



# **ECS Southeast, LLP**

Report of Preliminary Subsurface Exploration

## **Promenade II**

Lancaster, Lancaster County, South Carolina

ECS Project No. 08:15149

June 28, 2022





Geotechnical • Construction Materials • Environmental • Facilities

June 28, 2022

Mr. Doug Kyle Hutton Indian Land, LLC 736 Cherry Street Chattanooga, Tennessee 37402

ECS Project No. 08:15149

Reference: Report of Preliminary Subsurface Exploration

Promenade II

Lancaster, Lancaster County, South Carolina

Dear Mr. Kyle:

ECS Southeast, LLP (ECS) has completed the subsurface exploration, laboratory testing, and geotechnical engineering recommendations for the above-referenced project. Our services were performed in general accordance with our agreed to scope of work. This report presents our understanding of the geotechnical aspects of the project along with the results of the field exploration and laboratory testing conducted, and our design and construction recommendations.

It has been our pleasure to be of service to Hutton Indian Land, LLC during the design phase of this project. We would appreciate the opportunity to remain involved during the continuation of the design phase, and we would like to provide our services during construction phase operations to confirm subsurface conditions assumed for this report. Should you have any questions concerning the information contained in this report, or if we can be of further assistance to you, please contact us.

Respectfully submitted,

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- Boring Location Diagram
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GBA Important Information About This Geotechnical-Engineering Report

#### **EXECUTIVE SUMMARY**

This report contains the results of our subsurface exploration and geotechnical engineering recommendations for the proposed single-family residential subdivision located in Lancaster, Lancaster County, South Carolina.

- Existing fill soils were encountered at Boring B-18 to a depth of approximately 2 feet below the existing ground surface and at Hand Auger Boring HA-2 to a depth of at least 3 feet. Records of existing fill placement were not provided to us; therefore, the fill is considered undocumented. ECS does not recommend supporting project foundations, slabs-on-grades, pavements, or new Structural Fill on undocumented fill soils. The risk associated with undocumented fill can be mitigated by undercutting and removing existing fill and replacement with Structural Fill. Existing fill meeting the requirements of Structural Fill can be re-used as backfill following undercutting/excavation.
- Potentially expansive, moisture sensitive Elastic SILT (MH) was encountered at 11 of the 20 mechanical borings and 4 of the 9 hand auger borings to depths ranging from approximately 1 to 12 feet below the existing ground surface. Expansive MH soils with Plasticity Index (PI) greater than 30 and CH soils should not be used for direct support of project foundations, slabs-on-grade, and pavement subgrade elevations. A minimum separation of 2 feet should be provided between expansive MH soils (PI > 30) and CH soils and the bottom of foundations, slabs, and pavement sections.
- Partially Weathered Rock (PWR) was encountered at 2 of the 20 mechanical boring locations beginning at depths ranging from approximately 5.5 to 22 feet below the existing ground surface. Auger refusal material (i.e. possible rock) was encountered at Boring B-13 at a depth of approximately 21 feet below the existing ground surface. Additionally, hand auger boring refusal (i.e. bucket refusal) was encountered at each hand auger boring location at depths ranging from approximately 0.3 to 5.2 feet below existing grades. Depending on final grades and planned utility depths, difficult excavation into PWR and/or rock should be anticipated during mass grading and/or foundation and utility excavations. Grading plans should be developed to limit the amount of PWR and/or rock material removed due to potential cost and constructability impacts associated with difficult material removal.
- Test Pits, additional mechanical borings, and/or geophysical testing (i.e. seismic refraction arrays)
  are recommended to further explore the extents of the PWR and/or rock and to estimate the
  rippability and excavation characteristics of the subsurface materials.

The above information summarizes the main findings of the exploration, particularly those that may have a cost impact on the planned development. Further, our principal foundation recommendations are summarized. Information gleaned from the Executive Summary should not be utilized in lieu of reading the entire geotechnical report.

#### 1.0 INTRODUCTION

#### 1.1 GENERAL

The purpose of this exploration was to provide preliminary geotechnical information for the proposed commercial development located east of the intersection of Charlotte Highway and Laurel Hill Road in Lancaster, Lancaster County, South Carolina. The recommendations developed for this report are based on project information supplied by Hutton Indian Land, LLC. Our services were provided in accordance with our Proposal No. 08:27696P, dated April 21, 2022, as authorized by Mr. Doug Kyle of Hutton Indian Land, LLC on April 28, 2022, which includes the incorporated terms and conditions.

This report contains the procedures and results of our preliminary subsurface exploration and laboratory testing programs, review of existing site conditions, engineering analyses, and preliminary recommendations for the design and construction of the geotechnical aspects of the project. The report includes the following items:

- Information on site conditions including geologic information and special site features.
- Description of the field exploration and laboratory tests performed.
- Final logs of the soil borings and records of the field exploration and laboratory tests.
- General recommendation regarding site suitability to support the proposed development.
- Evaluation of the onsite soil characteristics encountered in the soil borings with regard to suitability
  of the on-site materials for re-use as Structural Fill for mass grading operations and pavement
  support.
- Recommendations for minimum soil cover during frost heaving, compaction requirements for fill and backfill areas, and slab-on-grade construction.
- Recommendations regarding site preparation and construction observations testing.

#### 2.0 PROJECT INFORMATION

#### 2.1 PROJECT LOCATION/CURRENT SITE USE/PAST SITE USE

The project site is located east of the intersection of Charlotte Highway and Laurel Hill Road in Lancaster, Lancaster County, South Carolina, as shown in the figure below, and included on the Site Location Diagram in Appendix A. The approximately 61-acre site is identified as Lancaster County Parcel Identification Numbers (PINs) 001300067.00, 001300067.01, 001300067.04, 001300135, and 001300067.02.



Based on our review of available aerial photography and our site visit, the site currently consists mainly of undeveloped, moderately wooded land, a grass field, seven single-family residences (some in various states of demolition), an unpaved drive (Murphy Drive), and a paved roadway (Laurel Hills Road). The following is a brief summary of the site history:

- As early as 1955, the majority of the site consisted of dense woodlands with open agricultural
  fields in the southwest and northwest portions of the site. Laurel Hills Road bisected the southern
  portion of the site in a generally east-west direction, and various small structures (possible
  cottages and/or storage structures) were noted adjacent to the roadway. Murphy Drive existed
  within the northern portion of the site.
- Sometime between 1968 and 1983, three single-family residences were constructed to the south of Laurel Hill Road.
- Between 1983 and 1995, three additional residences were constructed on the property, to the north of Laurel Hill Road.
- Between 1998 and 2004, a residence was constructed off Murphy Drive.
- Between late 2017 and early 2018, one of the residences south of Laurel Hill Road had been demolished.

Based on our review of available historical imagery, it appears that the site has remained generally similar to its current condition since approximately 2018.

Based on the Client provided site plan prepared by Banks Engineering, PLLC, existing ground surface elevations within the planned commercial development and off-site sanitary sewer areas range from approximately 582 feet to approximately 642 feet.

The previous use discussion is not considered a comprehensive or in-depth review of the site history, rather a quick overview of available aerial imagery.

#### 2.2 PROPOSED CONSTRUCTION

Based on our review of the site plan prepared by Banks Engineering, PLLC dated April 13, 2022, we understand the initial site development will include commercial out parcels along Charlotte Highway, associated paved roadways, a stormwater pond, and an off-site sanitary sewer utility north of the site. Based on the provided preliminary site grading plans, we anticipate maximum cut and fill depths of approximately 15 and 5 feet, respectively.

#### 3.0 FIELD EXPLORATION AND LABORATORY TESTING

Our exploration procedures are explained in greater detail in Appendix B including the inserts titled Subsurface Exploration Procedure. Our scope of work included drilling twenty (20) mechanical borings and nine (9) hand auger borings coupled with dynamic core penetrometer (DCP) tests. The borings were field located using GPS technology and their approximate locations are shown on the Boring Location Diagram in Appendix A. Preliminary ground surface elevations noted on our boring logs were estimated from the Client provided site plan prepared by Banks Engineering, PLLC and should be considered preliminary and approximate. The users of the reported elevations do so at their own risk.

#### 3.1 SUBSURFACE CHARACTERIZATION

The site is located in the Piedmont Physiographic Province of South Carolina. The native soils in the Piedmont Province consist mainly of residuum with underlying saprolites weathered from the parent bedrock, which can be found in both weathered and unweathered states. In a mature weathering profile of the Piedmont Province, the soils are generally found to be finer grained at the surface where more extensive weathering has occurred. The particle size of the soils generally becomes more granular with increasing depth and gradually changes first to weathered and finally to unweathered parent bedrock.

The natural geology in portions of the site has been modified in the past by grading that included the disturbance of near surface soils and/or placement of fill materials. The quality of man-made fills can vary significantly, and it is often difficult to assess the engineering properties of existing fills. Furthermore, there is no specific correlation between N-values from standard penetration tests performed in soil test borings and the degree of compaction of existing fill soils; however, a qualitative assessment of existing fills can sometimes be made based on the N-values obtained and observations of the materials sampled in the test borings.

The following sections provide generalized characterizations of the subsurface conditions. Please refer to the boring logs in Appendix B for detailed information at a specific location.

GENERALIZED SUBSURFACE CONDITIONS <sup>(1)</sup>			
Approximate Depth (ft)	Stratum	Description	Ranges of SPT (2) N-values (bpf)
0 to 0.2	NA	Surficial Organic Laden Materials. (3)	N/A
0 to 3	1	Fill – Elastic SILT (MH)	15
3 to 50	3 to 50  II RESIDUAL – Sandy SILT (ML), Elastic SILT (MH), and Sandy CLAY (CL), and silty SAND (SM)		4 to 75
22 to 40	III	PARTIALLY WEATHERED ROCK (PWR) sampled as Sandy SILT (ML) (4) (5)	100+ (50/6" to 50/3")

#### Notes:

- (1) Based on mechanical soil borings
- (2) Standard Penetration Test in blows per foot (bpf).
- (3) Surficial materials are driller reported and should not be used in surficial material take-offs. Since mechanical clearing was used to gain access to the boring locations, surficial organic laden materials/soils may have been removed at the boring locations. Our experience indicates that organic laden soil depths in wooded areas generally range from 6 to 12 inches or greater, depending on the amount of vegetation.
- (4) PWR is defined as residual material exhibiting SPT N-values greater than 100 bpf.
- (5) PWR was encountered at Borings B-9 and B-10

The subsurface conditions encountered by the hand auger borings generally consisted of Elastic SILT (MH), Sandy SILT (ML), and Silty SAND (SM) with occasional rock fragments. Based on dynamic cone penetrometer (DCP) testing recorded with the hand auger borings, DCP test values ranged from about 6 blows per increment (bpi) to greater than 25 bpi. Hand auger boring refusal (i.e. bucket refusal) was encountered at each hand auger boring location at depths ranging from approximately 0.3 to 5.2 feet below existing grades.

#### **3.2 GROUNDWATER OBSERVATIONS**

Groundwater measurements were attempted at the termination of drilling and prior to demobilization from the site. Groundwater was encountered at Borings B-19 and B-20 at the time of drilling at depths ranging from approximately 21 to 30 feet below existing grades. Groundwater was not apparent at the

remainder of the boring locations at the time of drilling within the explored depths. Variations in the long-term water table may occur as a result of changes in precipitation, evaporation, surface water runoff, depth of restrictive clay and PWR layers, construction activities, and other factors.

#### 3.3 LABORATORY TESTING

The laboratory testing consisted of selected tests performed on samples obtained during our field exploration operations. Classification, moisture content, Atterberg limits, and percent fines tests were performed on select samples. The test results are included on the boring logs in Appendix B and the Laboratory Testing Summary in Appendix C.

Each sample was visually classified on the basis of texture and plasticity in accordance with ASTM D2488 Standard Practice for Description and Identification of Soils (Visual-Manual Procedures) and including USCS classification symbols, and ASTM D2487 Standard Practice for Classification for Engineering Purposes (Unified Soil Classification System, USCS). After classification, the samples were grouped in the major zones noted on the boring logs in Appendix B. The group symbols for each soil type are indicated in parentheses along with the soil descriptions. The stratification lines between strata on the logs are approximate; in situ, the transitions may be gradual.

#### 4.0 DESIGN RECOMMENDATIONS

#### **4.1 FOUNDATIONS AND SLABS**

Depending on the structure types, finished grades, and relative subsurface profiles at the final structure locations, conventional shallow foundations appear feasible for support of the anticipated commercial structures with maximum column loads of 100 kips. At this time, a preliminary allowable design bearing pressure of 3,000 psf for conventional shallow foundations bearing on low plasticity residual soils, PWR, or newly placed Structural Fill soils appears feasible. Please note that the provided preliminary bearing capacity may vary once the structure types, finished grades, and locations are finalized.

Potential expansive, moisture sensitive Elastic SILTS (MH) soils were encountered at 10 of the 20 boring locations. CH and MH (P1>30) soils should not be used for direct support of project foundations and slabs-on-grade. A minimum separation of 2 feet should be provided between MH soils and the bottom of foundations and slabs-on-grade.

Concrete slabs-on-grade can be adequately supported on undisturbed low plasticity residual soils or newly placed Structural Fill provided the recommendations outlined herein are implemented. Because PWR and auger refusal (possible rock) conditions were encountered in some borings, it is possible that some foundations may transition between these dense natural materials and soil over short distances. In such instances, the PWR and/or possible rock should be over excavated 12 inches and replaced with structural fill.

More specific bearing pressure, settlement, floor slab, and any potential groundwater related recommendations can be provided once final site plans, loading information, finished grades, and bearing elevations of structures are known. Additional field testing may be necessary once the project grading requirements are known.

#### **4.2 PAVEMENT CONSIDERATIONS**

Moisture sensitive soils (MH and CH soils) were encountered at approximately half of the borings locations and extend to depths ranging from approximately 1 to 12 feet below existing grades. MH soils with a PI greater than 30 and CH soils, should not be used for direct support of pavements. MH (PI>30) and CH soils encountered within proposed pavement areas should be undercut and replaced with low plasticity Structural Fill to a minimum depth of 2 feet below pavement areas.

Undisturbed low-plasticity residual soils or newly placed engineered fill can provide adequate support for pavement structures and walkways designed for appropriate subgrade strength and traffic characteristics. For the design and construction of exterior pavements, the subgrades should be prepared in accordance with the recommendations in this report.

We emphasize that good base course drainage is essential for successful pavement performance. Water buildup in the base course may result in premature pavement failures. The subgrade and pavement should be graded to provide positive runoff to either the outer limits of the paved area or to catch basins so that standing water will not accumulate on the subgrade or pavement.

The pavement at locations for refuse dumpsters should be properly designed for the high axial loads and twisting movements of the trucks. Consideration should be given to the use of concrete pavement for the dumpster and approach areas.

When the traffic volumes, wheel loading conditions, and service life have been estimated, ECS can perform pavement analyses for flexible and rigid pavements for an additional fee.

#### **4.3 CUT AND FILL SLOPES**

A detailed grading plan was not provided at the time of this report. We recommend that permanent cut slopes with less than 15 feet crest height through undisturbed residual soils be constructed at 2:1 (horizontal: vertical) or flatter. Where permanent cut slopes expose PWR or rock, steeper slopes may be considered. ECS will need to evaluate those conditions prior to recommending a final slope inclination. Permanent fill slopes less than 15 feet tall may be constructed using Structural Fill at a slope of 2.5:1 or flatter. However, a slope of 3:1 or flatter may be desirable to permit establishment of vegetation, safe mowing, and maintenance. Flatter slopes may be necessary for heights exceeding the noted values. Fill slopes should be over-built and cut back to the final grades. The surface of cut and fill slopes should be properly compacted. Permanent and temporary slopes should be protected using vegetation or other means to prevent erosion.

Slope stability analyses should be performed on cut and fill slopes exceeding 15 feet in height, to determine a slope inclination resulting in a factor of safety greater than 1.3. Upon finalization of site civil drawings, ECS should be contacted to perform slope stability analysis and determine if further exploration and testing is necessary.

The outside face of building foundations and the edges of pavements placed near slopes should be located an appropriate distance from the slope. Buildings or pavements placed at the top of fill slopes should be placed a distance equal to at least 1/3 of the height of the slope behind the crest of the slope. Buildings or pavements near the bottom of a slope should be located at least 1/2 of the height of the slope from the toe of the slope. Slopes with structures located closer than these limits or slopes taller than the height

limits indicated should be specifically evaluated by ECS and may require approval from the building code official.

Temporary slopes in confined or open excavations in soil should perform satisfactorily at inclinations of 2:1. Excavations should conform to applicable OSHA regulations. Appropriately sized ditches or other appropriate storm water controls should run above and parallel to the crest of permanent slopes to divert surface runoff away from the slope face.

#### **5.0 SITE CONSTRUCTION RECOMMENDATIONS**

#### **5.1 SUBGRADE PREPARATION**

#### 5.1.1 Stripping and Grubbing

The subgrade preparation should consist of stripping vegetation, rootmat, topsoil, and soft or unsuitable materials from the 5-foot expanded pavement limits, and 5 feet beyond the toe of structural fills. ECS should be retained to observe that topsoil and unsuitable surficial materials have been removed prior to the placement of Structural Fill or new overlying construction.

#### **5.1.2 Proofrolling**

Prior to fill placement or other construction on subgrades, the subgrades should be observed by ECS. The exposed subgrade should be thoroughly proofrolled with construction equipment having a minimum axle load of 10 tons [e.g., fully loaded tandem-axle dump truck]. Proofrolling should be traversed in two perpendicular directions with overlapping passes of the vehicle under the observation of ECS. This procedure is intended to assist in identifying localized yielding materials.

Where proofrolling identifies areas that are unstable or "pumping", those areas should be repaired prior to the placement of any subsequent Structural Fill or other construction materials. Methods of stabilization include undercutting, moisture conditioning, or chemical stabilization. The situation should be discussed with ECS to determine the appropriate procedure. Test pits may be excavated to explore the shallow subsurface materials to help in determining the cause of the observed unstable materials, and to assist in selecting appropriate remedial actions to stabilize the subgrade.

#### **5.2 EARTHWORK CONSIDERATIONS**

#### 5.2.1 Existing Man-Placed Fill

Existing fill soils were encountered at Boring B-18 to a depth of approximately 2 feet below the existing ground surface and at Hand Auger Boring HA-2 to a depth of at least 3 feet. Records of existing fill placement were not provided to us; therefore, the fill is considered undocumented. ECS does not recommend supporting project foundations, slabs-on-grades, pavements, or new Structural Fill on undocumented fill soils. The risk associated with undocumented fill can be mitigated by undercutting and removing existing fill and replacement with Structural Fill. Existing fill meeting the requirements of Structural Fill can be re-used as backfill following undercutting/excavation.

Undocumented fill poses risks associated with undetected deleterious inclusions within the fill and/or deleterious materials at the virgin ground/fill interface that are covered by the fill. Deleterious materials can consist of significant amounts of organics derived from organic rich strippings, rubbish, construction or demolition debris, stumps and roots and logs. If these materials are covered over by or are within undocumented fill, the organic materials tend to decompose slowly in the anaerobic conditions in or under the fill. Decomposition can occur over periods ranging from several years to several decades. As

the organic materials decompose, a void is created which can create soft conditions and even subsidence in areas above the organics. Additionally, subsidence can occur as the result of voids within nested debris or shot rock materials within the fill matrix. These conditions sometimes are encountered in discreet pockets that can go undetected by normal subsurface exploration techniques, i.e. soil test borings and test pits. Existing fill encountered within structural areas should be removed and replaced with Structural Fill.

#### 5.2.2 Expansive and Moisture Sensitive Soils

Potentially expansive and moisture sensitive soils are those materials classified as Elastic SILT (MH) and Fat CLAY (CH). Elastic SILT (MH) was encountered at Borings B-1 through B-5, B-7, B-11, B-14, B-17, B-18, and B-19 and Hand Auger Borings HA-1, HA-5, HA-7, and HA-8 to depths ranging from 1 to 12 feet below the existing ground surface. Moisture sensitive soils will degrade quickly when disturbed by construction traffic and/or with elevated moisture content.

High plasticity, expansive, moisture sensitive soils (MH soils with a Plasticity Index greater than 30 and CH soils) should not be used for direct support of slabs, foundations, and pavements. MH soils (PI>30) and CH soils encountered within proposed structural areas should be undercut and replaced with low plasticity Structural Fill to a minimum depth of 2 feet below subgrade elevations in slab, foundation, and pavement areas. Upon completion of the undercut, the resulting subgrade soils should be evaluated for stability prior to the placement of Structural Fill. The recommended separation can also be provided by the addition of Structural Fill. Alternatively, chemical (lime) stabilization may be considered to improve/modify high plasticity, moisture sensitive soils in lieu of undercut and replacement and/or for reuse as Structural Fill.

Based on limited laboratory testing performed, the on-site MH soils have plasticity index (PI) values ranging from 17 to 21. ECS recommends additional index property testing and expansion index testing on the onsite MH and CH soils to further evaluate the characteristics and shrink/swell potential of these soils.

#### 5.2.3 Partially Weathered Rock and Rock

Partially Weathered Rock (PWR) was encountered at Borings B-9 and B-10, beginning at depths of approximately 22 and 5.5 feet below the existing ground surface, respectively.

Additionally, hand auger boring refusal (i.e. bucket refusal) was encountered at each hand auger boring location at depths ranging from approximately 0.3 to 5.2 feet below existing grades. Hand auger refusal could be the result of dense materials and/or inclusions of rock fragments within the soil matrix.

ECS recommends performing additional subsurface exploration including test pit excavations, additional borings, and/or geophysical testing (i.e. seismic refraction) to explore the excavation characteristics (i.e., rippability) of the subsurface materials.

Depending on final grades and planned utility depths, difficult excavation into PWR and/or rock may be encountered during mass grading and/or foundation and utility excavations. Grading plans should be developed to limit the amount of PWR and/or rock material removed due to potential cost and constructability impacts associated with difficult material removal.

Our experience indicates rock in a weathered, boulder, and/or massive form varies erratically in location and depth within the Piedmont Geologic Province, of which Lancaster County is part. Due to the variability of the Piedmont geology, there is always potential that these materials could be encountered at shallower depths between the boring locations. The depth to, and thickness of weathered rock, rock lenses or seams, and bedrock, can vary dramatically in short distances and between boring locations. Consequently, significantly different conditions may be encountered intermediate of the actual boring locations.

In mass excavation for general site work, dense soils and PWR can usually be removed by ripping with a single-tooth ripper attached to a large crawler tractor or by breaking it out with large front-end loader. In confined excavations such as foundations, utility trenches, etc., removal of PWR may require use of heavy-duty backhoes, pneumatic spades, or blasting. Rock excavation techniques such as blasting and/or hammering should be anticipated for materials where auger refusal materials are encountered in mechanical borings.

As a general guide, we recommend the following definitions be used to define rock:

#### **General Excavation**

Rip Rock: Material that cannot be removed by scrapers, loaders, pans, dozers, or graders; and requires the use of a single-tooth ripper mounted on a crawler tractor having a minimum draw bar pull rated at not less than 56,000 pounds.

Blast Rock: Material which cannot be excavated with a single-tooth ripper mounted on a crawler tractor having a minimum draw bar pull rated at not less than 56,000 pounds (Caterpillar D-8 or equivalent) or by a Caterpillar 977 front-end loader or equivalent; and occupying an original volume of at least one (1) cubic yard.

#### **Trench Excavation**

Blast Rock: Material which cannot be excavated with a backhoe having a bucket curling force rated at not less than 25,700 pounds (Caterpillar Model 225 or equivalent) and occupying an original volume of at least one-half (1/2) cubic yard.

#### 5.2.4 Structural Fill

Prior to placement of Structural Fill, representative bulk samples (about 50 pounds) of on-site and/or off-site borrow should be submitted to ECS for laboratory testing, which will typically include Atterberg limits, natural moisture content, grain-size distribution, and moisture-density relationships (i.e., Proctors) for compaction. Import materials should be tested prior to being hauled to the site to determine if they meet project specifications.

**Structural Fill Materials:** Materials for use as Structural Fill should consist of inorganic soils classified as CL, ML, SC, SW, SP, GM, and GC, or a combination of these group symbols, per ASTM D2487. The materials should not contain organic matter debris and should contain no particle sizes greater than 4 inches in the largest dimension. Open graded materials and gravels (GW and GP), which contain void space in their masses should not be used in structural fills unless properly encapsulated with filter fabric. Structural Fill material should have the index properties shown in the following table.

STRUCTURAL FILL INDEX PROPERTIES			
Subject	Property		
Building and Pavement Areas	LL < 50, PI < 30		
Maximum Particle Size	4 inches		
Maximum Organic Content	5% by dry weight		
Minimum Dry Unit Weight (ASTM D698)	90 pounds per cubic foot		

STRUCTURAL FILL COMPACTION REQUIREMENTS			
Subject	Requirement		
Compaction Standard	Standard Proctor, ASTM D698		
Required Compaction (greater than 24 inches below finished soil subgrade)	95% of Maximum Dry Density		
Required Compaction (within 24 inches of finished soil subgrade)	100% of Maximum Dry Density		
Moisture Content	-3 to +3 % of the soil's optimum value		
Loose Lift Thickness (Maximum) (1)	8 inches prior to compaction		

(1) Thinner loose lift thickness may be required depending on the type of equipment used.

**Unsatisfactory Materials:** Unsatisfactory fill materials include materials which do not satisfy the requirements for Structural Fill, as well as topsoil and organic materials (OH, OL), Elastic SILT (MH), and Fat CLAY (CH).

On-Site Borrow Suitability: Natural deposits of soils that meet the definition of Structural Fill are present on the site including residual soils classified as Lean CLAY (CL), Sandy SILT (ML), and Silty SAND (SM); however, selective mining and/or soil exchange may be required to obtain these materials. Rippable/excavatable partially weathered rock (PWR) materials may require processing (i.e. crushing and/or screening) to use as Structural Fill depending on the resulting rock fragment size (i.e., greater than 4 inches nominal diameter) and ability of compaction equipment to break down the PWR materials.

Given the presence of moisture sensitive MH and/or CH soils on this site, and to reduce the amount of potential import material to the site, the Owner can consider allowing soils with a maximum Liquid Limit of 65 and maximum Plasticity Index of 30 to be used as Structural Fill at depths greater than 4 feet below pavement subgrades outside the expanded building limits and within non-structural areas. Chemical (lime) treatment of on-site MH and/or CH soils may also be considered to improve/modify these soils for re-use as Structural Fill.

**Fill Compaction Control:** The expanded limits of the proposed construction areas should be well defined, including the limits of the fill zones for buildings, slopes, etc., at the time of fill placement. Grade controls should be maintained throughout the filling operations. Filling operations should be observed on a full-time basis by ECS to determine that the minimum compaction requirements are being achieved.

**Fill Placement:** Fill materials should not be placed on frozen soils, on frost-heaved soils, and/or on excessively wet soils. Borrow fill materials should not contain frozen materials at the time of placement,

and frozen or frost-heaved soils should be removed prior to placement of Structural Fill or other fill soils and aggregates. Excessively wet soils or aggregates should be scarified, aerated, and moisture conditioned.

Where fill materials will be placed to widen existing embankment fills, or placed up against sloping ground, the soil subgrade should be scarified, and the new fill benched or keyed into the existing material. Fill material should be placed in horizontal lifts.

#### **5.2.5 General Construction Considerations**

Because the site has been previously disturbed and/or filled, we emphasize the importance of comprehensive subgrade evaluations prior to Structural Fill placement and/or other construction activities. These evaluations may include proofrolling the subgrade soils, performing hand auger borings, and excavation of test pits within previously filled and built-over areas. The mentioned evaluations would help in identifying areas of soft, loose, otherwise unsuitable materials, or buried debris, which would require remedial activities. We recommend a contingency for unforeseen conditions in the earthwork phase of construction.

**Moisture Conditioning:** During the cooler and wetter periods of the year, delays and additional costs should be anticipated. At these times, reduction of soil moisture may need to be accomplished by a combination of mechanical manipulation and the use of chemical additives, such as lime or cement, in order to lower moisture contents to levels appropriate for compaction. Alternatively, during the drier times of the year, such as the summer months, moisture may need to be added to the soil to provide adequate moisture for successful compaction according to the project requirements.

**Subgrade Protection:** Measures should also be taken to limit site disturbance, especially from rubber-tired heavy construction equipment, and to control and remove surface water from development areas, including structural areas. It would be advisable to designate a haul road and construction staging area to limit the areas of disturbance and to prevent construction traffic from excessively degrading sensitive subgrade soils and existing pavement areas. Haul roads and construction staging areas could be covered with excess depths of aggregate to protect those subgrades. The aggregate can later be removed and used as Structural Fill provided it meets project specifications.

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

**Excavation Safety:** Excavations and slopes should be constructed and maintained in accordance with OSHA excavation safety standards. The Contractor is solely responsible for designing, constructing, and maintaining stable temporary excavations and slopes. The Contractor's responsible person, as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the Contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations. ECS is providing this information solely as a service to our Client. ECS is not assuming responsibility for construction site safety or the Contractor's activities; such responsibility is not being implied and should not be inferred.

#### **5.3 FOUNDATION AND SLAB OBSERVATIONS**

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

**Footing Subgrade Observations:** With the exception of the high plasticity soils, the soils at the foundation bearing elevation are anticipated to be adequate for support of the proposed structures. It is important to have ECS observe the foundation subgrade prior to placing foundation concrete, to confirm the bearing soils are what was anticipated.

**Slab Subgrade Observations:** Provided high plasticity are remediated, the soils at the finished soil subgrade elevation are anticipated to be satisfactory for support of the proposed slabs-on-grade. Prior to construction of slabs, the subgrade should be prepared in accordance with the recommendations found in Section 5.1.2 Proofrolling.

#### **5.4 UTILITY INSTALLATIONS**

**Utility Subgrades:** The soils encountered in our exploration are anticipated to be generally acceptable for support of utility pipes; however, depending on final utility grades and PWR encountered at the site, difficult excavation may be encountered at utility excavations. PWR and/or rock materials encountered at utility subgrade excavations should be undercut an additional 6-inches and replaced with bedding material to reduce potential point load stress. The pipe subgrades should be observed and probed for stability by ECS. Loose or unsuitable materials encountered should be removed and replaced with suitable compacted Structural Fill, or pipe stone bedding material.

**Utility Backfilling:** Granular bedding material should be at least 4 inches thick, but not less than that specified by the civil engineer's project drawings and specifications. We recommend that the bedding materials be placed up to the springline of the pipe. Fill placed for support of the utilities, as well as backfill over the utilities, should satisfy the requirements for Structural Fill.

#### 6.0 CLOSING

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

The description of the proposed project is based on limited information provided to ECS by the Client. If any of this information is inaccurate or changes, either because of our interpretation of the documents provided or site or design changes that may occur later, ECS should be contacted so we can review our recommendations and provide additional or alternate recommendations that reflect the proposed construction.

We recommend that ECS review the project plans and specifications so we can confirm that those plans/specifications are in accordance with the recommendations of this geotechnical report.

Field observations, and quality assurance testing during earthwork and foundation installation are an extension of, and integral to, the geotechnical design. We recommend that ECS be retained to apply our expertise throughout the geotechnical phases of construction, and to provide consultation and recommendation should issues arise.

ECS is not responsible for the conclusions, opinions, or recommendations of others based on the data in this report.

# APPENDIX A – Diagrams & Reports

Site Location Diagram
Boring Location Diagram
Subsurface Cross Sections A-A' through E-E'





# SITE LOCATION DIAGRAM PROMENADE II

**CHARLOTTE HWY, LANCASTER, SOUTH CAROLINA** 

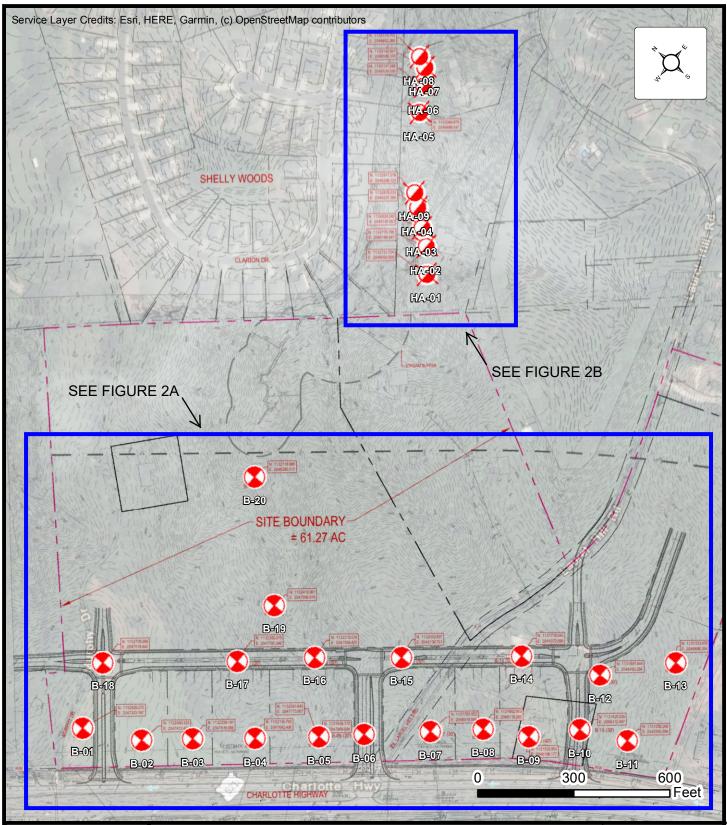
**HUTTON INDIAN LAND, LLC** 

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SCALE AS NOTED

PROJECT NO. 08:15149

FIGURE





# BORING LOCATION DIAGRAM PROMENADE II

**CHARLOTTE HWY, LANCASTER, SOUTH CAROLINA** 

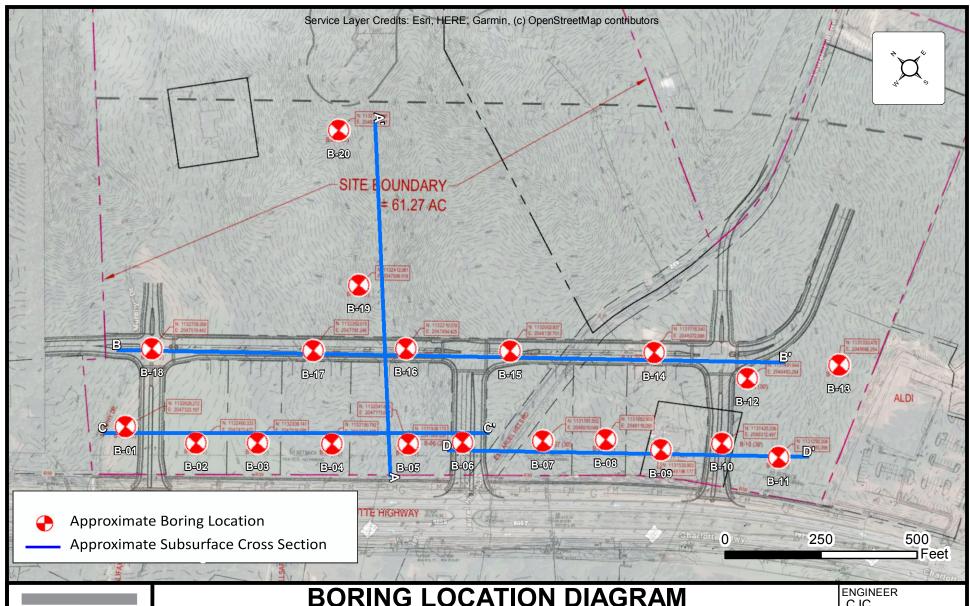
**HUTTON INDIAN LAND, LLC** 

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FIGURE 2





# **BORING LOCATION DIAGRAM PROMENADE II**

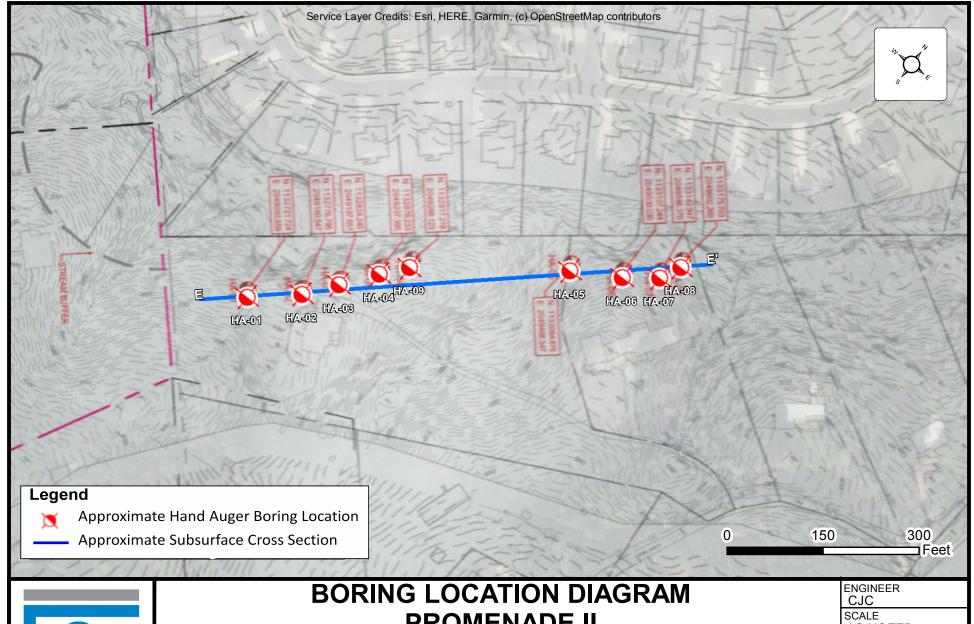
**CHARLOTTE HWY, LANCASTER, SOUTH CAROLINA HUTTON INDIAN LAND, LLC** 

ENGINEER
CJC

SCALE AS NOTED

PROJECT NO. 08:15149

**FIGURE** 2A





# **PROMENADE II**

**CHARLOTTE HWY, LANCASTER, SOUTH CAROLINA HUTTON INDIAN LAND, LLC** 

ENGINEER CJC
SCALE AS NOTED
PROJECT NO. 08:15149
FIGURE 2B

# **APPENDIX B – Field Operations**

Reference Notes for Boring Logs

Subsurface Exploration Procedure: Standard Penetration Testing (SPT) Subsurface Exploration Procedure: Hand Auger Borings/DCP Testing

Boring Logs Hand Auger Logs



# REFERENCE NOTES FOR BORING LOGS

MATERIAL <sup>1,2</sup>				
	ASPHALT			
	CONCRETE			
0,00	GRA	VEL		
	TOPS	SOIL		
	VOID			
	BRIC	κ		
	AGG	REGATE BASE COURSE		
	GW	WELL-GRADED GRAVEL gravel-sand mixtures, little or no fines		
\$0°.0°	GP	POORLY-GRADED GRAVEL gravel-sand mixtures, little or no fines		
	GM	SILTY GRAVEL gravel-sand-silt mixtures		
Z Z	GC	CLAYEY GRAVEL gravel-sand-clay mixtures		
Δ Δ	sw	WELL-GRADED SAND gravelly sand, little or no fines		
	SP	POORLY-GRADED SAND gravelly sand, little or no fines		
	SM	SILTY SAND sand-silt mixtures		
///>	sc	CLAYEY SAND sand-clay mixtures		
	ML	SILT non-plastic to medium plasticity		
	МН	ELASTIC SILT high plasticity		
	CL	LEAN CLAY low to medium plasticity		
	СН	FAT CLAY high plasticity		
	OL	ORGANIC SILT or CLAY non-plastic to low plasticity		
\$\$\$	ОН	ORGANIC SILT or CLAY high plasticity		
5 76 7 76 75	PT	PEAT highly organic soils		
9				

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

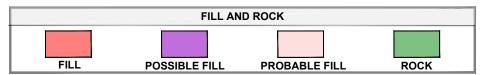
PARTICLE SIZE IDENTIFICATION			
DESIGNATION PARTICLE SIZES		PARTICLE SIZES	
Boulders 12 inches (300 mm) or larger			
Cobbles		3 inches to 12 inches (75 mm to 300 mm)	
Gravel:	Coarse	arse ¾ inch to 3 inches (19 mm to 75 mm)	
	Fine	Fine 4.75 mm to 19 mm (No. 4 sieve to 3/4 inch)	
Sand:	Coarse	rse 2.00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

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

RELATIVE AMOUNT <sup>7</sup>	COARSE GRAINED (%) <sup>8</sup>	FINE GRAINED (%) <sup>8</sup>
Trace	<u>&lt;</u> 5	<u>&lt;</u> 5
With	10 - 20	10 - 25
Adjective (ex: "Silty")	25 - 45	30 - 45

CONTRACTOR CANDO	NON 0011505/5 011 TO
GRAVELS, SANDS &	NON-COHESIVE SILTS
SPT <sup>5</sup>	DENSITY
<5	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
>50	Very Dense

WATER LEVELS <sup>6</sup>	
WL (First Encountered)	
WL (Completion)	
WL (Seasonal High Water)	
WL (Stabilized)	
	WL (First Encountered) WL (Completion) WL (Seasonal High Water)



<sup>&</sup>lt;sup>1</sup>Classifications and symbols per ASTM D 2488-17 (Visual-Manual Procedure) unless noted otherwise.

<sup>&</sup>lt;sup>2</sup>To be consistent with general practice, "POORLY GRADED" has been removed from GP, GP-GM, GP-GC, SP, SP-SM, SP-SC soil types on the boring logs.

<sup>&</sup>lt;sup>3</sup>Non-ASTM designations are included in soil descriptions and symbols along with ASTM symbol [Ex: (SM-FILL)].

<sup>&</sup>lt;sup>4</sup>Typically estimated via pocket penetrometer or Torvane shear test and expressed in tons per square foot (tsf).

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

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

<sup>&</sup>lt;sup>7</sup>Minor deviation from ASTM D 2488-17 Note 14.

 $<sup>^8\</sup>mbox{Percentages}$  are estimated to the nearest 5% per ASTM D 2488-17.



# SUBSURFACE EXPLORATION PROCEDURE: STANDARD PENETRATION TESTING (SPT) ASTM D 1586

**Split-Barrel Sampling** 

Standard Penetration Testing, or **SPT**, is the most frequently used subsurface exploration test performed worldwide. This test provides samples for identification purposes, as well as a measure of penetration resistance, or N-value. The N-Value, or blow counts, when corrected and correlated, can approximate engineering properties of soils used for geotechnical design and engineering purposes.

# **SPT Procedure:**

- Involves driving a hollow tube (split-spoon) into the ground by dropping a 140-lb hammer a height of 30-inches at desired depth
- Recording the number of hammer blows required to drive split-spoon a distance of 12 inches (in 3 or 4 Increments of 6 inches each)
- Auger is advanced\* and an additional SPT is performed
- One SPT test is typically performed for every two to five feet
- Obtain two-inch diameter soil sample





<sup>\*</sup>Drilling Methods May Vary— The predominant drilling methods used for SPT are open hole fluid rotary drilling and hollow-stem auger drilling.



#### **SUBSURFACE EXPLORATION PROCEDURES:**

HAND AUGER BORINGS
DYNAMIC CONE PENETROMETER (DCP) TESTS
WILDCAT DYNAMIC CONE PENETROMETER (WDCP) TESTS
KESSLER DYNAMIC CONE PENETROMETER (KDCP) TESTS

Hand auger borings coupled with dynamic cone penetrometer testing are often performed to evaluate shallow subsurface explorations and/or locations with limited access to larger equipment.

## **Hand Auger Boring Procedure:**

The hand auger borings were conducted in general conformance with ASTM D1452. In this procedure, the auger boring is performed by manually rotating and advancing an auger to the desired depths while periodically removing the auger from the hole to clear and examine the auger cuttings. The auger cuttings were visually classified in the field. Stratification lines shown on the hand auger boring logs represent approximate boundaries between physical soil types.

# **Dynamic Cone Penetrometer (DCP) Test Procedure:**

The dynamic cone penetrometer testing was performed in general accordance with ASTM SPT 399. In this procedure, a sliding hammer with a 15 pound steel mass is dropped 20 inches on a cone tip and the number of blows to penetrate 1.75 inches is recorded. The results are presented in blows per increment (bpi).

## Wildcat Dynamic Cone Penetrometer (WDCP) Test Procedure:

For the WDCP test, a sliding hammer is dropped on a cone tip and the resulting penetration of the cone is recorded. The 35 lb hammer is repeated dropped from a height of 15 inches and the number of hammer drops (blows per increment) is recorded over continuous 10 centimeter lengths.

## **Kessler Dynamic Cone Penetrometer (KDCP) Test Procedure:**

For the KDCP test, a sliding hammer is dropped on a cone tip and the resulting penetration of the cone is recorded. The Kessler DCP was improved and patented by the US Army Corps of Engineers. The Kessler DCP used for testing has a 4.8 kg (10 lb) or 8 kg (17 lb) hammer. The hammer is repeatedly dropped from a height of 22 inches and the penetration is recorded. The DCP is primarily used to determine in place soil shear strength in road construction. It has a CBR range from less than 0.5 to 100% and bearing value range from 430 to 10,800 psf.

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			ster, Sc	outh Ca	arolina 29707							LOSS	OF CIRCULATION	<u> </u>
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DE	SAMP	SAN	SAMP	RECC					WAT	ELEV	BL	_	C BRATED PENETROME	TER TON/SF
					Topsoil Thickness[4.00	)"]						[FINES CO	ONTENT] %	: :
- - - -	S-1	SS	18	18	(MH) Residuum, ELAS brown, moist, stiff		ddish			-	5-6-8 (14)	⊗ <sub>14</sub>	26.9 <sup>38</sup> >	59 [93.3%]
					(ML) SANDY SILT, oran	gish red, m	noist,	#11						
5 <del>-</del>	S-2	SS	18	18	stiff	,	ŕ			626	6-6-6 (12)	<b>⊗</b> <sub>12</sub>		
- - - -	S-3	SS	18	18	<ul> <li>(ML) SANDY SILT, oran reddish brown, moist,</li> </ul>	_	_			-	9-11-13 (24)	<b>∞</b> <sub>24</sub>		
_					_									
10	S-4	SS	18	18						621	15-7-8 (15)	<b>⊗</b> <sub>15</sub>		
- - -										-				
- - -	S-5	SS	18	18						-	5-7-7 (14)	⊗ <sub>14</sub>		
15 <del>-</del> - - -										616				
- - - -	S-6	SS	18	18						-	6-4-6 (10)	⊗ <sub>10</sub>		
20 <del>-</del>					END OF BORIN	NG AT 20 FT				611 –				
- - -										-				
25 <u> </u>										606				
-														
30										601				
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					T 11 T 1 T C 00			<b>1</b>	X///				[FINES CONTENT] %	
- - -	S-1	SS	18	18	Topsoil Thickness[6.00 (MH) Residuum, ELAS brown, moist, stiff to v	TIC SILT, r	eddish				-	3-4-5 (9)		
- - -	S-2	SS	18	18							-	7-7-11	<b>№</b> 18	
5					(ML) SANDY SILT, oran orangish red, moist, ve	_	_				618	(18)		
_ 	S-3	SS	18	18	orangish reu, moist, ve	ery still to	ry stiff to stiff				-	15-18-20 (38)	38	
-	S-4	SS	18	18							-	5-6-7 (13)	⊗ <sub>13</sub>	
10-							613 -							
- - -					(ML) SANDY SILT, conta fragments, light orang						- - -			
15 <del>-</del>	S-5	SS	18	18	moist, firm						608	6-4-4 (8)	⊗ <sub>8</sub>	
-														
- - -	S-6	SS	18	18							-	5-4-4 (8)	⊗ <sub>8</sub>	
20 -					END OF BORIN	NG AT 20 F	T				603	(0)		
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ОЕРТН (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION O	)F MATERIAL			WATER LEVELS	ELEVATION (FT)	BLOWS/6"	ROCK QUALITY DESIGN RQD REC CALIBRATED PENE	IATION & RECOVERY
					Topsoil Thickness[6.00	וייו						[FINES CONTENT] %	: :
- - -	S-1	SS	18	18	(MH) Residuum, ELAS brown, moist, stiff		ddish				4-5-7 (12)	<b>⊗</b> <sub>12</sub>	
_					(MH) ELASTIC SILT, red	dish brow	n, moist,			1	7-7-11		
5 -	S-2	SS	18	18	very stiff to hard					611	(18)	18	
- - -	S-3	SS	18	18						-	14-15-19 (34)	≫34	
_					(ML) SANDY SILT, light		_			-	5-5-6		
10-	S-4	SS	18	18	light orangish pink, mo	oist, stiff to	o firm			606	(11)	Ø <sub>11</sub>	
_ _ _ _ _										-			
_	S-5	SS	18	18						-	4-4-4 (8)	⊗ <sub>8</sub>	
15 <u> </u>										601 –	. ,		
_ - -										-     			
20-	S-6	SS	18	18						596	4-4-4 (8)	⊗ <sub>8</sub>	
-					END OF BORIN	NG AT 20 F	ı			-			
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<b>DEPTH (FT)</b>	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION C	DF MATERIAL			WATER LEVELS	ELEVATION (FT)	BLOWS/6"	STANDARD PENETRATI  ROCK QUALITY DESIGNATIO  RQD  REC	
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_					Topsoil Thickness[3.00			_/  ` `		1 1			
- - -	S-1	SS	18	18	(MH) Residuum, ELAS brown, moist, very sti		ddish			-	6-8-11 (19)	<b>№</b> 19	
_ _ _	S-2	SS	18	18						-	10-11-18		
5	3-2		10	10						611	(29)	29	
- -	S-3	SS	18	18						-	20-20-25 (45)	×45	
-										]			
- 10 -	S-4	SS	18	18						606	10-8-9 (17)	<b>⊗</b> <sub>17</sub>	
- - -										-			
- - -					(ML) SANDY SILT, redd	lish brown,	moist,			- - -			
15	S-5	SS	18	18						601	7-6-6 (12)	⊗ <sub>12</sub>	
- 10 										-			
- - -										- - -			
20	S-6	SS	18	18						596	4-4-4 (8)	⊗ <sub>8</sub>	
					END OF BORI	NG AT 20 FT				-			
-										-			
25 –										591 –			
										-			
-   -   -										-			
30-										586			
30-										300 -			
	TI	L HE STRA	ATIFICA	L TION LI	 NES REPRESENT THE APPROXII	MATE BOUND	ARY LINES	BETWEE	L N SOII	TYPES. IN	N-SITU THE TR	I ANSITION MAY BE GRADU	JAL
	/L (Firs	st Encc	ountere		GNE		NG STAR			1 2022	CAVE IN		
<b>Y</b> W				Mata:::\			BORING COMPLETED: May 31 2022 HAMME				HAMMEI	MER TYPE: Automatic	
			High V	water)		EQUIPMENT: LOGGED BY: DRILLING METHOD: 2.25 HSA							
▼ W	/L (Sta	pilized	1)		CF(	ATV C			JMS13		DIVILLING	, WETTOD. <b>2.23 HJA</b>	
					GEC	DTECHNIC	AL DU	'NEHU	LC L	UU			

CLIENT								BORING NO.: B-05		NO.:	SHEET:			
Hutton			LC					ONTD				1 of 1	⊣ EC	6
PROJEC Promen		/IE:					DRILLER/C	ONTRA	ACTO	rK:				<u> </u>
SITE LO		N:												
Charlot	te Hwy	, Lanca	ster, S	outh Ca	arolina 29707							LOSS OF CIRCULATION	1	<u> </u>
NORTH			Г		ASTING: 147769.2	STATION:				JRFACE E 1 <b>6.00</b>	ELEVATION:	BOTTOM OF CASING	i	
	BER	JC	(NI)	Î					S	(L:		Plastic Limit Water Conte	ent Liquid Limi ∆	it
ОЕРТН (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION C	F MATERIAL			WATER LEVELS	ELEVATION (FT)	BLOWS/6"	STANDARD PENETRAT  ROCK QUALITY DESIGNATION	-	
	SAN	√S	SAN	RE					<b>%</b>	ELE		— REC  CALIBRATED PENETRO  [FINES CONTENT] %	METER TON/SF	
_					Topsoil Thickness[3.00					_				
-	S-1	SS	18	18	(MH) Residuum, ELAS slight rock fragments,	reddish br					4-4-5 (9)	- ⊗9		
			40	10	moist, stiff to very stif (ML) SANDY SILT, cont	ains slight				-	3-10-10	- 30	<u>41</u> 574	
5	S-2	SS	18	18	fragments, reddish bromoist, very stiff	own and or	range,			601	(20)	⊗ <sub>20</sub> 22.8 <sup>30</sup> ×—	<u></u> 71	1.1%]
	S-3	SS	18	18							10-14-16 (30)	30		
					(ML) SANDY SILT, light	_	-				5-4-4			
10	S-4	SS	18	18	white to red and brow	n, moist, fi	irm			596	(8)	∅8		
-    -														
- - -							3-3-4				3_3_/			
15	S-5	SS	18	18			591 –					\&7		
-					(ML) SANDY SILT, whit	o maist h	ard			- - -				
			10	10	(WIL) SANDT SIEI, WIIIC	c, moist, m	aru				12-19-25			
20	S-6	SS	18	18	END OF BORII	NG AT 20 FT	•			586	(44)	⊗ <sub>44</sub>		
-										- -				
										_				
25										581				
										-				
30										576				
	71	JE CTD	ATIFICA	TIONL	NES DEDDESENT THE ADDROVA	MATE BOLIND	ADVIINEC DE	T\\/\	LSOU	TVDEC IN	AL CITILITUE TO	DANISITION MAY BE CRAD	141	
□ V					NES REPRESENT THE APPROXI  GNE		ARY LINES BE			1 2022	CAVE IN		JAL	
<b>Y</b> W	VL (Coi	mpleti	on)			BORII								
<b>∡</b> ∧	VL (Sea	sonal	High \	Water)			COMPLETED: May 31 2022 HAMM			HAMME	MER TYPE: Automatic			
▼ W	VL (Sta	bilized	l)			EQUIPMENT: LOGGED BY: DRILLIN  ATV CME 45 JMS13				DRILLING	METHOD: 2.25 HSA			
					GEC	TECHNIC	CAL BOR	EHOL	E LO	OG			_	_

CLIENT		land I	1.0			PROJECT NO.: BORING NO.: 08:15149 B-06 DRILLER/CONTRACTOR:		NO.:	SHEET: 1 of 1				
Hutton PROJE			LC					ONT				1011	EU'S
Promer							A.E. Drillir						
SITE LC			ıster. Sı	outh Ca	arolina 29707	1		_				LOSS OF CIRCULATION	)100 <i>x</i> )
NORTH 113194	HING:	,		EA	STING: STATION: <b>47865.8</b>	:				URFACE E	ELEVATION:	BOTTOM OF CASING	-
ОЕРТН (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIA	<b>AL</b>			WATER LEVELS	ELEVATION (FT)	BLOWS/6"	Plastic Limit Water Conter  X  STANDARD PENETRATIC  ROCK QUALITY DESIGNATIO	ON BLOWS/FT
DEF	SAMPI	SAM	SAMPI	RECC					WATE	ELEW	718	RQD REC CALIBRATED PENETRON	IFTER TON/SE
-					Topsoil Thickness[4.00"]			<b>X</b>		-		[FINES CONTENT] %	in toly 51
- - -	S-1	SS	18	18	(ML) Residuum, SANDY SILT, lig light red and white, moist, firm					- -	3-3-3 (6)	$\otimes_6$	
- - -	S-2	SS	18	18							6-4-5 (9)	<b>⊗</b> <sub>9</sub>	
5 <del>-</del> -	S-3	SS	18	18						609 –	7-7-7	<b>⊗</b> <sub>14</sub>	
-					(ML) SANDY SILT, dark red and	hro	wn				(14)	14	
10-	S-4	SS	18	18	moist, very stiff to hard	510	<b>,</b>			604	7-6-10 (16)	<b>⊗</b> <sub>16</sub>	
- - -													
- - -	6.5		40	40							13-17-24		
15-	S-5	SS	18	18						599	(41)	₩41	
- - -					(ML) SANDY SILT, dark red and	bro	wn,			-			
20-	S-6	SS	18	18	moist, very hard					594	7-20-31 (51)	⊗ <sub>51</sub>	
- - -					END OF BORING AT 20	FI				-			
- - -													
25 -										589			
- - -										-			
30-										584			
30 -									+	JU4 _			
	TI	HE STRA	ATIFICA	TION LI	NES REPRESENT THE APPROXIMATE BOUT	NDAF	RY LINES B	ETWE	EN SOI	L TYPES. IN	N-SITU THE TE	RANSITION MAY BE GRADU	AL
	VL (Firs			ed)	<b>GNE</b> BO	RIN	G STARTE	 D:	May :	31 2022	CAVE IN	DEPTH:	
	VL (Co					RIN(			May :	31 2022	НАММЕ	R TYPE: Automatic	
	VL (Sea			vater)	EQ	EQUIPMENT: LOGGED BY: DRILLING METHOD: 2.25 HSA							
_ × V	VL (Sta	niiizea	1			ATV CME 45 JMS13 DRILLING METHOD: 2.25 HSA  EOTECHNICAL BOREHOLE LOG							

CLIENT						PROJECT NO.:  08:15149  B-08  DRILLER/CONTRACTOR:			NO.:	SHEET:			
Hutton PROJEC			LC									1 of 2	
Promen		/IL.					A.E. Dril						
SITE LO							•	_				LOSS OF CIRCULATION	VIDE NC
		, Lanca	ster, S		arolina 29707	CTATION			16	LIDEAGE	T EVATION		
NORTH					STING: <b>48117.4</b>	STATION:				34.00	ELEVATION:	BOTTOM OF CASIN	IG IG
	BER	JC	(NI)	â					l.S	(L		Plastic Limit Water Con	tent Liquid Limit ∆
БЕРТН (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION C	NE NANTEDIA I			WATER LEVELS	ELEVATION (FT)	BLOWS/6"	STANDARD PENETRA ROCK QUALITY DESIGNA	
DEPT	APLE	4MPI	APLE	COV	DESCRIPTION C	/ WATERIAL			ATER	EVAT	BLOV	RQD	HOW & RECOVERY
	SAN	S	SAN	R					>			— REC  CALIBRATED PENETR	OMETER TON/SF
_					Topsoil Thickness[6.00	)"]				-		[FINES CONTENT] %	
_	S-1	SS	18	18	(ML) Residuum, SAND	Y SILT, light	reddish	<u> </u>		-	2-4-4	⊗ <sub>8</sub>	
_	J 1				brown, moist, firm					] ]	(8)	78	
_	S-2	SS	18	18	(ML) SANDY SILT, light light brown and orang					-	12-10-16		
5-	3-2	33	10	10	very stiff	ge, moist, st	iii aiiu			629	(26)	26	
_					•						8-15-15		
_	S-3	SS	18	18						]	(30)	≫30	
_										-			
_	S-4	SS	18	18						-	6-5-5 (10)	<b>⊗</b> <sub>10</sub>	
10 –										624 –			
_										]			
-													
_	S-5	SS	18	18						-	17-9-9	<b>⊗</b> <sub>18</sub>	
15 -	3-3	33	10	10						619	(18)	V18	
_										-			
_										-			
-	S-6	SS	18	18						044	17-14-10 (24)	⊗ <sub>24</sub>	
20 –										614			
_													
_										-			
_	S-7	SS	18	18						-	20-10-7 (17)	<b>⊗</b> <sub>17</sub>	
25 -										609	(17)		
_													
-										-			
_										=	10-11-12		
30	S-8	SS	18	18						604	(23)	⊗ <sub>23</sub>	
30-										604 –			
		JE CTD	ATIFIC A	TION	CONTINUED ON			DETIA	EN CO	I TVDEC '		DANISITION MANY DE CRAS	
\\ \to \w			ounter		NES REPRESENT THE APPROXII  GNE								vUAL
	VL (Coi			- ~ /	3.42		NG STAR	ובט:	iviay	25 2022	CAVE IN	UEPIH: 	
			High V	Vater)		BORING May 25 2022 HAMMER TYPE: Automatic							
	` √L (Sta			,		EQUIPMENT: LOGGED BY: DRILLING M				METHOD: <b>2.25 HSA</b>			
	•		•		GEC	OTECHNIC		REHC					

CLIENT: Hutton Indian Land, LLC PROJECT NAME:							PROJECT NO.: BORING NO.:  08:15149  DRILLER/CONTRACTOR:			NO.:	SHEET: <b>2 of 2</b>				
			LC					ONTR A				2 of 2			.6
Promen		/IL.					A.E. Drilling								2
SITE LO												LOSS OF	CIRCULATION		)100 <i>i</i> )
NORTH		, Lanca	ister, S		arolina 29707 STING:	STATION:			SI	IREACE E	LEVATION:				
113166					48117.4	STATION.				4.00	LL VALION.	BOTTON	1 OF CASING		
(	IBER	PE	(NE)	<u> </u>					STIS	E (E	_	Plastic Limit V	Water Content	: Liquid Lim ∆	it
DЕРТН (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION C	NE NANTEDINI			WATER LEVELS	ELEVATION (FT)	BLOWS/6"		RD PENETRATIO		
DEPT	1PLE	\MPI	1PLE	\ CO \	DESCRIPTION C	/ WATERIAL			ATER	EVAT	BLOV	RQD	T DESIGNATION	I & NECOVERI	
	SAN	<i>T</i> S	SAN	R					>	EL		— REC	TED PENETROM	ETER TON/SF	
_					(ML) SANDY SILT, light	reddish bro	own to					[FINES CONT	ENT] %		
-					light brown and orang										
_ _	S-9	SS	18	18	very still						9-8-10	⊗ <sub>18</sub>			
35 –				10						599	(18)	18			
_										-					
_											0.00				
40-	S-10	SS	18	18						594	8-9-8 (17)	<b>⊗</b> <sub>17</sub>			
40 -					END OF BORII	NG AT 40 FT				394					
_															
-															
_															
45 –										589					
_										-					
_										=					
-										504					
50 –										584 –					
_															
_															
_															
55 <del>-</del>										579					
_										-					
_										-					
-															
60 –										574					
_															
	TH	HE STRA	ATIFICA.	TION I II	NES REPRESENT THE APPROXI	MATE BOUND	ARY LINFS RF	TWFFN	l soii	TYPES IN	I-SITU THE TR	ANSITION MAY F	BE GRADU	AL	
□ V	/L (Firs				GNE		NG STARTED			5 2022	CAVE IN		510 1007	-	
<b>Y</b> V	/L (Cor	mpleti	on)			BORIN		n.	/lav ?	5 2022	HVVVV	S TYPE: A	omatic		
▼ ∧	/L (Sea	sonal	High V	Vater)		COMPLETED:  HAMMER TYPE: Automatic  EQUIPMENT: LOGGED BY:									
▼ v	/L (Sta	bilized	)			ATV CI	ME 45	JI	MS13	3	DRILLING	6 METHOD: <b>2.2</b>	5 HSA		
					GEC	DTECHNIC	AL BORI	<u>EHOL</u>	<u>.E L</u> (	OG					

CLIENT								BORING NO.: B-07		SHEET:			
Hutton PROJEC				0 II				NITR				1 of 1	<b>LCC</b>
FIVOJEC	, I INAIN	/IL.PIU	illellau	e II			A.E. Drilling						
SITE LO			ister, S	outh Ca	arolina 29707				-			LOSS OF CIRCULATION	) <u>&gt;100%</u>
NORTH 113178					STING: <b>48005.6</b>	STATION:				URFACE E <b>25.00</b>	LEVATION:	BOTTOM OF CASING	-
ОЕРТН (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION C	OF MATERIAL			WATER LEVELS	ELEVATION (FT)	BLOWS/6"	Plastic Limit Water Conte  X  STANDARD PENETRATI  ROCK QUALITY DESIGNATIC  RQD  REC  CALIBRATED PENETROI  [FINES CONTENT] %	ON BLOWS/FT
- - - -	S-1	SS	18	18	Topsoil Thickness[4.00 (MH) Residuum, ELAS brown, moist, stiff		ddish			- - - -	3-6-6 (12)	<b>₽</b> <sub>12</sub>	
5-	S-2	SS	18	18						620	7-7-7 (14)	<b>⊗</b> 14	
	S-3	SS	18	18	(ML) SANDY SILT, light dark reddish brown, n stiff					-	9-10-10 (20)	⊗ <sub>20</sub>	
10-	S-4	SS	18	18						615	4-6-8 (14)	<b>⊗</b> <sub>14</sub>	
15 -	S-5	SS	18	18						610	8-8-11 (19)	<b>⊗</b> <sub>19</sub>	
20 -	S-6	SS	18	18						605	7-8-10 (18)	<b>⊗</b> <sub>18</sub>	
25 -	S-7	SS	18	18						600	11-11-13 (24)	<b>⊗</b> <sub>24</sub>	
30-	S-8	SS	18	18	END OF BORII	NG AT 30 FT				595	8-14-15 (29)	⊗ <sub>29</sub>	
					NES REPRESENT THE APPROXI	MATE BOUND	ARY LINES BE	TWEE	N SOI	L TYPES. IN	N-SITU THE TR	ANSITION MAY BE GRADU	AL
	/L (Firs			ed)	GNE	BORIN	NG STARTED	): I 	May 2	25 2022	CAVE IN	DEPTH:	
	/L (Cor					BORIN		-	May 2	25 2022	НАММЕ	R TYPE: Automatic	
<b>▼</b> ∧				Vater)		COMPLETED:  EQUIPMENT: LOGGED BY: DRILLING METHOD: 2.25 HSA							
<u> </u>	/L (Sta	bilized	)		GEC	ATV CI			IMS1		DIVILLING	, WETHOD, <b>2.23 HJA</b>	
					GEC	A L CLINIC	WF DOUE	<u> </u>	<u></u>	.UU			

CLIENT:							PROJECT NO.:					SHEET:		
Hutton Indian Land, LLC PROJECT NAME:							08:15149 B		B-09		1 of 2		.0	
Promen		/IE.												<u> </u>
SITE LOCATION:													)100 <i>x</i> )	
Charlotte Hwy, Lancaster, South Carolina 29707														71007/
NORTHING: EASTING: ST 1131541.6 2048191.2					STATION:	ON: SURFACE ELEVATION: 635.00			ELEVATION:	BOTTOM OF CASING				
	IBER	SAMPLE TYPE	SAMPLE DIST. (IN)	<u> </u>		\$//33//A		WATER LEVELS	ELEVATION (FT)	BLOWS/6"	Plastic Limit Water Content Liquid Limit X		nit	
DEPTH (FT)	SAMPLE NUMBER			RECOVERY (IN)	DESCRIPTION O						STANDARD PENETRATION BLOWS/FT ROCK QUALITY DESIGNATION & RECOVERY  RQD  REC			
	<i>/</i> S										CALIBRATED PENETROMETER TON/SF [FINES CONTENT] %			
-					Topsoil Thickness[3.00	reddish		_						
				18		ML) Residuum, SANDY SILT, light reddisl prown, moist, stiff to very stiff				- -	4-6-5 (11)	⊗11		
-	S-2	SS	18	18					630	6-14-12 (26)	<b>№</b> 26			
5-														
-	S-3	SS	18	18	(ML) SANDY SILT, light moist, hard to very ha		own,			- -	14-16-17 (33)	₩33		
-									-	27-17-40				
10	S-4	SS	18	18						625	(57)	≫ <sub>57</sub>		
-										_				
-		(ML) SANDY SILT, light reddish light orangish brown and brow								-				
15	S-5	SS	18	18	very stiff to hard					620	33-10-10 (20)	€20		
_														
-										_ _ _				
20	S-6	SS	18	18						615	30-20-20 (40)	<b>⊗</b> <sub>40</sub>		
-														
-	- (PWR) PARTIALLY WEATHERED F SAMPLED AS SANDY SILT, light o							_						
-	S-7	SS	6	6	brown	, 0				-	50/5" (50/5')		7	\$50/5"
25 –										610				
-										_				
										-				
-	S-8 SS 5 5								_	50/5" (50/5")		(	⊗ <sub>50/5"</sub>	
30 -										605	, , ,			
CONTINUED ON NEXT								T) A '55'	1.60::	T/050 ::		ANGITION A 197 SE CE LE		+
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL  WL (First Encountered)  GNE  BORING STARTED: May 25 2022  CAVE IN DEPTH:														
▼ MI (Completion)							·			CAVE IN	N DEPTH:			
<ul><li>▼ WL (Completion)</li><li>▼ WL (Seasonal High Water)</li></ul>						BORIN COMF	RING MPLETED:  MAY 25 2022  HAMN			HAMMEI	ER TYPE: Automatic			
▼ WL (Stabilized)						I	IIPMENT: LOGGED BY:			DRILLING	G METHOD: <b>2.25 HSA</b>			
	,,,,,,,				GEC	OTECHNIC		EHOL	<u>.E</u> L(	OG				

CLIENT: Hutton Indian Trail, LLC	PROJECT NO.: <b>08:15149</b>		BORING NO.: B-09		SHEET: 2 of 2		
PROJECT NAME:	DRILLER/C	ONTRAC			2012	EU'S	
Promenade II	A.E. Drillin						
SITE LOCATION: Charlotte Hwy, Lancaster, South Carolina 29707	•				LOSS OF CIRCULATION	<u> </u>	
NORTHING: EASTING: STATIO 1131541.6 2048191.2	N:	SURFACE ELEVATION 635.00			BOTTOM OF CASING		
T)  ABER  (IN)  (IN)		( -	(FT)	BLOWS/6"	Plastic Limit Water Content Liquid Limit  X		
SAMPLE NUMBER SAMPLE TYPE SAMPLE DIST. (IN) RECOVERY (IN)	RIAL		WAIER LEVELS ELEVATION (FT)		STANDARD PENETRATION BLOWS/FT  ROCK QUALITY DESIGNATION & RECOVERY  RQD  REC  CALIBRATED PENETROMETER TON/SF		
- (PWR) PARTIALLY WEATHERE	D ROCK		-		[FINES CONTENT] %		
SAMPLED AS SANDY SILT, light			-				
<u>S-9 SS 4 4</u>			-	50/4" (50/4")		⊗ <sub>50/4"</sub>	
35 –			600 -				
			_				
- - - - - - - - - - - - - - - - - - -			-	50/3"			
END OF BORING AT 38	.75 FT		595	(50/3")		<b>⊗</b> <sub>50/3"</sub>	
407			393 -				
			_				
			-				
45-			590-				
			-				
			-				
			-				
50 –			585 -				
			-				
			_				
55-			580				
			-				
			-				
			-				
60 -			575				
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BO	UNDARY LINES BE	TWEEN SO	OIL TYPES. II	N-SITU THE TR	ANSITION MAY BE GRADUA	AL	
\(\tau_1\) \(\frac{1}{2}\) \(\frac{1}2\) \(\frac{1}2\) \(\frac{1}2\) \(\frac{1}2\) \(\frac{1}2\) \(\frac{1}2\)				CAVE IN			
	BORING	May	ay <b>25 2022</b> HAMME				
E WE (Scasonal ringh water)	COMPLETED: EQUIPMENT:	IPMENT: LOGGED BY:			NG METHOD: <b>2.25 HSA</b>		
<u> </u>	NICAL BOR	EHOLF	LOG	322			

CLIENT	:						PROJECT N	IO.:	I	BORING	NO.:	SHEET:	
Hutton			LC				08:15149			B-10		1 of 1	<b>LC</b> C
PROJEC		ΛE:					DRILLER/C						_0
Promen SITE LC		ıNI•					A.E. Drilling	g Servic	es, ir	nc.			~
			ster, S	outh Ca	arolina 29707							LOSS OF CIRCULATION	<u> </u>
NORTH 113143					ASTING: <b>48309.4</b>	STATION:				JRFACE E 28.00	ELEVATION:	BOTTOM OF CASING	-
	BER	J.	(NI)	2					S	(L:		Plastic Limit Water Conter	nt Liquid Limit ∆
ОЕРТН (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)					WATER LEVELS	ELEVATION (FT)	BLOWS/6"	STANDARD PENETRATIO	
EPTF	OLE N	MPLE	) JE	OVE	DESCRIPTION C	)F MATERIAL			TER	VATIC	MO	ROCK QUALITY DESIGNATIO	N & RECOVERY
	SAMI	SAI	SAMI	REC					× ×	ELE	Ф	— REC	
	0,		•,					K///88///8				CALIBRATED PENETRON [FINES CONTENT] %	IETER TON/SF
-					Topsoil Thickness[4.00		/			_			
-	S-1	SS	18	18	(ML) Residuum, SAND	_				_	5-7-9	⊗ <sub>46, 17.1</sub> 24 × 33	IGE 40/1
_				-	orangish red, moist, v	ery stiff				_	(16)	17.1	[65.1%]
_					(ML) SANDY SILT, light	brown and	white,			-	2.46.50		
-	S-2	SS	18	18	moist, very hard					_	3-16-50 (66)	⊗ <sub>66</sub>	
5-										623			
_	S-3	SS	2	2	(PWR) PARTIALLY WEA					_	50/2" (50/2")		⊗ <sub>50/2"</sub>
_					SAMPLED AS SANDY S white	ILI, light bro	own and			_	(30/2 )		
-					Willie					-			
_	S-4	SS	8	8						_	12-50/2" (50/2")		\$50/2"
10 -										618			
_										_			
_										_			
_										_			
-	S-5	SS	2	2							50/2"		⊗ <sub>50/2"</sub>
45										040	(50/2")		
15-										613			
_										_			
_										-			
_										_	c = 0 /= !!		
-	S-6	SS	11	11						_	6-50/5" (50/5")		50/5"
20 –										608 –			
-										-			
_					(ML) SANDY SILT, light	hrown and	white			-			
_					moist, hard	DIOWII aliu	wille,			_			
_	S-7	SS	18	18	, moise, mara					_	6-17-23		
25 –	3-7		10	10						603	(40)	×40	
_										_			
										_			
_					(PWR) PARTIALLY WEA		OCK			_			
-	S-8	SS	5	5	SAMPLED AS SANDY S reddish brown	ill, light					50/5"		⊗ <sub>50/5"</sub>
20					END OF BORING	G AT 28.92 F	т/			F00 -	(50/5")		
30 -										598 –			
<u> </u>					NES REPRESENT THE APPROXI	MATE BOUNDA	ARY LINES BE	TWEEN	I SOIL	_ TYPES. II	N-SITU THE TE	RANSITION MAY BE GRADU	AL
	VL (Firs			ed)	GNE	BORIN	NG STARTED	): <b>N</b>	/lay 2	4 2022	CAVE IN	DEPTH:	
<b>V</b> V	VL (Coi	mpleti	on)			BORIN		Α.	/lav ?	4 2022	HAMME	R TYPE: Automatic	
<b>T</b> V	VL (Sea	asonal	High \	Water)			PLETED:				INCIVIIVIE	Automatic	
▼ V	√L (Sta	bilized	1)			EQUIF ATV CI	PMENT: <b>ME 45</b>		OGG MS13	ED BY:	DRILLING	METHOD: 2.25 HSA	
					GEO	OTECHNIC					1		

CLIENT							PROJECT N	0.:		BORING	NO.:	SHEET:	
Hutton			LC				08:15149			B-11		1 of 1	LCC
PROJEC		ΛE:					DRILLER/C						<b>-03</b>
Promen							A.E. Drilling	Serv	ices, I	nc.			~
SITE LO			ster. S	outh Ca	arolina 29707							LOSS OF CIRCULATION	1 21003
NORTH 1131298	ING:	,	,	EA	ASTING: 48378.2	STATION:				URFACE E <b>19.00</b>	ELEVATION:	BOTTOM OF CASING	-
(FT)	JMBER	TYPE	ST. (IN)	(NI) ×					SVELS	N (FT)	9/	Plastic Limit Water Conte X	Δ
<b>DEPTH (FT)</b>	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION C	F MATERIAL			WATER LEVELS	ELEVATION (FT)	BLOWS/6"	ROCK QUALITY DESIGNATION RQD REC CALIBRATED PENETROI	
					Tansail Thiskness [F 00	ייי			8			[FINES CONTENT] %	: :
- - -	S-1	SS	18	18	Topsoil Thickness[5.00 (MH) Residuum, ELAS brown to reddish brow	TIC SILT, rec				- - -	3-5-7 (12)	⊗ <sub>12</sub>	
- -	S-2	SS	18	18	moist, stiff to very stif	I				-	14-6-6 (12)	<b>⊗</b> <sub>12</sub>	
5 <u> </u>										614			
- - -	S-3	SS	18	18							14-12-12 (24)	Ø <sub>24</sub>	
<u>-</u>	S-4	SS	18	18	(ML) SANDY SILT, light to light brown and wh	_				-	4-4-6	<b>♥</b> 10	
10	3-4		10	10	stiff	iite, moist,	ili ili aliu			609	(10)	Ψ10	
										-			
-	S-5	SS	18	18						604	8-6-6 (12)	⊗ <sub>12</sub>	
15 <u> </u>										604 –			
										-			
20 –	S-6	SS	18	18						599 –	4-3-4 (7)	♦ <sub>7</sub>	
_ _ _										-     -			
- - -	6.7		10	10						-	5-5-8		
25 –	S-7	SS	18	18						594	(13)	\$13	
_ _ -										-			
30-	S-8	SS	18	18						589	6-14-17 (31)	⊗31	
30-					END OF BORI	NG AT 30 FT				308			
		JE CTD	المالان ٧-	TION !!	NEC DEDDECENT THE ADDROVE	MATE DOLLNO	A DV LINIEC DE	T\ <i>\</i> /	N SOI	I TVDEC IN	N CITIL TUE TO	ANISITION MAY BE CRASH	IAI
\\ \to \v	Th L (Firs				NES REPRESENT THE APPROXII  GNE								IAL
	/L (Cor			,		BORIN	NG STARTEI NG			24 2022 24 2022	CAVE IN		
▼ v	/L (Sea	sonal	High V	Vater)			PLETED:			SED BY:	ITAIVIIVIEI	Automatic	
▼ v	/L (Sta	bilized	)			ATV CI	PMENT: <b>ME 45</b>	- 1	JMS1		DRILLING	METHOD: 2.25 HSA	
					GEO	TECHNIC							

CLIENT							PROJECT N	IO.:		BORING I	VO.:	SHEET:	
Hutton			LC				08:15149			B-13		1 of 1	LCC
PROJEC		ΛE:					DRILLER/C						<b>-03</b>
Promen		NI.					A.E. Drillin	g Servi	ces, li	nc.			~
SITE LO  Charlot			ster, S	outh Ca	arolina 29707							LOSS OF CIRCULATIO	N <u>&gt;100%</u>
NORTH 113133					STING: <b>48663.6</b>	STATION:				JRFACE E	LEVATION:	BOTTOM OF CASING	
I (FT)	NUMBER	E TYPE	OIST. (IN)	RY (IN)					LEVELS	ON (FT)	.9/5.	Plastic Limit Water Conte X	———△ ION BLOWS/FT
ОЕРТН (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION C	DE MATERIAL			WATER LEVELS	ELEVATION (FT)	BLOWS/6"	ROCK QUALITY DESIGNATI  RQD  REC  CALIBRATED PENETRO  [FINES CONTENT] %	
_					Topsoil Thickness[4.00	)"]				+ +		[FINES CONTENT] %	
- - - -	S-1	SS	18	18	(ML) Residuum, SAND brown to pink to whit very stiff	_				-	5-6-7 (13)	<b>⊗</b> <sub>13</sub>	
5-	S-2	SS	18	18						607	4-5-6 (11)	₩11	
- - - -	S-3	SS	18	18						- - - -	8-9-8 (17)	<b>№</b> 17	
10-	S-4	SS	18	18						602	14-6-8 (14)	<b>⊗</b> 14	
- - - -					(ML) SANDY SILT, grayi	ish white, r	moist,						
_ 					very hard	·	•				20-20-40		
15 -	S-5	SS	18	18						597	(60)	© <sub>60</sub>	
					(ML) SANDY SILT, whit	e, moist, v	ery stiff			- - - -			
20	S-6	SS	18	18						592	14-17-12 (29)	<b>⊗</b> <sub>29</sub>	
- - -	<del>S-7</del>	SS	0	0	AUGER REFUS	SAL AT 21 F	Т				50/0" (50/0")		<b>→</b> \$50/0"
25-										587			
25-										387			
- -													
30										582			
	_				NEG DEDDEST: T T							ANGETICAL TOTAL TO	
\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	TI VL (Firs				NES REPRESENT THE APPROXII  GNE		NG STARTE			L TYPES. IN 24 2022	CAVE IN		JAL
	VL (Coi					BORI							
▼ v	VL (Sea	sonal	High V	Vater)			IPLETED: IPMENT:			24 2022 GED BY:	HAMMEI		
▼ v	VL (Sta	bilized	)			ATV C	CME 45	J	MS13	3	DRILLING	6 METHOD: 2.25 HSA	
					GEC	DTECHNIC	CAL BOR	EHOL	E L	OG			

CLIENT							PROJECT N	10.:		BORING	NO.:	SHEET:	
Hutton			LC				08:15149			B-12		1 of 1	<b>LC</b> c
PROJEC		ΛE:					DRILLER/C						
Promen							A.E. Drillin	g Servic	ces, I	nc.		Ι	~
SITE LO  Charlot			ster, S	outh Ca	arolina 29707							LOSS OF CIRCULATION	<u> </u>
NORTH 113149					STING: <b>48480.6</b>	STATION:			- 1	URFACE E 29.00	LEVATION:	BOTTOM OF CASING	
(FT)	JMBER	TYPE	ST. (IN)	Y (IN)					EVELS	N (FT)	/6"	Plastic Limit Water Conten X  STANDARD PENETRATIC	Δ
ОЕРТН (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION O	F MATERIAL			WATER LEVELS	ELEVATION (FT)	BLOWS/6"	ROCK QUALITY DESIGNATION RQD REC CAUBRATED PENETROM	
_					Tancail Thickness[2,00	\!!1		MANA				[FINES CONTENT] %	: :
- - -	S-1	SS	18	18	Topsoil Thickness[3.00 (ML) Residuum, SAND brown to pink to white	Y SILT, redd e to light br				- - - - -	3-6-6 (12)	<b>⊗</b> <sub>12</sub>	
- - -	6.3		10	10	white, moist, stiff and	very sun					4-5-10		
5-	S-2	SS	18	18						624	(15)	\$15	
- -	S-3	SS	18	18						-	11-13-13 (26)	<b>⊗</b> <sub>26</sub>	
- -	S-4	SS	18	18						=	5-11-9	<b>₽</b> <sub>20</sub>	
10-										619	(20)	20	
- - -										- - - -			
- - -	S-5	SS	18	18							9-6-5 (11)	<b>♦</b> 11	
15-										614 –			
20-	S-6	SS	18	18						609	8-11-11 (22)	⊗ <sub>22</sub>	
- - - -										-			
_ - -	S-7	SS	18	18						-	11-12-13	<b>₽</b> 25	
25 – –					(ML) SANDY SILT, pinki hard	ish white, m	noist,			604	(25)		
	6.0		40	40						- - -	13-20-16		
30 -	S-8	SS	18	18	END OF BORIN	NG AT 30 FT				599	(36)	⊗ <sub>36</sub>	
													· · · · · · · · · · · · · · · · · · ·
					NES REPRESENT THE APPROXII	MATE BOUNDA	ARY LINES BE	TWEEN	SOI	L TYPES. IN	N-SITU THE TR	ANSITION MAY BE GRADUA	AL
	VL (Firs			ed)	GNE		NG STARTEI	): <b>N</b>	/lay 2	24 2022	CAVE IN	DEPTH:	
	VL (Cor VL (Sea			Vater)		BORIN COMF	NG PLETED:		/lay 2	24 2022	HAMMEI	R TYPE: Automatic	
	VL (Sta					EQUIF ATV CI	PMENT:	I .	.OGG	GED BY:	DRILLING	6 METHOD: <b>2.25 HSA</b>	
	•		•		GEC	OTECHNIC							

CLIENT								ECT NO	D.:		BORING	NO.:	SHEET:			
Hutton PROJEC			LC				08:1	<b>5149</b> LER/CO	NTR		B-14 IR:		1 of 2			9
Promen		VIL.						Drilling								2
SITE LC													LOSS	OF CIRCULATION		\(\)
Charlot NORTH		, Lanca	aster, S		arolina 29707 ASTING:	STATION:				CI	IDEACE	ELEVATION:				
<b>113172</b> :					48371.2	STATION.					1.00	LEVATION.	ВОТ	TOM OF CASING		
	ER		<u> </u>							S	_		Plastic Lir X—	mit Water Content	: Liquid Lim	it
(FT)	UMB	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)						WATER LEVELS	ELEVATION (FT)	,,9/9		NDARD PENETRATIO		
ОЕРТН (FT)	LE N	APLE	LE D	OVEF	DESCRIPTION C	OF MATERIAL				ER L	MTIC	BLOWS/6"	ROCK O	UALITY DESIGNATION	& RECOVERY	,
	SAMPLE NUMBER	SA	SAME	REC						WA	ELE	В	— RI	EC		
	•		- '					IS	///////				_	IBRATED PENETROMI CONTENT] %	ETER TON/SF	-
_					Topsoil Thickness[4.00 (MH) Residuum, ELAS		ht				_					
_	S-1	SS	18	18	reddish brown, moist,	_	110				_	4-7-7 (14)	<b>₹9.</b> 5	<sup>35</sup> ×	;	5 <u>2</u> [98
_					(ML) SANDY SILT, light	raddish hr	own t	to II	+		-					70
-	S-2	SS	18	18	dark pink, moist, stiff						_	8-6-8 (14)	<b>⊗</b> <sub>14</sub>			
5-					. , , ,	•					636	(14)	\			
_											_	10-10-11				
-	S-3	SS	18	18							-	(21)	∞21			
_											-					
-	S-4	SS	18	18							_	4-7-7 (14)	<b>♦</b> 14			
10-											631 –					
_											-					
-											-					
-											-	7.40.40	\			
	S-5	SS	18	18							-	7-10-13 (23)	\$23			
15-											626 –					
-											-		\			
_					(ML) SANDY SILT, dark	•					_					
]					reddish brown to light	t brown, m	oist,				-	10-20-29				
20-	S-6	SS	18	18	hard and very hard						621	(49)		₩49		
-											-					
-											-					
_											_					
_	S-7	SS	10	18							_	12-17-40				
25 –	3-7	33	18	10							616	(57)		∞57		
_											_					
_											_					
_											_					
_	S-8	SS	18	18							_	12-17-20		D <sub>27</sub>		
30 -					_						611 -	(37)		31		
<u> </u>					CONTINUED ON	N NEXT PA	GE									
	TI	HE STR	ATIFICA	TION LI	NES REPRESENT THE APPROXI			NES BET	WEEN	I SOIL	TYPES. II	N-SITU THE TR	RANSITION MA	AY BE GRADUA	AL.	
□ ∇ V	VL (Firs	st Enco	ounter	ed)	GNE	BORI	NG ST	ARTED:	N	∕lay 2	4 2022	CAVE IN	DEPTH:			
<b>V</b> V	VL (Co	mpleti	on)			BORI			N	/lav 2	4 2022	HAMMEI	R TYPE:	Automatic		
<b>∡</b> ∧	VL (Sea	asonal	High \	Nater)			PLETE PMEN				ED BY:					
<u>▼</u> ∨	VL (Sta	bilizec	l)				ME 45			MS13		DRILLING	METHOD:	2.25 HSA		
					GEO	OTECHNIC	CALE	BORE	HOI	E L	OG					

CLIENT								ROJECT N	IO.:		BORING	NO.:	SHEET:	
Hutton			LC					8:15149			B-14		2 of 2	-ECc
PROJEC		⁄IЕ:						RILLER/C						_03
Promen		N.L.					Α	.E. Drillin	g Servi	ces, I	nc.			PM
SITE LO			ster. S	outh Ca	arolina 29707								LOSS OF CIRCULA	ION NO.
NORTH		, Lanca	.500., 5		STING:	STATION:	:			SI	URFACE E	ELEVATION:		
113172					48371.2						41.00		BOTTOM OF CAS	NG
<b>DEPTH (FT)</b>	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION C	DF MATERIA	.L			WATER LEVELS	ELEVATION (FT)	BLOWS/6"	Plastic Limit Water Cc  X  STANDARD PENET  ROCK QUALITY DESIGN  RQD  REC  CALIBRATED PENET	RATION BLOWS/FT ATION & RECOVERY
					(MI) CANDV SIIT dark	nink to d	- -		ШШ				[FINES CONTENT] %	: :
- - - - -	S-9	SS	18	18	(ML) SANDY SILT, dark reddish brown to light hard and very hard (ML) SANDY SILT, light brown, moist, very sti	brown, i	mois o me	dium			- - - - - -	30-12-17 (29)	& <sub>29</sub>	
35 — - - - -					brown, moist, very str	n to very	narc	1			606 -	. ,		
40	S-10	SS	18	18							601	20-12-11 (23)	\$23	
- - - - -											- - - -			
45 <u> </u>	S-11	SS	18	18							596	10-10-24 (34)	♥34	
-												9-17-20		
50	S-12	SS	18	18	END OF BORII	NG AT 50	FT				591	(37)	⊗ <sub>37</sub>	
- - - -											- - -			
55 – -											586			
- - -														
60 -											581			
														· · · · · · · · · · · · · · · · · · ·
					NES REPRESENT THE APPROXI	MATE BOUN	NDAR	/ LINES BE	TWEE	N SOI	L TYPES. II	N-SITU THE TR	RANSITION MAY BE GRA	DUAL
$\nabla$ M	VL (Firs	t Enco	unter	ed)	GNE	ВО	RING	STARTE	): I	May 2	24 2022	CAVE IN	DEPTH:	
▼ W	VL (Cor	npleti	on)				RING			May <sup>2</sup>	24 2022	HAMMEI	R TYPE: Automati	
▼ N	VL (Sea	isonal	High V	Vater)		-	MPLE					, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,		-
▼ W	VL (Sta	bilized	)				UIPM <b>/ CME</b>			IMS13	GED BY: 3	DRILLING	G METHOD: 2.25 HSA	
					GEC	OTECHN						1		

CLIENT							PROJECT N	0.:		BORING	NO.:	SHEET:	
Hutton			.c				08:15149			B-15		1 of 1	<b>LCc</b>
PROJEC		⁄ΙΕ:					DRILLER/C						-03
Promen							A.E. Drilling	Servi	ces, I	nc.			~
SITE LO Charlot			ster, S	outh Ca	arolina 29707							LOSS OF CIRCULATION	<u> </u>
NORTH 1132006					STING: <b>48125.8</b>	STATION:			- 1	URFACE E <b>26.00</b>	LEVATION:	BOTTOM OF CASING	
ОЕРТН (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION O	PF MATERIAL			WATER LEVELS	ELEVATION (FT)	BLOWS/6"	Plastic Limit Water Conten  X  Standard Penetratic  ROCK QUALITY DESIGNATIO  RQD  REC	N BLOWS/FT
	S		\2	1								CALIBRATED PENETROM [FINES CONTENT] %	ETER TON/SF
- - -	S-1	SS	18	18	Topsoil Thickness[6.00 (ML) Residuum, SAND brown to light reddish firm to stiff	Y SILT, light				- - - -	4-4-4 (8)	⊗8	
	S-2	SS	18	18	111111 60 36111					-	6-7-7 (14)	<b>⊗</b> <sub>14</sub>	
5 <del>-</del>					(ML) SANDY SILT, light	orange and	d white,			621 –			
	S-3	SS	18	18	moist, very stiff					-	9-12-13 (25)	⊗ <sub>25</sub>	
-	S-4	SS	18	18						-	12-12-10 (22)	⊗ <sub>22</sub>	
10 -										616 -	24-8-8		
15 -	S-5	SS	18	8						611	(16)	<b>⊗</b> 16	
20-	S-6	SS	18	18						606	6-8-8 (16)	<b>⊗</b> <sub>16</sub>	
25 –	S-7	SS	18	18						601	8-10-8 (18)	<b>⊗</b> <sub>18</sub>	
30	S-8	SS	18	18						506	8-9-10 (19)	⊗ <sub>19</sub>	
30-					END OF BORIN	NG AT 30 FT				596			
	Tı	IE CTD	TIEIC^	TION ! !	NIES BEDBESENIT THE ADDROVI	MATE BOLIND	V BA I IVIEC DE	T\\\/EE*	1 501	I TYDEC IN	I_SITI I THE TO	ANSITION MAY BE CRADE	<b>N</b> I
\\ \textstyle \textst	/L (Firs				NES REPRESENT THE APPROXII  GNE		NG STARTED			L TYPES. IN 25 2022	CAVE IN		AL .
	/L (Cor					BORIN	NG			25 2022	HAMME		
	/L (Sea			Vater)			PLETED: PMENT:			GED BY:			
▼ W	/L (Sta	bilized	)			ATV CI	ME 45	J	MS1	3	DRILLING	6 METHOD: <b>2.25 HSA</b>	
					GEC	TECHNIC	AL BORE	HO	LE L	.OG			

CLIENT							PROJEC		.:		BORING	NO.:	SHEET:	
Hutton			LC				08:151				B-16		1 of 1	<b>LCc</b>
PROJEC		ΛE:					DRILLE							_03
Promen							A.E. Dr	illing	Servi	es, li	nc.		I	~
SITE LO  Charlot			ster, S	outh Ca	arolina 29707								LOSS OF CIRCULATION	<u> </u>
NORTH					STING: <b>47952.9</b>	STATION:				- 1	JRFACE E 98.00	LEVATION:	BOTTOM OF CASING	-
(	IBER	PE	(NI)	<u> </u>						. STI	FT)	_	Plastic Limit Water Conten	t Liquid Limit ∆
DЕРТН (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION C	)F MATERIAL				WATER LEVELS	ELEVATION (FT)	BLOWS/6"	STANDARD PENETRATION  ROCK QUALITY DESIGNATION  RQD	
DE	SAME	SAN	SAMP	REC						WAJ	ELE	18	— REC  CALIBRATED PENETROM	ETER TON/SF
					Topsoil Thickness[4.00	)"]		, i					[FINES CONTENT] %	
- - -	S-1	SS	18	18	(ML) Residuum, SAND moist, firm to stiff		inge,				-     	2-2-3 (5)	<b>⊗</b> <sub>5</sub>	
_ _ _	S-2	SS	18	18							-	2-4-6	<b>№</b> 10	
5-					(ML) SANDY SILT, cont	ains slight	rock				593	(10)		
- - -	S-3	SS	18	18	fragments, light brown red and white, moist,	nish gray a		:			-	6-21-14 (35)	⊗35	
_	S-4	SS	18	18								10-17-18		
10	3-4		10	10							588	(35)	\$35	
					(SM) SILTY SAND WITH	H GRAVEL	. light	:						
_ _ _	S-5	SS	18	18	brown and white, moi		_					10-25-50		75
15	3-3		10	10							583	(75)		P75
_ 														
- - -	S-6	SS	18	18								10-25-50 (75)		S <sub>75</sub>
20 –					END OF BORII	NG AT 20 F	Т	:			578	(13)		
- - -											-    -			
25 – –											573			
- - -														
30 -											568 –			
	TI	HE STR	TIFICA.	TION LI	 NES REPRESENT THE APPROXII	MATE ROLIN	DARYLINE	SRET	V/EEV	   SO!!	TYPES IN	I-SITI THE TR	RANSITION MAY BE GRADIA	71
\\ \triangle \t			ounter		GNE		RING STAR				27 2022	CAVE IN		16
		mpleti				BOR	RING				27 2022	HAMMEI		
				Vater)			ЛРLETED: JIPMENT:				SED BY:			
▼ V	VL (Sta	bilized	l)			ATV	CME 45		J	MS13	3	DRILLING	6 METHOD: 2.25 HSA	
					GEO	<b>TECHNI</b>	CAL BO	DREI	HOL	E L	OG			

CLIENT			_				PROJE		).:		BORING	NO.:	SHEET:			
Hutton I			LC				<b>08:151</b> DRILLE		NITD		3-17		1 of 1		<b>LC</b> c	
Promen		/IE.					A.E. Dr									<b>)</b>
SITE LO		N:					ı						LOSS OF CIRC	THATION	)100	λ =
		, Lanca	ster, S		arolina 29707	T							LOSS OF CIRC	JULATION	7,00	У —
NORTH 1132392					ASTING: <b>47788.9</b>	STATION:					JRFACE E <b>2.00</b>	LEVATION:	BOTTOM OF	CASING		
	IBER	ЬE	(NI)	(N						STIS	ET)	_	Plastic Limit Wate	er Content I	Liquid Limit ∆	
БЕРТН (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION O	)F MATERIAL				WATER LEVELS	ELEVATION (FT)	BLOWS/6"	STANDARD P		-	
DEF	SAMPL	SAM	SAMPL	RECO						WATE	ELEVA	BLC	RQD REC CALIBRATED F	DENISTRONASTI	FR TON/SF	
					Tanaail Thislerassic OC	\!II							[FINES CONTENT]		ER TON/SF	
-					Topsoil Thickness[6.00 (MH) Residuum, ELAS		nt	-1				4.5.6				
- -	S-1	SS	18	18	brown to reddish brow	_					-	4-5-6 (11)	<b>₩</b> 11			
-	S-2	SS	18	18	very stiff						-	5-8-8	<b>№</b> 16			
5	J 2		10	10	(AAL) CANDY CUT		. 1. 1				607	(16)	Ψ16			
-	S-3	SS	18	18	(ML) SANDY SILT, pink orange to gray and wh			nt				9-10-11 (21)	Ø <sub>21</sub>			
- - -					stiff to stiff						-					
10-	S-4	SS	18	18							602	9-8-8 (16)	<b>⊗</b> <sub>16</sub>			
- - -																
-											-					
- - -	S-5	SS	18	18							-	9-7-6 (13)	<b>⊗</b> <sub>13</sub>			
15 <u> </u>											597 –					
- - -											-					
- - -	S-6	SS	18	18							-	9-6-8	⊗ <sub>14</sub>			
20	3-0		10	10	END OF BORIN	NG AT 20 FT	•				592	(14)	14			
- - -											_					
- - -											-					
25 –											587					
-											=					
_																
-											-					
30 –											582					
	т:	JE CTD	۸۲۱۲۱۲۸	TION ! !	NEC DEDDECENT THE ADDROVE	MATE DOLLNO	VDA LIVIL	כ פרדי	۸/ <b>۲</b> ۲۸	LSOU	TVDEC IN	ו פודוו דויר דיי	ANSITION NAME OF	SD V DI I V I		
□ ∇ W			unter		NES REPRESENT THE APPROXII  GNE		ng staf				7 2022	CAVE IN		3KAUUAL	=	
▼ W						BORIN			N	/lay 2	7 2022	HAMMEI	R TYPE: Autom	natic		
▼ W				Vater)		-	PLETED: PMENT:		L	OGG	ED BY:		AAETUOD			
▼ W	/L (Sta	bilized	)			ATV CI	ME 45		J	MS13	1	DRILLING	6 METHOD: <b>2.25 H</b>	SA		
					GEC	DTECHNIC	CAL BO	OREI	101	E LO	OG					

CLIENT	:						PROJECT	NO.:		BORING	NO.:	SHEET:	
Hutton			LC				08:15149			B-18		1 of 1	- tCo
PROJEC	TNAN	ΛE:					DRILLER/						-63
Promen							A.E. Drilli	ng Ser	vices, I	nc.		1	~
SITE LO			ster. S	outh Ca	arolina 29707							LOSS OF CIRCULATION	ON ZIOOX
NORTH 113271:	ING:	•		EA	STING: <b>47515.6</b>	STATION:				URFACE E	ELEVATION:	BOTTOM OF CASIN	G 💌
DЕРТН (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION O	F MATERIAL			WATER LEVELS	ELEVATION (FT)	BLOWS/6"	Plastic Limit Water Cont X—————  STANDARD PENETRA ROCK QUALITY DESIGNAT ————————————————————————————————————	TION BLOWS/FT
	Ś		'S									CALIBRATED PENETRO [FINES CONTENT] %	OMETER TON/SF
	S-1	SS	18	18	Topsoil Thickness[3.00 (MH FILL) ELASTIC SILT wood, reddish brown, (MH) Residuum, ELAST	, contains moist, sti	ff				5-7-8 (15)	<b>⊗</b> <sub>15</sub>	
5-	S-2	SS	18	18	brown, moist, stiff (ML) SANDY SILT, reddi			/		629	6-7-8 (15)	<b>⊗</b> <sub>15</sub>	
- - -	S-3	SS	18	18	(ML) SANDY SILT, light moist, hard	reddish b	rown,				12-15-17 (32)	≫ <sub>32</sub>	
10-	S-4	SS	18	18	(ML) SANDY SILT, pink reddish brown and ora firm	_				624	13-6-8 (14)	<b>⊗</b> <sub>14</sub>	
- - - - - -										- - - - -	10.5.5		
15-	S-5	SS	18	18						619	10-6-6 (12)	\$12	
20 –	S-6	SS	18	18	END OF BORIN	NG AT 20 F	т			614	6-3-5 (8)	$\otimes_{\epsilon}$	
- - - - - -										- - - - -			
25 – – – – –										609			
30										604			
		IE 077	ATIE! = ::		NEC DEDDECENT THE 1222 TO	AATE DO:	DADVIII = 1	\	- L	LTVS55	I OTTO TO THE	ANGITION AND TO THE	
\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \			ATIFICA ounter		NES REPRESENT THE APPROXIN  GNE								UAL
		mpleti		1	GIAL	BOR	ING STARTI	υ:		1 2022	CAVE IN		
			High V	Vater)		COM	1PLETED:			1 2022	HAMMEI	R TYPE: Automatic	
		bilized		<u> </u>			IPMENT: C <b>ME 45</b>		LOGO JMS1	GED BY:	DRILLING	METHOD: <b>2.25 HSA</b>	
	,		•		GEO	TECHNI		REHC					

PROJECT NAME: Promenade II  SITE LOCATION: Charlotte Hwy, Lancaster, South Carolina 29707  NORTHING: 1132415.5  Charlotte Hwy, Lancaster, South Carolina 29707  DESCRIPTION OF MATERIAL  Topsoil Thickness[6.00"]  (MH) Residuum, ELASTIC SILT, reddish orange, moist, stiff to very stiff  (ML) SANDY SILT, reddish orange, moist, work stiff to very stiff  (ML) SANDY SILT, reddish orange, moist, work stiff to very stiff  (ML) SANDY SILT, reddish orange, moist, work stiff to very stiff  (ML) SANDY SILT, reddish orange, moist, work stiff to very stiff  (ML) SANDY SILT, reddish orange, moist, work stiff to very stiff  (ML) SANDY SILT, reddish orange, moist, work stiff to very stiff  (ML) SANDY SILT, reddish orange, moist, work stiff to very stiff  (ML) SANDY SILT, reddish orange, moist, work stiff to very stiff  (ML) SANDY SILT, reddish orange, moist, work stiff to very stiff  (ML) SANDY SILT, reddish orange, moist, work stiff to very stiff  (ML) SANDY SILT, reddish orange, moist, work stiff to very stiff	CLIENT							PROJECT			BORING	NO.:	SHEET:			
Note   Continue   Co				LC				08:15149					1 of 1		<b>LC</b> c	À
STELECTION:   Construction   Const			/IE:													
Control   Cont			NI ·					A.E. Drilli	ing servi	ces, i	nc.					~
1312415-5   2047995-7   2047995-7   2047995-7   2047995-7   2047995-7   2047995-7   2047995-7   2047995-7   2047995-7   204795-7   204795-7   2047995-7   204795-7   204				ster, S	outh Ca	arolina 29707							LOS	S OF CIRCULATION	<u> </u>	>
Part	NORTH	ING:	-		EA	ASTING:	STATION:					ELEVATION:	BC	OTTOM OF CASING		<b>)</b>
10		3ER	ш	<u> </u>	9					S	(L			_		
10	(FT)	JME	TYP	ST. (	\(\(\)					SVEL	N (F	9/				_
10	PTH	Z H	IPLE	E DI	VER	DESCRIPTION C	F MATERIAL			ER LI	ATIO	SMC			& RECOVERY	
10	DE	MP	SAN	MM	RECC					WAT	:LEV	BL				
The Stratification Lines Represent The Approximate Boundary Lines Services   Solid Plane   Solid P		\$		/5									_		TER TON/SF	
S-1   S5   18   18	_					Topsoil Thickness[6.00	)"]						[FINES	CONTENT] %		_
S-1   SS   18   18   18   orange, moist, stiff to very stiff	_					-	-	ddish	~		-	2-5-6				
S-2   SS   18   18   Very stiff	-	S-1	SS	18	18	orange, moist, stiff to	very stiff				-		<b>₩</b> 11			
S-2   SS   18   18   Very stiff	_					(24)					4 4					
Solution   Solution	_	6.2		40	40		ish orange,	moist,				6-10-8		29	4Q	
10	5-	5-2	55	18	18	very stiff					502	(18)	18	24.5	[83.3	%]
S	J -					(CI) I EANI CLAV contai	nc rock frag	monto	$\frac{1}{1}$		392					
10	-	<b>C</b> 2	cc	10	10		-		1///	1	7					
S-4   SS   18   18   18   18   18   18   18	_	3-3	33	10	10	reduisir orange to gray	, illoist, vei	y Still	1///	1	=	(22)	22			
S-4   SS   18   18   18   18   18   18   18	_								4///	1	_					
10	_	S-4	SS	12	12				4///	4	-		<b>b</b>			
S-5   SS   18   18	10-	3 4		10	10				-Y///	4	587	(18)	18			
S-5   SS   18   18   18   20	_								-Y///	4	_					
S-5   SS   18   18   18   20	-								Y///	1	-					
S-5   SS   18   18   18	_					(ML) SANDY SILT, oran	gish brown	to			1 7					
S-5   SS   18   18   18	_					orangish brown and b	lack, moist,	firm			=					
15	_	S-5	SS	18	18						-		<b>⊗</b> <sub>8</sub>			
S-6   SS   18   18	15-										582-	(0)				
S-6   SS   18   18	_															
S-6   SS   18   18	_															
S-6   SS   18   18	=										-					
S-6   SS   18   18	_										1 7	222				
S-7   SS   18   18	-	S-6	SS	18	18								\$5 €			
S-7   SS   18   18	20 –										577 –					
S-7   SS   18   18	_										-					
S-7   SS   18   18	_					(2.2.)					4 4					
S-7   SS   18   18   18	_						_	and								
S-7   SS   18   18	_					Diack, moist, very stiff	to nard					4-8-8				
S-8 SS 18 18  THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL  WL (First Encountered)  WL (Completion)  TWU (Completion)  WL (Seasonal High Water)  WL (Stabilized)  BORING COMPLETED: EQUIPMENT: ATV CME 45  JMS13  BRILLING METHOD: 2.25 HSA	25	S-7	SS	18	18						F70		₩16			
S-8 SS 18 18  THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL  WL (First Encountered)  30.00  BORING STARTED:  WL (Completion)  THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL  AND APPLY THE TRANSITION MAY BE GRADUAL  AND APPLY TO APPLY THE TRANSITION MAY BE GRADUAL  WL (Seasonal High Water)  WL (Seasonal High Water)  WL (Stabilized)  DRILLING METHOD: 2.25 HSA	∠5-										312		\			
S-8 SS 18 18  THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL  WL (First Encountered)  30.00  BORING STARTED:  WL (Completion)  THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL  AND APPLY THE TRANSITION MAY BE GRADUAL  AND APPLY TO APPLY THE TRANSITION MAY BE GRADUAL  WL (Seasonal High Water)  WL (Seasonal High Water)  WL (Stabilized)  DRILLING METHOD: 2.25 HSA	-										=					
S-8 SS 18 18   18   END OF BORING AT 30 FT   STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL  WL (First Encountered) 30.00   BORING STARTED: May 27 2022   CAVE IN DEPTH:  WL (Completion) 27.00   BORING COMPLETED: COMPLETED: EQUIPMENT: AUTOMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL  LOGGED BY: JMS13   DRILLING METHOD: 2.25 HSA	_										-		\			
S-8 SS 18 18   18   END OF BORING AT 30 FT   STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL  WL (First Encountered) 30.00   BORING STARTED: May 27 2022   CAVE IN DEPTH:  WL (Completion) 27.00   BORING COMPLETED: COMPLETED: EQUIPMENT: AUTOMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL  LOGGED BY: JMS13   DRILLING METHOD: 2.25 HSA	-										-					
BORING STARTED: May 27 2022 CAVE IN DEPTH:  WL (Completion)  WL (Seasonal High Water)  WL (Stabilized)  END OF BORING AT 30 FT  END OF BORING AT 30 FT  STATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL  CAVE IN DEPTH:  HAMMER TYPE: Automatic  COMPLETED:  EQUIPMENT:  ATV CME 45  JMS13  DRILLING METHOD: 2.25 HSA	-	S-8	SS	18	12						-			),,		
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL  WL (First Encountered)  30.00  BORING STARTED: May 27 2022  CAVE IN DEPTH:  WL (Seasonal High Water)  WL (Seasonal High Water)  WL (Stabilized)  DRILLING METHOD: 2.25 HSA	30 -			10	10	END OF BODI	IC AT 20 ET				567	(31)		31		
✓ WL (First Encountered) 30.00 BORING STARTED: May 27 2022 CAVE IN DEPTH:   ✓ WL (Completion) 27.00 BORING COMPLETED: May 27 2022 HAMMER TYPE: Automatic   ✓ WL (Seasonal High Water) EQUIPMENT: ATV CME 45 LOGGED BY: JMS13 DRILLING METHOD: 2.25 HSA	_					END OF BOKII	NG AI 3U FI									_
✓ WL (First Encountered) 30.00 BORING STARTED: May 27 2022 CAVE IN DEPTH:   ✓ WL (Completion) 27.00 BORING COMPLETED: May 27 2022 HAMMER TYPE: Automatic   ✓ WL (Seasonal High Water) EQUIPMENT: ATV CME 45 LOGGED BY: JMS13 DRILLING METHOD: 2.25 HSA			IE CES	ATIELO:	TICNIII	NEC DEDDECENT THE ASSESSME	MATE BOLLS	A D.V. I. I.S. C. C.	DETAILE	N. CO.	L TVDES ::		ANGTON	1AV DE CD 1 2 1 1 1	1	_
▼ WL (Completion) 27.00   BORING COMPLETED: May 27 2022   WL (Seasonal High Water) EQUIPMENT: ATV CME 45   LOGGED BY: JMS13 DRILLING METHOD: 2.25 HSA										N SOI	L TYPES. IN	N-SITU THE TE	KANSIIION N	IAY BE GRADUA	AL.	
▼ WL (Seasonal High Water)     COMPLETED:     May 27 2022     HAMMER TYPE:     Automatic       ▼ WL (Stabilized)     EQUIPMENT:     LOGGED BY:     DRILLING METHOD: 2.25 HSA	<u> </u>	/L (Firs	t Enco	unter	ed)	30.00	BORIN	NG START	ED: I	May 2	27 2022	CAVE IN	DEPTH:			
▼ WL (Seasonal High Water)       COMPLETED:         EQUIPMENT:       LOGGED BY:         JMS13       DRILLING METHOD: 2.25 HSA	<b>▼</b> ∨	/L (Cor	npleti	on)		27.00	BORIN	NG		Maria	יכחכ דו	LIANANAE	D TVDE,	Automata		_
▼ WL (Stabilized)   EQUIPMENT: LOGGED BY: JMS13     DRILLING METHOD: 2.25 HSA	▼ v	 /L (Sea	sonal	High V	Vater)							MAIVIIVIE	N TIPE:	AULUMATIC		
AIV CME 45 JMS13												DRILLING	METHOD:	2.25 HSA		
		(Jta	~1112CU	• /		CEC										_

CLIENT		Trail II				PROJE 08:15	ECT NO.:		BORING <b>B-20</b>	NO.:	SHEET: 1 of 1	
Hutton PROJE(			LC				ER/CONTI				1 01 1	EU'S
Promer							Drilling Serv					
SITE LC			ster. S	outh Ca	arolina 29707						LOSS OF CIRCULATION	)100 <i>x</i> )
NORTH	IING:	,		EA	STING: STATION: <b>48264.3</b>				URFACE E	ELEVATION:	BOTTOM OF CASING	
H (FT)	NUMBER	E TYPE	OIST. (IN)	RY (IN)				WATER LEVELS	ON (FT)	9/8	Plastic Limit Water Conten X  STANDARD PENETRATIO	N BLOWS/FT
DЕРТН (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL			WATER	ELEVATION (FT)	BLOWS/6"	ROCK QUALITY DESIGNATION RQD REC CALIBRATED PENETROM	
_					Topsoil Thickness[4.00"]				_		[FINES CONTENT] %	
- - -	S-1	SS	18	18	(ML) Residuum, SANDY SILT, yello orange, moist, stiff	owish			-	5-6-6 (12)	<b>⊗</b> <sub>12</sub>	
- - -	S-2	SS	18	18	(ML) SANDY SILT, light gray, mois	t, stiff			- -	4-6-9 (15)	<b>⊗</b> <sub>15</sub>	
5-					(ML) SANDY SILT, white to black	and			578	6-9-7		
- - -	S-3	SS	18	18	orange, moist, very stiff to stiff				-	(16)	₩16	
10-	S-4	SS	18	18					573	5-4-6 (10)	<b>⊗</b> <sub>10</sub>	
- - -									- -			
- - -					(CL) LEAN CLAY WITH SAND, brownist, stiff to firm	wn,			-			
15 –	S-5	SS	18	18					568	3-3-6 (9)	⊗ <sub>9</sub>	
- - - -									- - - -			
20-	S-6	SS	18	18					563	3-3-4 (7)	$\otimes_7$	
- - - - -								•	-			
25 –	S-7	SS	18	18					558	2-2-2 (4)	₩4	
-									-			
- - -					(CL) LEAN CLAY WITH GRAVEL, b moist, hard	rown,			- -			
30	S-8	SS	18	18	END OF BORING AT 30 F	Г	///	4	553	22-19-17 (36)	⊗ <sub>36</sub>	
					NES REPRESENT THE APPROXIMATE BOUND							AL
	VL (Firs VL (Cor			eu)	24.00	NG STA	ARTED:	May :	31 2022	CAVE IN	DEPTH:	
	VL (Sea	-	•	Vater)	COM	IPLETE			31 2022	HAMME	R TYPE: Automatic	
	VL (Sta					IPMENT CME 45		LOGO JMS1	GED BY: 3	DRILLING	6 METHOD: <b>2.25 HSA</b>	
					GEOTECHNIC							

PROJ Promo	enade	TION:		9707	PROJECT NO.: 08:15149 HAND AUGER NO.: HA-01		SHEET: 1 of 1 SURFACE E 579 STATION:	ELEVAT	ION:		<b>-</b> C	2
NOR			1132712		EASTING:		2049093.9					TW
DEPTH (FT)	WATER LEVELS	ELEVATION (FT)		DESCRIPTION OF N				EXCAVATION EFFORT	DCP	SAMPLE NUMBER	FINES CONTENT (%)	MOISTURE CONTENT (%)
- - - - -		- - - - -	(MH) Residuum, E brown, moist	LASTIC SILT, contains	rock fragments, or	rangish		VD VD VD VD	23-20-22 23-20-22 21-25- 25+	S-2		
5-		574 –							25+	S-6		
10-		569		BUCKET REFUSAL	.AI 5.3 FI			VD				
REMA												
TI	THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL  EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT											
$\nabla$	WL (	(First E	EXC ncountered)	AVATION EFFORT: E - E		ECS REP:	DATE C		ETED: U	NITS:	CAVE-IN	N-DEPTH:
▼	WL (	Comp	letion)			GML	May 04	2022	Er	nglish		
					HAND AUGER L	.OG						

PROJE Prome	n Ind ECT N enade	ΓΙΟΝ:			PROJECT NO.: 08:15149 HAND AUGER NO.: HA-02		SHEET: of 1 URFACE E 575 TATION:	LEVAT	ION:		<b>-</b> C	22
NORT			1132768		EASTING:		2049159.2				_	VIT
DЕРТН (FT)	WATER LEVELS	ELEVATION (FT)		DESCRIPTION OF N	∕/ATERIAL			EXCAVATION EFFORT	DCP	SAMPLE NUMBER .	FINES CONTENT (%)	MOISTURE CONTENT (%)
-		-		NDY SILT, orangish bro		brown		D	21-16-15	S-1 S-2		
-		-	moist	r SAND, CORTAINS FOR	.k iraginents, dark	brown,		E	6-6-5 10-15-13	S-3		
-		- -		BUCKET REFUSA	J AT 3 FT			М				
5-		- - 570 –										
-		- - -										
-		- - -										
10 - 565												
-												
- - - -15	15											
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NOR			1132815		EASTING:		2049195.6					TN
ОЕРТН (FT)	WATER LEVELS	ELEVATION (FT)		DESCRIPTION OF N	∕/ATERIAL			EXCAVATION EFFORT	DCP	SAMPLE NUMBER -	FINES CONTENT (%)	MOISTURE CONTENT (%)
5		565	(ML) Residuum, SA	ANDY SILT, contains ro BUCKET REFUSAL	AT 0.3 FT			VD	25+	S-1		
15												
	THE STRATIFICATION HINES REPRESENT THE ARREST MATE ROLLINGRY LINES RETWEEN SOIL TYPES IN SITUATION MAY BE CRADULAL											
TI	THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL  EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT											
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NOR			1132867		EASTING:		2049235.0				_	TN	
ОЕРТН (FT)	WATER LEVELS	ELEVATION (FT)		DESCRIPTION OF N				EXCAVATION EFFORT	DCP	SAMPLE NUMBER -	FINES CONTENT (%)	MOISTURE CONTENT (%)	
-		-	(SM) Residuum, SI brown, moist	LTY SAND, contains r		t brown and		D	22-25+ 25+	S-1 S-2			
-		-		BUCKET REFUSAL	. AT 1.2 FT			VD					
- - - - 5-		- - - - 563 –											
- - - -		- - - - -											
10    -15													
REMA	RKS:	<u> </u>											
TI	THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL												
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$\Box$	WL (	(First E	ncountered)	▼ WL (Seasonal H	ligh)	ECS REP:	DATE CO	OMPLE	ETED: U	NITS:	CAVE-IN	N-DEPTH:	
•	WL (	Comp	letion)		HAND ALLOSS:	GML	May 04 2	2022	Er	nglish			
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Charlotte Hays, Lancester, Suth Caroline 29707   133033.6   EASTING: 2049467.0	PROJ Promo	en Ind ECT N enade	TION:			PROJECT NO.: 08:15149 HAND AUGER NO.: HA-05	1 	SHEET: of 1 URFACE E 552 TATION:	LEVAT	ION:		<b>-</b> C	2
(MH) Residuum, ELASTIC SILT, contains roots and rock fragments, reddish brown, moist  (ML) SANDY SILT, trace clay, contains rock fragments, reddish brown, moist  BUCKET REFUSAL AT 1.5 FT  10 − 542 − 15 − 1 − 1 − 1 − 1 − 1 − 1 − 1 − 1 −	_					EASTING:		2049467.0			_		W
reddish brown, moist  (ML) SANDY SILT, trace clay, contains rock fragments, reddish brown, moist  BUCKET REFUSAL AT 1.5 FT  10 542  16 REMARKS:  THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL  EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT  WL (First Encountered)  WL (Seasonal High)  CS RP: DATE COMPLETED: UNITS: CAVE-IN-DEPTH: W WL (Completion)	DEPTH (FT)	WATER LEVELS	ELEVATION (FT)						EXCAVATION EFFORT			FINES CONTENT (%)	MOISTURE CONTENT (%)
moist  BUCKET REFUSAL AT 1.5 FT     547	-		-	reddish brown, mo	oist				М				
BUCKET REFUSAL AT 1.5 FT  5 -   547 -   542 -	-		-		race clay, contains ro	ock fragments, redo	lish brown,		VD	25+			
REMARKS:  THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL  EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT  ▼ WL (First Encountered)  ▼ WL (Seasonal High)  ECS REP: DATE COMPLETED: UNITS: CAVE-IN-DEPTH:  ▼ WL (Completion)	10-		- - - - -		BUCKET REFUSAL	AT 1.5 FT							
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL  EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT  WL (First Encountered)  WL (Seasonal High)  ECS REP:  DATE COMPLETED:  UNITS:  CAVE-IN-DEPTH:  GML  May 04 2022  English													
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NOR			1133095		EASTING:		2049538.5			_=		Th
ОЕРТН (FT)	WATER LEVELS	ELEVATION (FT)		DESCRIPTION OF N				EXCAVATION EFFORT	DCP	SAMPLE NUMBER	FINES CONTENT (%)	MOISTURE CONTENT (%)
_		_		ANDY SILT, contains ro	ock fragments, red	dish brown,		VD	24-25+	S-1		
5-		551 —	moist	BUCKET REFUSAL	AT 0.6 FT			VD				
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15												
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TI	THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL  EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT											
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			letion)		·························	GML	May 04 2			glish	_, , , _ 11,	
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NOR			1133130		EASTING:	2	049584.8				_	TN
ОЕРТН (FT)	WATER LEVELS	ELEVATION (FT)		DESCRIPTION OF N				EXCAVATION EFFORT	DCP	SAMPLE NUMBER	FINES CONTENT (%)	MOISTURE CONTENT (%)
- - - -		- - - -	(MH) Residuum, E light brown, moist	LASTIC SILT, contains		n brown to		D  D  M	23-25+ 24-25+ 16-15-11 25+	. <del>S-2</del>	_	
5-		546 — - - - - -										
10-		541 — - - - - -										
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NOR			1133164		EASTING:		2049600.6					TW	
DEPTH (FT)	WATER LEVELS	ELEVATION (FT)		DESCRIPTION OF N				EXCAVATION EFFORT	DCP	SAMPLE NUMBER	FINES CONTENT (%)	MOISTURE CONTENT (%)	
-		- -	(MH) Residuum, E moist	LASTIC SILT, trace san	nd, brown to reddi	sh brown,		E E	16-12-12 23-21-15	S-2			
-		- - -	(ML) SANDY SILT, o	contains rock fragmer BUCKET REFUSAL	nts, brown, moist AT 2.2 FT			E	25+	<del>S-3</del>			
- - 5-		- - 537 –											
-		- - -											
-		- -											
- 10 -		532 –											
-		- -											
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REMA			ICATION LINES DEDDES	ENIT THE ADDDOVINAATE	BOHNIDDA LINEC DE	JWEEN SOU TYPE	S IN CITU	TUET	- DANICITI		SE CD AT	71141	
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			ncountered)	▼ WL (Seasonal H		ECS REP:	DATE CO	OMPLE	ETED: UI	NITS:	CAVE-IN	I-DEPTH:	
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					IIVIAN VACATUL								

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NOR			1132904		EASTING:		2049265.9					Th
ОЕРТН (FT)	WATER LEVELS	ELEVATION (FT)		DESCRIPTION OF N				EXCAVATION EFFORT	DCP	SAMPLE NUMBER .	FINES CONTENT (%)	MOISTURE CONTENT (%)
-		-	(ML) Residuum, SA	ANDY SILT, contains ro	ock fragments, bro	wn, moist		E	5-4-12 23-25+	S-1 S-2		
5- - - - - - - - - - - - - - - - - - -		560		BUCKET REFUSAL	- AT 1.5 FT			Е	23-25+			
REMA	EMARKS:											
TI	THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL											
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$\Box$	WL (	(First E	ncountered)	<b>▼</b> WL (Seasonal H	igh)	ECS REP:	DATE CO	OMPLE	ETED: UI	NITS:	CAVE-IN	N-DEPTH:
▼	WL (	Comp	letion)			GML	May 04	2022	En	glish		
					HAND AUGER L	.OG						

### **APPENDIX C – Laboratory Testing**

**Laboratory Testing Summary** 

## **Laboratory Testing Summary**

					Atte	rberg Li	imits	**Percent	Moisture	- Density	CBF	R (%)	
Sample Location	Sample Number	Depth (feet)	^MC (%)	Soil Type	LL	PL	PI	Passing No. 200 Sieve	<maximum (pcf)<="" density="" th=""><th><optimum Moisture (%)</optimum </th><th>0.1 in.</th><th>0.2 in.</th><th>#Organic Content (%)</th></maximum>	<optimum Moisture (%)</optimum 	0.1 in.	0.2 in.	#Organic Content (%)
B-01	S-1	1-2.5	26.9	МН	59	38	21	93.3					
B-05	S-2	3.5-5	22.8	ML	41	30	11	71.1					
B-10	S-1	1-2.5	17.1	ML	33	24	9	65.1					
B-14	S-1	1-2.5	9.5	МН	52	35	17	98.0					
B-19	S-2	3.5-5	24.5	ML	40	29	11	83.3					
HA-07	D35-25	1-2	27.2	ML	47	30	17	95.2					

Notes: See test reports for test method, ^ASTM D2216-19, \*ASTM D2488, \*\*ASTM D1140-17, #ASTM D2974-20e1 < See test report for D4718 corrected values

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

Project: Promenade II Project No.: 08:15149
Client: Hutton Indian Land, LLC Date Reported: 6/28/2022



Office / Lab Address Office Number / Fax

1812 Center Park Drive (704)525-5152 ECS Southeast LLP - Charlotte Suite D

Charlotte, NC 28217 (704)357-0023

Tested by	Checked by	Approved by	Date Received
EBlackwood	AHuxtable	AHuxtable	6/7/2022

# **APPENDIX D – Other Information** GBA Important Information About This Geotechnical-Engineering Report

# **Important Information about This**

# Geotechnical-Engineering Report

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

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

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

# Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civilworks constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared solely for the client. Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled. No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.

#### Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full*.

# You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- · project ownership.

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

#### This Report May Not Be Reliable

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

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

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be,* and, in general, *if you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying it. A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

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

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

# This Report's Recommendations Are Confirmation-Dependent

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

#### This Report Could Be Misinterpreted

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

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

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

#### **Give Constructors a Complete Report and Guidance**

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, but be certain to note conspicuously that you've included the material for informational purposes only. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, only from the design drawings and specifications. Remind constructors that they may

perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

#### **Read Responsibility Provisions Closely**

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

#### **Geoenvironmental Concerns Are Not Covered**

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Unanticipated subsurface environmental problems have led to project failures. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old.

# Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration. Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. Geotechnical engineers are not building-envelope or mold specialists.



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