GEOTECHNICAL REPORT
M SOLAR GENERATING LLC.
MANATI, PUERTO RICO
September 11, 2012

1.0 INTRODUCTION

This report covers the results of the subsurface investigation undertaken at the request of **Eng. Noel Marrero**, on behalf of **ERM Puerto Rico**, pursuant to the terms and conditions stated in our accepted proposal dated August 28, 2012. The technical report contains the results of the preliminary geotechnical exploration performed for the proposed photovoltaic plant project, to be located in the town of Manatí, Puerto Rico.

The geotechnical study embracing this work has been geared to evaluate the index and physical properties of the underlying soils in order to provide preliminary foundation recommendations for the planned solar plant. Descriptions of the geological and soil conditions at the project site are discussed, followed by foundation and earthwork recommendations for the conceptual design phase of the project.

2.0 GENERAL PROJECT LOCATION AND DESCRIPTION

The M Solar Generating LLC. is contemplated at the approximate site presented in **Figure 1.** The area is comprised of a vast extent of land covered by short to high vegetation, which is traversed by road PR-667 in a general northeast to southwest direction. The land is characterized by a typical karst topography, consisting of a series of conical limestone hills (*"mogotes"*) surrounded by small valleys (see **Figure 2**).

The project will consists of the installation of solar panels distributed throughout several valleys that make up the karst topography. Typically on this type of project, the panels stand on small columns or pedestals, which are designed to bear essentially tension loads. The construction of an electrical substation is expected as part of the photovoltaic project, but at the time of this report its proposed location is projected on the eastern most portion of the site in proximity to the transmission corridor of PREPA.

Figure 1. Site location

Figure 2. Karst topography at project site.

The intend of the project owner seems to be installing the solar panels following natural contour, avoiding any significant change in grading and disturbance of landscape and environment.

3.0 WORK PERFORMED

A total of 12 SPT borings were performed at locations shown in **Figure 3**. The test holes were advanced by means of the Power Auger Method employing a CME-45 Model drilling rig. The borings were bottomed at 15 feet deep.

Visual/manual procedures were used to characterize the underlying soils. As part of the work, Natural Moisture Contents, Atterberg Limits, and Grain Size Distributions were performed on selected samples to determine their strength properties as well as their classification as per AASHTO Standards. Unconfined Compressive Strength tests were also performed where possible.

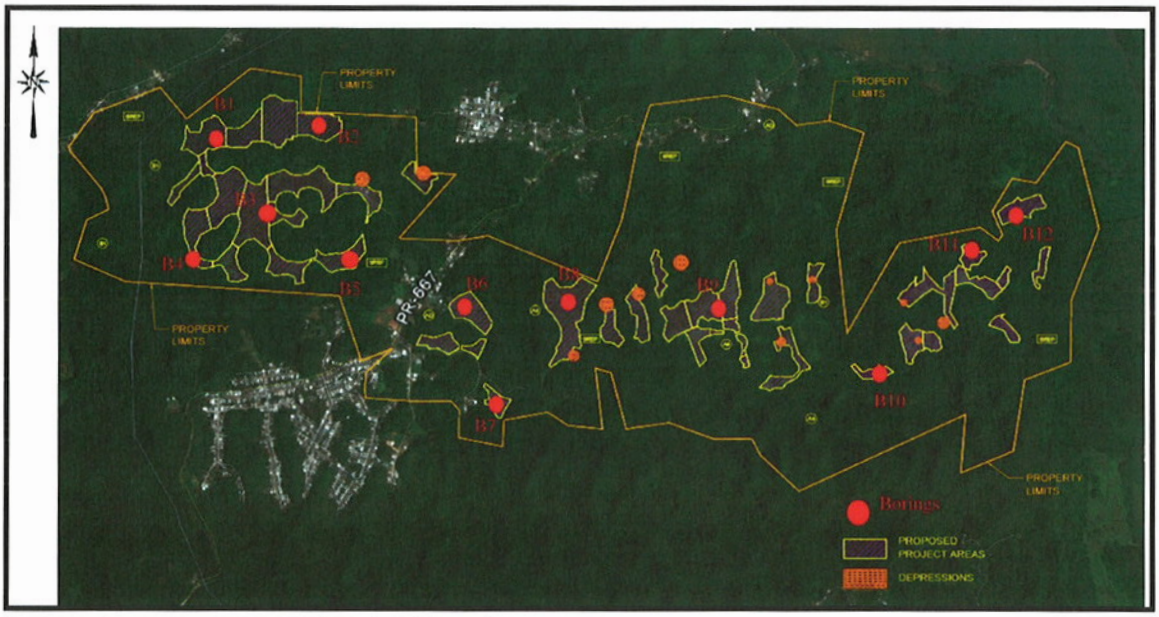


Figure 3. Approximate boring locations.

4.0 GEOLOGICAL CONDITIONS OF THE SITE

4.1 Geological Notes

The general site location lays within the northern Puerto Rico middle-Tertiary limestone belt which extends about 125 km (80 mi.) from the San Juan area to Aguadilla. The geology of the region has been mapped by U.S. Geological Survey personnel **(refer to Figure 4**). Five (5) limestone formations are recognized. In order of decreasing age they are: the Lares Limestone, Cibao Formation, Aguada Limestone, Aymamón Limestone, and the Camuy Formation. These, and an underlying basal clastic unit (San Sebastián Formation) unconformable overlie volcanic, volcaniclastic, and intrusive rocks of late Cretaceous to early Tertiary age.

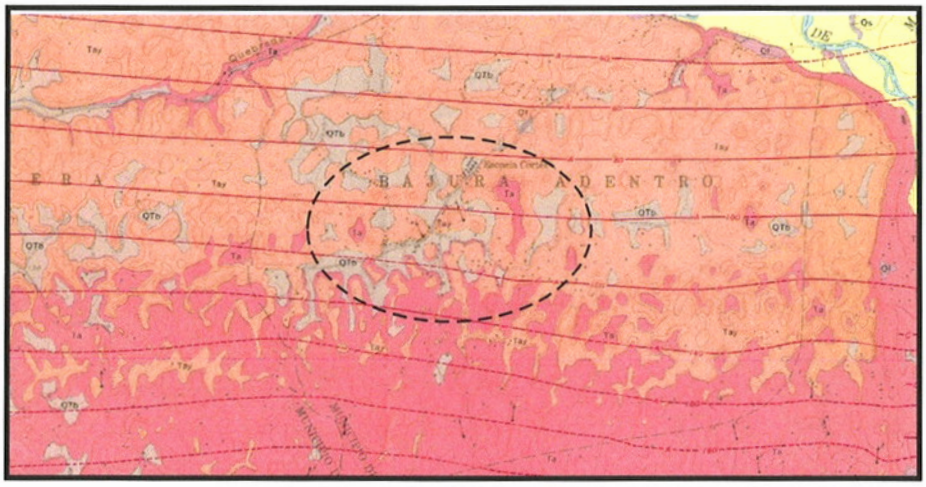


Figure 4. Geologic setting

4.2 Site Geology

The particular area where the photovoltaic project will be located is underlaid by two main geologic units, namely the Blanket Deposits (**Qtb**) and the Aymamón Limestone **(see Figure 7**). The following is a general description of the previously mentioned geologic deposits:

4.3 Blanket Deposits, Sand, Clay (Qtbs, Qtbc)

The Blanket Deposits have been described as composed of quartz sand, clayey sand, sandy clay and clay, the dominant constituents of which are angular, sub-angular and sub-round, medium to fine grains of clear quartz, and reddish brown to medium brown, light gray and white, commonly ferruginous, kaolinitic clay.

4.4 Aymamón Limestone (Tay)

According to the USGS, the Aymamón consists of a very pale orange to bright yellow chalk interbedded with solution riddled, very pale to white, hard, limestone. It has been reported to be commonly recrystallized and pure near the surface.

Figure 7. Partial geologic setting of project site.

The evaluation of the available borehole data and site geologic reconnaissances have revealed the findings of the USGS to be in accordance with our findings. That is, the Aymamón Limestone and Blanket Deposits, have been disclosed through the interpretation of the borehole data, and after the site geologic reconnaissances.

5.0 SUBSOIL STRATIGRAPHY

Fairly in accordance to the information issued by the USGS in the geologic map of the Barceloneta Quadrangle, the site is underlain by blanket deposits and Aymamón limestone.

The results of the geotechnical investigation show that most part of the explored areas is underlaid by stiff to hard consistency, silty to sandy clay delivered from the blanket deposits; moderate reddish-brown to yellowish-red in color. The Aymamón limestone was only found in borings 4 and 11, sampled as calcareous silty sand with angular limestone fragments (broken down by sampling process).

Approximately 91% of the borings found fine-grained (silty or clayey) soils in the upper 10 feet, showing SPT N-values between 16 and 50 blows per foot (bpf), 35 bpf on average. Based on the results of soil classification tests, these are mostly A-7-6 type soils.

Borings 4 and 11recovered weathered Aymamón limestone below 12 and 2 feet deep, respectively. N-values in this material varied from 44 bpf to refusal count (N>100 bpf).

Boring 4 disclosed what appears to be a clay filled cavity between 9 and 12 feet deep, just above the contact with the Aymamón limestone. At this depth, the soil sample was described as soft silty clay with some caliche, N-value=3 bpf. Besides this particular boring, the drilling program was not able to find any other underground cavities of crevices, void or clay-filled, at the remaining boring locations.

6.0 GROUNDWATER TABLE

The groundwater table was not observed within the maximum depth drilled (15 feet), measured from existing grade.

The position of the water table presented in the boring logs (or the lack of) is not meant to be considered reliable. Natural conditions also affect the steadiness of the groundwater regimen. These may include as the distance from significant water sources, the permeability of the subsoil with depth, the topographic characteristics of a given area, and the amount of precipitation at the time the water level readings are taken. Hence, the given groundwater levels (or the lack of) shall not be considered invariant.

The above information and schematic subsurface cross sections are general descriptions of the subsoil conditions at the site. For a detailed information on the soil characteristics of the boreholes, along the boreholes, at the time and under the conditions these were drilled, refer to the boring logs which are included on an Appendix in this report.

The depths mentioned in this report, unless otherwise specified, are referred to the existing ground surface elevations prevailing during the drilling phase of this project.

7.0 SEISMIC GROUND MOTION VALUES

7.1 Mapped Acceleration Parameters

According to the 2011 Puerto Rico Building Code, the 0.2 sec spectral response acceleration (Ss) for the town of Manatí corresponds to 0.97. The 1.0 sec spectral response acceleration (S1) corresponds to 0.32.

7.2 Site Class Definition

Based on the included **Figure 8** (site classification), a **Class C type** may be assigned to the project site (very dense soil and soft rock having shear wave velocities between 1,200 and 2,500 ft/sec; average properties in top 100 feet). The following table describes the criteria to categorize the soil profiles in order to model the seismic response of the structures.

SITE CLASS	SOIL PROFILE NAME	AVERAGE PROPERTIES IN TOP 100 feet, SEE SECTION 1613.5.5		
		Soil shear wave velocity, $\bar{v}_s$, (ft/s)	Standard penetration resistance, $\bar{N}$	Soil undrained shear strength, $\bar{s}_u$, (psf)
A	Hard rock	$\bar{v}_s > 5{,}000$	N/A	N/A
B	Rock	$2{,}500 < \bar{v}_s \le 5{,}000$	N/A	N/A
C	Very dense soil and soft rock	$1{,}200 < \bar{v}_s \le 2{,}500$	$\bar{N} > 50$	$\bar{s}_u \ge 2{,}000$
D	Stiff soil profile	$600 \le \bar{v}_s \le 1{,}200$	$15 \le \bar{N} \le 50$	$1{,}000 \le \bar{s}_u \le 2{,}000$
E	Soft soil profile	$\bar{v}_s < 600$	$\bar{N} < 15$	$\bar{s}_u < 1{,}000$
E	—	Any profile with more than 10 feet of soil having the following characteristics: 1. Plasticity index $PI > 20$, 2. Moisture content $w \ge 40\%$, and 3. Undrained shear strength $\bar{s}_u < 500$ psf		
F	—	Any profile containing soils having one or more of the following characteristics: 1. Soils vulnerable to potential failure or collapse under seismic loading such as liquefiable soils, quick and highly sensitive clays, collapsible weakly cemented soils. 2. Peats and/or highly organic clays (H > 10 feet of peat and/or highly organic clay where H = thickness of soil) 3. Very high plasticity clays (H >25 feet with plasticity index PI >75) 4. Very thick soft/medium stiff clays (H >120 feet)		

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m², 1 pound per square foot = 0.0479 kPa. N/A = Not applicable

Figure 8. Site Class definitions

7.3 Estimate of Peak Ground Acceleration

It is the current standard of practice to consider seismic events corresponding to a 10% probability of exceedance within a 50 year design life (i.e. an annual risk level of 0.21% or a 475-year return period) as the Design Basis Earthquake.

Prediction of peak horizontal ground accelerations (PHGA) on bedrock in the study area were obtained from the USGS Seismic Hazard Maps for Puerto Rico (2003). According to the USGS maps, a peak bedrock acceleration of **0.24g** is applicable to the 475-year return period. Refer to **Figure 9**.

Figure 9. PGA map (%g) for an exceedance probability of 10% in 50 years (approximately 500-year return time).

For this study, in the absence of a detailed ground response analysis, it is conceived that the relatively shallow depth to bedrock combined with the presence of stiff soils, should not significantly amplify the intensity of ground shaking during upward propagation. Therefore, we expect that the peak horizontal acceleration at the site be approximately **0.24g**. Note that a detailed ground response analysis would be necessary for a more precise value of PGA at ground surface.

8.0 ASSESSMENT OF LIQUEFACTION SUSCEPTIBILITY

One of the most dramatic causes of damage to engineering structures during an earthquake has been the development of liquefaction in saturated soil deposits. The factors affecting liquefaction of sands have been extensively investigated in the past three decades. The understanding of the phenomenon has advanced to a degree that analytical procedures have been formulated to predict if liquefaction would occur at a site. More recently, Boulanger and Idriss (2006, 2007), as well as Bray and Sancio (2006), have incorporated new concepts and refinements to the standard practices of liquefaction analysis.

The latest liquefaction susceptibility criteria for saturated silts and clays provided guidance for selecting engineering procedures for estimating potential strains, and strength loss during seismic loading. For the case of clays and silts, monotonic and cyclic undrained loading test data shows that they transition, over a fairly narrow range of plasticity indices (PI), from soil that behave more fundamentally like sands (sand-like behavior) to soils that behave more fundamentally like clays (clay-like behavior).

Considering the behavior of fine-grained soils under seismic loading, it is recommended to the term "liquefaction" be reserved for describing the development of significant strains or strength loss in soils exhibiting a sand-like behavior, whereas the term cyclic softening be used to describe similar phenomena in soils exhibiting a clay-like behavior. Clay-like behavior can be expected for fine grained soils that have PI>5 or 7 (Boulanger and Idriss, 2006).

The plasticity index (PI) has been described as a robust indicator of liquefaction susceptibility. According to Bray and Sancio (2006), loose soils with PI<12 and w>0.85LL are susceptible to liquefaction while cyclic mobility should be expected in fine-grained soils with PI<20 and w>0.85LL. Seed et al. (2003) found that sand-like soils are potentially liquefiable if their PI<12, LL<37 and w>0.80LL. In a similar way, clay-like soils may be susceptible to cyclic softening if their PI<20, LL<47 and w>0.85LL.

From these studies, Table 1 and **Figure 10** can be used to judge the liquefaction susceptibility of sand-like soils or the cyclic softening of clay-like soils. **From the boring information and soil classification results we have, it can be concluded that the site does not have potential to liquefaction based on the soil composition criteria.**

TABLE 1; Liquefaction/Cyclic Softening Susceptibility Criteria

Soil behavior	Susceptibility Criteria
Clay-like soils (PI≥7)	expect cyclic softening if w>0.85LL do not expect cyclic softening if PI>18
Sand-like soil (PI<7)	expect liquefaction if w>0.85LL

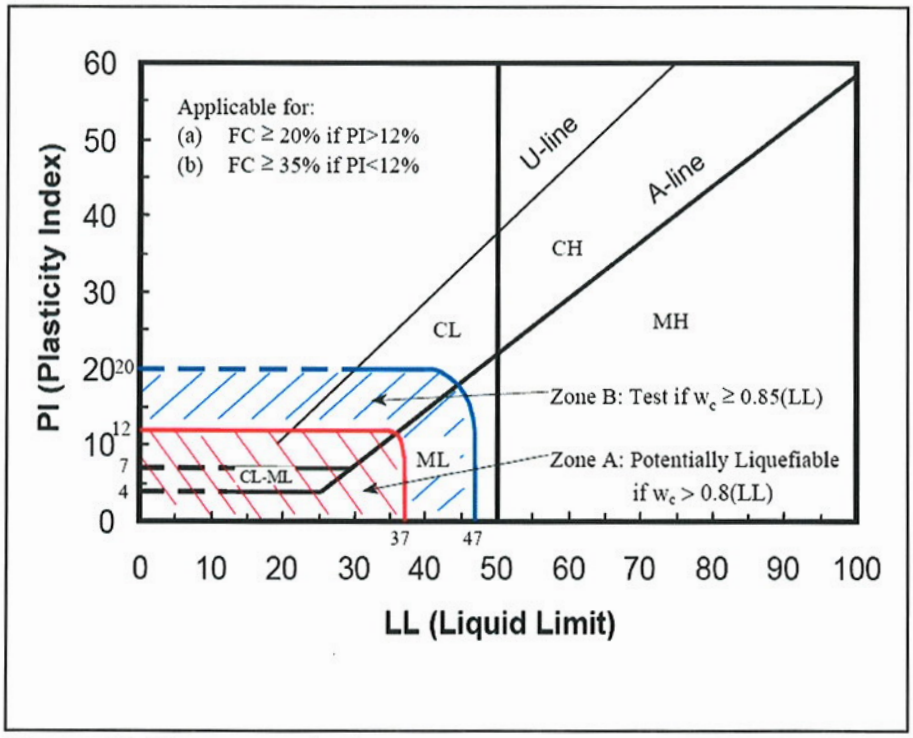


Figure 10. Recommendations regarding assessment of liquefiable soil types.

9.0 DISCUSSION ON FINDINGS

The results of the drilling program shows competent soil conditions that favors the proposed project. A relatively thin crust of topsoil covers the general area, followed by blanket deposits (silt and clay) and/or severely weathered Aymamón limestone.

In general terms, the competence of most native soils and their granulometric characteristics, combined with the lack of a shallow groundwater table, make us describe the site as not having potential for liquefaction. The potential for elastic settlements and time-dependent soil volume changes (soil consolidation) is also low at the site.

10.0 FINAL COMMENTS

It should be understood that since the testing of every square meter of land in this project would not be economically feasible, the above conclusions and preliminary foundation recommendations are based on various test holes and site visits considered appropriate by us to form a judgment pursuant to the best standards of engineering practice. However, some variations may be encountered in the soil profile, especially at areas around the boreholes. Any variations encountered during the period of this project construction must be reported to the inspecting Geotechnical Engineer to study such conditions and present corresponding solutions.

This preliminary report contains limited and tentative information. The project designers shall be alerted that, at the time being, there are items that require clarification and additional recommendations to those discussed herein.

The standard procedures followed during the drilling of the test borings are discussed in the Appendix to this soil report.

Respectfully submitted,

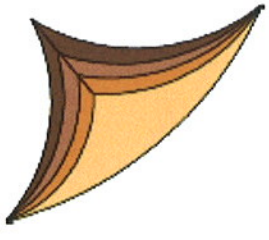
IVAN JACKSON MADURO, P.E., MSCE
Chief Geotechnical Engineer, Partner

mgn

Reference No. 4338.rep

BORING LOGS

Suelos, PSC
Calle Chile 258, San Juan, P.R. 00917-2103 Tel. (787)753-0147 Fax. (787)753-8387



BORING LOGS

The description of subsurface profile and results of field and laboratory tests, as enclosed, pertain to conditions actually encountered at the borings location proper and at the depths indicated. Profile tracings between borings, when give, represent a reasonable interpolation of subsoil characteristics and should not be taken to indicate true intermediate conditions.

NOTES:

N	**-**	**Number of blows required to drive the sampling spoon a distance of 12" with a 140 lbs hammer falling 30".**
NW	**-**	**No water.**
WH	**-**	**Weight of hammer.**
WR	**-**	**Weight of Rods.**
W	**-**	**Natural moisture content in % of dry weight.**
qu	**-**	**Unconfined compressive strength in tons/sq ft.**
*	**-**	**Penetrometer value.**

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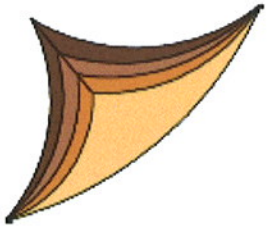

SUELOS, INC.

Soil and Construction Materials Laboratory

SUBSURFACE EXPLORATION LOG

PROJECT: MANATI SOLAR LLC, MANATI, PR

BORING NO.: 3

Job No. 4337

Sheet 1 of 1

Spoon :	1.375"ID	Driller :	J. CALDERON	Date Started :	9/5/2012	WATER LEVEL:		N < 100 =	
Hammer:	140#	Method :	AUGER	Date Completed:	--	Date :	--	N > 100 =	
Drop :	30"	Drill Type:	CME-45	Total Depth :	15.5	Depth:	Not Observed	CORE =	

Depth ft	Samp No.	Recov %	S.P.T. values	RQD %	Description of material	SPT-N values	Qu TSF	Moist Cont%
0	1	100	5-6-5		Medium density, dark reddish brown, fine grained silty sand, roots	11		20
	2	100	5-7-12		Very stiff, yellowish red sandy fat clay (A-7-6, CH), LL=53, PI=25	19	4.75+	20
5	3	100	6-9-16			25	3.75	20
	4	100	8-13-15			28		19
10	5	100	11-14-17		Very stiff clayey silt, yellowish red, (A- 7-5, MH), LL=55, PI=24	31	4.5+	26
15	6	100	13-18-21			39		27
					END OF TEST HOLE - 15.5 FT			
20								
25								
30								
35								
40								

"N" values are the number of blows required to drive the sampling spoon a distance of twelve inches with a 140 lbs hammer falling 30 inches. Natural Moisture Content (2) is expressed in percentage of its dry weight. Unconfined Compressive Strength (Qu) values are expressed in tons per square foot. *Pocket penetrometer values are marked with an asterisk.

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SUBSURFACE EXPLORATION LOG

PROJECT: M SOLAR GENERATING LLC.

BORING NO.: 1

Job No. 4337

Sheet 1 of 1

Spoon :	1.375"ID	Driller :	J. CALDERON	Date Started :	9/6/2012	WATER LEVEL:		N < 100 =	
Hammer:	140#	Method :	AUGER	Date Completed:	--	Date :	--	N > 100 =	
Drop :	30"	Drill Type:	CME-45	Total Depth :	15.5	Depth:	Not Observed	CORE =	

Depth ft	Samp No.	Recov %	S.P.T. values	RQD %	Description of material	SPT-N values	Qu TSF	Moist Cont%
0	1	72	4-4-4		Topsoil, stiff, strong brown	8	4.5+	25
	2	89	6-9-11		Very stiff-hard, yellowish red sandy fat clay (A-7- 6) LL=54, PI=25	20	4.5	29
5	3	78	13-15-17		sandy	32	4.5	23
	4	100	11-13-19		sandy	32		21
10	5	100	17-23-28		Stiff elastic silt (A-7-5) LL=68, PI=32 (MH)	51		19
15	6	100	22-27-31		sandy	58		23
					END OF TEST HOLE - 15.5 FT			
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30								
35								
40								

"N" values are the number of blows required to drive the sampling spoon a distance of twelve inches with a 140 lbs hammer falling 30 inches. Natural Moisture Content (2) is expressed in percentage of its dry weight. Unconfined Compressive Strength (Qu) values are expressed in tons per square foot. *Pocket penetrometer values are marked with an asterisk.

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SUBSURFACE EXPLORATION LOG

PROJECT: M SOLAR GENERATING LLC.

BORING NO.: 2

Job No. 4337

Sheet 1 of 1

Spoon :	1.375"ID	Driller :	J. CALDERON	Date Started :	9/6/2012	WATER LEVEL:		N < 100 =	
Hammer:	140#	Method :	AUGER	Date Completed:	--	Date :	--	N > 100 =	
Drop :	30"	Drill Type:	CME-45	Total Depth :	15.5	Depth:	Not Observed	CORE =	

Depth ft	Samp No.	Recov %	S.P.T. values	RQD %	Description of material	SPT-N values	Qu TSF	Moist Cont%
0	1	100	3-4-5		Strong brown, stiff silty clay with roots	9	4.5	33
	2	100	4-7-6			13		30
5	3	89	10-19-24		Hard, yellowish red clayey silt (A-7-5), MH), LL=87, PI=47	43		30
	4	100	13-17-23			40		30
10	5	100	12-15-25			40	4.5+	29
15	18	100	9-13-21			34	4.5+	30
					END OF TEST HOLE - 15.5 FT			
20								
25								
30								
35								
40								

"N" values are the number of blows required to drive the sampling spoon a distance of twelve inches with a 140 lbs hammer falling 30 inches. Natural Moisture Content (2) is expressed in percentage of its dry weight. Unconfined Compressive Strength (Qu) values are expressed in tons per square foot. *Pocket penetrometer values are marked with an asterisk.

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SUBSURFACE EXPLORATION LOG

PROJECT: MANATI SOLAR LLC, MANATI, PR

BORING NO.: 4
Job No. 4337
Sheet 1 of 1

Spoon : 1.375"ID Hammer: 140# Drop : 30"	Driller : J. CALDERON Method : AUGER Drill Type: CME-45	Date Started : 9/5/2012 Date Completed: -- Total Depth : 15.5	WATER LEVEL: Date : -- Depth: Not Observed	N < 100 = N > 100 = CORE =

Depth ft	Samp No.	Recov %	S.P.T. values	RQD %	Description of material	SPT-N values	Qu TSF	Moist Cont%
0	1	67	4-6-4		Stiff, dark reddish brown sandy silt with roots	10	4.5	18
	2	78	4-6-10		Very stiff, dark reddish brown sandy clay	16	4.5+	22
5	3	100	6-7-9		Very stiff, yellowish red, clayey silt with some sand (A-7-5, MH) LL=63, PI=27	16		19
	4	100	5-9-9			18		19
10	5	72	3-1-2		Soft, yellowish red silty clay with some caliche (A-7-6, CL) LL=47, PI=20	3	3.75	32
15	6	83	21-27-36		Crushed limestone, sampled as silty sand with angular rock fragments, broken by sampling process	63		9
					END OF TEST HOLE - 15.5 FT			
20								
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"N" values are the number of blows required to drive the sampling spoon a distance of twelve inches with a 140 lbs hammer falling 30 inches. Natural Moisture Content (2) is expressed in percentage of its dry weight. Unconfined Compressive Strength (Qu) values are expressed in tons per square foot. *Pocket penetrometer values are marked with an asterisk.

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Soil and Construction Materials Laboratory

SUBSURFACE EXPLORATION LOG

PROJECT: M SOLAR GENERATING LLC.

BORING NO.: 5

Job No. 4337

Sheet 1 of 1

Spoon :	1.375"ID	Driller :	J. CALDERON	Date Started :	9/5/2012	WATER LEVEL:		N < 100 =	
Hammer:	140#	Method :	AUGER	Date Completed:	--	Date :	--	N > 100 =	
Drop :	30"	Drill Type:	CME-45	Total Depth :	15.5	Depth:	Not Observed	CORE =	

Depth ft	Samp No.	Recov %	S.P.T. values	RQD %	Description of material	SPT-N values	Qu TSF	Moist Cont%
0	1	83	4-6-6		Topsoil: dark brown, stiff silty clay with some sand, roots	12		24
	2	100	5-8-10		Very stiff-hard, strong brown yellowish clayey silt with some sand, red (A-7-5, MH) LL=54, PI=24	18	4.5+	25
5	3	89	8-11-14			25	4.5	26
	4	83	10-17-14			31	4.5	26
10	5	100	13-14-21		Very stiff silty clay, sandy (A-7-6, CH) LL=51, PI=24	35	4.5+	23
15	6	100	16-18-23			41	4.5+	24
					END OF TEST HOLE - 15.5 FT			
20								
25								
30								
35								
40								

"N" values are the number of blows required to drive the sampling spoon a distance of twelve inches with a 140 lbs hammer falling 30 inches. Natural Moisture Content (2) is expressed in percentage of its dry weight. Unconfined Compressive Strength (Qu) values are expressed in tons per square foot. *Pocket penetrometer values are marked with an asterisk.

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Soil and Construction Materials Laboratory

SUBSURFACE EXPLORATION LOG

PROJECT: M SOLAR GENERATING LLC.

BORING NO.: 8
Job No. 4337
Sheet 1 of 1

Spoon : 1.375"ID Hammer: 140# Drop : 30"	Driller : J. CALDERON Method : AUGER Drill Type: CME-45	Date Started : 9/8/2012 Date Completed: -- Total Depth : 15.5	WATER LEVEL: Date : -- Depth: Not Observed	N < 100 = N > 100 = CORE =
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Depth ft	Samp No.	Recov %	S.P.T. values	RQD %	Description of material	SPT-N values	Qu TSF	Moist Cont%
0	1	94	4-4-7		Topsoil: dark brown, stiff silty clay with sand traces, roots	11	4.5+	35
	2	100	12-16-22		Red, stiff-hard, silty clay	38	3.25	37
5	3	100	12-16-22			38		31
	4	100	10-15-24		Sandy	39	4.5+	29
10	5	100	14-19-27			46		31
15	6	100	18-21-29			50	4.5	30
					END OF TEST HOLE - 15.5 FT			
20								
25								
30								
35								
40								

"N" values are the number of blows required to drive the sampling spoon a distance of twelve inches with a 140 lbs hammer falling 30 inches. Natural Moisture Content (2) is expressed in percentage of its dry weight. Unconfined Compressive Strength (Qu) values are expressed in tons per square foot. *Pocket penetrometer values are marked with an asterisk.

SUELOS, INC.

Soil and Construction Materials Laboratory

SUBSURFACE EXPLORATION LOG

PROJECT: M SOLAR GENERATING LLC.

BORING NO.: 9

Job No. 4337

Sheet 1 of 1

Spoon :	1.375"ID	Driller :	J. CALDERON	Date Started :	9/8/2012	WATER LEVEL:		N < 100 =	
Hammer:	140#	Method :	AUGER	Date Completed:	--	Date :	--	N > 100 =	
Drop :	30"	Drill Type:	CME-45	Total Depth :	15.5	Depth:	Not Observed	CORE =	

Depth ft	Samp No.	Recov %	S.P.T. values	RQD %	Description of material	SPT-N values	Qu TSF	Moist Cont%
0	1	83	5-6-7		Stiff-very stiff, dark red silty clay with roots	13		30
	2	100	5-5-9			14	4.5+	32
5	3	100	6-9-12		Stiff, dark red clayey silt (A-7-5, MH) LL=73, PI=38	21	4.5+	30
	4	100	8-11-16			27	4.5+	32
10	5	100	9-13-21		Hard, dark red, black mottled clay (A-7-5, CH) LL=57, PI=27	34	4.5+	33
15	6	100	14-17-20			37	4.5+	36
					END OF TEST HOLE - 15.5 FT			
20								
25								
30								
35								
40								

"N" values are the number of blows required to drive the sampling spoon a distance of twelve inches with a 140 lbs hammer falling 30 inches. Natural Moisture Content (2) is expressed in percentage of its dry weight. Unconfined Compressive Strength (Qu) values are expressed in tons per square foot. *Pocket penetrometer values are marked with an asterisk.

SUELOS, INC.

Soil and Construction Materials Laboratory

SUBSURFACE EXPLORATION LOG

PROJECT: M SOLAR GENERATING LLC.

BORING NO.: 10

Job No. 4337

Sheet 1 of 1

Spoon : 1.375"ID	Driller : J. CALDERON	Date Started : 9/7/2012	WATER LEVEL:	N < 100 =
Hammer: 140#	Method : AUGER	Date Completed: --	Date : --	N > 100 =
Drop : 30"	Drill Type: CME-45	Total Depth : 15.5	Depth: Not Observed	CORE =

Depth ft	Samp No.	Recov %	S.P.T. values	RQD %	Description of material	SPT-N values	Qu TSF	Moist Cont%
0	1	78	7-8-8		Very stiff, reddish brown silty clay with sand traces roots	16	4.5+	34
	2	78	10-13-17		Hard, yellowish red silty clay with sand traces, dry	30	4.5+	34
5	3	100	13-20-24		no sand	44	4.5+	31
	4	100	15-18-22		no sand	40	4.5+	27
10	5	100	18-23-28		Hard, red clay, dry	51	4.5+	29
15	6	100	17-21-25			46		30
					END OF TEST HOLE - 15.5 FT			
20								
25								
30								
35								
40								

"N" values are the number of blows required to drive the sampling spoon a distance of twelve inches with a 140 lbs hammer falling 30 inches. Natural Moisture Content (2) is expressed in percentage of its dry weight. Unconfined Compressive Strength (Qu) values are expressed in tons per square foot. *Pocket penetrometer values are marked with an asterisk.

SUELOS, INC.

Soil and Construction Materials Laboratory

SUBSURFACE EXPLORATION LOG

PROJECT: M SOLAR GENERATING LLC.

BORING NO.: 11

Job No. 4337

Sheet 1 of 1

Spoon :	1.375"ID	Driller :	J. CALDERON	Date Started :	9/7/2012	WATER LEVEL:		N < 100 =	
Hammer:	140#	Method :	AUGER	Date Completed:	--	Date :	--	N > 100 =	
Drop :	30"	Drill Type:	CME-45	Total Depth :	15.5	Depth:	Not Observed	CORE =	

Depth ft	Samp No.	Recov %	S.P.T. values	RQD %	Description of material	SPT-N values	Qu TSF	Moist Cont%
0	1	72	7-20-16		Hard, dark brown silty clay with weathered limestone fragments	36		39
	2	44	25-50/3"----		Crushed weathered limestone, sampled as silty sand with angular rock fragments broken by sampling process	50/3"		7
5	3	78	21-18-26		with clay pockets	44		13
	4	67	16-32-50/2"		with clay pockets	50/2"		6
10	5	22	73/6"------			73/6"		
15	6	11	64/3"------			64/3"		2
					END OF TEST HOLE - 15.5 FT			
20								
25								
30								
35								
40								

"N" values are the number of blows required to drive the sampling spoon a distance of twelve inches with a 140 lbs hammer falling 30 inches. Natural Moisture Content (2) is expressed in percentage of its dry weight. Unconfined Compressive Strength (Qu) values are expressed in tons per square foot. *Pocket penetrometer values are marked with an asterisk.