Geotechnical Engineering Report

Proposed Red Mesa Solar Project

PV Array Field

South of Montezuma Creek, Utah

Navajo Nation, Utah

February 3, 2020

Terracon Project No. 65195246

Prepared for:
Navajo Tribal Utility Authority
Fort Defiance, Arizona

Prepared by:
Terracon Consultants, Inc.
Tempe, Arizona

terracon.com

Terracon

Environmental ■ Facilities ■ Geotechnical ■ Materials

February 3, 2020

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Re: **Geotechnical Engineering Report**
Proposed Red Mesa Solar Project
PV Array Field
South of Montezuma Creek, Utah
Navajo Nation, Utah
Terracon Project No. 65195246

Dear Mr. Steiger:

Terracon Consultants, Inc. (Terracon) has completed the geotechnical engineering services for the PV array field for the proposed Red Mesa Solar project to be located South of Montezuma Creek in Navajo Nation, Utah. These services were performed in general accordance with our proposal number P65195246 dated September 13, 2019. This geotechnical engineering report presents the results of the subsurface exploration and provides geotechnical engineering recommendations concerning earthwork and the design and construction of foundations for the PV array field for the proposed project. Recommendations for the substation area will be provided in a separate report.

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

Sincerely,
Terracon Consultants, Inc.

Matthew R. Kleinholz, E.I.T.
Staff Geotechnical Engineer

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GEOTECHNICAL ENGINEERING REPORT
PROPOSED RED MESA SOLAR PROJECT
PV ARRAY FIELD
SOUTH OF MONTEZUMA CREEK
NAVAJO NATION, UTAH

Terracon Project No. 65195246
February 3, 2020

1.0 INTRODUCTION

This report presents the results of our geotechnical engineering services performed for the PV array field for the proposed Red Mesa Solar project to be located South of Montezuma Creek in Navajo Nation, Utah. The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- subsurface soil conditions
- earthwork
- seismic considerations
- groundwater conditions
- array foundation design and construction
- on-site roadway construction

Our geotechnical engineering scope of work for this project included the advancement of twenty-eight (28) test pits to depths ranging from approximately 5½ to 9½ feet below existing site grades, field resistivity testing, laboratory testing, engineering analyses, and preparation of this report. A Site Location Map and Exploration Plan (Exhibits A-1 and A-2), and logs of the test pits are included in Appendix A of this report. The results of the laboratory testing performed on soil samples obtained from the site during the field exploration are included in Appendix B of this report. The results of the field resistivity testing are included in Appendix C of this report. Descriptions of the field exploration and laboratory testing are included in their respective appendices.

2.0 PROJECT INFORMATION

2.1 Project Description

ITEM	DESCRIPTION
Project Description	The proposed project will consist of the construction of an approximately 100-Megawatt (MW AC) solar facility, including a substation.
Proposed Structures	▪ Ground-mounted, single-axis photovoltaic modules ▪ Other various project components could include electric cable/conduit laid in trenches, equipment and appurtenances (e.g., invertors, meteorological stations, and combiner boxes)
Array Construction	Steel-framed racking system supported on steel W-Section piles.
Maximum Loads	Structural loads were not provided, but have been estimated based on our experience on similar solar projects using single axis tracker rack systems: Downward: 2.5 to 4 kips; Uplift: 0.75 to 1.5 kips; and Lateral: 2.0 to 3.0 kips.
Grading	We anticipate that the solar field grade will follow the existing site grade with minimal grading.
Access Roads	We understand that access road cross sections used for construction of the project will be the responsibility of the EPC, and that only post construction traffic with an allowable rut depth of 2 inches is required. We anticipate low-volume, aggregate-surfaced and/or native soil access roads will have a maximum vehicle load of 30,000 lbs. and will travel over the access roads only once per week.

2.2 Site Description

ITEM	DESCRIPTION
Parcel Information	The project is located within an approximate 700-acre area East of County Road 454 and County Road 439 south of Montezuma Creek, Utah. Approximate center of site: latitude: 37.1215ºN, longitude: 109.4100ºW
Existing Improvements	The site is native land with exception of some dirt trails. An existing transmission line borders the eastern edge of the site.
Existing Topography (from Google Earth ™)	The site appears to slope downwards towards the eastern and northern portion of the site, from approximately 5,070 to 4,920 feet above mean sea level.

3.0 SUBSURFACE CONDITIONS

3.1 Typical Subsurface Profile

Specific conditions encountered at each test pit location are indicated on the individual test pit logs. Stratification boundaries on the test pit logs represent the approximate location of changes in soil types; in-situ, the transition between materials may be gradual. Details for each of the test pits can be found on the logs included in Appendix A of this report. Based on the results of the test pits, subsurface conditions on the project site can be generalized as follows:

Description	Approximate Depth to Bottom of Stratum (feet)	Material Encountered	Relative Density
Stratum 1	3 to 5	Poorly-graded Sand with Silt, Silty Sand	Very Loose to Loose
Stratum 2	9.5 (Maximum Depth Explored)	Silty Sand, Silty Clayey Sand, Clayey Sand	Medium Dense to Dense

Note: Variable weak to strong calcium carbonate cementation was noted in Stratum 2 soils in most of the test pits.

3.2 Laboratory Test Results

Laboratory tests were conducted on selected soil samples and the test results are presented in Appendix B. The results of the laboratory testing indicate the near surface soils across the site consist of non-plastic poorly-graded sand with silt and silty sand soils with percent passing the #200 sieve ranging from 8.2% to 31.2%, with an average of 13.3%.

3.3 Field Resistivity Test Results

Field measurements of soil resistivity were performed on October 29 through 31, 2019. The approximate soil electrical resistivity test locations are shown on Exhibit C-1 in Appendix C. Field measurements of soil resistivity were performed in general accordance with ASTM Test Method G 57, and IEEE std. 81, using the Wenner Four-Electrode Method. The soil electrical resistivity measurements during the geotechnical exploration were performed using a MiniSting, Memory Earth Resistivity and IP Meter, manufactured by Advanced Geosciences, Inc. The Wenner arrangement (equal electrode spacing) was used for each electrical resistivity test. Each test location consisted of 2 mutually perpendicular arrays. Test locations ER-2 through ER-14 for the proposed array were performed with “a” spacings of 2, 5, 10, 20 and 40 feet. Test location ER-1 for the proposed substation was performed with “a” spacings of ½, 1, 2, 5, 10, 15, 25, 75, 100, and 150 feet. The “a” spacing is generally considered to be the depth of influence of the test. Results of the soil resistivity measurements performed are presented in tables and graphs in Appendix C.

3.4 Corrosion Potential

Laboratory soil corrosivity testing was performed on 15 soil samples obtained from the test pits in the array area of the project site. Results of the corrosion analysis are presented on Exhibits B-23 through B-26. These values may be used to estimate potential corrosive characteristics of the on-site soils with respect to contact with the various underground materials which will be used for project construction.

Results of soluble sulfate testing indicate that the samples of the on-site soils tested classify as S0 according to Table 19.3.1.1 of Section 318 of the 2019 American Concrete Institute (ACI) Building Code Requirements for Structural Concrete.

3.5 Thermal Resistivity

Laboratory thermal resistivity testing was performed on ten (10) soil samples obtained from the test pits. In-situ samples for thermal resistivity testing could not be obtained with the exploration methods and loose sand soil conditions encountered on the site; therefore, thermal resistivity testing was conducted only on remolded bulk samples obtained within the top 5 feet of the surface soils from the site. The remolded bulk samples were tested at the optimum moisture content and densities equal to 95% of maximum dry density determined in accordance with standard Proctor criteria (ASTM D698). A series of thermal resistivity measurements were made in stages with moisture content ranging from optimum to the totally dry condition. The thermal resistivity testing was performed in accordance with the IEEE standard 442. The results of the thermal resistivity tests are presented in Exhibits B-17 through B-22 of Appendix B.

3.6 Groundwater

Groundwater was not observed in any test pit at the time of the field exploration. These observations represent groundwater conditions at the time of the field exploration and may not be indicative of other times, or at other locations. Groundwater conditions can change with varying seasonal and weather conditions, and other factors.

3.7 Seismic Considerations

The seismic design requirements for buildings and other structures are based on Seismic Design Category. Site Classification is required to determine the Seismic Design Category for a structure. The Site Classification is based on the upper 100 feet of the site profile defined by a weighted average value of either shear wave velocity, standard penetration resistance, or undrained shear strength in accordance with Section 20.4 of ASCE 7 and the International Building Code (IBC). Based on the soil properties encountered at the site and as described on the exploration logs and results, it is our professional opinion that the **Seismic Site Classification is D**. Subsurface

explorations at this site were extended to a maximum depth of 9.5 feet. The site properties below the exploration depth to 100 feet were estimated based on our experience and knowledge of geologic conditions of the general area. Additional deeper exploration or geophysical testing may be performed to confirm the conditions below the current exploration depth.

3.8 Dynamic Cone Penetrometer Testing

Dynamic Cone Penetrometer (DCP) testing was performed in general accordance with ASTM D6951 at 3 depths in Test Pits TP-9 through TP-28. The test pits were benched at depths of 2, 4, and 6 feet, and a DCP test was subsequently performed on each bench. Cumulative penetration readings were taken every 5 blows for a total of about 24 inches or refusal. Using correlations published by the Army Corps of Engineers, the penetration rate (expressed in number of blows per 2 inches of penetration) can be correlated to ultimate bearing capacity of soils. The following table summarizes the results of the DCP testing performed for the project:

Test Pit	DCP Depth (feet)	Average Penetration Rate (blows/2”)	Correlated Ultimate Bearing Capacity (psf)
TP-9	2	2.0	2,130
	4	3.2	2,880
	6	6.9	5.420
TP-10	2	1.8	2,130
	4	1.6	1,720
	6	2.0	2,130
TP-11	2	1.3	1,720
	4	1.6	1,720
	6	2.3	2,520
TP-12	2	0.9	1,270
	4	1.6	1,720
	6	2.4	2,520
TP-13	2	0.9	1,270
	4	0.9	1,270
	6	0.6	760
TP-14	2	1.3	1,720
	4	1.5	1,720
	6	2.1	2,130
TP-15	2	0.9	1,270
	4	1.3	1,720

Test Pit	DCP Depth (feet)	Average Penetration Rate (blows/2")	Correlated Ultimate Bearing Capacity (psf)
	6	1.9	2,130
TP-16	2	1.3	1,720
	4	2.3	2,520
	6	2.4	2,520
TP-17	2	1.6	1,720
	4	1.6	1,720
	6	2.1	2,130
TP-18	2	1.5	1,720
	4	1.8	2,130
	6	1.7	1,720
TP-19	2	1.5	1,720
	4	1.8	2,130
	6	1.7	1,720
TP-20	2	1.2	1,270
	4	2.0	2,130
	6	1.6	1,720
TP-21	2	1.3	1,720
	4	1.8	2,130
	6	1.8	2,130
TP-22	2	1.0	1,270
	4	0.8	1,270
	6	1.2	1,270
TP-23	2	1.2	1,270
	4	2.0	2,130
	6	1.6	1,720
TP-24	2	1.0	1,270
	4	1.5	1,720
	6	0.5	760
TP-25	2	0.7	760
	4	1.1	1,270
	6	1.4	1,720
TP-26	2	1.0	1,270
	4	1.6	1,720
	6	1.7	1,720

Test Pit	DCP Depth (feet)	Average Penetration Rate (blows/2")	Correlated Ultimate Bearing Capacity (psf)
TP-27	2	3.2	2,880
	4	3.6	3,240
	6	6.9	5,420
TP-28	2	1.3	1,720
	4	1.7	1,720
	6	1.8	2,130

4.0 RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION

4.1 Geotechnical Considerations

The site appears suitable for the proposed construction based upon geotechnical conditions encountered in the test pits and provided the geotechnical engineering recommendations contained in this report are implemented in the design and construction of the project. Based on the information obtained from our engineering analyses of the field and laboratory data, the following geotechnical considerations were identified:

- The subsurface soils at the project site generally consist of very loose to loose silty sand and poorly-graded sand with silt. Test Pits TP-1, TP-3, TP-4, TP-5, and TP-6 all collapsed at depths of 7 feet or less. Weak to strong cementation was encountered at depths of about 4 to 5 feet in the majority of the test pits on the site.

- Based upon the subsurface soil conditions encountered across the array area on the project site, driven W-section piles are recommended for support of PV array modules for the project. Preliminary recommendations for the design and construction of driven pile foundations are presented in the following sections. A full-scale pile load testing program should be conducted by the EPC to fully develop driven pile designs.

- Based on the very loose to loose conditions on the project site and low bearing capacity exhibited during DCP testing, shallow foundations and mat slabs should be supported on engineered fill soils. Recommendations for the design and construction of shallow spread footings and mat slabs are presented in the following sections.

Geotechnical engineering recommendations for foundation systems in the array area and other earth connected phases of the project are outlined below. The recommendations contained in this report are based upon the results of field and laboratory testing (which are presented in

Appendices A, B and C), engineering analyses, and our current understanding of the proposed project.

4.2 Array Support –Driven Pile Foundations

The proposed solar PV panels may be supported on driven pile foundation systems. The design capacity of a single-driven pile is a function of several factors including:

- size and type of pile; and,
- engineering properties of the subsurface soils.

The most effective means of verifying pile capacities is through pile load tests. Preliminary foundation design can be based upon calculated capacities utilizing soil strength criteria determined from the field and laboratory testing conducted during this exploration. A full-scale pile load testing program should be conducted by the EPC to fully develop driven pile designs.

The ultimate axial capacity of the straight sided pile in compression or tension can be determined by the following equation:

$$Q_u = Q_f + Q_p = f_s A_s + q_s A_p$$

where:

Q_u = ultimate axial capacity in compression (lb)
Q_f = ultimate skin-friction resistance (lb)
Q_p = ultimate end bearing (lb)
f_s = unit load transfer in skin friction (lb/ft^2)
q_s = unit load transfer in end bearing (lb/ft^2)
A_s = side surface area of the pile (ft^2)
A_p = gross end area of the pile (ft^2)

The allowable axial capacities of the pile are determined by dividing the ultimate axial capacity by a factor-of-safety (FOS). For this preliminary analysis, a FOS of 2.0 was applied for axial resistance attributable to skin friction and a FOS of 3.0 was applied to the end-bearing resistance. For driven W-sections and other similar pile shapes, the box perimeter should be used to compute the actual area providing skin resistance to the applied loads, which will be less than the actual surface area of the pile. The allowable unit skin friction determined using the soil strengths based on our field and laboratory testing is presented in the following table:

Stratum	Bottom Depth (feet)	Unit Weight (pcf)	Allowable Unit Skin Friction[1] (psf)	Allowable End-Bearing (psf)[2]
Stratum 1	1	100	---	---
Stratum 2	5	100	75	375
Stratum 3	9.5	110	200	500

[1] The upper 1 foot should be neglected due to soil disturbance.

[2] Piles should have a minimum embedment of 5 feet.

The pile skin friction and capacities shown above assume the adjacent soil providing support to the piles will remain in place during the life of the project. Skin friction or capacity of soil that may be subject to scour or erosion should be neglected, and the top of the design pile embedment should be located at the bottom of scour or erosion depths, whichever depth is greater. The vertical movement of the piles designed on the basis of the parameters outlined above is estimated to be less than one-half (½) of an inch.

Recommended soil parameters for lateral load analysis for the driven pile foundations have been developed for use in the LPILE 2018 computer program, as shown in following table:

Layer Number	Depth to Bottom of Layer (ft)	Soil Type (P-y) Curve Model	Unit Weight (pcf)	Friction Angle (Φ')	k
1	5	Sand (Reese)	100	30°	Note 1
2	9.5	Sand (Reese)	110	32°	Note 1

Note 1: Input zero into these fields in L-Pile and allow the program to choose an appropriate value for k.

Final L-Pile parameters for use in design of the piles on the project should be determined from the results of a pile load test program. In our experience, the above parameters could be used in the L-Pile modeling by increasing the P-Multiplier above 1.0 to match the field pile performance.

4.3 Mat Foundations Recommendations

Reinforced mat foundations are recommended for support of transformers and other slab mounted equipment on the project. The mat foundations should be designed based on the criteria outlined below:

DESIGN ITEM	DESCRIPTION/RECOMMENDATION
Foundation Type	Mat Foundations for Equipment Slabs
Bearing Material	A minimum of 3 feet of engineered fill soils
Design Modulus of Subgrade Reaction, k	175 pounds per cubic inch (pci)
Modulus Correction Factor*	$k_c=k((b+1)/2b)^2$
Maximum Design Contact Stress	Any practical value up to 1,500 psf
Minimum Embedment Depth	24 inches
Maximum Width	10 feet
Total Estimated Settlement	1 inch or less

*It is common to reduce the k-value to account for dimensional effects of large loaded areas. Where k_c is the corrected or design modulus value and b is the mat width or tributary loaded area.

4.4 Spread Footing Foundations Recommendations

Spread footings founded on dense undisturbed native soils should be used for support of any proposed buildings on the project. The foundation excavations should be inspected and approved by the geotechnical engineer as described in the Earthwork section of this report.

DESIGN ITEM	DESCRIPTION/RECOMMENDATION
Foundation Type	Conventional Shallow Spread Footings
Bearing Material	A minimum of 3 feet of engineered fill soils
Allowable Bearing Pressure	2,000 psf*
Minimum Embedment Depth Below Finished Grade	24 inches
Minimum Footing Dimensions	Isolated Column Footings: 24 inches Continuous Wall Footings: 16 inches
Total Estimated Settlement	1 inch or less
Estimated Differential Settlement	½ of the total settlement

* The maximum net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. An appropriate factor of safety has been applied. The allowable bearing pressure may be increased by ⅓ when considering the alternative load combinations of Section 1605.3.2 of the *2012 International Building Code*, however, it should not be increased when loads are determined by the basic allowable stress design load combinations of Section 1605.3.1.

Finished grade is defined as the lowest adjacent grade within five feet of the foundation for perimeter (or exterior) footings and finished floor level for interior footings. The allowable foundation bearing pressure applies to dead loads plus design live load conditions. The weight of the foundation concrete below grade may be neglected in dead load computations.

Footings, foundations, and masonry walls should be reinforced as necessary to reduce the potential for distress caused by differential foundation movement. The use of joints at openings or other discontinuities in masonry walls is recommended.

Foundation excavations should be observed by the geotechnical engineer. If the soil conditions encountered differ significantly from those presented in this report, supplemental recommendations will be required.

4.5 Roadway Design and Construction Recommendations

4.5.1 Aggregate Surface Roadway Design Recommendations

We recommend the design team consider the use of aggregate-surfaced roadways consisting of a minimum 4-inch thickness of compacted aggregate base course constructed over prepared and compacted subgrade to support traffic loads. The native subgrade soils should be scarified, moisture conditioned and compacted to a minimum depth of 10 inches.

The aggregate surface should consist of materials meeting the specifications for untreated base outlined in the Utah Department of Transportation (UDOT) Standard Specifications, or equivalent. The aggregate surface materials and native subgrade soils beneath roadways should be compacted to a minimum of 95 percent of the maximum dry density as determined by standard Proctor criteria, ASTM D-698. The surface course should be compacted at a moisture content within 3 percent of the optimum moisture content defined by ASTM D-698.

4.5.2 Compacted Native Soils Access Road Design Recommendations

Based upon the soil conditions encountered in the test borings, the use of on-site soils for construction of onsite unsurfaced roads could be considered for the project. Without the use of asphalt concrete or other hardened material to surface the roadways, there is an increased potential for erosion of the roadway to occur.

If high traffic loading is anticipated during wet seasons or when the upper soils are in saturated conditions, the proposed compacted soils road may experience wheel path rutting and depression.

Construction of the un-surfaced roadways should consist of a minimum of 10-inches of compacted on-site soils. In the event the proposed roadways are higher in elevation than the existing grades, the upper ten inches of subgrade soils at existing grade, and any fill required to raise site grades, should be moisture conditioned and compacted to a minimum of 95 percent of the maximum density determined in accordance with ASTM D-698.

Positive drainage should be provided during construction and maintained throughout the life of the roadways. Proposed un-surfaced roadways design should be graded to eliminate ponding. The un-surfaced roads are expected to function with periodic maintenance.

4.5.3 Roadway Design and Construction Considerations

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

Shoulder build-up on both sides of proposed roadways should match the road surface elevation and slope outwards at a minimum grade of 10% for five feet.

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

Materials and construction of pavements for the project should be in accordance with the requirements and specifications of the local governing agency.

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

4.6 Earthwork Recommendations

The following presents recommendations for site preparation, excavation, subgrade preparation and placement of engineered fills on the project.

4.6.1 Site and Subgrade Preparation

The parameters provided for the design of driven piles has not considered preparation of the exposed surface, and subgrade preparation within the array field is not required.

The results of the DCP testing performed in the test pits across the project site indicate the soils in their in-situ conditions have a low bearing capacity. Shallow and mat foundations to support proposed structures and equipment for the project should bear on a minimum of 3 feet of

engineered fill materials. For placement of engineered fill below footings, the excavation should be widened laterally, at least eight inches for each foot of fill placed below footing base elevations.

The on-site soils are considered suitable for use as engineered fill in all construction areas and elevations. Prior to engineered fill placement, subgrade soils should be scarified, moisture conditioned, and compacted to a minimum depth of 10 inches. The moisture content and compaction of subgrade soils should be maintained until placement of any required engineered fill.

4.6.2 Excavation

Excavations for earthwork on the site should be expected to encounter variable conditions including caving soils and soils with variable degrees of cementation.

As a minimum, excavations should be performed in accordance with OSHA 29 CFR, Part 1926, Subpart P, “Excavations” and its appendices, and in accordance with any applicable local, state, and federal safety regulations. The contractor should be aware that slope height, slope inclination, and excavation depth should in no instance exceed those specified by these safety regulations. Flatter slopes than those dictated by these regulations may be required depending upon the soil conditions encountered and other external factors. These regulations are strictly enforced and if they are not followed, the owner, contractor, and/or earthwork and utility subcontractor could be liable and subject to substantial penalties.

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

4.6.3 Fill Materials and Placement

All fill materials should be inorganic soils free of vegetation, debris, and fragments larger than 4 inches in size. Pea gravel or other similar non-cementitious, poorly-graded materials should not be used as fill or backfill without the prior approval of the geotechnical engineer.

Imported soils (if required) should be sampled, tested and approved by Terracon prior to being hauled to the site. Imported soils used for the support of structural elements should meet the following specifications:

Gradation	Percent Finer by Weight (ASTM C 136)
4"	100
3"	70-100
No. 4 Sieve	50-100
No. 200 Sieve	15 (min) to 45 (max)

- Liquid Limit ..... 35 (max)
- Plasticity Index ..... 15 (max)
- Maximum expansive potential (%)* 1.0

*Measured on a sample compacted to approximately 95 percent of the ASTM D698 maximum dry density at about 3 percent below optimum water content. The sample is confined under a 100 psf surcharge and submerged/inundated.

Engineered fill should be placed and compacted in horizontal lifts, using equipment and procedures that will produce recommended moisture contents and densities throughout the lift. Fill lifts should not exceed 10 inches loose thickness.

4.6.4 Compaction Requirements

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

Material Type and Location	Per the Standard Proctor Test (ASTM D698)		
	Minimum Compaction Requirement (%)	Range of Moisture Contents for Compaction[1]	
		Minimum	Maximum
On-site and imported soils:			
Beneath roadways	95	-3%	+3%
Beneath spread footings/mat foundations	95	-3%	+3%
Beneath concrete flatwork	95	-3%	+3%
Trench backfill supporting structural elements	95	-3%	+3%
Trench backfill in planned graded array field[2]	85	-3%	+3%
All other areas	95	-3%	+3%
Aggregate base (beneath slabs)	95	-3%	+3%

[1] Moisture contents outlined in the table are referenced to optimum moisture content determined in accordance with ASTM D698.
[2] Trench backfill in planned graded array field areas not supporting structural elements.

4.6.5 Grading and Drainage

All grades must be adjusted to provide positive drainage away from the structures during construction and maintained throughout the life of the proposed project.

4.6.6 Erosion Control

Based on our experience with similar solar sites, soil erosion will likely occur along the edges of retention basins and other areas where sheet flows from the solar array field become channelized, including site specific drainage basins or channels. In the event that basins are constructed, or other sloped areas are required for site development purposes, recommended maximum slope ratios and erosion control/slope protection for either cut areas or properly compacted engineered fill when using on-site materials are as follows:

Recommended Slope Ratios and Erosion Control/Slope Protection	
Channel/Roadway Configuration	**Recommended Slope Configuration [1]**
Channel, basin or roadway slopes not subject to erosion in either cut or fill areas	2-1/2H:1V
Erodible channels or basin side slopes in cut or fills with no protection	4H:1V
Erodible embankments within channels, basins or at roadways	6H:1V
Channels, basins or roadway embankments protected with permanent reinforced soil mats	2-1/2:1V
Shotcrete or rip-rap protected channels, basins or roadway embankments	2H:1V
Grouted rip-rap protected channels or basins	1-1/2H:1V
Soil-cement protected channels, basins and roadway embankments[2]	From 2H:1V to 1/2H:1V

[1] All slope configurations are expressed in H:V (horizontal:vertical)
[2] Pending design of a suitable thickness of soil-cement

For either hand placed or grouted rip-rap, we recommend a minimum thickness of 12 inches be specified. Additionally, grouted rip rap sections should include a minimum of three feet of toe-down at the bottom when placed on slopes constructed at a ratio of 1½H:1V. Rip-rap should be constructed on an appropriate filter material or a high-severability geotextile filter fabric.

5.0 GENERAL COMMENTS

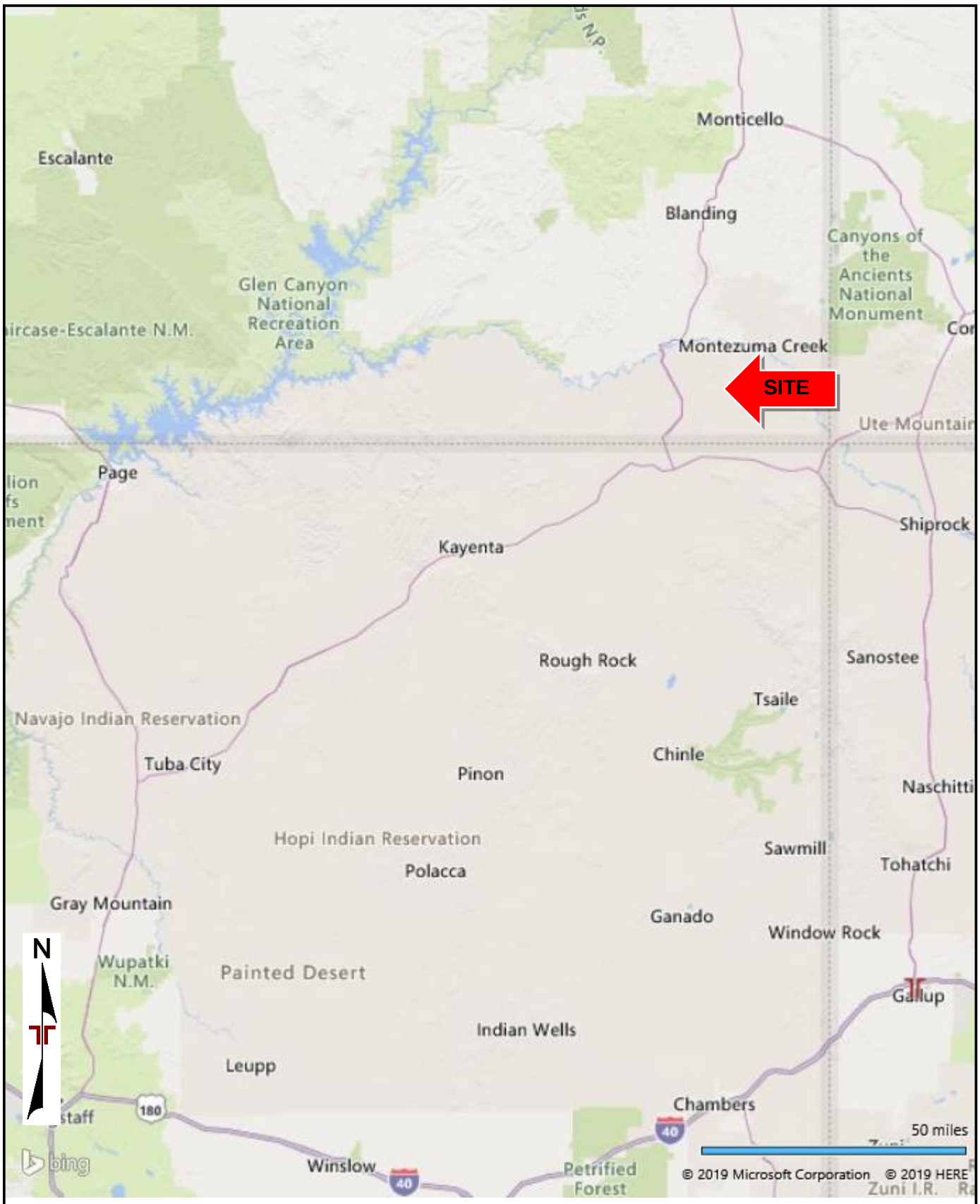
The analysis and recommendations presented in this report are based upon the data obtained from the test pits performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur across the site, or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction.

The scope of services for this project does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, and bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either expressed or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless Terracon reviews the changes and either verifies or modifies the conclusions of this report in writing.

APPENDIX A

FIELD EXPLORATION



TOPOGRAPHIC MAP IMAGE COURTESY OF THE U.S. GEOLOGICAL SURVEY
QUADRANGLES INCLUDE: ARIPINE, AZ (1/1/1998) and DAY SPRING, AZ (1/1/1998).

Project Manager: MRK	Project No. 65195246	Terracon 4685 S Ash Ave Ste H-4 Tempe, AZ 85282-6767	SITE LOCATION **Red Mesa Solar** East of County Road 454 and County Road 439 Navajo Nation, Utah
Drawn by: MRK	Scale: AS SHOWN		
Checked by: SDN	File Name: A-1-2		Exhibit A-1
Approved by: SDN	Date: 12/06/19		

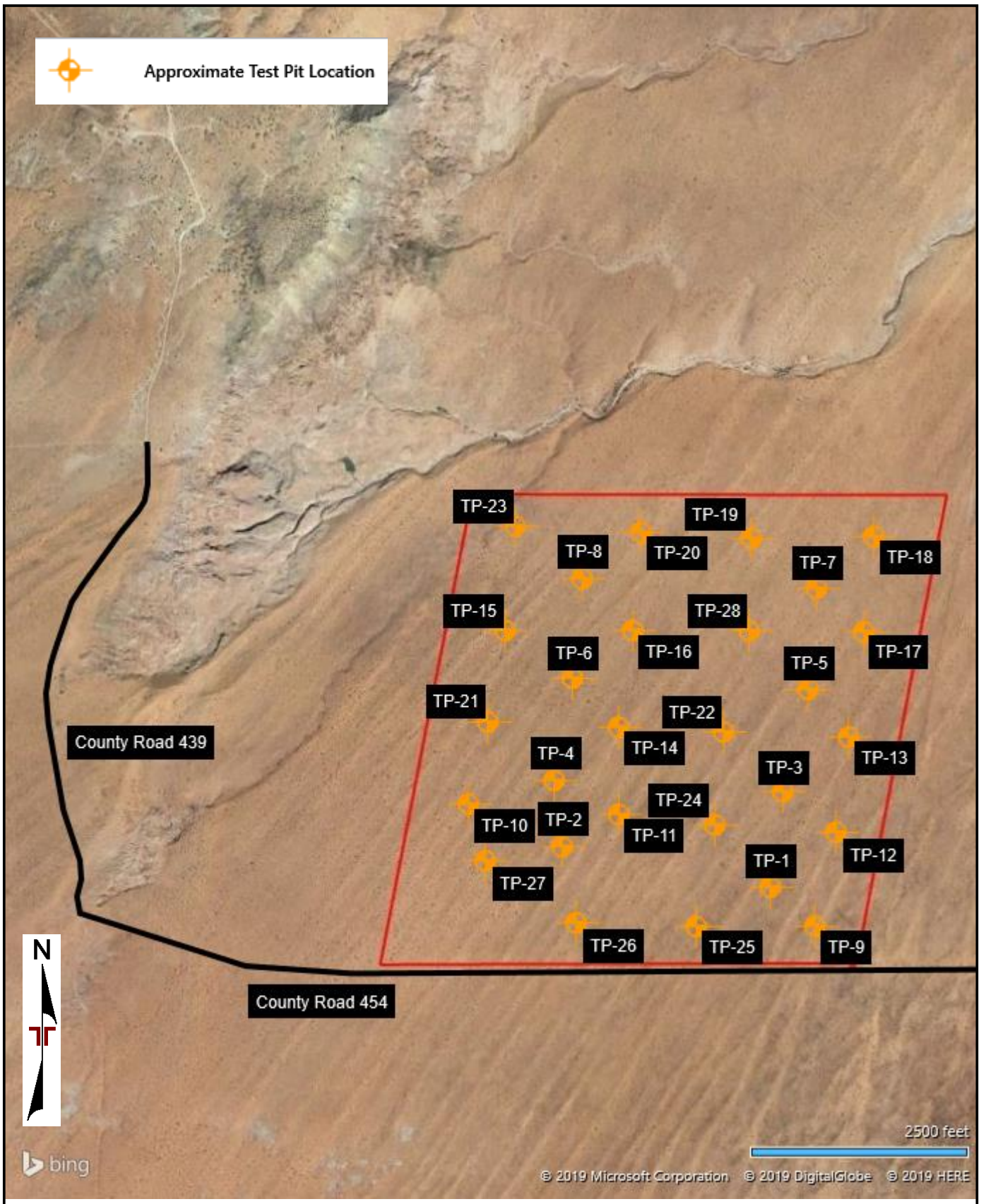


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

Project Manager:	MRK
Drawn by:	MRK
Checked by:	SDN
Approved by:	SDN

Project No.	65195246
Scale:	AS SHOWN
File Name:	A-1-2
Date:	12/06/19

Terracon
4685 S Ash Ave Ste H-4
Tempe, AZ 85282-6767

EXPLORATION PLAN

Red Mesa Solar

East of County Road 454 and County Road 439
Navajo Nation, Utah

Exhibit

A-2

Field Exploration Description

A total of twenty-eight (28) test pits were advanced at the site between October 8 and 24, 2019 to depths ranging from approximately 5½ to 9½ feet below the ground surface. The approximate locations of the test pits are shown on the attached Site Plan, Exhibit A-1.

The test pits were excavated with a Case 580N EP backhoe equipped with a 24-inch bucket. The test pits were located in the field by a hand-held GPS unit (estimated horizontal accuracy of about ±15 feet). The accuracy of test pit locations should only be assumed to the level implied by the method used.

Continuous lithologic logs of the test pits were recorded by our field geologist during the drilling operations. Bulk samples of subsurface materials were also obtained. Dynamic cone penetration testing was performed at 3 depth intervals in Test Pits TP-9 through TP-28.

Groundwater was not encountered in any test pit at the time of the field exploration.

UNIFIED SOIL CLASSIFICATION SYSTEM

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

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

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

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

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

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

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

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

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

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

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

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

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

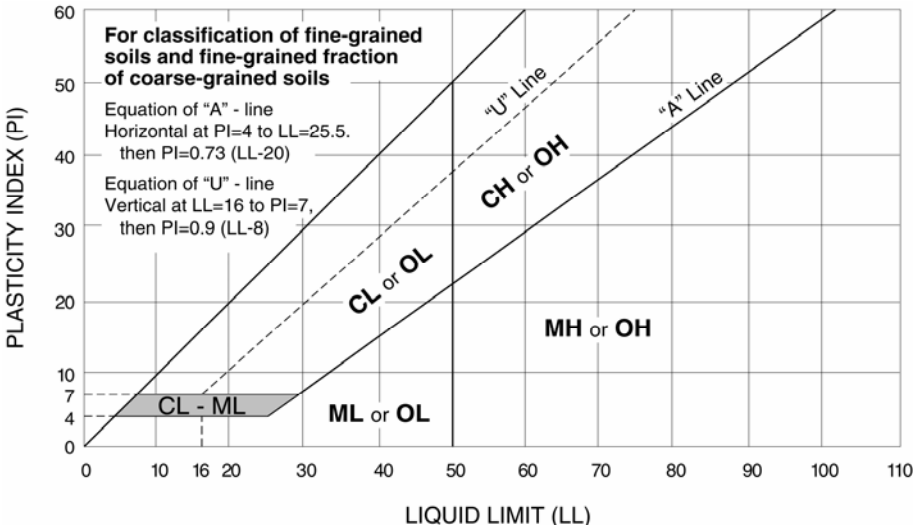
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

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

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

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

[Q] PI plots below "A" line.



Terracon

Form 111—6/98

Exhibit A-4

GENERAL NOTES

DRILLING & SAMPLING SYMBOLS:

SS:	Split Spoon - 1-3/8" I.D., 2" O.D., unless otherwise noted	HS:	Hollow Stem Auger
MC:	Modified California Sampler – 2.5" O.D., unless otherwise noted	DC:	Dynamic Cone
RS:	Ring Sampler - 2.42" I.D., 3" O.D., unless otherwise noted	HA:	Hand Auger
BS:	Bulk Sample or Auger Sample	GS:	Grab Sample
Hammer Blows:	Number of Blows to advance the 9" O.D. steel casing one foot with the diesel hammer at "full" throttle.	WB:	Wash Boring or Mud Rotary

The number of blows required to advance a standard 2-inch O.D. split-spoon sampler (SS) the last 12 inches of the total 18-inch penetration with a 140-pound hammer falling 30 inches is considered the "Standard Penetration" or "N-value". For 3" O.D. ring samplers (RS) the penetration value is reported as the number of blows required to advance the sampler 12 inches using a 140-pound hammer falling 30 inches, reported as "blows per foot," and is not considered equivalent to the "Standard Penetration" or "N-value".

WATER LEVEL MEASUREMENT SYMBOLS:

WL:	Water Level	WS:	While Sampling
WCI:	Wet Cave in	WD:	While Drilling
DCI:	Dry Cave in	BCR:	Before Casing Removal
AB:	After Boring	ACR:	After Casing Removal

Water levels indicated on the boring logs are the levels measured in the borings at the times indicated. Groundwater levels at other times and other locations across the site could vary. In pervious soils, the indicated levels may reflect the location of groundwater. In low permeability soils, the accurate determination of groundwater levels may not be possible with only short-term observations.

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

CONSISTENCY OF FINE-GRAINED SOILS

Unconfined Compressive Strength, Qu, psf	Standard Penetration or N-value (SS) Blows/Ft.	Consistency
< 500	<2	Very Soft
500 – 1,000	2-3	Soft
1,001 – 2,000	4-6	Medium Stiff
2,001 – 4,000	7-12	Stiff
4,001 – 8,000	13-26	Very Stiff
8,000+	26+	Hard

RELATIVE DENSITY OF COARSE-GRAINED SOILS

Standard Penetration or N-value (SS) Blows/Ft.	Ring Sampler (RS) Blows/Ft.	Relative Density
0 – 3	0-6	Very Loose
4 – 9	7-17	Loose
10 – 29	18-55	Medium Dense
30 – 49	56-95	Dense
50+	96+	Very Dense

RELATIVE PROPORTIONS OF SAND AND GRAVEL

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

GRAIN SIZE TERMINOLOGY

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

RELATIVE PROPORTIONS OF FINES

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

PLASTICITY DESCRIPTION

Term	Plasticity Index
Non-plastic	0-3
Low	4-15
Medium	16-25
High	25+

Terracon

TEST PIT LOG NO. TP-1

PROJECT: Red Mesa Solar

CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

LOCATION See Exhibit A-2

Latitude: 37.1176° Longitude: -109.4066°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	FIELD DCP (BLOWS/2")	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	POORLY GRADED SAND WITH SILT (SP-SM), nonplastic, light orangish brown roots present increase in silt content with depth								NP	11
	4.0 **SILTY SAND (SM)**, nonplastic, light brown test pit collapsed at 7 feet	5								
	7.0 ***Test Pit Terminated at 7 Feet***									

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

Hammer Type: None

Advancement Method:
24-inch bucket

Abandonment Method:
Test pit backfilled with cuttings upon completion

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

Test Pit Started: 10-08-2019	Test Pit Completed: 10-08-2019
Excavator: Case 580N EP	Operator: J&R
Project No.: 65195246	Exhibit: A-6

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 1/17/20

TEST PIT LOG NO. TP-2

PROJECT: Red Mesa Solar

CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

LOCATION See Exhibit A-2

Latitude: 37.1189° Longitude: -109.4149°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	FIELD DCP (BLOWS/2")	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), nonplastic, light orangish brown									
	roots present								NP	14
	increase in silt content with depth	5							NP	31
	brown, weak to moderate cementation									
	strong cementation, hard digging									
	8.5									
	Test Pit Terminated at 8.5 Feet									

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

Hammer Type: None

Advancement Method:
24-inch bucket

Abandonment Method:
Test pit backfilled with cuttings upon completion

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

Test Pit Started: 10-09-2019 | Test Pit Completed: 10-09-2019

Excavator: Case 580N EP | Operator: J&R

Project No.: 65195246 | Exhibit: A-7

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 1/17/20

TEST PIT LOG NO. TP-3

PROJECT: Red Mesa Solar

CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

LOCATION See Exhibit A-2

Latitude: 37.1206° Longitude: -109.4062°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	FIELD DCP (BLOWS/2")	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), nonplastic, light orangish brown									
	roots present								NP	13
	brown, weak cementation, increase in silt content	5							NP	21
	test pit collapsed at 7 feet									
	7.0									
	Test Pit Terminated at 7 Feet									

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

Hammer Type: None

Advancement Method:
24-inch bucket

Abandonment Method:
Test pit backfilled with cuttings upon completion

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

Test Pit Started: 10-08-2019 | Test Pit Completed: 10-08-2019

Excavator: Case 580N EP | Operator: J&R

Project No.: 65195246 | Exhibit: A-8

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 1/17/20

TEST PIT LOG NO. TP-4

PROJECT: Red Mesa Solar

CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

LOCATION See Exhibit A-2

Latitude: 37.1209° Longitude: -109.4152°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	FIELD DCP (BLOWS/2")	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	POORLY GRADED SAND WITH SILT (SP-SM), nonplastic, light orangish brown roots present increase in silt content with depth								NP	11
	5.0	5								
	SILTY SAND (SM), nonplastic, brown weak cementation test pit collapsed at 7.5 feet									
	7.5									
	Test Pit Terminated at 7.5 Feet									

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

Hammer Type: None

Advancement Method:
24-inch bucket

Abandonment Method:
Test pit backfilled with cuttings upon completion

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

Test Pit Started: 10-09-2019 | Test Pit Completed: 10-09-2019

Excavator: Case 580N EP | Operator: J&R

Project No.: 65195246 | Exhibit: A-9

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 1/17/20

TEST PIT LOG NO. TP-5

PROJECT: Red Mesa Solar

CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

LOCATION See Exhibit A-2

Latitude: 37.1238° Longitude: -109.4052°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	FIELD DCP (BLOWS/2")	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), nonplastic, light orangish brown									
	weak cementation, increase in silt content with depth								NP	13
	test pit collapsed at 5.5 feet	5								
	5.5 ***Test Pit Terminated at 5.5 Feet***									

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

Hammer Type: None

Advancement Method:
24-inch bucket

Abandonment Method:
Test pit backfilled with cuttings upon completion

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

Test Pit Started: 10-08-2019	Test Pit Completed: 10-08-2019
Excavator: Case 580N EP	Operator: J&R
Project No.: 65195246	Exhibit: A-10

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 1/17/20

TEST PIT LOG NO. TP-6

PROJECT: Red Mesa Solar

CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

LOCATION See Exhibit A-2

Latitude: 37.1242° Longitude: -109.4146°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	FIELD DCP (BLOWS/2")	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), low plasticity, light orange to light brown								NP	16
	very weak cementation brown, hard digging	5							NP	16
	test pit collapsed at 7 feet									
	7.5									
	Test Pit Terminated at 7.5 Feet									

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

Hammer Type: None

Advancement Method:
24-inch bucket

Abandonment Method:
Test pit backfilled with cuttings upon completion

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

Test Pit Started: 10-09-2019 | Test Pit Completed: 10-09-2019

Excavator: Case 580N EP | Operator: J&R

Project No.: 65195246 | Exhibit: A-11

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 1/17/20

TEST PIT LOG NO. TP-7

PROJECT: Red Mesa Solar

CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

LOCATION See Exhibit A-2

Latitude: 37.1269° Longitude: -109.405°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	FIELD DCP (BLOWS/2")	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	POORLY GRADED SAND WITH SILT (SP-SM), nonplastic, light orangish brown								NP	12
	increase in silt content with depth									
	4.0									
	SILTY SAND (SM), nonplastic, light brown, moderate cementation									
	strong cementation	5								
	9.5									
	Test Pit Terminated at 9.5 Feet									

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

Hammer Type: None

Advancement Method:
24-inch bucket

Abandonment Method:
Test pit backfilled with cuttings upon completion

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

Test Pit Started: 10-08-2019 | Test Pit Completed: 10-08-2019

Excavator: Case 580N EP | Operator: J&R

Project No.: 65195246 | Exhibit: A-12

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 1/17/20

TEST PIT LOG NO. TP-8

PROJECT: Red Mesa Solar

CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

LOCATION See Exhibit A-2

Latitude: 37.1274° Longitude: -109.414°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	FIELD DCP (BLOWS/2")	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), nonplastic, light orangish brown									
	roots present								NP	16
	moderate cementation, increase in silt content with depth	5								
	9.5									
	Test Pit Terminated at 9.5 Feet									

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

Hammer Type: None

Advancement Method:
24-inch bucket

Abandonment Method:
Test pit backfilled with cuttings upon completion

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

Test Pit Started: 10-09-2019 | Test Pit Completed: 10-09-2019

Excavator: Case 580N EP | Operator: J&R

Project No.: 65195246 | Exhibit: A-13

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 1/17/20

TEST PIT LOG NO. TP-9

PROJECT: Red Mesa Solar

CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

LOCATION See Exhibit A-2

Latitude: 37.1164° Longitude: -109.405°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	FIELD DCP (BLOWS/2")	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), nonplastic, light orangish brown									
	roots present					2				
	light grayish tan, weak to moderate cementation	5				3.2				
	6.0									
	Test Pit Terminated at 6 Feet					6.9				

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

Hammer Type: None

Advancement Method:
24-inch bucket

Abandonment Method:
Test pit backfilled with cuttings upon completion

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

Test Pit Started: 10-23-2019 | Test Pit Completed: 10-23-2019

Excavator: Case 580N EP | Operator: J&R

Project No.: 65195246 | Exhibit: A-14

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 1/17/20

TEST PIT LOG NO. TP-10

PROJECT: Red Mesa Solar

CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

LOCATION See Exhibit A-2

Latitude: 37.1202° Longitude: -109.4188°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	FIELD DCP (BLOWS/2")	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	POORLY GRADED SAND WITH SILT (SP-SM), nonplastic, light orangish brown roots present					1.8			NP	11
	4.0 **SILTY CLAYEY SAND (SC-SM)**, low plasticity, light brown, weak cementation	5				1.6				
	6.0 ***Test Pit Terminated at 6 Feet***					2.0				

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

Hammer Type: None

Advancement Method:
24-inch bucket

Abandonment Method:
Test pit backfilled with cuttings upon completion

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

Test Pit Started: 10-25-2019 | Test Pit Completed: 10-25-2019

Excavator: Case 580N EP | Operator: Dine Resources

Project No.: 65195246 | Exhibit: A-15

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 1/17/20

TEST PIT LOG NO. TP-11

PROJECT: Red Mesa Solar

CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

LOCATION See Exhibit A-2

Latitude: 37.1199° Longitude: -109.4127°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	FIELD DCP (BLOWS/2")	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), nonplastic, light orangish brown									
	weak cementation					1.3				
		5				1.6				
	moderate cementation									
	6.0									
	Test Pit Terminated at 6 Feet					2.3				

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

Hammer Type: None

Advancement Method:
24-inch bucket

Abandonment Method:
Test pit backfilled with cuttings upon completion

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

Test Pit Started: 10-24-2019 | Test Pit Completed: 10-24-2019

Excavator: Case 580N EP | Operator: Dine Resources

Project No.: 65195246 | Exhibit: A-16

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 1/17/20

TEST PIT LOG NO. TP-12

PROJECT: Red Mesa Solar

CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

LOCATION See Exhibit A-2

Latitude: 37.1193° Longitude: -109.4041°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	FIELD DCP (BLOWS/2")	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), nonplastic, light orangish brown									
	weak cementation					0.9				
	moderate cementation	5				1.6				
	6.0									
	Test Pit Terminated at 6 Feet					2.4				

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

Hammer Type: None

Advancement Method:
24-inch bucket

Abandonment Method:
Test pit backfilled with cuttings upon completion

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

Test Pit Started: 10-23-2019 | Test Pit Completed: 10-23-2019

Excavator: Case 580N EP | Operator: Dine Resources

Project No.: 65195246 | Exhibit: A-17

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 1/17/20

TEST PIT LOG NO. TP-13

PROJECT: Red Mesa Solar

CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

LOCATION See Exhibit A-2

Latitude: 37.1223° Longitude: -109.4037°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	FIELD DCP (BLOWS/2")	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), nonplastic, light orangish brown									
	very weak cementation					0.9			NP	13
		5				0.9				
	6.0									
	Test Pit Terminated at 6 Feet					0.6				

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

Hammer Type: None

Advancement Method:
24-inch bucket

Abandonment Method:
Test pit backfilled with cuttings upon completion

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

Test Pit Started: 10-23-2019 | Test Pit Completed: 10-23-2019

Excavator: Case 580N EP | Operator: Dine Resources

Project No.: 65195246 | Exhibit: A-18

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 1/17/20

TEST PIT LOG NO. TP-14

PROJECT: Red Mesa Solar

CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

LOCATION See Exhibit A-2

Latitude: 37.1227° Longitude: -109.4129°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	FIELD DCP (BLOWS/2")	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), nonplastic, light orangish brown					1.3				
	yellowish brown, weak to moderate cementation	5				1.5				
	6.0									
	Test Pit Terminated at 6 Feet					2.1				

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

Hammer Type: None

Advancement Method:
24-inch bucket

Abandonment Method:
Test pit backfilled with cuttings upon completion

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

Test Pit Started: 10-24-2019 | Test Pit Completed: 10-24-2019

Excavator: Case 580N EP | Operator: Dine Resources

Project No.: 65195246 | Exhibit: A-19

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 1/17/20

TEST PIT LOG NO. TP-15

PROJECT: Red Mesa Solar

CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

LOCATION See Exhibit A-2

Latitude: 37.1256° Longitude: 109.4173°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	FIELD DCP (BLOWS/2")	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), nonplastic, light orangish brown									
	roots present					0.9				
	weak to moderate cementation, increase in silt content	5				1.3				
	6.0									
	Test Pit Terminated at 6 Feet					1.9				

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

Hammer Type: None

Advancement Method:
24-inch bucket

Abandonment Method:
Test pit backfilled with cuttings upon completion

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

Test Pit Started: 10-25-2019 | Test Pit Completed: 10-25-2019

Excavator: Case 580N EP | Operator: Dine Resources

Project No.: 65195246 | Exhibit: A-20

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 1/17/20

TEST PIT LOG NO. TP-16

PROJECT: Red Mesa Solar

CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

LOCATION See Exhibit A-2

Latitude: 37.1257° Longitude: -109.4123°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	FIELD DCP (BLOWS/2")	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), nonplastic, light orangish brown, dense roots to 2 feet									
	moderate cementation					1.3				
	trace gravel	5				2.3				
	6.0									
	Test Pit Terminated at 6 Feet					2.4				

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

Hammer Type: None

Advancement Method:
24-inch bucket

Abandonment Method:
Test pit backfilled with cuttings upon completion

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

Test Pit Started: 10-24-2019 | Test Pit Completed: 10-24-2019

Excavator: Case 580N EP | Operator: Dine Resources

Project No.: 65195246 | Exhibit: A-21

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 1/17/20

TEST PIT LOG NO. TP-17

PROJECT: Red Mesa Solar

CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

LOCATION See Exhibit A-2

Latitude: 37.1257° Longitude: -109.4031°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	FIELD DCP (BLOWS/2")	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), nonplastic, light orangish brown									
	weak cementation, roots present, vesicular carbonates					1.6				
	moderate cementation	5				1.6				
	6.0									
	Test Pit Terminated at 6 Feet					2.1				

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

Hammer Type: None

Advancement Method:
24-inch bucket

Abandonment Method:
Test pit backfilled with cuttings upon completion

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

Test Pit Started: 10-23-2019	Test Pit Completed: 10-23-2019
Excavator: Case 580N EP	Operator: Dine Resources
Project No.: 65195246	Exhibit: A-22

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 1/17/20

TEST PIT LOG NO. TP-18

PROJECT: Red Mesa Solar

CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

LOCATION See Exhibit A-2

Latitude: 37.1288° Longitude: -109.4026°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	FIELD DCP (BLOWS/2")	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), nonplastic, light orangish brown									
	weak cementation					1.5				
	moderate cementation	5				1.8				
	6.0									
	Test Pit Terminated at 6 Feet					1.7				

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

Hammer Type: None

Advancement Method:
24-inch bucket

Abandonment Method:
Test pit backfilled with cuttings upon completion

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

Test Pit Started: 10-23-2019 | Test Pit Completed: 10-23-2019

Excavator: Case 580N EP | Operator: Dine Resources

Project No.: 65195246 | Exhibit: A-23

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 1/17/20

TEST PIT LOG NO. TP-19

PROJECT: Red Mesa Solar

CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

LOCATION See Exhibit A-2

Latitude: 37.1286° Longitude: -109.4075°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	FIELD DCP (BLOWS/2")	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), nonplastic, light orangish brown								NP	13
	moderate cementation	5				1.5				
						1.8				
	6.0									
	Test Pit Terminated at 6 Feet					1.7				

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

Hammer Type: None

Advancement Method:
24-inch bucket

Abandonment Method:
Test pit backfilled with cuttings upon completion

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

Test Pit Started: 10-24-2019 | Test Pit Completed: 10-24-2019

Excavator: Case 580N EP | Operator: Dine Resources

Project No.: 65195246 | Exhibit: A-24

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 1/17/20

TEST PIT LOG NO. TP-20

PROJECT: Red Mesa Solar

CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

LOCATION See Exhibit A-2

Latitude: 37.1228° Longitude: -109.4119°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	FIELD DCP (BLOWS/2")	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), nonplastic, light orangish brown									
	weak cementation, roots present					1.2				
	moderate cementation	5				2.0				
	6.0									
	Test Pit Terminated at 6 Feet					1.6				

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

Hammer Type: None

Advancement Method:
24-inch bucket

Abandonment Method:
Test pit backfilled with cuttings upon completion

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

Test Pit Started: 10-25-2019 | Test Pit Completed: 10-25-2019

Excavator: Case 580N EP | Operator: Dine Resources

Project No.: 65195246 | Exhibit: A-25

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 1/17/20

TEST PIT LOG NO. TP-21

PROJECT: Red Mesa Solar

CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

LOCATION See Exhibit A-2

Latitude: 37.1228° Longitude: -109.4179°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	FIELD DCP (BLOWS/2")	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), nonplastic, light orangish brown									
	roots present								NP	13
						1.3				
	weak to moderate cementation									
		5				1.8				
	6.0									
	Test Pit Terminated at 6 Feet					1.8				

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

Hammer Type: None

Advancement Method:
24-inch bucket

Abandonment Method:
Test pit backfilled with cuttings upon completion

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

Test Pit Started: 10-25-2019 | Test Pit Completed: 10-25-2019

Excavator: Case 580N EP | Operator: Dine Resources

Project No.: 65195246 | Exhibit: A-26

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 1/17/20

TEST PIT LOG NO. TP-22

PROJECT: Red Mesa Solar

CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

LOCATION See Exhibit A-2

Latitude: 37.1225° Longitude: -109.4086°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	FIELD DCP (BLOWS/2")	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	POORLY GRADED SAND WITH SILT (SP-SM), nonplastic, light orangish brown									
	roots present					1.0			NP	11
		5				0.8				
	trace clay, weak cementation									
	6.0 ***Test Pit Terminated at 6 Feet***					1.2				

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

Hammer Type: None

Advancement Method:
24-inch bucket

Abandonment Method:
Test pit backfilled with cuttings upon completion

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

Test Pit Started: 10-24-2019 | Test Pit Completed: 10-24-2019

Excavator: Case 580N EP | Operator: Dine Resources

Project No.: 65195246 | Exhibit: A-27

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 1/17/20

TEST PIT LOG NO. TP-23

PROJECT: Red Mesa Solar

CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

LOCATION See Exhibit A-2

Latitude: 37.129° Longitude: -109.4169°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	FIELD DCP (BLOWS/2")	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), nonplastic, light orangish brown									
	stratified lenses of coarser sand					1.2			NP	13
	5.0	5				2.0				
	SILTY CLAYEY SAND (SC-SM), low plasticity, light brownish gray, weak to moderate cementation									
	6.0					1.6				
	Test Pit Terminated at 6 Feet									

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

Hammer Type: None

Advancement Method:
24-inch bucket

Abandonment Method:
Test pit backfilled with cuttings upon completion

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

Test Pit Started: 10-25-2019 | Test Pit Completed: 10-25-2019

Excavator: Case 580N EP | Operator: Dine Resources

Project No.: 65195246 | Exhibit: A-28

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 1/17/20

TEST PIT LOG NO. TP-24

PROJECT: Red Mesa Solar

CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

LOCATION See Exhibit A-2

Latitude: 37.1196° Longitude: -109.4089°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	FIELD DCP (BLOWS/2")	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY SAND, nonplastic, light orangish brown									
	weak cementation, roots present					1.0				
	moderate cementation	5				1.5				
	6.0									
	Test Pit Terminated at 6 Feet					0.5				

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

Hammer Type: None

Advancement Method:
24-inch bucket

Abandonment Method:
Test pit backfilled with cuttings upon completion

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

Test Pit Started: 10-24-2019 | Test Pit Completed: 10-24-2019

Excavator: Case 580N EP | Operator: Dine Resources

Project No.: 65195246 | Exhibit: A-29

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 1/17/20

TEST PIT LOG NO. TP-25

PROJECT: Red Mesa Solar

CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

LOCATION See Exhibit A-2

Latitude: 37.1162° Longitude: -109.4097°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	FIELD DCP (BLOWS/2")	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), nonplastic, light orangish brown					0.7				
	weak to moderate cementation	5				1.1				
	light brown, slight increase in silt content									
	6.0									
	Test Pit Terminated at 6 Feet					1.4				

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

Hammer Type: None

Advancement Method:
24-inch bucket

Abandonment Method:
Test pit backfilled with cuttings upon completion

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

Test Pit Started: 10-24-2019 | Test Pit Completed: 10-24-2019

Excavator: Case 580N EP | Operator: Dine Resources

Project No.: 65195246 | Exhibit: A-30

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 1/17/20

TEST PIT LOG NO. TP-26

PROJECT: Red Mesa Solar

CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

LOCATION See Exhibit A-2

Latitude: 37.1161° Longitude: -109.4146°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	FIELD DCP (BLOWS/2")	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	POORLY GRADED SAND WITH SILT (SP-SM), nonplastic, light orangish brown								NP	8
	roots present					1.0				
	5.0	5				1.6				
	SILTY SAND (SM), nonplastic, brown, weak cementation									
	6.0					1.7				
	Test Pit Terminated at 6 Feet									

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

Hammer Type: None

Advancement Method:
24-inch bucket

Abandonment Method:
Test pit backfilled with cuttings upon completion

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

Test Pit Started: 10-25-2019 | Test Pit Completed: 10-25-2019

Excavator: Case 580N EP | Operator: Dine Resources

Project No.: 65195246 | Exhibit: A-31

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 1/17/20

TEST PIT LOG NO. TP-27

PROJECT: Red Mesa Solar

CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

LOCATION See Exhibit A-2

Latitude: 37.1184° Longitude: -109.4148°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	FIELD DCP (BLOWS/2")	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), nonplastic, light orangish brown									
	dark brown, weak to moderate cementation, cementation increases with depth					3.2				
	grayish brown and white, moderate to strong cementation	5				3.6				
	6.0									
	Test Pit Terminated at 6 Feet					6.9				

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

Hammer Type: None

Advancement Method:
24-inch bucket

Abandonment Method:
Test pit backfilled with cuttings upon completion

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

Test Pit Started: 10-25-2019 | Test Pit Completed: 10-25-2019

Excavator: Case 580N EP | Operator: Dine Resources

Project No.: 65195246 | Exhibit: A-32

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 1/17/20

TEST PIT LOG NO. TP-28

PROJECT: Red Mesa Solar

CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

LOCATION See Exhibit A-2

Latitude: 37.1257° Longitude: -109.4076°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	FIELD DCP (BLOWS/2")	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), nonplastic, light orangish brown									
						1.3				
	weak to moderate cementation, cementation increases with depth	5				1.7				
	moderate to strong cementation									
	6.0									
	Test Pit Terminated at 6 Feet					1.8				

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

Hammer Type: None

Advancement Method:
24-inch bucket

Abandonment Method:
Test pit backfilled with cuttings upon completion

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

Test Pit Started: 10-24-2019	Test Pit Completed: 10-24-2019
Excavator: Case 580N EP	Operator: Dine Resources
Project No.: 65195246	Exhibit: A-33

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 1/17/20

APPENDIX B

LABORATORY TESTING

Laboratory Testing

Samples retrieved during the field exploration were taken to the laboratory for further observation by the project geotechnical engineer and were classified in accordance with the Unified Soil Classification System (USCS) described in Appendix A. At that time, the field descriptions were confirmed or modified as necessary and an applicable laboratory testing program was formulated to determine engineering properties of the subsurface materials.

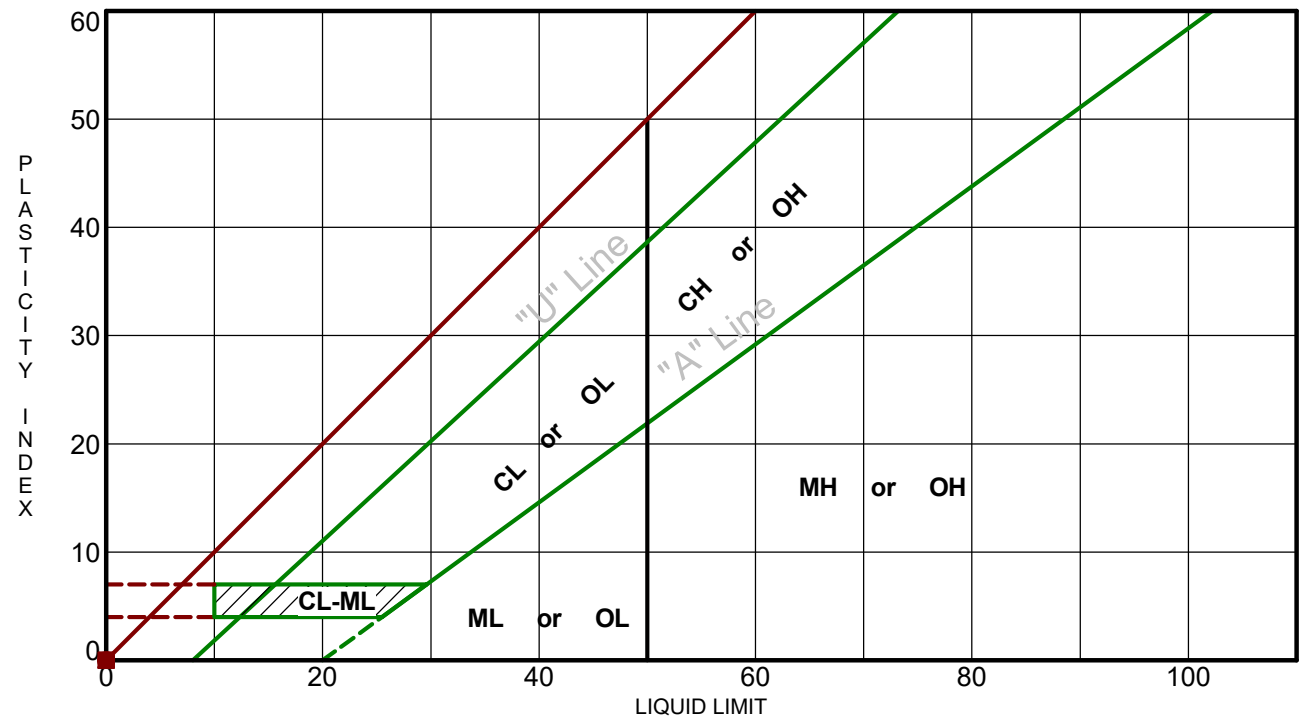
Laboratory tests were conducted on selected soil samples and the test results are presented in this appendix. The laboratory test results were used for the geotechnical engineering analyses, and the development of foundation and earthwork recommendations. Laboratory tests were performed in general accordance with the applicable ASTM, local or other accepted standards.

Selected soil samples obtained from the site were tested for the following engineering properties:

- Atterberg Limits
- Resistivity
- pH
- Sulfides
- Thermal Resistivity
- Sieve Analysis
- Moisture-Density Relationships
- Soluble Chlorides
- Soluble Sulfate
- Red-Ox

ATTERBERG LIMITS RESULTS

ASTM D4318



Boring ID	Depth	LL	PL	PI	Fines	USCS	Description
TP-1	0 - 4	NP	NP	NP	10.8	SP-SM	POORLY GRADED SAND with SILT
TP-2	0 - 5	NP	NP	NP	13.6	SM	SILTY SAND
TP-2	5 - 6	NP	NP	NP	31.2	SM	SILTY SAND
TP-3	0 - 3.5	NP	NP	NP	12.7	SM	SILTY SAND
TP-3	3.5 - 4.5	NP	NP	NP	20.8	SM	SILTY SAND
TP-4	0 - 5	NP	NP	NP	10.9	SP-SM	POORLY GRADED SAND with SILT
TP-5	0 - 5	NP	NP	NP	12.7	SM	SILTY SAND
TP-6	0 - 1.8	NP	NP	NP	16.2	SM	SILTY SAND
TP-6	1.8 - 5	NP	NP	NP	16.4	SM	SILTY SAND
TP-7	0 - 4	NP	NP	NP	11.7	SP-SM	POORLY GRADED SAND with SILT
TP-8	0 - 5	NP	NP	NP	15.6	SM	SILTY SAND
TP-10	0 - 3	NP	NP	NP	11.2	SP-SM	POORLY GRADED SAND with SILT
TP-13	0 - 4	NP	NP	NP	13.4	SM	SILTY SAND
TP-19	0 - 4	NP	NP	NP	13.5	SM	SILTY SAND
TP-21	0 - 4	NP	NP	NP	13.1	SM	SILTY SAND
TP-22	0 - 4	NP	NP	NP	11.2	SP-SM	POORLY GRADED SAND with SILT
TP-23	0 - 4	NP	NP	NP	12.6	SM	SILTY SAND
TP-26	0 - 3	NP	NP	NP	8.2	SP-SM	POORLY GRADED SAND with SILT

PROJECT: Red Mesa Solar

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

PROJECT NUMBER: 65195246

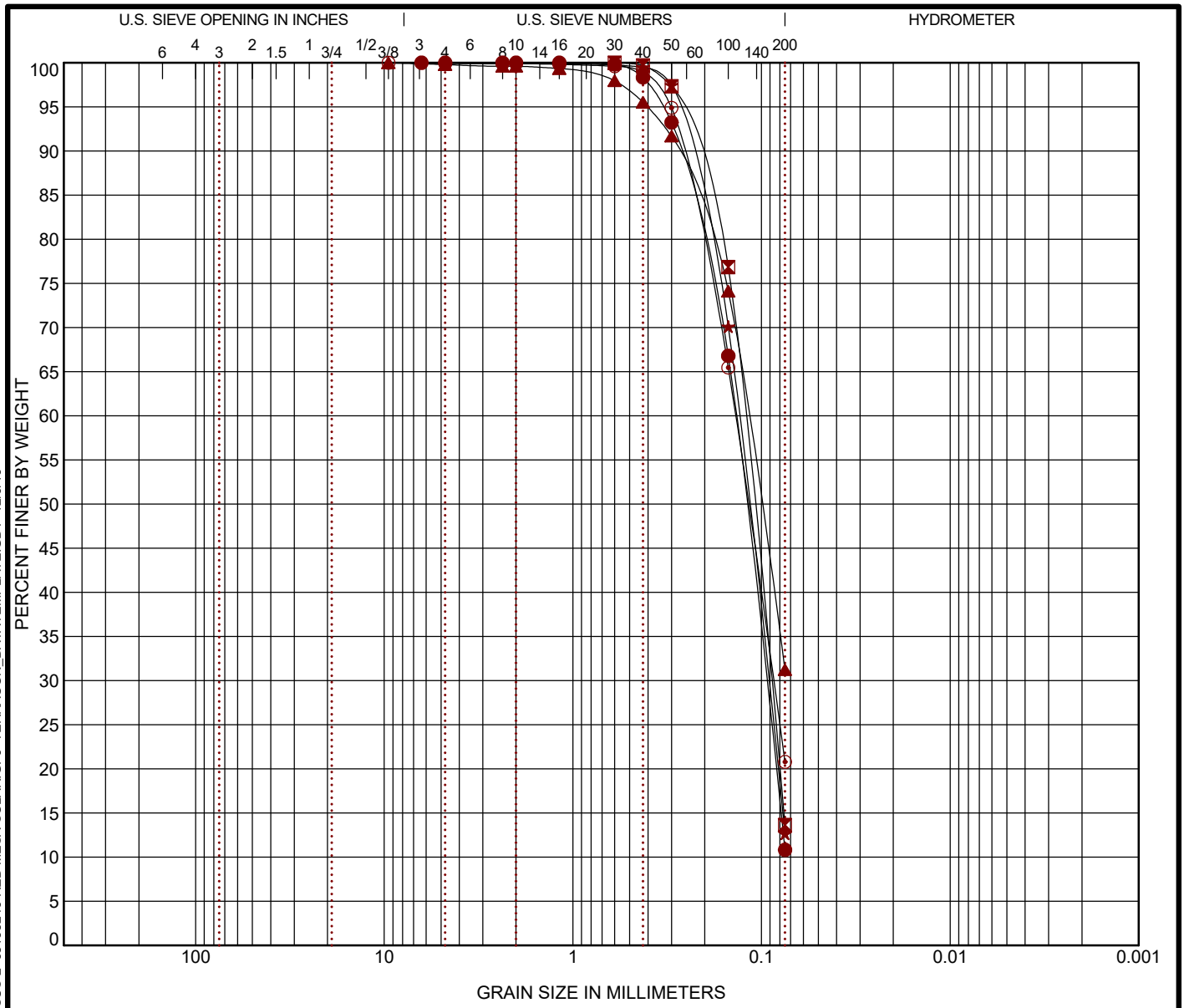
CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

EXHIBIT: B-2

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. ATTERBERG LIMITS 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 12/6/19

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



Boring ID	Depth	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
TP-1	0 - 4	POORLY GRADED SAND with SILT (SP-SM)		NP	NP	NP	0.88	1.86
TP-2	0 - 5	SILTY SAND (SM)		NP	NP	NP		
TP-2	5 - 6	SILTY SAND (SM)		NP	NP	NP		
TP-3	0 - 3.5	SILTY SAND (SM)		NP	NP	NP		
TP-3	3.5 - 4.5	SILTY SAND (SM)		NP	NP	NP		

Boring ID	Depth	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
TP-1	0 - 4	6.35	0.138	0.095		0.0	0.0	89.2		10.8	
TP-2	0 - 5	0.6	0.125	0.09		0.0	0.0	86.4		13.6	
TP-2	5 - 6	9.5	0.119			0.0	0.2	68.6		31.2	
TP-3	0 - 3.5	4.75	0.133	0.092		0.0	0.0	87.3		12.7	
TP-3	3.5 - 4.5	9.5	0.138	0.087		0.0	0.1	79.1		20.8	

PROJECT: Red Mesa Solar

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

PROJECT NUMBER: 65195246

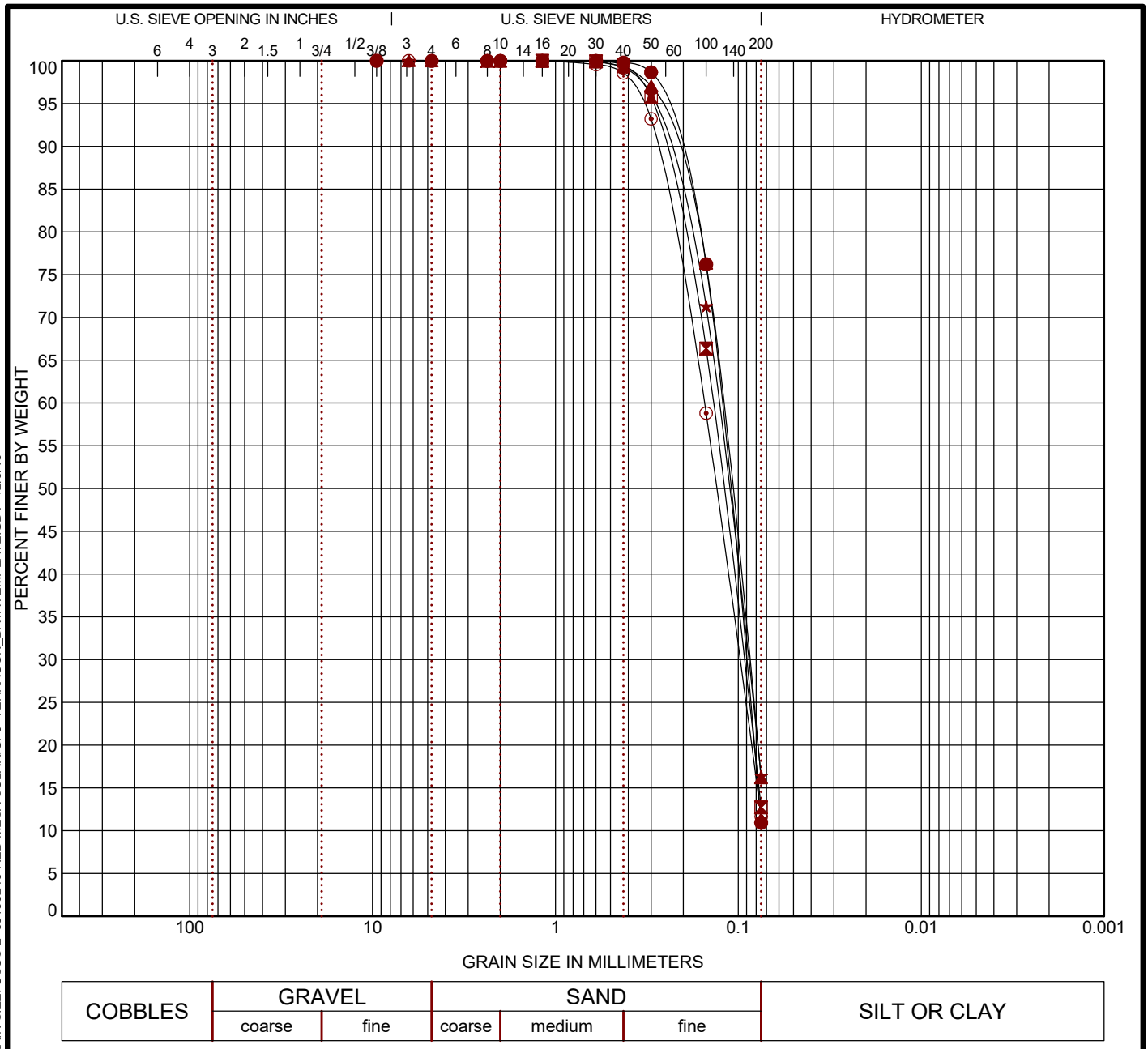
CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

EXHIBIT: B-3

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 12/6/19

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



Boring ID	Depth	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
TP-4	0 - 5	POORLY GRADED SAND with SILT (SP-SM)		NP	NP	NP	0.90	1.70
TP-5	0 - 5	SILTY SAND (SM)		NP	NP	NP		
TP-6	0 - 1.8	SILTY SAND (SM)		NP	NP	NP		
TP-6	1.8 - 5	SILTY SAND (SM)		NP	NP	NP		
TP-7	0 - 4	POORLY GRADED SAND with SILT (SP-SM)		NP	NP	NP	0.86	2.10

Boring ID	Depth	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
TP-4	0 - 5	9.5	0.126	0.092		0.0	0.0	89.1		10.9	
TP-5	0 - 5	1.18	0.138	0.094		0.0	0.0	87.3		12.7	
TP-6	0 - 1.8	6.35	0.124	0.088		0.0	0.0	83.8		16.2	
TP-6	1.8 - 5	6.35	0.13	0.089		0.0	0.0	83.6		16.4	
TP-7	0 - 4	6.35	0.154	0.098		0.0	0.0	88.3		11.7	

PROJECT: Red Mesa Solar

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

PROJECT NUMBER: 65195246

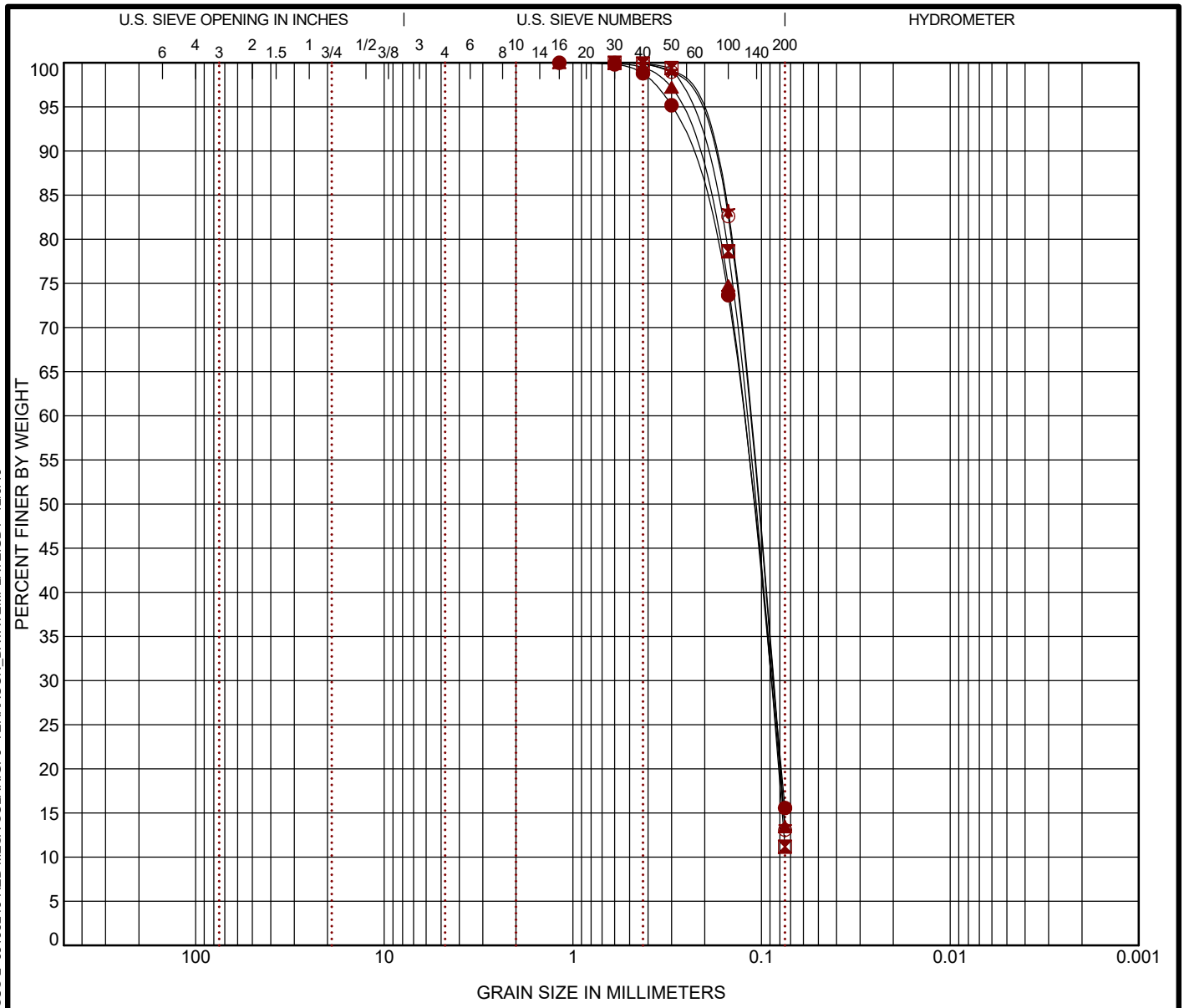
CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

EXHIBIT: B-4

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 12/6/19

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID		Depth	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	TP-8	0 - 5	SILTY SAND (SM)		NP	NP	NP		
⊠	TP-10	0 - 3	POORLY GRADED SAND with SILT (SP-SM)		NP	NP	NP	0.90	1.67
▲	TP-13	0 - 4	SILTY SAND (SM)		NP	NP	NP		
★	TP-19	0 - 4	SILTY SAND (SM)		NP	NP	NP		
⊙	TP-21	0 - 4	SILTY SAND (SM)		NP	NP	NP		

Boring ID		Depth	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	TP-8	0 - 5	1.18	0.127	0.089		0.0	0.0	84.4		15.6	
⊠	TP-10	0 - 3	0.6	0.124	0.091		0.0	0.0	88.8		11.2	
▲	TP-13	0 - 4	1.18	0.127	0.09		0.0	0.0	86.6		13.4	
★	TP-19	0 - 4	0.6	0.119	0.088		0.0	0.0	86.5		13.5	
⊙	TP-21	0 - 4	0.6	0.12	0.089		0.0	0.0	86.9		13.1	

PROJECT: Red Mesa Solar

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

PROJECT NUMBER: 65195246

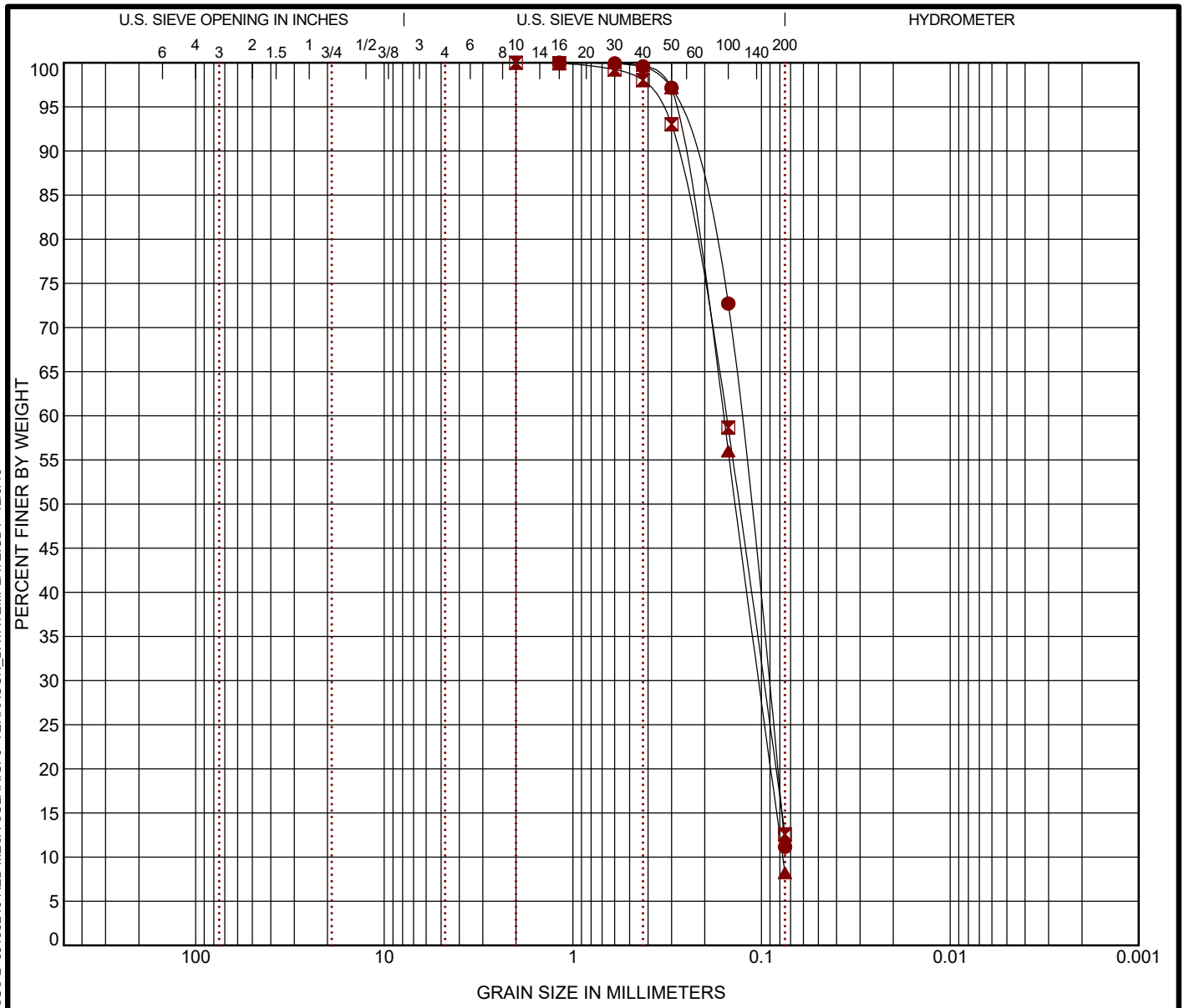
CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

EXHIBIT: B-5

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 12/6/19

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID		Depth	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	TP-22	0 - 4	POORLY GRADED SAND with SILT (SP-SM)		NP	NP	NP	0.89	1.76
⊠	TP-23	0 - 4	SILTY SAND (SM)		NP	NP	NP		
▲	TP-26	0 - 3	POORLY GRADED SAND with SILT (SP-SM)		NP	NP	NP	0.86	2.08

Boring ID		Depth	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	TP-22	0 - 4	1.18	0.13	0.093		0.0	0.0	88.8		11.2	
⊠	TP-23	0 - 4	2	0.154	0.097		0.0	0.0	87.4		12.6	
▲	TP-26	0 - 3	0.6	0.16	0.103	0.077	0.0	0.0	91.8		8.2	

PROJECT: Red Mesa Solar

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

PROJECT NUMBER: 65195246

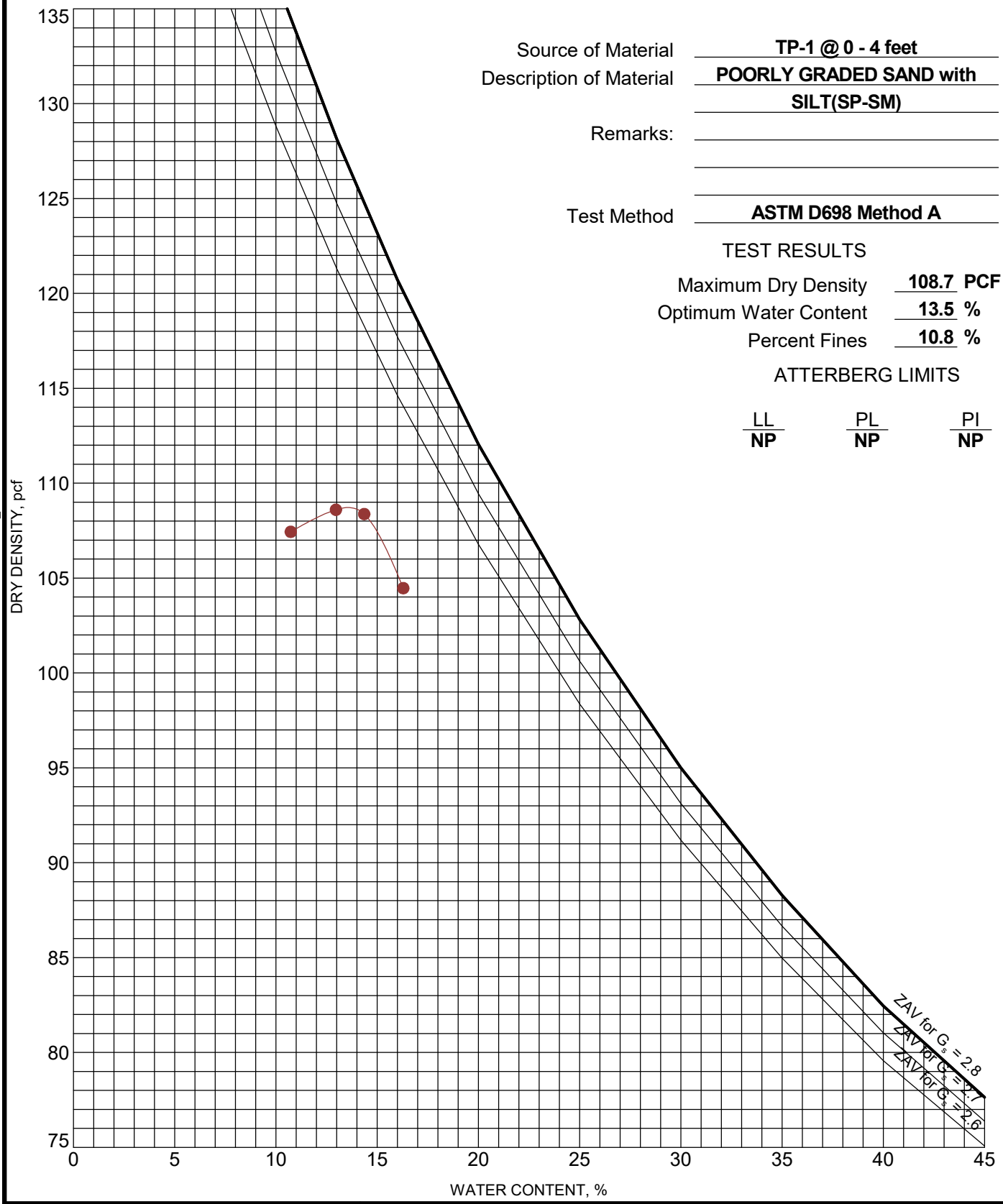
CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

EXHIBIT: B-6

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 12/6/19

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557



Source of Material	**TP-1 @ 0 - 4 feet**
Description of Material	**POORLY GRADED SAND with SILT(SP-SM)**
Remarks:	
Test Method	**ASTM D698 Method A**

TEST RESULTS

Maximum Dry Density	**108.7** PCF
Optimum Water Content	**13.5** %
Percent Fines	**10.8** %

ATTERBERG LIMITS

LL	PL	PI
NP	**NP**	**NP**

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. COMPACTION - V2 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 12/6/19

PROJECT: Red Mesa Solar

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

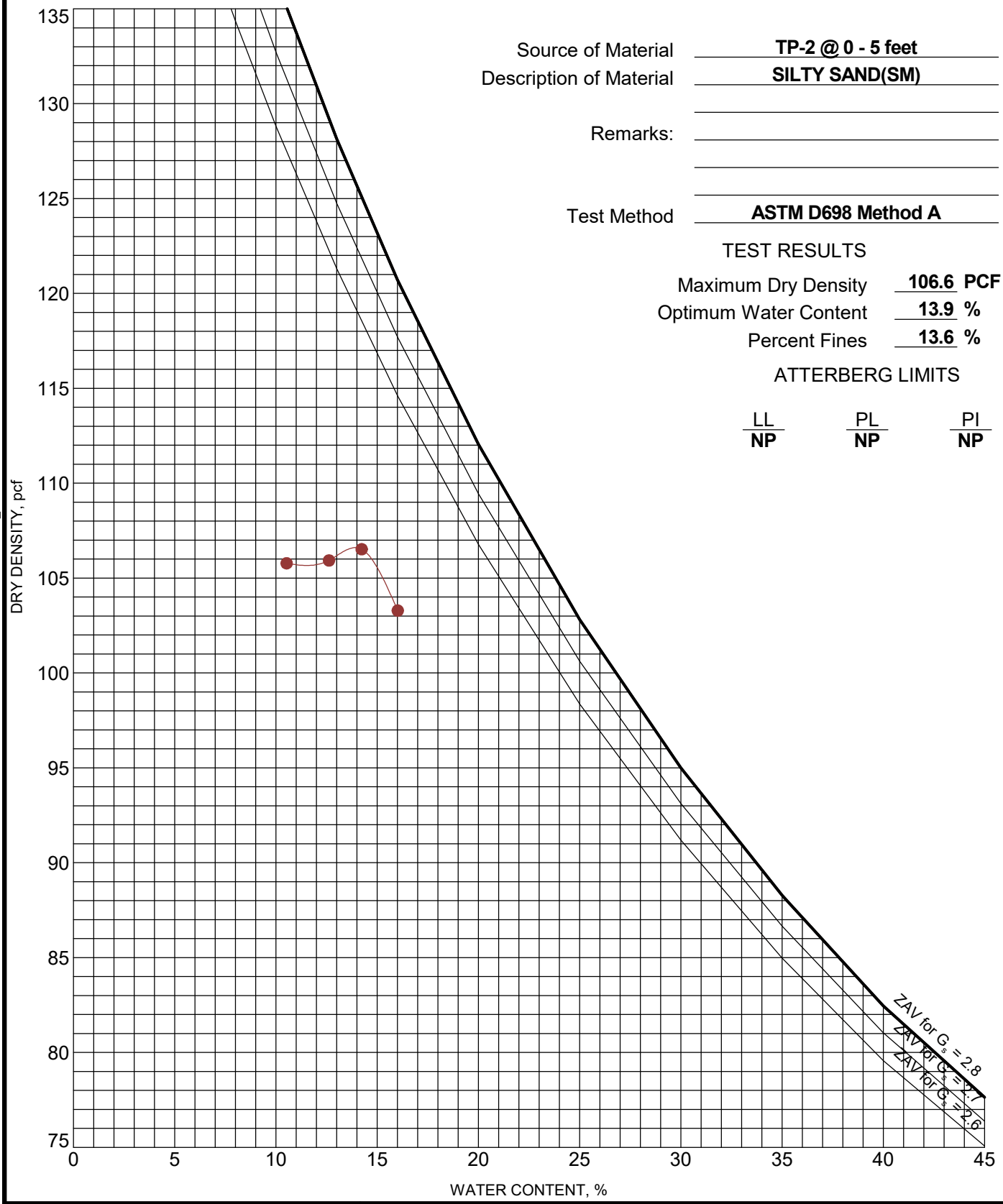
PROJECT NUMBER: 65195246

CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

EXHIBIT: B-7

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557



Source of Material	**TP-2 @ 0 - 5 feet**
Description of Material	**SILTY SAND(SM)**
Remarks:	
Test Method	**ASTM D698 Method A**

TEST RESULTS

Maximum Dry Density	**106.6**	**PCF**
Optimum Water Content	**13.9**	**%**
Percent Fines	**13.6**	**%**

ATTERBERG LIMITS

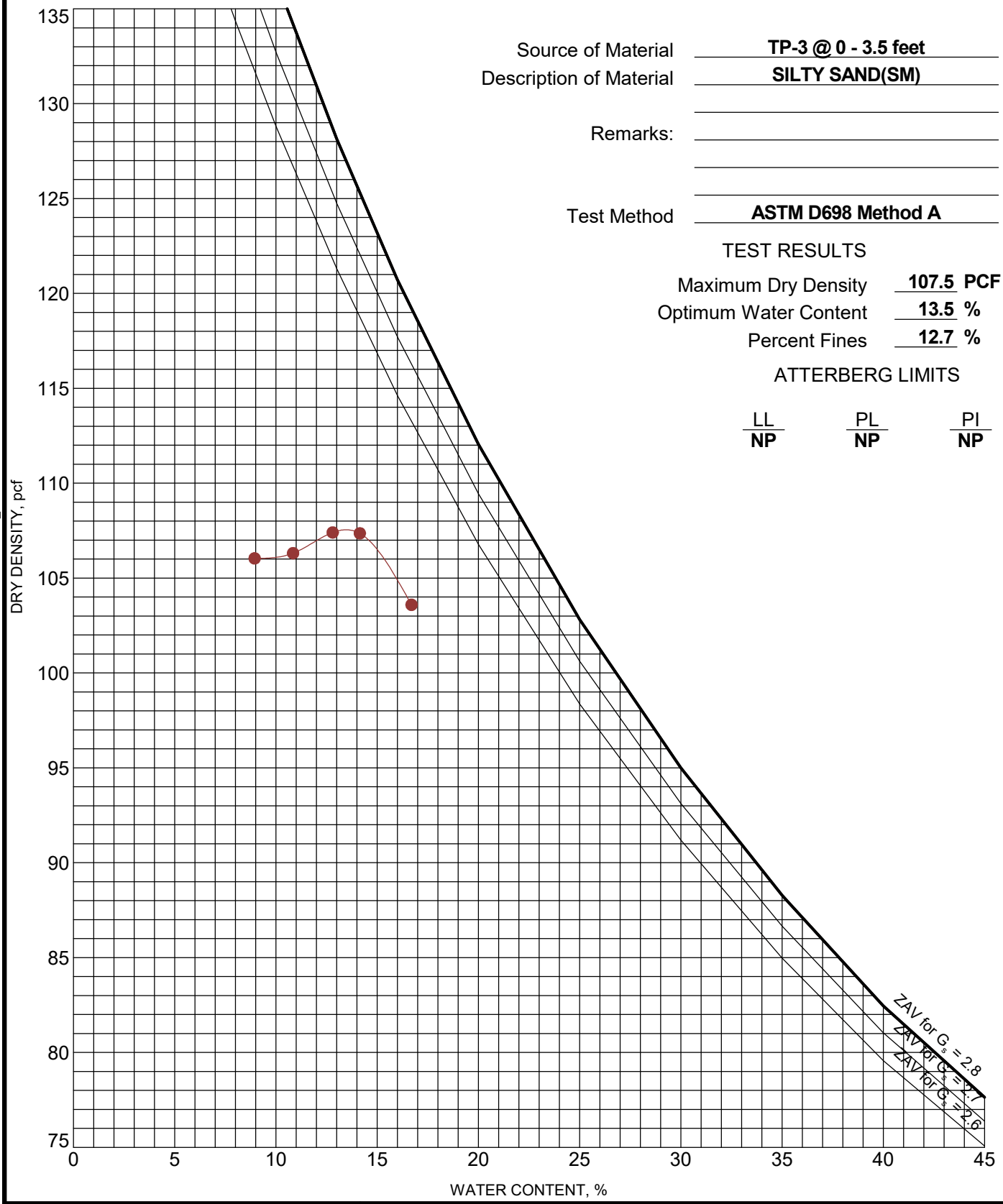
LL	PL	PI
NP	**NP**	**NP**

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. COMPACTION - V2 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 12/6/19

PROJECT: Red Mesa Solar	Terracon 4685 S Ash Ave, Ste H-4 Tempe, AZ	PROJECT NUMBER: 65195246
SITE: East of CR 454 and CR 439 Montezuma Creek, Utah		CLIENT: Navajo Tribal Utility Authority Fort Defiance, Arizona
		EXHIBIT: B-8

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557



Source of Material: **TP-3 @ 0 - 3.5 feet**

Description of Material: **SILTY SAND(SM)**

Remarks:

Test Method: **ASTM D698 Method A**

TEST RESULTS

Maximum Dry Density	**107.5** PCF
Optimum Water Content	**13.5** %
Percent Fines	**12.7** %

ATTERBERG LIMITS

LL	PL	PI
NP	**NP**	**NP**

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. COMPACTION - V2 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 12/6/19

PROJECT: Red Mesa Solar

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

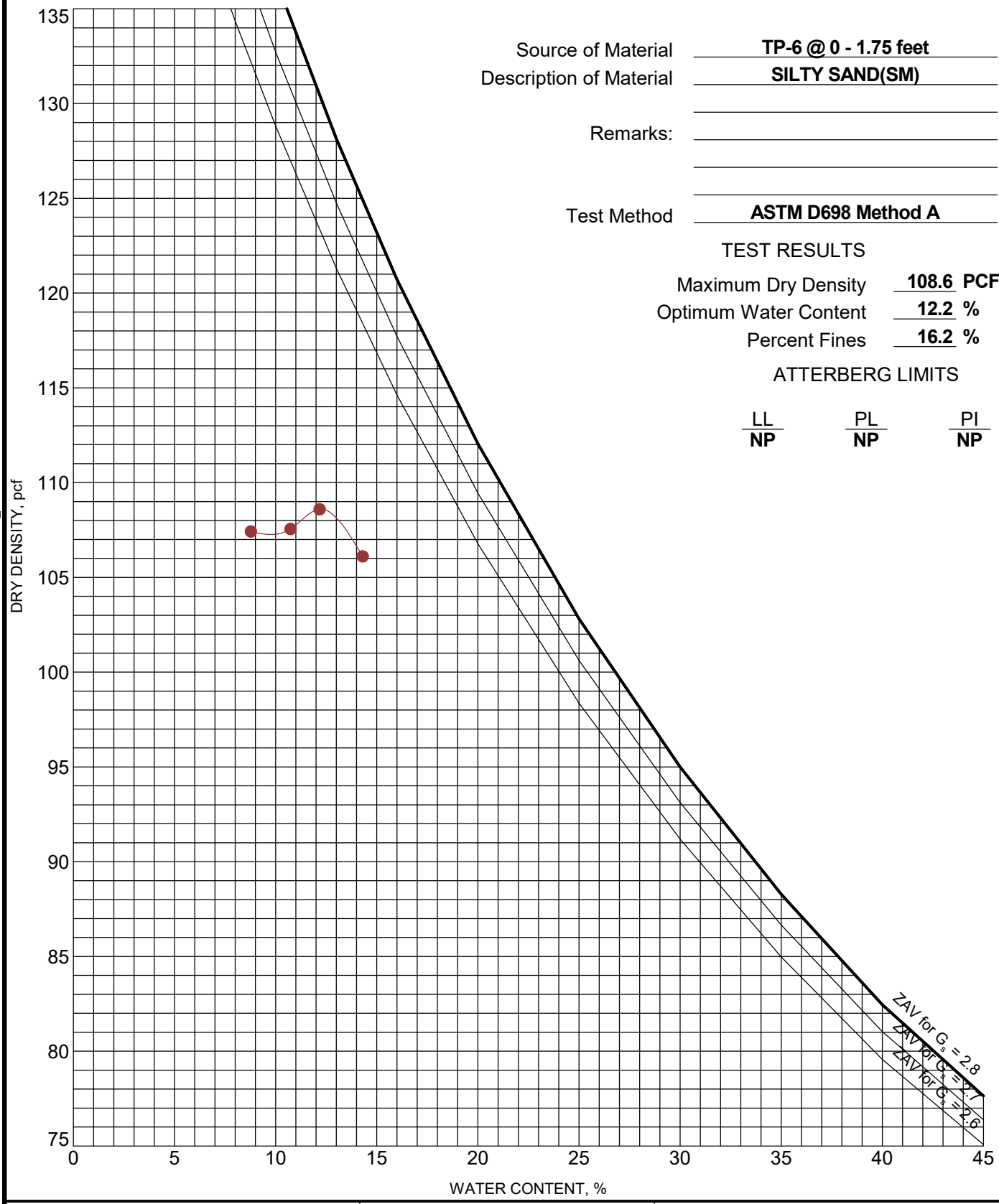
PROJECT NUMBER: 65195246

CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

EXHIBIT: B-9

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557



Source of Material: **TP-6 @ 0 - 1.75 feet**

Description of Material: **SILTY SAND(SM)**

Remarks:

Test Method: **ASTM D698 Method A**

TEST RESULTS

Maximum Dry Density	**108.6 PCF**
Optimum Water Content	**12.2 %**
Percent Fines	**16.2 %**

ATTERBERG LIMITS

LL	PL	PI
NP	**NP**	**NP**

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. COMPACTION - V2 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 12/6/19

PROJECT: Red Mesa Solar

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

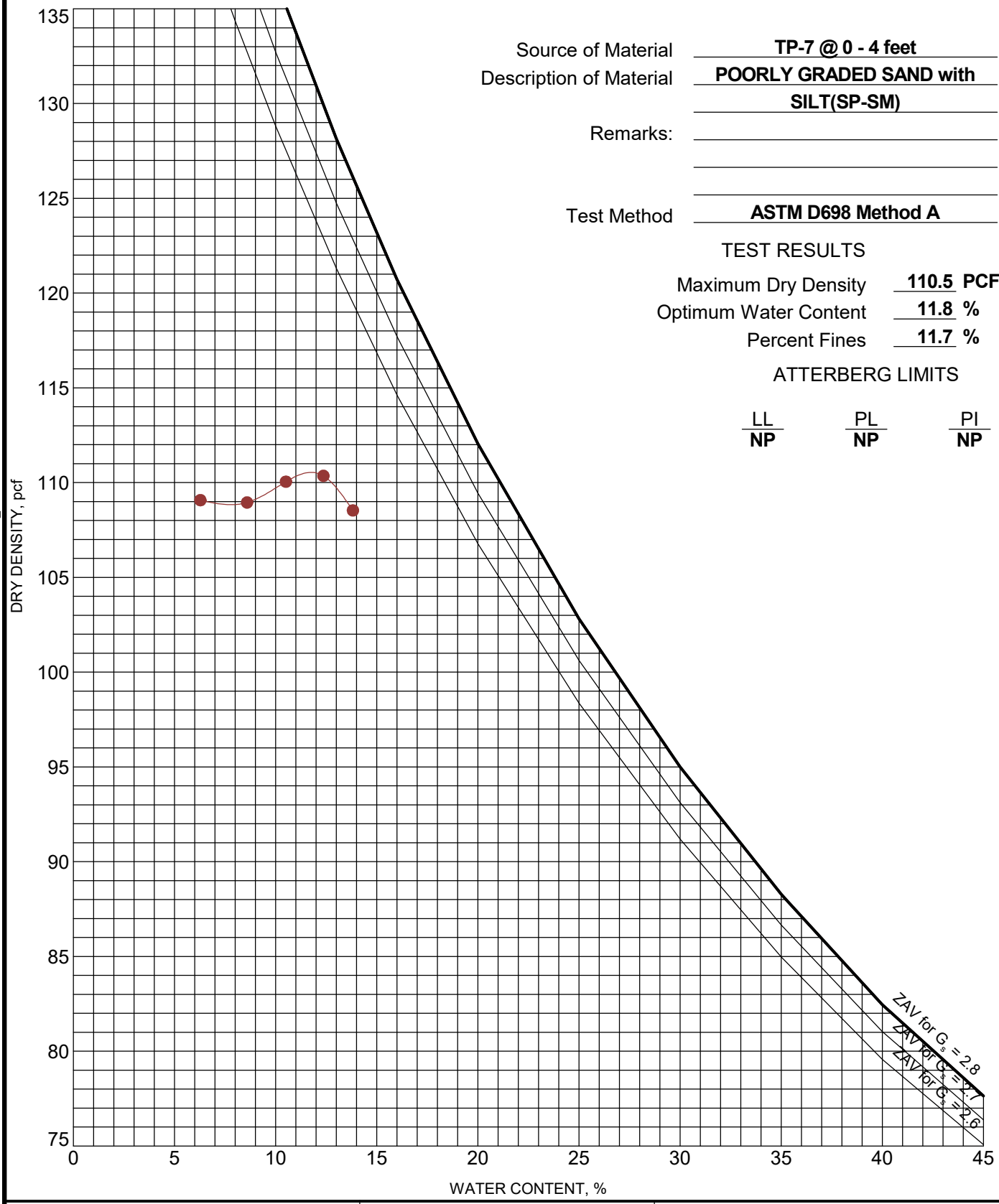
PROJECT NUMBER: 65195246

CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

EXHIBIT: B-10

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557



Source of Material	**TP-7 @ 0 - 4 feet**
Description of Material	**POORLY GRADED SAND with SILT(SP-SM)**
Remarks:	
Test Method	**ASTM D698 Method A**

TEST RESULTS

Maximum Dry Density	**110.5 PCF**
Optimum Water Content	**11.8 %**
Percent Fines	**11.7 %**

ATTERBERG LIMITS

LL	PL	PI
NP	**NP**	**NP**

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. COMPACTION - V2 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 12/6/19

PROJECT: Red Mesa Solar

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

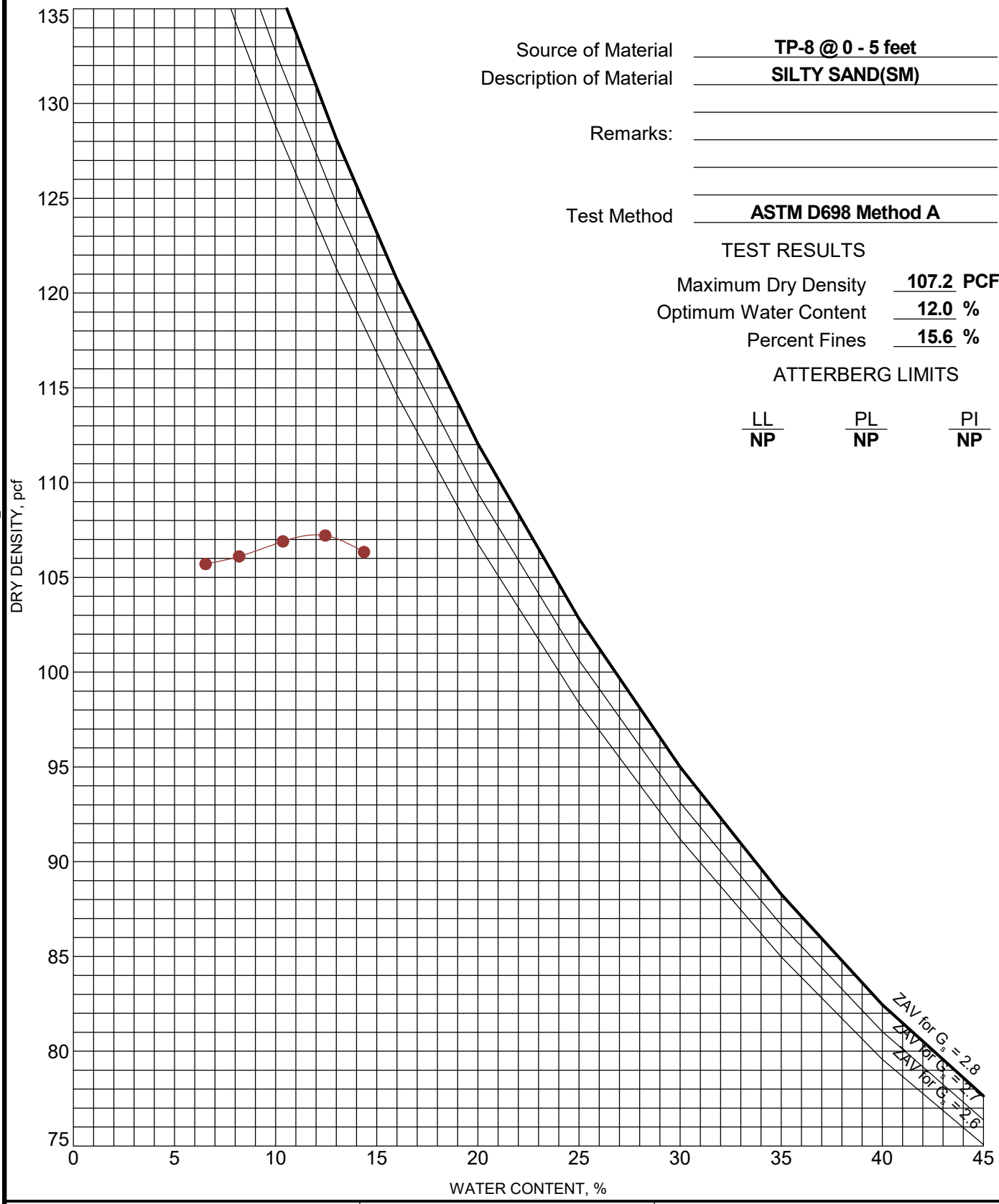
PROJECT NUMBER: 65195246

CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

EXHIBIT: B-11

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557



Source of Material: **TP-8 @ 0 - 5 feet**

Description of Material: **SILTY SAND(SM)**

Remarks:

Test Method: **ASTM D698 Method A**

TEST RESULTS

Maximum Dry Density	**107.2** PCF
Optimum Water Content	**12.0** %
Percent Fines	**15.6** %

ATTERBERG LIMITS

LL	PL	PI
NP	**NP**	**NP**

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. COMPACTION - V2 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 12/6/19

PROJECT: Red Mesa Solar

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

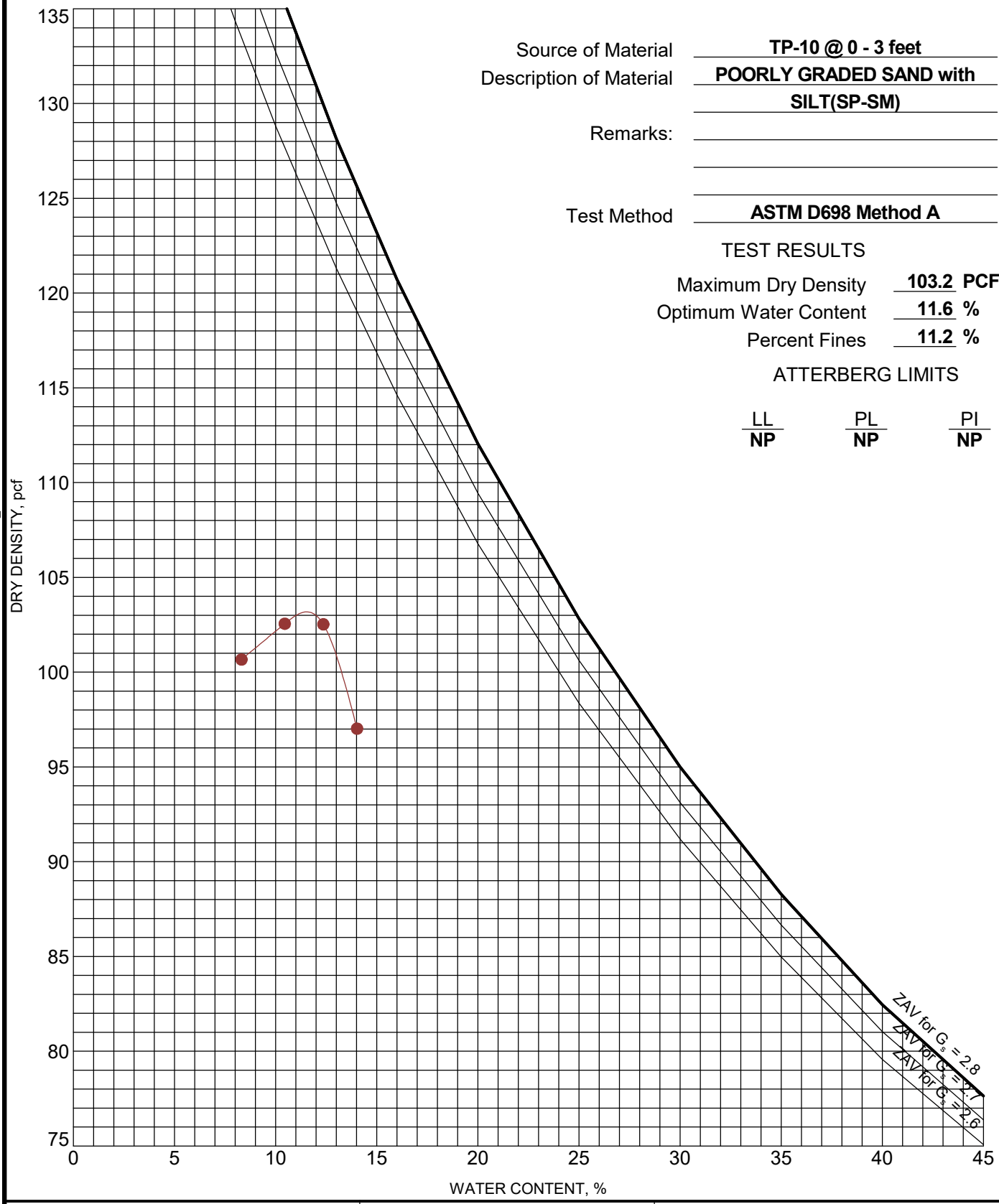
PROJECT NUMBER: 65195246

CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

EXHIBIT: B-12

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557



Source of Material	**TP-10 @ 0 - 3 feet**
Description of Material	**POORLY GRADED SAND with SILT(SP-SM)**
Remarks:	
Test Method	**ASTM D698 Method A**

TEST RESULTS

Maximum Dry Density	**103.2**	**PCF**
Optimum Water Content	**11.6**	**%**
Percent Fines	**11.2**	**%**

ATTERBERG LIMITS

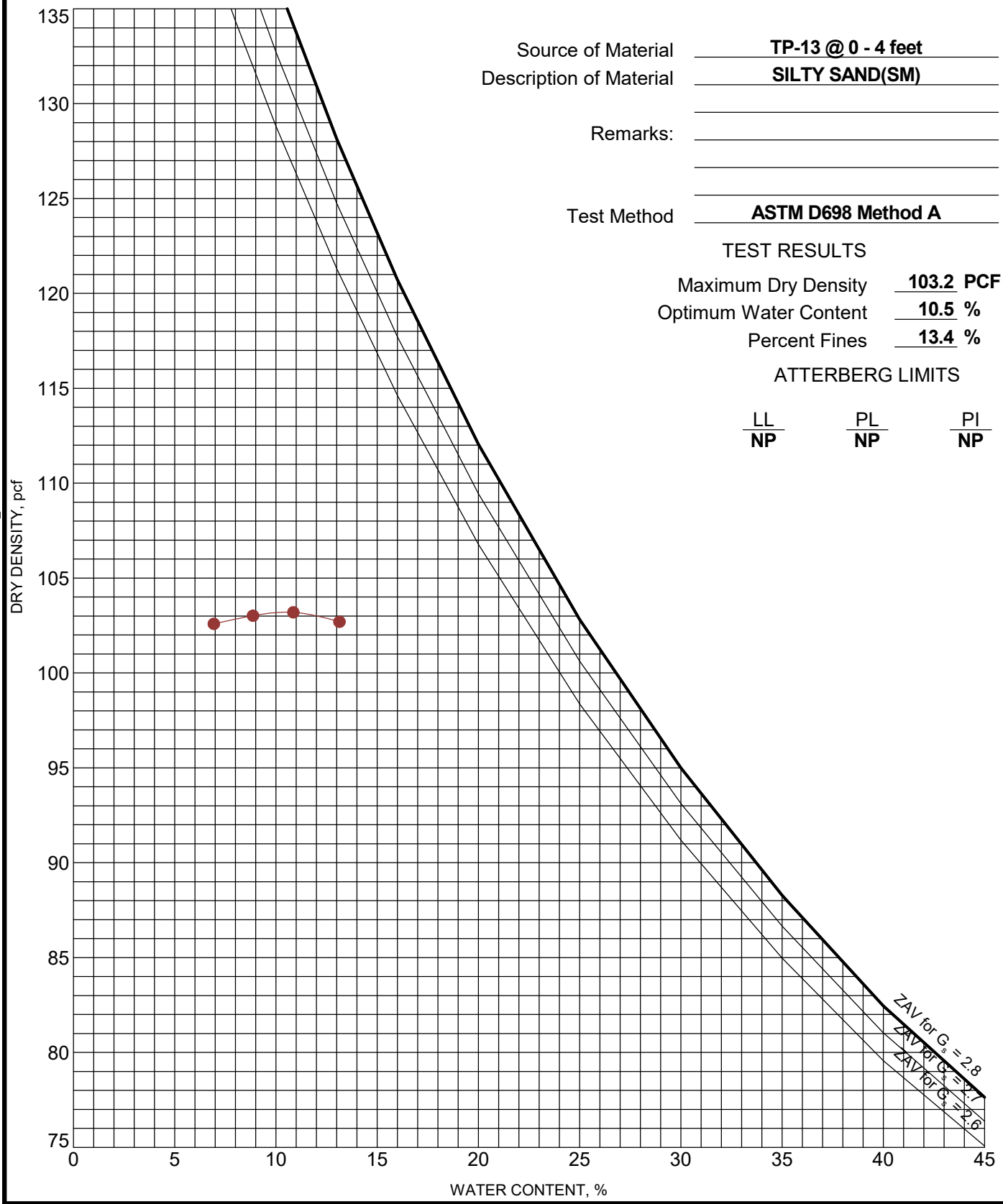
LL	PL	PI
NP	**NP**	**NP**

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. COMPACTION - V2 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 12/6/19

PROJECT: Red Mesa Solar	Terracon 4685 S Ash Ave, Ste H-4 Tempe, AZ	PROJECT NUMBER: 65195246
SITE: East of CR 454 and CR 439 Montezuma Creek, Utah		CLIENT: Navajo Tribal Utility Authority Fort Defiance, Arizona
		EXHIBIT: B-13

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557



Source of Material: **TP-13 @ 0 - 4 feet**

Description of Material: **SILTY SAND(SM)**

Remarks:

Test Method: **ASTM D698 Method A**

TEST RESULTS

Maximum Dry Density	**103.2**	**PCF**
Optimum Water Content	**10.5**	**%**
Percent Fines	**13.4**	**%**

ATTERBERG LIMITS

LL	PL	PI
NP	**NP**	**NP**

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. COMPACTION - V2 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 12/6/19

PROJECT: Red Mesa Solar

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

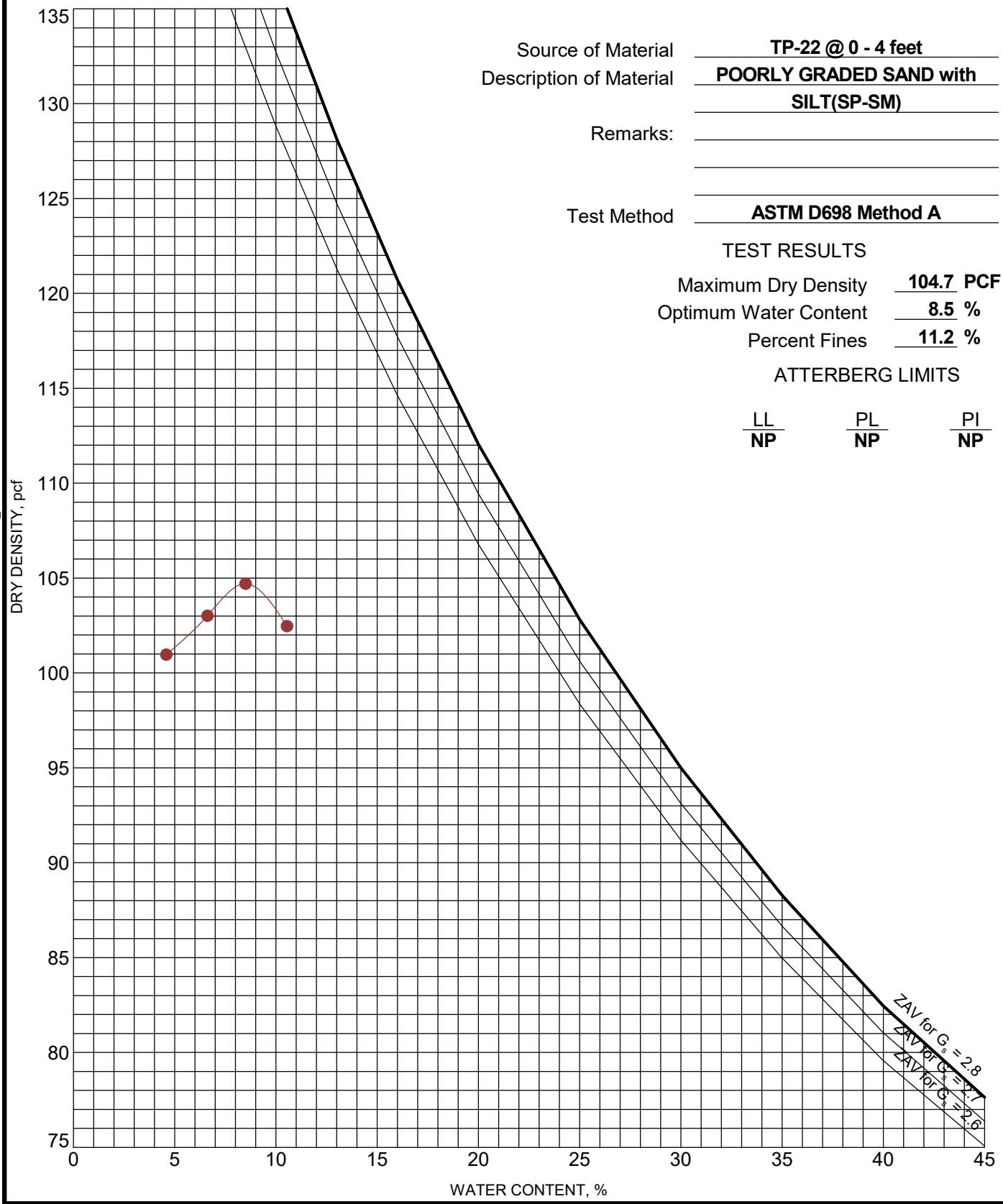
PROJECT NUMBER: 65195246

CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

EXHIBIT: B-14

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557



Source of Material	**TP-22 @ 0 - 4 feet**
Description of Material	**POORLY GRADED SAND with SILT(SP-SM)**
Remarks:	
Test Method	**ASTM D698 Method A**

TEST RESULTS

Maximum Dry Density	**104.7**	**PCF**
Optimum Water Content	**8.5**	**%**
Percent Fines	**11.2**	**%**

ATTERBERG LIMITS

LL	PL	PI
NP	**NP**	**NP**

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. COMPACTION - V2 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 12/6/19

PROJECT: Red Mesa Solar

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

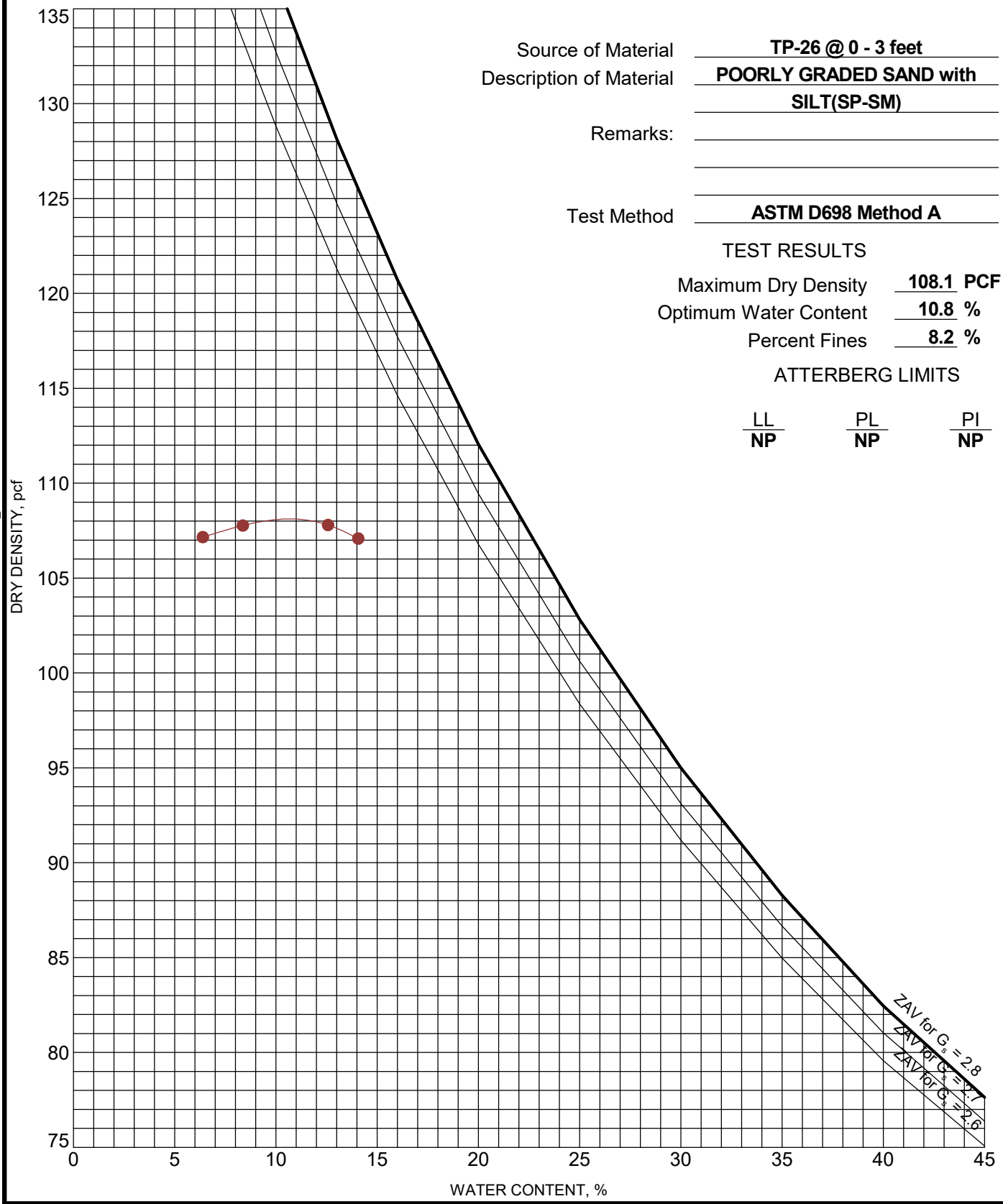
PROJECT NUMBER: 65195246

CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

EXHIBIT: B-15

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557



Source of Material	**TP-26 @ 0 - 3 feet**
Description of Material	**POORLY GRADED SAND with SILT(SP-SM)**
Remarks:	
Test Method	**ASTM D698 Method A**

TEST RESULTS

Maximum Dry Density	**108.1**	**PCF**
Optimum Water Content	**10.8**	**%**
Percent Fines	**8.2**	**%**

ATTERBERG LIMITS

LL	PL	PI
NP	**NP**	**NP**

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. COMPACTION - V2 65195246 RED MESA SOLAR.GPJ TERRACON_DATATEMPLATE.GDT 12/6/19

PROJECT: Red Mesa Solar	Terracon 4685 S Ash Ave, Ste H-4 Tempe, AZ	PROJECT NUMBER: 65195246
SITE: East of CR 454 and CR 439 Montezuma Creek, Utah		CLIENT: Navajo Tribal Utility Authority Fort Defiance, Arizona
		EXHIBIT: B-16

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

October 30, 2019

Terracon Consultants, Inc.
4685 South Ash Avenue, Suite H-4
Tempe, AZ 85282
Attn: Matt Kleinholz, E.I.T.

Re: Thermal Analysis of Native Soil Samples
Red Mesa Solar – Montezuma Creek, UT (Project No. 65195246)

The following is the report of thermal dryout characterization tests conducted on six (6) soil samples from the referenced project sent to our laboratory.

Thermal Resistivity Tests: The samples were reconstituted at optimum moisture content and at 95% of the maximum dry density ***provided by Terracon.*** The tests were conducted in accordance with the IEEE standard 442-2017. The results are tabulated below and the thermal dryout curves are presented in **Figure 1.**

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

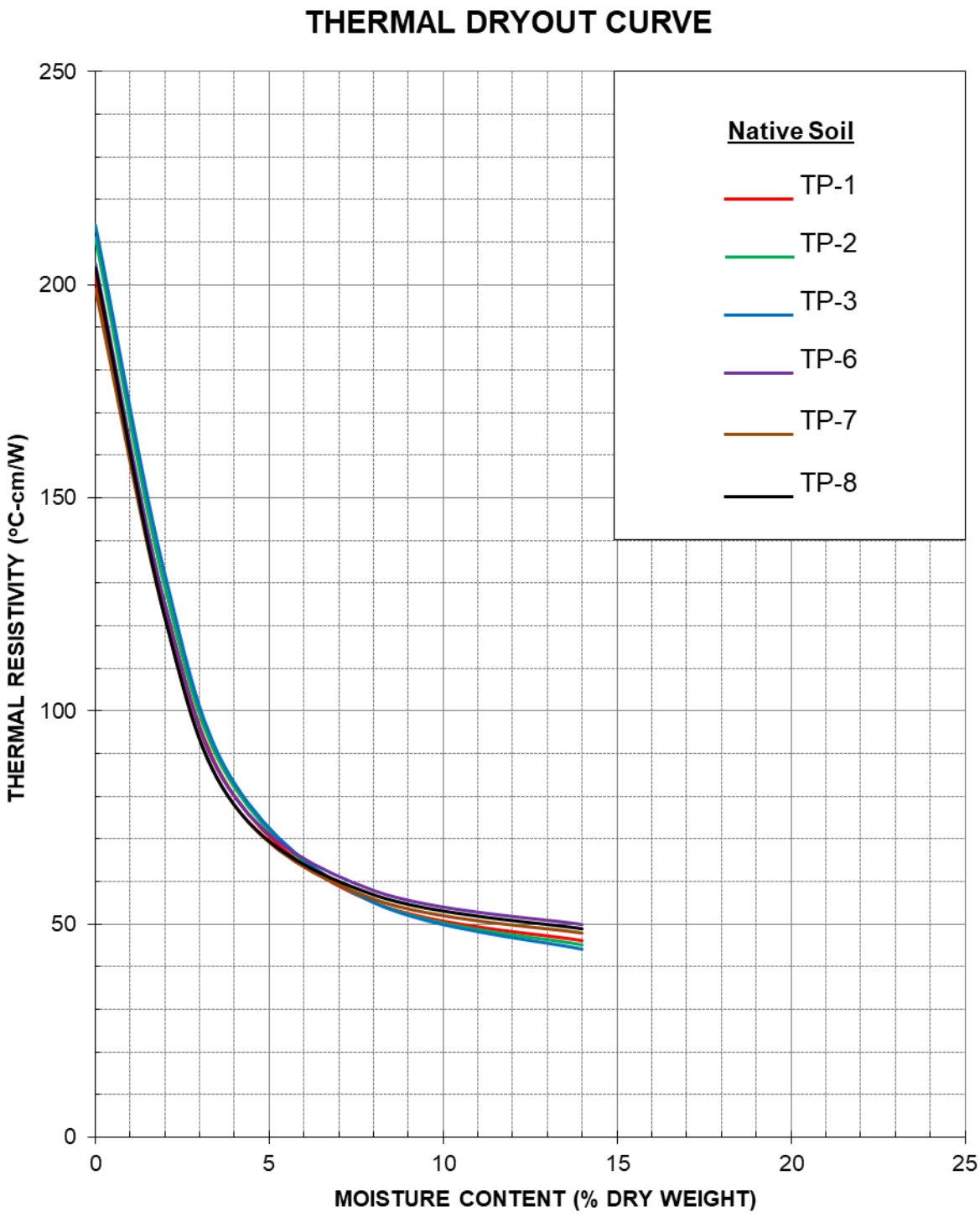
Sample ID	Depth	Soil Description (Terracon)	Thermal Resistivity (°C-cm/W)		Moisture Content (%)	Dry Density (lb/ft^3)
			Wet	Dry		
TP-1	0'-4'	Poorly Graded Sand w/ Silt	46	202	14	103
TP-2	0'-5'	Silty Sand	45	211	14	101
TP-3	0'-3.5'	Silty Sand	44	214	14	102
TP-6	0'-1.75'	Silty Sand	50	205	12	103
TP-7	0'-4'	Poorly Graded Sand w/ Silt	48	199	12	105
TP-8	0'-5'	Silty Sand	49	204	12	102

Comments: The thermal characteristic depicted in the dryout curves apply for the soil at its test dry density.

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

Geotherm USA

Nimesh Patel



Terracon Consultants, Inc. (Project No. 65195246)

Thermal Analysis of Native Soil

Red Mesa Solar – Montezuma Creek, UT

October 2019 **Figure 1**

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

November 14, 2019

Terracon Consultants, Inc.
4685 South Ash Avenue, Suite H-4
Tempe, AZ 85282
Attn: Matt Kleinholz, E.I.T.

Re: Thermal Analysis of Native Soil Samples
Red Mesa Solar – Montezuma Creek, UT (Project No. 65195246)

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

Thermal Resistivity Tests: The samples were reconstituted at optimum moisture content and at 95% of the maximum dry density ***provided by Terracon.*** The tests were conducted in accordance with the IEEE standard 442-2017. The results are tabulated below and the thermal dryout curves are presented in **Figures 1 & 2.**

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

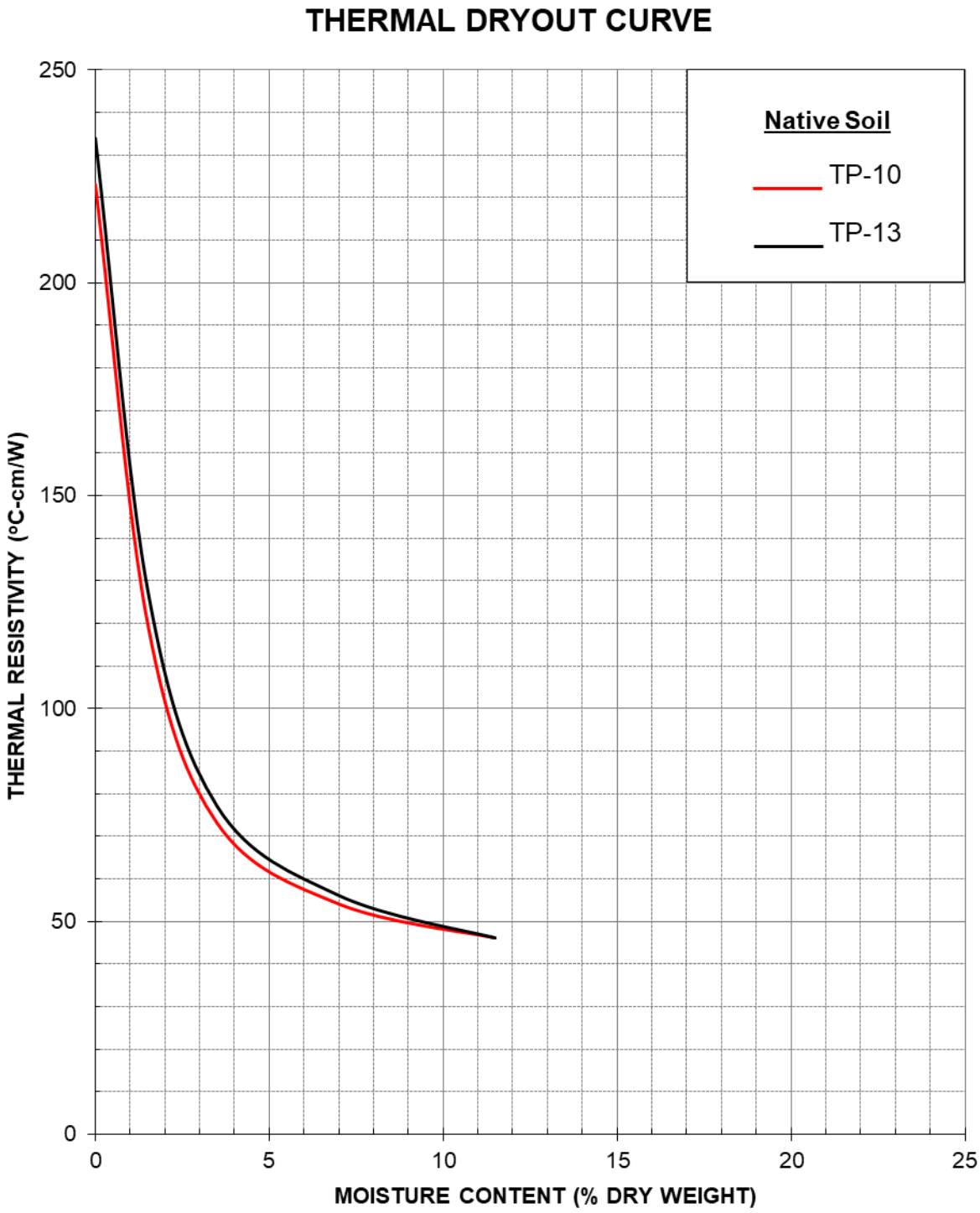
Sample ID @ 0' – 3'	Soil Description (Terracon)	Thermal Resistivity (°C-cm/W)		Moisture Content (%)	Dry Density (lb/ft^3)
		Wet	Dry		
TP-10	Poorly graded SAND with Silt (SP-SM)	46	223	12	98
TP-13	Silty Sand	46	234	11	98
TP-22	Poorly graded SAND with Silt (SP-SM)	45	213	9	100
TP-26	Poorly graded SAND with Silt (SP-SM)	48	205	8	103

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

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

Geotherm USA

Nimesh Patel

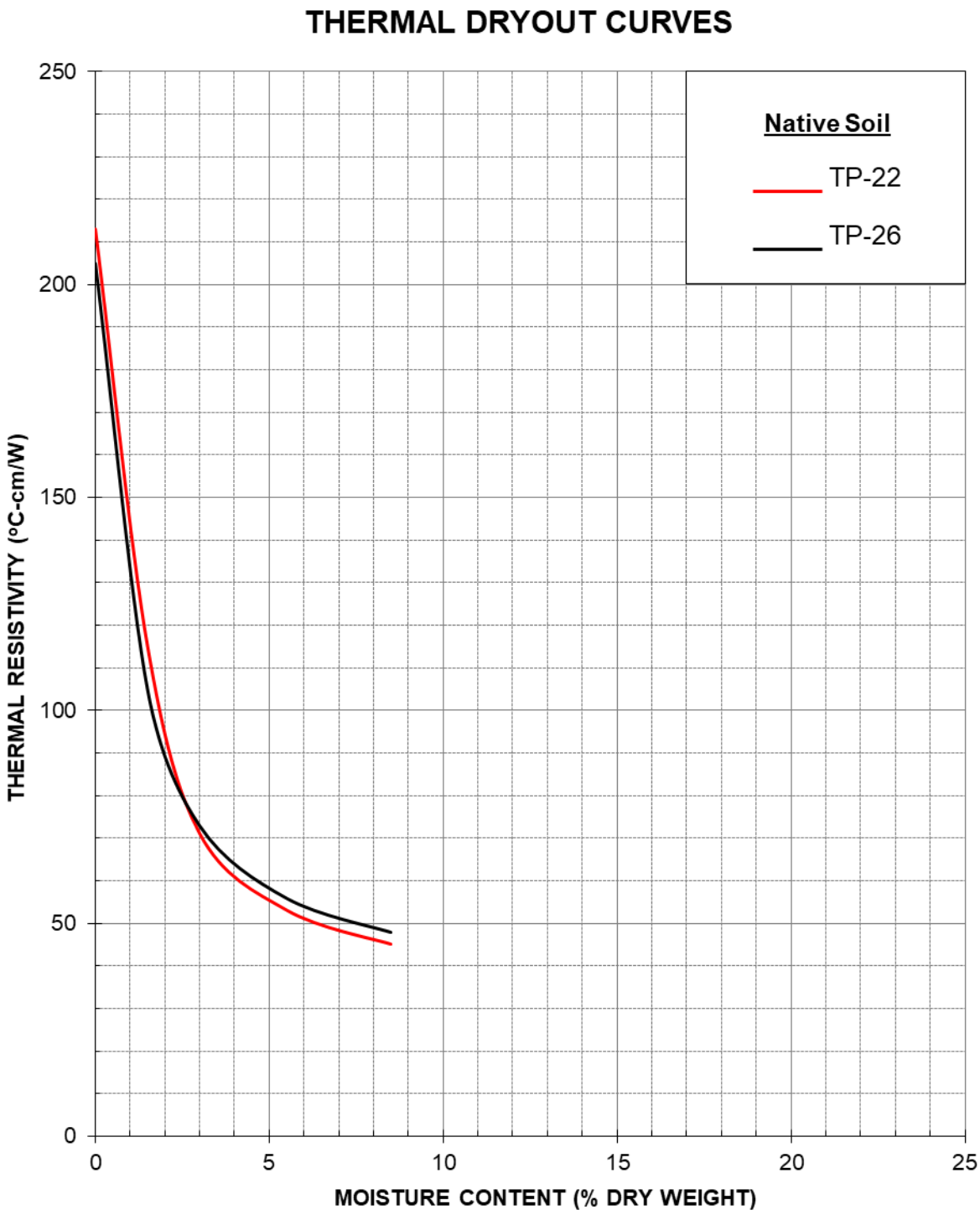


Terracon Consultants, Inc. (Project No. 65195246)

Thermal Analysis of Native Soil

Red Mesa Solar – Montezuma Creek, UT

November 2019 **Figure 1**



Terracon Consultants, Inc. (Project No. 65195246)

Thermal Analysis of Native Soil

Red Mesa Solar – Montezuma Creek, UT

November 2019 **Figure 2**

CHEMICAL LABORATORY TEST REPORT

Project Number: 65195246
Service Date: 10/24/2019
Report Date: 10/31/19
Task:

Terracon
750 Pilot Road, Suite F
Las Vegas, Nevada 89119
(702) 597-9393

Client

Navajo Tribal Utility Authority
Fort Defiance, Arizona

Project

Red Mesa Solar

Sample Submitted By: Terracon (65) **Date Received:** 10/21/2019 **Lab No.: 19-1195**

Results of Corrosion Analysis

Sample Number				
Sample Location	TP-1	TP-2	TP-3	TP-3
Sample Depth (ft.)	0.0-4.0	0.0-5.0	0.0-3.5	3.5-4.5
pH Analysis, AWWA 4500 H	8.01	8.06	8.11	8.25
Water Soluble Sulfate (SO4), ASTM C 1580 (mg/kg)	75	80	49	122
Sulfides, AWWA 4500-S D, (mg/kg)	Nil	Nil	Nil	Nil
Chlorides, ASTM D 512, (mg/kg)	28	27	40	30
Red-Ox, AWWA 2580, (mV)	+681	+680	+682	+683
Total Salts, AWWA 2540, (mg/kg)	286	250	293	362
Resistivity, ASTM G 57, (ohm-cm)	7081	7372	7566	5238

Analyzed By: Trisha Campo

Trisha Campo
Chemist

The tests were performed in general accordance with applicable ASTM, AASHTO, or DOT test methods. This report is exclusively for the use of the client indicated above and shall not be reproduced except in full without the written consent of our company. Test results transmitted herein are only applicable to the actual samples tested at the location(s) referenced and are not necessarily indicative of the properties of other apparently similar or identical materials.

CHEMICAL LABORATORY TEST REPORT

Project Number: 65195246
Service Date: 10/24/2019
Report Date: 10/31/19
Task:

Terracon
750 Pilot Road, Suite F
Las Vegas, Nevada 89119
(702) 597-9393

Client

Navajo Tribal Utility Authority
Fort Defiance, Arizona

Project

Red Mesa Solar

Sample Submitted By: Terracon (65) **Date Received:** 10/21/2019 **Lab No.: 19-1195**

Results of Corrosion Analysis

Sample Number				
Sample Location	TP-6	TP-6	TP-7	TP-8
Sample Depth (ft.)	0.0-1.75	1.75-5.0	0.0-4.0	0.0-5.0
pH Analysis, AWWA 4500 H	8.09	8.35	8.11	8.08
Water Soluble Sulfate (SO4), ASTM C 1580 (mg/kg)	94	132	80	74
Sulfides, AWWA 4500-S D, (mg/kg)	Nil	Nil	Nil	Nil
Chlorides, ASTM D 512, (mg/kg)	25	27	25	25
Red-Ox, AWWA 2580, (mV)	+681	+682	+680	+681
Total Salts, AWWA 2540, (mg/kg)	328	388	265	287
Resistivity, ASTM G 57, (ohm-cm)	5723	6499	7178	6645

Analyzed By:

Trisha Campo
Chemist

The tests were performed in general accordance with applicable ASTM, AASHTO, or DOT test methods. This report is exclusively for the use of the client indicated above and shall not be reproduced except in full without the written consent of our company. Test results transmitted herein are only applicable to the actual samples tested at the location(s) referenced and are not necessarily indicative of the properties of other apparently similar or identical materials.

CHEMICAL LABORATORY TEST REPORT

Project Number: 65195246
Service Date: 11/12/2019
Report Date: 11/25/19
Task:

Terracon
750 Pilot Road, Suite F
Las Vegas, Nevada 89119
(702) 597-9393

Client

Navajo Tribal Utility Authority
Fort Defiance, Arizona

Project

Red Mesa Solar

Sample Submitted By: Terracon (65) **Date Received:** 11/5/2019 **Lab No.: 19-1298**

Results of Corrosion Analysis

Sample Number				
Sample Location	TP-10	TP-13	TP-19	TP-21
Sample Depth (ft.)	0.0-3.0	0.0-4.0	0.0-4.0	0.0-4.0
pH Analysis, AWWA 4500 H	8.47	8.50	8.60	8.52
Water Soluble Sulfate (SO4), ASTM C 1580 (mg/kg)	94	67	86	24
Sulfides, AWWA 4500-S D, (mg/kg)	Nil	Nil	Nil	Nil
Chlorides, ASTM D 512, (mg/kg)	73	53	70	60
Red-Ox, AWWA 2580, (mV)	+680	+681	+680	+681
Total Salts, AWWA 2540, (mg/kg)	452	458	414	427
Resistivity, ASTM G 57, (ohm-cm)	5626	7033	7857	7081

Analyzed By: Trisha Campo

Trisha Campo
Chemist

The tests were performed in general accordance with applicable ASTM, AASHTO, or DOT test methods. This report is exclusively for the use of the client indicated above and shall not be reproduced except in full without the written consent of our company. Test results transmitted herein are only applicable to the actual samples tested at the location(s) referenced and are not necessarily indicative of the properties of other apparently similar or identical materials.

CHEMICAL LABORATORY TEST REPORT

Project Number: 65195246
Service Date: 11/12/2019
Report Date: 11/25/19
Task:

Terracon
750 Pilot Road, Suite F
Las Vegas, Nevada 89119
(702) 597-9393

Client

Navajo Tribal Utility Authority
Fort Defiance, Arizona

Project

Red Mesa Solar

Sample Submitted By: Terracon (65) **Date Received:** 11/5/2019 **Lab No.: 19-1298**

Results of Corrosion Analysis

Sample Number			
Sample Location	TP-22	TP-23	TP-26
Sample Depth (ft.)	0.0-4.0	0.0-4.0	0.0-3.0
pH Analysis, AWWA 4500 H	8.46	8.61	8.55
Water Soluble Sulfate (SO4), ASTM C 1580 (mg/kg)	31	45	91
Sulfides, AWWA 4500-S D, (mg/kg)	Nil	Nil	Nil
Chlorides, ASTM D 512, (mg/kg)	53	70	58
Red-Ox, AWWA 2580, (mV)	+682	+683	+685
Total Salts, AWWA 2540, (mg/kg)	431	450	493
Resistivity, ASTM G 57, (ohm-cm)	7372	8342	6596

Analyzed By: Trisha Campo
Chemist

The tests were performed in general accordance with applicable ASTM, AASHTO, or DOT test methods. This report is exclusively for the use of the client indicated above and shall not be reproduced except in full without the written consent of our company. Test results transmitted herein are only applicable to the actual samples tested at the location(s) referenced and are not necessarily indicative of the properties of other apparently similar or identical materials.

SUMMARY OF LABORATORY RESULTS

Borehole No.	Depth (ft.)	USCS Soil Class.	In-Situ Properties		Classification				Expansion Testing					Corrosivity				Remarks
			Dry Density (pcf)	Water Content (%)	Passing #200 Sieve (%)	Atterberg Limits			Dry Density (pcf)	Water Content (%)	Surcharge (psf)	Expansion (%)	Expansion Index EI_{50}	pH	Resistivity (ohm-cm)	Sulfates (ppm)	Chlorides (ppm)	
						LL	PL	PI										
TP-1	0.0 - 4.0	SP-SM			11	NP	NP	NP						8.0	7081	75	28	
TP-2	0.0 - 5.0	SM			14	NP	NP	NP						8.1	7372	80	27	
TP-2	5.0 - 6.0	SM			31	NP	NP	NP										
TP-3	0.0 - 3.5	SM			13	NP	NP	NP						8.1	7566	49	40	
TP-3	3.5 - 4.5	SM			21	NP	NP	NP						8.3	5238	122	30	
TP-4	0.0 - 5.0	SP-SM			11	NP	NP	NP										
TP-5	0.0 - 5.0	SM			13	NP	NP	NP										
TP-6	0.0 - 1.8	SM			16	NP	NP	NP						8.1	5723	94	25	
TP-6	1.8 - 5.0	SM			16	NP	NP	NP						8.4	6499	132	27	
TP-7	0.0 - 4.0	SP-SM			12	NP	NP	NP						8.1	7178	80	25	
TP-8	0.0 - 5.0	SM			16	NP	NP	NP						8.1	6645	74	25	
TP-10	0.0 - 3.0	SP-SM			11	NP	NP	NP						8.5	5626	94	73	
TP-13	0.0 - 4.0	SM			13	NP	NP	NP						8.5	7033	67	53	
TP-19	0.0 - 4.0	SM			13	NP	NP	NP						8.6	7857	86	70	
TP-21	0.0 - 4.0	SM			13	NP	NP	NP						8.5	7081	24	60	
TP-22	0.0 - 4.0	SP-SM			11	NP	NP	NP						8.5	7372	31	53	
TP-23	0.0 - 4.0	SM			13	NP	NP	NP						8.6	8342	45	70	
TP-26	0.0 - 3.0	SP-SM			8	NP	NP	NP						8.6	6596	91	58	

REMARKS

1. Dry Density and/or moisture determined from one or more rings of a multi-ring sample.
2. Visual Classification.
3. Submerged to approximate saturation.
4. Expansion Index in accordance with ASTM D4829-95.
5. Air-Dried Sample

PROJECT: Red Mesa Solar

SITE: East of CR 454 and CR 439
Montezuma Creek, Utah

Terracon
4685 S Ash Ave Ste H-4
Tempe, AZ
PH. 480-897-8200 FAX. 480-897-1133

PROJECT NUMBER: 65195246

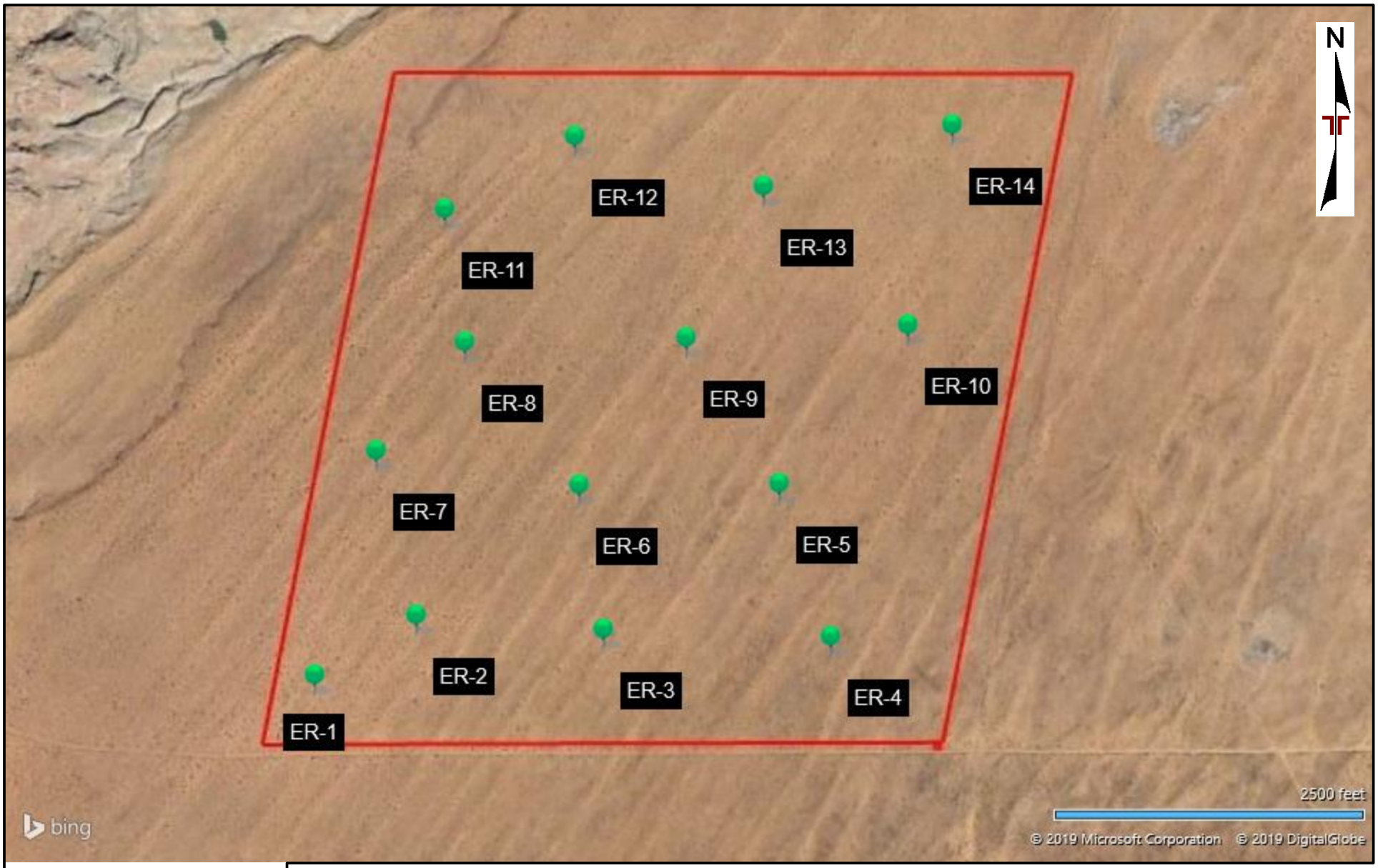
CLIENT: Navajo Tribal Utility Authority
Fort Defiance, Arizona

EXHIBIT: B-27

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. SOIL PROPERTIES 2 65195246 RED MESA SOLAR.GPJ TERRACON2012.GDT 12/6/19

APPENDIX C

FIELD RESISTIVITY TESTING



AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

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

Project Manager:	MRK
Drawn by:	MRK
Checked by:	SDN
Approved by:	SDN

Project No.	651895246
Scale:	AS SHOWN
File Name:	A-1-2
Date:	12/06/19

Terracon
4685 S Ash Ave Ste H-4
Tempe, AZ 85282-6767

ELECTRICAL RESISTIVITY TESTING PLAN

Red Mesa Solar

East of County Road 454 and County Road 439
Navajo Nation, Utah

Exhibit

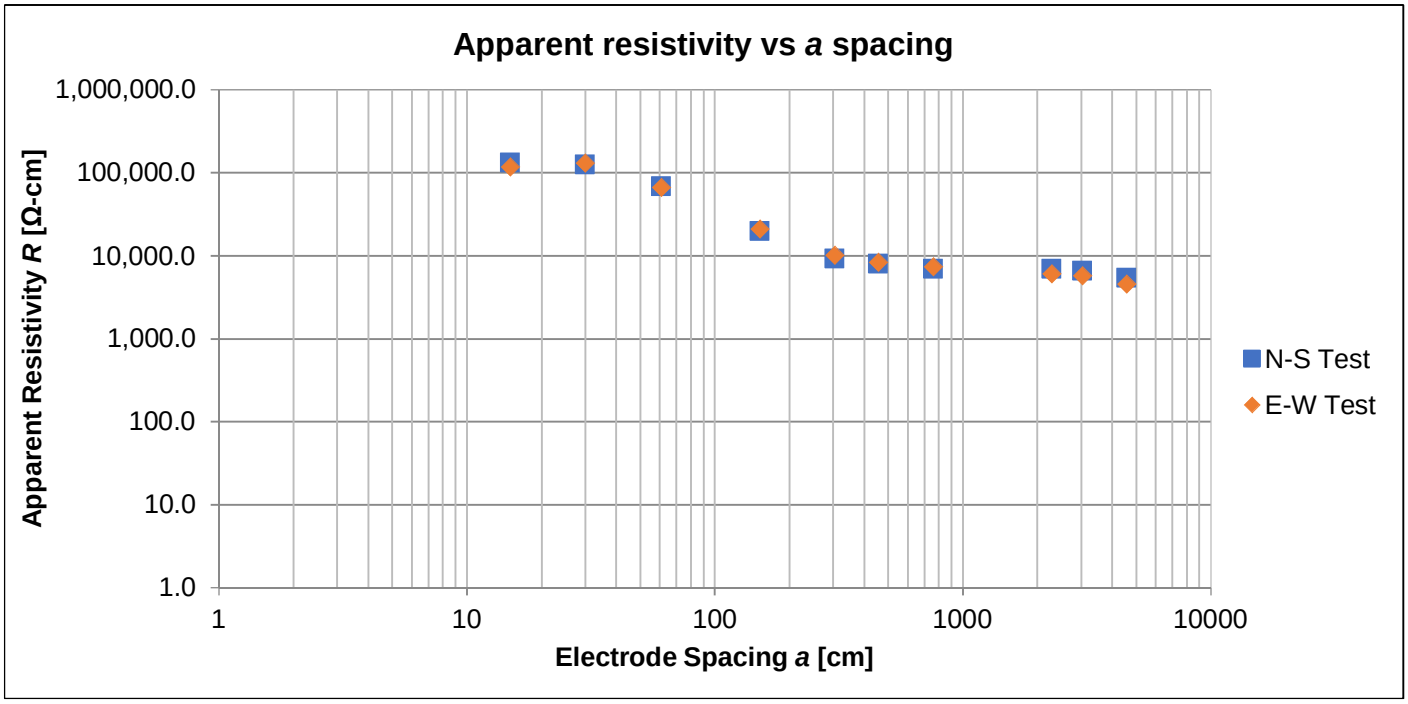
C-1

FIELD ELECTRICAL RESISTIVITY TEST DATA
Proposed Red Mesa Solar Project ■ Montezuma Creek, Utah
January 16, 2020 ■ Terracon Project No. 65195246

Array Loc.	ER-1; 37.1161.-109.4208		
Instrument	MiniSting Memory Earth Resistivity and IP Meter	**Weather**	Cold, Dry
Serial #		**Ground Cond.**	Silty Sand
Cal. Check		**Tested By**	Justing Delgado, David Linkey
Test Date	October 31, 2019	**Method**	Wenner 4-pin (ASTM G57-06 (2012); IEEE 81-2012
Notes & Conflicts			

Apparent resistivity ρ is calculated as : $\rho = \dfrac{4\pi aR}{1 + \dfrac{2a}{\sqrt{a^2 + 4b^2}} - \dfrac{a}{\sqrt{a^2 + b^2}}}$

Electrode Spacing *a*		Electrode Depth *b*		N-S Test		E-W Test	
[feet]	[centimeters]	[inches]	[centimeters]	Measured Resistance *R*	Apparent Resistivity ρ	Measured Resistance *R*	Apparent Resistivity ρ
				Ω	[Ω-cm]	Ω	[Ω-cm]
0.5	15	12	30	735.00	133490	651.50	118330
1	30	12	30	396.00	125740	416.30	132180
2	61	12	30	137.50	68960	132.30	66350
5	152	12	30	19.57	19890	20.65	20990
10	305	12	30	4.78	9310	5.23	10190
15	457	12	30	2.81	8130	2.90	8390
25	762	12	30	1.47	7060	1.53	7350
75	2286	12	30	0.49	7040	0.42	6030
100	3048	12	30	0.35	6700	0.30	5750
150	4572	12	30	0.19	5460	0.16	4600

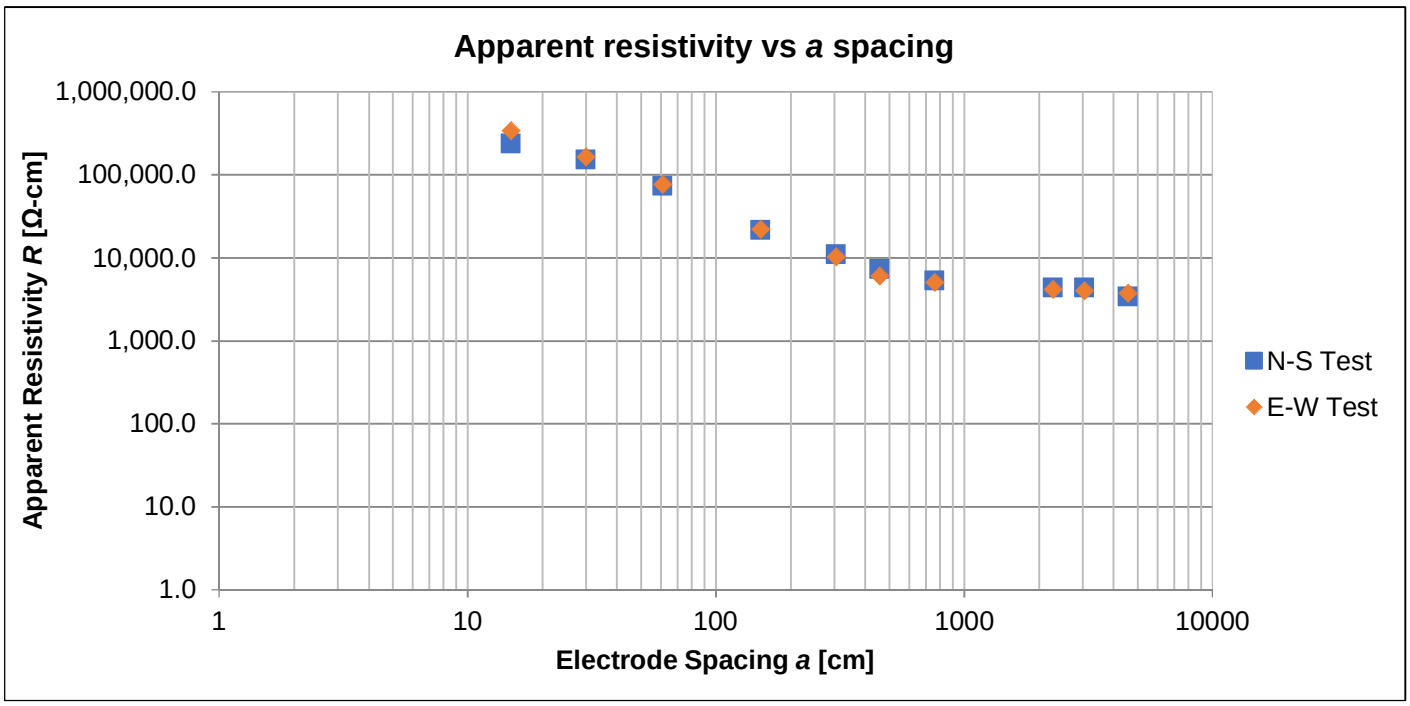


FIELD ELECTRICAL RESISTIVITY TEST DATA
Proposed Red Mesa Solar Project ■ Montezuma Creek, Utah
January 16, 2020 ■ Terracon Project No. 65195246

Array Loc.	ER-2; 37.1175, -109.4180		
Instrument	MiniSting Memory Earth Resistivity and IP Meter	**Weather**	Cold, Dry
Serial #		**Ground Cond.**	Silty Sand
Cal. Check		**Tested By**	Justin Delgado, David Linkey
Test Date	October 31, 2019	**Method**	Wenner 4-pin (ASTM G57-06 (2012); IEEE 81-2012
Notes & Conflicts			

Apparent resistivity ρ is calculated as : $\rho = \dfrac{4\pi aR}{1 + \dfrac{2a}{\sqrt{a^2 + 4b^2}} - \dfrac{a}{\sqrt{a^2 + b^2}}}$

Electrode Spacing *a*		Electrode Depth *b*		N-S Test		E-W Test	
[feet]	[centimeters]	[inches]	[centimeters]	Measured Resistance *R*	Apparent Resistivity ρ	Measured Resistance *R*	Apparent Resistivity ρ
				Ω	[Ω-cm]	Ω	[Ω-cm]
0.5	15	12	30	1,327.00	241010	1,894.00	343990
1	30	12	30	483.70	153580	518.40	164600
2	61	12	30	149.70	75070	154.00	77230
5	152	12	30	21.34	21690	21.93	22290
10	305	12	30	5.71	11120	5.28	10290
15	457	12	30	2.55	7380	2.12	6130
25	762	12	30	1.11	5330	1.06	5090
75	2286	12	30	0.31	4450	0.29	4170
100	3048	12	30	0.23	4410	0.21	4020
150	4572	12	30	0.12	3450	0.13	3730

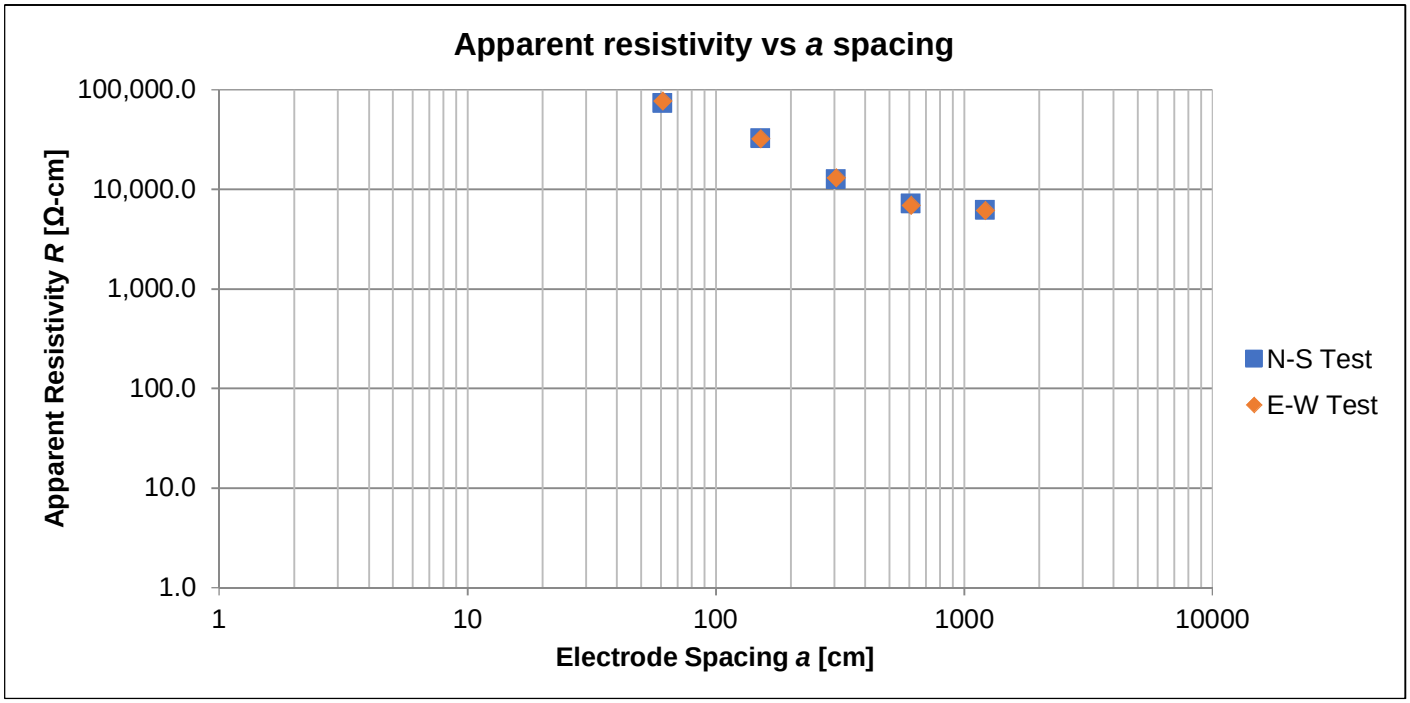


FIELD ELECTRICAL RESISTIVITY TEST DATA
Proposed Red Mesa Solar Project ■ Montezuma Creek, Utah
January 16, 2020 ■ Terracon Project No. 65195246

Array Loc.	ER-3; 37.1171, -109.4128		
Instrument	MiniSting Memory Earth Resistivity and IP Meter	**Weather**	Cold, Dry
Serial #		**Ground Cond.**	Silty Sand
Cal. Check		**Tested By**	Justin Delgado, David Linkey
Test Date	October 30, 2019	**Method**	Wenner 4-pin (ASTM G57-06 (2012); IEEE 81-2012
Notes & Conflicts			

Apparent resistivity ρ is calculated as : $\rho = \dfrac{4\pi aR}{1 + \dfrac{2a}{\sqrt{a^2 + 4b^2}} - \dfrac{a}{\sqrt{a^2 + b^2}}}$

Electrode Spacing *a*		Electrode Depth *b*		N-S Test		E-W Test	
[feet]	[centimeters]	[inches]	[centimeters]	Measured Resistance *R*	Apparent Resistivity ρ	Measured Resistance *R*	Apparent Resistivity ρ
				Ω	[Ω-cm]	Ω	[Ω-cm]
2	61	12	30	148.00	74220	154.90	77680
5	152	12	30	32.10	32630	31.90	32420
10	305	12	30	6.52	12700	6.78	13210
20	610	12	30	1.89	7270	1.79	6890
40	1219	12	30	0.82	6290	0.80	6130

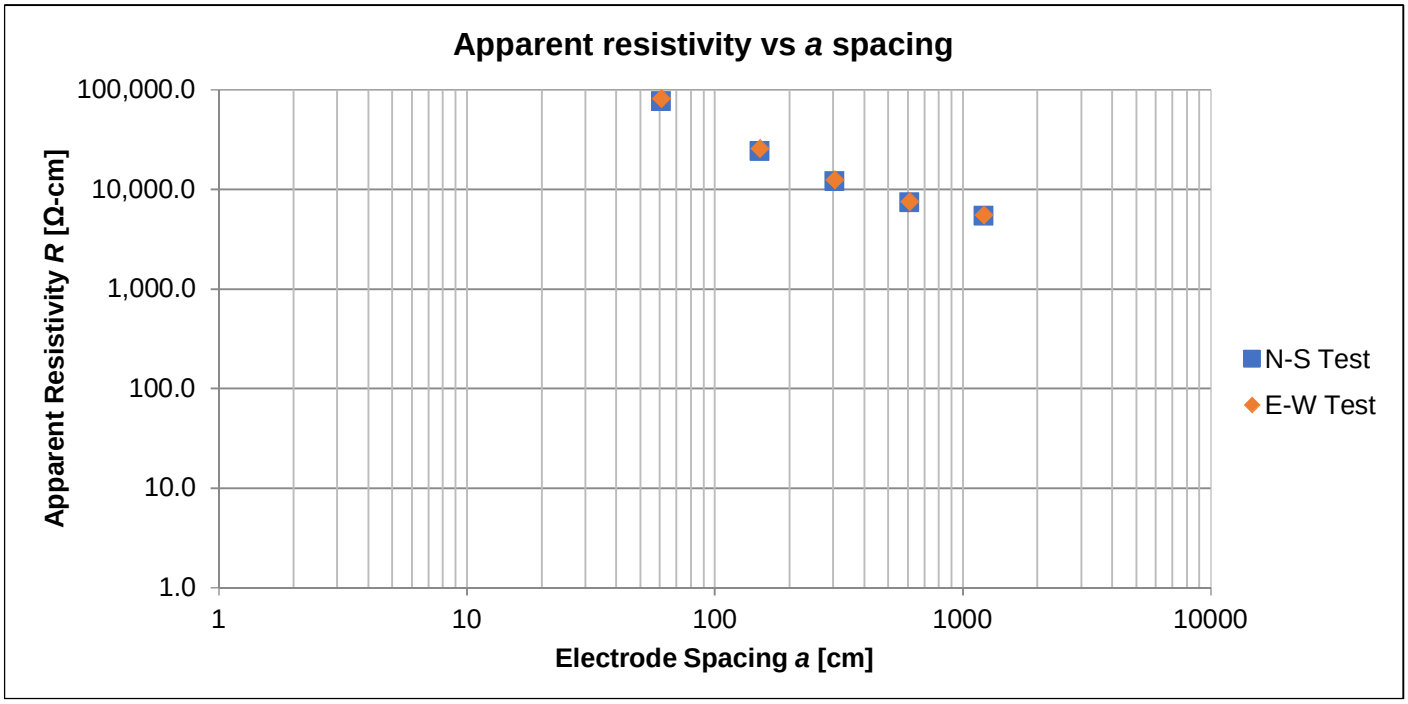


FIELD ELECTRICAL RESISTIVITY TEST DATA
Proposed Red Mesa Solar Project ■ Montezuma Creek, Utah
January 16, 2020 ■ Terracon Project No. 65195246

Array Loc.	ER-4; 37.1170, -109.4065		
Instrument	MiniSting Memory Earth Resistivity and IP Meter	**Weather**	Cold, Dry
Serial #		**Ground Cond.**	Silty Sand
Cal. Check		**Tested By**	Justin Delgado, David Linkey
Test Date	October 30, 2019	**Method**	Wenner 4-pin (ASTM G57-06 (2012); IEEE 81-2012
Notes & Conflicts			

Apparent resistivity ρ is calculated as : $\rho = \dfrac{4\pi aR}{1 + \dfrac{2a}{\sqrt{a^2 + 4b^2}} - \dfrac{a}{\sqrt{a^2 + b^2}}}$

Electrode Spacing *a*		Electrode Depth *b*		N-S Test		E-W Test	
[feet]	[centimeters]	[inches]	[centimeters]	Measured Resistance *R*	Apparent Resistivity ρ	Measured Resistance *R*	Apparent Resistivity ρ
				Ω	[Ω-cm]	Ω	[Ω-cm]
2	61	12	30	155.10	77780	164.70	82600
5	152	12	30	24.18	24580	25.35	25770
10	305	12	30	6.29	12260	6.48	12630
20	610	12	30	1.95	7510	1.98	7620
40	1219	12	30	0.71	5440	0.72	5520

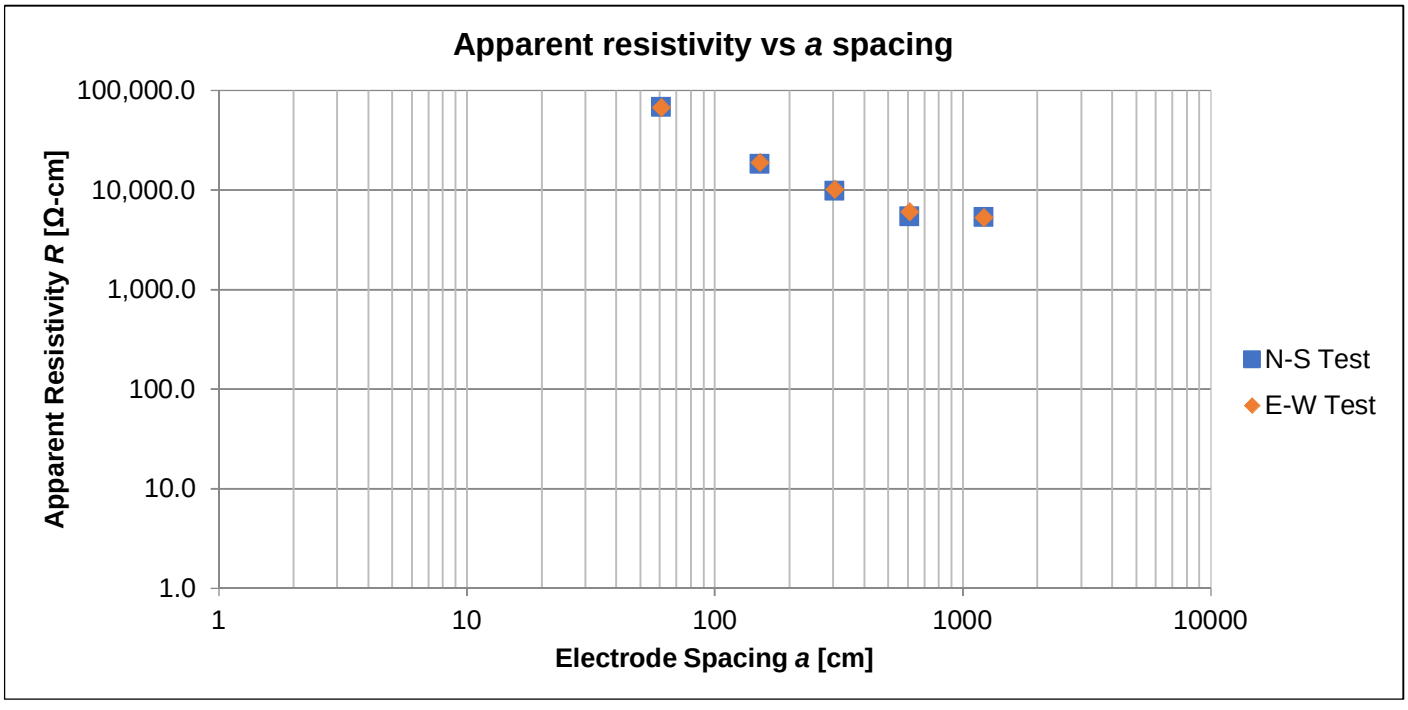


FIELD ELECTRICAL RESISTIVITY TEST DATA
Proposed Red Mesa Solar Project ■ Montezuma Creek, Utah
January 16, 2020 ■ Terracon Project No. 65195246

Array Loc.	ER-5; 37.1204, -109.4079		
Instrument	MiniSting Memory Earth Resistivity and IP Meter	**Weather**	Cold, Dry
Serial #		**Ground Cond.**	Silty Sand
Cal. Check		**Tested By**	Justin Delgado, David Linkey
Test Date	October 30, 2019	**Method**	Wenner 4-pin (ASTM G57-06 (2012); IEEE 81-2012
Notes & Conflicts			

Apparent resistivity ρ is calculated as : $\rho = \dfrac{4\pi aR}{1 + \dfrac{2a}{\sqrt{a^2 + 4b^2}} - \dfrac{a}{\sqrt{a^2 + b^2}}}$

Electrode Spacing *a*		Electrode Depth *b*		N-S Test		E-W Test	
[feet]	[centimeters]	[inches]	[centimeters]	Measured Resistance *R*	Apparent Resistivity ρ	Measured Resistance *R*	Apparent Resistivity ρ
				Ω	[Ω-cm]	Ω	[Ω-cm]
2	61	12	30	136.40	68410	134.70	67550
5	152	12	30	18.27	18570	18.55	18850
10	305	12	30	5.10	9930	5.26	10240
20	610	12	30	1.42	5470	1.57	6030
40	1219	12	30	0.71	5410	0.69	5290

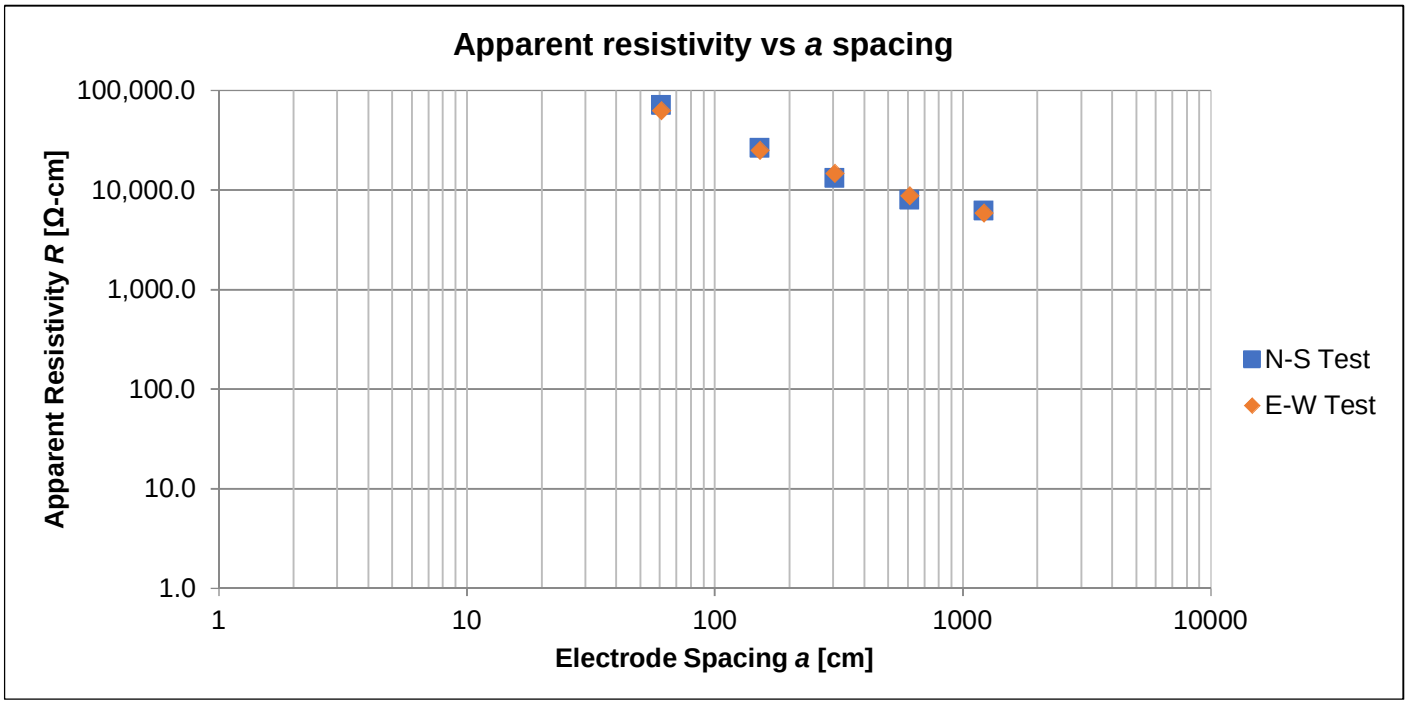


FIELD ELECTRICAL RESISTIVITY TEST DATA
Proposed Red Mesa Solar Project ■ Montezuma Creek, Utah
January 16, 2020 ■ Terracon Project No. 65195246

Array Loc.	ER-6; 37.1203, -109.4135		
Instrument	MiniSting Memory Earth Resistivity and IP Meter	**Weather**	Cold, Dry
Serial #		**Ground Cond.**	Silty Sand
Cal. Check		**Tested By**	Justin Delgado, David Linkey
Test Date	October 30, 2019	**Method**	Wenner 4-pin (ASTM G57-06 (2012); IEEE 81-2012
Notes & Conflicts			

Apparent resistivity ρ is calculated as : $\rho = \dfrac{4\pi aR}{1 + \dfrac{2a}{\sqrt{a^2 + 4b^2}} - \dfrac{a}{\sqrt{a^2 + b^2}}}$

Electrode Spacing *a*		Electrode Depth *b*		N-S Test		E-W Test	
[feet]	[centimeters]	[inches]	[centimeters]	Measured Resistance *R*	Apparent Resistivity ρ	Measured Resistance *R*	Apparent Resistivity ρ
				Ω	[Ω-cm]	Ω	[Ω-cm]
2	61	12	30	144.30	72370	124.90	62640
5	152	12	30	26.45	26880	24.76	25170
10	305	12	30	6.82	13280	7.52	14660
20	610	12	30	2.10	8090	2.28	8760
40	1219	12	30	0.82	6260	0.76	5860

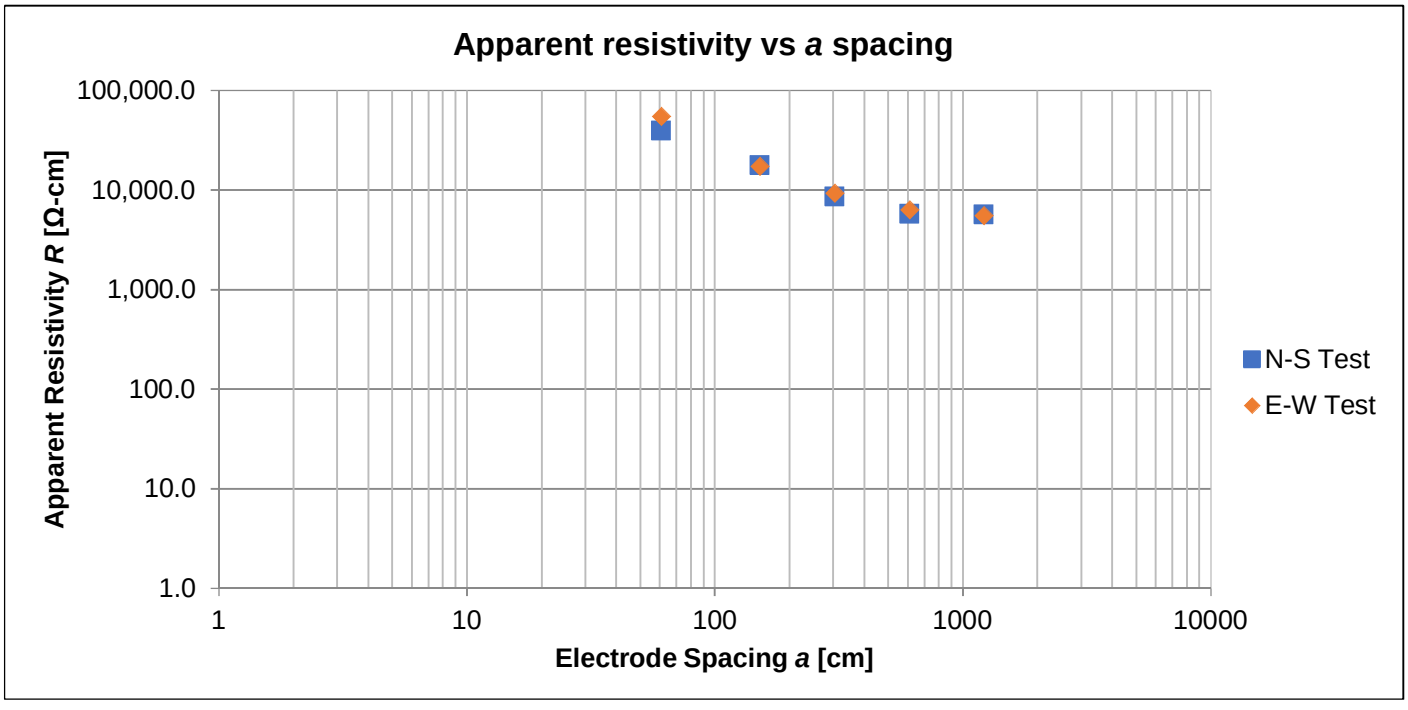


FIELD ELECTRICAL RESISTIVITY TEST DATA
Proposed Red Mesa Solar Project ■ Montezuma Creek, Utah
January 16, 2020 ■ Terracon Project No. 65195246

Array Loc.	ER-7; 37.1211, -109.4191		
Instrument	MiniSting Memory Earth Resistivity and IP Meter	**Weather**	Cold, Dry
Serial #		**Ground Cond.**	Silty Sand
Cal. Check		**Tested By**	Justin Delgado, David Linkey
Test Date	October 31, 2019	**Method**	Wenner 4-pin (ASTM G57-06 (2012); IEEE 81-2012
Notes & Conflicts			

Apparent resistivity ρ is calculated as : $\rho = \dfrac{4\pi aR}{1 + \dfrac{2a}{\sqrt{a^2 + 4b^2}} - \dfrac{a}{\sqrt{a^2 + b^2}}}$

Electrode Spacing *a*		Electrode Depth *b*		N-S Test		E-W Test	
[feet]	[centimeters]	[inches]	[centimeters]	Measured Resistance *R*	Apparent Resistivity ρ	Measured Resistance *R*	Apparent Resistivity ρ
				Ω	[Ω-cm]	Ω	[Ω-cm]
2	61	12	30	79.80	40020	109.30	54810
5	152	12	30	17.50	17790	17.22	17500
10	305	12	30	4.45	8670	4.80	9340
20	610	12	30	1.51	5820	1.66	6390
40	1219	12	30	0.75	5720	0.73	5570

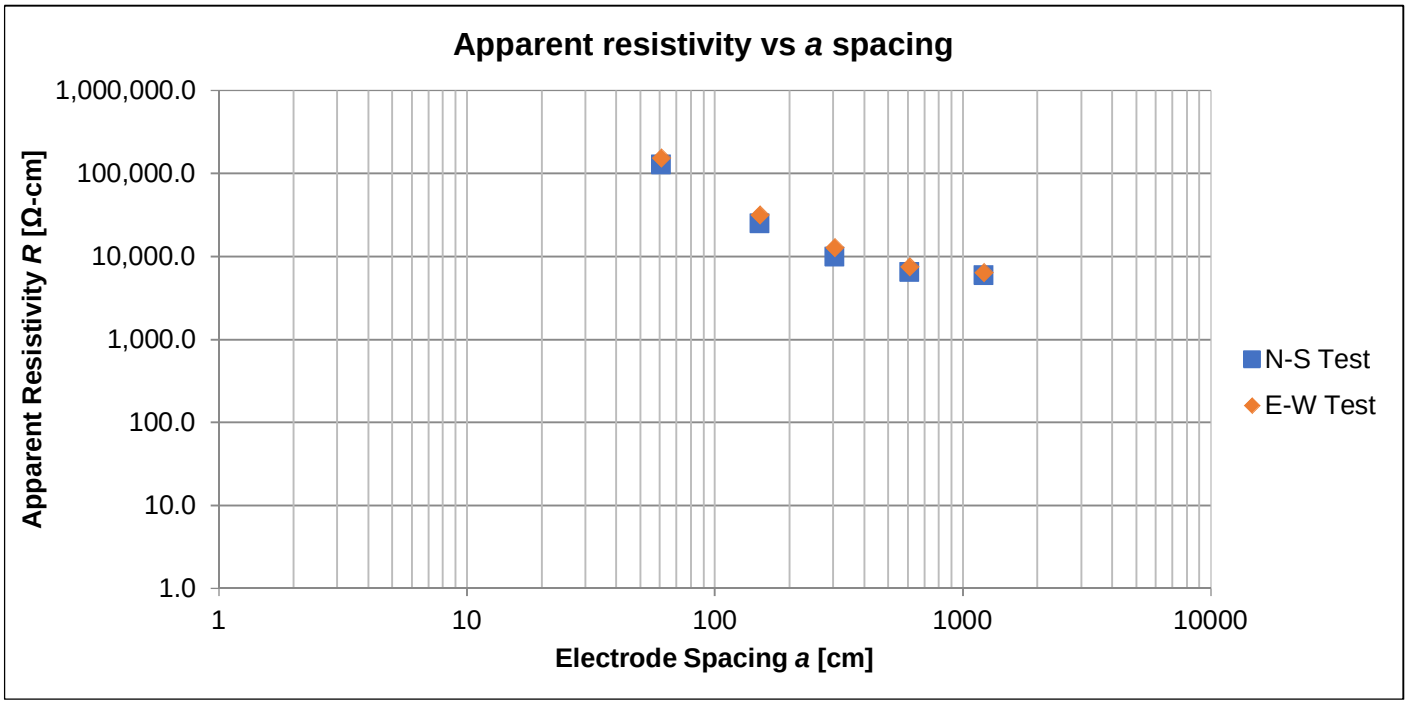


FIELD ELECTRICAL RESISTIVITY TEST DATA
Proposed Red Mesa Solar Project ■ Montezuma Creek, Utah
January 16, 2020 ■ Terracon Project No. 65195246

Array Loc.	ER-8; 37.1235, -109.4167		
Instrument	MiniSting Memory Earth Resistivity and IP Meter	**Weather**	Cold, Dry
Serial #		**Ground Cond.**	Silty Sand
Cal. Check		**Tested By**	Justin Delgado, David Linkey
Test Date	October 31, 2019	**Method**	Wenner 4-pin (ASTM G57-06 (2012); IEEE 81-2012
Notes & Conflicts			

Apparent resistivity ρ is calculated as : $\rho = \dfrac{4\pi aR}{1 + \dfrac{2a}{\sqrt{a^2 + 4b^2}} - \dfrac{a}{\sqrt{a^2 + b^2}}}$

Electrode Spacing *a*		Electrode Depth *b*		N-S Test		E-W Test	
[feet]	[centimeters]	[inches]	[centimeters]	Measured Resistance *R*	Apparent Resistivity ρ	Measured Resistance *R*	Apparent Resistivity ρ
				Ω	[Ω-cm]	Ω	[Ω-cm]
2	61	12	30	257.60	129190	307.50	154210
5	152	12	30	24.94	25350	31.25	31760
10	305	12	30	5.10	9930	6.52	12710
20	610	12	30	1.68	6480	1.97	7570
40	1219	12	30	0.78	6010	0.84	6450

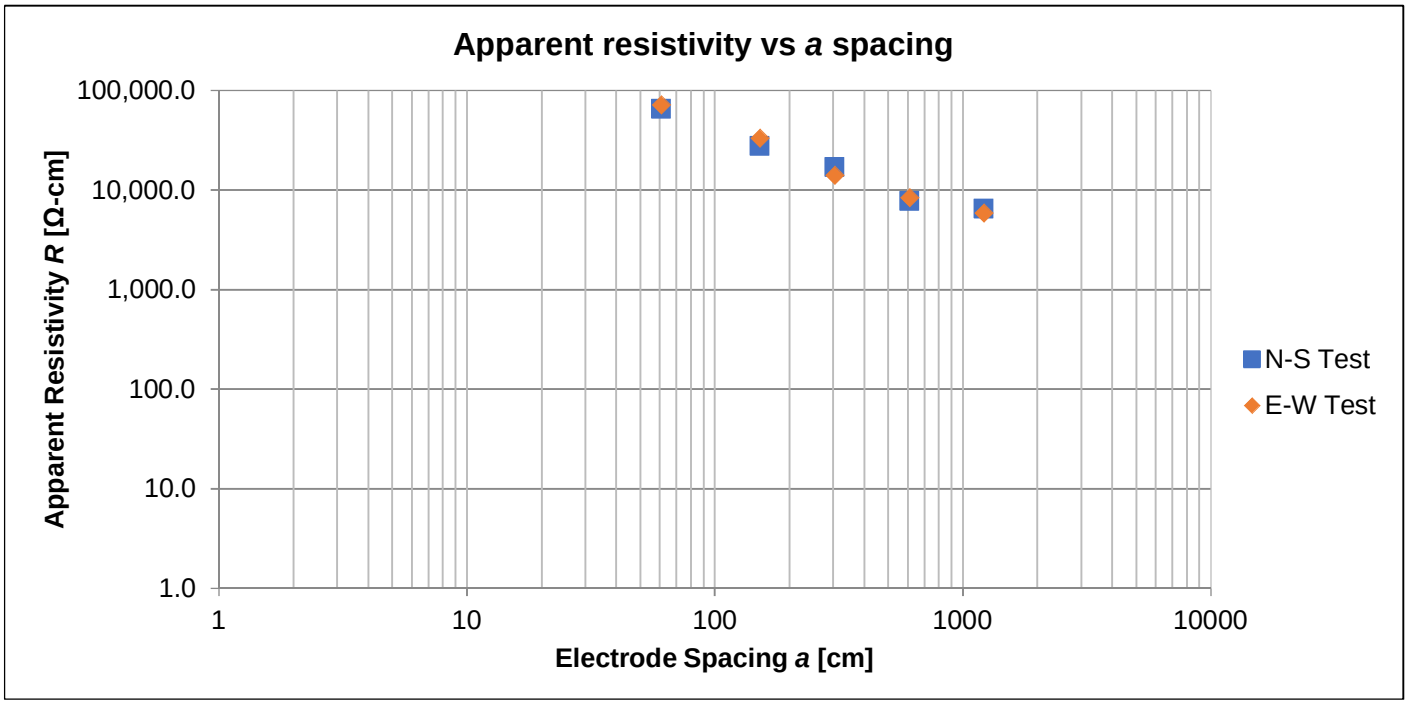


FIELD ELECTRICAL RESISTIVITY TEST DATA
Proposed Red Mesa Solar Project ■ Montezuma Creek, Utah
January 16, 2020 ■ Terracon Project No. 65195246

Array Loc.	ER-9; 37.1236, -109.4105		
Instrument	MiniSting Memory Earth Resistivity and IP Meter	**Weather**	Cold, Dry
Serial #		**Ground Cond.**	Silty Sand
Cal. Check		**Tested By**	Justin Delgado, David Linkey
Test Date	October 30, 2019	**Method**	Wenner 4-pin (ASTM G57-06 (2012); IEEE 81-2012
Notes & Conflicts			

Apparent resistivity ρ is calculated as : $\rho = \dfrac{4\pi aR}{1 + \dfrac{2a}{\sqrt{a^2 + 4b^2}} - \dfrac{a}{\sqrt{a^2 + b^2}}}$

Electrode Spacing *a*		Electrode Depth *b*		N-S Test		E-W Test	
[feet]	[centimeters]	[inches]	[centimeters]	Measured Resistance *R*	Apparent Resistivity ρ	Measured Resistance *R*	Apparent Resistivity ρ
				Ω	[Ω-cm]	Ω	[Ω-cm]
2	61	12	30	132.30	66350	144.60	72520
5	152	12	30	27.28	27730	32.97	33510
10	305	12	30	8.76	17070	7.20	14040
20	610	12	30	2.02	7770	2.17	8350
40	1219	12	30	0.85	6550	0.77	5930

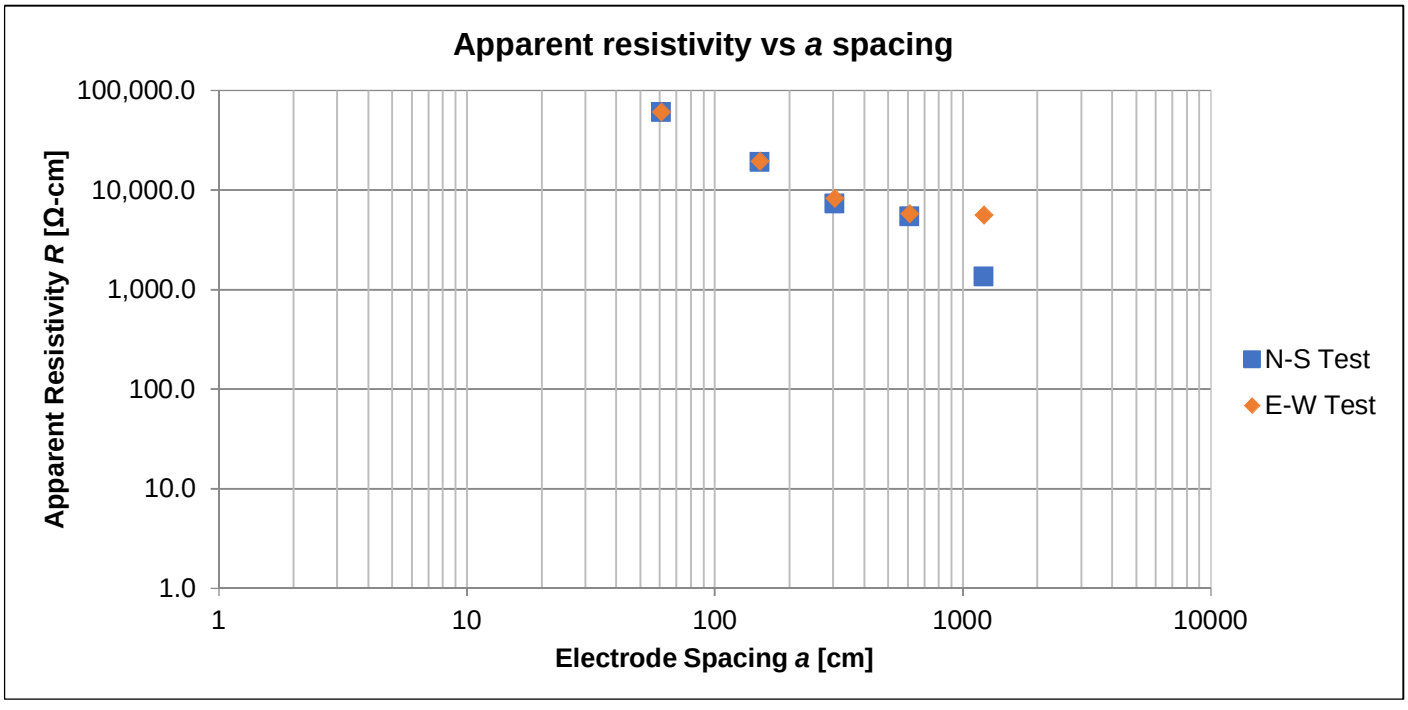


FIELD ELECTRICAL RESISTIVITY TEST DATA
Proposed Red Mesa Solar Project ■ Montezuma Creek, Utah
January 16, 2020 ■ Terracon Project No. 65195246

Array Loc.	ER-10; 37.1239, -109.4044		
Instrument	MiniSting Memory Earth Resistivity and IP Meter	**Weather**	Cold, Dry
Serial #		**Ground Cond.**	Silty Sand
Cal. Check		**Tested By**	Justin Delgado, David Linkey
Test Date	October 30, 2019	**Method**	Wenner 4-pin (ASTM G57-06 (2012); IEEE 81-2012
Notes & Conflicts			

Apparent resistivity ρ is calculated as : $\rho = \dfrac{4\pi aR}{1 + \dfrac{2a}{\sqrt{a^2 + 4b^2}} - \dfrac{a}{\sqrt{a^2 + b^2}}}$

Electrode Spacing *a*		Electrode Depth *b*		N-S Test		E-W Test	
[feet]	[centimeters]	[inches]	[centimeters]	Measured Resistance *R*	Apparent Resistivity ρ	Measured Resistance *R*	Apparent Resistivity ρ
				Ω	[Ω-cm]	Ω	[Ω-cm]
2	61	12	30	122.40	61380	122.40	61380
5	152	12	30	19.06	19370	19.24	19560
10	305	12	30	3.77	7350	4.26	8300
20	610	12	30	1.43	5500	1.51	5810
40	1219	12	30	0.18	1370	0.73	5630

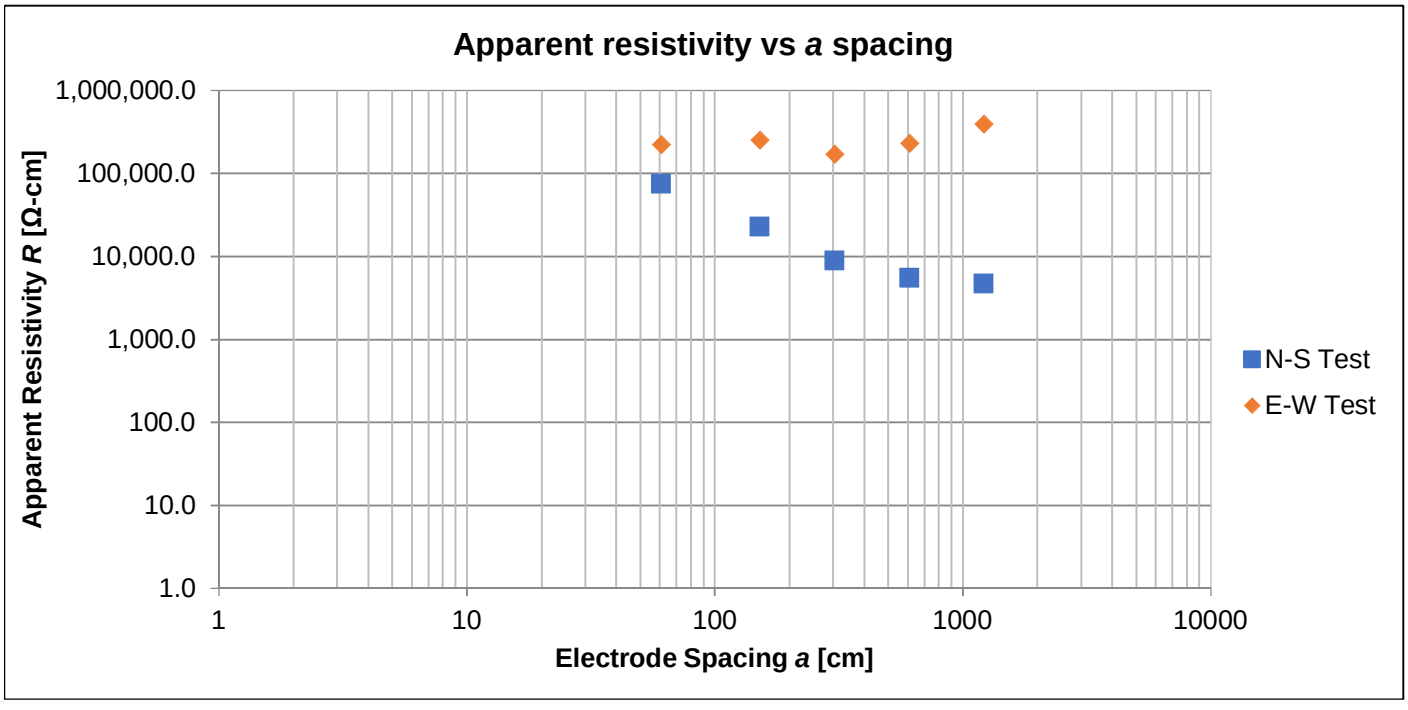


FIELD ELECTRICAL RESISTIVITY TEST DATA
Proposed Red Mesa Solar Project ■ Montezuma Creek, Utah
January 16, 2020 ■ Terracon Project No. 65195246

Array Loc.	ER-11; 37.1264, -109.4172		
Instrument	MiniSting Memory Earth Resistivity and IP Meter	**Weather**	Cold, Dry
Serial #		**Ground Cond.**	Silty Sand
Cal. Check		**Tested By**	Justin Delgado, David Linkey
Test Date	October 31, 2019	**Method**	Wenner 4-pin (ASTM G57-06 (2012); IEEE 81-2012
Notes & Conflicts			

Apparent resistivity ρ is calculated as : $\rho = \dfrac{4\pi aR}{1 + \dfrac{2a}{\sqrt{a^2 + 4b^2}} - \dfrac{a}{\sqrt{a^2 + b^2}}}$

Electrode Spacing *a*		Electrode Depth *b*		N-S Test		E-W Test	
[feet]	[centimeters]	[inches]	[centimeters]	Measured Resistance *R*	Apparent Resistivity ρ	Measured Resistance *R*	Apparent Resistivity ρ
				Ω	[Ω-cm]	Ω	[Ω-cm]
2	61	12	30	150.90	75680	448.52	224930
5	152	12	30	22.76	23130	249.73	253830
10	305	12	30	4.65	9060	88.52	172460
20	610	12	30	1.43	5520	60.75	233810
40	1219	12	30	0.62	4740	51.32	393470

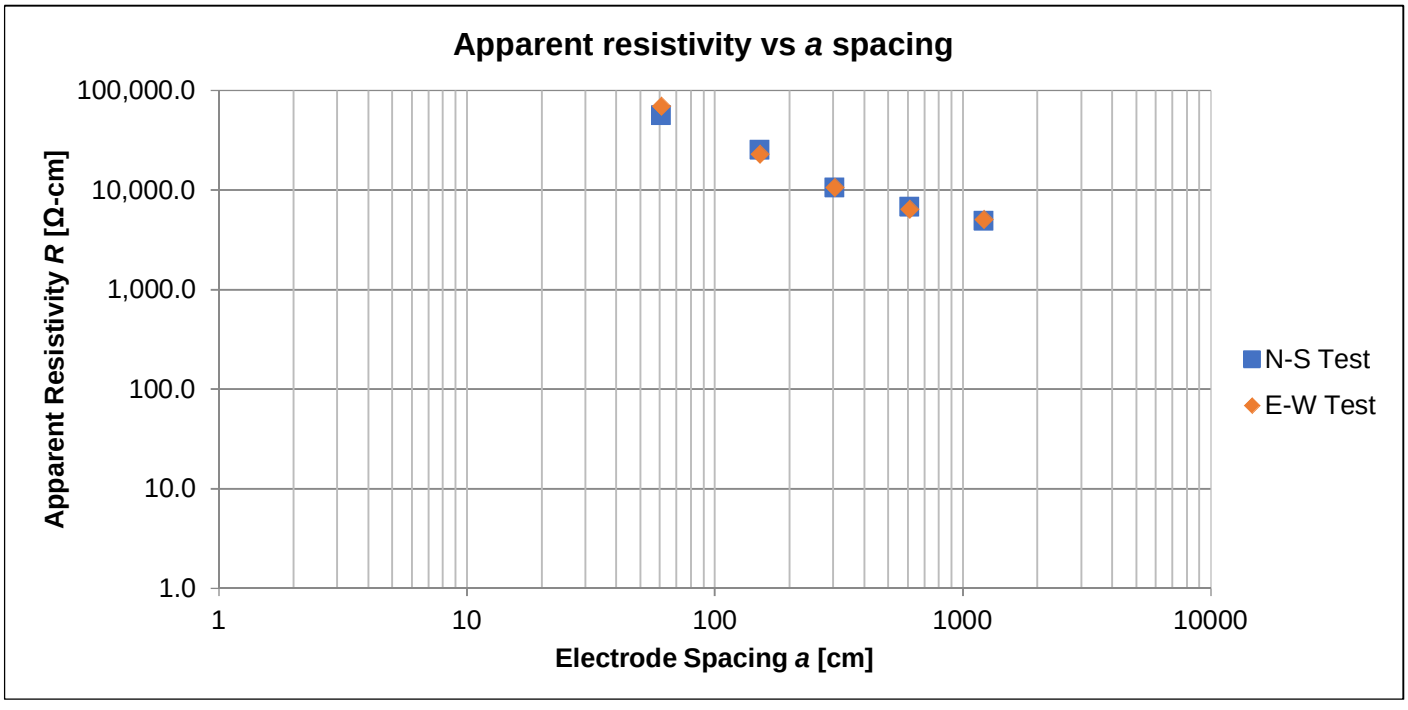


FIELD ELECTRICAL RESISTIVITY TEST DATA
Proposed Red Mesa Solar Project ■ Montezuma Creek, Utah
January 16, 2020 ■ Terracon Project No. 65195246

Array Loc.	ER-12; 37.1281, -109.4136		
Instrument	MiniSting Memory Earth Resistivity and IP Meter	**Weather**	Cold, Dry
Serial #		**Ground Cond.**	Silty Sand
Cal. Check		**Tested By**	Justin Delgado, David Linkey
Test Date	October 31, 2019	**Method**	Wenner 4-pin (ASTM G57-06 (2012); IEEE 81-2012
Notes & Conflicts			

Apparent resistivity ρ is calculated as : $\rho = \dfrac{4\pi aR}{1 + \dfrac{2a}{\sqrt{a^2 + 4b^2}} - \dfrac{a}{\sqrt{a^2 + b^2}}}$

Electrode Spacing *a*		Electrode Depth *b*		N-S Test		E-W Test	
[feet]	[centimeters]	[inches]	[centimeters]	Measured Resistance *R*	Apparent Resistivity ρ	Measured Resistance *R*	Apparent Resistivity ρ
				Ω	[Ω-cm]	Ω	[Ω-cm]
2	61	12	30	113.30	56820	139.10	69760
5	152	12	30	24.98	25390	22.62	22990
10	305	12	30	5.48	10670	5.44	10600
20	610	12	30	1.77	6790	1.68	6480
40	1219	12	30	0.64	4920	0.67	5110

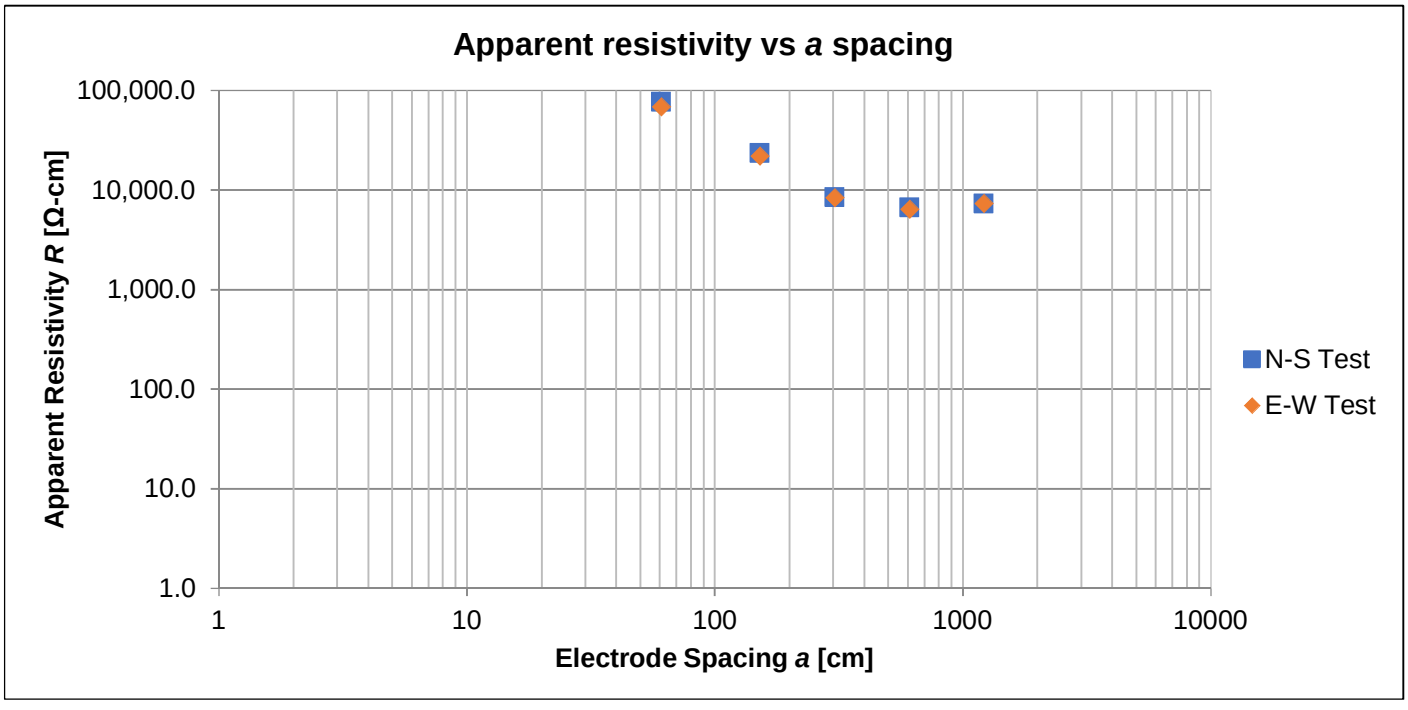


FIELD ELECTRICAL RESISTIVITY TEST DATA
Proposed Red Mesa Solar Project ■ Montezuma Creek, Utah
January 16, 2020 ■ Terracon Project No. 65195246

Array Loc.	ER-13; 37.1270, -109.4084		
Instrument	MiniSting Memory Earth Resistivity and IP Meter	**Weather**	Cold, Dry
Serial #		**Ground Cond.**	Silty Sand
Cal. Check		**Tested By**	Justin Delgado, David Linkey
Test Date	October 30, 2019	**Method**	Wenner 4-pin (ASTM G57-06 (2012); IEEE 81-2012
Notes & Conflicts			

Apparent resistivity ρ is calculated as : $\rho = \dfrac{4\pi aR}{1 + \dfrac{2a}{\sqrt{a^2 + 4b^2}} - \dfrac{a}{\sqrt{a^2 + b^2}}}$

Electrode Spacing *a*		Electrode Depth *b*		N-S Test		E-W Test	
[feet]	[centimeters]	[inches]	[centimeters]	Measured Resistance *R*	Apparent Resistivity ρ	Measured Resistance *R*	Apparent Resistivity ρ
				Ω	[Ω-cm]	Ω	[Ω-cm]
2	61	12	30	153.50	76980	138.10	69260
5	152	12	30	23.27	23650	21.60	21950
10	305	12	30	4.37	8520	4.35	8470
20	610	12	30	1.76	6760	1.66	6400
40	1219	12	30	0.96	7330	0.96	7360



FIELD ELECTRICAL RESISTIVITY TEST DATA
Proposed Red Mesa Solar Project ■ Montezuma Creek, Utah
January 16, 2020 ■ Terracon Project No. 65195246

Array Loc.	ER-14; 37.1283, -109.4031		
Instrument	MiniSting Memory Earth Resistivity and IP Meter	**Weather**	Cold, Dry
Serial #		**Ground Cond.**	Silty Sand
Cal. Check		**Tested By**	Justin Delgado, David Linkey
Test Date	October 30, 2019	**Method**	Wenner 4-pin (ASTM G57-06 (2012); IEEE 81-2012
Notes & Conflicts			

Apparent resistivity ρ is calculated as : $\rho = \dfrac{4\pi aR}{1 + \dfrac{2a}{\sqrt{a^2 + 4b^2}} - \dfrac{a}{\sqrt{a^2 + b^2}}}$

Electrode Spacing *a*		Electrode Depth *b*		N-S Test		E-W Test	
[feet]	[centimeters]	[inches]	[centimeters]	Measured Resistance *R*	Apparent Resistivity ρ	Measured Resistance *R*	Apparent Resistivity ρ
				Ω	[Ω-cm]	Ω	[Ω-cm]
2	61	12	30	67.25	33730	58.94	29560
5	152	12	30	12.68	12890	13.80	14030
10	305	12	30	4.00	7790	4.18	8150
20	610	12	30	1.30	4980	1.22	4710
40	1219	12	30	0.68	5250	0.66	5070