COLLETON COUNTY
SOUTH CAROLINA

Purchasing Department
113 Mable T. Willis Blvd.
Walterboro, SC 29488
843.782.0504

BID: CPST-15
Venture Park Water & Wastewater Improvements

Due: Thursday, August 19, 2021 at 11:00am

ADDENDUM 2
Dated: August 16, 2021

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

PART I – GENERAL

A Geotechnical Engineering Report prepared by Terracon, dated May 31, 2020, is attached for reference.

1. **Can the limits of disturbance be expanded? Can the limits of Disturbance be expanded to 40 or 50 feet, to provide the room necessary for the installation of the deeper cuts of the gravity sewer?**
   Answer: Contractor shall utilize provided construction easements to install gravity sewer per Construction Plans. Sections of gravity sewer wetland impact areas cannot exceed the limits identified on the plans.

PART II – CONTRACT DOCUMENTS
No Changes

PART III – TECHNICAL SPECIFICATIONS:
No Changes

PART IV – DRAWINGS
Delete Roadway Pavement Replacement Detail on Drawing C4.2

Geotechnical Engineering Report

Venture Park Sewer & Water Lines
Colleton County, SC
May 31, 2020
Terracon Project No. EN205064

Prepared for:
Thomas & Hutton
Columbia, South Carolina

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

May 31, 2020

Terracon GeoReport

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

Attn: Mr. Patrick Burk, Project Manager
P: 803-451-6776
E: burk.p@tandh.com

Re: Geotechnical Engineering Report
Venture Park Sewer & Water Lines
Industrial Road and Thunderbolt Drive
Colleton County, SC
Terracon Project No. EN205064

Dear Mr. Burk:

We have completed the Geotechnical Engineering services for the above referenced project. This study was performed in general accordance with Terracon Proposal No. PEN205064 dated April 15, 2020, as authorized on April 15, 2020. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the construction of water and 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.

Will J. Botts, P.E.
Geotechnical Project Engineer

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER No. 30792 THOMAS C. SMOAK, III 5/31/2020

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.

EXECUTIVE SUMMARY

Terracon has completed a geotechnical engineering report for the Venture Park Water and Sewer Lines project located in Colleton County, South Carolina. Our geotechnical scope of work for this project included conducting geotechnical fieldwork, engineering analysis, and the development of this engineering report. This report provides recommendations for earthwork, utility installation, and construction. The following geotechnical considerations were identified during this phase of the investigation:

- Sloping, shielding consisting of steel sheeting, or a combination of both will be necessary for deep excavations and construction of the utility lines. These can be designed and constructed utilizing the lateral earth pressures presented in this report.

- At the time of our exploration, groundwater was encountered and estimated at depths generally ranging from approximately 2 to 8 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.

- Dewatering will be required if excavations extend below the water table. Given the sandy soils at the site, dewatering can be accomplished by either using pumps and sumps in the bottom of the excavation or by using sanded well-points.

This summary should be used in conjunction with the entire report for design purposes. It should be recognized that details were not included or fully developed in this section, and the report must be read in its entirety for a comprehensive understanding of the items contained herein.

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

Geotechnical Engineering Report

Venture Park Sewer & Water Lines
Industrial Road and Thunderbolt Drive
Colleton County, SC
Terracon Project No. EN205064
May 31, 2020

INTRODUCTION

This report presents the results of our subsurface exploration and geotechnical engineering services performed for the proposed Venture Park Water and Sewer Lines Project to be located near the intersection Industrial Road and Thunderbolt Drive in Colleton County, SC. 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 twelve (12) Cone Penetration Test (CPT) soundings to depths ranging from approximately 16 to 24 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 sewer and water lines will generally run along the perimeter of the Venture Park facility near the intersection of Industrial Road and Thunderbolt Drive in Colleton County, SC. ■ The approximate center of the sewer line segment is located at 32.948238° N, -80.625860° W. ■ The approximate center of the water line segment is located at 32.952159° N, - 80.624198° W. For additional location information see **Site Location** and **Exploration Plan** sections.
Existing Improvements	The area of the proposed sewer and water lines are generally located on the shoulder of roadways within the existing facility. The southernmost sections of the water and sewer lines run through undeveloped and wooded areas.
Current Ground Cover	Varies. Generally, the ground cover included grass and underbrush in the subject section.
Existing Topography	Relatively flat.

PROJECT DESCRIPTION

Our final understanding of the project conditions is as follows:

Item	Description
Information Provided	Site plan of the proposed sewer and water improvements.
Project Description	The project consists of the construction and installation of 5,000 linear feet of new 8-inch and 10-inch PVC water line running along the perimeter of the Venture Park facility. In addition, 6,100 linear feet of 8-inch gravity sewer line will also be constructed. The new sewer line will start along the west edge of the existing facility and run south along Thunderbolt drive and tie into the existing gravity line.
Grading/Slopes	Specific grading information is unavailable at this time. We understand the proposed water lines will have about 3 feet of cover. We assume excavations will not exceed 20 feet below the existing ground surface.

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.

Description	Approximate Depth to Bottom of Stratum	Material Encountered [1]
Surface	2 to 12 inches	Topsoil [2]
Stratum 1	9 feet	Loose to medium dense clean sand to silty sand
Stratum 2	11 feet [3]	Soft to stiff silt mixtures
Stratum 3	24 feet [4]	Medium dense to dense clean sand to silty sand with interbedded sandy silt layers

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. No topsoil was encountered at CPT-7, CPT-8, and CPT-9.
3. Strata not encountered at CPT-3, CPT-5, CPT-11 and CPT-12.
4. 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 2 to 8 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 [3]	Depth to Groundwater in Adjacent Hand Auger Boring
CPT-1	5.4 ft.	5.0 ft.	NE [1]
CPT-2	2.5 ft.	3.0 ft.	2.7 ft.
CPT-3	2.5 ft.	2.5 ft.	3.2 ft.
CPT-4	2.2 ft.	2.5 ft.	2.5 ft.
CPT-5	3.5 ft.	3.5 ft.	3.5 ft.
CPT-6	NE [1]	4.0 ft.	NE [1]
CPT-7	NE [1]	7.0 ft.	NE [1]
CPT-8	8.3 ft.	8.0 ft.	NE [1]
CPT-9	8.2 ft.	7.5 ft.	NE [1]
CPT-10	6.5 ft.	6.0 ft.	NE [1]
CPT-11	NE [1]	6.0 ft.	NE [1]
CPT-12	NE [1]	5.0 ft.	NE [1]

1. NE = Not Encountered.
2. NA = Not Applicable. Pore pressure data is only available for CPTs.

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.

EARTHWORK

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.

Site Preparation

The initial step in site preparation is to remove trees, grass, organic material, topsoil, root balls, and other deleterious material from within the proposed construction areas. Stripping should extend a minimum of 10 feet outside the construction area footprint (if possible) and we expect stripping depths to range between 2 and 12 inches.

Please bear in mind that the volume of topsoil and organics may be significantly greater than the area multiplied by the topsoil/organics thickness indicated in the boring logs. Rutting of the subgrade can also cause mixing of topsoil/organics with underlying soils, which will result in additional required topsoil/organics stripping. Deeper undercut may be needed in some localized areas to remove tree stumps or other unsuitable materials. Voids remaining from the clearing/stripping operation should be backfilled with properly compacted Controlled Fill.

Earthwork on the project should be observed and evaluated by Terracon personnel. The evaluation of earthwork should include observation and sufficient testing of Controlled Fill and subgrade preparation, and other geotechnical conditions exposed during the construction of the project.

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	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.

Fill Compaction Requirements

Controlled Fill should meet the following compaction requirements:

Item	Description
Fill Lift Thickness	When heavy, self-propelled compaction equipment is used, fill lifts shall have a maximum of 10 inches in loose thickness.
	When hand-guided equipment (i.e. jumping jack or plate compactor) is used, fill lifts shall have a maximum of 2 to 4 inches in loose thickness.
Compaction Requirements [1]	**Controlled Fill in Structural Areas**- **95%** of the material's maximum modified Proctor dry density (ASTM D1557).
	Controlled Fill in Green Spaces - 90% 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.

Excavation & Dewatering Considerations

Sloping, shielding consisting of steel sheeting, or a combination of both will be necessary for deep excavations and construction of the utility lines. We assume these excavations will not exceed depths of 20 feet below the existing ground surface. Open cut excavation with slopes no steeper than 1:2 (vertical: horizontal) can be utilized. 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.

Groundwater was encountered between 2 and 8 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.

Depending on the stability of the excavation bottom encountered at time of construction, it may be necessary over excavate 1 to 2 feet below the anticipated bottom of the excavation followed by backfilling with #57 stone. The stone will aid in dewatering the excavation by using sumps and pumps and will also 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 following estimated soil parameters 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.

Utility Trench Backfill

On completion of utility installations, excavations (or sections thereof) located within the pavement footprint should be backfilled with material conforming to material specifications and compaction criteria for on-site or off-site fill material described in **Compaction Requirements**. For utility line excavations located in landscaped "green" areas, the utility line excavation backfill shall be compacted to a minimum of 90% of the materials maximum modified Proctor Dry Density.

Earthwork Construction Considerations

It is anticipated that excavations for the proposed construction can be accomplished with conventional earthmoving equipment.

The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. If the subgrade should become desiccated, saturated, or disturbed, the affected material should be removed, or these materials should be scarified, moisture conditioned, and recompacted prior to floor slab construction.

Surface water should not be allowed to pond on the site and soak into the soil during construction. Construction staging should provide drainage of surface water and precipitation away from the construction areas. Any water that collects over or adjacent to construction areas should be promptly removed, along with any softened or disturbed soils. Surface water control in the form of sloping surfaces, drainage ditches and trenches, and sump pits and pumps will be important to avoid ponding and associated delays due to precipitation and seepage.

Construction site safety is the sole responsibility of the contractor who controls the means, methods, and sequencing of construction operations. Under no circumstances shall the information provided herein be interpreted to mean Terracon is assuming responsibility for construction site safety, or the contractor's activities; such responsibility shall neither be implied nor inferred.

Construction Observation and Testing

The earthwork efforts should be monitored under the direction of our Geotechnical Engineer. This monitoring should include documentation of adequate removal of vegetation and top soil, proof-rolling and mitigation of areas delineated by the proof-roll to require mitigation.

Each lift of compacted fill should be tested, evaluated, and reworked as necessary until approved by the Geotechnical Engineer prior to placement of additional lifts. Each lift of fill should be tested for density and water content at a frequency of at least one test for every 50 linear feet of compacted utility trench backfill, is recommended.

In addition to the documentation of the essential parameters necessary for construction, the continuation of the Geotechnical Engineer into the construction phase of the project provides the continuity to maintain the Geotechnical Engineer's evaluation of subsurface conditions, including assessing variations and associated design changes.

LATERAL EARTH PRESSURES

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.

Estimated Soil Parameters and Lateral Earth Pressure Coefficients

Stratum	Approximate Depth (ft)	Estimated Soil Properties					
		Total/Effective Unit Weight (pcf)	**Friction Angle (f)**	**Cohesion (psf)**	**Earth Pressure Coeff.**		
					K_a	**K_o**	**K_p**
Off-site Fill	N/A	115/52.6	32	N/A	0.31	0.47	3.25
1	0 to 9	115/52.6	32	N/A	0.31	0.47	3.25
2	9 to 11	105/42.6	N/A	1,000	1.00	1.00	1.00
3	11 to 24	115/52.6	36	N/A	0.26	0.42	3.85

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.

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	Number of Test	Test Depth (feet) [1]	Test Location
Cone Penetration Test (CPT)	6	16 to 24	Planned sewer line
	6	20	Planned water line

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.

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:

SITE LOCATION

Venture Park Sewer & Water Lines ■ Colleton County, SC

May 26, 2020 ■ Terracon Project No. EN205064

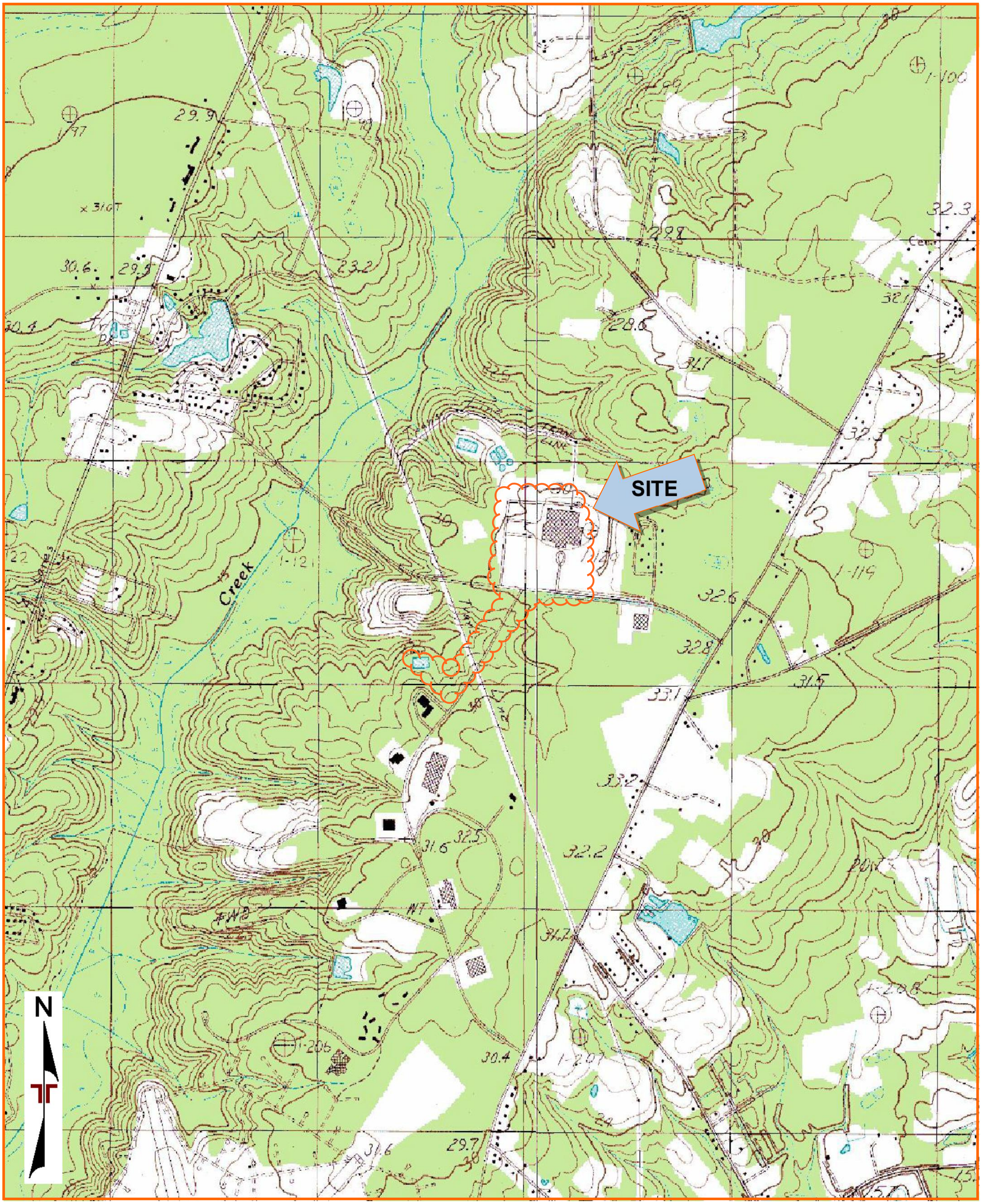


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

TOPOGRAPHIC MAP IMAGE COURTESY OF THE U.S. GEOLOGICAL SURVEY QUADRANGLES INCLUDE: WALTERBORO, SC (1/1/1988) and ROUND O, SC (1/1/1988).

EXPLORATION PLAN

Venture Park Sewer & Water Lines ■ Colleton County, SC

May 26, 2020 ■ Terracon Project No. EN205064

Terracon GeoReport

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

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

EXPLORATION PLAN

Venture Park Sewer & Water Lines ■ Colleton County, SC
May 26, 2020 ■ Terracon Project No. EN205064

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

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

EXPLORATION RESULTS

Contents:

CPT and DMT Logs
Hand Auger Boring Logs

CPT LOG NO. CPT-1

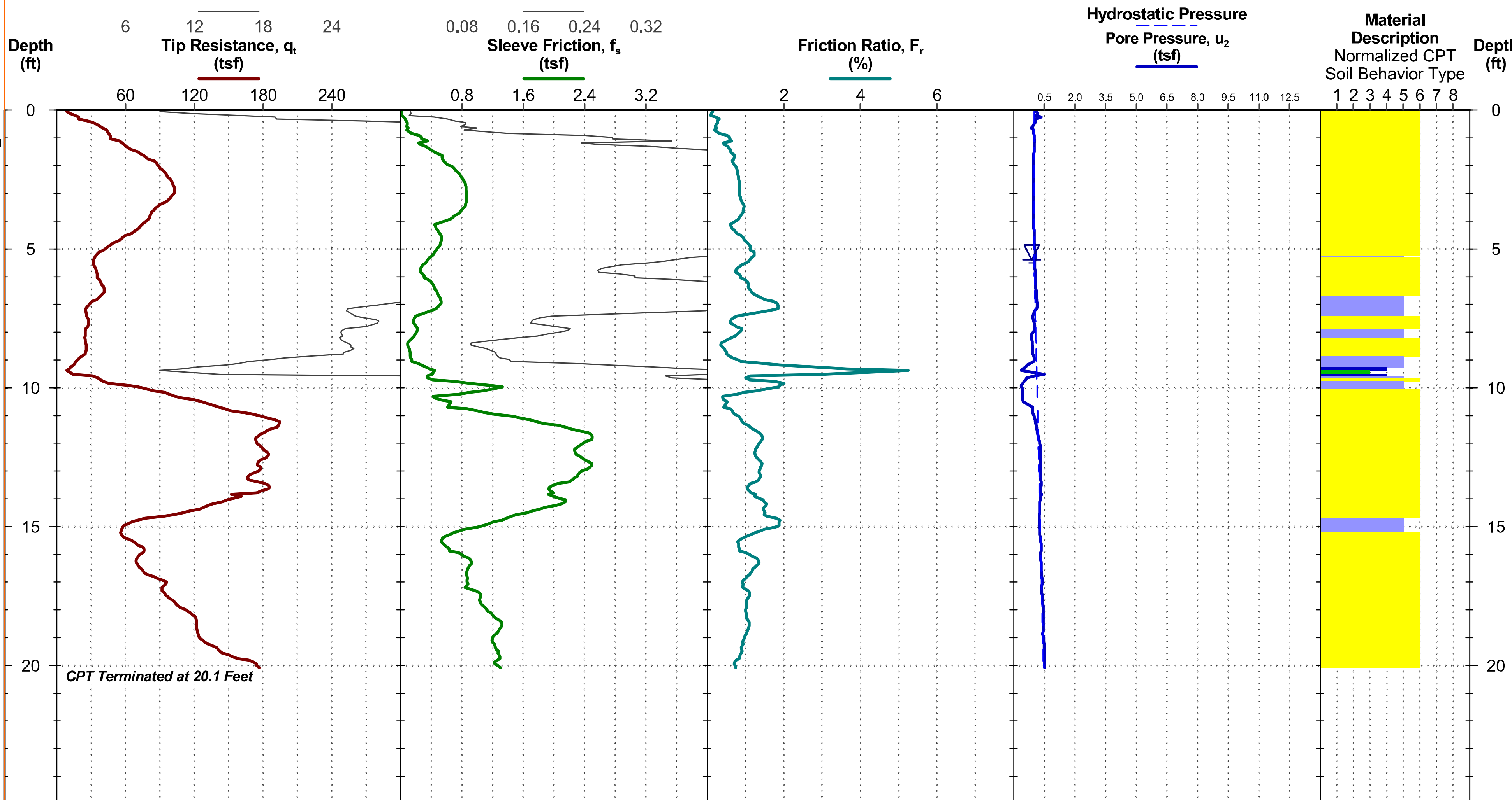
PROJECT: Venture Park Sewer & Water Lines

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

TEST LOCATION: See Exploration Plan

SITE: Industrial Road
Colleton County, SC

Latitude: 32.9526°
Longitude: -80.62318°



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

Dead weight of rig used as reaction force.
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

∇ 5.4 ft measured water depth
(used in normalizations and correlations; See Supporting Information)

Probe no. 5207 with net area ratio of .88
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 3/4/202
Tip and sleeve areas of 10 cm^2 and 150 cm^2
Ring friction reducer with O.D. of 1.875 in

Terracon
1450 Fifth St W
North Charleston, SC

CPT Started: 4/29/2020	CPT Completed: 4/29/2020
Rig: Pagani TG73-200	Operator: RF
Project No.: EN205064	

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. CPT REPORT EN205064 VENTURE PARK SEWE.GPJ TERRACON_DATATEMPLATE.GDT 4/30/20

CPT LOG NO. CPT-2

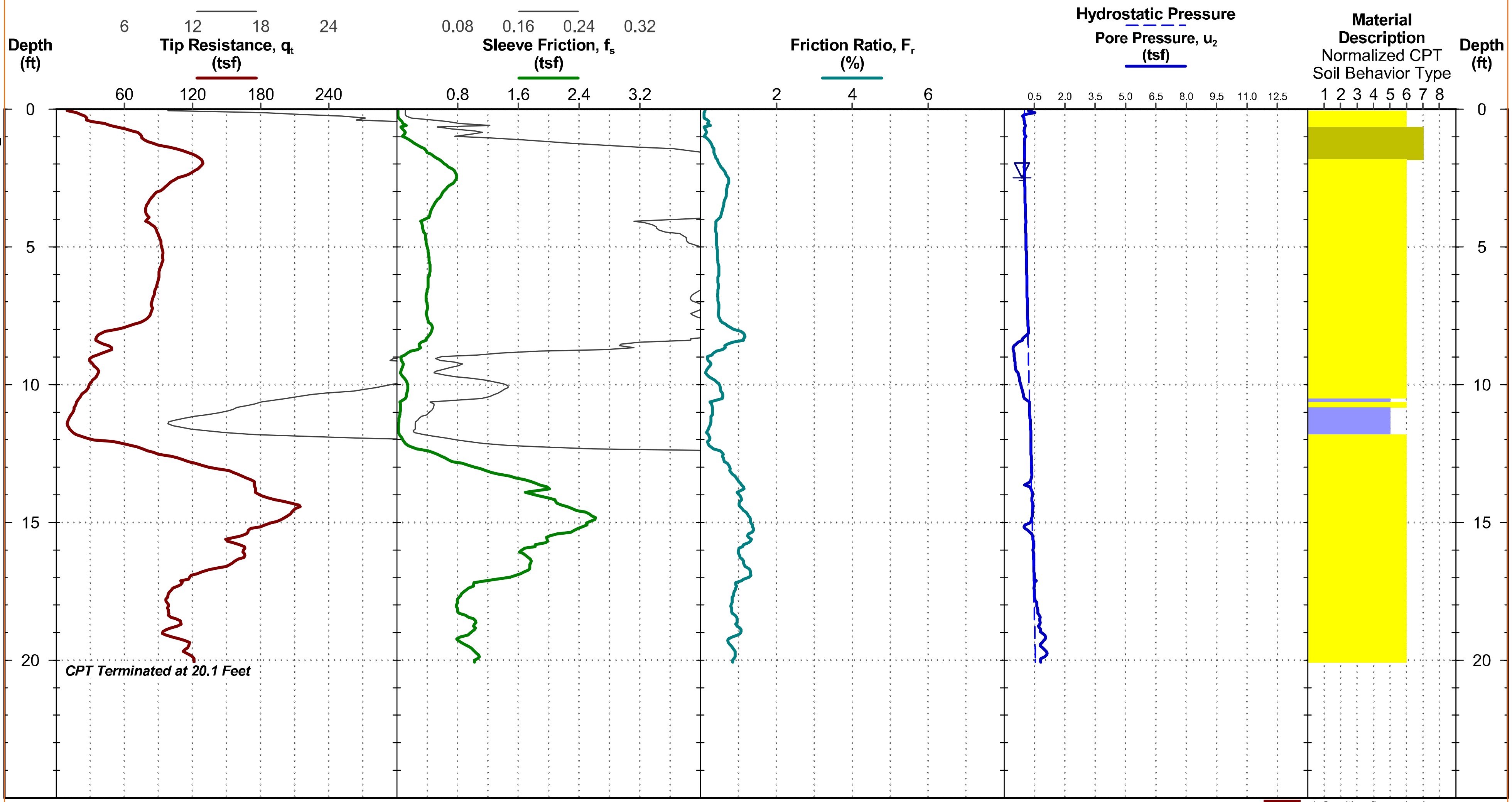
PROJECT: Venture Park Sewer & Water Lines

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

TEST LOCATION: See Exploration Plan

SITE: Industrial Road
Colleton County, SC

Latitude: 32.94821°
Longitude: -80.62603°



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

Dead weight of rig used as reaction force.
CPT sensor calibration reports available upon request.

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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. 5207 with net area ratio of .88
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 3/4/202
Tip and sleeve areas of 10 cm^2 and 150 cm^2
Ring friction reducer with O.D. of 1.875 in

1450 Fifth St W
North Charleston, SC

CPT Started: 4/29/2020
CPT Completed: 4/29/2020
Rig: Pagani TG73-200
Operator: RF
Project No.: EN205064

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. CPT REPORT EN205064 VENTURE PARK SEWE.GPJ TERRACON_DATATEMPLATE.GDT 4/30/20

CPT LOG NO. CPT-3

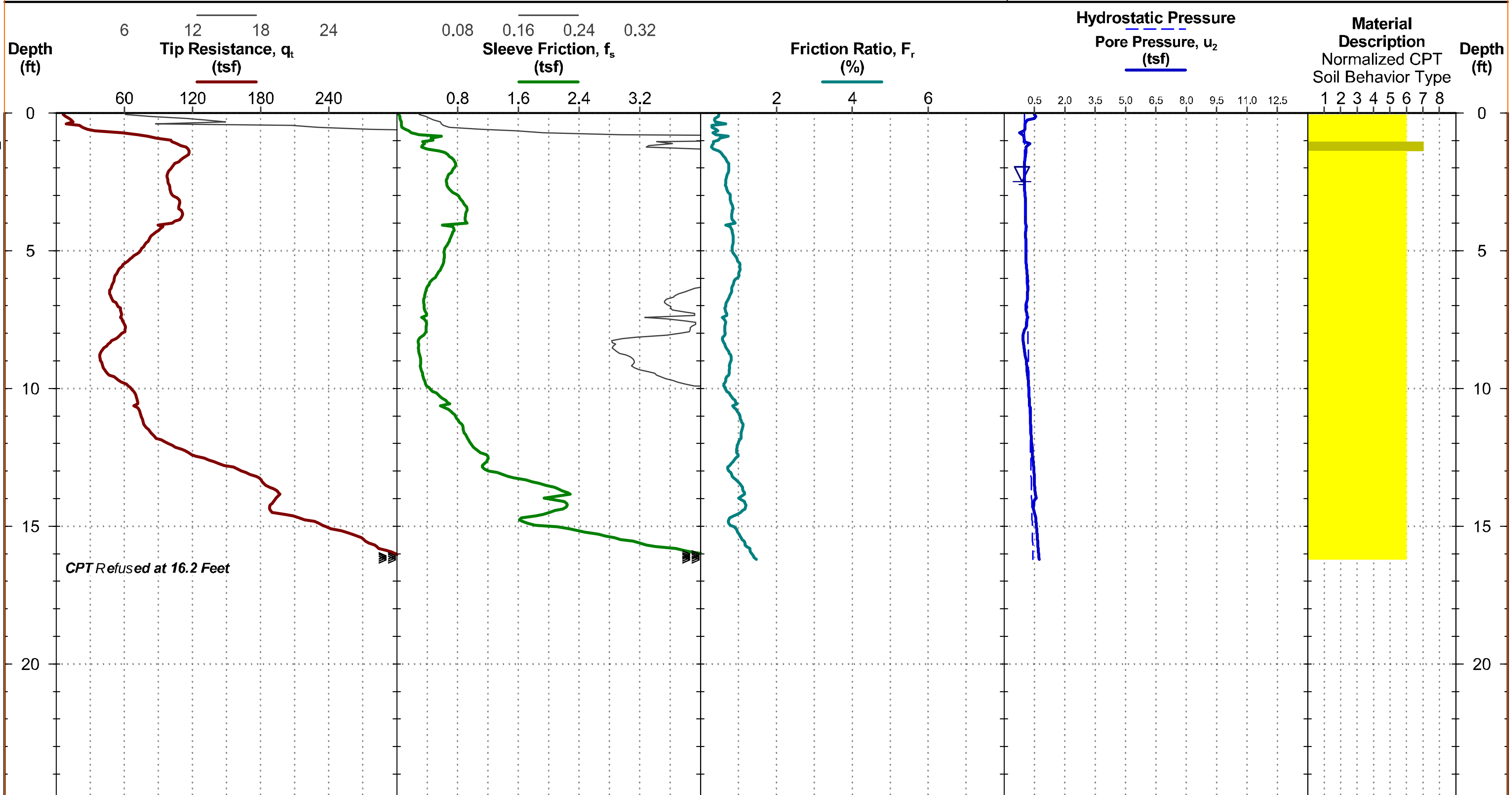
PROJECT: Venture Park Sewer & Water Lines

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

TEST LOCATION: See Exploration Plan

SITE: Industrial Road
Colleton County, SC

Latitude: 32.94841°
Longitude: -80.62343°



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

Dead weight of rig used as reaction force.
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. 5207 with net area ratio of .88
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 3/4/202
Tip and sleeve areas of 10 cm^2 and 150 cm^2
Ring friction reducer with O.D. of 1.875 in

Terracon
1450 Fifth St W
North Charleston, SC

CPT Started: 4/29/2020
CPT Completed: 4/29/2020
Rig: Pagani TG73-200
Operator: RF
Project No.: EN205064

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. CPT REPORT EN205064 VENTURE PARK SEWE.GPJ TERRACON_DATATEMPLATE.GDT 4/30/20

CPT LOG NO. CPT-4

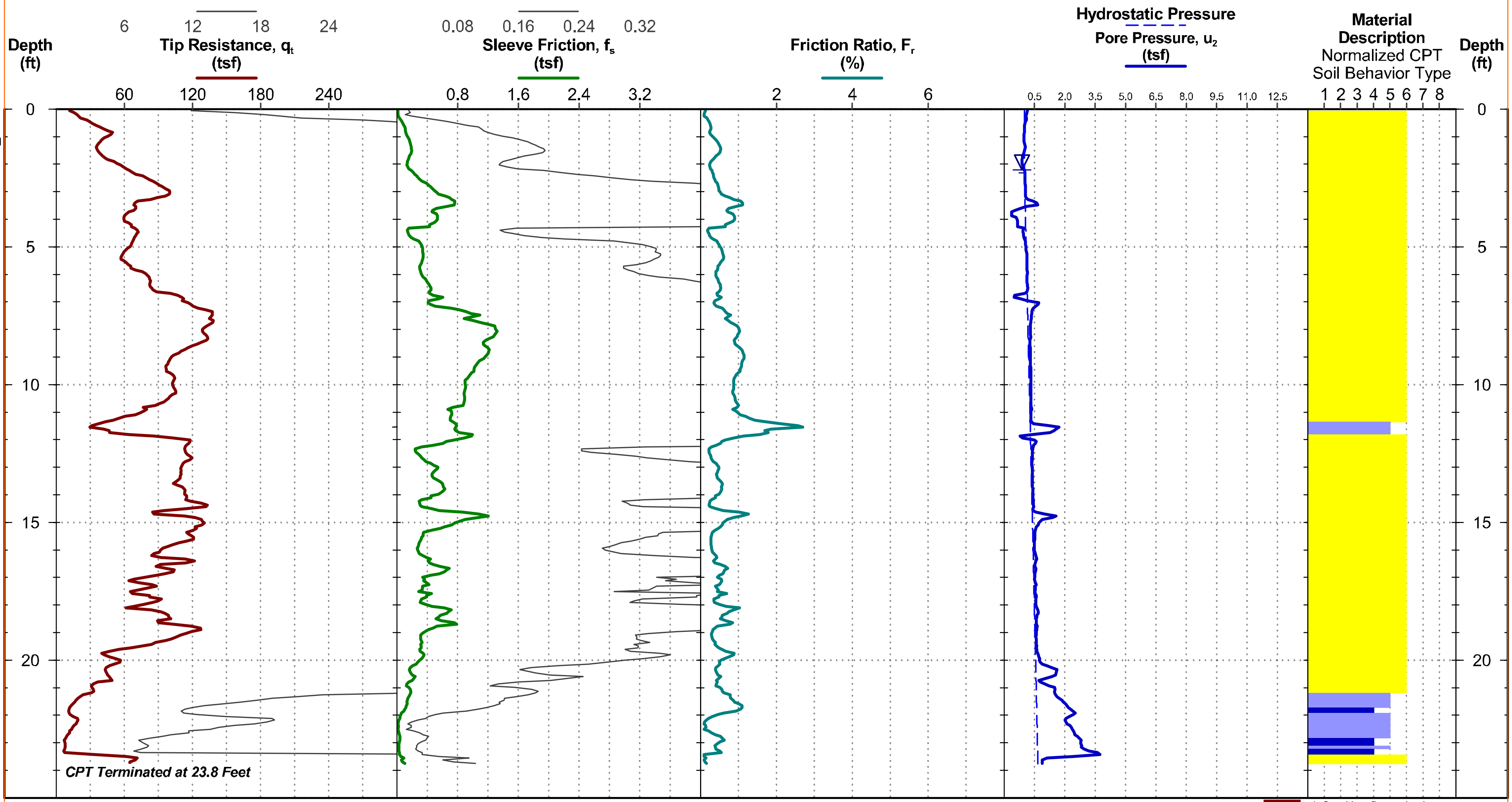
PROJECT: Venture Park Sewer & Water Lines

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

TEST LOCATION: See Exploration Plan

SITE: Industrial Road
Colleton County, SC

Latitude: 32.9456°
Longitude: -80.6278°



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

Dead weight of rig used as reaction force.
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

∇ 2.2 ft measured water depth
(used in normalizations and correlations; See Supporting Information)

Probe no. 5207 with net area ratio of .88
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 3/4/202
Tip and sleeve areas of 10 cm^2 and 150 cm^2
Ring friction reducer with O.D. of 1.875 in

Terracon
1450 Fifth St W
North Charleston, SC

CPT Started: 4/29/2020	CPT Completed: 4/29/2020
Rig: Pagani TG73-200	Operator: RF
Project No.: EN205064	

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. CPT REPORT EN205064 VENTURE PARK SEWE.GPJ TERRACON_DATATEMPLATE.GDT 4/30/20

CPT LOG NO. CPT-5

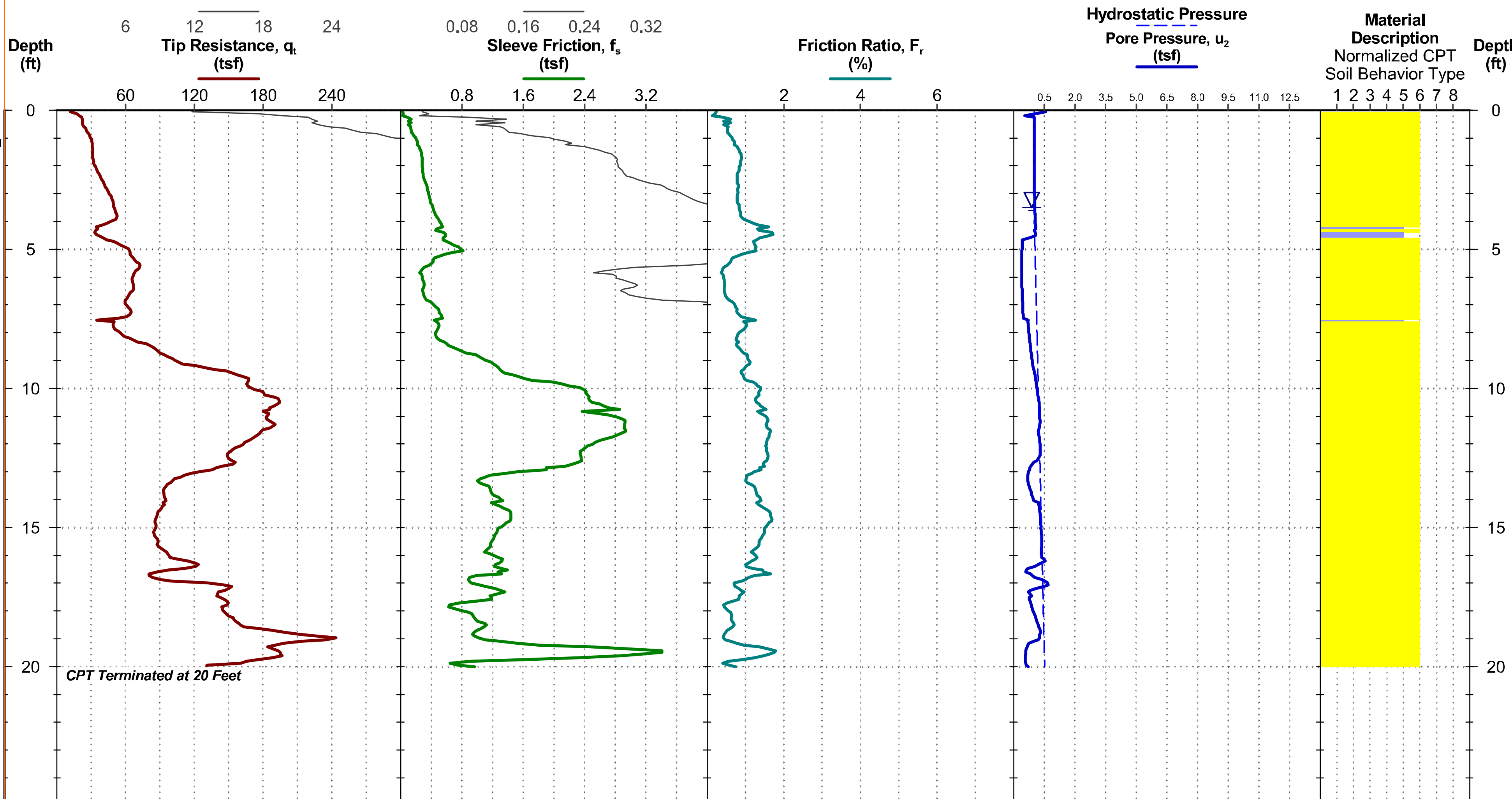
PROJECT: Venture Park Sewer & Water Lines

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

TEST LOCATION: See Exploration Plan

SITE: Industrial Road
Colleton County, SC

Latitude: 32.9446°
Longitude: -80.62879°



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

Dead weight of rig used as reaction force.
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. 5207 with net area ratio of .88
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 3/4/202
Tip and sleeve areas of 10 cm^2 and 150 cm^2
Ring friction reducer with O.D. of 1.875 in

1450 Fifth St W
North Charleston, SC

CPT Started: 4/29/2020	CPT Completed: 4/29/2020
Rig: Pagani TG73-200	Operator: RF
Project No.: EN205064	

CPT LOG NO. CPT-6

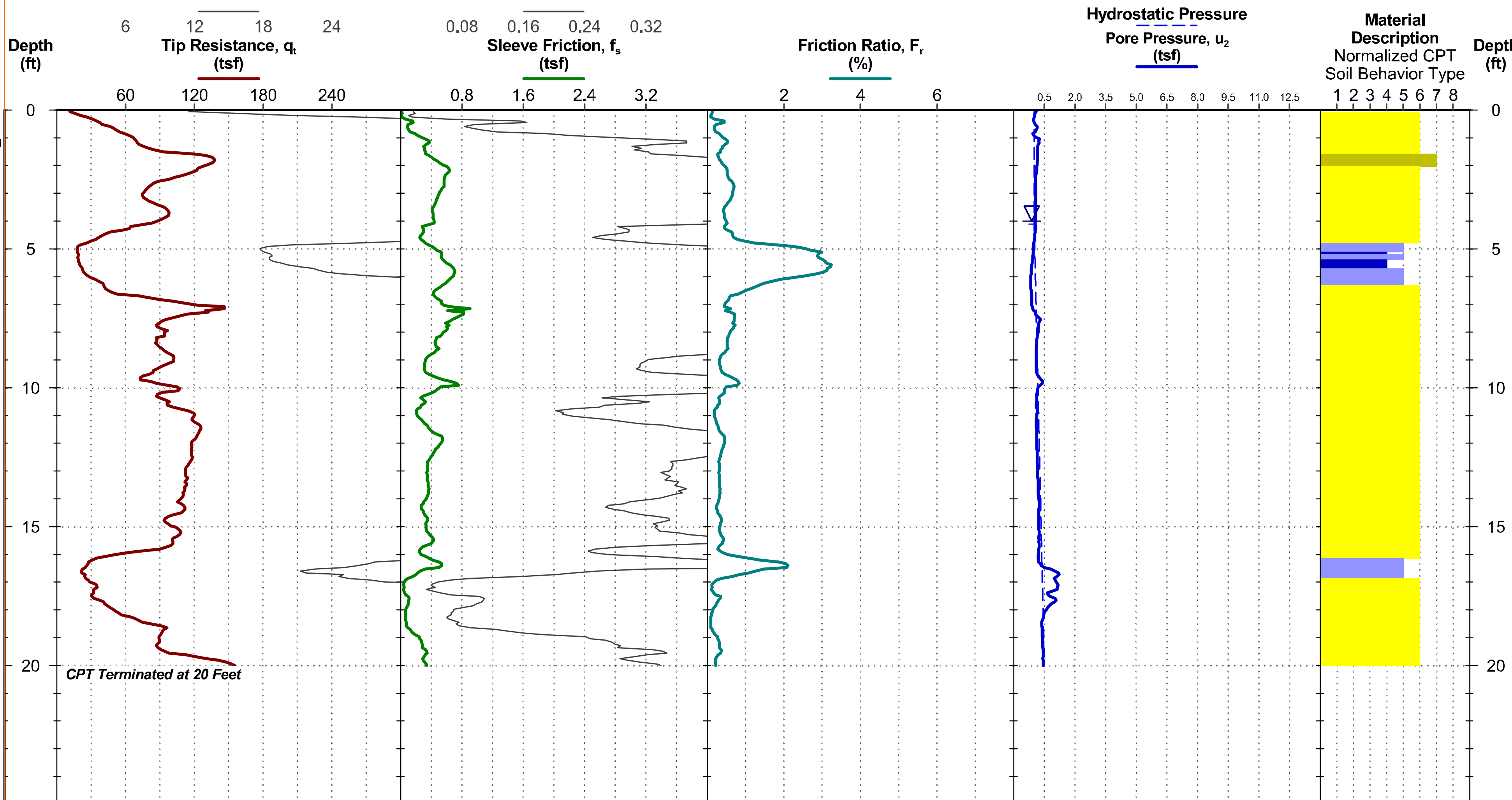
PROJECT: Venture Park Sewer & Water Lines

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

TEST LOCATION: See Exploration Plan

SITE: Industrial Road
Colleton County, SC

Latitude: 32.94524°
Longitude: -80.63018°



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

Dead weight of rig used as reaction force.
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

∇ 4 ft estimated water depth
(used in normalizations and correlations; See Supporting Information)

Probe no. 5207 with net area ratio of .88
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 3/4/202
Tip and sleeve areas of 10 cm² and 150 cm²
Ring friction reducer with O.D. of 1.875 in

Terracon
1450 Fifth St W
North Charleston, SC

CPT Started: 4/29/2020
CPT Completed: 4/29/2020
Rig: Pagani TG73-200
Operator: RF
Project No.: EN205064

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. CPT REPORT EN205064 VENTURE PARK SEWE.GPJ TERRACON_DATATEMPLATE.GDT 4/30/20

CPT LOG NO. CPT-7

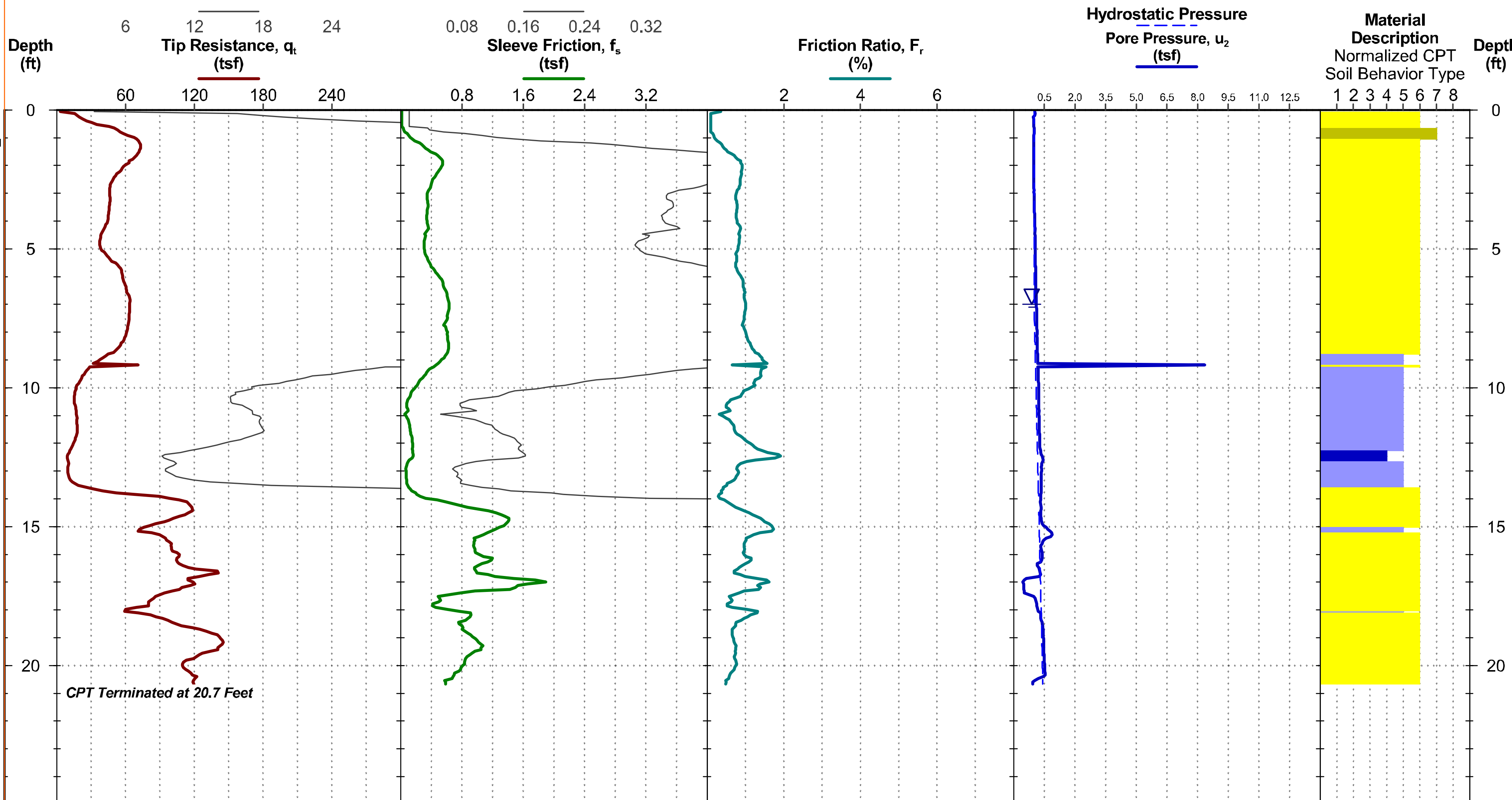
PROJECT: Venture Park Sewer & Water Lines

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

TEST LOCATION: See Exploration Plan

SITE: Industrial Road
Colleton County, SC

Latitude: 32.9524°
Longitude: -80.62382°



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

Dead weight of rig used as reaction force.
CPT sensor calibration reports available upon request.

WATER LEVEL OBSERVATION

∇ 7 ft estimated water depth
(used in normalizations and correlations; See Supporting Information)

Probe no. 5207 with net area ratio of .88
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 3/4/202
Tip and sleeve areas of 10 cm^2 and 150 cm^2
Ring friction reducer with O.D. of 1.875 in

Terracon
1450 Fifth St W
North Charleston, SC

CPT Started: 4/29/2020
CPT Completed: 4/29/2020
Rig: Pagani TG73-200
Operator: RF
Project No.: EN205064

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. CPT REPORT EN205064 VENTURE PARK SEWE.GPJ TERRACON_DATATEMPLATE.GDT 4/30/20

CPT LOG NO. CPT-8

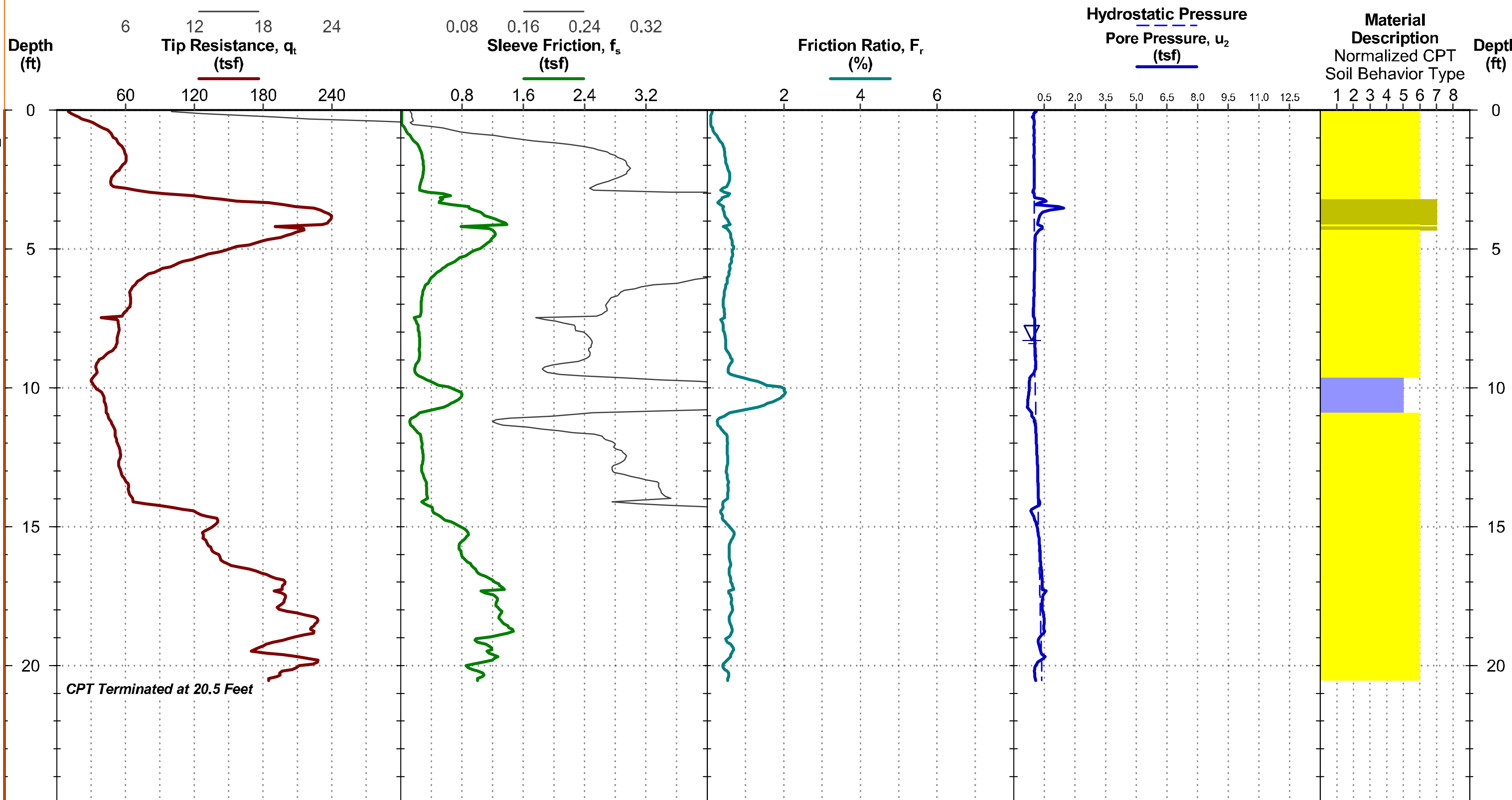
PROJECT: Venture Park Sewer & Water Lines

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

TEST LOCATION: See Exploration Plan

SITE: Industrial Road
Colleton County, SC

Latitude: 32.95252°
Longitude: -80.62568°



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

Dead weight of rig used as reaction force.
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

∇ 8.3 ft measured water depth
(used in normalizations and correlations; See Supporting Information)

Probe no. 5207 with net area ratio of .88
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 3/4/202
Tip and sleeve areas of 10 cm^2 and 150 cm^2
Ring friction reducer with O.D. of 1.875 in

Terracon
1450 Fifth St W
North Charleston, SC

CPT Started: 4/29/2020	CPT Completed: 4/29/2020
Rig: Pagani TG73-200	Operator: RF
Project No.: EN205064	

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. CPT REPORT EN205064 VENTURE PARK SEWE.GPJ TERRACON_DATATEMPLATE.GDT 4/30/20

CPT LOG NO. CPT-9

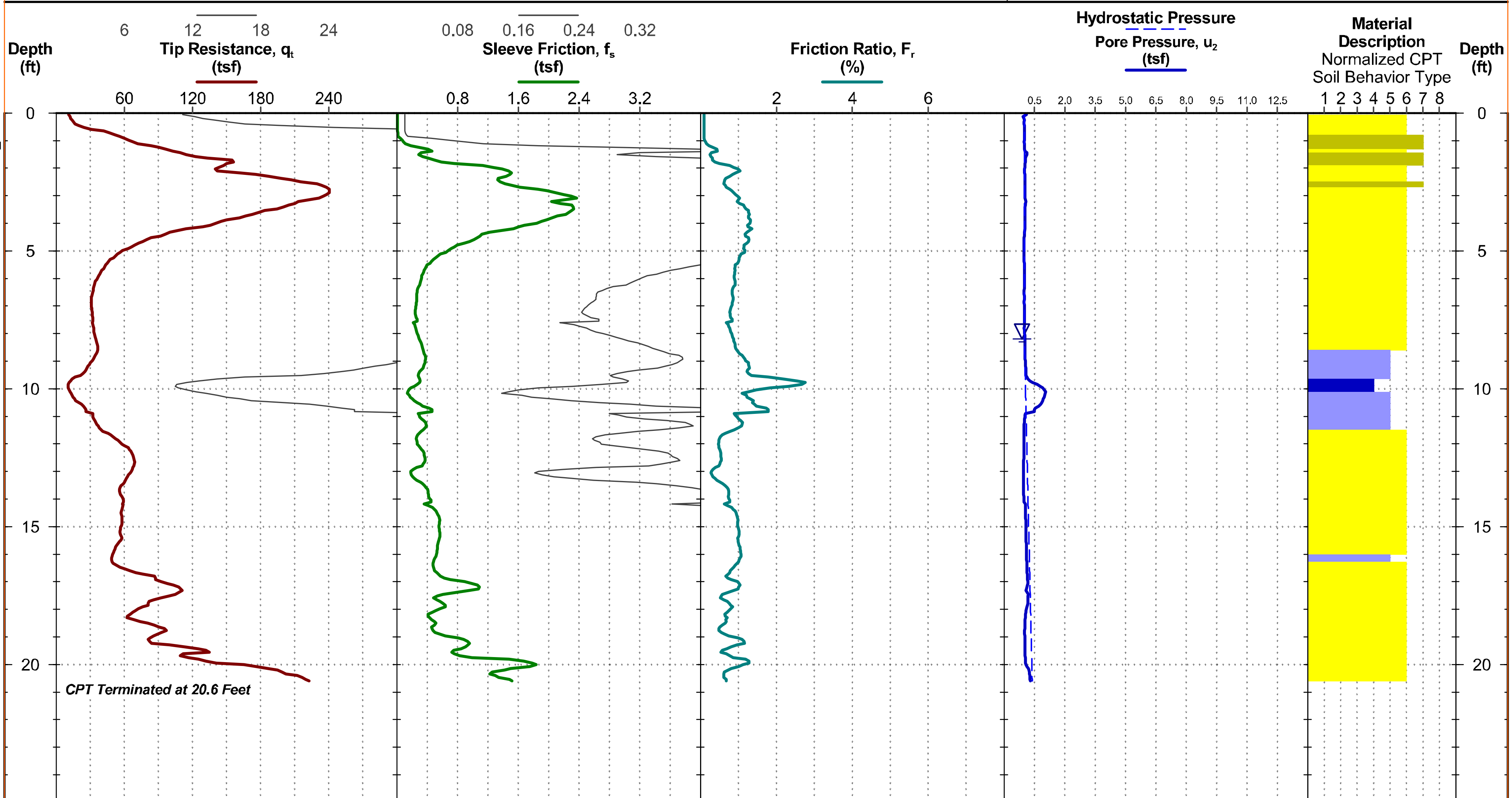
PROJECT: Venture Park Sewer & Water Lines

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

TEST LOCATION: See Exploration Plan

SITE: Industrial Road
Colleton County, SC

Latitude: 32.95153°
Longitude: -80.62629°



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

Dead weight of rig used as reaction force.
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

∇ 8.2 ft measured water depth
(used in normalizations and correlations; See Supporting Information)

Probe no. 5207 with net area ratio of .88
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 3/4/202
Tip and sleeve areas of 10 cm² and 150 cm²
Ring friction reducer with O.D. of 1.875 in

Terracon
1450 Fifth St W
North Charleston, SC

CPT Started: 4/29/2020
CPT Completed: 4/29/2020
Rig: Pagani TG73-200
Operator: RF
Project No.: EN205064

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. CPT REPORT EN205064 VENTURE PARK SEWE.GPJ TERRACON_DATATEMPLATE.GDT 4/30/20

CPT LOG NO. CPT-10

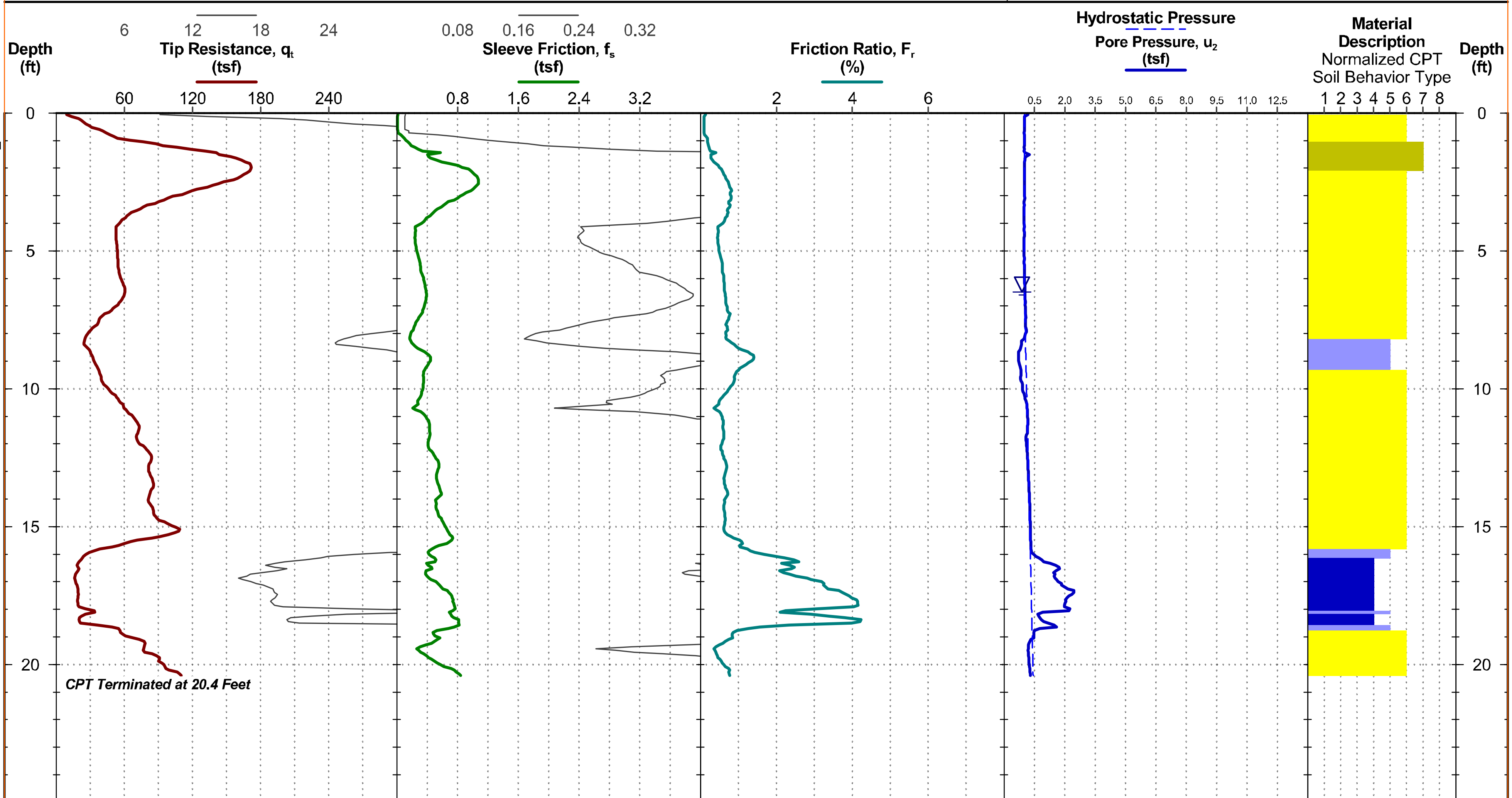
PROJECT: Venture Park Sewer & Water Lines

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

TEST LOCATION: See Exploration Plan

SITE: Industrial Road
Colleton County, SC

Latitude: 32.95041°
Longitude: -80.62642°



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

Dead weight of rig used as reaction force.
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

∇ 6.5 ft measured water depth
(used in normalizations and correlations; See Supporting Information)

Probe no. 5207 with net area ratio of .88
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 3/4/202
Tip and sleeve areas of 10 cm² and 150 cm²
Ring friction reducer with O.D. of 1.875 in

Terracon
1450 Fifth St W
North Charleston, SC

CPT Started: 4/29/2020
CPT Completed: 4/29/2020
Rig: Pagani TG73-200
Operator: RF
Project No.: EN205064

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. CPT REPORT EN205064 VENTURE PARK SEWE.GPJ TERRACON_DATATEMPLATE.GDT 4/30/20

CPT LOG NO. CPT-11

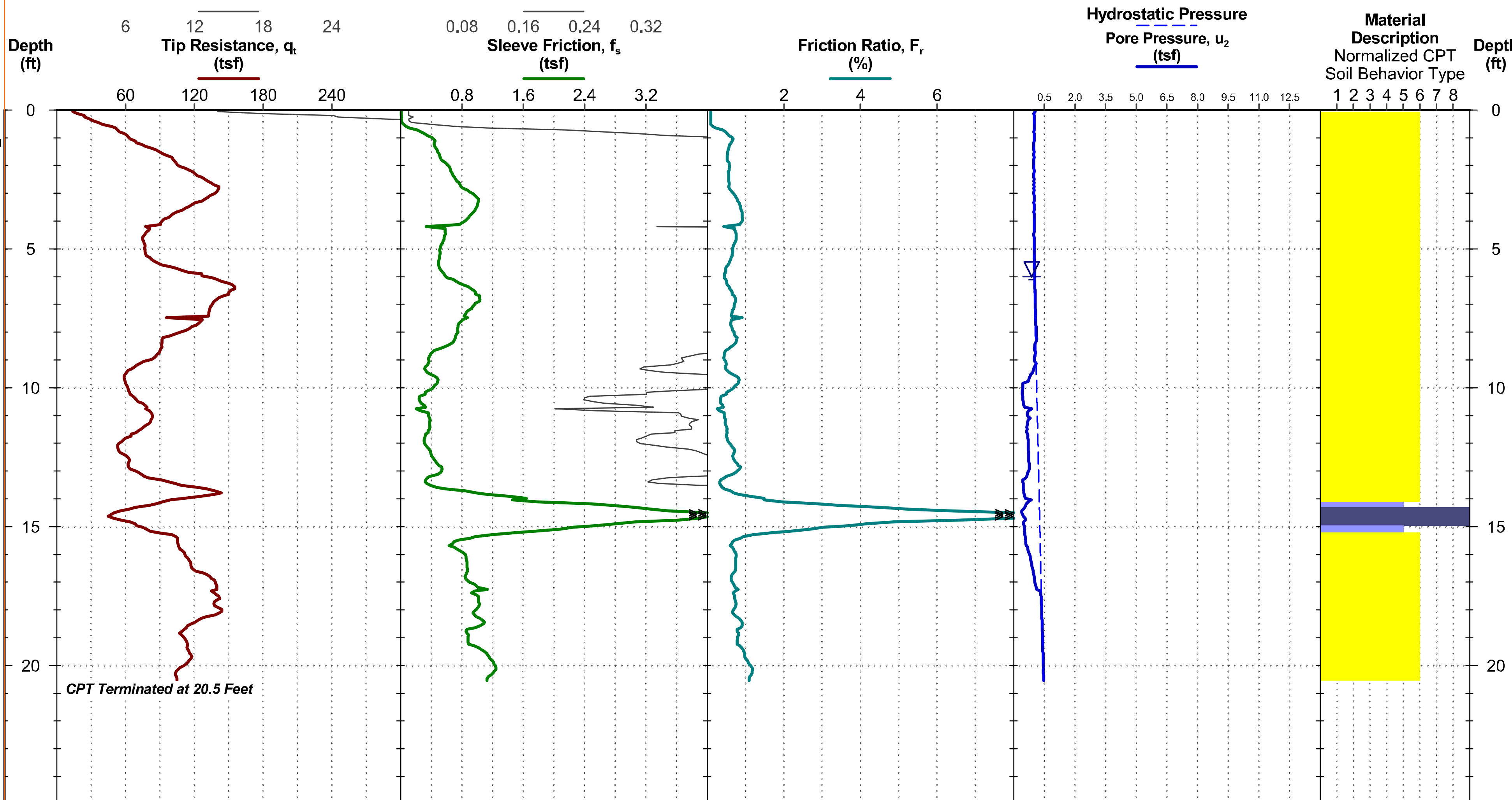
PROJECT: Venture Park Sewer & Water Lines

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

TEST LOCATION: See Exploration Plan

SITE: Industrial Road
Colleton County, SC

Latitude: 32.94947°
Longitude: -80.62637°



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

Dead weight of rig used as reaction force.
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 ft estimated water depth
(used in normalizations and correlations; See Supporting Information)

Probe no. 5207 with net area ratio of .88
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 3/4/202
Tip and sleeve areas of 10 cm^2 and 150 cm^2
Ring friction reducer with O.D. of 1.875 in

Terracon
1450 Fifth St W
North Charleston, SC

CPT Started: 4/29/2020
CPT Completed: 4/29/2020
Rig: Pagani TG73-200
Operator: RF
Project No.: EN205064

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. CPT REPORT EN205064 VENTURE PARK SEWE.GPJ TERRACON_DATATEMPLATE.GDT 4/30/20

CPT LOG NO. CPT-12

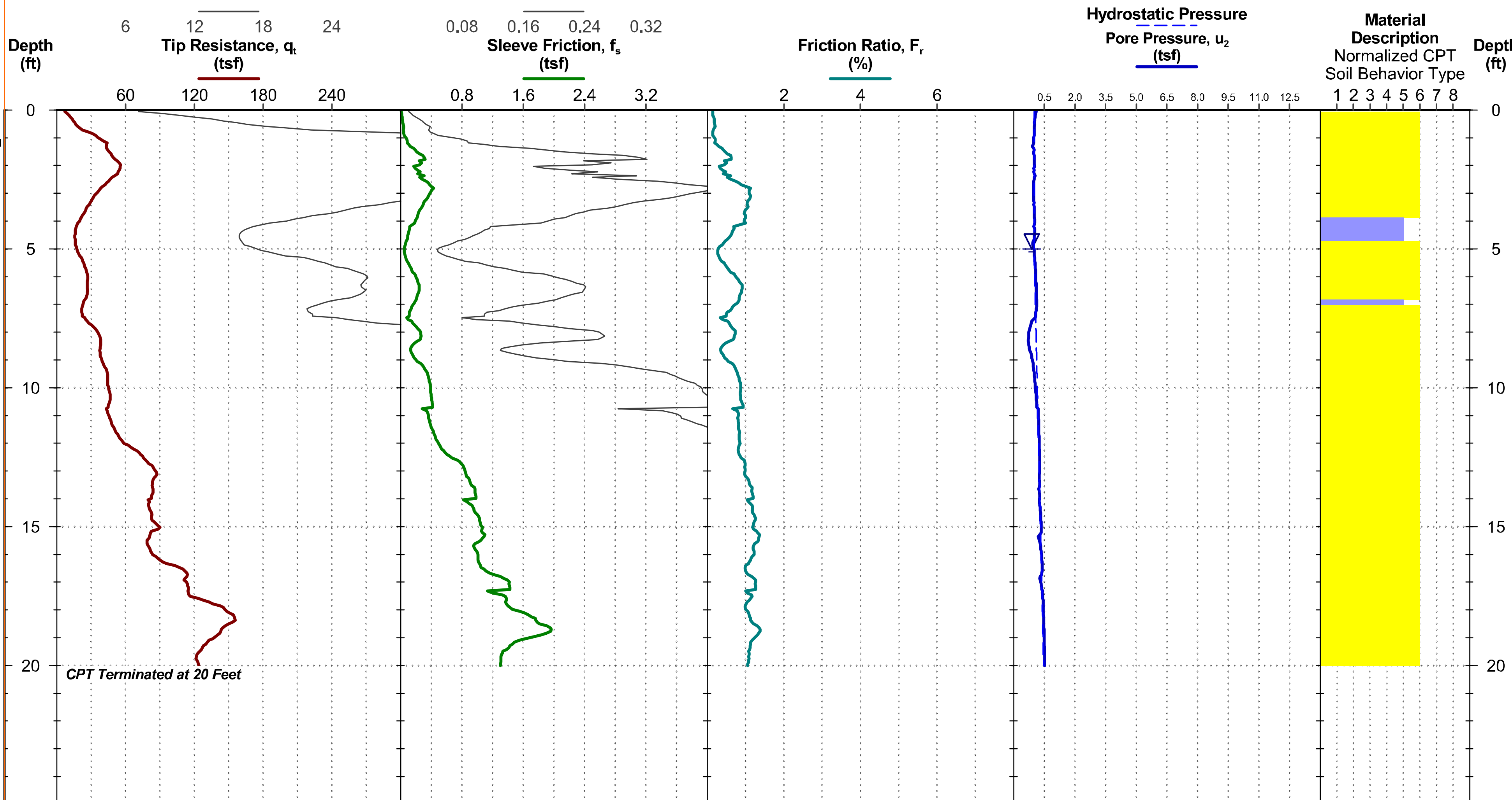
PROJECT: Venture Park Sewer & Water Lines

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

TEST LOCATION: See Exploration Plan

SITE: Industrial Road
Colleton County, SC

Latitude: 32.94862°
Longitude: -80.62574°



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

Dead weight of rig used as reaction force.
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. 5207 with net area ratio of .88
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 3/4/202
Tip and sleeve areas of 10 cm^2 and 150 cm^2
Ring friction reducer with O.D. of 1.875 in

Terracon
1450 Fifth St W
North Charleston, SC

CPT Started: 4/29/2020
CPT Completed: 4/29/2020
Rig: Pagani TG73-200
Operator: RF
Project No.: EN205064

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. CPT REPORT EN205064 VENTURE PARK SEWE.GPJ TERRACON_DATATEMPLATE.GDT 4/30/20

BORING LOG NO. HAB at CPT-1

PROJECT: Venture Park Sewer & Water Lines

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

SITE: Industrial Road
Colleton County, SC

MODEL LAYER	GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 32.9526° Longitude: -80.6232° DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE
		TOPSOIL, dark brown to gray			
		0.3			
		SILTY SAND (SM), fine to medium grained, light brown to brown, dry to moist			
		4.0			
		Boring Terminated at 4 Feet			

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

Advancement Method:
Manual Hand Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1450 Fifth St W
North Charleston, SC

Boring Started: 04-29-2020	Boring Completed: 04-29-2020
Drill Rig: NA	Driller: RF
Project No.: EN205064	

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL EN205064 VENTURE PARK SEWE.GPJ TERRACON_DATATEMPLATE.GDT 5/7/20

BORING LOG NO. HAB at CPT-2

PROJECT: Venture Park Sewer & Water Lines

CLIENT: Thomas & Hutton Engineering Co Columbia, SC

SITE: Industrial Road Colleton County, SC

MODEL LAYER	GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 32.9482° Longitude: -80.626° DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE
		TOPSOIL, dark brown to gray			
		0.3 **SILTY SAND (SM)**, fine to medium grained, light brown to brown, dry to wet		▽	
		4.0 ***Boring Terminated at 4 Feet***			

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

Advancement Method: Manual Hand Auger Abandonment Method: Boring backfilled with auger cuttings upon completion.	See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any). See Supporting Information for explanation of symbols and abbreviations.	Notes:

WATER LEVEL OBSERVATIONS

▽ *2.7 ft. at completion of drilling*

Terracon
1450 Fifth St W
North Charleston, SC

Boring Started: 04-29-2020	Boring Completed: 04-29-2020
Drill Rig: NA	Driller: RF
Project No.: EN205064	

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL EN205064 VENTURE PARK SEWE.GPJ TERRACON_DATATEMPLATE.GDT 5/7/20

BORING LOG NO. HAB at CPT-3

PROJECT: Venture Park Sewer & Water Lines

CLIENT: Thomas & Hutton Engineering Co Columbia, SC

SITE: Industrial Road Colleton County, SC

MODEL LAYER	GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 32.9484° Longitude: -80.6234° DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE
		TOPSOIL, dark brown to gray			
		0.3			
		SILTY SAND (SM), fine to medium grained, light brown to brown, dry to wet		▽	
		4.0			
		Boring Terminated at 4 Feet			

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

Advancement Method:
Manual Hand Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *3.2 ft. at completion of drilling*

Terracon
1450 Fifth St W
North Charleston, SC

Boring Started: 04-29-2020	Boring Completed: 04-29-2020
Drill Rig: NA	Driller: RF
Project No.: EN205064	

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL EN205064 VENTURE PARK SEWE.GPJ TERRACON_DATATEMPLATE.GDT 5/7/20

BORING LOG NO. HAB at CPT-4

PROJECT: Venture Park Sewer & Water Lines

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

SITE: **Industrial Road**
Colleton County, SC

MODEL LAYER	GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 32.9456° Longitude: -80.6278° DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE
		TOPSOIL, dark brown to gray			
		0.2			
		SILTY SAND (SM), fine to medium grained, light brown to brown, dry to wet		▽	
		4.0			
		Boring Terminated at 4 Feet			

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

Advancement Method: Manual Hand Auger Abandonment Method: Boring backfilled with auger cuttings upon completion.	See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any). See Supporting Information for explanation of symbols and abbreviations.	Notes:

WATER LEVEL OBSERVATIONS

▽ *2.5 ft. at completion of drilling*

Terracon
1450 Fifth St W
North Charleston, SC

Boring Started: 04-29-2020	Boring Completed: 04-29-2020
Drill Rig: NA	Driller: RF
Project No.: EN205064	

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL EN205064 VENTURE PARK SEWE.GPJ TERRACON_DATATEMPLATE.GDT 5/7/20

BORING LOG NO. HAB at CPT-5

PROJECT: Venture Park Sewer & Water Lines

CLIENT: Thomas & Hutton Engineering Co Columbia, SC

SITE: Industrial Road Colleton County, SC

LOCATION See Exploration Plan

Latitude: 32.9446° Longitude: -80.6288°

MODEL LAYER	GRAPHIC LOG	DEPTH		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE
		0.2	**TOPSOIL**, dark brown to gray			
		4.0	**SILTY SAND (SM)**, fine to medium grained, light brown to brown, dry to wet		▽	
			Boring Terminated at 4 Feet			

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

Advancement Method:
Manual Hand Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *3.5 ft. at completion of drilling*

Terracon
1450 Fifth St W
North Charleston, SC

Boring Started: 04-29-2020	Boring Completed: 04-29-2020
Drill Rig: NA	Driller: RF
Project No.: EN205064	

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL EN205064 VENTURE PARK SEWE.GPJ TERRACON_DATATEMPLATE.GDT 5/7/20

BORING LOG NO. HAB at CPT-6

PROJECT: Venture Park Sewer & Water Lines

CLIENT: Thomas & Hutton Engineering Co Columbia, SC

SITE: Industrial Road Colleton County, SC

MODEL LAYER	GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 32.9452° Longitude: -80.6302° DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE
		TOPSOIL, dark brown to gray			
		1.0			
		SILTY SAND (SM), fine to medium grained, light brown to brown, dry to moist			
		4.0			
		Boring Terminated at 4 Feet			

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

Advancement Method:
Manual Hand Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1450 Fifth St W
North Charleston, SC

Boring Started: 04-29-2020	Boring Completed: 04-29-2020
Drill Rig: NA	Driller: RF
Project No.: EN205064	

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL EN205064 VENTURE PARK SEWE.GPJ TERRACON_DATATEMPLATE.GDT 5/7/20

BORING LOG NO. HAB at CPT-7

PROJECT: Venture Park Sewer & Water Lines	**CLIENT: Thomas & Hutton Engineering Co Columbia, SC**
SITE: Industrial Road Colleton County, SC	

LOCATION See Exploration Plan

Latitude: 32.9524° Longitude: -80.6238°

MODEL LAYER	GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE
		SILTY SAND (SM), fine to medium grained, light brown to brown, dry to moist			
		4.0			
		Boring Terminated at 4 Feet			

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

Advancement Method:
Manual Hand Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1450 Fifth St W
North Charleston, SC

Boring Started: 04-29-2020	Boring Completed: 04-29-2020
Drill Rig: NA	Driller: RF
Project No.: EN205064	

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL EN205064 VENTURE PARK SEWE.GPJ TERRACON_DATATEMPLATE.GDT 5/7/20

BORING LOG NO. HAB at CPT-8

PROJECT: Venture Park Sewer & Water Lines

CLIENT: Thomas & Hutton Engineering Co Columbia, SC

SITE: Industrial Road Colleton County, SC

MODEL LAYER	GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 32.9525° Longitude: -80.6257° DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE
		SILTY SAND (SM), fine to medium grained, light brown to brown, dry to moist			
		4.0			
		Boring Terminated at 4 Feet			

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

Advancement Method: Manual Hand Auger Abandonment Method: Boring backfilled with auger cuttings upon completion.	See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any). See Supporting Information for explanation of symbols and abbreviations.	Notes:

WATER LEVEL OBSERVATIONS	Terracon	Boring Started: 04-29-2020	Boring Completed: 04-29-2020
Groundwater not encountered	1450 Fifth St W North Charleston, SC	Drill Rig: NA	Driller: RF
		Project No.: EN205064	

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL EN205064 VENTURE PARK SEWE.GPJ TERRACON_DATATEMPLATE.GDT 5/7/20

BORING LOG NO. HAB at CPT-9

PROJECT: Venture Park Sewer & Water Lines

CLIENT: Thomas & Hutton Engineering Co Columbia, SC

SITE: Industrial Road Colleton County, SC

MODEL LAYER	GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 32.9515° Longitude: -80.6263° DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE
		SILTY SAND (SM), fine to medium grained, light brown to brown, dry to moist			
		4.0			
		Boring Terminated at 4 Feet			

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

Advancement Method: Manual Hand Auger Abandonment Method: Boring backfilled with auger cuttings upon completion.	See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any). See Supporting Information for explanation of symbols and abbreviations.	Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1450 Fifth St W
North Charleston, SC

Boring Started: 04-29-2020	Boring Completed: 04-29-2020
Drill Rig: NA	Driller: RF
Project No.: EN205064	

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL EN205064 VENTURE PARK SEWE.GPJ TERRACON_DATATEMPLATE.GDT 5/7/20

BORING LOG NO. HAB at CPT-10

PROJECT: Venture Park Sewer & Water Lines

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

SITE: Industrial Road
Colleton County, SC

MODEL LAYER	GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 32.9504° Longitude: -80.6264° DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE
		TOPSOIL, dark brown to gray			
		1.0 **SILTY SAND (SM)**, fine to medium grained, light brown to brown, dry to moist			
		4.0 ***Boring Terminated at 4 Feet***			

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

Advancement Method:
Manual Hand Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1450 Fifth St W
North Charleston, SC

Boring Started: 04-29-2020	Boring Completed: 04-29-2020
Drill Rig: NA	Driller: RF
Project No.: EN205064	

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL EN205064 VENTURE PARK SEWE.GPJ TERRACON_DATATEMPLATE.GDT 5/7/20

BORING LOG NO. HAB at CPT-11

PROJECT: Venture Park Sewer & Water Lines

CLIENT: Thomas & Hutton Engineering Co
Columbia, SC

SITE: Industrial Road
Colleton County, SC

LOCATION See Exploration Plan

Latitude: 32.9495° Longitude: -80.6264°

MODEL LAYER	GRAPHIC LOG	DEPTH		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE
			TOPSOIL, dark brown			
		0.7	**SILTY SAND (SM)**, fine to medium grained, light brown to brown, dry to moist			
		4.0	***Boring Terminated at 4 Feet***			

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

Advancement Method:
Manual Hand Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

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

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1450 Fifth St W
North Charleston, SC

Boring Started: 04-29-2020	Boring Completed: 04-29-2020
Drill Rig: NA	Driller: RF
Project No.: EN205064	

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL EN205064 VENTURE PARK SEWE.GPJ TERRACON_DATATEMPLATE.GDT 5/7/20

BORING LOG NO. HAB at CPT-12

PROJECT: Venture Park Sewer & Water Lines	**CLIENT: Thomas & Hutton Engineering Co Columbia, SC**
SITE: Industrial Road Colleton County, SC	

LOCATION See Exploration Plan

Latitude: 32.9486° Longitude: -80.6257°

MODEL LAYER	GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE
		TOPSOIL, dark brown			
		0.3			
		SILTY SAND (SM), fine to medium grained, light brown to brown, dry to moist			
		4.0			
		Boring Terminated at 4 Feet			

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

Advancement Method: Manual Hand Auger	See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).	Notes:
Abandonment Method: Boring backfilled with auger cuttings upon completion.	See Supporting Information for explanation of symbols and abbreviations.	

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1450 Fifth St W
North Charleston, SC

Boring Started: 04-29-2020	Boring Completed: 04-29-2020
Drill Rig: NA	Driller: RF
Project No.: EN205064	

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL EN205064 VENTURE PARK SEWE.GPJ TERRACON_DATATEMPLATE.GDT 5/7/20

SUPPORTING INFORMATION

Contents:

CPT GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

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 $q/q_{ultimate}$ ~ 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)
$\alpha_M = 0.0188 \times 10^{(0.55Ic + 1.68)}$

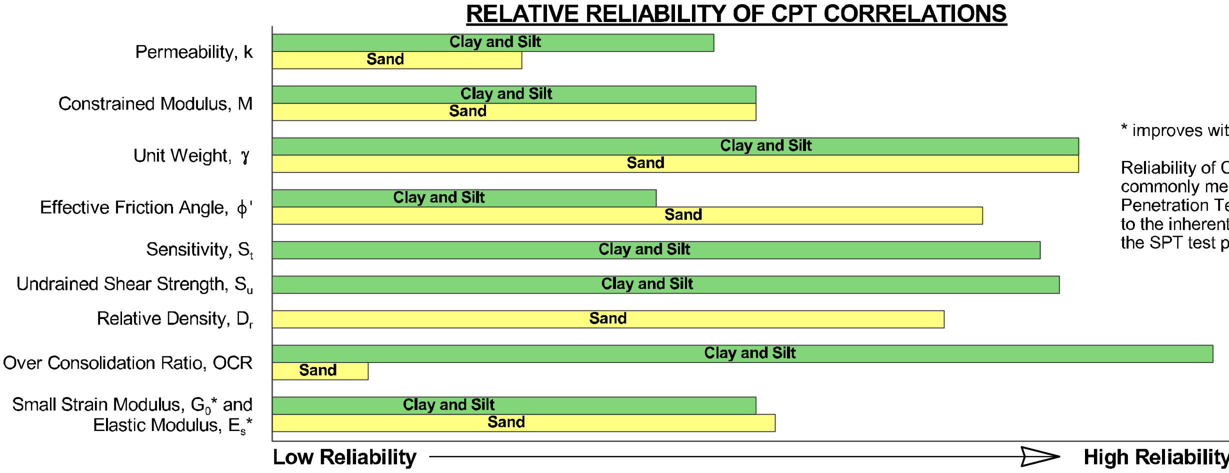
Hydraulic Conductivity, k
For $1.0 < I_c < 3.27$ $k = 10^{(0.952 - 3.04Ic)}$
For $3.27 < I_c < 4.0$ $k = 10^{(-4.52 - 1.37Ic)}$

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

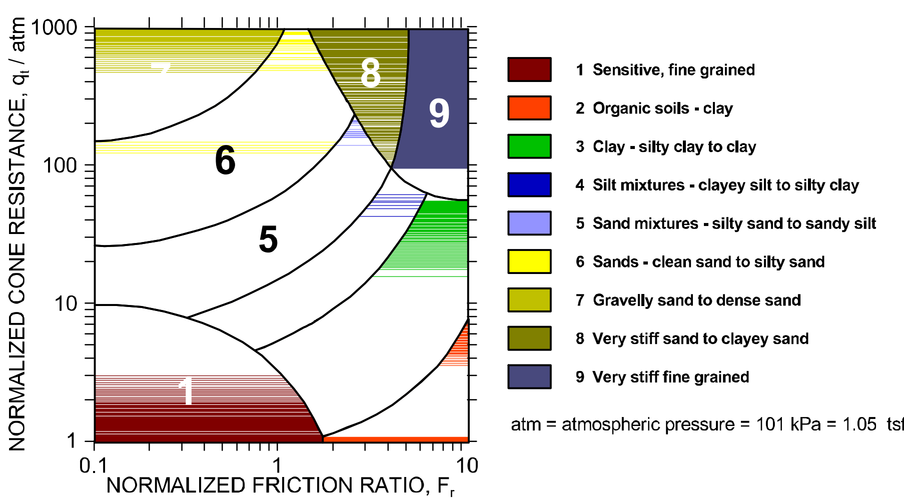
Estimated - Depth to water interpolated by the practitioner using pore pressure measurements in coarse grained soils and known site conditions

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.

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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

Terracon GeoReport

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]					Soil Classification: Group Symbol	Soil Classification: 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] $Cu = D_{60}/D_{10}$ $\qquad Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$

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

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

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

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

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

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

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

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

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

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

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.