GEOTECHNICAL REPORT

Summer Shade Solar Project

Summer Shade, Kentucky

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1 Executive Summary

ANS Geo, Inc. is pleased to provide this **Geotechnical Report** (Report) to Candela Renewables to summarize the results of our geotechnical investigation program in support of the proposed Summer Shade Solar project located in Metcalfe and Monroe Counties, Kentucky. ANS Geo has summarized, at a very high level, some of the critical geotechnical items and observations which may impact project design and construction in this Section based on our geotechnical investigation at the project site.

1. ANS Geo advanced a total of 23 soil borings: 20 borings were advanced across the proposed array area(s), two (2) borings were advanced within the proposed substation footprint and one (1) boring was advanced in the proposed BESS location. Additionally, a total of seven (7) percussion probes were advanced across the project area. Soil boring and percussion probe logs are provided as **Attachment C** and **Attachment D**, respectively.
2. The soils observed in the field were predominantly comprised of low to high plasticity clays with variable amounts of silt, sands and gravel. Auger refusal during soil borings and percussion probes were frequently observed. Subsurface conditions encountered at the site are summarized in **Section 4**.
3. Groundwater was observed within ten (10) of the 23 soil borings advanced and within six (6) of the seven (7) percussion probes advanced. Where groundwater was encountered, depths ranged from 11.5 to 43 feet below grade.
4. ANS Geo performed seven (7) electrical resistivity tests at spread locations across the site. Electrical resistivity test data are provided as **Attachment E**.
5. Laboratory testing was performed on selected representative soil samples for material index properties, thermal resistivity, corrosivity, and California Bearing Ratio. ANS Geo's laboratory results are summarized in **Section 5** and the full results from ANS Geo's laboratory testing are presented in **Attachment F**.
6. Based on corrosivity laboratory testing and field electrical resistivity, sulfate, chlorides measurements from ANS Geo's Report, the in-situ soil conditions generally indicate that soils are "mildly corrosive" to buried steel. It is anticipated that appropriate protective measures for buried steel, such as increased galvanic coating or similar, will be employed. The soil samples on the site exhibit sulfate exposure class of **S0**, indicating **negligible** sulfate exposure.
7. ANS Geo has provided Substation and BESS Foundation Recommendations in **Table A** and **Table B,** directly preceding our provided Attachments.

2 Project Description

ANS Geo, Inc. presents this **Geotechnical Report** to Candela Renewables (Candela) to summarize the results of the geotechnical investigation program supporting the proposed Summer Shade Solar project in Metcalfe and Monroe County, Kentucky. ANS Geo, in agreement with Candela, developed and implemented this geotechnical investigation program with the intent of providing information to support the design and construction of the proposed solar facility. ANS Geo previously completed a *Focused Geophysical Investigation and Karst Evaluation Report* dated January 10th, 2025 for the same proposed project site for Candela Renewables.

It is our understanding that the Summer Shade Solar project is expected to encompass approximately 698 buildable acres for the development of a photovoltaic (PV) facility and a project substation, which is expected to generate approximately 110 megawatts alternating current (MWac) of renewable energy. Additionally, the Summer Shade Solar project is expected to include a Battery Energy Storage System (BESS) with a capacity of 106 MW.

ANS Geo's geotechnical investigation program included: a desktop study of local geologic conditions, soil borings, percussion probes, in-situ electrical resistivity testing, in-situ thermal resistivity testing, laboratory thermal resistivity testing, corrosion testing, laboratory California bearing ratio (CBR) testing, and laboratory soil index testing. Our targeted test locations were focused within the solar array area, project substation and BESS areas. A general location plan and an as-completed investigation location plan are provided within **Attachment A**.

This Geotechnical Report has been prepared to summarize the information gathered within our investigation program, which was conducted between March 24th, 2025, and April 2nd, 2025, as well as to provide project-specific data to support planning and early-stage design efforts.

2.1 Reference Files

Prior to commencing our geotechnical investigations, ANS Geo was provided multiple project files from Candela detailing the planned development. Several of the referenced files are listed below:

1. *20250203 SummerShade CAD.zip*
2. *20250302 SummerShade FixTilt MaxBuildable.pdf*

In addition to these project files, site coordination, land access, and project details were shared and communicated between ANS Geo and Candela via e-mail and phone conversations.

2.2 Project Assumptions

ANS Geo understands that the proposed solar development will include a solar photovoltaic (PV) system, a substation, a battery energy storage system (BESS), an underground cable collection system, supporting structures, and equipment. We understand the project footprint spans across multiple and/or contiguous parcels separated by existing county and state roads, and will additionally include the development of unpaved, aggregate access roadways within the project parcels. ANS Geo assumes the project design life to be 35 years.

ANS Geo's scope of work was completed based on our approved proposal dated March 6, 2025 and our recommendations herein are specific and based on our understanding of the project and communications with Candela. Should the system's configuration differ from our stated understanding, ANS Geo must be contacted to review, confirm, and/or update our recommendations to reflect the planned development. For example, recommendations such as pile design parameters will change if alternate pile installation techniques are considered, such as pre-drilling, screw piles, helical piles, compaction-and-backfilling, or other method, and these changes may cause a material change in the design of foundations. Similarly, should the location of access roadways and expected traffic volumes and loading, assumed facility design life, or other site condition change, our recommendations will need to be updated.

3 Methodology

3.1 Soil Boring Explorations

ANS Geo conducted 23 soil borings (borings), completed at select locations across the project area, between March 25th, 2025, and March 29th, 2025. A total of 20 borings were advanced within the proposed array area(s) (B-01 through B-20), two (2) borings (B-SS-01 and B-SS-02) were advanced within the proposed substation footprint and one (1) boring (B-BESS-01) were advanced within the proposed BESS footprint. The soil boring locations are shown in the investigation location plan, provided as **Attachment A**.

The 20 soil borings conducted in the array area were drilled to a depth of approximately 20 feet below ground surface (BGS) or until auger refusal, whichever occurred first. Additionally, the two (2) borings in the substation were extended to approximately 50 feet BGS or until auger refusal, whichever occurred first. Lastly, the one (1) soil boring in the BESS footprint was extended to 35 feet BGS or until auger refusal, whichever occurred first. Of the 33 completed soil borings, ten (10) encountered auger refusal due to weathered rock/bedrock at depths ranging approximately between two (2) feet and 31 feet BGS. ANS Geo performed rock coring at four (4) location where early auger refusal was encountered (B-SS-01, B-BESS-01, B-09 and B-11). One (1), 5-foot core run was taken at each rock coring location.

Soil samples were collected using an CME 550x rubber tire drill rig, employing the Standard Penetration Test method through hollow stem augers, as per ASTM Standard D1586. Samples were collected continuously within the upper 10 feet of each boring and at five-foot intervals thereafter to the termination depth. Rock coring was performed in accordance with ASTM Standard D2113. ANS Geo recognizes that ASTM Standard D2113 was withdrawn in 2023, however the standard was still utilized because there has not yet been an updated standard for reference. Upon completion, each borehole was backfilled to its existing grade with soil cuttings. All soil borings were overseen and logged by an ANS Geo representative under the direction of a Professional Engineer licensed in the State of Kentucky. Typed soil boring logs are presented as **Attachment C.**

At select boring locations, bulk soil samples were collected between zero (0) to five (5) feet below grade for laboratory corrosivity, thermal resistivity testing (TRT), and California bearing ratio (CBR) testing. Following sample completion, all samples were packaged and transported to ANS Consultants' accredited laboratory in South Plainfield, New Jersey for testing and storage, in accordance with ASTM D4220. Soil samples are held for up to six (6) months for the purpose of retesting if necessary.

3.2 Percussion Probes

ANS Geo conducted seven (7) percussion probes across the project area to evaluate the subsurface conditions and to identify any karst features. Percussion probe locations were located at relatively evenly spread locations throughout the project's array area(s). All percussion probes were overseen and documented by an ANS Geo geotechnical representative under the supervision of a licensed Professional Engineer in the State of Kentucky. Soil strata changes, soil classification, depth to competent rock and approximate voids in the rock were documented during each percussion probe performed and are presented within the percussion probe logs, provided as **Attachment D**. Upon completion, each percussion probe was backfilled with native soils to grade.

3.3 Electrical Resistivity Testing

As part of our field investigation program, ANS Geo performed field Electrical Resistivity Testing (ERT) at seven (7) locations across the project site. Of these, five (5) ERTs were within the proposed array area(s), one (1) ERT was within the substation footprint and BESS footprint, each. All electrical resistivity measurements were conducted using the Wenner 4-Pin Method, in accordance with the procedures outlined in ASTM G57 and IEEE Standard 81.

At each ERT location, two (2) mutually perpendicular traverses (oriented N-S & E-W) were collected utilizing electrode “a”-spacings of 5, 10, 15, 20, 25, and 50 feet in the array area, as well as two (2) testing locations which utilized “a”-spacings of 5, 10, 15, 20, 25, 50, 75, 100, 150, and 200 feet within the substation and BESS footprint. ANS geo notes that due to project boundary restrictions and obstructions, the max “a” spacing ERT-SS-01 was able to be completed at was 150-ft (NW/SE transect) and 75-ft (NE/SW transect). At ERT-BESS-01, the max “a” spacing completed was 100-ft (N/S & E/W transects). Detailed ERT test results are provided in **Attachment E**.

4 Geology, Surface, and Subsurface Conditions

Prior to site mobilization, ANS Geo conducted a desktop review of anticipated geologic conditions, including both surficial and bedrock geology.

4.1 Observed Site Conditions

At the time of our investigation, ANS Geo observed the site to be a mixed use of farmland, plain grass fields with variable number of manmade paths or undisturbed forests areas spread throughout the multiple parcels. Additionally, livestock was continuously encountered across the project sites. Our investigation occurred following significant precipitation which created soft ground conditions and standing water that was observed at several locations across the project site.

4.2 Historic & Topographic Setting

ANS Geo reviewed historical satellite imagery made available via Google Earth. High-quality satellite imagery was available as far back as 1951, and our review indicated that the project area has not changed substantially between 1951 and the time of the desktop study. No major construction or alteration of the land was visible. The land has historically been operated as farmland by numerous dwellers spread around the numerous parcels.

Based on USGS topographic mapping, the site had elevations that ranged approximately between 850 feet and 1,125 feet above mean sea level (ASML) and is generally hilly with areas of steep slopes (> 35%) and areas that were relatively flat (< 10%) that varied throughout the project site. An elevation and slope map are provided in **Attachment B**.

4.3 Surficial and Bedrock Geology

ANS Geo conducted a brief desktop review of surficial and bedrock geology maps and reports made available by the USGS and the Kentucky Geological Survey. These resources indicate the project area is mapped within the Ste. Genevieve and St. Louis Limestones and the Salem, Warsaw, and Harrodsburg Limestones and the Renfro and Muldraugh Members of the Borden Formation and the Fort Payne Formation. The Ste. Genevieve and St. Louis Limestones are composed of approximately 90% limestone, 8% dolomite, and incidental chert beds and sandstone. The Salem, Warsaw, and Harrodsburg Limestones are collectively composed of approximately 70% limestone, 10% dolomite, and 20% calcareous interbedded shale, siltstone, and sandstone. The Renfro and Muldraugh Members are the uppermost units of the Borden Formation, and the Fort Payne Formation overlies the Borden Formation along the delta front and the Chattanooga Shale. The USGS identifies the Ste. Genevieve and St. Louis Limestones and the Salem, Warsaw, and Harrodsburg Limestones as karst-prone formations. A geological map is provided as **Attachment B.**

ANS Geo additionally reviewed surficial soil mapping available from the Natural Resource Conservation Service (NRCS) Web Soil Survey application. The NRCS survey was initially created for agricultural purposes and is generally limited to the upper five (5) feet BGS; however, the resource provides generalized information pertaining to the soil chemistry and properties. The NRCS soil survey was used in our initial desktop review of the site, however the observations and information collected during our geotechnical

investigation supersede the information provided within the reviewed NRCS Soil Survey. The NRCS mapping identifies the project area to be primarily comprised of the Baxter gravelly silt loam, Crider silt loam, and Newark silt loam. The NRCS report is presented in **Attachment H**.

4.4 Observed Subsurface Conditions

ANS Geo has provided the generalized subsurface conditions within **Table 1** based on observations recorded during our geotechnical investigation program. Soil boring and percussion probe logs have been provided as **Attachment C** and **Attachment D**, respectively, and should be reviewed for specific soil condition observations.

Table 1: Generalized Subsurface Conditions

Stratum	Avg. Depth (ft)	Material (USGS Classification)	Avg. Consistency/ Density	Description
	0 – 0.7	Topsoil	-	A layer of topsoil existed across most of the site. Typically ranging from three (3) to eight (8) inches in depth, with an average of approximately five (5) inches across site.
I	~0.7 – 4	CL/CH (Clay)	Medium Stiff to Stiff	The above layer of topsoil was observed to be underlain by clay material ranging from medium stiff to stiff, with varying amounts of silt, sand and gravel. N-values within this region range from 3 to 31 blows per foot, with an average N-Value of 9. **At one (1) boring (B-11) and at one (1) percussion probe (P-08) location, top of rock was encountered at depths of two (2) feet and three (3) feet, respectively, due to bedrock.**
II	4 – 20	CL/CH (Clay)	Very Stiff	A layer of very stiff clay with variable amounts of silt, sands and gravels were predominantly observed at four (4) feet and extended to approximately 20 feet below grade, or practical refusal, whichever occurred first. N-values generally ranged between 4 and exceeding 50 with an average N-value of 18. **Auger refusal was encountered within this stratum in the array borings and at the BESS location due to weathered rock and/or bedrock. A total of eight (8) from the total 23 completed borings encountered auger refusal at depths ranging approximately between nine (9) and 16 feet below grade. At two (2) percussion probe locations, top of rock was encountered at depths of eight (8) and 11 feet below grade.** In addition, at nine (9) boring and two (2) percussion probe locations, groundwater was encountered within this stratum at depths ranging approximately between 11.5 and 20 feet below grade.
III	20+	CL/CH (Clay)	Very Soft to Soft	At both substation locations (B-SS-01 and B-SS-02), from 20 feet below grade onward, the material consisted predominantly of very soft to soft clay with varying amounts of silt, sands and gravel. Auger refusal was encountered at both boring locations at depths of 26 and 31 feet below grade. **At four (4) percussion probe locations, top of rock was encountered at depths ranging approximately between 24 and 43 feet below**

Stratum	Avg. Depth (ft)	Material (USGS Classification)	Avg. Consistency/ Density	Description
				grade. Lastly, groundwater was encountered at one (1) boring and four (4) percussion probe locations at a depths ranging approximately between 22 and 32 feet below grade.

The mapped soil formations identified within our desktop study are generally consistent with the findings of our field investigations.

4.5 Groundwater

At the time of our field investigation, groundwater was observed within ten (10) of the 23 soil borings advanced and within six (6) of the seven (7) percussion probes advanced. Where groundwater was encountered, depths ranged from 11.5 to 43 feet below grade. It should be noted that ANS Geo's investigation occurred during a significant multiple day rainfall event and with borings, where groundwater was encounter, nearby lowland depression areas with significant amount of standing water were observed. Additionally, perched water was observed near grade within several of the completed soil borings. It should be recognized that groundwater conditions are ephemeral and fluctuate due to seasonal and climate influences.

Table 2: Observed In-Borehole Water Levels

Location ID	Depth to Groundwater (ft)
B-02	18
B-08	14
B-09	13
B-13	18
B-15	11.5
B-16	18
B-17	14
B-20	16.5
B-SS-01	20
B-SS-02	23
PP-06	19
PP-08	19
PP-14	22
PP-17	28
PP-22	32
PP-24	23

4.6 Summary of Geohazards

ANS Geo assessed publicly available information, results of the geotechnical investigation and the site conditions during the investigation to evaluate any potential geotechnical or geological hazards. The project site generally consists of flat to steep slope land across the project site; therefore, the slope stability risk is moderate.

Based on karst hazard maps, the project site is located near where bedrock susceptible to karstic features may be present. Also, during the site investigation, bedrock was encountered as shallow as two (2) feet below ground surface. In addition, limestone was identified across the site. Therefore, the risk of potential karst to the project is found to be moderate to high which is further detailed in our separate *Focused Geophysical Investigation and Karst Evaluation Report* dated January 10, 2025 which should be reviewed for site specific karst risk and mitigation recommendations.

Since the project site is located in a low seismicity area and the encountered soils generally contain clays with varying amounts of coarse to fine sand and gravel, risk of liquefaction is generally low.

The mapped frost depth for the project site is about 24 inches.

The soils at the project site are generally fine grained high plasticity clays with variable amounts of sands and gravels with moderate shrink and/or swell potential.

5 Laboratory Results

Representative soil samples were collected during our investigation and submitted to ANS's soil testing laboratory. Soil samples will be retained for a period of three (3) months following the initial submission of this Report with all laboratory results.

5.1 Soil Index Testing

A summary of the index laboratory test results has been provided within **Table 3** through **Table 4** and as-received laboratory test results are included within **Attachment F**.

Table 3: Soil Index Testing Summary (Sieve Analysis, ASTM D6913)

Boring ID	Sample ID	Depth (ft)	% Gravel	% Sand	%Fines	% Moisture	USCS
B-08	S-4	6-8	33.3	42.5	24.2	19.9	SC
B-14	S-3	4-6	30.7	20.1	49.2	18.4	GC
B-16	S-5	8-10	16.6	42.2	41.2	18.9	SC

Table 4: Soil Index Testing Summary (Atterberg Limits, ASTM D4318)

Location ID	Sample ID	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	% Moisture	USCS
B-01	S-3	4-6	74	28	46	30.7	CH
B-02	S-2	2-4	71	28	43	29.1	CH
B-03	S-5	8-10	75	28	43	25.1	CH
B-04	S-1	0-2	33	19	14	21.5	CH
B-05	S-3	4-6	70	27	43	19.8	CH
B-06	S-6	13-15	62	25	37	33.7	CH
B-07	S-6	13-15	48	22	26	22.8	CL
B-09	S-2	2-4	61	25	36	24.6	CH

Location ID	Sample ID	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	% Moisture	USCS
B-10	S-4	6-8	65	25	40	35.2	CH
B-11	S-1	0-2	29	20	9	9.8	CL
B-12	S-7	18-20	50	23	27	35.2	CH
B-13	S-3	4-6	41	20	21	23.3	CL
B-15	S-5	8-10	34	20	14	24.1	CL
B-17	S-1	0-2	69	27	42	23.1	CH
B-18	S-2	2-4	65	26	39	20.6	CH
B-19	S-5	8-10	72	28	44	24.8	CH
B-20	S-3	4-6	33	19	14	17.4	CL
B-SS-01	S-4	6-8	69	26	43	22.2	CH
B-SS-02	S-5	8-10	71	27	44	38.0	CH
B-BESS-01	S-2	2-4	74	28	46	18.3	CH

5.1 Thermal Resistivity Testing

ANS Geo collected bulk samples from four (4) locations within the project area from. Three (3) locations (B-SS-01, B-07, B-15) had samples collected from three (3) to five (5) feet below grade and one (1) location (B-BESS-01) from two (2) to four (4) feet below grade due to lack of soil cuttings to backfill the borehole. All bulk samples were collected for laboratory testing of Thermal Resistivity. Soil samples were collected in five-gallon buckets and delivered to ANS's laboratory for testing. Samples were compacted to 85 percent of its Standard Proctor Density in accordance with ASTM D698, and Thermal Resistivity Testing was conducted in accordance with IEEE Standard 442-2017 and ASTM D5334. Results of the thermal testing are summarized within **Table 5**. Complete, as-received results are provided within **Attachment F.**

Table 5: Thermal Resistivity Testing Summary (ASTM D5334)

Location ID	Percent Compaction (% of Max. Dry Density)	Material Type	Thermal Resistivity Values at Various Moisture Content						Received Moisture Content (%)	Remolded Dry Density (lb/ft^3)
			% water	% water	% water	% water	% water	% water		
			(°C-cm/W)	(°C-cm/W)	(°C-cm/W)	(°C-cm/W)	(°C-cm/W)	(°C-cm/W)		
B-07	85	Clay (CL)	0.0	3.6	7.1	10.7	14.2	26.9	26.9	95.6
			161.9	**129.7**	**82.8**	**73.1**	**68.2**	**62.0**		
B-15	85	Clay (CL)	0.0	4.1	8.3	12.4	16.5	16.9	16.9	94.7
			163.9	**114.5**	**69.2**	**62.4**	**58.5**	**58.1**		
B-BESS-01	85	Clay (CL)	0.0	3.8	7.6	11.4	15.2	22.5	22.5	93.9
			165.9	**126.1**	**76.0**	**67.6**	**63.3**	**61.1**		
B-SS-01	85	Clay (CL)	0.0	3.9	7.8	11.6	15.5	15.9	15.9	95.9
			160.1	**120.2**	**75.2**	**67.4**	**62.9**	**62.5**		

5.2 Corrosivity Testing

ANS Geo collected bulk samples from zero (0) to five (5) feet grade at seven (7) locations for corrosivity testing. The results of the testing, completed by ANS, are summarized within **Table 6** and are detailed within **Attachment F**.

Table 6: Corrosivity Testing Summary

Location ID	pH	Sulfate (mg/kg)	Chloride (mg/kg)	Redox Potential (average) (mV)	Soil Box (Calculated Resistivity) (Ω-cm)
B-BESS-01	5.7	< 15	12	113	12,400
B-SS-01	5.4	< 15	42	130	5,200
B-03	4.2	30	48	210	16,200
B-06	4.1	< 15	51	224	26,800
B-13	5.0	60	30	211	4,700
B-17	5.0	30	54	305	16,000
B-20	4.4	< 15	15	311	45,300

5.3 California Bearing Ratio

ANS Geo collected bulk samples from four (4) locations within the project area from. Three (3) locations (B-SS-02, B-08, B-16) had samples collected from one (1) to three (3) feet below grade and one (1) location (B-BESS-01) from two (2) to four (4) feet below grade due to lack of soil cuttings to backfill the borehole. All bulk samples were sent for testing of California Bearing Ratio (CBR) in accordance with ASTM D1883 at approximately 95 percent of its Standard Proctor Density (ASTM D698). The results of the testing are summarized within **Table 7** and the detailed results are provided within **Attachment F**.

Table 7: California Bearing Ratio Summary

Location ID	CBR Ratio (%)
B-BESS-01	3.9
B-SS-02	4.2
B-08	4.1
B-16	4.2

5.4 Rock Strength Testing

A representative rock core sample was taken and submitted to ANS, for unconfined compressive strength testing in accordance with ASTM D7012. The results of the testing are summarized in **Table 8**, and as-received lab results are included in **Appendix F**.

Table 8: Unconfined Compressive Strength of Rock

Location ID	Approximate Depth (ft BGS)	Bulk Density (pcf)	Unconfined Compressive Strength (psi)	Rock Classification
B-SS-10	31-35	148.0	2,907	Limestone

6 Seismic Considerations

6.1 Site Classification

Based on the observations recorded within our subsurface investigation program and our familiarity with the project area, Site Class D is assumed as the representative seismic site class across the project site for Risk Category II.

The seismic ground motion values for this this were obtained from the USGS Seismic Hazard Maps, referenced in ASCE 7-16 Standard and provided as **Attachment G,** and are as follows:

- 0.2 second spectral response acceleration, S_S= 0.193 g
- 1 second spectral response acceleration, S_1= 0.107 g
- Maximum spectral acceleration for short periods, S_{MS}= 0.309 g
- Maximum spectral acceleration for a 1-second period, S_{M1}= 0.255 g
- 5% damped design spectral acceleration at short periods, S_{DS}= 0.206 g
- 5% damped design spectral acceleration at 1-second period, S_{D1}= 0.170 g

6.2 Historic Seismic Events

According to the United States Geological Survey (USGS) earthquake catalog, no earthquake events were recorded within 50 miles of the project site within the past 50 years. The project site is historically considered a low active seismic area.

6.3 Preliminary Seismic Evaluation

The designated seismic site class is anticipated based on results from our investigation program and using select areas of the site which have been investigated by ANS Geo. Based on our observation of subsurface conditions, estimated Site Class ratings, and review of USGS's 2018 National Seismic Hazard Map and publicly available information, ANS Geo concludes that the area is generally considered to be a low seismic hazard zone.

7 Foundation Design Considerations

ANS Geo anticipates that, as typical with solar farm construction, driven piles (embedded posts), such as W6x9 H-piles, will be used to support the proposed solar panels. Conventional shallow foundations such as sonotubes, spread footings, or systems may also be utilized for equipment pads and associated support structures.

7.1 Corrosion Considerations

7.1.1 Buried Steel

Given limited testing results measuring the soil pH level, sulfate and chloride concentrations, resistivity, and redox potential summarized in **Section 5.2** (**Table 6**), in consideration with the soil and moisture conditions observed, the in-situ soil conditions generally indicate soils that are "mildly corrosive". It is anticipated that hot dipped galvanized steel with a minimum zinc coating thickness in accordance with ASTM A123 may require a significant increase in sacrificial steel thickness to be able to accommodate the expected corrosion loss over the project design life. Therefore, we strongly recommend evaluating the need for an increased zinc coating thickness of 5-mil to provide some protection prior to the increased rate of expected bare-steel corrosion loss over the project design life. For structural steel shapes, a minimum zinc coating thickness

typically ranges from 3-mil to 4-mil depending on the steel section size as specified by ASTM A123. For example, a W6x9 shall contain a minimum zinc coating grade of 75 micrometers, or a 3-mil thick coating.

Steel section loss in piles decreases the structural load carrying capacity of the member as well as increases the member deflections. Therefore, it is recommended that the final structural design considers the useful life of galvanized (zinc) coating, followed by the anticipated loss of steel due to corrosion to ensure the structural integrity is maintained throughout the service life. Thicker pile sections, increased zinc coating thickness, or other corrosion protection measures may be necessary to accommodate any reduction in structural capacity. For example, it is possible that a W6x12 pile with a standard zinc coating thickness could corrode to W6x9-equivalent section throughout the service life depending on the corrosion-related soil properties.

Based on the limited corrosivity and resistivity testing results, it is our professional opinion that a 75-micrometer (3-mil) zinc coating would maintain an approximate lifespan of 9 to 10 years prior to full depletion. Upon depletion of the zinc coating, bare steel loss would occur at an estimated rate of 1.084 mils (0.001084 inches) per year. For context, under these assumed conditions, a 3-mil coated W6x9 steel pile would experience approximately 27.85 mils (0.02785 inches) of steel loss (per side) within a 35-year lifespan.

If desired, a detailed corrosion evaluation report can be developed by ANS Geo to interpret the soil corrosivity test results and estimate the rate of corrosion for zinc and bare steel resulting from exposure to the surrounding environment. This detailed corrosion evaluation may be provided to Candela Renewables and/or a foundation engineer to incorporate the test results into the design and selection of pile foundations, or other buried steel across the site.

7.1.2 Buried Concrete

Corrosive soils can have a significant impact on below grade concrete foundations by potentially damaging or weakening the concrete. One of the primary forms of concrete deterioration due to exposure to corrosive soils is sulfate attack. Sulfate attack is a common form of concrete deterioration which occurs when concrete encounters water or soils containing sulfates. Sulfates are typically found in some soils, in seawater, and in wastewater treatment plants. The principal factors which affect the rate and severity of sulfate attack are permeability of concrete, concentration of sulfates, tricalcium aluminate (C3A) content, and calcium hydroxide content. When sulfates react with C3A, it will form ettringite which will expand and create internal tension within the concrete that eventually leads to cracking. Therefore, a low C3A content is one of the main considerations when selecting cement for sulfate resistance. For example, for severe sulfate exposures, Type V cement with a maximum C3A content of 5% is specified in Table 19.3.2.1 of the ACI Building Code (ACI 318-14).

Recommended concrete properties, including cement type, to resist sulfate attack are based on the site-specific sulfate exposure class, as per ACI318-14, Table 19.3.2.1. The severity of the exposure of concrete to sulfate is divided into four classes (S0 through S3) depending on the water-soluble sulfate in soil (percent by mass) or dissolved sulfates in water (ppm). The sulfate exposure class limits are given in **Table 9** below.

Table 9: Sulfate Exposure Classification from ACI318-14 Table 19.3.2.1

Sulfate Exposure Class	*Water-Soluble Sulfate (SO_4^2) in soil, percent by mass*	*Dissolved Sulfate (SO_4^2) in water, ppm*
S0	*$SO_4^2 < .10$*	*$SO_4^2 < 150$*
S1	*$.10 \leq SO_4^2 < .20$*	*$150 \leq SO_4^2 < 1500$ or seawater*
S2	*$.20 \leq SO_4^2 \leq 2.00$*	*$1500 \leq SO_4^2 \leq 10{,}000$*

Sulfate Exposure Class	Water-Soluble Sulfate (SO_4^2) in soil, percent by mass	Dissolved Sulfate (SO_4^2) in water, ppm
S3	SO_4^2 > 2.00	SO_4^2 > 10,000

As shown in **Section 0 (Table 6)**, ANS Geo laboratory corrosion testing data indicate the water-soluble sulfate concentration within soil at zero (0) and five (5) feet depths range from <15 and 60 mg/kg or 0.027 to 0.7636 percent by mass, respectively. Based on the results of this testing, the site soils appear to have a sulfate exposure class of **S0,** which corresponds to **negligible** sulfate exposure. ANS Geo recommends that concrete adheres to the requirements of ACI 318-14, Table 19.3.2.1 for concrete properties including maximum water-cement ratio, minimum compressive strength (psi), and cement type for the site-specific sulfate exposure class. For sulfate exposure class **S0**, external sulfate attack is likely not a concern and there are no recommended restrictions on cement type. These recommendations do not consider acidic or basic soils, which should additionally be considered during cement design.

7.2 Frost Considerations

7.2.1 Frost Depth

According to the US Department of Commerce frost mapping, within Metcalfe County, Kentucky the local frost depth is mapped to exist at approximately 24 inches below grade. ANS Geo recommends that all shallow (non-pile) foundations should be embedded at least to this depth. Shallower foundation depths may also be accommodated, provided they are frost-protected by way of appropriately designed haunched edges, foam insulation, and/or free-draining structural fill extending to the frost depth. For shallow foundations which are not load-bearing or sensitive to movement, such foundations may be able to be found at shallower depths. ANS Geo should be contacted to provide recommendations for minimum embedment depth in this scenario.

7.2.1 Ad-freeze Influence

We recognize that fluctuations in air temperature, snow cover and insulation, and historic freezing indices have shown empirical correlations of shallower frost depth. For design of array and support structure pile foundations, shallower depths of frost influence may be considered, hereby referred to as “ad-freeze depth”.

Given the location of the project and soils encountered, the potential for frost heave against post foundations should be considered. Fine-grained soils, or granular soils with greater than 10 percent fine-grained content are frost-susceptible due to the inability of entrapped moisture from infiltrating or evaporating prior to freezing. Trapped moisture will begin to create ice lenses, which will grip the steel posts or embedded structures, followed by ice-jacking due to frost heave. The phenomenon is more commonly referred to as “ad-freeze stress”, which can be considered as an external, upward force applied to the post. The magnitude of the upward force will depend on the depth/thickness of the frost zone, the interface bond stress between embedded structure/material and the surrounding area, and the surface area of the structure/material in contact with this bond stress.

Several methods exist to evaluate frost susceptibility of soils, including determination of fine-grained content of near-surface soils, evaluation of air freezing index, and local, empirical correlations such as the Atlas of Soil Freezing Depth Extremes for the Northeastern United States. Frost penetration depth may be calculated in multiple ways, including local, County, or State building code frost depths, the US Army Corps of Engineers method using the modified Berggren Equation, and empirical data.

Using the modified Berggren Equation, frost penetration depth can also be calculated based on assumed values for soil density, moisture content, thermal conductivity, air freezing index, and volumetric latent heat of soil. Using site-specific values and assumptions, input into the modified Berggren Equation, and our

professional opinion and experience, the calculated frost penetration depth for a 100-year return period, for ad-freeze stress consideration purposes, is roughly 15 inches.

Based on our evaluation, since conditions may exist where snow cover is not present during low temperature extremes, and using a calculated depth of frost penetration, ANS Geo recommends that piles may be designed considering an “ad-freeze depth” of 15 inches (1.25 feet) below grade with the presence of sod/vegetative cover. As predominantly clayey soils were observed near grade, ANS Geo recommends that an unfactored ad-freeze (uplift) stress of 1,500 pounds per square foot (10.4 psi) be considered within the 15-inch ad-freeze depth of posts for panel foundation sizing and design.

7.3 Soil Shrink & Swell Potential

Shrinkage and swelling of soils refer to the volumetric change (decrease and increase) exhibited in primarily fine-grained soils due to a change in moisture conditions. The extent of shrinking and swelling is largely influenced by the type and amount of clay present in the native near-surface soils. Higher-risk soils generally include fine-grained material with a high clay content, greater than 50 percent by weight, and liquid limits of 50 percent or higher (fat clays).

Given the location of the project site and the soils encountered, the potential for shrinkage and swelling of soils was considered. Laboratory plasticity testing in the soil borings indicate that high plasticity clay soils are present within the upper zero (0) to 20 feet below grade with an average liquid limit of 58 and with liquid limits as high as 75. In addition, ANS Geo notes that 15 out of the 20 samples tested for Atterberg Limits (**Table 4**) resulted in a soil classification of fat clay with the remaining five (5) classified as a lean clay. Based on our observed soil conditions and results of laboratory testing, it is our professional opinion that the native on-site soil exhibits a moderate to high shrink and/or swell potential in the event of significant moisture fluctuation.

7.3.1 Active Zone Depth

Based on ANS Geo’s observation on site and laboratory index testing results, we have characterized the site to have an active zone depth of four (4) feet below grade. This depth will be limited by shallow bedrock, if and where encountered less than four (4) feet below grade, however for design purposes four (4) feet should be considered. This depth has been recommended considering the understanding that moisture content may fluctuate throughout the profile, and that expansion may not occur equally and simultaneously at any given time along the full depth of the soil profile within the zone.

It is noted that the active depth assumed herein may not represent the moisture variations that can occur at greater depths due to the presence of large tree root systems that could desiccation the soils, the presence of other heating units, or soil wetting due to pipe leaks, poor drainage, etc. ANS Geo expects that any vegetative cover (trees, shrubs, etc) will be removed in areas where arrays or structures will be placed; and, therefore swelling caused by roots will be eliminated.

7.3.2 Evaluation of Potential Vertical Rise

Soils tend to swell when soil moisture increases and shrink when the soil moisture decreases. The amount of potential soil movement due to shrinking and swelling with soil moisture variations is represented or indicated by Potential Vertical Rise (PVR). Using the Texas Department of Transportation (TXDOT) TEX-124-E method, **the estimated PVR value is in the order of 1.5 inches**, which indicates moderate swelling (assumed tolerance of max 1-inch vertical movement). For slab, pad, and other ground-supported structures, over-excavation, replacement, and improvements will be necessary to mitigate the expected PVR to control movements to one-inch or less. We have recommended an over-excavation and

replacement depth of 15 inches (1.25 feet) below foundations to control and limit PVR to less than one-inch at these pad locations. This is discussed further in **Section 8.3.**

It should be noted that it is very difficult to predict the moisture variations under the structure during its service life. Therefore, the PVR estimates provided herein should be considered approximate probable estimates based on industry standard practice and experience, and the movements predicted herein should not be construed as absolute values that could occur in the field. Poor drainage and water infiltration into the foundation soils can be detrimental to the ground supported structures. Excessive wetting of soil (due to accumulation of water), or, excessive drying (due to the presence of large trees, removal of vegetation and exposure to atmosphere, change in topography and drainage, etc) could possibly result in greater PVR values than those estimated herein.

There are a number of methods used in the mitigation of damage caused by the shrinking of swelling of these expansive clays for both pile foundations and shallow foundations. These methods include over-excavation, the introduction of chemical admixtures, and the implementation of moisture control barriers. Over-excavation of the expansive clay and/or pre-wetting are some commonly used techniques to diminish the effect of these expansive clays. Chemical admixtures such as hydrated lime and sodium chloride can also be added to the expansive clays to partially mitigate the chance of shrinkage and swelling. Addition of hydrated lime at a dose of 3 – 8% by weight of soil is most effective in soils with at least 25% passing No. 200 sieve and plasticity index > 10. This method reacts in a way that the lime supplies a divalent calcium cation that can form calcium silicates and calcium aluminum hydrates, which can form physical bonds between particles to increase soil strength. Recommendations for over-excavation for shallow and mat foundations have been provided in **Section 7.6** and **Section 8.3**.

7.4 Recommended Parameters for PV Array Pile Design

Based on our interpretation of the subsurface conditions observed within our limited investigation program, and the laboratory testing results, ANS Geo recommends that the soil parameters in **Table 10** be considered for axial and lateral preliminary driven pile designs using direct drive installation or installation within an undersized pre-drilled hole (hole diameter less than 75% of diagonal pile dimension) within array areas only.

Table 10: Recommended LPILE Parameters for Array-Area Driven Pile Design

Depth (ft)	Material Model	Total Unit Weight (pcf)	Internal Friction Angle	Cohesion (psf)	Soil Modulus (pci)	Soil Strain (E_{50})	Allowable End Bearing[1,2] (psf)	Allowable Side Resistance[1,2] (psf)
0 to 2	Stiff Clay w/o Free Water	100	---	750	---	*Default*	---	---
2 to 4	Stiff Clay w/o Free Water	105	---	1,500	---	*Default*	---	---
4 +	Stiff Clay w/o Free Water	110	---	2,500	---	*Default*	3,000	300

1. These recommendations consider a minimum factor of safety of 3.0 for end-bearing and 2.0 for skin friction conditions.
2. An equivalent box perimeter area approach was utilized for axial capacities.
3. Allowable end bearing values are recommended based on strain compatibility with mobilized allowable side resistances.

ANS Geo recommends that allowable side resistance within the upper 48 inches (4 feet) be neglected due to active zone considerations. For lateral design considerations, ANS Geo additionally recommends that lateral resistance within the upper six (6) inches be neglected to account for potential erosion; this depth should be confirmed in the Civil Engineer of Record's hydrological study. ANS Geo notes that the soil parameters depicted within **Table 10** represent values based on our observed soil conditions and laboratory test results; these parameters should not be relied upon for other site foundation designs. It is our

recommendation that a pile load testing program and detailed structural calculations, using the intended pile sections and design loads, be performed prior to construction to confirm these recommendations.

ANS Geo notes that these recommendations are based on typical criteria we have observed through our professional experience; once a racking vendor has been selected, the racking vendor's specific criteria should govern over our recommendations.

7.5 Recommended Soil Parameters – Shallow Foundations

ANS Geo anticipates that shallow foundations such as concrete footings, housekeeping pads, inverter pads, or sonotubes will be used to support non-critical and lightly loaded structures. As such, we recommend the soil parameters depicted within **Table 11** be considered for such foundation designs, assuming a maximum post-construction vertical movement of one inch. Load-bearing foundations should be installed atop properly prepared subgrade as indicated in **Section 8.3**.

Table 11: Recommended Soil Parameters for Shallow Foundations

Depth (ft)	Material	Max. Allowable Bearing Pressure (psf)	Vertical Subgrade Modulus (pci)	Soil / Concrete Friction Factor
2 to 3	Clay	600	25	0.3
3 to 4	Clay	1,000	75	0.3
4 +	Clay	1,200	75	0.3

For foundations which are founded within the frost zone (as noted in **Section 7.2**), these foundations should be frost-protected by way of appropriately designed haunched edges, foam insulation, and/or free-draining structural fill extending to the frost depth. Should the maximum allowable bearing capacity be lower than required, ANS Geo recommends over-excavating below the foundation depth and replacement of native material using additional structural fill placed and prepared as noted in **Section 8.3**.

The capacities and parameters noted in **Table 11** are based on foundation considerations and assumptions detailed in **Section 8.3.** The above recommendations in **Table 11** are based on strip footings and isolated spread footings with dimensions producing less than 100 square feet.

7.5.1 Mat Foundations

Mat foundations (100 square feet or larger, such as larger substation slabs) should be founded on at least 15 inches of properly compacted structural fill as indicated in **Section 8.3**. Recommended soil parameters for mat foundations can be found in **Table 12** below.

Table 12: Recommended Soil Parameters for Mat Foundation

Depth (ft)	Material	Max. Allowable Bearing Pressure (psf)	Vertical Subgrade Modulus (pci)	Soil / Concrete Friction Factor
2 to 3	Clay	500	25	0.3
3 to 4	Clay	850	75	0.3
4+	Clay	1,150	75	0.3

Rigid mat foundations placed on properly compacted fill for a maximum allowable bearing capacity indicated above will experience a maximum settlement of two (2) inches or less. The vertical subgrade modulus provided in **Table 12** is for a square plate with a 1-foot dimension. The vertical subgrade modulus for a mat foundation with a specific footprint area should be estimated based on this value. Adequate

construction joints and reinforcement should be provided to reduce the potential for cracking of the floor slab due to differential movement.

Lastly, sliding resistance of any shallow foundations will be largely provided by the friction between the concrete foundation and the underlying subgrade soils. Although the concrete foundation will be separated from the native soil by a compacted structural fill layer, we have conservatively considered direct contact on native fine-grained soils for purposes of obtaining a design value. The base friction coefficient for the foundation on native soils is provided in the above table. The strains required to mobilize base friction are not compatible with the strains required to mobilize passive resistance. Therefore, we recommend that passive earth pressure be ignored.

7.6 Recommended Soil Parameters – Deep Foundations

If critical substation structures or transmission poles are subjected to heavy compressive and/or overturning loads, it is recommended that drilled pier foundations be used. Geotechnical design values have been created for use in Ensoft LPILE, Fad Tool's MFAD, or CAISSON software. These parameters have been provided in **Table A** and **Table B** immediately preceding the attachments.

7.6.1 Deep Foundation Capacities

Design capacities can be calculated using the diameter of the shaft, depth of the shaft, installation method, and various geotechnical parameters, provided in **Table A** and **Table B**, that define how the soil will behave under different loads. A summary of the recommended ultimate skin friction and end bearing values for drilled shaft design is provided in **Table A** and **Table B**. Piers (Drilled shafts) should extend a minimum of 1.5 pier diameters into a given soil stratum to fully develop the recommended design end bearing strengths. A minimum factor of safety of two (2) must be applied to the skin friction values and three (3) to the end bearing capacities for design purposes.

Post-construction settlement for piers designed for end bearing should be limited to one (1) inch or less, based on the recommended capacities provided herein. Foundation loads and dimensions would be required to calculate an explicit anticipated settlement. ANS Geo should be consulted with the final dimensions and loading of the proposed foundations to allow calculation of the anticipated settlement of each structure and confirm the settlement remains within a serviceable limit.

7.6.2 Deep Foundation Construction

Based on the presence of coarse grained soils and groundwater, temporary casing may be required, depending on the design embedment depth of the piers, to maintain borehole integrity prior to placement of reinforcing steel and concrete. Contractors should be required to provide bid prices for varying sizes and lengths of temporary casing based on the design depths and diameters of deep foundation elements. Piers should be poured the same day they are drilled and must not be left open overnight. If a pier cannot be poured on the same day as drilling, they may be loosely backfilled and re-drilled the following day for installation. To the extent possible, cast-in-place concrete should be placed "in the dry"; pumps or casing may be necessary to remove or prevent infiltration of groundwater into open excavations prior to placement of concrete.

Pier holes should be inspected for verticality (plumbness), proper depth of drilling, proper bearing strata, and cleanliness of the bottom of the excavation prior to introduction of reinforcing steel or concrete. ANS Geo encourages that concrete should be placed via tremie method to avoid consolidation or segregation of the aggregates in the concrete. Concrete should not be allowed to freefall more than 6 feet.

8 Construction Recommendations

ANS Geo notes the recommendations provided below are provided as general recommendations for the observed site conditions.

8.1 Excavation

Depending on proposed foundation configurations, degree of earthwork, and depth of utilities, some excavations may extend deeper than four (4) feet below grade. Temporary excavations deeper than four (4) feet should be shored or sloped and benched, in accordance with OSHA regulations, to ensure safe working conditions within the excavations. For benching purposes, fine-grained clays and silty clays observed on site can be considered “Type A”, and should be slope at 3/4H:1V. Coarse-grained gravels observed on site can be considered “Type C”, and should be sloped at 1-1/2H:1V or shallower. All OSHA soil classifications should be field determined by the contractor’s “competent person” prior to excavation. Any proposed shoring systems should be designed by the contractor’s “competent person”, be certified by a Professional Engineer licensed in the State of Nevada and should be submitted to the engineer for review. ANS Geo notes at two (2) locations, shallow rock was encountered within the same general area at depths of two (2) to three (3) feet below grade and the contractor should be prepared for rock excavation and/or predrilling near these test locations

Contractors are made aware that the presence of shallow rock, cobbles, and/or boulders were noted and confirmed across the site. Since it is understood that cut activities and earthmoving will be required to meet final design grades for the project, the presence of harder excavation and/or rock excavation will be required. At minimum, Contractors should be prepared to conduct excavation, grading, and rock removal as part of their work. To provide a baseline definition, rock excavation consists of the removal of hard igneous, metamorphic, and/or sedimentary rock, which should be attempted using a track mounted power excavator, equivalent to Caterpillar Model No. 215C LC, which is rated at not less than 115 HP flywheel power and 32,000 pound drawbar pull equipped with a short stick and a 42 inch wide, short tip radius rock bucket rated at 0.81 cubic yard (heaped) capacity. Should rock removal not be possible, the contractor should attempt to break and remove rock using a hoe-ram, rock breaker, or other mechanical means as part of the attempt to grade and remove rock. Lastly, the presence of isolated boulders or rock fragments larger than one (1) cubic yard is not in itself a sufficient cause to change the classification of the surrounding material and should not be considered rock excavation.

Should rock removal not be possible with machinery meeting the minimum requirements of typical rock removal and excavation equipment, and additional means such as controlled blasting, line drilling, or other method be required, the Geotechnical Engineer, Owner, and/or Owner’s representative should be immediately notified in writing, and the Contractor should provide several options and methods based on their site-specific and local experience for the removal of the rock, to allow the Owner to evaluate what additional methods can be used and any additional costs which may be incurred. The Contractor shall have documented their attempt to remove rock using the equipment and traditional means noted above by means of providing cut sheets, video, on-site meeting, and/or other method prior to notifying of harder rock conditions which require additional effort.

8.2 Dewatering

At the time of our geotechnical investigation, perched water and/or groundwater was encountered within ten (10) of the completed 20 borings and within six (6) of the completed even (7) percussion probes at depths ranging approximately between 11.5 and 32 feet below grade. In addition, standing water was observed at select locations across the project site. As such, dewatering is not anticipated for shallow excavations. Notwithstanding, the contractor should be prepared to manage groundwater, perched water, and/or infiltrated stormwater as needed using localized sump-and-pump, wellpoint, or similar techniques to allow for concrete foundation construction in-the-dry. Water discharge should be managed in compliance

with applicable state and local regulations. The contractor should be sure to grade the surface as necessary to divert stormwater away from open excavation to the extent possible.

8.3 Subgrade Preparation and Compaction

Prior to the installation of shallow concrete foundations, ANS Geo recommends over-excavating the subgrade by at least 15 inches, proof-rolling the subgrade, lining the exposed material with a geotextile separation fabric, and bringing the subgrade back up to the design foundation elevation with compacted structural fill as specified within **Table 13**. If geotextile fabric is not desired, an additional two (2) inches of stone should be provided to account for some impregnation of the stone into native soil, to maintain a capillary break, and maintain drainage.

Native material beneath the separation fabric should be inspected for unsatisfactory conditions such as standing water, frozen soil, unsuitable soil, organics, protruding cobbles or boulders, or deleterious materials. Should any unsatisfactory conditions exist within the native subgrade, the excavation should be undercut an additional six (6) inches (21 total inches beneath proposed foundation depth) prior to placement of the geotextile separation fabric.

Table 13: Recommended Specification of Structural Fill

Sieve Size	Percent Passing
3-inch	100
No. 4	35 – 100
No. 30	20 – 100
No. 200	0 – 12
Max. Liquid Limit	Max. Plasticity Index
35	10

Should structural fill material not be available, in accordance with the specifications highlighted in **Table 13**, ANS Geo should be contacted to evaluate alternate materials. Structural fill should be placed in loose lifts not exceeding 12-inches if using large equipment, or 8-inches if using hand-operated tools such as jumping jacks, tamping plates, or similar equipment. Structural fill should be placed within two (2) percent of its optimum moisture content and be compacted to at least 95 percent of its Modified Proctor Density (ASTM D1557). The subgrade preparation (over-excavation, fabric, and structural fill) should horizontally extend at least two (2) times the compacted vertical structural fill thickness beyond each edge of the foundation. For example, a six (6)-inch over-excavation and compacted structural fill thickness should extend at least 12 inches laterally beyond each foundation edge.

8.4 Backfilling and Compaction

8.4.1 Re-Use of Native Soils

ANS Geo notes that any native soils with considerable fine-grained content (more than 20 percent) may be difficult to handle, place, and compact without proper moisture conditioning and protection. ANS Geo recommends the following measures be considered to reduce the adverse impacts of moisture-sensitive soils:

- Positive measures should be implemented and maintained to intercept and direct surface water away from moisture-sensitive subgrade surfaces.
- Subgrade surfaces should be sloped and, as appropriate, seal-rolled to facilitate proper drainage. Surfaces should be properly prepared in anticipation of inclement weather. Moisture should not be allowed to collect on subgrade surfaces.
- To the extent practical, the limits of exposed subgrade soils should be minimized.
- Construction traffic should be limited to properly constructed haul roads.
- Disturbed soils should be removed and replaced with compacted controlled fill material.

- In place moisture contents should be maintained with two percent wet/dry of the optimum moisture content as determined by the Modified Proctor Test (ASTM D1557).

These native soils may be re-used across the project area for fill in landscaped areas; however, it should not be used under, or above foundations or load-bearing structures where typically imported structural fill or general backfill are used, respectively. Native material used as backfill for cable trenches should be handled and placed at a moisture content at or above its optimum value to ensure representative thermal properties are maintained. Native soils may also be used in required "fill" areas within the PV array footprint(s), provided that the material is placed and compacted consistent with the "general backfill" recommendations described herein.

8.4.2 General Backfill

In areas around and above installed foundations, large utilities, and other buried site features, ANS Geo recommends well-graded granular soils with less than 20 percent fine-grained content may be used as general backfill. Native soils meeting these criteria, if and where present, may also be used. General backfill material should be screened of any cobbles, boulders, and any particles larger than 3 inches in diameter, and should not be used beneath any load-bearing structures. General backfill should be placed in loose lift thicknesses not exceeding 12 inches and be compacted to at least 95 percent of its Modified Proctor Density (ASTM D1557). Soil used as backfill should not be handled when frozen and should be free of excessive moisture, organics, and deleterious material. In fill areas beneath foundations and load-bearing structures, ANS Geo recommends structural fill as described in **Section 8.3** and **Table 13**. Flexible base for gravel access roads is specified in **Section 8.5**.

8.5 Access Roads

ANS Geo understands that, as part of the project, access roads will be constructed to provide access for heavy equipment such as a main power transformer, poles, and other ancillary structures, as well as long-term access for site maintenance purposes. It is expected that new, unpaved paths will be constructed of aggregate material placed on native, compacted and proof-rolled subgrade stripped of topsoil and other organic material.

During construction, the delivery and movement of heavier loads such as transformers, inverters, delivery of steel and concrete, and transportation of cabling is expected. Construction loads and vehicles are larger and heavier than the expected vehicles during long-term operation; however, the duration of these activities will be much shorter considering the access road life. Designing for short-duration, construction-phase access road would require increased thickness of aggregate, the use of geogrid, or other soil improvement, but these increased roads would be over-designed for long-term operation including routine light-duty trucks, maintenance vehicles, and infrequent accessibility to emergency personnel including fire-fighting rigs. Therefore, it is typical for access road design to be completed considering the thickness of road base required for long-term use since it is expected that the site subcontractor will be able to maintain serviceable access roads throughout construction and at turn-over of the facility by backfilling ruts greater than two-inches, back-blading and re-compacting loose and rutted areas, re-shaping roads to promote drainage and safe passage of traffic, and other improvements.

Considering the above, ANS Geo has performed an evaluation of the required access road thickness based on infrequent emergency access for firefighting vehicles as well as occasional light vehicular traffic. Our preliminary road evaluation for a post-construction access road assumed the following:

Table 14: Access Road Design Considerations

Design Consideration	Design Assumption
Equivalent Single-Axle Loads (ESALs)	5,000 & 10,000
Allowable Rut Depth	2 inches
Subgrade Soil	Medium stiff silty clay
Assumed Min. Design Subgrade CBR	3.5% (following proof-roll and compaction)

ANS Geo recommends that road base material (flexible base) consists of clean, crushed stone or road base material with particle size distribution as presented in **Table 15**.

Table 15: Recommended Gradation of Crushed Stone

Sieve Size	Percent Passing
1 ½-inch	100
3/4”	55 – 90
No. 4	25 – 50
No. 50	5 – 20
No.200	3 – 10

ANS Geo has provided a number of access road configurations in **Table 16** based on the assumptions in **Table 14**. The use of a geotextile fabric (such as Mirafi HP270) is recommended and presented within our evaluation. In addition, it is possible and likely that certain areas will require stabilization or additional access stone thickness where weaker soils are present. The overall cross-sectional thickness may be reduced using a Class II geogrid (such as Tensar BX1200 or TX7). This access road thickness can also be reduced if a greater rut depth is allowed to minimize the access road thickness as long as maintenance is performed to restore the roadway to a serviceable condition as damage occurs. A comparison of various options and configurations has been provided in **Table 16.**

Table 16: Recommended Aggregate Thickness for Permanent Site Access Roads

Aggregate Construction Option	Access Road Cross Section (5,000 ESALS)	Access Road Cross Section (10,000 ESALs)
Aggregate on prepared subgrade soil	11 inches of Crushed Stone	12 inches of Crushed Stone
Aggregate with geotextile fabric	8 inches of Crushed Stone over geotextile	9 inches of Crushed Stone over geotextile
Aggregate with Class II geogrid and geotextile fabric	6 inches of Crushed Stone over Class II geogrid atop geotextile	6 inches of Crushed Stone over Class II geogrid atop geotextile
Aggregate over Chemically Stabilized Subgrade	12-inch treatment depth, 7-9% lime/cement by weight + 4 inches of Crushed Stone	12-inch treatment depth, 7-9% lime/cement by weight + 4 inches of Crushed Stone

When using geogrid, it is recommended that a nonwoven geotextile fabric be placed between the subgrade and the geogrid to provide separation and avoid the stone aggregate to be blinded with native soil. If geotextile fabric is not desired, an additional two (2) inches of stone should be provided to account for some impregnation of the stone into native soil. When geogrid is used, it should be placed in accordance with manufacturer’s recommendations such as three (3) foot overlap, fastening overlapping areas, and material storage and handling.

If chemical stabilization is performed, the contractor should perform any necessary due diligence to confirm their design, means, and methods. The subgrade should be verified below the treatment depth to evaluate the CBR value of the subgrade prior to treatment. In addition, the recommended chemical stabilization

application rate should be taken as an assumed average. The actual application rate should be determined by the contractor and may vary based on the tested and desired subgrade CBR along the proposed roadway, the treatment depth required, and the moisture content. The application rate and treatment depth should be evaluated by performing several test strips at the project site prior to the start of construction and testing the test strips in the field using a dynamic cone penetrometer or plate load test to confirm the CBR. Then, once the application rate and depth are evaluated, verification and calibration testing should be performed using the dynamic cone penetrometer at intervals of no less than 500-linear feet along the access roadway.

Prior to roadway construction, the subgrade should be stripped of vegetation and topsoil, and should be confirmed to maintain a minimum CBR value assumed in **Table 14** and compaction to 95 percent of its Modified Proctor Density (ASTM D1557) to be in conformance with ANS Geo's above recommendations. Should the desired CBR and/or target compaction not be achieved, ANS Geo first recommends that the upper 12-inches be scarified, moisture-conditioned (dried or wetted to within +/- 2% of optimum moisture content), and re-placed and re-compacted. Should this not produce the desired minimum CBR and subgrade performance, soil improvement such as additional stone, and/or additional stabilization may be required to meet ANS Geo's minimum design recommendations. Crushed stone should be placed in loose lifts not exceeding eight (8) inches in height and be compacted to ensure a minimum CBR of 35 percent is achieved.

Field conditions should be verified at the time of construction. Subgrade conditions could vary based on excavation depths, weather, drainage, and construction practices that disturb the subgrade. Dynamic cone penetrometer (DCP) testing should be completed on the prepared subgrade per ASTM D6951 and in a consistent manner by trained personnel to obtain useful and reliable data. ANS Geo recommends that, at minimum, DCP testing should be completed at a frequency of one test per each 500-linear feet of access roadway. Should conditions vary, this frequency may be increased or decreased based on observations from the site, or at the discretion of the Geotechnical Engineer of Record, Civil/Structural Engineer of Record or Owners Engineer. The tests should be staggered across the width of the road at outer wheel-tracks (left and right) and the centerline. However, the variability of the road subgrade strength will only become fully apparent when the tests have been carried out. In order to ensure statistical reliability, at least ten tests should be taken in each uniform section. The use of DCP testing may also be used to decrease the thickness of access road stone, if the prepared subgrade is stiffer (is confirmed to have a higher CBR) than ANS Geo's design assumption and no visible surface water or pumping is observed in the section of roadway being tested. ANS Geo can be contacted to provide a table of access road stone thickness compared to field confirmed CBR.

8.6 Compaction Testing

Compaction testing should be performed at each discrete equipment foundation location for each compacted lift at a minimum of one test per 2,500 square feet. For linear sections such as trenches, the contractor and/or the owner's representative should perform a visual trench bottom inspection along the length of the trench to confirm no angular, sharp, deleterious, frozen, trash, organic material, or standing water exists at the bottom of trench. For backfilling and compaction of trenches, a minimum of one compaction test per 500 linear feet and minimum one per lift, should be performed. In all cases, the subgrade should be maintained, covered, or protected if concrete is not immediately placed. Excessively wet or dry material should be removed or improved prior to the placement of foundations.

9 Pile Installation Considerations

ANS Geo anticipates that, as typical with solar farm construction, solar panels will be supported by driven steel wide-flanged piles or screw-type piles torqued to their final embedment depths. Wide-flanged piles are typically installed via direct-push, vibration, and/or percussive hammer methods. Based on our field investigation and knowledge of the regional geology, weathered rock and rock may be encountered at the

foundation post locations within the anticipated embedment depths and, therefore, piles may not be able to be installed to the typical embedment depth before refusal.

It should be noted, however, that soil boring refusals may not be directly representative of driven pile refusals. In many cases, wide-flanged sections have the ability to "bend" at the flanges or push small cobbles aside. Notwithstanding, ANS Geo recommends a design-level pull-out testing campaign be completed using the planned pile sections (screw piles or W-sections), to the proposed embedment depths, and using the expected construction means and methods.

Should driven piles be implemented, ANS Geo recommends that the contractor be prepared to pre-drill at proposed post locations to clear obstructions, as needed. We recommend that pre-drilled holes be completed to a diameter slightly smaller than the diagonal dimension of the proposed pile section to ensure a tight fit once the pile is driven to its targeted depth. For example, an under-sized, four to five-inch diameter hole may be drilled and utilized for W6x9 section (approx. 7.1-inch diagonal measurement). The contractor should be aware, however, that heavier sections (ie. W6x12 or W6x15) may have limiting "bending" capacity in its flanges, and therefore require a hole of a slightly larger proportion

10 Limitations

ANS Geo notes that the findings and recommendations presented within this Geotechnical Report are based on our investigation programs conducted between March and April of 2025, and our engineering judgment. Our recommendations shall only be valid for the exact and specific locations at which field investigations or laboratory testing was completed. All other areas and regions of the site which are not investigated under our investigation program will be at the risk of the individual or entity using this Report.

If actual site subsurface conditions differ from the inferred conditions on which ANS Geo has based our confirmation-dependent recommendations, ANS Geo will need to modify our confirmation-dependent recommendations to develop final recommendations.

Tables A and B

Deep Foundation Recommendations

Table A

Recommended Substation Design Parameters

Location	Material Type	Lpile/Mfad/Caisson Modeled Material Type	Depth (ft)		Consistency	LPile / MFAD				MFAD	Drilled Shafts(Lpile)		Active Earth Pressure Coefficient, K_a	Passive Earth Pressure Coefficient, K_p	Drilled Shafts	
			From	To	Design N-Value	Effective Unit Weight [pcf]	Friction Angle soil [°]	Cohesion of soil [psf]	Adhesion Factor	Deformation Modulus, E_D [ksi]	p-y Modulus, k [lb/in^3]	Strain Factor, e50			Ultimate Skin Friction [ksf]	Ultimate End Bearing [ksf]
Substation (B-SS-01 & B-SS-02)	Clay (CL)	Soft Clay (Matlock)	0	2	4	100	-	500	0.55	0.30	-	-	1.0	1.0	---	---
	Clay (CL)	Stiff Clay w/o Free Water	2	6	6	105	-	750	0.55	0.50	-	*default*	1.0	1.0	0.41	---
	Clay (CL)	Stiff Clay w/o Free Water	6	20	12	110	-	1,300	0.55	0.80	-	*default*	1.0	1.0	0.72	11.7
	Clay (CL)	Stiff Clay w/ Free Water	20	28	2	47.6	-	250	0.75	0.15	*default*	*default*	1.0	1.0	0.19	2.3
	Limestone	Stiff Clay w/ Free Water	28	50	>50	72.2	-	3,500	0.43	3.50	*default*	*default*	1.0	1.0	1.51	31.5

Notes:

1. Parameters assume static groundwater is encoutnered at 20 feet BGS.

2. Skin friction in the upper 5 feet should be neglected.

3. Skin Friction and End Bearing Resistances assume a 24-inch diameter shaft is constructed. Larger diameter foundations may exhibit larger resistances.

4. Ultimate skin friction should be reduced by 10 percent (factor of 0.9) for uplift resistance evaluations.

5. A factor of safety of 3.0 and 2.0 is recommended for end bearing and skin friction capacities, respectively.

6. ANS Geo notes that the recommended safety factors provided are based on soil strength-limit conditions. Additional factors of safety may be required to meet Serviceability (settlement) criteria.

7. ANS Geo notes that piers should extend a minimum of 1.5 pier diameters into a given soil stratum to achieve the recommended design end bearing strengths.

Table B

Recommended BESS Design Parameters

Location	Material Type	Lpile/Mfad/Caisson Modeled Material Type	Depth (ft)		Consistency	LPile / MFAD				MFAD	Drilled Shafts(Lpile)		Active Earth Pressure Coefficient, K_a	Passive Earth Pressure Coefficient, K_p	Drilled Shafts	
			From	To	Design N-Value	Effective Unit Weight [pcf]	Friction Angle soil [°]	Cohesion of soil [psf]	Adhesion Factor	Deformation Modulus, E_D [ksi]	p-y Modulus, k [lb/in^3]	Strain Factor, e50			Ultimate Skin Friction [ksf]	Ultimate End Bearing [ksf]
BESS (B-BESS-01)	Clay (CL)	Soft Clay (Matlock)	0	2	5	100	-	625	0.55	0.35	-	-	1.0	1.0	---	---
	Clay (CL)	Stiff Clay w/o Free Water	2	6	6	105	-	750	0.55	0.50	-	*default*	1.0	1.0	0.41	---
	Clay (CL)	Stiff Clay w/o Free Water	6	10.2	17	110	-	2,250	0.55	1.30	-	*default*	1.0	1.0	1.24	20.3
	Limestone	Stiff Clay w/o Free Water	10.2	19	>50	135	-	3,500	0.43	3.50	-	*default*	1.0	1.0	1.51	31.5
	Limestone	Stiff Clay w Free Water	10.2	50	>50	72.2	-	3,500	0.43	3.50	*default*	*default*	1.0	1.0	1.51	31.5

Notes:

1. Parameters assume static groundwater is encoutnered at 19 feet BGS.

2. Skin friction in the upper 5 feet should be neglected.

3. Skin Friction and End Bearing Resistances assume a 24-inch diameter shaft is constructed. Larger diameter foundations may exhibit larger resistances.

4. Ultimate skin friction should be reduced by 10 percent (factor of 0.9) for uplift resistance evaluations.

5. A factor of safety of 3.0 and 2.0 is recommended for end bearing and skin friction capacities, respectively.

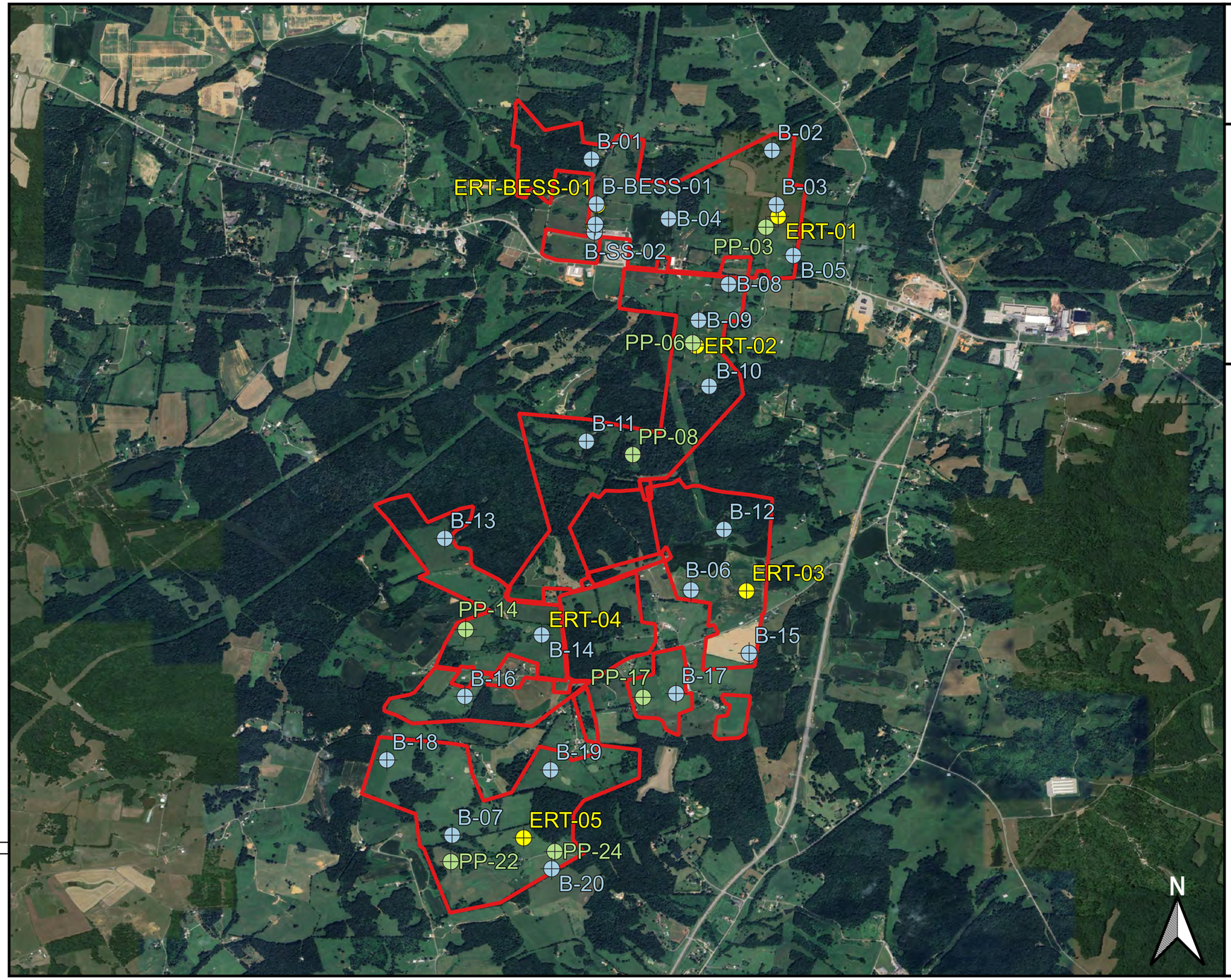
6. ANS Geo notes that the recommended safety factors provided are based on soil strength-limit conditions. Additional factors of safety may be required to meet Serviceability (settlement) criteria.

7. ANS Geo notes that piers should extend a minimum of 1.5 pier diameters into a given soil stratum to achieve the recommended design end bearing strengths.

Attachment A

Site Investigation Mapping

INVESTIGATION LOCATION PLAN



ANS GEO

Candela RENEWABLES

INVESTIGATION LOCATION PLAN

CANDELA RENEWABLES
SUMMER SHADE SOLAR PROJECT
METCALFE AND MONROE COUNTIES, KENTUCKY

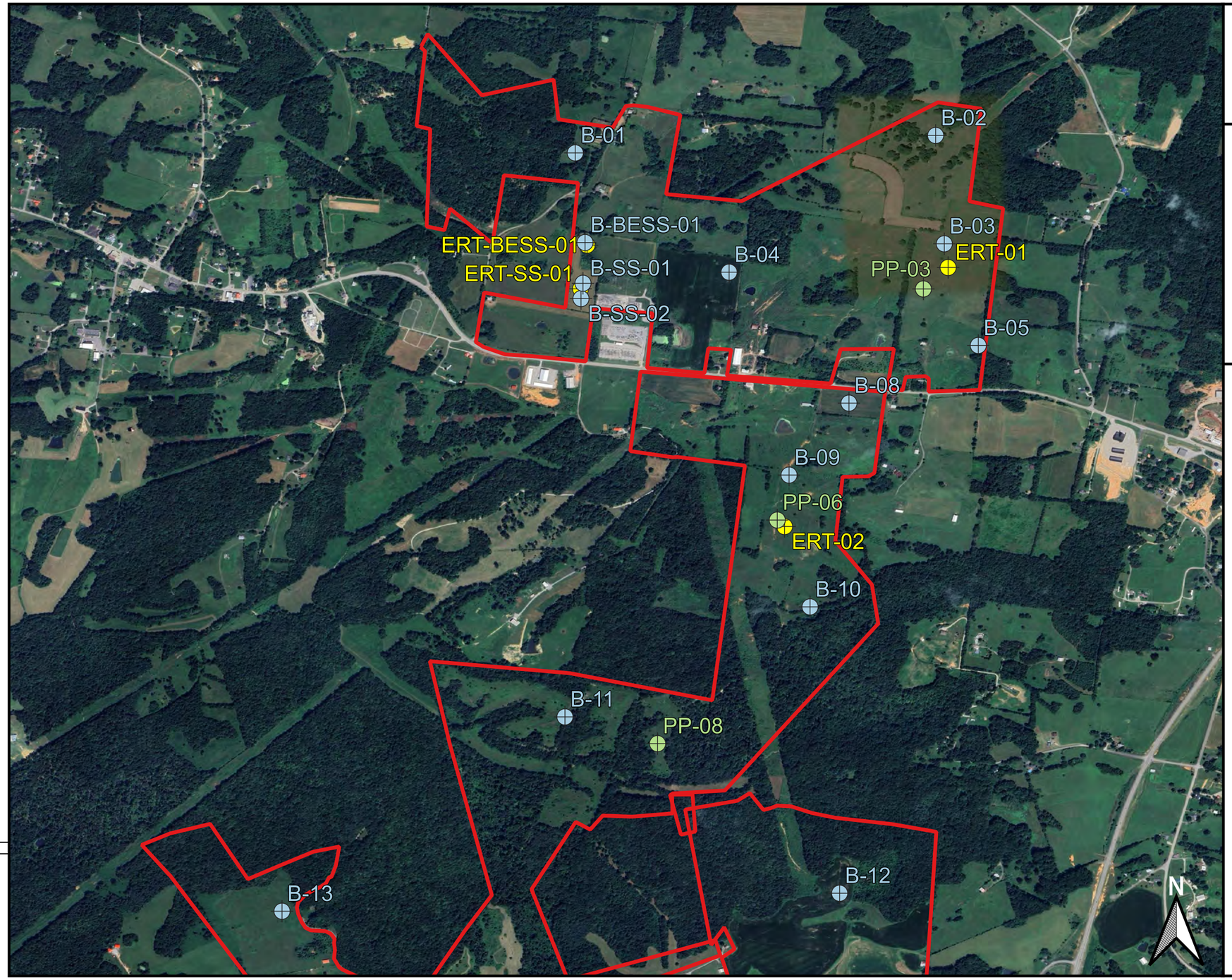
Legend

- Soil Boring Locations
- Percussion Probe Locations
- ERT Locations
- Approximate Project Boundary

0 2,000 4,000 ft

Absolute Scale: 1 inch = 2000 feet
Scale at 11" x 17" AS SHOWN

Prepared by: Jonah Gomez
Date: April 28, 2025
Drawing Number: ILP-1 Rev.0



ANS GEO

Candela RENEWABLES

INVESTIGATION LOCATION PLAN A

**CANDELA RENEWABLES
SUMMER SHADE SOLAR PROJECT
METCALFE AND MONROE COUNTIES, KENTUCKY**

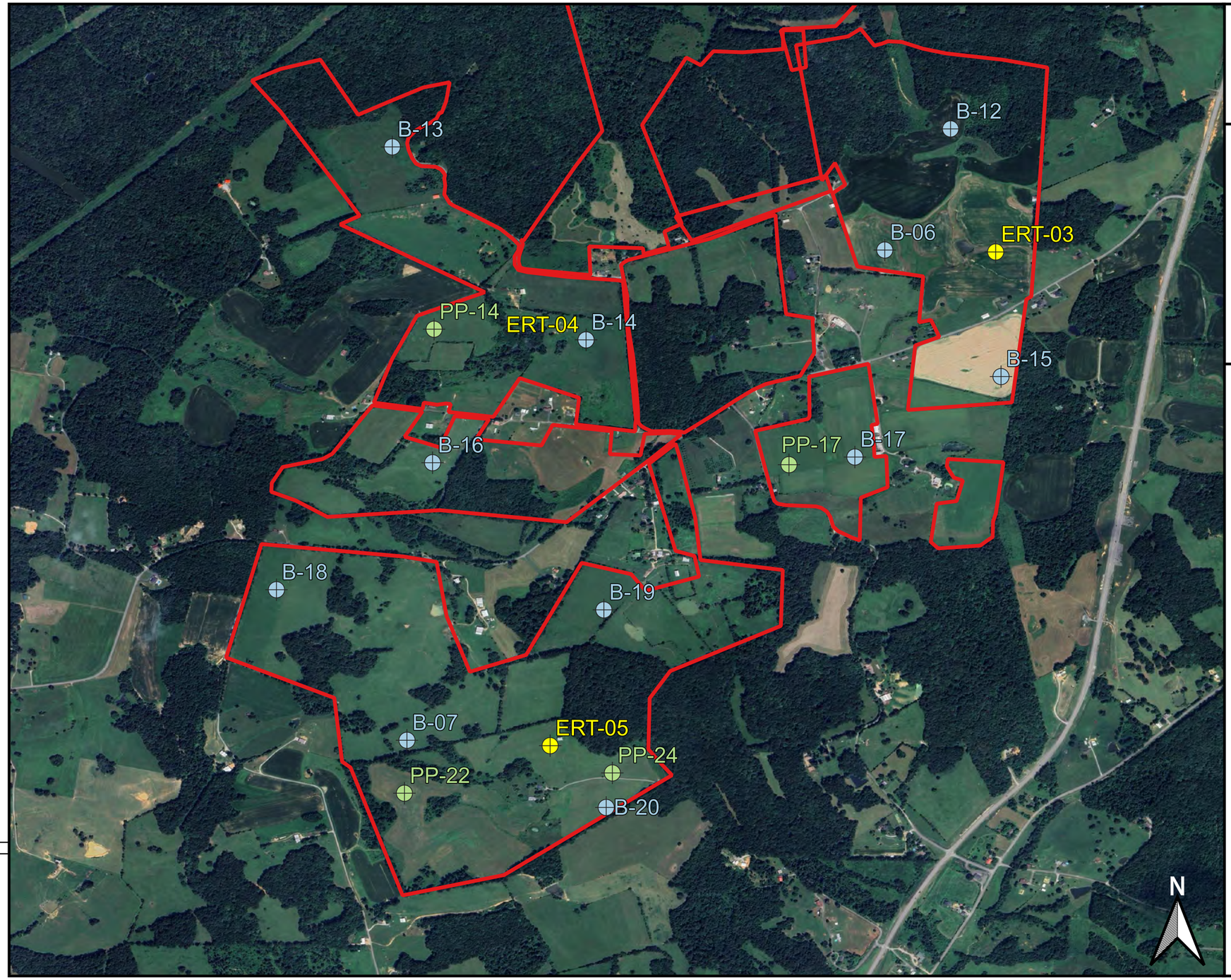
Legend

- Soil Boring Locations
- Percussion Probe Locations
- ERT Locations
- Approximate Project Boundary

0 1,000 2,000 ft

**Absolute Scale: 1 inch = 1000 feet
Scale at 11" x 17" AS SHOWN**

Prepared by: Jonah Gomez
Date: April 28, 2025
Drawing Number: ILP-1 Rev.0



ANS GEO

Candela RENEWABLES

INVESTIGATION LOCATION PLAN B

CANDELA RENEWABLES
SUMMER SHADE SOLAR PROJECT
METCALFE AND MONROE COUNTIES, KENTUCKY

Legend

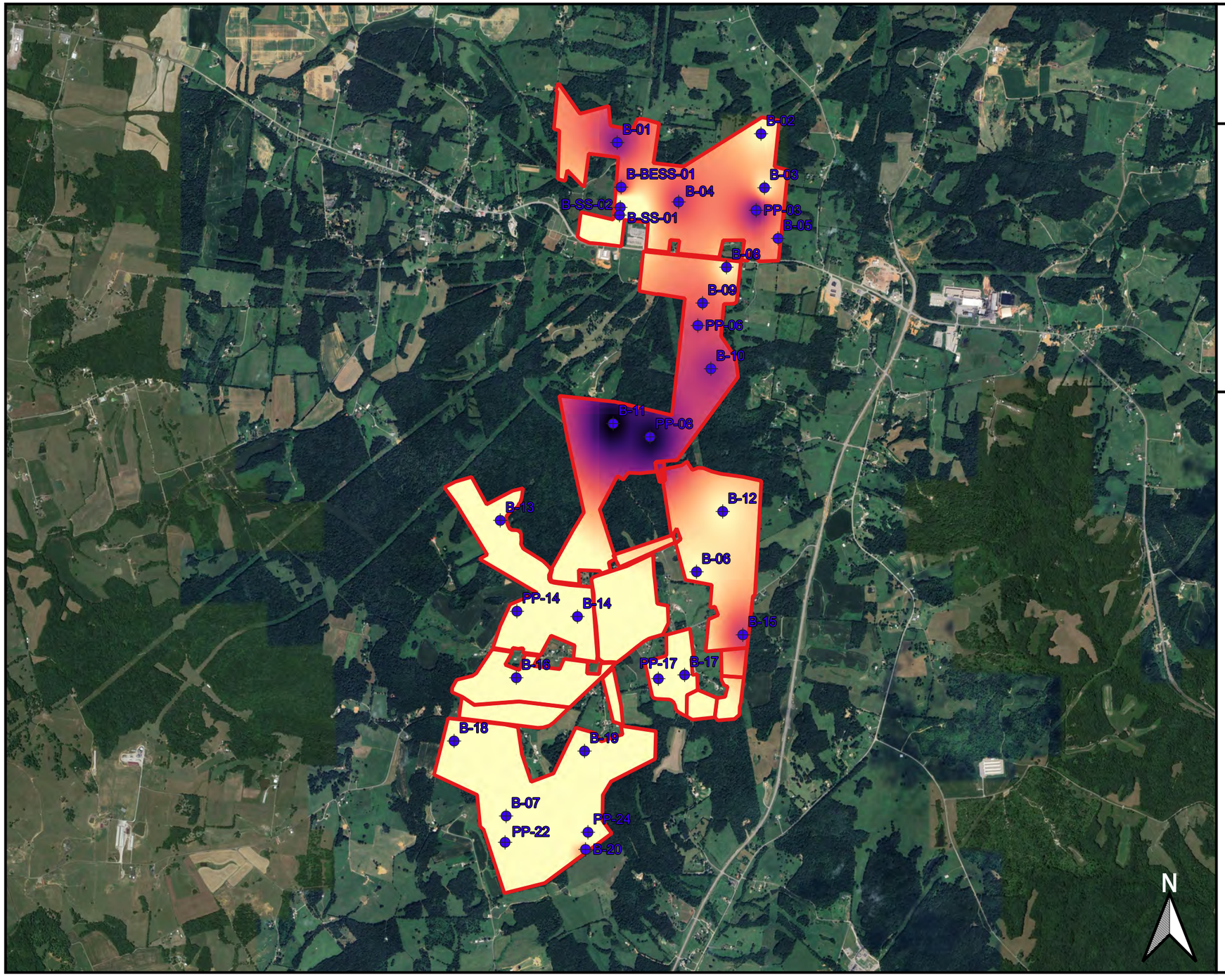
- Soil Boring Locations
- Percussion Probe Locations
- ERT Locations
- Approximate Project Boundary

0 1,000 2,000 ft

Absolute Scale: 1 inch = 1000 feet
Scale at 11" x 17" AS SHOWN

Prepared by: Jonah Gomez
Date: April 28, 2025
Drawing Number: ILP-1 Rev.0

HEATMAP



ANS GEO

Client: Candela RENEWABLES

DEPTH TO BEDROCK HEAT MAP

**CANDELA RENEWABLES
SUMMER SHADE SOLAR
PROJECT
METCALFE AND MONROE
COUNTIES, KENTUCKY**

Legend

- Project Boundary
- Soil Boring Locations

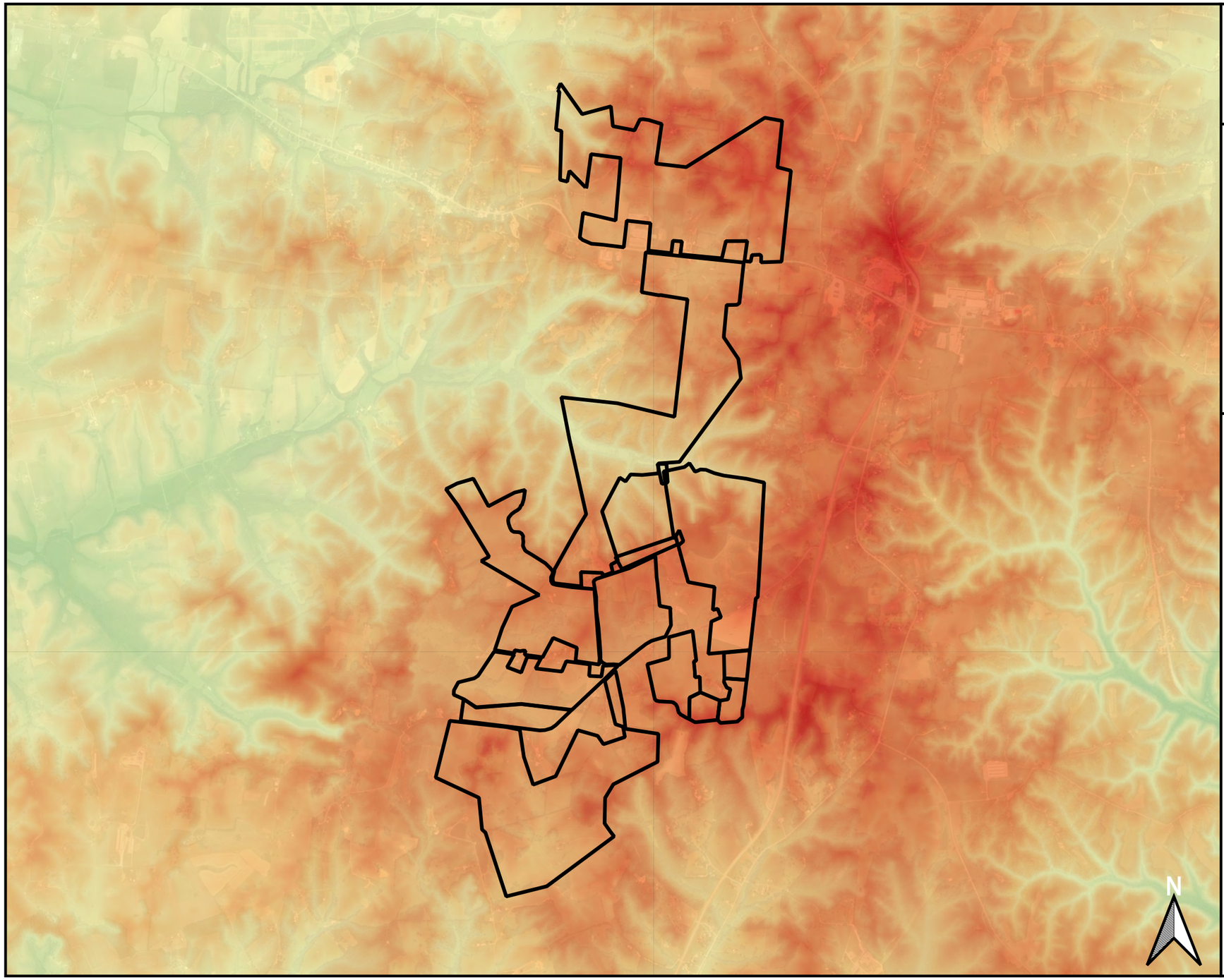
Depth to Bedrock (Feet BGS)

- 2
- 5
- 8
- 11
- 14
- 17
- >20

0 2,500 5,000 ft

**Absolute Scale: 1 inch = 2,500 feet
Scale at 11" x 17" AS SHOWN**

Prepared by: Vanessa Glaser
Date: April 28, 2025
Drawing Number: BRHM-1 Rev.0



ANS GEO

Client:

Candela RENEWABLES

ELEVATION MAPPING

**CANDELA RENEWABLES
SUMMER SHADE SOLAR
PROJECT
METCALFE AND MONROE
COUNTIES, KENTUCKY**

Legend

Project Boundary

Elevation (Feet ASML)

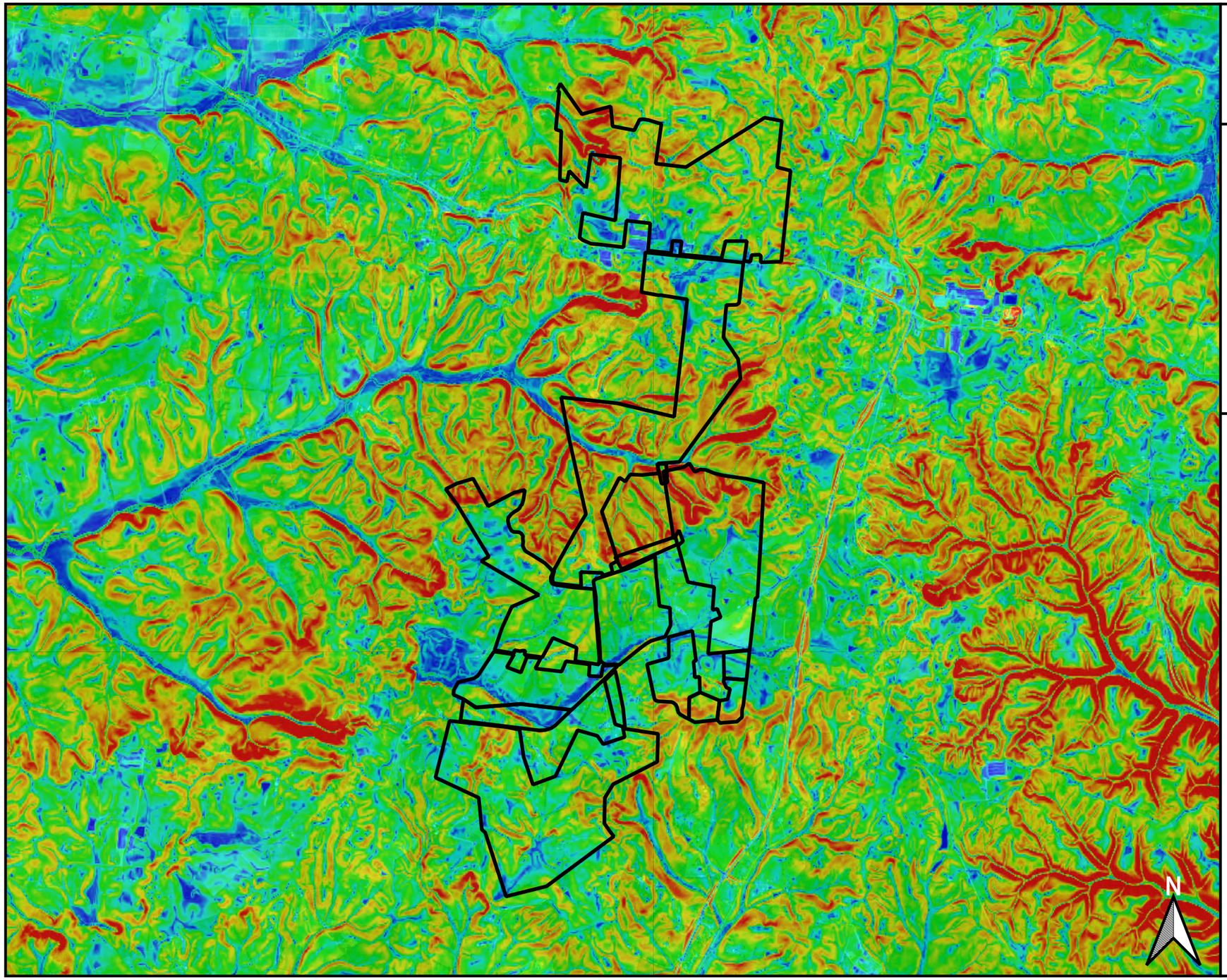
- 629
- 738
- 848
- 957
- 1066
- 1175

0 2,500 5,000 ft

**Absolute Scale: 1 inch = 2,500 feet
Scale at 11" x 17" AS SHOWN**

N

Prepared by: Vanessa Glaser
Date: April 24, 2024
Drawing Number: EM-1 Rev.0



ANS GEO

Client:

Candela RENEWABLES

SLOPE MAPPING

**CANDELA RENEWABLES
SUMMER SHADE SOLAR
PROJECT
METCALFE AND MONROE
COUNTIES, KENTUCKY**

Legend

Project Boundary

Percentage Slope (%)

- 0
- 3
- 8
- 15
- 25
- 35

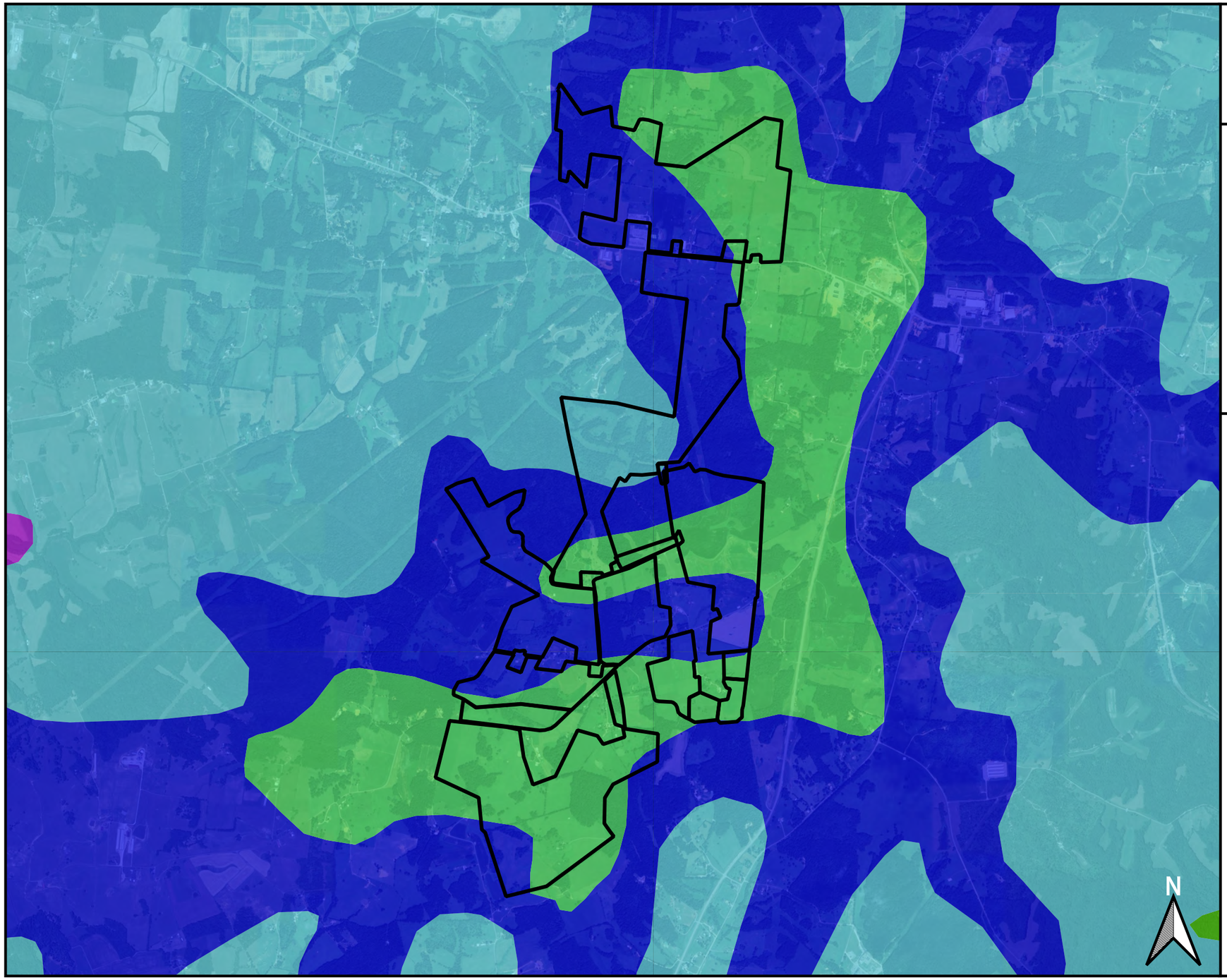
0 2,500 5,000 ft

**Absolute Scale: 1 inch = 2,500 feet
Scale at 11" x 17" AS SHOWN**

Prepared by: Vanessa Glaser
Date: April 24, 2024
Drawing Number: SM-1 Rev.0

Attachment B

Geologic Mapping



ANS GEO

Client:

Candela RENEWABLES

GEOLOGIC MAPPING

**CANDELA RENEWABLES
SUMMER SHADE SOLAR
PROJECT
METCALFE AND MONROE
COUNTIES, KENTUCKY**

Legend

Project Boundary

Geologic Units of Kentucky

- Alluvium
- Renfro and Muldraugh Members of Borden Formation and Fort Payne Formation, undivided
- Salem, Warsaw, and Harrodsburg Limestones, undivided
- Ste. Genevieve and St. Louis Limestones, undivided

0 2,500 5,000 ft

**Absolute Scale: 1 inch = 2,500 feet
Scale at 11" x 17" AS SHOWN**

N

Prepared by: Vanessa Glaser
Date: April 24, 2024
Drawing Number: GM-1 Rev.0

Attachment C

Soil Boring Logs

SOIL BORING

B-01

Client:	Candela Renewables	**Drilling Firm:**	Challenge Testing	**Coordinates:**	36.88862, -85.6905
Project:	Summer Shade	**Drill Crew:**	Richard Blackston	**Horiz. Datum:**	WGS84
Location:	Summer Shade, KY	**Boring Start:**	03/26/2025	**Elevation:**	1049 ft
Inspector:	Jonah Gomez	**Boring End:**	03/26/2025	**Vert. Datum:**	NAD83

Rig Type/Model:	CME-550X	**Sampler Type:**	Split Spoon	**Casing Type:**	-
Drill Method:	Auger	**Sampler I.D.:**	1.375 in	**Casing Length:**	-
Drilling Fluid:	None	**Hammer:**	Auto / 140 lbs / 30 in	**Casing I.D.:**	-

Depth (ft)	Sample Graphic	Sample ID	Recovery (in)	Blow Counts	Uncorrected N-Value	USCS	Graphic Log	Visual Classification	Pocket Penetrometer	Torvane (tsf)	N-Value	Drilling Notes
								TOPSOIL	2.25	0.25	6	
		S-1	14	1 2 4 4	6	CL		Medium Stiff, reddish brown Silty CLAY, trace fine to medium Sand, trace fine Gravel, moist (CL)				
		S-2	16	4 6 7 8	13			Stiff, reddish brown Silty CLAY, trace fine to medium Sand, trace fine Gravel, moist (CL)	3.25	0.25	13	
5		S-3	20	3 6 8 9	14	CH		Stiff, reddish brown Silty CLAY, trace fine to medium Sand, trace fine Gravel, moist (CH)	>4.5	0.55	14	
		S-4	18	12 11 13 11	24	CL		Very Stiff, yellowish red Silty CLAY, little fine to coarse Sand, moist (CL)	>4.5	0.3	24	
		S-5	9	3 50/3"	50			Gray to brown CLAY, trace fine to medium Sand, moist (CL)	4.5	0.2	50	
						GM		Gray fine to coarse GRAVEL, little Silt, fine to coarse grained Sand, moist (GM)				

End of boring at 9 feet BGS.
Borehole backfilled with soil cuttings.

Graphics Legend

- CL
- CH
- Topsoil
- GM
- SPT - Standard Penetration

Water Levels

- ▽ -
- ▼ -

SOIL BORING

B-02

Client:	Candela Renewables	**Drilling Firm:**	Challenge Testing	**Coordinates:**	36.88929, -85.67759
Project:	Summer Shade	**Drill Crew:**	Richard Blackston	**Horiz. Datum:**	WGS84
Location:	Summer Shade, KY	**Boring Start:**	03/26/2025	**Elevation:**	1079 ft
Inspector:	Jonah Gomez	**Boring End:**	03/26/2025	**Vert. Datum:**	NAD83

Rig Type/Model:	CME-550X	**Sampler Type:**	Split Spoon	**Casing Type:**	-
Drill Method:	Auger	**Sampler I.D.:**	1.375 in	**Casing Length:**	-
Drilling Fluid:	None	**Hammer:**	Auto / 140 lbs / 30 in	**Casing I.D.:**	-

Depth (ft)	Sample Graphic	Sample ID	Recovery (in)	Blow Counts	Uncorrected N-Value	USCS	Graphic Log	Visual Classification	Pocket Penetrometer	Torvane (tsf)	N-Value	Drilling Notes
								TOPSOIL	1	0.05	4	
		S-1	16	2 2 2 3	4	CH		Medium Stiff, brown CLAY, little fine to coarse Sand, trace fine Gravel, moist (CH)				
		S-2	15	3 5 7 10	12			Stiff, reddish brown Silty CLAY, trace fine to medium Sand, moist (CH)	3	0.25	12	
		S-3	20	5 8 10 11	18			Very Stiff, reddish brown Silty CLAY, trace fine to medium Sand, moist (CL)	4	0.3	18	
5		S-4	21	11 14 15 14	29			Very Stiff, reddish brown Silty CLAY, trace fine to medium Sand, moist (CL)	4.5	0.35	29	Mottling observed between 6 and 8 feet BGS
		S-5	24	4 7 9 11	16			Very Stiff, reddish brown Silty CLAY, little fine to coarse Sand, moist (CL)	4.5	0.3	16	
10												
		S-6	20	3 5 11 9	16	CL		Very Stiff, light brown Silty CLAY, some fine to coarse Gravel, trace fine to coarse Sand, moist (CL)	2.25	0.4	16	
15												
▽		S-7	20	1 2 2 1	4			Medium Stiff, brown CLAY, trace fine to coarse Sand, moist (CL)	1.5	0.1	4	
20												Auger chatter at 20 feet BGG Auger refusal at 21.9'

End of Boring at 21.9 feet BGS.
Borehole backfilled with soil cuttings.

Graphics Legend

- At Time of Drilling (ATD)
- Topsoil
- CH
- CL
- SPT - Standard Penetration

Water Levels

- Water encountered @ 18'
- -

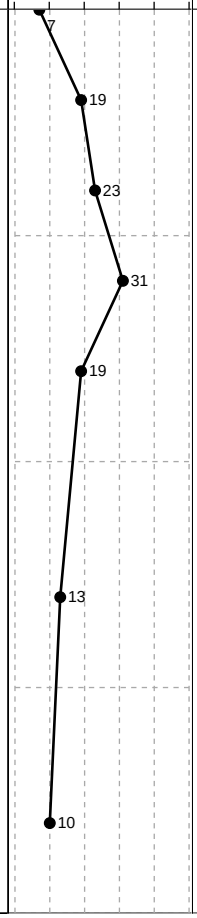
SOIL BORING

B-03

Client:	Candela Renewables	**Drilling Firm:**	Challenge Testing	**Coordinates:**	36.88562, -85.6767
Project:	Summer Shade	**Drill Crew:**	Richard Blackston	**Horiz. Datum:**	WGS84
Location:	Summer Shade, KY	**Boring Start:**	03/26/2025	**Elevation:**	1094 ft
Inspector:	Jonah Gomez	**Boring End:**	03/26/2025	**Vert. Datum:**	NAD83

Rig Type/Model:	CME-550X	**Sampler Type:**	Split Spoon	**Casing Type:**	-
Drill Method:	Auger	**Sampler I.D.:**	1.375 in	**Casing Length:**	-
Drilling Fluid:	None	**Hammer:**	Auto / 140 lbs / 30 in	**Casing I.D.:**	-

Depth (ft)	Sample ID	Recovery (in)	Blow Counts	Uncorrected N-Value	USCS	Visual Classification	Pocket Penetrometer	Torvane (tsf)
	S-1	14	2 3 4 8	7		TOPSOIL	3.25	0.45
						Medium Stiff, reddish brown Silty CLAY, little fine to coarse Sand, moist (CL)		
	S-2	22	6 10 9 13	19		Very Stiff, reddish brown Silty CLAY, little fine to coarse, little fine to coarse Sand, moist (CL)	>4.5	0.1
5	S-3	18	7 12 11 13	23	CL	Very Stiff, reddish brown Silty CLAY, some fine to coarse Gravel, trace fine to coarse Sand, moist (CL)	>4.5	0.5
	S-4	23	17 15 16 18	31		Hard, reddish brown Silty CLAY, little fine to coarse Sand, trace fine to coarse Gravel, moist (CL)	3.75	0.15
	S-5	24	5 8 11 12	19		Very Stiff, reddish brown Silty CLAY, little fine to coarse Gravel, little fine to coarse Sand, moist (CH)	>4.5	
10					CH			
	S-6	15	5 5 8 9	13		Stiff, reddish brown Silty CLAY, little fine to coarse Gravel, little fine to coarse Sand, moist (CL)		
15					CL			
	S-7	22	3 4 6 7	10		Stiff, reddish brown Silty CLAY, little fine to coarse Gravel, little fine to coarse grained Sand, fine to coarse, moist (CL)	2.5	0.2
20						End of Boring at 20 feet BGS. Borehole backfilled with soil cuttings.		



Drilling Notes

Graphics Legend

- CL
- CH
- Topsoil
- SPT - Standard Penetration Test

Water Levels

- -
- -

SOIL BORING

B-04

Client:	Candela Renewables	**Drilling Firm:**	Challenge Testing	**Coordinates:**	36.88456, -85.68475
Project:	Summer Shade	**Drill Crew:**	Richard Blackston	**Horiz. Datum:**	WGS84
Location:	Summer Shade, KY	**Boring Start:**	03/26/2025	**Elevation:**	1046 ft
Inspector:	Jonah Gomez	**Boring End:**	03/26/2025	**Vert. Datum:**	NAD83

Rig Type/Model:	CME-550X	**Sampler Type:**	Split Spoon	**Casing Type:**	-
Drill Method:	Auger	**Sampler I.D.:**	1.375 in	**Casing Length:**	-
Drilling Fluid:	None	**Hammer:**	Auto / 140 lbs / 30 in	**Casing I.D.:**	-

Depth (ft)	Sample ID	Recovery (in)	Blow Counts	Uncorrected N-Value	USCS	Visual Classification	Pocket Penetrometer	Torvane (tsf)	N-Value	Drilling Notes
	S-1	18	2 2 4 3	6		TOPSOIL	3.75	0.15	6	
						Medium Stiff, brown CLAY, little fine to coarse Sand, trace fine Gravel, moist (CL)				
	S-2	20	3 4 6 8	10		Stiff, reddish brown Silty CLAY, little fine to coarse Sand, trace fine Gravel, moist (CL)	3.25	0.4	10	
5	S-3	15	4 6 9 11	15	CL	Very Stiff, reddish brown Silty CLAY, little fine to coarse Sand, trace fine Gravel, moist (CL)	>4.5	0.1	15	
	S-4	16	11 12 16 18	28		Very Stiff, reddish brown Silty CLAY, little fine to coarse Sand, trace fine Gravel, moist (CL)	>4.5	0.35	28	
	S-5	7	6 9 8 8	17		Very Stiff, reddish brown Silty CLAY, little fine to coarse Sand, trace fine Gravel, moist (CL)	3.75	0.4	17	Auger chatter observed at 11 feet BGS.
10										
	S-6	2	50/4"	>50	GC	Very Dense, gray to brown fine to coarse GRAVEL, some Clay, trace fine to coarse Sand, moist (GC)				Auger refusal encountered at 12 feet BGS.
						End of Boring at 12.3 feet BGS. Borehole backfilled with soil cuttings.				

Graphics Legend

- GC
- CL
- Topsoil
- SPT - Standard Penetration Test

Water Levels

- ▽ -
- ▼ -

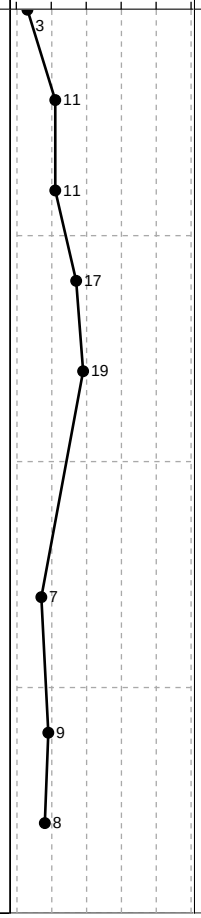
SOIL BORING

B-05

Client:	Candela Renewables	**Drilling Firm:**	Challenge Testing	**Coordinates:**	36.8819, -85.67647
Project:	Summer Shade	**Drill Crew:**	Richard Blackston	**Horiz. Datum:**	WGS84
Location:	Summer Shade, KY	**Boring Start:**	03/26/2025	**Elevation:**	1052 ft
Inspector:	Jonah Gomez	**Boring End:**	03/26/2025	**Vert. Datum:**	NAD83

Rig Type/Model:	CME-550X	**Sampler Type:**	Split Spoon	**Casing Type:**	-
Drill Method:	Auger	**Sampler I.D.:**	1.375 in	**Casing Length:**	-
Drilling Fluid:	None	**Hammer:**	Auto / 140 lbs / 30 in	**Casing I.D.:**	-

Depth (ft)	Sample ID	Recovery (in)	Blow Counts	Uncorrected N-Value	USCS	Visual Classification	Pocket Penetrometer	Torvane (tsf)
	S-1	18	1 1 2 3	3		TOPSOIL	2.75	0.25
					CL	Soft, brown CLAY, little fine to coarse Sand, trace fine Gravel, moist (CL)		
	S-2	22	4 5 6 5	11		Stiff, reddish brown CLAY, little fine to coarse Sand, little fine to coarse Gravel, moist (CL)	>4.5	0.1
5	S-3	22	3 4 7 6	11	CH	Stiff, reddish brown Silty CLAY, little fine to coarse Sand, moist (CH)	4.25	0.3
	S-4	22	8 8 9 9	17	CL	Very Stiff, reddish brown Silty CLAY, little fine to coarse Sand, moist (CL)	2.5	0.2
	S-5	23	5 9 10 12	19		Very Stiff, reddish brown Silty CLAY, little fine to coarse Sand, moist (CL)	3.5	0.2
10								
	S-6	20	2 3 4 5	7		Medium Stiff, reddish brown Silty CLAY, little fine to coarse Sand, moist (CL)		
15								
	S-7	12	3 4 5 8	9	SC	Loose, gray fine to coarse SAND, some Clay, wet (SC)		
	S-8	10	4 5 3 5	8		Loose, gray fine to coarse SAND, little fine to coarse Gravel, trace Clay, wet (SC)		
20						End of Boring at 20 feet BGS. Borehole backfilled with soil cuttings.		



Drilling Notes

Graphics Legend

- CL
- CH
- Topsoil
- SPT - Standard Penetration
- SC

Water Levels

- -
- -

SOIL BORING

B-06

Client:	Candela Renewables	**Drilling Firm:**	Challenge Testing	**Coordinates:**	36.85863, -85.68273
Project:	Summer Shade	**Drill Crew:**	Richard Blackston	**Horiz. Datum:**	WGS84
Location:	Summer Shade, KY	**Boring Start:**	03/28/2025	**Elevation:**	1051 ft
Inspector:	Jonah Gomez	**Boring End:**	03/28/2025	**Vert. Datum:**	NAD83

Rig Type/Model:	CME-550X	**Sampler Type:**	Split Spoon	**Casing Type:**	-
Drill Method:	Auger	**Sampler I.D.:**	1.375 in	**Casing Length:**	-
Drilling Fluid:	None	**Hammer:**	Auto / 140 lbs / 30 in	**Casing I.D.:**	-

Depth (ft)	Sample Graphic	Sample ID	Recovery (in)	Blow Counts	Uncorrected N-Value	USCS	Graphic Log	Visual Classification	Pocket Penetrometer	Torvane (tsf)	N-Value	Drilling Notes
0		S-1	14	1 1 2 3	3			TOPSOIL	1.25	0.1	3	
								Soft, brown Silty CLAY, trace fine to medium Sand, moist (CL)				
		S-2	24	5 5 6 7	11			Stiff, gray to brown Silty CLAY, trace fine to medium Sand, moist (CL)	3.75	0.2	11	
5		S-3	24	5 6 10 13	16			Very Stiff, reddish brown Silty CLAY, trace fine to medium Sand, moist (CL)	2.75	0.3	16	Mottling observed between 4 and 10 feet BGS.
		S-4	24	9 9 10 12	19	CL		Very Stiff, reddish brown Silty CLAY, trace fine to medium Sand, moist (CL)	3.25	0.25	19	
		S-5	24	3 5 8 11	13			Stiff, reddish brown Silty CLAY, trace fine to medium Sand, moist (CL)	>4.5	0.25	13	
10												
		S-6	24	3 5 7 9	12	CH		Stiff, brown Silty CLAY, little fine to coarse Sand, moist (CH)	4.25	0.65	12	
15												
		S-7	24	3 4 5 5	9	CL		Stiff, brown Silty CLAY, little fine to coarse Sand, moist (CL)	2.25	0.3	9	
20								End of Boring at 20 fee BGS. Borehole backfilled with soil cuttings.				

N-Value axis: 0, 10, 20, 30, 40, 50

Graphics Legend

- CL
- CH
- Topsoil
- SPT - Standard Penetration Test

Water Levels

- -
- -

SOIL BORING

B-07

Client:	Candela Renewables	**Drilling Firm:**	Challenge Testing	**Coordinates:**	36.84116, -85.70006
Project:	Summer Shade	**Drill Crew:**	Richard Blackston	**Horiz. Datum:**	WGS84
Location:	Summer Shade, KY	**Boring Start:**	03/29/2025	**Elevation:**	1014 ft
Inspector:	Jonah Gomez	**Boring End:**	03/29/2025	**Vert. Datum:**	NAD83

Rig Type/Model:	CME-550X	**Sampler Type:**	Split Spoon	**Casing Type:**	-
Drill Method:	Auger	**Sampler I.D.:**	1.375 in	**Casing Length:**	-
Drilling Fluid:	None	**Hammer:**	Auto / 140 lbs / 30 in	**Casing I.D.:**	-

Depth (ft)	Sample Graphic	Sample ID	Recovery (in)	Blow Counts	Uncorrected N-Value	USCS	Graphic Log	Visual Classification	Pocket Penetrometer	Torvane (tsf)	N-Value	Drilling Notes
		S-1	12	3 3 4 5	7			TOPSOIL	2.0	0.1	7	
								Medium Stiff, brown Silty CLAY, trace fine Gravel, trace fine to coarse Sand, moist (CL)				
		S-2	20	5 7 8 11	15			Very Stiff, reddish brown Silty CLAY, trace fine Gravel, trace fine to coarse Sand, moist (CL)	3.5	0.1	15	
5		S-3	23	7 7 11 14	18			Very Stiff, reddish brown Silty CLAY, trace fine Gravel, trace fine to coarse Sand, moist (CL)	>4.5	0.1	18	
		S-4	22	12 18 16 18	34			Hard, reddish brown Silty CLAY, trace fine to medium Sand (CL)	>4.5	0.15	34	
		S-5	20	4 6 9 12	15			Very Stiff, reddish brown Silty CLAY, trace fine to coarse Sand, trace fine Gravel (CL)	>4.5	0.1	15	
10						CL						
		S-6	18	3 9 9 9	18			Very Stiff, reddish brown Gravelly CLAY, little fine to coarse Sand, moist (CL)			18	
15												
		S-7	22	4 5 7 9	12			Stiff, reddish brown Silty CLAY, trace fine to coarse Gravel, trace fine to coarse Sand (CL)	3.5	0.25	12	
20								End of Boring at 20 feet BGS. Borehole backfilled with soil cuttings.				

N-Value axis: 0, 10, 20, 30, 40, 50

Graphics Legend

- Topsoil
- CL
- SPT - Standard Penetration Test

Water Levels

- ▽ -
- ▼ -

SOIL BORING

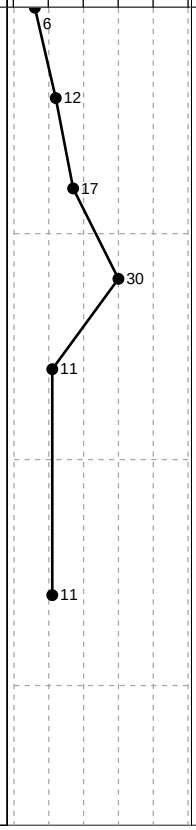
B-08

Client:	Candela Renewables	**Drilling Firm:**	Challenge Testing	**Coordinates:**	36.87998, -85.68059
Project:	Summer Shade	**Drill Crew:**	Richard Blackston	**Horiz. Datum:**	WGS84
Location:	Summer Shade, KY	**Boring Start:**	03/27/2025	**Elevation:**	1005 ft
Inspector:	Jonah Gomez	**Boring End:**	03/27/2025	**Vert. Datum:**	NAD83

Rig Type/Model:	CME-550X	**Sampler Type:**	Split Spoon	**Casing Type:**	-
Drill Method:	Auger	**Sampler I.D.:**	1.375 in	**Casing Length:**	-
Drilling Fluid:	None	**Hammer:**	Auto / 140 lbs / 30 in	**Casing I.D.:**	-

Depth (ft)	Sample ID	Recovery (in)	Blow Counts	Uncorrected N-Value	USCS	Visual Classification	Pocket Penetrometer	Torvane (tsf)
	S-1	19	2 2 4 4	6		TOPSOIL	2.5	0.2
					CL	Medium Stiff, light brown Silty CLAY, little fine to coarse Sand, moist (CL)		
	S-2	24	4 6 6 10	12		Stiff, reddish brown Silty CLAY, little fine to coarse, little fine to coarse Sand, moist (CL)	2.75	0.3
5	S-3	24	6 7 10 13	17		Very Stiff, reddish brown Silty CLAY, some fine to coarse Gravel, trace fine to coarse Sand, moist (CL)		
	S-4	24	13 16 14 15	30	SC	Dense, brown coarse to fine SAND, some coarse to fine Gravel, little Clay, trace Silt, moist (SC)	2.5	0.25
	S-5	23	4 5 6 8	11		Stiff, brown Silty CLAY, some fine to coarse Gravel, trace fine to coarse Sand, moist (CL)	1.0	0.1
10					CL			
	S-6	22	4 7 4 5	11		Stiff, reddish brown Silty CLAY, little fine to coarse Gravel, trace fine to coarse Sand, wet (CL)		
15								
	S-7		50/1"		SC	Very Dense, brown Clayey fine to coarse SAND, trace Silt, wet (SC)		

End of boring at 18.1 feet BGS.
Borehole backfilled with soil cuttings



Graphics Legend

- At Time of Drilling (ATD)
- Topsoil
- CL
- SC
- SPT - Standard Penetration

Water Levels

- Water encountered @ 14'
- -

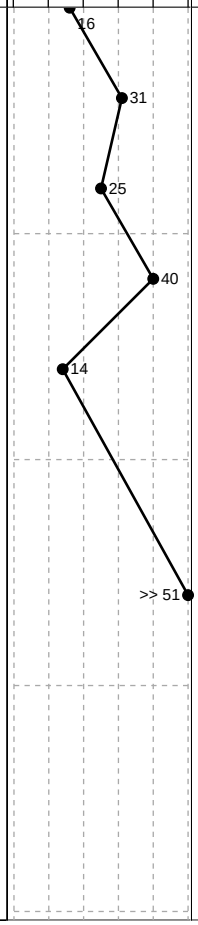
SOIL BORING

B-09

Client:	Candela Renewables	**Drilling Firm:**	Challenge Testing	**Coordinates:**	36.87745, -85.68275
Project:	Summer Shade	**Drill Crew:**	Richard Blackston	**Horiz. Datum:**	WGS84
Location:	Summer Shade, KY	**Boring Start:**	03/27/2025	**Elevation:**	1032 ft
Inspector:	Jonah Gomez	**Boring End:**	03/27/2025	**Vert. Datum:**	NAD83

Rig Type/Model:	CME-550X	**Sampler Type:**	Split Spoon	**Casing Type:**	-
Drill Method:	Auger	**Sampler I.D.:**	1.375 in	**Casing Length:**	-
Drilling Fluid:	None	**Hammer:**	Auto / 140 lbs / 30 in	**Casing I.D.:**	-

Depth (ft)	Sample ID	Recovery (in)	Blow Counts	Uncorrected N-Value	USCS	Visual Classification	Pocket Penetrometer	Torvane (tsf)	Drilling Notes
	S-1	18	5 7 9 9	16	CL	TOPSOIL Very Stiff, brown Silty CLAY, some fine to coarse Sand, trace fine Gravel, moist (CL)	>4.5	0.2	
	S-2	20	9 14 17 18	31	CH	Hard, reddish brown Silty CLAY, trace fine to coarse Gravel, trace fine to coarse Sand, moist (CH)	>4.5	0.3	
5	S-3	22	8 11 14 18	25		Very Stiff, reddish brown Silty CLAY, trace fine to coarse Gravel, trace fine to coarse Sand, moist (CL)	>4.5	0.3	
	S-4	20	19 19 21 20	40		Hard, reddish brown Silty CLAY, trace fine to coarse Gravel, trace fine to coarse Sand, moist (CL)	>4.5	0.25	
	S-5	22	4 6 8 9	14	CL	Stiff, brown Sandy CLAY, moist (CL)	3.5	0.2	
10									
	S-6	2	2 1 50/4"	51		Hard, brown Sandy CLAY, wet (CL)	1	0.1	
15						LIMESTONE, brown to gray, moderately weathered, very weak			Auger refusal at 15.2 feet BGS. Rock coring to begin at 15.2 feet BGS. See Rock Core Log.
20						End of Boring at 20,2 feet BGS. Borehole backfilled with soil cuttings.			



Graphics Legend

- At Time of Drilling (ATD)
- Limestone
- Topsoil
- CH
- CL
- SPT - Standard Penetration Test

Water Levels

- Water encountered @ 13'
- -

Rock Core Log

B-09

Client:	Candela Renewables	**Drilling Firm:**	Challenge Testing	**Coordinates:**	36.87745, -85.68275
Project:	Summer Shade	**Drill Crew:**	Richard Blackston	**Horiz. Datum:**	WGS84
Location:	Summer Shade, KY	**Boring Start:**	03/27/2025	**Elevation:**	1032 ft
Inspector:	Jonah Gomez	**Boring End:**	03/27/2025	**Vert. Datum:**	NAD83

Rig Type/Model:	CME-550X	**Sampler Type:**	Split Spoon	**Casing Type:**	-
Drill Method:	Auger	**Sampler I.D.:**	1.375 in	**Casing Length:**	-
Drilling Fluid:	None	**Hammer:**	Auto / 140 lbs / 30 in	**Casing I.D.:**	-

Depth (ft)	Drilling Rate Time Elapsed	Run No.	Recovery (in. / %)	RQD (in. / %)	Weathering	Graphic Log	Visual Classification and Remarks	Discontinuities: Type	Dip	JRC	Weathering	Aperture	Infill	Drilling Notes
		S-1	18 (75)				TOPSOIL 0.3							
							Very Stiff, brown Silty CLAY, some fine to coarse Sand, trace fine Gravel, moist (CL) 2.0							
		S-2	20 (83)				Hard, reddish brown Silty CLAY, trace fine to coarse Gravel, trace fine to coarse Sand, moist (CH) 4.0							
		S-3	22 (92)				Very Stiff, reddish brown Silty CLAY, trace fine to coarse Gravel, trace fine to coarse Sand, moist (CL)							
5		S-4	20 (83)				Hard, reddish brown Silty CLAY, trace fine to coarse Gravel, trace fine to coarse Sand, moist (CL)							
		S-5	22 (92)				Stiff, brown Sandy CLAY, moist (CL)							
10														
▽		S-6	2 (13)				Hard, brown Sandy CLAY, wet (CL) 15.2							
15	00:59						LIMESTONE, brown to gray, moderately weathered, very weak	B	3		DS	T	FE	Auger refusal at 15.2 feet BGS. Rock coring to begin at 15.2 feet BGS. See Rock Core Log.
	01:49							J	15		DS	MW	FE	
	01:32							J	7		DS	MW	FE	
	01:22							J	25		DS	MW	FE	
	01:12							J	13		DS	MW	FE	
20							20.2							

End of Boring at 20,2 feet BGS. Borehole backfilled with soil cuttings.

Graphics Legend

- At Time of Drilling (ATD)
- Limestone
- Topsoil
- CH
- CL
- SPT - Standard Penetration..

Water Levels

- Water encountered @ 13'
- -

SOIL BORING

B-10

Client:	Candela Renewables	**Drilling Firm:**	Challenge Testing	**Coordinates:**	36.87286, -85.68189
Project:	Summer Shade	**Drill Crew:**	Richard Blackston	**Horiz. Datum:**	WGS84
Location:	Summer Shade, KY	**Boring Start:**	03/27/2025	**Elevation:**	1049 ft
Inspector:	Jonah Gomez	**Boring End:**	03/27/2025	**Vert. Datum:**	NAD83

Rig Type/Model:	CME-550X	**Sampler Type:**	Split Spoon	**Casing Type:**	-
Drill Method:	Auger	**Sampler I.D.:**	1.375 in	**Casing Length:**	-
Drilling Fluid:	None	**Hammer:**	Auto / 140 lbs / 30 in	**Casing I.D.:**	-

Depth (ft)	Sample Graphic	Sample ID	Recovery (in)	Blow Counts	Uncorrected N-Value	USCS	Graphic Log	Visual Classification	Pocket Penetrometer	Torvane (tsf)	N-Value	Drilling Notes
		S-1	15	2 4 5 8	9			TOPSOIL Stiff, reddish brown Silty CLAY, little fine to medium Sand, moist (CL)			9	
		S-2	16	7 10 12 13	22	CL		Very Stiff, reddish brown Silty CLAY, little fine to medium Sand, moist (CL)			22	
5		S-3	16	5 8 11 13	19			Very Stiff, reddish brown Silty CLAY, little fine to medium Sand, moist (CL)			19	
		S-4	23	5 8 11 15	19	CH		Very Stiff, reddish brown Silty CLAY, little fine to medium Sand, moist (CH)			19	
10		S-5	22	13 13 13 13	26	CL		Stiff, brown Silty CLAY, wet (CL)			26	

End of Boring at 10 feet BGS.
Borehole backfilled with soil cuttings.

Graphics Legend

CL

CH

Topsoil

SPT - Standard Penetration Test

Water Levels

- -
- -

SOIL BORING

B-11

Client:	Candela Renewables	**Drilling Firm:**	Challenge Testing	**Coordinates:**	36.86903, -85.69064
Project:	Summer Shade	**Drill Crew:**	Richard Blackston	**Horiz. Datum:**	WGS84
Location:	Summer Shade, KY	**Boring Start:**	03/27/2025	**Elevation:**	953 ft
Inspector:	Jonah Gomez	**Boring End:**	03/28/2025	**Vert. Datum:**	NAD83

Rig Type/Model:	CME-550X	**Sampler Type:**	Split Spoon	**Casing Type:**	-
Drill Method:	Auger	**Sampler I.D.:**	1.375 in in	**Casing Length:**	-
Drilling Fluid:	None	**Hammer:**	Auto / 140 lbs / 30 in	**Casing I.D.:**	-

Depth (ft)	Sample Graphic	Sample ID	Recovery (in)	Blow Counts	Uncorrected N-Value	USCS	Graphic Log	Visual Classification	Pocket Penetrometer	Torvane (tsf)	N-Value (0 10 20 30 40 50)	Drilling Notes
0		S-1	18	1 5 15 50/5"	20	CL		TOPSOIL Hard, gray CLAY, some coarse to fine Gravel, little coarse to fine Sand, trace Silt, moist (CL)			20	
5								LIMESTONE, brown to gray, moderately weathered, very weak				Auger refusal at 2 feet BGS. Rock coring to begin at 2 feet BGS. See Rock Core Log.

End of Boring at 7 feet BGS. Borehole backfilled with soil cuttings.

Graphics Legend

- Limestone
- Topsoil
- CL
- SPT - Standard Penetration Test

Water Levels

- -
- -

Rock Core Log

B-11

Client:	Candela Renewables	**Drilling Firm:**	Challenge Testing	**Coordinates:**	36.86903, -85.69064
Project:	Summer Shade	**Drill Crew:**	Richard Blackston	**Horiz. Datum:**	WGS84
Location:	Summer Shade, KY	**Boring Start:**	03/27/2025	**Elevation:**	953 ft
Inspector:	Jonah Gomez	**Boring End:**	03/28/2025	**Vert. Datum:**	NAD83

Rig Type/Model:	CME-550X	**Sampler Type:**	Split Spoon	**Casing Type:**	-
Drill Method:	Auger	**Sampler I.D.:**	1.375 in in	**Casing Length:**	-
Drilling Fluid:	None	**Hammer:**	Auto / 140 lbs / 30 in	**Casing I.D.:**	-

Depth (ft)	Drilling Rate Time Elapsed	Run No.	Recovery (in. / %)	RQD (in. / %)	Weathering	Graphic Log	Visual Classification and Remarks	Discontinuities: Type	Dip	JRC	Weathering	Aperture	Infill	Drilling Notes
		S-1	18 (78)				TOPSOIL 0.5 Hard, gray CLAY, some coarse to fine Gravel, little coarse to fine Sand, trace Silt, moist (CL) 2.0							
	00:59						LIMESTONE, brown to gray, moderately weathered, very weak	J	6		DS	MW	FE	Auger refusal at 2 feet BGS. Rock coring to begin at 2 feet BGS. See Rock Core Log.
	01:49							J	4		DS	MW	FE	
	01:32							J	6		DS	T	FE	
5	01:22													
	01:12						7.0	J	10		DS	MW	FE	

End of Boring at 7 feet BGS. Borehole backfilled with soil cuttings.

Graphics Legend

- Limestone
- Topsoil
- CL
- SPT - Standard Penetration Test

Water Levels

- -
- -

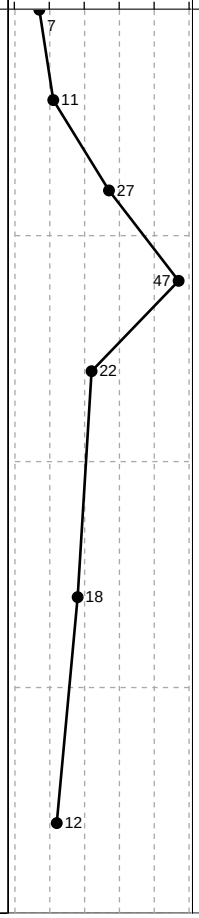
SOIL BORING

B-12

Client:	Candela Renewables	**Drilling Firm:**	Challenge Testing	**Coordinates:**	36.86282, -85.68108
Project:	Summer Shade	**Drill Crew:**	Richard Blackston	**Horiz. Datum:**	WGS84
Location:	Summer Shade, KY	**Boring Start:**	03/25/2025	**Elevation:**	1082 ft
Inspector:	Jonah Gomez	**Boring End:**	03/25/2025	**Vert. Datum:**	NAD83

Rig Type/Model:	CME-550X	**Sampler Type:**	Split Spoon	**Casing Type:**	-
Drill Method:	Auger	**Sampler I.D.:**	1.375 in	**Casing Length:**	-
Drilling Fluid:	None	**Hammer:**	Auto / 140 lbs / 30 in	**Casing I.D.:**	-

Depth (ft)	Sample ID	Recovery (in)	Blow Counts	Uncorrected N-Value	USCS	Visual Classification	Pocket Penetrometer	Torvane (tsf)
	S-1	12	2 4 3 4	7		TOPSOIL	2.5	0.3
						Medium Stiff, reddish brown Silty CLAY, trace fine Gravel, trace fine to coarse Sand, moist (CL)		
	S-2	11	5 5 6 8	11		Stiff, reddish brown Silty CLAY, trace fine Gravel, trace fine to coarse Sand, moist (CL)	2.5	0.25
5	S-3	22	7 11 16 19	27		Very Stiff, reddish brown Silty CLAY, trace fine Gravel, trace fine to coarse Sand, moist (CL)	3.5	0.25
	S-4	22	20 23 24 24	47		Hard, reddish brown Silty CLAY, trace fine Gravel, trace fine to coarse Sand, moist (CL)	>4.5	0.3
	S-5	24	8 8 14 16	22	CL	Very Stiff, reddish brown Silty CLAY, trace fine Gravel, trace fine to coarse Sand, moist (CL)	>4.5	0.3
10								
	S-6	23	4 7 11 13	18		Very Stiff, reddish brown Silty CLAY, trace fine Gravel, trace fine to coarse Sand, moist (CL)	>4.5	0.25
15								
	S-7	24	4 5 7 7	12	CH	Stiff, reddish brown Silty CLAY, trace fine Gravel, trace fine to coarse Sand, moist (CH)	2.75	
20						End of Boring at 20 feet BGS. Borehole backfilled with soil cuttings.		



Drilling Notes

Graphics Legend

- Topsoil
- CL
- CH
- SPT - Standard Penetration Test

Water Levels

- -
- -

SOIL BORING

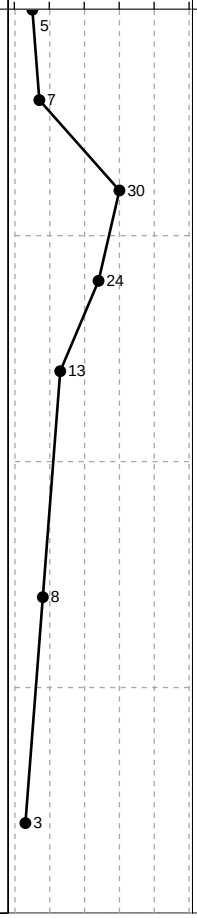
B-13

Client:	Candela Renewables	**Drilling Firm:**	Challenge Testing	**Coordinates:**	36.86215, -85.70059
Project:	Summer Shade	**Drill Crew:**	Richard Blackston	**Horiz. Datum:**	WGS84
Location:	Summer Shade, KY	**Boring Start:**	03/25/2025	**Elevation:**	1017 ft
Inspector:	Jonah Gomez	**Boring End:**	03/25/2025	**Vert. Datum:**	NAD83

Rig Type/Model:	CME-550X	**Sampler Type:**	Split Spoon	**Casing Type:**	-
Drill Method:	Auger	**Sampler I.D.:**	1.375 in	**Casing Length:**	-
Drilling Fluid:	None	**Hammer:**	Auto / 140 lbs / 30 in	**Casing I.D.:**	-

Depth (ft)	Sample ID	Recovery (in)	Blow Counts	Uncorrected N-Value	USCS	Visual Classification
	S-1	8	2 2 3 3	5		TOPSOIL Medium Stiff, brown Silty CLAY, trace fine to medium Sand, moist (CL)
	S-2	22	3 3 4 7	7		Medium Stiff, reddish brown to gray Silty CLAY, trace fine to medium Sand, moist (CL)
5	S-3	23	7 16 14 14	30		Hard, reddish brown Silty CLAY, little fine to coarse Gravel, little fine to coarse Sand, moist (CL)
	S-4	24	10 12 12 14	24		Very Stiff, reddish brown Silty CLAY, little fine to coarse Gravel, little fine to coarse Sand, moist (CL)
	S-5	24	5 6 7 8	13		Stiff, reddish brown Silty CLAY, little fine to coarse Gravel, little fine to coarse Sand, moist (CL)
10					CL	
	S-6	17	4 4 4 5	8		Stiff, reddish brown Silty CLAY, trace fine to medium Sand, moist (CL)
15						
▽	S-7	18	1 2 1 2	3		Soft, brown Silty CLAY, trace fine to medium Sand, wet (CL)
20						End of Boring at 20 feet BGS. Borehole backfilled with soil cuttings

Pocket Penetrometer | Torvane (tsf) | N-Value | Drilling Notes



Light auger chatter observed at 16 feet BGS.

Graphics Legend

- At Time of Drilling (ATD)
- CL
- Topsoil
- SPT - Standard Penetration Test

Water Levels

- Water encountered @ 18'
- -

SOIL BORING

B-14

Client:	Candela Renewables	**Drilling Firm:**	Challenge Testing	**Coordinates:**	36.85531, -85.69385
Project:	Summer Shade	**Drill Crew:**	Richard Blackston	**Horiz. Datum:**	WGS84
Location:	Summer Shade, KY	**Boring Start:**	03/25/2025	**Elevation:**	1057 ft
Inspector:	Jonah Gomez	**Boring End:**	03/25/2025	**Vert. Datum:**	NAD83

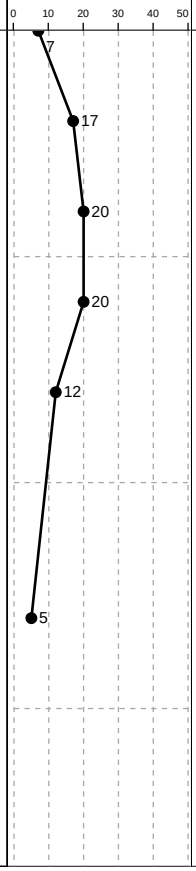
Rig Type/Model:	CME-550X	**Sampler Type:**	Split Spoon	**Casing Type:**	-
Drill Method:	Auger	**Sampler I.D.:**	1.375 in	**Casing Length:**	-
Drilling Fluid:	None	**Hammer:**	Auto / 140 lbs / 30 in	**Casing I.D.:**	-

Depth (ft)	Sample ID	Recovery (in)	Blow Counts	Uncorrected N-Value	USCS	Visual Classification	Drilling Notes
						TOPSOIL	
	S-1	14	1 2 5 5	7	CL	Medium Stiff, reddish brown Silty CLAY, trace fine to medium Sand, moist (CL)	
	S-2	14	6 7 10 12	17		Very Stiff, reddish brown Silty CLAY, trace fine to medium Sand, moist (CL)	Mottling observed between 2 and 4 feet BGS.
5	S-3	16	8 7 13 14	20	GC	Medium Dense, gray to reddish brown Clayey fine to coarse GRAVEL, some fine to coarse Sand, moist (GC)	
	S-4	16	4 9 11 11	20	CL	Very Stiff, reddish brown Gravelly CLAY, little fine to coarse Sand, trace Silt, moist (CL)	
	S-5	24	8 8 4 9	12		Very Stiff, reddish brown Sandy CLAY, little fine to coarse Gravel, trace Silt, moist (CL)	
10							
	S-6	24	3 2 3 10	5		Medium Stiff, gray Silty CLAY, trace fine to medium Sand, moist (CL)	
15							Auger chatter observed at approximately 16 feet BGS.
	S-7		50/1"		GM	Very Dense, gray fine to coarse GRAVEL, little fine to coarse Sand, little Silt, moist (GM)	
						End of Boring at 18.1 feet BGS. Borehole backfilled with soil cuttings.	

Pocket Penetrometer

Torvane (tsf)

N-Value



Graphics Legend

- Topsoil
- GM
- GC
- CL
- SPT - Standard Penetration

Water Levels

- -
- -

SOIL BORING

B-15

Client:	Candela Renewables	**Drilling Firm:**	Challenge Testing	**Coordinates:**	36.8541, -85.67915
Project:	Summer Shade	**Drill Crew:**	Richard Blackston	**Horiz. Datum:**	WGS84
Location:	Summer Shade, KY	**Boring Start:**	03/28/2025	**Elevation:**	1044 ft
Inspector:	Jonah Gomez	**Boring End:**	03/28/2025	**Vert. Datum:**	NAD83

Rig Type/Model:	CME-550X	**Sampler Type:**	Split Spoon	**Casing Type:**	-
Drill Method:	Auger	**Sampler I.D.:**	1.375 in	**Casing Length:**	-
Drilling Fluid:	None	**Hammer:**	Auto / 140 lbs / 30 in	**Casing I.D.:**	-

Depth (ft)	Sample ID	Recovery (in)	Blow Counts	Uncorrected N-Value	USCS	Visual Classification
	S-1	18	1 2 3 4	5		Medium Stiff, brown Silty CLAY, trace fine to medium Sand, moist (CL)
	S-2	24	4 7 9 10	16		Very Stiff, grayish brown Silty CLAY, trace fine to medium Sand, moist (CL)
5	S-3	24	4 6 7 10	13	CL	Stiff, brown to gray Silty CLAY, trace fine to medium Sand, moist (CL)
	S-4	18	10 11 12 14	23		Very Stiff, brown to gray Silty CLAY, trace fine to medium Sand, moist (CL)
	S-5	18	3 4 5 6	9		Stiff, brown to gray CLAY, trace fine to medium Sand, moist (CL)
10						
	S-6	1	50/1"		SC	Very Dense, gray to brown Clayey fine to coarse SAND, wet (SC)

Pocket Penetrometer | Torvane (tsf) | N-Value (0 10 20 30 40 50) | Drilling Notes

N-Value: 5, 16, 13, 23, 9

Auger refusal at 12 feet BGS.

End of Boring at 12.1 feet BGS.
Borehole backfilled with soil cuttings.

Graphics Legend

- At Time of Drilling (ATD)
- CL
- SC
- SPT - Standard Penetration Test

Water Levels

- Water encountered @ 11.5'
- -

SOIL BORING

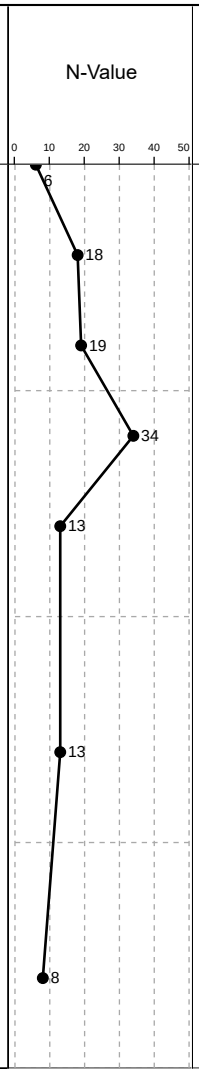
B-16

Client:	Candela Renewables	**Drilling Firm:**	Challenge Testing	**Coordinates:**	36.85097, -85.69922
Project:	Summer Shade	**Drill Crew:**	Richard Blackston	**Horiz. Datum:**	WGS84
Location:	Summer Shade, KY	**Boring Start:**	03/28/2025	**Elevation:**	1011 ft
Inspector:	Jonah Gomez	**Boring End:**	03/28/2025	**Vert. Datum:**	NAD83

Rig Type/Model:	CME-550X	**Sampler Type:**	Split Spoon	**Casing Type:**	-
Drill Method:	Auger	**Sampler I.D.:**	1.375 in	**Casing Length:**	-
Drilling Fluid:	None	**Hammer:**	Auto / 140 lbs / 30 in	**Casing I.D.:**	-

Depth (ft)	Sample ID	Recovery (in)	Blow Counts	Uncorrected N-Value	USCS	Visual Classification	Pocket Penetrometer	Torvane (tsf)
	S-1	6	2 3 3 5	6		TOPSOIL Medium Stiff, brown Silty CLAY, trace fine to medium Sand, moist (CL)		
	S-2	24	5 8 10 11	18		Very Stiff, brown Silty CLAY, trace fine Gravel, trace fine to coarse Sand, moist (CL)	4.0	0.25
5	S-3	24	7 9 10 14	19	CL	Very Stiff, reddish brown to light gray Silty CLAY, little fine to coarse Gravel, little fine to coarse Sand, moist (CL)	2.5	0.1
	S-4	24	22 19 15 15	34		Hard, reddish brown to light gray Silty CLAY, little fine to coarse Gravel, little fine to coarse Sand, moist (CL)	2.0	0.5
	S-5	18	5 7 6 10	13		Medium Dense, reddish brown Clayey fine to coarse SAND, little coarse to fine Gravel, moist (SC)		
10					SC			
	S-6	18	3 5 8 9	13		Stiff, brown Clayey SILT, trace fine to medium Sand, moist (ML)	3.5	0.5
15					ML			
▽	S-7	24	3 4 4 5	8		Stiff, brown Sandy CLAY, trace Silt, wet (CL)	1.5	0.2
20					CL			

End of Boring at 20 feet BGS.
Borehole backfilled with soil cuttings.



Drilling Notes

Graphics Legend

- At Time of Drilling (ATD)
- ML
- Topsoil
- CL
- SC
- SPT - Standard Penetration Test

Water Levels

- Water encountered @ 18'
- -

SOIL BORING

B-17

Client:	Candela Renewables	**Drilling Firm:**	Challenge Testing	**Coordinates:**	36.85132, -85.68444
Project:	Summer Shade	**Drill Crew:**	Richard Blackston	**Horiz. Datum:**	WGS84
Location:	Summer Shade, KY	**Boring Start:**	03/28/2025	**Elevation:**	1041 ft
Inspector:	Jonah Gomez	**Boring End:**	03/28/2025	**Vert. Datum:**	NAD83

Rig Type/Model:	CME-550X	**Sampler Type:**	Split Spoon	**Casing Type:**	-
Drill Method:	Auger	**Sampler I.D.:**	1.375 in	**Casing Length:**	-
Drilling Fluid:	None	**Hammer:**	Auto / 140 lbs / 30 in	**Casing I.D.:**	-

Depth (ft)	Sample Graphic	Sample ID	Recovery (in)	Blow Counts	Uncorrected N-Value	USCS	Graphic Log	Visual Classification	Pocket Penetrometer	Torvane (tsf)	N-Value	Drilling Notes
0		S-1	10	3 3 4 5	7	CH		Medium Stiff, reddish brown Silty CLAY, trace fine to medium Sand, moist (CH)	3.5	0.3	7	
		S-2	18	8 7 9 10	16	CL		Very Stiff, reddish brown Silty CLAY, some fine to coarse Gravel, trace fine to coarse Sand, moist (CL)	3.25	0.3	16	
5		S-3	24	5 5 5 7	10			Stiff, reddish brown Silty CLAY, little fine to coarse Gravel, trace fine to coarse Sand, moist (CL)	2.25	0.35	10	Mottling observed between 4 and 8 feet BGS.
		S-4	23	7 8 9 10	17			Very Stiff, reddish brown Silty CLAY, little fine to coarse Gravel, trace fine to coarse Sand, moist (CL)	2.25	0.35	17	
		S-5	5	4 6 6 5	12	GC		Medium Dense, light gray fine to coarse GRAVEL, little Clay, trace fine to coarse Sand, moist (GC)			12	
10												
	▽	S-6	14	WOH 2 2 5	4	CL		Medium Stiff, brown Silty CLAY, little fine to coarse Sand, wet (CL)	1.25	0.05	4	
15		S-7	22	3 3 4 6	7			Medium Stiff, brown Silty CLAY, little fine to coarse Gravel, little fine to coarse Sand, wet (CL)	1.5	0.1	7	
		S-8	6	3 4 5 5	9	GC		Loose, brown to light gray Clayey fine to coarse GRAVEL, little fine to coarse Sand, wet (GC)			9	
20								End of Boring at 20 feet BGS. Borehole backfilled with soil cuttings.				

N-Value axis: 0, 10, 20, 30, 40, 50

Graphics Legend

- At Time of Drilling (ATD)
- CL
- GC
- CH
- SPT - Standard Penetration

Water Levels

- Water encountered @ 14'
- -

SOIL BORING

B-18

Client:	Candela Renewables	**Drilling Firm:**	Challenge Testing	**Coordinates:**	36.84642, -85.70451
Project:	Summer Shade	**Drill Crew:**	Richard Blackston	**Horiz. Datum:**	WGS84
Location:	Summer Shade, KY	**Boring Start:**	03/28/2025	**Elevation:**	1035 ft
Inspector:	Jonah Gomez	**Boring End:**	03/28/2025	**Vert. Datum:**	NAD83

Rig Type/Model:	CME-550X	**Sampler Type:**	Split Spoon	**Casing Type:**	-
Drill Method:	Auger	**Sampler I.D.:**	1.375 in	**Casing Length:**	-
Drilling Fluid:	None	**Hammer:**	Auto / 140 lbs / 30 in	**Casing I.D.:**	-

Depth (ft)	Sample Graphic	Sample ID	Recovery (in)	Blow Counts	Uncorrected N-Value	USCS	Graphic Log	Visual Classification	Pocket Penetrometer	Torvane (tsf)	N-Value	Drilling Notes
								TOPSOIL				
		S-1	14	1 3 2 3	5	CL		Medium Stiff, CLAY, trace fine to medium Sand, moist (CL)	1.25	0.25	5	
		S-2	24	2 4 4 5	8	CH		Stiff, reddish brown Silty CLAY, little fine to coarse Sand, moist (CH)	1.5	0.15	8	
5		S-3	18	4 6 8 12	14	CL		Stiff, reddish brown Silty CLAY, little fine to coarse Gravel, little fine to coarse Sand, moist (CL)	4.5	0.4	14	
		S-4	24	11 13 13 12	26			Very Stiff, reddish brown Silty CLAY, little fine to coarse Sand, trace fine Gravel, moist (CL)	2.5	0.15	26	
		S-5	22	3 5 10 10	15			Very Stiff, reddish brown Silty CLAY, little fine to coarse Gravel, little fine to coarse Sand, moist (CL)	2.25	0.05	15	
10												
		S-6	20	3 4 4 6	8			Stiff, reddish brown Silty CLAY, trace fine to medium Sand, moist (CL)	2.0	0.05	8	
15												
		S-7	22	2 3 4 4	7			Stiff, reddish brown Silty CLAY, trace fine to medium Sand, moist (CL)	1.75	0.05	7	
20								End of Boring at 20 feet BGS. Borehole backfilled with soil cuttings				

Graphics Legend

- Topsoil
- CL
- CH
- SPT - Standard Penetration Test

Water Levels

- ▽ -
- ▼ -

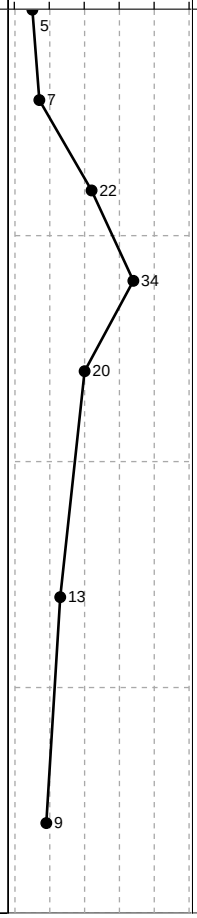
SOIL BORING

B-19

Client:	Candela Renewables	**Drilling Firm:**	Challenge Testing	**Coordinates:**	36.84572, -85.69315
Project:	Summer Shade	**Drill Crew:**	Richard Blackston	**Horiz. Datum:**	WGS84
Location:	Summer Shade, KY	**Boring Start:**	03/28/2025	**Elevation:**	1049 ft
Inspector:	Jonah Gomez	**Boring End:**	03/29/2025	**Vert. Datum:**	NAD83

Rig Type/Model:	CME-550X	**Sampler Type:**	Split Spoon	**Casing Type:**	-
Drill Method:	Auger	**Sampler I.D.:**	1.375 in	**Casing Length:**	-
Drilling Fluid:	None	**Hammer:**	Auto / 140 lbs / 30 in	**Casing I.D.:**	-

Depth (ft)	Sample ID	Recovery (in)	Blow Counts	Uncorrected N-Value	USCS	Visual Classification	Pocket Penetrometer	Torvane (tsf)	Drilling Notes
	S-1	6	2 2 3 4	5		TOPSOIL			Only TOPSOIL recovered in S-1 Sample
	S-2	10	2 2 5 11	7		Medium Stiff, reddish brown Silty CLAY, little fine to coarse Gravel, little fine to coarse Sand, moist (CL)	4.25		
5	S-3	0	6 9 13 15	22	CL	NO RECOVERY: Assumed to be Silty CLAY (CL)			
	S-4	6	14 15 19 19	34		Hard, reddish brown Silty CLAY, trace fine to medium Sand, moist (CL)	4.5	0.35	
	S-5	20	5 8 12 13	20	CH	Very Stiff, reddish brown Silty CLAY, little fine to coarse Sand, trace fine Gravel, moist (CH)	3.75	0.1	
10									
	S-6	23	3 7 6 7	13	CL	Stiff, brown to reddish brown Silty CLAY, trace fine to coarse Sand, moist (CL)	4.0	0.1	
15									
	S-7	20	3 4 5 6	9		Stiff, brown to reddish brown Silty CLAY, trace fine to coarse Sand, moist (CL)	2.5	0.05	
20						End of Boring at 20 feet BGS. Borehole backfilled with soil cuttings.			



Graphics Legend

- CH
- CL
- Topsoil
- SPT - Standard Penetration Test

Water Levels

- ▽ -
- ▼ -

SOIL BORING

B-20

Client:	Candela Renewables	**Drilling Firm:**	Challenge Testing	**Coordinates:**	36.83896, -85.69311
Project:	Summer Shade	**Drill Crew:**	Richard Blackston	**Horiz. Datum:**	WGS84
Location:	Summer Shade, KY	**Boring Start:**	03/29/2025	**Elevation:**	998 ft
Inspector:	Jonah Gomez	**Boring End:**	03/29/2025	**Vert. Datum:**	NAD83

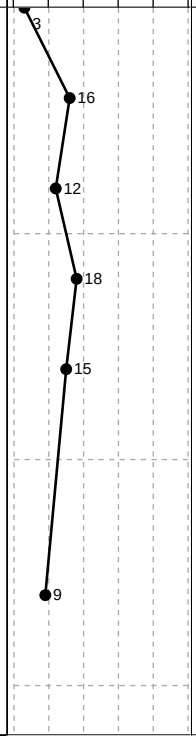
Rig Type/Model:	CME-550X	**Sampler Type:**	Split Spoon	**Casing Type:**	-
Drill Method:	Auger	**Sampler I.D.:**	1.375 in	**Casing Length:**	-
Drilling Fluid:	None	**Hammer:**	Auto / 140 lbs / 30 in	**Casing I.D.:**	-

Depth (ft)	Sample ID	Recovery (in)	Blow Counts	Uncorrected N-Value	USCS	Visual Classification
	S-1	14	2 1 2 5	3		TOPSOIL Soft, brown CLAY, trace fine Gravel, trace fine to coarse Sand, moist (CL)
	S-2	20	4 8 8 9	16		Stiff, reddish brown CLAY, trace fine Gravel, trace fine to coarse Sand, moist (CL)
5	S-3	23	3 6 6 15	12		Stiff, brown Silty CLAY, little fine to coarse Sand, little fine to coarse Gravel, moist (CL)
	S-4	24	10 10 8 7	18		Very Stiff, brown Silty CLAY, little fine to coarse Sand, little fine to coarse Gravel, moist (CL)
	S-5	20	5 7 8 9	15	CL	Very Stiff, brown Silty CLAY, trace fine to medium Sand, moist (CL)
10						
	S-6	19	3 3 6 7	9		Stiff, brown Silty CLAY, little fine to coarse Sand, trace fine Gravel, moist (CL)
15						
	S-7	1	50/1"		GP	Very Dense, gray fine to coarse GRAVEL, little fine to coarse Sand, trace Silt, moist (GP)

End of Boring at 16.1 feet BGS.
Borehole backfilled with soil cuttings

Pocket Penetrometer

Torvane (tsf)



Drilling Notes

Auger refusal encountered at 16 feet BGS.

Graphics Legend

- Topsoil
- CL
- GP
- SPT - Standard Penetration Test

Water Levels

- Water encountered @ 16.5'
- -

SOIL BORING

B-SS-01

Client:	Candela Renewables	**Drilling Firm:**	Challenge Testing	**Coordinates:**	36.88421, -85.68996
Project:	Summer Shade	**Drill Crew:**	Richard Blackston	**Horiz. Datum:**	WGS84
Location:	Summer Shade, KY	**Boring Start:**	03/25/2025	**Elevation:**	1007 ft
Inspector:	Jonah Gomez	**Boring End:**	03/25/2025	**Vert. Datum:**	NAD83
Rig Type/Model:	CME-550X	**Sampler Type:**	Split Spoon	**Casing Type:**	-
Drill Method:	Auger	**Sampler I.D.:**	1.375 in in	**Casing Length:**	-
Drilling Fluid:	None	**Hammer:**	Auto / 140 lbs / 30 in	**Casing I.D.:**	-

Depth (ft)	Sample Graphic	Sample ID	Recovery (in)	Blow Counts	Uncorrected N-Value	USCS	Graphic Log	Visual Classification	Pocket Penetrometer	Torvane (tsf)	N-Value	Drilling Notes
		1	6	2 2 3 5	5	CL		Medium Stiff, brown CLAY, some Silt, little coarse to fine Sand, moist (CL)	2.75	0.15	5	
		2	24	4 4 5 6	9			Stiff, reddish brown CLAY, some Silt, little medium to fine Sand, moist (CL)	2.75	0.25	9	
5		3	14	4 2 4 7	6			Very Stiff, reddish brown CLAY, little coarse to fine Sand, trace fine Gravel, moist (CL)	2.5	0.25	6	
		4	24	8 8 9 11	17	CH		Very Stiff, reddish brown CLAY, some Silt, little medium to fine Sand, moist (CH)	3.75	0.2	17	
		5	24	2 5 6 7	11	CL		Stiff, yellowish red CLAY, some Silt, trace medium to fine Sand, moist (CL)	2.75	0.4	11	
10												
		6		3 4 6 7	10			Stiff, yellowish red CLAY, some Silt, little medium to fine Sand, moist (CL)	3.0	0.4	10	
15												
		7	16	3 10 10 11	20			Very Stiff, yellowish red CLAY, some Silt, little coarse to fine Sand, trace fine Gravel, moist (CL)	3.25	0.15	20	
20												
		8	14	2 3 2 3	5			Medium Stiff, yellowish red CLAY, some coarse to fine Gravel, little coarse to fine Sand, trace Silt, wet (CL)	1.0	0	5	

Graphics Legend

- At Time of Drilling (ATD)
- CL
- CH
- SS - Small Split Spoon

Water Levels

- Water encountered @ 20'
- -

ANS GEO

Soil Boring

Log Type: Soil Boring
Log Name: B-SS-01
Client: Candela Renewables

LOG ID: **B-SS-01**
Project Number:

Depth (ft)	Sample Graphic	Sample ID	Recovery (in)	Blow Counts	Uncorrected N-Value	USCS	Graphic Log	Visual Classification	Pocket Penetrometer	Torvane (tsf)	N-Value (0 10 20 30 40 50)	Drilling Notes
						CL		Stiff, yellowish red CLAY, some Silt, trace medium to fine Sand, moist (CL)				
		9	2	0 0 2 50/1"	2	SC		Very Loose, yellowish red coarse to fine SAND, little Clay, trace fine Gravel, wet (SC)			●2	
30								LIMESTONE, brown to gray, coarse to fine grained, moderately weathered, very weak				
35												
40												
45												

Graphics Legend

- Limestone
- CL
- SC
- SS - Small Split Spoon

Water Levels

- Water encountered @ 20'
- -

Rock Core Log

B-SS-01

Client:	Candela Renewables	**Drilling Firm:**	Challenge Testing	**Coordinates:**	36.88421, -85.68996
Project:	Summer Shade	**Drill Crew:**	Richard Blackston	**Horiz. Datum:**	WGS84
Location:	Summer Shade, KY	**Boring Start:**	03/25/2025	**Elevation:**	1007 ft
Inspector:	Jonah Gomez	**Boring End:**	03/25/2025	**Vert. Datum:**	NAD83

Rig Type/Model:	CME-550X	**Sampler Type:**	Split Spoon	**Casing Type:**	-
Drill Method:	Auger	**Sampler I.D.:**	1.375 in in	**Casing Length:**	-
Drilling Fluid:	None	**Hammer:**	Auto / 140 lbs / 30 in	**Casing I.D.:**	-

Depth (ft)	Drilling Rate Time Elapsed	Run No.	Recovery (in. / %)	RQD (in. / %)	Weathering	Graphic Log	Visual Classification and Remarks	Discontinuities: Type	Dip	JRC	Weathering	Aperture	Infill	Drilling Notes
		1	6 (25)				Medium Stiff, brown CLAY, some Silt, little coarse to fine Sand, moist (CL)							
		2	24 (100)				Stiff, reddish brown CLAY, some Silt, little medium to fine Sand, moist (CL)							
5		3	14 (58)				Very Stiff, reddish brown CLAY, little coarse to fine Sand, trace fine Gravel, moist (CL)							
		4	24 (100)				6.0 Very Stiff, reddish brown CLAY, some Silt, little medium to fine Sand, moist (CH)							
		5	24 (100)				8.0 Stiff, yellowish red CLAY, some Silt, trace medium to fine Sand, moist (CL)							
10														
		6					Stiff, yellowish red CLAY, some Silt, little medium to fine Sand, moist (CL)							
15														
		7	16 (67)				Very Stiff, yellowish red CLAY, some Silt, little coarse to fine Sand, trace fine Gravel, moist (CL)							
▽ 20														
		8	14 (58)				Medium Stiff, yellowish red CLAY, some coarse to fine Gravel, little coarse to fine Sand, trace Silt, wet (CL)							

Graphics Legend

- At Time of Drilling (ATD)
- CL
- CH
- SS - Small Split Spoon

Water Levels

- Water encountered @ 20'
- -

Rock Core Log

B-SS-01

Client:	Candela Renewables	**Drilling Firm:**	Challenge Testing	**Coordinates:**	36.88421, -85.68996
Project:	Summer Shade	**Drill Crew:**	Richard Blackston	**Horiz. Datum:**	WGS84
Location:	Summer Shade, KY	**Boring Start:**	03/25/2025	**Elevation:**	1007 ft
Inspector:	Jonah Gomez	**Boring End:**	03/25/2025	**Vert. Datum:**	NAD83

Rig Type/Model:	CME-550X	**Sampler Type:**	Split Spoon	**Casing Type:**	-
Drill Method:	Auger	**Sampler I.D.:**	1.375 in in	**Casing Length:**	-
Drilling Fluid:	None	**Hammer:**	Auto / 140 lbs / 30 in	**Casing I.D.:**	-

Depth (ft)	Drilling Rate Time Elapsed	Run No.	Recovery (in. / %)	RQD (in. / %)	Weathering	Graphic Log	Visual Classification and Remarks	Discontinuities: Type	Dip	JRC	Weathering	Aperture	Infill	Drilling Notes
							Stiff, yellowish red CLAY, some Silt, trace medium to fine Sand, moist (CL) 26.5							
		9	2 (11)				Very Loose, yellowish red coarse to fine SAND, little Clay, trace fine Gravel, wet (SC) 31.0							
30	01:28						LIMESTONE, brown to gray, coarse to fine grained, moderately weathered, very weak	J	35		DS	PO	FE	
	01:13							J	8		DS FR	PO	FE	
	01:08													
	02:09													
35	01:30						36.0							
40														
45														

Graphics Legend

- Limestone
- CL
- SC
- SS - Small Split Spoon

Water Levels

- Water encountered @ 20'
- -

SOIL BORING

B-SS-02

Client:	Candela Renewables	**Drilling Firm:**	Challenge Testing	**Coordinates:**	36.88367, -85.69003
Project:	Summer Shade	**Drill Crew:**	Richard Blackston	**Horiz. Datum:**	WGS84
Location:	Summer Shade, KY	**Boring Start:**	03/25/2025	**Elevation:**	1005 ft
Inspector:	Jonah Gomez	**Boring End:**	03/25/2025	**Vert. Datum:**	NAD83

Rig Type/Model:	CME-550X	**Sampler Type:**	Split Spoon	**Casing Type:**	-
Drill Method:	Auger	**Sampler I.D.:**	1.375 in	**Casing Length:**	-
Drilling Fluid:	None	**Hammer:**	Auto / 140 lbs / 30 in	**Casing I.D.:**	-

Depth (ft)	Sample Graphic	Sample ID	Recovery (in)	Blow Counts	Uncorrected N-Value	USCS	Graphic Log	Visual Classification	Pocket Penetrometer	Torvane (tsf)	N-Value	Drilling Notes
		1	18	2 2 2 2	4			TOPSOIL	1.25	0.15	4	
						CL		Medium Stiff, brown CLAY, trace medium to fine Sand (CL)				
		2	20	2 2 3 3	5			Medium Stiff, reddish brown CLAY, trace medium to fine Sand, moist (CL)	0.75	0.2	5	
5		3	24	1 3 3 4	6			Medium Stiff, reddish brown CLAY, some Silt, trace medium to fine Sand, moist (CL)	1.75	0.2	6	
		4	24	6 6 7 10	13			Stiff, reddish brown CLAY, some Silt, little medium to fine Sand, moist (CL)	4.25	0.35	13	
		5	24	4 6 8 8	14	CH		Stiff, reddish brown CLAY, some Silt, little medium to fine Sand, moist (CH)	4.5	0.35	14	
10												
		6	20	3 3 4 4	7	CL		Medium Stiff, reddish brown CLAY, some Silt, trace medium to fine Sand, moist (CL)	2.25	0.3	7	
15												
		7	24	3 3 4 4	7			Medium Stiff, reddish brown CLAY, some Silt, trace medium to fine Sand, moist (CL)	2.5	0.4	7	
20												
		8	1	1 1 1 50/4"	2	SC		Very Loose, reddish brown coarse to fine SAND, some Clay, trace Silt, wet (SC)			2	Auger chattering observed at 23 feet BGS.

Graphics Legend

- CL
- SC
- CH
- Topsoil
- SS - Small Split Spoon

Water Levels

- Water encountered @ 23' on 03/25 at 1:42PM during drilling.
- Water encountered @ 23' on 03/25 at 2:15PM after drilling

ANS GEO

Soil Boring

Log Type: Soil Boring
Log Name: B-SS-02
Client: Candela Renewables

LOG ID: **B-SS-02**
Project Number:

Depth (ft)	Sample Graphic	Sample ID	Recovery (in)	Blow Counts	Uncorrected N-Value	USCS	Graphic Log	Visual Classification	Pocket Penetrometer	Torvane (tsf)	N-Value (0 10 20 30 40 50)	Drilling Notes
						SC		Very Loose, reddish brown coarse to fine SAND, some Clay, trace Silt, wet (SC)				

End of Boring at 26 feet BGS. Borehole backfilled with soil cuttings.

Graphics Legend

SC

Water Levels

Water encountered @ 23' on 03/25 at 1:42PM during drilling.

Water encountered @ 23' on 03/25 at 2:15PM after drilling

SOIL BORING

B-BESS-01

Client:	Candela Renewables	**Drilling Firm:**	Challenge Testing	**Coordinates:**	36.88564, -85.68989
Project:	Summer Shade	**Drill Crew:**	Richard Blackston	**Horiz. Datum:**	WGS84
Location:	Summer Shade, KY	**Boring Start:**	03/25/2025	**Elevation:**	1011 ft
Inspector:	Jonah Gomez	**Boring End:**	03/25/2025	**Vert. Datum:**	NAD83

Rig Type/Model:	CME-550X	**Sampler Type:**	Split Spoon	**Casing Type:**	-
Drill Method:	Auger	**Sampler I.D.:**	1.375 in	**Casing Length:**	-
Drilling Fluid:	None	**Hammer:**	Auto / 140 lbs / 30 in	**Casing I.D.:**	-

Depth (ft)	Sample Graphic	Sample ID	Recovery (in)	Blow Counts	Uncorrected N-Value	USCS	Graphic Log	Visual Classification	Pocket Penetrometer	Torvane (tsf)	N-Value	Drilling Notes
								TOPSOIL	0.75	0.15	5	
		S-1	10	1 3 2 3	5	CL		Medium Stiff, brown Silty CLAY, trace fine to coarse Sand, moist (CL)				
		S-2	14	2 2 4 4	6	CH		Medium Stiff, reddish brown CLAY, trace fine to medium Sand, wet (CH)	3.0	0.25	6	
5		S-3	18	0 3 4 5	7	CL		Medium Stiff, reddish brown Silty CLAY, trace fine to medium Sand, moist (CL)	3.5	0.25	7	
		S-4	20	8 9 10 10	19			Very Stiff, reddish brown Silty CLAY, trace fine to medium Sand, moist (CL)	4.5+	0.35	19	
		S-5	24	5 6 9 11	15			Very Stiff, reddish brown Silty CLAY, trace fine to medium Sand, moist (CL)	4.5+	0.3	15	Auger chatter observed at 10 feet BGS.
10		RC-1						LIMESTONE, dark gray, fine grained, moderately weathered, weak, close to moderate discontinuity spacing				Auger refusal at 10.2 feet BGS. Rock coring to begin at 10.2 feet BGS. See Rock Core Log.
15								End of Boring at 15.2 feet BGS. Borehole backfilled with soil cuttings.				

Graphics Legend

- CL
- CH
- Limestone
- Core - Core Sample
- Topsoil
- SPT - Standard Penetration Test

Water Levels

- ▽ -
- ▼ -

Rock Core Log

B-BESS-01

Client:	Candela Renewables	**Drilling Firm:**	Challenge Testing	**Coordinates:**	36.88564, -85.68989
Project:	Summer Shade	**Drill Crew:**	Richard Blackston	**Horiz. Datum:**	WGS84
Location:	Summer Shade, KY	**Boring Start:**	03/25/2025	**Elevation:**	1011 ft
Inspector:	Jonah Gomez	**Boring End:**	03/25/2025	**Vert. Datum:**	NAD83

Rig Type/Model:	CME-550X	**Sampler Type:**	Split Spoon	**Casing Type:**	-
Drill Method:	Auger	**Sampler I.D.:**	1.375 in	**Casing Length:**	-
Drilling Fluid:	None	**Hammer:**	Auto / 140 lbs / 30 in	**Casing I.D.:**	-

Depth (ft)	Drilling Rate Time Elapsed	Run No.	Recovery (in. / %)	RQD (in. / %)	Weathering	Graphic Log	Visual Classification and Remarks	Discontinuities: Type	Dip	JRC	Weathering	Aperture	Infill	Drilling Notes
		S-1	10 (42)				TOPSOIL 0.5							
							Medium Stiff, brown Silty CLAY, trace fine to coarse Sand, moist (CL) 2.0							
		S-2	14 (58)				Medium Stiff, reddish brown CLAY, trace fine to medium Sand, wet (CH) 4.0							
5		S-3	18 (75)				Medium Stiff, reddish brown Silty CLAY, trace fine to medium Sand, moist (CL)							
		S-4	20 (83)				Very Stiff, reddish brown Silty CLAY, trace fine to medium Sand, moist (CL)							
		S-5	24 (100)				Very Stiff, reddish brown Silty CLAY, trace fine to medium Sand, moist (CL) 10.2							Auger chatter observed at 10 feet BGS.
10	01:58	RC-1					LIMESTONE, dark gray, fine grained, moderately weathered, weak, close to moderate discontinuity spacing	J	34		DS	MW	C	Auger refusal at 10.2 feet BGS. Rock coring to begin at 10.2 feet BGS. See Rock Core Log.
	02:17													
	02:00		(96.6)	(95)				J	7		DG	MW	CL	
	02:25													
15	02:03						15.2	J	14		DG	T	ST	

End of Boring at 15.2 feet BGS. Borehole backfilled with soil cuttings.

Graphics Legend

- CL
- CH
- Limestone
- Core - Core Sample
- Topsoil
- SPT - Standard Penetration..

Water Levels

- ▽ -
- ▼ -

Attachment D

Percussion Probe Logs

SOIL BORING: PP-03

Project Number: -
Project Name: Summer Shade
Client: Candela Renewables
Address: Summer Shade, KY
Drilling Date: 04/02/2025

Drilling Company: Challenge Testing
Driller: Richard Blackston
Drill Rig: CME-550X
Drilling Method: Auger and Air Rotary
Total Depth: 50'
Borehole Diameter: -

Coordinates: 36.88401, -85.67799
Coords Sys: Lat/Lon
Surface Elevation: 1068.9'
Logged By: Jonah Gomez
Checked By: -

Comments

Depth (ft)	Drilling Rate Time Elapsed (mm:ss)	USCS	Graphic Log	Visual Classification	Drilling Notes
5		CL		Brown CLAY, some Silt, trace coarse to fine Gravel, trace coarse to fine Sand, moist (CL)	
10	01:58			LIMESTONE, gray	Auger chatter and auger refusal at 8 feet BGS, Air rotary to begin at 8 feet BGS,
	02:17				
	02:11				
	02:20				
	02:09				
15	02:14				
	01:59				
	02:07				
	02:01				
	01:48				
20	02:13				
	01:58				
	01:01				
	02:07			Potential soil zone/highly weathered based on fast drilling	Fast drilling observed at 20.5 feet BGS.
	01:47				
25	00:27			Potential soil zone/small void based on fast drilling	Fast drilling observed at 23 feet BGS.
	01:56				
	01:48				
	02:02				
	01:54				
30	01:45				
	01:51				
	01:36				
	01:54				
	01:59				
35	02:03				
	01:47				
	01:51				
	01:38				

Graphics Legend

CL

Limestone

Water Levels

- -
- -

SOIL BORING: PP-03

Project Number: -
Project Name: Summer Shade
Client: Candela Renewables
Address: Summer Shade, KY
Drilling Date: 04/02/2025

Drilling Company: Challenge Testing
Driller: Richard Blackston
Drill Rig: CME-550X
Drilling Method: Auger and Air Rotary
Total Depth: 50'
Borehole Diameter: -

Coordinates: 36.88401, -85.67799
Coords Sys: Lat/Lon
Surface Elevation: 1068.9'
Logged By: Jonah Gomez
Checked By: -

Comments

Depth (ft)	Drilling Rate Time Elapsed (mm:ss)	USCS	Graphic Log	Visual Classification	Drilling Notes
	01:58			LIMESTONE, gray	
	02:02				
	01:39				
40	02:05				
	02:08				
	01:49				
	02:01				
	02:11				
45	01:57				
	02:15				
	01:52				
	02:08				
	02:20				
50				End of percussion probe at 50feet BGS. Probe backfilled with soil cuttings.	

Graphics Legend

Limestone

Water Levels

- -
- -

SOIL BORING: PP-06

Project Number: -
Project Name: Summer Shade
Client: Candela Renewables
Address: Summer Shade, KY
Drilling Date: 04/02/2025

Drilling Company: Challenge Testing
Driller: Richard Blackston
Drill Rig: CME-550X
Drilling Method: Auger and Air Rotary
Total Depth: 50'
Borehole Diameter: -

Coordinates: 36.87589, -85.68313
Coords Sys: Lat/Lon
Surface Elevation: 1001.3'
Logged By: Jonah Gomez
Checked By: -

Comments

Depth (ft)	Drilling Rate Time Elapsed (mm:ss)	USCS	Graphic Log	Visual Classification	Drilling Notes
0		CL		Brown CLAY, some Silt, trace coarse to fine Sand, trace coarse to fine Gravel, moist (CL)	
5				Reddish brown CLAY, some Silt, trace coarse to fine Gravel, trace coarse to fine Sand (CL)	
10	01:35			LIMESTONE, gray	Perched water observed at 10 feet BGS. Auger refusal encountered at 11 feet BGS. Air rotary to begin at 11 feet BGS. Approximate 1.5 foot void observed at 12 feet BGS.
	00:34				
	00:41				
	01:43				
15	01:57				
	00:21			Potential soil zone/void between 16 and 18 feet based on fast drilling	Fast drilling/rod drop observed at 16 feet BGS.
	00:17				
	01:48				
	01:54				
20	01:39				
	02:08				
	01:40				
	01:53				
	02:04				
25	02:15				
	01:49				
	02:03				
	01:54				
	01:58				
30	02:09				
	02:05				
	01:54				
	01:55				
	02:02				
35	01:59				
	02:11				

Graphics Legend

Limestone

CL

Water Levels

- -
- -

SOIL BORING: PP-06

Project Number: -
Project Name: Summer Shade
Client: Candela Renewables
Address: Summer Shade, KY
Drilling Date: 04/02/2025

Drilling Company: Challenge Testing
Driller: Richard Blackston
Drill Rig: CME-550X
Drilling Method: Auger and Air Rotary
Total Depth: 50'
Borehole Diameter: -

Coordinates: 36.87589, -85.68313
Coords Sys: Lat/Lon
Surface Elevation: 1001.3'
Logged By: Jonah Gomez
Checked By: -

Comments

Depth (ft)	Drilling Rate Time Elapsed (mm:ss)	USCS	Graphic Log	Visual Classification	Drilling Notes
	02:07			LIMESTONE, gray	
	02:20				
	01:58				
40	02:08				
	02:04				
	02:14				
	01:57				
	01:51				
45	02:08				
	02:10				
	01:51				
	01:48				
	02:06				
50				End of percussion probe at 50 feet BGS. Probe backfilled with soil cuttings.	

Graphics Legend

Limestone

Water Levels

- -
- -

SOIL BORING: PP-08

Project Number: -
Project Name: Summer Shade
Client: Candela Renewables
Address: Summer Shade, KY
Drilling Date: 04/02/2025

Drilling Company: Challenge Testing
Driller: Richard Blackston
Drill Rig: CME-550X
Drilling Method: Auger and Air Rotary
Total Depth: 50'
Borehole Diameter: -

Coordinates: 36.86803, -85.68734
Coords Sys: Lat/Lon
Surface Elevation: 956.3'
Logged By: Jonah Gomez
Checked By: -

Comments

Depth (ft)	Drilling Rate Time Elapsed (mm:ss)	USCS	Graphic Log	Visual Classification	Drilling Notes
		CL		Brown CLAY, some Silt, little coarse to fine Gravel, trace coarse to fine Sand, moist (CL)	
	01:25			LIMESTONE, gray	Auger chatter and auger refusal at 2 feet BGS. Air rotary to begin at 2 feet BGS. Fast drilling observed at 4 feet BGS.
	01:39				
	00:20			Potential soil zone based on fast drilling	
5	01:28				
	01:30				
	01:15				
	01:10				
	01:33				
10	01:47				
	01:44				
	01:52				
	01:45				
	01:41				
15	01:53				
	01:38				
	01:45				
	01:51				
	01:27			Potentially highly weathered between 19 and 25 based on easy drilling	Easy drilling (weathered rock) observed from 19 feet and 25 feet BGS.
20	01:29				
	01:34				
	01:25				
	01:38				
	01:24				
25	01:34				
	01:38				
	01:35				
	01:48				
	01:47				
30	01:52				
	01:45				
	01:55				
	01:49				
	02:01				
35	01:58				
	02:08				

Graphics Legend

Limestone

CL

Water Levels

Water encountered @ 19' on 04/02 at 8:45AM during drilling.

-

SOIL BORING: PP-08

Project Number: -
Project Name: Summer Shade
Client: Candela Renewables
Address: Summer Shade, KY
Drilling Date: 04/02/2025

Drilling Company: Challenge Testing
Driller: Richard Blackston
Drill Rig: CME-550X
Drilling Method: Auger and Air Rotary
Total Depth: 50'
Borehole Diameter: -

Coordinates: 36.86803, -85.68734
Coords Sys: Lat/Lon
Surface Elevation: 956.3'
Logged By: Jonah Gomez
Checked By: -

Comments

Depth (ft)	Drilling Rate Time Elapsed (mm:ss)	USCS	Graphic Log	Visual Classification	Drilling Notes
	01:52			LIMESTONE, gray	
	01:55				
40	01:52				
	01:57				
	02:00				
	01:45				
	01:58				
	02:05				
45	01:56				
	01:49				
	02:08				Easy drilling (weathered rock) observed from 48 feet to 50 feet BGS.
	01:39			Potentially highly weathered rock between 48 and 50 feet based on easy drilling	
	01:42				
50				End of percussion probe at 50 feet BGS. Probe backfilled with soil cuttings.	

Graphics Legend

Limestone

Water Levels

Water encountered @ 19' on 04/02 at 8:45AM during drilling.

-

SOIL BORING: PP-14

Project Number: -
Project Name: Summer Shade
Client: Candela Renewables
Address: Summer Shade, KY
Drilling Date: 04/01/2025

Drilling Company: Challenge Testing
Driller: Richard Blackston
Drill Rig: CME-550X
Drilling Method: Auger and Air Rotary
Total Depth: 50'
Borehole Diameter: -

Coordinates: 36.85573, -85.69908
Coords Sys: Lat/Lon
Surface Elevation: 1059.1'
Logged By: Jonah Gomez
Checked By: -

Comments

Depth (ft)	Drilling Rate Time Elapsed (mm:ss)	USCS	Graphic Log	Visual Classification	Drilling Notes
0		CL		Brown CLAY, some Silt, trace coarse to fine Gravel, trace coarse to fine Sand, moist (CL)	
5				Reddish brown CLAY, some Silt, trace coarse to fine Gravel, trace coarse to fine Sand, moist (CL)	
10					
15				Reddish brown CLAY, some Silt, little coarse to fine Gravel, little coarse to fine Sand, moist (CL)	
20					
25				Reddish brown CLAY, some Silt, little coarse to fine Gravel, little coarse to fine Sand, wet (CL)	Auger chatter observed at 23 feet BGS.
30					
35					

Graphics Legend

CL

Water Levels

Water encountered @ 22' on 04/01 at 10:30AM during drilling.

-

SOIL BORING: PP-14

Project Number: -
Project Name: Summer Shade
Client: Candela Renewables
Address: Summer Shade, KY
Drilling Date: 04/01/2025

Drilling Company: Challenge Testing
Driller: Richard Blackston
Drill Rig: CME-550X
Drilling Method: Auger and Air Rotary
Total Depth: 50'
Borehole Diameter: -

Coordinates: 36.85573, -85.69908
Coords Sys: Lat/Lon
Surface Elevation: 1059.1'
Logged By: Jonah Gomez
Checked By: -

Comments

Depth (ft)	Drilling Rate Time Elapsed (mm:ss)	USCS	Graphic Log	Visual Classification	Drilling Notes
40		CL		Brown CLAY, some Silt, trace coarse to fine Gravel, trace coarse to fine Sand, moist (CL)	
45	01:45			LIMESTONE, gray	Auger chatter and auger refusal at 43 feet BGS. Air rotary to begin at 43 feet BGS.
	02:03				
	01:54				
	01:42			Potential small void based on fast drilling and rod drop between 46 and 48 feet	Fast drilling and potential rod drop between 46 feet and 48 feet BGS
	01:39				
	01:56				Easy drilling (weathered rock) from 48 feet to 50 feet BGS
50	02:01				

End of percussion probe at 50 feet BGS. Probe backfilled with soil cuttings.

Graphics Legend

Limestone

CL

Water Levels

Water encountered @ 22' on 04/01 at 10:30AM during drilling.

-

SOIL BORING: PP-17

Project Number: -
Project Name: Summer Shade
Client: Candela Renewables
Address: Summer Shade, KY
Drilling Date: 03/31/2025

Drilling Company: Challenge Testing
Driller: Richard Blackston
Drill Rig: CME-550X
Drilling Method: Auger and Air Rotary
Total Depth: 50'
Borehole Diameter: -

Coordinates: 36.85096, -85.68661
Coords Sys: Lat/Lon
Surface Elevation: 1048.4'
Logged By: Jonah Gomez
Checked By: -

Comments

Depth (ft)	Drilling Rate Time Elapsed (mm:ss)	USCS	Graphic Log	Visual Classification	Drilling Notes
0		CL		Brown CLAY, some Silt, trace coarse to fine Gravel, trace coarse to fine Sand, moist (CL)	
5				Reddish brown CLAY, some Silt, trace coarse to fine Gravel, trace coarse to fine Sand, moist (CL)	
10					
15				Reddish brown CLAY, some Silt, little coarse to fine Gravel, little coarse to fine Sand, moist (CL)	
20					
25					
30				Reddish brown CLAY, some Silt, little coarse to fine Gravel, little coarse to fine Sand, wet (CL)	
35	01:42			LIMESTONE, gray	Auger chatter observed at 33 feet BGS. Auger refusal encountered at 35 feet BGS. Air rotary to begin at 35 feet BGS.
	01:39				

Graphics Legend

Limestone

CL

Water Levels

Water encountered @ 28' after drilling.

-

SOIL BORING: PP-17

Project Number: -
Project Name: Summer Shade
Client: Candela Renewables
Address: Summer Shade, KY
Drilling Date: 03/31/2025

Drilling Company: Challenge Testing
Driller: Richard Blackston
Drill Rig: CME-550X
Drilling Method: Auger and Air Rotary
Total Depth: 50'
Borehole Diameter: -

Coordinates: 36.85096, -85.68661
Coords Sys: Lat/Lon
Surface Elevation: 1048.4'
Logged By: Jonah Gomez
Checked By: -

Comments

Depth (ft)	Drilling Rate Time Elapsed (mm:ss)	USCS	Graphic Log	Visual Classification	Drilling Notes
	01:47			LIMESTONE, gray	
	00:18				
	00:24				
40	00:22				
	01:49				
	01:45				
	01:59				
	01:54				
45	01:48				
	02:11				
	02:06				
	01:57				
	02:08				
50				End of percussion probe at 50 feet BGS. Probe backfilled with soil cuttings.	

Graphics Legend

Limestone

Water Levels

Water encountered @ 28' after drilling.

-

SOIL BORING: PP-22

Project Number: -
Project Name: Summer Shade
Client: Candela Renewables
Address: Summer Shade, KY
Drilling Date: 03/31/2025

Drilling Company: Challenge Testing
Driller: Richard Blackston
Drill Rig: CME-550X
Drilling Method: Auger and Air Rotary
Total Depth: 50'
Borehole Diameter: -

Coordinates: 36.83942, -85.70013
Coords Sys: Lat/Lon
Surface Elevation: 1012.1'
Logged By: Jonah Gomez
Checked By: -

Comments

Depth (ft)	Drilling Rate Time Elapsed (mm:ss)	USCS	Graphic Log	Visual Classification	Drilling Notes
0		CL		Brown CLAY, some, trace coarse to fine Sand, trace fine Gravel, moist (CL)	
5				Yellowish red GRAVEL, some Silt, trace coarse to fine Sand, trace coarse to fine, moist (CL)	
10					
15				Brown CLAY, some Silt, little fine Gravel, trace coarse to fine Sand, moist (CL)	
20					
25				Reddish brown CLAY, some, little coarse to fine Gravel, little coarse to fine Sand, moist (CL)	Auger chatter observed at 23 feet BGS.
30					
35				Reddish brown CLAY, some Silt, little coarse to fine Gravel, little coarse to fine Sand, wet (CL)	

Graphics Legend

CL

Water Levels

Water encountered @ 32' on 03/31 at 2:50PM after drilling.

-

SOIL BORING: PP-22

Project Number: -
Project Name: Summer Shade
Client: Candela Renewables
Address: Summer Shade, KY
Drilling Date: 03/31/2025

Drilling Company: Challenge Testing
Driller: Richard Blackston
Drill Rig: CME-550X
Drilling Method: Auger and Air Rotary
Total Depth: 50'
Borehole Diameter: -

Coordinates: 36.83942, -85.70013
Coords Sys: Lat/Lon
Surface Elevation: 1012.1'
Logged By: Jonah Gomez
Checked By: -

Comments

Depth (ft)	Drilling Rate Time Elapsed (mm:ss)	USCS	Graphic Log	Visual Classification	Drilling Notes
40		CL		Brown CLAY, some, trace coarse to fine Sand, trace fine Gravel, moist (CL)	
	01:54			LIMESTONE, gray	Auger chatter observed at 41 feet BGS. Auger refusal encountered at 41.5 feet BGS. Air rotary to begin at 41.5 feet BGS.
	01:54				
	01:56				
45	01:59				
	01:44				
	01:53				
	02:08				
	01:48				
50				End of percussion probe at 50 feet BGS. Probe backfilled with soil cuttings.	

Graphics Legend

Limestone

CL

Water Levels

Water encountered @ 32' on 03/31 at 2:50PM after drilling.

-

SOIL BORING: PP-24

Project Number: -
Project Name: Summer Shade
Client: Candela Renewables
Address: Summer Shade, KY
Drilling Date: 03/31/2025

Drilling Company: Challenge Testing
Driller: Richard Blackston
Drill Rig: CME-550X
Drilling Method: Auger and Air Rotary
Total Depth: 50'
Borehole Diameter: -

Coordinates: 36.84013, -85.69282
Coords Sys: Lat/Lon
Surface Elevation: 1024.4'
Logged By: Jonah Gomez
Checked By: -

Comments

Depth (ft)	Drilling Rate Time Elapsed (mm:ss)	USCS	Graphic Log	Visual Classification	Drilling Notes
0		CL		Brown CLAY, some Silt, trace coarse to fine Gravel, trace coarse to fine Sand, moist (CL)	Auger chatter observed at 16 feet BGS.
5				Yellowish red CLAY, some Silt, trace coarse to fine Gravel, trace coarse to fine Sand, moist (CL)	
10					
15					
20					
▽				Yellowish red CLAY, some Silt, trace coarse to fine Gravel, trace coarse to fine Sand, wet (CL)	
25	01:30			LIMESTONE, gray	
	01:38				
	01:41				
	01:37				
	01:48				
30	02:15				
	01:49				
	02:10				
	01:52				
	01:39				
35	02:06				
	01:54				

Graphics Legend

▽ At Time of Drilling (ATD)

Limestone

CL

Water Levels

▽ Water encountered @ 23'

▼ -

SOIL BORING: PP-24

Project Number: -
Project Name: Summer Shade
Client: Candela Renewables
Address: Summer Shade, KY
Drilling Date: 03/31/2025

Drilling Company: Challenge Testing
Driller: Richard Blackston
Drill Rig: CME-550X
Drilling Method: Auger and Air Rotary
Total Depth: 50'
Borehole Diameter: -

Coordinates: 36.84013, -85.69282
Coords Sys: Lat/Lon
Surface Elevation: 1024.4'
Logged By: Jonah Gomez
Checked By: -

Comments

Depth (ft)	Drilling Rate Time Elapsed (mm:ss)	USCS	Graphic Log	Visual Classification	Drilling Notes
	01:29			LIMESTONE, gray	
	02:18				
	01:54				
40	01:55				
	01:58				
	01:39				
	01:47				
	01:58				
45	02:04				
	02:18				
	01:53				
	02:07				
	01:59				
50					

End of percussion probe at 50 feet BGS. Probe backfilled with soil cuttings.

Graphics Legend

Limestone

Water Levels

Water encountered @ 23'

-

Attachment E

Electrical Resistivity Test Data

Soil Resistivity Results

Client:	Candela Renewables	Date:	March, 2025	Prepared by:	Jonah G.
Project Name:	Summer Shade Solar Project	Weather:	Sunny	Checked by:	Kyle H.
Project Location:	Metcalfe and Monroe County, Kentucky	Temperature:	45-70F		
Equipment:	AGI MiniSting				
Test Method:	Wenner 4 Electrode Array				

Array		Data	Array spacing (ft)					
			5	10	15	20	25	50
ERT-01	N-S	Measured Resistance (Ω)	530.2	9.533	6.591	5.527	4.97	0.3859
		Apparent Resistivity (Ω-m)	161.60	182.58	189.34	242.16	222.72	36.94
	E-W	Measured Resistance (Ω)	17.11	9.059	6.732	5.915	5.218	3.722
		Apparent Resistivity (Ω-m)	163.77	173.00	193.40	241.80	249.81	356.31
ERT-02	N-S	Measured Resistance (Ω)	16.06	8.587	5.777	4.79	4.79	4.166
		Apparent Resistivity (Ω-m)	153.80	164.47	165.93	183.49	199.49	340.16
	E-W	Measured Resistance (Ω)	17.68	0.9608	6.323	5.629	11.93	2.945
		Apparent Resistivity (Ω-m)	169.29	0.01	181.63	215.59	236.04	281.97
ERT-03	N-S	Measured Resistance (Ω)	21.84	10.99	7.361	5.079	3.95	1.498
		Apparent Resistivity (Ω-m)	209.15	210.37	211.44	1945.54	184.34	194.55
	E-W	Measured Resistance (Ω)	17.5	11.7	8.47	5.611	3.993	1.428
		Apparent Resistivity (Ω-m)	167.58	224.03	243.60	214.91	190.23	205.53
ERT-04	N-S	Measured Resistance (Ω)	6.885	3.011	2.115	1.778	1.529	1.077
		Apparent Resistivity (Ω-m)	65.93	57.67	60.75	68.12	73.18	103.30
	E-W	Measured Resistance (Ω)	5.958	3.164	2.128	1.713	1.518	1.25
		Apparent Resistivity (Ω-m)	57.06	60.59	61.14	65.59	72.69	119.69
ERT-05	N-S	Measured Resistance (Ω)	45.3	20	12.28	9.516	6.859	2.695
		Apparent Resistivity (Ω-m)	433.73	383.13	352.96	364.54	328.27	272.31
	E-W	Measured Resistance (Ω)	42.81	22.98	111.22	8.09	6.057	2.988
		Apparent Resistivity (Ω-m)	409.96	441.66	322.48	309.98	289.99	286.12
		Site Average (Ω)	72.1343	9.99848	16.8997	5.3648	5.0814	2.21549
		Site Average (Ω-m)	199.19	189.75	198.27	385.17	204.68	219.69

Soil Resistivity Results

Client:	Candela Renewables	Date:	3/1/2025	Prepared by:	Jonah G.
Project Name:	Summer shade Solar Project	Weather:	Sunny	Checked by:	Kyle H.
Project Location:	Metcalfe and Monroe County, Kentucky	Temperature:	45-70		
Equipment:	AGI MiniSting				
Test Method:	Wenner 4 Electrode Array				

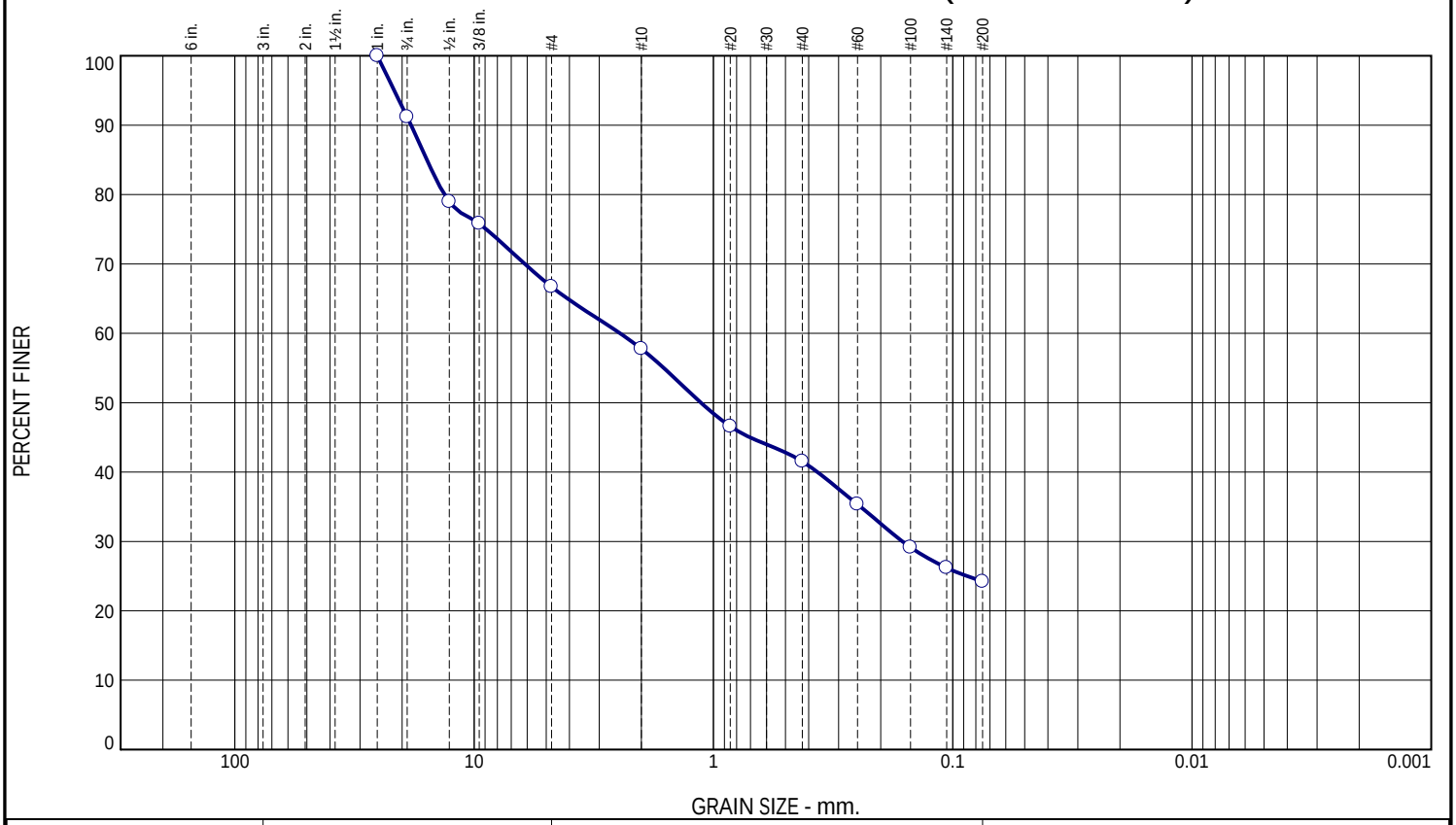
Array		Data	Array spacing (ft)									
			5	10	15	20	25	50	75	100	150	200
ERT-BESS-01	N-S	Measured Resistance (Ω)	33.9	15.3	11.69	10.5	9.823	8.672	6.988	5.773	-	-
		Apparent Resistivity (Ω-m)	324.61	292.97	335.89	402.34	470.61	830.58	1003.71	1119.23	-	-
	E-W	Measured Resistance (Ω)	34.6	14.38	10.87	10.12	9.432	8.618	7.99	6.677	-	-
		Apparent Resistivity (Ω-m)	331.62	275.42	312.42	387.71	436.47	520.90	1147.57	1278.64	-	-
ERT-SS-01	N-S	Measured Resistance (Ω)	11.25	7.368	5.629	4.488	3.947	2.852	2.172	1.638	0.9866	-
		Apparent Resistivity (Ω-m)	107.75	141.12	161.73	171.91	188.98	273.13	311.81	313.64	283.40	-
	E-W	Measured Resistance (Ω)	12.16	7.71	5.461	4.561	3.902	2.4	1.75	-	-	-
		Apparent Resistivity (Ω-m)	116.46	147.80	156.88	174.68	186.81	229.79	270.85	-	-	-
		Site Average (Ω)	22.9775	11.1895	8.4125	7.41725	6.776	5.6355	4.725	4.696	0.9866	-
		Site Average (Ω-m)	220.11	214.33	241.73	284.16	320.72	463.60	683.48	903.83	283.40	-

Attachment F

Lab Test Results

SIEVE ANALYSIS

PARTICLE SIZE DISTRIBUTION REPORT (ASTM D6913)



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	8.8	24.5	8.9	16.3	17.3	24.2	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.0"	100.0		
0.75"	91.2		
0.5"	79.0		
0.375"	75.8		
#4	66.7		
#10	57.8		
#20	46.6		
#40	41.5		
#60	35.4		
#100	29.1		
#140	26.2		
#200	24.2		

* (no specification provided)

Soil Description

Reddish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 18.3361 D_{85}= 15.7588 D_{60}= 2.4567
D_{50}= 1.1275 D_{30}= 0.1623 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Undersized Specimen

Sample Number: B-08, S-4 Depth: 6'-8'

Date: 5/5/2025

ANS CONSULTANTS, INC.

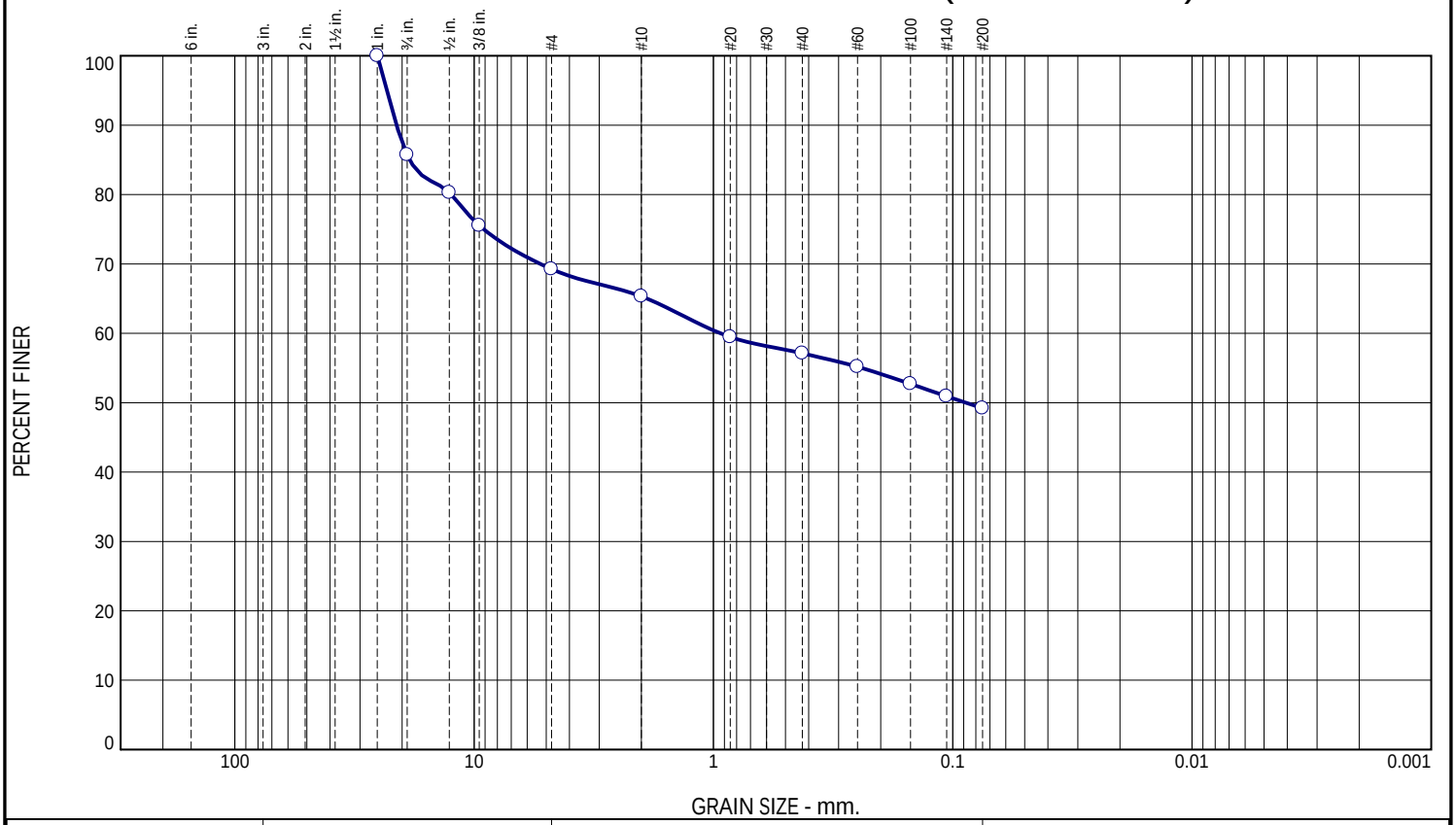
South Plainfield, New Jersey

Client: Candela
Project: Summer Shade, Summer Shade, KY

Project No: IRN 25-N-159 Figure

Tested By: AG Checked By: ANS

PARTICLE SIZE DISTRIBUTION REPORT (ASTM D6913)



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	14.3	16.4	4.0	8.2	7.9	49.2	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.0"	100.0		
0.75"	85.7		
0.5"	80.3		
0.375"	75.5		
#4	69.3		
#10	65.3		
#20	59.5		
#40	57.1		
#60	55.2		
#100	52.7		
#140	50.9		
#200	49.2		

* (no specification provided)

Soil Description

Yellowish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 21.0916 D_{85}= 18.5913 D_{60}= 0.9345
D_{50}= 0.0882 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Undersized Specimen

Sample Number: B-14, S-3 Depth: 4'-6'

Date: 5/5/2025

ANS CONSULTANTS, INC.

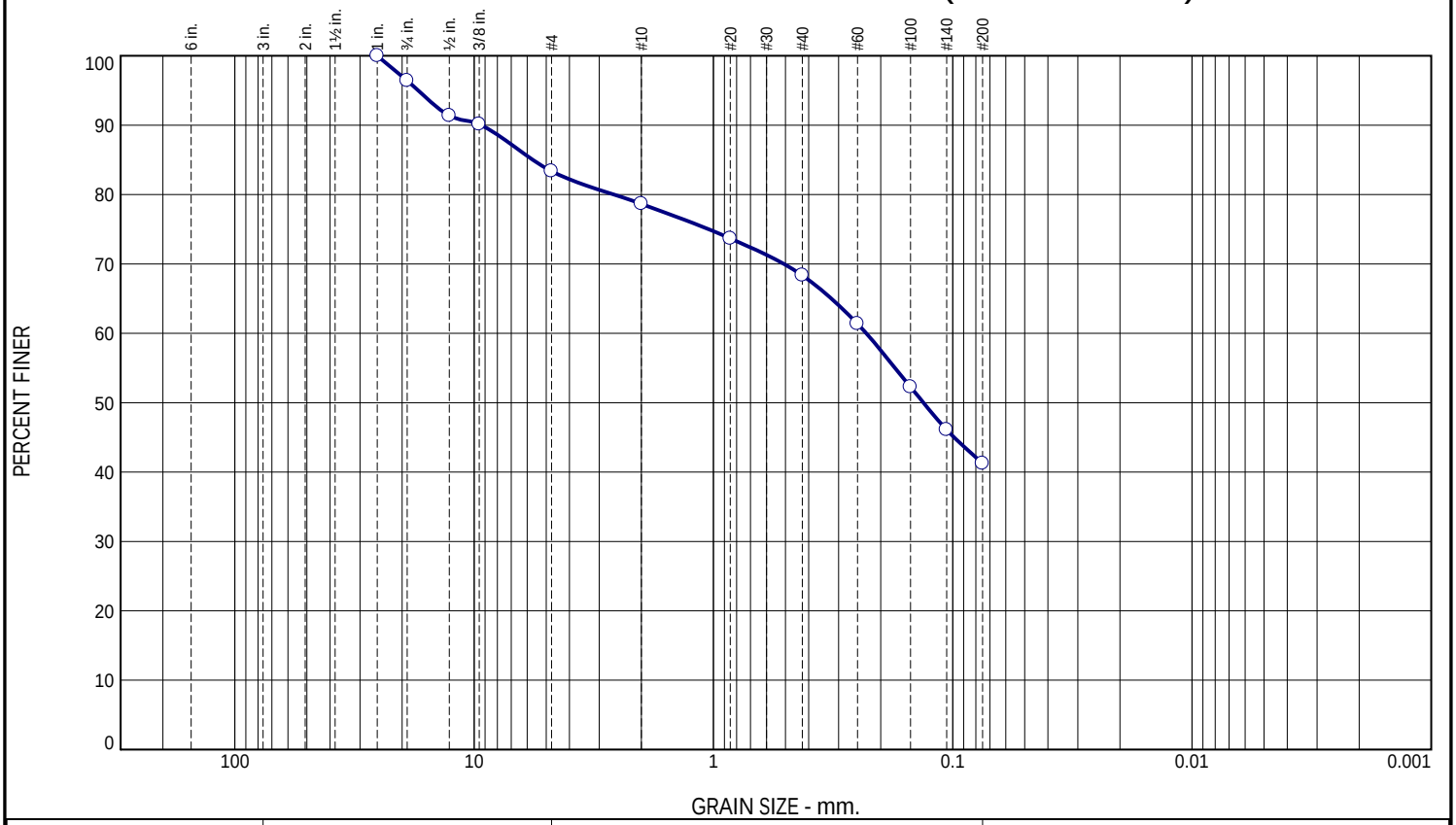
South Plainfield, New Jersey

Client: Candela
Project: Summer Shade, Summer Shade, KY

Project No: IRN 25-N-159 Figure

Tested By: AG Checked By: ANS

PARTICLE SIZE DISTRIBUTION REPORT (ASTM D6913)



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.6	13.0	4.7	10.4	27.1	41.2	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.0"	100.0		
0.75"	96.4		
0.5"	91.4		
0.375"	90.1		
#4	83.4		
#10	78.7		
#20	73.7		
#40	68.3		
#60	61.4		
#100	52.3		
#140	46.1		
#200	41.2		

* (no specification provided)

Soil Description

Reddish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 9.3410 D_{85}= 5.6838 D_{60}= 0.2297
D_{50}= 0.1325 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: B-16, S-5 Depth: 8'-10'

Date: 5/5/2025

ANS CONSULTANTS, INC.

South Plainfield, New Jersey

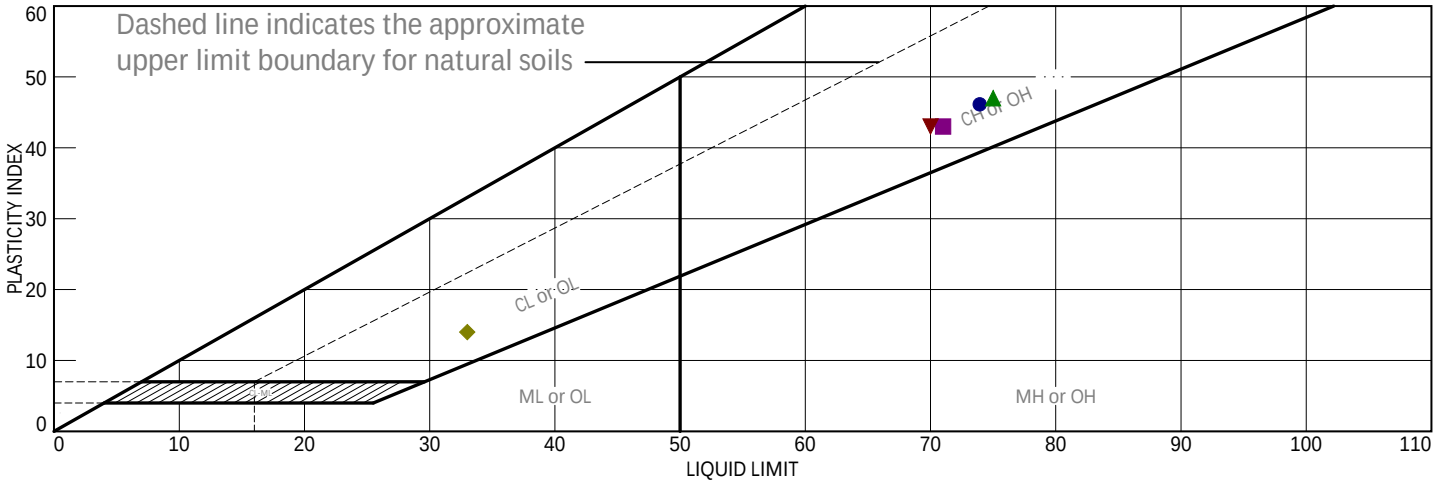
Client: Candela
Project: Summer Shade, Summer Shade, KY

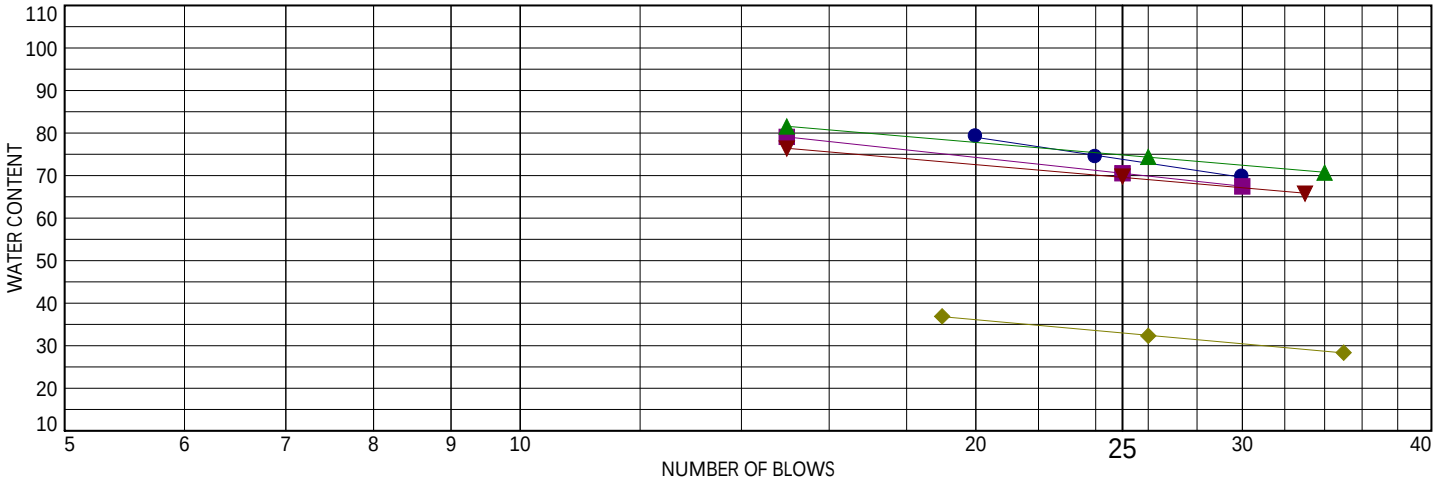
Project No: IRN 25-N-159 Figure

Tested By: AG Checked By: ANS

ATTERBERG LIMITS RESULTS

LIQUID AND PLASTIC LIMITS TEST REPORT (ASTM D4318)





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Light Reddish Brown Clay & Silt, trace cmf Sand (Visual)	74	28	46			
■	Reddish Brown Clay & Silt, trace cmf Sand (Visual)	71	28	43			
▲	Light Reddish Brown Clay & Silt, trace cmf Sand (Visual)	75	28	47			
◆	Light Brown Clay & Silt, little cmf Sand (Visual)	33	19	14			
▼	Light Reddish Brown Clay & Silt, trace cmf Sand (Visual)	70	27	43			

Project No. IRN 25-N-159 Client: Candela

Project: Summer Shade, Summer Shade, KY

●Depth: 4'-6' Sample Number: B-01, S-3
■Depth: 2'-4' Sample Number: B-02, S-2
▲Depth: 8'-10' Sample Number: B-03, S-5
◆Depth: 0'-2' Sample Number: B-04, S-1
▼Depth: 4'-6' Sample Number: B-05, S-3

ANS CONSULTANTS, INC.

South Plainfield, New Jersey

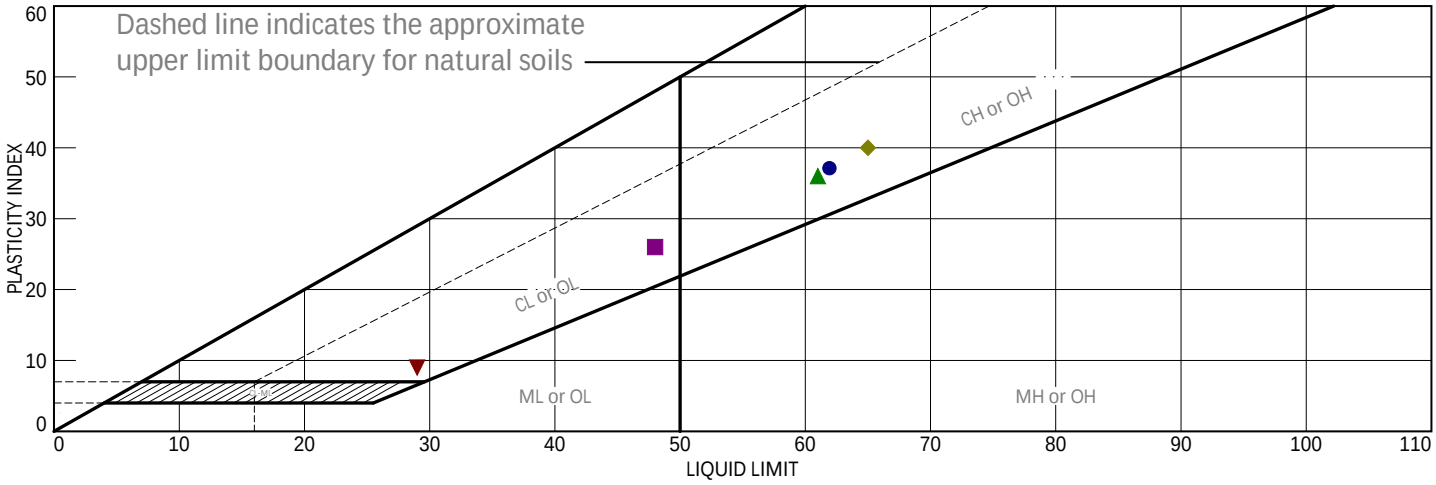
Remarks:

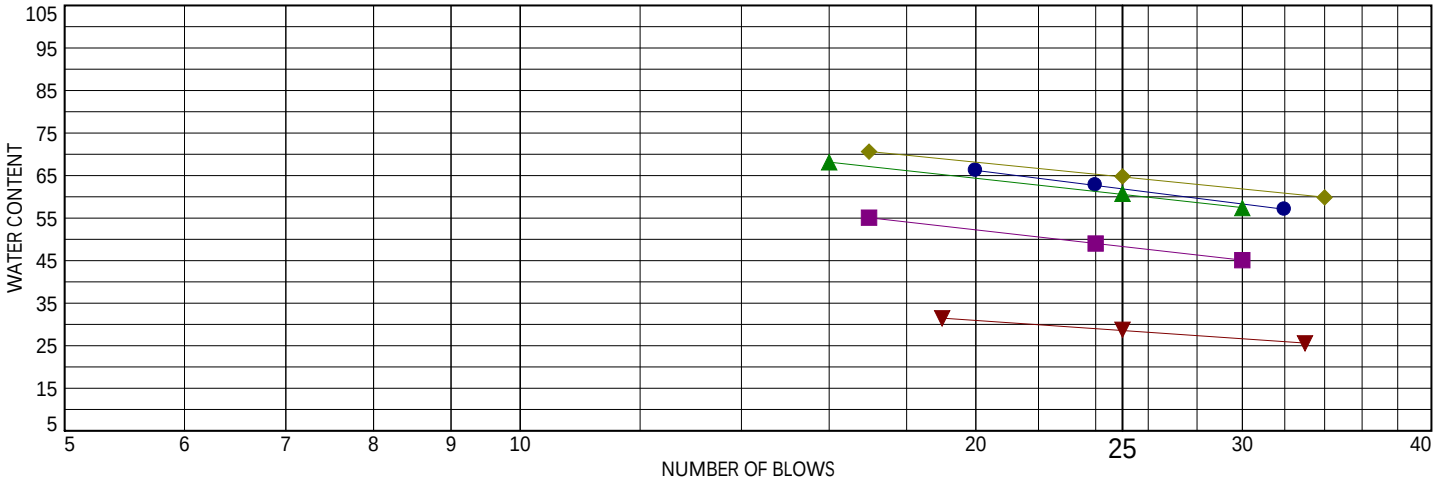
●ASTM D4318 - Sample Air-Dried, LL Device: Manual, PL Rolling Method: Hand-Rolled, Grooving Tool: Metal
5/5/2025

Figure

Tested By: AG Checked By: ANS

LIQUID AND PLASTIC LIMITS TEST REPORT (ASTM D4318)





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Reddish Brown Clay & Silt, trace cmf Sand (Visual)	62	25	37			
■	Reddish Brown Clay & Silt, little cmf Sand (Visual)	48	22	26			
▲	Light Reddish Brown Clay & Silt, trace cmf Sand (Visual)	61	25	36			
◆	Reddish Brown Clay & Silt, trace cmf Sand (Visual)	65	25	40			
▼	Olive Brown Clay & Silt, some cmf Sand (Visual)	29	20	9			

Project No. IRN 25-N-159 Client: Candela

Project: Summer Shade, Summer Shade, KY

●Depth: 13'-15' Sample Number: B-06, S-6
■Depth: 13'-15' Sample Number: B-07, S-6
▲Depth: 2'-4' Sample Number: B-09, S-2
◆Depth: 6'-8' Sample Number: B-10, S-4
▼Depth: 0'-2' Sample Number: B-11, S-1

ANS CONSULTANTS, INC.

South Plainfield, New Jersey

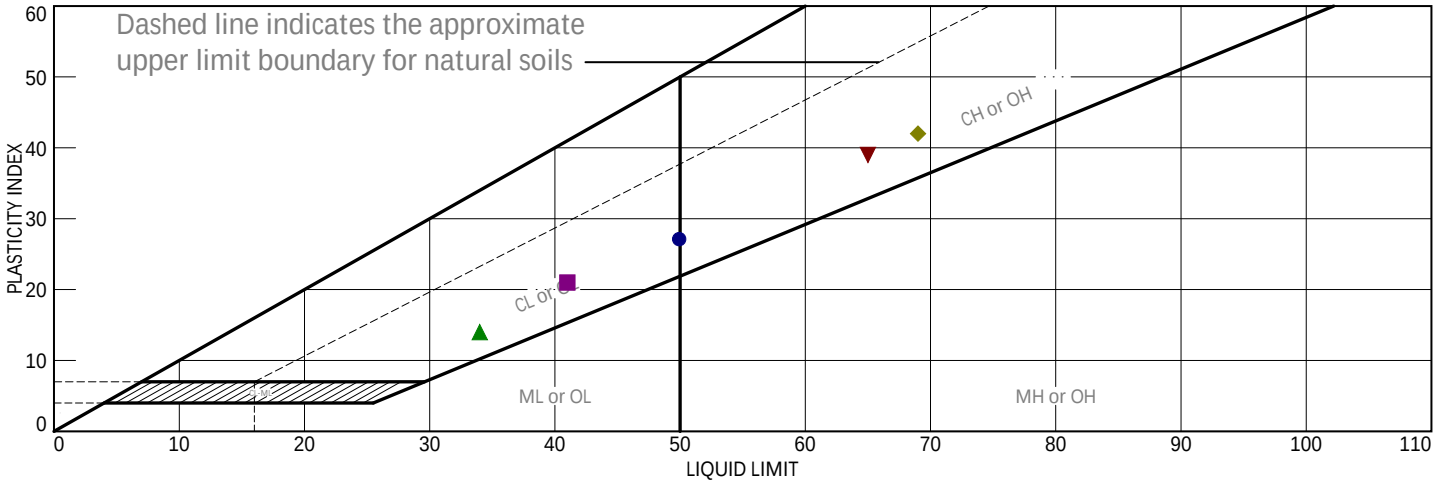
Remarks:

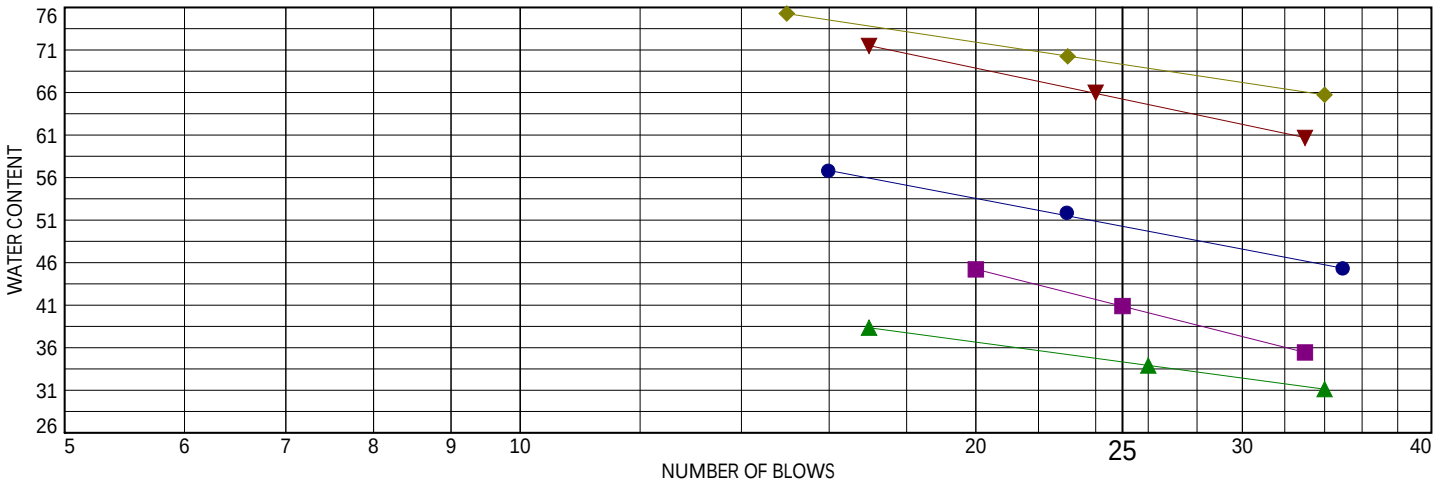
●ASTM D4318 - Sample Air-Dried, LL Device: Manual, PL Rolling Method: Hand-Rolled, Grooving Tool: Metal
5/5/2025

Figure

Tested By: CC Checked By: ANS

LIQUID AND PLASTIC LIMITS TEST REPORT (ASTM D4318)





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Yellowish Brown Clay & Silt, little cmf Sand (Visual)	50	23	27			
■	Strong Reddish Brown Clay & Silt, trace cmf Sand (Visual)	41	20	21			
▲	Light Brown Clay & Silt, trace cmf Sand (Visual)	34	20	14			
◆	Light Reddish Brown Clay & Silt, trace cmf Sand (Visual)	69	27	42			
▼	Reddish Brown Clay & Silt, trace cmf Sand (Visual)	65	26	39			

Project No. IRN 25-N-159 Client: Candela

Project: Summer Shade, Summer Shade, KY

- ● Depth: 18'-20' Sample Number: B-12, S-7
- ■ Depth: 4'-6' Sample Number: B-13, S-3
- ▲ Depth: 8'-10' Sample Number: B-15, S-5
- ◆ Depth: 0'-2' Sample Number: B-17, S-1
- ▼ Depth: 2'-4' Sample Number: B-18, S-2

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South Plainfield, New Jersey

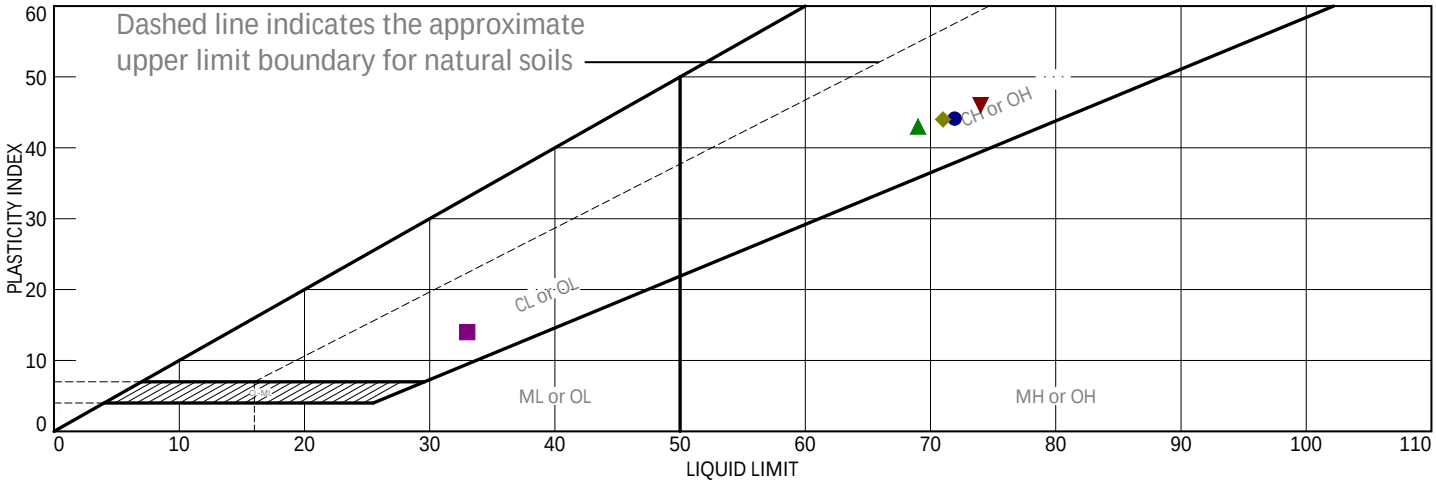
Remarks:

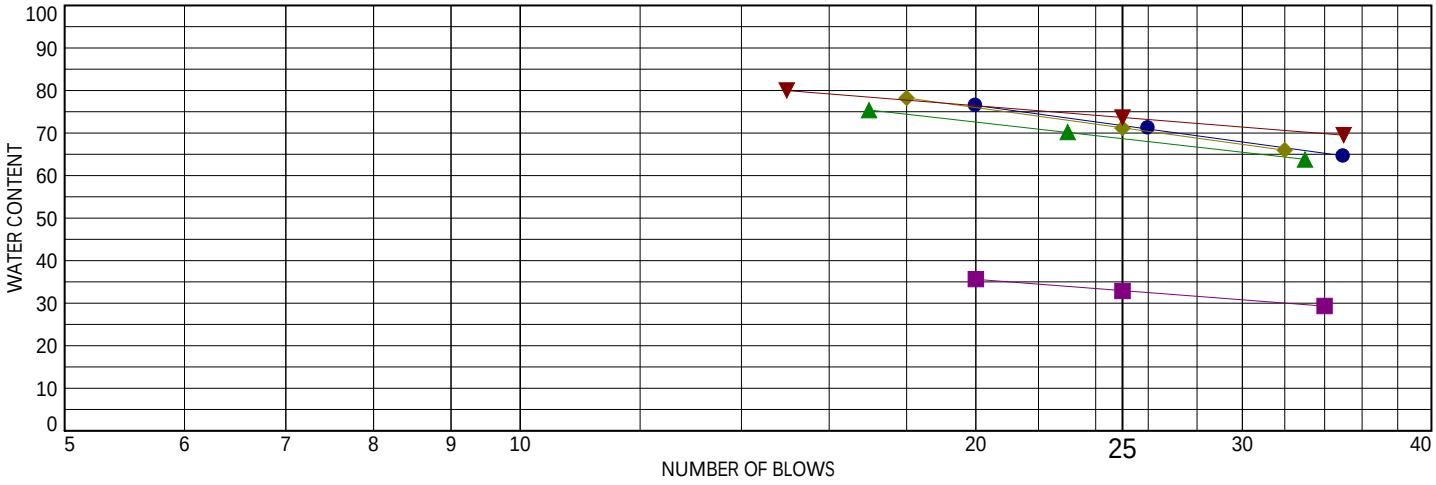
● ASTM D4318 - Sample Air-Dried, LL Device: Manual, PL Rolling Method: Hand-Rolled, Grooving Tool: Metal
5/5/2025

Figure

Tested By: KB Checked By: ANS

LIQUID AND PLASTIC LIMITS TEST REPORT (ASTM D4318)





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Light Reddish Brown Clay & Silt, trace cmf Sand (Visual)	72	28	44			
■	Light Brown Clay & Silt, little cmf Sand (Visual)	33	19	14			
▲	Reddish Brown Clay & Silt, trace cmf Sand (Visual)	69	26	43			
◆	Light Reddish Brown Clay & Silt, trace cmf Sand (Visual)	71	27	44			
▼	Reddish Brown Clay & Silt, trace cmf Sand (Visual)	74	28	46			

Project No. IRN 25-N-159 Client: Candela

Project: Summer Shade, Summer Shade, KY

●Depth: 8'-10' Sample Number: B-19, S-5
■Depth: 4'-6' Sample Number: B-20, S-3
▲Depth: 2'-4' Sample Number: B-BESS-01, S-2
◆Depth: 6'-8' Sample Number: B-SS-01, S-4
▼Depth: 8'-10' Sample Number: B-SS-02, S-5

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Remarks:

●ASTM D4318 - Sample Air-Dried, LL Device: Manual, PL Rolling Method: Hand-Rolled, Grooving Tool: Metal
5/5/2025

Figure

Tested By: AG Checked By: ANS

THERMAL RESISTIVITY RESULTS

ANS CONSULTANTS, INC.
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Determination of Thermal Conductivity of Soil and Rock by Thermal Needle Probe (ASTM D5334)

Client Name: Candela
Project Name: Summer Shade, Summer Shade, KY
LAB IRN: 25-N-159
Date: 5/5/2025

Sample ID: B-07, TRT-1, 3'-5'
Description: Light Reddish Brown Clay & Silt, little cmf Sand, trace mf Gravel (Visual)

Specimen type: Reconstituted (85% D698)
Recompaction Dry Density: 95.6 PCF
In-Situ Moisture: 26.9 %
Optimum Moisture: 14.2 %

S.No.	Moisture (%)		Thermal Conductivity (W/m-K)	Thermal Resistivity (°C-cm/W)
1	Dry	0.0	0.6178	161.9
2	¼ OMC	3.6	0.7709	129.7
3	½ OMC	7.1	1.2071	82.8
4	¾ OMC	10.7	1.3680	73.1
5	OMC	14.2	1.4661	68.2
6	In-Situ	26.9	1.6126	62.0

Remarks:

1. Needle size: 1.9 mm diameter × 100 mm length
2. Thermal grease used: High-density polysynthetics silver thermal compound
3. Tested under controlled room temperature conditions (20°C to 22°C).

Tested By: AG
Checked By: ANS

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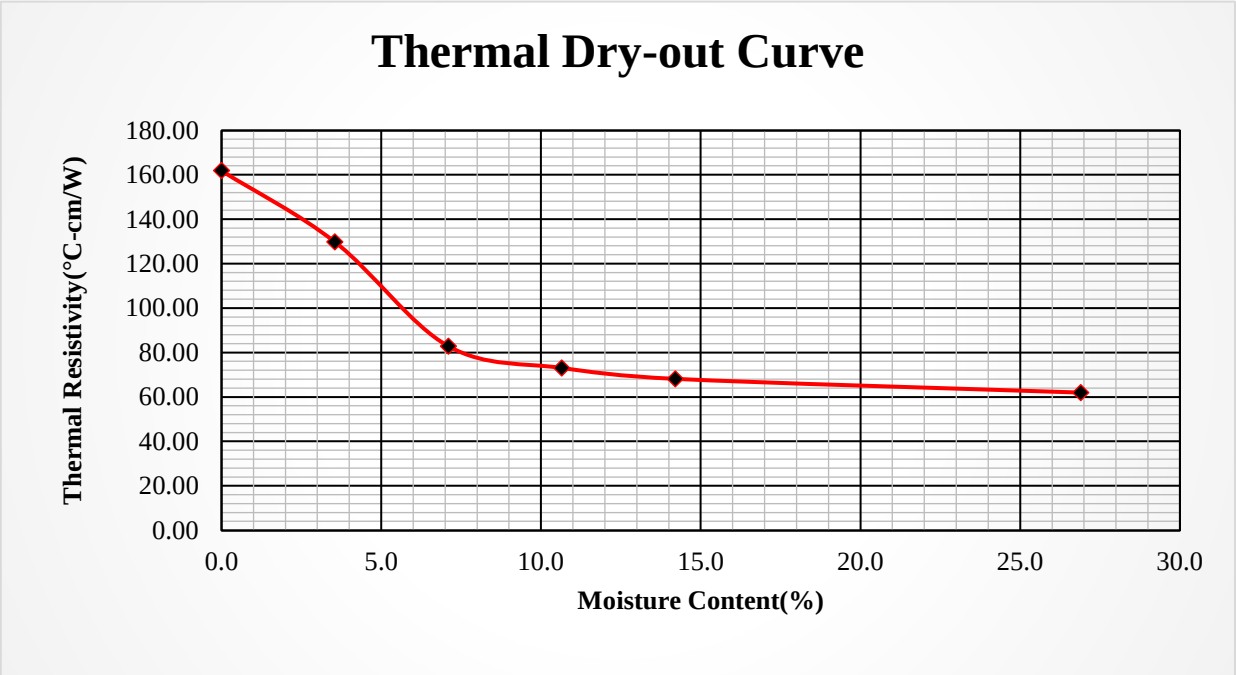
Thermal Dryout Curve (ASTM D5334)

Client Name:	Candela	LAB IRN:	25-N-159
Project Name:	Summer Shade, Summer Shade, KY	Date:	5/5/2025

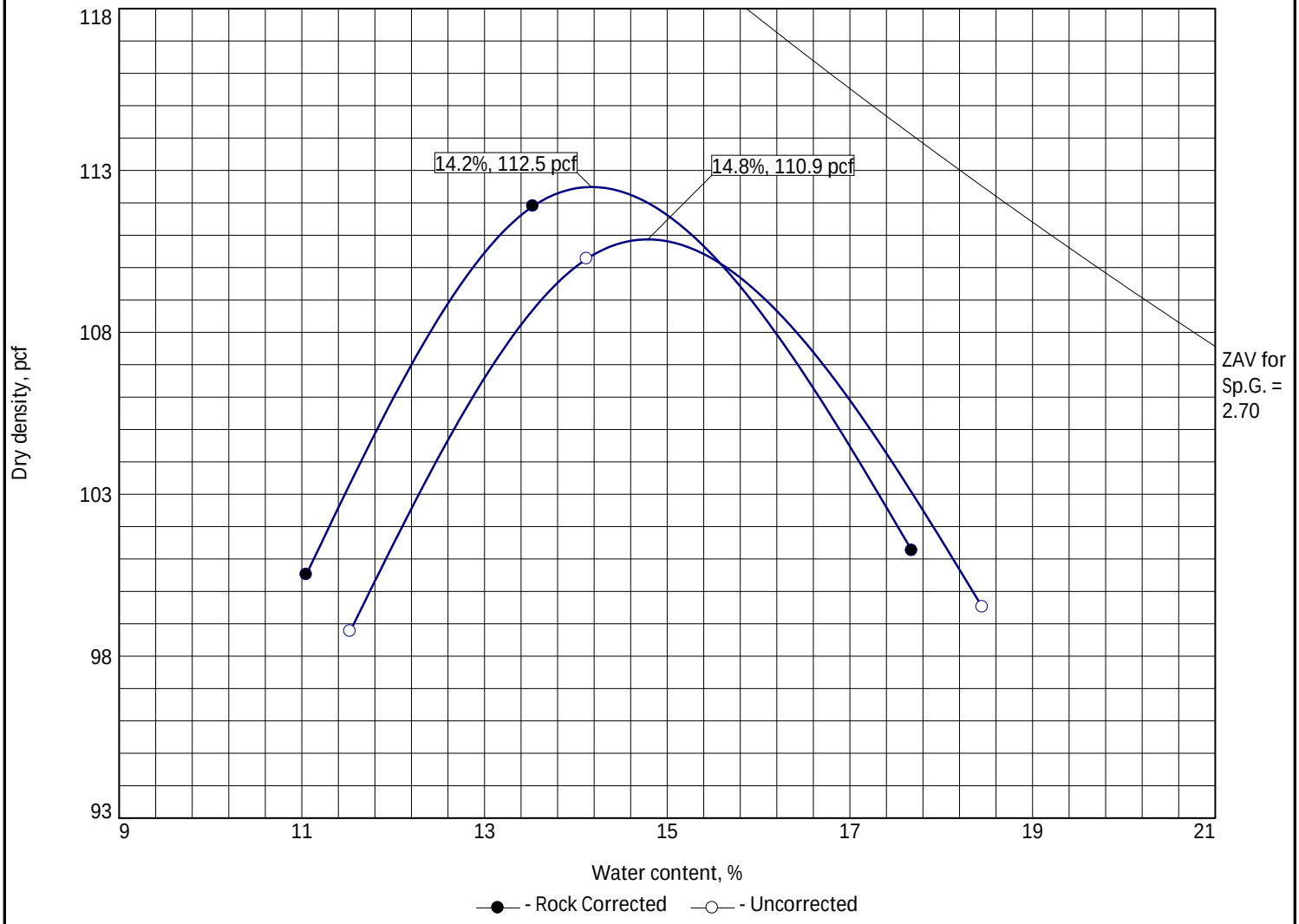
Sample ID: B-07, TRT-1, 3'-5'

Description: Light Reddish Brown Clay & Silt, little cmf Sand, trace mf Gravel (Visual)

Specimen type:	Reconstituted (85% D698)	Recompaction Dry Density:	95.6 PCF
In-Situ Moisture:	26.9 %	Optimum Moisture:	14.2 %



COMPACTION TEST REPORT



Test specification: ASTM D 698-12 Method B Standard
ASTM D4718-15 Oversize Corr. Applied to Each Test Point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
3'-5'				2.7			4.2	

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 112.5 pcf	110.9 pcf	Light Reddish Brown Clay & Silt, little cmf Sand, trace mf Gravel (Visual)
Optimum moisture = 14.2 %	14.8 %	

Project No. IRN 25-N-159 Client: Candela
Project: Summer Shade, Summer Shade, KY
Date: 5/5/2025
○ Sample Number: B-07, TRT-1

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South Plainfield, New Jersey

Remarks:
SG Assumed

Figure

Tested By: MG Checked By: ANS

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Determination of Thermal Conductivity of Soil and Rock by Thermal Needle Probe (ASTM D5334)

Client Name: Candela
Project Name: Summer Shade, Summer Shade, KY
LAB IRN: 25-N-159
Date: 5/5/2025

Sample ID: B-15, TRT-1, 3'-5'
Description: Light Brown Clay & Silt, little cmf Sand, trace mf Gravel (Visual)

Specimen type: Reconstituted (85% D698)
Recompaction Dry Density: 94.7 PCF
In-Situ Moisture: 16.9 %
Optimum Moisture: 16.5 %

S.No.	Moisture (%)		Thermal Conductivity (W/m-K)	Thermal Resistivity (°C-cm/W)
1	Dry	0.0	0.6101	163.9
2	¼ OMC	4.1	0.8730	114.5
3	½ OMC	8.3	1.4460	69.2
4	¾ OMC	12.4	1.6026	62.4
5	OMC	16.5	1.7101	58.5
6	In-Situ	16.9	1.7201	58.1

Remarks:

1. Needle size: 1.9 mm diameter × 100 mm length
2. Thermal grease used: High-density polysynthetics silver thermal compound
3. Tested under controlled room temperature conditions (20°C to 22°C).

Tested By: AG
Checked By: ANS

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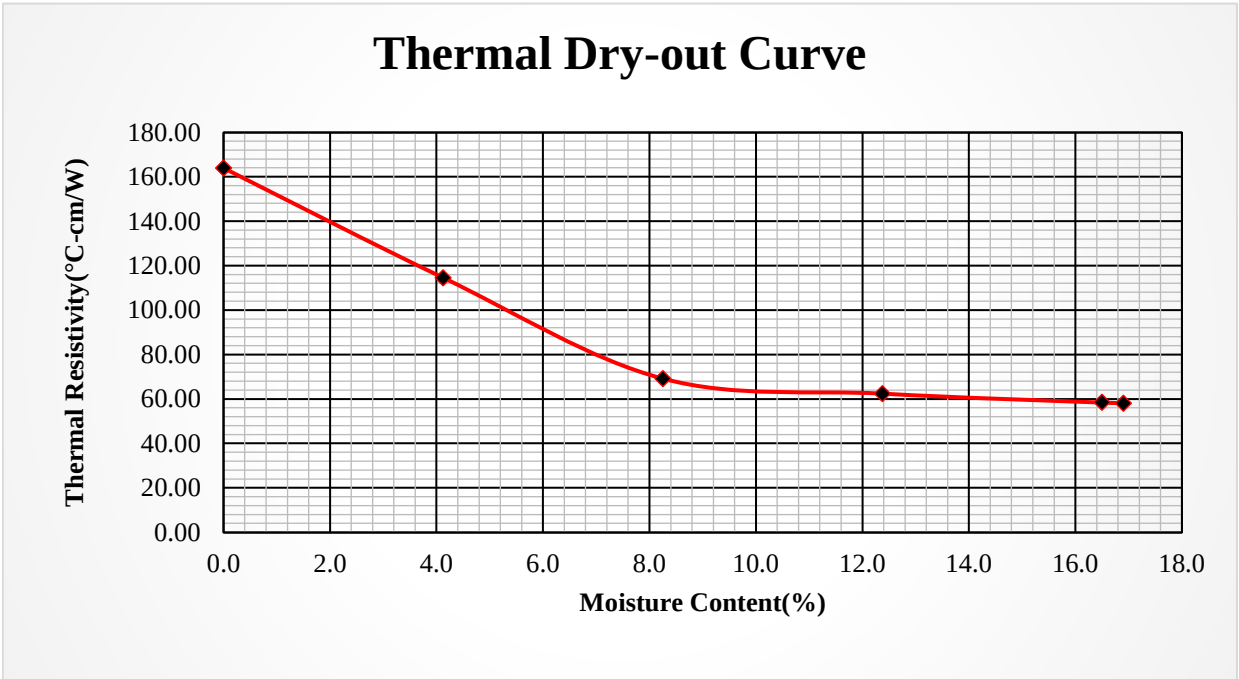
Thermal Dryout Curve (ASTM D5334)

Client Name:	Candela	LAB IRN:	25-N-159
Project Name:	Summer Shade, Summer Shade, KY	Date:	5/5/2025

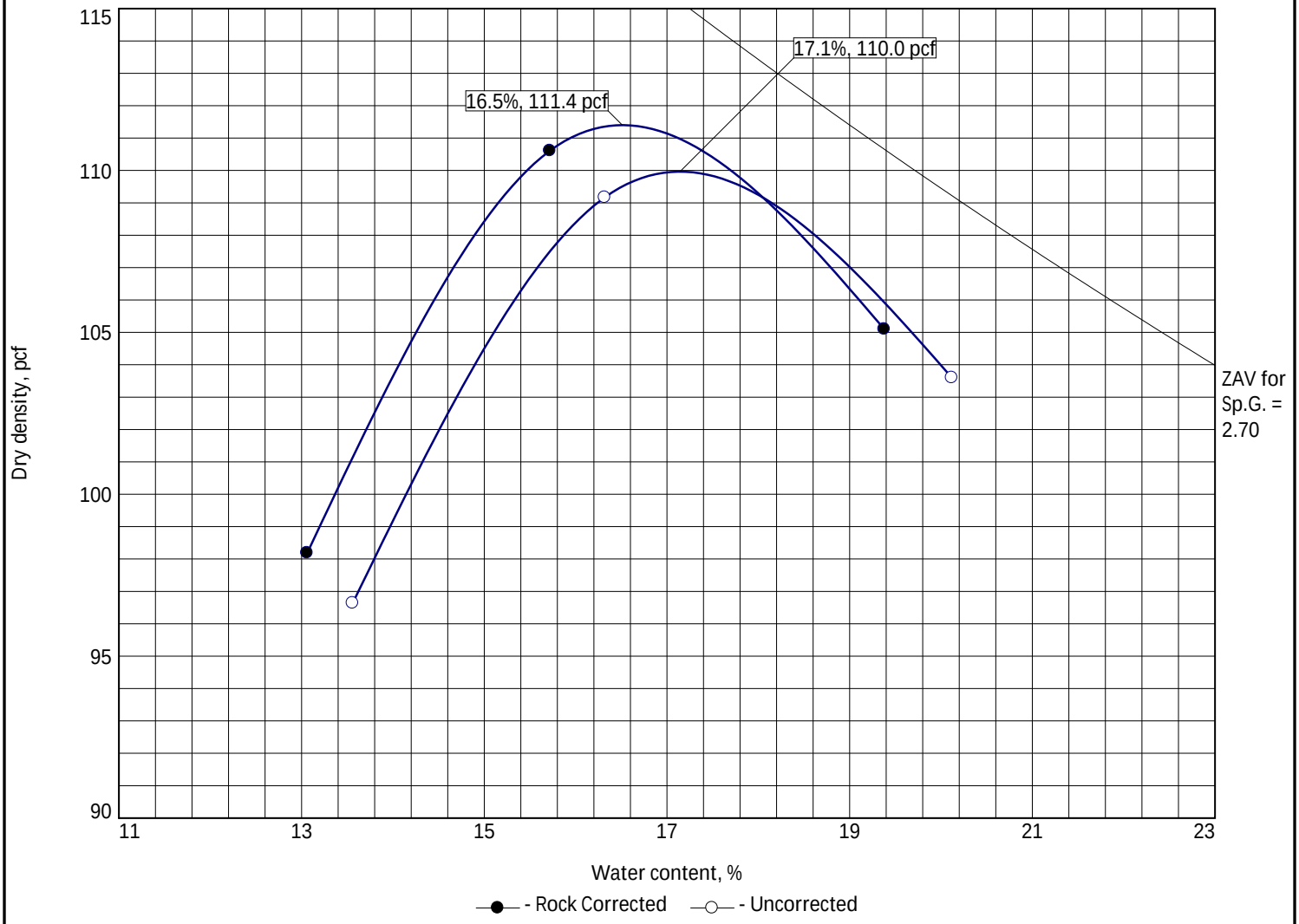
Sample ID: B-15, TRT-1, 3'-5'

Description: Light Brown Clay & Silt, little cmf Sand, trace mf Gravel (Visual)

Specimen type:	Reconstituted (85% D698)	Recompaction Dry Density:	94.7 PCF
In-Situ Moisture:	16.9 %	Optimum Moisture:	16.5 %



COMPACTION TEST REPORT



Test specification: ASTM D 698-12 Method B Standard
ASTM D4718-15 Oversize Corr. Applied to Each Test Point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
3'-5'				2.7			3.7	

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 111.4 pcf	110.0 pcf	Light Brown Clay & Silt, little cmf Sand, trace mf Gravel (Visual)
Optimum moisture = 16.5 %	17.1 %	

Project No. IRN 25-N-159 Client: Candela
Project: Summer Shade, Summer Shade, KY
Date: 5/5/2025
○ Sample Number: B-15, TRT-1

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South Plainfield, New Jersey

Remarks:
SG Assumed

Figure

Tested By: MG Checked By: ANS

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Determination of Thermal Conductivity of Soil and Rock by Thermal Needle Probe (ASTM D5334)

Client Name: Candela
Project Name: Summer Shade, Summer Shade, KY
LAB IRN: 25-N-159
Date: 5/5/2025

Sample ID: B-BESS-01, TRT-1, 2'-4'
Description: Yellow/Reddish Brown Clay & Silt, little cmf Sand, trace mf Gravel (Visual)

Specimen type: Reconstituted (85% D698)
Recompaction Dry Density: 93.9 PCF
In-Situ Moisture: 22.5 %
Optimum Moisture: 15.2 %

S.No.	Moisture (%)		Thermal Conductivity (W/m-K)	Thermal Resistivity (°C-cm/W)
1	Dry	0.0	0.6026	165.9
2	¼ OMC	3.8	0.7931	126.1
3	½ OMC	7.6	1.3157	76.0
4	¾ OMC	11.4	1.4800	67.6
5	OMC	15.2	1.5807	63.3
6	In-Situ	22.5	1.6373	61.1

Remarks:

1. Needle size: 1.9 mm diameter × 100 mm length
2. Thermal grease used: High-density polysynthetics silver thermal compound
3. Tested under controlled room temperature conditions (20°C to 22°C).

Tested By: AG
Checked By: ANS

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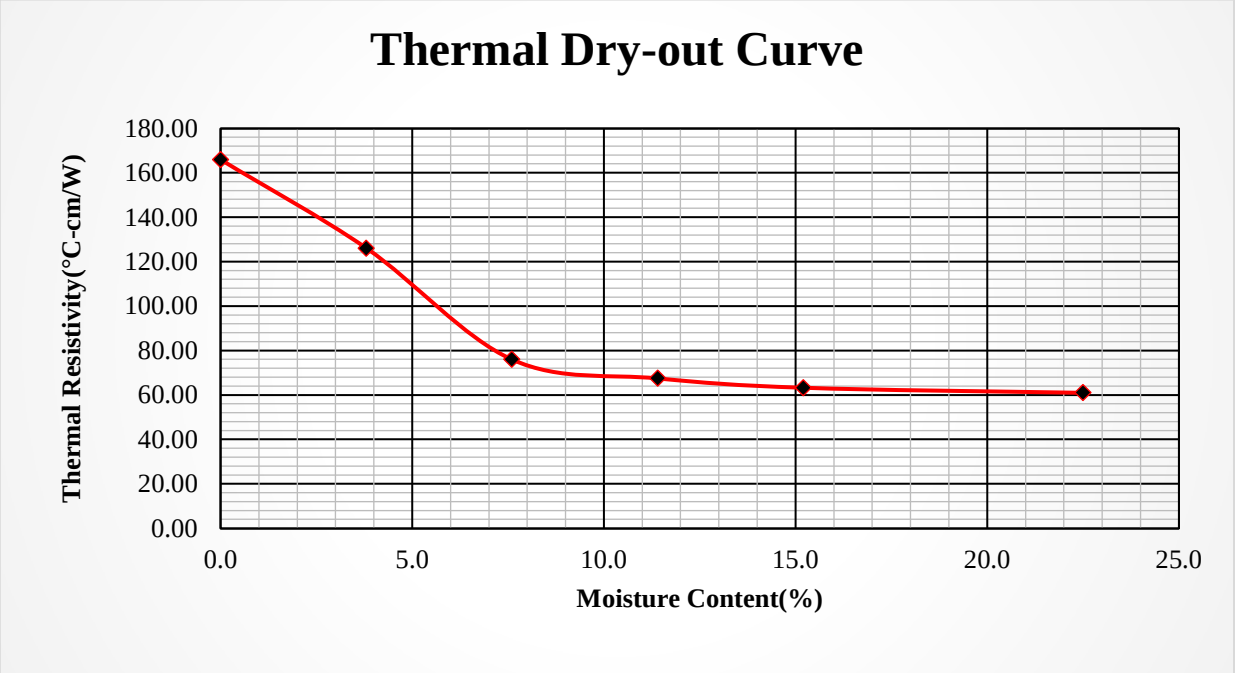
Thermal Dryout Curve (ASTM D5334)

Client Name:	Candela	LAB IRN:	25-N-159
Project Name:	Summer Shade, Summer Shade, KY	Date:	5/5/2025

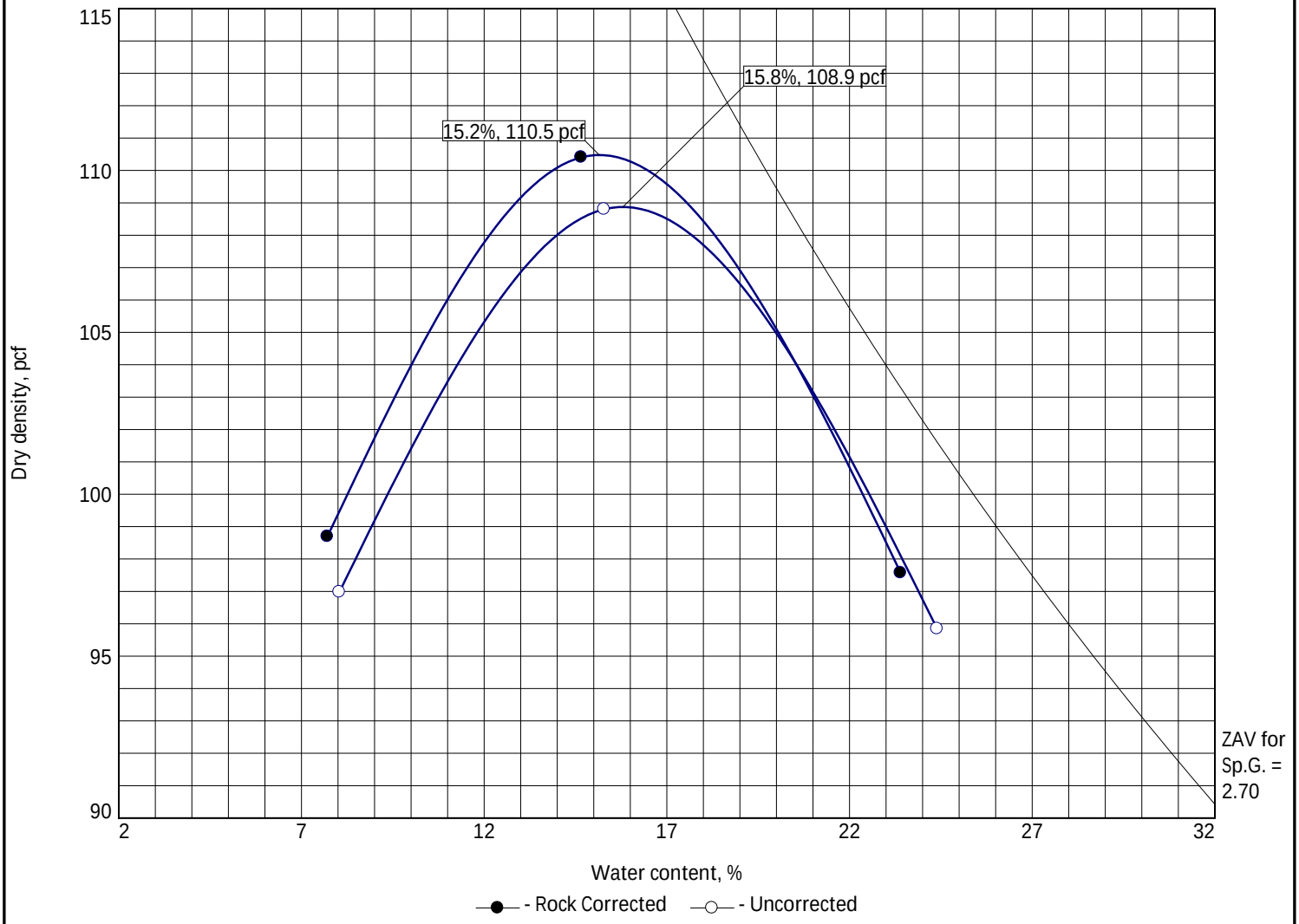
Sample ID: B-BESS-01, TRT-1, 2'-4'

Description: Yellow/Reddish Brown Clay & Silt, little cmf Sand, trace mf Gravel (Visual)

Specimen type:	Reconstituted (85% D698)	Recompaction Dry Density:	93.9 PCF
In-Situ Moisture:	22.5 %	Optimum Moisture:	15.2 %



COMPACTION TEST REPORT



Test specification: ASTM D 698-12 Method B Standard
ASTM D4718-15 Oversize Corr. Applied to Each Test Point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
2'-4'				2.7			4.1	

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 110.5 pcf	108.9 pcf	Yellow/Reddish Brown Clay & Silt, little cmf Sand, trace mf Gravel (Visual)
Optimum moisture = 15.2 %	15.8 %	

Project No. IRN 25-N-159 Client: Candela
Project: Summer Shade, Summer Shade, KY
Date: 5/5/2025
○ Sample Number: B-BESS-01, TRT/CBR-1

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South Plainfield, New Jersey

Remarks:
SG Assumed

Figure

Tested By: ST Checked By: ANS

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Determination of Thermal Conductivity of Soil and Rock by Thermal Needle Probe (ASTM D5334)

Client Name: Candela
Project Name: Summer Shade, Summer Shade, KY
LAB IRN: 25-N-159
Date: 5/5/2025

Sample ID: B-SS-01, TRT-1, 3'-5'
Description: Light Reddish Brown Clay & Silt, little cmf Sand, trace mf Gravel (Visual)

Specimen type: Reconstituted (85% D698)
Recompaction Dry Density: 95.9 PCF
In-Situ Moisture: 15.9 %
Optimum Moisture: 15.5 %

S.No.	Moisture (%)		Thermal Conductivity (W/m-K)	Thermal Resistivity (°C-cm/W)
1	Dry	0.0	0.6246	160.1
2	¼ OMC	3.9	0.8317	120.2
3	½ OMC	7.8	1.3299	75.2
4	¾ OMC	11.6	1.4845	67.4
5	OMC	15.5	1.5887	62.9
6	In-Situ	15.9	1.5989	62.5

Remarks:

1. Needle size: 1.9 mm diameter × 100 mm length
2. Thermal grease used: High-density polysynthetics silver thermal compound
3. Tested under controlled room temperature conditions (20°C to 22°C).

Tested By: AG
Checked By: ANS

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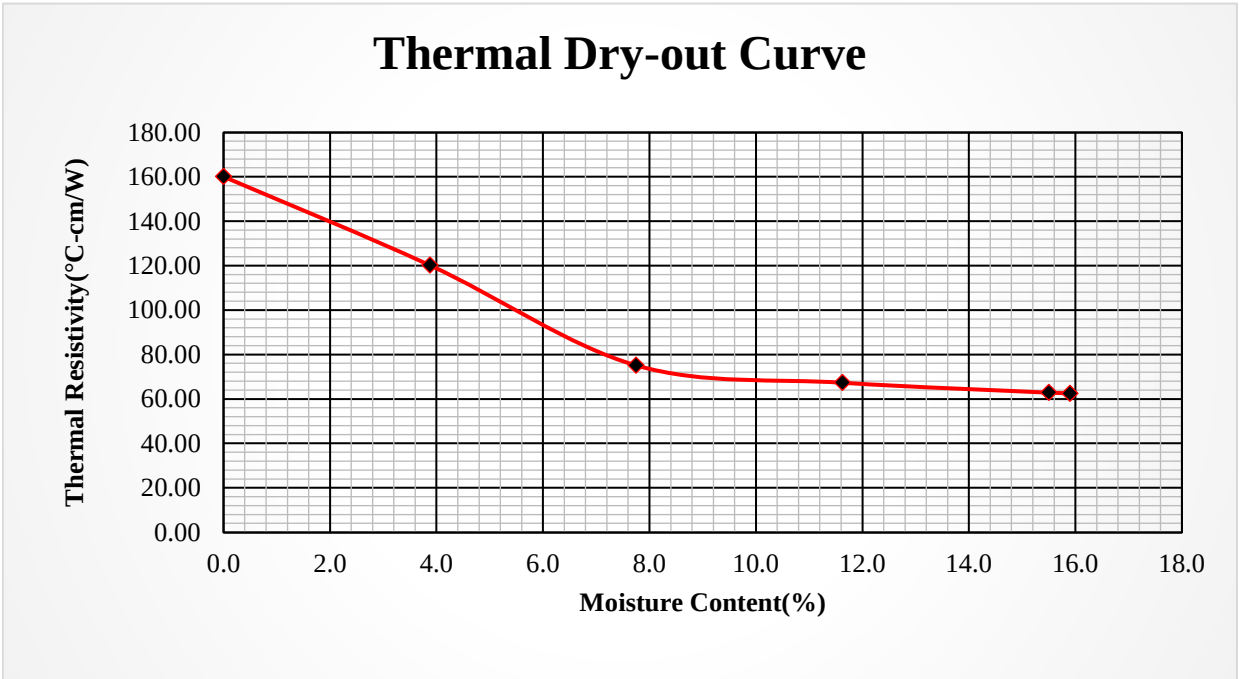
Thermal Dryout Curve (ASTM D5334)

Client Name:	Candela	LAB IRN:	25-N-159
Project Name:	Summer Shade, Summer Shade, KY	Date:	5/5/2025

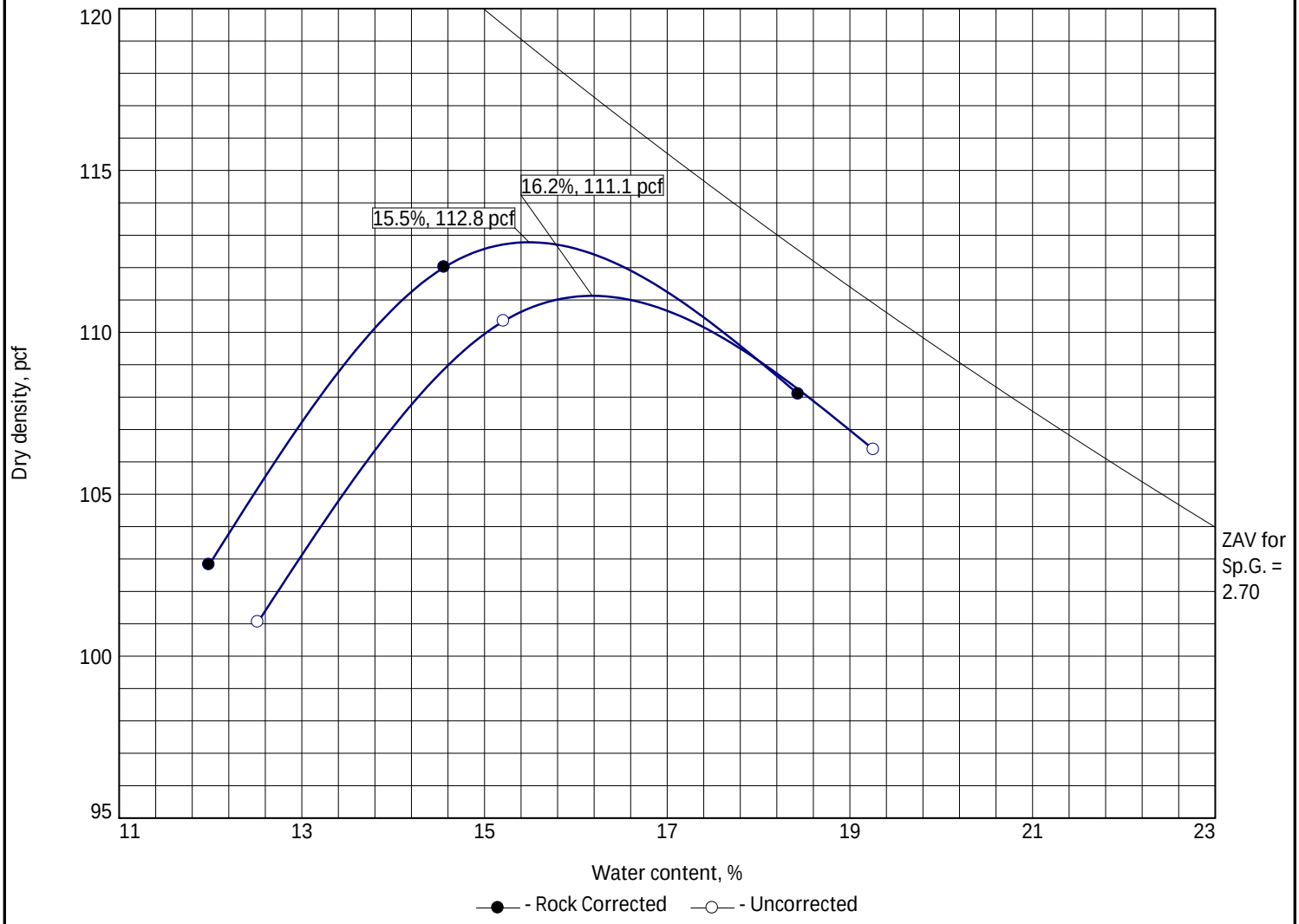
Sample ID: B-SS-01, TRT-1, 3'-5'

Description: Light Reddish Brown Clay & Silt, little cmf Sand, trace mf Gravel (Visual)

Specimen type:	Reconstituted (85% D698)	Recompaction Dry Density:	95.9 PCF
In-Situ Moisture:	15.9 %	Optimum Moisture:	15.5 %



COMPACTION TEST REPORT



Test specification: ASTM D 698-12 Method B Standard
ASTM D4718-15 Oversize Corr. Applied to Each Test Point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
3'-5'				2.7			4.3	

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 112.8 pcf	111.1 pcf	Light Reddish Brown Clay & Silt, little cmf Sand, trace mf Gravel (Visual)
Optimum moisture = 15.5 %	16.2 %	

Project No. IRN 25-N-159 Client: Candela
Project: Summer Shade, Summer Shade, KY
Date: 5/5/2025
○ Sample Number: B-SS-01, TRT-1

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South Plainfield, New Jersey

Remarks:
SG Assumed

Figure

Tested By: MG Checked By: ANS

CORROSIVITY SUITE RESULTS

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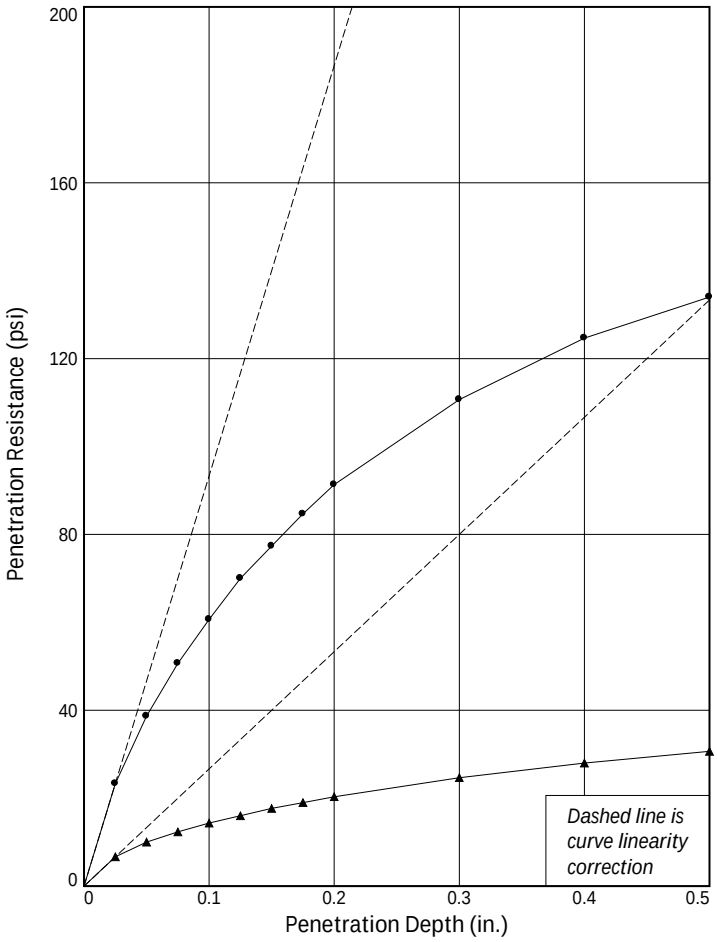
Corrosivity Testing of Soil

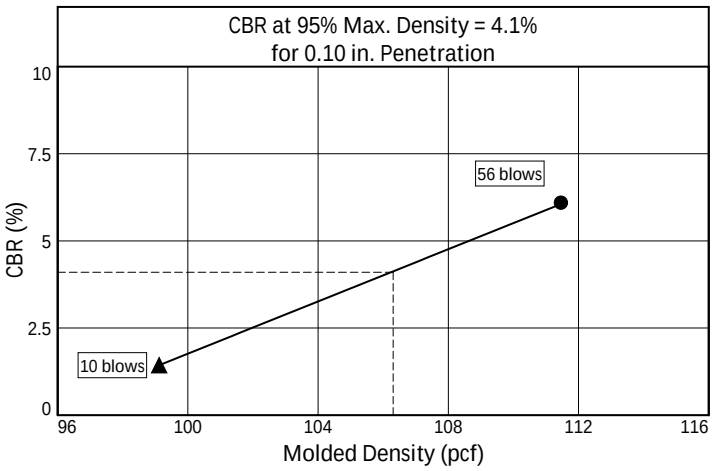
Client Name: Candela
Project Name: Summer Shade, Summer Shade, KY
LAB IRN: 25-N-159
Date: 5/5/2025

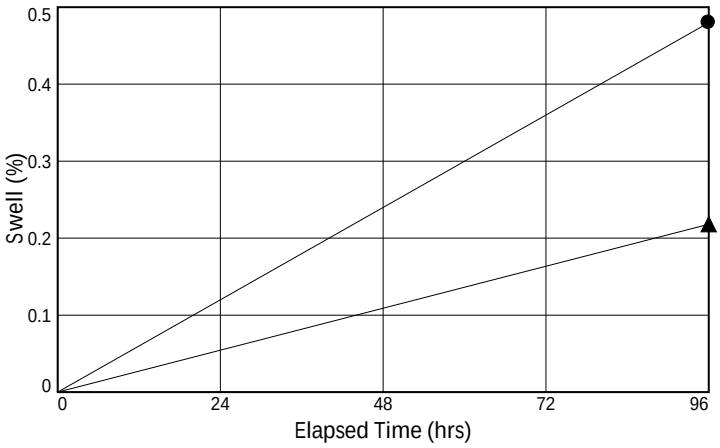
S.No.	Sample	Depth	Soil Resistivity (ohm-cm)	pH of Soil	Sulfate Content (mg/kg)	Chloride Content (mg/kg)	Oxidation-Reduction Pot. (mV)
		Natural Moisture	ASTM G187	ASTM G51	ASTM C1580	AASHTO T291	ASTM G200
1	B-BESS-01 CORR-1	0'-5'	12,400	5.7	<15	12	113
		21.9%		Reddish Brown C&S, little cmf Sand (Vis.)			
2	B-SS-01 CORR-1	0'-5'	5,200	5.4	<15	42	130
		20.8%		Reddish Brown C&S, trace cmf Sand (Vis.)			
3	B-03 CORR-1	0'-5'	16,200	4.2	30	48	210
		29.6%		Reddish Brown C&S, little mf Gravel, trace cmf Sand (Vis.)			
4	B-06 CORR-1	0'-5'	26,800	4.1	<15	51	224
		22.1%		Light Brown C&S, little cmf Sand, trace mf Gravel (Vis.)			
5	B-13 CORR-1	0'-5'	4,700	5.0	60	30	211
		20.8%		Reddish Brown C&S, trace mf Gravel, trace cmf Sand (Vis.)			
6	B-17 CORR-1	0'-5'	16,000	5.0	30	54	305
		22.4%		Reddish Brown C&S, little cmf Sand, trace mf Gravel (Vis.)			
7	B-20 CORR-1	0'-5'	45,300	4.4	<15	15	311
		20.6%		Reddish Brown C&S, little cmf Sand, trace mf Gravel (Vis.)			

CALIFORNIA BEARING RATIO RESULTS

BEARING RATIO TEST REPORT
ASTM D1883-21







	Molded			Soaked			CBR (%)		Linearity Correction (in.)	Surcharge (lbs.)	Max. Swell (%)
	Density (pcf)	Percent of Max. Dens.	Moisture (%)	Density (pcf)	Percent of Max. Dens.	Moisture (%)	0.10 in.	0.20 in.			
1 ●	111.5	99.6	13.8	111.0	99.2	20.3	6.1	6.1	0.000	10	0.5
2 ▲	99.1	88.6	13.8	98.9	88.4	22.8	1.4	1.4	0.000	10	0.2
3 ■											

Material Description	USCS	Max. Dens. (pcf)	Optimum Moisture (%)	LL	PI
Pale Reddish Brown Clay & Silt, little cmf Sand, trace mf Gravel (Visual)		111.9	13.8		

Project No: IRN 25-N-159
Project: Summer Shade, Summer Shade, KY
Sample Number: B-08, CBR-1 Depth: 1'-3'

Date: 5/5/2025

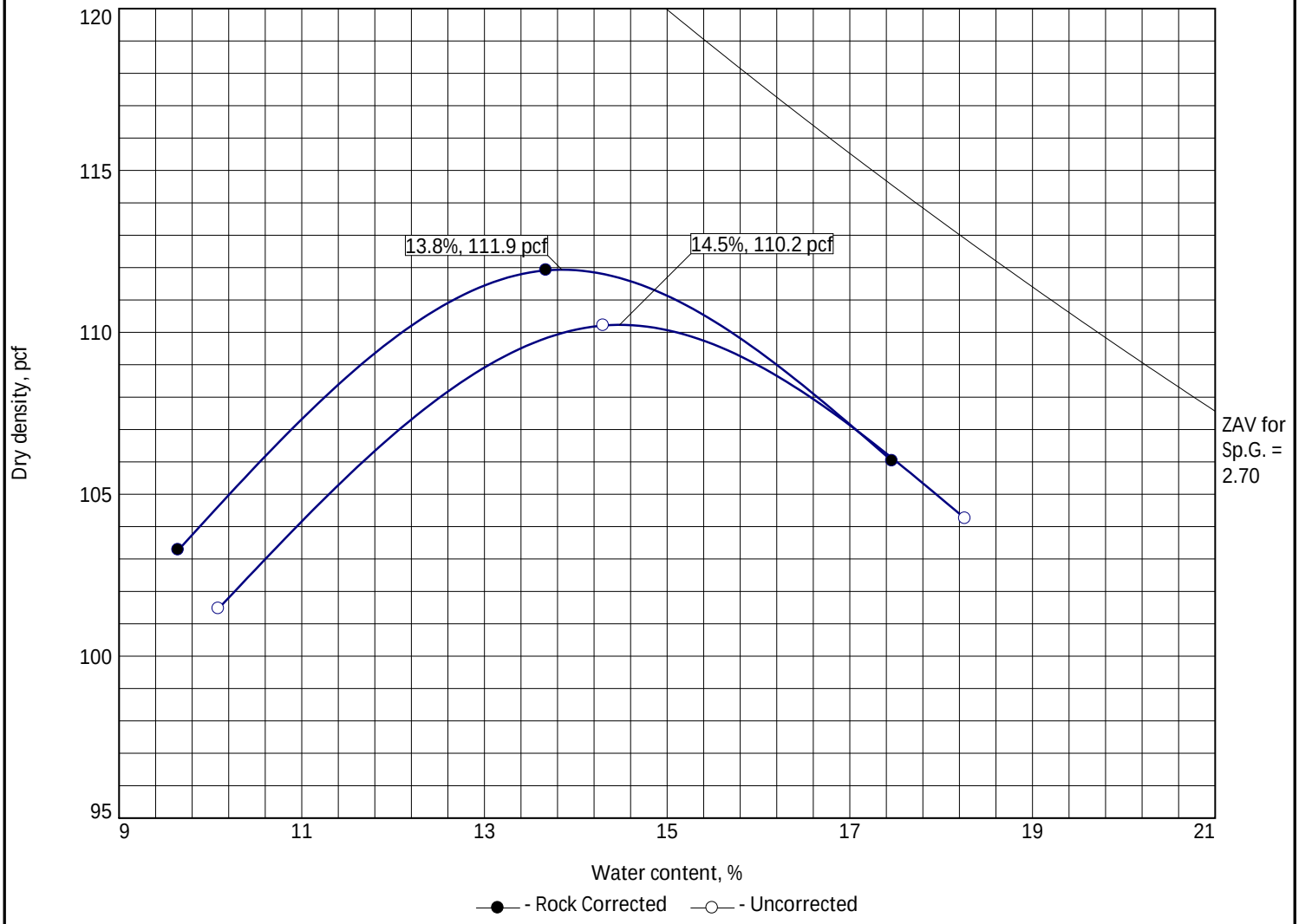
BEARING RATIO TEST REPORT
ANS CONSULTANTS, INC.

Test Remarks:
Saturation Period: 96 Hours

Figure _____

Tested By: FM Checked By: ANS

COMPACTION TEST REPORT



Test specification: ASTM D 698-12 Method B Standard
ASTM D4718-15 Oversize Corr. Applied to Each Test Point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
1'-3'				2.7			4.4	

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 111.9 pcf	110.2 pcf	Pale Reddish Brown Clay & Silt, little cmf Sand, trace mf Gravel (Visual)
Optimum moisture = 13.8 %	14.5 %	

Project No. IRN 25-N-159 Client: Candela
Project: Summer Shade, Summer Shade, KY
Date: 5/5/2025
○ Sample Number: B-08, CBR-1

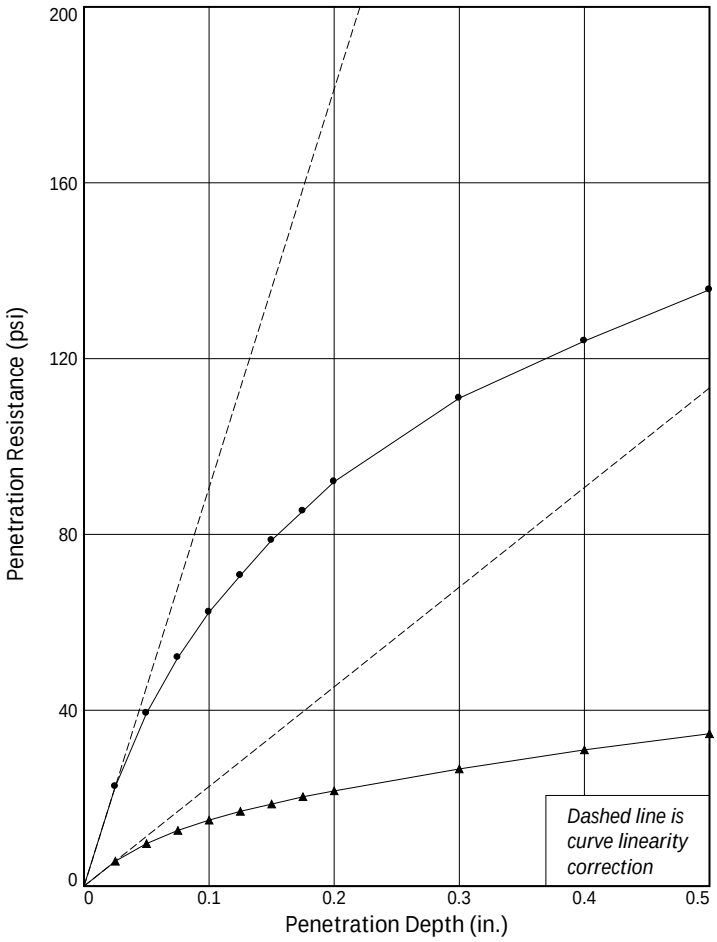
ANS CONSULTANTS, INC.
South Plainfield, New Jersey

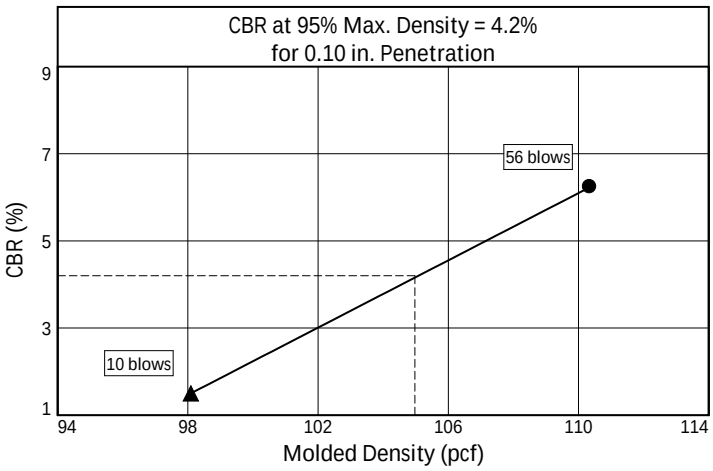
Remarks:
SG Assumed

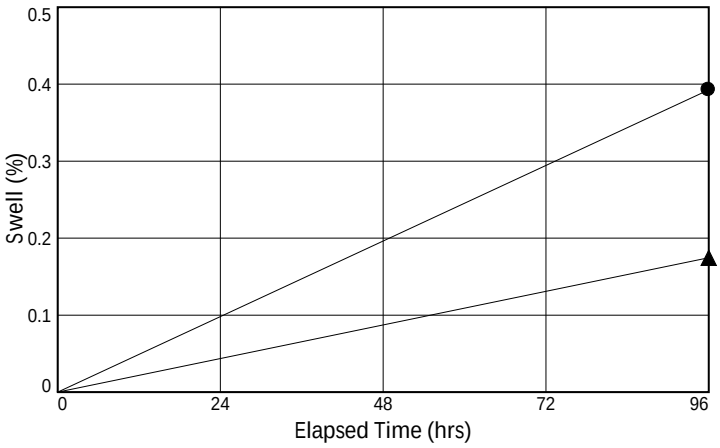
Figure

Tested By: MG Checked By: ANS

BEARING RATIO TEST REPORT
ASTM D1883-21







	Molded			Soaked			CBR (%)		Linearity Correction (in.)	Surcharge (lbs.)	Max. Swell (%)
	Density (pcf)	Percent of Max. Dens.	Moisture (%)	Density (pcf)	Percent of Max. Dens.	Moisture (%)	0.10 in.	0.20 in.			
1 ●	110.4	99.9	15.5	109.9	99.5	20.2	6.2	6.1	0.000	10	0.4
2 ▲	98.1	88.8	15.5	97.9	88.6	23.9	1.5	1.4	0.000	10	0.2
3 ■											

Material Description	USCS	Max. Dens. (pcf)	Optimum Moisture (%)	LL	PI
Light Brown Clay & Silt, little cmf Sand, little mf Gravel (Visual)		110.5	15.5		

Project No: IRN 25-N-159
Project: Summer Shade, Summer Shade, KY
Sample Number: B-16, CBR-1 Depth: 1'-3'

Date: 5/5/2025

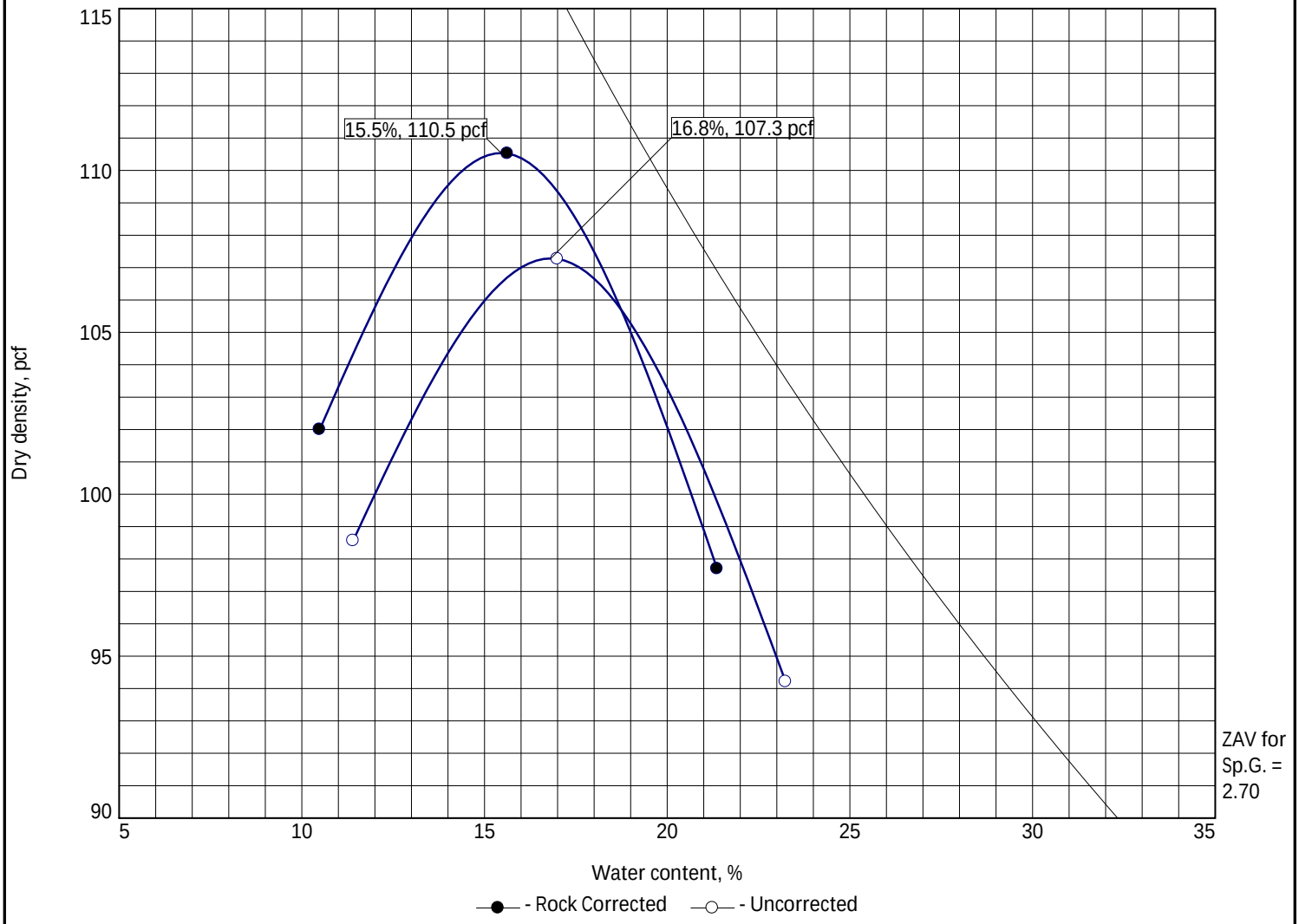
BEARING RATIO TEST REPORT
ANS CONSULTANTS, INC.

Test Remarks:
Saturation Period: 96 Hours

Figure _____

Tested By: CC Checked By: ANS

COMPACTION TEST REPORT



Test specification: ASTM D 698-12 Method B Standard
ASTM D4718-15 Oversize Corr. Applied to Each Test Point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
1'-3'				2.7			8.1	

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 110.5 pcf	107.3 pcf	Light Brown Clay & Silt, little cmf Sand, little mf Gravel (Visual)
Optimum moisture = 15.5 %	16.8 %	

Project No. IRN 25-N-159 Client: Candela
Project: Summer Shade, Summer Shade, KY
Date: 5/5/2025
○ Sample Number: B-16, CBR-1

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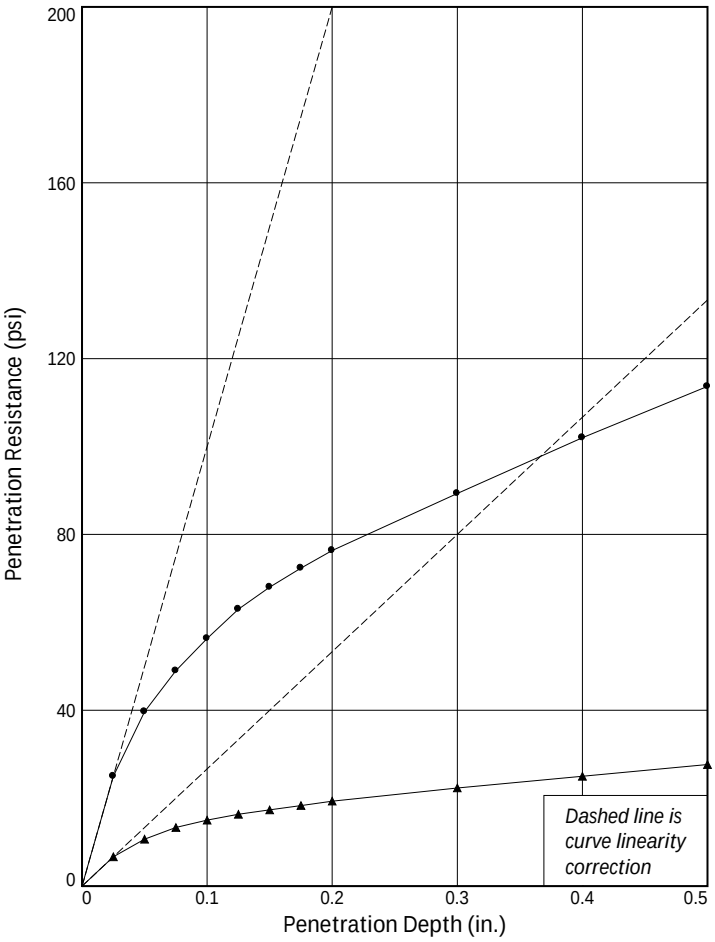
South Plainfield, New Jersey

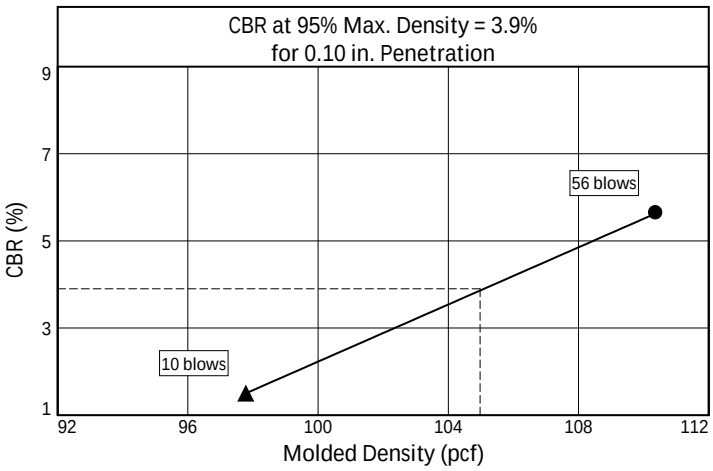
Remarks:
SG Assumed

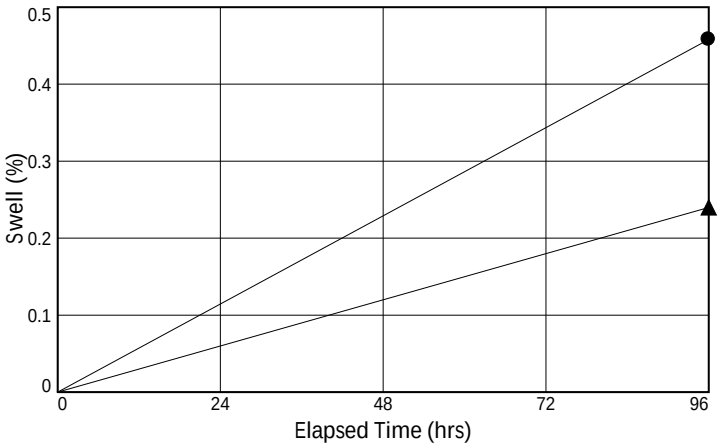
Figure

Tested By: HP Checked By: ANS

BEARING RATIO TEST REPORT
ASTM D1883-21







	Molded			Soaked			CBR (%)		Linearity Correction (in.)	Surcharge (lbs.)	Max. Swell (%)
	Density (pcf)	Percent of Max. Dens.	Moisture (%)	Density (pcf)	Percent of Max. Dens.	Moisture (%)	0.10 in.	0.20 in.			
1 ●	110.4	99.9	15.2	109.9	99.4	21.3	5.6	5.1	0.000	10	0.5
2 ▲	97.8	88.5	15.2	97.5	88.3	23.2	1.5	1.3	0.000	10	0.2
3 ■											

Material Description	USCS	Max. Dens. (pcf)	Optimum Moisture (%)	LL	PI
Yellow/Reddish Brown Clay & Silt, little cmf Sand, trace mf Gravel (Visual)		110.5	15.2		

Project No: IRN 25-N-159
Project: Summer Shade, Summer Shade, KY
Sample Number: B-BESS-01, TRT/CBR-1 Depth: 2'-4'

Date: 5/5/2025

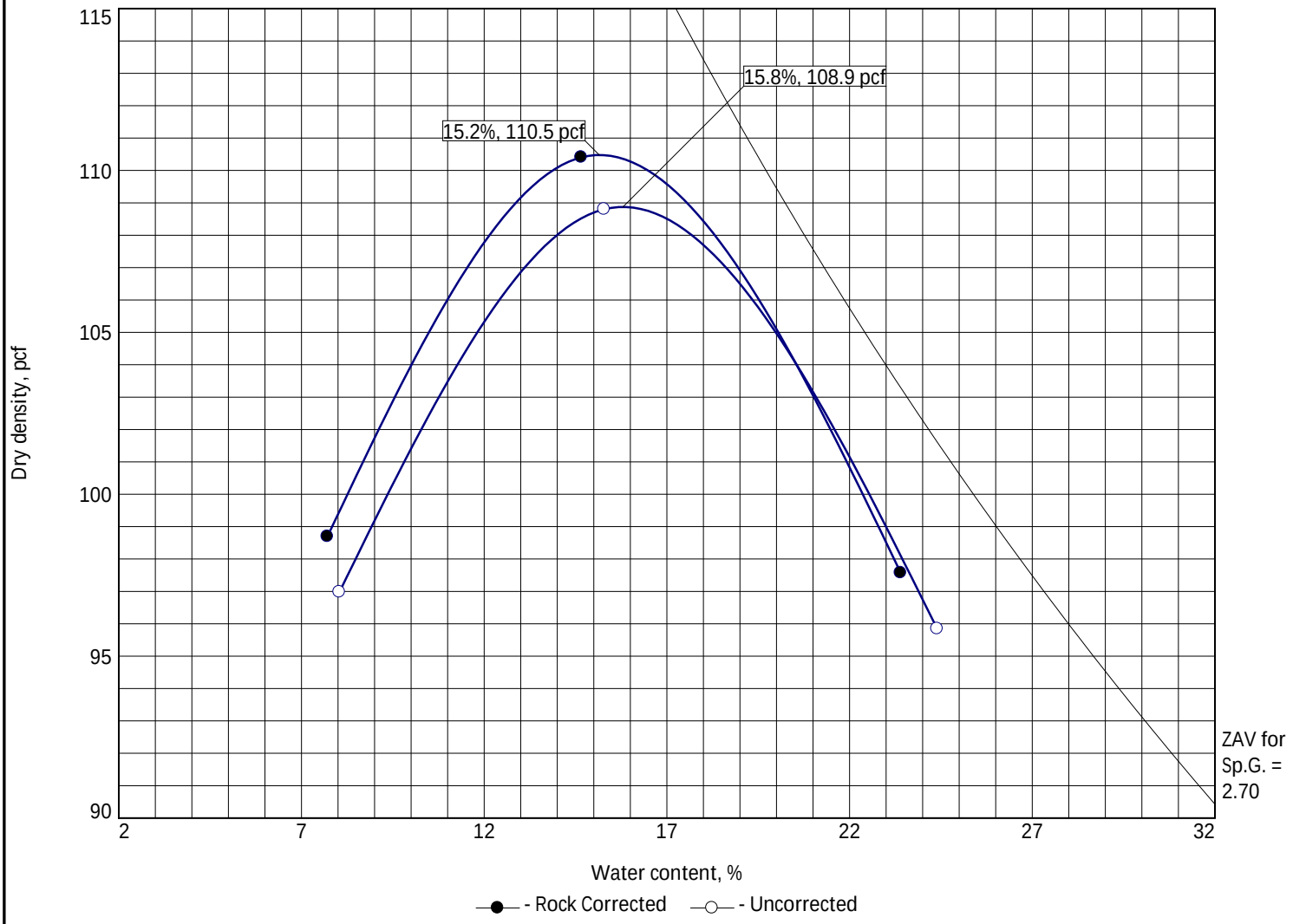
BEARING RATIO TEST REPORT
ANS CONSULTANTS, INC.

Test Remarks:
Saturation Period: 96 Hours

Figure _____

Tested By: FM Checked By: ANS

COMPACTION TEST REPORT



Test specification: ASTM D 698-12 Method B Standard
ASTM D4718-15 Oversize Corr. Applied to Each Test Point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
2'-4'				2.7			4.1	

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 110.5 pcf	108.9 pcf	Yellow/Reddish Brown Clay & Silt, little cmf Sand, trace mf Gravel (Visual)
Optimum moisture = 15.2 %	15.8 %	

Project No. IRN 25-N-159 Client: Candela
Project: Summer Shade, Summer Shade, KY
Date: 5/5/2025
○ Sample Number: B-BESS-01, TRT/CBR-1

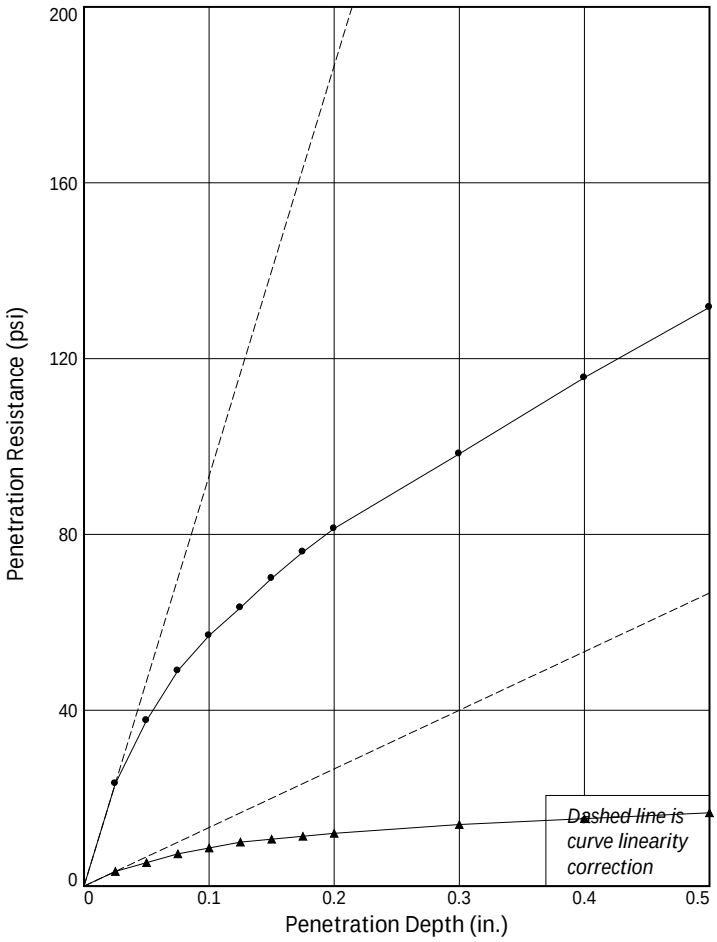
ANS CONSULTANTS, INC.
South Plainfield, New Jersey

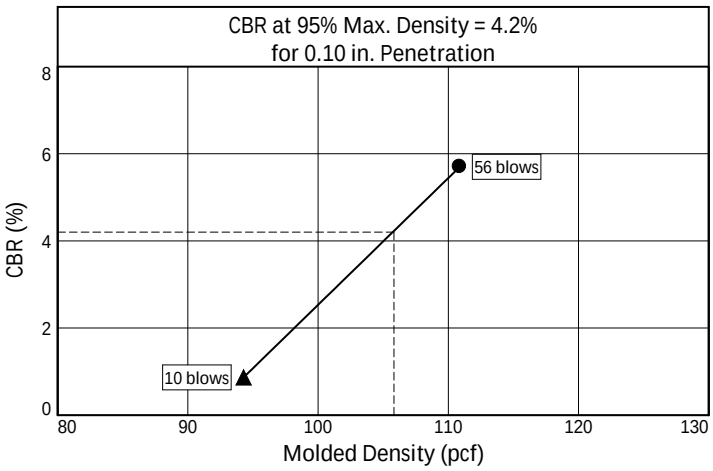
Remarks:
SG Assumed

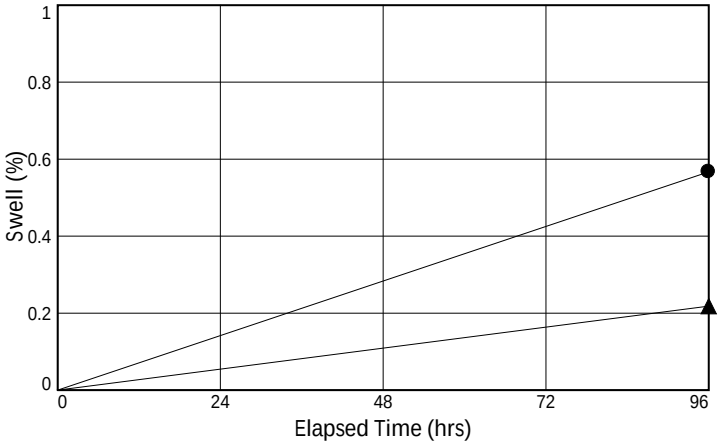
Figure

Tested By: ST Checked By: ANS

BEARING RATIO TEST REPORT
ASTM D1883-21







	Molded			Soaked			CBR (%)		Linearity Correction (in.)	Surcharge (lbs.)	Max. Swell (%)
	Density (pcf)	Percent of Max. Dens.	Moisture (%)	Density (pcf)	Percent of Max. Dens.	Moisture (%)	0.10 in.	0.20 in.			
1 ●	110.9	99.6	13.6	110.3	99	23.5	5.7	5.4	0.000	10	0.6
2 ▲	94.3	84.6	13.6	94.1	84.4	26.3	0.9	0.8	0.000	10	0.2
3 ■											

Material Description	USCS	Max. Dens. (pcf)	Optimum Moisture (%)	LL	PI
Light Reddish Brown Clay & Silt, little cmf Sand, trace mf Gravel (Visual)		111.4	13.6		

Project No: IRN 25-N-159
Project: Summer Shade, Summer Shade, KY
Sample Number: B-SS-02, CBR-1 Depth: 1'-3'

Date: 5/5/2025

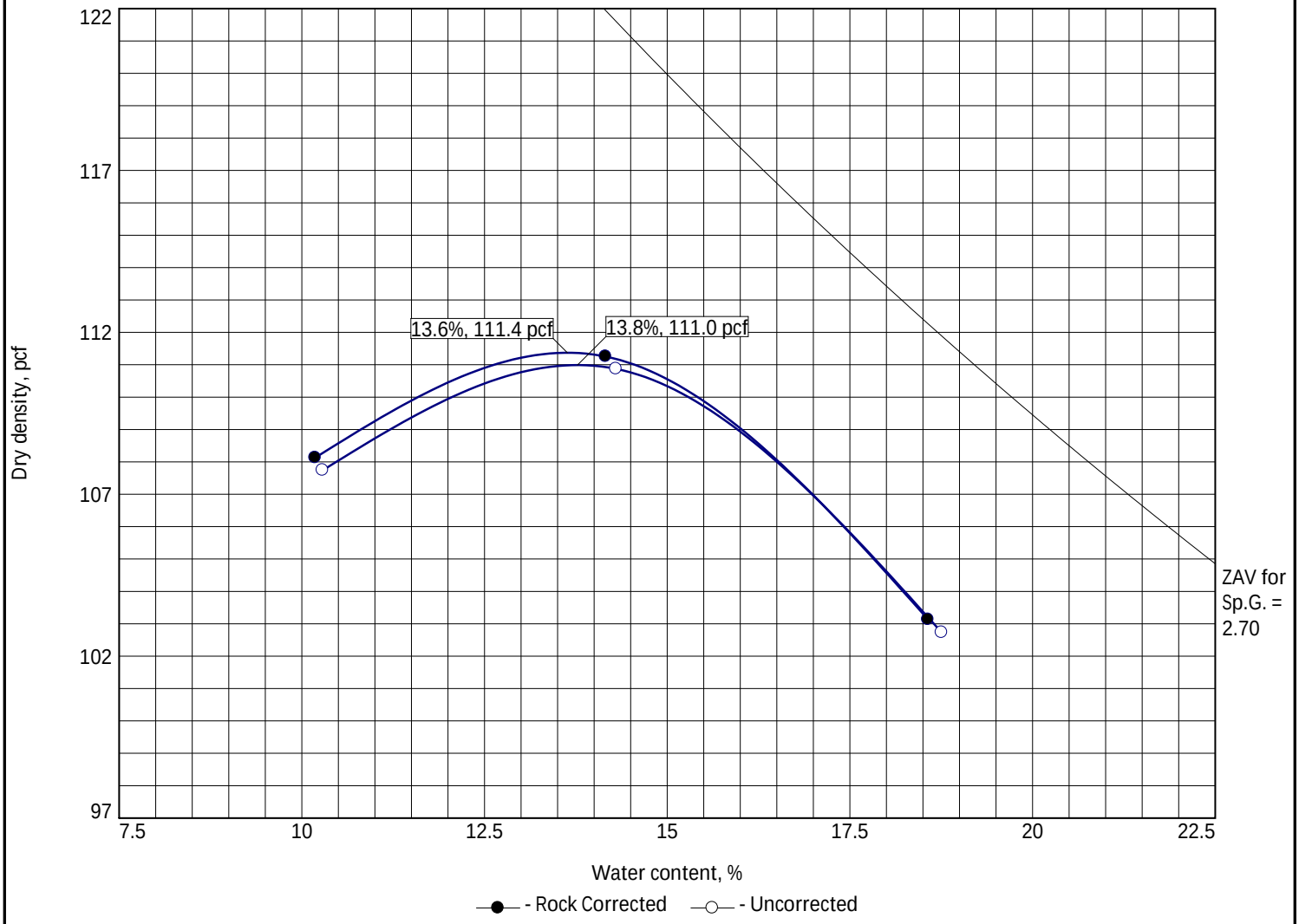
BEARING RATIO TEST REPORT
ANS CONSULTANTS, INC.

Test Remarks:
Saturation Period: 96 Hours

Figure _____

Tested By: FM Checked By: ANS

COMPACTION TEST REPORT



Test specification: ASTM D 698-12 Method B Standard
ASTM D4718-15 Oversize Corr. Applied to Each Test Point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
1'-3'				2.7			1	

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 111.4 pcf	111.0 pcf	Light Reddish Brown Clay & Silt, little cmf Sand, trace mf Gravel (Visual)
Optimum moisture = 13.6 %	13.8 %	

Project No. IRN 25-N-159 Client: Candela
Project: Summer Shade, Summer Shade, KY
Date: 5/5/2025
○ Sample Number: B-SS-02, CBR-1

ANS CONSULTANTS, INC.
South Plainfield, New Jersey

Remarks:
SG Assumed

Figure

Tested By: SL Checked By: ANS

MOISTURE CONTENT ANALYSIS RESULTS

ANS CONSULTANTS, INC.
4405 South Clinton Avenue
South Plainfield, NJ 07080
Tel: (800) 585-ATUL
(908) 754-8383
Fax: (908) 754-8633
NJ EDA Approved Testing Laboratory • MBE/DBE Certified • NJ DEP Certified
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Soil, Concrete, Masonry, Rebar, Asphalt, Structural Steel, Precast, Piles, Caissons, Fire-Proofing, Roofing, Soil Boring, Concrete/Rock Coring, UST Removal, Environmental Testing & Reports

Laboratory Determination of Water (Moisture) Content of Soil and Rock (ASTM D2216)

Client Name: Candela
Project Name: Summer Shade, Summer Shade, KY
LAB IRN: 25-N-159
Date: 5/5/2025

Sample ID	B-01, S-3	B-02, S-2	B-03, S-5	B-04, S-1	B-05, S-3
Depth	4'-6'	2'-4'	8'-10'	0'-2'	4'-6'
Wet soil + Tare (g)	311.1	297.6	305.9	291.9	293.7
Dry soil + Tare (g)	240.8	233.3	247.1	242.4	247.5
Wt. of Tare (g)	12.0	12.4	12.5	12.3	14.5
Moisture Content	**30.7%**	**29.1%**	**25.1%**	**21.5%**	**19.8%**

Sample ID	B-06, S-6	B-07, S-6	B-08, S-4	B-09, S-2	B-10, S-4
Depth	13'-15'	13'-15'	6'-8'	2'-4'	2'-4'
Wet soil + Tare (g)	486.5	319.7	370.7	351.8	310.9
Dry soil + Tare (g)	367.0	263.2	311.2	284.8	233.3
Wt. of Tare (g)	12.4	15.1	12.9	12.8	13.0
Moisture Content	**33.7%**	**22.8%**	**19.9%**	**24.6%**	**35.2%**

Sample ID	B-11, S-1	B-12, S-7	B-13, S-3	B-14, S-3	B-15, S-5
Depth	0'-2'	18'-20'	4'-6'	4'-6'	8'-10'
Wet soil + Tare (g)	396.1	308.6	394.0	297.5	382.9
Dry soil + Tare (g)	362.0	231.5	322.5	253.3	310.9
Wt. of Tare (g)	14.1	12.9	15.0	12.5	12.7
Moisture Content	**9.8%**	**35.2%**	**23.3%**	**18.4%**	**24.1%**

Tested By: CC/ST
Checked By: ANS

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Laboratory Determination of Water (Moisture) Content of Soil and Rock (ASTM D2216)

Client Name: Candela
Project Name: Summer Shade, Summer Shade, KY
LAB IRN: 25-N-159
Date: 5/5/2025

Sample ID	B-16, S-5	B-17, S-1	B-18, S-2	B-19, S-5	B-20, S-3
Depth	8'-10'	0'-2'	2'-4'	8'-10'	4'-6'
Wet soil + Tare (g)	388.5	242.1	476.2	341.0	285.1
Dry soil + Tare (g)	328.8	199.0	397.1	275.5	244.8
Wt. of Tare (g)	12.7	12.4	13.1	11.9	12.8
Moisture Content	**18.9%**	**23.1%**	**20.6%**	**24.8%**	**17.4%**

Sample ID	B-SS-01, S-4	B-SS-02, S-5	B-BESS-01, S-2	B-BESS-01, TRT-1/CBR-1	B-SS-02, CBR-1
Depth	6'-8'	8'-10'	2'-4'	2'-4'	1'-3'
Wet soil + Tare (g)	496.5	293.1	254.6	423.4	469.0
Dry soil + Tare (g)	408.6	215.6	217.0	347.8	385.7
Wt. of Tare (g)	13.0	12.0	12.3	12.0	12.5
Moisture Content	**22.2%**	**38.0%**	**18.3%**	**22.5%**	**22.3%**

Sample ID	B-08, CBR-1	B-16, CBR-1	B-SS-01, TRT-1	B-07, TRT-1	B-15, TRT-1
Depth	1'-3'	1'-3'	3'-5'	3'-5'	3'-5'
Wet soil + Tare (g)	388.5	357.0	240.2	340.8	347.6
Dry soil + Tare (g)	321.5	294.9	209.1	271.3	299.2
Wt. of Tare (g)	12.2	12.0	13.4	13.0	12.5
Moisture Content	**21.7%**	**21.9%**	**15.9%**	**26.9%**	**16.9%**

Tested By: CC/ST
Checked By: ANS

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Laboratory Determination of Water (Moisture) Content of Soil and Rock (ASTM D2216)

Client Name: Candela
Project Name: Summer Shade, Summer Shade, KY
LAB IRN: 25-N-159
Date: 5/5/2025

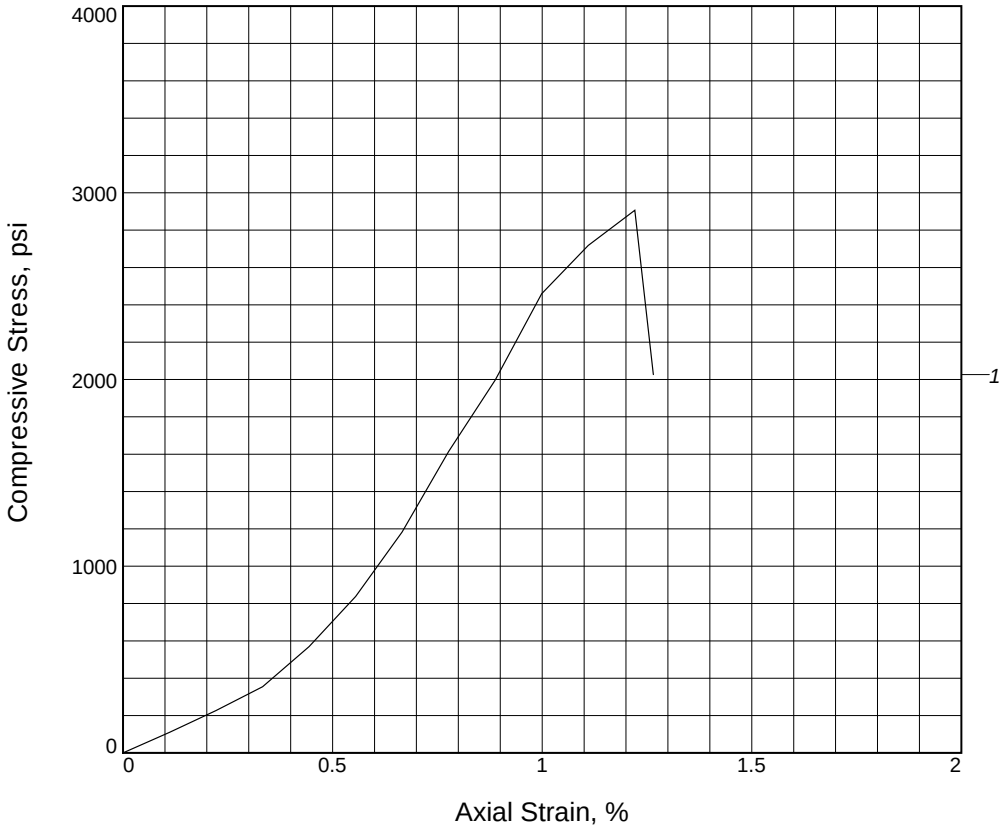
Sample ID	B-BESS-01, CORR-1	B-SS-01, CORR-1	B-03, CORR-1	B-06, CORR-1	B-13, CORR-1
Depth	0'-5'	0'-5'	0'-5'	0'-5'	0'-5'
Wet soil + Tare (g)	289.3	347.9	298.8	474.1	366.1
Dry soil + Tare (g)	239.6	290.2	233.6	390.6	305.2
Wt. of Tare (g)	12.8	12.7	13.1	12.4	12.1
Moisture Content	**21.9%**	**20.8%**	**29.6%**	**22.1%**	**20.8%**

Sample ID	B-17, CORR-1	B-20, CORR-1	B-SS-10, RC-1
Depth	0'-5'	0'-5'	31'-36'
Wet soil + Tare (g)	294.8	268.0	534.4
Dry soil + Tare (g)	243.1	224.2	530.1
Wt. of Tare (g)	12.3	12.2	121.6
Moisture Content	**22.4%**	**20.6%**	**1.0%**

Tested By: CC/ST
Checked By: ANS

Unconfined Compressive Strength of Rock

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psi	2906.69			
Undrained shear strength, psi	1453.35			
Failure strain, %	1.2			
Strain rate, in./min.	N/A			
Water content, %	1.0			
Wet density, pcf	148.0			
Dry density, pcf	146.5			
Saturation, %	18.6			
Void ratio	0.1508			
Specimen diameter, in.	1.86			
Specimen height, in.	4.50			
Height/diameter ratio	2.42			

Description: Pale Brown Rock Core

LL =	**PL =**	**PI =**	**Assumed GS=** 2.7	**Type:**

Project No.: IRN 25-N-159

Date Sampled: 5/5/2025

Remarks:
ASTM D7012 - Method C
Loading Manner: Constant Stress Rate (0.5 MPa/sec)
Undrained Shear Strength estimated using Mohr's circle as half of max UC Strength

Figure _____

Client: Candela

Project: Summer Shade, Summer Shade, KY

Sample Number: B-SS-10, RC-1 **Depth:** 31'-36'

UNCONFINED COMPRESSION TEST
ANS CONSULTANTS, INC.
South Plainfield, New Jersey

Tested By: MG **Checked By:** ANS


25-N-159
B-SS-01
RC-1
31'-36'
MC / UCS Rock

Attachment G

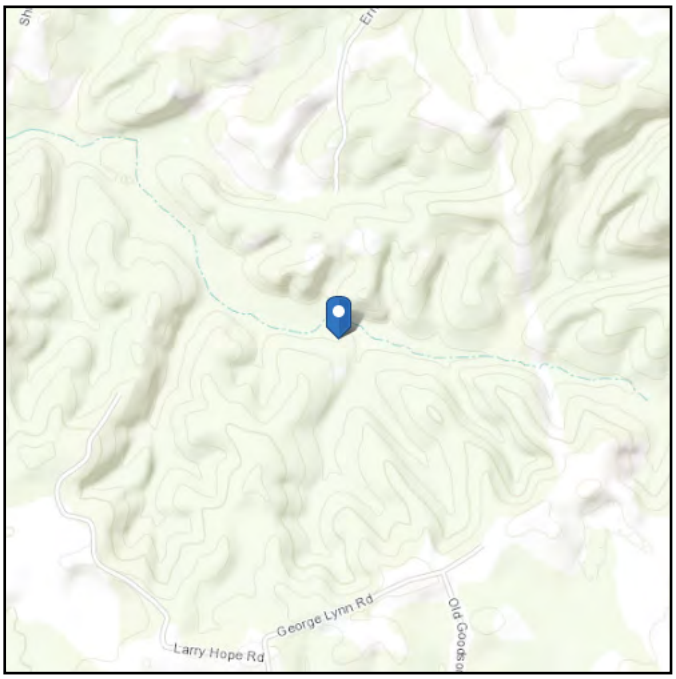
Seismic Hazard Mapping

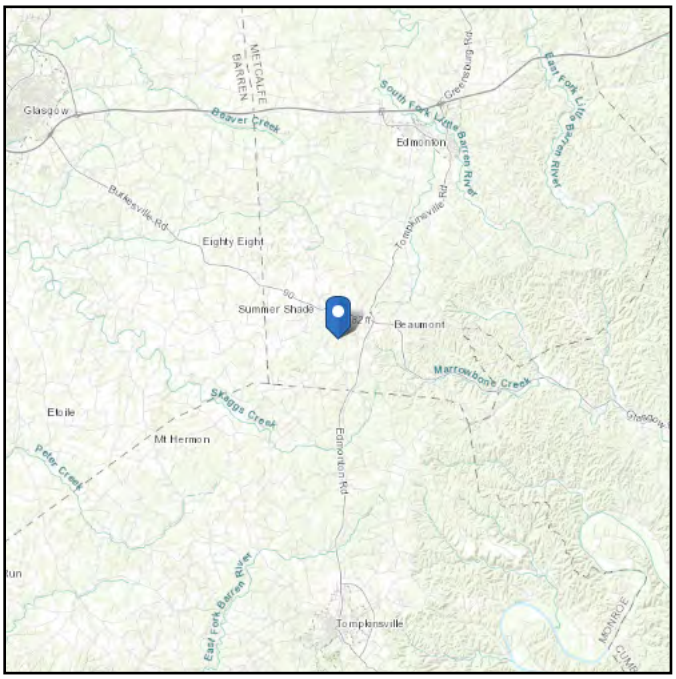
ASCE Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: D - Stiff Soil

Latitude: 36.866582
Longitude: -85.689916
Elevation: 874.5274861147999 ft (NAVD 88)





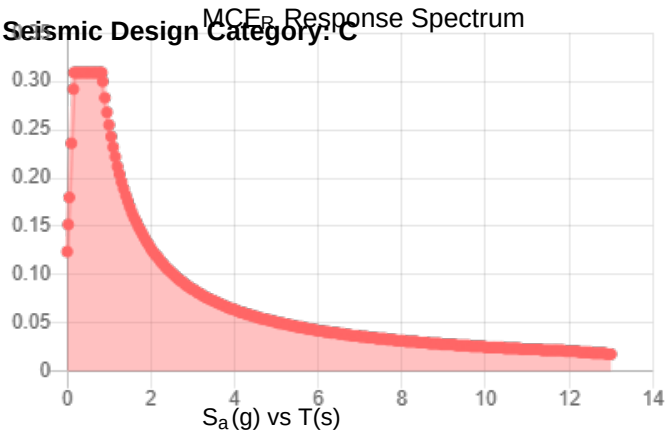
Seismic

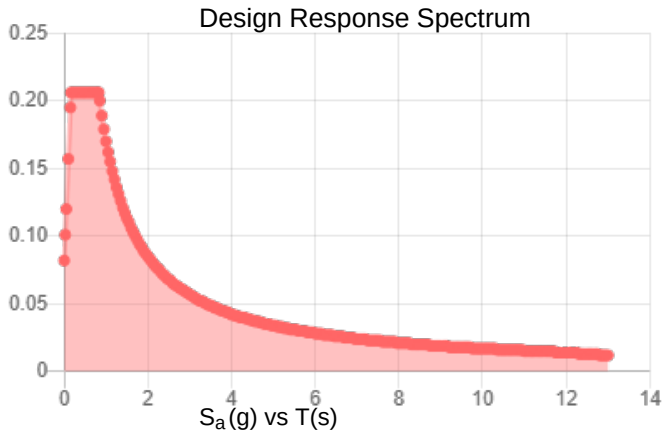
Site Soil Class: D - Stiff Soil

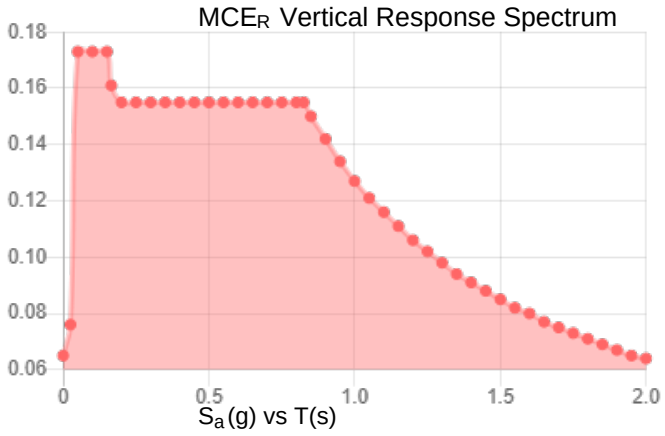
Results:

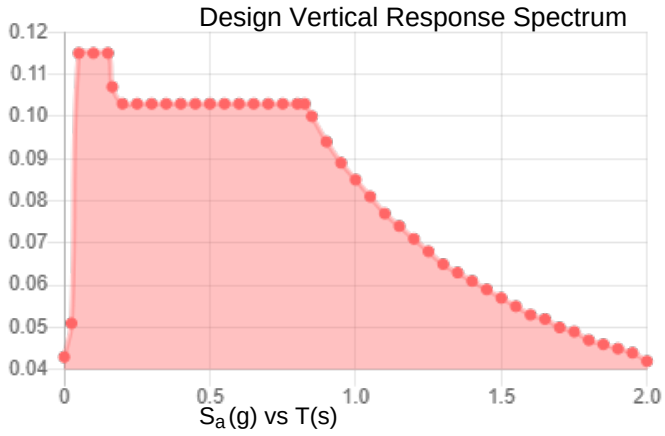
S_S :	0.193	S_{D1} :	0.17
S_1 :	0.107	T_L :	12
F_a :	1.6	PGA :	0.091
F_v :	2.386	PGA_M :	0.146
S_{MS} :	0.309	F_{PGA} :	1.6
S_{M1} :	0.255	I_e :	1
S_{DS} :	0.206	C_v :	0.7

Seismic Design Category: C









Data Accessed: **Thu Apr 17 2025**

Date Source:

USGS Seismic Design Maps based on ASCE/SEI 7-16 and ASCE/SEI 7-16 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-16 Ch. 21 are available from USGS.

The ASCE Hazard Tool is provided for your convenience, for informational purposes only, and is provided “as is” and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

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Attachment H

NRCS Mapping

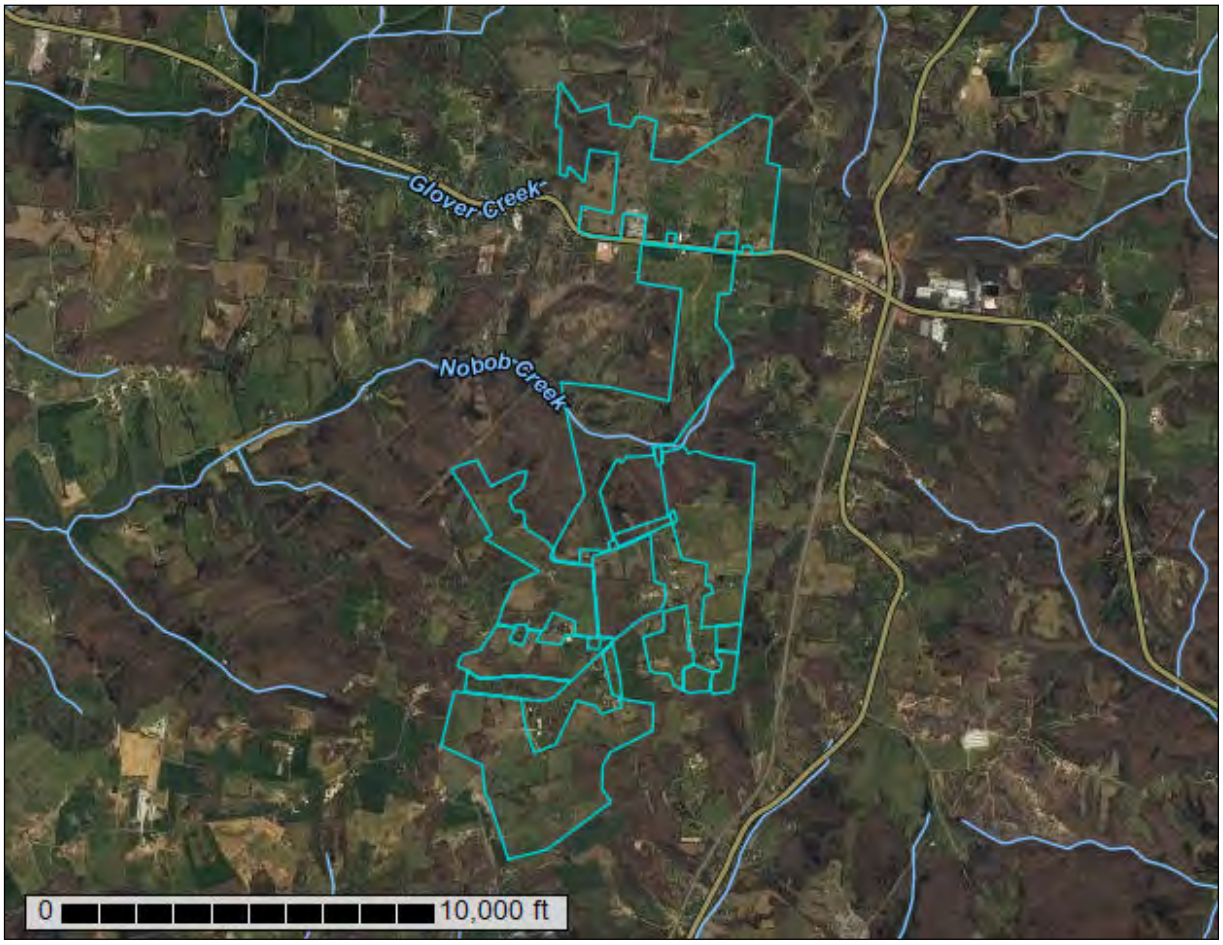
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Metcalfe County, Kentucky, and Monroe County, Kentucky



May 9, 2025

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

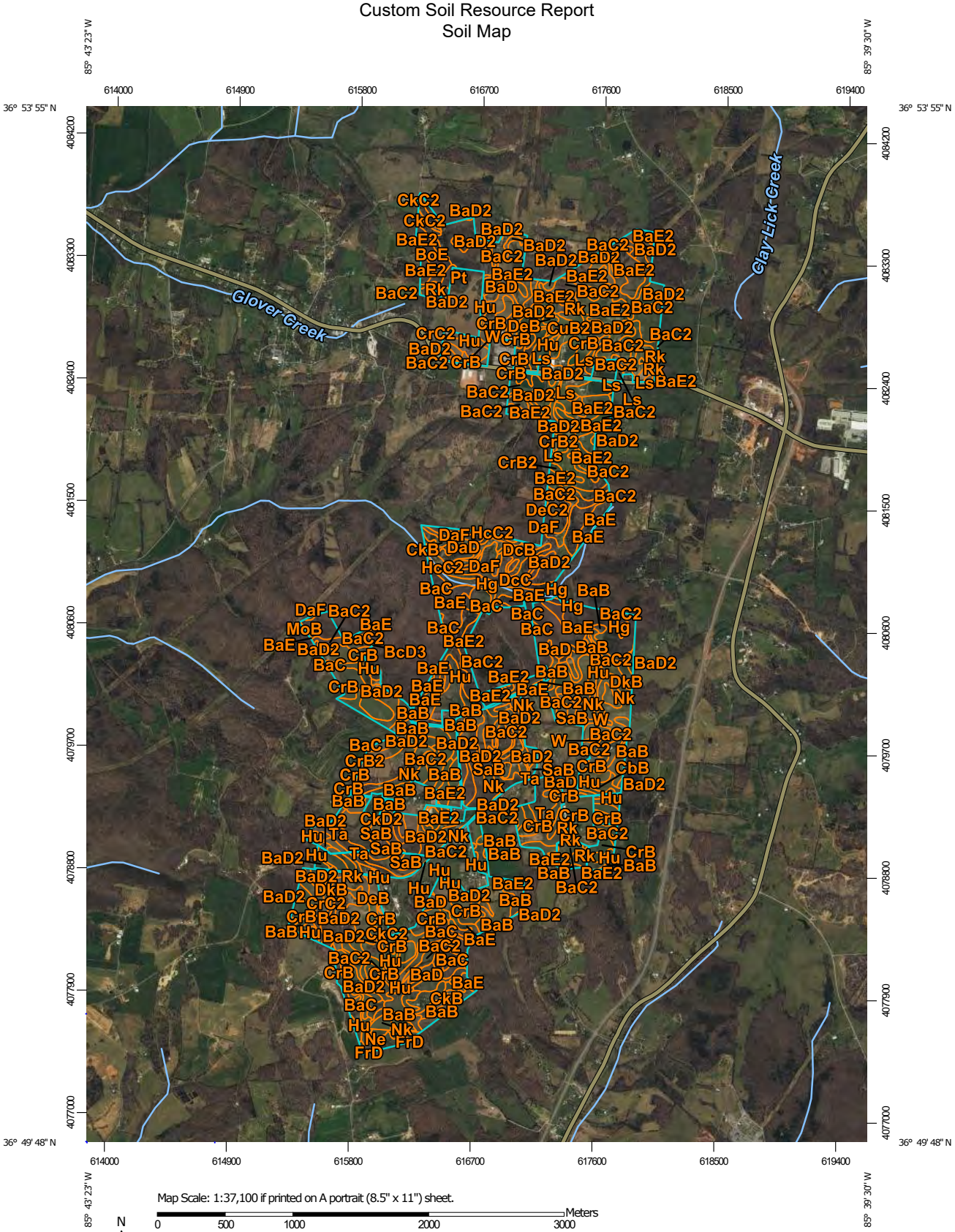
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at scales ranging from 1:15,800 to 1:20,000.

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

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

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

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

Soil Survey Area: Metcalfe County, Kentucky
Survey Area Data: Version 20, Aug 30, 2024

Soil Survey Area: Monroe County, Kentucky
Survey Area Data: Version 20, Aug 30, 2024

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

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

Date(s) aerial images were photographed: Apr 1, 2021—Oct 1, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BaB	Baxter gravelly silt loam, 2 to 6 percent slopes	93.6	5.8%
BaB2	Baxter gravelly silt loam, 2 to 6 percent slopes, eroded	1.8	0.1%
BaC	Baxter gravelly silt loam, 6 to 12 percent slopes	60.1	3.7%
BaC2	Baxter gravelly silt loam, 6 to 12 percent slopes, eroded	292.7	18.1%
BaD	Baxter gravelly silt loam, 12 to 20 percent slopes	20.4	1.3%
BaD2	Baxter gravelly silt loam, 12 to 20 percent slopes, eroded	226.1	14.0%
BaE	Baxter gravelly silt loam, 20 to 30 percent slopes	98.3	6.1%
BaE2	Baxter gravelly silt loam, 20 to 30 percent slopes, eroded	247.4	15.3%
BcC3	Baxter cherty silty clay loam, 6 to 12 percent slopes, severely eroded	5.0	0.3%
BcD3	Baxter cherty silty clay loam, 12 to 20 percent slopes, severely eroded	8.1	0.5%
BcE3	Baxter cherty silty clay loam, 20 to 30 percent slopes, severely eroded	2.7	0.2%
BoD	Bodine cherty silt loam, 12 to 20 percent slopes	3.2	0.2%
BoE	Bodine cherty silt loam, 20 to 35 percent slopes	8.8	0.5%
CbB	Captina silt loam, 2 to 6 percent slopes	6.1	0.4%
CkB	Clarksville cherty silt loam, 2 to 6 percent slopes	17.6	1.1%
CkC2	Clarksville cherty silt loam, 6 to 12 percent slopes, eroded	35.6	2.2%
CkD2	Clarksville cherty silt loam, 12 to 20 percent slopes, eroded	6.9	0.4%
CkE2	Clarksville cherty silt loam, 20 to 30 percent slopes, eroded	9.3	0.6%
CrB	Crider silt loam, 2 to 6 percent slopes	98.2	6.1%
CrB2	Crider silt loam, 2 to 6 percent slopes, eroded	5.2	0.3%
CrC2	Crider silt loam, 6 to 12 percent slopes, eroded	12.1	0.7%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CuB2	Cumberland cherty silt loam, 2 to 6 percent slopes, eroded (frederick)	1.0	0.1%
DaD	Dandridge and Westmoreland shaly silt loams, 12 to 20 percent slopes (dandridge, garmon)	11.2	0.7%
DaF	Dandridge and Westmoreland shaly silt loams, 20 to 50 percent slopes (dandridge, garmon)	34.8	2.2%
DcB	Dandridge and Westmoreland silt loams, 2 to 6 percent slopes (dandridge, garmon)	2.3	0.1%
DcC	Dandridge and Westmoreland silt loams, 6 to 12 percent slopes (dandridge, garmon)	4.3	0.3%
DeB	Dewey silt loam, 2 to 6 percent slopes	13.8	0.9%
DeC2	Dewey silt loam, 6 to 12 percent slopes, eroded	0.2	0.0%
DkB	Dickson silt loam, 2 to 6 percent slopes	16.0	1.0%
HcB	Humphreys cherty silt loam, 2 to 6 percent slopes	1.5	0.1%
HcC2	Humphreys cherty silt loam, 6 to 12 percent slopes, eroded	5.5	0.3%
Hg	Huntington gravelly silt loam (sensabaugh)	22.0	1.4%
Hu	Huntington silt loam	50.4	3.1%
Ls	Lindside silt loam	20.9	1.3%
MoB	Mountview silt loam, 2 to 6 percent slopes	0.3	0.0%
Nk	Newark silt loam	74.1	4.6%
PmB	Pembroke silt loam, 2 to 6 percent slopes	9.2	0.6%
Pt	Pits, quarries	2.3	0.1%
Rk	Rock land (rock outcrop)	14.4	0.9%
SaB	Sango silt loam, 2 to 6 percent slopes	35.2	2.2%
Ta	Taft silt loam	22.4	1.4%
W	Water	2.6	0.2%
Subtotals for Soil Survey Area		**1,603.9**	**99.2%**
Totals for Area of Interest		**1,617.5**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
FrD	Frederick cherty silt loam, 12 to 20 percent slopes	4.7	0.3%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Hu	Huntington silt loam	1.0	0.1%
Ne	Newark silt loam	6.3	0.4%
TrC	Trimble cherty silt loam, 6 to 12 percent slopes	1.6	0.1%
Subtotals for Soil Survey Area		**13.5**	**0.8%**
Totals for Area of Interest		**1,617.5**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Metcalfe County, Kentucky

BaB—Baxter gravelly silt loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 2xv1x
Elevation: 420 to 1,140 feet
Mean annual precipitation: 39 to 60 inches
Mean annual air temperature: 45 to 69 degrees F
Frost-free period: 157 to 215 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Baxter and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Baxter

Setting

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey residuum weathered from cherty limestone

Typical profile

Ap - 0 to 9 inches: gravelly silt loam
Bt1 - 9 to 16 inches: gravelly silty clay loam
Bt2 - 16 to 75 inches: gravelly clay
C - 75 to 98 inches: gravelly clay

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F122XY001KY - Deep Well Drained Cherty Uplands
Hydric soil rating: No

Minor Components

Crider

Percent of map unit: 8 percent

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Caneyville
Percent of map unit: 4 percent
Landform: Hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Vertrees
Percent of map unit: 2 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Hammack
Percent of map unit: 1 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

BaB2—Baxter gravelly silt loam, 2 to 6 percent slopes, eroded

Map Unit Setting
National map unit symbol: 2xv1y
Elevation: 590 to 1,130 feet
Mean annual precipitation: 42 to 58 inches
Mean annual air temperature: 46 to 59 degrees F
Frost-free period: 161 to 199 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Baxter and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Baxter

Setting

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey residuum weathered from cherty limestone

Typical profile

Ap - 0 to 4 inches: gravelly silt loam
Bt1 - 4 to 10 inches: gravelly silty clay loam
Bt2 - 10 to 70 inches: gravelly clay
C - 70 to 98 inches: gravelly clay

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F122XY001KY - Deep Well Drained Cherty Uplands
Hydric soil rating: No

Minor Components

Crider

Percent of map unit: 8 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Caneyville

Percent of map unit: 4 percent
Landform: Hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Vertrees

Percent of map unit: 2 percent

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Hammack

Percent of map unit: 1 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

BaC—Baxter gravelly silt loam, 6 to 12 percent slopes

Map Unit Setting

National map unit symbol: 2xv1z
Elevation: 410 to 1,160 feet
Mean annual precipitation: 42 to 59 inches
Mean annual air temperature: 45 to 69 degrees F
Frost-free period: 161 to 215 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Baxter and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Baxter

Setting

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey residuum weathered from cherty limestone

Typical profile

Ap - 0 to 9 inches: gravelly silt loam
Bt1 - 9 to 16 inches: gravelly silty clay loam
Bt2 - 16 to 75 inches: gravelly clay
C - 75 to 98 inches: gravelly clay

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained

Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F122XY001KY - Deep Well Drained Cherty Uplands
Hydric soil rating: No

Minor Components

Crider

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Caneyville

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Vertrees

Percent of map unit: 3 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Hammack

Percent of map unit: 2 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

BaC2—Baxter gravelly silt loam, 6 to 12 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2xv20
Elevation: 480 to 1,170 feet
Mean annual precipitation: 49 to 53 inches
Mean annual air temperature: 55 to 59 degrees F
Frost-free period: 157 to 207 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Baxter and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Baxter

Setting

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey residuum weathered from cherty limestone

Typical profile

Ap - 0 to 4 inches: gravelly silt loam
Bt1 - 4 to 10 inches: gravelly silty clay loam
Bt2 - 10 to 70 inches: gravelly clay
C - 70 to 98 inches: gravelly clay

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F122XY001KY - Deep Well Drained Cherty Uplands
Hydric soil rating: No

Minor Components

Caneyville

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Crider

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Vertrees

Percent of map unit: 3 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Hammack

Percent of map unit: 2 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

BaD—Baxter gravelly silt loam, 12 to 20 percent slopes

Map Unit Setting

National map unit symbol: 2xv21
Elevation: 410 to 1,140 feet
Mean annual precipitation: 49 to 53 inches
Mean annual air temperature: 55 to 59 degrees F
Frost-free period: 157 to 215 days
Farmland classification: Not prime farmland

Map Unit Composition

Baxter and similar soils: 85 percent

Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Baxter

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Clayey residuum weathered from cherty limestone

Typical profile

Ap - 0 to 9 inches: gravelly silt loam
Bt1 - 9 to 16 inches: gravelly silty clay loam
Bt2 - 16 to 75 inches: gravelly clay
C - 75 to 98 inches: gravelly clay

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: F122XY001KY - Deep Well Drained Cherty Uplands
Hydric soil rating: No

Minor Components

Caneyville

Percent of map unit: 6 percent
Landform: Hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Vertrees

Percent of map unit: 4 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Crider

Percent of map unit: 4 percent
Landform: Hills
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Hammack

Percent of map unit: 1 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

BaD2—Baxter gravelly silt loam, 12 to 20 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2xv22
Elevation: 490 to 1,180 feet
Mean annual precipitation: 51 to 54 inches
Mean annual air temperature: 55 to 59 degrees F
Frost-free period: 157 to 207 days
Farmland classification: Not prime farmland

Map Unit Composition

Baxter and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Baxter

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Clayey residuum weathered from cherty limestone

Typical profile

Ap - 0 to 4 inches: gravelly silt loam
Bt1 - 4 to 10 inches: gravelly silty clay loam
Bt2 - 10 to 70 inches: gravelly clay
C - 70 to 98 inches: gravelly clay

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: F122XY001KY - Deep Well Drained Cherty Uplands
Hydric soil rating: No

Minor Components

Caneyville

Percent of map unit: 6 percent
Landform: Hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Vertrees

Percent of map unit: 4 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Crider

Percent of map unit: 4 percent
Landform: Hills
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Hammack

Percent of map unit: 1 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

BaE—Baxter gravelly silt loam, 20 to 30 percent slopes

Map Unit Setting

National map unit symbol: 2xv23
Elevation: 410 to 1,130 feet
Mean annual precipitation: 51 to 53 inches
Mean annual air temperature: 55 to 59 degrees F
Frost-free period: 157 to 215 days
Farmland classification: Not prime farmland

Map Unit Composition

Baxter and similar soils: 88 percent
Minor components: 12 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Baxter

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Clayey residuum weathered from cherty limestone

Typical profile

Ap - 0 to 9 inches: gravelly silt loam
Bt1 - 9 to 16 inches: gravelly silty clay loam
Bt2 - 16 to 75 inches: gravelly clay
C - 75 to 98 inches: gravelly clay

Properties and qualities

Slope: 20 to 30 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: F122XY001KY - Deep Well Drained Cherty Uplands
Hydric soil rating: No

Minor Components

Vertrees

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Caneyville

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Hammack

Percent of map unit: 1 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Crider

Percent of map unit: 1 percent
Landform: Hills
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

BaE2—Baxter gravelly silt loam, 20 to 30 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2xv24
Elevation: 490 to 1,180 feet
Mean annual precipitation: 51 to 53 inches
Mean annual air temperature: 55 to 59 degrees F
Frost-free period: 161 to 205 days
Farmland classification: Not prime farmland

Map Unit Composition

Baxter and similar soils: 88 percent

Minor components: 12 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Baxter

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Clayey residuum weathered from cherty limestone

Typical profile

Ap - 0 to 4 inches: gravelly silt loam
Bt1 - 4 to 10 inches: gravelly silty clay loam
Bt2 - 10 to 70 inches: gravelly clay
C - 70 to 98 inches: gravelly clay

Properties and qualities

Slope: 20 to 30 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: F122XY001KY - Deep Well Drained Cherty Uplands
Hydric soil rating: No

Minor Components

Vertrees

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Caneyville

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Hammack

Percent of map unit: 1 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Crider

Percent of map unit: 1 percent
Landform: Hills
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

BcC3—Baxter cherty silty clay loam, 6 to 12 percent slopes, severely eroded

Map Unit Setting

National map unit symbol: lg0s
Elevation: 580 to 1,060 feet
Mean annual precipitation: 42 to 58 inches
Mean annual air temperature: 46 to 59 degrees F
Frost-free period: 161 to 199 days
Farmland classification: Not prime farmland

Map Unit Composition

Baxter, severely eroded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Baxter, Severely Eroded

Setting

Landform: Ridges
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey residuum weathered from cherty limestone

Typical profile

H1 - 0 to 6 inches: gravelly silty clay loam
H2 - 6 to 10 inches: gravelly silty clay loam
H3 - 10 to 40 inches: gravelly silty clay
H4 - 40 to 70 inches: gravelly clay

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: F122XY001KY - Deep Well Drained Cherty Uplands
Hydric soil rating: No

Minor Components

Bodine

Percent of map unit: 4 percent
Hydric soil rating: No

Dickson

Percent of map unit: 3 percent
Hydric soil rating: No

Frederick

Percent of map unit: 3 percent
Hydric soil rating: No

BcD3—Baxter cherty silty clay loam, 12 to 20 percent slopes, severely eroded

Map Unit Setting

National map unit symbol: lg0t
Elevation: 650 to 1,070 feet
Mean annual precipitation: 42 to 58 inches
Mean annual air temperature: 46 to 59 degrees F
Frost-free period: 161 to 199 days
Farmland classification: Not prime farmland

Map Unit Composition

Baxter, severely eroded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Baxter, Severely Eroded

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey residuum weathered from cherty limestone

Typical profile

H1 - 0 to 6 inches: gravelly silty clay loam
H2 - 6 to 10 inches: gravelly silty clay loam
H3 - 10 to 40 inches: gravelly silty clay
H4 - 40 to 70 inches: gravelly clay

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: F122XY001KY - Deep Well Drained Cherty Uplands
Hydric soil rating: No

Minor Components

Bodine

Percent of map unit: 4 percent
Hydric soil rating: No

Dickson

Percent of map unit: 3 percent
Hydric soil rating: No

Frederick

Percent of map unit: 3 percent
Hydric soil rating: No

BcE3—Baxter cherty silty clay loam, 20 to 30 percent slopes, severely eroded

Map Unit Setting

National map unit symbol: lg0v
Elevation: 650 to 1,090 feet
Mean annual precipitation: 42 to 58 inches
Mean annual air temperature: 46 to 59 degrees F
Frost-free period: 161 to 199 days
Farmland classification: Not prime farmland

Map Unit Composition

Baxter, severely eroded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Baxter, Severely Eroded

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Clayey residuum weathered from cherty limestone

Typical profile

H1 - 0 to 6 inches: gravelly silty clay loam
H2 - 6 to 10 inches: gravelly silty clay loam
H3 - 10 to 40 inches: gravelly silty clay
H4 - 40 to 70 inches: gravelly clay

Properties and qualities

Slope: 20 to 30 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: F122XY001KY - Deep Well Drained Cherty Uplands
Hydric soil rating: No

Minor Components

Caneyville

Percent of map unit: 2 percent
Hydric soil rating: No

Dandridge

Percent of map unit: 2 percent
Hydric soil rating: No

Dewey

Percent of map unit: 2 percent
Hydric soil rating: No

Frederick

Percent of map unit: 2 percent
Hydric soil rating: No

Garmon

Percent of map unit: 2 percent
Hydric soil rating: No

BoD—Bodine cherty silt loam, 12 to 20 percent slopes

Map Unit Setting

National map unit symbol: lg10
Elevation: 610 to 1,040 feet
Mean annual precipitation: 42 to 58 inches
Mean annual air temperature: 46 to 59 degrees F
Frost-free period: 161 to 199 days
Farmland classification: Not prime farmland

Map Unit Composition

Bodine and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bodine

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Loamy-skeletal colluvium derived from cherty limestone

Typical profile

H1 - 0 to 7 inches: gravelly silt loam
H2 - 7 to 23 inches: gravelly silty clay loam
H3 - 23 to 72 inches: gravelly silty clay loam

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Ecological site: F122XY008KY - Loamy Skeletal Uplands
Hydric soil rating: No

Minor Components

Baxter

Percent of map unit: 3 percent
Hydric soil rating: No

Mountview

Percent of map unit: 3 percent
Hydric soil rating: No

Garmon

Percent of map unit: 2 percent
Hydric soil rating: No

Garmon

Percent of map unit: 2 percent
Hydric soil rating: No

BoE—Bodine cherty silt loam, 20 to 35 percent slopes

Map Unit Setting

National map unit symbol: lg11
Elevation: 560 to 1,080 feet
Mean annual precipitation: 42 to 58 inches
Mean annual air temperature: 46 to 59 degrees F
Frost-free period: 161 to 199 days
Farmland classification: Not prime farmland

Map Unit Composition

Bodine and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bodine

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Loamy-skeletal colluvium derived from cherty limestone

Typical profile

H1 - 0 to 7 inches: gravelly silt loam
H2 - 7 to 23 inches: gravelly silty clay loam
H3 - 23 to 72 inches: gravelly silty clay loam

Properties and qualities

Slope: 20 to 35 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Ecological site: F122XY008KY - Loamy Skeletal Uplands
Hydric soil rating: No

Minor Components

Baxter

Percent of map unit: 3 percent
Hydric soil rating: No

Mountview

Percent of map unit: 3 percent
Hydric soil rating: No

Garmon

Percent of map unit: 2 percent
Hydric soil rating: No

Garmon

Percent of map unit: 2 percent
Hydric soil rating: No

CbB—Captina silt loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: lg16
Elevation: 590 to 1,090 feet
Mean annual precipitation: 42 to 58 inches
Mean annual air temperature: 46 to 59 degrees F
Frost-free period: 161 to 199 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Captina and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Captina

Setting

Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Old fine-silty alluvium derived from limestone, sandstone, and shale

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 24 inches: silt loam
H3 - 24 to 42 inches: silty clay loam
H4 - 42 to 64 inches: gravelly silty clay loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: 22 to 27 inches to fragipan
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 19 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Ecological site: F122XY010KY - Moderately Well Drained Fragipan Terraces
Hydric soil rating: No

Minor Components

Elk

Percent of map unit: 4 percent
Landform: Stream terraces
Hydric soil rating: No

Captina

Percent of map unit: 3 percent
Hydric soil rating: No

Taft

Percent of map unit: 3 percent
Hydric soil rating: No

CkB—Clarksville cherty silt loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: lg1f
Elevation: 630 to 1,050 feet
Mean annual precipitation: 42 to 58 inches
Mean annual air temperature: 46 to 59 degrees F
Frost-free period: 161 to 199 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Clarksville and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Clarksville

Setting

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy-skeletal colluvium derived from cherty limestone over clayey residuum weathered from cherty limestone

Typical profile

H1 - 0 to 7 inches: gravelly silt loam
H2 - 7 to 38 inches: gravelly silty clay loam
H3 - 38 to 68 inches: gravelly silty clay loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F122XY008KY - Loamy Skeletal Uplands
Hydric soil rating: No

Minor Components

Crider

Percent of map unit: 4 percent
Hydric soil rating: No

Baxter

Percent of map unit: 3 percent
Hydric soil rating: No

Bodine

Percent of map unit: 3 percent
Hydric soil rating: No

CkC2—Clarksville cherty silt loam, 6 to 12 percent slopes, eroded

Map Unit Setting

National map unit symbol: lg1h
Elevation: 620 to 1,110 feet
Mean annual precipitation: 42 to 58 inches
Mean annual air temperature: 46 to 59 degrees F
Frost-free period: 161 to 199 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Clarksville and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Clarksville

Setting

Landform: Ridges
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

Parent material: Loamy-skeletal colluvium derived from cherty limestone over clayey residuum weathered from cherty limestone

Typical profile

H1 - 0 to 5 inches: gravelly silt loam
H2 - 5 to 36 inches: gravelly silty clay loam
H3 - 36 to 66 inches: gravelly silty clay loam

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F122XY008KY - Loamy Skeletal Uplands
Hydric soil rating: No

Minor Components

Crider

Percent of map unit: 4 percent
Hydric soil rating: No

Baxter

Percent of map unit: 3 percent
Hydric soil rating: No

Bodine

Percent of map unit: 3 percent
Hydric soil rating: No

CkD2—Clarksville cherty silt loam, 12 to 20 percent slopes, eroded

Map Unit Setting

National map unit symbol: lg1j
Elevation: 570 to 1,110 feet
Mean annual precipitation: 42 to 58 inches
Mean annual air temperature: 46 to 59 degrees F
Frost-free period: 161 to 199 days
Farmland classification: Not prime farmland

Map Unit Composition

Clarksville and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Clarksville

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Loamy-skeletal colluvium derived from cherty limestone over clayey residuum weathered from cherty limestone

Typical profile

H1 - 0 to 5 inches: gravelly silt loam
H2 - 5 to 36 inches: gravelly silty clay loam
H3 - 36 to 66 inches: gravelly silty clay loam

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: F122XY008KY - Loamy Skeletal Uplands
Hydric soil rating: No

Minor Components

Crider

Percent of map unit: 4 percent
Hydric soil rating: No

Baxter

Percent of map unit: 3 percent
Hydric soil rating: No

Bodine

Percent of map unit: 3 percent
Hydric soil rating: No

CkE2—Clarksville cherty silt loam, 20 to 30 percent slopes, eroded

Map Unit Setting

National map unit symbol: lg1k
Elevation: 660 to 1,070 feet
Mean annual precipitation: 42 to 58 inches
Mean annual air temperature: 46 to 59 degrees F
Frost-free period: 161 to 199 days
Farmland classification: Not prime farmland

Map Unit Composition

Clarksville and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Clarksville

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Loamy-skeletal colluvium derived from cherty limestone over clayey residuum weathered from cherty limestone

Typical profile

H1 - 0 to 5 inches: gravelly silt loam
H2 - 5 to 36 inches: gravelly silty clay loam
H3 - 36 to 66 inches: gravelly silty clay loam

Properties and qualities

Slope: 20 to 30 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: F122XY008KY - Loamy Skeletal Uplands
Hydric soil rating: No

Minor Components

Dewey
Percent of map unit: 4 percent
Hydric soil rating: No

Baxter
Percent of map unit: 3 percent
Hydric soil rating: No

Bodine
Percent of map unit: 3 percent
Hydric soil rating: No

CrB—Crider silt loam, 2 to 6 percent slopes

Map Unit Setting
National map unit symbol: 2v5b2
Elevation: 350 to 1,340 feet
Mean annual precipitation: 39 to 60 inches
Mean annual air temperature: 44 to 69 degrees F
Frost-free period: 154 to 219 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Crider and similar soils: 88 percent
Minor components: 12 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Crider

Setting
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over clayey residuum weathered from limestone

Typical profile
Ap - 0 to 8 inches: silt loam
Bt1 - 8 to 38 inches: silt loam
2Bt2 - 38 to 100 inches: clay
2R - 100 to 110 inches: bedrock

Properties and qualities
Slope: 2 to 6 percent
Depth to restrictive feature: 59 to 157 inches to lithic bedrock
Drainage class: Well drained

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F122XY004KY - Loess Veneered Uplands
Hydric soil rating: No

Minor Components

Baxter

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Bedford

Percent of map unit: 4 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Pembroke

Percent of map unit: 3 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

CrB2—Crider silt loam, 2 to 6 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2v58v
Elevation: 360 to 1,110 feet
Mean annual precipitation: 39 to 60 inches
Mean annual air temperature: 44 to 69 degrees F
Frost-free period: 154 to 219 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Crider and similar soils: 88 percent
Minor components: 12 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Crider

Setting

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over clayey residuum weathered from limestone

Typical profile

Ap - 0 to 5 inches: silt loam
Bt1 - 5 to 38 inches: silt loam
2Bt2 - 38 to 100 inches: clay
2R - 100 to 110 inches: bedrock

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: 59 to 157 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F122XY004KY - Loess Veneered Uplands
Hydric soil rating: No

Minor Components

Baxter

Percent of map unit: 7 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Bedford

Percent of map unit: 4 percent
Landform: Ridges
Landform position (two-dimensional): Summit

Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Pembroke

Percent of map unit: 1 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

CrC2—Crider silt loam, 6 to 12 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2v5b3
Elevation: 370 to 1,120 feet
Mean annual precipitation: 39 to 60 inches
Mean annual air temperature: 44 to 69 degrees F
Frost-free period: 154 to 219 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Crider and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Crider

Setting

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over clayey residuum weathered from limestone

Typical profile

Ap - 0 to 5 inches: silt loam
Bt1 - 5 to 38 inches: silt loam
2Bt2 - 38 to 100 inches: clay
2R - 100 to 110 inches: bedrock

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 59 to 157 inches to lithic bedrock
Drainage class: Well drained

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F122XY004KY - Loess Veneered Uplands
Hydric soil rating: No

Minor Components

Baxter

Percent of map unit: 7 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Pembroke

Percent of map unit: 3 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Bedford

Percent of map unit: 3 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Nolin, occasionally flooded

Percent of map unit: 2 percent
Landform: Sinkholes
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: No

CuB2—Cumberland cherty silt loam, 2 to 6 percent slopes, eroded (frederick)

Map Unit Setting

National map unit symbol: lg1q
Elevation: 640 to 1,040 feet
Mean annual precipitation: 42 to 58 inches
Mean annual air temperature: 46 to 59 degrees F
Frost-free period: 161 to 199 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Frederick and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Frederick

Setting

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Clayey residuum weathered from limestone, sandstone, and shale

Typical profile

H1 - 0 to 7 inches: gravelly silt loam
H2 - 7 to 11 inches: gravelly silty clay loam
H3 - 11 to 46 inches: gravelly silty clay
H4 - 46 to 62 inches: gravelly clay

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F122XY001KY - Deep Well Drained Cherty Uplands

Hydric soil rating: No

Minor Components

Baxter
Percent of map unit: 3 percent
Hydric soil rating: No

Pembroke
Percent of map unit: 3 percent
Hydric soil rating: No

Crider
Percent of map unit: 2 percent
Hydric soil rating: No

Humphreys
Percent of map unit: 2 percent
Hydric soil rating: No

DaD—Dandridge and Westmoreland shaly silt loams, 12 to 20 percent slopes (dandridge, garmon)

Map Unit Setting
National map unit symbol: lg1v
Elevation: 590 to 1,060 feet
Mean annual precipitation: 42 to 58 inches
Mean annual air temperature: 46 to 59 degrees F
Frost-free period: 161 to 199 days
Farmland classification: Not prime farmland

Map Unit Composition
Dandridge and similar soils: 46 percent
Garmon and similar soils: 44 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dandridge

Setting
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey-skeletal residuum weathered from calcareous shale and/or limestone

Typical profile
H1 - 0 to 7 inches: channery silt loam
H2 - 7 to 19 inches: channery silty clay loam
Cr - 19 to 29 inches: bedrock

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Drainage class: Excessively drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: F122XY019KY - Well Drained Shale Siltstone Uplands
Hydric soil rating: No

Description of Garmon

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Fine-loamy residuum weathered from limestone and siltstone and/or calcareous shale

Typical profile

H1 - 0 to 7 inches: channery silt loam
H2 - 7 to 13 inches: channery silty clay loam
H3 - 13 to 25 inches: channery silty clay loam
R - 25 to 35 inches: bedrock

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: F122XY020TN - Cherty Limestone Escarpment
Hydric soil rating: No

Minor Components

Baxter
Percent of map unit: 2 percent
Hydric soil rating: No

Bodine
Percent of map unit: 2 percent
Hydric soil rating: No

Clarksville
Percent of map unit: 2 percent
Hydric soil rating: No

Dickson
Percent of map unit: 2 percent
Hydric soil rating: No

Mountview
Percent of map unit: 2 percent
Hydric soil rating: No

DaF—Dandridge and Westmoreland shaly silt loams, 20 to 50 percent slopes (dandridge, garmon)

Map Unit Setting
National map unit symbol: lg1w
Elevation: 570 to 1,140 feet
Mean annual precipitation: 42 to 58 inches
Mean annual air temperature: 46 to 59 degrees F
Frost-free period: 161 to 199 days
Farmland classification: Not prime farmland

Map Unit Composition
Dandridge and similar soils: 46 percent
Garmon and similar soils: 44 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dandridge

Setting
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Clayey-skeletal residuum weathered from calcareous shale and/or limestone

Typical profile

H1 - 0 to 7 inches: channery silt loam
H2 - 7 to 19 inches: channery silty clay loam
Cr - 19 to 29 inches: bedrock

Properties and qualities

Slope: 20 to 50 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Drainage class: Excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: F122XY019KY - Well Drained Shale Siltstone Uplands
Hydric soil rating: No

Description of Garmon

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Fine-loamy residuum weathered from limestone and siltstone and/or calcareous shale

Typical profile

H1 - 0 to 7 inches: channery silt loam
H2 - 7 to 13 inches: channery silty clay loam
H3 - 13 to 25 inches: channery silty clay loam
R - 25 to 35 inches: bedrock

Properties and qualities

Slope: 20 to 50 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B

Ecological site: F122XY020TN - Cherty Limestone Escarpment
Hydric soil rating: No

Minor Components

Baxter
Percent of map unit: 2 percent
Hydric soil rating: No

Bodine
Percent of map unit: 2 percent
Hydric soil rating: No

Clarksville
Percent of map unit: 2 percent
Hydric soil rating: No

Dickson
Percent of map unit: 2 percent
Hydric soil rating: No

Mountview
Percent of map unit: 2 percent
Hydric soil rating: No

DcB—Dandridge and Westmoreland silt loams, 2 to 6 percent slopes (dandridge, garmon)

Map Unit Setting
National map unit symbol: lg1z
Elevation: 610 to 1,040 feet
Mean annual precipitation: 42 to 58 inches
Mean annual air temperature: 46 to 59 degrees F
Frost-free period: 161 to 199 days
Farmland classification: Not prime farmland

Map Unit Composition
Dandridge and similar soils: 46 percent
Garmon and similar soils: 44 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dandridge

Setting
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear

Parent material: Clayey-skeletal residuum weathered from calcareous shale and/or limestone

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 19 inches: channery silty clay loam
Cr - 19 to 29 inches: bedrock

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Drainage class: Excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Ecological site: F122XY019KY - Well Drained Shale Siltstone Uplands
Hydric soil rating: No

Description of Garmon

Setting

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Fine-loamy residuum weathered from limestone and siltstone and/or calcareous shale

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 13 inches: channery silty clay loam
H3 - 13 to 25 inches: channery silty clay loam
R - 25 to 35 inches: bedrock

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F122XY020TN - Cherty Limestone Escarpment
Hydric soil rating: No

Minor Components

Baxter
Percent of map unit: 2 percent
Hydric soil rating: No

Bodine
Percent of map unit: 2 percent
Hydric soil rating: No

Clarksville
Percent of map unit: 2 percent
Hydric soil rating: No

Dickson
Percent of map unit: 2 percent
Hydric soil rating: No

Mountview
Percent of map unit: 2 percent
Hydric soil rating: No

DcC—Dandridge and Westmoreland silt loams, 6 to 12 percent slopes (dandridge, garmon)

Map Unit Setting
National map unit symbol: lg20
Elevation: 630 to 1,090 feet
Mean annual precipitation: 42 to 58 inches
Mean annual air temperature: 46 to 59 degrees F
Frost-free period: 161 to 199 days
Farmland classification: Not prime farmland

Map Unit Composition
Dandridge and similar soils: 46 percent
Garmon and similar soils: 44 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dandridge

Setting
Landform: Ridges
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope

Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey-skeletal residuum weathered from calcareous shale and/or limestone

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 19 inches: channery silty clay loam
Cr - 19 to 29 inches: bedrock

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Drainage class: Excessively drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: F122XY019KY - Well Drained Shale Siltstone Uplands
Hydric soil rating: No

Description of Garmon

Setting

Landform: Hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Fine-loamy residuum weathered from limestone and siltstone and/or calcareous shale

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 13 inches: channery silty clay loam
H3 - 13 to 25 inches: channery silty clay loam
R - 25 to 35 inches: bedrock

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: F122XY020TN - Cherty Limestone Escarpment
Hydric soil rating: No

Minor Components

Baxter

Percent of map unit: 2 percent
Hydric soil rating: No

Bodine

Percent of map unit: 2 percent
Hydric soil rating: No

Clarksville

Percent of map unit: 2 percent
Hydric soil rating: No

Dickson

Percent of map unit: 2 percent
Hydric soil rating: No

Mountview

Percent of map unit: 2 percent
Hydric soil rating: No

DeB—Dewey silt loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: lg21
Elevation: 620 to 1,090 feet
Mean annual precipitation: 42 to 58 inches
Mean annual air temperature: 46 to 59 degrees F
Frost-free period: 161 to 199 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Dewey and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dewey

Setting

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve

Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Clayey residuum weathered from cherty limestone

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 21 inches: silty clay loam
H3 - 21 to 44 inches: silty clay
H4 - 44 to 62 inches: clay

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F122XY026TN - Clayey Limestone Terraces And Uplands
Hydric soil rating: No

Minor Components

Baxter

Percent of map unit: 3 percent
Hydric soil rating: No

Crider

Percent of map unit: 3 percent
Hydric soil rating: No

Christian

Percent of map unit: 2 percent
Hydric soil rating: No

Dickson

Percent of map unit: 2 percent
Hydric soil rating: No

DeC2—Dewey silt loam, 6 to 12 percent slopes, eroded

Map Unit Setting

National map unit symbol: lg22
Elevation: 620 to 1,050 feet

Mean annual precipitation: 42 to 58 inches
Mean annual air temperature: 46 to 59 degrees F
Frost-free period: 161 to 199 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Dewey and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dewey

Setting

Landform: Ridges
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey residuum weathered from cherty limestone

Typical profile

H1 - 0 to 6 inches: silt loam
H2 - 6 to 19 inches: silty clay loam
H3 - 19 to 42 inches: silty clay
H4 - 42 to 62 inches: clay

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F122XY026TN - Clayey Limestone Terraces And Uplands
Hydric soil rating: No

Minor Components

Baxter

Percent of map unit: 3 percent
Hydric soil rating: No

Crider

Percent of map unit: 3 percent
Hydric soil rating: No

Christian

Percent of map unit: 2 percent
Hydric soil rating: No

Dickson
Percent of map unit: 2 percent
Hydric soil rating: No

DkB—Dickson silt loam, 2 to 6 percent slopes

Map Unit Setting
National map unit symbol: lg25
Elevation: 650 to 1,080 feet
Mean annual precipitation: 42 to 58 inches
Mean annual air temperature: 46 to 59 degrees F
Frost-free period: 161 to 199 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Dickson and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dickson

Setting
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over clayey residuum weathered from limestone

Typical profile
H1 - 0 to 7 inches: silt loam
H2 - 7 to 23 inches: silty clay loam
H3 - 23 to 34 inches: silt loam
H4 - 34 to 65 inches: gravelly silty clay loam

Properties and qualities
Slope: 2 to 6 percent
Depth to restrictive feature: 20 to 26 inches to fragipan
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.60 in/hr)
Depth to water table: About 19 to 23 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.4 inches)

Interpretive groups
Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Ecological site: F122XY023TN - Loess Veneered Thermic Uplands
Hydric soil rating: No

Minor Components

Baxter
Percent of map unit: 2 percent
Hydric soil rating: No

Crider
Percent of map unit: 2 percent
Hydric soil rating: No

Dewey
Percent of map unit: 2 percent
Hydric soil rating: No

Mountview
Percent of map unit: 2 percent
Hydric soil rating: No

Sango
Percent of map unit: 2 percent
Hydric soil rating: No

HcB—Humphreys cherty silt loam, 2 to 6 percent slopes

Map Unit Setting
National map unit symbol: lg2b
Elevation: 590 to 1,010 feet
Mean annual precipitation: 42 to 58 inches
Mean annual air temperature: 46 to 59 degrees F
Frost-free period: 161 to 199 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Humphreys, rarely flooded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Humphreys, Rarely Flooded

Setting
Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Fine-loamy alluvium and/or colluvium derived from limestone, sandstone, and shale

Typical profile

H1 - 0 to 8 inches: gravelly silt loam
H2 - 8 to 38 inches: gravelly silty clay loam
H3 - 38 to 62 inches: very gravelly clay loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: About 60 to 72 inches
Frequency of flooding: Rare
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: A
Ecological site: F122XY027TN - Loamy Terraces
Hydric soil rating: No

Minor Components

Otwell

Percent of map unit: 4 percent
Landform: Stream terraces
Hydric soil rating: No

Tarklin

Percent of map unit: 3 percent
Hydric soil rating: No

Taft

Percent of map unit: 3 percent
Hydric soil rating: No

HcC2—Humphreys cherty silt loam, 6 to 12 percent slopes, eroded

Map Unit Setting

National map unit symbol: lg2d
Elevation: 560 to 1,020 feet
Mean annual precipitation: 42 to 58 inches
Mean annual air temperature: 46 to 59 degrees F
Frost-free period: 161 to 199 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Humphreys and similar soils: 90 percent

Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Humphreys

Setting

Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Fine-loamy alluvium and/or colluvium derived from limestone, sandstone, and shale

Typical profile

H1 - 0 to 8 inches: gravelly silt loam
H2 - 8 to 38 inches: gravelly silty clay loam
H3 - 38 to 62 inches: very gravelly clay loam

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: About 60 to 72 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: A
Ecological site: F122XY027TN - Loamy Terraces
Hydric soil rating: No

Minor Components

Otwell

Percent of map unit: 4 percent
Landform: Stream terraces
Hydric soil rating: No

Tarklin

Percent of map unit: 3 percent
Hydric soil rating: No

Taft

Percent of map unit: 3 percent
Hydric soil rating: No

Hg—Huntington gravelly silt loam (sensabaugh)

Map Unit Setting

National map unit symbol: lg2f
Elevation: 600 to 1,060 feet
Mean annual precipitation: 42 to 58 inches
Mean annual air temperature: 46 to 59 degrees F
Frost-free period: 161 to 199 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Sensabaugh, occasionally flooded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sensabaugh, Occasionally Flooded

Setting

Landform: Flood plains
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Fine-loamy alluvium

Typical profile

H1 - 0 to 9 inches: gravelly loam
H2 - 9 to 23 inches: gravelly loam
H3 - 23 to 42 inches: gravelly clay loam
H4 - 42 to 62 inches: gravelly loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: About 48 to 72 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: A
Ecological site: F122XY014KY - Loamy Alluvial Headwaters
Hydric soil rating: No

Minor Components

Lindside
Percent of map unit: 3 percent
Landform: Flood plains
Hydric soil rating: No

Newark
Percent of map unit: 3 percent
Landform: Flood plains
Hydric soil rating: No

Elk
Percent of map unit: 2 percent
Landform: Stream terraces
Hydric soil rating: No

Huntington
Percent of map unit: 2 percent
Landform: Flood plains
Hydric soil rating: No

Hu—Huntington silt loam

Map Unit Setting
National map unit symbol: lg2g
Elevation: 570 to 1,100 feet
Mean annual precipitation: 42 to 58 inches
Mean annual air temperature: 46 to 59 degrees F
Frost-free period: 161 to 199 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Huntington, occasionally flooded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Huntington, Occasionally Flooded

Setting
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Fine-silty alluvium derived from limestone, sandstone, and shale

Typical profile
H1 - 0 to 22 inches: silt loam
H2 - 22 to 64 inches: silt loam

Properties and qualities
Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B
Ecological site: F122XY016KY - Riverbank Loamy Alluvium
Hydric soil rating: No

Minor Components

Lindside

Percent of map unit: 3 percent
Landform: Flood plains
Hydric soil rating: No

Newark

Percent of map unit: 3 percent
Landform: Flood plains
Hydric soil rating: No

Elk

Percent of map unit: 2 percent
Landform: Stream terraces
Hydric soil rating: No

Sensabaugh

Percent of map unit: 2 percent
Landform: Flood plains
Hydric soil rating: No

Ls—Lindside silt loam

Map Unit Setting

National map unit symbol: lg2l
Elevation: 620 to 1,080 feet
Mean annual precipitation: 42 to 58 inches
Mean annual air temperature: 46 to 59 degrees F
Frost-free period: 161 to 199 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Lindside, occasionally flooded, and similar soils: 90 percent

Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lindside, Occasionally Flooded

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Fine-silty alluvium derived from limestone

Typical profile

H1 - 0 to 10 inches: silt loam
H2 - 10 to 30 inches: silt loam
H3 - 30 to 62 inches: stratified gravelly sandy loam to silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C
Ecological site: F122XY016KY - Riverbank Loamy Alluvium
Hydric soil rating: No

Minor Components

Huntington

Percent of map unit: 4 percent
Landform: Flood plains
Hydric soil rating: No

Newark

Percent of map unit: 3 percent
Landform: Flood plains
Hydric soil rating: No

Sensabaugh

Percent of map unit: 3 percent
Landform: Flood plains
Hydric soil rating: No

MoB—Mountview silt loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: lg2n
Elevation: 620 to 1,080 feet
Mean annual precipitation: 42 to 58 inches
Mean annual air temperature: 46 to 59 degrees F
Frost-free period: 161 to 199 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Mountview and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mountview

Setting

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over clayey residuum weathered from cherty limestone

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 40 inches: silty clay loam
H3 - 40 to 66 inches: clay

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F122XY023TN - Loess Veneered Thermic Uplands
Hydric soil rating: No

Minor Components

Baxter
Percent of map unit: 2 percent
Hydric soil rating: No

Bodine
Percent of map unit: 2 percent
Hydric soil rating: No

Clarksville
Percent of map unit: 2 percent
Hydric soil rating: No

Dickson
Percent of map unit: 2 percent
Hydric soil rating: No

Crider
Percent of map unit: 1 percent
Hydric soil rating: No

Garmon
Percent of map unit: 1 percent
Hydric soil rating: No

Nk—Newark silt loam

Map Unit Setting

National map unit symbol: lg2r
Elevation: 600 to 1,090 feet
Mean annual precipitation: 42 to 58 inches
Mean annual air temperature: 46 to 59 degrees F
Frost-free period: 161 to 199 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Newark, occasionally flooded, and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Newark, Occasionally Flooded

Setting
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Fine-silty alluvium derived from limestone, sandstone, and shale

Typical profile
H1 - 0 to 8 inches: silt loam
H2 - 8 to 26 inches: silt loam

H3 - 26 to 62 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 12 to 18 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D
Ecological site: F122XY017KY - Moist Alluvium
Hydric soil rating: No

Minor Components

Melvin, occasionally flooded

Percent of map unit: 3 percent
Landform: Flood plains
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: Yes

Lindside

Percent of map unit: 2 percent
Landform: Flood plains
Hydric soil rating: No

PmB—Pembroke silt loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 2v5c1
Elevation: 290 to 1,290 feet
Mean annual precipitation: 39 to 60 inches
Mean annual air temperature: 45 to 69 degrees F
Frost-free period: 156 to 213 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Pembroke and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pembroke

Setting

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over clayey residuum weathered from limestone

Typical profile

Ap - 0 to 9 inches: silt loam
Bt1 - 9 to 18 inches: silt loam
2Bt2 - 18 to 62 inches: silty clay loam
2Bt3 - 62 to 79 inches: silty clay

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F122XY004KY - Loess Veneered Uplands
Hydric soil rating: No

Minor Components

Crider

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Bedford

Percent of map unit: 4 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Nolin, occasionally flooded

Percent of map unit: 1 percent
Landform: Sinkholes
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: No

Baxter

Percent of map unit: 0 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Pt—Pits, quarries

Map Unit Setting

National map unit symbol: 1jy1p
Elevation: 840 to 1,090 feet
Mean annual precipitation: 42 to 58 inches
Mean annual air temperature: 46 to 59 degrees F
Frost-free period: 161 to 199 days
Farmland classification: Not prime farmland

Map Unit Composition

Pits, quarry: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pits, Quarry

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

Rk—Rock land (rock outcrop)

Map Unit Setting

National map unit symbol: lg2y
Elevation: 560 to 1,120 feet
Mean annual precipitation: 42 to 58 inches
Mean annual air temperature: 46 to 59 degrees F
Frost-free period: 161 to 199 days

Farmland classification: Not prime farmland

Map Unit Composition

Rock outcrop: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rock Outcrop

Setting

Landform: Hills
Landform position (three-dimensional): Free face
Parent material: Limestone

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

SaB—Sango silt loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: lg30
Elevation: 640 to 1,070 feet
Mean annual precipitation: 42 to 58 inches
Mean annual air temperature: 46 to 59 degrees F
Frost-free period: 161 to 199 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Sango and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sango

Setting

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Coarse-silty noncalcareous loess over clayey residuum weathered from limestone

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 20 inches: silt loam
H3 - 20 to 62 inches: silty clay loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: 20 to 26 inches to fragipan
Drainage class: Moderately well drained

Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 15 to 22 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.0 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: D
Ecological site: F122XY023TN - Loess Veneered Thermic Uplands
Hydric soil rating: No

Minor Components

Baxter
Percent of map unit: 2 percent
Hydric soil rating: No

Dewey
Percent of map unit: 2 percent
Hydric soil rating: No

Frederick
Percent of map unit: 2 percent
Hydric soil rating: No

Mountview
Percent of map unit: 2 percent
Hydric soil rating: No

Bodine
Percent of map unit: 1 percent
Hydric soil rating: No

Dickson
Percent of map unit: 1 percent
Hydric soil rating: No

Ta—Taft silt loam

Map Unit Setting
National map unit symbol: lg31
Elevation: 590 to 1,100 feet
Mean annual precipitation: 42 to 58 inches
Mean annual air temperature: 46 to 59 degrees F
Frost-free period: 161 to 199 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Taft and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Taft

Setting

Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Old fine-silty alluvium derived from limestone, sandstone, and shale

Typical profile

H1 - 0 to 9 inches: silt loam
H2 - 9 to 16 inches: silt loam
H3 - 16 to 64 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 14 to 20 inches to fragipan
Drainage class: Somewhat poorly drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 12 to 16 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: D
Ecological site: F122XY011KY - Somewhat Poorly Drained Fragipan Terraces And Uplands
Hydric soil rating: No

Minor Components

Baxter

Percent of map unit: 2 percent
Hydric soil rating: No

Clarksville

Percent of map unit: 2 percent
Hydric soil rating: No

Dickson

Percent of map unit: 2 percent
Hydric soil rating: No

Robertsville, occasionally flooded

Percent of map unit: 2 percent
Landform: Stream terraces

Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Newark

Percent of map unit: 1 percent
Landform: Flood plains
Hydric soil rating: No

Mountview

Percent of map unit: 1 percent
Hydric soil rating: No

W—Water

Map Unit Setting

National map unit symbol: 1jy1q
Mean annual precipitation: 42 to 58 inches
Mean annual air temperature: 46 to 59 degrees F
Frost-free period: 161 to 199 days
Farmland classification: Not prime farmland

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Monroe County, Kentucky

FrD—Frederick cherty silt loam, 12 to 20 percent slopes

Map Unit Setting

National map unit symbol: lg6p
Elevation: 520 to 1,090 feet
Mean annual precipitation: 44 to 57 inches
Mean annual air temperature: 47 to 69 degrees F
Frost-free period: 167 to 215 days
Farmland classification: Not prime farmland

Map Unit Composition

Frederick and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Frederick

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey residuum weathered from cherty limestone and/or shale

Typical profile

H1 - 0 to 6 inches: gravelly silt loam
H2 - 6 to 22 inches: silty clay loam
H3 - 22 to 70 inches: clay

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: F122XY001KY - Deep Well Drained Cherty Uplands
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 5 percent
Hydric soil rating: No

Trimble
Percent of map unit: 5 percent
Hydric soil rating: No

Waynesboro
Percent of map unit: 5 percent
Hydric soil rating: No

Hu—Huntington silt loam

Map Unit Setting
National map unit symbol: lg6v
Elevation: 500 to 1,060 feet
Mean annual precipitation: 44 to 57 inches
Mean annual air temperature: 47 to 69 degrees F
Frost-free period: 167 to 215 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Huntington, occasionally flooded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Huntington, Occasionally Flooded

Setting
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Fine-silty alluvium derived from limestone

Typical profile
H1 - 0 to 10 inches: silt loam
H2 - 10 to 61 inches: silt loam

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 36 to 72 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.6 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B

Ecological site: F122XY016KY - Riverbank Loamy Alluvium
Hydric soil rating: No

Minor Components

Other soils
Percent of map unit: 4 percent
Hydric soil rating: No

Nolin
Percent of map unit: 2 percent
Landform: Flood plains
Hydric soil rating: No

Lindside
Percent of map unit: 2 percent
Landform: Flood plains
Hydric soil rating: No

Egam
Percent of map unit: 2 percent
Landform: Flood plains
Hydric soil rating: No

Ne—Newark silt loam

Map Unit Setting
National map unit symbol: lg72
Elevation: 500 to 1,080 feet
Mean annual precipitation: 44 to 57 inches
Mean annual air temperature: 47 to 69 degrees F
Frost-free period: 167 to 215 days
Farmland classification: Prime farmland if drained

Map Unit Composition
Newark, occasionally flooded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Newark, Occasionally Flooded

Setting
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Fine-silty alluvium derived from limestone

Typical profile
H1 - 0 to 8 inches: silt loam
H2 - 8 to 27 inches: silt loam
H3 - 27 to 62 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 12 to 18 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D
Ecological site: F122XY017KY - Moist Alluvium
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 4 percent
Hydric soil rating: No

Lindside

Percent of map unit: 3 percent
Landform: Flood plains
Hydric soil rating: No

Melvin, occasionally flooded

Percent of map unit: 3 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

TrC—Trimble cherty silt loam, 6 to 12 percent slopes

Map Unit Setting

National map unit symbol: lg79
Elevation: 520 to 1,070 feet
Mean annual precipitation: 44 to 57 inches
Mean annual air temperature: 47 to 69 degrees F
Frost-free period: 167 to 215 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Trimble and similar soils: 90 percent
Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Trimble

Setting

Landform: Ridges
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Fine-loamy residuum weathered from cherty limestone

Typical profile

H1 - 0 to 6 inches: gravelly silt loam
H2 - 6 to 46 inches: gravelly silty clay loam
H3 - 46 to 62 inches: gravelly silty clay loam

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F122XY001KY - Deep Well Drained Cherty Uplands
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 4 percent
Hydric soil rating: No

Bewleyville

Percent of map unit: 3 percent
Hydric soil rating: No

Tarklin

Percent of map unit: 3 percent
Hydric soil rating: No

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