



Geotechnical Data Report

**The Pilot at Sedgefield Tract 3B
Greensboro, North Carolina**

September 7, 2022

Terracon Project No. 75225059

Prepared for:

Craig Davis Properties
Cary, NC



Prepared by:

Terracon Consultants, Inc.
Greensboro, NC



September 7, 2022

Craig Davis Properties
8000 Weston Parkway, Suite 300
Cary, NC 27513



Attn: Mr. Greg Jonczyk
P: (919) 678-4208
E: greg.jonczyk@craigdavisproperties.com

Re: Geotechnical Data Report
The Pilot at Sedgefield Tract 3B
5300 High Point Road
Greensboro, North Carolina
Terracon Project No. 75225059

Dear Mr. Jonczyk:

We have completed Geotechnical Data Reporting services for the above-referenced project. This study was performed in general accordance with Terracon Proposal No. P75225059 dated April 1, 2022. This report presents the findings of the subsurface exploration and provides geotechnical recommendations as described in the above-referenced proposal for the project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants, Inc.

Mitch D. Crayton, P.E.
Project Engineer

Joseph N. Link, Jr., P.E.
Geotechnical Department Manager
NC PE: No. 041094



REPORT TOPICS

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Note: This report was originally delivered in a web-based format. **Orange Bold** text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the **GeoReport** logo will bring you back to this page. For more interactive features, please view your project online at client.terracon.com.

ATTACHMENTS

EXPLORATION AND TESTING PROCEDURES
PHOTOGRAPHY LOG
SITE LOCATION AND EXPLORATION PLANS
EXPLORATION RESULTS
SUPPORTING INFORMATION

Note: Refer to each individual Attachment for a listing of contents

Geotechnical Data Report

The Pilot at Sedgefield Tract 3B ■ Greensboro, North Carolina

September 7, 2022 ■ Terracon Project No. 75225059



REPORT SUMMARY

Topic ¹	Overview Statement ²
Project Description	■ The preliminary site plan indicates a future townhome development ■ The overall site development is preliminary, and the site is currently in due diligence planning ■ The purpose of this report is to provide subsurface data for the due diligence planning ■ The exploration at the locations indicated was completed to evaluate the potential impact of bedrock and difficult excavation on the project during planning in the proposed cut areas
Geotechnical Characterization	■ Approximately 2 to 4 inches of topsoil was encountered across the site at the ground surface ■ CPT probe refusal (an indication of dense/hard materials) was encountered at three sounding locations at depths ranging between approximately 5½ and 12 feet below the existing ground surface (Elevations 829+/- and 845+/- feet) ■ Existing fat clay fill was encountered at one location to a maximum depth of approximately 2 feet below the existing ground surface (Elevation 838+/- feet) ■ Partially weathered rock was encountered in four boring locations at depths ranging between 6 and 23 feet below existing grades (Elevations 817+/- to 844+/- feet) ■ Materials causing auger refusal were encountered at one boring location at a depth of approximately 9 feet below existing grade (Elevation 839+/- feet) ■ Groundwater was not observed at any exploration locations
Earthwork	■ Effective site drainage should be established early and maintained throughout construction to minimize delays during construction. This will be particularly important where surface materials consist of moderately plastic silt and clay ■ We do not expect groundwater to impact utility excavation or mass grading operations. Refer to the Earthwork Section for additional details ■ Difficult excavation may be encountered depending on final site grades and during utility construction operation. Refer to the Earthwork Section for additional details ■ Generally, existing site soils can be used re-used for structural fill as recommended in the Earthwork Section
General Comments	■ This section contains important information about the limitations of this geotechnical engineering report

1. If the reader is reviewing this report as a pdf, the topics above can be used to access the appropriate section of the report by clicking on the topic itself

2. This summary is for convenience only and should be used in conjunction with the entire report for design purposes

Geotechnical Data Report
The Pilot at Sedgefield Tract 3B
5300 High Point Road
Greensboro, North Carolina
Terracon Project No. 75225059
September 7, 2022

INTRODUCTION

This report presents the results of our subsurface exploration and geotechnical engineering services performed for the proposed development to be located at 5300 High Point Road in Greensboro, North Carolina. The purpose of these services is to provide information and comments relating to geotechnical aspects of the project relative to:

- Subsurface soil conditions
- Groundwater conditions
- General site suitability

The geotechnical engineering Scope of Services for this project included advancing ten test locations to depths ranging from approximately 5½ to 25 feet below existing site grades.

Maps indicating the site and exploration locations are in the **Site Location and Exploration Plans** Section. The results of the laboratory testing performed on soil samples obtained from the site during the field exploration are included on the exploration logs in the **Exploration Results** Section.

SITE CONDITIONS

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly-available geologic and topographic maps.

Item	Description
Parcel Information	■ Located at 5300 High Point Road in Greensboro, North Carolina ■ Parcel is identified by Guilford County PIN 7832882008 and has an area of 43.65 acres but will be reduced according to the preliminary site plan ■ Located at approximately 36.0231° N 79.8846° W ■ See Site Location
Existing Improvements	■ Parcel includes the location of the main JP Building and associated parking areas ■ The site plan provided indicates the existing structure will be outside of the development except for areas of pavement surrounding the existing structure which require demolition prior to site grading efforts

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September 7, 2022 ■ Terracon Project No. 75225059



Item	Description
Current Ground Cover	■ Generally clear with areas of grass and pavement ■ Wooded to the west and north of the proposed site improvements
Existing Topography	■ The site slopes downward generally from northwest to southeast ■ Elevations range from approximately 830 to 870 feet
Geology	■ The project site is in the Piedmont Physiographic Province, an area underlain by ancient igneous and metamorphic rocks. The residual soils in this area are the product of in-place chemical weathering of rock. The typical residual soil profile consists of clayey soils near the surface where soil weathering is more advanced, underlain by sandy silts / silty sands that generally become harder / denser with depth to the top of parent bedrock. In residual materials the transition from soil to rock occurs gradually over a vertical distance ranging from a few feet to tens of feet. This transitional zone is termed "partially weathered rock" which is defined for engineering purposes as residual material that can be drilled with soil drilling methods and exhibits standard penetration test values above 100 blows per foot. According to the 1985 Geologic Map of North Carolina, the bedrock under the site is Granite rock from the Paleozoic period.

We collected photographs at the time of our field services program. Representative photos are provided in our [Photography Log](#).

PROJECT DESCRIPTION

Our initial understanding of the project was provided in our proposal and was discussed during project planning. A period of collaboration has transpired since the project was initiated, and our final understanding of the project conditions is as follows:

Item	Description
Information Provided	■ Project information was provided to Terracon via email and phone conversations with Craig Davis Properties Personnel ■ Information was utilized from a previous Terracon Proposal dated May 3, 2021, Terracon Proposal No. P75215038 ■ A preliminary plan was provided in email correspondence on May 27, 2022. The preliminary site plan was dated May 17, 2022.

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The Pilot at Sedgefield Tract 3B ■ Greensboro, North Carolina
September 7, 2022 ■ Terracon Project No. 75225059



Item	Description
Project Description	■ The preliminary site plan indicates a future townhome development ■ The overall site development is preliminary, and the site is currently in due diligence planning ■ The purpose of this proposed report is to provide subsurface data for the due diligence planning ■ We understand the objective for performing the exploration at the locations indicated is to help determine the impact of bedrock and difficult excavation on the project during planning in the proposed cut areas

GEOTECHNICAL CHARACTERIZATION

We have developed a general characterization of the subsurface conditions based upon our review of the subsurface exploration, laboratory data, geologic setting and our understanding of the project. This characterization, termed GeoModel, forms the basis of our evaluation of the site being developed. Conditions encountered at each exploration point are indicated on the individual logs. The individual logs can be found in the **Exploration Results** Section and the GeoModel can be found in the **Figures** Section of this report.

As part of our evaluation, we identified the following model layers within the subsurface profile. For a more detailed view of the model layer depths at each exploration location, refer to the GeoModel.

Model Layer	Layer Name	General Description
1	Surface Material	Topsoil, Asphalt, Concrete, and/or Crushed Stone
2	Moderate to High Plasticity Fill	Undocumented fill material consisting of fat clay
3	Moderate to High Plasticity Residual Soils	Residual soils consisting of zones of medium stiff to stiff elastic silt and lean clay with varying amounts of sand
4	Low Plasticity Residual Soils	Residual soils consisting of zones of medium stiff to very stiff silt with varying amounts of sand and loose to very dense silty sand
5	Partially Weathered Rock	Partially weathered rock is defined for engineering purposes as any residual material exhibiting a Standard Penetration Resistance above 100 blows within 1 foot of split-spoon sampling

Groundwater Conditions

We observed each exploration location for the presence and level of groundwater during and/or after completion. The water levels observed at each location can be found on the logs in **Exploration Results**.

Groundwater was not encountered in any exploration location; however, groundwater level fluctuations can occur due to seasonal variations in the amount of rainfall, runoff, and other factors not evident at the time of our exploration. Therefore, groundwater levels during construction or at other times may be higher or lower than the levels indicated on the logs. The possibility of groundwater level fluctuations should be considered.

Boring and Sounding Refusal Observations

CPT probe tip and/or friction refusal was encountered at Sounding B-02, B-04, and B-09 at approximate depths ranging between 5½ feet and 12½ feet below the ground surface (elevations between 828+/- and 845+/- feet). CPT refusal does not necessarily indicate non-rippable material. SPT auger and/or sampler refusal was encountered Borings B-01, B-9a, and B-10 at approximate depths ranging between 9 feet and 24 feet below the ground surface (elevations between 815+/- and 839+/- feet). SPT auger and/or sampler refusal generally indicates non-rippable material is present. The data gathered indicates that difficult excavation may be possible depending on final site grades and utility elevations which were not available at the time of this report.

EARTHWORK

Earthwork is expected to include pavement demolition, clearing and grubbing, excavations, and fill placement. The following section provides recommendations for Homeowner-Association-owned areas only.

Site Preparation

Existing pavement, vegetation, and root mat should be removed prior to placing fill. Topsoil, ranging between 2 and 4 inches thick, should be completely stripped in the proposed construction areas. Any utilities associated with the previous development should be removed. We recommend leaving crushed stone base material in place after removing the asphalt surface to improve conditions at the working grade during earthwork.

Proposed site grading was not available at the time of this report. The refusal information as noted in the **Geotechnical Characterization** Section above should be used to determine difficult excavation impacts once site grading has been determined.

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Generally, existing material can be used as fill for site balancing efforts as determined by the Geotechnical Engineer of Record at the time of construction or in subsequent reporting.

GENERAL COMMENTS

Our comments are based on our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Natural variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction.

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials, or conditions. If the Owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence or collaboration are intended for the sole benefit and exclusive use of our Client for specific application to the project discussed and are accomplished in accordance with generally-accepted geotechnical practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our Client. Reliance on the services and any work product is limited to our Client and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for site consideration and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly impact excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety, and cost estimating including, excavation support, and dewatering requirements/design are the responsibility of others. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

ATTACHMENTS

EXPLORATION AND TESTING PROCEDURES

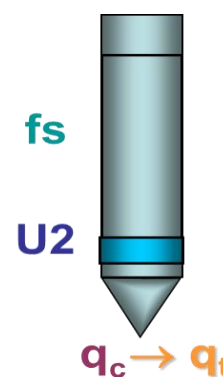
Field Exploration

Location Designation	Exploration Depth (feet)	Location
B-01 through B-10	5½ to 25 or auger refusal	HOA-Owned Roads/Stormwater Ponds

Exploration Location Layout and Elevations: Terracon personnel selected the exploration locations and provided the layout. Coordinates were obtained with a handheld GPS unit (estimated horizontal accuracy of about ± 3 feet) and approximate elevations were obtained by interpolation from the Guilford County GIS website. If elevations and a more precise layout are desired, we recommend surveying the exploration locations following completion of fieldwork.

Subsurface Exploration Procedures: We advanced the borings with a track-mounted rotary drill rig using hollow-stem, continuous flight augers. Four samples were obtained in the upper 10 feet of each boring and at intervals of 5 feet thereafter. In the split-barrel sampling procedure, a standard 2-inch outer diameter split-barrel sampling spoon was driven into the ground by a 140-pound automatic hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the middle 12 inches of a normal 24-inch penetration is recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the test depths. We observed and recorded groundwater levels during drilling and sampling. For safety purposes, all borings were backfilled with auger cuttings after their completion. Pavements were patched with cold-mix asphalt and/or pre-mixed concrete, as appropriate.

We advanced soundings with track-mounted equipment in general accordance with ASTM D5778 "Standard Test Method for Performing Electronic Friction Cone and Piezocone Penetration Testing of Soils." The CPT hydraulically pushes an instrumented cone through the soil while nearly continuous readings are recorded to a portable laptop. The cone is equipped with electronic load cells to measure tip resistance and sleeve resistance and a pressure transducer to measure the generated ambient pore pressure. The face of the cone has an apex angle of 60 degrees and an area of 10 square centimeters. Digital data representing the tip resistance, friction resistance, pore water pressure, and probe inclination angle are recorded about every 2 centimeters while advancing through the ground at a rate between 1½ and 2½ centimeters per second. These measurements are correlated to various soil properties used for geotechnical design. No soil samples are gathered through this subsurface investigation technique.



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A macrocore sampler was used to collect select soil samples in 5-foot intervals where CPTs were conducted. We observed and recorded groundwater levels during drilling and sampling. We used correlative soil parameters from computations using the in-situ measurements in addition to the data included on the CPT sounding logs. We can provide these parameters for others upon request.

The sampling depths, penetration distances, and other sampling information was recorded on the field exploration logs. The samples were placed in appropriate containers and taken to our soil laboratory for testing and classification by our Geotechnical Department Staff. Our exploration team prepared field logs as part of the drilling operations. These field logs included visual classifications of the materials encountered during drilling and our interpretation of the subsurface conditions between samples. Final exploration logs were prepared from the field logs. The final logs represent the Geotechnical Engineer's interpretation of the field logs and include modifications based on observations and tests of the samples in our laboratory.

Laboratory Testing

The project engineer reviewed the field data and assigned laboratory tests to understand the general properties of the various soil strata, as necessary, for this project. Soil testing for this project was selected and performed in generally accordance with the guidelines established based on our understanding of the standards below.

- ASTM D2216 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
- ASTM D4318 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- ASTM D1140 Standard Test Methods for Determining the Amount of Material Finer than 75- μ m (No. 200) Sieve in Soils by Washing

The laboratory testing program often included examination of soil samples by an engineer. Based on the material's texture and plasticity, we described and classified the soil samples in accordance with the Unified Soil Classification System.

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PHOTOGRAPHY LOG



Location B-06 facing northwest



Location B-07 facing northeast



Location B-08 facing northeast



Location B-04 facing southwest

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The Pilot at Sedgefield Tract 3B ■ Greensboro, North Carolina
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Near Location B-04 facing southwest



Near Location B-07 facing northeast

SITE LOCATION AND EXPLORATION PLANS

Contents:

Site Location Plan

Exploration Plan

Note: All attachments are one page unless noted above

SITE LOCATION

The Pilot at Sedgefield Tract 3B ■ Greensboro, North Carolina
September 7, 2022 ■ Terracon Project No. 75225059

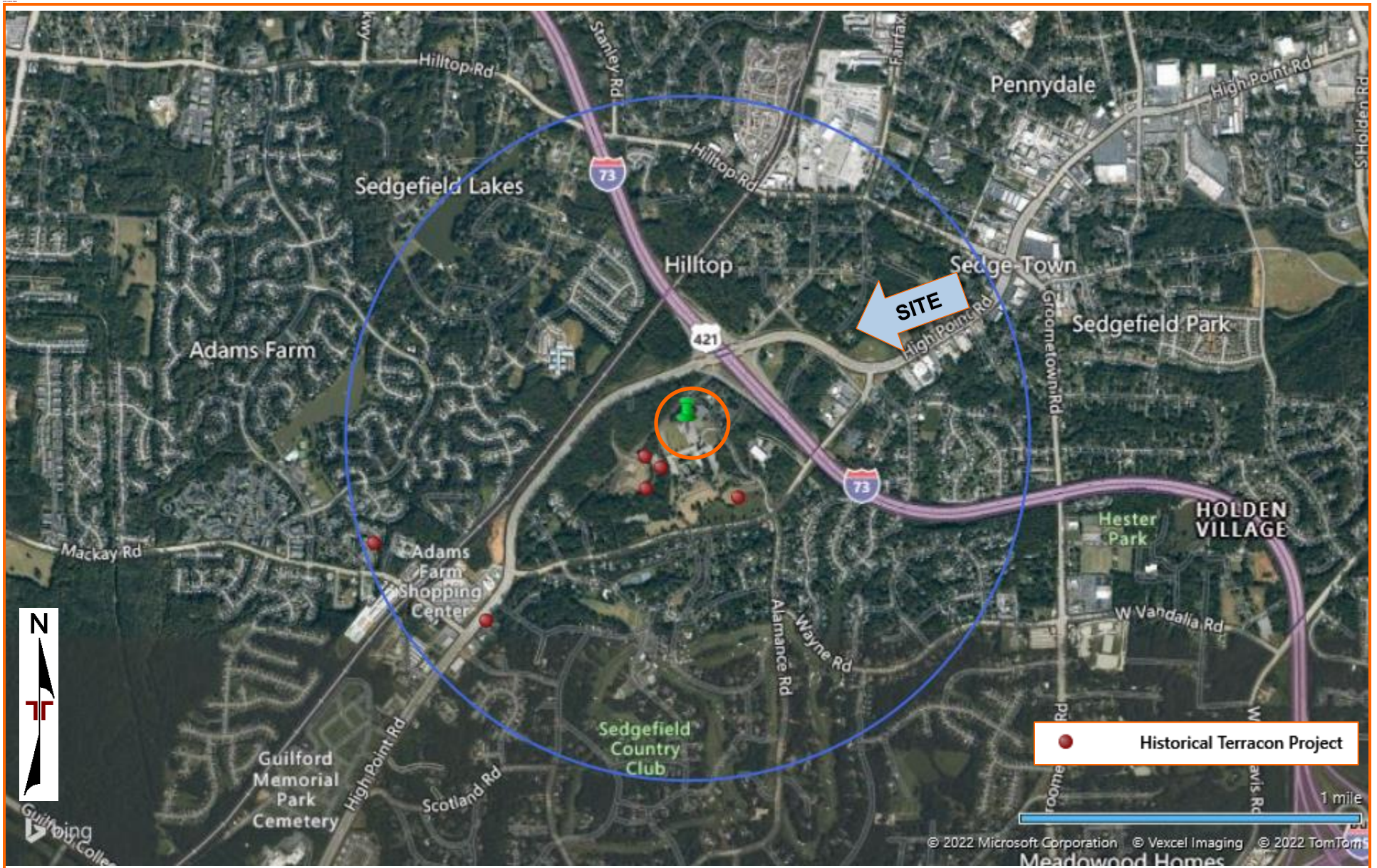


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

EXPLORATION PLAN

The Pilot at Sedgefield Tract 3B ■ Greensboro, North Carolina
September 7, 2022 ■ Terracon Project No. 75225059

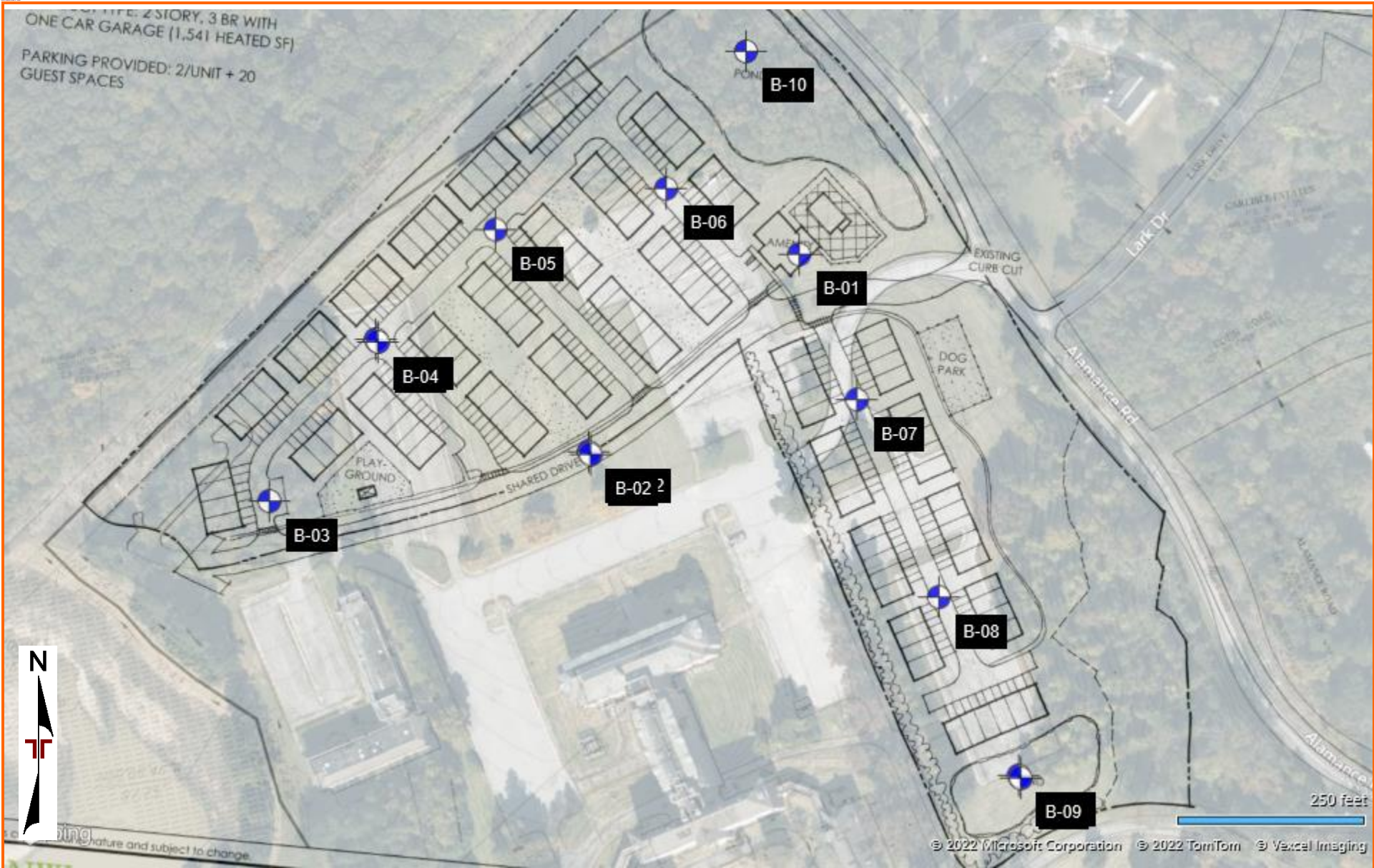


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

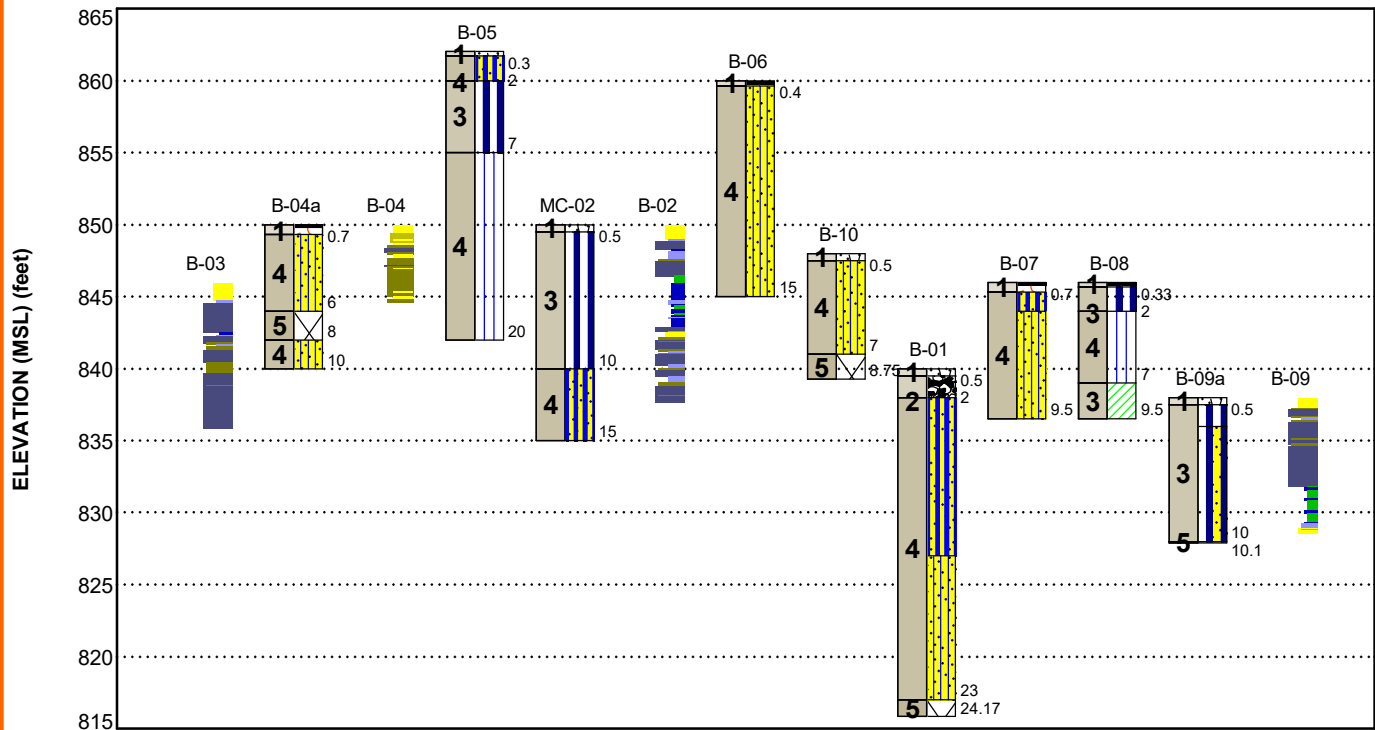
FIGURES

Contents:

GeoModel

GEOMODEL

Pilot at Sedgefield Tract 3B ■ Greensboro, NC
Terracon Project No. 75225059



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	Surface Material	Topsoil, Asphalt, Concrete, and/or Crushed Stone
2	Moderate to High Plasticity Fill	Undocumented fill material consisting of fat clay
3	Moderate to High Plasticity Residual Soils	Residual soils consisting of zones of medium stiff to stiff elastic silt and lean clay with varying amounts of sand
4	Low Plasticity Residual Soils	Residual soils consisting of zones of medium stiff to very stiff silt with varying amounts of sand and loose to very dense silty sand
5	Partially Weathered Rock	Partially weathered rock is defined for engineering purposes as any residual material exhibiting a Standard Penetration Resistance above 100 blows within 1 foot of split-spoon sampling

LEGEND

Topsoil	Silty Sand	Asphalt	Lean Clay
Fill	Weathered Rock	Aggregate Base Course	Elastic Silt with Sand
Sandy Silt	Elastic Silt	Silt	

NOTES:

Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project.
Numbers adjacent to soil column indicate depth below ground surface.

EXPLORATION RESULTS

Contents:

Boring Logs (B-01 through B-10)

Note: All attachments are one page unless noted above

BORING LOG NO. B-01

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PROJECT: Pilot at Sedgefield Tract 3B

CLIENT: Craig Davis Properties
Cary, NC

SITE: Alamance Road
Greensboro, NC

MODEL LAYER	GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 36.023640° Longitude: -79.884540° Approximate Surface Elev.: 840 (Ft.) +/- DEPTH ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
1		0.5 TOPSOIL, 6" 839.5+/-						
2		FILL - FAT CLAY WITH SAND , brown with some orange and gray, moist 838+/-				2-2-2-3 N=4	26.5	
		2.0 RESIDUAL - SANDY SILT (ML) , tan, brown, and white, moist stiff				3-6-8-9 N=14	21.6	
			5			5-5-7-10 N=12	22.0	
		greenish brown with some orange, very stiff				4-7-13-19 N=20		
			10					
4		13.0 SILTY SAND (SM) , fine to coarse grained, dark brown with some green, moist, very dense 827+/-				15-20-26-56 N=46		
			15					
			20			15-41-70 N=111		
5		23.0 PARTIALLY WEATHERED ROCK - SAMPLED AS SILTY SAND , fine to coarse grained, dark brown, moist 817+/- 24.2 815.8+/-				21-48-50/2"		
		Auger Refusal at 24.17 Feet						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
HSA

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).

See [Supporting Information](#) for explanation of symbols and abbreviations.

Elevations were interpolated from the Guilford Co. GIS.

Notes:

WATER LEVEL OBSERVATIONS

No groundwater encountered

Cave-in = 10.3'

Terracon

7327 W Friendly Ave Ste G
Greensboro, NC

Boring Started: 06-06-2022

Drill Rig: Geoprobe 3126GT

Project No.: 75225059

Boring Completed: 06-06-2022

Driller: C. Storm

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL_75225059 PILOT AT SEDGEFIE.GPJ TERRACON_DATATEMPLATE.GDT 9/7/22

CPT LOG NO. B-02

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PROJECT: Pilot at Sedgefield Tract 3B

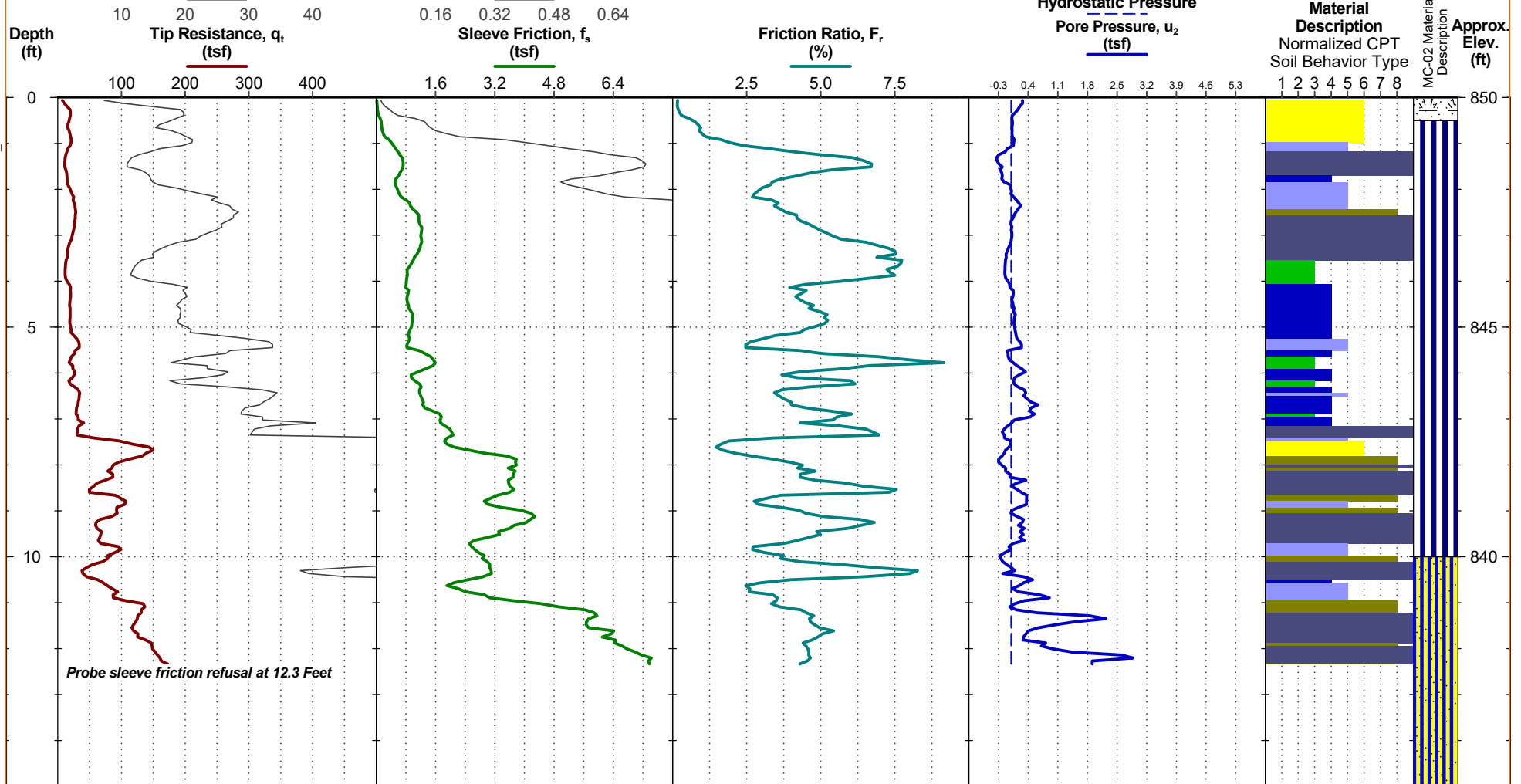
CLIENT: Craig Davis Properties
Cary, NC

TEST LOCATION: See [Exploration Plan](#)

Approx. Surface Elev: 850 ft +/- Adjacent Test: MC-02

SITE: Alamance Road
Greensboro, NC

Latitude: 36.02291°
Longitude: -79.88548°



Cave-in = 10.5'; No groundwater encountered

3" Topsoil; Sounding backfilled with bentonite chips upon completion

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).

Elevations were interpolated from the Guilford Co. GIS

See MC-02 for the adjacent test's full details.

CPT sensor calibration reports available upon request.

- 1 Sensitive, fine grained
- 2 Organic soils - clay
- 3 Clay - silty clay to clay
- 4 Silt mixtures - clayey silt to silty clay
- 5 Sand mixtures - silty sand to sandy silt
- 6 Sands - clean sand to silty sand
- 7 Gravelly sand to dense sand
- 8 Very stiff sand to clayey sand
- 9 Very stiff fine grained

WATER LEVEL OBSERVATION

Probe no. 5570 with net area ratio of 0.855

Manufactured by Geotech A.B.; calibrated 3/18/2021
Tip and sleeve areas of 10 cm² and 150 cm²

Terracon
7327 W Friendly Ave Ste G
Greensboro, NC

CPT Started: 6/3/2022

Rig: Geoprobe 3126GT

Project No.: 75225059

CPT Completed: 6/3/2022

Operator: C. Storm

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. CPT REPORT 75225059 PILOT AT SEDGEFIELD TRACT 3B TERRACON_DATA_TEMPLATE.GDT 9/7/22



(used in normalizations and correlations;
See [Supporting Information](#))

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**CLIENT: Craig Davis Properties
Cary, NC**

SITE: Alamance Road
Greensboro, NC

MODEL LAYER	GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 36.022920° Longitude: -79.885490° Approximate Surface Elev.: 850 (Ft.) +/-	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS
								LL-PL-PI
1		0.5 TOPSOIL, 6"	849.5+/-					
3		RESIDUAL - ELASTIC SILT (MH) , gray and brown with some black and orange, moist					19.7	36-17-19
		brown, gray, orange with some white and black	5					
4		SANDY SILT (ML) , contains rock fragments, gray, tan, orange, brown with some white and green, moist	10.0 840+/-	10				
			15.0 835+/-	15				
		Boring Terminated at 15 Feet						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Percussion

Advancement Method:
Macrocore DT22

Abandonment Method:
Location backfilled with bentonite chips upon completion

See **Exploration and Testing Procedures** for a description of field and laboratory procedures used and additional data (if any).

See **Supporting Information** for explanation of symbols and abbreviations.

Elevations were interpolated from the Guilford Co. GIS

Notes:

WATER LEVEL OBSERVATIONS

No groundwater encountered

No Cave-in

Terracon
7327 W Friendly Ave Ste G
Greensboro, NC

Boring Started: 06-03-2022

Drill Rig: Geoprobe 3126GT

Project No.: 75225059

Boring Completed: 06-03-2022

Driller: C. Storm

CPT LOG NO. B-03

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PROJECT: Pilot at Sedgefield Tract 3B

CLIENT: Craig Davis Properties
Cary, NC

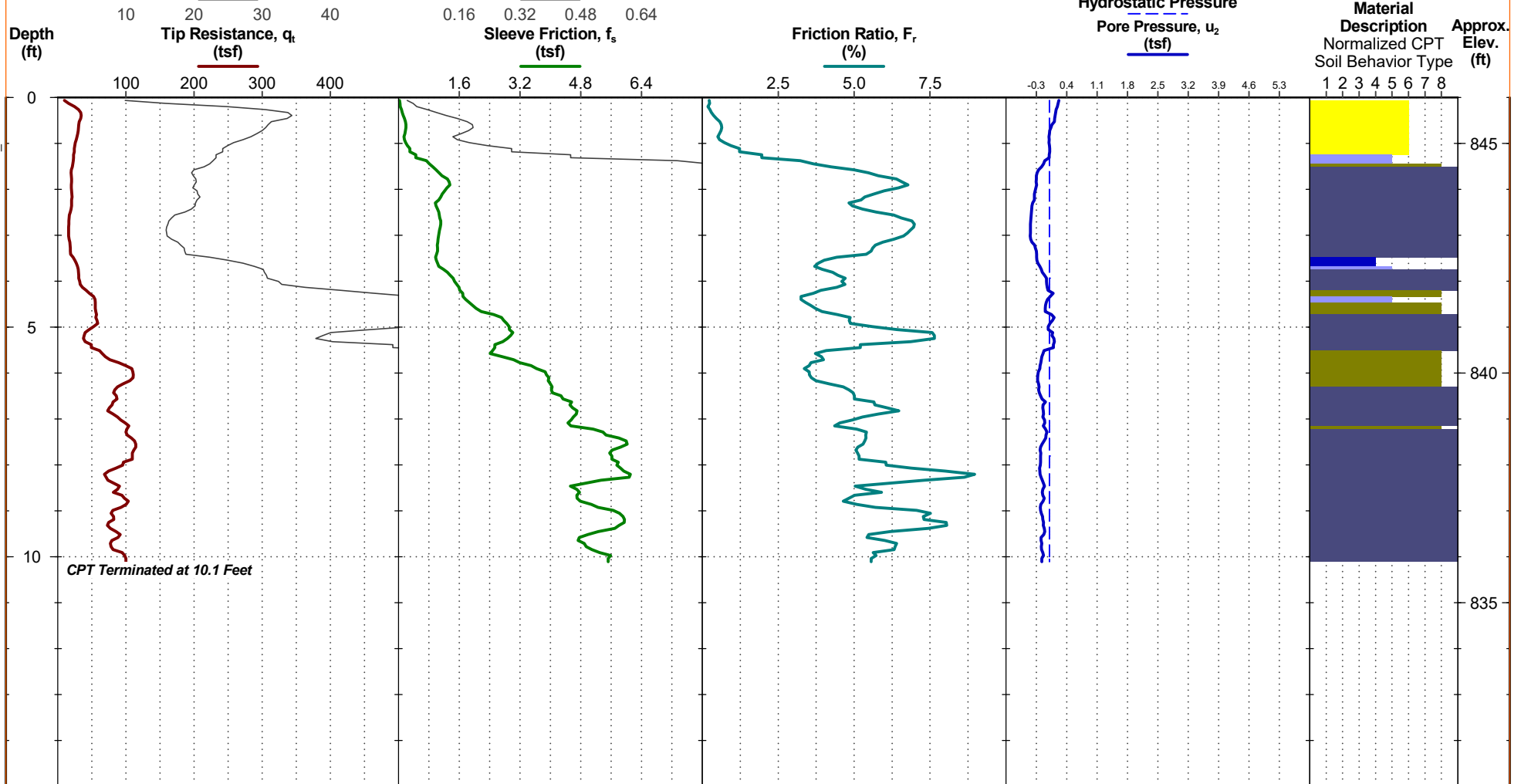
TEST LOCATION: See [Exploration Plan](#)

SITE: Alamance Road
Greensboro, NC

Approx. Surface Elev: 846 ft +/-

Latitude: 36.02274°

Longitude: -79.88693°



No groundwater encountered

2" Topsoil; Sounding backfilled with bentonite chips upon completion

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).

Elevations were interpolated from the Guilford Co. GIS

CPT sensor calibration reports available upon request.

- 1 Sensitive, fine grained
- 2 Organic soils - clay
- 3 Clay - silty clay to clay
- 4 Silt mixtures - clayey silt to silty clay
- 5 Sand mixtures - silty sand to sandy silt
- 6 Sands - clean sand to silty sand
- 7 Gravelly sand to dense sand
- 8 Very stiff sand to clayey sand
- 9 Very stiff fine grained

WATER LEVEL OBSERVATION

▼
(used in normalizations and correlations;
See [Supporting Information](#))

Probe no. 5570 with net area ratio of 0.855

Manufactured by Geotech A.B.; calibrated 3/18/2021
Tip and sleeve areas of 10 cm² and 150 cm²

Terracon
7327 W Friendly Ave Ste G
Greensboro, NC

CPT Started: 6/3/2022

Rig: Geoprobe 3126GT

Project No.: 75225059

CPT Completed: 6/3/2022

Operator: C. Storm

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. CPT REPORT 75225059 PILOT AT SEDGEFIELD TRACT 3B TERRACON_DATATEMPLATE.GDT 9/7/22

CPT LOG NO. B-04

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PROJECT: Pilot at Sedgefield Tract 3B

CLIENT: Craig Davis Properties
Cary, NC

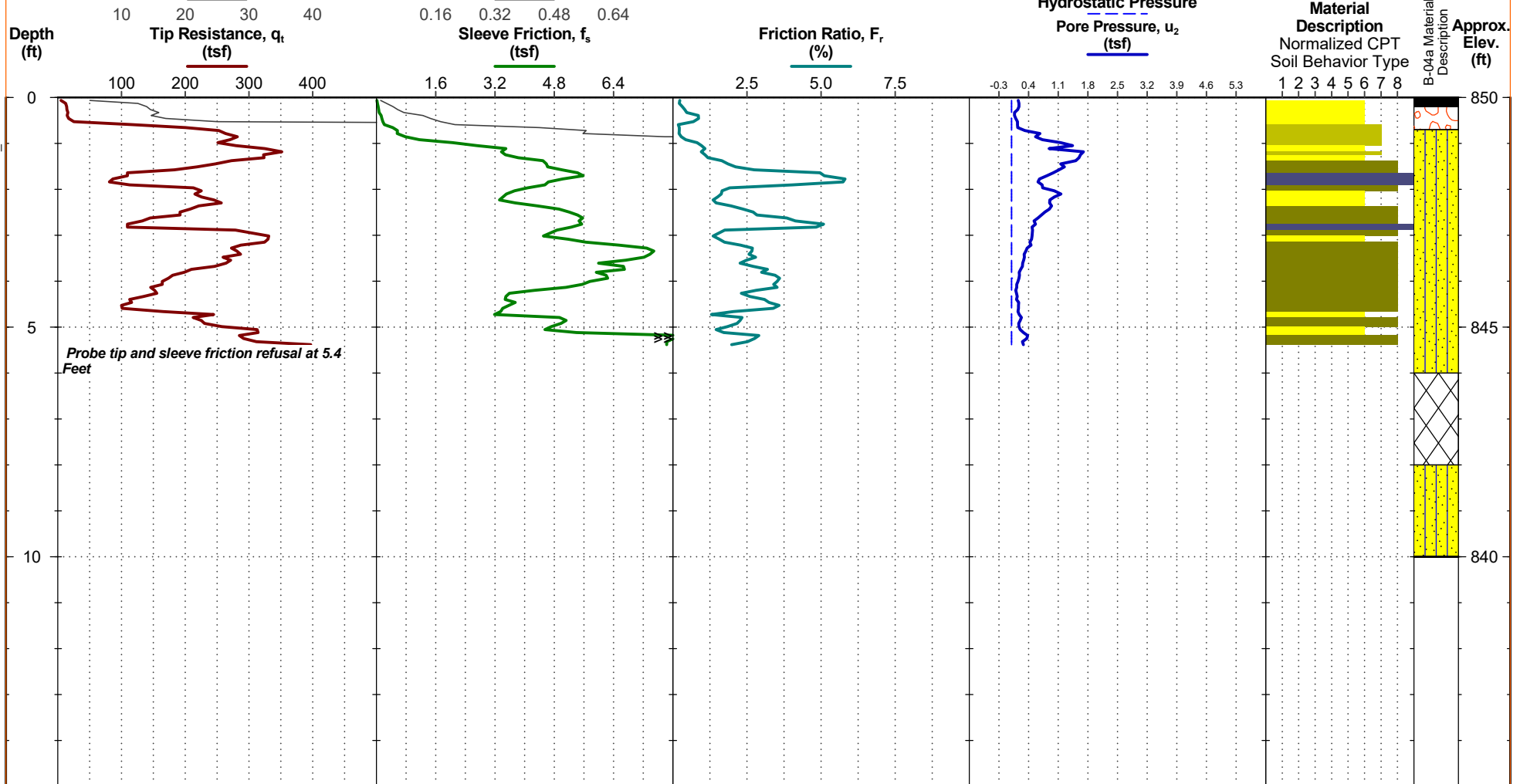
TEST LOCATION: See [Exploration Plan](#)

Approx. Surface Elev: 850 ft +/- Adjacent Test: B-04a

Latitude: 36.02332°

Longitude: -79.88644°

SITE: Alamance Road
Greensboro, NC



Cave-in = 4', No groundwater encountered

2" Asphalt, 4" Crushed Stone; Sounding backfilled with bentonite chips upon completion

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).

Elevations were interpolated from the Guilford Co. GIS

See B-04a for the adjacent test's full details.

CPT sensor calibration reports available upon request.

- 1 Sensitive, fine grained
- 2 Organic soils - clay
- 3 Clay - silty clay to clay
- 4 Silt mixtures - clayey silt to silty clay
- 5 Sand mixtures - silty sand to sandy silt
- 6 Sands - clean sand to silty sand
- 7 Gravelly sand to dense sand
- 8 Very stiff sand to clayey sand
- 9 Very stiff fine grained

WATER LEVEL OBSERVATION

Probe no. 5570 with net area ratio of 0.855

Manufactured by Geotech A.B.; calibrated 3/18/2021
Tip and sleeve areas of 10 cm² and 150 cm²

Terracon
7327 W Friendly Ave Ste G
Greensboro, NC

CPT Started: 6/3/2022

Rig: Geoprobe 3126GT

Project No.: 75225059

CPT Completed: 6/3/2022

Operator: C. Storm

↓
(used in normalizations and correlations;
See [Supporting Information](#))

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. CPT REPORT 75225059 PILOT AT SEDGEFIELD TRACT 3B TERRACON_DATATEMPLATE.GDT 9/7/22

BORING LOG NO. B-04a

Page 1 of 1

PROJECT: Pilot at Sedgefield Tract 3B

CLIENT: Craig Davis Properties
Cary, NC

SITE: Alamance Road
Greensboro, NC

MODEL LAYER	GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 36.023330° Longitude: -79.886450° Approximate Surface Elev.: 850 (Ft.) +/-	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS
								LL-PL-PI
		DEPTH 0.2 0.7						
1		ASPHALT, 2" ELEVATION (Ft.) 849.8+/- 849.3+/-				4-12-10-14 N=22		
		CRUSHED STONE, 6"						
4		RESIDUAL - SILTY SAND (SM) , fine to coarse grained, tan, white, and brown, dry, medium dense, contains rock fragments dense very dense				19-21-25-22 N=46		
		6.0 844+/-	5			16-24-43-46 N=67		
5		PARTIALLY WEATHERED ROCK - SAMPLED AS SILTY SAND , fine to coarse grained, tan, white, and brown, dry				28-68-50/3"		
		8.0 842+/-						
4		RESIDUAL - SILTY SAND (SM) , fine to coarse grained, tan, white, and brown, dry, very dense, contains rock fragments				38-42-25-33 N=67		
		10.0 840+/-	10					
		Boring Terminated at 10 Feet						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
HSA

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

Elevations were interpolated from the Guilford Co. GIS.

WATER LEVEL OBSERVATIONS

No groundwater encountered

Cave-in = 3'

Terracon
7327 W Friendly Ave Ste G
Greensboro, NC

Boring Started: 06-02-2022

Boring Completed: 06-02-2022

Drill Rig: Geoprobe 3126GT

Driller: C. Storm

Project No.: 75225059

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 75225059 PILOT AT SEDGEFIELD GPJ TERRACON DATATEMPLATE.GDT 9/7/22

BORING LOG NO. B-05

Page 1 of 1

PROJECT: Pilot at Sedgefield Tract 3B

CLIENT: Craig Davis Properties
Cary, NC

SITE: Alamance Road
Greensboro, NC

MODEL LAYER	GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 36.023730° Longitude: -79.885910° Approximate Surface Elev.: 862 (Ft.) +/- DEPTH ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
1		0.3' TOPSOIL , 4"	861.7+/-					
4		RESIDUAL - SANDY SILT (ML) , red, brown, and tan, moist, medium stiff				2-3-4-5 N=7	20.6	
		2.0' ELASTIC SILT (MH) , red, moist, medium stiff	860+/-					
3						2-3-5-6 N=8	43.1	84-44-40
		7.0' SILT (ML) , red with some black, moist, medium stiff	855+/-			2-2-4-5 N=6	44.0	
						2-2-3-4 N=5	46.5	
4		red, some black and orange				3-3-5-7 N=8		
		brownish tan and black, stiff				5-5-7-11 N=12		
		20.0' Boring Terminated at 20 Feet	842+/-					

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
HSA

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

Elevations were interpolated from the Guilford Co. GIS.

WATER LEVEL OBSERVATIONS

No groundwater encountered

 Cave-in = 13'

Terracon
7327 W Friendly Ave Ste G
Greensboro, NC

Boring Started: 06-06-2022

Boring Completed: 06-06-2022

Drill Rig: Geoprobe 3126GT

Driller: C. Storm

Project No.: 75225059

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 75225059 PILOT AT SEDGEFIELD GPJ TERRACON_DATATEMPLATE.GDT 9/7/22

BORING LOG NO. B-06

Page 1 of 1

PROJECT: Pilot at Sedgefield Tract 3B

CLIENT: Craig Davis Properties
Cary, NC

SITE: Alamance Road
Greensboro, NC

MODEL LAYER	GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 36.023880° Longitude: -79.885140° Approximate Surface Elev.: 860 (Ft.) +/-	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS
								LL-PL-PI
1		0.3 ASPHALT, 2" 0.4 CRUSHED STONE, 3" RESIDUAL - SILTY SAND (SM) , fine to coarse grained, tan, brown, with some orange, moist, medium dense				2-6-7-7 N=13		
		dark brown, dense	5			6-8-20-16 N=28		
						10-15-17-17 N=32		
		gray, tan, brown, contains rock fragments				8-14-28-38 N=42		
		dark brown, very dense	10					
						45-64-28-38 N=92		
		15.0 Boring Terminated at 15 Feet	15					

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
HSA

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

Elevations were interpolated from the Guilford Co. GIS.

WATER LEVEL OBSERVATIONS

No groundwater encountered

Cave-in = 7'

Terracon

7327 W Friendly Ave Ste G
Greensboro, NC

Boring Started: 06-06-2022

Boring Completed: 06-06-2022

Drill Rig: Geoprobe 3126GT

Driller: C. Storm

Project No.: 75225059

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 75225059 PILOT AT SEDGEFIE.GPJ TERRACON_DATATEMPLATE.GDT 9/7/22

BORING LOG NO. B-07

Page 1 of 1

PROJECT: Pilot at Sedgefield Tract 3B

CLIENT: Craig Davis Properties
Cary, NCSITE: Alamance Road
Greensboro, NC

MODEL LAYER	GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 36.023110° Longitude: -79.884280° Approximate Surface Elev.: 846 (Ft.) +/- DEPTH ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS
								LL-PL-PI
1		0.2' ASPHALT, 2" 845.8+/-						
		0.7' CRUSHED STONE, 6" 845.3+/-				9-13-24-21 N=37	8.1	
		2.0' RESIDUAL - SANDY SILT (ML) , tan, moist, hard 844+/-				7-12-18-20 N=30	17.3	
		SILTY SAND (SM) , fine to coarse grained, tan, brown, moist, dense				15-16-35-91 N=51	9.8	
4		dry, very dense	5			16-31-58-107 N=89		
		Boring Terminated at 9.5 Feet 836.5+/-						
Stratification lines are approximate. In-situ, the transition may be gradual. Hammer Type: Automatic								
Advancement Method: HSA		See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).		Notes:				
Abandonment Method: Boring backfilled with auger cuttings upon completion.		See Supporting Information for explanation of symbols and abbreviations. Elevations were interpolated from the Guilford Co. GIS						
WATER LEVEL OBSERVATIONS		 7327 W Friendly Ave Ste G Greensboro, NC		Boring Started: 06-06-2022		Boring Completed: 06-06-2022		
No groundwater encountered				Drill Rig: Geoprobe 3126GT		Driller: C. Storm		
Cave-in = 1.5'				Project No.: 75225059				

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL_75225059 PILOT AT SEDGEFIELD GPJ TERRACON_DATATEMPLATE.GDT 9/7/22

BORING LOG NO. B-08

Page 1 of 1

PROJECT: Pilot at Sedgefield Tract 3B

CLIENT: Craig Davis Properties
Cary, NC

SITE: Alamance Road
Greensboro, NC

MODEL LAYER	GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 36.022390° Longitude: -79.883910° Approximate Surface Elev.: 846 (Ft.) +/-	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS
		DEPTH ELEVATION (Ft.)						LL-PL-PI
1		0.2 ASPHALT, 2" 845.8+/-						
3		0.3 CRUSHED STONE, 2" 845.7+/-				2-2-3-6 N=5		
		2.0 RESIDUAL - ELASTIC SILT (MH) , red with some orange, moist, medium stiff 844+/-						
		SILT (ML) , red with some orange, moist, medium stiff						
4			5			3-4-4-4 N=8		
		7.0 839+/-				2-3-3-4 N=6		
3		LEAN CLAY (CL) , tan with some black, moist, medium stiff						
		9.5 836.5+/-				2-3-3-5 N=6		
Boring Terminated at 9.5 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
HSA

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

Elevations were interpolated from the Guilford Co. GIS.

WATER LEVEL OBSERVATIONS

No groundwater encountered

No Cave-in

Terracon
7327 W Friendly Ave Ste G
Greensboro, NC

Boring Started: 06-06-2022

Boring Completed: 06-06-2022

Drill Rig: Geoprobe 3126GT

Driller: C. Storm

Project No.: 75225059

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 75225059 PILOT AT SEDGEFIELD GPJ TERRACON_DATATEMPLATE.GDT 9/7/22

CPT LOG NO. B-09

Page 1 of 1

PROJECT: Pilot at Sedgefield Tract 3B

CLIENT: Craig Davis Properties
Cary, NC

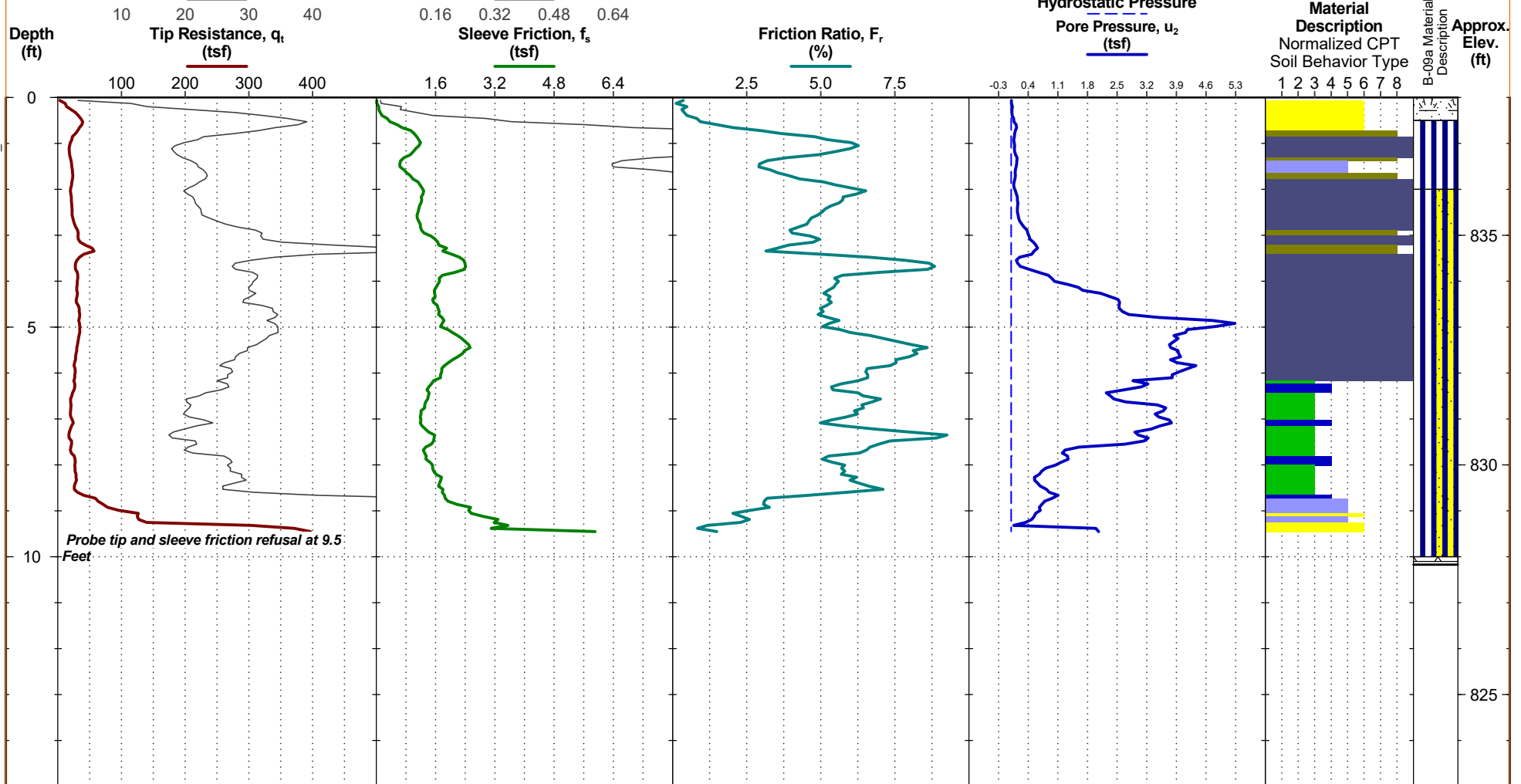
TEST LOCATION: See [Exploration Plan](#)

Approx. Surface Elev: 838 ft +/- Adjacent Test: B-09a

Latitude: 36.02173°

Longitude: -79.88354°

SITE: Alamance Road
Greensboro, NC



Cave-in = 9', No groundwater encountered

2" Topsoil; Sounding backfilled with bentonite chips upon completion

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).

Elevations were interpolated from the Guilford Co. GIS

See B-09a for the adjacent test's full details.

CPT sensor calibration reports available upon request.

WATER LEVEL OBSERVATION

Probe no. 5570 with net area ratio of 0.855

Manufactured by Geotech A.B.; calibrated 3/18/2021
Tip and sleeve areas of 10 cm² and 150 cm²

Terracon
7327 W Friendly Ave Ste G
Greensboro, NC

CPT Started: 6/6/2022

Rig: Geoprobe 3126GT

Project No.: 75225059

CPT Completed: 6/6/2022

Operator: C. Storm

▼
(used in normalizations and correlations;
See [Supporting Information](#))

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. CPT REPORT 75225059 PILOT AT SEDGEFIELD TRACT 3B TERRACON_DATATEMPLATE.GDT 9/7/22

BORING LOG NO. B-09a

Page 1 of 1

PROJECT: Pilot at Sedgefield Tract 3B

CLIENT: Craig Davis Properties
Cary, NC

SITE: Alamance Road
Greensboro, NC

MODEL LAYER	GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 36.021740° Longitude: -79.883550° Approximate Surface Elev.: 838 (Ft.) +/- DEPTH ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
1		0.5 TOPSOIL, 6" 837.5+/- RESIDUAL - ELASTIC SILT (MH) , red with some black, medium stiff 2.0 ELASTIC SILT WITH SAND (MH) , red and brown, stiff 836+/- 3 red with some orange, medium stiff stiff, contains rock fragments 10.0 10.17 PARTIALLY WEATHERED ROCK - SAMPLED AS SILTY SAND , white and black, contains rock fragments 828+/- Auger Refusal at 10.17 Feet 827.9+/-				3-4-4-6 N=8 4-5-5-18 N=10 2-3-4-5 N=7 2-2-9-32 N=11 50/2"		

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
HSA

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

Elevations were interpolated from the Guilford Co. GIS.

WATER LEVEL OBSERVATIONS

No groundwater encountered

Cave-in = 3.7'

Terracon
7327 W Friendly Ave Ste G
Greensboro, NC

Boring Started: 06-06-2022

Boring Completed: 06-06-2022

Drill Rig: Geoprobe 3126GT

Driller: C. Storm

Project No.: 75225059

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 75225059 PILOT AT SEDGEFIELD GPJ TERRACON_DATATEMPLATE.GDT 9/7/22

BORING LOG NO. B-10

Page 1 of 1

PROJECT: Pilot at Sedgefield Tract 3B

CLIENT: Craig Davis Properties
Cary, NC

SITE: Alamance Road
Greensboro, NC

MODEL LAYER	GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 36.024380° Longitude: -79.884780° Approximate Surface Elev.: 848 (Ft.) +/- DEPTH ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
1		0.5 TOPSOIL, 6" 847.5+/-				2-3-3-2 N=6	32.4	
4		RESIDUAL - SILTY SAND (SM) , fine to coarse grained, tan, brown, with some black, moist, loose white brown, some orange and black, medium dense tan, brown, some black and orange 7.0 841+/-	5			5-12-16-13 N=28	16.4	
5		PARTIALLY WEATHERED ROCK - SAMPLED AS SILTY SAND , fine to coarse grained, tan, gray, brown, some red, orange and black, moist 8.8 839.3+/-				9-14-14-24 N=28	13.9	
		Auger Refusal at 8.75 Feet				9-33-75/3"		

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
HSA

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

Elevations were interpolated from the Guilford Co. GIS.

WATER LEVEL OBSERVATIONS

No groundwater encountered

Cave-in = 3'

Terracon

7327 W Friendly Ave Ste G
Greensboro, NC

Boring Started: 06-06-2022

Boring Completed: 06-06-2022

Drill Rig: Geoprobe 3126GT

Driller: C. Storm

Project No.: 75225059

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL 75225059 PILOT AT SEDGEFIELD GPJ TERRACON_DATATEMPLATE.GDT 9/7/22

SUPPORTING INFORMATION

Contents:

General Notes

CPT General Notes

Unified Soil Classification System

Note: All attachments are one page unless noted above

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

SAMPLING	WATER LEVEL	FIELD TESTS
 Auger  Shelby Tube  Ring Sampler  Grab Sample  Split Spoon  Macro Core  Rock Core  No Recovery	 Water Initially Encountered  Water Level After a Specified Period of Time  Water Level After a Specified Period of Time Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.	N Standard Penetration Test Resistance (Blows/Ft.) (HP) Hand Penetrometer (T) Torvane (DCP) Dynamic Cone Penetrometer UC Unconfined Compressive Strength (PID) Photo-Ionization Detector (OVA) Organic Vapor Analyzer

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

LOCATION AND ELEVATION NOTES

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS

RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance		CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
Descriptive Term (Density)	Standard Penetration or N-Value Blows/Ft.	Descriptive Term (Consistency)	Unconfined Compressive Strength Qu, (tsf)	Standard Penetration or N-Value Blows/Ft.
Very Loose	0 - 3	Very Soft	less than 0.25	0 - 1
Loose	4 - 9	Soft	0.25 to 0.50	2 - 4
Medium Dense	10 - 29	Medium Stiff	0.50 to 1.00	5 - 8
Dense	30 - 50	Stiff	1.00 to 2.00	9 - 15
Very Dense	> 50	Very Stiff	2.00 to 4.00	16 - 30
		Hard	> 4.00	> 30

RELATIVE PROPORTIONS OF SAND AND GRAVEL		RELATIVE PROPORTIONS OF FINES	
Descriptive Term(s) of other constituents	Percent of Dry Weight	Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	<15	Trace	<5
With	15-29	With	5-12
Modifier	>30	Modifier	>12
GRAIN SIZE TERMINOLOGY		PLASTICITY DESCRIPTION	
Major Component of Sample	Particle Size	Term	Plasticity Index
Boulders	Over 12 in. (300 mm)	Non-plastic	0
Cobbles	12 in. to 3 in. (300mm to 75mm)	Low	1 - 10
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)	Medium	11 - 30
Sand	#4 to #200 sieve (4.75mm to 0.075mm)	High	> 30
Silt or Clay	Passing #200 sieve (0.075mm)		

CPT GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

DESCRIPTION OF GEOTECHNICAL CORRELATIONS

DESCRIPTION OF MEASUREMENTS AND CALIBRATIONS

To be reported per ASTM D5778:

Uncorrected Tip Resistance, q_u
Measured force acting on the cone divided by the cone's projected area

Corrected Tip Resistance, q_t
Cone resistance corrected for porewater and net area ratio effects
 $q_t = q_u + u_2(1 - a)$

Where a is the net area ratio, a lab calibration of the cone typically between 0.70 and 0.85

Pore Pressure, u
Pore pressure measured during penetration
 u_1 - sensor on the face of the cone
 u_2 - sensor on the shoulder (more common)

Sleeve Friction, f_s
Frictional force acting on the sleeve divided by its surface area

Normalized Friction Ratio, F_r
The ratio as a percentage of f_s to q_t , accounting for overburden pressure

To be reported per ASTM D7400, if collected:

Shear Wave Velocity, V_s
Measured in a Seismic CPT and provides direct measure of soil stiffness

Normalized Tip Resistance, Q_{tn}
 $Q_{tn} = ((q_t - \sigma_{v0})/P_a)(P_a/\sigma_{v0})^n$
 $n = 0.381(I_c) + 0.05(\sigma_{v0}/P_a) - 0.15$

Over Consolidation Ratio, OCR
OCR (1) = $0.25(Q_{tn})^{1.25}$
OCR (2) = $0.33(Q_{tn})$

Undrained Shear Strength, S_u
 $S_u = Q_{tn} \times \sigma'_{v0}/N_{kt}$
 N_{kt} is a soil-specific factor (shown on S_u plot)

Sensitivity, S_t
 $S_t = (q_t - \sigma_{v0}/N_{kt}) \times (1/f_s)$

Effective Friction Angle, ϕ'
 $\phi' (1) = \tan^{-1}(0.373[\log(q_t/\sigma'_{v0}) + 0.29])$
 $\phi' (2) = 17.6 + 11[\log(Q_{tn})]$

Unit Weight, γ
 $\gamma = (0.27[\log(F_r)] + 0.36[\log(q_t/\text{atm})] + 1.236) \times \gamma_{water}$
 σ_{v0} is taken as the incremental sum of the unit weights

Small Strain Shear Modulus, G_0
 $G_0 (1) = \rho V_s^2$
 $G_0 (2) = 0.015 \times 10^{(0.55I_c + 1.68)}(q_t - \sigma_{v0})$

Soil Behavior Type Index, I_c
 $I_c = [(3.47 - \log(Q_{tn}))^2 + (\log(F_r) + 1.22)^2]^{0.5}$

SPT N_{60}
 $N_{60} = (q_t/\text{atm}) / 10^{(1.1268 - 0.2817I_c)}$

Elastic Modulus, E_s (assumes $q_t/q_{t, \text{estimate}} \sim 0.3$, i.e. FS = 3)

$E_s (1) = 2.6\psi G_0$ where $\psi = 0.56 - 0.33\log Q_{tn, \text{clean sand}}$

$E_s (2) = G_0$

$E_s (3) = 0.015 \times 10^{(0.55I_c + 1.68)}(q_t - \sigma_{v0})$

$E_s (4) = 2.5q_t$

Constrained Modulus, M

$M = \alpha_M(q_t - \sigma_{v0})$

For $I_c > 2.2$ (fine-grained soils)

$\alpha_M = Q_{tn}$ with maximum of 14

For $I_c < 2.2$ (coarse-grained soils)

$\alpha_M = 0.0188 \times 10^{(0.55I_c + 1.68)}$

Hydraulic Conductivity, k

For $1.0 < I_c < 3.27$ $k = 10^{(0.952 - 3.04I_c)}$

For $3.27 < I_c < 4.0$ $k = 10^{(-4.52 - 1.37I_c)}$

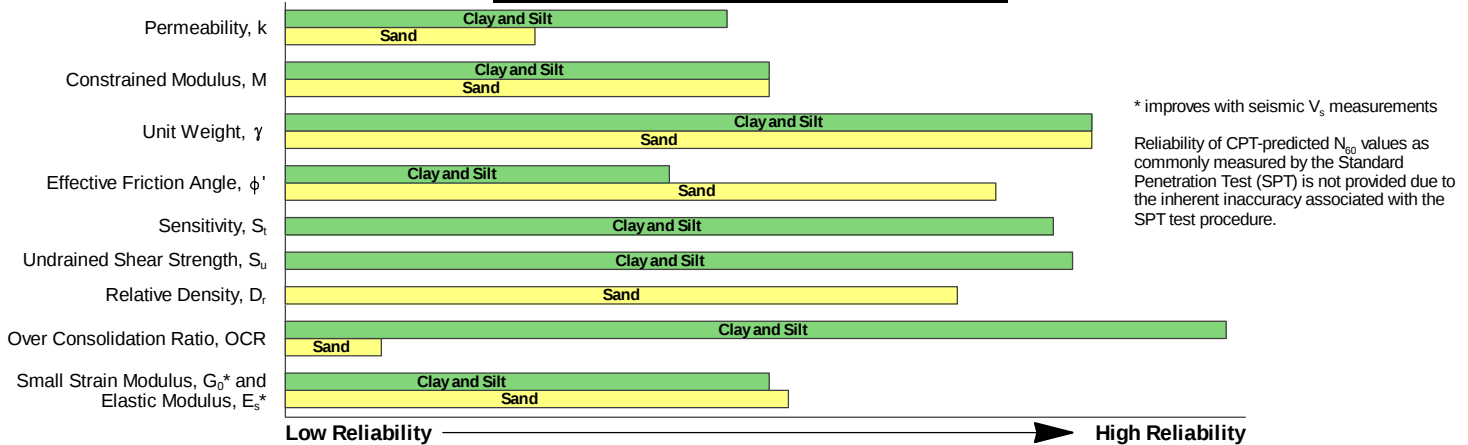
Relative Density, D_r

$D_r = (Q_{tn} / 350)^{0.5} \times 100$

REPORTED PARAMETERS

CPT logs as provided, at a minimum, report the data as required by ASTM D5778 and ASTM D7400 (if applicable). This minimum data include q_t , f_s , and u . Other correlated parameters may also be provided. These other correlated parameters are interpretations of the measured data based upon published and reliable references, but they do not necessarily represent the actual values that would be derived from direct testing to determine the various parameters. To this end, more than one correlation to a given parameter may be provided. The following chart illustrates estimates of reliability associated with correlated parameters based upon the literature referenced below.

RELATIVE RELIABILITY OF CPT CORRELATIONS



WATER LEVEL

The groundwater level at the CPT location is used to normalize the measurements for vertical overburden pressures and as a result influences the normalized soil behavior type classification and correlated soil parameters. The water level may either be "measured" or "estimated:"

Measured - Depth to water directly measured in the field

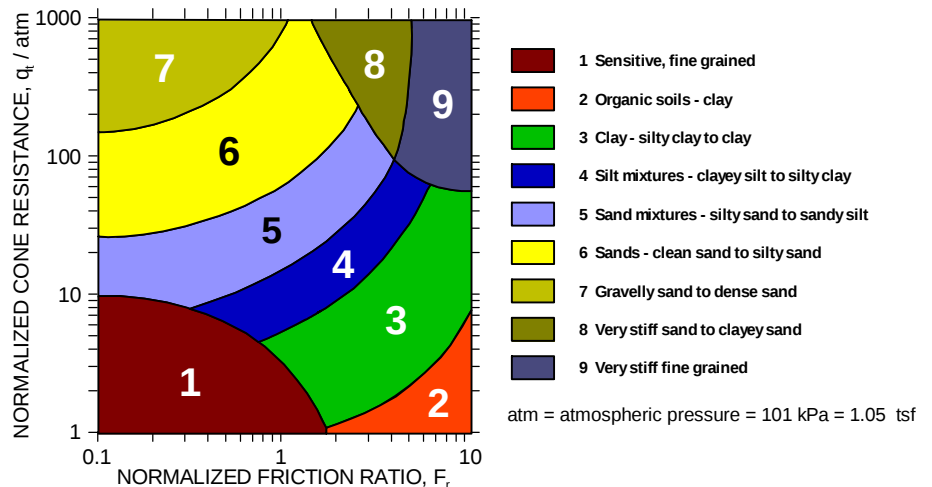
Estimated - Depth to water interpolated by the practitioner using pore pressure measurements in coarse grained soils and known site conditions

While groundwater levels displayed as "measured" more accurately represent site conditions at the time of testing than those "estimated," in either case the groundwater should be further defined prior to construction as groundwater level variations will occur over time.

CONE PENETRATION SOIL BEHAVIOR TYPE

The estimated stratigraphic profiles included in the CPT logs are based on relationships between corrected tip resistance (q_t), friction resistance (f_s), and porewater pressure (u_2). The normalized friction ratio (F_r) is used to classify the soil behavior type.

Typically, silts and clays have high F_r values and generate large excess penetration porewater pressures; sands have lower F_r 's and do not generate excess penetration porewater pressures. The adjacent graph (Robertson *et al.*) presents the soil behavior type correlation used for the logs. This normalized SBT chart, generally considered the most reliable, does not use pore pressure to determine SBT due to its lack of repeatability in onshore CPTs.



REFERENCES

- Kulhavy, F.H., Mayne, P.W., (1997). "Manual on Estimating Soil Properties for Foundation Design," Electric Power Research Institute, Palo Alto, CA.
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- Robertson, P.K., Cabal, K.L. (2012). "Guide to Cone Penetration Testing for Geotechnical Engineering," Signal Hill, CA.
- Schmertmann, J.H., (1970). "Static Cone to Compute Static Settlement over Sand," *Journal of the Soil Mechanics and Foundations Division*, 96(SM3), 1011-1043.

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests ^A					Soil Classification	
					Group Symbol	Group Name ^B
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	Gravels: More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels: Less than 5% fines ^C	$Cu \geq 4$ and $1 \leq Cc \leq 3$ ^E	GW	Well-graded gravel ^F	
			$Cu < 4$ and/or $[Cc < 1$ or $Cc > 3.0]$ ^E	GP	Poorly graded gravel ^F	
		Gravels with Fines: More than 12% fines ^C	Fines classify as ML or MH	GM	Silty gravel ^{F, G, H}	
			Fines classify as CL or CH	GC	Clayey gravel ^{F, G, H}	
	Sands: 50% or more of coarse fraction passes No. 4 sieve	Clean Sands: Less than 5% fines ^D	$Cu \geq 6$ and $1 \leq Cc \leq 3$ ^E	SW	Well-graded sand ^I	
			$Cu < 6$ and/or $[Cc < 1$ or $Cc > 3.0]$ ^E	SP	Poorly graded sand ^I	
		Sands with Fines: More than 12% fines ^D	Fines classify as ML or MH	SM	Silty sand ^{G, H, I}	
			Fines classify as CL or CH	SC	Clayey sand ^{G, H, I}	
Fine-Grained Soils: 50% or more passes the No. 200 sieve	Silts and Clays: Liquid limit less than 50	Inorganic:	$PI > 7$ and plots on or above “A”	CL	Lean clay ^{K, L, M}	
			$PI < 4$ or plots below “A” line ^J	ML	Silt ^{K, L, M}	
		Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay ^{K, L, M, N}
			Liquid limit - not dried			Organic silt ^{K, L, M, O}
	Silts and Clays: Liquid limit 50 or more	Inorganic:	PI plots on or above “A” line	CH	Fat clay ^{K, L, M}	
			PI plots below “A” line	MH	Elastic Silt ^{K, L, M}	
		Organic:	Liquid limit - oven dried	< 0.75	OH	Organic clay ^{K, L, M, P}
			Liquid limit - not dried			Organic silt ^{K, L, M, Q}
Highly organic soils:	Primarily organic matter, dark in color, and organic odor			PT	Peat	

^A Based on the material passing the 3-inch (75-mm) sieve.

^B If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^C Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

^D Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.

$$E \quad Cu = D_{60}/D_{10} \quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$$

^F If soil contains $\geq 15\%$ sand, add "with sand" to group name.

^G If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

^H If fines are organic, add "with organic fines" to group name.

^I If soil contains $\geq 15\%$ gravel, add "with gravel" to group name.

^J If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

^K If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

^L If soil contains $\geq 30\%$ plus No. 200 predominantly sand, add "sandy" to group name.

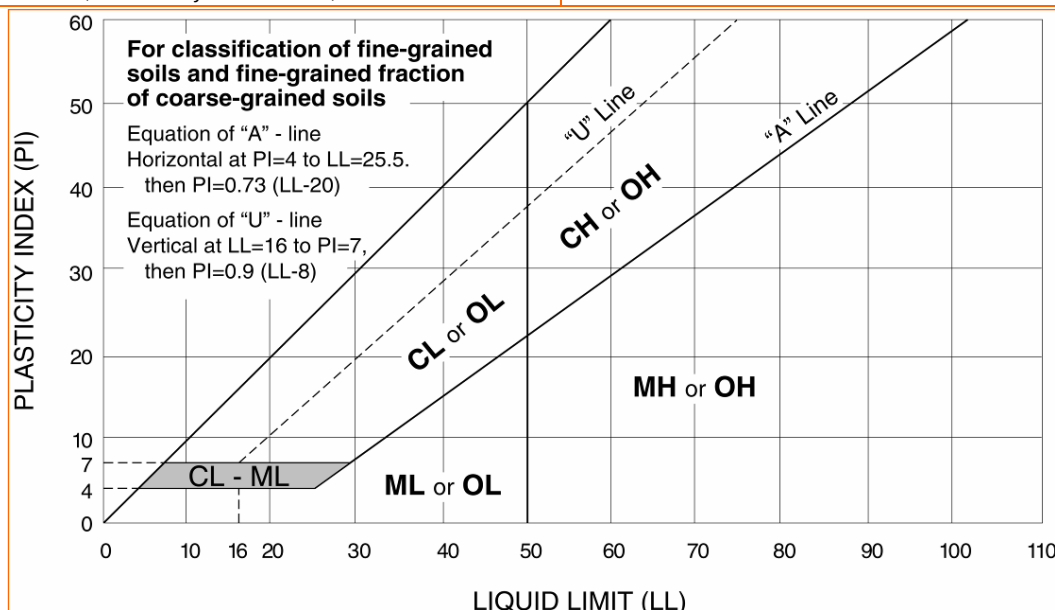
^M If soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.

^N $PI \geq 4$ and plots on or above "A" line.

^O $PI < 4$ or plots below "A" line.

^P PI plots on or above "A" line.

^Q PI plots below "A" line.



Responsive ■ Resourceful ■ Reliable