ECS Southeast, LLC

Geotechnical Engineering Report

Emergency Call Center – Clarendon County Additional Testing

219 Commerce Street
Manning, South Carolina 29102
Clarendon County GIS TMS No. 169-10-02-052-00

ECS Project Number 34:4577-A-R2

May 27, 2025

May 27, 2025

Mr. Steve Coe
Rosenblum Coe Architects, Inc.
1643 Means Street
Charleston, South Carolina 29412

Reference: Geotechnical Engineering Report
Emergency Call Center – Clarendon County Additional Testing Additional Testing
219 Commerce Street
Manning, South Carolina 29102

ECS Project Number 34:4577-A – R2

Dear Mr. Coe:

ECS Southeast, LLC (ECS) has completed the subsurface exploration and geotechnical engineering analyses for the above-referenced project. Our services were performed in general accordance with our Proposal No. 34:5744-GP-R1, dated January 23, 2024. This report presents our understanding of the geotechnical aspects of the project along with the results of the field exploration and engineering analyses conducted and our recommendations for design and construction of geotechnical related items.

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

Respectfully submitted,

ECS Southeast, LLC

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EXECUTIVE SUMMARY

ECS has completed a subsurface exploration and geotechnical analysis for the subject property located at 219 Commerce Street in Manning, South Carolina. This Executive Summary is intended as a very brief overview of the primary geotechnical conditions that are expected to affect design and construction. Information gleaned from this executive summary should not be utilized in lieu of reading the geotechnical report. Our findings, conclusions, and recommendations are summarized below.

SUBSURFACE CONDITIONS:

- Coastal Sedimentary Deposits: Observed below surface materials to the maximum depth explored of approximately 42 feet below the current site grades.
- Groundwater Depths: Groundwater was encountered during the field exploration at depths ranging from approximately 3.1 to 3.6 feet below the current ground surface in the CPT soundings. Groundwater was encountered during the field exploration at a depth of approximately 3, 2.5, and 2 feet, respectively, below the current ground surface in hand auger borings C-01, C-02, and HA-03.

GEOTECHNICAL CONCERNS:

- Liquefaction settlement from the design seismic event: up to 3 inches. If risks associated with liquefaction are not acceptable or the proposed structure cannot be designed to accommodate the anticipated liquefaction induced settlement without suffering catastrophic failure, ground improvement techniques such as Earthquake drains, Aggregate Piers, or Rigid inclusions, may be required.
- Based on the previously developed nature of a portion of the site, undocumented fill may be present in unexplored areas of the site.

DESIGN & CONSTRUCTION RECOMMENDATIONS:

- Seismic Design: Site Class “D.”
- Shallow Foundations: 2,000 psf allowable bearing capacity.
- Slabs-on-Grade: Modulus of Subgrade Reaction, k = 150 pci

Details of our conclusions and recommendations are discussed in the report text. Should the proposed project features be changed from those described above, ECS must be consulted in order to verify that the recommendations made in this report are still valid.

1.0 INTRODUCTION

The purpose of this study was to provide geotechnical information for the design and construction of the proposed Emergency Call Center at 219 Commerce Street in Manning, South Carolina. The site is further identified by Clarendon County GIS TMS No. 169-10-02-052-00.

Our services were provided in accordance with our Proposal No. 34:5744-GP-R1, dated January 23, 2024, as authorized by Steve Coe, which includes our Terms and Conditions of Service.

This report contains the results of our subsurface exploration, site characterization, engineering analyses, and recommendations for the design and construction of the proposed future development.

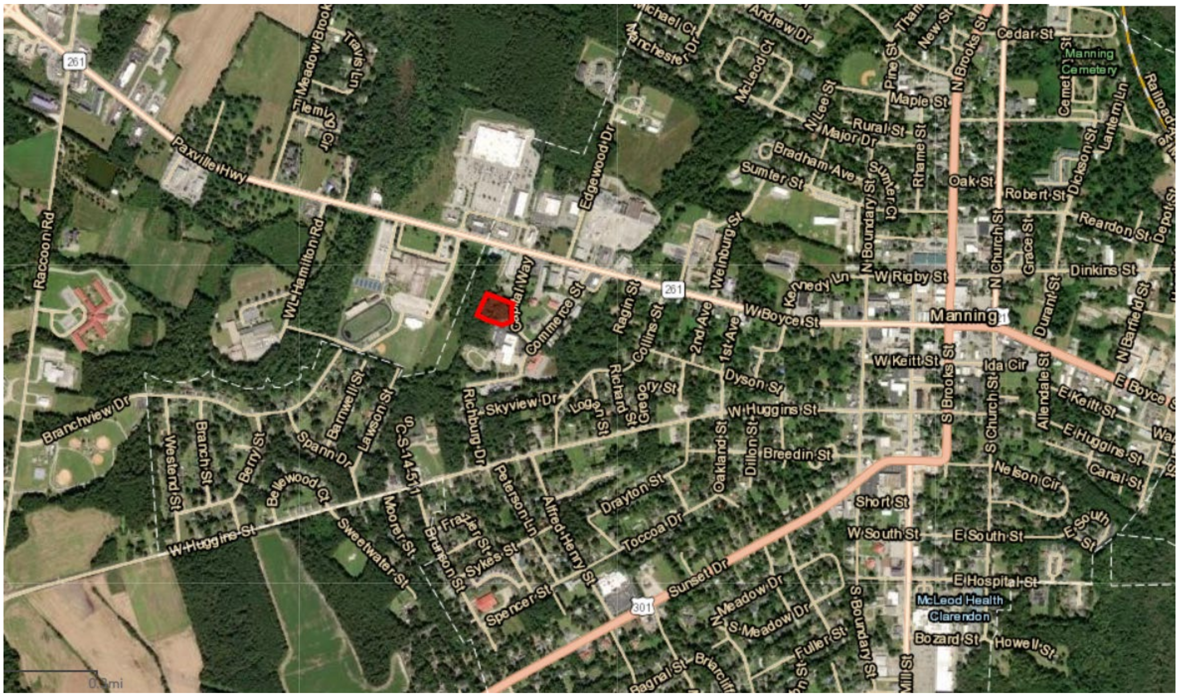
The report includes the following items.

1. Description of subsurface exploration program and test location plan.
2. Description of tests performed, results of tests and data collected.
3. CPT and hand auger boring logs and soil classification in accordance with Unified Soil Classification System.
4. Pertinent geological data and general description of area soils.
5. Site class determination per 2021 International Building Code (IBC 2021), including site liquefaction analysis.
6. Shallow foundation recommendations.
7. Estimated total and differential settlement.
8. Impact of potential soil liquefaction on design and construction.
9. Recommendations on subgrade modulus for design of at-grade slabs.
10. Constructability recommendations including suitability of site soils for use as structural fill, compaction requirements, dewatering, and identifying undesirable subgrade material present such as old fill, refuse, rubble, existing foundations, organic material, etc., which are recommended for removal.

2.0 PROJECT INFORMATION

2.1 PROJECT LOCATION

The project site is located at 219 Commerce Street in Manning, South Carolina, as shown below and on Sheet 1 in Appendix A. The site consists of a 0.26-acre portion of a parcel which is further identified on the Clarendon Country GIS online mapping as TMS No. 169-10-02-052-00.



2.2 CURRENT SITE CONDITIONS

At the time of our site visit, a portion of the site was developed with an existing parking lot while the remainder of the site was undeveloped and heavily wooded. Site specific topographic information was not available at the time of this report; however, from observations made during our site visit, the site appeared to be relatively flat.

2.3 PROPOSED CONSTRUCTION

According to conversations and correspondence with Mr. Steve Coe, we understand the site will likely be developed with a new Emergency Call Center. The following information explains our understanding of the planned future development, including proposed building, related infrastructure, and stormwater pond:

DESIGN ESTIMATIONS	
SUBJECT	**DESIGN INFORMATION / ESTIMATIONS**
Building	Emergency Call Center
Structural Loading	Column: 100 kips (estimated) Wall: 4 klf (estimated)
Finished Floor Elevation	Up to 2 feet above existing grade (estimated)

3.0 FIELD EXPLORATION AND LABORATORY TESTING

The field exploration was planned with the objective of characterizing the project site in general geotechnical and geological terms and to evaluate subsequent field data to assist in the evaluation of geotechnical recommendations for design and construction for the project.

The test locations were identified in the field by ECS personnel using GPS techniques and are shown on the Boring Location Diagram in Appendix A.

3.1.1 Cone Penetration Testing (CPT) Soundings

Two (2) CPT soundings identified as C-01 to C-02 were performed within the proposed building footprint. The CPT soundings were performed in general conformance with ASTM D5778 by our subcontractor. The CPT sounding logs and an explanation of our exploration procedures are presented in Appendix B.

3.1.2 Hand Auger Borings

Six (6) hand auger borings designated C-01 to C-02, and HA-01 to HA-04 were performed adjacent to the CPT soundings and within the footprint of the stormwater pond during our field exploration. The hand auger borings were conducted in general conformance with ASTM D1452. The hand auger boring logs and an explanation of our exploration procedures are presented in Appendix B.

3.2 REGIONAL/SITE GEOLOGY

The site is located in the Bear Bluff formation of the Coastal Plain Physiographic Province of South Carolina. The Coastal Plain is composed of seven terraces, each representing a former level of the Atlantic Ocean. Soils in this area generally consist of sedimentary materials transported from other areas by the ocean or rivers. These deposits vary in thickness from a thin veneer along the western edge of the region to more than 10,000 feet near the coast. The sedimentary deposits of the Coastal Plain rest upon consolidated rocks similar to those underlying the adjacent Piedmont Physiographic Province. In general, shallow unconfined groundwater movement within the overlying soils is largely controlled by topographic gradients. Recharge occurs primarily by infiltration along higher elevations and typically discharges into streams or other surface water bodies. The elevation of the shallow water table is transient and can vary greatly with seasonal fluctuations in precipitation.

3.3 SUBSURFACE CHARACTERIZATION

The subsurface conditions encountered were generally consistent with published geological mapping. The following sections provide generalized characterizations of the soil strata encountered during our subsurface exploration. For subsurface information at a specific location, refer to the CPT and hand auger boring logs presented in Appendix B.

GENERAL SUBSURFACE STRATIGRAPHY			
Approximate Depth Range (ft)	**Stratum**	**Description**	**Estimated Ranges of CPT N-values (bpf)**
0 to 1.2	N/A	Approximately 6 to 14 inches of organic-laden topsoil was encountered the hand auger borings.	N/A
1.2 to 15	I	Very loose to dense SAND with varying amounts of silt and clay, interbedded layer of clay, moist to saturated	2 to 42
15 to 20	II	Soft to stiff CLAY with varying amounts of silt and sand, saturated	2 to 10
20 to 24	III	Very loose to medium dense SAND with varying amounts of silt and clay, saturated	2 to 15
24 to 26	IV	Soft CLAY with varying amounts of silt and sand, saturated	2 to 4
26 to 42	V	Loose to very dense SAND with varying amounts of silt and clay, saturated	6 to 50+

3.4 GROUNDWATER OBSERVATIONS

Groundwater depths were measured in our CPT soundings and hand auger borings as noted on the logs in Appendix B. The groundwater depths were measured at approximately 3.1 to 3.6 feet below ground surface during the time of our field exploration at the CPT locations. Groundwater was encountered in hand auger boring locations C-01, C-02, and HA-03 at approximately 3, 2.5, and 2 feet below current site grades, respectively, at the time of exploration.

Variations in the long-term water table may occur as a result of changes in precipitation, evaporation, surface water runoff, construction activities, and other factors.

4.0 DESIGN RECOMMENDATIONS

4.1 GENERAL

The primary purpose of this geotechnical exploration was to help identify and evaluate the general subsurface conditions relative to the proposed construction. Our recommendations have been developed on the basis of the previously described project information and subsurface conditions identified during this study.

4.2 SEISMIC DESIGN CONSIDERATIONS

4.2.1 Liquefaction

When saturated soil with little to no cohesion liquefies during a major earthquake, it experiences a temporary loss of shear strength as a result of a transient rise in excess pore water pressure generated by strong ground motion. Flow failure, lateral spreading, differential settlement, loss of bearing, ground fissures, and sand boils are evidence of excess pore pressure generation and liquefaction.

We completed a liquefaction analysis in accordance with the 2021 International Building Code (IBC) design earthquake[1]. Layers of very loose to very dense saturated sand and silty sand were encountered below the groundwater table to a depth of approximately 34 feet below the existing ground surface. ECS has compared the cyclic stress in these saturated soils to the cyclic resistance to estimate a Factor of Safety Against Liquefaction (FSAL).[2] On the basis of the results of our analyses, we conclude several of these layers have the potential to liquefy during the design seismic event.

Although the FSAL represents the liquefaction resistance of a soil stratum at a specific depth in a soil profile and are used in evaluating liquefaction-induced settlements, it does not quantify the severity of liquefaction-induced settlements or potential infrastructure damage for a site. Iwasaki et al. (1978) proposed the liquefaction potential index (LPI), which expresses liquefaction potential over an entire soil profile by integrating the product of the liquefaction potential of liquefiable soil layers and a weighting factor with respect to depth to the center of each liquefiable layer.

LPI is an empirical tool used to assess site liquefaction hazards and potential for liquefaction-related damage that ranges from 0 to 100. An LPI less than 5 indicates no anticipation of surface manifestations and low to moderate liquefaction-induced damages, LPIs ranging from 5 to 15 indicates surface manifestations and a high degree of liquefaction-induced damages are possible, and an LPI greater than 15 indicates probable surface manifestations with severe liquefaction-induced damages and that foundation damage is likely.

The LPI estimated for this site ranged between approximately 7 to 12, which indicates a high risk of surface manifestations, and a high degree of liquefaction-induced damages are possible during and immediately following the design seismic event. When soils susceptible to liquefaction are located within approximately 10 feet of the surface, ground surface disruptions (i.e., sand boils) are possible. Such disruptions beneath at-grade structures would result in bearing capacity failure. Since potentially liquefiable sands are not located in the upper 10 feet at this site, there is a low risk of ground surface disruption.

Our analysis indicates that at-grade structures such as parking, slabs and shallow foundations could potentially settle on the order of up to 3 inches during and immediately following the design seismic event. Differential settlement associated with liquefaction-induced settlement is expected to be approximately 50 to 100 percent of the overall anticipated liquefaction settlement. This settlement would result from volumetric compression of the liquefiable sand layers which occurs as seismically-induced excess soil pore water pressures dissipate.

Liquefaction Mitigation: If risks associated with liquefaction are not acceptable or the proposed structure cannot be designed to accommodate the anticipated liquefaction induced settlement without suffering catastrophic failure, ground improvement techniques such as Earthquake drains, Aggregate Piers, or Rigid inclusions, may be required. If it is evaluated that ground improvement will likely be implemented, ECS should be contacted to discuss.

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1 The IBC design earthquake has a 2% probability of exceedance in 50 years. Our liquefaction analysis was based on an earthquake with a magnitude of 7.3 and ground surface acceleration of 0.402 g.

2 Analysis completed following the procedures presented in the 1996 NCEER and the 1998 NCEER/NSF workshops on the Evaluation of Liquefaction Resistance of Soils (Youd and Idriss 2001). To estimate volumetric strain and associated liquefaction-induced settlement, we used the procedures developed by Zhang et al. (2002) and a depth weighting factor proposed by Cetin (2009).

4.2.2 Seismic Site Classification

Section 1613 of the IBC 2021 and Section 20.3 of ASCE 7-16 classifies sites with the potential for liquefaction as Seismic Site Class F. However, Section 20.3 of ASCE 7-16 also allows the design spectral response accelerations for a site to be evaluated without regard to liquefaction provided structures have a fundamental period of less than or equal to 0.5 seconds and the risks of liquefaction are considered in design. Based on our past experience, the proposed building types should meet this criterion; however, this must be confirmed by the structural engineer.

Based on the results of the CPT soundings and our knowledge of local geologic conditions, it is our interpretation the site may be considered a **Seismic Site Classification "D,"** in accordance with the IBC 2021.

The Site Class definition should not be confused with the Seismic Design Category designation, which the structural engineer typically assesses.

4.2.3 Ground Motion Parameters

In addition to the seismic site classification noted above, ECS has provided the design spectral response acceleration parameters following the IBC 2021 and ASCE 7-16 methodology. The Mapped Responses were estimated from the free Seismic Design Map Tool available from https://hazards.atcouncil.org. The design responses for the short (0.2 second, S_{DS}) and long period (1-second, S_{D1}) are noted in bold at the far right end of the following table.

GROUND MOTION PARAMETERS – SITE CLASS D (IBC 2021/ASCE 7-16 METHOD)									
Period (sec)	**Mapped Spectral Response Accelerations (g)**		**Values of Site Coefficient for Site Class (unitless)**		**Maximum Spectral Response Acceleration Adjusted for Site Class (g)**		**Design Spectral Response Acceleration (g)**	
Reference	Figures 1613.3.1 (1) & (2)		Tables 1613.3.3 (1) & (2)		Eqs. 16-37 & 16-38		Eqs. 16-39 & 16-40	
0.2	S_S	0.532	F_a	1.375	$S_{MS}=F_aS_s$	0.731	$S_{DS}=2/3\ S_{MS}$	**0.487**
1.0	S_1	0.170	F_v	2.261	$S_{M1}=F_vS_1$	0.383	$S_{D1}=2/3\ S_{M1}$	**0.256**

4.3 SHALLOW FOUNDATION RECOMMENDATIONS

Provided that the fill heights and building loads are no greater than those estimated, liquefaction risk is accepted or mitigated, and subgrade preparation and earthwork operations are completed in strict accordance with the recommendations of this report, the proposed structure can be supported by conventional shallow foundations: individual column footings and continuous wall footings. The design of the foundation shall utilize the following parameters:

Design Parameter	Column Footing	Wall Footing
Net Allowable Bearing Pressure[1]	2,000 psf	2,000 psf
Acceptable Bearing Soil Material	Structural fill or Approved native soil	Structural fill or Approved native soil
Minimum Width	30 inches	18 inches
Minimum Footing Embedment Depth (below slab or finished grade)	12 inches	12 inches
Estimated Total Settlement[2]	1 inch	1 inch
Estimated Differential Settlement	Less than 0.5 inches between columns	Less than 0.5 inches over 30 feet

1. Net allowable bearing pressure is the applied pressure in excess of the surrounding overburden soils above the base of the foundation.
2. The settlement calculations were based on the estimated structural loads. If final loads are different, ECS must be contacted to update foundation recommendations and settlement calculations.
3. Based on maximum column/wall loads and variability in subsurface data. Differential settlement can be re-evaluated once the foundation plans are more complete.

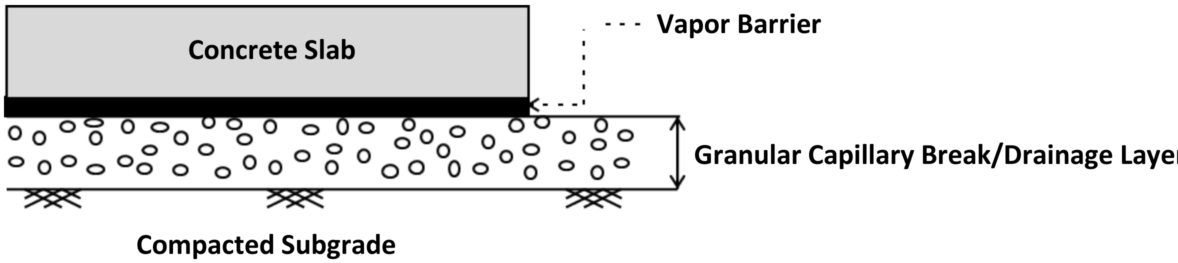
Estimates of settlement for foundations bearing on structural or non-structural fills are strongly dependent on the quality of fill placed. Factors which may affect the quality of fill include maximum loose lift thickness of the fills placed and the amount of compactive effort placed on each lift. The final footing elevation should be evaluated by ECS personnel to document that the bearing soils are capable of supporting the recommended net allowable bearing pressure and are suitable for foundation construction. These evaluations should include visual observations, hand rod probing, and dynamic cone penetrometer (ASTM STP 399) testing, or other methods deemed appropriate by the geotechnical engineer at the time of construction, in each column footing excavation and at intervals not greater than 50 feet in continuous footing excavations.

Areas of Potential Undercut: Soft or unsuitable soils observed at the footing bearing elevations should be undercut and removed. Undercutting or backfilling should be performed under the observation of ECS personnel. Undercut areas should be backfilled up to the original design bottom of footing elevation with one of the following:

- Lean concrete ($f'_c \geq$ 1,000 psi at 28 days).
- AASHTO size No. 57 stone; up to 2 feet in thickness.
- Structural Fill or aggregate base in accordance with the recommendations of this report (with additional compaction testing and soil bearing evaluation).

4.4 SLABS-ON-GRADE

Provided the risks associated with undocumented fill and potential for long-term settlement are accepted and subgrades and Structural Fills are prepared in accordance with the recommendations of this report, the proposed floor slabs can be constructed as ground supported slabs (Slabs-On-Grade). During initial site grading there may be areas of soft or yielding soils that should be removed and replaced with Structural Fill placed in accordance with the recommendations included in this report. Adjusting the moisture content of Structural Fills during earthwork operations, including the use of disking or appropriate drying equipment, may be necessary. The following graphic depicts our ground supported slab recommendations:



1. Drainage Layer Thickness: 4 inches
2. Drainage Layer Material: GRAVEL (GP, GW), SAND (SP, SW)
3. Subgrade compacted to a minimum of 95% maximum dry density per ASTM D1557

Subgrade Modulus: Provided the placement of Structural Fill and granular drainage layer are completed per the recommendations discussed herein, the slab may be designed estimating a modulus of subgrade reaction, k_1 of 150 pci (lbs/cu. inch). This value is applicable for design of slabs subject to point loads and should be reduced based on loaded area for uniform sustained distributed loads.

Slab Isolation: Ground-supported slabs should be isolated from the foundations and foundation-supported elements of the structure so that differential movement between the foundations and slab do not induce excessive shear and bending stresses in the floor slab. Where the structural configuration prevents the use of a free-floating slab, the slab should be designed by the structural engineer of record with suitable reinforcement and load transfer devices to avoid overstressing of the slab.

Design Considerations: We also recommend that slabs-on-grade be underlain by a minimum of 4 inches of suitable material as shown in the figure above to help provide a firm working surface for equipment and reduce the risk of capillary rise of subsurface moisture from adversely affecting the slab. If open graded aggregate is not available or is cost prohibitive, sand with less than 5 percent fines can be used provided the placement and compaction of the sand complies with the above recommendations.

A vapor barrier should be installed on top of the subgrade in areas to receive moisture-sensitive floor coverings to help reduce dampness on the surface of the floor slab. A vapor barrier is generally understood to consist of a minimum 10-mil thickness, overlapping sheets of plastic without sealing the overlap between the individual sheets. If a minimum of one foot of Structural Fill with less than 5 percent fines is placed prior to slab placement an open graded aggregate is not required under the slabs, provided that a 10 mil or thicker vapor barrier is provided.

We recommend that the perm rating of the vapor barrier be adequate to protect the rating of the floor coverings (0.01 perms or less for moisture sensitive floor coverings) and have adequate puncture resistance according to the expected foot traffic and equipment and materials placed on the barrier. If the vapor barrier is punctured or unsealed during construction, the perm rating will likely be greatly decreased, and vapor intrusion may occur through the slab after construction. Punctures can be caused by concrete finishing, placement of reinforcement, or by equipment and foot traffic. Openings may be caused by unsealed edges at the floor wall interface or laps.

4.5 SITE DRAINAGE

Positive drainage should be provided around the perimeter of the structure to reduce the potential for moisture infiltration into the foundation and slab subgrade soils. We recommend that landscaped areas adjacent to the structures and pavements be sloped away from the structures. Roof drains should discharge 5 feet or more from the building perimeter or into below grade storm water piping. Paved areas should also be sloped to divert surface water away from the proposed buildings. Site drainage is the sole responsibility of the project civil engineer.

5.0 SITE CONSTRUCTION RECOMMENDATIONS

5.1 SUBGRADE PREPARATION

We emphasize the importance of comprehensive subgrade evaluations prior to structural fill placement and/or other construction activities. These evaluations may include proofrolling the subgrade soils, performing hand auger borings, and excavation of test pits. The mentioned evaluations would help in identifying areas of soft, loose, or otherwise unsuitable materials, which would require remedial activities.

5.1.1 Stripping and Grubbing

The subgrade preparation should consist of stripping vegetation, rootmat, topsoil, and other soft or unsuitable materials from the 10-foot expanded building pad and 5-foot expanded pavement limits and to 5 feet beyond the toe of structural fills.

Existing organic-laden topsoil was observed in the hand auger borings to depths of up to 14 inches. Deeper topsoil, organics, or otherwise unsuitable materials may be present at unexplored areas of the site. Based on the wooded/undeveloped nature of portions of the site, root balls and stumps may extend as deep as about 2 to 3 feet and will likely require additional localized stripping depth to remove the organics. ECS should observe and document that unsuitable surficial materials have been removed or are firm and unyielding with adequate bearing capacity prior to the placement of structural fill or footing construction.

5.1.2 Risk Associated with Undocumented Fill

Based on the previously developed portion of the site, we expect there is an increased potential for portions of the site to have been modified in the past by grading activities resulting in the placement of undocumented fill materials. If existing fill soils containing under-compacted soils or pockets of organics or debris are encountered during construction and are not removed, then localized excessive differential settlements could occur in response to new structural loads and the on-going process of volume change which may still occur in the fill. If such non-uniform settlements occur, then moderate structural distress could result. As such, if existing undocumented fill soils are encountered during construction, they should be further evaluated by proofrolling and Dynamic Cone Penetrometer (DCP) testing as discussed below.

5.1.3 Site Temporary Dewatering

Excavations performed at this site may encounter groundwater when extending to depths greater than 3 feet below the existing ground surface. The contractor shall make their own assessment of temporary dewatering needs based upon the limited subsurface groundwater information presented in this report. Soil testing is not continuous, and thus soil and groundwater conditions may vary between testing locations. If the contractor believes additional subsurface information is needed to assess dewatering needs, they should obtain such information at their own expense. ECS makes no warranties or guarantees regarding the adequacy of the provided information to evaluate dewatering requirements; such recommendations are beyond our scope of services.

Dewatering systems are a critical component of many construction projects. Dewatering systems must be selected, designed, and maintained by a qualified and experienced (specialty or other) contractor familiar with the geotechnical and other aspects of the project. The failure to properly design and maintain a dewatering system for a given project can result in delayed construction, unnecessary foundation subgrade undercuts, detrimental phenomena such as ‘running sand’ conditions, internal erosion (i.e., ‘piping’), the migration of ‘fines’ down-gradient towards the dewatering system, localized settlement of nearby infrastructure, foundations, slabs-on-grade and pavements, etc. Water discharged from any site dewatering system shall be discharged in accordance with local, state and federal requirements.

5.2 EARTHWORK OPERATIONS

5.2.1 Structural Fill Materials

Materials satisfactory for use as structural fill should consist of inorganic soils classified as SM, SC, SW, SP, GW, GP, GM, and GC, or a combination of these group symbols, per ASTM D2487. The structural fill materials should be free of organic matter, debris, and should contain no particle sizes greater than 1 ½ inches in the largest dimension. Open graded materials, such as gravels (GP, GW), which contain void space in their mass should not be used in structural fills unless properly encapsulated with geotextile filter fabric.

Suitable structural fill material should consist of inorganic soils with the following engineering properties and compaction requirements.

STRUCTURAL FILL INDEX PROPERTIES	
Subject	**Property**
Atterberg Limits	LL < 35, PI < 10
Max. Particle Size	1 ½ inches
Fines Content	Max. 25 % passing #200 sieve
Max. organic content	5% by dry weight

STRUCTURAL FILL COMPACTION REQUIREMENTS	
Subject	**Requirement**
Compaction Standard	Modified Proctor, ASTM D1557
Required Compaction	95% of Max. Dry Density
Moisture Content	-3 to +3 % points of the soil’s optimum value
Loose Thickness	8 inches prior to compaction

Unsatisfactory Materials: Materials that should not be used as structural fill include topsoil, organic materials (OH, OL), and high plasticity CLAYS and SILTS (CH, MH). Such materials removed during grading operations should be placed in approved off-site disposal areas.

5.2.2 On-Site Borrow Suitability

Existing organic-laden soil was observed in the hand auger borings to depths up to 14 inches. Below the surface material, Silty SAND and Clayey SAND (SC) was observed to the maximum depth explored in the hand auger borings of about 4 feet.

In our experience, the on-site upper sandy (SM) materials may be used as Structural Fill. Laboratory results on the upper silty SAND material indicate natural moisture content of approximately 17 to 21 percent and fines content of approximately 15 to 20 percent, where tested. The grading contractor should anticipate additional efforts including disking and drying as the material is placed to facilitate compaction and reduce the risk of pumping conditions during placement.

The on-site upper fine materials (SC) are generally not recommended for use as Structural Fill. Laboratory tests on the upper fine materials indicate a natural moisture content of approximately 23.9 percent, a fine content of approximately 43 percent, and a plasticity index of approximately 17, where tested. If the on-site fine materials are utilized in lieu of imported materials, the grading contractor should anticipate additional moisture conditioning efforts including the use of cement treatment to facilitate compaction and reduce the risk of pumping conditions during placement.

Organic materials (OL, OH) should not be used as Structural Fill.

5.2.3 Fill Placement Considerations

Fill materials should not be placed on excessively wet soils. Borrow fill materials should not be excessively wet at the time of placement. Excessively wet soils or aggregates should be scarified, aerated, and moisture conditioned. At the end of each workday, fill areas should be graded to facilitate drainage of any precipitation and the surface should be sealed by use of a smooth-drum roller to limit infiltration of surface water.

Proper drainage should be maintained during the earthwork phases of construction to prevent ponding of water which tends to degrade subgrade soils. Alternatively, if these soils cannot be stabilized by conventional methods as previously discussed, additional modifications to the subgrade soils such as cement stabilization may be utilized to adjust the moisture content. If cement is utilized to control moisture contents and/or for stabilization, regular Type I/II cement can be used. The contractor should be required to minimize dusting or implement dust control measures, as required.

We recommend that the grading contractor have equipment on site during earthwork for both drying and wetting fill soils. We do not anticipate significant problems in controlling moisture within the fill during dry weather, but moisture control may be difficult during winter months or extended periods of rain. The control of moisture content of higher plasticity soils is difficult when these soils become wet. Further, such soils are easily degraded by construction traffic when the moisture content is elevated.

5.3 FOUNDATION AND SLAB OBSERVATIONS

Protection of Foundation Excavations: Exposure to the environment may weaken the soils at the footing bearing level if the foundation excavations remain open for too long a time. Therefore, foundation concrete should be placed the same day that excavations are made. If the bearing soils are softened by surface water intrusion or exposure, the softened soils must be removed from the foundation excavation bottom immediately prior to placement of concrete. If the excavation must remain open overnight, or if rainfall becomes imminent while the bearing soils are exposed, a 2 to 3-inch thick “mud mat” of “lean” concrete should be placed on the bearing soils before the placement of reinforcing steel.

Footing Subgrade Observations: It is important to have ECS observe the foundation subgrade prior to placing foundation concrete, to document that the bearing soils are what were anticipated. If loose, soft, or unsuitable soils are observed at the footing bearing elevations, these soils should be removed and replaced prior to concrete placement.

Slab Subgrade Observation: A representative of ECS should be called to observe slab subgrades prior to drainage layer placement to document that adequate subgrade preparation has been achieved. A proofroll using a loaded dump truck should be performed in their presence at that time.

5.4 GENERAL CONSTRUCTION CONSIDERATIONS

Construction Monitoring: ECS should be on-site full-time during earthwork and foundation construction activities to document that our recommendations are followed and to provide recommendations for remedial activities, where necessary. If we are not retained for geotechnical consulting during earthwork construction and foundation construction, ECS cannot be responsible for long-term performance of the subgrade-supported construction.

Subgrade Protection: Measures should also be taken to limit site disturbance, especially from rubber-tired heavy construction equipment, and to remove surface water from development areas, including structural and pavement areas.

Surface Drainage: Surface drainage conditions should be properly maintained. Surface water should be directed away from the construction area, and the work area should be sloped away from the construction area at a gradient of 1 percent or greater to reduce the potential of ponding water and the subsequent saturation of the surface soils. At the end of each workday, the subgrade soils should be sealed by rolling the surface with a smooth drum roller to minimize infiltration of surface water.

Erosion Control: The surface soils may be erodible. Therefore, the contractor should provide and maintain good site drainage during earthwork operations to maintain the integrity of the surface soils. Erosion and sedimentation controls should be in accordance with sound engineering practices and local requirements.

Means and Methods: Please note that the contractor is fully responsible for the means and methods employed in the construction of the project, and that the contractor shall confirm that work is conducted in accordance with OSHA standards.

Excavation Safety: Cuts or excavations may require forming or bracing, slope flattening, or other physical measures to control sloughing and/or prevent slope failures. Contractors should be familiar with applicable OSHA codes to confirm that adequate protection of the excavations and trench walls is provided.

6.0 CLOSING

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

The description of the proposed project is based on information provided to ECS by Steve Coe. If any of this information is inaccurate, either due to our interpretation of the documents provided or site or design changes that may occur later, ECS should be contacted immediately in order that we can review the report in light of the changes and provide additional or alternate recommendations as may be required to reflect the proposed construction.

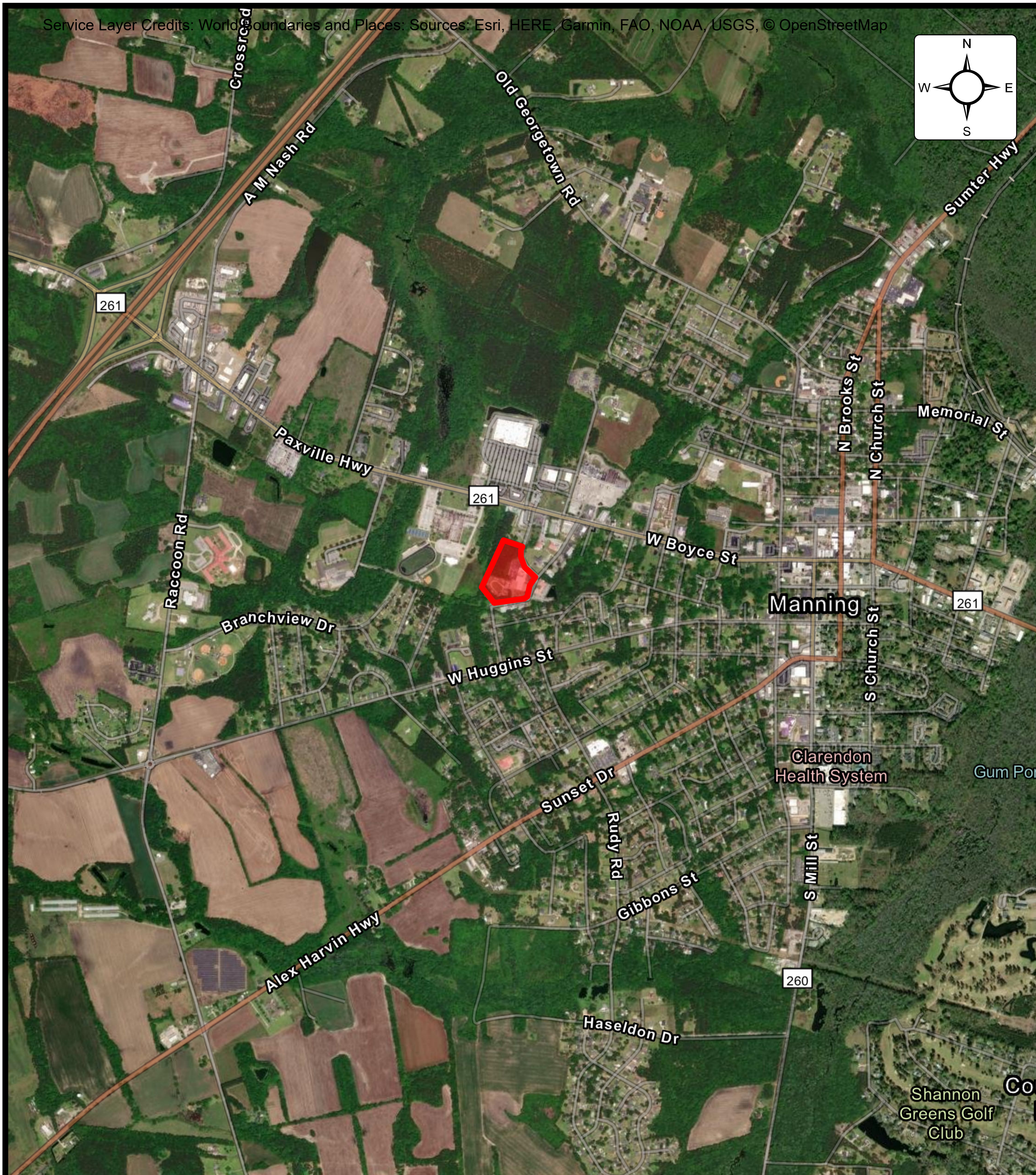
We recommend that ECS be retained to review the project's plans and specifications pertaining to our work so that we may ascertain consistency of those plans/specifications with the intent of the geotechnical report.

Field observations, monitoring, and quality assurance testing during earthwork and foundation installation are an extension of and integral to the geotechnical design recommendation. We recommend that the Owner retain these quality assurance services and that ECS be allowed to continue our involvement throughout these critical phases of construction to provide general consultation as issues arise. ECS is not responsible for the conclusions, opinions, or recommendations of others based on the data in this report.

APPENDIX A – Drawings & Reports

Site Location Diagram

Test Location Diagram



SITE LOCATION DIAGRAM

Emergency Call Center - Clarendon County

219 Commerce Street
Manning, South Carolina 29102
Caplea Coe Architects, Inc.

ENGINEER	NF
SCALE	1" = 2000'
PROJECT NO.	34:4577-A
SHEET	1 of 2
DATE	11/19/2024

TEST LOCATION DIAGRAM

Emergency Call Center - Clarendon County

219 Commerce Street

Manning, South Carolina 29102

Caplea Coe Architects, Inc.

ENGINEER	ADG2
SCALE	1" = 80'
PROJECT NO.	34:4577-A
SHEET	2 of 2
DATE	5/27/2025

APPENDIX B – Field Operations

Reference Notes for Cone Penetration Test (CPT) Soundings

Subsurface Exploration Procedure: Cone Penetration Testing (CPT) ASTM D 5778

CPT Logs (C-01 to C-02)

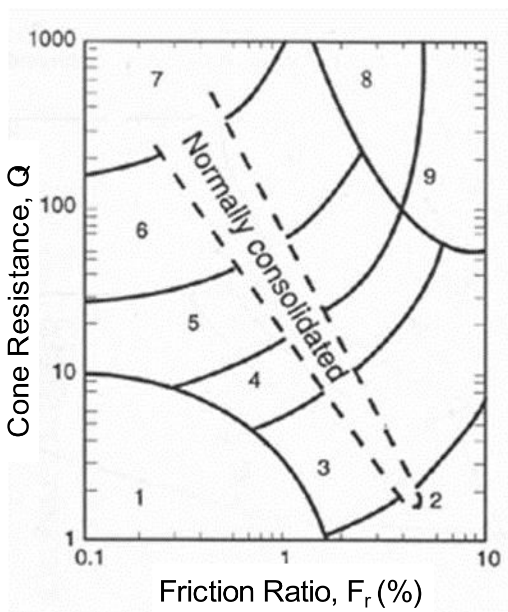
Reference Notes for Boring Logs

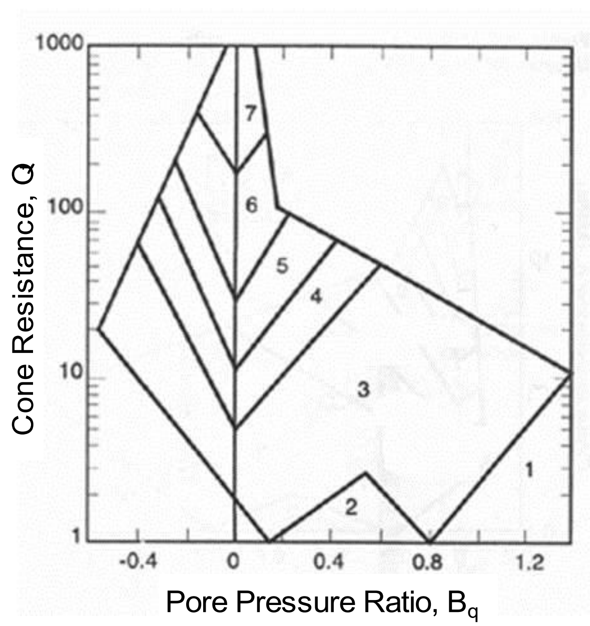
Subsurface Exploration Procedure: Hand Auger Boring ASTM D1452

Hand Auger Logs (C-01 to C-02, HA-01 to HA-04)

REFERENCE NOTES FOR CONE PENETRATION TEST (CPT) SOUNDINGS

In the CPT sounding procedure (ASTM-D-5778), an electronically instrumented cone penetrometer is hydraulically advanced through soil to measure point resistance (q_c), pore water pressure (u_2), and sleeve friction (f_s). These values are recorded continuously as the cone is pushed to the desired depth. CPT data is corrected for depth and used to estimate soil classifications and intrinsic soil parameters such as angle of internal friction, preconsolidation pressure, and undrained shear strength. The graphs below represent one of the accepted methods of CPT soil behavior classification (Robertson, 1990).





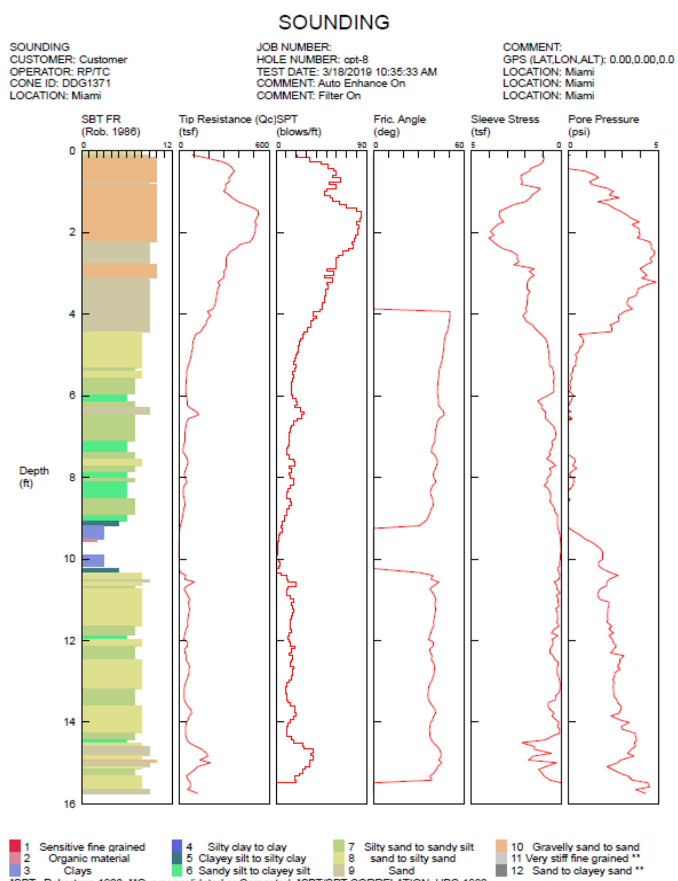
1. Sensitive, Fine Grained
2. Organic Soils-Peats
3. Clays; Clay to Silty Clay
4. Clayey Silt to Silty Clay
5. Silty Sand to Sandy Silt
6. Clean Sands to Silty Sands
7. Gravelly Sand to Sand
8. Very Stiff Sand to Clayey Sand
9. Very Stiff Fine Grained

The following table presents a correlation of corrected cone tip resistance (q_c) to soil consistency or relative density:

SAND		SILT/CLAY	
Corrected Cone Tip Resistance (q_c) (tsf)	**Relative Density**	**Corrected Cone Tip Resistance (q_c) (tsf)**	**Relative Density**
<20	Very Loose	<5	Very Soft
20-40	Loose	5-10	Soft
40-120	Medium Dense	10-15	Firm
		15-30	Stiff
120-200	Dense	30-45	Very Stiff
>200	Very Dense	45-60	Hard
		>60	Very Hard

SUBSURFACE EXPLORATION PROCEDURE: CONE PENETRATION TESTING (CPT) ASTM D 5778

In the CPT sounding procedure, an electronically instrumented cone penetrometer is hydraulically advanced through soil to measure point resistance (qc), pore water pressure (U2), and sleeve friction (fs). These values are recorded continuously as the cone is pushed to the desired depth. CPT data is corrected for depth and used to estimate soil classifications and intrinsic soil parameters such as angle of internal friction, pre-consolidation pressure, and undrained shear strength.



CPT Procedure:

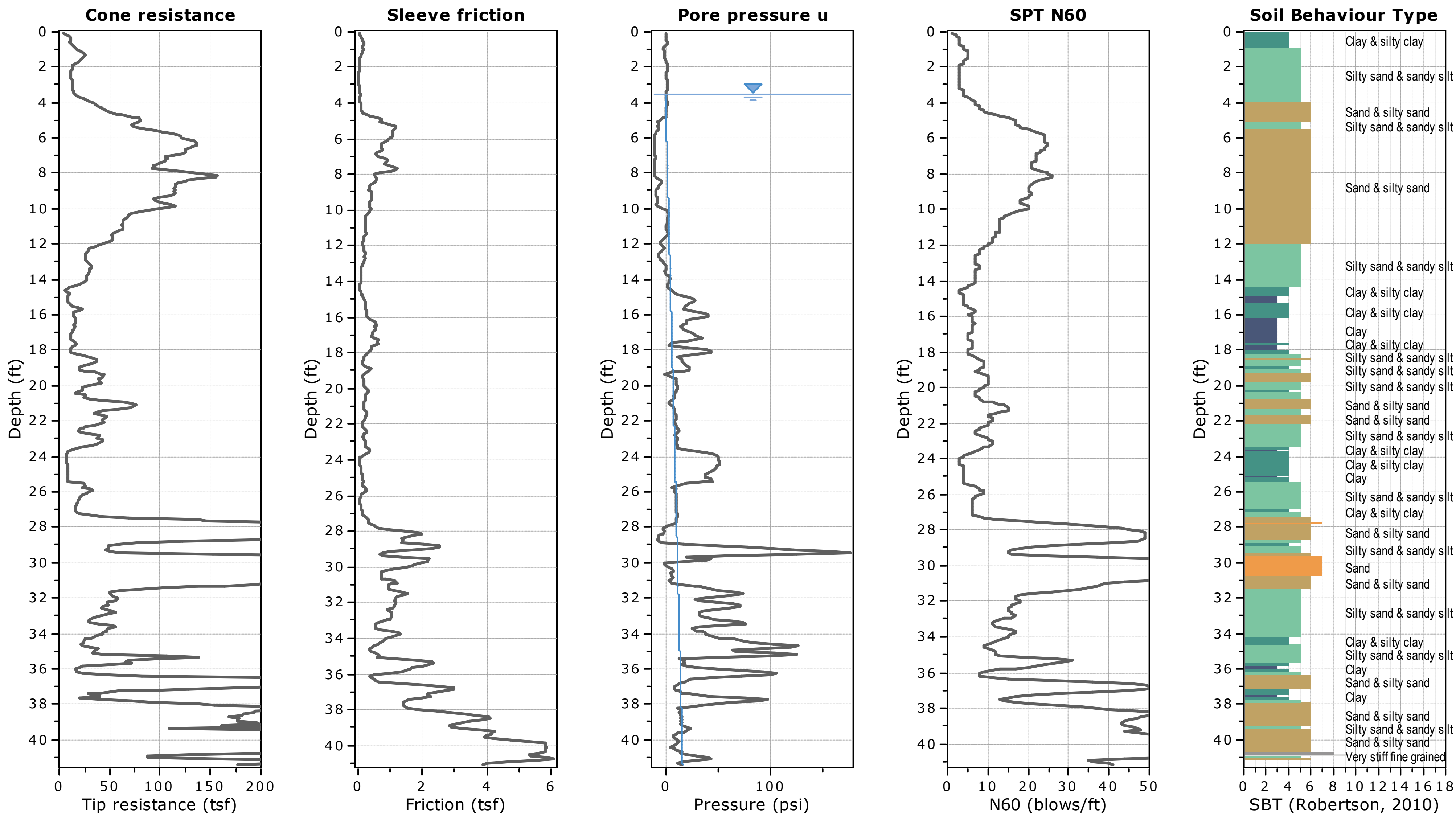
- Involves the direct push of an electronically instrumented cone penetrometer* through the soil
- Values are recorded continuously
- CPT data is corrected and correlated to soil parameters

**CPT Cone Size May Vary*

ECS Southeast, LLC
5935 Rivers Avenue, Suite 105A
North Charleston, SC 29406
ECS Project #: 34:4684

Project: Emergency Call Center - Clarendon County Additional Geo | **CPT: C-01**

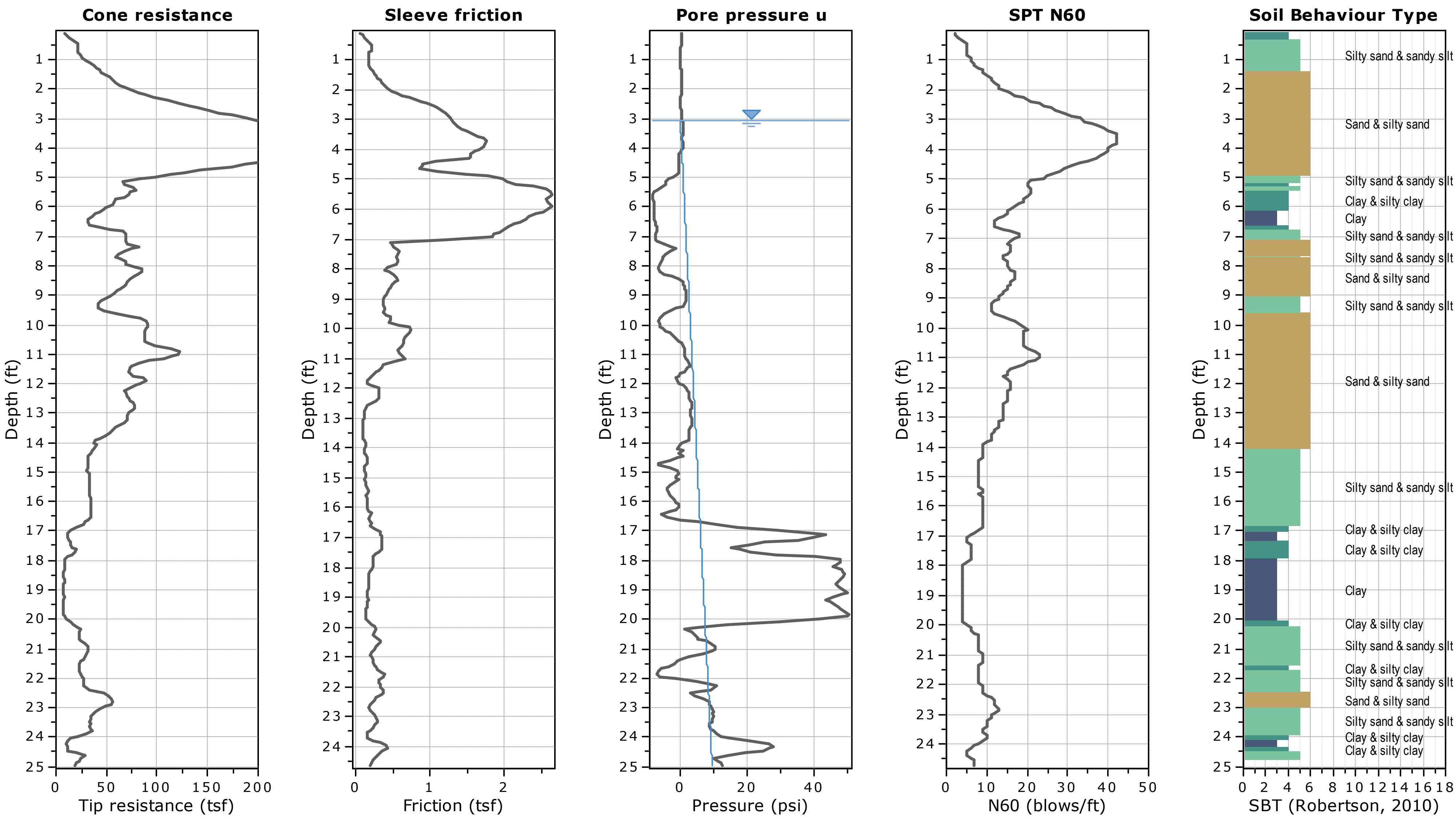
Location: Manning, South Carolina | Total depth: 41.41 ft, Date: 11/21/2024



ECS Southeast, LLC
5935 Rivers Avenue, Suite 105A
North Charleston, SC 29406
ECS Project #: 34:4684

Project: Emergency Call Center - Clarendon County Additional Geo **CPT: C-02**

Location: Manning, South Carolina Total depth: 24.96 ft, Date: 11/21/2024



REFERENCE NOTES FOR BORING LOGS

MATERIAL[1,2]

	ASPHALT
	CONCRETE
	GRAVEL
	TOPSOIL
	VOID
	BRICK
	AGGREGATE BASE COURSE
GW	WELL-GRADED GRAVEL gravel-sand mixtures, little or no fines
GP	POORLY-GRADED GRAVEL gravel-sand mixtures, little or no fines
GM	SILTY GRAVEL gravel-sand-silt mixtures
GC	CLAYEY GRAVEL gravel-sand-clay mixtures
SW	WELL-GRADED SAND gravelly sand, little or no fines
SP	POORLY-GRADED SAND gravelly sand, little or no fines
SM	SILTY SAND sand-silt mixtures
SC	CLAYEY SAND sand-clay mixtures
ML	SILT non-plastic to medium plasticity
MH	ELASTIC SILT high plasticity
CL	LEAN CLAY low to medium plasticity
CH	FAT CLAY high plasticity
OL	ORGANIC SILT or CLAY non-plastic to low plasticity
OH	ORGANIC SILT or CLAY high plasticity
PT	PEAT highly organic soils

DRILLING SAMPLING SYMBOLS & ABBREVIATIONS

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

PARTICLE SIZE IDENTIFICATION

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

COHESIVE SILTS & CLAYS

UNCONFINED COMPRESSIVE STRENGTH, QP[4]	SPT[5] (BPF)	CONSISTENCY[7] (COHESIVE)
<0.25	<2	Very Soft
0.25 - <0.50	2 - 4	Soft
0.50 - <1.00	5 - 8	Firm
1.00 - <2.00	9 - 15	Stiff
2.00 - <4.00	16 - 30	Very Stiff
4.00 - 8.00	31 - 50	Hard
>8.00	>50	Very Hard

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

GRAVELS, SANDS & NON-COHESIVE SILTS

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

WATER LEVELS[6]

- WL (First Encountered)
- WL (Completion)
- WL (Seasonal High Water)
- WL (Stabilized)

FILL AND ROCK

FILL | POSSIBLE FILL | PROBABLE FILL | ROCK

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

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

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

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

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

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

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

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

SUBSURFACE EXPLORATION PROCEDURE:
Hand Auger Borings
ASTM D1452

In this procedure, a shallow depth boring is made by manually rotating and advancing an auger to the desired depths while periodically removing the auger from the hole to clear and examine the auger cuttings. The auger cuttings are visually classified in the field in accordance with ASTM D2488. Disturbed samples are collected in each soil stratum and sealed in an airtight container and labeled appropriately.

Hand Auger Procedure:

- Involves manually rotating a tube or barrel type auger to the desired sample depth
- Recording the depth of changes in strata
- Describing soil in each major stratum in accordance with ASTM D2488
- Recording groundwater depth and location of seepage zones, when/if found
- Describing condition of augered hole (i.e. whether the hole remains open or the sides cave)

CLIENT:	PROJECT NO.:	SHEET:
Caplea Coe Architects, Inc.	**34:4577-A**	**1 of 1**
PROJECT NAME: **Emergency Call Center - Clarendon County Addl Geo**	HAND AUGER NO.: **C-01**	SURFACE ELEVATION:
SITE LOCATION: **Commerce Street & Capital Way, Manning, South Carolina, 29102**		STATION:
LATITUDE:	LONGITUDE:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	SAMPLE NUMBER	FINES CONTENT (%)	MOISTURE CONTENT (%)
			Topsoil Thickness[12"]					
			(SM) SILTY SAND, gray brown, moist					
			(SM) SILTY SAND, white, moist					
	▽		(SM) SILTY SAND, white mottled brown, saturated			S-4	20	19.3
			END OF HAND AUGER AT 4.0 FT					
5								
10								
15								

REMARKS:

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

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

		ECS REP:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:
▽ WL (First Encountered) **3'**	▼ WL (Seasonal High)				
▼ WL (Completion)		**NF**	**Nov 21 2024**	**Feet**	

HAND AUGER LOG

CLIENT:	PROJECT NO.:	SHEET:
Caplea Coe Architects, Inc.	**34:4577-A**	**1 of 1**
PROJECT NAME: **Emergency Call Center - Clarendon County Addl Geo**	HAND AUGER NO.: **C-02**	SURFACE ELEVATION:
SITE LOCATION: **Commerce Street & Capital Way, Manning, South Carolina, 29102**		STATION:
LATITUDE:	LONGITUDE:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	SAMPLE NUMBER	FINES CONTENT (%)	MOISTURE CONTENT (%)
			Topsoil Thickness[14"]					
			(SM) SILTY SAND, dark brown gray, moist					
	▽		(SM) SILTY SAND, light gray, moist to saturated			S-2	20	17.4
			(SM) SILTY SAND, white, saturated					
			(SM) SILTY SAND, white mottled brown, saturated					
			END OF HAND AUGER AT 4.0 FT					

REMARKS:

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

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

▽ WL (First Encountered) **2.5'**	▼ WL (Seasonal High)	ECS REP:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:
▼ WL (Completion)		**NF**	**Nov 21 2024**	**Feet**	

HAND AUGER LOG

CLIENT: Caplea Coe Architects, Inc.	PROJECT NO.: 34:4577-A	HAND AUGER NO.: HA-01	SHEET: 1 OF 1
PROJECT NAME: Emergency Call Center - Clarendon County Addl Geo	SITE LOCATION: Commerce Street & Capital Way, Manning, South Carolina, 29102		
LATITUDE:	LONGITUDE:	STATION:	SURFACE ELEVATION:

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	GRAPHIC LOG	DCP	EXCAVATION EFFORT	SAMPLE NUMBER	FINES CONTENT (%)	MOISTURE CONTENT (%)
			Topsoil [Thickness=12"].						
1			(SM) SILTY SAND - gray, moist.				S-2	15	21.2
			END OF HAND AUGER AT 2ft						

REMARKS:

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

EXCAVATION EFFORT: E-EASY M-MEDIUM D-DIFFICULT VD-VERY DIFFICULT

WL (First Encountered):	WL (Seasonal High Water):	ECS REP:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:
WL (Completion):				English	Not Observed

HAND AUGER LOG

CLIENT: Caplea Coe Architects, Inc.	PROJECT NO.: 34:4577-A	HAND AUGER NO.: HA-02	SHEET: 1 OF 1
PROJECT NAME: Emergency Call Center - Clarendon County Addl Geo	SITE LOCATION: Commerce Street & Capital Way, Manning, South Carolina, 29102		

LATITUDE:	LONGITUDE:	STATION:	SURFACE ELEVATION:

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	GRAPHIC LOG	DCP	EXCAVATION EFFORT	SAMPLE NUMBER	FINES CONTENT (%)	MOISTURE CONTENT (%)
			Topsoil [Thickness=6"].						
			(SC) CLAYEY SAND - gray, moist.						
1			(SC) CLAYEY SAND - gray mottled orange, moist.				S-2	43	23.9
			END OF HAND AUGER AT 2ft						

REMARKS:

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

EXCAVATION EFFORT: E-EASY M-MEDIUM D-DIFFICULT VD-VERY DIFFICULT

▽ WL (First Encountered):	▼ WL (Seasonal High Water):	ECS REP:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:
▼ WL (Completion):				English	Not Observed

HAND AUGER LOG

CLIENT: Caplea Coe Architects, Inc.	PROJECT NO.: 34:4577-A	HAND AUGER NO.: HA-03	SHEET: 1 OF 1
PROJECT NAME: Emergency Call Center - Clarendon County Addl Geo	SITE LOCATION: Commerce Street & Capital Way, Manning, South Carolina, 29102		

LATITUDE:	LONGITUDE:	STATION:	SURFACE ELEVATION:

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	GRAPHIC LOG	DCP	EXCAVATION EFFORT	SAMPLE NUMBER	FINES CONTENT (%)	MOISTURE CONTENT (%)
			Topsoil [Thickness=12"].						
1			(SC) CLAYEY SAND - dark gray, moist.						
	▽		**END OF HAND AUGER AT 2ft**						

REMARKS:

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

EXCAVATION EFFORT: E-EASY M-MEDIUM D-DIFFICULT VD-VERY DIFFICULT

▽ WL (First Encountered): 2 ft	▼ WL (Seasonal High Water):	ECS REP:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:
▼ WL (Completion):				English	Not Observed

HAND AUGER LOG

CLIENT: Caplea Coe Architects, Inc.	PROJECT NO.: 34:4577-A	HAND AUGER NO.: HA-04	SHEET: 1 OF 1
PROJECT NAME: Emergency Call Center - Clarendon County Addl Geo	SITE LOCATION: Commerce Street & Capital Way, Manning, South Carolina, 29102		

LATITUDE:	LONGITUDE:	STATION:	SURFACE ELEVATION:

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	GRAPHIC LOG	DCP	EXCAVATION EFFORT	SAMPLE NUMBER	FINES CONTENT (%)	MOISTURE CONTENT (%)
			Topsoil [Thickness=10"].						
1			(SM) SILTY SAND - light gray, moist.						
			END OF HAND AUGER AT 2ft						

REMARKS:

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

EXCAVATION EFFORT: E-EASY M-MEDIUM D-DIFFICULT VD-VERY DIFFICULT

▽ WL (First Encountered):	▼ WL (Seasonal High Water):	ECS REP:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:
▼ WL (Completion):				English	Not Observed

HAND AUGER LOG

APPENDIX C – Laboratory Testing

Laboratory Testing Summary

Laboratory Testing Summary

Sample Source	Sample Number	Depth (feet)	^MC (%)	Soil Type	Atterberg Limits			**Percent Passing No. 200 Sieve	Moisture - Density		CBR (%)		#Organic Content (%)
					LL	PL	PI		Maximum Density (pcf)	Optimum Moisture (%)	0.1 in.	0.2 in.	
C-01	S-4	3.5	19.3	SM	NP	NP	NP	20					
C-02	S-2	1.5	17.4	SM	NP	NP	NP	20					
HA-01	S-2	1.5	21.2	SM	NP	NP	NP	15					
HA-02	S-2	1.5	23.9	SC	29	12	17	43					

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

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

Project: Emergency Call Center - Clarendon County Additional Geo
Client: Caplea Coe Architects, Inc.
Project No.: 34:4577-A-R2
Date Reported:

Office / Lab	Address	Office Number / Fax
ECS Southeast LLP - Charleston	5935 RIVERS AVENUE Suite 105A North Charleston, SC 29406	(843)654-4448 (843)-884-7990

Tested by	Checked by	Approved by	Date Received
NF	AG	JW	05/23/25

APPENDIX D – Miscellaneous

Important Information about your Geotechnical Report

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept* *responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are not final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals' plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for information purposes only.* To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer's services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration. Confront the risk of moisture infiltration*** by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

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