Sunset Boulevard Arena

Geotechnical Engineering Report

Jesup, GA

August 29, 2025 | Terracon Project No. ES255175

Prepared for:

Wayne County Georgia
341 E Walnut Street
Jesup, GA 31546

Explore with us

Nationwide
Terracon.com

- Facilities
- Environmental
- Geotechnical
- Materials

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

August 29, 2025

Wayne County Georgia
341 E Walnut Street
Jesup, GA 31546

Attn: Brandon Purcell
P: (912) 256-3704
E: brandon.purcell@waynecountyga.us

Re: Geotechnical Engineering Report
Sunset Boulevard Arena
Sunset Blvd.
Jesup, GA
Terracon Project No. ES255175

Dear Mr. Purcell:

We have completed the scope of Geotechnical Engineering services for the above referenced project in general accordance with Terracon Proposal No. PES255175 July 2, 2025. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations and floor slabs 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

Matt Bemis

GEORGIA Registered No. 21978 PROFESSIONAL Engineer GUOMING LIN

Matthew L. Bemis, E.I.T.
Senior Staff Geotechnical Engineer

Guoming Lin, Ph.D., P.E., BC.GE
Senior Consultant

Table of Contents

Attachments

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

Refer to each individual Attachment for a listing of contents.

Report Summary

Topic [1]	Overview Statement [2]
Project Description	Development of the site includes a prefabricated metal building for use as a horse arena. Maximum loads were provided as follows: ▪ Column load = 86 kips
Geotechnical Characterization	The subsurface conditions are relatively variable between borings. The depth of topsoil may be deeper than 12 inches below the ground surface (BGS) in some areas. The thickness of topsoil will vary, depending upon the near-surface soil disturbance during the site preparation. Refer to the Geotechnical Characterization section. Below the topsoil, the site generally consists of loose to dense silty sand interbedded with medium-stiff to hard clay to depths of approximately 8 to 10 BGS. This layer is followed by loose to very dense silty sand to depths of approximately 12 to 18 feet BGS. After this layer is a layer of medium-stiff to hard silty clay/clayey silt to depths of approximately 23 to 26 feet BGS. Below this layer is a layer of medium dense to very dense silty/clayey sand to the termination of exploration at 30 feet BGS. Groundwater was encountered at depths of approximately 3 to 4 feet BGS in the CPT soundings and HA borings.
Earthwork Recommendations	Install a site drainage system. Strip/grub topsoil. Level, densify, and proofroll subgrade during subgrade preparation. If any soft/weak areas are detected, the subgrade should be repaired by densification or undercut and backfill. For details, please refer to the Earthwork section.
Foundation Recommendations	Shallow foundations will be sufficient after the subgrade has been improved by densification or undercut and backfill. Allowable bearing pressure = 2,500 psf Expected settlements after ground improvements: < 1-inch total, < 1/2-inch differential

Seismic Considerations	For seismic design purposes, the subject site is classified as Site Class D in accordance with the International Building Code (IBC) 2018 and ASCE 7-16 Section 11.4.2.
General Comments	This section contains important information about the limitations of this geotechnical engineering report.

1. If the reader is reviewing this report as a pdf, the topics above can be used to access the appropriate section of the report by simply clicking on the topic itself.
2. This summary is for convenience only. It should be used in conjunction with the entire report for design purposes.

Introduction

This report presents the results of our subsurface exploration and Geotechnical Engineering services performed for the proposed prefabricated building to be located on Sunset Blvd. in Jesup, GA. The purpose of these services was to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil conditions
- Groundwater conditions
- Seismic site classification per IBC
- Site preparation and earthwork
- Foundation design and construction

The geotechnical engineering Scope of Services for this project included the advancement of test borings, engineering analysis, and preparation of this report.

Drawings showing the site and boring locations are shown on the Site Location and Exploration Plan, respectively. The test boring classifications are included on the boring logs in the Exploration Results section.

Project Description

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

Item	Description
Information Provided	A site plan, grading plan, and preliminary column reaction loads were provided by Mr. Brandon Purcell via email on June 26, 2025.
Project Description	The project includes the construction of a prefabricated metal building for use as a horse arena.
Proposed Structure	Structures associated with the project include: ■ 63,000 square foot horse arena.
Building Construction	Prefabricated metal building.
Finished Floor Elevation	Not provided at this time, but assumed to be close to existing grade.

Item	Description
Maximum Loads	Structural loads were provided by Mr. Brandon Purcell as follows: ▪ Maximum column loads: 86 kips
Grading/Slopes	A maximum slope of 0.6% was estimated using the site location map depicting the site topography and the estimated length of the site from Google Earth. Minimal grading is anticipated.

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

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 project is located on Sunset Blvd. in Jesup, GA. Latitude: 31.5894°, Longitude: -81.9091° See Site Location
Existing Improvements	The site has been cleared of vegetation.
Current Ground Cover	Bare earth.
Existing Topography	The site is relatively level with a maximum slope of 0.6% across the site.

Geotechnical Characterization

We have developed a general characterization of the subsurface soil and groundwater conditions based upon our review of the data and our understanding of the geologic setting and planned construction. The following tables provide our geotechnical characterization.

The geotechnical characterization forms the basis of our geotechnical calculations and evaluation of site preparation, foundation options, and pavement options. As noted in

General Comments, the characterization is based upon widely spaced exploration points across the site, and variations are likely.

Stratum	Approximate Depth to Bottom of Stratum (feet) Below Ground Surface	Material Description Based on CPT Soundings	Consistency/Relative Density
Surface	0.8 to 1[1]	Topsoil: brown silty sand	--
1	8 to 10	Silty sand interbedded silty clay layers	Loose to dense sand; medium-stiff to hard clay
2	12 to 18	Silty sand	Loose to very dense
3	23 to 26	Silty clay/clayey silt	Medium-stiff to hard
4	30, termination of soundings	Silty/clayey sand	Medium dense to very dense

1. The thickness of the topsoil at the project site may reach deeper than 12 inches. The depth/thickness of topsoil will vary, depending upon the near-surface soil disturbance during the site preparation.

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

Groundwater Conditions

The soundings and hand auger borings were observed while drilling and after completion for the presence and level of groundwater. Groundwater was measured in three CPT sounding locations and observed in two hand auger borings across the site at depths of approximately 3 to 4 feet below ground surface (BGS).

We used a Slope Indicator® water level meter upon completing the CPT sounding tests to obtain the groundwater depths. The water levels observed in the soundings and hand auger borings can be found on the logs in the Exploration Results attached to this report. The observed water levels are summarized in the following table:

Boring Number	Measured Groundwater Depth (ft)
C01	3.30
C02	3.60
C03	2.10
HA01	4.00
HA02	5.00

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 boring logs. The possibility of shallow groundwater/groundwater level fluctuations should be considered when developing the design and construction plans for the project.

Mottling, as a strong indicator of water seepage during seasonal high groundwater levels, was noted on hand auger boring locations at a depth of 5 feet BGS.

Seismic Site Class

According to the International Building Code (IBC) 2018 and ASCE 7-16, structures should be designed and constructed to withstand the effects of earthquakes and avoid failure during a maximum considered earthquake. The maximum considered earthquake (MCE) is a seismic event that has a 50-year exposure period with a 2% probability of exceedance. The 2,500-year earthquake has a Moment Magnitude (Mw) of 7.3 and a Site Class Adjusted Peak Ground Acceleration (PGAM) of 0.139g, as determined by data provided by the IBC-2018 and ASCE 7-16 Standards.

Based on our findings from the field exploration and our knowledge of the local geological formation in the project area, the site can be classified as Site Class D in accordance with the International Building Code (IBC) 2018 and ASCE 7-16. The seismic design parameters obtained based on IBC-2018 and ASCE 7-16 are summarized in the table below.

The design response spectrum curve, as presented in the Supporting Information attachment of this report, was developed based on the S_{DS} and S_{D1} values according to IBC-2018 and ASCE 7-16.

Site Location (Latitude, Longitude)	Site Classification	S_s	S_1	F_a	F_v	S_{DS}	S_{D1}
31.5894°, -81.9091°	D	0.172g	0.077g	1.600	2.400	0.183g	0.124g

- In accordance with the 2018 International Building Code and ASCE 7-16.
- The 2018 IBC and ASCE 7-16 require a site soil profile determination extending a depth of 100 feet for seismic site classification. The current scope does not include 100-foot soil profile determination. Explorations for this project extended to a maximum depth of 30 feet BGS and this seismic site class definition was provided in consideration of the overall soil conditions as well as the general geology of the area.

Geotechnical Overview

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

Geotechnical Considerations

The subsurface conditions at this site are relatively variable, but suitable for the proposed construction. The soils below the topsoil are predominantly silty sands with deeper layers of sandy clays. The generalized soil profile is presented in the Geotechnical Characterization section.

We performed the settlement analyses at each sounding location using the soil parameters derived from the CPT soundings and the structural loads mentioned in the Project Description section. Based on the settlement analysis results, the estimated settlements under the weight of the 86 kip column load is less than 1 inch.

After the subgrade has been improved with densification or undercut and backfill as needed, the proposed buildings can be supported on a shallow foundation system, such as spread footings for the columns, resting on the improved subgrade. Some limited undercut and backfilling may be required if undesirable materials are encountered during construction to achieve a stable subgrade.

If the structural or load conditions are significantly different from those used in our evaluation and during construction, if the subsurface conditions are significantly different from those presented in this report, Terracon should be retained to perform additional evaluation and revise the recommendations, as well as provide testing and inspection during construction.

Earthwork

Earthwork is anticipated to include excavations, and engineered fill placement. The following sections provide recommendations for use in the preparation of specifications for the work. Recommendations include critical quality criteria, as necessary, to render the site in the state considered in our geotechnical engineering evaluation for foundations, and floor slabs.

Site Preparation

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

Site Drainage

An effective drainage system should be installed prior to the initiation of site preparation and grading activities to intercept surface water and to improve overall shallow drainage. The drainage system may consist of perimeter ditches supplemented with parallel ditches and swales. Pumping equipment should be used if the above ditch system cannot effectively drain water away from the site, especially during the rainy season. The site should be graded to shed water and avoid ponding over the subgrade.

Densification and Proofrolling

Prior to fill placement on the subgrade, the proposed building and pavement areas should be densified with a heavy-duty static roller to achieve a uniform subgrade. However, during bridge lift construction in drainage and wet areas, the vibration should be turned off and only static rolling or compaction should be used for the bridge lift layer to avoid water draw-up, which may destabilize the subgrade. The subgrade underneath the building and the pavement should be thoroughly proofrolled after the completion of densification. Proofrolling will help detect any isolated soft or loose areas that "pump", deflect or rut excessively, and also densify the near-surface soils for floor slab support.

A loaded tandem axle dump truck, capable of transferring a load in excess of 20 tons, should be utilized for this operation. Proofrolling should be performed under the Geotechnical Engineer's observation. Areas where pumping, excessive deflection or rutting is observed after successive passes of the proofrolling equipment should be undercut, backfilled and then properly compacted. It is anticipated that some amount of subgrade undercutting may be required under the footings during subgrade preparation.

Subgrade Preparation

We recommend hand auger borings and dynamic cone penetration (DCP) testing be performed during construction to evaluate and confirm the subgrade conditions under the footings. It is anticipated that subgrade soil undercutting may be required during subgrade preparation for the foundation.

If weak soils are encountered at the proposed subgrade level, we recommend subgrade improvement with undercut and backfill. The subgrade improvement should initially start with 1 foot of undercut below the topsoil. Additional undercut and backfill may be necessary to achieve a stable subgrade. In the footing locations, it is anticipated that deeper undercut will be necessary to achieve a stable subgrade. The building foundation work should be scheduled in consideration of the weather to avoid exposing the subgrade to rains.

During site preparation, topsoil, organic matter, stumps, existing fill, or other unsuitable materials should not be left in subgrade under buildings or pavements. All footings/slab should bear on suitable natural soil or on properly compacted structural fills. Compacted fill should be placed directly on suitable natural soil. We recommend Terracon be retained to test the footing subgrade during construction so that Terracon can provide additional recommendations to prepare the subgrade based on the conditions uncovered during the footing preparation.

Fill Material Considerations

Structural fill should be placed over a stable or stabilized subgrade. The properties of the fill will affect the performance of the footings and the floor slabs. The soils to be used as structural fill should be free of organics, roots, or other deleterious materials. Earthen materials used for structural fill should meet the following material property requirements:

Soil Type [1]	USCS Classification	Acceptable Parameters (for Structural Fill)
Granular	GW, GP, GM, GC, SW, SP, SM, SC	Less than 25% passing No. 200 sieve

1. Structural fill should consist of approved materials free of organic matter and debris. A sample of each material type should be submitted to the Geotechnical Engineer for evaluation prior to use on this site.

Based on the findings from our hand auger borings the subject site consists of soils that are silty sands (SM) in the upper 5 feet BGS. The silty sands (SM) are generally considered suitable for structural fill, provided that the soils are free of roots, organics, or other foreign materials.

Fill Placement and Compaction Requirements

Structural fill should meet the following compaction requirements.

Item	Structural Fill
Maximum Lift Thickness	8 to 10 inches or less in loose thickness when heavy, self-propelled compaction equipment is used 4 to 6 inches in loose thickness when hand-guided equipment (i.e. jumping jack or plate compactor) is used
Minimum Compaction Requirements [1]	95% of max. below foundations and below finished pavement subgrade
Water Content Range [1]	Granular: -3% to +3% of optimum

1. Maximum density and optimum water content as determined by the modified Proctor test (ASTM D 1557-12).

Some manipulation of the moisture content (such as wetting, drying) will be required during the filling operations to obtain the required degree of compaction. The manipulation of the moisture content is highly dependent on weather conditions and site drainage conditions. Therefore, the contractor should prepare both dry and wet fill materials to obtain the specified compaction during grading. A sufficient number of density tests should be performed to confirm the required compaction of the fill material.

Earthwork Construction Considerations

Shallow excavations for the proposed building foundations are anticipated to be accomplished with conventional construction equipment. Upon completion of filling and grading, care should be taken to maintain the subgrade water content prior to the construction of floor slabs. Construction traffic over the completed subgrades should be avoided. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. Water collecting over, or adjacent to, construction areas should be removed.

If the subgrade becomes saturated or is disturbed, the affected material should be removed or be scarified, moisture conditioned, and recompacted prior to floor slab construction. The groundwater table could affect some excavation efforts, particularly over-excavation and replacement of lower strength soils. A temporary dewatering system consisting of sumps with pumps could be necessary to achieve the recommended depth of over-excavation.

As a minimum, excavations should be performed in accordance with OSHA 29 CFR, Part 1926, Subpart P, “Excavations” and its appendices, and in accordance with any applicable local, and/or state regulations.

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 the Geotechnical Engineer. Monitoring should include documentation of adequate removal of vegetation and topsoil, proofrolling, and mitigation of areas delineated by the proofroll 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 provided by the project plan and specifications.

In areas of foundation excavations, the bearing subgrade should be evaluated under the direction of the Geotechnical Engineer. If unanticipated conditions are encountered, the Geotechnical Engineer should prescribe mitigation options.

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.

Shallow Foundations

After the proper subgrade improvement as discussed in the Geotechnical Considerations section, the proposed development can be supported on a shallow, spread footing foundation system, provided that the proposed structures will not exceed the loads as provided in Project Description section and the structure has criteria of the allowable settlement of 1 inch or greater.

Spread Footing Design Recommendations

Item	Column
Maximum Net Allowable Bearing Pressure [1, 2]	2,500 psf
Minimum Foundation Dimensions	24 inches
Minimum Embedment below Finished Grade	18 inches
Estimated Total Settlement from Structural Loads [2, 3]	<1 inch
Estimated Differential Settlement [2]	<1 inch between columns
Ultimate Coefficient of Sliding Friction [4]	0.32

1. The maximum net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. It assumes any unsuitable fill or soft soils, if encountered will be replaced with compacted structural fill.
2. Values provided are for maximum loads noted in Project Description. Additional geotechnical consultation will be necessary if higher loads are anticipated.
3. The foundation settlement will depend upon the variations within the subsurface soil profile, the structural loading conditions, the embedment depth of the footings, the thickness of the compacted fill, and the quality of the earthwork operations. Footings should be proportioned to reduce differential settlements. Proportioning on the basis of equal total settlement is recommended; however, proportioning to relative constant dead-load pressure will also reduce differential settlement between adjacent footings.
4. Sliding friction along the base of the footing will not develop where net uplift conditions exist.

The design bearing pressure may be increased by one-third when considering the total load that includes the wind or seismic conditions. The weight of the foundation concrete below grade may be neglected in dead load computations.

Footings, foundations, and masonry walls should be reinforced as necessary to reduce the potential for distress caused by the differential foundation movement. The use of joints at openings or other discontinuities in masonry walls is recommended.

Foundation excavations should be observed by Terracon. If the soil conditions encountered differ significantly from those presented in this report, Terracon should be contacted to provide additional evaluation and supplemental recommendations.

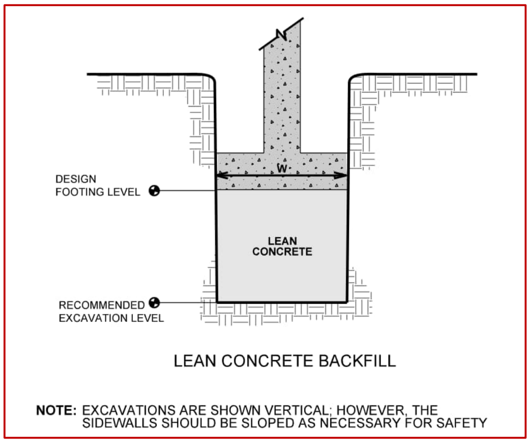
Foundation Construction Considerations

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

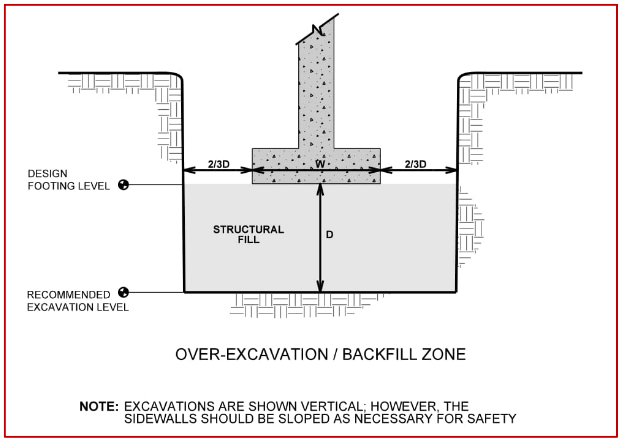
Care should be taken to prevent wetting or drying of the bearing materials during construction. Extremely wet or dry material or any loose or disturbed material in the bottom of the footing excavations should be removed before the foundation concrete is placed. If the soils at the bearing level become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

Regarding the construction of footings, we generally anticipate material suitable for the recommended design bearing pressure will be present at the bottom of the footings. However, there is a possibility that isolated zones of soft or loose native soils could be encountered below the footing bearing level, even though field density tests are expected to be performed during the fill placement operations. Therefore, it is important that Terracon be retained to observe, test, and evaluate the bearing soil prior to placing reinforcing steel and concrete to determine if additional footing excavation or other subgrade repair is needed for the design loads.

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.



As an alternative, the footings could also bear on properly compacted structural backfill extending down to the suitable soils. 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 structural fill placed, as recommended in the Earthwork section.



The over-excavation should be backfilled up to the footing base elevation with well-graded granular material placed in lifts of 6 inches or less in loose thickness and compacted to at least 95 percent of the material's maximum dry density as determined by the Modified Proctor test (ASTM D-1557). No. 57 stone is recommended in lieu of structural fill when the volume of excavation is relatively small, re-compaction of the fill is difficult, or the weather conditions or construction schedule becomes a controlling factor.

General Comments

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration.

Variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction.

Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

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

Our services and any correspondence are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended.

Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly affect excavation cost.

Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety and cost estimating including excavation support and dewatering requirements/design are the responsibility of others. Construction and site development have the potential to affect adjacent properties. Such impacts can include damages due to vibration, modification of groundwater/surface water flow during construction, foundation movement due to undermining or subsidence from excavation, as well as noise or air quality concerns. Evaluation of these items on nearby properties are commonly associated with contractor means and methods and are not addressed in this report. The owner and contractor should consider a preconstruction/precondition survey of surrounding development.

If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

Attachments

Exploration and Testing Procedures

Field Exploration

Number of Borings	Type of Exploration	Maximum Boring Depth (feet)	Location
5	Cone Penetration Test (CPT) Sounding	30	Horse arena
2	Hand Auger (HA) Boring	5	

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

Subsurface Exploration Procedures: We pushed the CPT soundings with a truck-mounted drill rig. CPT sounding is the technology in which an electronically instrumented cone penetrometer is hydraulically pushed through the soil while nearly continuous readings are recorded to a portable computer. The cone is equipped with electronic load cells to measure tip resistance and sleeve resistance and a pressure transducer to measure the generated ambient pore pressure. The face of the cone has an apex angle of 60° and an area of 15 cm^2. Digital data representing the tip resistance, friction resistance, pore water pressure, and probe inclination angle are recorded about every 2 centimeters while advancing through the ground at a rate between 1½ and 2½ centimeters per second. These measurements are correlated to various soil properties used for geotechnical design. No soil samples are gathered through this subsurface investigation technique.

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

Hand auger borings were conducted in general accordance with ASTM D 1452-80, Standard Practice for Soil Investigation and Sampling by Auger Borings. In this test, hand auger borings are drilled by rotating and advancing a bucket auger to the desired depths while periodically removing the auger from the hole to clear and examine the auger cuttings. The soils are classified in accordance with ASTM D2488.

The sampling depths, penetration distances, and other sampling information was recorded on the field boring logs. Our exploration team prepared field boring logs as part of the drilling operations. These field logs included visual classifications of the materials observed during drilling and our interpretation of the subsurface conditions between samples. Final boring logs were prepared from the field logs. The final boring logs represent the Geotechnical Engineer's interpretation of the field logs and include modifications based on site conditions.

Site Location and Exploration Plans

Contents:

Note: All attachments are one page unless noted above.

Site Location Plan

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

MAP PROVIDED BY GOOGLE EARTH MAPS

Exploration Plan

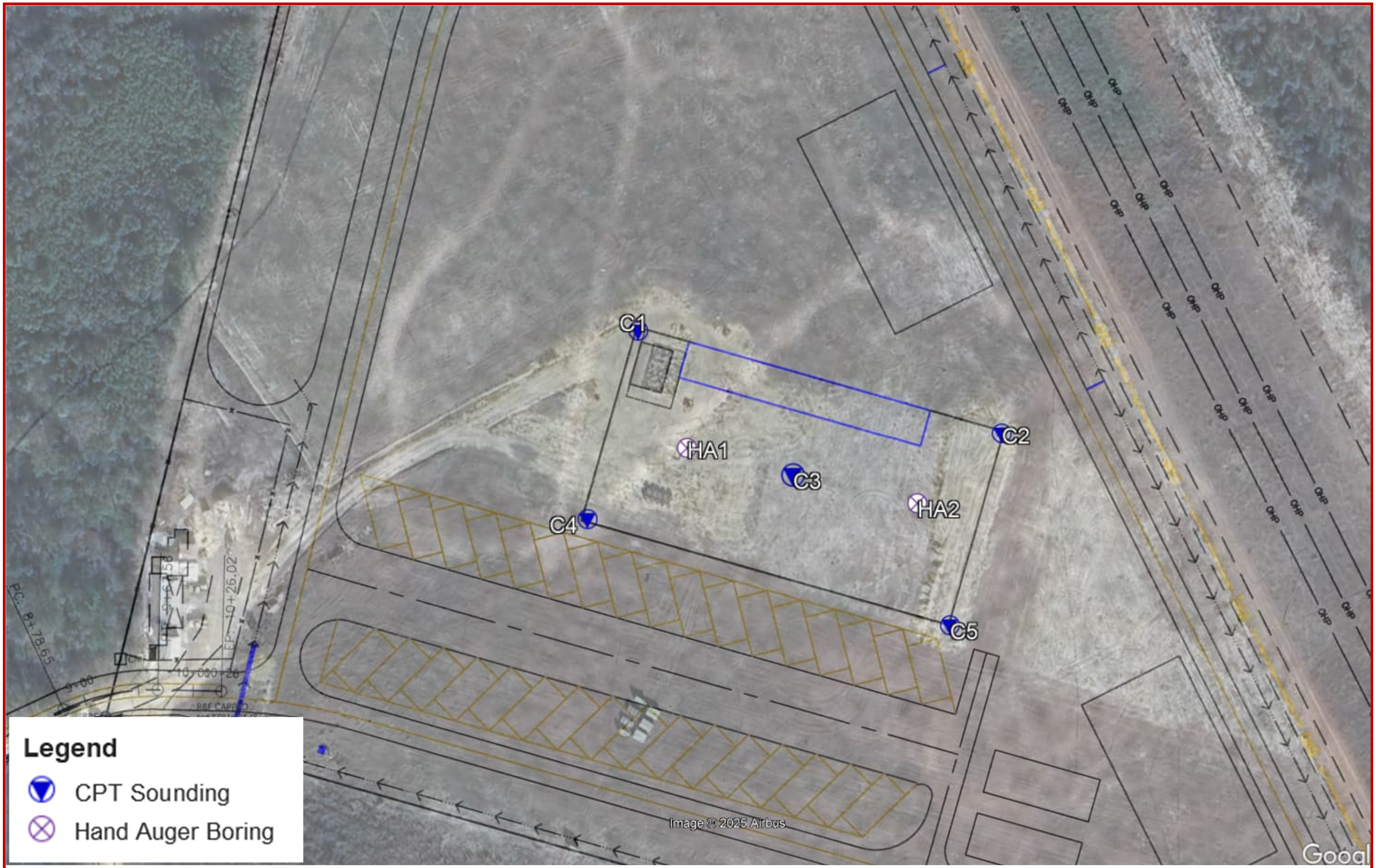


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY GOOGLE EARTH MAPS

Exploration Results

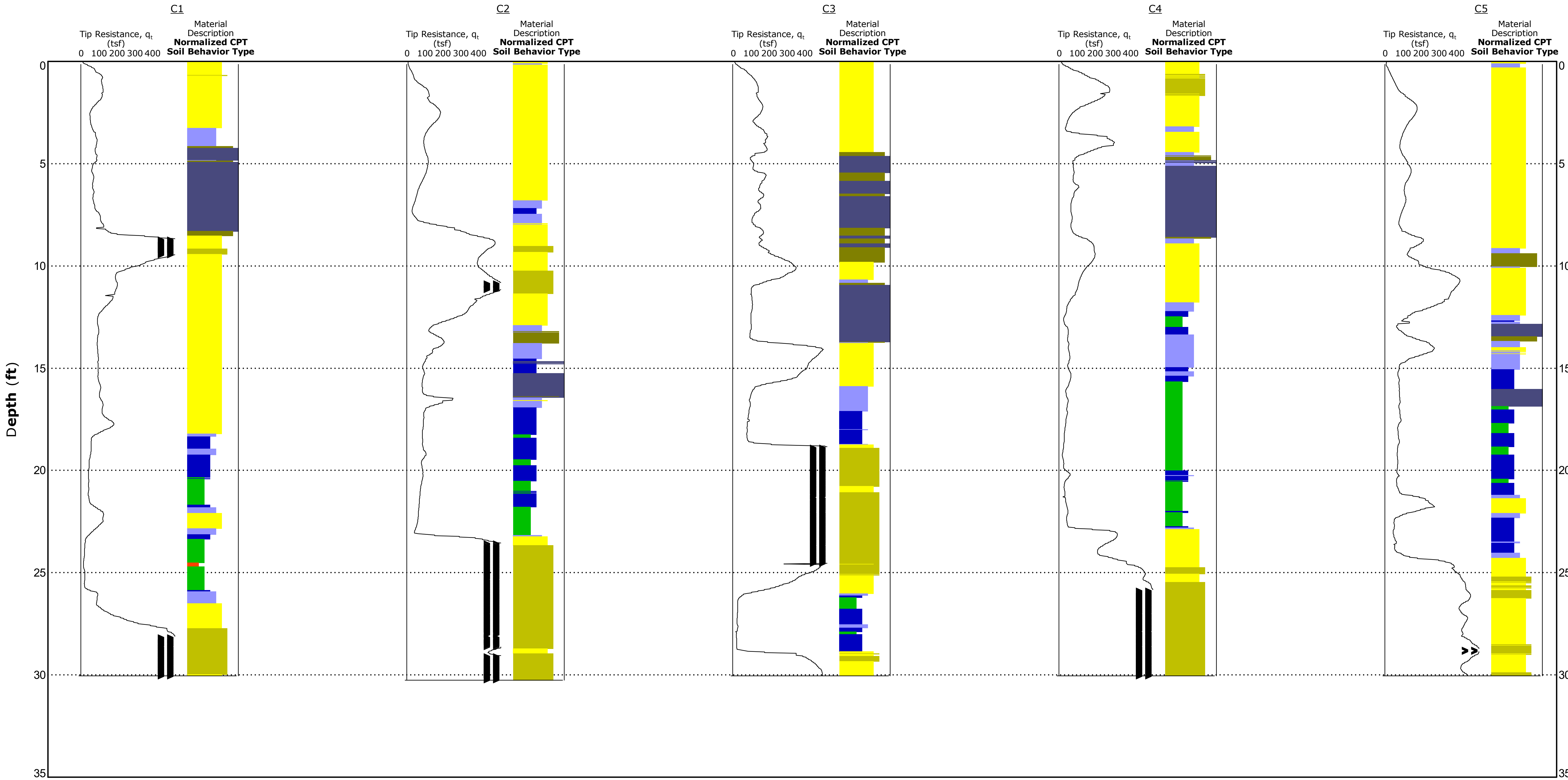
Contents:

Note: All attachments are one page unless noted above.

Sunset Blvd. Arena
Sunset Blvd. | Jesup, GA
Terracon Project No. ES255175

Subsurface Profile

Terracon
2201 Rowland Ave
Savannah, GA



Notes	Water Level Observations	Explanation
See Exploration Plan for orientation of soil profile. See General Notes in Supporting Information for symbols and soil classifications. Soils profile provided for illustration purposes only. Soils between borings may differ AR - Auger Refusal BT - Boring Termination	Water Level Reading at time of drilling. Water Level Reading after drilling.	C1 — Borehole Number Moisture Content — %w LL PL — Liquid and Plastic Limits Sampling (See General Notes) Borehole Lithology AR BT — Borehole Termination Type

CPT Soil Classification Graphic Color Code

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

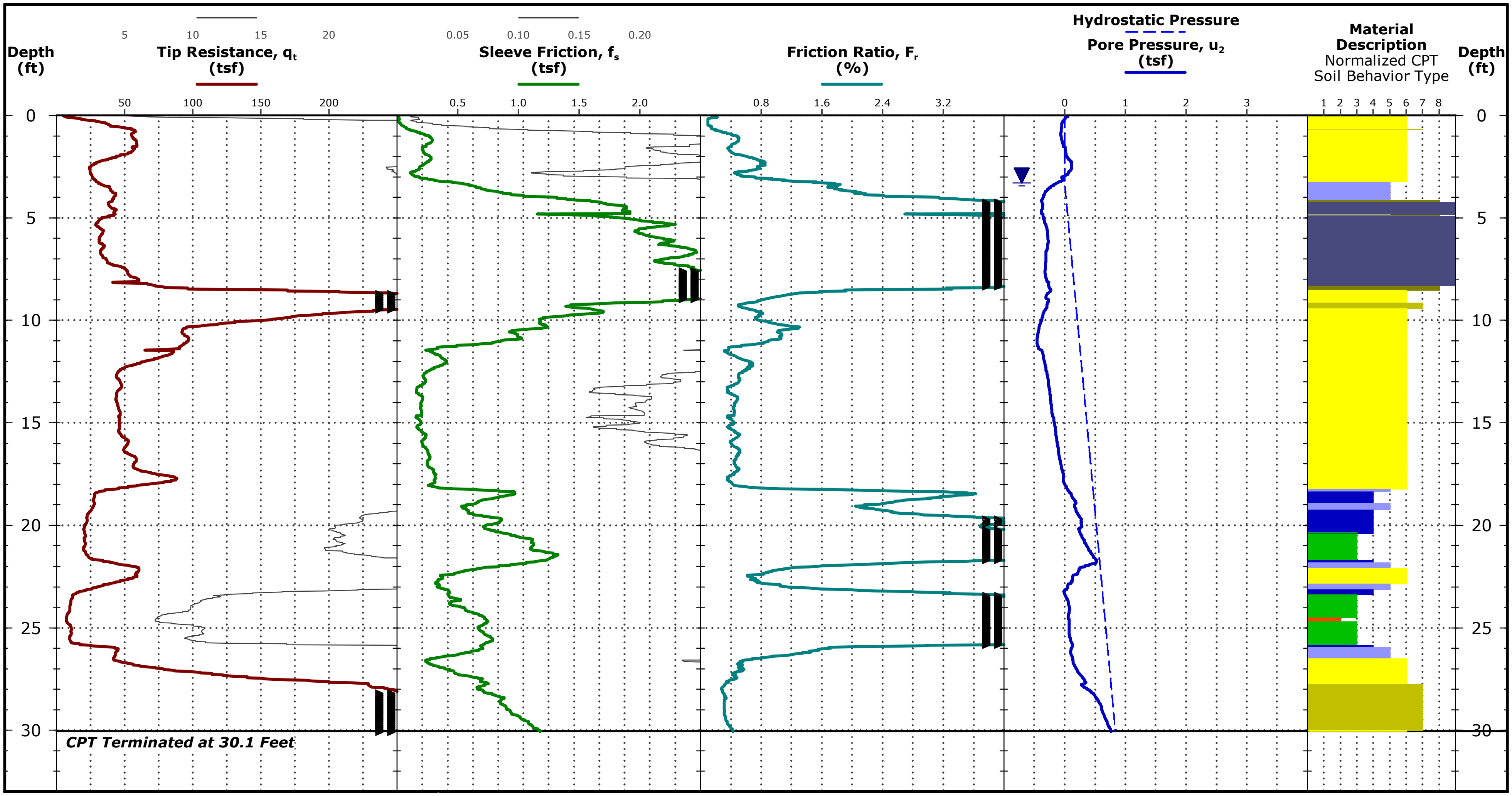
Sunset Blvd. Arena
Sunset Blvd. | Jesup, GA
Terracon Project No. ES255175

CPT Sounding ID C1

Latitude: 31.5897° Longitude: -81.9095°

Terracon
2201 Rowland Ave
Savannah, GA

CPT Started: 7/30/2025
CPT Completed: 7/30/2025



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

See Supporting Information for explanation of symbols and abbreviations.

Notes

Test Location: See Exploration Plan

CPT Equipment

CPT Rig: Geoprobe
Operator: RDM
CPT sensor calibration reports available upon request
Probe No. 8009 with net area ratio of .834
U_2 pore pressure transducer location
Manufactured by Geotech A.B.- Calibrated 1/21/2025
Tip and sleeve areas of 15 cm^2 and 225 cm^2
No friction reducer

Water Level Observation

3.3 ft measured water depth
(used in normalizations and correlations)

Normalized Soil Behavior Type
(Robertson 1990)

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

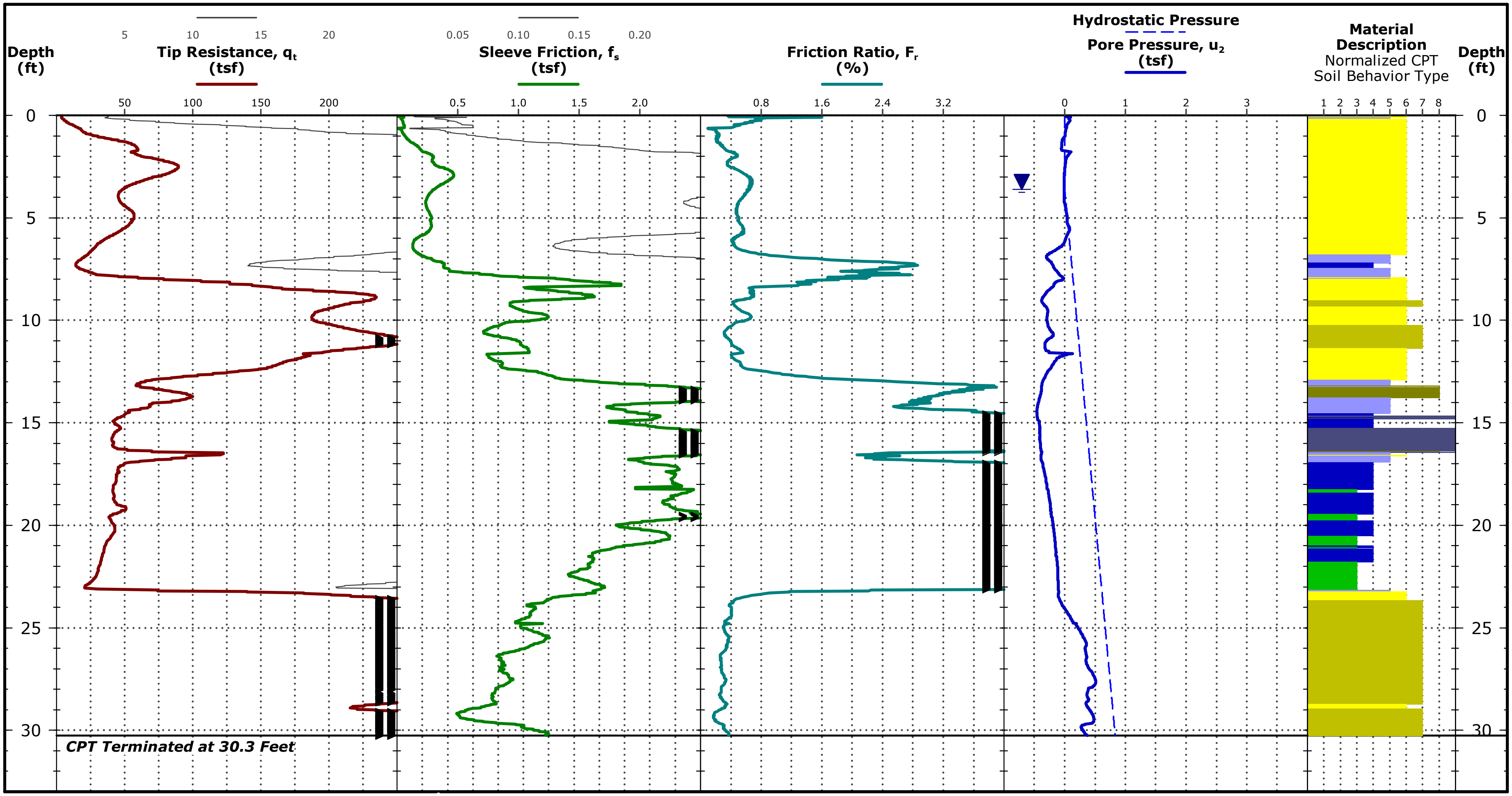
Sunset Blvd. Arena
Sunset Blvd. | Jesup, GA
Terracon Project No. ES255175

CPT Sounding ID C2

Latitude: 31.5895° Longitude: -81.9084°

Terracon
2201 Rowland Ave
Savannah, GA

CPT Started: 7/30/2025
CPT Completed: 7/30/2025



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

See Supporting Information for explanation of symbols and abbreviations.

Notes

Test Location: See Exploration Plan

CPT Equipment

CPT Rig: Geoprobe

Operator: RDM

CPT sensor calibration reports available upon request

Probe No. 8009 with net area ratio of .834

U_2 pore pressure transducer location

Manufactured by Geotech A.B.- Calibrated 1/21/2025

Tip and sleeve areas of 15 cm^2 and 225 cm^2

No friction reducer

Water Level Observation

3.6 ft measured water depth

(used in normalizations and correlations)

Normalized Soil Behavior Type
(Robertson 1990)

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

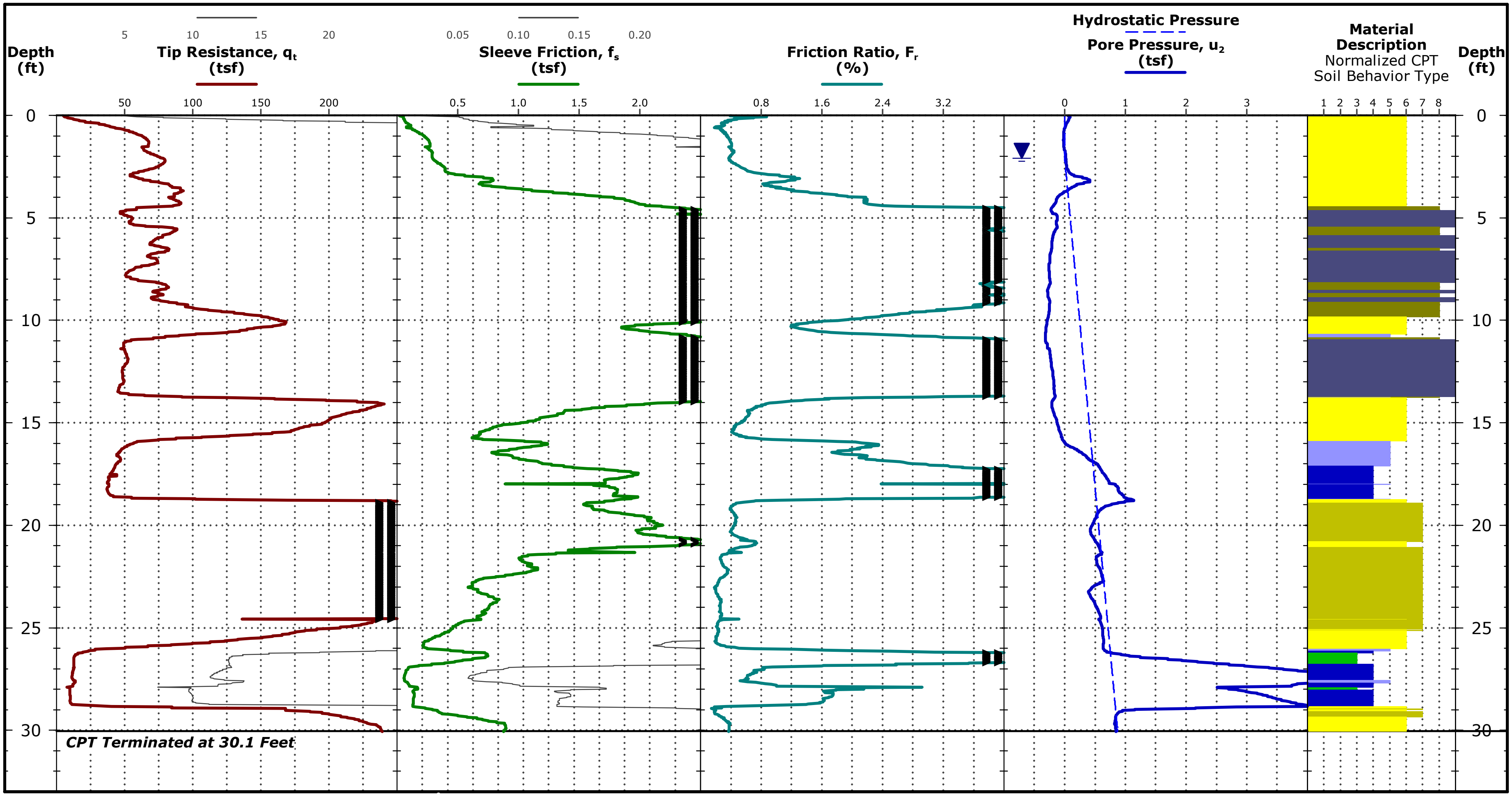
Sunset Blvd. Arena
Sunset Blvd. | Jesup, GA
Terracon Project No. ES255175

CPT Sounding ID C3

Latitude: 31.5894° Longitude: -81.9091°

Terracon
2201 Rowland Ave
Savannah, GA

CPT Started: 7/30/2025
CPT Completed: 7/30/2025



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

See Supporting Information for explanation of symbols and abbreviations.

Notes

Test Location: See Exploration Plan

CPT Equipment

CPT Rig: Geoprobe

Operator: RDM

CPT sensor calibration reports available upon request

Probe No. 8009 with net area ratio of .834

U_2 pore pressure transducer location

Manufactured by Geotech A.B.- Calibrated 1/21/2025

Tip and sleeve areas of 15 cm^2 and 225 cm^2

No friction reducer

Water Level Observation

2.1 ft measured water depth

(used in normalizations and correlations)

Normalized Soil Behavior Type
(Robertson 1990)

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

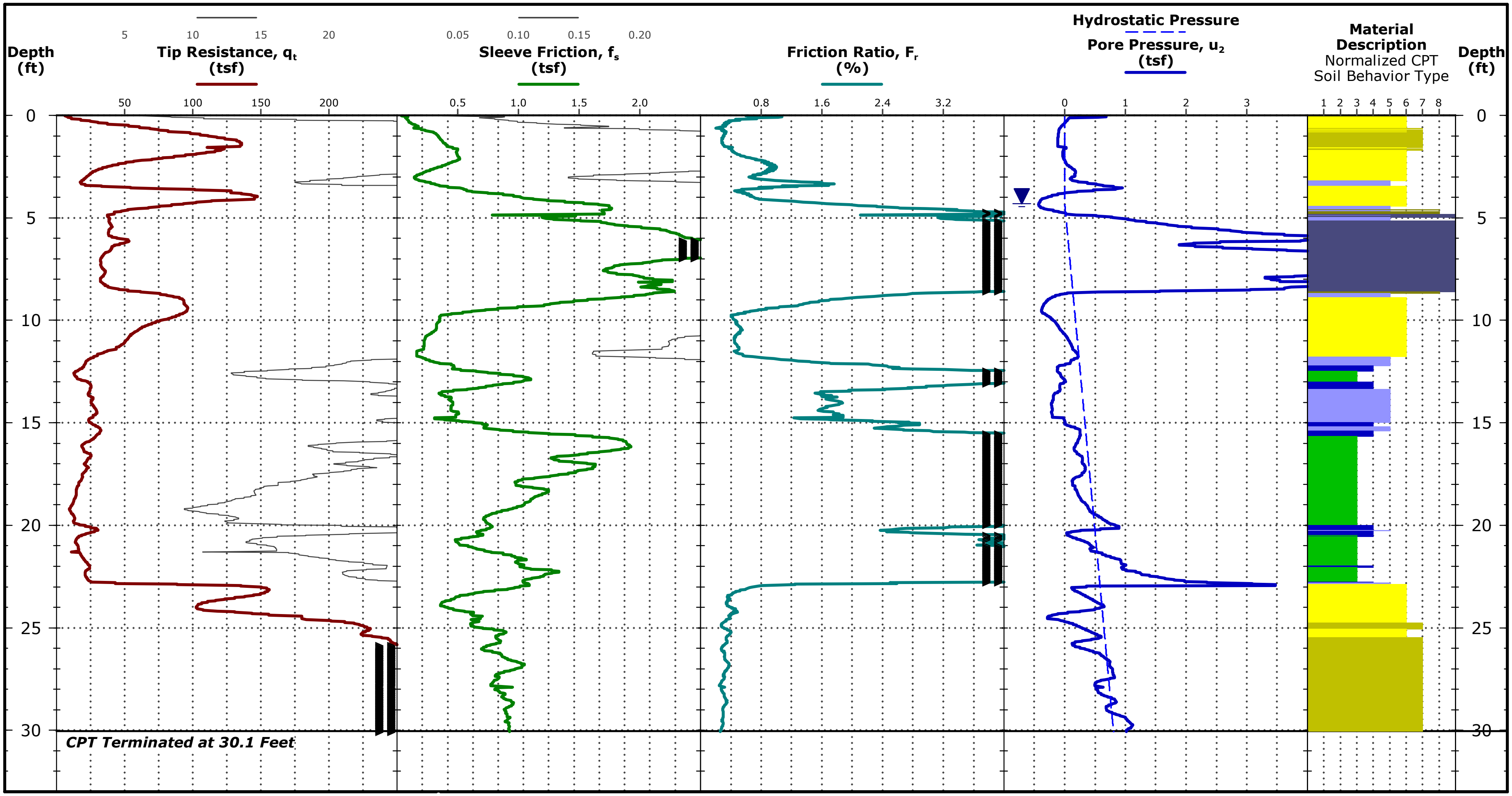
Sunset Blvd. Arena
Sunset Blvd. | Jesup, GA
Terracon Project No. ES255175

CPT Sounding ID C4

Latitude: 31.5893° Longitude: -81.9097°

Terracon
2201 Rowland Ave
Savannah, GA

CPT Started: 7/30/2025
CPT Completed: 7/30/2025



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

See Supporting Information for explanation of symbols and abbreviations.

Notes

Test Location: See Exploration Plan

CPT Equipment

CPT Rig: Geoprobe

Operator: RDM

CPT sensor calibration reports available upon request

Probe No. 8009 with net area ratio of .834

U_2 pore pressure transducer location

Manufactured by Geotech A.B.- Calibrated 1/21/2025

Tip and sleeve areas of 15 cm^2 and 225 cm^2

No friction reducer

Water Level Observation

4.3 ft estimated water depth

(used in normalizations and correlations)

Normalized Soil Behavior Type
(Robertson 1990)

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

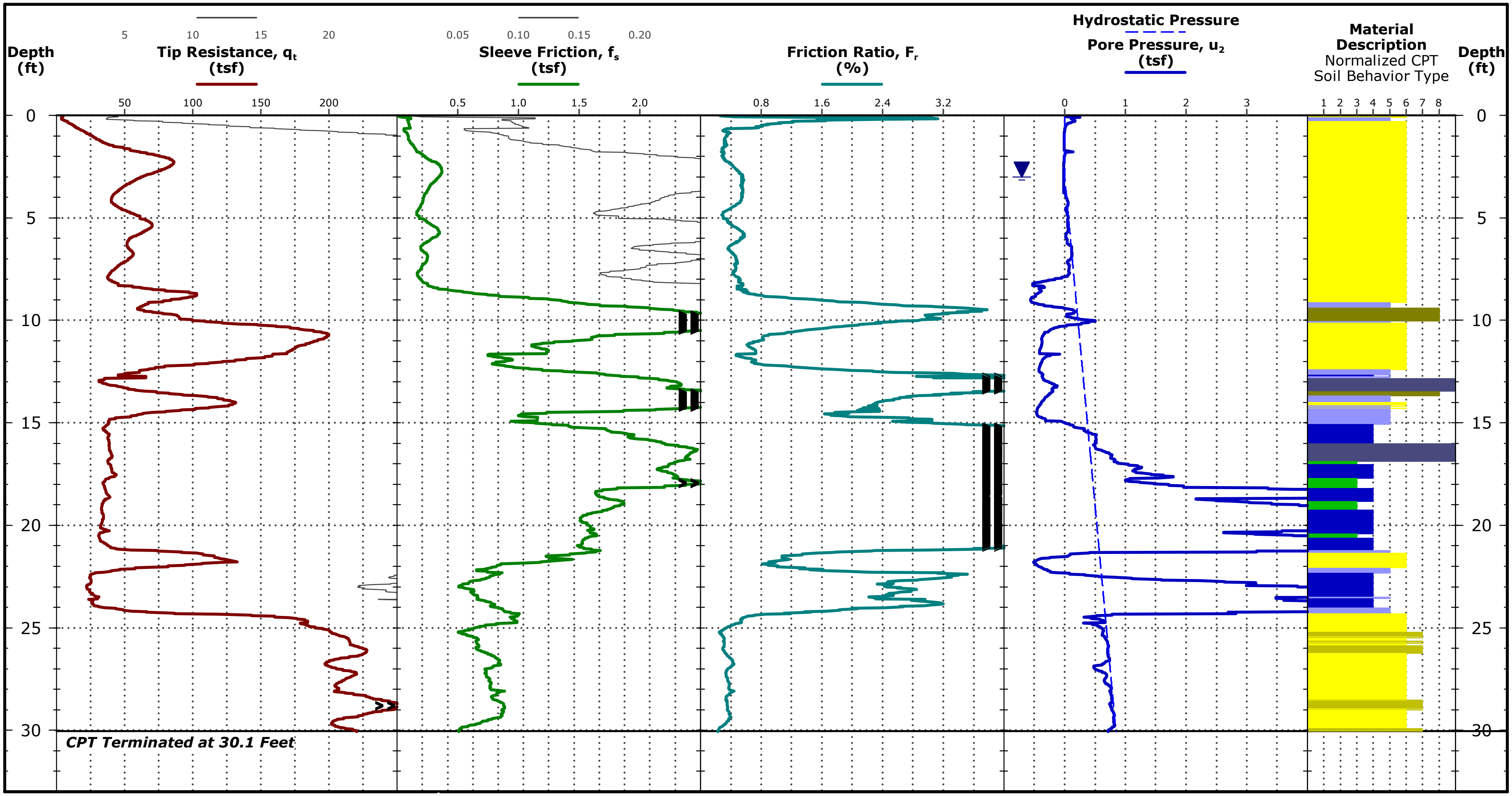
Sunset Blvd. Arena
Sunset Blvd. | Jesup, GA
Terracon Project No. ES255175

CPT Sounding ID C5

Latitude: 31.5890° Longitude: -81.9086°

Terracon
2201 Rowland Ave
Savannah, GA

CPT Started: 7/30/2025
CPT Completed: 7/30/2025



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

See Supporting Information for explanation of symbols and abbreviations.

Notes

Test Location: See Exploration Plan

CPT Equipment

CPT Rig: Geoprobe

Operator: RDM

CPT sensor calibration reports available upon request

Probe No. 8009 with net area ratio of .834

U_2 pore pressure transducer location

Manufactured by Geotech A.B.- Calibrated 1/21/2025

Tip and sleeve areas of 15 cm^2 and 225 cm^2

No friction reducer

Water Level Observation

3 ft estimated water depth

(used in normalizations and correlations)

Normalized Soil Behavior Type
(Robertson 1990)

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

Terracon
2201 Rowland Ave
Savannah, GA

Boring Log No. HA1

Location: See Exploration Plan

Latitude: 31.5894° Longitude: -81.9094°

Depth (Ft.)	Description	Depth (Ft.)	Water Level Observations	Sample Type
	TOPSOIL, with grass, fine to medium grained, brown, moist, silty sand			
0.8	**SILTY SAND (SM)**, fine to medium grained, light brown, moist	1		
		2		
		3		
	wet	4	▽	
5.0	***Boring Terminated at 5 Feet***	5		

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

Water Level Observations
▽ Groundwater encountered @ 4 ft BGS
Mottling encountered @ 5 ft BGS

Drill Rig
Hand Auger

Driller
MA

Notes

Advancement Method
Manual hand auger

Abandonment Method
Boring backfilled with auger cuttings upon completion.

Logged by
LV

Boring Started
07-31-2025

Boring Completed
07-31-2025

Terracon
2201 Rowland Ave
Savannah, GA

Boring Log No. HA2

Location: See Exploration Plan

Latitude: 31.5893° Longitude: -81.9087°

Graphic Log	Depth (Ft.)	Description	Depth (Ft.)	Water Level Observations	Sample Type
		TOPSOIL, with grass, fine to medium grained, brown, moist, silty sand			
	1.0	**SILTY SAND (SM)**, fine to medium grained, light brown, moist	1		
			2		
			3		
			4		
	5.0	***Boring Terminated at 5 Feet***	5	▽	

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

Water Level Observations
▽ Groundwater encountered @ 5 ft BGS
Mottling encountered @ 5 ft BGS

Drill Rig
Hand Auger

Driller
MA

Notes

Advancement Method
Manual hand auger

Abandonment Method
Boring backfilled with auger cuttings upon completion.

Logged by
LV

Boring Started
07-31-2025

Boring Completed
07-31-2025

Supporting Information

Contents:

Note: All attachments are one page unless noted above.

Seismic Design Parameters Based on IBC2018 Code and ASCE 7-16 Standard

Terracon Project Name: Sunset Blvd. Arena
Terracon Project No: ES255175

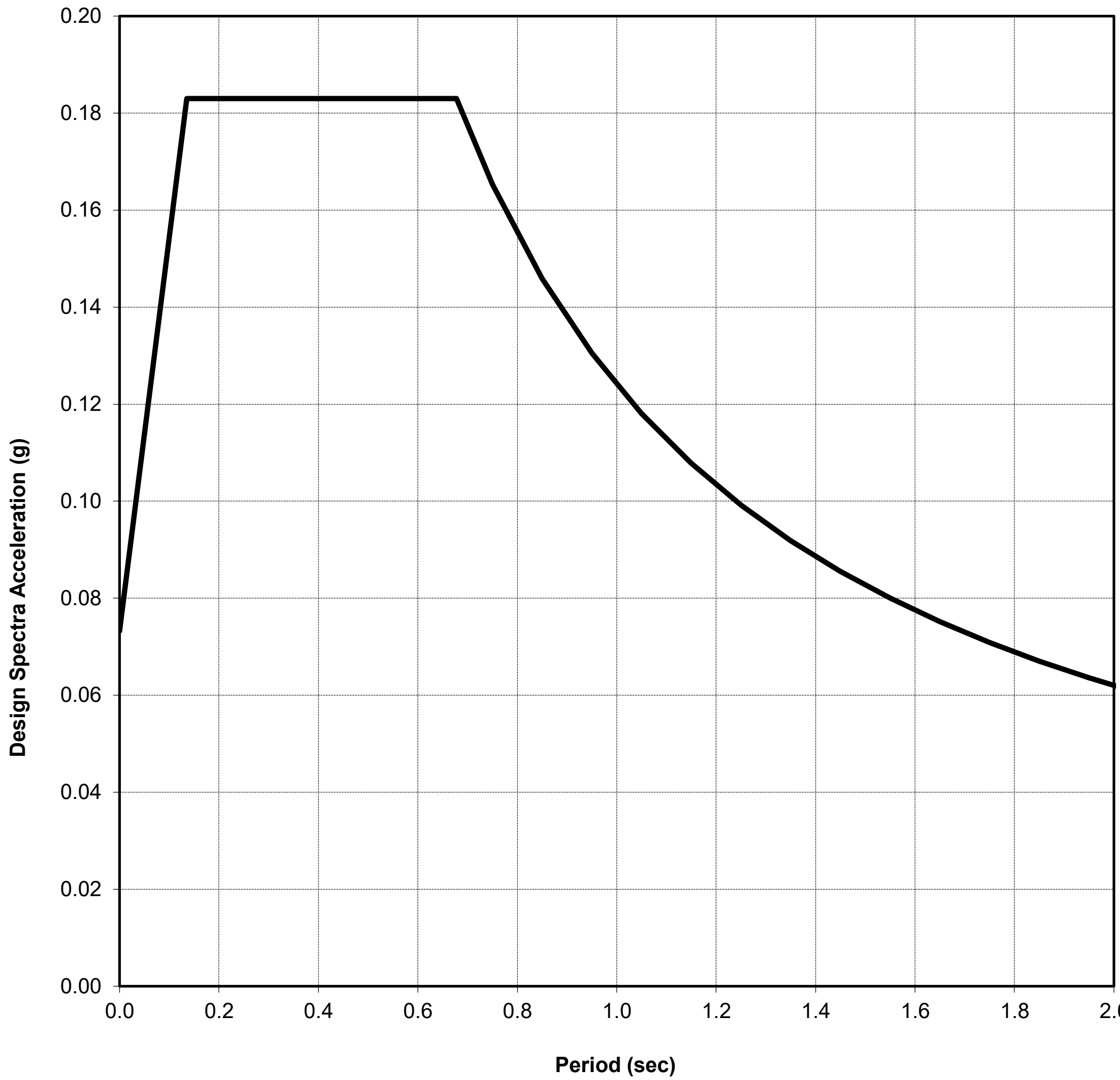
Site Location: Jesup, GA
Latitude : 31.5894°
Longitude : -81.9091°

Site Class: D

Design Response Spectrum for the Site Class

S_s = 0.172	S_1 = 0.077
F_a = 1.600	F_v = 2.400
S_{MS} = 0.275	S_{M1} = 0.186
S_{DS} = 0.183	S_{D1} = 0.124

	Period (sec)	Sa (g)
	0.000	0.073
T_0 =	0.136	0.183
	0.200	0.183
T_S =	0.678	0.183
T =	0.750	0.165
	0.850	0.146
	0.950	0.131
	1.050	0.118
	1.150	0.108
	1.250	0.099
	1.350	0.092
	1.450	0.086
	1.550	0.080
	1.650	0.075
	1.750	0.071
	1.850	0.067
	1.950	0.064
	2.050	0.060
	2.150	0.058



GENERAL NOTES

Terracon

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

SAMPLING

Auger, Split Spoon, Shelby Tube, Macro Core, No Recovery, Rock Core, Ring Sampler

GROUNDWATER

- Groundwater Initially Encountered
- Groundwater Level After a Specified Period of Time
- Static Groundwater Level After a Specified Period of Time
- No Groundwater Observed

Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.

FIELD TESTS

(HP)	Hand Penetrometer
(T)	Torvane
(b/f)	Standard Penetration Test (blows per foot)
(PID)	Photo-Ionization Detector
(OVA)	Organic Vapor Analyzer

DESCRIPTIVE SOIL CLASSIFICATION

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

LOCATION AND ELEVATION NOTES

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

STRENGTH TERMS

RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance Includes gravels, sands and silts.		CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
Descriptive Term (Density)	Std. Penetration Resistance (blows per foot)	Descriptive Term (Consistency)	Undrained Shear Strength (kips per square foot)	Std. Penetration Resistance (blows per foot)
Very Loose	0 - 3	Very Soft	less than 0.25	0 - 1
Loose	4 - 9	Soft	0.25 to 0.50	2 - 4
Medium Dense	10 - 29	Medium-Stiff	0.50 to 1.00	5 - 7
Dense	30 - 50	Stiff	1.00 to 2.00	8 - 14
Very Dense	> 50	Very Stiff	2.00 to 4.00	15 - 30
		Hard	above 4.00	> 30

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 15
With	15 - 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

Descriptive Term(s) of other constituents	Percent of Dry Weight
Boulders	Over 12 in. (300 mm)
Cobbles	12 in. to 3 in. (300mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm
Silt or Clay	Passing #200 sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 5
With	5 - 12
Modifier	> 12

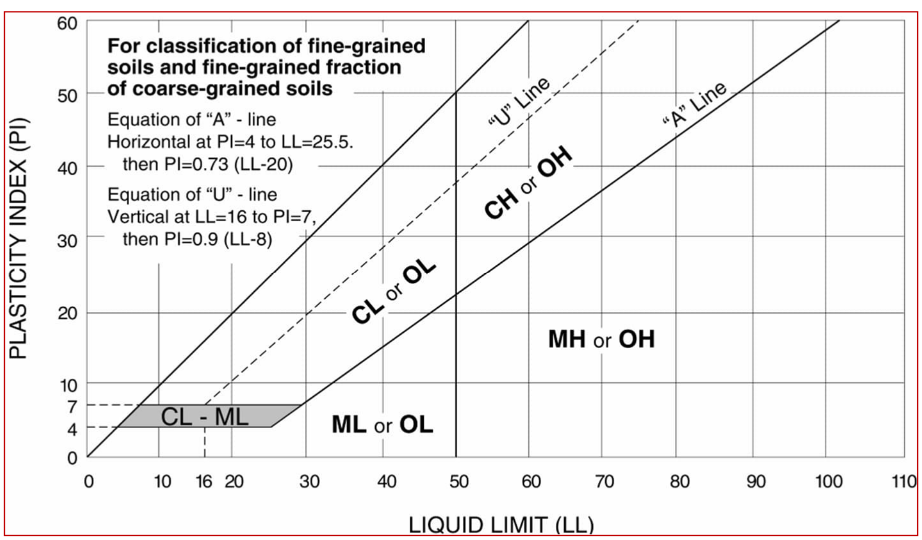
PLASTICITY DESCRIPTION

Term	Plasticity Index
Non-plastic	0
Low	1 - 10
Medium	11 - 30
High	> 30

Unified Soil Classification System

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≥4 and 1≤Cc≤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≥6 and 1≤Cc≤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 above "A" line [J]	CL	Lean clay [K, L, M]
			PI < 4 or plots below "A" line [J]	ML	Silt [K, L, M]
		Organic:	$\frac{LL\ oven\ dried}{LL\ not\ dried} < 0.75$	OL	Organic clay [K, L, M, N]
					Organic silt [K, L, M, O]
	Silts and Clays: Liquid limit 50 or more	Inorganic:	PI plots on or above "A" line	CH	Fat clay [K, L, M]
			PI plots below "A" line	MH	Elastic silt [K, L, M]
		Organic:	$\frac{LL\ oven\ dried}{LL\ not\ dried} < 0.75$	OH	Organic clay [K, L, M, P]
					Organic silt [K, L, M, Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor			PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve.
[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.
[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.
[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
[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.



CPT GENERAL NOTES

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
$q_t = q_c + U2(1 - a)$
Where a is the net area ratio, a lab calibration of the cone typically between 0.70 and 0.85

Pore Pressure, U1/U2
Pore pressure generated during penetration
U1 - sensor on the face of the cone
U2 - sensor on the shoulder (more common)

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

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

To be reported per ASTM D7400, if collected:

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

DESCRIPTION OF GEOTECHNICAL CORRELATIONS

Normalized Tip Resistance, Q_t
$Q_t = (q_t - \sigma_{v0})/\sigma'_{v0}$

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

Undrained Shear Strength, Su
$Su = Q_t \times \sigma'_{v0}/N_{kt}$
N_{kt} is a geographical factor (shown on Su plot)

Sensitivy, St
$St = (q_t - \sigma_{v0}/N_{kt}) \times (1/fs)$

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

Unit Weight
$UW = (0.27[\log(FR)]+0.36[\log(q_t/atm)]+1.236) \times UW_{water}$
σ_{v0} is taken as the incremental sum of the unit weights

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

Soil Behavior Type Index, Ic
$Ic = [(3.47 - \log(Q_t))^2 + (\log(FR) + 1.22)^2]^{0.5}$

Small Strain Modulus, G_0
$G_0 = \rho Vs^2$

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

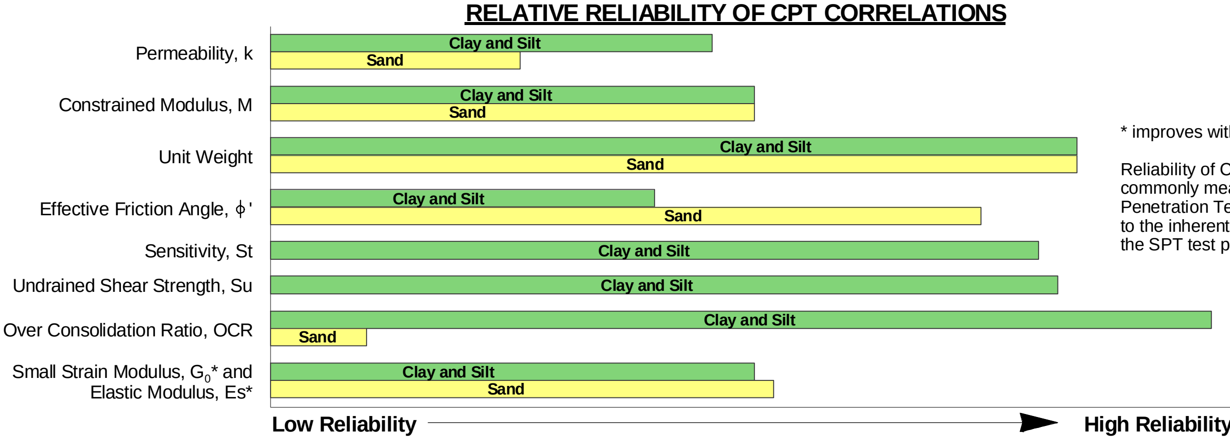
Constrained Modulus, M
$M = \alpha_M(q_t - \sigma_{v0})$
For Ic > 2.2 (fine-grained soils)
$\alpha_M = Q_t$ with maximum of 14
For Ic < 2.2 (coarse-grained soils)
$\alpha_M = 0.0188 \times 10^{(0.55Ic + 1.68)}$

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

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 tip resistance, sleeve resistance, and porewater pressure. 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. 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 Vs 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

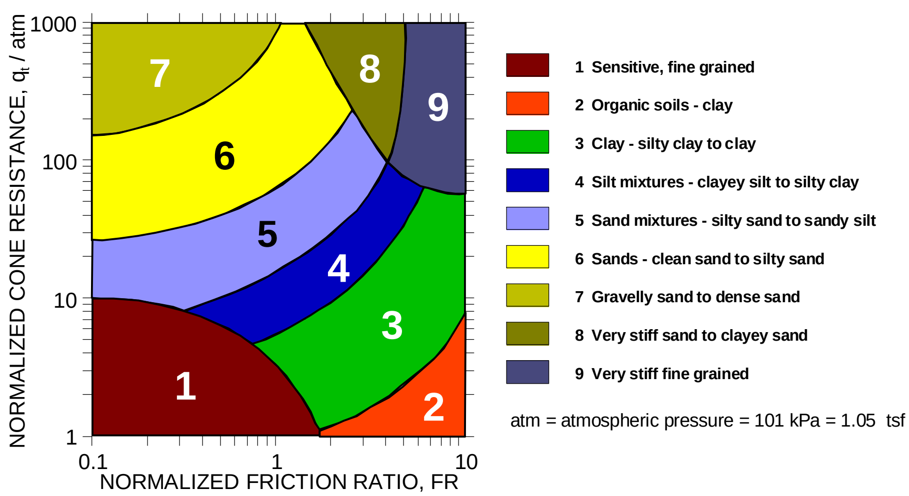
Estimated - Depth to water interpolated by the practitioner using pore pressure measurements in coarse grained soils and known site conditions

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 (fs), and porewater pressure (U2). The normalized friction ratio (FR) is used to classify the soil behavior type.

Typically, silts and clays have high FR values and generate large excess penetration porewater pressures; sands have lower FRs and do not generate excess penetration porewater pressures. Negative pore pressure measurements are indicative of fissured fine-grained material. The adjacent graph (Robertson et al.) presents the soil behavior type correlation used for the logs. This normalized SBT chart, generally considered the most reliable, does not use pore pressure to determine SBT due to its lack of repeatability in onshore CPTs.



REFERENCES

Kulhawy, F.H., Mayne, P.W., (1997). "Manual on Estimating Soil Properties for Foundation Design," Electric Power Research Institute, Palo Alto, CA.
Mayne, P.W., (2013). "Geotechnical Site Exploration in the Year 2013," Georgia Institute 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.