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VIA EMAIL

January 13, 2021
File No. 01.0175344.00

Borrego Solar Systems, Inc.
55 Technology Drive, Suite 102
Lowell, Massachusetts 01851

Attention: Steven Riggall

Re: Geotechnical Report
Proposed Ground-Mount Photo-Voltaic (PV) System
2621 State Highway 5S
Fultonville, New York

Dear Mr. Riggall:

In accordance with our initial agreement executed on September 15, 2021 and our addendum executed on September 21, 2021, GZA GeoEnvironmental, Inc. (GZA) is pleased to present this geotechnical engineering report to Borrego Solar Systems, Inc. (Client; Borrego) for the above-referenced project. The objectives of our work were to evaluate subsurface conditions, conduct laboratory analysis of soils, and develop geotechnical recommendations for the proposed foundations of the photo-voltaic (PV) array, retaining wall, and cattle guard, as well as other associated site work.

This report is subject to the *Limitations* outlined in **Appendix A** and the Terms and Conditions of our agreement.

BACKGROUND

This geotechnical report was prepared as part of our geotechnical engineering services for the site located at 2621 State highway 5S, in Fultonville, NY (Site). Our understanding of the project was based on:

- Discussions with you;
- Online aerial photography;
- A Site Access Plan, prepared by Borrego and dated August 6, 2021;
- A Tree Clearing Plan, Sheet C-4.0 prepared by Borrego Solar with a revision date of July 27, 2021
- A Grading and Erosion Control Plan, Sheet C-2.0 prepared by Borrego Solar with a revision date of July 27, 2021;
- A plan entitled “Retaining Wall Profile View”, Sheet C-5.3, prepared by Borrego Solar, with a revision date of September 8, 2021;
- A set of Civil Details, Sheet C-5.1, which included a cross-section profile of the proposed segmental block retaining wall, with a revision date of June 10, 2021;

- Plans for the cattle guard rails and precast reinforced concrete sill foundation, prepared by Big R Bridge of Greeley Colorado, dated April 30, 2010 and December 6, 2012, respectively;
- A Web Soil Map indicating the locations for topsoil nutrient testing, provided to GZA by Borrego on September 8, 2021
- Sampling procedures for topsoil nutrient testing entitled : Cornell University Fact Sheet #1 – Soil Sampling for Crop Fields; and
- RFP documentation provided by Borrego to GZA dated August 5, 2021.

From our previous work with Borrego and our conversations with you, short galvanized driven piles or hollow tapered ground screws installed by a design-build contractor are the preferred foundation alternatives.

Existing Conditions

Based on the provided plans and online aerial photography, the development area consists of mostly open field with partially wooded land to the north and east. Wetland areas are noted on the plans in the west of the site, with a stream running approximately north to south along the east side of the site. The site is bounded by residential abutters to the northwest, open farm fields to the west, wooded land to the north and east, and New York State Route 5S (NYS 5S) to the north. The existing site can be accessed from NYS 5S to the north along an existing unpaved access path. Based on the Grading and Erosion Control Plan, the existing site contours range from approximately elevation 310 near the entrance to the site in the north to elevation 415 in the southwest of the site (NAVD88).

Proposed Conditions

The plans depict an array area to be developed with a fenced-in area of approximately 19.4 acres. The Grading and Erosion Control Plan indicates that the proposed site grades are generally within about 2 feet of existing grades, with some regrading required along the proposed site access road. An approximately 103-foot-long retaining wall is proposed along the northern portion of the access road between the approximate site stations 1+22 to 2+25. The retaining wall will be a proprietary segmental block wall with geosynthetic reinforced backfill behind the wall. The wall will be as tall as about 6 feet from the grade at the base of the wall to the top of the wall. Site grades will be raised by as much as 5 feet to the west of the retaining wall, tapering out to no raise in grade to the north and south of the wall. Based on the plan notes, the manufacturer requires a minimum bearing capacity of 2,600 pounds per square (psf).

The proposed access road will enter the site from NYS 5S to the north and follow the general layout of the existing unpaved road running to the south. Based on correspondence with you, the road will be asphalt paved between site stations 0+18 and 1+42 and unpaved for the remaining sections to the south. The paved roadway section included in the Civil Details Plan shows asphalt pavement over 9 inches of crushed stone (NYSDOT Item No. 304.12 Type 2). A culvert appears to be proposed where the proposed access road crosses the wetland area to the west. An existing concrete culvert crossing will also be repaired along the access road. An electrical equipment pad area is proposed adjacent to the southern end of the unpaved access road, near the center of the proposed array area.

A cattle guard is also proposed along the access road towards the southern portion of the site near the entrance to the fenced array area, and at the bottom of the rising access roadway. The location of the cattle guard appears to be in an existing wetland area. Based on the provided plans, the cattle guard will be about 32 feet long across the road by 8 feet wide, with a 6-foot clear span. The planned cattle guard end supports consist of precast reinforced concrete sills that appear to have a base width of 18 inches and measure about 23 inches in total height, with an 11-inch-wide sill on which the metal cattle guard will sit, located about 12 inches from the bottom.

Based on our previous work with Borrego, we anticipate either hollow tapered ground screw piles or driven pile foundation elements will be selected and installed by a design-build contractor for the proposed ground-mounted, fixed-tilt system.

We understand that the proposed structures will have vertical and lateral loads on the support posts of 2 to 8 kips and 1 to 3 kips, respectively.

SCOPE OF SERVICES

To meet the stated objectives, GZA performed the following Scope of Services:

- Coordinated, performed and documented an exploration program consisting of one day of test pit excavations and one day of test borings at the Site;
- Performed laboratory Atterberg Limit analyses on two fine-grained soil samples; corrosivity testing was performed on one composite soil sample; laboratory nutrient and pH testing were performed on six topsoil samples; and one composite soil sample was submitted for thermal resistivity laboratory testing, which also included gradation analysis and Modified Proctor compaction testing;
- Evaluated subsurface conditions based on the explorations and laboratory results to develop geotechnical design and construction recommendations; and
- Prepared this report summarizing our analyses and recommendations.

SUBSURFACE EXPLORATIONS

Test Pits

GZA performed a subsurface exploration program consisting of seven test pit excavations (designated TP-1 through TP-7) in the area of the proposed PV installations, equipment pads, and access road. The test pits were performed by MC Environmental Services, Inc. of Queensbury, New York on November 29, 2021 with a tracked excavator. The test pits were excavated to about 9.5 to 13 feet below ground surface (bgs). The target test pit depth was 12 feet. Test pits TP-2 and TP-7 were terminated above the target depth at depths of 9.5 feet and 11 feet bgs, respectively, due to excavator refusal on possible nested boulders which made it difficult to progress any deeper. Upon completion, the test pits were backfilled to the existing ground surface with excavated material placed in lifts, each tamped with the heel of the excavator bucket.

Test Borings

Cascade Remediation Services, LLC of Albany, New York performed two test borings (designated GZ-1 and GZ-2) on December 2, 2021 with a drill rig mounted on a tracked all-terrain vehicle (ATV). Test boring GZ-1 was performed near the proposed retaining wall and test boring GZ-2 was performed near the proposed cattle guard. Test borings GZ-1 and GZ-2 were advanced to a depth of about 31 and 21 feet bgs, respectively, using hollow stem auger drilling techniques. Split-spoon samples were collected and Standard Penetration Tests (SPTs) were generally performed continuously to a depth of about 6 feet and at 5-foot intervals thereafter. Upon completion, the test borings were backfilled with drill cuttings to the approximate ground surface.

A GZA representative observed the test borings and test pits, classified the soil samples based on the Modified Burmister Soil Classification System, and prepared the test pit and test boring logs attached as **Appendix B** and **Appendix C**, respectively. Photos of the test pit excavations are provided in **Appendix D**. A handheld GPS unit was used to locate the explorations in the field following completion. Refer to **Figure 1** for an exploration location plan depicting approximate exploration locations and a table of exploration coordinates obtained using the handheld GPS unit.

LABORATORY ANALYSES

GZA performed laboratory Atterberg limit analyses on two soil samples collected from the Site. Laboratory test results for site's soil are included in **Appendix E**.

Corrosivity Testing

One composite soil sample from the test pits was evaluated for corrosivity using a suite of tests. The results from the corrosivity tests are summarized in the Summary of Laboratory Corrosivity Testing table below. Based on the parameters presented in the Comparison of Corrosivity Testing Results table below, steel piles or below grade exposed steel components on this site are not considered to be particularly susceptible to corrosion. Laboratory test results for corrosivity analyses are included in **Appendix F**.

Summary of Laboratory Corrosion Testing	
Resistivity	0.003 Mohm-cm (3,000 ohm-cm)
Sulfate	101 ppm
Sulfide	Not Detected (ND)
Chloride	ND
Redox Potential	269 mv
pH	7.68

Comparison of Corrosion Testing Results				
Parameter	Corrosive Based on Corrosivity Criteria[1]			Corrosive Based on Laboratory Results Compared to Corrosivity Criteria?
	CalTrans	AASHTO	FHWA	
Electrical Resistivity (ohm-cm)	Below 1,000 ohm-cm	Below 2,000 ohm-cm	Below 3,000 ohm-cm	No
pH	Below 5.5	Below 5.5; or Between 5.5 and 8.5 for organic soils	Below 5 and above 10	No
Sulfate (ppm)	Above 2,000 ppm	Above 1,000 ppm	Above 200 ppm	No
Chloride (ppm)	Above 500 ppm	No Criteria	Above 100 ppm	No

Based on American Concrete Institute (ACI) 318-14 Building Code and Commentary Table 19.3.1.1 and Table 19.3.2.1, it is our interpretation that the exposure class is “S0” and “no restriction” on cement type is applicable.

Thermal Resistivity Testing

Thermal resistivity laboratory testing of a composite sample from the upper 4 feet of on-site soils, excluding organics, was performed and the results are included in **Appendix E**.

[1] Three references used to evaluate corrosion test criteria herein included:
-CalTrans Publication entitled "Memo to Designers 3-1 July 2008.” CalTrans considers a site to be corrosive if one or more of the parameters listed in the table are exceeded.
-AASHTO LRFD Bridge Design Specifications (Fifth Edition 2010). AASHTO considers site conditions to be indicative of a potential pile deterioration or corrosion situation if one or more of the parameters listed on the table are exceeded.
-FHWA Publication No.FHWA NHI-05-039 entitled "Micropile Design and Construction" December2005. FHWA uses the criteria listed in the table to determine whether the ground is classified to have strong corrosion potential or is aggressive if any one of the conditions listed is exceeded.

Topsoil Nutrient and pH Testing

Soil nutrient and pH testing was performed on six samples collected from the upper 8 inches of topsoil at the site. The locations were preselected by Borrego, with input from the town of Fultonville, in areas previously identified as potential prime agricultural soils. A plan of the test sample locations and the results are included in **Appendix G**.

SUBSURFACE CONDITIONS

Soil

Based on GZA's test pits and two test borings, subsurface conditions generally consist of Topsoil underlain by Subsoil, potential Organic Soils (at test boring GZ-2 only), and natural Glaciofluvial or Lodgment Till Deposits which varied between predominantly granular to predominantly fine-grained soils. In the test pits, excavation effort generally ranged from easy to difficult in the upper 13 feet across the site, becoming more difficult with increasing depth. Refer to the exploration logs attached in **Appendix B** and **Appendix C** for detailed subsurface conditions at specific exploration locations. The depths and thicknesses elevations referenced herein should be considered approximate.

The subsurface soil strata are presented below in order of increasing depth:

Topsoil/Forest Mat – About 0.3 to 1 foot of Topsoil/Forest Mat was encountered at the ground surface at each of the explorations (test borings GZ-1 and GZ-2, and test pits TP-1 through TP-7). The Topsoil/Forest Mat generally consisted of dark brown, Clayey Silt to Silty Clay, and/or fine to medium Sand, with a visual estimate (based on weight) of up to 10 percent Organics/Roots. Excavation effort in the Topsoil/Forest Mat was generally easy. Due to the thickness of the Topsoil, Standard penetration tests (SPTs) in the test borings were limited in this stratum and limited to areas outside of the proposed array; however, N-Values (blow count from 6 to 18 inches of penetration) just below the Topsoil indicated that the layer is generally very loose to very soft in relative density and consistency, respectively.

Subsoil – A Subsoil layer was encountered below the Topsoil/Forest Mat at test pit TP-5 and test borings GZ-1 and GZ-2 at approximately 0.3 to 0.5 feet bgs. This stratum was observed to be primarily granular at TP-5 and GZ-1; but, was observed to be mostly fine-grained at test boring GZ-2. The granular Subsoil generally consisted of dark brown, fine to medium Sand, with a visual estimate (based on weight) of up to 50 percent (occasionally more) Clayey Silt, and less than 10 percent Roots. The subsoil at GZ-1 was observed to contain more gravel, but recovery was limited. The fine-grained Subsoil encountered at test boring GZ-2 consisted of dark brown, Silty Clay, with a visual estimate (based on weight) of up to 10 percent fine Sand, and less than 10 percent Organics. Excavation effort was observed to be easy in this stratum. SPT field N-values within this layer ranged from 1 to 12; indicating that the layer is very soft to medium stiff in consistency or medium dense to loose in relative density. The Subsoil stratum ranged between approximately 0.5 and 3.7 feet in thickness.

Potential Organics – A potential organic layer was encountered below the Subsoil at test boring GZ-2 between approximately 4 and 5.5 feet bgs, or about 1.5 feet thick. Sample recovery was limited (2 inches) within the one SPT split-spoon performed in this potential Organic layer, but organic Peat fibers were observed and the field N-value indicated that the soil was very soft in consistency.

Natural Glaciofluvial Deposits or Lodgment Till – Natural Glaciofluvial Deposits or Lodgment Till was encountered below the Topsoil/Forest Mat, Subsoil, or potential Organics at each of the explorations. The natural glaciofluvial deposits were generally observed to be generally more fine-grained (containing cohesive soil and less sand/gravel) than the lodgment till which was observed to be more coarse-grained (granular).

The granular deposits were observed below the Topsoil/Forest Mat/Subsoil at test pit locations TP-1 and TP-5, to depths between approximately 2 and 9 feet, measuring about 1 to 8.7 feet thick. The granular deposits were also observed below the fine-grained deposits at test pit locations TP-2 and TP-4, at a depth of 6.5 feet and extending to the bottom of the test pit at 9.5 to 12 feet bgs. The predominately granular deposits generally consisted of brown/dark brown fine to coarse Sand, with a visual estimate (based in weight) of between 20 and 50 percent Silt/Silt & Clay, and between 0 and 35 percent Gravel. Boulders measuring up to 18 inches in diameter were encountered in the granular deposits at test pit TP-2, starting at 7 feet bgs. Excavation effort ranged between easy to difficult in the granular deposits. Since the predominantly granular deposits were not observed in the test borings, no SPT field N-values were collected for this layer. Test pit TP-2 was terminated at 9.5 feet bgs within the granular deposits due to excavator refusal on possible nested boulders.

The fine-grained deposits were observed below the Topsoil/Forest Mat/Subsoil/Organics at test pit locations TP-2, TP-3, TP-4, TP-6, and TP-7 and test borings GZ-1 and GZ-2 at approximately 0.3 to 5.5 feet bgs. The fine-grained deposits were also observed below the granular deposits at test pits TP-1 and TP-5 starting at 2 and 9 feet bgs, respectively. The predominately fine-grained deposits within test pits TP-1 through TP-7 (proposed array area) and test boring GZ-1 (near proposed retaining wall to the north) generally consisted of brown/gray Silt & Clay to Silty Clay, with a visual estimate (based in weight) of between 0 to 20 percent fine to coarse Sand, and 0 to 10 percent Gravel and/or Cobbles. The fine-grained deposits encountered in test boring GZ-2 (near proposed cattle guard structure) was observed to contain up to 50 percent fine to coarse Sand. Boulders measuring up to 18 inches in diameter were encountered in the fine-grained deposit at test pit TP-7, starting at 9 feet bgs. Excavation effort ranged between easy to difficult in the fine-grained deposits, generally becoming more difficult with increasing depth. SPT field N-values within this layer ranged from 7 to more than 100 blows per foot; indicating that the layer is medium stiff to very hard in consistency. Test pit TP-7 was terminated at 9.5 feet bgs within the fine-grained deposits due to excavator refusal on possible nested boulders. Test pits TP-1, TP-3, TP-5, and TP-6 were terminated within the fine-grained deposits because the target depth had been reached between 12 and 13 feet bgs. Test borings GZ-1 and GZ-2 were also terminated within this layer at 31 and 21 feet bgs, respectively.

Groundwater

Groundwater was observed seeping into test pit TP-1 excavation at approximately 11.5 feet bgs. Groundwater was also observed at approximately 14 and 9 feet bgs at test borings GZ-1 and GZ-2, respectively. Soil mottling was observed at test pit TP-6 at approximately 2 to 6 feet bgs. Such mottling/rust staining may be indicative of seasonal high groundwater or perched water conditions due to compact fine-grained soils. Note that three wetland areas are shown on the plans within the development areas, indicating the water may be encountered at or near the ground surface at times.

Note that groundwater observations may not represent stabilized groundwater conditions, given the limited stabilization time and relatively low permeability surficial soils. Fluctuations in groundwater levels may occur due to variations in season, rainfall, site features and other factors different from those existing at the time of the explorations and measurements.

Frost Depth

For the soil conditions encountered in the test pits, as described above, the depth of frost penetration (“frost depth”) was estimated to be 4 feet based on the criteria in the U.S. Navy Frost Depth Map included in **Appendix H**. The actual maximum depth of freezing (frost depth) may be more or less than that estimated herein based on factors, including, but not necessarily limited to, extreme temperature fluctuations beyond those assumed in the U.S. Navy Frost Depth Map, variation in groundwater levels, construction conditions, ground cover and snow cover.

GEOTECHNICAL CONSIDERATIONS

Based on the subsurface conditions encountered in the explorations, the primary geotechnical consideration at this site is the presence of relatively very loose and very soft surficial soil deposits, and potential organic soils in the area of the cattle guard structure. In addition, potentially compressible soils were encountered in the areas of the proposed shallow foundations/equipment pads.

PV installations generally have relatively light vertical loads, but higher lateral loads and moments applied at the ground surface. Pile-supported foundations are typically the preferred foundation option for PV installations and are typically relatively quick to install. It is GZA's opinion that pile foundation systems are an appropriate foundation system for the site, provided the potential for encountering boulder obstructions or dense soils that may prevent piles from reaching design depths is addressed in project planning. Should pile foundations be chosen, predrilling may be required at some locations to allow piles to penetrate to design depth. Potential pile foundations include driven steel piles (H-piles, C-piles or pipe piles) or screw piles (such as hollow tapered ground screws). Piles should be galvanized to protect against corrosion. We anticipate that pile design lengths will be based in part on a comprehensive pile load test program performed at various locations at the site.

The design-build contractor may consider supporting the PV units on ground screw foundations to limit the impact of encountering obstructions and dense soils during construction, as ground screws can penetrate potential boulder obstructions better than driven piles installed with a lightweight hammer.

Based on our test pit and test boring observations and laboratory testing results, the soil within the upper 4 feet (typical frost depth) at the site, at certain locations, has a silt content of up to and over 50 percent and is considered to be a frost susceptible soil type. Soils with a significant silt fraction have the potential of retaining water via capillary action. Groundwater can become "perched" in the frost zone, where surface water from precipitation or snow melt traveling vertically through the soil column is impeded by the relatively low-permeability silt, creating a localized zone of saturated soils and potential for frost heave in cold weather.

DESIGN RECOMMENDATIONS

The recommendations presented below are based on our evaluation of the available data and information provided by you at the time of this report. Our findings and recommendations are subject to the *Limitations* contained in **Appendix A**.

Pile Foundations

It is GZA's opinion that driven steel piles or ground screw piles are acceptable foundation types for solar arrays at the site. We understand that some design-build contractors have a contingency procedure to follow in the field if the pile installation stops because of an obstruction. Moving the pile more than a few inches is not possible due to the pre-made rack placed on the piles. On other sites where piles have been used with potential shallow obstructions, we understand based on our experience with similar projects that the following criteria have been applied:

- If the obstruction is less than a certain depth, excavate to remove the obstruction, backfill in compacted lifts and then re-drive or re-screw the pile.
- If the obstruction is greater than a certain depth, terminate the pile driving and excavate around the pile to a certain depth and install a cardboard "Sonotube" concrete form over the pile, backfill and pour concrete within the form. The intent of the concrete collar is to increase the lateral and uplift capacity of the pile to compensate for the decreased pile embedment depth.

We understand that should a pile foundation type be chosen for this site, multiple load tests will be performed at the site using the same pile as proposed for production pile installation. We recommend performing load tests in areas where the granular deposits were encountered as well as where the fine-grained deposits were encountered to evaluate the strength of each soil type. We understand that data from the load tests will be used by the design-build foundation contractor to design the piles for construction. We recommend that driven pile testing be performed no sooner than 3 days after installation. No delay is required between ground screw installation and testing.

As discussed above, the soil within the frost zone is believed to be frost susceptible and shallow groundwater/perched water is possible at certain times of the year. Therefore, piles may need to be designed to resist the adfreeze (uplift) force caused by the soil heaving around the pile. Based on the Canadian Foundation Engineering Manual, 4th Edition, the designer may wish to consider an adfreeze uplift force within the frost zone on steel piles, if used. Proprietary pile coatings within the frost zone may be effective in reducing adfreeze forces.

We recommend that the structural engineer perform calculations to check the piles for shear and moment capacity before installation. GZA can provide a lateral load evaluation to assess pile embedment depths, if requested.

Based on our experience on sites with similar soil conditions, we understand that issues due to cumulative lateral ground surface deflections have become apparent due to loose silty/sandy soils and/or soft cohesive soils, with no gravel. Load testing and lateral load analyses may indicate that longer pile lengths will be required to provide pile base fixity.

We recommend that the structural engineer perform calculations to check the piles for shear and moment capacity before installation. GZA can provide a lateral load evaluation to assess pile embedment depths, if requested. It is recommended that the foundations be designed in accordance with the International Building Code (IBC), New York Edition. Friction parameters should only be applied to the rectangular perimeter of the pile plan area.

Seismic

Generally, the soils encountered in the PV installation area are unlikely to be susceptible to liquefaction based on criteria set forth in Section 1803.5 of the New York State Building Code (NYSBC). Please note that soils at depths below the limits of the explorations were not observed. Therefore, liquefaction susceptibility and liquefaction-induced settlement cannot be ruled out.

In accordance with Section 1613.3 of the IBC 2015, we recommend that Site Class D be used for seismic design for the site, assuming that the foundations are designed and constructed as recommended herein.

Unpaved Site Access Roads

Based on input from Borrego, we understand that post-construction temporary site access roads fall into two categories:

1. Fire truck access, anticipated maximum use 2 times per year; and
2. Pickup truck access, anticipated maximum use 4 times per year.

The following unpaved access road cross-section is recommended for new proposed fire truck access roads, in compliance with Appendix D of the International Fire Code (IFC), and assuming H-20 loading with an excavated subgrade consisting of the Glaciofluvial and Glaciolacustrine Deposits:

	Minimum Thicknesses
Finish Course (Dense-Graded Crushed Stone)	5 inches
Sand-Gravel Base Course	12 inches

Due to the potentially fine-grained, soft subgrades, GZA recommends the Sand-Gravel Base Course be underlain by a bi-axial geogrid/woven geotextile fabric (Mirafi BXG, Mirafi H2Ri or similar); if the geosynthetic is utilized, the Sand-Gravel Base Course thickness can be reduced to 10 inches for this section intended for fire truck access, assuming H-20 loading. Therefore, combined roadway cross section utilizing geosynthetic fabric would be 15 inches.

The following unpaved access road cross-section is recommended for new proposed pickup-truck-only access roads:

	Minimum Thicknesses
Finish Course (Dense-Graded Crushed Stone)	4 inches
Sand-Gravel Base Course	10 inches

Again, due to the potentially fine-grained, soft subgrades, GZA recommends the Sand-Gravel Base Course is underlain by a bi-axial geo-grid/woven geotextile fabric (Mirafi BXG, Mirafi H2Ri or similar); if the geosynthetic is utilized, the Sand-Gravel Base Course thickness can be reduced to 8 inches for this section intended for light duty pickup-truck access. Therefore, combined roadway cross section utilizing geosynthetic would be 12 inches.

Note that these cross-sections are not intended for construction traffic and are subject to seasonal frost heave as previously discussed.

Asphalt Paved Site Access Roads

We understand that the access road along Sections 0+18 and 1+42 will be asphalt paved. The following minimum pavement cross-sections are recommended for the proposed asphalt paved access road section.

Pavement Section	Minimum Required Thickness
	Truck Loading/Access Roads
Finish Course	2 inches
Binder Course	2 inches
Sand-Gravel Base Course	12 inches (with Geogrid or Woven Geotextile as recommended above)

Gradation requirements are provided below:

Sand-Gravel (Gravel) should consist of inert material comprised of hard, durable stone (not crushed concrete) and coarse sand, free from trash, ice, snow, tree stumps, roots, organic materials, and other deleterious matter, and conform to the following gradation:

Sieve Size (ASTM D422)	Percent Passing By Weight
2-inch*	100
1/2-inch	50-85
No. 4	40-75
No. 40	10-35
No. 200	0-8

Dense-Graded Crushed Stone should consist of angular fragments of hard, durable crushed rock (not crushed concrete), free from a detrimental quantity of thin, flat, elongated pieces or be durable crushed gravel stone obtained by artificial crushing of gravel, cobbles, boulders or fieldstone. The Dense-Graded Crushed Stone should be free from trash, ice, snow, tree stumps, roots, organic materials, lumps or balls of clay, and other deleterious matter. Dense-Graded Crushed Stone should conform to the following gradation:

Sieve Size (ASTM D422)	Percent Passing By Weight
2-inch	100
1-1/2-inch	70-100
3/4-inch	50-85
No. 4	30-55
No. 50	8-24
No. 200	3-8

Free Draining Structural Fill (Granular Fill) should be free from crushed concrete, trash, ice, snow, tree stumps, roots, organic materials, and other deleterious matter. Structural Fill should conform to the following gradation requirements:

Sieve Size (ASTM D422)	Percent Passing By Weight
3-inch	100
No. 10	30-95
No. 40	10-70
No. 200	0-10

3/4-inch Crushed Stone should consist of angular fragments of hard, durable crushed rock (not crushed concrete), free from a detrimental quantity of thin, flat, elongated pieces or should be durable crushed gravel stone obtained by artificial crushing of gravel boulders or fieldstone. The crushed stone should be free from trash, ice, snow, tree stumps, roots, organic materials, and other deleterious matter. 3/4-inch Crushed Stone should conform to the following gradation:

Sieve Size (ASTM D422)	Percent Passing By Weight
1-inch	100
3/4-inch	90-100
1/2-inch	10-50
3/8-inch	0-20
No. 4	0-5

Based on our observations, on-site materials are not anticipated to meet these recommended gradations.

Equipment Pads

Based on the plans, one electrical equipment pad area is proposed along the southern end of the proposed access road in the vicinity of test pit TP-3. Electrical equipment can be supported on conventional spread footing foundations bearing below the frost zone (4 feet below proposed grade) on undisturbed natural Glaciofluvial Deposits or Lodgment Till subgrades, or on compacted Granular Fill following subgrade preparation as recommended later in this report.

Equipment pads are typically poured eight-inch-thick reinforced concrete that are not designed to tolerate movement from frost, and as an alternative to conventional spread footings, may be supported on non-frost-susceptible soil extending to the frost depth, provided such soil is adequately drained. The bearing zone is defined as a minimum of 1 foot laterally from the outer edge of the pad and extending an additional 1 foot laterally for every 1 foot of excavation depth. Therefore, excavation for the equipment pad areas, should extend to at least 5 feet laterally (frost depth plus 1 foot) outside the edge of the equipment pads. Where practical, excavations should be performed with a smooth-edged bucket to minimize disturbance to the excavated subgrade.

A base course is recommended below the equipment pads consisting of at least 18 inches of ¾-inch crushed stone underlain by non-woven filter fabric (Mirafi 140N or similar). The filter fabric should envelop the crushed stone so that the crushed stone does not contact adjacent soil. The base course should extend to at least 2 feet laterally beyond the edge of the equipment pad. To help improve drainage, the finished grade within 2 horizontal feet of the pad/mat should be raised by at least 2 feet above surrounding site grades. If the pad area cannot be raised, it may be prudent to install a perimeter drain around the pad areas at the bottom of the Free Draining Structural Fill. The drain should consist of a 4-inch diameter perforated PVC pipe with perforations at the bottom and surrounded on all sides with approximately 4-inches of ¾-inch crushed stone wrapped in filter fabric (Mirafi 140N or similar). The drain should be day-lighted and allowed to drain by gravity. The invert of the drain should be located approximately 4 feet (frost depth) below the top of the concrete pad. Site grades in the area of the pads may need to be raised to achieve proper drainage. Surface water runoff should not be allowed to pond within the non-frost-susceptible soil. Non-frost-susceptible soil includes Free Draining Structural Fill (Granular Fill), Sand-Gravel, or Crushed Stone, as described above. GZA recommends a modulus of subgrade reaction of 150 pounds per cubic inch (pci) referenced to a 1-foot by 1-foot area for use in design of pads and mat foundations with subgrade prepared as described above.

Provided that footing subgrade preparation is performed in accordance with the recommendations of this report, the recommended maximum net allowable bearing pressure for design of spread footings bearing on undisturbed, natural or Glaciofluvial Deposits/Lodgment Till or Structural Fill placed over these materials is 1,500 psf.

GZA recommends that lateral loads, if any, be resisted by sliding friction between the base of the spread footings and subgrade soils. Foundations should be designed using a friction factor against base shear of 0.4. The factor of safety against sliding should be at least 1.5.

Strip footings and isolated footings should be at least 18 inches and 24 inches wide in the least lateral dimension, respectively. For frost protection, the footings should bear at least 4 feet below final exterior grades. Footing subgrades should be protected from frost. Do not place concrete or fill over a frozen subgrade.

Based on information from Borrego, GZA understands equipment pad areas typically require excavation up to about 3 feet below finished grade for placing conduits. Note that some utility trench locations may be located below the groundwater table, particularly at the proposed electrical equipment located along the southern spur. Backfill over the conduits should be compacted Free Draining Granular Fill, provided that the material in contact with the utility is screened to remove particles exceeding 1 inch in diameter and the material does not damage the conduit or inhibit the intended

use; or backfilled as otherwise recommended by the conduit manufacturer. The Granular Fill should also extend at least 1 foot outside the conduit on all sides. The Granular Fill should be compacted to at least 92 percent of the maximum dry density at optimum moisture content as determined by ASTM Test D1557, Method C. GZA understands that this 92 percent compaction requirement is in line with criteria typically used for compaction within electrical trenches in equipment pad areas.

Retaining Wall Foundations

Based on the provided plans, we understand the proposed 103-foot-long segmental block retaining wall will be supported on a leveling pad placed over natural undisturbed soils after the removal of Topsoil/Subsoil; the leveling pad material will be according to the wall designer material specification.

The block wall manufacturer specified a minimum soil bearing capacity below the blocks and behind the wall of 2600 psf. Based on the soil encountered in test boring GZ-1, located near the proposed wall, a required minimum bearing capacity of 2,600 psf should be achieved, provided that the subgrade is prepared as referenced in this report.

Typically, such proprietary modular block retaining walls are design by the contractor's engineer. Their design should be reviewed by Borrego and/or GZA and accepted before construction.

Cattle Guard Foundations

Based on the provided plans, we understand the proposed cattle guard will bear on precast reinforced concrete footings (sills). The sills appear to have a base width of 18 inches and measure about 23 inches in total height, with an 11-inch-wide sill on which the metal cattle guard will sit. The sill is located about 12 inches from the bottom of the footing. Due to the potential compressible organic soils encountered at test boring GZ-2 to a depth of 5.5 feet, the soil within the bearing zone will need to be excavated and replaced with compacted structural fill to a depth of approximately 5.5 feet bgs. The embedment depth of the footing is unclear based on the plans; however, we assume it will be at least 1 foot bgs. The bearing zone is defined as a minimum of 1 foot laterally from the outer edge of the footing and extending an additional 1 foot laterally for every 1 foot of excavation depth. Where practical, excavations should be performed "in the dry" with a smooth-edged bucket to minimize disturbance to the excavated subgrade.

Since the footing will likely bear above the frost depth, uneven frost heaving between the unpaved roadway and the concrete footings is possible. Additionally, it will be difficult to drain the area due to its location in a low-lying wetland area. If uneven frost heaving is undesirable, the cattle guard may be supported on a similar footing design that extends to the below the frost depth (minimum 4 feet bgs) and is supported on undisturbed natural soils, such as the typical Natural Glaciofluvial Deposits/Lodgment Till.

Provided that footing subgrade preparation is performed in accordance with the recommendations of this report, the recommended maximum net allowable bearing pressure for design of spread footings bearing on undisturbed, natural Glaciofluvial Deposits/Lodgment Till or Structural Fill placed over these materials is 2,600 psf.

<u>Equipment Pad and Foundation Subgrade Preparation</u>

- Excavate Topsoil/Forest Mat/Subsoil within the zone of influence of shallow foundations or equipment pads, as defined by a 1-horizontal to 1-vertical (1H:1V) line, sloping downward and outward from 1-foot outside the bottom edge of footings/pads.
- Where practical, final excavation should be undertaken using a smooth-edged bucket to limit disturbance of the subgrade.

- Proof-compact the exposed soil subgrade with at least ten passes of a 10,000-pound (minimum static weight) roller or a heavy plate compactor in confined areas. However, to limit disturbance of predominantly fine-grained soil subgrades, the bottom of the undisturbed excavation should be statically rolled or "heeled" with the excavator bucket in place of using vibratory compaction equipment.
- Fine-grained soils are sensitive to moisture and should be suitably protected if exposed. If fine-grained soils degrade due to exposure, the wet/disturbed soil should be undercut to suitable, stable soil and either the foundation extended to a suitable bearing grade, or the exposed suitable soil subgrade raised with Structural Fill or ¾-inch crushed stone. If ¾-inch crushed stone is used, non-woven filter fabric should envelop the crushed stone when the overall thickness exceeds 6 inches. Construction should be sequenced and planned to limit the time that the subgrades are exposed to potential precipitation and/or freezing temperatures.
- Protect the exposed subgrade from frost at all times during construction. Fill should not be placed over frozen soil. Do not place frozen Structural Fill.

Subgrade preparations for backfilling, equipment support slabs, retaining walls, cattle guard and access roads must be conducted in such a way as to limit disturbance and allow work "in the dry," using a smooth-edged excavator bucket, particularly if silty soils are encountered at subgrade level. Care must be taken to slope all working surfaces to facilitate drainage and control surface water. Appropriate dewatering/surface water control procedures should be implemented prior to performing final excavation to subgrade and proof-compaction. Temporary measures to reduce the amount of surface water (from rainfall runoff) into construction areas may include, but not be limited to:

- Construct small berms to divert and/or reduce the amount of surface water flowing over exposed subgrades during construction;
- Maintain general site grading to promote surface run-off and limit ponding; and
- Use a smooth drum compactor in static mode or back drag areas with a smooth bucket to help seal exposed soil surfaces prior to inclement weather.

Rutting from excavation equipment and drill rig was apparent during the subsurface explorations. The near surface, fine-grained soil subgrades may deteriorate during wet weather/seasons. Frequently traveled areas of the site may need to be temporarily stabilized to establish reliable travel lanes during construction.

The Owner and the Contractor should become familiar with and follow all applicable local, state, and federal safety regulations, including the current Occupational Safety and Health Administration (OSHA) Excavation and Trench Safety Standards. Construction site safety generally is the sole responsibility of the Contractor, who shall also be solely responsible for the means, methods, and sequencing of construction operations. As a safety measure, it is recommended that all vehicles and soil piles be kept a minimum lateral distance from the edge of excavations equal to no less than the excavation depth. Also, the exposed excavation face should be protected against the elements.

CLOSING

We trust the information presented herein is sufficient for your use. We have enjoyed working with you on this project and look forward to our assisting you on future projects. Please call us with any questions.

Very truly yours,

GZA GEOENVIRONMENTAL, INC.

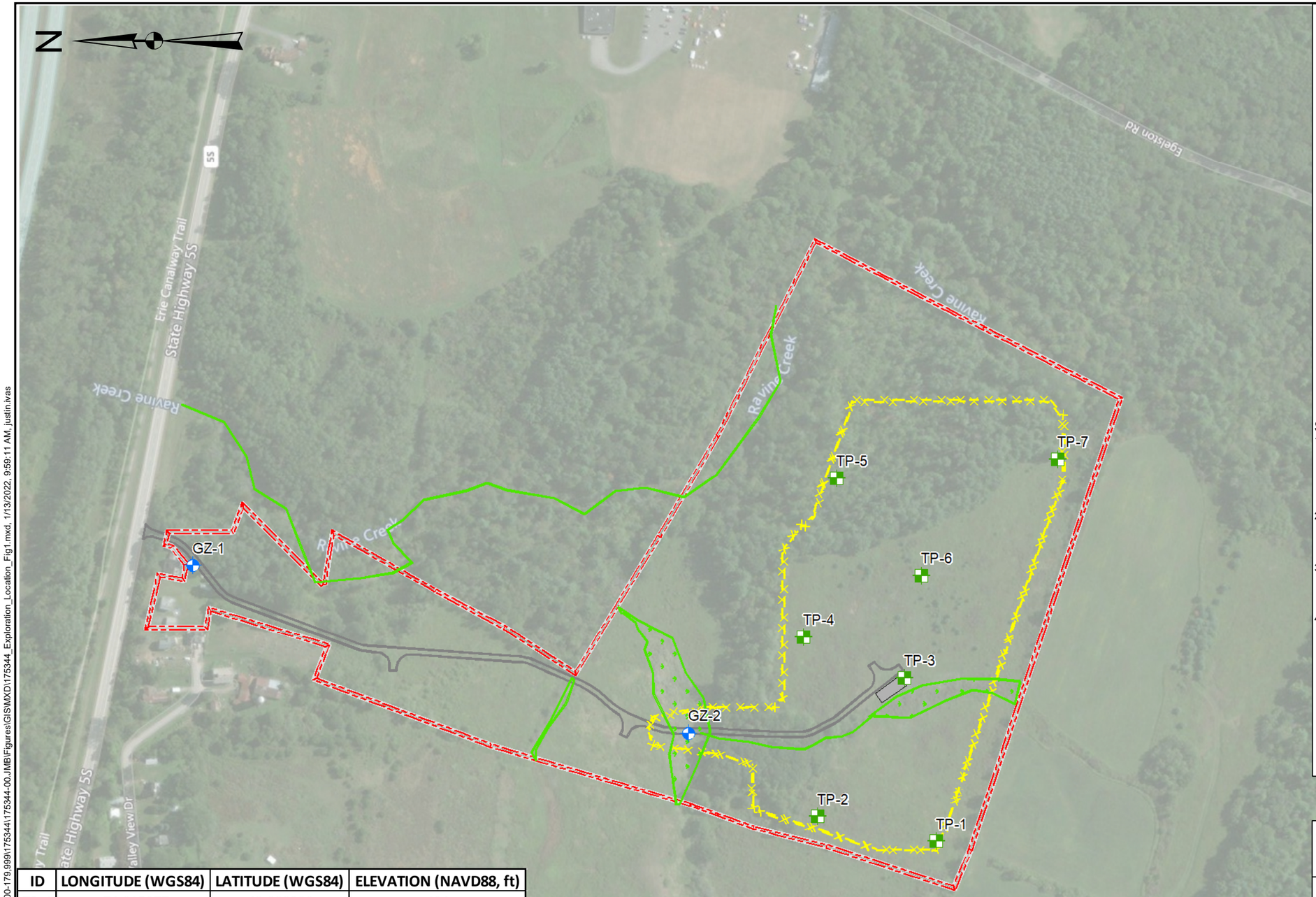
Joseph Benoit, P.E. (MA)
Project Manager

Ernest R. Hanna, P.E.
Consultant/Reviewer

Bruce W. Fairless, P.E.
Principal

Attachments: Figure 1 – Exploration Location Plan
Appendix A – Limitations
Appendix B – Test Pit Logs
Appendix C – Test Boring Logs
Appendix D – Test Pit Photos
Appendix E – Geotechnical Laboratory Test Results
Appendix F – Laboratory Corrosivity Test Results
Appendix G – Laboratory Topsoil Nutrient and pH Test Results
Appendix H – U.S. Navy Frost Depth Map

Figure



ID	LONGITUDE (WGS84)	LATITUDE (WGS84)	ELEVATION (NAVD88, ft)
TP-1	-74.315377	42.923222	404
TP-2	-74.315111	42.924141	382
TP-3	-74.313648	42.923461	379
TP-4	-74.313210	42.924249	384
TP-5	-74.311533	42.923989	401
TP-6	-74.312562	42.923332	389
TP-7	-74.311335	42.922268	388
GZ-1	-74.312437	42.928992	315
GZ-2	-74.314223	42.925143	332

LEGEND

- APPROXIMATE TEST PIT LOCATION PERFORMED BY MC ENVIRONMENTAL SERVICES, INC. OF QUEENSBURY, NEW YORK, ON NOVEMBER 29, 2021. OBSERVED AND LOGGED BY GZA PERSONNEL.
- APPROXIMATE TEST BORING LOCATION PERFORMED BY CASCADE DRILLING, INC. OF ALBANY, NEW YORK, ON DECEMBER 2, 2021. OBSERVED AND LOGGED BY GZA PERSONNEL.
- LOCATION OF WETLANDS PREVIOUSLY LOCATED BY OTHERS
- PROPOSED EQUIPMENT PAD
- PROPOSED ACCESS ROAD
- PROPOSED ARRAY FENCE LINE
- PROPERTY BOUNDARY

SOURCE

1) THIS MAP CONTAINS THE ESRI ArcGIS ONLINE BING MAPS AERIAL LAYER PACKAGE, PUBLISHED DECEMBER 1, 2010 BY ESRI ARCIMS SERVICES AND UPDATED MONTHLY. THIS SERVICE USES UNIFORM NATIONALLY RECOGNIZED DATUM AND CARTOGRAPHY STANDARDS AND A VARIETY OF AVAILABLE SOURCES FROM SEVERAL DATA PROVIDERS.

2) THE LOCATIONS OF THE TEST PITS AND BORINGS WERE APPROXIMATELY DETERMINED BY GPS OR LINE-OF-SIGHT. THIS DATA SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.

3) GROUND SURFACE ELEVATION DERIVED FROM THE NEW YORK STATE 2 METER DIGITAL ELEVATION MODEL, AND ARE CITED IN THE NORTH AMERICAN VERTICAL DATUM OF 1988 IN UNITS OF FEET (NAVD88).

4) SITE FEATURES SUCH AS: PROPERTY BOUNDARY, EQUIPMENT PAD, FENCE LINE, ACCESS ROAD, AND WETLANDS ARE APPROXIMATED AND COMPILED FROM: "2621 STATE HIGHWAY 52 - GRADING AND EROSION CONTROL PLAN", DATED 07/27/21, PREPARED BY BORREGO SOLAR. SITE FEATURES SHOULD BE CONSIDERED APPROXIMATE FOR THE PURPOSE OF THIS FIGURE.

0 200 400 800
SCALE IN FEET

PROPOSED GROUND-MOUNT
PHOTO-VOLTAIC (PV) SYSTEM
2621 STATE HWY 5S
FULTONVILLE, NEW YORK

EXPLORATION LOCATION PLAN

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com

PREPARED FOR: BORREGO SOLAR

PROJ MGR: JMB	REVIEWED BY: BWF	CHECKED BY: DGL	FIGURE 1
DESIGNED BY: JMB	DRAWN BY: JAI	SCALE: 1 " = 300 FEET	
DATE: 01/13/2022	PROJECT NO. 01.0175344.00	REVISION NO.	

Appendix A – Limitations

USE OF REPORT

1. GZA GeoEnvironmental of New York (GZANY) prepared this report on behalf of, and for the exclusive use of Borrego Solar Sysytems, Inc. (Client) for the stated purpose(s) and location(s) identified in the Agreement and/or Report. Use of this report, in whole or in part, at other locations, or for other purposes, may lead to inappropriate conclusions; and we do not accept any responsibility for the consequences of such use(s). Further, reliance by any party not expressly identified in the agreement, for any use, without our prior written permission, shall be at that party's sole risk, and without any liability to GZA.

STANDARD OF CARE

2. GZA's findings and conclusions are based on the current available information as part of the Scope of Services set forth in Agreement and/or Report, and reflect our professional judgment. These findings and conclusions must be considered not as scientific or engineering certainties, but rather as our professional opinions concerning the limited data gathered during the course of our work. If conditions other than those described in this report are found at the subject location(s), or the design has been altered in any way, GZA shall be so notified and afforded the opportunity to revise the report, as appropriate, to reflect the unanticipated changed conditions. The findings in this report will be revised based on additional subsurface explorations performed as part of final design.

3. GZA's services were performed using the degree of skill and care ordinarily exercised by qualified professionals performing the same type of services, at the same time, under similar conditions, at the same or a similar property. No warranty, expressed or implied, is made.

4. In conducting our work, GZA relied upon certain information made available by public agencies, Client and/or others. GZA did not attempt to independently verify the accuracy or completeness of that information. Inconsistencies in this information which we have noted, if any, are discussed in the report.

SUBSURFACE CONDITIONS

5. The generalized soil profile(s) provided in our report are based on widely-spaced subsurface explorations performed by others and are intended only to convey trends in subsurface conditions. GZA cannot be responsible for the accuracy of the data. The boundaries between strata are approximate and idealized, and were based on our assessment of subsurface conditions. The composition of strata, and the transitions between strata, may be more variable and more complex than indicated. For more specific information on soil conditions at a specific location refer to the exploration logs.

6. In preparing this report, GZA relied on certain information provided by Client, state and local officials, and other parties referenced therein which were made available to GZA at the time of our evaluation. GZA did not attempt to independently verify the accuracy or completeness of all information reviewed or received during the course of this evaluation.

7. Water level readings have been made in test holes at the specified times and under the stated conditions. GZA cannot be responsible for the accuracy of the data. These data have been reviewed and interpretations have been made in this report. Fluctuations in the level of the groundwater however occur due to temporal or spatial variations in areal recharge rates, soil heterogeneities, the presence of subsurface utilities, and/or natural or artificially induced perturbations. The water table encountered in the course of the work may differ from that indicated in the report.

8. GZA's services did not include an assessment of the presence of oil or hazardous materials at the property. The project's Licesnsed Site Professional shall be responsible for considering the potential impacts (if any) that contaminants in soil or groundwater may have on construction activities, or the use of structures on the property.

9. Recommendations for foundation drainage, waterproofing, and moisture control address the conventional geotechnical engineering aspects of seepage control. These recommendations may not preclude an environment that allows the infestation of mold or other biological pollutants.

COMPLIANCE WITH CODES AND REGULATIONS

10. We used reasonable care in identifying and interpreting applicable codes and regulations. These codes and regulations are subject to various, and possibly contradictory, interpretations. Compliance with codes and regulations by other parties is beyond our control.

ADDITIONAL SERVICES

11. GZA recommends that we be retained to provide services during any future: site observations, design, implementation activities, construction and/or property development/redevelopment. This will allow us the opportunity to: i) observe conditions and compliance with our design concepts and opinions; ii) allow for changes in the event that conditions are other than anticipated; iii) provide modifications to our design; and iv) assess the consequences of changes in technologies and/or regulations.

Appendix B – Test Pit Logs

GZA
GeoEnvironmental of NY
Engineers/Scientists
104 W 29th St #10
New York, NY 10001

2621 State Highway 5S Solar - Fultonville, NY	Test Pit No. TP-1
Borrego Solar Systems, Inc.	Page No. 1 of 1
2621 State Highway 5S	File No. 01.0175344.00
Fultonville, New York	Checked By: JMB

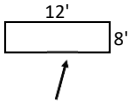
GZA Rep.	Shiv Bhardwaj	Contractor	MC Environmental Services, Inc.			Date	11/29/2021
		Operator	Michael Craft			Ground Elev.	404
Weather	Cloudy, 20-30s	Make	Kobelco	Model	SK-115DZ	Time Started	0859
		Capacity	~ 0.7 CY	Reach	~ 18 FT	Time Completed	0947

Depth	Soil Description	Sample No.	Field Test Data	Excav. Effort	Boulders: Count/ Class	Note No.
0	0.3' Brown, fine to medium SAND, some Silt, trace Organics/Roots (TOPSOIL)			E		1
1'				E		2
2'				E		
3'				E		
4'				M		
5'	Brown, fine to medium SAND, little Silt (SAND)			M		
6'				M		
7'				M		
8'				M		
9'	9'			M		3
10'	Brown, Silty CLAY (SILTY CLAY)			D		
11'	11'			D		
12'	Gray, SILT & CLAY, trace fine Sand (SILT & CLAY) 12'			D		4 5
13'	Bottom of Test Pit 12 feet below ground surface.					
14'						
15'						
16'						

Notes:

1. Ground surface elevation estimated from the USGS 3DEP 1 M Digital Elevations Model, and are cited in the North American Vertical Datum of 1988 (NAVD88) in units of feet. Test pit located by handheld GPS unit following excavation.
2. Roots observed to approximately 2 feet below ground surface (bgs).
3. Multiple north and south sidewall collapses observed from approximately 0.5 to 9 feet bgs.
4. Possible groundwater observed seeping from the excavation's sidewalls at approximately 11.5 feet bgs.
5. Test pit terminated at approximately 12 feet bgs. Upon completion, test pit was backfilled with excavated material in lifts and tamped with the heel of the excavator bucket.

Test Pit Plan



Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(X) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water
0.1	11.5 FT

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to factors other than those present at the time measurements were made.

GZA
GeoEnvironmental of NY
Engineers/Scientists
104 W 29th St #10
New York, NY 10001

2621 State Highway 5S Solar - Fultonville, NY	Test Pit No. TP-2
Borrego Solar Systems, Inc.	Page No. 1 of 1
2621 State Highway 5S	File No. 01.0175344.00
Fultonville, New York	Checked By: JMB

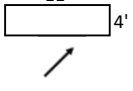
GZA Rep.	Shiv Bhardwaj	Contractor	MC Environmental Services, Inc.			Date	11/29/2021
		Operator	Michael Craft			Ground Elev.	382
Weather	Cloudy, 20-30s	Make	Kobelco	Model	SK-115DZ	Time Started	0957
		Capacity	~ 0.7 CY	Reach	~ 18 FT	Time Completed	1029

Depth	Soil Description	Sample No.	Field Test Data	Excav. Effort	Boulders: Count/ Class	Note No.
0	0.3' Brown, CLAY & SILT, trace Organics/Roots (TOPSOIL)			E		1
1'				E		2
2'				E / M		
3'	Brown/ gray, Silty CLAY, trace fine Sand (SILTY CLAY)			M		
4'					1A	
5'				M	1A	
6'				M		
	6.5'			D		
7'	Brown, fine to coarse SAND and SILT, little fine Gravel (SILTY SAND)			D	1A	
8'				D	2A	
9'	9.5'			D		3
10'	Excavator refusal encountered due to possible nested boulders. Bottom of Test Pit 9.5 feet below ground surface.					
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1. Ground surface elevation estimated from the USGS 3DEP 1 M Digital Elevations Model, and are cited in the North American Vertical Datum of 1988 (NAVD88) in units of feet. Test pit located by handheld GPS unit following excavation.
2. Roots observed to approximately 1.5 feet below ground surface (bgs).
3. Test pit terminated at approximately 9.5 feet bgs due to excavator refusal on possible nested boulders. Upon completion, test pit was backfilled with excavated material in lifts and tamped with the heel of the excavator bucket.

Test Pit Plan



Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
( ) Encountered
(X) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to factors other than those present at the time measurements were made.

GZA
GeoEnvironmental of NY
Engineers/Scientists
104 W 29th St #10
New York, NY 10001

2621 State Highway 5S Solar - Fultonville, NY
Borrego Solar Systems, Inc.
2621 State Highway 5S
Fultonville, New York

Test Pit No. TP-3
Page No. 1 of 1
File No. 01.0175344.00
Checked By: JMB

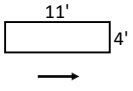
GZA Rep.	Shiv Bhardwaj	Contractor	MC Environmental Services, Inc.			Date	11/29/2021
		Operator	Michael Craft			Ground Elev.	379
Weather	Cloudy, 20-30s	Make	Kobelco	Model	SK-115DZ	Time Started	1037
		Capacity	~ 0.7 CY	Reach	~ 18 FT	Time Completed	1109

Depth	Soil Description	Sample No.	Field Test Data	Excav. Effort	Boulders: Count/ Class	Note No.
0	0.3' Brown, SILT & CLAY, trace Organics/Roots (TOPSOIL)			E		1
1'				E		2
2'				M		
3'				M		
4'	Brown, Silty CLAY (SILTY CLAY)			M		
5'				M		
6'				M / D		
7'				M / D		
8'	8'			D		
9'		S-1		D		
10'	Gray, Silty CLAY (SILTY CLAY)			D		
11'				D		
12'				D		3
	12.5 Bottom of Test Pit 12.5 feet below ground surface.					
13'						
14'						
15'						
16'						

Notes:

1. Ground surface elevation estimated from the USGS 3DEP 1 M Digital Elevations Model, and are cited in the North American Vertical Datum of 1988 (NAVD88) in units of feet. Test pit located by handheld GPS unit following excavation.
2. Roots observed to approximately 1.5 feet below ground surface (bgs).
3. Test pit terminated at approximately 12.5 feet bgs. Upon completion, test pit was backfilled with excavated material in lifts and tamped with the heel of the excavator bucket.

Test Pit Plan



Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
( ) Encountered
(X) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to factors other than those present at the time measurements were made.

GZA
GeoEnvironmental of NY
Engineers/Scientists
104 W 29th St #10
New York, NY 10001

2621 State Highway 5S Solar - Fultonville, NY
Borrego Solar Systems, Inc.
2621 State Highway 5S
Fultonville, New York

Test Pit No. TP-4
Page No. 1 of 1
File No. 01.0175344.00
Checked By: JMB

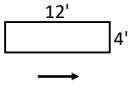
GZA Rep.	Shiv Bhardwaj	Contractor	MC Environmental Services, Inc.			Date	11/29/2021
		Operator	Michael Craft			Ground Elev.	384
Weather	Cloudy, 20-30s	Make	Kobelco	Model	SK-115DZ	Time Started	1115
		Capacity	~ 0.7 CY	Reach	~ 18 FT	Time Completed	1148

Depth	Soil Description	Sample No.	Field Test Data	Excav. Effort	Boulders: Count/ Class	Note No.
0	0.3' Brown, Silty CLAY, trace Organics/Roots (TOPSOIL)			E		1, 2
1'				E		
2'				E		
3'	Brown, Silty CLAY, trace fine to coarse Gravel, trace fine to coarse Sand (SILTY CLAY)			E / M		
4'				E / M		
5'				M		
6'	6.5'			M		
7'	Brown, fine to coarse SAND and SILT & CLAY, some fine Gravel (SILTY SAND & GRAVEL)			D		
8'				D		
9'				D		
10'				D		
11'				D		
12'	12' Bottom of Test Pit 12 feet below ground surface.			D		3
13'						
14'						
15'						
16'						

Notes:

1. Ground surface elevation estimated from the USGS 3DEP 1 M Digital Elevations Model, and are cited in the North American Vertical Datum of 1988 (NAVD88) in units of feet. Test pit located by handheld GPS unit following excavation.
2. Roots observed to approximately 1.0 foot below ground surface (bgs).
3. Test pit terminated at approximately 12 feet bgs. Upon completion, test pit was backfilled with excavated material in lifts and tamped with the heel of the excavator bucket.

Test Pit Plan



Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
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C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
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SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
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M = Medium
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V = Very
F/M = Fine to medium
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BN = Brown
YEL = Yellow

GROUNDWATER
( ) Encountered
(X) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to factors other than those present at the time measurements were made.

GZA
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Engineers/Scientists
104 W 29th St #10
New York, NY 10001

2621 State Highway 5S Solar - Fultonville, NY
Borrego Solar Systems, Inc.
2621 State Highway 5S
Fultonville, New York

Test Pit No. TP-5
Page No. 1 of 1
File No. 01.0175344.00
Checked By: JMB

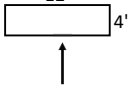
GZA Rep.	Shiv Bhardwaj	Contractor	MC Environmental Services, Inc.			Date	11/29/2021
		Operator	Michael Craft			Ground Elev.	401
Weather	Cloudy, 20-30s	Make	Kobelco	Model	SK-115DZ	Time Started	1308
		Capacity	~ 0.7 CY	Reach	~ 18 FT	Time Completed	1343

Depth	Soil Description	Sample No.	Field Test Data	Excav. Effort	Boulders: Count/ Class	Note No.
0	0.5' Dark brown, fine to coarse SAND and Clayey SILT, trace Organics/Roots			E		1
1'	1' (FOREST MAT)					
	Brown, fine to medium SAND and CLAYEY SILT (SUBSOIL)			E		
2'	2' Dark brown, fine to coarse SAND, little Silt, trace fine Gravel (SAND)					2
				E		
3'				E / M		
4'				E / M		
5'				M		
6'	Brown, Silty CLAY (SILTY CLAY)			D		
7'				D		
8'				D		
9'				D		
10'	10'			D		
11'	Gray, Silty CLAY (SILTY CLAY)			M		
12'				M		
13'	13' Bottom of Test Pit 13 feet below ground surface.					3
14'						
15'						
16'						

Notes:

1. Ground surface elevation estimated from the USGS 3DEP 1 M Digital Elevations Model, and are cited in the North American Vertical Datum of 1988 (NAVD88) in units of feet. Test pit located by handheld GPS unit following excavation.
2. Roots observed to approximately 2.0 feet below ground surface (bgs).
3. Test pit terminated at approximately 13 feet bgs. Upon completion, test pit was backfilled with excavated material in lifts and tamped with the heel of the excavator bucket.

Test Pit Plan



Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
( ) Encountered
(X) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to factors other than those present at the time measurements were made.

GZA
GeoEnvironmental of NY
Engineers/Scientists
104 W 29th St #10
New York, NY 10001

2621 State Highway 5S Solar - Fultonville, NY	Test Pit No. TP-6
Borrego Solar Systems, Inc.	Page No. 1 of 1
2621 State Highway 5S	File No. 01.0175344.00
Fultonville, New York	Checked By: JMB

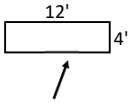
GZA Rep.	Shiv Bhardwaj	Contractor	MC Environmental Services, Inc.			Date	11/29/2021
		Operator	Michael Craft			Ground Elev.	389
Weather	Cloudy, 20-30s	Make	Kobelco	Model	SK-115DZ	Time Started	1355
		Capacity	~ 0.7 CY	Reach	~ 18 FT	Time Completed	1431

Depth	Soil Description	Sample No.	Field Test Data	Excav. Effort	Boulders: Count/ Class	Note No.
0	0.5' Dark brown, CLAY & SILT, trace fine Sand, trace Organics/Roots (TOPSOIL)			E		1
1'				E		2
2'				E		
3'				E / M		
4'				E / M		
5'	Brown, SILT & CLAY, trace fine Sand (SILT & CLAY)			M		3
6'				M		4
7'				D		
8'				D		
9'				D		
10'	10'			M		
11'	Gray, SILT & CLAY (SILT & CLAY)			M		5
12'	12' Bottom of Test Pit 12 feet below ground surface.					
13'						
14'						
15'						
16'						

Notes:

1. Ground surface elevation estimated from the USGS 3DEP 1 M Digital Elevations Model, and are cited in the North American Vertical Datum of 1988 (NAVD88) in units of feet. Test pit located by handheld GPS unit following excavation.
2. Roots observed to approximately 1.5 feet below ground surface (bgs).
3. Orange staining/soil mottling observed in the excavation sidewalls from approximately 2 to 6 feet bgs.
4. Multiple north sidewall collapses observed from approximately 1 to 7 feet bgs.
5. Test pit terminated at approximately 12 feet bgs. Upon completion, test pit was backfilled with excavated material in lifts and tamped with the heel of the excavator bucket.

Test Pit Plan



Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
( ) Encountered
(X) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to factors other than those present at the time measurements were made.

GZA
GeoEnvironmental of NY
Engineers/Scientists
104 W 29th St #10
New York, NY 10001

2621 State Highway 5S Solar - Fultonville, NY
Borrego Solar Systems, Inc.
2621 State Highway 5S
Fultonville, New York

Test Pit No. TP-7
Page No. 1 of 1
File No. 01.0175344.00
Checked By: JMB

GZA Rep.	Shiv Bhardwaj	Contractor	MC Environmental Services, Inc.			Date	11/29/2021
		Operator	Michael Craft			Ground Elev.	388
Weather	Cloudy, 20-30s	Make	Kobelco	Model	SK-115DZ	Time Started	1439
		Capacity	~ 0.7 CY	Reach	~ 18 FT	Time Completed	1512

Depth	Soil Description	Sample No.	Field Test Data	Excav. Effort	Boulders: Count/ Class	Note No.
0	Dark brown, Silty CLAY, trace Organics/Roots (TOPSOIL)			E		1
1'				E		2
2'				E		
3'	Dark brown, Silty CLAY, trace fine to medium Sand (SILTY CLAY)	S-2		E / M		
4'				E / M		
5'				M		
6'				M		
7'	Dark gray, Silty CLAY, little fine to coarse Sand, trace Cobbles, trace fine to coarse Gravel (SILTY CLAY)			D		
8'				D		
9'				D	1A	
10'				D	2A	3
11'	Excavator refusal encountered due to possible nested boulders. Bottom of Test Pit 11 feet below ground surface.					
12'						
13'						
14'						
15'						
16'						

Notes:

1. Ground surface elevation estimated from the USGS 3DEP 1 M Digital Elevations Model, and are cited in the North American Vertical Datum of 1988 (NAVD88) in units of feet. Test pit located by handheld GPS unit following excavation.
2. Roots observed to approximately 2 feet below ground surface (bgs).
3. Test pit terminated at approximately 11 feet bgs due to excavator refusal on possible nested boulders. Upon completion, test pit was backfilled with excavated material in lifts and tamped with the heel of the excavator bucket.

Test Pit Plan
12' × 4'
NORTH

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
( ) Encountered
(X) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to factors other than those present at the time measurements were made.

Appendix C – Test Boring Logs

TEST BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Borrego Solar Systems, Inc.
2621 State Highway 5S Solar, Fultonville, NY
2621 State Highway 5S
Fultonville, New York

BORING NO.: GZ-1
SHEET: 1 of 1
PROJECT NO: 01.0175344.00
REVIEWED BY: JMB

Drilling Co.: Cascade Environmental, LLC
Foreman: Joe Hutchins
Logged By: Shiv Bhardwaj

Type of Rig: ATV Mounted
Rig Model: Geoprobe 7822DT
Drilling Method: HSA

Boring Location: See Plan
Ground Surface Elev. (ft.): 315
Final Boring Depth (ft.): 31
Date Start - Finish: 12/2/2021 - 12/2/2021

H. Datum: WGS84
V. Datum: NAVD88

Auger/Casing Type: HSA
I.D/O.D.(in): 2.25 / 5.625
Hammer Weight (lb.): N/A
Hammer Fall (in.): N/A
Other: N/A

Sampler Type: Split Spoon
I.D./O.D. (in.): 1.375 / 2
Sampler Hmr Wt (lb): 140
Sampler Hmr Fall (in): 30
Other: Auto Hammer

Groundwater Depth (ft.)

Date	Time	Water Depth	Casing	Stab. Time
12/2/21	0855 hrs.	14 ft.	14 ft.	SEE NOTE

Depth (ft)	Casing Blows/ Core Rate	Sample No.	Sample Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)	SPT Value	Sample Description and Identification (Modified Burmister Procedure)	Remark	Field Test Data
		S-1	0-2	24	19	6 6 6 7	12	S-1: (Top 5 inches) Dark brown, GRAVEL and SILT, some fine to coarse Sand, trace (-) Roots.	1 2	
		S-2	2-4	24	13	4 6 5 12	11	S-1: (Bottom 14 inches) Brown, Clayey SILT, some fine to coarse Sand, trace (-) Roots.		
5		S-3	4-6	24	12	57 16 12 24	28	S-2: Medium dense, dark brown, GRAVEL, some fine to coarse Sand, some Clay & Silt. S-3: Very stiff, brown, SILT & CLAY.		
10		S-4	9-10.7	20	16	2 38 70 50/2"	R	S-4: Hard, gray, CLAY & SILT, trace fine Sand.		
15		S-5	14-16	24	0	7 15 38 27	53	S-5: No recovery.	3	
		S-6	16-18	24	0	17 15 13 27	28	S-6: No recovery.		
20		S-7	19-20.8	21	21	43 32 53 50/3"	85	S-7: Hard, gray, SILT & CLAY, trace fine Sand.		
25		S-8	24-26	24	24	2 3 4 5	7	S-8: Medium stiff, gray, Silty CLAY.		
30		S-9	29-31	24	24	5 5 5 7	10	S-9: Stiff, gray, Silty CLAY.		
35								Bottom of boring at 31 feet.	4	

Depth (ft.)	Stratum Description	Elev. (ft.)
0.5'	TOPSOIL	314.5'
	SUBSOIL	
4'		311.0'
	SILT AND CLAY	
23.5'		291.5'
	SILTY CLAY	
31'		284.0'

REMARKS

1. Ground surface elevation estimated from the USGS 3DEP 1 M Digital Elevations Model, and are cited in the North American Vertical Datum of 1988 (NAVD88) in units of feet.
2. Used AW rods to drive split spoon sampler.
3. Encountered probable groundwater at approximately 14 feet below ground surface (bgs) based on water around split spoon sampler for sample S-5.
4. Upon completion, borehole was backfilled with auger cuttings from approximately 31 feet bgs to flush with the ground surface.

See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Boring No.: GZ-1

175344.00 2621 STATE HIGHWAY 5S FULLTONVILLE.GPJ; STRATUM ONLY NORWOOD; 1/12/2022

TEST BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Borrego Solar Systems, Inc.
2621 State Highway 5S Solar, Fultonville, NY
2621 State Highway 5S
Fultonville, New York

BORING NO.: GZ-2
SHEET: 1 of 1
PROJECT NO: 01.0175344.00
REVIEWED BY: JMB

Drilling Co.: Cascade Environmental, LLC
Foreman: Joe Hutchins
Logged By: Shiv Bhardwaj

Type of Rig: ATV Mounted
Rig Model: Geoprobe 7822DT
Drilling Method: HSA

Boring Location: See Plan
Ground Surface Elev. (ft.): 332
Final Boring Depth (ft.): 21
Date Start - Finish: 12/2/2021 - 12/2/2021

H. Datum: WGS84
V. Datum: NAVD88

Auger/Casing Type: HSA
I.D/O.D.(in): 2.25 / 5.625
Hammer Weight (lb.): N/A
Hammer Fall (in.): N/A
Other: N/A

Sampler Type: Split Spoon
I.D./O.D. (in.): 1.375 / 2
Sampler Hmr Wt (lb): 140
Sampler Hmr Fall (in): 30
Other: Auto Hammer

Groundwater Depth (ft.)

Date	Time	Water Depth	Casing	Stab. Time
12/2/21	1205 hrs.	9.1 ft.	Open	SEE NOTE

Depth (ft)	Casing Blows/ Core Rate	Sample No.	Sample Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)	SPT Value	Sample Description and Identification (Modified Burmister Procedure)	Remark	Field Test Data	Stratum Depth (ft.)	Stratum Description	Stratum Elev. (ft.)
		S-1	0-2	24	18	WOH WOH 1 1	1	S-1: (Top 3 inches) Dark brown, Silty CLAY, trace fine to medium Sand, trace (-) Roots, trace Twigs, trace Grass.	1 2		0.3'	TOPSOIL	331.7'
		S-2	2-4	24	5	2 4 3 2	7	S-1: (Bottom 15 inches) Dark brown, Silty CLAY, trace fine to medium Sand, trace Organics. S-2: Medium stiff, dark brown, Silty CLAY, trace fine to coarse Sand.				SUBSOIL	
5		S-3	4-6	24	2	WOH WOH 1 29	1	S-3: Very loose, dark brown, GRAVEL, some fine to coarse Sand, some Silty Clay, trace Peat Fibers.			4' 5.5'	POTENTIAL ORGANICS	328.0' 326.5'
10		S-4	9-10.4	17	3	8 58 50/5"	R	S-4: Hard, gray to brown, Silty CLAY and fine to coarse SAND.				SANDY CLAY	
15		S-5	14-16	24	0	2 3 4 4	7	S-5: No recovery.					
20		S-6	19-21	24	15	19 6 12 43	18	S-6: Very stiff, gray, Silty CLAY and fine to coarse SAND.			21'		311.0'
								Bottom of boring at 21 feet.	3				
25													
30													
35													

REMARKS

1. Ground surface elevation estimated from the USGS 3DEP 1 M Digital Elevations Model, and are cited in the North American Vertical Datum of 1988 (NAVD88) in units of feet.
2. Used AW rods to drive split spoon sampler.
3. Upon completion, borehole was backfilled with auger cuttings from approximately 21 feet bgs to flush with the ground surface.

See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Boring No.: GZ-2

Appendix D – Test Pit Photos

TP-1

TP-1

TP-2

TP-2


TP-3


TP-3


TP-4


TP-4


TP-5


TP-5


TP-6


TP-6


TP-7


TP-7

Appendix E – Geotechnical Laboratory Test Results

THIELSCH ENGINEERING

195 Frances Avenue
Cranston RI, 02910
Phone: (401)-467-6454
Fax: (401)-467-2398
thielsch.com
Let's Build a Solid Foundation

Client Information:
GZA GeoEnvironmental
Norwood, MA
PM: Joseph Benoit
Assigned By: Joseph Benoit
Collected By: Shiv Bhardwaj

Project Information:
2621 State Highway 5S Solar
Fultonville, NY
GZA Project Number: 01.0175344.00
Summary Page: 1 of 1
Report Date: 01.03.22

LABORATORY TESTING DATA SHEET, Report No.: 7421-M-B003 R1

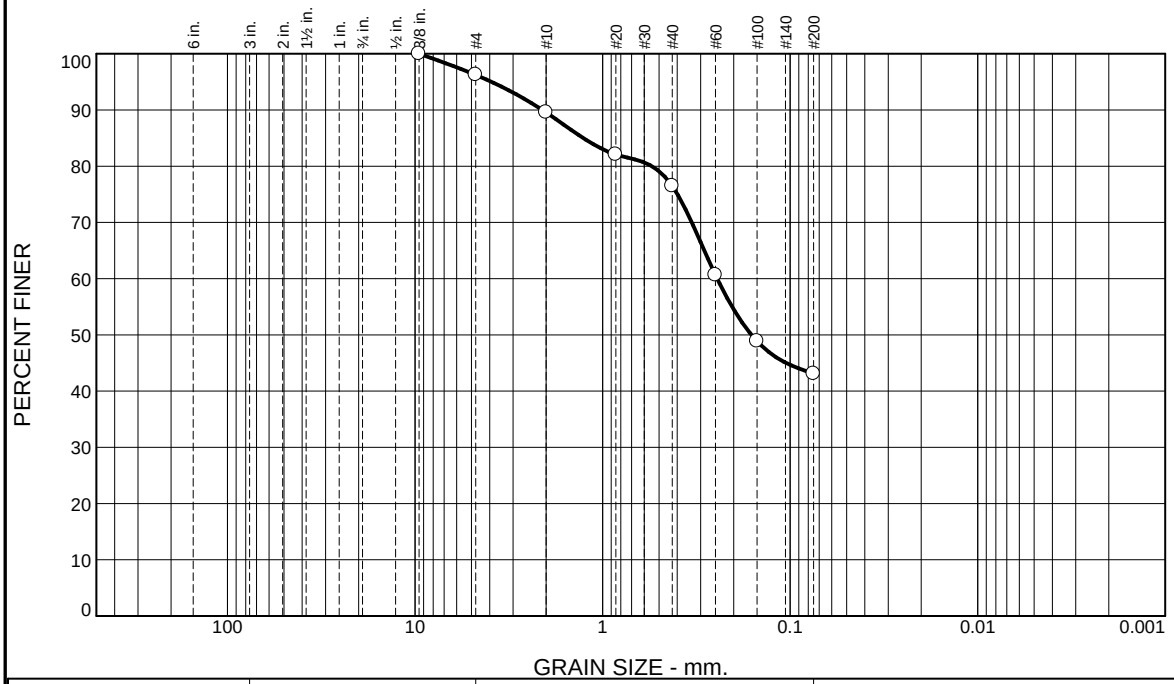
Boring No.	Sample No.	Depth (Ft)	Laboratory No.	Identification Tests								Proctor / Thermal Resistivity							Laboratory Log and Soil Description
				As Received Moisture Content %	LL %	PL %	Gravel %	Sand %	Fines %	Org. %	G_s	Dry unit wt. pcf	Test Water Content %	γ_d MAX (pcf) / W_{opt} (%)	γ_d MAX (pcf) W_{opt} (%) (Corr.)	Target Test Setup as % of Proctor	Thermal Resistivity Optimum (°C*cm/W)	Thermal Resistivity Oven Dried (°C*cm/W)	
				D2216	D4318		D6913			D2974	D854			D1557			D5334		
-	Compsite	1-4	21-S-B454				3.8	53.1	43.1			96.4	16.2	105.1 / 18.4		85	55.0	150.6	Brown f-c SAND and SILT & CLAY, trace fine Gravel
TP-3	S-1	9-10	21-S-B455	41.3	59	25													Gray - Brown Silty CLAY
TP-7	S-2	3-4	21-S-B456	18.0	47	25													Brown Silty CLAY

Date Received: *12.06.2021*

Reviewed By:

Date Reviewed: *01.03.22*

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.8	6.6	13.1	33.4	43.1	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/8"	100.0		
#4	96.2		
#10	89.6		
#20	82.1		
#40	76.5		
#60	60.6		
#100	48.9		
#200	43.1		

* (no specification provided)

Material Description

Brown f-c SAND and SILT & CLAY, trace fine Gravel

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= CL **AASHTO (M 145)=** A-4(0)

Coefficients

D_{90}= 2.0921 D_{85}= 1.2660 D_{60}= 0.2449
D_{50}= 0.1606 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Sample visually classified as plastic. Sample rolled to 1/8".

Date Received: 12.06.2021 **Date Tested:** 12.13.2021

Tested By: DN

Checked By: Ronelle LeBlanc, E.I.T.

Title: Laboratory Supervisor

Source of Sample: Composite **Depth:** 1-4' **Date Sampled:**
Sample Number: Composite

Thielsch Engineering Inc.

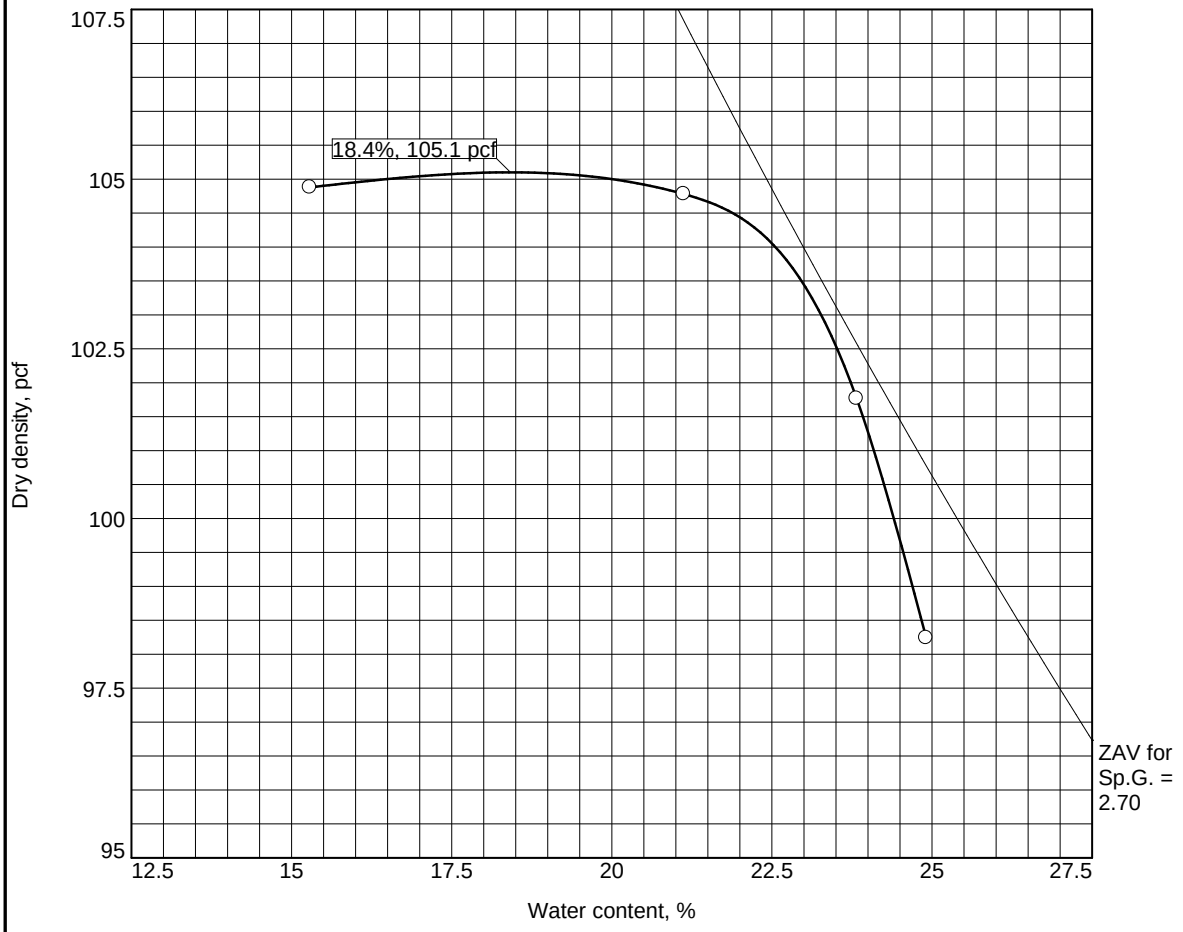
Cranston, RI

Client: GZA GeoEnvironmental

Project: 2621 State Highway Solar 5S Solar
Fultonville, NY

Project No: 01.0175344.00 **Figure** 21-S-B454

COMPACTION TEST REPORT



Test specification: ASTM D 1557-12 Method B Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
1-4'	CL	A-4(0)		2.7	NV	NP	0.0	43.1

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 105.1 pcf Optimum moisture = 18.4 %	Brown f-c SAND and SILT & CLAY, trace fine Gravel

Project No. 01.0175344.00 **Client:** GZA GeoEnvironmental
Project: 2621 State Highway Solar 5S Solar
Fultonville, NY
○**Source of Sample:** Composite **Sample Number:** Composite

Thielsch Engineering Inc.
Cranston, RI

Remarks:

Figure 21-MC-

Tested By: DN **Checked By:** Ronelle LeBlanc, E.I.T.

THIELSCH ENGINEERING

195 Frances Avenue
Cranston RI, 02910
Phone: (401)-467-6454
Fax: (401)-467-2398
http://www.thielsch.com

Client Information
GZA GeoEnviormental
Norwood, MA
Joseph Benoit
joseph.benoit@gza.com

Determination of Thermal Conductivity of Soil by Thermal Needle Probe Procedure

ASTM D5334-14

Project Name:	2621 State Highway 5S Solar	**Thermal Meter:**	TEMPOS
Project Number:	01.0175344.00	**Thermal Probe:**	TR-3 000143
Lab Number:	21-S-B454	**Calibration:**	08.09.18
Sample Number:	Composite	**Specimen Prep:**	Reconstituted Specimen
Material Source:	Fultonville, NY	**Mold Type:**	"B" Proctor
Depth:	1 to 4'	**Tested by:**	AV
Date:	12.30.21	**Reviewed By:**	RR

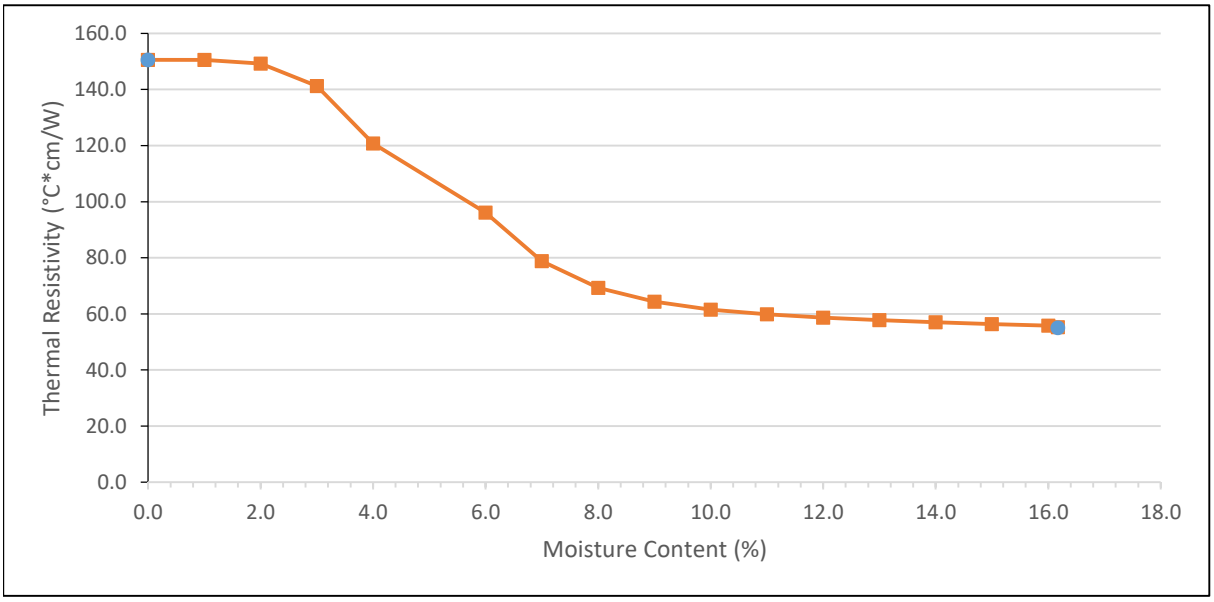
Compaction & Moisture Content Information

Soil Description:	Brown f-c SAND and SILT & CLAY, trace fine Gravel		
Oversized Material (%):	0	Passing #200 Sieve (%):	43.1
Proctor Method:	ASTM D1557 B	Requested % Compaction:	85.0
Maximum Dry Density (pcf):	105.1	Opt. Moisture Content (%):	18.4
Remolded Dry Density (pcf):	96.4	In-situ Moisture Cont. (%):	N/A

Thermal Resistivity Test Results

Moisture Content (%)	Thermal Conductivity (W/m*K)	Thermal Resistivity (°C*cm/W)
16.2	1.8183	55.0
0.0	0.6641	150.6

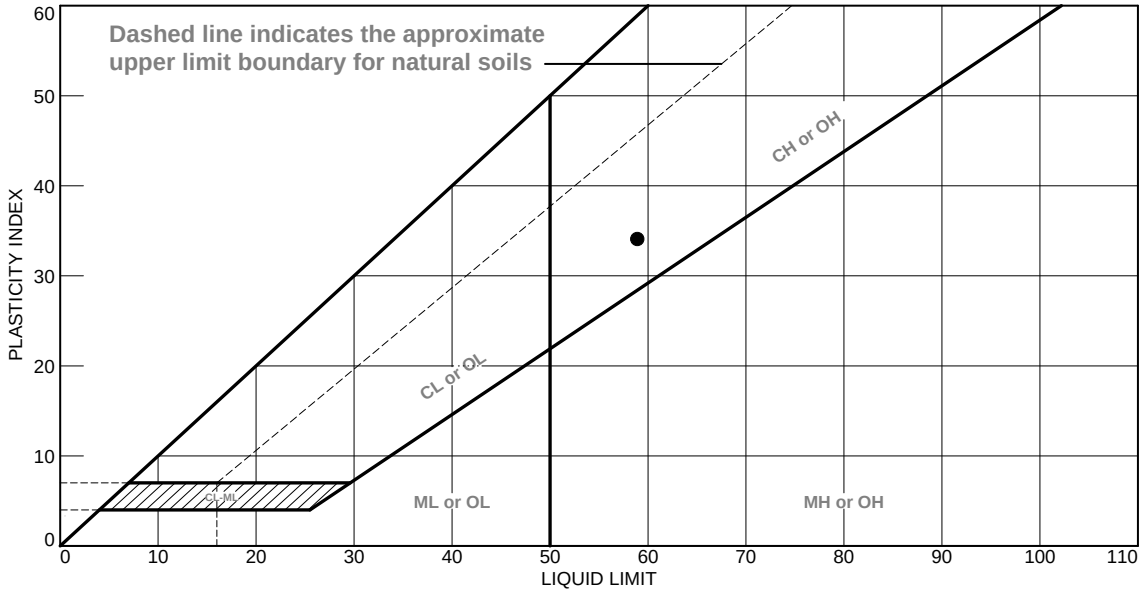
Thermal Resistivity Dryout Curve



Test Notes:

Optimum, Mid-Point, and Oven-Dried Test Conditions provided for Dryout Curve.
Maximum particle size used for reconstituted sample was 3/8".
Thermal dryout curve was interpolated between the oven dry and optimum water content points using Meter Group combination method.

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Gray - Brown Silty CLAY	59	25	34			

Project No. 01.0175344.00 **Client:** GZA GeoEnvironmental

Project: 2621 State Highway Solar 5S Solar

Fultonville, NY

Source of Sample: Grab **Depth:** 9-10'

Sample Number: TP-3 / S-1

Thielsch Engineering Inc.

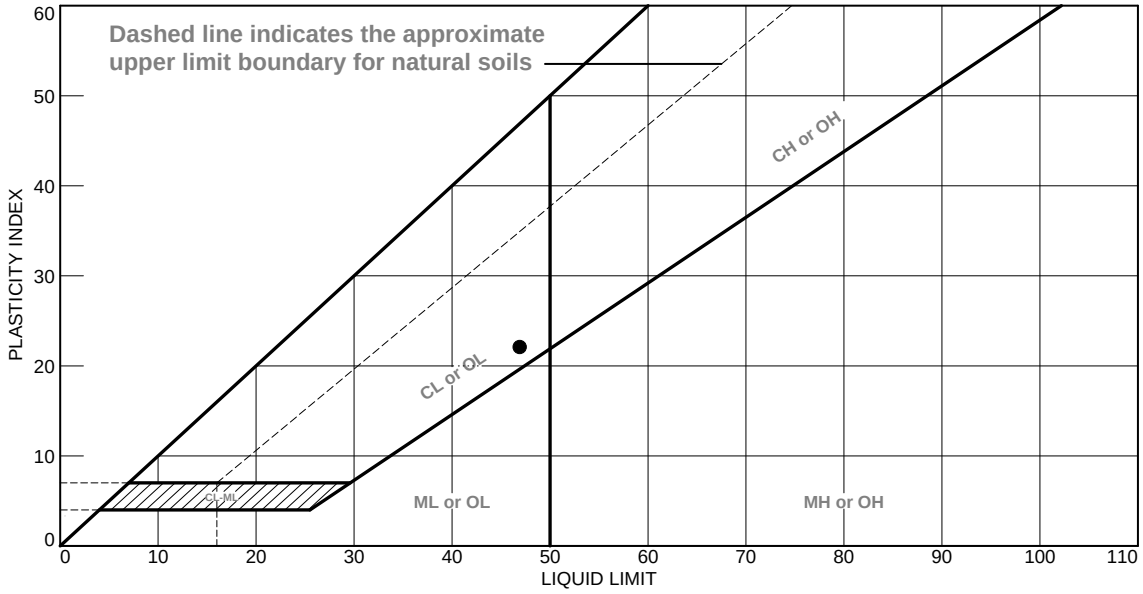
Cranston, RI

Remarks:

Figure 21-L-B455

Tested By: SL **Checked By:** RR

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown Silty CLAY	47	25	22			

Project No. 01.0175344.00 **Client:** GZA GeoEnvironmental

Project: 2621 State Highway Solar 5S Solar

Fultonville, NY

Source of Sample: Grab **Depth:** 3-4'

Sample Number: TP-7 / S-2

Thielsch Engineering Inc.

Cranston, RI

Remarks:

Figure 21-L-B456

Tested By: SL **Checked By:** RR

Appendix F – Laboratory Corrosivity Test Results

CERTIFICATE OF ANALYSIS

Joseph Benoit
GZA GeoEnvironmental, Inc.
249 Vanderbilt Avenue
Norwood, MA 02062

RE: 2621 State Highway 5S Solar - Fultonville NY (01.0175344.00)
ESS Laboratory Work Order Number: 21L0168

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this page, the entire report has been paginated. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.

Laurel Stoddard
Laboratory Director

REVIEWED
By ESS Laboratory at 2:37 pm, Dec 13, 2021

Analytical Summary
The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration is frequently used instead of automated integration because it produces more accurate results.

The test results present in this report are in compliance with TNI and relative state standards, and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.

CERTIFICATE OF ANALYSIS

Client Name: GZA GeoEnvironmental, Inc.
Client Project ID: 2621 State Highway 5S Solar - Fultonville NY

ESS Laboratory Work Order: 21L0168

SAMPLE RECEIPT

The following samples were received on December 06, 2021 for the analyses specified on the enclosed Chain of Custody Record.

Lab Number	Sample Name	Matrix	Analysis
21L0168-01	2621 State Highway 5S-Fultonville, NY Comp	Soil	2580, 9030B, 9038, 9045, 9050A, 9250

CERTIFICATE OF ANALYSIS

Client Name: GZA GeoEnvironmental, Inc.
Client Project ID: 2621 State Highway 5S Solar - Fultonville NY ESS Laboratory Work Order: 21L0168

PROJECT NARRATIVE

No unusual observations noted.

End of Project Narrative.

DATA USABILITY LINKS

To ensure you are viewing the most current version of the documents below, please clear your internet cookies for www.ESSLaboratory.com. Consult your IT Support personnel for information on how to clear your internet cookies.

Definitions of Quality Control Parameters

Semivolatile Organics Internal Standard Information

Semivolatile Organics Surrogate Information

Volatile Organics Internal Standard Information

Volatile Organics Surrogate Information

EPH and VPH Alkane Lists

CERTIFICATE OF ANALYSIS

Client Name: GZA GeoEnvironmental, Inc.
Client Project ID: 2621 State Highway 5S Solar - Fultonville NY ESS Laboratory Work Order: 21L0168

CURRENT SW-846 METHODOLOGY VERSIONS

Analytical Methods

1010A - Flashpoint
6010C - ICP
6020A - ICP MS
7010 - Graphite Furnace
7196A - Hexavalent Chromium
7470A - Aqueous Mercury
7471B - Solid Mercury
8011 - EDB/DBCP/TCP
8015C - GRO/DRO
8081B - Pesticides
8082A - PCB
8100M - TPH
8151A - Herbicides
8260B - VOA
8270D - SVOA
8270D SIM - SVOA Low Level
9014 - Cyanide
9038 - Sulfate
9040C - Aqueous pH
9045D - Solid pH (Corrosivity)
9050A - Specific Conductance
9056A - Anions (IC)
9060A - TOC
9095B - Paint Filter
MADEP 04-1.1 - EPH
MADEP 18-2.1 - VPH

Prep Methods

3005A - Aqueous ICP Digestion
3020A - Aqueous Graphite Furnace / ICP MS Digestion
3050B - Solid ICP / Graphite Furnace / ICP MS Digestion
3060A - Solid Hexavalent Chromium Digestion
3510C - Separatory Funnel Extraction
3520C - Liquid / Liquid Extraction
3540C - Manual Soxhlet Extraction
3541 - Automated Soxhlet Extraction
3546 - Microwave Extraction
3580A - Waste Dilution
5030B - Aqueous Purge and Trap
5030C - Aqueous Purge and Trap
5035A - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.

CERTIFICATE OF ANALYSIS

Client Name: GZA GeoEnvironmental, Inc.
Client Project ID: 2621 State Highway 5S Solar - Fultonville NY
Client Sample ID: 2621 State Highway 5S- Fultonville, NY Comp
Date Sampled: 11/29/21 15:00
Percent Solids: 74

ESS Laboratory Work Order: 21L0168
ESS Laboratory Sample ID: 21L0168-01
Sample Matrix: Soil

Classical Chemistry

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Units	Batch
Chloride	**WL** ND (41)		9250		1	JLK	12/09/21 17:28	mg/kg dry	DL10937
Corrosivity (pH)	**7.68** (N/A)		9045		1	EAM	12/06/21 18:48	S.U.	DL10654
Corrosivity (pH) Sample Temp	**Soil pH measured in water at 22.4 ºC.**								
Redox Potential	**WL 269** (N/A)		2580		1	EAM	12/06/21 18:48	mv	DL10653
Resistivity	**WL 0.003** (N/A)		9050A		1	EAM	12/08/21 16:47	Mohms-cm	DL10857
Sulfate	**WL 101** (68)		9038		1	JLK	12/09/21 19:41	mg/kg dry	DL10939
Sulfide	**WL** ND (0.7)		9030B		1	JLK	12/06/21 20:19	mg/kg dry	DL10646

CERTIFICATE OF ANALYSIS

Client Name: GZA GeoEnvironmental, Inc.
Client Project ID: 2621 State Highway 5S Solar - Fultonville NY ESS Laboratory Work Order: 21L0168

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Classical Chemistry										
Batch DL10646 - General Preparation										
Blank										
Sulfide	ND	0.05	mg/kg wet							
LCS										
Sulfide	0.5		mg/L	0.5000		99	85-115			
Batch DL10937 - General Preparation										
Blank										
Chloride	ND	3	mg/kg wet							
LCS										
Chloride	30		mg/L	30.00		100	90-110			
Batch DL10939 - General Preparation										
Blank										
Sulfate	ND	5	mg/kg wet							
LCS										
Sulfate	10		mg/L	9.988		98	80-120			

CERTIFICATE OF ANALYSIS

Client Name: GZA GeoEnvironmental, Inc.
Client Project ID: 2621 State Highway 5S Solar - Fultonville NY ESS Laboratory Work Order: 21L0168

Notes and Definitions

Z-10	Soil pH measured in water at 22.4 ºC.
WL	Results obtained from a deionized water leach of the sample.
U	Analyte included in the analysis, but not detected
ND	Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
MDL	Method Detection Limit
MRL	Method Reporting Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
DL	Detection Limit
I/V	Initial Volume
F/V	Final Volume
§	Subcontracted analysis; see attached report
1	Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
2	Range result excludes concentrations of target analytes eluting in that range.
3	Range result excludes the concentration of the C9-C10 aromatic range.
Avg	Results reported as a mathematical average.
NR	No Recovery
[CALC]	Calculated Analyte
SUB	Subcontracted analysis; see attached report
RL	Reporting Limit
EDL	Estimated Detection Limit
MF	Membrane Filtration
MPN	Most Probable Number
TNTC	Too numerous to Count
CFU	Colony Forming Units

CERTIFICATE OF ANALYSIS

Client Name: GZA GeoEnvironmental, Inc.
Client Project ID: 2621 State Highway 5S Solar - Fultonville NY

ESS Laboratory Work Order: 21L0168

ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS

ENVIRONMENTAL

Rhode Island Potable and Non Potable Water: LAI00179
http://www.health.ri.gov/find/labs/analytical/ESS.pdf

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750
http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutofStateCommercialLaboratories.pdf

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002
http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/partners/labCert.shtml

Massachusetts Potable and Non Potable Water: M-RI002
http://public.dep.state.ma.us/Labcert/Labcert.aspx

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 2424
http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313
http://www.wadsworth.org/labcert/elap/comm.html

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006
http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715

Pennsylvania: 68-01752
http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx

ESS Laboratory Sample and Cooler Receipt Checklist

Client: GZA - Norwood, MA - GZA/TB

Shipped/Delivered Via: ESS Courier

ESS Project ID: 21L0168
Date Received: 12/6/2021
Project Due Date: 12/13/2021
Days for Project: 5 Day

1. Air bill manifest present? No
   Air No.: NA
2. Were custody seals present? No
3. Is radiation count <100 CPM? Yes
4. Is a Cooler Present? Yes
   Temp: 4.4 Iced with: Ice
5. Was COC signed and dated by client? Yes
6. Does COC match bottles? Yes
7. Is COC complete and correct? Yes
8. Were samples received intact? Yes
9. **Were labs informed about short holds & rushes?** (Yes) / No / NA
10. Were any analyses received outside of hold time? (Yes) / No
    pH, ORP

11. Any Subcontracting needed? Yes (No)
    ESS Sample IDs:
    Analysis:
    TAT:
12. Were VOAs received? Yes / No
    a. Air bubbles in aqueous VOAs? Yes / No
    b. Does methanol cover soil completely? Yes / No / NA
13. Are the samples properly preserved? (Yes) / No
    a. If metals preserved upon receipt: Date: Time: By:
    b. Low Level VOA vials frozen: Date: Time: By:

Sample Receiving Notes:

pH, ORD are out of hold.

14. Was there a need to contact Project Manager? (Yes) / No
    a. Was there a need to contact the client? Yes / No
    Who was contacted? Date: Time: By:

Sample Number	Container ID	Proper Container	Air Bubbles Present	Sufficient Volume	Container Type	Preservative	Record pH (Cyanide and 608 Pesticides)
1	238760	Yes	N/A	Yes	Plastic Baggie	NP	

2nd Review
Were all containers scanned into storage/lab? Initials TD
Are barcode labels on correct containers? (Yes) / No
Are all Flashpoint stickers attached/container ID # circled? Yes / No / (NA)
Are all Hex Chrome stickers attached? Yes / No / (NA)
Are all QC stickers attached? Yes / No / (NA)
Are VOA stickers attached if bubbles noted? Yes / No / (NA)

Completed By: [signature] Date & Time: 12/6/21 1718
Reviewed By: [signature] Date & Time: 12/6/21 1806

185 Frances Avenue
Cranston, RI 02921
Phone: 401-461-7181
Fax: 401-461-4486
www.esslaboratory.com

CHAIN OF CUSTODY

ESS Lab # 21L0168 | Page 1 of 1

Turn Time ☐ 1-5 ☐5 ☐4 ☐3 ☐2 ☐1 ☐Same Day

Regulatory State: NY **Criteria:**

Is this project for any of the following?:

☐CT RCP ☐MA MCP ☐RGP ☐Permit ☐401 WQ

ELECTRONIC DELIVERABLES (Final Reports are PDF)

☐ Limit Checker ☐ State Forms ☐ EQuIS
☑ Excel ☐ Hard Copy ☐ Enviro Data
☐ CLP-Like Package ☐ Other(Specify)→

CLIENT INFORMATION

Client: GZA GeoEnvironmental, Inc.

Address: 249 Vanderbilt Avenue, Norwood, MA 02062

Phone: 781-278-5799

Email Distribution List: Joseph.Benoit@gza.com

PROJECT INFORMATION

Project Name: 2621 State Highway 5S Solar – Fultonville, NY
Project Location: 2621 State Highway 5S – Fultonville, NY
Project Number: 01.0175344.00
Project Manager: Joe Benoit
Bill to:
PO#:
Quote#:

Client acknowledges that sampling is compliant with all EPA / State regulatory programs

REQUESTED ANALYSES

ESS Lab ID	Collection Date	Collection Time	Sample Type	Sample Matrix	Sample ID	Electrical Resistivity	pH	Sulfate	Sulfide	Soluble Chloride	Oxidation/Reduction Potential	Total Number of Bottles
	11/29/2021	1500	Composite	Soil	2621 State Highway 5S – Fultonville, NY Composite Sample	X	X	X	X	X	X	1

Container Type: AC-Air Cassette AG-Amber Glass B-BOD Bottle C-Cubitainer J-Jar O-Other P-Poly S-Sterile V-Vial

Container Volume: 1-100 mL 2-2.5 gal 3-250 mL 4-300 mL 5-500 mL 6-1L 7-VOA 8-2 oz 9-4 oz 10-8 oz 11-Other*

Preservation Code: 1-Non Preserved 2-HCl 3-H2SO4 4-HNO3 5-NaOH 6-Methanol 7-Na2S2O3 8-ZnAce, NaOH 9-NH4Cl 10-DI H2O 11-Other*

Sampled by : Shiv Bhardwaj

Chain needs to be filled out neatly and completely for on time delivery.

Laboratory Use Only

Cooler Temperature (°C): 4.4
1 Cx

Comments: * Please specify "Other" preservative and containers types in this space

Standard Turnaround Time

All samples submitted are subject to ESS Laboratory's payment terms and conditions.

Dissolved Filtration

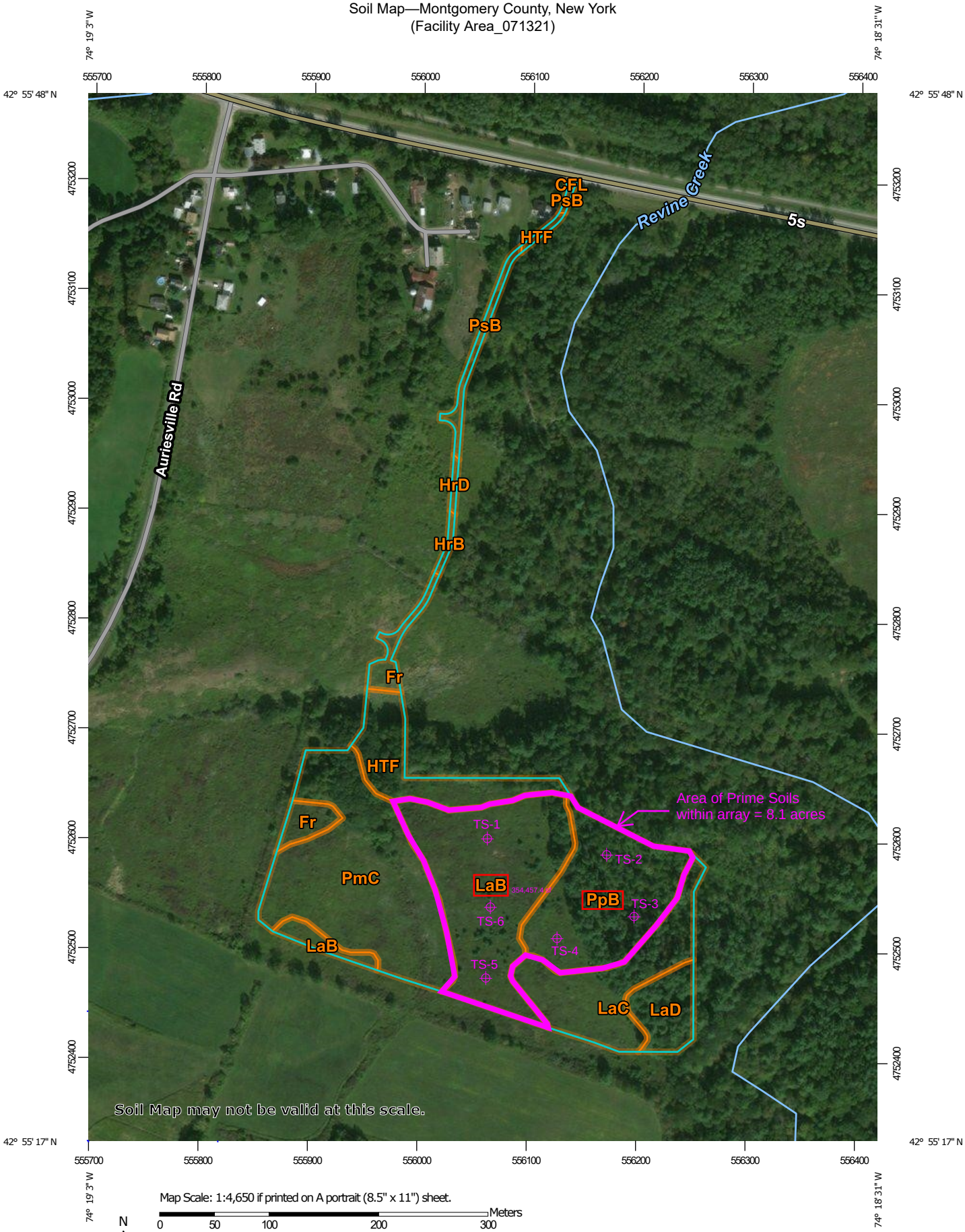
☐ Lab Filter

Relinquished by (Signature)	Date	Time	Received by (Signature)	Relinquished by (Signature)	Date	Time	Received by (Signature)
SHIV BHARDWAJ	12/3/21	1200 HRS	12/6/21 13:53		12/6/21	15:21	Maylon Davis
Relinquished by (Signature)	**Date**	**Time**	**Received by (Signature)**	**Relinquished by (Signature)**	**Date**	**Time**	**Received by (Signature)**

Appendix G – Laboratory Topsoil Nutrient and pH Test Results

TOPSOIL NUTRIENT TEST SAMPLE LOCATION PLAN

Soil Map—Montgomery County, New York
(Facility Area_071321)



Map Scale: 1:4,650 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

Soils Analysis Report

with Agro-One Nutrient Guidelines
generated by Cornell University

Also sent to:
GZA GEOENVIRONMENTAL INC
SHIV BHARDWAJ

Dairy One
730 Warren Road
Ithaca, NY 14850
Phone: (800) 344-2697
Fax: (607) 257-1350
www.dairyone.com

Soil & Plant Program 2019 NAPT Participating Laboratory

Cornell University College of Agriculture and Life Sciences

Dairy One Agronomy Services

Lab Sample ID:	**74318560**
Field/Location:	TS-1
Date Sampled:	12/02/2021
Date Tested:	01/07/2022
Statement ID:	GZA GEOENVIRONMENTAL INC
Description:	
County:	Montgomery

A

Emails/Phones: GZA GEOENVIRONMENTAL INC: joseph.benoit@gza.com,
SHIV BHARDWAJ: shiv.bhardwaj@gza.com

Element	lbs/acre*	Very Low	Low	Medium	High	Very High
Phosphorus (P)	2					
Potassium (K)	112					
Calcium (Ca)	3,731					
Magnesium (Mg)	702					

Element	Value	Element	Value	Element	Value
Soil pH	5.7	Manganese (Mn), lbs/acre	64.2	% OM	5.8
Buffer pH	5.5	Zinc (Zn), lbs/acre	1.7		
Iron (Fe) , lbs/acre	62.2	Aluminum (Al), lbs/acre	163.5		

Crop History (1 = last year, etc.)

Year	Crop
3	Grasses Maintenance
2	Grasses Maintenance
1	Grasses Maintenance

Sample Information Summary

Soil Name: Lansing
Tillage Depth: 1 - 7 Inches
Drainage: Not Specified
% Legume: 100% Non-legume
Crop Code: GRT
Type: Maintenance

Soil Fertilizer Recommendations (1=current yr, 2=next yr, etc.)

		tons / acre	lbs / acre		
Year	Crop	Lime	N Range	P2O5 Range	K2O
1	Grasses Maintenance	3.50	50 - 75	40	55.00
2	Grasses Maintenance	0.00	50 - 75	40	55.00
3	Grasses Maintenance	0.00	50 - 75	40	55.00

Comments - Improve yield and plant quality as well as protect the environment with proper fertilization.

* Morgan analysis results reported in pounds per acre.

Nutrient recommendations provided by Cornell University. For assistance interpreting your report, contact your local Cooperative Extension office at 518-762-3909 or http://cce.cornell.edu/Pages/Default.aspx for a complete list of Cornell Cooperative Extension offices.
Nutrient recommendations provided by Cornell University.

These are general comments. Always consult with your crop adviser for recommendations specific to your farm.

Yr1 Lime rate is for 100% ENV. To calculate actual rate: rate to use = recommended rate/ENV (of lime source) x 100.

Yr1 Iron, aluminum and manganese may be present at toxic levels - avoid by adding lime.

Yr1 Economic lime rate for topdressing sod or no till crop is 3 tons/acre. Apply 3 tons/acre and resample in 3 years or before plowing.

Visit http://cnal.cals.cornell.edu/links/index.html or www.dairyone.com for interpretive information.

Soils Analysis Report

with Agro-One Nutrient Guidelines
generated by Cornell University

Also sent to:
GZA GEOENVIRONMENTAL INC
SHIV BHARDWAJ

Dairy One
730 Warren Road
Ithaca, NY 14850
Phone: (800) 344-2697
Fax: (607) 257-1350
www.dairyone.com

Soil & Plant Program 2019 NAPT Participating Laboratory

Cornell University College of Agriculture and Life Sciences

Dairy One Agronomy Services

Lab Sample ID:	**74318570**
Field/Location:	TS-2
Date Sampled:	12/02/2021
Date Tested:	01/07/2022
Statement ID:	GZA GEOENVIRONMENTAL INC
Description:	
County:	Montgomery

A

Emails/Phones: GZA GEOENVIRONMENTAL INC: joseph.benoit@gza.com,
SHIV BHARDWAJ: shiv.bhardwaj@gza.com

Element	lbs/acre*	Very Low	Low	Medium	High	Very High
Phosphorus (P)	2					
Potassium (K)	87					
Calcium (Ca)	605					
Magnesium (Mg)	95					

Element	Value	Element	Value	Element	Value
Soil pH	4.6	Manganese (Mn), lbs/acre	8.7	% OM	3.2
Buffer pH	4.6	Zinc (Zn), lbs/acre	1.5		
Iron (Fe) , lbs/acre	88.6	Aluminum (Al), lbs/acre	582.1		

Crop History (1 = last year, etc.)

Year	Crop
3	Grasses Maintenance
2	Grasses Maintenance
1	Grasses Maintenance

Sample Information Summary

Soil Name: Lansing
Tillage Depth: 1 - 7 Inches
Drainage: Not Specified
% Legume: 100% Non-legume
Crop Code: GRT
Type: Maintenance

Soil Fertilizer Recommendations (1=current yr, 2=next yr, etc.)

		tons / acre	lbs / acre		
Year	Crop	Lime	N Range	P2O5 Range	K2O
1	Grasses Maintenance	9.50	50 - 75	40	85.00
2	Grasses Maintenance	0.00	50 - 75	40	85.00
3	Grasses Maintenance	0.00	50 - 75	40	85.00

Comments - Improve yield and plant quality as well as protect the environment with proper fertilization.

* Morgan analysis results reported in pounds per acre.

Nutrient recommendations provided by Cornell University. For assistance interpreting your report, contact your local Cooperative Extension office at 518-762-3909 or http://cce.cornell.edu/Pages/Default.aspx for a complete list of Cornell Cooperative Extension offices.
Nutrient recommendations provided by Cornell University.

These are general comments. Always consult with your crop adviser for recommendations specific to your farm.

Yr1 Lime rate is for 100% ENV. To calculate actual rate: rate to use = recommended rate/ENV (of lime source) x 100.

Yr1 Apply dolomitic lime containing at least 1% Mg.

Yr1 Iron, aluminum and manganese may be present at toxic levels - avoid by adding lime.

Yr1 Economic lime rate for topdressing sod or no till crop is 3 tons/acre. Apply 3 tons/acre and resample in 3 years or before plowing.

Visit http://cnal.cals.cornell.edu/links/index.html or www.dairyone.com for interpretive information.

Soils Analysis Report

with Agro-One Nutrient Guidelines
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Also sent to:
GZA GEOENVIRONMENTAL INC
SHIV BHARDWAJ

Dairy One
730 Warren Road
Ithaca, NY 14850
Phone: (800) 344-2697
Fax: (607) 257-1350
www.dairyone.com

Soil & Plant Program 2019 NAPT Participating Laboratory

Cornell University College of Agriculture and Life Sciences

Dairy One Agronomy Services

Lab Sample ID:	**74318580**
Field/Location:	TS-3
Date Sampled:	12/02/2021
Date Tested:	01/07/2022
Statement ID:	GZA GEOENVIRONMENTAL INC
Description:	
County:	Montgomery

A

Emails/Phones: GZA GEOENVIRONMENTAL INC: joseph.benoit@gza.com,
SHIV BHARDWAJ: shiv.bhardwaj@gza.com

Element	lbs/acre*	Very Low	Low	Medium	High	Very High
Phosphorus (P)	2	■				
Potassium (K)	160	■			■	
Calcium (Ca)	587	■				
Magnesium (Mg)	106	■		■		

Element	Value	Element	Value	Element	Value
Soil pH	4.7	Manganese (Mn), lbs/acre	23.7	% OM	2.9
Buffer pH	5.1	Zinc (Zn), lbs/acre	1.7		
Iron (Fe) , lbs/acre	74.3	Aluminum (Al), lbs/acre	459.4		

Crop History (1 = last year, etc.)

Year	Crop
3	Grasses Maintenance
2	Grasses Maintenance
1	Grasses Maintenance

Sample Information Summary

Soil Name: Phelps
Tillage Depth: 1 - 7 Inches
Drainage: Not Specified
% Legume: 100% Non-legume
Crop Code: GRT
Type: Maintenance

Soil Fertilizer Recommendations (1=current yr, 2=next yr, etc.)

		tons / acre	lbs / acre		
Year	Crop	Lime	N Range	P2O5 Range	K2O
1	Grasses Maintenance	6.00	50 - 75	40	0.00
2	Grasses Maintenance	0.00	50 - 75	40	0.00
3	Grasses Maintenance	0.00	50 - 75	40	0.00

Comments - Improve yield and plant quality as well as protect the environment with proper fertilization.

* Morgan analysis results reported in pounds per acre.

Nutrient recommendations provided by Cornell University. For assistance interpreting your report, contact your local Cooperative Extension office at 518-762-3909 or http://cce.cornell.edu/Pages/Default.aspx for a complete list of Cornell Cooperative Extension offices.
Nutrient recommendations provided by Cornell University.

These are general comments. Always consult with your crop adviser for recommendations specific to your farm.

Yr1 Lime rate is for 100% ENV. To calculate actual rate: rate to use = recommended rate/ENV (of lime source) x 100.

Yr1 Apply dolomitic lime containing at least 1% Mg.

Yr1 Iron, aluminum and manganese may be present at toxic levels - avoid by adding lime.

Yr1 Economic lime rate for topdressing sod or no till crop is 3 tons/acre. Apply 3 tons/acre and resample in 3 years or before plowing.

Visit http://cnal.cals.cornell.edu/links/index.html or www.dairyone.com for interpretive information.

Soils Analysis Report

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GZA GEOENVIRONMENTAL INC
SHIV BHARDWAJ

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730 Warren Road
Ithaca, NY 14850
Phone: (800) 344-2697
Fax: (607) 257-1350
www.dairyone.com

Soil & Plant Program 2019 NAPT Participating Laboratory

Cornell University College of Agriculture and Life Sciences

Dairy One Agronomy Services

Lab Sample ID:	**74318590**
Field/Location:	TS-4
Date Sampled:	12/02/2021
Date Tested:	01/07/2022
Statement ID:	GZA GEOENVIRONMENTAL INC
Description:	
County:	Montgomery

A

Emails/Phones: GZA GEOENVIRONMENTAL INC: joseph.benoit@gza.com,
SHIV BHARDWAJ: shiv.bhardwaj@gza.com

Element	lbs/acre*	Very Low	Low	Medium	High	Very High
Phosphorus (P)	2					
Potassium (K)	77					
Calcium (Ca)	3,208					
Magnesium (Mg)	381					

Element	Value	Element	Value	Element	Value
Soil pH	6.1	Manganese (Mn), lbs/acre	13.5	% OM	2.8
Buffer pH	6.0	Zinc (Zn), lbs/acre	0.6		
Iron (Fe) , lbs/acre	28.9	Aluminum (Al), lbs/acre	103.2		

Crop History (1 = last year, etc.)

Year	Crop
3	Grasses Maintenance
2	Grasses Maintenance
1	Grasses Maintenance

Sample Information Summary

Soil Name: Phelps
Tillage Depth: 1 - 7 Inches
Drainage: Not Specified
% Legume: 100% Non-legume
Crop Code: GRT
Type: Maintenance

Soil Fertilizer Recommendations (1=current yr, 2=next yr, etc.)

		tons / acre	lbs / acre		
Year	Crop	Lime	N Range	P2O5 Range	K2O
1	Grasses Maintenance	0.00	50 - 75	40	85.00
2	Grasses Maintenance	0.00	50 - 75	40	85.00
3	Grasses Maintenance	0.00	50 - 75	40	85.00

Comments - Improve yield and plant quality as well as protect the environment with proper fertilization.

* Morgan analysis results reported in pounds per acre.

Nutrient recommendations provided by Cornell University. For assistance interpreting your report, contact your local Cooperative Extension office at 518-762-3909 or http://cce.cornell.edu/Pages/Default.aspx for a complete list of Cornell Cooperative Extension offices.
Nutrient recommendations provided by Cornell University.

These are general comments. Always consult with your crop adviser for recommendations specific to your farm.

Visit http://cnal.cals.cornell.edu/links/index.html or www.dairyone.com for interpretive information.

Soils Analysis Report

with Agro-One Nutrient Guidelines
generated by Cornell University

Also sent to:
GZA GEOENVIRONMENTAL INC
SHIV BHARDWAJ

Dairy One
730 Warren Road
Ithaca, NY 14850
Phone: (800) 344-2697
Fax: (607) 257-1350
www.dairyone.com

Soil & Plant Program 2019 NAPT Participating Laboratory

Cornell University College of Agriculture and Life Sciences

Dairy One Agronomy Services

Lab Sample ID:	**74318600**
Field/Location:	TS-5
Date Sampled:	12/02/2021
Date Tested:	01/07/2022
Statement ID:	GZA GEOENVIRONMENTAL INC
Description:	
County:	Montgomery

A

Emails/Phones: GZA GEOENVIRONMENTAL INC: joseph.benoit@gza.com,
SHIV BHARDWAJ: shiv.bhardwaj@gza.com

Element	lbs/acre*	Very Low	Low	Medium	High	Very High
Phosphorus (P)	2					
Potassium (K)	69					
Calcium (Ca)	1,448					
Magnesium (Mg)	224					

Element	Value	Element	Value	Element	Value
Soil pH	5.6	Manganese (Mn), lbs/acre	10.3	% OM	3.6
Buffer pH	5.6	Zinc (Zn), lbs/acre	0.5		
Iron (Fe) , lbs/acre	83.2	Aluminum (Al), lbs/acre	290.3		

Crop History (1 = last year, etc.)

Year	Crop
3	Grasses Maintenance
2	Grasses Maintenance
1	Grasses Maintenance

Sample Information Summary

Soil Name: Phelps
Tillage Depth: 1 - 7 Inches
Drainage: Not Specified
% Legume: 100% Non-legume
Crop Code: GRT
Type: Maintenance

Soil Fertilizer Recommendations (1=current yr, 2=next yr, etc.)

		tons / acre	lbs / acre		
Year	Crop	Lime	N Range	P2O5 Range	K2O
1	Grasses Maintenance	3.00	50 - 75	40	95.00
2	Grasses Maintenance	0.00	50 - 75	40	95.00
3	Grasses Maintenance	0.00	50 - 75	40	95.00

Comments - Improve yield and plant quality as well as protect the environment with proper fertilization.

* Morgan analysis results reported in pounds per acre.

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Nutrient recommendations provided by Cornell University.

These are general comments. Always consult with your crop adviser for recommendations specific to your farm.

Yr1 Lime rate is for 100% ENV. To calculate actual rate: rate to use = recommended rate/ENV (of lime source) x 100.

Yr1 Iron, aluminum and manganese may be present at toxic levels - avoid by adding lime.

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www.dairyone.com

Soil & Plant Program 2019 NAPT Participating Laboratory

Cornell University College of Agriculture and Life Sciences

Dairy One Agronomy Services

Lab Sample ID:	**74318610**
Field/Location:	TS-6
Date Sampled:	12/02/2021
Date Tested:	01/07/2022
Statement ID:	GZA GEOENVIRONMENTAL INC
Description:	
County:	Montgomery

A

Emails/Phones: GZA GEOENVIRONMENTAL INC: joseph.benoit@gza.com,
SHIV BHARDWAJ: shiv.bhardwaj@gza.com

Element	lbs/acre*	Very Low	Low	Medium	High	Very High
Phosphorus (P)	2					
Potassium (K)	78					
Calcium (Ca)	3,427					
Magnesium (Mg)	481					

Element	Value	Element	Value	Element	Value
Soil pH	6.6	Manganese (Mn), lbs/acre	29.0	% OM	3.5
Buffer pH	6.4	Zinc (Zn), lbs/acre	0.6		
Iron (Fe) , lbs/acre	8.9	Aluminum (Al), lbs/acre	42.8		

Crop History (1 = last year, etc.)

Year	Crop
3	Grasses Maintenance
2	Grasses Maintenance
1	Grasses Maintenance

Sample Information Summary

Soil Name: Lansing
Tillage Depth: 1 - 7 Inches
Drainage: Not Specified
% Legume: 100% Non-legume
Crop Code: GRT
Type: Maintenance

Soil Fertilizer Recommendations (1=current yr, 2=next yr, etc.)

		tons / acre	lbs / acre		
Year	Crop	Lime	N Range	P2O5 Range	K2O
1	Grasses Maintenance	0.00	50 - 75	40	95.00
2	Grasses Maintenance	0.00	50 - 75	40	95.00
3	Grasses Maintenance	0.00	50 - 75	40	95.00

Comments - Improve yield and plant quality as well as protect the environment with proper fertilization.

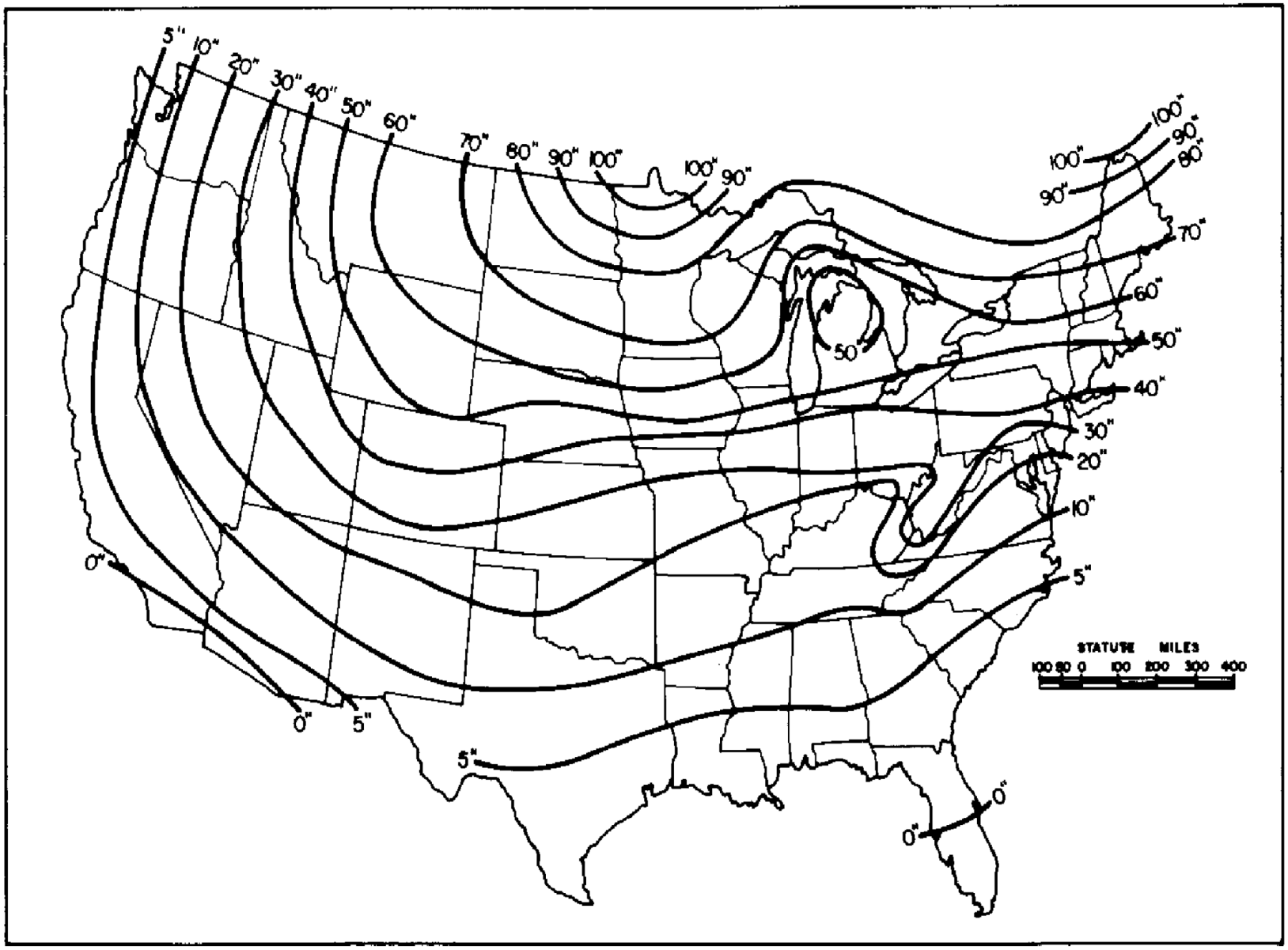
* Morgan analysis results reported in pounds per acre.

Nutrient recommendations provided by Cornell University. For assistance interpreting your report, contact your local Cooperative Extension office at 518-762-3909 or http://cce.cornell.edu/Pages/Default.aspx for a complete list of Cornell Cooperative Extension offices.
Nutrient recommendations provided by Cornell University.

These are general comments. Always consult with your crop adviser for recommendations specific to your farm.

Visit http://cnal.cals.cornell.edu/links/index.html or www.dairyone.com for interpretive information.

Appendix H – U.S. Navy Frost Depth Map



Approximate Depth of Frost Penetration in the United States (NAVFAC Design Manual 7.01 U.S. Navy, 1986