



2201 Rowland Avenue
Savannah, GA 31404
P (912) 629-4000
Terracon.com

February 9, 2026

Georgia Department of Economic Development
75 5th Street NW, Suite 1200
Atlanta, GA 30308

Attn: Mr. Lindsay Martin
P: (404) 962-4823
E: lmartin@georgia.gov

Re: Coastal GA Commerce Park GRAD
Kingsland, Camden County, Georgia
Terracon Project No. ES255233

Dear Mr. Martin,

Attached is a copy of Terracon Preliminary Geotechnical Report No. ES255233 dated February 4, 2026. This report presents the preliminary findings of the geotechnical subsurface exploration with a limited scope and provides preliminary geotechnical recommendations concerning the design and construction of foundations and floor slabs for future development.

Should you have any questions regarding this report, please do not hesitate to contact us.

Sincerely,

Terracon

A handwritten signature in black ink that reads "John C. Mikels".

John C. Mikels, E.I.T.
Senior Staff Engineer

A handwritten signature in black ink that reads "Guoming Lin".

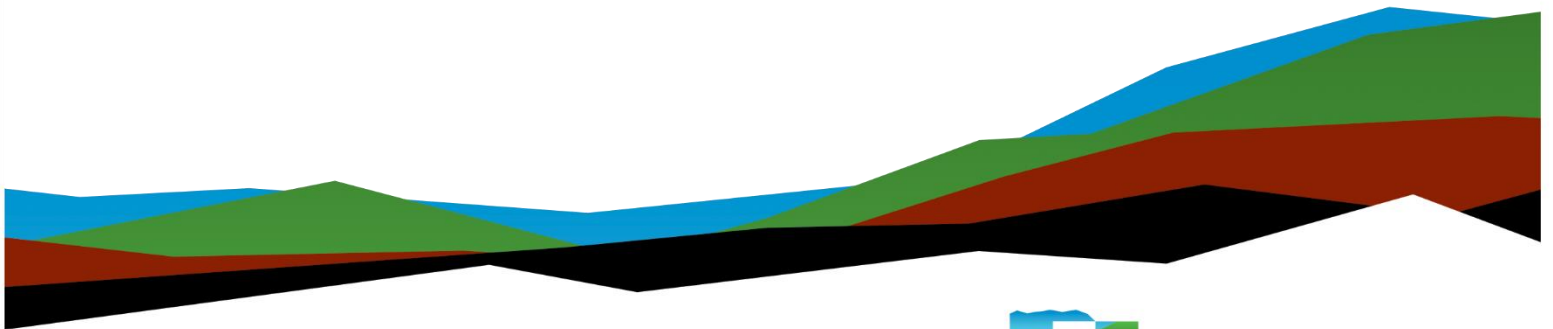
Guoming Lin, Ph.D., G.E., BC.GE
Senior Consultant / Senior Principal

Coastal GA Commerce Park GRAD Preliminary Geotechnical Engineering Report

February 4, 2026 | Terracon Project No. ES255233

Prepared for:

Camden County Joint Development Authority
531 North Lee Street
PO Box 513
Kingsland, GA 31548



Nationwide
[Terracon.com](https://www.terracon.com)

- Facilities
- Environmental
- Geotechnical
- Materials



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Savannah, GA 31404
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February 4, 2026

Camden County Joint Development Authority
531 North Lee Street
PO Box 513
Kingsland, GA 31548

Attn: James Coughlin
P: (912) 729-7201
E: jmcoughlin@co.camden.ga.us

Re: Preliminary Geotechnical Engineering Report
Coastal GA Commerce Park GRAD
Kingsland, Camden County, Georgia
Terracon Project No. ES255233

Dear Mr. Coughlin:

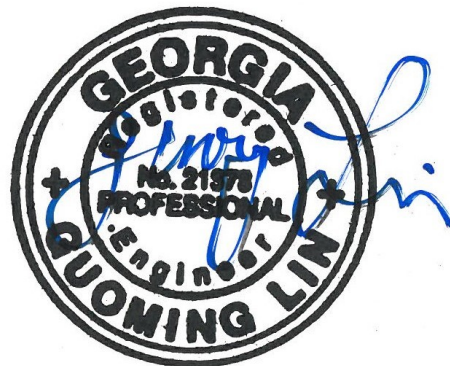
We have completed the scope of Preliminary Geotechnical Engineering services for the above-referenced project in general accordance with Terracon Proposal No. PES255233 dated October 7, 2025. This report presents the preliminary findings of the subsurface exploration with a limited scope and provides preliminary geotechnical recommendations concerning the design and construction of foundations and floor slabs for the proposed project. Additional Geotechnical exploration and analysis are needed prior to final design and construction of 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

John C. Mikels, EIT
Senior Staff Engineer




Guoming Lin, Ph.D., G.E., BC.GE
Senior Consultant / Senior Principal

Table of Contents

Report Summary	i
Introduction	1
Project Description	1
Site Conditions	2
Geotechnical Characterization	3
Geotechnical Overview	4
Earthwork	5
Shallow Foundations	6
Floor Slabs	6
Preliminary Pavement Considerations	6
General Comments	7

Attachments

- Exploration and Testing Procedures**
- Site Location and Exploration Plans**
- Exploration and Laboratory Results**
- Supporting Information**

Note: This report was originally delivered in a web-based format. **Blue 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  logo will bring you back to this page. For more interactive features, please view your project online at client.terracon.com.

Refer to each individual Attachment for a listing of contents.

Report Summary

Topic ¹	Overview Statement ²
<p>Project Description</p>	<p>Based on the communication with the client, we understand that the project needs a preliminary geotechnical investigation at this stage for the due diligence process.</p> <p>The project site is approximately 1,800 acres and includes the construction of a future industrial development.</p> <p>The structural loads were not available at the time of this report. We have assumed the following loads for the proposed warehouses:</p> <ul style="list-style-type: none"> ■ Maximum slab load: 500 psf ■ Maximum column load: 150 kips ■ Maximum wall load: 7.5 kips/ft ■ Maximum fill height: 5 feet
<p>Geotechnical Characterization</p>	<p>The subsurface profile is variable across the explored area, and is generally contains topsoils in the upper 8 to 12 inches below the ground surface (BGS). Below the topsoil, the soils consist of loose to medium dense sands to silty sands with interbedded layers of clays and silts to approximately 15 to 24 feet BGS. The sands are underlain by sandy clays and silts with interbedded sand layers to approximately 16 to 26 feet BGS. The sandy clays and silts are followed by very dense sands at the termination depths of the CPT soundings at approximately 16.1 to 26.4 feet BGS.</p> <p>Please refer to the Geotechnical Characterization for details. The measured or estimated groundwater depths ranged from 5.4 to 9.5 feet BGS in the CPT soundings.</p>
<p>Earthwork</p>	<ul style="list-style-type: none"> ■ Install a site drainage system. ■ Strip/grub topsoil and existing fill when encountered. ■ Level, densify, and proofroll subgrade during subgrade preparation. If any soft/weak areas are detected during proofroll testing, repair the subgrade by undercutting and backfilling.
<p>Preliminary Foundation Recommendations</p>	<p>Based on preliminary settlement analyses using the assumed loads listed above, shallow foundations should be sufficient for lightly or moderately loaded buildings after the subgrade is improved with densification or undercut and backfill in most site areas. The soil conditions encountered are variable and thick soft clays areas were encountered in the area of CPT soundings</p>

Preliminary Geotechnical Engineering Report

Coastal GA Commerce Park GRAD | Kingsland, Camden County, Georgia

February 4, 2026 | Terracon Project No. ES255233



	C9 and C10. As such, deep foundations or ground improvement measurements may be required for heavier structural loads for structures in these areas.
Pavements	Based on our experience with similar developments in this area, both concrete and asphalt pavement can be used for the parking area and driveways. Detailed pavement sections will be recommended in the future design-level geotechnical report.
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 simply clicking on the topic itself.
2. This summary is for convenience only. It should be used in conjunction with the entire report for design purposes.

Introduction

This report presents the results of our limited scope Preliminary Geotechnical Engineering services performed for a proposed industrial development to be located at Ocean Highway and U.S. Highway 17 in Kingsland, Georgia. The purpose of these services was to provide **preliminary** information and geotechnical engineering recommendations relative to:

- Subsurface soil conditions
- Groundwater conditions
- Site preparation and earthwork
- Foundation and floor slab considerations
- Pavement considerations

The geotechnical engineering Scope of Services for this project included the advancement of field exploration, engineering analysis, and report preparation. The field exploration mainly includes the Cone Penetration Test (CPT) soundings and hand auger borings. Prior to final design or construction of this development, a design level geotechnical investigation including additional field exploration, will be needed.

Terracon previously performed a geotechnical exploration on the property and the results are presented in "Preliminary Geotechnical Study – Kingsland Commerce Park" dated August 3, 2012. The previous geotechnical data has been used to supplement the findings of this exploration and the results from the previous exploration are presented in the [Exploration and Laboratory Results](#).

Drawings showing the site and boring locations are shown on the [Site Location](#) and [Exploration Plan](#), respectively.

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 Boundary Plans were provided by Ms. Lauren Davenport with Thomas & Hutton via email communication on September 8, 2025.

Item	Description
<p>Project Description</p>	<p>Based on the communication with the client, we understand that the project requires a preliminary geotechnical investigation at this stage of the project.</p> <p>The project site is approximately 1,800 acres. The development includes the construction of a future industrial development.</p>
<p>Maximum Loads</p>	<p>The following loads were not available at the time of this report. We assumed the following load for the proposed structures:</p> <ul style="list-style-type: none"> ■ Maximum slab load: 500 psf ■ Maximum column load: 150 kips ■ Maximum wall load: 7.5 kips/ft ■ Maximum fill height: 5 feet
<p>Grading/Slopes</p>	<p>The site grading plan was not available at the time of this report. We have assumed the warehouses will receive approximately 5 feet of fill to reach the final site grades.</p>

Terracon should be notified if any of the above information is inconsistent with the planned construction, as modifications to our recommendations may be necessary.

Site Conditions

The following description of site conditions is derived from our site visit associated with the field exploration.

Item	Description
<p>Parcel Information</p>	<p>The project area consists of a 1,800-acre parcel located at Ocean Highway and U.S. Highway 17 in Kingsland, Georgia. Latitude: 30.8649°, Longitude: -81.7121° See Site Location</p>
<p>Existing Improvements</p>	<p>The site is an undeveloped wooded area.</p>
<p>Current Ground Cover</p>	<p>The site consists of heavily wooded areas consisting of planted pine rows. Existing dirt access roads are located throughout the site area.</p>
<p>Existing Topography</p>	<p>The site is relatively flat.</p>

Geotechnical Characterization

We have developed a general characterization of the preliminary subsurface conditions based on our review of the subsurface exploration, geologic setting, and our understanding of the project. This characterization forms the basis of our geotechnical calculations and evaluation of the site.

Layer	Approximate Depth to Bottom of Stratum (feet)	Material Description	Relative Density/ Consistency
1	8 to 12 inches ¹	Topsoil: with grass roots and leaves	--
2	15 to 25	Sands to silty sands with interbedded layers of clays and silts	Medium dense
3	16 to 25	Sandy clays and silts	Very soft to soft
4	26.4, maximum termination depth of CPT soundings	Sands to silty sands	Very dense

1. The thickness of the topsoils at the project site may be deeper than 1 foot. The depth/thickness of topsoil will vary, depending upon the near-surface soil disturbance during the site preparation.

Conditions observed at each exploration point are indicated on the individual logs. The individual logs can be found in the [Exploration and Laboratory Results](#). Stratification boundaries on the logs represent the approximate location of changes in native soil types; in situ, the transition between materials may be gradual.

The CPT soundings and hand auger borings were observed while drilling and after completion for the presence and level of groundwater. No groundwater was observed in the hand auger borings during our field exploration. The measured water level from the CPT soundings can be found on the logs in the [Exploration and Laboratory Results](#) section of this report. The measured groundwater depths ranged from 5.4 to 9.5 feet BGS.

Boring Number	Measured Groundwater Depth below grades (ft)
C7	9.5
C8	5.8
C9	7.4
C10	6.3
C11	5.4

Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff, and other factors not evident when the borings were performed. The shallow clays are prone to a perched water table condition. Therefore, groundwater levels during construction or at other times in the structure's life may be higher or lower than the levels indicated on the sounding logs.

As a strong indicator of water seepage during seasonal high groundwater levels, mottling was noted in the hand auger borings at depths of about 0.8 to 3.3 feet BGS.

Geotechnical Overview

The following evaluation and recommendations are based on our understanding of the proposed construction and the results from our field exploration. If the above-described project conditions are incorrect or changed after this report, or subsurface conditions encountered during construction are significantly different from those reported, Terracon should be notified so we can re-evaluate our recommendations and make appropriate revisions.

In general, the subsurface conditions are suitable and generally favorable for an industrial development. However, the soil conditions are variable across the site. Based on the findings of our field exploration, CPT sounding locations C9 encountered very soft clays between 15 and 20 feet BGS and CPT sounding C10 encountered thick layers of soft clays and silts with interbedded loose sands throughout the entire soil column to the refusal depth at approximately 22 feet BGS.

We performed preliminary settlement analyses using the assumed structural loads, soil profiles, and parameters derived from the CPT soundings. The combined estimated settlements under the assumed slab load of 500 psf and fill height of 5 feet, as well as the combined settlements from the column load of 150 kips and wall load of 7.5 kips/ft were less than 1 inch in most areas. However, in areas where soft clays were encountered such as C9 and C10, the maximum slab and column loads should be reduced if shallow foundations are considered.

Lightly loaded manufacturing buildings can also be supported on shallow foundations. However, deep foundations may be needed for heavily loaded structures. The deep

foundations should extend to the marl layer. It should be noted that that CPT refusal was encountered on a very dense sand layer at depths ranging from approximately 16 to 26 feet BGS. This layer could cause difficulty during the installation of deep foundations. As such, further exploration of this layer should be conducted if deep foundations are to be considered.

The preliminary recommendations contained in this report are based on the results of field testing (presented in the **Exploration and Laboratory Results**), engineering analyses, and our current understanding of the proposed project. If the structural loads are heavier than assumed loads or the soft/weak soil conditions are encountered during the design-level geotechnical investigation, ground improvements such as preload, preload with surcharge, or rigid inclusion may be needed to support the proposed warehouse buildings.

The **General Comments** section provides an understanding of the report's limitations.

Earthwork

Site preparation should include the installation of a site drainage system, topsoil stripping and grubbing, subgrade preparation, densification, and proofrolling. Please bear in mind that, due to the uneven ground surface of the site, the volume of topsoil and organics may be significantly greater than the area times the topsoil/organics thickness indicated in the boring logs. Rutting of the subgrade can also cause the mixing of topsoil/organics with underlying soils, which will result in additional required topsoil/organics stripping. Deeper undercuts may be needed in some localized areas to remove unsuitable materials.

The site clearing should strip topsoil, rootmat and organics. Roots larger than one inch in diameter should be cut off two feet beneath the top of the subgrade. During the subgrade preparation, the near-surface soils should be removed with scrapers and bulldozers.

In general, silty sands and clayey sands were encountered in the upper 5 feet of the project site areas. However, the site may have isolated soft/weak areas that may require a deeper undercut and backfill to achieve a stable subgrade. As such, the contractor should be prepared to stabilize the ground by undercutting and backfilling of these soft areas

The subgrade soils may lose some of their strength when rain and surface water infiltrates into them. We recommend an effective drainage system be installed in the proposed construction area to intercept rain and surface water.

Shallow Foundations

In most site areas, the proposed warehouse buildings for future development can be supported on a shallow, spread footing foundation system, provided that the proposed structure will not exceed the assumed loads and the structure has criteria of the allowable settlement of 1 inch or greater. **Please keep in mind that this is a preliminary recommendation, which is based on the results of the field exploration with a limited scope and assumed loads.**

The bottom of all foundation excavations should be free of water and loose soil and rock prior to placing concrete. Concrete should be placed soon after excavating to reduce bearing soil disturbance.

Care should be taken to prevent wetting or drying of the bearing materials during construction. Extremely wet or dry material or any loose or disturbed material in the bottom of the footing excavations should be removed before the foundation concrete is placed. If the soils at the bearing level become excessively dry, disturbed, or saturated, the affected soil should be removed prior to placing concrete. A lean concrete mud-mat should be placed over the bearing soils if the excavations remain open for an extended period.

Floor Slabs

Specific attention should be given to positive drainage away from the structure and positive drainage of the aggregate base beneath the floor slab. A vapor retarder should be considered beneath concrete slabs on grade covered with wood, tile, carpet, or other moisture-sensitive or impervious coverings when the project includes humidity-controlled areas or when the slab will support equipment sensitive to moisture.

Saw-cut contraction joints should be placed in the slab to help control the location and extent of cracking. Where floor slabs are tied to perimeter walls or turn-down slabs to meet structural or other construction objectives, our experience indicates differential movement between the walls and slabs will likely be observed in adjacent slab expansion joints or floor slab cracks beyond the length of the structural dowels. The Structural Engineer should account for potential differential settlement through control joints, appropriate reinforcing, or other means.

Preliminary Pavement Considerations

Both concrete and asphalt pavement can be utilized for parking areas and driveways. The required pavement thickness will depend on the following:

- The traffic loads, including traffic pattern and the service life of the pavement;
- Subgrade conditions, including soil strength and drainage characteristics;
- Paving material characteristics;
- Climatic conditions of the region.

For the pavement support, the subgrade conditions can often be the overriding factor in pavement performance. The subgrade conditions will depend on the in-situ soils at the subgrade level, characteristics of fill material for the subgrade, and site preparation procedures. **In general, we recommend the upper two feet of the subgrade be relatively clean sands with percent fines less than 15 percent.** A California Bearing Ratio (CBR) value of 8 has been estimated based on the in-situ soils at the site and typical imported fills available in this area.

Detailed pavement sections will be provided in the future design-level geotechnical report.

General Comments

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. 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. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

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 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 engineering 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 upon 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.

Preliminary Geotechnical Engineering Report

Coastal GA Commerce Park GRAD | Kingsland, Camden County, Georgia

February 4, 2026 | Terracon Project No. ES255233



Site characteristics as provided are for design purposes 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 affect 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. Construction and site development have the potential to affect adjacent properties. Such impacts can include damages due to vibration, modification of groundwater/surface water flow during construction, foundation movement due to undermining or subsidence from excavation, as well as noise or air quality concerns. Evaluation of these items on nearby properties is commonly associated with contractor means and methods and is not addressed in this report. The owner and contractor should consider a preconstruction/precondition survey of the surrounding development. 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.

Preliminary Geotechnical Engineering Report

Coastal GA Commerce Park GRAD | Kingsland, Camden County, Georgia

February 4, 2026 | Terracon Project No. ES255233



Attachments

Exploration and Testing Procedures

Field Exploration

Number of Borings	Type of Exploration	Maximum Boring Depth (feet)	Location
5	Cone Penetration Test (CPT) Sounding	26.4	Future Site Development Areas
5	Hand auger (HA) Boring	5	

Boring Layout and Elevations: Terracon personnel provided the boring layout using handheld GPS equipment (estimated horizontal accuracy of about ± 10 feet) and referencing existing site features. If elevations and a more precise boring layout are desired, we recommend borings be surveyed.

Subsurface Exploration Procedures: CPT soundings were pushed with a track-mounted drill rig. CPT sounding is the technology in which an electronically instrumented cone penetrometer is hydraulically pushed through the soil while nearly continuous readings are recorded to a portable computer. 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° and an area of 15 cm^2 . 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 $1\frac{1}{2}$ and $2\frac{1}{2}$ 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.

CPT testing was conducted in general accordance with ASTM D5778 "Standard Test Method for Performing Electronic Friction Cone and Piezocone Penetration Testing of Soils." Upon completion, the CPT data collected was analyzed and processed by the project engineer.

Hand auger borings were conducted in general accordance with ASTM D1452. In this test, hand auger boring was drilled by rotating and advancing a bucket auger to the desired depths while periodically removing the auger from the hole to clear and examine the auger cuttings. The soils were visually classified by a geotechnical engineer or geologist in accordance with ASTM D2488. The hand auger borings were conducted to 5 feet below ground surface (BGS) or until auger refusal.

We also observed the boreholes while drilling and at the completion of drilling for the presence of groundwater. The groundwater level is shown on the attached boring logs. For safety purposes, all borings were backfilled with auger cuttings after their completion.

Preliminary Geotechnical Engineering Report

Coastal GA Commerce Park GRAD | Kingsland, Camden County, Georgia

February 4, 2026 | Terracon Project No. ES255233



The sampling depths, penetration distances, and other sampling information were recorded on the field boring logs. The samples were placed in appropriate containers and taken to our soil laboratory for testing and classification by a Geotechnical Engineer. Our exploration team prepared field boring logs as part of the drilling operations. These field logs included visual classifications of the materials observed during drilling and our interpretation of the subsurface conditions between samples. Final boring logs were prepared from the field logs. The final boring 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.

Site Location and Exploration Plans

Contents:

Site Location Plan

Exploration Plan

Note: All attachments are one page unless noted above.

Site Location Plan



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

PROVIDED BY MICROSOFT BING MAPS

Exploration Plan

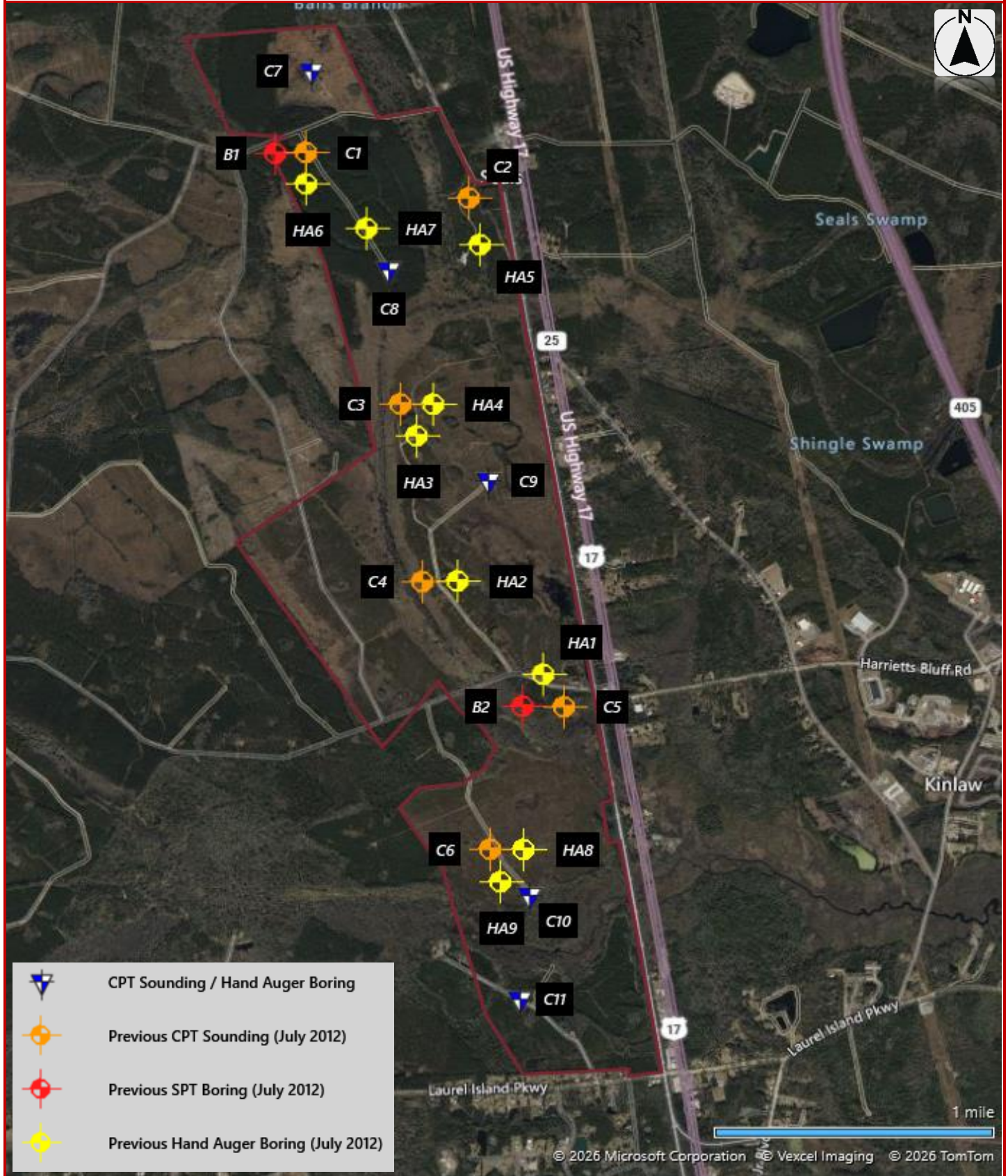


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

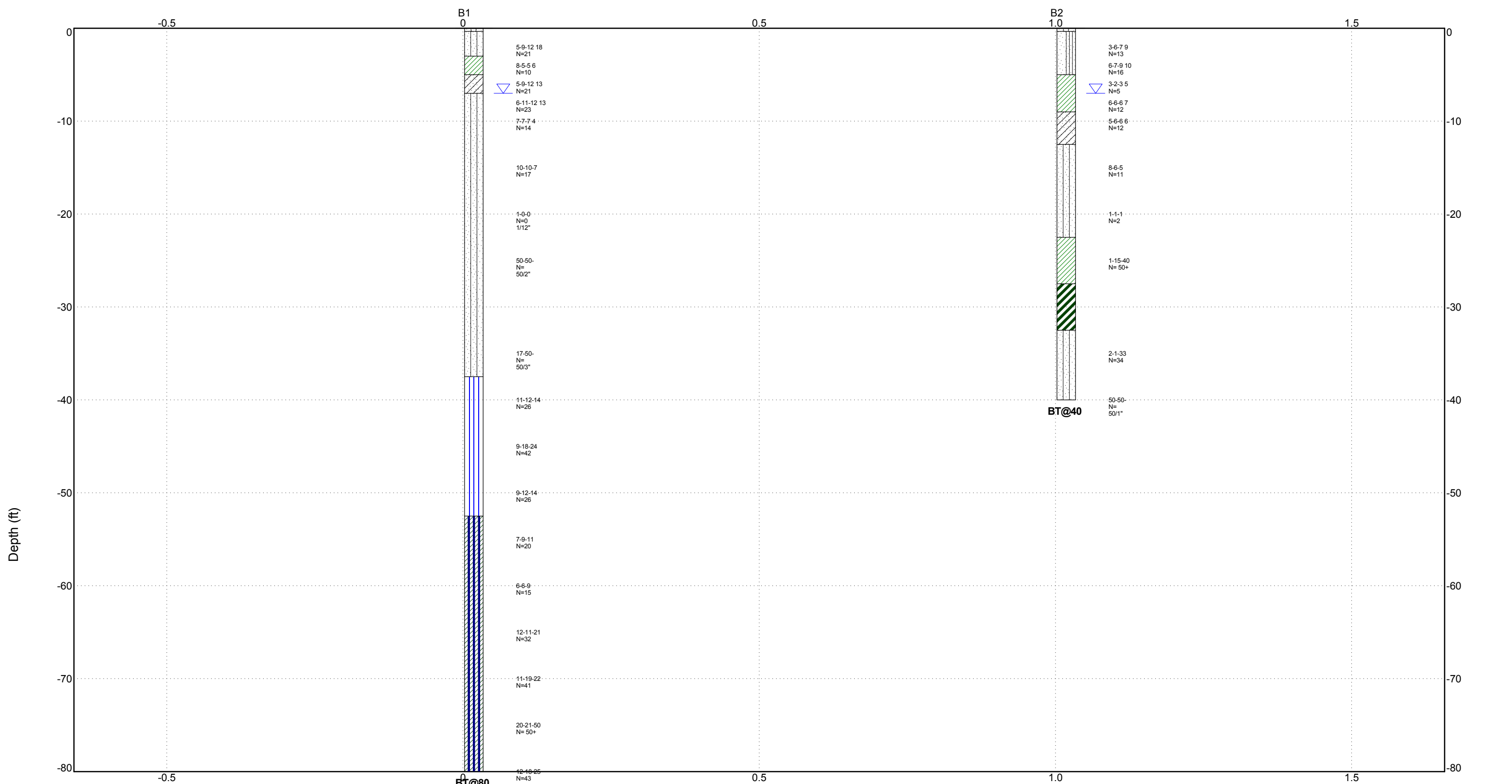
PROVIDED BY MICROSOFT BING MAPS

Exploration and Laboratory Results

Contents:

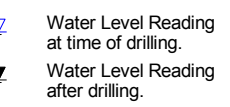
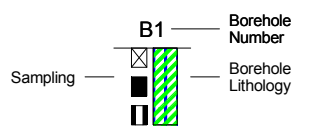
- Subsurface SPT Profile Cross Section – 2012
- Subsurface CPT Profile Cross Section – 2012
- Subsurface CPT Profile Cross Section – 2026
- SPT Boring Logs - 2012 (2 pages)
- CPT Sounding Logs - 2012 (6 pages)
- CPT Sounding Logs – 2026 (5 pages)
- Hand Auger Boring Logs – 2012 (3 pages)
- Hand Auger Boring Logs – 2026 (2 pages)
- Grain Size Analysis Results – 2026

Note: All attachments are one page unless noted above.



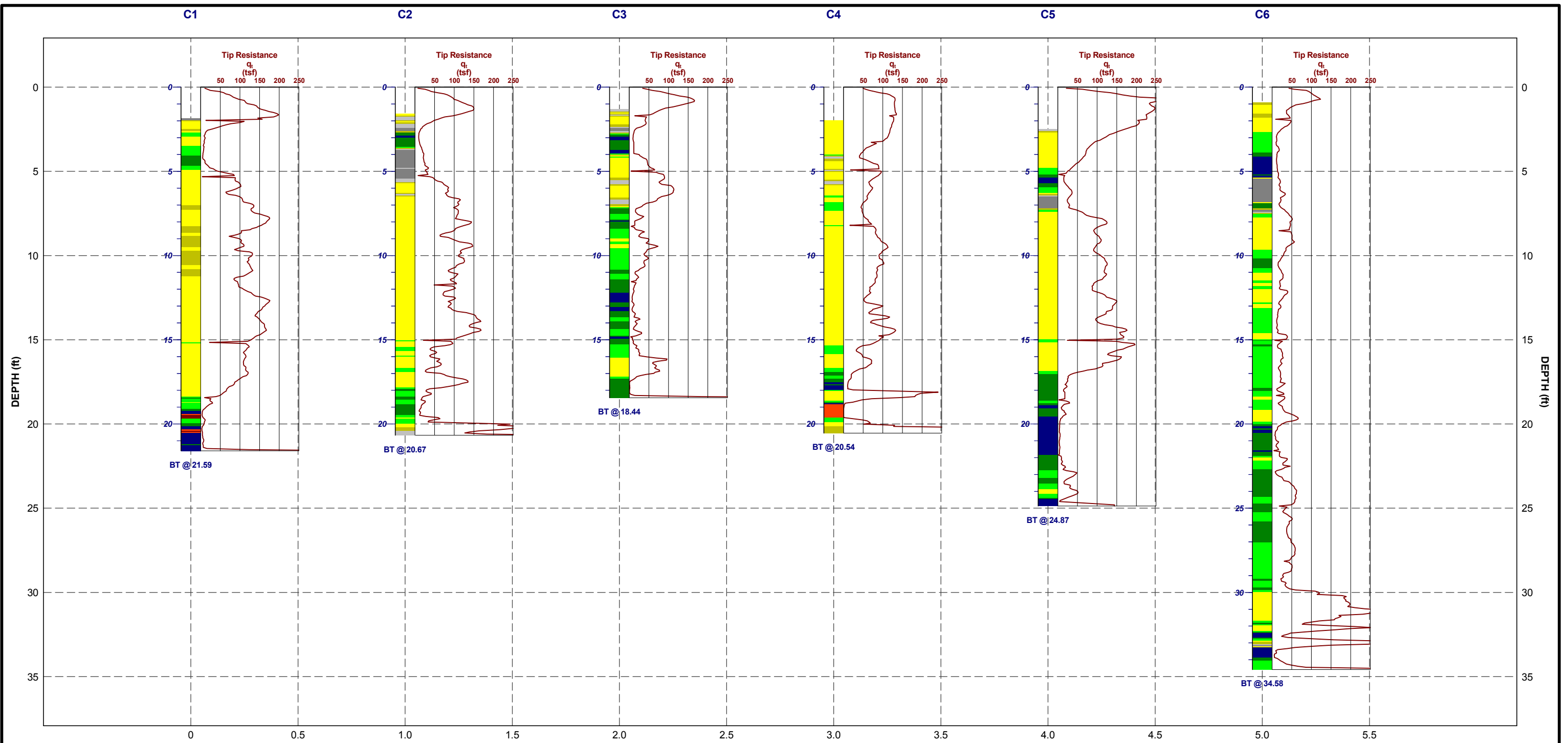
11X17 SPT.GPJ STD. PPI TEMPLATE.GDT 8/2/12

Explanation



NOTES:
 BT@80 = Bottom Terminated at 80
 See Figure A-2 for orientation of soil profile.
 See Boring Legend in Appendix B for symbols and soil classifications.

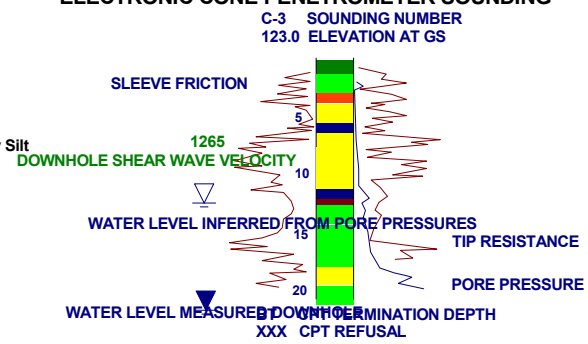
GENERALIZED SOILS PROFILE		
<i>Kingsland Commerce Park</i>		
<i>Kingsland, Georgia</i>		
ENGINEER:		Appendix A-3
CHECKED:		
PROJECT:		



CPT MATERIAL GRAPHICS

- Sensitive, Fine Grained Soils
- Organic Soils, Peats
- Clays-Clay to Silty Clay
- Silt Mixtures-Clay Silt to Silty Clay
- Sand Mixtures-Silty Sand to Sandy Silt
- Sands-Clean Sand to Silty Sand
- Gravelly Sand to Sand
- Very Stiff Clay to Clayey Sand
- Very Stiff Fine Grained Soils

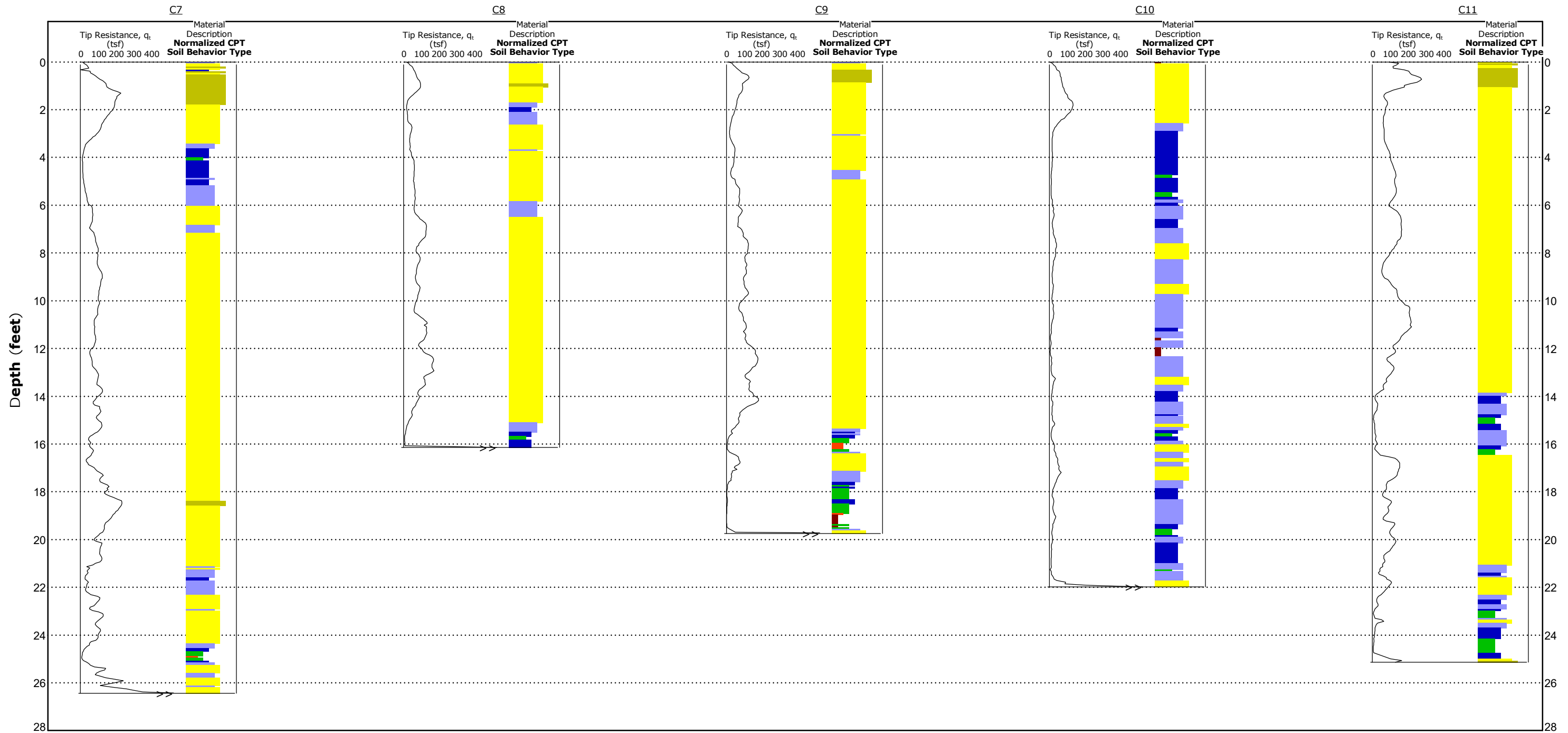
ELECTRONIC CONE PENETROMETER SOUNDING



Robertson et al (1990) Q_t vs F_r - MAI = 3

SUBSURFACE PROFILE		PROJECT NUMBER
PROJECT: Kingsland Commerce Park		ES125087
LOCATION: Kingsland, Georgia		DATE
		7/20/12

Subsurface Profile



Notes	Water Level Observations	Explanation	CPT Soil Classification Graphic Color Code
<p>See Exploration Plan for orientation of soil profile. See General Notes in Supporting Information for symbols and soil classifications. Soils profile provided for illustration purposes only. Soils between borings may differ AR - Auger Refusal BT - Boring Termination</p>	<p>▽ Water Level Reading at time of drilling. ▼ Water Level Reading after drilling.</p>	<p>C7 — Borehole Number LL PL — Liquid and Plastic Limits — Borehole Lithology AR — Borehole Termination Type BT — Borehole Termination Type</p>	<p>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</p>

BORING LOG NO. B1

PROJECT: Kingsland Commerce Park


CLIENT: Forest Investment Associates (CPT-FIA2,LLC)

SITE:
Kingsland, Georgia

ARCHITECT/ENGINEER: Christopher Barr, P.E.

GRAPHIC LOG	LOCATION	DEPTH (ft)	GROUNDWATER OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS
	See Exhibit A-2				
	DEPTH				
0.3	4" Topsoil, grass				5-9-12-18 N=21
3.0	SILTY FINE SAND (SM), medium dense, dark gray/ brown, moist				8-5-5-6 N=10
5.0	SANDY CLAY (CL), stiff, brown/ gray		▽		5-9-12-13 N=21
7.0	CLAYEY FINE SAND (SC), medium dense, brown/ orange				6-11-12-13 N=23
	SILTY SAND (SM), medium dense, mostly fine sand, gray	10			7-7-7-4 N=14
	mediums dense, mostly fine sand, gray/ brown				10-10-7- N=17
	mediums dense, mostly fine sand, gray/ brown				
	very loose, mostly fine sand, gray, with interbedded clay layers, wet	20			1-0-0- N=0
					1/12"
	very dense, fine to coarse sand, gray, with many gravels				50-50-- N=
					50/2"
	very dense, fine to coarse sand, gray/ brown, with many gravels	30			
					50/3"
	very dense, fine to medium sand, light gray				17-50-- N=
37.5	SANDY SILT (ML), very stiff, light gray	40			11-12-14- N=26
	hard				
					9-18-24- N=42
	very stiff, dark gray	50			
52.5	MARL FORMATION - SANDY SILT (ML), very stiff, dark gray/ olive green				9-12-14- N=26
	stiff	60			
	hard, with medium to coarse sand				12-11-21- N=32
	hard, light gray, with coarse sand	70			
	hard, light gray, with coarse sand				11-19-22- N=41
	hard, light gray, with coarse sand				20-21-50- N= 50+
80.0	hard, light gray, with coarse sand	80			
	Boring terminated at 80' below existing ground surface (BGS)				12-18-25- N=43

TERRACON SMART LOG-HEADERS SPT.GPJ STD. PPI TEMPLATE.GDT 8/2/12

Advancement Method: Mud Rotary	The stratification lines represent the approximate boundary lines between soil and rock types; in-situ, the transition may be gradual. See attached General Notes for explanation of symbols and terms.	Notes:	
Abandonment Method:			
GROUNDWATER OBSERVATIONS	 2201 Rowland Avenue Savannah, Georgia 31404	Boring Started: 7/31/2012	Boring Complete: 7/31/2012
▽ Groundwater initially observed		Drill Rig: CME 45	Driller: Francis & Billy
		Project No.: ES125087	Exhibit

BORING LOG NO. B2

PROJECT: Kingsland Commerce Park

CLIENT: Forest Investment Associates (CPT-FIA2,LLC)

SITE:
Kingsland, Georgia

ARCHITECT/ENGINEER: Christopher Barr, P.E.

GRAPHIC LOG	LOCATION	DEPTH (ft)	GROUNDWATER OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS
	See Exhibit A-2				
	DEPTH				
0.3	4" Topsoil				3-6-7-9 N=13
5.0	FINE SAND WITH SILT (SP-SM), medium dense, brown medium dense, light brown				6-7-9-10 N=16
9.0	SANDY CLAY (CL), medium stiff, brown/ orange stiff	10	▽		3-2-3-5 N=5 6-6-6-7 N=12
12.5	CLAYEY SAND (SC), medium dense, brown/ orange				5-6-6-6 N=12
22.5	SILTY FINE SAND (SM), medium dense, brown/ orange, with clay pockets, wet very loose, gray	20			8-6-5- N=11 1-1-1- N=2
27.5	SANDY CLAY (CL), hard, light gray				1-15-40- N= 50+
32.5	HIGH PLASTIC CLAY (CH), hard, light gray	30			50/4"
40.0	SILTY FINE SAND (SM), dense, brown/ gray, with gravel and shell fragments				2-1-33- N=34
	very dense, brown/ gray, fine to coarse SAND, with shell fragments Boring terminated at 40' below existing ground surface (BGS)	40			50-50-- N= 50/1"

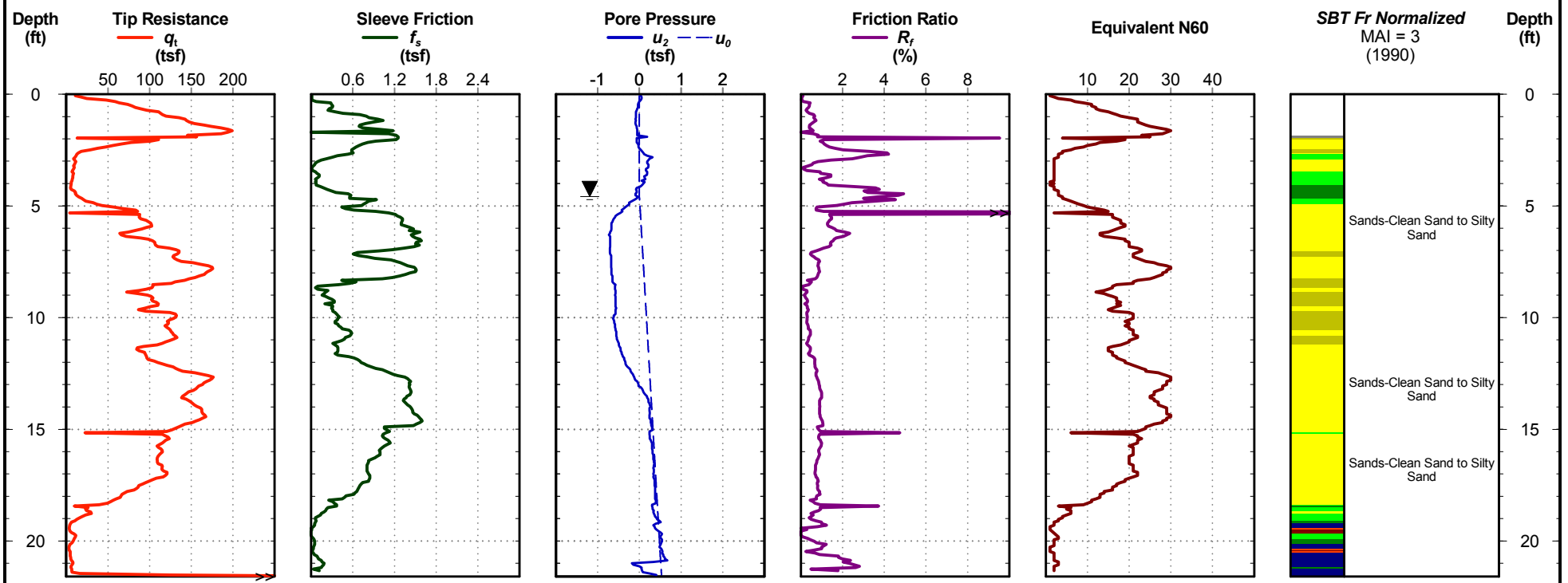
Advancement Method: Mud Rotary	The stratification lines represent the approximate boundary lines between soil and rock types; in-situ, the transition may be gradual. See attached General Notes for explanation of symbols and terms.	Notes:	
Abandonment Method:			
GROUNDWATER OBSERVATIONS			
▽ <i>Groundwater initially observed</i>	Terracon 2201 Rowland Avenue Savannah, Georgia 31404	Boring Started: 7/31/2012 Drill Rig: CME 45 Project No.: ES125087	Boring Complete: 7/31/2012 Driller: Francis & Billy Exhibit

TERRACON SMART LOG-HEADERS SPT.GPJ STD. PPI TEMPLATE.GDT 8/2/12

Date: Jul. 19, 2012
Estimated Water Depth: 4.58 ft
Rig/Operator: JB

Northing:
Easting:
Elevation:

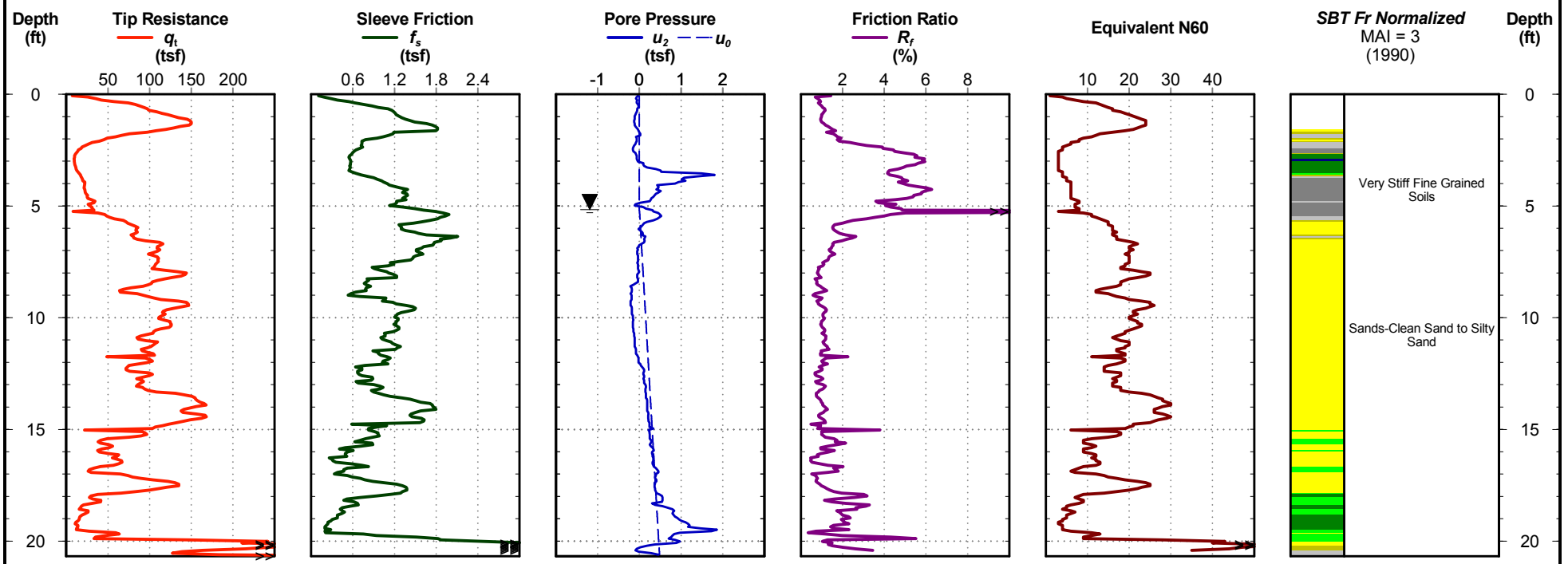
Total Depth: 21.6 ft
Note:
Cone Size: Geotech A B 10 cm2



Date: Jul. 19, 2012
Estimated Water Depth: 5.17 ft
Rig/Operator: JB

Northing:
Easting:
Elevation:

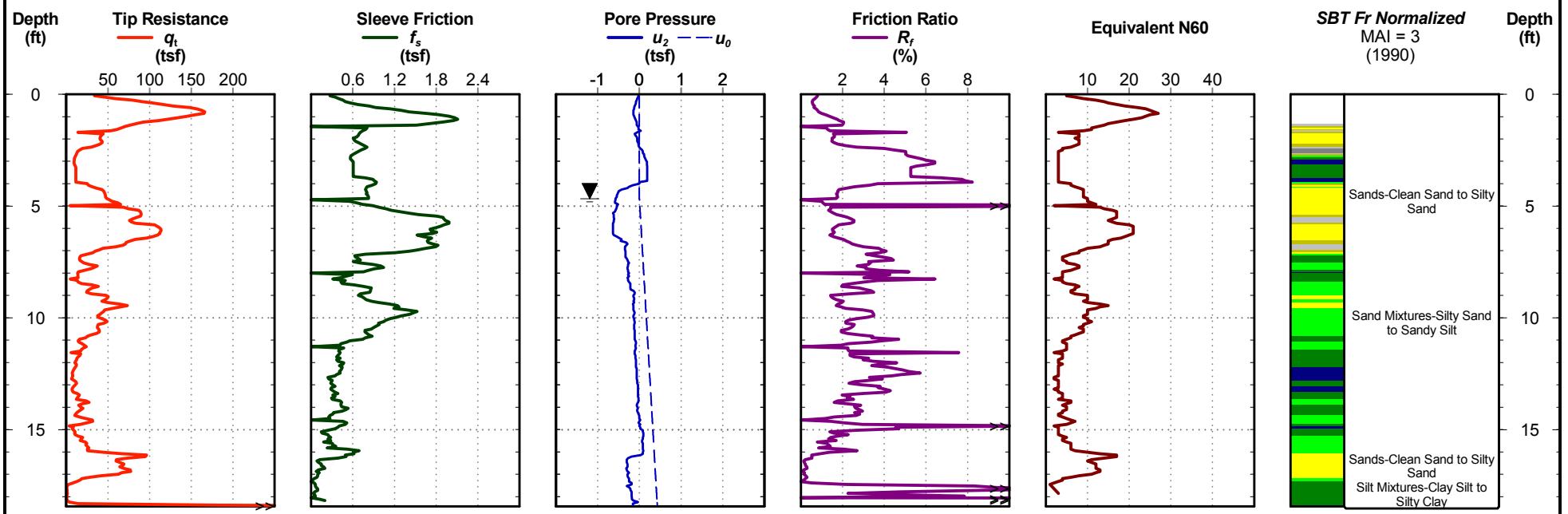
Total Depth: 20.7 ft
Note:
Cone Size: Geotech A B 10 cm2



Date: Jul. 19, 2012
Estimated Water Depth: 4.67 ft
Rig/Operator: JB

Northing:
Easting:
Elevation:

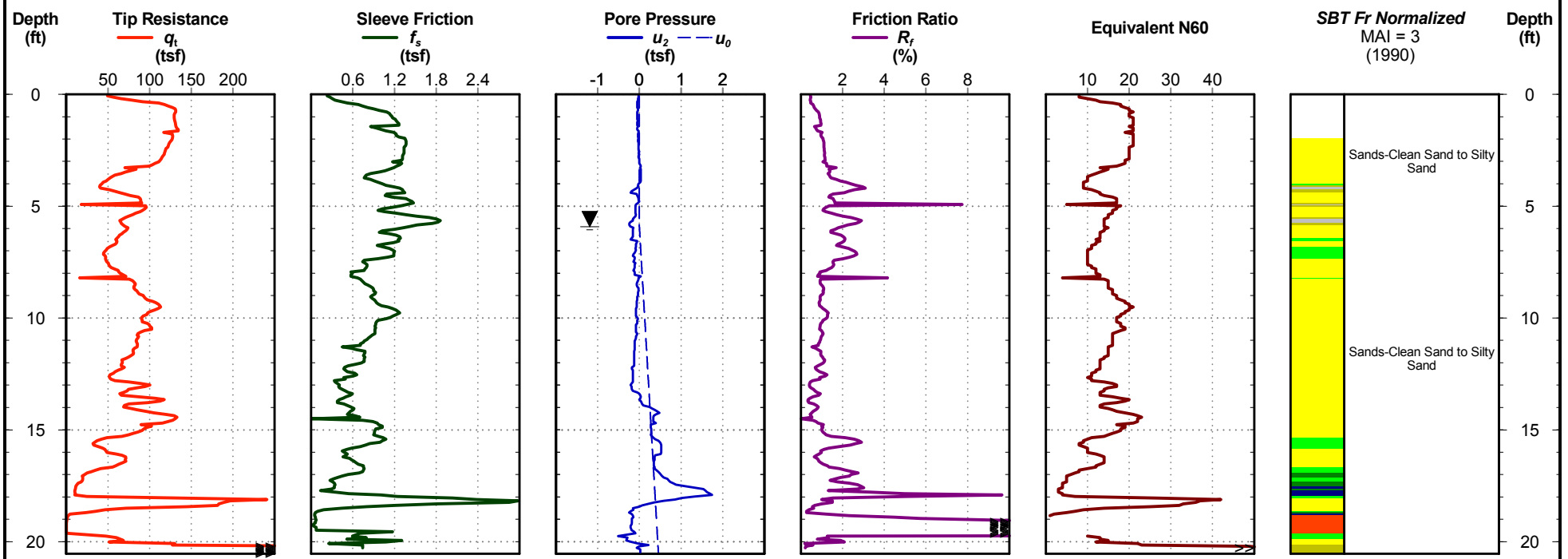
Total Depth: 18.4 ft
Note:
Cone Size: Geotech A B 10 cm2



Date: Jul. 19, 2012
Estimated Water Depth: 5.92 ft
Rig/Operator: JB

Northing:
Easting:
Elevation:

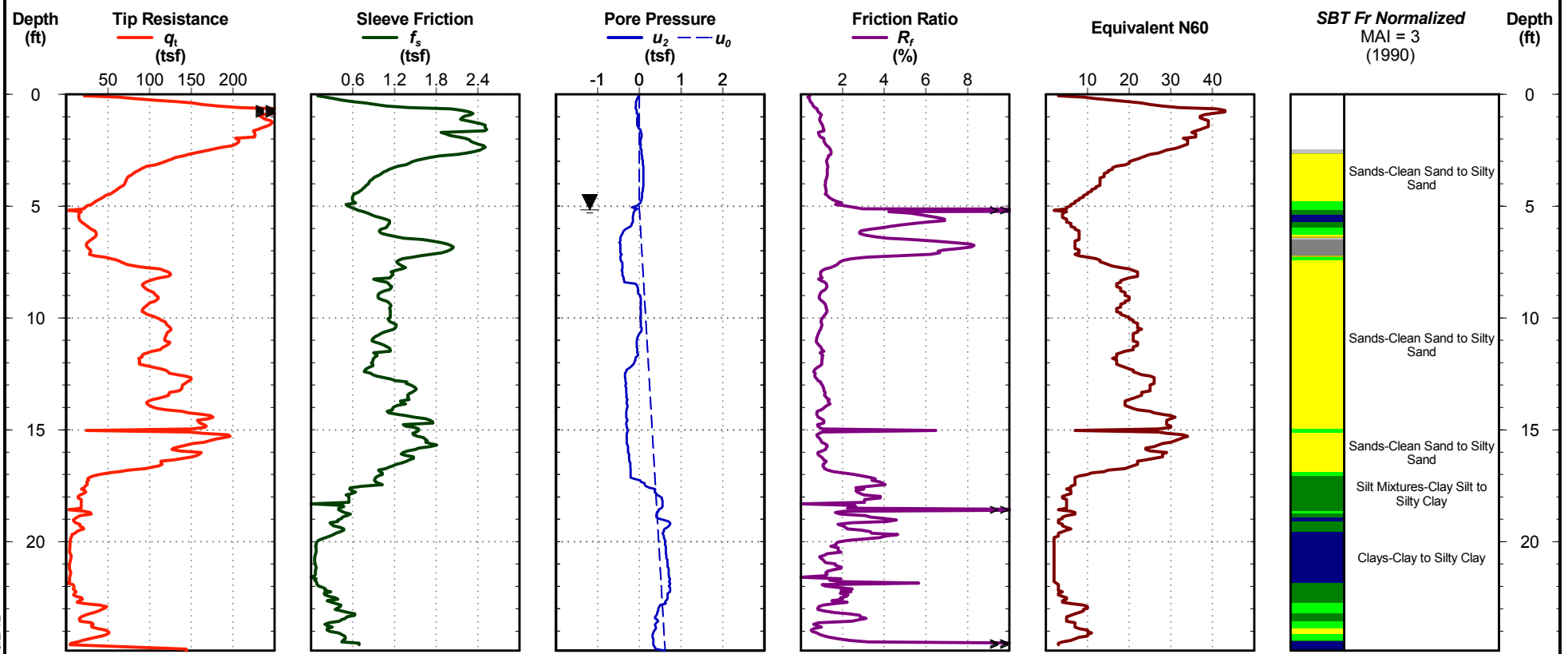
Total Depth: 20.5 ft
Note:
Cone Size: Geotech A B 10 cm2



Date: Jul. 19, 2012
Estimated Water Depth: 5.17 ft
Rig/Operator: JB

Northing:
Easting:
Elevation:

Total Depth: 24.9 ft
Note:
Cone Size: Geotech A B 10 cm2

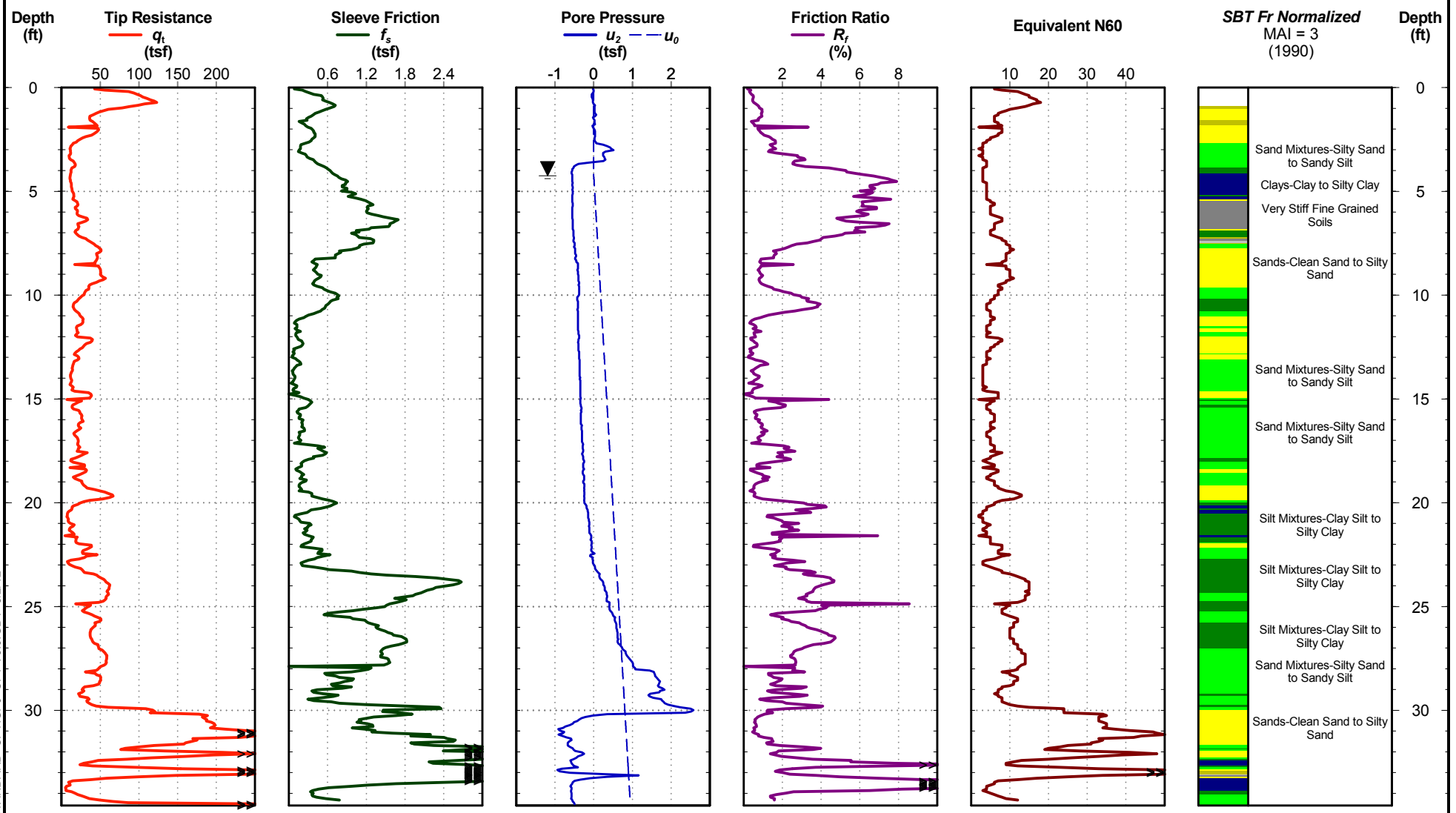


CPT REPORT - STANDARD_CPT.GPJ_CPT_V3.0.GDT_8/2/12

Date: Jul. 19, 2012
Estimated Water Depth: 4.25 ft
Rig/Operator: JB

Northing:
Easting:
Elevation:

Total Depth: 34.6 ft
Note:
Cone Size: Geotech A B 10 cm2



CPT REPORT - STANDARD_CPT.GPJ CPT V3.0.GDT 8/2/12

CPT Sounding ID C7

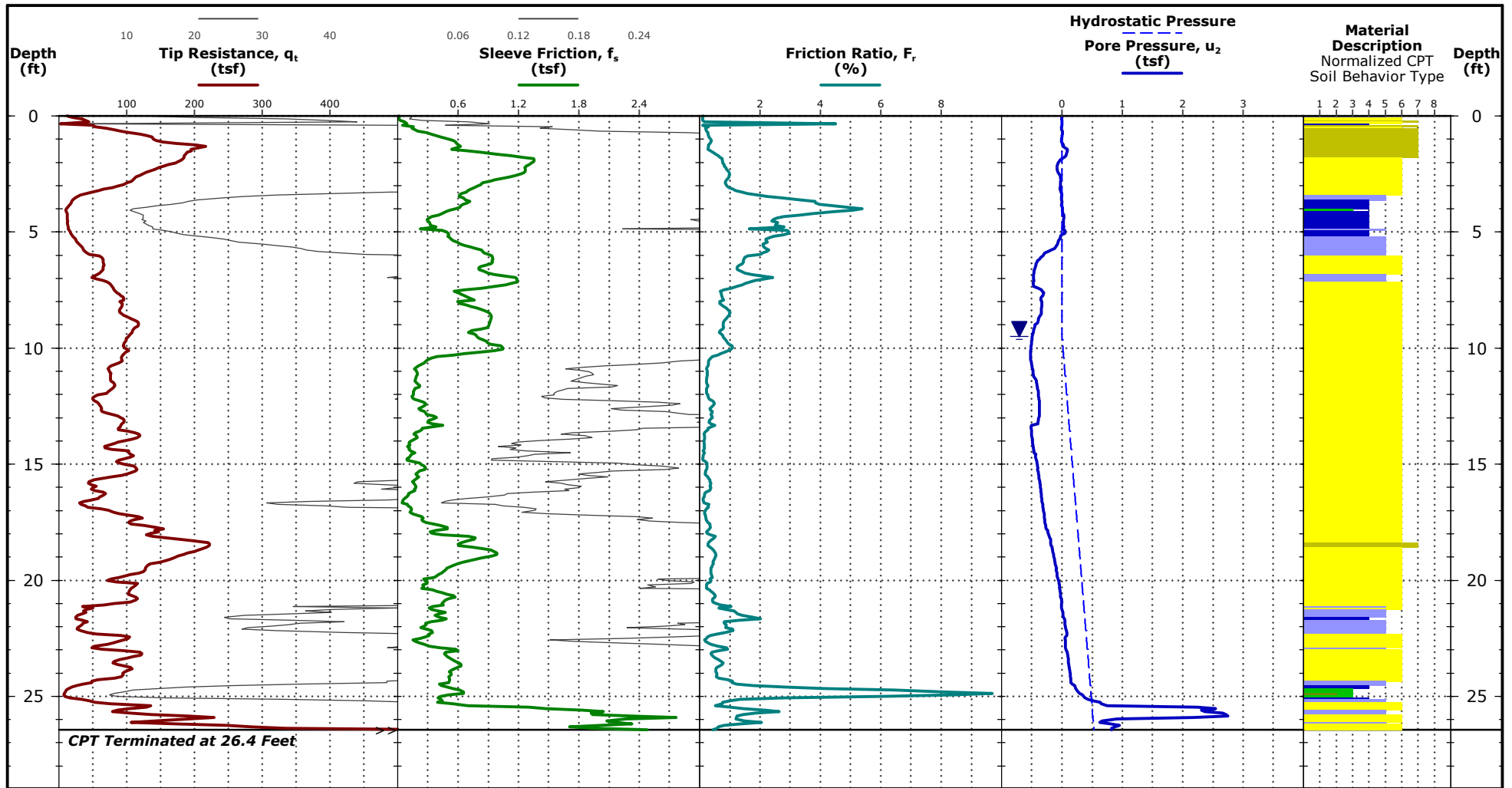
Latitude: 30.8766° Longitude: -81.7172°



2201 Rowland Ave
 Savannah, GA

CPT Started: 1/23/2026

CPT Completed: 1/23/2026



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.

Notes
 Test Location: See [Exploration Plan](#)

CPT Equipment
 CPT Rig: Geoprobe 6622
 Operator: AS
 CPT sensor calibration reports available upon request
 Probe No. 5712 with net area ratio of .85
 u_2 pore pressure transducer location
 Manufactured by Geotech A.B. - Calibrated 6/6/2025
 Tip and sleeve areas of 10 cm² and 150 cm²
 Ring friction reducer with O.D. of 2.0 in

Water Level Observation
 9.5 ft measured water depth
 (used in normalizations and correlations)

- Normalized Soil Behavior Type (Robertson 1990)**
- 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 Gravely sand to dense sand
 - 8 Very stiff sand to clayey sand
 - 9 Very stiff fine grained

CPT Sounding ID C8

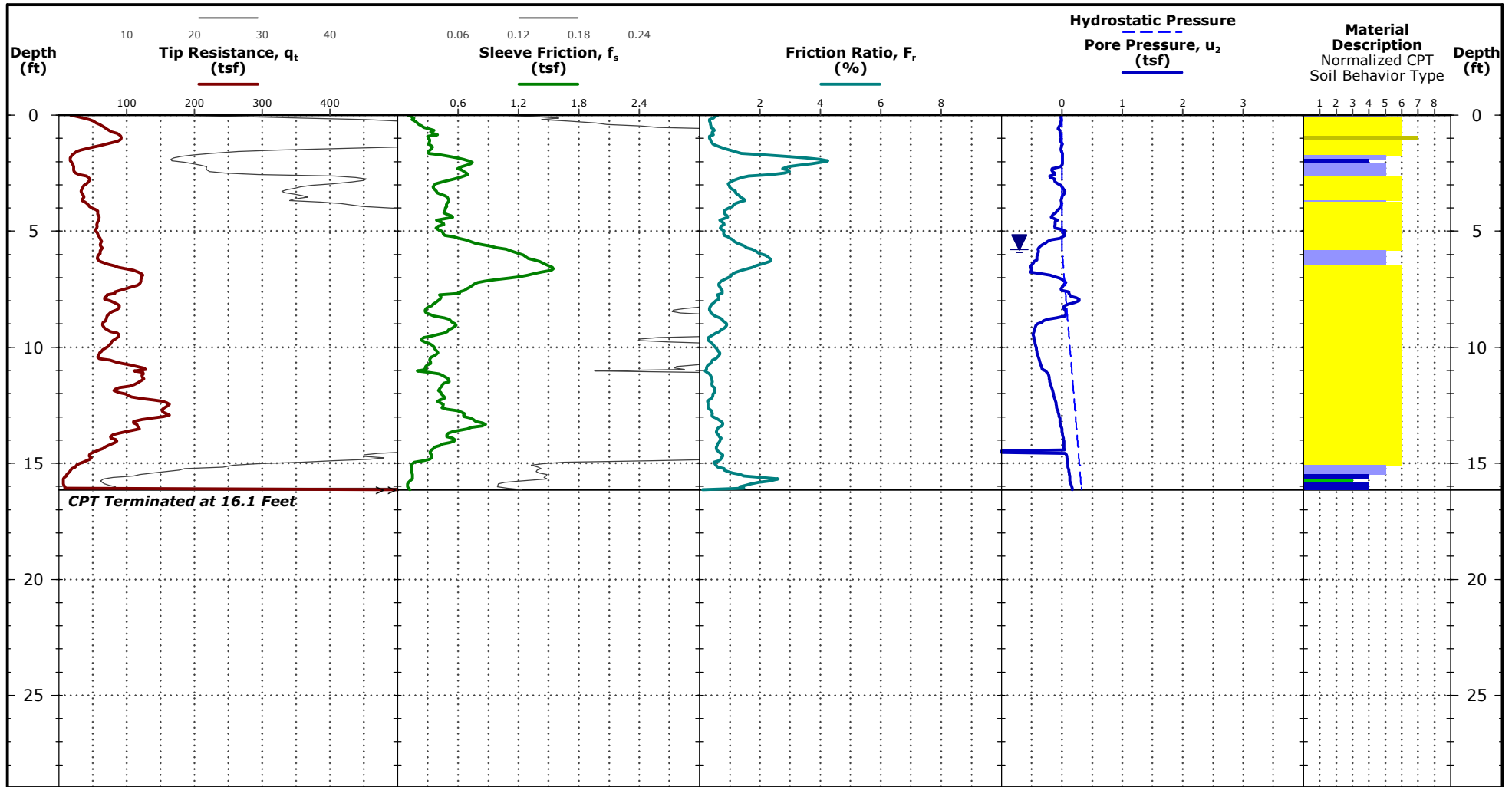
Latitude: 30.8658° Longitude: -81.7125°



2201 Rowland Ave
 Savannah, GA

CPT Started: 1/23/2026

CPT Completed: 1/23/2026



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.

Notes

Test Location: See [Exploration Plan](#)

CPT Equipment

CPT Rig: Geoprobe 6622
 Operator: AS
 CPT sensor calibration reports available upon request
 Probe No. 5712 with net area ratio of .85
 u_2 pore pressure transducer location
 Manufactured by Geotech A.B. - Calibrated 6/6/2025
 Tip and sleeve areas of 10 cm² and 150 cm²
 Ring friction reducer with O.D. of 2.0 in

Water Level Observation

▼ 5.8 ft measured water depth
 (used in normalizations and correlations)

Normalized Soil Behavior Type (Robertson 1990)

- 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

CPT Sounding ID C9

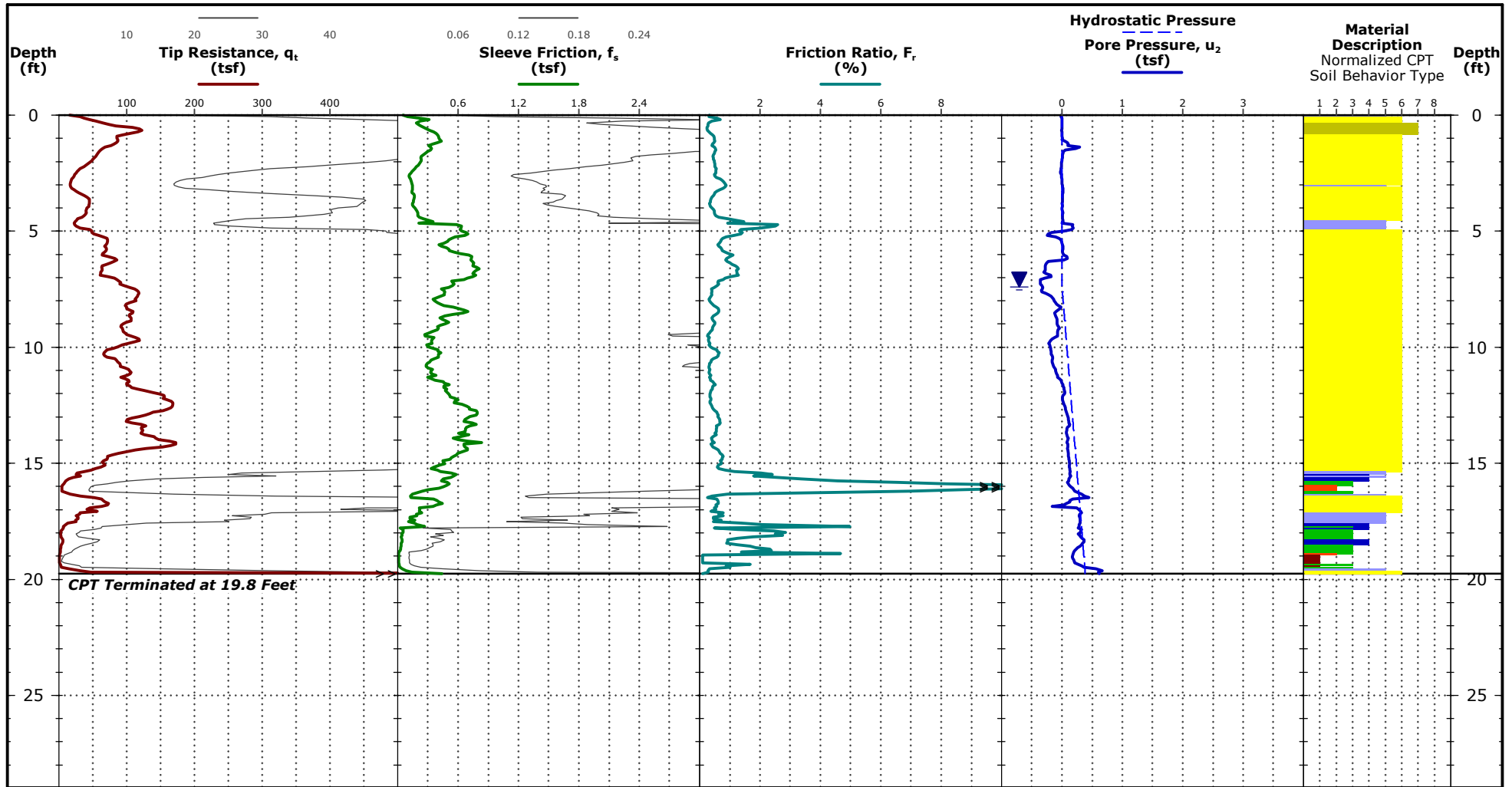
Latitude: 30.8545° Longitude: -81.7065°



2201 Rowland Ave
 Savannah, GA

CPT Started: 1/23/2026

CPT Completed: 1/23/2026



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.

Notes

Test Location: See [Exploration Plan](#)

CPT Equipment

CPT Rig: Geoprobe 6622
 Operator: AS
 CPT sensor calibration reports available upon request
 Probe No. 5712 with net area ratio of .85
 u_2 pore pressure transducer location
 Manufactured by Geotech A.B. - Calibrated 6/6/2025
 Tip and sleeve areas of 10 cm² and 150 cm²
 Ring friction reducer with O.D. of 2.0 in

Water Level Observation

▼ 7.4 ft estimated water depth
 (used in normalizations and correlations)

Normalized Soil Behavior Type (Robertson 1990)

- 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

CPT Sounding ID C10

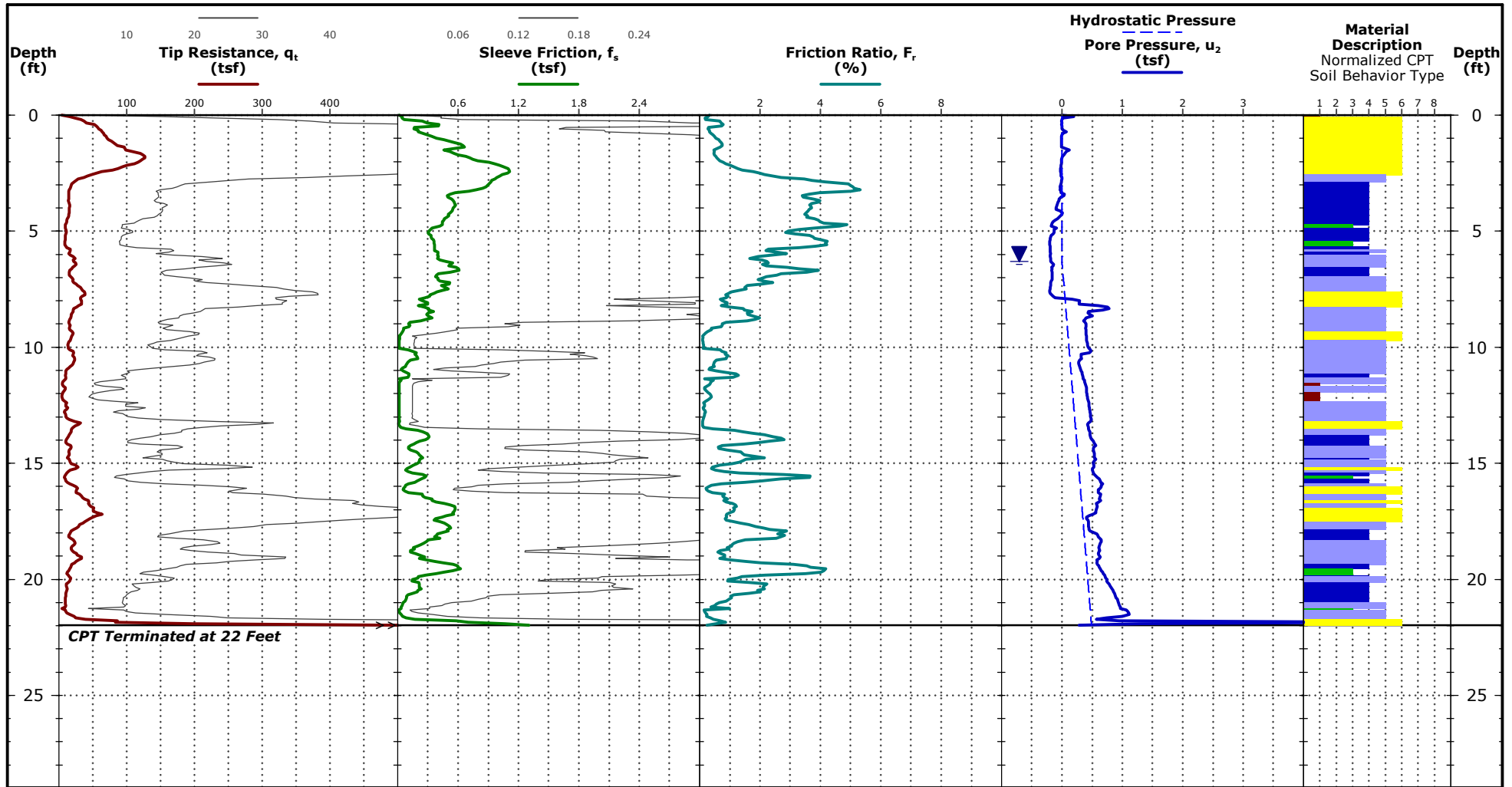
Latitude: 30.8323° Longitude: -81.7041°



2201 Rowland Ave
 Savannah, GA

CPT Started: 1/23/2026

CPT Completed: 1/23/2026



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.

Notes

Test Location: See [Exploration Plan](#)

CPT Equipment

CPT Rig: Geoprobe 6622
 Operator: AS
 CPT sensor calibration reports available upon request
 Probe No. 5712 with net area ratio of .85
 U₂ pore pressure transducer location
 Manufactured by Geotech A.B. - Calibrated 6/6/2025
 Tip and sleeve areas of 10 cm² and 150 cm²
 Ring friction reducer with O.D. of 2.0 in

Water Level Observation

▼ 6.3 ft measured water depth
 (used in normalizations and correlations)

Normalized Soil Behavior Type (Robertson 1990)

- 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

CPT Sounding ID C11

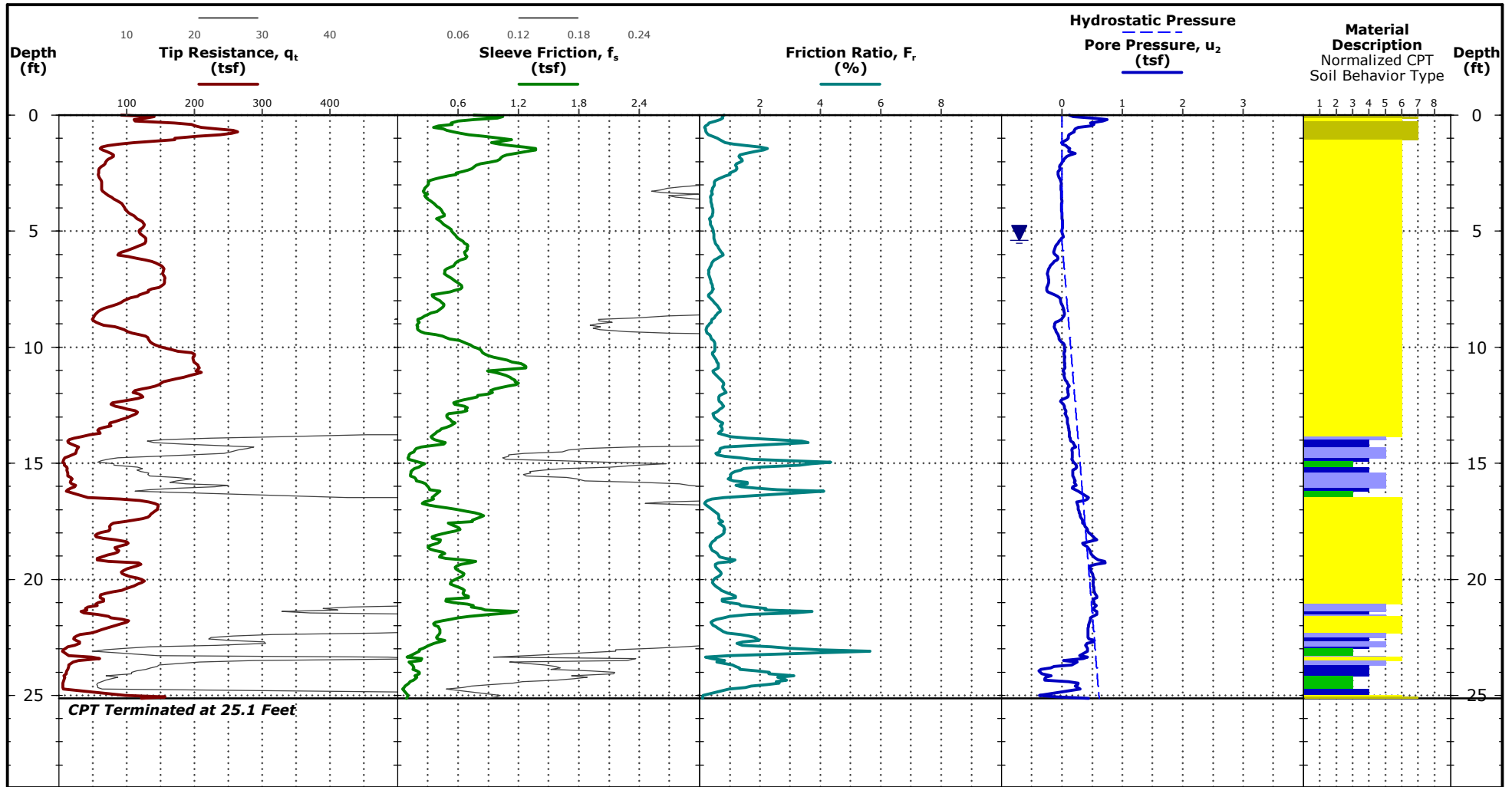
Latitude: 30.8268° Longitude: -81.7053°



2201 Rowland Ave
 Savannah, GA

CPT Started: 1/23/2026

CPT Completed: 1/23/2026



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.

Notes

Test Location: See [Exploration Plan](#)

CPT Equipment

CPT Rig: Geoprobe 6622
 Operator: AS
 CPT sensor calibration reports available upon request
 Probe No. 5712 with net area ratio of .85
 u_2 pore pressure transducer location
 Manufactured by Geotech A.B. - Calibrated 6/6/2025
 Tip and sleeve areas of 10 cm² and 150 cm²
 Ring friction reducer with O.D. of 2.0 in

Water Level Observation

▼ 5.4 ft estimated water depth
 (used in normalizations and correlations)

Normalized Soil Behavior Type (Robertson 1990)

- 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 Gravely sand to dense sand
- 8 Very stiff sand to clayey sand
- 9 Very stiff fine grained

Hand Auger Boring Log



Project Name: Kingsland Commerce Park

Project No.: ES125087

Project Location: Kingsland, Georgia

HA1		
Depth Below Grade (inch)	Material Description	USCS CLASSIFICATION
0 to 24	light brown fine SAND	SP
24 to 48	light brown/ white fine SAND	SP
48 to 60	light brown clayey SAND - moist	SC
No Groundwater encountered		No Mottling noted

HA2		
Depth Below Grade (inch)	Material Description	USCS CLASSIFICATION
0 to 60	light brown/ white fine SAND	SP
60 to 72	Light Brown ine SAND with Clay	SC
Refused @ 24" BGS due to concrete debris		
No Groundwater encountered		No Mottling noted

HA3		
Depth Below Grade (inch)	Material Description	USCS CLASSIFICATION
0 to 12	gray fine SAND	SP
12 to 24	gray clayey SAND	SC
24 to 60	gray/brown sandy CLAY - moist	CL
60 to 72	gray clayey SAND - saturated	SC
Groundwater @ 60" BGS		Mottling @ 48 " BGS

HA4		
Depth Below Grade (inch)	Material Description	USCS CLASSIFICATION
0 to 24	brown silty SAND with organics	SM
24 to 60	gray/brown sandy CLAY - wet	CL
Groundwater @ 60" BGS		Mottling @ 48 " BGS

Note: BGS = Below existing Ground Surface

Hand Auger Boring Log



Project Name: Kingsland Commerce Park

Project No.: ES125087

Project Location: Kingsland, Georgia

HA5		
Depth Below Grade (inch)	Material Description	USCS CLASSIFICATION
0 to 24	dark gray silty SAND with organics	SM
24 to 42	brown fine SAND with silt	SP-SM
42 to 48	light brown fine SAND with silt	SP-SM
48 to 72	light brown SAND with clay - moist	SP-SC
72 to 78	light brown SAND with clay - saturated	SP-SC
Groundwater @ 78" BGS		Mottling @ 48 " BGS

HA6		
Depth Below Grade (inch)	Material Description	USCS CLASSIFICATION
0 to 12	gray fine SAND	SP
12 to 30	light brown fine SAND	SP
30 to 36	light brown fine SAND with clay	SP-SC
36 to 72	light brown sandy CLAY	CL
No Groundwater encountered		No Mottling noted

HA7		
Depth Below Grade (inch)	Material Description	USCS CLASSIFICATION
0 to 12	gray fine SAND	SP
12 to 24	gray/brown fine SAND	SP
24 to 48	light brown fine SAND with clay	SP-SC
48 to 60	light brown fine SAND - moist	SP
No Groundwater encountered		No Mottling noted

HA8		
Depth Below Grade (inch)	Material Description	USCS CLASSIFICATION
0 to 12	dark gray fine SAND with organics	SP
12 to 24	light gray fine SAND	SP
24 to 54	gray sandy CLAY	CL
54 to 66	gray/ light brown clayey SAND - wet	SC
Groundwater @ 54" BGS		Mottling @ 54" BGS

Hand Auger Boring Log

Project Name: Kingsland Commerce Park

Project No.: ES125087

Project Location: Kingsland, Georgia



HA9		
Depth Below Grade (inch)	Material Description	USCS CLASSIFICATION
0 to 12	gray fine SAND with organics	SP
12 to 24	brown fine SAND	SP
24 to 42	light brown fine SAND with silt	SP-SM
42 to 54	brown sandy CLAY - moist	CL
54 to 60	brown sandy CLAY - wet	CL
Groundwater @ 54" BGS		Mottling @ 42" BGS

Boring Log No. HA-C7

Graphic Log	Location: See Exploration Plan Latitude: 30.8766° Longitude: -81.7172°	Depth (Ft.)	Water Level Observations	Sample Type	Percent Fines
Depth (Ft.)					
0.8	TOPSOIL , with grass, fine to medium grained, dark brown, dry, silty sand				
1.0	SILTY SAND (SM) , fine to medium grained, brown, dry	1			
2.0		2			23.5
3.0		3			
4.0	CLAYEY SAND (SC) , fine to medium grained, brown/orange, moist	4			
5.0	Boring Terminated at 5 Feet	5			

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.

Water Level Observations
 Groundwater not encountered
 Mottling encountered @ 3.3 ft BGS

Drill Rig
 Hand Auger

Driller
 MA

Notes


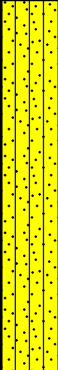

Advancement Method
 Manual hand auger

Logged by
 LV

Abandonment Method
 Boring backfilled with auger cuttings upon completion.

Boring Started
 01-16-2026
Boring Completed
 01-16-2026

Boring Log No. HA-C8

Graphic Log	Location: See Exploration Plan Latitude: 30.8658° Longitude: -81.7125° Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Percent Fines
	<p>TOPSOIL, with grass, fine to medium grained, dark brown, dry, silty sand</p>	1			
	<p>SILTY SAND (SM), fine to medium grained, brown, dry</p>	2			
	<p>CLAYEY SAND (SC), fine to medium grained, brown/orange, moist</p>	3			36.8
	<p>Boring Terminated at 5 Feet</p>	5			

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.

Water Level Observations
 Groundwater not encountered
 Mottling encountered @ 1.7 ft BGS

Drill Rig
 Hand Auger

Driller
 MA

Notes

Advancement Method
 Manual hand auger

Logged by
 LV

Abandonment Method
 Boring backfilled with auger cuttings upon completion.

Boring Started
 01-16-2026
Boring Completed
 01-16-2026

Boring Log No. HA-C9

Graphic Log	Location: See Exploration Plan Latitude: 30.8545° Longitude: -81.7065° Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Percent Fines
	TOPSOIL , with grass, fine to medium grained, dark brown, dry, silty sand	0.8			
	SILTY SAND (SM) , fine to medium grained, brown, dry dark brown	1			17.5
	CLAYEY SAND (SC) , fine to medium grained, brown/orange, moist	2.5			
		3			
		4			
		5.0			
	Boring Terminated at 5 Feet	5			

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.

Water Level Observations
 Groundwater not encountered
 Mottling encountered @ 2.5 ft BGS

Drill Rig
 Hand Auger

Driller
 MA

Notes

Advancement Method
 Manual hand auger

Logged by
 LV

Abandonment Method
 Boring backfilled with auger cuttings upon completion.

Boring Started
 01-16-2026
Boring Completed
 01-16-2026

Boring Log No. HA-C10

Graphic Log	Location: See Exploration Plan Latitude: 30.8323° Longitude: -81.7041° Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Percent Fines
	TOPSOIL , with grass, fine to medium grained, dark brown, dry, silty sand	0.8			
	SILTY SAND (SM) , fine to medium grained, brown, dry	2.0			
	CLAYEY SAND (SC) , fine to medium grained, brown/orange, moist	3.0			32.3
	Boring Terminated at 5 Feet	5.0			

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.

Water Level Observations
 Groundwater not encountered
 Mottling encountered @ 1.7 ft BGS

Drill Rig
 Hand Auger

Driller
 MA

Notes

Advancement Method
 Manual hand auger

Logged by
 LV

Abandonment Method
 Boring backfilled with auger cuttings upon completion.

Boring Started
 01-16-2026
Boring Completed
 01-16-2026

Boring Log No. HA-C11

Graphic Log	Location: See Exploration Plan Latitude: 30.8268° Longitude: -81.7053° Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Percent Fines
	TOPSOIL , with leaves, fine to medium grained, dark brown, dry, silty sand				
	0.7 CLAYEY SAND (SC) , fine to medium grained, brown/orange, moist	1			
	2.2 SILTY SAND (SM) , fine to medium grained, light brown, moist	2			14.3
	5.0 Boring Terminated at 5 Feet	3			
		4			
		5			

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.

Water Level Observations
 Groundwater not encountered
 Mottling encountered @ 0.8 ft BGS

Drill Rig
 Hand Auger

Driller
 MA

Notes

Advancement Method
 Manual hand auger

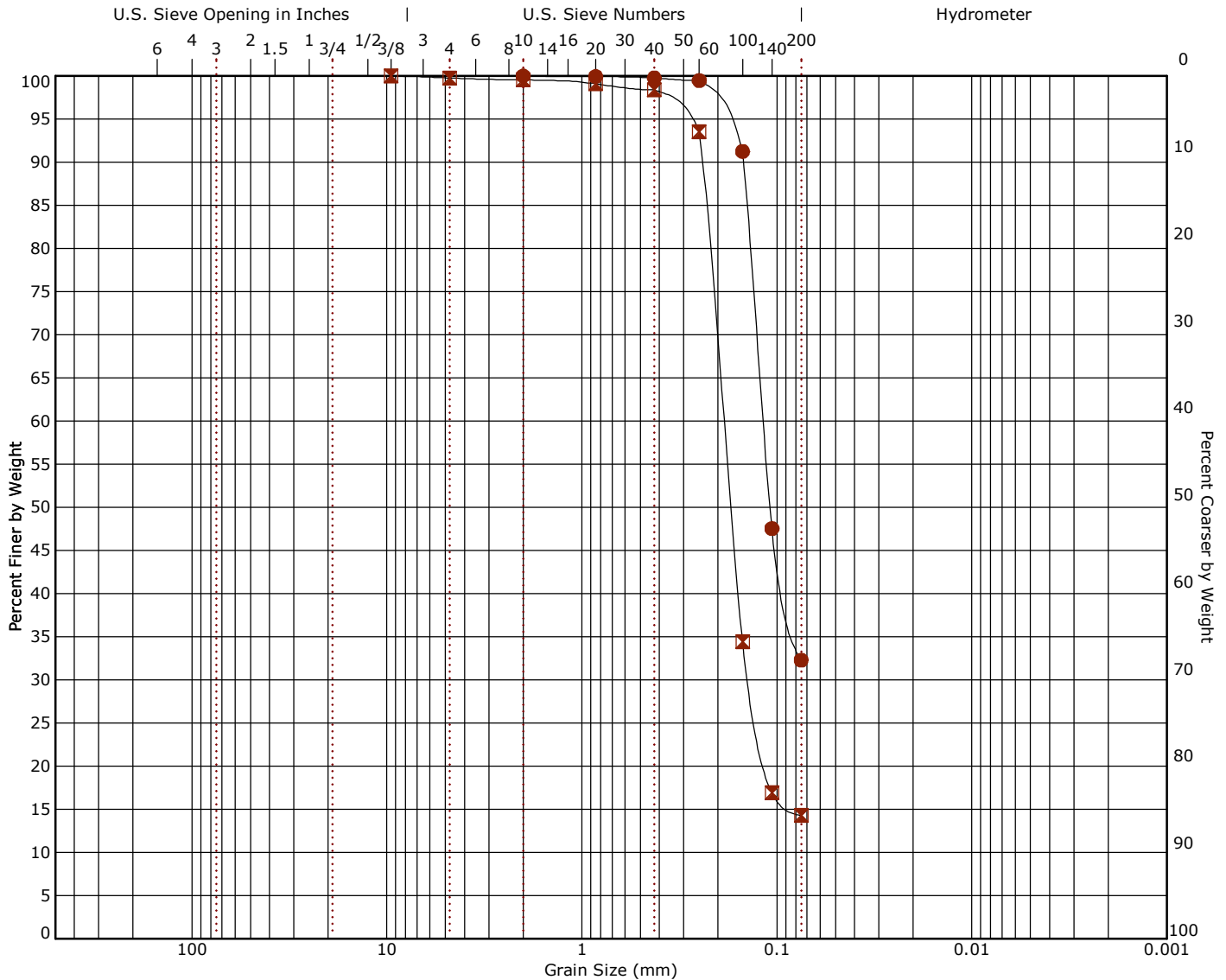
Logged by
 LV

Abandonment Method
 Boring backfilled with auger cuttings upon completion.

Boring Started
 01-16-2026
Boring Completed
 01-16-2026

Grain Size Distribution

ASTM D422 / ASTM C136 / AASHTO T27



	Cobbles	Gravel		Sand			Silt or Clay		USCS
		coarse	fine	coarse	medium	fine	% Silt	% Clay	
● HA-C10	0.0	0.0	67.7	32.3				SC	
☒ HA-C11	0.0	0.3	85.5	14.3				SC	

Description	●		☒				Grain Size		
	Sieve	% Finer	Sieve	% Finer	Sieve	% Finer		●	☒
● CLAYEY SAND	#10	100.0	3/8"	100.0			D ₆₀	0.117	0.187
☒ CLAYEY SAND	#20	99.93	#4	99.74					
	#40	99.76	#10	99.54			D ₁₀		
	#60	99.46	#20	99.08					
	#100	91.24	#40	98.38			Coefficients		
	#140	47.53	#60	93.55					
	#200	32.29	#100	34.45					
			#140	16.9			C _c		
			#200	14.29			C _u		

Preliminary Geotechnical Engineering Report

Coastal GA Commerce Park GRAD | Kingsland, Camden County, Georgia

February 4, 2026 | Terracon Project No. ES255233



Supporting Information

Contents:

CPT General Notes

General Notes

Unified Soil Classification System

Note: All attachments are one page unless noted above.

DESCRIPTION OF MEASUREMENTS AND CALIBRATIONS

To be reported per ASTM D5778:

- Uncorrected Tip Resistance, q_c
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
 $q_t = q_c + u_2(1 - a)$
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

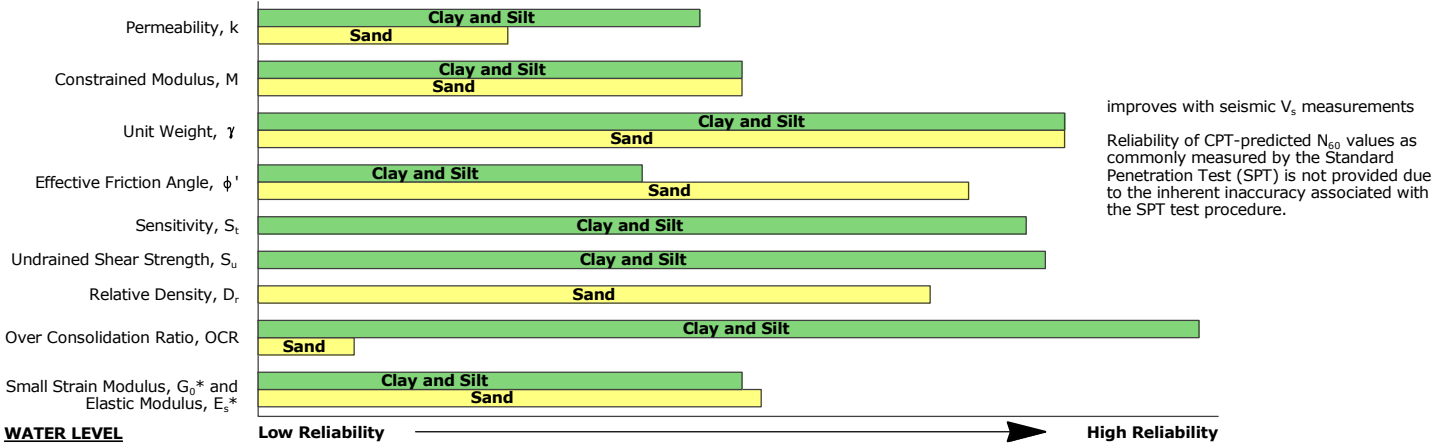
DESCRIPTION OF GEOTECHNICAL CORRELATIONS

- 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
 $\gamma = (0.27[\log(F_r)] + 0.36[\log(q_t/atm)] + 1.236) \times \gamma_{water}$
 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}
 $N_{60} = (q_t/atm) / 10^{(1.1268 - 0.2817I_c)}$
- Elastic Modulus, E_s (assumes $q/q_{ultimate} \sim 0.3$, i.e. FS = 3)
 $E_s(1) = 2.6\psi G_0$ where $\psi = 0.56 - 0.33\log Q_{tn, clean\ sand}$
 $E_s(2) = G_0$
 $E_s(3) = 0.015 \times 10^{(0.55I_c + 1.68)}(q_t - \sigma_{v0})$
 $E_s(4) = 2.5q_t$
- 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

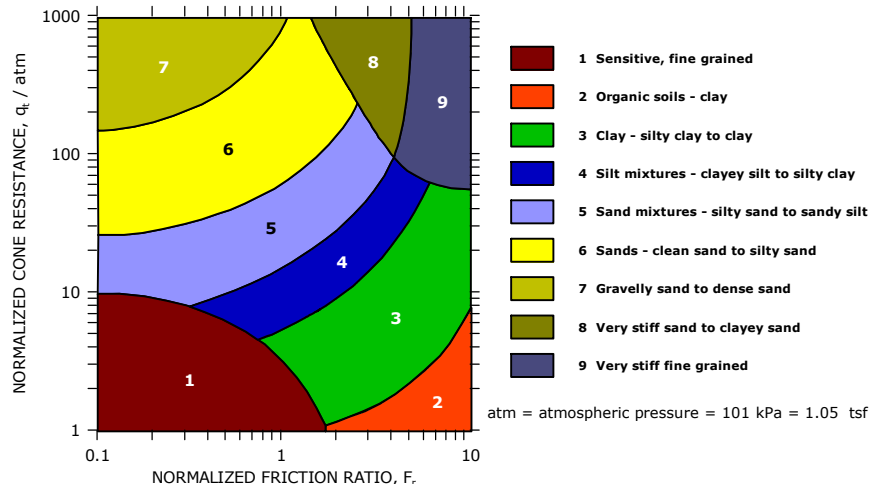
Estimated - Depth to water interpolated by the practitioner using pore pressure measurements in coarse grained soils and known site conditions

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

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General Notes

Sampling	Water Level	Field Tests
 Auger Cuttings	 Water Initially Encountered  Water Level After a Specified Period of Time  Water Level After a Specified Period of Time  Cave In Encountered 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 as noted on the soil boring logs is based Unified Soil Classification System. Where sufficient laboratory data exist to classify the soils consistent with ASTM D2487 "Classification of Soils for Engineering Purposes" this procedure is used. ASTM D2488 "Description and Identification of Soils (Visual-Manual Procedure)" is also used to classify the soils, particularly where insufficient laboratory data exist to classify the soils in accordance with ASTM D2487. In addition to USCS classification, coarse grained soils are classified on the basis of their in-place relative density, and fine-grained soils are classified on the basis of their consistency. See "Strength Terms" table below for details. The ASTM standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

Location And Elevation Notes

Exploration point locations as shown on the Exploration Plan and as noted on the soil boring logs in the form of Latitude and Longitude are approximate. See Exploration and Testing Procedures in the report for the methods used to locate the exploration points for this project. 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		
Relative Density	Standard Penetration or N-Value (Blows/Ft.)	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

Relevance of Exploration and Laboratory Test Results

Exploration/field results and/or laboratory test data contained within this document are intended for application to the project as described in this document. Use of such exploration/field results and/or laboratory test data should not be used independently of this document.

Unified Soil Classification System

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
		Gravels with Fines: More than 12% fines ^C	$Cu < 4$ and/or $[Cc < 1 \text{ or } Cc > 3.0]$ ^E	GP	Poorly graded gravel ^F
			Fines classify as ML or MH	GM	Silty gravel ^{F, G, H}
	Sands: 50% or more of coarse fraction passes No. 4 sieve	Clean Sands: Less than 5% fines ^D	Fines classify as CL or CH	GC	Clayey gravel ^{F, G, H}
			$Cu \geq 6$ and $1 \leq Cc \leq 3$ ^E	SW	Well-graded sand ^I
		Sands with Fines: More than 12% fines ^D	$Cu < 6$ and/or $[Cc < 1 \text{ or } Cc > 3.0]$ ^E	SP	Poorly graded sand ^I
Fines classify as ML or MH	SM		Silty 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 above "A" line ^J	CL	Lean clay ^{K, L, M}
			PI < 4 or plots below "A" line ^J	ML	Silt ^{K, L, M}
		Organic:	$\frac{LL \text{ oven dried}}{LL \text{ not dried}} < 0.75$	OL	Organic clay ^{K, L, M, N} 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:	$\frac{LL \text{ oven dried}}{LL \text{ not dried}} < 0.75$	OH	Organic clay ^{K, L, M, P} 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 $Cu = D_{60}/D_{10}$ $Cc =$

^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 ≥ 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.

