Report of Reconnaissance Level Geotechnical Exploration
Barnett Tracts
Blythewood, South Carolina
S&ME Project No. 4261-15-181

Prepared for:
Richland County Economic Development
1201 Main Street, Suite 910
Columbia, South Carolina, 29201

Prepared by:
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134 Suber Road
Columbia, SC 29210

December 7, 2015

December 7, 2015

Richland County Economic Development
1201 Main Street, Suite 910
Columbia, South Carolina, 29201

Attention: Mr. Nelson Lindsay

Reference: **Report of Reconnaissance Level Geotechnical Exploration**
Barnett Tracts – Blythewood Industrial Site RFP
Blythewood, South Carolina
S&ME Project No. 4261-15-181

Dear Mr. Lindsay:

We have completed our reconnaissance level geotechnical exploration for the Barnett Tracts in Blythewood, Richland County, South Carolina. Our services were performed in general accordance with S&ME proposal No. 42-1500995, dated September 11, 2015.

The purpose of our exploration was to determine the general site subsurface conditions at widely-spaced test locations and evaluate possible major impacts on site development. This report presents our understanding of the project, the site and subsurface conditions encountered, and our preliminary conclusions and recommendations.

S&ME appreciates this opportunity to work with you as your geotechnical engineering consultant on this project. Please contact us at (803) 561-9024 if you have any questions or need any additional information regarding this report.

Sincerely,

S&ME, Inc.

SOUTH CAROLINA
S&ME, INC.
No. C00473
CERTIFICATE OF AUTHORIZATION

Matthew F. Cooke, P.G.
Geotechnical Location Coordinator

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SOUTH CAROLINA
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Appendices

1.0 Project Information

Initial information about the project was provided through email correspondence between Mr. Nelson Lindsay of Richland County Economic Development and Marty Baltzegar of S&ME on August 18, 2015.

We understand the subject property is approximately 678.67 acres in size, is legally defined as 13 individual Richland County Tax Map Numbers as shown below.

- R15000-01-01 (4.480 ac)
- R15004-01-01 (90.480 ac)
- R15004-01-02 (1.990 ac)
- R15005-01-01 (107.990 ac)
- R15006-01-01 (178.040 ac)
- R15007-01-01 (41.560 ac)
- R15008-01-01 (97.500 ac)
- R15100-03-02 (9.650 ac)
- R15100-03-03 (17.020 ac)
- R15100-04-04 (0.190 ac)
- R15101-01-01 (14.690 ac)
- R15101-01-02 (3.200 ac)
- R15106-01-01 (102.120)

The property is located along the western side of Community Road, roughly 0.45 miles south of its intersection with Blythewood Road, in Blythewood, Richland County, South Carolina as shown on the *Site Location Plan*, Figure 1 in Appendix I. The property is being assessed for use as an industrial development.

Existing topographic information and planned site grades were not provided at the time of this report. From our review of on-line aerial imagery and historic topographic maps, the existing ground surface appears to range from elevation 400 feet to 490 feet.

2.0 Field Exploration

Prior to the subsurface exploration and in order to develop a testing plan, aerial photos of the property and available topographic maps were reviewed. A representative of S&ME visited the site to perform the following tasks:

- Observe topography, ground cover, and surface soils in the proposed project area.
- Lay out locations for soil test borings in the general locations shown on the *Boring Location Plan*, Figure 2 in Appendix I, and record their approximate locations using a handheld GPS unit.

The subsurface exploration for this project consisted of ten Standard Penetration Test (SPT) borings conducted to refusal/termination depths of 17 to 25 feet below the existing ground surface. The methods used to perform this task are described below. The approximate test locations are shown on the attached

Boring Location Plan as Borings B-1 through B-10. Staked coordinates for the test locations in State Plane format were obtained by a handheld GPS unit and are included on the attached boring records. Please note that no formal survey of boring locations or elevations was conducted by S&ME.

Soil sampling and penetration testing were performed on November 18 19, 2015 in general accordance with ASTM D1586, *Standard Test Method for Penetration Test and Split Barrel Sampling of Soils*. Shallow borings are made by mechanically twisting a continuous steel hollow stem auger into the soil. At regular intervals, soil samples were obtained with a standard 2.25 inch I. D., 2.5 inch O. D., split barrel sampler. The sampler was first seated six inches to penetrate any loose cuttings, and then driven an additional 12 inches with blows of a 140-pound hammer falling approximately 30 inches. The number of hammer blows required to drive the sampler through the two final six inch increments was recorded as the penetration resistance (SPT N) value. The N-value, when properly interpreted by qualified professional staff, is an index of the soil strength and foundation support capability.

3.0 Site and Subsurface Conditions

S&ME's assessment of the geotechnical conditions began with a reconnaissance of the topography and physical features of the site. To the extent feasible, this also included observation of nearby road cuts, etc. where accessible soil or rock exposures could be viewed. We also consulted available topographic and geologic maps, soil maps, or state geologic survey boring data for relevant information.

3.1 Surface Conditions

At the time of our exploration, access to the site was available along an unpaved roads emanating from Locklier Road and Community Road. The site was mostly wooded, with portions of the property less dense than others. An existing powerline was observed to traverse from east to west across the northern portion of the site. Two existing ponds were observed north of the existing powerline. During our site reconnaissance, areas of surface ponding were observed, generally in the northeastern quadrant of the site.

The property is bordered by Community Road to the east, undeveloped, wooded property to the north, Locklier Road and undeveloped, wooded property to the west and industrial and undeveloped wooded property to the south. Unnamed tributaries of Beasley Creek were observed to traverse through both the northern and southern portions of the site.

Based on visual observations made during our site reconnaissance, the broad topography of the site was gently sloping towards the southwest. Surface runoff on the site would be expected to be sheet flow towards the unnamed tributaries of Beasley Creek.

3.2 Subsurface Conditions

3.2.1 Site Geology

The site lies within the Piedmont Physiographic Province of South Carolina, an area underlain by soils weathered in place from the parent crystalline bedrock material. Residual soils of the Carolina Piedmont consist of stiff or very stiff micaceous silts and clays, grading to firm sands with depth. These soils have been completely weathered in place from the parent bedrock material, but below depths of a few feet retain most of the relict rock structure. Soil strength derives largely from relict intermolecular bonding and remolded materials generally less exhibit lower shear strength than do undisturbed samples. Piedmont soils are normally consolidated to slightly overconsolidated.

The term partially weathered rock (PWR) is applied to very dense micaceous sands or silty sands of the Carolina Piedmont, which register SPT N-values in excess of 100 blows per foot. PWR generally varies widely within even small areas owing to minute differences in the chemical properties of the parent bedrock, which results in widely varying rates of weathering. Isolated lenses or seams of PWR often are present within Piedmont Residuum well above the overall PWR level within a given area. PWR is considered excellent bearing material for foundations and is relatively incompressible except in highly stressed deep foundations.

3.2.2 USDA Soil Survey Information

From a qualitative standpoint, the USDA Natural Resources Conservation Service's Soil Surveys can often provide helpful information. The surveys map the near surface soils (i.e., depths ≤ 6 ft.) and provide general descriptions. The data is not intended to replace geotechnical evaluations and testing but it can help identify trends. Soil maps are often a useful indication of the geologic environment governing soil behavior as well as the seasonal depth to ground water and depth to rock.

The USDA Natural Resource Conservation Service's soils map of Richland County, South Carolina, issued in 1978, indicates ten soil series within the project area: Blanton Sand, 0 to 6 percent slopes (BaB), Chewacla soils (Ch), Fuquay Sand, 0 to 2 percent slopes (FuA), Herndon Silt Loam, 6 to 10 percent slopes (HeC), Johnston Loam (Jo), Lakeland Sand, 2 to 6 percent slopes (LaB), Nason Complex, 10 to 30 percent slopes (NaE), Pelion Loamy Sand, 2 to 6 percent slopes (PeB), Pelion Loamy Sand, 6 to 15 percent slopes (PeD), and Troup Sand, 0 to 6 percent slopes (TrB). The soil information is provided in Table 3-1 below.

Table 3-1 – USDA Soil Survey Soil Series

Soil Series	Soil Type	Portion of Site	Depth to Seasonal High GW Table	Depth to Restrictive Layer (PWR)	Remarks
Blanton Sand, 0 to 6 percent slopes (BaB)	SM, SP-SM, SC, SM-SC	Majority of the property	> 6.0 ft.	> 60 in.	Deep, nearly level to gently sloping, moderately well-drained soil in convex slopes. Soils have low shrink-swell potential and moderate to rapid permeability. Soils are very strongly acidic.

Soil Series	Soil Type	Portion of Site	Depth to Seasonal High GW Table	Depth to Restrictive Layer (PWR)	Remarks
Chewacla Soils (Ch)	ML, CL, MH	Isolated to central portion of property	0.5-1.5 ft.	> 60 in.	Deep, somewhat poorly drained, nearly level soils on flood plains. Soils have low shrink-swell potential and moderate permeability. Soils are strongly acidic.
Fuquay Sand, 0 to 2 percent slopes (FuA)	SM, SP-SM, SC, SM-SC, CL	Isolated to S-most portion of property	2.5-4.0 ft.	> 60 in.	Deep, well-drained, nearly level soil on ridgetops. Soils have low shrink-swell potential and slow to rapid permeability. Soils are strongly acidic.
Herndon silt loam, 6 to 10 percent slopes (HeC)	ML, CL-ML, MH	Majority of the property	> 6.0 ft.	> 60 in.	Deep, well-drained sloping soil on ridgetops and side slopes. Soils have low shrink-swell potential and moderate to moderately rapid permeability. Soils are slightly to very strongly acidic.
Johnston Loam (Jo)	ML, SM, CL, SC, SM-SC	Isolated to N-most portion of property	1.0-1.5 ft.	> 60 in.	Deep, poorly drained, nearly level soil on flood plains. Soils have low shrink-swell potential and moderately rapid to rapid permeability. Soils are strongly acidic.
Lakeland Sand, 2 to 6 percent slopes (LaB)	SP, SP-SM	Isolated to W-most portion of property	> 6.0 ft.	> 60 in.	Deep, excessively drained, gently sloping soil on smooth, convex ridgetops. Soils have low shrink-swell potential and rapid permeability. Soils are very strongly acidic.

Soil Series	Soil Type	Portion of Site	Depth to Seasonal High GW Table	Depth to Restrictive Layer (PWR)	Remarks
Nason Complex, 10 to 30 percent slopes (NaE)	ML, CL, MH, CH, ML-CL	Isolated to central portion of property	> 6.0 ft.	40-60 in.	Deep, well-drained, gently sloping soil on broad and narrow ridges. Soils have low to moderate shrink-swell potential and moderately slow permeability. Soils are strongly acidic.
Pelion Loamy Sand, 2 to 6 percent slopes (PeB)	SM, SM-SC, SC, CL, CL-ML	Majority of the property	1.0-2.5 ft.	> 60 in.	Deep, moderately well-drained, gently sloping soil on side slopes and toe slopes. Soils have low shrink-swell potential and slow to moderately slow permeability. Soils are strongly acidic.
Pelion Loamy Sand, 6 to 15 percent slopes (PeD)	SM, SM-SC, SC, CL, CL-ML	Isolated to W-most portion of property	1.0-2.5 ft.	> 60 in.	Deep, moderately well-drained, sloping to strongly sloping soil on irregular side slopes and knolls. Soils have low shrink-swell potential and slow to moderately slow permeability. Soils are strongly acidic.
Troup Sand, 0 to 6 percent slopes (TrB)	SM, SC, SM-SC, CL, CL-ML	Isolated to E-most portion of property	> 6.0 ft.	> 60 in.	Deep, well-drained, nearly level to gently sloping soil on smooth convex ridgetops. Soils have low shrink-swell potential and slow to moderately slow permeability. Soils are strongly acidic.

The USDA information provided for this site points to a few items that could influence geotechnical recommendations for specific structures within the site.

The NaE mapped soils series are reported to have more shallow depths to restrictive layers. The Ch, FuA, Jo, PeB and PeD mapped soil series are reported to have shallow seasonal high ground water tables.

The USDA Soil Survey is shown on the *USDA Soil Survey Map*, Figure 3 in Appendix I.

3.2.3 Interpreted Subsurface Profile

Details of the subsurface conditions encountered by the field exploration are shown on the boring records in Appendix II. These records represent our interpretation of the subsurface conditions based upon field data. Stratification lines on the boring records represent approximate boundaries between soil types; however, the actual transition is likely more gradual. The general subsurface conditions and their pertinent characteristics are discussed in the following paragraphs.

Top-of-ground elevations shown on the boring records were estimated from Google Earth and are for demonstration purposes only. Boring locations and elevations shown on the attached records and elevations indicated in this report were not surveyed and should be considered approximate.

<u>Surface Materials</u>

Surface materials in the form of topsoil, up to 6 inches in thickness, were encountered at the existing ground surface. We caution that topsoil may be encountered at deeper depths in areas that were not explored by our borings.

<u>Course Grained Piedmont Residuum</u>

Piedmont residuum consisting of sands with varying fines content (SP-SM and SM) were generally encountered from beneath the surface materials or at the existing ground surface and extending to various depths, depending on the boring location, before reaching a termination depth of 25 feet.

Recovered samples of the sandy Piedmont residuum were dominated by reddish-brown, tan and gray coloring. These soils were generally moist and moist-to-wet to the touch. SPT N-values were observed to range between WOH (weight of hammer) and 67 blows per foot (bpf), indicating very loose to very dense relative densities.

<u>Fine Grained Piedmont Residuum</u>

Piedmont residuum consisting of mostly low plasticity silts with varying amounts of sand (ML) were generally encountered at various depths beneath the ground surface and surface materials in addition to beneath the upper sandy soils to termination depth.

Recovered samples of the silty Piedmont residuum were dominated by tan, gray, yellowish-brown and white coloring. These soils were moist and dry-to-moist to the touch. SPT N-values were observed to range between 6 and 71 bpf, indicating firm to very hard relative consistencies.

<u>Partially Weathered Rock</u>

As previously mentioned, the term partially weathered rock (PWR) is applied to very hard Piedmont residuum that register SPT N-values in excess of 100 blows per foot. PWR was encountered in Borings B-4, -7 and -9 at depths of 20 feet, 20 feet and 3 feet, respectively, below the existing round surface. PWR was sampled as silt with varying amounts of fines (ML) and sands with varying amounts of silt (SP-SM and SM), similar to the overlying coarse and fine grained residuum.

Auger Refusal

Boring B-2 encountered auger refusal at a depth of roughly 17 feet below the existing ground surface. Auger refusal is defined as material that could not be penetrated with the drill rig equipment used on the project. Auger refusal material may consist of large boulders, rock ledges, lenses, seams or the top of parent bedrock. Core drilling techniques would be required to evaluate the character and continuity of the refusal material. Depth to rock often varies widely over short distances in the Piedmont and the potential exists that rock will be encountered in areas other than our boring locations.

Ground Water

Ground water was encountered in Borings B-2, -3, -5 and -10 at the time of drilling (ATD) and Borings B-2, -3 and -10 were left open for stabilized ground water measurements. These measurements are tabulated below in Table 3-2 and Table 3-3, respectively.

Table 3-2 – ATD Ground Water Measurements

Boring	GW Depth Below Surface
B-2	8 ft.
B-3	1 ft.
B-5	1½ ft.
B-10	15½ ft.

Table 3-3 – Stabilized Ground Water Measurements

Boring	Stabilized GW Depth Below Surface
B-2	5½ ft.
B-3	1 ft.
B-10	13½ ft.

In borings that did not encounter ground water at the time of drilling, borehole cave-in was observed at depths ranging from 14 to 20 feet below the existing ground surface. Borehole cave-in is sometimes an indicator of ground water.

Additionally, due to the cohesive and low permeability characteristics of the fairly shallow silty soils, perched ground water conditions appear to be possible. Perched groundwater is typically the result of surface stormwater that infiltrates through the upper sandy, more permeable soils, and then gets trapped or “perched” on the underlying, silty, less permeable soils.

The stabilized ground water levels encountered in the borings during the present effort appear to corroborate reported seasonal high ground water levels in the soils maps, however, ground water may be evident at shallow depths and may impact construction, particularly during the winter months.

We note that ground-water levels are influenced by precipitation, long term climatic variations, and nearby construction. Measurements of ground water made at different times than our exploration may indicate ground-water levels substantially different than indicated on the boring records in Appendix II.

4.0 SEISMIC CONSIDERATIONS

Seismic induced ground shaking at the foundation is the effect taken into account by building code seismic-resistant design provisions. Other effects, such as soil liquefaction, are not addressed in building codes but must also be considered.

4.1 IBC Site Class

We classified the site as one of the Site Classes defined in IBC Section 1613, which references ASCE 7-10 Chapter 20 (Table 20.3-1), using the procedures described in Chapter 20. The initial step in site class definition is a check for the four conditions described for Site Class F, which would require a site-specific evaluation to determine site coefficients F_A and F_V. Soils vulnerable to potential failure under item 1) including quick and highly sensitive clays or collapsible weakly cemented soils were not observed in the borings. Three other conditions, 2) peats and highly organic clays (H>10 feet); 3) very high plasticity clays (H>25 feet); and 4) very thick soft/medium stiff clays (H>120 feet), were also not evident in the borings performed.

Seismic site class for the adjacent site to the south was established during out Report of Geotechnical Exploration, dated September 7, 2012 (S&ME Project Number 1611-12-316) where a MASW/MAM array was performed. The calculated average shear wave velocity using the shear wave velocity profile performed on the adjacent site to the south was 1,494 feet per second (fps) over a depth of 100 feet, which translates into Site Class C.

4.2 Design Spectral Values

S&ME determined the spectral response parameters for the site using the general procedures outlined under the 2012 International Building Code Section 1613.3. This approach utilizes a mapped acceleration response spectrum corresponding to an earthquake having a 2 percent statistical probability of exceedance in 50 years to determine the spectral response acceleration at the top of seismic bedrock for any period.

The Site Class is used in conjunction with mapped spectral accelerations S_S and S_1 to determine Site Coefficients F_A and F_V in IBC Section 1613.3.3, tables 1613.3.3(1) and 1613.3.3(2). For purposes of computation, the Code includes mapped induced acceleration at frequencies of 5 hertz (S_S) and 1 hertz (S_1), which are then used to derive the remainder of the response spectra at all other frequencies. Mapped S_S and S_1 values represent motion at the top of bedrock. The surface ground motion response spectrum, accounting for inertial effects within the soil column overlying rock, is then determined for the design earthquake using spectral coefficients F_A and F_V for the appropriate Site Class.

The design ground motion at any period is taken as 2/3 of the smoothed spectral acceleration as allowed in section 1613.3.4. The design spectral response acceleration values at short periods S_{DS} and at one second periods S_{D1} are tabulated below for the unimproved soil profile.

The 2012 IBC specifically references ASCE 7-10 for determination of peak ground acceleration value for computation of seismic hazard. Peak ground acceleration is separately mapped in ASCE 7-10 and corresponds to the geometric mean maximum credible earthquake (MCEG). The mapped PGA values are adjusted for site class effects to arrive at a design peak ground acceleration value, designated as PGA_M.

Table 4-1 – Spectral Design Values

Spectral Design Value	2012 IBC – Site Class C (2008 Seismic Hazard Maps)
S_{DS}	0.315 g
S_{D1}	0.152 g
PGA_M	0.250 g

Under the 2012 IBC, for a structure having a Seismic Use Group classification of I, II or II, spectral response acceleration factors given above correspond to Seismic Design Category C.

5.0 Preliminary Comments and Conclusions

The preliminary analyses and conclusions submitted herein are based, in part, upon data obtained from the test locations. Subsurface conditions across the site will vary, as will grading and construction details. For the future industrial development on the site, we only provide general comments about the suitability of the property for the anticipated construction. Additional geotechnical exploration and analysis will be required to provide recommendations for site preparation and foundation design, in the event the site is developed for industrial use.

Based on the limited boring data to date, we make the following preliminary comments and conclusions. Conditions at this site do not appear to pose issues for site preparation, grading or foundation construction that differ substantially from the surrounding region.

5.1 Site Preparation

Site preparation will need to include removal of unsuitable surface materials within proposed building and pavement footprints. This should include surface vegetation, organic laden topsoil, stumps, root bulbs, and any unstable surface or subsurface soils.

In most areas, surface preparation can likely be limited to proofrolling of the surface. Areas that rut, pump, or move excessively under movement of the equipment will require stabilization prior to the placement of structural fill, concrete, or base course stone.

Removal of stumps and roots will result in disturbance of the upper soils. In areas to be filled, the upper subgrade soils will need to be stabilized prior to placing fill. Stabilization, if required, may consist of removing and replacing unstable material or, where unstable soils are thin, drying and compacting in-place.

5.2 Ground Water Control

Due to the shallow ground water and probable "perched" ground water conditions, depending on planned grades, dewatering may be required. If these conditions are encountered, it will be necessary to provide sufficient drainage of water away from building pads and pavements. Even during dry weather, the grading contractor should take measures so that periodic rain showers do not significantly affect grading. This includes diverting rainwater runoff away from the construction area and sealing the ground surface to help prevent rainwater runoff from migrating below the surface soils. During construction, gravity-drained surface ditches may need to be installed around the site to promote surface runoff.

5.3 Wet Weather Grading

Based on our experience, silts and similar to those encountered in the borings across the site will be difficult to work if allowed to become wet. These soils have a tendency to retain moisture and may require extended drying times once wet. However, conditions do not appear to pose undue difficulties for contractors familiar with local soils.

Our experience also suggests that the movement of clearing and construction equipment on areas of standing water or saturated soils will result in degradation of the soils to depths of 1 to 2 feet. Repeated passes of equipment will cause rutting and the mixture of surface materials (organics) into what might otherwise be acceptable soils. Movement of construction equipment on saturated soils should be avoided where possible. Where organics and near surface soils become mixed, it will be necessary to remove and replace the mixed material. Most local contractors are familiar with these issues.

Drainage from the site should be provided and maintained prior to clearing and during grading to reduce the potential for ponding of water on exposed subgrades. Ditches should be excavated to help reduce rainwater runoff from flowing onto, and to help promote rainwater runoff from, the construction area. Rainwater should not be allowed to pond on subgrades. In addition, we recommend the surface be "sealed" with a smooth drum roller if rain is pending to help reduce the potential for these upper soils becoming wet during rain events.

5.4 Site Excavation

The boring data indicates that there is a potential that PWR will be encountered, depending on the planned grades at the property. PWR may be present in ledges, seams, or in massive bodies, and may contain boulders or seams of less weathered, more resistant rock. The depth and extent of PWR varies erratically in depth and location in the Piedmont Geologic Province. Materials requiring difficult excavation could be encountered at shallow depths between boring locations or elsewhere on the property.

Heavy excavating equipment with ripping tools will likely be effective in removing the PWR during site grading. The speed and ease of excavation will depend on the type of grading equipment, operator skill and the geologic structure of the material itself, such as the direction of bedding, planes of weakness and spacing of discontinuities.

Rock excavation may also be required depending on final grades and locations. The volume of rock excavation can have a major impact on the project cost, particularly when substantial quantities of rock must be excavated. Small diameter exploratory borings at dispersed locations do not provide sufficient information for reliable rock quantity estimates.

Determination of presence and depth of materials requiring difficult excavation will need to be part of any follow on exploration within the property. As previously mentioned, boulders or seams of less weathered, more resistant rock could be encountered at some locations which would necessitate much greater rock removal than expected. Exploration to help determine depth to rock should be conducted once building and roadway locations are finalized.

5.5 Use of On-site Soils as Structural Fill

The sandy soils encountered across the site appear suitable for use as structural fill. The low plasticity silty soils encountered across the site appear marginally suitable for use as structural fill. As previously mentioned, these soils are moisture sensitive and can become difficult to work if allowed to become wet and will likely require moisture conditioning procedures during placement. These soils may not provide adequate support under footings, grade slabs or pavements if placed too wet of optimum. Where PWR is excavated, these materials will be rocky in nature. Although this material can be used as structural fill, additional work will be required to breakdown the larger pieces into smaller particles to allow compaction.

5.6 Foundations

The soil profile encountered appears generally suitable for development for light to moderate-duty industrial use considering static loading. Use of shallow foundations for support of column loads up to 200 kips appears feasible for typical light to medium industrial structural column configurations, provided footings are properly designed and constructed and settlements of about 1 inch can be tolerated. Under these conditions, we anticipate net bearing capacities ranging from 3,000 to 4,000 pounds per square foot (psf) will be available on-site depending on project location and bearing elevation of foundations. This must be verified by a design level geotechnical investigation for each specific project.

5.7 Grade Slab Support and Construction

The sandy soils encountered in our borings or well-compacted on-site fill soils generally appear suitable for soil-supported grade slabs, assuming proper preparation, moisture control, and compaction. We recommend placing a blanket of compacted granular soils below slabs to provide a capillary break between the subgrade and the slab concrete.

5.8 Pavement Support and Construction

The sandy soils encountered in our borings appear suitable for pavement support, assuming proper preparation, moisture control, and compaction. Future exploration at the site should include plasticity tests of the on-site silty soils to determine suitability of subgrade support.

Pavement performance is very dependent on drainage. Drainage should be designed to result in subsurface water levels being at least 2 feet below the top of the pavement subgrade. The pavement design should not result in water standing on the pavement surface or behind curbing. Landscaped areas behind curbing should be at or above the elevation of the curbing.

The pavement design should result in positive drainage being available from the stone base material. Areas adjacent to pavements (embankments, landscaped island, ditching, etc.) which can drain water (rainwater or sprinklers) should be designed so that water does not seep below the pavements. This may require the use of French drains or swales.

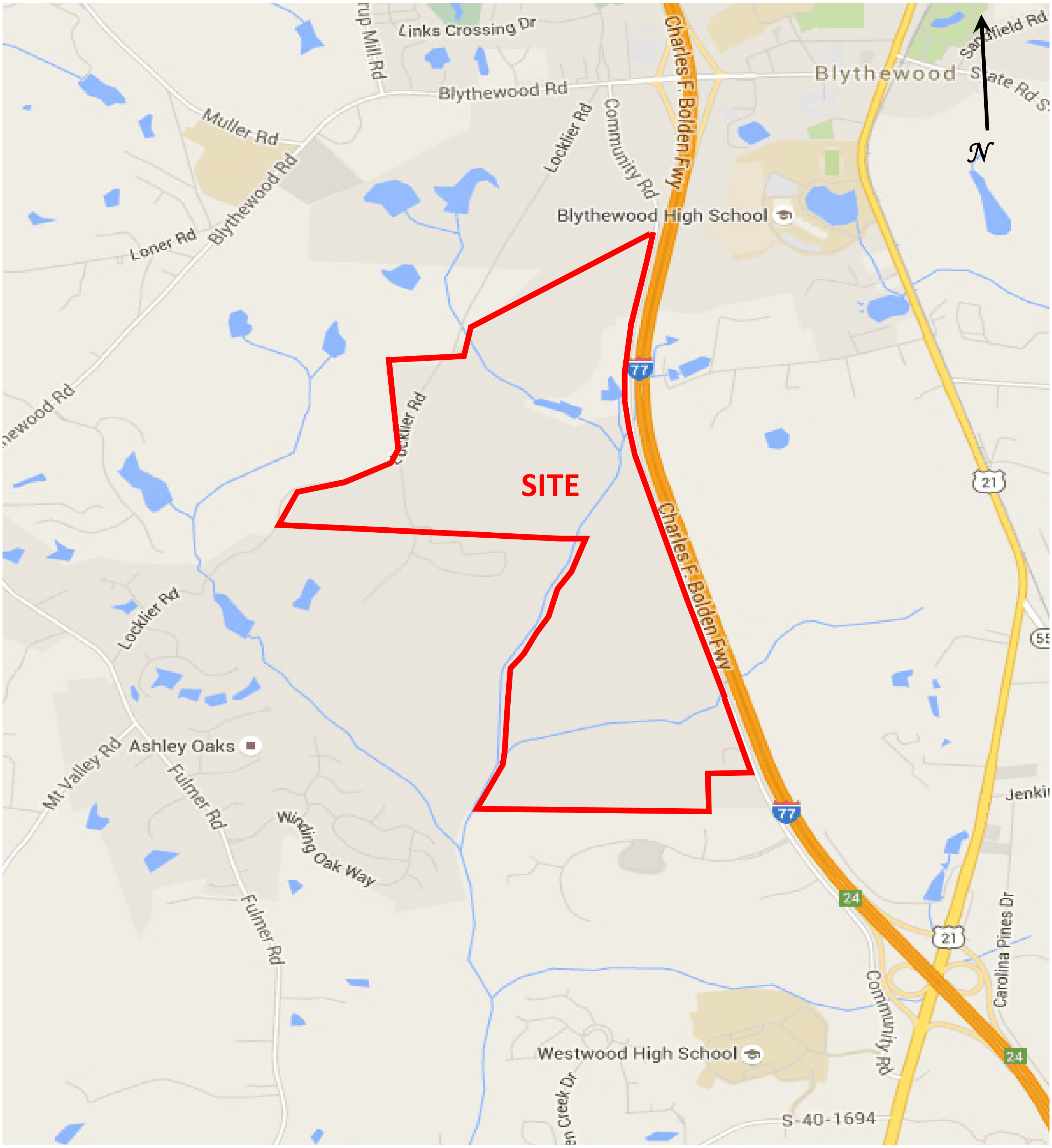
6.0 Limitations of Report

This reconnaissance level geotechnical report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. The preliminary conclusions and recommendations contained in this report are based upon applicable standards of our practice in this geographic area at the time this report was prepared. No other warranty, express or implied, is made.

Again, we note that the information provided herein is preliminary with regard to future industrial use of the site. A final geotechnical exploration tailored to the actual development specifics must be performed before final recommendations for structures or roadways can be provided.

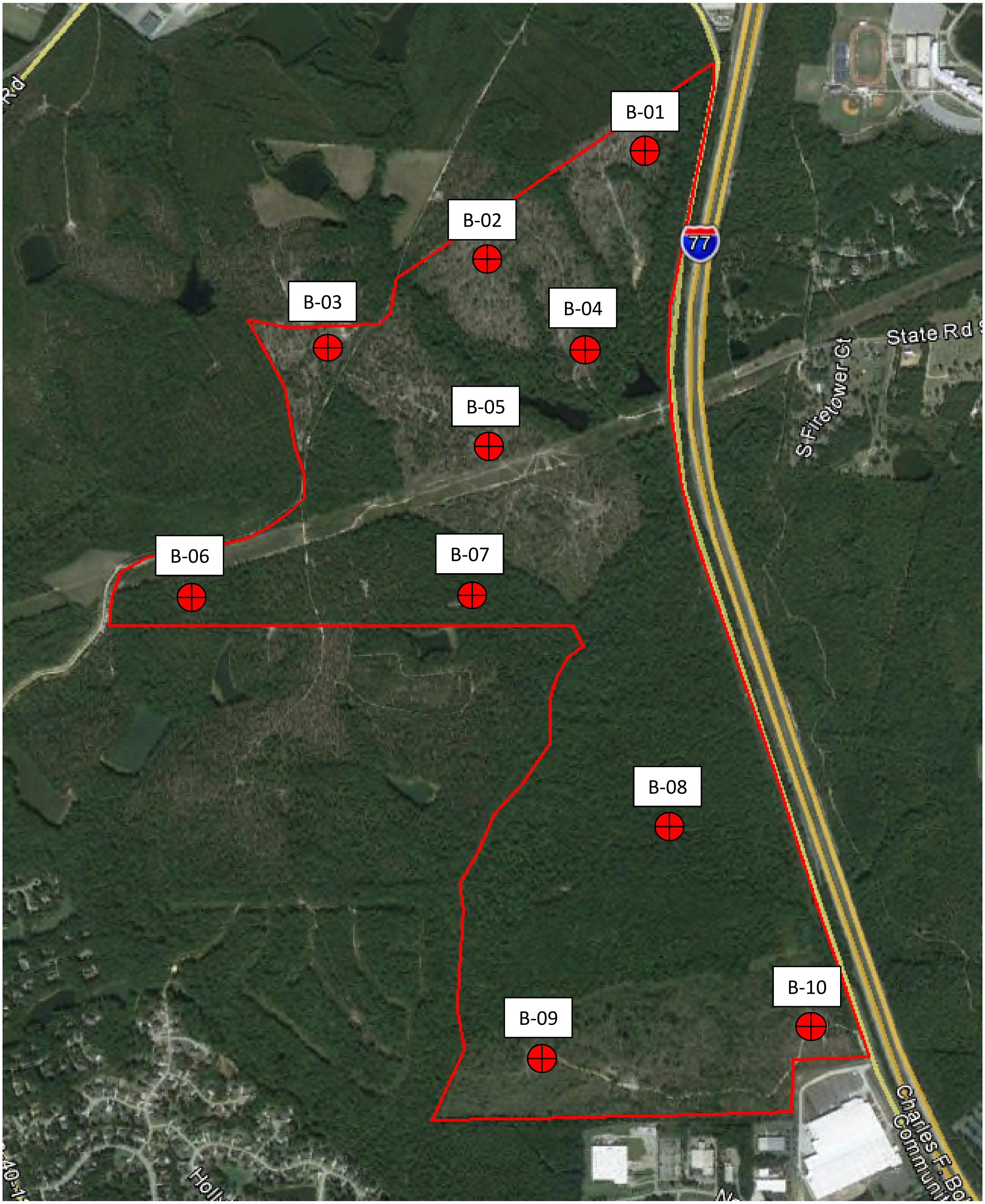
Appendices

Appendix I – Figures



SOURCE: Google Maps

SCALE:	NTS	S&ME	**SITE LOCATION PLAN**	FIGURE NO.
CHECKED BY:	RCB		Barnett Tracts	1
DRAWN BY:	HGM		Blythewood, South Carolina	
DATE:	12/7/2015		JOB NO. 4261-15-181	



SOURCE: Google Earth

APPROXIMATE BORING LOCATION

SCALE:	NTS
CHECKED BY:	RCB
DRAWN BY:	HGM
DATE:	12/7/2015

S&ME

BORING LOCATION PLAN

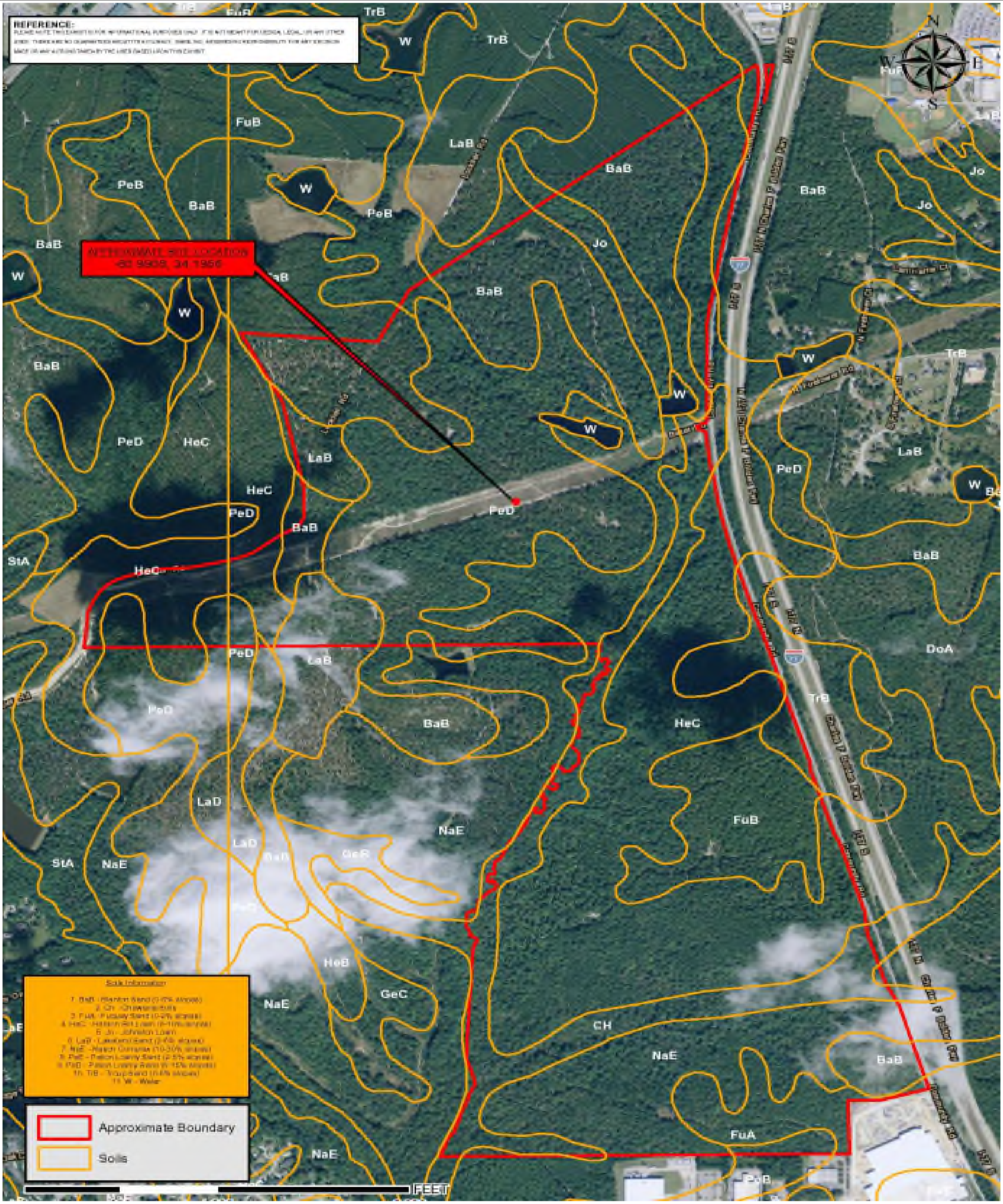
Barnett Tracts

Blythewood, South Carolina

JOB NO. 4261-15-181

FIGURE NO.

2



SOURCE: World Imagery 2013 & SCDNR (Soils Data)

SCALE:	AS SHOWN	S&ME	**USDA SOIL SURVEY MAP**	FIGURE NO.
CHECKED BY:	HGM		Barnett Tarcts	3
DRAWN BY:	RCB		Blthewood, South Carolina	
DATE:	12/7/2015		JOB NO. 4261-15-181	

Appendix II – Field Data

LEGEND TO SOIL CLASSIFICATION AND SYMBOLS

SOIL TYPES

(Shown in Graphic Log)

- Fill
- Asphalt
- Concrete
- Topsoil
- Gravel
- Sand
- Silt
- Clay
- Organic
- Silty Sand
- Clayey Sand
- Sandy Silt
- Clayey Silt
- Sandy Clay
- Silty Clay
- Partially Weathered Rock
- Cored Rock

WATER LEVELS

(Shown in Water Level Column)

- ▽ = Water Level At Termination of Boring
- ▼ = Water Level Taken After 24 Hours
- ◄ = Loss of Drilling Water
- HC = Hole Cave

CONSISTENCY OF COHESIVE SOILS

CONSISTENCY	STD. PENETRATION RESISTANCE BLOWS/FOOT
Very Soft	0 to 2
Soft	3 to 4
Firm	5 to 8
Stiff	9 to 15
Very Stiff	16 to 30
Hard	31 to 50
Very Hard	Over 50

RELATIVE DENSITY OF COHESIONLESS SOILS

RELATIVE DENSITY	STD. PENETRATION RESISTANCE BLOWS/FOOT
Very Loose	0 to 4
Loose	5 to 10
Medium Dense	11 to 30
Dense	31 to 50
Very Dense	Over 50

SAMPLER TYPES

(Shown in Samples Column)

- Shelby Tube
- Split Spoon
- Rock Core
- No Recovery

TERMS

Standard Penetration Resistance - The Number of Blows of 140 lb. Hammer Falling 30 in. Required to Drive 1.4 in. I.D. Split Spoon Sampler 1 Foot. As Specified in ASTM D-1586.

REC - Total Length of Rock Recovered in the Core Barrel Divided by the Total Length of the Core Run Times 100%.

RQD - Total Length of Sound Rock Segments Recovered that are Longer Than or Equal to 4" (mechanical breaks excluded) Divided by the Total Length of the Core Run Times 100%.

S&ME

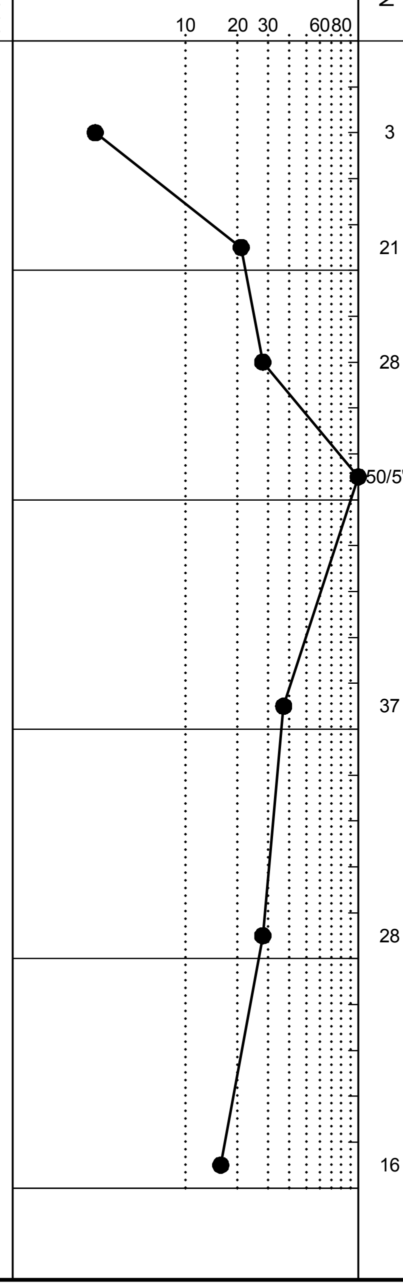
ENGINEERING • TESTING ENVIRONMENTAL SERVICES

PROJECT: **Barnett Tracts** **Blythewood, South Carolina** **S&ME Project No. 4261-15-181**	**BORING LOG B-1**

DATE DRILLED: **11/18/15**	ELEVATION: **509.0 ft**	NOTES: **Northing, Easting, and Elevation estimated from Google Earth.**
DRILL RIG: **CME 450**	BORING DEPTH: **25.0 ft**	
DRILLER: **H. Wessinger**	WATER LEVEL: **Not Encountered**	
HAMMER TYPE: **Auto**	LOGGED BY: **HGM**	
SAMPLING METHOD: **Split spoon**		NORTHING: **863220** / EASTING: **2003840**
DRILLING METHOD: **2¼" H.S.A.**		

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
0	**SURFACE MATERIALS** - 3 inches of TOPSOIL.							
	PIEDMONT - SILTY SAND (SM) - mostly fine to medium sands, some low plasticity fines, saturated, tan, very loose.			SS-1	1	1	2	3
	- - - @ 3 feet - mostly medium to coarse sands, little low to medium plasticity fines, moist, mottled reddish-brown, tan and gray, medium dense.			SS-2	11	9	12	21
5			504.0					
	- - - @ 6 feet - some low plasticity fines.			SS-3	10	13	15	28
	- - - @ 8 feet - mostly fine to medium sands, yellowish-brown, very dense.			SS-4	39	50/5"		50/5"
10	**SANDY SILT (ML)** - mostly low plasticity fines, some fine sands, dry to moist, tan, hard.		499.0					
				SS-5	13	16	21	37
15	**SILT WITH SAND (ML)** - mostly low plasticity fines, little fine sands, dry to moist, tan, very stiff.		494.0					
		HC		SS-6	10	13	15	28
20	- - - @ 20 feet - tan and white.		489.0					
				SS-7	3	6	10	16
25	Boring terminated at 25 ft		484.0					

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS



NOTES:

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3. *STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.*
4. *WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.*

PROJECT: **Barnett Tracts**
Blythewood, South Carolina
S&ME Project No. 4261-15-181

BORING LOG B-2

DATE DRILLED: **11/18/15**	ELEVATION: **503.0 ft**	NOTES: **Northing, Easting, and Elevation estimated from Google Earth.**
DRILL RIG: **CME 450**	BORING DEPTH: **17.0 ft**	
DRILLER: **H. Wessinger**	WATER LEVEL: **8' ATD, 5.5' 24 hr**	
HAMMER TYPE: **Auto**	LOGGED BY: **HGM**	
SAMPLING METHOD: **Split spoon**		NORTHING: **862060** / EASTING: **2002403**
DRILLING METHOD: **2¼" H.S.A.**		

MATERIAL DESCRIPTION

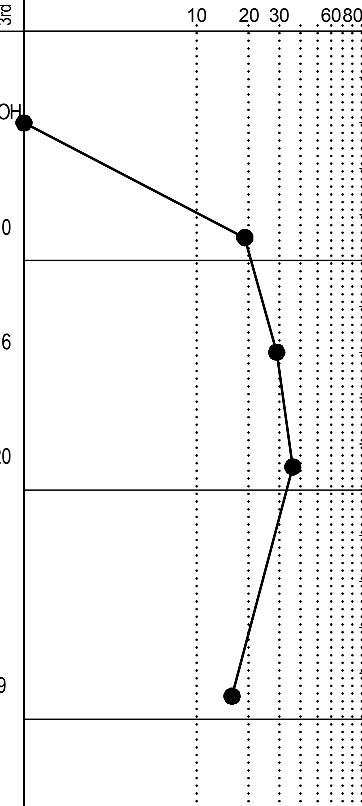
SURFACE MATERIALS - 4 inches of TOPSOIL.

PIEDMONT - SILTY SAND (SM) - mostly fine to medium sands, little low plasticity fines, saturated, brown, very loose.
- - - @ 3 feet - moist, reddish-brown, medium dense.
- - - @ 8 feet - mostly medium to coarse sands, some low plasticity fines, trace organics, dense.
- - - @ 12 feet - light gray and black, medium dense.

Boring terminated at 17 ft due to auger refusal

DEPTH (feet)	ELEVATION (feet-MSL)	SAMPLE NO.	1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
		SS-1	WOH	WOH	WOH	WOH
5	498.0	SS-2	3	9	10	19
		SS-3	10	13	16	29
10	493.0	SS-4	9	16	20	36
15	488.0	SS-5	5	7	9	16

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS



S&ME BORING LOG BORING LOGS.GPJ S&ME 2011_03_09.GDT 12/6/15

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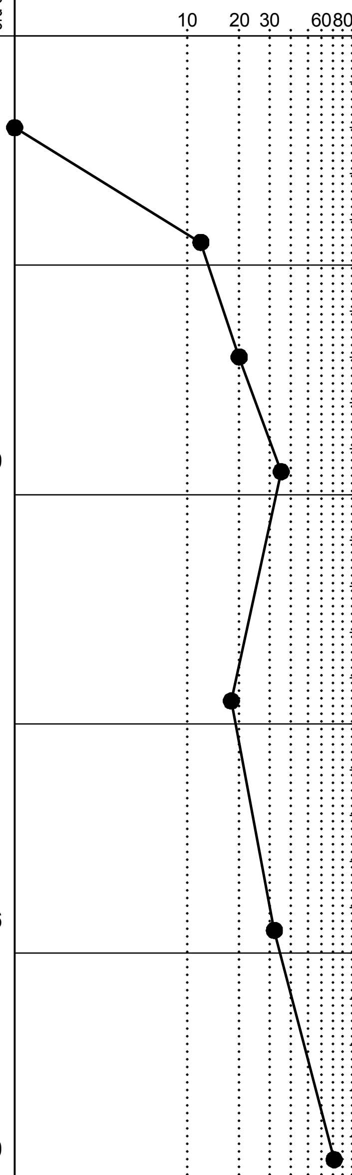
PROJECT: **Barnett Tracts** **Blythewood, South Carolina** **S&ME Project No. 4261-15-181**	**BORING LOG B-3**

DATE DRILLED: **11/19/15**	ELEVATION: **506.0 ft**	NOTES: **Northing, Easting, and Elevation estimated from Google Earth.**
DRILL RIG: **CME 450**	BORING DEPTH: **25.0 ft**	
DRILLER: **H. Wessinger**	WATER LEVEL: **1' ATD, 1' 24 hr**	
HAMMER TYPE: **Auto**	LOGGED BY: **HGM**	
SAMPLING METHOD: **Split spoon**		NORTHING: **861220** / EASTING: **2001084**
DRILLING METHOD: **2¼" H.S.A.**		

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
0–0.33	**SURFACE MATERIALS** - 4 inches of TOPSOIL.	▼						
0.33–6	**PIEDMONT - POORLY GRADED SAND WITH SILT (SP-SM)** - mostly fine to medium sands, few low plasticity fines, trace organics, moist to wet, brown, very loose. - - - @ 3 feet - absent organics, medium dense.			SS-1	1	WOH	1	1
				SS-2	5	6	6	12
5			501.0					
6–15	**SILTY SAND (SM)** - mostly fine to medium sands, little low plasticity fines, moist, brown, medium dense. - - - @ 8 feet - reddish-brown, dense. - - - @ 10 feet - some low plasticity fines, trace mica, tan and white, medium dense.			SS-3	5	9	11	20
				SS-4	13	16	19	35
10			496.0					
				SS-5	7	9	9	18
15			491.0					
15–25	**SILT (ML)** - mostly low plasticity fines, few fine sands, moist, light gray, hard. - - - @ 20 feet - very hard.			SS-6	14	16	16	32
20			486.0					
				SS-7	22	31	40	71
25	Boring terminated at 25 ft		481.0					

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS



S&ME BORING LOG BORING LOGS.GPJ S&ME 2011_03_09.GDT 12/6/15

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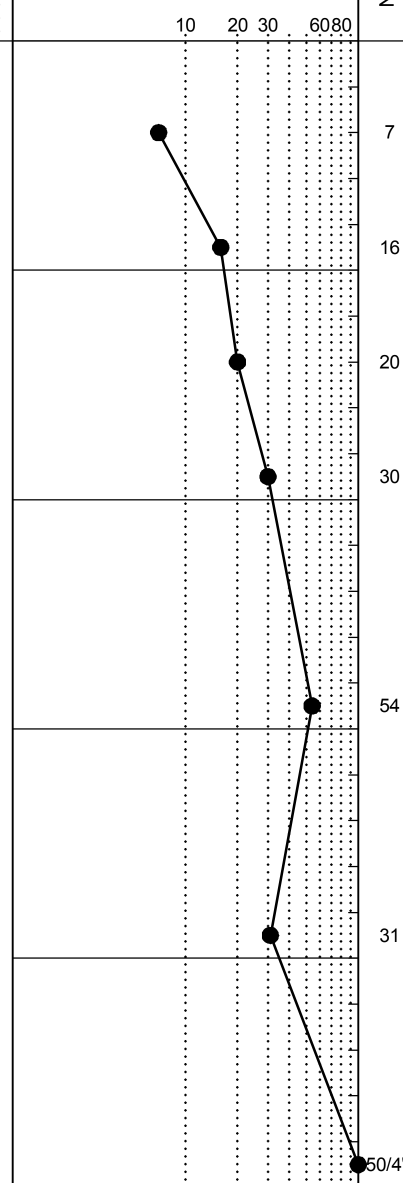
PROJECT: **Barnett Tracts** **Blythewood, South Carolina** **S&ME Project No. 4261-15-181**	**BORING LOG B-4**

DATE DRILLED: **11/18/15**	ELEVATION: **479.0 ft**	NOTES: **Northing, Easting, and Elevation estimated from Google Earth.**
DRILL RIG: **CME 450**	BORING DEPTH: **25.0 ft**	
DRILLER: **H. Wessinger**	WATER LEVEL: **Not Encountered**	
HAMMER TYPE: **Auto**	LOGGED BY: **HGM**	
SAMPLING METHOD: **Split spoon**		NORTHING: **861010** — EASTING: **2003203**
DRILLING METHOD: **2¼" H.S.A.**		

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
0	**SURFACE MATERIALS** - 4 inches of TOPSOIL.							
	PIEDMONT - POORLY GRADED SAND WITH SILT (SP-SM) - mostly fine to medium sands, few low plasticity fines, moist to wet, brown, loose.			SS-1	2	3	4	7
	SILTY SAND (SM) - mostly medium to coarse sands, little low plasticity fines, trace gravel, moist, reddish-brown and tan, medium dense.			SS-2	5	7	9	16
5			474.0					
	SANDY SILT (ML) - mostly low plasticity fines, some fine sands, moist, light gray and yellowish-brown, very stiff.			SS-3	6	9	11	20
				SS-4	10	16	14	30
10	- - - @ 10 feet - 1" quartz gravel lense, light tan, very hard.		469.0					
				SS-5	18	21	33	54
15	**SILT WITH SAND (ML)** - mostly low plasticity fines, little fine sands, moist, white, hard.		464.0					
		HC		SS-6	13	16	15	31
20	**PARTIALLY WEATHERED ROCK (PWR) - SANDY SILT (ML)** - mostly low plasticity fines, some fine sands, moist, white, very hard.		459.0					
				SS-7	25	50/4"		50/4"
25	Boring terminated at 25 ft		454.0					

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS



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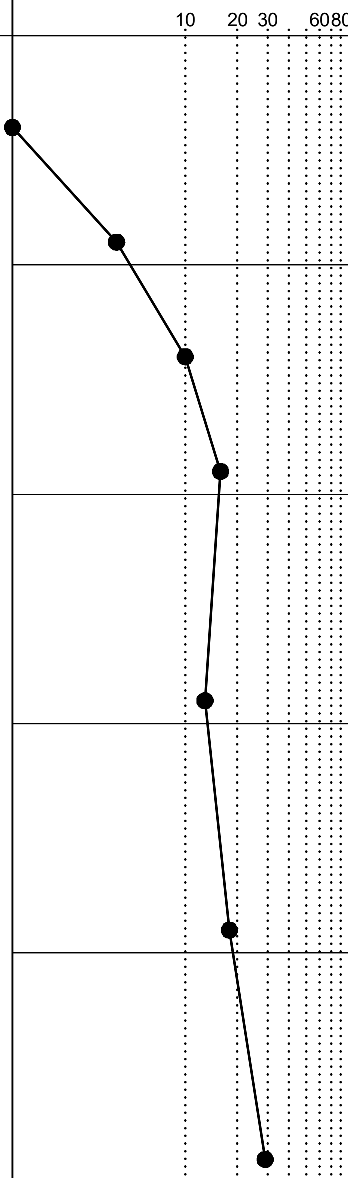
PROJECT: **Barnett Tracts** **Blythewood, South Carolina** **S&ME Project No. 4261-15-181**	**BORING LOG B-5**

DATE DRILLED: **11/19/15**	ELEVATION: **490.0 ft**	NOTES: **Northing, Easting, and Elevation estimated from Google Earth.**
DRILL RIG: **CME 450**	BORING DEPTH: **25.0 ft**	
DRILLER: **H. Wessinger**	WATER LEVEL: **1.5' ATD**	
HAMMER TYPE: **Auto**	LOGGED BY: **HGM**	
SAMPLING METHOD: **Split spoon**		NORTHING: **860175** / EASTING: **2002364**
DRILLING METHOD: **2¼" H.S.A.**		

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
0	**SURFACE MATERIALS** - 6 inches of TOPSOIL.							
	PIEDMONT - POORLY GRADED SAND WITH SILT (SP-SM) - mostly fine to medium sands, few low plasticity fines, trace organics, moist to wet, brown, very loose.	▽		SS-1	1	WOH	1	1
	- - - @ 3 feet - absent organics, gray.			SS-2	2	2	2	4
5			485.0					
	SILTY SAND (SM) - mostly fine to medium sands, little low plasticity fines, moist, reddish-brown, loose.			SS-3	3	4	6	10
	- - - @ 8 feet - some low plasticity fines, medium dense.			SS-4	5	7	9	16
10	**SILT (ML)** - mostly low plasticity fines, few fine sands, trace mica, moist, light gray and tan, stiff.		480.0					
				SS-5	5	6	7	13
15	- - - @ 15 feet - absent mica, light reddish-brown, very stiff.		475.0					
				SS-6	6	8	10	18
20	- - - @ 20 feet - yellowish-brown.		470.0					
				SS-7	9	13	16	29
25	Boring terminated at 25 ft		465.0					

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS



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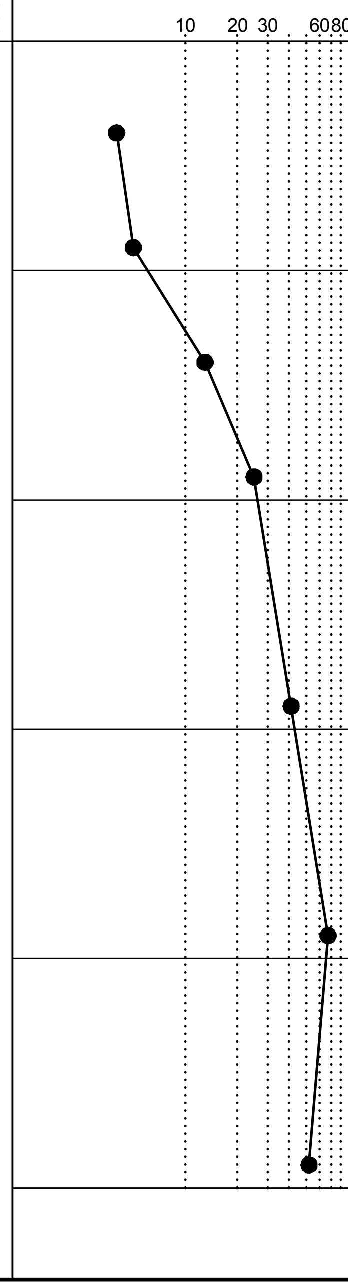
PROJECT: Barnett Tracts Blythewood, South Carolina S&ME Project No. 4261-15-181	BORING LOG B-6

DATE DRILLED: **11/19/15**	ELEVATION: **496.0 ft**	NOTES: **Northing, Easting, and Elevation estimated from Google Earth.**
DRILL RIG: **CME 450**	BORING DEPTH: **25.0 ft**	
DRILLER: **H. Wessinger**	WATER LEVEL: **Not Encountered**	
HAMMER TYPE: **Auto**	LOGGED BY: **HGM**	
SAMPLING METHOD: **Split spoon**		NORTHING: **858689** EASTING: **1999639**
DRILLING METHOD: **2¼" H.S.A.**		

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	BLOW COUNT / CORE DATA: 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
0	**SURFACE MATERIALS** - 6 inches of TOPSOIL.							
	PIEDMONT - POORLY GRADED SAND WITH SILT (SP-SM) - mostly fine to medium sands, few low plasticity fines, moist, brown, very loose.			SS-1	2	2	2	4
	- - - @ 3 feet - moist to wet, light brown, loose.			SS-2	2	2	3	5
5			491.0					
	SILTY SAND (SM) - mostly fine to medium sands, some low plasticity fines, moist, light brown, medium dense.			SS-3	5	6	7	13
	- - - @ 8 feet - little low plasticity fines, mottled tan, gray and reddish-brown.			SS-4	9	10	15	25
10	- - - @ 10 feet - dense.		486.0					
				SS-5	16	20	21	41
15	- - - @ 15 feet - some low plasticity fines, dry to moist, tan, very dense.	HC	481.0					
				SS-6	19	26	41	67
20	**SILT (ML)** - mostly low plasticity fines, trace fine sands, moist, white, very hard.		476.0					
				SS-7	16	22	30	52
25	Boring terminated at 25 ft		471.0					

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS



S&ME BORING LOG BORING LOGS.GPJ S&ME 2011_03_09.GDT 12/6/15

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S&ME

PROJECT: **Barnett Tracts**
Blythewood, South Carolina
S&ME Project No. 4261-15-181

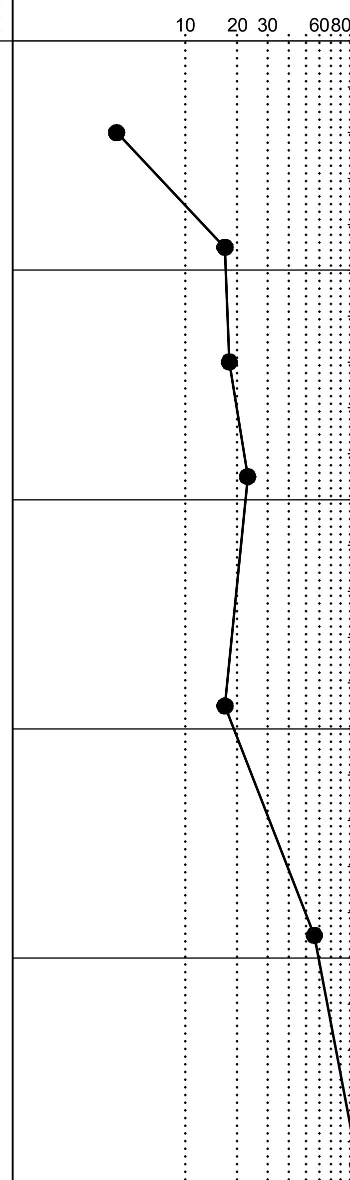
BORING LOG B-7

DATE DRILLED: **11/19/15**	ELEVATION: **479.0 ft**
DRILL RIG: **CME 450**	BORING DEPTH: **25.0 ft**
DRILLER: **H. Wessinger**	WATER LEVEL: **Not Encountered**
HAMMER TYPE: **Auto**	LOGGED BY: **HGM**
SAMPLING METHOD: **Split spoon**	NORTHING: **858669**
DRILLING METHOD: **2¼" H.S.A.**	EASTING: **2002063**

NOTES: **Northing, Easting, and Elevation estimated from Google Earth.**

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
0	**SURFACE MATERIALS** - 4 inches of TOPSOIL.		479.0					
	<u>PIEDMONT</u> - POORLY GRADED SAND WITH SILT (SP-SM) - mostly fine to medium sands, few low plasticity fines, moist, brown, very loose.			SS-1	2	2	2	4
	SILTY SAND (SM) - mostly fine to medium sands, some low plasticity fines, dry to moist, reddish-brown, medium dense.			SS-2	5	7	10	17
5	--- @ 6 feet - mottled reddish-brown, tan and gray.		474.0	SS-3	8	9	9	18
	--- @ 8 feet - tan and light gray.			SS-4	9	10	13	23
10	**SILT WITH SAND (ML)** - mostly low plasticity fines, little fine sands, moist, very light tan, very stiff.	▼ HC	469.0	SS-5	7	8	9	17
15	**SILTY SAND (SM)** - mostly medium to coarse sands, some low plasticity fines, moist to wet, white and light brown, very dense.		464.0	SS-6	17	20	36	56
20	**<u>PARTIALLY WEATHERED ROCK (PWR)</u> - SILTY SAND (SM)** - mostly fine to medium sands, little low plasticity fines, moist, tan, very dense.		459.0	SS-7	50/5"			50/5"
25	Boring terminated at 25 ft		454.0					

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS



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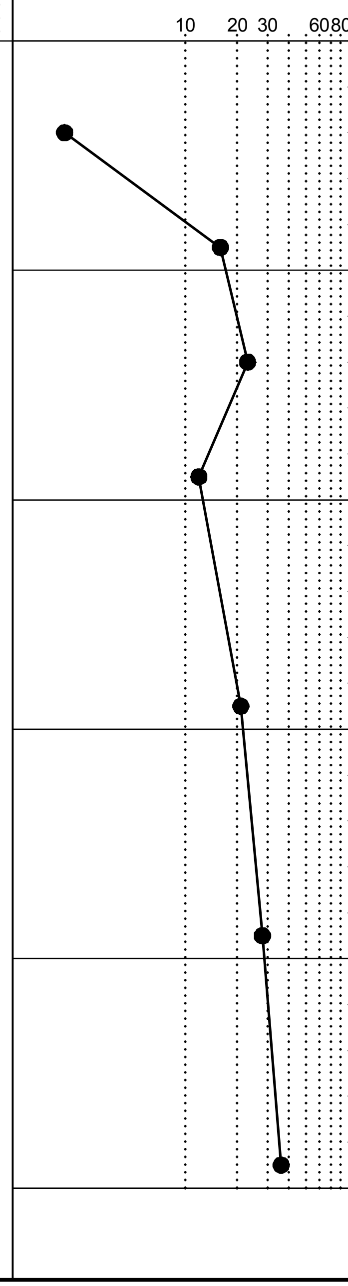
S&ME

PROJECT: **Barnett Tracts Blythewood, South Carolina** S&ME Project No. 4261-15-181	**BORING LOG B-8**

DATE DRILLED: **11/18/15**	ELEVATION: **463.0 ft**	NOTES: **Northing, Easting, and Elevation estimated from Google Earth.**
DRILL RIG: **CME 450**	BORING DEPTH: **25.0 ft**	
DRILLER: **H. Wessinger**	WATER LEVEL: **Not Encountered**	
HAMMER TYPE: **Auto**	LOGGED BY: **HGM**	
SAMPLING METHOD: **Split spoon**		NORTHING: **856500** / EASTING: **2004046**
DRILLING METHOD: **2¼" H.S.A.**		

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
	SURFACE MATERIALS - 4 inches of TOPSOIL.							
	<u>PIEDMONT</u> - SILTY SAND (SM) - mostly fine to medium sands, some low to medium plasticity fines, moist to wet, brown, very loose.			SS-1	1	1	1	2
	- - - @ 3 feet - little low plasticity fines, moist, yellowish-brown, medium dense.			SS-2	5	7	9	16
5			458.0					
	- - - @ 6 feet - reddish-brown.			SS-3	8	10	13	23
	SILT (ML) - mostly low plasticity fines, trace fine sands, moist, white, stiff.			SS-4	5	6	6	12
10	**SILT WITH SAND (ML)** - mostly low plasticity fines, little fine sands, moist, white and tan, very stiff.		453.0					
				SS-5	7	9	12	21
15	**SANDY SILT (ML)** - mostly low plasticity fines, some fine to medium sands, trace gravel, moist, mottled gray, tan and white, very stiff.		448.0					
		<u>HC</u>		SS-6	7	12	16	28
20	**SILT WITH SAND (ML)** - mostly low plasticity fines, little fine sands, moist, purple, hard, relict rock structure.		443.0					
				SS-7	10	16	20	36
25	Boring terminated at 25 ft		438.0					

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS



S&ME BORING LOG BORING LOGS.GPJ S&ME 2011_03_09.GDT 12/6/15

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S&ME

PROJECT:	Barnett Tracts Blythewood, South Carolina S&ME Project No. 4261-15-181	BORING LOG B-9

DATE DRILLED: **11/18/15**	ELEVATION: **429.0 ft**	NOTES: **Northing, Easting, and Elevation estimated from Google Earth.**
DRILL RIG: **CME 450**	BORING DEPTH: **25.0 ft**	
DRILLER: **H. Wessinger**	WATER LEVEL: **Not Encountered**	
HAMMER TYPE: **Auto**	LOGGED BY: **HGM**	
SAMPLING METHOD: **Split spoon**		NORTHING: **854325** / EASTING: **2002815**
DRILLING METHOD: **2¼" H.S.A.**		

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
0 – 2	**PIEDMONT - SANDY SILT (ML)** - mostly low plasticity fines, some fine to medium sands, trace rock fragments, moist, tan and reddish-brown, firm.			SS-1	2	3	3	6
2 – 8	**PARTIALLY WEATHERED ROCK (PWR) - SANDY SILT (ML)** - mostly low plasticity fines, some fine to medium sands, trace rock fragments, moist, gray and tan, very hard, relict rock structure.			SS-2	16	50/5"		50/5"
5			424.0					
	- - - @ 6 feet - mostly subangular gravel, some low plasticity fines, trace fine to medium sands, moist to dry, gray and tan, relict rock structure, very dense.			SS-3	27	34	50/5"	50/5"
8 – 20	**SANDY SILT (ML)** - mostly low plasticity fines, some fine to medium sands, trace rock fragments, dry to moist, mottled reddish-brown, tan and gray, hard.			SS-4	13	16	15	31
10	- - - @ 10 feet - absent rock fragments, gray and tan.		419.0					
				SS-5	13	14	22	36
15	- - - @ 15 feet - very hard.		414.0					
		HC		SS-6	18	21	36	57
20 – 25	**SILTY SAND (SM)** - mostly fine to medium sands, some low plasticity fines, dry to moist, mottled reddish-brown, tan and gray, dense.		409.0					
				SS-7	10	16	18	34
25	Boring terminated at 25 ft		404.0					

S&ME BORING LOG BORING LOGS.GPJ S&ME 2011_03_09.GDT 12/7/15

NOTES:

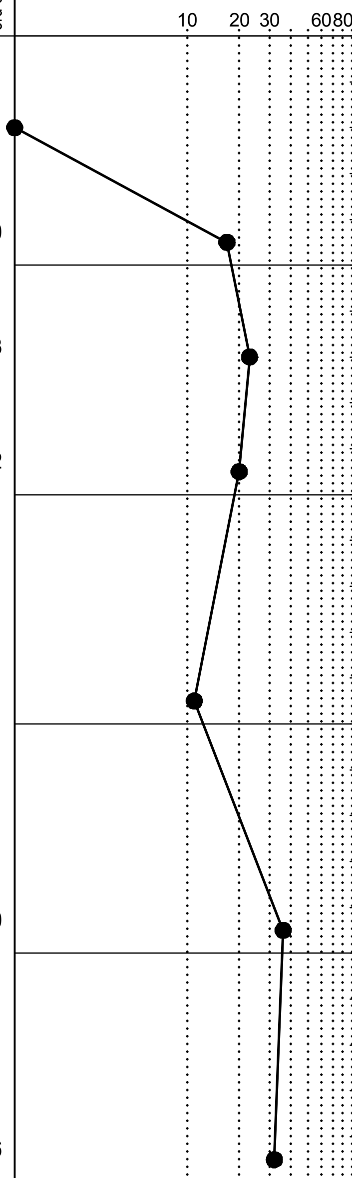
1. *THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.*
2. *BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.*
3. *STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.*
4. *WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.*

PROJECT: **Barnett Tracts** **Blythewood, South Carolina** **S&ME Project No. 4261-15-181**	**BORING LOG B-10**

DATE DRILLED: **11/18/15**	ELEVATION: **450.0 ft**	NOTES: **Northing, Easting, and Elevation estimated from Google Earth.**
DRILL RIG: **CME 450**	BORING DEPTH: **25.0 ft**	
DRILLER: **H. Wessinger**	WATER LEVEL: **15.5' ATD, 13.5' 24 hr**	
HAMMER TYPE: **Auto**	LOGGED BY: **HGM**	
SAMPLING METHOD: **Split spoon**		NORTHING: **854580** EASTING: **2005388**
DRILLING METHOD: **2¼" H.S.A.**		

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	BLOW COUNT / CORE DATA: 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
0	**SURFACE MATERIALS** - 4 inches of TOPSOIL.							
	<u>PIEDMONT</u> - SILTY SAND (SM) - mostly fine to medium sands, some low plasticity fines, wet, brown, very loose.			SS-1	1	WOH	1	1
	- - - @ 3 feet - little low plasticity fines, moist to wet, reddish-brown, medium dense.			SS-2	5	7	10	17
5			445.0					
				SS-3	8	10	13	23
	- - - @ 8 feet - mostly medium to coarse sands, light reddish-brown, very dense.			SS-4	5	8	12	20
10	**SANDY SILT (ML)** - mostly low plasticity fines, some fine sands, trace mica, moist, light gray and tan, stiff.		440.0					
		▼ (13.5' 24 hr)		SS-5	3	5	6	11
15	- - - @ 15 feet - absent mica, dry to moist, light gray, hard.	∇ (15.5' ATD)	435.0					
				SS-6	14	16	20	36
20	**SILTY SAND (SM)** - mostly medium to coarse sands, some low plasticity fines, moist to wet, white, medium dense.		430.0					
				SS-7	13	16	16	32
25	Boring terminated at 25 ft		425.0					

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS



S&ME BORING LOG BORING LOGS.GPJ S&ME 2011_03_09.GDT 12/6/15

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SUMMARY OF EXPLORATION PROCEDURES

The American Society for Testing and Materials (ASTM) publishes standard methods to explore soil, rock and ground water conditions in Practice D-420-98, "Standard Guide to Site Characterization for Engineering Design and Construction Purposes." The boring and sampling plan must consider the geologic or topographic setting. It must consider the proposed construction. It must also allow for the background, training, and experience of the geotechnical engineer. While the scope and extent of the exploration may vary with the objectives of the client, each exploration includes the following key tasks:

- Reconnaissance of the Project Area
- Preparation of Exploration Plan
- Layout and Access to Field Sampling Locations
- Field Sampling and Testing of Earth Materials
- Laboratory Evaluation of Recovered Field Samples
- Evaluation of Subsurface Conditions

The standard methods do not apply to all conditions or to every site. Nor do they replace education and experience, which together make up engineering judgment. Finally, ASTM D 420 does not apply to environmental investigations.

Boring and Sampling

Soil Test Boring with Hollow-Stem Auger – Soil sampling and penetration testing were performed in general accordance with ASTM D1586, "Standard Test Method for Penetration Test and Split Barrel Sampling of Soils. Borings were made by mechanically twisting a continuous steel hollow stem auger into the soil. At regular intervals, soil samples were obtained with a standard 1.4 inch I. D., two-inch O. D., split barrel sampler. The sampler was first seated six inches to penetrate any loose cuttings, then driven an additional 12 inches with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler through the two final six inch increments was recorded as the penetration resistance (SPT N) value. The N-value, when properly interpreted by qualified professional staff, is an index of the soil strength and foundation support capability.

Refusal to Drilling – Refusal to the soil drilling methods used at this site may result from encountering hard cemented soil, soft weathered rock, coarse gravel, cobbles or boulders, thin rock seams, or the upper surface of sound continuous rock. Core drilling would be required to determine the character and continuity of materials below refusal of the soil auger in natural soils. Where fills are present, refusal to drilling may also result from encountering buried debris, building materials, or objects. Backhoe test pits would be required to expose and identify buried materials below refusal levels in filled areas.

Borehole Closure - Following collection of relevant geotechnical data, boreholes were filled by slowly pouring auger cuttings into the open hole such that minimal "bridging" of the material occurred in the hole. Backfilling of the upper two feet of each hole was tamped as heavily as possible with a shovel handle or other hand held equipment, and the backfill crowned to direct rainfall away on the surface. Where boreholes exceeded five feet in depth, a plastic hole plug was firmly tamped into place within the backfill at a depth of about two feet.

Preservation and Transporting of Soil Samples with Control of Field Moisture – Procedures for preserving soil samples obtained in the field and transportation of samples to the laboratory generally followed those given in ASTM D 4220, "Standard Practice for Preserving and Transporting Soil Samples" for Group B samples as defined in Section 4. Group B samples are those samples not suspected of being contaminated and for which only water content and classification, proctor, relative density, or profile logging will be performed. Group B samples also include bulk samples that are intended to be remolded in the laboratory for compaction, swell pressure, percent swell, consolidation, permeability, CBR, or shear testing. Representative samples of the cuttings or split spoon samples, or representative bulk samples, were placed in suitably identified, sealed glass jars or plastic containers and transported to the laboratory. Sample identification numbers on the containers corresponded to sample numbers recorded on field boring records or test pit records. Thin-walled tube samples were sealed at the ends with paraffin and capped with plastic end caps.

Field Tests of Earth Materials

The subsurface conditions encountered during drilling were reported on a field test boring record by the chief driller. The record contains information about the drilling method, samples attempted and sample recovery, indications of materials in the borings such as coarse gravel, cobbles, etc, and indications of materials encountered between sample intervals. Representative soil samples were placed in glass jars and transported to the laboratory along with the field boring records. Recovered samples not expended in laboratory tests are commonly retained in our laboratory for 60 days following completion of drilling. Field boring records are retained at our office.

Measurement of Static Water Levels – Water level readings were made in the open boreholes immediately after completing drilling and withdrawal of the tools. Where feasible, measurements were repeated after an elapsed period of 24 hours to gauge the stabilized water level. Procedures for measurement of liquid levels in open boreholes are described in ASTM D 4750, "Standard Test Method for Determining Subsurface Liquid Levels in a Borehole or Monitoring Well (Observation Well)." A weighted measuring tape was slowly lowered into each borehole until the liquid surface was penetrated by the weighted end. The reading on the tape was recorded at a reference point on the surface and compared to the reading at the demarcation of the wetted and unwetted portions of the tape. The difference between the two readings was recorded as the depth of the liquid surface below the reference point. Measurements made by this method were then repeated until approximately consistent values were obtained.

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Laboratory Tests of Soil and Rock

Recovered disturbed and undisturbed samples and the drillers' field logs were transported to the laboratory where they were examined by the geotechnical engineer. Selected samples representative of certain groups of soils were subjected to simple classification tests by hand or other simple means.

Examination of Split Spoon Soil Samples - Soil and rock samples and field boring records were reviewed in the laboratory by the geotechnical engineer. Soils were classified in general accordance with the visual-manual method described in ASTM D 2488, "Standard Practice for Description and Identification of Soils (Visual-Manual Method)". The geotechnical engineer also prepared the final boring records enclosed with this report.