REPORT OF RECONNAISSANCE LEVEL GEOTECHNICAL EXPLORATION

STEEPLECHASE INDUSTRIAL PARK
KERSHAW COUNTY, SOUTH CAROLINA
S&ME PROJECT NO. 1461-14-015

Prepared For:

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April 4, 2014

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Attention: Ms. Peggy B. McLean

Reference: **REPORT OF RECONNAISSANCE LEVEL GEOTECHNICAL EXPLORATION**
Steeplechase Industrial Park
Kershaw County, South Carolina
S&ME Project No. 1461-14-015

Dear Ms. McLean:

We have completed our reconnaissance level geotechnical exploration for the Steeplechase Industrial Park site in Kershaw County, South Carolina. Our services were performed in general accordance with S&ME proposal No. 14-1400112, dated February 7, 2014. The purpose of our exploration was to determine the general site subsurface conditions at widely-spaced test locations and evaluate the impacts that site conditions will have on development. This report presents our understanding of the project, the site and subsurface conditions encountered, and our preliminary conclusions and recommendations.

PROJECT INFORMATION

Information about the project was obtained through e-mail correspondence between Peggy McLean of Kershaw County Economic Development and Marty Baltzegar of S&ME on January 10, 2014. Information provided by Ms. McLean included an aerial map of the site, archaeological report, Phase I report, previous soils reports, wetlands delineation maps, topographic maps, and a vicinity map with approximate lot boundaries.

The Steeplechase Industrial Park is approximately 460 acres and is located near the intersection of Interstate 20 and Highway 521 near Camden, South Carolina. The site is generally bordered by Interstate 20 to the south, Campus Drive to the west, and Black River Road to the north and east. The industrial park is divided into two separate tracts by a belt of wetlands – a 115-acre tract facing Campus Drive to the west of the wetlands, and an eastern tract mainly along Black River Road comprising about 240 acres.

S&ME has performed several previous explorations in this area. S&ME performed 7 soil test borings in the footprint of "Steeplechase Speculative Building No. 2" in 1999. This site is located near the central southern boundary, at the location currently occupied by Accuride Corporation. S&ME also performed 6 additional borings for an expansion to this facility in 2011.

S&ME performed 17 borings and for a speculative office building at the end of Corporate Drive in 2006. Work at this site included surface wave geophysics to determine site class in accordance with the International Building Code.

Eight soil test borings were previously conducted within the western tract by Law Engineering in 2000. Boring data was provided by Peggy McLean of Kershaw County Economic Development Office.

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. On March 20, 2014 a representative of S&ME visited the site to perform the following tasks:

- Observe topography, ground cover, and surface soils in the proposed project areas.
- Lay out locations for soil test borings in the general locations shown on Figure 2 in the Appendix and record the approximate position using a handheld GPS unit.

The subsurface exploration for this project consisted of four Standard Penetration Test (SPT) borings conducted to a depth of approximately 25 feet each. The methods used to perform this task are described below. The approximate test locations are shown on Figure 2 "Boring Location Plan" as B-1 through B-4. As-drilled coordinates for the test locations, in State Plane format as obtained by a handheld GPS unit, are also included on the attached boring records. Please note that no formal survey of boring locations or elevations was conducted by S&ME.

Figure 2 also includes the estimated locations of eight SPT borings performed on this site in 2000 by Law Engineering and Environmental Services, Inc. and previous borings by S&ME, Inc. Those borings are designated with yellow boring markers and colored hatch areas respectively.

Soil sampling and penetration testing were performed on March 24, 2014 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 1.4 inch I.D., two-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.

Geophysical measurements of soil properties were conducted by S&ME as part of S&ME Project No. 1611-06-519 dated December 26, 2006. Shear wave velocity measurements were performed using Multi-Channel Analysis of Surface Waves (MASW) and Microtremor Array Method (MAM) arrays. Each method measures the travel times of surface generated (active) or ambient (passive) vibrations to geophones mounted on the ground surface at various incremental distances along the array.

Ground water measurements were taken in the test borings shortly after drilling was completed. Where ground water was encountered, the boreholes were left open overnight to allow for stabilized readings to be obtained approximately 24 hours later. Boreholes were subsequently backfilled after ground water measurements were completed.

LABORATORY TESTING

Soil samples and field boring records were reviewed in the laboratory by a 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.

SITE AND SUBSURFACE CONDITIONS

Site Conditions

At the time of our exploration, the site was partially developed with multiple areas of second growth woodlands. The western tract is mostly undeveloped, wooded, and contains a delineated wetlands area. The wetland runs north to south and is situated to the east of the Central Carolina Technical College building. Vehicular access to the western portion of the site is from Campus Drive from Highway 521.

Several parcels in the eastern tract are developed and occupied by existing industrial structures. Accuride Corporation and Hengst Automotive are located at the intersection of Black River Road and Steeplechase Industrial Boulevard. To the west of Hengst Automotive is a large field with grass surface cover surrounded by woodlands. To the east of Accuride Corporation is open field with grass surface cover and to the south is wooded and undeveloped.

The eastern portion of the tract is accessed by Corporate Drive. Parcels in this area have been previously developed and are occupied by Haier America and an untenanted speculative office building. Undeveloped areas in this section are a combination of open grassed fields with second growth woodlands.

Surface relief across the property varies from about +149 feet MSL near Century Drive to about +193 feet MSL where the Accuride Corporation building resides. In general, the site drains from the central portion to the east and west of Steeplechase Industrial Boulevard. Some low standing water and saturated soils were noted within the western portion of the site near B-1 and the delineated wetlands area.

Subsurface Conditions

Site Geology

Based upon a review of previous geotechnical work performed at the site, our boring data, and published geologic and soil maps, Holocene-aged alluvial deposits associated with the Wateree River appear to encroach upon the western margins of the site facing Campus Drive. Alluvial deposits form a thin veneer over considerably older sediments associated with the White Sand Hills Physiographic Region of the Upper Coastal Plain of South Carolina.

The White Sand Hills form the most inland portion of the coastal plain and are underlain by mostly sandy Cretaceous age sediments of the Black Mingo and Middendorf formations. These soils were eroded from a range of mountains in the northwest portion of the state approximately 65,000,000 years ago and laid down in their present positions as fan deposits, where they have weathered in place. These sediments rest unconformably on top of the underlying Piedmont crystalline bedrock at depths of between 20 and 120 feet. Massive, buff or tan kaolin beds are prevalent throughout the sequence, alternating with coarse-grained water-bearing sands and gravels which become increasingly prevalent near the base of the formation. Soil layers exhibit considerable lateral and vertical discontinuity. In many areas groundwater is perched on top of impervious sediments, is relatively shallow, and supports heavy forest cover. Fresh soil exposures are typically white, but become pink, purple or rusty orange with weathering. Iron-oxide cemented sandstone beds are common.

USDA Soil Survey Information

From a qualitative standpoint, the USDA Soil Conservation Service 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 Soil Conservation Service's soils map of Kershaw County, South Carolina, issued in September of 1989, indicates eight soil series within the project area. Details are provided in Table 1 below.

Table 1: USDA Soil Survey Soil Series

Soil Series	Soil Type	Depth to Seasonal High GW Table	Depth to Restrictive Layer (PWR)	Remarks
Blanton sand (BaB) Isolated	SP-SM, SM, SC, SM-SC	5 - 6 ft. Perched Dec. – Mar.	>60 ft.	Soils that formed in sandy and loamy marine sediment. Somewhat excessively drained soil on irregularly shaped ridges of the Coastal Plain. Soils have low shrink-swell potential and moderate permeability. Soils are very strongly to medium acid and are suited to most urban uses.
Goldsboro loamy sand (GoA) Along Black River Road	SM, SM-SC, SC, CL-ML, CL	2 - 3 ft. Apparent Dec. – Apr.	>60 ft.	Soils that formed in loamy marine and alluvial sediments. Moderately well drained soil in smooth and slightly depressional areas of the Coastal Plain. Soils have moderate permeability with low shrink-swell potential. Soils are very strongly to strongly acid and are suited for most urban uses.
Grady loam (Gr) (Western Tract)	ML, CL-ML, CL, CH	0 - 1 ft. Apparent Dec. – Jun.	>60 ft.	Soils that formed in clayey marine sediment. Poorly drained soil in nearly level to slightly depressional areas of the Coastal Plain. Soils have slow permeability with moderate shrink-swell potential. Soils are extremely too strongly acid and are poorly suited for urban use.
Norfolk loamy sand (NoB) (Eastern Tract)	SM, SC, SM-SC, CL, CL-ML	4 - 6 ft. Apparent Jan. – Mar.	>60 ft.	Soils that formed in loamy marine sediment. Well drained soil on broad ridges and side slopes of interstream divides of the Coastal Plain. Soils have moderate permeability with low shrink-swell potential. Soils are very strongly to strongly acid and are well suited for most urban uses.
Pantego loam (Pe) (Wetlands)	SM, SM-SC, CL, ML, SC, CL-ML	0 - 1.5 ft. Apparent Dec. – May	>60 ft.	Soils that formed in marine and alluvial sediments on broad flats adjacent to flood plains of the Wateree and Lynches Rivers. Also on flood plains of some small creeks and branches and in some depressions or bays of the Coastal Plain. Poorly drained soils with moderate permeability and low shrink-swell potential. Soils are extremely to strongly acid and is poorly suited for most urban uses.
Persanti sandy loam (PsA) Western Tract off of Campus Drive)	SM, SM-SC, ML, CL-ML, CL, CH, MH	2 - 3.5 ft. Apparent Dec. – Apr.	>60 ft.	Soils that formed in unconsolidated clayey marine sediment. Moderately well drained soil in nearly level areas mainly in the middle and upper parts of the Coastal Plain. Soils have slow permeability with low shrink-swell potential. Soils are very strongly to slightly acid and is poorly suited for most urban uses.
Rains sandy loam (Ra) (Wetland)	SM, ML, SC, SM-SC, CL, CL-ML	0 - 1 ft. Apparent Nov. – Apr.	>60 ft.	Poorly drained soils that formed in loamy marine sediment on broad flats and in depressional areas of the Coastal Plain. Soils have moderate permeability with low shrink-swell potential. Soils are very strongly too strongly acid and are poorly suited for most urban uses.

Soil Series	Soil Type	Depth to Seasonal High GW Table	Depth to Restrictive Layer (PWR)	Remarks
Wagram sand (WaB) (Eastern Tract)	SP-SM, SM, SC	> 6 ft.	>60 ft.	Well drained soils that formed in sandy and loamy marine sediments on ridge tops on the Sand Hills and the Coastal Plain. Soils have moderate permeability with low shrink-swell potential. Soils are very strongly to medium acid and are well suited for most urban uses.

The USDA information provided for this site indicates a few items which could affect development costs:

- There is the potential for shallow ground water to occur during late winter through spring months in the soils mapped as Blanton sand (BaB), Goldsboro loamy sand (GoA), Norfolk loamy sand (NoB), Pantego loam (Pe), Persanti sandy loam (PsA), Rains sandy loam (Ra). Potential for shallow ground water extends through summer in soils mapped as Grady loam (Gr). It is important to note that ground water levels are sensitive to many factors and can fluctuate significantly over short periods of time. Perched water may occur in both eastern and western tracts.

- The USDA soil survey indicates that the map units designated for the western tract facing Campus Drive are poorly suited for urban development and use. Persanti sandy loam (PsA) mapped soils are subject to seasonal high ground water tables and slow permeability. Grady loam (Gr), also mapped in the western tract, are subject to wetness and slow permeability which can make construction and site preparation more difficult.

- The above provided information also suggests a very low likelihood of encountering a partially weathered rock considering the range of likely cut depths at this site.

An image of the mapped soil series from the USDA soil map is included in the Appendix as Figure 3 for reference.

Interpreted Subsurface Profile

Generalized descriptions of the interpreted soil types encountered by the field exploration are shown on the soil test boring records in the Appendix. Boring records represent the engineering 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 than shown. The general subsurface conditions and their pertinent characteristics are discussed in the following paragraphs. Please note that the discussion below does incorporate data obtained during our previous site work from 1999, 2006, and 2011.

Top-of-ground elevations shown on the boring records were estimated from Google Earth and checked against the local USGS topographic quadrangle maps. Elevations are shown for demonstration purposes only. Boring locations and elevations shown on the attached drawings and elevations indicated in this report were not surveyed and should be considered approximate.

Surface Soils

Boring B-1 near Campus Drive encountered 3-1/2 inches of topsoil. Law Engineering borings from 2000 indicate 4 inches in most locations. This area is indicated by aerial photography to have been covered by row pines about 2006. Row pine cultivation in areas of high ground water is typically carried out by windrowing pine straw, limbs and other debris into ridges, where young saplings are planted. This material may still be in place in areas not previously cleared for industrial development.

Borings B-2, B-3 and B-4 in the eastern tract penetrated 8 to 12 inches of topsoil. These values are similar to borings conducted for the Accuride facility.

We caution that topsoil may be encountered at deeper depths in areas that were not explored by our borings.

Holocene Alluvial Soils of the Wateree River Floodplain

These soils were penetrated by Boring B-1 conducted off of Campus Drive. Alluvial sediments from nearby Wateree River extended from the surface to termination of drilling at 25 feet. The encountered profile was dominated by fine-grained soils that were medium to high plasticity under hand manipulation. The upper 17 feet were classified as fat clays (CH) according to ASTM D 2488. Samples contained varying amounts of fine to medium sands. The boring penetrated a seam of low plasticity, clayey sands between 8 to 12 feet below the surface.

Below 17 feet, the soils transition to silty sands and poorly graded sands with nonplastic fines.

Recovered samples generally exhibited gray to bluish-gray coloration. The upper soils were moist to the touch and generally became increasingly wet with depth. Standard Penetration Test (SPT) N-values ranged from 8 to 18 blows per foot in the fine grained soils in the upper 8 feet, indicating stiff to very stiff consistency. Below a depth of 8 feet were coarse grained soils with SPT N-values ranging from 1 to 12 bpf, indicating a very loose to medium dense relative density, interlayered with very soft clays.

Upper Coastal Plain Sediments

These soils underlie the eastern tract. Borings B-2, B-3, and B-4 encountered virgin sediments of the Upper Coastal Plain which extend to termination of drilling. The encountered profile generally consisted of clayey and silty sands with fine to medium sands and some coarse sands. Occasional fine rounded and sub-rounded quartz gravels were also encountered at varying depths. Fines contents and plasticity most commonly ranged from little to some low to medium plasticity in the upper 12 feet transitioning to poorly graded sands with few low plasticity fines and then to nonplastic fines.

Recovered samples generally exhibited brown, tan, and gray coloration with traces of other colors. Samples were generally moist to the touch and became increasingly wet with depth. SPT N-values ranged from 4 to 16 bpf in the upper 10 feet, indicating a very loose to medium dense relative density. Below 10 feet, SPT N-values ranged from 4 to 36 bpf, indicating a very loose to dense relative density.

Ground Water

In the western tract off of Campus Drive, ground water was encountered in Boring B-1 at 4 feet at time of drilling, and re-measured at a depth of 1.4 feet the next day. Eight borings conducted by Law Engineering in 2000 indicate "stabilized" ground water measurements ranging between 2-1/2 feet to 11-1/2 feet. Law borings B-6 and B-7, located immediately east and west of S&ME Boring B-1, show ground water levels at 7-1/2 feet and 9 feet, respectively. Law boring B-8, performed about 700 feet south of S&ME Boring B-1, showed ground water at 2-1/2 feet.

S&ME borings carried out in the eastern tract encountered ground water at depths of 5.3 to 14 feet, except in Boring B-4 where free water was not measured in the boring. A wet spoon was recovered in Boring B-4 during sampling at 23.5 feet below ground surface. Additional details are provided in Table 2 below.

Table 2: Measured Ground Water Levels

Water Level Type	B-1	B-2	B-3	B-4
At Time of Drilling (3/24/2014)	4 ft.	14 ft.	8 ft.	Wet Spoon @ 23.5 ft.
Approx. 24 hrs. Later (3/25/2014)	1.4 ft.	14 ft.	5.3 ft.	--

As previously noted, the local geology (Table 1) indicates a fairly high potential for perched water to be present during some periods of the year. This will be especially so during periods of high rainfall.

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 the Appendix.

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 explicitly in building codes but must also be considered.

IBC Site Class

As of July 1, 2013, the 2012 edition of the International Building Code (IBC) has been adopted for use in South Carolina. We classified the site as one of the Site Classes listed in IBC Section 1613.3, using the procedures described in Chapter 20 of ASCE 7-10. Geophysical measurements of soil properties were conducted by S&ME as part of S&ME Project No. 1611-06-519 dated December 26, 2006. This is the speculative office building at the southeast end of the industrial park off of Corporate Drive.

One MASW traverse was performed at the site at the general location shown on Figure 2. The reported average shear wave velocity was 1304 feet per second (fps) over a depth of 100 feet. Based on the MASW shear wave velocity data, the soil profile has a weighted average shear wave velocity consistent with **Site Class C** at the location of the test. Since the park will be subdivided, site class of individual parcels may differ from those determined at the location of this profile. The site class should be established for each individual site development within the project site during the design level geotechnical exploration.

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 reflecting a targeted risk of structural collapse equal to 1 percent in 50 years to determine the spectral response acceleration at the top of seismic bedrock for any period. The 2012 IBC seismic provisions of Section 1613 use the 2008 Seismic Hazard Maps published by the National Earthquake Hazard Reduction Program (NEHRP) to define the base rock motion spectra.

The Site Class is used in conjunction with mapped spectral accelerations S_S and S_1 to determine Site Amplification 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 probabilistic mapped acceleration parameters at periods of 0.2 seconds (S_S) and 1.0 seconds (S_1), which are then used to derive the remainder of the response spectra at all other periods. The mapped S_S and S_1 values represent motion at the top of seismic bedrock, defined as the Site Class B-C boundary. 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 using the IBC 2012 criteria.

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 (MCE_G). The mapped PGA value is adjusted for site class effects to arrive at a design peak ground acceleration value, designated as PGA_M.

Table 3: Spectral Design Values

	2012 IBC (2008 Seismic Hazard Maps)
S_{DS}	0.337 g
S_{D1}	0.162 g
PGA_M	0.267 g

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

Liquefaction

We considered potential for liquefaction of bearing soils using the empirical procedure described by T. L. Youd, I. M. Idriss, et al, "*Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshops on Evaluation of Liquefaction Resistance of Soils*," Journal of Geotechnical and Geoenvironmental Engineering, ASCE (2001), vol. 127. This approach characterizes the stress state of the soil by a cyclic stress ratio (CSR), the ratio of the average earthquake-induced shear stress to the effective confining pressure. Cyclic stress ratio plotted against Standard penetration resistance (SPT) N-values indicates in general terms potential for liquefaction to occur at given elevations, based on comparison of plotted values for this site to plotted values for locations where occurrence of liquefaction following earthquakes of known magnitude is documented in the literature.

Loose to very loose, saturated sandy soils similar to those encountered in the boring performed in the western tract off of Campus Drive (Boring B-1) appear vulnerable to liquefaction initiation using the above approach. Blow counts obtained in samples SS-4 and SS-6 imply cyclic resistance ratio values substantially lower than would be required to resist liquefaction under the design earthquake.

Similar analyses were carried out for borings B-2, B-3 and B-4 in the eastern tract. Cyclic resistance ratios determined for these borings appeared to provide acceptable factors of safety against liquefaction initiation for the design earthquake.

Seismic hazards associated with liquefaction occurrence include loss of bearing capacity, surface settlements due to volumetric compaction of the liquefied soils, lateral spreading or flow, or surface rupture. Depending on extent and thickness of the liquefiable layers, one or more of these hazards may apply to the western tract.

Computation of cyclic resistance ratio did not take into account corrections to SPT blow count that may be applicable due to thin layer effects within the deposit or due to the age of the deposit. While the practice in the South Carolina coastal plain has been to consider Quaternary-age sediments to be potentially liquefiable, historical earthquake data has suggested meaningful liquefaction occurrence to be limited in pre-Holocene-age soils. Age correction factors tabulated by the SCDOT as high as 1.6 for older Quaternary materials may include soils at this site.

We recommend that the design level exploration(s) for specific building sites include either one or a combination of Cone Penetrometer (CPT) soundings and/or SPT borings performed using mud rotary methods to further assess liquefaction risk. Due to the potential for the liquefiable zones to be highly layered, CPT soundings should be emphasized in any future work since these methods provide a better definition of thin layer occurrence.

Shear wave velocity measurements may also provide useful data for computation of an age correction factor which may be applied in future risk assessment. Our experience within the vicinity of this site also indicates that shear wave velocities may also provide the opportunity to demonstrate Site Class C within some portions of the parcel.

COMMENTS RELATED TO CONCEPTUAL PLANNING

The following comments are based, in part, upon data obtained from the test locations and our previous experience at the Accuride facility and the speculative office building off of Corporate Drive. While previous experience at Accuride and the speculative building was that the sites were generally favorable for development, we note that subsurface conditions across the remaining portions of 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. A design level 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 findings of our field exploration, we make the following comments related to conceptual planning:

Site Preparation: Surface preparation of the eastern tract will be similar to the level of effort typical for upland sites in South Carolina. Surface stripping should include removal of all unsuitable surface materials within building and pavement footprints. This would include surface vegetation, organic laden topsoil, stumps, root bulbs, and any unstable surface or subsurface soils. Areas that rut, pump, or move excessively under movement of the equipment should be stabilized prior to placement of fill soil, concrete, or base course stone. If left in place, soft or wet soils will exhibit substantially lower bearing for foundations and pavements.

Removal of stumps and roots will result in disturbance of the upper soils throughout much of this site. In fill areas, the upper 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.

Surface preparation of the western tract near Campus Drive will be complicated by the presence of shallow ground water over portions of the site. Our experience also indicates 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.

Surface rolling in areas of shallow water table will tend to draw the water up to the surface and cause local instability under the compaction equipment. There are also reports of local borrow excavation in the vicinity of the existing structure and backfilling of the excavations with unsuitable materials such as topsoil and stumps. These materials will have to be located, undercut and replaced with suitable fill as part of any development.

Improvement of the surface soils may involve extensive ditching and sumping of the site to draw down water levels sufficient to permit densification of the surface and excavation of utility lines. 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. Ditches should have at least 6 inches of relief per 100 feet of length to facilitate flow. 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.

Use of On Site Soils as Structural Fill: The generally sandy soils encountered at shallow depth in the eastern tract appear suitable for use as structural fill. This will permit most of the soils excavated from retention ponds to be reused as structural fill in building pads or parking area subgrades. Some of the more cohesive silty and clayey sands could become difficult to work with if allowed to become wet and will likely require moisture conditioning procedures during placement. These soils may not provide adequate support under footings or grade slabs if placed too wet of optimum.

The more cohesive alluvial soils underlying the western tract and along Campus Drive appear generally poorly suited for use as structural fill. Fat clays similar to those encountered in the upper 13 feet of boring B-1 are not recommended for use as structural fill within building footprints or within the upper 10 feet of pavement subgrades. These soils may be placed in non-structural areas or near the base of deep fill areas if approved by the geotechnical engineer. Structural fill used in the western tract will likely have to be imported from offsite.

Foundations: The soil profile in the eastern tract 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 300 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, allowable bearing pressures on the order of 3000 to 4000 pounds per square foot (psf) may be assumed for conceptual planning.

The soil profile in the western tract appears suitable for support of only very lightly loaded commercial or residential structures. Moderately loaded column or wall footings typical of high bay manufacturing areas, mezzanine areas, areas with larger than normal bay spacing, areas with substantial area loads or loaded vessels, may apply vertical stresses which exceed the preconsolidation stress of the underlying clays. Where this is the case footings will need to be evaluated for potential punching shear failure through the relatively stiff surface clays into the soft underlying layers. In addition, primary and secondary consolidation of the clays under the weight applied by the structures could cause unacceptable amounts of total or differential settlement. Finally, seismic liquefaction or loss of bearing strength would have substantial negative impact on foundation performance unless foundations were supported by deep foundations or unless ground improvement methods such as vibro-replacement stone columns were used to support the building frame.

A design-level geotechnical exploration will be required to explore specific building areas once a tenant of buyer for the site has prepared a specific plan of development. Bearing pressures used in design of specific foundations will need to be individually evaluated for the service loads of the proposed structure(s).

Grade Slab Support and Construction: Soils encountered in the upper strata of our borings in the eastern tract generally appear suitable for soil-supported grade slabs, assuming proper preparation, moisture control, and compaction. Typically a blanket of at least 4 inches of compacted granular soils is placed below slabs to provide a capillary break between the subgrade and the slab concrete. A vapor barrier such as "Visqueen," or the equivalent, is also advised for placement beneath the slab to limit moisture infiltration into the finished space.

CH fat clays similar to those encountered in the western tract facing Campus Drive are considered very unsuitable for support of floor slabs. Where these soils are encountered at or near the proposed slab subgrade, these soils will need to be either undercut and replaced with suitable fill or stabilized to improve their load bearing capacity. These areas should be evaluated on a case by case basis by the geotechnical engineer. Recommendations for stabilization may include removal and replacement of fat clays, use of geo-grid material and/or separation fabric, or placement of under-drainage.

Pavement Support and Construction: Soils encountered in the eastern tract are generally suitable for pavement support assuming proper preparation, moisture control, and compaction. 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. 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. 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.

The western tract will require substantially greater effort to prepare the pavement subgrade. Stabilization or removal of fat clays similar to those encountered in Boring B-1 may be required where these soils will provide immediate support for pavements. Low bearing ratio values typically obtained in these soils will result in substantially greater pavement thickness for loading docks or heavy load pavement regions.

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 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 intended for use in conceptual planning and pricing of future industrial use of the site. This report is not intended to support design of any structure or development of plans or specification documents of any type. A design-level geotechnical exploration addressing the specific configuration and loading of any structure(s) must be performed before recommendations for design of industrial-use foundations can be provided.

CLOSURE

We appreciate the opportunity to continue to be of service on this project. If you have any questions concerning this reconnaissance level report, please call (803) 561-9024.

Sincerely,
S&ME, Inc.

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

SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER JOHN C. LESSLEY No. 14133 4/4/14

Stephen M. Jones, E.I.T.
Staff Geotechnical Professional

John C. Lessley, P.E.
Vice President/Technical Principal

APPENDIX

Site Vicinity Plan – Figure 1

Boring Location Plan – Figure 2

USDA Soils Map – Figure 3

Legend to Soil Classification and Symbols

S&ME SPT Boring Logs B-1 through B-4

Summary of Exploration Procedures

SCALE:	AS SHOWN	S&ME	**SITE VICINITY PLAN** STEEPLECHASE INDUSTRIAL PARK KERSHAW COUNTY, SOUTH CAROLINA	FIGURE NO. 1
DRAWN BY:	SMJ			
CHECKED BY:	JCL			
DATE:	MARCH 14, 2014		JOB NO: **1461-14-015**	

SCALE:	AS SHOWN	S&ME	**BORING LOCATION PLAN** STEEPLECHASE INDUSTRIAL PARK KERSHAW COUNTY, SOUTH CAROLINA	FIGURE NO. 2
DRAWN BY:	SMJ			
CHECKED BY:	JCL			
DATE:	MARCH 19, 2014		JOB NO: **1461-14-015**	

SCALE:	NTS	S&ME	**USDA SOIL SURVEY** STEEPLECHASE INDUSTRIAL PARK KERSHAW COUNTY, SOUTH CAROLINA	FIGURE NO.
DRAWN BY:	SMJ			3
CHECKED BY:	JCL			
DATE:	MARCH 28, 2014		JOB NO: **1461-14-015**	

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%.

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ENGINEERING • TESTING ENVIRONMENTAL SERVICES

PROJECT: Steeplechase Industrial Park, Kershaw County, South Carolina, S&ME Project No. 1461-14-015	BORING LOG B-1

DATE DRILLED: **3/24/14**	ELEVATION: **149.0 ft**	NOTES: **Borings were conducted at approximate locations shown on Figure 2. No survey of boring locations or elevations was performed by S&ME, Inc.**
DRILL RIG: **CME 550**	BORING DEPTH: **25.0 ft**	
DRILLER: **H. Wessinger**	WATER LEVEL: **24hr @ 1.4 ft,ATD @ 4 ft**	
HAMMER TYPE: **Auto**	LOGGED BY: **B. Jones**	
SAMPLING METHOD: **Split spoon**	NORTHING: **868270**	EASTING: **2125465**
DRILLING METHOD: **3¼" H.S.A.**		

DEPTH (feet)	MATERIAL DESCRIPTION	ELEVATION (feet-MSL)	SAMPLE NO.	1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
0	Approximately 3 inches of topsoil.						
	FAT CLAY WITH SAND (CH) - medium to high plasticity fines, little fine sands, gray with trace red, moist, firm.		SS-1	3	4	4	8
	- - - @ 3.5 feet - increase fine to medium sands, stiff.		SS-2	5	6	8	14
5		144.0					
	SANDY FAT CLAY (CH) - medium to high plasticity fines, some fine to medium sands, light gray, moist, very stiff.		SS-3	7	9	9	18
	CLAYEY SAND (SC) - fine to medium sands, some low plasticity fines, 2" nodule of fat clay, gray, moist, very loose, wet spoon.		SS-4	1	0	1	1
10		139.0					
	FAT CLAY (CH) - medium to high plasticity fines, few fine sands, slightly micaceous, gray, wet, very soft.		SS-5	1	1	1	2
15		134.0					
	SILTY SAND (SM) - fine to medium sands, some low plasticity fines, slightly micaceous, light blueish gray, moist to wet, loose.		SS-6	2	3	3	6
20		129.0					
	POORLY GRADED SAND WITH SILT (SP-SM) - fine to coarse sands, some fine gravels, few nonplastic fines, light blueish gray, wet, medium dense.		SS-7	5	6	6	12
25	Boring terminated at 25 ft	124.0					

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS: 10 20 30 60 80

NOTES:

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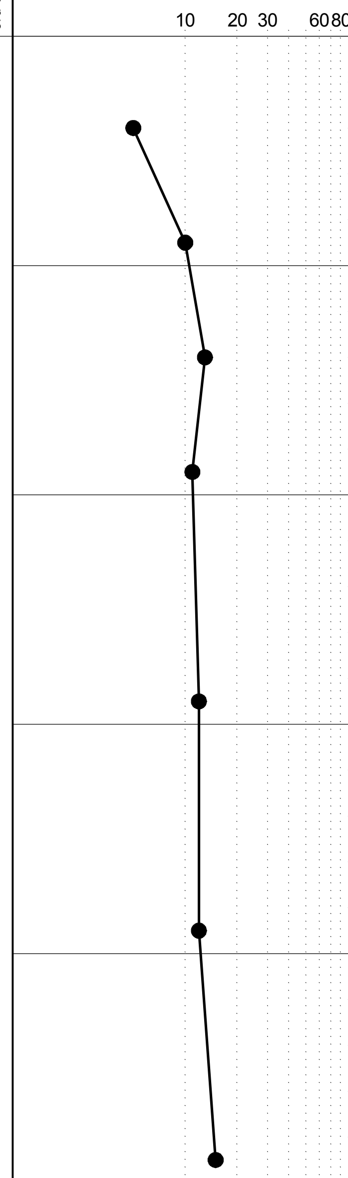
2. *BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.*
3. *STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.*
4. *WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.*

PROJECT:	Steeplechase Industrial Park Kershaw County, South Carolina S&ME Project No. 1461-14-015	BORING LOG	B-2

DATE DRILLED: **3/24/14**	ELEVATION: **165.0 ft**	NOTES: **Borings were conducted at approximate locations shown on Figure 2. No survey of boring locations or elevations was performed by S&ME, Inc.**
DRILL RIG: **CME 550**	BORING DEPTH: **25.0 ft**	
DRILLER: **H. Wessinger**	WATER LEVEL: **24hr @ 14 ft,ATD @ 14 ft**	
HAMMER TYPE: **Auto**	LOGGED BY: **B. Jones**	
SAMPLING METHOD: **Split spoon**		NORTHING: **869968** EASTING: **2126932**
DRILLING METHOD: **3¼" 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	Approximately 8 inches of topsoil.		165.0					
	CLAYEY SAND (SC) - fine to medium sands, some low plasticity fines, brown, moist, loose.			SS-1	2	2	3	5
	- - - @3.5 feet - some low to medium plasticity fines, trace quartz gravels, brown, orange, gray, moist.			SS-2	3	5	5	10
5			160.0					
	- - - @6 feet - increase fine quartz gravels, red, light brown, trace gray, moist, medium dense.			SS-3	4	6	7	13
	SILTY SAND (SM) - fine to coarse sands, some low plasticity fines, slightly micaceous, light tan, yellow, gray, moist, medium dense.			SS-4	3	5	6	11
10			155.0					
	POORLY GRADED SAND WITH SILT (SP-SM) - fine to medium sands, few low plasticity fines, slightly micaceous, light brown, trace orange, moist to wet, medium dense.	▼		SS-5	4	6	6	12
15			150.0					
	SILTY SAND (SM) - fine to coarse sands, trace nonplastic fines, light tan, trace light orange, saturated, medium dense, wet spoon.			SS-6	2	4	8	12
20			145.0					
	- - - @23.5 feet - light brown, trace light purple.			SS-7	4	6	9	15
25	Boring terminated at 25 ft		140.0					

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS



S&ME BORING LOG 14-015 BORING LOGS.GPJ S&ME.GDT 4/4/14

NOTES:

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

S&ME

PROJECT:	Steeplechase Industrial Park Kershaw County, South Carolina S&ME Project No. 1461-14-015	BORING LOG	B-3

DATE DRILLED: **3/24/14**	ELEVATION: **157.0 ft**	NOTES: **Borings were conducted at approximate locations shown on Figure 2. No survey of boring locations or elevations was performed by S&ME, Inc.**
DRILL RIG: **CME 550**	BORING DEPTH: **25.0 ft**	
DRILLER: **H. Wessinger**	WATER LEVEL: **24hr @ 5.3 ft,ATD @ 8 ft**	
HAMMER TYPE: **Auto**	LOGGED BY: **B. Jones**	
SAMPLING METHOD: **Split spoon**		NORTHING: **867926** / EASTING: **2127497**
DRILLING METHOD: **3¼" H.S.A.**		

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA: 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
	Approximately 12 inches of previously cultivated topsoil.								
	CLAYEY SAND (SC) - fine to medium sands, some low plasticity fines, brown, moist, loose.			SS-1		3	4	4	8
5	- - - @3.5 feet - some low to medium plasticity fines, brown, orange, trace red and gray, medium dense.	▼	152.0	SS-2		4	5	7	12
	- - - @6 feet - increase medium to high plasticity fines, gray, brown.	▽		SS-3		6	8	8	16
10	- - - @8.5 feet - few fine quartz gravels, gray, red, brown, moist to wet, loose, wet spoon.		147.0	SS-4		4	5	4	9
15	**POORLY GRADED SAND WITH SILT (SP-SM)** - fine to coarse sands, few low plasticity fines, 2" gray and trace red nodule of medium to high plasticity fat clay, brown, orange, moist to wet, medium dense.		142.0	SS-5		9	12	15	27
20	- - - @18.5 feet - absent fat clay nodule.		137.0	SS-6		8	16	20	36
25	**POORLY GRADED SAND (SP)** - fine to medium sands, trace nonplastic fines, tan, light purple, wet, medium dense.		132.0	SS-7		3	5	7	12
	Boring terminated at 25 ft								

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS: 10 20 30 60 80

NOTES:

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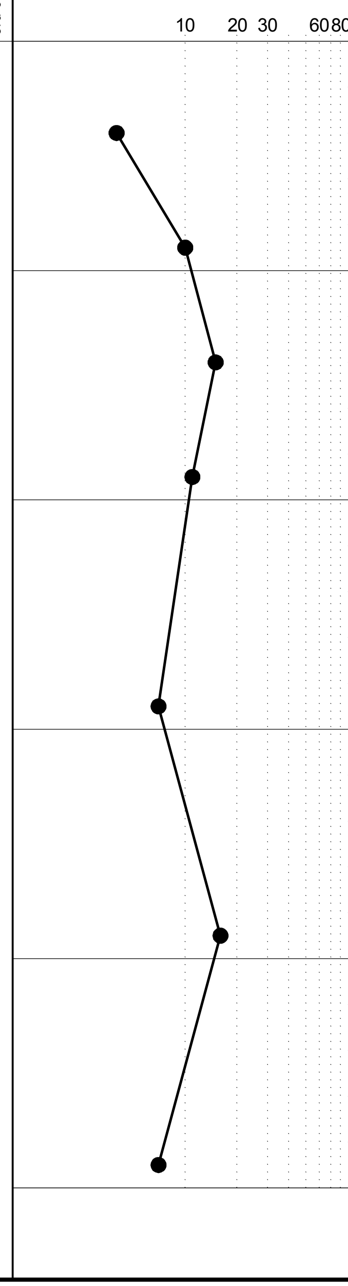
4. *WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.*

PROJECT: **Steeplechase Industrial Park** **Kershaw County, South Carolina** **S&ME Project No. 1461-14-015**	**BORING LOG B-4**

DATE DRILLED: **3/24/14**	ELEVATION: **183.0 ft**	NOTES: **Borings were conducted at approximate locations shown on Figure 2. No survey of boring locations or elevations was performed by S&ME, Inc.**
DRILL RIG: **CME 550**	BORING DEPTH: **25.0 ft**	
DRILLER: **H. Wessinger**	WATER LEVEL: **Dry Cave @ 21 ft**	
HAMMER TYPE: **Auto**	LOGGED BY: **B. Jones**	
SAMPLING METHOD: **Split spoon**		NORTHING: **868246** / EASTING: **2129410**
DRILLING METHOD: **3¼" 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	Approximately 12 inches of previously cultivated topsoil.							
1	**CLAYEY SAND (SC)** - fine to medium sands, little low plasticity fines, brown, moist, very loose.			SS-1	1	2	2	4
3.5	- - - @3.5 feet - some low to medium plasticity fines, red, loose.			SS-2	3	4	6	10
5			178.0					
6	- - - @6 feet - medium dense.			SS-3	5	7	8	15
8.5	- - - @8.5 feet - some low plasticity fines, trace fine gravels, red, orange.			SS-4	4	6	5	11
10			173.0					
12	**POORLY GRADED SAND WITH SILT (SP-SM)** - fine to medium sands, few low plasticity fines, trace coarse sands, trace fine gravels, brown, orange, moist, loose.			SS-5	4	3	4	7
15			168.0					
17	**CLAYEY SAND WITH GRAVEL (SC)** - fine subrounded gravels, some fine to medium sands, little low plasticity fines, brown, orange, moist, medium dense.			SS-6	3	7	9	16
20			163.0					
21		HC						
22	**POORLY GRADED SAND WITH SILT (SP-SM)** - fine to coarse sands, some fine gravels, few low plasticity fines, light brown, yellow, wet to saturated, loose. - - - @23.5 feet - wet spoon.			SS-7	3	3	4	7
25	Boring terminated at 25 ft		158.0					

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS



S&ME BORING LOG 14-015 BORING LOGS.GPJ S&ME.GDT 4/4/14

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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.

Reconnaissance of the Project Area

Where practical, we reviewed available topographic maps, county soil surveys, reports of nearby investigations and aerial photographs when preparing the boring and sampling plan. Then we walked over the site to note land use, topography, ground cover, and surface drainage. We observed general access to proposed sampling points and noted any existing structures.

Right of Entry and Permits - Right-of-entry to perform borings and other fieldwork on the property was granted with acceptance of our proposal.

Checks for Hazardous Conditions - State law requires that we notify the Palmetto Utility Protection Service (PUPS) before we drill or excavate at the site. PUPS is operated by the major water, sewer, electrical, telephone, CATV, and natural gas suppliers of South Carolina. PUPS forwarded our location request to the participating utilities. Location crews then marked buried lines with colored flags within 72 hours. They did not mark utility lines beyond junction boxes or meters. We checked proposed sampling points for conflicts with marked utilities, overhead power lines, tree limbs, or man-made structures during the site walkover. Where the site lies beyond junction boxes or meters, these areas will not be checked by the utility location crews dispatched in response to our utility locate request. In these cases we check proposed sampling points for conflicts during the site walkover with a representative of the facility.

Preparation of Exploration Plan

The exploration plan or drilling assignment sheet consisted of a set of written directions to the drillers or to other field exploration staff. The plan tabulated the minimum depth of borings, method of drilling and stabilizing the boring, sampling methods and depths, procedures for backfilling, and procedures to be followed if certain subsurface conditions were encountered. The location, number and depth of the borings, the method of drilling, and the method and depths of sampling were discussed prior to commencement of the exploration and were outlined in our initial proposal. This scope of work formed the basis of the initial exploration plan.

Layout and Access to Boring Locations

Layout Plan - S&ME was provided with an unscaled sketch of the site indicating the locations of proposed structures prior to commencement of field work.

Staking of Borings - S&ME laid out the borings in accessible areas planned to be representative of the site. No clearing or grading to access boring locations was proposed or performed. Boring locations were marked in the field with small colored flags with the boring numbers inscribed. Boring locations indicated on the attached "Boring Location Plan" must be considered as approximate.

Boring Elevations - Top-of-ground elevations at boring locations were estimated from Google Earth and checked against the local USGS topographic quadrangle map which includes the site area. Interpolations between adjacent topographic contours were made using the care and judgment ordinarily exercised in similar work. Boring elevations must be considered accurate only to the degree that the topographic elevations portrayed on Google Earth accurately reflect site topography.

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.

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.

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.

Evaluation of Subsurface Conditions

The Soil Test Boring Records enclosed with this report represent our interpretation of the contents of the field records based on the results of engineering examination and tests of field samples. Soil test boring records depict conditions at the specific boring locations at the particular time when drilled. The nature and extent of variations between the borings will not become evident until construction.