REPORT OF RECONNAISSANCE LEVEL GEOTECHNICAL EXPLORATION

Highway 38/917 Tract
Dillon County, South Carolina
S&ME Project No. 1611-10-269

Prepared By:

S&ME, Inc.
134 Suber Road
Columbia, South Carolina 29210

August 4, 2010

S&ME

August 4, 2010

[redacted]

[redacted]

Reference: **REPORT OF RECONNAISSANCE LEVEL GEOTECHNICAL EXPLORATION**
Highway 38/917 Tract
Dillon County, South Carolina
S&ME Project No. 1611-10-269

As requested, S&ME, Inc. has conducted a reconnaissance level geotechnical exploration at the above referenced site. This work was performed in general accordance with S&ME Proposal No. 1614-7283-10 dated January 19, 2010, and under the Master Service Agreement (MSA) contract with Alliance Consulting Engineers.

The purpose of this exploration was to characterize the general surface and subsurface conditions of the site, to provide the recommended seismic site classification according to IBC 2006, as well as preliminary recommendations regarding site preparation, suitability of on-site soils for use in construction and potential foundation types. This investigation was performed to aid in evaluation of the site's suitability for industrial development. The recommendations contained herein are not valid for design without the confirmation of an additional design level subsurface investigation after the locations of the proposed structures are determined.

S&ME appreciates this opportunity to work with Alliance Consulting Engineers, Inc. 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.

MICHAEL D. HARRIS, JR.
No 25487
08/04/10

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PROJECT INFORMATION

Information about the project was obtained through email correspondence between Tristan Pressley with Alliance Consulting Engineers and Marty Baltzegar with S&ME on January 6, 2010. A topographic map, site location map, and aerial map were also provided on the same date.

We understand the site consists of approximately 33 acres located west of the town of Latta in Dillon County, SC. It is situated east of the Interstate-95/South Carolina Highway 38 interchange at exit 181 to the immediate east of the intersection of SC Highway 38 and SC Highway 917. Based on the provided 2006 aerial photograph, the site consists of open fields.

Potential proposed construction would likely consist of light to medium industrial facilities with associated parking and drive areas. Maximum column loads are expected to be less than 250 kips with wall loads of 3 to 4 kips per linear ft. Finished floor elevations are yet to be determined and will likely vary by building.

EXPLORATION PROCEDURES

Prior to the subsurface exploration, subsurface data from adjacent properties, aerial photos of the subject property, and available topographic maps were reviewed to develop the proposed testing plan. On July 20, 2010, 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 four soil test borings by rough measurement from site features.

Using a truck-mounted rig, three soil test borings were conducted to a depth of 25 feet each and one boring was conducted to a depth of 50 feet for a total drilling footage of 125 feet at the site. Groundwater was measured at the time of borings and at least 24 hours following completion of drilling.

Subsurface Exploration

Soil test borings were performed at the site on July 21, 2010, using a truck-mounted drill rig. Right-of-entry to perform borings and other fieldwork on the property was granted with acceptance of our proposal. The boring locations shown on Figure 2 should only be considered approximate. No survey of the boring locations or elevations was conducted by S&ME. The methods used to perform the soil test borings are described below.

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"*. 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. The soil test boring data is attached in the Appendix.

SITE CONDITIONS

Surface Conditions

The majority of the site is primarily open field and appears to have been used for agricultural purposes. Hay bales were noted along the northeastern edge of the site. Dirt roads border the site to the northeast and southeast. The site is also bordered by SC Highway 917 to the north and SC Highway 38 to the southwest. The site is relatively flat to gently sloping downward generally from northwest to southeast with approximately 5 feet or less of elevation change across the site, according to the provided topographical map. No standing water, rock outcroppings, or existing structures were observed on the site during our site visit.

Subsurface Conditions

Local Physiographic Conditions and Geology

The site lies within the Atlantic Flatwoods Region of the Lower Coastal Plain of South Carolina. The Atlantic Flatwoods comprises most of the Lower Coastal Plain, lying between the Citronelle and Surry escarpments, and ranging from 15 to 100 miles inland from the sea. The topography of this region is dominated by up to six archaic beach terraces. Local geologic maps indicate the site to be on the Pliocene-age Sunderland Terrace. The Sunderland terrace in this area forms a thin veneer over older (upper Miocene), underlying Coastal Plain residual soils, locally termed the Duplin Marl. Materials comprising the terraces typically consist of a strand or beach ridge deposit of clean sands at the seaward margin. Between the strand and the toe of the next inland terrace are mainly finely interlayered clays and sands termed backbarrier deposits. Old swamp deposits, stumps and buried trees have in some areas been covered by the backbarrier deposits and are usually not evident at the surface. Though most areas are suitable for development, in some areas soils are highly compressible under light to moderate structural loads, are susceptible to liquefaction, or exhibit moderate to high plasticity.

Carolina bays are natural shallow depressions that are largely fed by rain and shallow groundwater. Bays in South Carolina are found on relict marine barrier beaches associated with Pleistocene sea level fluctuations, in dune fields, on stream terraces and sandy portions of backbarrier flats. No bays occur on modern river flood plains or beaches. Carolina Bays are elliptical and vary in size from approximately 200 feet to 7 miles. The bays display a marked alignment with northwest-southeast being the preferred orientation. Many bays have elevated sandy rims ranging up to 23 feet in height. Carolina bays occur only in unconsolidated sediments and are filled or partly filled with both organic and inorganic materials. Some bays contain lakes, some are boggy, others are either naturally or artificially drained and are farmed, and still others are naturally dry. Apparent old bays appear on a site as shallow depressions generally less than half of an acre in size. Any bays present in the site area have likely been heavily reworked by agricultural plowing and timber harvesting.

USDA Soil Survey Information

From a qualitative standpoint, the USDA Soil Conservation Service's (SCS) Soil Surveys can often provide helpful information. The SCS surveys map the near surface soils (i.e., depths ≤ 6 ft) and provide general descriptions. Soil map units are also described in terms of some relevant engineering properties or in terms of relative suitability for use in land development. The data is not intended to replace geotechnical evaluations and testing but it can help identify trends. USDA Soils Conservation Service soils mapping for Dillon County identifies three soil series in the project area with the majority of the site being located within the Pocalla sand series. Descriptions of the soil series mapped within the proposed site are summarized in Table 1:

Table 1 – USDA Soil Survey Soil Series

Soil Series	Soil Type	Depth to Seasonal High GW Table	Permeability (in/hr)	Remarks
Pocalla sand (PoA)	SP-SM, SM, SM-SC, SC	>6 ft.	0.6 – 6.0	Nearly level, somewhat excessively drained soils formed on broad ridges of uplands of the Coastal Plain.
Brogdon sand (BrA)	SM, SP-SM, SC, CL-ML, CL	>6 ft.	0.6 – 6.0	Gently sloping well drained soils formed in narrow ridges of uplands of the Coastal Plain.
Pantego loam (Pa)	SM, SM-SC, CL, CL-ML, SC, MH	0 - 1 ft. (Apparent, Nov. – Apr.)	0.6 – 6.0	Nearly level, very poorly drained soils formed in slightly depressional areas and at the heads of streams in the uplands of the Coastal Plain.

The seasonal high groundwater table as indicated by the Soil Survey appears to be slightly lower than the groundwater measurements made during our subsurface exploration. Groundwater elevations similar to those indicated for the site are also common within the Costal Plain region.

Interpreted Subsurface Profile

The generalized subsurface conditions at the site are described below. Subsurface conditions between the borings will likely vary. The nature and extent of variations between the sampling points will not become evident until construction or during further subsurface exploration, and stratification lines shown are not warranted. For detailed descriptions and stratification at a particular boring location, the respective boring record should be reviewed. Soil test boring logs are attached in the Appendix.

Organic plow zone material is present across much of site since the primary use of the property, at our boring locations, has been for farming. Plow zone depths encountered across the site were generally 12 inches, though they may be greater in areas not explored by our borings. Commonly in this area, Carolina Bays are drained and plowed as part of agricultural activities, obscuring their presence. The potential exists for organic-laden material to be several feet thick in drained Carolina Bays.

Bear Bluff Formation (upper Pliocene)

The upper portion of the soil profile mostly consists of clayey sands and sandy lean clays with some clean sands. These soils are common to the lower Coastal Plain province of South Carolina and extend to depths of approximately 17 feet in borings B-1 and B-2 and to termination of the boring at approximately 25 feet in borings B-3 and B-4. The sands and clayey sands were generally brown, tan, orange, red, or a combination of these colors, and were moist to wet. Standard Penetration Test (SPT) N-values ranged from 3 to 24 blows per foot (bpf), indicated a very loose to medium dense relative density. The sandy clays were generally brown, orange, red, gray, or a combination of these colors, were moist, and exhibited low to moderate plasticity when remolded by hand. SPT N-values ranged from 3 to 29 bpf, indicated a soft to very stiff consistency.

Donohoo Creek Formation (upper Cretaceous)

Below the clayey sands and sandy clays at a depth of about 17 feet in borings B-1 and B-2, elastic silts with varying thickness of silty sand seams and pockets, were encountered. These soils extended to termination of the borings at depths ranging from 25 to 50 feet. Recovered samples were generally dark gray, were moist to wet, and exhibited moderate plasticity when remolded by hand. Standard Penetration Test (SPT) N-values ranged from 20 to 47 bpf, indicating a very stiff to hard consistency. The silty sands seams generally ranged in thickness from less than a quarter of an inch to 4 feet thick. Silty sands were generally light gray and consisted of very fine sand.

Groundwater

Groundwater measurements were taken at time of boring and after and elapsed time of 24 hours after drilling. Time of boring water levels ranged from 3 to 3.7 feet below existing ground elevations. Groundwater measurements recorded at least 24 hours after drilling ranged from 4.8 to 5.8 feet in borings B-2 and B-3. Borings B-1 and B-4 caved a depths ranging from 3.5 to 4.2 feet below the ground surface. Hole caving generally occurs in sandy soils within a few feet of the water table.

Medium dense clayey sands and firm to stiff fine-grained soils were encountered within the upper 10 feet of our borings. These soils will likely limit rain water infiltration and perched groundwater is likely during periods of normal or above normal rainfall. If perched water is encountered, it can likely be controlled by ditching or by construction of sumps and pumping. We note that groundwater levels are influenced by precipitation, long term climatic variations, and nearby construction. Groundwater measurements made at different times than our exploration may indicate groundwater 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 seismic-resistant design provisions of the 2006 International Building Code (IBC). Other effects, including soil liquefaction, are not addressed in building codes but must also be considered.

IBC Site Class

This site has been classified according to one of the Site Classes defined in IBC Section 1613.5 (Table 1613.5.2) using the procedures described in Section 1613.5.5.1. 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 1613.5.3, tables 1613.5.3(1) and 1613.5.3(2).

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 soundings. Three other conditions, 2) peats and highly organic clays; 3) very high plasticity clays; and 4) very thick soft/medium stiff clays were also not evident in the borings at thicknesses that would indicate potential for collapse.

We then compared site conditions to the three conditions described for Site Class E. These are soft soils vulnerable to large strains under seismic motion. Borings did not include at least 10 feet having 1) plasticity index greater than 20, 2) moisture content greater than 40 percent, and 3) undrained shear strength less than 500 psf.

The site was then categorized using the method described in section 1613.5.5.1, paragraph 3.2 (SPT N method). Boring data available at this site only extends to 50 feet. We estimated properties of the soils between termination of the borings and a depth of 100 feet based on our knowledge of the general geologic profile of this area. Based on this approach, the Seismic Site Class according to the 2006 IBC is **Site Class D**. The site class should be established for each individual site development within the tract 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 2006 International Building Code Section 1613.5. 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 2006 International Building Code seismic provisions of Section 1613 use the 2002 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 Coefficients F_A and F_V in IBC Section 1613.5.3, tables 1613.5.3(1) and 1613.5.3(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 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 1613.5.3, tables 1613.5.3(1) and 1613.5.3(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 1613.5.4. 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. Peak ground acceleration (PGA) was obtained by dividing the S_{DS} value by 2.5.

Table 2 – Design Spectral Values

Value	2002 Seismic Hazard Maps
S_{DS}	0.53 g
S_{D1}	0.24 g
PGA	0.21 g

For a structure having an Occupancy Category classification of I, II, or III, the S_{DS} and S_{D1} values obtained from the 2006 IBC (2002 Seismic Hazard Maps) are consistent with Seismic Design Category D as defined in section 1613.5.6.

Liquefaction

Loose sandy soils encountered at a depth of about 12 to 17 feet in boring B-1 and 17 to 22 feet in boring B-4 appear to meet the general criteria for liquefaction, e.g. contain little fines, lie below the water table, and exhibit a loose relative density based on SPT N-values. However, empirical computations of liquefaction resistance based on SPT data do not account for the geologic age or origin of the deposit. In this case, use of the empirical charts would lead to very conservative results in terms of liquefaction susceptibility.

The effect of geologic age on the liquefaction susceptibility of a geologic formation was addressed in 1978 by Youd and Perkins[1]. Liquefaction potential decreases with increasing age of a soil deposit. Many processes occur with aging, such as cementation, weathering, increased exposure to low level shaking, cold-bonding and consolidation. All of these processes tend to increase the liquefaction resistance of soils, but their effect can usually not be captured by penetration tests due to disturbance of the soil matrix during sampling.

In this case, the site is underlain by materials substantially older than considered susceptible to liquefaction by researchers. Nearly all known liquefaction features considered in the literature occur in Holocene-age strata (less than 11,000 years). Paleo-liquefaction features, or evidence of past liquefaction occurrence, have been discovered in the upper Pleistocene-age (Q3 or younger) deposits of the lower coastal plain in South Carolina in connection with the 1886 Charleston earthquake, but not in any older terrace deposits within the study area around Charleston. Regional geologic mapping in the area indicate the surface deposits to consist of early Pliocene-age sediments laid down between 1.8 million and 2.4 million years ago. Soils of this age are considered very unlikely to experience liquefaction.

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[1] Youd, T. L., and Perkins, D. M. (1978), “ Mapping Liquefaction-Induced Ground Failure Potential”, Journal of Geotechnical Engineering, ASCE, Vol. 104, No. GT4, pp. 433-446.

S&ME's opinion is that while liquefaction is computationally possible based on penetration or blow count based empirical methods, these methods are not necessarily applicable to this site. It is our opinion that liquefaction does not represent a creditable geologic hazard for the design earthquake required by the 2006 IBC.

CONCLUSIONS AND RECOMMENDATIONS

The conclusions and recommendations included in this section are based on the data obtained during our exploration. The following recommendations are given only to present a general idea of the soil conditions that may be anticipated at the site. More in-depth subsurface investigations should be performed in future building pads and parking areas. We recommend that S&ME be retained to perform these additional subsurface explorations.

Site Preparation and Earthwork

Stripping depths as indicated by our borings will likely be about 12 inches over the majority of the site. In drainage features and old Carolina Bays (if encountered), stripping depths may be considerably greater. Stripping depths may also be greater in fields where organic plow zone material extends to greater depths. We recommend conducting organic content tests within the building and pavement footprints. Organically stained soils with organic contents of 3 percent or less may be left in place but may need stabilization (compaction).

Detention/retention ponds may be constructed to provide borrow material for site construction. Borrow soils excavated below a depth of about 3 to 5 feet will likely be wet to saturated and drying will likely be required prior to compaction of the material. Establishing drainage such as ditching, sumps, or other measures may help limit groundwater infiltration into the excavation area.

The clayey sands and poorly-graded sands with clay or silt encountered in our soil test borings appear suitable for re-use as structural fill. However, sands containing high fines content may be difficult to work if allowed to become wet and could require extensive drying. Sandy lean clays similar to those encountered in our borings have been used successfully at other nearby locations, but will be very difficult to work due to their tendency to retain moisture. If proper moisture control is not used, these soils will provide reduced bearing support below footings, floor slabs, or pavement areas.

Foundations

The soil profiles encountered appear generally suitable for development for industrial use considering static loading. The use of shallow foundations for support of column loads up to 250 kips appears feasible for typical light to medium industrial structural column configurations, provided footings are properly constructed and settlements of about 1 to 1-½ inches can be tolerated. Area loads imposed by stacked materials or large vessels or tanks can likely be supported by mat or strip footings, provided that several inches of settlement can be withstood by the structure.

Column loads greater than 250 kips will likely need to be supported on deep foundations. This would include column and area loads typical of heavy industry. Once building locations are established, borings should be conducted within each building footprint prior to design of foundations.

Control of Groundwater and Surface Runoff

Groundwater water was encountered in our borings at depths ranging from about 3 to 3.7 feet at the time of boring and from about 4.8 to 5.8 at least 24 hours after drilling. The medium dense clayey sands and firm to stiff fine grained soils encountered within the upper 10 feet of the soil profile of our borings will likely limit rain water infiltration and perched water is likely during periods of normal or above normal rainfall.

During normal rainfall periods, ditching or other provisions for drainage should be provided prior to stripping and grading, especially in low areas of the site. If subsurface water or infiltrating surface water is not properly controlled during construction, the subgrade soils that will support foundations, as well as pavements or floor slabs, may be damaged. Furthermore, construction equipment mobility may be impaired. If perched water or groundwater is encountered during grading, ditching will be necessary to provide a stable bearing surface for foundations or pavements. In areas were machine pits may be constructed, ditching, well points or excavation of sumps and pumping may be necessary to sufficiently lower groundwater levels for construction of foundations.

Capacity of sediment or detention ponds may also be limited in areas where shallow groundwater is encountered. In areas of proposed construction where shallow groundwater is encountered, it may be desirable to raise site grades to help reduce the impact of groundwater on construction.

Grade Slab Support and Construction

It is likely that grade slabs will be supported by virgin on-site soils or on-site borrow soils.

1 The clayey sands and sandy clays similar to those penetrated by our borings will generally provide adequate support to soil-supported slabs-on-grade, assuming proper preparation, moisture control, and compaction of the subgrade for static load conditions.

2 A capillary break of at least 4 inches of clean sand or crushed stone placed below floor slabs is recommended.

3 We recommend you place a vapor barrier such as "Visqueen," or the equivalent, to limit moisture infiltration into finished space, or other areas where moisture infiltration

will potentially cause problems. The vapor barrier should be placed below the capillary break material.

Pavement Subgrade and Base Material Preparation

The clayey sands encountered in the soil test borings will provide adequate bearing for pavements after being improved by drainage, rolling and compaction. However, the clayey sands may be difficult to work if allowed to become wet and will not provide good bearing if proper moisture control is not used. The sandy lean clays encountered by our borings are less desirable for support of pavement sections, but can be successfully used with proper construction practices.

Drainage of subgrade material plays an important role in the performance of pavement sections. Site preparation should allow for drainage that results in groundwater elevations being maintained at least 2 feet below the top of the pavement section. Ditching or other provisions for drainage should be provided prior to stripping and grading. Groundwater and surface runoff must be controlled during construction in order to provide a stable subgrade for pavements. If groundwater or infiltrating surface water is not properly controlled during construction, the subgrade soils that will support pavements may be damaged. In areas where visible standing water is noted, additional measures to control drainage after the pavements are installed should be put in place. This may involve using french drains or similar underdrain systems or elevating the pavement surface to force runoff away from the pavement subgrade.

At least one laboratory Standard Proctor test and California Bearing Ratio (CBR) test should be performed upon representative soil samples of each soil type that is proposed for use as subgrade material. This is to establish the relationship between relative compaction and CBR for the soil in question and provide a CBR value for use in pavement section design.

Recommendations for Additional Exploration

The current number of borings provides some indication of the range of conditions that may be encountered at the site. However, the spacing and number of borings does not provide a reliable basis for design of building foundations. Once building, possible railway, parking and access drive locations are decided, we recommend additional soil test borings or cone penetration test soundings be performed in the proposed footprints.

QUALIFICATIONS OF REPORT

This 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 were based on the applicable standards of our profession at the time this report was prepared. No other warranty, express or implied, is made.

Due to the distance between each boring, subsurface conditions can be expected to vary from the conditions described herein. This report was intended to give general information about overall site conditions only. Additional geotechnical explorations should be conducted for each proposed structure, railway, pavement area or roadway.

Under Section 1705 of the International Building Code, a formal Quality Assurance Plan is required for most structures described as Seismic Design Category D as defined in Section 1613. While some of the Special Inspection required under sections 1706-1713 involve soils or foundations, preparation of the Quality Assurance Plan was beyond the scope of this preliminary report.

SOURCE: Google Maps 2010

SCALE:	NTS
CHECKED BY:	JTP
DRAWN BY:	TH
DATE:	08/03/10

S&ME

SITE LOCATION MAP
HIGHWAY 38/917 TRACT
DILLON COUNTY, SOUTH CAROLINA

JOB NO. **1611-10-269**

FIGURE NO:
1

Source: Alliance Consulting Engineers' aerial site plan dated January 6, 2010 and SCDNR 2006.

SCALE:	NTS
CHECKED BY:	JTP
DRAWN BY:	TH
DATE:	08/03/10

S&ME

BORING LOCATION PLAN
HIGHWAY 38/917 TRACT
DILLON COUNTY, SOUTH CAROLINA

JOB NO. 1611-10-269

FIGURE NO: 2

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
⁘	Partially Weathered Rock (PWR)
▨	Sandy Clay
▩	Rock
▥	Incompetent Rock
▱	Boulder

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%.

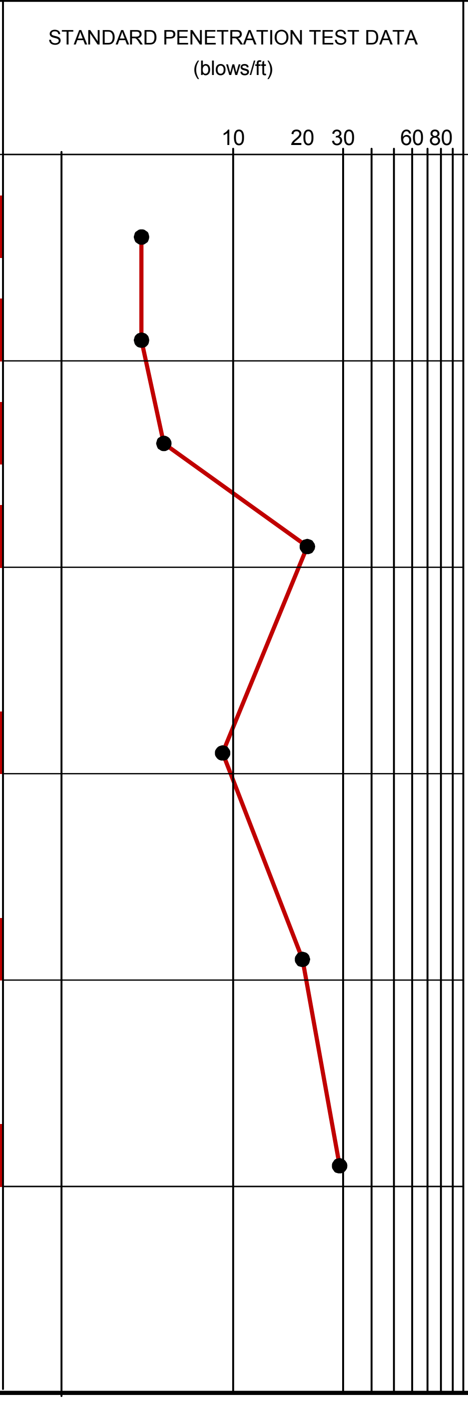
S&ME
ENGINEERING • TESTING
ENVIRONMENTAL SERVICES

PROJECT: **Highway 38/917 Tract**
Dillon County, South Carolina
S&ME Project No. 1611-10-269

BORING LOG B-1

DATE DRILLED: **7/21/2010**
ELEVATION:
DRILLING METHOD: **2¼" H.S.A.**
BORING DEPTH: **25**
LOGGED BY: **TH**
WATER LEVEL: **3.7 ft. @ TOB. Cave @ 24 hrs.**
DRILLER: **Howard Wessinger**
DRILL RIG: **CME 55**
NOTES:

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	N VALUE
	TOPSOIL / PLOWZONE - approximately 1 foot of plowzone soils.				
	CLAYEY SAND (SC) - mostly fine to medium sand, some low to medium plasticity fines, moist, brown, very loose.			1	4
5	- brown with orange.	∇ HC		2	4
	SANDY LEAN CLAY (CL) - mostly low to medium plasticity fines, some fine to medium sand, moist, brown with orange, firm to very stiff.			3	5
10	- some fine to coarse sand, red, orange, gray.			4	21
15	**POORLY GRADED SAND WITH CLAY (SP-SC)** - mostly fine to medium sand, few low plasticity fines, wet, tan with red and orange, loose.			5	9
20	**ELASTIC SILT (MH)** - mostly medium plasticity fines, many thin very fine light gray sand seams, moist to wet, dark gray, very stiff.			6	20
25				7	29
	SILTY SAND (SM) - mostly fine sand, some low plasticity fines, moist to wet, light gray and dark gray, medium dense.				
	BORING TERMINATED AT 25 FEET.				



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.*

S&ME
ENGINEERING • TESTING
ENVIRONMENTAL SERVICES

PROJECT: **Highway 38/917 Tract**
Dillon County, South Carolina
S&ME Project No. 1611-10-269

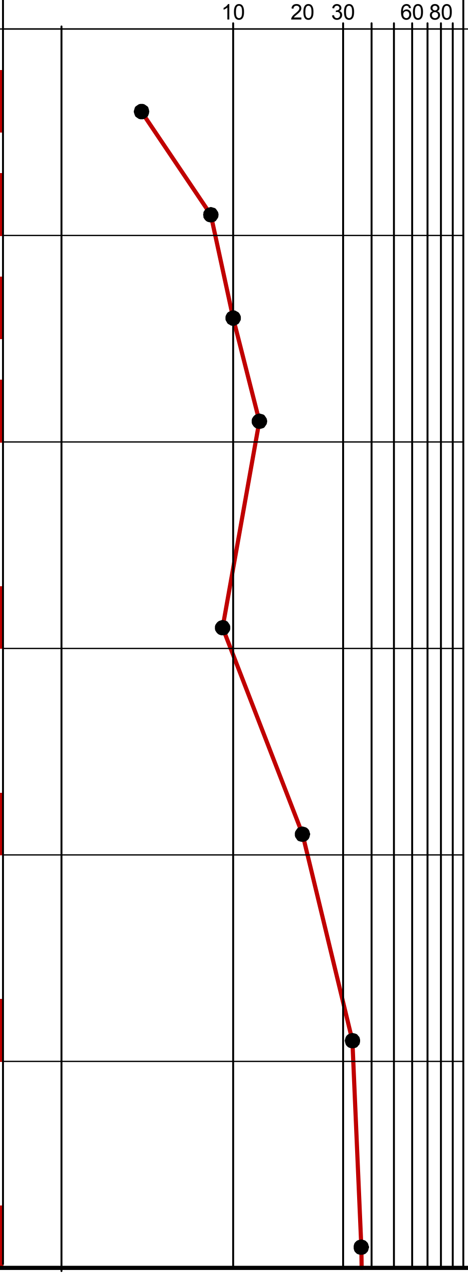
BORING LOG B-2

DATE DRILLED:	7/21/2010	ELEVATION:	
DRILLING METHOD:	2¼" H.S.A.	BORING DEPTH:	50
LOGGED BY:	TH	WATER LEVEL:	3 ft. @ TOB. 4.8 ft. @ 24 hrs.
DRILLER:	Howard Wessinger	DRILL RIG:	CME 55

NOTES:

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO. SAMPLE TYPE	N VALUE
	🟩	**TOPSOIL / PLOWZONE** - approximately 1 foot of plowzone soils.				
	▨	**CLAYEY SAND (SC)** - mostly fine to medium sand, some low to medium plasticity fines, moist to wet, brown, very loose.	▽		1	4
5	▨	**SANDY LEAN CLAY (CL)** - mostly low to medium plasticity fines, some fine to medium sand, few fine to medium cemented pieces, moist, brown and red, firm to stiff.	▼		2	8
		- red, gray, brown.			3	10
10	▨	**CLAYEY SAND (SC)** - mostly fine to medium sand, some low plasticity fines, wet, brownish orange and dark red, loose to medium dense.			4	13
15		- orange with tan and gray.			5	9
20	▥	**ELASTIC SILT (MH)** - mostly medium plasticity fines, pockets of fine light gray sand, moist to wet, dark gray, very stiff.			6	20
25	▨	**SILTY SAND (SM)** - mostly fine sand, some low plasticity fines, several 1/2 in. Elastic Silt (MH) seams, moist to wet, light gray and dark gray, dense.			7	33
	▥	**ELASTIC SILT (MH)** - mostly medium plasticity fines, moist to wet, dark gray, hard.			8	36

STANDARD PENETRATION TEST DATA (blows/ft)



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.***

S&ME
ENGINEERING • TESTING
ENVIRONMENTAL SERVICES

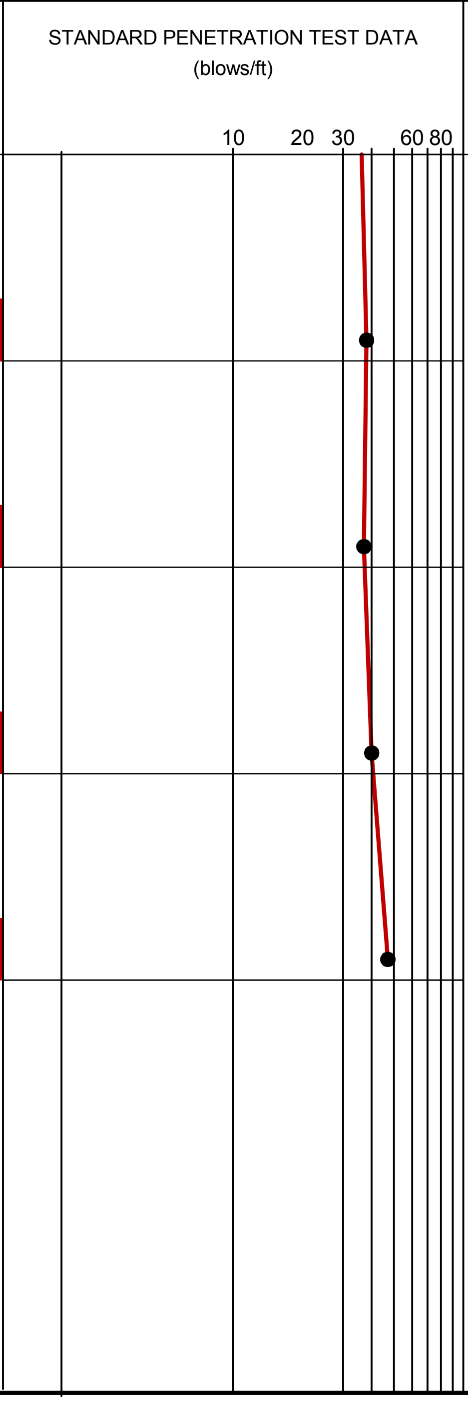
PROJECT: **Highway 38/917 Tract**
Dillon County, South Carolina
S&ME Project No. 1611-10-269

BORING LOG B-2

DATE DRILLED:	**7/21/2010**	ELEVATION:	
DRILLING METHOD:	**2¼" H.S.A.**	BORING DEPTH:	**50**
LOGGED BY:	**TH**	WATER LEVEL:	**3 ft. @ TOB. 4.8 ft. @ 24 hrs.**
DRILLER:	**Howard Wessinger**	DRILL RIG:	**CME 55**

NOTES:

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO. SAMPLE TYPE	N VALUE
	🟩	**ELASTIC SILT (MH)** - mostly medium plasticity fines, moist to wet, dark gray, hard. *(continued)*				
35	🟩				9	38
40	🟩	- many very fine sand seams.			10	37
45	🟩	- no sand except for 1/2 in. of sand at bottom of sample.			11	40
50	🟩	- 1 in. Silty Sand (SM) seam.			12	47
		BORING TERMINATED AT 50 FEET.				



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PROJECT: **Highway 38/917 Tract**
Dillon County, South Carolina
S&ME Project No. 1611-10-269

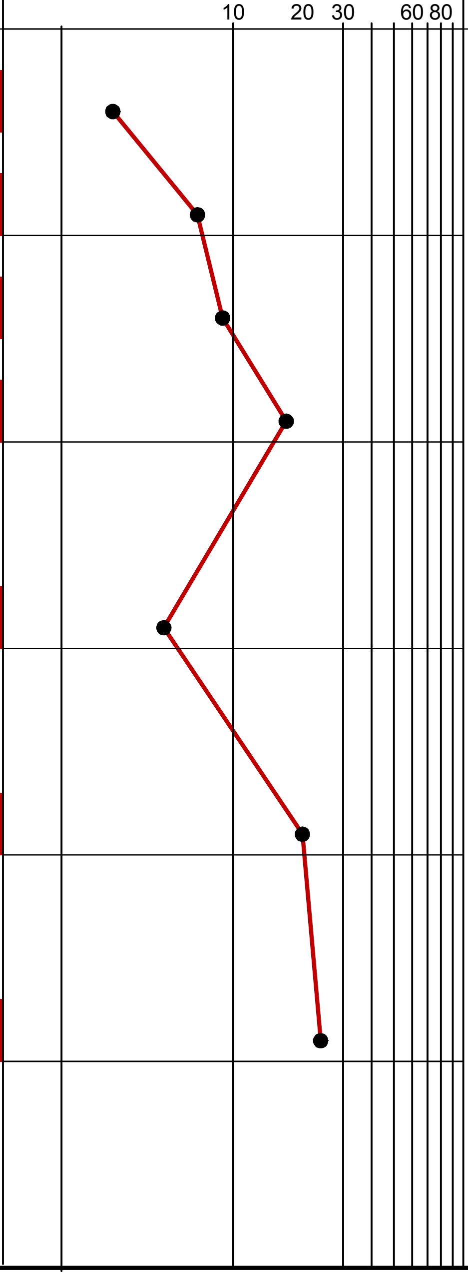
BORING LOG B-3

DATE DRILLED: **7/21/2010**	ELEVATION:
DRILLING METHOD: **2¼" H.S.A.**	BORING DEPTH: **25**
LOGGED BY: **TH**	WATER LEVEL: **3.5 ft. @ TOB. 5.75 ft. @ 24 hrs.**
DRILLER: **Howard Wessinger**	DRILL RIG: **CME 55**

NOTES:

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO. SAMPLE TYPE	N VALUE
	🟩	**TOPSOIL / PLOWZONE** - approximately 1 foot of plowzone soils.				
	▨	**CLAYEY SAND (SC)** - mostly fine to medium sand, some low to medium plasticity fines, moist, brown, very loose.			1 ☐	3
	▨	**SANDY LEAN CLAY (CL)** - mostly low to medium plasticity fines, some fine to medium sand, moist to wet, brown with orange, firm to very stiff.	▽		2 ☐	7
5			▼			
		- brown with red.			3 ☐	9
		- orange, red, gray.			4 ☐	17
10						
	▨	**CLAYEY SAND (SC)** - mostly fine to medium sand, little low plasticity fines, saturated, orange with tan, loose to medium dense.				
					5 ☐	5
15						
		- brown.			6 ☐	20
20						
		- tan.			7 ☐	24
25		BORING TERMINATED AT 25 FEET.				

STANDARD PENETRATION TEST DATA
(blows/ft)



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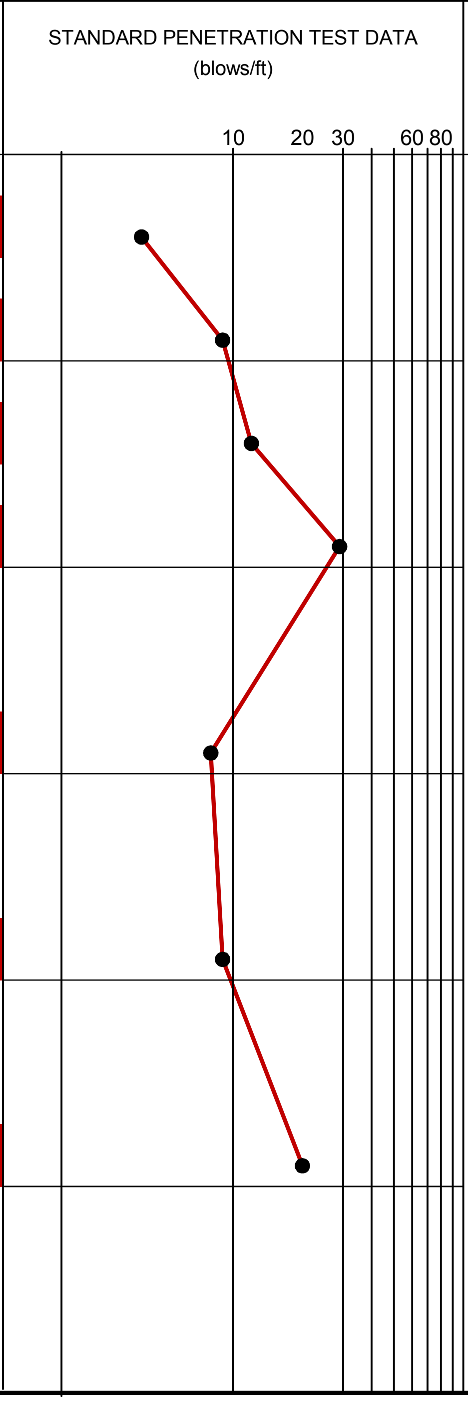
PROJECT: **Highway 38/917 Tract**
Dillon County, South Carolina
S&ME Project No. 1611-10-269

BORING LOG B-4

DATE DRILLED: **7/21/2010**
ELEVATION:
DRILLING METHOD: **2¼" H.S.A.**
BORING DEPTH: **25**
LOGGED BY: **TH**
WATER LEVEL: **3 ft. @ TOB. Cave @ 24 hrs.**
DRILLER: **Howard Wessinger**
DRILL RIG: **CME 55**
NOTES:

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	N VALUE
	🟩	**TOPSOIL / PLOWZONE** - approximately 1 foot of plowzone soils.					
	▨	**SANDY LEAN CLAY (CL)** - mostly low to medium plasticity fines, some fine to medium sand, moist, brown, soft.	▽ HC		1	☐	4
5	▨	**CLAYEY SAND (SC)** - mostly fine to medium sand, little low plasticity fines, wet, tan with brown, stiff. - moist to wet, brown, red, gray.			2 3	☐ ☐	9 12
10	▨	**SANDY LEAN CLAY (CL)** - mostly medium plasticity fines, little fine to medium sand, moist, red, orange, gray, firm to very stiff.			4	☐	29
15	▨	**CLAYEY SAND (SC)** - mostly fine to medium sand, little low plasticity fines, saturated, light orange, loose.			5	☐	8
20	░	**POORLY GRADED SAND (SP)** - mostly fine to coarse sand, saturated, dark tan, loose.			6	☐	9
	▨	**CLAYEY SAND WITH GRAVEL (SC)** - mostly fine to medium sand, some low to medium plasticity fines, some fine to medium rounded quartz gravel, wet, light gray to white, medium dense.			7	☐	20
25		BORING TERMINATED AT 25 FEET.					



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