# ECS Southeast, LLP

## Geotechnical Engineering Report

## Snug Harbor SNF/ALF

Morehead City, Carteret County, North Carolina

ECS Project No. 22:30006

March 1, 2021

March 1, 2021

Mr. Nicholas Ciccone
Embassy Snug Harbor, LLC
25201 Chagrin Boulevard, Suite 190
Beachwood, Ohio 44122

ECS Project No. 22:30006

Reference: Geotechnical Engineering Report
**Snug Harbor SNF/ALF**
Morehead City, Carteret County, North Carolina

Dear Mr. Ciccone

ECS Southeast, LLP (ECS) has finished the subsurface exploration and geotechnical engineering analyses for the above-referenced project. Our services were performed in general accordance with our agreed to scope of work. This report presents our understanding of the geotechnical aspects of the project along with the results of the field exploration and our design and construction recommendations.

It has been our pleasure to be of service to Embassy Snug Harbor, LLC during the design phase of this project. We would appreciate the opportunity to remain involved during the continuation of the design phase, and we would like to provide our services during construction phase operations as well to verify subsurface conditions assumed for this report. Should you have questions concerning the information contained in this report, or if we can be of further assistance to you, please contact us.

Respectfully submitted,

**ECS Southeast, LLP**

***Annemarie Crumrine, PE***
*Project Manager*
*ACrumrine@ecslimited.com*

***Winslow Goins, PE***
*Principal Engineer*
*WGoins@ecslimited.com*

NORTH CAROLINA PROFESSIONAL SEAL 033751 ENGINEER WINSLOW E. GOINS
WEG 3/01/21

# TABLE OF CONTENTS



## APPENDICES

## EXECUTIVE SUMMARY

The following summarizes the main findings of the exploration, particularly those that may have a cost impact on the planned development. Further, our principal foundation recommendations are summarized. Information gleaned from the executive summary should not be utilized in lieu of reading the geotechnical report.

- The geotechnical exploration performed for the site included nine (9) electronic cone penetration test (CPT) soundings drilled to termination and refusal depths of approximately 25 to 57.6 feet. Six (6) Kessler dynamic cone penetrometer (DCP) tests with hand auger borings were performed in the proposed pavements.

- Provided the subgrades are prepared as recommended in this report, the planned building may be supported by conventional shallow foundations consisting of column or strip footings bearing on compacted structural fill and natural soils using a net allowable soil bearing pressure of 1,500 psf.

- Groundwater was encountered in the soundings and borings at depths ranging from approximately 0 feet to 0.5 feet below existing grade. Standing water was encountered on site in the vicinity of soundings S-5 through S-9 at the time of exploration. Construction dewatering operations should be anticipated during construction for removing accumulated rainwater and for seepage from the support of excavation (SOE) during undercutting operations, construction of foundations and pavement subgrades, and installation of underground utilities.

- Due to the near surface loose sands on site, after grubbing operations are performed, in-place densification should be anticipated across the site prior to construction of foundations or placement of structural fill.

- Due to the near surface thick topsoil layers and loose near surface sands encountered in the hand auger borings, undercutting to depths of approximately 1 to 2 feet beneath existing grades should be anticipated in the proposed pavements.

Please note this Executive Summary is an important part of this report and should be considered a ***"summary"*** only. The subsequent sections of this report constitute our findings, conclusions, and recommendations in their entirety.

## 1.0 INTRODUCTION

The purpose of this study was to provide geotechnical information for the design of foundations and pavements for the proposed senior living building located off of Galantis Drive in Morehead City, North Carolina. The recommendations developed for this report are based on project information supplied by Mr. Andy Daunhauer of CapEX Solutions, LLC.

Our services were provided in accordance with our Proposal No. 22:24347, dated November 20, 2020, as authorized by Mr. Nicholas Ciccone of Embassy Snug Harbor, LLC on February 3, 2021, which includes our Terms and Conditions of Service.

This report contains the procedures and results of our subsurface exploration programs, review of existing site conditions, engineering analyses, and recommendations for the design and construction of the project.

The report includes the following items.

- A brief review and description of our field test procedures and the results of testing conducted;
- A review of surface topographical features and site conditions;
- A review of subsurface soil stratigraphy with pertinent available physical properties;
- Preliminary foundation recommendations;
    - Allowable bearing pressure;
    - Settlement estimates (total and differential);
- Site development recommendations;
- Suitability of soils for use as fill material;
- Pavement design recommendations;
- Seismic site class and liquefaction recommendations;
- Discussion of groundwater impact;
- Compaction recommendations;
- Site vicinity map;
- Exploration location plan;
- Hand Auger boring logs with Kessler DCP test results; and
- CPT sounding logs.

# 2.0 PROJECT INFORMATION

## 2.1 PROJECT LOCATION/CURRENT SITE USE/PAST SITE USE

The proposed site is located off of Galantis Drive in Morehead City, Carteret County, North Carolina. The site is bounded on the south by Galantis Drive, on the east by an existing commercial building, on the north by an existing residential neighborhood, and on west by undeveloped wooded land. Figure 2.1.1 below shows an image of where the site is located.


**Figure 2.1.1 Site Location**

At the time of our exploration, the site currently consisted of an undeveloped wooded site with ditches along the eastern and southern edge of the site and along the northern utility easement. The site consists of an approximately 5.57-acre portion of a parcel which contains an approximately 0.95-acre utility easement on the northern side of the site. Based on our site visit, provided information, and approximate elevations from Google Earth, the site is relatively level with typical elevations on site ranging from approximately 14 to 22 feet.

## 2.2 PROPOSED CONSTRUCTION

The following information explains our understanding and assumptions of the planned development including proposed buildings and related infrastructure.

| SUBJECT | DESIGN INFORMATION / ASSUMPTIONS |
|---|---|
| Usage | Senior Living Facility |
| Column Loads | Up to 150 kips |
| Wall Loads | Up to 6 kips per linear foot (klf) |
| Lowest Finish Floor Elevation | Within +/- 4.0 feet of existing grades |

ECS understands the project consists of construction of a new approximately 64,862 square foot single-story wood framed senior living building with associated paved parking and drives around the building.

## 3.0 FIELD EXPLORATION TESTING

Our exploration procedures are explained in greater detail in Appendix B including the Reference Notes for Cone Penetration Soundings. Our scope of work included performing nine (9) CPT Soundings and six (6) hand auger borings with Kessler DCP tests. Our approximate CPT soundings and hand auger borings locations are shown on the Exploration Location Diagram in Appendix A.

### 3.1 SUBSURFACE CHARACTERIZATION

The subsurface conditions encountered were generally consistent with published geological mapping. The following sections provide generalized characterizations of the soil. Please refer to the CPT sounding logs in Appendix B.

The site is located in the Coastal Plain Physiographic Province of North Carolina. The Coastal Plain is composed of seven terraces, each representing a former level of the Atlantic Ocean. Soils in this area generally consist of sedimentary materials transported from other areas by the ocean or rivers. These deposits vary in thickness from a thin veneer along the western edge of the region to more than 10,000 feet near the coast. The sedimentary deposits of the Coastal Plain rest upon consolidated rocks similar to those underlying the Piedmont and Mountain Physiographic Provinces. In general, shallow unconfined groundwater movement within the overlying soils is largely controlled by topographic gradients. Recharge occurs primarily by infiltration along higher elevations and typically discharges into streams or other surface water bodies. The elevation of the shallow water table is transient and can vary greatly with seasonal fluctuations in precipitation.

**Table 3.1.1 Subsurface Stratigraphy**

| Approximate Depth Range | Stratum | Description | Ranges of N*-Values(1) blows per foot (bpf) |
|---|---|---|---|
| 0 to (0.5-1.0) (Surface cover) | N/A | Topsoil was encountered on-site with an observed thickness of approximately 6 to 12 inches. Deeper topsoil or organic laden soils are likely present in wet, poorly drained areas and potentially unexplored areas of the site. | N/A |
| (0.5-1.0) to 5 | I | Very Loose to Medium Dense, CLAYEY, SILTY, and CLEAN SAND (SC, SM, SP) with occasional interbedded layers of Very Soft to Firm, SANDY LEAN CLAY (CL) | 1 to 29 |
| 5 to 14 | II | Very Loose to Medium Dense, SILTY TO CLEAN SAND (SM, SP) and Very Soft to Stiff, SANDY and CLAYEY SILT (ML) and SILTY and SANDY LEAN CLAY (CL-ML, CL) | 1 to 26 |
| 14 to 20 | III | Very Loose to Dense, SILTY, CLEAN, and CEMENTED SAND (SM, SP) | 4 to 50 |
| 20 to 46 | IV | Soft to Stiff, CLAYEY SILT (ML) and SILTY and SANDY LEAN CLAY (CL-ML, CL) with interbedded layers of Loose to Very Dense, SILTY, CLEAN, and CEMENTED SAND (SM, SP) | 4 to 67 |
| 46 to 57.6 | V | Loose to Very Dense, SILTY, CLEAN, and CEMENTED SAND (SM, SP) with interbedded layers of Firm to Very Stiff, CLAYEY SILT (ML) and SILTY CLAY (CL-ML) | 5 to in excess of 100 |

Notes: (1) Equivalent Corrected Standard Penetration Test Resistances

### 3.2 GROUNDWATER OBSERVATIONS

Water levels were measured in our CPT soundings and hand auger borings and are shown in Appendix B. Standing water was encountered at the time of exploration on site in the vicinity of soundings S-5 through S-9. Groundwater depths measured at the time of exploration ranged from approximately 0 to 2.5 feet below the ground surface. Groundwater was not encountered in hand auger boring K-4 at the depths explored. Variations in the long-term water table may occur as a result of changes in precipitation, evaporation, surface water runoff, construction activities, and other factors.

# 4.0 DESIGN RECOMMENDATIONS

## 4.1 SHALLOW FOUNDATIONS

Provided subgrades and structural fills are prepared as recommended in this report and the anticipated column and wall loads provided, in the table in **Section 2.2 Proposed Construction,** are not exceeded, the proposed structure can be supported by shallow foundations including column footings and continuous wall footings. We recommend the foundation design use the following parameters*:*

| Design Parameter | Column Footing | Wall Footing |
| --- | --- | --- |
| Net Allowable Bearing Pressure(1) | 1,500 psf | 1,500 psf |
| Recommended Bearing Soil Material | Stratum I Soils or Structural Fill | Stratum I Soils or Structural Fill |
| Minimum Width | 30 inches | 18 inches |
| Minimum Footing Embedment Depth (below slab or finished grade) (2) | 12 inches | 12 inches |
| Minimum Exterior Frost Depth (below final exterior grade) | 6 inches | 6 inches |
| Estimated Total Settlement (3) | Less than 1- inch | Less than 1- inch |
| Estimated Differential Settlement (4) | Less than ½ inches between columns | Less than ½ inches |

Notes:

(1) Net allowable bearing pressure is the applied pressure in excess of the surrounding overburden soils above the base of the foundation.
(2) For bearing considerations and frost penetration requirements.
(3) Based on assumed structural loads. If final loads are different, ECS must be contacted to update foundation recommendations and settlement calculations.
(4) Based on maximum column/wall loads and variability in borings. Differential settlement can be re-evaluated once the foundation plans are finished.

**Potential Undercuts:** A majority of the soils at the estimated foundation bearing elevation are anticipated to be adequate for support of the proposed structure. If soft or loose soils are observed at the footing bearing elevations, the soils should be undercut and removed. Undercut should be backfilled with structural fill up to the original design bottom of footing elevation; the original footing may be constructed on top of the structural fill.

Due to the near surface loose sands on site, after grubbing operations are performed, in-place densification should be anticipated across the site prior to construction of foundations or placement of structural fill.

## 4.2 SLABS ON GRADE

The on-site natural soils are generally considered adequate for support of the slab-on-grade floor slabs. Based on the assumption that the finished floor elevation is around current grades, it appears that the slabs for the structure will likely bear on Stratum I Sands (SC, SM) or structural fill. The following graphic depicts our soil-supported slab recommendations:

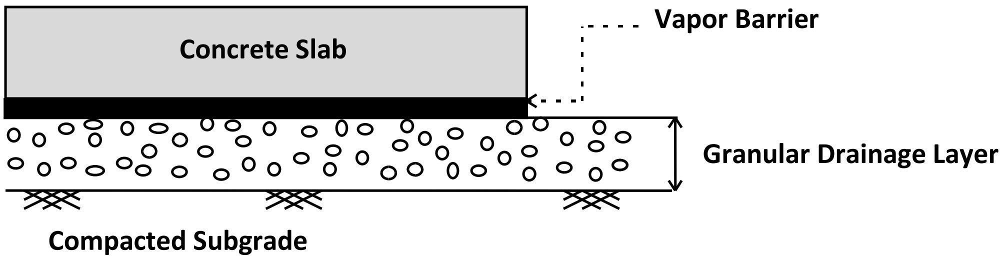



**Figure 4.3.1**

1. Drainage Layer Thickness: 6 inches
2. Drainage Layer Material: GRAVEL (GP), SAND containing <5% fines passing #200 sieve (SP, SW)

Soft or yielding soils may be encountered in some areas. Those soils should be removed and replaced with compacted Structural Fill in accordance with the recommendations included in this report.

**Subgrade Modulus:** Provided the Structural Fill and Granular Drainage Layer are constructed in accordance with our recommendations, the slab may be designed assuming a modulus of subgrade reaction, $k_1$ of 125 pci (lbs./cu. inch). The modulus of subgrade reaction value is based on a 1 ft by 1 ft plate load test basis.

**Vapor Barrier:** Before the placement of concrete, a vapor barrier may be placed on top of the granular drainage layer to provide additional protection against moisture penetration through the floor slab. Curing of the slab should be performed in accordance with ACI specifications to reduce the potential for uneven drying, curling and/or cracking of the slab. Depending on proposed flooring material types, the structural engineer and/or the architect may choose to do away with the vapor barrier.

**Slab Isolation:** Soil-supported slabs should be isolated from the foundations and foundation-supported elements of the structure so that differential movement between the foundations and slab will not induce excessive shear and bending stresses in the floor slab. Where the structural configuration inhibits the use of a free-floating slab such as in a drop down footing/monolithic slab configuration, the slab should be designed to avoid overstressing of the slab.

## 4.4 SEISMIC DESIGN CONSIDERATIONS

**Liquefaction:** When a saturated soil with little to approximately no cohesion liquefies during a major earthquake, it experiences a temporary loss of shear strength as a result of a transient rise in excess pore water pressure generated by strong ground motion. Flow failure, lateral spreading, differential settlement, loss of bearing, ground fissures, and sand boils are evidence of excess pore pressure generation and liquefaction.

The potential for liquefaction at the site is considered high based upon the CPT results and the liquefaction index procedure developed by Iwasaki (1982). Based on our CPT results and our evaluation using a site peak ground acceleration of 0.09 ($PGA_m$) per IBC 2015, an earthquake event with a magnitude of 7.3 and procedures developed by Robertson (2009) and Boulanger & Idriss (2014), the liquefaction induced settlement at the subject site is estimated to be approximately 3.2 inches.

Section 1613.3.2 of the IBC 2015 classifies sites with the potential for liquefaction as Seismic Site Class F. However, Chapter 20 of ASCE 7 allows the design spectral response accelerations for a site to be determined without regard to liquefaction provided structures have a fundamental period of less than or equal to 0.5 seconds and the risks of liquefaction are considered in design. The structures should meet this criterion; however, this must be confirmed by the Structural Engineer.

**Ground Motion Parameters:** Provided that the fundamental period of the structure is less than or equal to 0.5 seconds, the design spectral response acceleration parameters can be based on a Seismic Site Classification "D" based on the weighted average shear wave velocity at the site. ECS has established the design spectral response acceleration parameters following the IBC 2015 methodology. The mapped responses were estimated from the free ATC Hazards by Location Tool available from the USGS website (https://hazards.atcouncil.org). The design responses for the short (0.2 sec, $S_{DS}$) and 1-second period ($S_{D1}$) are noted in bold at the far right end of the following table. If the fundamental period of the structure exceeds 0.5 seconds, the design spectral response acceleration parameters will require a Site Specific Response Analysis (SSRA).

| **GROUND MOTION PARAMETERS – SITE CLASS D [IBC 2015 Method]** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Period (sec)** | **Mapped Spectral Response Accelerations (g)** | | **Values of Site Coefficient for Site Class** | | **Maximum Spectral Response Acceleration Adjusted for Site Class (g)** | | **Design Spectral Response Acceleration (g)** | |
| Reference | Figures 1613.3.1 (1) & (2) | | Tables 1613.3.3 (1) & (2) | | Eqs. 16-37 & 16-38 | | Eqs. 16-39 & 16-40 | |
| 0.2 | $S_S$ | 0.119 | $F_a$ | 1.6 | $S_{MS}=F_aS_s$ | 0.190 | $S_{DS}=2/3\ S_{MS}$ | **0.127** |
| 1.0 | $S_1$ | 0.060 | $F_v$ | 2.4 | $S_{M1}=F_vS_1$ | 0.145 | $S_{D1}=2/3\ S_{M1}$ | **0.096** |

The Site Class definition should not be confused with the Seismic Design Category designation which the Structural Engineer typically assesses.

## 4.4 PAVEMENTS

**Subgrade Characteristics:** Based on the results of our hand auger borings and provided information, it appears that the pavement subgrades will consist mainly of Silty and Clayey Sands (SM, SC) or Approved Structural Fill.

Due to the near surface thick topsoil layers and loose near surface sands encountered in the hand auger borings, undercutting to depths of approximately 1 to 2 feet beneath existing grades and backfilling should be anticipated in the proposed pavements.

California Bearing Ratio (CBR) values were obtained from the Kessler DCP tests performed on site adjacent to the hand auger borings. For preliminary design purposes, provided undercutting recommendations are followed and structural fills are placed on site as recommended in this report, we recommend assuming a preliminary CBR value of 8.

We were not provided traffic loading information so we have assumed loadings typical of this type of project. Our recommended pavement sections are based on up to 20,000 ESALs over a 20 year design life for light duty and up to 75,000 ESALs over a 20 year design life for heavy duty.

The preliminary pavement sections below are guidelines that may or may not comply with local jurisdictional minimums.

| **PROPOSED PAVEMENT SECTIONS** | | | | |
|---|---|---|---|---|
| **MATERIAL** | **FLEXIBLE PAVEMENT** | | **RIGID PAVEMENT** | |
| | **Heavy Duty** | **Light Duty** | **Heavy Duty** | **Light Duty** |
| Portland Cement Concrete ($f'_c$ = 4000 psi) | - | - | 6.5 in. | 5 in. |
| Asphalt Surface Course | 3 in | 2 in | - | - |
| Graded Aggregate Base Course | 8 in | 6 in | - | - |

In general, heavy duty sections are areas that will be subjected to trucks, buses, or other similar vehicles including main drive lanes of the development. Light duty sections are appropriate for vehicular traffic and parking areas.

Large, front loading trash dumpsters frequently impose concentrated front wheel loads on pavements during loading. This type of loading typically results in rutting of asphalt pavement and ultimately pavement failures. For preliminary design purposes, we recommend that the pavement in trash pickup areas consist of a 6-inch thick, 4,000 psi, reinforced concrete slab over 4-inches of dense graded aggregate. When traffic loading becomes available ECS or the Civil Engineer can design the pavements.

Prior to subbase placement and paving, CBR testing of the subgrade soils (both natural and fill soils) should be performed to determine the soil engineering properties for final pavement design.

# 5.0 SITE CONSTRUCTION RECOMMENDATIONS

## 5.1 SUBGRADE PREPARATION

### 5.1.1 Stripping and Grubbing

The subgrade preparation should consist of stripping vegetation, rootmat, topsoil, and soft or loose materials from the 10-foot expanded building and 5-foot expanded pavement limits. Soundings performed in “undisturbed” areas of the site contained an observed thickness of approximately 6 to 12 inches of topsoil. Deeper topsoil or organic laden soils may be present in wet, low-lying, and poorly drained areas. ECS should be retained to verify that topsoil, existing foundations, and substandard surficial materials have been removed prior to the placement of structural fill or construction of structures.

### 5.1.2 Proofrolling

Prior to fill placement or other construction on subgrades, the subgrades should be evaluated by an ECS field technician. The exposed subgrade should be proofrolled with construction equipment having a minimum axle load of 10 tons [e.g. tandem-axle dump truck loaded to capacity]. Proofrolling should be traversed in two perpendicular directions with overlapping passes of the vehicle under the observation of an ECS technician. This procedure is intended to assist in identifying localized yielding materials.

Where proofrolling identifies areas that are unsteady or “pumping” subgrade those areas should be repaired prior to the placement of subsequent Structural Fill or other construction materials. Methods of stabilization include undercutting and moisture conditioning. The situation should be discussed with ECS to determine the appropriate procedure. Test pits may be excavated to explore the shallow subsurface materials to help in determining the cause of the observed unsteady materials, and to assist in the evaluation of appropriate remedial actions to stabilize the subgrade.

Due to the near surface loose sands on site, after grubbing operations are performed, in-place densification should be anticipated across the site prior to construction of foundations or placement of structural fill. Due to the near surface thick topsoil layers and loose near surface sands encountered in the hand auger borings, undercutting to depths of approximately 1 to 2 feet beneath existing grades and backfilling should be anticipated in the proposed pavements.

### 5.1.3 Site Temporary Dewatering

**Perched Groundwater:** After periods of precipitation, surface water can be characterized as being broadly perched above less permeable materials. In low-lying areas, the presence of perched water is more pronounced after rain events. Once the site is graded to drain and storm features are installed, ECS anticipates the perched conditions will become less pronounced after rain events.

**Limited Excavation Dewatering:** Based upon our subsurface exploration at this site, as well as significant experience on sites in nearby areas of similar geologic setting, we believe construction dewatering at this site will be needed for removing accumulated rainwater and for seepage from the support of excavation (SOE) during undercutting operations, construction of foundations and pavement subgrades, and installation of underground utilities.

Deep wells should not be required for the temporary dewatering system. However, the dewatering operations can be handled by the use of conventional submersible pumps directly in the excavation or temporary trenches.

If temporary sump pits are used, we recommend they be established at an elevation one to two feet below the bottom of the excavation subgrade or bottom of footing. A perforated 55 gallon drum or other temporary structure could be used to house the pump. We recommend continuous dewatering of the excavations using electric pumps or manned gasoline pumps be used during construction.

If dewater operations are performed at the site, ECS recommends that the dewatering operations be performed in accordance with Local, State and Federal Government regulatory requirements for surface water discharges. ECS would be pleased to be consulted by the client on those requirements, if requested.

## 5.2 EARTHWORK OPERATIONS

### 5.2.1 Structural Fill

Prior to placement of Structural Fill, bulk samples (about 50 pounds) of on-site and/or off-site borrow should be submitted to ECS for laboratory testing, which typically include Atterberg limits, natural moisture content, grain-size distribution, and moisture-density relationships (i.e., Proctors) for compaction. Import materials should be tested prior to being hauled to the site to determine if they meet project specifications. Alternatively, Proctor data from other accredited laboratories can be submitted if the test results are within the last 90 days.

**Structural Fill Materials:** Materials selected for use as structural fill should consist of inorganic soils with the following engineering properties and compaction requirements.

| STRUCTURAL FILL INDEX PROPERTIES | |
|---|---|
| **Subject** | **Property** |
| Building and Pavement Areas | LL < 40, PI<10 |
| Max. Particle Size | 3 inches |
| Fines Content | Max. 20 % < #200 sieve |
| Max. organic content | 5% by dry weight |

| STRUCTURAL FILL COMPACTION REQUIREMENTS | |
|---|---|
| **Subject** | **Requirement** |
| Compaction Standard | Standard Proctor, ASTM D698 |
| Required Compaction | 98% of Max. Dry Density |
| Dry Unit Weight | >100 pcf |
| Moisture Content | -2 to +2 % points of the soil's optimum value |
| Loose Thickness | 8 inches prior to compaction |

**On-Site Borrow Suitability:** Some natural deposits of possible fill material are present on the site. The intermittent on-site sands (SP, SM) with fines contents less than 20 percent should meet the recommendations for re-use as structural fill.

**Fill Placement:** Fill materials should not be placed on frozen soils, on frost-heaved soils, and/or on excessively wet soils. Borrow fill materials should not contain frozen materials at the time of placement, and frozen or frost-heaved soils should be removed prior to placement of structural fill or other fill soils and aggregates. Excessively wet soils or aggregates should be scarified, aerated, and moisture conditioned.

## 5.3 FOUNDATION AND SLAB OBSERVATIONS

**Protection of Foundation Excavations:** Exposure to the environment may weaken the soils at the footing bearing level if the foundation excavations remain open for too long a time. Therefore, foundation concrete should be placed the same day that excavations are made. If the bearing soils are softened by surface water intrusion or exposure, the softened soils must be removed from the foundation excavation bottom immediately prior to placement of concrete. If the excavation must remain open overnight, or if rainfall becomes imminent while the bearing soils are exposed, a 1 to 3-inch thick “mud mat” of “lean” concrete should be placed on the bearing soils before the placement of reinforcing steel.

**Footing Subgrade Observations:** A majority of the soils encountered on site at the foundation bearing elevation are anticipated to be adequate for support of the proposed structure. It is important to have ECS observe the foundation subgrade prior to placing foundation concrete, to confirm the bearing soils are what was anticipated.

**Slab Subgrade Verification:** Prior to placement of a drainage layer, the subgrade should be prepared in accordance with the recommendations found in **Section 5.1.2 Proofrolling**.

## 5.4 UTILITY INSTALLATIONS

**Utility Subgrades:** The soils encountered in our exploration are expected to be generally adequate for support of utility pipes. The pipe subgrades should be observed and probed for stability by ECS. Loose or unsteady materials encountered should be removed and replaced with compacted Structural Fill, or pipe stone bedding material.

**Utility Backfilling:** The granular bedding material (AASHTO #57 stone) should be 4 inches thick, but not less than that specified by the civil engineer’s project drawings and specifications. We recommend that the bedding materials be placed up to the springline of the pipe. Fill placed for support of the utilities, as well as backfill over the utilities, should meets the requirements for structural fill and fill placement.

**Excavation Safety:** Excavations and slopes should be constructed and maintained in accordance with OSHA excavation safety standards. The contractor is solely responsible for designing, constructing, and maintaining steady temporary excavations and slopes. The contractor’s responsible person, as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor’s safety procedures. The slope height, slope inclination, or excavation depth, including utility trench excavation depth, should not exceed those specified in local, state, and federal safety regulations. ECS is providing this information solely as a service to our client. ECS is not assuming responsibility for construction site safety or the contractor’s activities; such responsibility is not being implied and should not be inferred.

## 6.0 CLOSING

ECS has prepared this report to guide the geotechnical-related design and construction aspects of the project. We performed these services in accordance with the standard of care expected of professionals in the industry performing similar services on projects of like size and complexity at this time in the region. No other representation, expressed or implied, and no warranty or guarantee is included or intended in this report.

The description of the proposed project is based on information provided to ECS by Mr. Andy Daunhauer of CapEX Solutions, LLC. If this information is untrue or changes, either because of our interpretation of the documents provided or site or design changes that may occur later, ECS should be contacted so we can review our recommendations and provide additional or alternate recommendations that reflect the proposed construction.

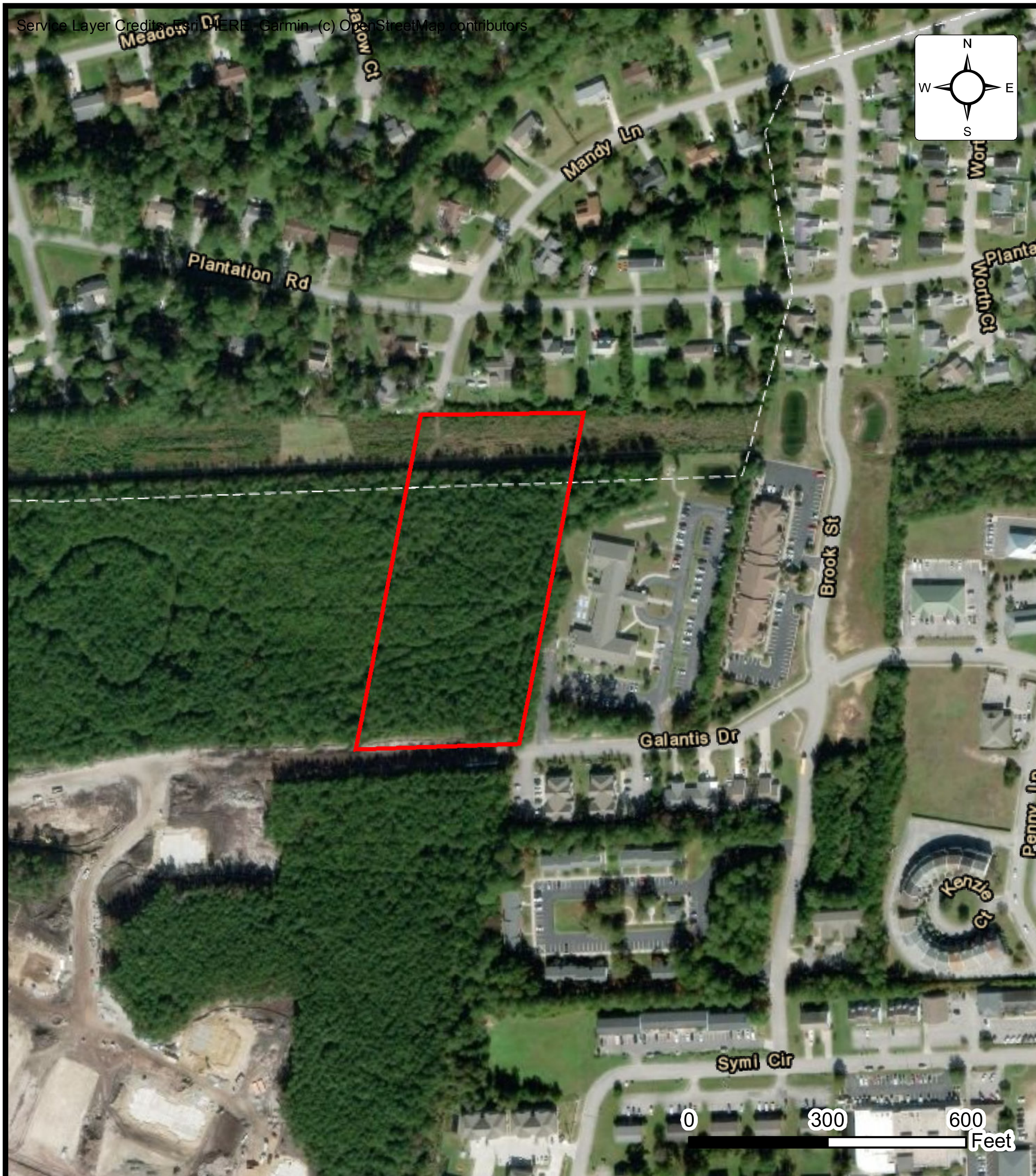
We recommend that ECS review the project plans and specifications so we can confirm that those plans/specifications are in accordance with the recommendations of this geotechnical report.

Field observations and quality assurance testing during earthwork and foundation installation are an extension of, and integral to, the geotechnical design. We recommend that ECS be retained to apply our expertise throughout the geotechnical phases of construction, and to provide consultation and recommendation should issues arise.

ECS is not responsible for the conclusions, opinions, or recommendations of others based on the data in this report.

## APPENDIX A – Diagrams & Reports

Site Location Diagram
Exploration Location Diagram




# Site Location Diagram
# SNUG HARBOR SNF/ALF

**GALANTIS DRIVE, MOREHEAD CITY, NORTH**

**EMBASSY SNUG HARBOR, LLC**

| | |
|---|---|
| ENGINEER | WEG |
| SCALE | AS NOTED |
| PROJECT NO. | 22:30006 |
| SHEET | 1 OF 2 |
| DATE | 3/1/2021 |


# Boring Location Diagram
# SNUG HARBOR SNF/ALF

**GALANTIS DRIVE, MOREHEAD CITY, NORTH**

**EMBASSY SNUG HARBOR, LLC**

ENGINEER
WEG

SCALE
AS NOTED

PROJECT NO.
22:30006

SHEET
2 OF 2

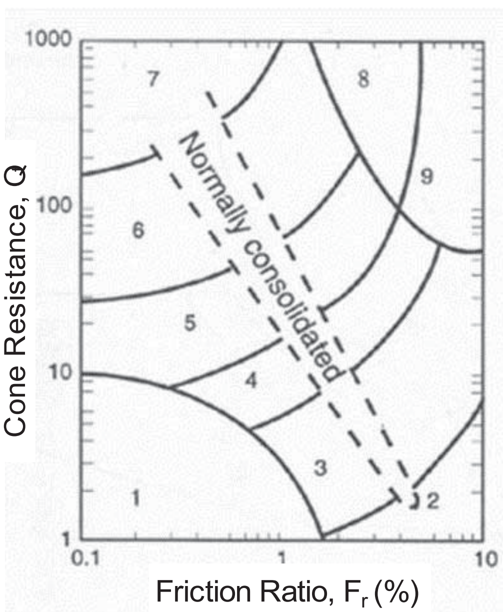
DATE
3/1/2021

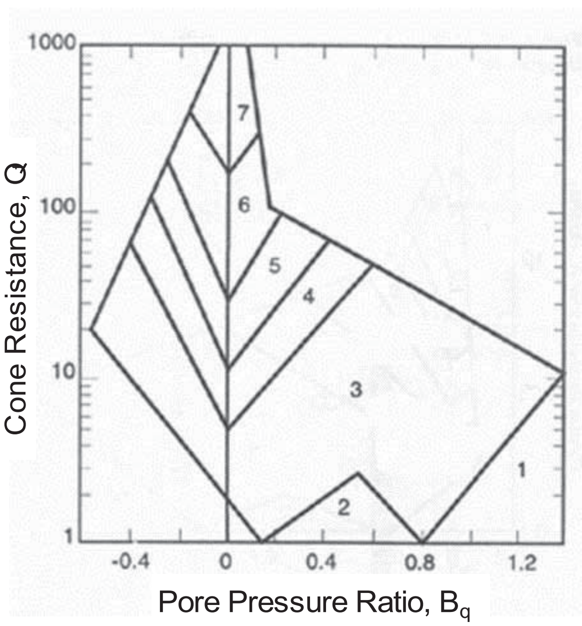
## APPENDIX B – Field Operations

Reference Notes for CPT Sounding Logs
Cone Penetration Test Sounding Logs (S-1 through S-9)
Reference Notes for Boring Logs
Hand Auger Boring Logs (K-1 through K-6)
Kessler DCP Test Data

## REFERENCE NOTES FOR CONE PENETRATION TEST (CPT) SOUNDINGS

In the CPT sounding procedure (ASTM-D-5778), an electronically instrumented cone penetrometer is hydraulically advanced through soil to measure point resistance ($q_c$), pore water pressure ($u_2$), and sleeve friction ($f_s$). These values are recorded continuously as the cone is pushed to the desired depth. CPT data is corrected for depth and used to estimate soil classifications and intrinsic soil parameters such as angle of internal friction, preconsolidation pressure, and undrained shear strength. The graphs below represent one of the accepted methods of CPT soil behavior classification (Robertson, 1990).



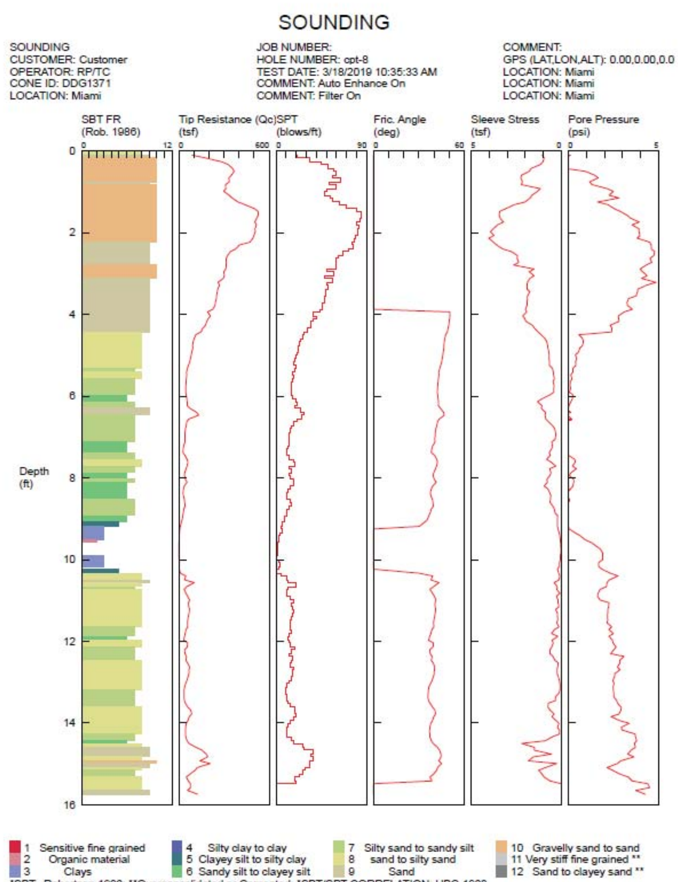

1. Sensitive, Fine Grained
2. Organic Soils-Peats
3. Clays; Clay to Silty Clay
4. Clayey Silt to Silty Clay
5. Silty Sand to Sandy Silt
6. Clean Sands to Silty Sands
7. Gravelly Sand to Sand
8. Very Stiff Sand to Clayey Sand
9. Very Stiff Fine Grained

The following table presents a correlation of corrected cone tip resistance ($q_t$) to soil consistency or relative density:

| SAND | | SILT/CLAY | |
|---|---|---|---|
| Corrected Cone Tip Resistance ($q_t$) (tsf) | Relative Density | Corrected Cone Tip Resistance ($q_t$) (tsf) | Relative Density |
| <20 | Very Loose | <5 | Very Soft |
| 20-40 | Loose | 5-10 | Soft |
| 40-120 | Medium Dense | 10-15 | Firm |
| | | 15-30 | Stiff |
| 120-200 | Dense | 30-45 | Very Stiff |
| >200 | Very Dense | 45-60 | Hard |
| | | >60 | Very Hard |

# SUBSURFACE EXPLORATION PROCEDURE: CONE PENETRATION TESTING (CPT) ASTM D 5778

In the CPT sounding procedure, an electronically instrumented cone penetrometer is hydraulically advanced through soil to measure point resistance (qc), pore water pressure (U2), and sleeve friction (fs). These values are recorded continuously as the cone is pushed to the desired depth. CPT data is corrected for depth and used to estimate soil classifications and intrinsic soil parameters such as angle of internal friction, pre-consolidation pressure, and undrained shear strength.




## CPT Procedure:

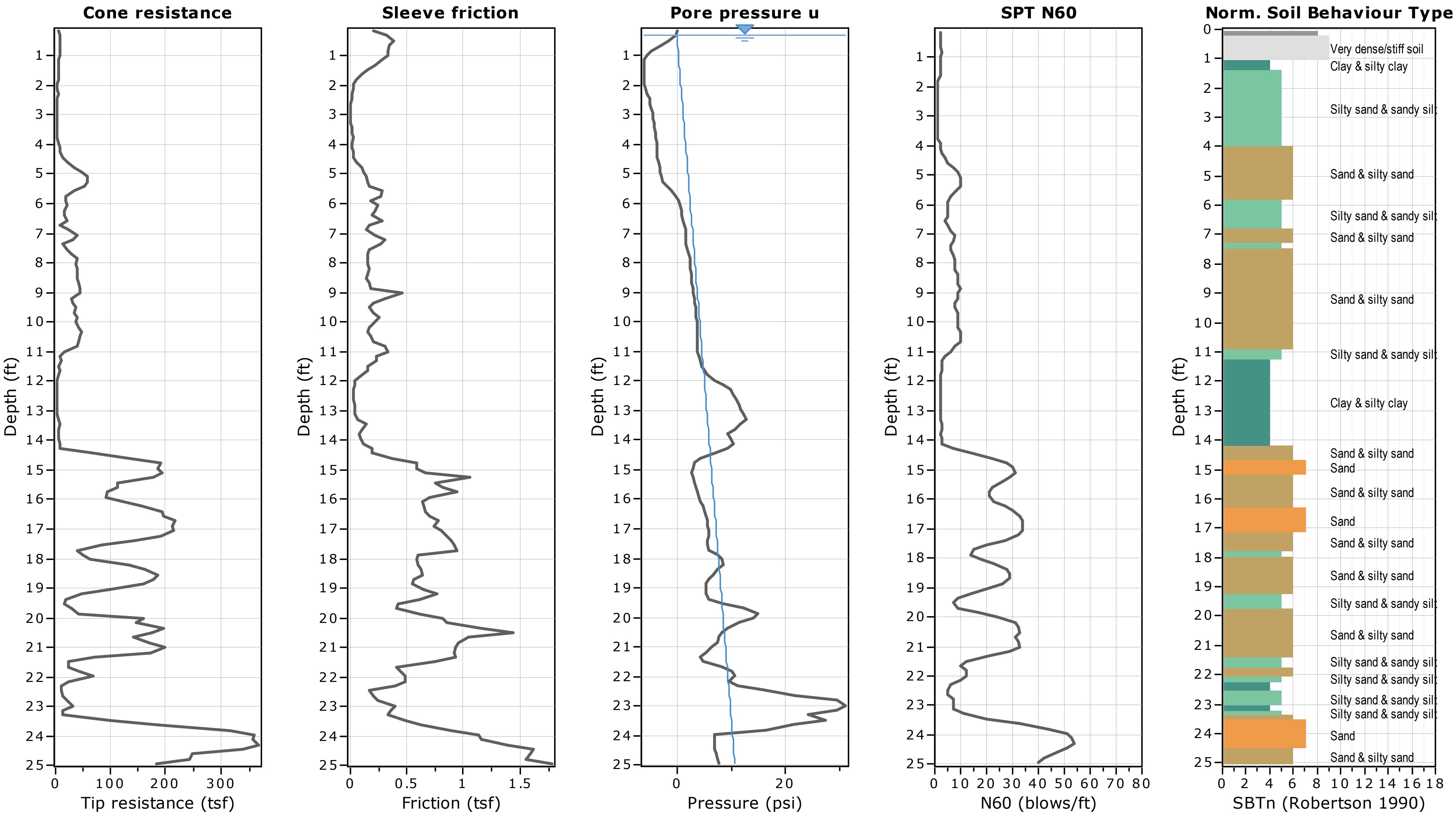
- Involves the direct push of an electronically instrumented cone penetrometer* through the soil
- Values are recorded continuously
- CPT data is corrected and correlated to soil parameters

**CPT Penetrometer Size May Vary*

**ECS Southeast, LLP**
6714 Netherlands Drive
Wilmington, NC 28403
ECS Project # 22-30006

**CPT: S-1**
Total depth: 24.93 ft, Date: 2/23/2021
Cone Operator: Austin Fowler

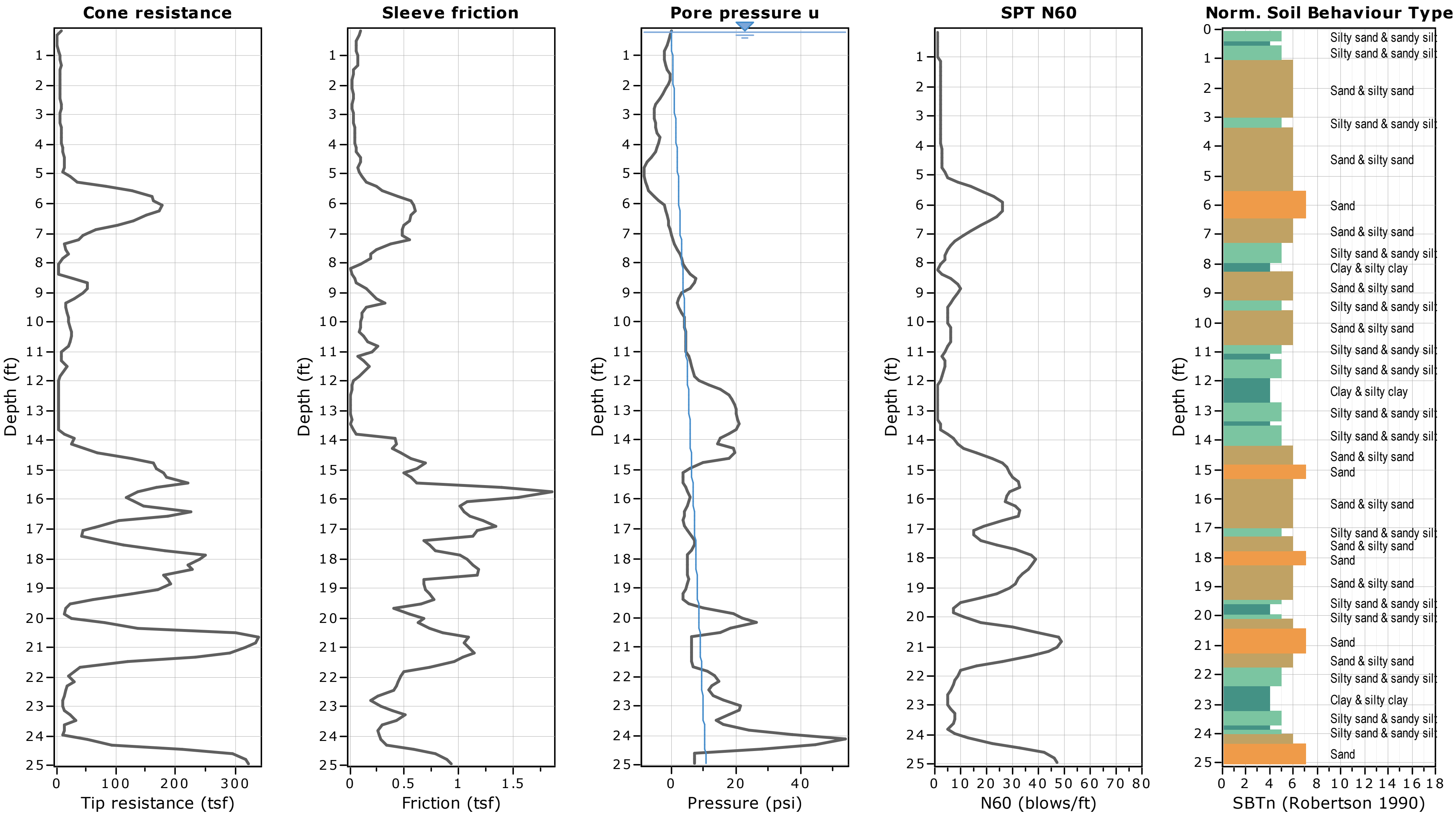
**Project:** **Snug Harbor SNF/ALF**
**Location:** **Morehead City, Carteret County, North Carolina**



**ECS Southeast, LLP**
6714 Netherlands Drive
Wilmington, NC 28403
ECS Project # 22-30006

**CPT: S-2**
Total depth: 24.93 ft, Date: 2/23/2021
Cone Operator: Austin Fowler

**Project:** **Snug Harbor SNF/ALF**
**Location:** **Morehead City, Carteret County, North Carolina**

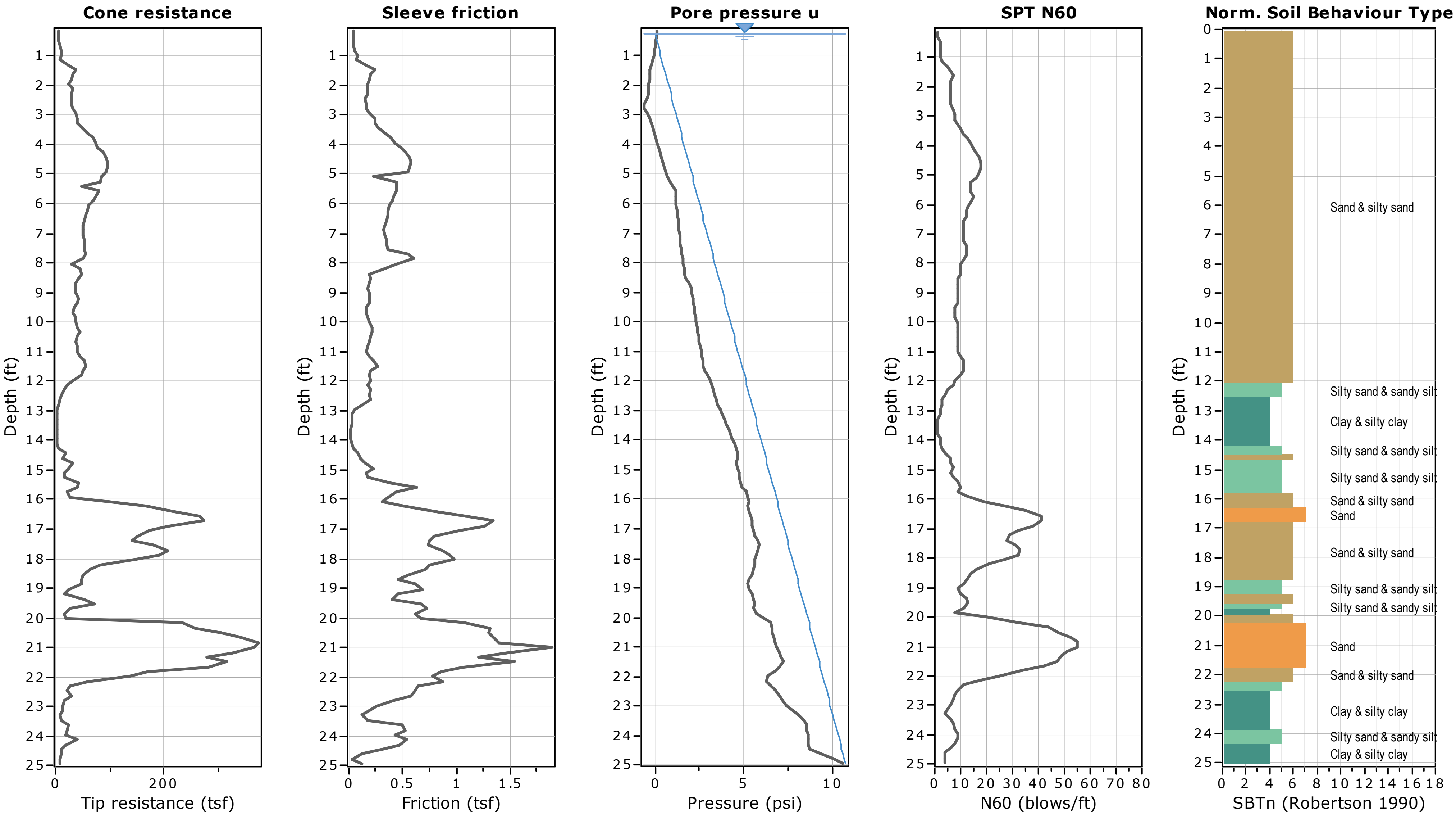


**ECS Southeast, LLP**
6714 Netherlands Drive
Wilmington, NC 28403
ECS Project # 22-30006

**CPT: S-3**

Total depth: 24.93 ft, Date: 2/24/2021
Cone Operator: Malcolm Coogan

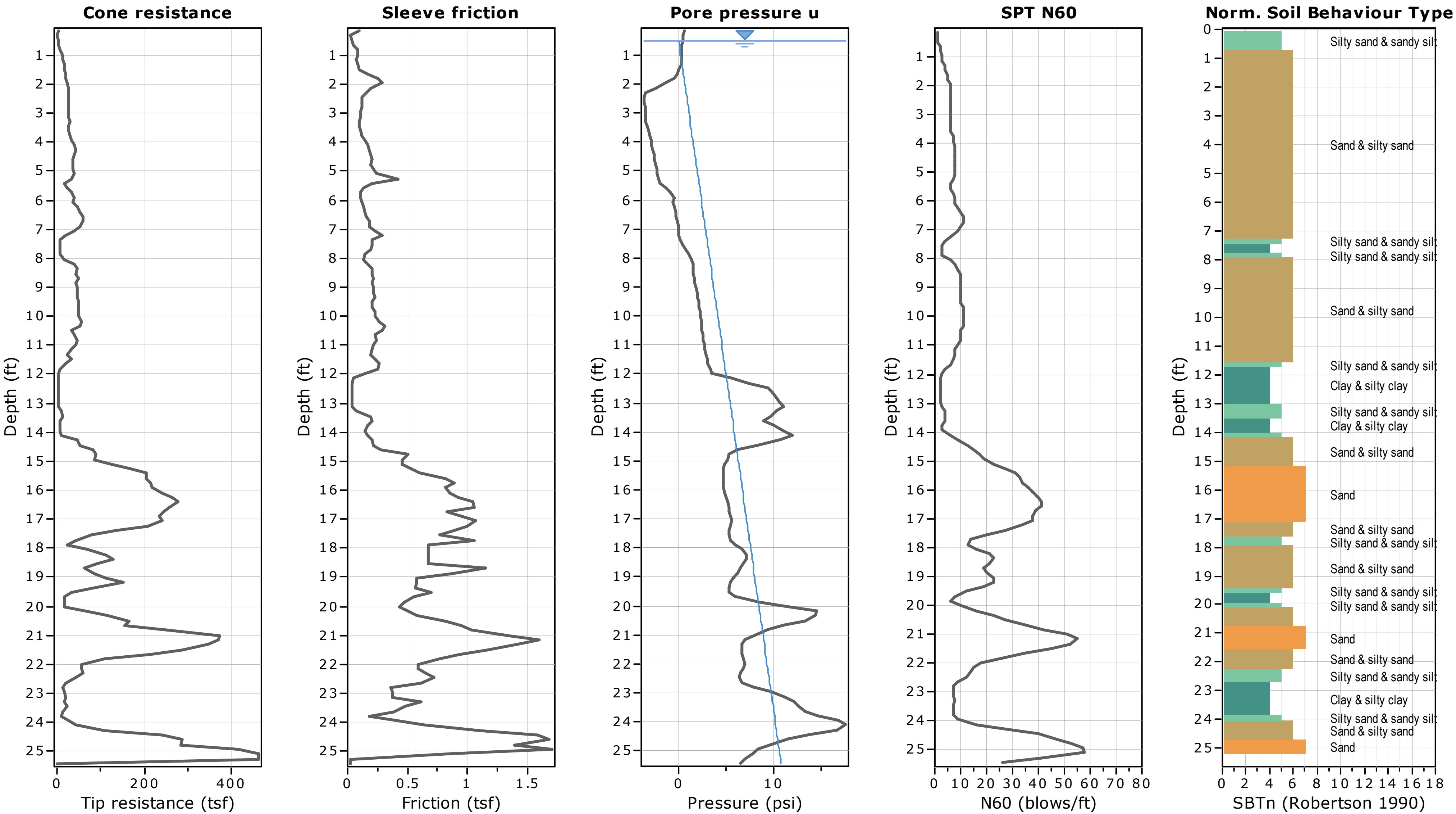
**Project:** **Snug Harbor SNF/ALF**
**Location:** **Morehead City, Carteret County, North Carolina**



**ECS Southeast, LLP**
6714 Netherlands Drive
Wilmington, NC 28403
ECS Project # 22-30006

**CPT: S-4**
Total depth: 25.43 ft, Date: 2/23/2021
Cone Operator: Austin Fowler

**Project:** **Snug Harbor SNF/ALF**
**Location:** **Morehead City, Carteret County, North Carolina**

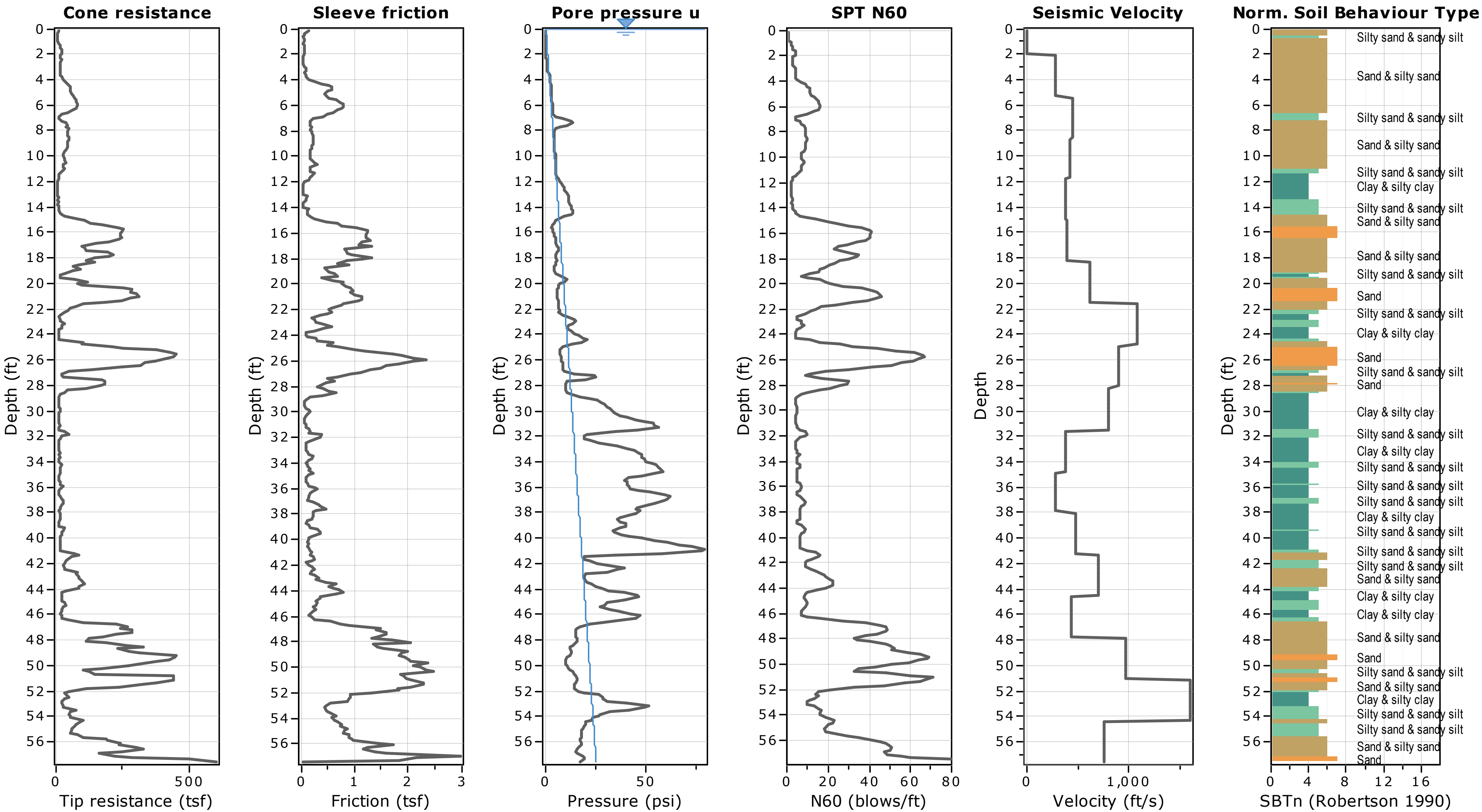


**ECS Southeast, LLP**
6714 Netherlands Drive
Wilmington, NC 28403
ECS Project # 22-30006

**CPT: S-5**

**Project:** **Snug Harbor SNF/ALF**
**Location:** **Morehead City, Carteret County, North Carolina**

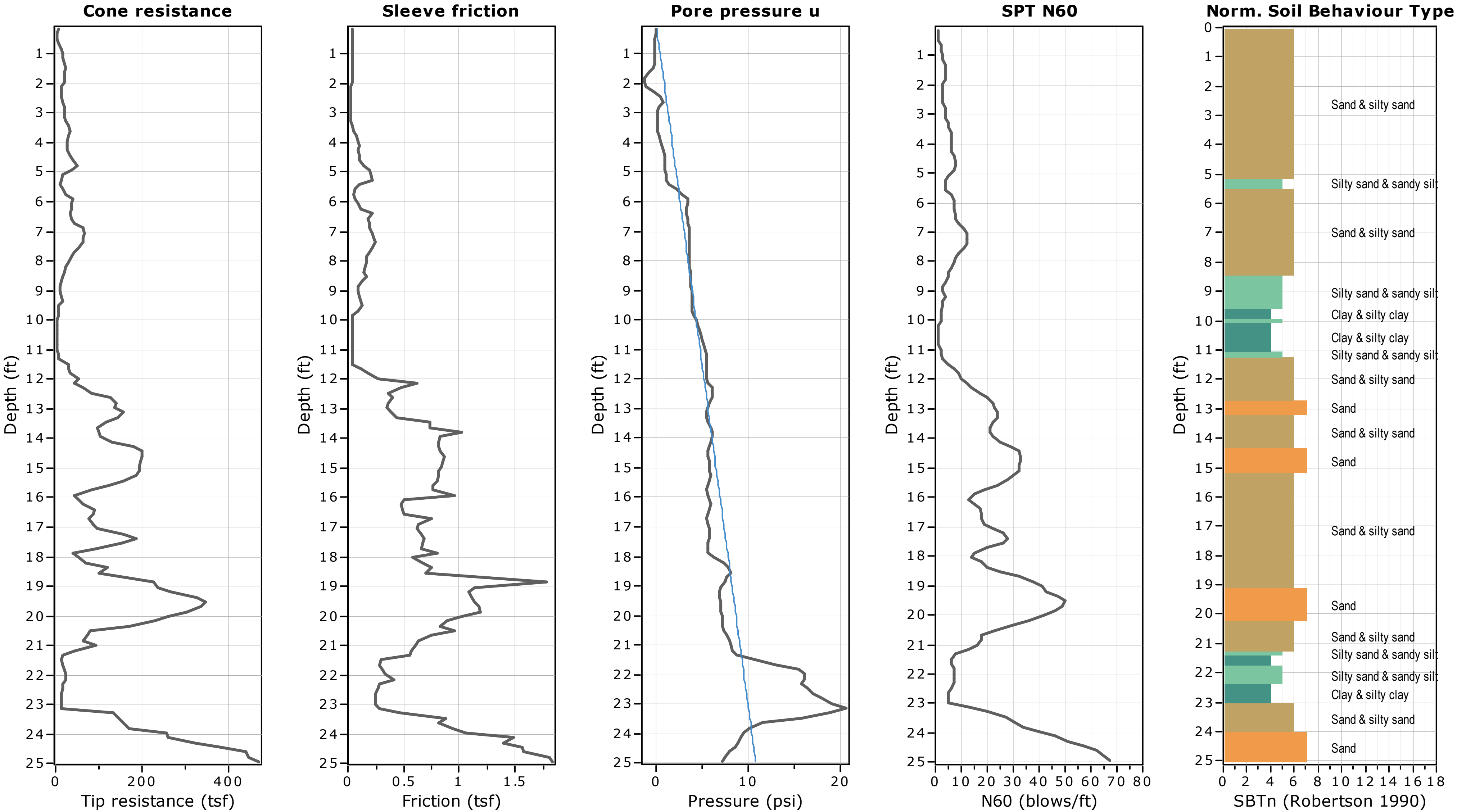
Total depth: 57.58 ft, Date: 2/24/2021
Cone Operator: Malcolm Coogan



**ECS Southeast, LLP**
6714 Netherlands Drive
Wilmington, NC 28403
ECS Project # 22-30006

**CPT: S-6**
Total depth: 24.93 ft, Date: 2/24/2021
Cone Operator: Malcolm Coogan

**Project:** **Snug Harbor SNF/ALF**
**Location:** **Morehead City, Carteret County, North Carolina**

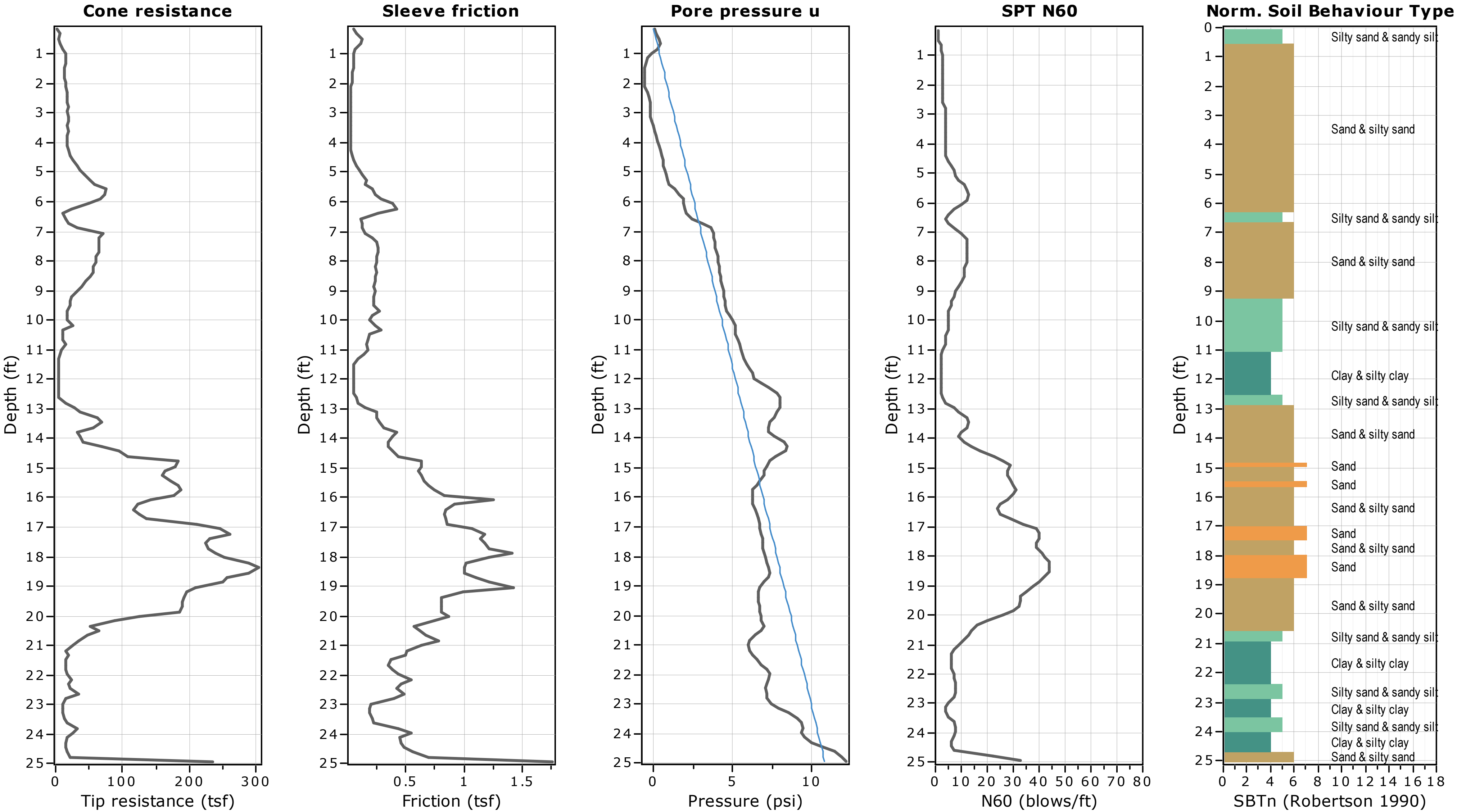


**ECS Southeast, LLP**
6714 Netherlands Drive
Wilmington, NC 28403
ECS Project # 22-30006

**CPT: S-7**

**Project:** **Snug Harbor SNF/ALF**
**Location:** **Morehead City, Carteret County, North Carolina**

Total depth: 24.93 ft, Date: 2/24/2021
Cone Operator: Malcolm Coogan

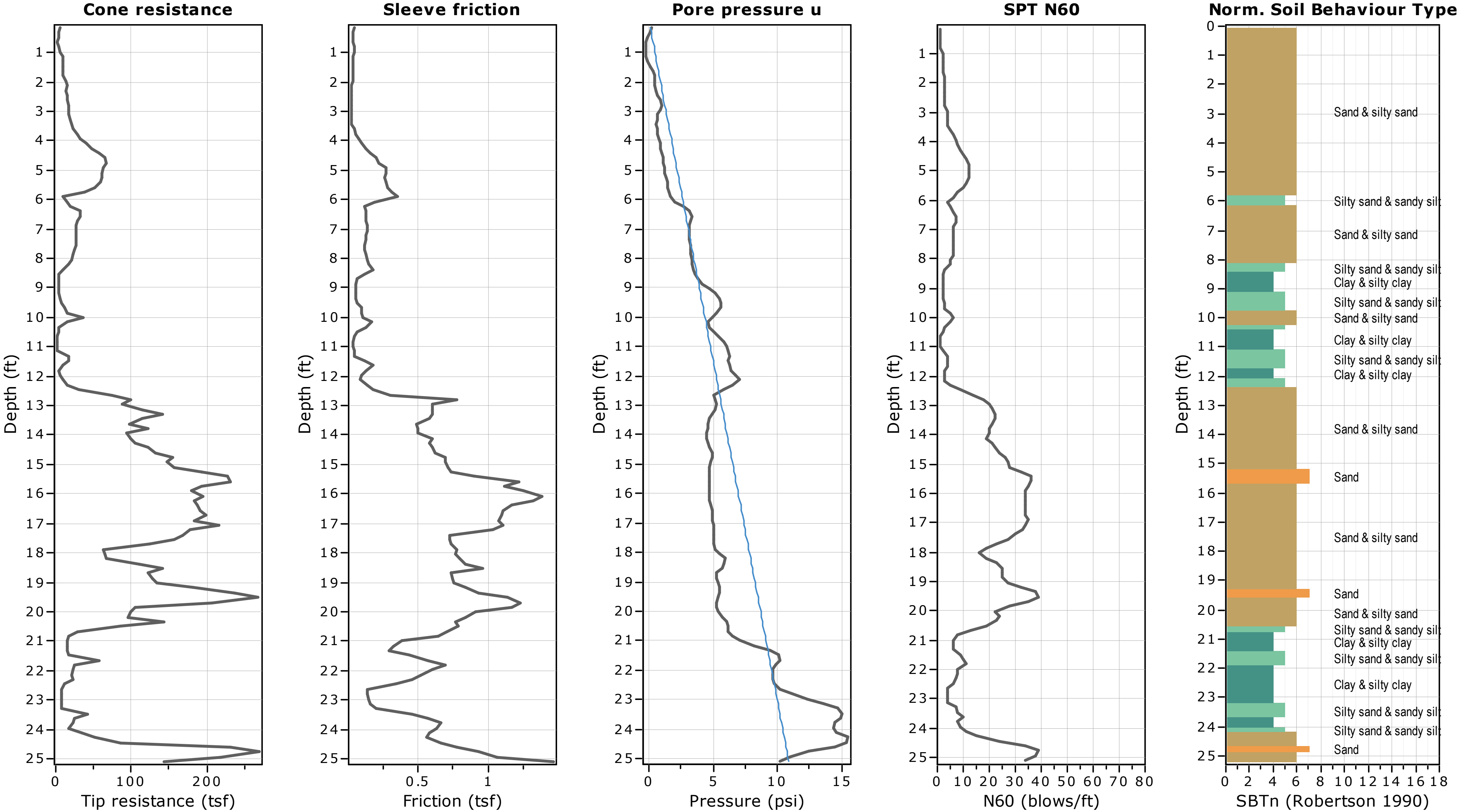


**ECS Southeast, LLP**
6714 Netherlands Drive
Wilmington, NC 28403
ECS Project # 22-30006

**CPT: S-8**

**Project:** **Snug Harbor SNF/ALF**
**Location:** **Morehead City, Carteret County, North Carolina**

Total depth: 25.10 ft, Date: 2/24/2021
Cone Operator: Malcolm Coogan



ECS Southeast, LLP
6714 Netherlands Drive
Wilmington, NC 28403
ECS Project # 22-30006

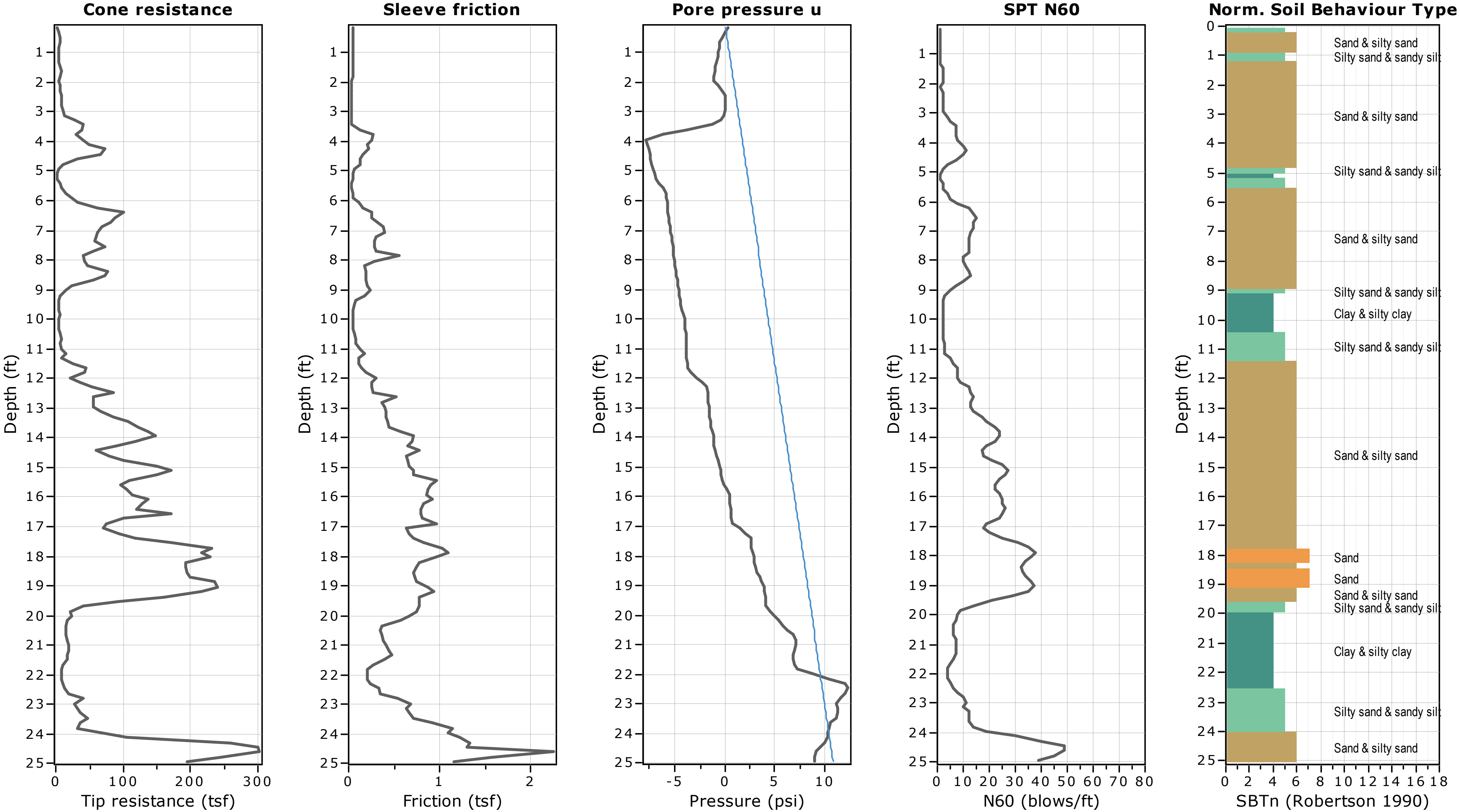
**CPT: S-9**

Total depth: 24.93 ft, Date: 2/24/2021

Cone Operator: Malcolm Coogan

**Project:** Snug Harbor SNF/ALF

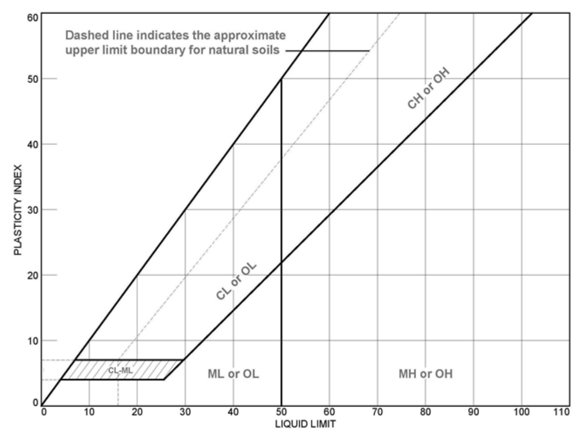
**Location:** Morehead City, Carteret County, North Carolina



# Unified Soil Classification System
(ASTM Designation D-2487)

| Major Division | | Group Symbol | Typical Names | | Classification Criteria |
|---|---|---|---|---|---|
| Coarse-grained soils: More than 50% retained on No. 200 sieve | Gravels: More than 50% of coarse fraction retained on No. 4 sieve | GW | Well-graded gravels and gravel-sand mixtures, little or no fines | Classification on basis of percentage of fines: Less than 5% Pass No. 200 sieve: GW, GP, SW, SP; More than 12% Pass No. 200 sieve: GM, GC, SM, SC; 5% to 12% Pass No. 200 sieve: Borderline classification requiring use of dual symbol | $C_u = D_{60}/D_{10}$ Greater than 4<br>$C_z = (D_{30})^2/(D_{10} x D_{60})$ Between 1 and 3 |
| | | GP | Poorly graded gravels and gravel-sand mixtures, little or no fines | | Not meeting both criteria for GW |
| | | GM | Silty gravels, gravel-sand-silt mixtures | | Atterberg limits plot below "A" line or plasticity index less than 4 |
| | | GC | Clayey gravels, gravel-sand-clay mixtures | | Atterberg limits plot above "A" line and plasticity index greater than 7 |
| | Sands: More than 50% of coarse fraction passes No. 4 sieve | SW | Well-graded sands and gravelly sands, little or no fines | | $C_u = D_{60}/D_{10}$ Greater than 6<br>$C_z = (D_{30})^2/(D_{10} x D_{60})$ Between 1 and 3 |
| | | SP | Poorly graded sands and gravelly sands, little or no fines | | Not meeting both criteria for SW |
| | | SM | Silty sands, sand-silt mixtures | | Atterberg limits plot below "A" line or plasticity index less than 4 |
| | | SC | Clayey sands, sand-clay mixtures | | Atterberg limits plot above "A" line and plasticity index greater than 7 |
| Fine-grained soils: 50% or more passing No. 200 sieve | Silts and Clays: Liquid limit 50% or less | ML | Inorganic silts, very fine sands, rock flour, silty or clayey fine sands | | |
| | | CL | Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays | | |
| | | OL | Organic silts and organic silty clays of low plasticity | | |
| | Silts and Clays: Liquid limit greater than 50% | MH | Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts | | |
| | | CH | Inorganic clays of high plasticitiy, fat clays | | |
| | | OH | Organic clays of medium to high plasticity | | |
| Highly organic soils | | Pt | Peat, muck and other highly organic soils | | Fibrous organic matter; will char, burn, or glow |

Note: U-line represents approximate upper limit of LL and PI combinations for natural soils (empircally determined). ASTM-D2487.




Plasticity chart for the classification of fine-grained soils. Tests made on fraction finer than No. 40 sieve

**UNIFIED SOIL CLASSIFICATION SYSTEM**

| CLIENT: | PROJECT NO.: | SHEET: |
|---|---|---|
| **Embassy Snug Harbor, LLC** | **22:30006** | **1 of 1** |
| PROJECT NAME: **Snug Harbor SNF/ALF** | HAND AUGER NO.: **K-1** | SURFACE ELEVATION: |
| SITE LOCATION: **Galantis Drive, Morehead City, North Carolina 28557** | | STATION: |
| NORTHING: | EASTING: | |

| DEPTH (FT) | WATER LEVELS | ELEVATION (FT) | DESCRIPTION OF MATERIAL | EXCAVATION EFFORT | DCP | SAMPLE NUMBER | FINES CONTENT (%) | MOISTURE CONTENT (%) |
|---|---|---|---|---|---|---|---|---|
| | | | Topsoil Thickness[9.00"] | | | | | |
| | | | (SC) CLAYEY FINE TO MEDIUM SAND, gray, moist to saturated | | | | | |
| | | | **END OF DRILLING AT 4.0 FT** | | | | | |
| 5 | | | | | | | | |

*REMARKS:*

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

| WL (First Encountered) | WL (Seasonal High) | ECS REP: | DATE COMPLETED: | UNITS: | CAVE-IN-DEPTH: |
|---|---|---|---|---|---|
| WL (Completion) **1.75** | | | **Feb 09 2021** | **English** | **3.00** |

## HAND AUGER LOG

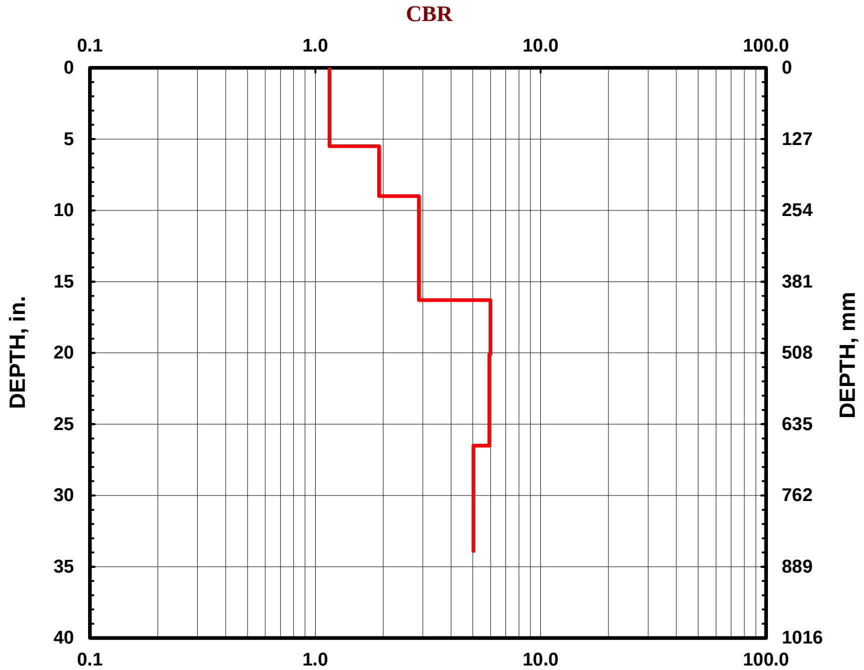
# DCP TEST DATA

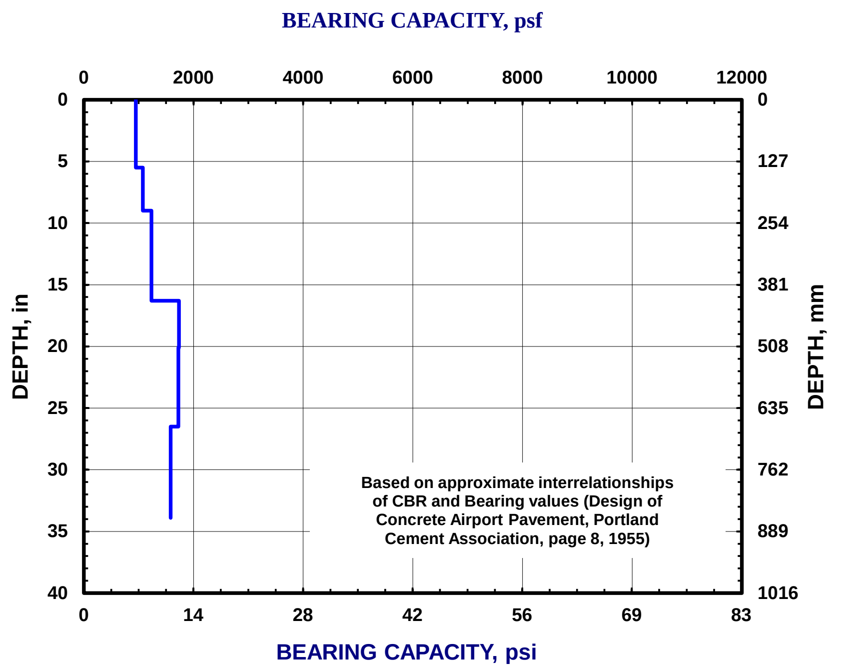
**Project:** *Snug Harbor* **Date:** 9-Feb-21
**Location:** K-1 **Soil Type(s):** SAND (SC)

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

| No. of Blows | Cumulative Penetration (mm) | Type of Hammer |
|---|---|---|
| 0 | 0 | 1 |
| 1 | 140 | 1 |
| 1 | 229 | 1 |
| 3 | 414 | 1 |
| 3 | 511 | 1 |
| 5 | 673 | 1 |
| 5 | 861 | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |



| CLIENT: | PROJECT NO.: | SHEET: |
|---|---|---|
| **Embassy Snug Harbor, LLC** | **22:30006** | **1 of 1** |
| PROJECT NAME: **Snug Harbor SNF/ALF** | HAND AUGER NO.: **K-2** | SURFACE ELEVATION: |
| SITE LOCATION: **Galantis Drive, Morehead City, North Carolina 28557** | | STATION: |
| NORTHING: | EASTING: | |

| DEPTH (FT) | WATER LEVELS | ELEVATION (FT) | DESCRIPTION OF MATERIAL | EXCAVATION EFFORT | DCP | SAMPLE NUMBER | FINES CONTENT (%) | MOISTURE CONTENT (%) |
|---|---|---|---|---|---|---|---|---|
| | | | Topsoil Thickness[9.00"] | | | | | |
| | | | (SM) SILTY FINE TO MEDIUM SAND, dark brown, moist | | | | | |
| | ▼ | | (SC) CLAYEY FINE TO MEDIUM SAND, dark brown to gray, moist to saturated | | | | | |
| | | | (CL) SANDY LEAN CLAY, gray, saturated | | | | | |
| | | | **END OF DRILLING AT 4.0 FT** | | | | | |
| 5 | | | | | | | | |

*REMARKS:*

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

| | | ECS REP: | DATE COMPLETED: | UNITS: | CAVE-IN-DEPTH: |
|---|---|---|---|---|---|
| ▽ WL (First Encountered) | WL (Seasonal High) | | **Feb 09 2021** | **English** | |
| ▼ WL (Completion) **2.00** | | | | | |

**HAND AUGER LOG**

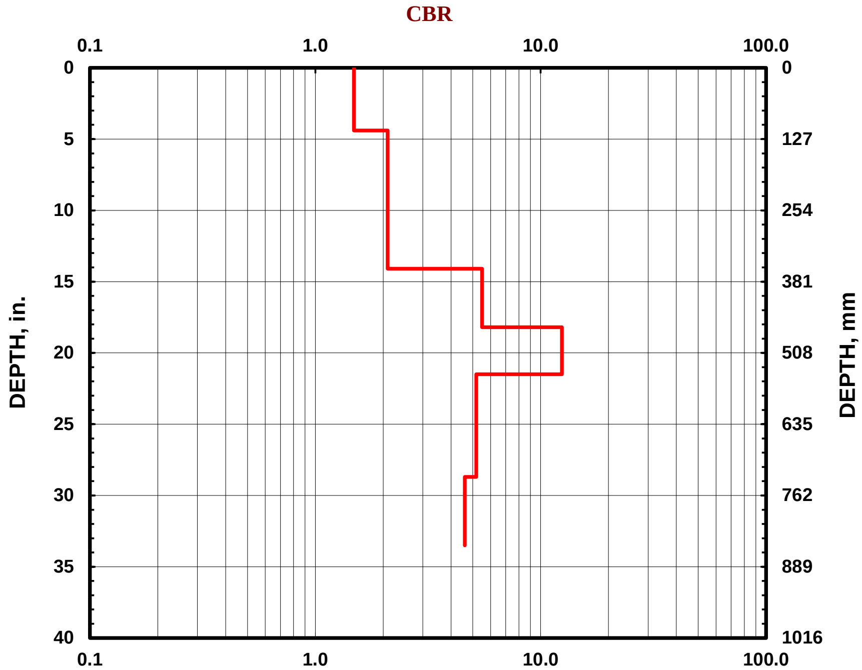
# DCP TEST DATA

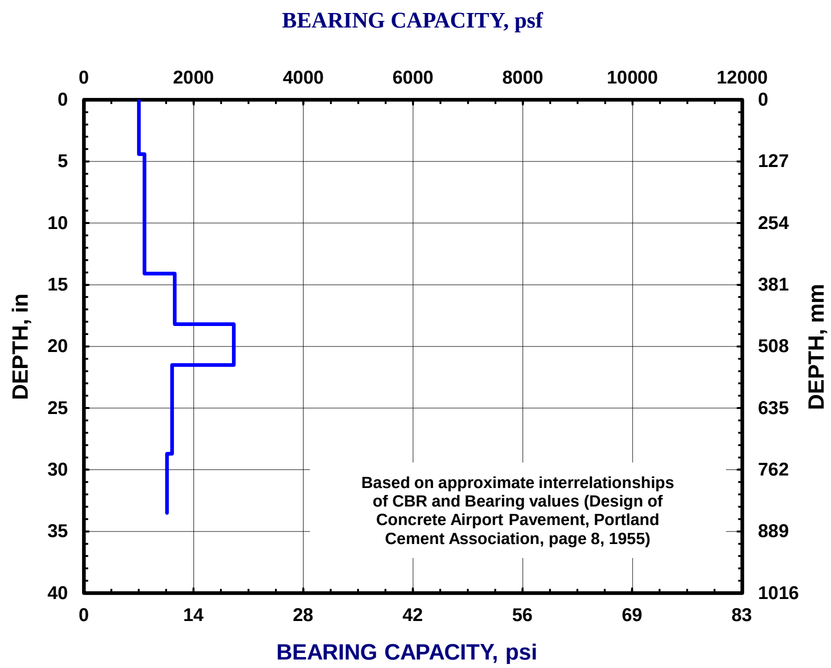
**Project:** *Snug Harbor* **Date:** 9-Feb-21
**Location:** K-2 **Soil Type(s):** SAND/CLAY (SM, SC, CL)

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

| No. of Blows | Cumulative Penetration (mm) | Type of Hammer |
|---|---|---|
| 0 | 0 | 1 |
| 1 | 112 | 1 |
| 3 | 358 | 1 |
| 3 | 462 | 1 |
| 5 | 546 | 1 |
| 5 | 729 | 1 |
| 3 | 851 | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |



| CLIENT: | PROJECT NO.: | SHEET: |
|---|---|---|
| **Embassy Snug Harbor, LLC** | **22:30006** | **1 of 1** |
| PROJECT NAME: **Snug Harbor SNF/ALF** | HAND AUGER NO.: **K-3** | SURFACE ELEVATION: |
| SITE LOCATION: **Galantis Drive, Morehead City, North Carolina 28557** | | STATION: |
| NORTHING: | EASTING: | |

| DEPTH (FT) | WATER LEVELS | ELEVATION (FT) | DESCRIPTION OF MATERIAL | EXCAVATION EFFORT | DCP | SAMPLE NUMBER | FINES CONTENT (%) | MOISTURE CONTENT (%) |
|---|---|---|---|---|---|---|---|---|
| | | | Topsoil Thickness[12.00"] | | | | | |
| | | | (SC) CLAYEY FINE TO MEDIUM SAND, dark brown to gray, moist to saturated | | | | | |
| | ▼ | | | | | | | |
| | | | (CL) SANDY LEAN CLAY, gray, saturated | | | | | |
| | | | **END OF DRILLING AT 4.0 FT** | | | | | |
| 5 | | | | | | | | |

*REMARKS:*

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

| | | ECS REP: | DATE COMPLETED: | UNITS: | CAVE-IN-DEPTH: |
|---|---|---|---|---|---|
| ▽ WL (First Encountered) | ▼ WL (Seasonal High) | | | | |
| ▼ WL (Completion) **2.50** | | | **Feb 09 2021** | **English** | |

**HAND AUGER LOG**

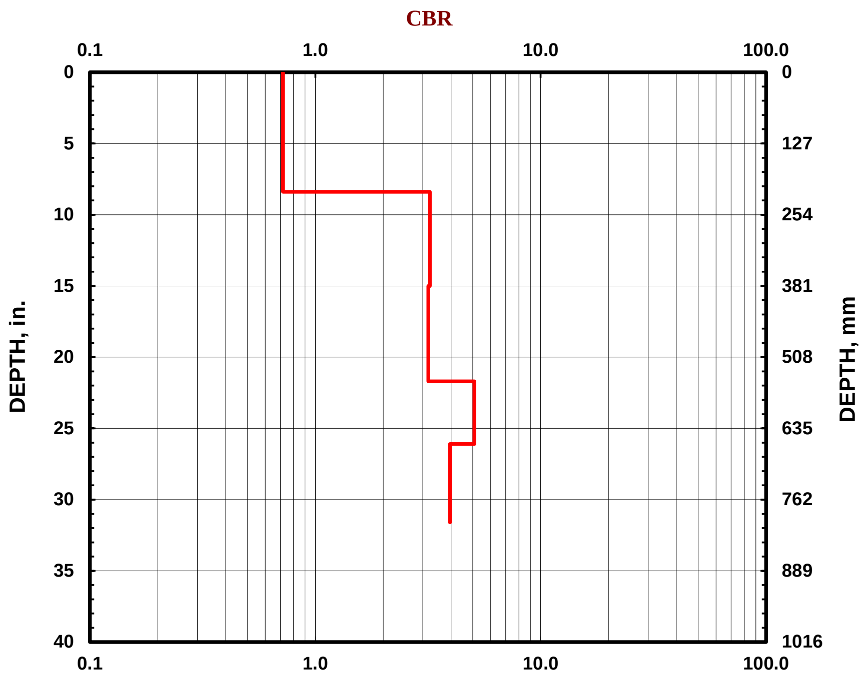
# DCP TEST DATA

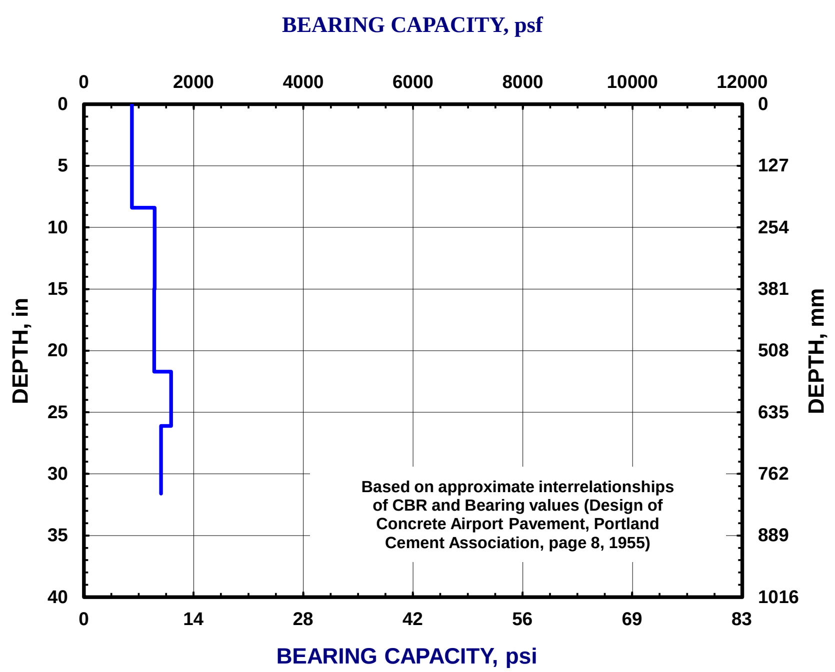
**Project:** *Snug Harbor* **Date:** 9-Feb-21
**Location:** K-3 **Soil Type(s):** SAND/CLAY (SC, CL)

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

| No. of Blows | Cumulative Penetration (mm) | Type of Hammer |
|---|---|---|
| 0 | 0 | 1 |
| 1 | 213 | 1 |
| 3 | 381 | 1 |
| 3 | 551 | 1 |
| 3 | 663 | 1 |
| 3 | 803 | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |



| CLIENT: | PROJECT NO.: | SHEET: |
|---|---|---|
| **Embassy Snug Harbor, LLC** | **22:30006** | **1 of 1** |
| PROJECT NAME: **Snug Harbor SNF/ALF** | HAND AUGER NO.: **K-4** | SURFACE ELEVATION: |
| SITE LOCATION: **Galantis Drive, Morehead City, North Carolina 28557** | | STATION: |
| NORTHING: | EASTING: | |

| DEPTH (FT) | WATER LEVELS | ELEVATION (FT) | DESCRIPTION OF MATERIAL | EXCAVATION EFFORT | DCP | SAMPLE NUMBER | FINES CONTENT (%) | MOISTURE CONTENT (%) |
|---|---|---|---|---|---|---|---|---|
| | | | Topsoil Thickness[12.00"] | | | | | |
| | | | (SC) CLAYEY FINE SAND, dark brown to gray, moist | | | | | |
| | | | (CL) SANDY LEAN CLAY, gray, moist | | | | | |
| | | | **END OF DRILLING AT 4.0 FT** | | | | | |
| 5 | | | | | | | | |

*REMARKS:*

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

| | | | | | |
|---|---|---|---|---|---|
| ▽ WL (First Encountered) | ▼ WL (Seasonal High) | ECS REP: | DATE COMPLETED: | UNITS: | CAVE-IN-DEPTH: |
| ▼ WL (Completion) | | | **Feb 09 2021** | **English** | |

**HAND AUGER LOG**

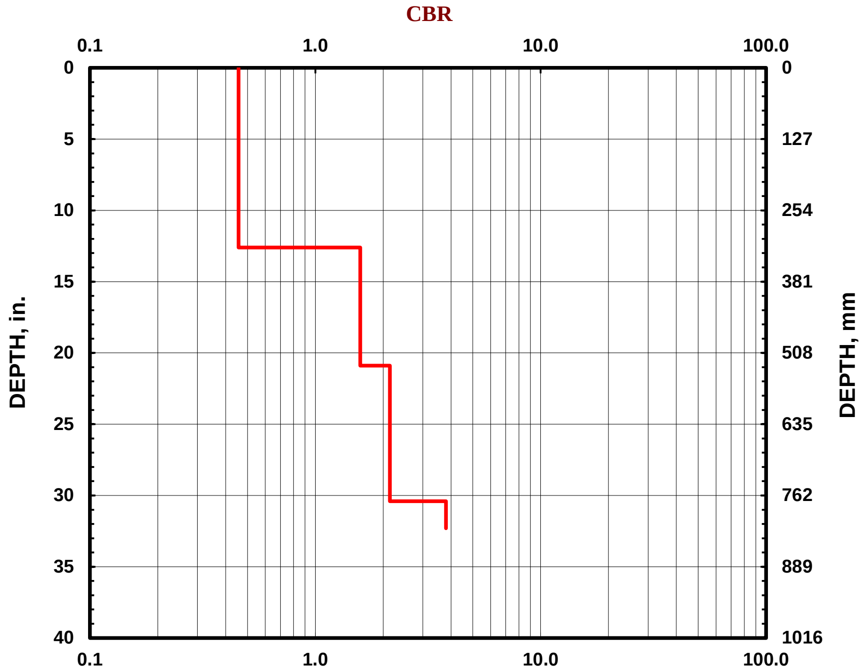
# DCP TEST DATA

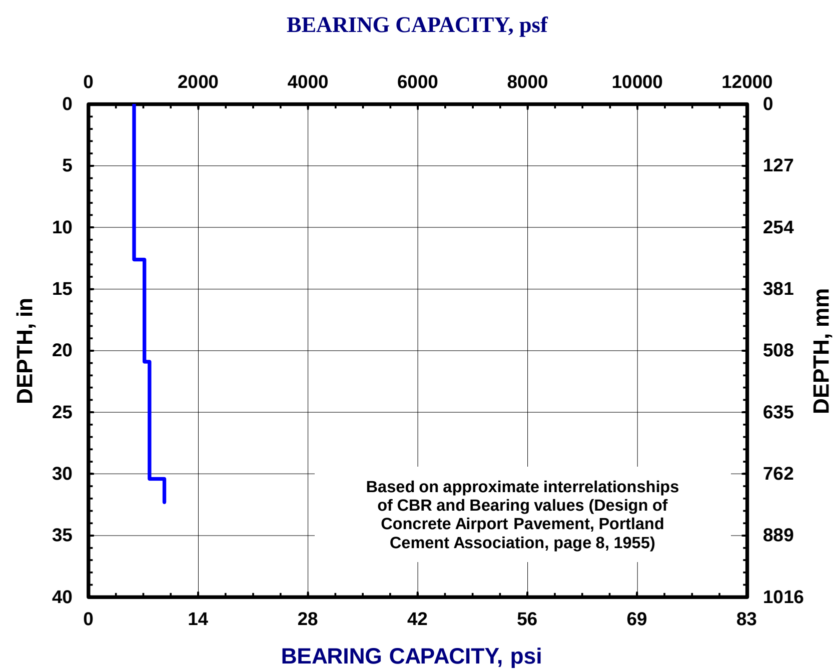
Project: *Snug Harbor* Date: 9-Feb-21
Location: K-4 Soil Type(s): SAND/CLAY (SC, CL)

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

| No. of Blows | Cumulative Penetration (mm) | Type of Hammer |
|---|---|---|
| 0 | 0 | 1 |
| 1 | 320 | 1 |
| 2 | 531 | 1 |
| 3 | 772 | 1 |
| 1 | 820 | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |



| | | | |
|---|---|---|---|
| CLIENT: **Embassy Snug Harbor, LLC** | PROJECT NO.: **22:30006** | SHEET: **1 of 1** | |
| PROJECT NAME: **Snug Harbor SNF/ALF** | HAND AUGER NO.: **K-5** | SURFACE ELEVATION: | |
| SITE LOCATION: **Galantis Drive, Morehead City, North Carolina 28557** | | STATION: | |
| NORTHING: | EASTING: | | |

| DEPTH (FT) | WATER LEVELS | ELEVATION (FT) | DESCRIPTION OF MATERIAL | EXCAVATION EFFORT | DCP | SAMPLE NUMBER | FINES CONTENT (%) | MOISTURE CONTENT (%) |
|---|---|---|---|---|---|---|---|---|
| | ▼ | | Topsoil Thickness[12.00"] | | | | | |
| | | | (SC) CLAYEY FINE TO MEDIUM SAND, dark brown to gray, saturated | | | | | |
| | | | **END OF DRILLING AT 3.0 FT** | | | | | |
| 5 | | | | | | | | |

*REMARKS:*

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

| | | | | | |
|---|---|---|---|---|---|
| ▽ WL (First Encountered) | ⧗ WL (Seasonal High) | ECS REP: | DATE COMPLETED: | UNITS: | CAVE-IN-DEPTH: |
| ▼ WL (Completion) **0.50** | | | **Feb 09 2021** | **English** | **2.00** |

## HAND AUGER LOG

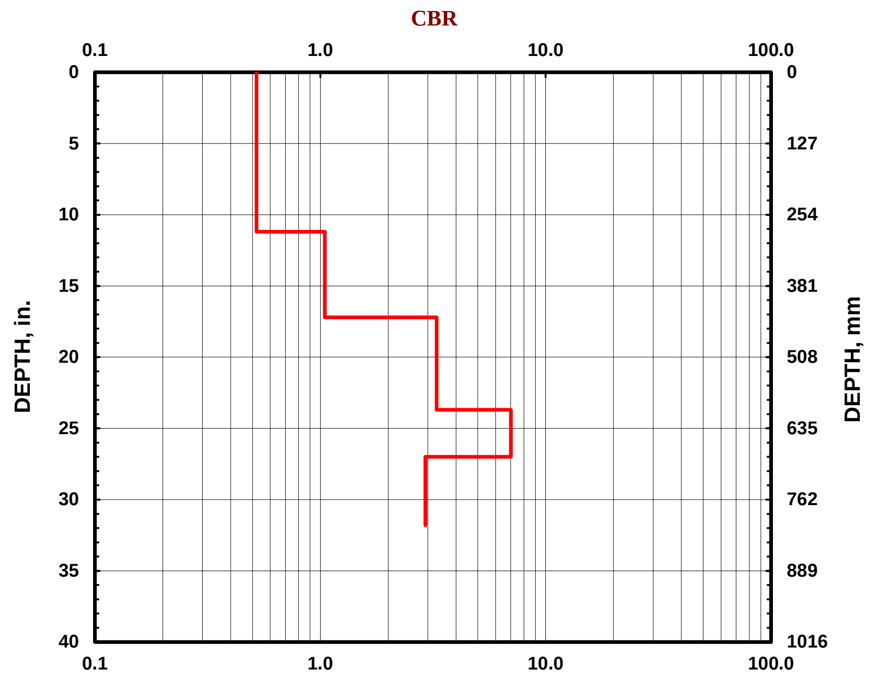
# DCP TEST DATA

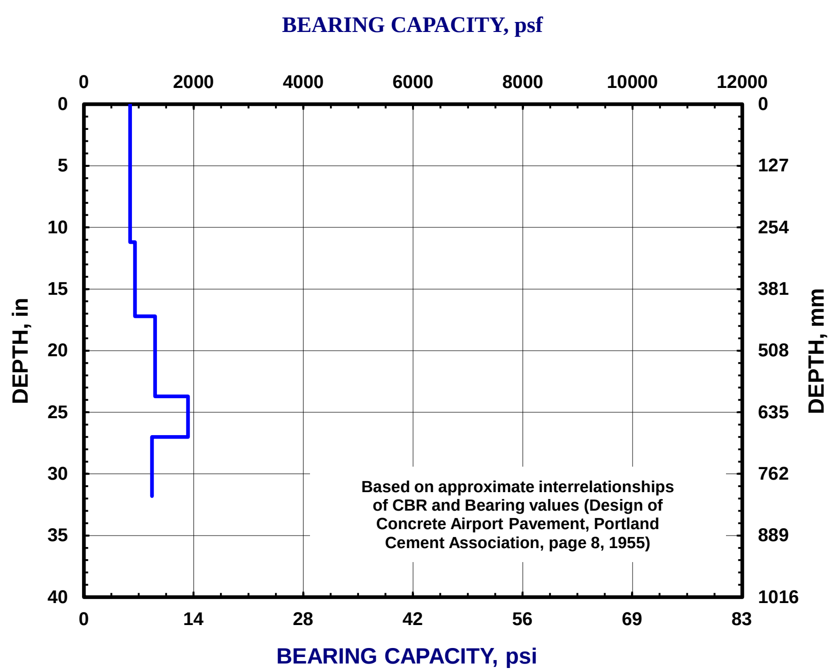
**Project:** *Snug Harbor* **Date:** 9-Feb-21
**Location:** K-5 **Soil Type(s):** SAND (SC)

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

| No. of Blows | Cumulative Penetration (mm) | Type of Hammer |
|---|---|---|
| 0 | 0 | 1 |
| 1 | 284 | 1 |
| 1 | 437 | 1 |
| 3 | 602 | 1 |
| 3 | 686 | 1 |
| 2 | 808 | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |



| CLIENT: | PROJECT NO.: | SHEET: |
|---|---|---|
| **Embassy Snug Harbor, LLC** | **22:30006** | **1 of 1** |
| PROJECT NAME: **Snug Harbor SNF/ALF** | HAND AUGER NO.: **K-6** | SURFACE ELEVATION: |
| SITE LOCATION: **Galantis Drive, Morehead City, North Carolina 28557** | | STATION: |
| NORTHING: | EASTING: | |

| DEPTH (FT) | WATER LEVELS | ELEVATION (FT) | DESCRIPTION OF MATERIAL | EXCAVATION EFFORT | DCP | SAMPLE NUMBER | FINES CONTENT (%) | MOISTURE CONTENT (%) |
|---|---|---|---|---|---|---|---|---|
| | | | Topsoil Thickness[9.00"] | | | | | |
| | | | (SM) SILTY FINE TO MEDIUM SAND, dark brown to gray, moist | | | | | |
| | ▼ | | (SC) CLAYEY FINE TO MEDIUM SAND, gray, moist to saturated | | | | | |
| | | | **END OF DRILLING AT 4.0 FT** | | | | | |
| 5 | | | | | | | | |

*REMARKS:*

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

| | | | | | |
|---|---|---|---|---|---|
| ▽ WL (First Encountered) | ▼ WL (Seasonal High) | ECS REP: | DATE COMPLETED: | UNITS: | CAVE-IN-DEPTH: |
| ▼ WL (Completion) 1.75 | | | **Feb 09 2021** | **English** | **3.50** |

## HAND AUGER LOG

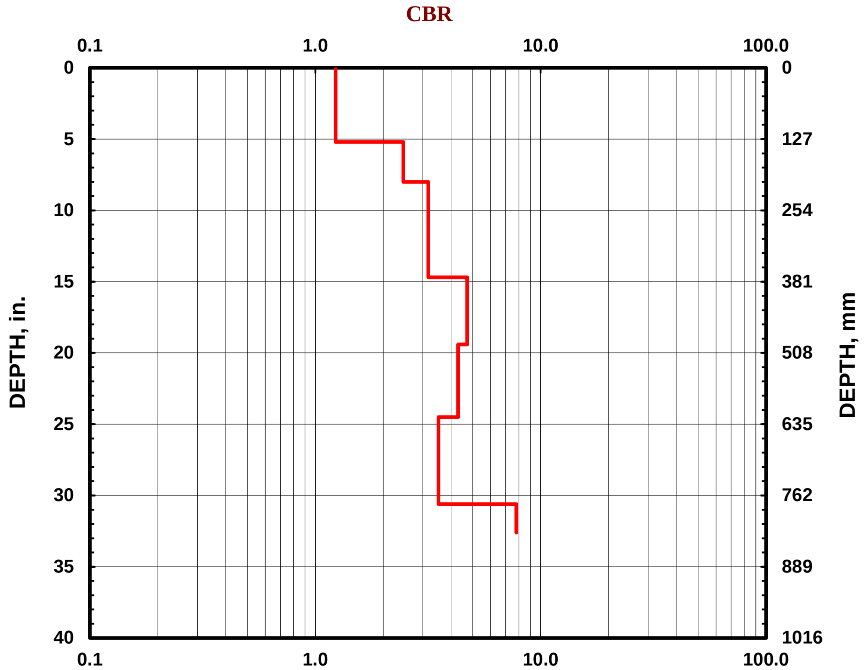
# DCP TEST DATA

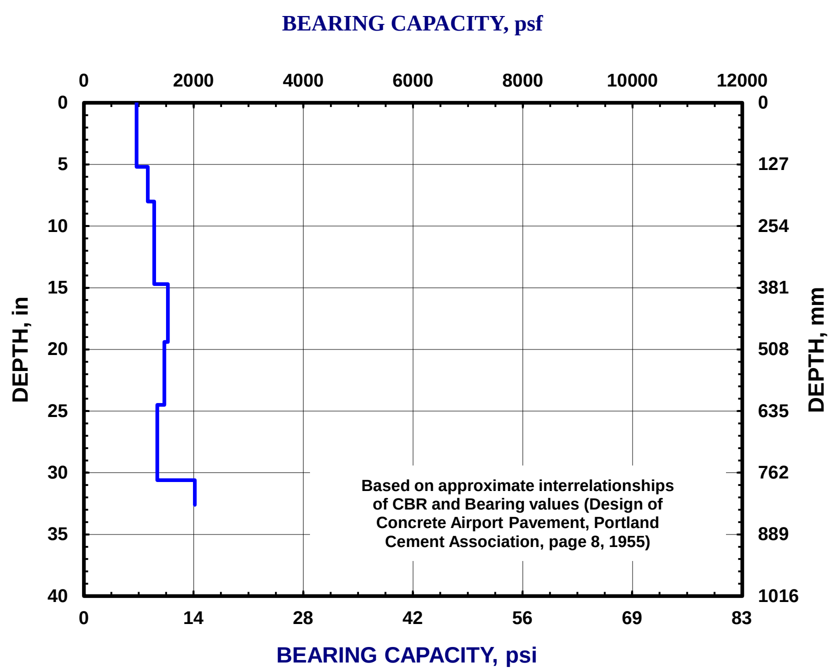
Project: *Snug Harbor*  Date: 9-Feb-21
Location: K-6  Soil Type(s): SAND (SM, SC)

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

| No. of Blows | Cumulative Penetration (mm) | Type of Hammer |
|---|---|---|
| 0 | 0 | 1 |
| 1 | 132 | 1 |
| 1 | 203 | 1 |
| 3 | 373 | 1 |
| 3 | 493 | 1 |
| 3 | 622 | 1 |
| 3 | 777 | 1 |
| 2 | 828 | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |
| | | 1 |



## APPENDIX C – Supplemental Report Documents

GBA Document

# Important Information about This

# Geotechnical-Engineering Report

**Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.**

**While you cannot eliminate all such risks, you can manage them. The following information is provided to help.**

**The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.**

## Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled.* No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

## Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

## You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

## This Report May Not Be Reliable

*Do not rely on this report* if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be*, and, in general, *if you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying it. A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

## Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

## This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

## This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

## Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

## Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

## Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old.*

## Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration.*** Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GBA GEOPROFESSIONAL BUSINESS ASSOCIATION

Telephone: 301/565-2733
e-mail: info@geoprofessional.org www.geoprofessional.org