Preliminary Geotechnical Engineering Study Commonwealth Crossing Business Center U.S. 220 South of Ridgeway, Henry County, Virginia

Project 09160023

May 15, 2009





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May 15, 2009

Mr. Tim Wagner, P.E. Wiley & Wilson 127 Nationwide Drive Lynchburg, Virginia 24502-4272

Subject: Project 09160023, Preliminary Geotechnical Engineering Study, Commonwealth Crossing Business Center, U.S. 220 South of Ridgeway, Henry County, Virginia

Dear Tim:

Schnabel Engineering, LLC (Schnabel), is pleased to submit our preliminary geotechnical report for this project. This document includes attached figures and appendices with relevant data collected for this study. We provided our services in accordance with the Standard Form of Agreement for this project between Wiley & Wilson and Schnabel Engineering dated December 11, 2008.

SCOPE

Our proposal, dated January 28, 2009, defines the scope of this study. Our services include subsurface exploration, field engineering, soil laboratory testing, and development of preliminary geotechnical engineering recommendations. The objective of this study is to evaluate the subsurface conditions and provide preliminary recommendations regarding the design of earthwork and foundations for this project.

Services not described in our agreement are not included in this study. We would be happy to provide additional support services to the design team as the project demands.

SITE DESCRIPTION

The project site is a rural property located immediately northwest of U.S. 220 and adjacent to the Virginia/North Carolina line in southern Henry County, Virginia. A Norfolk Southern rail line parallels the southeast property boundary along the southbound lanes of U.S. 220. White House Road marks the northeast extent of the property. Marrowbone Reservoir is situated north of the site. The site encompasses about 832 acres. Site topography is hilly with numerous ridges and

intersecting valleys. Existing ground surface grades vary from about El 850 to El 990. Patterson Branch bisects the site and flows north into Marrowbone Reservoir. The site has recently been logged and surface vegetation at the time of our recent field exploration consisted of brush and small trees.

We obtained the site information from the topographic site plan and boring survey data provided by Henry County and through our site visits. A Vicinity Map is included as Figure 1.

PROPOSED CONSTRUCTION

Henry County owns the subject property and is interested in developing it as an industrial park and/or business center. Cut and fill depths of up to 65 ft and 110 ft, respectively, are anticipated to grade site roadways and individual building pads. Building construction could vary from light commercial to heavy industrial. Froehling & Robertson (F&R) drilled three borings at this site in 2007. Schnabel Engineering drilled eight additional borings in 2008.

SUBSURFACE CONDITIONS

Geology

The project site is located in the Blue Ridge physiographic province of Virginia. The Blue Ridge province is characterized by crystalline igneous and metamorphic rocks that range in age from about late Protorozoic to Cambrian. The metamorphic rocks include metamorphosed igneous and sedimentary rocks. The overall physiography of the Blue Ridge in southern Virginia is that of a broad upland plateau that trends in a northeast-southwest direction.

According to the Geologic Map of Virginia Portion of the Danville 30 x 60 Minute Quadrangle (Virginia Division of Mineral Resources, 1993) and information in our files, the site is underlain by rocks of the late Proterozoic to Cambrian age Alligator Back formation and the late Proterozoic Ashe Metamorphic Suite. These formations consist primarily of muscovite-biotite schist and gneiss with lesser amounts of hornblende schist and amphibolite. Pegmatite and alaskite dikes and sills are reported along the Ridgeway Fault, which is mapped immediately to the northwest of the study site.

Residual overburden materials in this geology typically consist of a mixture of sandy silt, silty sand, lean clay, and weathered or disintegrated rock. This description corresponds well to the materials encountered in the borings drilled for this study. The residual soils are derived from the chemical and physical weathering of the underlying bedrock. Disintegrated rock is a partially weathered gradational zone between the overlying residual soils and the underlying bedrock. Residual soil and disintegrated rock strata are commonly interbedded in this geology as was observed in several of the borings at this site.

Data Collection Techniques

We performed test borings and soil laboratory testing on samples collected to develop our preliminary geotechnical recommendations. Appendix A includes our summary of soil laboratory test results and laboratory test curves. Appendix B includes the logs from our recent subsurface

exploration as well as our 2008 subsurface exploration. We have also included three borings logs drilled by F&R in 2007.

Our geotechnical laboratory conducted tests on selected samples obtained in the borings. This testing aided in the classification of soils encountered in the subsurface exploration, and provided data for use in the development of foundation and earthwork recommendations. Laboratory tests included natural moisture content, gradation curves, Atterberg Limits and moisture-density relationships. The logs in Appendix B show the natural moisture content values of selected soil samples. Appendix A presents the results of the remaining laboratory tests.

Blue Ridge Drilling, Inc., Boones Mill, Virginia drilled twelve borings (B-12 through B-24) and one offset boring at this site under our observation between April 22 and 27, 2009. Previously, Soil Drilling Services, Charlotte, North Carolina drilled eight borings (B-1 through B-8) and two offset borings at this site under our observation on February 18, 2008. The F&R borings were drilled on August 8 and 9, 2007. Appendix B includes specific observations, remarks, and logs for the borings; classification criteria; and sampling protocols. Figure 2 shows the boring locations. Boring coordinates and elevations were surveyed by Henry County personnel and provided to us for our use. We will retain soil samples from Borings B-12 through B-24 up to 45 days beyond the issuance of this report, unless you request other disposition.

Generalized Subsurface Stratigraphy

We have characterized the following generalized subsurface soil stratigraphy based on the boring data presented in Appendix B:

Ground Cover:

Due to previous clear-cutting of the property and clearing of trails to the boring locations, no topsoil was present at the test boring locations. Our experience in this region indicates that topsoil thicknesses are generally in the 4 to 6-inch range. However, we anticipate that the top 6 to 8 inches below the ground surface generally contains abundant roots, stumps, and topsoil-contaminated soil.

Stratum F: Existing Fill

We encountered soft consistency existing fill in Borings B-22 and B-24 from the ground surface to depths of 3.0 to 4.0 ft. The existing fill was composed primarily of silt and elastic silt soils. These soils contained varying amounts of sand, along with some organic matter, glass, and mica. Standard Penetration Test N-values in Stratum F averaged 3. We believe these fill soils are associated with localized residential and/or farming activities.

Stratum A: Alluvial

We did not encounter alluvial soils in any of the borings we drilled. However, we expect that alluvial soils are present in and around the bottoms of stream valleys. Typically, alluvial soils in this geology are relatively thin strata consisting of silts, clays, and sands.

Stratum B: Residual

We encountered medium stiff to very stiff consistency residual ELASTIC SILT (MH), SILT (ML), and LEAN CLAY (CL) in most of the borings from the ground surface to depths of about 3.5 ft to 8.5 ft. Beneath these near-surface fine-grained soils, and interbedded with Stratum C disintegrated rock, we encountered loose to compact density residual SANDY SILT (ML), SILTY SAND (SM), POORLY GRADED SAND (SP), and POORLY GRADED SAND WITH SILT (SP-SM) soils to depths of 6.0 to 50.0 ft. Stratum B soils typically contained mica. Residual soils are derived from the physical and chemical weathering of the underlying bedrock. Standard Penetration Test N-values ranged from 6 to 54 in this stratum.

Stratum C: Disintegrated Rock

We encountered very compact density disintegrated rock in most borings beneath and interbedded with Stratum B soils to depths of 8.0 ft to 61.4 ft. These partially weathered rock materials represent a weathered gradational zone between the overlying residual soils and the underlying bedrock. N-values in Stratum C ranged from 62 to 100/3".

Disintegrated rock is defined by Schnabel Engineering as residual material with N values equal to or greater than 60 blows per foot and less than 100 blows for 2 inches of penetration. Equivalent penetration resistance of 100 blows or more per 2 inches is designated as sampler refusal. We recorded sampler refusal in Boring B-1, B-20, and B-22 at depths ranging from 13.6 ft to 28.5 ft. We recorded auger refusal in Borings B-1, B-2, B-6, B-8, B-20, B-21, B-22, and B-23 at depths ranging from 5.9 ft to 61.4 ft. Due to shallow refusal, we offset Borings B-1, B-6, and B-23 and resumed drilling. In offset Boring B-1A, we recorded auger refusal at a depth of 19.4 ft, compared to auger refusal at 15.0 ft in Boring B-1. In offset Boring B-6A, we recorded auger refusal at a depth of 47.5 ft, compared to auger refusal at 5.9 ft in Boring B-6. In offset Boring B-23A (40 ft east of B-23), we did not encounter auger refusal to a depth of 34.0 ft, compared to auger refusal at 8.0 ft in Boring B-23. Large variations in refusal depths over short distances are not uncommon in this geology due to the presence of igneous rock intrusions or dikes. These features are typically harder than the surrounding strata and tend to weather at a slower rate.

Groundwater

We encountered groundwater during drilling and upon completion in Borings B-13 (53.5 ft; Elevation 896 ft) and B-16 (48.0 ft; Elevation 892 ft). In our previous study, groundwater was not encountered in any of the eight test borings. These dry conditions may or may not represent the stabilized groundwater levels at the site. Borings were backfilled upon completion for safety. The final design should anticipate fluctuations in the hydrostatic water table depending on variations in precipitation, surface runoff, evaporation, stream levels, and similar factors. Also, perched groundwater can occur in these geologic conditions as the downward migration of surface water is retarded by very compact layers of disintegrated rock.

PRELIMINARY GEOTECHNICAL RECOMMENDATIONS

We based our geotechnical engineering analysis on the information developed from our previous and current subsurface exploration, soil laboratory testing, along with our general assumptions regarding site development. The following sections of the report provide our detailed recommendations.

Earthwork and Grading

Our primary concern related to site development is site grading. Based on the master plan of the site, cuts of up to 65 ft and fills of 110 ft may be required to grade site roadways and building pads. Excavation depths and compacted structural fill heights of this magnitude are relatively common in this part of Virginia due to the large variations in topographic relief in most areas. Site excavation in the transitional residual profile can present difficulties to a grading contractor. These difficulties are often reflected in contract administration and the cost of site preparation. Also a concern is cut slope stability in the residual soils. Flatter slopes required for long term stability can consume valuable land area. In order to facilitate the design and implementation of grading at this site, it will be important to carefully consider subgrade preparation, subdrainage, compacted structural fill placement, cut and fill slopes, settlement monitoring, and rock excavation.

Subgrade Preparation

The contractor should strip vegetation, topsoil, and organic matter from subgrades to receive compacted structural fill for building and pavement support. At the test boring locations, surface material was cleared in the process of providing access. Consequently, no topsoil was present in the borings. We anticipate that an average of about 4 or 6 inches of topsoil and root mat may be encountered across the site. Stripping and grubbing of previously wooded sites typically result in some disturbance and contamination of near-surface soils, particularly during periods of wet weather. Therefore, we recommend a topsoil stripping depth of at least 8 inches for project planning.

Two test borings encountered soft existing fill soils to depths of about 4 ft below the ground surface. We anticipate the extent of these fill soils is probably limited but, where encountered, they should be undercut and replaced with compacted structural fill. We anticipate soft residual and/or alluvial soils are present in other areas of the site, particularly in the valleys. A previous test boring (B-2, F&R) located in a topographically low area near the center of the property, encountered some soft and wet soils near the ground surface. We anticipate that these soft near-surface soils may be unsuitable for support of the compacted structural fill. Where unsuitable soils are encountered, they should be undercut to expose suitable subgrade soils. The geotechnical engineer should evaluate the subgrade soils for suitability based on observations of proofrolling with a loaded dump truck or scraper. Areas that exhibit excessive pumping, weaving, or rutting, should be undercut and replaced with additional compacted structural fill.

Subdrainage

We anticipate that seeps and springs may exist in some locations, particularly during wet weather periods. Containing and transporting groundwater flow beneath embankment fills will be an important consideration during the development of this site and should be anticipated. We expect

that subdrainage beneath embankment fills can be accomplished using trench drains. Specific details regarding subdrainage design and installation should be addressed in the final geotechnical engineering study.

Compacted Structural Fill

We anticipate that the non-organic portions of material excavated from cut areas of the site should generally be suitable for re-use as compacted structural fill. The use of these materials as compacted structural fill will depend on the soil moisture content, and the contractor's ability to limit contamination of these materials with organic matter during stripping and undercutting.

Compacted structural fill should consist of material classifying MH, CL, ML, SC, SM, SP, SW, GC, GM, GP, or GW per ASTM D2487. Non-organic, on-site soils are generally expected to meet this criterion. Rock larger than about 3 inches encountered during excavation should either be spoiled outside the fill areas or incorporated into non-structural areas of the fill embankment. If the volume of rock encountered during excavation is large, then rock fills may be necessary. Rock fills, if used, should be confined to the lower portions of deep fill embankments and preferably beyond the limits of buildings. In general, we expect that a maximum rock fill lift thickness of about 2 ft with a maximum rock size of 18 inches should be acceptable. Rock fill should be placed in carefully controlled lifts with respect to thickness and compactive effort.

Successful reuse of the excavated, on-site soils as compacted structural fill will depend on their natural moisture contents at the time of excavation. Natural moisture content values of the upper fine grained Stratum B soils (MH, ML, CL) ranged from 23.3 percent to 39.3 percent, with an average of about 30 percent. Natural moisture content values of the lower coarse grained Stratum B soils (SM, ML, SP, SP-SM) ranged from 4.5 percent to 22.6 percent, with an average of about 14 percent. Based upon the laboratory proctor results, the natural moisture contents of the upper Stratum B soils tested are typically above the probable optimum moisture content for compaction. The natural moisture content for compaction. Moisture conditioning (drying and/or wetting) of the excavated soils will likely be required prior to their use as compacted structural fill and should be anticipated.

Compacted structural fill should be placed in maximum 8-inch thick horizontal, loose lifts and should be compacted to at least 95 percent of maximum dry density per ASTM D698, Standard Proctor. The contractor should bench compacted structural fill subgrades steeper than 4H:1V to allow placement of horizontal lifts and to tie lifts into the adjacent ground. Compacted structural fill should extend laterally at least 20 ft beyond the building limits and 10 ft beyond pavement limits, and then slope as needed to meet existing grades.

Cut and Fill Slopes

The on-site soils generally consist of micaceous silts and sands that are susceptible to erosion. Consequently, we recommend that excavated cut slopes and compacted structural fill slopes be designed and constructed no steeper than 2.5H:1V. If benches are incorporated into the slopes, then slopes between benches may be as steep as 2H:1V provided the effective total slope angle from toe to crest is not steeper than 2.5H:1V. Storm water runoff at the top of cut and fill slopes should be diverted to prevent the flow of water over the slopes and the subsequent soil erosion.

Settlement Monitoring

The on-site soils generally consist of coarse-grained non-plastic sands and low plasticity silts. These soil types are not considered susceptible to significant long-term consolidation settlements. Consequently, a majority of the subgrade and fill settlement should occur during and shortly after placement. However, for buildings and pavements on fill embankments deeper than about 30 ft, we recommend that settlement of the fill surface be monitored prior to foundation and pavement construction. Settlement points should be surveyed twice weekly. Construction on the fill should not begin until, in the opinion of the geotechnical engineer, the settlement has essentially ceased. We anticipate that in the deepest fill areas, a waiting period on the order of eight to twelve weeks should be adequate. To avoid the delay associated with settlement monitoring and to facilitate construction, buildings should be situated so that they are either in cut or underlain by less than 30 ft of fill.

Rock Excavation

Some rock excavation will probably be required to grade the site. In general, material that is hard enough to result in auger refusal in test borings will require rock excavation. Based on the test boring data and our experience in this geology, we anticipate that rock excavation will primarily consist of the removal of igneous rock intrusions or dikes that may be randomly scattered throughout the site. In some cases, these dikes of rock are surrounded by soil and can be removed without using rock excavation techniques after the soil has been excavated. In any event, rock should be defined in the project specifications. A sample definition of rock for excavation specifications is provided below:

For mass excavation, rock is defined as any material that cannot be dislodged by a Caterpillar Model No. D-8 heavy-duty tractor, or equivalent, equipped with a hydraulically operated, single-tooth power ripper without the use of hoe-ramming or blasting. For trench, footing and pit excavations, rock excavation shall be defined in terms of a Caterpillar Model No. 330 hydraulic excavator, or equivalent. This classification does not include material such as loose rock, concrete, cemented gravel, or other materials that can be removed by means other than hoe-ramming or blasting, but which for reasons of economy in excavating, the contractor chooses to remove by hoe-ramming or blasting. Rock does not include boulders less than one cubic yard in volume. Boulders larger than one cubic yard in volume will be considered rock for payment purposes.

Where the rock cannot be removed with conventional excavation equipment, special means of excavation may be necessary. Removal of this rock may require the use of blasting, air-powered tools, rock splitters, large hoe rams, or rippers. Additional work may be required to reduce the excavated materials down to a size suitable for use as compacted structural fill.

Preliminary Foundation Recommendations

For general building support, we anticipate that shallow spread footings supported on suitable natural residual soils and disintegrated rock of Strata B and C, or on properly placed compacted structural fill will be an appropriate foundation alternative for buildings constructed at this site. We anticipate an allowable soil bearing pressure in the range of 2,000 psf to 3,000 psf will be appropriate for shallow spread footings bearing on Stratum B soils. Even higher allowable bearing pressures on the order of 4,000 to 6,000 psf may be feasible for foundations bearing directly on disintegrated rock of Stratum C. For footings bearing on properly placed compacted structural fill, an allowable soil bearing pressure of 3,000 psf should be considered.

For foundations requiring higher allowable bearing pressures, we anticipate that some form of ground improvement may be required prior to foundation construction where soil subgrades are present. Partial undercut of soils and replacement with dense aggregate stone (VDOT No. 21A) compacted to modified proctor density is one alternative for increasing the allowable bearing capacity. Another option is ground improvement using rammed aggregate piers.

Minimum widths of 18 and 24 inches should be maintained for wall and column footings, respectively, for shear considerations. Interior footing grades may be set at nominal depths below the floor slab. Exterior footings, or those which may be exposed to climate variation, should be founded below a depth of 24 inches for frost considerations.

Differential Settlement Potential

Due to the natural topographic relief at this site, differential settlement may be a potential problem. Following site grading, portions of the building pads and roadways may be in rock cut or shallow soil areas and portions may be in deep fill areas. While very little settlement would be expected in rock cuts or shallow soil areas, fill and subgrade settlements in deep fill areas could be significant.

In order to avoid excessive differential settlements between adjacent footings founded on soil and rock, it may be necessary in some cases to provide a compacted soil cushion between the bottom of footings and the rock surface. The need for soil cushions should be evaluated during the final studies for individual project sites when final footing elevations and configurations are known.

Seismic Site Classification

We have performed a preliminary assessment of the probable Seismic Site Class for this site according to IBC Section 1613.5.5 (2006). For buildings whose foundations bear directly on disintegrated rock or compacted structural fill and Stratum B soils totaling less than about 10 ft thick, we anticipate that a Site Class C should be appropriate. For buildings situated on soils deeper than about 10 ft, we anticipate that a Site Class D will be appropriate. The selection of Seismic Site Class should be evaluated in more detail during geotechnical engineering studies for individual buildings.

Floor Slabs

We anticipate that the natural residual soils of Stratum B, and the disintegrated rock of Stratum C should generally be suitable for floor slab support. Floor slabs may also be supported on properly placed compacted structural fill. The suitability of floor slab subgrades should be evaluated at the time of construction by the geotechnical engineer. A modulus of subgrade reaction, k, in the range of 100 to 200 pci should be appropriate for the soils and disintegrated rock at this site.

Scope for Final Geotechnical Engineering Study

The discussion of preliminary earthwork, foundation, and floor slab recommendations presented herein is intended only to give a generalized assessment of the area and is not intended for final design. Prior to design and construction at this site, a final geotechnical engineering study should be performed to better define the site stratigraphy and groundwater conditions, and to determine specific earthwork, foundation, floor slab, seismic, and pavement design requirements for the design loads, grades, and traffic volumes. The final study should include sufficient additional test borings and laboratory testing to adequately define the subsurface conditions and groundwater levels within the area of the proposed development.

LIMITATIONS

We based our preliminary analyses and recommendations submitted in this report on the information revealed by our exploration. We attempted to provide for normal contingencies, but the possibility remains that unexpected conditions may be encountered during the final geotechnical engineering study and during construction.

We prepared this report to aid in the preliminary evaluation of this site. We intend it for use concerning this specific project. We based our recommendations on information on the site and anticipated construction as described in this report. We would appreciate the opportunity to provide a final geotechnical engineering studies for individual building sites and roadways as the project moves forward.

We have endeavored to complete the services identified herein in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality and under similar conditions as this project. No other representation, express or implied, is included or intended, and no warranty or guarantee is included or intended in this report, or any other instrument of service. We appreciate the opportunity to be of service for this project. Please call us if you have any questions regarding this report.

Very truly yours,

SCHNABEL ENGINEERING, LLC

Jem Mm

Thomas T. Moore, E.I.T. Senior Staff Engineer



Steven J. Winter, P.E. Senior Associate

SJW:SEC:rl

Figures Appendix A: Soil Laboratory Test Data Appendix B: Subsurface Exploration Data

Distribution:

Wiley & Wilson (Two Copies) Attn: Tim Wagner, P.E. 127 Nationwide Drive Lynchburg, Virginia 24502-4272

FIGURES

Vicinity Map, Figure 1 Test Boring Location Plan, Figure 2



VICINITY MAP

FIGURE 1

SCALE: 1"=2000'

CONTRACT 09160023 COMMONWEALTH BUSINESS CENTER, U.S. ROUTE 220 SOUTH OF RIDGEWAY, HENRY COUNTY, VIRGINIA

SOURCE:

NATIONAL GEOGRAPHIC USGS TOPOGRAPHIC MAPS BY TOPO! ©2000

ALL LOCATIONS ARE APPROXIMATE



Schnabel Engineering

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	LEGEND
⊕ ^{B17}	TEST BORING NUMBER AND LOCATION
⊕ ^{B1}	TEST BORING NUMBER AND LOCATION FROM PREVIOUS STUDY BY SCHNABEL ENGINEERING SOUTH, LLC
	TEST BORING NUMBER AND LOCATION FROM PREVIOUS STUDY BY F&R
	1
E: Henry Cou	nty, VA provided the base plan for this drawing
ATE:	TEST BORING
5/09	LOCATION PLAN

1.45	The second
SHOWN	FIGURE 2
CALE:	PROJECT 09160023
5/09	LOCATION PLAN

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APPENDIX A

Soil Laboratory Test Data

Summary of Soil Laboratory Tests (1) Gradation Curves (3) Moisture Density Relationship (3)

Summary Of Laboratory Tests

Appendix Sheet 1 of 1 Project Number: 09160023

Boring	Sample Depth ft	Sample	Description of Soil	eve	0 0	ž	it	ndex	Dry cf)	Moisture 6)	st
No. Type Specimen 0.0-1.5 SANDY SILT (ML), contains mica - orange		% Passing No. 200 Si	% Retaine No. 4 Siev	Liquid Lim	Plastic Lin	Plasticity I	Maximum Density (p	Optimum / Content (%	Proctor Te Method		
B-15	0.0-1.5	Bulk	SANDY SILT (ML), contains mica - orange brown	51.3	0.2	NP	NP	NP	99.3	19.0	698A
	951.7-950.2										
B-19	0.0-1.5	Bulk	SILTY SAND (SM), fine to medium, contains mica - brown	43.7	0.0	NP	NP	NP	91.1	24.7	698A
	900.0-898.5										
B-21	10.0	Bulk	SANDY SILT (ML), contains mica - red brown	51.9	0.9	10	24	15	106.2	17.0	6084
5-21	971.0	Duik		01.0	0.0	49	34	10	100.2	17.9	0904
Notes: 1.5	Soil tests in genera	l accordan	ice with ASTM standards.	e							
2. S and 3. F	Soil classifications visual classification (ey to abbreviation	are in gene n. s: NP=Nor	eral accordance with ASTM D2487(as applicable n-Plastic; indicates no test performed	e), based on te	sting indicated	1		Schnak	hnab	el ring	
						Pi	r oject: Com U.S. Marti	monwealth Route 220 nsville, VA	Crossing E South, Her	Business C hry County	enter

Notes:	 Soil tests in general accordance with ASTM standards. Soil classifications are in general accordance with ASTM D2487(as applicable), based on testing indicated and visual classification. Key to abbreviations: NP=Non-Plastic; indicates no test performed 	Schnabel Schnabel Engineering	
		Project: Commonwealth Crossing Business Center U.S. Route 220 South, Henry County Martinsville, VA	



DATA SCHNABEL GPJ 09160023



60023.GPJ





SCHNARFI 09160023.GPJ





COMPACTION 09160023.GPJ SCHNABEL DATA TEMPLATE 2008 04 22.GDT 5/14/09

APPENDIX B

Subsurface Exploration Data

Subsurface Exploration Procedures General Notes for Test Boring Logs Identification of Soil Boring Logs, B-1 through B-8 – February 2008 Boring Logs, B-11 through B-24 – April 2009 Boring Logs, B1-FR through B3-FR – August 2007

SUBSURFACE EXPLORATION PROCEDURES

Boring Procedures

Drillers advanced the borings using hollow-stem augers. At the designated depth, drillers performed the Standard Penetration Test. Water or drilling fluid was not introduced into the boring using this procedure. The logs indicate water level data.

Standard Penetration Test Results

The numbers in the Sampling Data column of the boring logs represent Standard Penetration Test (SPT) results. Each number represents the blows needed to drive a 2-inch O.D., 1³/₈ inch I.D. splitspoon sampler six inches, using a 140-pound hammer falling 30 inches. The sampler is typically driven a total of 18 or 24 inches. The first 6-inch interval usually represents a seating interval. The total of the number of blows for the second and third six-inch intervals is the SPT "N value." When the blow count reaches 100 before the full driving distance, we determine the SPT N value based on extrapolation of the blows recorded. The SPT is conducted according to ASTM D1586.

Soil Classification Criteria

The group symbols on the logs represent the Unified Soil Classification System Group Symbols (ASTM D2487) based on visual observation and limited laboratory testing of the samples. Criteria for visual identification of soil samples are included in this appendix. Some variation may be expected between samples visually classified and samples classified in the laboratory.

Disintegrated rock is residual material with SPT N values between 60 blows per foot and refusal. Refusal is a penetration rate of 100 blows per two inches or less penetration.

Boring Locations and Elevations

Boring locations were staked in the field by Henry County personnel. We drilled the borings at the staked locations. Boring locations and elevations included in this report were provided by Henry County.

SCHNABEL ENGINEERING GENERAL NOTES FOR SUBSURFACE EXPLORATION LOGS

- 1. Numbers in sampling data column next to Standard Penetration Test (SPT) symbols indicate blows required to drive a 2 inch O.D., 1-3/8 inch I.D. sampling spoon 6 inches using a 140 pound hammer falling 30 inches. The Standard Penetration Test (SPT) N value is the number of blows required to drive the sampler 12 inches, after a 6 inch seating interval. The Standard Penetration Test is performed in general accordance with ASTM-1586.
- 2. Visual classification of soil is in accordance with terminology set forth in "Identification of Soil." The ASTM D-2487 group symbols (e.g. CL) shown in the classification column are based on visual observations.
- 3. Estimated ground water levels indicated on the logs are only estimates from available data and may vary with precipitation, porosity of the soil, site topography, and other factors.
- Refusal at the surface of rock, boulder, or other obstruction is defined as an SPT resistance of 100 blows for 2 4. inches or less of penetration.
- The logs and related information depict subsurface conditions only at the specific locations and at the particular 5. time when drilled or excavated. Soil conditions at other locations may differ from conditions occurring at these locations. Also, the passage of time may result in a change in the subsurface soil and ground water conditions at the subsurface exploration location.
- The stratification lines represent the approximate boundary between soil and rock types as obtained from the 6. subsurface exploration. Some variation may also be expected vertically between samples taken. The soil profile, water level observations and penetration resistances presented on these logs have been made with reasonable care and accuracy and must be considered only an approximate representation of subsurface conditions to be encountered at the particular location.
- 7. Key to symbols and abbreviations:

C-1. CORE

Run = 5.0 ft

PP



- Sample No., Standard Penetration Test

- Number of blows in each 6-in increment



UD-1, UNDIST - Sample No., 2" or 3" Undisturbed Tube Sample REC=24", 100% - Recovery in inches, Percent Recovery



- Run Length in feet - Recovery in inches, Percent Recovery REC = 60" 100%

- Core No., Rock Core

- RQD = 60" 100%- RQD in inches, Percent RQD
- MC - Moisture Content
 - Pocket Penetrometer Reading (tsf)
- FID - Flame Ionization Detector Reading (ppm)
- PID - Photoionization Detector Reading (ppm)
- GP - Geostick Penetration Reading (inches)
- LL - Liquid Limit
- PL - Plastic Limit
- TPH - Total Petroleum Hydrocarbons

SCHNABEL ENGINEERING IDENTIFICATION OF SOILS

I. DEFINITION OF SOIL GROUP NAMES (ASTM D-2487) SYMBOL GROUP NAME

Coarse-Grained Soils More than 50% retained	Gravels – More than 50% of coarse fraction	Clean Gravels Less than 5% fines	GW	WELL GRADED GRAVEL
on No. 200 sieve	retained on No. 4 sieve Coarse, ¾" to 3"		GP	POORLY GRADED GRAVEL
	Fine, No. 4 to ³ / ₄ "	Gravels with fines	GM	SILTY GRAVEL
		More than 12% fines	GC	CLAYEY GRAVEL
	Sands – 50% or more of coarse	Clean Sands	SW	WELL GRADED SAND
Fraction passes No. 4 sieve Coarse, No. 10 to No. 4 Medium, No. 40 to No. 10		Less than 5% fines	SP	POORLY GRADED SAND
	Fine No. 200 to No. 40	Sands with fines	SM	SILTY SAND
	1 me, 110. 200 to 110. 10	More than 12% fines	SC	CLAYEY SAND
Fine-Grained Soils	Silts and Clays -	Inorganic	CL	LEAN CLAY
50% or more passes	Liquid Limit less than 50		ML	SILT
the No. 200 sieve	Low to medium plasticity	Organic	OL	ORGANIC CLAY
				ORGANIC SILT
	Silts and Clays -	Inorganic	CH	FAT CLAY
	Liquid Limit 50 or more		MH	ELASTIC SILT
	Medium to high plasticity	Organic	OH	ORGANIC CLAY
				ORGANIC SILT
Highly Organic Soils	Primarily organic matter, dark in co	lor and organic odor	PT	PEAT

II. DEFINITION OF SOIL COMPONENT PROPORTIONS (ASTM D-2487)

And the second			Examples
Adjective Form	GRAVELLY SANDY	>30% to <50% coarse grained component in a fine-grained soil	GRAVELLY LEAN CLAY
	CLAYEY SILTY	>12% to <50% fine grained component in a coarse-grained soil	SILTY SAND
"With"	WITH GRAVEL WITH SAND	>15% to <30% coarse grained component in a fine-grained soil	FAT CLAY WITH GRAVEL
	WITH GRAVEL WITH SAND	>15% to <50% coarse grained component in a coarse-grained soil	POORLY GRADED GRAVEL WITH SAND
	WITH SILT WITH CLAY	>5% to <12% fine grained component in a coarse-grained soil	POORLY GRADED SAND WITH SILT

-

III. GLOSSARY OF MISCELLANEOUS TERMS

SYMBOLS	Unified Soil Classification Symbols are shown above as group symbols. A dual symbol "-" indicates the soil belongs to two groups. A borderline symbol "/" indicates the soil belongs to two
	possible groups.
FILL	Man-made deposit containing soil, rock and often foreign matter.
PROBABLE FILL	Soils which contain no visually detected foreign matter but which are suspect with regard to origin.
DISINTEGRATED ROCK	Residual materials with a standard penetration resistance (SPT) between 60 blows per foot and
(DR)	refusal. Refusal is defined as a SPT of 100 blows for 2" or less penetration.
PARTIALLY WEATHERED	Residual materials with a standard penetration resistance (SPT) between 100 blows per foot and
ROCK (PWR)	refusal. Refusal is defined as a SPT of 100 blows for 2" or less penetration.
BOULDERS & COBBLES	Boulders are considered rounded pieces of rock larger than 12 inches, while cobbles range from 3 to 12 inch size.
LENSES	0 to 1/2 inch seam within a material in a test pit.
LAYERS	1/2 to 12 inch seam within a material in a test pit.
POCKET	Discontinuous body within a material in a test pit.
MOISTURE CONDITIONS	Wet, moist or dry to indicate visual appearance of specimen.
COLOR	Overall color, with modifiers such as light to dark or variation in coloration.

	hnabol	TEST	Project:	Mainstr	eam Pha	se 1A	Prelimir	nary Stud	ly	Boring N	lumber:		B-1
Schna	bel Engineering	LOG		US 220 Henry (South County, Vi	rginia				Contract Number: 081600 Sheet: 1 of 1)
Contrac	tor:				, , ,	- <u>g</u>	-		Groun	dwater Obse	ervations		
									Date	Time	Depth	Casing	Caved
Contrac	tor Foreman: Craig el Representative: [D. Lvons				C	ompleti	on	2/20	11:05 AM	Dry	15.0'	
Equipm	ent: CME-55 (ATV)	y				Ca	sing Pu	lled	2/20	11:10 AM	Dry		13.0'
Method:	2-1/4" I.D. Hollow S	tem Auger											
		-											
Hamme	Type: Auto Hamme	er (140 lb)											
Dates	Started: 2/20/08	Finished: 2	/20/08										
Locatio	n: See Boring Location	n Plan											
Ground	Surface Elevation:	936.0 (ft)	Total De	pth: 15	.0 ft					<u> </u>		<u> </u>	
DEPTH (ft)	MATERIAL	DESCRIPTIO	ON	SYM		_EV ft)	STRA TUM	s. Depth	AMPLING	A	TESTS	RE	MARKS
	SANDY LEAN CLA	AY; moist, red	land									Residu	ıal
-	brown, contains mi	lud				-	-	F -1)	5+9+10				
				CL		-	-	╞╴┦	4				
-						-	- В						
3.5	SANDY SILT; mois	st, red and bro	own,		93	32.5		L	/ SPT	МС	; = 28.2%		
	contains mica			м				$\begin{bmatrix} \\ \end{bmatrix}$	4+8+9				
_				IVIL I			1	- 5 -					
6.0 -	DISINTEGRATED	ROCK. same	oled as		93	30.0 -		+ $+$	SPT				
-	sandy silt; moist, re	ed and brown	, contains		M -	-	-	- 4	10+50				
_	milita				VA	_							
8.5	DISINTEGRATED	ROCK. same	led as		92	27.5			SPT			Augers	s scraping
_	fine to coarse silty	sand; moist, l	brown,			-			50/4"			l	o oor aprilig
-	Contains mica							- 10 -					
					M	-							
-				DR		-	-						
_					KA.	-							
1									SPT				
-						-	1		50/1"				
15.0 —					_htt//92	21.0-		└ 15 └└	SPT				
	Auger refusal at 15	it 15.0 π. 5.0 ft.							25/0"				
	Boring terminated a	at auger refus	sal.	4:									
	Boring backfilled w	nth cuttings up	pon comple	tion.									

	hughal	TEST	Project:	Mainstre	eam Ph	ase 1	A Prelimi	nary Stu	ldy	Boring N	Boring Number:			
20	maper	BORING		US 220	South	<i>c</i>	•_			Contrac	t Number:	08160020	C	
Schna	bel Engineering	LUG		Henry C	ounty,	Virgin	lla			Sheet: 7	1 of 1			
	tor:								Groun	dwater Obse	Depth	Casing	Caved	
Contrac	tor Foreman: Crai	ig							0/00			40.01		
Schnabe	el Representative:	D. Lyons				Obs	servatio	n Well	2/20	11:25 AM	Dry	19.0'		
Equipme	ent: CME-55 (ATV)												
Method:	2-1/4" I.D. Hollow	Stem Auger												
Hammer	r Type: Auto Hamr	ner (140 lb)												
Dates	Started: 2/20/08	Finished: 2	2/20/08											
Location	n: See Boring Locati	on Plan												
	-													
Ground	Surface Elevation:	935.5 (ft)	Total De	pth: 19	.4 ft									
DEPTH (ft)	MATERIA	L DESCRIPTI	ON	SYME	BOL	ELEV (ft)	TUM	DEDTI		•	TESTS	RE	MARKS	
						.,		DEPTI		•				
	See Boring B-1 for Boring B-1A offs	or strata descri et 10.0' north c	ption. of B-1.									Residu	ual	
							1							
-					-		-		-					
							– в	L -						
							1	-	1					
							-	- 5 -						
								+ -						
]	[-]					
-							-		1					
							-							
							_	- 10 -						
							-							
-							-							
							_ c	L -						
							1							
15.0-		D ROCK sam	oled as		PP-	920.5 [.]		- 15 -	{					
	silty sand; moist,	brown, contair	ns mica		MA		_	L -	-					
				DR	MA		1	F -						
							-		-					
_					A		_	-	SPT					
19.4					EMIZI	916.1			00/0					
	Auger refusal at	at 19.4 ft. 19.4 ft.												
	Boring terminated	d at auger refu	sal.											
	Observation well	installed upon	completion.											

Schna	bel Engineering	TEST Project BORING LOG	nary Stu	dy	Boring I Contrac Sheet:	Boring Number: Contract Number: 081600 Sheet: 1 of 2						
Contrac	tor:							Groun	dwater Obs	ervations		
Contract	4							Date	Time	Depth	Casing	Caved
Schnabe	tor Foreman: J. Wi el Representative:	R. Reed			c	Completi	ion	2/20	11:50 AM	Dry	61.4'	
Equipme	ent: CME-550X (AT	V)			Ca	asing Pu	illed	2/20	12:07 PM	Dry		53.2'
Method:	2-1/4" I.D. Hollow S	Stem Auger										
Hammei	r Type: Auto Hamm	er (140 lb)										
Dates	Started: 2/20/08	Finished: 2/20/08										
Location	n: See Boring Locatio	n Plan										
Ground	Surface Elevation		Donth: 61	۸ (1								
DEDTU		904.0 (it) 10ta		<u>4 II</u>		OTDA						
(ft)	MATERIAL	DESCRIPTION	SYME	BOL	(ft)	TUM	DEPTH		A	TESTS	RE	MARKS
	FINE SANDY SIL	T; moist, reddish							LL	= NP	Residu	ıal
	brown, contains m	lica	ML					A 37474	% = 2	Passing #2 11.4	00	
_						-						
3.5	FINE SILTY SAN	D; moist, light brown,		Ш-	960.5	-		SPT 4+4+4	M	C = 16.5%		
_	Contains mica		SM	-		-	- 5 -					
6.0 -	FINE SILTY SAND	D; moist, white and ligh	nt		958.0	-	- +	SPT	м	C = 16.1%		
	brown					1						
]			м	C = 12.1%		
						_	- 10 -	6+7+8				
-				-		-						
						-						
-						-				0 47.00/		
-			SM					4+5+8	INC	17.9% = ز		
						- В	- 15 -4					
						_	L]					
-						-						
-						-		SPT 10+10+1	3 MC	C = 11.2%		
						-	- 20 -					
-						-						
23.5	FINE SILTY SAND	D; moist, light brown,			940.5	_		SPT	м	C = 12.3%		
	contains weathere	d rock fragments				-	- 25 -	13+23+1	2			
-						-						
-			SM			-						
-						-						
						1		14+12+3	4 MC	10.3% = 10		

TEST BORING LOG 08160020.GPJ SCHNABEL DATA TEMPLATE 2008 07_06.GDT 5/14/09

(continued)

Schna	bel Engineering	Project:	Mainstream US 220 Sout Henry Count	Phase 1A th y, Virginia	Prelimi	nary Study	y	Boring Number: B-2 Contract Number: 08160020 Sheet: 2 of 2			
DEPTH (ft)	MATERIAL DESCRIPTI	ON	SYMBOL	ELEV (ft)	STRA TUM	S# DEPTH	AMPLING	TESTS	REMARKS		
-	FINE SILTY SAND; moist, light contains weathered rock fragm <i>(continued)</i>	brown, ents	SM		В		SPT 11+11+12	MC = 9.3%	Residual (continued)		
38.5	DISINTEGRATED ROCK, sam mica schist ; moist, light brown	pled as	DR	925.5	C	- 40	SPT 12+23+43				
43.5 -	FINE SILTY SAND; moist, brov light brown, contains mica	vn and		920.5		- 45	SPT 15+22+25	MC = 7.7%			
-			SM		B		SPT 9+16+25	MC = 9.5% MC = 8.2%			
- - - 58.5		nled as		 905.5	-	- 55	13+11+17 SPT		Hard Augering at		
	mica schist; moist, brown		DR	9026	с	- 60 - 	50/4"		50.0		
	Bottom of Boring at 61.4 ft. Auger refusal at 61.4 ft. Boring terminated at auger refu Boring backfilled with cuttings u	sal. pon complet	ion.								

TEST BORING LOG 08160020.GPJ SCHNABEL DATA TEMPLATE 2008_07_06.GDT 5/14/09

	TEST	Project:	Mainstr	eam Pha	ase 1A	Prelimir	nary Stud	у	Boring I	Number:		B-3	
Schna	abel Engineering LOG		US 220 Henry () South County, \	/irginia	I			Contrac Sheet:	Contract Number: 08160020 Sheet: 1 of 1			
Contrac	tor:			,	1	-		Ground	dwater Obs	water Observations			
								Date	Time	Depth	Casing	Caved	
Contrac	tor Foreman: Craig				C	ompleti	on	2/20	12:10 PM	Dry	13.5'		
Equipm	ent: CME-55 (ATV)				Ca	sing Pu	lled	2/20	12:15 PM	Dry		12.0'	
Method:	2-1/4" I.D. Hollow Stem Auger					•				,			
	-												
Hamme	r Type: Auto Hammer (140 lb)												
Dates	Started: 2/20/08 Finished: 2	2/20/08											
Locatio	n: See Boring Location Plan												
Ground	Surface Elevation: 887.5 (ft)	Total Dep	pth: 15	5.0 ft									
DEPTH	MATERIAL DESCRIPTI	ON	SYM		ELEV	STRA	S	AMPLING		TESTS	RE	MARKS	
(π)					(π)		DEPTH	DATA	A				
	SILTY SAND; moist, red and br	own,									Residu	Jal	
-					-	1_		6+10+22					
-			SM		-	_ В	┝─┼	4					
-					-	-							
3.5	DISINTEGRATED ROCK, sam	pled as			884.0 -			SPT					
	silty sand; moist, light gray, con	tains mica					E	50/6					
_]							
-			DR	M	-	- C		SPT					
-				M.	-	-		25+50/5					
-				M	-	-							
8.5	SANDY SILT; moist, red and br	own,		- //// 8	879.0			SPT					
	contains mica							11+15+20	,				
-					-		- 1						
-			ML		-	_ в							
-					-	-							
					-	-	╞╶╶┦	SPT					
 15.0				,	872 5				,				
	Bottom of Boring at 15.0 ft.						10						
	Boring terminated at selected de	epth. non completi	ion										
	Doning backlined with cuttings u	porr complet											

Schna	chnabel abel Engineering	TEST BORING LOG	Project:	Mainstre US 220 Henry C	eam F South County	Phase h y, Virgi	1A Prelin nia	nina	ary Stud	y	Borin Contr Shee	ig Number: ract Number: t: 1 of 2	08160020	B-4
Contrac	tor:									Groun	dwater O	bservations		
										Date	Time	e Depth	Casing	Caved
Schnab	etor Foreman: Crai	Ig D I vons					Comple	etio	n	2/20	1:05 P	M Dry	33.5'	
Equipme	ent: CME-55 (ATV	')				(Casing F	Pull	ed	2/20	1:15 P	M Dry		30.6'
Method:	: 2-1/4" I.D. Hollow	Stem Auger												
Lamma		mor (140 lb)												
	Started: 2/20/08	Finished: 2	0/20/08											
	n: See Boring Locati	on Plan	/20/00			-								
Ground	Surface Elevation:	912.5 (ft)	Total Dep	oth: 35	0 ft									
DEPTH	MATERIA	DESCRIPTI	ON	SYME	301	ELE	V STR	A	S	AMPLING		TESTS	RF	MARKS
(ft)						(ft)	TUN	י נ	DEPTH	DAT	\	12010		
	SANDY LEAN C	LAY; moist, rec	and							7007			Residu	ıal
-	DIOWII, COIItains I	nica				-	-	-	$ \rangle$	3+3+3				
-				CL		-	-	-	<u>+</u>					
25						-	_	-	-					
3.5	SILTY SAND; mo	oist, light browr	١,			- 909.0	-	+	-\	SPT 15+24+22	2	MC = 13.1%		
_							_	-	- 5 🕂	4				
_						_	_	_	\downarrow					
_						_	_			4+4+6		MC = 30.2%		
						_			Ľ					
										/ SPT		MC = 28.0%		
									$\langle \rangle$	4+7+8				
									- 10					
						_	- B	F						
5				SM		-	-	F	-					
				SIVI		-	-	F						
						-	-	-	-1>	(SP1 11+14+33	3			
							-	-	- 15 -	-				
						-	-	-	-					
-						-	-	-	-					
						-	-	-	-					
_						-	-	-	-5	SPT 9+10+14		MC = 14.0%		
							_	-	- 20 –	4				
						_	_	F	4					
22.0 -						- 890 !	5 🗕	\downarrow						
	DISINTEGRATEI silty sand; moist,	D ROCK, samp light gray	oled as		M	_							Augers from 2	s scraping 2.0' to 24.0'
				DR	VA	_	_ c			SPT				
					M					50/2"				

(continued)

Schna	test beleingineering	Project:	Mainstream US 220 Sout Henry Count	Phase 1A th ty, Virginia	Prelimi	nary Study		Bori Cont Shee	ng Number: tract Number: 08 et: 2 of 2	B-4
DEPTH (ft)	MATERIAL DESCRIPTI	ON	SYMBOL	ELEV (ft)	STRA TUM	sai Depth	MPLING DATA		TESTS	REMARKS
-	DISINTEGRATED ROCK, samp silty sand; moist, light gray (con	bled as tinued)	DR		С					Residual (continued)
28.5	SILTY SAND; moist, light brown contains mica	ι,	SM	884.0 	B		SPT 9+11+12 SPT 9+11+12		MC = 15.8%	
	Bottom of Boring at 35.0 ft. Boring terminated at selected de Boring backfilled with cuttings u	epth. pon complet	ion.							

50	chnabel TEST BORING	Project:	Mainstream US 220 Soι	Phas ith	e 1A	Prelimi	nary Stuc	ly	Bori Con	ng Ni tract	umber: Number:	08160020	B-5
Schna	bel Engineering LOG		Henry Coun	ty, Vi	rginia				Shee	et: 1	of 1		
Contrac	tor:							Ground	dwater (Obsei	rvations Depth	Casing	Caved
Contrac	tor Foreman: Craig							Date			Берш	Casing	Caveu
Schnabe	el Representative: D. Lyons				Co	ompleti	ion	2/20	1:43 F	РМ	Dry	13.5'	
Equipme	ent: CME-55 (ATV)				Cas	sing Pu	illed	2/20	1:50 F	РМ	Dry		11.8'
Method:	2-1/4" I.D. Hollow Stem Auger												
Hammer	r Type: Auto Hammer (140 lb)												
Dates	Started: 2/20/08 Finished: 2	/20/08											
Location	n: See Boring Location Plan												
Ground	Surface Elevation: 872.0 (ft)	Total Dept	th: 15.0 ft										
DEPTH (ft)	MATERIAL DESCRIPTION	ОN	SYMBOL	EL	.EV ft)	STRA TUM	S				TESTS	RE	MARKS
				ì	,		DEPIR	DATA	•				
-	SANDY LEAN CLAY; moist, rec brown, contains mica	l and	CL		-			SPT 3+3+3				Residu	ıal
3.5	SANDY SILT; moist, brown, cor mica	ntains	ML	4 86 - 	i8.5 - -	-	5	SPT 3+4+5		MC	= 26.4%		
6.0 -	SILTY SAND; moist, brown, cor mica	ntains		+ 86	- 6.0 - -	В		SPT 5+4+5		МС	= 22.6%		
-			SM		-		- 10	SPT 4+4+5		МС	= 20.6%		
15.0-					- 7 0			SPT 2+3+4		мс	= 18.7%		

Bottom of Boring at 15.0 ft. Boring terminated at selected depth. Boring backfilled with cuttings upon completion.

	hashal	TEST	Project:	Mainstream F	hase	1A F	Prelimir	nary Stu	dy		Borin	g Number			B-6
Schnz		BORING LOG		US 220 South Henry County	ו V. Virai	inia					Cont	ract Numb	er:	08160020)
Contrac	tor:									Ground	water O	bservatio	ns		
										Date	Time	e Dep	th	Casing	Caved
Contrac Schnab	etor Foreman: J. V	Vhite R Reed				Со	mpleti	on		2/20	12:50 F	PM Dry	ý	5.9'	
Equipm	ent: CMF-550X (A	TV)			(Casi	ing Pu	lled		2/20	12:57 F	M Dr	/		
Method	2-1/4" I D Hollow	Stem Auger							+	-			, 		
	. 2 174 1.2.1101000	olem / luger													
Hamme	r Type: Auto Hamr	mer (140 lb)													
Dates	Started: 2/20/08	Finished: 2	/20/08												
Locatio	n: See Boring Locati	on Plan													
Ground	Surface Elevation	052.0 (ft)	Total Day	ath: 50ft											
Ground	Surface Elevation.	. 955.0 (II)	Total Dep	5.11. 5.9 ft											
DEPTH (ft)	MATERIA	AL DESCRIPTION	N	SYMBOL	ELE (ft)		STRA TUM	S DEPTH	SAM I	PLING DATA		TEST	S	RE	MARKS
	LEAN CLAY; mo	oist, red, trace s	and,						\sqrt{s}	SPT				Residu	ıal
	contains mica				-	-			Ň	+					
				CL	-	_	В								
3.5					949.	.5 -		- 7		דחי				Augers	s scraping
	silty sand; dry, gr	D ROCK, samp ayish green	led as	M	-	-			5	50/3"				at 3.0	
				DR			С	- 5 -							
5.9					947	1								Hard a	lugering at
	Bottom of Boring) at 5.9 ft.			• • • •										
	Auger refusal at	5.9 ft.													
	Boring terminated	with cuttings up	ai. con completi	ion.											
	Ū														
, ,															
5															
2 2 2															
Ś															
1															
5															
5															
700															

Schna	chnabel	TEST BORING LOG	Project:	Mainstre US 220 Henry C	eam Pha South county, V	se 1A ′irqinia	Prelimi	nary Stud	у	Boring Contrac Sheet:	Number: t Number: 1 of 2	08160020	B-6A
Contrac	tor:			,		Ť			Ground	dwater Obs	ervations		
	••••								Date	Time	Depth	Casing	Caved
Contrac	tor Foreman: J. W	/hite				En	ncounte	red	2/20		Dry		
Equipm	ent: CME-550X (A ⁻	TV)				С	ompleti	on	2/20	2:40 PM	Dry		
Method	2-1/4" I.D. Hollow	Stem Auger				Ca	sing Pu	illed	2/20	3:30 PM	Dry		
						Obse	ervatior	n Well	2/20	3:35 PM	Dry	47.5'	
Hamme	r Type: Auto Hamn Started: 2/20/08	ner (140 lb)	/20/08										
Locatio	n: See Boring Location	on Plan	20/00										
Current	Quarte e Elevetiere	050 5 (#)	Total Da		- 4								
Ground	Surface Elevation:	958.5 (π)	lotal De	ptn: 47.	лс								
DEPTH (ft)	MATERIA	L DESCRIPTI	N	SYME		LEV (ft)	STRA TUM	S/ DEPTH	AMPLING	A	TESTS	RE	MARKS
-	See Boring B-6 fo 0 to 6.0'. Boring B Boring B-6.	or strata descri 3-6A offset 10.	ption from 0' west of		-	-	-			LL % =	. = NP Passing #2 35.5	00 Residu	Jal
					-	-	-						
					-	-	-						
-					-	-	-						
						_	-	- 5 -					
6.0 -	FINE TO MEDIU	M SILTY SAN	D; moist,		9	52.5 -	-	\vdash	SPT	M	C = 13.7%	Augers from 5	s scraping 5.5' to 6.0'
-	weathered rock fr	id gray, contain ragments	S			-	-	F 1/2					
-						-	-				o o =0/		
-				SM		-		$\left - \right\rangle$	9+10+17	M	C = 9.7%		
-				SIVI		_		- 10 -+					
-						-	-						
5 -						-							
13.5		D POCK same	led as		9	- 45.0			SPT				
	silty sand; moist, brown	grayish green	and		M	-	1		19+50/3"				
							1	- 15 -					
						-	1	- 1					
-						-							
						-	1		SPT				
				DR		-	C		50/4"				
						_]	_ 20 _					
-					KA	-		[]					
					VA.	-		[]					
_					M	-]	[]	SPT				
									50/6"				

(continued)

Schna	bel Engineering	TEST BORING LOG	Project:	Mainstrean US 220 So Henry Cou	m Phase 1A outh inty, Virginia	Prelimir	nary Stu	jy	Boring Number: Contract Number: Sheet: 2 of 2	B-6A
DEPTH (ft)	MATERIA	L DESCRIPTI	ON	SYMBO	L ELEV (ft)	STRA TUM	S DEPTH	AMPLING	TESTS	REMARKS
-	DISINTEGRATEI silty sand; moist, brown <i>(continued</i>	D ROCK, samı grayish green I)	oled as and	DR						Residual (continued)
28.5	DISINTEGRATEI fine to medium si and white, contain	D ROCK, samį lty sand; moist ns mica	oled as , brown	DR	930.0 	С	 - 30 	SPT 12+32+43		
33.5	FINE TO MEDIU	M SILTY SAN	D; moist,	SM	4 925.0 	В	 - 35 	SPT 11+13+21	MC = 11.4%	
38.5 -	DISINTEGRATEI silty sand; moist,	D ROCK, sam brownish gray	oled as and white		920.0 		 - 40 	SPT 14+33+40		
				DR		С	 - 45 	SPT 50/2"		
	Bottom of Boring Auger refusal at 4 Boring terminated Observation well	at 47.5 ft. 47.5 ft. d at auger refu installed upon	sal. completion.		<u>911.0</u>		I L			Augers scraping

TEST BORING LOG 08160020.GPJ SCHNABEL DATA TEMPLATE 2008_07_06.GDT 5/14/09

Schna	the Engineering LOG	Project:	Mainstream F US 220 South Henry County	hase 1A 1 7, Virginia	. Prelimi	nary Stud	у	Borin Contr Sheet	g Number: act Number: :: 1 of 1	08160020	B-7
Contract	tor:						Ground	lwater O	bservations		
							Date	Time	Depth	Casing	Caved
Contract	tor Foreman: Craig			c	ompleti	ion	2/20	3:12 PI	M Dry	13.5'	
Equipme	ant: CME-55 (ATV)			Ca	sina Pu	illed	2/20	3·19 P	M Drv		12 2'
Method:	2-1/4" I.D. Hollow Stem Auger				<u>-</u>		2,20	0.1011			
Hammer	Type: Auto Hammer (140 lb)										
Dates	Started: 2/20/08 Finished: 2	/20/08									
Location	1: See Boring Location Plan										
Ground	Surface Elevation: 895.5 (ft)	Total Dep	th: 15.0 ft								
DEPTH (ft)	MATERIAL DESCRIPTIO	N	SYMBOL	ELEV (ft)	STRA TUM	S/ DEPTH	AMPLING		TESTS	RE	MARKS
3.5	SANDY LEAN CLAY; moist, red brown, contains mica SILTY SAND; moist, red and bro contains mica	and own,	CL	892.0	B		SPT 2+7+9 SPT 5+8+7 SPT 11+13+13 SPT 10+9+11		MC = 18.8% MC = 18.0% MC = 20.5%	Residu	Jal
13.5	FINE TO COARSE SILTY SAND dark grayish	D; moist,	SM	882.0 			SPT 16+15+13	5	MC = 4.5%	Augers from 1	s scraping 3.0' to 13.5'

Bottom of Boring at 15.0 ft. Boring terminated at selected depth. Boring backfilled with cuttings upon completion.

	hnabel	TEST	Project:	Mainstrea	am Phas	se 1A	Prelimir	nary Stud	ly	Borin	ng Number:		B-8
Schna	bel Engineering	LOG		Henry Co	outri unty, Vi	rginia				Cont	ract Number: t: 1 of 1	08160020)
Contrac	tor:			- ,	,,,	J			Grour	dwater O	bservations		
									Date	Time	e Depth	Casing	Caved
Contrac Schnab	tor Foreman: Craig el Representative: I	D. Lyons				Co	ompleti	on	2/20	2:30 P	'M Dry	9.5'	
Equipme	ent: CME-55 (ATV)	,				Cas	sing Pu	lled	2/20	2:42 P	'M Dry		8.5'
Method:	2-1/4" I.D. Hollow S	stem Auger											
		0											
Hamme	Type: Auto Hamme	er (140 lb)											
Dates	Started: 2/20/08	Finished: 2	/20/08										
Locatio	n: See Boring Locatior	n Plan											
Ground	Surface Elevation:	911.5 (ft)	Total De	pth: 9.5 f	ť			I					
DEPTH (ft)	MATERIAL	. DESCRIPTI	ON	SYMBO		_EV ft)	STRA TUM	S. DEPTH	AMPLING	A	TESTS	RE	MARKS
	SANDY LEAN CLA	AY; moist, red	and									Residu	ıal
-	brown, contains mi	ica				-	-		SPT 4+5+6				
				CL		-	-	L 4					
3.5					90	- 8.0	В						
-	contains mica	st, red and bro	own,			-	-		(SP1 7+11+17	,			
				ML		_	-	- 5 -4	1				
6.0													
0.0	DISINTEGRATED	ROCK, samp	oled as			5.5			SPT 50/5"				
	Silty Sand, moist, re		anu gray			-							
-				DR	P-	-	С						
					W.L	-			SPT				
9.5					2 90)2.0			50/4"				s scraping
	Bottom of Boring a Auger refusal at 9. Boring terminated Boring backfilled w	at 9.5 ft. 5 ft. at auger refus vith cuttings u	sal. pon complet	ion.									

	hashal	TEST	Project:	Commo	nwealth (Crossi	ing Busi	iness Cei	nter	Boring N	lumber:		B-12
20	maper	BORING		U.S. Ro Martines	ute 220 S	South, nia	, Henry	County		Contrac	t Number:	09160023	3
Contrac	tor: Blue Ridge Dr	rilling Inc		IVIAI UI ISV	ville, vilgi	IIIa			Group	Sileet:	nutions		
	Boones Mill, V	/irginia							Date	Time	Depth	Casing	Caved
Contrac	tor Foreman: R. F	Rowe				En	ncounte	red	4/27		Dry		
Equipmo	en Representative.	R. Reeu				C	ompleti	on	4/27	2.02 BM	Dry	31.0'	
Method:	2-1/4" I.D. Hollow	Stem Auger							-1/21	2.00110	-	01.0	
	2 11 1.2.110101	etern ager				Cas	sing Pu	illed	4/27	2:19 PM	Dry		19.0'
Hammer	r Type: Auto Hamr	mer (140 lb)											
Dates	Started: 4/27/09	Finished: 4	/27/09										
Location	n: See Location Plar	า											
Ground	Surface Elevation:	: 986.5 (ft)	Total Dep	o th: 31.	.0 ft								
DEPTH (ft)	MATERIA	AL DESCRIPTI	ON	SYME	BOL EI	_EV ft)	STRA TUM	S DEPTH	AMPLING		TESTS	RE	MARKS
	FINE TO COARS	SE SILTY SAN	D; moist,						SPT			Residu	ıal
	white and tan, co fragments	ontains mica, ar	nd rock	SM		-			WOH+2+	4			
						·· · · -	-	$ \downarrow \downarrow$	SPT 5+3+15	MC	; = 13.2%		
4.0 -	SANDY ELASTI	C SILT; moist, l mica	ight	MH	98	32.5 -	-	$-\frac{1}{2}$	 	мс	2 = 7.5%		
-	FINE SILTY SAM	ND; moist, light	brown,				1	- 5 -	5+16+25				
	contains mica					_	1		SPT			at 5.5	s scraping
						_							
-						-		\vdash $+$	ASPT	MC	- 5 8%		
-								- 10 -	10+17+20		, = 5.0 %		
-				SM		-	1						
						-							
-					-	-	-	\vdash					
							-	- 15 -	7+10+13				
-						-	-						
						-						Auger	s scraning
19.0 -					96	67.5 -		\downarrow \downarrow				at 17.5	5'
- 1	fine sand with sil	t; moist, light bi	own,		M	_	-	- 20 -	26+52+39		;=5.3%		
_	contains mica					-	1						
					M	_							
_						-	_	$ \downarrow \downarrow$					
				DR	M-	_	c	- 25 -	72+28/2"				
-						-	-						
-						-	1						
						_]		_				
_							-	- 30 -	SPT 46+54/1"	MC	\$ = 7.1%	Augers	s scraping
31.0	Pottom of Daria	at 21 0 ft			199 199	55.5 -		L				at 29.5	o'
	Auger refusal at	31.0 ft.											
	Boring backfilled Outcrop at surface	with cuttings u	pon completi	on.									

	hashal	TEST	Project:	Commo	nwealth	Cross	ing Busi	ness Cei	nter	Boring N	lumber:		B-13
Schna	abel Engineering	LOG		U.S. Ro Martins	ute 220 : /ille, Virg	South iinia	, Henry	County		Contract Sheet:	t Number: 1 of 2	09160023	3
Contrac	tor: Blue Ridge Dr	illing, Inc.	1						Groun	dwater Obse	ervations		
Contrac	tor Foreman: R. F	Arginia Rowe							Date	Time	Depth	Casing	Caved
Schnab	el Representative:	R. Reed				Er	ncounte	red ∑	4/27	4:30 PM	54.0'	54.0'	
Equipm	ent: CME-45 (Trac	ck)				С	ompleti	on <u>T</u>	4/27	4:46 PM	53.5'	54.0'	
Method:	: 2-1/4" I.D. Hollow	Stem Auger				Ca	sing Pu	lled	4/27	5:00 PM	Dry		36.4'
Hamme	r Type: Auto Hamr	ner (140 lb)											
Dates	Started: 4/27/09	Finished: 4	/27/09										
Locatio	n: See Location Plar	ı											
Ground	Surface Elevation	949 5 (ft)	Total De	nth: 54	6 ft								
Ground		040.0 (it)	Total De					_					
DEPTH (ft)	MATERIA	AL DESCRIPTION	N	SYME		LEV (ft)	STRA	S DEPTH		•	TESTS	RE	MARKS
_	SANDY SILT; mo	oist, light orang	sh brown			-			SPT 2+4+6			Residu	ıal
-	and gray, contain	13 11100		ML		-	-	+ +					
-						-	-	$-\frac{1}{2}$	3+4+5				
4.0 -	POORLY GRAD	ED SAND; moi	st, white,		9	45.5 -	1		SPT				
_	contains mica, ai	nd rock fragme	าเร			-		[°7					
-					-	-	-		SPT 3+5+6				
-						-	1						
_						-			SPT				
-					-	-	-						
-				SP	-	-	-						
-						-	1						
_						_			SPT 9+9+10				
e) –					-	-	-						
- 00					-	-	В						
					- -	- 	1						
5 19.0 - 5 -	POORLY GRAD moist, light brown	ED SAND WIT	H SILT; a		i i g	30.5 - 		- 20 -	SPT 4+7+8				
- 10	, , , , , , , , , , , , , , , , , , ,	,				-	-						
				SP-SM		-	1						
						-]						
24.5	POORLY GRAD	ED SAND; moi	st, white,		9 	25.0_	4	- 25 -	SPT 7+10+17				
	contains mica				-	-	-						
				SP		-	1	F -					
290 -					[- 20.5 -]	[]					
	POORLY GRAD moist, light brown	ED SAND WIT n, contains mica	H SILT; a				-	- 30 -	SPT 14+20+24	1			
- 19						-	-						
				SP-SM		-	1	┝ ┤					
						-							
<u> </u>													

(continued)



Boring backfilled with cuttings upon completion.

50	chnabel BORING	Project:	Commo U.S. Ro	nweal ute 22	Ith Cr 20 Sc	rossii outh,	ng Busi Henry	iness Ce County	enter	Borin	ig Number:	r . 0916002 [°]	B-14
Schna	bel Engineering LOG		Martinsv	ville, V	/irgini	ia				Shee	t: 1 of 1		
Contrac	tor: Blue Ridge Drilling, Inc. Boones Mill Virginia								Grou	ndwater O	bservations	;	Coursed
Contrac	tor Foreman: R. Rowe				\vdash				Date	IIme			Caved
Schnab	el Representative: R. Reed					En	counte	red	4/24		Dry		
Equipm	ent: CME-45 (Track)					Co	mpleti	on	4/24	11:23 A	M Dry	18.5'	
Method:	2-1/4" I.D. Hollow Stem Auger					Cas	ing Pu	lled	4/24	11:26 A	AM Dry		11.5'
Hammo	r Type: Auto Hammer (140 lb)												
Dates	Started: 4/24/09 Finished: 4	1/24/09											
Locatio	n: See Location Plan	1/24/03			\vdash								
					-								
Ground	Surface Elevation: 951.7 (ft)	Total De	pth: 20.	0 ft									
					E 1 B	=V	STDA			G			
(ft)	MATERIAL DESCRIPTI	ON	SYMB	OL	(ft	t)	TUM	DEPTH	I DA	TA	TESTS	RE	MARKS
_	ELASTIC SILT; moist, reddish t	prown,	мн						SPT 3+3+5			Residu	ual
2.0 -				╎┛┛	- 949	9.7 -							
-	Contains mica	sn drown,	ML			_			3+6+10)			
4.0 -	SANDY SILT; moist, orangish b contains mica	rown,	ML		- 94 <i>1</i> _	'./ - 		- 5 -	SPT 3+4+5				
6.0 -	FINE SANDY SILT; moist, tan a gray, contains mica	and light			945	5.7 -			SPT 3+8+5				
-	0.17				-	-							
					-		В	 - 10 -	SPT 3+4+5				
-				-	-	-							
-			ML		-	_							
					-								
_					_			- 15 -	SPT 9+5+6				
					-	_							
_					-	_							
18.5				<u>I</u> III}-	033	22							
	FINE SILTY SAND; moist, white contains mica	е,	SM		-	·.~ _			SPT 4+4+5				
20.0	Bottom of Boring at 20.0 ft			<u></u>	-931	.7—		- 20 -	<u> </u>			I	

Bottom of Boring at 20.0 ft. Boring backfilled with cuttings upon completion.

TEST BORING LOG 09160023.GPJ SCHNABEL DATA TEMPLATE 2008_07_06.GDT 5/14/09

50	hnabel	TEST BORING	Project:	Commo U.S. Ro	onweal oute 22	th Cros 0 South	sing Bus n, Henry	iness Cei County	nter	Boring Contrac	Number: t Number:	09160023	B-15
Schna	bel Engineering	LOG		Martins	ville, V	irginia				Sheet:	1 of 2		
Contrac	tor: Blue Ridge Dr Boones Mill, \	illing, Inc. /irginia							Groun Date	dwater Obs Time	ervations	Casing	Caved
Contrac	tor Foreman: R. F	Rowe				E	ncounte	ered	4/23		Dry		
Equipme	ent: CME-45 (Trad	k)				(Completi	ion	4/24	10:20 AM	Dry	40.5'	
Method:	2-1/4" I.D. Hollow	Stem Auger				C	asing Pu	illed	4/24	10:40 AM	Dry		33.4'
	Turner Auto Lleve												
Dates	Started: 4/23/09	Finished: 4/	/23/09										
Location	n: See Location Plar	ı											
Ground	Surface Elevation:	940.0 (ft)	Total De	pth: 50	.0 ft								
DEPTH (ft)	MATERIA	AL DESCRIPTIC	DN	SYME	BOL	ELEV (ft)	STRA TUM	S		<u>,</u>	TESTS	RE	MARKS
	FLASTIC SILT:	noist reddish h	rown						/ISPT		= NP	Residu	ıal
	contains mica		iown,	MH		020 0	_	2	2+2+6	%	Passing #2 51.3	00	
2.0 -	SILT WITH SAN contains mica	D; moist, reddis	h brown,			936.0	-		SPT 3+5+8	M	C = 29.3%		
				ML			_	- 5 -	SPT 2+4+5	M	C = 23.3%		
6.0 -	SANDY SILT; m	oist, light orangi	sh		++++	934.0	-			M	C = 15.3%		
	brown, contains	mica		ML					3+3+3				
9.0 -	FINE SILTY SAM	ND; moist, light t	orown			931.0	-		SPT	M	C = 13.1%		
							-	- 10 - <u>/</u> 	2+3+4				
-							- в						
				SM					Лерт				
. –							-	- 15 -	3+3+6				
						001.0	-						
	POORLY GRAD contains mica	ED SAND; mois	st, gray,		-	921.0	_	- 20 -	SPT 11+13+14	4 M	C = 9.9%		
				SP			_						
					-		-						
24.0 -	DISINTEGRATE	D ROCK, samp	led as		KA	916.0		- 25 -	SPT	4			
	poony graded sa	nu, moist, gray		DR									
					M								
29.0 -	FINE SILTY SAM	ND; moist, light t	prown,			911.0		+ $+$	SPT	M	C = 9.3%		
	contains mica	-					-		4+6+11				
				SM			- в						
							-		1077				
									X 221				

TEST BORING LOG 09160023.GPJ SCHNABEL DATA TEMPLATE 2008_07_06.GDT 5/14/09

(continued)

Schna	chnabel abel Engineering	TEST BORING LOG	Project:	Commonwea U.S. Route 2 Martinsville,	alth Crossi 20 South, Virginia	ing Busi Henry	ness Cente County	er	Boring Number: B-15 Contract Number: 09160023 Sheet: 2 of 2			
DEPTH (ft)	MATERIA	L DESCRIPTI	ON	SYMBOL	ELEV (ft)	STRA TUM	SA DEPTH	MPLING DATA		TESTS	REMARKS	
44.7	FINE SILTY SAN contains mica (co POORLY GRAD contains mica	ID; moist, light ontinued) ED SAND; moi	brown,	SM	 	В		7+6+7 SPT 4+7+12 SPT 8+7+9 SPT 4+5+10		MC = 7.5% MC = 18.1%	Residual (continued)	

Bottom of Boring at 50.0 ft. Boring backfilled with cuttings upon completion.

Grountation and Mighing Inc. Boomes Mill, Virginia Contractor Foremani: R, Rove Groundwater Observations Date Schnabel Representative: R, Reed Equipment: CME-46 (Track) Query Contractor Foremani: R, Rove Method: 2-14" I.D. Hollow Stem Auger Query Contractor Foremani: R, Rove Hammer Type: Auto Hammer (140 lb) Query Contractor Foremani: R, Rove Dates Started: 4/22/09 Location: See Location Plan Total Depth: 49.4 ft Method: Started: 4/22/09 Total Depth: 49.4 ft Matterial Description SYMBOL ELEV (ft) STRA TUM SAMPLING Depth TESTS Remarks OPORLY GRADED SAND WITH SAND; moist, and is how, ontains mica MH PoorL SP:M PoorL SP:M PoorL SP:M Point Paint POORLY GRADED SAND WITH SULT; SP:SM SP:SM Point Paint Point Paint MC = 15.0% Point Link Contains mica MH Point Paint SP:M Point Paint MC = 15.0% Point Paint	
Boones Mill, Virginia Contractor Forman: R. Rowe Schabel Representative: R. Rode Equipment: CME-45 (Track) Method: 2-1/4*1D. Hollow Stem Auger Type: Auto Hammer (140 lb) Dates Started: 4/2209 Finished: 4/2209 Location: See Location Plan B Cround Elevation: 940.0 (ft) Total Dept: 49.4 ft DepTH MATERIAL DESCRIPTION SUBSC. Elevation: 940.0 (ft) Total Dept: 49.4 ft Casing Pulled SPEN ML SPEN A SPESM SPESM SPESM SPESM SPESM Completion II (ft) SPEC S	
Contractor Foreman: R. Rowe Schabel Representative: R. Roed Equipment: CME-45 (Track) Completion Y 4/22 12:41 PM 48.0° Completion Y 4/22 12:41 PM 48.0° 33.7° Hammer Type: Auto Hammer (140 lb) Date Started: 4/22/09 Finished: 4/22/09 Completion Y 4/22 12:41 PM 48.0° 33.7° Ground-cell (4/22/09 Finished: 4/22/09 Completion Y <th colspa="</td"></th>	
Schadbel Representative: R. Reed Completion ⊻ 4/22 12.41 PM 48.0' Completion ⊻ 4/22 12.41 PM 48.0' Method: 2-1/4*1D. Hollow Stem Auger 20.0 12.54 PM Dry 33.7' Hammer Type: Auto Hammer (140 lb) Detection: Set Location Plan 20.0 10.0 20.0 10.0 20.0 10.0 20.0 10.0	
Equipment: CME-45 (Track) Completion V 422 124 PM 48.0 Method: 2-114" LD. Hollow Stem Auger Casing Puiled 4/22 12:64 PM Dry 33.7 Hammer Type: Auto Hammer (140 lb) Location: See Location Plan Image: Completion of the state	
Method: 2-14*1.D. Hollow Stem Auger Casing Pulled 4/22 12-54 PM Dry 33.7' Hammer Type: Auto Hammer (140 lb) Dates Started: 4/22/09 Finished: 4/22/09 Location: See Location Plan Ground Surface Elevation: 940.0 (ft) Total Depth: 49.4 ft DepTH (ft) MATERIAL DESCRIPTION SYMBOL ELEV (ft) STRA SAMPLING DEPTH DATA TESTS REMARKS OCRUY GRADED SAND WITH SULT: ML SPT 2/3/3 MC = 19.3% OCRUY GRADED SAND WITH SULT: SPT - 10 SPT 2/3/3 MC = 15.0% SPT- 2/3/3 MC = 15.0% FEE determent	
Hammer Type: Auto Hammer (140 lb) Dates Started: 4/22/09 Finished: 4/22/09 Location: See Location PlanImage: Colspan="6">Image: Colspan="6" Colspa	
Hammer Type: Auto Hammer (14016) Dates Started: 4/22/09 Finished: 4/22/09 Location: See Location Plan Ground Surface Elevation: 940.0 (ft) Total Depth: 49.4 ft DEPTH MATERIAL DESCRIPTION SYMBOL ELEV (ft) STRA TUM DEPTH DATA TESTS REMARKS ELASTIC SLT WITH SAND; moist, reddish brown, contains mica MH MI SILT; moist, reddish brown, contains mica ML SILT WITH SAND; moist, reddish brown, contains mica ML SILT WITH SAND; moist, reddish brown, contains mica ML SILT WITH SAND; moist, reddish brown, contains mica ML SILT WITH SAND; moist, reddish brown, contains mica ML SILT WITH SAND; moist, reddish brown, contains mica ML SILT WITH SAND; moist, reddish brown, contains mica ML SILT WITH SAND; moist, reddish brown, SP-SM SILT WITH SAND; moist, reddish brown, contains mica ML SILT WITH SAND; moist, reddish brown, contains mica ML SILT WITH SAND; moist, reddish brown, SP-SM SILT WITH SILT; moist, tan, contains mica SILT WITH SILT; SP-SM	
Location: See Location Plan Ground Surface Elevation: 940.0 (ft) Total Depth: 49.4 ft DEPTH MATERIAL DESCRIPTION SYMBOL ELEV (ft) MATERIAL DESCRIPTION SYMBOL ELEV (ft) SILT WITH SAND; moist, reddish brown, contains mica MI SILT WITH SAND; moist, reddish brown, contains mica MI OPORLY GRADED SAND WITH SILT; OPORLY GRADED SAND WITH SILT; SP-SM	
Image: Second Surface Elevation: 940.0 (ft) Total Dept: 49.4 ft Image: Second Surface Elevation: 940.0 (ft) Total Dept: 49.4 ft MATERIAL DESCRIPTION SYMBOL ELEV (ft) STRA Dept: STRA Dept: 100 TESTS Residual OPEPTH DATA TESTS Residual SULT WITH SAND; moist, reddish brown, contains mica MH SPT SPT Residual OPORLY GRADED SAND WITH SILT: ML SPT SPT SPT 0 POORLY GRADED SAND WITH SILT: 0	
Ground Surface Elevation: 940.0 (ft) Total Dept:: 49.4 ft STRA SAMPLING TESTS REMARKS DEPTH (ft) MATERIAL DESCRIPTION SYMBOL ELEV (ft) STRA SAMPLING DEPTH DATA TESTS REMARKS 2.0 ELASTIC SILT WITH SAND; moist, reddish brown, contains mica MH 938.0 938.0 MC = 30.1% Residual 6.0 SILT WITH SAND; moist, reddish brown, contains mica MH 934.0 SPT 24346 MC = 30.1% MC = 19.3% 900RLY GRADED SAND WITH SILT; moist, tan, contains mica SPSN SPS 934.0 SPT 10 SPT 24345 MC = 19.3% MC = 19.3% 900RLY GRADED SAND WITH SILT; ME SPSN SPS SPS SPT 10 SPT 24345 MC = 15.0% Fund diline dil SPS 934.0 SPS-SM SPS-SM SPS SPS MC = 15.0% Fund diline dil SPS SPS 934.0 SPS-SM SPS-SM SPS SPS SPS SPS SPS SPS SPS 934.0 SPS-SM SPS-SM SPS SPS SPS SPS SPS SPS SPS SPS SPS <td< td=""></td<>	
DEPTH (ft) MATERIAL DESCRIPTION SYMBOL ELEV (ft) STRA TUM SAMPLING DEPTH TESTS REMARKS 2.0 	
Definition MATERIAL DESCRIPTION SYMBOL Clear (tr) TUM Depth DATA TESTS REMARKS 2.0 ELASTIC SILT WITH SAND; moist, reddish brown, contains mica MH - - - - 2*2*4 - - 2*2*4 MC = 30.1% Residual 5.1LT WITH SAND; moist, reddish brown, contains mica ML - - - - 2*2*4 MC = 30.1% 6.0 POORLY GRADED SAND WITH SILT; moist, tan, contains mica ML - - - SPT = 2*3*5 MC = 19.3% 7 POORLY GRADED SAND WITH SILT; moist, tan, contains mica ML - - - SPT = 2*3*4 - - 8 - - - - - - SPT = 2*3*4 - - - - - - - - - - - SPT = 2*3*4 - - - - - - - - - - - SPT = 2*3*4 - - - - - - - - - - - - - - - - - - - - - - <	
ELASTIC SILT WITH SAND; moist, reddish brown, contains mica MH SILT WITH SAND; moist, reddish brown, contains mica ML SILT WITH SAND; moist, reddish brown, contains mica ML POORLY GRADED SAND WITH SILT; moist, tan, contains mica SPT B SPT B SPT SPT SPT SPT SPT SPT SPT SPT	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	
$\begin{array}{c} 2.0 \\ \hline SILT WITH SAND; moist, reddish brown, \\ contains mica \\ \hline ML \\ \hline 938.0 \\ \hline 0 \\ \hline \\ 938.0 \\ \hline \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ -$	
$B = \frac{1}{10} + \frac{1}{$	
$B = \frac{1}{2}$	
6.0 - POORLY GRADED SAND WITH SILT;moist, tan, contains mica	
SP-SM $SP-SM$ $SP-S$	
SP-SM $SP-SM$ $SP-S$	
SP-SM $SP-SM$ $SP-S$	
SP-SM =	
SP-SM =	
SP-SM =	
SP-SM $SP-SM$ $SPT = 15.0%$ $SPT = 15.0%$ $SPT = 15.0%$ $SPT = 15.0%$	
SP-SM SP-SM SP-SM SPT	
24.0 DISINTEGRATED ROCK, sampled as	
and tan, contains mica	
29.0 POORLY GRADED SAND WITH SILT;	
- moist, gray and tan, contains mica	
$- \qquad \qquad$	

(continued)

	hnabel	TEST	Project:	Commonw	ealth Crossi	ing Busi	iness Center	Boring Number: B-16			
Schna	bel Engineering	LOG		U.S. Route Martinsville	e 220 South, e, Virginia	Henry	County	Contract Number Sheet: 2 of 2	r: 09160023		
DEPTH (ft)	MATERIA	AL DESCRIPTIO	N	SYMBOL	ELEV (ft)	STRA TUM	SAMPLING DEPTH DATA	TESTS	REMARKS		
	POORLY GRAD moist, gray and t (continued) DISINTEGRATE poorly graded sa and tan, contains Bottom of Boring Boring backfilled	ED SAND WIT an, contains mi D ROCK, samp nd with silt; moi s mica	H SILT; ca bled as ist, gray	SP-SM	901.0 -	В	- 40 - SPT - 40 - SPT - 40 - SPT - 45 - SPT - 45 - SPT 5+40+26 	MC = 15.5%	 Residual (continued) Outside of sampler wet at 44.0' Hard augering at 44.5' Augers scraping at 48.0' 		

Schna	bel Engineering	TEST BORING LOG	Project:	Commo U.S. Ro Martinsv	nwealth (ute 220 \$ /ille, Virgi	Cross South, nia	ing Busi , Henry	iness Ce County	nter	Boring N Contract Sheet: 1	B-17		
Contract	tor: Blue Ridge Di	rilling, Inc.	1						Groun	dwater Obse	ervations		
	Boones Mill, \	/irginia							Date	Time	Depth	Casing	Caved
Contract	tor Foreman: R. H	Rowe				En	counte	red	4/23		Dry		
Schnabe		R. Reed				- C	omnleti	ion	1/23	10·36 AM	Dny	48.5'	
Equipme	2.1/4" D. Hollow	CK)					ompieu		4/23	10.30 AW	Diy	40.0	
Method:	2-1/4 I.D. Hollow	Stern Auger				Ca	sing Pu	illed	4/23	10:58 AM	Dry		25.0'
Hammer	• Type: Auto Hami	mer (140 lb)											
Dates	Started: 4/23/09	Finished: 4	/23/09										
Location	1: See Location Plar	n											
Ground	Surface Elevation:	: 940.2 (ft)	Total De	pth: 50.	.0 ft		1	1					
DEPTH	ΜΔΤΕΒΙ		N	SYME		LEV	STRA	5	SAMPLING		TESTS	RF	MARKS
(ft)					(ft)	TUM	DEPTH		•	12010		
	ELASTIC SILT V	VITH SAND; m	oist,							2		Residu	ıal
	reddish brown, c	contains mica		MH		- 20.2				.5			
2.0	SILT WITH SAN	D; moist, reddis	sh brown,		TTT 9.	- 2.00							
						-							
				ML			-	- 5 -	SPT 3+3+4				
-							-						
6.5	FINE SILTY SAM	ND; moist, brow	n,		9: -	33.7	-						
-	contains mica			SM		-	-	- +	3+3+4				
0.5						20 7	-	- +	SPT				
	POORLY GRAD	ED SAND; moi	st, white				-	- 10 -	8+15+20			Firm d	riling from 11.5'
	fragments			SD	-	-	1						
						-	1					Soft dr 11.5' te	o 14.0'
						-	1	F 1					
14.0	FINE SILTY SAN	ND; moist, brow	n,		9/	- 20.2]						
						-							
_						-	-						
-						-	B						
. –				SM		-	-	- +	SPT				
!							-	- 20 -	4+6+6				
-					-	-	-						
-						-	-						
-						-	1	- 1					
24.0 -	FINE SILTY SAM	ND; moist, white	and		9	16.2 -	1						
	gray, contains m	ica, and rock fra	agments					- 25 -	19+24+24	+			
				SM		_		[]					
_						_		L _					
29.0 -					9	11.2 -	-	_					
	FINE SILTY SAN contains mica	ND; moist, brow	n,				-	- 30 -	SPT 5+10+15				
-						-	-						
-				SM	-	-	-	├ ┤					
-						-	-						
						-	1		SPT				

(continued)

Schna	bel Engineering	TEST ORING LOG	Project:	Commonwe U.S. Route 2 Martinsville,	alth Crossi 220 South, Virginia	ng Busi Henry	ness Cente County	er	Boring Number: B-17 Contract Number: 09160023 Sheet: 2 of 2			
DEPTH (ft)	MATERIAL D	ESCRIPTIC	ON	SYMBOL	ELEV (ft)	STRA TUM	SA DEPTH	MPLING DATA		TESTS	REMARKS	
	FINE SILTY SAND; n contains mica (contin	noist, brow nued)	n,	SM		в	 	12+15+17			Residual (continued)	
39.0 -	DISINTEGRATED R(poorly graded sand; r contains mica, and ro	OCK, samp moist, white ock fragmer	led as , hts	DR	+ 901.2 - 	С	- 40 - 	SPT 100/3"				
44.0 -	SILTY SAND; moist, contains mica	light brown	,	SM	896.2 -	В		SPT 11+17+23 SPT 16+10+12				

Bottom of Boring at 50.0 ft. Boring backfilled with cuttings upon completion.

	chnabel BORING		onwealth	Cross	ing Bus	iness Cer	nter	Boring N	lumber:	0040000	B-18	
Schna	bel Engineering LOG		Martins	ville, Vir	ginia	rieny	County		Sheet: 1	l of 1	09160023	5
Contrac	tor: Blue Ridge Drilling, Inc.							Ground	dwater Obse	ervations		
Contrac	tor Foreman: R Rowe							Date	Time	Depth	Casing	Caved
Schnabe	el Representative: R. Reed				En	counte	ered	4/23		Dry		
Equipme	ent: CME-45 (Track)				C	omplet	ion	4/23	12:15 PM	Dry	18.5'	
Method:	2-1/4" I.D. Hollow Stem Auger				Ca	sing Pı	illed	4/23	12:23 PM	Dry		8.7'
Hammei	Type: Auto Hammer (140 lb)											
Dates	Started: 4/23/09 Finished: 4	/23/09										
Location	n: See Location Plan											
Ground	Surface Elevation: 900.0 (ft)	Total De	pth: 20	.0 ft								
DEPTH	MATERIAL DESCRIPTI	ON	SYME	30L	ELEV	STRA	S	AMPLING		TESTS	RE	MARKS
(ft)					(ft)	TUM	DEPTH	DATA	A			
-	ELASTIC SILT; moist, reddish t contains mica	Drown,	мн		-		2	SPT 3+3+3			Residu	al
2.5	SILT WITH SAND; moist, reddi contains mica, and rock fragme	sh brown, nts		+ #.# _	- 397.5 - -	-		SPT 3+4+5	MC	; = 39.3%		
-			ML			-	- 5 -	2+4+7	MC	; = 28.0%		
-					-	-		3+4+5	MC	; = 25.9%		
8.5	FINE SILTY SAND; moist, oran brown, contains mica	gish			391.5 -	в		SPT 3+4+6	MC	; = 19.9%		
-			SM		-							
13.5					386.5	-						
-	Contains mica	١,			-	-	- 15 -	3+3+5				
-			ML		-	-						
18.5	FINE SILTY SAND; moist, white	Э,	SM	- - -	- 381.5 -	-		SPT	мс	; = 8.7%		
20.0	contains mica			ШЦ,	380.0		⊥ 20 ⊥∕	10120+10	,			

Bottom of Boring at 20.0 ft. Boring backfilled with cuttings upon completion.

TEST BORING LOG 09160023.GPJ SCHNABEL DATA TEMPLATE 2008_07_06.GDT 5/14/09

50	hnabel	t: Commonwealth Crossing Business Center U.S. Route 220 South, Henry County						Boring Number: B-19 Contract Number: 09160023					
Schna	bel Engineering	LOG		Martins	ville, Virg	inia				Sheet:	1 of 1		
Contrac	tor: Blue Ridge Dr Boones Mill, V	illing, Inc. /irginia		_	_		_	_	Ground Date	dwater Obso Time	ervations Depth	Casing	Caved
Contract	tor Foreman: R. F	Rowe				Er	ncounte	red	4/23		Dry		
Equipme	ent: CME-45 (Trac	к. кеец к)				С	ompleti	on	4/23	2:00 PM	Dry	28.5'	
Method:	2-1/4" I.D. Hollow	Stem Auger				Ca	sing Pu	lled	4/23	2:10 PM	Dry		13.0'
	Transa Asstalla												
Hammer Dates	Started: 4/23/09	Finished: 4	/23/09										
Locatior	n: See Location Plar	ı											
Ground	Surface Elevation:	924.8 (ft)	Total De	pth: 30.	.0 ft								
DEPTH	MATERIA		אר	SYME		LEV	STRA	s	AMPLING		TESTS	BE	MARKS
(ft)						(ft)	TUM	DEPTH	DATA	x	12010		
_	SANDY ELASTIC	C SILT; moist, r mica	eddish	МН		-	-	2	SPT 3+4+8	LL %	= NP Passing #20	Residu	ıal
2.0 -	SANDY SILT; mo	oist, reddish bro	own,	ML	+ # , # ,+ 9:	- 22.8			SPT 3+4+8	- 4	·3.7		
4.0 -	FINE SILTY SAN	ID; moist, light	brown,		9	20.8 -			SPT				
	contains mica								ZISPT				
_						-			3+4+5				
_					-	-	-	+ $+$	SPT				
								- 10 -/ - -	3+3+5				
_						-	-						
-						-							
						_	- в	- 15 -	3+4+6				
-				SM		-							
_						-	-						
						_		- 20 -	SPT 6+5+6				
-						-							
						-	-						
_						-			SPT 7+9+11				
-						-	-	/					
-						-							
-						-	-		SPT 7+9+12				
30.0 —	Bottom of Boring	at 30.0 ft.			<u>19.19</u> -8	94.8-		└─ 30L	N	I		I	
	Boring backfilled	with cuttings u	oon complet	ion.									

	hnabal	Project:	Commo	onwealt	n Cros	ssing Bus	siness Ce	enter	Boring N		B-20		
Schnabel Engineering BURING LOG U.S. Route 220 South, Henry County Martinsville, Virginia Contract Numl Sheet: 1 of 1 Contractor: Blue Ridge Drilling, Inc. Groundwater Observation									t Number: 1 of 1	09160023	3		
Contrac	tor: Blue Ridge Di Boones Mill. \	rilling, Inc. √irginia							Groun	dwater Obse	ervations	Casing	Coved
Contrac	tor Foreman: R. F	Rowe							Date	Time	Deptn	Casing	Caved
Schnabe	el Representative:	R. Reed				E	Encount	ered	4/24		Dry		
Equipme	ent: CME-45 (Trad	ck)					Complet	tion	4/24	2:16 PM	Dry	28.5'	
Method:	2-1/4" I.D. Hollow	/ Stem Auger				С	asing P	ulled	4/24	2:23 PM	Dry		21.6'
Hammer	Type: Auto Ham	mer (140 lb)											
Dates	Started: 4/24/09	Finished: 4	/24/09										
Location	1: See Location Plan	n											
Ground	Surface Elevation	: 951.2 (ft)	Total De	oth: 28	.5 ft								
													<u> </u>
(ft)	MATERIA	AL DESCRIPTIO	NC	SYME	BOL	ELEV (ft)		DEPTH		•	TESTS	RE	MARKS
-	ELASTIC SILT V reddish brown, c	VITH SAND; mo contains mica	oist,	мн			-		SPT 2+3+5			Residu	lal
2.0 -	SILT WITH SAN contains mica	ID; moist, reddis	sh brown,	ML		949.2	-		SPT 2+4+7	MC	; = 37.0%		
4.0 -	FINE SILTY SAM	ND; moist, oran	gish			947.2	2 -			MC	2 = 28.3%		
	brown, contains	mica					_	- 5 -			- 47.00/		
-				SM			-		3+5+6	INIC	, = 17.0%		
90-						942 2							
	FINE SILTY SAN contains mica	ND; moist, white) ,				B	- 10 -	SPT 4+4+6	MC	; = 10.3%		
-				SM			-						
14.0 -	POORLY GRAD	ED SAND WIT	H SILT;			937.2	2 -		\∕ SPT	мс) = 15.5%		
_	moist, orangish t contains rock fra	prown and black	κ, ica				-	- 15 -	7+10+12				
				SP-SM									
_							-						
19.0 -	DISINTEGRATE	D ROCK, samp	oled as			932.2	: 	+ -					
	poorly graded sa contains mica	ind; moist, white	<u>},</u>		M			- 20 -	9+30+39				
-				DR	A		- C					Firm d	Irilling at
-					Й-		-					22.0'	niing at
24.0 -	POORLY GRAD	ED SAND; moi	st, white	SP		927.2	<u>е</u> — в	- 25 -	SPT	0			
26.0 -						925.2	:+	+ -				Hord c	drilling of
-	poorly graded sa	and; moist, white)eu as),	DR	M		- c					26.0	iniing at
28.5						922.7	, 1	_F _{	SPT			Augers	s scraping
	Auger refusal at	28.5 π. 28.5 ft.							50/0"				0.0 10 20.0
	Boring backfilled	with cuttings up	pon complet	ion.									
í													

	hnahal	TEST	Project:	Commo	onwealth	Cross	sing Busi	iness C	enter	Boring I	Number:		B-21
Schna	bel Engineering	BORING LOG		U.S. Ro Martins	oute 220 ville, Viro	South jinia	i, Henry	County		Contrac Sheet:	t Number: 1 of 1	09160023	3
Contract	tor: Blue Ridge D	rilling, Inc.							Groun	dwater Obs	ervations		
Contract	Boones Mill, V	/irginia Powo							Date	Time	Depth	Casing	Caved
Schnabe	el Representative:	R. Reed				E	ncounte	red	4/24		Dry		
Equipme	ent: CME-45 (Trad	ck)				C	completi	ion	4/24	3:42 PM	Dry	32.0'	
Method:	2-1/4" I.D. Hollow	Stem Auger				Ca	ising Pu	Illed	4/24	3:52 PM	Dry		21.0'
Hammer	• Type: Auto Ham	mer (140 lb)											
Dates	Started: 4/24/09	Finished: 4	/24/09										
Location	n: See Location Plar	n											
Ground	Surface Elevation	: 981.0 (ft)	Total Der	oth: 32	2.0 ft								
DEDTU					-		STDA						
(ft)	MATERIA	AL DESCRIPTI	NC	SYME	BOL	(ft)	TUM	DEPTI		A	TESTS	RE	MARKS
_	ELASTIC SILT V reddish brown, c	VITH SAND; m ontains mica, a	oist, nd rock	МН	-		-		SPT 4+5+5			Residu	Jal
2.0 -	SILT WITH SAN	D; moist, reddig	sh brown,	ML	+ 4 ,4+ 9	79.0	-		SPT 5+6+10	мо	C = 17.7%		
4.0 -	FINE SILTY SAN	ND; moist, orang	ge and			77.0	_		SPT	мо	C = 18.0%		
_	- white, contains mica						-			м	C = 18.9%		
	-						-		4+5+6				
_			SM		_	В		SPT					
-	-						-			LL PL	= 49 = 34	00	
							-			= 5	51.8		
14.0 -	FINE SILTY SAN	ND; moist, brow	n,			67.0	_		SPT 3+4+4	мо	C = 19.3%		
_				SM	-		-						
							-						
19.0 -	DISINTEGRATE	D ROCK, samp	oled as		si i i i i i i i i i i i i i i i i i i	62.0		- 20 -	SPT 53+47/0"	мо	C = 11.4%	Auger	s scraping
-	grayish green	aver with sand,	moist,				-					at 19.8	5'
					M								
24.5						56.5	-			M	C = 23.6%		
	SILT WITH SAN black, contains n	D; moist, brown nica, and rock f	and and ragments			_	-	- 25 - 					
-				ML	-		_ В		SPT			Augen	s scraping
29.0 -					c	52.0	1					at 27.0)'
	DISINTEGRATE with sand; moist, contains mica, a	D ROCK, samp brown and bla nd rock fragme	oled as silt ck, nts	DR			c	- 30 -	SPT 4+16+84	/3" MC	2 = 28.9%		
32.0 ⊥	Bottom of Boring	at 32.0 ft.		1	g L	49.0		L _					
	Auger refusal at Boring backfilled	32.0 ft. with cuttings u	oon completi	on.									
	-	.	•										

		Project:	Commonwealth	Cross	ing Busi	iter	Boring Number: 09160023				
Schna	bel Engineering LOG		Martinsville, Virg	jinia	, rienry	County		Sheet: 1	of 1	09160023	3
Contrac	tor: Blue Ridge Drilling, Inc.						Ground	lwater Obse	rvations		
Contract	tor Foreman: R Rowe						Date	Time	Depth	Casing	Caved
Schnabe	al Representative: R Reed			En	counte	red	4/27		Dry		
Equipme	ent: CME-45 (Track)			C	ompleti	ion	4/27	10:36 AM	Dry		
Method:	2-1/4" I.D. Hollow Stem Auge	r		Ca	sing Pu	illed	4/27	10:46 AM	Dry		13.8'
	-										
Hammer	1 ype: Auto Hammer (140 lb)	4/07/00									
Dates	Started: 4/2//09 Finished:	4/27/09									
Location											
Ground	Surface Elevation: 939.5 (ft)	Total De	pth: 21.0 ft								
DEPTH (ft)	MATERIAL DESCRIF	SYMBOL	LEV (ft)	STRA TUM	S/ DEPTH	AMPLING		TESTS	RE	MARKS	
4.0 -	FILL, sampled as sandy elas gray, contains glass, mica, a FINE SILTY SAND; moist, or brown, contains mica POORLY GRADED SAND V moist, white and gray, contain DISINTEGRATED ROCK, sa fine sand; moist, white and g mica DISINTEGRATED ROCK, sa sandy silt; moist, white and b contains mica	tic silt; moist, nd organics rangish VITH SILT; ns mica ampled as ray, contains ampled as rown,	FILL 99 SM 99 SP-SM 99 DR 99 DR 99 DR 99 DR 99	- - - - - - - - - - - - - - - - - - -	B C		SPT WOH+2+ SPT 1+1+2 SPT 3+5+7 SPT 7+10+30 SPT 57+48/3" SPT 6+100/5" SPT 6+100/5"	1		Fill Residu Hard, / scrapin to 12.0 Hard, / scrapin 14.5' to	Augers ng from 9.0' ' Augers ng from o 17.5'
21.0	Bottom of Boring at 21.0 ft.		J9	18.5 -							

Auger refusal at 21.0 ft. Boring backfilled with cuttings upon completion.

	hnabol	TEST	Project:	Commo	nwealt	n Cro	ssing Bu	usir	ness Cen	ter	Boring I	Number:		B-23
Schnal	bel Engineering	LOG		U.S. Ro Martinsv	ute 220 ville, Vi) Sou ginia	ith, Henr 1	уC	County		Contrac Sheet:	t Number: 1 of 1	09160023	3
Contract	or: Blue Ridge Dr	illing, Inc.								Ground	dwater Obs	ervations		
	Boones Mill, V	'irginia								Date	Time	Depth	Casing	Caved
Contract	or Foreman: R. F	Rowe					Encoun	ter	ed	4/27		Drv		
Schnabe	Representative:	R. Reed										5.9		
Equipme	nt: CME-45 (Trac	k)					Comple	etic	on	4/27	11:17 AM	Dry	8.0'	
Method:	2-1/4" I.D. Hollow	Stem Auger				C	Casing I	Pul	lled	4/27	11:20 AM	Dry		
Hommor	Tuno: Auto Hom	por(140 lb)												
	ates Started: 4/27/09 Finished: 4/27/09													
Location	cation: See Location Plan													
Location		I												
		050 5 (0)												
Ground	Surface Elevation:	952.5 (ft)	Total Dep	tn: 8.0			-							
DEPTH			אר	SAME		ELE\	LEV STRA SA		MPLING		теете	DE	MADKS	
(ft)				STIVIE		(ft)	TUN	N	DEPTH	DATA	A	12313		
	SILT WITH SAN	D; moist, orang	ish				_			SPT			Residu	ıal
	brown, contains i	nica												
										SPT	MC	2 = 28.8%		
							_	-	- 5 -	SPT 2+3+5	MC	2 = 28.8%		
6.0 +	6.0 DISINTEGRATED ROCK, sampled as					946.5	5 +		- +	SPT	м	C = 10.5%		
-	poorly graded sa	nd; moist, white	and	DR	M		- C		- +	17+56+44	1/0"		Augen	s scraping
8.0 ⊥	3.0 gray, contains mica, and rock fragments						5 上							sociaping

Bottom of Boring at 8.0 ft. Auger refusal at 8.0 ft. Boring backfilled with cuttings upon completion. Boring B-23 moved 40.0' East of staked location. Outcrop in logging road between Borings B-22 and B-23.

Schna	hnabel	TEST BORING LOG	Project:	Common U.S. Ron Martinsv	nwealth (ute 220 \$ ille_Virgi	Cross South	ing Bus , Henry	iness Ce County	nter	Boring N Contrac	Number: t Number:	B-23A 09160023	
Contract	tor: Blue Ridge Dr	rilling Inc		ind anot					Group	dwator Obs	orvations		
Contract	Boones Mill, V	/irginia							Date	Time	Depth	Casing	Caved
Contract	tor Foreman: R. F	Rowe				En	counte	red	4/27		Dry		
Equipme	el Representative:	K. Reed				C	omplet	ion	4/27	11.22 AM	Dry	34.0'	
Method:	2-1/4" I.D. Hollow	Stem Auger							4/07	10.05 DM	Diy	04.0	
						Ca	sing Pl	lliea	4/27	12:05 PM	Dry		21.4
Hammer	• Type: Auto Ham	mer (140 lb)											
Dates	Started: 4/27/09	Finished: 4	/27/09										
Location	1: See Location Plar	ו											
Ground	Surface Elevation:	: 950± (ft)	Total Dep	oth: 34.	0 ft								
ПЕРТН					F	FV	STRA	9					
(ft)	MATERIA	AL DESCRIPTION	ON	SYMB		(ft)	TUM	DEPTH		4	TESTS	RE	MARKS
-	Auger probe to 9 see Boring B-23	.0'. No SPT sar for strata descr	npling, iptions.		-	-	-					Clear	cut with
						-						DIUSIT	and stumps
-					-	-	-						
						_		- 5 -					
-					-	-	-						
-					-	-	-						
9.0 -	POORLY GRAD	ED SAND; moi	st, gray, nts		92	- 1.0+		- 10 -	SPT 6+13+10	MC	C = 11.7%		
-		na rook nagino		SP	-	-	-						
						-							
14.0 -	FINE SILTY SAM	ND; moist, brow	'n,		9:	36.0 -	В		SPT	мс	C = 16.6%		
	contains mica	, ,	,					- 15 - 	4+4+6				
-					-	-	-						
_						-							
							-	- 20 -	SPT 3+4+6				
_				SM		-	-						
						-]	F 1					
-						-	-			мс	C = 12.0%		
						_		- 25 -	4+6+9				
-						-	-						
290 -					9	- - 2100							
	DISINTEGRATE poorly graded sa	D ROCK, samp nd; moist, white	oled as e,		M-		-	- 30 -	SPT 55+45/0"	MC	C = 11.5%		
_	contains mica, a	nd rock fragme	nts	DR		-	с						
					MA	-	-						
34.0 ⊥	Bottom of Boring	u at 34.0 ft			V// 9'	16.0 -		L _	SPT				
	Boring backfilled	with cuttings u	pon complet	ion.					25/0"				
	Boring moved 40	DUTE ast of B-23	5.										

	hashal	TEST	Project:	Commo	onwealt	h Cros	sing Busi	iness Cer	nter	Boring I	Number:		B-24
Schna	abel Engineering	BORING LOG		U.S. Ro Martins	oute 220 ville, Vi) Soutl rginia	h, Henry	County		Contrac Sheet:	t Number: 1 of 2	09160023	3
Contrac	tor: Blue Ridge Dr Boones Mill	rilling, Inc. /irginia							Ground	dwater Obs	ervations	Casima	Cound
Contrac	tor Foreman: R. F	Rowe							Date	TIME	Depth	Casing	Caved
Schnab	el Representative:	R. Reed				E	ncounte	red	4/22		Dry		
Equipm	ent: CME-45 (Trac	ck)				0	Completi	on	4/22	3:21 PM	Dry	48.0'	
Method	: 2-1/4" I.D. Hollow	Stem Auger				C	asing Pu	illed	4/22	3:37 PM	Dry		26.0'
Hamme	r Type: Auto Hamr	mer (140 lb)											
Dates	Started: 4/22/09	Finished: 4	/22/09										
Locatio	n: See Location Plar	n											
Ground	Surface Elevation:	: 965.5 (ft)	Total De	pth: 49	.3 ft								
DEDTU							OTDA				-		
(ft)	MATERIA	AL DESCRIPTI	NC	SYME	BOL	elev (ft)	TUM	DEPTH		4	TESTS	RE	MARKS
_	FILL, sampled as	s fine sandy ela	stic silt;						SPT 2+1+2			Fill	
		113 10013		FILL			F						
3.0 -		VITH SAND' m	oiet	NAL I		962.5		+ $+$	WOH+1+	5 MC) = 25.3%	Posidu	ıal
4.0 -	reddish brown, c	ontains mica	/			961.5	-	\vdash	SPT	м	C = 15.2%	i tesiut	
6.0 -	POORLY GRAD reddish brown ar \fragments	ED SAND; moi nd white, contai	st, ns rock /	SP		959.5	-	- 5 -/	6+10+15	мс	C = 12.1%		
-	POORLY GRAD tan, contains mic	ED SAND; moi ca	st, light	SP			-		4+3+4				
9.0 -	POORLY GRAD and white, contai	ED SAND; moi	st, orange nts			956.5	-	\ - 10	SPT 5+9+9				
-		-		SP			-						
-							-						
14.0 -	POORLY GRAD	ED SAND WIT	H SILT;			951.5	-	\vdash	SPT	мс	C = 14.9%		
3 -	moist, grayish ta	n					_	- 15 -/	4+4+7				
-							-						
-							-						
				3P-3M				- 20 -	SPT 4+6+7				
							-						
- 1							_						
24.0 -	POORLY GRAD	ED SAND WIT	H SILT;			941.5	-	\vdash	SPT	MC	C = 13.8%	Contai	ns 1" lavers
	moist, white, con fragments	itains mica, and	rock					- 25 -	3+4+5			of poo tan an	rly graded d gray sand
								[]					
-							-						
-				SP-SM			-		SPT				
									/+8+11				
							_	$\lfloor]$					
-							-						
34.0 -				SP		931.5	-	\vdash	SPT	мс	C = 14.6%		

(continued)

Schnabel TEST BORING				Commonwe U.S. Route 2	Commonwealth Crossing Business Center U.S. Route 220 South, Henry County					Boring Number: B-24 Contract Number: 09160023			
Schna	bel Engineering	LUG		Martinsville,	Virginia	1			She	et: 2 of 2			
DEPTH (ft)	MATERIA	AL DESCRIPTI	ON	SYMBOL	ELEV (ft)	STRA TUM	SAI DEPTH	MPLING DATA		TESTS	REMARKS		
	POORLY GRAD and tan, contains	ED SAND; moi s mica <i>(continue</i>	ist, white ed)	SP		в	 	13+18+28			Residual (continued)		
39.0 -	DISINTEGRATE poorly graded sa	D ROCK, samp nd; moist, white	oled as	DR	- 920.5 -		- 40 - 	SPT 100/5"					
44.0 -	DISINTEGRATE poorly graded sa and gray, contair	D ROCK, samp nd with silt; mo is mica	oled as ist, tan	DR	+ 921.5 - 	C	- 45 -	SPT 31+34+38		MC = 9.5%			
40.0					310.2			100/3"	1				

Bottom of Boring at 49.3 ft. Boring backfilled with cuttings upon completion.



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Report No.: J62-183D

Date: August 2007

	Client: H	enry Cou	unty						
-	Project: F	Proposed	Roma Site, Hen	ry County, Virginia					
-	Boring No.	: B-1	(1 of 1) Depth	21.0' Elev:	894	Loc	ation:	See Attac	hed Map
	Type of Bo	oring: 2.2	5" HSA CME 55	Started: 8/9/0*	7 Comp	leted: 8/9/07		Driller: B	. Maxson
	Elevation	Depth	DESCI	CIPTION OF MATERIALS (Classification)		* Sample Blows	Sample Depth (feet)	N Value (blows/ft)	REMARKS
			RESIDUUM: S moist, fine to mo mica and trace o	tiff to medium stiff, red edium sandy SILT (ML) rganics	brown, with little	5-5-7	1.0 2.5	12	Subsurface water was not encountered immediately upon completion of drilling.
	890.2					2-3-4	3.5	7.	
	889.3 -	5.0-	Medium stiff, or coarse sandy SII	ange red and tan, moist, T (ML) with some mica	fine to	2-2-3	5.0 6.0	5	
							7.5 8.5	_	
						3-2-4	10.0	6	
	882.3 -	12.0	Medium stiff, tai	h brown, moist fine to co	arse sandy				
		 - -	SILT (ML) with	some mica		2-3-4	13.5 15.0	7	
	877.3 -	17.0				-	10.0		
			SAND (SM) wit	i little mica	to coarse	7-14-47	18.5	61	
	873.3 -	21.0	A	uger refusal at 21 feet			20.0		
									•
7/07									
R.GDT 8/1									
D.GPJ F&									
3 162-1831									
RING LOC									
ăL	<u> </u>								

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N.

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"OVER ONE HUNDRED YEARS OF SERVICE"

Report No.: J62-183D

Date: August 2007

Client: H	enry Count	ty		· ·				<u> </u>	•
Project: P	roposed Ro	oma Site, Henr	y County, Vi	rginia			ation: 6	Son Attan	had Man
Boring No.	: B-2	(1 OI 2) Depth	52.5 Elev:	8/0/07	044 Commi	Loc:	ation: 2	Deillori R	Maxson
Elevation	Depth	DESCRI	PTION OF MAT	ERIALS	Compo	* Sample Blows	Sample Depth	N Value (blows/ft)	REMARKS
		RESIDUUM: Mo to coarse SAND (edium dense, lig SM) with trace	tht gray, silty coarse grave	fine	5-5-6	(reet) 1.0 2.5	11	Subsurface water was encountered during drilling and immediately upon completion of drilling at 17.3
819.3 -	3.0	Soft, orange brow CLAY (CH)	n, moist, fine to	coarse sand	y y	2-2-2	3.5 5.0	4	feet and 9 feet below the existing ground surface elevation, respectively.
				·		WOH-1-2	6.0 7.5	3	WOH = 0 = Weight of hammer
		- No recovery				1-2-2	8.5	4	
							10.0		
						1-2-2	13.5	4	
805.2		- No recovery					15.0		
803.3	17.0	Stiff, brown, wet, with some mica	fine to coarse sa	andy SILT (N	AL)	2-4-6	18.5	10	
800.3 -	22.0						20.0	,	
000.5		Loose, tan and wh (SM) with some m	ite, wet, silty fin lica	ne to coarse s	SAND	2-3-3	23.5	6	
							25.0		
						2-3-6	28.5	9	
790.3 -	32.0		· 				30.0		
		coarse SAND (SM) and winte, we () with some mi	t, siny fine to ca		3-6-8	33.5	14	
							35.0		
						4-6-11	38.5	17	
				1			40.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N.



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Report No.: J62-183D

Date: August 2007

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Boring No : R-2	(2 of 2) Total	52.5' Elev:	822	Loc	ation:	See Attack	ned Man
Type of Boring 2	25" HSA CME 55	Started: 8/9/07	Comple	ted: 8/9/07	k	Driller: B.	Maxson
Elevation Depth	DESCR	IPTION OF MATERIALS (Classification)	Compte	* Sample Blows	Sample Depth (feet)	N Value (blows/ft)	REMARKS
	Medium dense, ta coarse SAND (SM	an and white, wet, silty find M) with some mica	e to	5-8-10	43.5 45.0	18	· · · ·
775.3 - 47.0	Dense, brown, mo with little mica	oist, silty fine to coarse SA	ND (SM)	11-23-24	48.5 50.0	47	
769.8 - 52.5	Au	ger refusal at 52.5 feet					
•							
					•		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N.



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Report No.: J62-183D

Date: August 2007

Chem. II	enry Cou	nty						·····
Project: F	Proposed I	Roma Site, Henry	y County, Virginia	079				had Man
Boring No.	: B-3	(1 of 2) Depth	64.5' Elev:	9/8	Loc:	ation:	bee Attac	Moreon
Type of Bo Elevation	Depth	HSA CME 55 DESCRI	Started: 8/8/07 PTION OF MATERIALS (Classification)	Compl	* Sample Blows	Sample Depth	N Value (blows/ft)	REMARKS
		RESIDUUM: Ve fine to medium sa	ry stiff to stiff, red orang ndy SILT (ML) with so	ge, moist, ne mica	7-7-10	1.0	17	Subsurface water was encountered during drilling a 56 feet below the existing ground surface elevation.
					3-4-5	3.5	9	Elound Surroy electronism
973.0 -	5.0-	Medium stiff, oran sandy SILT (ML)	nge brown, moist, fine to with some mica	coarse	2-3-4	5.0 6.0	7	
970.0 -	8.0	Medium dense, or	ange tan, moist, silty fir	e to coarse	3-4-7	7.5 8.5	11	
		SAND (SM) with	some mica			10.0	11	
966.0 -	12.0	PARTIALLY W	EATHERED ROCK:	Sampled as				
		SAND (SM)	and orange, dry, sny III	10 10 004150	16-22-50/6	13.5 15.0		
961.0 -	17.0	RESIDUUM: Me medium SAND (S	dium dense, tan, dry, si M) with little mica	Ity fine to	7-9-9	18.5	18	
956.0 -	22.0					20.0		
		Very dense, white SAND (SM)	and orange, dry, silty fi	ne to coarse	24-38-38	23.5 25.0	76	
951.0 -	27.0	Medium dense, tai	n, dry, silty fine to coars	e SAND		<u> </u>		
					11-10-10	28.5 30.0	20	
946.0 -	32.0	Very dense, tan as SAND (SM) with	d while, dry, silty fine t some mica	o coarse	25-34-40	33.5	74	
						35.0		· · · ·
941.0 -	37.0	PARTIALLY W very dense, tan an SAND (SM) with	EATHERED ROCK: d white, moist, silty fine little mica	Sampled as to coarse	25-50/3	3 8.5 39.3		. ·

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N.



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Report No.: J62-183D

Date: August 2007

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Client: He Project: P	enry Cour Proposed I	nty Roma Site. Hen	rv County, Vi	rginia						
Boring No.	· B-3	(2 of 2) Total Depth	64.5' Elev:	9	78	Loc	ation:	See Attac	hed Map	
Type of Bo	ring: 2.25	" HSA CME 55	Started:	8/8/07	Compl	eted: 8/8/07	'	Driller: B	Maxson	-
Elevation	Depth	DESCR	IPTION OF MAT (Classification)	TERIALS		* Sample Blows	Sample Depth (feet)	N Value (blows/ft)	REMARI	<s< td=""></s<>
		PARTIALLY V very dense, tan a SAND (SM) with	VEATHERED nd white, moist, a little mica	<u>ROCK:</u> Samp silty fine to co	oled as barse	28-50/3	43.5 44.3			
							48.5			
						27-42-50/1	53.5 54.6			
918.0 -	60.0	- wet				50/1	58.5			
		Sampled as very to coarse SAND	dense, gray and (SM) with little	black, wet, sil mica	ty fine	50/1	63.5			
913.5 -	64.5 —	Au	ger refusal at 64	1.5 feet						, ,

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N.

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