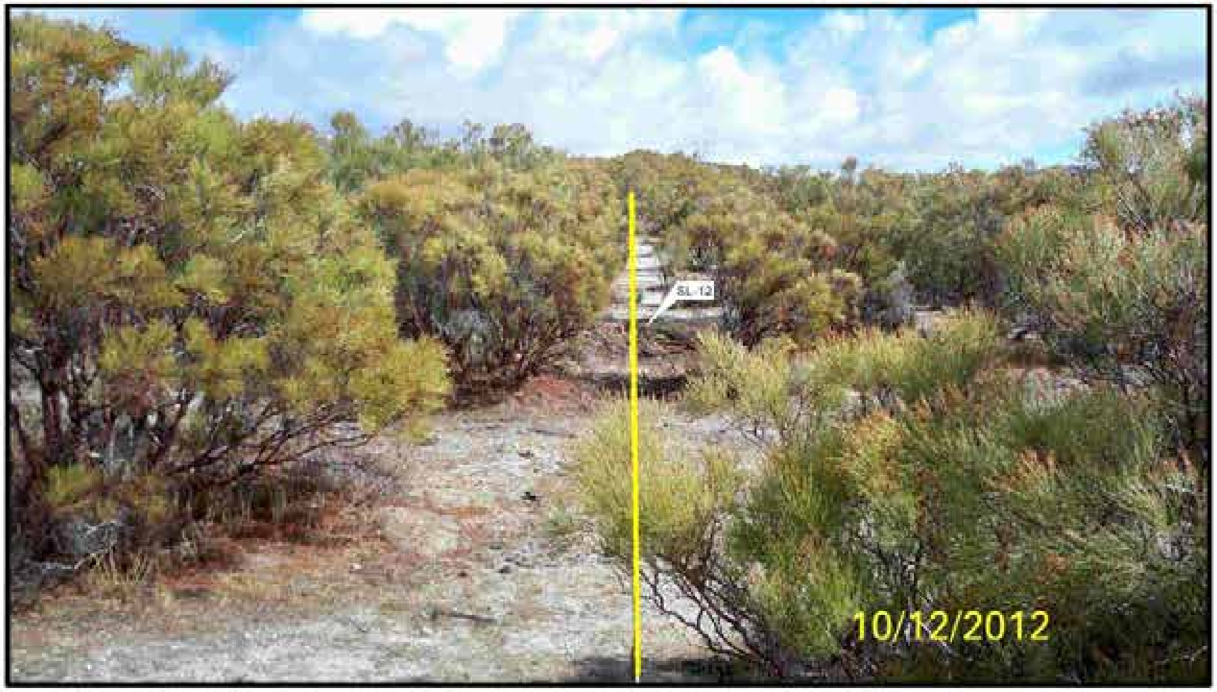
SITE PHOTOGRAPHS
Seismic Lines

Tierra Del Sol Solar Project
Boulevard, California

Project No.: 112405
Date: 11/12

SOUTHWEST
GEOPHYSICS INC.

Figure 3a



SITE PHOTOGRAPHS
Seismic Lines

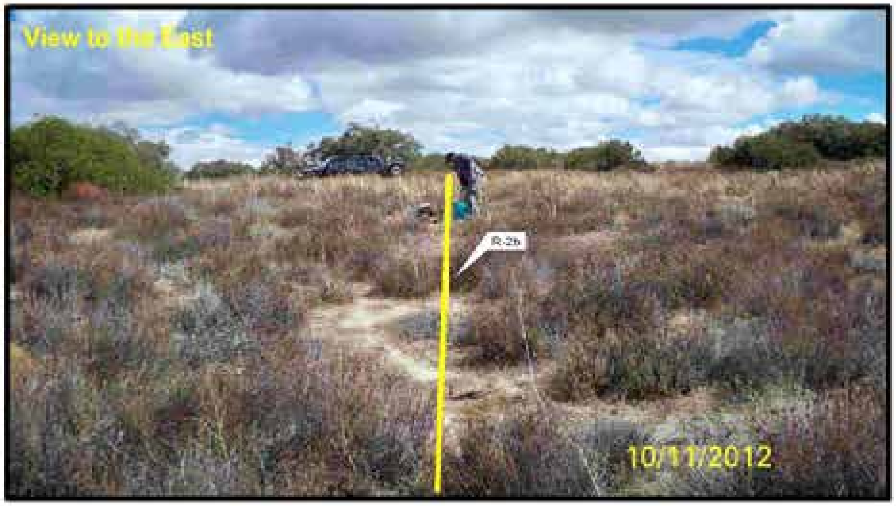
Tierra Del Sol Solar Project
Boulevard, California

Project No.: 112405

Date: 11/12

SOUTHWEST GEOPHYSICS INC.

Figure 3b



SITE PHOTOGRAPHS **Resistivity Lines**	Tierra Del Sol Solar Project Boulevard, California Project No.: 112405 Date: 11/12	SOUTHWEST GEOPHYSICS INC. Figure 3c

SITE PHOTOGRAPHS
Resistivity Lines

Tierra Del Sol Solar Project
Boulevard, California

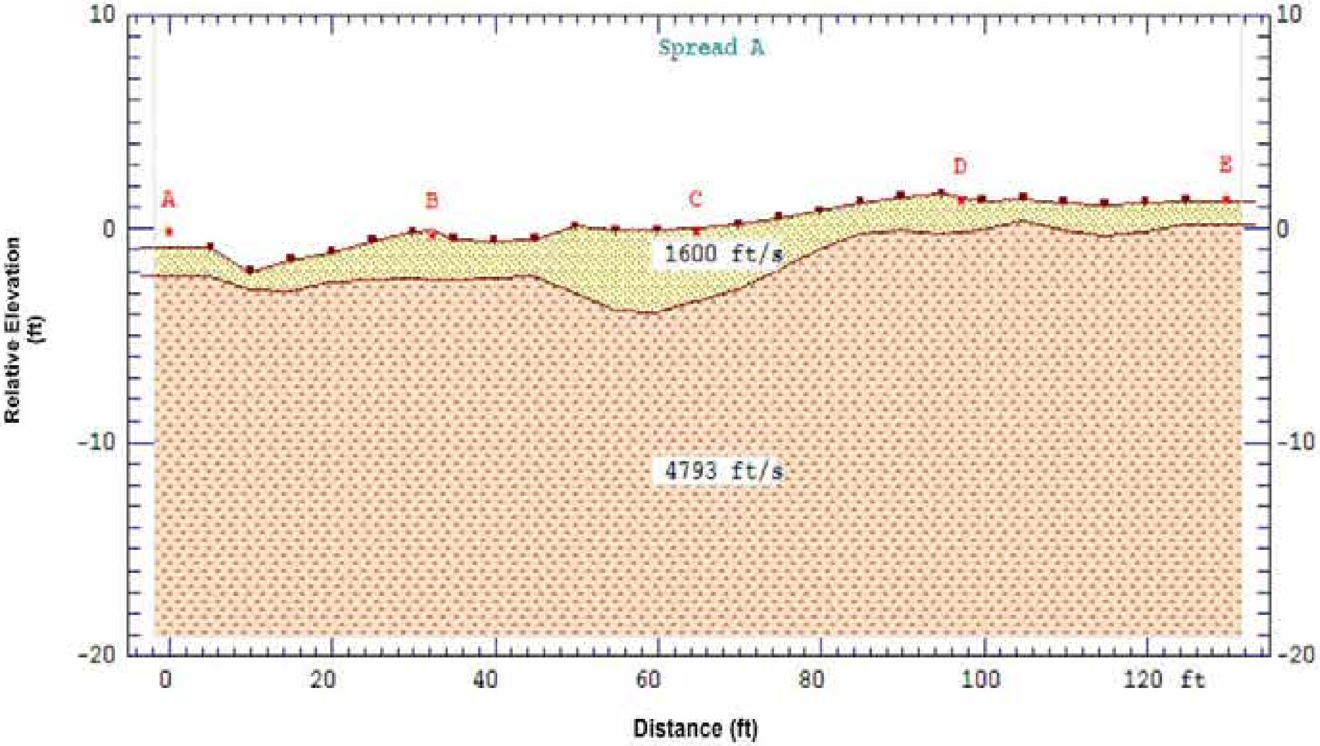
Project No.: 112405

Date: 11/12

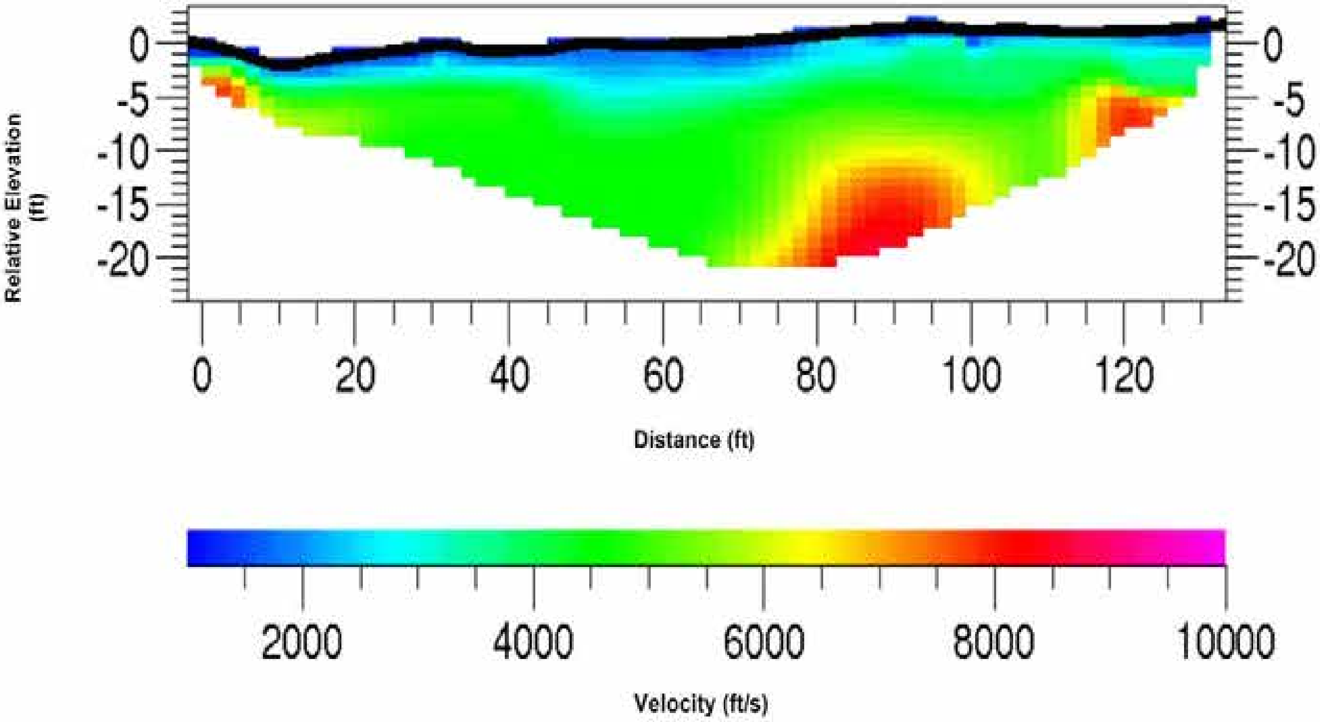
SOUTHWEST GEOPHYSICS INC.

Figure 3e

Layer Model



Tomography Model



SEISMIC PROFILE
SL-1

Tierra Del Sol Solar Project
Boulevard, California

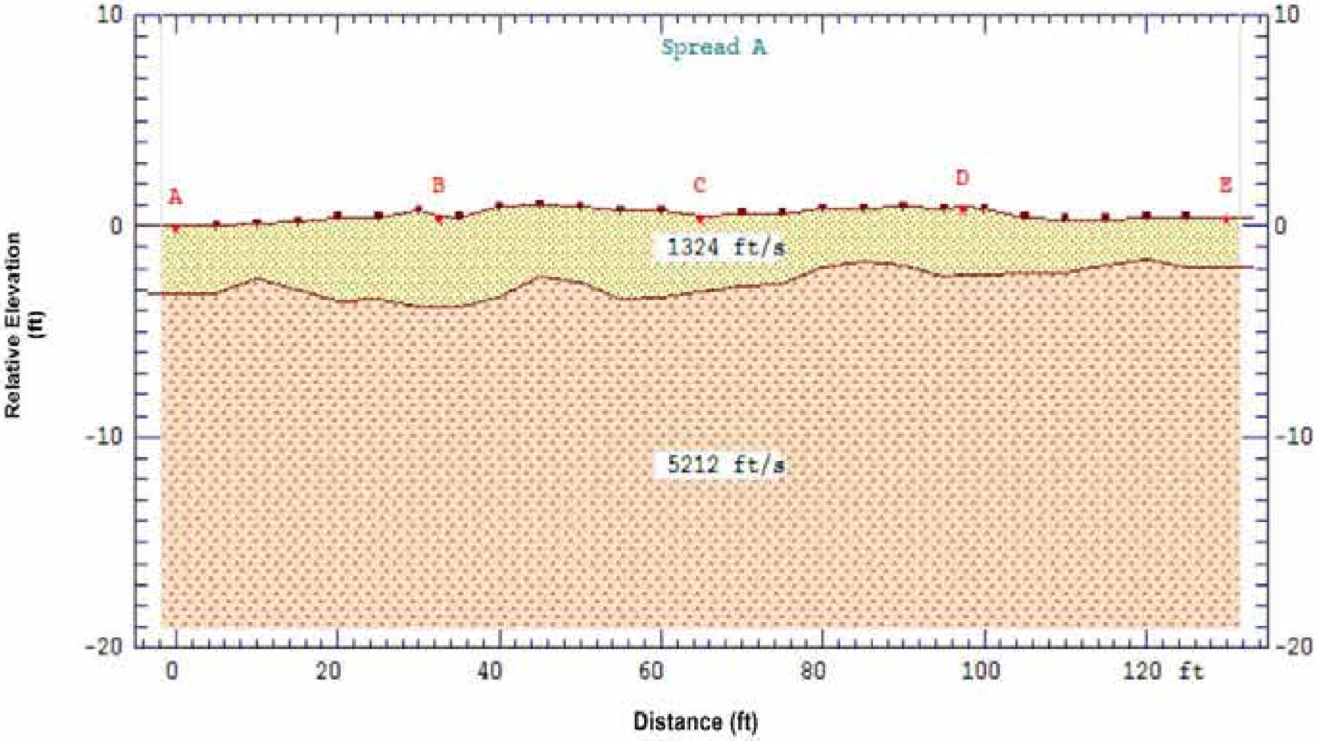
Project No.: 112405

Date: 11/12

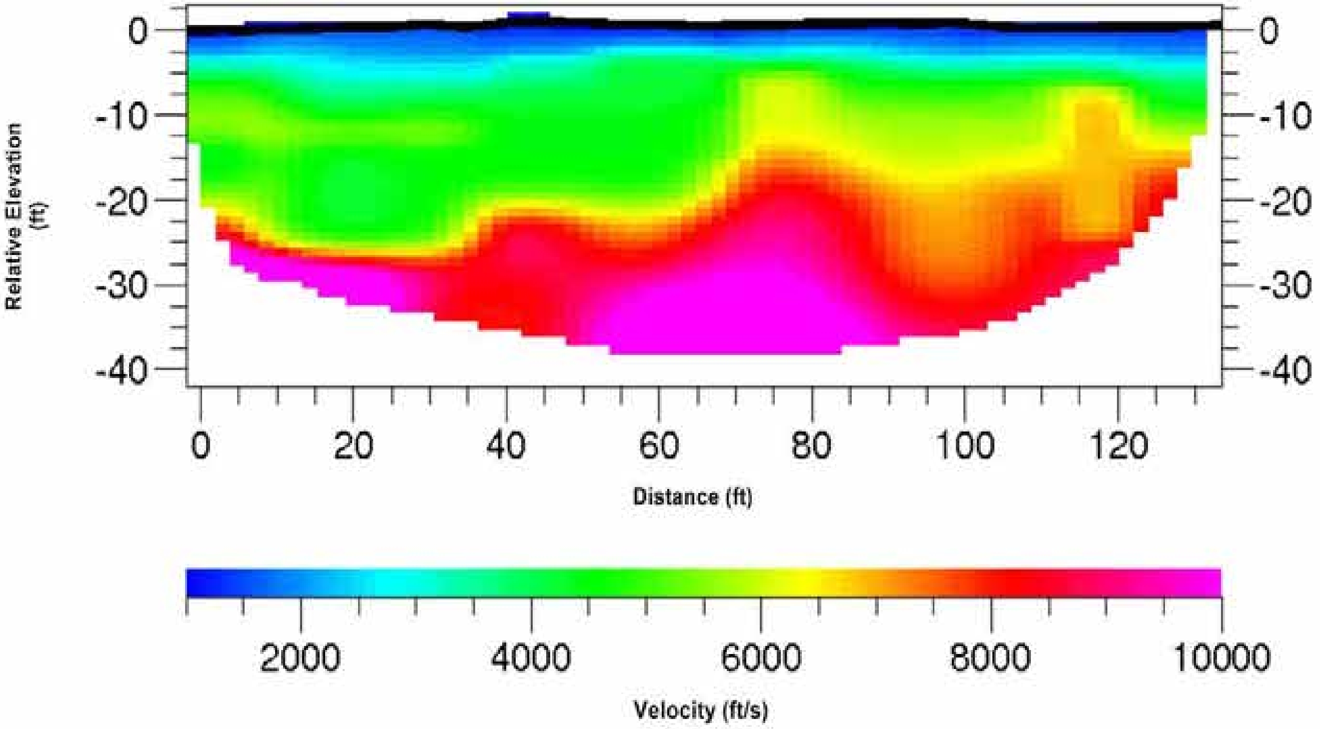
SOUTHWEST GEOPHYSICS INC.

Figure 4a

Layer Model



Tomography Model



SEISMIC PROFILE
SL-2

Tierra Del Sol Solar Project
Boulevard, California

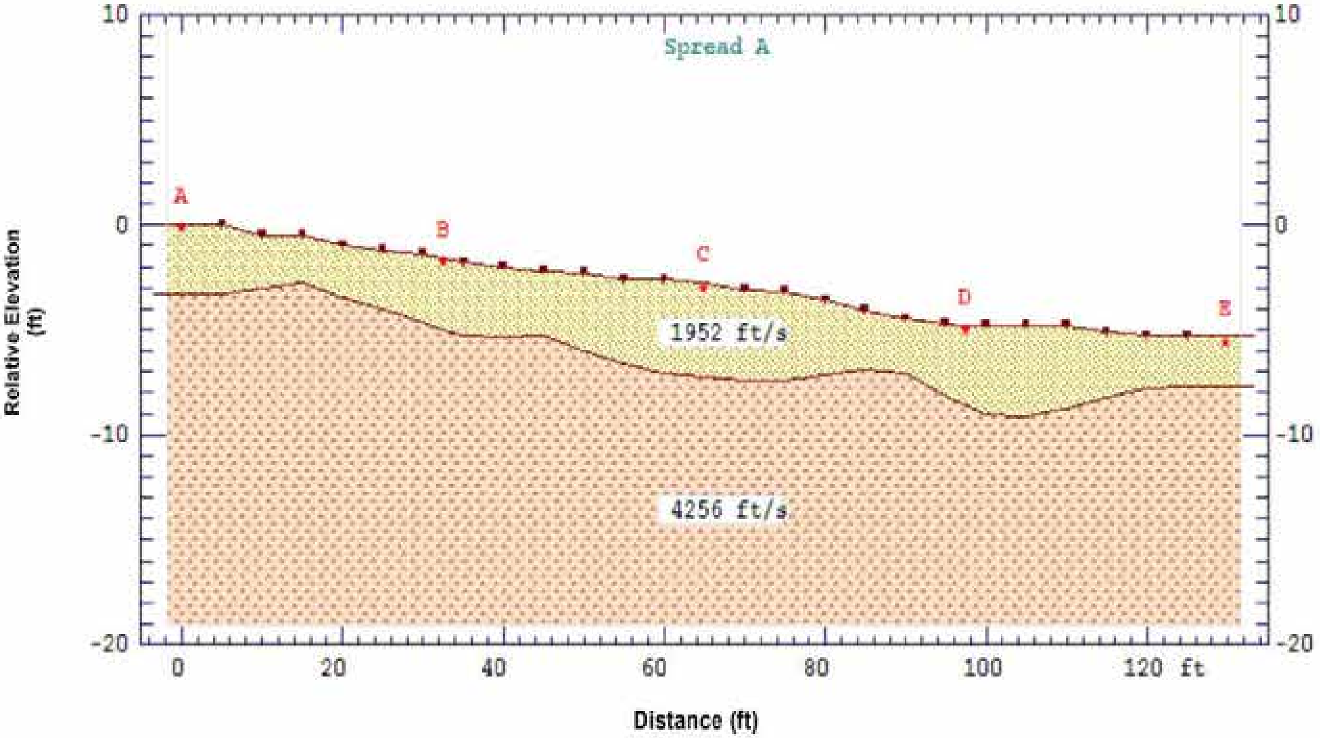
Project No.: 112405

Date: 11/12

SOUTHWEST GEOPHYSICS INC.

Figure 4b

Layer Model



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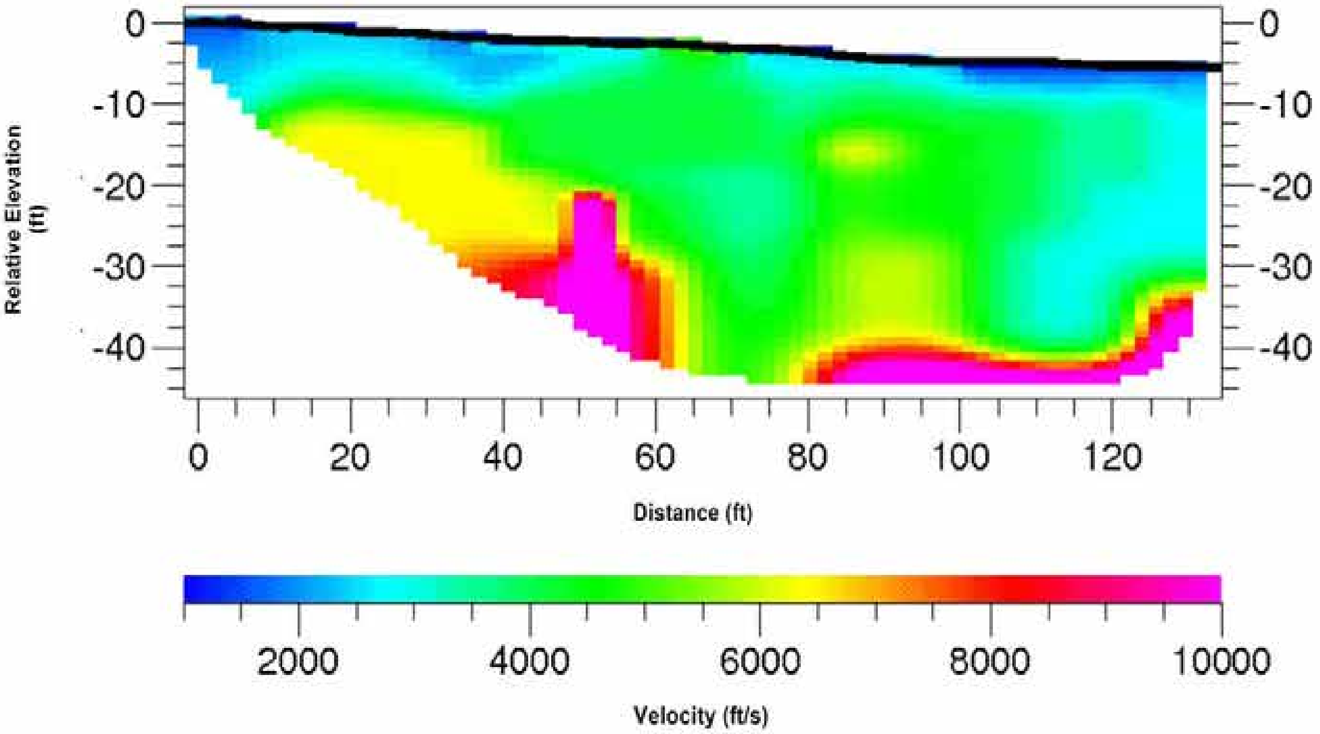


SEISMIC PROFILE
SL-5

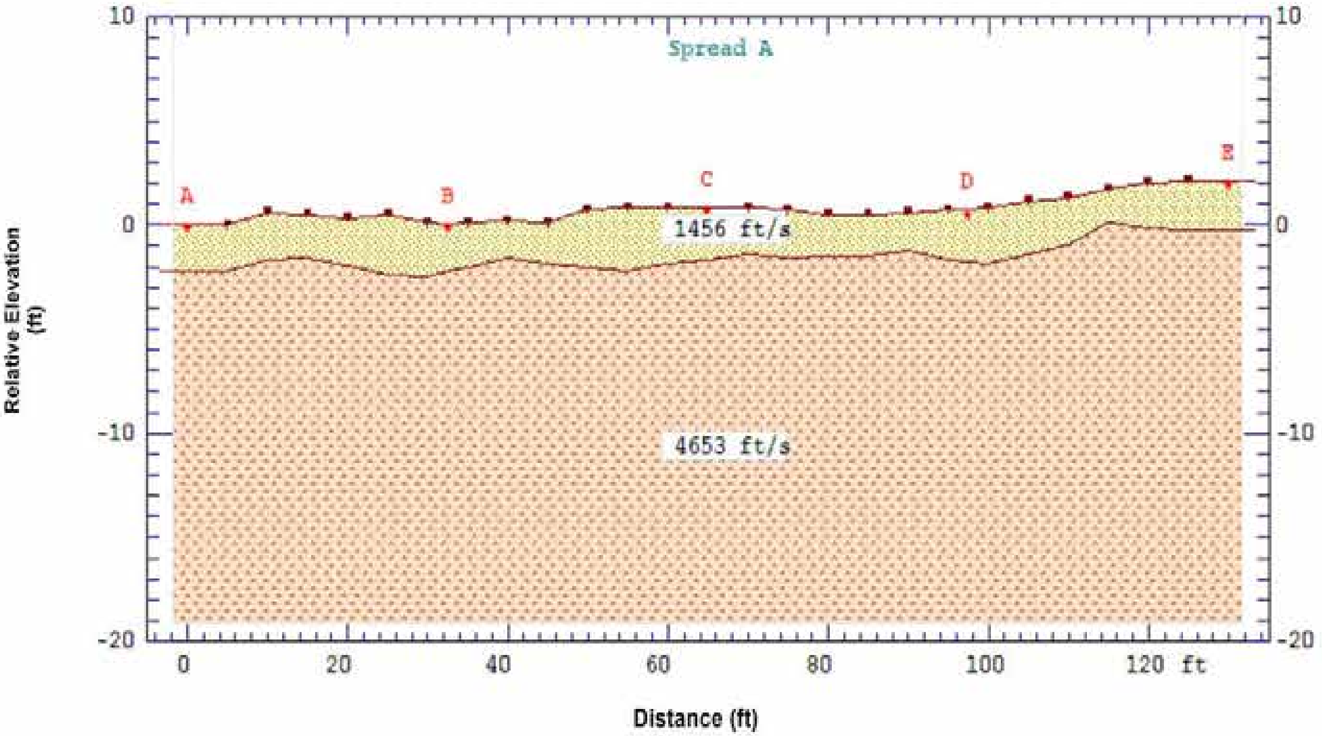
Tierra Del Sol Solar Project
Boulevard, California

Project No.: 112405

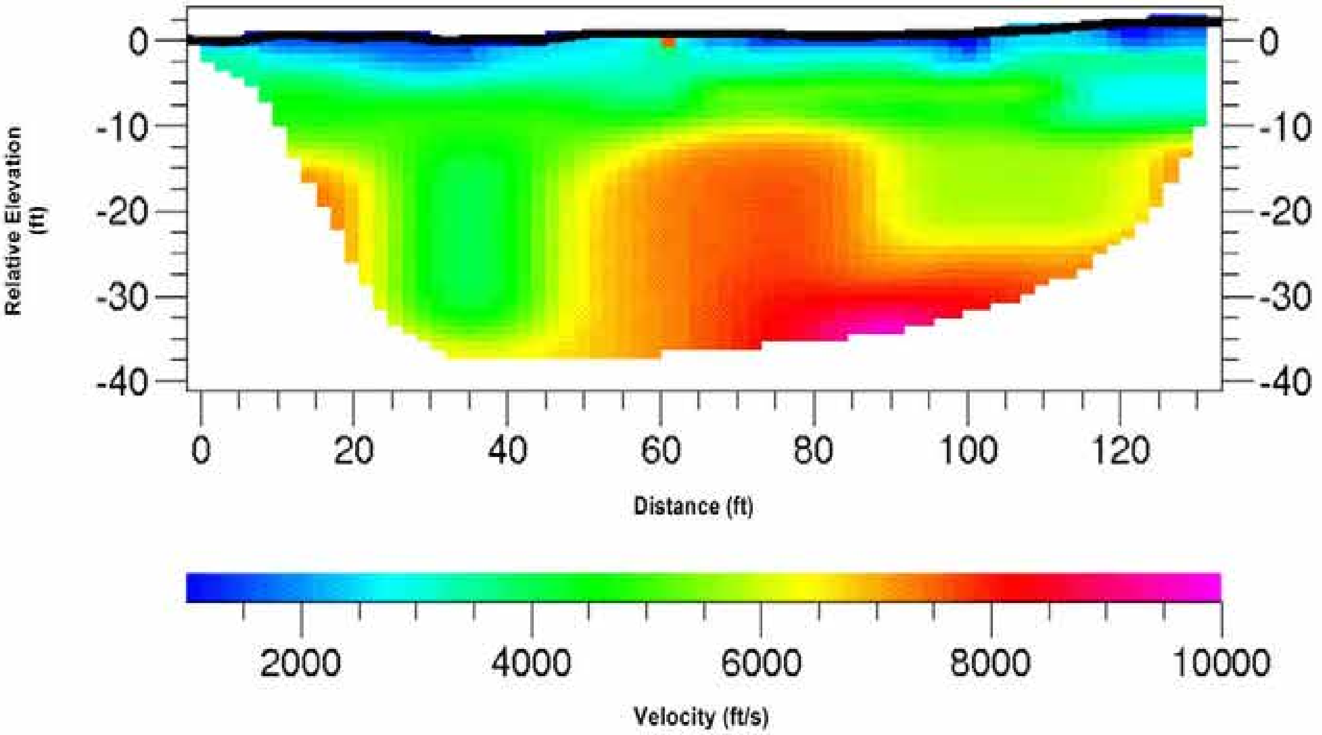
Date: 11/12

SOUTHWEST GEOPHYSICS INC.

Figure 4c



Layer Model



Tomography Model

SEISMIC PROFILE
SL-12

Tierra Del Sol Solar Project
Boulevard, California

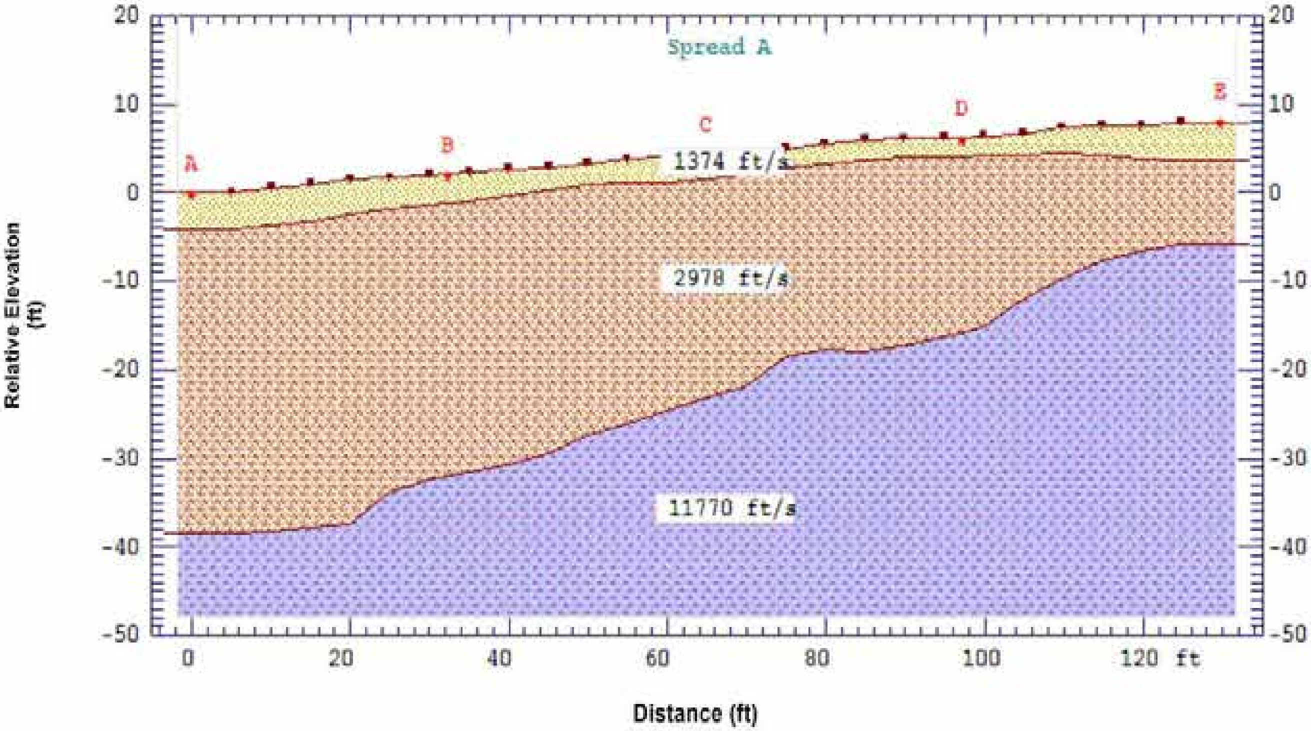
Project No.: 112405

Date: 11/12

SOUTHWEST GEOPHYSICS INC.

Figure 4d

Layer Model



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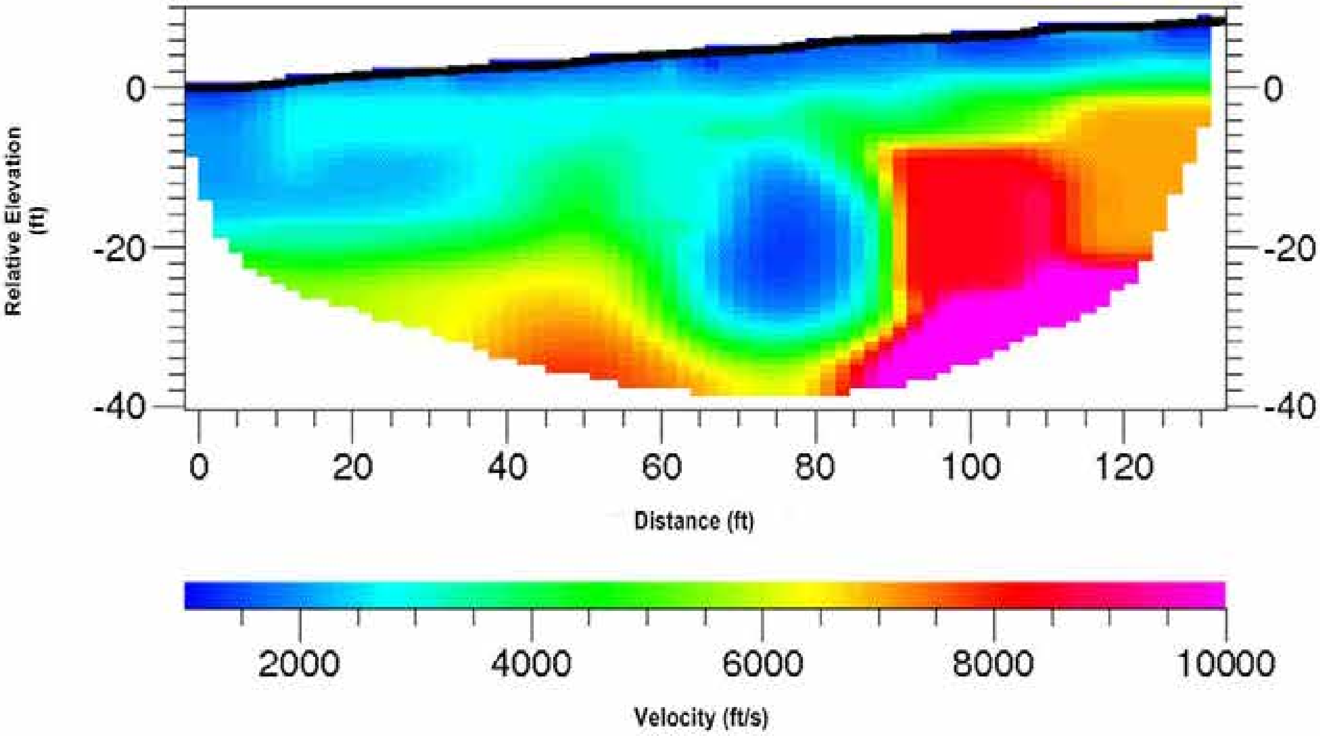


SEISMIC PROFILE
SL-19

Tierra Del Sol Solar Project
Boulevard, California

Project No.: 112405

Date: 11/12

SOUTHWEST GEOPHYSICS INC.

Figure 4e

Line No. Orientation	Spacing (ft)	Current (mA)	Resistance (Ohms)	Error (%)	Apparent Resistivity	
					(ohm-cm)	(ohm-ft)
R-1a	2	10.08	137.20	0.0	52551	1724
(N-S)	5	5.92	26.92	0.0	25777	846
	10	45.72	11.95	0.0	22886	751
	20	57.97	6.40	0.0	24498	804
	30	51.79	5.12	0.0	29439	966
	40	38.36	4.19	0.0	32105	1053
R-1b	2	10.09	220.60	0.0	84495	2772
(E-W)	5	5.76	30.07	0.0	28794	945
	10	28.26	11.02	0.0	21105	692
	20	21.59	6.09	0.0	23326	765
	30	19.81	3.89	0.1	22338	733
	40	22.53	3.15	0.0	24115	791
R-2a	2	4.39	206.20	0.0	78979	2591
(N-S)	5	4.66	41.76	0.0	39988	1312
	10	20.94	26.82	0.0	51363	1685
	20	12.58	13.93	0.0	53355	1750
	30	15.66	11.28	0.0	64807	2126
	40	24.74	8.91	0.0	68255	2239
R-2b	2	5.69	116.40	0.0	44584	1463
(E-W)	5	9.28	61.07	0.0	58478	1919
	10	27.44	25.75	0.0	49314	1618
	20	26.99	17.00	0.0	65114	2136
	30	26.21	12.46	0.0	71587	2349
	40	25.48	9.84	0.0	75409	2474
R-5a	2	13.81	25.61	0.0	9809	322
(N-S)	5	15.12	12.55	0.0	12017	394
	10	151.80	9.65	0.0	18477	606
	20	117.60	5.68	0.0	21771	714
	30	63.80	4.36	0.0	25061	822
	40	104.90	3.71	0.0	28428	933
R-5b	2	13.90	227.00	0.1	86946	2853
(E-W)	5	38.53	92.17	0.0	88258	2896
	10	76.71	38.84	0.0	74383	2440
	20	34.02	15.44	0.0	59139	1940
	30	63.55	7.89	0.0	45319	1487
	40	76.38	6.32	0.0	48406	1588
R-12a	2	15.07	115.70	0.0	44316	1454
(N-S)	5	13.13	33.93	0.0	32490	1066
	10	61.10	22.95	0.0	43952	1442
	20	71.11	13.78	0.0	52781	1732
	30	65.23	8.28	0.0	47560	1560
	40	48.86	5.66	0.0	43335	1422
R-12b	2	24.17	98.33	0.0	37663	1236
(E-W)	5	18.86	37.11	0.0	35535	1166
	10	57.50	21.50	0.0	41175	1351
	20	53.36	12.40	0.0	47495	1558
	30	48.61	8.47	0.0	48634	1596
	40	60.50	5.21	0.0	39942	1310
R-19a	2	20.84	34.01	0.0	13027	427
(N-S)	5	5.56	9.46	0.0	9056	297
	10	31.76	5.76	0.0	11023	362
	20	26.64	4.71	0.0	18033	592
	30	31.64	3.55	0.0	20413	670
	40	9.94	3.54	0.0	27118	890
R-19b	2	55.89	11.45	0.0	4386	144
(E-W)	5	178.60	5.20	0.0	4978	163
	10	407.10	3.84	0.0	7362	242
	20	353.50	2.78	0.0	10648	349
	30	64.25	2.47	0.0	14197	466
	40	43.23	2.53	0.0	19389	636

ELECTRICAL RESISTIVITY RESULTS

Tierra Del Sol Road
Boulevard, California

Project No.: 112405

Date: 11/12

SOUTHWEST
GEOPHYSICS INC

Figure 5

APPENDIX C

LABORATORY TESTING

Classification

Soils were visually and texturally classified in accordance with USCS in general accordance with ASTM D 2488. Soil classifications are indicated on the logs of the exploratory borings in Appendix A.

In-Place Moisture and Density Tests

The moisture content and dry density of relatively undisturbed samples obtained from the exploratory borings were evaluated in general accordance with ASTM D 2937. The test results are presented on the logs of the exploratory borings in Appendix A.

Direct Shear Tests

Direct shear tests were performed on relatively undisturbed samples in general accordance with ASTM D 3080 to evaluate the shear strength characteristics of selected materials. The samples were inundated during shearing to represent adverse field conditions. The results are shown on Figure C-1.

Modified Proctor Density Tests

The maximum dry density and optimum moisture content of selected representative soil sample was evaluated using the Modified Proctor method in general accordance with ASTM D 1557. The results of this test are summarized on Figure C-2.

Soil Corrosivity Tests

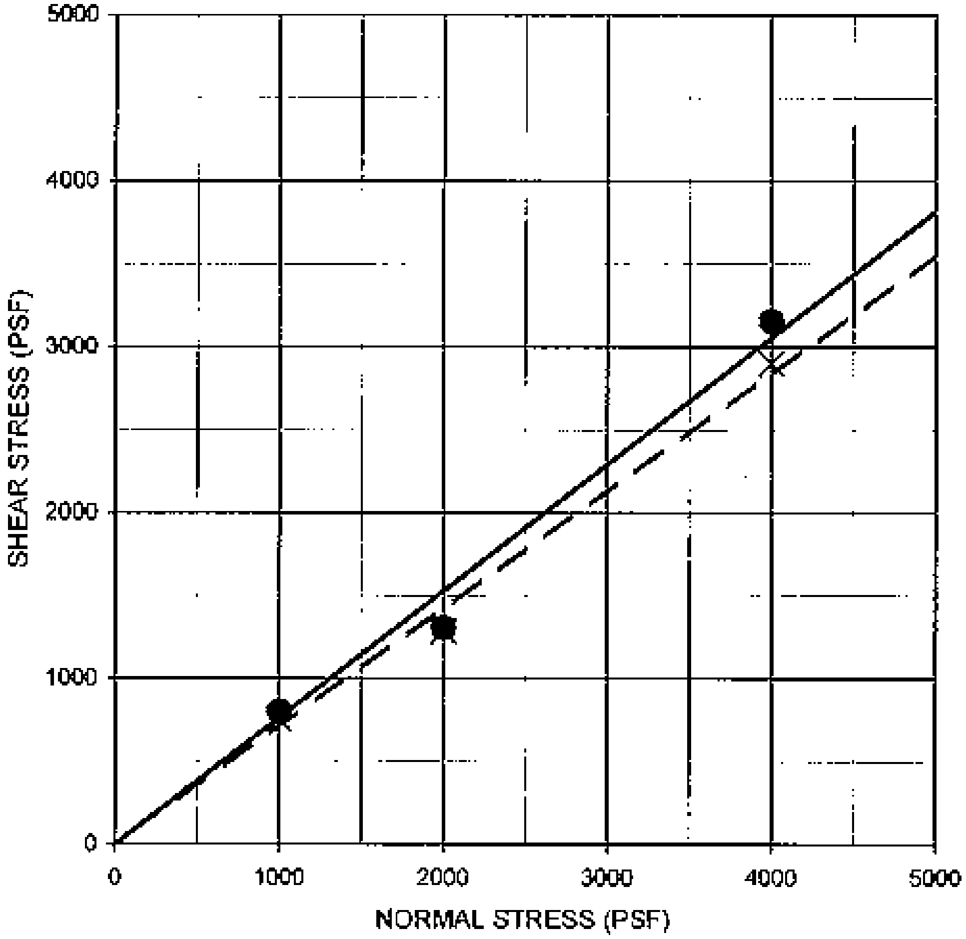
Soil pH and resistivity tests were performed on a representative sample in general accordance with CT 643. The soluble sulfate and chloride content of the selected sample was evaluated in general accordance with CT 417 and CT 422, respectively. The test results are presented on Figure C-3.

R-Value

The resistance value, or R-value, for near-surface site soils was evaluated in general accordance with CT 301. A sample was prepared and evaluated for exudation pressure and expansion pressure. The equilibrium R-value is reported as the lesser or more conservative of the two calculated results. The test results are summarized on Figure C-4.

Thermal Resistivity Tests

Thermal resistivity was evaluated on soil samples that were obtained at the subject project. The samples were recompacted to 90 percent relative compaction and tested at varying moisture contents to obtain thermal resistivity measurements in general accordance with ASTM D 5334. A Decagon KD2 was utilized to obtain the thermal resistivity measurements. The thermal dryout curves are presented on Figures C-5.



Description	Symbol	Sample Location	Depth (ft)	Shear Strength	Cohesion, c (psf)	Friction Angle, ϕ (degrees)	Soil Type
Weathered Granitic Rock	—●—	B-7	5.0-6.5	Peak	0	39	Bedrock
Weathered Granitic Rock	- - X - -	B-7	5.0-6.5	Ultimate	0	36	Bedrock

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 3080

Ninyo & Moore

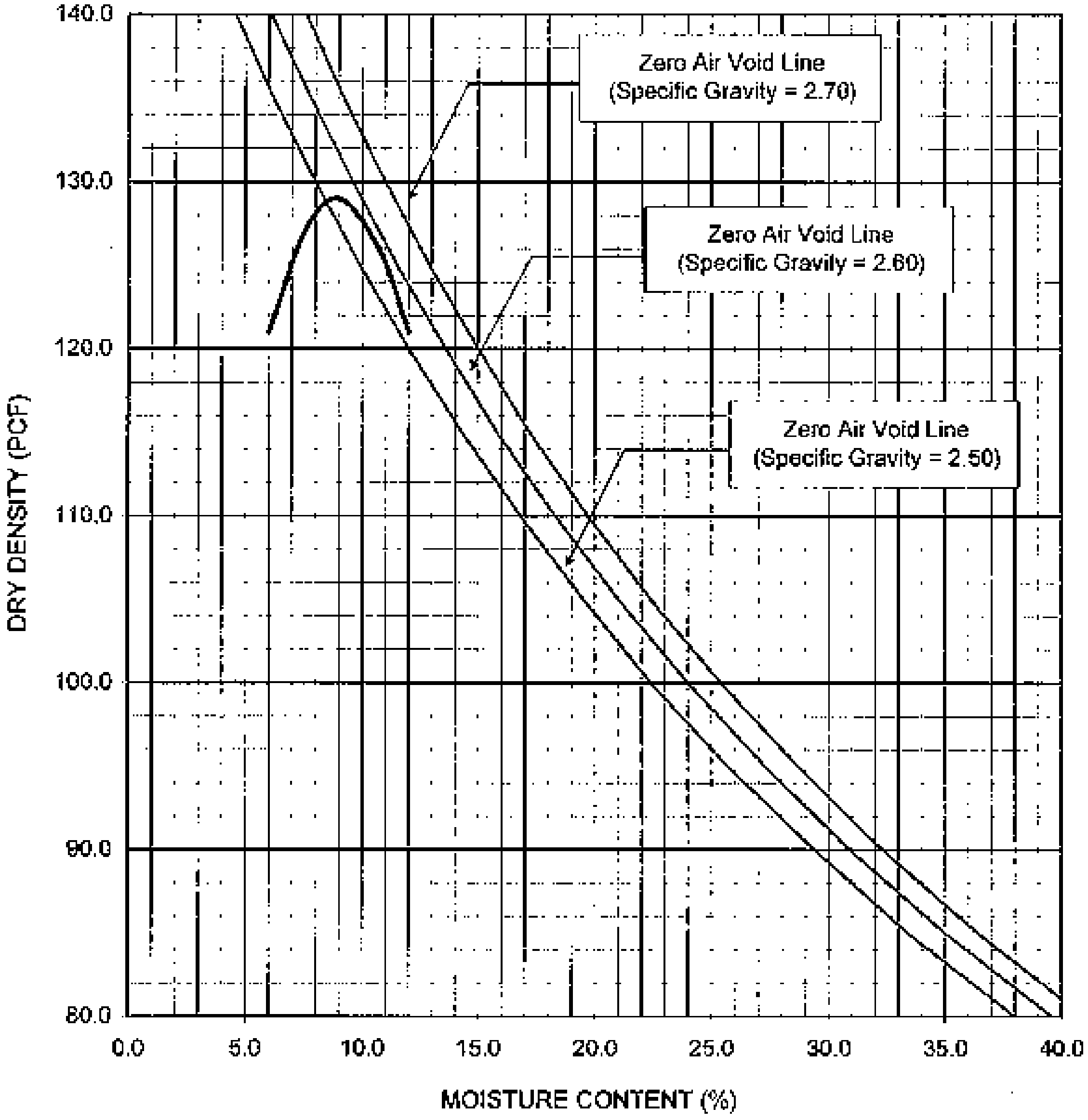
DIRECT SHEAR TEST RESULTS

PROJECT NO.	DATE
107418001	11/12

TIERRA DEL SOL SOLAR PROJECT
BOULEVARD, CALIFORNIA

FIGURE

C-1



Sample Location	Depth (ft.)	Soil Description	Proctor Dry Density (pcf)	Optimum Moisture Content (%)
TP-1	3.5-4.0	Weathered Granitic Rock, recovered as Silty SAND (SM)	129.0	9.0
Dry Density and Moisture Content Values Corrected for Oversize (ASTM D 4718-07)			N/A	N/A

PERFORMED IN GENERAL ACCORDANCE WITH ☑ ASTM D 1557-12 ☐ ASTM D 698-12 METHOD ☑ A ☐ B ☐ C

Ninyo & Moore

PROCTOR DENSITY TEST RESULTS

FIGURE

C-2

PROJECT NO.	DATE
107418001	11/12

TIERRA DEL SOL SOLAR PROJECT
BOULEVARD, CALIFORNIA

SAMPLE LOCATION	SAMPLE DEPTH (FT)	pH [1]	RESISTIVITY [1] (Ohm-cm)	SULFATE CONTENT [2]		CHLORIDE CONTENT [3] (ppm)
				(ppm)	(%)	
TP-3	0.0-6.0	7.1	6,500	30	0.003	75

[1] PERFORMED IN GENERAL ACCORDANCE WITH CALIFORNIA TEST METHOD 643

[2] PERFORMED IN GENERAL ACCORDANCE WITH CALIFORNIA TEST METHOD 417

[3] PERFORMED IN GENERAL ACCORDANCE WITH CALIFORNIA TEST METHOD 422

Ninyo & Moore

CORROSIVITY TEST RESULTS

PROJECT NO.	DATE
107418001	11/12

TIERRA DEL SOL SOLAR PROJECT
BOULEVARD, CALIFORNIA

FIGURE

C-3

SAMPLE LOCATION	SAMPLE DEPTH (FT)	SOIL TYPE	R-VALUE
TP-3	0.0-0.6	Silty SAND (SM)	37

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 2844/CT 301

Ninyo & Moore

R-VALUE TEST RESULTS

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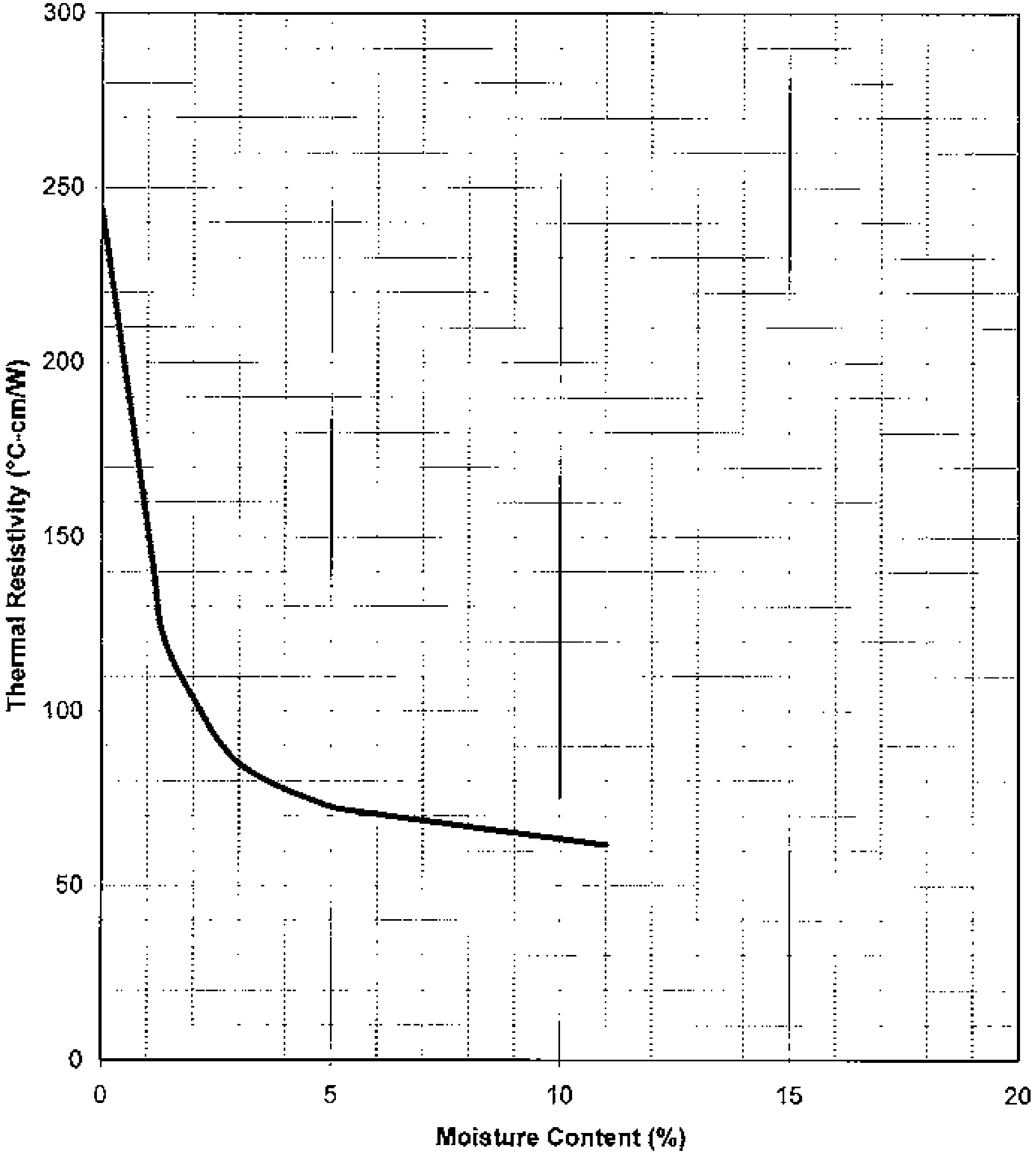
TIERRA DEL SOL SOLAR PROJECT
BOULEVARD, CALIFORNIA

FIGURE
C-4



PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 5334

Sample TP-4: 1-2.5 FT

Ninyo & Moore		THERMAL RESISTIVITY RESULTS	FIGURE
PROJECT NO.	DATE	TIERRA DEL SOL SOLAR PROJECT BOULEVARD, CALIFORNIA	C-5
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