Geotechnical Engineering Report
Proposed Randolph County Emergency Services Headquarters Building
New Century Drive
Asheboro, North Carolina
S&ME Project No. 1335-15-037

Prepared For:

Randolph County Public Works
725 McDowell Road
Asheboro, North Carolina 27205

Prepared By:

S&ME, Inc.
9751 Southern Pine Boulevard
Charlotte, North Carolina 28273

June 12, 2015

June 12, 2015

Randolph County Public Works
725 McDowell Road
Asheboro, North Carolina 27205

Attention: Mr. Paxton Arthurs, P.E.
Director of Randolph County Public Works

Reference: **Geotechnical Engineering Report**
Proposed Randolph County Emergency Services Headquarters Building
New Century Drive
Asheboro, North Carolina
S&ME Project No. 1335-15-037
NC PE Firm License F-0176

Dear Mr. Arthurs:

S&ME, Inc. (S&ME) is pleased to submit this geotechnical engineering report for the proposed emergency services headquarters building for Randolph County, North Carolina. This exploration was performed in general accordance with our Proposal No. 13-1500138R dated April 9, 2015.

The purpose of the geotechnical study was to determine the general subsurface conditions at the site and to evaluate those conditions with regard to design and construction of the project. This report presents our findings together with our conclusions and recommendations for foundation design and associated earthwork for the proposed project.

S&ME appreciates the opportunity to assist you during this phase of the project. If you should have any questions concerning this report or if we may be of further assistance, please contact us.

Very truly yours,

S&ME, Inc.

Joseph R. Williamson, P.E.
Project Engineer

NORTH CAROLINA PROFESSIONAL SEAL 037845 6/12/2015 ENGINEER LUIS A. CAMPOS

Luis A. Campos, P.E.
Project Engineer
N.C. Registration No. 37845

Senior Reviewed By: Keith C. Brown, P.E.

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APPENDIX

1. INTRODUCTION

1.1 Project Background

This proposal is based on e-mail correspondence between Eric Schoenagel of Little Diversified Architectural Consulting (Little) and Luis Campos of S&ME between March 16 and April 7, 2015. The e-mail correspondence included a topographic map and a site drawing showing the northings and eastings of requested test locations.

We understand that Randolph County Public Works is planning an emergency services headquarters off of New Century Drive in Asheboro, North Carolina (see Figure 1 in the Appendix for the approximate site location). The subject site consists of approximately 5 acres of a larger 30.2-acre parcel (Randolph County Parcel ID No. 7659288862), and is located on the west side of New Century Drive and just south of the Randolph County Office Building. S&ME previously provided geotechnical services testing for this project, the results of which were presented in our *Geotechnical Engineering Report*, dated November 11, 2014 (S&ME Project No. 1335-14-094). At the issuance of that report, the building layout and design grades had not been finalized.

Based on the updated information, the proposed structure will consist of an approximately 25,000 square-foot building. The southern portion will consist of a one-story, high bay type structure, and the middle portion will be consist of a two-story office space. Both of these areas have a planned finish floor elevation of 809.67 feet. The northern portion of the building will be a single-story office space with a planned finish floor elevation of 825.00 feet. The proposed grades correspond to cuts of up to 11 feet and fills of up to 7 feet. The structure is planned to be steel-framed with shallow spread footings and a slab-on-grade floor system. The basement walls of the two-story office space will retain up to 20 feet of soil. Maximum column loads of 300 kips are anticipated. Access will be provided via a new entrance south of the proposed building from New Century Drive. Also, an additional parking lot is planned north of the proposed building and just south of the existing parking lot for the Randolph County Office Building. Segmental-block retaining walls may be required to provide grade separation at the site; however these locations have not been presented.

Based on our site reconnaissance and the provided topographical information, the site is moderately wooded and slopes down to the south. Grades at the site range from an elevation of 826 to 805 feet.

1.2 Project Assumptions

In developing the conclusions and recommendations in this report, we have assumed:

- Structural loads for proposed building will be relatively light (wall loads less than 6 kips per foot, and floor loads less than 200 pounds per square foot).
- Traffic conditions will include automobiles and light- to moderately-heavy trucks.

1.3 Purpose and Scope

The purpose of this geotechnical study was to perform additional subsurface exploration at the site to help better determine the subsurface conditions and to revise the geotechnical recommendations that were provided in our previous report to reflect the current design plans. In addition to the services performed as part of our previous investigation, S&ME has completed the following scope of additional geotechnical services for this project:

- Visited the site to observe site surface conditions and mark boring locations.
- Contacted North Carolina 811 to mark the locations of existing underground utilities in the exploration areas.
- Mobilized an ATV-mounted drill rig and crew to the site.
- Drilled four (4) soil test borings.
- Attempted groundwater level measurements, backfilled the boreholes with soil cuttings, installed a hole closure device near the ground surface in each borehole, and finished backfilling to the ground surface with soil.
- Estimated ground surface elevations at the boring locations using a surveyor's rod and level and using nearby manhole covers as a benchmark.
- Performed laboratory testing consisting of grain-size distribution, Atterberg limits, and moisture content tests on two (2) representative soil samples to confirm visual soil classifications and estimate the engineering properties of the soils tested. Also, one (1) standard Proctor and California Bearing Ratio (CBR) test was performed.
- Performed shear wave velocity testing.
- Prepared this report providing geotechnical recommendations.

2. EXPLORATION PROCEDURES

2.1 Field Testing

2.1.1 Soil Test Borings

In order to explore the general subsurface conditions at the project site, four (4) additional soil test borings (S-1 through S-4) were drilled to depths of 25 to 28.8 feet below the ground surface on May 28, 2015. The initial exploration included eight soil test borings (B-1 through B-8) which were performed between October 2 and 3, 2014 to depths ranging from 10 to 37.3 feet below the existing ground surface. The borings were advanced at the approximate locations shown on the Test Location Plan (Figure 2) presented in the Appendix. The additional boring locations were selected by Little and located in the field by S&ME using a hand-held GPS unit.

During both explorations, a CME-550X drill rig mounted on an all-terrain vehicle (ATV) carrier was used to advance the borings with hollow-stem, continuous flight augers. Standard Penetration Test (SPT) split-spoon sampling was performed at designated intervals in the soil test borings in general accordance with ASTM D 1586 to provide an index for estimating soil strength and relative density or consistency. The CME-550X

drill rig used to drill the borings is equipped with a hydraulic automatic hammer for Standard Penetration Tests. In conjunction with the SPT testing, samples are obtained for soil classification purposes. Representative portions of each soil sample were placed in plastic bags or glass jars and taken to our laboratory.

Temporary slotted standpipe was installed at the termination of drilling Boring B-3 to help facilitate groundwater level measurements. All borings were left open for a waiting period of at least one day to allow for groundwater level measurements. The standpipe was removed from Boring B-3 and all borings performed during the initial exploration were backfilled prior to October 7, 2014. All borings performed during the additional exploration were backfilled on May 29, 2015.

2.1.2 Shear Wave Velocity Measurements

S&ME measured the shear wave velocities of the subsurface materials at the site using surface wave methods. Specifically, we used a combination of Multi-Channel Analysis of Surface Waves (MASW) and Microtremor Array Measurements (MAM) at the site. Performing both MASW and MAM provides the greater depth of penetration using microtremor analyses (low frequency surface waves) without sacrificing resolution at shallower depths from MASW (higher frequency surface waves).

On April 9, 2015 S&ME performed MASW and MAM measurements at the site at the approximate location (SW-1) shown on the Test Location Plan (Figure 2) presented in the Appendix. The MASW survey consisted of recording different frequency surface waves generated from an active energy source (sledgehammer striking a metal plate) traveling across a linear array. The MASW survey was conducted using a 24-channel Geometrics ES3000 seismograph equipped with 4.5 Hz geophones. Measurements were collected with geophones at set spacing of 5 feet. The MAM survey consisted of recording different frequency surface waves generated from a passive energy source (e.g. background noise, vehicles, etc.) traveling across a non-linear array. The MAM survey was conducted using the Geometrics ES3000 seismograph equipped with eleven 4.5 Hz geophones. Measurements were conducted along an “L-shaped” array using geophones at a set spacing of 30 feet. The analysis was conducted using the OYO Corporation’s SeisImager/SW software (*Pickwin* and *WaveEq)*.

2.2 Laboratory Testing

A geotechnical professional visually examined each sample in general accordance with the Unified Soil Classification System (USCS) to estimate the distribution of grain sizes, plasticity, organic content, color, presence of lenses and seams and apparent geological origin. The results of the classifications, as well as the field test results, are presented on the individual boring logs included in the Appendix. Similar materials were grouped into strata on the logs. The strata contact lines represent approximate boundaries between the soil and rock types; the actual transition between the soil and rock types in the field may be gradual in both the horizontal and vertical directions.

Representative soil samples were tested in S&ME's laboratory to confirm visual-manual soil classifications and evaluate the engineering properties of the tested soils. Laboratory testing included:

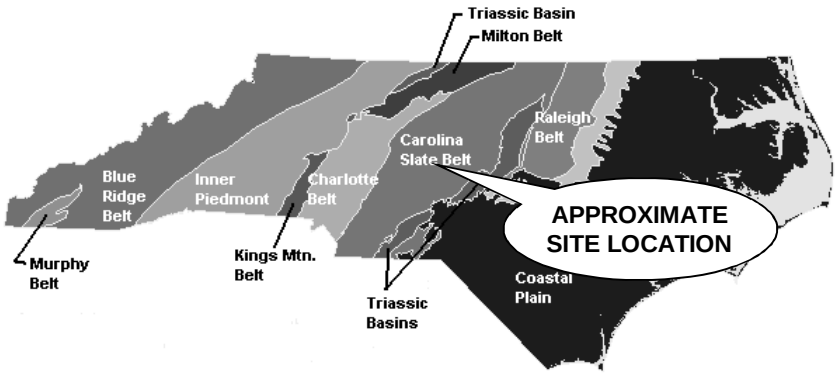
- Natural Moisture Content (ASTM D 2216)
- Atterberg Limits (ASTM D 4318)
- Grain-Size Distribution (ASTM D 422)
- Standard Proctor Compaction (ASTM D 698)
- California Bearing Ratio (ASTM D 1883)

Results of the laboratory tests are presented in the Appendix.

3. AREA GEOLOGY AND SUBSURFACE CONDITIONS

3.1 Physiography and Area Geology

The site is located within the Carolina Slate Belt of the Piedmont Physiographic Province of North Carolina as shown in the following figure. The Carolina Slate Belt is a rock formation which extends from Georgia to North Carolina and parts of Virginia. Over geologic time, the volcanic and sedimentary rocks which originally covered the Belt area were subjected to metamorphism, heat and pressure. The metamorphic process gave rise to the primary rock types seen today in this region which are referred to as metavolcanics. These metavolcanics include dacitic, rhyolitic, and andesitic flows along with tuffs and breccias. The metasediments found in the region include argillite and slate, the latter for which the belt is named. According to the 1985 *Geologic Map of North Carolina*, the bedrock under the site consists of metamudstone and meta-argillite.

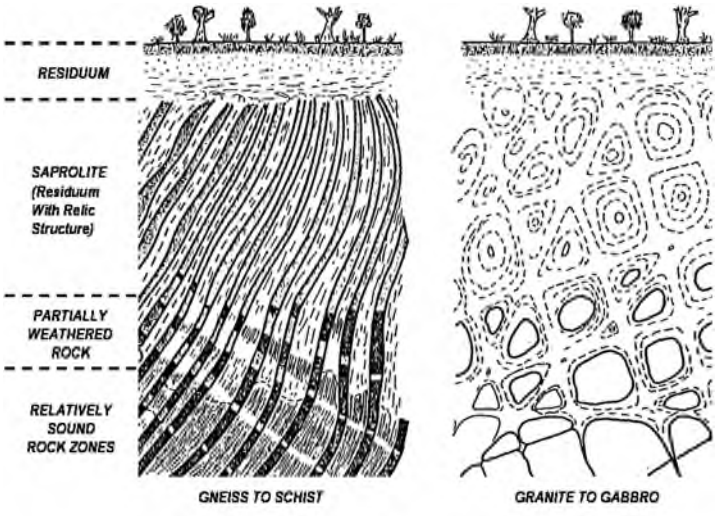


Physiographic Provinces of North Carolina

The topography and relief of the Piedmont Province have developed from differential weathering of the igneous and metamorphic rock. Because of the continued chemical and physical weathering, the rocks in the Piedmont Province are now generally covered with a mantle of soil that has weathered in place from the parent bedrock. These soils have variable thicknesses and are referred to as residuum or residual soils. The residuum is typically finer grained and has higher clay content near the surface because of the advanced weathering. Similarly, the soils typically become coarser grained with

increasing depth because of decreased weathering. As the degree of weathering decreases, the residual soils generally retain the overall appearance, texture, gradation and foliations of the parent rock.

The boundary between soil and rock in the Piedmont is not sharply defined. A transitional zone termed "Partially Weathered Rock" is normally found overlying the parent bedrock. Partially Weathered Rock (PWR) is defined for engineering purposes as residual material with Standard Penetration Resistances (N-values) exceeding 100 blows per foot. The transition between hard/dense residual soils and PWR occurs at irregular depths due to variations in degree of weathering. A depiction of typical weathering profiles in the Piedmont Province is presented in the following figure.



Typical Piedmont Weathering Profiles (After Sowers/Richardson, 1983)

Water is typically present in the residual soils and within fractures in the PWR or underlying bedrock in the Piedmont. On upland ridges in the Piedmont, water may or may not be present in the residual soils above the PWR and bedrock. Fluctuations in water levels are typical in residual soils and PWR in the Piedmont, depending on variations in precipitation, evaporation and surface water runoff. Seasonal high water levels are expected to occur during or just after the typically wetter months of the year (November through April).

3.2 Soil Survey

The Soil Survey Report for Randolph County, North Carolina (published by the US Department of Agriculture Natural Resources Conservation Service) indicates that there are two main soil series at the site: Georgeville and Georgeville-Urban (see Figure 3). The Georgeville series covers approximately 98 percent of the site while the Georgeville-Urban series covers the remaining 2 percent of the site. The following soil properties are given in the Soil Survey Report for Randolph County:

Soil Name	Typical Depth (in)	Unified Classification	Liquid Limit	Plasticity Index	Flood Freq.	High Water Table (ft)	Risk of Corrosion of Concrete	Risk of Corrosion of Uncoated Steel
Georgeville (GaC)	0 – 5 5 – 50 50 – 65 65 – 80	ML CL, ML MH, ML CL, ML, CL-ML	15 – 40 30 – 49 41 – 85 10 – 30	NP – 11 8 – 20 15 – 45 NP – 12	None	> 6	Moderate	Moderate
Georgeville-Urban (GmC)	0 – 8 8 – 15 15 – 45 45 – 80	ML CL, ML MH, ML CL, ML, CL-ML	15 – 40 30 – 49 41 – 85 10 – 30	NP – 11 8 – 20 15 – 45 NP – 12	None	> 6	Moderate	Moderate

3.3 Subsurface Conditions

The soil test borings generally encountered surficial topsoil underlain by residual soils, PWR, and auger refusal material. Isolated fill soils were encountered beneath the surficial topsoil in Boring B-8 located near New Century Drive. The generalized subsurface conditions at the site are described below and are also illustrated in the Generalized Subsurface Profiles presented as Figures 4 and 5 in the Appendix. Ground surface elevations indicated on the logs were estimated using differential leveling techniques with an established on-site benchmark, which was a sewer manhole cover in the southeast corner of the property with a given elevation of 800.42 feet. The northings and eastings presented on the logs are approximate and were obtained with a handheld GPS unit. For more detailed soil descriptions and stratifications at a particular boring location, the respective boring log should be reviewed.

Surface Materials: Each of the soil test borings encountered a layer of topsoil measuring approximately 2 to 5 inches thick.

Fill: Underlying the surficial topsoil in Boring B-8, fill soils were encountered to a depth of approximately 3 feet below the existing ground surface. The fill soils consisted of stiff clayey silt (USCS classification MH). An SPT N-value of 13 blows per foot (bpf) was encountered in the fill soils.

Residual Soils: Underlying the surficial materials and/or fill soils, residual soils were encountered in each boring. The residual soils generally consisted of stiff to very stiff silty clay (CH), stiff sandy clay (CL), stiff to very stiff clayey silt (MH), stiff to very hard sandy silt (ML), and medium dense silty sand (SM). SPT N-values in the residual soils ranged from 5 to 79 bpf. Borings S-4, B-1, B-2, B-4, B-6, B-7, and B-8 were terminated in residual soils.

Laboratory classification tests (moisture content, grain-size distribution and Atterberg limits) were performed on selected samples of residual materials. The results are presented in the following table and in the Appendix:

Boring	Sample	Sample Depth (feet)	USCS Classification	Moisture Content	Percent Fines	Liquid Limit	Plasticity Index
S-1	Bag-1	1 - 10	CL	27.8	85.1	46	20
S-2	SS-4	8.5 - 10	ML	21.9	98.4	48	11
B-1	SS-1	1 - 2.5	CH	30.7	99.0	80	47
B-3	SS-1	1 - 2.5	CH	24.6	99.1	65	35

Partially Weathered Rock: Partially Weathered Rock was encountered in Borings S-1, S-2, S-3, B-3, and B-5 at depths ranging from 17 to 32 feet below the existing ground surface (approximate elevations of 799.9 to 787.6 feet). When sampled, the PWR encountered generally breaks down into sandy silt and silty sand. Borings S-1, S-3, and B-5 was terminated in the PWR at depths ranging from 24 to 28.8 feet below the existing ground surface, which was near the planned drilling termination depth.

Auger Refusal Material: Borings S-2 and B-3 were terminated in PWR upon encountering auger refusal material prior to reaching the proposed termination depth. Auger refusal, which is a relative term used to define material that could not be penetrated with the drilling equipment used, was encountered in Borings S-2 and B-3 at depths of 28 and 37.3 feet (approximate elevations of 789.9 and 782.3 feet), respectively. Refusal material may result due to the presence of boulders, rock ledges, lenses or seams, or the top of parent bedrock. Based on the borings performed, we interpret refusal material to be the top of parent bedrock; however, rock coring would be required to confirm the continuity/character of refusal materials, which was beyond our scope of services.

Water Levels: Water level measurements were attempted in the borings at the termination of drilling activities. All boreholes were left open for a waiting period of 1 to 3 days, at which time a subsequent water level measurement was attempted. Water was encountered in Boring B-3 at a depth of 34 feet at the termination of drilling activities and at a depth of 30 feet (elevation of 789.6 feet) after the waiting period. Water was not encountered in any of the other borings either at drilling termination or after the waiting period. Water levels tend to fluctuate with seasonal and climatic variations, as well as with some types of construction operations. Therefore, water may be encountered during construction operations at depths or elevations different than indicated in this study.

4. CONCLUSIONS AND RECOMMENDATIONS

4.1 Earthwork

4.1.1 Site Preparation

Immediately prior to construction, the entire structural (building and pavement) area should be stripped of any topsoil, rootmat, trash, debris, organic materials, and tree stumps to a minimum of 5 feet outside the structural limits. Topsoil thicknesses in the borings ranged from 2 to 5 inches; however, our experience indicates an average stripping depth of 8 to 12 inches may be required in wooded areas. Deeper stripping depths may be required in order to adequately remove large root bulbs.

Any existing underground utilities or other obstructions in the proposed construction areas should also be properly excavated, removed, abandoned, or re-routed to facilitate the proposed construction. The resulting excavations should be properly backfilled as described later in this report.

4.1.2 Existing Fill Soils

Existing fills soils were encountered to a depth of approximately 3 feet below the existing ground surface in Boring B-8, which was performed near the New Century Drive. Based on visual observations of the split-spoon samples recovered and the driller's field observations, the fill soils encountered appeared clear of concentrated organics, debris and other deleterious materials. The existing fill soils generally consisted of moderate-plasticity clayey silt (MH) materials with an SPT N-value of 13 bpf. Based on our experience, properly compacted fill typically exhibits N-values in excess of 8 bpf, suggesting the material was placed in a controlled manner with compactive effort.

Because the site is wooded, we anticipate that the presence of fill soils will be limited to near the existing roadway and/or near utilities within the project area. However, due to the wide spacing of the borings and sampling depths, fill soils may be present in other areas of the site. Therefore, the possibility of deleterious inclusions, high plasticity soils and variable density material in or under the existing fill cannot be completely ruled out. If, during grading activities, fill soils are found to contain wood fragments, trash, organics, voids, or soft lenses, then excessive settlement could result causing structure or pavement distress. S&ME should be notified immediately so that we may review our recommendations based on the new information and make any necessary changes.

4.1.3 Expansive Soils

Based on the results of the soil test borings performed, our visual observations of the split-spoon samples recovered, plastic soils (CH and MH) were encountered in each of the borings in the upper 3 to 5.5 feet across the site, which is common for the project area. Additionally, the fill soils described above consisted of moderate-plasticity silts (MH). The CH and MH soils have a moderate to high shrink/swell potential, are very moisture sensitive, and can be difficult to work. Due to their shrink/swell potential and moisture sensitivity, support of foundations, slabs and pavements directly above these materials poses a risk of excessive settlement which could lead to structural distress. To reduce this risk, we recommend adequate separation be provided between these plastic soils and structural subgrades. By providing adequate separation, seasonal variations in moisture conditions are less severe and overburden pressures can counteract swell pressures thereby reducing the shrink/swell risks associated with these materials.

We recommend 3 feet of separation material consisting of clean, low-plasticity soils be provided between high-plasticity clay soils (CH) and structural subgrades (e.g., pavement, slab and foundation subgrades). A lesser separation of 1 foot can be used between residual moderately plastic silts (MH) that proofroll stable and structural subgrades as these moderate-plasticity silts have less potential for shrink/swell behavior. In areas where the cut and fill depths are greater than 5 feet, adequate separation should be provided through the earthwork activities. However, in areas where final grades are

near existing grades (near the cut/fill boundary), some undercutting should be anticipated to provide adequate separation.

It should be noted that expansive soils are fairly low-strength, sensitive to moisture, and can degrade quickly when subjected to changes in moisture. Additional preparation of these materials (undercutting, moisture-conditioning, etc.) should be anticipated particularly if construction occurs during the wetter, cooler months of the year (November through April). Moderately plastic silts (MH) can be re-used provided they are well-mixed with low plasticity soils or placed deeper than three feet from structural subgrades. Highly plastic clays (CH) are not considered suitable for re-use as structural fill and should only be re-used in landscaped areas, or placed deeper than ten feet from structural subgrades.

4.1.4 Groundwater

As previously noted, groundwater was only encountered in Boring B-3. The stabilized water level in the boring was measured at a depth of 30 feet below the ground surface (approximate elevation of 789.6 feet). Based on the relatively deep water level measurements and the provided grading information, temporary or permanent dewatering is not anticipated at the site.

4.1.5 Excavations

Based on the results of the soil test borings, we anticipate that the majority of general excavations at the site in addition to excavations for footings, utilities, and undercutting will be in existing fill and residual soils. These soils, as well as any newly placed fill, can typically be excavated using backhoes, trackhoes, front-end loaders, bull dozers and other types of typical earthmoving equipment.

Partially Weathered Rock was encountered in Borings S-1, S-2, S-3, B-3 and B-5 at depths ranging from 17 to 32 feet below the ground surface (elevations of 799.9 to 787.6 feet), respectively. Also, auger refusal/rock was encountered in Borings S-2 and B-3 at depths of 28 and 37.3 feet (elevations 789.9 and 782.3 feet), respectively. Due to the relatively deep depths that these difficult to excavate materials were encountered, we do not anticipate these materials will be encountered within the proposed depths of excavation. However, the depth to and thickness of PWR, rock lenses or seams and bedrock can vary dramatically in short distances and between boring locations; therefore, PWR, boulders or bedrock may be encountered during general excavation or depths between boring locations not encountered during this exploration.

Temporary excavations required during construction should be shored and braced or the slopes flattened (laying back) to obtain a safe working environment. Excavations should be sloped or shored in accordance with local, state and federal regulations, including OSHA (29 CFR Part 1926) excavation trench safety standards. The contractor is solely responsible for site safety; this information is provided only as a service and under no circumstances should we be assumed responsible for construction site safety.

4.1.6 Proofrolling and Subgrade Evaluation

Upon completion of the stripping, and undercutting of plastic soils, we recommend that areas to provide support for the foundations, floor slabs, structural fill, and any pavement areas be proofrolled with a loaded dump truck or similar pneumatic tired vehicle (minimum loaded weight of 20 tons) under the observation of a staff professional or a senior soil technician. After excavation of the site has been completed, the exposed subgrade in cut areas should also be proofrolled. The proofrolling procedures should consist of four complete passes of the exposed areas, with two of the passes being in a direction perpendicular to the preceding ones. Any areas which deflect, rut or pump excessively during proofrolling or fail to "tighten up" after successive passes should be undercut to suitable soils and replaced with compacted fill.

After the subgrade/proofroll evaluation has been completed and stable subgrades have been achieved, final site grading should proceed immediately. If construction progresses during wet weather, the proofrolling operation shall be repeated with at least one pass in each direction immediately prior to placing aggregate base course in the parking areas or pouring of foundations. If unstable conditions are exposed during this operation, additional undercutting or scarifying may be required.

4.1.7 Subgrade Repair after Exposure

The exposed subgrade material will consist of silty soils which are known to deteriorate when exposed to environmental changes such as freezing, erosion, and softening from ponded rainwater. Also, these materials can deteriorate and rut when exposed to construction traffic. Laboratory testing of the on-site soils and our experience with local soils indicates that the on-site soils and commonly available fill soils are very sensitive to moisture and their condition will degrade quickly if these soils are allowed to saturate.

To alleviate the potential of degrading structural subgrade soils, we recommend that the subgrades be either immediately covered by floor slab bearing or pavement/base course materials, covered with a sacrificial layer of crushed stone which can also act as a working pad, or graded approximately 6 to 12 inches high and cut at a later date. The contractor should consider using a smooth faced bucket to make the final cut to design subgrade elevation. If care is not taken to protect the subgrade soils, the contractor should be prepared to repair/stabilize the subgrades before placing slab bearing or pavement/base course materials at his/her expense as failure to protect these materials should not be considered a changed condition.

We recommend that exposed subgrade surfaces in the building and pavement areas that have deteriorated be properly repaired by scarifying and re-compacting immediately prior to additional construction. It should be noted that the level of difficulty and cost of developing a stable subgrade will depend upon the weather conditions before and during construction as well as the time available to stabilize the subgrade. If subgrade preparation operations must be performed during wet weather conditions, undercutting the deteriorated soil and replacing it with compacted crushed stone may be preferable.

We recommend that the grading subcontractor smooth-roll exposed subgrades at the end of each work day, limit construction traffic to defined areas, and protect exposed subgrade soils during construction. This is essential for construction during the typically wetter, cooler months of November through April.

4.1.8 Fill Material and Placement

All fill used for site grading operations should consist of a clean (free of organics and debris), low plasticity soil (Liquid Limit less than 50, Plasticity Index less than 25). The proposed fill should have a maximum dry density of at least 90 pcf as determined by a standard Proctor compaction test, ASTM D 698 (Standard Proctor). Structural fill soils should generally classify as CL, ML, SC, SM, SW or GW in accordance with the USCS. Additionally, the maximum grain size should not exceed 3 inches.

As previously discussed, moderately plastic silts (MH) can be re-used provided they are well-mixed with low-plasticity soils or placed more than 3 feet below subgrades. Highly plastic clays (CH) should only be re-used in landscaped areas or placed deeper than 10 feet below subgrades.

All fill should be placed in loose lifts not exceeding eight inches in thickness at moisture contents within 3 percent of the optimum moisture content of the material as determined by ASTM D 698 (standard Proctor). Each lift of fill should be uniformly compacted to a dry density of at least 95 percent of the maximum dry density of the material determined according to ASTM D 698 (standard Proctor), with the upper 18 inches of fill compacted to at least 98 percent. The geotechnical engineer's representative should perform in-place field density tests to evaluate the compaction of the structural fill and backfill placed at the site. We recommend that at least one density test be performed per lift per 5,000 square feet of fill placement in structural areas and one test per lift per 100 linear feet in utility trenches.

Based on laboratory test results and visual observations of split-spoon samples, portions of residual soils at design subgrade elevation and in cut areas are 5 to 10 percent wet of optimum moisture content. The contractor should be prepared to disc and dry soils as necessary to achieve the moisture content range mentioned above.

4.1.9 Cut and Fill Slopes

Final project slopes should be designed at 3 horizontal to 1 vertical or flatter. The tops and bases of all slopes should be located a minimum of 10 feet from structural limits and a minimum of 5 feet from pavement limits. The fill slopes should be adequately compacted, as outlined in this report, and all slopes should be seeded and maintained after construction.

4.2 Seismic Design Parameters

The proposed structure should be designed to resist possible earthquake effects as determined in accordance with the current applicable building code. Based on Section 1613 of the North Carolina Building Code (NCBC) 2012 Edition (2009 International Building Code with North Carolina Amendments), and considering that the design finish

floor elevations will require on average approximately 5 feet of cut, the results of the shear wave velocity measurements obtained at the site indicate the weighted average shear wave velocity in the upper 100 feet below the design finish floor elevations to be approximately 1,269 feet per second. Based on Section 1613 of the NCBC, a **Seismic Site Class C** can be used for design.

Based on a Seismic Site Class C, the five percent damped design spectral response acceleration at short periods, S_{DS}, and at 1 second period, S_{D1}, were determined to be 0.199 g and 0.104 g, respectively. For an Occupancy Category IV, this corresponds to a **Seismic Design Category C**.

4.3 Foundation Support

The proposed building can be adequately supported by shallow foundations bearing on the low-plasticity residual soils or newly-placed structural fill provided the earthwork procedures and recommendations outlined in this report are implemented. An allowable bearing pressure of up to 3,000 pounds per square foot (psf) can be used for design of the foundations.

Shallow foundations should be designed to bear at least 12 inches below finished grades for frost protection and protective embedment. Column footings should be at least 24 inches square and wall footings should be at least 18 inches wide to prevent a punching shear failure of the foundation bearing soils.

Based on the general stratigraphy in the building areas, our experience with similar projects, the anticipated magnitude of the building loads, and the anticipated bearing elevations, total settlement potential for the structure on the order of 1 inch is estimated with differential settlement potential on the order of 1/2 inches. The majority of the settlement should occur shortly after construction.

All footing excavations should be observed by the geotechnical engineer's representative to confirm that suitable soils are present at/below the proposed bearing elevation. Plastic soils, if encountered at foundation bearing elevation, should be undercut per the direction of the geotechnical engineer. If evaluation with DCP testing encounters soft or other unsuitable materials in the footing excavations, undercutting may be required. Soft soils should be undercut until suitable soils are encountered. Undercut foundations should be backfilled with compacted structural fill, washed stone wrapped in a non-woven geotextile, or lean concrete.

Prepared bearing surfaces for foundations should not be disturbed or left exposed during inclement weather. The contractor should consider using a smooth face bucket to dig footings to excavate an undisturbed bearing surface. Use of a backhoe with teeth will disturb the subgrade soils (especially in areas where SPT <8 bpf). The footing excavation would then have to be recompacted. Saturation of the footing subgrade can cause a loss of strength and increased compressibility. If foundation excavations must remain open overnight or if rainfall becomes imminent while the bearing soils are exposed, we recommend that a 2 to 4-inch thick “mud-mat” of lean (2000 psi) concrete

be placed on the bearing soils before placement of reinforcing steel to help protect the bearing soils from further disturbance. Also, concrete should not be placed on frozen subgrades.

4.4 Floor Slabs

Ground-level floor slabs may be supported on properly compacted fill or low plasticity residual soils. A minimum 4-inch-thick layer of stone (NCDOT No. 57, No. 67 or ABC), as well as a plastic vapor retarder, should be provided beneath all building floor slabs to provide a capillary break in areas where floor coverings/spaces prohibit a damp slab condition.

The floor slabs should be designed to resist the anticipated dead and live loads. We recommend that the floor slabs be designed using a using a Standard Modulus of Subgrade Reaction of 100 pounds per cubic inch. The Standard Modulus of Subgrade Reaction represents the value correlated for a 30-inch-diameter Plate Bearing Test.

The subsurface conditions at the site (excluding the presence of the near-surface plastic materials) are generally favorable for a traditional slab-on-grade. Based on the floor loads assumed, we do not anticipate the need for a structural floor slab.

Immediately prior to constructing the floor slabs, we recommend that the areas be evaluated to detect any softened, loosened or disturbed areas that may have been exposed to wet weather or construction traffic. Areas that are found to be disturbed or appear unstable should be undercut and replaced with adequately compacted structural fill.

4.5 Below-Grade Walls

Any below-grade walls (basement or site retaining walls) planned should be designed with regard to the lateral pressure exerted by the retained soils in accordance with the 2012 North Carolina Building Code. In addition to the lateral loads exerted by the retained materials, allowances should be included for lateral stresses imposed by any temporary or long-term surcharge loads, such as cars or trucks, adjacent to the tops of the walls, including foundation loads from adjacent buildings. External stability of the proposed retaining walls should be checked during design, including resistance to sliding, overturning, and global slope failure.

A minimum of 12 inches of free-draining granular material and/or approved manufactured product should be placed directly behind the walls to provide drainage and prevent buildup of hydrostatic forces. The pressures exerted on walls will depend on the materials used as backfill and on the boundary condition (i.e., allowable movement) at the top of the wall.

Basement walls are typically restrained from rotation/movement and should be designed using “at-rest” lateral earth pressures. Walls that are not restrained from movement (e.g., cantilever retaining walls) can be designed using “active” lateral earth pressures; however, the lateral movement can result in settlement behind the walls which could cause distress in pavements, slabs, structures, and utilities. Use of a granular material for

wall backfill will also reduce the amount of movement that is required to mobilize active earth pressures. Design of the retaining walls should consider the boundary conditions and the amount of acceptable deflection.

Based on the on-site low-plasticity soils and locally available borrow materials, we recommend the following design parameters:

RETAINING WALL DESIGN PARAMETERS

Lateral Earth Pressure Condition		Coefficient	Equivalent Fluid Pressure
At-Rest Condition		(K_o) = 0.53	64 psf/ft
Active Condition		(K_A) = 0.36	43 psf/ft
Passive Condition		(K_P) = 2.77	330 psf/ft
Unit Weight of Soil (Moist)	120 pcf	Friction Angle	28°
Friction Factor for Foundations and Bearing Soils	0.36	Cohesion	100 psf

Care should be taken to prevent retaining wall backfill from being over-compacted, as this could result in excessive lateral stresses against the walls. Hand-held equipment should be used to avoid placing high stresses on the walls during compaction. Heavy compactors and grading equipment should not be allowed to operate within 5 to 10 feet of the walls during backfilling to avoid developing excessive temporary or long-term lateral soil pressures.

4.6 Pavements

Pavements may be supported on properly compacted, low plasticity fill or low plasticity residual soils. Immediately prior to constructing the pavements, we recommend that the areas be evaluated to detect any softened, loosened or disturbed areas that may have been exposed to wet weather or construction traffic. Areas that are found to be disturbed or appear unstable should be undercut and replaced with properly compacted structural fill.

The fine-grained soils typically available for use as structural fill/backfill in the project area are generally poor to marginal for pavement support since they are subject to softening and loss of strength with gradual exposure to moisture. High to moderately plastic clayey or silty soils (CH and MH) are not suitable for direct support of the pavement subgrade due to excessive swell and shrink potential.

Pavement section thicknesses are dependent on the subgrade soil conditions and loading (i.e., Equivalent Single Axle Loads). Although details on pavement loading conditions associated with the project have not been provided, we have assumed design parameters for use in our pavement design.

A soaked laboratory California Bearing Ratio (CBR) test was performed on a bulk sample obtained from boring S-1. The sample was compacted (remolded) to approximately 95 percent of the standard Proctor maximum dry density near the optimum moisture content. The results of the laboratory testing indicate a CBR value of approximately 8.2 percent. Based on the results of the laboratory testing and our experience with soils in the project area, a more conservative CBR value of 6 percent was used in the pavement design. Due to the moisture sensitivity of the on-site soils, this design is highly dependent on maintaining good surface drainage and proper site preparation.

An estimated Equivalent Single Axle Load (18-kip ESAL) of 20,000 for light-duty pavements and 100,000 for heavy-duty pavement areas over a 20-year design life was used in the design.

Typical pavement sections based on the anticipated traffic and subgrade conditions are presented in the following table:

Pavement Type	Material	Thickness (inches)	
		Light Duty	Heavy Duty
Rigid	Concrete (4,000 psi)	4	6
	Aggregate Base Course (ABC) (recommended)	6	6
Flexible	Asphalt Concrete (SF 9.5A)	2.5	3
	Aggregate Base Course (ABC)	6	8

All materials and workmanship shall meet the respective NCDOT *Standard Specifications for Roads and Structures* manual. In addition, inspections shall be performed during pavement installation to confirm that the required thickness, density, and quality requirements of the specifications are followed.

The asphalt pavement (SF 9.5A superpave asphalt mix) should be compacted to a minimum of 90 percent of its maximum specific gravity (G_{mm}). If other pavement mix types are selected, we would be happy to provide compaction recommendations for those mix types. If actual pavement loading conditions become available, we request the opportunity to evaluate our pavement thickness recommendations.

Light-duty pavements should be designated for car parking areas and lightly traveled service roads. Heavy-duty pavements should be designated for entrances and exits, access roads and driveways. Heavy-duty concrete pavement should be used in areas in front of loading docks and dumpsters.

Prevention of infiltration of water into the subgrade is essential for the successful performance of any pavement. Both the subgrade and the pavement surface should be sloped to promote surface drainage away from the pavement structure.

The ABC crushed stone should be placed in a single lift not exceeding 10 inches thick (compacted). The ABC should be compacted to at least 98 percent of its Modified Proctor maximum dry unit weight per AASHTO T-180.

To confirm that the specified degree of compaction is being obtained, field compaction testing should be performed in each ABC lift by the geotechnical engineer's representative. We recommend that compaction tests be performed at a minimum frequency of one test per 5,000 square feet per lift in pavement areas.

The early placement of graded aggregate base course will minimize the deterioration of the prepared soil subgrades. However, some loss of graded aggregate due to rutting and surface contamination may occur prior to final asphalt paving. Some infilling and re-grading of the graded aggregate in conjunction with sweeping with a wire broom may be required. The ABC should be smooth-rolled and proofrolled prior to asphalt or concrete pavement placement. Areas that pump, rut, or are otherwise unstable should be wetted or dried as needed and re-compacted.

We recommend that the asphalt contractor perform quality control procedures and testing per the project specifications. Quality assurance testing should be provided by the geotechnical engineer's representative and should consist of coring the placed asphalt pavement to verify thickness and compaction.

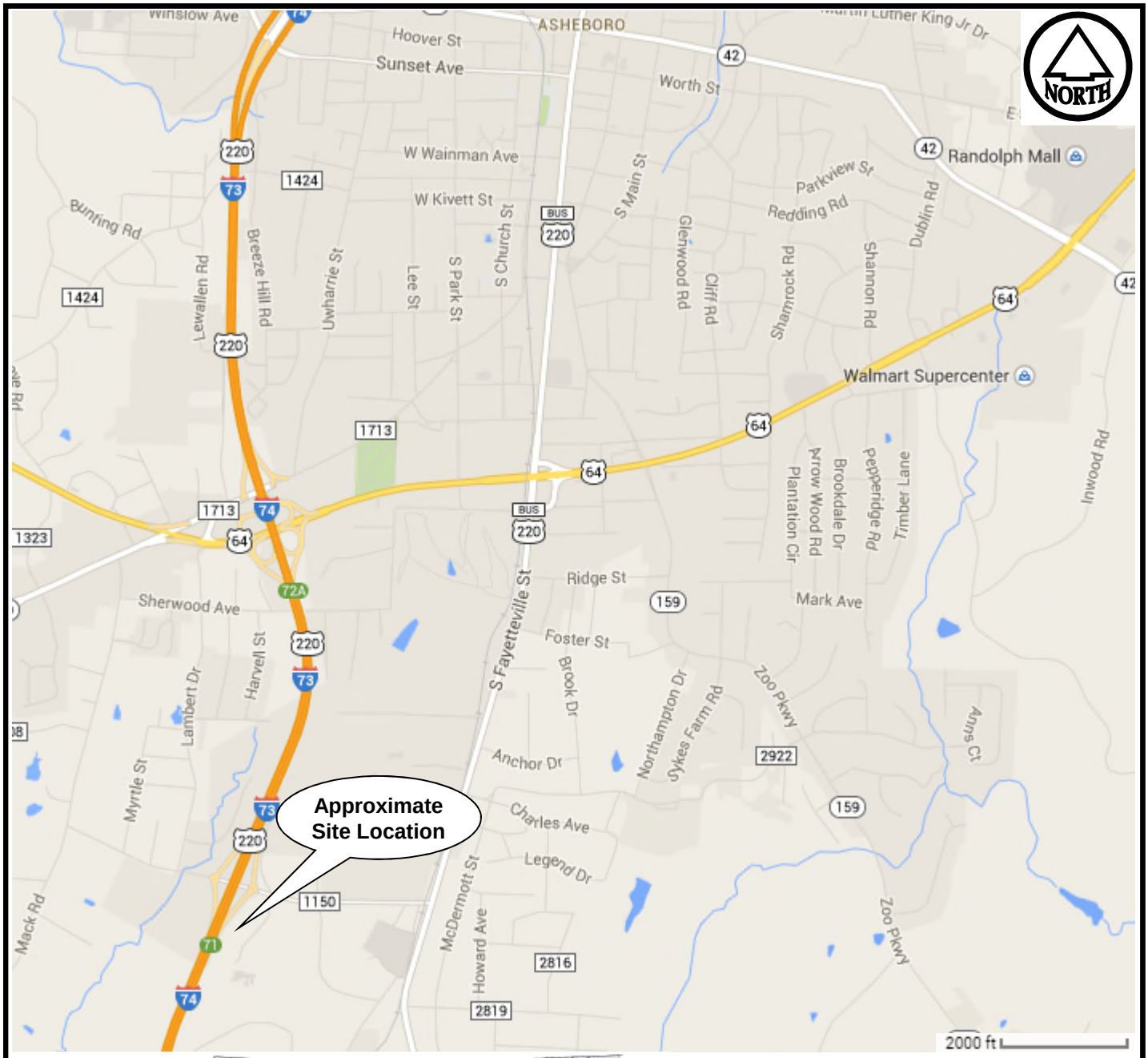
Although asphalt pavements should have a 15 to 20 year performance period, our experience indicates an overlay may be needed in approximately 7 to 10 years due to normal weathering of the asphaltic concrete surface. Also, some areas could require repair in a shorter time period.

5. LIMITATIONS

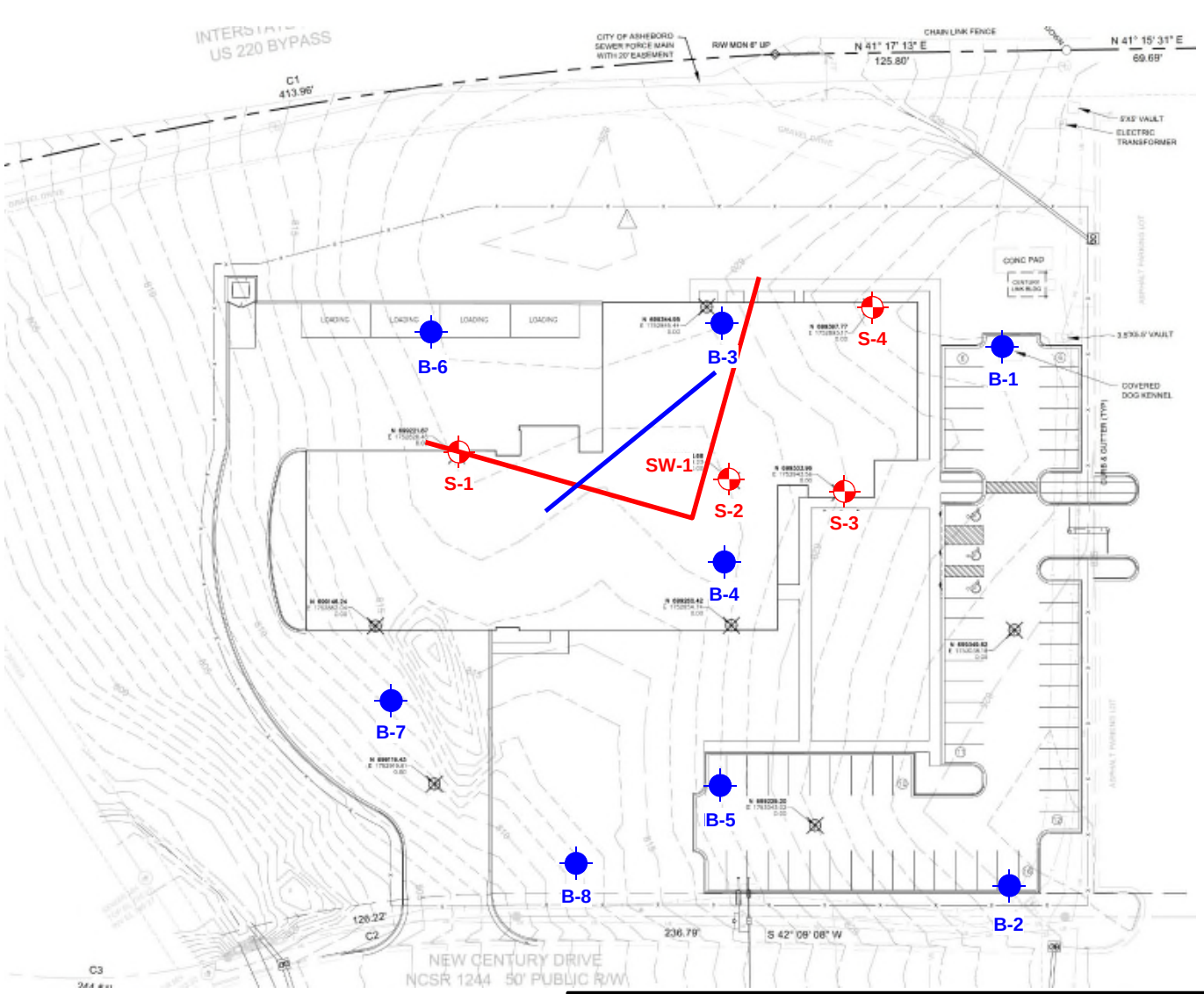
This report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. The conclusions and recommendations contained in this report are based upon applicable standards of our practice in this geographic area at the time this report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

The analyses and recommendations submitted herein are based, in part, upon the data obtained from the subsurface exploration. The nature and extent of variations between the borings will not become evident until construction. If variations appear evident, then we will re-evaluate the recommendations of this report. In the event that any changes in the nature, design, or location of the building are planned, the conclusions and recommendations contained in this report will not be considered valid unless the changes are reviewed and conclusions modified or verified in writing.

We recommend that S&ME be provided the opportunity to review the final design plans and specifications in order that earthwork and foundation recommendations are properly interpreted and implemented.



SCALE: AS SHOWN	S&ME ENGINEERING • TESTING ENVIRONMENTAL SERVICES	**SITE VICINITY MAP** **EMERGENCY SERVICES HEADQUARTERS** NEW CENTURY DRIVE ASHEBORO, NORTH CAROLINA	FIGURE NO. 1
DRAWN BY: LAC			
CHECKED BY: KCB			
DATE: 6/12/2015		PROJECT NO.: 1335-15-037	



LEGEND

- APPROXIMATE BORING LOCATION
- PREVIOUS BORING LOCATION
- APPROXIMATE MAM TEST LOCATION
- APPROXIMATE MASW TEST LOCATION

NOTE: SITE SCHEMATIC PROVIDED BY LITTLE AND MODIFIED BY S&ME TO SHOW APPROXIMATE TEST LOCATIONS.
DO NOT USE DRAWING TO DETERMINE DISTANCES OR QUANTITIES.

SCALE:	NTS
DRAWN BY:	JRW
CHECKED BY:	KCB
DATE:	6/12/2015

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TEST LOCATION PLAN

PROPOSED EMERGENCY SERVICES HEADQUARTERS

NEW CENTURY DRIVE
ASHEBORO, NORTH CAROLINA

PROJECT NO.: 1335-15-037

FIGURE NO.

2

NOTE: SOIL SERIES MAP OBTAINED FROM USDA WEBSITE.
DO NOT USE DRAWING TO DETERMINE DISTANCES OR QUANTITIES.

SCALE:	NTS
DRAWN BY:	LAC
CHECKED BY:	KCB
DATE:	6/12/2015

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USDA SOIL SERIES MAP

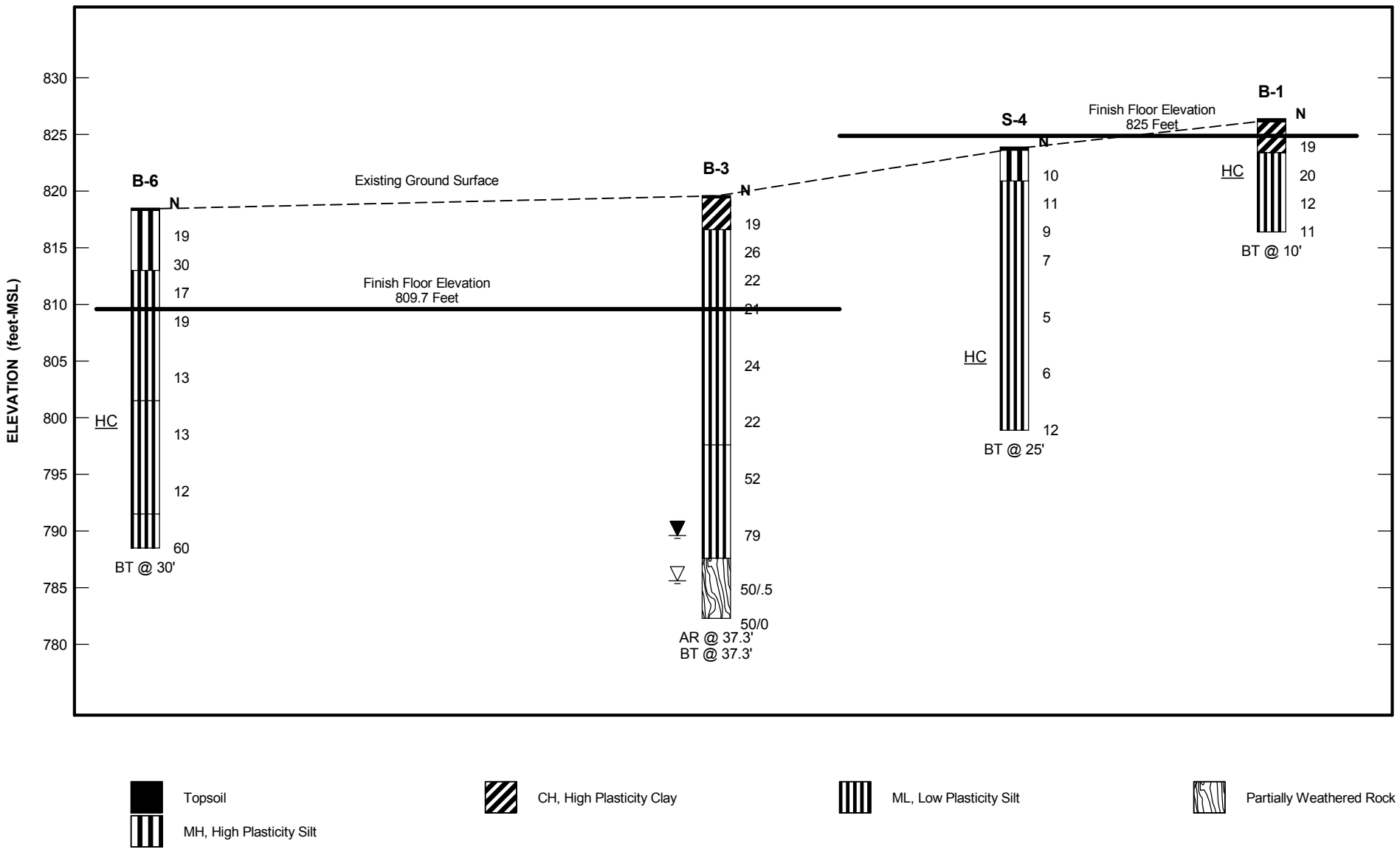
PROPOSED EMERGENCY SERVICES HEADQUARTERS

NEW CENTURY DRIVE
ASHEBORO, NORTH CAROLINA

PROJECT NO.: 1335-15-037

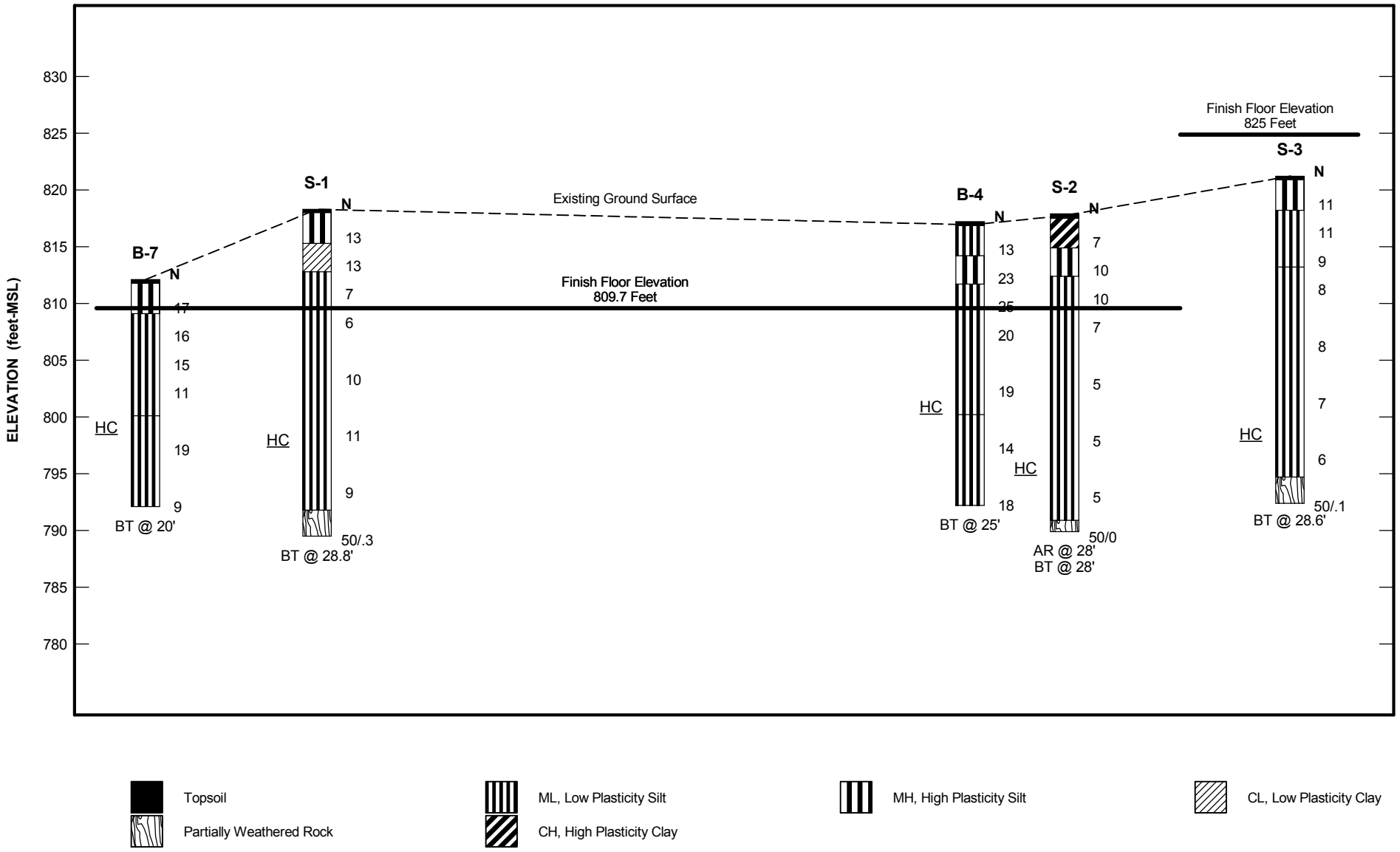
FIGURE NO.

3



N = Standard Penetration Test resistance value (blows per foot). The depicted stratigraphy is shown for illustrative purposes only. The actual subsurface conditions will vary between boring locations.

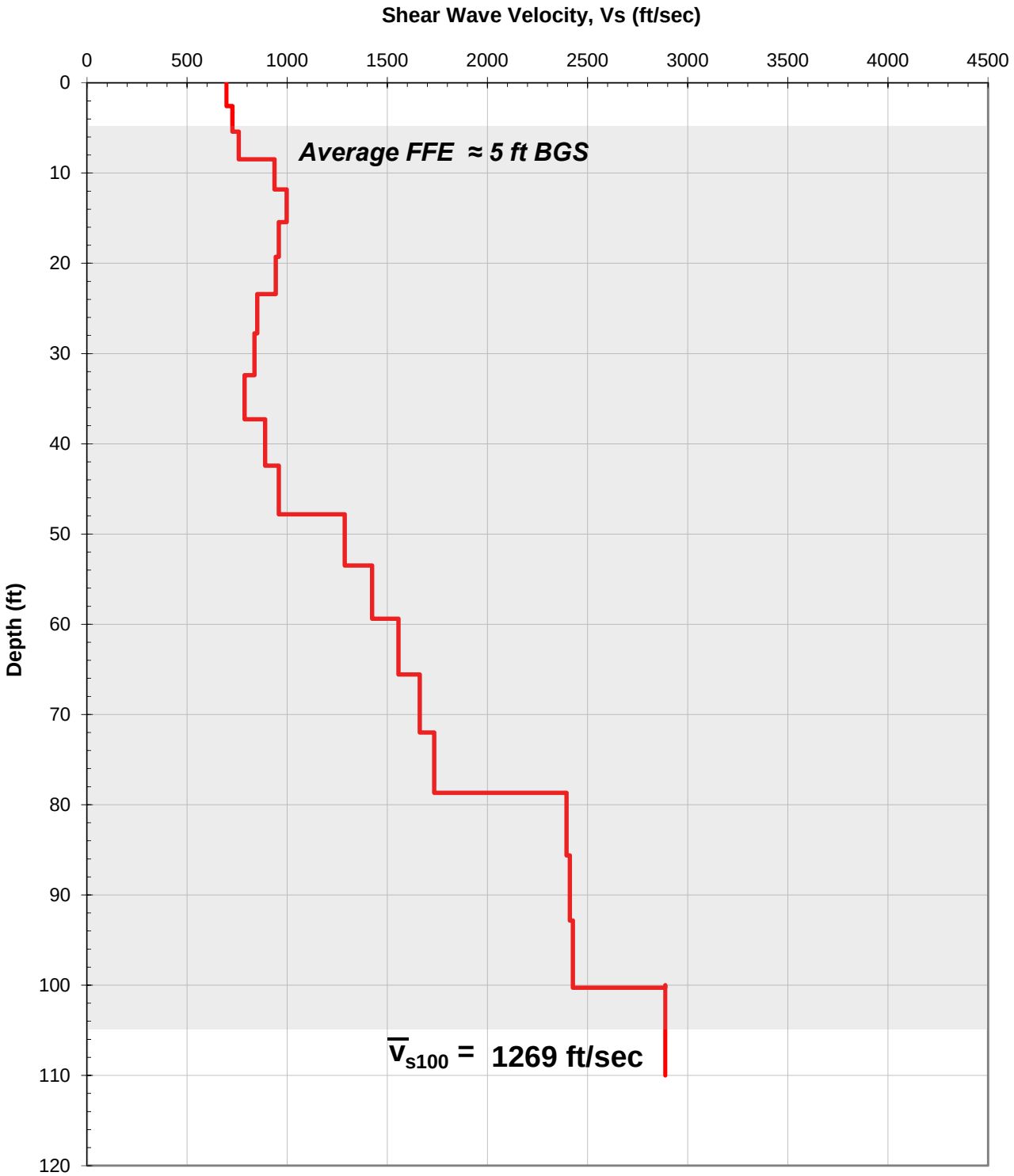
JOB NO: 1335-15-037 DATE: 6/12/15	S&ME	9751 SOUTEHRN PINE BOULEVARD CHARLOTTE, NORTH CAROLINA P: (704) 523-4726 F: (704) 525-3953	Diagram: Generalized Subsurface Profile Project: Emergency Services Headquarters Location: Randolph County, North Carolina	Figure 4



N = Standard Penetration Test resistance value (blows per foot). The depicted stratigraphy is shown for illustrative purposes only. The actual subsurface conditions will vary between boring locations.

JOB NO: 1335-15-037 DATE: 6/12/15	S&ME	9751 SOUTEHRN PINE BOULEVARD CHARLOTTE, NORTH CAROLINA P: (704) 523-4726 F: (704) 525-3953	Diagram: Generalized Subsurface Profile Project: Emergency Services Headquarters Location: Randolph County, North Carolina	Figure 5

Shear Wave Velocity Profile SW-1
Randolph County EMS Headquarters
Ashboro, North Carolina
1335-15-037



LEGEND TO SOIL CLASSIFICATION AND SYMBOLS

SOIL TYPES

(Shown in Graphic Log)


Fill


Asphalt


Concrete


Topsoil


Partially Weathered Rock


Cored Rock


GW — WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES


GP — POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES


GM — SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES


GC — CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES


SW — WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES


SP — POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES


SM — SILTY SANDS, SAND - SILT MIXTURES


SC — CLAYEY SANDS, SAND - CLAY MIXTURES


ML — INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY


CL — INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS


OL — ORGANIC SILTS AND ORGANIC CLAYS OF LOW PLASTICITY


MH — INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS, ELASTIC SILTS


CH — INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS


OH — ORGANIC SILTS AND ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY

WATER LEVELS

(Shown in Water Level Column)

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

CONSISTENCY OF COHESIVE SOILS

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

RELATIVE DENSITY OF COHESIONLESS SOILS

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

SAMPLER TYPES

(Shown in Samples Column)


Shelby Tube


Split Spoon


Rock Core


No Recovery

TERMS

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

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

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

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PROJECT: **Emergency Services Headquarters**
Randolph County, North Carolina
S&ME Project No. 1335-15-037

BORING LOG S-1

DATE DRILLED: **5/28/15**	ELEVATION: **818.3 ft**
DRILL RIG: **CME-550X**	BORING DEPTH: **28.8 ft**
DRILLER: **E. Rummage**	WATER LEVEL: **Not Encountered**
HAMMER TYPE: **Automatic**	LOGGED BY: **L. Campos**
SAMPLING METHOD: **Split Spoon**	NORTHING: **699222** EASTING: **1752821**
DRILLING METHOD: **2¼" H.S.A.**	

NOTES: **Northings & Eastings presented obtained from hand-held GPS unit and should be considered approximate.**

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SPT REC. (in.) / SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	REMARKS / STANDARD PENETRATION TEST DATA (blows/ft)	N VALUE
	Topsoil/Rootmat (3 inches)									
	RESIDUUM: CLAYEY SILT (MH) - stiff, red brown			SS-1		3	5	8	13	13
	SANDY CLAY (CL) - stiff, red brown			SS-2		5	6	7	13	13
5			813.3	SS-3		3	3	4	7	7
	SANDY SILT (ML) - firm to stiff, brown tan			SS-4		2	3	3	6	6
10			808.3							
				SS-5		4	4	6	10	10
15			803.3							
				SS-6		3	5	6	11	11
20		HC	798.3							
				SS-7		3	4	5	9	9
25			793.3							
	PARTIALLY WEATHERED ROCK: SANDY SILT (ML) - gray			SS-8		50/.3			100 50/.3	
	Boring terminated at 28.8 feet									

S&ME BORING LOG EMERGENCY SERVICES HEADQUARTERS DESIGN.GPJ S&ME.GDT 6/12/15

NOTES:

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

S&ME

PROJECT: **Emergency Services Headquarters**
Randolph County, North Carolina
S&ME Project No. 1335-15-037

BORING LOG S-2

DATE DRILLED: **5/28/15**	ELEVATION: **817.9 ft**	NOTES: **Northings & Eastings presented obtained from hand-held GPS unit and should be considered approximate.**
DRILL RIG: **CME-550X**	BORING DEPTH: **28.0 ft**	
DRILLER: **E. Rummage**	WATER LEVEL: **Not Encountered**	
HAMMER TYPE: **Automatic**	LOGGED BY: **L. Campos**	
SAMPLING METHOD: **Split Spoon**	NORTHING: **699302**	EASTING: **1752908**
DRILLING METHOD: **2¼" H.S.A.**		

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SPT REC. (in.) SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	REMARKS STANDARD PENETRATION TEST DATA (blows/ft) 10 20 30 60 80	N VALUE
	Topsoil/Rootmat (5 inches)									
	RESIDUUM: SILTY CLAY (CH) - firm, brown			SS-1		3	3	4	7	7
	CLAYEY SILT (MH) - stiff, red			SS-2		4	4	6	10	10
5			812.9							
	SANDY SILT (ML) - stiff to firm, red brown tan			SS-3		3	5	5	10	10
				SS-4		3	3	4	7	7
10			807.9							
				SS-5		2	2	3	5	5
15			802.9							
				SS-6		2	2	3	5	5
20		HC	797.9							
				SS-7		2	2	3	5	5
25			792.9							
	PARTIALLY WEATHERED ROCK: SANDY SILT (ML) - gray			SS-8		50/0			100 50/0	
	Refusal at 28 feet Boring terminated at 28 feet									

S&ME BORING LOG EMERGENCY SERVICES HEADQUARTERS DESIGN.GPJ S&ME.GDT 6/12/15

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S&ME

PROJECT: **Emergency Services Headquarters**
Randolph County, North Carolina
S&ME Project No. 1335-15-037

BORING LOG S-3

DATE DRILLED: **5/28/15**	ELEVATION: **821.2 ft**	NOTES: **Northings & Eastings presented obtained from hand-held GPS unit and should be considered approximate.**
DRILL RIG: **CME-550X**	BORING DEPTH: **28.6 ft**	
DRILLER: **E. Rummage**	WATER LEVEL: **Not Encountered**	
HAMMER TYPE: **Automatic**	LOGGED BY: **L. Campos**	
SAMPLING METHOD: **Split Spoon**	NORTHING: **699334**	EASTING: **1752943**
DRILLING METHOD: **2¼" H.S.A.**		

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SPT REC. (in.) SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	REMARKS STANDARD PENETRATION TEST DATA (blows/ft)	N VALUE
	Topsoil/Rootmat (4 inches)									
	RESIDUUM: CLAYEY SILT (MH) - stiff, red brown			SS-1		4	5	6	11	11
	SANDY SILT (ML) - stiff, red tan			SS-2		4	5	6	11	11
5			816.2	SS-3		3	4	5	9	9
				SS-4		3	4	4	8	8
	SANDY SILT (ML) - firm, gray tan		811.2							
10				SS-5		3	4	4	8	8
			806.2							
15				SS-6		3	3	4	7	7
			801.2							
20		HC		SS-7		3	3	3	6	6
			796.2							
25	**PARTIALLY WEATHERED ROCK: SANDY SILT (ML)** - gray			SS-8		50/.1			100/.1	50/.1
	Boring terminated at 28.6 feet									

S&ME BORING LOG EMERGENCY SERVICES HEADQUARTERS DESIGN.GPJ S&ME.GDT 6/12/15

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

PROJECT: **Emergency Services Headquarters**
Randolph County, North Carolina
S&ME Project No. 1335-15-037

BORING LOG S-4

DATE DRILLED: **5/28/15**	ELEVATION: **823.9 ft**	NOTES: **Northings & Eastings presented obtained from hand-held GPS unit and should be considered approximate.**
DRILL RIG: **CME-550X**	BORING DEPTH: **25.0 ft**	
DRILLER: **E. Rummage**	WATER LEVEL: **Not Encountered**	
HAMMER TYPE: **Automatic**	LOGGED BY: **L. Campos**	
SAMPLING METHOD: **Split Spoon**	NORTHING: **699398**	EASTING: **1752893**
DRILLING METHOD: **2¼" H.S.A.**		

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SPT REC. (in.)	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	REMARKS STANDARD PENETRATION TEST DATA (blows/ft) 10 20 30 60 80	N VALUE
	Topsoil/Rootmat (3 inches)										
	RESIDUUM: CLAYEY SILT (MH) - stiff, red brown			SS-1			4	4	6	10	10
	SANDY SILT (ML) - stiff to firm, red tan gray			SS-2			4	5	6	11	11
5			818.9	SS-3			4	4	5	9	9
				SS-4			3	3	4	7	7
10			813.9								
				SS-5			2	2	3	5	5
15			808.9								
		HC		SS-6			2	3	3	6	6
20			803.9								
				SS-7			4	7	5	12	12
25			798.9								
	Boring terminated at 25 feet										

S&ME BORING LOG EMERGENCY SERVICES HEADQUARTERS DESIGN.GPJ S&ME.GDT 6/12/15

NOTES:

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

S&ME

PROJECT: **Emergency Services Headquarters**
Randolph County, North Carolina
S&ME Project No. 1335-15-037

BORING LOG B-1

DATE DRILLED: **10/2/14**	ELEVATION: **826.4 ft**	NOTES: **Northings & Eastings presented obtained from hand-held GPS unit and should be considered approximate.**
DRILL RIG: **CME-550X**	BORING DEPTH: **10.0 ft**	
DRILLER: **J. White**	WATER LEVEL: **Not Encountered**	
HAMMER TYPE: **Automatic**	LOGGED BY: **M. Keatts**	
SAMPLING METHOD: **Split Spoon**	NORTHING: **699430**	EASTING: **1752942**
DRILLING METHOD: **3¼" H.S.A.**		

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SPT REC. (in.) SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	REMARKS STANDARD PENETRATION TEST DATA (blows/ft) 10 20 30 60 80	N VALUE
		Topsoil/Rootmat (3 inches)									
		RESIDUUM: SILTY CLAY (CH) - very stiff, red, moist			SS-1		5	8	11	19	19
		SANDY SILT (ML) - very stiff to stiff, orange white, moist			SS-2		7	8	12	20	20
5			HC	821.4	SS-3		4	5	7	12	12
					SS-4		5	4	7	11	11
10		Boring terminated at 10 feet		816.4							

S&ME BORING LOG EMERGENCY SERVICES HEADQUARTERS DESIGN.GPJ S&ME.GDT 6/12/15

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

PROJECT: **Emergency Services Headquarters**
Randolph County, North Carolina
S&ME Project No. 1335-15-037

BORING LOG B-2

DATE DRILLED: **10/2/14**	ELEVATION: **822.6 ft**	NOTES: **Northings & Eastings presented obtained from hand-held GPS unit and should be considered approximate.**
DRILL RIG: **CME-550X**	BORING DEPTH: **10.0 ft**	
DRILLER: **J. White**	WATER LEVEL: **Not Encountered**	
HAMMER TYPE: **Automatic**	LOGGED BY: **M. Keatts**	
SAMPLING METHOD: **Split Spoon**	NORTHING: **699274**	EASTING: **1753119**
DRILLING METHOD: **3¼" H.S.A.**		

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SPT REC. (in.) SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	REMARKS STANDARD PENETRATION TEST DATA (blows/ft) 10 20 30 60 80	N VALUE
		Topsoil/Rootmat (3 inches)									
		RESIDUUM: CLAYEY SILT (MH) - very stiff, tan brown, moist			SS-1		8	13	15	28	28
		SANDY SILT (ML) - very stiff to stiff, red white, moist			SS-2		7	10	12	22	22
5			HC	817.6	SS-3		5	6	8	14	14
					SS-4		3	5	6	11	11
10		Boring terminated at 10 feet		812.6							

S&ME BORING LOG EMERGENCY SERVICES HEADQUARTERS DESIGN.GPJ S&ME.GDT 6/12/15

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S&ME

PROJECT: **Emergency Services Headquarters**
Randolph County, North Carolina
S&ME Project No. 1335-15-037

BORING LOG B-3

DATE DRILLED: **10/3/14**
ELEVATION: **819.6 ft**
DRILL RIG: **CME-550X**
BORING DEPTH: **37.3 ft**
DRILLER: **J. White**
WATER LEVEL: **30 Feet on 10/72014**
HAMMER TYPE: **Automatic**
LOGGED BY: **M. Keatts**
NOTES: **Northings & Eastings presented obtained from hand-held GPS unit and should be considered approximate.**
SAMPLING METHOD: **Split Spoon**
NORTHING: **699348**
EASTING: **1752850**
DRILLING METHOD: **3¼" H.S.A.**

DEPTH (feet)	MATERIAL DESCRIPTION	ELEVATION (feet-MSL)	SAMPLE NO.	SPT REC. (in.)	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
0	Topsoil/Rootmat (2 inches)								
	RESIDUUM: SILTY CLAY (CH) - very stiff, red, moist		SS-1			5	6	13	19
	SANDY SILT (ML) - very stiff, orange tan red, moist		SS-2			9	12	14	26
5		814.6	SS-3			6	9	13	22
			SS-4			6	9	12	21
10		809.6							
			SS-5			9	11	13	24
15		804.6							
			SS-6			6	10	12	22
20		799.6							
	SANDY SILT (ML) - very hard, tan gray white, manganese staining, moist		SS-7			31	27	25	52
25		794.6							
			SS-8			13	29	50	79
30		789.6							

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

S&ME BORING LOG EMERGENCY SERVICES HEADQUARTERS DESIGN.GPJ S&ME.GDT 6/12/15

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

S&ME

PROJECT: **Emergency Services Headquarters**
Randolph County, North Carolina
S&ME Project No. 1335-15-037

BORING LOG B-3

DATE DRILLED: **10/3/14**	ELEVATION: **819.6 ft**	NOTES: **Northings & Eastings presented obtained from hand-held GPS unit and should be considered approximate.**
DRILL RIG: **CME-550X**	BORING DEPTH: **37.3 ft**	
DRILLER: **J. White**	WATER LEVEL: **30 Feet on 10/72014**	
HAMMER TYPE: **Automatic**	LOGGED BY: **M. Keatts**	
SAMPLING METHOD: **Split Spoon**	NORTHING: **699348**	EASTING: **1752850**
DRILLING METHOD: **3¼" H.S.A.**		

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SPT REC. (in.) SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	REMARKS STANDARD PENETRATION TEST DATA (blows/ft) 10 20 30 60 80	N VALUE
35		**PARTIALLY WEATHERED ROCK: SANDY SILT (ML)** - white gray, manganese staining, moist	▽	784.6	SS-9	31	50/.5			100 50/.5	
					SS-10	50/0				100 50/0	
		Refusal at 37.3 feet Boring terminated at 37.3 feet Temporary slotted PVC standpipe inserted at termination.									

S&ME BORING LOG EMERGENCY SERVICES HEADQUARTERS DESIGN.GPJ S&ME.GDT 6/12/15

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S&ME

PROJECT: **Emergency Services Headquarters**
Randolph County, North Carolina
S&ME Project No. 1335-15-037

BORING LOG B-4

DATE DRILLED: **10/2/14**	ELEVATION: **817.2 ft**	NOTES: **Northings & Eastings presented obtained from hand-held GPS unit and should be considered approximate.**
DRILL RIG: **CME-550X**	BORING DEPTH: **25.0 ft**	
DRILLER: **J. White**	WATER LEVEL: **Not Encountered**	
HAMMER TYPE: **Automatic**	LOGGED BY: **M. Keatts**	
SAMPLING METHOD: **Split Spoon**	NORTHING: **699277**	EASTING: **1752930**
DRILLING METHOD: **3¼" H.S.A.**		

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SPT REC. (in.) SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	REMARKS STANDARD PENETRATION TEST DATA (blows/ft) 10 20 30 60 80	N VALUE
	Topsoil/Rootmat (4 inches)									
	RESIDUUM: SANDY SILT (ML) - stiff, tan, dry			SS-1		4	5	8	13	13
	CLAYEY SILT (MH) - very stiff, red tan white, moist			SS-2		8	10	13	23	23
5			812.2							
	SANDY SILT (ML) - very stiff, orange tan white, manganese staining, moist			SS-3		12	12	13	25	25
				SS-4		6	9	11	20	20
10			807.2							
				SS-5		9	9	10	19	19
15			802.2							
		HC								
	SANDY SILT (ML) - stiff to very stiff, gray, wet			SS-6		5	5	9	14	14
20			797.2							
				SS-7		7	8	10	18	18
25			792.2							
	Boring terminated at 25 feet									

S&ME BORING LOG EMERGENCY SERVICES HEADQUARTERS DESIGN.GPJ S&ME.GDT 6/12/15

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

S&ME

PROJECT: **Emergency Services Headquarters**
Randolph County, North Carolina
S&ME Project No. 1335-15-037

BORING LOG B-5

DATE DRILLED: **10/2/14**	ELEVATION: **816.9 ft**	NOTES: **Northings & Eastings presented obtained from hand-held GPS unit and should be considered approximate.**
DRILL RIG: **CME-550X**	BORING DEPTH: **24.0 ft**	
DRILLER: **J. White**	WATER LEVEL: **Not Encountered**	
HAMMER TYPE: **Automatic**	LOGGED BY: **M. Keatts**	
SAMPLING METHOD: **Split Spoon**	NORTHING: **699210**	EASTING: **1753002**
DRILLING METHOD: **3¼" H.S.A.**		

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SPT REC. (in.) SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	REMARKS STANDARD PENETRATION TEST DATA (blows/ft) 10 20 30 60 80	N VALUE
	Topsoil/Rootmat (4 inches)									
	RESIDUUM: SILTY CLAY (CH) - very stiff, tan brown red, moist			SS-1		7	7	9	16	16
	SANDY SILT (ML) - very stiff to stiff, red white orange, moist			SS-2		5	7	9	16	16
5			811.9	SS-3		3	5	6	11	11
				SS-4		4	4	6	10	10
10			806.9							
	SILTY SAND (SM) - medium dense, red brown, wet, fine to coarse			SS-5		4	6	8	14	14
15			801.9							
	PARTIALLY WEATHERED ROCK: SILTY SAND (SM) - tan, dry, fine to coarse	HC		SS-6		4	6	50/.3	100 50/.3	
20			796.9							
				SS-7		50/.5			100 50/.5	
	Boring terminated at 24 feet									

S&ME BORING LOG EMERGENCY SERVICES HEADQUARTERS DESIGN.GPJ S&ME.GDT 6/12/15

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S&ME

PROJECT: **Emergency Services Headquarters**
Randolph County, North Carolina
S&ME Project No. 1335-15-037

BORING LOG B-6

DATE DRILLED: **10/3/14** | ELEVATION: **818.5 ft**

DRILL RIG: **CME-550X** | BORING DEPTH: **30.0 ft**

DRILLER: **J. White** | WATER LEVEL: **Not Encountered**

HAMMER TYPE: **Automatic** | LOGGED BY: **M. Keatts**

NOTES: **Northings & Eastings presented obtained from hand-held GPS unit and should be considered approximate.**

SAMPLING METHOD: **Split Spoon** | NORTHING: **699250** | EASTING: **1752770**

DRILLING METHOD: **3¼" H.S.A.**

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SPT REC. (in.) SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	REMARKS STANDARD PENETRATION TEST DATA (blows/ft)	N VALUE
		Topsoil/Rootmat (2 inches)									
		RESIDUUM: CLAYEY SILT (MH) - very stiff, tan brown red, moist			SS-1		5	7	12	19	19
					SS-2		10	12	18	30	30
5				813.5							
		SANDY SILT (ML) - very stiff to stiff, red white tan, moist			SS-3		5	8	9	17	17
					SS-4		5	8	11	19	19
10				808.5							
					SS-5		4	6	7	13	13
15				803.5							
		SANDY SILT (ML) - stiff, gray white, manganese staining, moist	HC		SS-6		4	5	8	13	13
20				798.5							
					SS-7		3	4	8	12	12
25				793.5							
		SANDY SILT (ML) - very hard, gray white, manganese staining, moist			SS-8		15	28	32	60	60
30				788.5							
		Boring terminated at 30 feet									

S&ME BORING LOG EMERGENCY SERVICES HEADQUARTERS DESIGN.GPJ S&ME.GDT 6/12/15

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

S&ME

PROJECT: **Emergency Services Headquarters**
Randolph County, North Carolina
S&ME Project No. 1335-15-037

BORING LOG B-7

DATE DRILLED: **10/2/14**	ELEVATION: **812.1 ft**	NOTES: **Northings & Eastings presented obtained from hand-held GPS unit and should be considered approximate.**
DRILL RIG: **CME-550X**	BORING DEPTH: **20.0 ft**	
DRILLER: **J. White**	WATER LEVEL: **Not Encountered**	
HAMMER TYPE: **Automatic**	LOGGED BY: **M. Keatts**	
SAMPLING METHOD: **Split Spoon**	NORTHING: **699128**	EASTING: **1752877**
DRILLING METHOD: **3¼" H.S.A.**		

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SPT REC. (in.) SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	REMARKS STANDARD PENETRATION TEST DATA (blows/ft) 10 20 30 60 80	N VALUE
	Topsoil/Rootmat (3 inches)									
	RESIDUUM: CLAYEY SILT (MH) - very stiff, red, moist			SS-1		6	8	9	17	17
	SANDY SILT (ML) - very stiff to stiff, tan white orange, moist			SS-2		8	8	8	16	16
5			807.1	SS-3		7	7	8	15	15
				SS-4		5	5	6	11	11
10			802.1							
	SANDY SILT (ML) - very stiff to stiff, gray tan white, moist	HC		SS-5		6	9	10	19	19
15			797.1							
				SS-6		3	4	5	9	9
20			792.1							
	Boring terminated at 20 feet									

S&ME BORING LOG EMERGENCY SERVICES HEADQUARTERS DESIGN.GPJ S&ME.GDT 6/12/15

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S&ME

PROJECT: **Emergency Services Headquarters**
Randolph County, North Carolina
S&ME Project No. 1335-15-037

BORING LOG B-8

DATE DRILLED: **10/2/14**	ELEVATION: **810.8 ft**	NOTES: **Northings & Eastings presented obtained from hand-held GPS unit and should be considered approximate.**
DRILL RIG: **CME-550X**	BORING DEPTH: **10.0 ft**	
DRILLER: **J. White**	WATER LEVEL: **Not Encountered**	
HAMMER TYPE: **Automatic**	LOGGED BY: **M. Keatts**	
SAMPLING METHOD: **Split Spoon**	NORTHING: **699140**	EASTING: **1752985**
DRILLING METHOD: **3¼" H.S.A.**		

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SPT REC. (in.)	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	REMARKS STANDARD PENETRATION TEST DATA (blows/ft) 10 20 30 60 80	N VALUE
	Topsoil/Rootmat (3 inches)										
	FILL: CLAYEY SILT (MH) - stiff, brown tan, moist			SS-1			6	6	7	13	13
	RESIDUUM: CLAYEY SILT (MH) - very stiff, brown tan, moist	HC		SS-2			6	10	11	21	21
5			805.8								
	SANDY SILT (ML) - stiff, red orange, moist			SS-3			4	4	6	10	10
				SS-4			4	4	5	9	9
10			800.8								
	Boring terminated at 10 feet										

S&ME BORING LOG EMERGENCY SERVICES HEADQUARTERS DESIGN.GPJ S&ME.GDT 6/12/15

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S&ME

Sieve Analysis of Soils

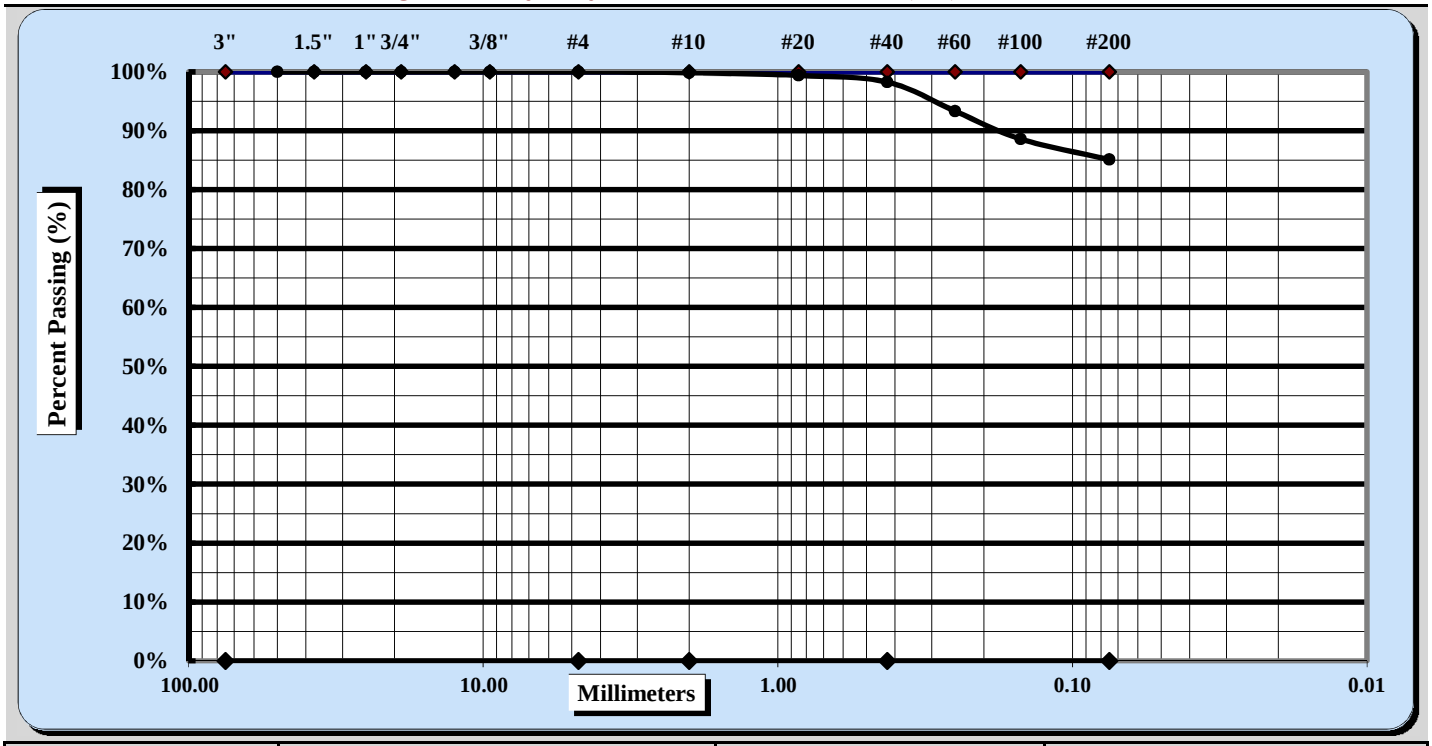
ASTM D 422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard~Charlotte, NC 28273

Project #:	**1335-15-037 (01)**	Report Date:	6/4/15
Project Name:	Emergency Services Headquarters	Test Date(s):	6/2-4/15
Client Name:	Randolph County Public Works		
Client Address:	725 McDowell Road, Asheboro, NC 27205		
Sample ID: S-1	Type: Bulk	Sample Date:	5/28/15
Location: Borehole	Sample: Bag-1	Elevation:	1-10'

Sample Description: Orange Tan Silty Clay w/Medium to Fine Sand (CL)



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	#10	Coarse Sand	0.1%	Fine Sand	13.1%
Gravel	0.0%	Medium Sand	1.6%	Silt & Clay	85.1%
Liquid Limit	46	Plastic Limit	26	Plastic Index	20
Specific Gravity	ND			Moisture Content	27.8%
Coarse Sand	0.1%	Medium Sand	1.6%	Fine Sand	13.1%

Description of Sand & Gravel Particles: Rounded ☐ Angular ☒
Hard & Durable ☒ Soft ☐ Weathered & Friable ☐

Notes / Deviations / References:

Technician Name: **Date:**

Luis Campos		Project Engineer	6/12/2015
Technical Responsibility	*Signature*	*Position*	*Date*

Sieve Analysis of Soils

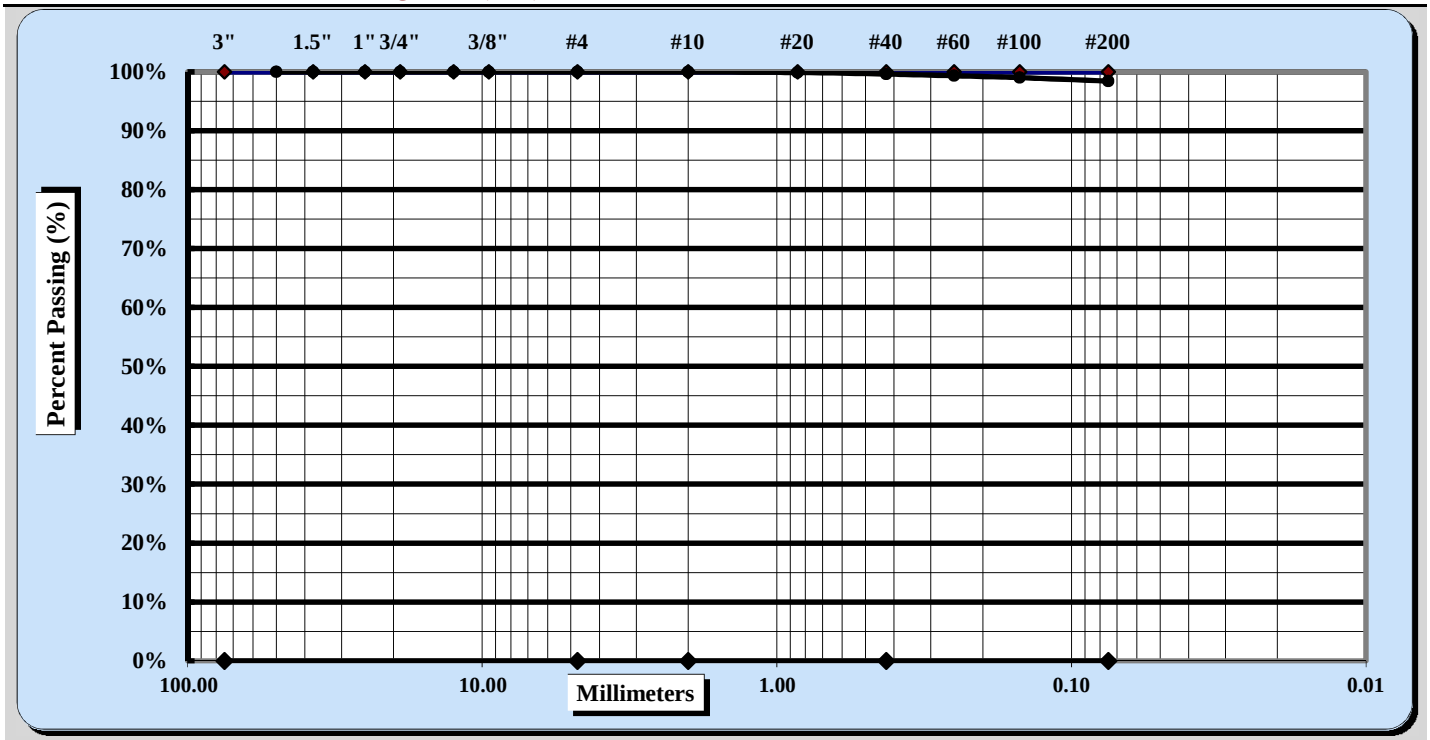
ASTM D 422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard~Charlotte, NC 28273

Project #:	**1335-15-037 (01)**	Report Date:	6/5/15
Project Name:	Emergency Services Headquarters	Test Date(s):	6/2-4/15
Client Name:	Randolph County Public Works		
Client Address:	725 McDowell Road, Asheboro, NC 27205		
Sample ID: S-2	Type: Split Spoon	Sample Date:	5/28/15
Location: Borehole	Sample: SS-4	Elevation:	8.5-10'

Sample Description: Orange Silt (ML)



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	#20	Coarse Sand	0.0%	Fine Sand	1.2%
Gravel	0.0%	Medium Sand	0.4%	Silt & Clay	98.4%
Liquid Limit	48	Plastic Limit	37	Plastic Index	11
Specific Gravity	ND			Moisture Content	21.9%
Coarse Sand	0.0%	Medium Sand	0.4%	Fine Sand	1.2%

Description of Sand & Gravel Particles: Rounded ☐ Angular ☒
Hard & Durable ☒ Soft ☐ Weathered & Friable ☐

Notes / Deviations / References:

Technician Name: **Date:**

Luis Campos		Project Engineer	6/12/2015
Technical Responsibility	*Signature*	*Position*	*Date*

Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME
Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

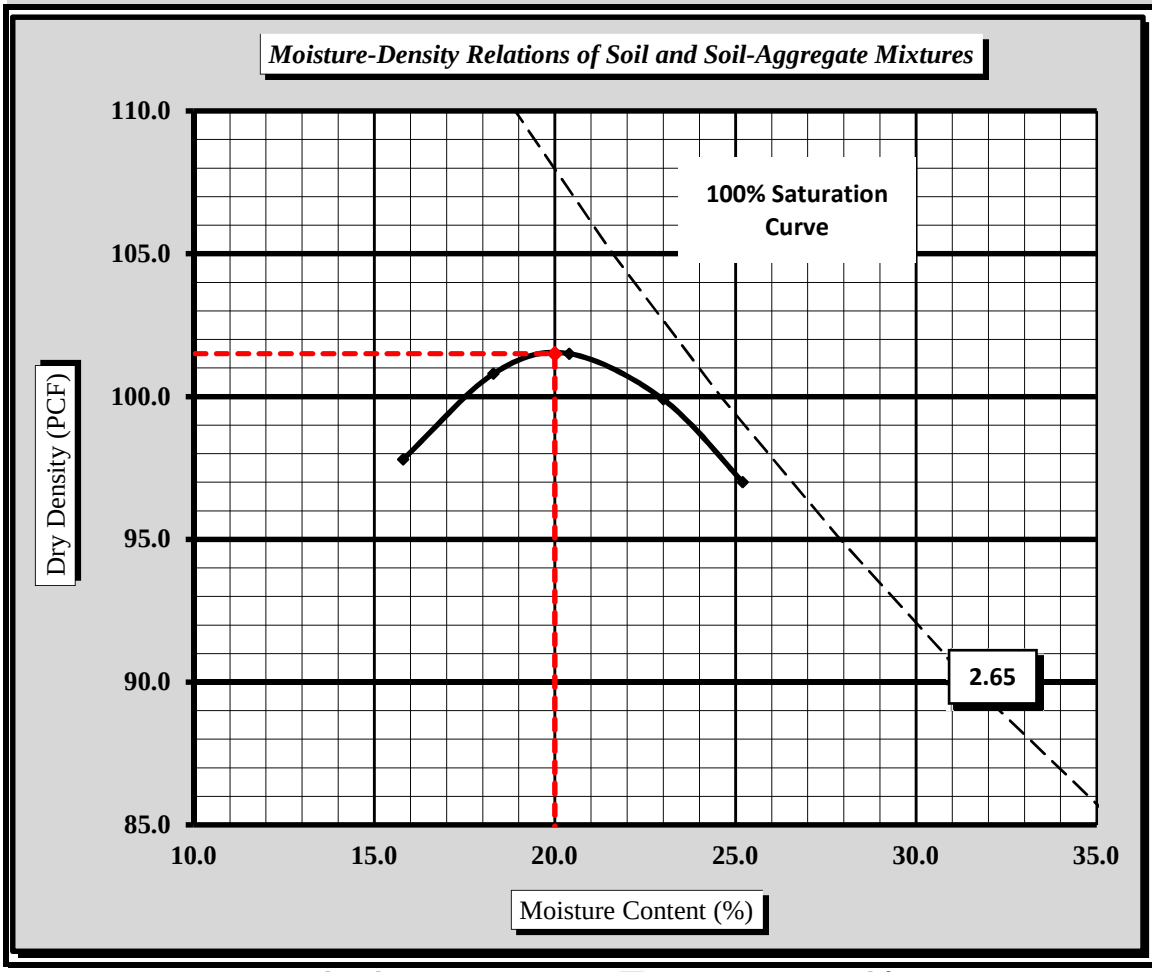
S&ME Project #:	**1335-15-037 (01)**	Report Date:	6/5/15
Project Name:	Emergency Service Headquarters	Test Date(s):	6/2-5/15
Client Name:	Randolph County Public Works		
Client Address:	725 McDowell Road, Asheboro, NC 27205		

Boring #:	S-1	Sample #:	Bag-1	Sample Date:	5/28/2015
Location:	Borehole	Offset:	NI	Depth:	1-10'

Sample Description: Orange Tan Silty Clay with Medium to Fine Sand (CL)

Maximum Dry Density **101.5** **PCF.** **Optimum Moisture Content** **20.0%**

ASTM D 698 - - Method A



Soil Properties	
Natural Moisture Content	**27.8%**
Specific Gravity of Soil	**ND**
Liquid Limit	**46**
Plastic Limit	**26**
Plastic Index	**20**

% Passing	
3/4"	100.0%
3/8"	100.0%
#4	100.0%
#10	99.9%
#20	99.4%
#40	98.3%
#200	85.1%

Oversize Fraction	
Bulk Gravity	
% Moisture	
% Oversize	
MDD	
Opt. MC	

Moisture-Density Curve Displayed: Fine Fraction ☒ Corrected for Oversize Fraction (ASTM D 4718) ☐

Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐

Mechanical Rammer ☒ Manual Rammer ☐ Moist Preparation ☐ Dry Preparation ☒

References / Comments / Deviations: ND = Not determined NI = Information was not provided

Technician: Jennifer Olsen Date: 6/5/15

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

Luis Campos		Project Engineer	6/12/2015
Technical Responsibility	*Signature*	*Position*	*Date*

Form No. TR-D1883-T193-3
Revision No. 1
Revision Date: 9/29/08

CBR (California Bearing Ratio) of Laboratory Compacted Soil

ASTM D 1883

S&ME

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

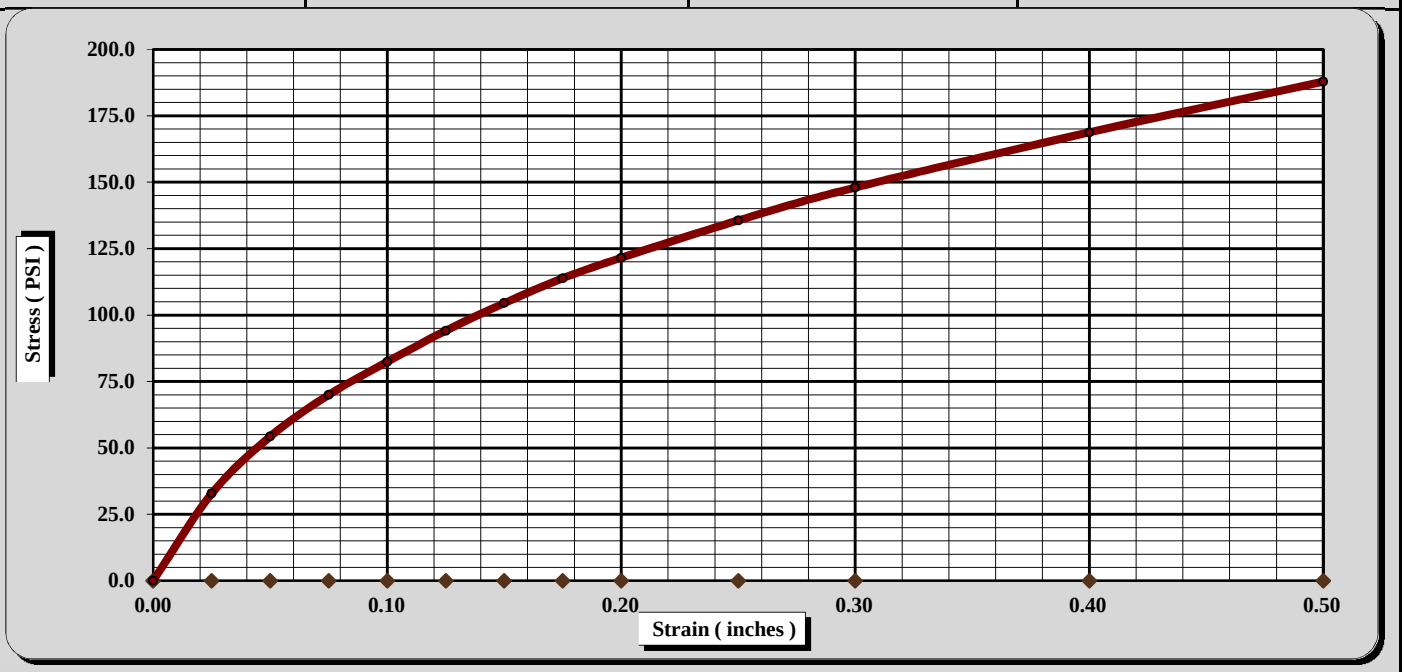
Project #:	**1335-15-037**	Report Date:	6/12/15
Project Name:	Emergency Services Headquarters	Test Date(s)	6/4-12/15
Client Name:	Randolph County Public Works		
Client Address:	725 McDowell Road, Asheboro, NC 27205		
Boring #:	S-1	Sample #: Bag-1	Sample Date: 5/28/15
Location:	Borehole	Offset: NI	Elevation: 1-10'

Sample Description: Orange Tan Silty Clay with Medium to Fine Sand (CL)

ASTM D 698 *Method A* Maximum Dry Density: **101.5** **PCF** Optimum Moisture Content: **20.0%**

Compaction Test performed on the Fine Fraction only % Retained on the 3/4" sieve: **0.0%**

Uncorrected CBR Values		Corrected CBR Values	
CBR at 0.1 in. 8.2	**CBR at 0.2 in. 8.1**	**CBR at 0.1 in. 0.0**	**CBR at 0.2 in. 0.0**



CBR Sample Preparation: *Performed on the fine fraction*

Grading was in accordance with the above method and compacted using the 6" diameter CBR mold. ASTM D1883, Section 6.1.1

Before Soaking		*After Soaking*	
Compactive Effort (Blows per Layer)	43	Final Dry Density (PCF)	95.9
Initial Dry Density (PCF)	99.4	Average Final Moisture Content	23.0%
Moisture Content of the Compacted Specimen	19.8%	Moisture Content (top 1" after soaking)	23.0%
Percent Compaction	98.0%	Percent Swell	0.8%

Soak Time:	72 Hours	Surcharge Weight	30.5	Surcharge Wt. per sq. Ft.	155.0
Liquid Limit	46	Plastic Index	20	Apparent Relative Density	ND

Notes/Deviations/References: NI = No information provided. ND = Not determined.

Technician: **Jennifer Olsen** **Date: 6/12/15**

Luis Campos		Project Engineer	6/12/2015
Technical Responsibility	*Signature*	*Position*	*Date*