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ADDENDUM NO. 07

PROJECT:	**Auburn Park Full Build-Out** **Montgomery County, VA Parks and Recreation**
GNI Job No.:	**2893.00**
DATE:	Tuesday, April 2, 2024

The following additions, deletions and/or modifications are to be incorporated into the Contract Documents and acknowledgement of receipt of this addendum shall be so noted on the Proposal Form submitted.

BID DOCUMENTS

TECHNICAL SPECIFICATIONS

DRAWINGS

CLARIFICATIONS

1. Please find attached the Geotechnical Engineering Report conducted by ECS Mid-Atlantic, LLC dated March 21, 2021 which corresponds to the boring locations shown on C1-02, C1-03 and C1-04 of the drawings.

ATTACHMENTS

1. Geotechical Engineering Report by ECS Mid-Atlantic, LLC dated March 21, 2021.

END ADDENDUM NO. 7

ECS Mid-Atlantic, LLC

Geotechnical Engineering Report

Auburn Park

3595 Riner Road
Riner, Virginia

ECS Project No. 12:19208

March 12, 2021

March 12, 2021

Mr. Trevor Kimzey, PE
Gay and Neel, Inc.
1260 Radford Street
Christiansburg, Virginia 24073

ECS Project No. 12:19208

Reference: Geotechnical Engineering Report
Auburn Park
3595 Riner Road
Riner, Virginia

Dear Mr. Kimzey:

ECS Mid-Atlantic, LLC (ECS) has completed the subsurface exploration, laboratory testing, and geotechnical engineering analyses for the above-referenced project. Our services were performed in general accordance with our agreed to scope of work. This report presents our understanding of the geotechnical aspects of the project along with the results of the field exploration and laboratory testing conducted, and our design and construction recommendations.

It has been our pleasure to be of service to Gay and Neel, Inc. during the design phase of this project. We would appreciate the opportunity to remain involved during the continuation of the design phase, and we would like to provide our services during construction phase operations as well to verify subsurface conditions assumed for this report. Should you have any questions concerning the information contained in this report, or if we can be of further assistance to you, please contact us.

Respectfully submitted,
ECS Mid-Atlantic, LLC

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APPENDICES

EXECUTIVE SUMMARY

This Executive Summary is intended as a very brief overview of the primary geotechnical conditions that are expected to affect design and construction. Information gleaned from the Executive Summary should not be utilized in lieu of reading the entire geotechnical report.

Based on the results of our SPT soil borings and assumed structural loads, the proposed lightly loaded structures may be supported on conventional shallow foundations consisting of column or strip footings bearing on natural soils or approved structural fill with an allowable net bearing capacity of 2,000 psf.

Based on the provided preliminary grading plan and the results of our borings, we anticipate shallow rock will be encountered in some cut areas of the site.

1.0 INTRODUCTION

The purpose of this study was to provide geotechnical information for the design of the proposed park development. The project will include the construction of athletic fields, lightly loaded picnic shelters, playground areas, stormwater management, and parking areas. The recommendations developed for this report are based on project information supplied by you.

Our services were provided in accordance with our Proposal No. 14511-P, dated February 5, 2021, as authorized by Gay and Neel, Inc. on February 5, 2021, which includes our Terms and Conditions of Service.

This report contains the procedures and results of our subsurface exploration and laboratory testing programs, review of existing site conditions, engineering analyses, and recommendations for the design and construction of the project.

The report includes the following items:

- A brief review and description of our field and laboratory test procedures and the results of testing conducted
- A review of surface topographical features and site conditions
- A review of area and site geologic conditions
- A review of subsurface soil/rock stratigraphy with pertinent physical properties
- Final soil exploration boring logs
- Recommendations for site preparation and construction of compacted fills, including an evaluation of on-site soils for use as compacted fills and identification of potentially unsuitable soils and/or soils exhibiting excessive moisture at the time of sampling
- Recommended foundation type
- An evaluation of soil and rock excavation issues

2.0 PROJECT INFORMATION

2.1 PROJECT LOCATION/CURRENT SITE USE/PAST SITE USE

The site is located at 3595 Riner Road in the Riner area of Montgomery County, Virginia. At the time of our visit, the ground surface was generally covered with grass. The overall site is located to the southwest and south of the existing Riner Volunteer Fire Department.

Figure 2.1 Site Location

The topography of the site is generally characterized by gently undulating hills. Grades vary from approximately 2120 feet near the middle of the southwest border of the site, to approximately 2061 feet at the southernmost corner of the site.

2.2 PROPOSED CONSTRUCTION

ECS was provided project documents prepared by Gay and Neel, Inc., which included a conceptual master plan dated January 12, 2021, and the preliminary grading plan dated February 2, 2021. Based on our review of the provided documents, we understand the project will include the construction of a park located to the south and west of the Riner Volunteer Fire Department. We understand the park will consist of multiple athletic fields, lightly-loaded picnic shelters, and playground areas.

Structural loading conditions for the picnic shelters have not been provided, however, we anticipate maximum column and wall loads of approximately 25 kips per column and 3 kips per linear foot, respectively.

Based on the existing and proposed grades, it appears maximum cuts and fills will be on the order of approximately 20 feet and 15 feet, respectively, to reach design grades.

Stormwater management, consisting of two ponds and an underground stormwater detention system are included in the design. Design grades have not been provided at this time, however, we understand the proposed ponds will utilize existing grades. We understand the proposed stormwater facility closest to Riner Road will be utilized as a sediment basin during the mass grading phase and later converted to an underground system.

3.0 FIELD EXPLORATION AND LABORATORY TESTING

Our exploration procedures are explained in greater detail in Appendix B including the insert titled Subsurface Exploration Procedures. Our scope of work included drilling 33 borings, as well as four offset borings. Our borings were located with a Trimble GPS unit while referencing available satellite imagery Their approximate locations are shown on the Boring Location Diagram in Appendix A.

3.1 SITE GEOLOGY

Based on our review of the Interstate 81 Corridor Digital Geologic Compilation: Riner Quadrangle, Virginia (2013), the site is located within the Valley and Ridge Geologic Province of Virginia. Specifically, the mapping indicates the site is underlain by the Rome Formation. Bedrock in this formation primarily consists of phyllitic mudstone, quartzose argillite, metasiltstone, and dolomite, with limestone interbeds.

The carbonate rock types encountered in this geology are subject to development of karst features such as sinkholes. Carbonate materials solution in water over long periods of time, resulting in loss of rock material. The solution process typically occurs along planes of more soluble material and causes the formation of interconnected seams and cavities within carbonate formations.

The boundary between soil and rock is not sharply defined. A transitional zone termed "highly weathered rock" (HWR) is normally found overlying the parent bedrock. Highly weathered rock is defined, for engineering purposes, as residual material with Standard Penetration resistance greater than 100 blows per foot (bpf). Because weathering is facilitated by fractures, joints, and the presence of less resistant rock types, the profile of the HWR and bedrock is typically irregular and erratic, even over short horizontal distances. Also, it is not unusual to find lenses and natural boulders of hard rock “floating” in zones of HWR within the soil mantle, well above the general bedrock level.

3.2 SUBSURFACE CHARACTERIZATION

The subsurface conditions encountered were generally consistent with published geological mapping. The following sections provide generalized characterizations of the soil and rock strata. Please refer to the boring logs in Appendix B.

Approximate Depth (ft)	Stratum	Description	Ranges of SPT(1) N-values (bpf)
0-1 (Surface cover)	n/a	Topsoil (approximately 5 to 12 inches)	N/A
0.4-20	I	Residuum, soft to very hard, LEAN CLAY (CL), FAT CLAY (CH), SILT (ML), ELASTIC SILT (MH), CLAYEY SAND (SC), containing varying concentrations of sand, and SILTY SAND (SM)	3 to 65
0.5-22	II	Highly Weathered Rock Sampled as SILTY SAND WITH GRAVEL and GRAVEL WITH SAND (HWR), moist	100+
5.5-22+	III	Hard rock, presumed to be mudstone, argillite, siltstone, dolomite, or limestone	N/A

Notes:
(1) Standard Penetration Testing

3.3 GROUNDWATER OBSERVATIONS

Water levels were measured in our borings were measured at the time of drilling and are reported in our borings logs in Appendix B. Perched groundwater was encountered in Boring B-18 at a depth of approximately 6 feet. Variations in the long-term water table may occur as a result of changes in precipitation, evaporation, surface water runoff, construction activities, and other factors.

3.4 LABORATORY TESTING

The laboratory testing consisted of selected tests performed on samples obtained during our field exploration operations. Classification and index property tests were performed on representative soil samples. The laboratory testing program included natural moisture content tests (ASTM D2216), percent passing the No. 200 sieve tests (ASTM D1140), and Atterberg Limits tests (ASTM D4318). Standard Proctor tests (VTM-1) were performed on bulk soil samples. The results of all laboratory testing conducted are included in the Appendix of this report.

Each sample was visually classified on the basis of texture and plasticity in accordance with ASTM D2488 Standard Practice for Description and Identification of Soils (Visual-Manual Procedures) and including USCS classification symbols, and ASTM D2487 Standard Practice for Classification for Engineering Purposes (Unified Soil Classification System (USCS)). After classification, the samples were grouped in the major zones noted on the boring logs in Appendix B. The group symbols for each soil type are indicated in parentheses along with the soil descriptions. The stratification lines between strata on the logs are approximate; in situ, the transitions may be gradual.

4.0 DESIGN RECOMMENDATIONS

4.1 KARST RISK COMMENTARY

Based on our site reconnaissance karst features were not observed in close vicinity of the proposed development. However, the site is mapped to be underlain by geologic parent rock which is known to be

carbonate in nature. Based on our experience in the geology, the site will likely be most vulnerable to sinkhole development during the mass grading phase of construction. During grading operations, drainage control is typically poor and the critical rock/soil interface is exposed to flooding from precipitation. It is a common occurrence for small sinkholes to develop during this phase of construction.

The subsurface conditions encountered in the soil test borings consist of residual soils of varying strength and moisture, as well as an erratic karst bedrock surface. In addition, the soil strength profile encountered in some of the borings decreased gradually with depth. These conditions are indicative of residual soils underlain by karst bedrock, which is subject to sinkhole development. Although we define the risk of future sinkhole development on this site as low to moderate, the owner should accept some risk related to the impact of karst features on foundation and overall site performance.

4.2 FOUNDATIONS

Provided subgrades and Structural Fills are prepared as recommended in this report, the proposed lightly loaded shelter structures can be supported by shallow foundations including column footings and continuous wall footings. We recommend the foundation design use the following parameters:

Design Parameter	Column Footing	Wall Footing
Net Allowable Bearing Pressure(1)	2,000 psf	2,000 psf
Acceptable Bearing Soil Material	Firm Residual Soils (Stratum I)	Firm Residual Soils (Stratum I)
Minimum Width	24 inches	16 inches
Minimum Footing Embedment Depth (below slab or finished grade) (2)	30 inches	30 inches
Estimated Total Settlement (3)	Less than 1- inch	Less than 1- inch
Estimated Differential Settlement (4)	Less than ¾ inches between columns	Less than ¾ inches

Notes:

(1) Net allowable bearing pressure is the applied pressure in excess of the surrounding overburden soils above the base of the foundation.
(2) For frost penetration requirements and expansive soil concerns.
(3) Based on assumed structural loads. If final loads are different, ECS must be contacted to update foundation recommendations and settlement calculations.
(4) Based on maximum column/wall loads and variability in borings. Differential settlement can be re-evaluated once the foundation plans are more complete.

Shallow Rock: The borings suggest that hard rock may be encountered at or above design bearing elevations in some areas of the site. This rock is also likely to be seamy, with abrupt transitions between soil-supported and rock-supported footings. In such instances, it is recommended to perform isolated undercuts below the footings to reduce the potential for excessive differential settlement across relatively short horizontal distances. Where footings transition from soil-support to rock-support and the length of the rock seam is greater than 4 feet, we recommend that soil on either side of the rock seam, for a distance of 4 feet along the trench, be removed and replaced with compacted stone. In instances where the rock

pinnacle extends for a distance of less than 4 feet along the trench, the rock pinnacle should be removed to a depth of 12 inches below the design bearing level and replaced with compacted stone.

Potential Undercuts: Most of the soils at the foundation bearing elevation are anticipated to be suitable for support of the proposed structure. If soft or unsuitable soils are observed at the footing bearing elevations, the unsuitable soils should be undercut and removed. Any undercut should be backfilled with cementitious flowable fill ($f'_c \geq 200$ psi at 28 days) or compacted VDOT No. 21-A Stone up to the original design bottom of footing elevation; the original footing shall be constructed at the desired footing elevations. Due to karst potential on the site, we do not recommend the use of VDOT No. 57 Stone for undercut backfilling.

4.3 SLABS ON GRADE

Provided subgrades and structural fills are prepared as discussed herein, the proposed floor slabs can be constructed as Ground Supported Slabs (or Slab-On-Grade). The following graphic depicts our soil-supported slab recommendations:

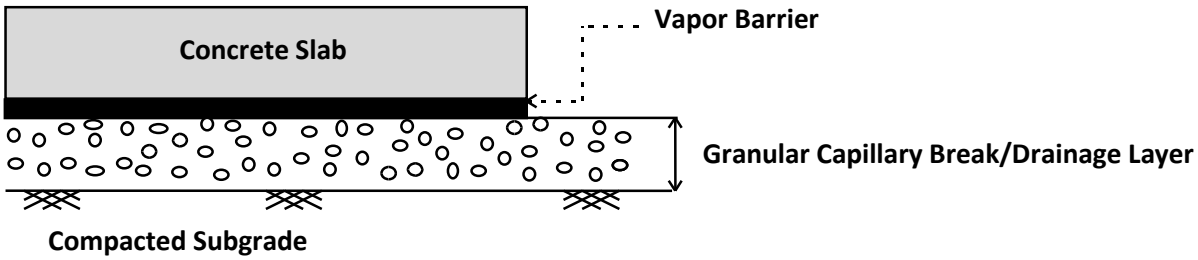


Figure 4.2.1

1. Drainage Layer Thickness: 4 inches
2. Drainage Layer Material: GRAVEL (GP, GW), SAND (SP, SW)

Soft or yielding soils may be encountered in some areas. Those soils should be removed and replaced with compacted Structural Fill in accordance with the recommendations included in this report.

Subgrade Modulus: Provided the Structural Fill and Granular Drainage Layer are constructed in accordance with our recommendations, the slab may be designed assuming a modulus of subgrade reaction, k_1 of 75 pci (lbs./cu. inch). The modulus of subgrade reaction value is based on a 1 foot by 1 foot plate load test basis.

Porous Slab Base: We recommend the slab-on-grade be underlain by a minimum of 4 inches of clean, angular gravel (crushed stone) having a maximum aggregate size of 1.5 inches. VDOT No. 57 Stone is considered suitable for this purpose. This porous fill layer will facilitate the fine grading of the building pad, provide more uniform bearing conditions, and help prevent the rise of water to the bottom of the slab (capillary action).

Vapor Barrier: Before the placement of concrete, a vapor barrier may be placed on top of the granular drainage layer to provide additional protection against moisture penetration through the floor slab. When

a vapor barrier is used, special attention should be given to surface curing of the slab to reduce the potential for uneven drying, curling and/or cracking of the slab. Depending on proposed flooring material types, the structural engineer and/or the architect may choose to eliminate the vapor barrier.

Rock Above Design Bearing Elevation: We recommend that sufficient rock be removed to allow placement of the entire drainage layer. This will serve to cushion the slab and reduce the potential for point loads and subsequent cracking of the concrete. In such cases, additional overexcavation of rock should be considered to allow installation of underslab utilities.

Slab Isolation: Soil-supported slabs should be isolated from the foundations and foundation-supported elements of the structure so that differential movement between the foundations and slab will not induce excessive shear and bending stresses in the floor slab. Where the structural configuration prevents the use of a free-floating slab such as in a drop down footing/monolithic slab configuration, the slab should be designed with suitable reinforcement and load transfer devices to preclude overstressing of the slab.

5.0 SUBGRADE PREPARATION

5.1 STRIPPING AND GRUBBING

The subgrade preparation should consist of stripping all vegetation, rootmat, topsoil, existing fill, and any soft or unsuitable materials from the 5-foot expanded building and 2-foot expanded pavement limits, and 5 feet beyond the toe of Structural Fills. Borings performed in “undisturbed” areas of the site contained an observed 5 to 12 inches of topsoil. Deeper topsoil or organic laden soils may be present in wet, low-lying, and poorly drained areas. In wooded areas, the root balls may extend as deep as about 2 feet and will require additional localized stripping depth to completely remove the organics. It is noted that the site has been subject to previous agricultural activity. Often, this results in a subsoil layer which is not organic, but is notably different from the underlying residual soils. It is not uncommon for this layer to be several feet thick, particularly in low-lying areas. This layer, where present, should not be stripped as topsoil unless specifically recommended by the geotechnical engineer in the field. ECS should be retained to verify that topsoil and unsuitable surficial materials have been removed prior to the placement of structural fill or construction of structures.

5.2 PROOFROLLING

Prior to fill placement or other construction on subgrades, the subgrades should be evaluated by an ECS field technician. The exposed subgrade should be thoroughly proofrolled with construction equipment having a minimum axle load of 10 tons [e.g. fully loaded tandem-axle dump truck]. Proofrolling should be traversed in two perpendicular directions with overlapping passes of the vehicle under the observation of an ECS technician. This procedure is intended to assist in identifying any localized yielding materials.

Where proofrolling identifies areas that are unstable or “pumping” subgrade those areas should be repaired prior to the placement of any subsequent Structural Fill or other construction materials. Methods of stabilization include undercutting, moisture conditioning, or chemical stabilization. The situation should be discussed with ECS to determine the appropriate procedure. Test pits may be excavated to explore the shallow subsurface materials to help in determining the cause of the observed unstable materials, and to assist in the evaluation of appropriate remedial actions to stabilize the subgrade.

5.3 EARTHWORK OPERATIONS

5.3.1 Weathered Rock and Rock

Based on boring data obtained during the exploration, we anticipate that materials requiring difficult or rock excavation techniques will be encountered during site grading and excavation to planned subgrades. Borings B-06, B-08, and B-21 refused at elevations higher than design elevations. We anticipate these areas will require significant excavation of rock to reach design grades. Borings B-10, B-14, B-16, and B-20 encountered auger refusal at elevations close to design grade. We anticipate these areas may require some amount of difficult excavation to reach design grades. Specific invert elevations have not been provided for the proposed underground stormwater detention, however we anticipate rock will be encountered above design grades in this area as well.

The excavation of weathered rock and rock can have a substantial impact on the cost and schedule of the proposed construction. This discussion considers two general classes of materials for purposes of describing excavatability. Residuum and weathered rock will be used as the terms for the materials to be excavated.

In mass excavations for general site work, overburden soils with standard penetration test N-values of 40 bpf or less can usually be removed with conventional earth excavation equipment. Residual soils or soft weathered (Saprolitic) rock with N-values of 40 to 50 bpf can generally be removed with conventional earth moving equipment after first being loosened with a large single-tooth ripper attached to a large crawler tractor. Harder, less weathered rock will generally require the use of a large single-tooth ripper, dozers, and/or track-mounted backhoes for excavation. However, materials exhibiting N-values of 50 blows or greater for 6 inches of penetration, typically defined as refusal material, will be more difficult to excavate and generally require blasting and other rock excavation techniques. The actual excavatability of the bedrock material will be greatly controlled by in-situ jointing and bedding and may vary from location to location.

In confined excavations, such as utility trenches, excavation of dense residual soils typically requires the use of large track-mounted backhoes. Excavation of harder phases of weathered rock typically requires the use of large track-mounted backhoes, pneumatic spades, or light blasting. Refusal materials (apparent rock) normally require blasting in trench excavations. Blasting in utility trenches should be done carefully to avoid damage to the surrounding materials. When the material to be excavated requires blasting, the contractor should comply with the jurisdictional requirements.

5.3.2 Structural Fill

Prior to placement of Structural Fill, representative bulk samples (about 50 pounds) of on-site and/or off-site borrow should be submitted to ECS for laboratory testing, which will typically include Atterberg limits, natural moisture content, grain-size distribution, and moisture-density relationships (i.e., Proctors) for compaction. Import materials should be tested prior to being hauled to the site to determine if they meet project specifications. Alternatively, Proctor data from other accredited laboratories can be submitted if the test results are within the last 90 days.

Satisfactory Structural Fill Materials: Materials satisfactory for use as Structural Fill should consist of inorganic soils with the following engineering properties and compaction requirements.

STRUCTURAL FILL INDEX PROPERTIES	
Subject	**Property**
Building and Pavement Areas (Borrow Soils)	LL < 50, PI<25
Building and Pavement Areas (On-site Soils)	LL < 60, PI < 30
Max. Particle Size	4 inches
Max. organic content	5% by dry weight

STRUCTURAL FILL COMPACTION REQUIREMENTS	
Subject	**Requirement**
Compaction Standard	Standard Proctor, ASTM D698
Required Compaction	95% of Max. Dry Density
Moisture Content	+/-3 % points of the soil's optimum value
Loose Thickness	8 inches prior to compaction

On-Site Borrow Suitability: Significant natural deposits of soils are present on the site. These occur mostly at relatively shallow depth below the surface where residual soils are most weathered.

Aggregates/Blast Rock: The gradation of the material removed by ripping or blasting is typically quite varied. Excavated rock and weathered rock are generally only suitable for use in the deeper parts of embankment fills, or outside the zone of Structural Fill.

When rock or intact weathered rock fragments are placed in non-structural areas, we recommend that the rock fragments be spread out evenly in layers. Many times, the rock needs to be choked off with rock fines, and/or soil, so that voids between the rock fragments are filled. Where the material exhibits large voids between rock fragments, a geotextile may be needed to be placed over the rock prior to placement of additional materials. In general, the larger rock fragments should be placed at the bottom of the fill, but no fragment should exceed 1.5 feet in its maximum dimension. Between 2 feet and 10 feet below the final subgrade elevation, no rock fragment should exceed 8 inches in its maximum dimension. Within 2 feet of the subgrade elevation, no rock fragment should exceed 4 inches in maximum dimension.

In some situations, it can be cost effective to use an onsite rock crusher to produce material that meets the requirements of Structural Fill materials.

Fill Placement: Fill materials should not be placed on frozen soils, on frost-heaved soils, and/or on excessively wet soils. Borrow fill materials should not contain frozen materials at the time of placement, and all frozen or frost-heaved soils should be removed prior to placement of Structural Fill or other fill soils and aggregates. Excessively wet soils or aggregates should be scarified, aerated, and moisture conditioned.

5.4 FOUNDATION AND SLAB OBSERVATIONS

Protection of Foundation Excavations: Exposure to the environment may weaken the soils at the footing bearing level if the foundation excavations remain open for too long a time. Therefore, foundation

concrete should be placed the same day that excavations are made. If the bearing soils are softened by surface water intrusion or exposure, the softened soils must be removed from the foundation excavation bottom immediately prior to placement of concrete. If the excavation must remain open overnight, or if rainfall becomes imminent while the bearing soils are exposed, a 1 to 3-inch thick "mud mat" of "lean" concrete should be placed on the bearing soils before the placement of reinforcing steel.

Footing Subgrade Observations: Most of the soils at the foundation bearing elevation are anticipated to be suitable for support of the proposed structure. It is important to have ECS observe the foundation subgrade prior to placing foundation concrete, to confirm the bearing soils are what was anticipated.

Slab Subgrade Verification: Prior to placement of a drainage layer, the subgrade should be prepared in accordance with the recommendations found in **Section 5.1.2 Proofrolling**.

5.5 UTILITY INSTALLATIONS

Utility Subgrades: The soils encountered in our exploration are expected to be generally suitable for support of utility pipes. The pipe subgrades should be observed and probed for stability by ECS. Any loose or unsuitable materials encountered should be removed and replaced with suitable compacted Structural Fill, or pipe stone bedding material.

Utility Backfilling: The granular bedding material (AASHTO #57 stone) should be at least 4 inches thick, but not less than that specified by the civil engineer's project drawings and specifications. We recommend that the bedding materials be placed up to the springline of the pipe. Fill placed for support of the utilities, as well as backfill over the utilities, should satisfy the requirements for Structural Fill and Fill Placement.

Excavation Safety: All excavations and slopes should be constructed and maintained in accordance with OSHA excavation safety standards. The contractor is solely responsible for designing, constructing, and maintaining stable temporary excavations and slopes. The contractor's responsible person, as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations. ECS is providing this information solely as a service to our client. ECS is not assuming responsibility for construction site safety or the contractor's activities; such responsibility is not being implied and should not be inferred.

6.0 CLOSING

ECS has prepared this report to guide the geotechnical-related design and construction aspects of the project. We performed these services in accordance with the standard of care expected of professionals in the industry performing similar services on projects of like size and complexity at this time in the region. No other representation, expressed or implied, and no warranty or guarantee is included or intended in this report.

The description of the proposed project is based on information provided to ECS by our client. If any of this information is inaccurate or changes, either because of our interpretation of the documents provided or site or design changes that may occur later, ECS should be contacted so we can review our

recommendations and provide additional or alternate recommendations that reflect the proposed construction.

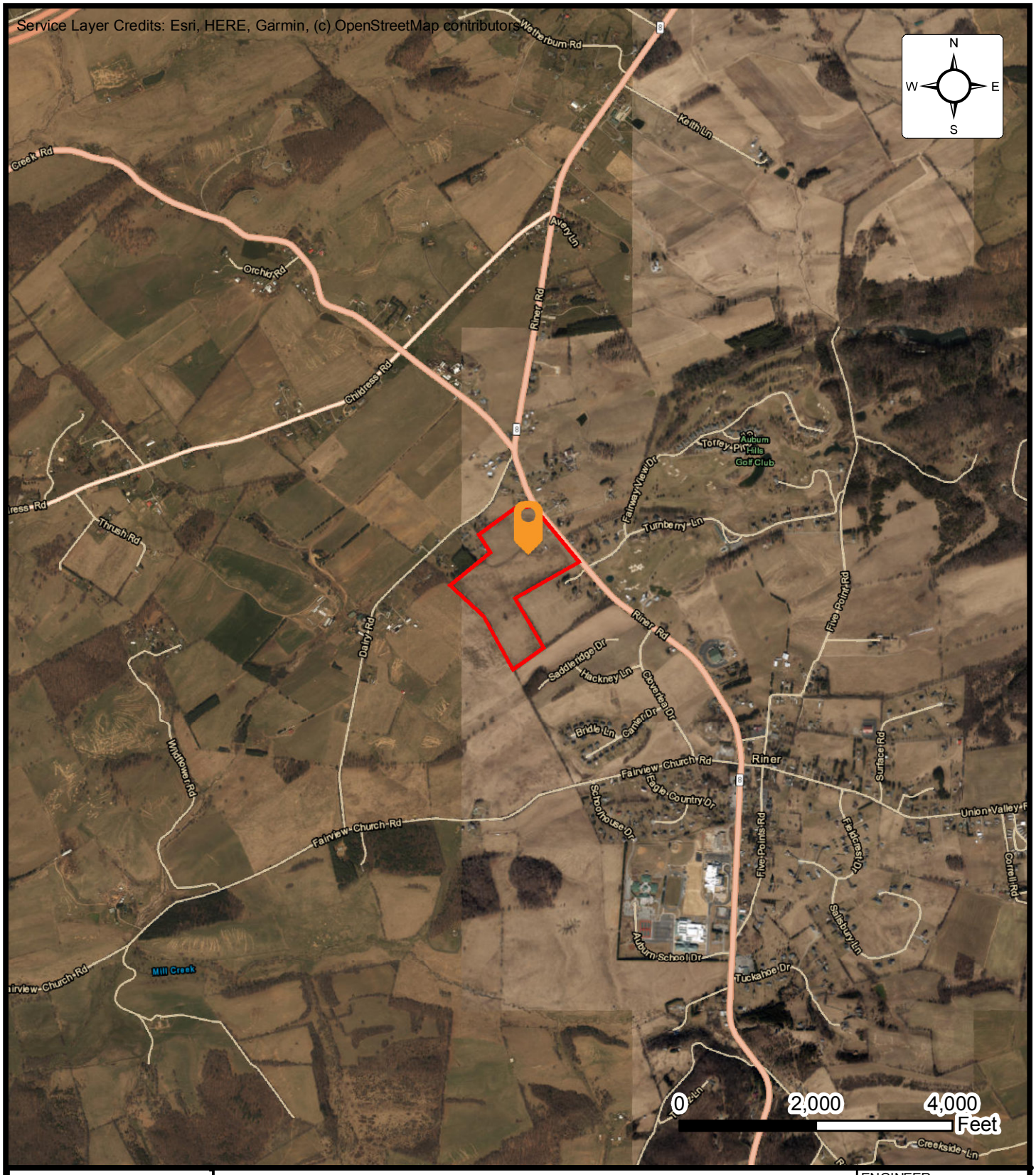
We recommend that ECS review the project plans and specifications so we can confirm that those plans/specifications are in accordance with the recommendations of this geotechnical report.

Field observations, and quality assurance testing during earthwork and foundation installation are an extension of, and integral to, the geotechnical design. We recommend that ECS be retained to apply our expertise throughout the geotechnical phases of construction, and to provide consultation and recommendation should issues arise.

ECS is not responsible for the conclusions, opinions, or recommendations of others based on the data in this report.

APPENDIX A – Diagrams & Reports

Site Location Diagram
Boring Location Diagram

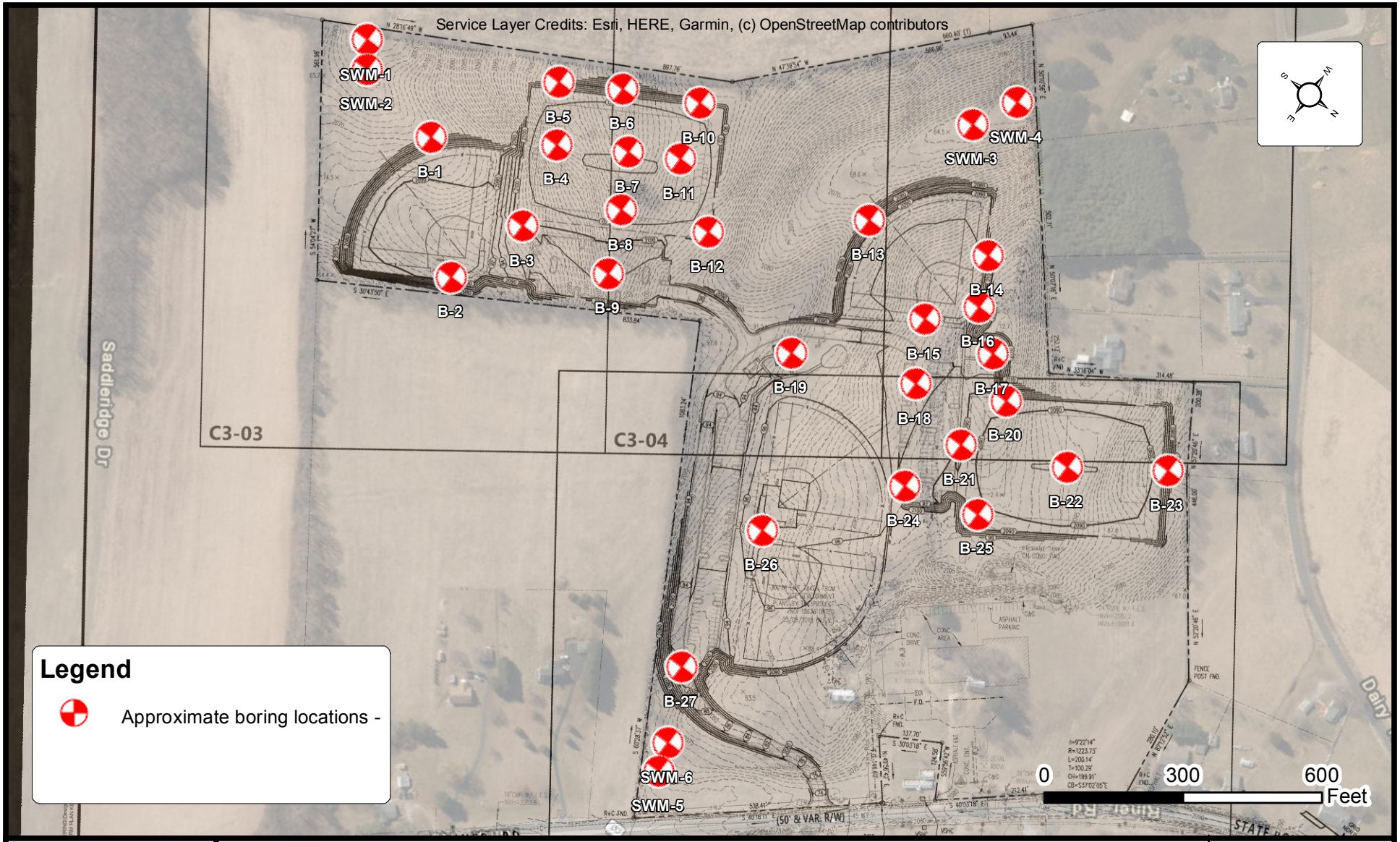


Site Location Diagram
AUBURN PARK

3595 RINER ROAD, RINER, VIRGINIA

GAY AND NEEL, INC.

ENGINEER	BMQ
SCALE	AS NOTED
PROJECT NO.	12:19208
SHEET	1 OF 1
DATE	2/22/2021



Boring Location Diagram
AUBURN PARK

3595 RINER ROAD, RINER, VIRGINIA
GAY AND NEEL, INC.

ENGINEER	BMQ
SCALE	AS NOTED
PROJECT NO.	12:19208
SHEET	1 OF 1
DATE	2/22/2021

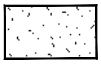
APPENDIX B – Field Operations

Reference Notes for Boring Logs
Subsurface Exploration Procedure: Standard Penetration Testing (SPT)
Boring Logs B-1 through B-27, SWM-1 through SWM-6

REFERENCE NOTES FOR BORING LOGS

MATERIAL[1,2]


ASPHALT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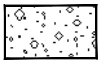
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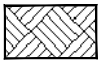
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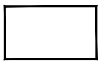
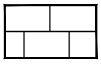
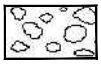
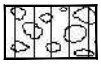

VOID


BRICK

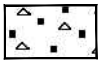

AGGREGATE BASE COURSE

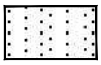

GW **WELL-GRADED GRAVEL**
gravel-sand mixtures, little or no fines

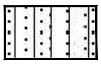

GP **POORLY-GRADED GRAVEL**
gravel-sand mixtures, little or no fines


GM **SILTY GRAVEL**
gravel-sand-silt mixtures

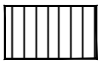

GC **CLAYEY GRAVEL**
gravel-sand-clay mixtures

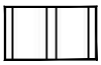

SW **WELL-GRADED SAND**
gravelly sand, little or no fines

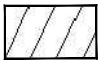

SP **POORLY-GRADED SAND**
gravelly sand, little or no fines


SM **SILTY SAND**
sand-silt mixtures

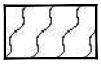

SC **CLAYEY SAND**
sand-clay mixtures

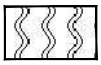

ML **SILT**
non-plastic to medium plasticity

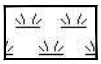

MH **ELASTIC SILT**
high plasticity


CL **LEAN CLAY**
low to medium plasticity


CH **FAT CLAY**
high plasticity


OL **ORGANIC SILT or CLAY**
non-plastic to low plasticity


OH **ORGANIC SILT or CLAY**
high plasticity


PT **PEAT**
highly organic soils

DRILLING SAMPLING SYMBOLS & ABBREVIATIONS

SS	Split Spoon Sampler	PM	Pressuremeter Test
ST	Shelby Tube Sampler	RD	Rock Bit Drilling
WS	Wash Sample	RC	Rock Core, NX, BX, AX
BS	Bulk Sample of Cuttings	REC	Rock Sample Recovery %
PA	Power Auger (no sample)	RQD	Rock Quality Designation %
HSA	Hollow Stem Auger		

PARTICLE SIZE IDENTIFICATION

DESIGNATION		PARTICLE SIZES
Boulders		12 inches (300 mm) or larger
Cobbles		3 inches to 12 inches (75 mm to 300 mm)
Gravel:	Coarse	¾ inch to 3 inches (19 mm to 75 mm)
	Fine	4.75 mm to 19 mm (No. 4 sieve to ¾ inch)
Sand:	Coarse	2.00 mm to 4.75 mm (No. 10 to No. 4 sieve)
	Medium	0.425 mm to 2.00 mm (No. 40 to No. 10 sieve)
	Fine	0.074 mm to 0.425 mm (No. 200 to No. 40 sieve)
Silt & Clay ("Fines")		<0.074 mm (smaller than a No. 200 sieve)

COHESIVE SILTS & CLAYS

UNCONFINED COMPRESSIVE STRENGTH, Q_P[4]	SPT[5] (BPF)	CONSISTENCY[7] (COHESIVE)
<0.25	<3	Very Soft
0.25 - <0.50	3 - 4	Soft
0.50 - <1.00	5 - 8	Firm
1.00 - <2.00	9 - 15	Stiff
2.00 - <4.00	16 - 30	Very Stiff
4.00 - 8.00	31 - 50	Hard
>8.00	>50	Very Hard

GRAVELS, SANDS & NON-COHESIVE SILTS

SPT[5]	DENSITY
<5	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
>50	Very Dense

RELATIVE AMOUNT[7]	COARSE GRAINED (%)[8]	FINE GRAINED (%)[8]
Trace	≤5	≤5
With	10 - 20	10 - 25
Adjective *(ex: "Silty")*	25 - 45	30 - 45

WATER LEVELS[6]


WL (First Encountered)


WL (Completion)


WL (Seasonal High Water)


WL (Stabilized)

FILL AND ROCK

FILL | POSSIBLE FILL | PROBABLE FILL | ROCK

[1]Classifications and symbols per ASTM D 2488-17 (Visual-Manual Procedure) unless noted otherwise.

[2]To be consistent with general practice, "POORLY GRADED" has been removed from GP, GP-GM, GP-GC, SP, SP-SM, SP-SC soil types on the boring logs.

[3]Non-ASTM designations are included in soil descriptions and symbols along with ASTM symbol [Ex: (SM-FILL)].

[4]Typically estimated via pocket penetrometer or Torvane shear test and expressed in tons per square foot (tsf).

[5]Standard Penetration Test (SPT) refers to the number of hammer blows (blow count) of a 140 lb. hammer falling 30 inches on a 2 inch OD split spoon sampler required to drive the sampler 12 inches (ASTM D 1586). "N-value" is another term for "blow count" and is expressed in blows per foot (bpf). SPT correlations per 7.4.2 Method B and need to be corrected if using an auto hammer.

[6]The water levels are those levels actually measured in the borehole at the times indicated by the symbol. The measurements are relatively reliable when augering, without adding fluids, in granular soils. In clay and cohesive silts, the determination of water levels may require several days for the water level to stabilize. In such cases, additional methods of measurement are generally employed.

[7]Minor deviation from ASTM D 2488-17 Note 14.

[8]Percentages are estimated to the nearest 5% per ASTM D 2488-17.

SUBSURFACE EXPLORATION PROCEDURE: STANDARD PENETRATION TESTING (SPT) ASTM D 1586 Split-Barrel Sampling

Standard Penetration Testing, or **SPT**, is the most frequently used subsurface exploration test performed worldwide. This test provides samples for identification purposes, as well as a measure of penetration resistance, or N-value. The N-Value, or blow counts, when corrected and correlated, can approximate engineering properties of soils used for geotechnical design and engineering purposes.

SPT Procedure:

- Involves driving a hollow tube (split-spoon) into the ground by dropping a 140-lb hammer a height of 30-inches at desired depth
- Recording the number of hammer blows required to drive split-spoon a distance of 12 inches (in 3 or 4 Increments of 6 inches each)

- Auger is advanced* and an additional SPT is performed
- One SPT test is typically performed for every two to five feet

- Obtain two-inch diameter soil sample

**Drilling Methods May Vary—* The predominant drilling methods used for SPT are open hole fluid rotary drilling and hollow-stem auger drilling.

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Gay and Neel, Inc.	**12:19208**	**B-01**	**1 of 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Auburn Park	**Blue Ridge Drilling, Inc.**		
SITE LOCATION:			LOSS OF CIRCULATION
3595 Riner Road, Riner, Virginia 24149			
NORTHING:	EASTING:	STATION:	SURFACE ELEVATION:
3555342.6	**10913312.0**		**2070.0**

BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Topsoil Thickness [6"]		2070	
	S-1	SS	18	16	(CL) Residuum, LEAN CLAY WITH SAND, tan- brown, moist, soft to firm			2-3-5 (8)
	S-2	SS	18	18				2-4-4 (8)
5							2065	
	S-3	SS	18	18				2-2-2 (4)
	S-4	SS	18	18				2-3-5 (8)
10					**END OF DRILLING AT 10.0 FT**		2060	
15							2055	
20							2050	
25							2045	
30							2040	

Plastic Limit Water Content Liquid Limit

X———●———△

⊗ STANDARD PENETRATION BLOWS/FT

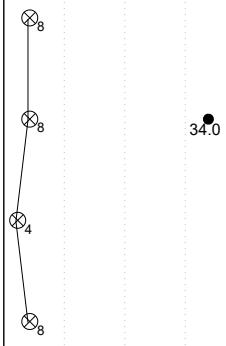
ROCK QUALITY DESIGNATION & RECOVERY

RQD

REC

○ CALIBRATED PENETROMETER TON/SF

[FINES CONTENT] %



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered) **Dry**	BORING STARTED: **Feb 17 2021**		CAVE IN DEPTH: **4.60**
▼ WL (Completion)	BORING COMPLETED: **Feb 17 2021**		HAMMER TYPE: **Auto**
▼ WL (Seasonal High Water)	EQUIPMENT: **ATV CME-55**	LOGGED BY: **BRD**	DRILLING METHOD: **2 1/4" HSA**
▽ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Gay and Neel, Inc.	**12:19208**	**B-02**	**1 of 1**

PROJECT NAME:	DRILLER/CONTRACTOR:
Auburn Park	**Blue Ridge Drilling, Inc.**

SITE LOCATION: **3595 Riner Road, Riner, Virginia 24149**

LOSS OF CIRCULATION

NORTHING:	EASTING:	STATION:	SURFACE ELEVATION:
3555559.9	**10913527.4**		**2078.0**

BOTTOM OF CASING

Plastic Limit Water Content Liquid Limit

STANDARD PENETRATION BLOWS/FT

ROCK QUALITY DESIGNATION & RECOVERY

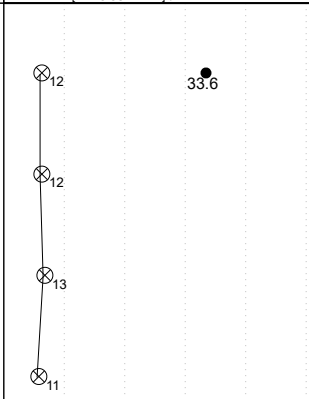
RQD

REC

CALIBRATED PENETROMETER TON/SF

[FINES CONTENT] %

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
	S-1	SS	18	16	Topsoil Thickness [6"] (CH) Residuum, FAT CLAY, trace sand, brown, moist, stiff			3-5-7 (12)
	S-2	SS	18	18				4-6-6 (12)
5							2073	
	S-3	SS	18	17				4-5-8 (13)
	S-4	SS	18	14	(ML) SILT WITH SAND, red- brown, moist, stiff			4-5-6 (11)
10					**END OF DRILLING AT 10.0 FT**		2068	
15							2063	
20							2058	
25							2053	
30							2048	



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered) **Dry**	BORING STARTED: **Feb 17 2021**	CAVE IN DEPTH: **3.90**	
▼ WL (Completion)	BORING COMPLETED: **Feb 17 2021**	HAMMER TYPE: **Auto**	
▼ WL (Seasonal High Water)	EQUIPMENT: **ATV CME-55**	LOGGED BY: **BRD**	DRILLING METHOD: **2 1/4" HSA**
▽ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Gay and Neel, Inc.	**12:19208**	**B-03**	**1 of 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Auburn Park	**Blue Ridge Drilling, Inc.**		
SITE LOCATION:			LOSS OF CIRCULATION
3595 Riner Road, Riner, Virginia 24149			
NORTHING:	EASTING:	STATION:	SURFACE ELEVATION:
3555617.1	**10913346.1**		**2090.0**

BOTTOM OF CASING

Plastic Limit Water Content Liquid Limit

STANDARD PENETRATION BLOWS/FT

ROCK QUALITY DESIGNATION & RECOVERY

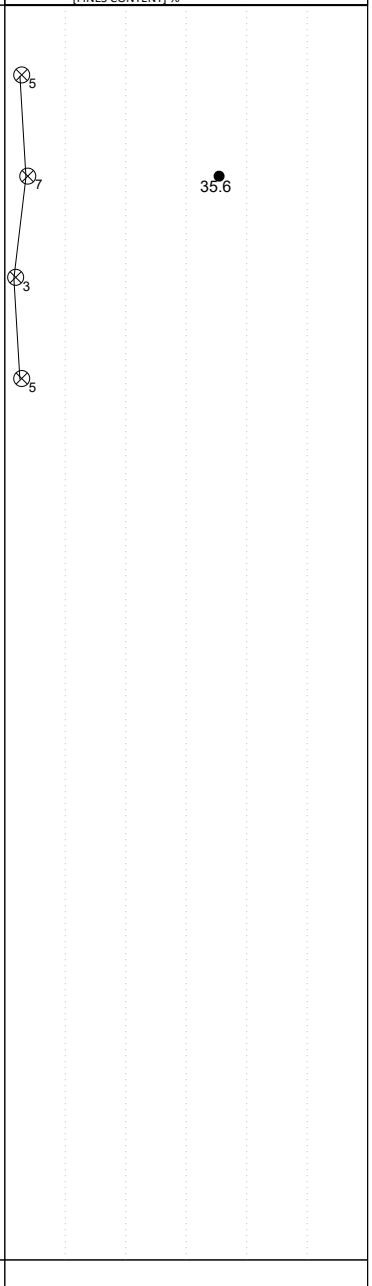
RQD

REC

CALIBRATED PENETROMETER TON/SF

[FINES CONTENT] %

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					Topsoil Thickness [6"]			
	S-1	SS	18	14	(CL) Residuum, LEAN CLAY, trace sand, brown, moist, firm			2-2-3 (5)
	S-2	SS	18	15				2-3-4 (7)
5							2085	
	S-3	SS	18	18	(ML) SILT WITH SAND, tan, moist, soft to firm			2-1-2 (3)
	S-4	SS	18	16				2-2-3 (5)
10					**END OF DRILLING AT 10.0 FT**		2080	
15							2075	
20							2070	
25							2065	
30							2060	



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered) **Dry**	BORING STARTED: **Feb 17 2021**	CAVE IN DEPTH: **4.20**	
▼ WL (Completion)	BORING COMPLETED: **Feb 17 2021**	HAMMER TYPE: **Auto**	
▼ WL (Seasonal High Water)	EQUIPMENT: **ATV CME-55**	LOGGED BY: **BRD**	DRILLING METHOD: **2 1/4" HSA**
▽ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Gay and Neel, Inc.	**12:19208**	**B-04**	**1 of 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Auburn Park	**Blue Ridge Drilling, Inc.**		
SITE LOCATION:			LOSS OF CIRCULATION
3595 Riner Road, Riner, Virginia 24149			
NORTHING:	EASTING:	STATION:	SURFACE ELEVATION:
3555569.2	**10913161.2**		**2108.0**

BOTTOM OF CASING

Plastic Limit Water Content Liquid Limit

STANDARD PENETRATION BLOWS/FT

ROCK QUALITY DESIGNATION & RECOVERY

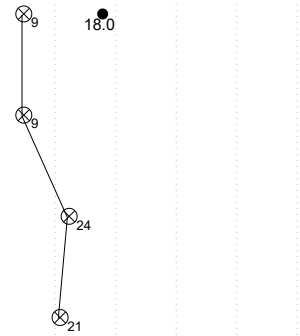
RQD

REC

CALIBRATED PENETROMETER TON/SF

[FINES CONTENT] %

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					Topsoil Thickness [6"]			
	S-1	SS	18	13	(ML) Residuum, SANDY SILT, moist, stiff			4-5-4 (9)
	S-2	SS	18	14				3-4-5 (9)
5							2103	
	S-3	SS	18	14	(SM) SILTY FINE SAND, light brown, moist, medium dense			8-10-14 (24)
	S-4	SS	18	15				7-9-12 (21)
10					**END OF DRILLING AT 10.0 FT**		2098	
15							2093	
20							2088	
25							2083	
30							2078	



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered) **Dry**	BORING STARTED: **Feb 17 2021**	CAVE IN DEPTH: **4.30**	
WL (Completion)	BORING COMPLETED: **Feb 17 2021**	HAMMER TYPE: **Auto**	
WL (Seasonal High Water)	EQUIPMENT: **ATV CME-55**	LOGGED BY: **BRD**	DRILLING METHOD: **2 1/4" HSA**
WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

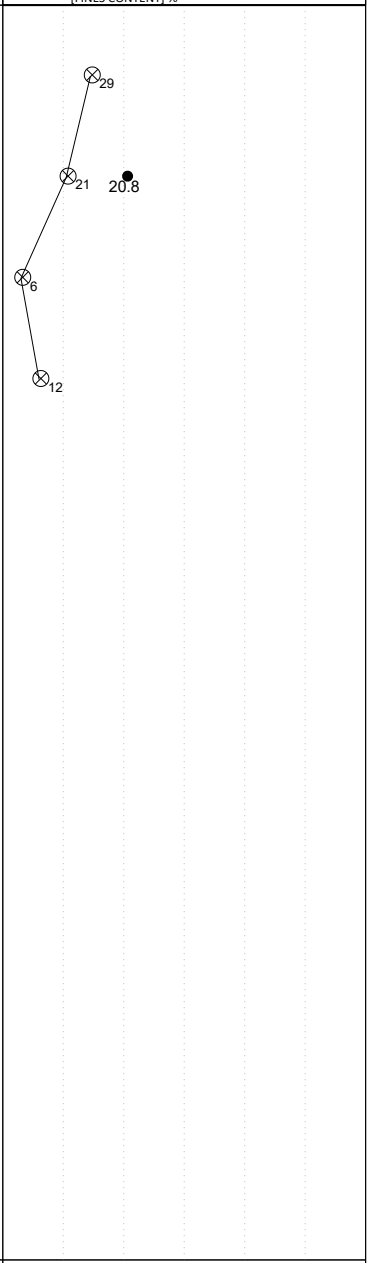
CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Gay and Neel, Inc.	**12:19208**	**B-05**	**1 of 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Auburn Park	**Blue Ridge Drilling, Inc.**		
SITE LOCATION:			LOSS OF CIRCULATION
3595 Riner Road, Riner, Virginia 24149			
NORTHING:	EASTING:	STATION:	SURFACE ELEVATION:
3555492.2	**10913050.7**		**2112.0**

BOTTOM OF CASING

Plastic Limit Water Content Liquid Limit
X———●———△

⊗ STANDARD PENETRATION BLOWS/FT
ROCK QUALITY DESIGNATION & RECOVERY
RQD
REC
○ CALIBRATED PENETROMETER TON/SF
[FINES CONTENT] %

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					Topsoil Thickness [7"]			
	S-1	SS	18	14	(ML) Residuum, SANDY SILT WITH GRAVEL, tan- brown, moist, very stiff [weathered rock structure visible in samples]			5-12-17 (29)
	S-2	SS	18	16				11-10-11 (21)
5							2107	
	S-3	SS	18	15	(CL) LEAN CLAY, trace sand, brown, moist, firm to stiff			3-3-3 (6)
	S-4	SS	18	18				4-5-7 (12)
10					**END OF DRILLING AT 10.0 FT**		2102	
15							2097	
20							2092	
25							2087	
30							2082	



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered) **Dry**	BORING STARTED: **Feb 17 2021**	CAVE IN DEPTH: **4.20**	
▼ WL (Completion)	BORING COMPLETED: **Feb 17 2021**	HAMMER TYPE: **Auto**	
▼ WL (Seasonal High Water)	EQUIPMENT: **ATV CME-55**	LOGGED BY: **BRD**	DRILLING METHOD: **2 1/4" HSA**
▽ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Gay and Neel, Inc.	**12:19208**	**B-06**	**1 of 1**
PROJECT NAME: **Auburn Park**	DRILLER/CONTRACTOR: **Blue Ridge Drilling, Inc.**		
SITE LOCATION: **3595 Riner Road, Riner, Virginia 24149**			LOSS OF CIRCULATION
NORTHING: **3555610.7**	EASTING: **10912979.0**	STATION:	SURFACE ELEVATION: **2123.0**
			BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					Topsoil Thickness [6"]			
	S-1	SS	15	16	(HWR) HIGHLY WEATHERED ROCK SAMPLED AS GRAVEL WITH SAND, purple-gray, moist			13-27-50/3" (77/9")
	~~S-2~~	~~SS~~	~~2~~	~~0~~				50/2" (50/2")
5					Refusal encountered at 5.5 feet. **END OF DRILLING AT 5.5 FT**		2118	
10							2113	
15							2108	
20							2103	
25							2098	
30							2093	

Plastic Limit Water Content Liquid Limit
X———●———△

⊗ STANDARD PENETRATION BLOWS/FT

ROCK QUALITY DESIGNATION & RECOVERY

RQD

REC

○ CALIBRATED PENETROMETER TON/SF

[FINES CONTENT] %

77/9"

50/2"

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered) **Dry**	BORING STARTED: **Feb 17 2021**		CAVE IN DEPTH: **2.10**
▼ WL (Completion)	BORING COMPLETED: **Feb 17 2021**		HAMMER TYPE: **Auto**
▼ WL (Seasonal High Water)	EQUIPMENT: **ATV CME-55**	LOGGED BY: **BRD**	DRILLING METHOD: **2 1/4" HSA**
▽ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Gay and Neel, Inc.	**12:19208**	**B-06A**	**1 of 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Auburn Park	**Blue Ridge Drilling, Inc.**		
SITE LOCATION: **3595 Riner Road, Riner, Virginia 24149**			LOSS OF CIRCULATION
NORTHING:	EASTING:	STATION:	SURFACE ELEVATION: **2123.0**

BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Auger probed to refusal, no sampling performed.		2123	
5					Refusal encountered at 5.0 feet. **END OF DRILLING AT 5.0 FT** *performed 4' NE of B-06		2118	
10							2113	
15							2108	
20							2103	
25							2098	
30							2093	

Plastic Limit Water Content Liquid Limit
X———●———△

⊗ STANDARD PENETRATION BLOWS/FT

ROCK QUALITY DESIGNATION & RECOVERY

RQD

REC

○ CALIBRATED PENETROMETER TON/SF

[FINES CONTENT] %

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered)	BORING STARTED: **Feb 17 2021**	CAVE IN DEPTH:
▼ WL (Completion)	BORING COMPLETED: **Feb 17 2021**	HAMMER TYPE: **Auto**
▼ WL (Seasonal High Water)	EQUIPMENT: **ATV CME-55** / LOGGED BY:	DRILLING METHOD: **2 1/4" HSA**
▽ WL (Stabilized)		

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Gay and Neel, Inc.	**12:19208**	**B-07**	**1 of 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Auburn Park	**Blue Ridge Drilling, Inc.**		
SITE LOCATION: **3595 Riner Road, Riner, Virginia 24149**			LOSS OF CIRCULATION
NORTHING: **3555702.4**	EASTING: **10913080.0**	STATION:	SURFACE ELEVATION: **2120.0**
			BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	18	15	Topsoil Thickness [6"] (GC) Residuum, CLAYEY GRAVEL WITH SAND, gray and brown, moist, dense		2120	13-14-20 (34)
	S-2	SS	6	6	(HWR) HIGHLY WEATHERED ROCK SAMPLED AS GRAVEL WITH SAND, gray, moist, very dense			50/6"
5	S-3	SS	18	15	(SC) CLAYEY SAND WITH GRAVEL, brown, moist, medium dense to very dense		2115	15-18-10 (28)
	S-4	SS	18	16				2-4-7 (11)
10							2110	
	S-5	SS	18	16				5-6-7 (13)
15							2105	
	S-6	SS	18	18				22-38-16 (54)
20					**END OF DRILLING AT 20.0 FT**		2100	
25							2095	
30							2090	

Plastic Limit Water Content Liquid Limit

STANDARD PENETRATION BLOWS/FT

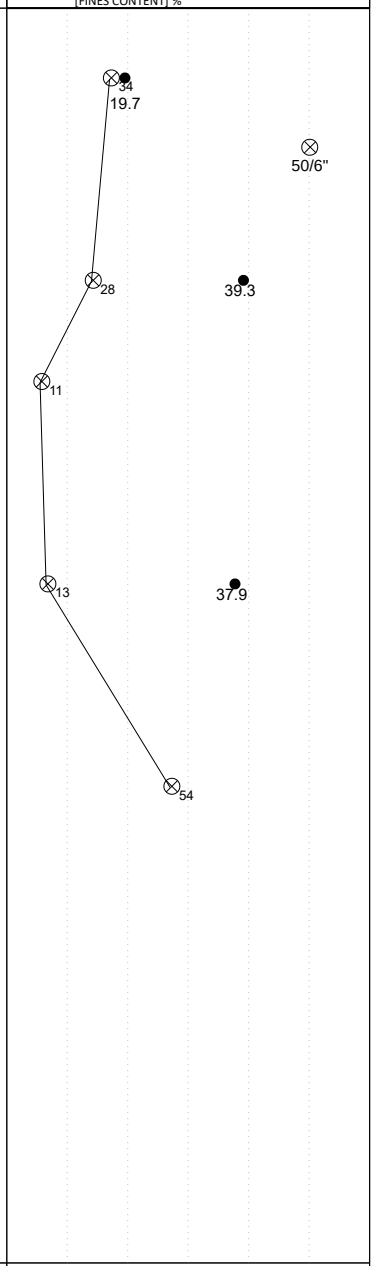
ROCK QUALITY DESIGNATION & RECOVERY

RQD

REC

CALIBRATED PENETROMETER TON/SF

[FINES CONTENT] %



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered) **Dry**	BORING STARTED: **Feb 17 2021**		CAVE IN DEPTH: **7.80**
WL (Completion)	BORING COMPLETED: **Feb 17 2021**		HAMMER TYPE: **Auto**
WL (Seasonal High Water)	EQUIPMENT: **ATV CME-55**	LOGGED BY: **BRD**	DRILLING METHOD: **2 1/4" HSA**
WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Gay and Neel, Inc.	**12:19208**	**B-08**	**1 of 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Auburn Park	**Blue Ridge Drilling, Inc.**		
SITE LOCATION:			LOSS OF CIRCULATION
3595 Riner Road, Riner, Virginia 24149			
NORTHING:	EASTING:	STATION:	SURFACE ELEVATION:
3555766.2	**10913189.5**		**2115.0**

Plastic Limit Water Content Liquid Limit
X———●———△

⊗ STANDARD PENETRATION BLOWS/FT
ROCK QUALITY DESIGNATION & RECOVERY
RQD
REC
○ CALIBRATED PENETROMETER TON/SF
[FINES CONTENT] %

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					Topsoil Thickness [7"]			
	S-1	SS	8	5	(HWR) HIGHLY WEATHERED ROCK SAMPLED AS GRAVEL WITH SAND, gray, moist, very dense			22-50/2" (50/2")
	S-2	SS	8	4				35-50/2" (50/2")
5					Refusal encountered at 5.5 feet. **END OF DRILLING AT 5.5 FT**		2110	
10							2105	
15							2100	
20							2095	
25							2090	
30							2085	

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered) **Dry**	BORING STARTED: **Feb 19 2021**		CAVE IN DEPTH: **2.10**
▼ WL (Completion)	BORING COMPLETED: **Feb 19 2021**		HAMMER TYPE: **Auto**
▼ WL (Seasonal High Water)	EQUIPMENT: **ATV CME-55**	LOGGED BY: **BRD**	DRILLING METHOD: **2 1/4" HSA**
▽ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Gay and Neel, Inc.	**12:19208**	**B-08A**	**1 of 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Auburn Park	**Blue Ridge Drilling, Inc.**		
SITE LOCATION: **3595 Riner Road, Riner, Virginia 24149**			LOSS OF CIRCULATION
NORTHING:	EASTING:	STATION:	SURFACE ELEVATION: **2115.0**

BOTTOM OF CASING

Plastic Limit Water Content Liquid Limit

⊗ STANDARD PENETRATION BLOWS/FT

ROCK QUALITY DESIGNATION & RECOVERY

RQD

REC

○ CALIBRATED PENETROMETER TON/SF

[FINES CONTENT] %

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Auger probed to refusal, no sampling performed.		2115	
5					Refusal encountered at 5.0 feet. **END OF DRILLING AT 5.0 FT** * performed 4' from B-08		2110	
10							2105	
15							2100	
20							2095	
25							2090	
30							2085	

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered) **Dry**	BORING STARTED: **Feb 19 2021**		CAVE IN DEPTH:
▼ WL (Completion)	BORING COMPLETED: **Feb 19 2021**		HAMMER TYPE: **Auto**
▼ WL (Seasonal High Water)	EQUIPMENT: **ATV CME-55**	LOGGED BY:	DRILLING METHOD: **2 1/4" HSA**
▽ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Gay and Neel, Inc.	**12:19208**	**B-09**	**1 of 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Auburn Park	**Blue Ridge Drilling, Inc.**		
SITE LOCATION: **3595 Riner Road, Riner, Virginia 24149**			LOSS OF CIRCULATION
NORTHING: **3555825.8**	EASTING: **10913316.9**	STATION:	SURFACE ELEVATION: **2109.0**
			BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					Topsoil Thickness [7"]			
	S-1	SS	18	18	(SM) Residuum, SILTY SAND WITH GRAVEL, tan, moist, very dense			6-19-40 (59)
	S-2	SS	8	6	(HWR) HIGHLY WEATHERED ROCK SAMPLED AS SILTY SAND WITH GRAVEL, tan, moist, very dense			24-50/2" (50/2")
5							2104	
	S-3	SS	18	18	(ML) SANDY SILT, brown, moist, very stiff			18-13-16 (29)
	S-4	SS	18	18				8-14-14 (28)
10					**END OF DRILLING AT 10.0 FT**		2099	
15							2094	
20							2089	
25							2084	
30							2079	

Plastic Limit Water Content Liquid Limit

X———●———△

⊗ **STANDARD PENETRATION BLOWS/FT**

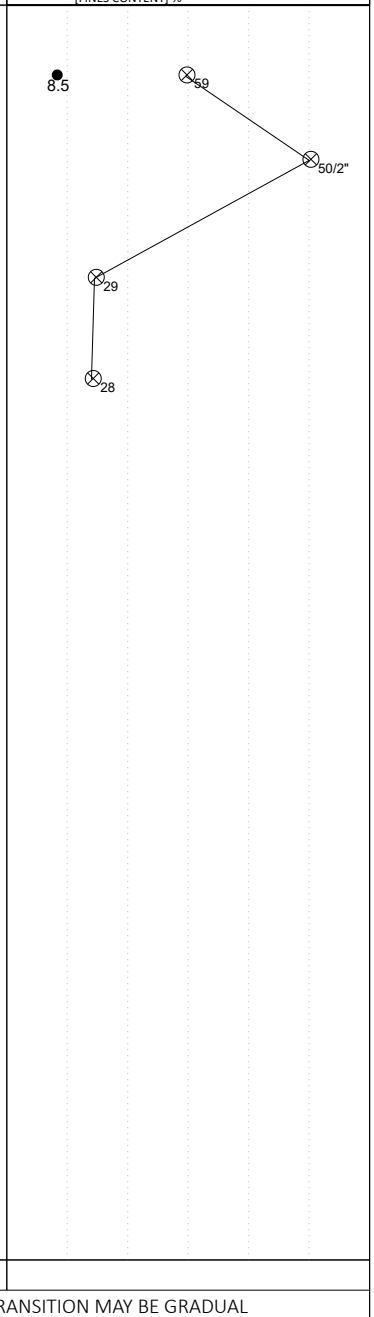
ROCK QUALITY DESIGNATION & RECOVERY

RQD

REC

○ **CALIBRATED PENETROMETER TON/SF**

[FINES CONTENT] %



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered) **Dry**	BORING STARTED: **Feb 19 2021**	CAVE IN DEPTH: **3.80**	
▼ WL (Completion)	BORING COMPLETED: **Feb 19 2021**	HAMMER TYPE: **Auto**	
▼ WL (Seasonal High Water)	EQUIPMENT: **ATV CME-55**	LOGGED BY: **BRD**	DRILLING METHOD: **2 1/4" HSA**
▽ WL (Stabilized)			

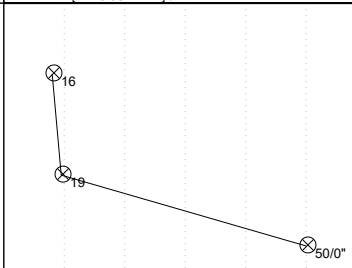
GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Gay and Neel, Inc.	**12:19208**	**B-10**	**1 of 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Auburn Park	**Blue Ridge Drilling, Inc.**		
SITE LOCATION: **3595 Riner Road, Riner, Virginia 24149**			LOSS OF CIRCULATION
NORTHING: **3555762.3**	EASTING: **10912903.9**	STATION:	SURFACE ELEVATION: **2109.0**
			BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					Topsoil Thickness [6"]			
	S-1	SS	18	18	(CL) Residuum, LEAN CLAY, trace sand, gray- brown, moist, very stiff			3-6-10 (16)
	S-2	SS	18	18				4-7-12 (19)
5	S-3	SS	0	0			2104	50/0" (50/0")
					No recovery, presumed to be HWR			
					Refusal encountered at 7.5 feet. **END OF DRILLING AT 7.5 FT**			
10							2099	
15							2094	
20							2089	
25							2084	
30							2079	

Plastic Limit Water Content Liquid Limit
X———●———△

⊗ STANDARD PENETRATION BLOWS/FT
ROCK QUALITY DESIGNATION & RECOVERY
RQD
REC
○ CALIBRATED PENETROMETER TON/SF
[FINES CONTENT] %



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered) **Dry**	BORING STARTED: **Feb 17 2021**		CAVE IN DEPTH: **Not Observed**
▼ WL (Completion)	BORING COMPLETED: **Feb 17 2021**		HAMMER TYPE: **Auto**
▼ WL (Seasonal High Water)	EQUIPMENT: **ATV CME-55**	LOGGED BY: **BRD**	DRILLING METHOD: **2 1/4" HSA**
▽ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Gay and Neel, Inc.	**12:19208**	**B-11**	**1 of 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Auburn Park	**Blue Ridge Drilling, Inc.**		
SITE LOCATION: **3595 Riner Road, Riner, Virginia 24149**			LOSS OF CIRCULATION
NORTHING: **3555801.2**	EASTING: **10913024.1**	STATION:	SURFACE ELEVATION: **2110.0**
			BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					Topsoil Thickness [6"]			
	S-1	SS	18	15	(CL) Residuum, LEAN CLAY, trace sand, brown, moist, stiff			2-3-6 (9)
	S-2	SS	18	14				3-5-7 (12)
5							2105	
	S-3	SS	18	15	(CH) FAT CLAY, red brown, moist, stiff			4-6-7 (13)
	S-4	SS	18	18				5-6-6 (12)
10					**END OF DRILLING AT 10.0 FT**		2100	
15							2095	
20							2090	
25							2085	
30							2080	

Plastic Limit Water Content Liquid Limit

X———●———△

⊗ STANDARD PENETRATION BLOWS/FT

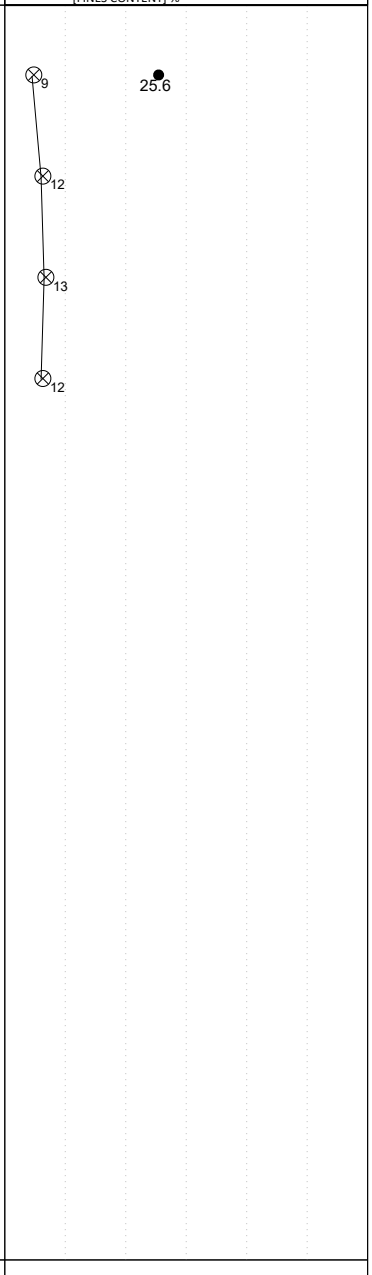
ROCK QUALITY DESIGNATION & RECOVERY

RQD

REC

○ CALIBRATED PENETROMETER TON/SF

[FINES CONTENT] %



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered) **Dry**	BORING STARTED: **Feb 17 2021**		CAVE IN DEPTH: **5.20**
▼ WL (Completion)	BORING COMPLETED: **Feb 17 2021**		HAMMER TYPE: **Auto**
▼ WL (Seasonal High Water)	EQUIPMENT: **ATV CME-55**	LOGGED BY: **BRD**	DRILLING METHOD: **2 1/4" HSA**
▽ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

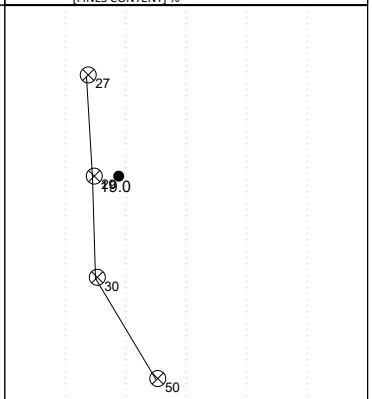
CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Gay and Neel, Inc.	**12:19208**	**B-12**	**1 of 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Auburn Park	**Blue Ridge Drilling, Inc.**		
SITE LOCATION:			LOSS OF CIRCULATION
3595 Riner Road, Riner, Virginia 24149			
NORTHING:	EASTING:	STATION:	SURFACE ELEVATION:
3555944.5	**10913114.2**		**2098.0**

BOTTOM OF CASING

Plastic Limit Water Content Liquid Limit
X———●———△

⊗ STANDARD PENETRATION BLOWS/FT
ROCK QUALITY DESIGNATION & RECOVERY
RQD
REC
○ CALIBRATED PENETROMETER TON/SF
[FINES CONTENT] %

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					Topsoil Thickness [7"]			
	S-1	SS	18	14	(SM) Residuum, SILTY SAND WITH GRAVEL, tan, moist, medium dense to dense			2-6-21 (27)
	S-2	SS	18	16				7-13-16 (29)
5							2093	
	S-3	SS	18	16				6-13-17 (30)
	S-4	SS	18	14				11-18-32 (50)
10					**END OF DRILLING AT 10.0 FT**		2088	
15							2083	
20							2078	
25							2073	
30							2068	



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered) **Dry**	BORING STARTED: **Feb 19 2021**	CAVE IN DEPTH: **4.90**	
▼ WL (Completion)	BORING COMPLETED: **Feb 19 2021**	HAMMER TYPE: **Auto**	
▼ WL (Seasonal High Water)	EQUIPMENT: **ATV CME-55**	LOGGED BY: **BRD**	DRILLING METHOD: **2 1/4" HSA**
▽ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Gay and Neel, Inc.	**12:19208**	**B-13**	**1 of 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Auburn Park	**Blue Ridge Drilling, Inc.**		
SITE LOCATION:			LOSS OF CIRCULATION
3595 Riner Road, Riner, Virginia 24149			
NORTHING:	EASTING:	STATION:	SURFACE ELEVATION:
3556208.8	**10912884.3**		**2072.0**

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					Topsoil Thickness [7"]			
	S-1	SS	18	18	(ML) Residuum, SANDY SILT, gray- brown, moist, stiff to very stiff			2-6-7 (13)
	S-2	SS	18	18				4-5-8 (13)
5							2067	
	S-3	SS	18	18				6-8-14 (22)
	S-4	SS	18	18				7-11-16 (27)
10					**END OF DRILLING AT 10.0 FT**		2062	
15							2057	
20							2052	
25							2047	
30							2042	

Plastic Limit Water Content Liquid Limit

X———●———△

⊗ **STANDARD PENETRATION BLOWS/FT**

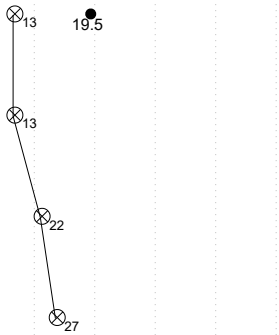
ROCK QUALITY DESIGNATION & RECOVERY

RQD

REC

○ **CALIBRATED PENETROMETER TON/SF**

[FINES CONTENT] %



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered) **Dry**	BORING STARTED: **Feb 19 2021**	CAVE IN DEPTH: **3.80**	
▼ WL (Completion)	BORING COMPLETED: **Feb 19 2021**	HAMMER TYPE: **Auto**	
▼ WL (Seasonal High Water)	EQUIPMENT: **ATV CME-55**	LOGGED BY: **BRD**	DRILLING METHOD: **2 1/4" HSA**
▽ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Gay and Neel, Inc.	**12:19208**	**B-14**	**1 of 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Auburn Park	**Blue Ridge Drilling, Inc.**		
SITE LOCATION:			LOSS OF CIRCULATION
3595 Riner Road, Riner, Virginia 24149			
NORTHING:	EASTING:	STATION:	SURFACE ELEVATION:
3556457.0	**10912791.0**		**2101.0**

BOTTOM OF CASING

Plastic Limit Water Content Liquid Limit

STANDARD PENETRATION BLOWS/FT

ROCK QUALITY DESIGNATION & RECOVERY

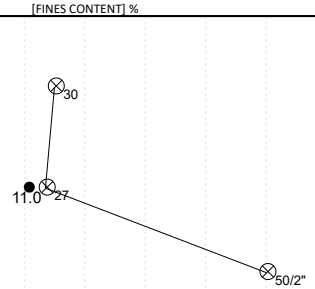
RQD

REC

CALIBRATED PENETROMETER TON/SF

[FINES CONTENT] %

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					Topsoil Thickness [7"]			
	S-1	SS	18	14	(SM) Residuum, SILTY SAND, tan, moist, medium dense			6-15-15 (30)
	S-2	SS	18	16				6-13-14 (27)
5							2096	
	S-3	SS	8	8	(HWR) HIGHLY WEATHERED ROCK SAMPLED AS SILTY SAND WITH GRAVEL, tan, very dense, moist			35-50/2" (50/2")
					Refusal encountered at 7.5 feet.			
					END OF DRILLING AT 7.5 FT			
10							2091	
15							2086	
20							2081	
25							2076	
30							2071	



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered) **Dry**	BORING STARTED: **Feb 22 2021**		CAVE IN DEPTH: **3.10**
▼ WL (Completion)	BORING COMPLETED: **Feb 22 2021**		HAMMER TYPE: **Auto**
▼ WL (Seasonal High Water)	EQUIPMENT: **ATV CME-55**	LOGGED BY: **BRD**	DRILLING METHOD: **2 1/4" HSA**
▽ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Gay and Neel, Inc.	**12:19208**	**B-15**	**1 of 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Auburn Park	**Blue Ridge Drilling, Inc.**		
SITE LOCATION:			LOSS OF CIRCULATION
3595 Riner Road, Riner, Virginia 24149			
NORTHING:	EASTING:	STATION:	SURFACE ELEVATION:
3556430.7	**10912982.7**		**28.0**

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					Topsoil Thickness [6"]			
	S-1	SS	18	16	(ML) Residuum, SANDY SILT, tan and purple, moist, very stiff to hard			2-9-10 (19)
	S-2	SS	18	15				7-10-16 (26)
5							23	
	S-3	SS	18	16				7-11-15 (26)
	S-4	SS	18	15				12-15-20 (35)
10					**END OF DRILLING AT 10.0 FT**		18	
15							13	
20							8	
25							3	
30							-2	

Plastic Limit Water Content Liquid Limit

X———●———△

⊗ STANDARD PENETRATION BLOWS/FT

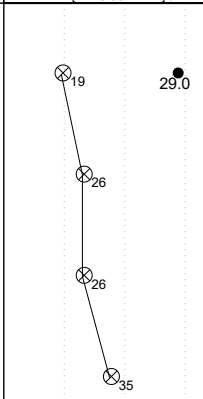
ROCK QUALITY DESIGNATION & RECOVERY

RQD

REC

○ CALIBRATED PENETROMETER TON/SF

[FINES CONTENT] %



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered) **Dry**	BORING STARTED: **Feb 22 2021**		CAVE IN DEPTH: **4.40**
▼ WL (Completion)	BORING COMPLETED: **Feb 22 2021**		HAMMER TYPE: **Auto**
▼ WL (Seasonal High Water)	EQUIPMENT: **ATV CME-55**	LOGGED BY: **BRD**	DRILLING METHOD: **2 1/4" HSA**
▽ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Gay and Neel, Inc.	**12:19208**	**B-16**	**1 of 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Auburn Park	**Blue Ridge Drilling, Inc.**		
SITE LOCATION: **3595 Riner Road, Riner, Virginia 24149**			LOSS OF CIRCULATION
NORTHING: **3556508.5**	EASTING: **10912891.3**	STATION:	SURFACE ELEVATION: **2108.0**
			BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					Topsoil Thickness [5"]			
	S-1	SS	18	14	(ML) Residuum, SANDY SILT, tan, moist, very stiff to hard			6-8-10 (18)
	S-2	SS	18	15				9-14-13 (27)
5							2103	
	S-3	SS	18	18				6-15-16 (31)
	S-4	SS	18	18	(CH) FAT CLAY WITH SAND, brown, moist, stiff			6-4-9 (13)
10							2098	
	S-5	SS	18	16	(SM) SILTY SAND WITH GRAVEL, tan brown, moist, dense			9-18-32 (50)
15							2093	
	S-6	SS	9	7	(HWR) HIGHLY WEATHERED ROCK SAMPLED AS SILTY SAND WITH GRAVEL, tan- gray, moist, very dense			17-50/3" (50/3")
20							2088	
					Refusal encountered at 22.0 feet. **END OF DRILLING AT 22.0 FT**			
25							2083	
30							2078	

Plastic Limit Water Content Liquid Limit

⊗ STANDARD PENETRATION BLOWS/FT

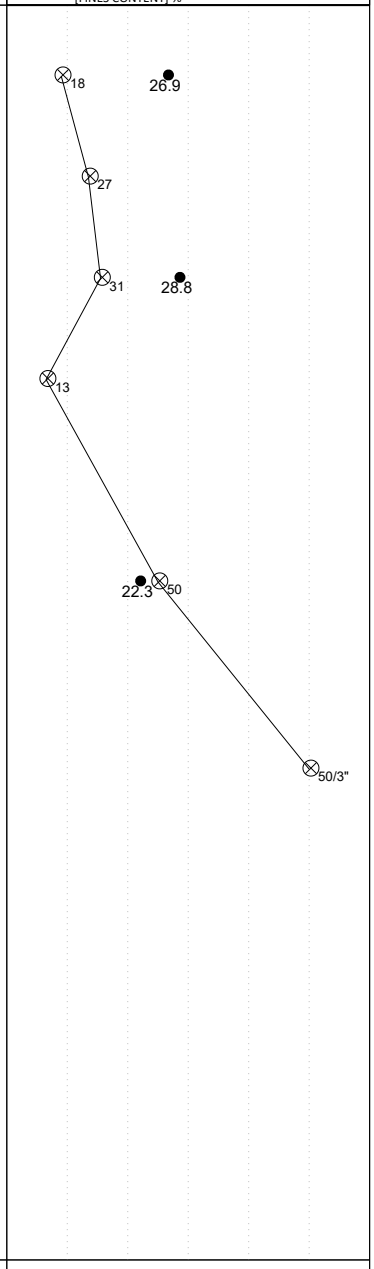
ROCK QUALITY DESIGNATION & RECOVERY

RQD

REC

○ CALIBRATED PENETROMETER TON/SF

[FINES CONTENT] %



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered) **Dry**	BORING STARTED: **Feb 17 2021**	CAVE IN DEPTH: **Not Observed**	
▼ WL (Completion)	BORING COMPLETED: **Feb 17 2021**	HAMMER TYPE: **Auto**	
▼ WL (Seasonal High Water)	EQUIPMENT: **ATV CME-55**	LOGGED BY: **BRD**	DRILLING METHOD: **2 1/4" HSA**
▽ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Gay and Neel, Inc.	**12:19208**	**B-17**	**1 of 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Auburn Park	**Blue Ridge Drilling, Inc.**		
SITE LOCATION: **3595 Riner Road, Riner, Virginia 24149**			LOSS OF CIRCULATION
NORTHING: **3556593.6**	EASTING: **10912954.5**	STATION:	SURFACE ELEVATION: **2112.0**
			BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	18	15	(SM) Residuum, SILTY SAND WITH GRAVEL, tan- brown, moist, medium dense to very dense		2112	5-13-14 (27)
	S-2	SS	18	14				8-17-24 (41)
5	S-3	SS	18	15			2107	4-7-13 (20)
	S-4	SS	18	14				18-21-33 (54)
10							2102	
	S-5	SS	18	18	(SM) SILTY SAND, brown, moist, medium dense			4-7-9 (16)
15							2097	
	S-6	SS	18	18				7-10-16 (26)
20					**END OF DRILLING AT 20.0 FT**		2092	
25							2087	
30							2082	

Plastic Limit Water Content Liquid Limit

STANDARD PENETRATION BLOWS/FT

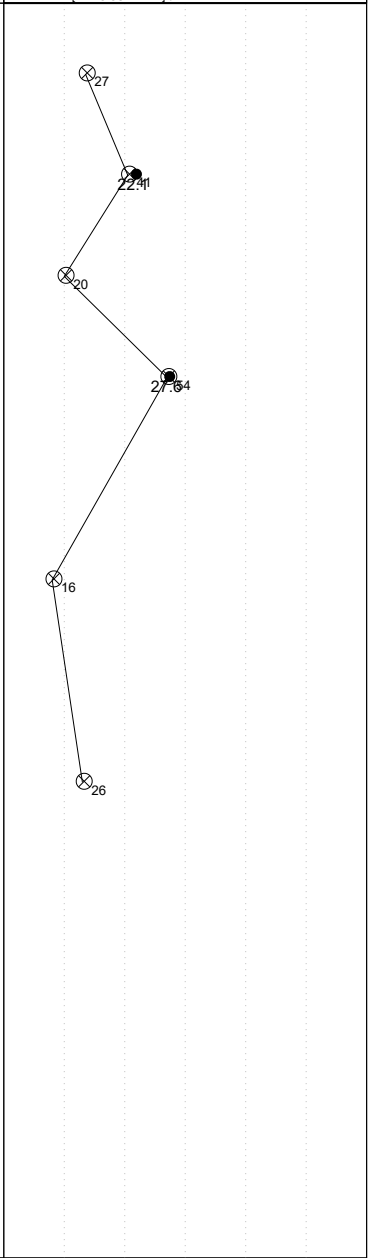
ROCK QUALITY DESIGNATION & RECOVERY

RQD

REC

CALIBRATED PENETROMETER TON/SF

[FINES CONTENT] %



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered) **Dry**	BORING STARTED: **Feb 22 2021**		CAVE IN DEPTH: **11.40**
▼ WL (Completion)	BORING COMPLETED: **Feb 22 2021**		HAMMER TYPE: **Auto**
▼ WL (Seasonal High Water)	EQUIPMENT: **ATV CME-55**	LOGGED BY: **BRD**	DRILLING METHOD: **2 1/4" HSA**
▽ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Gay and Neel, Inc.	**12:19208**	**B-18**	**1 of 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Auburn Park	**Blue Ridge Drilling, Inc.**		
SITE LOCATION:			LOSS OF CIRCULATION
3595 Riner Road, Riner, Virginia 24149			
NORTHING:	EASTING:	STATION:	SURFACE ELEVATION:
3556499.0	**10913106.0**		**2100.0**

BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					Topsoil Thickness [7"]			
	S-1	SS	18	16	(ML) Residuum, SILT, brown trace sand, moist, soft to firm			2-2-2 (4)
	S-2	SS	18	15				2-3-4 (7)
5							2095	
	S-3	SS	18	18	(ML) SANDY SILT, tan, wet, soft to firm	▽		1-2-2 (4)
	S-4	SS	18	18				2-2-4 (6)
10					**END OF DRILLING AT 10.0 FT**		2090	
15							2085	
20							2080	
25							2075	
30							2070	

Plastic Limit Water Content Liquid Limit
X———●———△

⊗ STANDARD PENETRATION BLOWS/FT

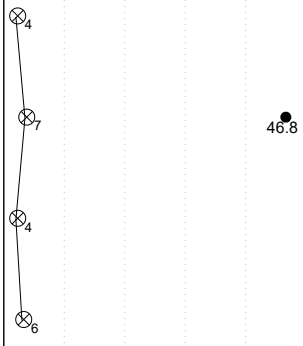
ROCK QUALITY DESIGNATION & RECOVERY

RQD

REC

○ CALIBRATED PENETROMETER TON/SF

[FINES CONTENT] %



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

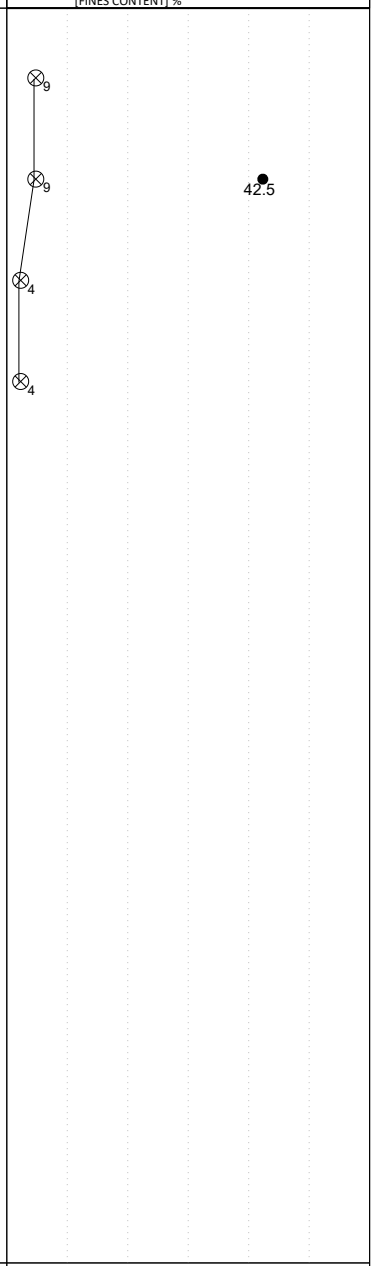
▽ WL (First Encountered) **6.0**	BORING STARTED: **Feb 22 2021**	CAVE IN DEPTH: **4.10**	
▼ WL (Completion)	BORING COMPLETED: **Feb 22 2021**	HAMMER TYPE: **Auto**	
▼ WL (Seasonal High Water)	EQUIPMENT: **ATV CME-55**	LOGGED BY: **BRD**	DRILLING METHOD: **2 1/4" HSA**
▽ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Gay and Neel, Inc.	**12:19208**	**B-19**	**1 of 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Auburn Park	**Blue Ridge Drilling, Inc.**		
SITE LOCATION: **3595 Riner Road, Riner, Virginia 24149**			LOSS OF CIRCULATION
NORTHING: **3556245.9**	EASTING: **10913214.2**	STATION:	SURFACE ELEVATION: **2085.0**
			BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Topsoil Thickness [7"]		2085	
	S-1	SS	18	13	(CL) Residuum, LEAN CLAY, trace sand, gray- brown, moist, stiff			3-4-5 (9)
	S-2	SS	18	18				3-4-5 (9)
5							2080	
	S-3	SS	18	18	(ML) SANDY SILT, brown, moist, soft			3-2-2 (4)
	S-4	SS	18	18				1-2-2 (4)
10					**END OF DRILLING AT 10.0 FT**		2075	
15							2070	
20							2065	
25							2060	
30							2055	

Plastic Limit Water Content Liquid Limit
X———●———△
⊗ STANDARD PENETRATION BLOWS/FT
ROCK QUALITY DESIGNATION & RECOVERY
RQD
REC
○ CALIBRATED PENETROMETER TON/SF
[FINES CONTENT] %



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered) **Dry**	BORING STARTED: **Feb 19 2021**		CAVE IN DEPTH: **5.10**
▼ WL (Completion)	BORING COMPLETED: **Feb 19 2021**		HAMMER TYPE: **Auto**
▼ WL (Seasonal High Water)	EQUIPMENT: **ATV CME-55**	LOGGED BY: **BRD**	DRILLING METHOD: **2 1/4" HSA**
▽ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Gay and Neel, Inc.	**12:19208**	**B-20**	**1 of 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Auburn Park	**Blue Ridge Drilling, Inc.**		
SITE LOCATION:			LOSS OF CIRCULATION
3595 Riner Road, Riner, Virginia 24149			
NORTHING:	EASTING:	STATION:	SURFACE ELEVATION:
3556677.5	**10913018.0**		**2110.0**

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					Topsoil Thickness [6"]			
	S-1	SS	18	15	(CL) LEAN CLAY WITH SAND, brown, trace gravel, moist, dense to medium dense			9-18-19 (37)
	S-2	SS	18	12				4-2-21 (23)
5							2105	
	S-3	SS	11	11	(HWR) HIGHLY WEATHERED ROCK SAMPLED AS GRAVEL WITH SAND, gray, moist, very dense			8-50/5" (50/5")
	S-4	SS	18	15	(SM) SILTY SAND, tan, moist, very dense to medium dense			13-30-35 (65)
10							2100	
	S-5	SS	18	14				3-13-12 (25)
15							2095	
	S-6	SS	5	5	(HWR) HIGHLY WEATHERED ROCK SAMPLED AS SILTY SAND, trace gravel, purple, moist, very dense			50/5" (50/5")
20							2090	
					Refusal encountered at 21.0 feet. **END OF DRILLING AT 21.0 FT**			
25							2085	
30							2080	

Plastic Limit Water Content Liquid Limit

X———●———△

⊗ STANDARD PENETRATION BLOWS/FT

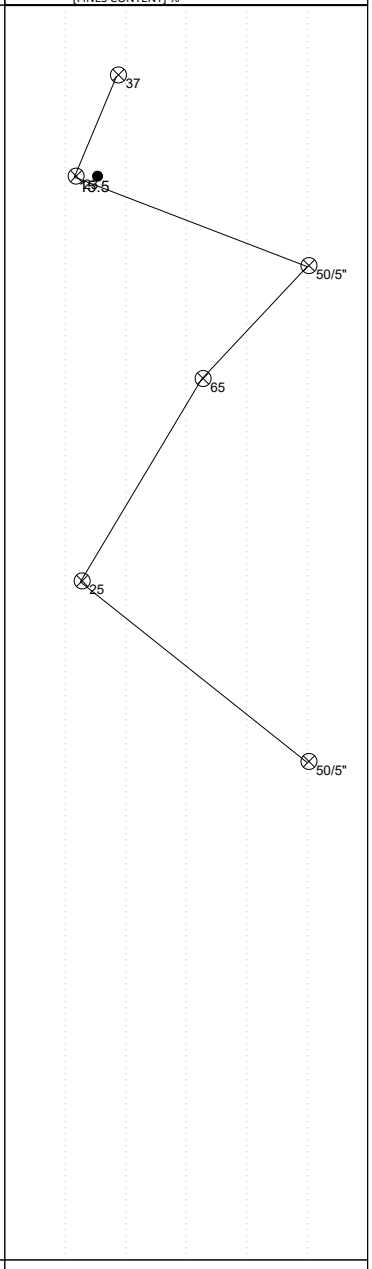
ROCK QUALITY DESIGNATION & RECOVERY

RQD

REC

○ CALIBRATED PENETROMETER TON/SF

[FINES CONTENT] %



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered) **Dry**	BORING STARTED: **Feb 17 2021**	CAVE IN DEPTH: **7.40**	
▼ WL (Completion)	BORING COMPLETED: **Feb 17 2021**	HAMMER TYPE: **Auto**	
▼ WL (Seasonal High Water)	EQUIPMENT: **ATV CME-55**	LOGGED BY: **BRD**	DRILLING METHOD: **2 1/4" HSA**
▽ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Gay and Neel, Inc.	**12:19208**	**B-21**	**1 of 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Auburn Park	**Blue Ridge Drilling, Inc.**		
SITE LOCATION: **3595 Riner Road, Riner, Virginia 24149**			LOSS OF CIRCULATION
NORTHING: **3556656.7**	EASTING: **10913153.0**	STATION:	SURFACE ELEVATION: **2105.0**
			BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					Topsoil Thickness [6"]			
	S-1	SS	18	16	(ML) Residuum, SILT, trace sand, tan-gray, moist, stiff			2-5-8 (13)
	S-2	SS	18	16	(SM) SILTY SAND WITH GRAVEL, gray, moist, medium dense to dense			4-7-13 (20)
5	S-3	SS	18	17			2100	14-20-15 (35)
	S-4	SS	18	16				17-18-22 (40)
10					Refusal encountered at 11.5 feet. **END OF DRILLING AT 11.5 FT**		2095	
15							2090	
20							2085	
25							2080	
30							2075	

Plastic Limit Water Content Liquid Limit

X———●———△

⊗ STANDARD PENETRATION BLOWS/FT

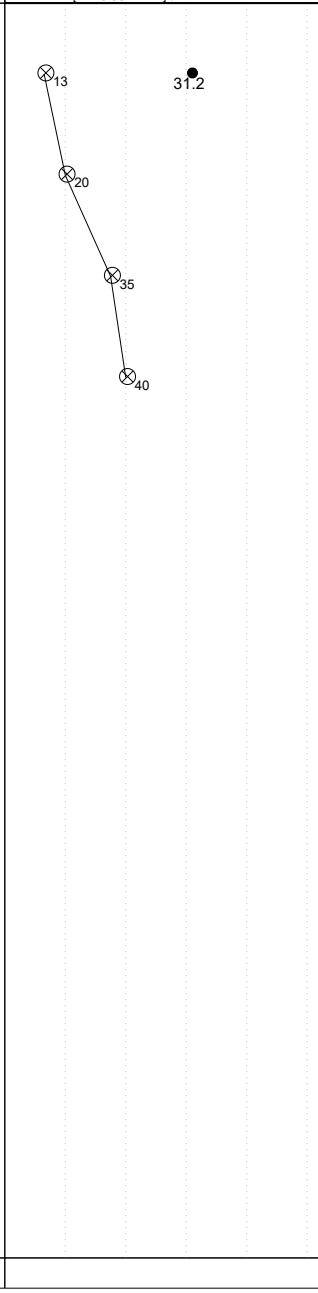
ROCK QUALITY DESIGNATION & RECOVERY

RQD

REC

○ CALIBRATED PENETROMETER TON/SF

[FINES CONTENT] %



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered) **Dry**	BORING STARTED: **Feb 22 2021**		CAVE IN DEPTH: **5.70**
▼ WL (Completion)	BORING COMPLETED: **Feb 22 2021**		HAMMER TYPE: **Auto**
▼ WL (Seasonal High Water)	EQUIPMENT: **ATV CME-55**	LOGGED BY: **BRD**	DRILLING METHOD: **2 1/4" HSA**
▽ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Gay and Neel, Inc.	**12:19208**	**B-22**	**1 of 1**

PROJECT NAME:	DRILLER/CONTRACTOR:
Auburn Park	**Blue Ridge Drilling, Inc.**

SITE LOCATION: **3595 Riner Road, Riner, Virginia 24149**

LOSS OF CIRCULATION

BOTTOM OF CASING

NORTHING:	EASTING:	STATION:	SURFACE ELEVATION:
3556869.3	**10913052.7**		**2096.0**

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					Topsoil Thickness [6"]			
	S-1	SS	18	16	(CH) FAT CLAY, trace sand, tan-gray, moist, firm to stiff			2-3-4 (7)
	S-2	SS	18	14				3-5-7 (12)
5							2091	
	S-3	SS	18	16	(CH) FAT CLAY, brown, moist, stiff to firm			3-5-4 (9)
	S-4	SS	18	15				4-3-4 (7)
10					**END OF DRILLING AT 10.0 FT**		2086	
15							2081	
20							2076	
25							2071	
30							2066	

Plastic Limit Water Content Liquid Limit

STANDARD PENETRATION BLOWS/FT

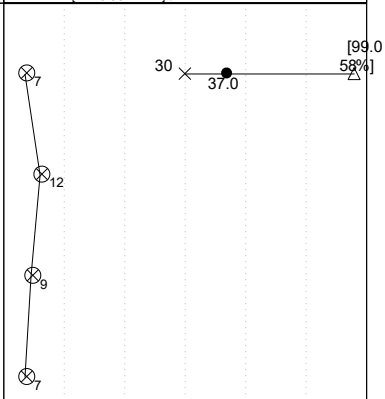
ROCK QUALITY DESIGNATION & RECOVERY

RQD

REC

CALIBRATED PENETROMETER TON/SF

[FINES CONTENT] %



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered) **Dry**	BORING STARTED: **Feb 22 2021**	CAVE IN DEPTH: **4.60**	
▼ WL (Completion)	BORING COMPLETED: **Feb 22 2021**	HAMMER TYPE: **Auto**	
▼ WL (Seasonal High Water)	EQUIPMENT: **ATV CME-55**	LOGGED BY: **BRD**	DRILLING METHOD: **2 1/4" HSA**
▽ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Gay and Neel, Inc.	**12:19208**	**B-23**	**1 of 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Auburn Park	**Blue Ridge Drilling, Inc.**		
SITE LOCATION:			LOSS OF CIRCULATION
3595 Riner Road, Riner, Virginia 24149			
NORTHING:	EASTING:	STATION:	SURFACE ELEVATION:
3557047.5	**10912927.3**		**2075.0**

BOTTOM OF CASING

Plastic Limit Water Content Liquid Limit

STANDARD PENETRATION BLOWS/FT

ROCK QUALITY DESIGNATION & RECOVERY

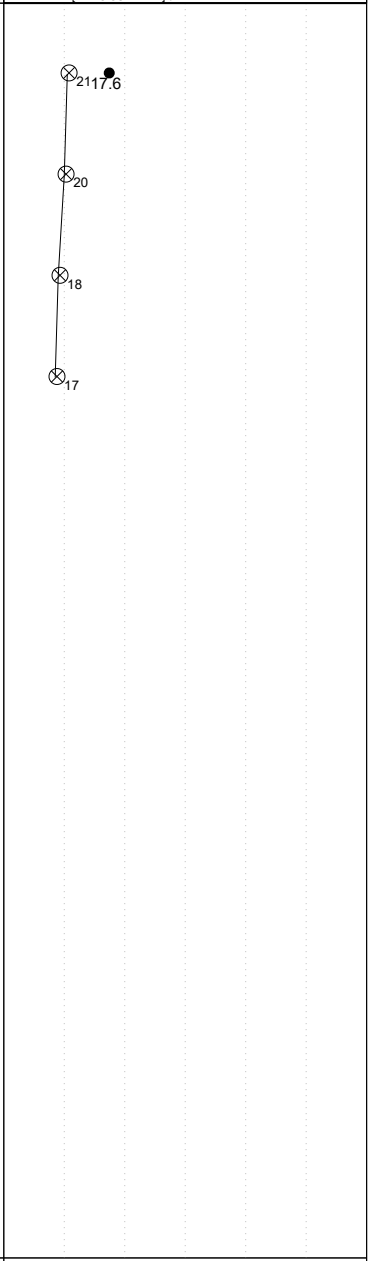
RQD

REC

CALIBRATED PENETROMETER TON/SF

[FINES CONTENT] %

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					Topsoil Thickness [7"]			
	S-1	SS	18	16	(ML) Residuum, SANDY SILT, brown, moist, very stiff			6-9-12 (21)
	S-2	SS	18	15				5-7-13 (20)
5							2070	
	S-3	SS	18	16				2-11-7 (18)
	S-4	SS	18	15				8-8-9 (17)
10					**END OF DRILLING AT 10.0 FT**		2065	
15							2060	
20							2055	
25							2050	
30							2045	



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered) **Dry**	BORING STARTED: **Feb 22 2021**	CAVE IN DEPTH: **4.70**	
▼ WL (Completion)	BORING COMPLETED: **Feb 22 2021**	HAMMER TYPE: **Auto**	
▼ WL (Seasonal High Water)	EQUIPMENT: **ATV CME-55**	LOGGED BY: **BRD**	DRILLING METHOD: **2 1/4" HSA**
▽ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Gay and Neel, Inc.	**12:19208**	**B-24**	**1 of 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Auburn Park	**Blue Ridge Drilling, Inc.**		
SITE LOCATION:			LOSS OF CIRCULATION
3595 Riner Road, Riner, Virginia 24149			
NORTHING:	EASTING:	STATION:	SURFACE ELEVATION:
3556613.2	**10913296.2**		**2100.0**

BOTTOM OF CASING

Plastic Limit Water Content Liquid Limit

⊗ STANDARD PENETRATION BLOWS/FT

ROCK QUALITY DESIGNATION & RECOVERY

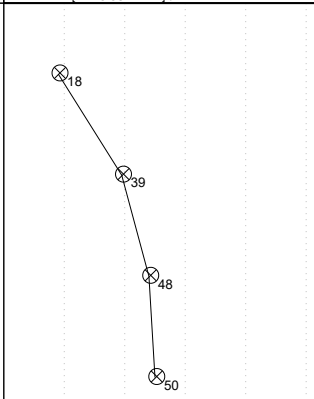
RQD

REC

○ CALIBRATED PENETROMETER TON/SF

[FINES CONTENT] %

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					Topsoil Thickness [6"]			
	S-1	SS	18	16	(SM) Residuum, SILTY SAND WITH GRAVEL, gray- brown, moist, medium dense to dense			4-5-13 (18)
	S-2	SS	18	17				5-13-26 (39)
5							2095	
	S-3	SS	18	16				25-23-25 (48)
	S-4	SS	18	16				20-22-28 (50)
10					**END OF DRILLING AT 10.0 FT**		2090	
15							2085	
20							2080	
25							2075	
30							2070	



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered) **Dry**	BORING STARTED: **Feb 22 2021**		CAVE IN DEPTH: **4.80**
▼ WL (Completion)	BORING COMPLETED: **Feb 22 2021**		HAMMER TYPE: **Auto**
▼ WL (Seasonal High Water)	EQUIPMENT: **ATV CME-55**	LOGGED BY: **BRD**	DRILLING METHOD: **2 1/4" HSA**
▽ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Gay and Neel, Inc.	**12:19208**	**B-25**	**1 of 1**

PROJECT NAME:	DRILLER/CONTRACTOR:
Auburn Park	**Blue Ridge Drilling, Inc.**

SITE LOCATION: **3595 Riner Road, Riner, Virginia 24149**

LOSS OF CIRCULATION

BOTTOM OF CASING

NORTHING:	EASTING:	STATION:	SURFACE ELEVATION:
3556775.2	**10913250.1**		**2101.0**

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					Topsoil Thickness [6"]			
	S-1	SS	18	16	(MH) Residuum, ELASTIC SILT, trace sand, brown, moist, firm			2-3-3 (6)
	S-2	SS	18	14				2-3-4 (7)
5							2096	
	S-3	SS	18	14	(ML) SANDY SILT, tan and purple, moist, stiff to very stiff			2-4-5 (9)
	S-4	SS	18	16				4-6-11 (17)
10							2091	
	S-5	SS	18	16				8-9-8 (17)
15					**END OF DRILLING AT 15.0 FT**		2086	
20							2081	
25							2076	
30							2071	

Plastic Limit Water Content Liquid Limit

⊗ STANDARD PENETRATION BLOWS/FT

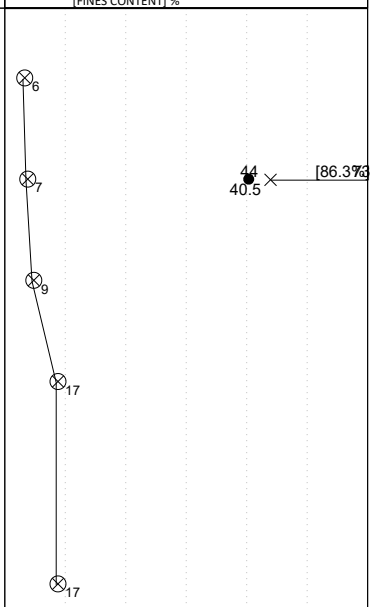
ROCK QUALITY DESIGNATION & RECOVERY

RQD

REC

○ CALIBRATED PENETROMETER TON/SF

[FINES CONTENT] %



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered) **Dry**	BORING STARTED: **Feb 22 2021**	CAVE IN DEPTH: **7.90**	
▼ WL (Completion)	BORING COMPLETED: **Feb 22 2021**	HAMMER TYPE: **Auto**	
▼ WL (Seasonal High Water)	EQUIPMENT: **ATV CME-55**	LOGGED BY: **BRD**	DRILLING METHOD: **2 1/4" HSA**
▽ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Gay and Neel, Inc.	**12:19208**	**B-26**	**1 of 1**

PROJECT NAME:	DRILLER/CONTRACTOR:
Auburn Park	**Blue Ridge Drilling, Inc.**

SITE LOCATION: **3595 Riner Road, Riner, Virginia 24149**

LOSS OF CIRCULATION

BOTTOM OF CASING

NORTHING:	EASTING:	STATION:	SURFACE ELEVATION:
3556425.6	**10913558.7**		**2081.0**

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					Topsoil Thickness [6"]			
	S-1	SS	18	14	(ML) Residuum, SILT WITH SAND, brown, moist, stiff to firm			2-3-6 (9)
	S-2	SS	18	18				2-6-9 (15)
5							2076	
	S-3	SS	18	18				2-3-3 (6)
	S-4	SS	18	18				2-3-3 (6)
10					**END OF DRILLING AT 10.0 FT**		2071	
15							2066	
20							2061	
25							2056	
30							2051	

Plastic Limit Water Content Liquid Limit

X———●———△

⊗ **STANDARD PENETRATION BLOWS/FT**

ROCK QUALITY DESIGNATION & RECOVERY

RQD

REC

○ **CALIBRATED PENETROMETER TON/SF**

[FINES CONTENT] %

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered) **Dry**	BORING STARTED: **Feb 19 2021**		CAVE IN DEPTH: **4.40**
▼ WL (Completion)	BORING COMPLETED: **Feb 19 2021**		HAMMER TYPE: **Auto**
▼ WL (Seasonal High Water)	EQUIPMENT: **ATV CME-55**	LOGGED BY: **BRD**	DRILLING METHOD: **2 1/4" HSA**
▽ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Gay and Neel, Inc.	**12:19208**	**B-27**	**1 of 1**

PROJECT NAME:	DRILLER/CONTRACTOR:
Auburn Park	**Blue Ridge Drilling, Inc.**

SITE LOCATION: **3595 Riner Road, Riner, Virginia 24149**

LOSS OF CIRCULATION

NORTHING:	EASTING:	STATION:	SURFACE ELEVATION:
3556464.4	**10913899.0**		**2072.0**

BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Topsoil Thickness [6"]			
	S-1	SS	18	18	(ML) Residuum, SILT WITH SAND, brown, moist, stiff			2-4-5 (9)
	S-2	SS	18	18				2-5-5 (10)
5							2067	
	S-3	SS	18	16				3-5-4 (9)
	S-4	SS	18	18				3-5-5 (10)
10					**END OF DRILLING AT 10.0 FT**		2062	
15							2057	
20							2052	
25							2047	
30							2042	

Plastic Limit Water Content Liquid Limit

X———●———△

⊗ **STANDARD PENETRATION BLOWS/FT**

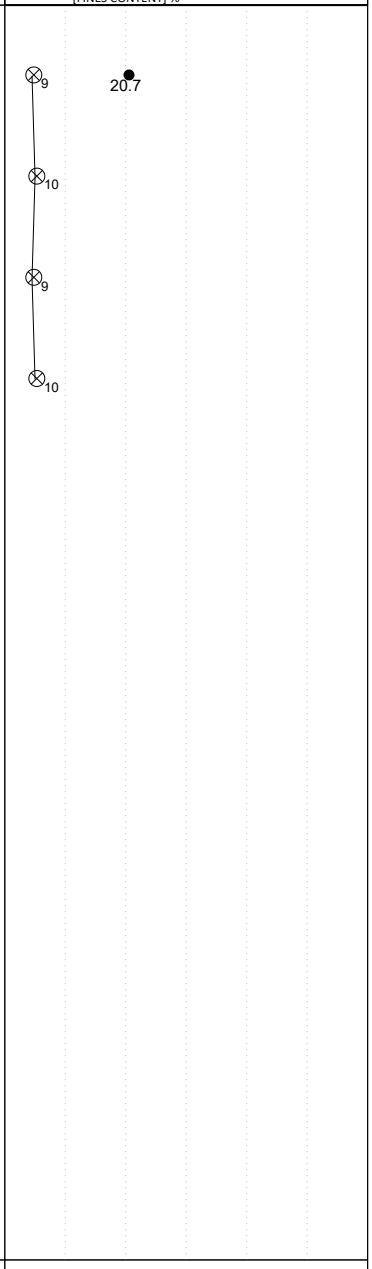
ROCK QUALITY DESIGNATION & RECOVERY

RQD

REC

○ **CALIBRATED PENETROMETER TON/SF**

[FINES CONTENT] %



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered) **Dry**	BORING STARTED: **Feb 19 2021**	CAVE IN DEPTH: **5.40**	
▼ WL (Completion)	BORING COMPLETED: **Feb 19 2021**	HAMMER TYPE: **Auto**	
▼ WL (Seasonal High Water)	EQUIPMENT: **ATV CME-55**	LOGGED BY: **BRD**	DRILLING METHOD: **2 1/4" HSA**
▽ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Gay and Neel, Inc.	**12:19208**	**SWM-1**	**1 of 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Auburn Park	**Blue Ridge Drilling, Inc.**		
SITE LOCATION: **3595 Riner Road, Riner, Virginia 24149**			LOSS OF CIRCULATION
NORTHING: **3555106.8**	EASTING: **10913227.8**	STATION:	SURFACE ELEVATION: **2061.0**
			BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					Topsoil Thickness [5"]			
	S-1	SS	18	16	(ML) Residuum, SILT WITH SAND, tan, moist, stiff			3-7-8 (15)
	S-2	SS	18	18	(ML) SANDY SILT, tan, moist, very stiff to stiff			5-7-10 (17)
5							2056	
	S-3	SS	18	18				6-9-11 (20)
	S-4	SS	18	16				5-7-6 (13)
10					**END OF DRILLING AT 10.0 FT**		2051	
15							2046	
20							2041	
25							2036	
30							2031	

Plastic Limit Water Content Liquid Limit

X———●———△

⊗ STANDARD PENETRATION BLOWS/FT

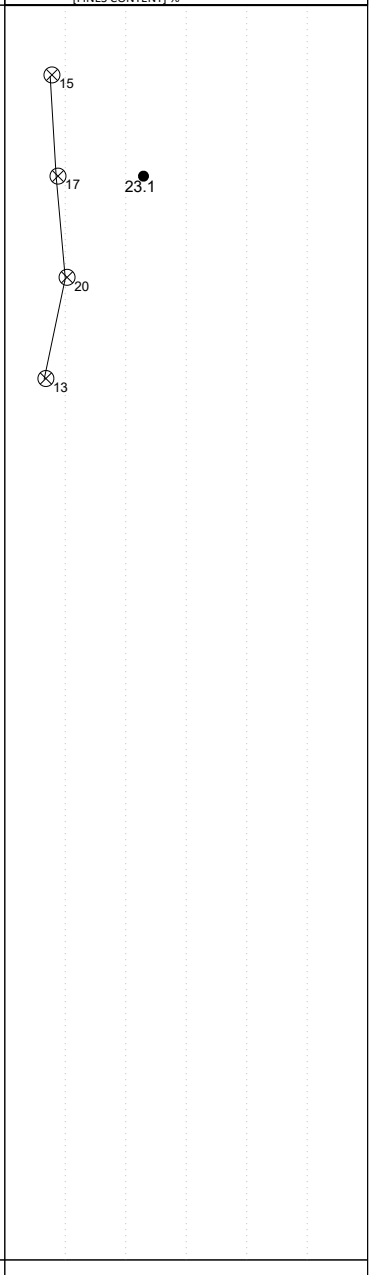
ROCK QUALITY DESIGNATION & RECOVERY

RQD

REC

○ CALIBRATED PENETROMETER TON/SF

[FINES CONTENT] %



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered) **Dry**	BORING STARTED: **Feb 17 2021**		CAVE IN DEPTH: **5.40**
▼ WL (Completion)	BORING COMPLETED: **Feb 17 2021**		HAMMER TYPE: **Auto**
▼ WL (Seasonal High Water)	EQUIPMENT: **ATV CME-55**	LOGGED BY: **BRD**	DRILLING METHOD: **2 1/4" HSA**
▽ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Gay and Neel, Inc.	**12:19208**	**SWM-2**	**1 of 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Auburn Park	**Blue Ridge Drilling, Inc.**		
SITE LOCATION: **3595 Riner Road, Riner, Virginia 24149**			LOSS OF CIRCULATION
NORTHING: **3555145.0**	EASTING: **10913278.3**	STATION:	SURFACE ELEVATION: **2062.0**
			BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					Topsoil Thickness [6"]			
	S-1	SS	18	18	(ML) SANDY SILT, brown, moist, firm to stiff			2-2-3 (5)
	S-2	SS	18	18				3-5-7 (12)
5							2057	
	S-3	SS	18	18	(SM) SILTY SAND, brown, moist, medium dense to loose			3-4-7 (11)
	S-4	SS	18	18				6-4-5 (9)
10					**END OF DRILLING AT 10.0 FT**		2052	
15							2047	
20							2042	
25							2037	
30							2032	

Plastic Limit Water Content Liquid Limit

X———●———△

⊗ STANDARD PENETRATION BLOWS/FT

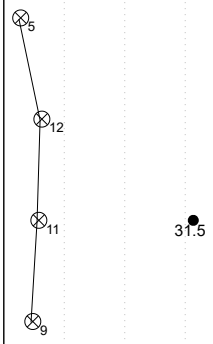
ROCK QUALITY DESIGNATION & RECOVERY

RQD

REC

○ CALIBRATED PENETROMETER TON/SF

[FINES CONTENT] %



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered) **Dry**	BORING STARTED: **Feb 17 2021**		CAVE IN DEPTH: **5.60**
▼ WL (Completion)	BORING COMPLETED: **Feb 17 2021**		HAMMER TYPE: **Auto**
▼ WL (Seasonal High Water)	EQUIPMENT: **ATV CME-55**	LOGGED BY: **BRD**	DRILLING METHOD: **2 1/4" HSA**
▽ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Gay and Neel, Inc.	**12:19208**	**SWM-3**	**1 of 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Auburn Park	**Blue Ridge Drilling, Inc.**		
SITE LOCATION: **3595 Riner Road, Riner, Virginia 24149**			LOSS OF CIRCULATION
NORTHING: **3556259.8**	EASTING: **10912585.3**	STATION:	SURFACE ELEVATION: **2064.0**
			BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					Topsoil Thickness [10"]			
	S-1	SS	18	15	(CL) Residuum, LEAN CLAY WITH SAND, brown, moist, soft			2-1-3 (4)
	S-2	SS	18	15				2-2-2 (4)
5							2059	
	S-3	SS	18	16	(ML) SANDY SILT, tan- brown, moist, firm to very stiff			4-3-4 (7)
	S-4	SS	18	14				3-7-23 (30)
10					**END OF DRILLING AT 10.0 FT**		2054	
15							2049	
20							2044	
25							2039	
30							2034	

Plastic Limit Water Content Liquid Limit

X———●———△

⊗ **STANDARD PENETRATION BLOWS/FT**

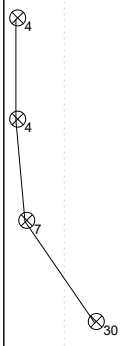
ROCK QUALITY DESIGNATION & RECOVERY

RQD

REC

○ **CALIBRATED PENETROMETER TON/SF**

[FINES CONTENT] %



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered) **Dry**	BORING STARTED: **Feb 22 2021**	CAVE IN DEPTH: **4.20**	
▼ WL (Completion)	BORING COMPLETED: **Feb 22 2021**	HAMMER TYPE: **Auto**	
▼ WL (Seasonal High Water)	EQUIPMENT: **ATV CME-55**	LOGGED BY: **BRD**	DRILLING METHOD: **2 1/4" HSA**
▽ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Gay and Neel, Inc.	**12:19208**	**SWM-4**	**1 of 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Auburn Park	**Blue Ridge Drilling, Inc.**		
SITE LOCATION: **3595 Riner Road, Riner, Virginia 24149**			LOSS OF CIRCULATION
NORTHING: **3556308.4**	EASTING: **10912488.9**	STATION:	SURFACE ELEVATION: **2063.0**
			BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					Topsoil Thickness [12"]			
	S-1	SS	18	18	(ML) Residuum, SANDY SILT, brown, moist, soft to very stiff			1-2-2 (4)
	S-2	SS	18	18				2-2-3 (5)
5							2058	
	S-3	SS	18	15				5-8-11 (19)
	S-4	SS	18	16				9-11-13 (24)
10					**END OF DRILLING AT 10.0 FT**		2053	
15							2048	
20							2043	
25							2038	
30							2033	

Plastic Limit Water Content Liquid Limit

X———●———△

⊗ STANDARD PENETRATION BLOWS/FT

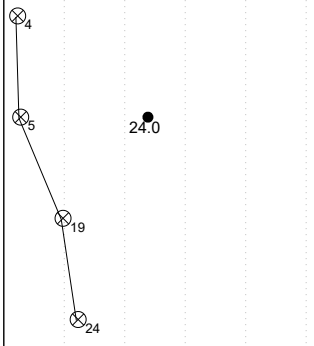
ROCK QUALITY DESIGNATION & RECOVERY

RQD

REC

○ CALIBRATED PENETROMETER TON/SF

[FINES CONTENT] %



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered) **Dry**	BORING STARTED: **Feb 22 2021**	CAVE IN DEPTH: **4.10**	
▼ WL (Completion)	BORING COMPLETED: **Feb 22 2021**	HAMMER TYPE: **Auto**	
▼ WL (Seasonal High Water)	EQUIPMENT: **ATV CME-55**	LOGGED BY: **BRD**	DRILLING METHOD: **2 1/4" HSA**
▽ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Gay and Neel, Inc.	**12:19208**	**SWM-5**	**1 of 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Auburn Park	**Blue Ridge Drilling, Inc.**		
SITE LOCATION: **3595 Riner Road, Riner, Virginia 24149**			LOSS OF CIRCULATION
NORTHING: **3556561.6**	EASTING: **10914108.2**	STATION:	SURFACE ELEVATION: **2070.0**
			BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
	S-1	SS	18	15	Topsoil Thickness [6"] (SM) Residuum, SILTY SAND, purple, moist, dense			4-22-14 (36)
	~~S-2~~	~~SS~~	~~0~~	~~0~~	No recovery, presumed to be HWR			50/0" (50/0")
5					Refusal encountered at 5.0 feet. **END OF DRILLING AT 5.0 FT**		2065	
10							2060	
15							2055	
20							2050	
25							2045	
30							2040	

Plastic Limit Water Content Liquid Limit
X———●———△

⊗ STANDARD PENETRATION BLOWS/FT

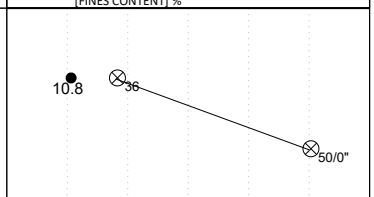
ROCK QUALITY DESIGNATION & RECOVERY

RQD

REC

○ CALIBRATED PENETROMETER TON/SF

[FINES CONTENT] %



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered) **Dry**	BORING STARTED: **Feb 19 2021**		CAVE IN DEPTH: **2.10**
▼ WL (Completion)	BORING COMPLETED: **Feb 19 2021**		HAMMER TYPE: **Auto**
⧩ WL (Seasonal High Water)	EQUIPMENT: **ATV CME-55**	LOGGED BY: **BRD**	DRILLING METHOD: **2 1/4" HSA**
⧩ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Gay and Neel, Inc.	**12:19208**	**SWM-5A**	**1 of 1**
PROJECT NAME: **Auburn Park**	DRILLER/CONTRACTOR: **Blue Ridge Drilling, Inc.**		
SITE LOCATION: **3595 Riner Road, Riner, Virginia 24149**			LOSS OF CIRCULATION
NORTHING:	EASTING:	STATION:	SURFACE ELEVATION: **2070.0**

BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					Auger probed to refusal, no sampling performed.			
5					Refusal encountered at 5.0 feet. **END OF DRILLING AT 5.0 FT** *Performed 4 feet SW of SWM-5		2065	
10							2060	
15							2055	
20							2050	
25							2045	
30							2040	

Plastic Limit Water Content Liquid Limit
X———●———△

⊗ STANDARD PENETRATION BLOWS/FT

ROCK QUALITY DESIGNATION & RECOVERY

RQD

REC

○ CALIBRATED PENETROMETER TON/SF

[FINES CONTENT] %

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered) **Dry**	BORING STARTED: **Feb 19 2021**		CAVE IN DEPTH:
▼ WL (Completion)	BORING COMPLETED: **Feb 19 2021**		HAMMER TYPE: **Auto**
▼ WL (Seasonal High Water)	EQUIPMENT: **ATV CME-55**	LOGGED BY:	DRILLING METHOD: **2 1/4" HSA**
▽ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Gay and Neel, Inc.	**12:19208**	**SWM-6**	**1 of 1**

PROJECT NAME:	DRILLER/CONTRACTOR:
Auburn Park	**Blue Ridge Drilling, Inc.**

SITE LOCATION: **3595 Riner Road, Riner, Virginia 24149**

LOSS OF CIRCULATION

NORTHING:	EASTING:	STATION:	SURFACE ELEVATION:
3556540.2	**10914047.6**		**2073.0**

BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Topsoil Thickness [6"]			
	S-1	SS	18	13	(ML) Residuum, SILT WITH SAND, brown, moist, soft to stiff			3-2-2 (4)
	S-2	SS	18	15				4-4-9 (13)
5	S-3	SS	1	1	No recovery, presumed to be HWR		2068	50/1" (50/1")
					Refusal encountered at 7.5 feet. **END OF DRILLING AT 7.5 FT**			
10							2063	
15							2058	
20							2053	
25							2048	
30							2043	

Plastic Limit Water Content Liquid Limit

X———●———△

⊗ STANDARD PENETRATION BLOWS/FT

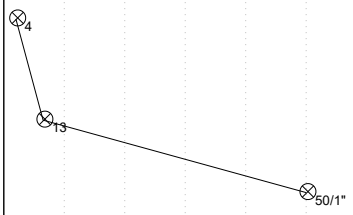
ROCK QUALITY DESIGNATION & RECOVERY

RQD

REC

○ CALIBRATED PENETROMETER TON/SF

[FINES CONTENT] %



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered) **Dry**	BORING STARTED: **Feb 22 2021**	CAVE IN DEPTH: **4.50**	
▼ WL (Completion)	BORING COMPLETED: **Feb 22 2021**	HAMMER TYPE: **Auto**	
▼ WL (Seasonal High Water)	EQUIPMENT: **ATV CME-55**	LOGGED BY: **BRD**	DRILLING METHOD: **2 1/4" HSA**
▽ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Gay and Neel, Inc.	**12:19208**	**SWM-6A**	**1 of 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Auburn Park	**Blue Ridge Drilling, Inc.**		
SITE LOCATION: **3595 Riner Road, Riner, Virginia 24149**			LOSS OF CIRCULATION
NORTHING:	EASTING:	STATION:	SURFACE ELEVATION: / BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0					Auger probed to sample depth.		0	
5							-5	
10	S-4	SS	18	15	(SM) Residuum, SILTY SAND, brown, moist medium dense		-10	7-7-12 (19)
					END OF DRILLING AT 10.0 FT			
					*Performed 5 feet from SWM-6			
15							-15	
20							-20	
25							-25	
30							-30	

Plastic Limit Water Content Liquid Limit
X———●———△

⊗ STANDARD PENETRATION BLOWS/FT
ROCK QUALITY DESIGNATION & RECOVERY
RQD
REC
○ CALIBRATED PENETROMETER TON/SF
[FINES CONTENT] %

⊗19 ●20.2

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered) **Dry**	BORING STARTED: **Feb 22 2021**	CAVE IN DEPTH: **Not Observed**	
▼ WL (Completion)	BORING COMPLETED: **Feb 22 2021**	HAMMER TYPE: **Auto**	
▼ WL (Seasonal High Water)	EQUIPMENT: **ATV CME-55**	LOGGED BY: **BRD**	DRILLING METHOD: **2 1/4" HSA**
▽ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

APPENDIX C – Laboratory Testing

Laboratory Test Results Summary
Plasticity Chart
Moisture-Density Relationship Curves

Laboratory Testing Summary

Sample Location	Sample Number	Depth (feet)	^MC (%)	Soil Type	Atterberg Limits			**Percent Passing No. 200 Sieve	Moisture - Density		CBR (%)		#Organic Content (%)
					LL	PL	PI		Maximum Density (pcf)	Optimum Moisture (%)	0.1 in.	0.2 in.	
B-01	S-2	3.5-5	34.0										
B-02	S-1	1-2.5	33.6										
B-03	S-2	3.5-5	35.6										
B-04	S-1	1-2.5	18.0										
B-05	S-2	3.5-5	20.8										
B-07	S-1	1-2.5	19.7										
B-07	S-3	6-7.5	39.3										
B-07	S-5	13.5-15	37.9										
B-09	S-1	1-2.5	8.5										
B-11	S-1	1-2.5	25.6										

Notes: See test reports for test method, ^ASTM D2216-19, *ASTM D2488, **ASTM D1140-17, #ASTM D2974-20e1

Definitions: MC: Moisture Content, Soil Type: USCS (Unified Soil Classification System), LL: Liquid Limit, PL: Plastic Limit, PI: Plasticity Index, CBR: California Bearing Ratio, OC: Organic Content

Project: Auburn Park
Client: Gay and Neel, Inc.
Project No.: 12:19208
Date Reported:

Office / Lab	Address	Office Number / Fax
ECS Mid-Atlantic LLC - Roanoke	7670 Enon Drive Suite 101 Roanoke, VA 24019	(540)362-2000 (540)362-1202

Tested by	Checked by	Approved by	Date Received
JGeil	jginter	jginter	3/1/2021

Laboratory Testing Summary

Sample Location	Sample Number	Depth (feet)	^MC (%)	Soil Type	Atterberg Limits			**Percent Passing No. 200 Sieve	Moisture - Density		CBR (%)		#Organic Content (%)
					LL	PL	PI		Maximum Density (pcf)	Optimum Moisture (%)	0.1 in.	0.2 in.	
B-12	S-2	3.5-5	19.0										
B-13	S-1	1-2.5	19.5										
B-14	S-2	3.5-5	11.0										
B-15	S-1	1-2.5	29.0										
B-16	S-1	1-2.5	26.9										
B-16	S-3	6-7.5	28.8										
B-16	S-5	13.5-15	22.3										
B-17	S-2	3.5-5	22.1										
B-17	S-4	8.5-10	27.6										
B-18	S-2	3.5-5	46.8										

Notes: See test reports for test method, ^ASTM D2216-19, *ASTM D2488, **ASTM D1140-17, #ASTM D2974-20e1

Definitions: MC: Moisture Content, Soil Type: USCS (Unified Soil Classification System), LL: Liquid Limit, PL: Plastic Limit, PI: Plasticity Index, CBR: California Bearing Ratio, OC: Organic Content

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Laboratory Testing Summary

Sample Location	Sample Number	Depth (feet)	^MC (%)	Soil Type	Atterberg Limits			**Percent Passing No. 200 Sieve	Moisture - Density		CBR (%)		#Organic Content (%)
					LL	PL	PI		Maximum Density (pcf)	Optimum Moisture (%)	0.1 in.	0.2 in.	
B-19	S-2	3.5-5	42.5										
B-20	S-2	3.5-5	15.5										
B-21	S-1	1-2.5	31.2										
B-22	S-1	1-2.5	37.0	CH	58	30	28	99					
B-23	S-1	1-2.5	17.6										
B-25	S-2	3.5-5	40.5	MH	73	44	29	86.3					
B-27	S-1	1-2.5	20.7										
SWM-1	S-2	3.5-5	23.1										
SWM-2	S-3	6-7.5	31.5										
SWM-4	S-2	3.5-5	24.0										

Notes: See test reports for test method, ^ASTM D2216-19, *ASTM D2488, **ASTM D1140-17, #ASTM D2974-20e1

Definitions: MC: Moisture Content, Soil Type: USCS (Unified Soil Classification System), LL: Liquid Limit, PL: Plastic Limit, PI: Plasticity Index, CBR: California Bearing Ratio, OC: Organic Content

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Laboratory Testing Summary

Sample Location	Sample Number	Depth (feet)	^MC (%)	Soil Type	Atterberg Limits			**Percent Passing No. 200 Sieve	Moisture - Density		CBR (%)		#Organic Content (%)
					LL	PL	PI		Maximum Density (pcf)	Optimum Moisture (%)	0.1 in.	0.2 in.	
SWM-5	S-1	1-2.5	10.8										
SWM-6A	S-4	8.5-10	20.2										
B-07 (BULK)	D3S-56	1-10		SC	28	19	9	31.9	125.9	10.5			
B-16 (BULK)	D3S-57	1-10		ML	35	25	10	92.6	104.7	19.1			
B-20 (BULK)	D3S-58	1-10		CL	31	21	10	71.4	114.3	15.9			

Notes: See test reports for test method, ^ASTM D2216-19, *ASTM D2488, **ASTM D1140-17, #ASTM D2974-20e1

Definitions: MC: Moisture Content, Soil Type: USCS (Unified Soil Classification System), LL: Liquid Limit, PL: Plastic Limit, PI: Plasticity Index, CBR: California Bearing Ratio, OC: Organic Content

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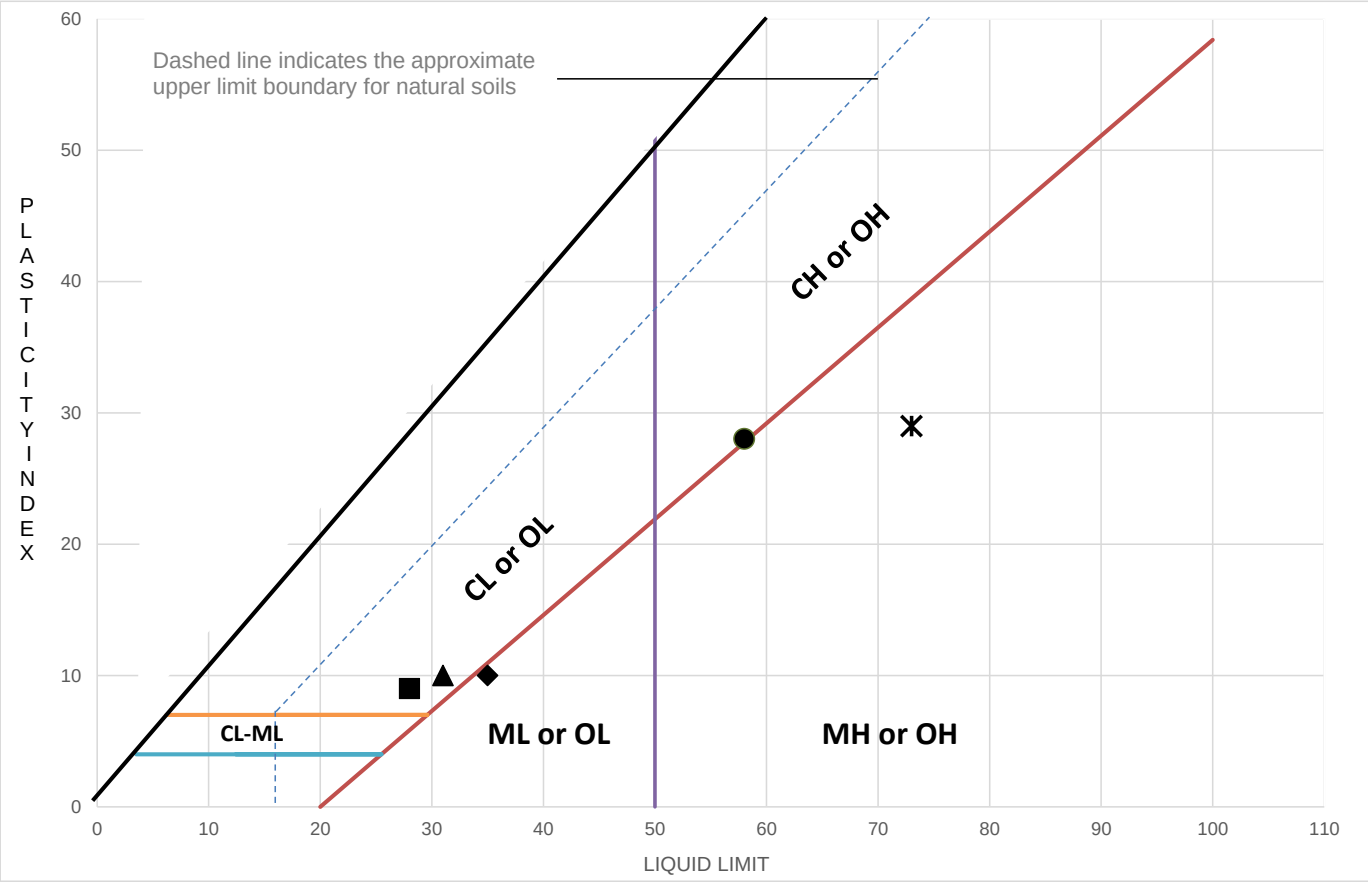
JGeil	jginter	jginter	3/1/2021

LIQUID AND PLASTIC LIMITS TEST REPORT



TEST RESULTS ()

	Sample Location	Sample Number	Sample Depth (ft)	LL	PL	PI	%<#40	%<#200	AASHTO	USCS	Material Description
■	B-07	D3S-56	1-10	28	19	9	44.6	31.9	A-2-4	SC	Tan CLAYEY SAND WITH GRAVEL
◆	B-16	D3S-57	1-10	35	25	10	98.9	92.6	A-4	ML	Light Brown SILT
▲	B-20	D3S-58	1-10	31	21	10	91.1	71.4	A-4	CL	Tan LEAN CLAY WITH SAND
●	B-22	S-1	1-2.5	58	30	28	99.7	99.0	A-7-5	CH	Tan-gray FAT CLAY
✳	B-25	S-2	3.5-5	73	44	29	91.0	86.3	A-7-5	MH	Brown ELASTIC SILT

Project: Auburn Park
Client: Gay and Neel, Inc.

Project No.: 12:19208
Date Reported: 3/10/2021

Office / Lab: ECS Mid-Atlantic LLC - Roanoke

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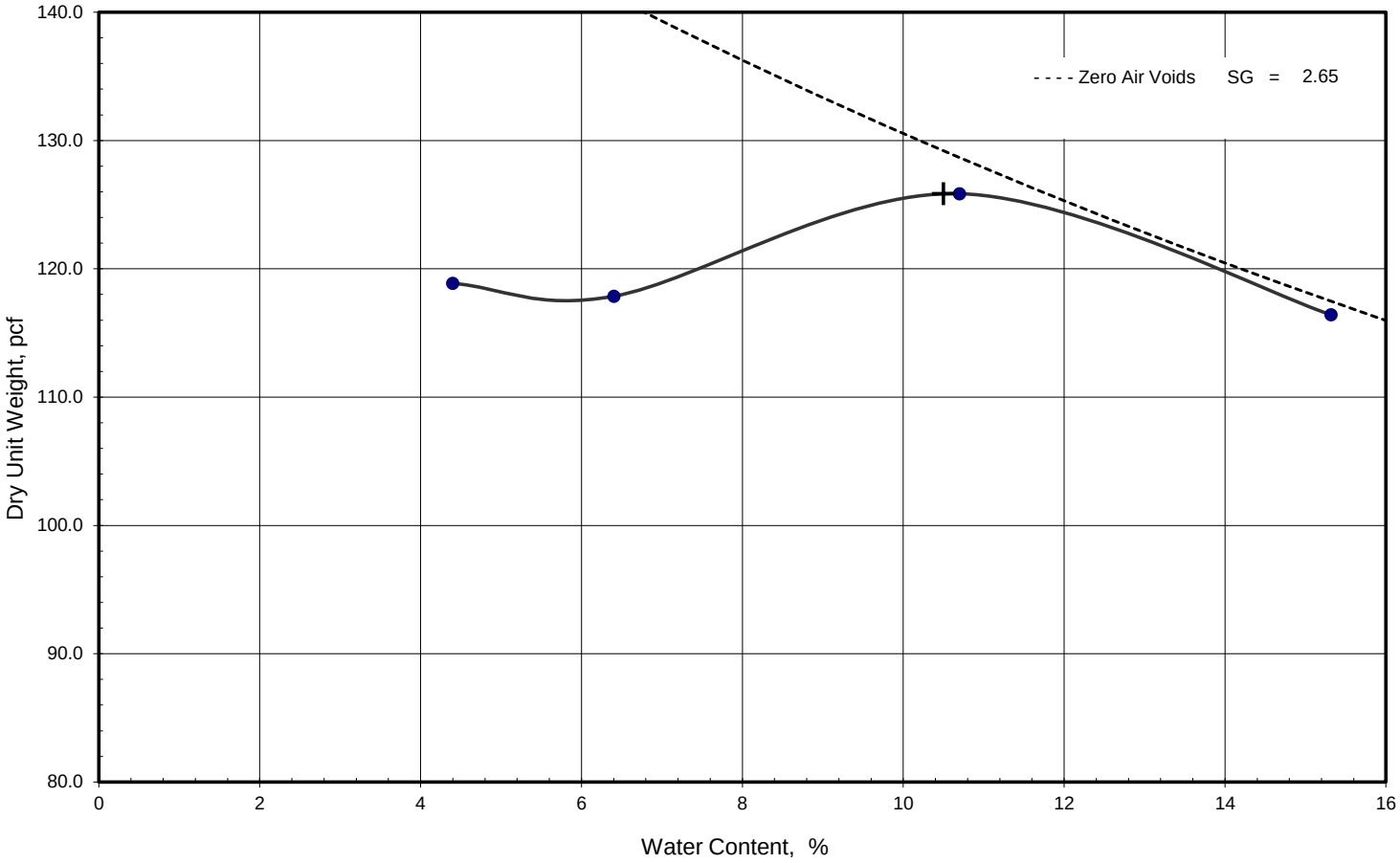
Suite 101
Roanoke, VA 24019

Office Number / Fax: (540)362-2000
(540)362-1202

Tested by	Checked by	Approved by	Date Received
JGeil	jginter	jginter	3/1/2021

Laboratory Compaction Characteristics of Soil
Using Standard Effort



Optimum Moisture Content		**10.5**	%
Maximum Dry Unit Weight		**125.9**	pcf
Cumulative material retained on:	3/4 in. sieve	0.0	%
	3/8 in. sieve	9.9	%
	#4 sieve	26.2	%

Preparation	ASTM dry preparation method	
Type of rammer	Manual - 5.5lbf (24.5N)	
Test Specfication / Method	ASTM D698-12e2-method B	
Specific gravity - D854 water pycnometer	2.65	Assumed
Coarse Aggregate Specific Gravity -		

Soil Description	Nat. Moist. %	Liquid Limit	Plasticity Index	%< #200	USCS	AASHTO
Tan CLAYEY SAND WITH GRAVEL		28	9	31.9	SC	A-2-4

Project: Auburn Park
Client: Gay and Neel, Inc.
Sample / Source B-07
Test Reference/No.:

Project No.: 12:19208
Depth (ft.): 1 - 10
Sample No.: D3S-56
Date Reported: 3/10/2021

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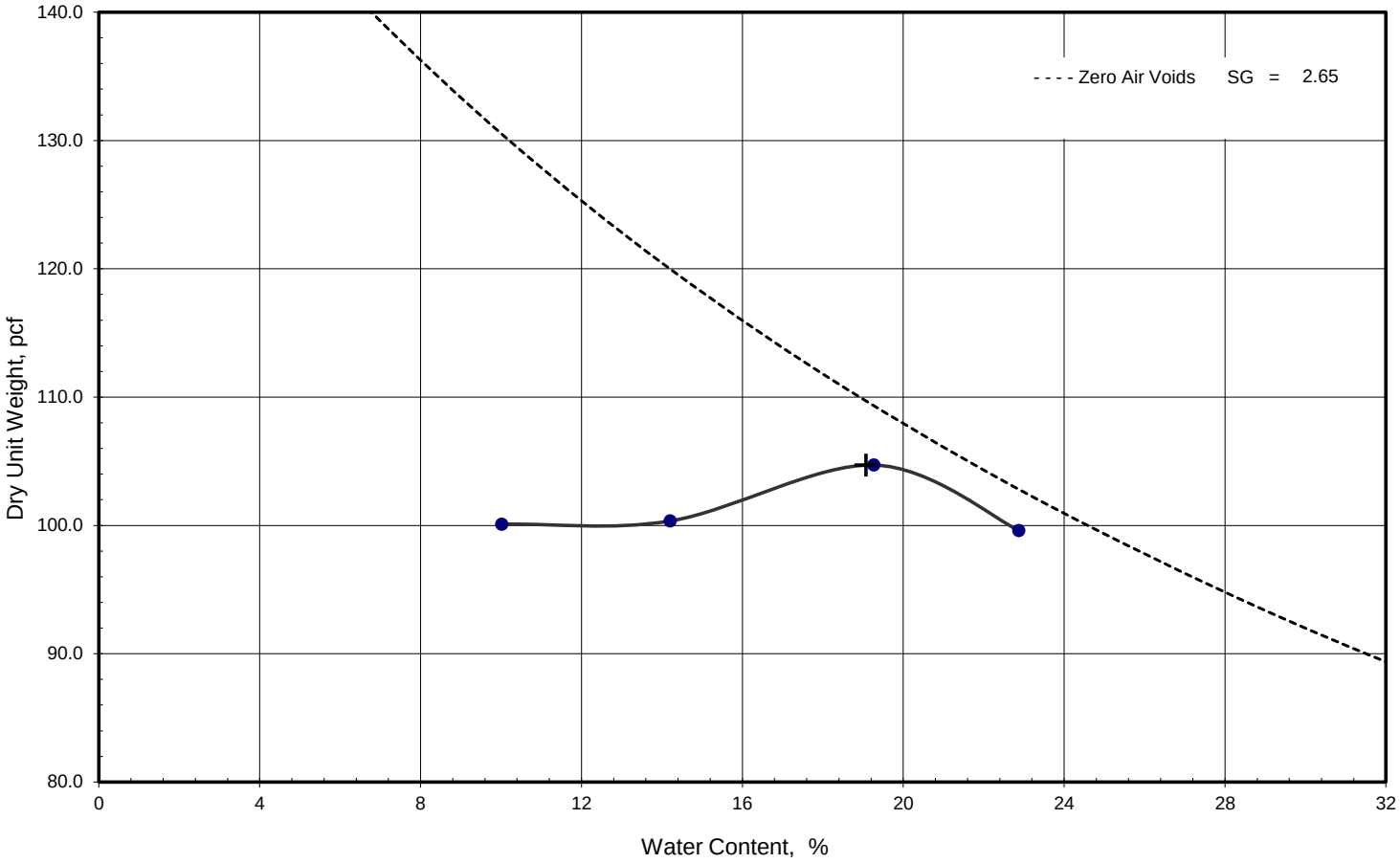
ECS Mid-Atlantic LLC - Roanoke	7670 Enon Drive Suite 101 Roanoke, VA 24019	(540)362-2000 (540)362-1202

Tested by	Checked by	Approved by	Date Received	Remarks
JGeil	jginter	jginter	3/1/2021	

Laboratory Compaction Characteristics of Soil
Using Standard Effort



Optimum Moisture Content		**19.1**	%
Maximum Dry Unit Weight		**104.7**	pcf
Cumulative material retained on:	3/4 in. sieve	0.0	%
	3/8 in. sieve	0.0	%
	#4 sieve	0.0	%

Preparation	ASTM dry preparation method	
Type of rammer	Manual - 5.5lbf (24.5N)	
Test Specfication / Method	ASTM D698-12e2-method A	
Specific gravity - D854 water pycnometer	2.65	Assumed
Coarse Aggregate Specific Gravity -		

Soil Description	Nat. Moist. %	Liquid Limit	Plasticity Index	%< #200	USCS	AASHTO
Light Brown SILT		35	10	92.6	ML	A-4

Project: Auburn Park
Client: Gay and Neel, Inc.
Sample / Source B-16
Test Reference/No.:

Project No.: 12:19208
Depth (ft.): 1 - 10
Sample No.: D3S-57
Date Reported: 3/10/2021

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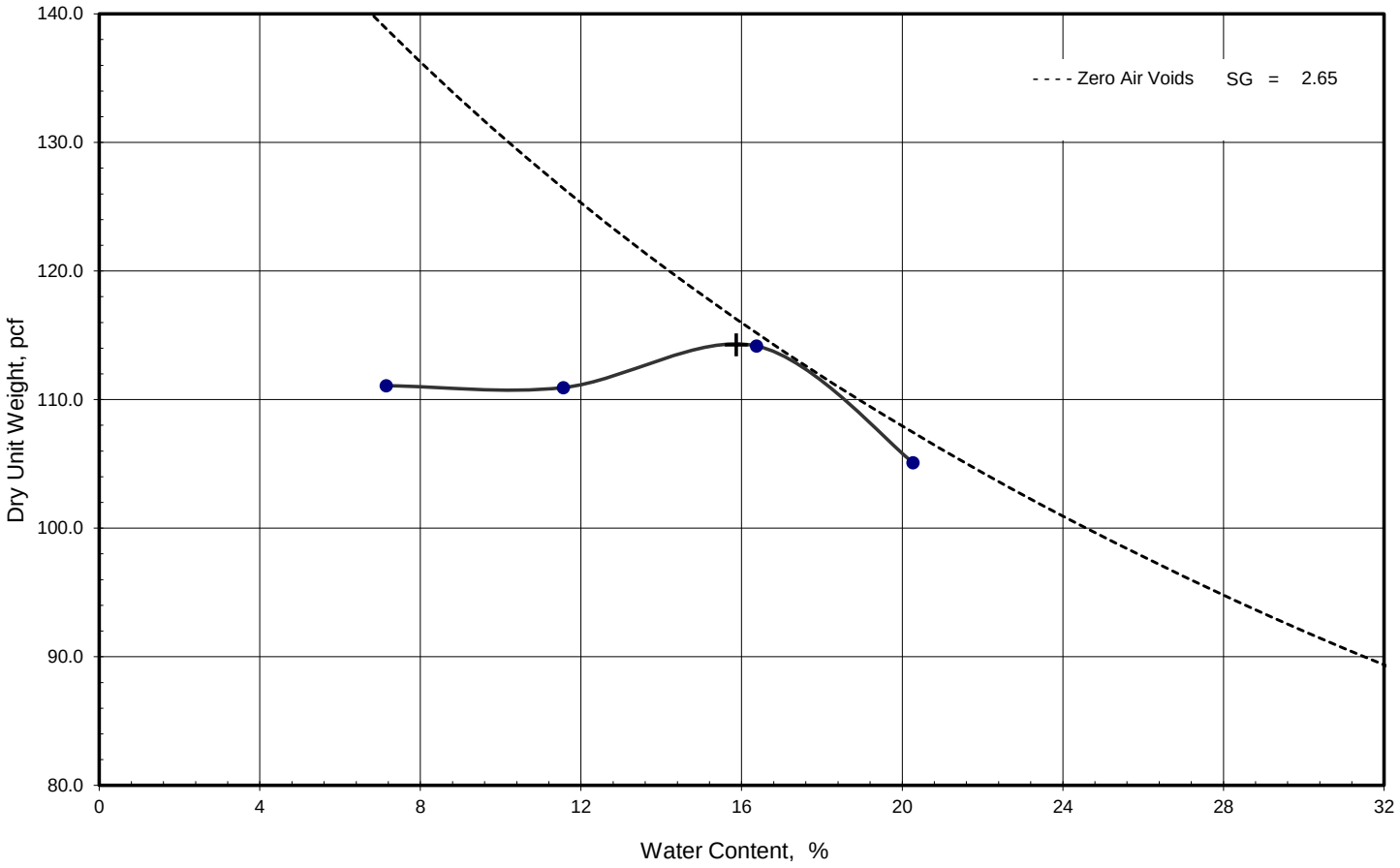
Tested by	Checked by	Approved by	Date Received	Remarks
JGeil	jginter	jginter	3/1/2021	

Laboratory Compaction Characteristics of Soil
Using Standard Effort



Optimum Moisture Content		**15.9**	%
Maximum Dry Unit Weight		**114.3**	pcf
Cumulative material retained on:	3/4 in. sieve	0.0	%
	3/8 in. sieve	0.0	%
	#4 sieve	0.0	%

Preparation	ASTM dry preparation method
Type of rammer	Manual - 5.5lbf (24.5N)
Test Specfication / Method	ASTM D698-12e2-method A
Specific gravity - D854 water pycnometer	2.65 Assumed
Coarse Aggregate Specific Gravity -	

Soil Description	Nat. Moist. %	Liquid Limit	Plasticity Index	%< #200	USCS	AASHTO
Tan LEAN CLAY WITH SAND		31	10	71.4	CL	A-4

Project: Auburn Park
Client: Gay and Neel, Inc.
Sample / Source B-20
Test Reference/No.:

Project No.: 12:19208
Depth (ft.): 1 - 10
Sample No.: D3S-58
Date Reported: 3/10/2021

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Tested by	Checked by	Approved by	Date Received	Remarks
JGeil	jginter	jginter	3/1/2021	