Final Geotechnical Exploration Report
Midway Event Center
Raleigh, North Carolina
S&ME Project No. 23050451

PREPARED FOR:

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March 27, 2024

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Attention: Mr. Jacob Hilton, PE, PMP, LEED AP
Department Manager, Federal Market

Reference: **Final Geotechnical Exploration Report**
Midway Event Center
State Fairgrounds
Raleigh, North Carolina
S&ME Project No. 23050541

Dear Jacob:

S&ME, Inc. (S&ME) is pleased to submit this geotechnical exploration report for the referenced project. Our services were performed in general accordance with our change order number 23050451 CO-1 Rev 1, dated September 29, 2023. The purpose of our geotechnical study was to explore and evaluate subsurface conditions as they relate to site development. This geotechnical report presents a brief summary of our understanding of the project, descriptions of our field exploration and laboratory testing, a discussion of encountered subsurface conditions, and recommendations related to earthwork and foundation design.

We appreciate the opportunity to work with you on this project. Please contact us with any questions, or if you need additional information.

Sincerely, S&ME, Inc.

Will Harrison
Associate Project Manager

Wes Lowder, P.E.
Vice President
N.C. License No. 18819

Table of Contents

Appendices

1.0 Executive Summary

A brief summary of our preliminary and final explorations is presented below. This brief summary should not be used for design or construction without reviewing the more detailed information presented in this report.

- The design of the Midway Event Center has not been finalized. The building will be one or two-stories, with corresponding assumed maximum column loads of 150 kips and 250 kips, respectively.
- The preliminary finish floor elevation is 493 feet; however, this elevation is subject to change.
- The explorations were performed in two phases: a preliminary exploration performed prior to demolition of the Lunch Stand building, and a final exploration performed after demolition.
- All borings encountered existing fill soils to depths of approximately 5 to 12 feet. Fill was erratically, and in many cases, poorly compacted. Existing fill is not suitable for foundation or floor slab support.
- We recommend that all fill be removed from the building area and replaced with well compacted structural fill. We considered alternative foundation support through ground improvement techniques. However, because of the potential for aggregate piers to bulge due to very soft fill, and the fact that ground improvement would also be needed for slabs, it is our opinion that undercut and replacement is a preferred method for building support.
- Some of the undercut fill could be re-used as structural fill; however, this would require segregation of deleterious materials and drying of soils. Given the limited space available for construction, it is our opinion that re-use of these materials will not be practical.
- Materials found in the off-site stockpile are not suitable for re-use as structural fill.
- After fill has been removed and replaced with well compacted structural fill, building foundations can be designed as shallow spread footings using a bearing pressure of 3,000 pounds per square foot.
- Floor slabs can be soil supported on properly prepared and compacted subgrades.

2.0 Project Information

S&ME was provided the *NC State Fairgrounds – Midway Event Center* conceptual site plan, which was prepared by HH Architecture, dated January 8, 2023. We understand the new building will occupy a plan area of about 20,000 square feet. We anticipate the building will be a one or two-story, steel-framed structure with a soil supported slab-on-grade. Structural loads were not available at the time this report was prepared. Based on experience with similar projects, we expect that maximum wall and column loads will be 5 kips per linear foot and 150 kips for a one-story building, and column loads 250 kips for a two-story building. Floor slab loads are expected to be 150 pounds per square foot or less. Concrete pavements will wrap around the building perimeter with a concrete entranceway/stairway proposed just north of the building.

The finish floor elevation has been tentatively set at 493 feet, which is near existing grade. Shallow cut and fill depths, on the order of 5 feet or less, are anticipated.

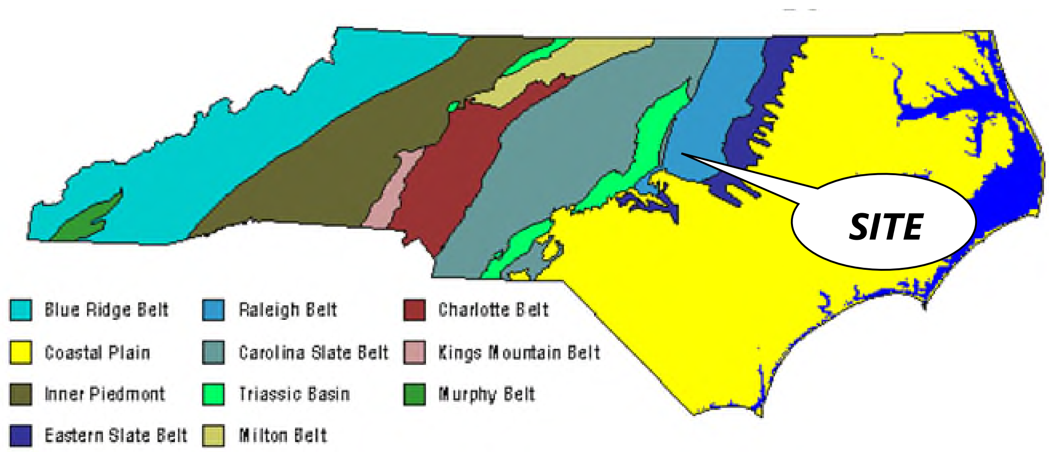
3.0 Site Description

The existing Lunch Stand building was present when our preliminary borings were performed (S&ME report dated September 12, 2023). At the time of this final exploration, the Lunch Stand building had been demolished and the area stabilized as shown in photos below.

The surrounding area is highly developed, consisting of paved parking areas surrounding the demolished building and numerous underground utilities located nearby.

4.0 Regional Geology

Figure 3.1 - Physiography



The site is located within the Raleigh Belt region of the Piedmont Physiographic Province in North Carolina. The parent rock materials in the area primarily consist of gneiss and schist rock. Within the upland areas, soils within the Piedmont Province are the residual product of in-place chemical and physical weathering of parent rock materials. The typical residual profile consists of finer grain silts and clays near the ground surface which gradually transition to coarser and denser material with depth. In many locations, the transition zone between soil and rock is not well defined. Locally, the transition zone is termed partially weathered rock (PWR). For engineering purposes, partially weathered rock is defined as residual material in which standard penetration test values exceed 100 blows per foot.

5.0 Exploration Program

The preliminary subsurface exploration for this project included a visual site reconnaissance and the performance of four soil test borings (B-1 through B-4) to depths of 25 to 50 feet below the ground surface. Boring locations were established in the field by S&ME using a hand-held GPS. Approximate boring locations are shown on Figure 1 in Appendix I. The borings were performed outside of the Lunch Stand building which had not yet been demolished.

The final subsurface exploration consisted of a visual site reconnaissance and the performance of an additional five soil test borings (B-5 through B-9) to depths of 25 feet below the exiting ground surface. Boring locations were established in the field by S&ME using a hand-held GPS. Approximate boring locations are shown on Figure 1 in Appendix I.

Soil test borings were advanced using 3¼-inch hollow-stem-auger hollow stem auger drilling procedures with a D-50 drill rig. The borings were sampled at 2.5-foot intervals in the upper 10 feet, and at 5-foot intervals below 10 feet to their boring termination depths. Standard penetration testing was performed with an automatic hammer in conjunction with split-spoon sampling in general accordance with ASTM D 1586.

Groundwater measurements were attempted immediately after drilling was completed. Boreholes were then backfilled with auger cuttings nearly to the existing ground surface.

Soil Test Boring Logs (Appendix II) and Generalized Subsurface Profiles (Figures 2.1 and 2.2, Appendix I) showing specific subsurface information from each boring (preliminary and final exploration borings), are included in the Appendix. Ground surface elevations were estimated from the provided conceptual site plan and should be considered approximate. Stratification lines shown on Test Boring Records and Subsurface Profile are intended to represent approximate depths of changes in soil types. Naturally, transitional changes in soil types are often gradual and cannot be defined at a particular depth.

Representative split-spoon samples were brought back to our laboratory for visual classification and testing. Soils were classified in general accordance with Unified Soil Classification System (USCS) guidelines. Testing included natural moisture content, Atterberg limits and grain size testing. Laboratory testing was performed in general accordance with applicable ASTM standards.

5.1 Proposed Borrow Area

A stockpile located west of the project area was evaluated for use as structural fill. We planned on performing a soil test boring in this area to evaluate these materials. However, given the configuration of the stockpile, we could not safely move the drill rig to the top of the stockpile. These materials were instead sampled by hand by excavating into the sides of the stockpile in numerous locations and collecting composite samples. Samples were subjected to standard Proctor compaction testing.

6.0 Surface and Subsurface Conditions

A general description of surface and subsurface conditions encountered during our field exploration for this site is provided below. More detailed information on subsurface conditions is presented on the Test Boring Logs in Appendix II.

6.1.1 Surficial Materials

Surficial asphalt thicknesses ranging from 4 to 5 inches in thickness were encountered in each boring during our preliminary exploration. A surficial layer of topsoil approximately 2 to 6 inches in depth was encountered in each boring during our final exploration. Topsoil is typically a dark-colored soil material containing roots, fibrous matter, and/or other organic components, and is unsuitable for engineering purposes. The topsoil depths provided in this report are based on measurements made during drilling and should be considered approximate. The transition from topsoil to underlying natural soils may be gradual.

6.1.2 *Fill Soils*

Fill soils were encountered at each boring to approximate depths of 5 ½ to 12 feet below ground surface. Fill soils consists of elastic silt (USCS group symbol ML and MH), sandy lean and fat clays (CL and CH), and silty and clayey sands (SC and SM). Fill soils contained some debris, including gravel, rootlets, rock fragments and asphalt pieces.

Standard penetration test values ranged from weight of hammer (WOH) to 23 blows per foot (bpf). Weight of hammer indicates the split-spoon sampler was able to penetrate the last 12 inches of sampling interval under its own weight without any blows from the hammer. These values indicate an erratic, and in many cases, poor degree of compaction.

6.1.3 *Residual Soils*

Each boring encountered residual soils underlying fill materials at depths ranging from 5 ½ to 12 feet below existing ground surface. Residual soils consisted of low plasticity silt (ML) with varying sand content. SPT N-values ranged from 6 to 70 bpf indicating firm to hard consistencies with more typical residual soils having SPT N-values between 10 and 20 bpf. The residual soils were visually observed to be moist to wet.

6.1.4 *Groundwater*

Groundwater measurements and cave depths were attempted after completion of drilling. Groundwater was encountered in boring B-3 at a depth of 26 feet below existing ground surface. Borings B-1, B-2, and B-4 through B-9 were found to be dry above their cave-in depths.

Groundwater levels should be expected to fluctuate with seasonal changes and with rainfall and evaporation rates at other times of the year.

7.0 Laboratory Test Results

Representative soil samples were returned to our laboratory for testing and visual classification in general accordance with Unified Soil Classification System Guidelines. Laboratory testing included natural moisture content, grain size analyses, and Atterberg limits for general classification purposes as well as California Bearing Ratio (CBR) and standard Proctor testing for the bulk sample from the stockpile.

The stockpiled offsite borrow material (adjacent to the fairgrounds) was tested for standard Proctor, Atterberg limits, grain size analyses and organic content. Maximum dry density, optimum moisture content, and organic content for the stockpiled material was 79.8 pounds per cubic foot (pcf), 32.0% and 14.7%, respectively.

Individual laboratory test results are included in Appendix III and a summary of the laboratory test results is presented in the table below.

Table 1 - Summary of Laboratory Test Results

Boring ID	Sample Depth (ft)	Natural Moisture Content (%)	Atterberg Limits (%)		Standard Proctor		CBR[1] (%)	Swell (%)	USCS
			Liquid Limit	Plasticity Index	Opt. Moisture Content (%)	Max. Dry Unit Weight (pcf)			
B-3	1 – 5*	12.4	48	13	20.0	103.8	6.5	0.6	ML
B-1	3.5 – 5	30.6	66	26	--	--	--	--	MH
B-2	8.5 – 10	21.7	--	--	--	--	--	--	ML
B-2	13.5 – 15	26.3	--	--	--	--	--	--	ML**
Composite (Stockpile)	0 – 5	--	--	--	32.0	79.8	--	--	SM

[1] Corrected CBR value at 0.1 inches of penetration. The sample was compacted to approximately 98% of its standard Proctor maximum dry density, near its optimum moisture content. The sample was soaked for approximately 96 hours under a surcharge of approximately 100pounds per square foot.
** Bulk Sample*
*** Visually Classified*

8.0 Conclusions and Recommendations

The following sections provide our geotechnical conclusions and recommendations regarding site development. These recommendations are based upon review of our test boring data, our understanding of proposed site development, engineering analyses, and experience with similar projects and subsurface conditions.

8.1 Earthwork

8.1.1 Removal of Existing Fill

All fill should be undercut from the building area, including nearby structural areas such as retaining walls. The area undercut should extend at least 20 feet horizontally beyond the actual building/structural limits. The complete removal of all existing fill is a critical part of site development. The contractor should be able to confirm that he/she has met the above requirement prior to backfilling.

After undercutting, the exposed subgrade should be evaluated by the geotechnical engineer or his representative. This evaluation should include proofrolling with heavily loaded rubber-tired equipment, performance of shallow hand auger borings, test pits, or some combination of these. If unstable soil conditions are present once fill has been removed, stabilization of the excavation bottom could be required. This is especially true if site grading occurs during winter months or during a period of wet weather. Stabilization measures could require additional undercutting, compaction of the subgrade surface, placement of a geotextile fabric, placement of crushed stone, or some combination of these. Because the need for stabilization will be partially weather dependent, actual repair measures can only be determined in the field.

8.1.2 *Site Preparation – General*

Site grading will be difficult due to the fine-grained nature of the near-surface soils encountered. This will be especially true if site grading occurs during periods of extended rainfall that generally occur during the winter and early spring months. Near-surface soils are moisture sensitive, and when wet, will tend to rut and pump under rubber-tired traffic and provide poor subgrade support for structures and pavements. To reduce potential earthwork problems, site preparation and grading should be scheduled during the typically drier months of May through November, if possible.

8.1.3 *Reuse of On-Site Soils as Structural Fill*

A portion of the existing fill soils could be suitable for re-use as structural fill; however, this would require that deleterious materials be segregated and that soils be dried to a suitable moisture content. Given the relatively limited area of construction, it is our opinion that re-use of existing fill will not be practical. We recommend that existing fill which is undercut be wasted.

8.1.4 *Off-Site Stockpile*

Off-site stockpiled materials consisted of red highly plastic clays with various amounts of debris and sandier soils which contain significant organics. Neither are suitable for re-use as structural fill.

8.2 Excavations

Excavations to remove existing fill will extend through low to medium-consistency soils. Outside of undercut areas, we expect that only shallow excavations will be needed. These soils can typically be excavated using backhoes, dozers, and other types of typical earthmoving equipment. In this geologic province, there is always a potential to encounter rock at erratic depths and locations. However, this appears unlikely at this site.

Groundwater was encountered at depths of about 26 feet below the existing ground surface in the performed soil test borings. Based on our understanding of proposed grades, water is not expected during mass grading or utility installation. Shallow water or perched water conditions may be encountered during wet periods of the year or after heavy rainfall. The contractor should be prepared to control groundwater during construction.

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 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.

8.2.1 *Structural Fill Requirements*

After proper site preparation (including the removal of poorly compacted fill materials and other deleterious materials), areas requiring fill may be raised to their design subgrade levels using approved borrow materials. Borrow material should meet the following requirements:

- USCS classification of ML, CL, SP, SM, SC or some combination of these.
- Low plasticity soil (with a plasticity index less than 25%).
- A standard Proctor maximum dry density of at least 95 pounds per cubic foot.
- Maximum particle size of 3 inches in any dimension.
- Less than 3% organic content.
- Free of deleterious materials.

Once a borrow area has been identified, samples should be provided to us for laboratory testing.

8.2.2 *Structural Fill Placement*

Structural fill should be placed in uniform lifts of 8 to 10 inches and compacted to at least 95 percent of its standard Proctor maximum dry density at a moisture content within 2 percent of optimum moisture. The upper 12 inches below buildings and pavements should be compacted to at least 98 percent.

Fill placement and compaction operations should be observed and tested by a qualified soil technician working under the supervision of the geotechnical engineer. Fill should not be placed in areas where free water is standing, on frozen subsoil, or on surfaces which have not been approved by the soil technician. An appropriate number of soil density tests should be conducted to confirm that adequate fill compaction is achieved.

8.2.3 *Subgrade Repair and Improvement Methods*

The exposed subgrade can deteriorate and lose support when exposed to construction traffic and adverse weather conditions. Deterioration can occur in the form or rutting, pumping, freezing, or erosion. We recommend that during construction, exposed subgrade surfaces be sealed at the end of each day or when wet weather is forecast. Water should not be allowed to pond on exposed subgrades. Heavy rubber-tired construction equipment should not be allowed to operate on exposed subgrades during wet conditions.

Immediately prior to floor slab or pavement construction, exposed subgrade soils should be evaluated by proof-rolling to determine their stability. Soils which rut, pump, or deflect under proof-rolling should be repaired prior to ABC stone placement. Repair measures may include scarifying/drying/recompacting, undercutting, placement of geotextiles, use of chemical additives, or some combination of these. Actual repair measures will be influenced by project schedule and weather conditions and can only be determined in the field by the geotechnical engineer.

8.3 Foundation and Floor Slab Support

Assuming that the site is prepared as recommended, the proposed structure can be supported on a shallow spread foundation system. A net allowable bearing pressure of 3,000 pounds per square foot (psf) may be used for design.

Footings should bear at least 18 inches below exterior grade to avoid frost penetration and develop the design bearing capacity. All footings should be a minimum of 18 inches wide for wall footings and 24 inches wide for column footings. This recommendation is made to help prevent a localized or shear failure condition. Footing excavation and concrete placement should occur on the same day if practical. Footing excavations should be evaluated by the geotechnical engineer or his representative as described below.

The bottom of footing excavations should be evaluated by the project geotechnical engineer (or a soils technician working under their direction) using hand auger borings and dynamic cone penetrometer (DCP) to gauge the consistency of subgrade soils and determine that subsurface conditions beneath footings are consistent with those encountered in the soil borings. Foundation subgrades that are unstable should be over-excavated and replaced with washed (NCDOT #57) stone. The acceptability of #57 stone for use as over-excavation backfill must be evaluated on a case-by-case basis during construction considering the potential for undermining due to future adjoining excavations, underground repair work, interference with subdrains, etc.

Assuming that site preparation recommendations are followed, we estimate total settlement beneath building loads will be 1 inch or less. We expect that differential settlement will be about one-half of expected total settlement.

8.3.1 Floor Slabs

A properly prepared subgrade should be suitable for slab-on-grade support. We recommend a 6-inch thickness of compacted dense graded aggregate (NCDOT ABC gradation) beneath the slab to enhance uniform slab support. A vapor retarder should be included in the slab design if vapor penetration is an unacceptable condition.

The slab subgrade should be evaluated by proofrolling with overlapping passes of a loaded tandem-axle dump truck or similar pneumatic tire vehicle immediately prior to placement of concrete. Provided subgrade materials are stable under proofrolling, a modulus of subgrade reaction value (k-value) of 100 psi/inch may be used for slab-on-grade design. This value is predicated on anticipated results of a 30-inch diameter plate load test and is applicable for relatively light loads (i.e. 150 psf or less).

The k-value described above is not applicable to heavier slab loads, especially those created by stored materials or heavy rack loads. If building tenants store materials which create slab loads greater than those described above, a risk of slab cracking exists.

8.4 Seismic Site Classification

The proposed structure should be designed to resist possible earthquake effects as determined in accordance with Section 1613 of the 2018 North Carolina Building Code. Based on our test borings and experience in the project area, we recommend a Seismic Site Class D be used.

8.5 Retaining Walls

We are not aware of planned retaining walls on this development. However, based on grades in the northern portion of the site near the planned walkway area, existing site grades from 480 to 487 are present and may require retaining walls for soil retention. Also, loading dock walls may be needed.

General recommendations with respect to retaining wall design and construction are provided below along with specific recommendations for cast-in-place and MSE walls. Once additional information is available, we should be contacted for any additions or revisions to the recommendations that may be appropriate.

8.5.1 Retaining Walls – General

Retaining walls must be designed to resist lateral earth pressures from the backfill. In addition to the lateral stresses from backfill, the walls may be subjected to surcharge loading from adjacent traffic, stockpiled materials, or stresses from nearby footings or floor slabs. If present, these surcharge stresses should be resolved into appropriate lateral stress distributions and added to the earth pressures outlined below. Walls should have adequate factors of safety against overturning, sliding, and global failure.

We recommend placing a drainage medium, such as clean stone (NCDOT No. 57) wrapped in geotextile fabric or a prefabricated geocomposite drain, behind the wall. The drainage medium should be connected to a footing drain or weep holes to reduce potential buildup of hydrostatic pressure due to surface water, perched water, or utility leaks.

Backfill soils placed behind retaining walls should be of low plasticity and compacted to at least 95 percent of the soil's standard Proctor maximum dry density (ASTM D 698) and within 2 percent of optimum moisture. Operating heavy compaction equipment within 5 feet behind the retaining structures can create lateral earth pressures in excess of those recommended for design. As such, we recommend that hand-operated equipment be used within 5 feet of the walls.

8.5.2 Cast-In-Place Concrete Walls

Recommended backfill parameters for on-site soils are summarized in the table below. The lateral earth pressure coefficients presented below assume no wall friction between the wall and soil backfill (δ = 0 degrees) and are based on placement of properly compacted backfill and a level backfill surface.

Table 7-1 – Recommended Parameters for Retained Soils behind Concrete Walls

Parameter	On-Site Soils
Friction Angle, ϕ (degrees)	26
At-Rest Earth Pressure Coefficient (K_o)	0.56
At-Rest Equivalent Earth Pressure (psf/ft)	73
Active Coefficient Earth Pressure (K_a)	0.4
Active Equivalent Earth Pressure (psf/ft)	51
Passive Earth Pressure Coefficient (K_p)	2.56
Passive Equivalent Earth Pressure (psf/ft)	333
Moist Unit Weight of Backfill (pcf)	130
Ultimate Friction Coefficient Between Wall Foundations and Bearing Soils	0.33

8.5.3 *Mechanically Stabilized Earth (MSE) Walls*

On-site soils should not be used as backfill within the reinforced zone. Off-site soils such as clean sands, stone screenings, ABC stone, or washed stone, are recommended for use as reinforced backfill (backfill containing mechanical reinforcement or geogrid) behind MSE walls. Depending on several factors (i.e., geogrid length, compaction conditions of backfill, and others), use of silts or clays as backfill could cause wall instability. It is our opinion that silt and clay backfill cause more long-term lateral deflection of the backfill mass (and wall face) when compared to granular soil backfill. Excessive lateral deflection could cause leaning of the wall face and development of cracks behind the wall (e.g., cracking of ground surface or asphalt behind the wall). Cracks behind the wall can create a path for surface water infiltration into the backfill. Water infiltration into the backfill can create loss of backfill strength (i.e. soil strength lower than the design strength) and lead to wall instability (i.e. possible wall failure).

Once a backfill material is selected, sufficient laboratory testing (i.e., grain size analysis, standard Proctor and triaxial testing) of the backfill should be performed prior to construction, or empirical judgments made, to verify design soil parameters for reinforced fill.

The parameters in the table below are applicable for retained soils (i.e. soils behind the reinforced zone). The parameters assume that retained soils are properly compacted in accordance with recommendations presented previously.

Table 7-3 – Recommended Parameters for Retained Soil behind MSE Walls

Parameter	Value
Friction Angle, ϕ (degrees)	26
Cohesion, c (psf)	0
Active Coefficient Earth Pressure (K_a)	0.4
Moist Unit Weight (pcf)	130

9.0 Qualifications of Report

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

We relied on project information given to us to develop our conclusions and recommendations. If project information described in this report is not accurate, or if it changes during project development, we should be notified of the changes so that we can modify our recommendations based on this additional information if necessary.

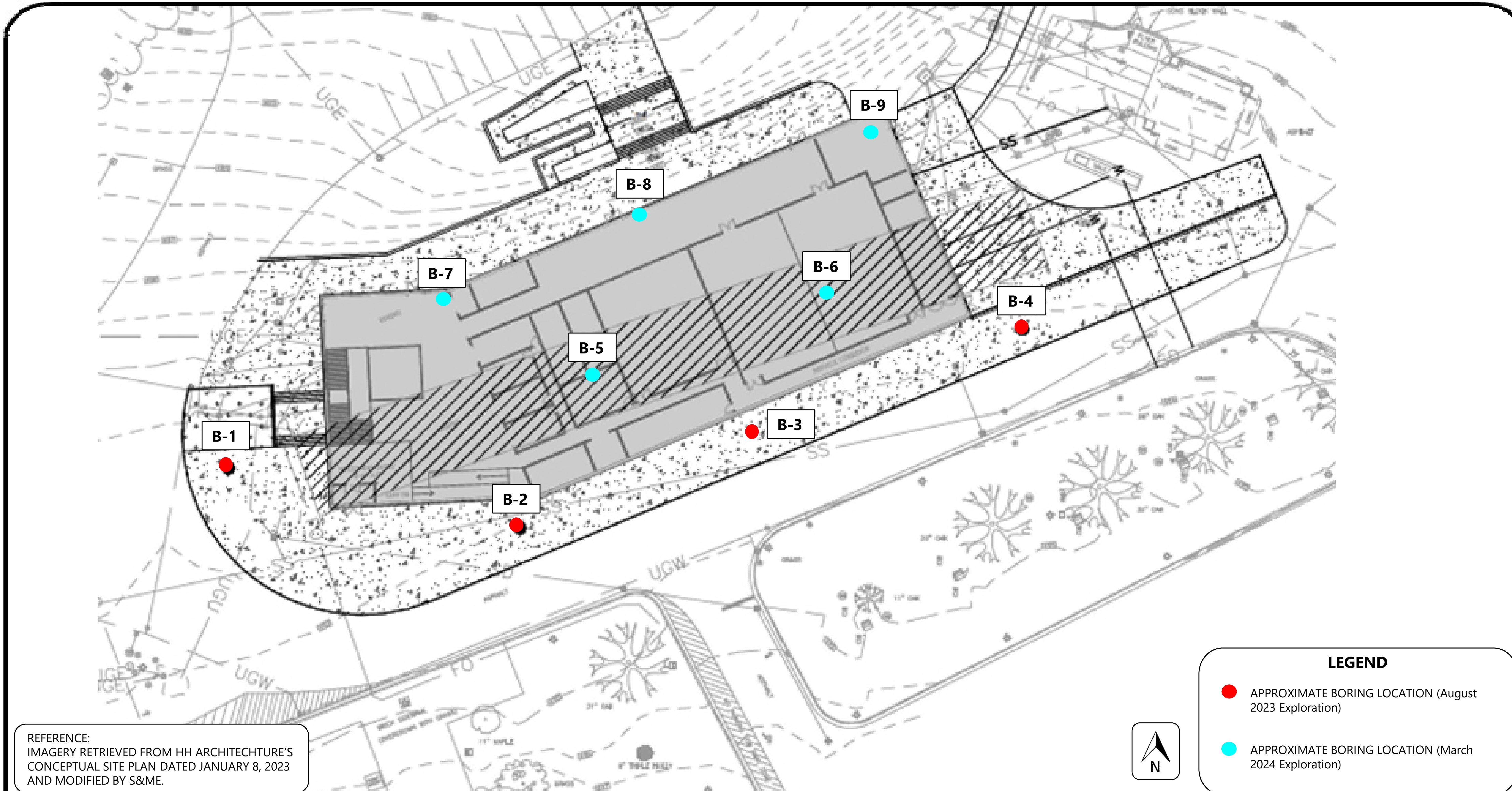
Our conclusions and recommendations are based on limited data from a field exploration program. Subsurface conditions can vary widely between explored areas. Some variations may not become evident until construction. If conditions are encountered which appear different than those described in our report, we should be notified. This report should not be construed to represent subsurface conditions for the entire site.

Our field exploration program did not include an assessment of regulatory compliance, environmental conditions or pollutants or presence of any biological materials (mold, fungi, bacteria). The environmental assessment of this site is being handled by a separate consultant.

S&ME should be retained to review the final plans and specifications to confirm that earthwork, foundation, and other recommendations are properly interpreted and implemented. The recommendations in this report are contingent on S&ME's review of final plans and specifications followed by our observation and monitoring of earthwork and foundation construction activities.

Appendices

Appendix I – Figures



REFERENCE:
IMAGERY RETRIEVED FROM HH ARCHITECHTURE'S CONCEPTUAL SITE PLAN DATED JANUARY 8, 2023 AND MODIFIED BY S&ME.

LEGEND

- APPROXIMATE BORING LOCATION (August 2023 Exploration)
- APPROXIMATE BORING LOCATION (March 2024 Exploration)

S&ME

BORING LOCATION PLAN

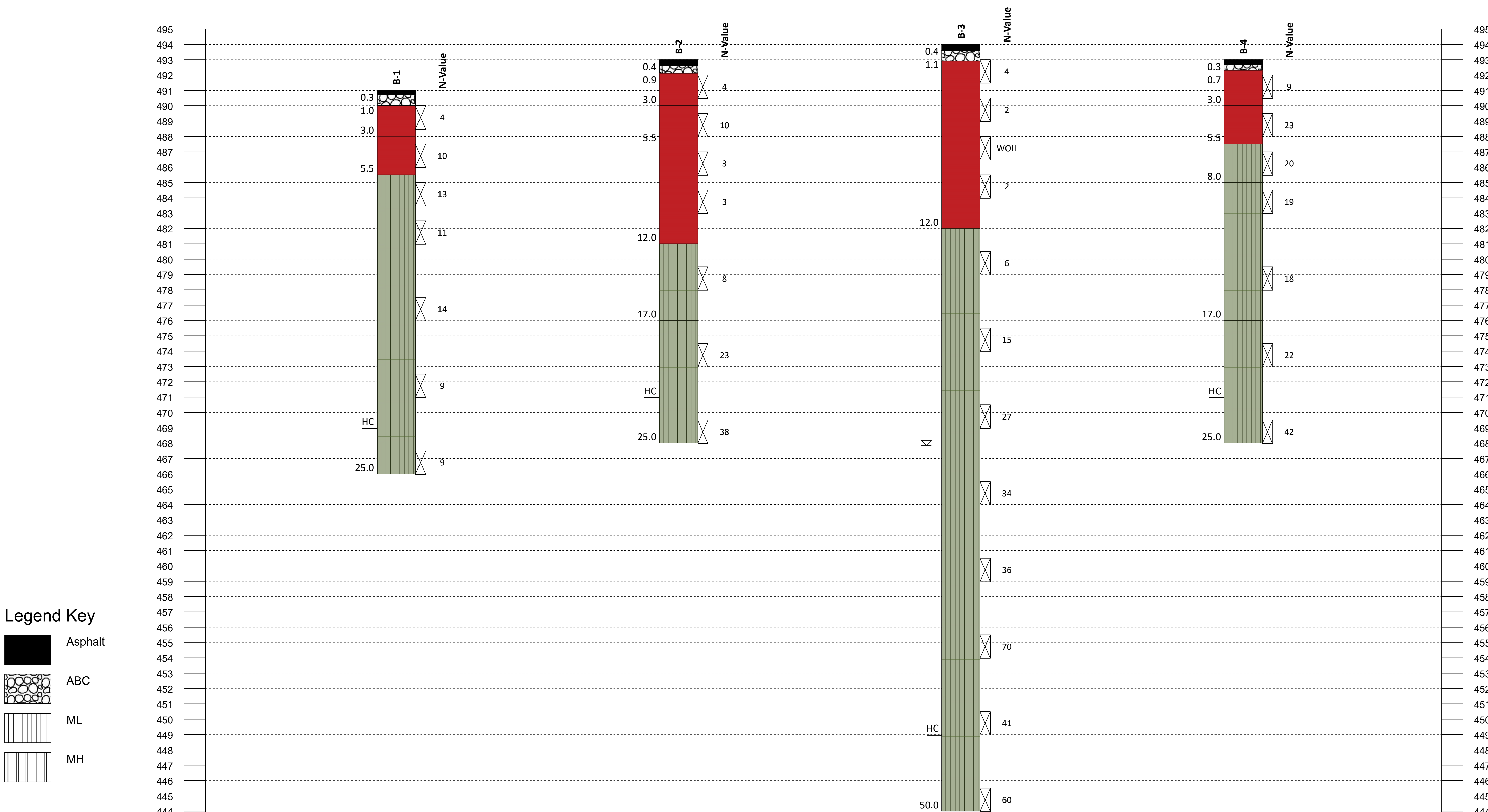
STATE FAIRGROUNDS LUNCH STAND
RALEIGH, NORTH CAROLINA

SCALE:
NOT TO SCALE

DATE:
3-19-2024

PROJECT NUMBER:
23050451

FIGURE NO.
1



The depicted stratigraphy is shown for illustrative purposes only and is not warranted. Separations between different strata may be gradual and likely vary considerably from those shown. Profiles between nearby borings have been estimated using reasonable engineering care and judgement. The actual subsurface conditions will vary between boring locations.

∇	AT TIME OF DRILLING
▼	END OF DRILLING
▼	AFTER DRILLING

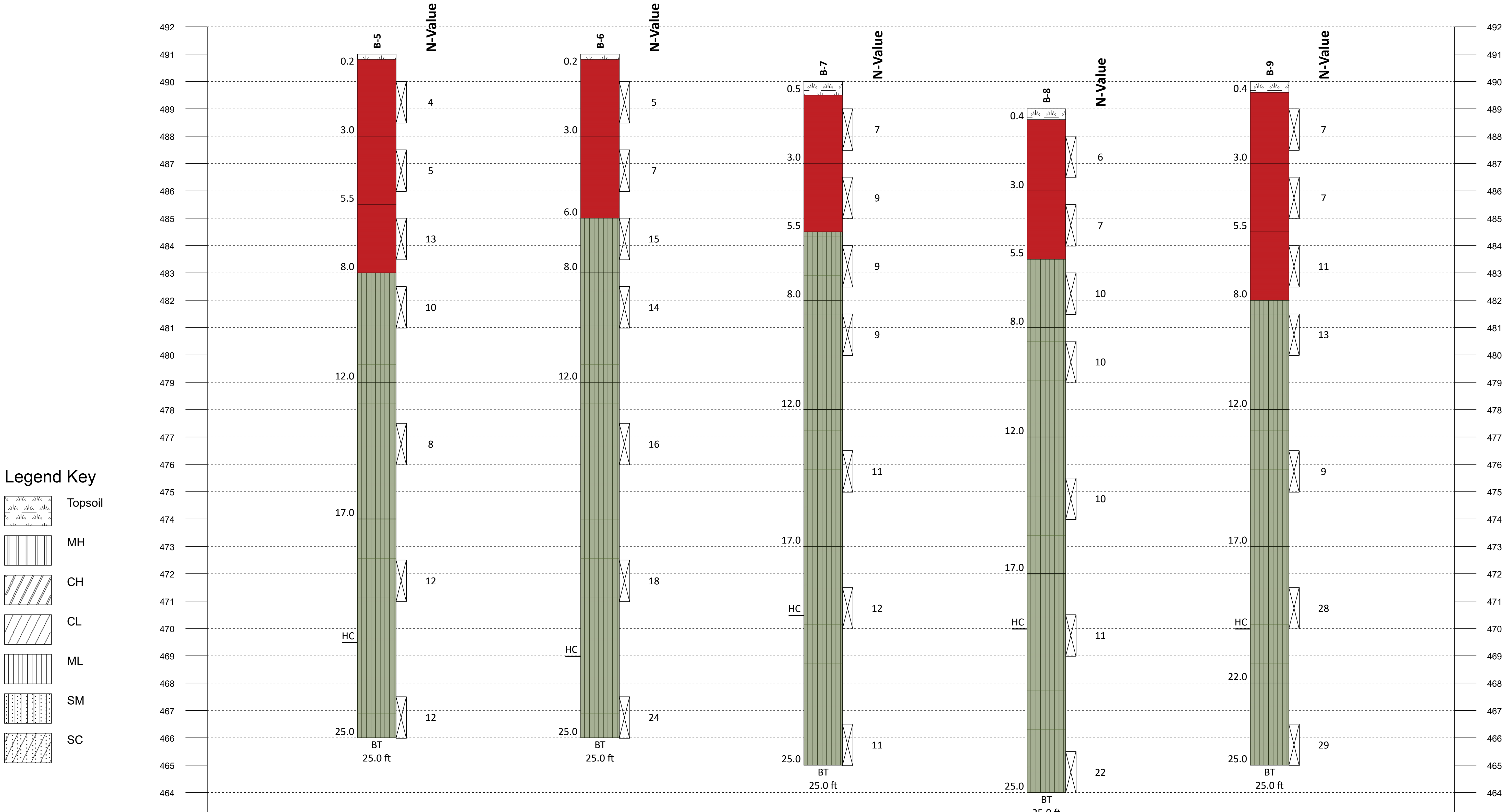
Generalized Subsurface Profile

NC Fairgrounds Lunch Stand Replacement
Raleigh, North Carolina

SCALE:	Not to scale
DATE:	Aug 28, 2023
PROJECT NUMBER:	23050451

FIGURE NO.

2.1



The depicted stratigraphy is shown for illustrative purposes only and is not warranted. Separations between different strata may be gradual and likely vary considerably from those shown. Profiles between nearby borings have been estimated using reasonable engineering care and judgement. The actual subsurface conditions will vary between boring locations.

"AR" = Auger Refusal, "BT = Boring Termination

▽	AT TIME OF DRILLING
▽	END OF DRILLING
▼	AFTER DRILLING

Generalized Subsurface Conditions

NC Fairgrounds Lunch Stand Replacement
Raleigh, North Carolina

SCALE:	Not to scale
DATE:	Mar 19, 2024
PROJECT NUMBER:	23050451

FIGURE NO.

2.2

Appendix II – Field Exploration Data

♦ Summary of Exploration Procedures

The American Society for Testing and Materials (ASTM) publishes standard methods to explore soil, rock and ground water conditions in Practice D-420-18, "*Standard Guide for Site Characterization for Engineering Design and Construction Purposes*." The boring and sampling plan must consider the geologic or topographic setting. It must consider the proposed construction. It must also allow for the background, training, and experience of the geotechnical engineer. While the scope and extent of the exploration may vary with the objectives of the client, each exploration includes the following key tasks:

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

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

♦ Reconnaissance of the Project Area

We walked over the site to note land use, topography, ground cover, and surface drainage. We observed general access to proposed sampling points and noted any existing structures.

Checks for Hazardous Conditions - State law requires that we notify the North Carolina (NC 811) before we drill or excavate at any site. NC 811 is operated by the major water, sewer, electrical, telephone, CATV, and natural gas suppliers of North Carolina. NC 811 forwarded our location request to the participating utilities. Location crews then marked buried lines with colored flags within 72 hours. They did not mark utility lines beyond junction boxes or meters. We checked proposed sampling points for conflicts with marked utilities, overhead power lines, tree limbs, or man-made structures during the site walkover.

Boring and Sampling

Soil Test Boring with Hollow Stem Auger Drilling

Soil sampling and penetration testing were performed in general accordance with ASTM D 1586, "Standard Test Method for Penetration Test and Split Barrel Sampling of Soils". Rotary drilling processes were used to advance the boreholes. At regular intervals, the drilling tools were removed and soil samples were obtained with a standard 1.4 inch I. D., two-inch O. D., split barrel sampler. The sampler was first seated six inches to penetrate any loose cuttings, then driven an additional 18 inches with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler through the two intermediate six inch increments was recorded as the penetration resistance (SPT N) value. The N-value, when properly interpreted by qualified professional staff, is an index of the soil strength and foundation support capability. The bottom 6 inches of each sample recovered in the split barrel sampler was placed in a glass jar, closed with a screw top lid, and labeled.

Water Level Measurement

Subsurface water levels in the boreholes were measured during the onsite exploration by measuring depths from the existing grade to the current water level using a tape.

Backfilling of Borings

Once subsurface water levels were obtained, boring spoils were backfilled into the open bore holes. Bore holes were backfilled to the existing ground surface.

LEGEND TO SOIL CLASSIFICATION AND SYMBOLS

SOIL TYPES

(Shown in Graphic Log)

Fill

Asphalt

Concrete

Topsoil

Gravel

Sand

Silt

Clay

Organic

Silty Sand

Clayey Sand

Sandy Silt

Clayey Silt

Sandy Clay

Silty Clay

Partially Weathered Rock

Cored Rock

WATER LEVELS

(Shown in Water Level Column)

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

CONSISTENCY OF COHESIVE SOILS

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

RELATIVE DENSITY OF COHESIONLESS SOILS

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

SAMPLER TYPES

(Shown in Samples Column)

Shelby Tube

Split Spoon

Rock Core

No Recovery

TERMS

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

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

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

PROJECT:	NC Fairgrounds Lunch Stand Replacement Raleigh, North Carolina **S&ME Project No. 23050451**	**BORING LOG: B-1** *Sheet 1 of 1*

DATE DRILLED: 08/23/2023	**ELEVATION:** 491 ft	**NOTES:** Location and elevation are approximate
DRILL RIG: CME 750	**DATUM:** NAVD88	
DRILLER: D. Garrow	**BORING DEPTH:** 25.0 ft	
HAMMER TYPE: Automatic hammer	**CLOSURE:** Cuttings and Asphalt Patch	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** Matthew Millette	**LATITUDE:** 35.794929 **LONGITUDE:** -78.710763
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane North Carolina FIPS 3200 Feet	

STANDARD PENETRATION TEST DATA: △ % Fines, ○ NMC, ├┤ PL---LL (scale 20, 40, 60, 80, 100)

DEPTH (feet)	NOTES	Origin/Identifier	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	ELEVATION
0				ASPHALT, 4"		491
	0.3			AGGREGATE BASE, 8"		
	1.0	Fill	SS-1 (18 in)	SILT WITH SAND (ML), few gravel, soft, red brown and tan, moist	1-2-2 N = 4	
	3.0	Fill	SS-2 (18 in)	ELASTIC SILT WITH SAND (MH), stiff, red brown, moist	3-5-5 N = 10	
5	5.5	Residuum	SS-3 (18 in)	SILT (ML), trace mica, stiff, red orange brown, moist	3-5-8 N = 13	486
		Residuum	SS-4 (18 in)	*Purple red and orange tan.*	3-4-7 N = 11	
10						481
		Residuum	SS-5 (18 in)	*Gray purple.*	5-5-9 N = 14	
15						476
		Residuum	SS-6 (18 in)		3-4-5 N = 9	
20						471
	Hole Cave at 22.0 feet					
		Residuum	SS-7 (18 in)	*Trace gravel, purple red brown.*	3-4-5 N = 9	
25	25.0			Borehole terminated at 25.0 feet		466
30						461

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	08/23/2023		Not encountered
END OF DRILLING	▼			
AFTER DRILLING	▼			
AFTER DRILLING	▼			

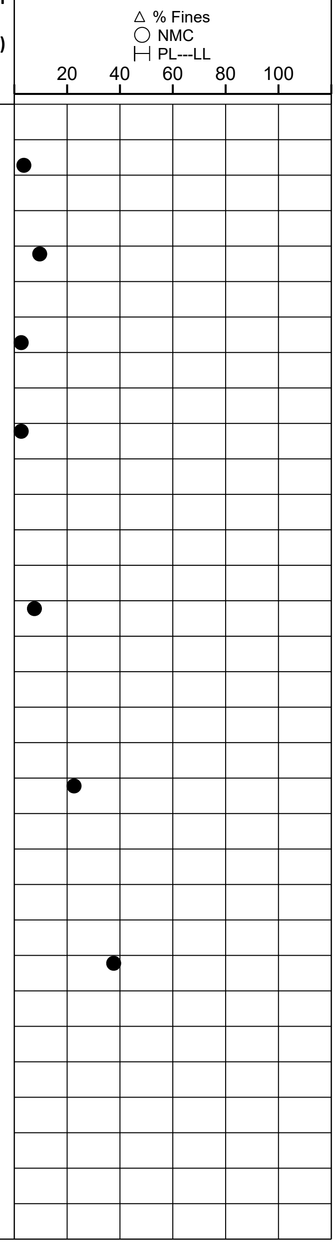
GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal

PROJECT:	NC Fairgrounds Lunch Stand Replacement Raleigh, North Carolina **S&ME Project No. 23050451**	**BORING LOG: B-2** *Sheet 1 of 1*

DATE DRILLED: 08/23/2023	**ELEVATION:** 493 ft	**NOTES:** Location and elevation are approximate
DRILL RIG: CME 750	**DATUM:** NAVD88	
DRILLER: D. Garrow	**BORING DEPTH:** 25.0 ft	
HAMMER TYPE: Automatic hammer	**CLOSURE:** Cuttings and Asphalt Patch	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** Matthew Millette	**LATITUDE:** 35.794888 **LONGITUDE:** -78.710374
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane North Carolina FIPS 3200 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	ELEVATION
0				ASPHALT, 5"		493
	0.4			AGGREGATE BASE, 6"		
	0.9	Fill	SS-1 (18 in)	SILT WITH SAND (ML), trace gravel, soft, red brown, moist	1-2-2 N = 4	
	3.0	Fill	SS-2 (18 in)	SILT (ML), stiff, red brown, moist	2-2-8 N = 10	
5						488
	5.5	Fill	SS-3 (18 in)	SILT WITH SAND (ML), trace gravel, trace mica, soft, orange red	1-1-2 N = 3	
		Fill	SS-4 (18 in)	*Trace gravel, red brown.*	0-1-2 N = 3	
10						483
	12.0	Residuum	SS-5 (18 in)	SILT WITH SAND (ML), trace mica, firm, red brown and gray, moist	4-3-5 N = 8	
15						478
	17.0	Residuum	SS-6 (18 in)	SILT (ML), trace mica, very stiff to hard, orange brown, moist	4-6-17 N = 23	
20						473
	Hole Cave at 22.0 feet	Residuum	SS-7 (18 in)	*Purple red and orange brown.*	5-10-28 N = 38	
25	25.0			Borehole terminated at 25.0 feet		468
30						463

STANDARD PENETRATION TEST DATA



GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	08/23/2023		Not encountered
END OF DRILLING	▼			
AFTER DRILLING	▼			
AFTER DRILLING	▼			

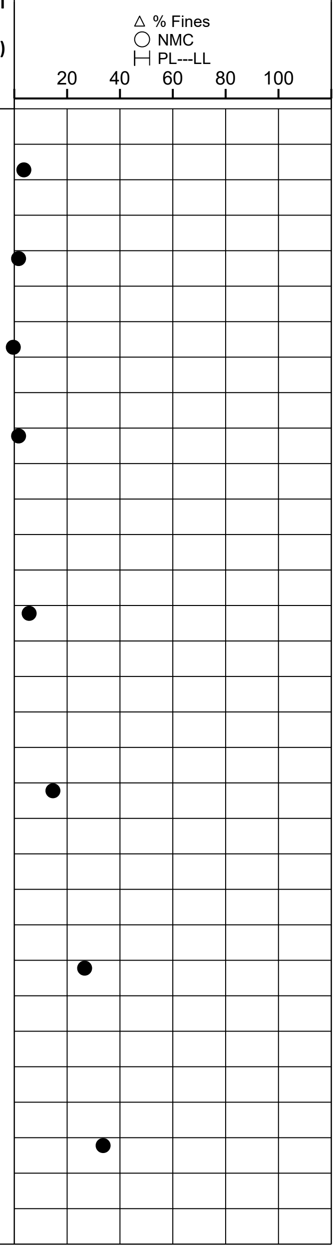
GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal

PROJECT:	NC Fairgrounds Lunch Stand Replacement Raleigh, North Carolina **S&ME Project No. 23050451**	**BORING LOG: B-3** *Sheet 1 of 2*

DATE DRILLED: 08/23/2023	**ELEVATION:** 494 ft	**NOTES:** Location and elevation are approximate
DRILL RIG: CME 750	**DATUM:** NAVD88	
DRILLER: D. Garrow	**BORING DEPTH:** 50.0 ft	
HAMMER TYPE: Automatic hammer	**CLOSURE:** Cuttings and Asphalt Patch	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** Matthew Millette	**LATITUDE:** 35.795003 **LONGITUDE:** -78.709967
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane North Carolina FIPS 3200 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	ELEVATION
0					ASPHALT, 5"		494
	0.4				AGGREGATE BASE, 7"		
	1.1	Fill		SS-1 (18 in)	SANDY SILT (ML), trace mica, very soft to soft, red brown, moist	2-2-2 N = 4	
				SS-2 (18 in)	*Trace gravel.*	1-1-1 N = 2	
5							489
				SS-3 (18 in)	*Trace asphalt.*	0-0-0 N = WOH	
				SS-4 (18 in)	*Few gravel, no asphalt.*	1-1-1 N = 2	
10							484
	12.0	Residuum			SILT WITH SAND (ML), trace mica, trace gravel, firm to hard, purple brown and tan, moist to wet		
				SS-5 (18 in)		1-1-5 N = 6	
15							479
				SS-6 (18 in)	*No gravel, purple red.*	7-6-9 N = 15	
20							474
				SS-7 (18 in)	*Gray purple.*	6-12-15 N = 27	
25							469
	▽						
				SS-8 (18 in)		10-16-18 N = 34	
30							464

STANDARD PENETRATION TEST DATA



GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	08/23/2023	26.0	
END OF DRILLING	▼			
AFTER DRILLING	▼			
AFTER DRILLING	▼			

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),
AR = Auger Refusal

PROJECT:	NC Fairgrounds Lunch Stand Replacement Raleigh, North Carolina **S&ME Project No. 23050451**	**BORING LOG: B-3** *Sheet 2 of 2*

DATE DRILLED: 08/23/2023	**ELEVATION:** 494 ft	**NOTES:** Location and elevation are approximate
DRILL RIG: CME 750	**DATUM:** NAVD88	
DRILLER: D. Garrow	**BORING DEPTH:** 50.0 ft	
HAMMER TYPE: Automatic hammer	**CLOSURE:** Cuttings and Asphalt Patch	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** Matthew Millette	**LATITUDE:** 35.795003 **LONGITUDE:** -78.709967
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane North Carolina FIPS 3200 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA (△ % Fines, ○ NMC, ├┤ PL---LL; 20 40 60 80 100)	ELEVATION
		Residuum			SILT WITH SAND (ML), trace mica, trace gravel, firm to hard, purple brown and tan, moist to wet			
35				SS-9 (18 in)		10-16-20 N = 36	●	459
40				SS-10 (18 in)		20-30-40 N = 70	●	454
					Light red with gray tan.			
45	Hole Cave at 45.0 feet			SS-11 (18 in)		13-16-25 N = 41	●	449
					Purple red with gray tan.			
50	50.0			SS-12 (18 in)	Borehole terminated at 50.0 feet	22-30-30 N = 60	●	444
55								439
60								434

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	08/23/2023	26.0	
END OF DRILLING	▼			
AFTER DRILLING	▼			
AFTER DRILLING	▼			

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),
AR = Auger Refusal

PROJECT:	NC Fairgrounds Lunch Stand Replacement Raleigh, North Carolina **S&ME Project No. 23050451**	**BORING LOG: B-4** *Sheet 1 of 1*	
DATE DRILLED: 08/23/2023	**ELEVATION:** 493 ft	**NOTES:** Location and elevation are approximate	
DRILL RIG: CME 750	**DATUM:** NAVD88		
DRILLER: D. Garrow	**BORING DEPTH:** 25.0 ft		
HAMMER TYPE: Automatic hammer	**CLOSURE:** Cuttings with Hole Closure Device		
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** Matthew Millette	**LATITUDE:** 35.795125	**LONGITUDE:** -78.709623
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane North Carolina FIPS 3200 Feet		

DEPTH (feet)	NOTES	Origin/Identifier	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	ELEVATION
0						493
	0.3	Fill		ASPHALT, 4"		
	0.7	Fill	SS-1 (18 in)	AGGREGATE BASE, 4" SILT (ML), trace gravel, stiff, red brown, moist	3-4-5 N = 9	
	3.0	Fill	SS-2 (18 in)	SILT (ML), trace mica, very stiff, orange red, moist	6-9-14 N = 23	
5						488
	5.5	Residuum	SS-3 (18 in)	SILT WITH SAND (ML), trace mica, very stiff, red orange and tan gray, moist	6-9-11 N = 20	
	8.0	Residuum	SS-4 (18 in)	SANDY SILT (ML), trace mica, very stiff, orange red, trace quartz fragments	4-9-10 N = 19	
10						483
		Residuum	SS-5 (18 in)	*No gravel, light red with tan.*	7-8-10 N = 18	
15						478
	17.0	Residuum	SS-6 (18 in)	SILT WITH SAND (ML), trace mica, very stiff to hard, light red with gray brown, moist	5-10-12 N = 22	
20						473
	Hole Cave at 22.0 feet	Residuum	SS-7 (18 in)	*Purple red.*	9-14-28 N = 42	
25	25.0			Borehole terminated at 25.0 feet		468
30						463

STANDARD PENETRATION TEST DATA

△ % Fines
○ NMC
├┤ PL---LL

20 40 60 80 100

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD		08/23/2023		Not encountered
END OF DRILLING				
AFTER DRILLING				
AFTER DRILLING				

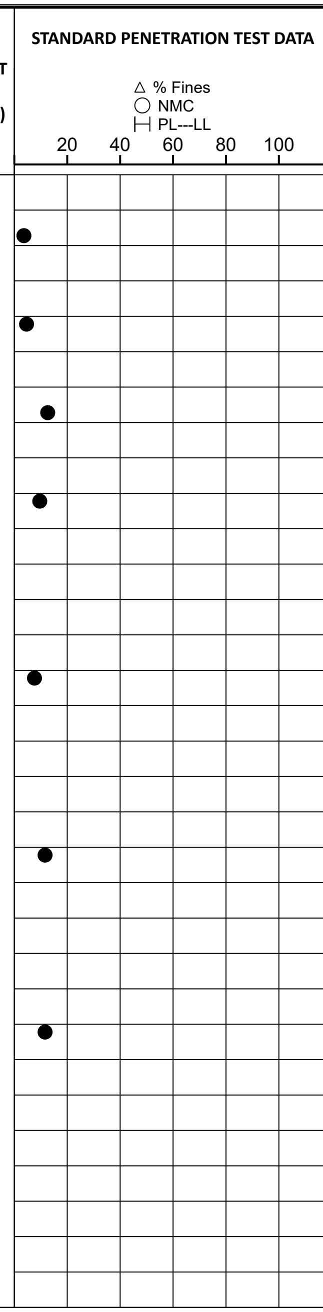
GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal

PROJECT: NC Fairgrounds Lunch Stand Replacement, Raleigh, North Carolina — S&ME Project No. 23050451	**BORING LOG: B-5** *Sheet 1 of 1*

DATE DRILLED: 03/11/2024	**ELEVATION:** 491 ft	**NOTES:** Boring location and elevation are approximate.
DRILL RIG: D-50	**DATUM:** NAVD88	
DRILLER: TJ Williams	**BORING DEPTH:** 25.0 ft	
HAMMER TYPE: Automatic hammer	**CLOSURE:** Cuttings with Hole Closure Device	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** William Harrison	**LATITUDE:** 35.795068 **LONGITUDE:** -78.710158
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane North Carolina FIPS 3200 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	ELEVATION
0.2		Fill		TOPSOIL, 2"		491
0.2–3.0		Fill	SS-1 (18 in)	SANDY ELASTIC SILT (MH), trace mica, trace fine gravel, soft, brown with red orange, moist	2-2-2 N = 4	
3.0–5.5		Fill	SS-2 (18 in)	FAT CLAY (CH), firm, brown red, moist	2-3-2 N = 5	486
5.5–8.0		Fill	SS-3 (18 in)	LEAN CLAY WITH SAND (CL), trace fine gravel, trace, stiff, tan red and orange, moist, quartz	5-6-7 N = 13	
8.0–12.0		Residuum	SS-4 (18 in)	SILT WITH SAND (ML), trace mica, stiff, purple red and orange, moist	4-5-5 N = 10	481
12.0–17.0		Residuum	SS-5 (18 in)	SANDY SILT (ML), trace mica, firm, purple gray and tan, moist	3-4-4 N = 8	476
17.0–25.0	Hole Cave at 21.5 feet	Residuum	SS-6 (18 in)	SILT WITH SAND (ML), little mica, stiff, red purple with gray, moist	4-6-6 N = 12	471
			SS-7 (18 in)		6-5-7 N = 12	466
25.0				Borehole terminated at 25.0 feet		

STANDARD PENETRATION TEST DATA



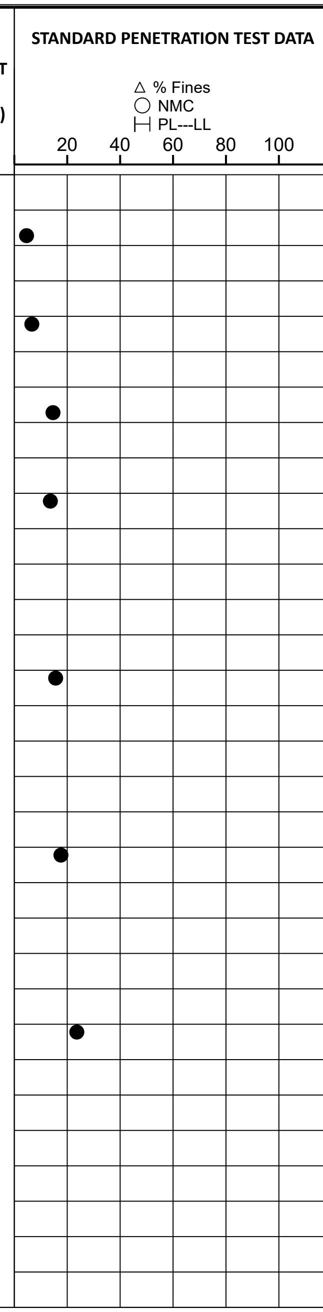
GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD		03/11/2024		Caved dry at 21.5'
END OF DRILLING				
AFTER DRILLING				
AFTER DRILLING				

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal, IGM = Intermediate Geomaterial

PROJECT: NC Fairgrounds Lunch Stand Replacement, Raleigh, North Carolina	**BORING LOG: B-6**
S&ME Project No. 23050451	*Sheet 1 of 1*

DATE DRILLED: 03/11/2024	**ELEVATION:** 491 ft	**NOTES:** Boring location and elevation are approximate.
DRILL RIG: D-50	**DATUM:** NAVD88	
DRILLER: TJ Williams	**BORING DEPTH:** 25.0 ft	
HAMMER TYPE: Automatic hammer	**CLOSURE:** Cuttings with Hole Closure Device	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** William Harrison	**LATITUDE:** 35.795165 **LONGITUDE:** -78.709865
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane North Carolina FIPS 3200 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	ELEVATION
0						491
0.2		Fill		TOPSOIL, 2"		
		Fill	SS-1 (18 in)	FAT CLAY (CH), with silt, trace fine to medium gravel, trace mica, firm, brown and red, moist	3-2-3 N = 5	
3.0		Fill	SS-2 (18 in)	FAT CLAY WITH SAND (CH), with, trace mica, firm, brown red and yellow, moist, rootlets	3-3-4 N = 7	
5						486
6.0		Residuum	SS-3 (18 in)	SANDY SILT (ML), trace mica, stiff, orange red, moist	4-7-8 N = 15	
8.0		Residuum	SS-4 (18 in)	SANDY SILT (ML), with, little mica, stiff, tan red and gray, moist, quartz	5-5-9 N = 14	
10						481
12.0		Residuum	SS-5 (18 in)	SANDY SILT (ML), little mica, very stiff, red purple, moist	7-7-9 N = 16	
15						476
		Residuum	SS-6 (18 in)		6-8-10 N = 18	
20						471
	Hole Cave at 22.0 feet	Residuum	SS-7 (18 in)		9-10-14 N = 24	
25						466
25.0				Borehole terminated at 25.0 feet		
30						461



GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD		03/11/2024		Caved dry at 22'
END OF DRILLING				
AFTER DRILLING				
AFTER DRILLING				

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal, IGM = Intermediate Geomaterial

PROJECT:	NC Fairgrounds Lunch Stand Replacement Raleigh, North Carolina **S&ME Project No. 23050451**	**BORING LOG: B-7** *Sheet 1 of 1*

DATE DRILLED: 03/11/2024	**ELEVATION:** 490 ft	**NOTES:** Boring location and elevation are approximate.
DRILL RIG: D-50	**DATUM:** NAVD88	
DRILLER: TJ Williams	**BORING DEPTH:** 25.0 ft	
HAMMER TYPE: Automatic hammer	**CLOSURE:** Cuttings with Hole Closure Device	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** William Harrison	**LATITUDE:** 35.795154 **LONGITUDE:** -78.710351
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane North Carolina FIPS 3200 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	ELEVATION
0				TOPSOIL, 6"		490
0.5		Fill	SS-1 (18 in)	SANDY SILT (ML), with clay, trace mica, trace fine gravel, firm, brown red, moist	3-4-3 N = 7	
3.0		Fill	SS-2 (18 in)	SILT WITH SAND (ML), trace fine gravel, stiff, orange and tan, moist	3-4-5 N = 9	
5						485
5.5		Residuum	SS-3 (18 in)	SILT (ML), little mica, stiff, red purple and orange, moist	3-4-5 N = 9	
8.0		Residuum	SS-4 (18 in)	SANDY SILT (ML), little mica, stiff, tan brown, moist	3-3-6 N = 9	
10						480
12.0		Residuum	SS-4 (18 in)	SANDY SILT (ML), little mica, stiff, purple tan, moist	3-4-7 N = 11	
15						475
17.0	Hole Cave at 19.5 feet	Residuum	SS-6 (18 in)	SANDY SILT (ML), little mica, stiff, purple red and tan, moist	3-5-7 N = 12	
20						470
		Residuum	SS-7 (18 in)		5-5-6 N = 11	
25 / 25.0				Borehole terminated at 25.0 feet		465
30						460

STANDARD PENETRATION TEST DATA
△ % Fines
○ NMC
├┤ PL---LL
20 40 60 80 100

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	03/11/2024		Caved dry at 19.5'
END OF DRILLING	▼			
AFTER DRILLING	▼			
AFTER DRILLING	▼			

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),
AR = Auger Refusal, IGM = Intermediate Geomaterial

PROJECT:	NC Fairgrounds Lunch Stand Replacement Raleigh, North Carolina **S&ME Project No. 23050451**	**BORING LOG: B-8** *Sheet 1 of 1*

DATE DRILLED: 03/11/2024	**ELEVATION:** 489 ft	**NOTES:** Boring location and elevation are approximate.
DRILL RIG: D-50	**DATUM:** NAVD88	
DRILLER: TJ Williams	**BORING DEPTH:** 25.0 ft	
HAMMER TYPE: Automatic hammer	**CLOSURE:** Cuttings with Hole Closure Device	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** William Harrison	**LATITUDE:** 35.795241 **LONGITUDE:** -78.710088
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane North Carolina FIPS 3200 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	ELEVATION
0				TOPSOIL, 5"		489
	0.4	Fill	SS-1 (18 in)	SANDY LEAN CLAY (CL), trace fine gravel, trace, firm, orange red, moist, rootlets	3-3-3 N = 6	
	3.0	Fill	SS-2 (18 in)	SILTY SAND (SM), trace fine gravel, loose, tan yellow, fine grained, moist	6-4-3 N = 7	
5	5.5	Residuum	SS-3 (18 in)	SILT (ML), stiff, tan orange, moist	4-4-6 N = 10	484
	8.0	Residuum	SS-4 (18 in)	SANDY SILT (ML), little mica, stiff, red purple and orange, moist	4-4-6 N = 10	
10						479
	12.0	Residuum	SS-5 (18 in)	SANDY SILT (ML), little mica, stiff, brown purple and red, moist	4-4-6 N = 10	
15						474
	17.0	Residuum		SANDY SILT (ML), trace mica, stiff to very stiff, tan and red, moist		
	Hole Cave at 19.0 feet		SS-6 (18 in)		4-6-5 N = 11	
20						469
			SS-7 (18 in)		6-10-12 N = 22	
25	25.0			Borehole terminated at 25.0 feet		464
30						459

STANDARD PENETRATION TEST DATA: △ % Fines, ○ NMC, ├┤ PL---LL; scale 20 40 60 80 100

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	03/11/2024		Caved dry at 19'
END OF DRILLING	▼			
AFTER DRILLING	▼			
AFTER DRILLING	▼			

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal, IGM = Intermediate Geomaterial

BORING LOG: B-9

Sheet 1 of 1

PROJECT:	NC Fairgrounds Lunch Stand Replacement Raleigh, North Carolina S&ME Project No. 23050451

DATE DRILLED: 03/11/2024	**ELEVATION:** 490 ft	**NOTES:**
DRILL RIG: D-50	**DATUM:** NAVD88	
DRILLER: TJ Williams	**BORING DEPTH:** 25.0 ft	
HAMMER TYPE: Automatic hammer	**CLOSURE:** Cuttings with Hole Closure Device	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** William Harrison	**LATITUDE:** 35.795325 **LONGITUDE:** -78.709799
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane North Carolina FIPS 3200 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	ELEVATION
0				TOPSOIL, 5"		490
	0.4	Fill	SS-1 (18 in)	SANDY LEAN CLAY (CL), with fine to medium gravel, firm, tan brown and red, moist	4-3-4 N = 7	
	3.0	Fill	SS-2 (18 in)	SANDY SILT (ML), trace mica, trace fine gravel, firm, purple red and tan, moist	3-4-3 N = 7	
5						485
	5.5	Fill	SS-3 (18 in)	CLAYEY SAND (SC), trace rock fragments, medium dense, tan brown and red, fine to medium grained, moist	3-5-6 N = 11	
	8.0	Residuum	SS-4 (18 in)	SANDY SILT (ML), with, stiff, orange red, moist, quartz	8-9-4 N = 13	
10						480
	12.0	Residuum	SS-5 (18 in)	SANDY SILT (ML), little mica, stiff, purple tan and orange, moist	4-4-5 N = 9	
15						475
	17.0	Residuum	SS-6 (18 in)	SANDY SILT (ML), little mica, very stiff, light red purple, moist	13-13-15 N = 28	
20	Hole Cave at 20.0 feet					470
	22.0	Residuum	SS-7 (18 in)	SANDY SILT (ML), trace mica, with, very stiff, tan red, moist, quartz	10-18-11 N = 29	
25	25.0			Borehole terminated at 25.0 feet		465
30						460

STANDARD PENETRATION TEST DATA: △ % Fines ○ NMC ├┤ PL---LL (scale 20, 40, 60, 80, 100)

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	03/11/2024		Caved dry at 20'
END OF DRILLING	▼			
AFTER DRILLING	▼			
AFTER DRILLING	▼			

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),
AR = Auger Refusal, IGM = Intermediate Geomaterial

Appendix III – Laboratory Test Data

Form No: TR-D2216-T265-2
Revision No. 1
Revision Date: 08/16/17

LABORATORY DETERMINATION OF WATER CONTENT

ASTM D 2216 ☑ *AASHTO T 265* ☐

S&ME, Inc. Raleigh: 3201 Spring Forest Road, Raleigh, NC 27616

Project #:	23050451	Report Date:	9/7/2023
Project Name:	NC Fairgroups Lunch Stand Replacement	Test Date(s):	9/6 - 9/7/23
Client Name:	Dewberry		
Client Address:			
Sample by:	S&ME	Sample Date(s):	8/23/23
Sampling Method:	Bulk & Splitt Spoon	Drill Rig :	N/A

Method: **A** **(1%)** ☐ **B** **(0.1%)** ☑

Balance ID.	20977	Calibration Date:	3/2/23
Oven ID.	1454	Calibration Date:	8/30/23

Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt.+ Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture
		ft.		grams	grams	grams	grams	%
B-1	SS-2	3.5-5		6.91	91.93	72.03	19.90	30.6%
B-2	SS-4	8.5-10		6.95	153.94	127.72	26.22	21.7%
B-2	SS-5	13.5-15		6.86	153.07	122.58	30.49	26.3%
B-3	Bulk	1-5		6.95	201.89	180.39	21.50	12.4%

Notes / Deviations / References

AASHTO T 265: Laboratory Determination of Moisture Content of Soils

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

Mal Krajan, ET		Laboratory Manager	9/7/2023
Technical Responsibility	*Signature*	*Position*	*Date*

Moisture, Ash, and Organic Matter

ASTM D-2974

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	23050451			Report Date:	3/21/2024
Project Name:	NC Fairgrounds Lunch Building			Test Date(s):	3/19 - 3/21/23
Client Name:	Dewberry				
Client Address:					
Boring #:	N/A	Sample No.	S-1	Sample Date:	3/4/2024
Location:	On Site Stockpile	Offset:	N/A	Depth (ft):	0-5 ft.
Sample Description:	Gray Silty SAND with Organics				

Equipment: Balance: 0.01 g.Readability, 500g. Minimum Capaccity

Balance: S&ME ID #: **20977** Cal. Date: **3/2/23** Due: **3/2/24**

Method A: Moisture Content Determination Required Oven Temperature:105 $\pm$ 5°C

Oven Temperature: 105 °C		Tare #	10
t	Tare Weight (Dish plus Aluminum Foil Cover)	grams	49.23
a	Mass of **As-Received** Specimen + Tare Wt.	grams	149.19
b	Mass of Oven Dry Specimen + Tare Wt.	grams	122.45
w	Water Weight	(a-b)	26.74
A	Mass of As-Received Specimen	(a-t)	99.96
B	Mass of Oven Dry Specimen	(b-t)	73.22
% Moisture Content as a % of As Received or Total Mass		(w/A)*100	**26.8%**
% Moisture Content as a % of Oven-dried Mass		(w/B)*100	**36.5%**

Oven S&ME ID #: 1454 Cal. Date: 8/30/23 Due: 8/30/24

Method C (440°C) or D (750°C): Ash Content and Organic Matter Determination

Muffle Furnace: 440 °C		Tare #	10
t	Tare Weight (Dish plus Aluminum Foil Cover)	grams	49.23
b	Mass of Oven Dry Specimen + Tare Wt.	grams	122.45
c	Ash Weight + Tare Wt.	grams	111.67
C	Ash Weight	c-t	62.44
B	Mass of Oven Dry Specimen	(b-t)	73.22
D	**% Ash Content**	(C/B)*100	**85.3%**
	% Organic Matter	100-D	**14.7%**

Muffle Furnace: S&ME ID #: 00261

Notes / Deviations / References:

ASTM D2974: Moisture, Ash, and Organic Matter of Peat and Other Organic Soils

Mal Krajan, ET		Laboratory Manager	3/21/2024
Technical Responsibility	*Signature*	*Position*	*Date*

Form No. TR-D698-2
Revision No. : 1
Revision Date: 07/25/17

MOISTURE - DENSITY REPORT

Quality Assurance

S&ME, Inc. Raleigh: 3201 Spring Forest Road, Raleigh, NC 27616

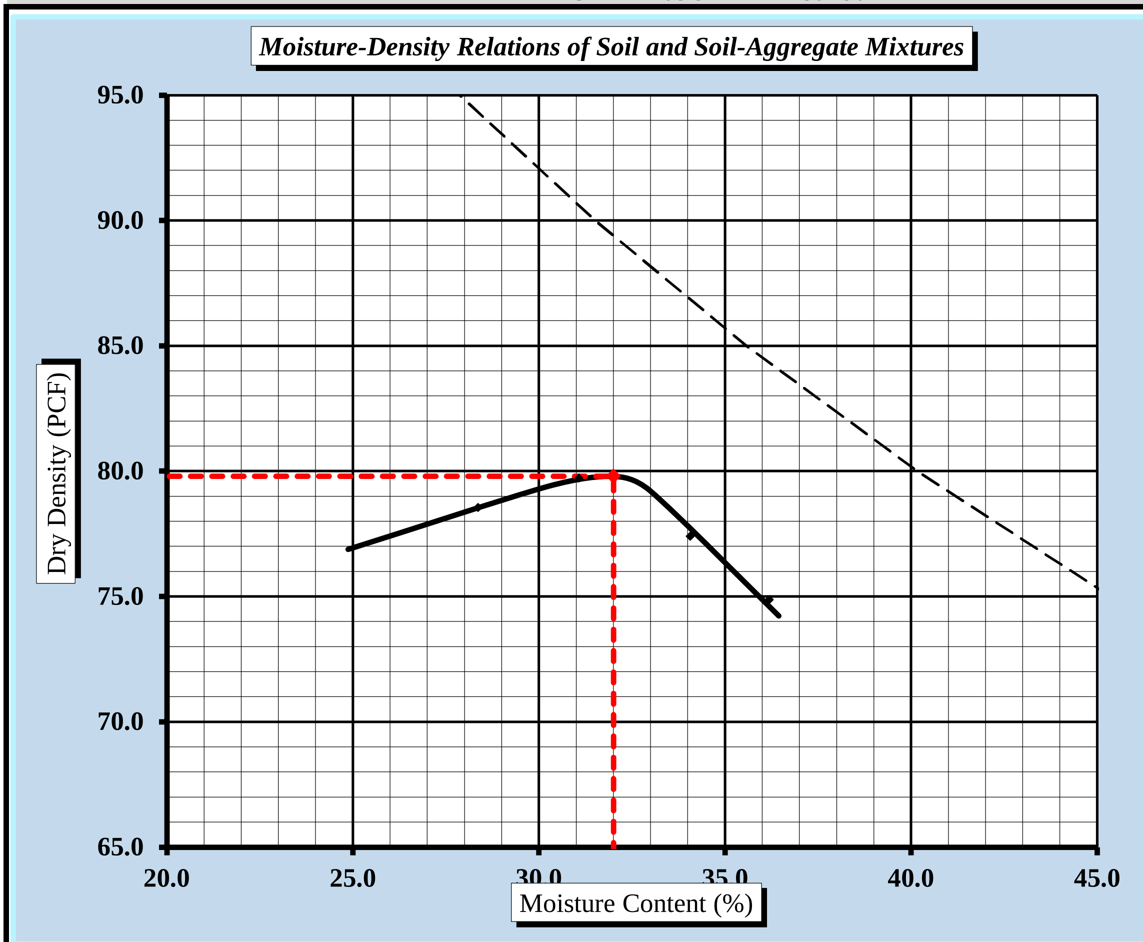
S&ME Project #:	23050451	Report Date:	3/12/24
Project Name:	NC Fairgrounds lunch Building	Test Date(s):	3/8 - 3/12/24
Client Name:			
Client Address:			

Boring #:	N/A	Sample #:	S-1	Sample Date:	3/4/2024
Location:	On Site	Offset:	N/A	Depth (ft):	N/A

Sample Description: Gray Silty SAND with Organics

Maximum Dry Density 79.8 PCF. Optimum Moisture Content 32.0%

ASTM D 698 - - Method A



Soil Properties	
Natural Moisture Content	ND
Assumed Specific Gravity	2.650
Liquid Limit	ND
Plastic Limit	ND
Plastic Index	ND
% Passing	
3/4"	100.0%
3/8"	100.0%
#4	
#200	
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.
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

Mal Krajan		Laboratory Manager	3/12/2024
Technical Responsibility	*Signature*	*Position*	*Date*

Form No. TR-D698-2
Revision No. : 1
Revision Date: 07/25/17

MOISTURE - DENSITY REPORT

Quality Assurance

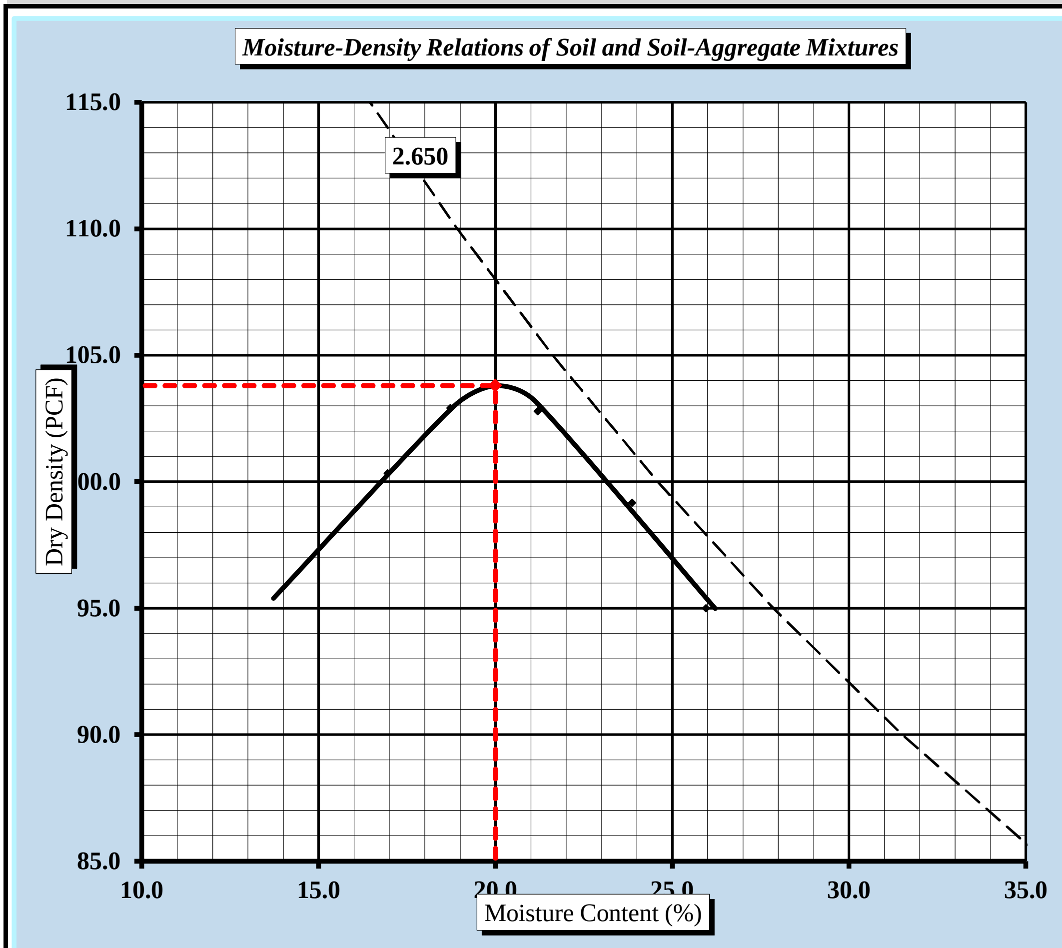
S&ME, Inc. Raleigh: 3201 Spring Forest Road, Raleigh, NC 27616

S&ME Project #:	23050451	Report Date:	9/1/2023
Project Name:	NC Fairgrounds Lunch Stand Replacement	Test Date(s):	8/30-9/1/2023
Client Name:	Dewberry		
Client Address:			

Boring #:	B-3	Sample #:	Bulk	Sample Date:	8/23/2023
Location:	Boreholes	Offset:	N/A	Depth (ft):	1-5
Sample Description:	Brown Sandy SILT (ML)				

Maximum Dry Density 103.8 PCF. Optimum Moisture Content 20.0%

ASTM D 698 - - Method A



Soil Properties	
Natural Moisture Content	12.4%
Assumed Specific Gravity	2.650
Liquid Limit	48
Plastic Limit	35
Plastic Index	13
% Passing	
3/4"	100.0%
3/8"	99.0%
#4	96.7%
#10	90.4%
#40	81.4%
#60	78.0%
#200	50.1%
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:

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

Mal Krajan, ET		Laboratory Manager	9/1/2023
Technical Responsibility	*Signature*	*Position*	*Date*

Form No. TR-D1883-T193-3
Revision No. 2
Revision Date: 08/11/17

CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL

ASTM D 1883

S&ME, Inc. Raleigh: 3201 Spring Forest Road, Raleigh, NC 27616

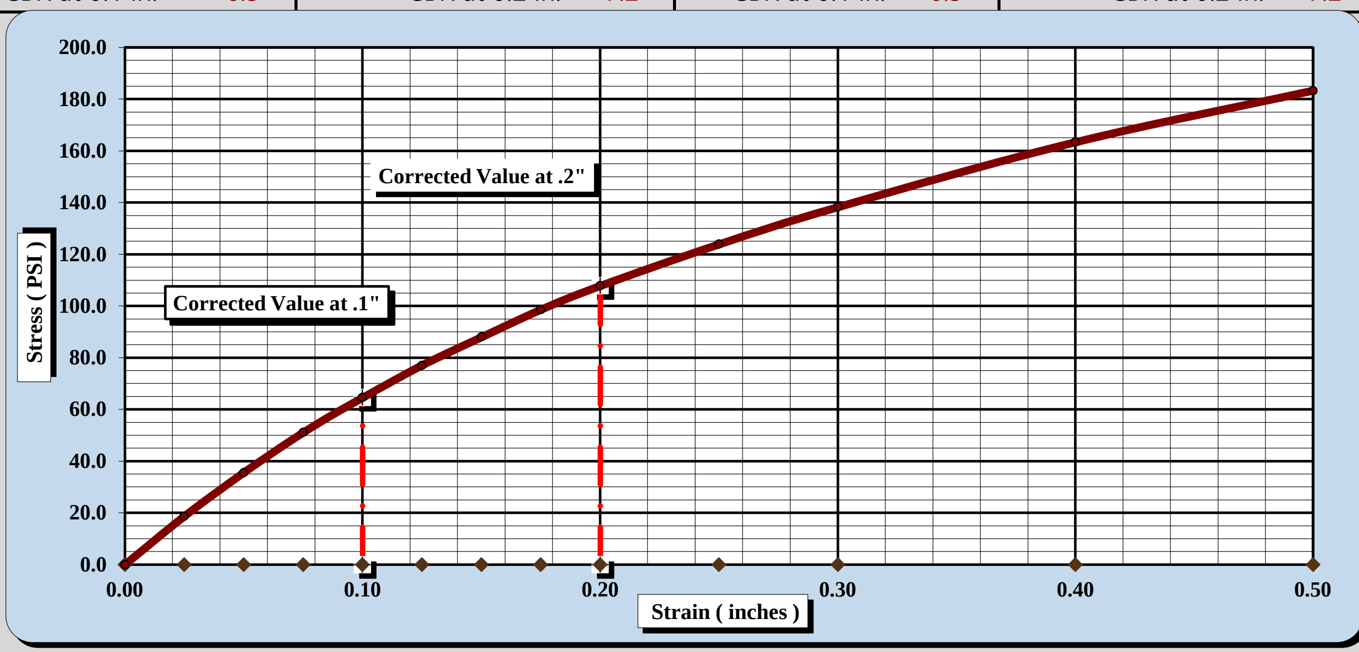
Project #:	23050451	Report Date:	9/6/2023
Project Name:	NC Fairgrounds Lunch Stand Replacement	Test Date(s)	9/4 - 9/6/23
Client Name:	Dewberry		
Client Address:			

Boring #:	B-3	Sample #:	Bulk	Sample Date:	8/23/23
Location:	Site-Borehole	Offset:	N/A	Depth (ft):	1-5

Sample Description: Brown Sandy SILT (ML)

ASTM D 698 *Method A* Maximum Dry Density: 103.8 PCF Optimum Moisture Content: 20.0%
Compaction Test performed on grading complying with CBR spec. % Retained on the 3/4" sieve: 0.0%

Uncorrected CBR Values		Corrected CBR Values	
CBR at 0.1 in. 6.5	CBR at 0.2 in. 7.2	CBR at 0.1 in. 6.5	CBR at 0.2 in. 7.2



CBR Sample Preparation:
The entire gradation was used and compacted in a 6" CBR mold in accordance with ASTM D1883, Section 6.1.1

Before Soaking		*After Soaking*	
Compactive Effort (Blows per Layer)	42	Final Dry Density (PCF)	101.4
Initial Dry Density (PCF)	101.8	Average Final Moisture Content	23.0%
Moisture Content of the Compacted Specimen	19.9%	Moisture Content (top 1" after soaking)	23.7%
Percent Compaction	98.1%	Percent Swell	0.6%

Soak Time: 96 hrs. Surcharge Weight 20.0 Surcharge Wt. per sq. Ft. 101.9
Liquid Limit 48 Plastic Index 13

Notes/Deviations/References:
Test specimen compacted to 98% at optimum moisture.

Mal Krajan, ET		Laboratory Manager	9/13/2023
Technical Responsibility	*Signature*	*Position*	*Date*

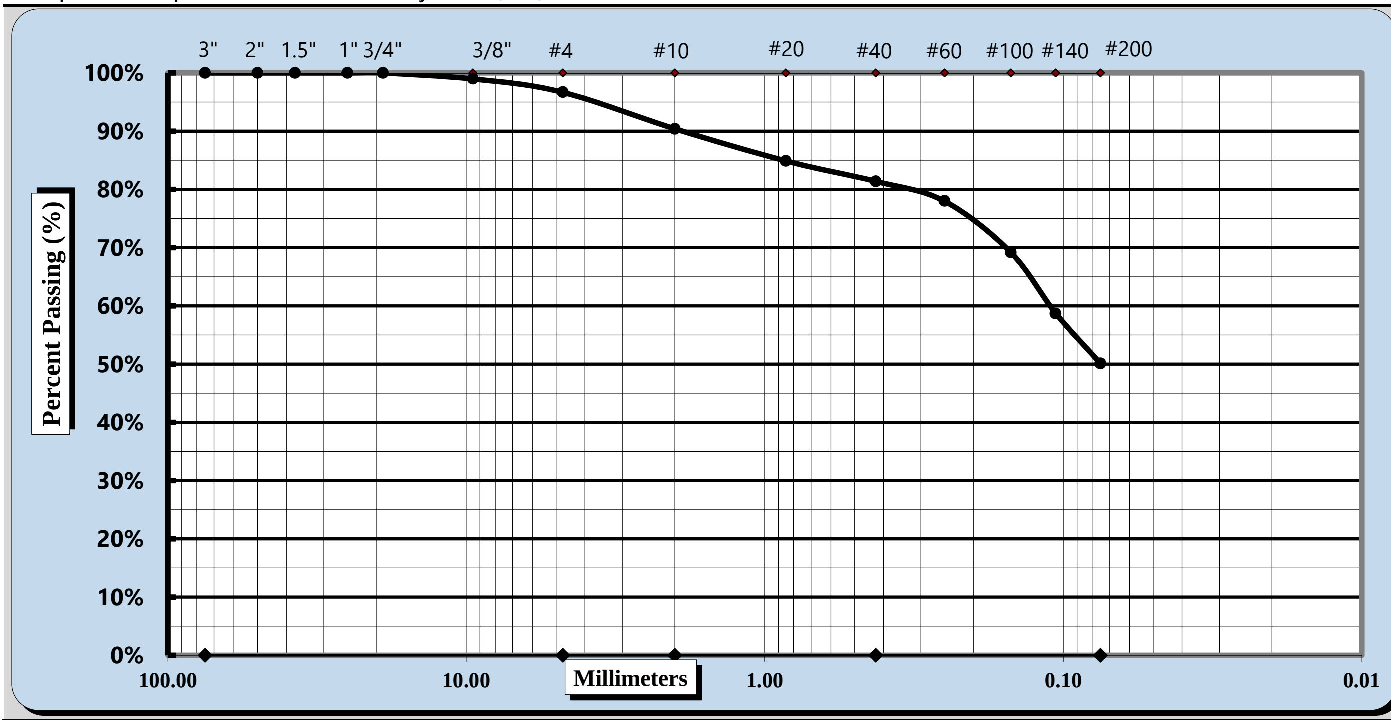
SIEVE ANALYSIS OF SOIL

Single sieve set ASTM D6913

S&ME, Inc. Raleigh: 3201 Spring Forest Road, Raleigh, NC 27616

Project #:	23050451	Record Date:	8/29/2003
Project Name:	NC Fairgrounds Lunch Stand Replacement	Lab Report #:	1
Client Name:	Dewberry	Date Received:	8/29/2023
Client Address:			
Received By:	Lab Tech Sampled by: S&ME, Inc.	Date Sampled:	8/23/2023
Location:	Site-Borehole Boring #: B-2	Sample #:	SS-4
Log/Sample Id.	289 Type: SS-4	Elev/Depth (ft):	8.5-10

Sample Description: Brown Sandy SILT (ML)



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm
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

Method: B Procedure for obtaining Specimen: Moist

Maximum Particle Size	3/4"	Coarse Sand	6.3%	Fine Sand	31.3%
Gravel	3.3%	Medium Sand	9.0%	Silt & Clay	50.1%
Liquid Limit	ND	Plastic Limit	ND	Plastic Index	ND
Maximum Dry Density	ND	Bulk Gravity (C127)	N/A	% Absorption	N/A
Optimum Moisture	ND	Natural Moisture	21.7%		

Notes / Deviations / References: ND=Not Determined.

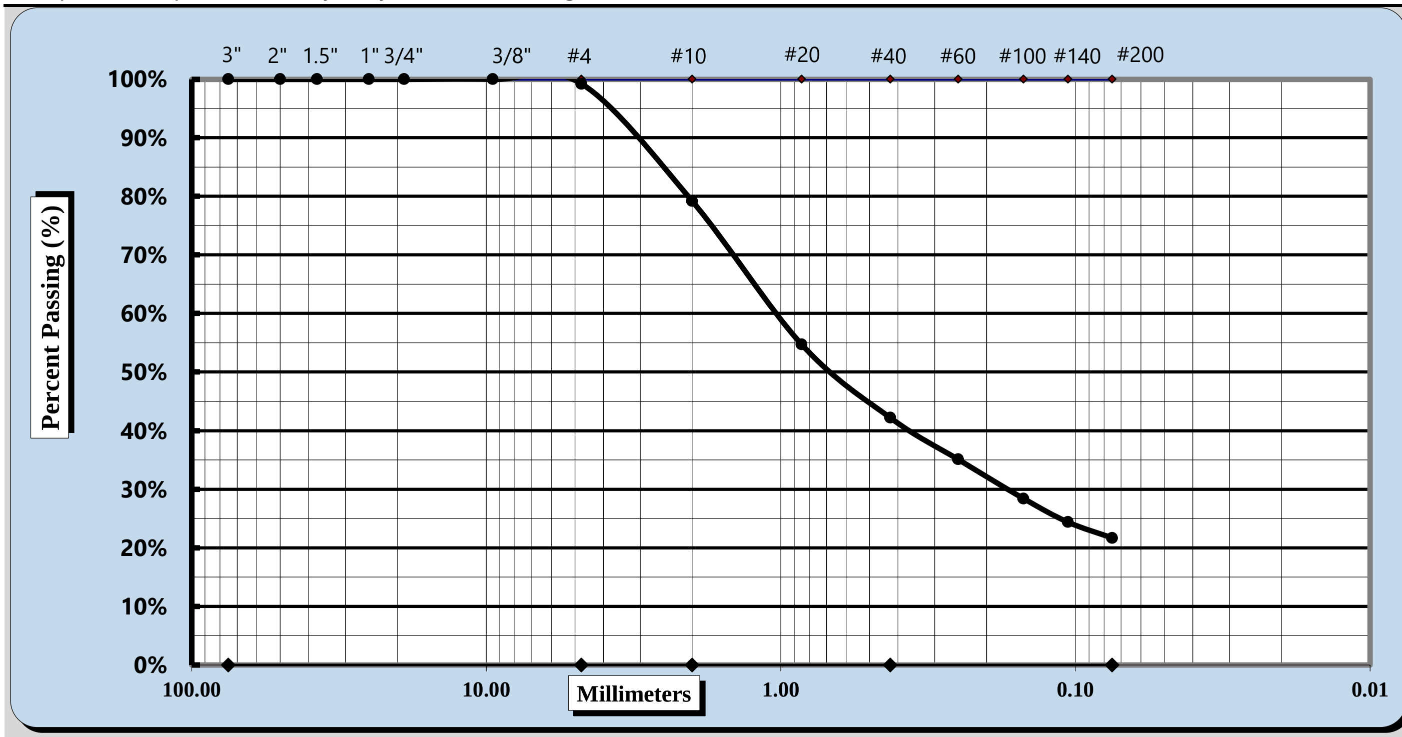
Mal Krajan, ET	[signature]	Laboratory Manager	9/14/2023
Technical Responsibility	*Signature*	*Position*	*Date*

SIEVE ANALYSIS OF SOIL

Single sieve set ASTM D6913

S&ME, Inc. Raleigh: 3201 Spring Forest Road, Raleigh, NC 27616

Project #:	23050451			Record Date:	3/5/2024
Project Name:	NC Fairgrounds Lunch Building			Lab Report #:	1
Client Name:	Dewberry			Date Received:	3/5/2024
Client Address:					
Received By:	Lab Tech	Sampled by:	S&ME, Inc.	Date Sampled:	3/4/2024
Location:	Site-Borehole	Boring #:	Bulk	Sample #:	S-1
Log/Sample Id.	48	Type:	Bulk	Elev/Depth (ft):	0-5 ft.
Sample Description:	Gray Silty SAND with Organic (SM)				



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm
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

Method: B Procedure for obtaining Specimen: Moist

Maximum Particle Size	3/8"	Coarse Sand	20.0%	Fine Sand	20.5%
Gravel	0.8%	Medium Sand	37.0%	Silt & Clay	21.7%
Liquid Limit	*ND	Plastic Limit	N.P.	Plastic Index	N.P.
Maximum Dry Density	N/A	Bulk Gravity (C127)	N/A	% Absorption	N/A
Optimum Moisture	N/A	Natural Moisture	33.5%		

Notes / Deviations / References: *ND=The Liquid Limit Could Not be Determined.

Mal Krajan		Laboratory Manager	3/21/2024
Technical Responsibility	*Signature*	*Position*	*Date*

Form No. TR-D4318-T89-90
Revision No.
Revision Date: 8/28/17

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX

ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

S&ME, Inc. Raleigh: 3201 Spring Forest Road, Raleigh, NC 27616

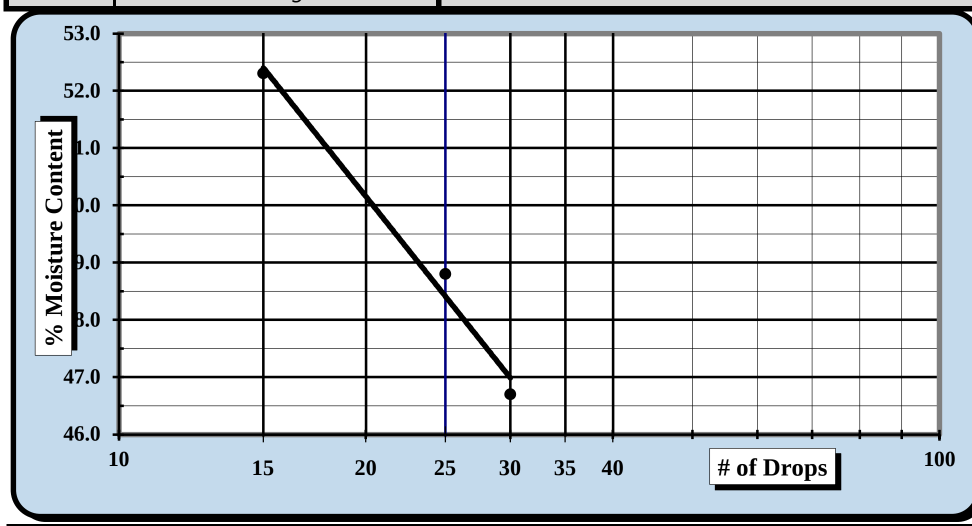
Project #:	23050451	Report Date:	9/13/23
Project Name:	NC Fairgrouds Lunch Stand Replacement	Test Date(s)	9/6 - 9/13/23
Client Name:	Dewberry		
Client Address:			

Boring #:	B-3	Sample #:	Bulk	Sample Date:	8/23/23
Location:	Site-Borehole	Offset:	N/A	Depth (ft):	1-5

Sample Description: Brown Sandy SILT

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	20977	3/2/2023	Grooving tool	1801	3/2/2023
LL Apparatus	34656	3/20/2023			
Oven	13289	8/30/2023			

Pan #		Liquid Limit						Plastic Limit		
	Tare #:									
A	Tare Weight	12.34	12.25	13.92				13.96	12.32	
B	Wet Soil Weight + A	23.62	23.25	24.67				24.05	21.74	
C	Dry Soil Weight + A	20.03	19.64	20.98				21.43	19.30	
D	Water Weight (B-C)	3.59	3.61	3.69				2.62	2.44	
E	Dry Soil Weight (C-A)	7.69	7.39	7.06				7.47	6.98	
F	% Moisture (D/E)*100	46.7%	48.8%	52.3%				35.1%	35.0%	
N	# OF DROPS	30	25	15				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**35.1%**		



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	☐
Liquid Limit	**48**
Plastic Limit	**35**
Plastic Index	**13**
Group Symbol	**ML**
Multipoint Method	☑
One-point Method	☐

Wet Preparation ☐ Dry Preparation ☐ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:* 5.5%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Mal Krajan, ET		Laboratory Manager	9/13/2023
Technical Responsibility	*Signature*	*Position*	*Date*

Form No. TR-D4318-T89-90
Revision No.
Revision Date: 8/28/17

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX

ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

S&ME, Inc. Raleigh: 3201 Spring Forest Road, Raleigh, NC 27616

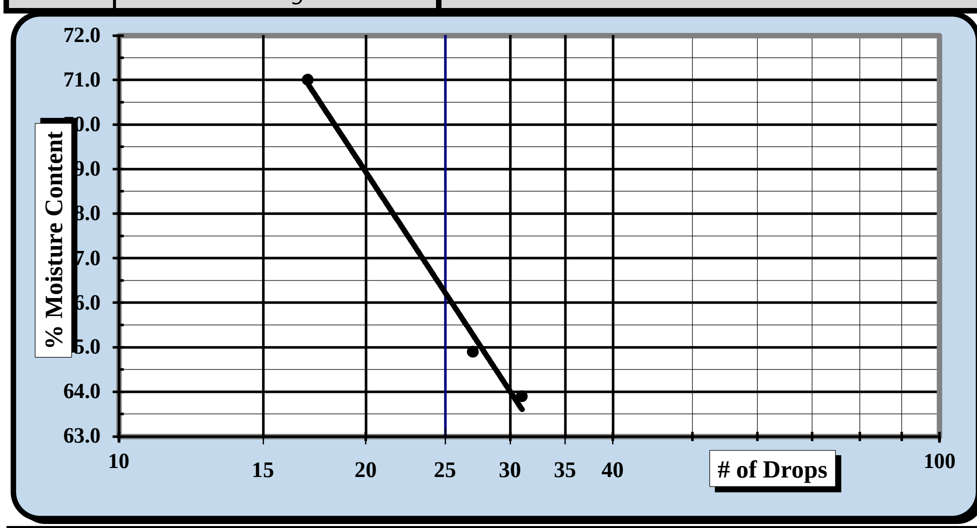
Project #:	23050451	Report Date:	9/13/23
Project Name:	NC Fairgrouds Lunch Stand Replacement	Test Date(s)	9/6 - 9/13/23
Client Name:	Dewberry		
Client Address:			

Boring #:	B-1	Sample #:	SS-2	Sample Date:	8/23/23
Location:	Site-Borehole	Offset:	N/A	Depth (ft):	3.5-5

Sample Description: Red SILT with Sand

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	20977	3/2/2023	Grooving tool	1801	3/2/2023
LL Apparatus	34656	3/20/2023			
Oven	13289	8/30/2023			

Pan #		Liquid Limit						Plastic Limit		
	Tare #:									
A	Tare Weight	12.21	12.34	12.20				12.19	12.35	
B	Wet Soil Weight + A	21.19	21.08	22.12				22.96	24.31	
C	Dry Soil Weight + A	17.69	17.64	18.00				19.90	20.88	
D	Water Weight (B-C)	3.50	3.44	4.12				3.06	3.43	
E	Dry Soil Weight (C-A)	5.48	5.30	5.80				7.71	8.53	
F	% Moisture (D/E)*100	63.9%	64.9%	71.0%				39.7%	40.2%	
N	# OF DROPS	31	27	17				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**40.0%**		



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	☐
Liquid Limit	**66**
Plastic Limit	**40**
Plastic Index	**26**
Group Symbol	**MH**
Multipoint Method	☑
One-point Method	☐

Wet Preparation ☐ Dry Preparation ☐ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:* 5.5%

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Mal Krajan, ET		Laboratory Manager	9/13/2023
Technical Responsibility	*Signature*	*Position*	*Date*

BUILT FOR VERSATILITY

Important Information About Your Geotechnical Engineering Report

Variations in subsurface conditions can be a principal cause of construction delays, cost overruns and claims. The following information is provided to assist you in understanding and managing the risk of these variations.

Geotechnical Findings Are Professional Opinions

Geotechnical engineers cannot specify material properties as other design engineers do. Geotechnical material properties have a far broader range on a given site than any manufactured construction material, and some geotechnical material properties may change over time because of exposure to air and water, or human activity.

Site exploration identifies subsurface conditions at the time of exploration and only at the points where subsurface tests are performed or samples obtained. Geotechnical engineers review field and laboratory data and then apply their judgment to render professional opinions about site subsurface conditions. Their recommendations rely upon these professional opinions. Variations in the vertical and lateral extent of subsurface materials may be encountered during construction that significantly impact construction schedules, methods and material volumes. While higher levels of subsurface exploration can mitigate the risk of encountering unanticipated subsurface conditions, no level of subsurface exploration can eliminate this risk.

Scope of Geotechnical Services

Professional geotechnical engineering judgment is required to develop a geotechnical exploration scope to obtain information necessary to support design and construction. A number of unique project factors are considered in developing the scope of geotechnical services, such as the exploration objective; the location, type, size and weight of the proposed structure; proposed site grades and improvements; the construction schedule and sequence; and the site geology.

Geotechnical engineers apply their experience with construction methods, subsurface conditions and exploration methods to develop the exploration scope. The scope of each exploration is unique based on available project and site information. Incomplete project information or constraints on the scope of exploration increases the risk of variations in subsurface conditions not being identified and addressed in the geotechnical report.

Services Are Performed for Specific Projects

Because the scope of each geotechnical exploration is unique, each geotechnical report is unique. Subsurface conditions are explored and recommendations are made for a specific project. Subsurface information and recommendations may not be adequate for other uses. Changes in a proposed structure location, foundation loads, grades, schedule, etc. may require additional geotechnical exploration, analyses, and consultation. The geotechnical engineer should be consulted to determine if additional services are required in response to changes in proposed construction, location, loads, grades, schedule, etc.

Geo-Environmental Issues

The equipment, techniques, and personnel used to perform a geo-environmental study differ significantly from those used for a geotechnical exploration. Indications of environmental contamination may be encountered incidental to performance of a geotechnical exploration but go unrecognized. Determination of the presence, type or extent of environmental contamination is beyond the scope of a geotechnical exploration.

Geotechnical Recommendations Are Not Final

Recommendations are developed based on the geotechnical engineer's understanding of the proposed construction and professional opinion of site subsurface conditions. Observations and tests must be performed during construction to confirm subsurface conditions exposed by construction excavations are consistent with those assumed in development of recommendations. It is advisable to retain the geotechnical engineer that performed the exploration and developed the geotechnical recommendations to conduct tests and observations during construction. This may reduce the risk that variations in subsurface conditions will not be addressed as recommended in the geotechnical report.