NORTH WALTERBORO SEWER IMPROVEMENTS
PHASE I GRAVITY

PREPARED FOR:

COLLETON COUNTY, SOUTH CAROLINA

T&H PROJECT NO.
J-29851.0000

ADDENDUM NO. 001 **2/13/2025**

This Addendum forms a part of the Contract Documents and hereby modifies them as follows:

- A non-mandatory Pre-Bid Meeting will be held via Microsoft Teams on February 20, 2025, at 3:00 P.M., meeting information shown below:

  Microsoft Teams Need help?
  Join the meeting now
  Meeting ID: 279 940 710 008
  Passcode: DU6UK9e3

  Dial in by phone
  +1 872-703-0381,,750492756# United States, Chicago
  Find a local number
  Phone conference ID: 750 492 756#

- Section 02 30 00 Subsurface Investigation which will include a Geotechnical Engineering Report performed by Terracon Consultants

Ross Oakley, P.E.
Project Manager

End of ADDENDUM NO. 001

SECTION 02 30 00

SUBSURFACE INVESTIGATION

SECTION 02 30 00

SUBSURFACE INVESTIGATION

PART 1 – GENERAL

1.1 DESCRIPTION

A. This section includes subsurface data logs for information only.

1.2 SOIL INVESTIGATION DATA

A. Subsurface data logs are available for information only. Actual conditions may vary. If bidders are not satisfied with accuracy and completeness of all available data, they are at liberty to make borings or perform soil investigation work for their own use at its expense. If Contractor chooses to perform their own investigation, work shall be coordinated with the Engineer. Any results from Contractor's investigation shall be shared promptly with the Engineer. Owner reserves the right to share Contractor's investigation data with other potential bidders if information could affect bidding process.

B. The boring logs and test results are for information of the Contractor. Owner and Engineer assume no responsibility for the information.

PART 2 – PRODUCTS

See attached report.

PART 3 – EXECUTION

None this Section.

END OF SECTION

Geotechnical Engineering Report

Colleton Mega Site Sewer
Colleton County, South Carolina
September 21, 2022
Terracon Project No. EN225002

Prepared for:
Thomas & Hutton
Columbia, South Carolina

Prepared by:
Terracon Consultants, Inc.
Charleston, South Carolina

September 21, 2022

Thomas & Hutton
1501 Main Street, Suite 760
Columbia, South Carolina 29201

Attn: Mr. Ross Oakley
P: (803) 451-6780
E: oakley.r@tandh.com

Re: Geotechnical Engineering Report
Colleton Mega Site Sewer
Bells Highway
Colleton County, South Carolina
Terracon Project No. EN225002

Dear Mr. Oakley:

We have completed the Geotechnical Engineering services for the above referenced project. This study was performed in general accordance with Terracon Proposal No. PEN225002 dated January 4, 2022. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the construction of sewer lines for the proposed 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.

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER No. 30792 9/21/2022 THOMAS C. SMOAK, III

Caroline Whigham, E.I.T.
Staff Engineer

Thomas C. Smoak, III, P.E.
Geotechnical Department Manager
SC Registration No. 30792

SOUTH CAROLINA TERRACON CONSULTANTS, INC. No. 2220 CERTIFICATE OF AUTHORIZATION

REPORT TOPICS

Note: This report was originally delivered in a web-based format. For more interactive features, please view your project online at client.terracon.com.

ATTACHMENTS

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

Geotechnical Engineering Report

Colleton Mega Site Sewer
Bells Highway
Colleton County, South Carolina

Terracon Project No. EN225002
September 21, 2022

INTRODUCTION

This report presents the results of our subsurface exploration and geotechnical engineering services performed for the proposed Colleton County Site Sewer Project to be located near Bells Highway in Colleton County, South Carolina. The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil conditions
- Groundwater conditions
- Site preparation and earthwork
- Excavation considerations
- Dewatering considerations
- Lateral earth pressures

The geotechnical engineering scope of work for this project included the advancement of in-situ tests consisting of one (1) Seismic Cone Penetration Test (SCPT) and nineteen (19) Cone Penetration Test (CPT) soundings to depths ranging from approximately 15 to 41 feet below existing site grades. Adjacent to each in situ sounding, a Hand Auger Boring was advanced to a depth of 4 feet.

Maps showing the site and sounding test locations are presented in the **Site Location** and **Exploration Plan** sections, respectively, and logs of the soundings/borings are included in the **Exploration Results** section in the appendix of this ***GeoReport***.

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	The proposed pump station and sewer lines will generally be located along Bells Highway south towards Ivanhoe Road Colleton County, South Carolina. ■ The approximate center of the sewer line segment is located at 32.92311°, -80.68622° For additional location information see **Site Location** and **Exploration Plan** sections.
Existing Improvements	The areas of the proposed sewer lines are generally located on the shoulder of roadways and through grassed or wooded areas. The proposed pump station is located in a grassed area.
Current Ground Cover	Varies. Generally, the ground cover included grass, trees, and underbrush in the subject section.
Existing Topography	Relatively flat based on visual observations.

PROJECT DESCRIPTION

Our final understanding of the project conditions is as follows:

Item	Description
Information Provided	Site plans and proposed location of the sewer alignment were provided by Ross Oakley with Thomas & Hutton.
Project Description	The project consists of the construction and installation of a 10” force main with three directional drills at wet land crossings, ranging from approximately 500 to 2,000 feet in length, and a 16” gravity main which will be installed using open cut methods. We understand that the gravity lines will bear at depths from approximately 5 to 10 feet below grade. A new pump station wet well will be constructed and will bear between 25 to 30 feet below existing grade.

GEOTECHNICAL CHARACTERIZATION

Subsurface Profile

The geotechnical characterization forms the basis of our geotechnical evaluation of site preparation and utility installation. As noted in **General Comments**, the characterization is based upon widely spaced exploration points across the site, and variations are possible.

Pump Station Subsurface Conditions

Generalized Subsurface Conditions at Pump Station (SCPT-1)

Description	Approximate Depth to Bottom of Stratum	Material Encountered [1]
Surface	8 inches	Topsoil [2]
Stratum 1	8 feet	Soft to medium stiff silty clay to clay with interbedded sand layers
Stratum 2	14 feet	Loose to medium dense silty sand to clayey sand
Stratum 3	37 feet	Soft to medium stiff silty clay to clay with interbedded sand layers
Stratum 4	38 feet [3]	Dense sand

1. Material descriptions are based on visual classification from HAB samples and correlations with in-situ data.
2. The thickness of topsoil is **variable** as described under Site Preparation.
3. Refusal depth of deepest sounding.

HDD Subsurface Conditions

Generalized Subsurface Conditions at HDD #1 (CPT-2 and CPT-3)

Description	Approximate Depth to Bottom of Stratum	Material Encountered [1]
Surface	6 to 8 inches	Topsoil [2]
Stratum 1	2 ½ feet	Loose to medium dense silty sand to clayey sand
Stratum 2	21 feet	Soft to stiff silty clay to clay with interbedded sand layers
Stratum 3	25 feet [3]	Dense sand

1. Material descriptions are based on visual classification from HAB samples and correlations with in-situ data.
2. The thickness of topsoil is **variable** as described under Site Preparation.
3. Refusal depth of deepest sounding.

Generalized Subsurface Conditions at HDD #2 (CPT-4 and CPT-5)

Description	Approximate Depth to Bottom of Stratum	Material Encountered [1]
Surface	8 to 11 inches	Topsoil [2]
Stratum 1	17 feet	Loose to very dense silty sand to clayey sand
Stratum 2	25 feet	Medium stiff silty clay to clay with interbedded sand layers
Stratum 3	40 feet [3]	Medium stiff to stiff clayey to sandy silt (Hawthorn Marl Formation[4])

1. Material descriptions are based on visual classification from HAB samples and correlations with in-situ data.
2. The thickness of topsoil is **variable** as described under Site Preparation.
3. Termination depth of deepest sounding.
4. The Hawthorn Marl is an Eocene aged soil deposit that underlies portions of Colleton County and is considered the basement layer for geotechnical design. ..

Generalized Subsurface Conditions at HDD #3 (CPT-6 and CPT-7)

Description	Approximate Depth to Bottom of Stratum	Material Encountered [1]
Surface	0 to 8 inches	Topsoil [2]
Stratum 1	5 feet	Loose to medium dense silty sand to clayey sand
Stratum 2	20 to 38 feet	Soft to medium stiff silty clay to clay with interbedded sand layers
Stratum 3	41 feet [3]	Medium stiff to stiff clayey to sandy silt (Hawthorn Marl Formation[4,5])

1. Material descriptions are based on visual classification from HAB samples and correlations with in-situ data.
2. The thickness of topsoil is **variable** as described under Site Preparation.
3. Termination depth of deepest sounding.

   The Hawthorn Marl is an Eocene aged soil deposit that underlies portions of Colleton County and is considered the basement layer for geotechnical design.
4. The depth of the Hawthorn Marl Formation ranged from approximately 20 to 38 feet. Grading information was not provided to Terracon at the time if this report, however the variation in Hawthorn Marl depth may be to elevation change.

Gravity Main Subsurface Conditions

Generalized Subsurface Conditions for Gravity Main from Heirs Corner Road to Ann Court (CPT-8, CPT-9, CPT-10, and CPT-11)

Description	Approximate Depth to Bottom of Stratum	Material Encountered [1]
Surface	0 to 24 inches	Topsoil, Silty sand with aggregate base course and crushed asphalt [2]
Stratum 1	7 feet	Loose to medium dense silty sand to clayey sand
Stratum 2	15 feet	Medium stiff silty clay to clay with interbedded sand layers
Stratum 3	21 feet [3]	Medium dense silty sand to sand

1. Material descriptions are based on visual classification from HAB samples and correlations with in-situ data.
2. The thickness of surface material is **variable** as described under Site Preparation.
3. Termination depth of deepest sounding.

Generalized Subsurface Conditions for Gravity Main from Forest Circle to Ireland Hills Drive (CPT-12, CPT-13, CPT-14, CPT-15, and CPT-16)

Description	Approximate Depth to Bottom of Stratum	Material Encountered [1]
Surface	8 to 12 inches	Topsoil, Aggregate Base Course[2]
Stratum 1	7 feet	Loose to medium dense silty sand to clayey sand
Stratum 2	41 feet [3]	Medium stiff silty clay to clay with interbedded sand layers

1. Material descriptions are based on visual classification from HAB samples and correlations with in-situ data.
2. The thickness of surface material is **variable** as described under Site Preparation. Aggregate Base Course was only encountered in HAB @ CPT-16.
3. Termination depth of deepest sounding.

Generalized Subsurface Conditions for Gravity Main from Ireland Hills Drive to West Washington Street (CPT-17 and CPT-18)

Description	Approximate Depth to Bottom of Stratum	Material Encountered [1]
Surface	6 to 8 inches	Topsoil[2]
Stratum 1	5 feet	Soft to medium stiff silty clay with interbedded silty to clayey sand
Stratum 2	11 feet	Medium dense to dense silty sand
Stratum 3	15 feet	Soft silty clay to clay
Stratum 4	21 feet [3]	Medium dense silty sand to sand with interbedded clay

1. Material descriptions are based on visual classification from HAB samples and correlations with in-situ data.
2. The thickness of topsoil is **variable** as described under Site Preparation.
3. Termination depth of deepest sounding.

Generalized Subsurface Conditions for Gravity Main from West Washington Street to End of Proposed Sewer Alignment (CPT-19 and CPT-20)

Description	Approximate Depth to Bottom of Stratum	Material Encountered [1]
Surface	7 to 16 inches	Topsoil, Aggregate Base Course[2]
Stratum 1	2 feet	Loose to medium dense silty sand to clayey sand
Stratum 2	8 feet	Medium stiff silty clay to clay
Stratum 3	15 feet [3]	Medium dense to dense sand

1. Material descriptions are based on visual classification from HAB samples and correlations with in-situ data.
2. The thickness of surface material is **variable** as described under Site Preparation. Aggregate Base Course was only encountered in HAB @ CPT-20.
3. Termination depth of deepest sounding.

Conditions encountered at each boring location are indicated on the individual boring logs shown in the **Exploration Results** section and are attached to this report. Stratification boundaries on the boring logs represent the approximate location of changes in native soil types; in situ, the transition between materials may be gradual.

Groundwater Conditions

At the time of our exploration, groundwater was encountered and estimated at depths generally ranging from approximately 1 to 13 feet below the existing ground surface. The ground water depths were determined by measuring the water table depth in the voids left by in situ testing and

by estimating the hydrostatic line (height of water below the ground surface) on the penetrometer porewater pressure (U) graph in the CPT log and measured in the hand auger borings.

The water levels as observed during field exploration are summarized in the following table and noted on the attached in situ and boring logs, in **Exploration Results**:

Test	Depth to Groundwater within Voids left from CPT/DMT Testing	Estimated Depth to Groundwater based on CPT Pore Pressure Data	Depth to Groundwater in Adjacent Hand Auger Boring
SCPT-1	3.5 ft.	3.5 ft.	Not Encountered
CPT-2	Cave in at 1.0 ft.	5.0 ft.	3.3 ft.
CPT-3	6.1 ft.	6.1 ft.	Not Encountered
CPT-4	Cave in at 5.0 ft.	7.0 ft.	Not Encountered
CPT-5	5.3 ft.	5.3 ft.	Not Encountered
CPT-6	1.0 ft.	1.0 ft.	0.8 ft.
CPT-7	2.4 ft.	2.4 ft.	Not Encountered
CPT-8	Cave in at 4.0 ft.	5.0 ft.	4.0 ft.
CPT-9	Cave in at 4.0 ft.	5.0 ft.	Not Encountered
CPT-10	Cave in at 4.4 ft.	5.0 ft.	Not Encountered
CPT-11	Cave in at 1.5 ft.	5.0 ft.	3.8 ft.
CPT-12	11.3 ft.	11.3 ft.	Not Encountered
CPT-13	12.6 ft.	12.6 ft.	Not Encountered
CPT-14	4.2 ft.	4.2 ft.	Not Encountered
CPT-15	1.6 ft.	1.6 ft.	4.0 ft.
CPT-16	3.3 ft.	3.3 ft.	0.5 ft.
CPT-17	2.3 ft.	2.3 ft.	Not Encountered
CPT-18	2.5 ft.	2.5 ft.	2.3 ft.
CPT-19	5.6 ft.	5.6 ft.	Not Encountered
CPT-20	4.3 ft.	4.3 ft.	Not Encountered

At some of the test locations, fine-grained soils located near the existing ground surface may drain poorly during and after periods of heavy rainfall. Based on this information, we anticipate the possibility for “perched” groundwater conditions during wet months. A “perched” groundwater table occurs when water collects above low permeability soils, such as the silts and clays located within several feet of the ground surface. During heavy rainfall periods, water will tend to move laterally across the site and collect in low-lying areas before it slowly descends into the groundwater table.

Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff and other factors not evident at the time the borings were performed. Therefore, groundwater levels during construction or at other times in the life of the structure may be higher or lower than

the levels indicated on the logs. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project. The groundwater surface should be checked prior to construction to assess its effect on site work and other construction activities.

Groundwater levels were measured using the following criteria:

- Physical observation within hand auger boring (HAB) testing depth.
- Where not physically encountered in HABs, groundwater levels are measured using an electronic water level meter within the voids ("borehole") left by cone penetration tests (CPT).
- Where hole collapse does not allow for measurement within CPT voids, groundwater levels are estimated using the hydrostatic line (height of water below the ground surface) on the CPT porewater pressure (U) graph shown on the CPT logs.
- Unless otherwise specified on the logs or in the report, all groundwater measurements are collected during or immediately after drilling.

SEISMIC CONSIDERATIONS

The seismic design requirements for buildings and other structures are based on Seismic Design Category. Site Classification is required to determine the Seismic Design Category for a structure. The Site Classification is based on the upper 100 feet of the site profile defined by a weighted average value of either shear wave velocity, standard penetration resistance, or undrained shear strength in accordance with Section 20.3 and Table 20.3-1 of ASCE 7-16.

Note that the scope of services did not include site profile determination to a depth of 100 feet. Explorations for this project extended to a maximum depth of 38 feet, and based on our knowledge of these soils, we assume the soils encountered at the deepest test depth (Hawthorn Marl Formation) extend to at least 100 feet in depth.

Seismic Evaluation

According to the International Building Code 2018 edition (2018 IBC), the design earthquake has a 50-year exposure period with a 2% probability of exceedance (i.e. a 2500-year design earthquake) with a Moment Magnitude (Mw) of 7.3. Due to the high seismicity of the Coastal Plain of South Carolina, we performed a liquefaction potential analysis to evaluate the stability of the soils. The seismic evaluation of the site indicates the liquefaction hazard at the site is negligible. Based on an average weighted shear wave velocity of 977 feet per second, the site's 2018 International Building Code (IBC) seismic site classification is **Site Class D** and the following seismic design parameters can be used for this site:

Code Used	Site Classification
2018 International Building Code (IBC) [1]	**D** [2]
Seismic Design Parameter	**Value**
F_a	1.269
F_v	2.200
F_{PGA}	1.197
S_{DS}	0.562 g
S_{D1}	0.293 g
PGA_M [3]	0.482 g

1. In general accordance with the 2018 International Building Code and ASCE 7-16 Table 20.3-1.
2. Based upon the average weighted shear wave velocity of 977 feet per second at this site.
3. Based on procedures outlined in ASCE 7-16 for geotechnical hazards.

SOIL DESIGN PARAMETERS FOR HDD LOCATIONS

Soil Design Parameters – HDD-1 (CPT-2 and CPT-3)

Stratum	Depth (Feet)	Average N_{60}	Total/Effective Unit Weight (pcf)	Estimated Cohesion (psf)	Estimated Friction Angle (degrees)
1	0 to 2 ½	10	115/52.6	n/a	32
2	2 ½ to 21	7	110/47.6	1,200	n/a
3	12 to 25[1]	55	120/57.6	n/a	36

1. Refusal depth of deepest sounding

Soil Design Parameters – HDD-2 (CPT-4, CPT-4A, and CPT-5)

Stratum	Depth (Feet)	Average N_{60}	Total/Effective Unit Weight (pcf)	Estimated Cohesion (psf)	Estimated Friction Angle (degrees)
1	0 to 17	25	115/52.6	n/a	32
2	17 to 25	8	110/47.6	1,200	n/a
3	25 to 40[1]	15	120/57.6	2,600	n/a

1. Termination depth of deepest sounding

Soil Design Parameters – HDD-3 (CPT-6 and CPT-7)

Stratum	Depth (Feet)	Average N_{60}	Total/Effective Unit Weight (pcf)	Estimated Cohesion (psf)	Estimated Friction Angle (degrees)
1	0 to 5	15	115/52.6	n/a	34
2	5 to 20-38	5	110/47.6	600	n/a
3	20-38 to 41[1]	15	120/57.6	2,600	n/a

1. Termination depth of deepest sounding

EARTHWORK FOR GRAVITY MAIN & PUMP STATION

Earthwork for utility construction is anticipated to include clearing and grubbing, excavations and fill placement. The following sections provide recommendations for use in the preparation of specifications for the work.

Drainage/Erosion Control Plan

A drainage plan should be established and implemented prior to beginning earthwork operations to ensure surficial runoff and groundwater is adequately controlled and the construction areas remain free from standing water. During periods of heavy rainfall, this condition can result in a significant inflow of water (from both surface and groundwater sources) into the low-lying areas of the site,

either at the time of construction or during the operation life of the various structures, either pavements or pads, especially those located in close proximity to wetlands, or other low-lying areas. This would result in the deterioration of subgrade soils and resulting increase in construction costs and/or time delays, and an increased occurrence of maintenance and/or repairs (for pavements) during the design life.

Additionally, provisions for temporary drainage (i.e. drainage ditches parallel to the roadways, whistles, etc.) during construction should be planned prior to the start of earthwork operations will also aid in mitigating effects of water inflow. These provisions can be integrated into the permanent planned drainage system (as needed).

Site Preparation

After implementing the drainage/erosion control plan, the next step in site preparation for the wet well is to strip the proposed construction area of trees, organic material, topsoil, root balls, debris, and other deleterious material from within the proposed construction areas. Stripping should extend a minimum of 5 feet outside the construction area footprint. Voids remaining from the clearing/stripping operation should be backfilled with properly compacted Controlled Fill as outlined in the **Compaction Requirements** section.

Depending on how the wet well will be constructed will dictate the next step in site preparation. If the wet well is being constructed using sloped excavation methods, it is likely that excavation can commence without proofrolling the area around the wetwell, since most of it will be removed and replaced. If steel sheeting is being utilized, then we recommend proofrolling the remaining access road and pump station area with a loaded tandem axle dump truck or other similar approved construction equipment, after stripping and subgrade repair is completed. A geotechnical engineer should monitor proofrolling operations. Areas that pump or rut excessively should be undercut and reworked or replaced with Controlled Fill placement may commence after the subgrade stability has been verified by the geotechnical engineer.

Shallow Utility Construction Considerations

For installation of shallow utility lines, shallow excavations can be sloped back per OSHA soil types or shielding with trench boxes can be utilized. Dewatering will be required for excavations deeper than the groundwater. Due to the presence of clayey fine-grained soils, a bridge lift of No. 57 stone may be necessary to provide a stable working platform.

Fill Material Types

The grading contractor should provide samples of proposed fill soils prior to placement. Controlled Fill should meet the following soil property requirements:

Controlled Fill Type [1]	USCS Classification	Acceptable Location for Placement
Imported Fill [2]	SP, SP-SM, SP-SW, SW, SM (Passing #200 <12%)	All locations
Onsite Soils	SP, SP-SM, SM, SC (Passing #200 <25%)	All locations.

1. Controlled Fill should consist of approved materials that are free of organic matter and other deleterious debris.
2. It may be necessary to install an undrain system to mitigate ponding of water within the imported granular fill material.

Fill Compaction Requirements

Controlled Fill should meet the following compaction requirements:

ITEM	DESCRIPTION
Fill Lift Thickness	10 inches or less in loose thickness when heavy, self-propelled compaction equipment is used
	4 inches or less in loose thickness when hand-guided equipment such as a jumping jack or plate compactor is used
Compaction Requirements[1]	**Controlled Fill** - 95% of the material's maximum modified Proctor dry density (ASTM D1557).
	Graded Aggregate Base Course (GABC) - 100% of the material's maximum modified Proctor dry density (ASTM D1557).
Moisture Content – Controlled Fill or Onsite Soils[2]	Fill materials should be placed near the optimal moisture content (typically between ±3 percent) as determined by laboratory testing. Actual range of acceptable moisture contents will be highly dependent on the type of soil used. Soils with a higher fine-grained component typically have a tighter range of acceptable moisture contents as compared with coarse grained soils.

1. Fill should be tested for moisture content and compaction during placement. If the results of the in-place density tests indicate the specified moisture or compaction limits have not been met, the area represented by the test should be reworked and retested as required until the specified moisture and compaction requirements are achieved.
2. Specifically, moisture levels should be maintained low enough to allow for satisfactory compaction to be achieved without the Controlled Fill material pumping when proofrolled.

Deep Excavations

Deep excavations are expected at the sewer line and wet well site. Deep excavations can be accomplished using open cut excavations with slopes no steeper than 1:2 (vertical:horizontal) to construct the wet well and install utilities. If site constraints will not allow slopes of that size, shielding consisting of steel sheeting can be used, or a combination of both sloping and shielding. The shielding designs should be performed concurrently with the dewatering design by an engineer registered in the State of South Carolina, and employed by the contractor, and who is familiar with this type of operation

Depending on the stability of the excavation bottom encountered at time of construction, it may be necessary to increase the excavation depth by 1 to 2 feet below the bearing elevation and backfilled with free draining #57 stone or similar material. The stone will aid in temporary dewatering of the excavation by using sump pumps and provide a stable working surface during construction. The stone should be wrapped in geotextile separation fabric such as Mirafi HP 270 or similar, to limit the migration of fines into the stone.

The Occupational Safety and Health Administration (OSHA) requires soils within the proposed excavation be classified for shielding and safety considerations. The estimated soil parameters in the **Lateral Earth Pressures** section may be used in conjunction with OSHA Standards 29 CFR 1926 Subpart P Appendix A for the contractor's shielding design. The soil properties are based on the results of our field investigation and experience with similar soil conditions. The contractor is solely responsible for designing and maintaining a stable excavation, and all excavations should comply with applicable local, state, and OSHA standards.

Dewatering Considerations

Groundwater was encountered between 1 and 13 feet below the existing ground surface, so dewatering will be required in areas where excavation extends below the water table. The dewatering and shielding designs should be undertaken by an engineer registered in the State of South Carolina, and employed by the contractor, and is familiar with this type of operation. At a minimum, sheeting should extend past the anticipated bottom depth of the excavation by a minimum of 5 feet to minimize the potential for bottom heave and limit groundwater inflow to a level that can be adequately controlled with sumps and pumps.

LATERAL EARTH PRESSURES FOR PUMP STATION & GRAVITY MAIN

Walls/temporary sheeting with unbalanced backfill levels on opposite sides should be designed for earth pressures at least equal to those indicated in the following table. Earth pressures will be influenced by structural design of the walls, conditions of wall restraint, methods of construction and/or compaction and the strength of the materials being restrained. Appropriate earth pressures

should be used for wall restraint conditions. Active pressure can be used when the top of wall can move 0.002H to 0.004H. At rest earth pressure is used when there is no wall movement. The recommended design lateral earth pressures do not include a factor of safety and do not provide for possible hydrostatic pressure on the walls.

Lateral Earth Pressure Coefficients at Pump Station (SCPT-1)

Stratum	Approximate Depth (ft)	Estimated Soil Properties					
		Total/Effective Unit Weight (pcf)	Friction Angle (Φ)	Cohesion (psf)	Earth Pressure Coeff.		
					K_a	K_o	K_p
Controlled Fill	N/A	115/52.6	32	n/a	0.31	0.47	3.25
1	0 to 8	110/47.6	n/a	800	1	1	2
2	8 to 14	115/52.6	32	n/a	0.31	0.47	3.25
3	14 to 37	110/47.6	n/a	1,000	1	1	2
4	37 to 38[1]	115/52.6	32	n/a	0.31	0.47	3.25

1. Termination depth of deepest sounding.

Lateral Earth Pressure Coefficients for Gravity Main from Heirs Corner Road to Ann Court (CPT-8, CPT-9, CPT-10, and CPT-11)

Stratum	Approximate Depth (ft)	Estimated Soil Properties					
		Total/Effective Unit Weight (pcf)	Friction Angle (Φ)	Cohesion (psf)	Earth Pressure Coeff.		
					K_a	K_o	K_p
Controlled Fill	N/A	115/52.6	32	n/a	0.31	0.47	3.25
1	0 to 7	115/52.6	32	n/a	0.31	0.47	3.25
2	7 to 15	110/47.6	n/a	1,000	1	1	2
3	15 to 21[1]	115/52.6	32	n/a	0.31	0.47	3.25

1. Termination depth of deepest sounding

Lateral Earth Pressure Coefficients for Gravity Main from Forest Circle to Ireland Hills Drive (CPT-12, CPT-13, CPT-14, CPT-15, and CPT-16)

Stratum	Approximate Depth (ft)	Estimated Soil Properties					
		Total/Effective Unit Weight (pcf)	Friction Angle (Φ)	Cohesion (psf)	Earth Pressure Coeff.		
					K_a	K_o	K_p
Controlled Fill	N/A	115/52.6	32	n/a	0.31	0.47	3.25
1	0 to 7	115/52.6	32	n/a	0.31	0.47	3.25
2	7 to 41[1]	110/47.6	n/a	800	1	1	2

1. Termination depth of deepest sounding.

Lateral Earth Pressure Coefficients for Gravity Main from Ireland Hills Drive to West Washington Street (CPT-17 and CPT-18)

Stratum	Approximate Depth (ft)	Estimated Soil Properties					
		Total/Effective Unit Weight (pcf)	Friction Angle (Φ)	Cohesion (psf)	Earth Pressure Coeff.		
					K_a	K_o	K_p
Controlled Fill	N/A	115/52.6	32	n/a	0.31	0.47	3.25
1	0 to 5	110/47.6	n/a	500	1	1	2
2	5 to 11	115/52.6	32	n/a	0.31	0.47	3.25
3	11 to 15	110/47.6	n/a	800	1	1	2
4	15 to 21[1]	115/52.6	32	n/a	0.31	0.47	3.25

1. Termination depth of deepest sounding.

Lateral Earth Pressure Coefficients for Gravity Main from West Washington Street to End of Proposed Sewer Alignment (CPT-19 and CPT-20)

Stratum	Approximate Depth (ft)	Estimated Soil Properties					
		Total/Effective Unit Weight (pcf)	Friction Angle (Φ)	Cohesion (psf)	Earth Pressure Coeff.		
					K_a	K_o	K_p
Controlled Fill	N/A	115/52.6	32	n/a	0.31	0.47	3.25
1	0 to 2	115/52.6	32	n/a	0.31	0.47	3.25
2	2 to 8	115/52.6	n/a	800	1	1	2
3	8 to 15[1]	110/47.6	32	n/a	0.31	0.47	3.25

1. Termination depth of deepest sounding.

Depending on the section modulus of sheeting selected, final loading, etc. the sheeting system may require supplemental bracing to maintain stability. If surface area is available, ground control may be accomplished with a combined slope/shoring configuration. If side slopes or open cut excavations are considered, a slope stability analysis will be necessary. The slope stability analysis should account for the potential for groundwater inflow, including steady state conditions and storm events.

The ground support system (with or without slopes) should conform to OSHA Standard 29 CFR 1926.652 – Requirements for Protective Systems. The design of the shielding system should be based on the soils within the study area and parameters provided in the previous table. The shielding and dewatering systems should be designed concurrently by an engineer registered in the State of South Carolina, employed by the contractor, and is familiar with this type of operation.

SHALLOW FOUNDATIONS FOR PUMP STATION BUILDING

If the site has been prepared in accordance with the requirements noted in **Earthwork** and the following considerations are followed, the following design parameters are applicable for shallow foundations.

Design Parameters

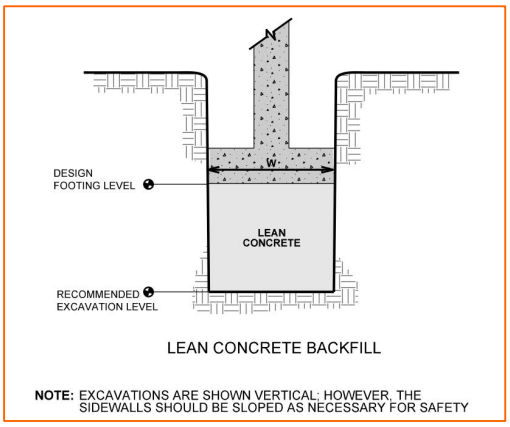
Description	Column	Wall
Allowable bearing pressure[1]	2,000 psf	2,000 psf
Minimum dimensions	24 inches	18 inches
Minimum embedment below finished grade	12 inches	12 inches
Estimated total static settlement[2]	1 inch or less	1 inch or less
Estimated differential static settlement[2]	< ½ inch between columns	< ½ inch over 30 feet

1. The recommended net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. This assumes that any unsuitable fill, debris or soft soils, if encountered, will be undercut and replaced with Controlled Fill.
2. The settlement estimates are based on loading the building pads to a maximum load of 50 kips for columns, 3 kips per foot for strip footings and the above allowable bearing pressure. The foundation settlement will depend upon the variations within the subsurface soil profile, the structural loading conditions, the embedment depth and dimensions of the footings, the thickness of compacted fill, and the quality of the earthwork operations. These settlement magnitudes assume the foundation subgrade will be repaired as recommended in this report. The settlement calculations were based on maximum footing sizes of 5 ft by 5 ft for columns and 1.5 ft wide strip footings.

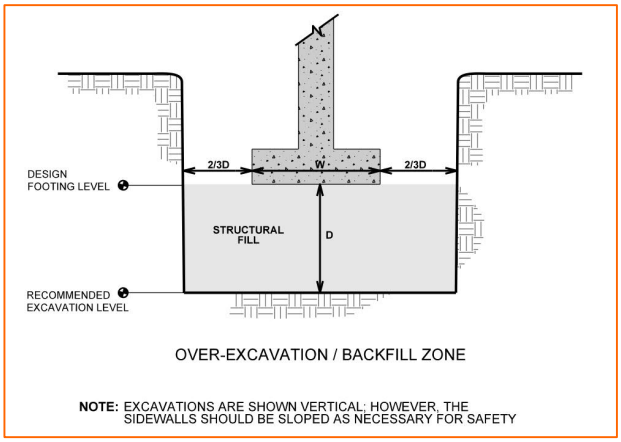
Foundation Construction Considerations

As noted in **Earthwork**, the footing excavations should be evaluated under the direction of the Geotechnical Engineer**.** The base of all foundation excavations should be free of water and loose soil, 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. Excessively wet or dry material or any loose/disturbed material in the bottom of the footing excavations should be removed/reconditioned before foundation concrete is placed.

If unsuitable bearing soils are encountered at the base of the planned footing excavation, the excavation should be extended deeper to suitable soils, and the footings could bear directly on these soils at the lower level or on lean concrete backfill placed in the excavations. This is illustrated on the sketch below.



Over-excavation for structural fill placement below footings should be conducted as shown below. The over-excavation should be backfilled up to the footing base elevation, with #57 stone or Controlled Fill placed, as recommended in the **Earthwork** section.



MAT FOUNDATIONS FOR WET WELL

The new wet well may be constructed on a monolithic mat foundation with a net allowable contact pressure of **2,000 psf**. Long-term post construction static settlements are expected to be 1 inch or less.

Buoyancy (uplift) forces exerted by the groundwater on the wet well should be considered during design. If additional uplift resistance is needed, the designers may consider extending the perimeter of the bottom mat of the wet well beyond the edge of the vertical concrete walls to engage the surrounding soil and further resist the buoyant forces exerted by groundwater. For this case, the volume of the soil mass available for uplift restraint includes the mass directly above the edge of the mat plus that contained within the wedge bounded by a vertical line and a line projected at a 15° angle with the vertical, both originating from the top outside edge of the mat. The unit weight of 115 pcf and 150 pcf can be used for the soil and concrete, respectively, in

calculating the vertical restraint. These values should be reduced by the unit weight of water (62.4 pcf) below the groundwater level. If surface drainage conditions are expected to be poor in the area of the wet well area, full buoyant conditions should be resisted.

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. 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. 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 or collaboration through this system 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.

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 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

The field exploration program consisted of the following:

Type of Test	Test Location	Number of Tests	Test Depth [1]
Seismic Cone Penetration Test (SCPT)	Proposed Pump Station	1	38 feet
Cone Penetration Test (CPT)	Proposed HDD Locations	6	15 to 41 feet
Cone Penetration Test (CPT)	Proposed Gravity Line	13	15 to 41 feet
Hand Auger Boring (HAB)	Adjacent to SCPT/CPT	19	4 feet

1. Below ground surface.

Boring Layout and Elevations: We used handheld GPS equipment to locate borings with an estimated horizontal accuracy of +/-20 feet. Ground surface elevations were not determined.

Subsurface Exploration Procedures: The soundings were performed with the appropriate ASTM Standards. The in-situ tests were advanced with a Pagani TG73-200 rig. The field exploration included observations for groundwater, which occurred during the exploration program after or as the soundings/auger borings are being advanced.

No provisions have been made to collect water level data other than the observations made during the advancement of the soundings/auger borings. The field data was reviewed and processed by the geotechnical engineer to create the final in situ sounding and hand auger boring logs.

SITE LOCATION AND EXPLORATION PLANS

Contents:

Note: All attachments are one page unless noted above.

SITE LOCATION

Colleton Mega Site Sewer ■ Colleton County, South Carolina
August 22, 2022 ■ Terracon Project No. EN225002

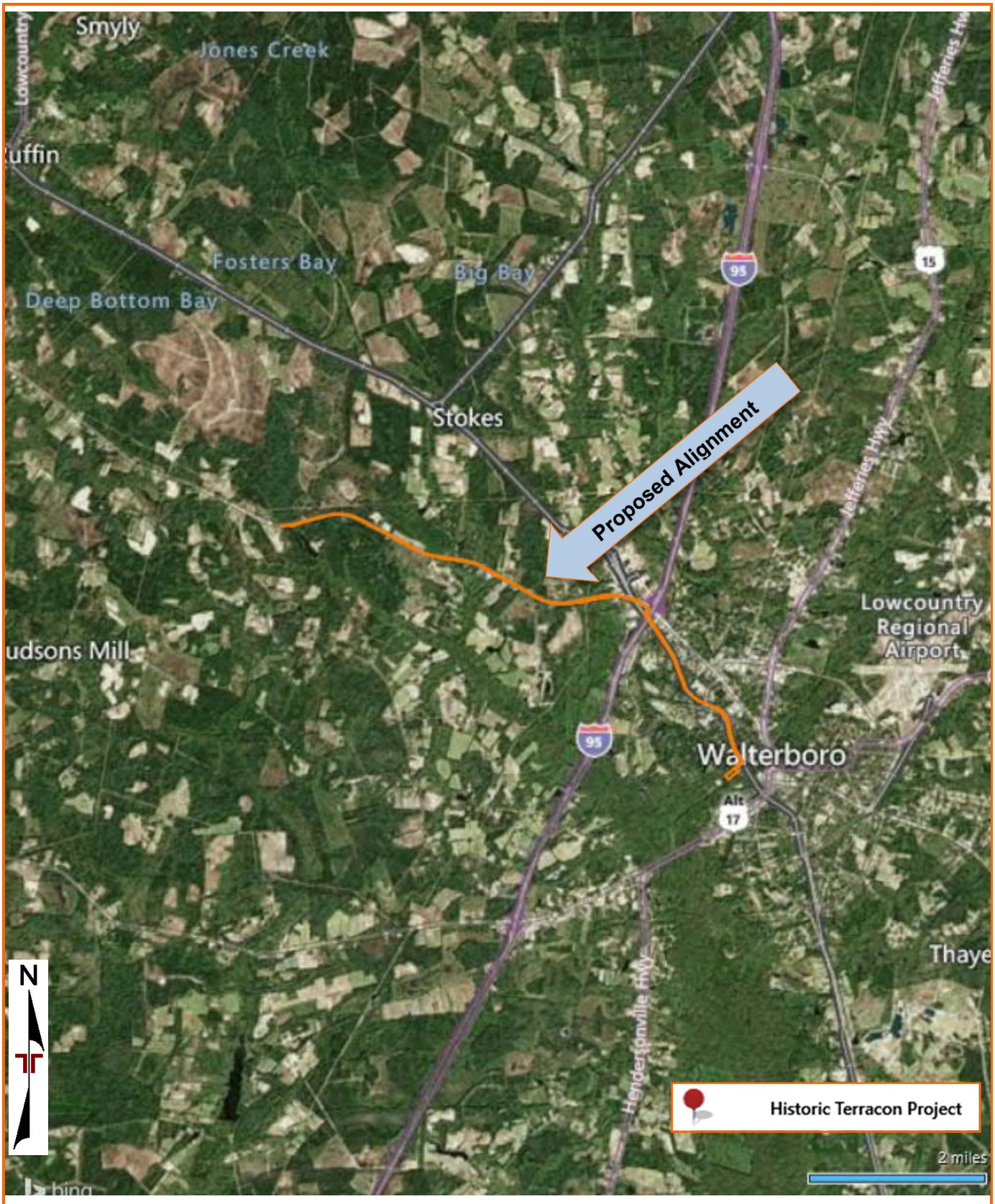


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

EXPLORATION PLAN FOR PUMP STATION

Colleton Mega Site Sewer ■ Colleton County, South Carolina
August 22, 2022 ■ Terracon Project No. EN225002

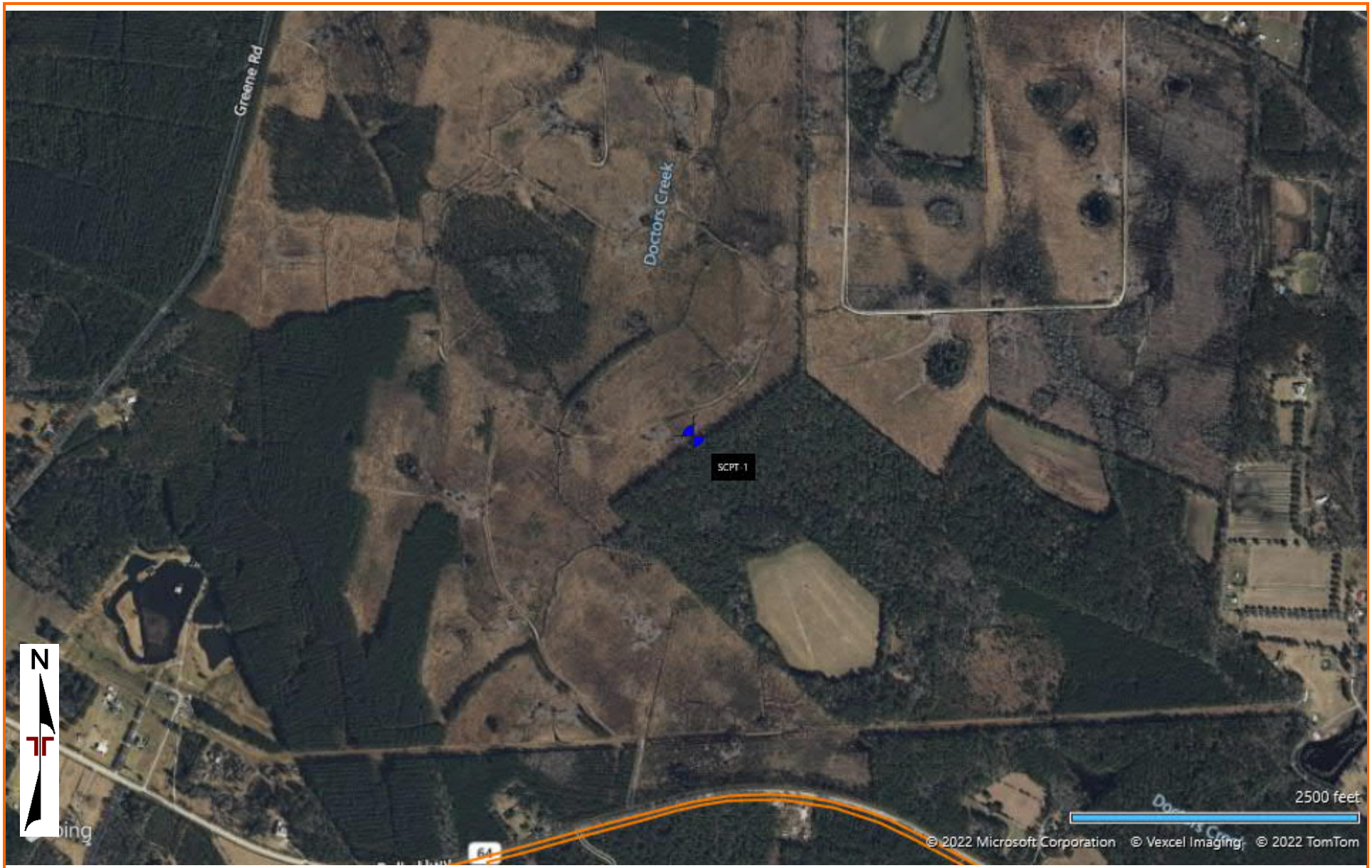


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

EXPLORATION PLAN FOR HDD LOCATIONS

Colleton Mega Site Sewer ■ Colleton County, South Carolina
August 22, 2022 ■ Terracon Project No. EN225002

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

MAP PROVIDED BY MICROSOFT BING MAPS

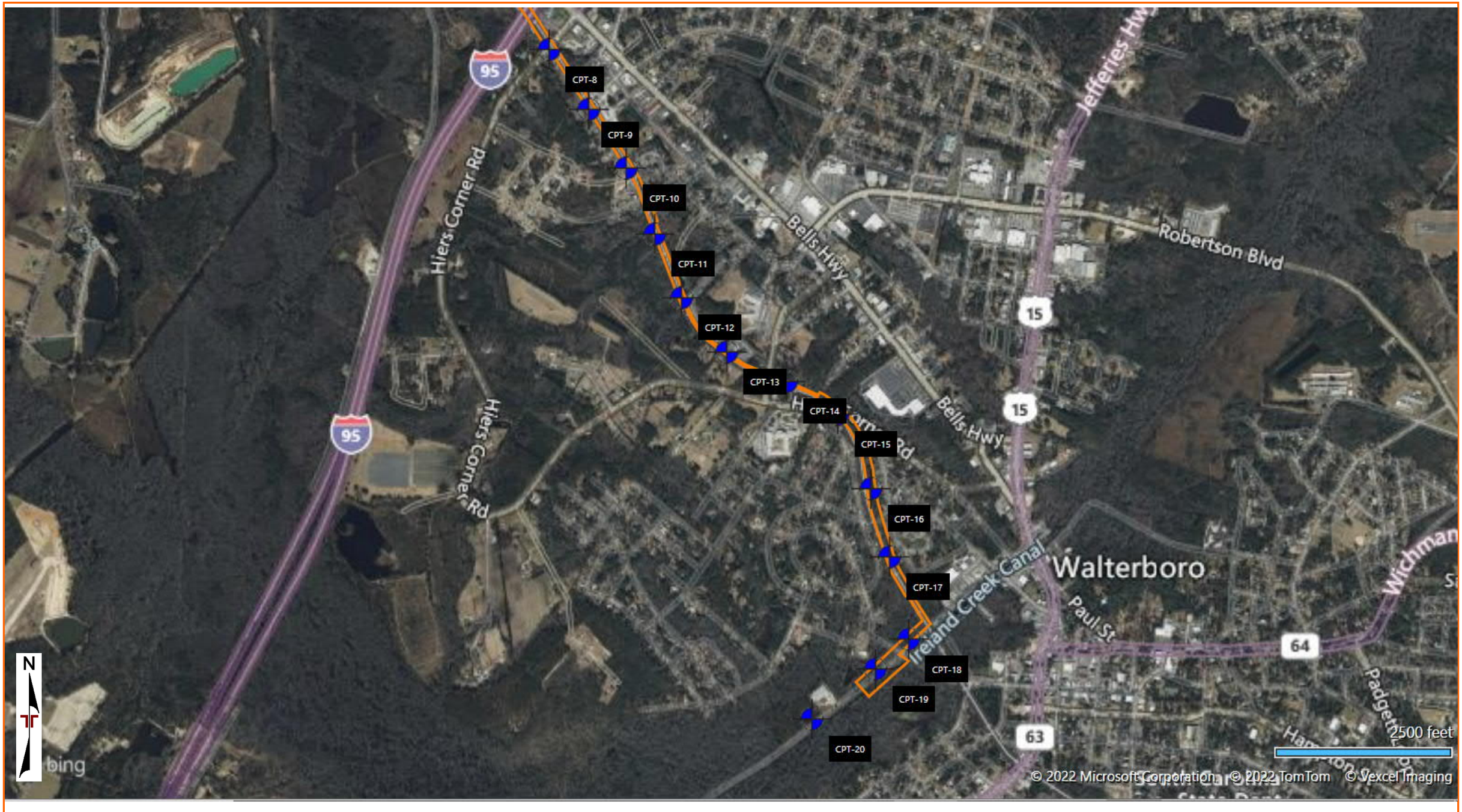


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

EXPLORATION RESULTS

Contents:

Note: All attachments are one page unless noted above.

CPT LOG NO. SCPT-1

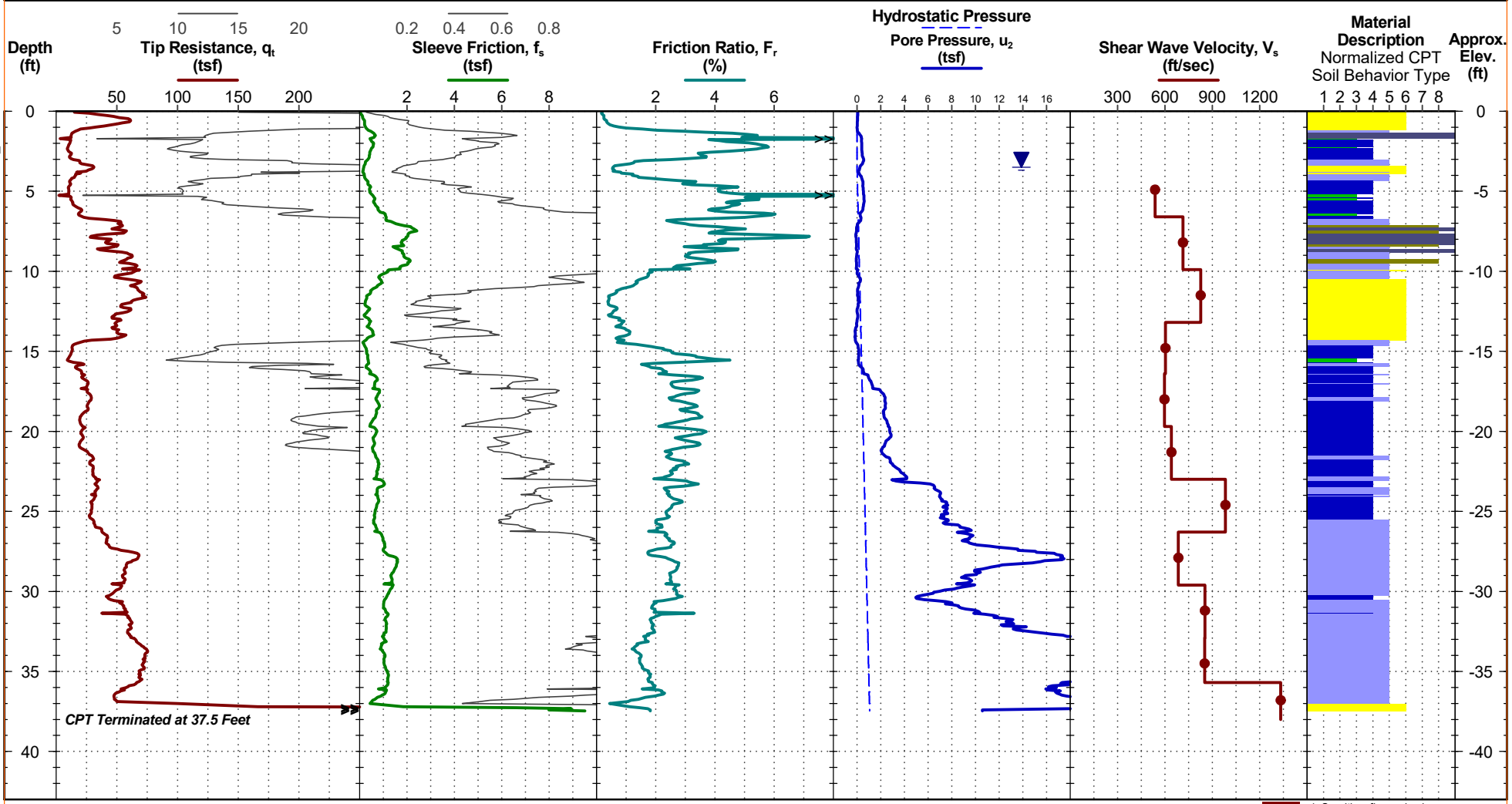
PROJECT: Colleton Mega Site Sewer

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

TEST LOCATION: See Exploration Plan

SITE: Bells Highway
Walterboro, SC

Latitude: 32.954457°
Longitude: -80.752786°



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

Elevations not obtained

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

▼ 3.5 ft measured water depth
(used in normalizations and correlations; See Supporting Information)

Probe no. 5834 with net area ratio of .861

Calibrated 3/2/2022

Terracon
1800 Reynolds Ave
North Charleston, SC

CPT Started: 8/4/2022

CPT Completed: 8/4/2022

Rig: Geoprobe

Operator: AM/BL

Project No.: EN225002

CPT LOG NO. CPT-2

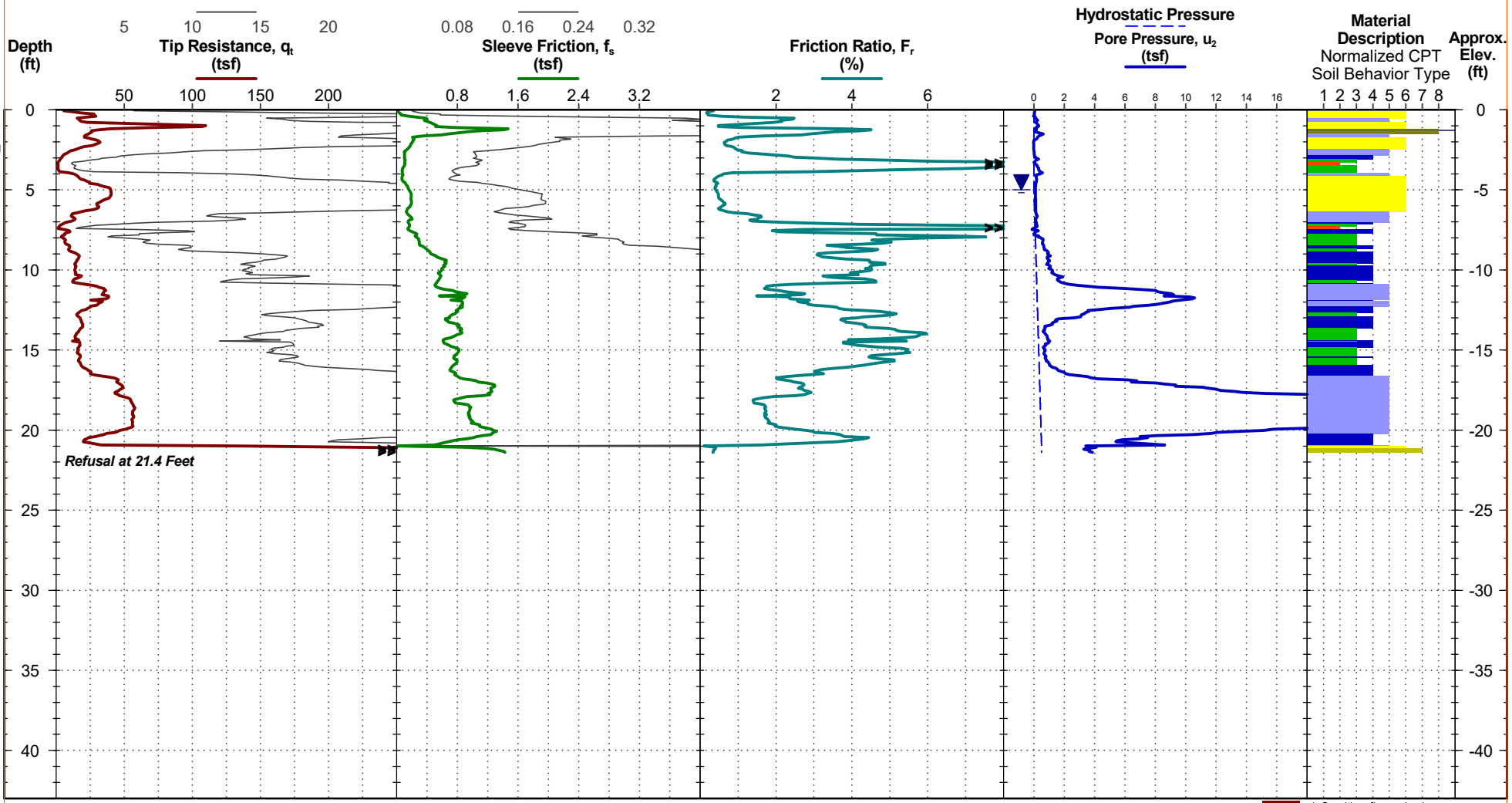
PROJECT: Colleton Mega Site Sewer

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

TEST LOCATION: See Exploration Plan

SITE: Bells Highway
Walterboro, SC

Latitude: 32.93872°
Longitude: -80.7311°



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

Elevations not obtained

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

5 ft estimated water depth
(used in normalizations and correlations; See Supporting Information)

Probe no. 5384 with net area ratio of .86
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 1/12/2022
Tip and sleeve areas of 10 cm^2 and 150 cm^2
Ring friction reducer with O.D. of 2 in

Terracon
1800 Reynolds Ave
North Charleston, SC

CPT Started: 3/28/2022
CPT Completed: 3/28/2022
Rig: Geoprobe
Operator: BR
Project No.: EN225002

CPT LOG NO. CPT-3

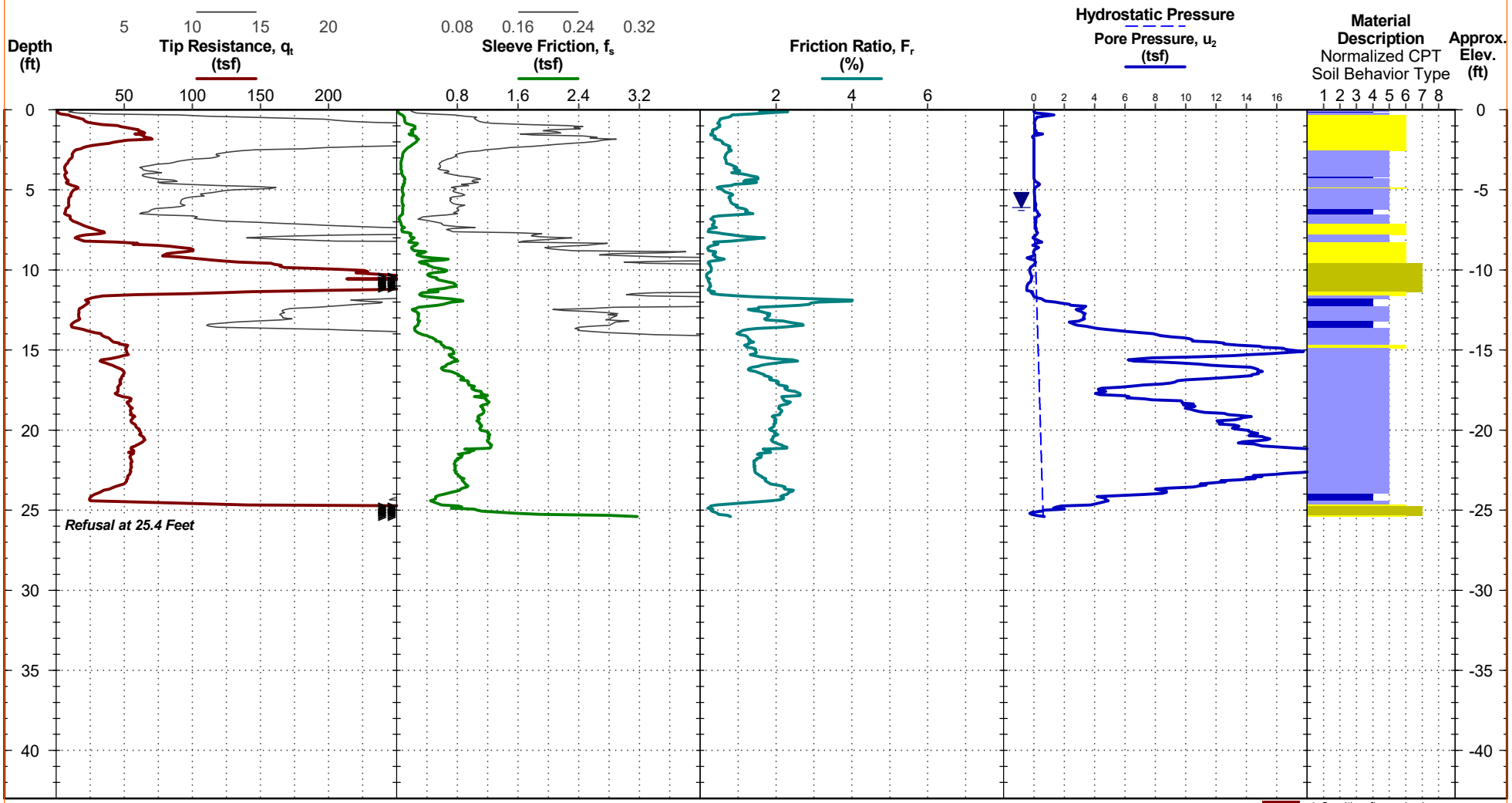
PROJECT: Colleton Mega Site Sewer

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

TEST LOCATION: See Exploration Plan

SITE: Bells Highway
Walterboro, SC

Latitude: 32.93834°
Longitude: -80.72826°



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

Elevations not obtained

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

▼ 6.1 ft measured water depth
(used in normalizations and correlations; See Supporting Information)

Probe no. 5384 with net area ratio of .86
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 1/12/2022
Tip and sleeve areas of 10 cm^2 and 150 cm^2
Ring friction reducer with O.D. of 2 in

Terracon
1800 Reynolds Ave
North Charleston, SC

CPT Started: 3/28/2022
CPT Completed: 3/28/2022
Rig: Geoprobe
Operator: BR
Project No.: EN225002

CPT LOG NO. CPT-4

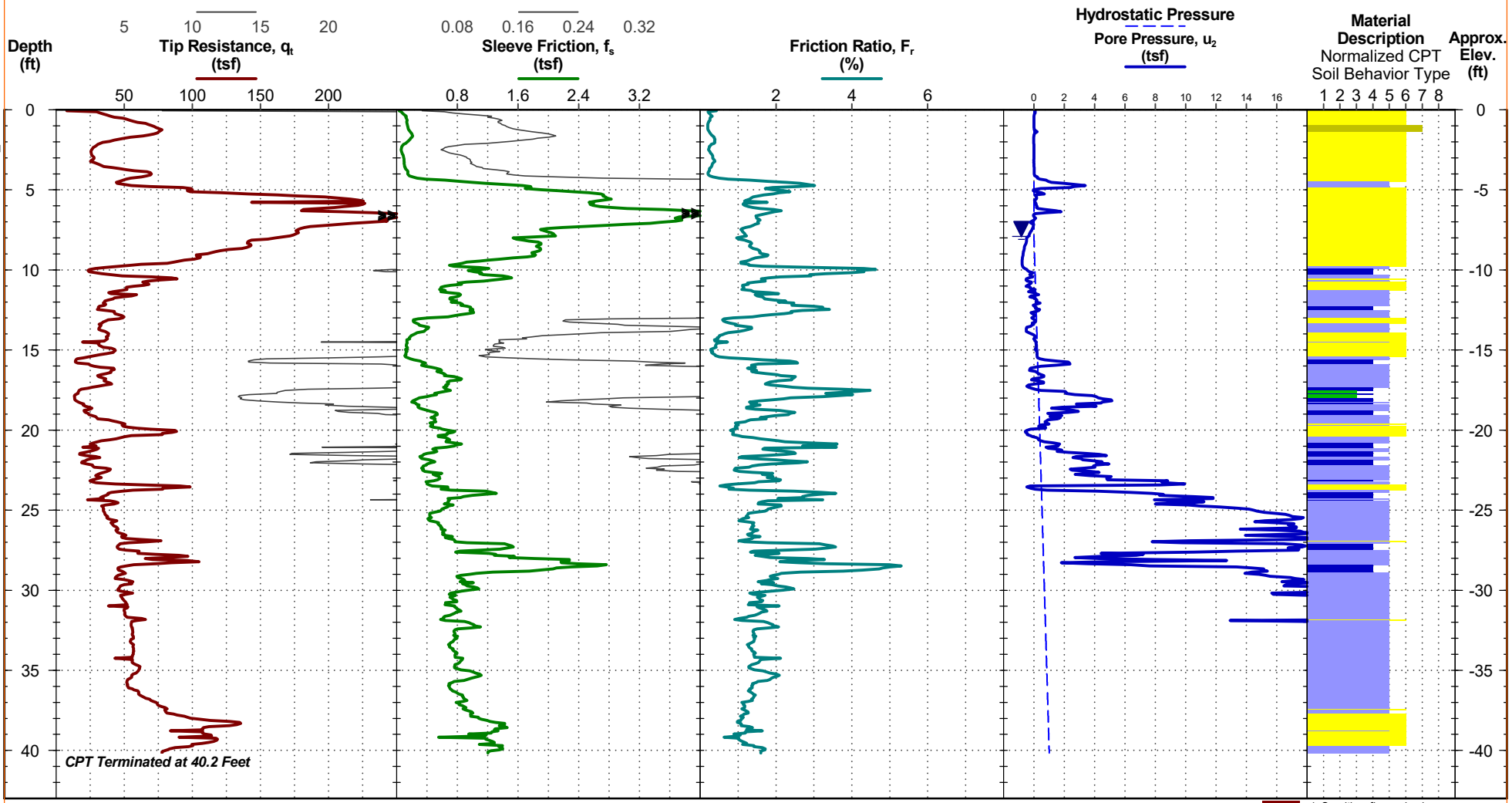
PROJECT: Colleton Mega Site Sewer

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

TEST LOCATION: See Exploration Plan

SITE: Bells Highway
Walterboro, SC

Latitude: 32.93621°
Longitude: -80.72074°



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

Elevations not obtained

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

▼ 7.9 ft measured water depth
(used in normalizations and correlations; See Supporting Information)

Probe no. 5384 with net area ratio of .86
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 1/12/2022
Tip and sleeve areas of 10 cm^2 and 150 cm^2
Ring friction reducer with O.D. of 2 in

Terracon
1800 Reynolds Ave
North Charleston, SC

CPT Started: 3/28/2022
CPT Completed: 3/28/2022
Rig: Geoprobe
Operator: BR
Project No.: EN225002

CPT LOG NO. CPT-5

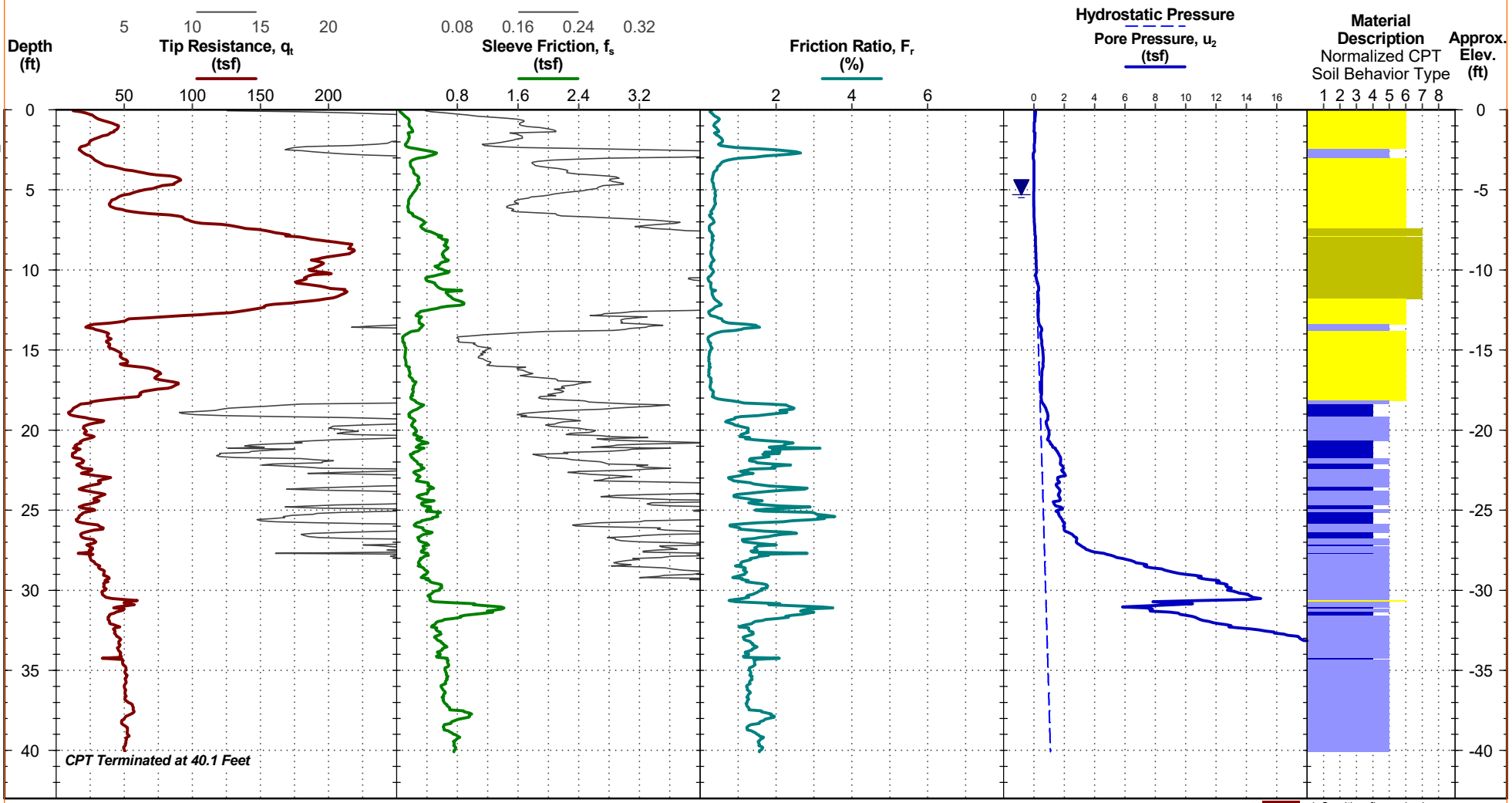
PROJECT: Colleton Mega Site Sewer

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

TEST LOCATION: See Exploration Plan

SITE: Bells Highway
Walterboro, SC

Latitude: 32.93526°
Longitude: -80.71887°



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

Elevations not obtained

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

▼ 5.3 ft measured water depth
(used in normalizations and correlations; See Supporting Information)

Probe no. 5384 with net area ratio of .86
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 1/12/2022
Tip and sleeve areas of 10 cm^2 and 150 cm^2
Ring friction reducer with O.D. of 2 in

Terracon
1800 Reynolds Ave
North Charleston, SC

CPT Started: 3/28/2022
CPT Completed: 3/28/2022
Rig: Geoprobe
Operator: BR
Project No.: EN225002

CPT LOG NO. CPT-6

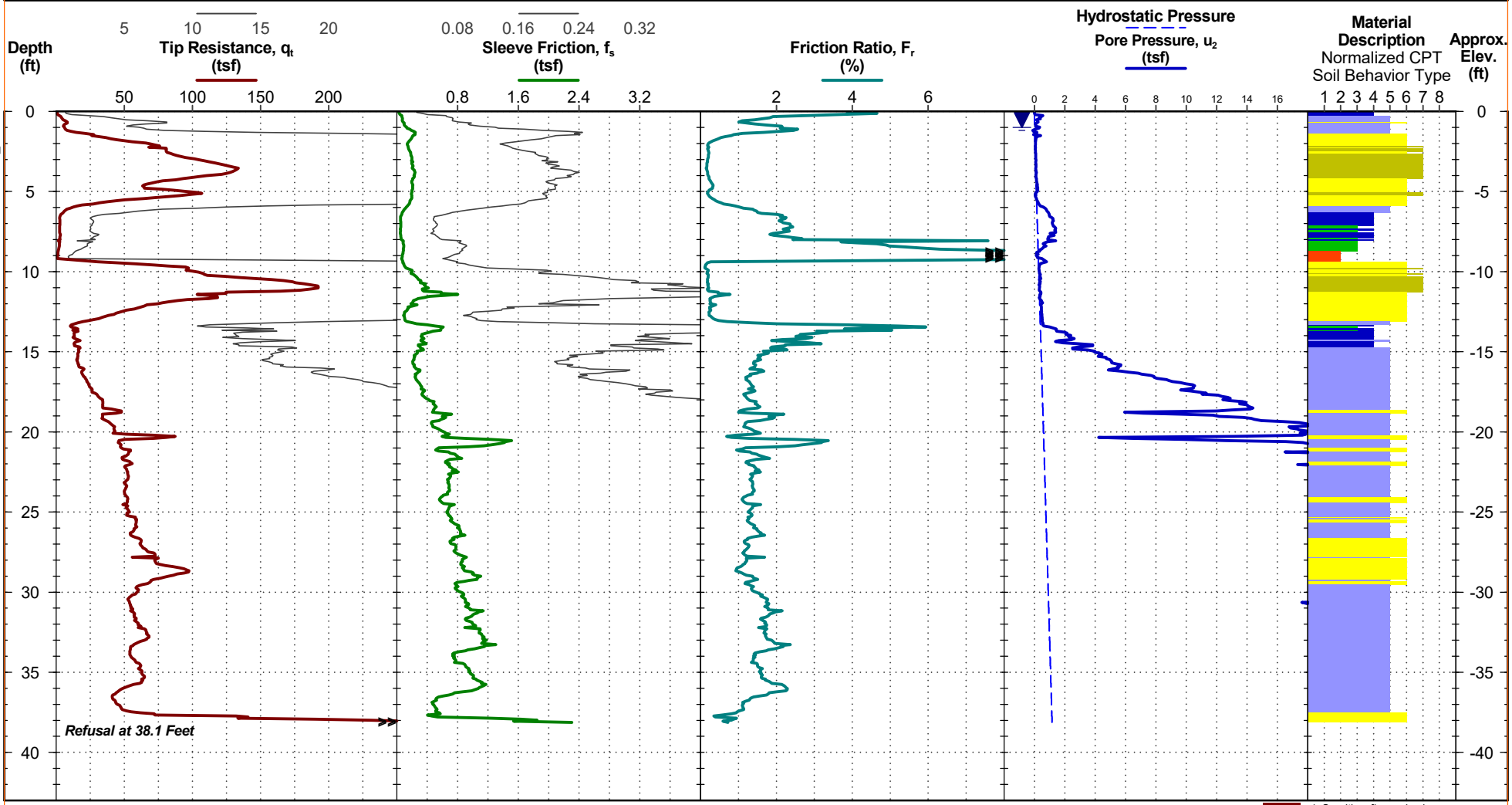
PROJECT: Colleton Mega Site Sewer

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

TEST LOCATION: See Exploration Plan

SITE: Bells Highway
Walterboro, SC

Latitude: 32.93154°
Longitude: -80.70405°



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

Elevations not obtained

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

1 ft measured water depth
(used in normalizations and correlations; See Supporting Information)

Probe no. 5384 with net area ratio of .86
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 1/12/2022
Tip and sleeve areas of 10 cm^2 and 150 cm^2
Ring friction reducer with O.D. of 2 in

Terracon
1800 Reynolds Ave
North Charleston, SC

CPT Started: 3/28/2022
CPT Completed: 3/28/2022
Rig: Geoprobe
Operator: BR
Project No.: EN225002

CPT LOG NO. CPT-7

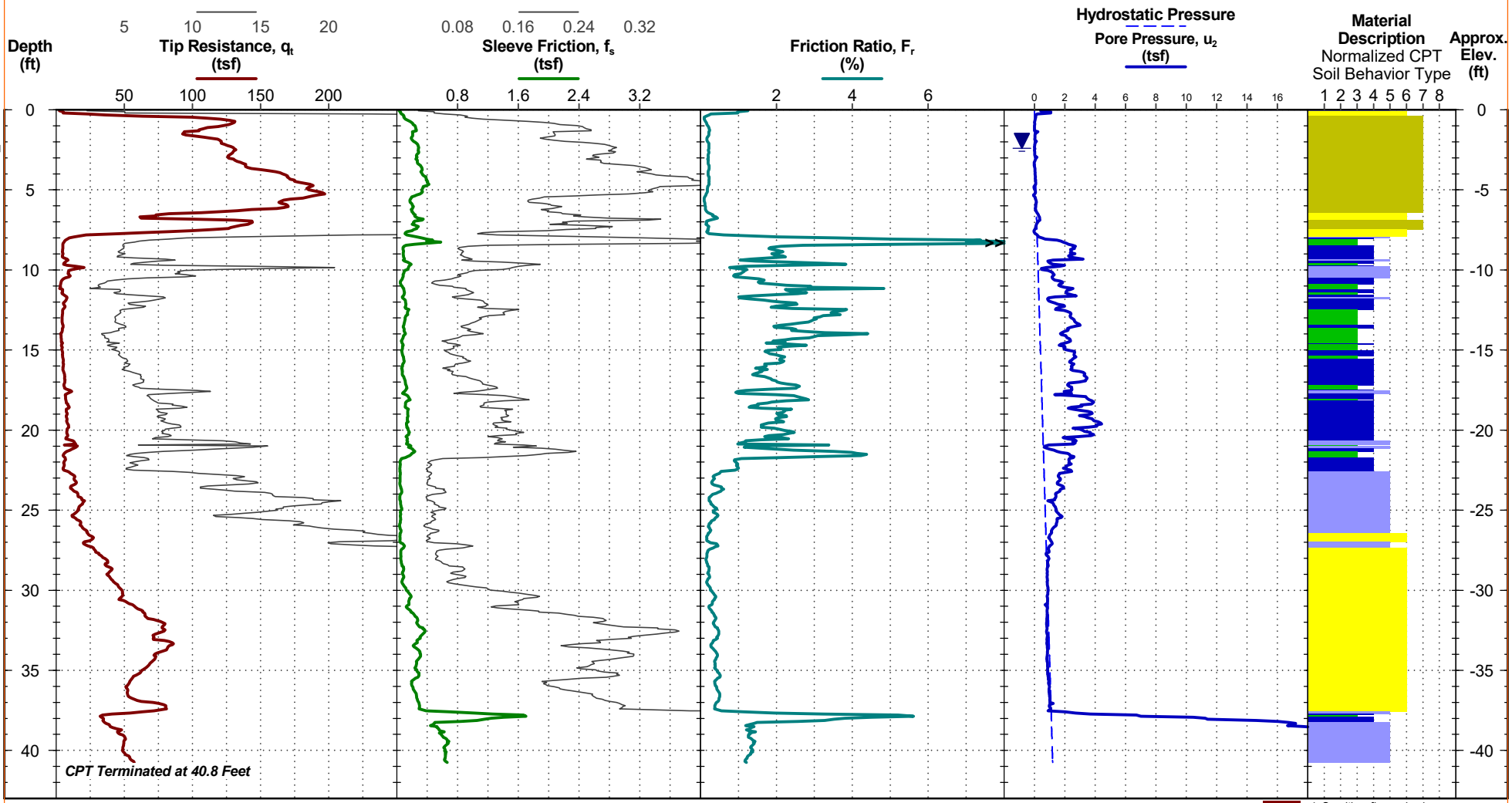
PROJECT: Colleton Mega Site Sewer

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

TEST LOCATION: See Exploration Plan

SITE: Bells Highway
Walterboro, SC

Latitude: 32.9324°
Longitude: -80.69788°



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

CPT sensor calibration reports available upon request.

Elevations not obtained

WATER LEVEL OBSERVATION

▼ 2.4 ft measured water depth
(used in normalizations and correlations; See Supporting Information)

Probe no. 5384 with net area ratio of .86
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 1/12/2022
Tip and sleeve areas of 10 cm^2 and 150 cm^2
Ring friction reducer with O.D. of 2 in

Terracon
1800 Reynolds Ave
North Charleston, SC

CPT Started: 3/28/2022
CPT Completed: 3/28/2022
Rig: Geoprobe
Operator: BR
Project No.: EN225002

CPT LOG NO. CPT-8

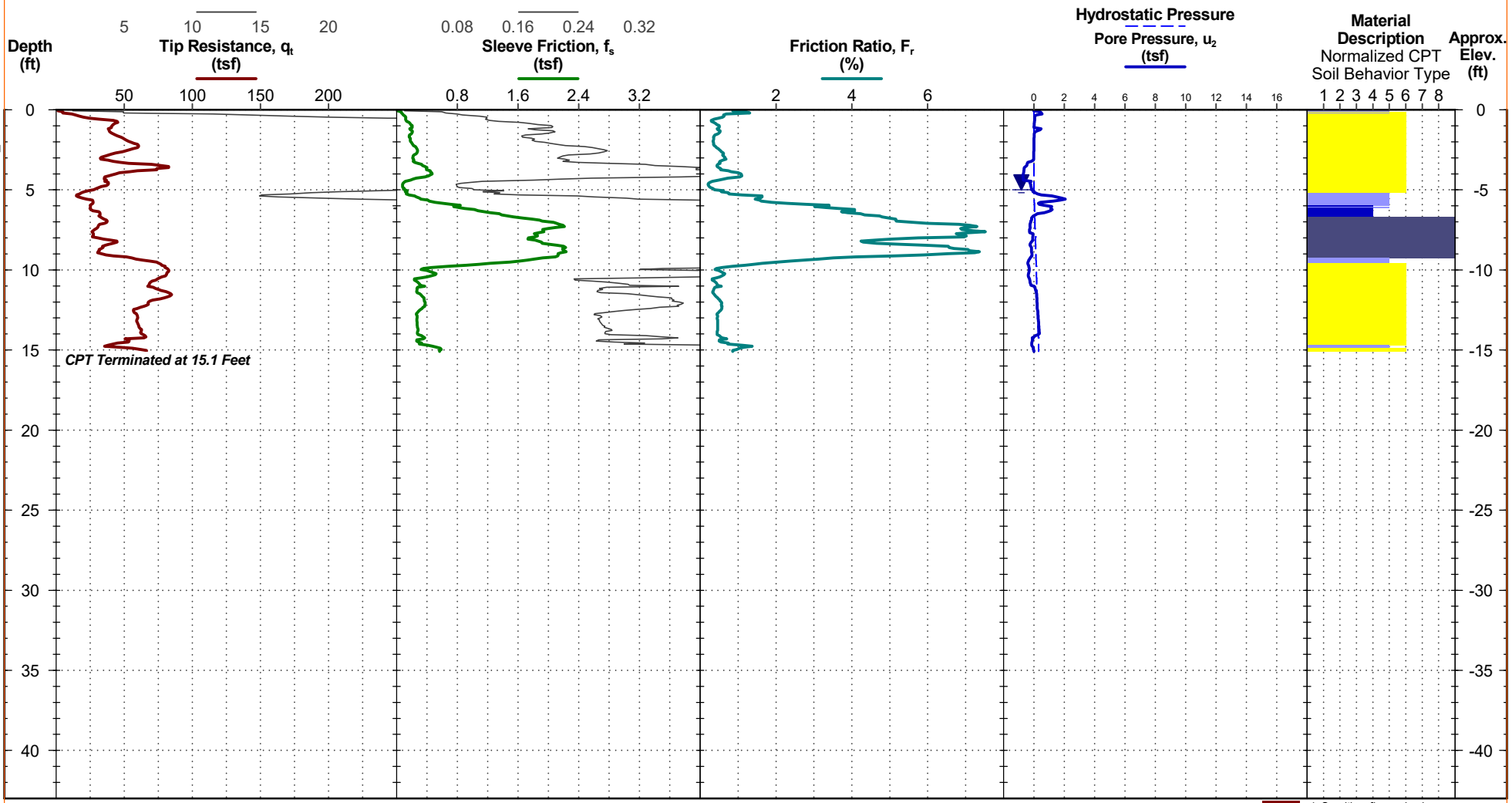
PROJECT: Colleton Mega Site Sewer

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

TEST LOCATION: See Exploration Plan

SITE: Bells Highway
Walterboro, SC

Latitude: 32.92771°
Longitude: -80.68979°



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

Elevations not obtained

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

5 ft estimated water depth
(used in normalizations and correlations; See Supporting Information)

Probe no. 5384 with net area ratio of .86
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 1/12/2022
Tip and sleeve areas of 10 cm^2 and 150 cm^2
Ring friction reducer with O.D. of 2 in

Terracon
1800 Reynolds Ave
North Charleston, SC

CPT Started: 3/25/2022
CPT Completed: 3/25/2022
Rig: Geoprobe
Operator: BR
Project No.: EN225002

CPT LOG NO. CPT-9

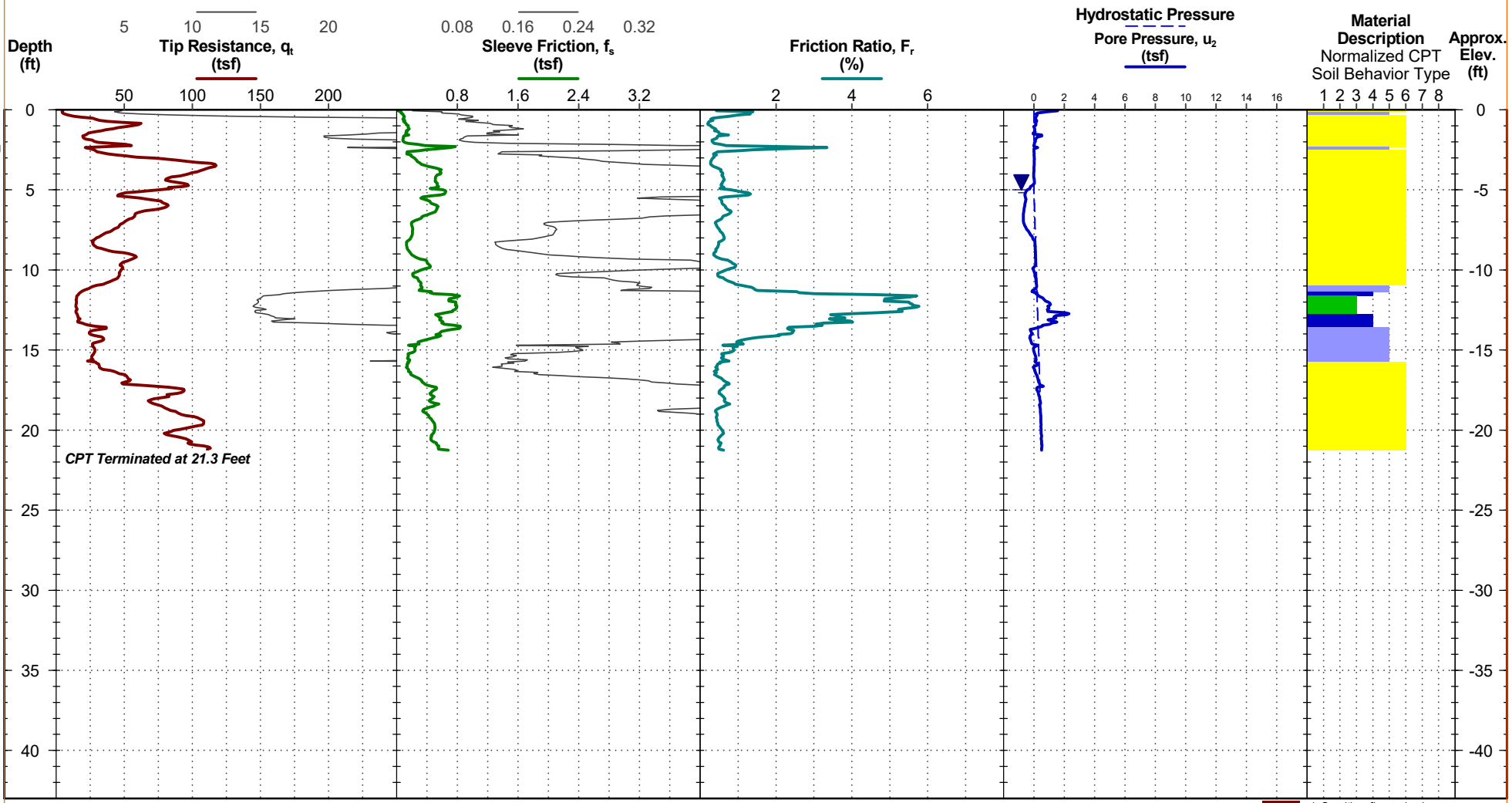
PROJECT: Colleton Mega Site Sewer

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

TEST LOCATION: See Exploration Plan

SITE: Bells Highway
Walterboro, SC

Latitude: 32.92538°
Longitude: -80.68795°



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

Elevations not obtained

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

▼ 5 ft estimated water depth
(used in normalizations and correlations; See Supporting Information)

Probe no. 5384 with net area ratio of .86
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 1/12/2022
Tip and sleeve areas of 10 cm^2 and 150 cm^2
Ring friction reducer with O.D. of 2 in

Terracon
1800 Reynolds Ave
North Charleston, SC

CPT Started: 3/25/2022
CPT Completed: 3/25/2022
Rig: Geoprobe
Operator: BR
Project No.: EN225002

CPT LOG NO. CPT-10

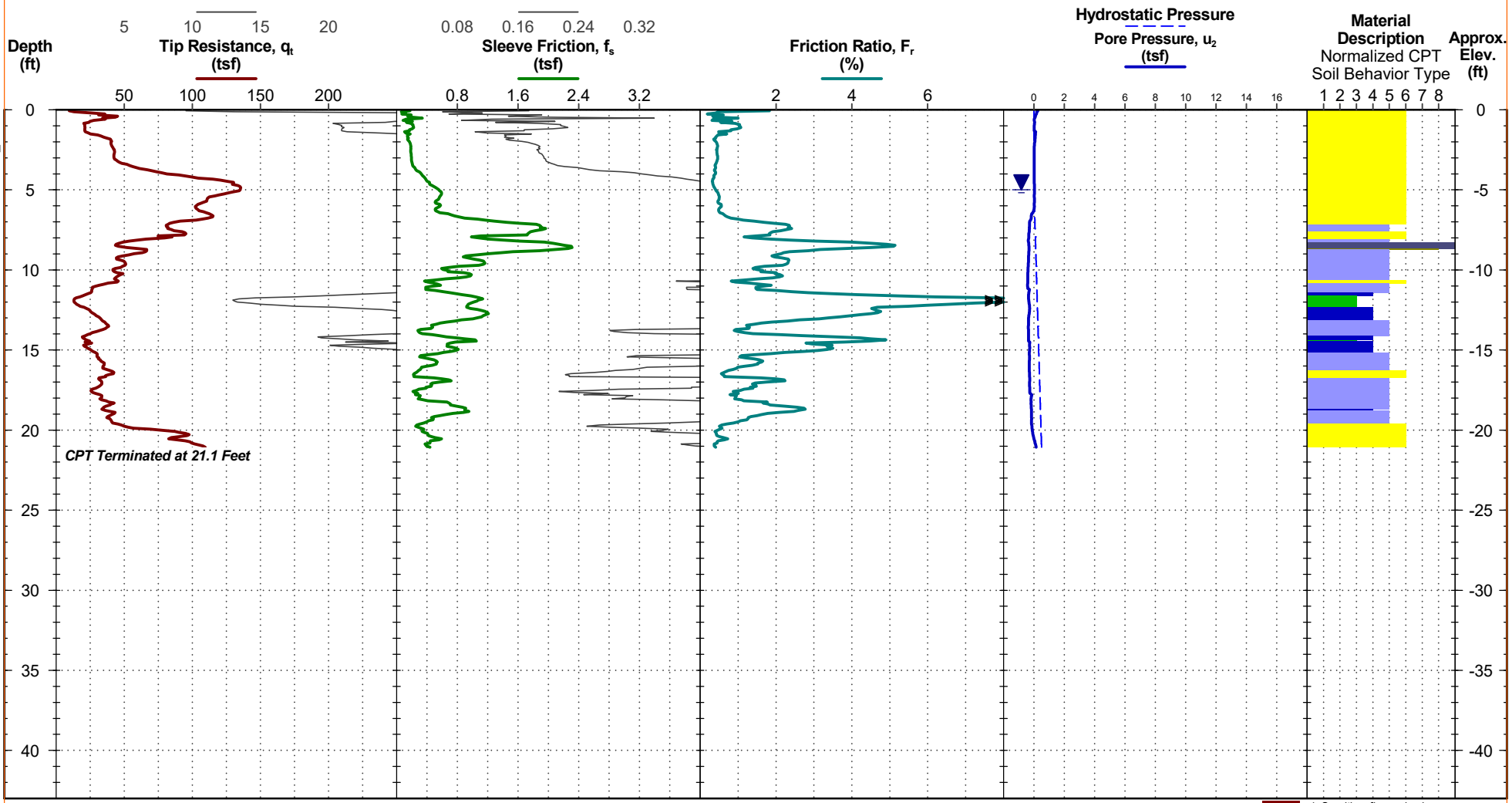
PROJECT: Colleton Mega Site Sewer

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

TEST LOCATION: See Exploration Plan

SITE: Bells Highway
Walterboro, SC

Latitude: 32.9231°
Longitude: -80.68622°



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

Elevations not obtained

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

▼ 5 ft estimated water depth
(used in normalizations and correlations; See Supporting Information)

Probe no. 5384 with net area ratio of .86
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 1/12/2022
Tip and sleeve areas of 10 cm^2 and 150 cm^2
Ring friction reducer with O.D. of 2 in

Terracon
1800 Reynolds Ave
North Charleston, SC

CPT Started: 3/25/2022
CPT Completed: 3/25/2022
Rig: Geoprobe
Operator: BR
Project No.: EN225002

CPT LOG NO. CPT-11

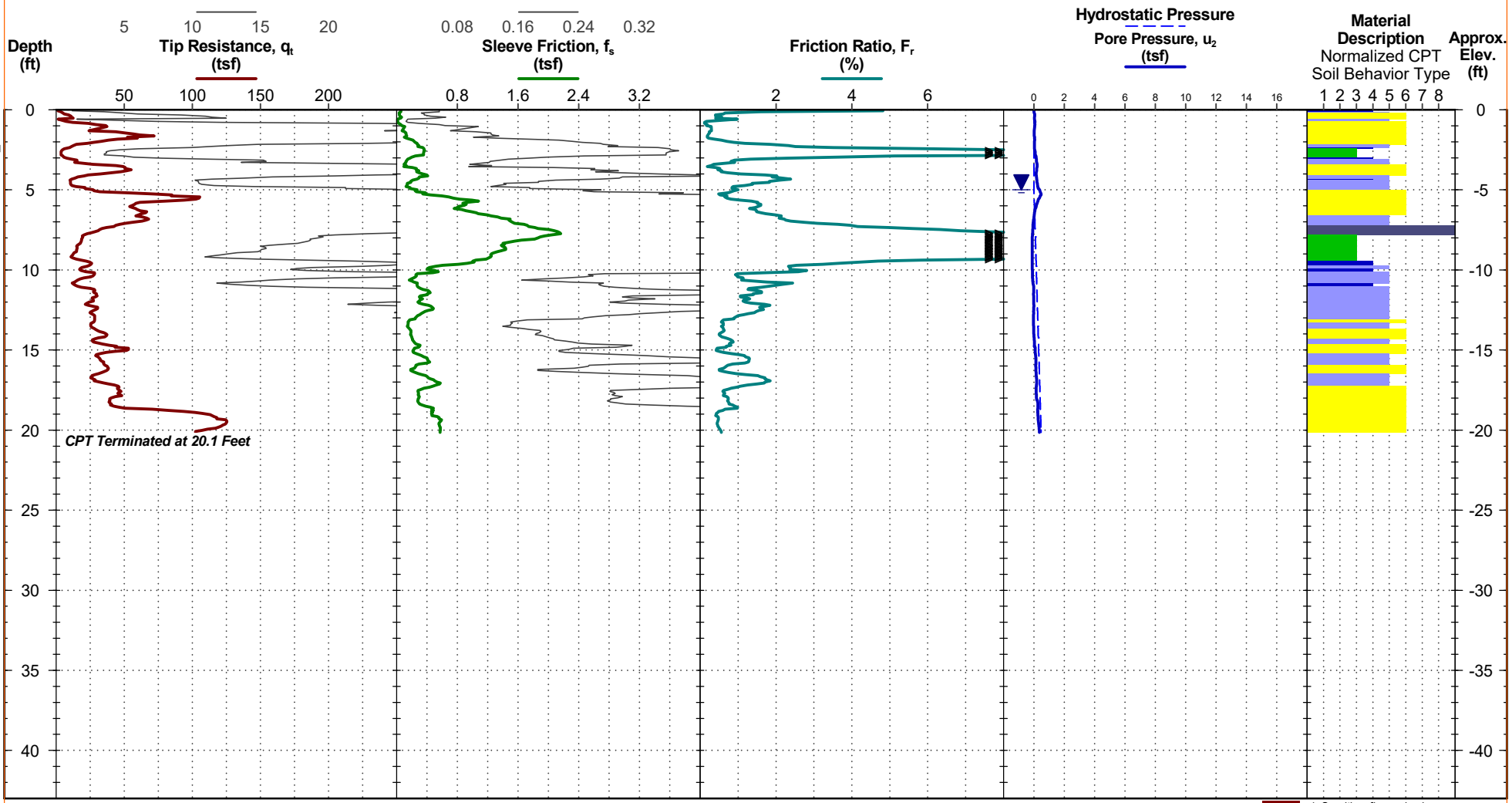
PROJECT: Colleton Mega Site Sewer

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

TEST LOCATION: See Exploration Plan

SITE: Bells Highway
Walterboro, SC

Latitude: 32.920539°
Longitude: -80.68489°



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

Elevations not obtained

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

▼ 5 ft estimated water depth
(used in normalizations and correlations; See Supporting Information)

Probe no. 5384 with net area ratio of .86
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 1/12/2022
Tip and sleeve areas of 10 cm^2 and 150 cm^2
Ring friction reducer with O.D. of 2 in

Terracon
1800 Reynolds Ave
North Charleston, SC

CPT Started: 3/25/2022
CPT Completed: 3/25/2022
Rig: Geoprobe
Operator: BR
Project No.: EN225002

CPT LOG NO. CPT-12

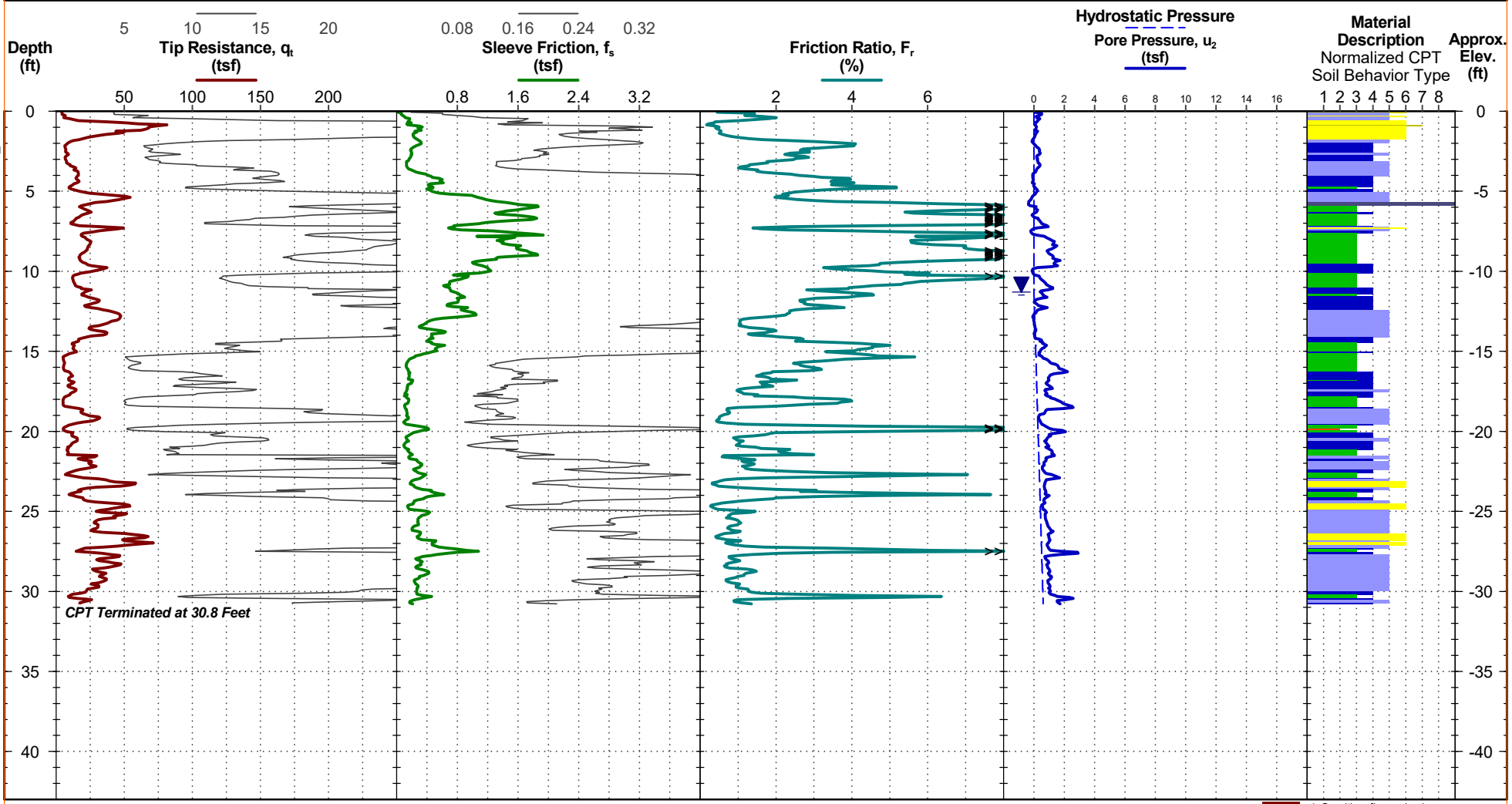
PROJECT: Colleton Mega Site Sewer

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

TEST LOCATION: See Exploration Plan

SITE: Bells Highway
Walterboro, SC

Latitude: 32.91805°
Longitude: -80.68365°



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

Elevations not obtained

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

▼ 11.3 ft measured water depth
(used in normalizations and correlations; See Supporting Information)

Probe no. 5384 with net area ratio of .86
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 1/12/2022
Tip and sleeve areas of 10 cm^2 and 150 cm^2
Ring friction reducer with O.D. of 2 in

Terracon
1800 Reynolds Ave
North Charleston, SC

CPT Started: 3/25/2022
CPT Completed: 3/25/2022
Rig: Geoprobe
Operator: BR
Project No.: EN225002

CPT LOG NO. CPT-13

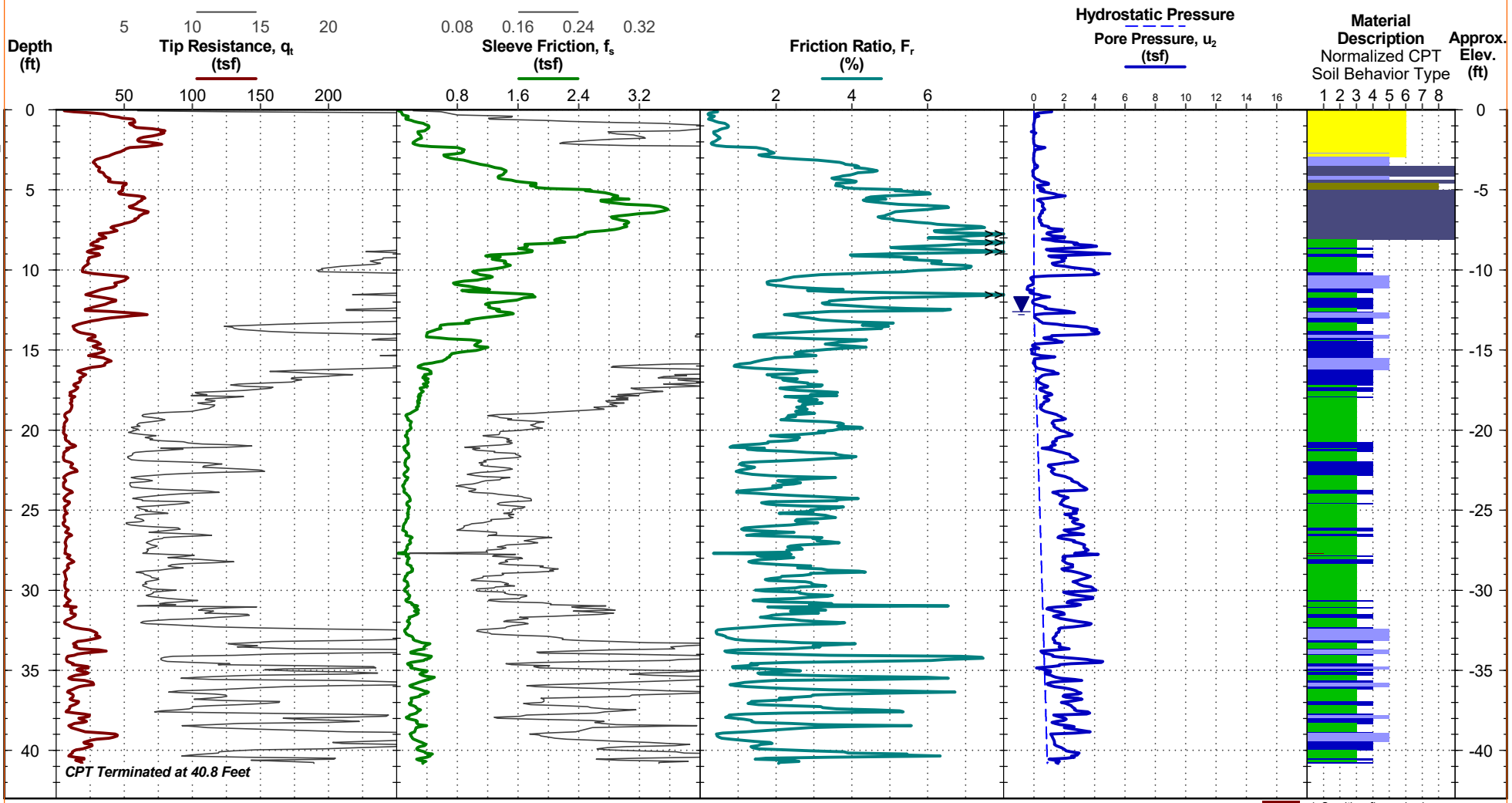
PROJECT: Colleton Mega Site Sewer

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

TEST LOCATION: See Exploration Plan

SITE: Bells Highway
Walterboro, SC

Latitude: 32.91595°
Longitude: -80.68156°



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

Elevations not obtained

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

▼ 12.6 ft measured water depth
(used in normalizations and correlations; See Supporting Information)

Probe no. 5384 with net area ratio of .86
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 1/12/2022
Tip and sleeve areas of 10 cm^2 and 150 cm^2
Ring friction reducer with O.D. of 2 in

Terracon
1800 Reynolds Ave
North Charleston, SC

CPT Started: 3/25/2022
CPT Completed: 3/25/2022
Rig: Geoprobe
Operator: BR
Project No.: EN225002

CPT LOG NO. CPT-14

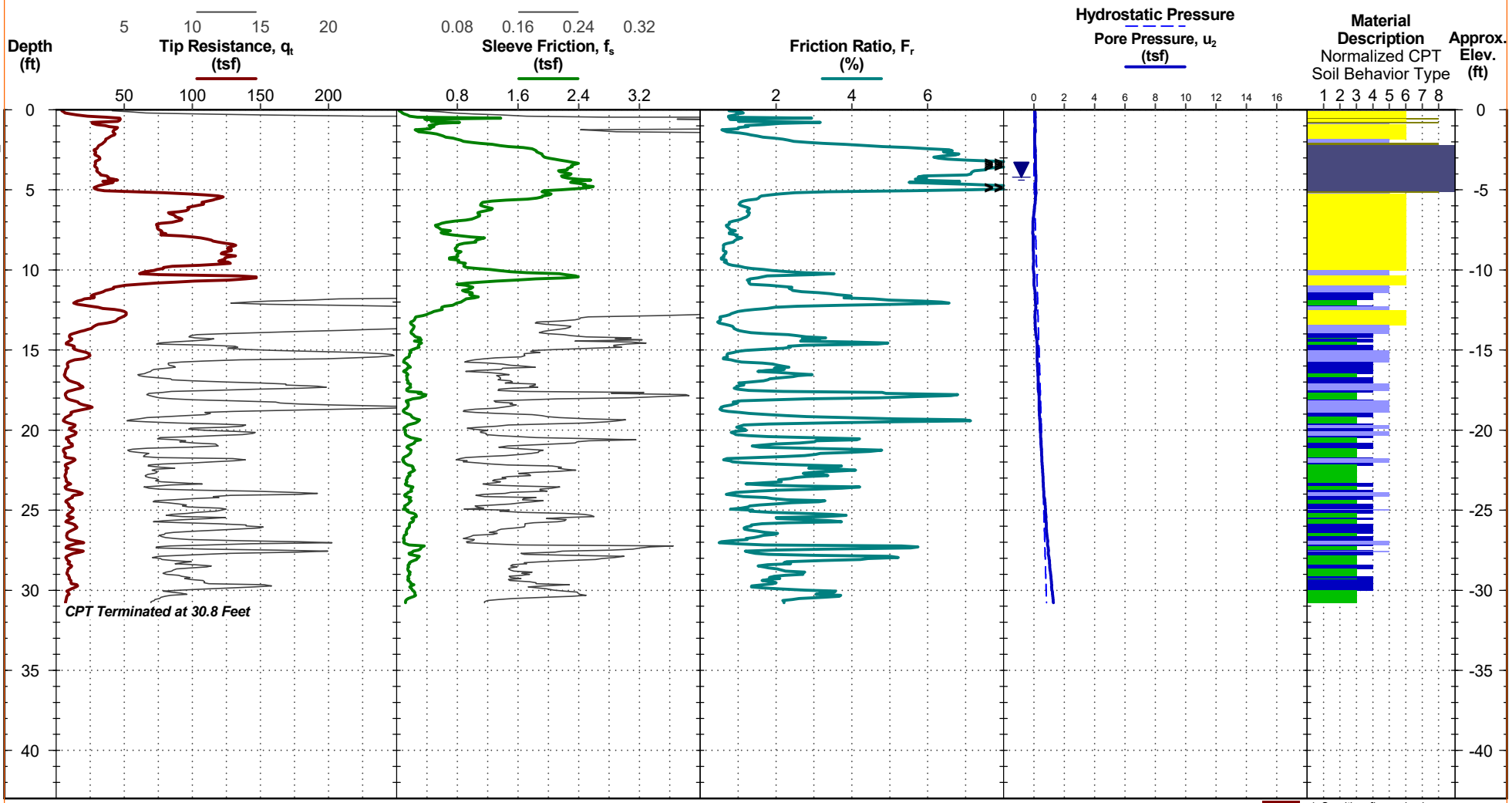
PROJECT: Colleton Mega Site Sewer

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

TEST LOCATION: See Exploration Plan

SITE: Bells Highway
Walterboro, SC

Latitude: 32.9148°
Longitude: -80.67879°



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

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

Elevations not obtained

CPT sensor calibration reports available upon request.

WATER LEVEL OBSERVATION

▼ 4.2 ft measured water depth
(used in normalizations and correlations; See Supporting Information)

Probe no. 5384 with net area ratio of .86
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 1/12/2022
Tip and sleeve areas of 10 cm^2 and 150 cm^2
Ring friction reducer with O.D. of 2 in

Terracon
1800 Reynolds Ave
North Charleston, SC

CPT Started: 3/25/2022
CPT Completed: 3/25/2022
Rig: Geoprobe
Operator: BR
Project No.: EN225002

CPT LOG NO. CPT-15

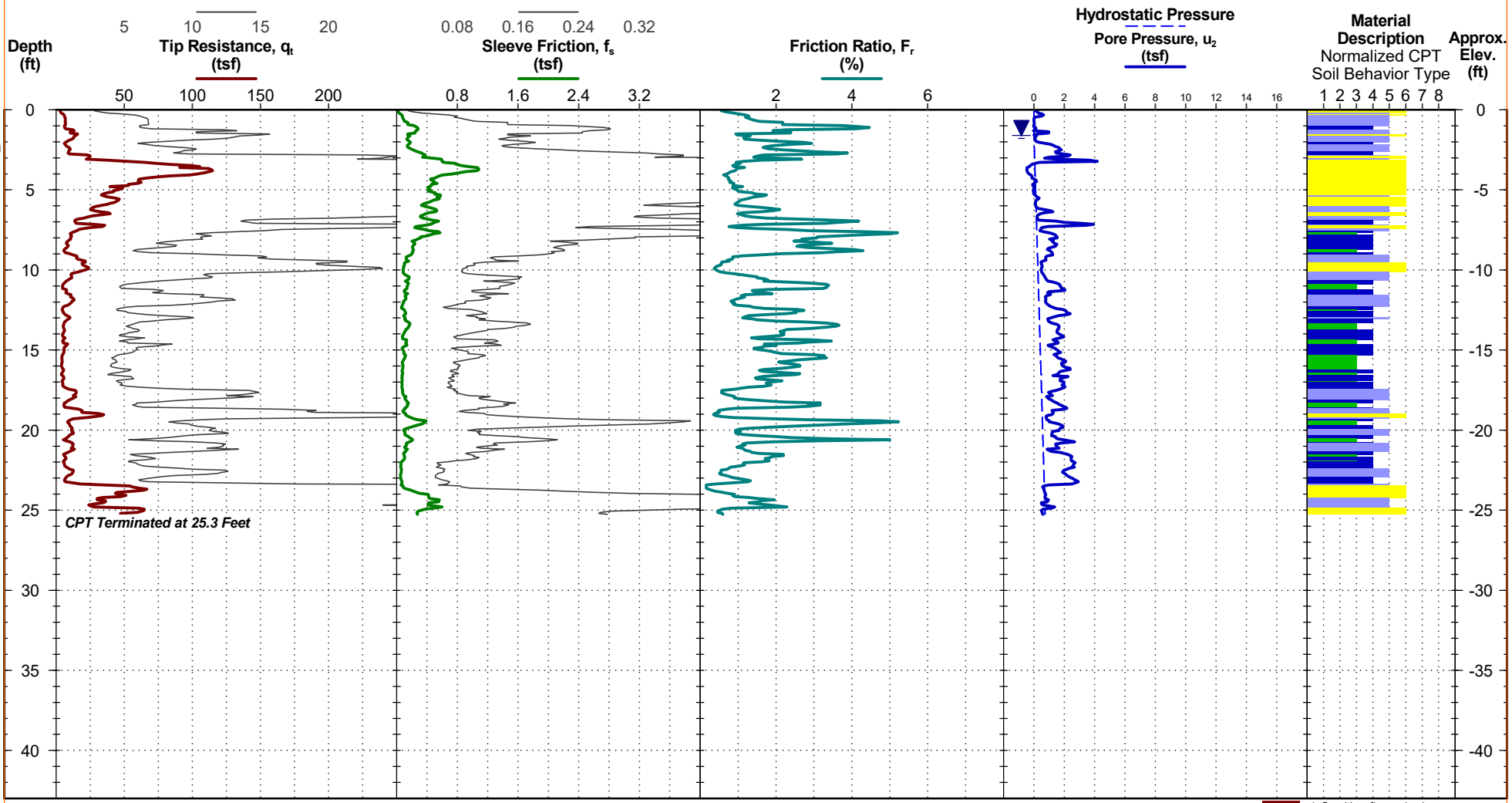
PROJECT: Colleton Mega Site Sewer

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

TEST LOCATION: See Exploration Plan

SITE: Bells Highway
Walterboro, SC

Latitude: 32.91351°
Longitude: -80.67642°



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

Elevations not obtained

CPT sensor calibration reports available upon request.

WATER LEVEL OBSERVATION

▼ 1.6 ft measured water depth
(used in normalizations and correlations; See Supporting Information)

Probe no. 5384 with net area ratio of .86
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 1/12/2022
Tip and sleeve areas of 10 cm^2 and 150 cm^2
Ring friction reducer with O.D. of 2 in

Terracon
1800 Reynolds Ave
North Charleston, SC

CPT Started: 3/25/2022
CPT Completed: 3/25/2022
Rig: Geoprobe
Operator: BR
Project No.: EN225002

CPT LOG NO. CPT-16

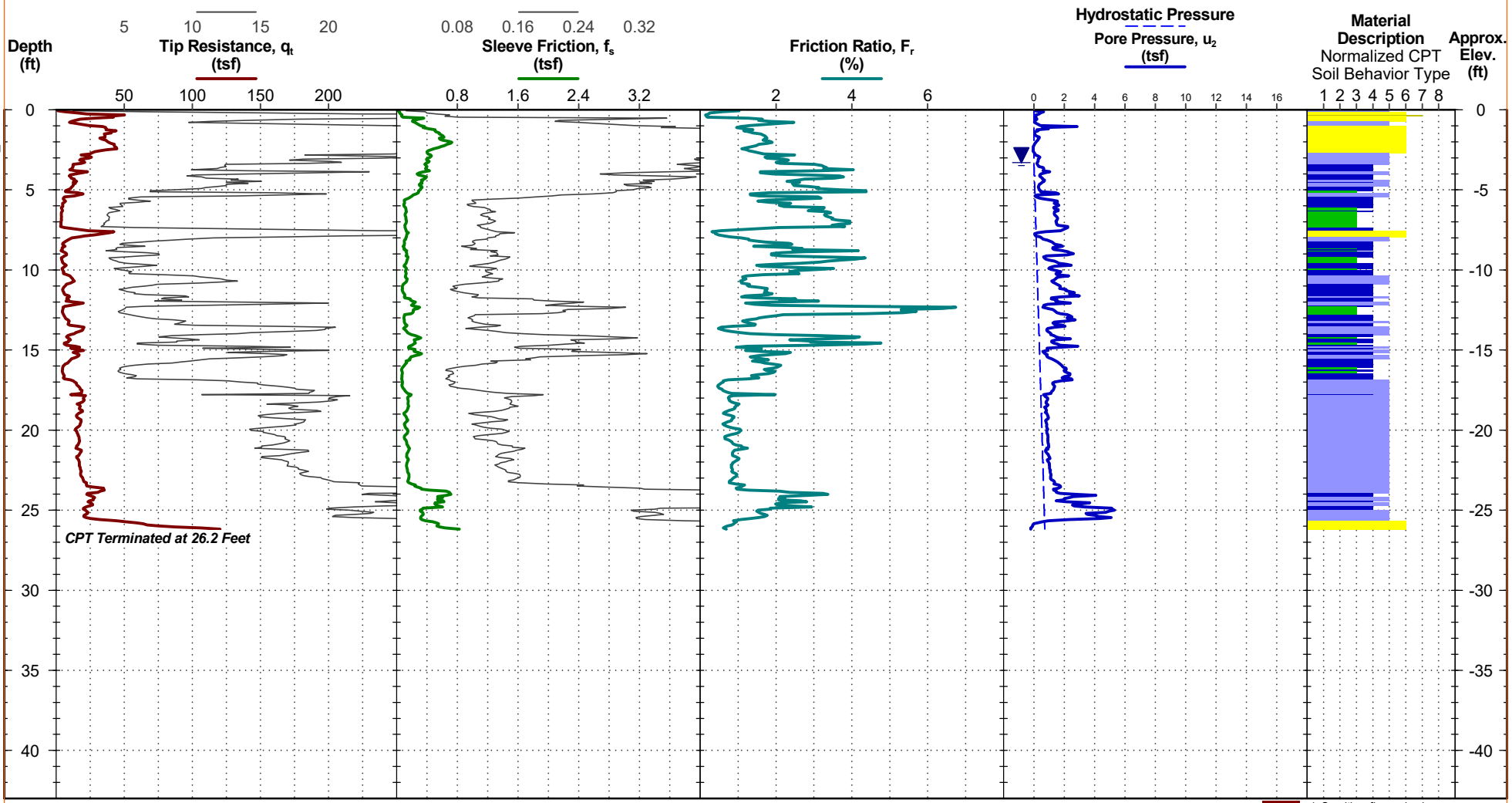
PROJECT: Colleton Mega Site Sewer

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

TEST LOCATION: See Exploration Plan

SITE: Bells Highway
Walterboro, SC

Latitude: 32.910627°
Longitude: -80.67488°



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

Elevations not obtained

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

▼ 3.3 ft measured water depth
(used in normalizations and correlations; See Supporting Information)

Probe no. 5384 with net area ratio of .86
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 1/12/2022
Tip and sleeve areas of 10 cm^2 and 150 cm^2
Ring friction reducer with O.D. of 2 in

Terracon
1800 Reynolds Ave
North Charleston, SC

CPT Started: 3/25/2022
CPT Completed: 3/25/2022
Rig: Geoprobe
Operator: BR
Project No.: EN225002

CPT LOG NO. CPT-17

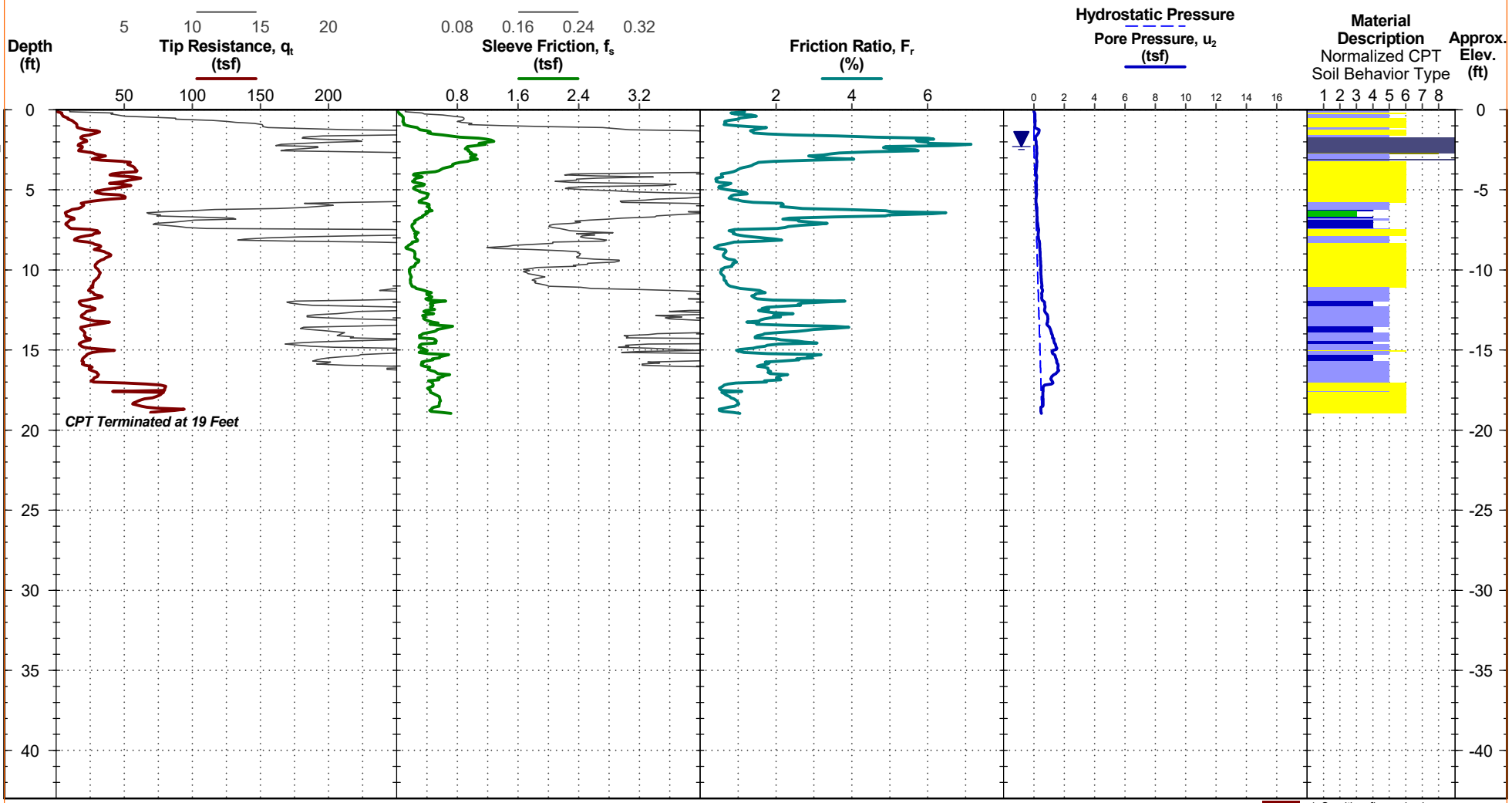
PROJECT: Colleton Mega Site Sewer

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

TEST LOCATION: See Exploration Plan

SITE: Bells Highway
Walterboro, SC

Latitude: 32.907982°
Longitude: -80.67402°



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

Elevations not obtained

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

▼ 2.3 ft measured water depth
(used in normalizations and correlations; See Supporting Information)

Probe no. 5384 with net area ratio of .86
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 1/12/2022
Tip and sleeve areas of 10 cm^2 and 150 cm^2
Ring friction reducer with O.D. of 2 in

Terracon
1800 Reynolds Ave
North Charleston, SC

CPT Started: 3/25/2022
CPT Completed: 3/25/2022
Rig: Geoprobe
Operator: BR
Project No.: EN225002

CPT LOG NO. CPT-18

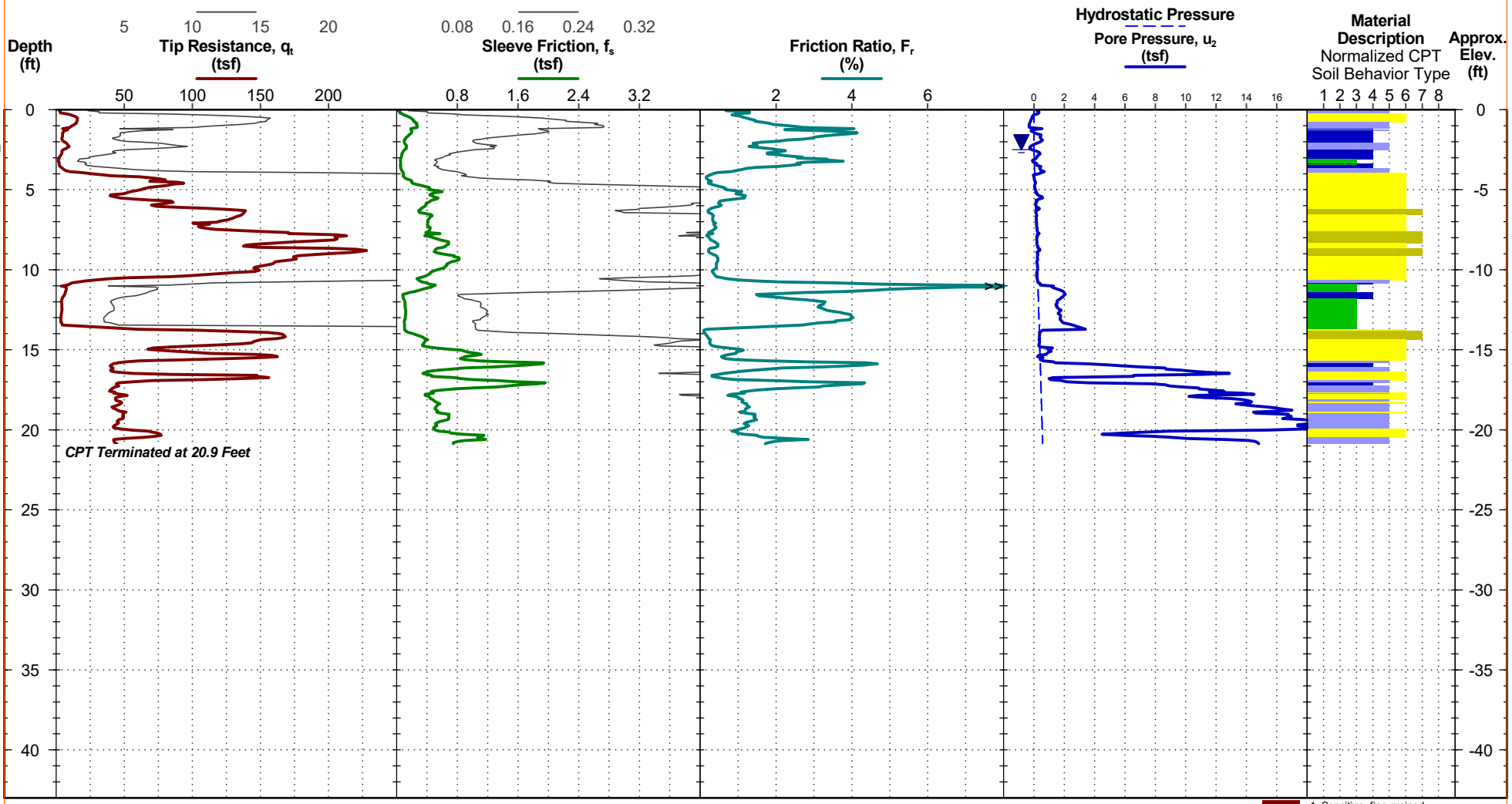
PROJECT: Colleton Mega Site Sewer

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

TEST LOCATION: See Exploration Plan

SITE: Bells Highway
Walterboro, SC

Latitude: 32.90479°
Longitude: -80.67313°



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

Elevations not obtained

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

▼ 2.5 ft measured water depth
(used in normalizations and correlations; See Supporting Information)

Probe no. 5384 with net area ratio of .86
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 1/12/2022
Tip and sleeve areas of 10 cm^2 and 150 cm^2
Ring friction reducer with O.D. of 2 in

Terracon
1800 Reynolds Ave
North Charleston, SC

CPT Started: 3/28/2022
CPT Completed: 3/28/2022
Rig: Geoprobe
Operator: BR
Project No.: EN225002

CPT LOG NO. CPT-19

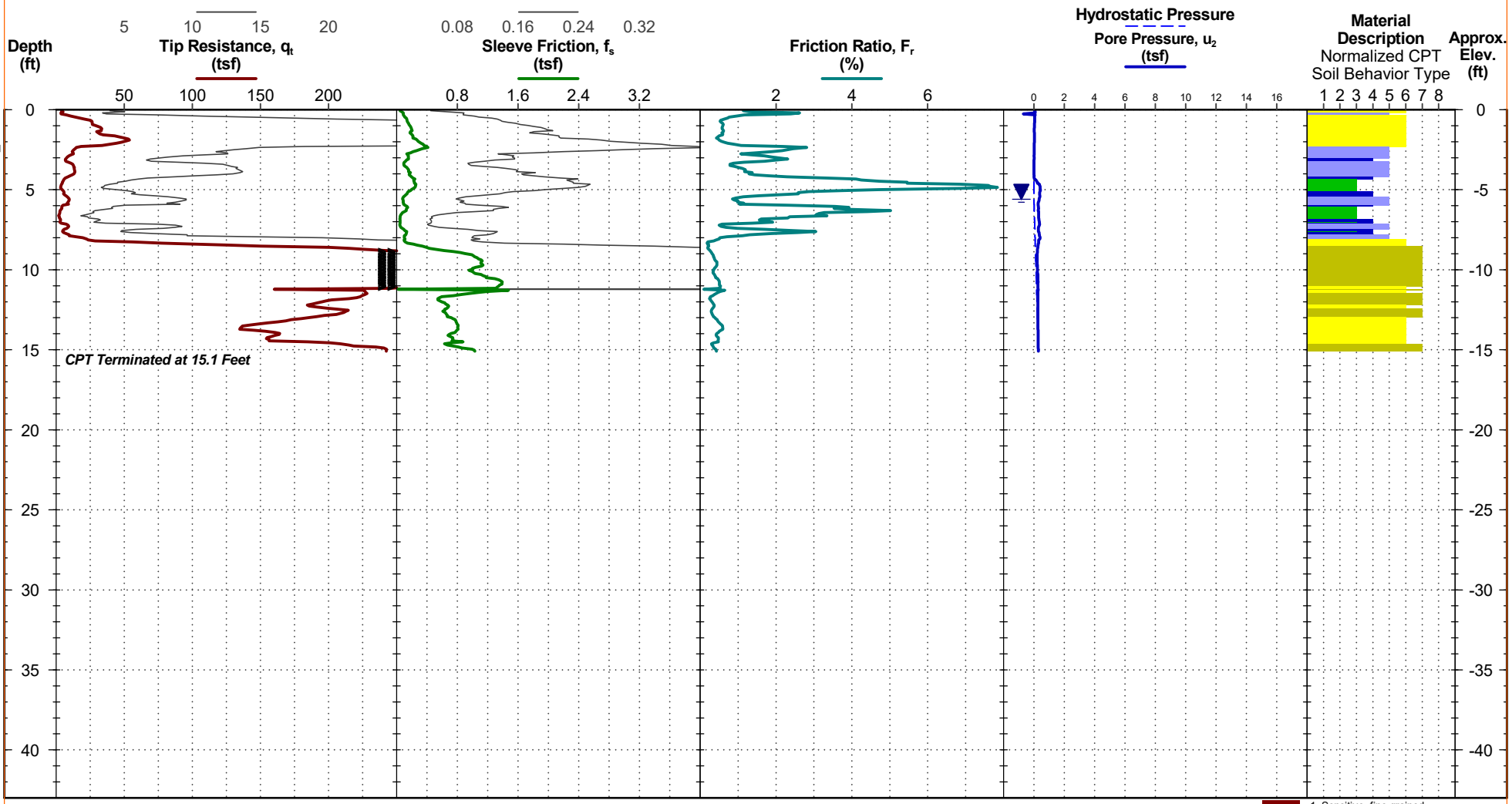
PROJECT: Colleton Mega Site Sewer

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

TEST LOCATION: See Exploration Plan

SITE: Bells Highway
Walterboro, SC

Latitude: 32.90363°
Longitude: -80.67467°



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

CPT sensor calibration reports available upon request.

Elevations not obtained

WATER LEVEL OBSERVATION

▼ 5.6 ft measured water depth
(used in normalizations and correlations; See Supporting Information)

Probe no. 5384 with net area ratio of .86
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 1/12/2022
Tip and sleeve areas of 10 cm^2 and 150 cm^2
Ring friction reducer with O.D. of 2 in

Terracon
1800 Reynolds Ave
North Charleston, SC

CPT Started: 3/28/2022
CPT Completed: 3/28/2022
Rig: Geoprobe
Operator: BR
Project No.: EN225002

CPT LOG NO. CPT-20

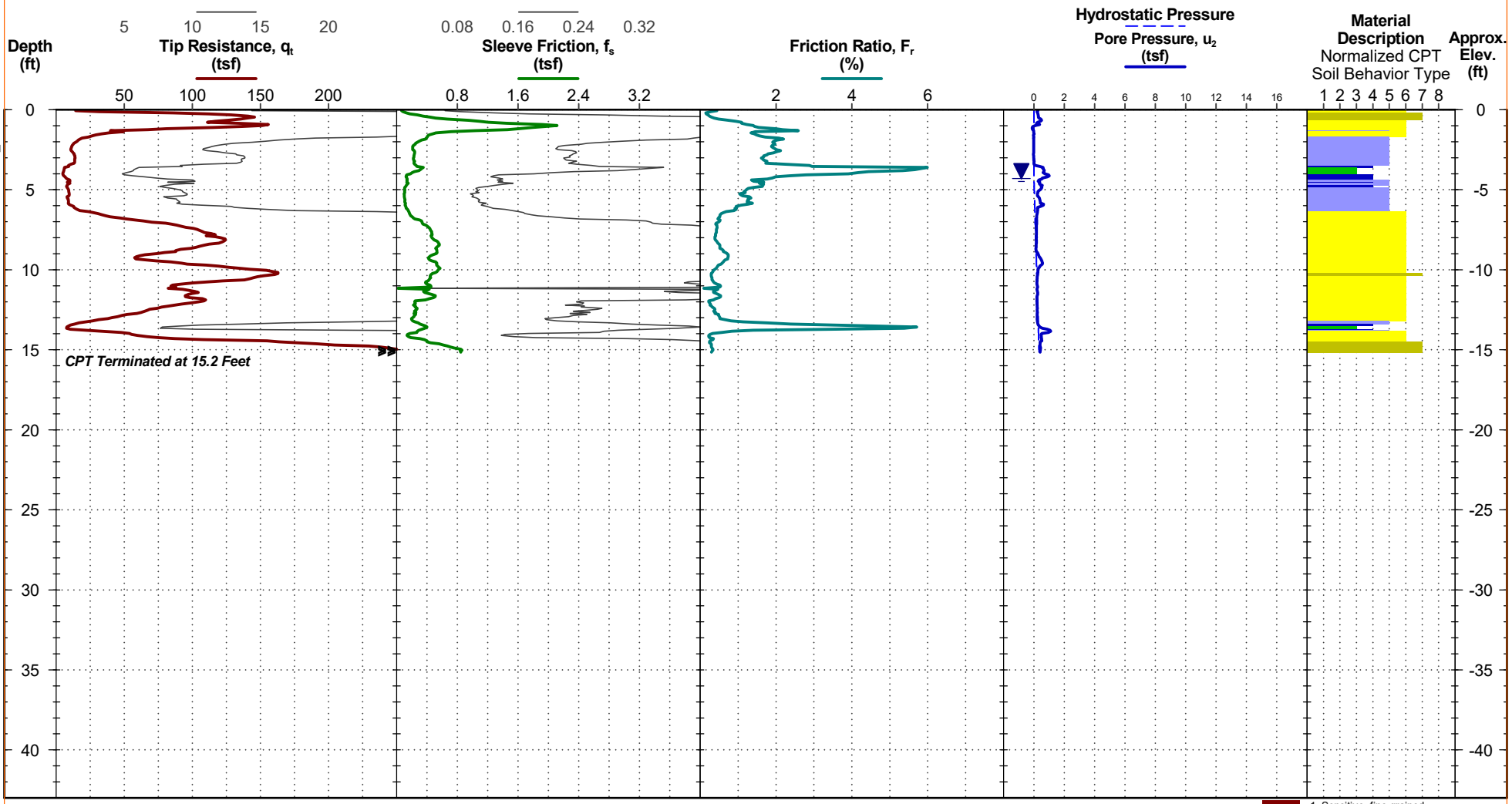
PROJECT: Colleton Mega Site Sewer

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

TEST LOCATION: See Exploration Plan

SITE: Bells Highway
Walterboro, SC

Latitude: 32.90168°
Longitude: -80.67761°



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

Elevations not obtained

CPT sensor calibration reports available upon request.

WATER LEVEL OBSERVATION

▼ 4.3 ft measured water depth
(used in normalizations and correlations; See Supporting Information)

Probe no. 5384 with net area ratio of .86
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 1/12/2022
Tip and sleeve areas of 10 cm^2 and 150 cm^2
Ring friction reducer with O.D. of 2 in

Terracon
1800 Reynolds Ave
North Charleston, SC

CPT Started: 3/28/2022
CPT Completed: 3/28/2022
Rig: Geoprobe
Operator: BR
Project No.: EN225002

BORING LOG NO. HAB @ SCPT-1

PROJECT: Colleton Mega Site Sewer

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

SITE: Bells Highway
Walterboro, SC

LOCATION See Exploration Plan

Latitude: 32.9545° Longitude: -80.7528°

GRAPHIC LOG	DEPTH		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE
		TOPSOIL, 8 inches			
	0.7	**CLAYEY SAND (SC)**, brown to gray	1 2 3		
	4.0	***Boring Terminated at 4 Feet***	4		

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

Advancement Method:

Abandonment Method:

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:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
1800 Reynolds Ave
North Charleston, SC

Boring Started: 08-04-2022 | Boring Completed: 08-04-2022

Drill Rig: Geoprobe | Driller: BR

Project No.: EN225002

BORING LOG NO. HAB @ CPT-2

PROJECT: Colleton Mega Site Sewer

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

SITE: Bells Highway
Walterboro, SC

GRAPHIC LOG	LOCATION See Exploration Plan DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE
	TOPSOIL, 6 inches 0.5			
	CLAYEY SAND (SC), light brown 2.3	1 2		
	SANDY LEAN CLAY (CL), light brown 4.0	3	▽	
	Boring Terminated at 4 Feet	4		

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

Advancement Method:

Abandonment Method:

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:

WATER LEVEL OBSERVATIONS

▽ *3.3 feet at completion of drilling*

Terracon
1800 Reynolds Ave
North Charleston, SC

Boring Started: 03-28-2022	Boring Completed: 03-28-2022
Drill Rig: Geoprobe	Driller: BR
Project No.: EN225002	

BORING LOG NO. HAB @ CPT-3

PROJECT: Colleton Mega Site Sewer

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

SITE: Bells Highway
Walterboro, SC

GRAPHIC LOG	LOCATION See Exploration Plan DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE
	TOPSOIL, 8 inches 0.7			
	SILTY SAND (SM), dark brown, crushed asphalt encountered between 1 to 2.2 feet 2.8	1 2		
	SANDY LEAN CLAY (CL), light brown to brown 3.5	3		
	SILTY SAND (SM), light brown to brown 4.0			
	Boring Terminated at 4 Feet	4		

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

Advancement Method:

Abandonment Method:

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:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
1800 Reynolds Ave
North Charleston, SC

Boring Started: 03-28-2022 | Boring Completed: 03-28-2022

Drill Rig: Geoprobe | Driller: BR

Project No.: EN225002

BORING LOG NO. HAB @ CPT-4

PROJECT: Colleton Mega Site Sewer

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

SITE: Bells Highway
Walterboro, SC

GRAPHIC LOG	LOCATION See Exploration Plan DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE
	TOPSOIL, 8 inches			
	0.7 **POORLY GRADED SAND (SP)**, yellowish brown	1 2		
	2.5 **CLAYEY SAND (SC)**, orangish brown	3		
	4.0 ***Boring Terminated at 4 Feet***	4		

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

Advancement Method:

Abandonment Method:

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:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
1800 Reynolds Ave
North Charleston, SC

Boring Started: 03-28-2022	Boring Completed: 03-28-2022
Drill Rig: Geoprobe	Driller: BR
Project No.: EN225002	

BORING LOG NO. HAB @ CPT-5

PROJECT: Colleton Mega Site Sewer

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

SITE: Bells Highway
Walterboro, SC

GRAPHIC LOG	LOCATION See Exploration Plan DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE
	TOPSOIL, 11 inches			
0.9				
	POORLY GRADED SAND (SP), yellowish brown	1		
1.7				
	SANDY LEAN CLAY (CL), yellowish brown	2		
		3		
3.3				
	CLAYEY SAND (SC), yellowish brown			
4.0		4		
	Boring Terminated at 4 Feet			

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

Advancement Method:

Abandonment Method:

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:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
1800 Reynolds Ave
North Charleston, SC

Boring Started: 03-28-2022 | Boring Completed: 03-28-2022

Drill Rig: Geoprobe | Driller: BR

Project No.: EN225002

BORING LOG NO. HAB @ CPT-6

PROJECT: Colleton Mega Site Sewer

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

SITE: Bells Highway
Walterboro, SC

GRAPHIC LOG	DEPTH		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE
LOCATION See Exploration Plan					
		TOPSOIL, 8 inches			
	0.7	**CLAYEY SAND (SC)**, brown	1	▽	
	1.2	**SANDY LEAN CLAY (CL)**, brown			
	1.8	**CLAYEY SAND (SC)**, brown	2		
			3		
	4.0	***Boring Terminated at 4 Feet***	4		

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

Advancement Method:

Abandonment Method:

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:

WATER LEVEL OBSERVATIONS

▽ *0.8 feet at completion of drilling*

Terracon
1800 Reynolds Ave
North Charleston, SC

Boring Started: 03-28-2022	Boring Completed: 03-28-2022
Drill Rig: Geoprobe	Driller: BR
Project No.: EN225002	

BORING LOG NO. HAB @ CPT-7

PROJECT: Colleton Mega Site Sewer

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

SITE: Bells Highway
Walterboro, SC

GRAPHIC LOG	LOCATION See Exploration Plan DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE
	SILTY SAND (SM), yellowish brown to gray	1 2 3		
	4.0 ***Boring Terminated at 4 Feet***	4		

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

Advancement Method:

Abandonment Method:

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:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
1800 Reynolds Ave
North Charleston, SC

Boring Started: 03-28-2022 | Boring Completed: 03-28-2022

Drill Rig: Geoprobe | Driller: BR

Project No.: EN225002

BORING LOG NO. HAB @ CPT-8

PROJECT: Colleton Mega Site Sewer

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

SITE: Bells Highway
Walterboro, SC

LOCATION See Exploration Plan

GRAPHIC LOG	DEPTH		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE
	0.4	**TOPSOIL**, 5 inches			
	2.2	**SILTY SAND (SM)**, light brown	1 2		
	3.3	**CLAYEY SAND (SC)**, light brown	3		
	4.0	**SILTY SAND (SM)**, light brown	4	▽	
		Boring Terminated at 4 Feet			

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

Advancement Method:

Abandonment Method:

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:

WATER LEVEL OBSERVATIONS

▽ *4.0 feet at completion of drilling*

Terracon
1800 Reynolds Ave
North Charleston, SC

Boring Started: 03-28-2022	Boring Completed: 03-28-2022
Drill Rig: Geoprobe	Driller: BR
Project No.: EN225002	

BORING LOG NO. HAB @ CPT-9

PROJECT: Colleton Mega Site Sewer

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

SITE: Bells Highway
Walterboro, SC

GRAPHIC LOG	LOCATION See Exploration Plan DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE
	TOPSOIL, 5 inches 0.4			
	SILTY SAND (SM), light brown, aggregate base course and crushed asphalt enountered between 0.4 to 2 feet 4.0	1 2 3 4		
	Boring Terminated at 4 Feet			

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

Advancement Method:

Abandonment Method:

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:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
1800 Reynolds Ave
North Charleston, SC

Boring Started: 03-28-2022 | Boring Completed: 03-28-2022

Drill Rig: Geoprobe | Driller: BR

Project No.: EN225002

BORING LOG NO. HAB @ CPT-10

PROJECT: Colleton Mega Site Sewer

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

SITE: Bells Highway
Walterboro, SC

GRAPHIC LOG	LOCATION See Exploration Plan DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE
	SILTY SAND (SM), 9 inches, with aggregate base course	1 2 3		
	4.0 ***Boring Terminated at 4 Feet***	4		

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

Advancement Method:

Abandonment Method:

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:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
1800 Reynolds Ave
North Charleston, SC

Boring Started: 03-28-2022 | Boring Completed: 03-28-2022

Drill Rig: Geoprobe | Driller: BR

Project No.: EN225002

BORING LOG NO. HAB @ CPT-11

PROJECT: Colleton Mega Site Sewer

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

SITE: Bells Highway
Walterboro, SC

LOCATION See Exploration Plan

GRAPHIC LOG	DEPTH		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE
		TOPSOIL, 6 inches, with aggregate base course			
	0.5	**SILTY SAND (SM)**, gray	1		
	1.3	**LEAN CLAY WITH SAND (CL)**, dark brown	2		
			3	▽	
	4.0	***Boring Terminated at 4 Feet***	4		

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

Advancement Method:

Abandonment Method:

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:

WATER LEVEL OBSERVATIONS

▽ *3.8 feet at completion of drilling*

Terracon
1800 Reynolds Ave
North Charleston, SC

Boring Started: 03-28-2022 | Boring Completed: 03-28-2022

Drill Rig: Geoprobe | Driller: BR

Project No.: EN225002

BORING LOG NO. HAB @ CPT-12

PROJECT: Colleton Mega Site Sewer

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

SITE: Bells Highway
Walterboro, SC

LOCATION See Exploration Plan

GRAPHIC LOG	DEPTH		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE
	0.6	**TOPSOIL**, 7 inches, with roots			
	1.6	**SILTY SAND (SM)**, light brown	1		
	3.0	**CLAYEY SAND (SC)**, light brown	2		
	4.0	**SANDY LEAN CLAY (CL)**, orangish brown	3		
		Boring Terminated at 4 Feet	4		

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

Advancement Method:

Abandonment Method:

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:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
1800 Reynolds Ave
North Charleston, SC

Boring Started: 03-28-2022 | Boring Completed: 03-28-2022

Drill Rig: Geoprobe | Driller: BR

Project No.: EN225002

BORING LOG NO. HAB @ CPT-13

PROJECT: Colleton Mega Site Sewer

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

SITE: Bells Highway
Walterboro, SC

GRAPHIC LOG	LOCATION See Exploration Plan DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE
	TOPSOIL, 8 inches, with roots 0.7			
	SILTY SAND (SM), light brown 1.4	1		
	CLAYEY SAND (SC), light brown 2.0			
	SILTY SAND (SM), orangish brown 4.0	2 3		
	Boring Terminated at 4 Feet	4		

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

Advancement Method:

Abandonment Method:

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:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
1800 Reynolds Ave
North Charleston, SC

Boring Started: 03-28-2022	Boring Completed: 03-28-2022
Drill Rig: Geoprobe	Driller: BR
Project No.: EN225002	

BORING LOG NO. HAB @ CPT-14

PROJECT: Colleton Mega Site Sewer

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

SITE: Bells Highway
Walterboro, SC

GRAPHIC LOG	LOCATION See Exploration Plan DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE
	TOPSOIL, 8 inches			
	0.7 **SANDY LEAN CLAY (CL)**, reddish brown	1 2 3		
	4.0 ***Boring Terminated at 4 Feet***	4		

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

Advancement Method:

Abandonment Method:

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:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
1800 Reynolds Ave
North Charleston, SC

Boring Started: 03-28-2022 | Boring Completed: 03-28-2022

Drill Rig: Geoprobe | Driller: BR

Project No.: EN225002

BORING LOG NO. HAB @ CPT-15

PROJECT: Colleton Mega Site Sewer

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

SITE: Bells Highway
Walterboro, SC

GRAPHIC LOG	LOCATION See Exploration Plan DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE
	TOPSOIL, 8 inches 0.7			
	SILTY SAND (SM), orangish brown 1.7	1		
	SANDY LEAN CLAY (CL), orangish brown 3.3	2 3		
	SILTY SAND (SM), orangish brown 4.0		▽	
	Boring Terminated at 4 Feet	4		

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

Advancement Method:

Abandonment Method:

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:

WATER LEVEL OBSERVATIONS

▽ *4.0 feet at completion of drilling*

Terracon
1800 Reynolds Ave
North Charleston, SC

Boring Started: 03-28-2022 | Boring Completed: 03-28-2022

Drill Rig: Geoprobe | Driller: BR

Project No.: EN225002

BORING LOG NO. HAB @ CPT-16

PROJECT: Colleton Mega Site Sewer

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

SITE: Bells Highway
Walterboro, SC

GRAPHIC LOG	LOCATION See Exploration Plan DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE
	POORLY GRADED SAND (SP), with aggregate base course		▽	
	1.0	1		
	CLAYEY SAND (SC), orangish brown, refusal due to cave-in			
	2.2	2		
	Refusal at 2.2 Feet			

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

Advancement Method:

Abandonment Method:

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:

WATER LEVEL OBSERVATIONS

▽ *0.5 feet at completion of drilling*

Terracon
1800 Reynolds Ave
North Charleston, SC

Boring Started: 03-28-2022 | Boring Completed: 03-28-2022

Drill Rig: Geoprobe | Driller: BR

Project No.: EN225002

BORING LOG NO. HAB @ CPT-17

PROJECT: Colleton Mega Site Sewer

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

SITE: Bells Highway
Walterboro, SC

LOCATION See Exploration Plan

GRAPHIC LOG	DEPTH		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE
		TOPSOIL, 6 inches			
	0.5	**SANDY LEAN CLAY (CL)**, reddish brown	1		
	2.5	**CLAYEY SAND (SC)**, orangish brown	2		
	4.0	***Boring Terminated at 4 Feet***	3		
			4		

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

Advancement Method:

Abandonment Method:

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:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
1800 Reynolds Ave
North Charleston, SC

Boring Started: 03-28-2022	Boring Completed: 03-28-2022
Drill Rig: Geoprobe	Driller: BR
Project No.: EN225002	

BORING LOG NO. HAB @ CPT-18

PROJECT: Colleton Mega Site Sewer

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

SITE: Bells Highway
Walterboro, SC

LOCATION See Exploration Plan

GRAPHIC LOG	DEPTH		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE
		TOPSOIL, 8 inches			
	0.7	**SILTY SAND (SM)**, light brown to brown	1		
			2	▽	
			3		
	4.0	***Boring Terminated at 4 Feet***	4		

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

Advancement Method:

Abandonment Method:

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:

WATER LEVEL OBSERVATIONS

▽ *2.3 feet at completion of drilling*

Terracon
1800 Reynolds Ave
North Charleston, SC

Boring Started: 03-28-2022 | Boring Completed: 03-28-2022

Drill Rig: Geoprobe | Driller: BR

Project No.: EN225002

BORING LOG NO. HAB @ CPT-19

PROJECT: Colleton Mega Site Sewer

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

SITE: Bells Highway
Walterboro, SC

GRAPHIC LOG	LOCATION See Exploration Plan DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE
	TOPSOIL, 14 inches	1		
1.2	**POORLY GRADED SAND (SP)**, gray to brown, with roots	2		
		3		
4.0	***Boring Terminated at 4 Feet***	4		

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

Advancement Method:

Abandonment Method:

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:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
1800 Reynolds Ave
North Charleston, SC

Boring Started: 03-28-2022	Boring Completed: 03-28-2022
Drill Rig: Geoprobe	Driller: BR
Project No.: EN225002	

BORING LOG NO. HAB @ CPT-20

PROJECT: Colleton Mega Site Sewer

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

SITE: Bells Highway
Walterboro, SC

GRAPHIC LOG	LOCATION See Exploration Plan DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE
	TOPSOIL, 7 inches 0.6			
	POORLY GRADED SAND (SP), gray, with aggregate base course 1.3	1		
	SANDY LEAN CLAY (CL), brown to gray 2.1	2		
	POORLY GRADED SAND (SP), brown 4.0	3		
	Boring Terminated at 4 Feet	4		

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

Advancement Method:

Abandonment Method:

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:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
1800 Reynolds Ave
North Charleston, SC

Boring Started: 03-28-2022 | Boring Completed: 03-28-2022

Drill Rig: Geoprobe | Driller: BR

Project No.: EN225002

SUPPORTING INFORMATION

Contents:

Note: All attachments are one page unless noted above.

CPT GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

Terracon GeoReport

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
$G_0\ (1) = \rho V_s^2$
$G_0\ (2) = 0.015 \times 10^{(0.55Ic + 1.68)}(q_t - \sigma_{v0})$

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}
$N_{60} = (q_t/atm) / 10^{(1.1268 - 0.2817Ic)}$

Elastic Modulus, E_s (assumes $q/q_{ultimate} \sim 0.3$, i.e. FS = 3)
$E_s\ (1) = 2.6\psi G_0$ where $\psi = 0.56 - 0.33\log Q_{tn,clean\ sand}$
$E_s\ (2) = G_0$
$E_s\ (3) = 0.015 \times 10^{(0.55Ic + 1.68)}(q_t - \sigma_{v0})$
$E_s\ (4) = 2.5q_t$

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

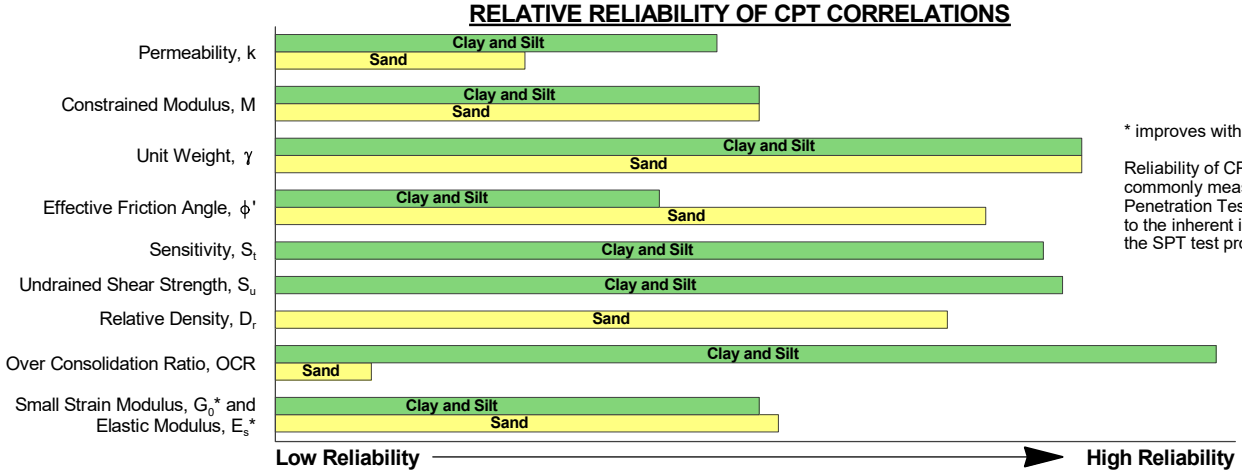
Hydraulic Conductivity, k
For $1.0 < I_c < 3.27$ $k = 10^{(0.952 - 3.04Ic)}$
For $3.27 < I_c < 4.0$ $k = 10^{(-4.52 - 1.37Ic)}$

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



* improves with seismic V_s measurements

Reliability of CPT-predicted N_{60} values as commonly measured by the Standard Penetration Test (SPT) is not provided due to the inherent inaccuracy associated with the SPT test procedure.

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

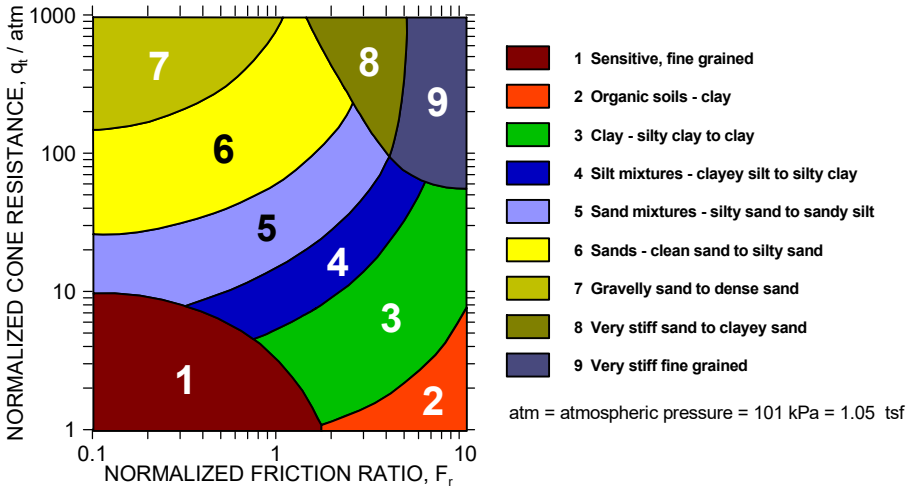
Estimated - Depth to water interpolated by the practitioner using pore pressure measurements in coarse grained soils and known site conditions

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.



atm = atmospheric pressure = 101 kPa = 1.05 tsf

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Mayne, P.W., (2013). "Geotechnical Site Exploration in the Year 2013," Georgia Institue of Technology, Atlanta, GA.

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.

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]
			$Cu < 4$ 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] $Cu = D_{60}/D_{10}$ $\quad Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 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 ≥ 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 ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

[M] If soil contains ≥ 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.