APPENDIX A: DETAILED DESIGN REPORT (35%)

PHASE 1 STONE STRUCTURES DESIGN DOCUMENTATION REPORT

MID-CHESAPEAKE BAY ISLAND RESTORATION
BARREN ISLAND RESTORATION
JUNE 2021

PREPARED BY:

UNITED STATES ARMY CORPS OF ENGINEERS
NORTH ATLANTIC DIVISION, BALTIMORE DISTRICT
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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ATTACHMENTS

Mid-Chesapeake Bay Island Ecosystem Restoration Project Feasibility Report
Chesapeake 2000 Agreement

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1 INTRODUCTION

1.1 Mid-Bay Island. The Mid-Bay Island Project, located north of Taylor Island in Dorchester County, is an environmental restoration/beneficial dredge use project proposed for the Chesapeake Bay. Dredged material from the Upper Chesapeake Bay Approach Channels to the Port of Baltimore will be beneficially used to restore wetland and upland habitat. Mid-Bay Island will be developed through the cooperative efforts of Federal and State agencies. The Maryland Department of Transportation Maryland Port Administration (MPA) is the non-Federal project sponsor. Maryland Environmental Services (MES), a not-for-profit public corporation, will act as the MPA's Project Manager.

The Mid-Bay Island Project will restore remote island habitat, a scarce and rapidly vanishing ecosystem component within the Chesapeake Bay region. Loss of remote island habitat within the middle eastern Chesapeake Bay has been estimated at approximately 10,500 acres in the last 150 years, a trend that will continue because of erosive forces and sea level rise. Remote islands in the Chesapeake Bay serve as an important stop-over point for migratory avian species, providing forage and protected resting habitat during spring and fall migration along the Atlantic Flyway for many shorebird and waterbird species. Additionally, the remote island habitat restored at James and Barren Islands will provide valuable wetlands and a vital connection between open-water and mainland terrestrial habitats within the region and provide valuable nesting habitat for a variety of colonial nesting and wading bird species.

The Mid-Bay Island Project is an integral component of the Federal Dredged Material Management Plan (*DMMP*), which is the long-term regional plan for managing sediments from the Chesapeake Bay Federal navigation channels. The significance of the fish and wildlife resources of the Chesapeake Bay is widely recognized by resource agencies, the public, and academic institutions. For more than 20 years, extensive efforts have been expended to support natural resources management and restoration plans in the Chesapeake Bay region. The restoration projects at James and Barren Island will contribute to the goals of the Chesapeake Bay Program watershed partnership through its habitat and ecosystem recovery and preservation efforts. Both James and Barren Islands will contribute to the Chesapeake 2000 Agreement goal to restore 25,000 acres of tidal and non-tidal wetlands. In addition, the protection of 1,325 acres of submerged aquatic vegetation (SAV) habitat adjacent to Barren Island will contribute to the Chesapeake 2000 Agreement goal to protect and restore 114,000 acres of SAV and to develop strategies to address water clarity in areas of critical importance for SAV. Both the James and Barren Island projects will improve water clarity by associated with localized erosion by reducing wave heights and buffering storm impacts to the shoreline.

1.2 Barren Island Site and Objective. Barren Island, located approximately 1 mile east of Hoopers Island, is a small island located in the Chesapeake Bay off the coast of Dorchester County. Originally attached to the Delmarva Peninsula, Barren Island has now eroded into two smaller, separate land masses. The island was obtained in 1993 by the United States Fish and Wildlife Service (USFWS). A small portion of the island was created by United States Army Corps of Engineers, Baltimore District (USACE NAB) Operations and Navigation Division in 2003 using dredge material taken from the realignment of the adjacent Honga River channel. This small spit of land is owned and maintained by the Maryland Department of Natural Resources (DNR) as the Tar Bay Wildlife Management Area.

The goal of the Barren Island Restoration (BIR) Project is to stabilize the existing island, prevent further erosion, construct 77 acres of new wetlands using dredge material from the nearby shipping channels, and protect the 1,325 acres of SAV adjacent to the island. While the primary owner of Barren Island is the Federal Government, the created wetlands and protected SAV will be located in State owned waters.

Figure 1 Project Location Map

1.3 Scope of Report. The Design Documentation Report (DDR) provides the technical basis for the preparation of the plans and specifications for construction of the Barren Island stabilization and dredged material containment facilities to be added to the existing island. The DDR will not address: (1) routine maintenance dredging that generates the material placed into the containment facility, (2) management of the dredged material placement within the new wetland cells, or (3) development of the wetland habitat within the project. The report complies with the guidance presented in Appendix D of engineering regulation ER 1110-2-1150, Content and Format of Design Documentation Report, 31 August 1999. The DDR will not be finalized until the completion of construction of the total build out of the Barren Island

Restoration so that design changes made in connection with contract modifications can be added to the initial DDR.

2 SITE PROJECT AND DESCRIPTION

2.1 Barren Island Total Build Out Description. The following description is based in part on the recommendations found in the Final Mid-Chesapeake Bay Island Ecosystem Restoration Integrated Feasibility Report & Environmental Impact Statement EIS dated June 2009. Most of the recommended features were subject to adjustment due to the current conditions at Barren Island; the stone sill alignments have been shifted, proposed outfalls have been included, total area for wetland development has changed, and unvegetated migratory bird habitat islands will be incorporated into the segmented breakwater.

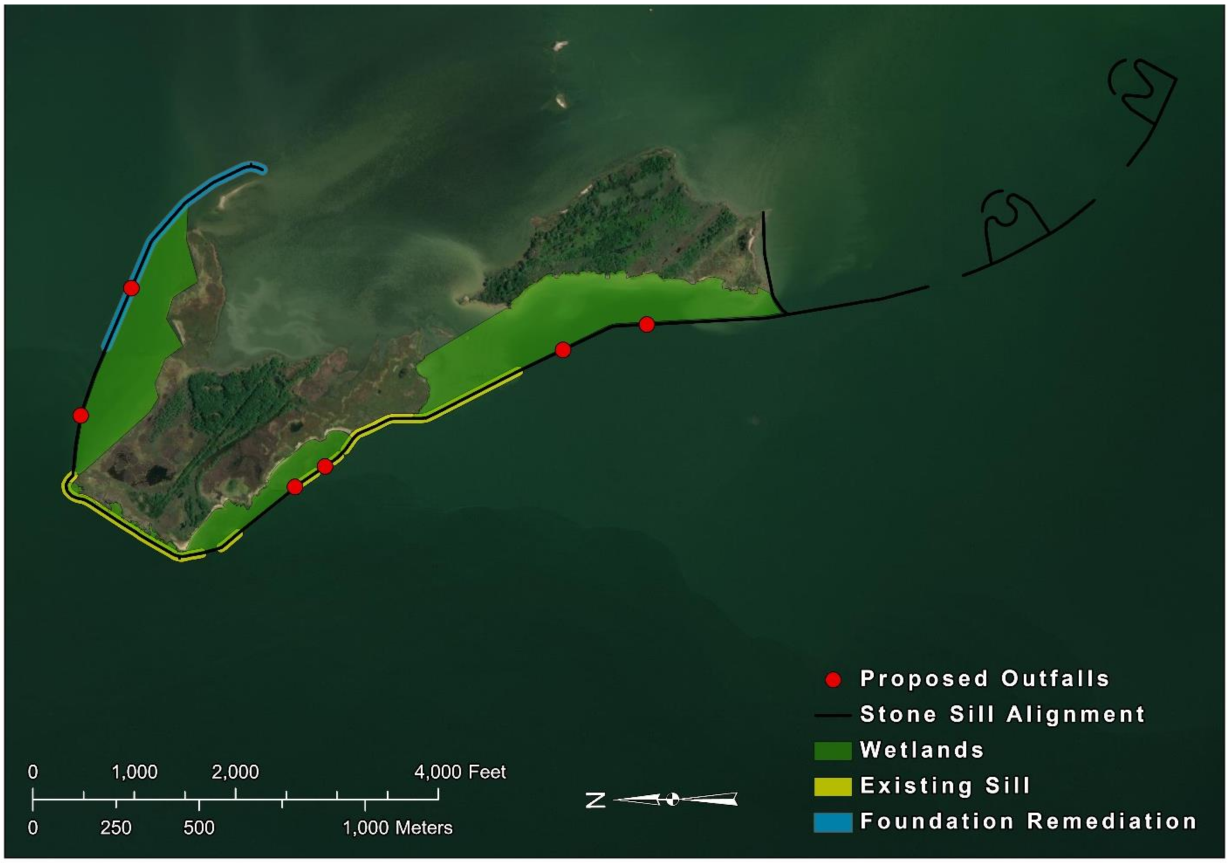

Figure 2 Barren Island Restoration Total Build Out

2.1.1 Stone Structures.

2.1.1.1 Stone Sills. The design for Barren Island calls for 13,546 linear feet of trapezoidal stone sills to be constructed off the shoreline in relatively shallow water with portions of the sill incorporating the existing, smaller sill constructed under a previous island stabilization project. The proposed height of the sill is 3.52 feet to protect the shore from a 30-year design storm water surface elevation. However, stone sizing computations used the wave energy from a 100-year storm to size the armor stone. Resiliency has been built into the sill design; the crest of the sill is 10.8 feet wide which allows for increasing the height of the sill to accommodate future sea level rise without increasing the footprint of the stone structures. Subsurface samples indicate that soils located along the northeast sill alignment do not have the requisite shear strength. Therefore, foundation remediation will be required. An area 60 feet in width and ten feet in depth, with side slopes of three to one extending back to the surface, will be excavated and material from the sand borrow site placed in its stead. This area will extend from Station 100 to Station 125. Specific alignments of the sills will act as the seaward protection to future, beneficial dredge-use, wetland creation, however, each sill is designed to be free-standing and independent of fill material

2.1.1.2 Stone Breakwater. To minimize wave energy and prevent the loss of SAV habitat east of Barren Island, a total of 4,269 linear feet of stone breakwaters will be constructed. The structures will be built to an elevation of 5.52 feet and were designed to the water surface elevation of the 50-year storm with stone sized for the 100-year storm.

2.1.1.3 Bird Island Habitats. Two unvegetated islands, 4.9 acres and 3.41 acres, isolated from the main Barren Island by 366 feet of open water, will be incorporated into the breakwater alignment. The interior of the islands will be filled with a well-draining material and capped with a sand and clam shell mixture. The height of the island is set at the 10-year design storm water surface elevation to facilitate periodic overtopping for the purpose of vegetation management. The east end of the islands will step down in elevation until the edge reaches MHW so that hatchlings will be able to access the water. The back end of each island will be protected by a rock reef that will form a slight embayment along the eastern edge of each island. These islands will provide high quality nesting habitat for migratory birds.

2.1.2 Outfalls. Outfalls were not identified under the Feasibility Report because it was initially believed that source material for the wetlands would be clean sand. However, Honga River dredge material has been identified as silty material, and once hydraulically placed behind the stone sills, this material will need to be dewatered, and clear effluent discharged to the Bay. Six outfalls, two for each proposed wetland, will be permitted. The proposed locations of these outfalls were chosen for the relatively deep discharge point. The outfalls will not have electrical power provided from the mainland, and any mechanism, whether gate or valve, will need to be operated manually.

2.1.3 Wetlands. The design team has identified three areas for dredge disposal acceptance: the northeast corner, the northwest corner, and the western edge of the island. The boundaries of the wetlands will be defined by the stone sills and the Mean High Water elevation along the shore of Barren Island; the majority of the wetlands will be created on the land controlled by the State with minor tie-ins to the property owned and maintained by FWS. The wetlands will take multiple inflows of dredge material. Planting of the wetlands will commence after each backfilled portion or cell is filled and consolidated to the required elevations.

2.1.4 Source of Construction Material. A sand borrow area, first identified under the EIS, will be permitted under the Nontidal Wetland Construction License. This borrow area is XX acres in size and located a mile to the west of Barren Island. Sand dredged from this area will be stockpiled at the north end of the island for use in construction of the dredge disposal containment units. Dredging and stockpiling will not be a part of Phase 1.

2.2 Stone Structures Phase 1.

2.2.1 Sill Alignments and Cross Sections. Sills will be constructed from Station 125+00 to 138+25, Sta 200+00 to 255+48, Sta 300+00 to 326+00, and Sta 400 to 410+73. Each sill will be constructed to an elevation of 3.52, be 10.8 feet wide at the crest, extending to the surface at a 2:1 slope. A layer of geotextile will be placed along the sill alignment prior to installation of stone where possible. The interior of the sill will be constructed of quarry spalls, with the exterior constructed of two layers armor stone at a W_{50} varying according to the alignment. The existing sill will be raised to a design elevation with quarry spalls and capped with armor stone.

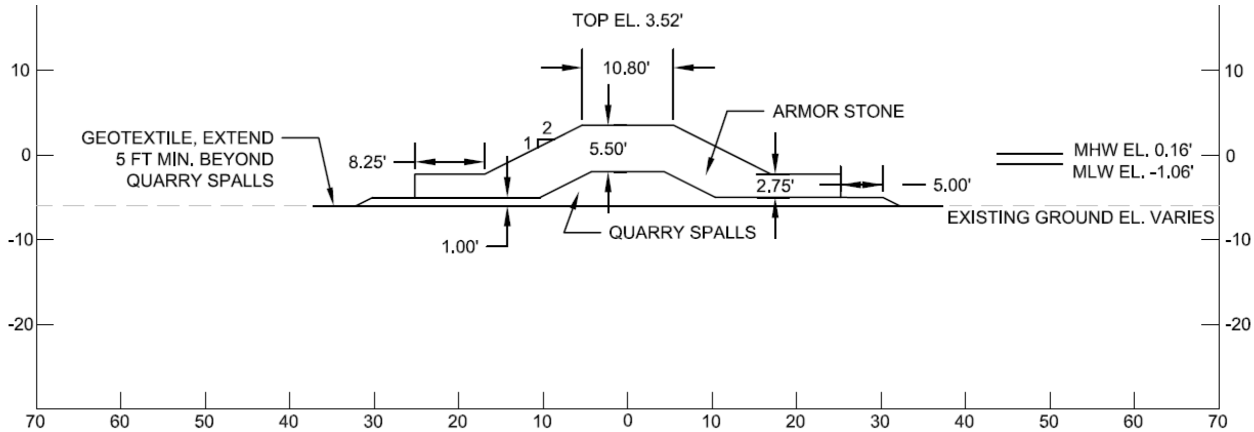

Figure 3 Typical Sill Cross Section

2.2.2 Breakwater Alignments and Cross Sections. The segmented breakwater will be constructed from Sta 500+00 to 514+05, Sta 600+00 to 615+00, and Sta 700+00 to 713+64. Each segment of the breakwater is designed to be constructed to an elevation of 5.52, have a crest width of 10.8 feet, extending the ground at a 2:1 slope. A layer of geotextile will be placed along the breakwater alignment beneath the initial course of core stone. The interior of the breakwater segments will be constructed of core stone, and an outer layer of armor stone with a W_{50} of 4200 pounds will be added.

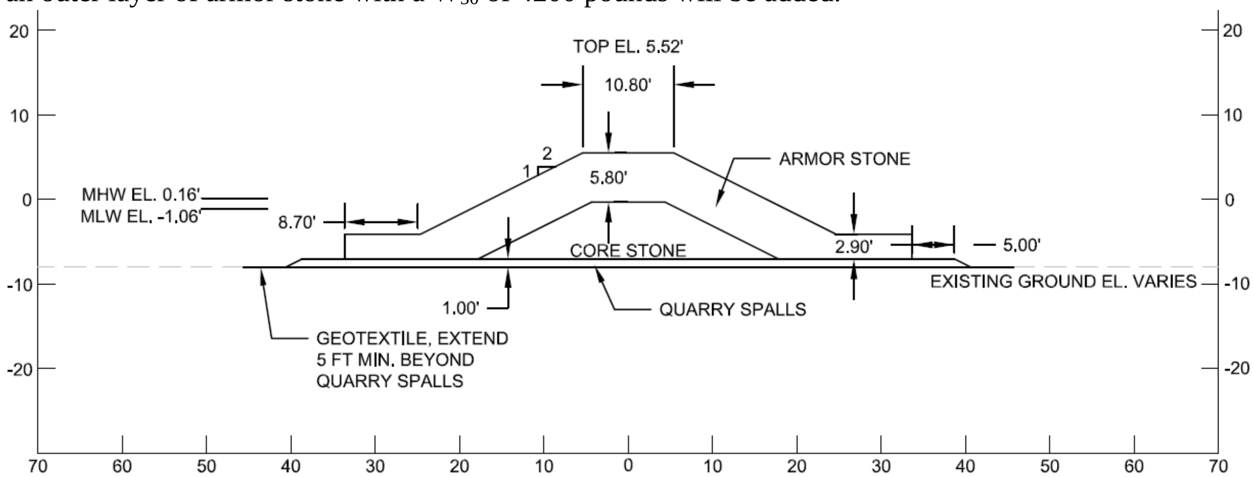

Figure 4 Typical Breakwater Cross Section

2.2.3 Exclusions. There will be no dredging or placement of dredge spoil in Phase 1 of the BIR Project. There will be no dredging for the purpose of sand borrow or stockpile. There will be no dredging of sand for the purposes of constructing the bird island habitat in Phase 1. There will be no wetland planting save for any re-seeding of disturbed areas where the stone structures may tie-in to Barren Island. There will be no outfall/spillway installed under Phase 1.

2.3 Phase 2.

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3 PHASE 1 DESIGN

3.1 Hydraulic Modeling. The ERDC modeling that was undertaken for the Mid-Chesapeake Bay Island Ecosystem Restoration project for James and Barren Islands focused on determining the existing and proposed alternative conditions to provide the design data for wetland and terrestrial habitat creation through the beneficial use of dredged materials. A feasibility study previously completed in 2009 recommended constructing environmental restoration projects at both James and Barren Islands.

The analysis described below concentrates on the Barren Island project. Storm surge and nearshore wave modeling focused on the project area was conducted by the Coastal and Hydraulics Laboratory (CHL) using the Coastal Storm Modeling System (CSTORM-MS) (Massey et al. 2011, Massey et al. 2015). CSTORM-MS is composed of the coupled Advanced Circulation (ADCIRC) model and the Steady State Wave (STWAVE) model for this study. The hydrodynamic modeling focused on several proposed project scenarios as well as existing conditions to determine the impact of the project conditions on storm surge water levels, current velocities, and wave properties at Barren Island and in Tar Bay during storm events. These modeling results were also used as inputs to determining stone sizes for the project construction.

Model setups developed as part of the North Atlantic Coastal Comprehensive Study (NACCS) were leveraged and refined specifically in the Barren Island region. Out of the 1050 synthetic tropical storms developed for the NACCS, 100 storms were selected for use for Mid-Bay. Those 100 storms were then narrowed down to a set of 25 storms that were used as screening storms on all of the with- and without project scenarios. This set of storms made landfall near the project area. These storms represent a variety of storm tracks, wind and pressure conditions, and water level annual recurrence intervals (ARIs) so that the impacts of a wide range of different storm conditions may be captured. Each of the 25 storms was run for existing conditions as well as for six (6) with-project alternatives. The six alternatives represent a variety of different sill, breakwater, and island configurations being considered for the final Barren Island protection project design. Additional wave diffraction modeling was conducted using the Coastal Modeling System (CMS) Wave model (CMS-Wave) for one of the with-project scenarios to determine the impact of various gap design widths between breakwaters/islands on wave energy. The alignment is currently being optimized with bird habitat islands and the associated segmented breakwater. This final alignment will be modeled and results incorporated into the 65% design submission.

The project design for the Barren Island protection effort must take a number of factors into account including the presence of local aquatic vegetation. Surveys at the project site have observed a significant incidence of submerged aquatic vegetation (SAV) to the east of Barren Island in Tar Bay (See Appendix B, **Error! Reference source not found.**). To maintain the natural habitat in this area, it is important that construction of new protective features do not have significant adverse impacts to the SAV by any changes in hydrodynamics during major storm events. Further, the intent was to design the structures to continue to provide conditions suitable for SAV habitat. Although it is estimated that SAV can withstand water velocities of up to 180 cm/s, the upper velocity threshold that SAV in this region routinely survive without being damaged or otherwise adversely affected is approximately 100 cm/s. Thus, water velocities in Tar Bay during storm events should ideally remain below that threshold after the Barren Island restoration project is completed. Further details about the model development and setup, storm selection process, simulation results, and the conclusions drawn from this design study are discussed in Appendix B.

3.2 Coastal Design Considerations.

3.2.1. Wave Diffraction. PED phase alignment changes raised concerns about wave action between the segmented breakwater. Wave diffraction analyses were performed using the program CMS-Wave to assess the changes in the design wave conditions. A total of 480 cases were run and of those, 36 were selected that represent an annual recurrence interval (ARI) of 50-100 years for both water level and wave heights. The same 25 storms used in the hydrodynamic modeling were also used in the wave diffraction analysis. Results of this analysis are provided in Appendix B. Based on these results, no offset breakwaters are proposed to protect the gaps between the breakwater and bird islands. Instead, the breakwater cross section will wrap around the southern side of Island M to protect the island fill. Rock reefs may be added in a future phase to protect the island coves from erosion.

3.2.2. Navigation. During the feasibility phase, it was recommended by the US Coast Guard to raise the crest elevation of the breakwater section from 4' MLLW to 6' MLLW to prevent navigational hazards. This height was supported by the ERDC Life Cycle Analysis and was used as the basis for the PED phase cross section development.

3.3 Alignment Changes. The original alignment for Phase I stone sills and breakwater is presented in the Feasibility Report and the Environmental Impact Statement. Adjustments to the original alignment of the stone sills were required to accommodate for poor soil foundation conditions. Adjustments to the stone breakwater were made to incorporate the findings of the ERDC modeling.

3.3.1 Feasibility alignment. The alignment laid out in the Feasibility Report was a Conceptual level design that attempted to follow the shore of the then existing island. The stone sill structures were proposed to be built in the shallow waters (3 to 4 feet depth at MLLW) just off Barren Island. The elevation of the stone sill was proposed to be +4 ft MLLW and provide a continuous line of protection from the northeast side of the island, running along the western edge, extending along the now eroded southern footprint of Barren, and wrapping back around to the east to form a new southern tip of the island. This sill would provide protection along the seaward side of future wetlands built between the island and the leeward side of the stone structures.

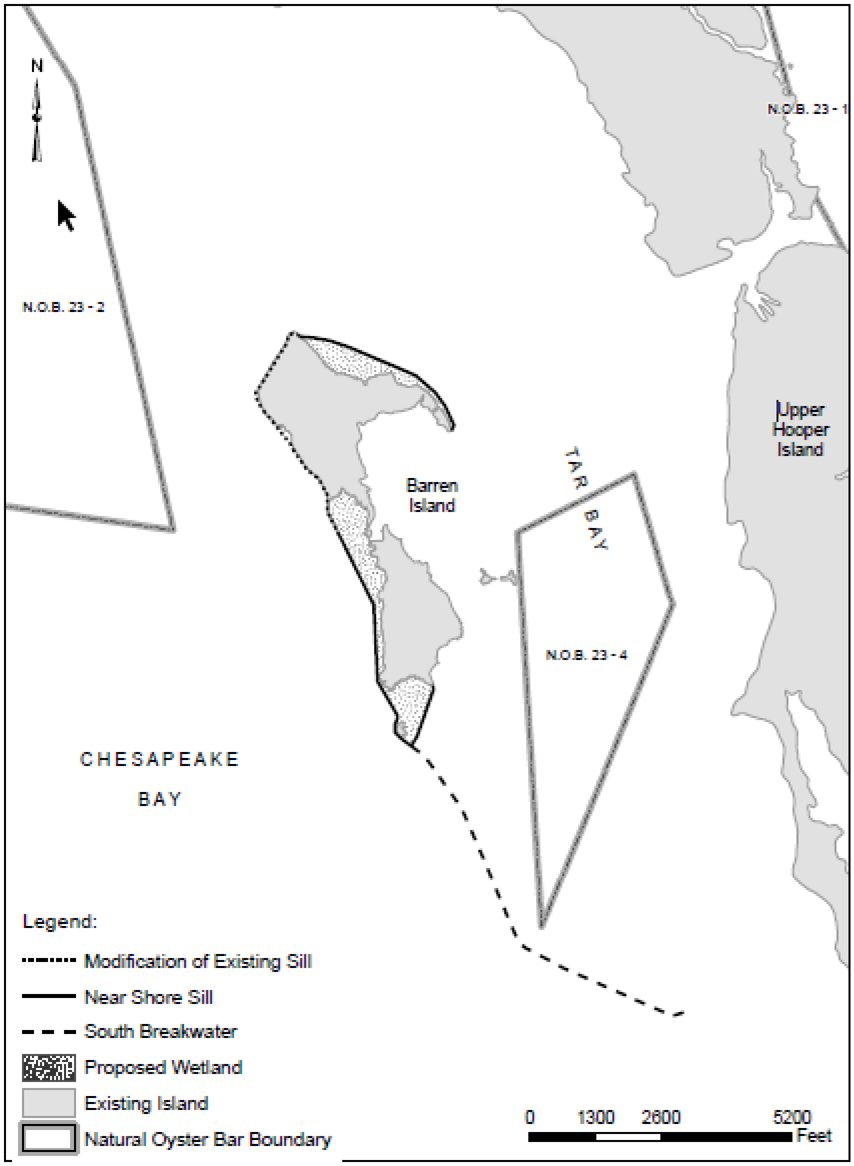


Figure 5 Feasibility Report Barren Island Alignment

3.3.2 Major changes to alignment. While the proposed northwest and west alignments were determined to traverse stable ground, analysis shows that significant portions of the northeast and southeast alignments would require soil remediation of the in situ material to provide a stable foundation for the stone structures. Consequently, Phase 1 will entail construction of the northeast alignment beginning at Station 125. The northeast alignment will be extended at a future date, maintaining the available area for dredge disposal and wetland creation. However, it was determined that the length of the southeast alignment made foundation remediation cost prohibitive. Consequently, the southeast alignment was shifted closer to the existing shoreline, intercepting the southwest alignment 970 feet farther to the north. The main effect of the shift removed the 21 acres identified behind the sill for disposal and wetland creation from the project's overall restoration plan. The ancillary effect of shifting the southeast alignment closer to the mainline was to extend the breakwater cross section to the new point where the southwest sill and southeast sill met.

The second major change in alignment occurs along the breakwater. The feasibility report called for a longer alignment to extend farther south and to the east. ERDC modeling indicated that this feasibility alignment did not provide a level of energy dissipation and protection to the adjacent SAV to justify the longer extents. Therefore the alignment was shortened and shifted to the west where soil borings indicated a stronger foundation material.

The third major change to the feasibility alignment altered the breakwater from a single continuous stone structure to a segmented breakwater. This segmented breakwater reduced anticipated velocities at the southern tip while providing the open water separation between the bird island habitats to reduce the risk of mammalian predation. Changes to the alignment are documented in the Design Decision Register (Appendix E).

3.3.3 Phase 1 Final alignment. For the purposes of design and documentation, the island's stone structures were split into different alignments.

3.3.3.1 Northeast Alignment (NE). Phase 1 will construct the NE alignment from Station 125+00 to Sta 138+25.

3.3.3.2 Modification of Existing alignment (NW). Phase 1 will construct new sills and modify existing sills from Sta 200+00 to Sta 255+48. This alignment will incorporate portions of the existing sill built under a previous shoreline stabilization project

3.3.3.3 Southwest Alignment (SW). The SW connects to the NW alignment, begins with Sta 300+00 and ends at Sta 326+00, where it ties into the breakwater and SE alignment

3.3.3.4 Southeast Alignment (SE). The SE alignment begins at Sta 400+00 where it connects to the SW and BW alignments and hugs the southern edge of Barren Island, terminating at Sta 410+73.

3.3.3.5 Breakwater. The breakwater is broken into three sections. Sta 500+00 to Sta 514+06, Island A Sta 600+00 to Sta 615+00, and Island M Sta 700+00 to Sta 713+64. The bird habitat islands will be constructed under a future phase; the southern portion of the breakwater will turn east to provide protection along the southern edge of Island M.

3.4 Stone Sizing Considerations.

3.4.1. Design Event. Stone sizing computations were completed using ERDC's draft Coastal Structure Calculator (version 1). Maximum wave height, wave period, and sea water level statistics were provided by ERDC for the 313 save points around Barren Island. All elevation data was converted from meters in MSL to feet in NAVD88. The maximum 100-year wave height and corresponding wave period along each structure reach was used to compute the stone sizes for all the sills and the breakwater. The data from alternative 4 (breakwater with windows) was selected for the stone sizing analysis because it is most similar to the alignment refined during the PED 35% phase.

3.4.2. Water Depth. Water depth was determined using the 2020 bathymetric data and the 100-year water surface elevation provided by ERDC for alternative 4. The depth at each structure alignment was determined and points were placed at an offset located at approximately the seaward and leeward toes. The maximum of the depths at these points was used as the total depth at the structure toe. These points were also used to develop the cross section coordinates in the Coastal Structure Calculator.

3.4.3. Assumptions. Perpendicular wave attack and the corresponding berm influence factor were used when computing the stone sizes. Generally, the cross sections from the feasibility report were used to determine the roughness factor, porosity, and stability coefficient, assuming random placement of two layers of armor stone. However, the side slopes were revised from 1.5:1 to 2:1. These cross sections were also used to determine the ratio of the underlayer weight to the armor weight. The zero-damage level and number of waves are based on feedback from ERDC and the 2005 "Life-Cycle Analysis of Mid-Bay and Poplar Island Projects" report provided by ERDC.

3.4.4. Stone Size Methodology. Three methodologies are analyzed using the Coastal Structure Calculator: Melby & Hughes, Hudson, and Low Crest. The Hudson method assumes a very tall structure with no overtopping. The Melby & Hughes method assumes a smaller structure with minimal overtopping. The Low Crest method assumes a small structure with waves crashing directly on the crest and is the most applicable to the Barren Island stone structures. The Low Crest method produces the largest stone sizes of the three methods because the crest of the structure is most vulnerable to rock displacement. Input data and results from the stone sizing computations are provided in Appendix B.

Table 1 Proposed Stone Sizes

Structure	Computed Stone Size W50 (lb)	Proposed Stone Size W50 (lb)
Northeast Sill	2025	2100
Modification of Existing Sill	3038	3500
Southwest Sill	3265	3500
Southeast Sill	3520	3500
Breakwater	4111	4200

3.5 Subsurface Investigation and Laboratory Testing. Three separate subsurface explorations have been performed at Barren Island. Details and results of the first two explorations can be found in the final Feasibility Report and EIS. The third and latest round of exploration was undertaken as design support for Phase 1 of the BIR Project. Details of this task are fully described in Appendix D

3.6 Design of Cross Section of Sill and Breakwater. Cross sections of the sill and breakwater were designed with sea level rise resiliency in mind. The crest width will be wider such that the structures' overall elevation can be increased if need be at a future date to accommodate higher sea levels. The sills were only designed for energy dissipation and are meant to be free-standing; i.e. the stability of the sill does not require a backfill to provide support. The sills will require modification for dredge spoil containment.

3.6.1 Sill Cross Section Description. The four sill alignments share the same geometry and elevations. All the sills will be built to an elevation of 3.5 ft, have a crest width of 10.8 feet, and side slopes of 2:1. The NE sill has a smaller W_{50} armor stone of 2100 pounds, whereas the remaining sills share a W_{50} of 3500 pounds. The sills will be constructed on top of a geotextile filter with a bedding layer of quarry spalls. A more detailed description on the sill cross section is provided in Appendix D

3.6.2 Breakwater Cross Section Description. The breakwater will have a crest width of 10.8 feet, be built to an elevation of 5.5 ft, and will have 2:1 slopes. The W_{50} of the armor stone is 4200 pounds. The breakwater will be constructed on top of a geotextile filter and a bedding of core stone. A more detailed description on the sill cross section is provided in Appendix D.

Table 2 Structure Cross Section Geometry

Alignment	Crest Width	Crest Elevation (NAVD 88)	Armor Stone W_{50}	Side Slope (H:V)
Northeast Sill	10.8 ft	3.5 ft	2100 pounds	2:1
Modification of Existing Sill	10.8 ft	3.5 ft	3500 pounds	2:1
Southwest Sill	10.8 ft	3.5 ft	3500 pounds	2:1
Southeast Sill	10.8 ft	3.5 ft	3500 pounds	2:1
Breakwater	10.8 ft	5.5 ft	4200 pounds	2:1

3.7 Slope Stability Analysis. A detailed slope stability analysis has been provided in Appendix D.

3.8 Stone Structures Foundation Considerations. As detailed in Appendix D, poor soil conditions were identified along the alignment laid down in the Feasibility Report and EIS. Where avoidable, the alignment has been shifted. Where the Design Team determined the alignment could not be shifted, foundation removal and replacement has been proposed. There will be no foundation removal and replacement under Phase 1 of the project.

3.9 Sea Level Rise Resiliency Considerations

Coastal areas are vulnerable to hazards posed by waves and surges associated with sea level rise and coastal storms. These hazards can cause damages to human life and property as well as ecosystems. Recent hurricane events have demonstrated the increasing vulnerability of coastal areas to natural disasters through the combination of sea level rise, land subsidence, and erosion. Sea level will continue to rise; however, much uncertainty still surrounds the expected magnitude of sea level rise.

The Mid-Bay ecosystem restoration project will restore remote Barren Island habitat, a vanishing ecosystem component within the Chesapeake Bay region. Loss of remote island habitat within the Mid-Bay has been estimated at approximately 10,500 acres in the last 150 years, a trend that will continue because of erosive coastal forces and sea level rise. Beneficial use of dredged material will be used as a method of replacing lost habitats. Armoring, or "hardening", a shoreline is a protection measure that typically consists of installing dikes, riprap, or bulkheads adjacent to a shoreline to prevent erosion. For Barren Island, stone sills will be used to attenuate waves and provide protection against erosion during coastal storms and hurricanes. Measures outlined above will reduce vulnerabilities from coastal forces and sea level rise and will increase resiliency for Barren Island. Further sea level rise analysis is provided in Appendix C.

3.10 Real Estate Considerations. The Government will exercise its right of navigational servitude for construction of the project on lands below the mean high-water line. However, it is noted that the State of Maryland owns the bay bottom in fee simple. The majority of Barren Island is owned by the Federal Government and is managed by the USFWS as part of the Chesapeake Island Wildlife Refuge Complex. Since there will be construction on the shoreline of Barren Island, possibly overlapping the mean high water line, a Special Use Permit, will be obtained from the USFWS for project purposes for an area near the shore during the design phase of the project. During the construction phase of the project, the Corps is working to secure an Authorization for Entry for Construction real estate instrument, on behalf of the Non-Federal Sponsor, to acquire the rights to construct the project on USFWS shoreline lands. Additionally, as requested by the USFWS, a Memorandum of Understanding will be executed, further outlining the relationship between both government agencies for the Mid-Bay Project. The dredged material utilized to fill the Mid-Bay Project sites will be from several navigation projects around the Chesapeake Bay. No additional real estate will have to be acquired in conjunction with the project, other than a yet to be determined temporary leased staging and harbor area on the mainland.

3.11 Operations and Maintenance Considerations. In accordance with the Project Management Plan, the Operations, Maintenance, Repair, Replacement and Rehabilitation (OMRR&R) manual will be prepared under the guidance of the Project Design Team consisting of the representatives from USACE and MPA.

REFERENCES (to be completed)

APPENDIX A

DDR PLAN SET

MARYLAND DEPARTMENT OF TRANSPORTATION

MARYLAND PORT ADMINISTRATION

MID-CHESAPEAKE BAY ISLAND ECOSYSTEM RESTORATION PROJECT, CHESAPEAKE BAY

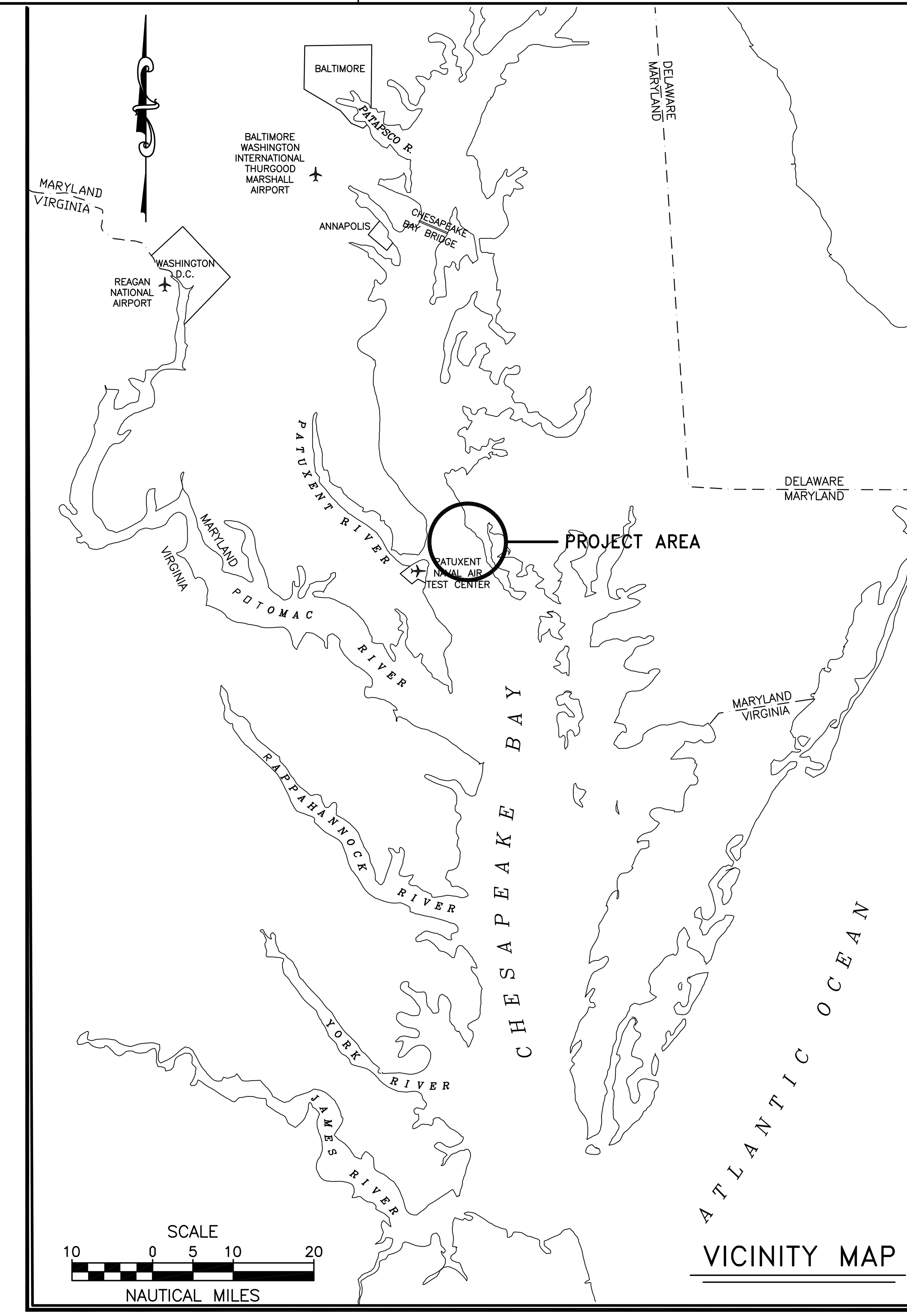
DORCHESTER COUNTY,
MARYLAND

BARREN ISLAND RESTORATION STONE STRUCTURES

MID-CHESAPEAKE BAY ISLAND ECOSYSTEM
RESTORATION PROJECT
DORCHESTER COUNTY, MARYLAND

BARREN ISLAND RESTORATION STONE STRUCTURES

INDEX OF DRAWINGS				
PLATE NO.	TITLE	FILE & MAP NO.	FILE NAME	SHEET NO.
	GENERAL			
1	COVER SHEET		514GI000	GI000
2	INDEX, LEGEND, AND VICINITY MAP		514GI001	GI001
3	GENERAL NOTES - PLACEHOLDER		514GI002	GI002
4	SURVEY CONTROL PLAN - PLACEHOLDER		514VH001	VH001
	CIVIL			
5	SITE PLAN - KEY MAP		514C101	C101
6	NORTHEAST STONE SILL PLAN (1 OF 4)		514C102	C102
7	NORTHEAST STONE SILL PLAN (2 OF 4)		514C103	C103
8	NORTHEAST STONE SILL PLAN (3 OF 4)		514C104	C104
9	NORTHEAST STONE SILL PLAN (4 OF 4)		514C105	C105
10	MODIFICATION OF EXISTING SILL PLAN (1 OF 7)		514C106	C106
11	MODIFICATION OF EXISTING SILL PLAN (2 OF 7)		514C107	C107
12	MODIFICATION OF EXISTING SILL PLAN (3 OF 7)		514C108	C108
13	MODIFICATION OF EXISTING SILL PLAN (4 OF 7)		514C109	C109
14	MODIFICATION OF EXISTING SILL PLAN (5 OF 7)		514C110	C110
15	MODIFICATION OF EXISTING SILL PLAN (6 OF 7)		514C111	C111
16	MODIFICATION OF EXISTING SILL PLAN (7 OF 7)		514C112	C112
17	SOUTHWEST STONE SILL PLAN (1 OF 4)		514C113	C113
18	SOUTHWEST STONE SILL PLAN (2 OF 4)		514C114	C114
19	SOUTHWEST STONE SILL PLAN (3 OF 4)		514C115	C115
20	SOUTHWEST STONE SILL PLAN (4 OF 4)		514C116	C116
21	SOUTHEAST STONE SILL PLAN (1 OF 1)		514C117	C117
22	STONE BREAKWATER PLAN (1 OF 2)		514C118	C118
23	STONE BREAKWATER PLAN (2 OF 2)		514C119	C119
24	BIRD ISLAND A PLAN (1 OF 2)		514C120	C120
25	BIRD ISLAND A PLAN (2 OF 2)		514C121	C121
26	BIRD ISLAND M PLAN (1 OF 2)		514C122	C122
27	BIRD ISLAND M PLAN (2 OF 2)		514C123	C123
28	NORTHEAST SILL PROFILE (1 OF 2)		514C201	C201
29	NORTHEAST SILL PROFILE (2 OF 2)		514C202	C202
30	MODIFICATION OF EXISTING SILL PROFILE (1 OF 3)		514C203	C203
31	MODIFICATION OF EXISTING SILL PROFILE (2 OF 3)		514C204	C204
32	MODIFICATION OF EXISTING SILL PROFILE (3 OF 3)		514C205	C205
33	SOUTHWEST SILL PROFILE (1 OF 2)		514C206	C206
34	SOUTHWEST SILL PROFILE (2 OF 2)		514C207	C207
35	SOUTHEAST SILL PROFILE (1 OF 1)		514C208	C208
36	BREAKWATER PROFILE (1 OF 1)		514C209	C209
37	ISLAND A PROFILE (1 OF 1)		514C210	C210
38	ISLAND M PROFILE (1 OF 1)		514C211	C211
39	CROSS SECTIONS		514C301	C301
40	EROSION AND SEDIMENT CONTROL GENERAL NOTES		514ES001	ES001
41	EROSION AND SEDIMENT CONTROL PLAN (1 OF 2)		514ES101	ES101
42	EROSION AND SEDIMENT CONTROL PLAN (2 OF 2)		514ES102	ES102



LEGEND

- EXISTING MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- SUBMERGED AQUATIC VEGETATION (SAV)
- SLOPE INDICATOR
- POSITION MARKER
- TREE LINE
- SAV — LIMITS OF SAV
- 2.0 — PROPOSED CONTOUR
- POINT OF INTERSECTION
- LOD — LIMIT OF DISTURBANCE (LOD)
- CONSTRUCTION BASELINE
- BARREN ISLAND SHORELINE
- MEAN HIGH WATER LINE

THIS PROJECT WAS DESIGNED BY THE BALTIMORE DISTRICT OF THE U.S. ARMY CORPS OF ENGINEERS. THE INITIALS OR SIGNATURES AND REGISTRATION DESIGNATIONS OF INDIVIDUALS APPEAR ON THESE PROJECT DOCUMENTS WITHIN THE SCOPE OF THEIR EMPLOYMENT AS REQUIRED BY ER 1110-1-8152.

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CHIEF, CIVIL WORKS BRANCH

SUBMITTED:

CHIEF, MILITARY DESIGN BRANCH

SUBMITTED:

CHIEF, GEOTECHNICAL BRANCH

APPROVED:

CHIEF, ENGINEERING DIVISION

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BALTIMORE DISTRICT

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SIZE: ANSI D	FILE NAME: 510GI001.DWG		

U.S. ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
BALTIMORE, MARYLAND

ENGINEERING DIVISION

MID-CHESAPEAKE BAY ISLAND ECOSYSTEM RESTORATION PROJECT

PHASE I - BARREN ISLAND
STONE RESTORATION STRUCTURES
INDEX OF DRAWINGS AND VICINITY MAP

SHEET IDENTIFICATION
GI001

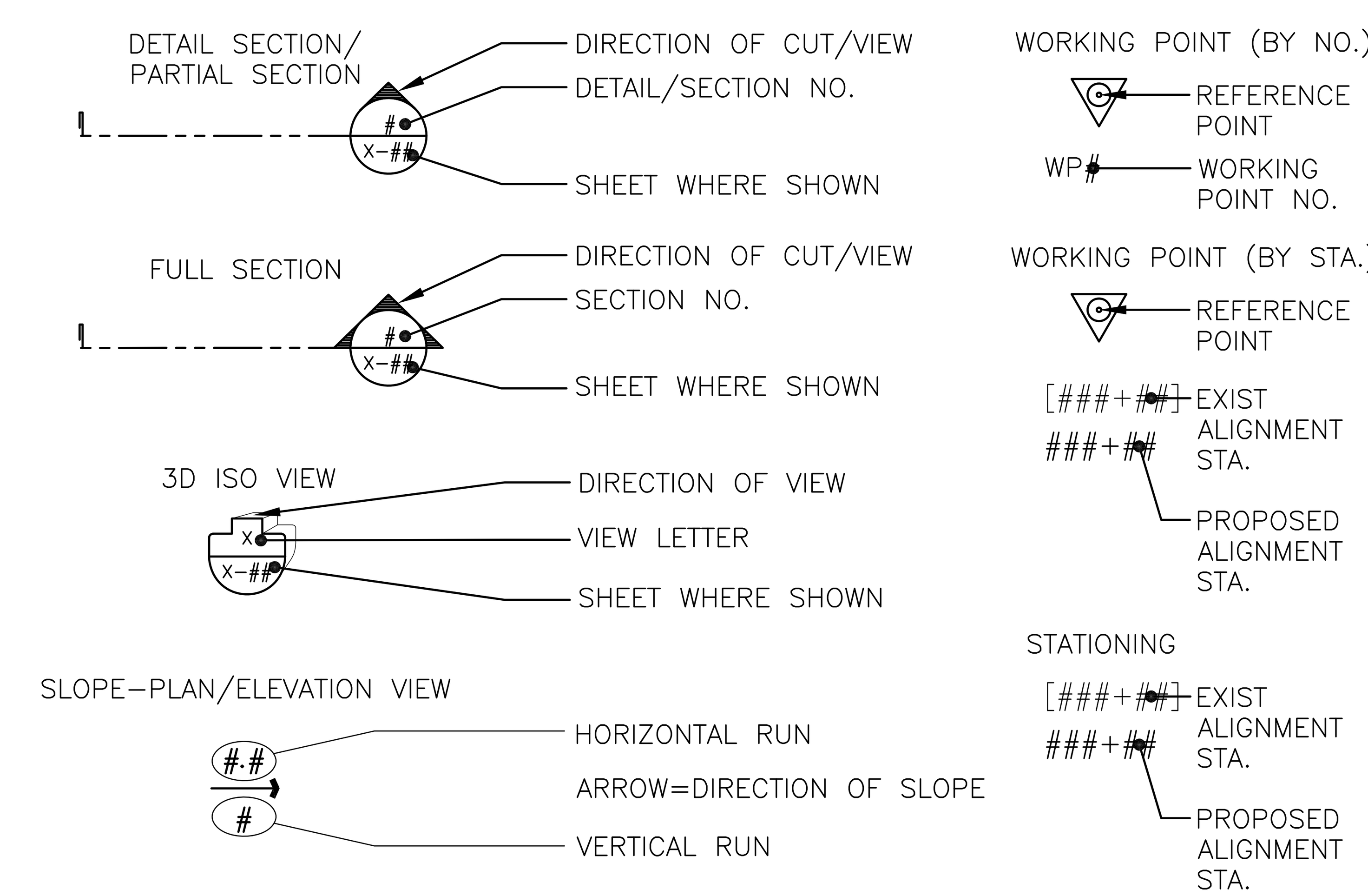
MID-CHESAPEAKE BAY ISLAND ECOSYSTEM RESTORATION PROJECT
DORCHESTER COUNTY, MARYLAND

BARREN ISLAND RESTORATION STONE STRUCTURES

LIST OF ABBREVIATIONS:

&	AND
@	AT
℄	CENTERLINE
Δ	DELTA
#	NUMBER
AASHTO	AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUCTION
APPROX.	APPROXIMATE
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
AWPA	AMERICAN WOOD-PRESERVERS' ASSOCIATION
CADD	COMPUTER AIDED DESIGN AND DRAFTING
CONC	CONCRETE
CONC.	CONCRETE
CONT	CONTINUOUS
DET.	DETAIL
DIA.	DIAMETER
DWG	DRAWING
DWGS	DRAWINGS
E	EAST, EASTING, TABULATED MODULUS OF ELASTICITY
EF	EACH FACE
E.F.	EACH FACE
EW	EACH WAY
E.W.	EACH WAY
ELEV	ELEVATION
ELEV.	ELEVATION
ENC	ELECTRONIC NAVIGATIONAL CHART
EX.	EXISTING
EXIST	EXISTING
EXIST.	EXISTING
Fb	TABULATED BENDING DESIGN VALUE
Fc	TABULATED COMPRESSION DESIGN VALUE PARALLEL TO GRAIN
Fc	TABULATED COMPRESSION DESIGN VALUE PERPENDICULAR TO GRAIN
Ft	TABULATED TENSION DESIGN VALUE PARALLEL TO GRAIN
FT	FEET
FT.	FEET
Fy	YIELD STRENGTH
GAB	GRADED AGGREGATE BASE
GALV.	GALVANIZED
H.S.	HIGH STRENGTH
IN	INCH
IN.	INCH
INFO	INFORMATION
KSI	THOUSANDS OF POUNDS PER SQUARE INCH
LB	POUND, POUNDS
MANUF.	MANUFACTURER
MAX	MAXIMUM
MAX.	MAXIMUM
MES	MARYLAND ENVIRONMENTAL SERVICE
MIN	MINIMUM
MIN.	MINIMUM
MLLW	MEAN LOWER LOW WATER
MSE	MECHANICALLY STABILIZED EARTH
MTL	MEAN TIDE LEVEL
N	NORTH, NORTHING
N.O.B.	NATURAL OYSTER BAR
NAD83	NORTH AMERICAN DATUM OF 1983
NO.	NUMBER
NOAA	NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NTS	NOT TO SCALE
O.C.	ON CENTER
P.C.	POINT OF CURVATURE
P.I.	POINT OF INTERSECTION
P.T.	POINT OF TANGENCY
PCD	POPLAR CONSTRUCTION DATUM
PSI	POUNDS PER SQUARE INCH
R	RADIUS
REV.	REVISION
SC	SILT CURTAIN
SIM.	SIMILAR
STA	STATION
STA.	STATION
STD.	STANDARD
TBD	TO BE DETERMINED
THK	THICK
THRU	THROUGH
TRM	TURF REINFORCED MATTING
TYP	TYPICAL
TYP.	TYPICAL
USACE	UNITED STATES ARMY CORPS OF ENGINEERS
WP	WORKING POINT
W/	WITH

DRAWING SYMBOLS & TAGS:



0.33'	MEAN HIGHER HIGH WATER (MHHW)
0.16'	MEAN HIGH WATER (MHW)
0.00'	NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)
-0.45'	MEAN TIDE LEVEL (MTL)
-1.06'	MEAN LOW WATER (MLW)
-1.22'	MEAN LOWER LOW WATER (MLLW)

TIDAL DATUMS AT BARREN ISLAND, MD FOR THE 1983-2001 TIDAL EPOCH*

NOT TO SCALE

DATUM NOTES

1. ALL COORDINATES ARE IN FEET AND REFERENCE THE MARYLAND STATE PLANE COORDINATE SYSTEM, NORTH AMERICAN DATUM OF 1983 (NAD83).
2. ALL ELEVATIONS ARE IN FEET. UNLESS OTHERWISE NOTED, ALL ELEVATIONS REFERENCE THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)..
3. TIDAL DATUMS ARE BASED ON A TWO YEAR SERIES (JAN 2001-MAR 2003) USING NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION TIDE STATION 8571579 AS THE CONTROL TIDE STATION.

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CHIEF, ENGINEERING DIVISION

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U.S. ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
BALTIMORE, MARYLAND
ENGINEERING DIVISION

MID-CHESAPEAKE BAY ISLAND ECOSYSTEM RESTORATION PROJECT
PHASE I - BARREN ISLAND
STONE RESTORATION STRUCTURES
GENERAL NOTES AND ABBREVIATIONS

SHEET IDENTIFICATION
GI002

NORTHEAST SILL (1)

Number	Radius	Length	Line/Chord Direction
L31		27.94	N25° 54' 23.43"E
C16	200.00	180.38	N0° 04' 06.92"E
L32		298.72	N25° 46' 09.58"W
C17	200.00	34.98	N30° 46' 44.94"W
L33		300.01	N35° 47' 20.30"W
C18	200.00	44.75	N42° 11' 55.40"W
L34		449.86	N48° 36' 30.49"W
C19	200.00	63.67	N57° 43' 43.79"W
L35		473.64	N66° 50' 57.10"W
L36		491.43	N66° 56' 55.03"W
L37		432.47	N66° 51' 26.53"W
L38		397.27	N71° 00' 11.50"W
C20	200.00	32.96	N75° 43' 28.47"W
L39		311.95	N80° 26' 45.45"W
L40		285.07	N84° 45' 08.55"W

MOD EXISTING SILL

Number	Radius	Length	Line/Chord Direction
L96		23.39	N43° 32' 40.31"W
C44	200.00	72.98	N53° 59' 50.84"W
L97		11.29	N64° 27' 01.37"W
C45	24.65	14.62	N81° 26' 12.40"W
L98		31.28	S81° 34' 36.56"W
C46	65.45	40.37	S63° 54' 16.69"W
L99		35.46	S46° 13' 56.81"W
C47	75.46	32.17	S34° 01' 14.97"W
L105		42.50	S21° 48' 33.13"W
L106		30.62	S9° 47' 12.67"W
C48	200.00	66.71	S19° 20' 32.05"W
L107		38.70	S28° 53' 51.43"W
L108		372.24	S33° 08' 25.17"W
L109		152.52	S31° 22' 44.09"W
L110		65.40	S35° 24' 32.78"W
C49	200.00	18.22	S32° 47' 56.15"W
L111		153.64	S30° 11' 19.53"W
L112		168.23	S29° 25' 28.19"W
L113		11.17	S32° 42' 37.86"W
C50	200.00	177.46	S7° 17' 29.30"W

SOUTHEAST SILL (1)

Number	Radius	Length	Line/Chord Direction
L163		32.52	N34° 37' 01.91"E
C74	200.00	70.58	N44° 43' 39.64"E
L164		85.94	N54° 50' 17.38"E
C75	200.00	62.78	N63° 49' 48.90"E
L166		11.76	N72° 49' 20.42"E
L167		193.86	N78° 27' 53.37"E
L168		194.96	N79° 15' 13.67"E
C76	200.00	31.44	N83° 45' 24.44"E
L165		388.94	N88° 15' 35.21"E

SOUTHWEST SILL (1)

Number	Radius	Length	Line/Chord Direction
L154		823.36	S25° 28' 31.76"E
C69	200.00	78.51	S14° 13' 47.50"E
L155		1461.29	S2° 59' 03.25"E
C70	200.00	22.94	S6° 16' 12.63"E
L156		213.56	S9° 33' 22.02"E

BREAKWATER (1)

Number	Radius	Length	Line/Chord Direction
L174		494.42	S9° 33' 21.86"E
L175		278.12	S9° 44' 14.46"E
L176		142.17	S8° 17' 32.91"E
C78	200.00	22.25	S11° 28' 46.81"E
L177		33.92	S14° 40' 00.70"E
L178		435.00	S14° 52' 00.24"E

ISLAND A (1)

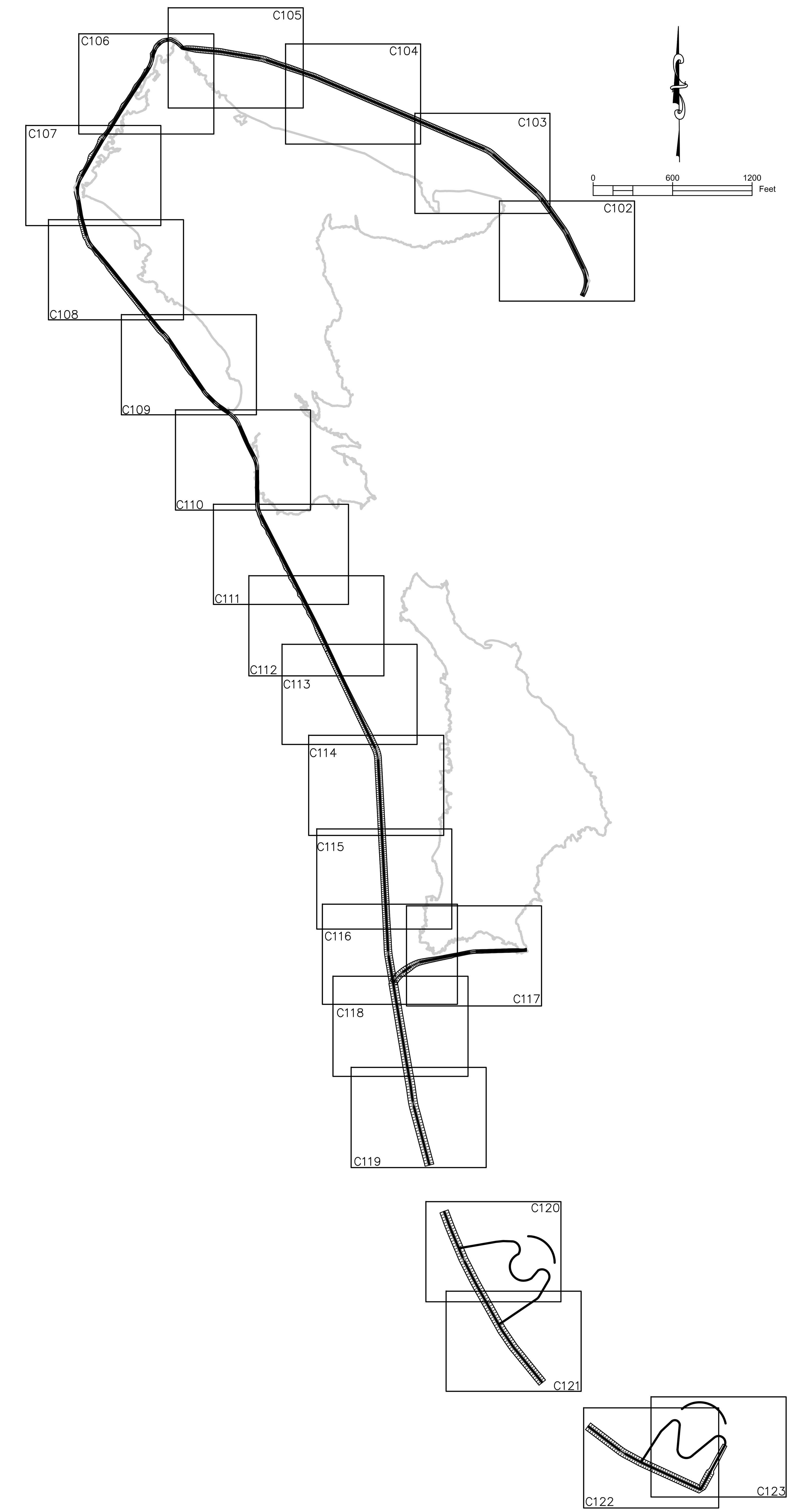
Number	Radius	Length	Line/Chord Direction
L197		128.44	S20° 21' 26.52"E
L198		256.31	S22° 49' 37.72"E
C82	200.00	14.09	S24° 50' 45.98"E
L195		192.27	S26° 51' 54.23"E
L196		409.69	S29° 13' 18.55"E
L194		153.47	S34° 14' 58.99"E
L193		345.73	S39° 06' 07.63"E

ISLAND M (1)

Number	Radius	Length	Line/Chord Direction
L183		310.06	S52° 48' 49.77"E
C80	200.00	30.84	S57° 13' 51.33"E
L184		144.63	S61° 38' 52.89"E
L185		495.21	S65° 24' 12.71"E
L186		383.03	N28° 32' 06.99"E

SHEET STATIONS

SHEET	STRUCTURE	START STATION	END STATION
C102	NORTHEAST SILL	100+00	107+60
C103	NORTHEAST SILL	107+60	119+57
C104	NORTHEAST SILL	119+57	130+08
C105	NORTHEAST SILL	130+08	138+25.09
C106	MOD. EXISTING SILL	200+00	209+50
C107	MOD. EXISTING SILL	209+50	217+38
C108	MOD. EXISTING SILL	217+38	226+20
C109	MOD. EXISTING SILL	226+20	235+63
C110	MOD. EXISTING SILL	235+63	243+50
C111	MOD. EXISTING SILL	243+50	251+34
C112	MOD. EXISTING SILL	251+34	255+48.15
C113	SOUTHWEST SILL	300+00	307+37
C114	SOUTHWEST SILL	307+37	314+58
C115	SOUTHWEST SILL	314+58	321+65
C116	SOUTHWEST SILL	321+65	325+99.66
	SOUTHEAST SILL	400+00	403+00
C117	SOUTHEAST SILL	403+00	410+72.78
C118	BREAKWATER	500+00	506+67
C119	BREAKWATER	506+67	514+05.89
C120	ISLAND A	600+00	607+50
C121	ISLAND A	607+50	615+00
C122	ISLAND M	700+00	711+96
C123	ISLAND M	711+96	713+63.77



US Army Corps of Engineers ®
BALTIMORE DISTRICT

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BALTIMORE DISTRICT
BALTIMORE, MARYLAND

ENGINEERING DIVISION

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DWN BY: | CKD BY: | SOLICITATION NO.: —
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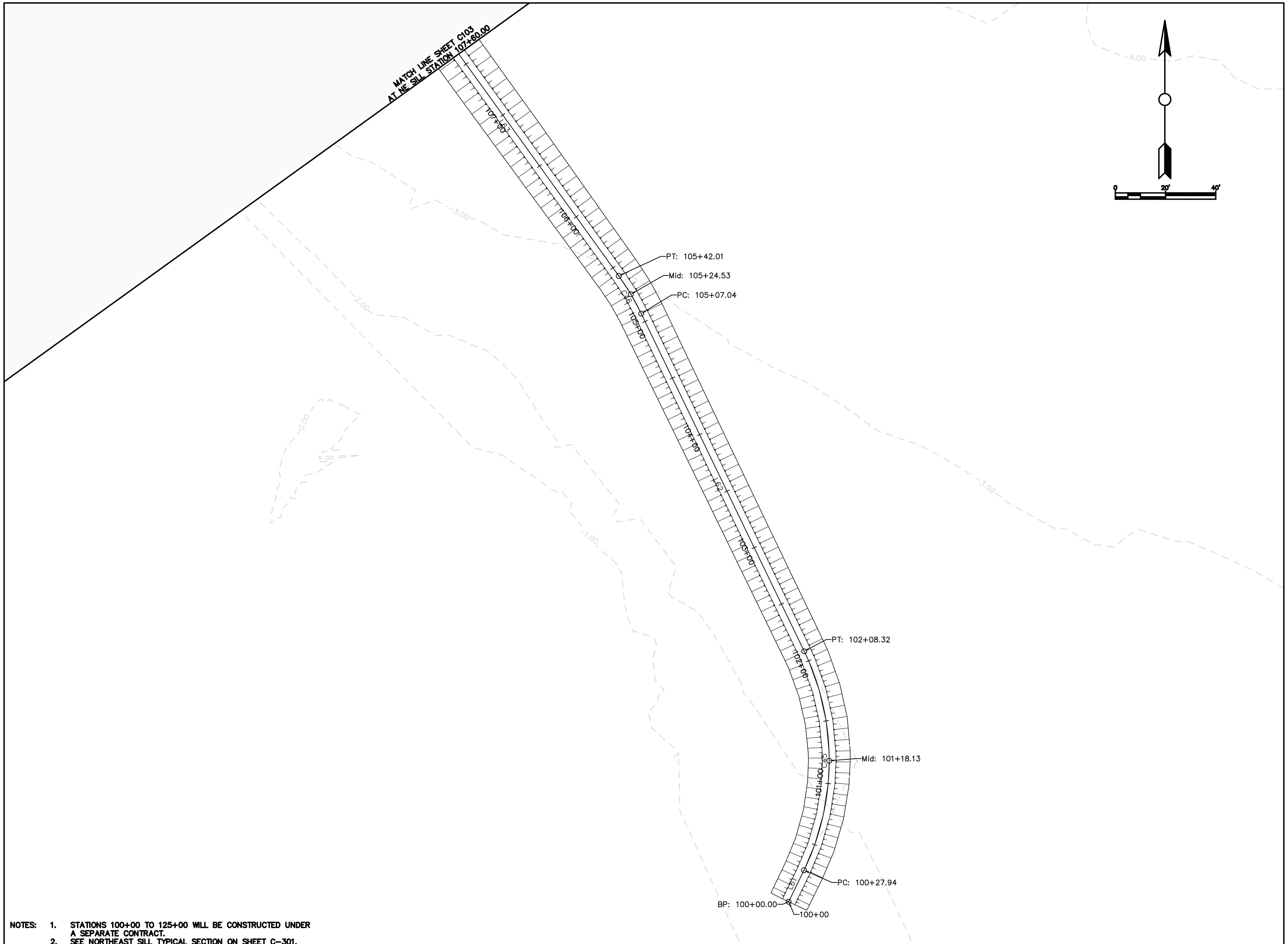
PLOT SCALE: | PLOT DATE: | FILE NUMBER: —
SIZE: ANSI D | FILE NAME:

MID-CHESAPEAKE BAY ISLAND
ECOSYSTEM RESTORATION PROJECT

PHASE I - BARREN ISLAND
STONE RESTORATION STRUCTURES
SITE PLAN - KEY MAP

SHEET IDENTIFICATION
C101



NOTES:
1. STATIONS 100+00 TO 125+00 WILL BE CONSTRUCTED UNDER A SEPARATE CONTRACT.
2. SEE NORTHEAST SILL TYPICAL SECTION ON SHEET C-301.

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MID-CHESAPEAKE BAY ISLAND
ECOSYSTEM RESTORATION PROJECT

PHASE I - BARREN ISLAND
STONE RESTORATION STRUCTURES

NORTHEAST SILL PLAN VIEW

SHEET IDENTIFICATION
C102

NOTES:
1. STATIONS 100+00 TO 125+00 WILL BE CONSTRUCTED UNDER A SEPARATE CONTRACT.
2. SEE NORTHEAST SILL TYPICAL SECTION ON SHEET C-301.

SHEET IDENTIFICATION C103	MID-CHESAPEAKE BAY ISLAND ECOSYSTEM RESTORATION PROJECT PHASE I - BARREN ISLAND STONE RESTORATION STRUCTURES NORTHEAST SILL PLAN VIEW	U.S. ARMY CORPS OF ENGINEERS BALTIMORE DISTRICT BALTIMORE, MARYLAND ENGINEERING DIVISION

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NOTES:
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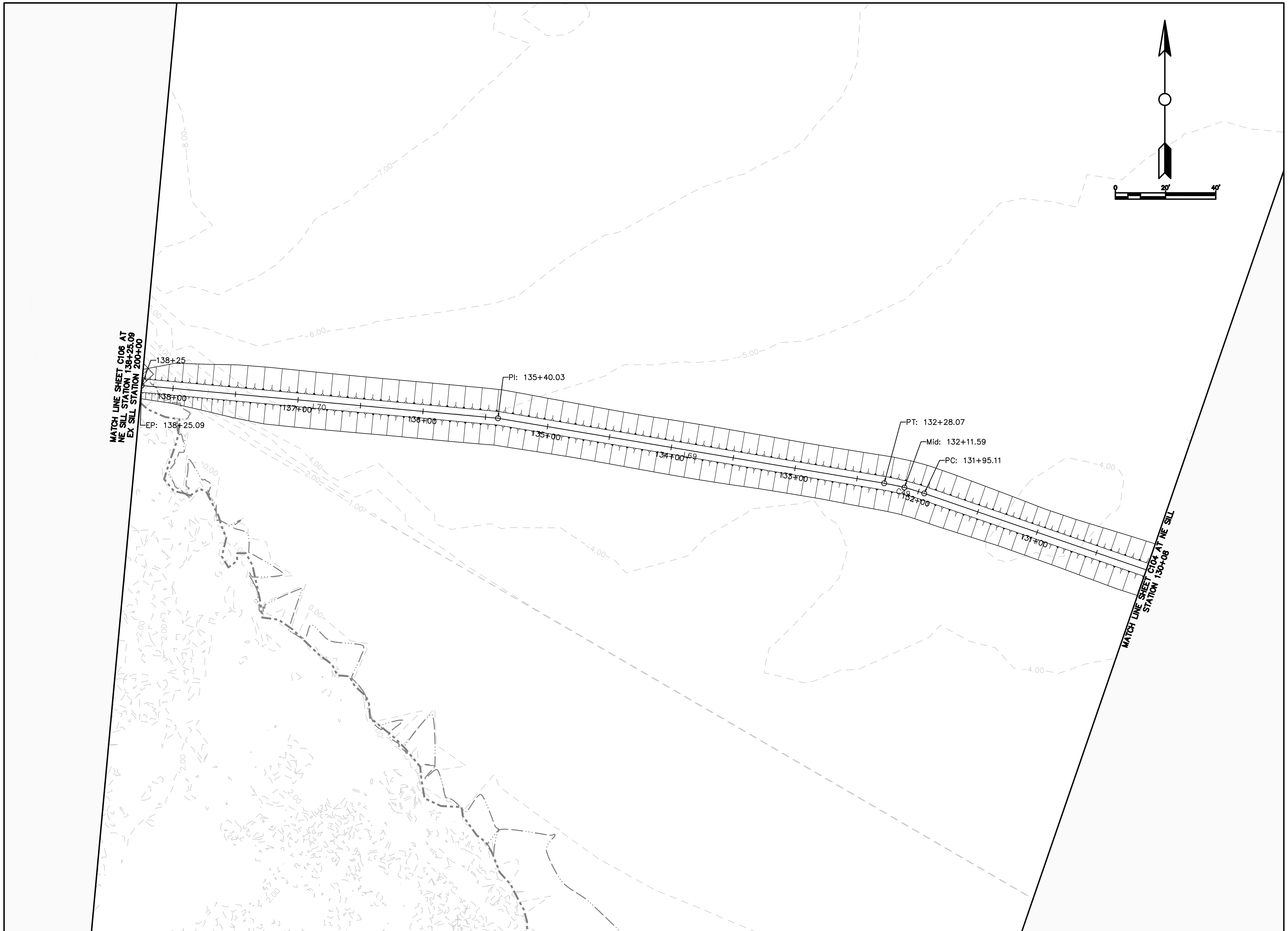
MID-CHESAPEAKE BAY ISLAND
ECOSYSTEM RESTORATION PROJECT

PHASE I - BARREN ISLAND
STONE RESTORATION STRUCTURES

NORTHEAST SILL PLAN VIEW

SHEET IDENTIFICATION
C104



NOTES: 1. SEE NORTHEAST SILL TYPICAL SECTION ON SHEET C-301.

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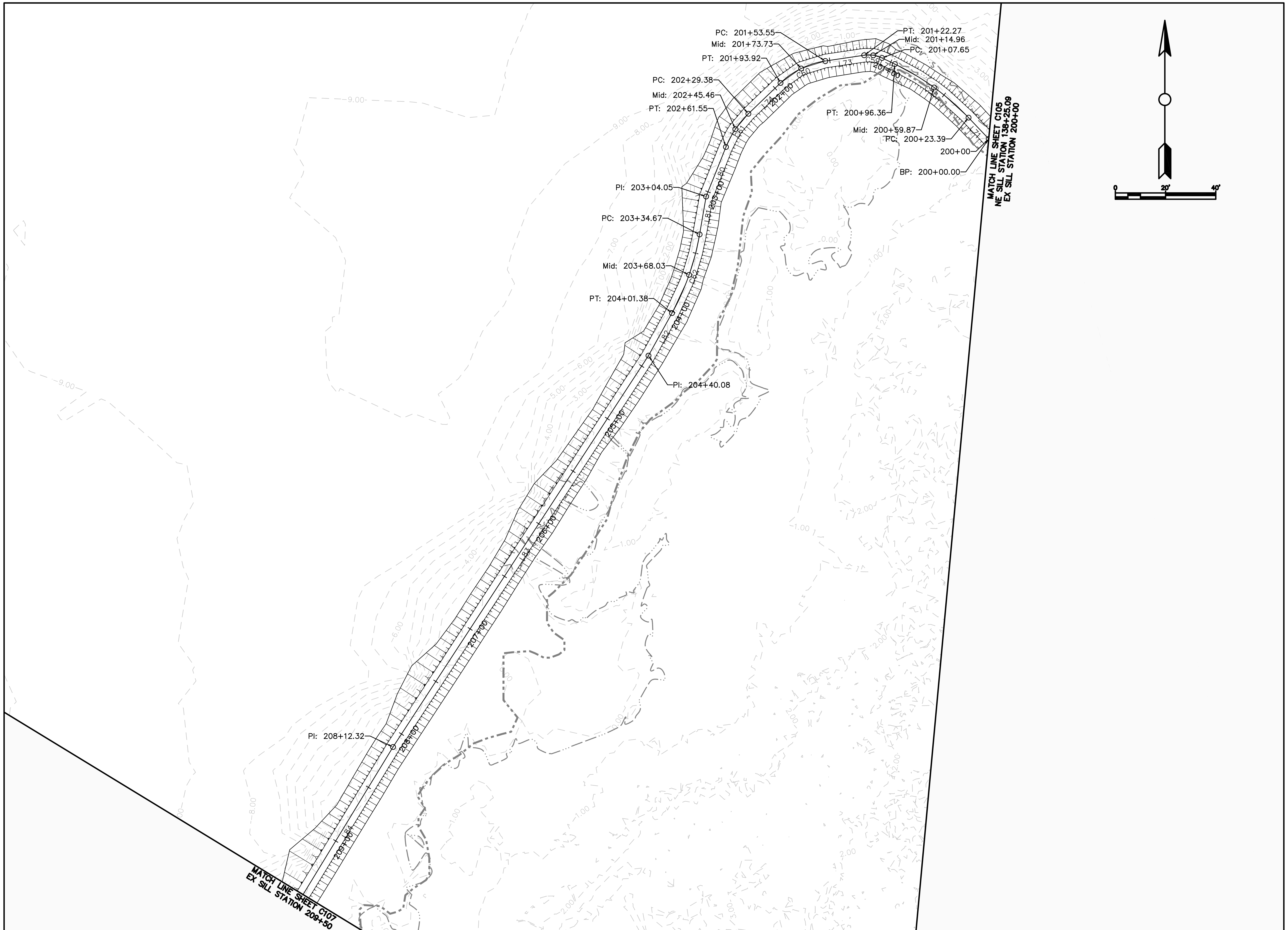
MID-CHESAPEAKE BAY ISLAND
ECOSYSTEM RESTORATION PROJECT
PHASE I - BARREN ISLAND
STONE RESTORATION STRUCTURES

NORTHEAST SILL PLAN VIEW

SHEET IDENTIFICATION
C105



NOTES: 1. SEE MODIFICATION OF EXISTING SILL TYPICAL SECTION ON SHEET C-301.

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BALTIMORE DISTRICT
BALTIMORE, MARYLAND

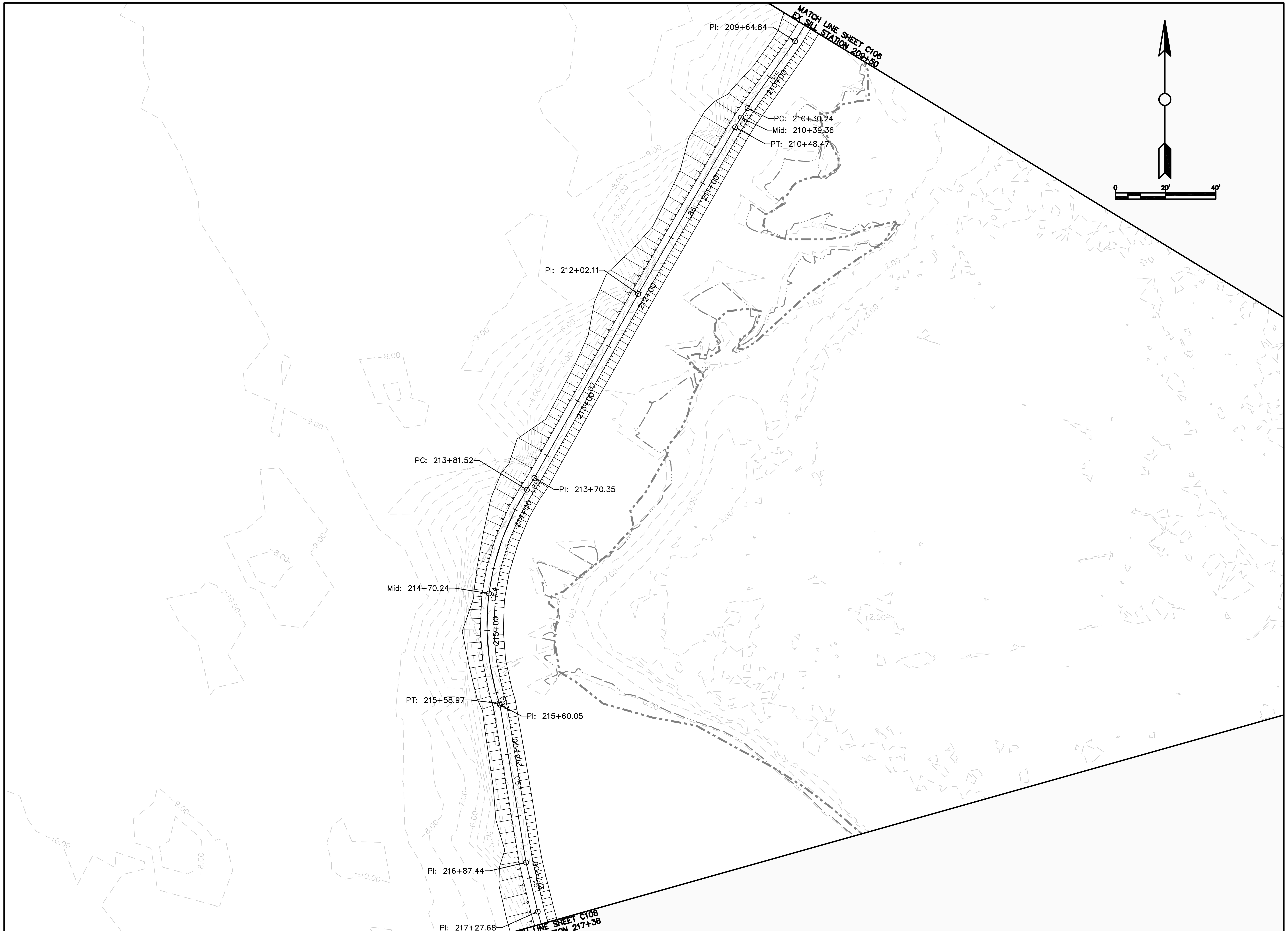
ENGINEERING DIVISION

MID-CHESAPEAKE BAY ISLAND
ECOSYSTEM RESTORATION PROJECT

PHASE I - BARREN ISLAND
STONE RESTORATION STRUCTURES

MODIFICATION OF EXISTING SILL PLAN VIEW

SHEET IDENTIFICATION
C106



NOTES: 1. SEE MODIFICATION OF EXISTING SILL TYPICAL SECTION ON SHEET C-301.

US Army Corps of Engineers ®
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U.S. ARMY CORPS OF ENGINEERS
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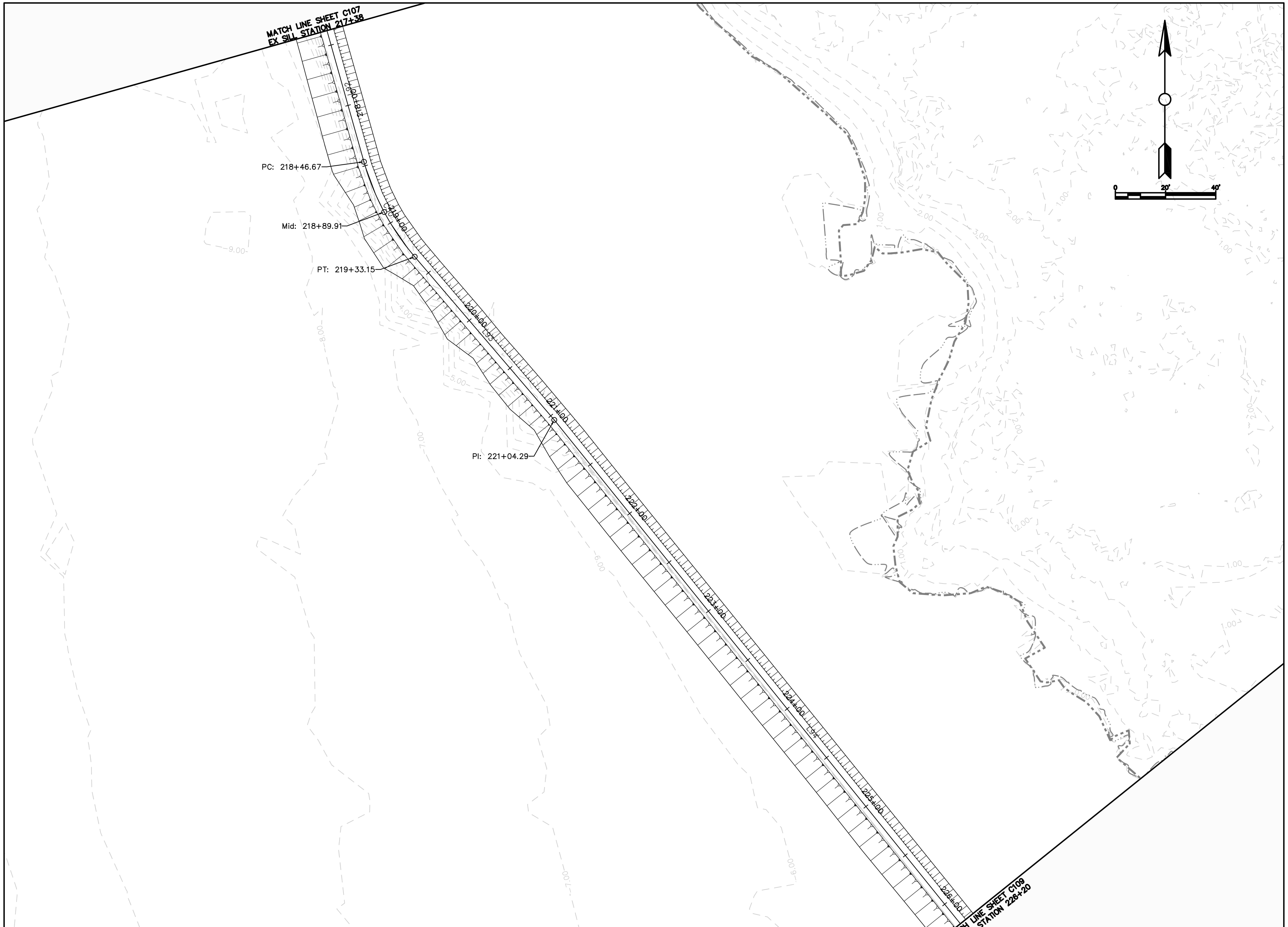
MID-CHESAPEAKE BAY ISLAND
ECOSYSTEM RESTORATION PROJECT

PHASE I - BARREN ISLAND
STONE RESTORATION STRUCTURES
MODIFICATION OF EXISTING SILL PLAN VIEW

SHEET IDENTIFICATION
C107



NOTES: 1. SEE MODIFICATION OF EXISTING SILL TYPICAL SECTION ON SHEET C-301.

US Army Corps of Engineers ®
BALTIMORE DISTRICT

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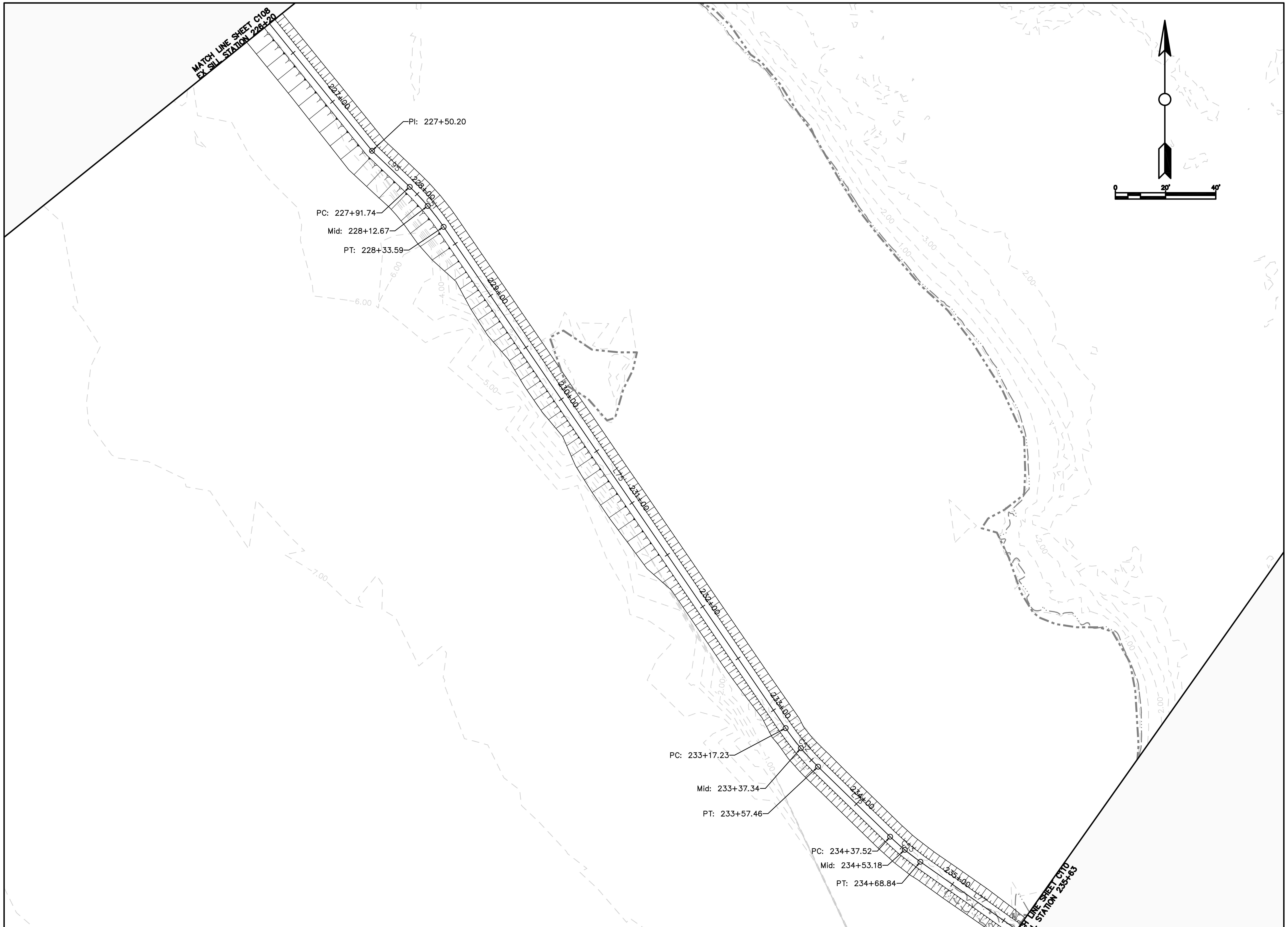
MID-CHESAPEAKE BAY ISLAND
ECOSYSTEM RESTORATION PROJECT
PHASE I - BARREN ISLAND
STONE RESTORATION STRUCTURES
MODIFICATION OF EXISTING SILL PLAN VIEW

SHEET IDENTIFICATION
C108



NOTES: 1. SEE MODIFICATION OF EXISTING SILL TYPICAL SECTION ON SHEET C-301.

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BALTIMORE, MARYLAND

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ECOSYSTEM RESTORATION PROJECT

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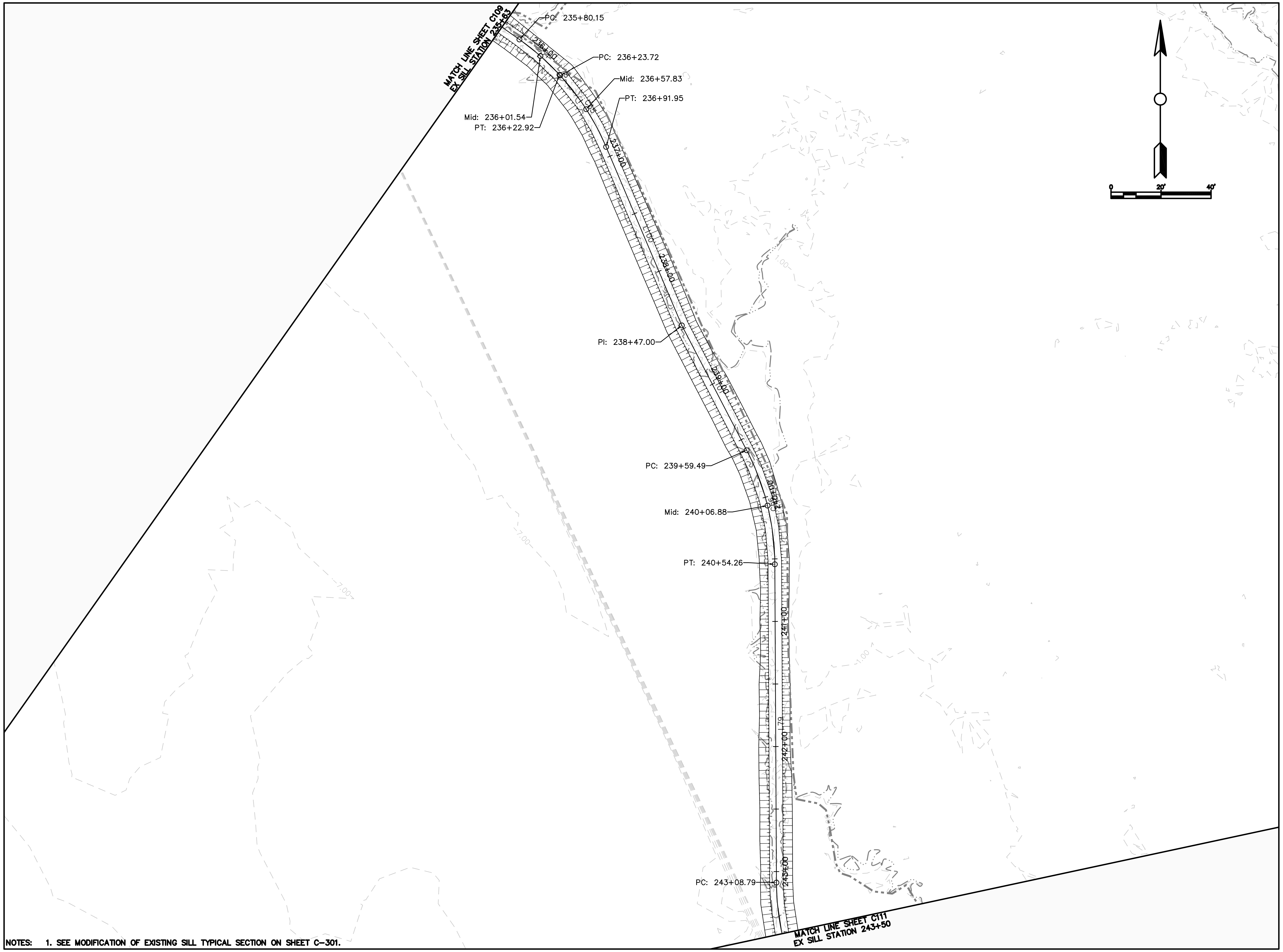
MODIFICATION OF EXISTING SILL PLAN VIEW

SHEET IDENTIFICATION
C109



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MID-CHESAPEAKE BAY ISLAND
ECOSYSTEM RESTORATION PROJECT

PHASE I - BARREN ISLAND
STONE RESTORATION STRUCTURES

MODIFICATION OF EXISTING SILL PLAN VIEW

SHEET IDENTIFICATION
C110

NOTES: 1. SEE MODIFICATION OF EXISTING SILL TYPICAL SECTION ON SHEET C-301.

US Army Corps of Engineers ®
BALTIMORE DISTRICT

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MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
BALTIMORE, MARYLAND

ENGINEERING DIVISION

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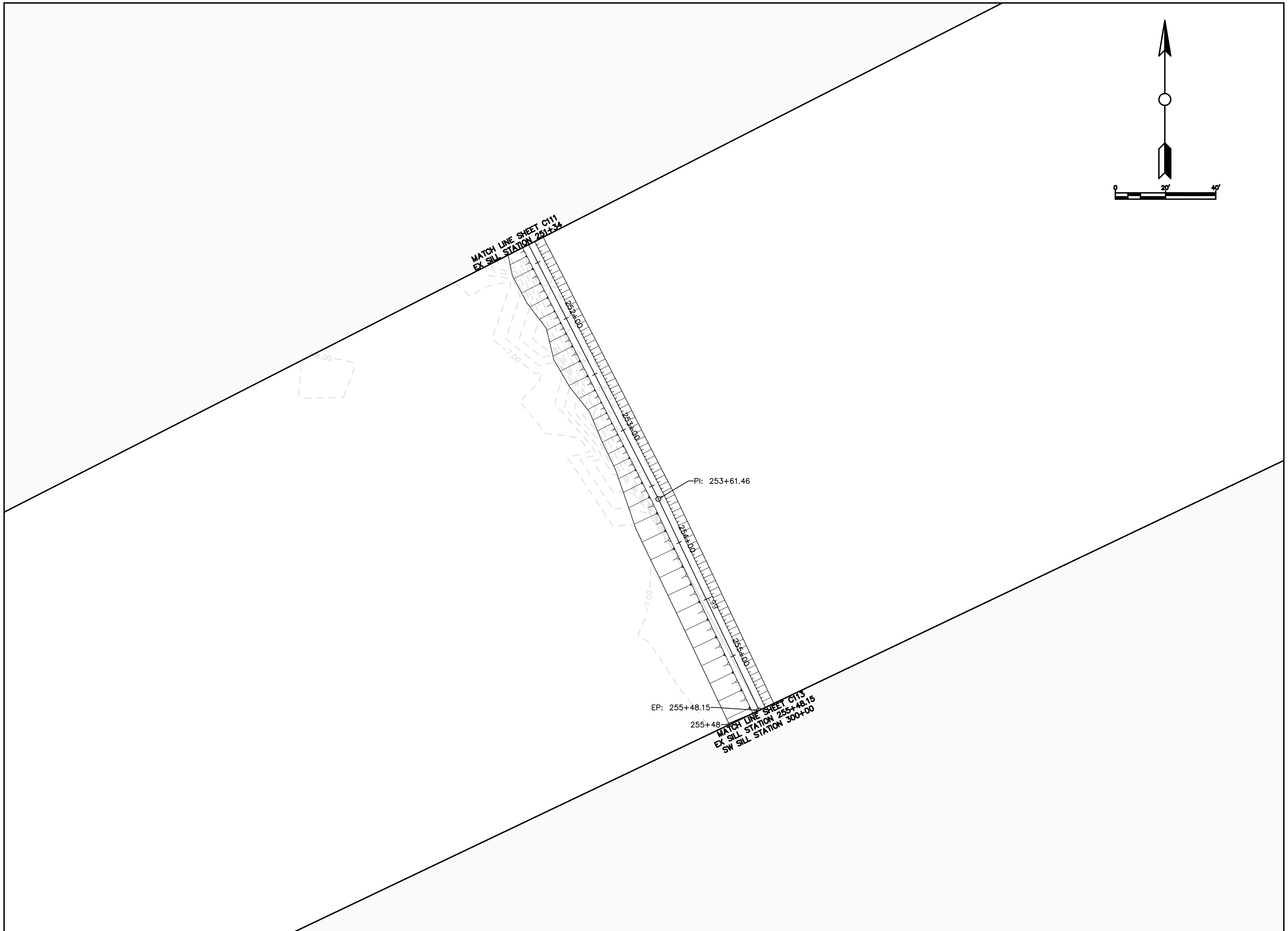
PLOT SCALE: | PLOT DATE: | FILE NUMBER: —
SIZE: ANSI D | FILE NAME:

MID-CHESAPEAKE BAY ISLAND
ECOSYSTEM RESTORATION PROJECT

PHASE I - BARREN ISLAND
STONE RESTORATION STRUCTURES
MODIFICATION OF EXISTING SILL PLAN VIEW

SHEET IDENTIFICATION
C111



NOTES: 1. SEE MODIFICATION OF EXISTING SILL TYPICAL SECTION ON SHEET C-301.

US Army Corps of Engineers ®
BALTIMORE DISTRICT

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MARK	DESCRIPTION	DATE	APPR.

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PLOT SCALE: | PLOT DATE: | FILE NUMBER: —
SIZE: ANSI D | FILE NAME:

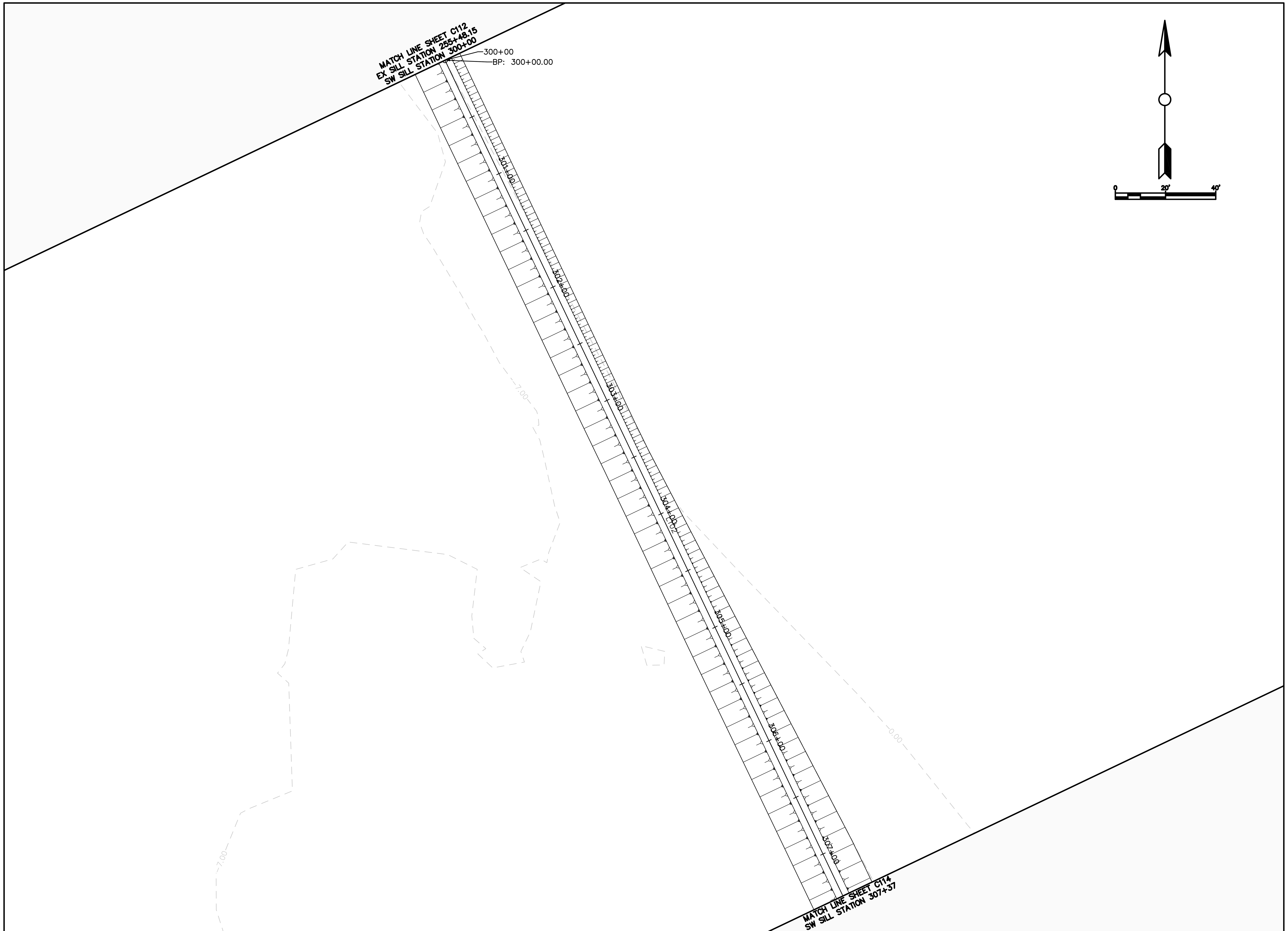
U.S. ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
BALTIMORE, MARYLAND

ENGINEERING DIVISION

MID-CHESAPEAKE BAY ISLAND
ECOSYSTEM RESTORATION PROJECT

PHASE I - BARREN ISLAND
STONE RESTORATION STRUCTURES
MODIFICATION OF EXISTING SILL PLAN VIEW

SHEET IDENTIFICATION
C112



NOTES: 1. SEE SOUTHWEST SILL TYPICAL SECTION ON SHEET C-301.

US Army Corps of Engineers ®
BALTIMORE DISTRICT

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BALTIMORE DISTRICT
BALTIMORE, MARYLAND

ENGINEERING DIVISION

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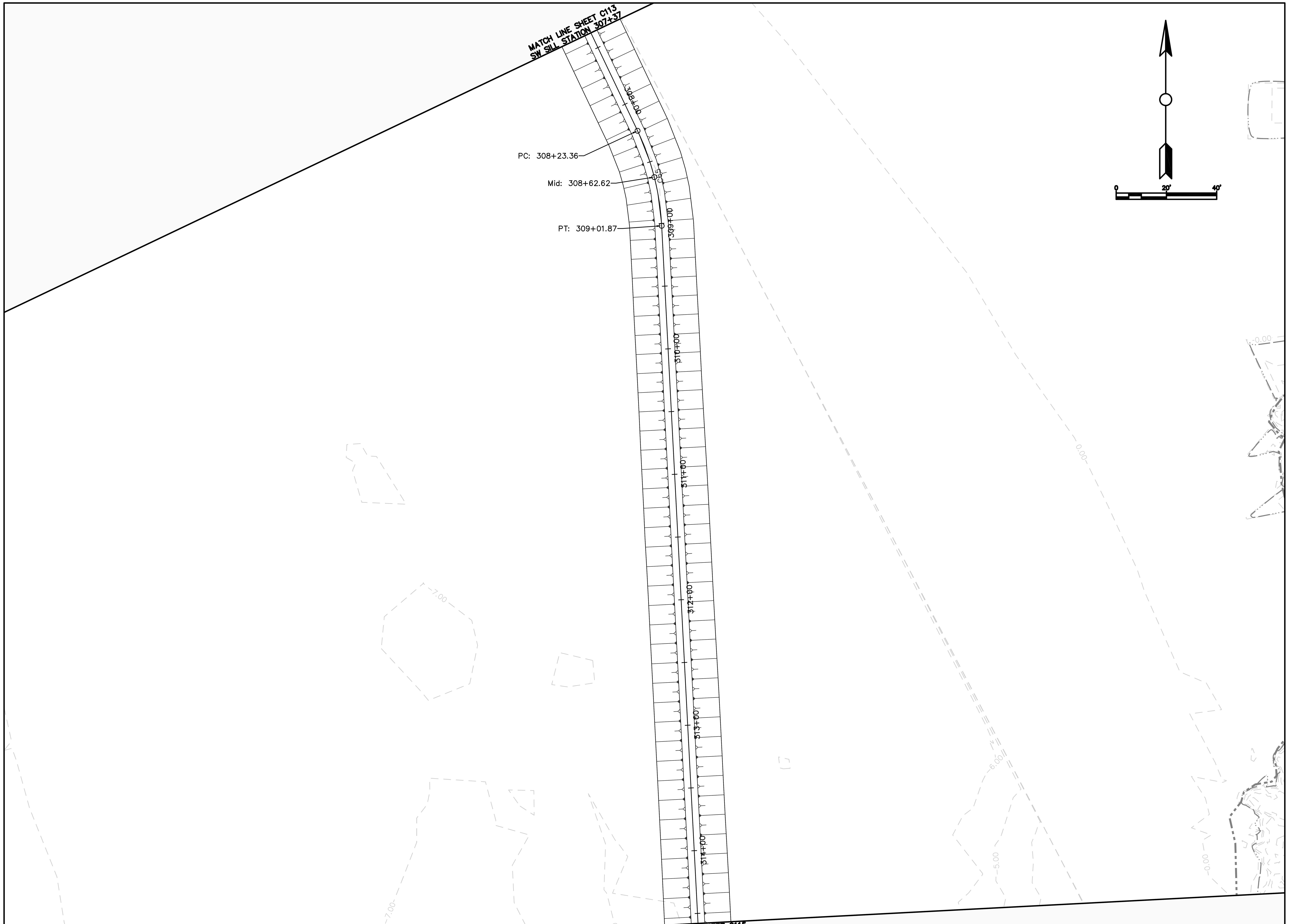
SUBMITTED BY:		CONTRACT NO.: ___
PLOT SCALE:	PLOT DATE:	FILE NUMBER: ___
SIZE: ANSI D	FILE NAME:	

MID-CHESAPEAKE BAY ISLAND
ECOSYSTEM RESTORATION PROJECT

PHASE I - BARREN ISLAND
STONE RESTORATION STRUCTURES

SOUTHWEST SILL PLAN VIEW

SHEET IDENTIFICATION
C113



NOTES: 1. SEE SOUTHWEST SILL TYPICAL SECTION ON SHEET C-301.

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BALTIMORE DISTRICT

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DWN BY: | CKD BY: | SOLICITATION NO.:
SUBMITTED BY: | CONTRACT NO.:
PLOT SCALE: | PLOT DATE: | FILE NUMBER:
SIZE: ANSI D | FILE NAME:

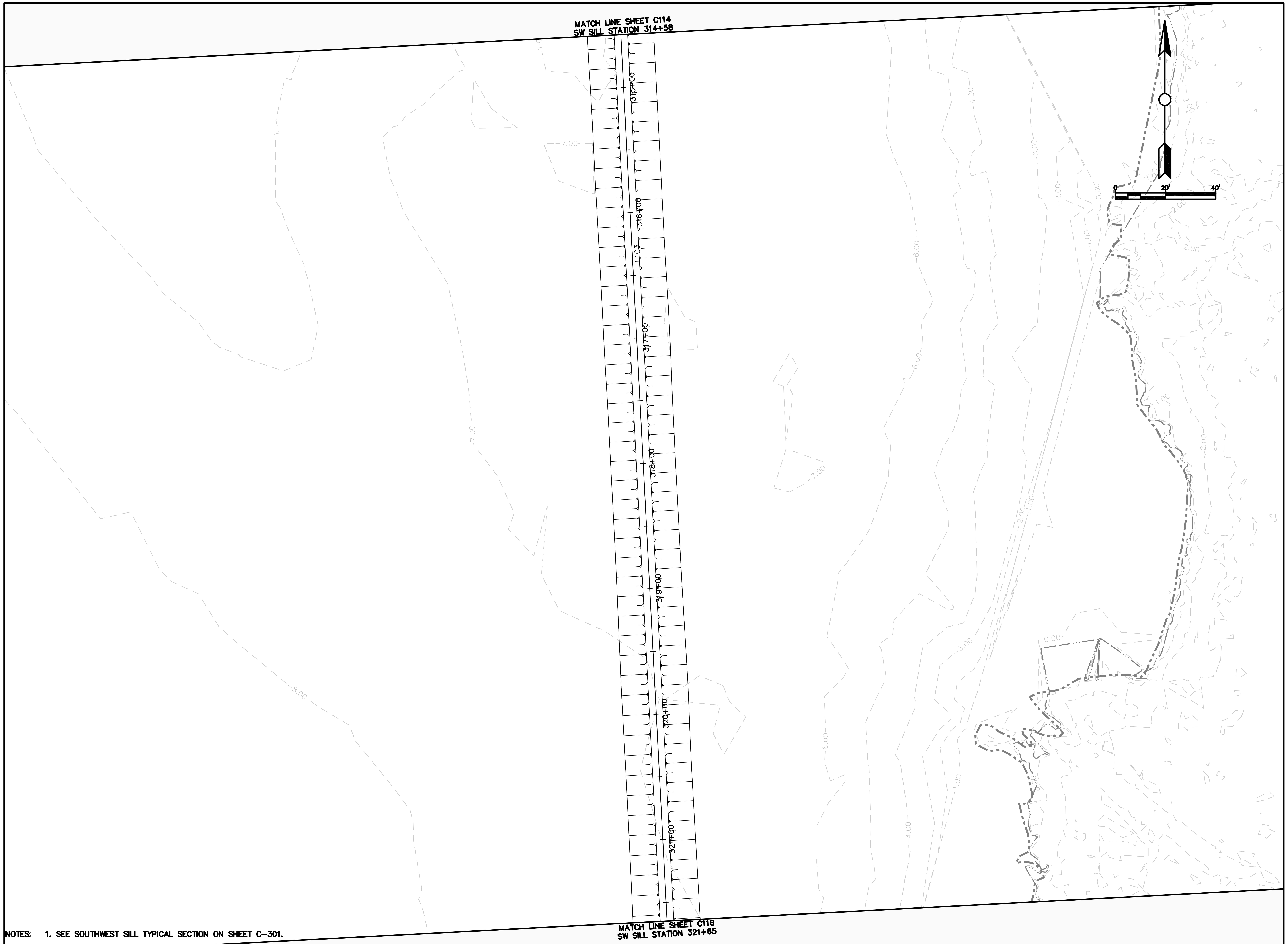
U.S. ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
BALTIMORE, MARYLAND

ENGINEERING DIVISION

MID-CHESAPEAKE BAY ISLAND
ECOSYSTEM RESTORATION PROJECT

PHASE I - BARREN ISLAND
STONE RESTORATION STRUCTURES
SOUTHWEST SILL PLAN VIEW

SHEET IDENTIFICATION
C114



NOTES: 1. SEE SOUTHWEST SILL TYPICAL SECTION ON SHEET C-301.

US Army Corps of Engineers ®
BALTIMORE DISTRICT

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MARK	DESCRIPTION	DATE	APPR

U.S. ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
BALTIMORE, MARYLAND

ENGINEERING DIVISION

DESIGNED BY:			DATE: XXX
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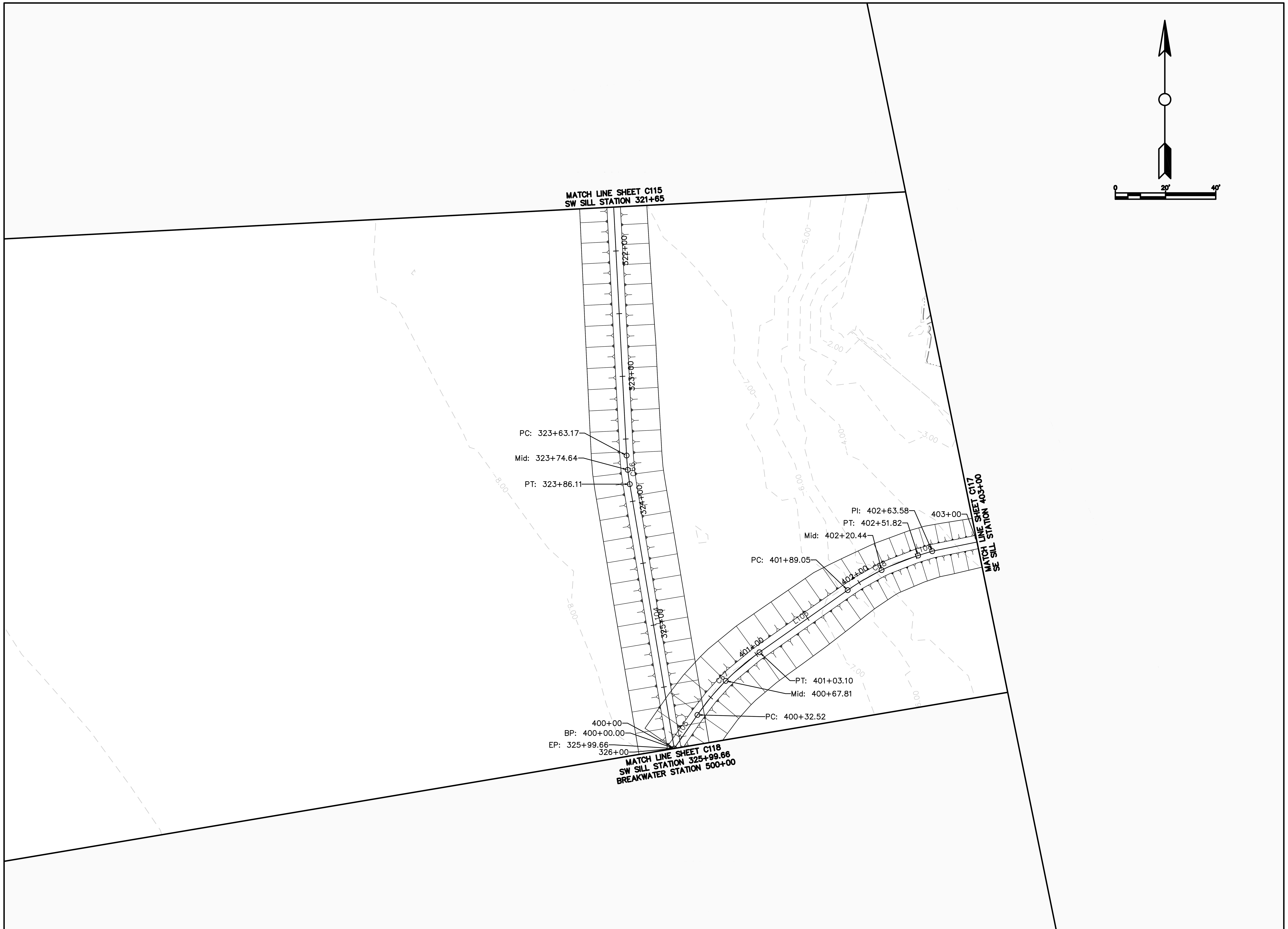
SUBMITTED BY:			CONTRACT NO.:
PLOT SCALE:	PLOT DATE:		FILE NUMBER:
SIZE: ANSI D	FILE NAME:		

MID-CHESAPEAKE BAY ISLAND
ECOSYSTEM RESTORATION PROJECT

PHASE I - BARREN ISLAND
STONE RESTORATION STRUCTURES
SOUTHWEST SILL PLAN VIEW

SHEET IDENTIFICATION
C115



NOTES: 1. SEE SOUTHWEST SILL TYPICAL SECTION ON SHEET C–301.

US Army Corps of Engineers ®
BALTIMORE DISTRICT

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MARK	DESCRIPTION	DATE	APPR

U.S. ARMY CORPS OF ENGINEERS
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ENGINEERING DIVISION

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DWN BY: | CKD BY: | SUBMITTED BY: | PLOT SCALE: | PLOT DATE: | SIZE: ANSI D | FILE NAME:

MID-CHESAPEAKE BAY ISLAND
ECOSYSTEM RESTORATION PROJECT

PHASE I - BARREN ISLAND
STONE RESTORATION STRUCTURES

SOUTHWEST SILL PLAN VIEW

SHEET IDENTIFICATION
C116

NOTES: 1. SEE SOUTHEAST SILL TYPICAL SECTION ON SHEET C-301.

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BALTIMORE DISTRICT

MARK	DESCRIPTION	DATE	APPR

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DWN BY:	CKD BY:	SOLICITATION NO.:	
SUBMITTED BY:		CONTRACT NO.: —	
PLOT SCALE:	PLOT DATE:	FILE NUMBER: —	
SIZE: ANSI D	FILE NAME:		

U.S. ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
BALTIMORE, MARYLAND

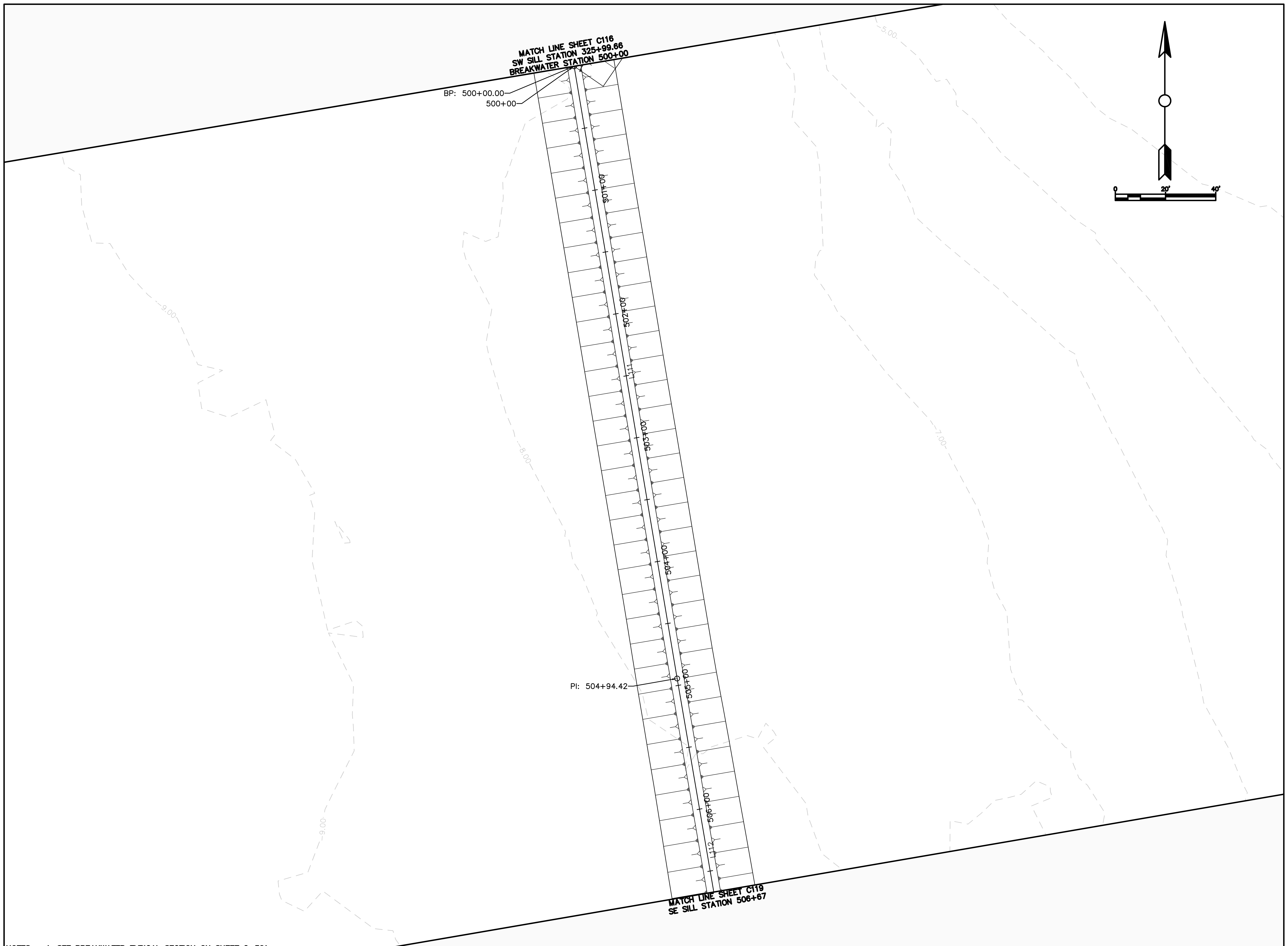
ENGINEERING DIVISION

MID-CHESAPEAKE BAY ISLAND
ECOSYSTEM RESTORATION PROJECT

PHASE I - BARREN ISLAND
STONE RESTORATION STRUCTURES

SOUTHEAST SILL PLAN VIEW

SHEET IDENTIFICATION
C117



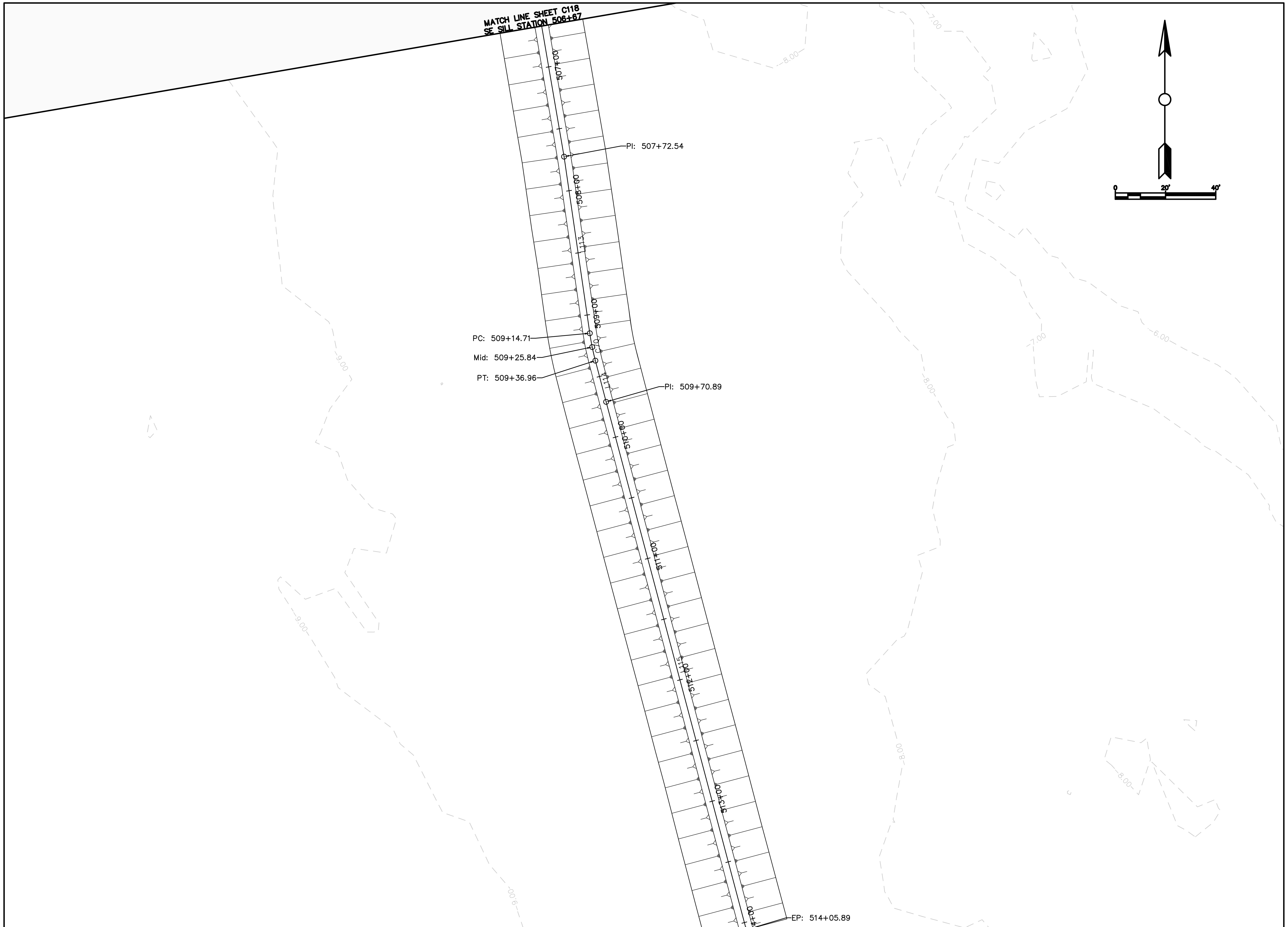
NOTES: 1. SEE BREAKWATER TYPICAL SECTION ON SHEET C-301.

MID-CHESAPEAKE BAY ISLAND ECOSYSTEM RESTORATION PROJECT PHASE I - BARREN ISLAND STONE RESTORATION STRUCTURES BREAKWATER PLAN VIEW	U.S. ARMY CORPS OF ENGINEERS BALTIMORE DISTRICT BALTIMORE, MARYLAND ENGINEERING DIVISION	DESIGNED BY:		DATE: XXX
		DWN BY:	CKD BY:	SOLICITATION NO.: —
		SUBMITTED BY:		CONTRACT NO.: —
		PLOT SCALE:	PLOT DATE:	FILE NUMBER: —
		SIZE: ANSI D	FILE NAME:	

MARK	DESCRIPTION	DATE	APPR.	MARK	DESCRIPTION	DATE	APPR.

US Army Corps of Engineers ®
BALTIMORE DISTRICT

SHEET IDENTIFICATION
C118



NOTES: 1. SEE BREAKWATER TYPICAL SECTION ON SHEET C-301.

US Army Corps of Engineers ®
BALTIMORE DISTRICT

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MARK	DESCRIPTION	DATE	APPR

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U.S. ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
BALTIMORE, MARYLAND

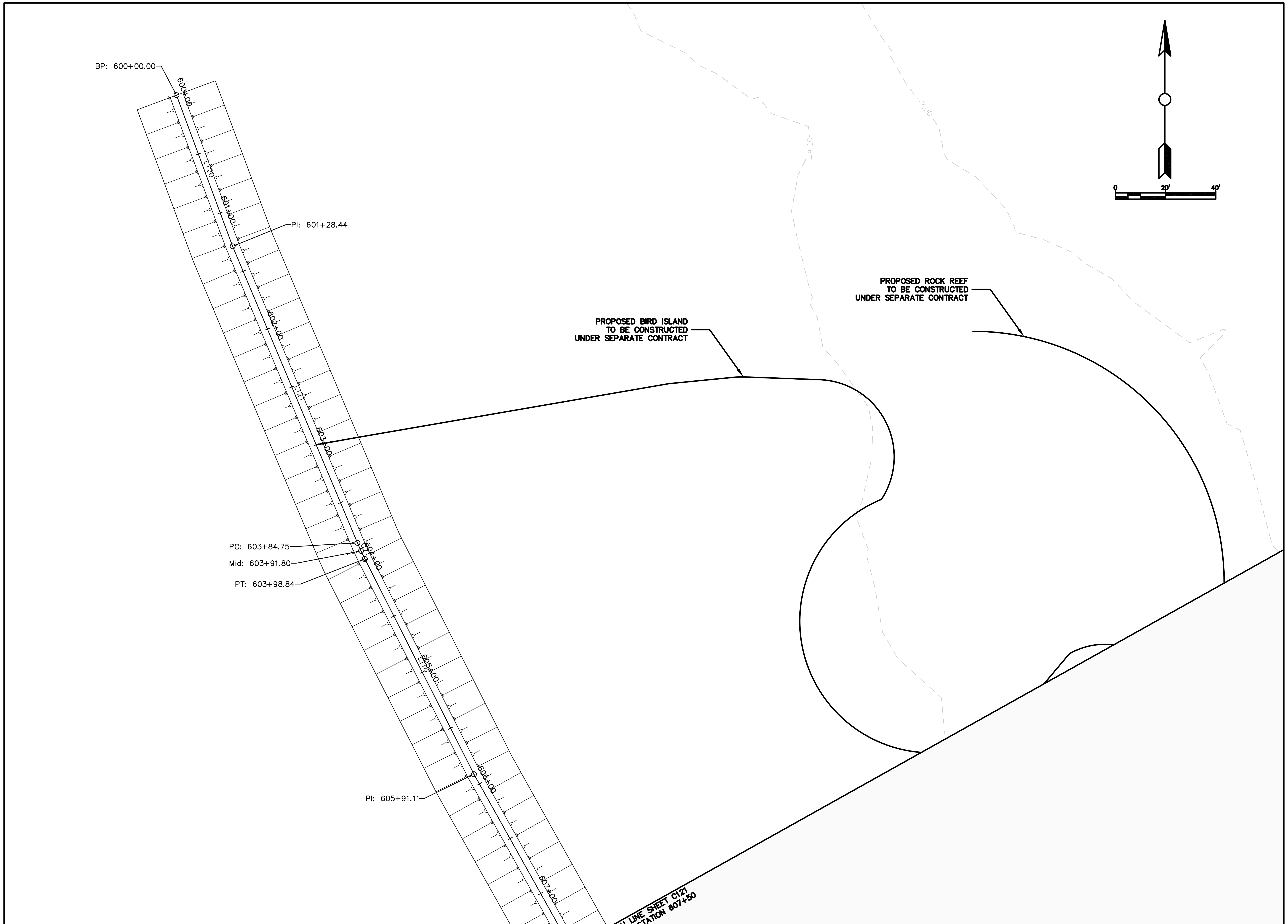
ENGINEERING DIVISION

MID-CHESAPEAKE BAY ISLAND
ECOSYSTEM RESTORATION PROJECT

PHASE I - BARREN ISLAND
STONE RESTORATION STRUCTURES

BREAKWATER PLAN VIEW

SHEET IDENTIFICATION
C119



NOTES: 1. SEE BREAKWATER TYPICAL SECTION ON SHEET C-301.

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BALTIMORE DISTRICT

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MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: | DATE: XXX
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U.S. ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
BALTIMORE, MARYLAND

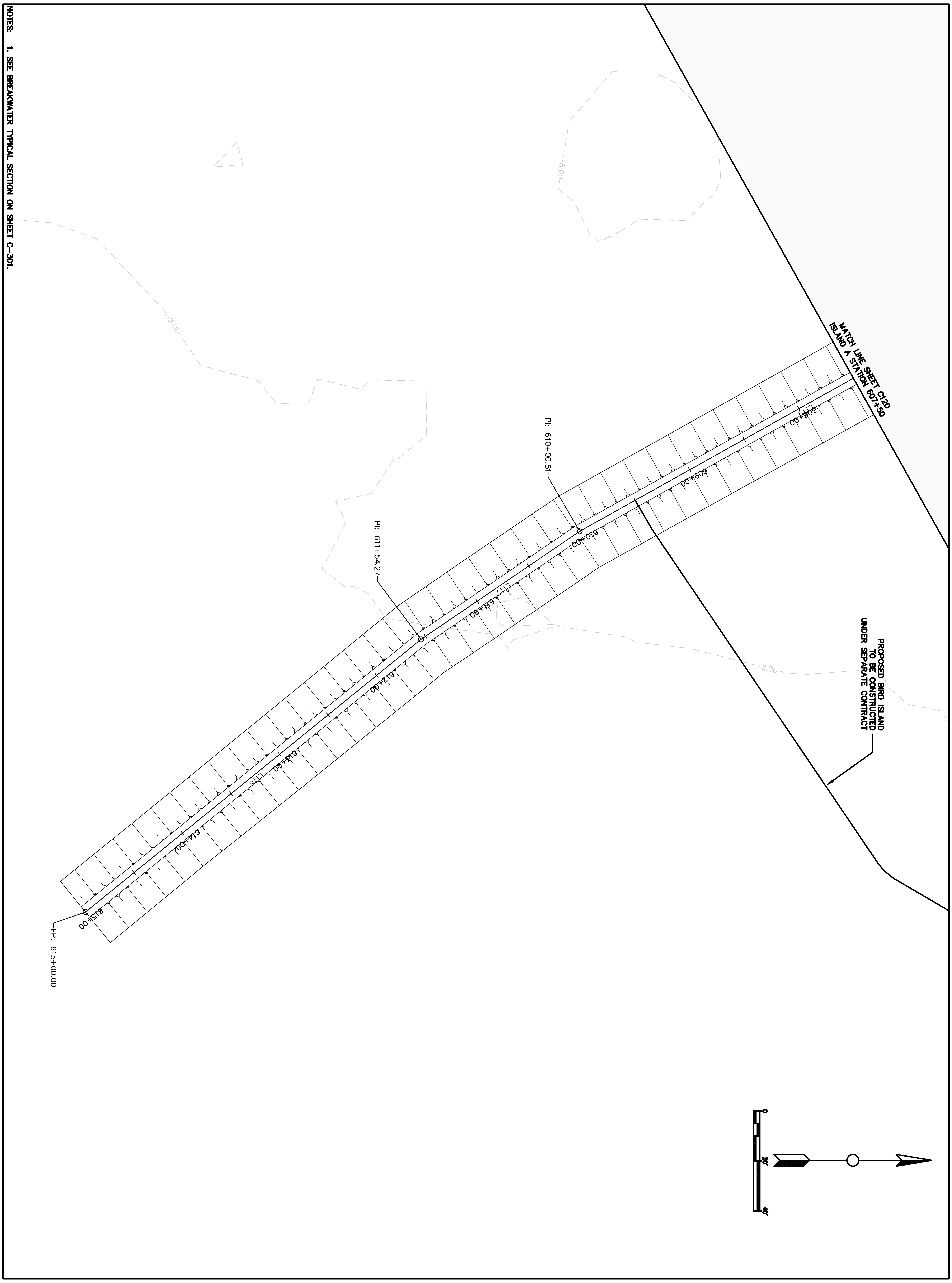
ENGINEERING DIVISION

MID-CHESAPEAKE BAY ISLAND
ECOSYSTEM RESTORATION PROJECT

PHASE I - BARREN ISLAND
STONE RESTORATION STRUCTURES

ISLAND A PLAN VIEW

SHEET IDENTIFICATION
C120



SHEET IDENTIFICATION	C121

MID-CHESAPEAKE BAY ISLAND
ECOSYSTEM RESTORATION PROJECT

PHASE I - BARREN ISLAND
STONE RESTORATION STRUCTURES

ISLAND A PLAN VIEW

U.S. ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
BALTIMORE, MARYLAND

ENGINEERING DIVISION

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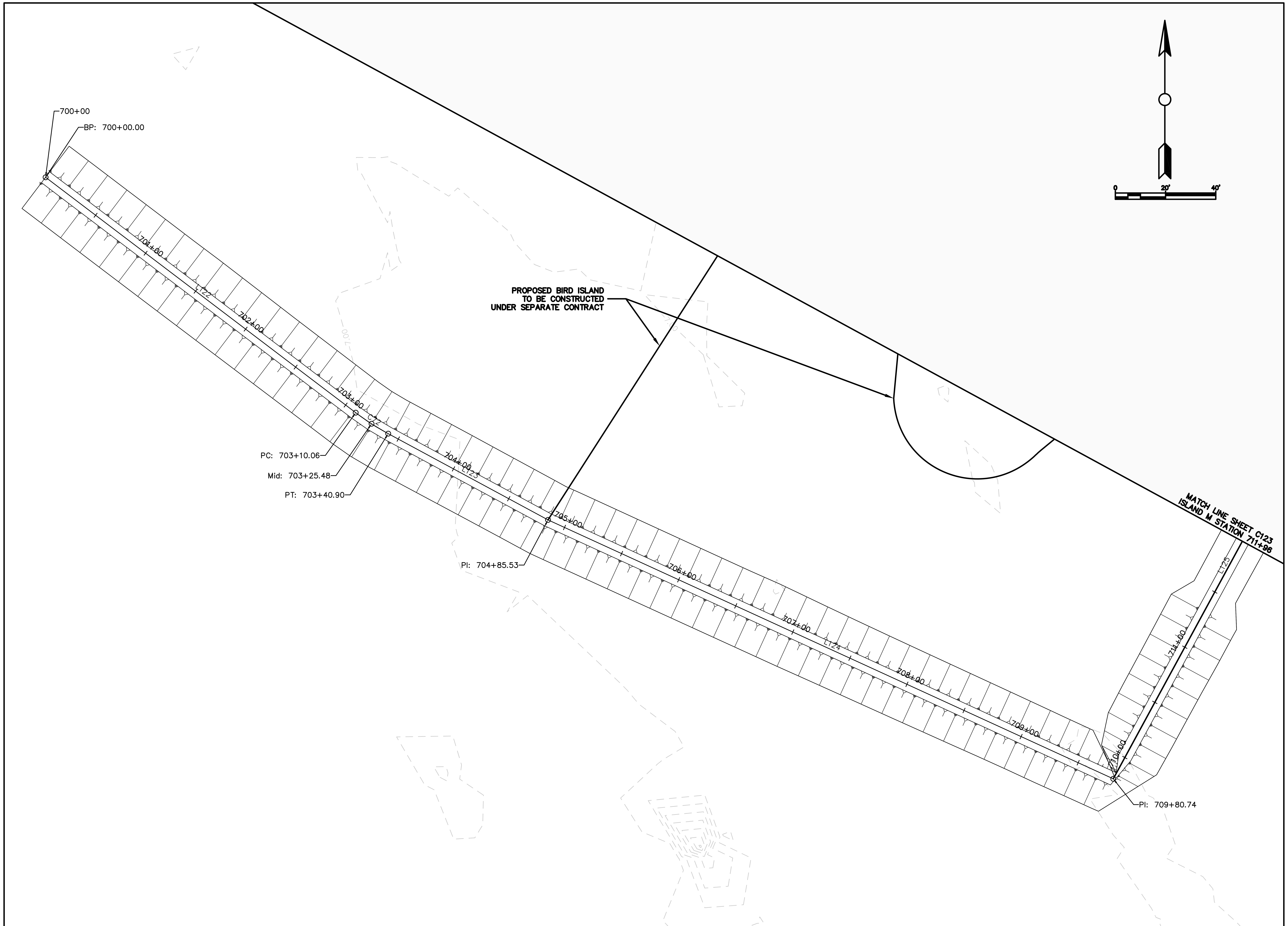
DWN BY:	CKD BY:	SOLICITATION NO.: ___
SUBMITTED BY:		CONTRACT NO.: ___
PLOT SCALE:	PLOT DATE:	FILE NUMBER: ___
SIZE: ANSI D	FILE NAME:	

MARK	DESCRIPTION	DATE	APPR.	MARK	DESCRIPTION	DATE	APPR.

US Army Corps of Engineers
BALTIMORE DISTRICT



NOTES: 1. SEE BREAKWATER TYPICAL SECTION ON SHEET C-301.

US Army Corps of Engineers ®
BALTIMORE DISTRICT

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MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
BALTIMORE, MARYLAND

ENGINEERING DIVISION

DESIGNED BY: | DATE: XXX
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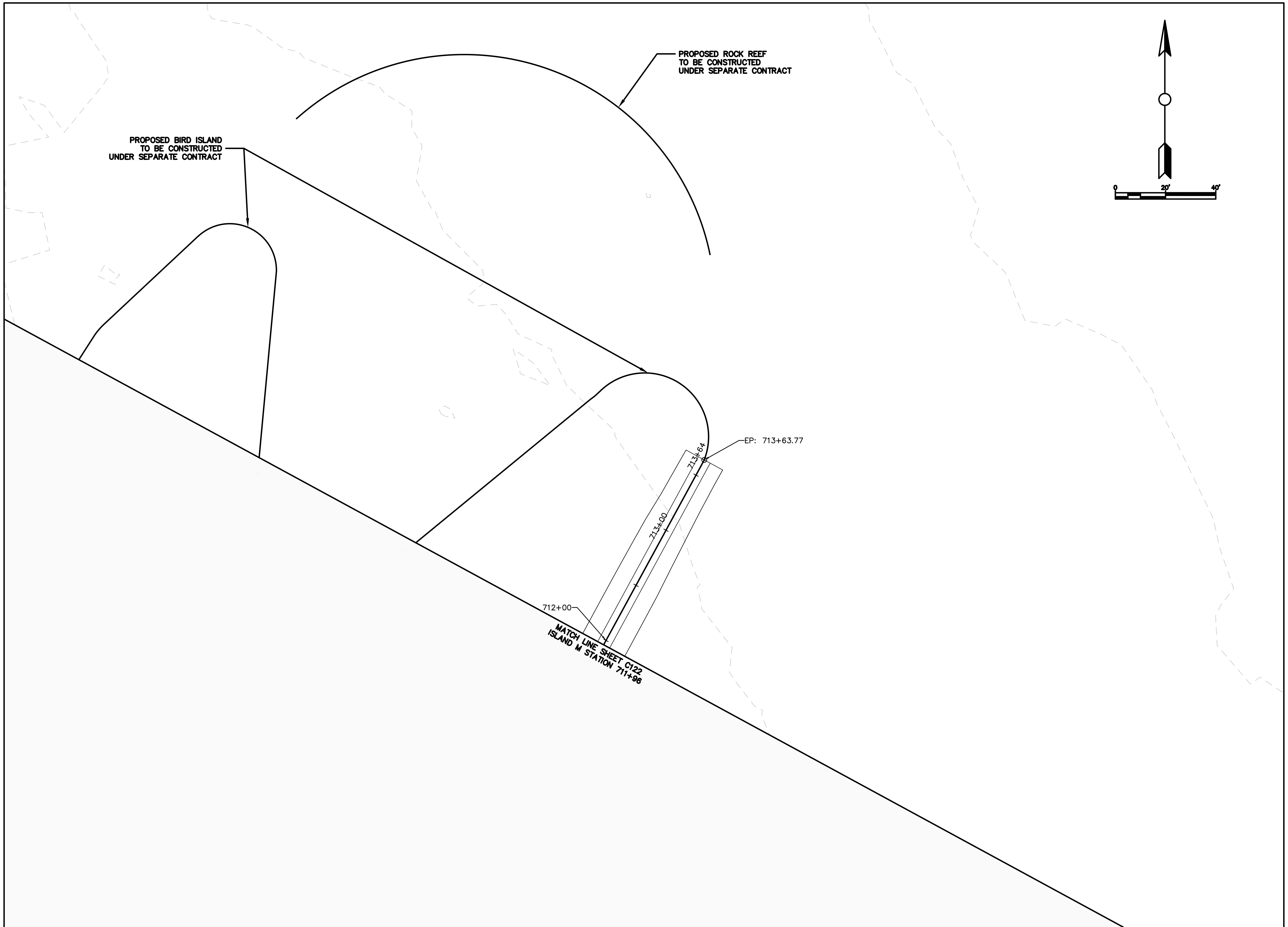
SUBMITTED BY: | CONTRACT NO.: —
PLOT SCALE: | PLOT DATE: | FILE NUMBER: —
SIZE: ANSI D | FILE NAME:

MID-CHESAPEAKE BAY ISLAND
ECOSYSTEM RESTORATION PROJECT

PHASE I - BARREN ISLAND
STONE RESTORATION STRUCTURES

ISLAND M PLAN VIEW

SHEET IDENTIFICATION
C122



NOTES: 1. SEE BREAKWATER TYPICAL SECTION ON SHEET C-301.

US Army Corps of Engineers®
BALTIMORE DISTRICT

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U.S. ARMY CORPS OF ENGINEERS
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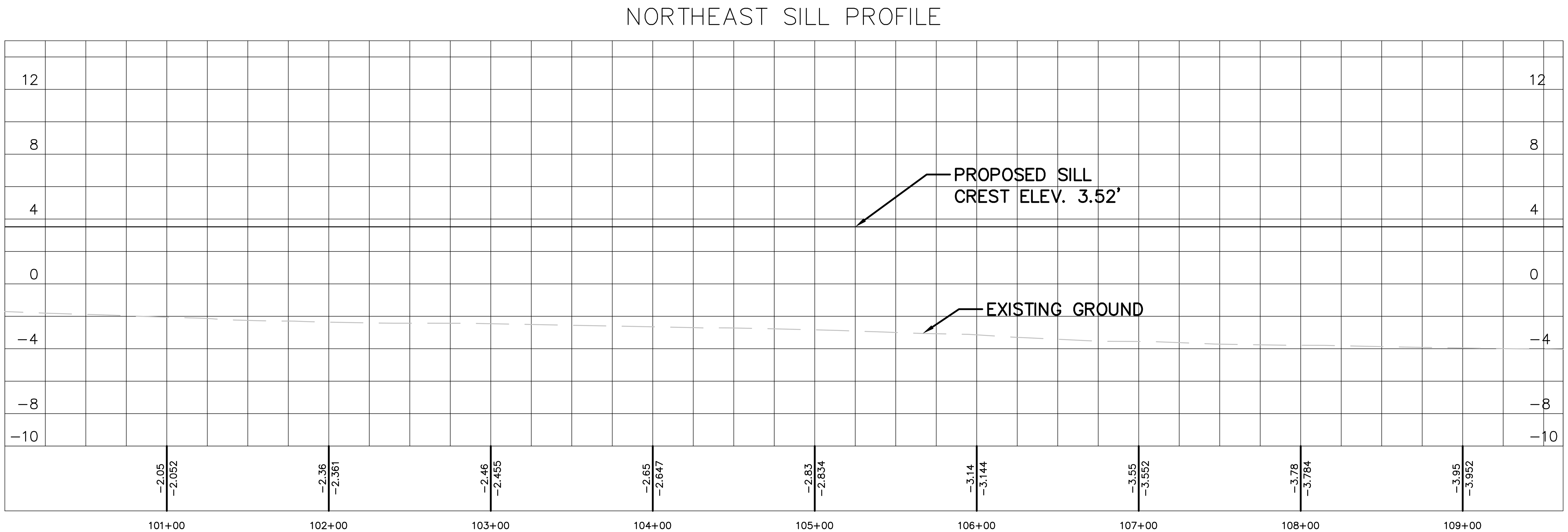
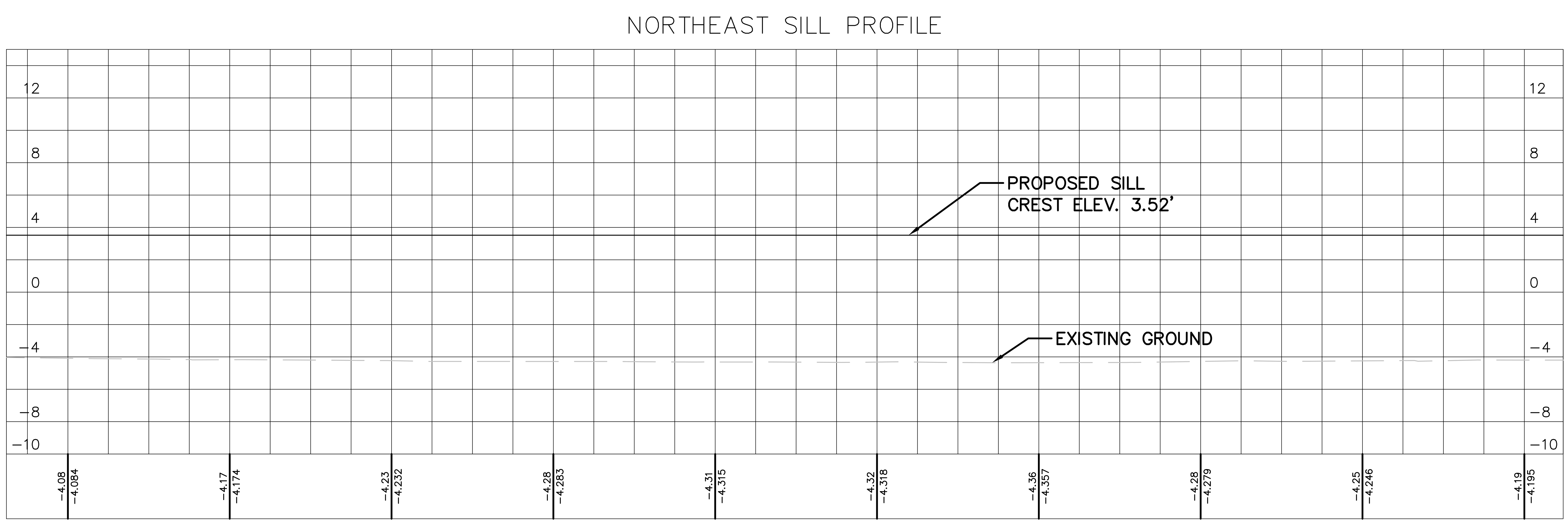
SUBMITTED BY: | FILE NUMBER: —
PLOT SCALE: | PLOT DATE:
SIZE: ANSI D | FILE NAME:

MID-CHESAPEAKE BAY ISLAND
ECOSYSTEM RESTORATION PROJECT
PHASE I - BARREN ISLAND
STONE RESTORATION STRUCTURES
ISLAND M PLAN VIEW

SHEET IDENTIFICATION
C123





SCALE:
1"=4' VERTICAL
1"=40' HORIZONTAL

US Army Corps of Engineers ®
BALTIMORE DISTRICT

MARK	DESCRIPTION	DATE	APPR.	MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
BALTIMORE, MARYLAND

ENGINEERING DIVISION

DESIGNED BY:		DATE: XXX
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PLOT SCALE:	PLOT DATE:	FILE NUMBER: ___
SIZE: ANSI D	FILE NAME:	

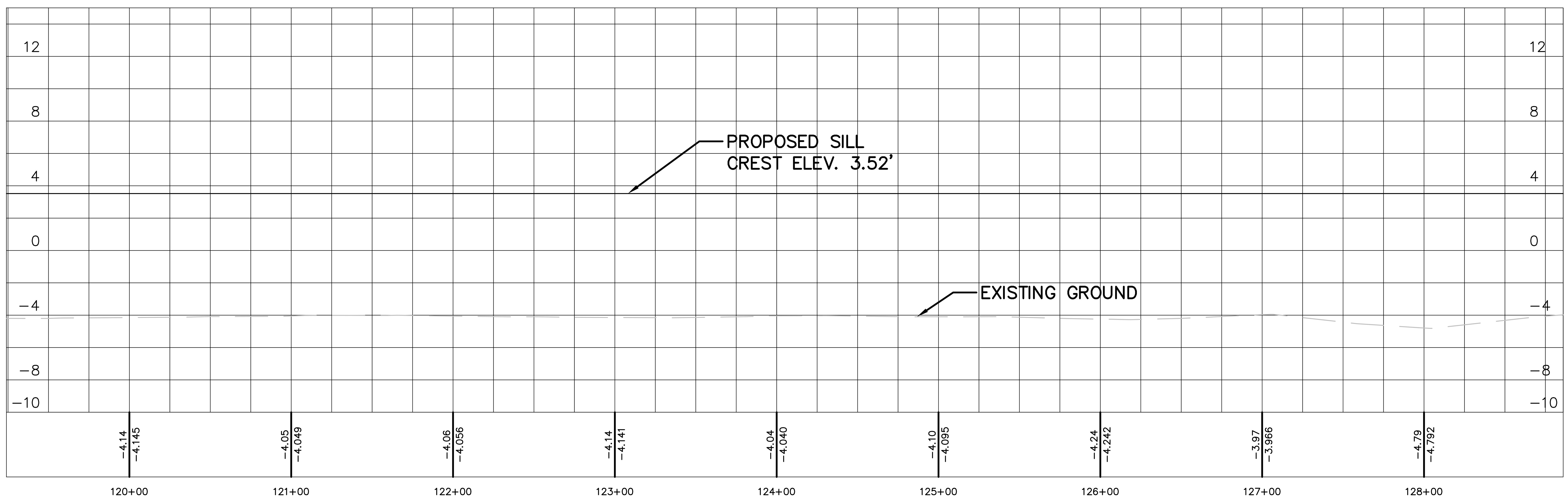
MID-CHESAPEAKE BAY ISLAND
ECOSYSTEM RESTORATION PROJECT

PHASE I - BARREN ISLAND
STONE RESTORATION STRUCTURES

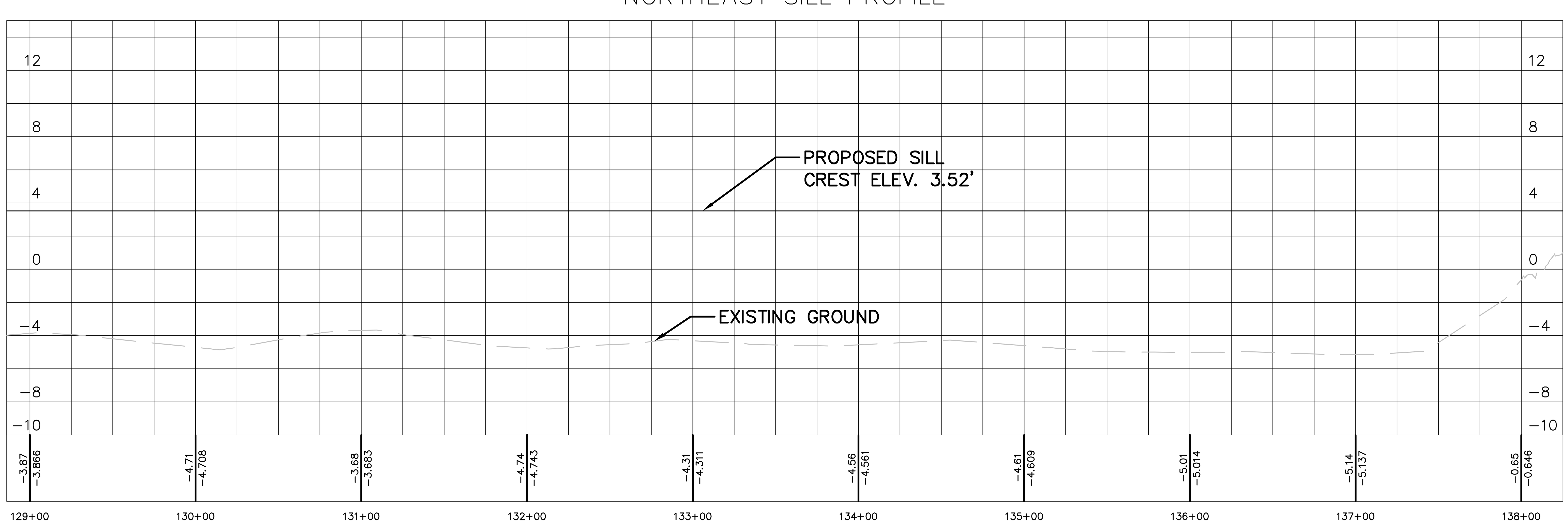
NORTHEAST SILL PROFILE VIEW

SHEET IDENTIFICATION
C201

NORTHEAST SILL PROFILE



NORTHEAST SILL PROFILE



SCALE:
1"=4' VERTICAL
1"=40' HORIZONTAL

US Army Corps of Engineers ®
BALTIMORE DISTRICT

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U.S. ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
BALTIMORE, MARYLAND

ENGINEERING DIVISION

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SOLICITATION NO.: __
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CONTRACT NO.: __
PLOT SCALE:
PLOT DATE:
FILE NUMBER: __
SIZE: ANSI D
FILE NAME:

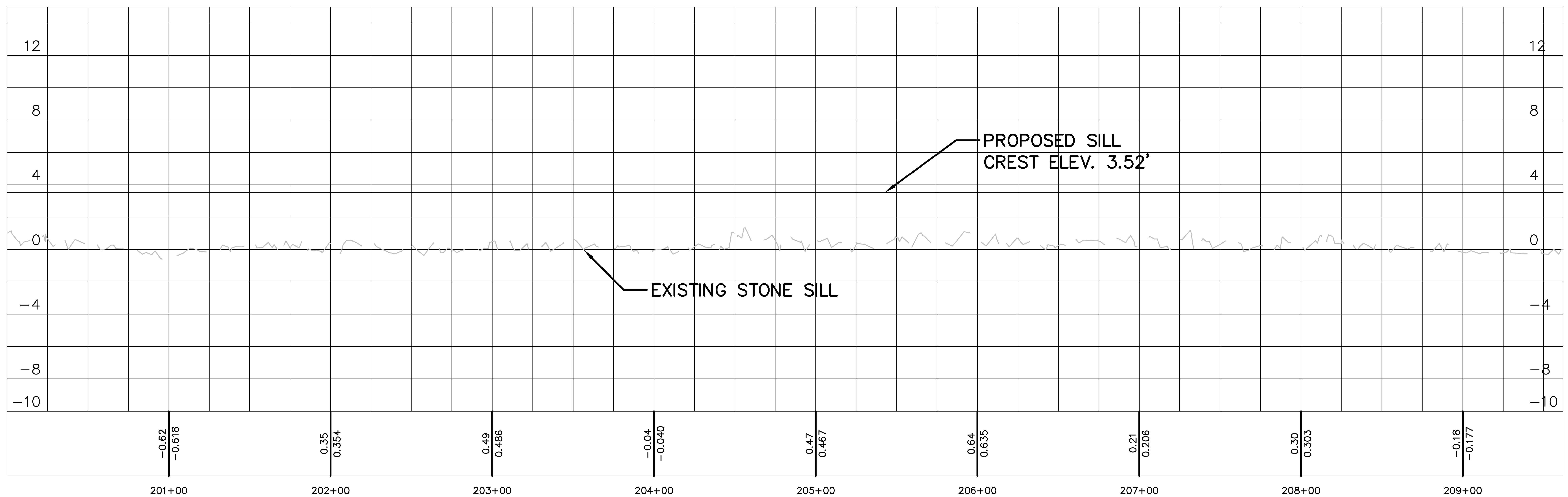
MID-CHESAPEAKE BAY ISLAND
ECOSYSTEM RESTORATION PROJECT

PHASE I - BARREN ISLAND
STONE RESTORATION STRUCTURES

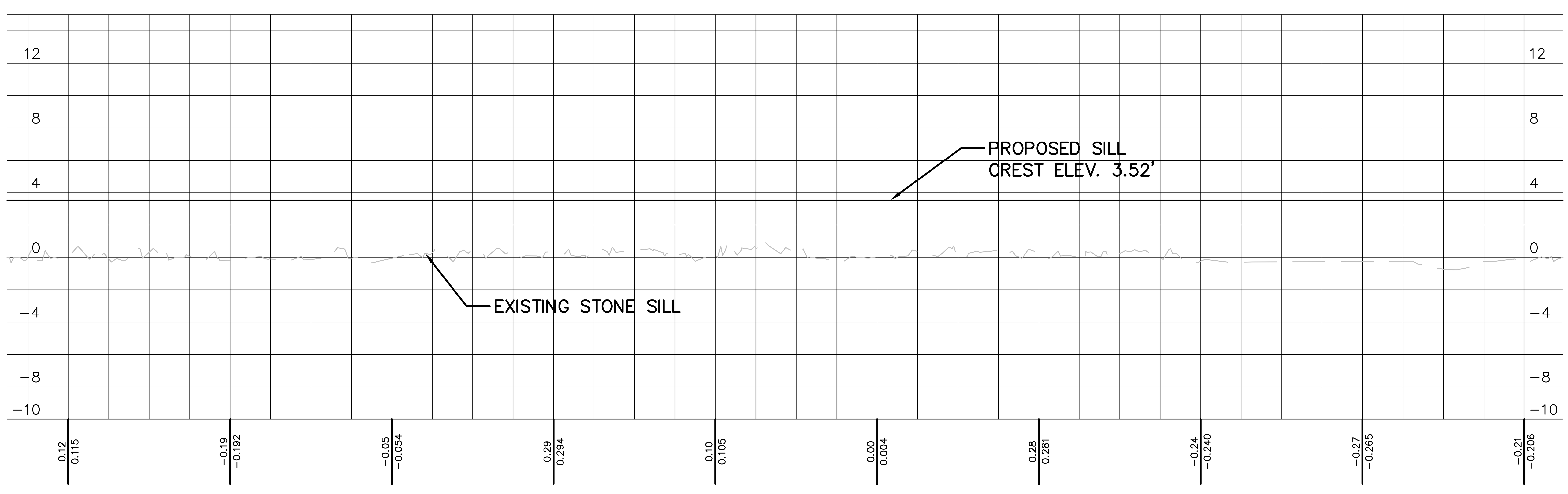
NORTHEAST SILL PROFILE VIEW

SHEET IDENTIFICATION
C202

MOD EXISTING SILL PROFILE



MOD EXISTING SILL PROFILE



SCALE:
1"=4' VERTICAL
1"=40' HORIZONTAL

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BALTIMORE DISTRICT

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MARK	DESCRIPTION	DATE	APPR.

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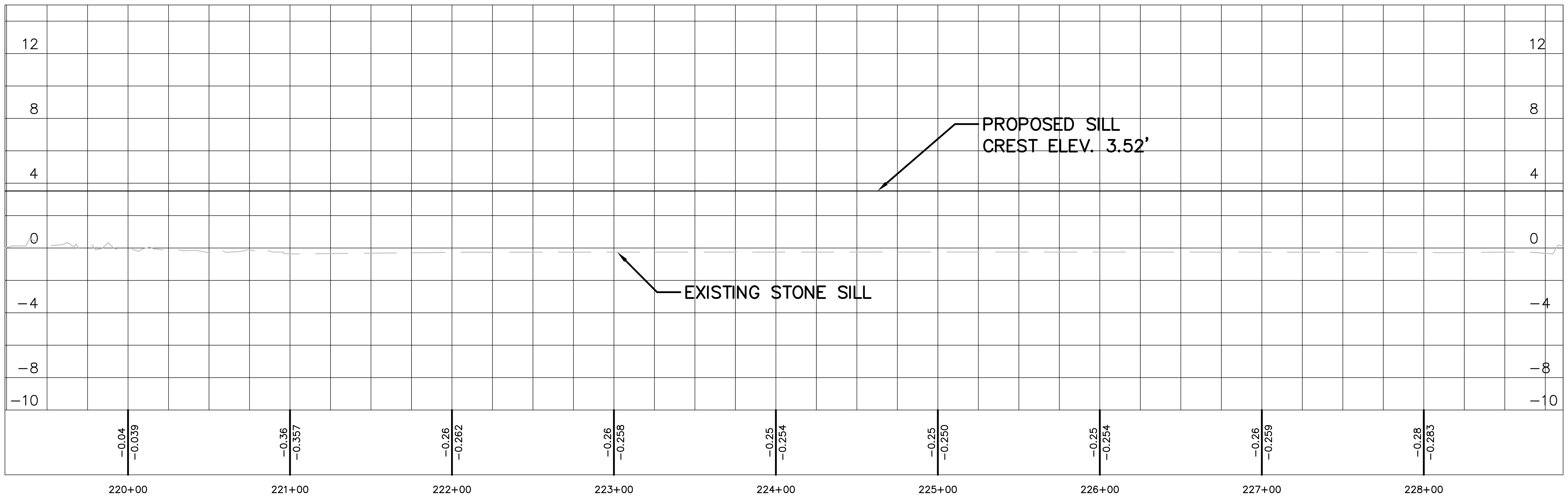
SUBMITTED BY: | FILE NUMBER: —
PLOT SCALE: | PLOT DATE: |
SIZE: ANSI D | FILE NAME:

MID-CHESAPEAKE BAY ISLAND
ECOSYSTEM RESTORATION PROJECT

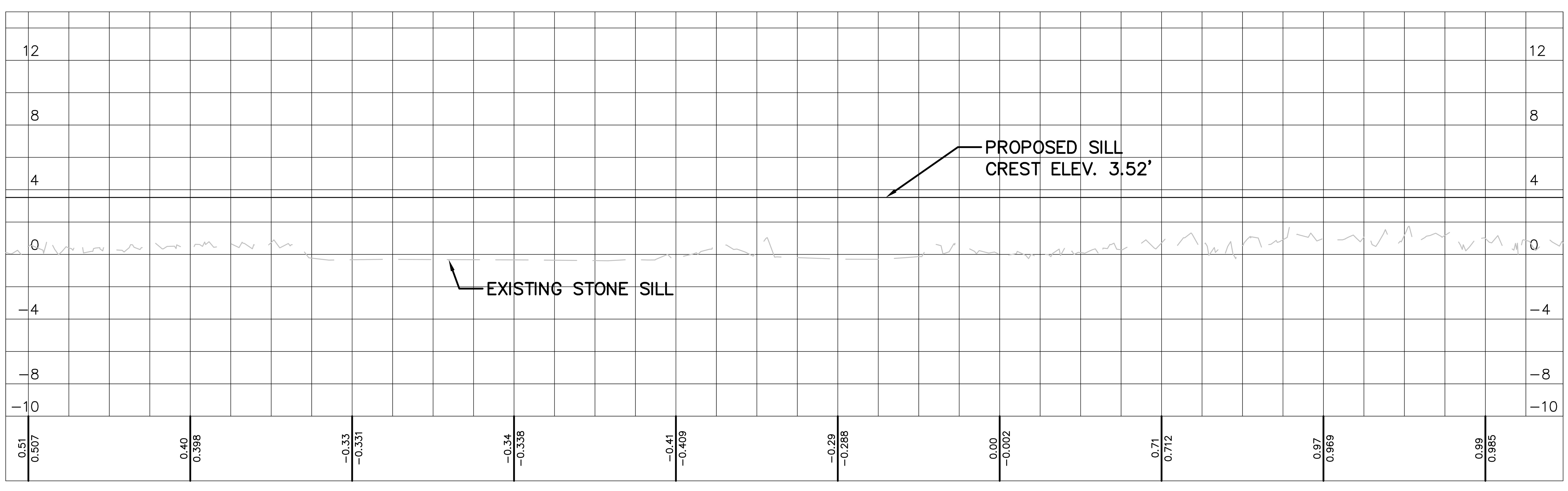
PHASE I - BARREN ISLAND
STONE RESTORATION STRUCTURES
MODIFICATION OF EXISTING SILL PROFILE VIEW

SHEET
IDENTIFICATION
C203

MOD EXISTING SILL PROFILE



MOD EXISTING SILL PROFILE



SCALE:
1"=4' VERTICAL
1"=40' HORIZONTAL

US Army Corps of Engineers
BALTIMORE DISTRICT

MARK	DESCRIPTION	DATE	APPR

MARK	DESCRIPTION	DATE	APPR

U.S. ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
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ENGINEERING DIVISION

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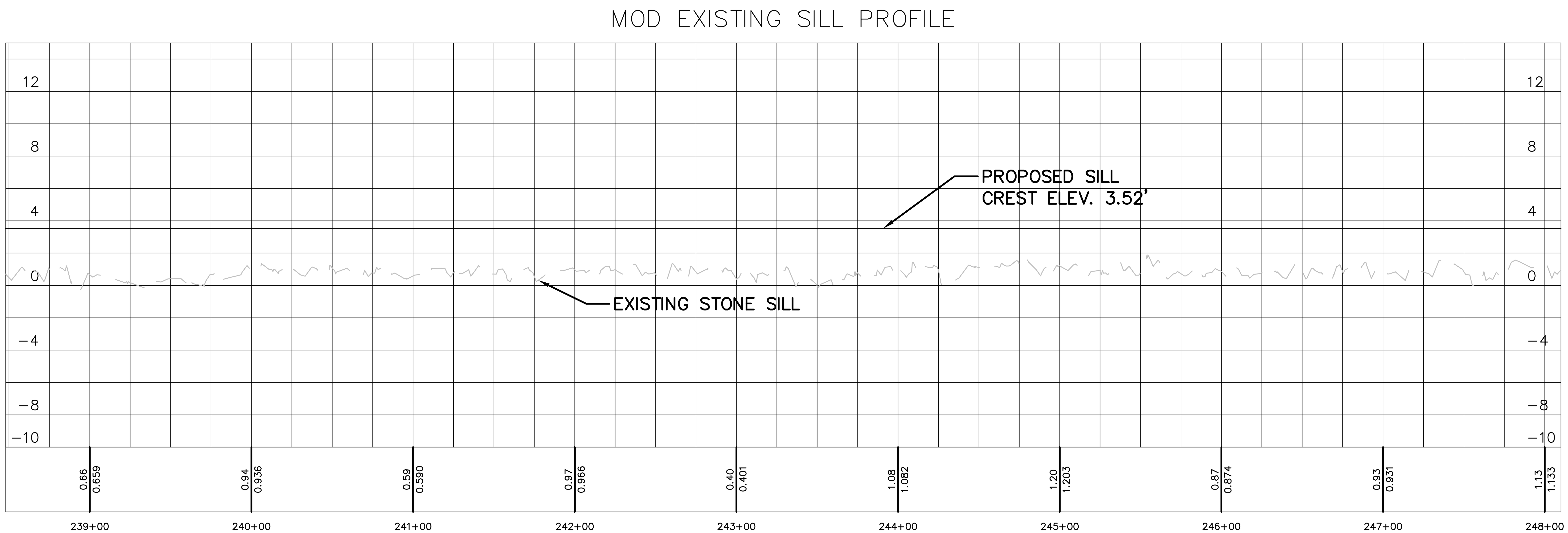
DATE: XXX | SOLICITATION NO.: — | CONTRACT NO.: — | FILE NUMBER: —

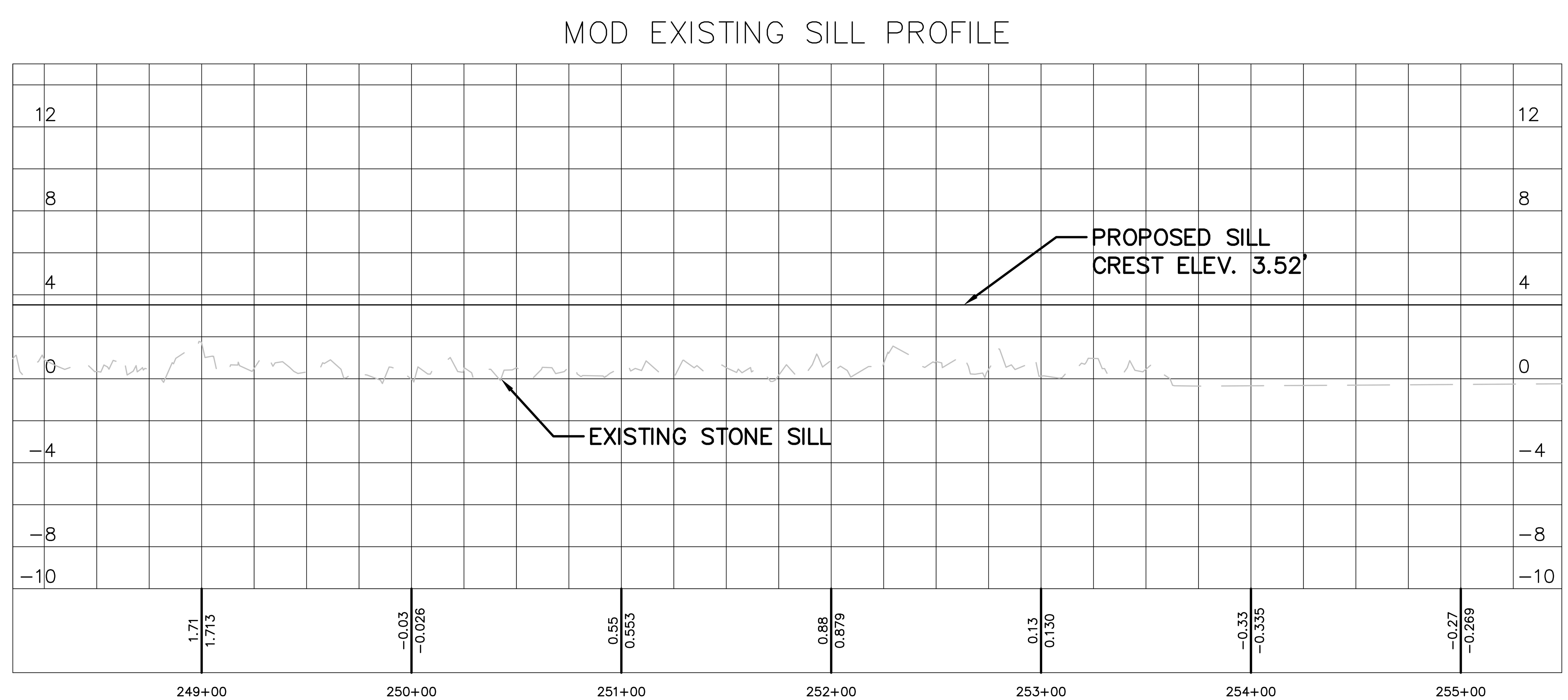
MID-CHESAPEAKE BAY ISLAND
ECOSYSTEM RESTORATION PROJECT

PHASE I - BARREN ISLAND
STONE RESTORATION STRUCTURES

MODIFICATION OF EXISTING SILL PROFILE VIEW

SHEET IDENTIFICATION
C204





SCALE:
1"=4' VERTICAL
1"=40' HORIZONTAL

US Army Corps of Engineers ®
BALTIMORE DISTRICT

MARK	DESCRIPTION	DATE	APPR.	MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
BALTIMORE, MARYLAND

ENGINEERING DIVISION

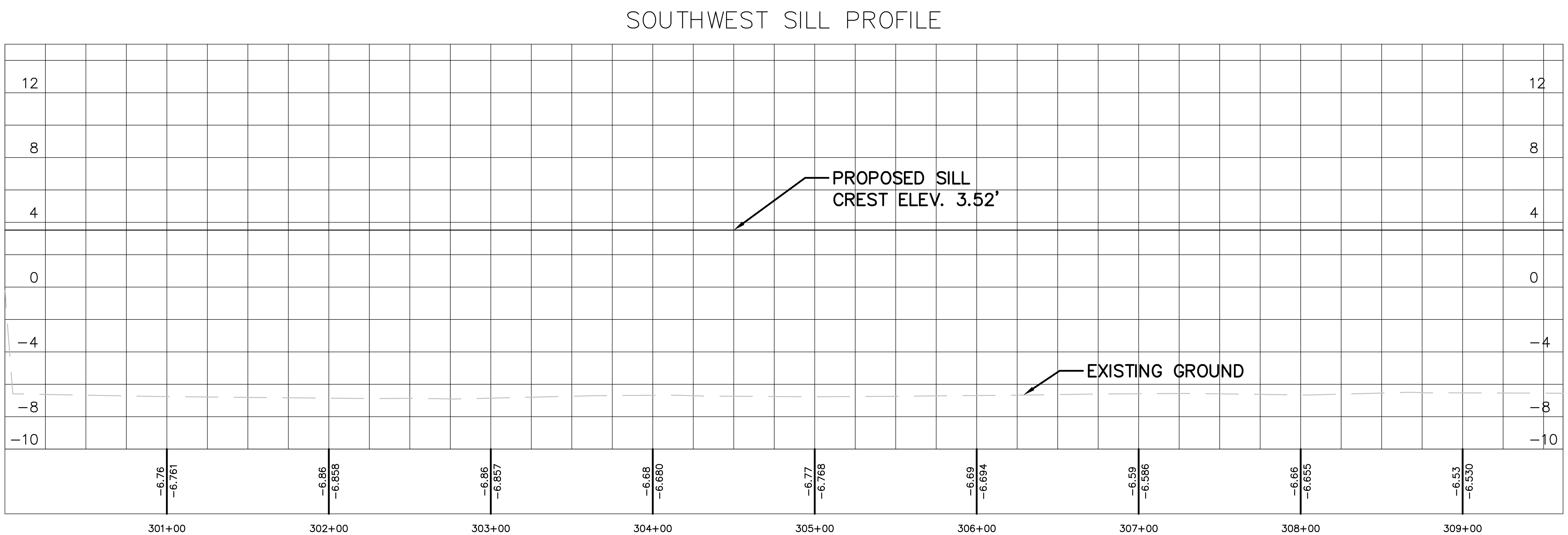
DESIGNED BY:		DATE: XXX
DWN BY:	CKD BY:	SOLICITATION NO.: —
SUBMITTED BY:		CONTRACT NO.: —
PLOT SCALE:	PLOT DATE:	FILE NUMBER: —
SIZE: ANSI D	FILE NAME:	

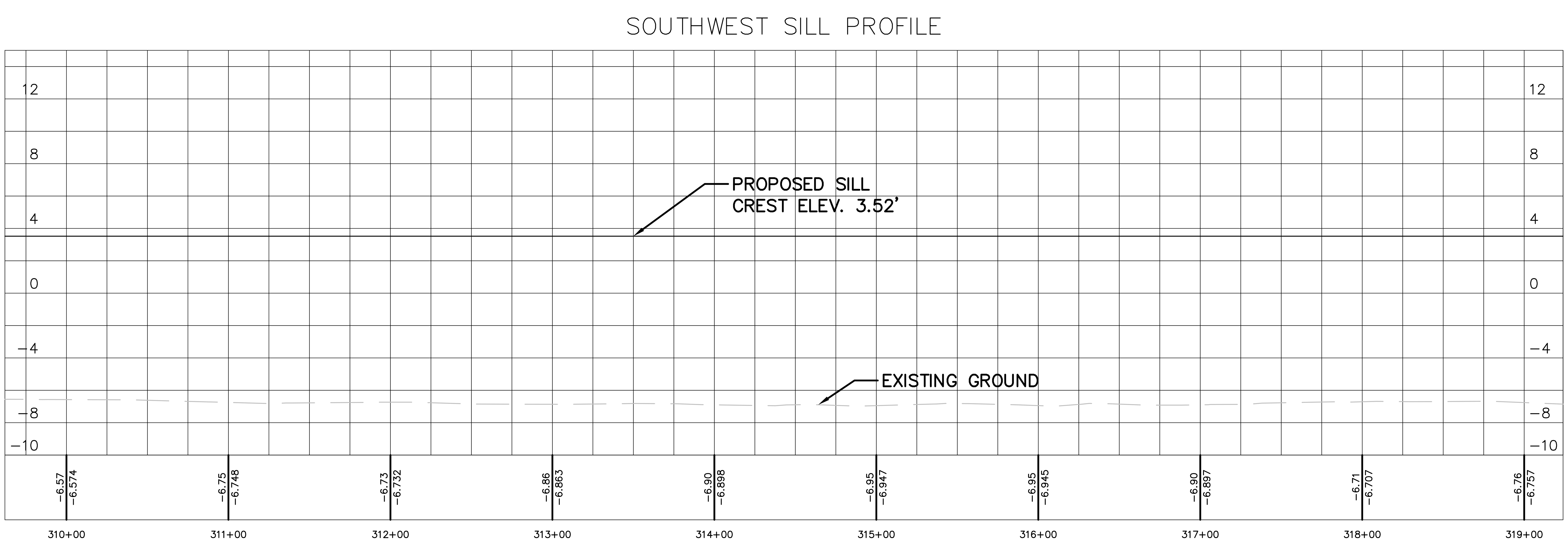
MID-CHESAPEAKE BAY ISLAND
ECOSYSTEM RESTORATION PROJECT

PHASE I - BARREN ISLAND
STONE RESTORATION STRUCTURES

MODIFICATION OF EXISTING SILL PROFILE VIEW

SHEET IDENTIFICATION
C205





SCALE:
1"=4' VERTICAL
1"=40' HORIZONTAL

US Army Corps of Engineers ®
BALTIMORE DISTRICT

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U.S. ARMY CORPS OF ENGINEERS
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PLOT SCALE:	PLOT DATE:	FILE NUMBER: —
SIZE: ANSI D	FILE NAME:	

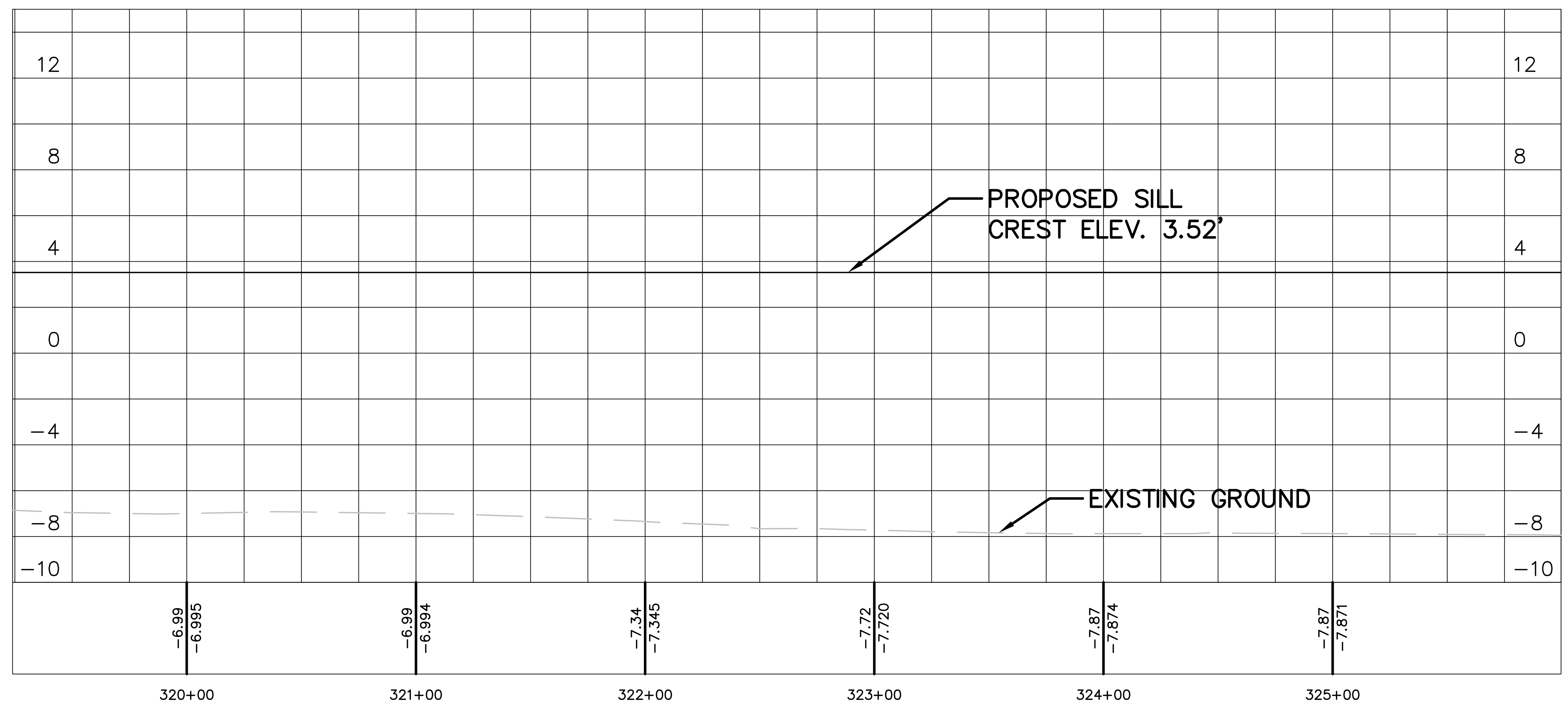
MID-CHESAPEAKE BAY ISLAND
ECOSYSTEM RESTORATION PROJECT

PHASE I - BARREN ISLAND
STONE RESTORATION STRUCTURES

SOUTHWEST SILL PROFILE VIEW

SHEET IDENTIFICATION
C206

SOUTHWEST SILL PROFILE



SCALE:
1"=4' VERTICAL
1"=40' HORIZONTAL

US Army Corps of Engineers ®
BALTIMORE DISTRICT

MARK	DESCRIPTION	DATE	APPR.	MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
BALTIMORE, MARYLAND

ENGINEERING DIVISION

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DATE: XXX
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SOLICITATION NO.: ___
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CONTRACT NO.: ___
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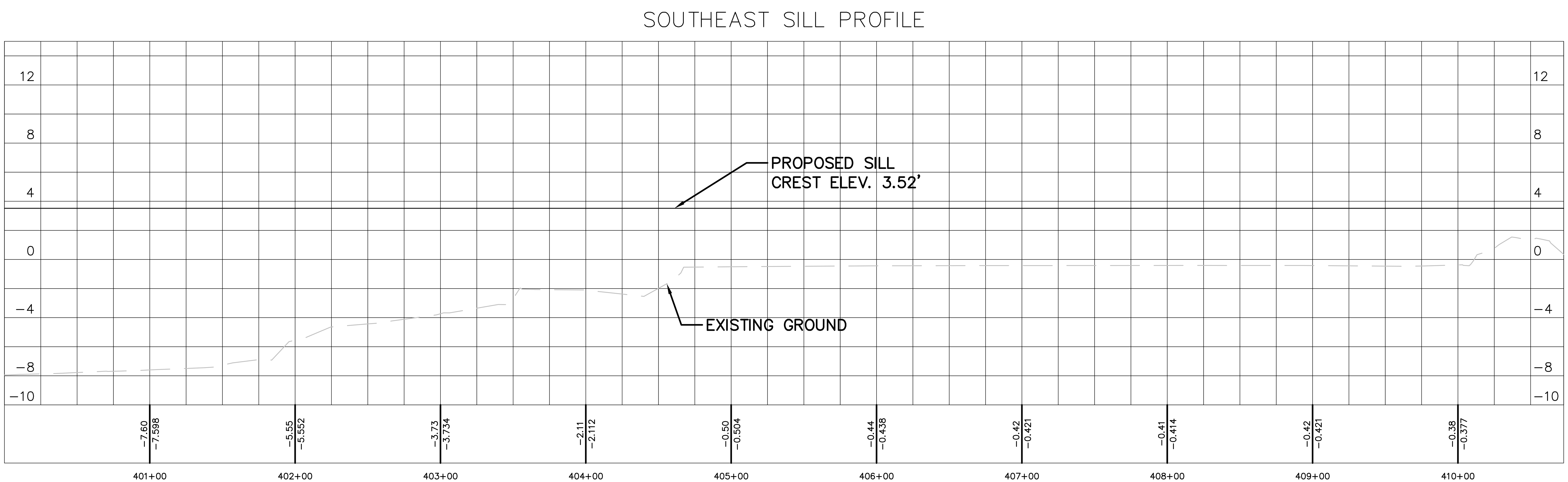
PLOT DATE:
FILE NUMBER: ___
SIZE: ANSI D
FILE NAME:

MID-CHESAPEAKE BAY ISLAND
ECOSYSTEM RESTORATION PROJECT

PHASE I - BARREN ISLAND
STONE RESTORATION STRUCTURES

SOUTHWEST SILL PROFILE VIEW

SHEET IDENTIFICATION
C207



SCALE:
1"=4' VERTICAL
1"=40' HORIZONTAL

US Army Corps of Engineers ®
BALTIMORE DISTRICT

MARK	DESCRIPTION	DATE	APPR.

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U.S. ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
BALTIMORE, MARYLAND

ENGINEERING DIVISION

DESIGNED BY:
DATE: XXX
DWN BY:
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PLOT SCALE:
PLOT DATE:
FILE NUMBER: ___
SIZE: ANSI D
FILE NAME:

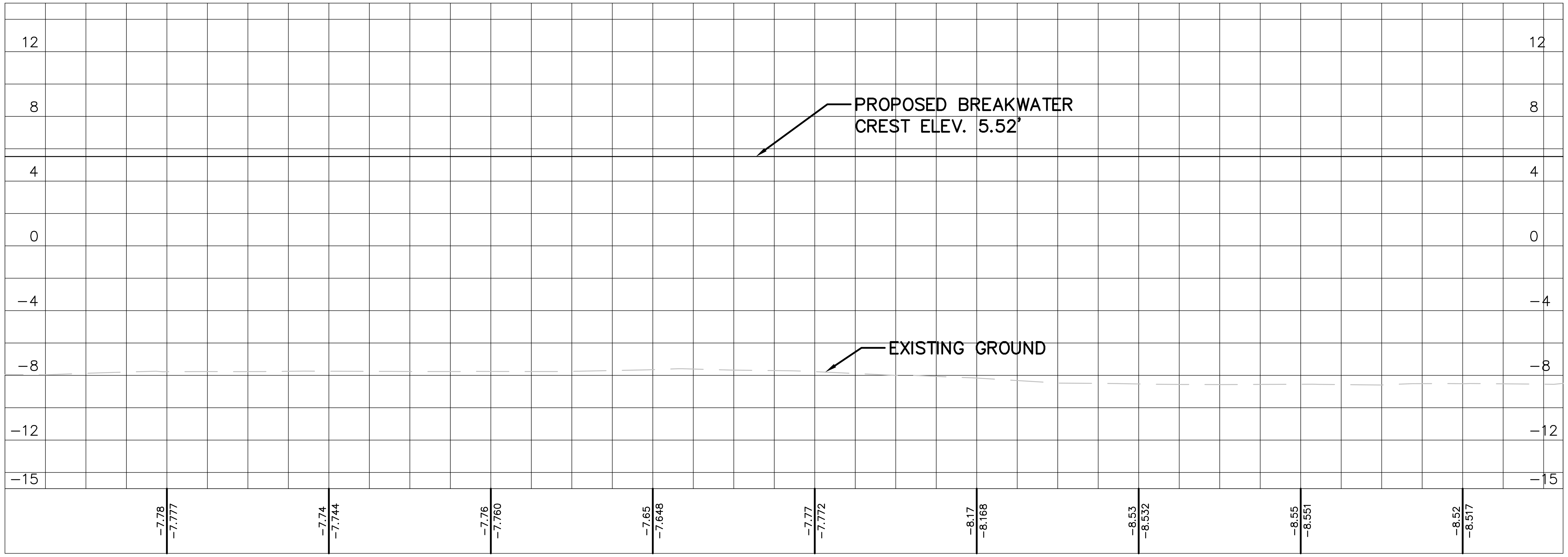
MID-CHESAPEAKE BAY ISLAND
ECOSYSTEM RESTORATION PROJECT

PHASE I - BARREN ISLAND
STONE RESTORATION STRUCTURES

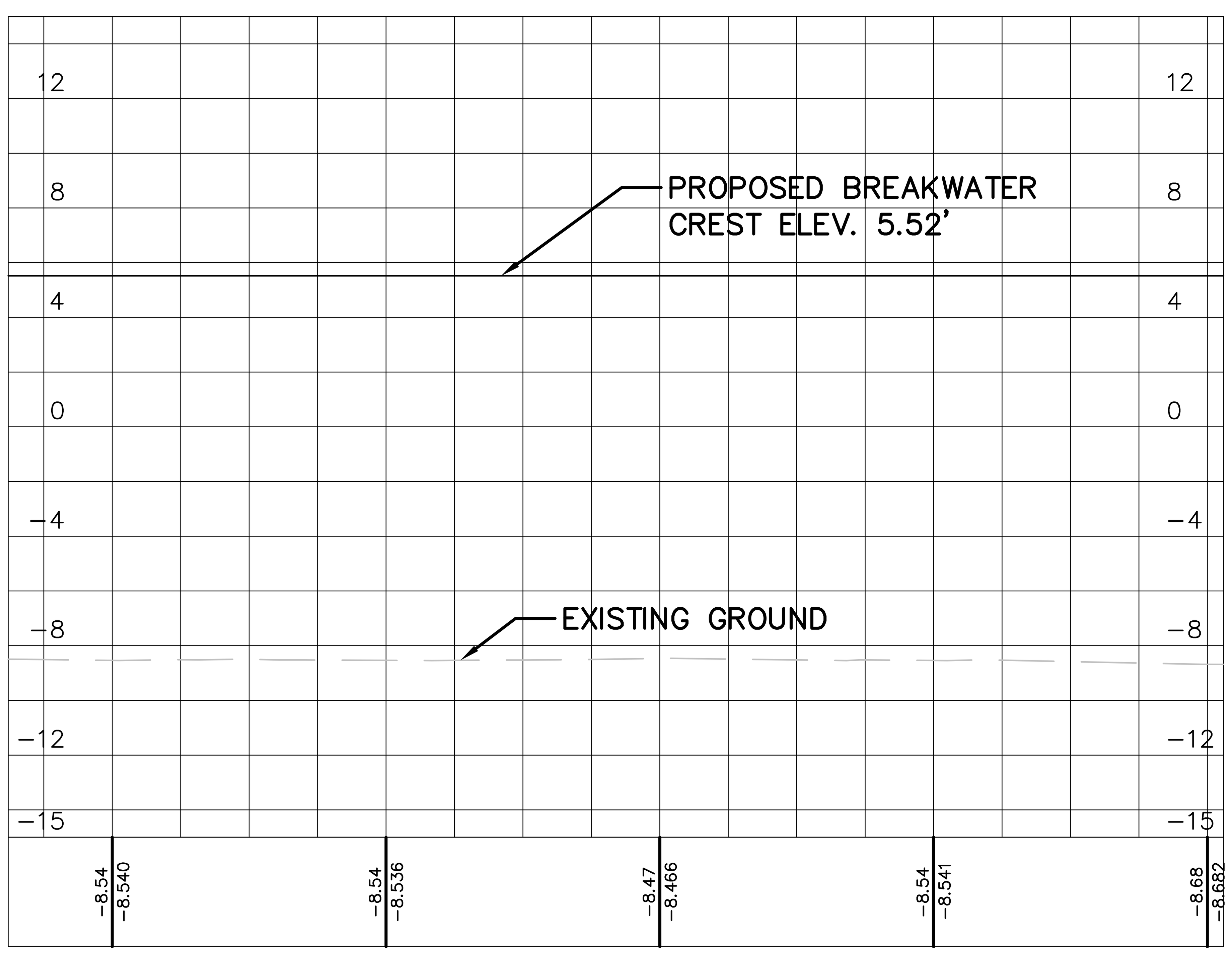
SOUTHEAST SILL PROFILE VIEW

SHEET IDENTIFICATION
C208

BREAKWATER PROFILE



BREAKWATER PROFILE



SCALE:
1"=4' VERTICAL
1"=40' HORIZONTAL

US Army Corps of Engineers ®
BALTIMORE DISTRICT

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BALTIMORE DISTRICT
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DESIGNED BY:		DATE: XXX
DWN BY:	CKD BY:	SOLICITATION NO.: —
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SIZE: ANSI D	FILE NAME:	

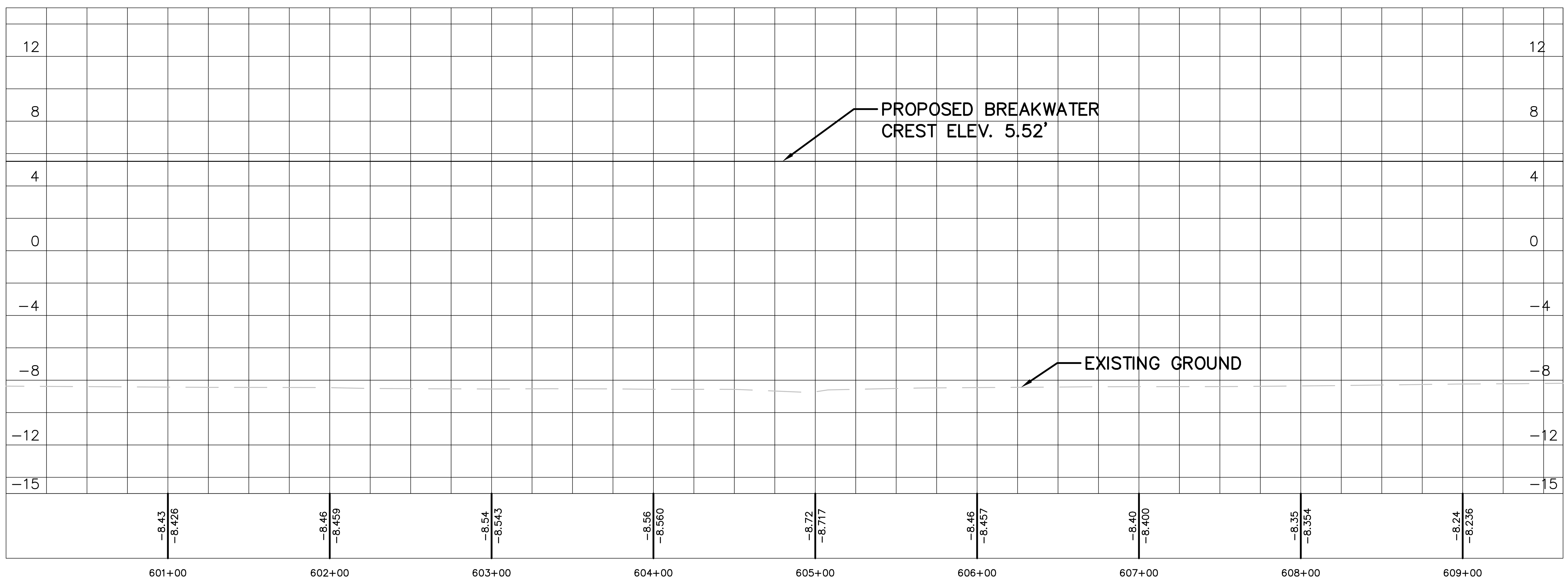
MID-CHESAPEAKE BAY ISLAND
ECOSYSTEM RESTORATION PROJECT

PHASE I - BARREN ISLAND
STONE RESTORATION STRUCTURES

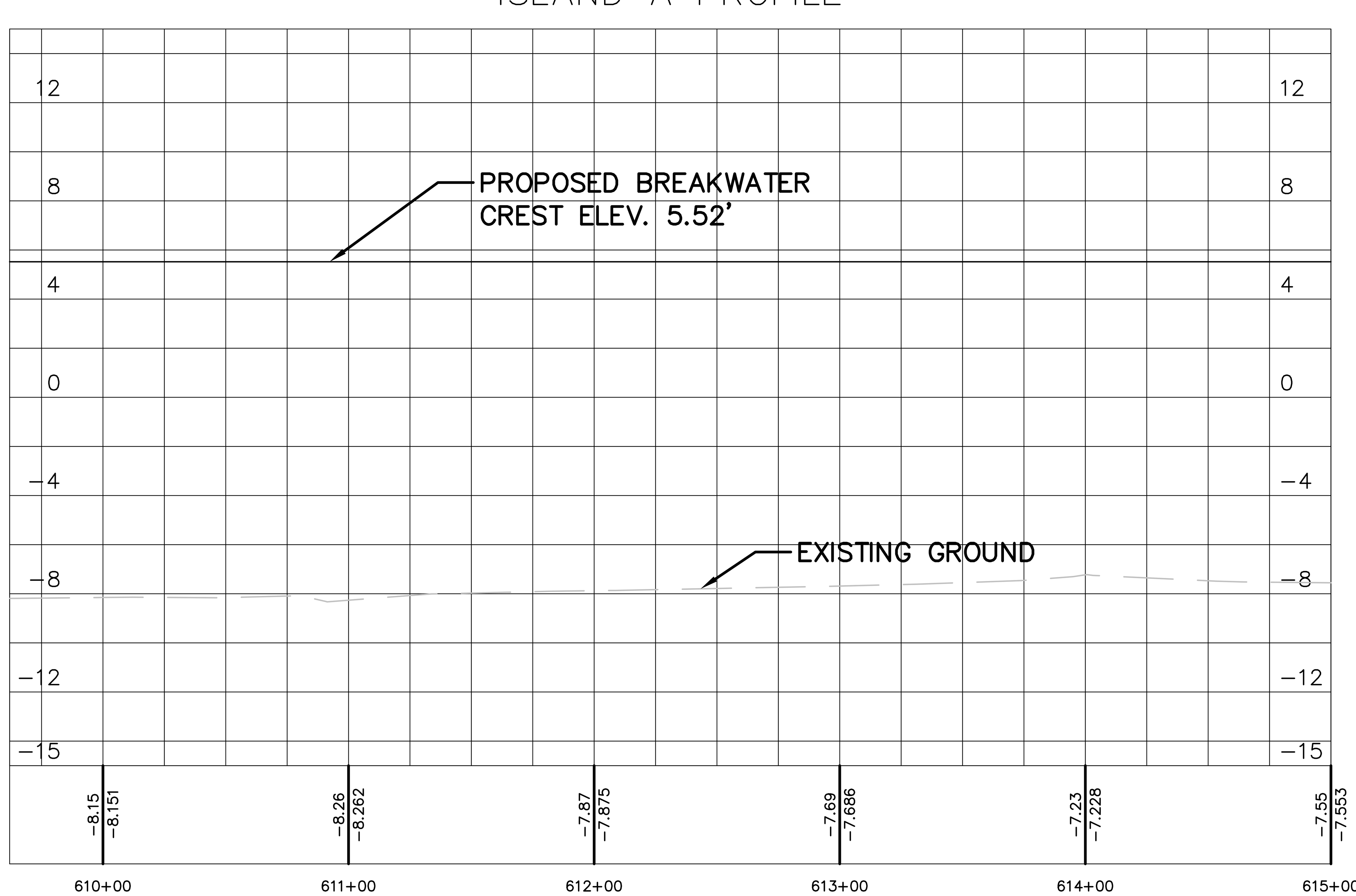
BREAKWATER PROFILE VIEW

SHEET IDENTIFICATION
C209

ISLAND A PROFILE



ISLAND A PROFILE



SCALE:
1"=4' VERTICAL
1"=40' HORIZONTAL

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BALTIMORE DISTRICT

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
BALTIMORE, MARYLAND

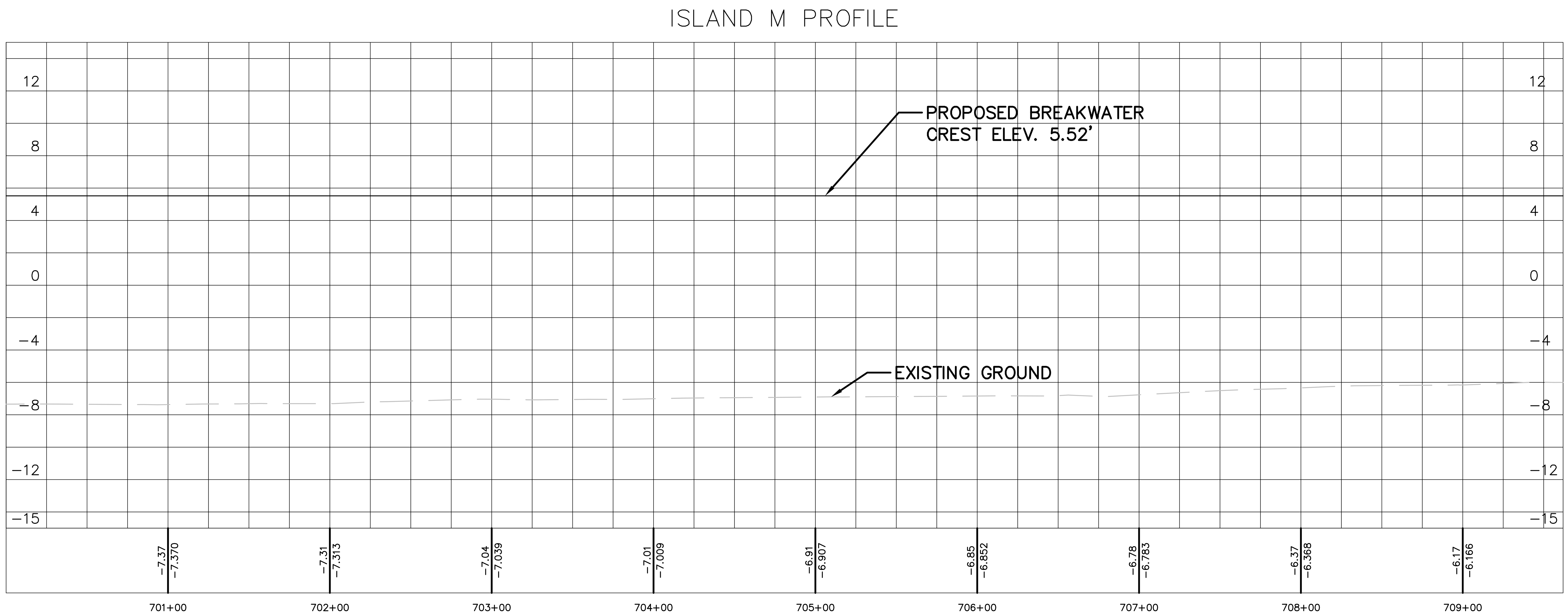
ENGINEERING DIVISION

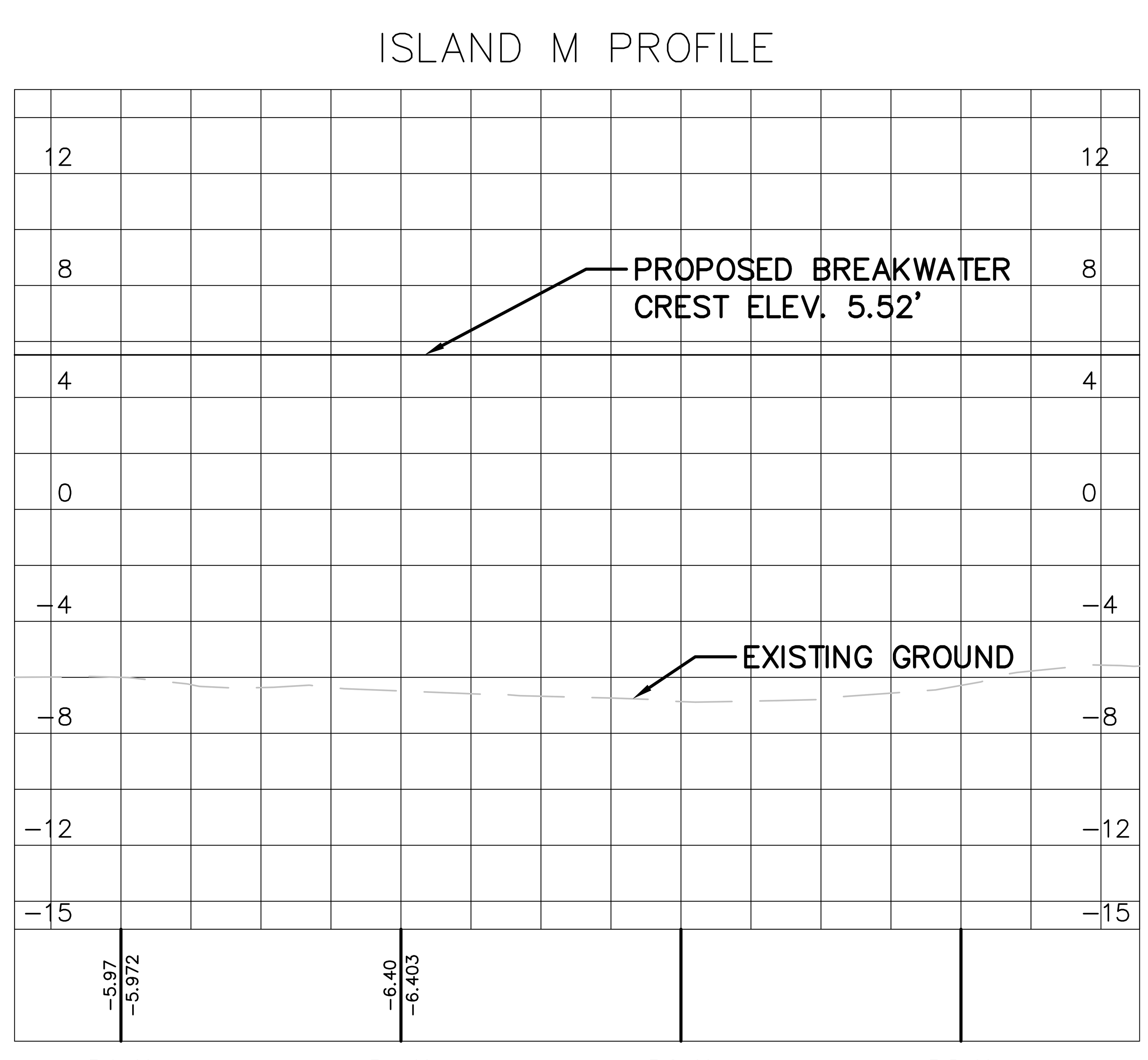
DESIGNED BY:		DATE: XXX
DWN BY:	CKD BY:	SOLICITATION NO.: —
SUBMITTED BY:		CONTRACT NO.: —
PLOT SCALE:	PLOT DATE:	FILE NUMBER: —
SIZE: ANSI D	FILE NAME:	

MID-CHESAPEAKE BAY ISLAND
ECOSYSTEM RESTORATION PROJECT

PHASE I - BARREN ISLAND
STONE RESTORATION STRUCTURES
ISLAND A BREAKWATER PROFILE VIEW

SHEET IDENTIFICATION
C210





SCALE:
1"=4' VERTICAL
1"=40' HORIZONTAL

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MID-CHESAPEAKE BAY ISLAND
ECOSYSTEM RESTORATION PROJECT

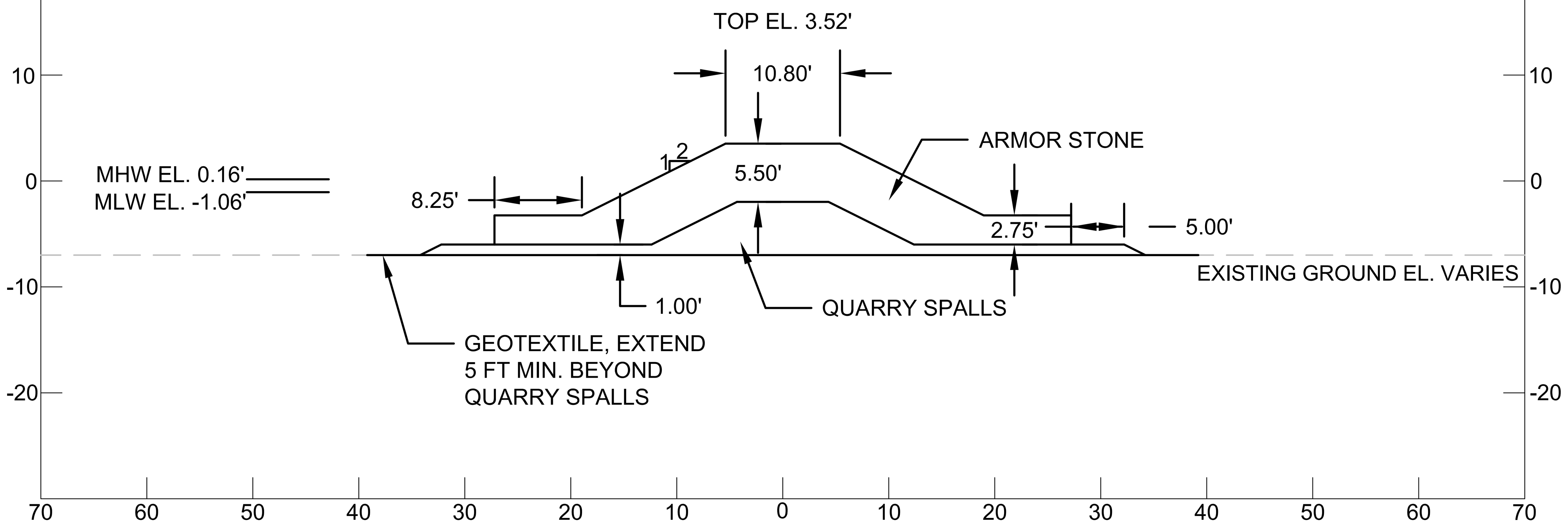
PHASE I - BARREN ISLAND
STONE RESTORATION STRUCTURES

ISLAND M BREAKWATER PROFILE VIEW

SHEET IDENTIFICATION
C211

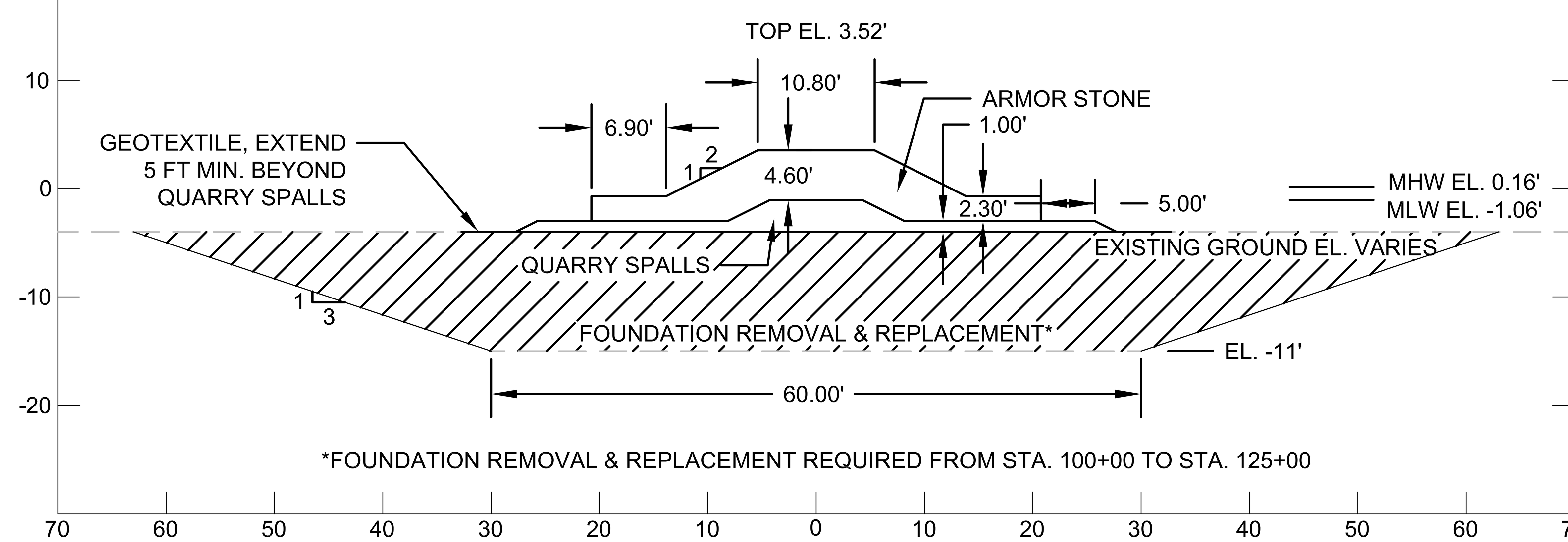
SOUTHWEST SILL

FROM STA 300+00 TO STA 325+99.66



NORTHEAST SILL

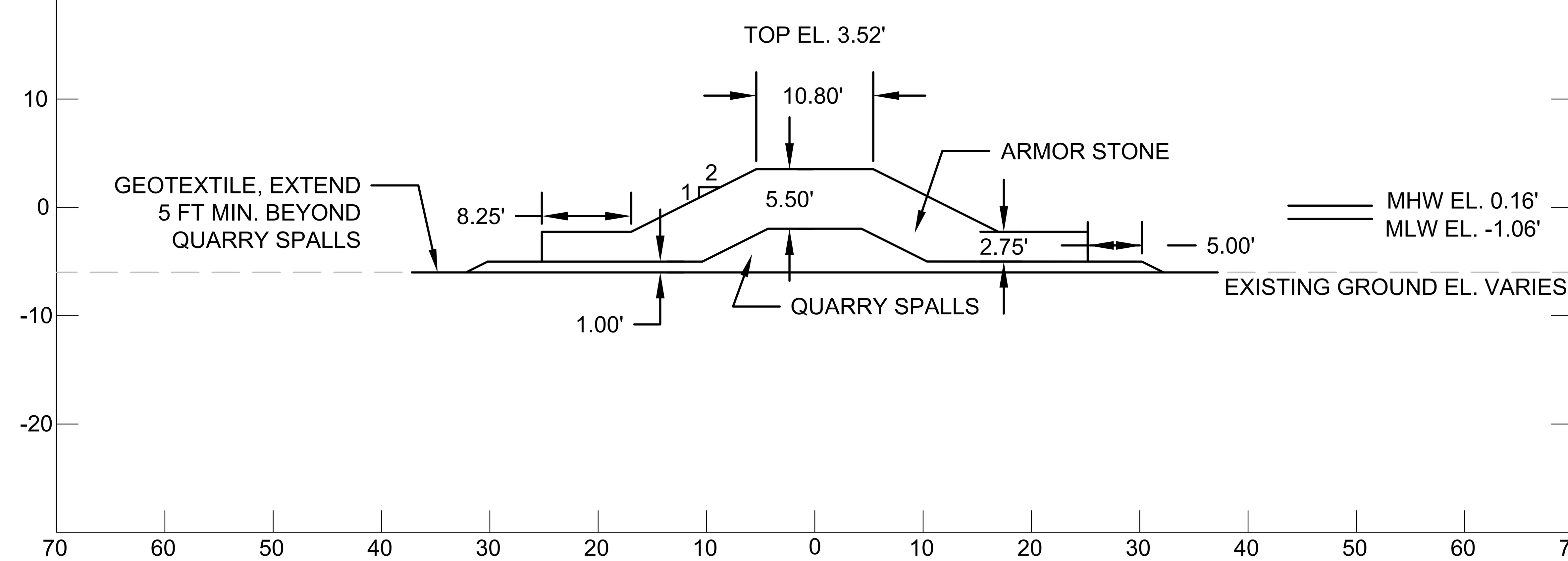
FROM STA 100+00 TO STA 138+25.09



*FOUNDATION REMOVAL & REPLACEMENT REQUIRED FROM STA. 100+00 TO STA. 125+00

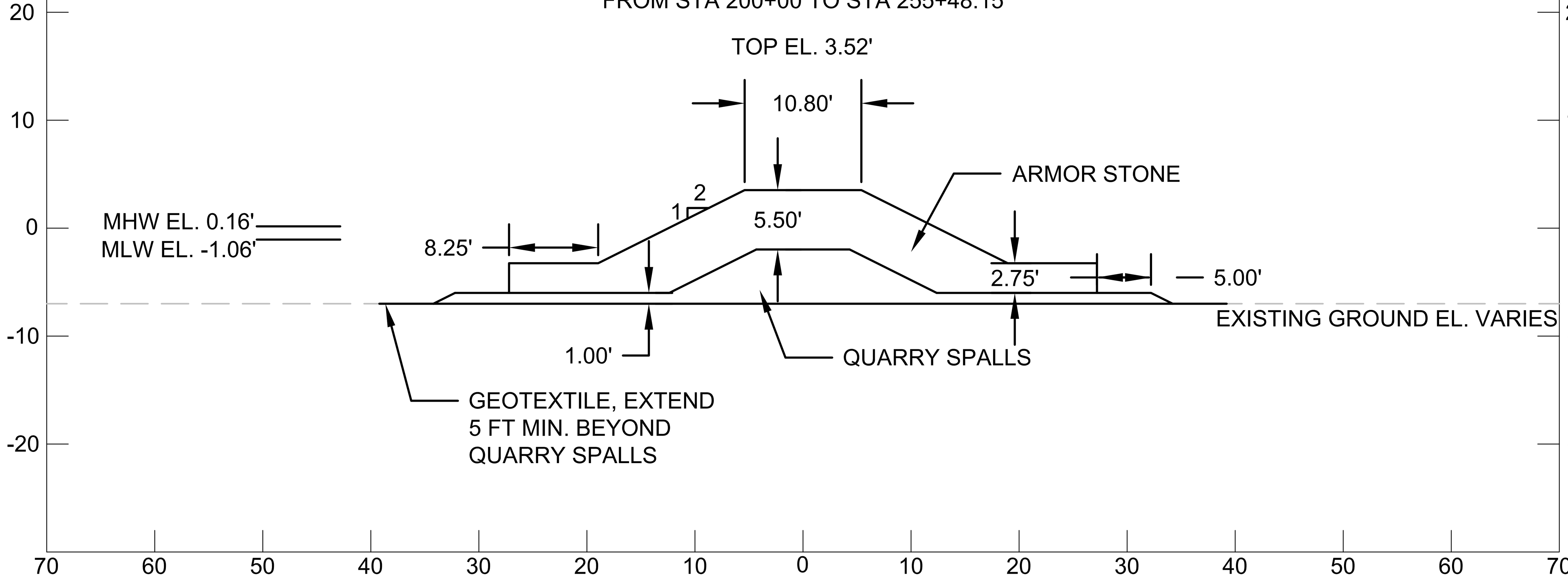
SOUTHEAST SILL

FROM STA 400+00 TO STA 410+72.78



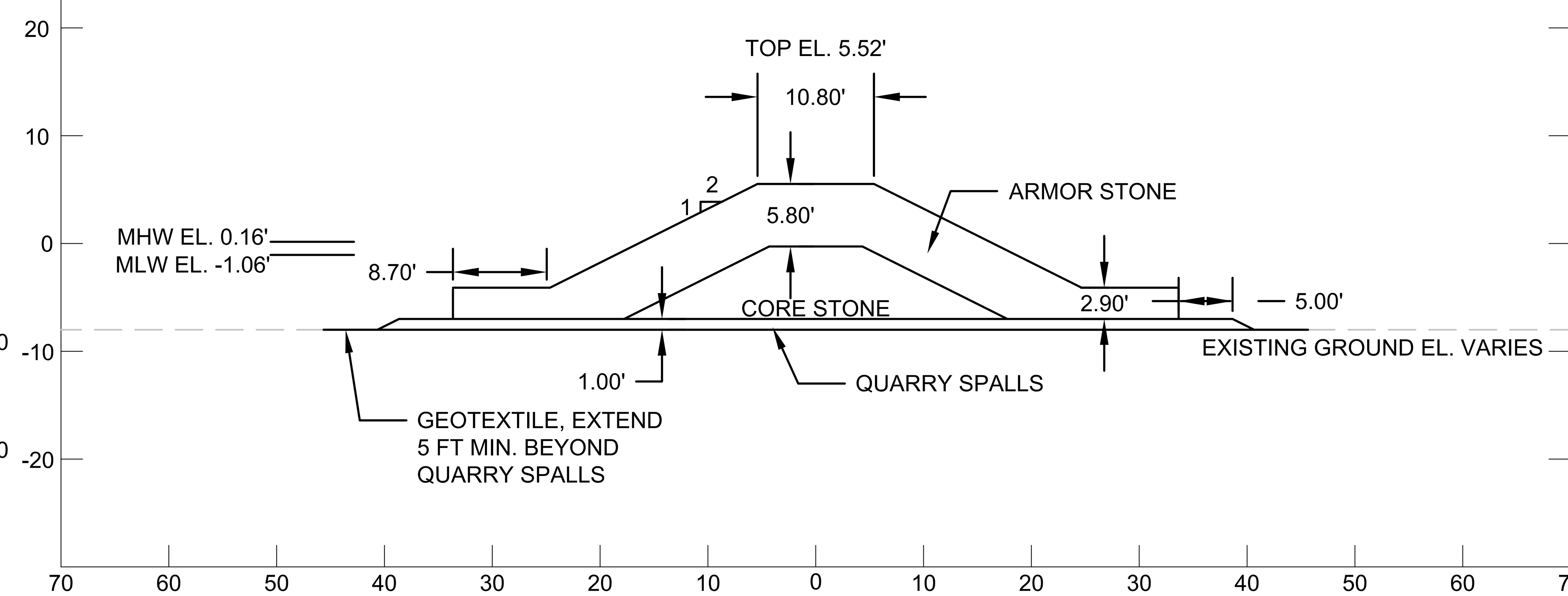
EXISTING SILL

FROM STA 200+00 TO STA 255+48.15



BREAKWATER

FROM STA 500+00 TO STA 514+05.89



0 10 20 Feet

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BALTIMORE DISTRICT

MARK	DESCRIPTION	DATE	APPR

DESIGNED BY: | DWN BY: | CKD BY: | SUBMITTED BY: | PLOT SCALE: | PLOT DATE: | SIZE: ANSI D | FILE NAME: 514C301.DWG | DATE: XXX | SOLICITATION NO.: | CONTRACT NO.: | FILE NUMBER:

U.S. ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
BALTIMORE, MARYLAND

ENGINEERING DIVISION

MID-CHESAPEAKE BAY ISLAND
ECOSYSTEM RESTORATION PROJECT

PHASE I - BARREN ISLAND
STONE RESTORATION STRUCTURES
CROSS SECTIONS

SHEET IDENTIFICATION

C301

MID-CHESAPEAKE BAY ISLAND ECOSYSTEM RESTORATION PROJECT
DORCHESTER COUNTY, MARYLAND

BARREN ISLAND RESTORATION STONE STRUCTURES

A. MODIFICATION OF EXISTING SILL (STA 200 TO 255+48.15):

1. WITH AUTHORIZATION FROM THE CONTRACTING OFFICER (KO) OR THE CONTRACTING OFFICER'S REPRESENTATIVE (COR) BEGIN MODIFICATION OF THE EXISTING STONE SILL.

2. ALL ELEVATIONS ARE IN FEET

3. TYPICAL SECTION FOR MODIFICATION OF EXISTING STONE SILL FOUND ON SHEET 514C301

4. INSTALL ACCESS POINT AT STATION 200. MAKE REASONABLE EFFORTS TO MINIMIZE NEED TO EXCAVATE AND/OR DISPLACE BAY BOTTOM MATERIAL.

5. STAKE OUT LIMITS OF DISTURBANCE, PLACE TIMBER MATS, AND INSTALL SILT FENCE.

6. BEGIN PLACEMENT OF FIRST COURSE OF QUARRY SPALLS. SURVEY HORIZONTAL LOCATION AND VERTICAL ORIENTATION AS WORK PROGRESSES

7. AFTER COMPLETION OF THE FIRST LAYER OF QUARRY SPALLS AND WITH AUTHORIZATION FROM THE COR, THE CONTRACTOR WILL SURVEY THE FIRST COURSE OF STONE TO DETERMINE THE STRUCTURES HORIZONTAL LOCATION AND VERTICAL ORIENTATION. THE CONTRACTOR WILL ASSESS THE HORIZONTAL AND VERTICAL LOCATION OF THE STRUCTURE FOR COMPLIANCE WITH THE PLANS AND SPECIFICATION, DOCUMENT THE SURVEYED STONE COURSE ON THE PROVIDED AS-BUILT TABLE, AND SUBMIT THE PROFESSIONAL LAND SURVEYOR STAMPED TABLE TO THE KO.

8. WITH APPROVAL FROM THE COR BEGIN CONSTRUCTION OF THE ARMOR STONE LAYER MAKING SURE TO MEET THE LINES AND GRADES AS SHOWN ON THE PLANS. THE CONTRACTOR WILL MONITOR THE STONE BREAKWATER FOR EXCESSIVE SETTLEMENT DURING CONSTRUCTION.

9. UPON COMPLETION OF THE INSTALLATION OF ARMOR STONE ON THE EXISTING SILL MODIFICATION AND WITH AUTHORIZATION FROM THE COR CONDUCT A COMPLETED CONDITION SURVEY OF THE MODIFIED STONE SILL. THE CONTRACTOR WILL ASSESS THE HORIZONTAL AND VERTICAL LOCATION OF THE STRUCTURE FOR COMPLIANCE WITH THE PLANS AND SPECIFICATION, DOCUMENT THE SURVEYED STONE COURSE ON THE PROVIDED AS-BUILT TABLE, AND SUBMIT THE PROFESSIONAL LAND SURVEYOR STAMPED TABLE TO THE KO.

B. STONE BREAKWATER (STA 500 TO 514+05.89):

1. WITH AUTHORIZATION FROM THE CONTRACTING OFFICER (KO) OR THE CONTRACTING OFFICER'S REPRESENTATIVE (COR) BEGIN CONSTRUCTION OF THE STONE BREAKWATER AT IT'S TIE-IN TO STA 342+70 OF THE SOUTHERN SILL.

2. ACCESS STONE BREAKWATER TIE-IN TO THE EXISTING SILL FROM THE BAY ONLY. MAKE REASONABLE EFFORTS TO MINIMIZE NEED TO EXCAVATE AND/OR DISPLACE SOFT RIVER BOTTOM MATERIAL TO ACCESS BREAKWATER TIE-IN.

3. ALL VERTICAL DATUM IS IN NAVD88, HORIZONTAL DATUM IS IN MD83

4. ALL ELEVATIONS ARE IN FEET

5. TYPICAL SECTION FOR STONE BREAKWATER FOUND ON SHEET 514C301

6. BEGIN PLACEMENT OF THE GEOTEXTILE

7. BEGIN PLACEMENT OF FIRST COURSE OF STONE. SURVEY HORIZONTAL LOCATION AND VERTICAL ORIENTATION AS WORK PROGRESSES.

8. AFTER COMPLETION OF GEOTEXTILE AND THE FIRST LAYER OF QUARRY SPALLS, AND WITH AUTHORIZATION FROM THE COR, THE CONTRACTOR WILL SURVEY THE FIRST COURSE OF STONE TO DETERMINE THE STRUCTURES HORIZONTAL LOCATION AND VERTICAL ORIENTATION. THE CONTRACTOR WILL ASSESS THE HORIZONTAL AND VERTICAL LOCATION OF THE STRUCTURE FOR COMPLIANCE WITH THE PLANS AND SPECIFICATION, DOCUMENT THE SURVEYED STONE COURSE ON THE PROVIDED AS-BUILT TABLE, AND SUBMIT THE PROFESSIONAL LAND SURVEYOR STAMPED TABLE TO THE KO.

9. WITH APPROVAL FROM THE COR BEGIN CONSTRUCTION OF THE CORE STONE LAYER MAKING SURE TO MEET THE LINES AND GRADES AS SHOWN ON THE PLANS. THE CONTRACTOR WILL MONITOR THE STONE BREAKWATER FOR EXCESSIVE SETTLEMENT DURING CONSTRUCTION.

10. SEVEN DAYS AFTER COMPLETION OF THE LAYER OF CORE STONE AND WITH AUTHORIZATION FROM THE COR, THE CONTRACTOR WILL SURVEY THE CORE STONE COURSE OF STONE TO DETERMINE THE STRUCTURES HORIZONTAL LOCATION AND VERTICAL ORIENTATION. THE CONTRACTOR WILL ASSESS THE HORIZONTAL AND VERTICAL LOCATION OF THE STRUCTURE FOR COMPLIANCE WITH THE PLANS AND SPECIFICATION, DOCUMENT THE SURVEYED STONE COURSE ON THE PROVIDED AS-BUILT TABLE, AND SUBMIT THE PROFESSIONAL LAND SURVEYOR STAMPED TABLE TO THE KO.

11. WITH APPROVAL FROM THE COR BEGIN CONSTRUCTION OF THE ARMOR STONE LAYER MAKING SURE TO MEET THE LINES AND GRADES AS SHOWN ON THE PLANS. THE CONTRACTOR WILL MONITOR THE STONE BREAKWATER FOR EXCESSIVE SETTLEMENT DURING CONSTRUCTION.

12. INSTALL NAVIGATION OR WARNING BEACONS AND SIGNAGE AS REQUIRED.

13. UPON COMPLETION OF THE ARMOR STONE BREAKWATER AND WITH AUTHORIZATION FROM THE COR CONDUCT A COMPLETED CONDITION SURVEY OF THE STONE BREAKWATER. THE CONTRACTOR WILL ASSESS THE HORIZONTAL AND VERTICAL LOCATION OF THE STRUCTURE FOR COMPLIANCE WITH THE PLANS AND SPECIFICATION, DOCUMENT THE SURVEYED STONE COURSE ON THE PROVIDED AS-BUILT TABLE, AND SUBMIT THE PROFESSIONAL LAND SURVEYOR STAMPED TABLE TO THE KO.

14. SUBMIT THE COMPLETED CONDITION SURVEY OF THE STONE BREAKWATER TO THE COR AND MAKE ANY REQUIRED ALTERATIONS TO THE STONE BREAKWATER FOR APPROVAL.

C. NORTHEAST STONE SILL (STA 100 TO 138+25.09):

1. WITH AUTHORIZATION FROM THE CONTRACTING OFFICER (KO) OR THE CONTRACTING OFFICER'S REPRESENTATIVE (COR) BEGIN CONSTRUCTION OF THE STONE SILL AT STA 100+00.

2. CONSTRUCTION OF THE STONE SILL FROM THE BAY ONLY. MAKE REASONABLE EFFORTS TO MINIMIZE NEED TO EXCAVATE AND/OR DISPLACE BAY BOTTOM MATERIAL.

3. ALL ELEVATIONS ARE IN FEET

4. TYPICAL SECTION FOR STONE SILL FOUND ON SHEET 514C301

5. BEGIN EXCAVATION OF MATERIAL FOR FOUNDATION REPLACEMENT. MECHANICALLY/HYDRAULICALLY PLACE DREDGE SPOILS IN PREAPPROVED SITE NOTED ON PLAN SHEET 514ES101.

6. DREDGE BORROW MATERIAL FROM APPROVED BORROW SITE, TRANSPORT, AND PLACE MATERIAL FOR FOUNDATION REPLACEMENT.

7. BEGIN PLACEMENT OF THE GEOTEXTILE.

8. BEGIN PLACEMENT OF FIRST COURSE OF QUARRY SPALLS. SURVEY HORIZONTAL LOCATION AND VERTICAL ORIENTATION AS WORK PROGRESSES

9. AFTER COMPLETION OF THE LAYER OF QUARRY SPALLS AND WITH AUTHORIZATION FROM THE COR, THE CONTRACTOR WILL SURVEY THE FIRST COURSE OF SILL STONE TO DETERMINE THE STRUCTURES HORIZONTAL LOCATION AND VERTICAL ORIENTATION. THE CONTRACTOR WILL ASSESS THE HORIZONTAL AND VERTICAL LOCATION OF THE STRUCTURE FOR COMPLIANCE WITH THE PLANS AND SPECIFICATION, DOCUMENT THE SURVEYED STONE COURSE ON THE PROVIDED AS-BUILT TABLE, AND SUBMIT THE PROFESSIONAL LAND SURVEYOR STAMPED TABLE TO THE KO.

10. WITH APPROVAL FROM THE COR BEGIN CONSTRUCTION OF THE ARMOR STONE LAYER MAKING SURE TO MEET THE LINES AND GRADES AS SHOWN ON THE PLANS. THE CONTRACTOR WILL MONITOR THE STONE SILL FOR EXCESSIVE SETTLEMENT DURING CONSTRUCTION.

11. UPON COMPLETION OF THE INSTALLATION OF ARMOR STONE ON THE NEW STONE SILL AND WITH AUTHORIZATION FROM THE COR CONDUCT A COMPLETED CONDITION SURVEY OF THE NEW STONE SILL. THE CONTRACTOR WILL ASSESS THE HORIZONTAL AND VERTICAL LOCATION OF THE STRUCTURE FOR COMPLIANCE WITH THE PLANS AND SPECIFICATION, DOCUMENT THE SURVEYED STONE COURSE ON THE PROVIDED AS-BUILT TABLE, AND SUBMIT THE PROFESSIONAL LAND SURVEYOR STAMPED TABLE TO THE KO.

D. SOUTHEAST STONE SILL (STA 400 TO 410+72.78):

1. WITH AUTHORIZATION FROM THE CONTRACTING OFFICER (KO) OR THE CONTRACTING OFFICER'S REPRESENTATIVE (COR) BEGIN CONSTRUCTION OF THE STONE SILL AT STA 400+00

2. ALL ELEVATIONS ARE IN FEET

3. TYPICAL SECTION FOR STONE SILL FOUND ON SHEET 514C301

4. BEGIN CONSTRUCTION AT STATION 400 UTILIZING LOW GROUND PRESSURE EQUIPMENT TO CONSTRUCT THE SILL TIE-IN. MAKE REASONABLE EFFORTS TO MINIMIZE NEED TO EXCAVATE AND/OR DISTURB THE GROUND AND BAY BOTTOM MATERIAL.

5. BEGIN PLACEMENT OF THE GEOTEXTILE

6. BEGIN PLACEMENT OF FIRST COURSE OF QUARRY SPALL STONE. SURVEY HORIZONTAL LOCATION AND VERTICAL ORIENTATION AS WORK PROGRESSES

7. AFTER COMPLETION OF THE FIRST LAYER OF ROCK AND WITH AUTHORIZATION FROM THE COR, THE CONTRACTOR WILL SURVEY THE FIRST COURSE OF SILL STONE TO DETERMINE THE STRUCTURES HORIZONTAL LOCATION AND VERTICAL ORIENTATION. THE CONTRACTOR WILL ASSESS THE HORIZONTAL AND VERTICAL LOCATION OF THE STRUCTURE FOR COMPLIANCE WITH THE PLANS AND SPECIFICATION, DOCUMENT THE SURVEYED STONE COURSE ON THE PROVIDED AS-BUILT TABLE, AND SUBMIT THE PROFESSIONAL LAND SURVEYOR STAMPED TABLE TO THE KO.

8. WITH APPROVAL FROM THE COR BEGIN CONSTRUCTION OF THE ARMOR STONE LAYER MAKING SURE TO MEET THE LINES AND GRADES AS SHOWN ON THE PLANS. THE CONTRACTOR WILL MONITOR THE STONE SILL FOR EXCESSIVE SETTLEMENT DURING CONSTRUCTION.

9. UPON COMPLETION OF THE INSTALLATION OF ARMOR STONE ON THE NEW STONE SILL AND WITH AUTHORIZATION FROM THE COR CONDUCT A COMPLETED CONDITION SURVEY OF THE NEW STONE SILL. THE CONTRACTOR WILL ASSESS THE HORIZONTAL AND VERTICAL LOCATION OF THE STRUCTURE FOR COMPLIANCE WITH THE PLANS AND SPECIFICATION, DOCUMENT THE SURVEYED STONE COURSE ON THE PROVIDED AS-BUILT TABLE, AND SUBMIT THE PROFESSIONAL LAND SURVEYOR STAMPED TABLE TO THE KO.

E. SOUTHWEST STONE SILL (STA 300 TO 325+99.66):

1. WITH AUTHORIZATION FROM THE CONTRACTING OFFICER (KO) OR THE CONTRACTING OFFICER'S REPRESENTATIVE (COR) BEGIN CONSTRUCTION OF THE STONE SILL AT STA 300+00

2. CONSTRUCTION OF STONE SILL FROM THE BAY ONLY. MAKE REASONABLE EFFORTS TO MINIMIZE NEED TO EXCAVATE AND/OR DISPLACE BAY BOTTOM MATERIAL.

3. ALL ELEVATIONS ARE IN FEET

4. TYPICAL SECTION FOR STONE SILL FOUND ON SHEET 514C301

5. BEGIN PLACEMENT OF THE GEOTEXTILE

6. BEGIN PLACEMENT OF FIRST COURSE OF STONE. SURVEY HORIZONTAL LOCATION AND VERTICAL ORIENTATION AS WORK PROGRESSES

7. AFTER COMPLETION OF THE LAYER OF QUARRY SPALL ROCK AND WITH AUTHORIZATION FROM THE COR, THE CONTRACTOR WILL SURVEY THE FIRST COURSE OF SILL STONE TO DETERMINE THE STRUCTURES HORIZONTAL LOCATION AND VERTICAL ORIENTATION. THE CONTRACTOR WILL ASSESS THE HORIZONTAL AND VERTICAL LOCATION OF THE STRUCTURE FOR COMPLIANCE WITH THE PLANS AND SPECIFICATION, DOCUMENT THE SURVEYED STONE COURSE ON THE PROVIDED AS-BUILT TABLE, AND SUBMIT THE PROFESSIONAL LAND SURVEYOR STAMPED TABLE TO THE KO.

8. WITH APPROVAL FROM THE COR BEGIN CONSTRUCTION OF THE ARMOR STONE LAYER MAKING SURE TO MEET THE LINES AND GRADES AS SHOWN ON THE PLANS. THE CONTRACTOR WILL MONITOR THE STONE SILL FOR EXCESSIVE SETTLEMENT DURING CONSTRUCTION.

9. UPON COMPLETION OF THE INSTALLATION OF ARMOR STONE ON THE NEW STONE SILL AND WITH AUTHORIZATION FROM THE COR CONDUCT A COMPLETED CONDITION SURVEY OF THE NEW STONE SILL. THE CONTRACTOR WILL ASSESS THE HORIZONTAL AND VERTICAL LOCATION OF THE STRUCTURE FOR COMPLIANCE WITH THE PLANS AND SPECIFICATION, DOCUMENT THE SURVEYED STONE COURSE ON THE PROVIDED AS-BUILT TABLE, AND SUBMIT THE PROFESSIONAL LAND SURVEYOR STAMPED TABLE TO THE KO.

G. BIRD ISLANDS (STA 600 TO 615+00 AND 700 TO 713+63.77):

1. WITH AUTHORIZATION FROM THE CONTRACTING OFFICER (KO) OR THE CONTRACTING OFFICER'S REPRESENTATIVE (COR) BEGIN CONSTRUCTION OF THE BIRD ISLANDS

2. ALL ELEVATIONS IN FEET

3. PLACE GEOTEXTILE FOR FOUNDATION

4. PLACE TOE DIKE

5. SURVEY, FILL OUT TABLE

6. INSTALL GEOTEXTILE MAKING SURE TO OVERLAP SEAMS

7. INSTALL ROCK

8. SURVEY, FILL OUT TABLE

9. PLACE FILL

10. SURVEY, FILL OUT TABLE

11. PLACE GEOTEXTILE

12. INSTALL CAPPING MATERIAL

13. SUBMIT THE COMPLETED CONDITION SURVEY OF THE BIRD ISLANDS TO THE COR AND MAKE ANY REQUIRED ALTERATIONS TO THE BIRD ISLANDS FOR APPROVAL.

NOTE: STONE STRUCTURES MAY BE CONSTRUCTED CONCURRENTLY OR IN ANY ORDER

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MARK	DESCRIPTION	DATE	APPR.

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BALTIMORE, MARYLAND
ENGINEERING DIVISION

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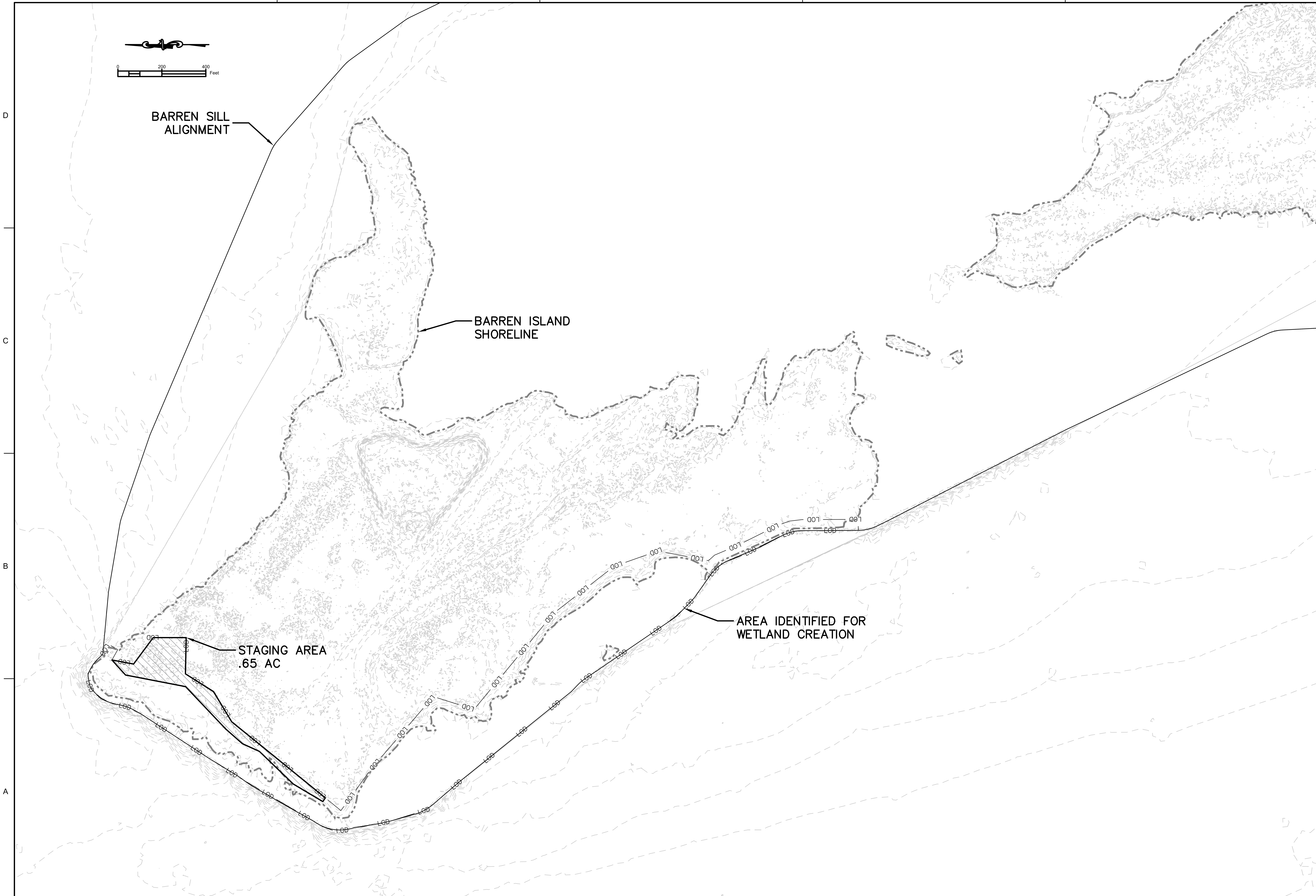
DWN BY:	CKD BY:	SOLICITATION NO.:	
SUBMITTED BY:		CONTRACT NO.:	
PLOT SCALE: 1"= 1'	PLOT DATE:	FILE NUMBER:	
SIZE: ANSI D	FILE NAME: 510G001.DWG		

MID-CHESAPEAKE BAY ISLAND
ECOSYSTEM RESTORATION PROJECT
PHASE I - BARREN ISLAND
STONE RESTORATION STRUCTURES
EROSION AND SEDIMENT CONTROL
SEQUENCE OF CONSTRUCTION

SHEET IDENTIFICATION
ES001



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U.S. ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
BALTIMORE, MARYLAND

ENGINEERING DIVISION

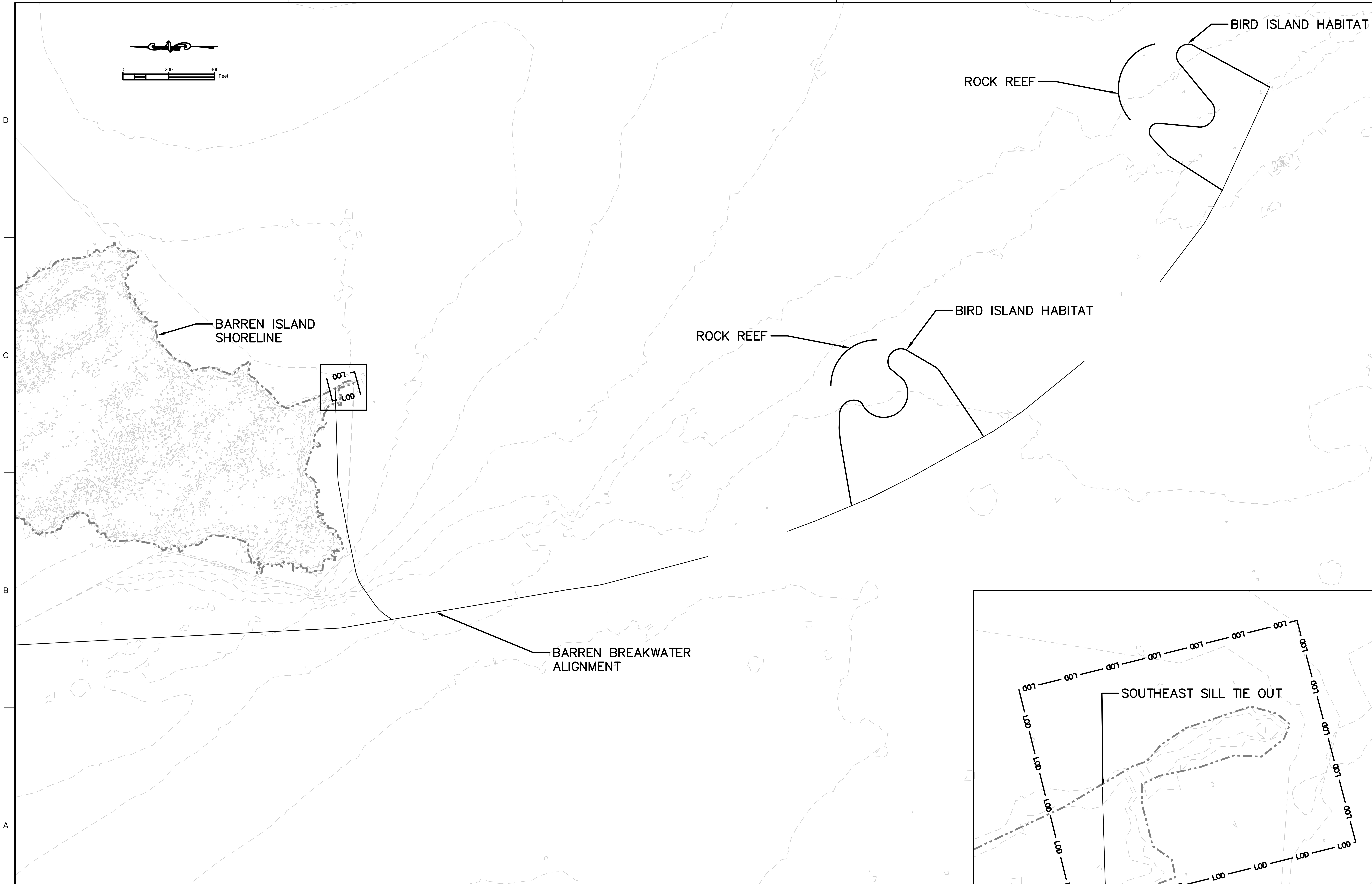
DESIGNED BY: | DATE: XXX
DWN BY: | CKD BY: | SOLICITATION NO.:
SUBMITTED BY: | CONTRACT NO.:
PLOT SCALE: | PLOT DATE: | FILE NUMBER:
SIZE: ANSI D | FILE NAME:

MID-CHESAPEAKE BAY ISLAND
ECOSYSTEM RESTORATION PROJECT

PHASE I - BARREN ISLAND
STONE RESTORATION STRUCTURES

EROSION AND SEDIMENT CONTROL PLAN

SHEET IDENTIFICATION
ES101



NOTE: BIRD ISLANDS AND ROCK REEFS ARE TO BE CONSTRUCTED UNDER A SEPARATE CONTRACT.

US Army Corps of Engineers ®
BALTIMORE DISTRICT

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PLOT SCALE: | PLOT DATE: | FILE NUMBER:
SIZE: ANSI D | FILE NAME:

U.S. ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
BALTIMORE, MARYLAND

ENGINEERING DIVISION

MID-CHESAPEAKE BAY ISLAND
ECOSYSTEM RESTORATION PROJECT

PHASE I - BARREN ISLAND
STONE RESTORATION STRUCTURES

EROSION AND SEDIMENT CONTROL PLAN

SHEET IDENTIFICATION
ES102

APPENDIX B

BARREN ISLAND COASTAL ENGINEERING

ATTACHMENT – STONE SIZING CALCULATIONS

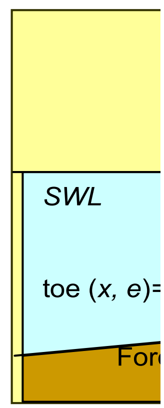
Barren Island Restoration Stone Sizing Input

Date: 12/10/2020
Computed By: MLM (USACE NAB)
Source: USACE ERDC Coastal Structure Calculator
Structure: Breakwater

Input Wave and Water Level Variables			
H_{mo} =	6.07	ft	Wave Height at Structure Toe
T_p =	4.12	s	Spectral Peak Wave Period
h =	13.3	ft	Total Depth at Structure Toe
g =	32.2	ft/s^2	Acceleration of Gravity
β =	0	deg	Wave Obliquity
	1		CASE
H_B/h_B =	0.6		Breaker Ratio for Breaker Height at x_B
γ_w =	63.3	pcf	Specific Weight of Water
γ_r =	165.0	pcf	Specific Weight of Armor
γ_b =	1.0		Berm Influence Factor

The breaker
Generally 0.

Input Structure Geometry from Crest to Toe				
Point	**x**	**Elevation**	**coords**	**Roughness**
	ft	**ft**		γ_f
Leeward Structure Toe	67.36	0.16	x_1, e_1	
Leeward End of Crest	39.24	14.22	x_2, e_2	0.55
Seaward End of Crest	28.44	14.22	x_3, e_3	0.55
Seaward Structure Toe	0	0	x_4, e_4	0.55
Crest Width	10.8			
$\cot\ \alpha$ = 2		Seaward Slope		
γ_f = 0.55		Roughness		
Por = 0.37		Porosity		



Example Roughness Coefficients	
Surface Covering	γ_f
Concrete or Asphalt	1
Closed concrete block	1
Grass	1
Armorflex	0.9
Small blocks over 1/25 of surface	0.85
Small blocks over 1/9 of surface	0.8
Armor rock – single layer	0.7
Armor rock – two layers	0.55

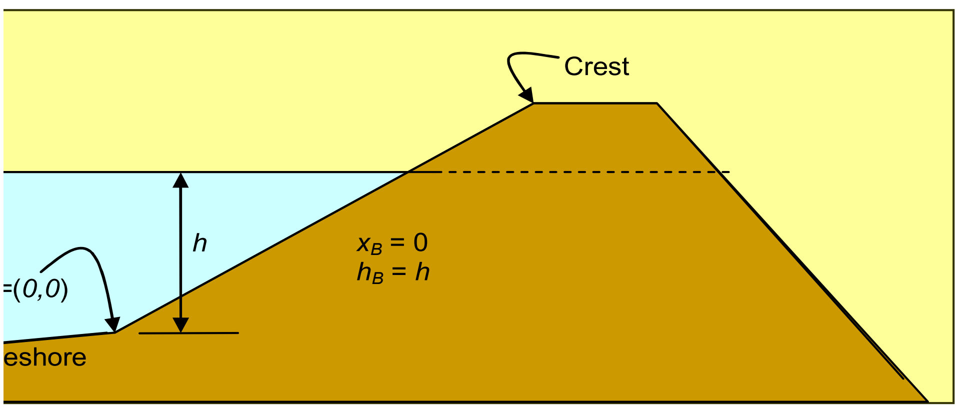
Hs/D 2.68

Interpolation Tool to compute input values for a specific SWL at 50% CL						
Desired SWL =		4.9	ft			
Hydraulic Parameter	CL	Annual Exceedai				
		0.2	0.1	0.05	0.02	0.01
SWL (ft)	50	8.4	10.0	11.9	14.5	17.1
	90	8.7	10.5	12.4	15.1	17.7
Hmo (ft)	50	1.3	1.6	1.9	2.6	3.1
Tp (s)	50	2.8	2.9	3.0	3.2	3.3
p1 (lbf/ft^2)	50	124	144	169	217	255
	90	191	223	261	335	395
p2 (lbf/ft^2)	50	0	0	0	108	227
	90	0	0	0	199	380
p3 (lbf/ft^2)	50	340	443	562	735	904
	90	406	517	636	821	990
AEP of Desired SWL		0.6536				
SWL	50	4.9	ft			
	90	5.5	ft			
Hmo	50	0.4	ft			
Tp	50	2.6	s			
p1 (lbf/ft^2)	50	37	(lbf/ft^2)			
	90	58	(lbf/ft^2)			
p2 (lbf/ft^2)	50	-372	(lbf/ft^2)			
	90	-503	(lbf/ft^2)			
p3 (lbf/ft^2)	50	119	(lbf/ft^2)			
	90	189	(lbf/ft^2)			

units of weight: lb
units of length ^2: ft^2

ratio should typically be 0.5 to 0.6.
5 applies to flat bathymetry and 0.6 is for steeper bathymetry.

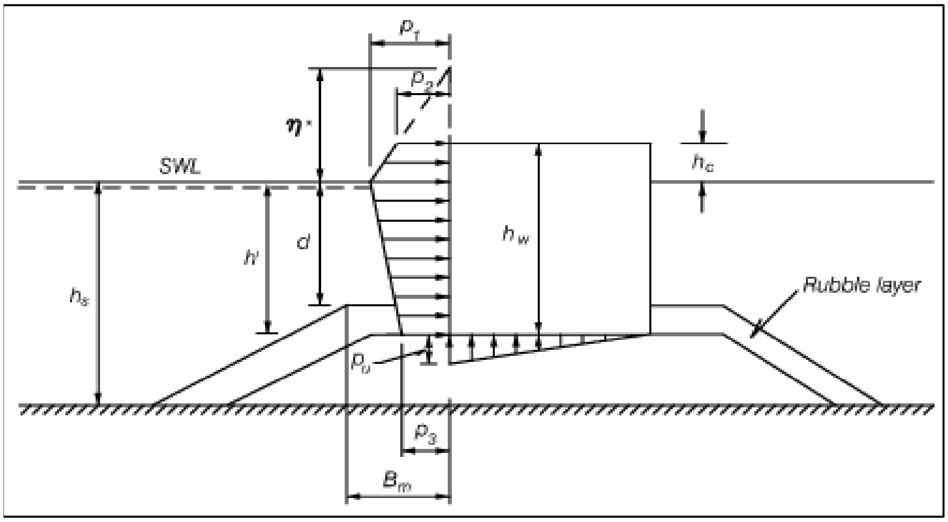
a sw



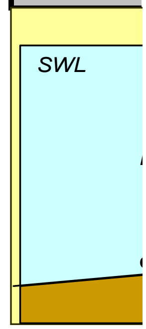
nce Probability

0.005	0.0033	0.002	0.0013	0.001
19.3	20.4	21.4	22.2	22.6
19.8	20.7	21.7	22.4	22.9
3.6	3.9	4.2	4.4	4.7
3.4	3.5	3.6	3.7	3.8
296	325	362	391	407
457	503	560	604	629
423	550	692	791	850
650	804	979	1102	1173
1040	1105	1170	1212	1264
1121	1193	1250	1297	1338

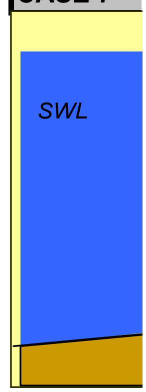
Input for "Wall Forces" and "Wall Overtopping" Worksheets



CASE 6



CASE 7



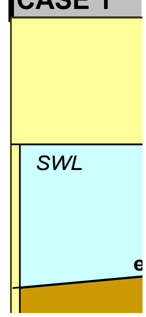
Caisson or wall Input			
h_s 50% CL=	13.3	ft	Water Depth
h_b 50% CL=	18	ft	Water depth at 5Hs from Wall
h' 50% CL=	18	ft	Water Depth at Toe of wall
d 50% CL=	18	ft	Water Depth at Base Armor Crest El
B =	0	ft	Wall/Casson Width
h_c =	4.7	ft	Freeboard
h_w =	18	ft	Height of Wall
γ_c =	155.0	pcf	Specific Weight of Caisson
Bm =	0	ft	Width of Rock Forward of Wall
γ_s =	1		Wall Type Coefficient
	0		Wave Type: 0 for long-crested, 1 for short

Wall-Type
Plain Impe
Plain Impe
Perforated
Perforated

Input for "Wave Runup" and "Sloped Structure Overtopping" Worksheets

Flooding Over Levee			
n =	0.045	Mannings n for grass	
$tan\ \theta$ =	0.500	rad	backside slope
h_w =	13.3	ft	Pool Depth at Levee Toe

CASE 1

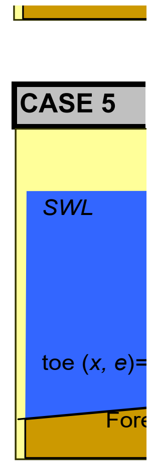


Input for "Stone Armor" and "Hudson Armor" Worksheets

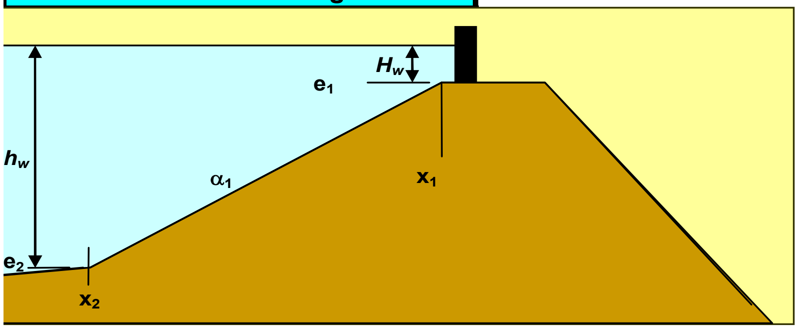
Armor Stone Stability Input - Melby and Hughes Equation			
S =	1		Zero Damage Level
N_z =	5000		Number of Waves in a Storm

P =	0.37		Structure Permeability
S_r =	2.61		Stone Specific Gravity
B_c =	10.8	ft	Crest Width
$\gamma_{f\text{-}C}$ =	0.55		Roughness Influence Coef., Cres
$R_{c\text{-}rear}$ =	0.92	ft	Leeside Freeboard
$\tan\ \phi$ =	0.500	rad	backside slope
K_W =	0.100		Underlayer Weight/Armor Weigh

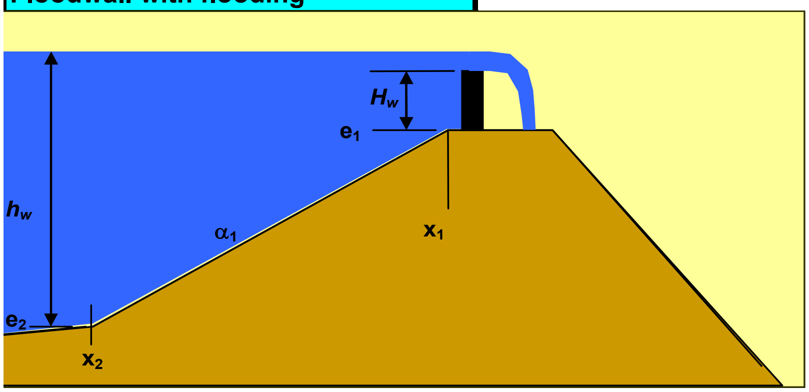
Concrete Stability Input - Hudson Equation			
H =	6.07	ft	Design Wave Height
K_D =	2		Stability Coefficient
S_r =	2.61		Armor Specific Gravity
Δ =	1.61		S_r - 1
K_W =	0.100		Underlayer Weight/Armor Weigh
Quarry stone			Armor Type



Floodwall with no flooding



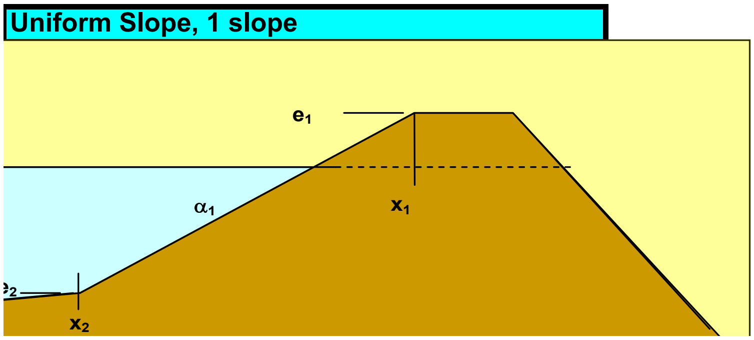
Floodwall with flooding

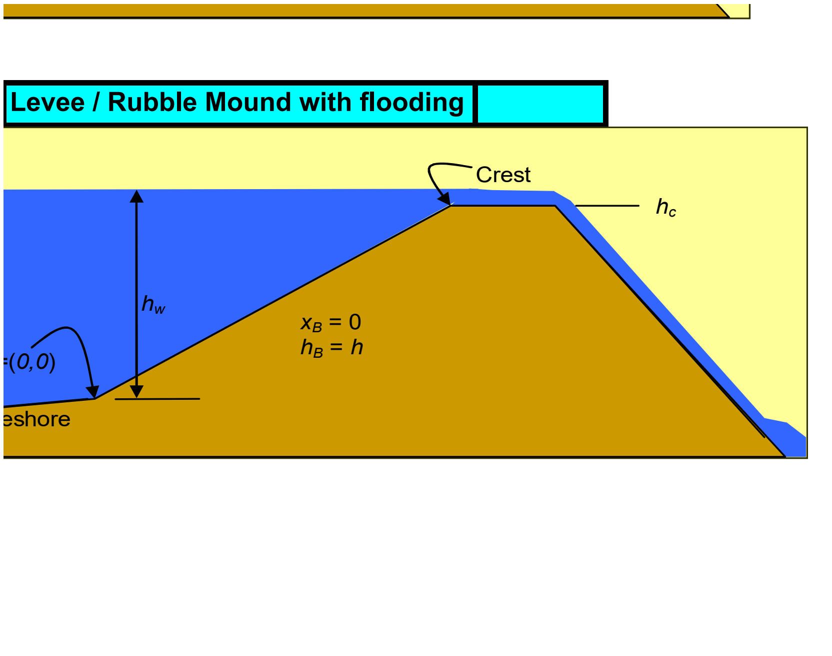


Coefficients for Wave Overtopping

	γ_s
rmeable Wall	1
rmeable Wall with Recurved Nose	0.78
front (20% hole area) and deck	0.72-0.79
front (20% hole area) and open deck	0.58

Uniform Slope, 1 slope





Levee / Rubble Mound with flooding
Crest
h_c
h_w
$x_B = 0$
$h_B = h$
=(0,0)
eshore

Barren Island Restoration Low-Crested Structure Stone Sizing Output
Date: 12/10/2020
Computed By: MLM (USACE NAB)
Source: USACE ERDC Coastal Structure Calculator - Delos, EurOtop
Structure: Breakwater

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	6.07	ft	Wave Height at Structure Toe
T_p =	4.12	s	Spectral Peak Wave Period
h =	13.3	ft	Total Depth at Structure Toe
$\cot\ \alpha$ =	2	ft	Seaward Slope
γ_w =	63.3	pcf	Specific Weight of Water
γ_r =	165	pcf	Specific Weight of Armor
g =	32.2	ft/s^2	Acceleration of Gravity
β =	0	deg	Wave Obliquity
S_r =	2.61		Stone Specific Gravity
H_B/h_B =	0.6		Breaker Ratio for Breaker Height at xB
Δ =	1.61		
R_c =	0.92		
B =	10.8	ft	Crest Width

S_r = ρ_r/ρ_w = γ_r/γ_w = specific gravity of stone

ρ_r = Density of Stone

ρ_w = Density of Water

D_{n50} = $(V_{50})^{1/3}$ = Nominal Stone Diameter

V_{50} = M_{50}/ρ_r = W_{50}/γ_r = Median Volume of Armor Stone

M_{50} = Median Armor Stone Mass

Computed Variables for Stability and Transmission			
H_{mo} =	6.07	ft	Significant Wave Height at Levee Toe
L_{op} =	86.99	ft	Deep Wave Length
ξ_{op} =	1.89		Surf Similarity Parameter
$\tan\ \alpha$ =	0.5000		Average Slope $=h_c/x_c$
R_c/H_i =	0.1516		
B/H_i =	1.7792		
a =	1.360		
b =	-3.98968	ft	
c =	0.050784	ft^2	

Computed Armor Size			
D_{n50} =	2.92	ft	Median Nominal Stone Size
W_{50} =	4111.42	lb	Median Stone Weight

Overtopping for Rubble Mound			
K_t =	0.267		
H_t =	1.620		
Overtopping for Smooth Structure include oblique wave			
Kt =	0.413		
H_t =	0.207		

Armor Sizing Equations

$$\frac{H_S}{\Delta D_{n50}} = 0.06\left(\frac{R_C}{D_{n50}}\right)^2 - 0.23\left(\frac{R_C}{D_{n50}}\right) + 1.36$$

$$1.36\,D_{n50}^2 + \left[-\left(0.23\,R_C + \frac{H_S}{\Delta}\right)\right]D_{n50} + 0.06\,R_C^2 = 0$$

$$D_{n50} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$a = 1.36 \qquad b = -\left(0.23\,R_C + \frac{H_S}{\Delta}\right) \qquad c = 0.06\,R_C^2$$

Armor Sizing Equations, linearly interpolate for 8<B/Hi<12

Narrow-Berm Crests

$$(K_t)_{\text{rubble}} = -0.40\left(\frac{R_c}{H_i}\right) + 0.64\left(\frac{B}{H_i}\right)^{-0.31}\left(1 - e^{-0.5\,\xi_{op}}\right) \qquad \text{for} \qquad \frac{B}{H_i} \leq 8$$

Broad-Berm Crests

$$(K_t)_{\text{rubble}} = -0.35\left(\frac{R_c}{H_i}\right) + 0.51\left(\frac{B}{H_i}\right)^{-0.65}\left(1 - e^{-0.41\,\xi_{op}}\right) \qquad \text{for} \qquad \frac{B}{H_i} \geq 12$$

Smooth Low-Crested Structures, Oblique Wave Incidence $(\beta \neq 0)$

$$(K_t)_{\text{smooth}} = \left[-0.30\left(\frac{R_c}{H_i}\right) + 0.75\left(1 - e^{-0.5\,\xi_{op}}\right)\right]\cos^{2/3}\beta \qquad \text{for} \qquad \xi_{op} < 3$$

Barren Island Restoration Stone Sizing Input

Date: 12/10/2020
Computed By: MLM (USACE NAB)
Source: USACE ERDC Coastal Structure Calculator
Structure: Modification of Existing Sill

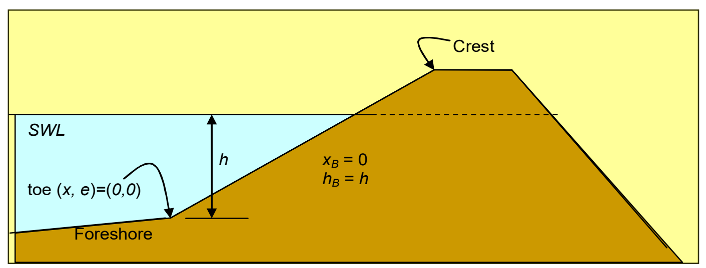
units of weight: lb
units of length ^2: ft^2

Input Wave and Water Level Variables			
H_{mo} =	5.77	ft	Wave Height at Structure Toe
T_p =	6.33	s	Spectral Peak Wave Period
h =	14.4	ft	Total Depth at Structure Toe
g =	32.2	ft/s^2	Acceleration of Gravity
β =	0	deg	Wave Obliquity
	1		CASE
H_B/h_B =	0.6		Breaker Ratio for Breaker Height at x_B
γ_w =	63.3	pcf	Specific Weight of Water
γ_r =	165.0	pcf	Specific Weight of Armor
γ_b =	1.0		Berm Influence Factor

The breaker ratio should typically be 0.5 to 0.6.
Generally 0.5 applies to flat bathymetry and 0.6 is for steeper bathymetry.

Input Structure Geometry from Crest to Toe				
Point	x	Elevation	coords	Roughness
	ft	ft		γ_f
Leeward Structure Toe	59.64	2.24	x_1, e_1	
Leeward End of Crest	37.46	13.33	x_2, e_2	0.55
Seaward End of Crest	26.66	13.33	x_3, e_3	0.55
Seaward Structure Toe	0	0	x_4, e_4	0.55
Crest Width	10.8			
cot α =	2	Seaward Slope		
γ_f =	0.55	Roughness		
Por =	0.37	Porosity		

a sw

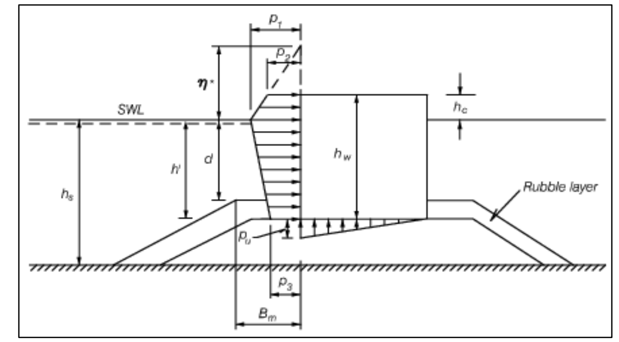


Example Roughness Coefficients	
Surface Covering	γ_f
Concrete or Asphalt	1
Closed concrete block	1
Grass	1
Armorflex	0.9
Small blocks over 1/25 of surface	0.85
Small blocks over 1/9 of surface	0.8
Armor rock – single layer	0.7
Armor rock – two layers	0.55

Hs/D 2.55

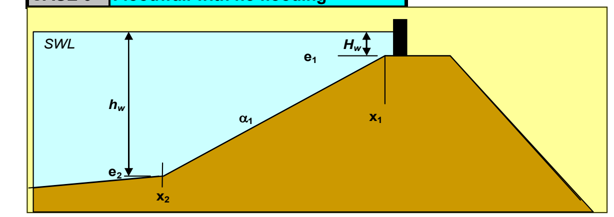
Interpolation Tool to compute input values for a specific SWL at 50% CL											
Desired SWL =		4.9	ft								
Hydraulic Parameter	CL	Annual Exceedance Probability									
		0.2	0.1	0.05	0.02	0.01	0.005	0.0033	0.002	0.0013	0.001
SWL (ft)	50	8.4	10.0	11.9	14.5	17.1	19.3	20.4	21.4	22.2	22.6
	90	8.7	10.5	12.4	15.1	17.7	19.8	20.7	21.7	22.4	22.9
Hmo (ft)	50	1.3	1.6	1.9	2.6	3.1	3.6	3.9	4.2	4.4	4.7
Tp (s)	50	2.8	2.9	3.0	3.2	3.3	3.4	3.5	3.6	3.7	3.8
p1 (lbf/ft^2)	50	124	144	169	217	255	296	325	362	391	407
	90	191	223	261	335	395	457	503	560	604	629
p2 (lbf/ft^2)	50	0	0	0	108	227	423	550	692	791	850
	90	0	0	0	199	380	650	804	979	1102	1173
p3 (lbf/ft^2)	50	340	443	562	735	904	1040	1105	1170	1212	1264
	90	406	517	636	821	990	1121	1193	1250	1297	1338
AEP of Desired SWL		0.6536									
SWL	50	4.9	ft								
	90	5.5	ft								
Hmo	50	0.4	ft								
Tp	50	2.6	s								
p1 (lbf/ft^2)	50	37	(lbf/ft^2)								
	90	58	(lbf/ft^2)								
p2 (lbf/ft^2)	50	-372	(lbf/ft^2)								
	90	-503	(lbf/ft^2)								
p3 (lbf/ft^2)	50	119	(lbf/ft^2)								
	90	189	(lbf/ft^2)								

Input for "Wall Forces" and "Wall Overtopping" Worksheets

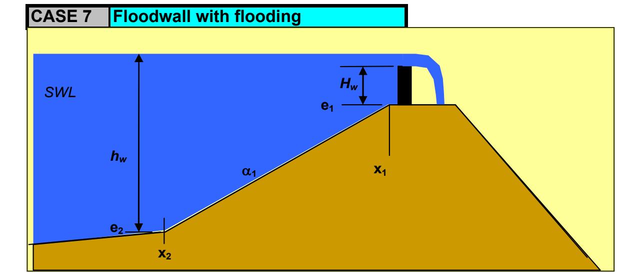


Caisson or wall Input			
h_s 50% CL=	14.4	ft	Water Depth
h_b 50% CL=	18	ft	Water depth at 5Hs from Wall
h' 50% CL=	18	ft	Water Depth at Toe of wall
d 50% CL=	18	ft	Water Depth at Base Armor Crest El
B =	0	ft	Wall/Casson Width
h_c =	3.6	ft	Freeboard
h_w =	18	ft	Height of Wall
γ_c =	155.0	pcf	Specific Weight of Caisson
Bm =	0	ft	Width of Rock Forward of Wall
γ_s =	1		Wall Type Coefficient
	0		Wave Type: 0 for long-crested, 1 for short

CASE 6 Floodwall with no flooding



CASE 7 Floodwall with flooding

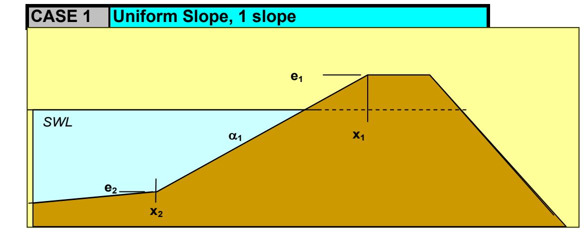


Wall-Type Coefficients for Wave Overtopping	
	γ_s
Plain Impermeable Wall	1
Plain Impermeable Wall with Recurved Nose	0.78
Perforated front (20% hole area) and deck	0.72-0.79
Perforated front (20% hole area) and open deck	0.58

Input for "Wave Runup" and "Sloped Structure Overtopping" Worksheets

Flooding Over Levee			
n =	0.046	Mannings n for grass	
$\tan\ \theta$ =	0.500	rad	backside slope
h_w =	14.4	ft	Pool Depth at Levee Toe

CASE 1 Uniform Slope, 1 slope

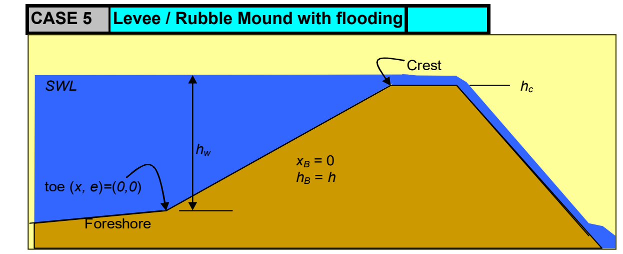


Input for "Stone Armor" and "Hudson Armor" Worksheets

Armor Stone Stability Input - Melby and Hughes Equation			
S =	1		Zero Damage Level
N_z =	5000		Number of Waves in a Storm
P =	0.37		Structure Permeability
S_r =	2.61		Stone Specific Gravity
B_c =	10.8	ft	Crest Width
$\gamma_{f\text{-}C}$ =	0.55		Roughness Influence Coef., Cre
$R_{c\text{-}rear}$ =	-1.07	ft	Leeside Freeboard
$\tan\ \phi$ =	0.500	rad	backside slope
K_W =	0.100		Underlayer Weight/Armor Weigh

Concrete Stability Input - Hudson Equation			
H =	5.77	ft	Design Wave Height
K_D =	2		Stability Coefficient
S_r =	2.61		Armor Specific Gravity
Δ =	1.61		S_r - 1
K_W =	0.100		Underlayer Weight/Armor Weigh
Quarry stone			Armor Type

CASE 5 Levee / Rubble Mound with flooding



Barren Island Restoration Low-Crested Structure Stone Sizing Output
Date: 12/10/2020
Computed By: MLM (USACE NAB)
Source: USACE ERDC Coastal Structure Calculator - Delos, EurOtop
Structure: Modification of Existing Sill

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	5.77	ft	Wave Height at Structure Toe
T_p =	6.33	s	Spectral Peak Wave Period
h =	14.4	ft	Total Depth at Structure Toe
$\cot\alpha$ =	2	ft	Seaward Slope
γ_w =	63.3	pcf	Specific Weight of Water
γ_r =	165	pcf	Specific Weight of Armor
g =	32.2	ft/s^2	Acceleration of Gravity
β =	0	deg	Wave Obliquity
S_r =	2.61		Stone Specific Gravity
H_B/h_B =	0.6		Breaker Ratio for Breaker Height at xB
Δ =	1.61		
R_c =	0		
B =	10.8	ft	Crest Width

$S_r = \rho_r/\rho_w = \gamma_r/\gamma_w$ = specific gravity of stone
ρ_r = Density of Stone
ρ_w = Density of Water
$D_{n50} = (V_{50})^{1/3}$ = Nominal Stone Diameter
$V_{50} = M_{50}/\rho_r = W_{50}/\gamma_r$ = Median Volume of Armor Stone
M_{50} = Median Armor Stone Mass

Computed Variables for Stability and Transmission			
H_{mo} =	5.77	ft	Significant Wave Height at Levee Toe
L_{op} =	205.34	ft	Deep Wave Length
ξ_{op} =	2.98		Surf Similarity Parameter
$\tan\alpha$ =	0.5000		Average Slope $=h_c/x_c$
R_c/H_i =	0.0000		
B/H_i =	1.8718		
a =	1.360		
b =	-3.59136	ft	
c =	0	ft^2	

Armor Sizing Equations

$$\frac{H_s}{\Delta D_{n50}} = 0.06\left(\frac{R_C}{D_{n50}}\right)^2 - 0.23\left(\frac{R_C}{D_{n50}}\right) + 1.36$$

$$1.36\,D_{n50}^2 + \left[-\left(0.23\,R_C + \frac{H_S}{\Delta}\right)\right]D_{n50} + 0.06\,R_C^2 = 0$$

$$D_{n50} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$a = 1.36 \qquad b = -\left(0.23\,R_C + \frac{H_S}{\Delta}\right) \qquad c = 0.06\,R_C^2$$

Computed Armor Size			
D_{n50} =	2.64	ft	Median Nominal Stone Size
W_{50} =	3038.39	lb	Median Stone Weight

Armor Sizing Equations, linearly interpolate for 8<B/Hi<12

Narrow-Berm Crests

$$(K_t)_{\text{rubble}} = -0.40\left(\frac{R_c}{H_i}\right) + 0.64\left(\frac{B}{H_i}\right)^{-0.31}\left(1 - e^{-0.5\,\xi_{op}}\right) \qquad \text{for} \quad \frac{B}{H_i} \leq 8$$

Broad-Berm Crests

$$(K_t)_{\text{rubble}} = -0.35\left(\frac{R_c}{H_i}\right) + 0.51\left(\frac{B}{H_i}\right)^{-0.65}\left(1 - e^{-0.41\,\xi_{op}}\right) \qquad \text{for} \quad \frac{B}{H_i} \geq 12$$

Overtopping for Rubble Mound			
K_t =	0.408		
H_t =	2.356		
Overtopping for Smooth Structure include oblique wave			
Kt =	0.581		
H_t =	0.291		

Smooth Low-Crested Structures, Oblique Wave Incidence ($\beta \neq 0$)

$$(K_t)_{\text{smooth}} = \left[-0.30\left(\frac{R_c}{H_i}\right) + 0.75\left(1 - e^{-0.5\,\xi_{op}}\right)\right]\cos^{2/3}\beta \qquad \text{for} \quad \xi_{op} < 3$$

Barren Island Restoration Stone Sizing Input

Date: 12/10/2020
Computed By: MLM (USACE NAB)
Source: USACE ERDC Coastal Structure Calculator
Structure: Northeast Sill

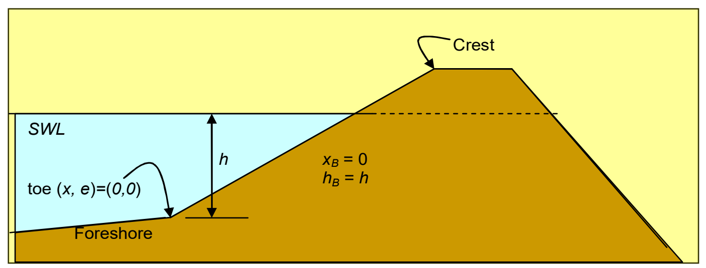
units of weight: lb
units of length ^2: ft^2

Input Wave and Water Level Variables			
H_{mo} =	5.04	ft	Wave Height at Structure Toe
T_p =	4.12	s	Spectral Peak Wave Period
h =	9.9	ft	Total Depth at Structure Toe
g =	32.2	ft/s^2	Acceleration of Gravity
β =	0	deg	Wave Obliquity
	1		CASE
H_B/h_B =	0.6		Breaker Ratio for Breaker Height at x_B
γ_w =	63.3	pcf	Specific Weight of Water
γ_r =	165.0	pcf	Specific Weight of Armor
γ_b =	1.0		Berm Influence Factor

The breaker ratio should typically be 0.5 to 0.6.
Generally 0.5 applies to flat bathymetry and 0.6 is for steeper bathymetry.

Input Structure Geometry from Crest to Toe				
Point	x	Elevation	coords	Roughness
	ft	ft		γ_f
Leeward Structure Toe	45.12	0.68	x_1, e_1	
Leeward End of Crest	28.64	8.92	x_2, e_2	0.55
Seaward End of Crest	17.84	8.92	x_3, e_3	0.55
Seaward Structure Toe	0	0	x_4, e_4	0.55
Crest Width	10.8			
cot α =	2	Seaward Slope		
γ_f =	0.55	Roughness		
Por =	0.37	Porosity		

a sw



Example Roughness Coefficients	
Surface Covering	γ_f
Concrete or Asphalt	1
Closed concrete block	1
Grass	1
Armorflex	0.9
Small blocks over 1/25 of surface	0.85
Small blocks over 1/9 of surface	0.8
Armor rock – single layer	0.7
Armor rock – two layers	0.55

Hs/D 2.63

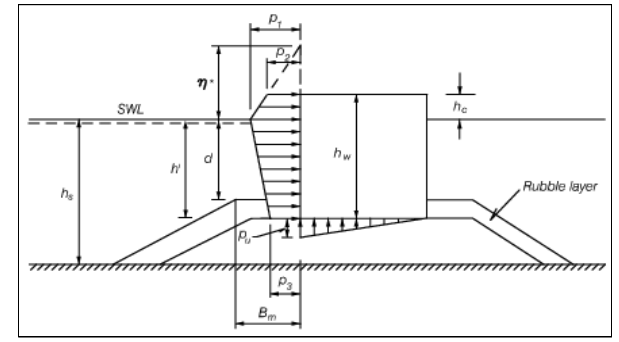
Interpolation Tool to compute input values for a specific SWL at 50% CL

Desired SWL = 4.9 ft

Hydraulic Parameter	CL	Annual Exceedance Probability 0.2	0.1	0.05	0.02	0.01	0.005	0.0033	0.002	0.0013	0.001
SWL (ft)	50	8.4	10.0	11.9	14.5	17.1	19.3	20.4	21.4	22.2	22.6
	90	8.7	10.5	12.4	15.1	17.7	19.8	20.7	21.7	22.4	22.9
Hmo (ft)	50	1.3	1.6	1.9	2.6	3.1	3.6	3.9	4.2	4.4	4.7
Tp (s)	50	2.8	2.9	3.0	3.2	3.3	3.4	3.5	3.6	3.7	3.8
p1 (lbf/ft^2)	50	124	144	169	217	255	296	325	362	391	407
	90	191	223	261	335	395	457	503	560	604	629
p2 (lbf/ft^2)	50	0	0	0	108	227	423	550	692	791	850
	90	0	0	0	199	380	650	804	979	1102	1173
p3 (lbf/ft^2)	50	340	443	562	735	904	1040	1105	1170	1212	1264
	90	406	517	636	821	990	1121	1193	1250	1297	1338

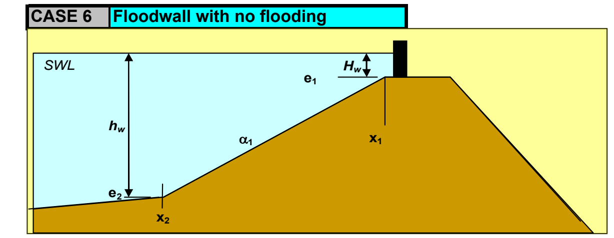
AEP of Desired SWL		0.6536	
SWL	50	4.9	ft
	90	5.5	ft
Hmo	50	0.4	ft
Tp	50	2.6	s
p1 (lbf/ft^2)	50	37	(lbf/ft^2)
	90	58	(lbf/ft^2)
p2 (lbf/ft^2)	50	-372	(lbf/ft^2)
	90	-503	(lbf/ft^2)
p3 (lbf/ft^2)	50	119	(lbf/ft^2)
	90	189	(lbf/ft^2)

Input for "Wall Forces" and "Wall Overtopping" Worksheets

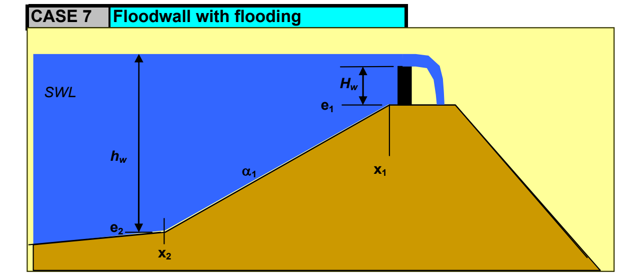


Caisson or wall Input			
h_s 50% CL=	9.9	ft	Water Depth
h_b 50% CL=	18	ft	Water depth at 5Hs from Wall
h' 50% CL=	18	ft	Water Depth at Toe of wall
d 50% CL=	18	ft	Water Depth at Base Armor Crest El
B =	0	ft	Wall/Casson Width
h_c =	8.1	ft	Freeboard
h_w =	18	ft	Height of Wall
γ_c =	155.0	pcf	Specific Weight of Caisson
Bm =	0	ft	Width of Rock Forward of Wall
γ_s =	1		Wall Type Coefficient
	0		Wave Type: 0 for long-crested, 1 for short

CASE 6 Floodwall with no flooding



CASE 7 Floodwall with flooding

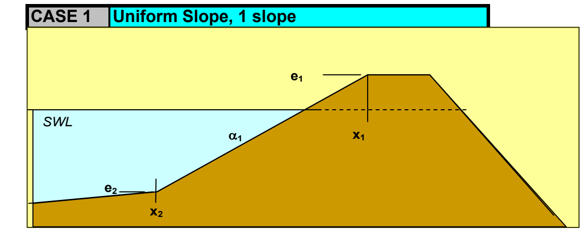


Wall-Type Coefficients for Wave Overtopping	
	γ_s
Plain Impermeable Wall	1
Plain Impermeable Wall with Recurved Nose	0.78
Perforated front (20% hole area) and deck	0.72-0.79
Perforated front (20% hole area) and open deck	0.58

Input for "Wave Runup" and "Sloped Structure Overtopping" Worksheets

Flooding Over Levee			
n =	0.044	Mannings n for grass	
tan θ =	0.500	rad	backside slope
h_w =	9.9	ft	Pool Depth at Levee Toe

CASE 1 Uniform Slope, 1 slope

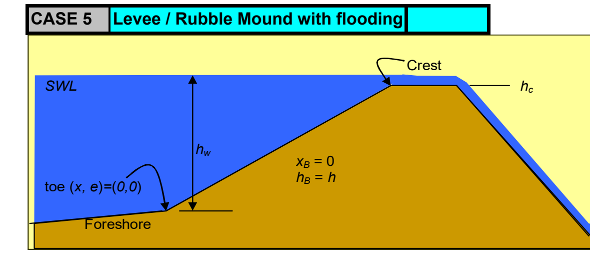


Input for "Stone Armor" and "Hudson Armor" Worksheets

Armor Stone Stability Input - Melby and Hughes Equation			
S =	1		Zero Damage Level
N_z =	5000		Number of Waves in a Storm
P =	0.37		Structure Permeability
S_r =	2.61		Stone Specific Gravity
B_c =	10.8	ft	Crest Width
$\gamma_{f\text{-}C}$ =	0.55		Roughness Influence Coef., Cre
$R_{c\text{-}rear}$ =	-0.98	ft	Leeside Freeboard
tan ϕ =	0.500	rad	backside slope
K_W =	0.100		Underlayer Weight/Armor Weigh

Concrete Stability Input - Hudson Equation			
H =	5.04	ft	Design Wave Height
K_D =	2		Stability Coefficient
S_r =	2.61		Armor Specific Gravity
Δ =	1.61		S_r - 1
K_W =	0.100		Underlayer Weight/Armor Weigh
Quarry stone			Armor Type

CASE 5 Levee / Rubble Mound with flooding



Barren Island Restoration Low-Crested Structure Stone Sizing Output
Date: 12/10/2020
Computed By: MLM (USACE NAB)
Source: USACE ERDC Coastal Structure Calculator - Delos, EurOtop
Structure: Northeast Sill

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	5.04	ft	Wave Height at Structure Toe
T_p =	4.12	s	Spectral Peak Wave Period
h =	9.9	ft	Total Depth at Structure Toe
$\cot \alpha$ =	2	ft	Seaward Slope
γ_w =	63.3	pcf	Specific Weight of Water
γ_r =	165	pcf	Specific Weight of Armor
g =	32.2	ft/s^2	Acceleration of Gravity
β =	0	deg	Wave Obliquity
S_r =	2.61		Stone Specific Gravity
H_B/h_B =	0.6		Breaker Ratio for Breaker Height at xB
Δ =	1.61		
R_c =	0		
B =	10.8	ft	Crest Width

Computed Variables for Stability and Transmission			
H_{mo} =	5.04	ft	Significant Wave Height at Levee Toe
L_{op} =	86.99	ft	Deep Wave Length
ξ_{op} =	2.08		Surf Similarity Parameter
$\tan \alpha$ =	0.5000		Average Slope $=h_c/x_c$
R_c/H_i =	0.0000		
B/H_i =	2.1429		
a =	1.360		
b =	-3.13699	ft	
c =	0	ft^2	

Computed Armor Size			
D_{n50} =	2.31	ft	Median Nominal Stone Size
W_{50} =	2024.92	lb	Median Stone Weight

Overtopping for Rubble Mound			
K_t =	0.326		
H_t =	1.645		
Overtopping for Smooth Structure include oblique wave			
Kt =	0.485		
H_t =	0.242		

$S_r = \rho_r/\rho_w = \gamma_r/\gamma_w$ = specific gravity of stone
ρ_r = Density of Stone
ρ_w = Density of Water
$D_{n50} = (V_{50})^{1/3}$ = Nominal Stone Diameter
$V_{50} = M_{50}/\rho_r = W_{50}/\gamma_r$ = Median Volume of Armor Stone
M_{50} = Median Armor Stone Mass

Armor Sizing Equations

$$\frac{H_S}{\Delta D_{n50}} = 0.06\left(\frac{R_C}{D_{n50}}\right)^2 - 0.23\left(\frac{R_C}{D_{n50}}\right) + 1.36$$

$$1.36\,D_{n50}^2 + \left[-\left(0.23\,R_C + \frac{H_S}{\Delta}\right)\right]D_{n50} + 0.06\,R_C^2 = 0$$

$$D_{n50} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$a = 1.36 \qquad b = -\left(0.23\,R_C + \frac{H_S}{\Delta}\right) \qquad c = 0.06\,R_C^2$$

Armor Sizing Equations, linearly interpolate for 8<B/Hi<12

Narrow-Berm Crests

$$(K_t)_{\text{rubble}} = -0.40\left(\frac{R_c}{H_i}\right) + 0.64\left(\frac{B}{H_i}\right)^{-0.31}\left(1 - e^{-0.5\,\xi_{op}}\right) \qquad \text{for} \qquad \frac{B}{H_i} \leq 8$$

Broad-Berm Crests

$$(K_t)_{\text{rubble}} = -0.35\left(\frac{R_c}{H_i}\right) + 0.51\left(\frac{B}{H_i}\right)^{-0.65}\left(1 - e^{-0.41\,\xi_{op}}\right) \qquad \text{for} \qquad \frac{B}{H_i} \geq 12$$

Smooth Low-Crested Structures, Oblique Wave Incidence ($\beta \neq 0$)

$$(K_t)_{\text{smooth}} = \left[-0.30\left(\frac{R_c}{H_i}\right) + 0.75\left(1 - e^{-0.5\,\xi_{op}}\right)\right]\cos^{2/3}\beta \qquad \text{for} \qquad \xi_{op} < 3$$

Barren Island Restoration Stone Sizing Input

Date: 12/10/2020
Computed By: MLM (USACE NAB)
Source: USACE ERDC Coastal Structure Calculator
Structure: Southeast Sill

units of weight: lb
units of length ^2: ft^2

Input Wave and Water Level Variables			
H_{mo} =	6.06	ft	Wave Height at Structure Toe
T_p =	5.92	s	Spectral Peak Wave Period
h =	13.2	ft	Total Depth at Structure Toe
g =	32.2	ft/s^2	Acceleration of Gravity
β =	0	deg	Wave Obliquity
	1		CASE
H_B/h_B =	0.6		Breaker Ratio for Breaker Height at x_B
γ_w =	63.3	pcf	Specific Weight of Water
γ_r =	165.0	pcf	Specific Weight of Armor
γ_b =	1.0		Berm Influence Factor

The breaker ratio should typically be 0.5 to 0.6.
Generally 0.5 applies to flat bathymetry and 0.6 is for steeper bathymetry.

Input Structure Geometry from Crest to Toe				
Point	x	Elevation	coords	Roughness
	ft	ft		γ_f
Leeward Structure Toe	58.84	-0.12	x_1, e_1	
Leeward End of Crest	34.7	11.95	x_2, e_2	0.55
Seaward End of Crest	23.9	11.95	x_3, e_3	0.55
Seaward Structure Toe	0	0	x_4, e_4	0.55
Crest Width	10.8			
cot α =	2	Seaward Slope		
γ_f =	0.55	Roughness		
Por =	0.37	Porosity		

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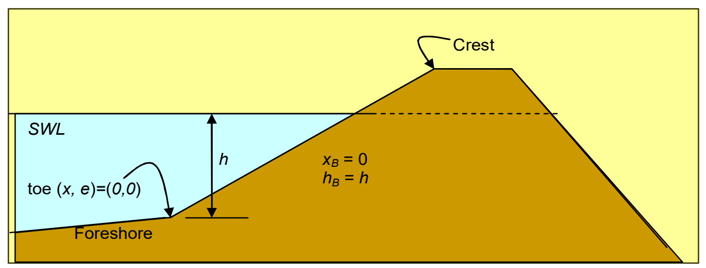
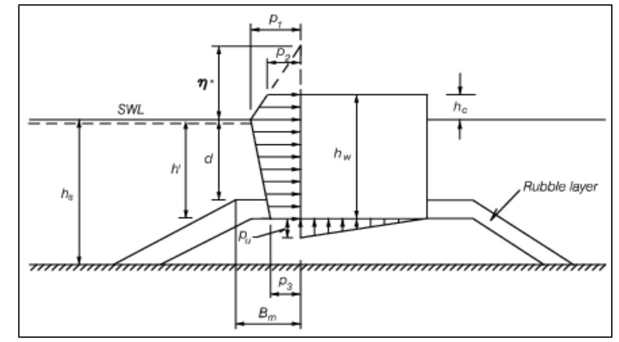


Example Roughness Coefficients	
Surface Covering	γ_f
Concrete or Asphalt	1
Closed concrete block	1
Grass	1
Armorflex	0.9
Small blocks over 1/25 of surface	0.85
Small blocks over 1/9 of surface	0.8
Armor rock – single layer	0.7
Armor rock – two layers	0.55

Hs/D 2.46

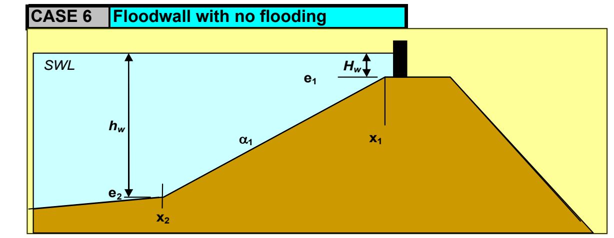
Interpolation Tool to compute input values for a specific SWL at 50% CL											
Desired SWL =		4.9	ft								
Hydraulic Parameter	CL	Annual Exceedance Probability									
		0.2	0.1	0.05	0.02	0.01	0.005	0.0033	0.002	0.0013	0.001
SWL (ft)	50	8.4	10.0	11.9	14.5	17.1	19.3	20.4	21.4	22.2	22.6
	90	8.7	10.5	12.4	15.1	17.7	19.8	20.7	21.7	22.4	22.9
Hmo (ft)	50	1.3	1.6	1.9	2.6	3.1	3.6	3.9	4.2	4.4	4.7
Tp (s)	50	2.8	2.9	3.0	3.2	3.3	3.4	3.5	3.6	3.7	3.8
p1 (lbf/ft^2)	50	124	144	169	217	255	296	325	362	391	407
	90	191	223	261	335	395	457	503	560	604	629
p2 (lbf/ft^2)	50	0	0	0	108	227	423	550	692	791	850
	90	0	0	0	199	380	650	804	979	1102	1173
p3 (lbf/ft^2)	50	340	443	562	735	904	1040	1105	1170	1212	1264
	90	406	517	636	821	990	1121	1193	1250	1297	1338
AEP of Desired SWL		0.6536									
SWL	50	4.9	ft								
	90	5.5	ft								
Hmo	50	0.4	ft								
Tp	50	2.6	s								
p1 (lbf/ft^2)	50	37	(lbf/ft^2)								
	90	58	(lbf/ft^2)								
p2 (lbf/ft^2)	50	-372	(lbf/ft^2)								
	90	-503	(lbf/ft^2)								
p3 (lbf/ft^2)	50	119	(lbf/ft^2)								
	90	189	(lbf/ft^2)								

Input for "Wall Forces" and "Wall Overtopping" Worksheets

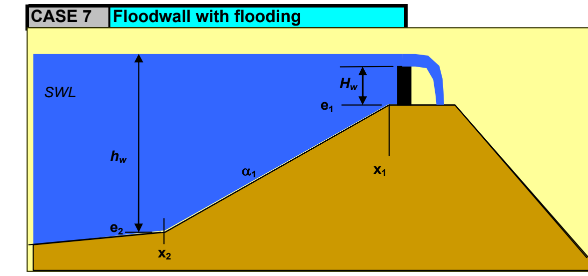


Caisson or wall Input			
h_s 50% CL=	13.2	ft	Water Depth
h_b 50% CL=	18	ft	Water depth at 5Hs from Wall
h' 50% CL=	18	ft	Water Depth at Toe of wall
d 50% CL=	18	ft	Water Depth at Base Armor Crest El
B =	0	ft	Wall/Casson Width
h_c =	4.8	ft	Freeboard
h_w =	18	ft	Height of Wall
γ_c =	155.0	pcf	Specific Weight of Caisson
Bm =	0	ft	Width of Rock Forward of Wall
γ_s =	1		Wall Type Coefficient
	0		Wave Type: 0 for long-crested, 1 for short

CASE 6 Floodwall with no flooding



CASE 7 Floodwall with flooding

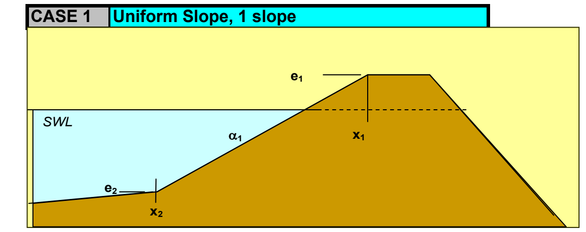


Wall-Type Coefficients for Wave Overtopping	
	γ_s
Plain Impermeable Wall	1
Plain Impermeable Wall with Recurved Nose	0.78
Perforated front (20% hole area) and deck	0.72-0.79
Perforated front (20% hole area) and open deck	0.58

Input for "Wave Runup" and "Sloped Structure Overtopping" Worksheets

Flooding Over Levee			
n =	0.046	Mannings n for grass	
tan θ =	0.500	rad	backside slope
h_w =	13.2	ft	Pool Depth at Levee Toe

CASE 1 Uniform Slope, 1 slope

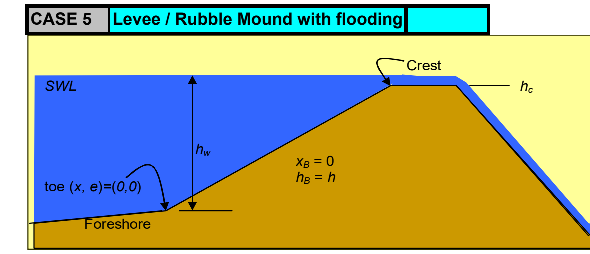


Input for "Stone Armor" and "Hudson Armor" Worksheets

Armor Stone Stability Input - Melby and Hughes Equation			
S =	1		Zero Damage Level
N_z =	5000		Number of Waves in a Storm
P =	0.37		Structure Permeability
S_r =	2.61		Stone Specific Gravity
B_c =	10.8	ft	Crest Width
$\gamma_{f\text{-}C}$ =	0.55		Roughness Influence Coef., Cre
$R_{c\text{-}rear}$ =	-1.25	ft	Leeside Freeboard
tan ϕ =	0.500	rad	backside slope
K_W =	0.100		Underlayer Weight/Armor Weigh

Concrete Stability Input - Hudson Equation			
H =	6.06	ft	Design Wave Height
K_D =	2		Stability Coefficient
S_r =	2.61		Armor Specific Gravity
Δ =	1.61		S_r - 1
K_W =	0.100		Underlayer Weight/Armor Weigh
Quarry stone			Armor Type

CASE 5 Levee / Rubble Mound with flooding



Barren Island Restoration Low-Crested Structure Stone Sizing Output
Date: 12/10/2020
Computed By: MLM (USACE NAB)
Source: USACE ERDC Coastal Structure Calculator - Delos, EurOtop
Structure: Southeast Sill

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	6.06	ft	Wave Height at Structure Toe
T_p =	5.92	s	Spectral Peak Wave Period
h =	13.2	ft	Total Depth at Structure Toe
$\cot\ \alpha$ =	2	ft	Seaward Slope
γ_w =	63.3	pcf	Specific Weight of Water
γ_r =	165	pcf	Specific Weight of Armor
g =	32.2	ft/s^2	Acceleration of Gravity
β =	0	deg	Wave Obliquity
S_r =	2.61		Stone Specific Gravity
H_B/h_B =	0.6		Breaker Ratio for Breaker Height at xB
Δ =	1.61		
R_c =	0		
B =	10.8	ft	Crest Width

S_r = $\rho_r/\rho_w = \gamma_r/\gamma_w$ = specific gravity of stone
ρ_r = Density of Stone
ρ_w = Density of Water
$D_{n50} = (V_{50})^{1/3}$ = Nominal Stone Diameter
$V_{50} = M_{50}/\rho_r = W_{50}/\gamma_r$ = Median Volume of Armor Stone
M_{50} = Median Armor Stone Mass

Computed Variables for Stability and Transmission			
H_{mo} =	6.06	ft	Significant Wave Height at Levee Toe
L_{op} =	179.61	ft	Deep Wave Length
ξ_{op} =	2.72		Surf Similarity Parameter
$\tan\ \alpha$ =	0.5000		Average Slope $=h_c/x_c$
R_c/H_i =	0.0000		
B/H_i =	1.7822		
a =	1.360		
b =	-3.77186	ft	
c =	0	ft^2	

Computed Armor Size			
D_{n50} =	2.77	ft	Median Nominal Stone Size
W_{50} =	3519.92	lb	Median Stone Weight

Overtopping for Rubble Mound			
K_t =	0.398		
H_t =	2.411		
Overtopping for Smooth Structure include oblique wave			
Kt =	0.558		
H_t =	0.279		

Armor Sizing Equations

$$\frac{H_S}{\Delta D_{n50}} = 0.06\left(\frac{R_C}{D_{n50}}\right)^2 - 0.23\left(\frac{R_C}{D_{n50}}\right) + 1.36$$

$$1.36\,D_{n50}^2 + \left[-\left(0.23\,R_C + \frac{H_S}{\Delta}\right)\right]D_{n50} + 0.06\,R_C^2 = 0$$

$$D_{n50} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$a = 1.36 \qquad b = -\left(0.23\,R_C + \frac{H_S}{\Delta}\right) \qquad c = 0.06\ R_C^2$$

Armor Sizing Equations, linearly interpolate for 8<B/Hi<12

Narrow-Berm Crests

$$(K_t)_{\text{rubble}} = -0.40\left(\frac{R_c}{H_i}\right) + 0.64\left(\frac{B}{H_i}\right)^{-0.31}\left(1 - e^{-0.5\,\xi_{op}}\right) \qquad \text{for} \qquad \frac{B}{H_i} \leq 8$$

Broad-Berm Crests

$$(K_t)_{\text{rubble}} = -0.35\left(\frac{R_c}{H_i}\right) + 0.51\left(\frac{B}{H_i}\right)^{-0.65}\left(1 - e^{-0.41\,\xi_{op}}\right) \qquad \text{for} \qquad \frac{B}{H_i} \geq 12$$

Smooth Low-Crested Structures, Oblique Wave Incidence ($\beta \neq 0$)

$$(K_t)_{\text{smooth}} = \left[-0.30\left(\frac{R_c}{H_i}\right) + 0.75\left(1 - e^{-0.5\,\xi_{op}}\right)\right]\cos^{2/3}\beta \qquad \text{for} \qquad \xi_{op} < 3$$

Barren Island Restoration Stone Sizing Input

Date: 12/10/2020
Computed By: MLM (USACE NAB)
Source: USACE ERDC Coastal Structure Calculator
Structure: Southwest Sill

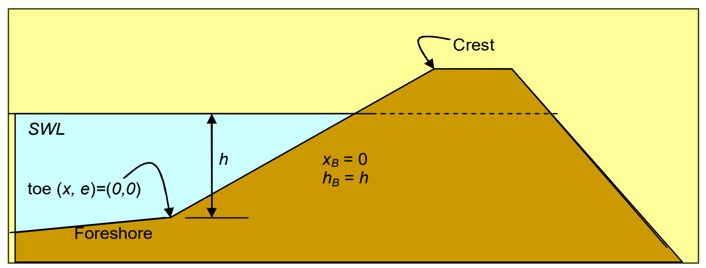
Input Wave and Water Level Variables			
H_{mo} =	5.91	ft	Wave Height at Structure Toe
T_p =	4.12	s	Spectral Peak Wave Period
h =	13.3	ft	Total Depth at Structure Toe
g =	32.2	ft/s^2	Acceleration of Gravity
β =	0	deg	Wave Obliquity
	1		CASE
H_B/h_B =	0.6		Breaker Ratio for Breaker Height at x_B
γ_w =	63.3	pcf	Specific Weight of Water
γ_r =	165.0	pcf	Specific Weight of Armor
γ_b =	1.0		Berm Influence Factor

The breaker ratio should typically be 0.5 to 0.6.
Generally 0.5 applies to flat bathymetry and 0.6 is for steeper bathymetry.

units of weight: lb
units of length ^2: ft^2

Input Structure Geometry from Crest to Toe				
Point	**x**	**Elevation**	**coords**	**Roughness**
	ft	ft		γ_f
Leeward Structure Toe	59.44	0.06	x_1, e_1	
Leeward End of Crest	35.18	12.19	x_2, e_2	0.55
Seaward End of Crest	24.38	12.19	x_3, e_3	0.55
Seaward Structure Toe	0	0	x_4, e_4	0.55
Crest Width	10.8			
$cot\ \alpha$ =	2		Seaward Slope	
γ_f =	0.55		Roughness	
Por =	0.37		Porosity	

a sw



Example Roughness Coefficients	
Surface Covering	γ_f
Concrete or Asphalt	1
Closed concrete block	1
Grass	1
Armorflex	0.9
Small blocks over 1/25 of surface	0.85
Small blocks over 1/9 of surface	0.8
Armor rock – single layer	0.7
Armor rock – two layers	0.55

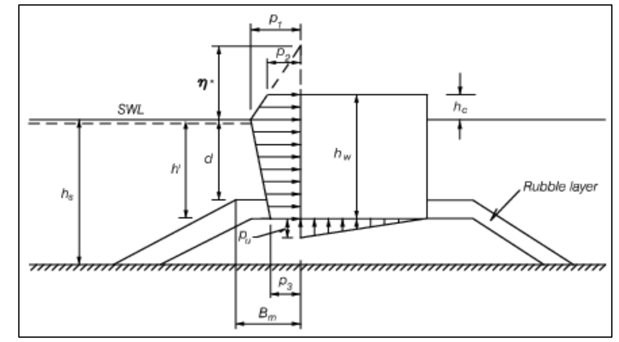
Hs/D 2.67

Interpolation Tool to compute input values for a specific SWL at 50% CL

Desired SWL = 4.9 ft

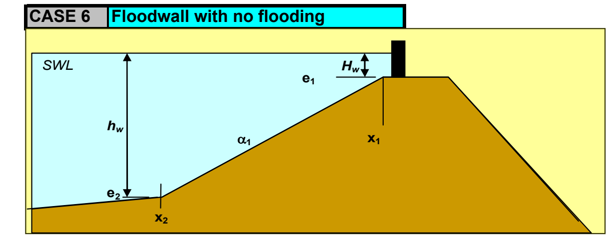
Hydraulic Parameter	CL	Annual Exceedance Probability									
		0.2	0.1	0.05	0.02	0.01	0.005	0.0033	0.002	0.0013	0.001
SWL (ft)	50	8.4	10.0	11.9	14.5	17.1	19.3	20.4	21.4	22.2	22.6
	90	8.7	10.5	12.4	15.1	17.7	19.8	20.7	21.7	22.4	22.9
Hmo (ft)	50	1.3	1.6	1.9	2.6	3.1	3.6	3.9	4.2	4.4	4.7
Tp (s)	50	2.8	2.9	3.0	3.2	3.3	3.4	3.5	3.6	3.7	3.8
p1 (lbf/ft^2)	50	124	144	169	217	255	296	325	362	391	407
	90	191	223	261	335	395	457	503	560	604	629
p2 (lbf/ft^2)	50	0	0	0	108	227	423	550	692	791	850
	90	0	0	0	199	380	650	804	979	1102	1173
p3 (lbf/ft^2)	50	340	443	562	735	904	1040	1105	1170	1212	1264
	90	406	517	636	821	990	1121	1193	1250	1297	1338
AEP of Desired SWL		0.6536									
SWL	50	4.9	ft								
	90	5.5	ft								
Hmo	50	0.4	ft								
Tp	50	2.6	s								
p1 (lbf/ft^2)	50	37	(lbf/ft^2)								
	90	58	(lbf/ft^2)								
p2 (lbf/ft^2)	50	-372	(lbf/ft^2)								
	90	-503	(lbf/ft^2)								
p3 (lbf/ft^2)	50	119	(lbf/ft^2)								
	90	189	(lbf/ft^2)								

Input for "Wall Forces" and "Wall Overtopping" Worksheets

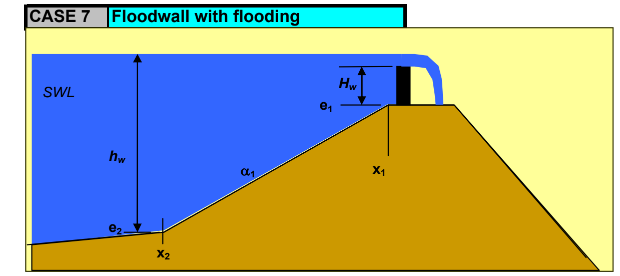


Caisson or wall Input			
h_s 50% CL=	13.3	ft	Water Depth
h_b 50% CL=	18	ft	Water depth at 5Hs from Wall
h' 50% CL=	18	ft	Water Depth at Toe of wall
d 50% CL=	18	ft	Water Depth at Base Armor Crest El
B =	0	ft	Wall/Casson Width
h_c =	4.7	ft	Freeboard
h_w =	18	ft	Height of Wall
γ_c =	155.0	pcf	Specific Weight of Caisson
Bm =	0	ft	Width of Rock Forward of Wall
γ_s =	1		Wall Type Coefficient
	0		Wave Type: 0 for long-crested, 1 for short

CASE 6 Floodwall with no flooding



CASE 7 Floodwall with flooding

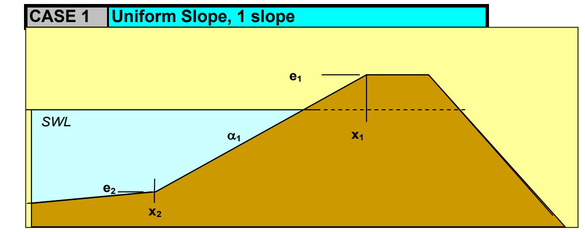


Wall-Type Coefficients for Wave Overtopping	
	γ_s
Plain Impermeable Wall	1
Plain Impermeable Wall with Recurved Nose	0.78
Perforated front (20% hole area) and deck	0.72-0.79
Perforated front (20% hole area) and open deck	0.58

Input for "Wave Runup" and "Sloped Structure Overtopping" Worksheets

Flooding Over Levee			
n =	0.045	Mannings n for grass	
$tan\ \theta$ =	0.500	rad	backside slope
h_w =	13.3	ft	Pool Depth at Levee Toe

CASE 1 Uniform Slope, 1 slope

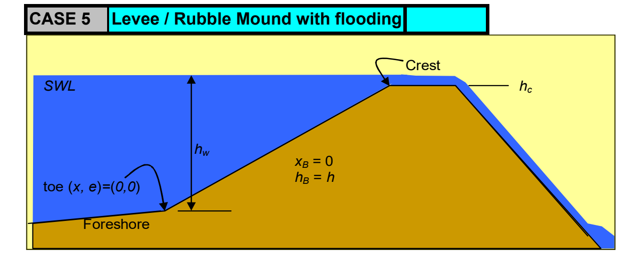


Input for "Stone Armor" and "Hudson Armor" Worksheets

Armor Stone Stability Input - Melby and Hughes Equation			
S =	1		Zero Damage Level
N_z =	5000		Number of Waves in a Storm
P =	0.37		Structure Permeability
S_r =	2.61		Stone Specific Gravity
B_c =	10.8	ft	Crest Width
$\gamma_{f\text{-}C}$ =	0.55		Roughness Influence Coef., Cre
$R_{c\text{-}rear}$ =	-1.11	ft	Leeside Freeboard
$tan\ \phi$ =	0.500	rad	backside slope
K_W =	0.100		Underlayer Weight/Armor Weigh

Concrete Stability Input - Hudson Equation			
H =	5.91	ft	Design Wave Height
K_D =	2		Stability Coefficient
S_r =	2.61		Armor Specific Gravity
Δ =	1.61		S_r - 1
K_W =	0.100		Underlayer Weight/Armor Weigh
Quarry stone			Armor Type

CASE 5 Levee / Rubble Mound with flooding



Barren Island Restoration Low-Crested Structure Stone Sizing Output
Date: 12/10/2020
Computed By: MLM (USACE NAB)
Source: USACE ERDC Coastal Structure Calculator - Delos, EurOtop
Structure: Southwest Sill

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	5.91	ft	Wave Height at Structure Toe
T_p =	4.12	s	Spectral Peak Wave Period
h =	13.3	ft	Total Depth at Structure Toe
$\cot \alpha$ =	2	ft	Seaward Slope
γ_w =	63.3	pcf	Specific Weight of Water
γ_r =	165	pcf	Specific Weight of Armor
g =	32.2	ft/s^2	Acceleration of Gravity
β =	0	deg	Wave Obliquity
S_r =	2.61		Stone Specific Gravity
H_B/h_B =	0.6		Breaker Ratio for Breaker Height at xB
Δ =	1.61		
R_c =	0		
B =	10.8	ft	Crest Width

Computed Variables for Stability and Transmission			
H_{mo} =	5.91	ft	Significant Wave Height at Levee Toe
L_{op} =	86.99	ft	Deep Wave Length
ξ_{op} =	1.92		Surf Similarity Parameter
$\tan \alpha$ =	0.5000		Average Slope $=h_c/x_c$
R_c/H_i =	0.0000		
B/H_i =	1.8274		
a =	1.360		
b =	-3.6785	ft	
c =	0	ft^2	

Computed Armor Size			
D_{n50} =	2.70	ft	Median Nominal Stone Size
W_{50} =	3264.96	lb	Median Stone Weight

Overtopping for Rubble Mound			
K_t =	0.327		
H_t =	1.935		
Overtopping for Smooth Structure include oblique wave			
Kt =	0.463		
H_t =	0.231		

$S_r = \rho_r/\rho_w = \gamma_r/\gamma_w$ = specific gravity of stone

ρ_r = Density of Stone

ρ_w = Density of Water

$D_{n50} = (V_{50})^{1/3}$ = Nominal Stone Diameter

$V_{50} = M_{50}/\rho_r = W_{50}/\gamma_r$ = Median Volume of Armor Stone

M_{50} = Median Armor Stone Mass

Armor Sizing Equations

$$\frac{H_s}{\Delta D_{n50}} = 0.06\left(\frac{R_C}{D_{n50}}\right)^2 - 0.23\left(\frac{R_C}{D_{n50}}\right) + 1.36$$

$$1.36\,D_{n50}^2 + \left[-\left(0.23\,R_C + \frac{H_S}{\Delta}\right)\right]D_{n50} + 0.06\,R_C^2 = 0$$

$$D_{n50} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$a = 1.36 \qquad b = -\left(0.23\,R_C + \frac{H_S}{\Delta}\right) \qquad c = 0.06\,R_C^2$$

Armor Sizing Equations, linearly interpolate for 8<B/Hi<12

Narrow-Berm Crests

$$(K_t)_{\text{rubble}} = -0.40\left(\frac{R_c}{H_i}\right) + 0.64\left(\frac{B}{H_i}\right)^{-0.31}\left(1 - e^{-0.5\,\xi_{op}}\right) \quad \text{for} \quad \frac{B}{H_i} \le 8$$

Broad-Berm Crests

$$(K_t)_{\text{rubble}} = -0.35\left(\frac{R_c}{H_i}\right) + 0.51\left(\frac{B}{H_i}\right)^{-0.65}\left(1 - e^{-0.41\,\xi_{op}}\right) \quad \text{for} \quad \frac{B}{H_i} \ge 12$$

Smooth Low-Crested Structures, Oblique Wave Incidence ($\beta \neq 0$)

$$(K_t)_{\text{smooth}} = \left[-0.30\left(\frac{R_c}{H_i}\right) + 0.75\left(1 - e^{-0.5\,\xi_{op}}\right)\right]\cos^{2/3}\beta \quad \text{for} \quad \xi_{op} < 3$$

APPENDIX C

BARREN ISLAND CLIMATE CHANGE ASSESSMENT DOCUMENTATION

Climate Change for the Mid Bay Ecosystem Restoration Project

1. Introduction

Engineering and Construction Bulletin (ECB) 2018-14 requires USACE studies to provide a qualitative description of climate change impacts to inland hydrology and/or sea level change assessments as necessary. The objective of this ECB is to enhance USACE climate preparedness and resilience by

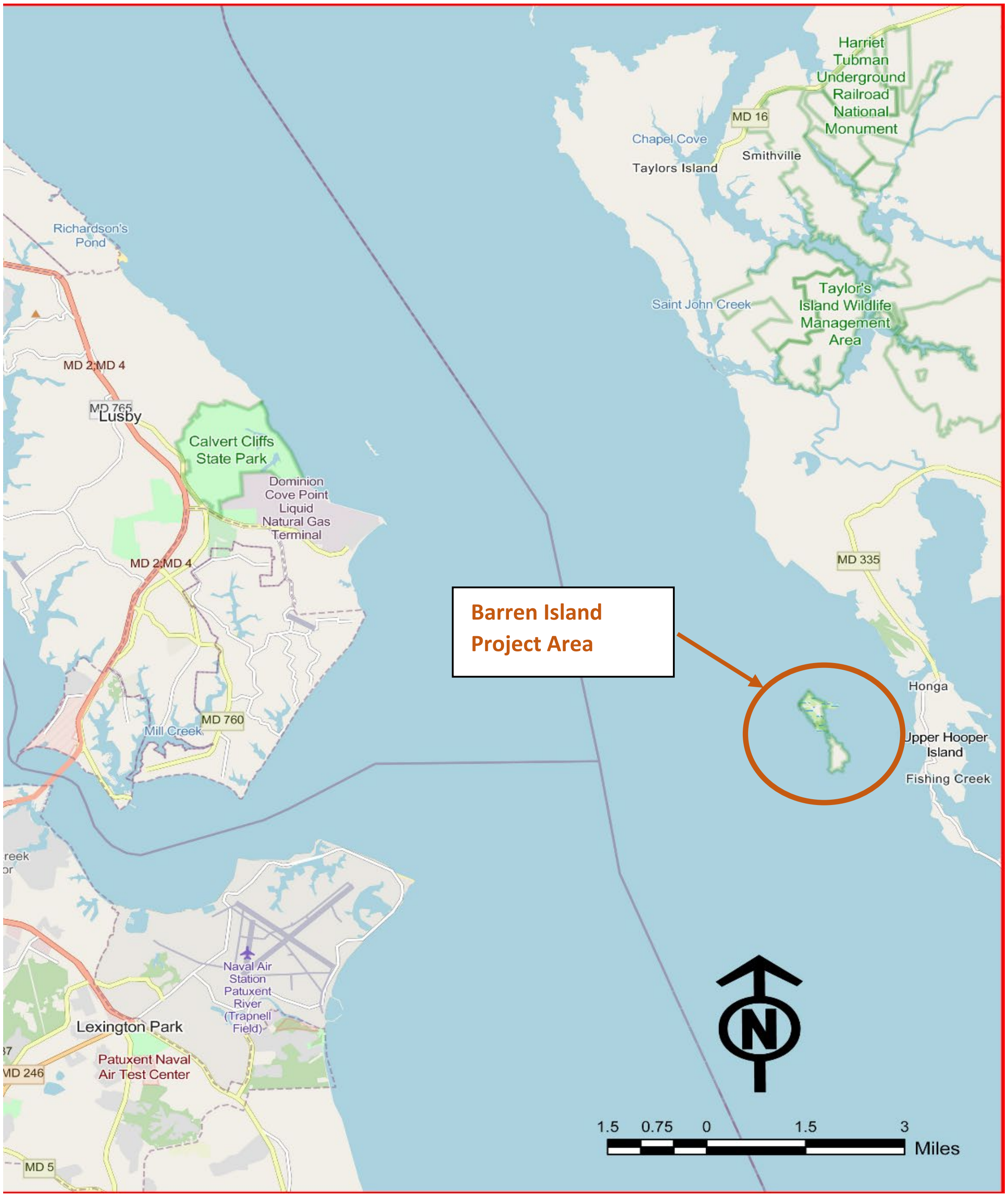


Figure 1 Barren Island Location Map

incorporating relevant information about observed and expected climate change impacts in hydrologic analyses for new, and existing USACE projects.

ECB 2018-14 requires at a minimum, a qualitative assessment of potential climate change threats and impacts that may be relevant to the recommended plan for the Mid Bay Ecosystem Restoration (hereinafter referred to as Mid Bay) Project. Mid Bay project area covers two very small islands - Barren Island and James Island. This climate change assessment is focused on Barren Island area shown in figure 1 above.

2. Scope of Qualitative Analysis

ECB 2018-14 stipulates that for project areas at elevations less than or equal to 50 feet NAVD88, a determination should be made as to whether Sea Level Change (SLC) will affect flooding by increasing (or decreasing) water surface elevation of the project area. The entire project area is affected by coastal flooding from Chesapeake Bay and area elevation is well below 50 feet NAVD88. Therefore, SLC assessment is necessary for Mid Bay project.

The climate assessment for SLC follows the USACE guidance of Engineer Regulation (ER) 1100-2-8162, “Incorporating Sea Level Change in Civil Works Programs,” and Engineer Technical Letter (ETL) 1100-2-1, “Procedures to Evaluate Sea Level Change: Impacts, Responses, and Adaptation.” ER 1100-2-8162 and ETL 1100-2-1 provide guidance for incorporating the direct and indirect physical effects of projected future SLC across the project life cycle in managing, planning, engineering, designing, constructing, operating, and maintaining the federal projects. Planning studies and engineering designs over the project life cycle, for both existing and proposed projects, will consider alternatives that are formulated and evaluated for the entire range of possible future rates of SLC.

A qualitative analysis will provide the necessary information to support the assessment of climate change risk and uncertainties for the Mid Bay project. The Barren Island has an area of 0.3 square mile. For this small drainage area, riverine flooding is an insignificant issue. Therefore, riverine hydrology will not be part of this qualitative assessments. The relevant climate variables identified for this study are temperature, precipitation, and relative sea level rise.

According to the Fourth National Climate Assessment (4th NCA) report on Region 2, The Chesapeake Bay watershed is experiencing stronger and more frequent storms, an increase in heavy precipitation events, increasing bay water temperatures, and a rise in sea level. These trends vary throughout the watershed and over time but are expected to continue over the next century.

3. Temperature

According to 4th NCA, warming rates on the Northeast Shelf have been higher than experienced in other ocean regions and climate projections indicate that warming in this region will continue to exceed rates expected in other ocean regions. NOAA state summary states that the average annual temperatures in Maryland have increased more than 1.5°F since the beginning of the 20th century (Figure 1) and temperatures in the 21st Century have been warmer than any other period.

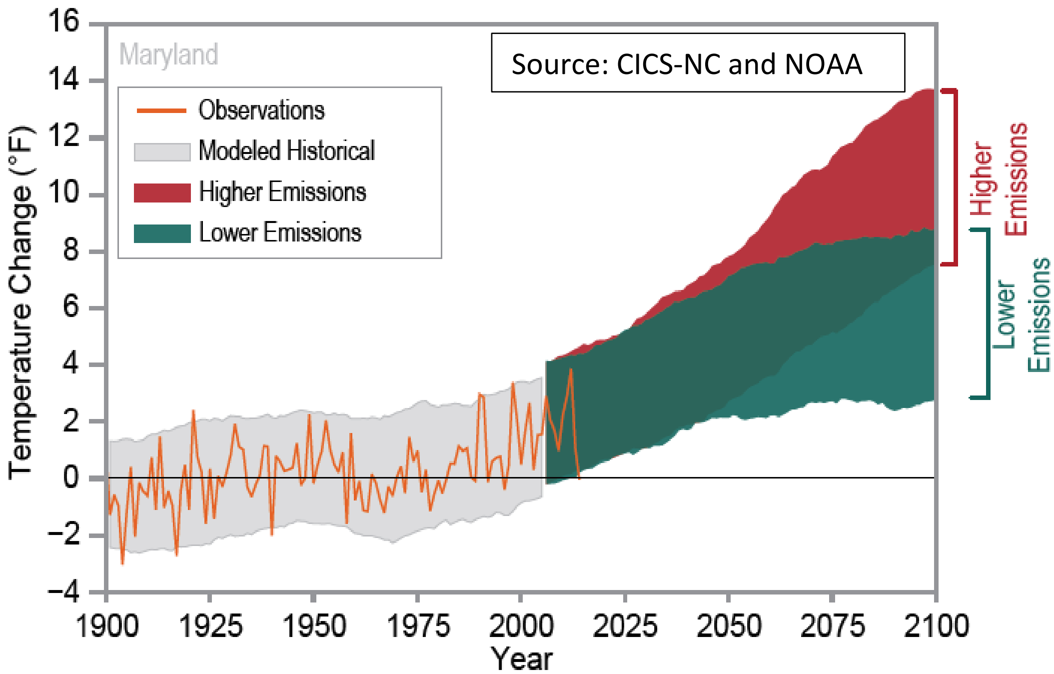


Figure 2 Observed and Projected Temperature

4. Precipitation

According to 4th NCA, historical precipitation differences across regions are apparent as increases have occurred in several regions and predominantly in the Northeast. A national average increase of 4% in annual precipitation since 1901 mostly a result of large increases in the fall season. Annual precipitation has increased by 5% to more than 15% in parts of the Northeast from the first half of the last century (1901–1960) compared to present day (1986–2015).

Regional changes in flood dynamics are likely to occur as a result of perturbations to precipitation and temperature conditions. Flood severity is a result of many interrelated factors including topography, soil moisture, precipitation amount, precipitation intensity, land cover, and others.

According to NOAA, the observed number of extreme precipitation events (days with precipitation greater than 2 inches) for 1950–2014, averaged over 5-year periods; these values are averages from 16 available long-term reporting stations. The dark horizontal lines represent the long-term average. The number of extreme precipitation events has been above average during the last 10 years. The number of extreme precipitation events for the contiguous United States (bottom panel) is also shown to provide a longer and larger context. Long-term stations back to 1900 were not available for Maryland.

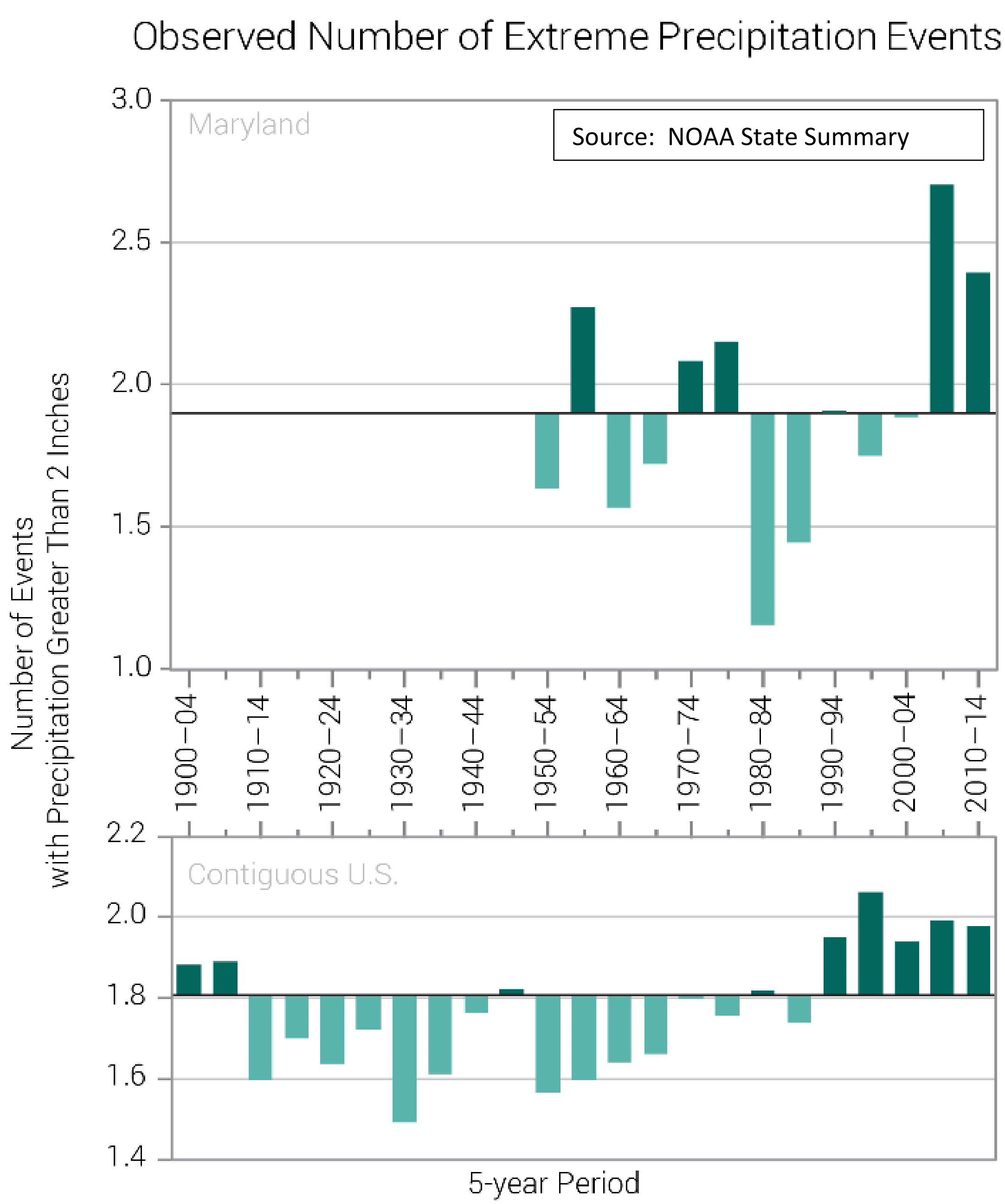


Figure 3 Observed and Projected Precipitation

5. Sea-Level Change

SLC has been a persistent trend for decades in the United States and elsewhere in the world. Observed and reasonably foreseeable global Sea Level Rise (SLR) means that local sea levels will continue beyond the end of this century. In most locations, global SLR results in local relative SLR, which has already caused impacts such as flooding and coastal shoreline erosion to the nation's assets located at or near the ocean. These impacts will continue to change in severity. Accordingly, the risks posed by SLC motivate decision-makers to ask: "What is the current rate of SLC, and how will that impact the future conditions that affect the performance and reliability of my infrastructure, or the current and future residential, commercial, and industrial development?" To better empower data-driven and risk-informed decision-making, the USACE has developed two web-based SLC tools: Sea Level Change Curve Calculator and the Sea Level Tracker. Both tools provide a consistent and reproducible method to visualize the dynamic nature and variability of coastal water levels at tide gauges, allow comparison to the USACE projected SLC scenarios, and support simple exploration of how SLC has or will intersect with local elevation thresholds related to infrastructure (e.g., roads, power generating facilities, dunes), and buildings. Taken together, decision-makers can align various SLR scenarios with existing and planned engineering efforts, estimating when and how the sea level may impact critical infrastructure and planned development activities (USACE, 2018b).

Both the Sea Level Change Curve Calculator and the Sea Level Tracker are designed to help with the application of the guidance found in ER 1100-2-8162 and ETL 1100-2-1. The tools use equations in the regulation to produce tables and graphs for the following three SLC scenarios:

- Low estimate, which is based on historic trend and represents the minimum expected SLC.
- Intermediate estimate.
- High estimate, representing the maximum expected SLC.

The calculator accepts user input—including project start date, selection of an appropriate NOAA long-term tide gauge, and project life span—to calculate projected SLCs for the respective project. The Sea Level Tracker has more functionality for quantifying and visualizing observed water levels and SLC trends and projections against existing threshold elevations for critical infrastructure and other local elevations of interest (USACE, 2018b).

i. Historic and Existing Condition Sea-Level Change

Historically, the relative sea level trend for Solomon Island is 3.88 millimeters/year with a 95% confidence interval of +/- 0.24mm/yr based on monthly mean sea level data from 1937 to 2019 which is equivalent to a change of 1.27 feet in 100 years. Details of historic trend is shown in NOAA chart below.

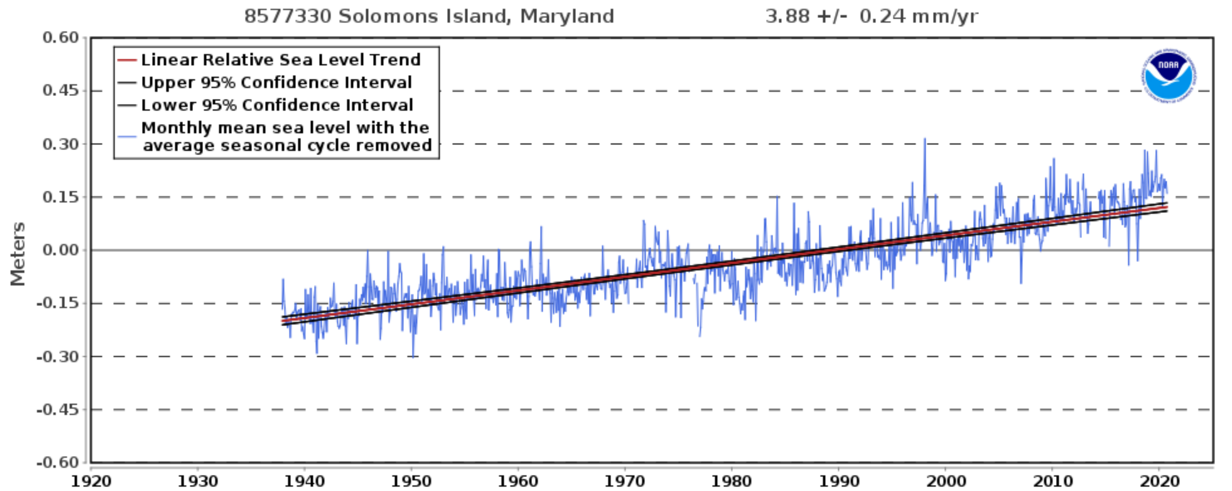


Figure 4 Historic Sea Level Change for Solomon Island, MD

ii. Potential Impacts to the Project from Sea-Level Change

The following analysis evaluates potential effects on Barren Island. For the purpose of this analysis, the following years are evaluated:

- 2025 (beginning of the Barren Island planning horizon at the completion of construction)
- 2075 (50 years into the future, representing the Barren Island future without project (FWO) condition)
- 2125 (100 years into the future, representing the end of the Barren Island project life cycle)

Climate for which the project is designed can change over the planning life cycle of that project and may affect its performance, or impact operation and maintenance activities. Given these factors, the USACE guidance from ECB 2018-14, suggests that the project life cycle should be up to 100 years. For most projects, the project life cycle starts when construction is complete which typically corresponds to the time when the project starts accruing benefits. For some cases, however, the project life cycle starts before construction completion, typically because these projects start getting benefits during construction.

For the Barren Island, the project life cycle begins in 2025, when construction is planned to be completed for any structural or non-structural improvements are made. The 2075 and 2125 conditions could ultimately affect flooding due to SLC. Hence, SLC considerations may result in an increase in WSEL under future conditions. The magnitude of those impacts will depend on how soon the sea rises to a level that impacts project performance.

Sea levels are expected to rise, depending on the projected rates of rise for low, intermediate, and high scenarios. Figure 5 shows the estimated relative SLC from 2025 to 2125, calculated with the USACE Sea Level Change Curve Calculator, at the Solomon Island, MD Shores NOAA gauges which closest to the Barren Island project site.

Climate Change for the Mid Bay Ecosystem Restoration Project

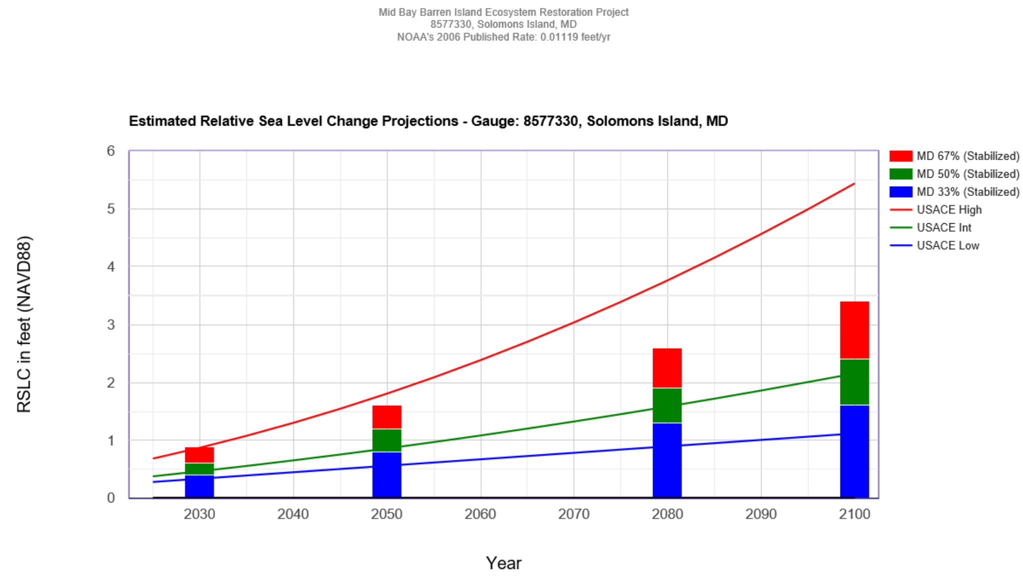


Figure 5 Estimated Relative SLC for Solomon Island, MD

Table 1 below shows estimated USACE Low, Intermediate, and High SLC projections at Solomon Island, MD Shores, in feet relative to NAVD88, from years 2025 to 2125. The USACE Seal level rise calculator is available at (http://corpsmapu.usace.army.mil/rccinfo/slc/slcc_calc.html).

Table 1 Barren Island Sea Level Rise Projection

Mid Bay Barren Island Protection			
8577330, Solomon's Island, MD			
NOAA's 2006 Published Rate: 0.01119 feet/yr			
All values are expressed in feet relative to NAVD88			
Year	USACE Low	USACE Int	USACE High
2025	0.28	0.38	0.68
2030	0.34	0.46	0.87
2035	0.39	0.56	1.08
2040	0.45	0.65	1.3
2045	0.5	0.75	1.54
2050	0.56	0.86	1.81
2055	0.62	0.97	2.09
2060	0.67	1.08	2.38
2065	0.73	1.2	2.7
2070	0.78	1.32	3.04
2075	0.84	1.45	3.39
2080	0.9	1.58	3.77
2085	0.95	1.72	4.16
2090	1.01	1.86	4.57
2095	1.06	2.01	5
2100	1.12	2.15	5.44
2105	1.17	2.31	5.91
2110	1.23	2.47	6.39
2115	1.29	2.63	6.9
2120	1.34	2.8	7.42
2125	1.4	2.97	7.96

iii. Sea Level Change Summary

Top of breawater profile elevation varies from 5.5 to __ feet NAVD88. Future with project condition , the breakwater structure will over top at Water Surface Elevation (WSEL) elevation

5.5 feet NAVD88. The following Table 2 shows computed WSEL for Barren Island. It shows WSEL for different flood frequency events:

Table 2 Flood Inundation Model Water Surface Elevation for Barren Island

Structure	2-year	5-year	10-year	20-year	50-year	100-year	200-year	500-year	1000-year	2000-year	5000-year	10000-year
	ft, NAVD88	ft, NAVD88	ft, NAVD88	ft, NAVD88	ft, NAVD88	ft, NAVD88	ft, NAVD88	ft, NAVD88	ft, NAVD88	ft, NAVD88	ft, NAVD88	ft, NAVD88
Northeast Sill	0.85	1.71	2.14	2.60	3.93	4.50	5.13	6.24	6.90	7.42	7.96	8.31
Modification of Existing Sill	0.85	1.72	2.15	2.63	4.07	4.62	5.22	6.32	6.98	7.50	8.05	8.39
Southwest Sill	0.85	1.72	2.15	2.64	4.08	4.62	5.18	6.23	6.88	7.38	7.93	8.26
Southeast Sill	0.85	1.71	2.14	2.63	4.14	4.70	5.29	6.34	7.02	7.54	8.10	8.45
Breakwater	0.85	1.72	2.15	2.63	4.10	4.64	5.21	6.23	6.89	7.40	7.95	8.29
Lowest WSEL Elevation	0.85	1.71	2.14	2.60	3.93	4.50	5.13	6.23	6.88	7.38	7.93	8.26

The breakwater structure is designed for the 50-year flood. The top of the breakwater wall is at 5.5 feet NAVD88. Therefore, when relative seal level change exceeds 5.5 foot, the breakwater starts overtopping and flooding of protected area begins.

Table 3 USACE Sea Level Rise Scenarios

Year		2020	2025	2025	2025	2075	2075	2075	2125	2125	2125
USACE Sea Level Rise Scenarios		None	Low	Medium	High	Low	Medium	High	Low	Medium	High
Sea Level Rise, ft		0	0.28	0.38	0.68	0.84	1.45	3.39	1.4	2.97	7.96
Recurrence Interval	**Percent Chance Exceedance**	Water Surface Elevations plus Sea Level Rise, ft (Top of Protection 5.5 ft NAVD88)									
10000-year	**0.01**	8.3	8.5	8.6	8.9	9.1	9.7	11.6	9.7	11.2	16.2
5000-year	**0.02**	7.9	8.2	8.3	8.6	8.8	9.4	11.3	9.3	10.9	15.9
2000-year	**0.05**	7.4	7.7	7.8	8.1	8.2	8.8	10.8	8.8	10.3	15.3
1000-year	**0.1**	6.9	7.2	7.3	7.6	7.7	8.3	10.3	8.3	9.8	14.8
500-year	**0.2**	6.2	6.5	6.6	6.9	7.1	7.7	9.6	7.6	9.2	14.2
200-year	**0.5**	5.1	5.4	5.5	5.8	6.0	6.6	8.5	6.5	8.1	13.1
100-year	**1**	4.5	4.8	4.9	5.2	5.3	6.0	7.9	5.9	7.5	12.5
50-year	**2**	3.9	4.2	4.3	4.6	4.8	5.4	7.3	5.3	6.9	11.9
20-year	**5**	2.6	2.9	3.0	3.3	3.4	4.1	6.0	4.0	5.6	10.6
10-year	**10**	2.1	2.4	2.5	2.8	3.0	3.6	5.5	3.5	5.1	10.1
5-year	**20**	1.7	2.0	2.1	2.4	2.5	3.2	5.1	3.1	4.7	9.7
2-year	**50**	0.8	1.1	1.2	1.5	1.7	2.3	4.2	2.2	3.8	8.8
(pink)	Flooding will occur during these conditions (WSEL greater than or equal to **5.5** feet NAVD88)										
(green)	No flooding will occur during these conditions (WSEL less than or equal to **5.5** feet NAVD88)										

APPENDIX D

BARREN ISLAND GEOTECHNICAL DESIGN

Barren Island
Geotechnical Design Appendix

1 INTRODUCTION

This report documents the geotechnical design aspects of the Barren Island project. As the design progresses, this report will be updated to include documentation for the geotechnical design. This report includes information on the subsurface exploration program, foundation conditions, and the design cross sections. Items highlighted in yellow indicate portions of the report which will be updated at further stages of deign.

2 SUBSURFACE EXPLORATIONS

Three separate subsurface investigations have been performed for the project. The first was performed in 2001 as part of a reconnaissance study, investigating the possibility of constructing a 1000 - 2000 acre island for dredged material disposal and beneficial use. The second investigation was performed in 2004 as part of a similar beneficial use of dredged material study that was finalized in 2008. The current round of exploration was performed in 2020 as part of the present study.

2.1 PREVIOUS SUBSURFACE EXPLORATION

2.1.1 2001 Investigation (for 2002 Reconnaissance Study)

The Maryland Port Administration (MPA) commissioned a preliminary geotechnical reconnaissance study for a beneficial use of dredged material project at the west side of Barren Island in 2001. The study had three primary goals (E2CR, 2002, p. 3):

i) "Evaluate the geotechnical conditions at the site, especially along the proposed dike alignments;"
ii) "Design a stable dike section for the site in order to establish a preliminary cost estimate for construction;"
iii) "Evaluate the availability of suitable borrow material (sand) at the site, for the construction of the dike."

A total of 18 soil borings were collected for the study. All of the borings were located west of the existing Barren Island. Depths for the borings ranged from 35 to 70 feet. Laboratory testing on the samples included consolidated undrained testing, unconfined compression testing, consolidation testing, and grain size analysis including Atterberg limits. The study concluded that the site contained a sufficient quantity of suitable borrow material. The study also concluded that the majority of the site had suitable foundation conditions for the proposed dike construction, but portions of the site would require foundation removal and replacement.

2.1.2 2004 Investigation (for 2008 Feasibility Study)

In 2004, twenty-seven (27) borings were completed offshore of Barren Island to investigate the subsurface conditions for a proposed island similar to the proposed island in the 2002 study. The borings collected in 2004 were intended to supplement the borings collected as part of the 2002 study. Testing consisted of grain size analysis, Atterberg limits, and water contents. By 2008, the U.S. Army Corps of Engineers (USACE), along with the MPA, completed the feasibility study *, Mid-Chesapeake Bay Island*

Ecosystem Restoration Integrated Feasibility Report and Environmental Impact Statement (USACE, 2008). The plan formulation changed. In the 2008 study, a site adjacent to James Island was selected for large ecosystem restoration (2072 acres) and a much smaller ecosystem restoration (72 acres) at Barren Island was formulated. The proposed plan at Barren Island consisted primarily of shoreline protection with stone sills, the creation of wetlands behind the stone sills, and a breakwater. Additional borings to support the design of the proposed features were not collected.

2.2 2020 Subsurface Exploration (for Current study)

A combined geotechnical investigation for James and Barren Island commenced in April 2020 and was completed in January 2021. The geotechnical investigation was developed to determine the engineering properties of the foundation materials along the alignment proposed in the 2008 Feasibility Report. In-situ testing included standard penetration testing, dilatometer testing, cone penetration testing, vane shear testing, and collection of 5 inch diameter undisturbed tube samples. Samples collected during standard penetration testing were sent to the USACE soils laboratory at Ft. McHenry, Maryland. Shelby tubes were sent to the USACE soils laboratory at Savannah, Georgia.

The testing plan included collection of cone penetration tests at 500 ft increments along the Barren Island shoreline, 1000 ft increments along the proposed breakwater south of Barren Island, and some west of the proposed breakwater. All other tests were performed at the same location as one of the cone penetration tests. Clusters of tests at the same location allow direction correlation of results from one type of test to another. Upon completion of the majority of the investigation, the alignment for the proposed breakwater was changed. Because the drill crew was still working at James Island, additional standard penetration borings and vane shear tests were added to the investigation to collect data along the updated alignment. The entire geotechnical investigation for Barren Island included:

1. 45 Cone Penetration (CPT)
2. 12 Dilatometer (DMT)
3. 17 Standard Penetration Borings (SPT)
4. 4 Shelby Tube Samples at 3 separate locations
5. 17 Vane Shear at 11 separate locations (FVS)

A boring location plan as well as logs for all of the tests are included in the attached appendices.

3 Foundation Conditions

Foundation conditions were determined using the results of the extensive field exploration and laboratory testing program. Geologic strata, strength, and compressibility characteristics of the foundation material were determined using multiple methods.

3.1 In-situ testing

Index property testing of the samples obtained from the SPT testing verified the material properties from the CPT and DMT tests. All logs were used to develop geologic profiles along the proposed alignment. In-situ testing for the strength of the foundation materials consisted of SPT, CPT, DMT, and FVS tests. Where tests were clustered together, correlations for all tests were plotted on top of each other and collectively used to determine the strength of the foundation materials.

3.2 STRATA AND GEOLOGIC PROFILES

CPT testing provided the most comprehensive data on the subsurface stratigraphy. To verify the soil behavior types determined from the CPT testing, a total of 10 borings, each to a depth of approximately 60 ft, were collected at the same location as 10 of the CPT tests. Two commonly computed CPT soil behavior types were determined. The first relates the soil behavior type to the friction ratio and cone resistance (f_s/q_c and q_c) and the second relates the soil behavior type to the corrected cone resistance and the pore pressure ratio (q_t and $\Delta u/(q_t - u_0)$) (FHWA, 1988, p. II: 63). Upon inspection of the SPT logs, it was clear that soil behavior type based on the pore pressure ratio corresponded better to the collected samples. By comparing the laboratory testing results to the CPT soil behavior types, the following correlation between soil behavior type and gradation was developed:

CPT Soil Behavior Type Classification (Pore Pressure Parameter)	Corresponding USCS Classification
2, 3, 4	CL, CH, ML
5, 6, 7, 8	SM
9	SM, SP-SM

3.2.1 Stratum 1: Silt

This stratum is encountered primarily at the existing mudline and can also be found underlying Stratum 2: Silty Sand and Clayey Sand. This stratum consists primarily of non-plastic silts of low strength. The soil behavior type (SBT) is generally between 2 and 4, indicating the silts behave in an undrained manner. Shear strengths outside of the footprint of the historic island are generally quite low, in the range of approximately 50 psf to 200 psf. Blow counts range from weight of hammer (WOH) to four (4). Shear strengths within the historic footprint of the island are higher (300 psf and higher).

3.2.2 Stratum 2: Silty Sand and Clayey Sand

This stratum is the primary stratum that underlies the entire site. This stratum consists of silty sands and clayey sands, with varying fines contents. Almost no clean sands were encountered. The SBT is generally between 5 and 9. Increasing SBT indicates decreasing fines content. This stratum has a wide range of thicknesses and can be found interspersed with Stratum 1: Silt. Blow counts range from WOH to thirty-nine (39). Correlated friction angles vary from as low as thirty (30) degrees to as high as fifty (50) degrees, but these values were not directly used in the analyses. Refer to Section 3.4 for more details. This stratum is underlain by Stratum 3: Clay.

3.2.3 Stratum 3: Clay

The stratum is found in almost every log. It consists of lean clay and fat clay, with an average plasticity index of approximately 25. This stratum is usually encountered at depths around 30 ft, but can be found in depths as shallow as 22 ft. Pockets of silty sand were encountered in a few boreholes. The strength of this stratum varies, but all of it is overconsolidated. Blow counts range from WOH to seventy-one (71). Shear strengths in this layer are generally over 1000 psf and increase with depth, up to approximately 10,000 psf for the depths measured.

3.3 UNDRAINED SHEAR STRENGTH DETERMINATIONS

Undrained shear strengths were determined using all of the available data (SPT, CPT, DMT, and FVS) except SPT data. Data from CPT tests was calibrated with the FVS data to determine correlation coefficients for undrained shear strength. Shear strengths derived from the dilatometer data and blow counts were plotted on top of the CPT data. At every CPT location, plots were created showing the shear strengths calculated from each method. Blow counts were ultimately not correlated to undrained shear strengths because of the wide range of shear strengths one blow count represents.

3.3.1 Field Vane Shear

Field vane shear was the basis against which undrained shear strengths from all other in-situ testing were calibrated and compared. Fifteen (15) vane shear tests were performed at eleven (11) separate locations. All of these locations coincided with SPT testing. Six of the locations coincided with CPT testing and four of these locations coincided with DMT testing. FVS was primarily collected in depths of less than 20 ft to verify the strengths in the shallow layers most important to the slope stability analysis, but a few tests were performed to verify strengths in the foundation clays.

Gradation analysis and Atterberg limit testing was performed for the samples collected during the associated SPT testing. With the exception of samples taken at B-246, all tested samples in depths less than 20 ft had a plasticity index less than 16. All samples tested at depths greater than 20 ft had a plasticity index between 20 and 25. Undrained shear strengths were corrected using the Bjerrum correction (Duncan, 2014, p. 67) factor. Because none of the materials were highly plastic, the corrected shear strengths are very close to the uncorrected shear strengths.

Samples collected in Stratum 1: Silt were either nonplastic or had a low plasticity index (PI <= 10). Care must be taken interpreting results of in-situ testing of low-plasticity silts because it is difficult to assess whether the tests are determining drained behavior, undrained behavior, or something in-between (Duncan, 2014, p. 52). CPT soil behavior types indicate the soil was behaving in an undrained manner. Strength used for slope stability analysis were determined by taking into consideration the results of all in-situ testing, and are discussed in Section 5.7.

Boring	Associated DMT/CPT	Depth [ft]	Elevation [ft, NAVD88]	USCS, Plasticity Index	Uncorrected Shear Strength (psf)	Bjerrum Correction Factor	Corrected Shear Strength (psf)
B-201	None	7	-9.7	CL, *	40	1.0	40
		8	-10.7	CL, *	20	1.0	20
		41	-43.7	CL, 25	2320	0.9	2090
B-224	CP-224, DMT-206	35	-41.6	CL, 24	4220	0.9	3800
B-227	CP-227	6	-15.5	CL, *	200	1	200
		30	-39.5	CL, 21	5200	0.9	4680
B-230	CP-230	4	-10.4	CL, *	40	1.0	40
		14	-20.4	SC, 3	40	1.0	40
B-232	CP-232, DMT-205	13	-20.1	SC, 16	340	1.0	340
B-244	CP-244, DMT-201	7	-12.1	ML, 10	100	1.0	100
B-246	CP-246, DMT-212	7	-12.1	CH, 31	100	0.9	90
B-302	None	6	-14.8	+	1000	1.0	1000
B-303	None	6	-14.7	+	1180	1.0	1180
B-304	None	4	-11.9	+	1230	1.0	1230
B-305	None	10	-17.5	+	940	1.0	940

*Not enough sample to run PI.

+Sample has not been tested yet.

Table 1 : FVS Summary

3.3.2 CPT

Two different methods were used to calculate the undrained shear strength for soil having a SBT below 4. The first method is the Nkt method in which shear strength is determined according to the following equation:

$$S_u = \frac{q_t - \sigma_{vo}}{N_{kt}}$$

$S_u = undrained\ shear\ strength$

$q_t = corrected\ cone\ tip\ resistance$

$\sigma_{vo} = total\ vertical\ stress$

$N_{kt} = correlation\ coefficient$

The second method correlates the excess pore pressure to the undrained shear strength according to the following equation:

$$S_u = \frac{\Delta u}{N_{\Delta u}}$$

$$\Delta u = \ excess\ pore\ pressure$$

$$N_{\Delta u} = pore\ pressure\ parameter$$

The first method requires an estimate of the total vertical stress. Soil unit weights were estimated using the correlation presented by Mayne (Mayne, 2010, p. 4).

Values of both correlation coefficients were varied until the shear strengths computed from the CPT data most closely matched the shear strengths computed from the vane shear data. For the Nkt method, two values provided best fit. Best fit in Stratum 1: Silt was found using Nkt = 20. Best fit in Stratum 3: Clay was found using Nkt = 11. Best fit using the pore pressure method of computing strengths was found using $N_{\Delta u}$ = 8 and did not require different parameters in the two different strata. Attachment G includes the plots used to calibrate the CPT data against the FVS data. The CPT logs provided in Attachment C include the measured CPT data and basic index parameters. Attachment H includes plots of the correlated shear strengths.

3.3.3 DMT

Undrained shear strengths were computed from the DMT results using the WinDMT program. Shear strengths were determined for all testing intervals with an I_D (material index) less than 0.6. The program uses the following equation:

$$S_U = 0.22\sigma'_v(0.5k_D)^{1.25}$$

$$S_u = undrained\ shear\ strength$$

$$\sigma'_v = effective\ vertical\ stress$$

$$k_D = horizontal\ stress\ index$$

The program computes unit weights for materials using Marchetti's relationship between I_D and the dilatometer modulus (E_D) (FHWA, 1988, p. III: 4.19). DMT logs are provided in Attachment D and include measured DMT data, calculated intermediate parameters, and computed shear strengths. Shears strengths derived from the DMT are also plotted against shear strengths derived from the CPT data in Attachment H.

3.3.4 SPT

A single blow count from an SPT test covers a wide range of shear strength values. A blow count of less than N=1 (WOH or WOR) covers strengths between approximately 0 psf and 800 psf. In every case, a blow count greater than or equal to 1 will provide an adequate factor of safety against slope failure. Unfortunately, many of the blow counts were less than 1. Enough FVS and CPT data was collected so that shear strengths did not have to be determined with blow counts.

3.4 Drained Shear Strength Determinations

Drained shear strengths were determined primarily from SPT and DMT testing. For the few SPT borings where a CPT was not also performed at the same location, drained shear strengths were determined from blow counts.

3.4.1 CPT

Two different methods were used to calculate the friction angle for soil having a SBT greater than 4. Both friction angles are effective stress friction angles for triaxial compression. The Kulhawy and Mayne (Kulhhawy., 1990, p. 4.15) approximation was computed according to the follow equation:

$$\emptyset_{TC} = \tan^{-1}[0.1 + 0.38 * \log\left(\frac{q_c}{\sigma'_{vo}}\right)]$$

$\emptyset_{TC} = Friction\ angle\ (triax.\ compression)$

$q_c = tip\ resistance$

$\sigma'_{vo} = effective\ vertical\ stress$

The Robertson and Campanella correlation, as reported by Duncan (2014, p. 48) was computed according to the follow equation:

$$\emptyset_{TC} = \tan^{-1}[\frac{1}{2.68}[\log(\frac{q_C}{\sigma'_{vo}})] + 0.29]$$

$All\ variables\ same\ as\ above.$

While the use of the triaxial compression friction angle is almost always conservative, care must be taken when using these correlations for sands with high fines contents. Both of these methods are based on laboratory testing of unaged and uncemented sands, primarily low to medium compressibility sands with little fines (Kulhhawy., 1990, p. 2.30). Because nearly all the sands at Barren Island are silty or clayey, friction angles were reduced to account for the decrease in strength due to the presence of fines.

3.4.2 DMT

Drained shear strengths were computed from the DMT results using the WinDMT program. Friction angles were determined for all testing intervals with an I_D (material index) greater than 1.2. The program uses a complex iterative procedure which does not lend itself to hand or spreadsheet computation. The procedure is documented in (FHWA, 1988, p. 4.28). The program reports the plane strain friction angle, which is different than the friction angle computed with the CPT correlations. To convert the plane strain friction angle to the triaxial compression friction angle, the following equation from (FHWA, 1988, p. 5.14) was used:

$$\emptyset_{TC} = \emptyset_{ps} - (\frac{\emptyset_{ps} - 32}{3}) \text{ for } \emptyset_{ps} > 32$$

$$\emptyset_{TC} = \emptyset_{ps}\ for\ \emptyset_{ps} \leq 32$$

$\emptyset_{TC} = triaxial\ compression\ friction\ angle$

$\emptyset_{ps} = plane\ strain\ friction\ angle$

3.4.3 SPT

A short portion of the southeast sill and the breakwater will be constructed where there is no CPT data. As of the 35% design, the location and extent of these reaches are still being changed. This section will be updated at the 65% design level to discuss SPT and friction angle correlations.

3.5 Laboratory Testing

As of the 35% design, laboratory strength testing of the undisturbed samples is ongoing. This section will be updated at the 65% design level to discuss the results of the laboratory testing.

3.6 Compressibility Correlations

DMT tests provide one of the best sources of compressibility and deformation characteristics of in-situ soil. At every testing interval, the DMT provides an estimate of the in-situ elastic modulus at in-situ effective stress. Similarly, correlations can be used to determine the elastic modulus with CPT data, though DMT is generally recognized as providing better estimates of elastic modulus.

The constrained modulus was computed from the DMT data using the WinDMT program, which computes it according to the following formula:

$$M = R_M * E_D$$

$M = constrained\ elastic\ modulus$

$R_M = correlation\ coefficient$

$E_D = dilatometer\ modulus$

Equations for the correlation coefficient can be found in FHWA 1988 (III: 4.43). Using the CPT data, the constrained modulus can be correlated to the cone resistance:

$$M = \alpha * q_C$$

$\alpha = correlation\ coefficient$

For each DMT test that was performed, there was also a corresponding CPT test. The moduli computed using the CPT and DMT test were plotted against each other for each of the 12 DMT tests. Assuming that the values derived from the DMT were more accurate, values of the α coefficient were varied to provide the best agreement between the two tests. It was found that one value of α provided good agreement for drained soils, and two values of α provided good agreement for undrained soils. The two values for α corresponded to the two different strata of undrained soils: Stratum 1: Silt and Stratum 3: Clay. This is because the DMT data does a much better job at accounting for the stress history and corresponding elastic properties. The CPT data does not directly account for variations in over-consolidation ratio and their effect on compressibility characteristics. In summary, the best-fit α values were:

$$\alpha_{drained} = 9$$

$$\alpha_{undrained,\ silt} = 6$$

$$\alpha_{undrained,\ clay} = 17$$

Values of α are independent of units used because units for the modulus and the cone resistance are the same.

4 Cross Section Design

Cross sections were designed according to procedures established in the *Shore Protection Manual* and *EM 1110-2-2903: Design of Breakwaters and Jetties*. The coastal engineer provided critical design parameters. Geotechnical aspects of the design included armor stone geometry, underlayer design, and foundation filter design.

4.1 DESIGN PROCEDURE

The design of the cross sections for all structures followed the guidance of the *Shore Protection Manual* and *EM 1110-2-2903: Design of Breakwaters and Jetties*. *EM 1110-2-2903* provides a comprehensive design procedure for the design of rubble-mound structures. The manual provides recommendations for rubble-mound structures subject to seaward wave exposure with zero-to-moderate overtopping and structures with wave exposure from both sides with moderate overtopping. In the long-term, the majority of structures on Barren Island will not be subject to waves from both sides, but because the construction sequencing will subject the structures to waves on both sides for many years, the cross section for wave exposure from both sides was selected as the basis for design. Figure 1 is the cross section from the manual.

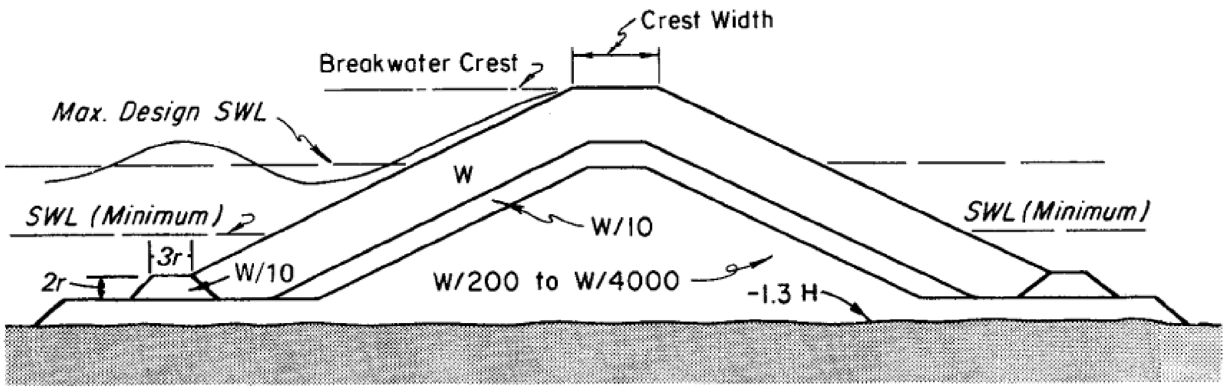


Figure 1: Rubble-Mound Section for Wave Exposure from Both Sides with Moderate Overtopping *(USACE, 1986, p. 4.13)*

Some modifications had to made to the cross section for the conditions at Barren Island. The typical cross sections are for traditional high-crested breakwaters. At Barren Island, the coastal engineer recommended a more shallow structure. Given the shallow height of the structures, incorporating multiple underlayers was not practical. For every section except the breakwater section, the core and bedding layer was designed so that it could also meet filter requirements for the armor stone, eliminating the need for a separate underlayer.

4.2 COASTAL CONSIDERATIONS

The coastal engineer separated the Barren Island alignment into five distinct sections based on the coastal climate and the existing structures: Northeast Sill, Existing Sill, Southwest Still, Southeast Sill, and Breakwater. For each section, the coastal engineer provided the crest elevation, crest width, armor stone size, number of armor stone layers, and armor stone slopes. Random placement was specified for all armor stone sections.

Reach	Crest Elevation (ft, NAVD88)	Crest Width (ft)	Armor Stone W_{50} (lbs)	Number of Armor Units	Armor Stone Slope
Northeast Sill	3.52	10.8	2100	2	2H:1V
Existing Sill	3.52	10.8	3500	2	2H:1V
Southwest Sill	3.52	10.8	3500	2	2H:1V
Southeast Sill	3.52	10.8	3500	2	2H:1V
Breakwater	5.52	10.8	4200	2	2H:1V

Table 2: Coastal Reaches and Parameters

4.3 Armor Stone Design

EM 1110-2-2903 and the *Shore Protection Manual* go into great detail on the engineering design of cover layers. They present several alternatives and design methods for the alternatives. Rubble mound structures are the most common. Based on previous experience with armored slopes at Poplar Island, the coastal engineer selected a rubble mound structure for the design.

The manual specifies that armor stone slopes shall be no steeper than 1.5 Horizontal : 1 Vertical (1.5:1) (USACE, 1986, p. 4.11). The existing structures at Barren Island were built with 1.5:1 slopes. Given that the structures were built between 2003 and 2009 and are still standing with little damage, it can be surmised that 1.5:1 slopes are indeed stable. Typically, selection of the side slopes is based on a cost optimization of the structure. The coastal engineer decided not to optimize the parameters of the structure, and selected a 2:1 side slope for both sides of all structures.

Crest elevation and width of the structures were specified by the coastal engineer. Typically, at the beginning of the design, the coastal engineer selects a design wave height which will reduce the wave climate in the lee of the structure to an acceptable limit. For the current design, the coastal engineer specified the crest elevation corresponding to total water level (TWL) elevations at varying recurrence intervals. EM 1110-2-2093 specifies that the armor stone should be extended downslope to an elevation below minimum still water level (SWL) elevation of 1.5 times the design significant wave height (see *Figure 1*). Given the shallow elevation of the structures and the design wave heights, the armor stone was extended all the way down both slopes. The armor stone was also selected for the toe of the structures for the same reasons.

4.4 Underlayer Design

According to EM 1110-2-2093, the first underlayer shall be at least two stones thick and be 1/10th the weight of the armor stone (USACE, 1986, p. 4.16). With the shallow height of the structures and relatively large thickness of armor stone, a first underlayer is impractical for every section except the breakwater. The breakwater was designed with core stone that serves as both the underlayer and the core stone. For the remaining structures, there were two options to consider. The structure could be built as one large section of armor stone or the core could be built out of the same material as the bedding layer. Filter requirements would have to be met between the bedding layer and the armor stone. For the 35% design, the bedding was chosen to serve as the core stone too. Further analysis of proposed cross sections at the 65% design level will be examined to determine if it is better to build the core out of armor stone too for constructability concerns.

4.5 Foundation Filter Design

The foundation along the alignment changes and is either silty sand or silt, as indicated on the geologic profiles provided in Attachment F. EM 1110-2-2093 recommends the use of a bedding layer. The bedding layer serves many purposes including protecting the structures from excessive settlement resulting from leaching, protecting the foundation of the structures from undermining, and also preventing damage to geotextiles used as foundation filter blankets (USACE, 1986, p. 4.16). The manual recommends a protective layer of quarry spalls between 4 and 7 inches in diameter. Filter criteria must be met between the quarry spalls and adjacent stone according to the following equation (USACE, 1986, p. 4.17):

$$D_{15\ (filter)} \leq D_{85\ (foundation)} \quad where\ D = diameter\ of\ percent\ passing$$

Preliminary calculations at the 35% design indicated that filter criteria can be achieved between the armor stone and quarry spalls close to the recommended size. Slight adjustment of the size range may be necessary to meet filter criteria. The 65% design will include a gradation of the quarry spalls designed to meet filter criteria for all armor stone sizes. Each cross section has a one-foot layer of quarry spalls. If the size of the quarry spalls is increased, the corresponding thickness on the cross sections may need to be increased to insure that the thickness is no less than 1.5 times the mean grain size diameter.

The manual also recommends use of a geotextile filter when the foundation is a cohesive material. A coarse gravel may also be required for cohesionless foundation materials so that waves and currents acting on the bottom of the structure do not disturb the foundation. A geotextile was chosen for foundation filtration. The exact specifications are yet to be determined, but will closely reflect the geotextiles used at Poplar Island. The foundation geotextile used at Poplar Island has an apparent opening size corresponding to the #70 sieve and is rated for an AASHTO survivability index of Class 1. In recent years, finding a Class 1 geotextile with such an apparent opening size has been difficult. During the next phase of design, potential sources of geotextile will be investigated.

4.6 Slope Stability Analysis

Slope stability analysis was conducted with Slope/W in accordance with EM 1110-2-1902: Slope Stability (USACE, 2003). Critical cross sections for each coastal reach were identified. At each location, simplified soil profiles were generated and the proposed structures were modeled. The analysis revealed areas of poor foundation conditions which are incapable of supporting the proposed structures. Recommendations are provided if the structures need to be built on the poor foundation.

4.6.1 Design Conditions and Methods

EM 1110-2-1902 identifies four design conditions for which slope stability should be evaluated: end-of-construction, long-term, maximum surcharge pool, and rapid drawdown (USACE, 2003, p. 3.2). The manual was primarily written for stability analysis of dams and levees, but can also be applied to coastal structures. The proposed structures at Barren Island will not be subjected to pools and rapid drawdowns. Only end-of-construction and long-term conditions are applicable. Past experience with design of coastal structures at Poplar Island indicates the most critical design condition is the end-of-construction condition. For the 35% design level, only end-of construction design conditions were analyzed. Ongoing triaxial testing on the undisturbed samples at Barren Island will provide better insight into the long-term (drained) properties of the cohesive foundation soils. Analysis for long-term conditions is not expected to dictate the design, and results of the long-term stability analysis will be included for the 65% level of design.

The Slope/W program was selected to perform the stability analysis. Slope/W gives several options for analysis method (for example Morgenstern and Price, Spencer, Bishop, Janbu). Each of the analysis methods employ different assumptions for inter-slice forces so that the resulting system of equations can be solved. Some methods satisfy all conditions of conditions of equilibrium (sum of horizontal forces, sum of vertical forces, and sum of moments) and some methods don't. A study by Duncan and Wright concluded that all methods which satisfy all conditions of equilibrium result in a factor of safety within +/- 5% (Duncan., 1980). For this analysis, Spencer's method was selected. Spencer's method satisfies all conditions of equilibrium.

4.6.2 Identification of Critical Sections

At least one cross section for each of the reaches identified by the coastal engineer was selected for slope stability analysis. Locations were selected by inspection of the plots of strength correlations at each CPT location, as shown in Attachment H. The worst locations for foundation strength are the locations which have thick layers of low-strength cohesive materials close to the ground surface. Cohesive materials were not encountered at the surface for the entire alignment. Near the northwest end of the project, the surficial geology is composed of silty sands, as indicated on the geologic profiles in Attachment F. Such locations were expected to yield acceptable factors of safety against slope failure, but slope stability analysis for these reaches was also performed.

4.6.3 Piezometric Line

Selection of pore water pressure conditions can have a significant impact on the computed factor of safety. While pore water pressure conditions don't affect the strengths of materials assumed to behave in an undrained matter, they decrease the strengths of cohesionless materials. Water pressures acting on the face of the proposed structures can also provide stabilizing forces on the structure which change as the water level changes. It's not immediately clear which water level is most conservative.

A series of analyses was performed to examine the effect of the water level on the factor of safety. Water levels were varied between mean lower low water (MLLW) and mean higher high water (MHHW) for two different foundation conditions: one with a cohesive foundation and one with a cohesionless foundation. In both cases, the same stone structure was modeled. In both cases, the lowest factor of safety was found using the lowest water elevation. For all subsequent analyses, a water elevation corresponding to MLLW (El. -1.2 NAVD88) was selected.

4.6.4 Material Properties

Material properties for the foundation were interpreted from the DMT and CPT correlations provided in Attachment H. A simplified soil profile was created at each CPT location a stability analysis was performed. The soil profiles can be seen on the slope stability figures provided in Attachment K. The soil profile consisted of drained layers with an effective stress analysis (c = 0 and ϕ), and undrained layers with a total stress analysis (ϕ = 0 and c). Unit weights were estimated from the CPT logs and the correlation from Mayne. (2010). Soil unit weights correlated well with strengths. Higher unit weights were found in higher strength materials and lower unit weights were found in lower strength materials. Unit weights derived from the CPT and DMT correlated well.

Undrained shear strengths were used for the undrained analysis. The undrained shear strengths on the CPT plots were calibrated against the vane shear tests and corrected according to the Bjjerum correction, so they could be directly used in analysis. Layers with different shear strengths were identified and the average strength value from available correlations was used. In most cases, this meant that the average strength value from the Nkt and NΔu correlations was used. When there was also DMT data, the shear strength from the DMT data was also considered.

Drained shear strengths were also determined from the CPT and DMT correlations. Layers were identified based on trends in the correlated friction angle, but layers were not as distinct as the undrained layers. The correlations showed that the friction angle varied over short distances. To err on the side of conservatism, peaks in the friction angle with depth were ignored and values used were the low to average values. To correct for the fact that the correlations were derived from mostly clean sand, friction angles were further reduced by 2 degrees. There is precedent to suggest that with increasing fines, the peak friction angle decreases, but 2 degrees was a judgement call after consulting Chapter 2 of (Kulhhawy., 1990). Most discussion on the topic primarily deals with the effect of soil compressibility on correlations between cone tip resistance and relative density. However, fines content correlates directly with soil compressibility and relative density correlates directly with friction angle. Friction angles for drained layers were capped at 40 degrees.

Because the proposed structures consist entirely of stone, they were all modeled as one region. Stone was assigned a unit weight of 125 pcf (pounds per cubic foot) and a friction angle of 40 degrees. Tensile strengths from any geotextiles were ignored. The geotextile is intended to provide filtration between the foundation and stone materials. While it can provide strength to the dike, potential damage during construction and degradation of the geotextile could minimize or eliminate the potential strength.

4.6.5 Bearing Capacity Analysis

Bearing capacity is not generally the critical failure mechanism for embankments and similar structures. Bearing capacity was computed for the Northeast Sill section while investigating alternatives for foundation removal and replacement. Bearing capacity analysis for the northeast sill and select sections will be included with the 65% design report.

4.6.6 Slope Stability Results and Recommendations

Slope stability was calculated for each reach. Early analysis of CPT data revealed extremely poor foundation conditions for the southernmost extent of the breakwater alignment provided in the feasibility study. This extent included CP-238 through CP-244. Through coordination with the environmentalist and coastal engineer, this problematic reach was eliminated prior to the 35% design, and the results are not included in this appendix. A summary of the results is presented below. Graphics are provided in Attachment K.

Reach	Critical Foundation Condition	Factor of Safety	Failure Type	Acceptable
Northeast Sill	CP-202	0.97	deep-seated	No
Existing Sill	CP-210	2.13	toe	Yes
	CP-219	2.06	deep-seated	Yes
Southwest Sill	CP-220	2.15	toe	Yes
Southeast Sill	CP-246	0.76	deep-seated	No
Breakwater	CP-225	1.59	deep-seated	Yes

Table 3 : Slope Stability Summary

As expected, deep-seated failures were observed for structures founded on cohesive foundations and toe failures were observed for structures founded on cohesionless foundation materials. EM 1110-2-1902 recommends a minimum factor of safety of 1.3 for end-of-construction conditions (USACE, 2003, p. 3.2). The analysis revealed two additional problematic areas – one along the northeast sill and one along the southeast sill. The existing sill, southwest still, and revised breakwater reaches all have an acceptable factor of safety against slope failure.

Poor foundation conditions were encountered from CP-202 through CP-205. CP-201 was never performed because the shallow depth of water did not allow access for the CPT barge. Average shear strengths for the surficial layer of silt were approximately 100 psf, far less than what is needed to support the proposed structure. Upon further examination of historic dredging documents, it is surmised that this poor foundation material is the disposal site of dredged material from the Honga River in the 80s. The material was likely placed unconfined, forming what is now known as Tar Bay Wildlife Management Area. Subsequent drilling was not performed because it was assumed that the unconfined disposal of the dredged material created poor foundation conditions in the entire vicinity and the ability to relocate the proposed structure would not be possible. As of the 35% design, the geotechnical section recommends that if the sills must be built in this area, foundation removal and replacement will be necessary. This will require removal to a depth of approximately 7 ft for a length of 2500 ft. The team has yet to determine the future course of action.

Problematic foundation was also encountered along the southeast sill at CP-246. CP-246 contains a 10 ft layer of silt with a shear strength of approximately 100 psf. B-306 also shows the presence of this layer. Historical mapping of the island from as far back as 1898 reveals that this a portion of the southeast alignment is not founded on the historic footprint of the island. Accretion of silt in this area could explain the poor foundation conditions. Fortuitously, the environmentalist wanted to change the southeast alignment so that it is much closer to the existing shoreline at Barren Island. The change was made after the demobilization of the drill crew, so additional subsurface exploration could not be performed. It is assumed that if the proposed southeast sill is located near the shore and on the historical footprint of the island, the sill can be placed without the need for foundation removal and replacement.

4.7 SETTLEMENT ANALYSIS

Settlement was calculated at every CPT location using the Janbu method, as described in (FHWA, 1988, p. IV: 5.2):

$$\rho = \sum_{i=1}^{n} \left(\frac{\Delta\sigma_v'}{M}\right) h_i$$

$\rho = settlement$

$\Delta\sigma_v' = increase\ in\ effective\ stress$

$M = constrained\ modulus$

$n = number\ of\ layers$
$h = height\ of\ layer$

The Janbu method is also known as the ordinary method. As opposed the special method, the ordinary method assumes that the constrained modulus is constant and equal to the modulus at the current state of effective stress. As was discussed earlier, the moduli derived from the CPT were calibrated to the moduli derived from the DMT. The ordinary method generally provides an acceptable estimate of settlement, but can be problematic in cases where the foundation loads are high compared to the in-situ effective stress or in cases where the soil is slightly overconsolidated. For preliminary design, the Janbu method was deemed acceptable. The surficial soils appear to be either normally consolidated or overconsolidated from the former island that washed away. None of the proposed foundation loads will greatly exceed the loads from the former island. Both the DMT and CPT data indicate the clay foundation is highly overconsolidated.

The DMT provides the drained, constrained modulus, at the current state of effective stress. By using a drained constrained modulus, both the immediate and primary consolidation settlement are taken into account. Secondary compression is not. Settlement for drained and undrained layers was calculated separately. Drained settlement was defined as settlement for any soil layer with a SBT greater than 4. Drained settlement is the immediate settlement. It was assumed that undrained settlement up to a foot could be tolerated, but at that point the slope stability may govern the design. Drained settlement will occur during construction and not cause any issues. Undrained settlement is the primary consolidation settlement. It was also assumed that undrained settlement less than half a foot would not require any overbuild of the structures. Given no negative construction tolerances for armored slopes, the contractor will likely build the structures slightly above the construction template, making it unnecessary to overbuild if settlements are less than half a foot.

Plots of settlement are provided in Attachment I. For all structures, immediate settlement was less than approximately one inch. This will not cause any issues during construction nor will it cause significant increases in material quantities. Primary consolidation settlement for all structures was less than approximately six inches. As the design progresses and cross sections are updated, the need for overbuild will be reexamined if primary consolidation settlement exceeds six inches. At this stage of design, secondary consolidation settlement was not estimated. Estimates of secondary settlement will be provided after the laboratory oedometer testing is complete.

5 Alternatives for Dealing with Poor Foundation

As of the 35% design, the recommended alternative for dealing with poor foundation conditions is foundation removal and replacement. In the past, this method has proven to be the most cost-effective alternative on Poplar Island. Additional alternatives will be examined for the 65% design and this section will be updated.

5.1 Potential Methods

5.2 Investigated Methods

5.3 Design and Recommendations

6 Borrow Area Analysis

A sand borrow source will likely be required for foundation removal and replacement, construction of the bird islands, and construction of containment dikes. Additional drilling will be performed prior to the 95% design level to investigate potential borrow sources. This section will be updated at the 95% design level with the borrow area analysis.

6.1 Borrow Needs

6.1.1 Foundation Removal and Replacement

6.1.2 Bird Islands

6.1.3 Containment Dikes

6.2 Potential Borrow Sources

6.3 Borrow Area Material Properties

6.4 Dredging Considerations

6.5 Borrow Area Recommendations

7 Material Source Investigation

Sources of armor stone will be investigated as part of the 95% design. Potential geotextile manufacturers and products will be identified as part of the 65% design.

7.1 Stone

7.1.1 Armor Stone Requirements

7.1.2 Other Stone Requirements

7.1.3 Potential Quarries

7.2 Geotextile

8 Wetland Design

The goal of the project is ultimately to create wetlands from dredged material. As of the 35% design, the source of this dredged material is unknown. Creation of wetlands is not part of the current contract. Different sources of dredged material impose different requirements for wetland design. This section will be updated when the source of the material has been identified.

8.1 Containment Structures

8.1.1 Perimeter Sills and Filtration Design

8.1.2 Containment Dikes

8.2 Inflows

8.2.1 Material Source for Inflow

8.2.2 Available Capacities

8.2.3 Inflow Schedule and Sequence

8.2.4 Wetland Planting and Grading

9 REFERENCES

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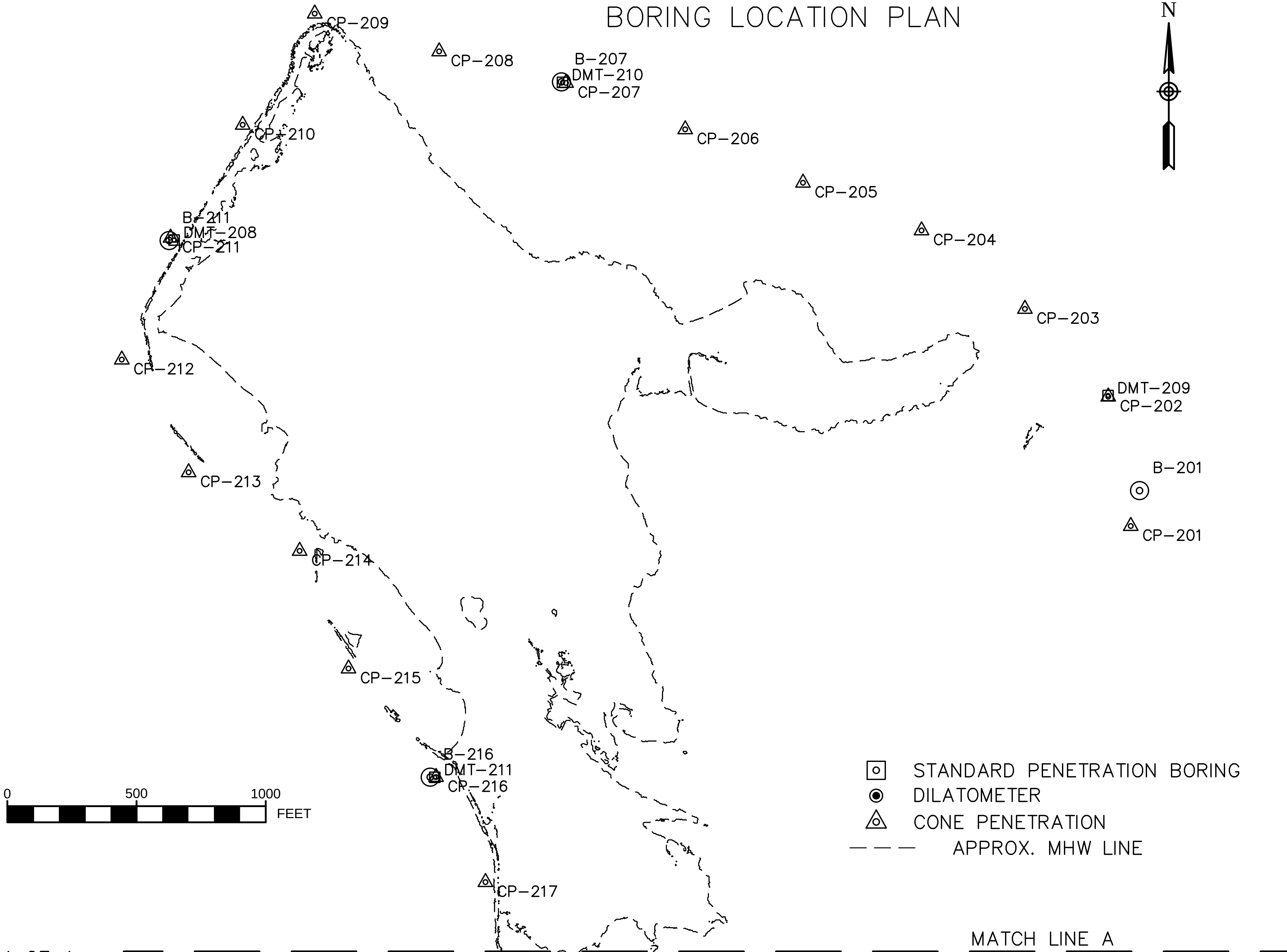
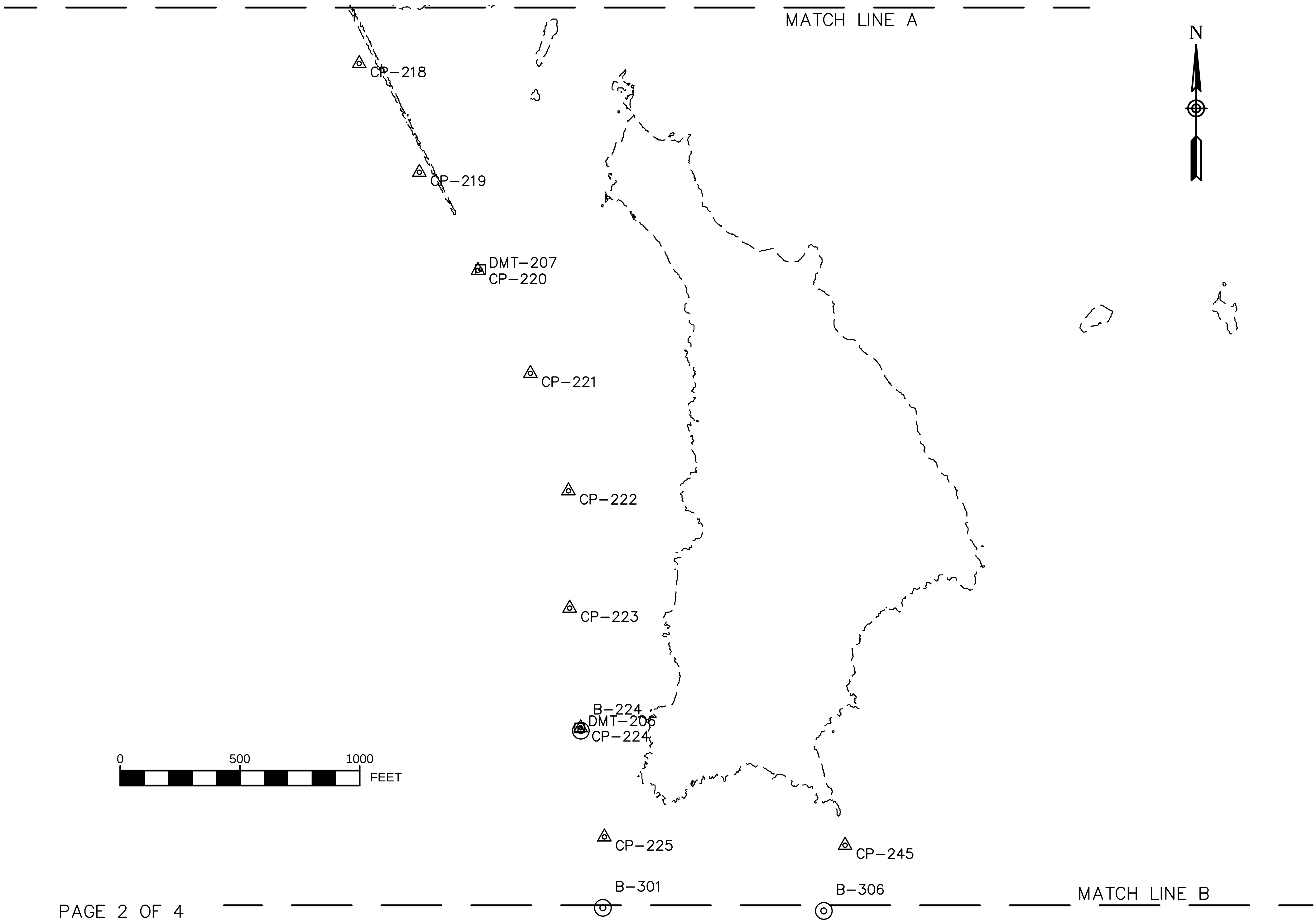
USACE. (2008). *Mid-Chesapeake Bay Island Ecosystem Restoration Integrated Feasibility Report and Environmental Impact Statement.*

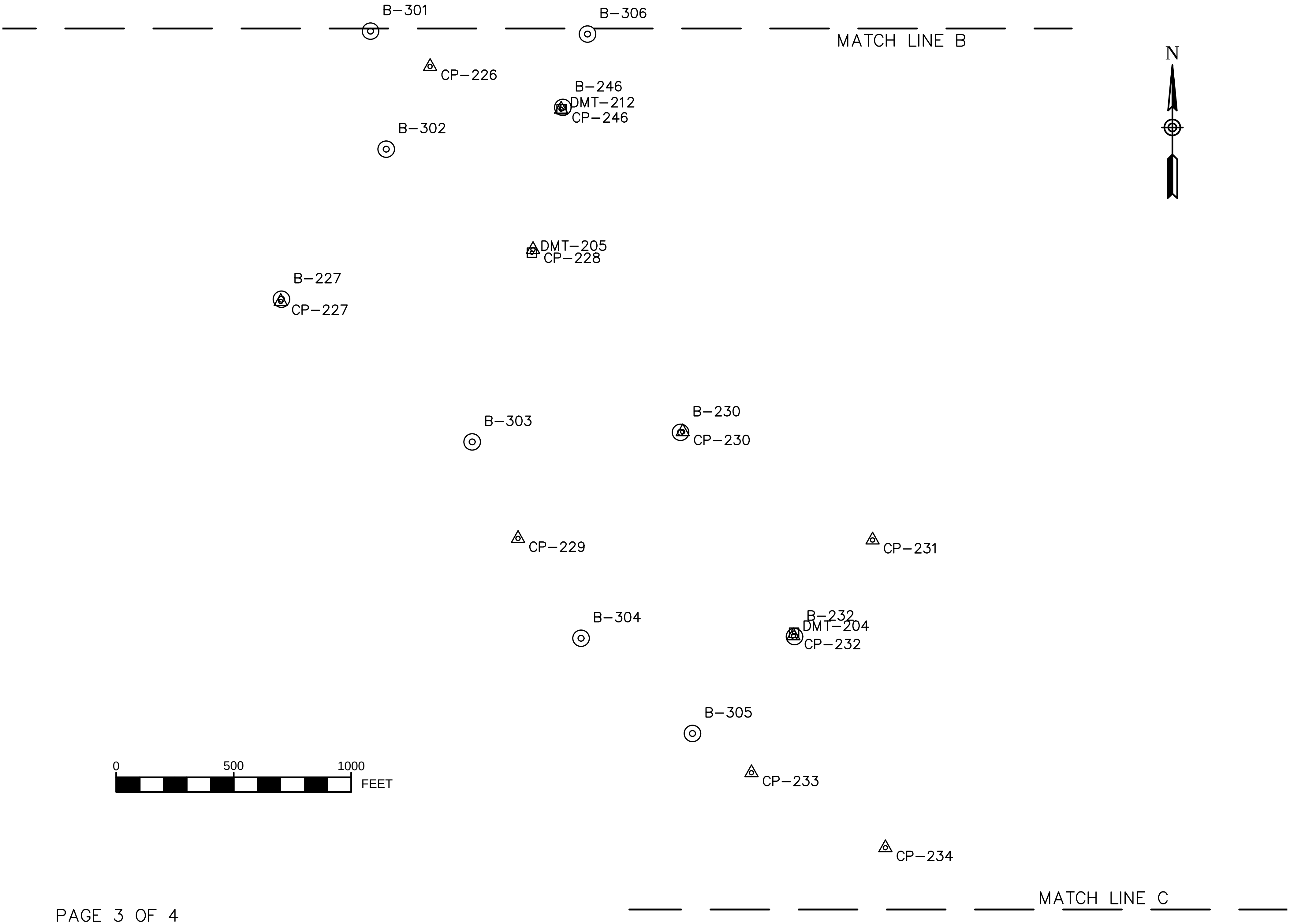
10 Attachments

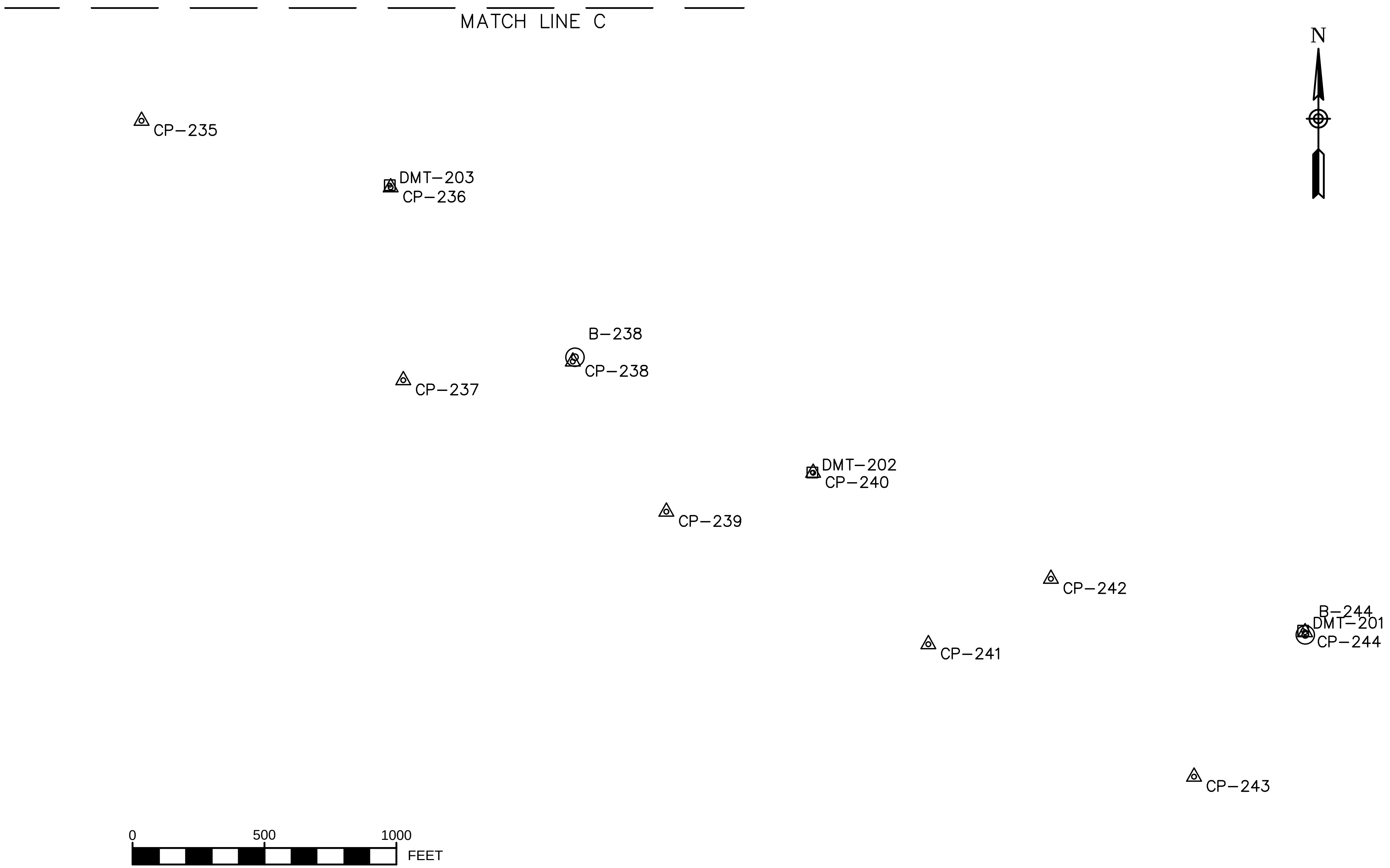
Attachment A	Boring Location Plan (2020 Exploration)
Attachment B	Boring Logs and Gradation Analyses
Attachment C	Cone Penetration Logs
Attachment D	Dilatometer Logs
Attachment E	Field Vane Shear Reports
Attachment F	Geologic Profiles
Attachment G	CPT Shear Strength Calibration
Attachment H	Strength Correlations
Attachment I	Compressibility Correlations and Settlement
Attachment J	Laboratory Strength Testing (Not Yet Complete. to be included at 65% design level.)
Attachment K	Slope Stability Results
Attachment L	Proposed Cross Sections

BARREN ISLAND
2020 SUBSURFACE EXPLORATION
BORING LOCATION PLAN




MATCH LINE A
N
CP-218
CP-219
DMT-207
CP-220
CP-221
CP-222
CP-223
B-224
DMT-205
CP-224
0
500
1000
FEET
CP-225
CP-245
B-301
B-306
MATCH LINE B


B-301
B-306
MATCH LINE B
N
CP-226
B-246
DMT-212
CP-246
B-302
DMT-205
CP-228
B-227
CP-227
B-303
B-230
CP-230
CP-229
CP-231
B-304
B-232
DMT-204
CP-232
B-305
0
500
1000
FEET
CP-233
CP-234
MATCH LINE C


MATCH LINE C
N
CP-235
DMT-203
CP-236
B-238
CP-238
CP-237
DMT-202
CP-240
CP-239
CP-242
B-244
DMT-201
CP-244
CP-241
CP-243
0
500
1000
FEET

RECORD OF SOIL EXPLORATION

Contracted With GBA
Boring # B.201
Projects Name Midbay Island Sub. Exp. phase I. Barren Island
Job # 19-0050.01
Location Barron Island

SAMPLER

Datum WL. ± 1.1
Surf. Elev. -2.39 Ft.
Date Started 8-7-16-20
Hammer Wt. 140 Lbs.
Hammer Drop 30 In.
Pipe Size 2" In.
Hole Diameter 8"
Rock Core Dia. NA
Boring Method HSA
Foreman M. Fletcher
Inspector B Adhikari
Date Completed 7-16-20

ELEV.	SOIL DESCRIPTION Color, Moisture, Density, Plasticity, Size Proportions	STRA DEPTH	DEPTH SCALE	Cond	Blows/6"	No.	Type	Rec	BORING & SAMPLING NOTES
	Gray, wet, V. loose, silty SAND	0 - 5.0'		I	WOH 18"	1	DS	13"	(I) Drill Rig: Mobile B.57. w/Auto hammer
				D	WOH 18"	2	DS	2"	(II) Two Jar sample were collected at: S.3 and S.4.
	Gray wet, V. soft silty, CLAY	5.0' - 8.5	5	I/D	WOH 18"	3	DS	13"	3B 3A
	Br. wet, V. loose to loose, silty, F. SAND	8.5 - 19.0'		I/D	WOH 6 · 2 · 3	4	DS	18"	4B 4A
			10	I/D	1 · 2 · 2	5	DS	12"	(III) GPS Co-ordinate N. 245,697.7 E. 1,526,787.5
				I/D	2 · 2 · 3	6	DS	12"	[141' offset from original hole]
			15	I/D	2 · 2 · 4	7	DS	12"	
				I/D	2 · 3 · 3	8	DS	11"	(IV) W.L +1.1 ft
	Brn. to Red Brn. wet, loose, F-M, SAND.	19.0' - 25.0'	20	I/D	2 · 3 · 3	9	DS	13"	(V) Mud line El. -2.39 ft
				I/D	4 · 5 · 5	10	DS	11"	
	Gray, wet, Loose to Medium Dense, F-M, SAND.	25.0' - 35.0'	25	I/D	2 · 3 · 3	11	DS	16"	
				I/D	2 · 2 · 3	12	DS	17"	
			30	I/D	4 · 5 · 6	13	DS	12"	
				I/D	7 · 10 · 15	14	DS	11"	
	Br, gray, wet, Medium Dense, SAND w/gravel	35.0 - 40	35	I/D	13 · 14 · 6	15	DS	11"	
				L	8 · 6 · 6	16	DS	0	

SAMPLER TYPE
DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE
CA – CONTINUOUS FLIGHT AUGER
RC – ROCK CORE

SAMPLE CONDITIONS
D – DISINTEGRATED
I – INTACT
U – UNDISTURBED
L – LOST

GROUND WATER DEPTH
AT COMPLETION ______ FT.
AFTER ______ HRS. ______ FT.
AFTER 24 HRS. ______ FT.

BORING METHOD
HSA – HOLLOW STEM AUGERS
CFA – CONTINUOUS FLIGHT AUGERS
DC – DRIVING CASING
MD – MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS

RECORD OF SOIL EXPLORATION

Contracted With GBA Boring # B-201
Projects Name Midbay Island sub. exp. phase 1 Barron Island Job # 19-0050.01
Location Barron Island

SAMPLER

Datum WL. 1.1 ft	Hammer Wt. 140 Lbs.	Hole Diameter 8"	Foreman M. Fletcher
Surf. Elev. -2.39 Ft.	Hammer Drop 30 In.	Rock Core Dia. NA	Inspector B. Adhikari
Date Started 7.16.20	Pipe Size 2" In.	Boring Method HSA	Date Completed 7.16.20

ELEV.	SOIL DESCRIPTION Color, Moisture, Density, Plasticity, Size Proportions	STRA DEPTH	DEPTH SCALE	Cond	Blows/6"	No.	Type	Rec	BORING & SAMPLING NOTES
	Gray, wet, Medn. Stiff to Stiff, CLAY	40'		I	3.3.4	17	DS	18"	
		61.5'		I	2.2.3	18	DS	18	
			45	I	2.3.3	19	DS	18"	
	+trace of sand at below 47.0			I	4.5.5	20	DS	11"	
			50	I	3.4.4	21	DS	2"	
				I	4.4.4	22	DS	18"	
			55	I	4.3.3	23	DS	18"	
				I	4.4.4	24	DS	18"	
			60		3.3.4	25	DS	18"	
	B.O.B. @ 61.5'	61.5'							

SAMPLER TYPE
DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE
CA – CONTINUOUS FLIGHT AUGER
RC – ROCK CORE

SAMPLE CONDITIONS
D – DISINTEGRATED
I – INTACT
U – UNDISTURBED
L – LOST

GROUND WATER DEPTH
AT COMPLETION ______ FT.
AFTER ______ HRS. ______ FT.
AFTER 24 HRS. ______ FT.

BORING METHOD
HSA – HOLLOW STEM AUGERS
CFA – CONTINUOUS FLIGHT AUGERS
DC – DRIVING CASING
MD – MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS

RECORD OF SOIL EXPLORATION

Contracted With GBA Boring # B 207
Projects Name Midbay Island sub exp. Phase I Barron Island Job # 19.0050.01
Location Barron Island, MD

W.L. +0.6 ft.

SAMPLER

Datum ______ Hammer Wt. 140 Lbs. Hole Diameter 8" Foreman M. Fletcher
Surf. Elev. -5.7 Ft. Hammer Drop 30 In. Rock Core Dia. NA Inspector B. Adhikari
Date Started 07-13-2020 Pipe Size 2" In. Boring Method HSA. Date Completed 07-13-202[0]

ELEV.	SOIL DESCRIPTION Color, Moisture, Density, Plasticity, Size Proportions	STRA DEPTH	DEPTH SCALE	SAMPLE Cond	Blows/6"	No.	Type	Rec	BORING & SAMPLING NOTES
	Brown, wet, V. loose to loose, silty, SAND. trace clay	0' - 8'		I	1-1-3	1	DS	18"	① Drill Rig: Mobile B-57 w/Auto hammer
				I/D	3-4-2	2	DS	18"	
			5	I/D	1-1-4	3	DS	18"	② Two Jar Sample were Collected at
	Gray, wet, soft CLAY trace sand	8'-11'		I/D	3-1-1	4	DS	18"	S-4A & S-4B S-5A & S5B
			10	I/D	WOH 18	5	DS	18"	S-10A & S-10B
	Gray, wet, V. loose Clayey, SAND	11.0 - 20		I/D	WOH 18	6	DS	18"	S-11A & S-11B S-12A & S-12B
			15	I	WOH 18	7	DS	18"	③ WL +0.6
				I	WOH 18	8	DS	18"	④ Mudline El. -5.7
	Gray, wet, v. loose, SAND	20'-22'	20	I/D	2-2-2	9	DS	16"	⑤ GPS Coordinate N. 2472799 E. 1,524,550.39
	Gray, wet, soft, CLAY, trace sand	22'-23'		I	1-1-WOH 6"	10	DS	18"	
	Gray, wet, v loose to loose Clayey, SAND	23'-26'	25	I/D	6-12-18	11	DS	18"	
	Gray, wet, Med. dense, F-C SAND with gravel	26'-28		I/D	9-3-4	12	DS	18"	
	Gray to greenish gray, wet Medm. stiff to v. stiff CLAY, trace gravel	28'-61.5'	30	I	11-12-12	13	DS	2"	
				I	4-2-3	14	DS	18"	
			35	I	12-9-7	15	DS	4"	
				I	10-9-4	16	DS	18"	
			40						

SAMPLER TYPE
DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE
CA – CONTINUOUS FLIGHT AUGER
RC – ROCK CORE

SAMPLE CONDITIONS
D – DISINTEGRATED
I – INTACT
U – UNDISTURBED
L – LOST

GROUND WATER DEPTH
AT COMPLETION ______ FT.
AFTER ______ HRS. ______ FT.
AFTER 24 HRS. ______ FT.

BORING METHOD
HSA – HOLLOW STEM AUGERS
CFA – CONTINUOUS FLIGHT AUGERS
DC – DRIVING CASING
MD – MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS

RECORD OF SOIL EXPLORATION

Contracted With GBA. Boring # B 207
Projects Name Midbay Island sub exp. Phase I - Barron Island Job # 19.0050.01
Location Barron Island.

SAMPLER

w.l. +0.6 ft.

Datum	Hammer Wt. 140 Lbs.	Hole Diameter 8"	Foreman M. Fletcher
Surf. Elev. -5.7 Ft.	Hammer Drop 30 In.	Rock Core Dia. NA	Inspector B. Adhikari
Date Started 7-13-2020	Pipe Size 2 In.	Boring Method HSA	Date Completed 7-13-2020

ELEV.	SOIL DESCRIPTION Color, Moisture, Density, Plasticity, Size Proportions	STRA DEPTH	DEPTH SCALE	SAMPLE Cond	Blows/6"	No.	Type	Rec	BORING & SAMPLING NOTES
	Continue Same Gray to Greenish gray wet, Medium stiff to Very stiff, CLAY trace gravel.			I	3-3-5	17	DS	18"	
				I	5-4-5	18	DS	18"	
			45		4-2-4	19	DS	18"	
					3-3-4	20	DS	18"	
			50		3-3-3	21	DS	18"	
					2-3-4	22	DS	18"	
			55		8-3-3	23	DS	18"	
					3-4-4	24	DS	18"	
			60		4-5-5	25	DS	18"	
	B.O.B. at 61.5'								

SAMPLER TYPE
DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE
CA – CONTINUOUS FLIGHT AUGER
RC – ROCK CORE

SAMPLE CONDITIONS
D – DISINTEGRATED
I – INTACT
U – UNDISTURBED
L – LOST

GROUND WATER DEPTH
AT COMPLETION ______ FT.
AFTER ______ HRS. ______ FT.
AFTER 24 HRS. ______ FT.

BORING METHOD
HSA – HOLLOW STEM AUGERS
CFA – CONTINUOUS FLIGHT AUGERS
DC – DRIVING CASING
MD – MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS

RECORD OF SOIL EXPLORATION

Contracted With GBA Boring # B-211
Projects Name Midbay Island sub exp. phase I - Barron Island Job # 19-0050-01
Location Barron Island, MD.

SAMPLER

W.L +0.9ft.
Datum
Surf. Elev. -9.7 Ft. Hammer Wt. 140 Lbs. Hole Diameter 8" Foreman M. Fletcher
Date Started 07-09-2020 Hammer Drop 30 In. Rock Core Dia. NA Inspector B. Adhikari
Pipe Size 2 In. Boring Method HSA Date Completed 07-09-2020

ELEV.	SOIL DESCRIPTION Color, Moisture, Density, Plasticity, Size Proportions	STRA DEPTH	DEPTH SCALE	SAMPLE Cond	Blows/6"	No.	Type	Rec	BORING & SAMPLING NOTES
	Br. wet, V. loose, fine SAND with Silty Clay	0 - 7.0'		I	1-1-3	1	DS	13"	① Drill Rig: Mobile B-57, w/ Autohammer
				I	1-2-1	2		13"	② Two Jar samples were collected at S-6A & S-6B, S-16A & S-16B.
			5	I/D	W.O.H / 18"	3		18"	
	Br., wet, V. loose to Medium dense, Medium to Coarse SAND.	7.0' - 13.0'		I/D	1-3-2	4		14"	③ WL EL. +0.9ft.
			10	I/D	4-6-8	5		16"	④ Mudline EL. -9.7
	Br. to gray, V. loose, Clayey SAND.	13.0' - 15.0		I/D	3-1-1	6		18"	(6A / 6B)
			15	I/D	W.O.H / 12 -1	7		14"	⑤ GPS Coordinate N. 246665.9 E. 1523032.0
	Br. to gray, wet, V. loose to loose, f-M, SAND trace Silt & Clay	15.0' - 38.0'		I/D	2-2-2	8		18"	
			20	I/D	2-2-2	9		18"	
				I/D	1-2-4	10		18"	
			25	I/D	2-1-2	11		16"	
				I/D	2-2-3	12		16"	
			30	I/D	2-3-5	13		18"	
				I/D	2-3-3	14		18"	
			35	I/D	3-3-4	15		15"	
	[Next page]			I	1-2-3	16		18"	(16A / 16B)
			40						

SAMPLER TYPE
DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE
CA – CONTINUOUS FLIGHT AUGER
RC – ROCK CORE

SAMPLE CONDITIONS
D – DISINTEGRATED
I – INTACT
U – UNDISTURBED
L – LOST

GROUND WATER DEPTH
AT COMPLETION ______ FT.
AFTER ______ HRS. ______ FT.
AFTER 24 HRS. ______ FT.

BORING METHOD
HSA – HOLLOW STEM AUGERS
CFA – CONTINUOUS FLIGHT AUGERS
DC – DRIVING CASING
MD – MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS

RECORD OF SOIL EXPLORATION

Contracted With GBA　　Boring # B-211
Projects Name Midbay Island Sub. exp. Phase-1 Barren Island　　Job # 19-0050.01
Location Barren Island, MD

SAMPLER

W.L +0.9 ft
Datum ______　　Hammer Wt. 140 Lbs.　　Hole Diameter 8"　　Foreman M. Fletcher
Surf. Elev. -9.7 Ft.　　Hammer Drop 30 In.　　Rock Core Dia. NA　　Inspector B. Adhikari
Date Started 07-09-2020　　Pipe Size 2 In.　　Boring Method HSA　　Date Completed 07-09-2020

ELEV.	SOIL DESCRIPTION Color, Moisture, Density, Plasticity, Size Proportions	STRA DEPTH	DEPTH SCALE	SAMPLE Cond	Blows/6"	No.	Type	Rec	BORING & SAMPLING NOTES
	Gray, wet, Medium Stiff to Stiff. CLAY, trace Sand	38.0 - 60.0'	40	I	4-5-5	17			
				I	3-3-4	18			
			45	I	1-2-3	19			
				I	2-2-4	20			
			50	I	2-3-4	21			
				I	3-4-5	22			
			55	I	5-5-7	23			
				I	6-6-7	24			
	Brn to gray, white & tan Molted, V. Dense SAND with silty Clay.		60	I	8-40-31	25			
	B. of Boring at 61.5'								

SAMPLER TYPE
DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE
CA – CONTINUOUS FLIGHT AUGER
RC – ROCK CORE

SAMPLE CONDITIONS
D – DISINTEGRATED
I – INTACT
U – UNDISTURBED
L – LOST

GROUND WATER DEPTH
AT COMPLETION ______ FT.
AFTER ______ HRS. ______ FT.
AFTER 24 HRS. ______ FT.

BORING METHOD
HSA – HOLLOW STEM AUGERS
CFA – CONTINUOUS FLIGHT AUGERS
DC – DRIVING CASING
MD – MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS

RECORD OF SOIL EXPLORATION

Contracted With: GBA Boring #: B-216
Projects Name: Mid bay Island env. exp. phase 1 Barron Island Job #: 19-0050.01
Location: Barron Island, MD

W.L +0.4 ft

SAMPLER

Datum	Hammer Wt. 140 Lbs.	Hole Diameter 8"	Foreman M. Fletcher
Surf. Elev. -6.2 Ft.	Hammer Drop 30 In.	Rock Core Dia. NA	Inspector B. Adhikari
Date Started 7-14-20	Pipe Size 2" In.	Boring Method HSA	Date Completed 7-14-20

ELEV.	SOIL DESCRIPTION Color, Moisture, Density, Plasticity, Size Proportions	STRA DEPTH	DEPTH SCALE	Cond	Blows/6"	No.	Type	Rec	BORING & SAMPLING NOTES
	Wood	0-1.5'		I	8.3.6	1	DS	2"	① Drill Rig: Mobile B.57
	Brown to Red. Brn. wet, V. loose to loose, silty, F. SAND, trace Clay	1.5' - 10'		I/D	3.3.5	2	DS	18"	② Two Jar samples were collected at S.10B/A S.15B/A & S.18B/A
			5	D	3.3.2	3	DS	18	
				D	WOH/18	4	DS	#4	
	Gray, wet, loose to Med. dense F.M. SAND	10'.0 - 23'.0	10	I/D	8.10.15	5	DS	18"	③ GPS N. 244,588.3 E. 1,524,042.4
				I/D	6.6.8	6	DS	18"	
							DS	2"	④ W.L +0.4
			15	I/D	5.4.4	7			
				I/D	2.4.6	8	DS	18"	⑤ Mud line EL. -6.2
			20	I/D	3.3.5	9	DS	14"	
	Gray, Wet, V. soft, CLAY w/ sand	23-24.5		I/D	4.1.1	10	DS	18"	S.10B S.18A
	Gray, wet, V. loose, SAND trace clay	24.5 - 27'	25	I/D	2.1.1	11	DS	18"	
	Gray. wet, V. soft, silty, CLAY trace sand	27' - 30'		I/D	WOH/18"	12	DS	18"	
	Gray, wet, V. loose, clayey F. SAND with sea shell at 35'	30'0 - 35.5'	30	I/D	WOH/6"-1-1	13	DS	18"	
				I/D	WOH/6"-2.1	14	DS	18"	
	Gray, wet, soft to Med. stiff, CLAY w/ sand & sea shells.	35.5' - 43.0	35	I/D	3.2.2	15	DS	18"	S.15B S.15A
					2.1.2	16	DS	18	
			40						

SAMPLER TYPE
DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE
CA – CONTINUOUS FLIGHT AUGER
RC – ROCK CORE

SAMPLE CONDITIONS
D – DISINTEGRATED
I – INTACT
U – UNDISTURBED
L – LOST

GROUND WATER DEPTH
AT COMPLETION ______ FT.
AFTER ______ HRS. ______ FT.
AFTER 24 HRS. ______ FT.

BORING METHOD
HSA – HOLLOW STEM AUGERS
CFA – CONTINUOUS FLIGHT AUGERS
DC – DRIVING CASING
MD – MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS

RECORD OF SOIL EXPLORATION

Contracted With: GBA — Boring # B 216
Projects Name: Midbay Island Silt exp Phase I - Barron Island — Job # 19.0050.01
Location: Barron Island

SAMPLER

WL to 0.4 ft

Datum	Hammer Wt. 140 Lbs.	Hole Diameter 8-inch	Foreman M. Fletcher
Surf. Elev. -6.2 Ft.	Hammer Drop 30 In.	Rock Core Dia. NA	Inspector B. Adhikari
Date Started 07-14-20	Pipe Size 2" In.	Boring Method HSA	Date Completed 07-14-20

ELEV.	SOIL DESCRIPTION Color, Moisture, Density, Plasticity, Size Proportions	STRA DEPTH	DEPTH SCALE	Cond	Blows/6"	No.	Type	Rec	BORING & SAMPLING NOTES
	(Continue) Gray, wet soft to medn Stiff CLAY w/ sand sea shells.		40	I/D	2.1.1	17	DS	18"	
				I/D	4-2-4	18	DS	18"	S.18B / S.18A
	Gray, wet, loose to dense, Clayey F-M, SAND	43.0 - 55'	45	I/D	5.7.5	19	DS	14"	
				I/D	4.8.6	20	DS	18"	
			50	I	4.12.13	21	DS	18"	
					21.21-14	22	DS	2"	
	Gray, wet, Medn Stiff to v. Stiff, CLAY trace Sand.	55' - 61.5	55		2.2.3	23	DS	18"	
					2.3.6	24	DS	18"	
			60		13.12.11	25	DS	3"	
	B.O.B @ 61.5'								

SAMPLER TYPE	SAMPLE CONDITIONS	GROUND WATER DEPTH	BORING METHOD
DS – DRIVEN SPLIT SPOON	D – DISINTEGRATED	AT COMPLETION ____ FT.	HSA – HOLLOW STEM AUGERS
PT – PRESSED SHELBY TUBE	I – INTACT	AFTER ____ HRS. ____ FT.	CFA – CONTINUOUS FLIGHT AUGERS
CA – CONTINUOUS FLIGHT AUGER	U – UNDISTURBED	AFTER 24 HRS. ____ FT.	DC – DRIVING CASING
RC – ROCK CORE	L – LOST		MD – MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS

RECORD OF SOIL EXPLORATION

Contracted With GBA Boring # B.224
Projects Name MIdbay Island sub exp. Phase I Barron Island Job # 19-0050.01
Location Barron Island, MD

SAMPLER

WL -0.2 ft

Datum	Hammer Wt. 140 Lbs.	Hole Diameter 8"	Foreman M.Fletcher
Surf. Elev. -6.76 Ft.	Hammer Drop 30 In.	Rock Core Dia. NA	Inspector B.Adhikari
Date Started 07-14-2020	Pipe Size 2" In.	Boring Method HSA	Date Completed 7-14-20

ELEV.	SOIL DESCRIPTION Color, Moisture, Density, Plasticity, Size Proportions	STRA DEPTH	DEPTH SCALE	Cond	Blows/6"	No.	Type	Rec	BORING & SAMPLING NOTES
	Brn to drk Brn, wet loose, clayey SAND	0-2'		I/D	1-3-3	1	DS	14"	① Drill rig: Mobile B.57 w/auto hammer
	Brn to gray, wet, soft, CLAY w/ sand	2.0'-5.0'		I/D	1-2-2	2	DS	18"	
	Brn to gray, wet, V. loose, clayey, fine SAND	5.0'-10.0'	5	I	WOH/18"	3	DS	18"	② GPS N. 240.8928 E. 1,525,280.8
				I/D	WOH/18"	4	DS	18"	
	Gray, wet, V. loose to loose, clayey/silty, F-M SAND	10.0'-20.0'	10	I/D	WOH/12" - 1	5	DS	18"	③ Average WL -0.2 ft
				I/D	1-1-1	6	DS	18"	④ Mud line EL. -6.76 ft
			15	I/D	1.3.5	7	DS	18"	
				I/D	WOH/6 -1.1	8	DS	18"	
	Gray, wet, V. loose to loose SAND, trace silt	20.0'-30.0'	20	I/D	1.1.2	9	DS	13"	
				I/D	1.1.1	10	DS	13"	
			25	I/D	1.1.7	11	DS	12"	
				I/D	WOH/6" 1.1	12	DS	15"	
	Gray, wet, Medm stiff to stiff, silty CLAY		30	I	2.2.3	13	DS	18"	
				I	3.4.4	14	DS	18"	
			35	I	3.2.3	15	DS	18"	
				I	5.4.5	16	DS	18"	
			40						

SAMPLER TYPE
DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE
CA – CONTINUOUS FLIGHT AUGER
RC – ROCK CORE

SAMPLE CONDITIONS
D – DISINTEGRATED
I – INTACT
U – UNDISTURBED
L – LOST

GROUND WATER DEPTH
AT COMPLETION ______ FT.
AFTER ______ HRS. ______ FT.
AFTER 24 HRS. ______ FT.

BORING METHOD
HSA – HOLLOW STEM AUGERS
CFA – CONTINUOUS FLIGHT AUGERS
DC – DRIVING CASING
MD – MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS

RECORD OF SOIL EXPLORATION

Contracted With GBA — Boring # B-224

Projects Name Midbay Island sub. exp phase I Barron Island — Job # 19-6050.01

Location Barron Island, MD

SAMPLER

Datum GL - 0.2 ft — Hammer Wt. 140 Lbs. — Hole Diameter 8" — Foreman M. Fletcher

Surf. Elev. -6.76 Ft. — Hammer Drop 30 In. — Rock Core Dia. NA — Inspector B. Adhikari

Date Started 7-14-20 — Pipe Size 2" In. — Boring Method HSA — Date Completed 7-14-20

ELEV.	SOIL DESCRIPTION Color, Moisture, Density, Plasticity, Size Proportions	STRA DEPTH	DEPTH SCALE	Cond	Blows/6"	No.	Type	Rec	BORING & SAMPLING NOTES
	(Continue) (Same) Gray, wet Med. stiff to stiff, silty, CLAY		40	I	2.3.3	17	DS	18"	
					3.4.4	18	DS	18"	
			45		4.3.4	19	DS	18"	
					3.4.4	20	DS	18"	
			50		4.6.6	21	DS	18"	
					3.4.5	22	DS	18"	
			55		4.5.5	23	DS	18"	
					5.5.7	24	DS	18"	
			60		3.4.6	25	DS	18"	
	B. of B. @ 61.5'								

SAMPLER TYPE
DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE
CA – CONTINUOUS FLIGHT AUGER
RC – ROCK CORE

SAMPLE CONDITIONS
D – DISINTEGRATED
I – INTACT
U – UNDISTURBED
L – LOST

GROUND WATER DEPTH
AT COMPLETION ______ FT.
AFTER ______ HRS. ______ FT.
AFTER 24 HRS. ______ FT.

BORING METHOD
HSA – HOLLOW STEM AUGERS
CFA – CONTINUOUS FLIGHT AUGERS
DC – DRIVING CASING
MD – MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS

RECORD OF SOIL EXPLORATION

Contracted With GBA Boring # B-227
Projects Name Midbay Island sub. exp. phase I Barron Island Job # 19-0050-01
Location Barron Island, MD

SAMPLER

Datum WL: 0.4 ft	Hammer Wt. 140 Lbs.	Hole Diameter 8"	Foreman M. Fletcher
Surf. Elev. -9.45 Ft.	Hammer Drop 30 In.	Rock Core Dia. NA	Inspector B. Adhikari
Date Started 07-15-20	Pipe Size 2" In.	Boring Method HSA	Date Completed 7-15-20

ELEV.	SOIL DESCRIPTION Color, Moisture, Density, Plasticity, Size Proportions	STRA DEPTH	DEPTH SCALE	Cond	Blows/6"	No.	Type	Rec	BORING & SAMPLING NOTES
	Brn to gray, wet, v. soft to soft, silty CLAY w/ F. Sand			I/D	2-1-1	1	DS	12"	(I) Drill Rig: Mobile B-57 14 Autohammer
				I	WOH/12". 1	2	DS	18"	(II) WL. EL. 0.4 ft
			5	I	WOH/18"	3	DS	18"	(III) Mudline EL. -9.45 ft
	Gray, wet, v. loose, F-M SAND, with clay			I/D	WOH/18"	4	DS	18"	4B / 4A
	Gray, wet, v. soft, silty CLAY	10.5 / 11.0	10	I	WOH/12. 1	5	DS	18"	5C / 5B / 5A
	Gray, wet, v. loose to loose, clayey, F-M SAND			I/D	3-4-6	6	DS	18"	(V) Two Jar Sample was Collected at S-4
			15	I/D	3-2-2	7	DS	18"	(VI) 3 Jar sample was collected at S-5
	Gray, wet, v. loose to medium dense, silty, F. SAND + trace of sea shells at 20' to 22'			I/D	WOH/6. 3-5	8	DS	18"	
			20	I/D	2-2-1	9	DS	18"	(VII) GPS Co-ordinate N 239,011.2 E 1524,993.5
				I/D	4-5-7	10	DS	12"	
	Gray, wet, Medium stiff to v. stiff, silty CLAY		25	I	3-5-6	11	DS	18"	
				I	3-2-4	12	DS	18"	
			30	I	10-5-4	13	DS	12"	
				I	3-3-4	14	DS	18"	
			35	I	4-3-4	15	DS	18"	
			40		10-6-3	16	DS	15"	

SAMPLER TYPE	SAMPLE CONDITIONS	GROUND WATER DEPTH	BORING METHOD
DS – DRIVEN SPLIT SPOON	D – DISINTEGRATED	AT COMPLETION ____ FT.	HSA – HOLLOW STEM AUGERS
PT – PRESSED SHELBY TUBE	I – INTACT	AFTER ____ HRS. ____ FT.	CFA – CONTINUOUS FLIGHT AUGERS
CA – CONTINUOUS FLIGHT AUGER	U – UNDISTURBED	AFTER 24 HRS. ____ FT.	DC – DRIVING CASING
RC – ROCK CORE	L – LOST		MD – MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS

RECORD OF SOIL EXPLORATION

Contracted With GBA Boring # B 227
Projects Name Midbay Island sub exp. phase I Barron Island Job # 19-0050.01
Location Barron Island, MD

SAMPLER

Datum WL 0.4 ft Hammer Wt. 140 Lbs. Hole Diameter 8" Foreman M. Fletcher
Surf. Elev. -9.45 Ft. Hammer Drop 30 In. Rock Core Dia. NA Inspector B. Adhikari
Date Started 07-15-20 Pipe Size 2" In. Boring Method HSA Date Completed 7.15.20

ELEV.	SOIL DESCRIPTION Color, Moisture, Density, Plasticity, Size Proportions	STRA DEPTH	DEPTH SCALE	SAMPLE Cond	Blows/6"	No.	Type	Rec	BORING & SAMPLING NOTES
	(continued) Gray, wet, medm stiff to v. stiff, silty CLAY		40	I	11.10.10	17	DS	18"	
				I	9.6.6	18	DS	5"	
			45	I	3.4.5	19	DS	18"	
				I	3.3.5	20	DS	18"	
			50	I	2.4.4	21	DS	18"	
				I	2.4.7	22	DS	18"	
			55	I	4.3.5	23	DS	18"	
					4.4.6	24	DS	18"	
			60		6.5.6	25	DS	18"	
	B.o.B. at 61.5 ft.								

SAMPLER TYPE
DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE
CA – CONTINUOUS FLIGHT AUGER
RC – ROCK CORE

SAMPLE CONDITIONS
D – DISINTEGRATED
I – INTACT
U – UNDISTURBED
L – LOST

GROUND WATER DEPTH
AT COMPLETION ____ FT.
AFTER ____ HRS. ____ FT.
AFTER 24 HRS. ____ FT.

BORING METHOD
HSA – HOLLOW STEM AUGERS
CFA – CONTINUOUS FLIGHT AUGERS
DC – DRIVING CASING
MD – MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS

RECORD OF SOIL EXPLORATION

Contracted With GBA
Boring # B.230
Projects Name Midbay Island sub exp. phase I. Barren Island
Job # 19.00 50.01
Location Barren Island, MD

W.L: -0.3 ft

SAMPLER

B. Strowderman

Datum
Hammer Wt. 140 Lbs.
Hole Diameter 8"
Foreman
Surf. Elev. -8.25 Ft.
Hammer Drop 30 In.
Rock Core Dia. NA
Inspector B. Adhikari
Date Started 07-15-20
Pipe Size 2" In.
Boring Method HSA
Date Completed 07-15-20

ELEV.	SOIL DESCRIPTION Color, Moisture, Density, Plasticity, Size Proportions	STRA DEPTH	DEPTH SCALE	Cond	Blows/6"	No.	Type	Rec	BORING & SAMPLING NOTES
	Gray, wet, V. Soft, CLAY trace sand.	0.' - 5.0		I	WOH 18	1	DS	18"	(i) Drill Rig: Mobile B-57 w/ Autohammer
				I	WOH 18	2	DS	18"	
	Brn to gray, wet, V. soft to soft, silty, CLAY, trace sand	5.0 - 11.0	5	I	W.O.H 6 2.1	3	DS	18"	(ii) EL of W.L Average = -0.3 ft
				I	1.2.2	4	DS	18"	(iii) Mudline EL. -8.25
			10	I/D	W.O.H 18	5	DS	18"	5B / 5A
	Brn to gray, wet, V. loose, clayey, SAND	11.0' - 18.5'		I/D	WOH 12 .1	6	DS	18"	(iv) GPS. Coordinate N. 238,444.5 E. 1,526,6920
			15	I	WOH 18"	7	DS	18"	
				I/D	3.4.6	8	DS	18"	8B / 8A
	Gray, wet, loose, F-M SAND	18.5'-20							
	Gray, wet, loose, clayey, F. SAND	20' - 25'	20	I/D	WOH 6 .1.1	9	DS	16"	(v) 2 jar samples were collected at S-5, S8, S-18 and S19 location.
				I	WOH 18"	10	DS	18	
	Gray, wet, loose, silty F. SAND	25' - 32.5'	25	I	WOH 6" .1.1	11	DS	18"	
				I	W.O.H 12 .1	12	DS	18"	
			30	I	WOH 6 .1.1	13	DS	18"	
	Gray, wet, V. soft, sandy SILT, trace clay	32.5' - 35'		I	WOH 18"	14	DS	18"	
	Gray, wet, CLAY, trace sand.	35.0 - 43.5	35	I	WOH 12 .1	15	DS	18"	
			40		WOH 6 .2.1	16	DS	1	

SAMPLER TYPE
DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE
CA – CONTINUOUS FLIGHT AUGER
RC – ROCK CORE

SAMPLE CONDITIONS
D – DISINTEGRATED
I – INTACT
U – UNDISTURBED
L – LOST

GROUND WATER DEPTH
AT COMPLETION ______ FT.
AFTER ______ HRS. ______ FT.
AFTER 24 HRS. ______ FT.

BORING METHOD
HSA – HOLLOW STEM AUGERS
CFA – CONTINUOUS FLIGHT AUGERS
DC – DRIVING CASING
MD – MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS

RECORD OF SOIL EXPLORATION

Contracted With GBA Boring # B 230
Projects Name Midbay Island sub exp phase I Barren Island Job # 19-0050.1
Location Barren Island

SAMPLER

Datum WL: -0.3	Hammer Wt. 140 Lbs.	Hole Diameter 8"	Foreman B. Strawderman
Surf. Elev. -8.25 Ft.	Hammer Drop 30 In.	Rock Core Dia. NA	Inspector B. Adhikari
Date Started 7-15-20	Pipe Size 2" In.	Boring Method HSA	Date Completed 7-15-20

ELEV.	SOIL DESCRIPTION Color, Moisture, Density, Plasticity, Size Proportions	STRA DEPTH	DEPTH SCALE	Cond	Blows/6"	No.	Type	Rec	BORING & SAMPLING NOTES
	(same) (continue)			I	1.2.2	17	DS	18"	
				I	2.6.8	18	DS	18	S18B S18A
	Brn to gray, wet, loose, silty fine SAND	43.5 - 45.5	45	I	1.2.3	19	DS	18	19B 19A
	Brown to light gray, wet med^m stiff to stiff, CLAY	45.5' - 49.0'		I	4.7.10	20	DS	16	(1" of silty SAND in spoon)
	Gray, wet, medium dense F-M SAND trace silt	49.0' - 57.0	50	D	6.7.10	21	DS	18"	
				D	6.5.6	22	DS	18"	
			55	D	5.12.9	~~23~~ 23	DS	18"	
	Gray, wet, med^m stiff to stiff, CLAY, trace silt				5.4.4	24	DS	18"	
			60		5.5.5	25	DS	18"	
	B.O.B. at 61.5'								

SAMPLER TYPE
DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE
CA – CONTINUOUS FLIGHT AUGER
RC – ROCK CORE

SAMPLE CONDITIONS
D – DISINTEGRATED
I – INTACT
U – UNDISTURBED
L – LOST

GROUND WATER DEPTH
AT COMPLETION ______ FT.
AFTER ______ HRS. ______ FT.
AFTER 24 HRS. ______ FT.

BORING METHOD
HSA – HOLLOW STEM AUGERS
CFA – CONTINUOUS FLIGHT AUGERS
DC – DRIVING CASING
MD – MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS

RECORD OF SOIL EXPLORATION

Contracted With GBA — Boring # B-232
Projects Name Midbay Island sub. exp. phase I Barron Island — Job # 19-0050-01
Location Barron Island, MD

SAMPLER

Datum WL +0.33	Hammer Wt. 140 Lbs.	Hole Diameter 8"	Foreman M Fletcher
Surf. Elev. -7.15 Ft.	Hammer Drop 30 In.	Rock Core Dia. NA	Inspector B. Adhikari
Date Started 8-1-2020	Pipe Size 2 In.	Boring Method HSA	Date Completed 8-1-2020

ELEV.	SOIL DESCRIPTION Color, Moisture, Density, Plasticity, Size Proportions	STRA DEPTH	DEPTH SCALE	SAMPLE Cond	Blows/6"	No.	Type	Rec	BORING & SAMPLING NOTES
	Brn to Red Brn, Wet, Loose, Silty, F. SAND	0-3		I/D	W.O.H 6" 2	1	DS	12"	*Drill Rig: Mobile B-57 w/ Autohammer
	Red Brn, wet, med. dense, F-M SAND	3-4		I/D	5.7.4	2	DS	18"	2B / 2A
	Red Brn, wet, v. soft, CLAY, tr. sand	4-5.5'	5	I/D	W.O.H 12" .1	3	DS	18"	2B / 3A
	Brn to gray, wet, v. soft, CLAY tr. sand	5.5'-7'							
	Red Brn, wet, v. loose, clayey SAND	7-8		I/D	W.O.H 18"	4	DS	18"	4B / 4A
	Gray, wet, v. soft, sandy, silty CLAY	8'-10'	10	I/D	W.O.H 18"	5	DS	18"	*GPS coordinate N. 237,575.1 E. 1527177.0
	Gray, wet, v. loose to med. dense, clayey F. SAND	10'-21'		I	W.O.H 18"	6	DS	18"	
			15	I	W.O.H 12" .1	7	DS	18"	* WL El +0.33
				I	1.2.2	8	DS	18"	*Mudline EL. -7.15
			20	I/D	4.11.13	9	DS	18"	9B / 9A
	Gray, wet, Medium Dense, F-M. SAND	21'-27'		D	9.12.15	10	DS	12"	
			25	I/D	3.3.3	11	DS	13"	
	Gray, wet, v. soft to soft silty CLAY, tr. silt			I	2-1-1	12	DS	18"	
			30	I	W.O.H 12 .2	13	DS	18"	
				I/D	W.O.H 12 .2	14	DS	18"	
			35	I/D	W.O.H 18"	15	DS	18"	
	- trace sand, & seashells		40		W.O.H 6 .1.1	16	DS	18"	

SAMPLER TYPE

DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE
CA – CONTINUOUS FLIGHT AUGER
RC – ROCK CORE

SAMPLE CONDITIONS

D – DISINTEGRATED
I – INTACT
U – UNDISTURBED
L – LOST

GROUND WATER DEPTH

AT COMPLETION ______ FT.
AFTER ______ HRS. ______ FT.
AFTER 24 HRS. ______ FT.

BORING METHOD

HSA – HOLLOW STEM AUGERS
CFA – CONTINUOUS FLIGHT AUGERS
DC – DRIVING CASING
MD – MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS

RECORD OF SOIL EXPLORATION

Contracted With GBA — Boring # B.232
Projects Name Midbay Island sub. exp. phase I Barron Island — Job # 19-0050.01
Location Barron Island, MD

SAMPLER

Datum WL. +0.33	Hammer Wt. 140 Lbs.	Hole Diameter 8	Foreman M. Fletcher
Surf. Elev. -7.15 Ft.	Hammer Drop 30 In.	Rock Core Dia. NA	Inspector B. Adhikari
Date Started 08-1-2020	Pipe Size 2 In.	Boring Method HSA	Date Completed 8-1-2020

ELEV.	SOIL DESCRIPTION Color, Moisture, Density, Plasticity, Size Proportions	STRA DEPTH	DEPTH SCALE	Cond	Blows/6"	No.	Type	Rec	BORING & SAMPLING NOTES
	(Continue) Gray, wet, v. soft to soft, CLAY trace silt.			I	W.OH/12" · 1	17	DS	18	
				I	1·1·2	18	DS	18"	
			45	I	W.OH/6 · 1·1	19	DS	18"	
				I	1·2·2	20	DS	18"	
			50	I	W.OH/12" · 1	21	DS	18"	
				I	1·2·2	22	DS	18"	
			55	I	W.OH/12 · 2	23	DS	18"	
				I	2·2·2	24	DS	18"	
	Gray, wet, stiff, sandy, silty CLAY		60	I	2·2·9	25	DS	18"	
	B.O.B=61.5'								

SAMPLER TYPE
DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE
CA – CONTINUOUS FLIGHT AUGER
RC – ROCK CORE

SAMPLE CONDITIONS
D – DISINTEGRATED
I – INTACT
U – UNDISTURBED
L – LOST

GROUND WATER DEPTH
AT COMPLETION ______ FT.
AFTER ______ HRS. ______ FT.
AFTER 24 HRS. ______ FT.

BORING METHOD
HSA – HOLLOW STEM AUGERS
CFA – CONTINUOUS FLIGHT AUGERS
DC – DRIVING CASING
MD – MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS

RECORD OF SOIL EXPLORATION

Contracted With GBA Boring # B-238
Projects Name Midbay Island Sub. Exp Phase I Barren Island Job # 19-0050-01
Location Barren Island, MD

SAMPLER

Datum WL +0.4 ft	Hammer Wt. 140 Lbs.	Hole Diameter 8"	Foreman M. Fletcher
Surf. Elev. -5.9 Ft.	Hammer Drop 30" In.	Rock Core Dia. NA	Inspector B. Adhikari
Date Started 7-22-20	Pipe Size 2" In.	Boring Method HSA	Date Completed 7-22-20

ELEV.	SOIL DESCRIPTION Color, Moisture, Density, Plasticity, Size Proportions	STRA DEPTH	DEPTH SCALE	SAMPLE Cond	Blows/6"	No.	Type	Rec	BORING & SAMPLING NOTES
	Gray, wet, V. Loose, Silty F. SAND, tr. clay	0.0'–5.0'		I	W.OH/18"	1	DS	11"	① Drill Rig: Mobile B-57, w/Auto hammer
	→ trace Seashell below 2.5'			I	W.OH/12", 1	2	DS	18"	
5 / 6	Gray, wet, Med. Stiff SILT trace sand,	5.6'	5	I	3.6.5.	3	DS	18"	3B / 3A
7	Gray to Brn, wet, Loose, clayey SAND,	6.8'		I	1.2.3	4	DS	18"	4B / 4A
	Brn to gray, V. Loose to Medm dense, silty, F-M SAND, trace clay,	8.0'–17.0'	10	I/D	2.2.1	5	DS	16"	⑪ GPS Co-ordinate N. 235,087.8 E. 1,528,651.3
				I/D	3.4.9	6	DS	18"	
			15	I/D	4.3.3	7	DS	12"	① Mudline EL. -5.9
17	Gray, wet, V. loose to Loose, F-M. SAND trace silt.	17.0'–21.0		D	3.6.4	8	DS	18"	⑪ WL. EL. +0.4 ft
21			20	I/D	W.OH/12"	9	DS	18"	9B / 9A
23.5	Gray, wet, V. soft to medm stiff, CLAY w/sand	21'–23.5'		I/D	9.18.26	10	DS	18"	10B / 10A
	Gray, wet, Medm dense to V. Dense, silty SAND w/gravel tr. clay.	23.5–27.0	25	I/D	5.7.9	11	DS	18"	
27 / 28	Gray, soft, wet, silty CLAY	27.0'–28'		I/D	4.9.18	12	DS	18"	12B / 12A
30.5	Brn to gray, wet, Loose to medm dense, silty SAND,	28–30.5	30	I/D	4.2.3	13	DS	18"	13B / 13A
32 / 34	Gray, wet, Soft, silty, CLAY / Gray, wet, Loose, F-M SAND	30.5–32.0		I/D	3.5.4	14	DS	18"	
	Gray, wet, medium stiff to Stiff, silty, CLAY, trace of seashells		35	I	2.3.2	15	DS	18"	
			40	I	3.4.4	16	DS	18"	

SAMPLER TYPE

DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE
CA – CONTINUOUS FLIGHT AUGER
RC – ROCK CORE

SAMPLE CONDITIONS

D – DISINTEGRATED
I – INTACT
U – UNDISTURBED
L – LOST

GROUND WATER DEPTH

AT COMPLETION ____ FT.
AFTER ____ HRS. ____ FT.
AFTER 24 HRS. ____ FT.

BORING METHOD

HSA – HOLLOW STEM AUGERS
CFA – CONTINUOUS FLIGHT AUGERS
DC – DRIVING CASING
MD – MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS

RECORD OF SOIL EXPLORATION

Contracted With GBA Boring # B238
Projects Name Midbay Island Sub. exp. Phase I Barron Island. Job # 19.0050.01
Location Barron Island, MD.

SAMPLER

Datum WL + 0.4 ft. Hammer Wt. 140 Lbs. Hole Diameter 8" Foreman M. Fletcher
Surf. Elev. – 5.9 Ft. Hammer Drop 30 In. Rock Core Dia. NA Inspector B. Adhikari
Date Started 7-22-20 Pipe Size 2 In. Boring Method HSA Date Completed 7-22-20

ELEV.	SOIL DESCRIPTION Color, Moisture, Density, Plasticity, Size Proportions	STRA DEPTH	DEPTH SCALE	SAMPLE Cond	Blows/6"	No.	Type	Rec	BORING & SAMPLING NOTES
	Continue (Same) Gray, Wet, Medium Stiff to Stiff, silty CLAY trace of seashells.		40	I	2-3-4	17	DS	18"	
				I	3-3-5	18	DS	18"	
			45	I	3-2-3	19	DS	18"	
				I	3-3-3	20	DS	18"	
			50	I	2-3-4	21	DS	18"	
				I	4-5-7	22	DS	18"	
			55	I	3-3-6	23	DS	18"	
				I	3-5-7	24	DS	18"	
			60	I	5-5-6	25	DS	18"	
	B.O.B @ 61.5'								

SAMPLER TYPE
DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE
CA – CONTINUOUS FLIGHT AUGER
RC – ROCK CORE

SAMPLE CONDITIONS
D – DISINTEGRATED
I – INTACT
U – UNDISTURBED
L – LOST

GROUND WATER DEPTH
AT COMPLETION ____ FT.
AFTER ____ HRS. ____ FT.
AFTER 24 HRS. ____ FT.

BORING METHOD
HSA – HOLLOW STEM AUGERS
CFA – CONTINUOUS FLIGHT AUGERS
DC – DRIVING CASING
MD – MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS

RECORD OF SOIL EXPLORATION

Contracted With GBA | Boring # B244
Projects Name Midbay Island sub exp phase I Barron Island | Job # 19-0050.01
Location Barron Island

SAMPLER

Datum W.L EL +0.8 | Hammer Wt. 140 Lbs. | Hole Diameter 8" | Foreman M. Fletcher
Surf. Elev. EL -5.3 Ft. | Hammer Drop 30" In. | Rock Core Dia. NA | Inspector B. Adhikari
Date Started 7-21-20 | Pipe Size 2" In. | Boring Method HSA | Date Completed 7-21-20

ELEV.	SOIL DESCRIPTION Color, Moisture, Density, Plasticity, Size Proportions	STRA DEPTH	DEPTH SCALE	Cond	Blows/6"	No.	Type	Rec	BORING & SAMPLING NOTES
	Gray, wet, Very soft, silty CLAY, trace sea shell	0 - 23.0'		L	W.OH / 18"	1	DS	L	① Drill Rig: Mobile B57 w/Auto hammer
				L	W.OH / 18"	2	DS	L	② GPS Coordinate N. 234,034.4 E. 1,531,419.5
							DS	12"	
			5	I/D	W.OH / 18"	3			
				I	W.OH / 18"	4	DS	13"	③ WL EL +0.8
			10	I	W.OH / 18"	5	DS	18"	④ Mudline EL -5.3
				I	W.OH / 18"	6	DS	18"	
			15	I	W.OH / 18	7	DS	18"	
				I	W.OH / 18"	8	DS	18"	
			20	I	W.OH / 18	9	DS	18"	
	Gray, wet, V. loose, silty SAND, trace clay	23.0' - 25.5'		I/D	W.OH / 6" - 1 - 2	10	DS	7"	
			25	I/D	W.OH / 8" - 2 - 2	11	DS	18"	11B / 11A
	Br. to gray, wet, soft CLAY trace F. sand	25.5' - 28.0'		I/D	2-1-1	12	DS	18"	12B / 12A
	Gray, wet, V. loose to loose SAND, w/clay, tr. gravel	28.0' - 35.0'	30	I/D	2-1-1	13	DS	12"	
				I/D	2-4-4	14	DS	18"	
	Br., wet, Dense, M-C SAND with gravel tr. clay	35.0' - 37.0	35	I/D	6-15-24	15	DS	10"	
	Gray, wet, Med. stiff to V. stiff Sandy SILT w/clay, trace gravel	39.0 - 42.0'	40	I/D	3-6-10	16	DS	18"	

SAMPLER TYPE
DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE
CA – CONTINUOUS FLIGHT AUGER
RC – ROCK CORE

SAMPLE CONDITIONS
D – DISINTEGRATED
I – INTACT
U – UNDISTURBED
L – LOST

GROUND WATER DEPTH
AT COMPLETION ______ FT.
AFTER ______ HRS. ______ FT.
AFTER 24 HRS. ______ FT.

BORING METHOD
HSA – HOLLOW STEM AUGERS
CFA – CONTINUOUS FLIGHT AUGERS
DC – DRIVING CASING
MD – MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS

RECORD OF SOIL EXPLORATION

Contracted With GBA Boring # B-244
Projects Name Midbay Island Sub. exp. Phase I Barron Island Job # 19-0050.01
Location Barron Island, MD

SAMPLER

WL EL. +0.8
Datum ______ Hammer Wt. 140 Lbs. Hole Diameter 8" Foreman M. Plotther
Surf. Elev. -5.3 Ft. Hammer Drop 30 In. Rock Core Dia. NA Inspector B. Adhikari
Date Started 7-21-20 Pipe Size 2" In. Boring Method HSA Date Completed 7-21-20

ELEV.	SOIL DESCRIPTION Color, Moisture, Density, Plasticity, Size Proportions	STRA DEPTH	DEPTH SCALE	Cond	Blows/6"	No.	Type	Rec	BORING & SAMPLING NOTES
	Continue (Same)	42.0'	40	I	3.3.4	17	DS	18"	
	Gray, Wet, Med. Stiff to Stiff silty CLAY	42.0' - 50.0'		I	3.3.5	18	DS	18"	
			45	I	3.3.4	19	DS	18"	
				I	4.4.5	20	DS	18"	
	Gray, Wet, Medium Stiff SILT, trace of Sea Shell.	50.0' - 52.0'	50	I	3.3.3	21	DS	18"	
				I	3.4.4	22	DS	18"	
	Gray, Wet, Medium Stiff to Stiff silty CLAY	52.0' -	55	I	3.4.5	23	DS	18"	
	B.O.B at 56.5' Drill Rig broke down at 56.5'. Stopped the work.								

SAMPLER TYPE
DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE
CA – CONTINUOUS FLIGHT AUGER
RC – ROCK CORE

SAMPLE CONDITIONS
D – DISINTEGRATED
I – INTACT
U – UNDISTURBED
L – LOST

GROUND WATER DEPTH
AT COMPLETION ______ FT.
AFTER ______ HRS. ______ FT.
AFTER 24 HRS. ______ FT.

BORING METHOD
HSA – HOLLOW STEM AUGERS
CFA – CONTINUOUS FLIGHT AUGERS
DC – DRIVING CASING
MD – MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS

RECORD OF SOIL EXPLORATION

Contracted With GBA — Boring # B-246
Projects Name Midbay Island sub. Exploration — Job # 19-0050.01
Location Barron Island, MD

SAMPLER

Datum WL. +0.19	Hammer Wt. 140 Lbs.	Hole Diameter 8"	Foreman M. Fletcher
Surf. Elev. EL. -4.72 Ft.	Hammer Drop 30" In.	Rock Core Dia. NA	Inspector B. Adhikari
Date Started 08-06-2020	Pipe Size 2" In.	Boring Method HSA	Date Completed 08-06-2020

ELEV.	SOIL DESCRIPTION Color, Moisture, Density, Plasticity, Size Proportions	STRA DEPTH	DEPTH SCALE	SAMPLE Cond	Blows/6"	No.	Type	Rec	BORING & SAMPLING NOTES
	Gray, wet, V. soft, CLAY	0 - 8.5'		L	W.O.H 12"	1	DS	0"	* Drilled Rig: Mobi B-57 w Autohammer
				I/D	W.O.R 12"	2	DS	15"	* GPS Co-ordinate N 239828.0 E. 1526191.1
			5	I/D	W.O.H 18"	3	DS	18"	
	Brn, Gray, wet, V. soft, organic CLAY	8.5' - 10'		I/D	W.O.H 18"	4	DS	18"	4B / 4A
	Gray, wet, V. soft, CLAY	10' - 12'	10	I/D	W.O.H 18"	5	DS	18"	* WL EL. +0.19
	Greenish Gray to Gray, wet V. Loose to Loose, clayey F. SAND	12' - 17'		I	2.4.2	6	DS	15"	* Mudline EL. -4.72
			15	I/D	W.O.H 18"	7	DS	18"	
	Gray, wet, V. Loose to Med. Dense, F-M. SAND → Fine, Clayey SAND at 21' to 21.5'	17.0' - 23.5'		D	2.5.7	8	DS	11"	
			20	I/D	3.2.2	9	DS	18"	9B / 9A
				I/D	1.2.2	10	DS	18"	10B / 10A
	Gray, wet, v. Loose Silty, F. SAND	23.5' - 27.0'	25	D	3.2.2	11	DS	15"	
	Gray, wet, Loose, F-M SAND with gravel	27.0' - 32'		D	2.2.3	12	DS	11"	
			30	I/D	7.3.3	13	DS	6"	
	Greenish Brn, wet, Med. Stiff Silty, CLAY	32.0' - 33'		I	5.3.4	14	DS	18"	14B / 14A
	Gray, wet, Medium Stiff CLAY	33.0' - 40'	35	I	3.4.4	15	DS	18"	
				I	2.3.4	16	DS	18"	
			40						

SAMPLER TYPE	SAMPLE CONDITIONS	GROUND WATER DEPTH	BORING METHOD
DS – DRIVEN SPLIT SPOON	D – DISINTEGRATED	AT COMPLETION ____ FT.	HSA – HOLLOW STEM AUGERS
PT – PRESSED SHELBY TUBE	I – INTACT	AFTER ____ HRS. ____ FT.	CFA – CONTINUOUS FLIGHT AUGERS
CA – CONTINUOUS FLIGHT AUGER	U – UNDISTURBED		DC – DRIVING CASING
RC – ROCK CORE	L – LOST	AFTER 24 HRS. ____ FT.	MD – MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS

RECORD OF SOIL EXPLORATION

Contracted With GBA — Boring # B 246
Projects Name Midbay Island Sub. Exp. — Job # 19-0050.01
Location Barren Island MD.

SAMPLER

Datum WL + 0.19	Hammer Wt. 140 Lbs.	Hole Diameter 8"	Foreman M. Fletcher
Surf. Elev. EL -4.72 Ft.	Hammer Drop 30 In.	Rock Core Dia. NA	Inspector B. Adhikari
Date Started 08-06-2020	Pipe Size 2" In.	Boring Method HSA	Date Completed 08-06-2020

ELEV.	SOIL DESCRIPTION Color, Moisture, Density, Plasticity, Size Proportions	STRA DEPTH	DEPTH SCALE	SAMPLE Cond	Blows/6"	No.	Type	Rec	BORING & SAMPLING NOTES
	Gray, wet, medium stiff to stiff, SILT	40' - 47		I	3.3.3	17	DS	18"	
				I	3.3.4	18	DS	18"	
			45	I	3.4.5	19	DS	18"	
	Gray, wet, Med. stiff to stiff Silty CLAY	47.0 - 61.5'		I	4.3.5	20	DS	18"	
			50	I	3.4.5	21	DS	18"	
				I	3.4.5	22	DS	18"	
			55	I	5.5.7	23	DS	18"	
				I	4.4.5	24	DS	18"	
			60	I	5.5.8	25	DS	18"	
	B.O.B @ 61.5'								

SAMPLER TYPE
DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE
CA – CONTINUOUS FLIGHT AUGER
RC – ROCK CORE

SAMPLE CONDITIONS
D – DISINTEGRATED
I – INTACT
U – UNDISTURBED
L – LOST

GROUND WATER DEPTH
AT COMPLETION ______ FT.
AFTER ______ HRS. ______ FT.
AFTER 24 HRS. ______ FT.

BORING METHOD
HSA – HOLLOW STEM AUGERS
CFA – CONTINUOUS FLIGHT AUGERS
DC – DRIVING CASING
MD – MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS

RECORD OF SOIL EXPLORATION

Contracted With GBA
Projects Name Ridley
Location Barren Island

Boring # B-301
Job # 19-0050

SAMPLER

Datum Water El -0.07 Surf. Elev. -7.8 Ft. Date Started 2/10/21

Hammer Wt. 140 Lbs. Hammer Drop 30 In. Pipe Size 2 In.

Hole Diameter 8 Rock Core Dia. NA Boring Method HSA

Foreman M. Fletcher Inspector C. Vegerma Date Completed 2/10/21

ELEV.	SOIL DESCRIPTION Color, Moisture, Density, Plasticity, Size Proportions	STRA DEPTH	DEPTH SCALE	SAMPLE Cond	Blows/6"	No.	Type	Rec	BORING & SAMPLING NOTES
	Grey, dark brown, wet, Clayey SILT, with roots. V.Soft		0–1.5'	I	WOH/18"	1	DS	18"	
			2.5–4	I/D	2-3-5	2	DS	16"	N. 240,152.4
	Grey, brown, wet, M.Stiff SILT with Sand, tr C-Sand @ 6.5'		5–6.5	I/D	3-4-2	3	DS	16"	E. 1,525,372.8
	Grey, wet, Soft to V.Soft Sandy SILT		7.5–9	I/D	WOH-1-2	4	DS	15"	Water EL -0.07
			10–11.5	D	WOH/12" - 2	5	DS	16"	Mudline EL -7.8
			12.5–14	D	WOH/18"	6	DS	18"	
	Grey, wet, V.loose to loose Silty SAND		15–16.5	D	1-2-1	7	DS	10"	15 Jars
			17.5–19	D	1-4-4	8	DS	12"	
			20–21.5	D	1-1-2	9	DS	18"	
			22.5–24	D	1-3-4	10	DS	7"	
	with gravel @ 26'-29'		25–26.5	D	5-9-14	11	DS	12"	
			27.5–29	D	5-3-3	12	DS	15"	
	Greenish grey, wet, M.Stiff CLAY with some Sand.		30–31.5	I	2-2-3	13	DS	18"	
			32.5–34	I	3-5-5	14	DS	16"	
			35–36.5	I	1-3-3	15	DS	18"	
	BOB @ 36.5'		37.5–39			16	DS		
			40						

SAMPLER TYPE

DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE
CA – CONTINUOUS FLIGHT AUGER
RC – ROCK CORE

SAMPLE CONDITIONS

D – DISINTEGRATED
I – INTACT
U – UNDISTURBED
L – LOST

GROUND WATER DEPTH

AT COMPLETION ____ FT.
AFTER ____ HRS. ____ FT.
AFTER 24 HRS. ____ FT.

BORING METHOD

HSA – HOLLOW STEM AUGERS
CFA – CONTINUOUS FLIGHT AUGERS
DC – DRIVING CASING
MD – MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS

0'4"
2'6"

1/2

RECORD OF SOIL EXPLORATION

Contracted With GBA
Projects Name Midbay
Location Barren Island

Boring # B-302
Job # 19-0080

SAMPLER

Datum Water EL -0.09 | Hammer Wt. 140 Lbs. | Hole Diameter 8 | Foreman M. Bletcher
Surf. Elev. -8.76 Ft. | Hammer Drop 30 In. | Rock Core Dia. N/A | Inspector C. Vegesna
Date Started 2/8/21 | Pipe Size 2 In. | Boring Method HSA | Date Completed 2/8/21

ELEV.	SOIL DESCRIPTION Color, Moisture, Density, Plasticity, Size Proportions	STRA DEPTH	DEPTH SCALE	Cond	Blows/6"	No.	Type	Rec	BORING & SAMPLING NOTES
	Grey, wet, Soft, SILT with some Sand.	0'-0.5'	0-1.5	I/D	6-2-2	1	DS	18"	1L 1B 1A
	Grey, brown, Loose, SAND (F-M-C)	0.5'-1'	1.5						N, 239,650.0
		1-5	2.5-4	I	WOH/18"	2	DS	18"	
	Brown, grey, wet, V. Soft, SILT, tr Sand		5						E. 1,525,439.4
	grey, Brown, V. Soft, Sandy SILT wet,	5-12.5	5-6.5	I/D	WOH/18"	3	DS	15"	
			7.5-9	I/D	WOH/12"-2	4	DS	18"	Water EL -0.09 Mudline EL. -8.76
			10-11.5	I	WOH/18"	5	DS	16"	
	Grey, wet, Loose Silty SAND	12.5 - 27.5	12.5-14	I/D	1-2-3	6	DS	13"	
			15-16.5	D	WOH/6"-2-3	7	DS	12"	27 Jars
			17.5-19	D	2-2-3	8	DS	16"	
			20-21.5	D	1-4-5	9	DS	16"	
			22.5-24		1-2-2	10	DS	0"	
			25-26.5	D	2-4-4	11	DS	18"	
	Grey, wet, M. Stiff to Stiff CLAY tr gravel @ 27.5'	27.5-	27.5-29	I	2-3-4	12	DS	15"	
			30-31.5	I	3-4-5	13	DS	15"	
			32.5-34	I	3-4-3	14	DS	18"	
			35-36.5	I	3-3-5	15	DS	18"	
			37.5-39	I	2-3-3	16	DS	18"	
			40						

SAMPLER TYPE
DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE
CA – CONTINUOUS FLIGHT AUGER
RC – ROCK CORE

SAMPLE CONDITIONS
D – DISINTEGRATED
I – INTACT
U – UNDISTURBED
L – LOST

GROUND WATER DEPTH
AT COMPLETION ______ FT.
AFTER ______ HRS. ______ FT.
AFTER 24 HRS. ______ FT.

BORING METHOD
HSA – HOLLOW STEM AUGERS
CFA – CONTINUOUS FLIGHT AUGERS
DC – DRIVING CASING
MD – MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS

11'9"

2'10"

RECORD OF SOIL EXPLORATION

Contracted With GBA — Boring # B-302
Projects Name Midway — Job # 19-0050
Location Barren Island

SAMPLER

Datum ______ Hammer Wt. 140 Lbs. Hole Diameter 8 Foreman M. Fletcher
Surf. Elev. ______ Ft. Hammer Drop 30 In. Rock Core Dia. NA Inspector C. Vegera
Date Started 2/8/21 Pipe Size 2 In. Boring Method HSA Date Completed ______

ELEV.	SOIL DESCRIPTION Color, Moisture, Density, Plasticity, Size Proportions	STRA DEPTH	DEPTH SCALE	SAMPLE Cond	Blows/6"	No.	Type	Rec	BORING & SAMPLING NOTES
			40 – 41.5	I	2-4-5	17	DS	18"	
			42.5 – 44	I	2-4-4	18	DS	18"	
	tr fragmented sea shells @ 45'		45 – 46.5	I	3-3-5	19	DS	18"	
			47.5 – 49	I	4-3-5	20	DS	18"	
			50 – 51.5	I	3-5-5	21	DS	18"	
			52.5 – 54	I	4-4-5	22	DS	18"	
			55 – 56.5	I	4-5-6	23	DS	18"	
			57.5 – 59	I	6-5-7	24	DS	18"	
			60 – 61.5	I	5-7-9	25	DS	18"	
	BOB @ 61.5'								

SAMPLER TYPE	SAMPLE CONDITIONS	GROUND WATER DEPTH	BORING METHOD
DS – DRIVEN SPLIT SPOON	D – DISINTEGRATED	AT COMPLETION ______ FT.	HSA – HOLLOW STEM AUGERS
PT – PRESSED SHELBY TUBE	I – INTACT	AFTER ______ HRS. ______ FT.	CFA – CONTINUOUS FLIGHT AUGERS
CA – CONTINUOUS FLIGHT AUGER	U – UNDISTURBED	AFTER 24 HRS. ______ FT.	DC – DRIVING CASING
RC – ROCK CORE	L – LOST		MD – MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS

RECORD OF SOIL EXPLORATION

Contracted With GBA
Boring # B-303
Projects Name Midway
Job # 19-0050.01
Location Barren Island.

SAMPLER

Datum Water EL. 0.16
Surf. Elev. -8.66 Ft.
Date Started 2/4/21
Hammer Wt. 140 Lbs.
Hammer Drop 30 In.
Pipe Size 2 In.
Hole Diameter 8
Rock Core Dia. NA
Boring Method HSA
Foreman M. Fletcher
Inspector C. Vagemer
Date Completed 2/4/21

ELEV.	SOIL DESCRIPTION Color, Moisture, Density, Plasticity, Size Proportions	STRA DEPTH	DEPTH SCALE	SAMPLE Cond	Blows/6"	No.	Type	Rec	BORING & SAMPLING NOTES
	Grey, wet, loose silty SAND	0'-1'	0 1.5	D	WOH/6" -2-1	1	DS	14"	1B 1A
	Brown to gray wet, soft to v. soft SILT with Sand to Clay	1-7.5'	2.5 4	I/D	WOH/6 -1-1	2	DS	15"	N. 238,403.8
			5 6.5	I/D	WOH/12" -1	3	DS	18"	E. 1,525,805.3
	Grey, wet, v. soft SILT to Clay	7.5-10'	7.5 9	I	WOH/12" -1	4	DS	18"	Water EL - 0.16 Mudline EL -8.66
	Grey, wet, v. loose to loose silty F SAND to C-SAND @ 11'	10-32.5'	10 11.5	I/D	WOH/18"	5	DS	18"	– ?, vs
			12.5 14	I/D	WOH 2-1	6	DS	16"	27 Jars
			15 16.5	I	WOH/18"	7	DS	18"	
			17.5 19	D	3-2-3	8	DS	5"	
			20 21.5	I	1-1-2	9	DS	18"	
			22.5 24	I/D	3-3-2	10	DS	14"	
			25 26.5	I/D	1-1-1	11	DS	18"	
			27.5 29	I/D	WOH/12" -1	12	DS	8"	
			30 31.5	I/D	WOH-1-2	13	DS	18"	
	Grey, wet, V. Soft, SILT to Sand to fragmented Sea Shell @ 14'	32.5-37.5'	32.5 34	I/D	WOH/18"	14	DS	18"	? VS ?
			35 36.5	I	WOH/18"	15	DS	18"	
	Gray, wet, v. soft, CLAY, to Silt	37.5-42.5'	37.5 39 40	I	WOH/12" -1	16	DS	18"	

SAMPLER TYPE
DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE
CA – CONTINUOUS FLIGHT AUGER
RC – ROCK CORE

SAMPLE CONDITIONS
D – DISINTEGRATED
I – INTACT
U – UNDISTURBED
L – LOST

GROUND WATER DEPTH
AT COMPLETION ______ FT.
AFTER ______ HRS. ______ FT.
AFTER 24 HRS. ______ FT.

BORING METHOD
HSA – HOLLOW STEM AUGERS
CFA – CONTINUOUS FLIGHT AUGERS
DC – DRIVING CASING
MD – MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS

11'6"
2'"

RECORD OF SOIL EXPLORATION

Contracted With: GAB
Projects Name: Midbay
Location: Barren Island
Boring #: B-303
Job #: 19-0050-01

SAMPLER

Datum:	Hammer Wt.: 140 Lbs.	Hole Diameter: 8"	Foreman: M. Fletcher
Surf. Elev.: Ft.	Hammer Drop: 30 In.	Rock Core Dia.: NA	Inspector: L. Vegara
Date Started: 2/4/21	Pipe Size: 2 In.	Boring Method: HSA	Date Completed: 2/4/21

ELEV.	SOIL DESCRIPTION Color, Moisture, Density, Plasticity, Size Proportions	STRA DEPTH	DEPTH SCALE	SAMPLE Cond	Blows/6"	No.	Type	Rec	BORING & SAMPLING NOTES
			40 – 41.5	I	WOH/18"	17	DS	18"	
	Grey to Brown, wet, soft to M.Stiff CLAY	42.5'-47.5'	42.5 – 44	I	WOH/12"-2	18	DS	18"	
			45 – 46.5	I	2-2-3	19	DS	18"	
	Grey, Brown, wet M.Stiff CLAY with SAND	47.5-50	47.5 – 49	I/D	2-3-1	20	DS	18"	
	Grey, wet, Loose SAND with gravel	50'-50.5'	50 – 51.5	I/D	2-2-4	21	DS	18"	21B / 21A
	Grey, wet, M.Stiff to Stiff CLAY, tr Sand		[illegible] – 54	I	4-4-6	22	DS	[illegible]	
			[illegible] – 8.5	I	3-3-4	23	DS	18"	
			57.5 – 59	I	3-5-5	24	DS	18"	
			[illegible] – 61.5	I	4-5-6	25	DS	18"	
	BOB @61.5'								

SAMPLER TYPE
DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE
CA – CONTINUOUS FLIGHT AUGER
RC – ROCK CORE

SAMPLE CONDITIONS
D – DISINTEGRATED
I – INTACT
U – UNDISTURBED
L – LOST

GROUND WATER DEPTH
AT COMPLETION ____ FT.
AFTER ____ HRS. ____ FT.
AFTER 24 HRS. ____ FT.

BORING METHOD
HSA – HOLLOW STEM AUGERS
CFA – CONTINUOUS FLIGHT AUGERS
DC – DRIVING CASING
MD – MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS

RECORD OF SOIL EXPLORATION

Contracted With GBA
Boring # B-304
Projects Name Midtay
Job # 19-0050-01
Location Barren Island

SAMPLER

Datum Water EL -0.25
Hammer Wt. 140 Lbs.
Hole Diameter 8
Foreman M. Fletcher

Surf. Elev. -7.93 Ft.
Hammer Drop 30 In.
Rock Core Dia. NA
Inspector C. Vogesma

Date Started 1/15/20
Pipe Size 2 In.
Boring Method HSA
Date Completed 01/15/20

ELEV.	SOIL DESCRIPTION Color, Moisture, Density, Plasticity, Size Proportions	STRA DEPTH	DEPTH SCALE	SAMPLE Cond	Blows/6"	No.	Type	Rec	BORING & SAMPLING NOTES
-7'	Grey, brown, wet, Loose, F-M-C SAND	0-2.5	1.5	D	1-3-3	1	DS	10"	N 237568.1'
	Brown to grey, wet, v. soft. CLAY tr sand	2.5-6	2.5 / 4	I/D	WOH/18"	2	DS	17"	E. 1,526,268.4
-12'			5 / 6.5	I/D	WOH/18"	3	DS	18"	3B 3A Water EL -0.25
	Grey, wet, v. loose, Clayey F-M SAND	6-12.5'	7.5 / 9	D	1-2-2	4	DS	14"	mudline EL -7.93
-17'			10 / 11.5	I/D	WOH/18"	5	DS	18"	27 Jars
	Grey, wet, soft, SILT tr sand.	12.5'-17.5'	12.5 / 14	I/D	WOH/12" - 2	6	DS	18"	
-22'			15 / 16.5	D	WOH/18"	7	DS	2"	→ S7. is not representative
	Grey, wet, silty F-M SAND M. dense - v. loose.	17.5'-23.5'	17.5	D	3-7-8	8	DS	12"	
-27'			20 / 21.5	D	2-2-1	9	DS	18"	
			22.5 / 24	I/D	3-2-1	10	DS	18"	10B 10A
-32'	Grey, wet, very soft, CLAY tr sand		25 / 26.5	I	WOH/12" - 1	11	DS	18"	
	Grey, wet, very soft SILT tr sand		27.5 / 29	I	WOH/18"	12	DS	18"	
-37'			30 / 31.5	I	WOH/18"	13	DS	18"	
			32.5 / 34	I	WOH-1-1	14	DS	18"	
	Greenish grey, wet, v. soft CLAY tr silt		35 / 36.5	I	WOH/12" - 1	15	DS	18"	
			37.5 / 39	I	WOH/12" - 2	16	DS	18"	

SAMPLER TYPE
DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE
CA – CONTINUOUS FLIGHT AUGER
RC – ROCK CORE

SAMPLE CONDITIONS
D – DISINTEGRATED
I – INTACT
U – UNDISTURBED
L – LOST

GROUND WATER DEPTH
AT COMPLETION ______ FT.
AFTER ______ HRS. ______ FT.
AFTER 24 HRS. ______ FT.

BORING METHOD
HSA – HOLLOW STEM AUGERS
CFA – CONTINUOUS FLIGHT AUGERS
DC – DRIVING CASING
MD – MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS

10'6"

RECORD OF SOIL EXPLORATION

2/2

Contracted With GBA — Boring # B-304
Projects Name Midbay — Job # 19-0050.05
Location Barren Island

SAMPLER

Datum ____	Hammer Wt. 140 Lbs.	Hole Diameter 8	Foreman M. Fletcher
Surf. Elev. ____ Ft.	Hammer Drop 30 In.	Rock Core Dia. NA	Inspector C. Vegerna
Date Started 1/15/20	Pipe Size 2 In.	Boring Method HSA	Date Completed 1/15/20

ELEV.	SOIL DESCRIPTION Color, Moisture, Density, Plasticity, Size Proportions	STRA DEPTH	DEPTH SCALE	SAMPLE Cond	Blows/6"	No.	Type	Rec	BORING & SAMPLING NOTES
	Greenish grey, wet, v. soft to soft Clay, tr Silt		40 / 41.5	I	WOH/12"	17	DS	18"	
			42.5 / 44	I	WOH-2-2	18	DS	18"	
	Greenish grey, wet, Stiff F Sand SILT		45 / 46.5	I	3-5-6	19	DS	18"	
			47.5 / 49	I/D	4-4-5	20	DS	16"	
			50 / 51.5	I/D	4-6-8	21	DS	12"	
	light grey, wet, dense to v. dense F-SAND, tr Silt		52.5 / 54	D	8-13-22	22	DS	8"	
			55 / 56.5	D	12-17-32	23	DS	10"	
	Greenish grey, wet, Stiff CLAY		57.5 / 59	I	7-8-6	24	DS	18"	
			60 / 61.5	I	6-6-9	25	DS	18"	
	BOB @ 61.5'								

SAMPLER TYPE	SAMPLE CONDITIONS	GROUND WATER DEPTH	BORING METHOD
DS – DRIVEN SPLIT SPOON	D – DISINTEGRATED	AT COMPLETION ____ FT.	HSA – HOLLOW STEM AUGERS
PT – PRESSED SHELBY TUBE	I – INTACT	AFTER ____ HRS. ____ FT.	CFA – CONTINUOUS FLIGHT AUGERS
CA – CONTINUOUS FLIGHT AUGER	U – UNDISTURBED	AFTER 24 HRS. ____ FT.	DC – DRIVING CASING
RC – ROCK CORE	L – LOST		MD – MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS

RECORD OF SOIL EXPLORATION

Contracted With GRA — Boring # B-305
Projects Name Midbay — Job # 19-005D 01
Location Barren Islands

SAMPLER

Datum Water EL -0.11	Hammer Wt. 140 Lbs.	Hole Diameter 8	Foreman M. Fletcher
Surf. Elev. -7.38 Ft.	Hammer Drop 30 In.	Rock Core Dia. NA	Inspector C. Vergara
Date Started 1/14/20	Pipe Size 2 In.	Boring Method HSA	Date Completed 1/14/20

ELEV.	SOIL DESCRIPTION Color, Moisture, Density, Plasticity, Size Proportions	STRA DEPTH	DEPTH SCALE	Cond	Blows/6"	No.	Type	Rec	BORING & SAMPLING NOTES
-6'	Brown to Reddish brown, wet, M-dense, Silty F-M SAND, tr C-S AND	0-3	0 / 1.5	D	1-8-3	1	DS	12"	N. 237,162.5
		3	2.5 / 4	I/D	WOH-2-1	2	DS	10"	2B 2A E. 1,526,742.6
-11'	Grey, Brown, wet, Soft CLAY, tr Sand		5 / 6.5	I	WOH/18"	3	DS	18"	Water EL -0.11
			7.5 / 9	I	WOH/18"	4	DS	18"	Mudline EL -7.38
-16'	Grey, wet, V-Soft Sandy SILT, tr Clay		10 / 11.5	I	WOH/18"	5	DS	18"	
			12.5 / 14	I	WOH/18"	6	DS	18"	26 Jars
-21'			15 / 16.5	I	WOH/12" - 2	7	DS	18"	
			17.5 / 19	I	WOH-1-2	8	DS	18"	
-26'	Grey, wet, M-dense, Silty SAND		20 / 21.5	I/D	3-6-5	9	DS	16"	
			22.5 / 24	I/D	1-2-2	10	DS	15"	
-31	Grey, wet, V. Soft, CLAY		25 / 26.5	I	WOH/12" -1	11	DS	18"	
			27.5 / 29	I	WOH/12" -1	12	DS	18"	
-36			30 / 31.5	I	WOH/18"	13	DS	18"	
			32.5 / 34	I	WOH/18"	14	DS	18"	
-41			35 / 36.5	I	WOH/18"	15	DS	18"	
	Greenish gry, wet, soft CLAY, tr Silt tr Sea Shells		37.5 / 39 / 40	I	1-2-2	16	DS	18"	
-46									

SAMPLER TYPE
DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE
CA – CONTINUOUS FLIGHT AUGER
RC – ROCK CORE

SAMPLE CONDITIONS
D – DISINTEGRATED
I – INTACT
U – UNDISTURBED
L – LOST

GROUND WATER DEPTH
AT COMPLETION ____ FT.
AFTER ____ HRS. ____ FT.
AFTER 24 HRS. ____ FT.

BORING METHOD
HSA – HOLLOW STEM AUGERS
CFA – CONTINUOUS FLIGHT AUGERS
DC – DRIVING CASING
MD – MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS

9'10"
2'10"

RECORD OF SOIL EXPLORATION

Contracted With ABA — Boring # B-305
Projects Name Midbay — Job # 19.0050.05
Location Barren Island

SAMPLER

Datum ______ Hammer Wt. 140 Lbs. Hole Diameter 8 Foreman M. Fletcher
Surf. Elev. ______ Ft. Hammer Drop 30 In. Rock Core Dia. NA Inspector C. Vaccaro
Date Started 1/14/21 Pipe Size 2 In. Boring Method HSA Date Completed 1/14/21

ELEV.	SOIL DESCRIPTION Color, Moisture, Density, Plasticity, Size Proportions	STRA DEPTH	DEPTH SCALE	SAMPLE Cond	Blows/6"	No.	Type	Rec	BORING & SAMPLING NOTES
	Same as above		40 – 41.5	I	WOH/12" - 1	17	DS	18"	
			42.5 – 44	I	WOH/12" - 2	18	DS	18"	
	Grey to dark brown V-soft to soft Clay with mica flakes		45 – 46.5	I	WOH/12" - 1	19	DS	18"	
			47.5 – 49	I	WOH-3-4	20	DS	18"	
	Grey, wet, CLAY with some Sand, M. dense.		50 – 51.5	I/D	6-7-8	21	DS	12"	
	BoB 51.5'								

SAMPLER TYPE
DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE
CA – CONTINUOUS FLIGHT AUGER
RC – ROCK CORE

SAMPLE CONDITIONS
D – DISINTEGRATED
I – INTACT
U – UNDISTURBED
L – LOST

GROUND WATER DEPTH
AT COMPLETION ______ FT.
AFTER ______ HRS. ______ FT.
AFTER 24 HRS. ______ FT.

BORING METHOD
HSA – HOLLOW STEM AUGERS
CFA – CONTINUOUS FLIGHT AUGERS
DC – DRIVING CASING
MD – MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS

RECORD OF SOIL EXPLORATION

Contracted With GBA
Boring # B-308
Projects Name Midbay
Job # 19-0050
Location Barnan Blvd

SAMPLER

Datum Water EL 0.61
Hammer Wt. 140 Lbs.
Hole Diameter 8
Foreman M. Fletcher
Surf. Elev. -3.48 Ft.
Hammer Drop 30 In.
Rock Core Dia. NA
Inspector L. Vazquez
Date Started 2/9/21
Pipe Size 2 In.
Boring Method HSA
Date Completed 2/9/21

ELEV.	SOIL DESCRIPTION Color, Moisture, Density, Plasticity, Size Proportions	STRA DEPTH	DEPTH SCALE	SAMPLE Cond	Blows/6"	No.	Type	Rec	BORING & SAMPLING NOTES
		0-5	0, 1.5		WOR 18"	1	DS	0"	
	Grey, wet, V. Soft, CLAY silt, Silt sea Shells		2.5, 4	I	WOH 18"	2	DS	18"	12" N. 240139.9 E. 1526,296.0
	Grey to brown, wet, V. Soft SILT & CLAY	5-12.5	5, 6.5	I/D	WOH 18"	3	DS	12"	
			7.5, 9, 10	I	WOH 2-2	4	DS	18"	Water EL 0.61 Mudline EL (-3.48')
			11.5	I	WOH 12" - 2	5	DS	14"	
	Grey, wet, V. Soft to Soft Sandy SILT, tr wood pieces	12.5'-20	12.5, 14, 15	I	WOH 18"	6	DS	18"	25 Jars
			16.5	I/D	WOH 18"	7	DS	18"	
			17.5, 19	I/D	WOH-1-3	8	DS	18"	
	Grey, wet, loose, silty F-M SAND	20-32.5	20, 21.5	D	2-2-1	9	DS	10"	
			22.5, 24, 25	D	2-3-3	10	DS	14"	
			26.5	D	1-2-3	11	DS	18"	
			27.5, 29, 30	D	1-1-4	12	DS	14"	
	with gravel @ 31.5		31.5	D	9-5-4	13	DS	14"	
	Grey, dark grey, wet, M. Stiff CLAY tr sand.	32.5'-42.5'	32.5, 34, 35	I	1-2-4	14	DS	18"	
			36.5	I	1-3-3	15	DS	18"	
			37.5, 39, 40	I	2-3-4	16	DS	18"	

SAMPLER TYPE
DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE
CA – CONTINUOUS FLIGHT AUGER
RC – ROCK CORE

SAMPLE CONDITIONS
D – DISINTEGRATED
I – INTACT
U – UNDISTURBED
L – LOST

GROUND WATER DEPTH
AT COMPLETION ______ FT.
AFTER ______ HRS. ______ FT.
AFTER 24 HRS. ______ FT.

BORING METHOD
HSA – HOLLOW STEM AUGERS
CFA – CONTINUOUS FLIGHT AUGERS
DC – DRIVING CASING
MD – MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS

7'1"
2'10"

2/2

RECORD OF SOIL EXPLORATION

Contracted With: GBA   Boring #: B-306
Projects Name: Millbury   Job #: 19-0050
Location: Barren Island

SAMPLER

Datum	Hammer Wt. 140 Lbs.	Hole Diameter 6	Foreman M. Fletcher
Surf. Elev. ___ Ft.	Hammer Drop 30 In.	Rock Core Dia. NA	Inspector C. Vocanes
Date Started 2/9/21	Pipe Size 2 In.	Boring Method HSA	Date Completed 2/9/21

ELEV.	SOIL DESCRIPTION Color, Moisture, Density, Plasticity, Size Proportions	STRA DEPTH	DEPTH SCALE	Cond	Blows/6"	No.	Type	Rec	BORING & SAMPLING NOTES
			40 / 41.5	I	3-3-3	17	DS	18"	
	Greenish grey, wet, M stiff to stiff SILT tr Sand	42.5	44 / 45	I	3-3-4	18	DS	18"	
			46.5	I	3-3-3	19	DS	18"	
			47.5 / 49 / 50	I	3-3-4	20	DS	18"	
			51.5	I	3-4-4	21	DS	18"	
			52.5 / 54 / 55	I	4-4-5	22	DS	18"	
			56.5	I	3-4-5	23	DS	18"	
	tr fragmented seashells @ 58'		57.5 / 59 / 60	I	4-5-6	24	DS	18"	
			61.5	I	3-4-5	25	DS	18"	
	BOB @ 61.5'								

SAMPLER TYPE
DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE
CA – CONTINUOUS FLIGHT AUGER
RC – ROCK CORE

SAMPLE CONDITIONS
D – DISINTEGRATED
I – INTACT
U – UNDISTURBED
L – LOST

GROUND WATER DEPTH
AT COMPLETION ____ FT.
AFTER ____ HRS. ____ FT.
AFTER 24 HRS. ____ FT.

BORING METHOD
HSA – HOLLOW STEM AUGERS
CFA – CONTINUOUS FLIGHT AUGERS
DC – DRIVING CASING
MD – MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" OD SAMPLER 1' WITH 140# HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS

U.S. Army Corps of Engineers

Baltimore District

Materials and Instrumentation Unit

Midbay Island - Barren Island, Dorchester Co. MD.

Date: January 2021

Pages: 1-58 of 58

Prepared by: Ray, D.

LABORATORY TEST RESULTS

Atterberg Limits and Moisture Content

PROJECT: MIDBAY ISLAND - BARREN ISLAND **DATE:** JAN 2021

AREA: DORCHESTER Co. MD **Page:** 1 of 3

TEST: Natural Moisture Contents (ASTM D 2216 Method B) & Atterberg Limits (ASTM D 4318)

Hole No.		Sample No.		Depth (ft)	Moisture Content %	LL	PL	PI	Atterberg Classification	Symbol
B	201	Jar-	9	20.0-21.5		NP	NP	NP	NON-PLASTIC	NP
B	201	Jar-	15	35.0-36.5		NP	NP	NP	NON-PLASTIC	NP
B	201	Jar-	19	45.0-46.5		43	18	25	Lean Clay	CL
B	207	Jar-	7	15.0-16.5		36	15	21	Lean Clay	CL
B	207	Jar-	9	20.0-21.5		22	21	1	Silt	ML
B	207	Jar-	12A	27.5-29.0		47	18	29	Lean Clay	CL
B	207	Jar-	18	42.5-44.0		38	16	22	Lean Clay	CL
B	211	Jar-	1	0.0-1.5		22	22	NP	Silt	ML
B	211	Jar-	3	5.0-6.5		23	16	7	Silty Clay	CL-ML
B	211	Jar-	22	52.5-54.0		67	22	45	Fat Clay	CH
B	211	Jar-	25	60.0-61.5		28	18	10	Lean Clay	CL
B	216	Jar-	3	5.0-6.5		NP	NP	NP	NON-PLASTIC	NP
B	216	Jar-	12	27.5-29.0		75	25	50	Fat Clay	CH
B	216	Jar-	14	32.5-34.0		27	25	2	Silt	ML
B	216	Jar-	19	45.0-46.5		22	20	2	Silt	ML
B	224	Jar-	2	2.5-4.0		23	22	1	Silt	ML
B	224	Jar-	6	12.5-14.0		28	18	10	Lean Clay	CL
B	224	Jar-	15	35.0-36.5		41	17	24	Lean Clay	CL
B	224	Jar-	20	47.5-49.0		42	17	25	Lean Clay	CL

* Classification based on visual identification or gradation curve.

Note: The Atterberg Limits test is only performed on minus No. 40 material portion of a sample and does not represent the entire sample. Refer to the Visual Classification or the Gradation

LABORATORY TEST RESULTS

Atterberg Limits and Moisture Content

PROJECT: MIDBAY ISLAND - BARREN ISLAND **DATE:** JAN 2021

AREA: DORCHESTER Co. MD **Page:** 2 of 3

TEST: Natural Moisture Contents (ASTM D 2216 Method B) & Atterberg Limits (ASTM D 4318)

Hole No.		Sample No.		Depth (ft)	Moisture Content %	LL	PL	PI	Atterberg Classification	Symbol
B	227	Jar-	6	12.5-14.0		28	21	7	Silty Clay	CL-ML
B	227	Jar-	13	30.0-31.5		36	15	21	Lean Clay	CL
B	227	Jar-	19	45.0-46.5		43	17	26	Lean Clay	CL
B	230	Jar-	6	12.5-14.0		20	17	3	Silt	ML
B	230	Jar-	9	20.0-21.5		NP	NP	NP	NON-PLASTIC	NP
B	230	Jar-	12	27.5-29.0		28	24	4	Silt	ML
B	230	Jar-	15	35.0-36.5		71	26	45	Fat Clay	CH
B	232	Jar-	4A	7.5-9.0		37	20	17	Lean Clay	CL
B	232	Jar-	6	12.5-14.0		33	17	16	Lean Clay	CL
B	232	Jar-	21	50.0-51.5		75	31	44	Fat Clay	CH
B	238	Jar-	2	2.5-4.0		22	20	2	Silt	ML
B	238	Jar-	10B	22.5-25.0		59	22	38	Fat Clay	CH
B	238	Jar-	16	37.5-39.0		43	16	27	Lean Clay	CL
B	238	Jar-	18	42.5-44.0		37	16	21	Lean Clay	CL
B	244	Jar-	3	5.0-6.5		36	26	10	Silt	ML
B	244	Jar-	7	15.0-16.5		65	29	36	Fat Clay	CH
B	244	Jar-	12A	27.5-29.0		19	19	NP	Silt	ML
B	244	Jar-	14	32.5-34.0		19	19	NP	Silt	ML

* Classification based on visual identification or gradation curve.

Note: The Atterberg Limits test is only performed on minus No. 40 material portion of a sample and does not represent the entire sample. Refer to the Visual Classification or the Gradation

LABORATORY TEST RESULTS

Atterberg Limits and Moisture Content

PROJECT: MIDBAY ISLAND - BARREN ISLAND **DATE:** JAN 2021

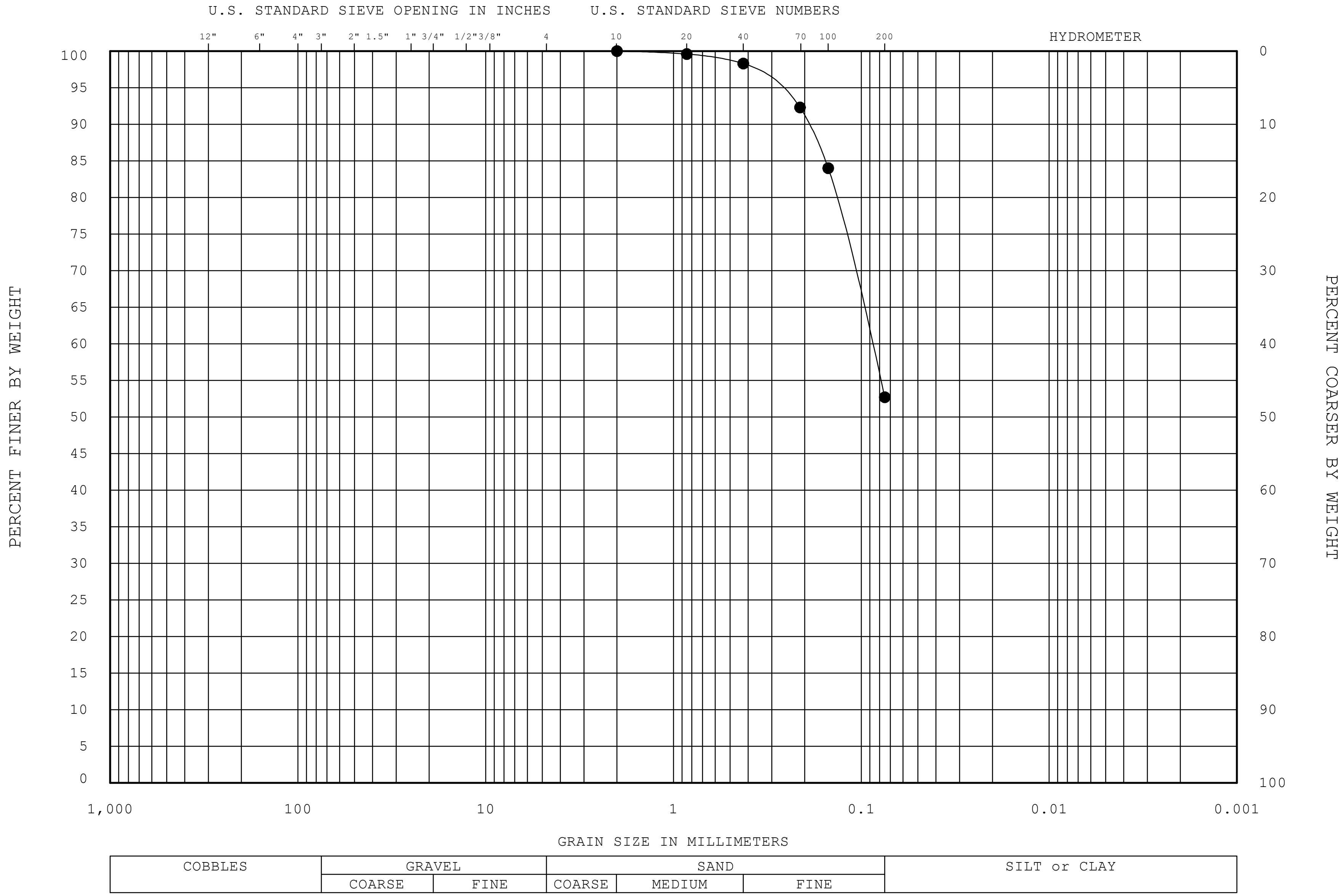
AREA: DORCHESTER Co. MD **Page:** 3 of 3

TEST: Natural Moisture Contents (ASTM D 2216 Method B)
& Atterberg Limits (ASTM D 4318)

Hole No.		Sample No.		Depth (ft)	Moisture Content %	LL	PL	PI	Atterberg Classification	Symbol
B	246	Jar-	3	5.0-6.5		55	24	31	Fat Clay	CH
B	246	Jar-	6	12.5-14.0		19	17	2	Silt	ML
B	246	Jar-	25	60.0-61.5		42	16	26	Lean Clay	CL

* Classification based on visual identification or gradation curve.

Note: The Atterberg Limits test is only performed on minus No. 40 material portion of a sample and does not represent the entire sample. Refer to the Visual Classification or the Gradation



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)	Nat wc%	LL	PL	PI
●	Jar-1	0.0-1.5	SANDY SILT ML				
⊠							
▲							
★							

PROJECT: *Midbay Island - Barren Island*

AREA: *Dorchester Co. MD*

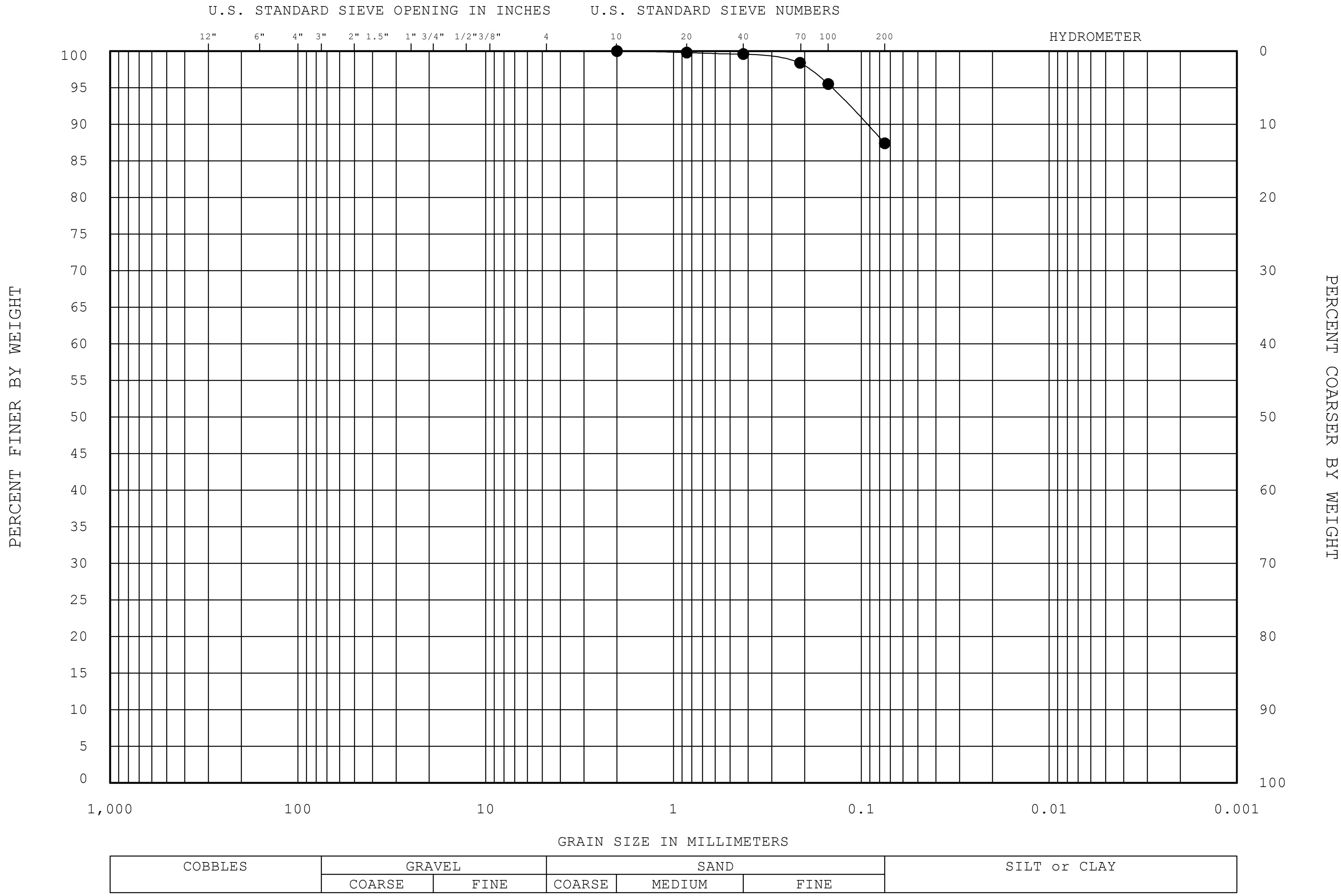
BORING NO.: *B-201*

DATE: *Jan-2020*

REMARKS :

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ

GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
●	Jar-4B	7.5-9.0	LEAN CLAY	CL				
⊠								
▲								
★								

PROJECT: *Midbay Island - Barren Island*

AREA: *Dorchester Co. MD*

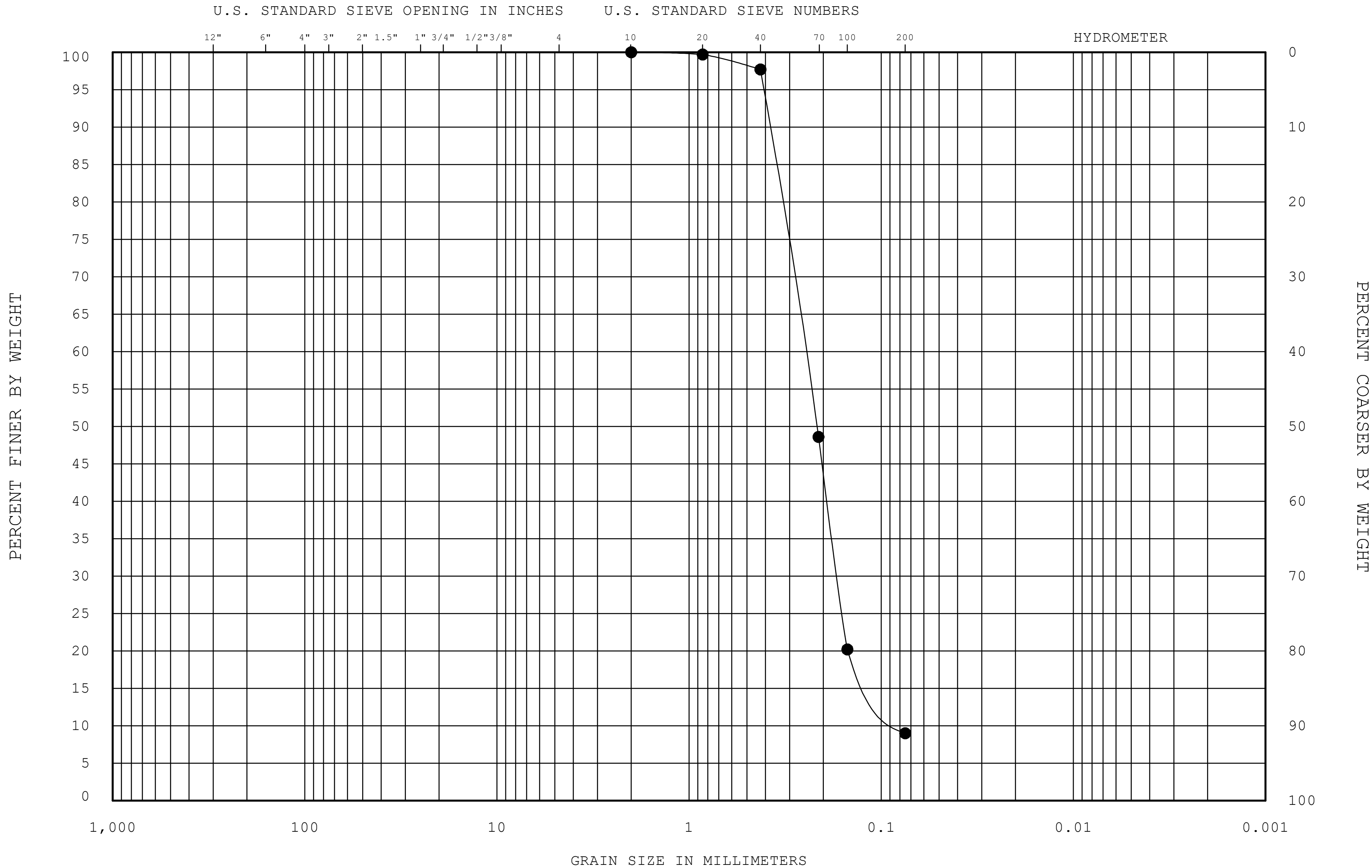
BORING NO.: *B-201*

DATE: *Jan-2020*

REMARKS :

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ

GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216



COBBLES	GRAVEL		SAND			SILT or CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
●	Jar-9	20.0-21.5	POORLY GRADED SAND with SILT	SP-SM		NP	NP	NP
⊠								
▲								
★								

PROJECT: *Midbay Island - Barren Island*

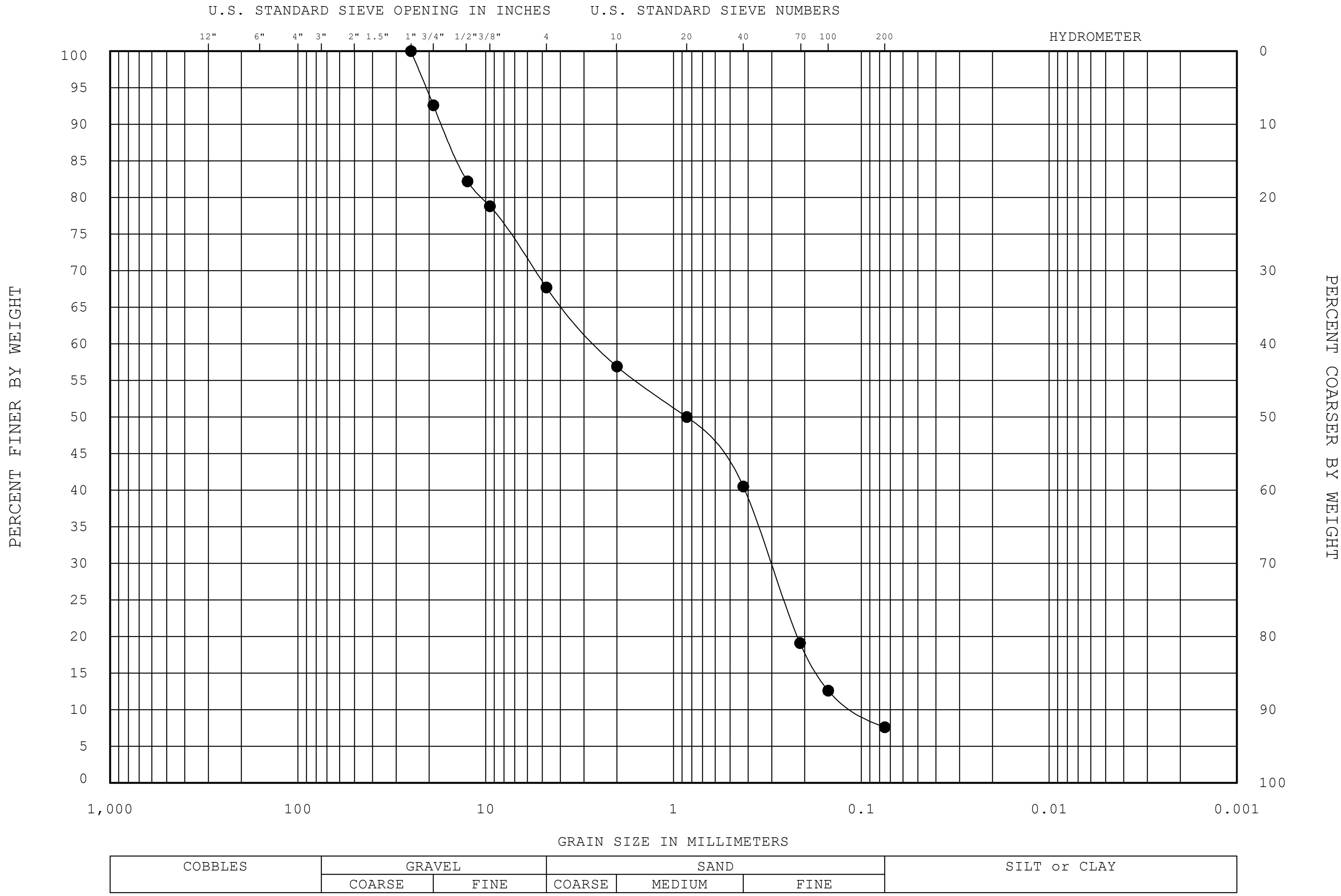
AREA: *Dorchester Co. MD*

BORING NO.: *B-201*

DATE: *Jan-2020*

REMARKS : SPECIFIC GRAVITY: 2.69

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ **GRADATION CURVES** TEST METHODS: ASTM D 422, D4318, D2216



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)	Nat wc%	LL	PL	PI
●	Jar-15	35.0-36.5	POORLY GRADED SAND with SILT and GRAVEL SP-SM		NP	NP	NP
⊠							
▲							
★							

PROJECT: *Midbay Island - Barren Island*

AREA: *Dorchester Co. MD*

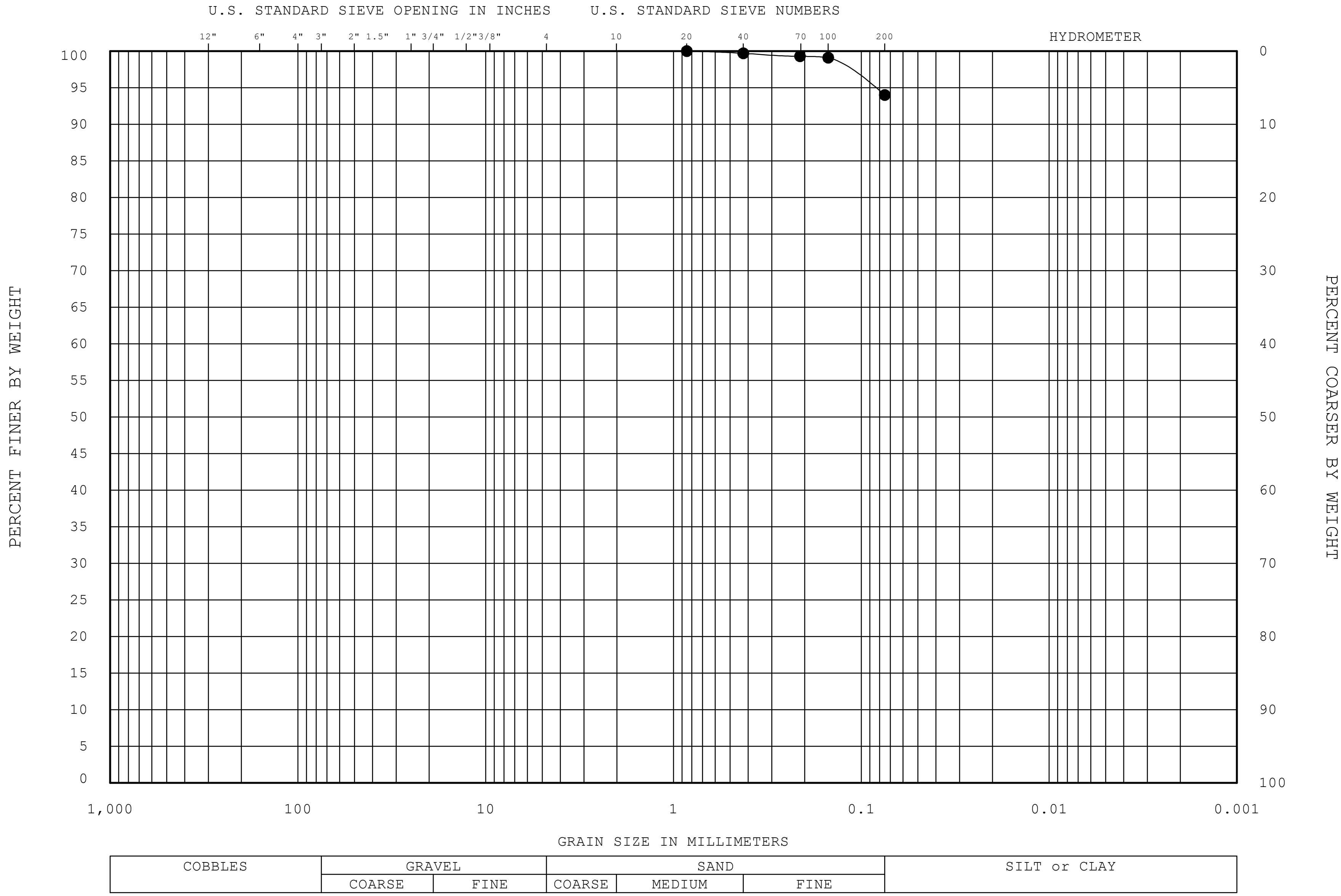
BORING NO.: *B-201*

DATE: *Jan-2020*

REMARKS :

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ

GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Jar-19	45.0-46.5	LEAN CLAY	CL		43	18	25
—⊠—								
—▲—								
—★—								

REMARKS :

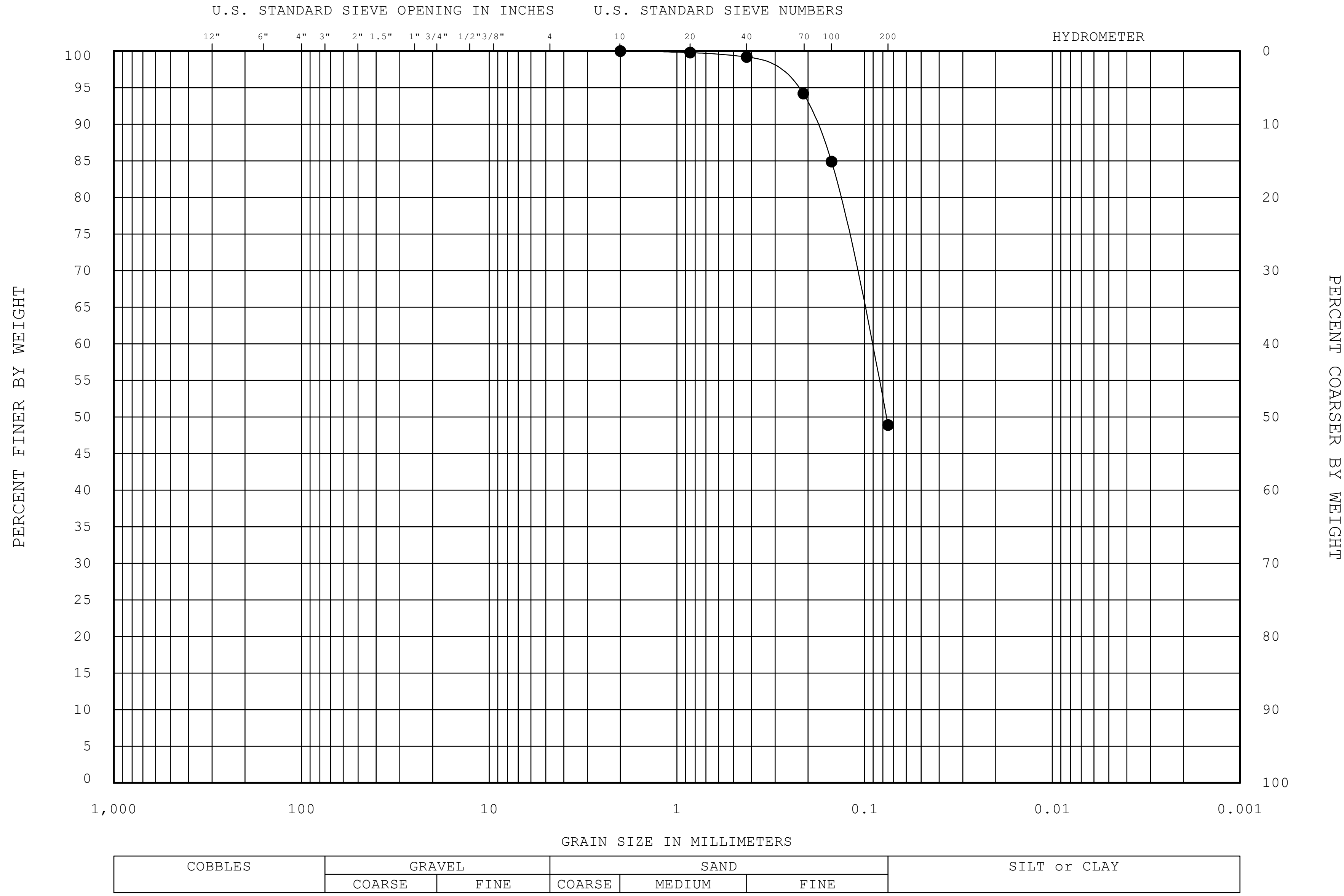
PROJECT: *Midbay Island - Barren Island*

AREA: *Dorchester Co. MD*

BORING NO.: *B-201*

DATE: *Jan-2020*

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ **GRADATION CURVES** TEST METHODS: ASTM D 422, D4318, D2216



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Jar-2	2.5-4.0	SILTY SAND	SM				
—⊠—								
—▲—								
—★—								

REMARKS :

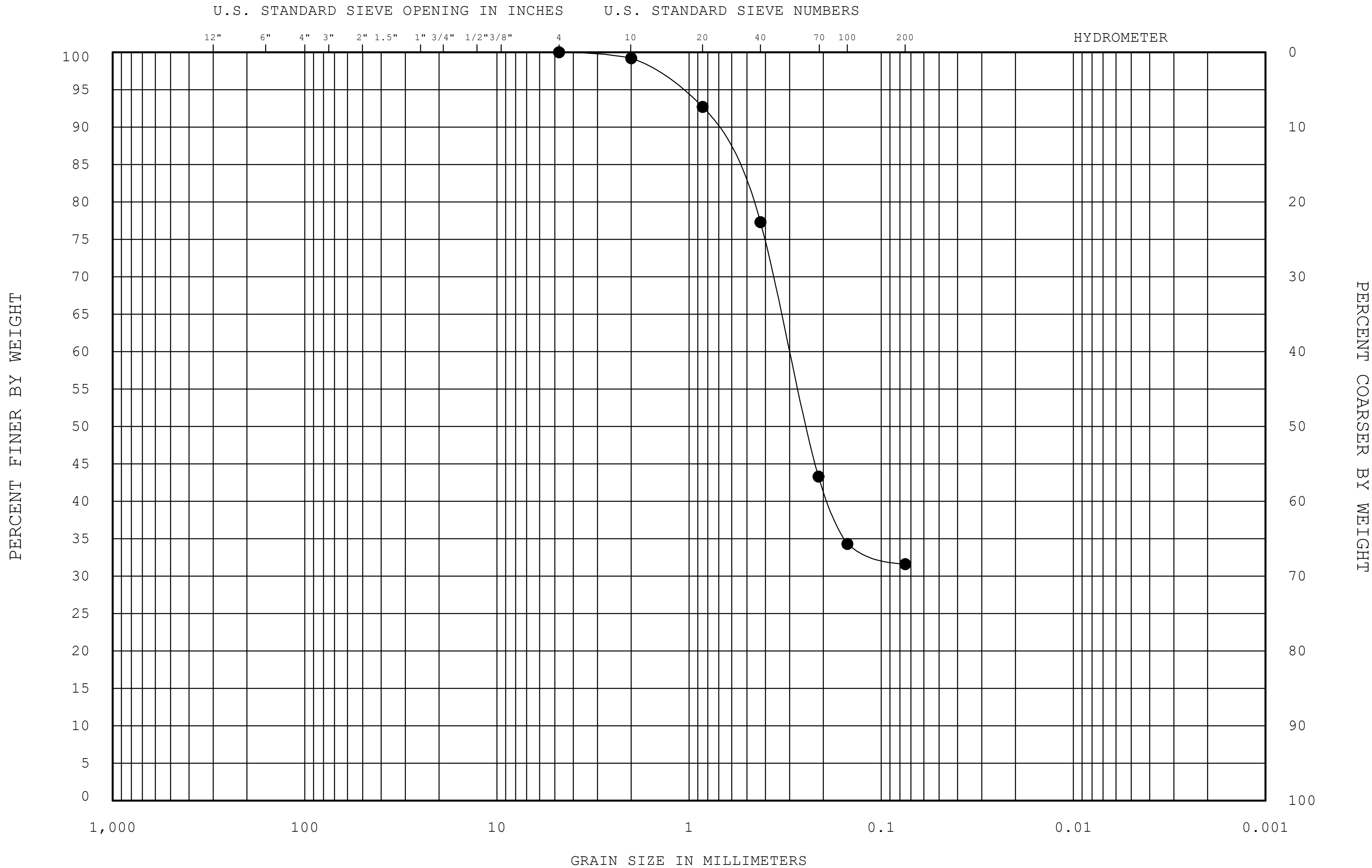
PROJECT: *Midbay Island - Barren Island*

AREA: *Dorchester Co. MD*

BORING NO.: *B-207*

DATE: *Jan-2020*

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ **GRADATION CURVES** TEST METHODS: ASTM D 422, D4318, D2216



COBBLES	GRAVEL		SAND			SILT or CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
●	Jar-7	15.0-16.5	CLAYEY SAND	SC		36	15	21
☒								
▲								
★								

PROJECT: *Midbay Island - Barren Island*

AREA: *Dorchester Co. MD*

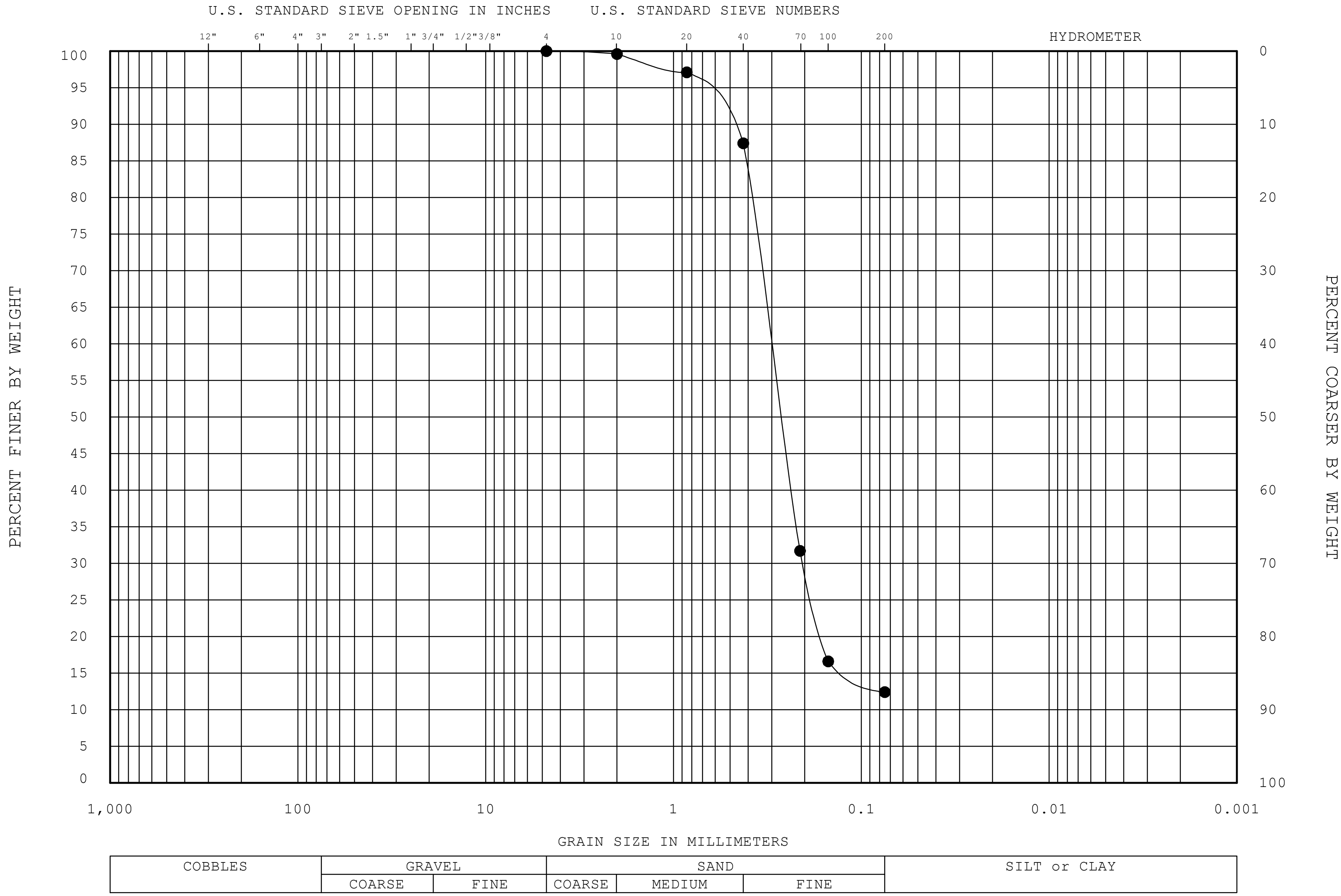
BORING NO.: *B-207*

DATE: *Jan-2020*

REMARKS :

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ

GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
●	Jar-9	20.0-21.5	SILTY SAND	SM		22	21	1
⊠								
▲								
★								

PROJECT: Midbay Island - Barren Island

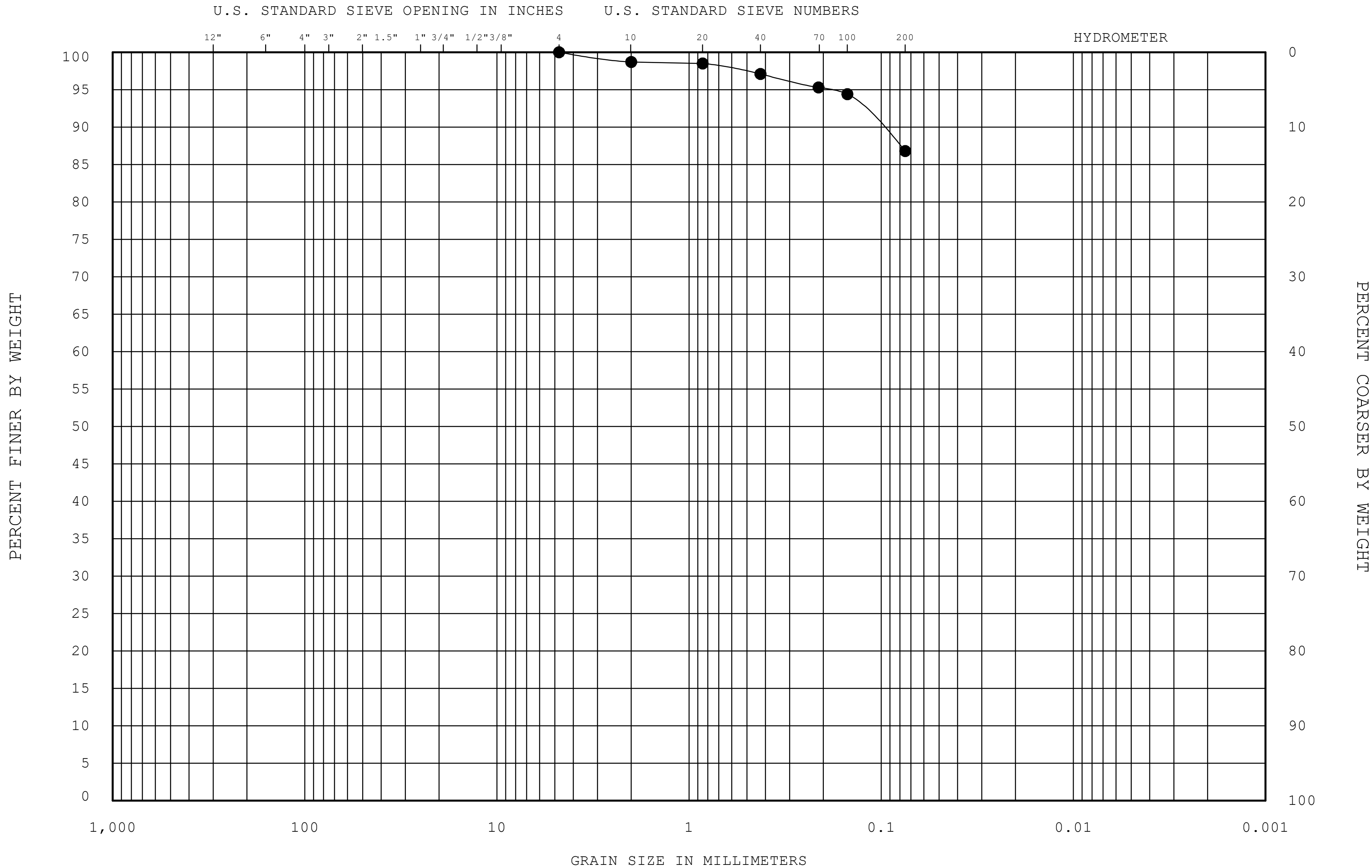
AREA: Dorchester Co. MD

BORING NO.: B-207

DATE: Jan-2020

REMARKS :

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ **GRADATION CURVES** TEST METHODS: ASTM D 422, D4318, D2216



COBBLES	GRAVEL		SAND			SILT or CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
●	Jar-12A	27.5-29.0	LEAN CLAY	CL		47	18	29
⊠								
▲								
★								

PROJECT: *Midbay Island - Barren Island*

AREA: *Dorchester Co. MD*

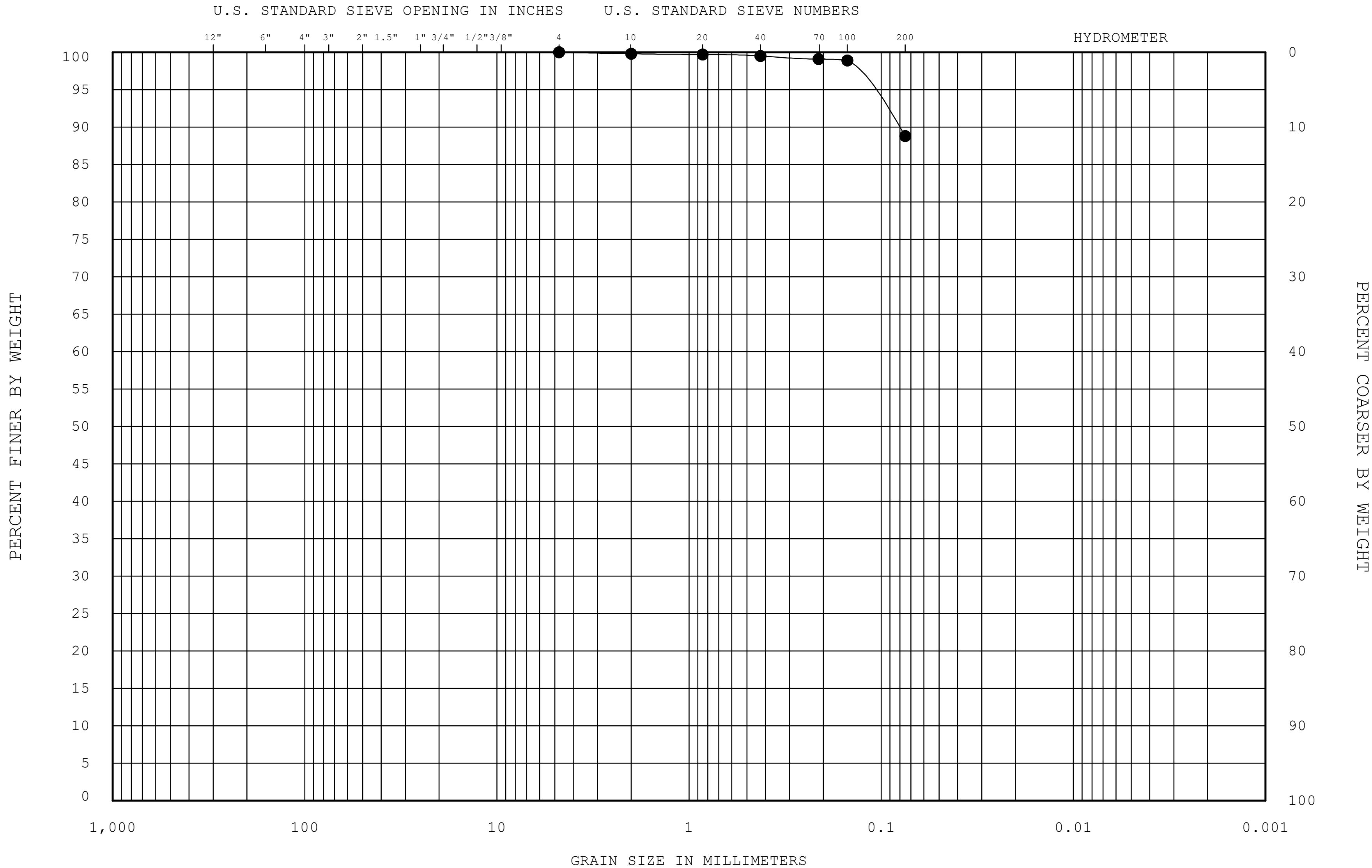
BORING NO.: *B-207*

DATE: *Jan-2020*

REMARKS :

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ

GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216



COBBLES	GRAVEL		SAND			SILT or CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Jar-18	42.5-44.0	LEAN CLAY	CL		38	16	22
—⊠—								
—▲—								
—★—								

REMARKS :

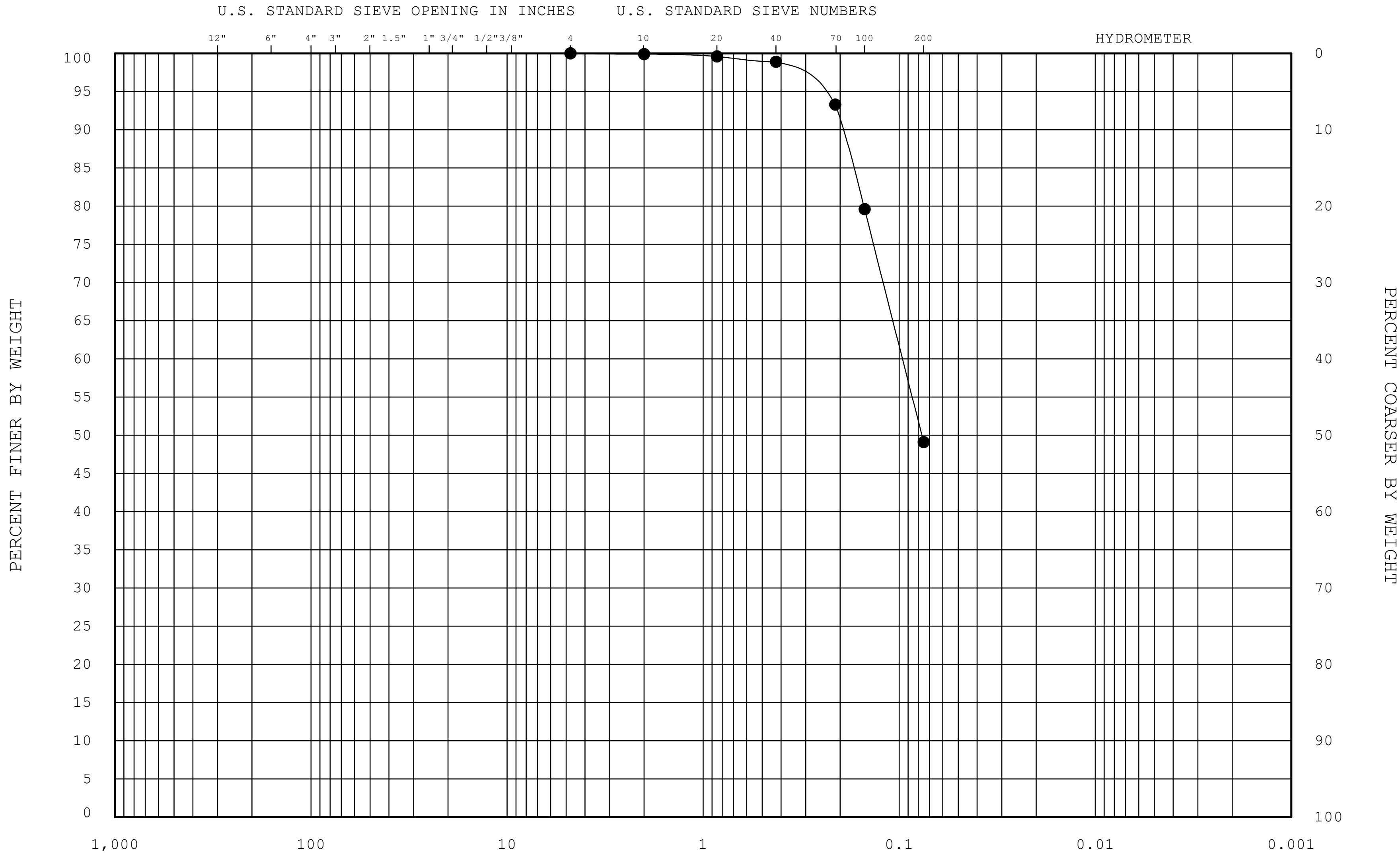
PROJECT: *Midbay Island - Barren Island*

AREA: *Dorchester Co. MD*

BORING NO.: *B-207*

DATE: *Jan-2020*

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ **GRADATION CURVES** TEST METHODS: ASTM D 422, D4318, D2216



COBBLES	GRAVEL		SAND			SILT or CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
●	Jar-1	0.0-1.5	SILTY SAND	SM		22	22	NP
⊠								
▲								
★								

REMARKS :

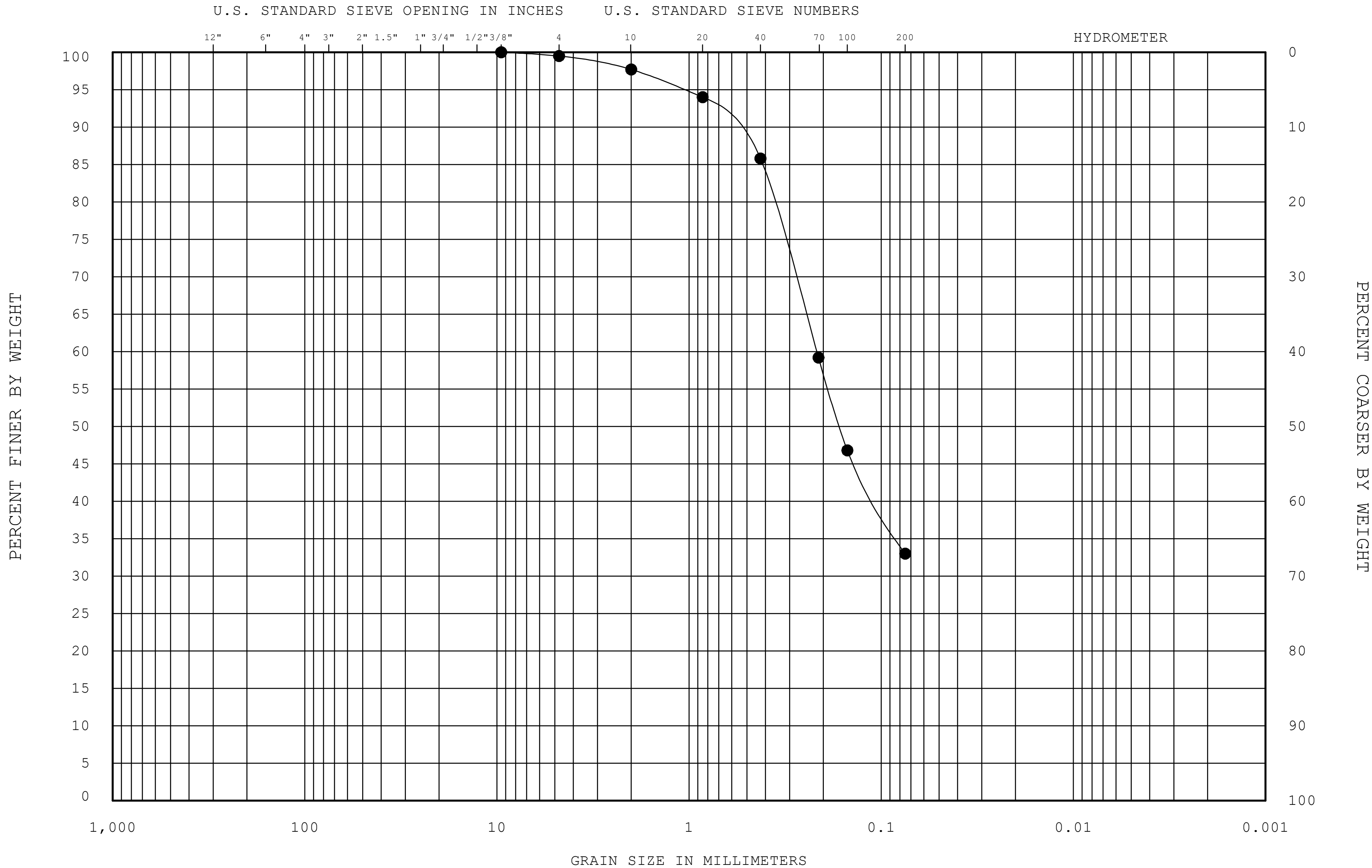
PROJECT: *Midbay Island - Barren Island*

AREA: *Dorchester Co. MD*

BORING NO.: *B-211*

DATE: *Jan-2020*

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ **GRADATION CURVES** TEST METHODS: ASTM D 422, D4318, D2216



COBBLES	GRAVEL		SAND			SILT or CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
●	Jar-3	5.0-6.5	SILTY, CLAYEY SAND	SC-SM		23	16	7
⊠								
▲								
★								

REMARKS :

PROJECT: *Midbay Island - Barren Island*

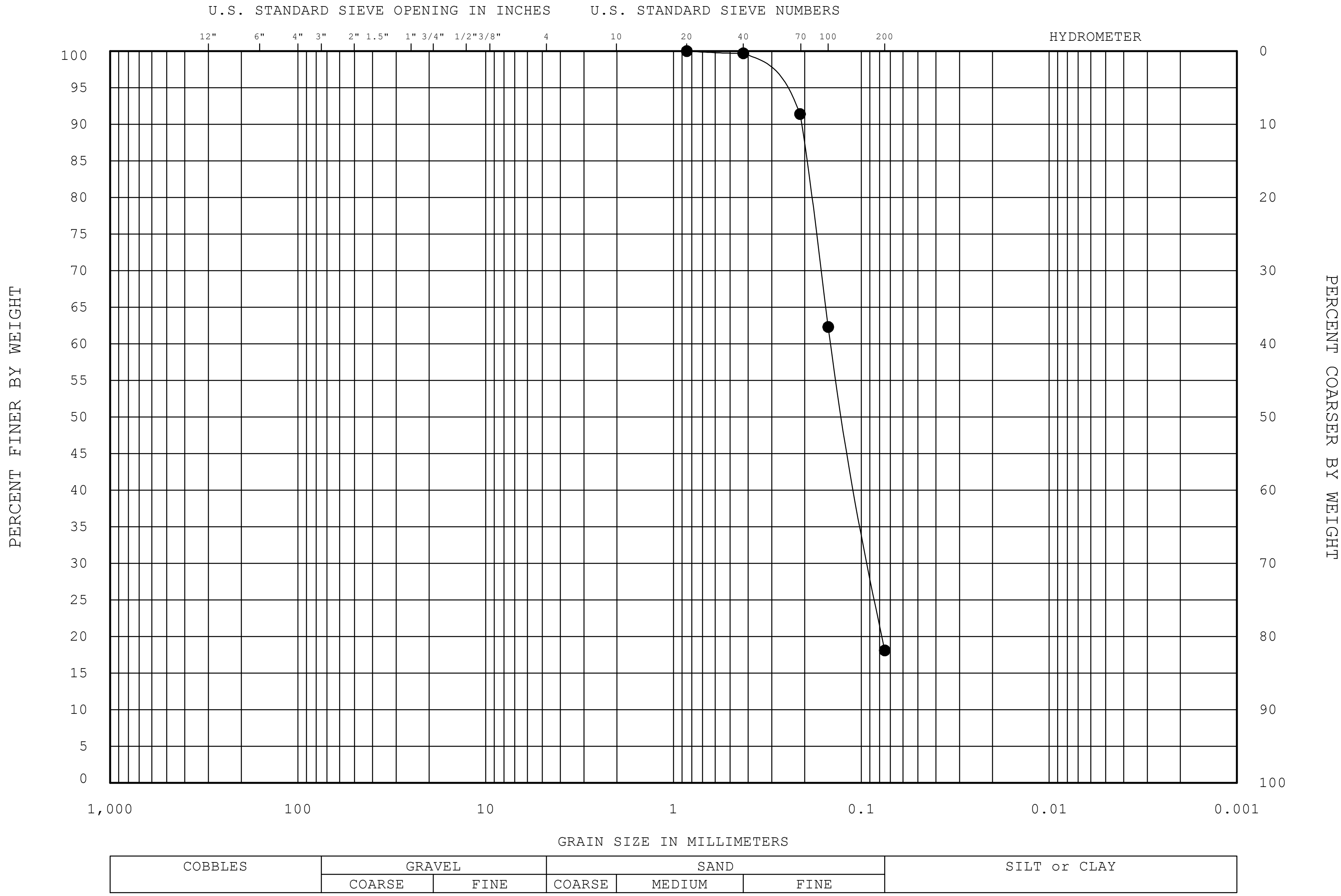
AREA: *Dorchester Co. MD*

BORING NO.: *B-211*

DATE: *Jan-2020*

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ

GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
●	Jar-11	25.0-26.5	SILTY SAND	SM				
⊠								
▲								
★								

REMARKS :

PROJECT: *Midbay Island - Barren Island*

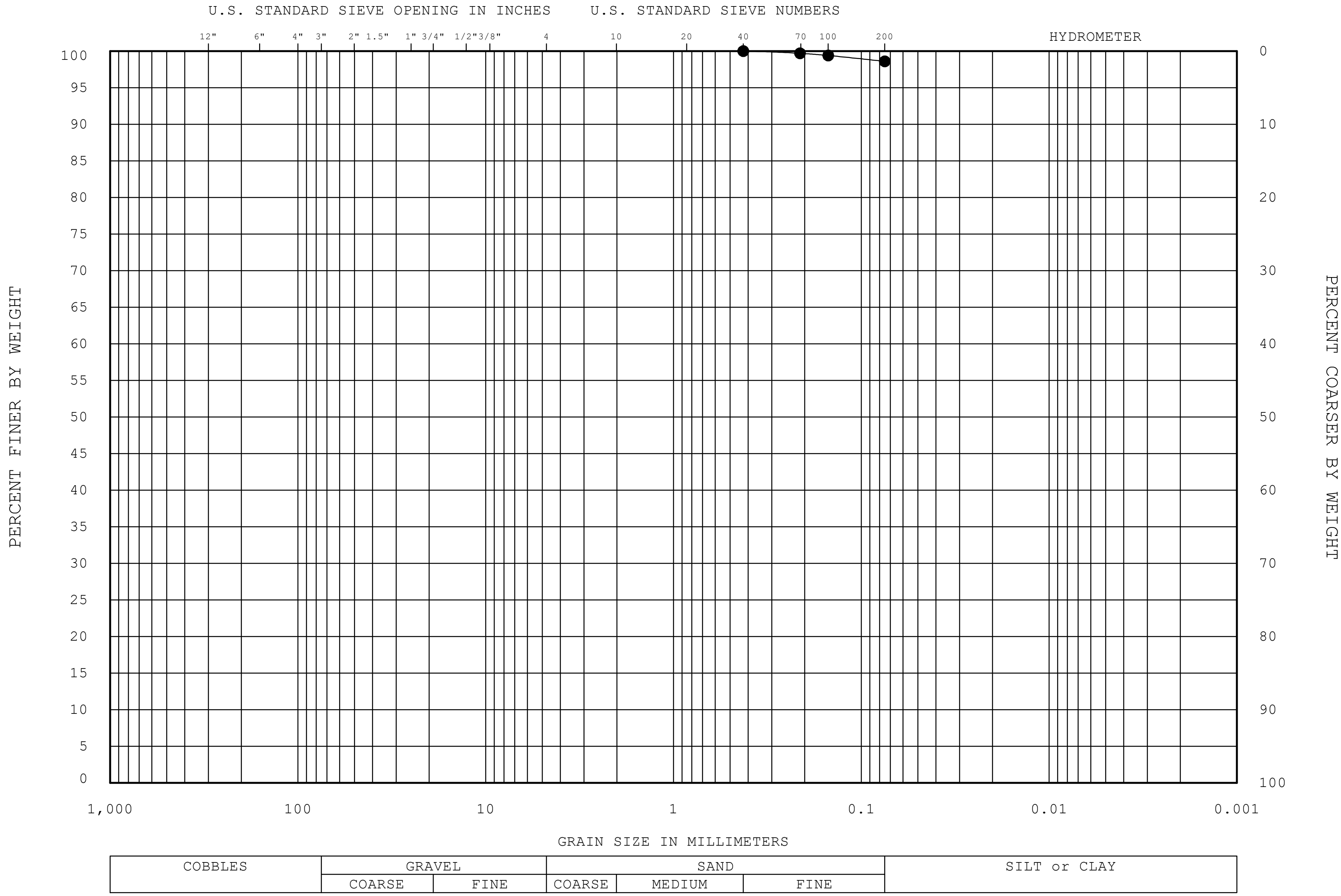
AREA: *Dorchester Co. MD*

BORING NO.: *B-211*

DATE: *Jan-2020*

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ

GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Jar-22	52.5-54.0	FAT CLAY	CH		67	22	45
—⊠—								
—▲—								
—★—								

REMARKS : SPECIFIC GRAVITY: 2.83

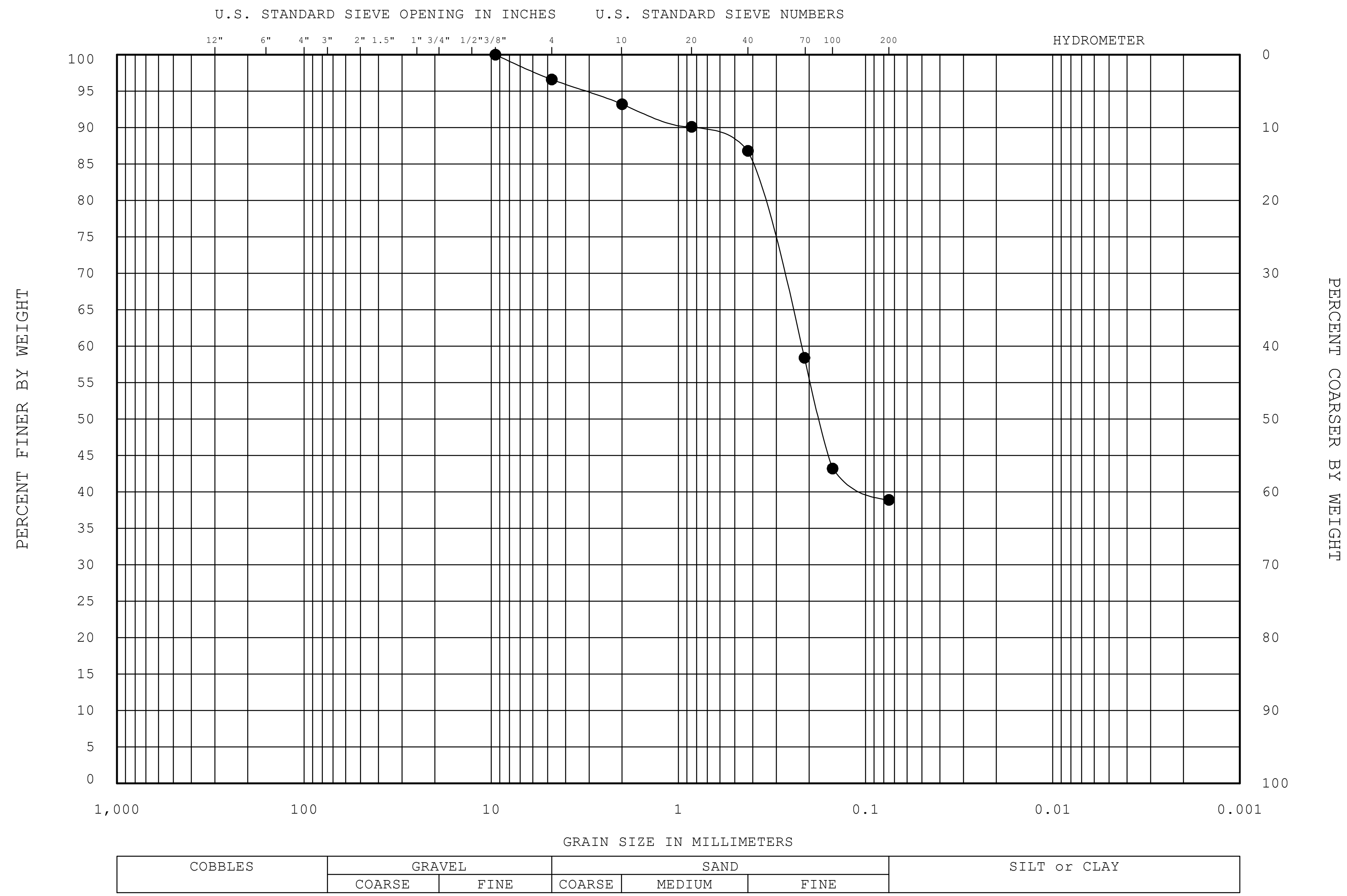
PROJECT: *Midbay Island - Barren Island*

AREA: *Dorchester Co. MD*

BORING NO.: *B-211*

DATE: *Jan-2020*

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ **GRADATION CURVES** TEST METHODS: ASTM D 422, D4318, D2216



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Jar-25	60.0-61.5	CLAYEY SAND	SC		28	18	10
—⊠—								
—▲—								
—★—								

PROJECT: Midbay Island - Barren Island

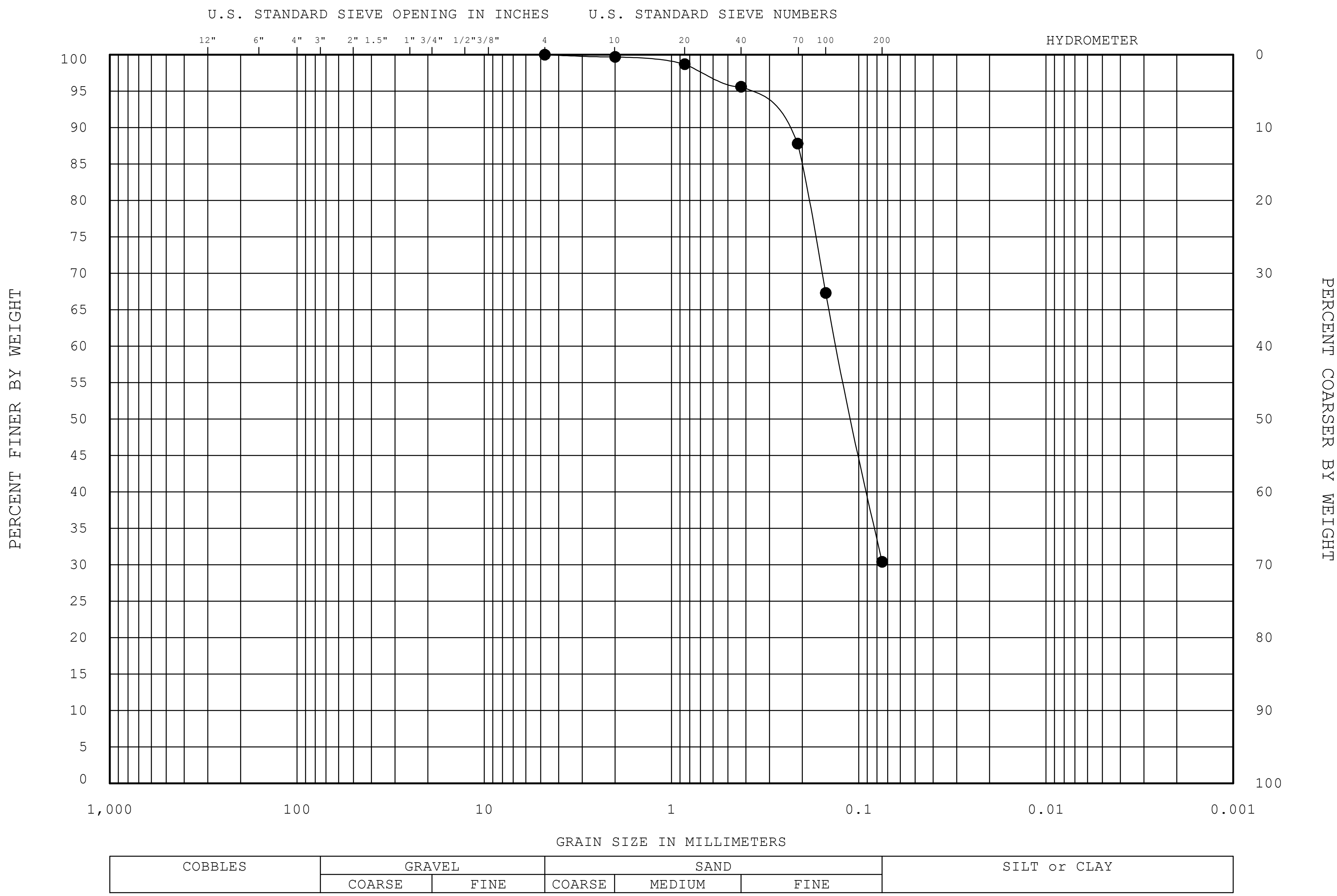
AREA: Dorchester Co. MD

BORING NO.: B-211

DATE: Jan-2020

REMARKS : SAMPLE AT #20 AND #40 SIEVE MADE UP OF APPROXIMATELY 75% SHELL MATERIAL

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ **GRADATION CURVES** TEST METHODS: ASTM D 422, D4318, D2216



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Jar-3	5.0-6.5	SILTY SAND	SM		NP	NP	NP
—⊠—								
—▲—								
—★—								

REMARKS : SPECIFIC GRAVITY: 2.70

PROJECT: *Midbay Island - Barren Island*

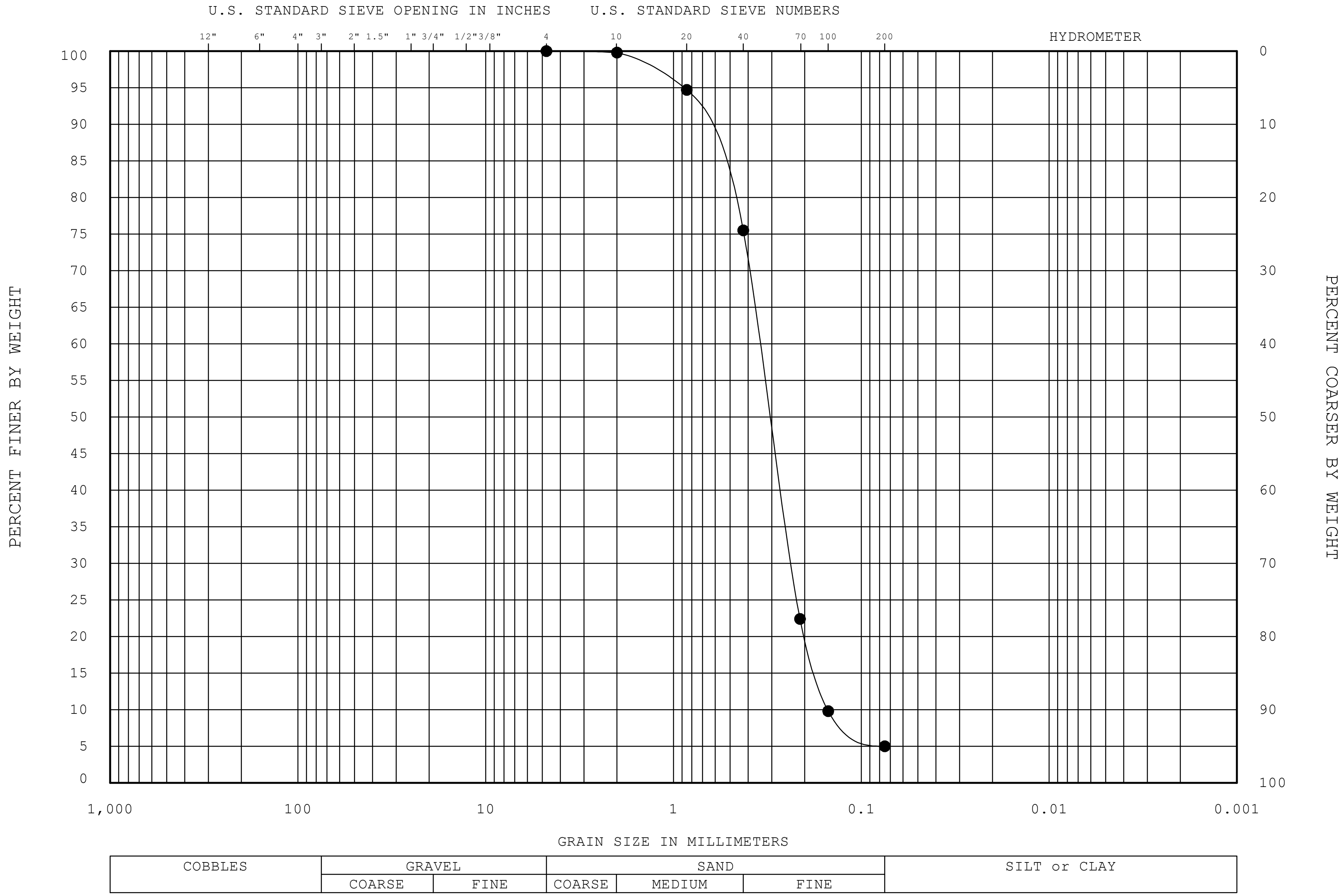
AREA: *Dorchester Co. MD*

BORING NO.: *B-216*

DATE: *Jan-2020*

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ

GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Jar-6	12.5-14.0	POORLY GRADED SAND with SILT	SP-SM				
—☒—								
—▲—								
—★—								

REMARKS :

PROJECT: *Midbay Island - Barren Island*

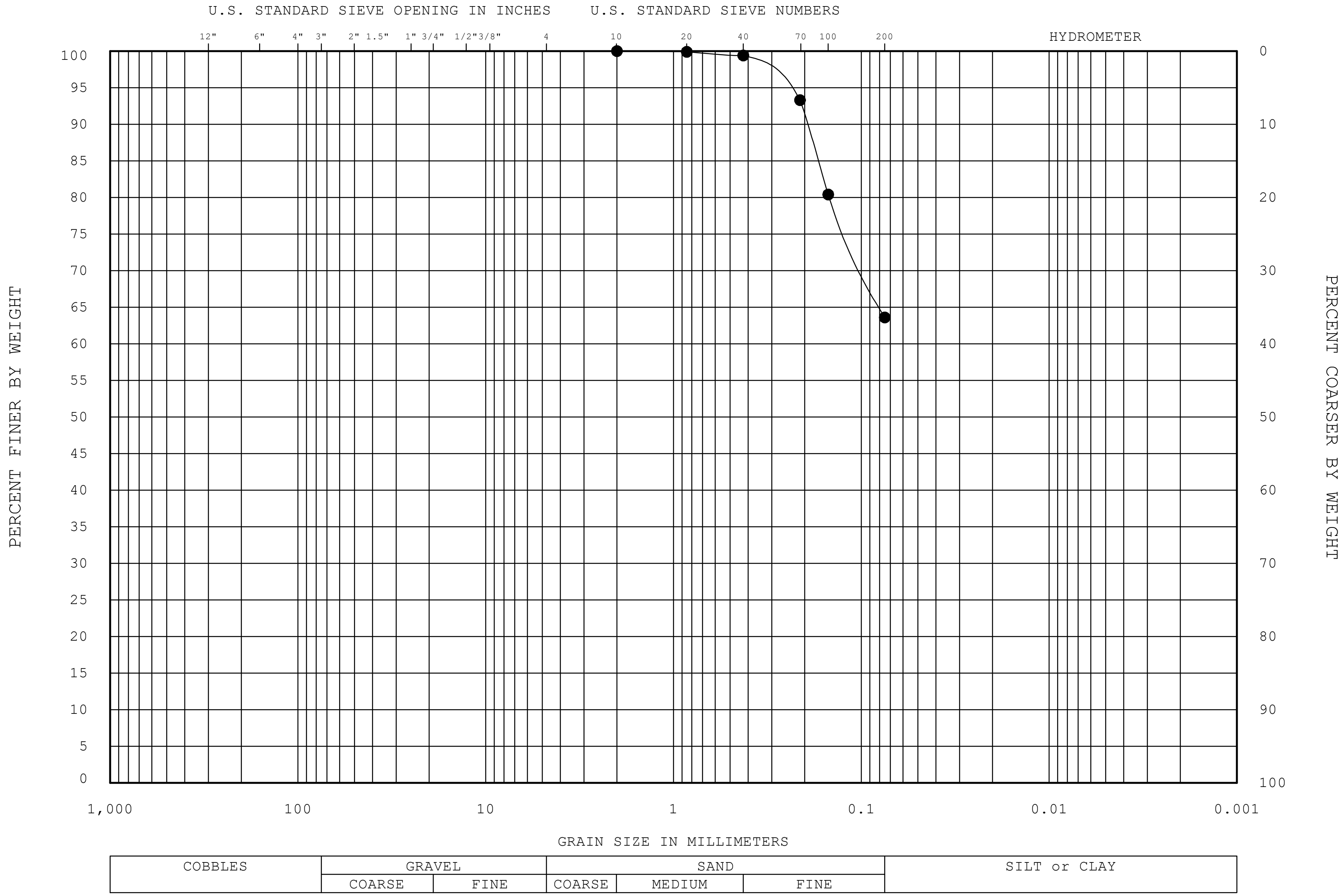
AREA: *Dorchester Co. MD*

BORING NO.: *B-216*

DATE: *Jan-2020*

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ

GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Jar-12	27.5-29.0	SANDY FAT CLAY	CH		75	25	50
—⊠—								
—▲—								
—★—								

PROJECT: *Midbay Island - Barren Island*

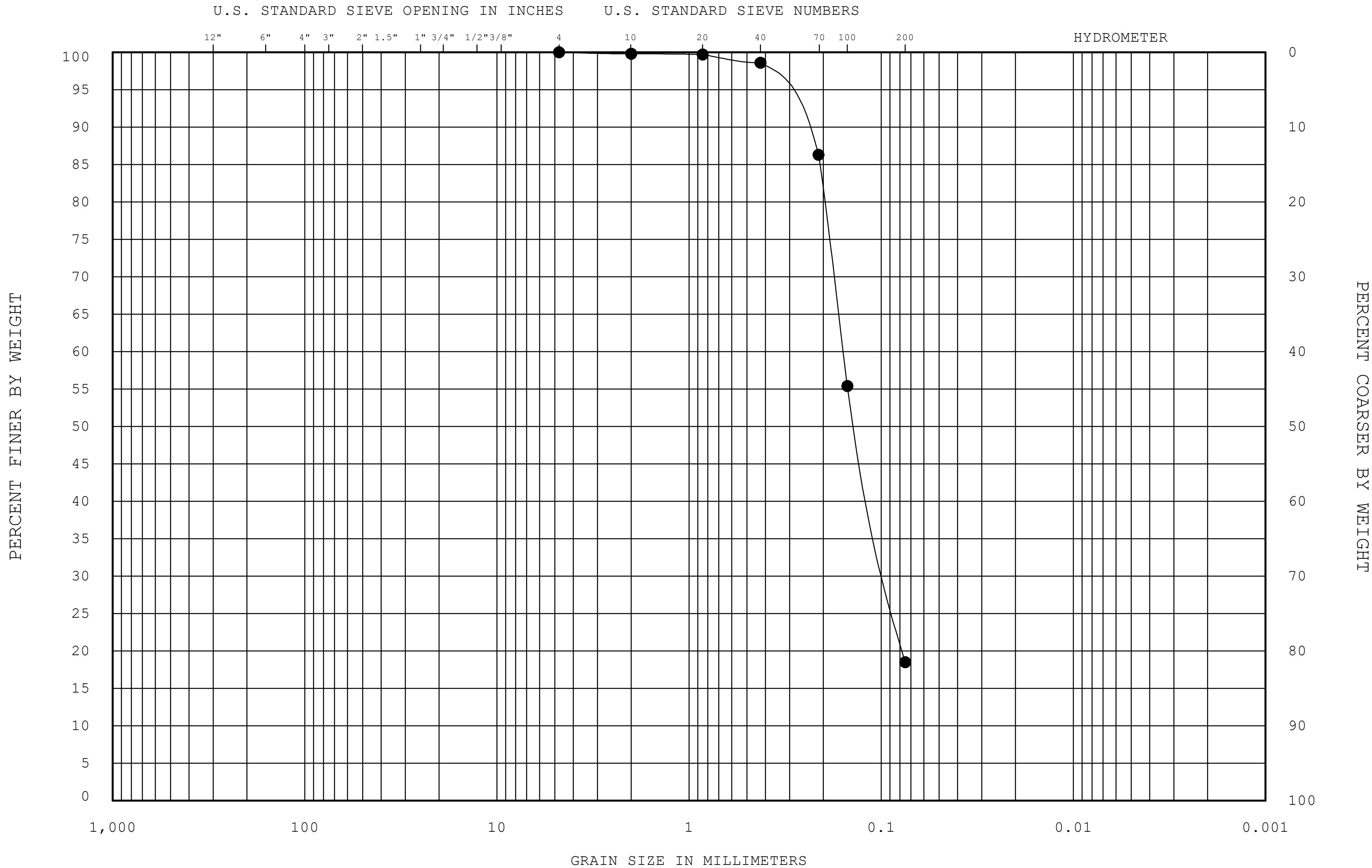
AREA: *Dorchester Co. MD*

BORING NO.: *B-216*

DATE: *Jan-2020*

REMARKS :

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ **GRADATION CURVES** TEST METHODS: ASTM D 422, D4318, D2216



COBBLES	GRAVEL		SAND			SILT or CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
●	Jar-14	32.5-34.0	SILTY SAND	SM		27	25	2
⊠								
▲								
★								

REMARKS :

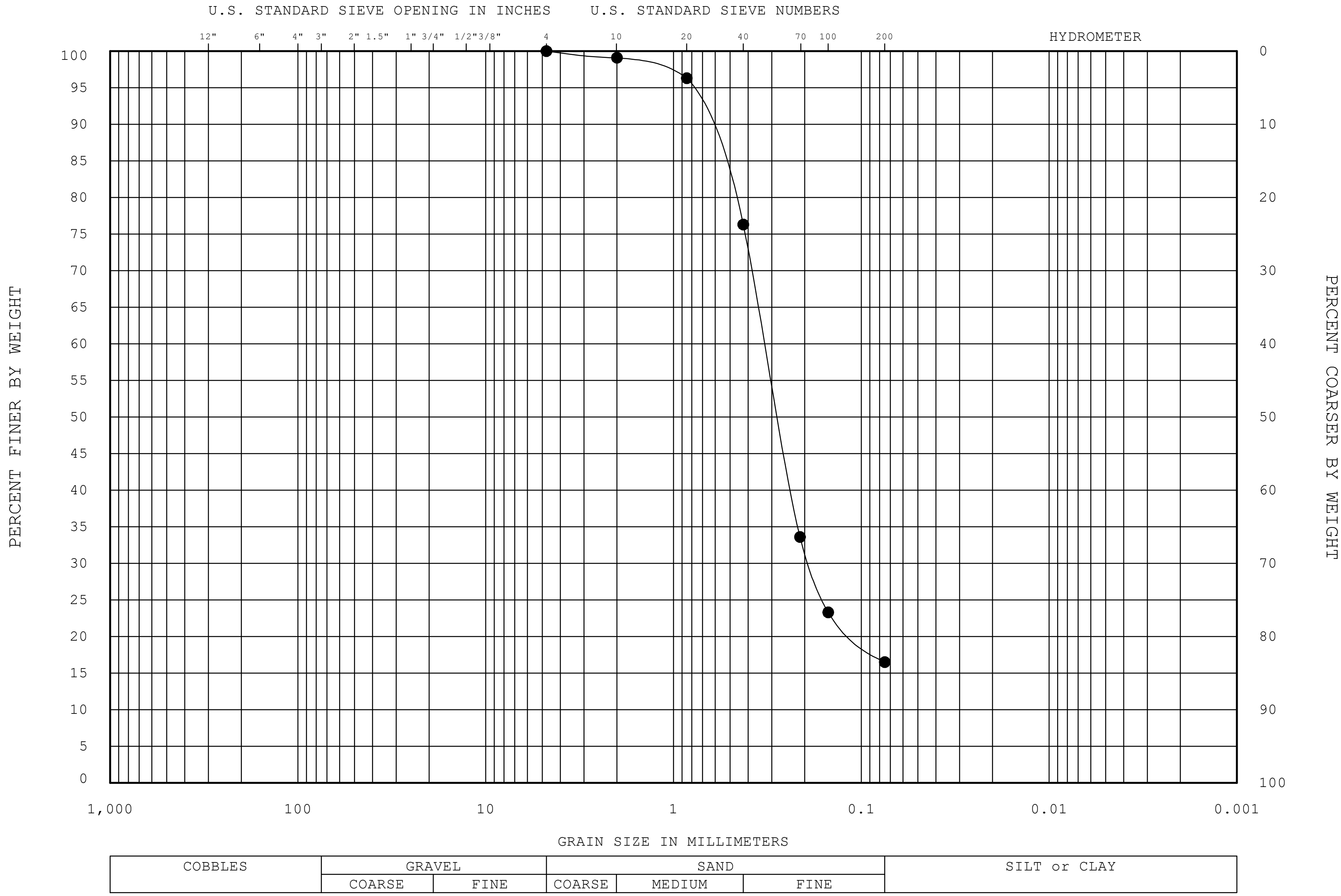
PROJECT: *Midbay Island - Barren Island*

AREA: *Dorchester Co. MD*

BORING NO.: *B-216*

DATE: *Jan-2020*

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ **GRADATION CURVES** TEST METHODS: ASTM D 422, D4318, D2216



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Jar-19	45.0-46.5	SILTY SAND	SM		22	20	2
—⊠—								
—▲—								
—★—								

REMARKS :

PROJECT: *Midbay Island - Barren Island*

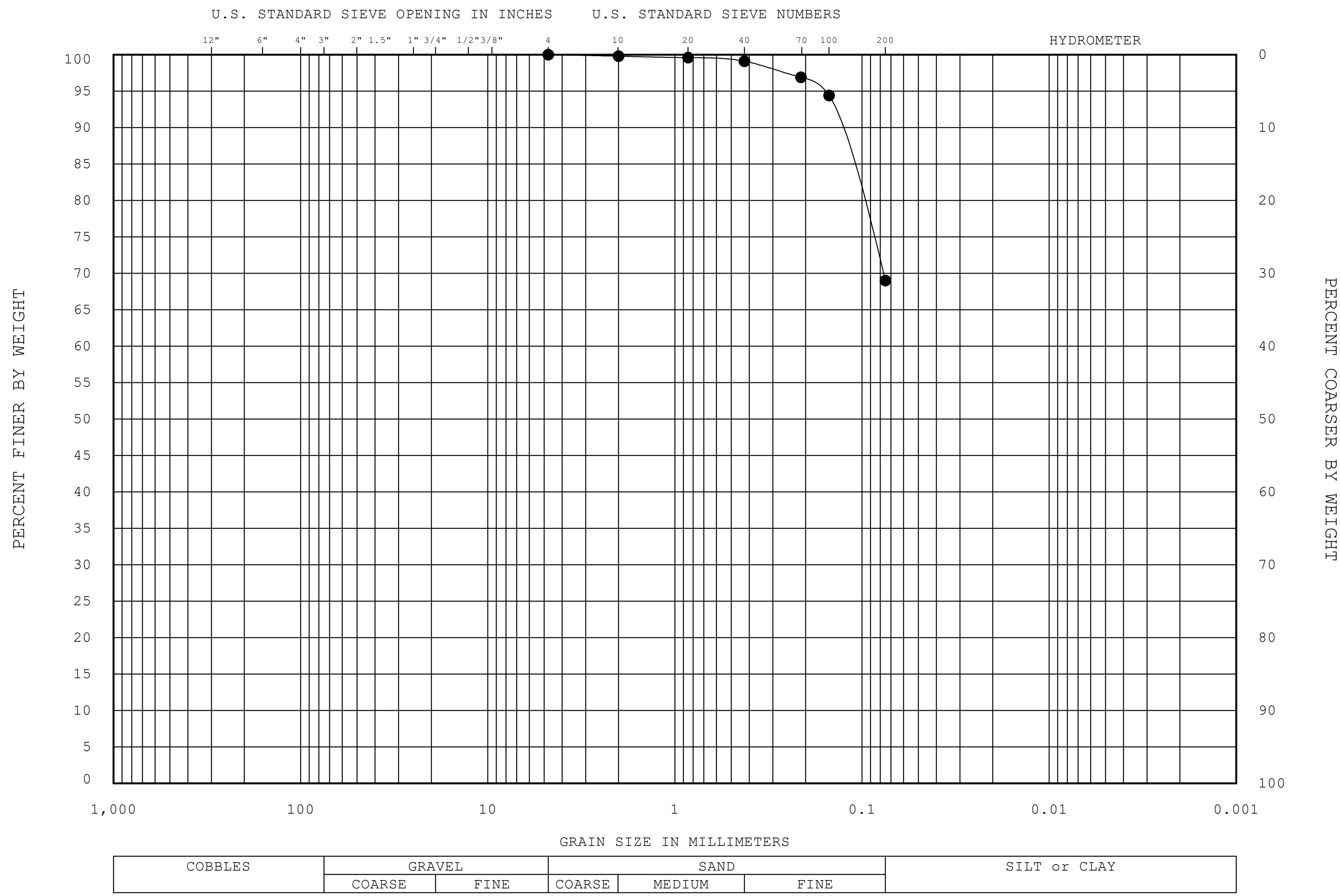
AREA: *Dorchester Co. MD*

BORING NO.: *B-216*

DATE: *Jan-2020*

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ

GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
●	Jar-2	2.5-4.0	SANDY SILT	ML		23	22	1
⊠								
▲								
★								

REMARKS :

PROJECT: *Midbay Island - Barren Island*

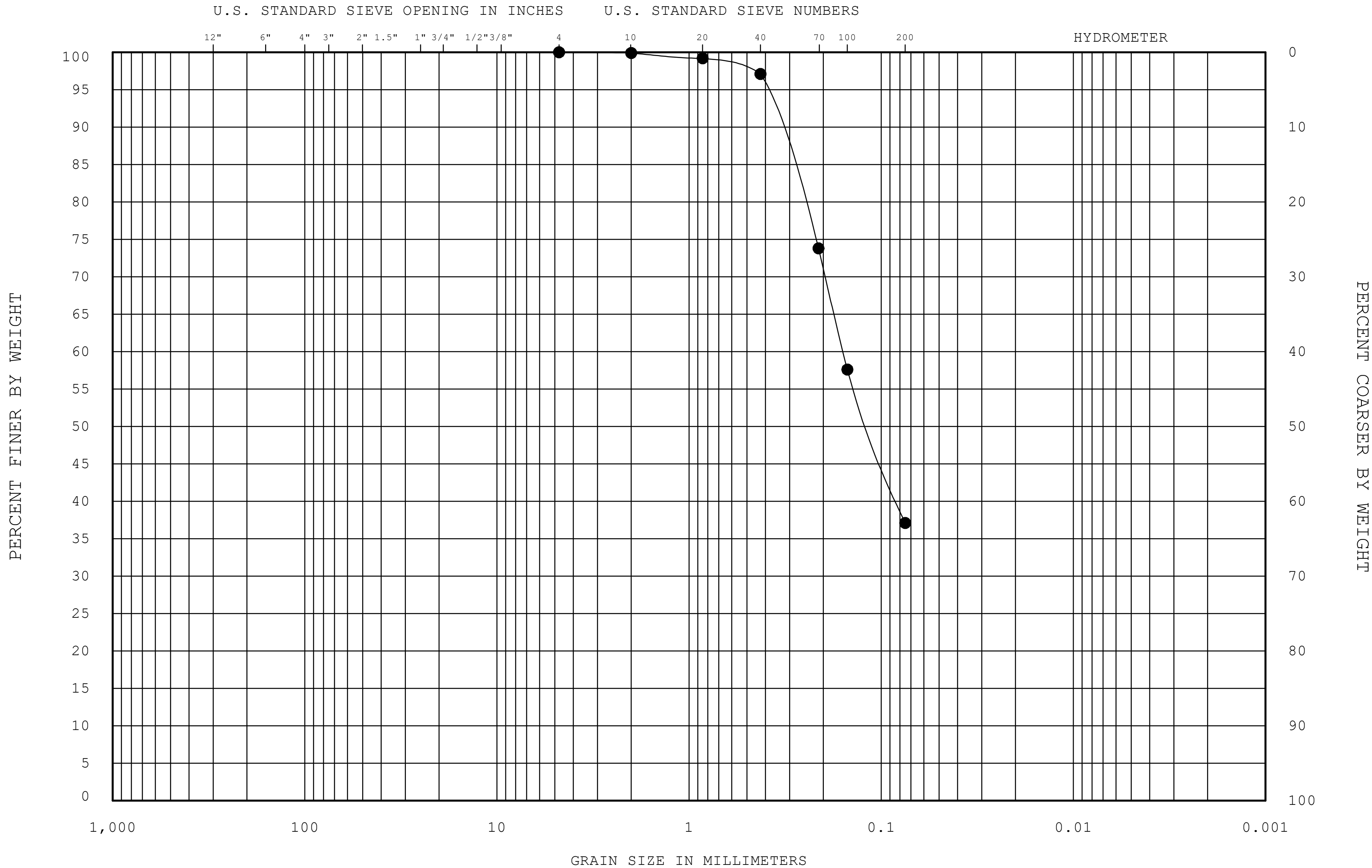
AREA: *Dorchester Co. MD*

BORING NO.: *B-224*

DATE: *Jan-2020*

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ

GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216



COBBLES	GRAVEL		SAND			SILT or CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
●	Jar-6	12.5-14.0	CLAYEY SAND	SC		28	18	10
⊠								
▲								
★								

PROJECT: *Midbay Island - Barren Island*

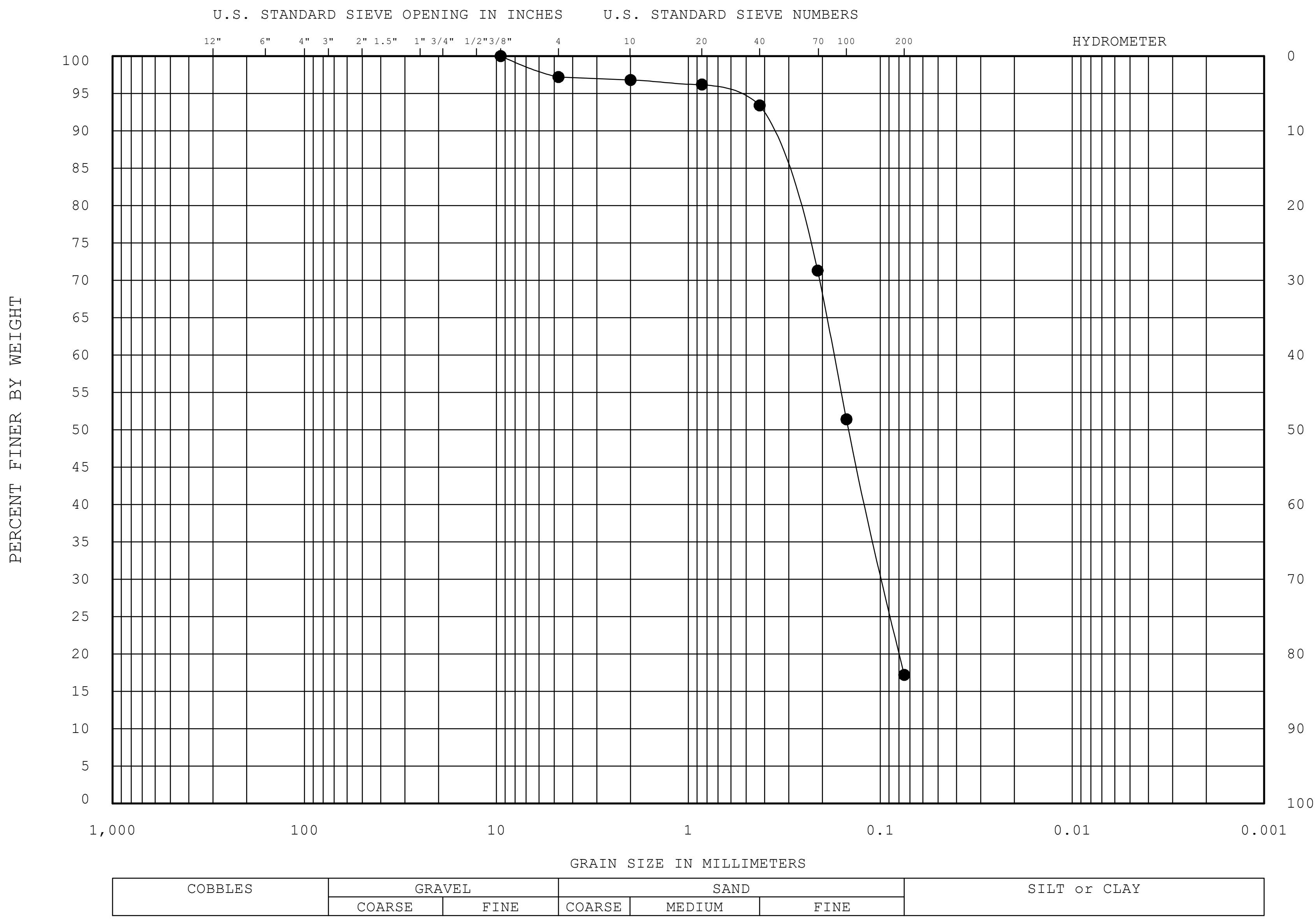
AREA: *Dorchester Co. MD*

BORING NO.: *B-224*

DATE: *Jan-2020*

REMARKS :

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ **GRADATION CURVES** TEST METHODS: ASTM D 422, D4318, D2216



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Jar-10	22.5-24.0	SILTY SAND	SM				
—⊠—								
—▲—								
—★—								

PROJECT: *Midbay Island - Barren Island*

AREA: *Dorchester Co. MD*

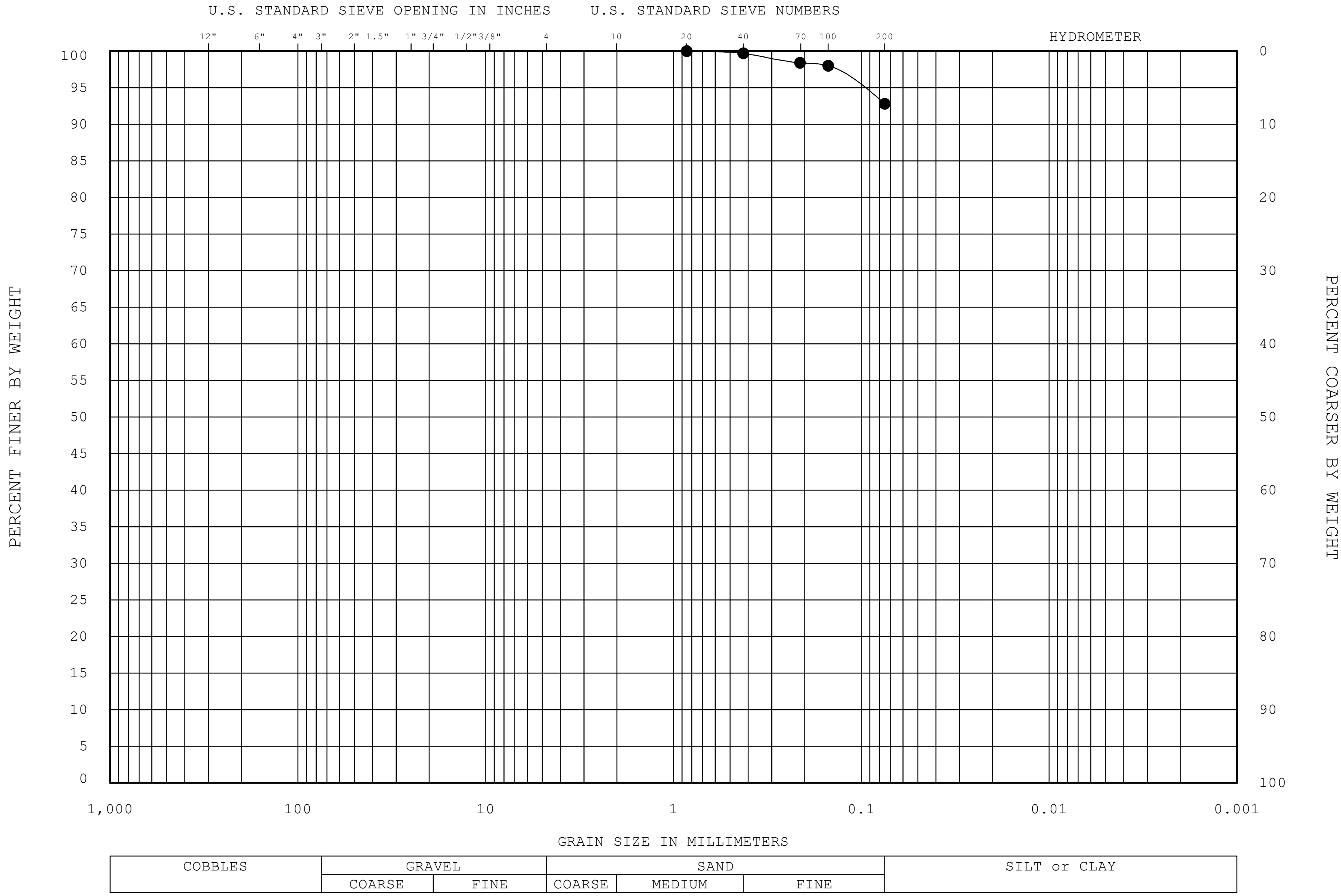
BORING NO.: *B-224*

DATE: *Jan-2020*

REMARKS :

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ

GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Jar-15	35.0-36.5	LEAN CLAY	CL		41	17	24
—⊠—								
—▲—								
—★—								

PROJECT: Midbay Island - Barren Island

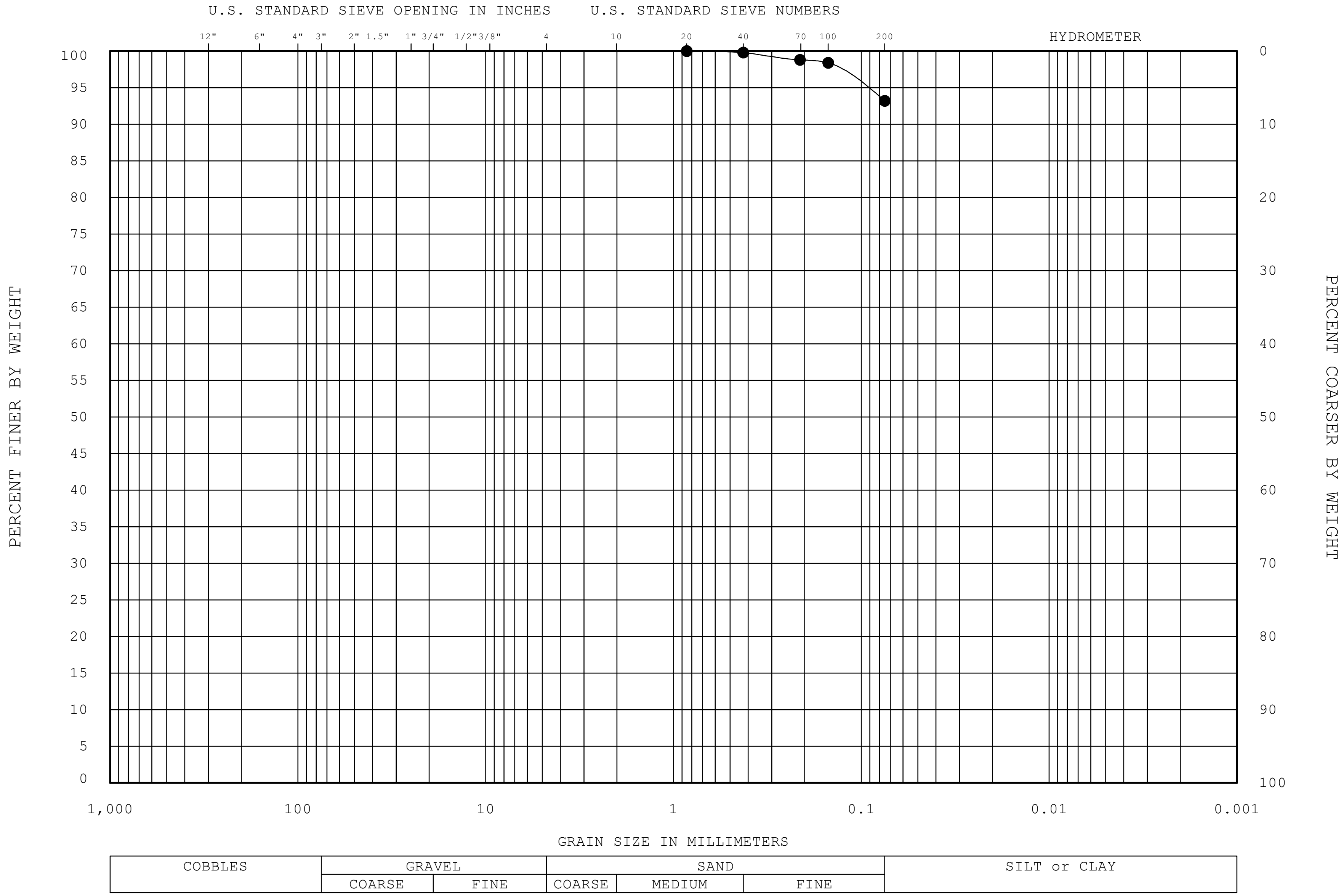
AREA: Dorchester Co. MD

BORING NO.: B-224

DATE: Jan-2020

REMARKS :

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ **GRADATION CURVES** TEST METHODS: ASTM D 422, D4318, D2216



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Jar-20	47.5-49.0	LEAN CLAY	CL		42	17	25
—⊠—								
—▲—								
—★—								

REMARKS : SPECIFIC GRAVITY: 2.79

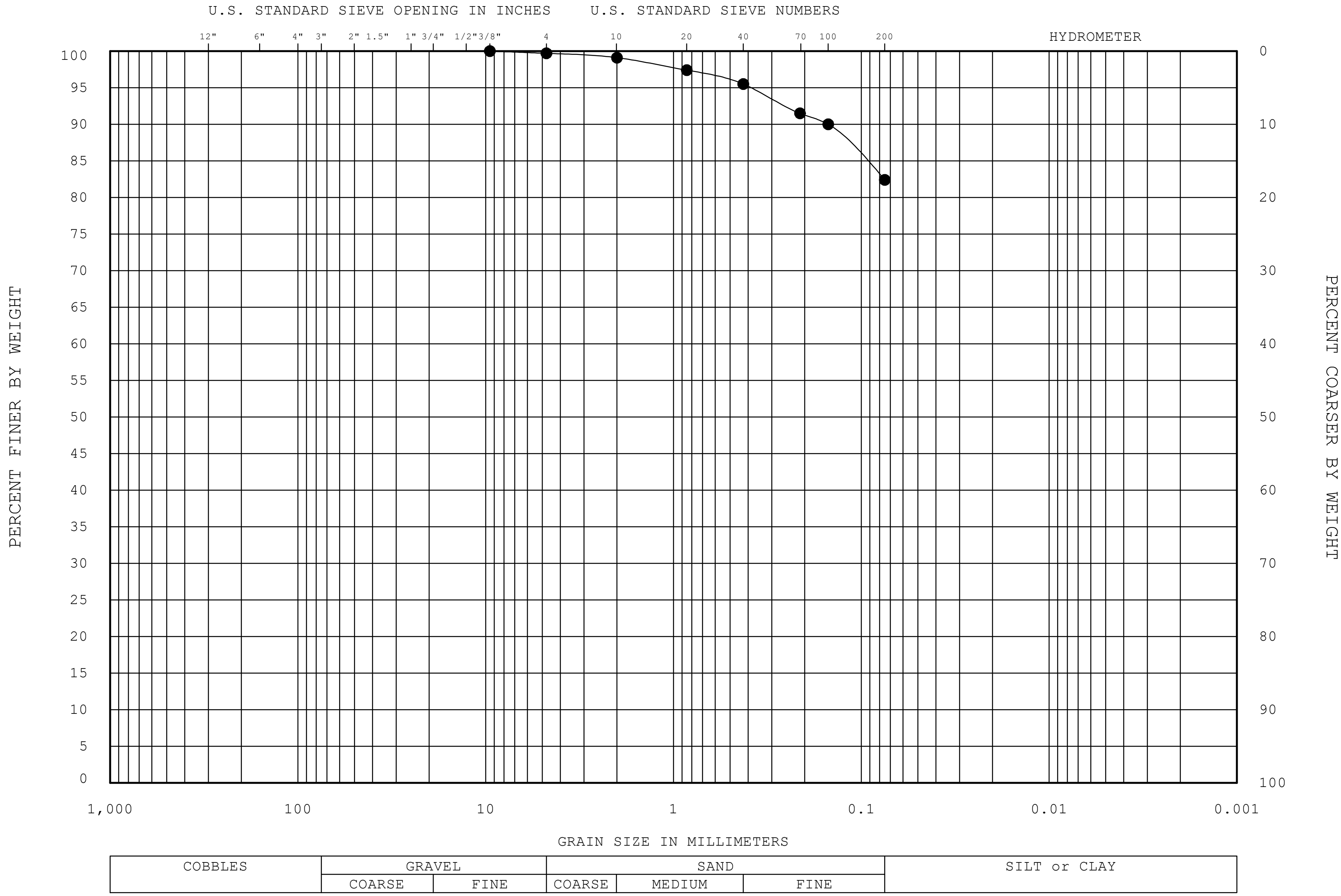
ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ **GRADATION CURVES** TEST METHODS: ASTM D 422, D4318, D2216

PROJECT: *Midbay Island - Barren Island*

AREA: *Dorchester Co. MD*

BORING NO.: *B-224*

DATE: *Jan-2020*



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Jar-3	5.0-6.5	LEAN CLAY with SAND	CL				
—⊠—								
—▲—								
—★—								

PROJECT: *Midbay Island - Barren Island*

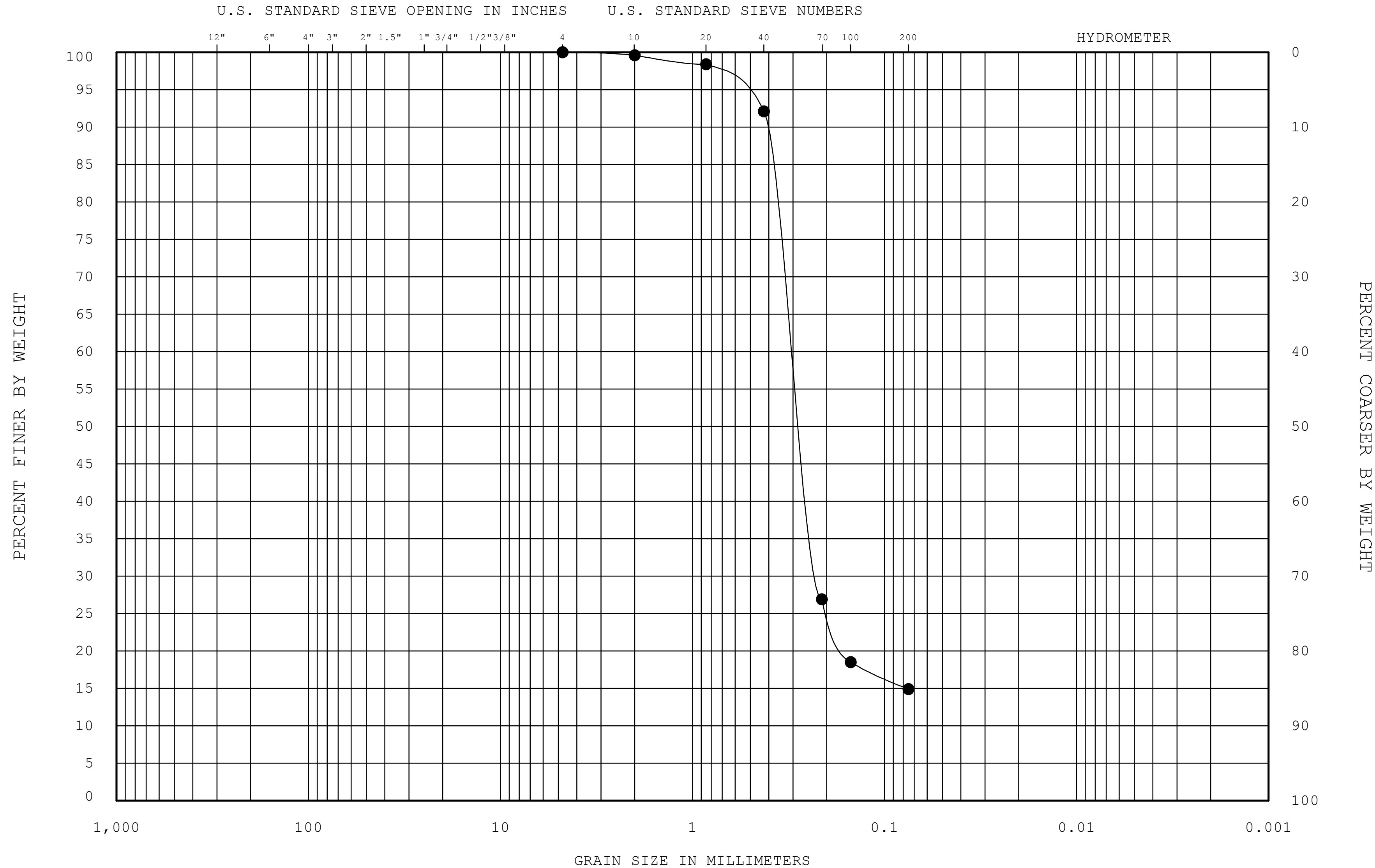
AREA: *Dorchester Co. MD*

BORING NO.: *B-227*

DATE: *Jan-2020*

REMARKS :

GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216



COBBLES	GRAVEL		SAND			SILT or CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Jar-6	12.5-14.0	SILTY, CLAYEY SAND	SC-SM		28	21	7
—⊠—								
—▲—								
—★—								

PROJECT: *Midbay Island - Barren Island*

AREA: *Dorchester Co. MD*

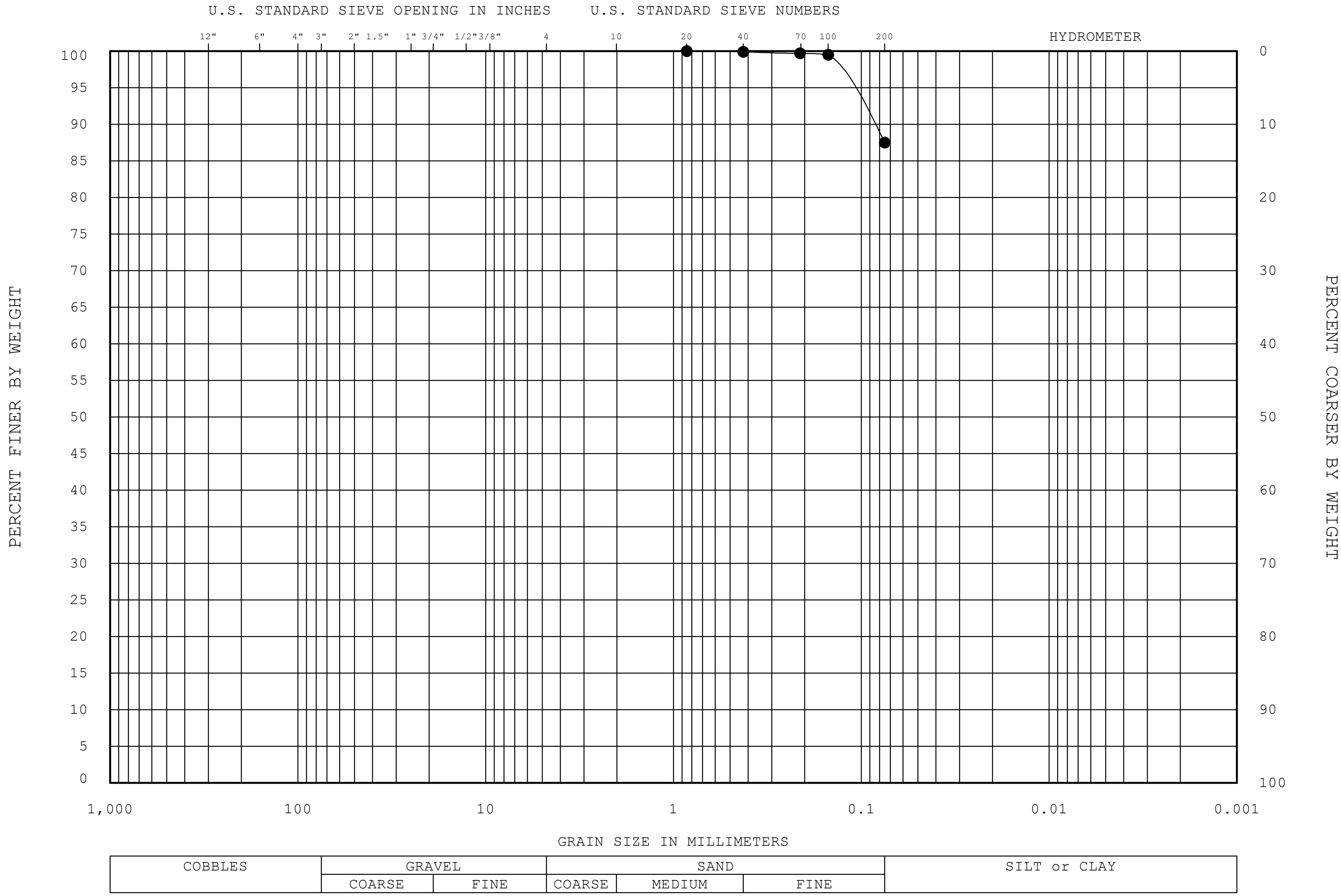
BORING NO.: *B-227*

DATE: *Jan-2020*

REMARKS :

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ

GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
●	Jar-13	30.0-31.5	LEAN CLAY	CL		36	15	21
⊠								
▲								
★								

PROJECT: *Midbay Island - Barren Island*

AREA: *Dorchester Co. MD*

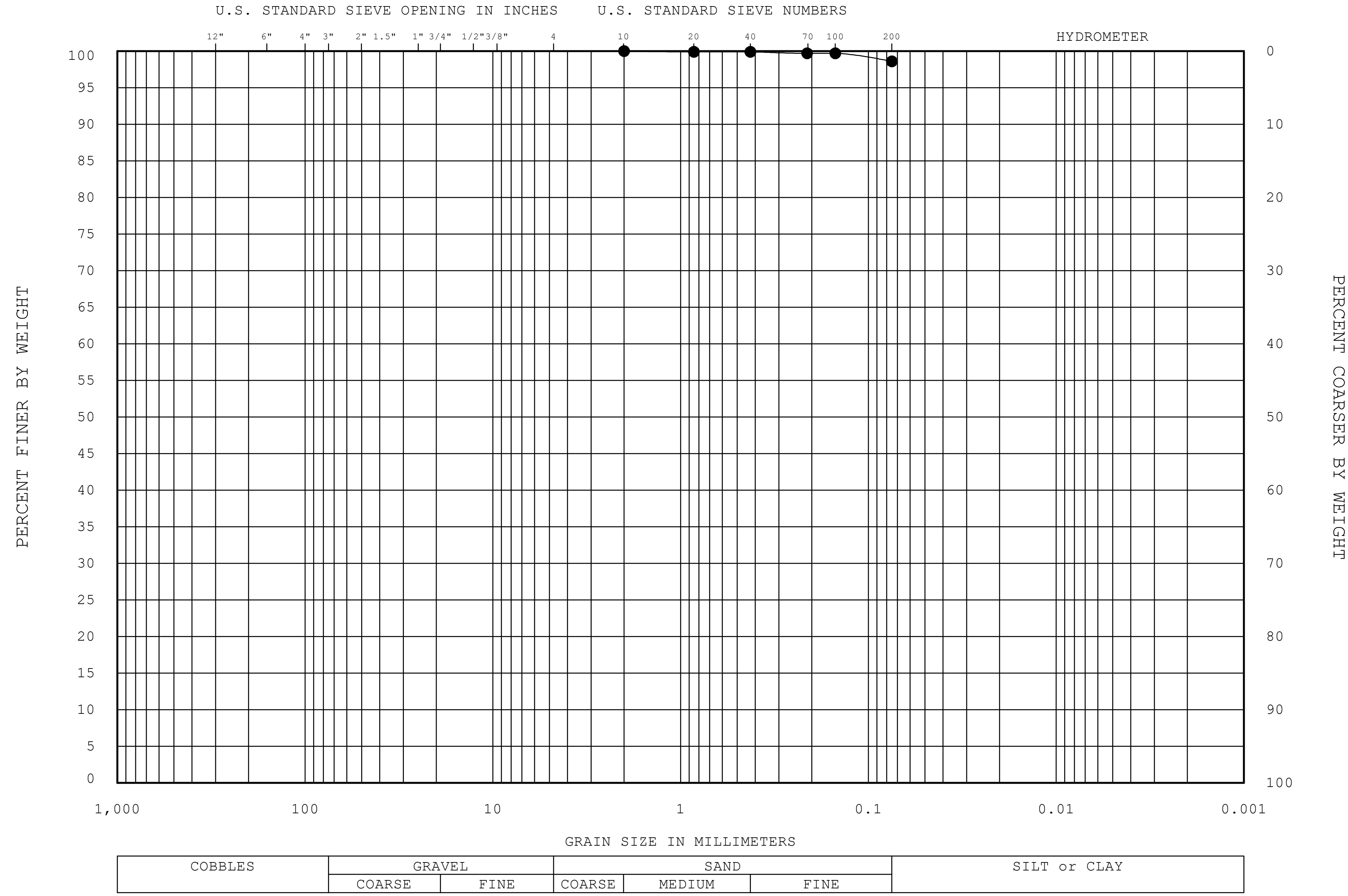
BORING NO.: *B-227*

DATE: *Jan-2020*

REMARKS :

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ

GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
●	Jar-19	45.0-46.5	LEAN CLAY	CL		43	17	26
⊠								
▲								
★								

REMARKS :

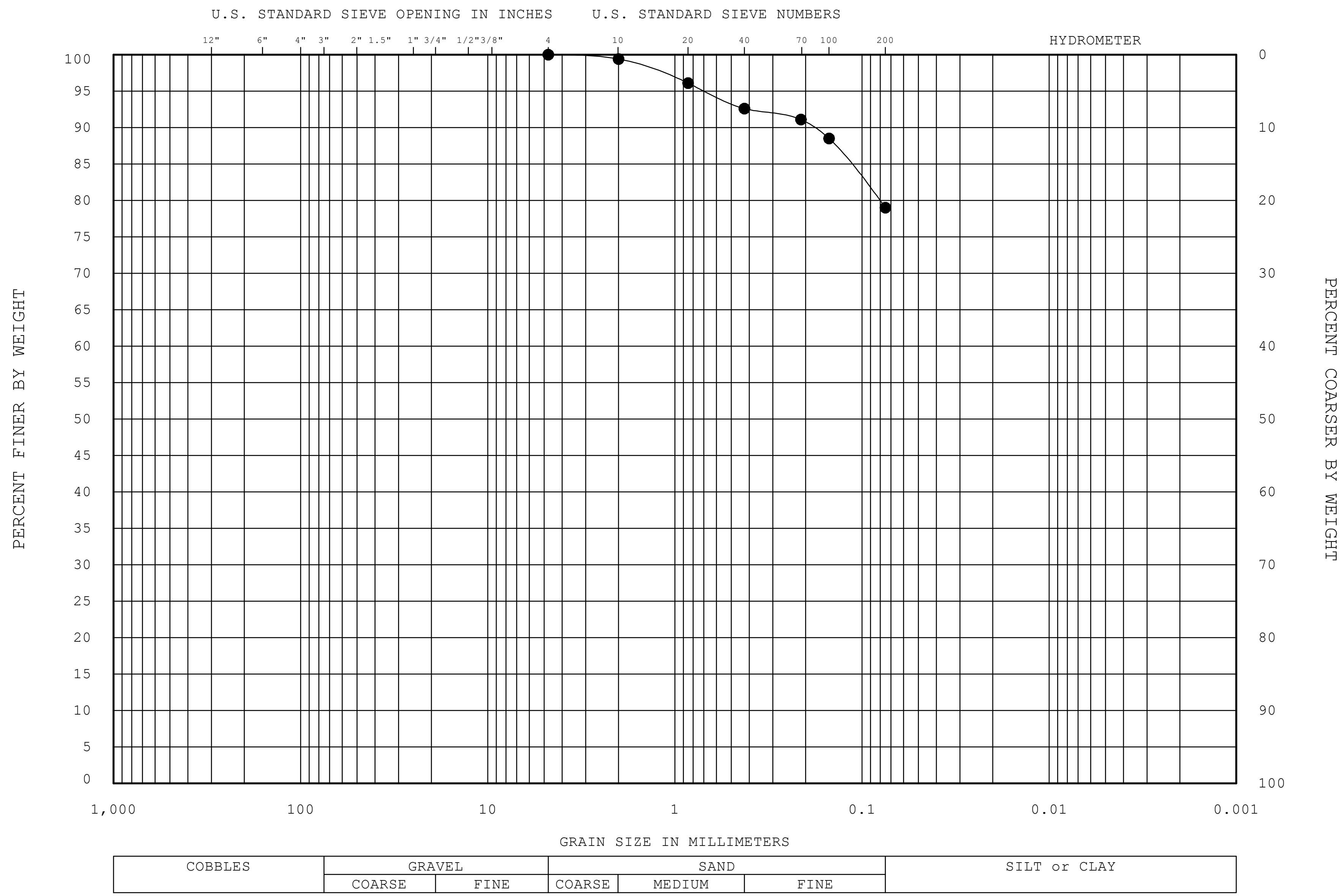
PROJECT: *Midbay Island - Barren Island*

AREA: *Dorchester Co. MD*

BORING NO.: *B-227*

DATE: *Jan-2020*

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ **GRADATION CURVES** TEST METHODS: ASTM D 422, D4318, D2216



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)	Nat wc%	LL	PL	PI
—●—	Jar-2	2.5-4.0	LEAN CLAY with SAND CL				
—⊠—							
—▲—							
—★—							

REMARKS :

PROJECT: *Midbay Island - Barren Island*

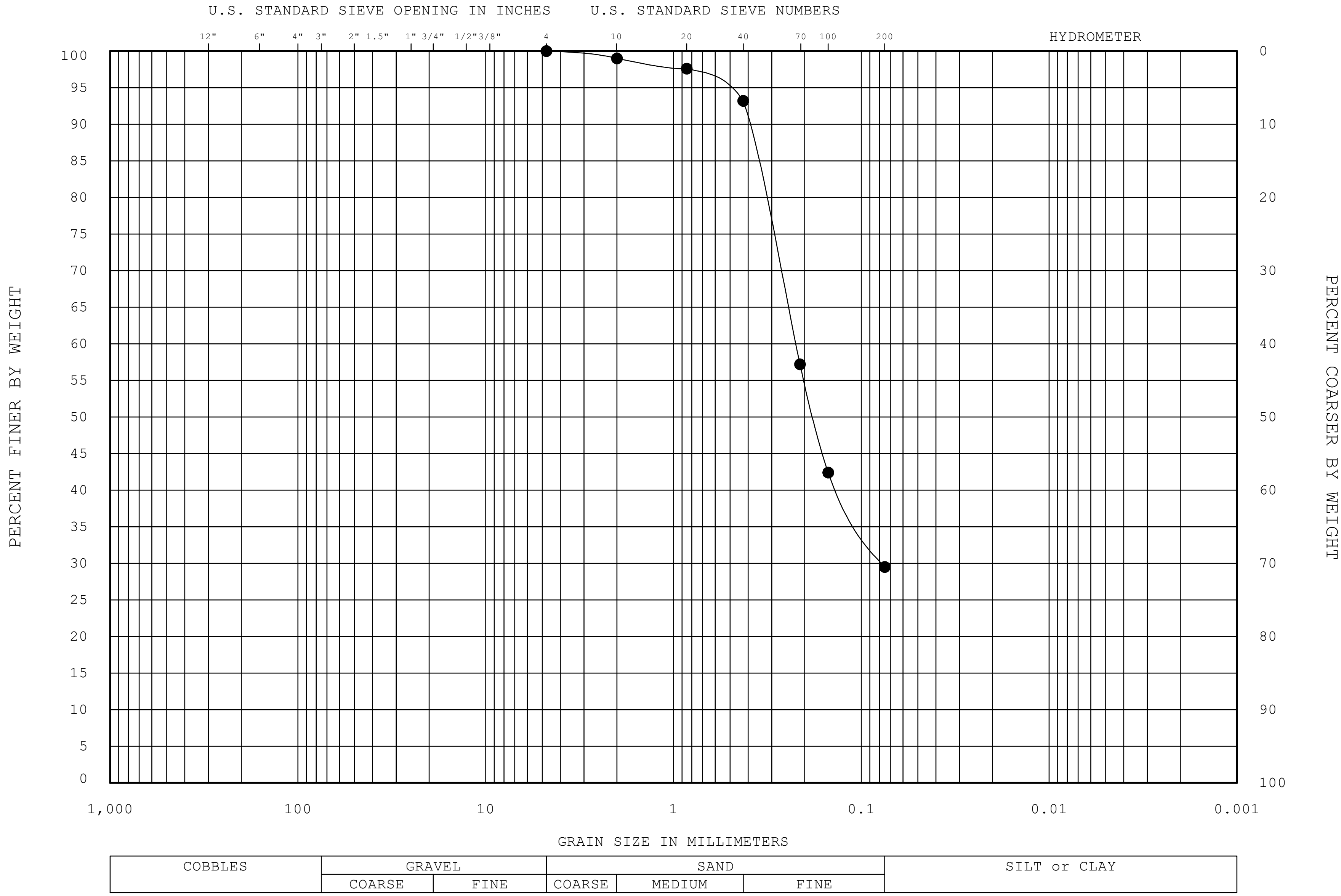
AREA: *Dorchester Co. MD*

BORING NO.: *B-230*

DATE: *Jan-2020*

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ

GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
●	Jar-6	12.5-14.0	CLAYEY SAND	SC				
⊠								
▲								
★								

PROJECT: Midbay Island - Barren Island

AREA: Dorchester Co. MD

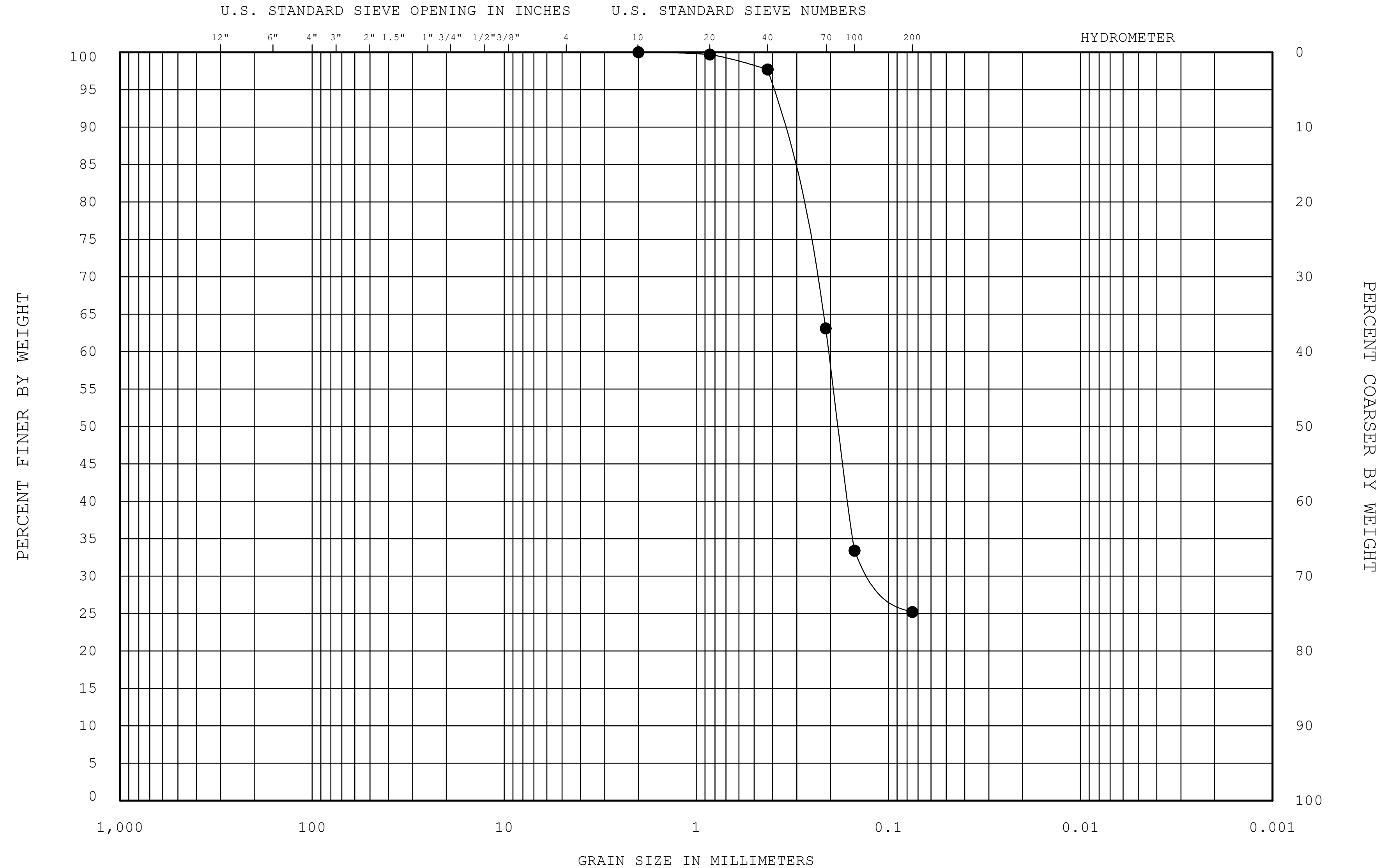
BORING NO.: B-230

DATE: Jan-2020

REMARKS :

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ

GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216



COBBLES	GRAVEL		SAND			SILT or CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
●	Jar-9	20.0-21.5	SILTY SAND	SM		NP	NP	NP
⊠								
▲								
★								

REMARKS :

PROJECT: *Midbay Island - Barren Island*

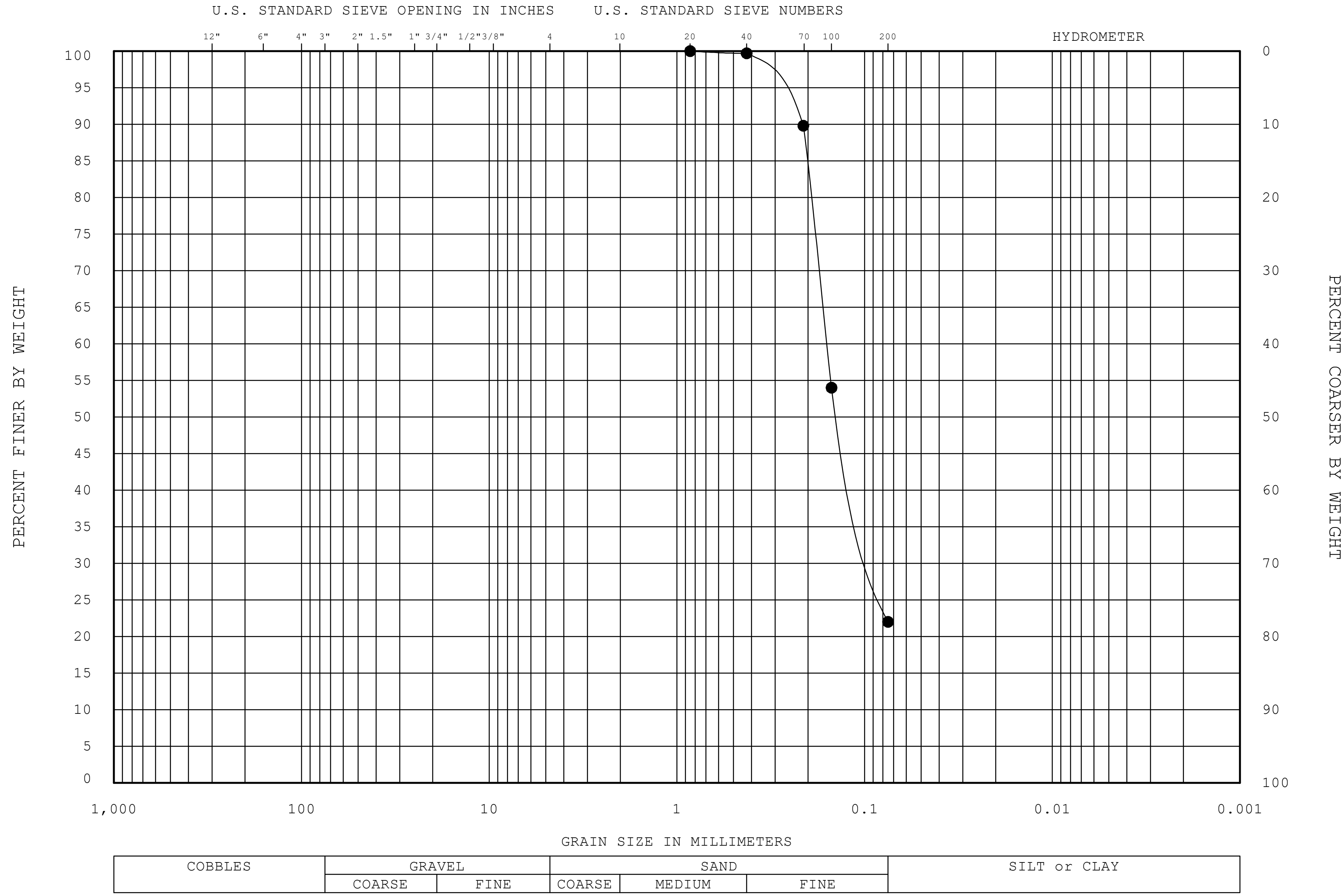
AREA: *Dorchester Co. MD*

BORING NO.: *B-230*

DATE: *Jan-2020*

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ

GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Jar-12	27.5-29.0	SILTY SAND	SM		28	24	4
—⊠—								
—▲—								
—★—								

REMARKS :

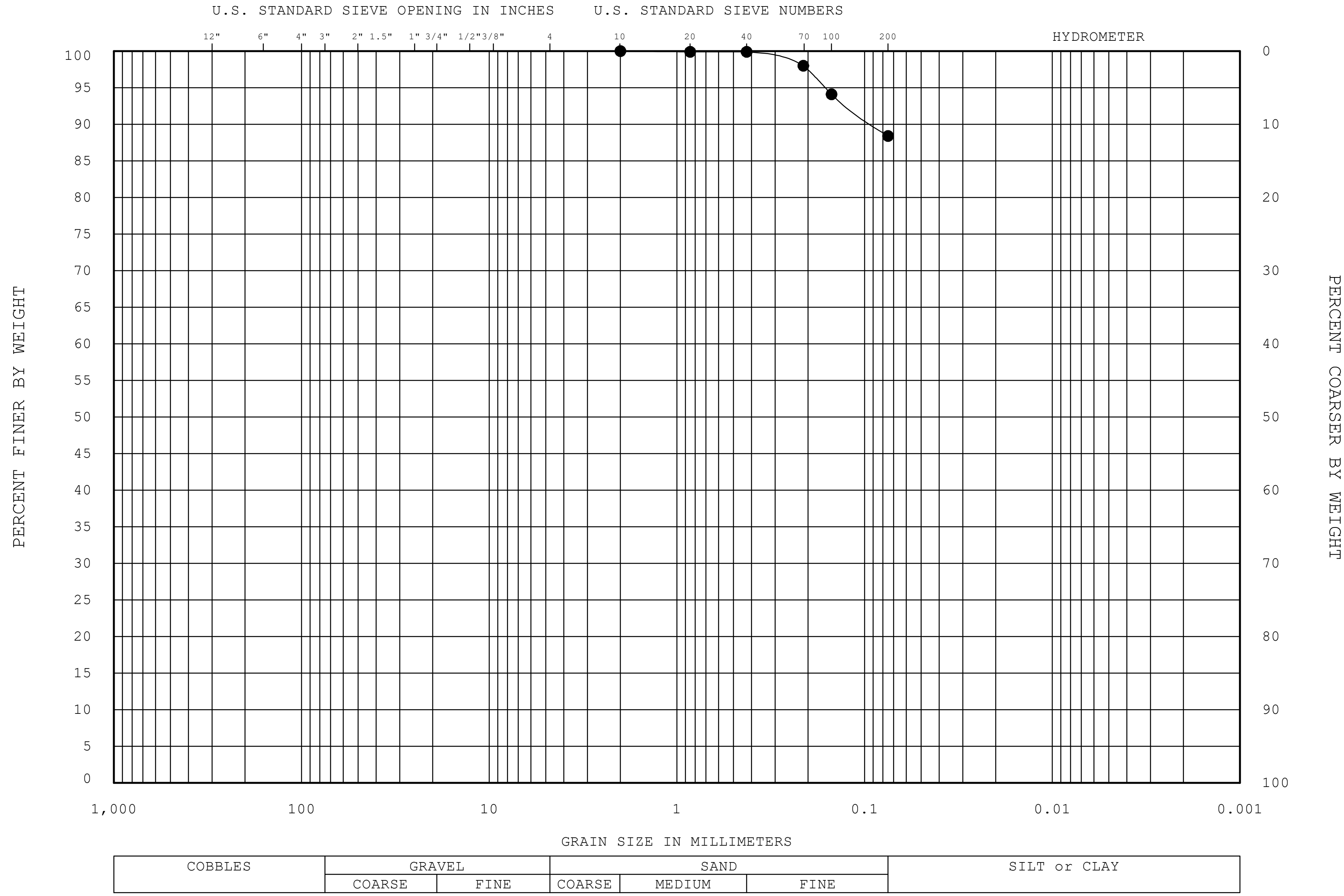
PROJECT: *Midbay Island - Barren Island*

AREA: *Dorchester Co. MD*

BORING NO.: *B-230*

DATE: *Jan-2020*

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ **GRADATION CURVES** TEST METHODS: ASTM D 422, D4318, D2216



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Jar-15	35.0-36.5	FAT CLAY	CH		71	26	45
—⊠—								
—▲—								
—★—								

REMARKS :

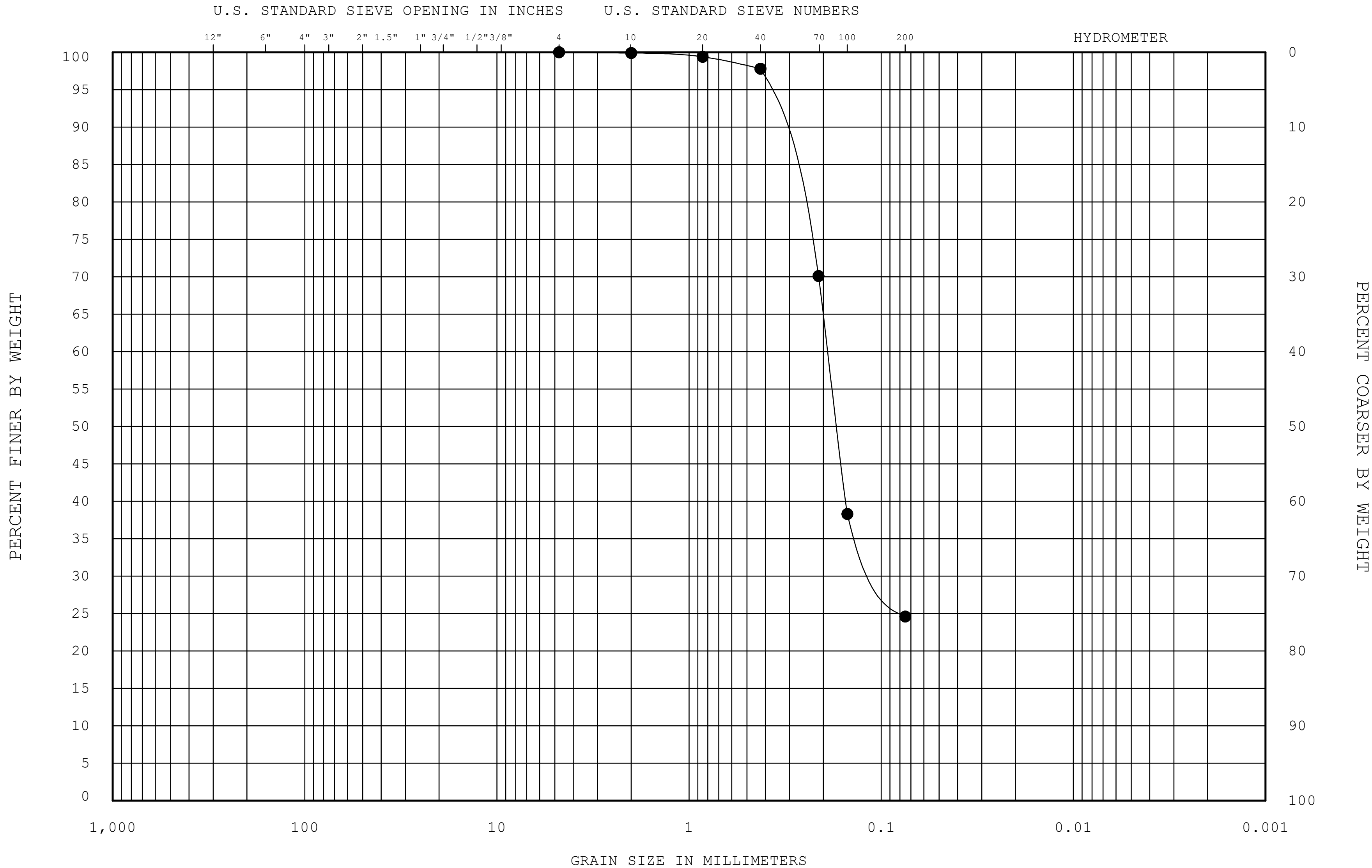
PROJECT: *Midbay Island - Barren Island*

AREA: *Dorchester Co. MD*

BORING NO.: *B-230*

DATE: *Jan-2020*

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ **GRADATION CURVES** TEST METHODS: ASTM D 422, D4318, D2216



COBBLES	GRAVEL		SAND			SILT or CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
●	Jar-22	52.5-54.0	SILTY SAND	SM				
☒								
▲								
★								

REMARKS :

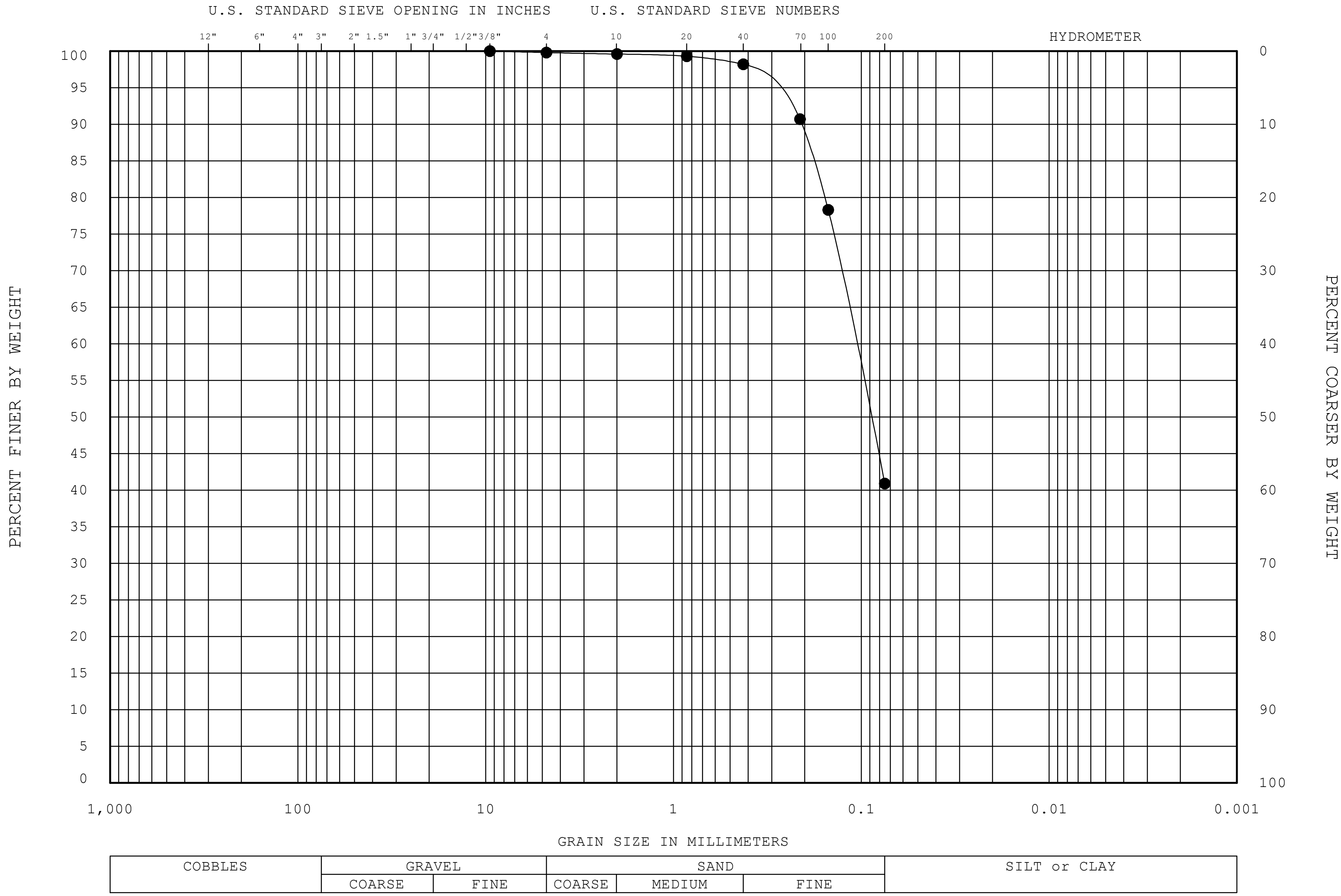
PROJECT: *Midbay Island - Barren Island*

AREA: *Dorchester Co. MD*

BORING NO.: *B-230*

DATE: *Jan-2020*

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ **GRADATION CURVES** TEST METHODS: ASTM D 422, D4318, D2216



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Jar-1	0.0-1.5	SILTY SAND	SM				
—⊠—								
—▲—								
—★—								

REMARKS :

PROJECT: *Midbay Island - Barren Island*

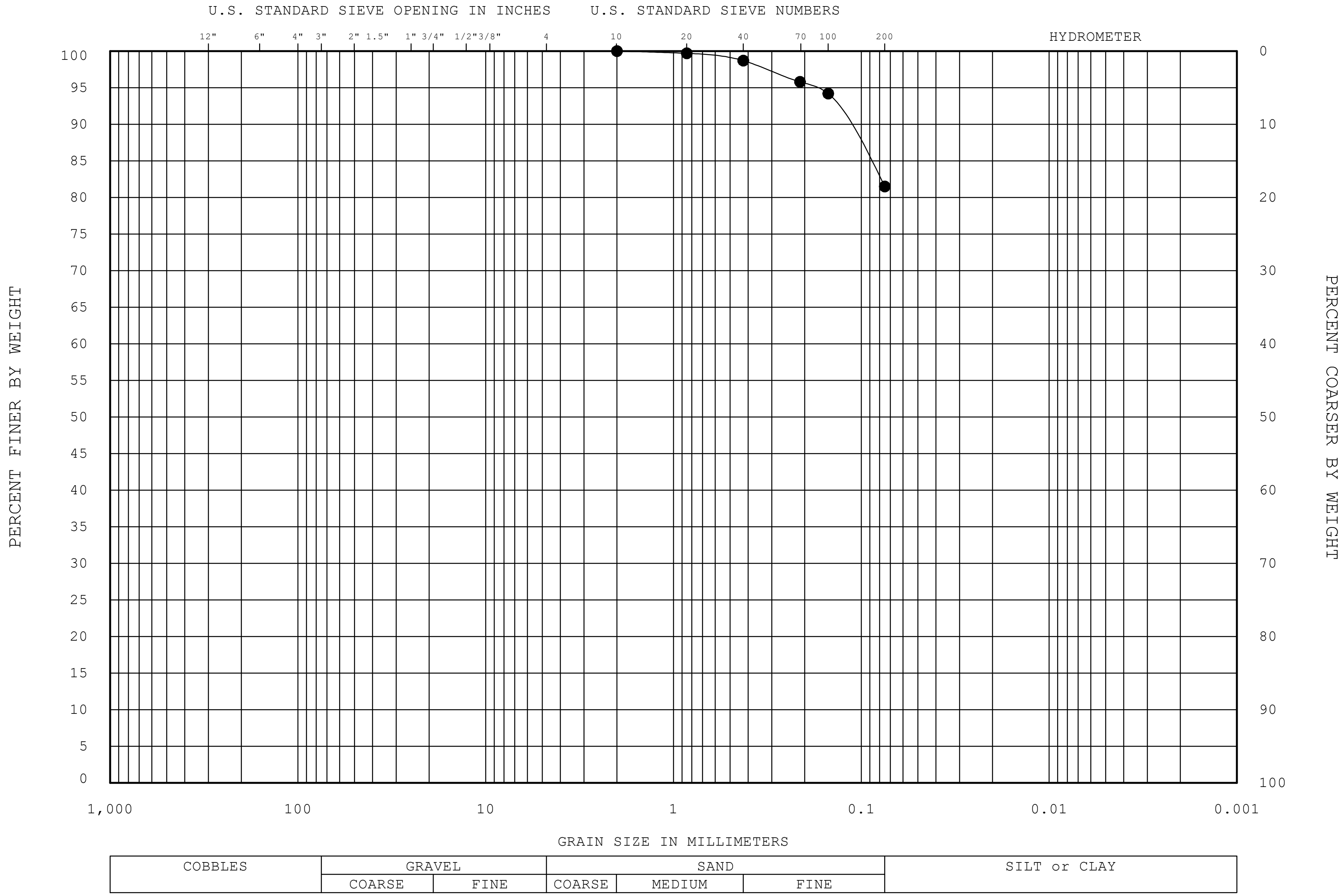
AREA: *Dorchester Co. MD*

BORING NO.: *B-232*

DATE: *Jan-2020*

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ

GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
●	Jar-4A	7.5-9.0	LEAN CLAY with SAND	CL		37	20	17
⊠								
▲								
★								

REMARKS :

PROJECT: *Midbay Island - Barren Island*

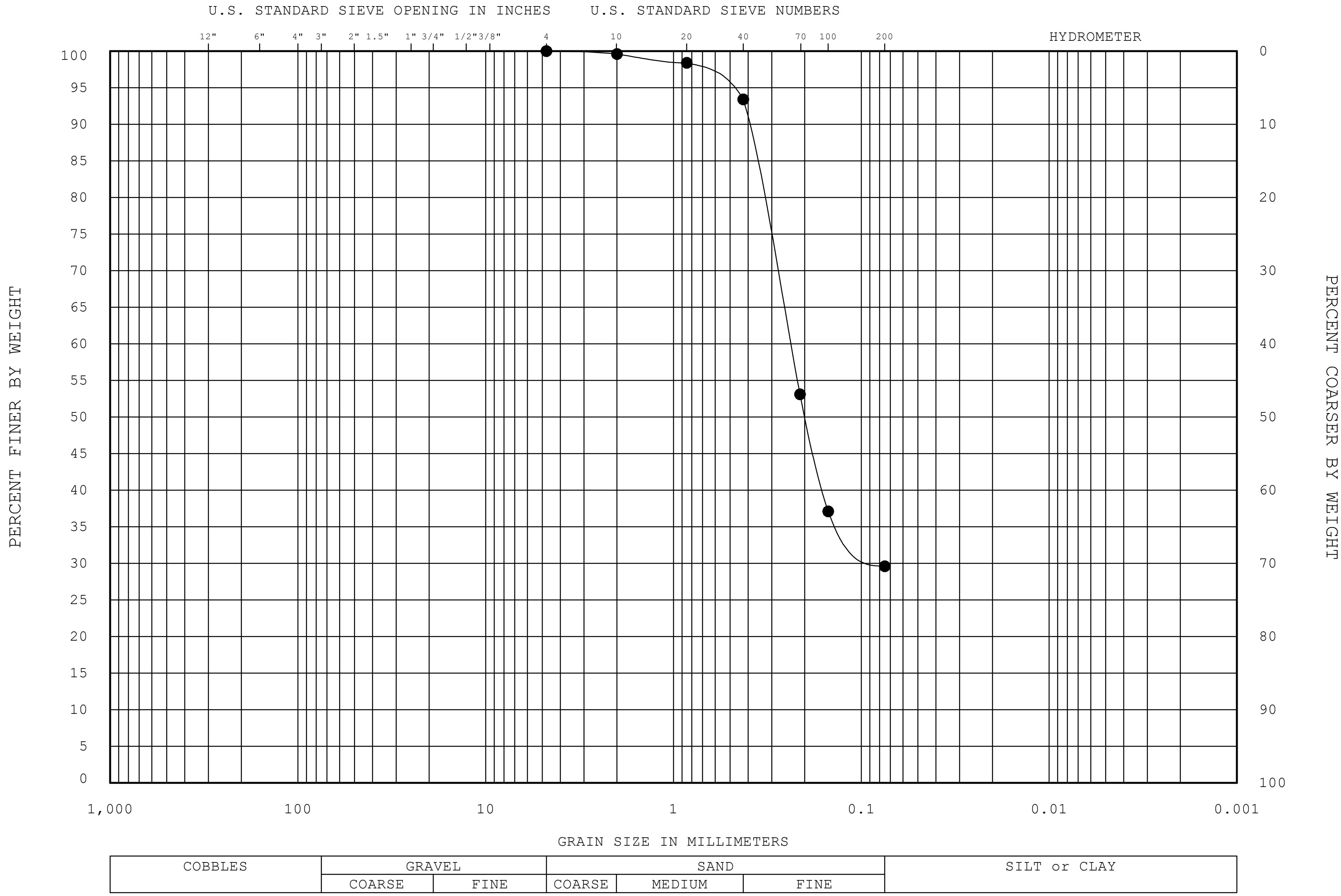
AREA: *Dorchester Co. MD*

BORING NO.: *B-232*

DATE: *Jan-2020*

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ

GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
●	Jar-6	12.5-14.0	CLAYEY SAND	SC		33	17	16
⊠								
▲								
★								

PROJECT: Midbay Island - Barren Island

AREA: Dorchester Co. MD

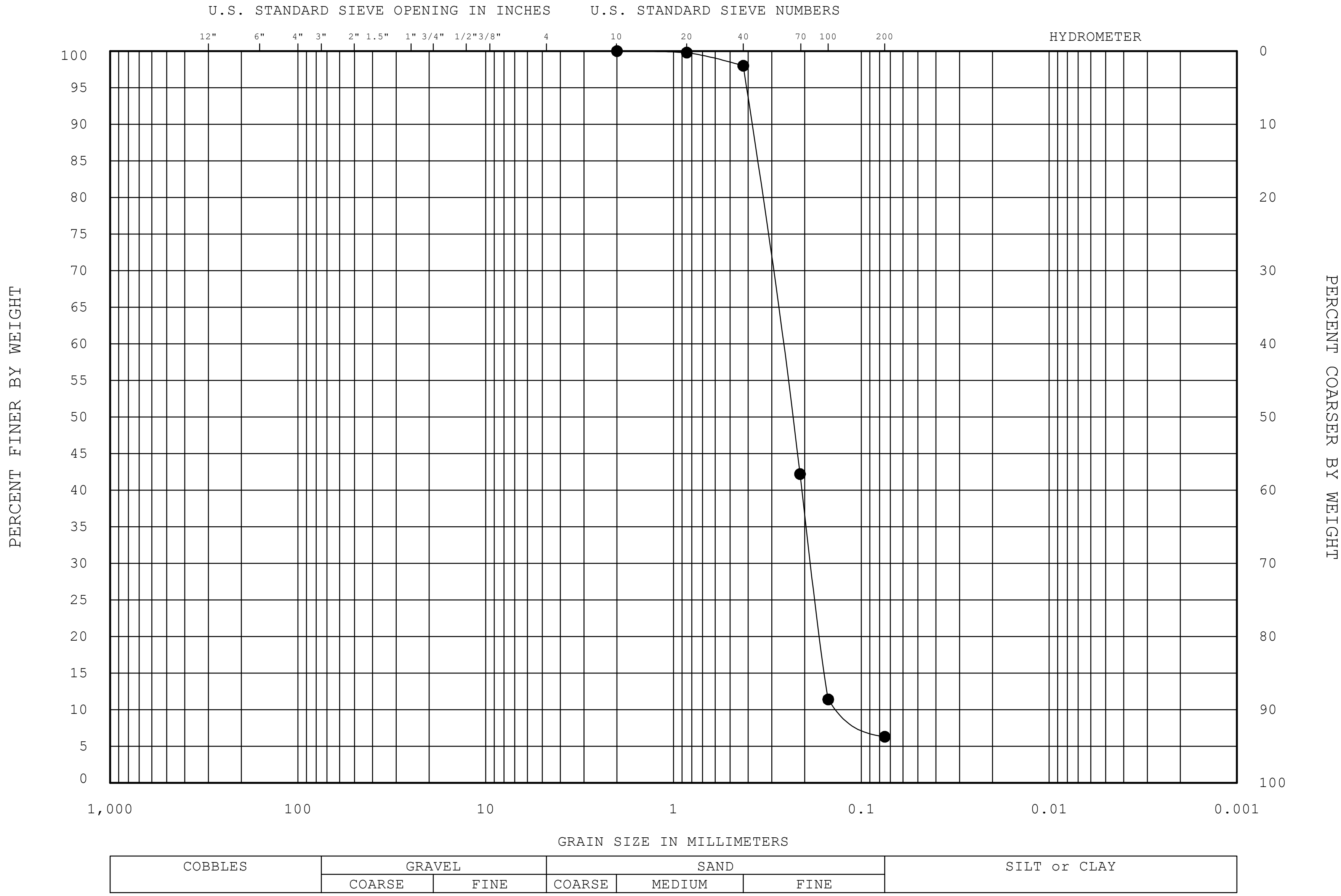
BORING NO.: B-232

DATE: Jan-2020

REMARKS :

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ

GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)	Nat wc%	LL	PL	PI
—●—	Jar-10	22.5-24.0	POORLY GRADED SAND with SILT SP-SM				
—⊠—							
—▲—							
—★—							

PROJECT: *Midbay Island - Barren Island*

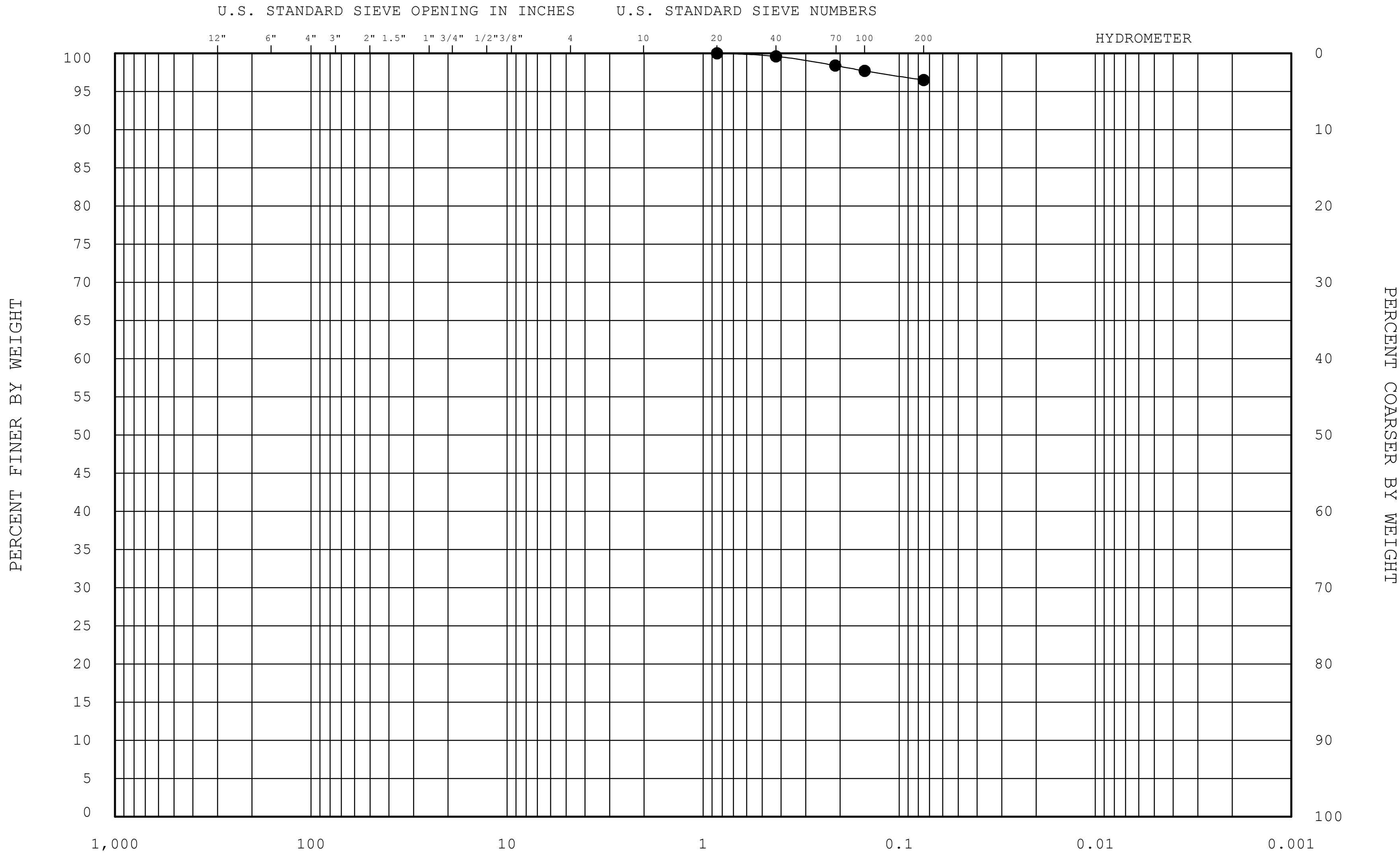
AREA: *Dorchester Co. MD*

BORING NO.: *B-232*

DATE: *Jan-2020*

REMARKS :

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ **GRADATION CURVES** TEST METHODS: ASTM D 422, D4318, D2216



COBBLES	GRAVEL		SAND			SILT or CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Jar-21	50.0-51.5	FAT CLAY	CH		75	31	44
—⊠—								
—▲—								
—★—								

PROJECT: *Midbay Island - Barren Island*

AREA: *Dorchester Co. MD*

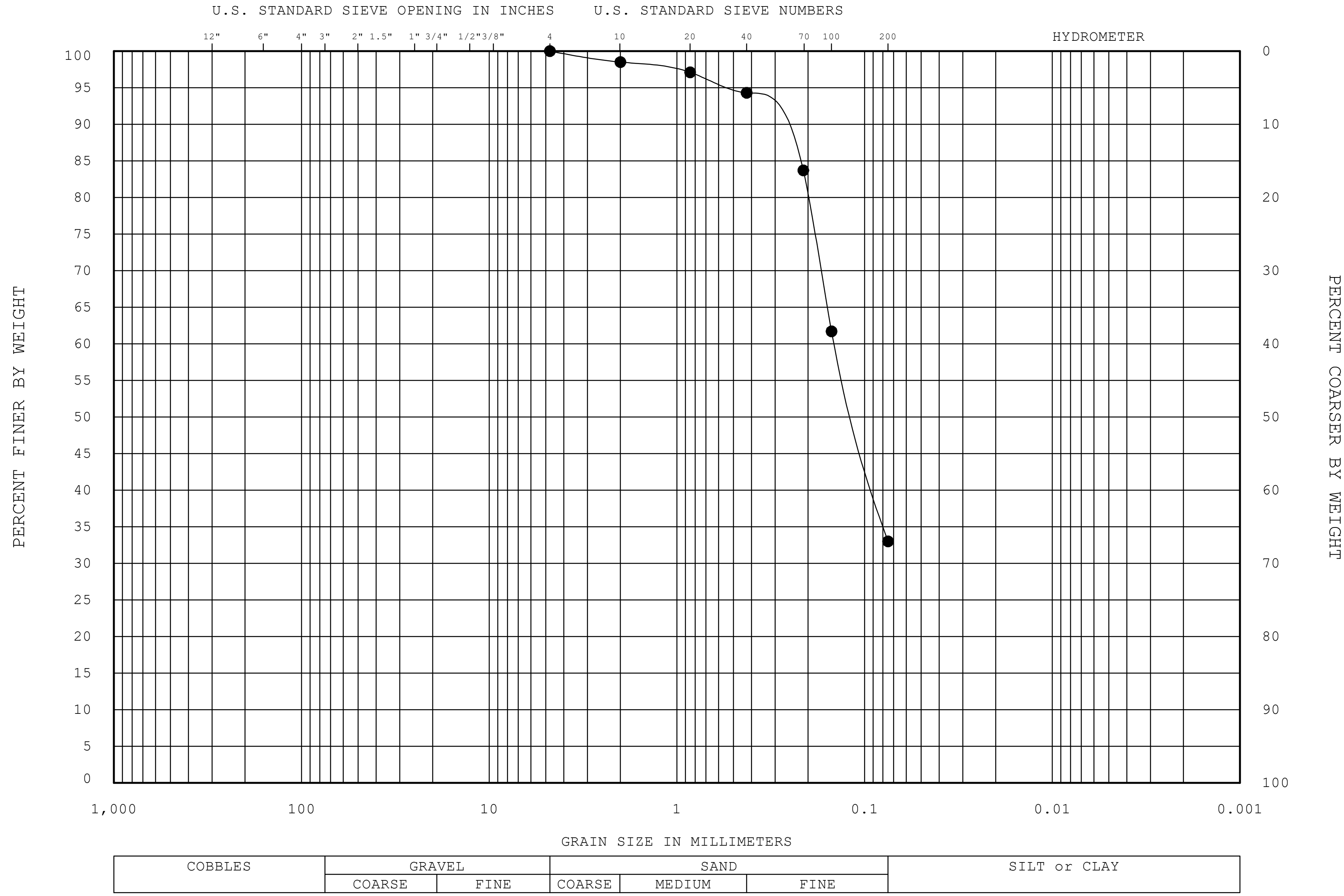
BORING NO.: *B-232*

DATE: *Jan-2020*

REMARKS :

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ

GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Jar-2	2.5-4.0	SILTY SAND	SM		22	20	2
—⊠—								
—▲—								
—★—								

REMARKS :

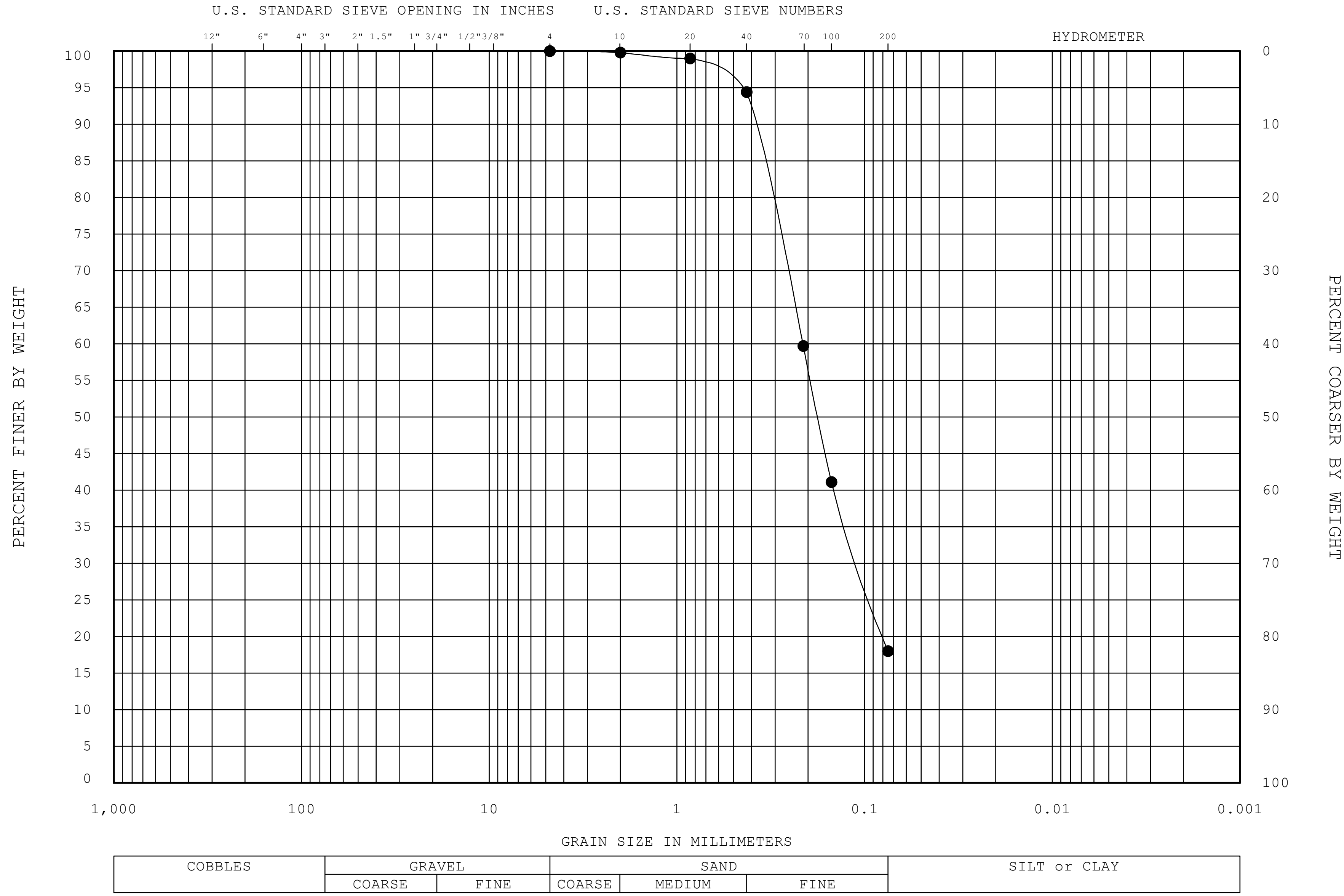
PROJECT: *Midbay Island - Barren Island*

AREA: *Dorchester Co. MD*

BORING NO.: *B-238*

DATE: *Jan-2020*

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ **GRADATION CURVES** TEST METHODS: ASTM D 422, D4318, D2216



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Jar-6	12.5-14.0	SILTY SAND	SM				
—⊠—								
—▲—								
—★—								

PROJECT: *Midbay Island - Barren Island*

AREA: *Dorchester Co. MD*

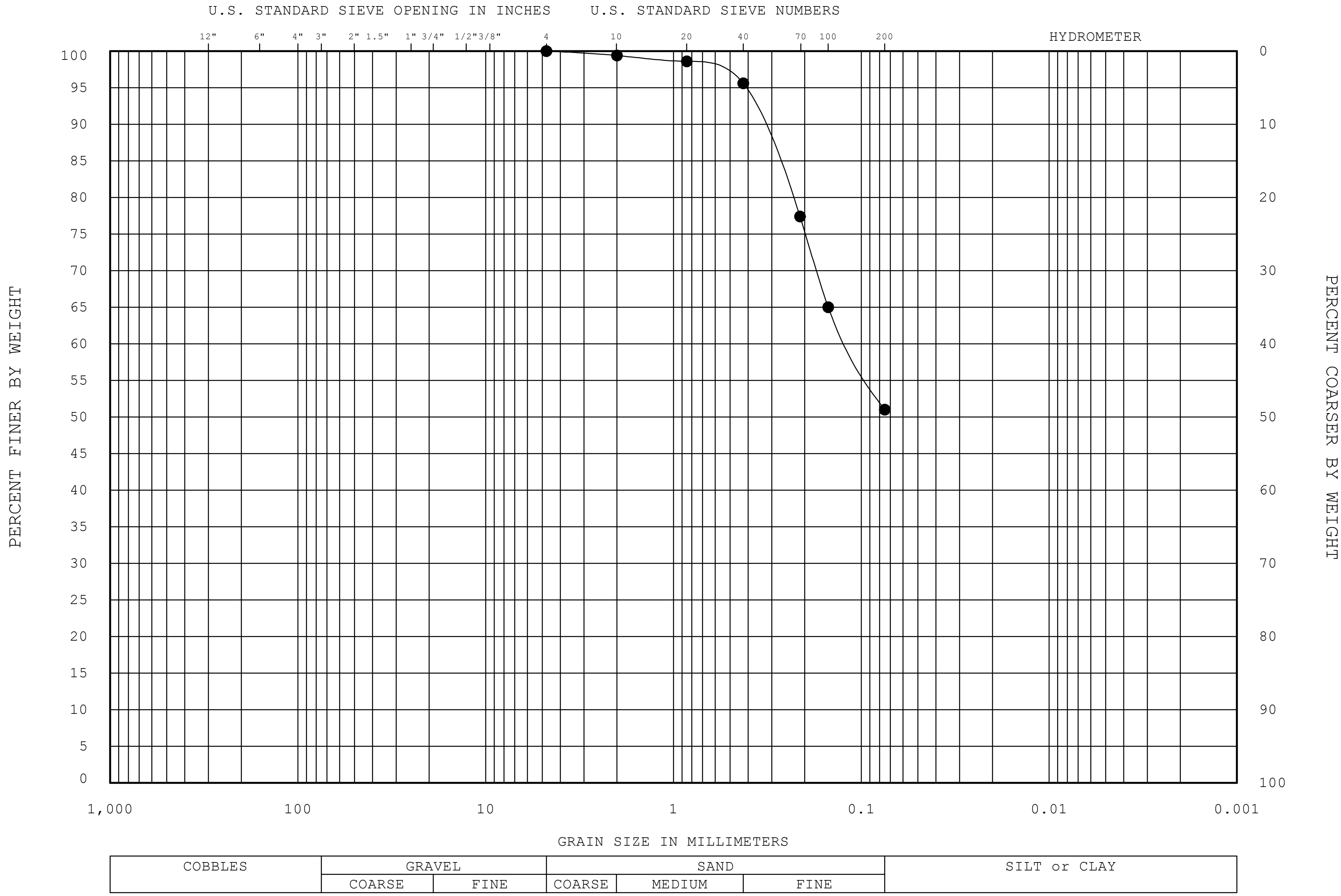
BORING NO.: *B-238*

DATE: *Jan-2020*

REMARKS :

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ

GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
●	Jar-10B	22.5-24.0	SANDY FAT CLAY	CH		59	22	37
⊠								
▲								
★								

PROJECT: Midbay Island - Barren Island

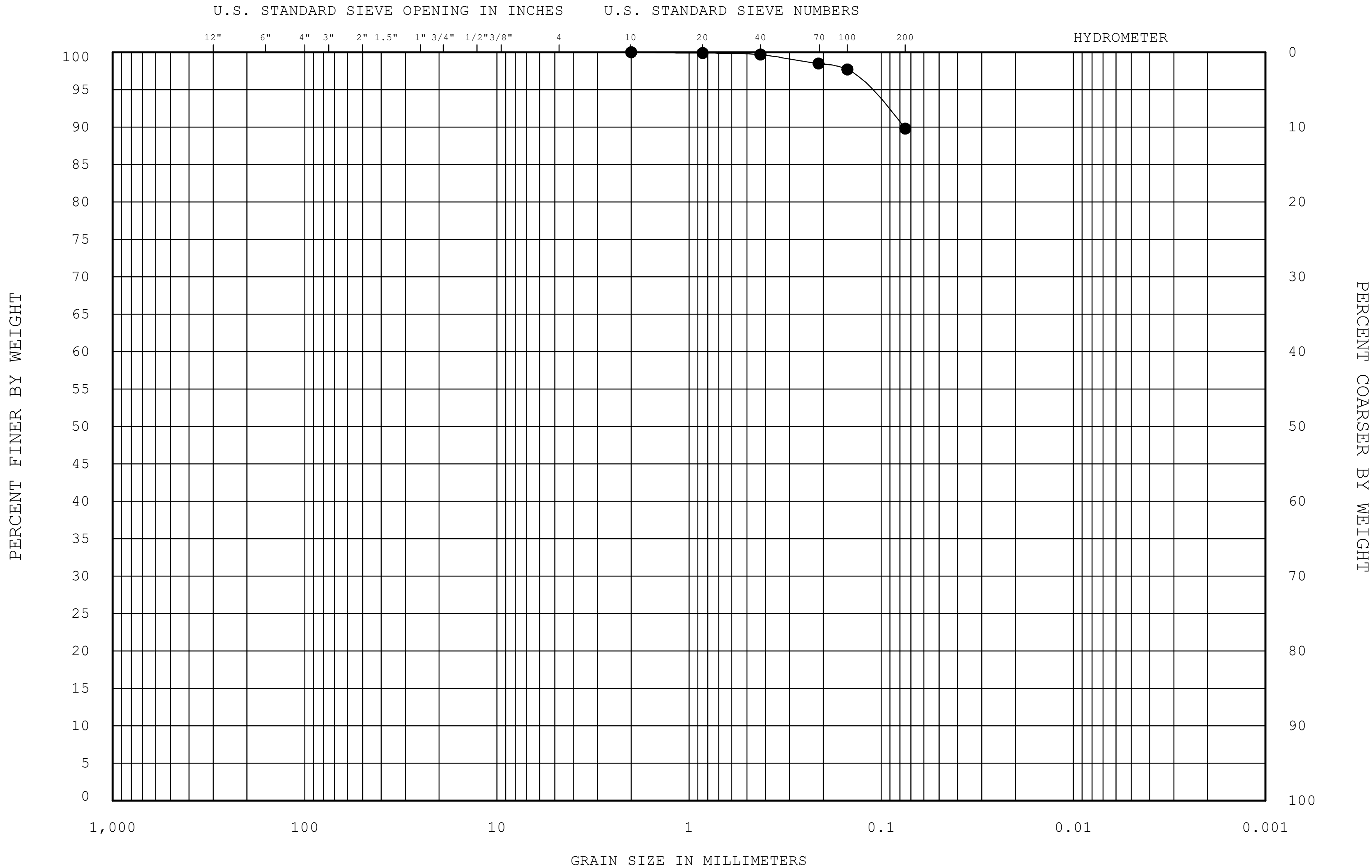
AREA: Dorchester Co. MD

BORING NO.: B-238

DATE: Jan-2020

REMARKS :

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ **GRADATION CURVES** TEST METHODS: ASTM D 422, D4318, D2216



COBBLES	GRAVEL		SAND			SILT or CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Jar-16	37.5-39.0	LEAN CLAY	CL		43	16	27
—⊠—								
—▲—								
—★—								

PROJECT: *Midbay Island - Barren Island*

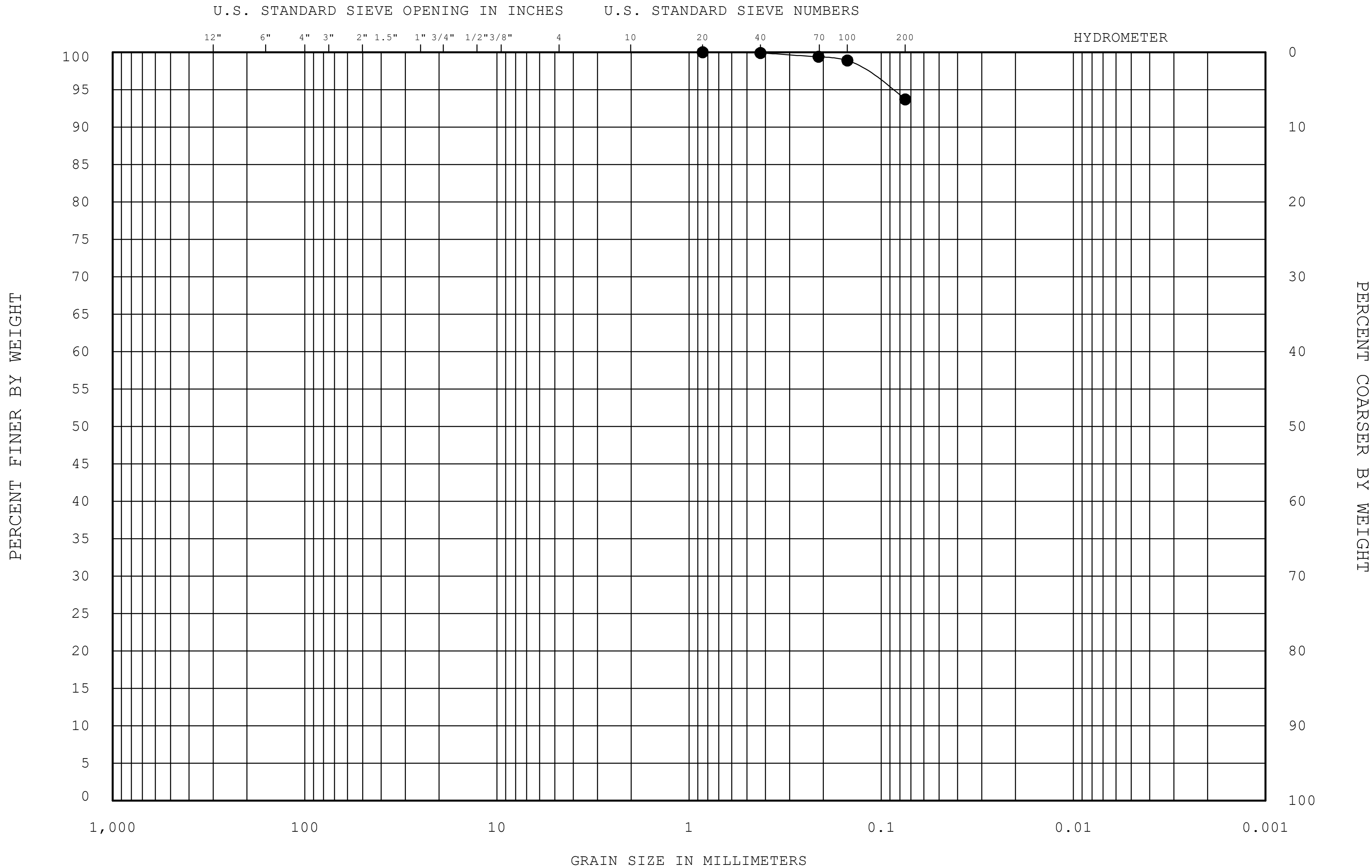
AREA: *Dorchester Co. MD*

BORING NO.: *B-238*

DATE: *Jan-2020*

REMARKS : SAMPLE AT AND ABOVE #40 SIEVE MADE UP OF APPROXIMATELY 50% SHELL MATERIAL

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ **GRADATION CURVES** TEST METHODS: ASTM D 422, D4318, D2216



COBBLES	GRAVEL		SAND			SILT or CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
●	Jar-18	42.5-44.0	LEAN CLAY	CL		37	16	21
⊠								
▲								
★								

PROJECT: *Midbay Island - Barren Island*

AREA: *Dorchester Co. MD*

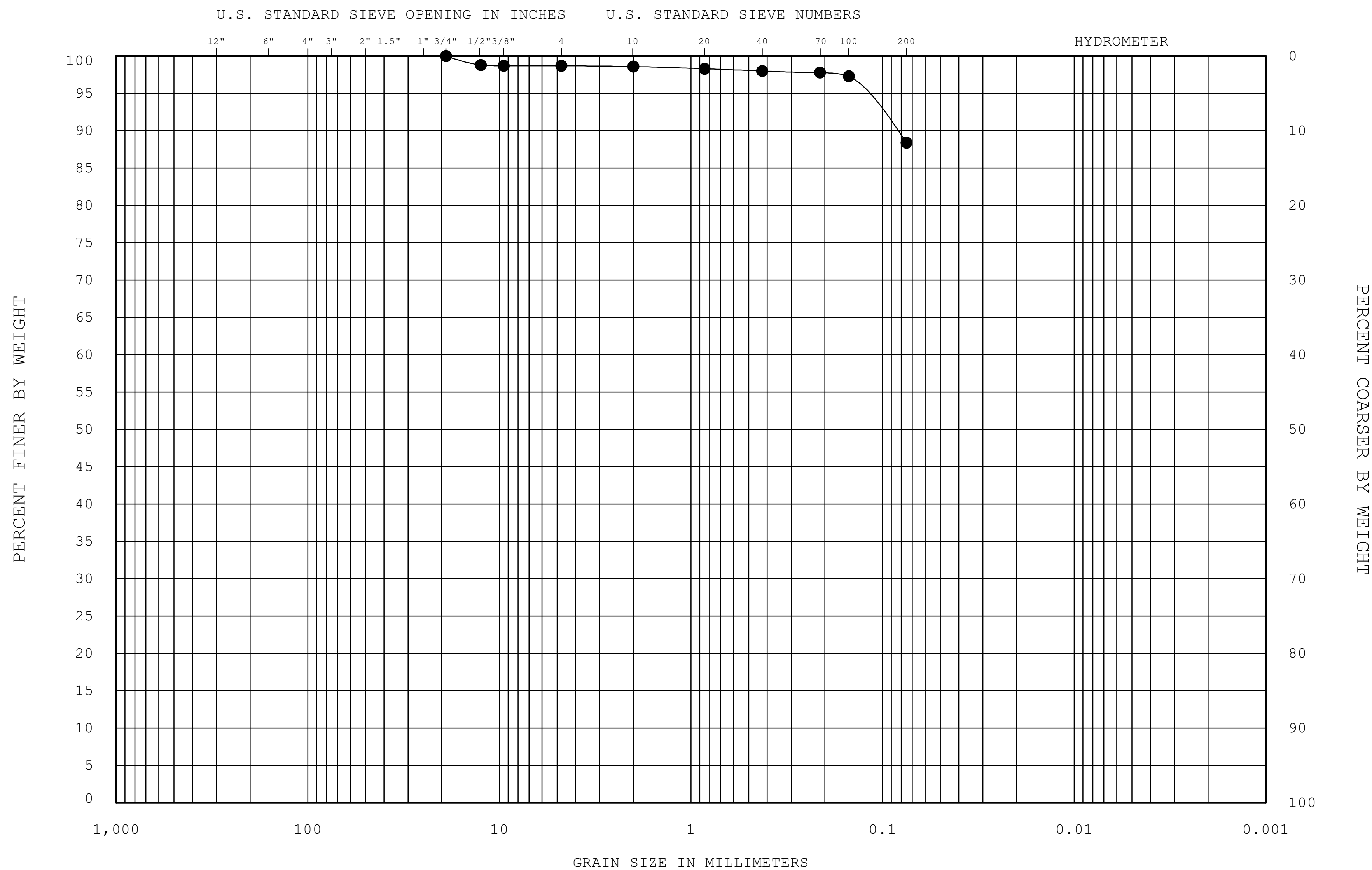
BORING NO.: *B-238*

DATE: *Jan-2020*

REMARKS :

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ

GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216



COBBLES	GRAVEL		SAND			SILT or CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
●	Jar-3	5.0-6.5	SILT	ML		36	26	10
⊠								
▲								
★								

PROJECT: *Midbay Island - Barren Island*

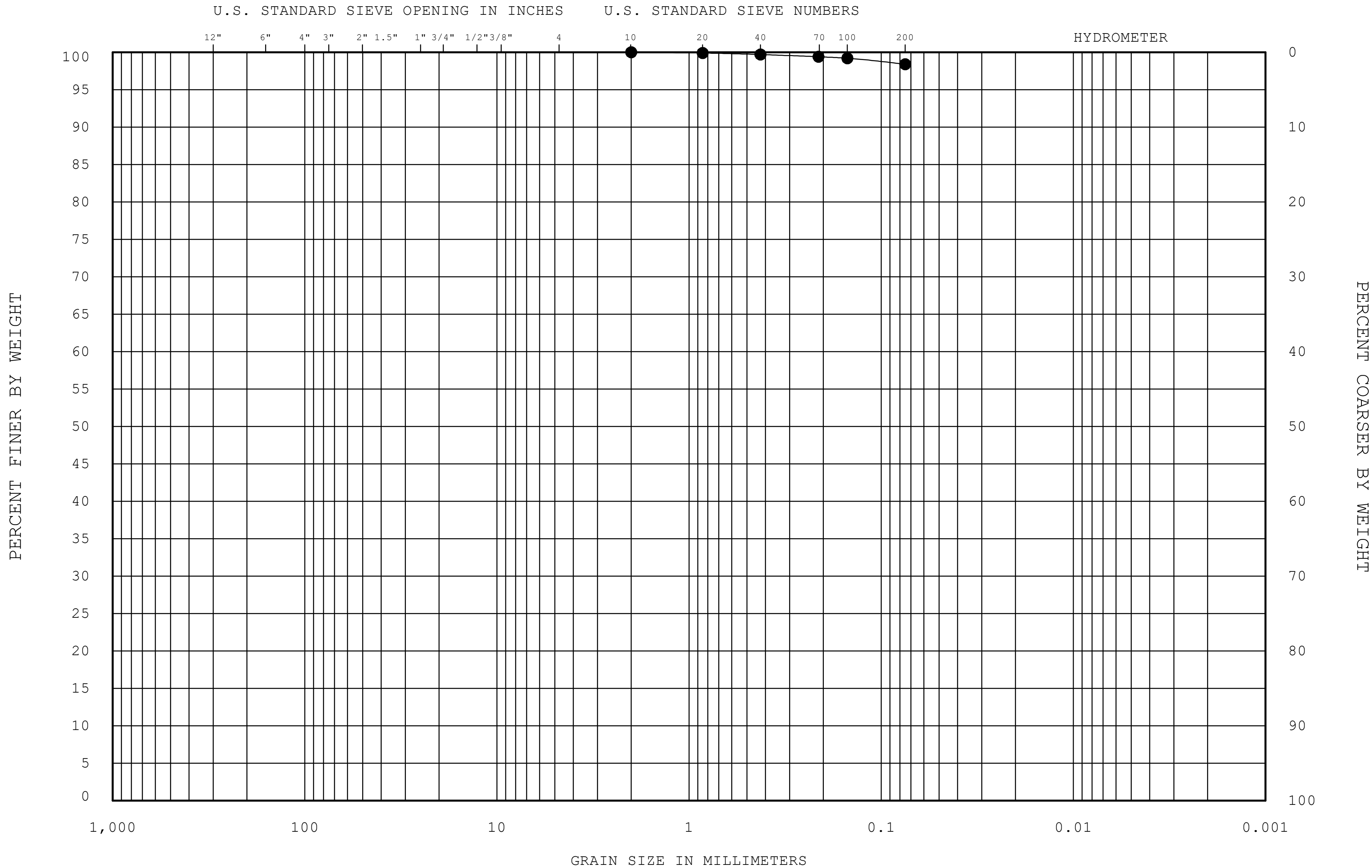
AREA: *Dorchester Co. MD*

BORING NO.: *B-244*

DATE: *Jan-2020*

REMARKS : SPECIFIC GRAVITY: 2.70 SAMPLE AT AND ABOVE #10 SIEVE MADE UP OF APPROXIMATELY 100% SHELL MATERIAL

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ **GRADATION CURVES** TEST METHODS: ASTM D 422, D4318, D2216



COBBLES	GRAVEL		SAND			SILT or CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Jar-7	15.0-16.5	FAT CLAY	CH		65	29	36
—⊠—								
—▲—								
—★—								

PROJECT: Midbay Island - Barren Island

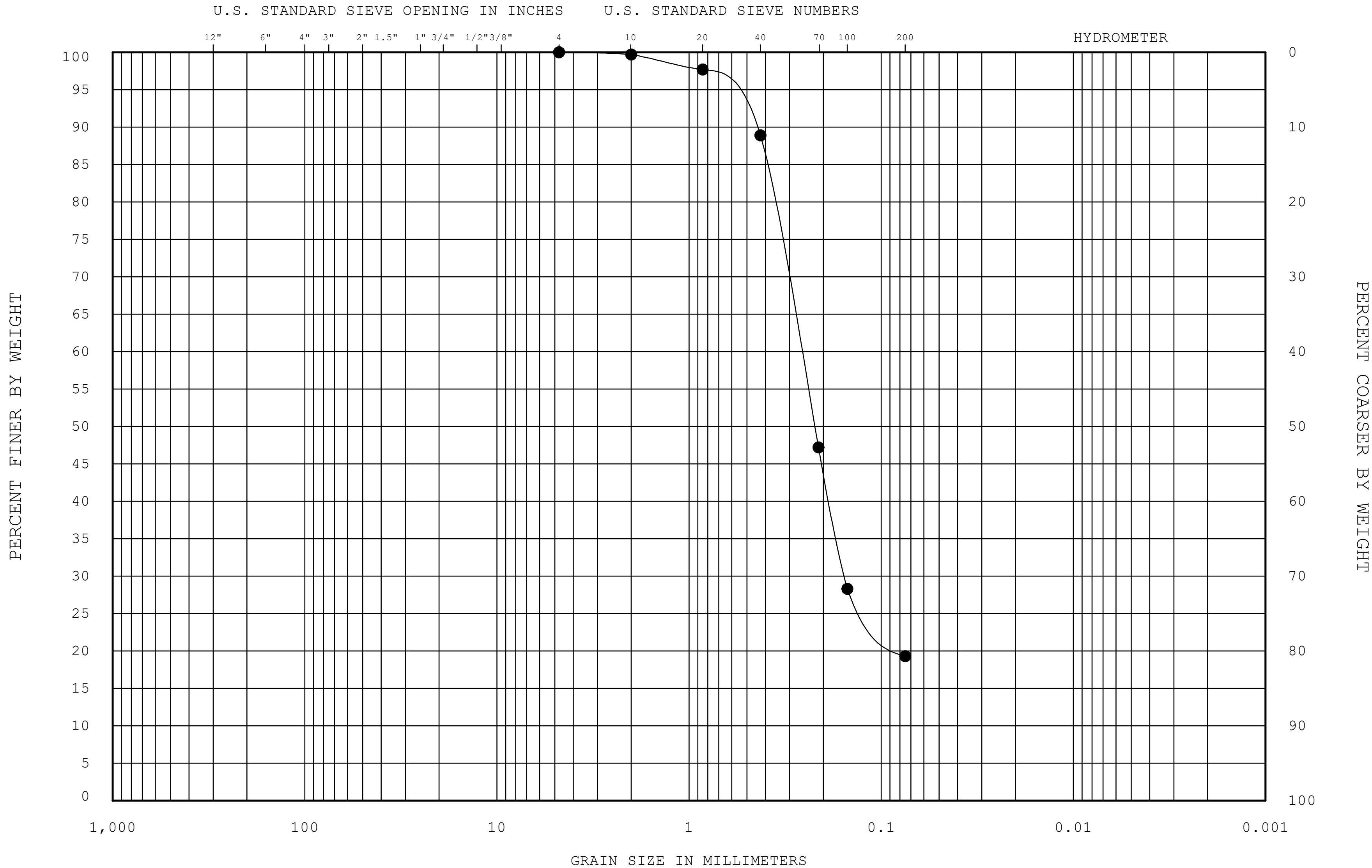
AREA: Dorchester Co. MD

BORING NO.: B-244

DATE: Jan-2020

REMARKS :

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ **GRADATION CURVES** TEST METHODS: ASTM D 422, D4318, D2216



COBBLES	GRAVEL		SAND			SILT or CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
●	Jar-12A	27.5-29.0	SILTY SAND	SM		19	19	NP
⊠								
▲								
★								

PROJECT: *Midbay Island - Barren Island*

AREA: *Dorchester Co. MD*

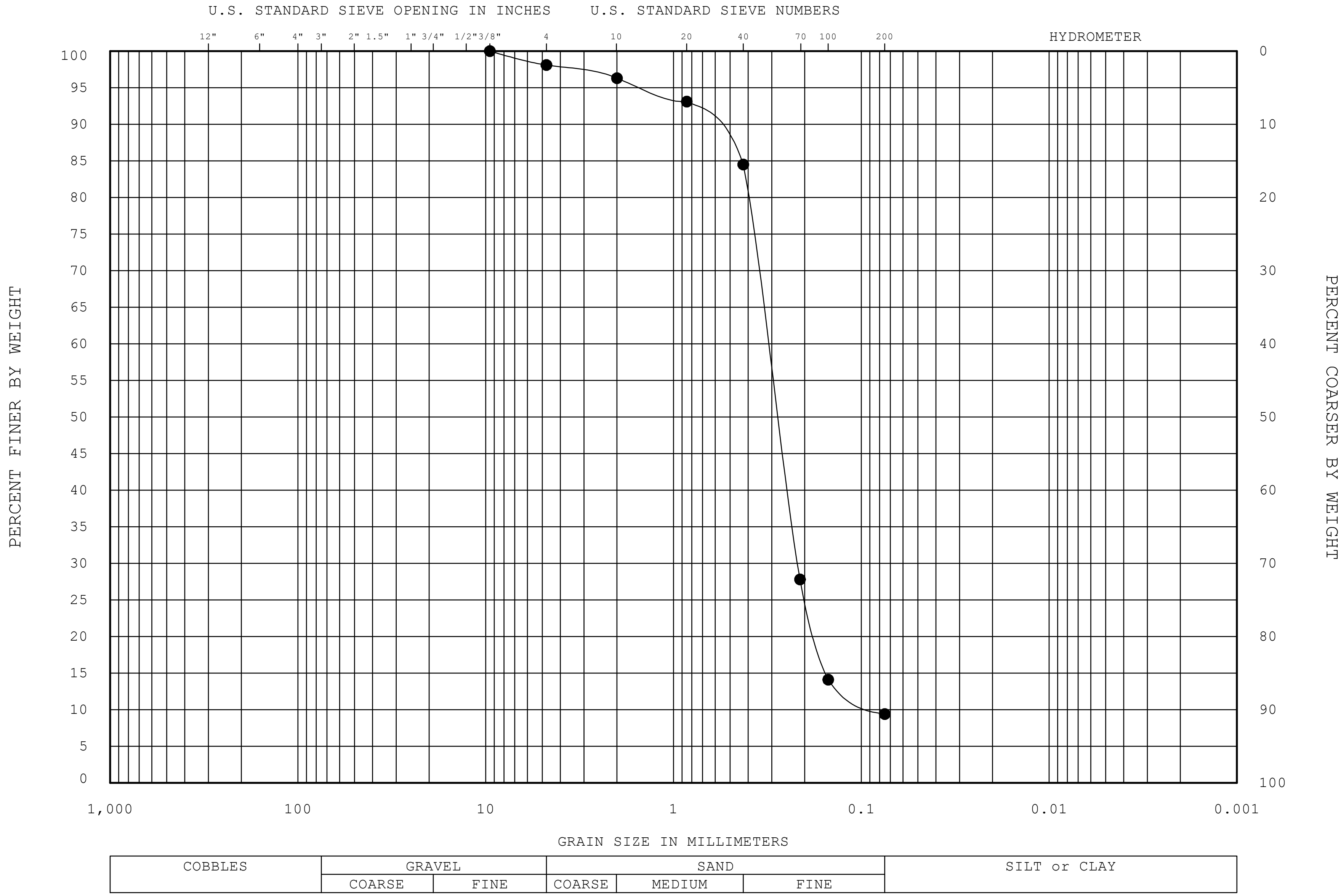
BORING NO.: *B-244*

DATE: *Jan-2020*

REMARKS :

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ

GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
●	Jar-14	32.5-34.0	POORLY GRADED SAND with SILT	SP-SM		19	19	NP
⊠								
▲								
★								

REMARKS :

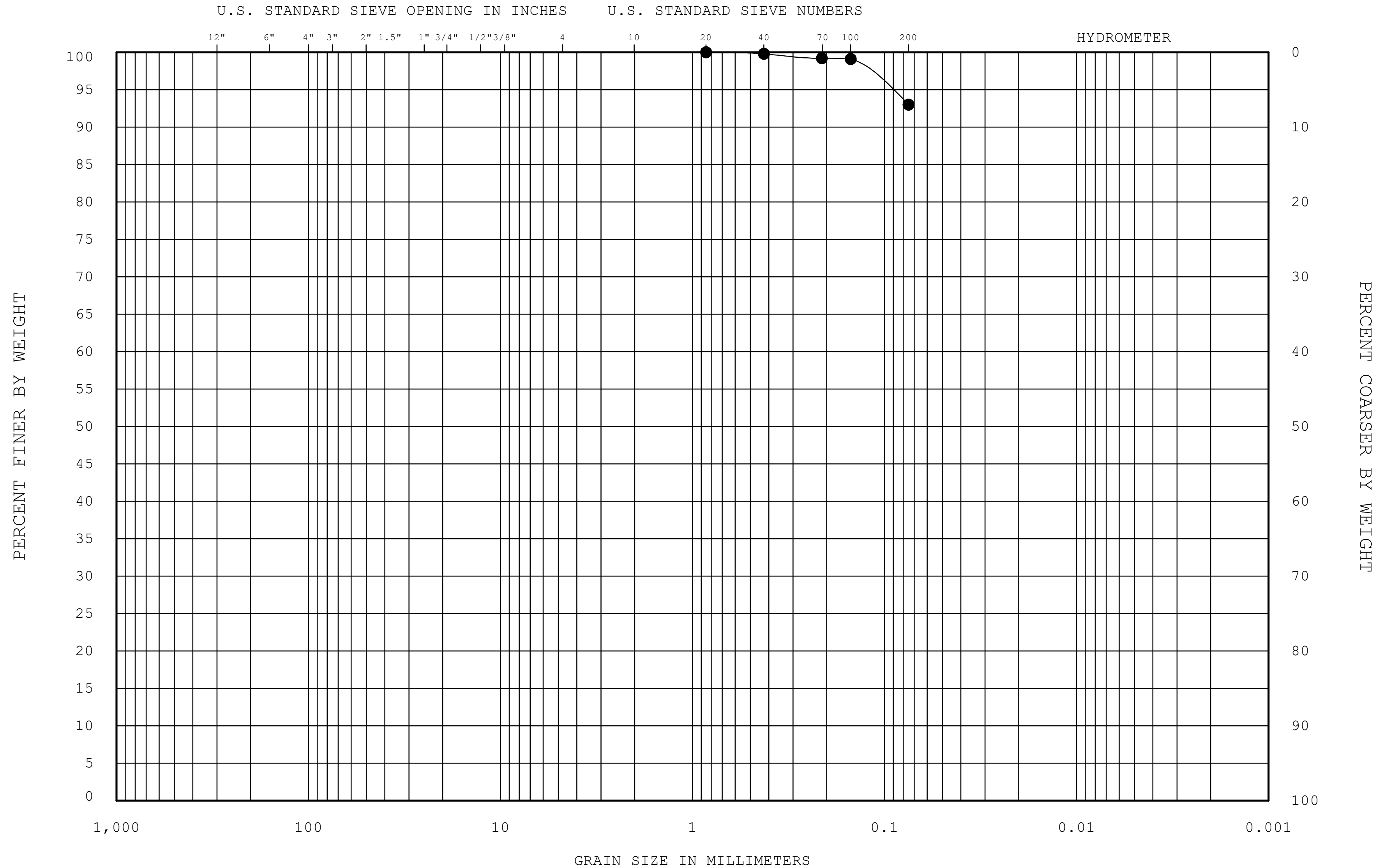
PROJECT: *Midbay Island - Barren Island*

AREA: *Dorchester Co. MD*

BORING NO.: *B-244*

DATE: *Jan-2020*

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ **GRADATION CURVES** TEST METHODS: ASTM D 422, D4318, D2216



COBBLES	GRAVEL		SAND			SILT or CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
●	Jar-22	52.5-54.0	LEAN CLAY	CL				
☒								
▲								
★								

REMARKS :

PROJECT: *Midbay Island - Barren Island*

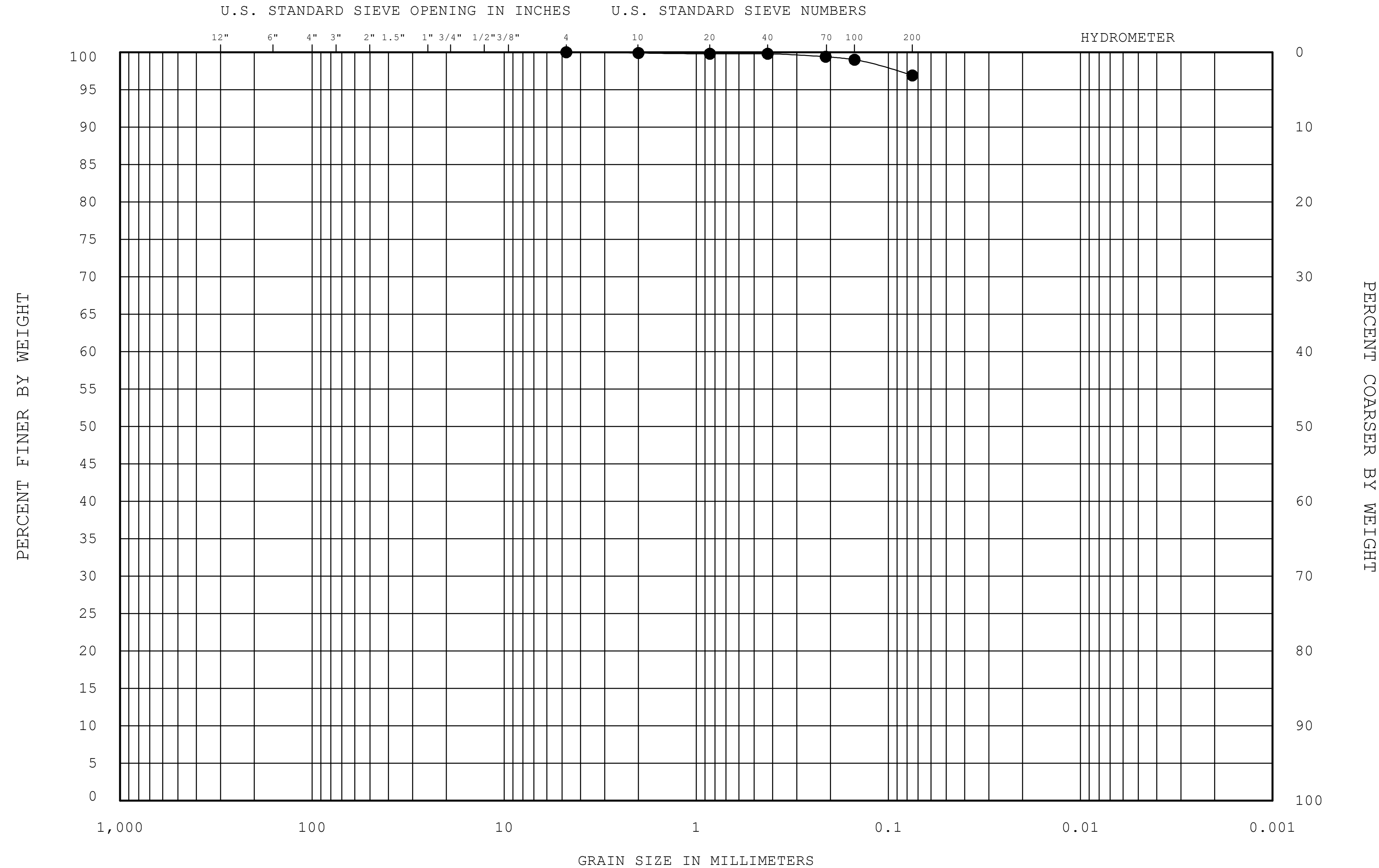
AREA: *Dorchester Co. MD*

BORING NO.: *B-244*

DATE: *Jan-2020*

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ

GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216



COBBLES	GRAVEL		SAND			SILT or CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Jar-3	5.0-6.5	FAT CLAY	CH		55	24	31
—⊠—								
—▲—								
—★—								

REMARKS : SAMPLE AT AND ABOVE #40 SIEVE MADE UP OF APPROXIMATELY 50% SHELL MATERIAL

PROJECT: *Midbay Island - Barren Island*

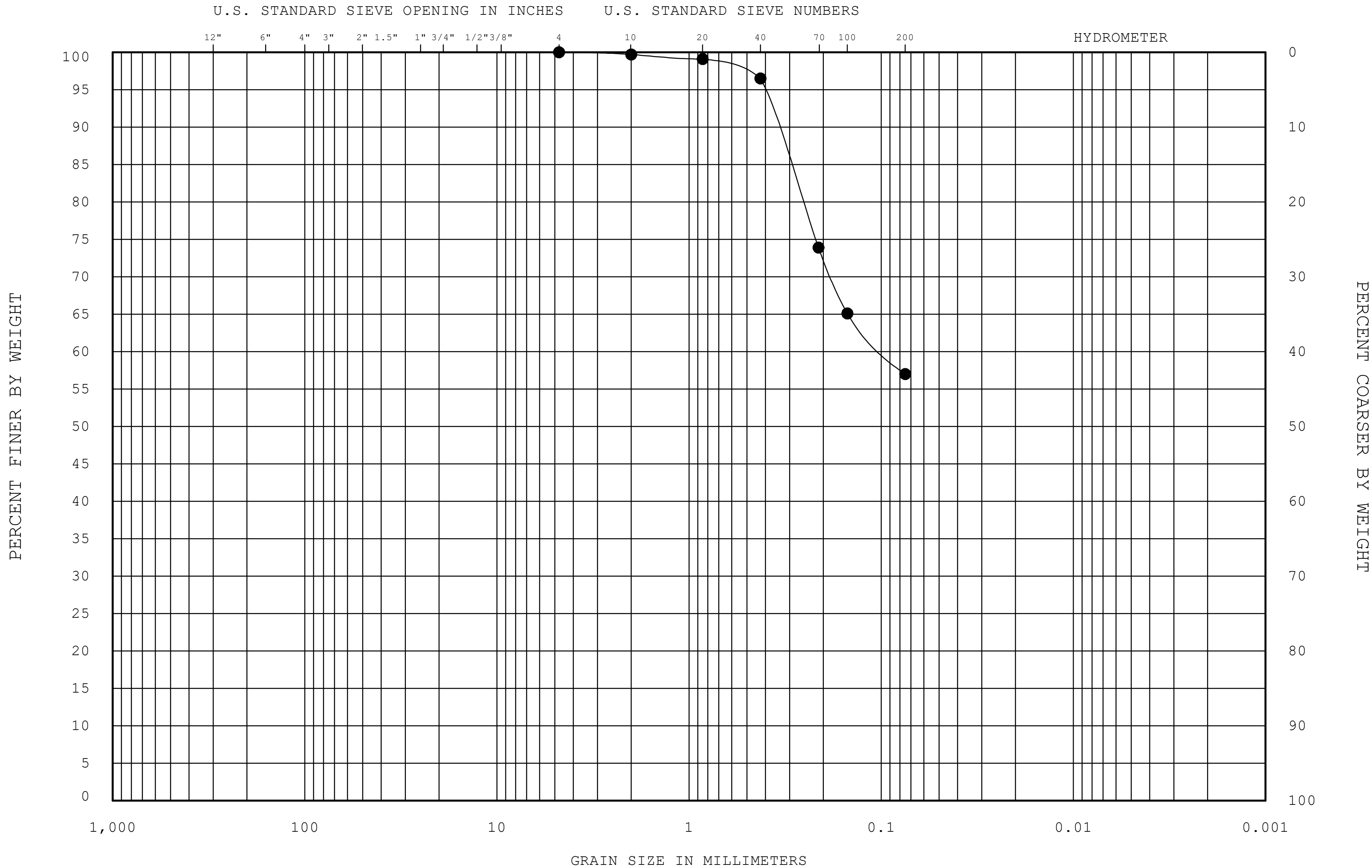
AREA: *Dorchester Co. MD*

BORING NO.: *B-246*

DATE: *Jan-2020*

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ

GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216



COBBLES	GRAVEL		SAND			SILT or CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Jar-6	12.5-14.0	SANDY SILT	ML		19	17	2
—⊠—								
—▲—								
—★—								

PROJECT: *Midbay Island - Barren Island*

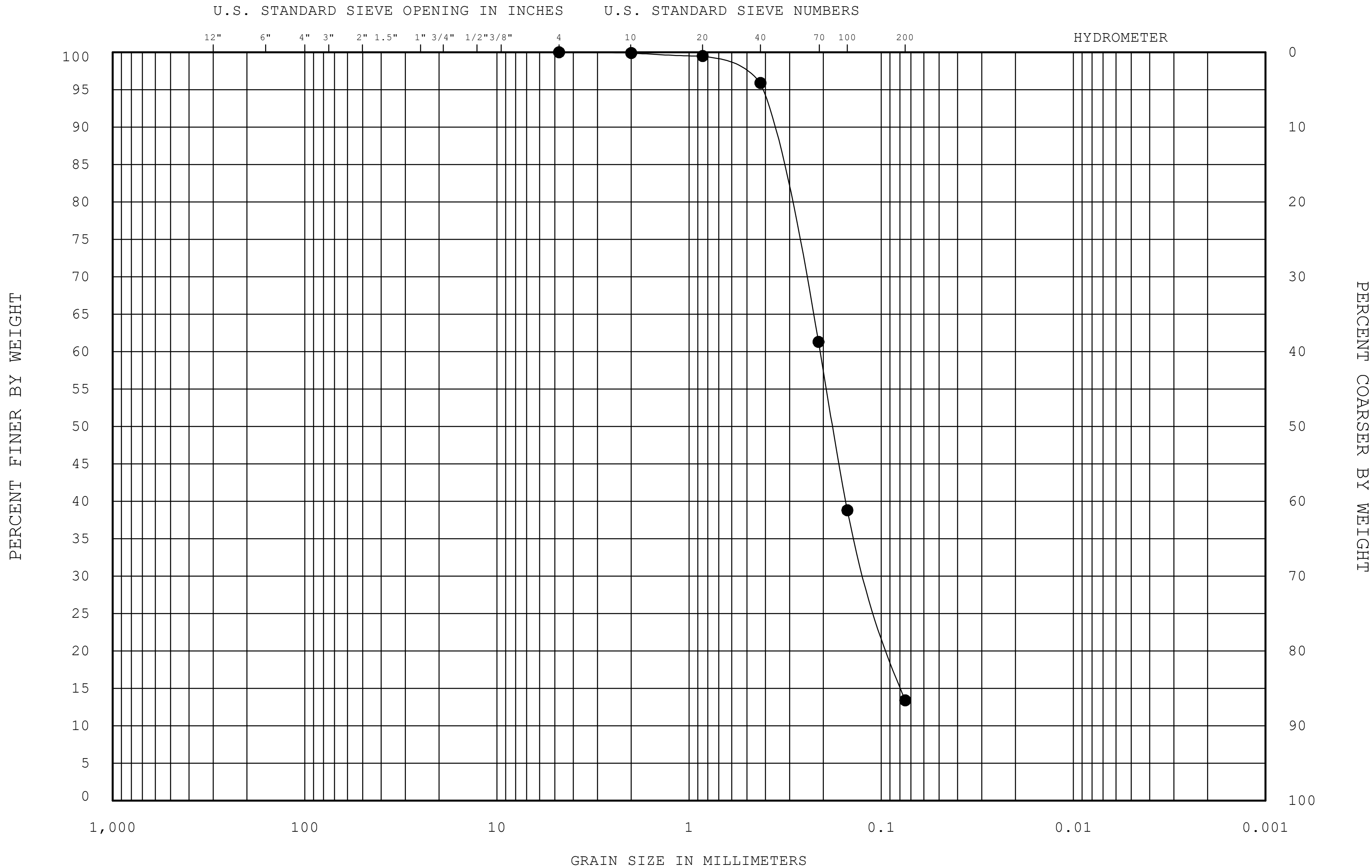
AREA: *Dorchester Co. MD*

BORING NO.: *B-246*

DATE: *Jan-2020*

REMARKS :

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ **GRADATION CURVES** TEST METHODS: ASTM D 422, D4318, D2216



COBBLES	GRAVEL		SAND			SILT or CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Jar-11	25.0-26.5	SILTY SAND	SM				
—⊠—								
—▲—								
—★—								

REMARKS :

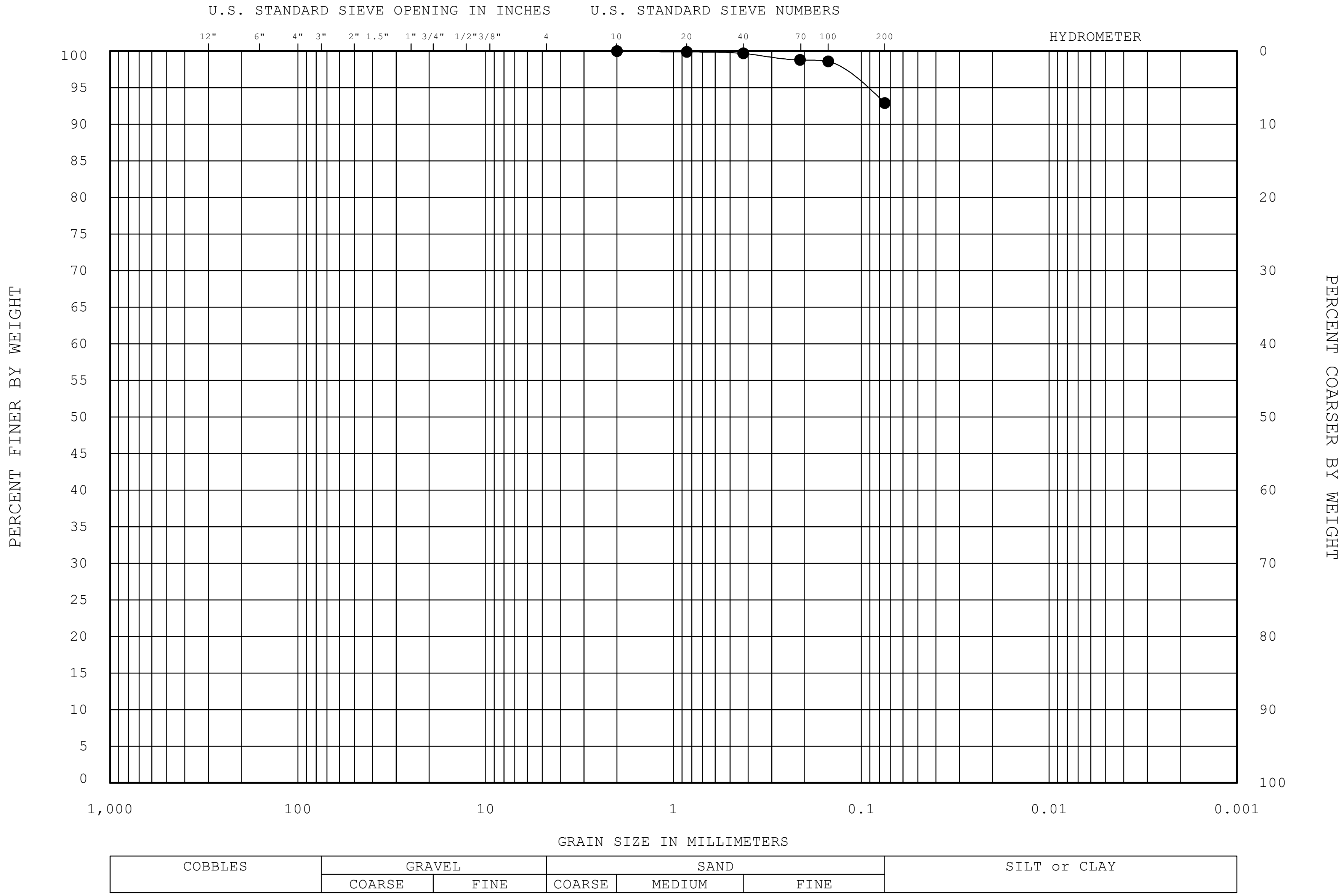
PROJECT: *Midbay Island - Barren Island*

AREA: *Dorchester Co. MD*

BORING NO.: *B-246*

DATE: *Jan-2020*

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ **GRADATION CURVES** TEST METHODS: ASTM D 422, D4318, D2216



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
●	Jar-16	37.5-39.0	FAT CLAY	CH				
⊠								
▲								
★								

REMARKS :

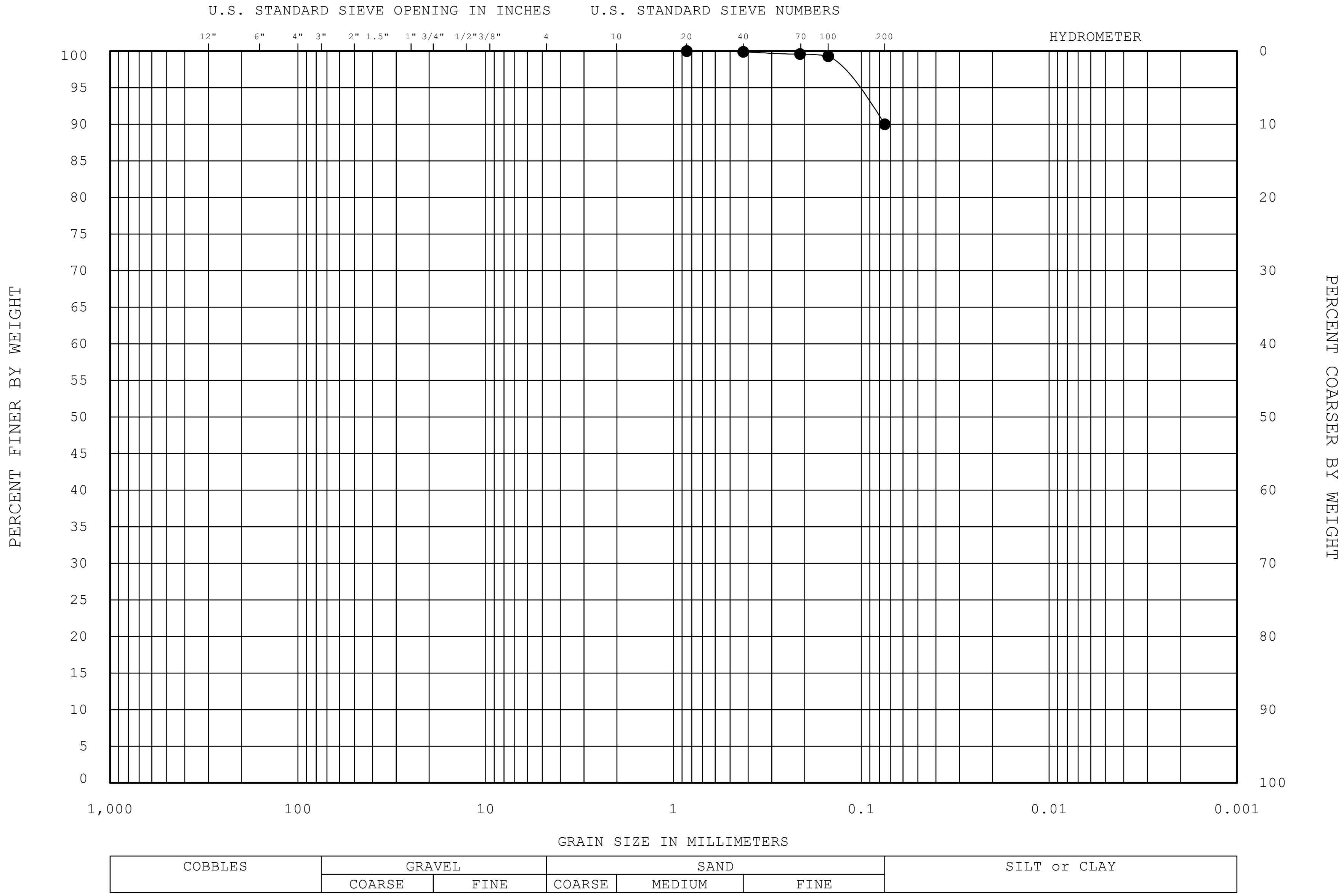
PROJECT: *Midbay Island - Barren Island*

AREA: *Dorchester Co. MD*

BORING NO.: *B-246*

DATE: *Jan-2020*

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ **GRADATION CURVES** TEST METHODS: ASTM D 422, D4318, D2216



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Jar-25	60.0-61.5	LEAN CLAY	CL		42	16	26
—☒—								
—▲—								
—★—								

PROJECT: *Midbay Island - Barren Island*

AREA: *Dorchester Co. MD*

BORING NO.: *B-246*

DATE: *Jan-2020*

REMARKS :

ENG FORM ENG2087MIDBAY ISLAND_BARREN ISLAND PHASE 1.GPJ

GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216

End of Report.

PROJECT: Barren Island

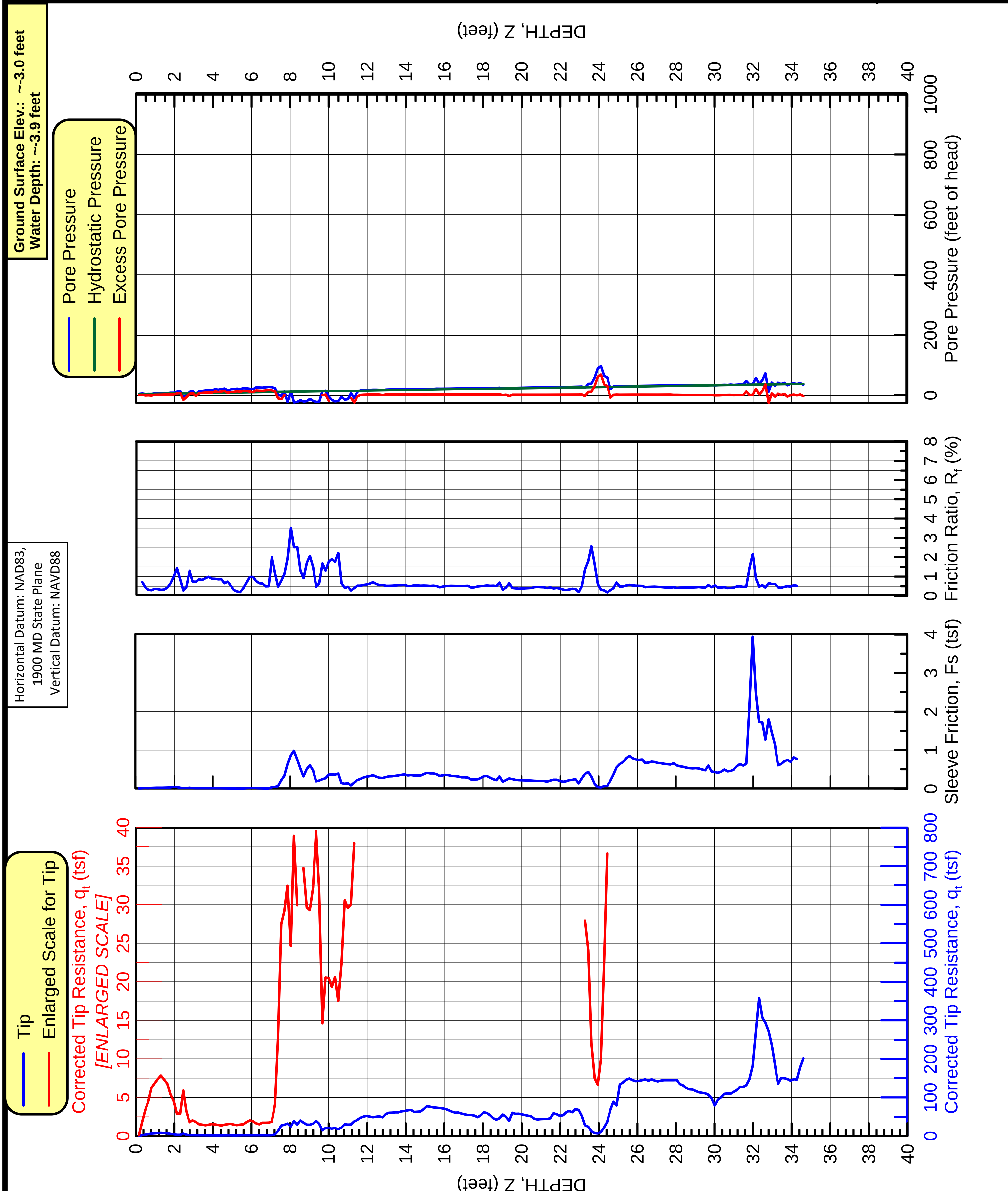
LOCATION: Dorchester County, Maryland N246,061.4 E1,526,666.5

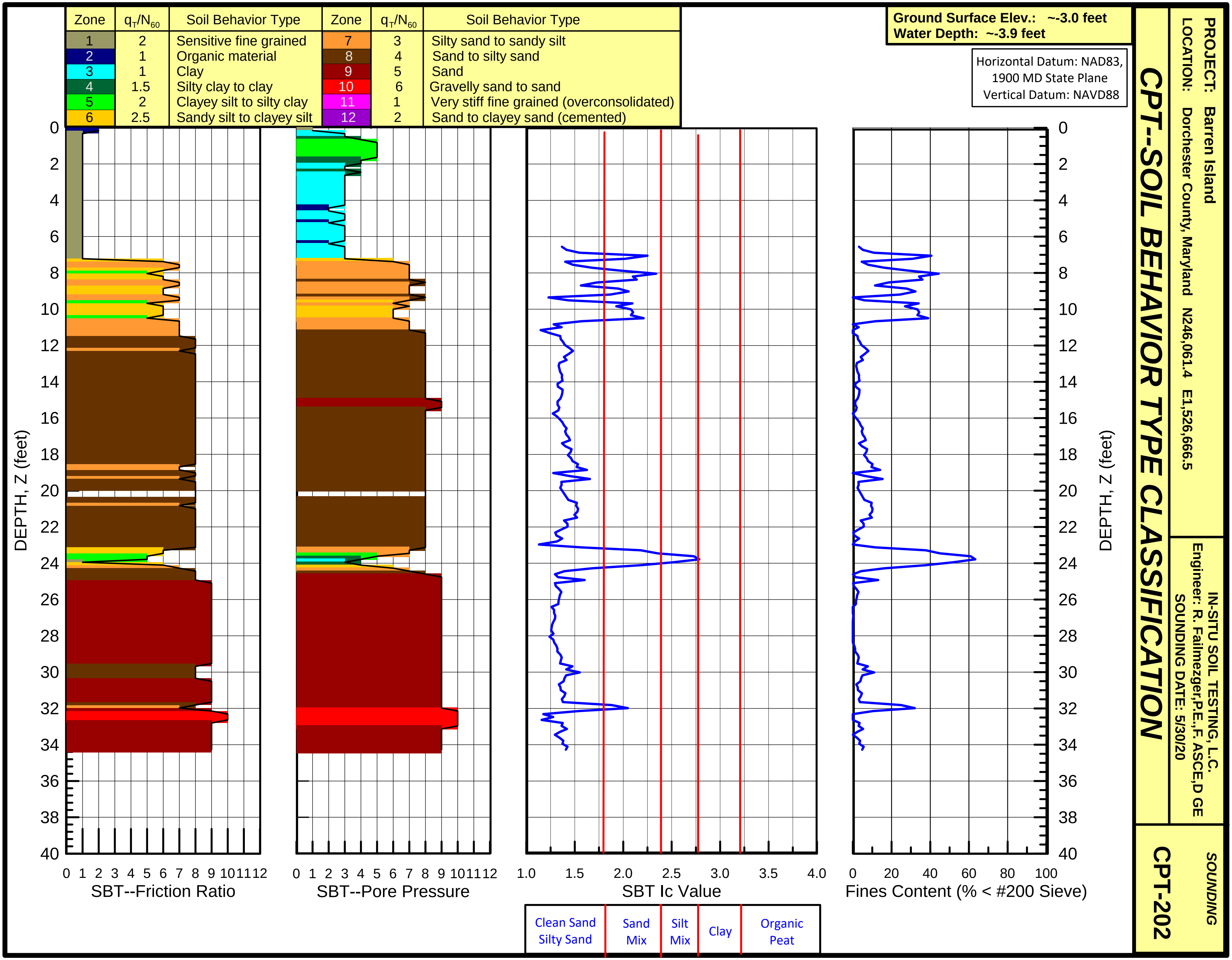
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 5/30/20

SOUNDING

CPT-202

CONE PENETROMETER TEST RESULTS



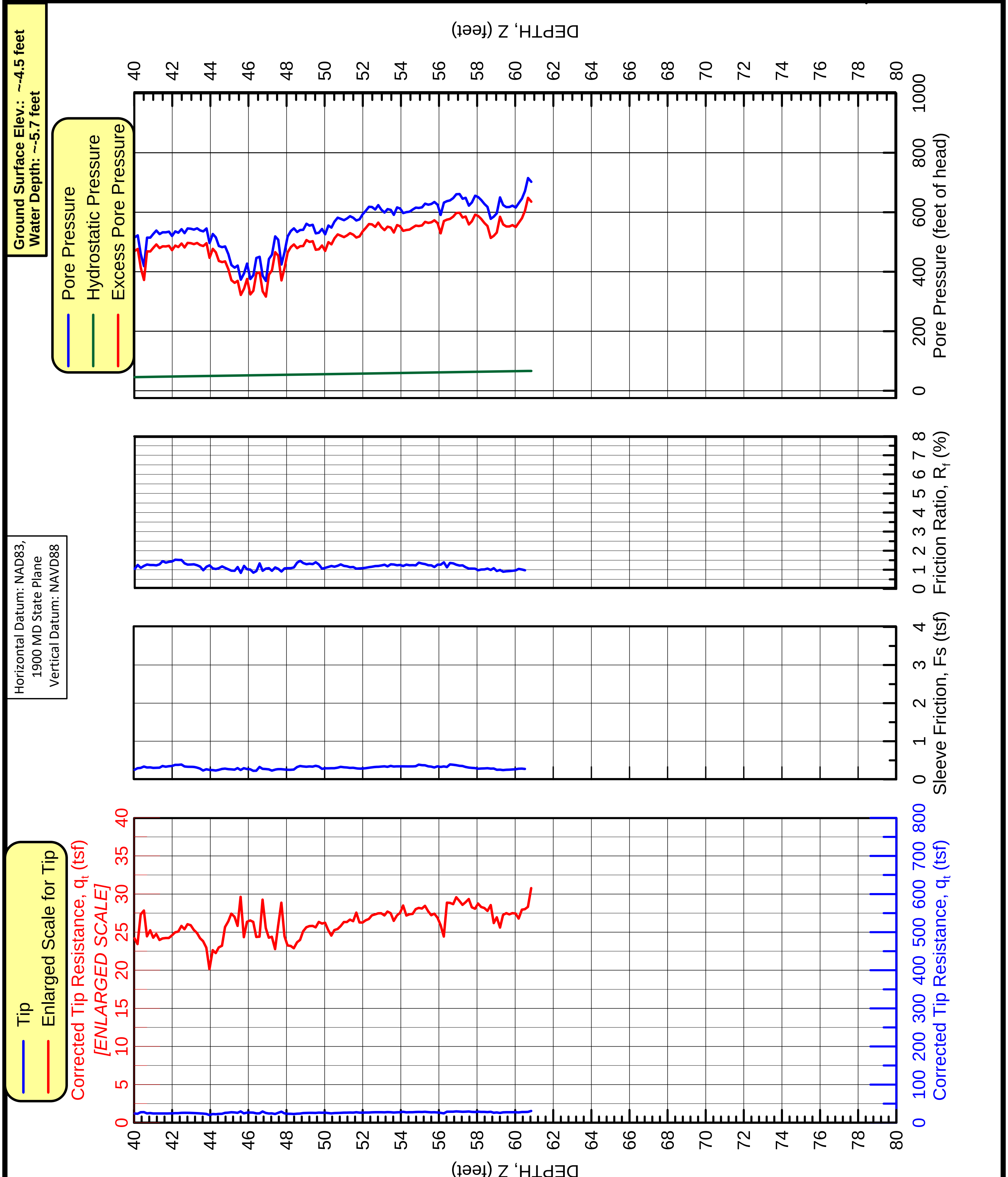


Zone | qT/N60 | Soil Behavior Type
1 | 2 | Sensitive fine grained
2 | 1 | Organic material
3 | 1 | Clay
4 | 1.5 | Silty clay to clay
5 | 2 | Clayey silt to silty clay
6 | 2.5 | Sandy silt to clayey silt
7 | 3 | Silty sand to sandy silt
8 | 4 | Sand to silty sand
9 | 5 | Sand
10 | 6 | Gravelly sand to sand
11 | 1 | Very stiff fine grained (overconsolidated)
12 | 2 | Sand to clayey sand (cemented)
Ground Surface Elev.: ~-3.0 feet
Water Depth: ~-3.9 feet
Horizontal Datum: NAD83, 1900 MD State Plane
Vertical Datum: NAVD88
DEPTH, Z (feet)
SBT--Friction Ratio
SBT--Pore Pressure
SBT Ic Value
Fines Content (% < #200 Sieve)
Clean Sand Silty Sand
Sand Mix
Silt Mix
Clay
Organic Peat
CPT--SOIL BEHAVIOR TYPE CLASSIFICATION
PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N246,061.4 E1,526,666.5
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 5/30/20
SOUNDING
CPT-202

PROJECT:	Barren Island	IN-SITU SOIL TESTING, L.C. Engineer: R. Failmezger,P.E.,F. ASCE,D GE SOUNDING DATE: 5/29/20	*SOUNDING*
LOCATION:	Dorchester County, Maryland N246,401 E1,526,344		

CONE PENETROMETER TEST RESULTS

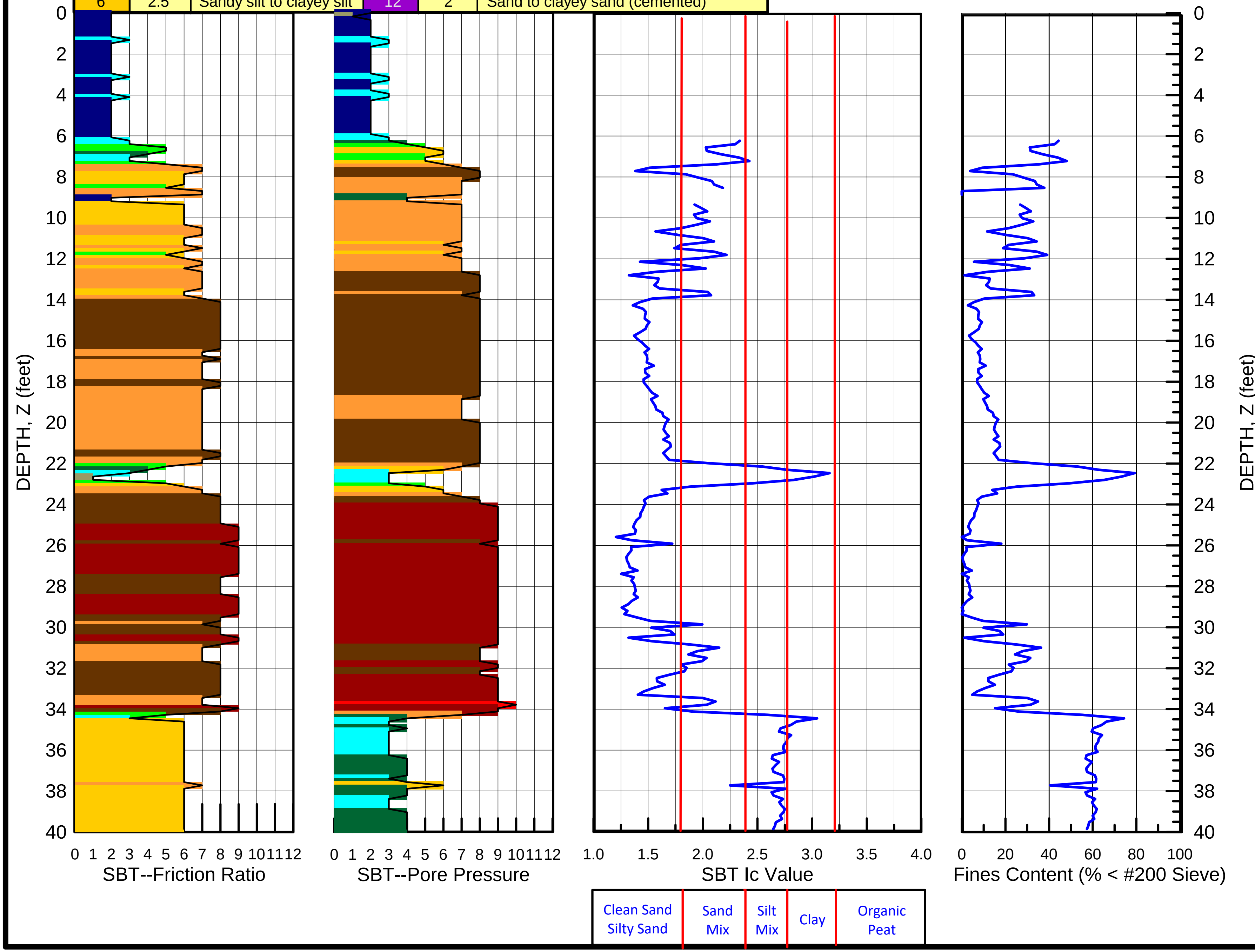
CPT-203



Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~-4.5 feet
Water Depth: ~-5.7 feet

Horizontal Datum: NAD83, 1900 MD State Plane
Vertical Datum: NAVD88



CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N246,401 E1,526,344

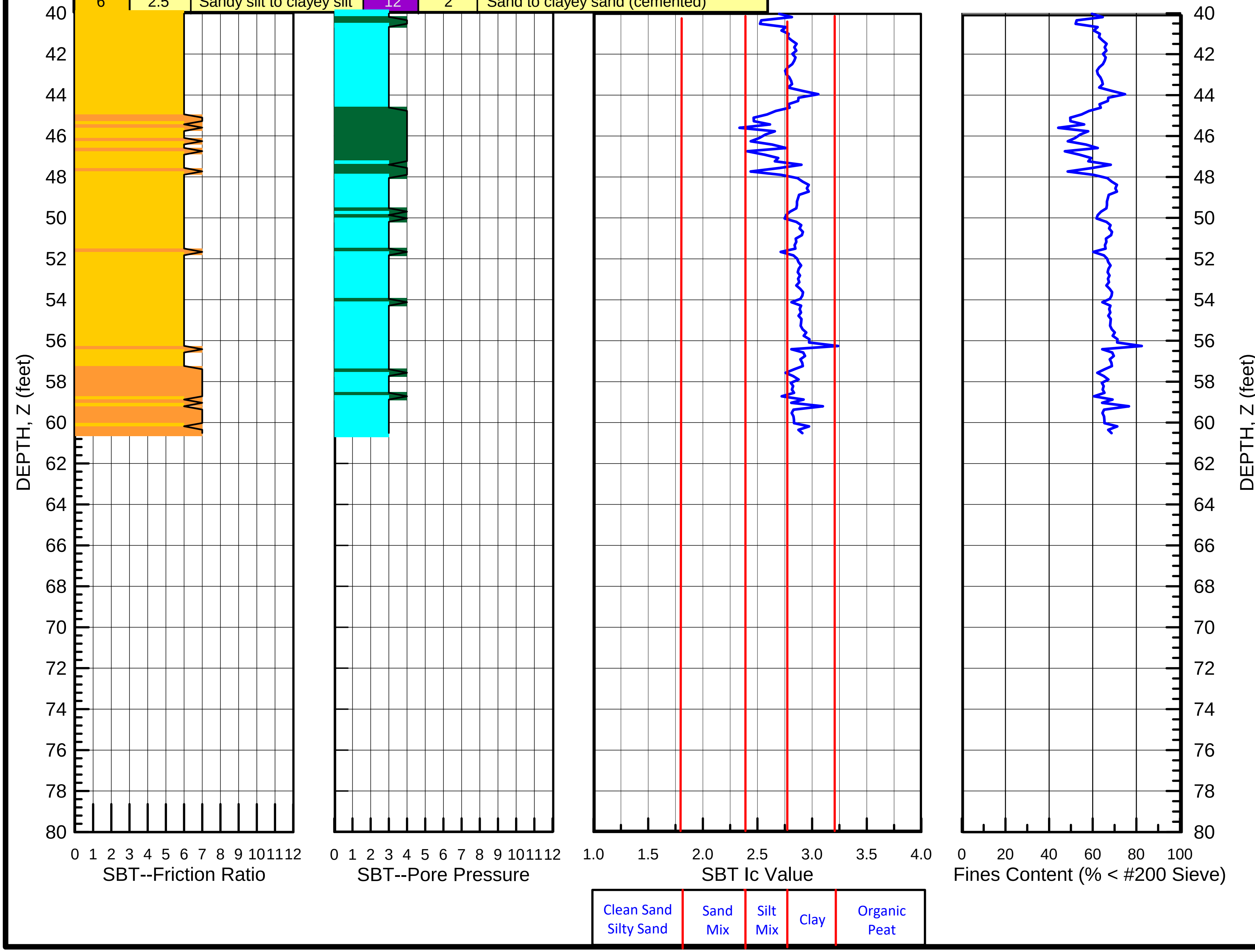
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 5/29/20

SOUNDING
CPT-203

Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~-4.5 feet
Water Depth: ~-5.7 feet

Horizontal Datum: NAD83, 1900 MD State Plane
Vertical Datum: NAVD88



CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N246,401 E1,526,344

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 5/29/20

SOUNDING
CPT-203

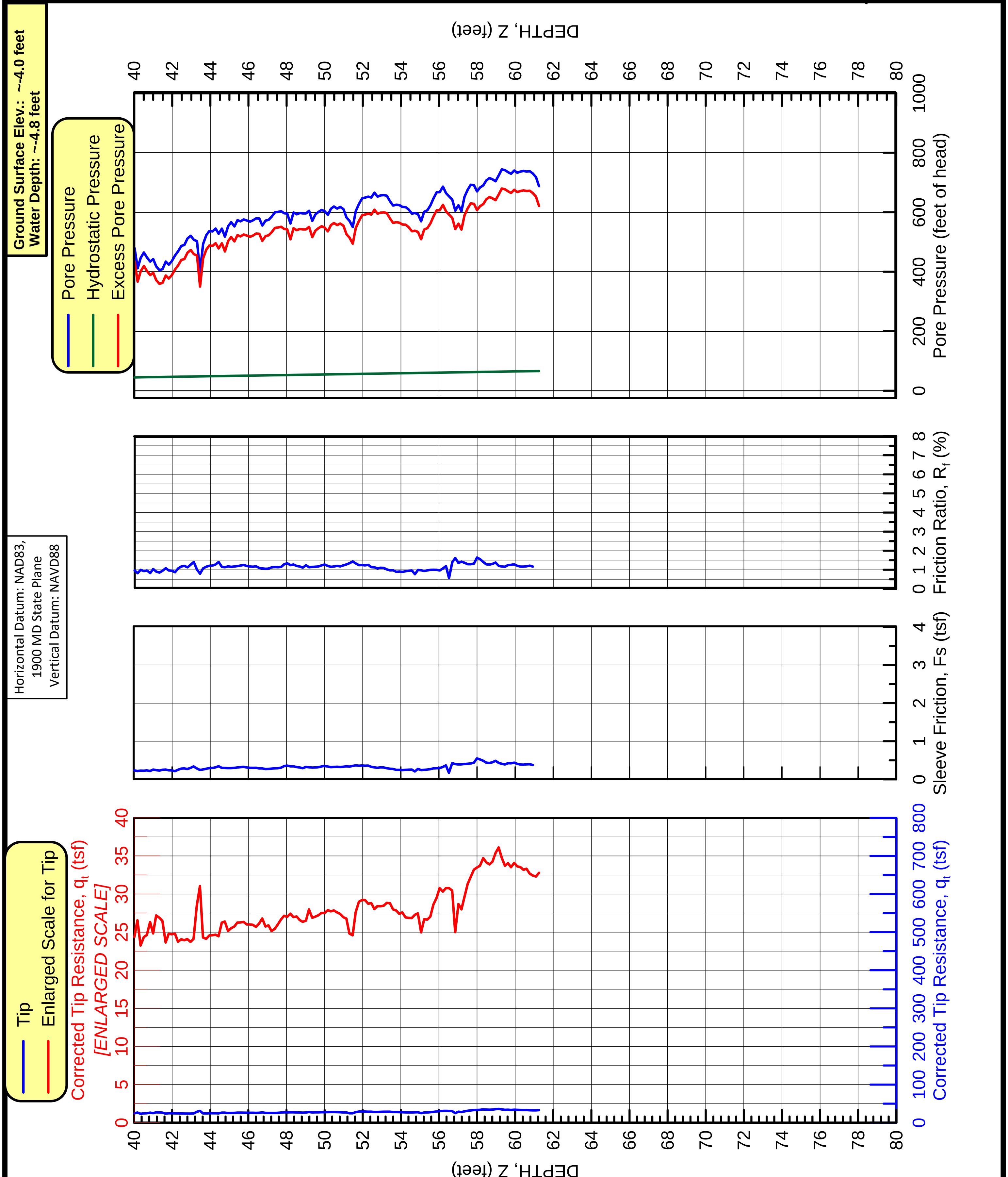
PROJECT: **Barren Island**
LOCATION: **Dorchester County, Maryland N246,705 E1,525,944**

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 5/29/20

SOUNDING

CPT-204

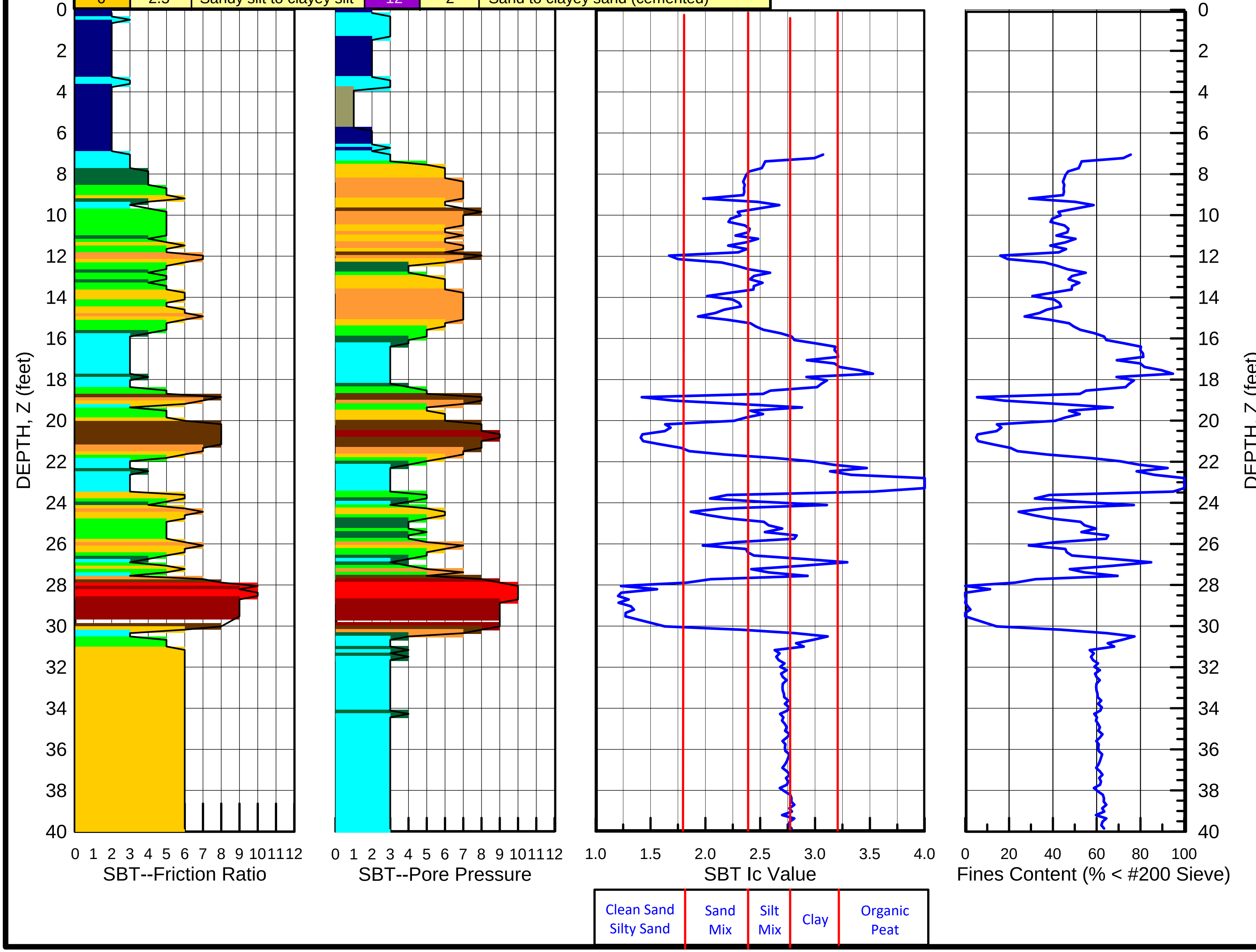
CONE PENETROMETER TEST RESULTS



Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~-4.0 feet
Water Depth: ~-4.8 feet

Horizontal Datum: NAD83,
1900 MD State Plane
Vertical Datum: NAVD88



CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N246,705 E1,525,944

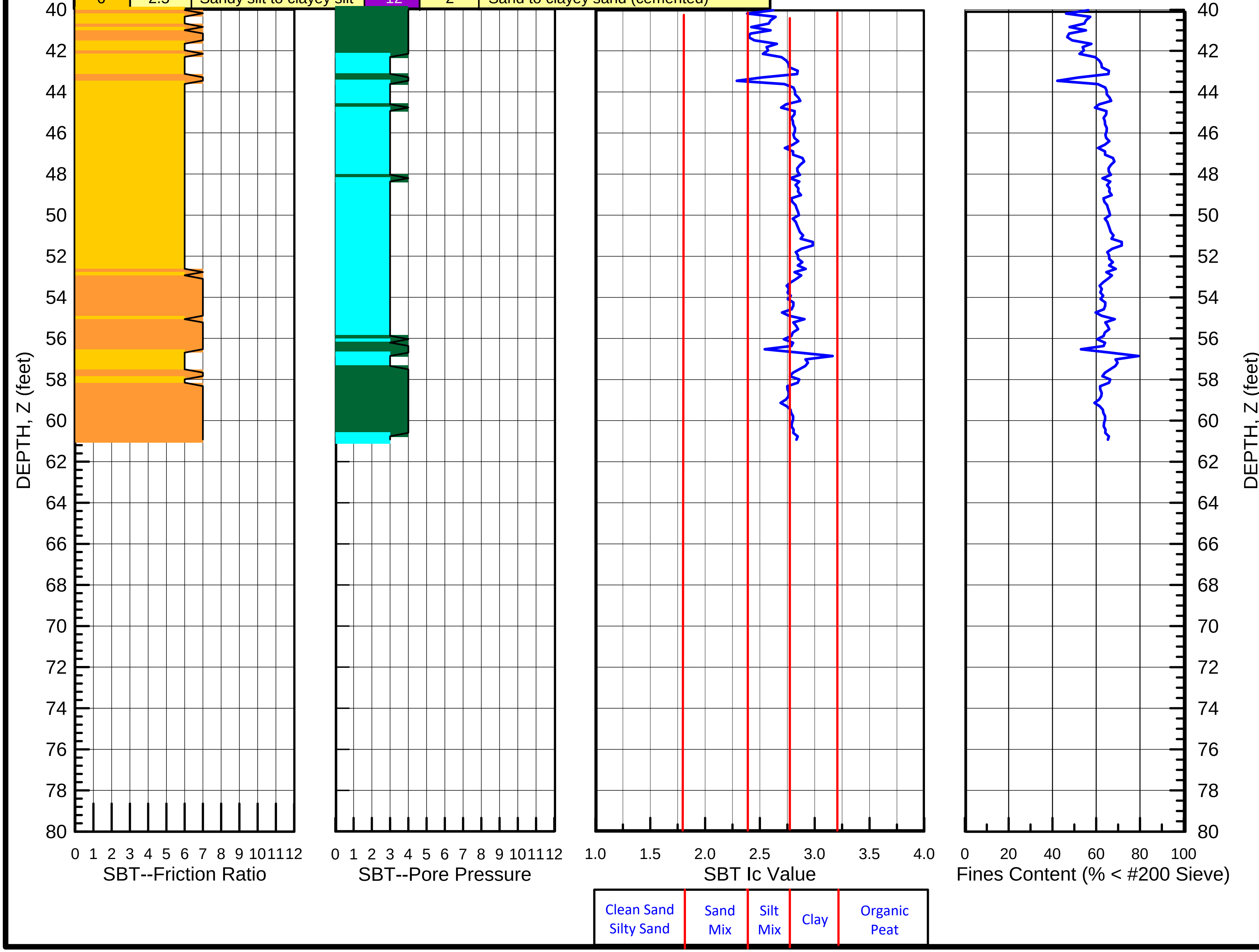
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 5/29/20

SOUNDING
CPT-204

Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~-4.0 feet
Water Depth: ~-4.8 feet

Horizontal Datum: NAD83, 1900 MD State Plane
Vertical Datum: NAVD88



CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

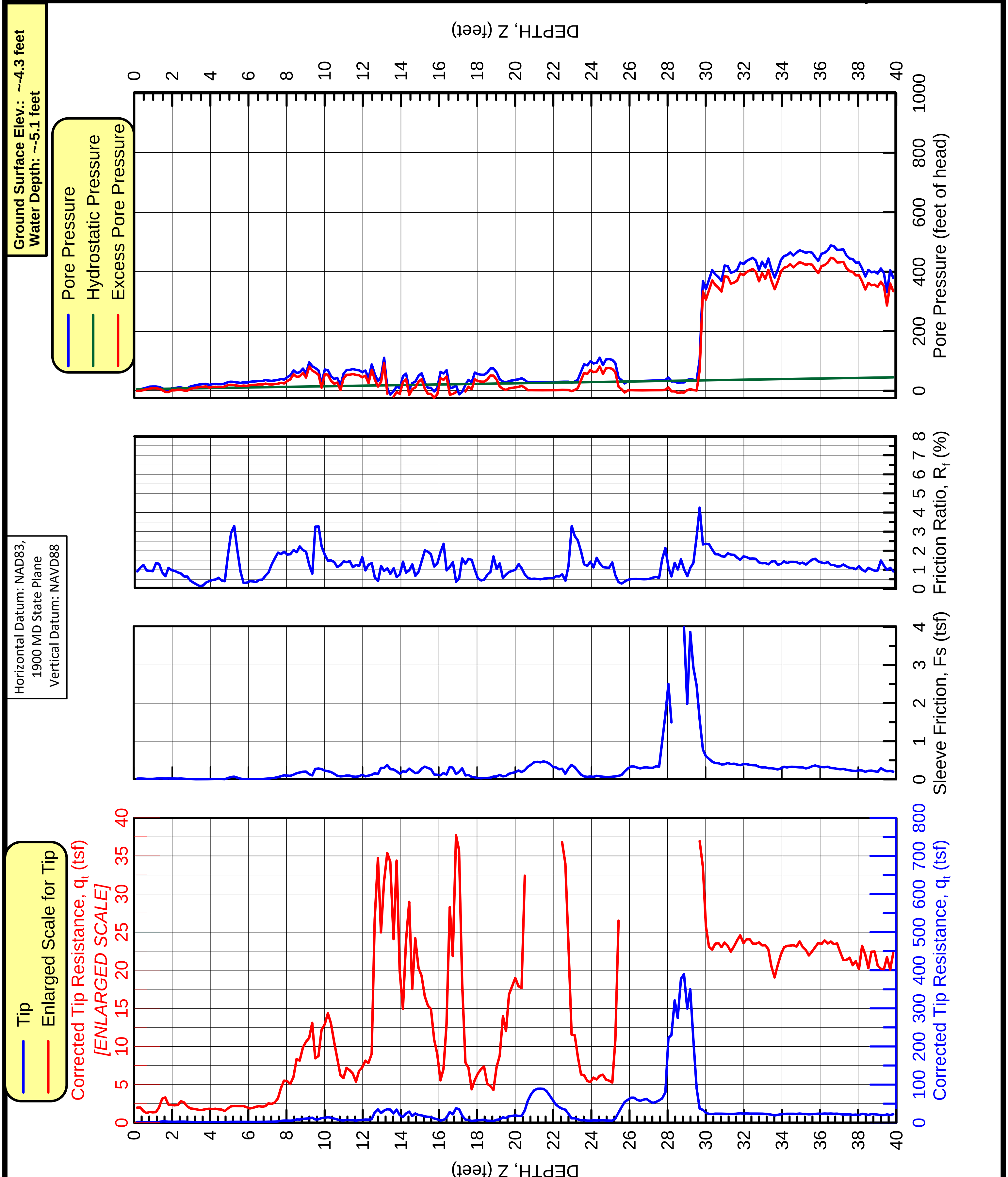
PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N246,705 E1,525,944

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 5/29/20

SOUNDING
CPT-204

PROJECT: Barren Island **LOCATION:** Dorchester County, Maryland N246,889.5 E1,525,485.2	**IN-SITU SOIL TESTING, L.C.** **Engineer: R. Failmezger,P.E.,F. ASCE,D GE** **SOUNDING DATE: 5/30/20**	***SOUNDING*** **CPT-205**

CONE PENETROMETER TEST RESULTS

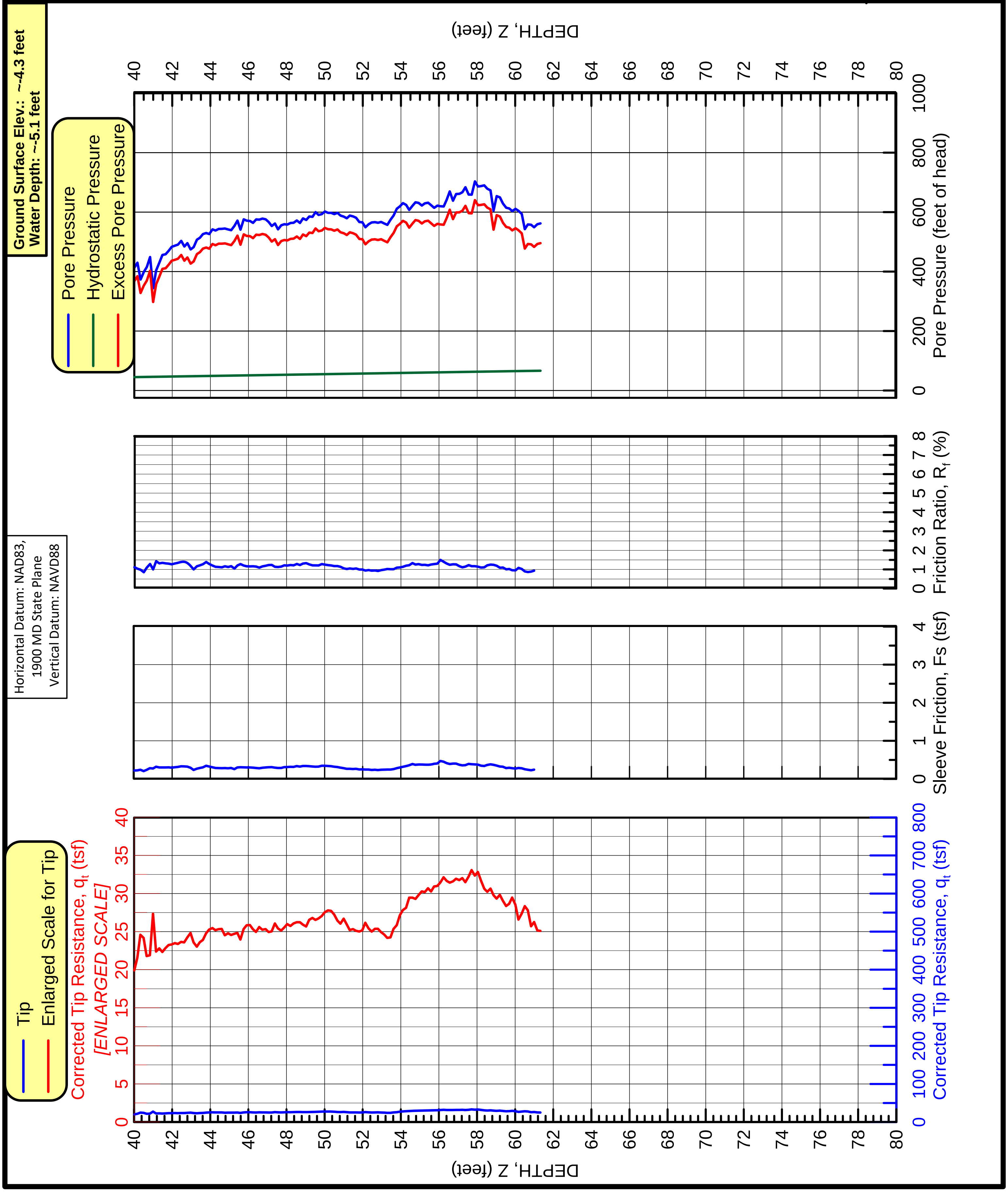


PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N246,889.5 E1,525,485.2

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 5/30/20

SOUNDING
CPT-205

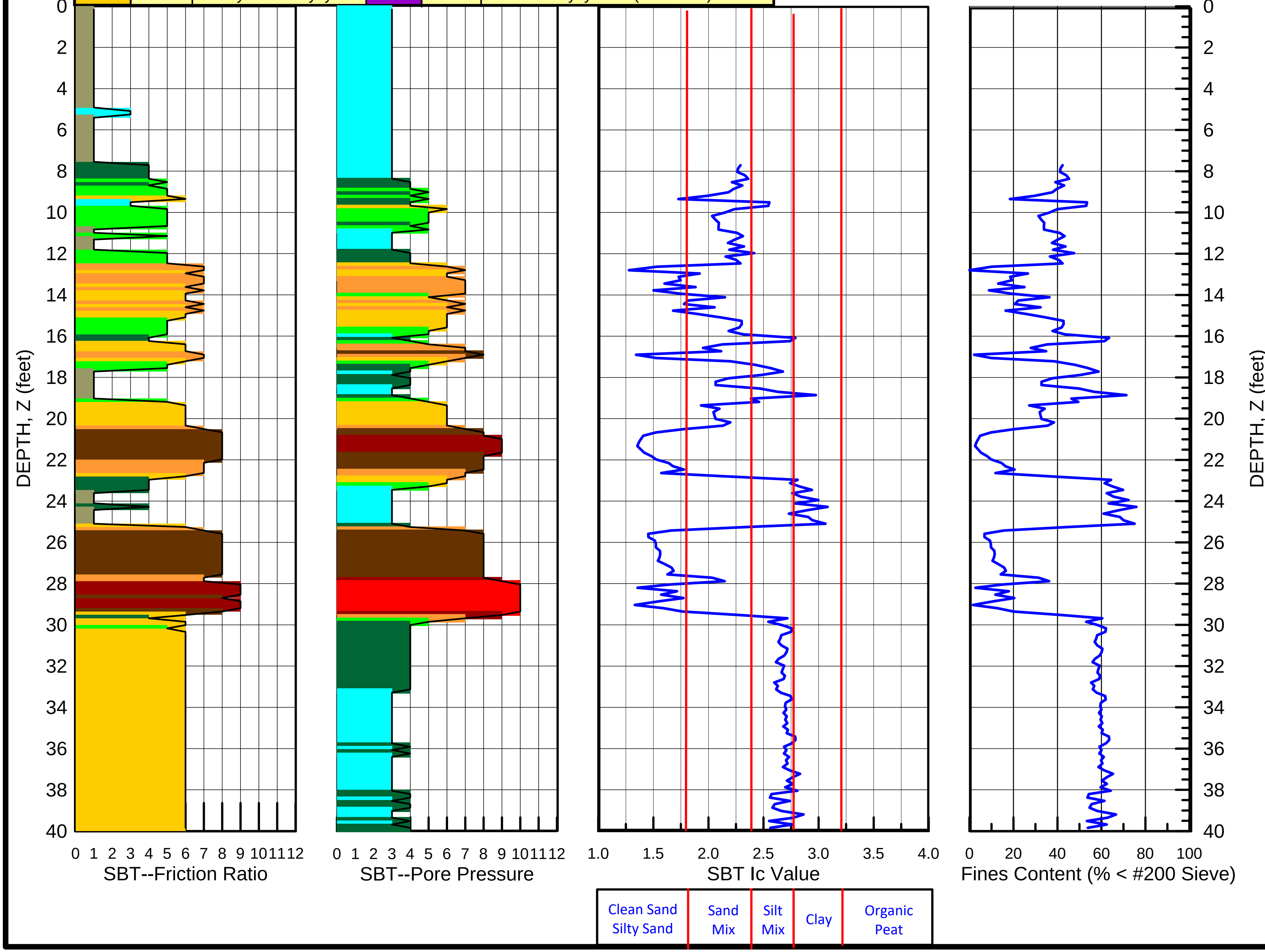
CONE PENETROMETER TEST RESULTS



Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~-4.3 feet
Water Depth: ~-5.1 feet

Horizontal Datum: NAD83,
1900 MD State Plane
Vertical Datum: NAVD88



CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N246,889.5 E1,525,485.2

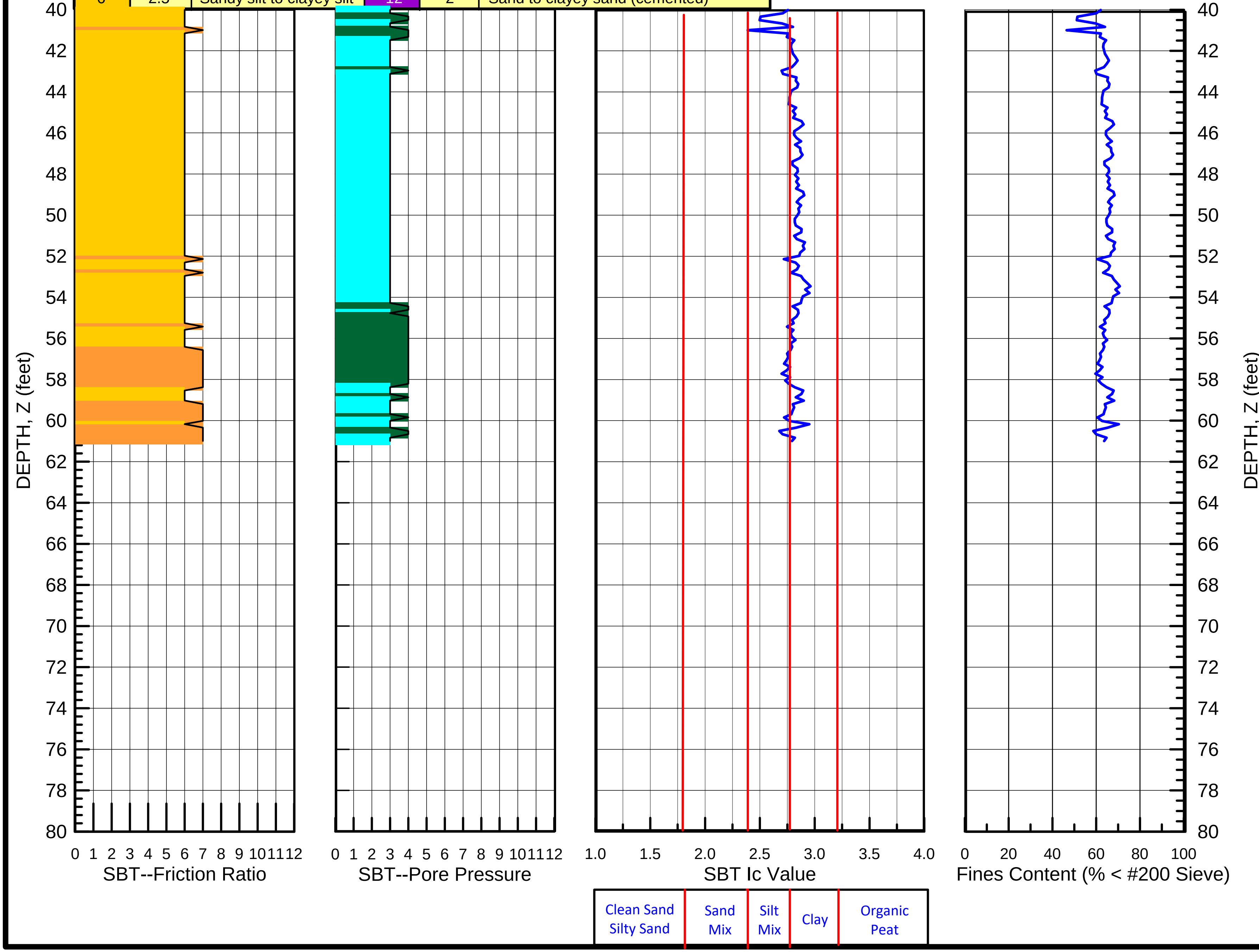
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 5/30/20

SOUNDING
CPT-205

Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~-4.3 feet
Water Depth: ~-5.1 feet

Horizontal Datum: NAD83,
1900 MD State Plane
Vertical Datum: NAVD88



CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N246,889.5 E1,525,485.2

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 5/30/20

SOUNDING
CPT-205

PROJECT: Barren Island

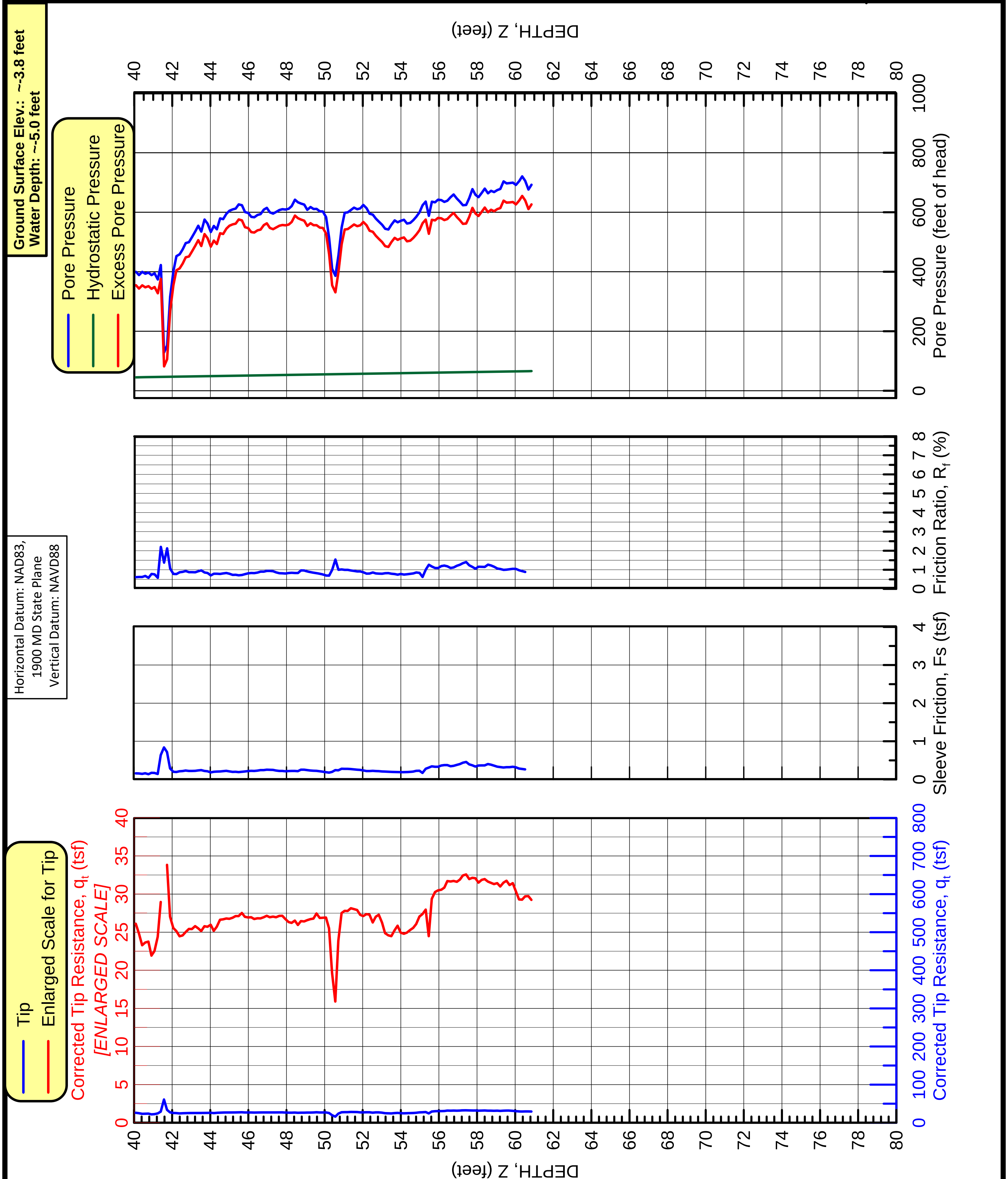
LOCATION: Dorchester County, Maryland N247,096.2 E1,525,029.2

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 6/2/20

SOUNDING

CPT-206

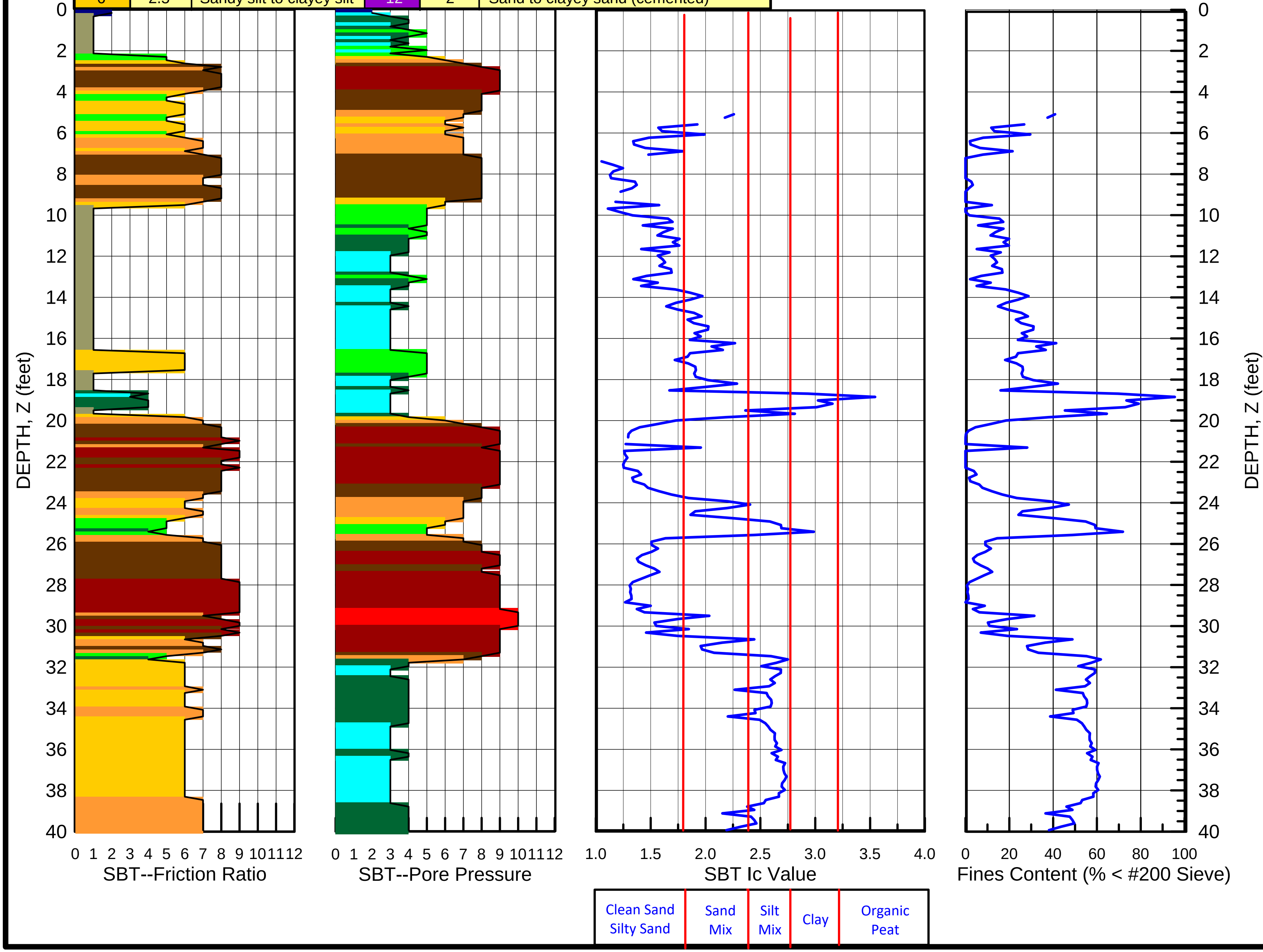
CONE PENETROMETER TEST RESULTS



Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~-3.8 feet
Water Depth: ~-5.0 feet

Horizontal Datum: NAD83, 1900 MD State Plane
Vertical Datum: NAVD88



CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N247,096.2 E1,525,029.2

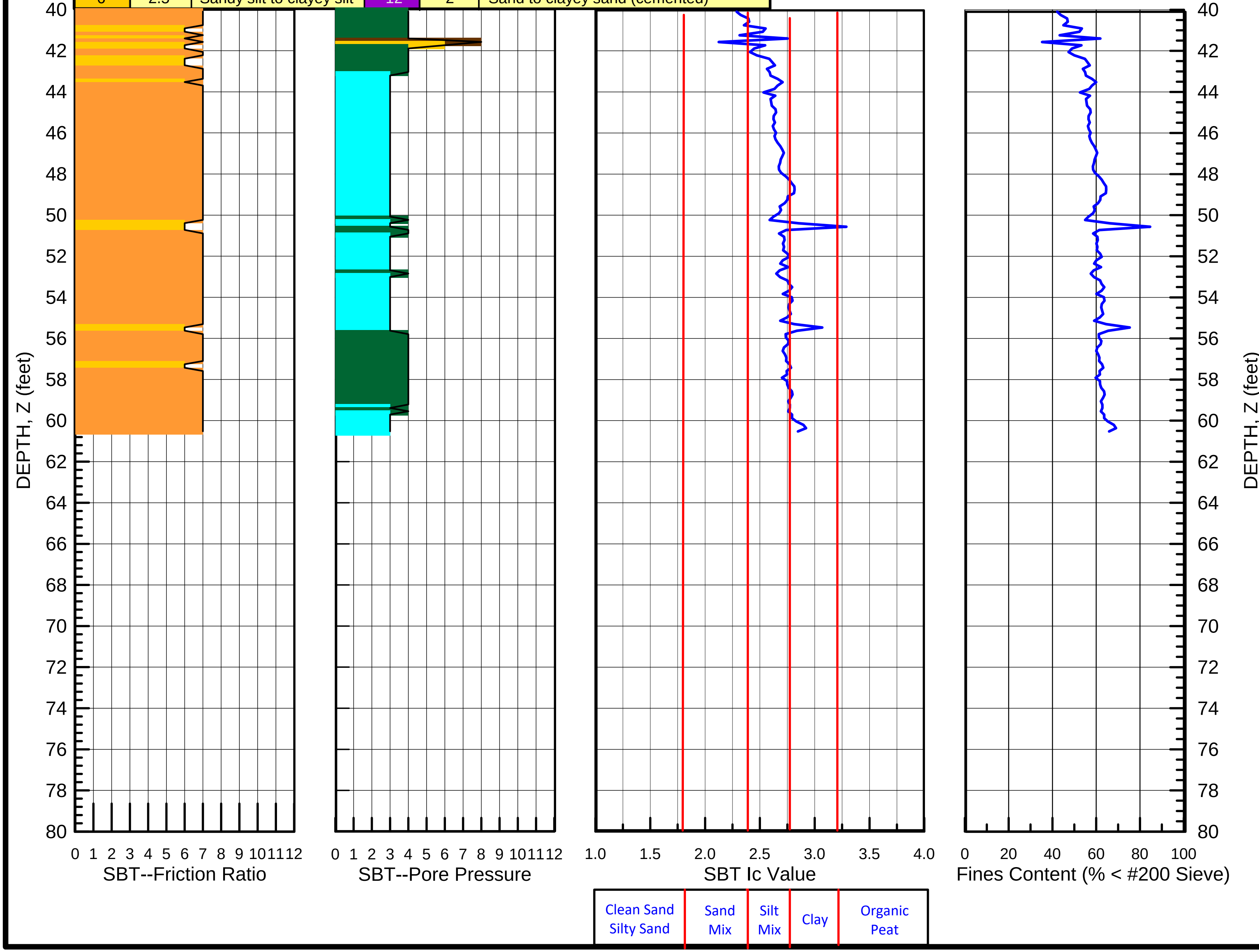
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 6/2/20

SOUNDING
CPT-206

Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~-3.8 feet
Water Depth: ~-5.0 feet

Horizontal Datum: NAD83, 1900 MD State Plane
Vertical Datum: NAVD88



PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N247,096.2 E1,525,029.2

CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

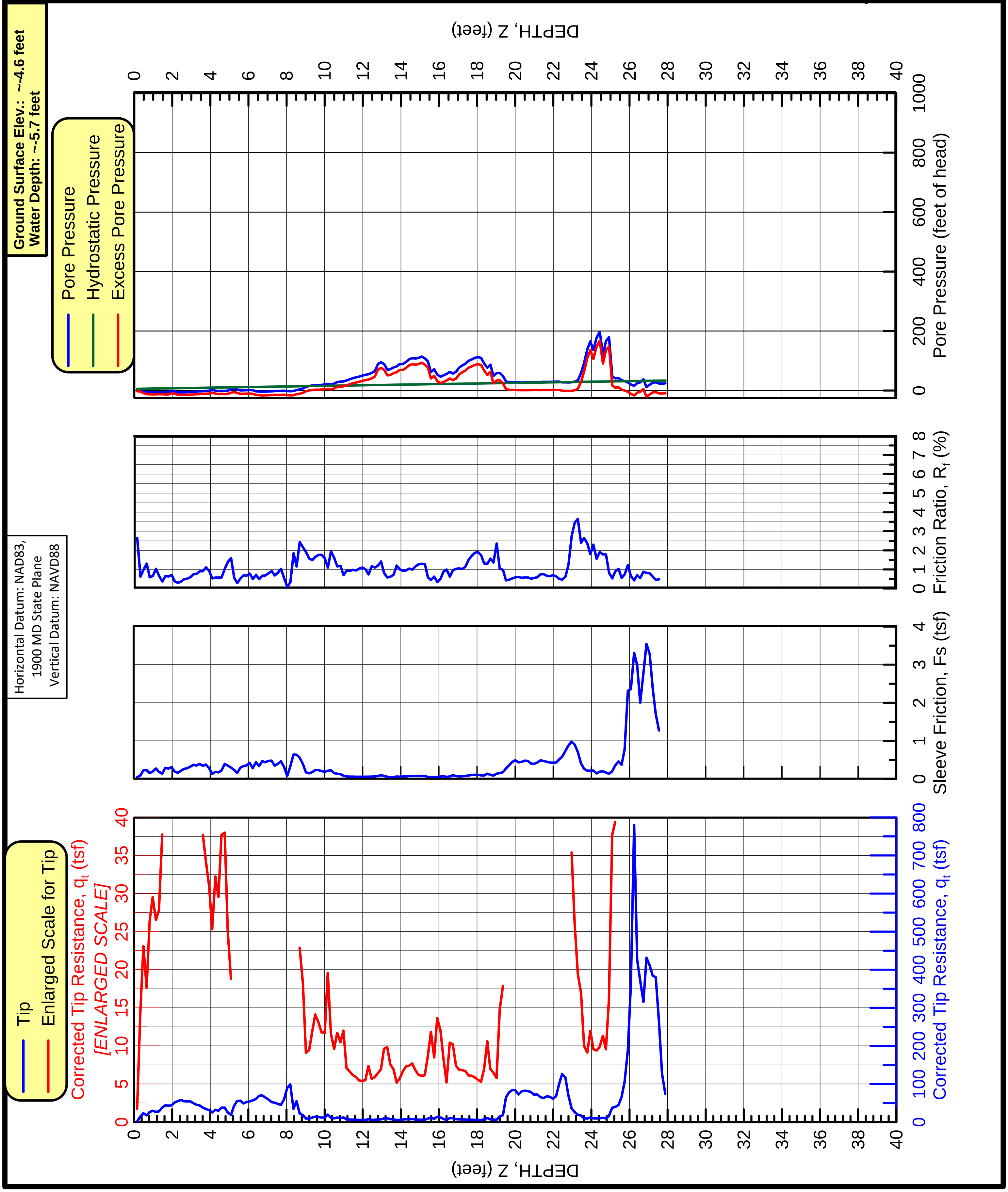
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/2/20

SOUNDING
CPT-206

PROJECT: Barren Island	IN-SITU SOIL TESTING, L.C.	*SOUNDING*
LOCATION: Dorchester County, Maryland N247,275.8 E1,524,568.1	Engineer: R. Failmezger,P.E.,F. ASCE,D GE SOUNDING DATE: 6/2/20	

CONE PENETROMETER TEST RESULTS

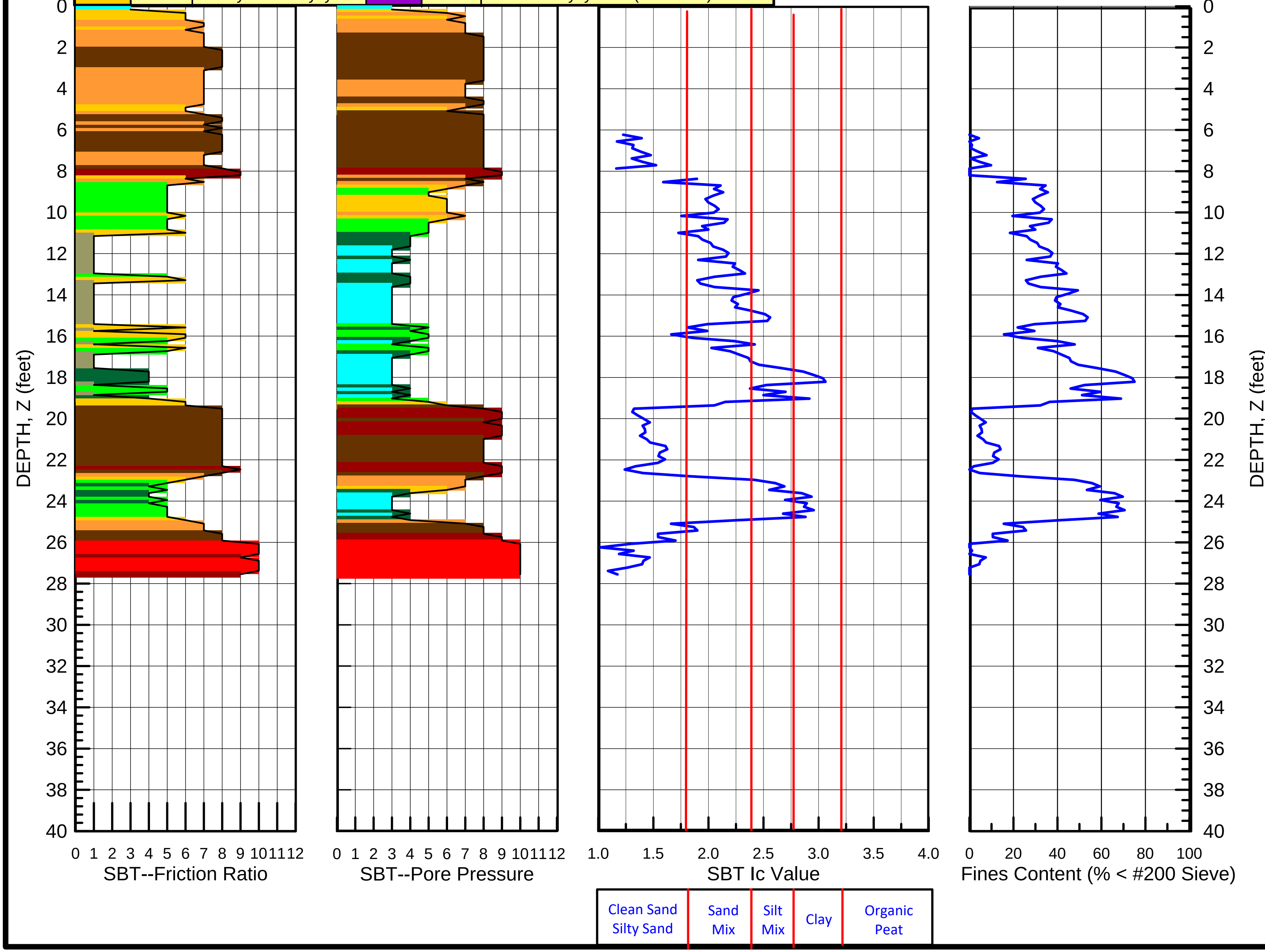
CPT-207



Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~-4.6 feet
Water Depth: ~-5.7 feet

Horizontal Datum: NAD83,
1900 MD State Plane
Vertical Datum: NAVD88



CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

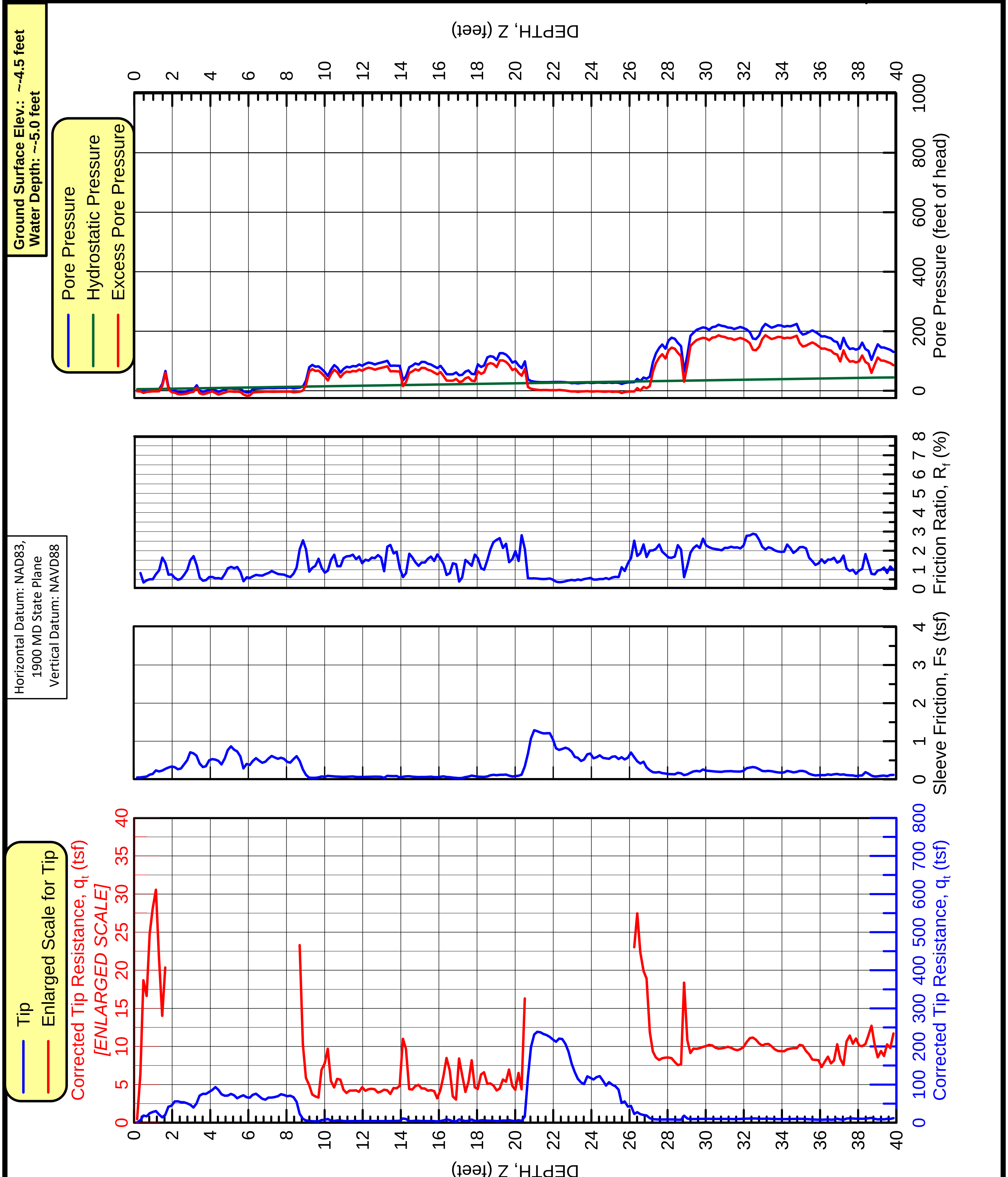
PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N247,275.8 E1,524,568.1

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/2/20

SOUNDING
CPT-207

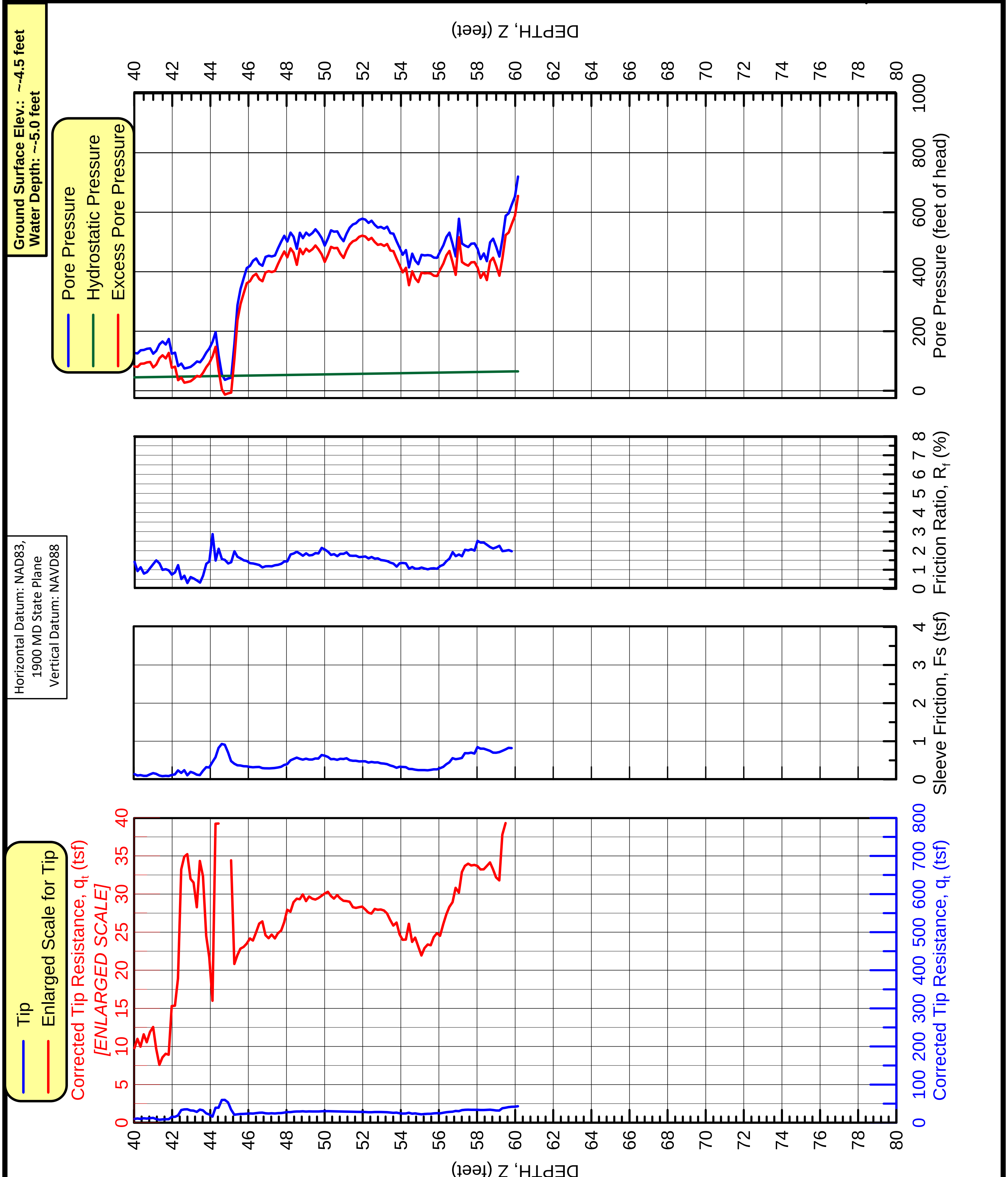
PROJECT: **Barren Island** **LOCATION:** **Dorchester County, Maryland N247,397.9 E1,524,076.9**	**IN-SITU SOIL TESTING, L.C.** **Engineer: R. Failmezger,P.E.,F. ASCE,D GE** **SOUNDING DATE: 6/2/20**	***SOUNDING*** **CPT-208**

CONE PENETROMETER TEST RESULTS



PROJECT: Barren Island **LOCATION:** Dorchester County, Maryland N247,397.9 E1,524,076.9	**IN-SITU SOIL TESTING, L.C.** **Engineer: R. Failmezger,P.E.,F. ASCE,D GE** **SOUNDING DATE: 6/2/20**	***SOUNDING*** **CPT-208**

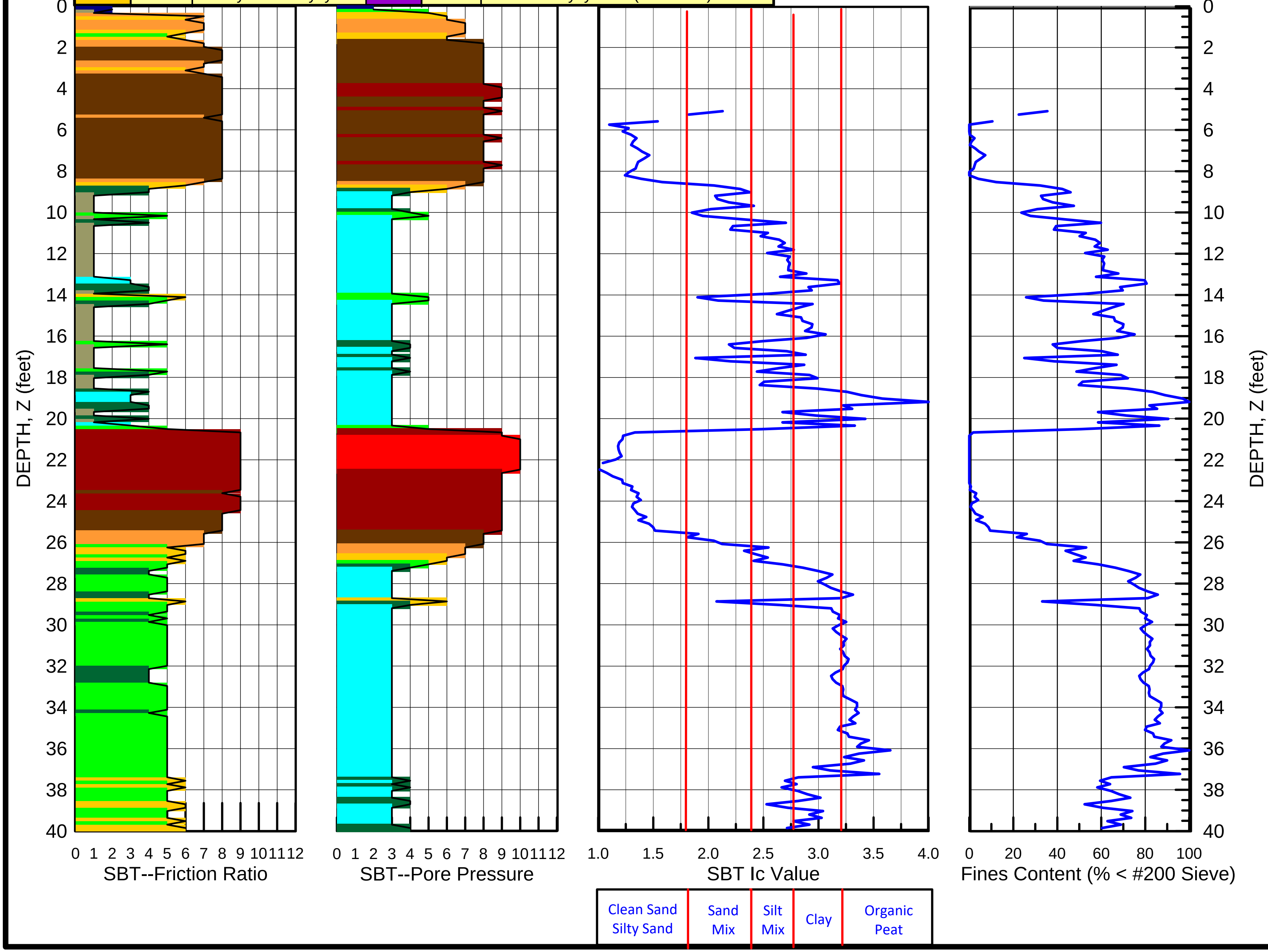
CONE PENETROMETER TEST RESULTS



Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~-4.5 feet
Water Depth: ~-5.0 feet

Horizontal Datum: NAD83,
1900 MD State Plane
Vertical Datum: NAVD88



CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N247,397.9 E1,524,076.9

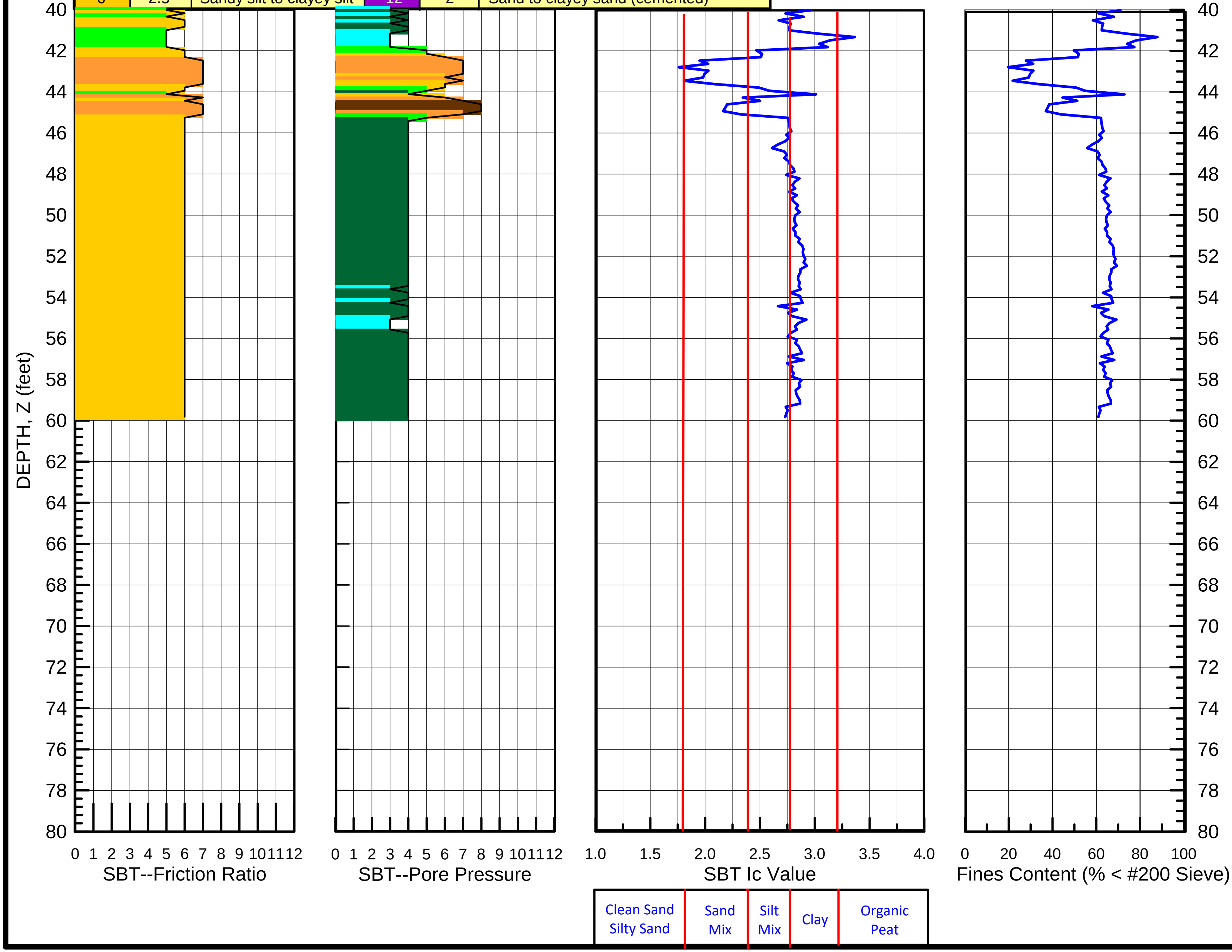
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 6/2/20

SOUNDING
CPT-208

Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~-4.5 feet
Water Depth: ~-5.0 feet

Horizontal Datum: NAD83, 1900 MD State Plane
Vertical Datum: NAVD88



PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N247,397.9 E1,524,076.9

CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 6/2/20

SOUNDING
CPT-208

PROJECT: Barren Island

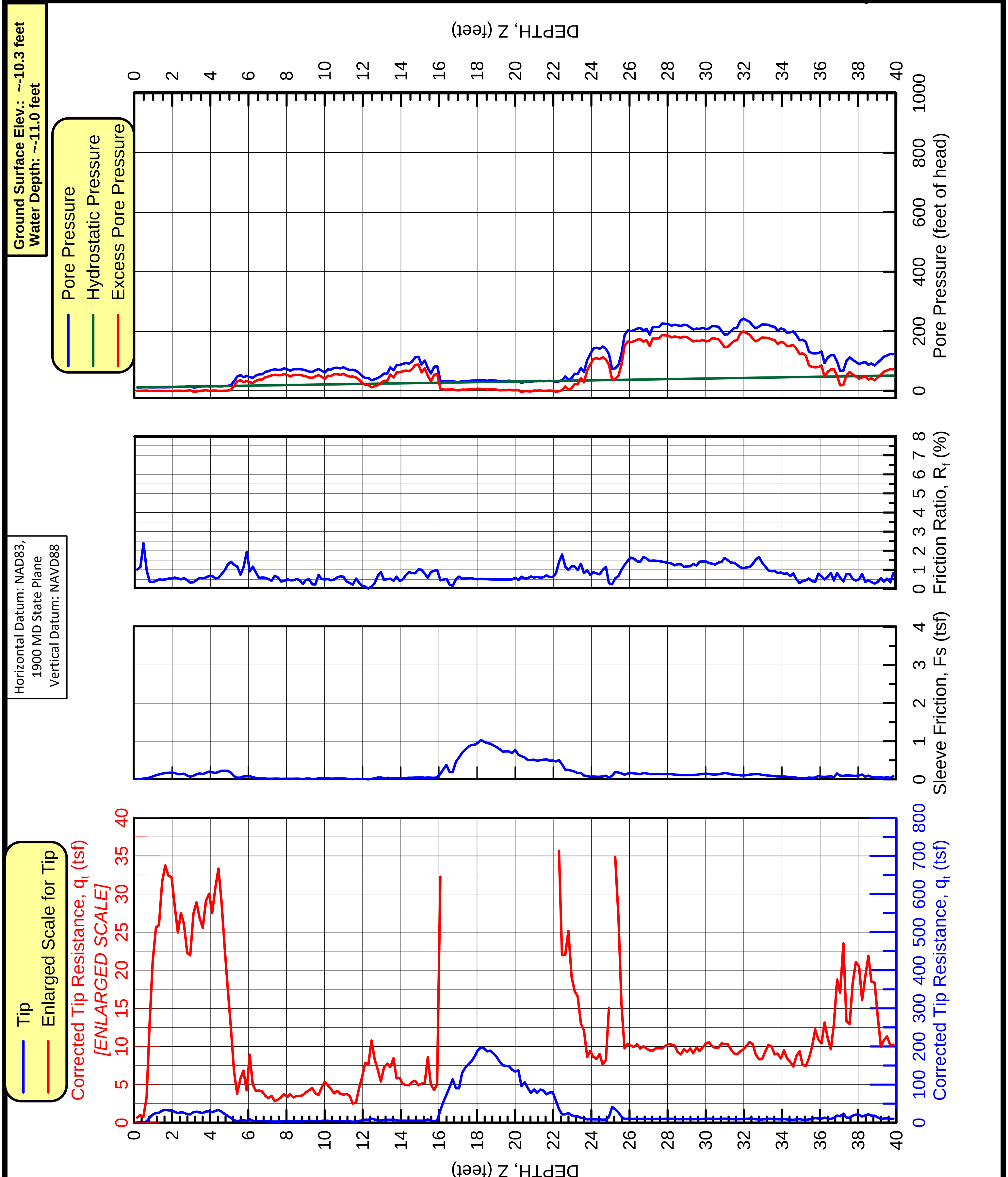
LOCATION: Dorchester County, Maryland N247,544.2 E1,523,595.5

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 5/30/20

SOUNDING

CPT-209

CONE PENETROMETER TEST RESULTS



PROJECT: Barren Island

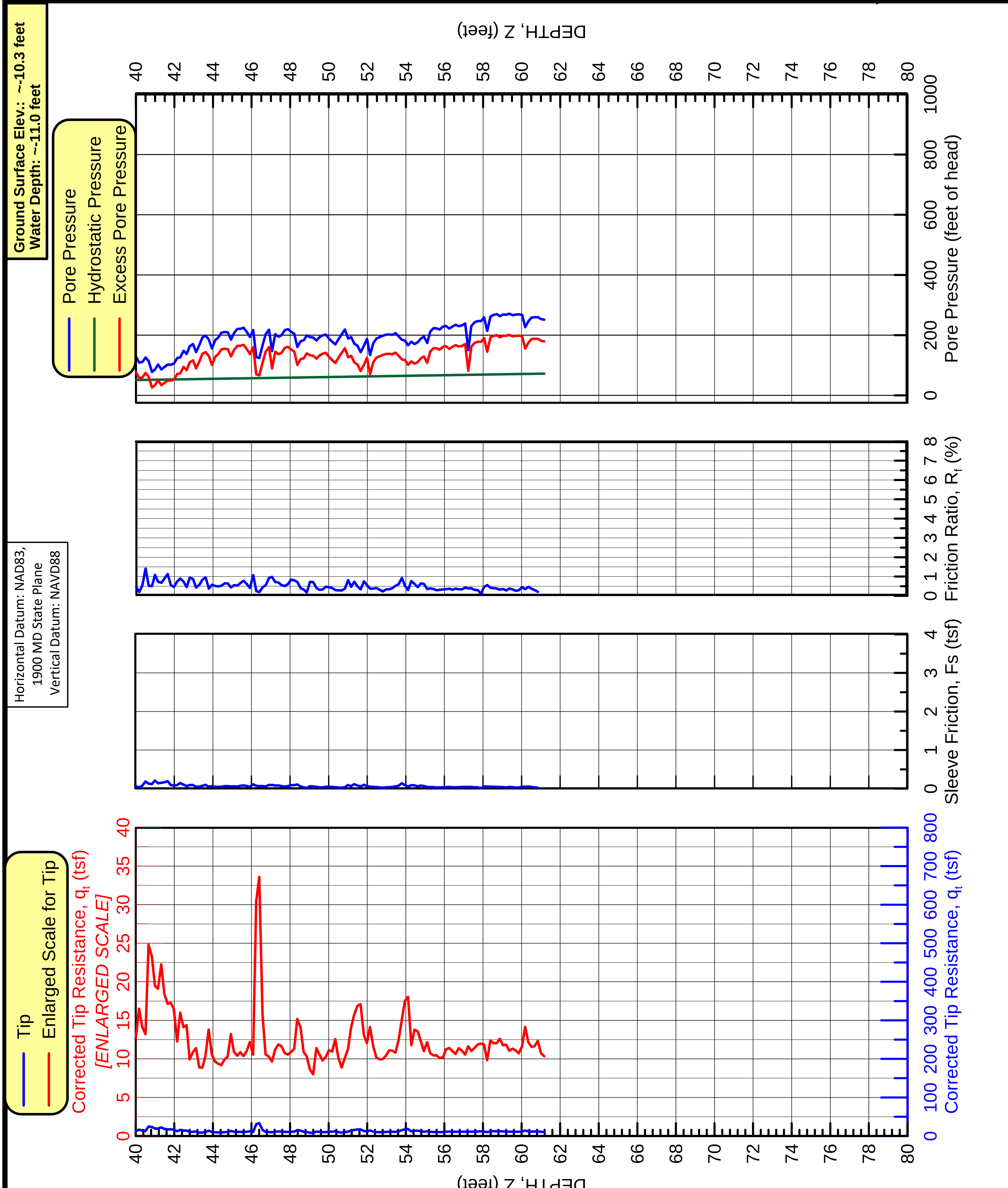
LOCATION: Dorchester County, Maryland N247,544.2 E1,523,595.5

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 5/30/20

SOUNDING

CPT-209

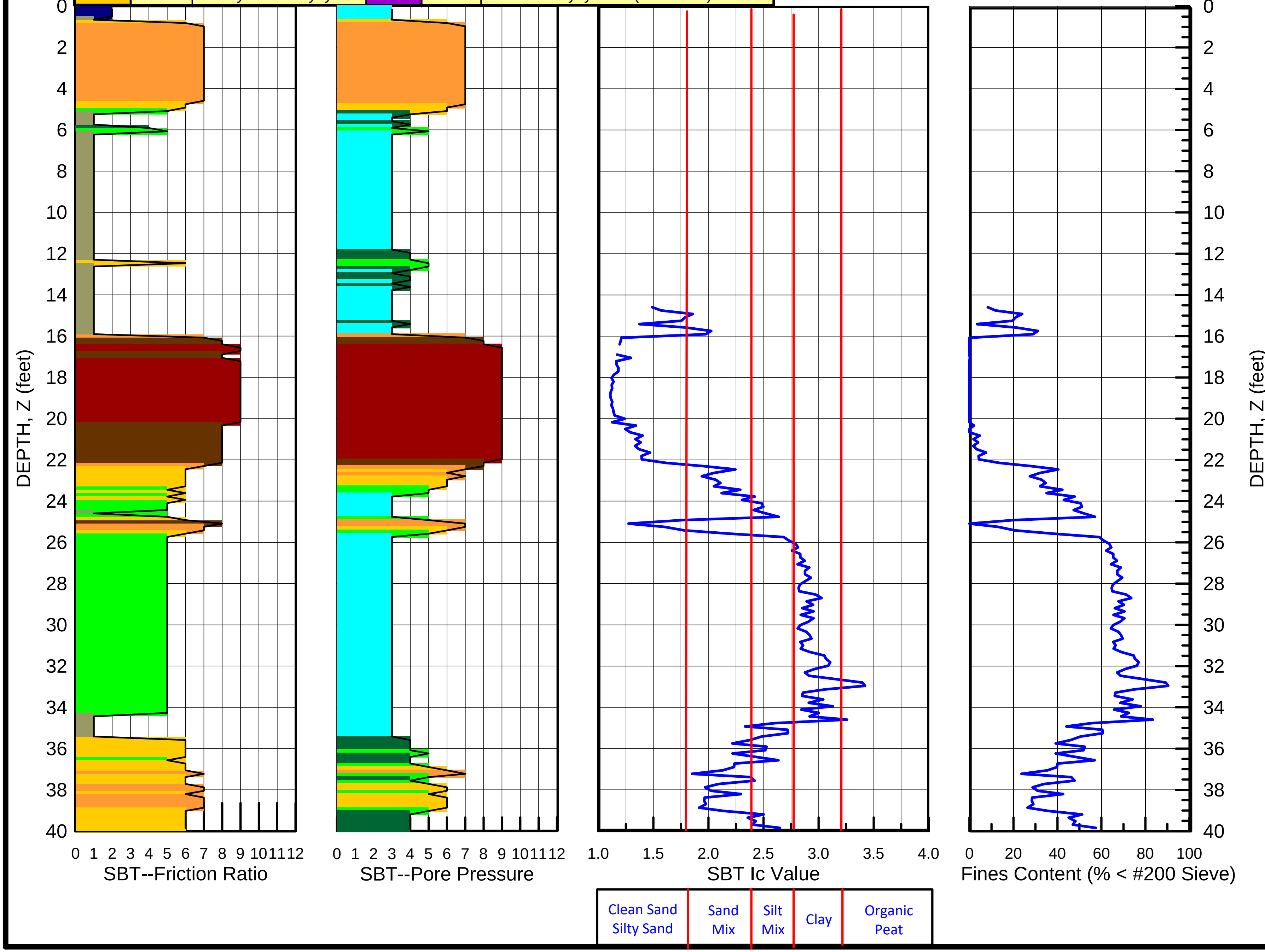
CONE PENETROMETER TEST RESULTS



Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~-10.3 feet
Water Depth: ~-11.0 feet

Horizontal Datum: NAD83,
1900 MD State Plane
Vertical Datum: NAVD88



CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N247,544.2 E1,523,595.5

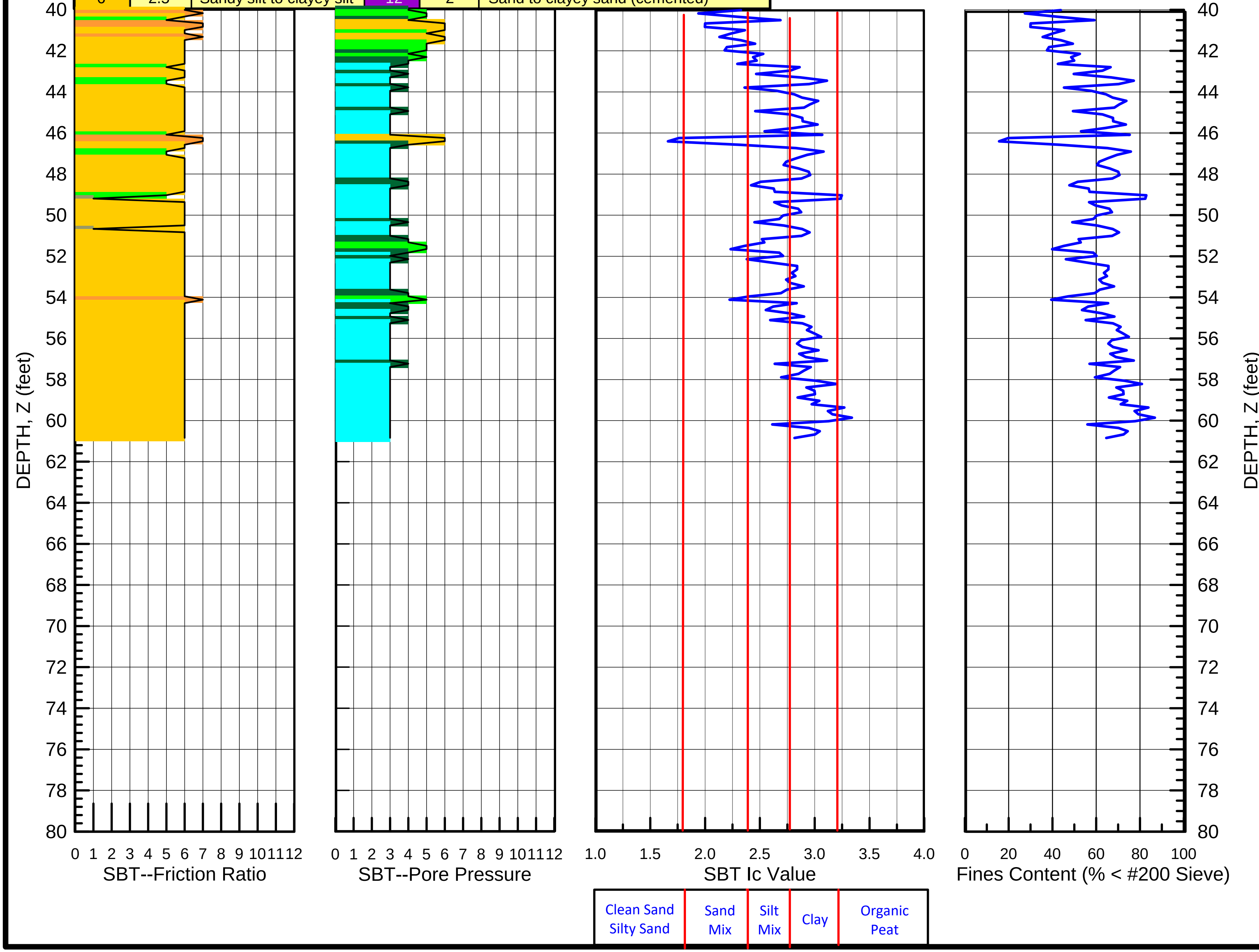
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 5/30/20

SOUNDING
CPT-209

Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~-10.3 feet
Water Depth: ~-11.0 feet

Horizontal Datum: NAD83,
1900 MD State Plane
Vertical Datum: NAVD88



CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N247,544.2 E1,523,595.5

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 5/30/20

SOUNDING
CPT-209

PROJECT: Barren Island

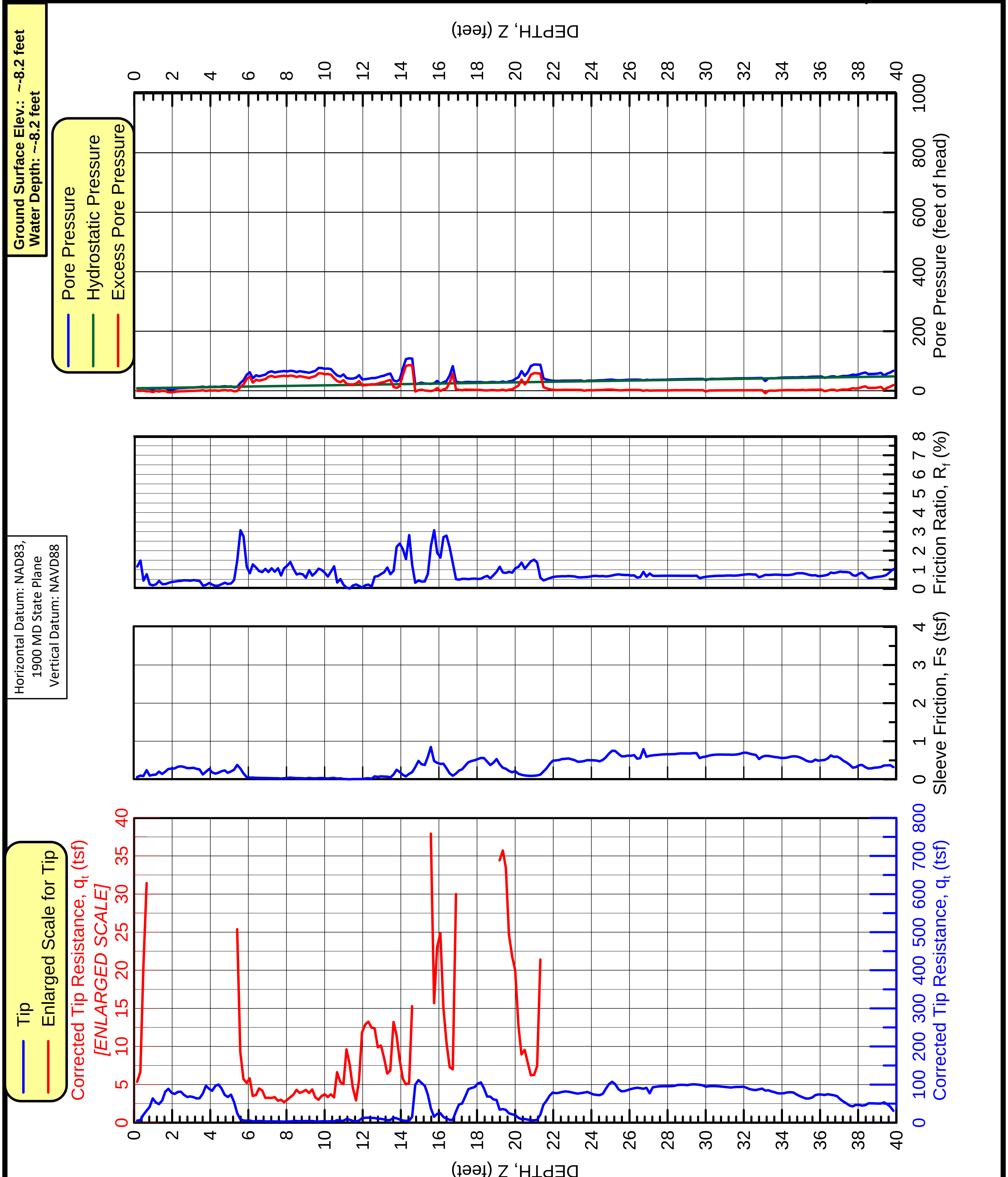
LOCATION: Dorchester County, Maryland N247,113.6 E1,523,316.7

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 5/30/20

SOUNDING

CPT-210

CONE PENETROMETER TEST RESULTS



PROJECT: Barren Island

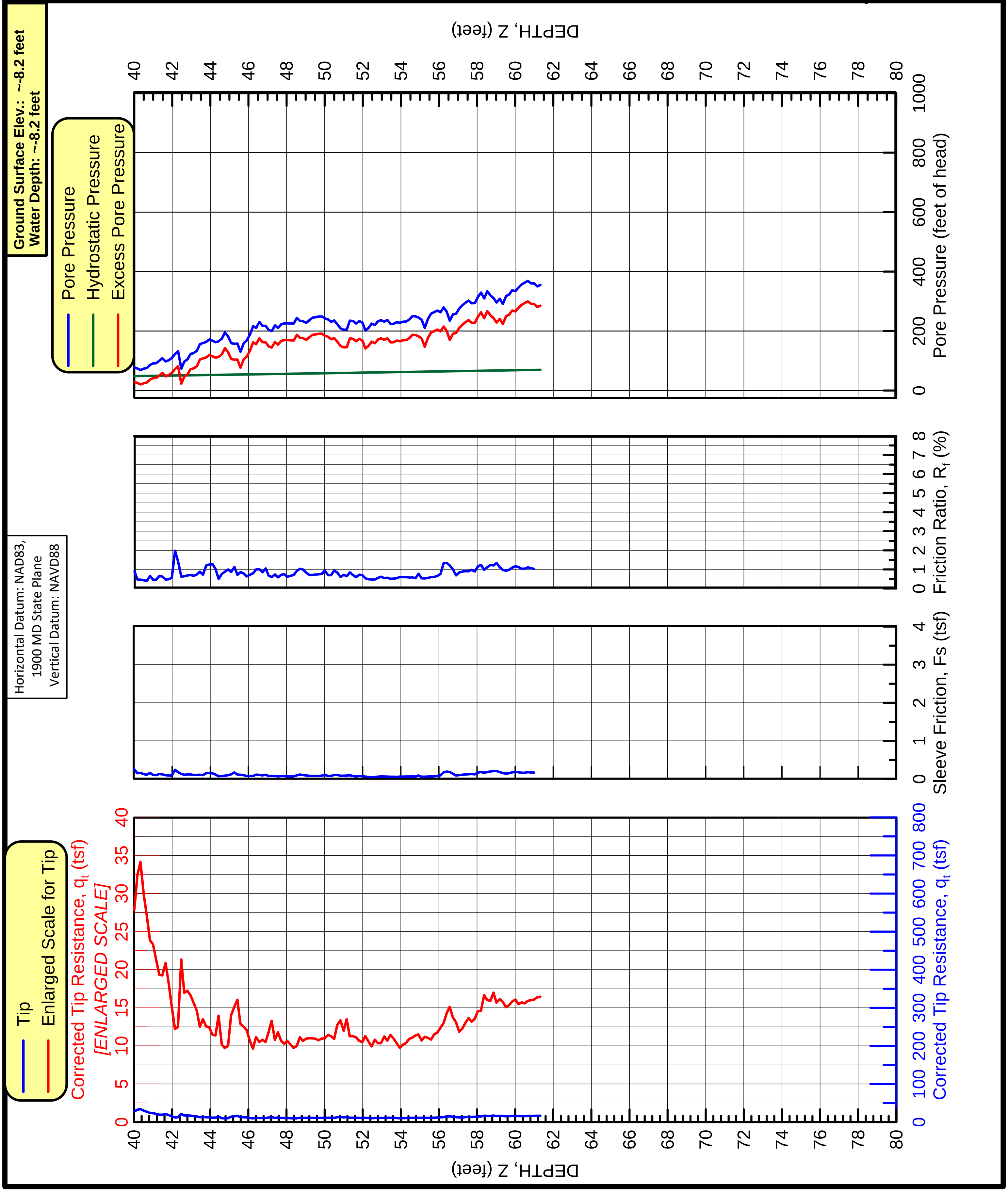
LOCATION: Dorchester County, Maryland N247,113.6 E1,523,316.7

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 5/30/20

SOUNDING

CPT-210

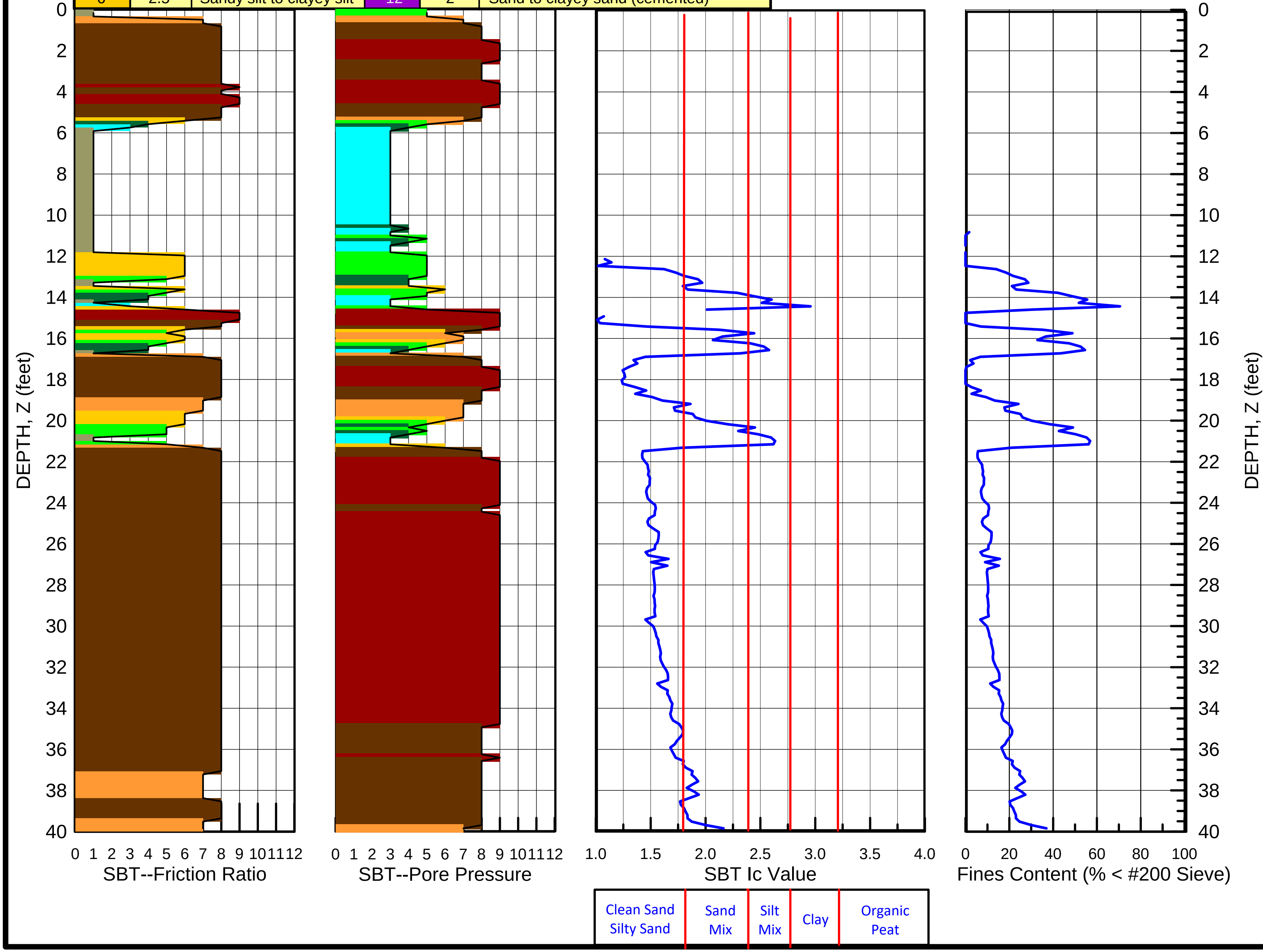
CONE PENETROMETER TEST RESULTS



Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~-8.2 feet
Water Depth: ~-8.2 feet

Horizontal Datum: NAD83,
1900 MD State Plane
Vertical Datum: NAVD88



CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N247,113.6 E1,523,316.7

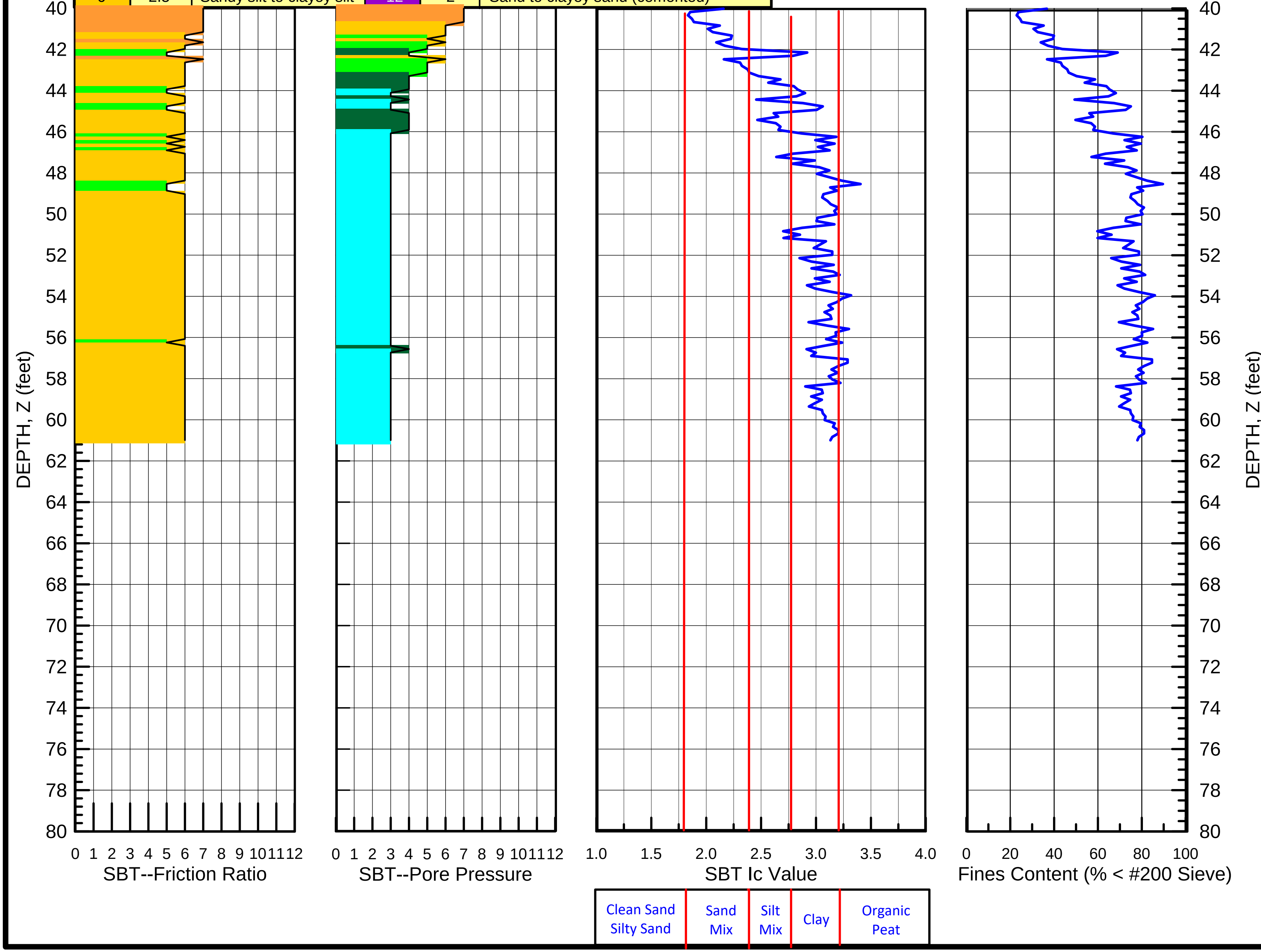
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 5/30/20

SOUNDING
CPT-210

Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~-8.2 feet
Water Depth: ~-8.2 feet

Horizontal Datum: NAD83,
1900 MD State Plane
Vertical Datum: NAVD88



PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N247,113.6 E1,523,316.7

CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 5/30/20

SOUNDING
CPT-210

PROJECT: Barren Island

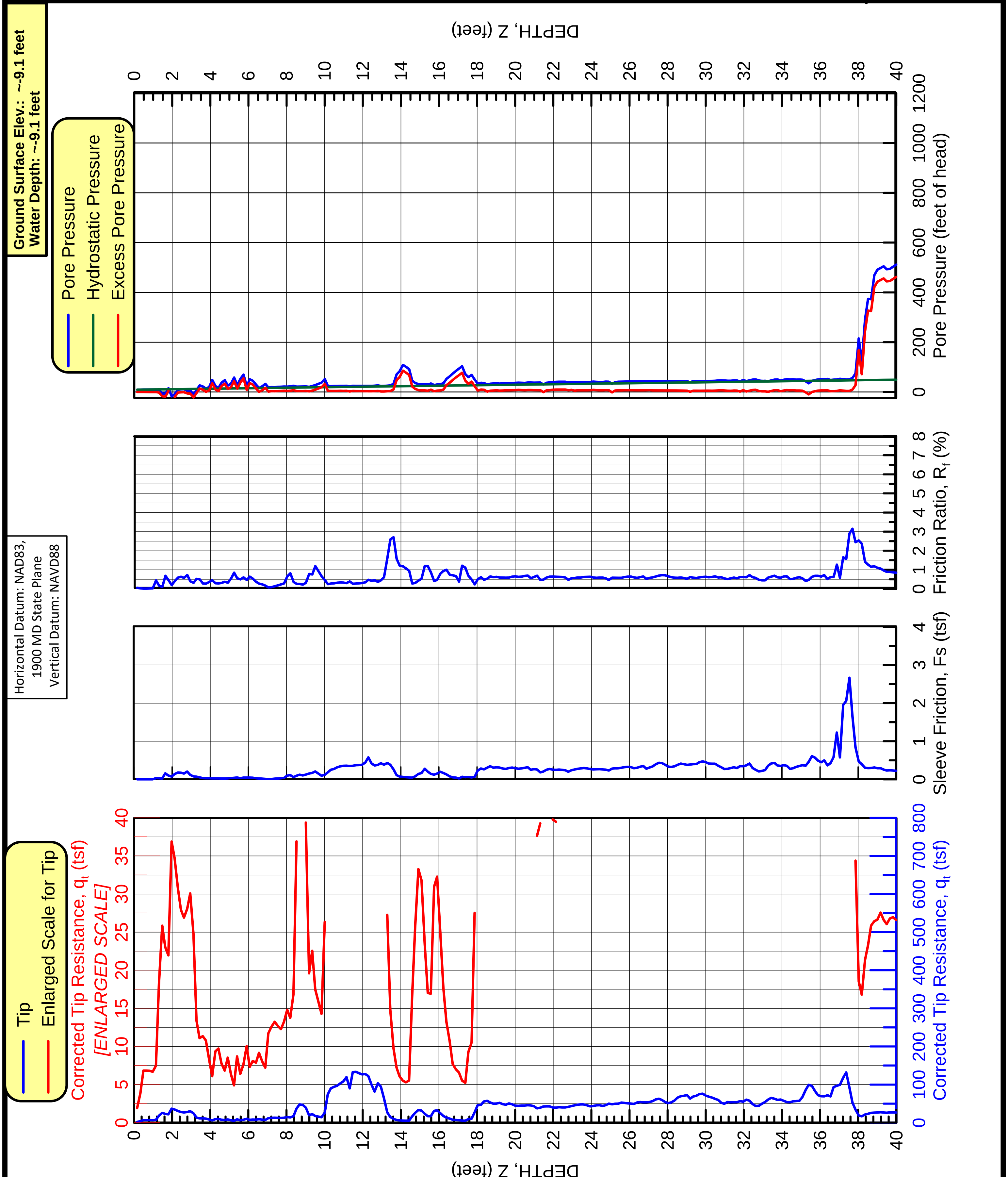
LOCATION: Dorchester County, Maryland N246,676.4 E1,523,037.5

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 6/4/20

SOUNDING

CPT-211

CONE PENETROMETER TEST RESULTS



PROJECT: Barren Island

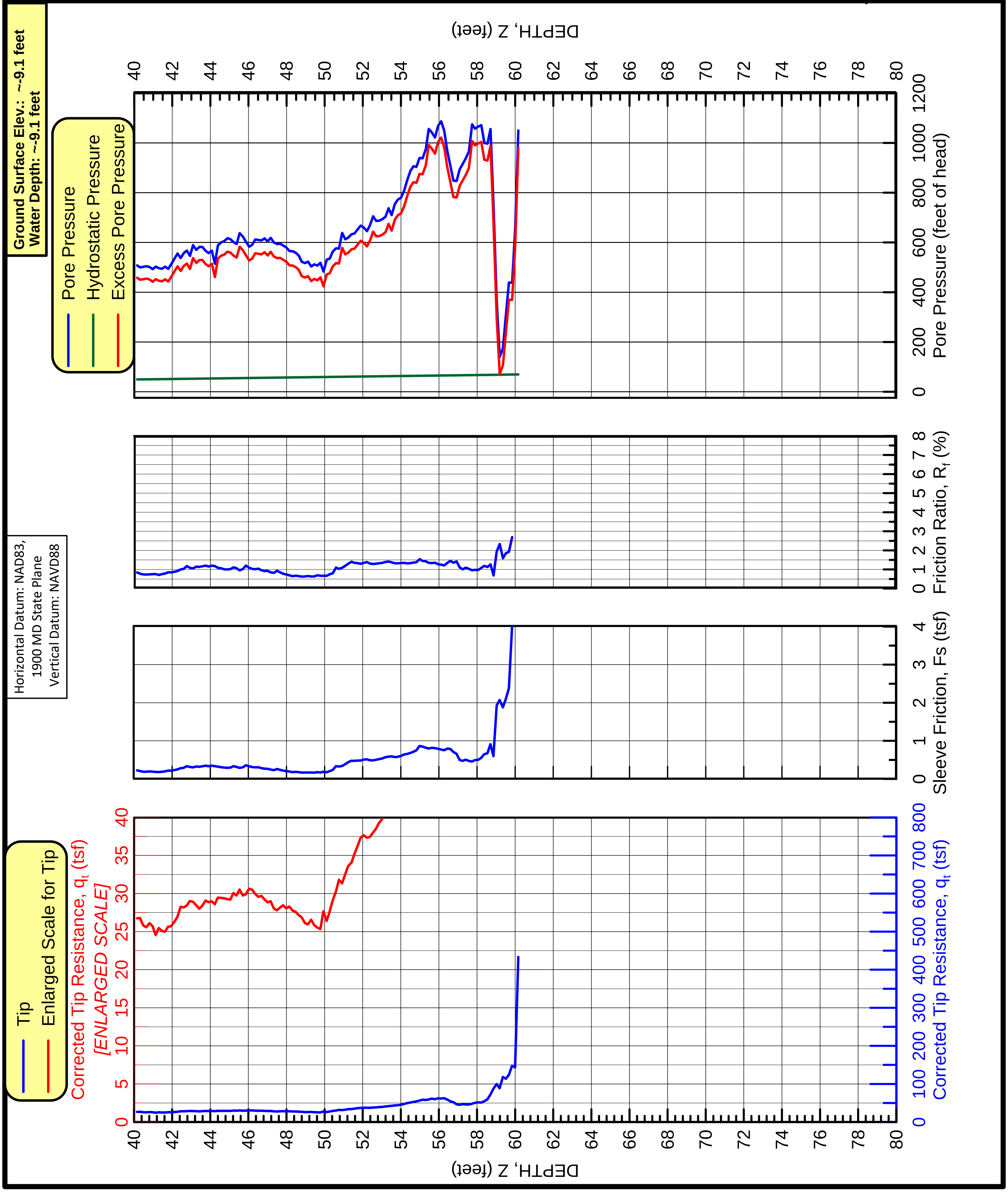
LOCATION: Dorchester County, Maryland N246,676.4 E1,523,037.5

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 6/4/20

SOUNDING

CPT-211

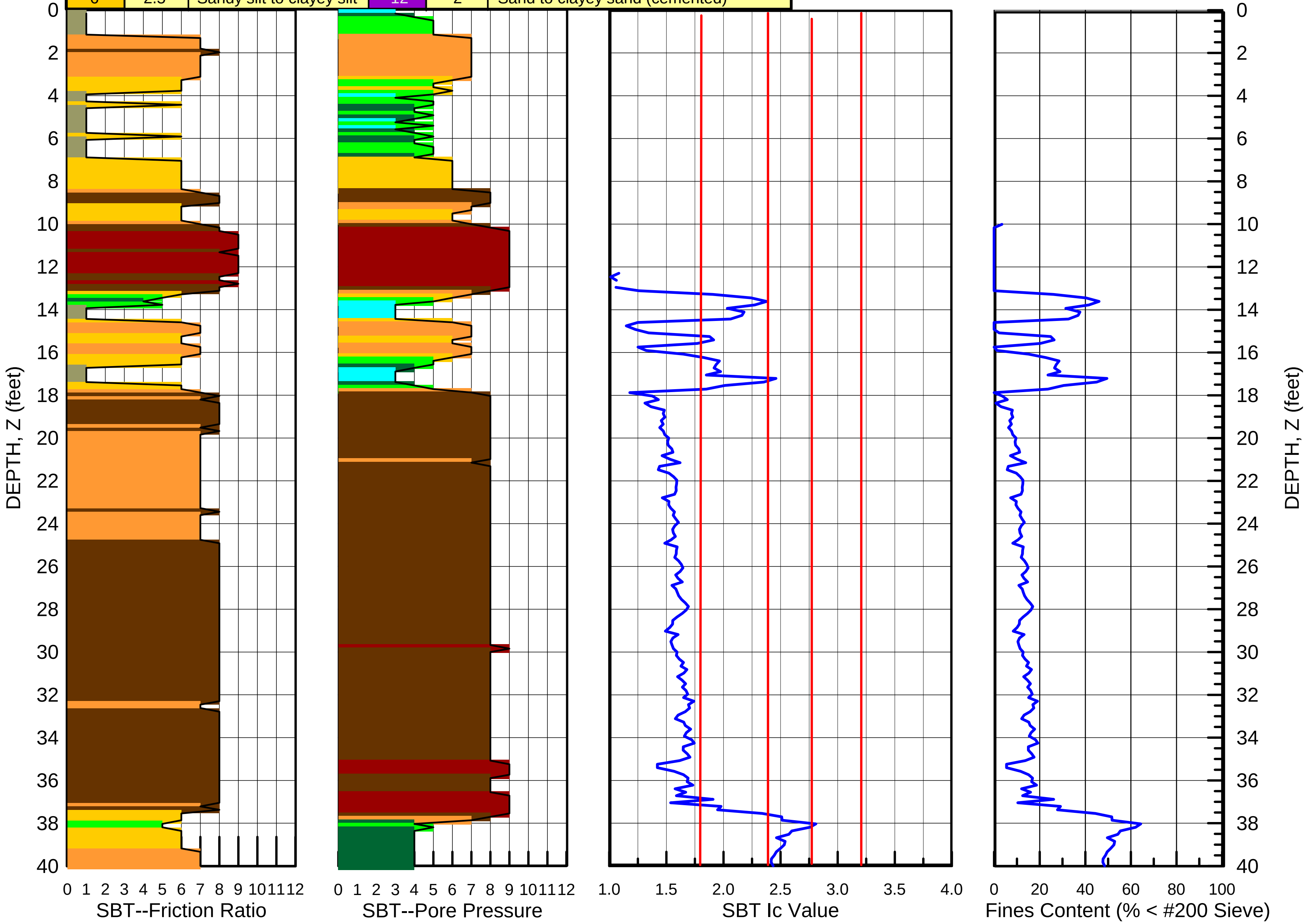
CONE PENETROMETER TEST RESULTS



Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~-9.1 feet
Water Depth: ~-9.1 feet

Horizontal Datum: NAD83, 1900 MD State Plane
Vertical Datum: NAVD88



Clean Sand Silty Sand	Sand Mix	Silt Mix	Clay	Organic Peat

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N246,676.4 E1,523,037.5

CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

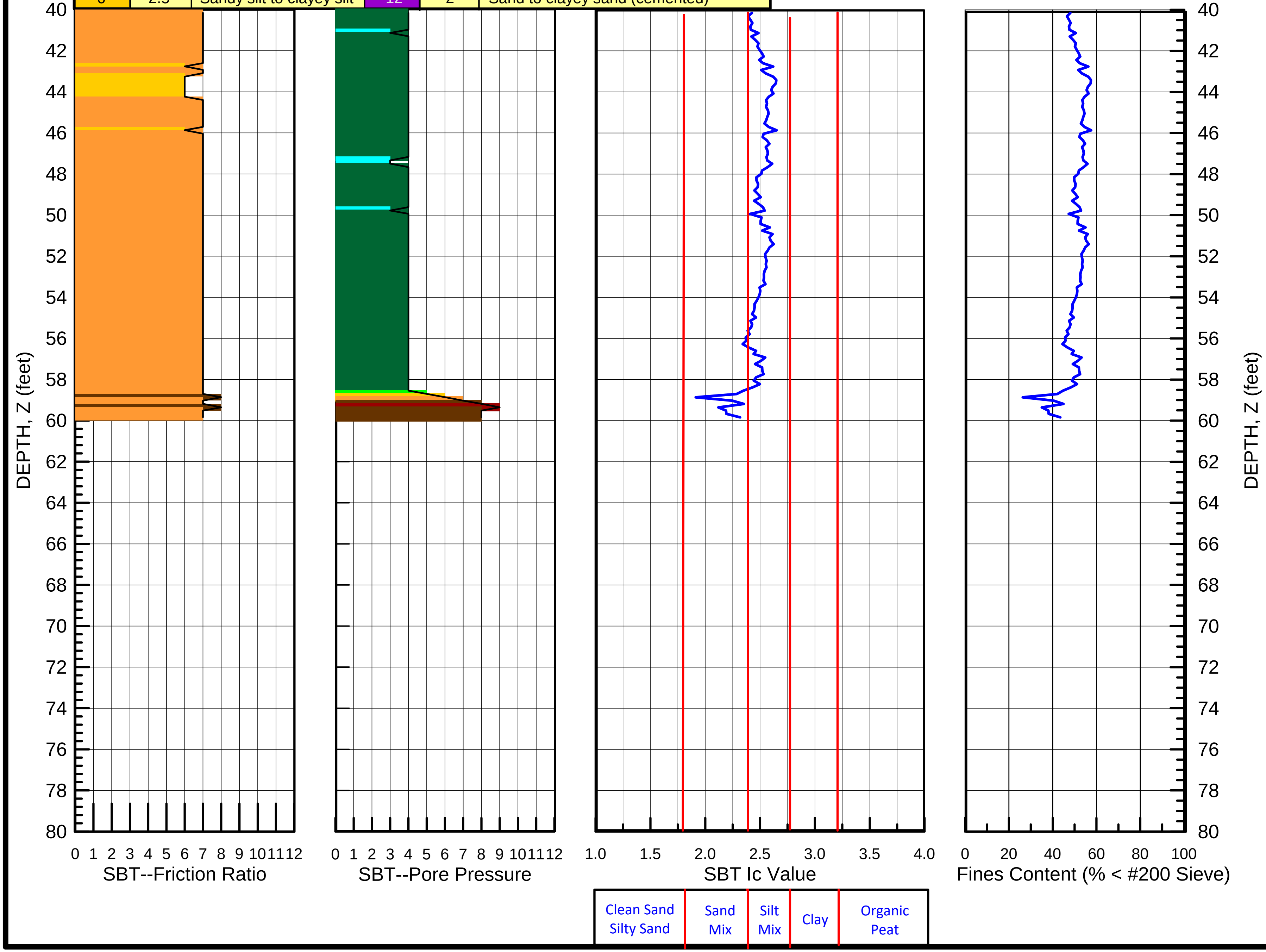
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/4/20

SOUNDING
CPT-211

Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~-9.1 feet
Water Depth: ~-9.1 feet

Horizontal Datum: NAD83,
1900 MD State Plane
Vertical Datum: NAVD88



CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N246,676.4 E1,523,037.5

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 6/4/20

SOUNDING
CPT-211

PROJECT: Barren Island

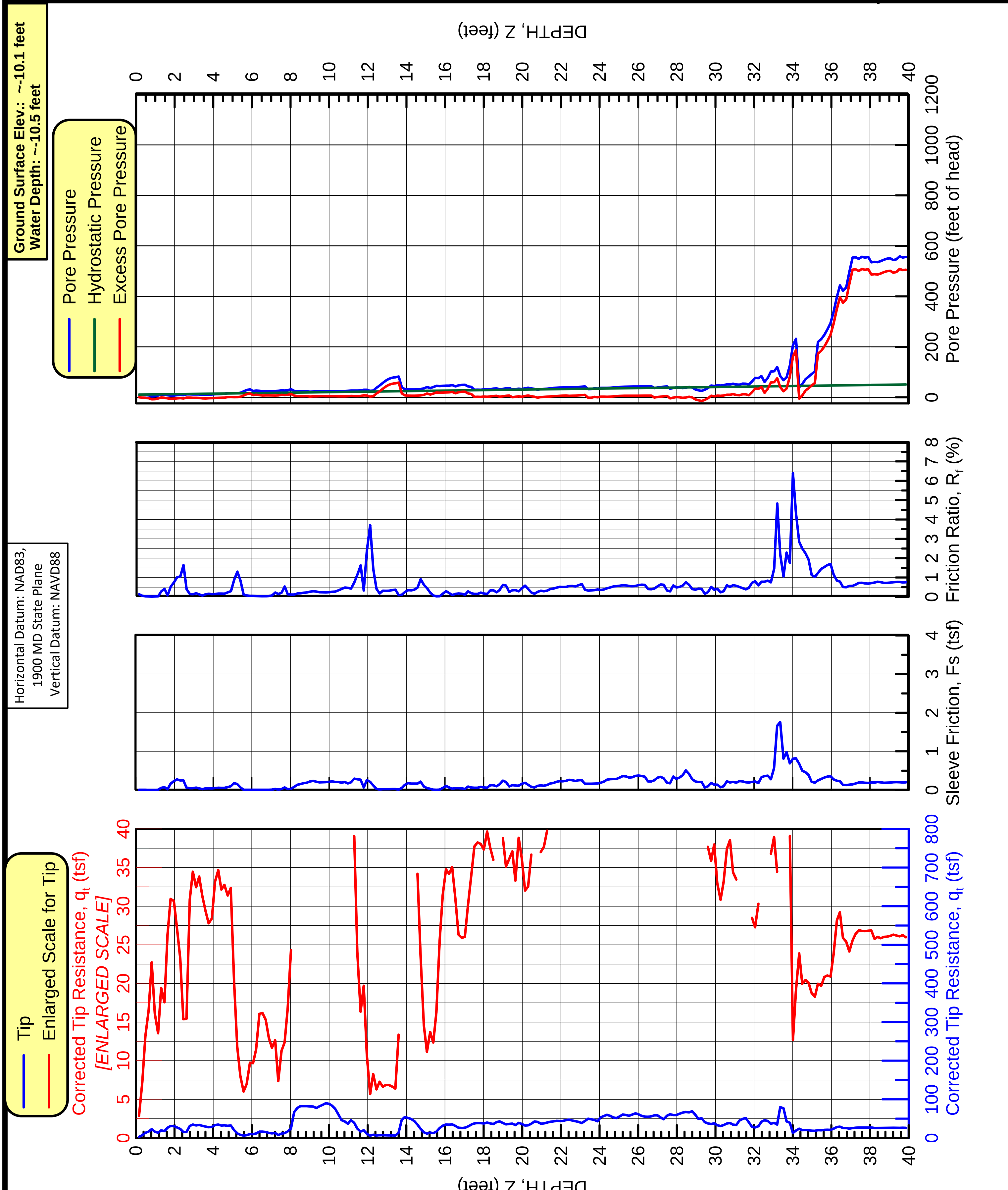
LOCATION: Dorchester County, Maryland N246,204.8 E1,522,848.8

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 6/4/20

SOUNDING

CPT-212

CONE PENETROMETER TEST RESULTS



PROJECT: Barren Island

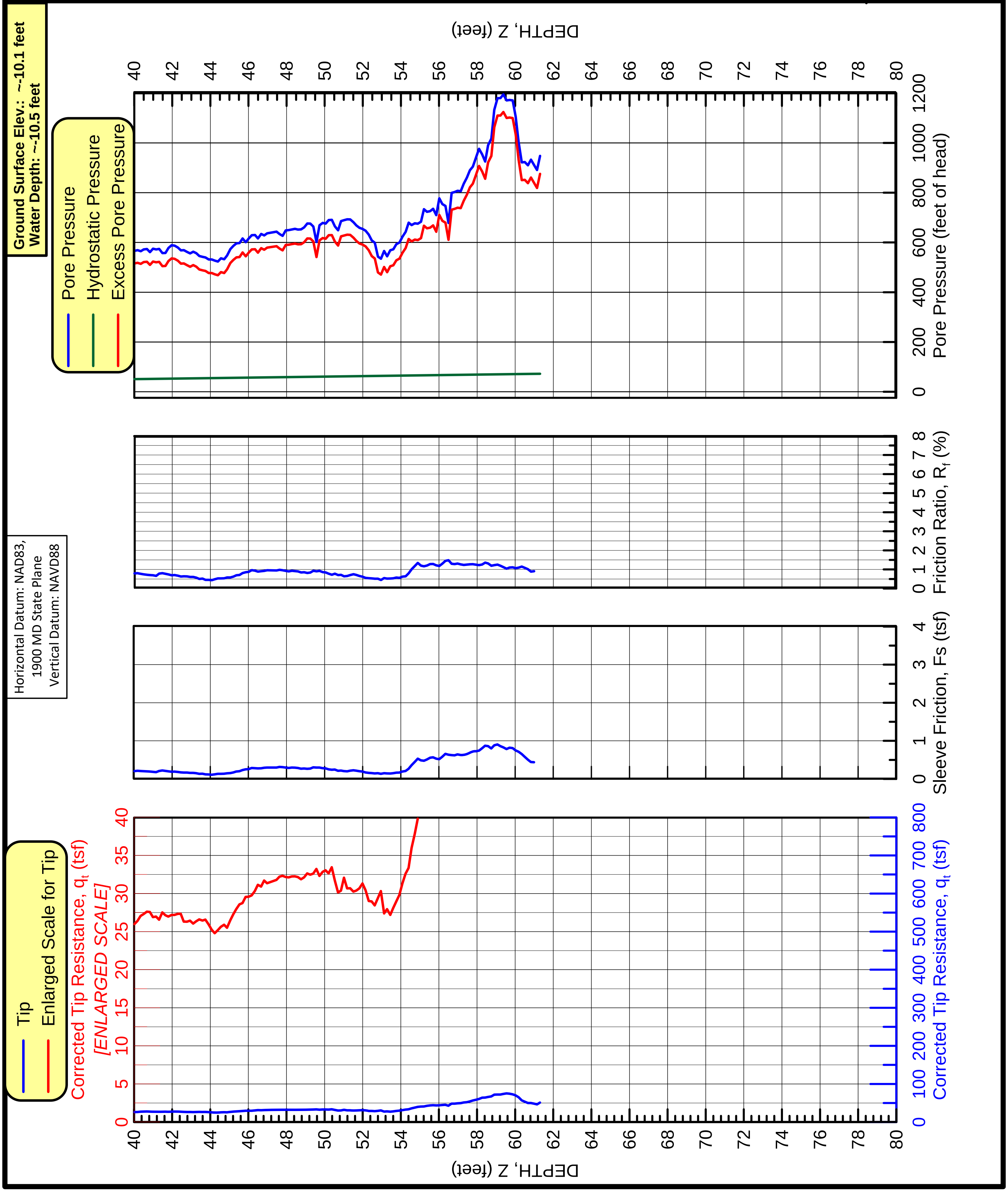
LOCATION: Dorchester County, Maryland N246,204.8 E1,522,848.8

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 6/4/20

SOUNDING

CPT-212

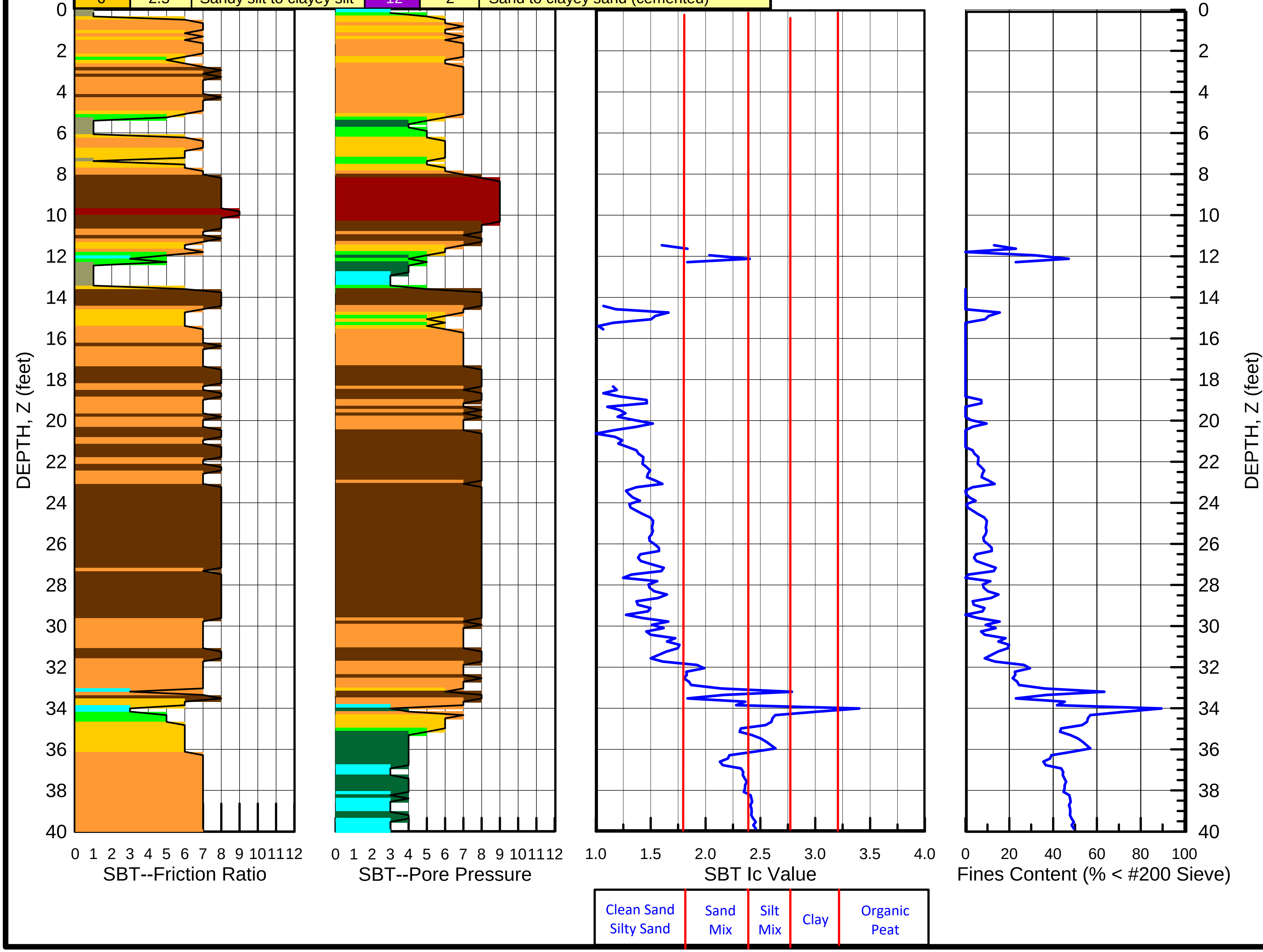
CONE PENETROMETER TEST RESULTS



Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~-10.1 feet
Water Depth: ~-10.5 feet

Horizontal Datum: NAD83,
1900 MD State Plane
Vertical Datum: NAVD88



CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N246,204.8 E1,522,848.8

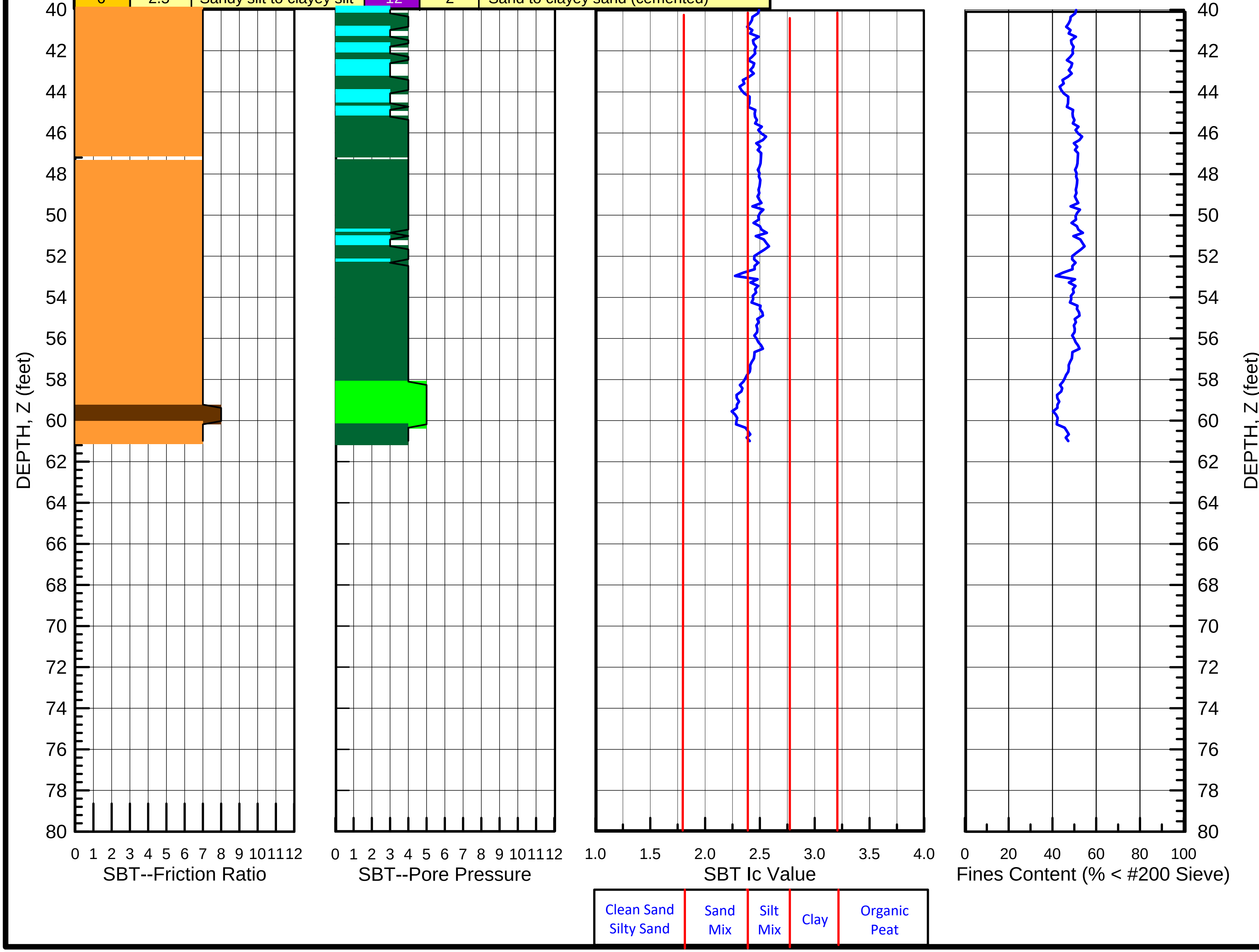
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 6/4/20

SOUNDING
CPT-212

Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~-10.1 feet
Water Depth: ~-10.5 feet

Horizontal Datum: NAD83, 1900 MD State Plane
Vertical Datum: NAVD88



PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N246,204.8 E1,522,848.8

CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 6/4/20

SOUNDING
CPT-212

PROJECT: Barren Island

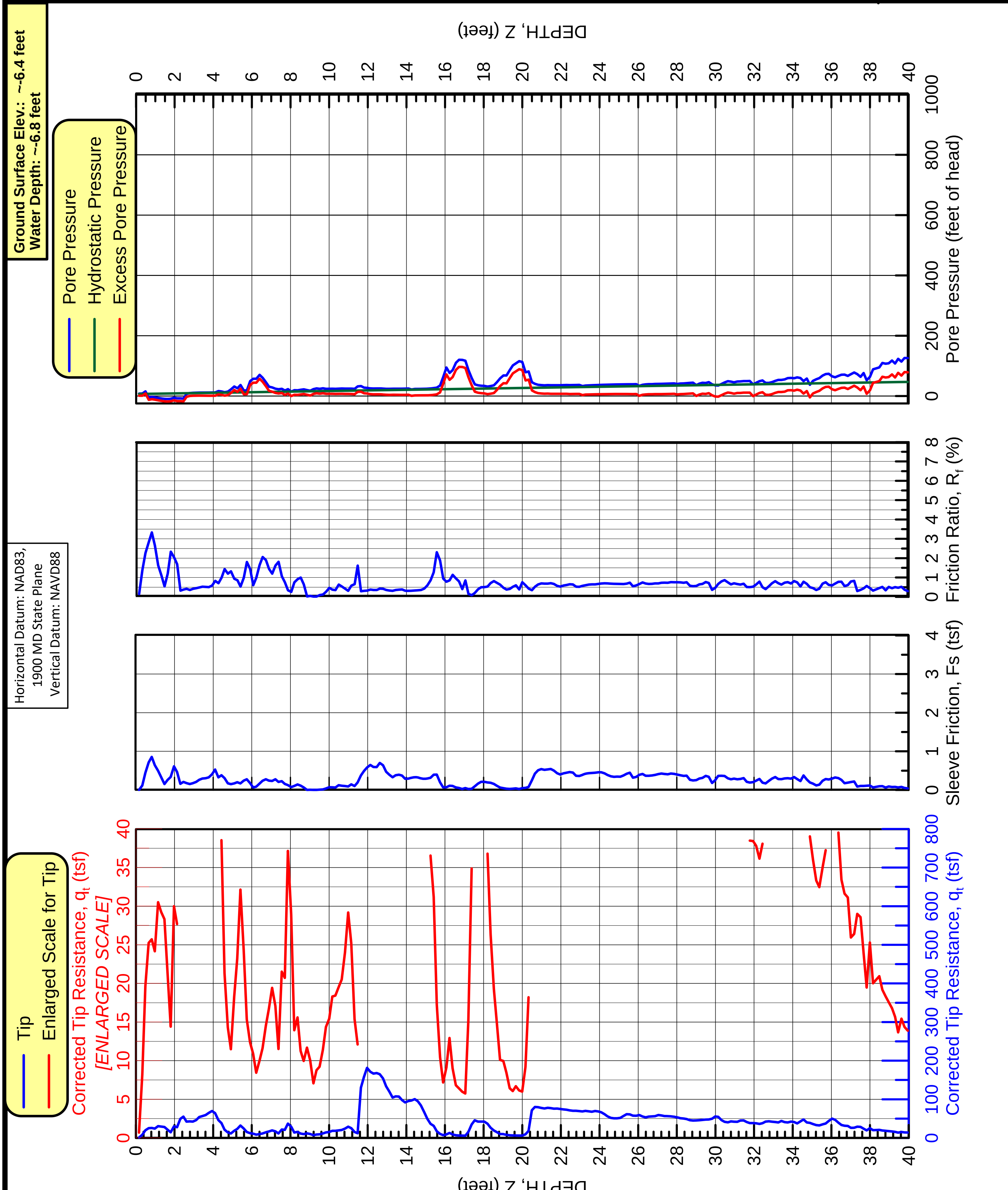
LOCATION: Dorchester County, Maryland N245,768.7 E1,523,107.2

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 6/4/20

SOUNDING

CPT-213

CONE PENETROMETER TEST RESULTS



PROJECT: Barren Island

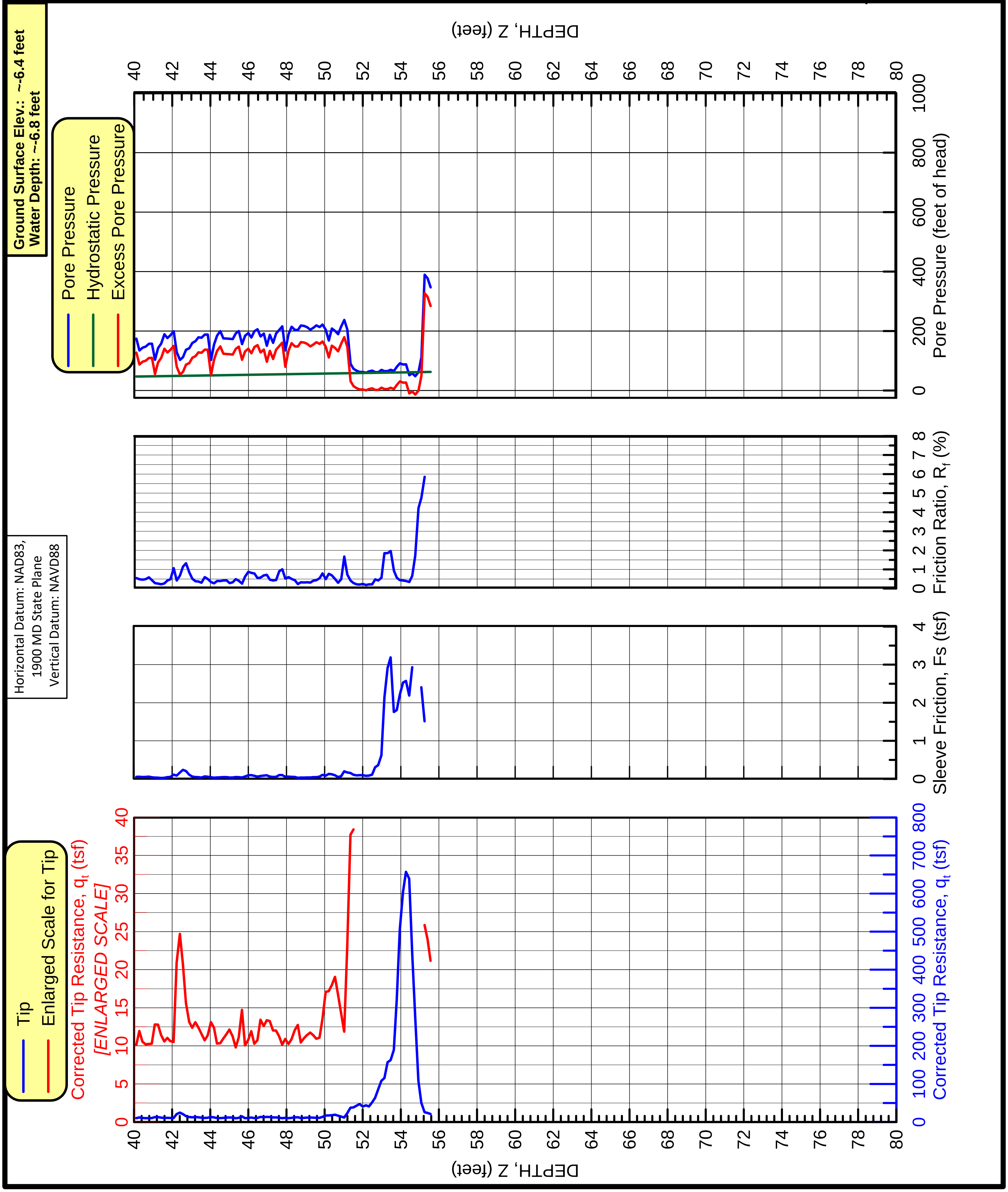
LOCATION: Dorchester County, Maryland N245,768.7 E1,523,107.2

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 6/4/20

SOUNDING

CPT-213

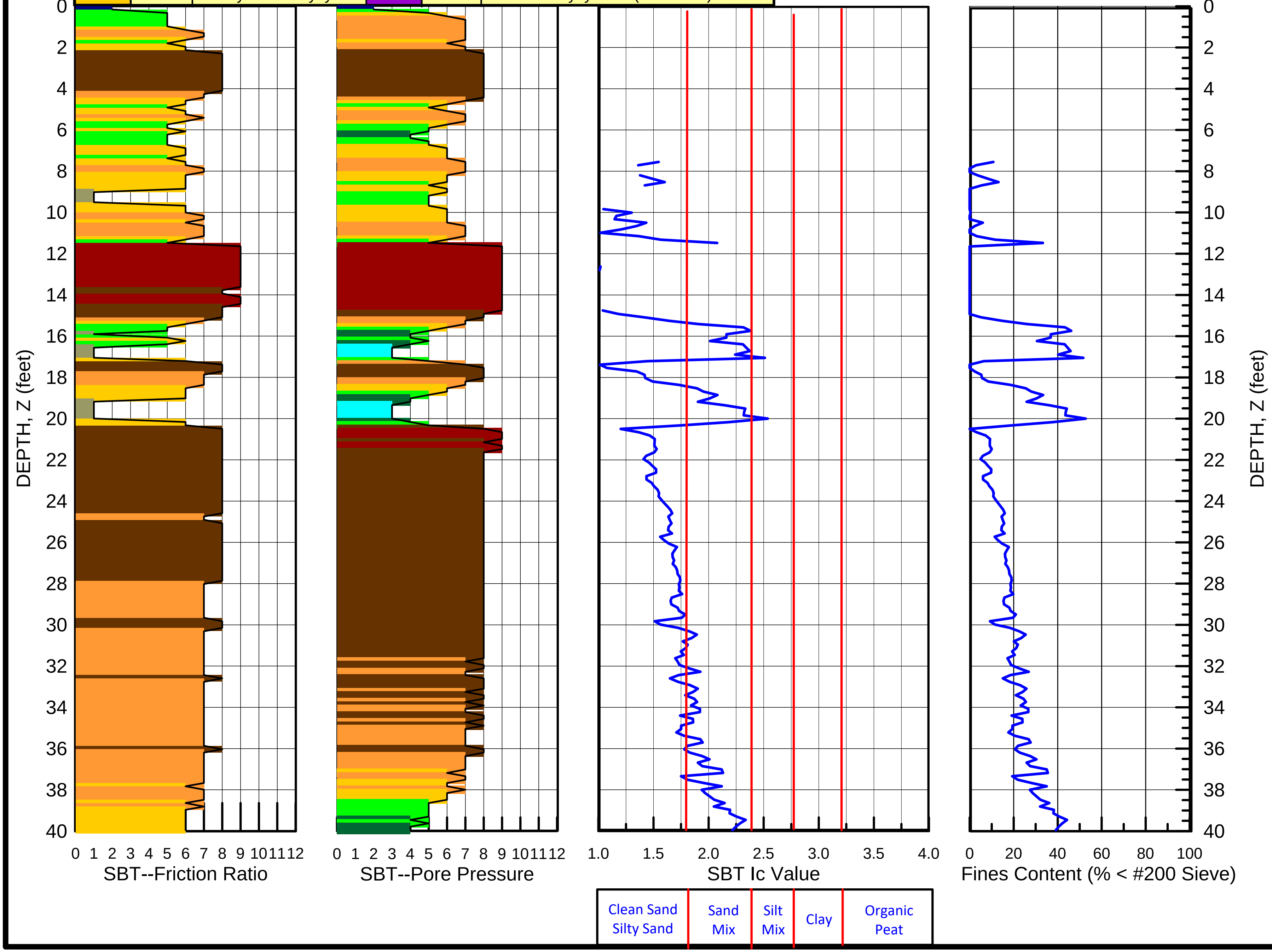
CONE PENETROMETER TEST RESULTS



Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~-6.4 feet
Water Depth: ~-6.8 feet

Horizontal Datum: NAD83, 1900 MD State Plane
Vertical Datum: NAVD88



CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N245,768.7 E1,523,107.2

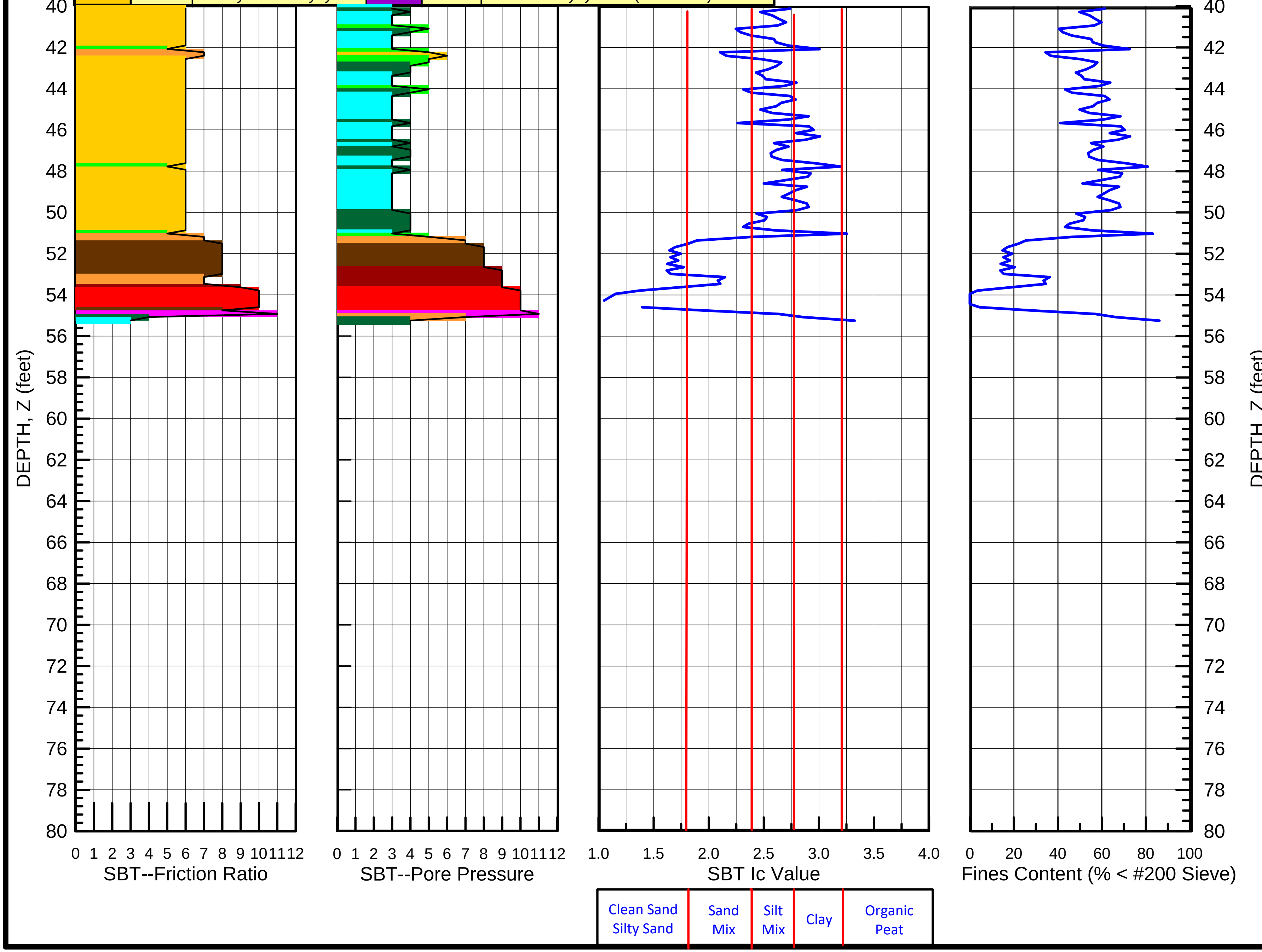
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/4/20

SOUNDING
CPT-213

Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~-6.4 feet
Water Depth: ~-6.8 feet

Horizontal Datum: NAD83,
1900 MD State Plane
Vertical Datum: NAVD88



PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N245,768.7 E1,523,107.2

CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/4/20

SOUNDING
CPT-213

PROJECT: Barren Island

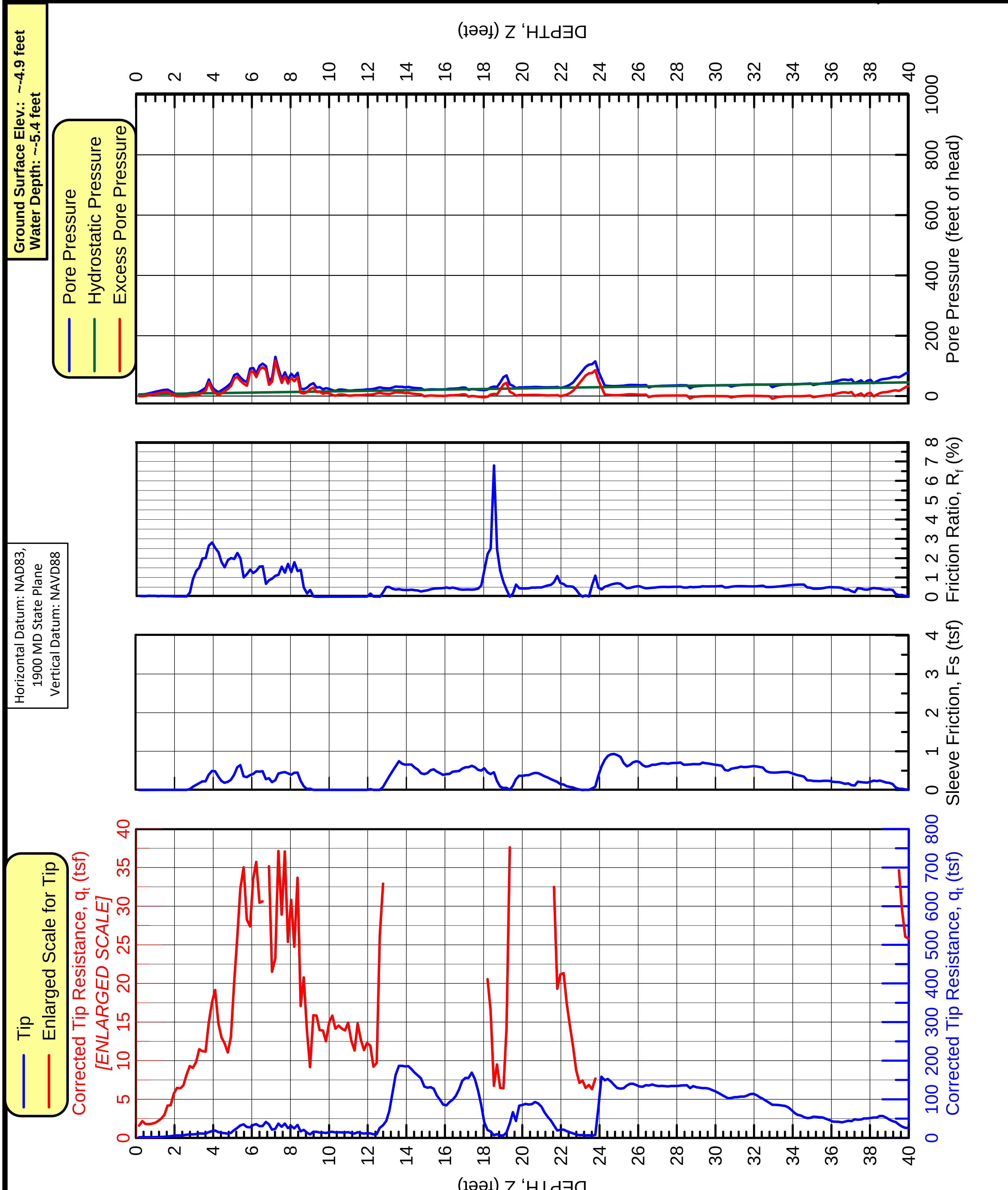
LOCATION: Dorchester County, Maryland N245,464.4 E1,523,537.0

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 6/4/20

SOUNDING

CPT-214

CONE PENETROMETER TEST RESULTS



PROJECT: Barren Island

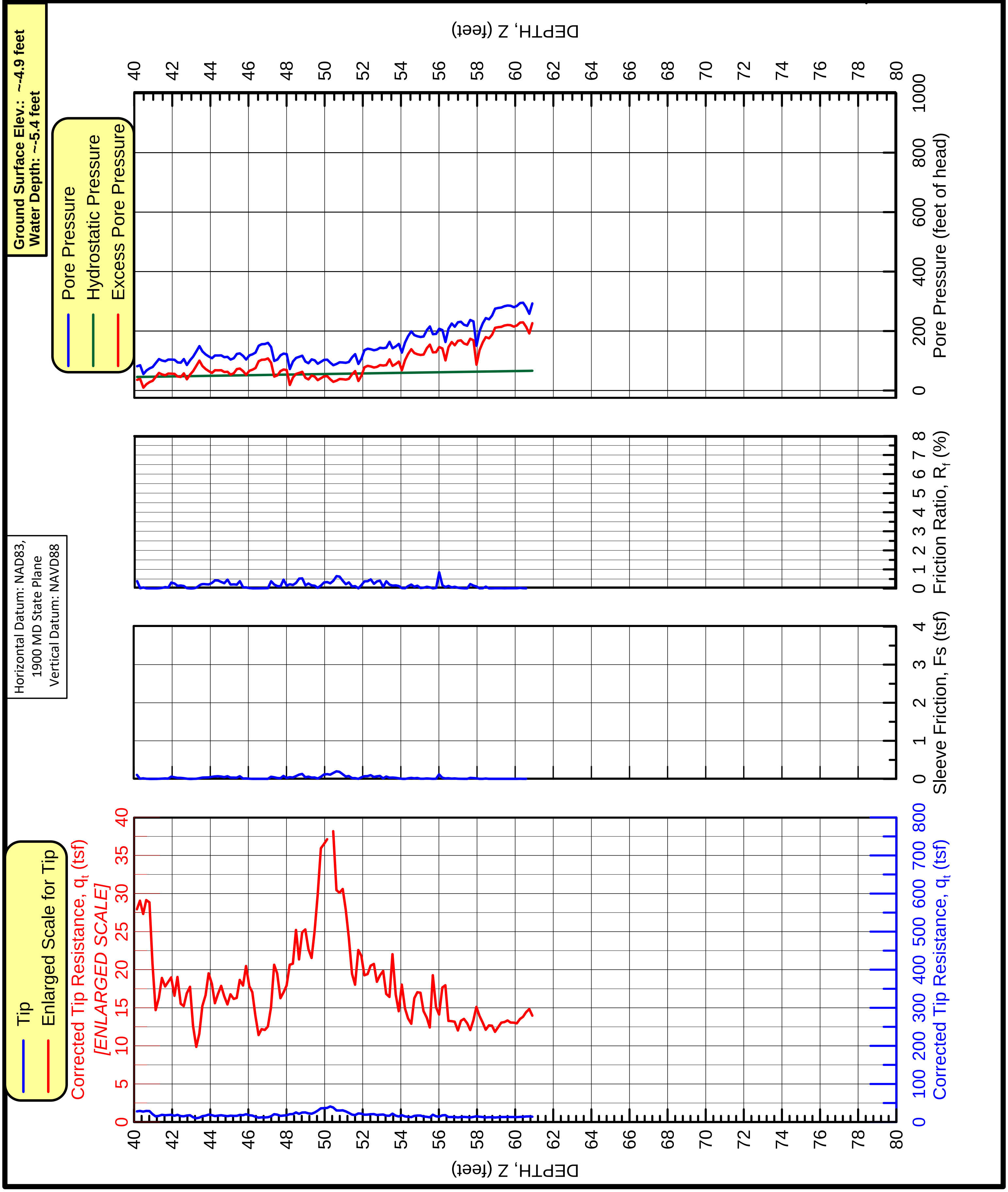
LOCATION: Dorchester County, Maryland N245,464.4 E1,523,537.0

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 6/4/20

SOUNDING

CPT-214

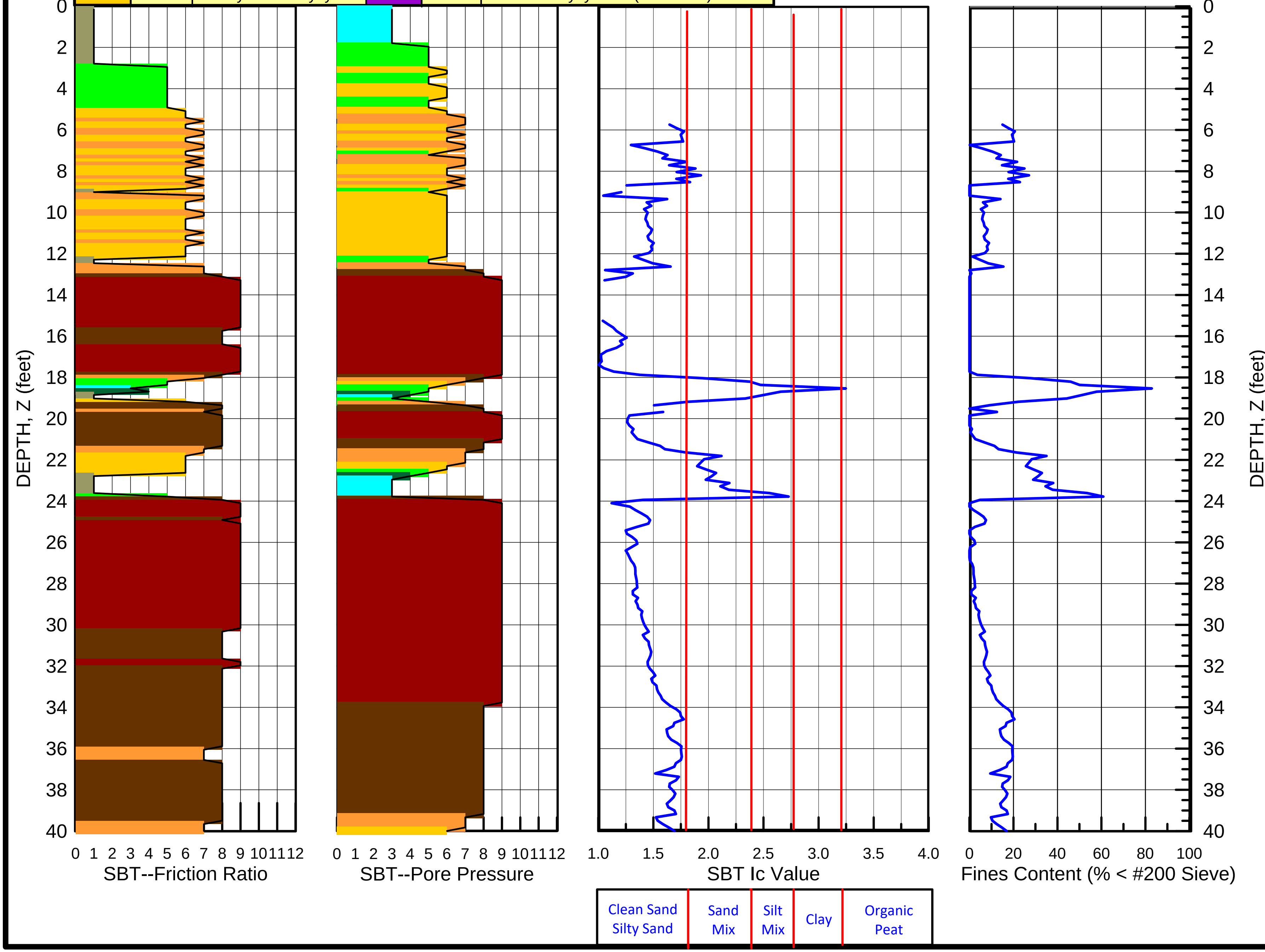
CONE PENETROMETER TEST RESULTS



Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~-4.9 feet
Water Depth: ~-5.4 feet

Horizontal Datum: NAD83, 1900 MD State Plane
Vertical Datum: NAVD88



CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N245,464.4 E1,523,537.0

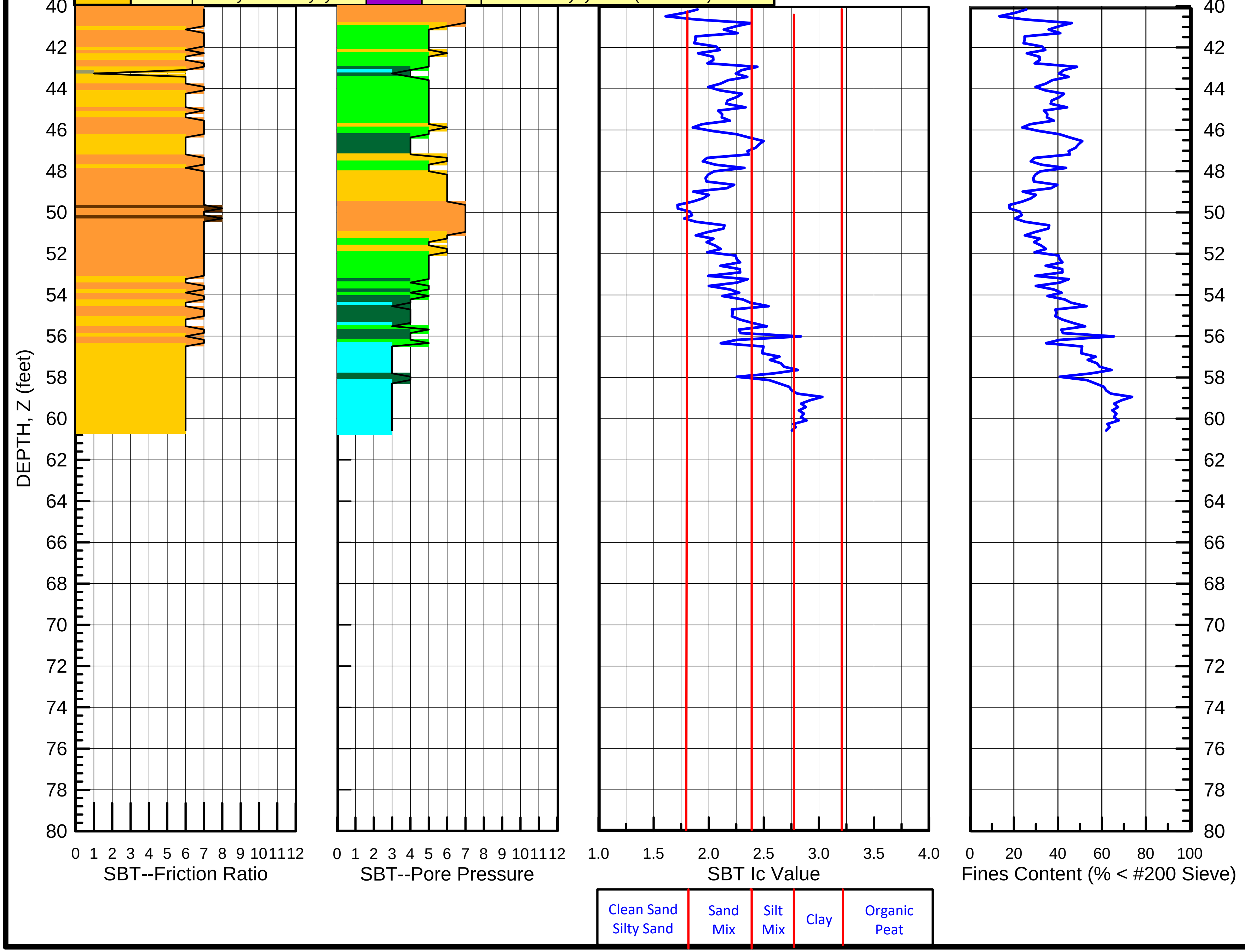
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 6/4/20

SOUNDING
CPT-214

Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~-4.9 feet
Water Depth: ~-5.4 feet

Horizontal Datum: NAD83, 1900 MD State Plane
Vertical Datum: NAVD88



CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N245,464.4 E1,523,537.0

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/4/20

SOUNDING
CPT-214

PROJECT: Barren Island

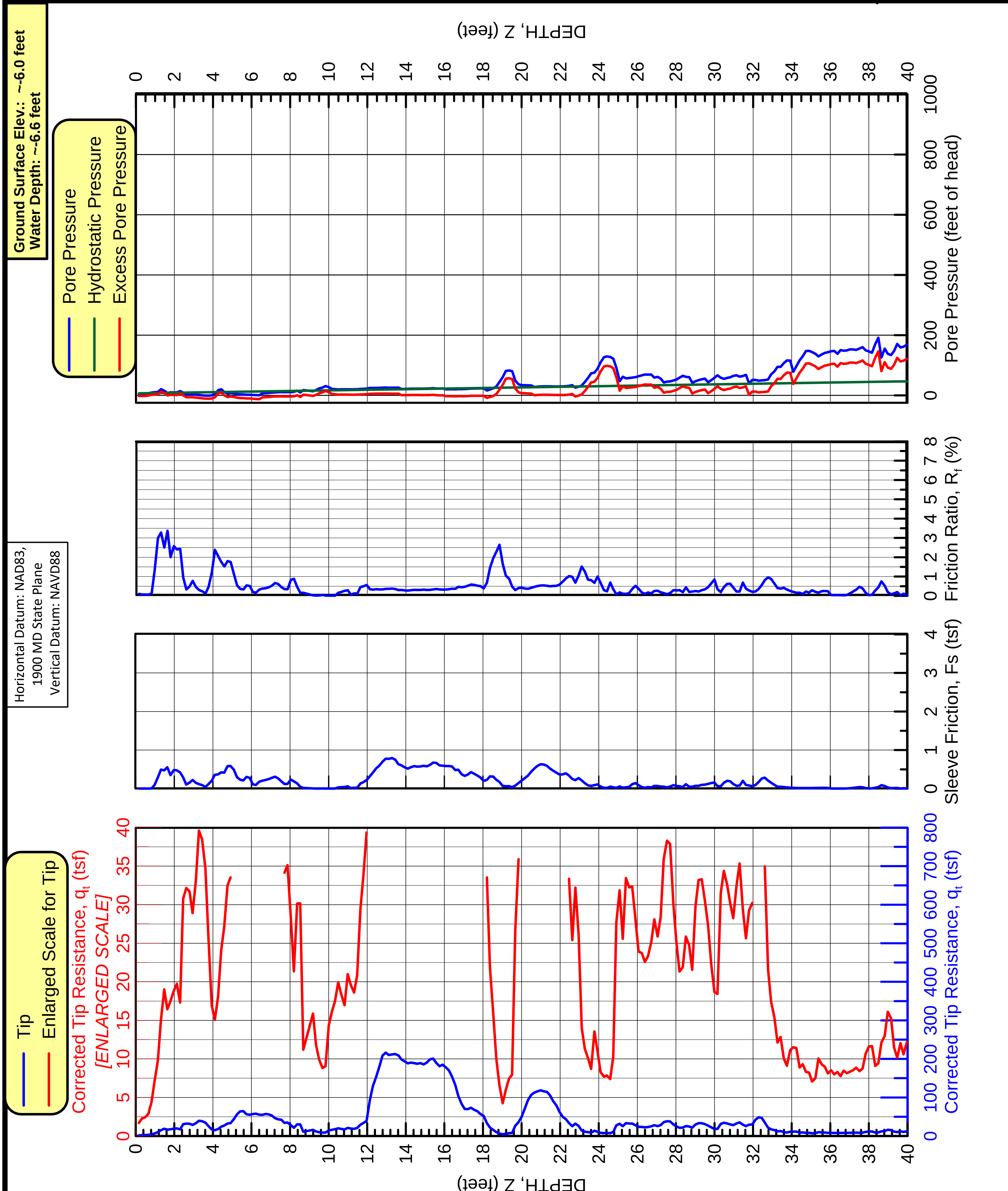
LOCATION: Dorchester County, Maryland N245,008.7 E1,523.726.2

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 6/4/20

SOUNDING

CPT-215

CONE PENETROMETER TEST RESULTS



PROJECT: Barren Island

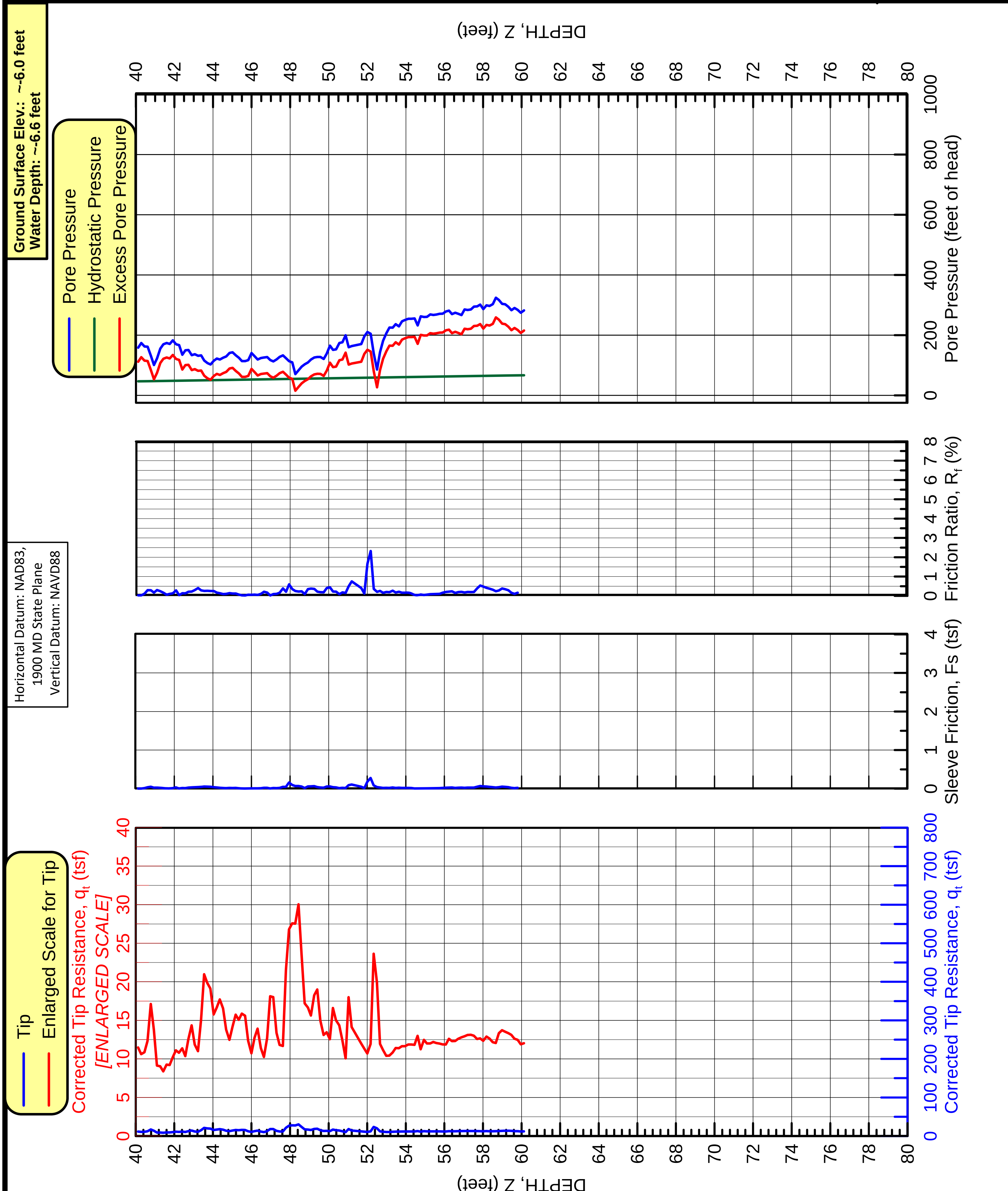
LOCATION: Dorchester County, Maryland N245,008.7 E1,523.726.2

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 6/4/20

SOUNDING

CPT-215

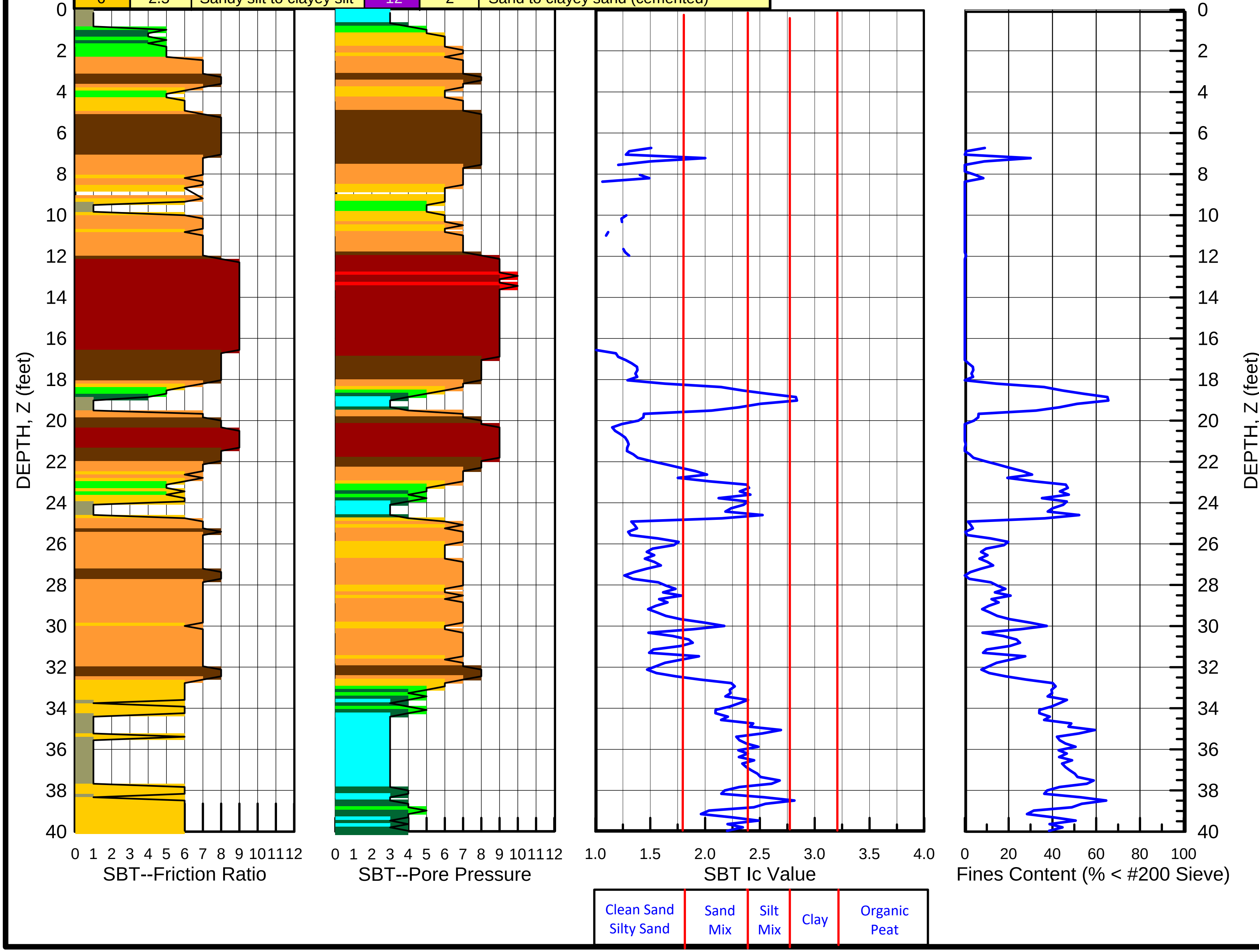
CONE PENETROMETER TEST RESULTS



Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~-6.0 feet
Water Depth: ~-6.6 feet

Horizontal Datum: NAD83,
1900 MD State Plane
Vertical Datum: NAVD88



CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N245,008.7 E1,523,726.2

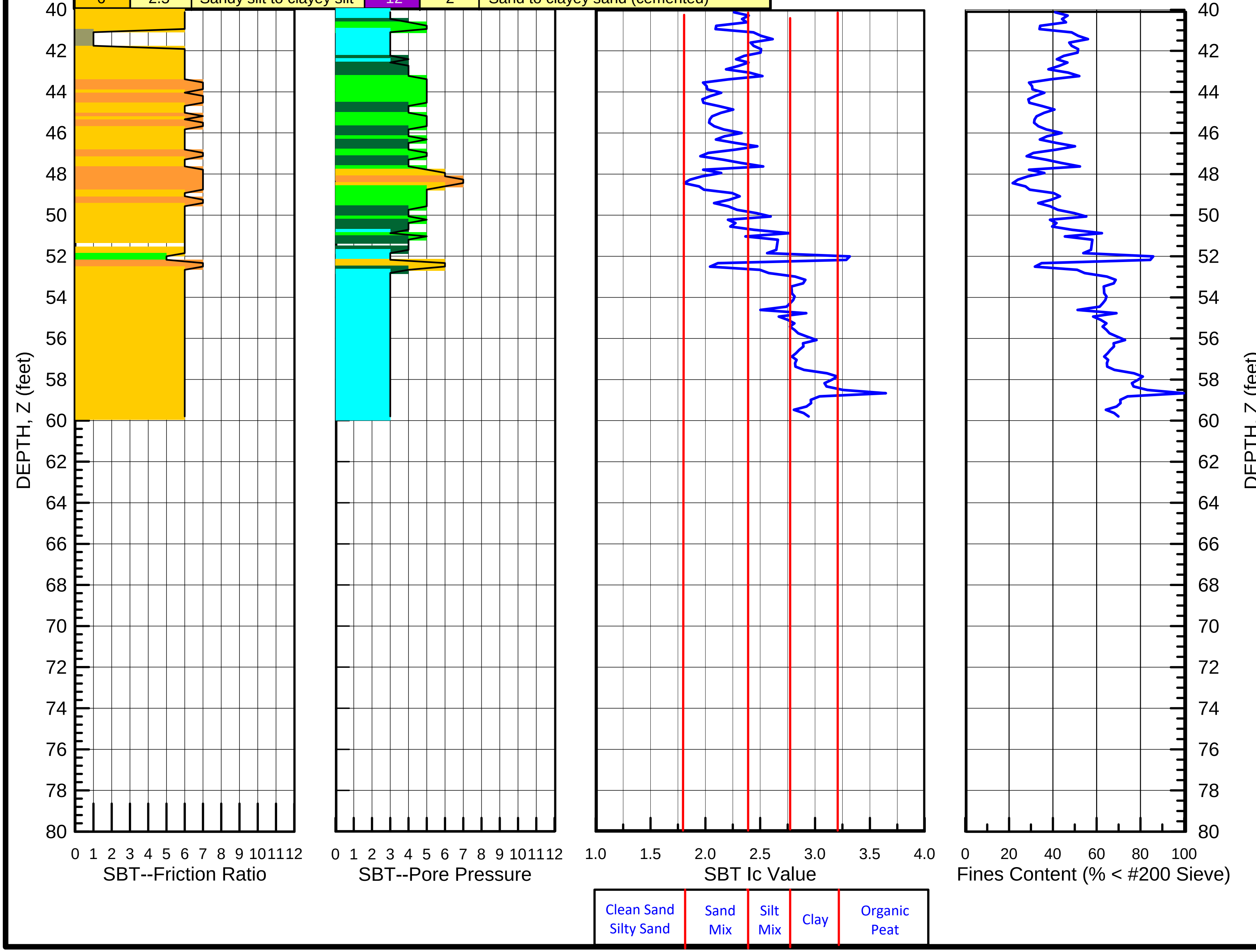
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/4/20

SOUNDING
CPT-215

Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~-6.0 feet
Water Depth: ~-6.6 feet

Horizontal Datum: NAD83,
1900 MD State Plane
Vertical Datum: NAVD88



PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N245,008.7 E1,523,726.2

CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 6/4/20

SOUNDING
CPT-215

PROJECT: Barren Island

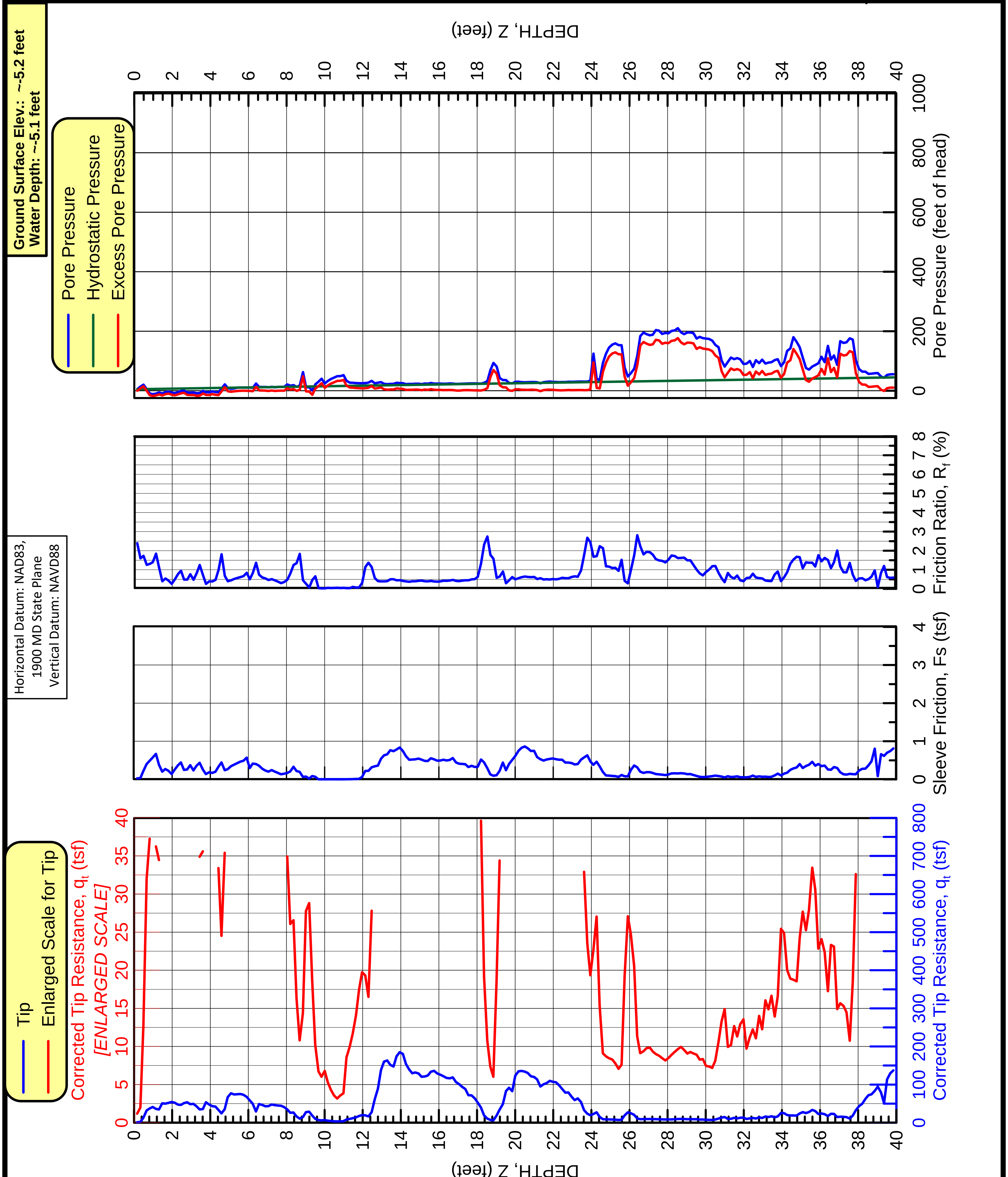
LOCATION: Dorchester County, Maryland N244,589 E1,524,065

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 5/27/20

SOUNDING

CPT-216

CONE PENETROMETER TEST RESULTS



PROJECT: Barren Island

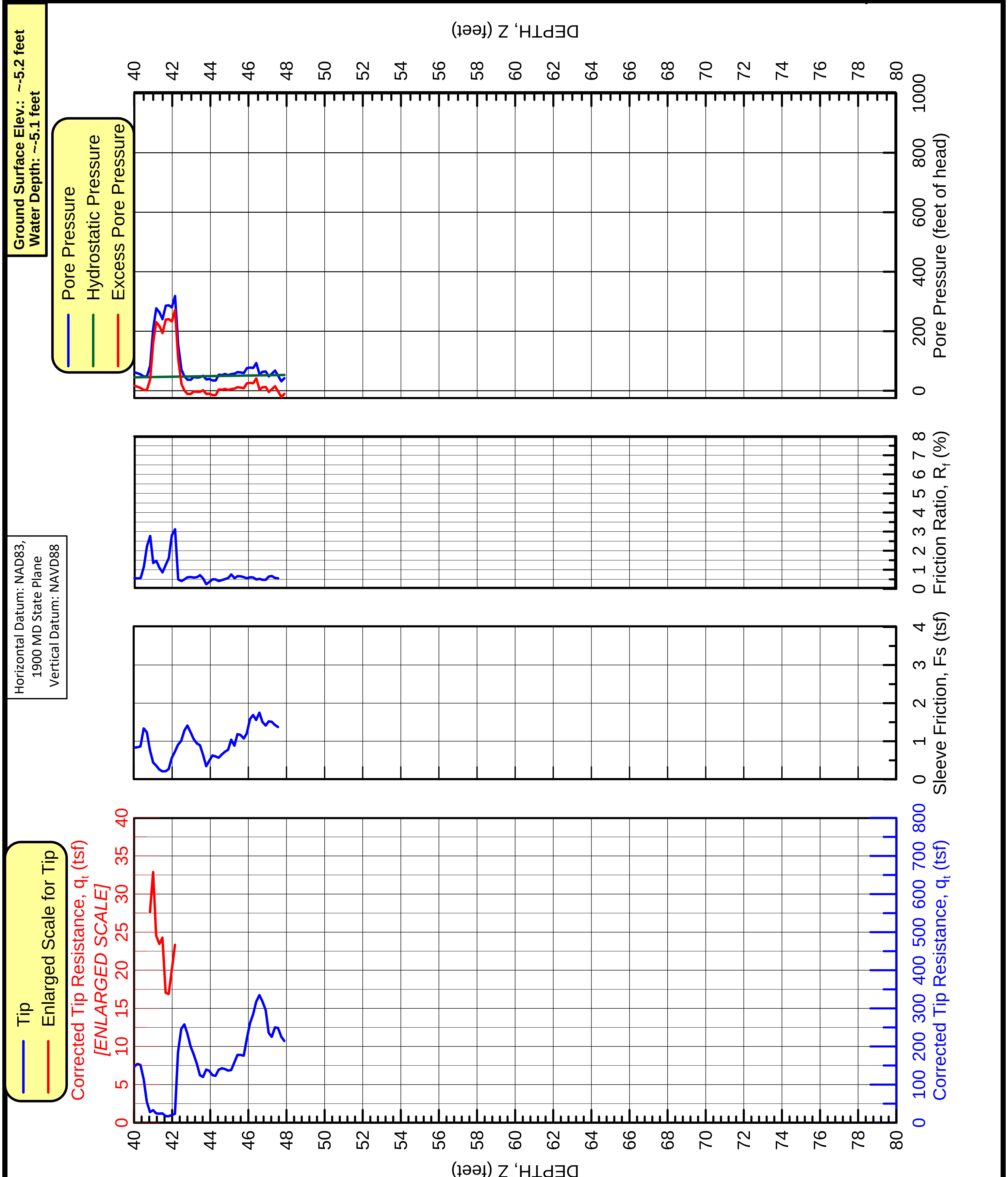
LOCATION: Dorchester County, Maryland N244,589 E1,524,065

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 5/27/20

SOUNDING

CPT-216

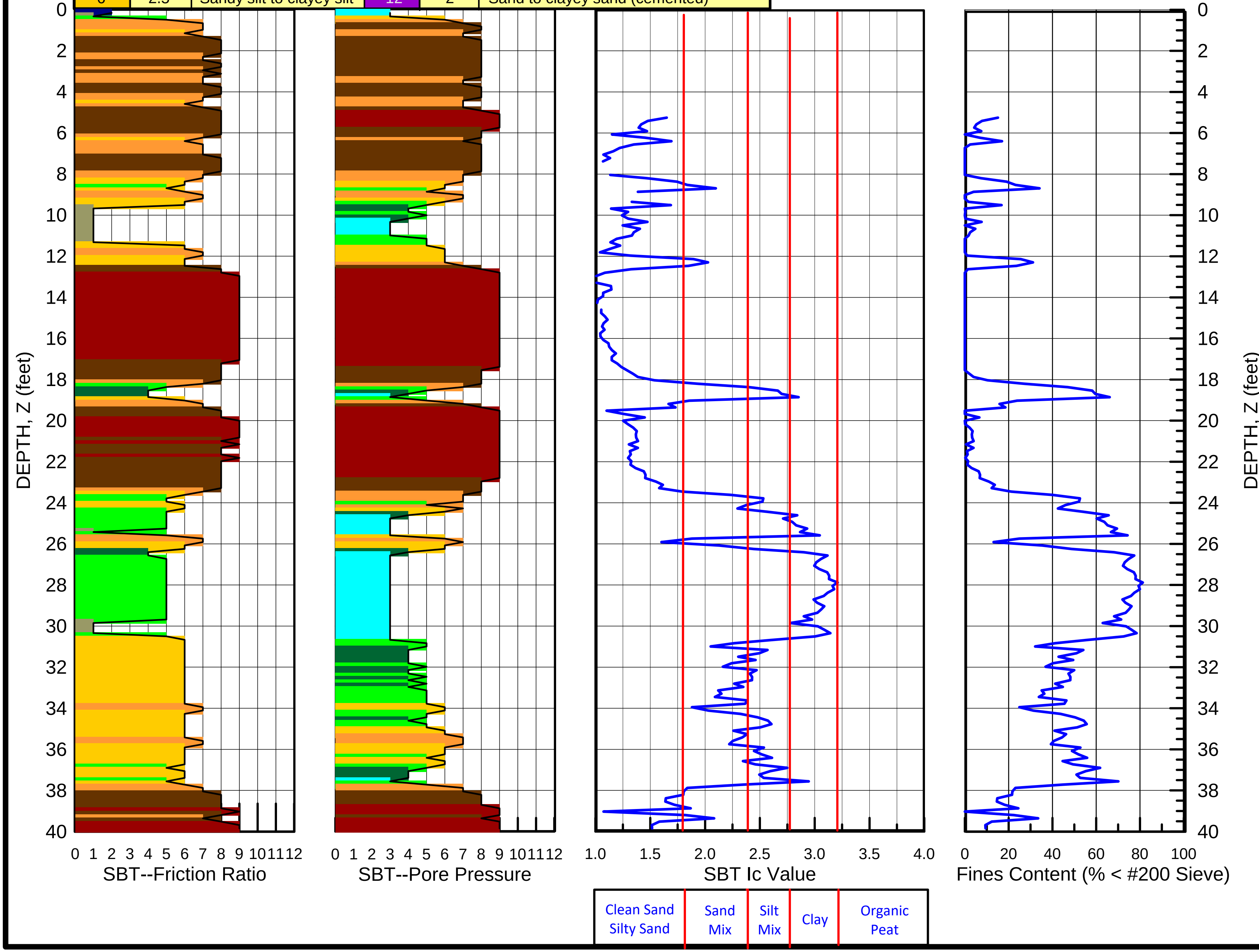
CONE PENETROMETER TEST RESULTS



Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~-5.2 feet
Water Depth: ~-5.1 feet

Horizontal Datum: NAD83, 1900 MD State Plane
Vertical Datum: NAVD88



CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N244,589 E1,524,065

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 5/27/20

SOUNDING
CPT-216

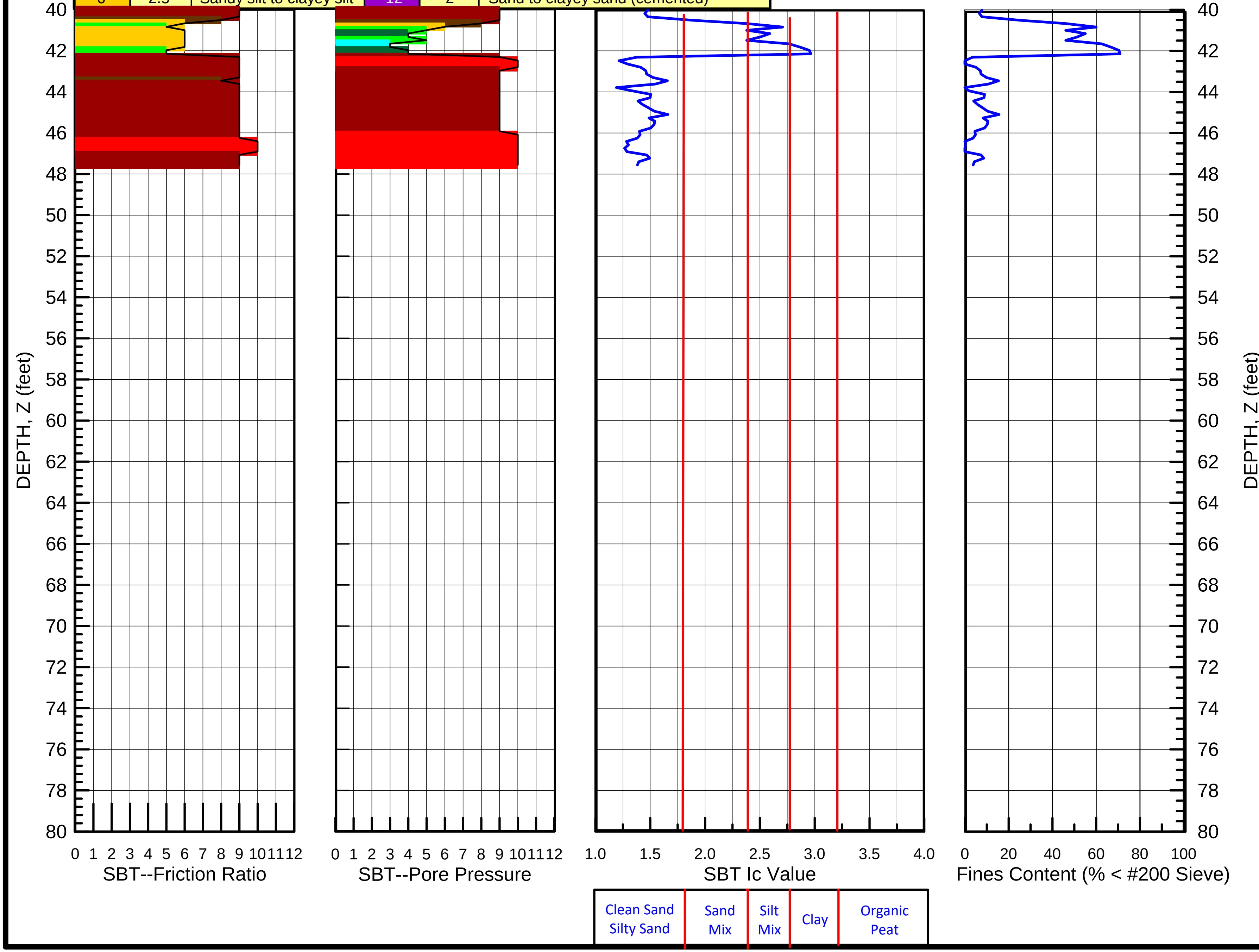
CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N244,589 E1,524,065

Ground Surface Elev.: ~-5.2 feet
Water Depth: ~-5.1 feet

Horizontal Datum: NAD83, 1900 MD State Plane
Vertical Datum: NAVD88

Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)



IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 5/27/20

SOUNDING
CPT-216

PROJECT: Barren Island

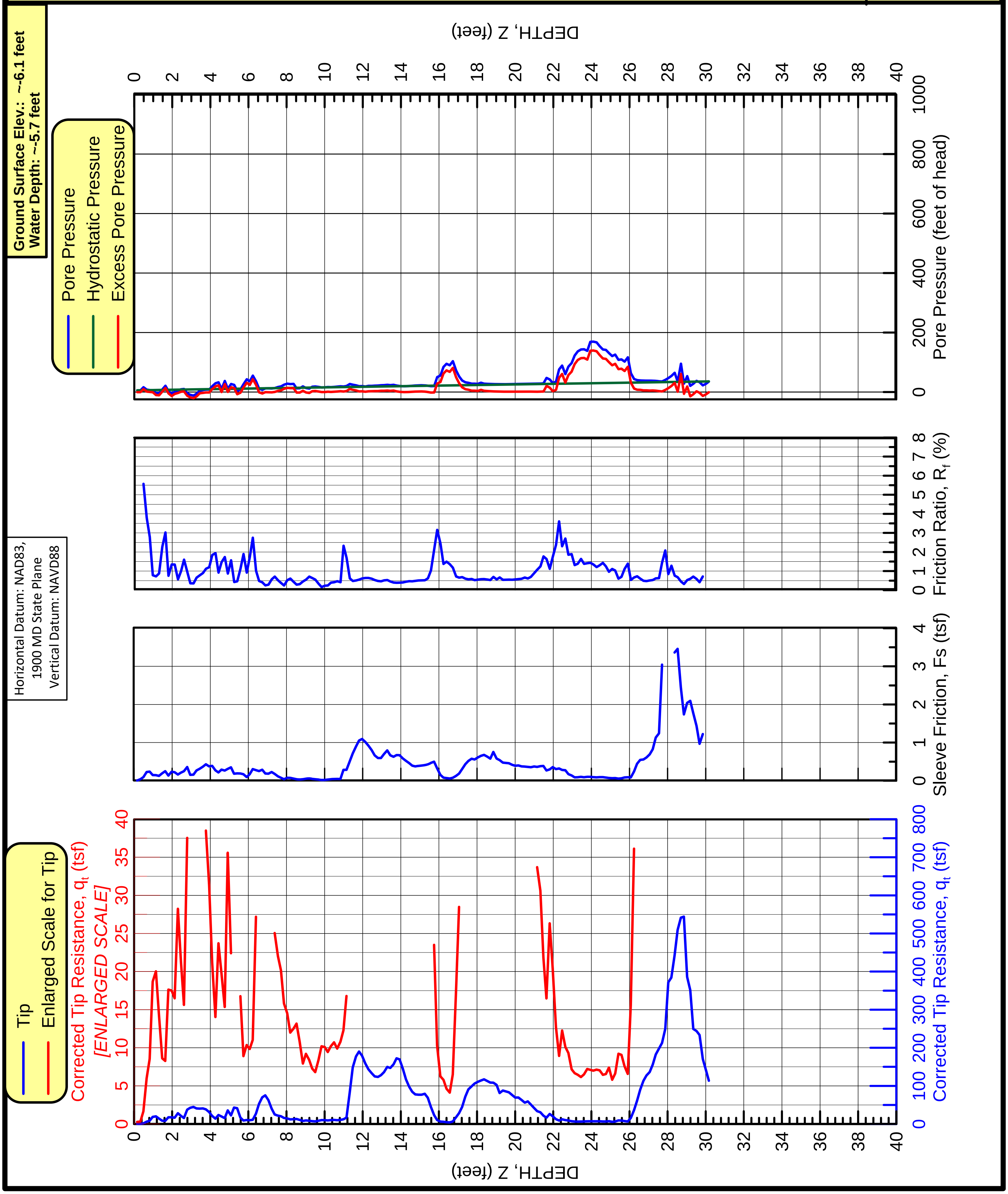
LOCATION: Dorchester County, Maryland N244,182 E1,524,256

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 5/27/20

SOUNDING

CPT-217

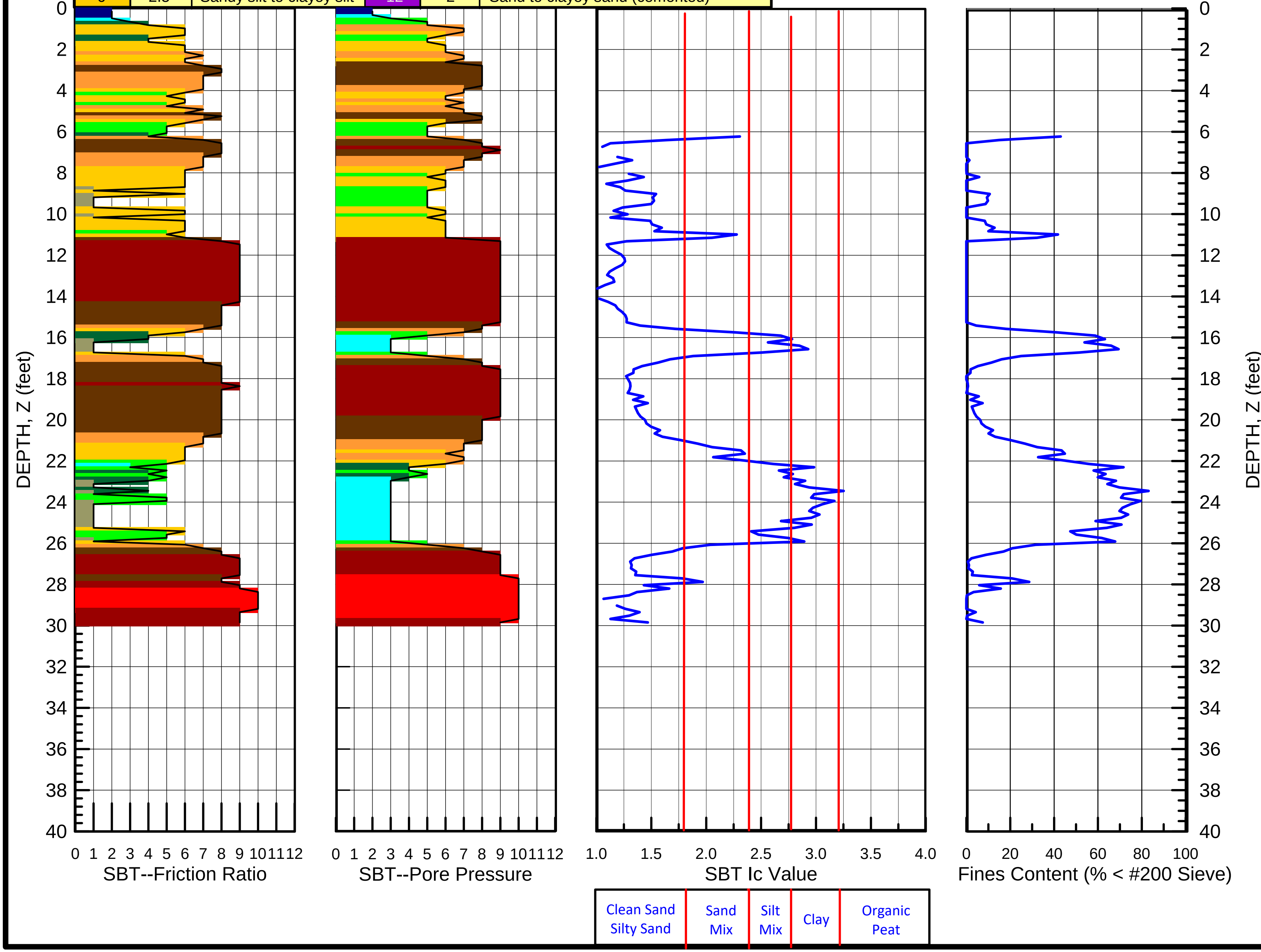
CONE PENETROMETER TEST RESULTS



Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~-6.1 feet
Water Depth: ~-5.7 feet

Horizontal Datum: NAD83, 1900 MD State Plane
Vertical Datum: NAVD88



CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N244,182 E1,524,256

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 5/27/20

SOUNDING
CPT-217

PROJECT: Barren Island

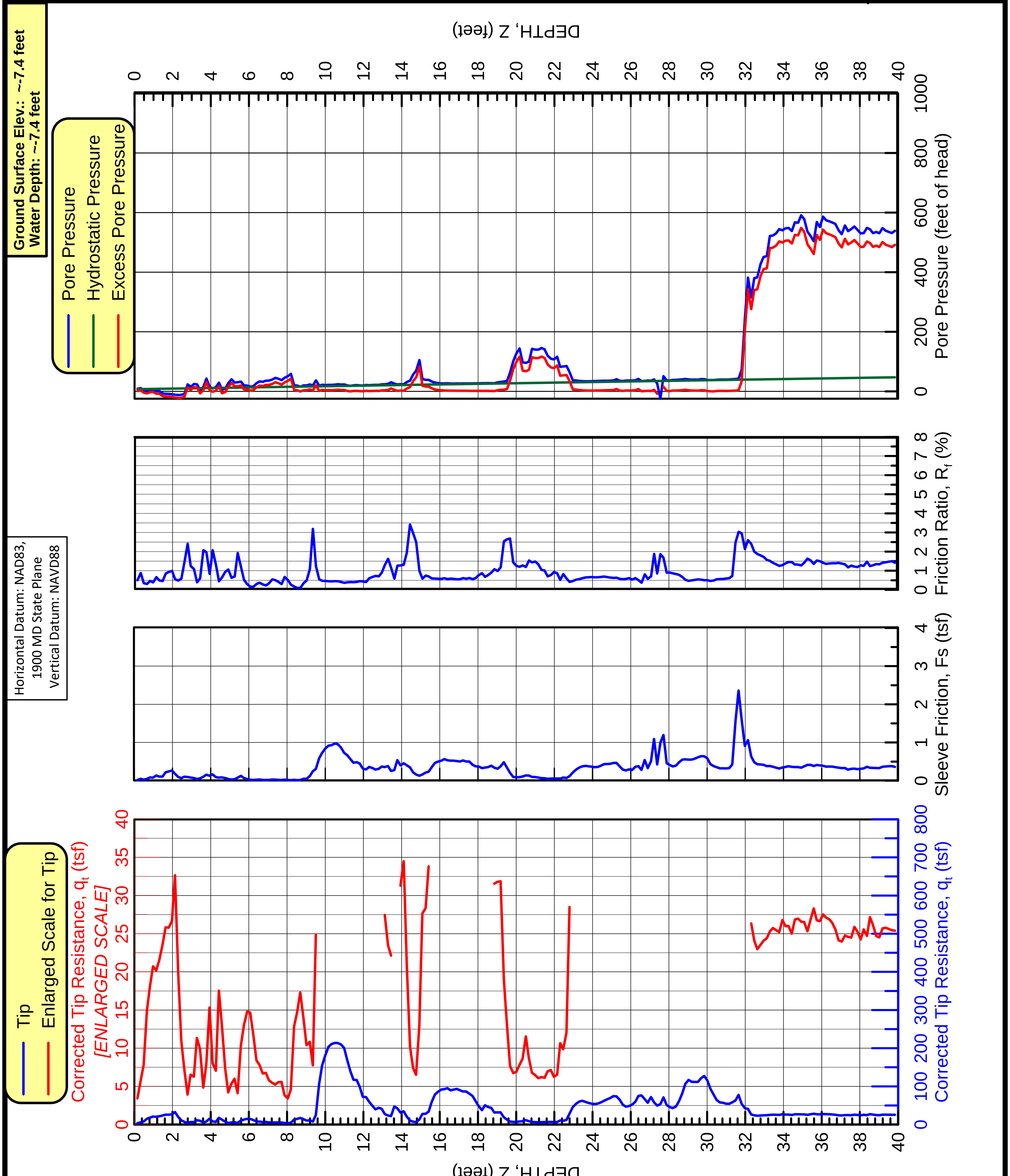
LOCATION: Dorchester County, Maryland N243,680 E1,524,355

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 5/27/20

SOUNDING

CPT-218

CONE PENETROMETER TEST RESULTS



PROJECT: Barren Island

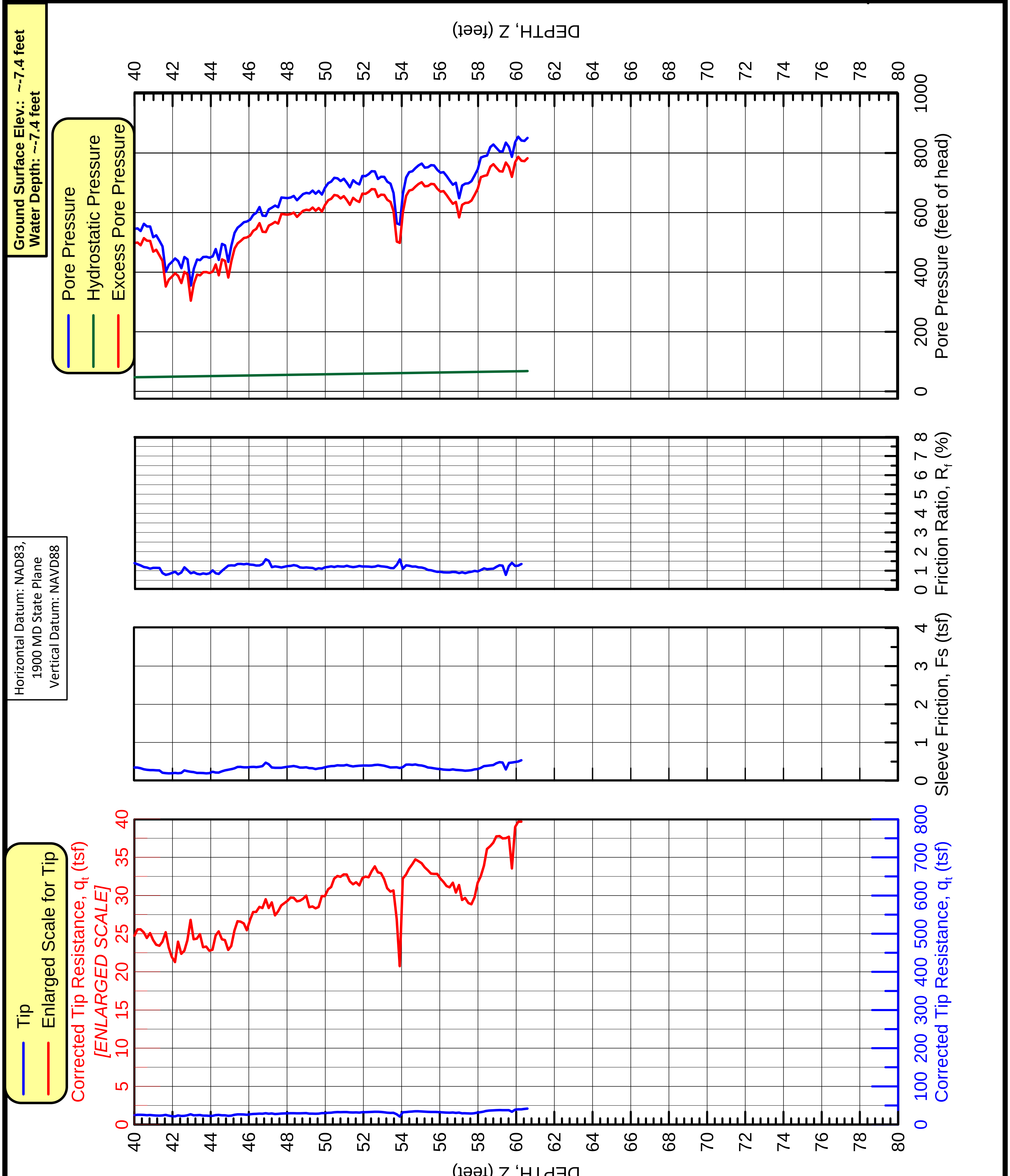
LOCATION: Dorchester County, Maryland N243,680 E1,524,355

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 5/27/20

SOUNDING

CPT-218

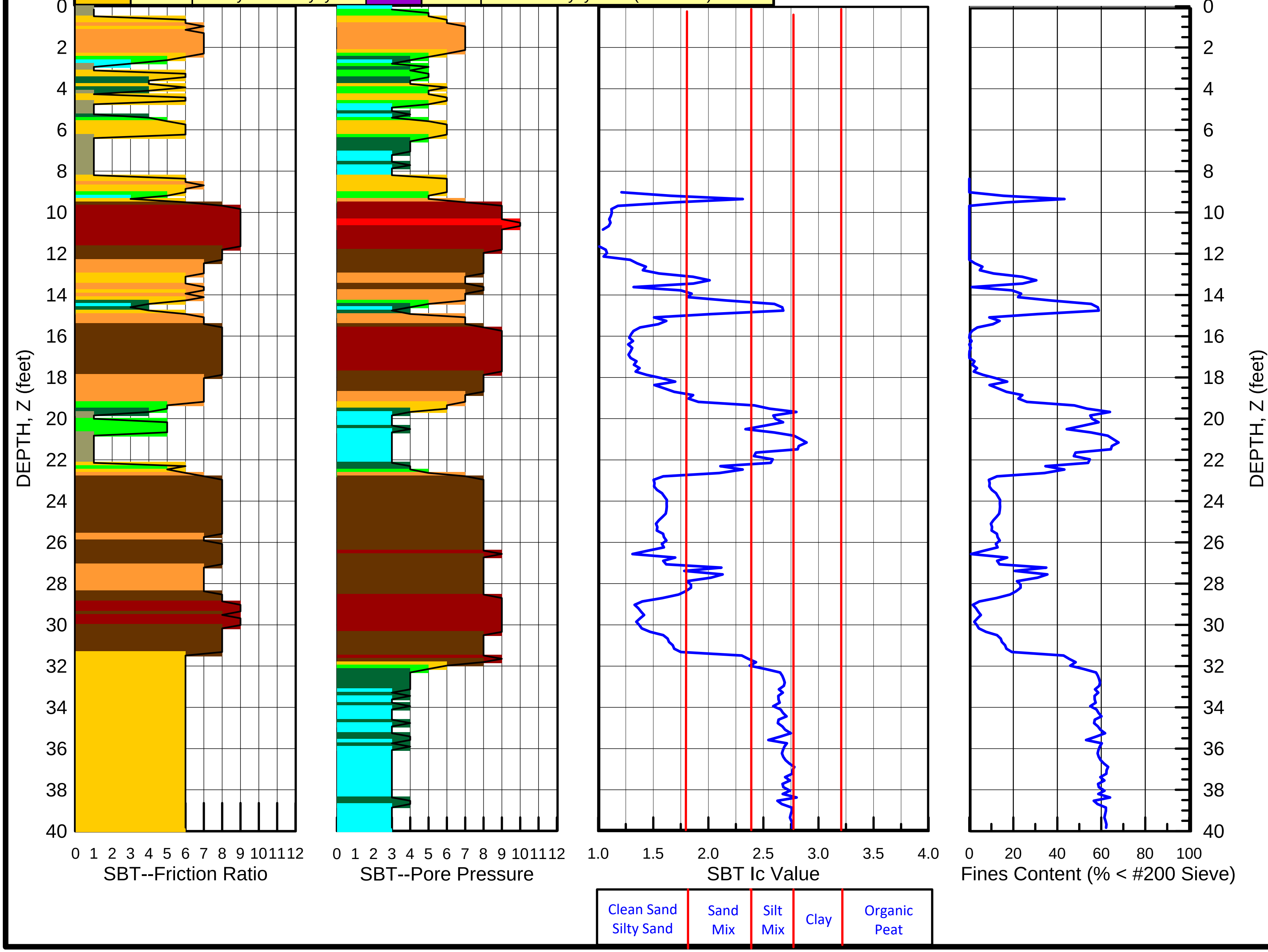
CONE PENETROMETER TEST RESULTS



Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~-7.4 feet
Water Depth: ~-7.4 feet

Horizontal Datum: NAD83, 1900 MD State Plane
Vertical Datum: NAVD88



PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N243,680 E1,524,355

CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

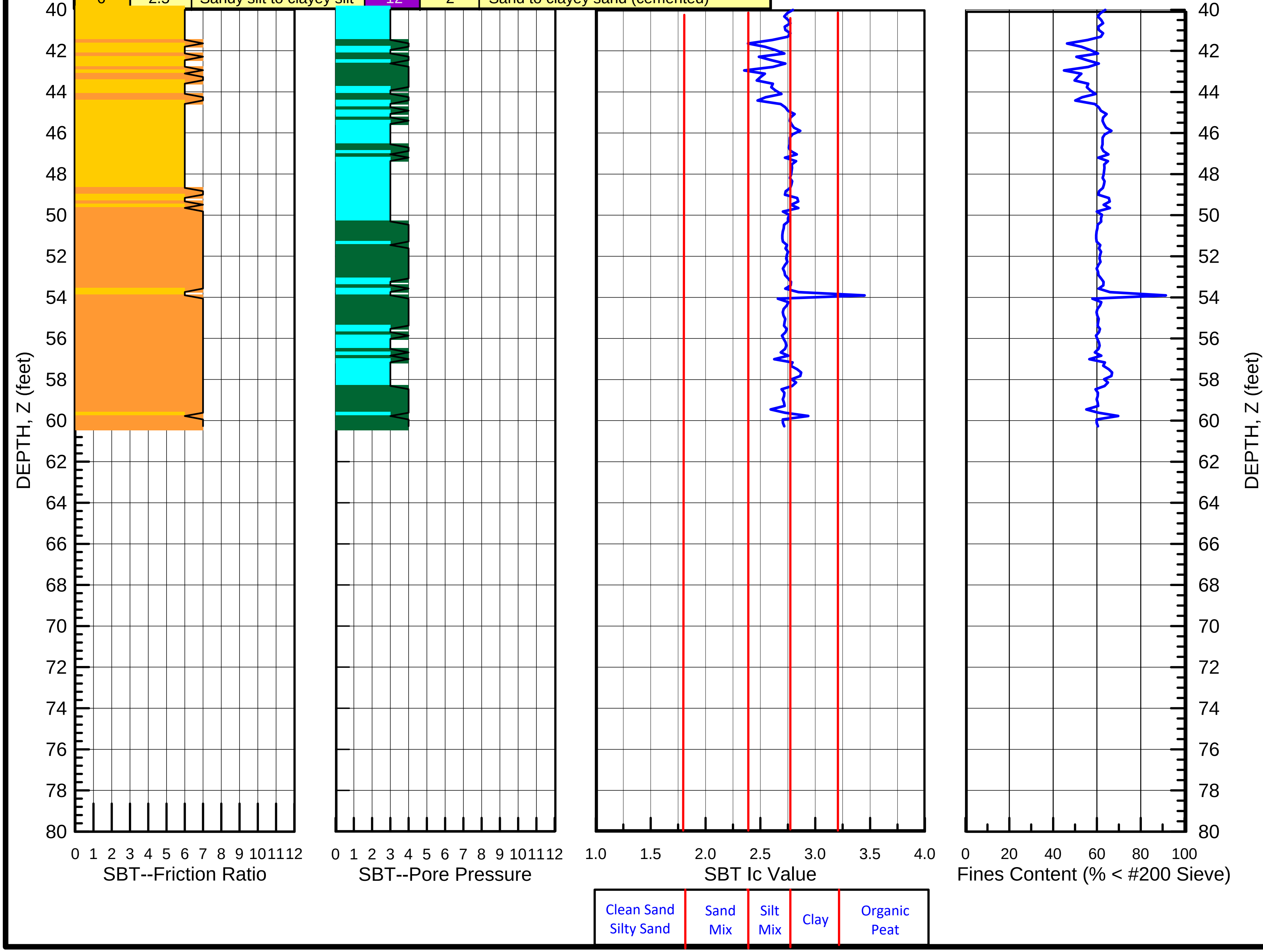
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 5/27/20

SOUNDING
CPT-218

Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~-7.4 feet
Water Depth: ~-7.4 feet

Horizontal Datum: NAD83,
1900 MD State Plane
Vertical Datum: NAVD88



PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N243,680 E1,524,355

CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 5/27/20

SOUNDING
CPT-218

PROJECT: Barren Island

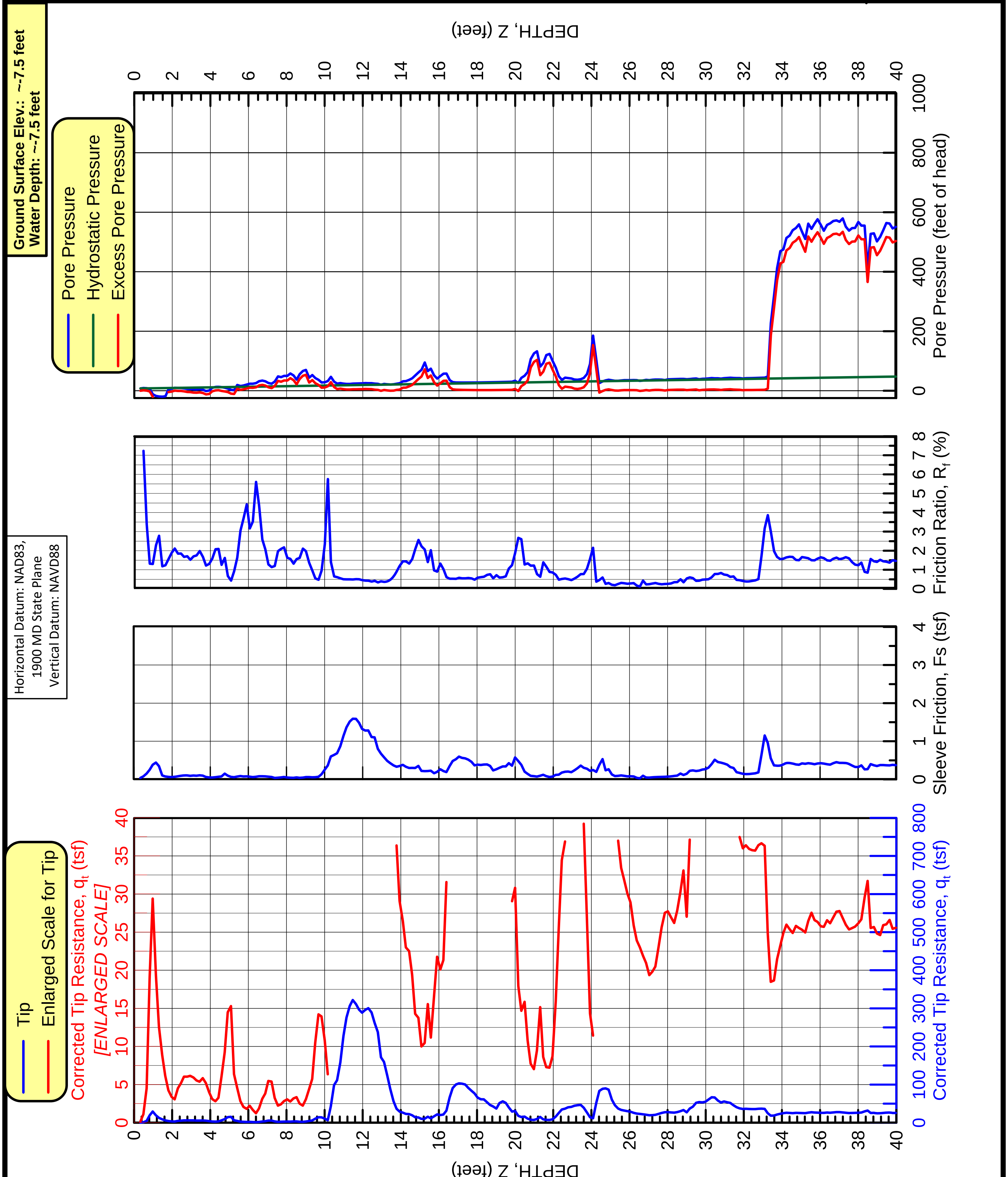
LOCATION: Dorchester County, Maryland N243,225.8 E1,524,606.1

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 6/5/20

SOUNDING

CPT-219

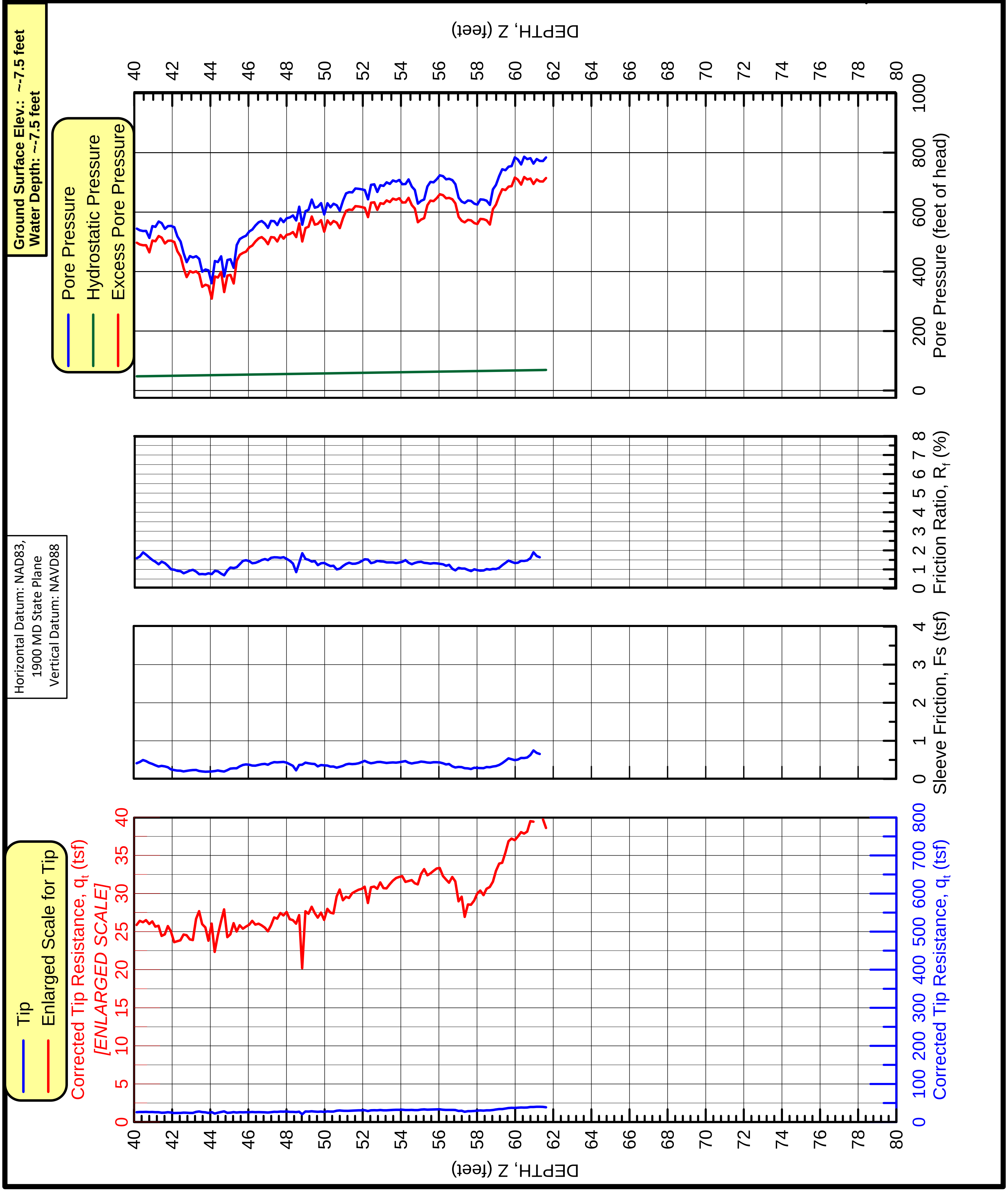
CONE PENETROMETER TEST RESULTS



PROJECT:	**Barren Island**	**IN-SITU SOIL TESTING, L.C.**	***SOUNDING***
LOCATION:	**Dorchester County, Maryland N243,225.8 E1,524,606.1**	**Engineer: R. Failmezger,P.E.,F. ASCE,D GE**	
		SOUNDING DATE: 6/5/20	

CONE PENETROMETER TEST RESULTS

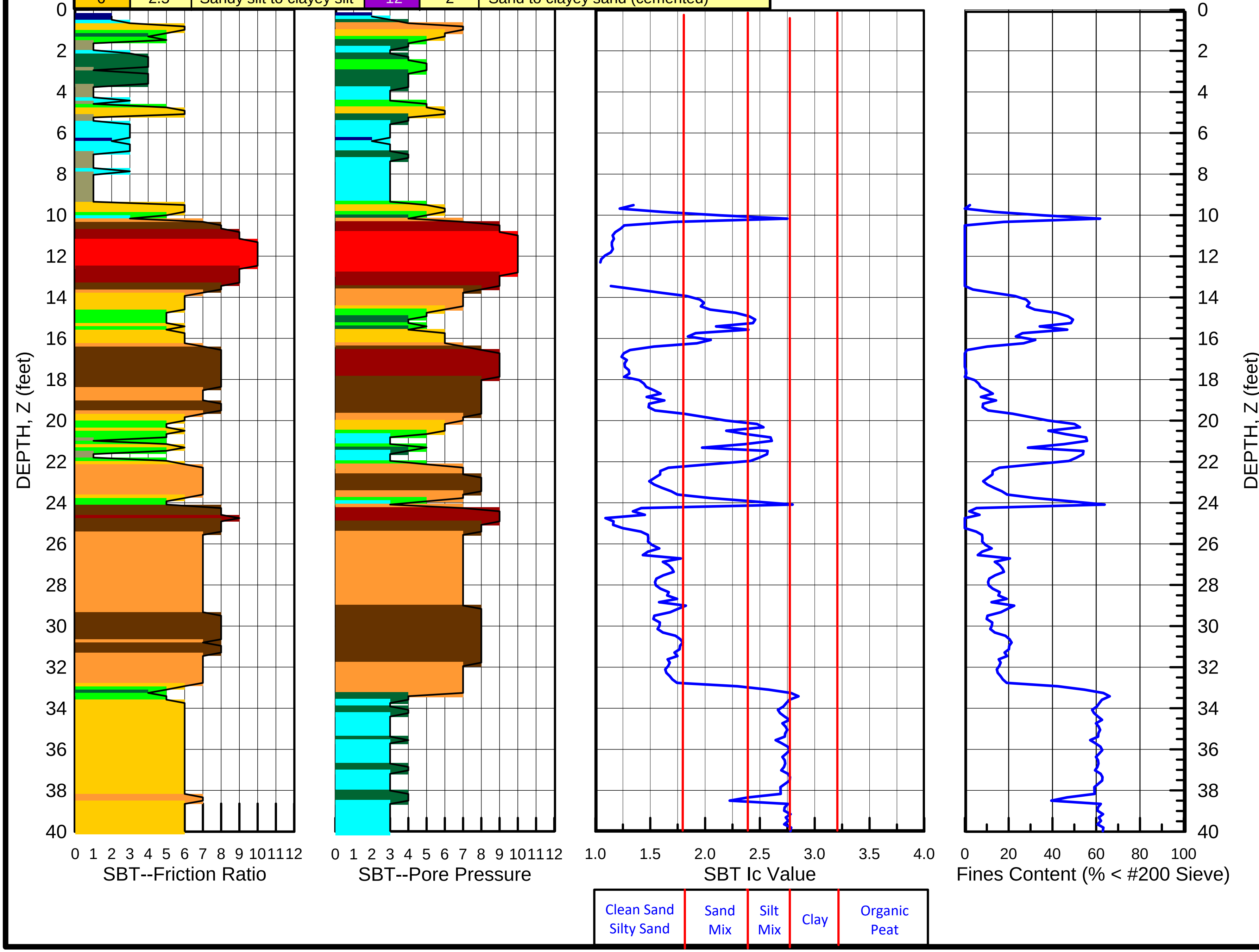
CPT-219



Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~-7.5 feet
Water Depth: ~-7.5 feet

Horizontal Datum: NAD83,
1900 MD State Plane
Vertical Datum: NAVD88



PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N243,225.8 E1,524,606.1

CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

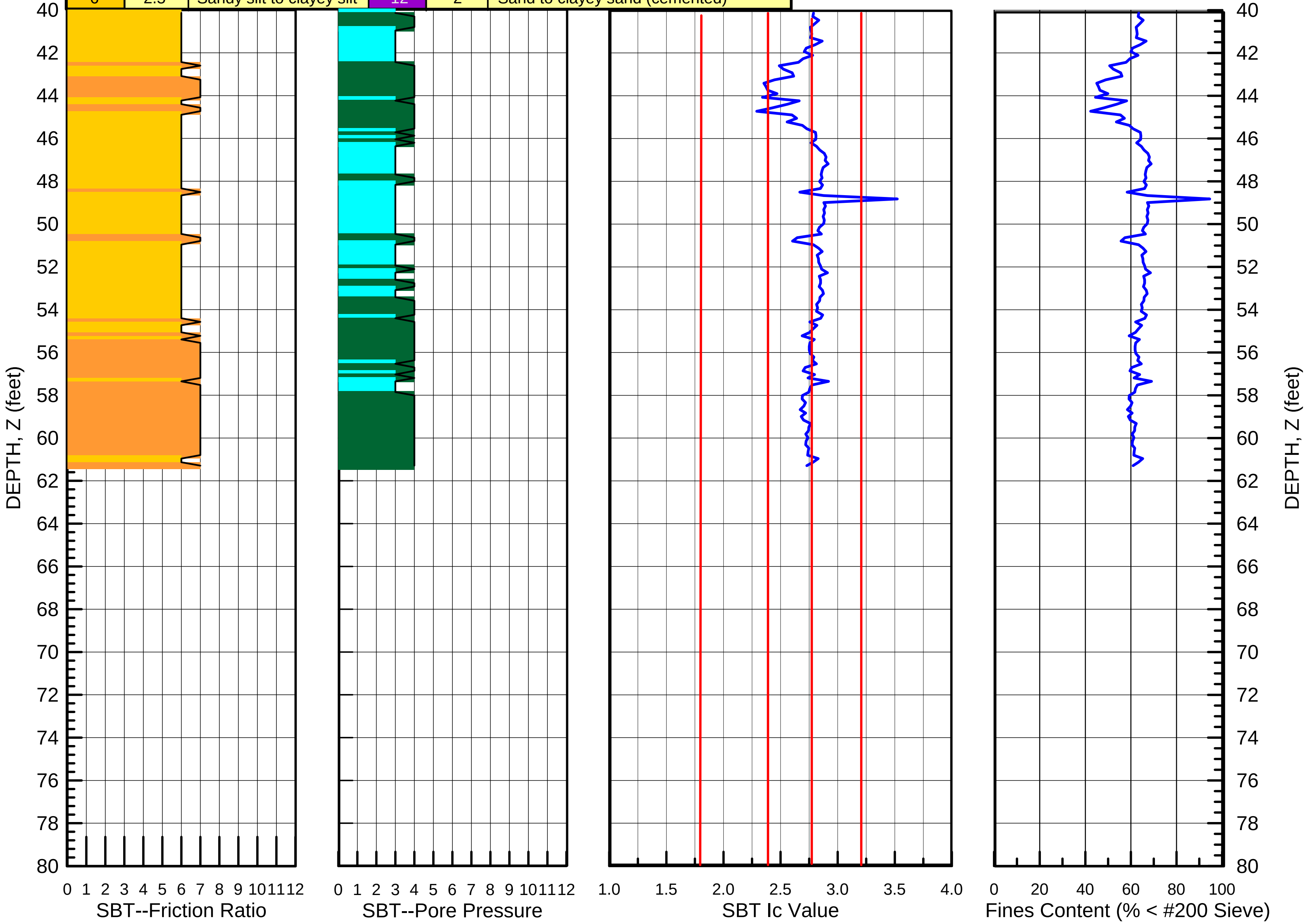
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 6/5/20

SOUNDING
CPT-219

Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~-7.5 feet
Water Depth: ~-7.5 feet

Horizontal Datum: NAD83,
1900 MD State Plane
Vertical Datum: NAVD88



CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

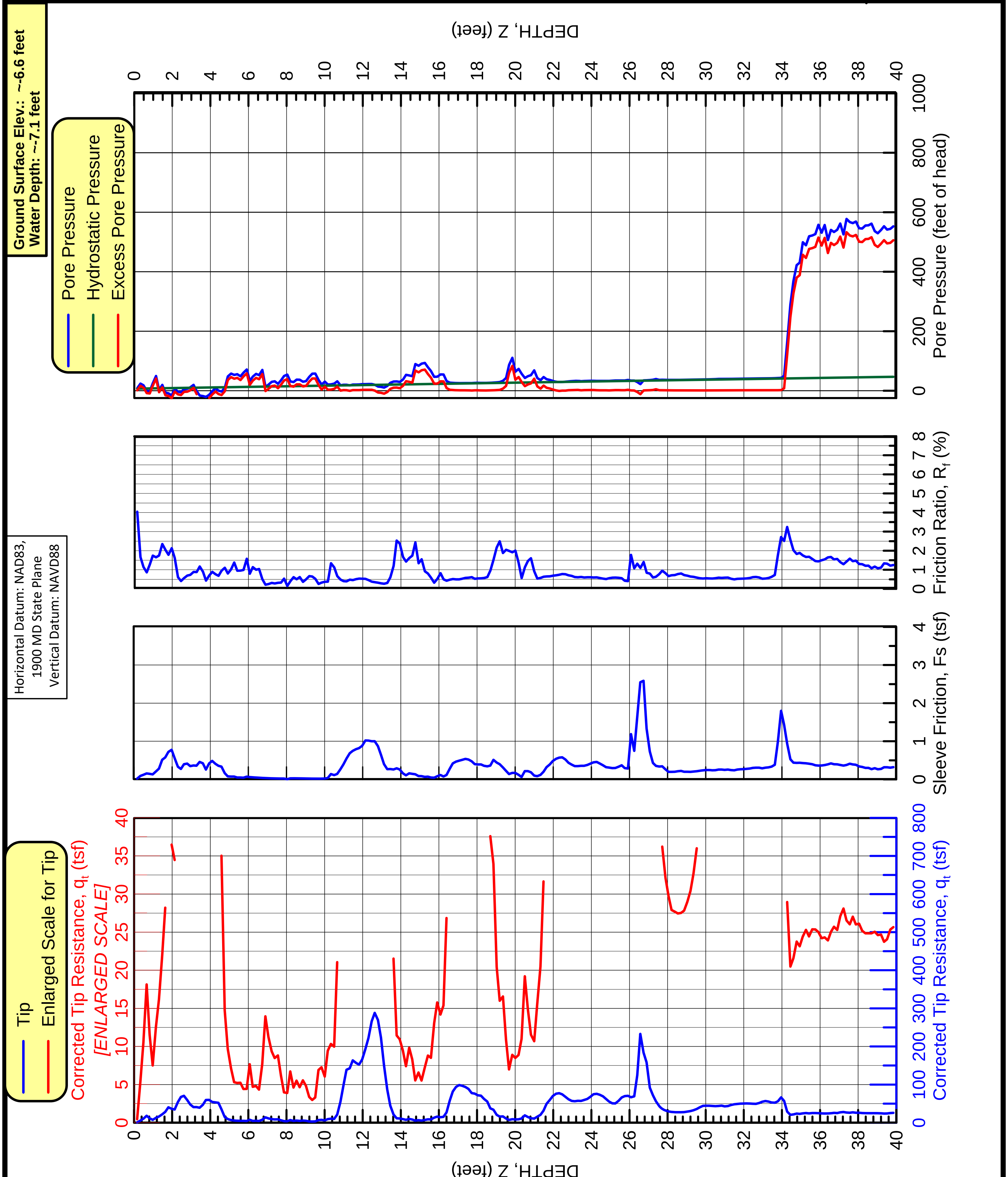
PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N243,225.8 E1,524,606.1

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 6/5/20

SOUNDING
CPT-219

PROJECT: Barren Island	IN-SITU SOIL TESTING, L.C.	SOUNDING
LOCATION: Dorchester County, Maryland N242,816 E1,524,851	Engineer: R. Failmezger,P.E.,F. ASCE,D GE SOUNDING DATE: 5/27/20	CPT-220

CONE PENETROMETER TEST RESULTS



PROJECT: Barren Island

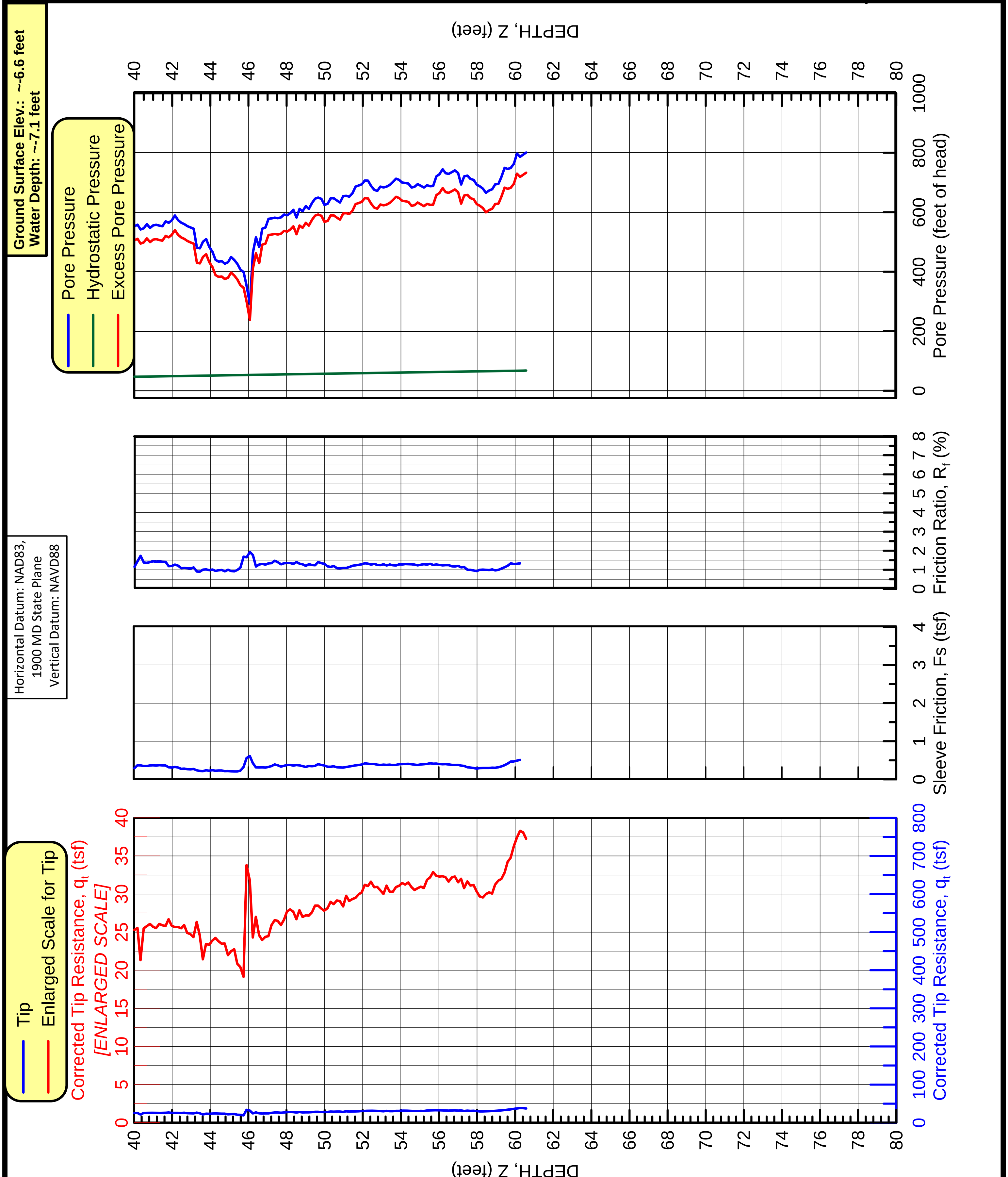
LOCATION: Dorchester County, Maryland N242,816 E1,524,851

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 5/27/20

SOUNDING

CPT-220

CONE PENETROMETER TEST RESULTS



CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N242,816 E1,524,851

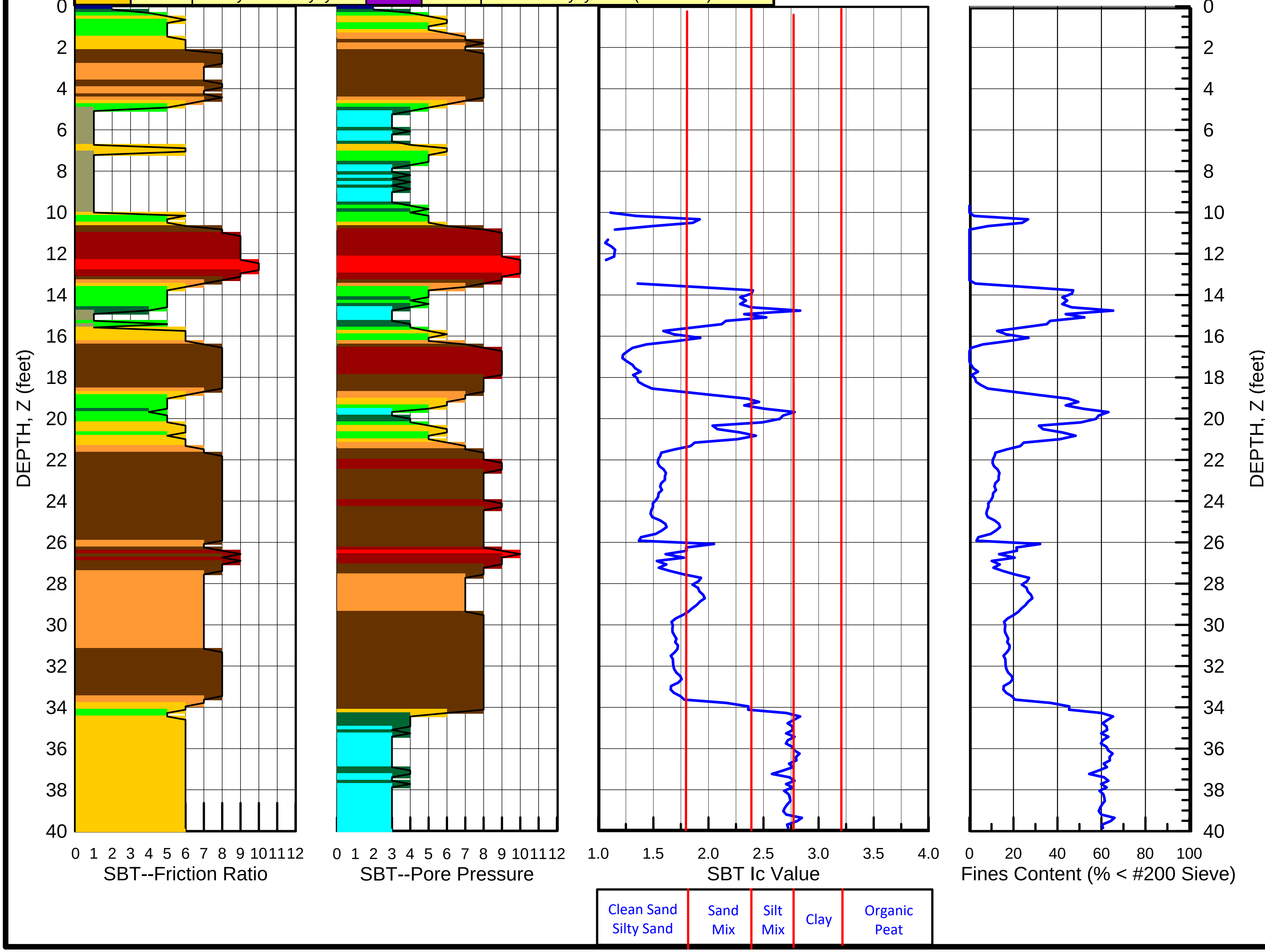
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 5/27/20

SOUNDING
CPT-220

Ground Surface Elev.: ~-6.6 feet
Water Depth: ~-7.1 feet

Horizontal Datum: NAD83, 1900 MD State Plane
Vertical Datum: NAVD88

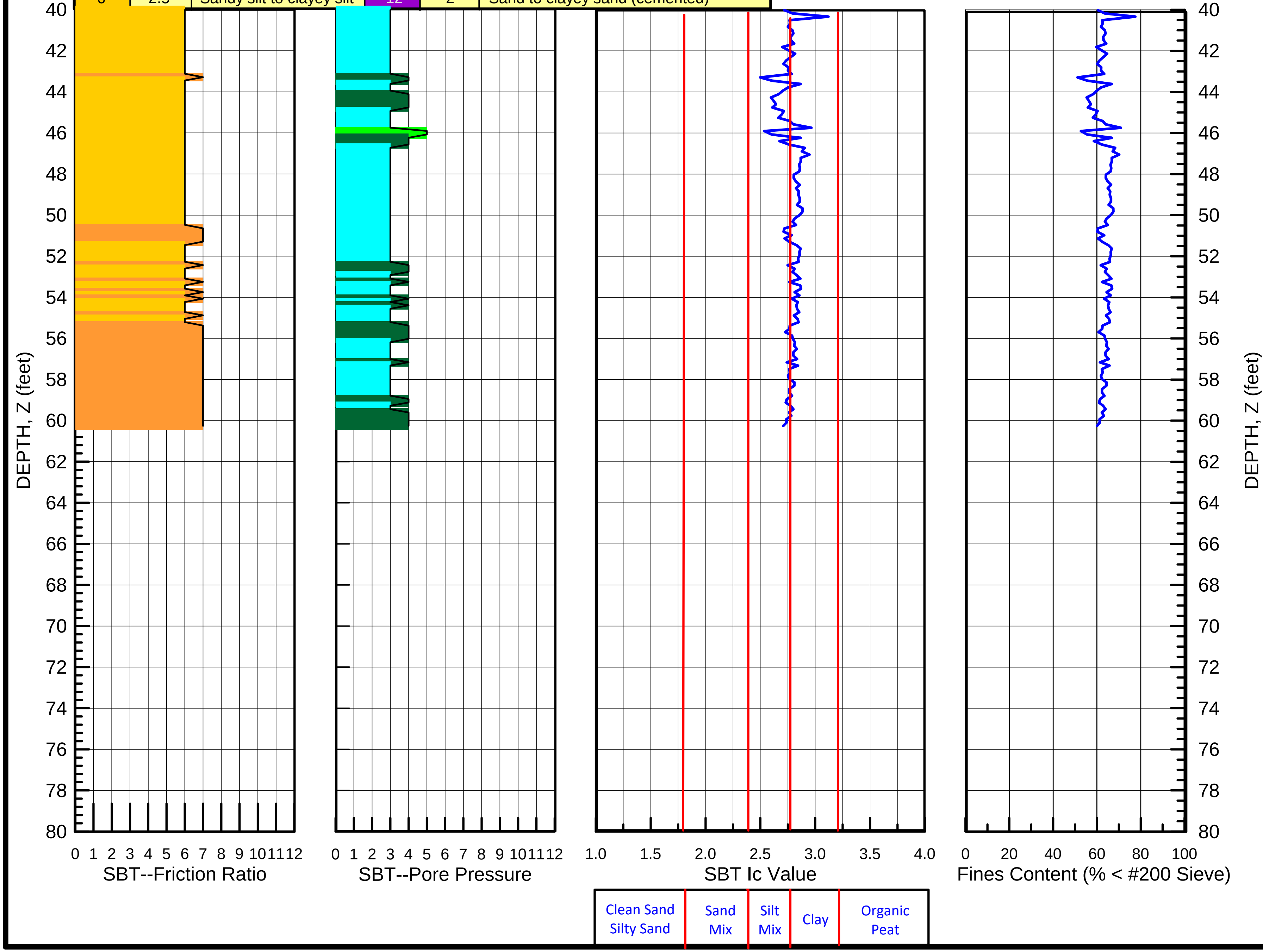
Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)



Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~-6.6 feet
Water Depth: ~-7.1 feet

Horizontal Datum: NAD83,
1900 MD State Plane
Vertical Datum: NAVD88



PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N242,816 E1,524,851

CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 5/27/20

SOUNDING
CPT-220

PROJECT: Barren Island

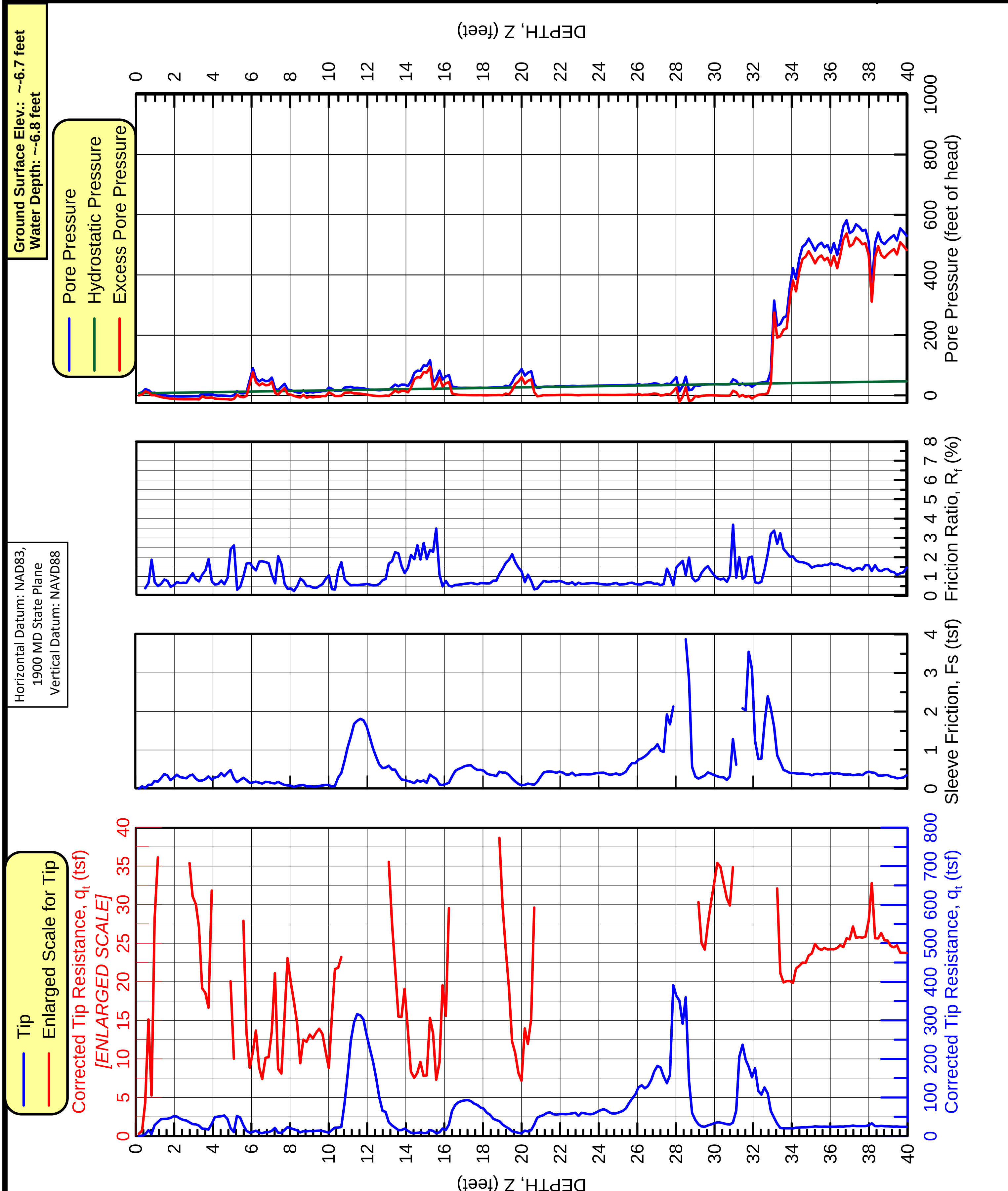
LOCATION: Dorchester County, Maryland N242,386 E1,525,070

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 5/26/20

SOUNDING

CPT-221

CONE PENETROMETER TEST RESULTS



PROJECT: Barren Island

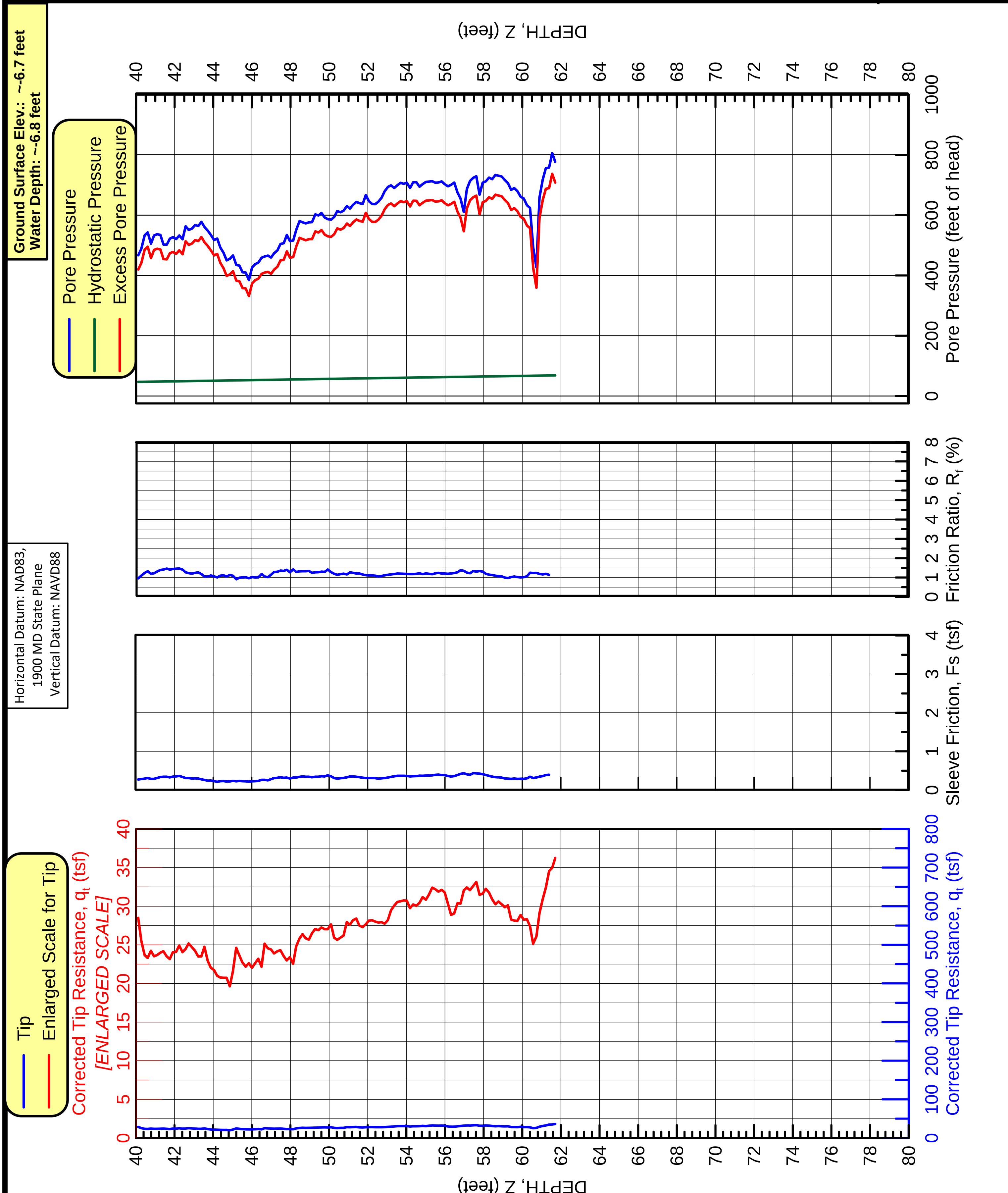
LOCATION: Dorchester County, Maryland N242,386 E1,525,070

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 5/26/20

SOUNDING

CPT-221

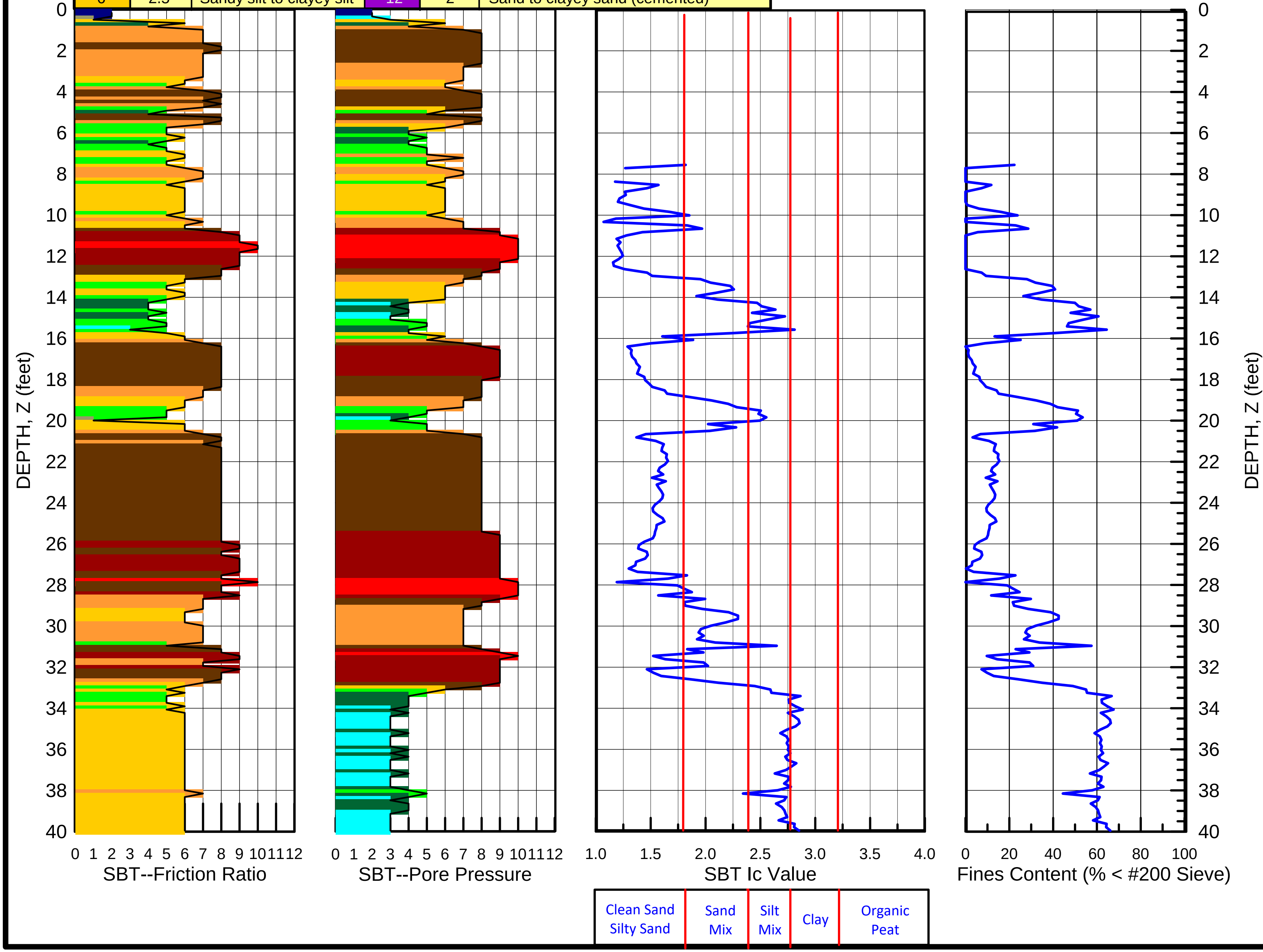
CONE PENETROMETER TEST RESULTS



Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~-6.7 feet
Water Depth: ~-6.8 feet

Horizontal Datum: NAD83, 1900 MD State Plane
Vertical Datum: NAVD88



CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N242,386 E1,525,070

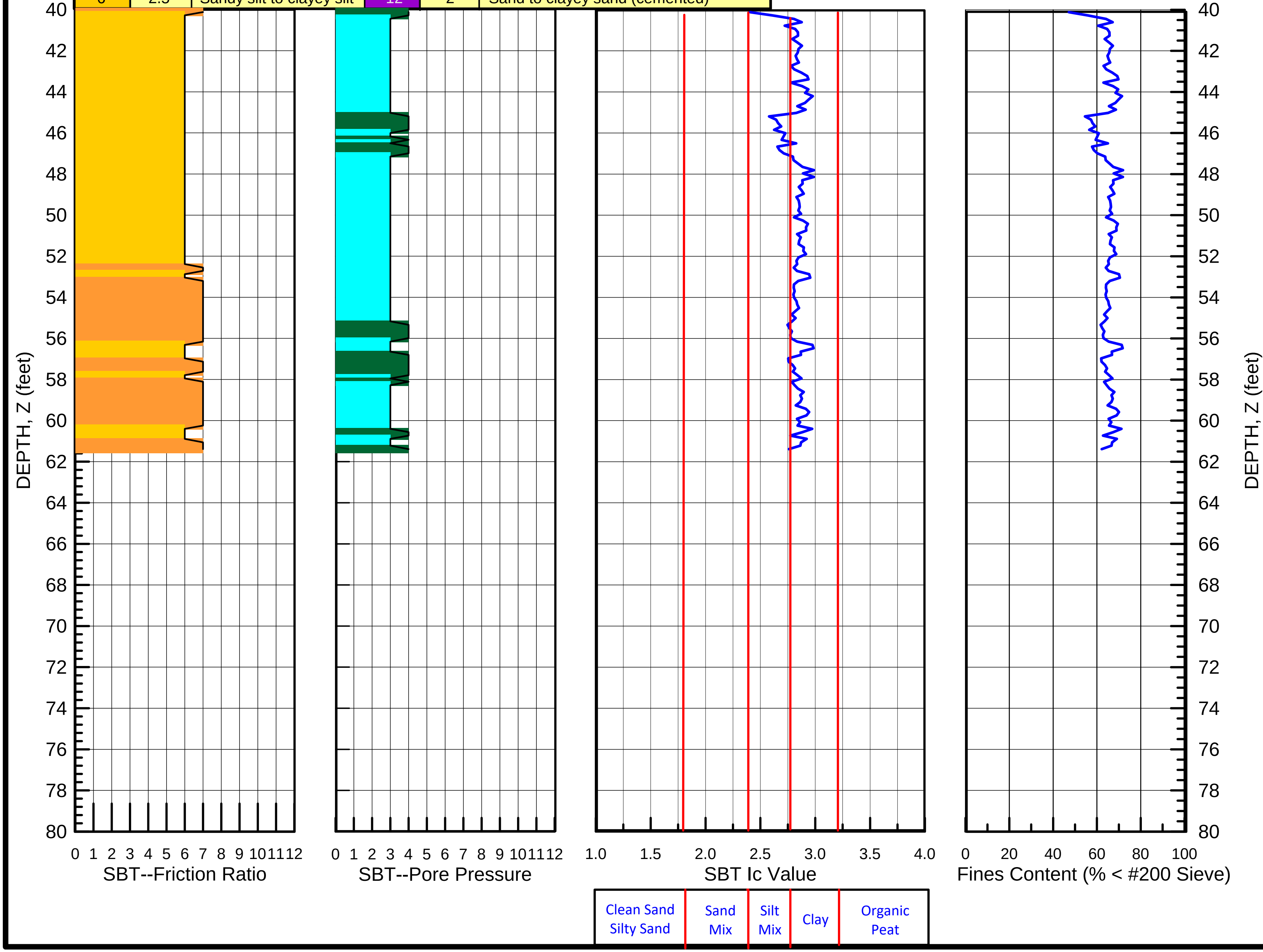
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 5/26/20

SOUNDING
CPT-221

Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~-6.7 feet
Water Depth: ~-6.8 feet

Horizontal Datum: NAD83, 1900 MD State Plane
Vertical Datum: NAVD88



PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N242,386 E1,525,070

CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 5/26/20

SOUNDING
CPT-221

PROJECT: Barren Island

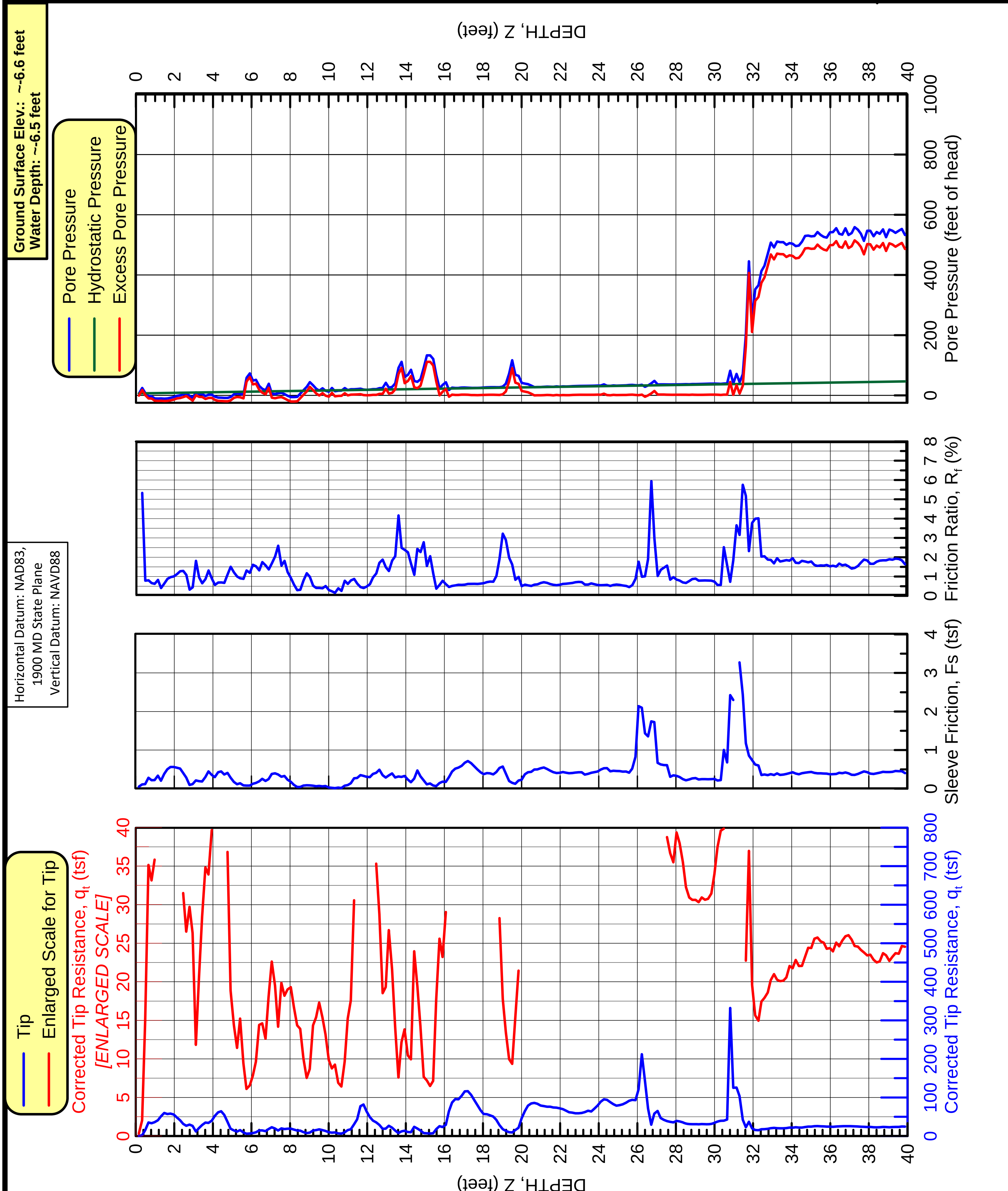
LOCATION: Dorchester County, Maryland N241,895 E1,525,229

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 5/26/20

SOUNDING

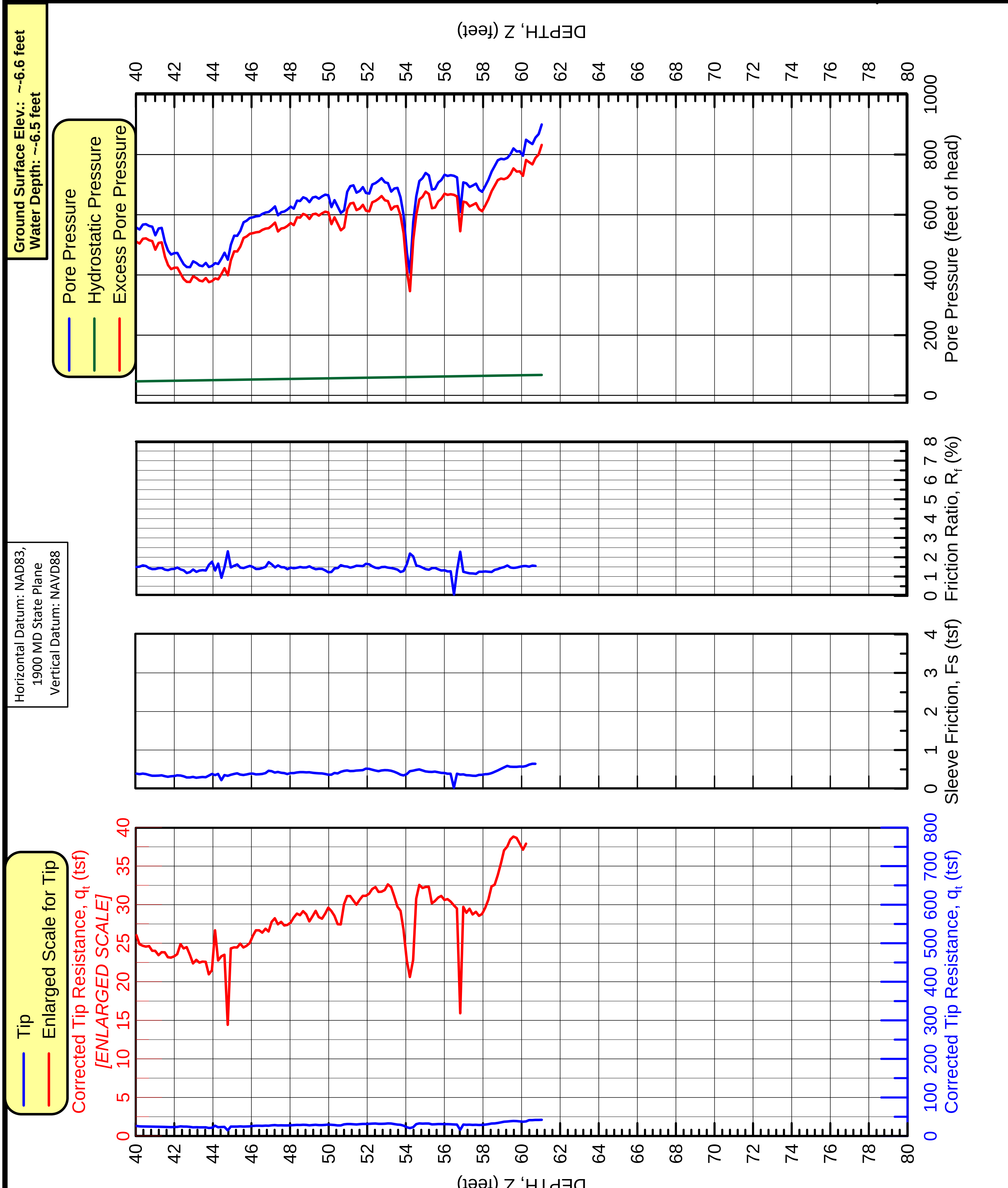
CPT-222

CONE PENETROMETER TEST RESULTS



PROJECT: Barren Island **LOCATION:** Dorchester County, Maryland N241,895 E1,525,229	**IN-SITU SOIL TESTING, L.C.** **Engineer: R. Failmezger,P.E.,F. ASCE,D GE** **SOUNDING DATE: 5/26/20**	***SOUNDING*** **CPT-222**

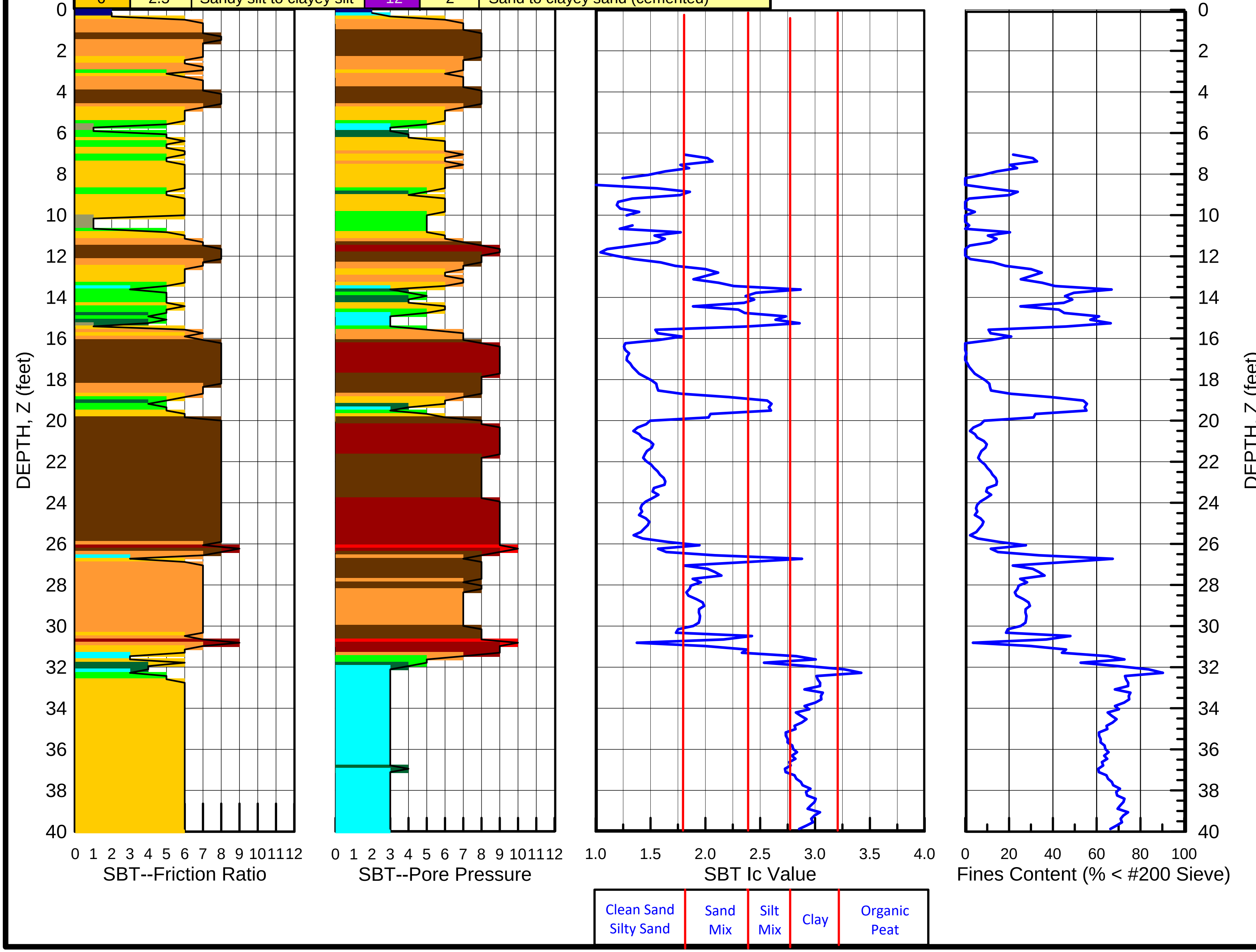
CONE PENETROMETER TEST RESULTS



Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~-6.6 feet
Water Depth: ~-6.5 feet

Horizontal Datum: NAD83,
1900 MD State Plane
Vertical Datum: NAVD88



PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N241,895 E1,525,229

CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

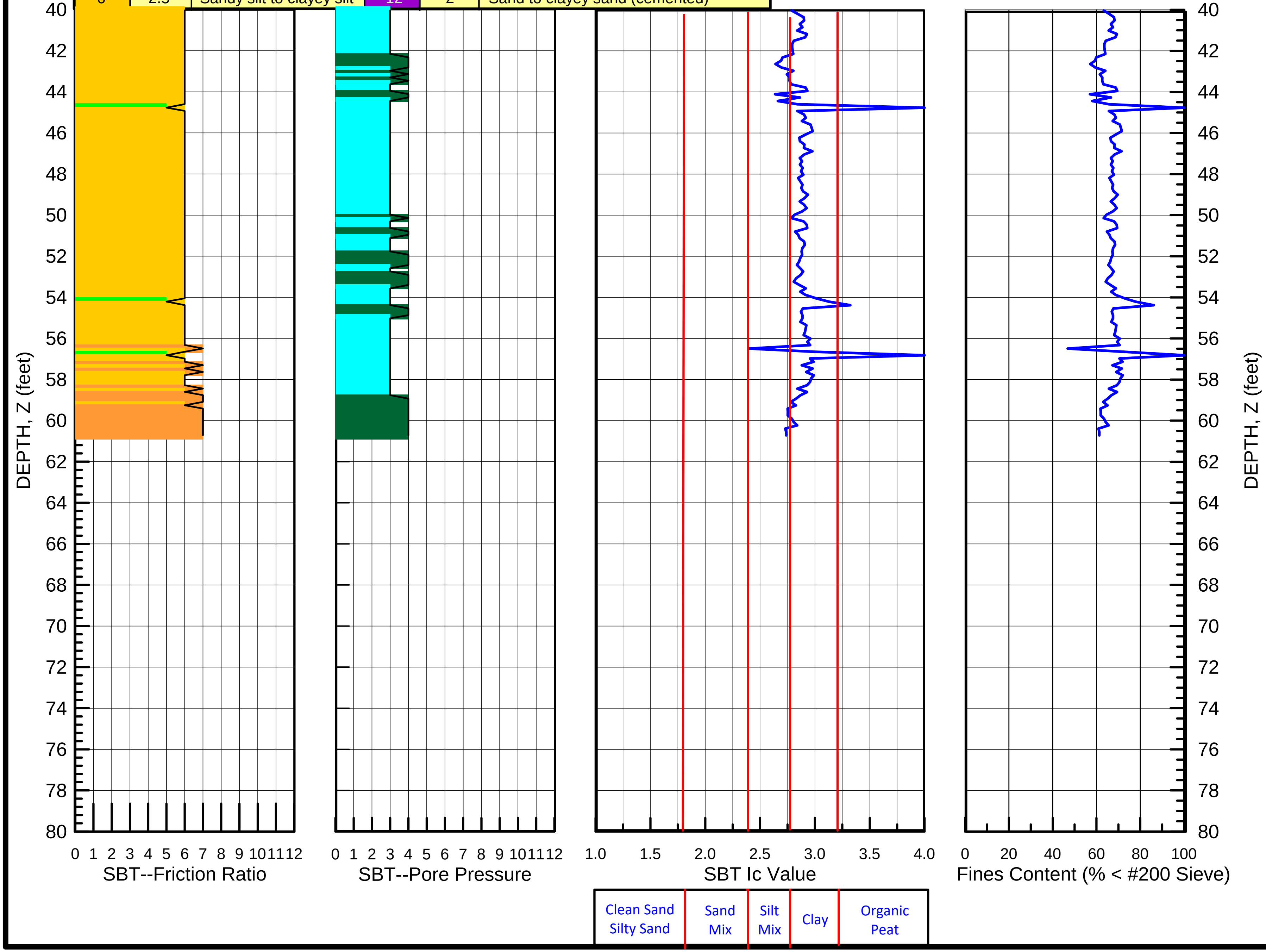
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 5/26/20

SOUNDING
CPT-222

Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~-6.6 feet
Water Depth: ~-6.5 feet

Horizontal Datum: NAD83,
1900 MD State Plane
Vertical Datum: NAVD88



CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N241,895 E1,525,229

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 5/26/20

SOUNDING
CPT-222

PROJECT: Barren Island

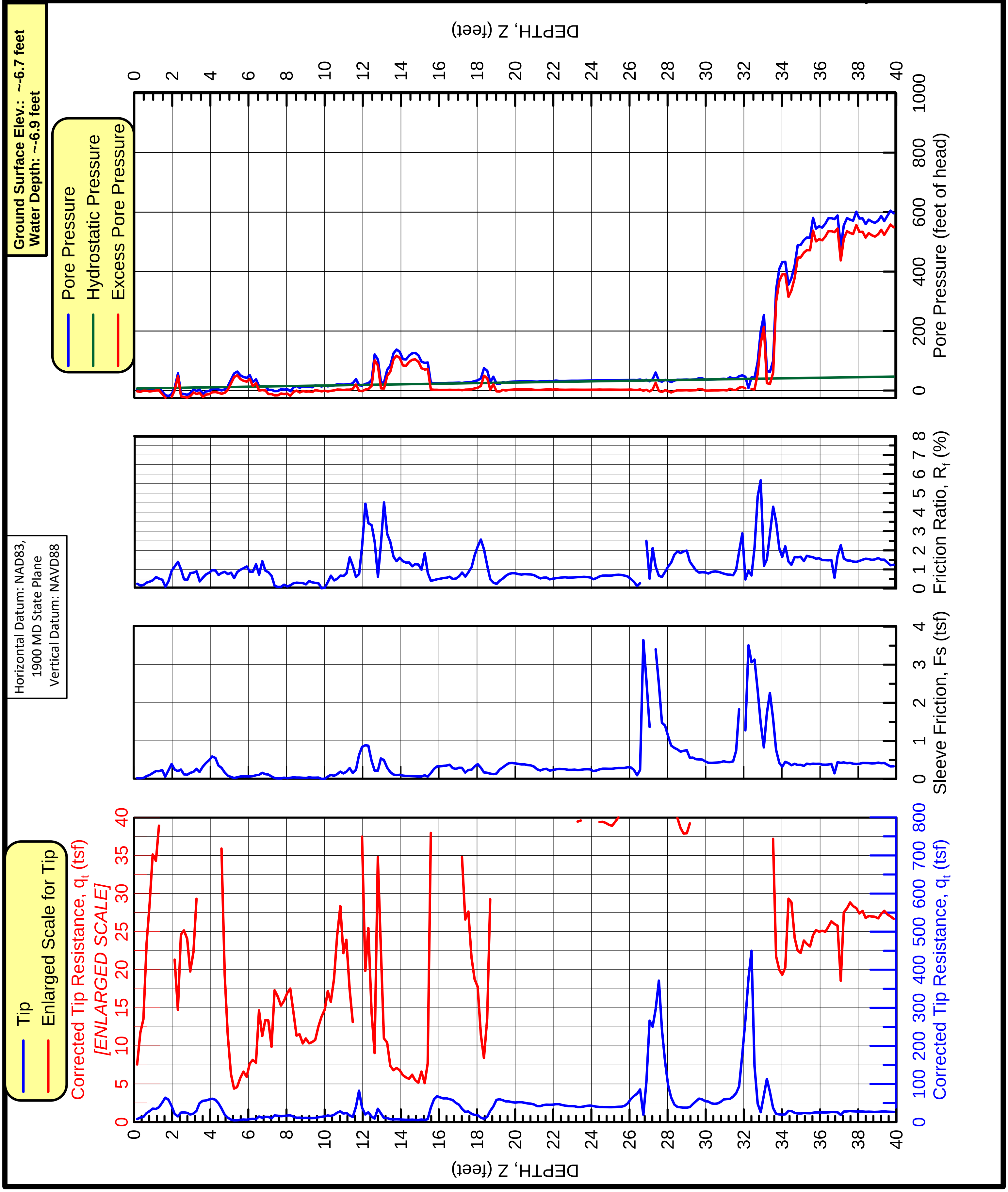
LOCATION: Dorchester County, Maryland N241,405 E1,525,234

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 5/26/20

SOUNDING

CPT-223

CONE PENETROMETER TEST RESULTS



PROJECT: Barren Island

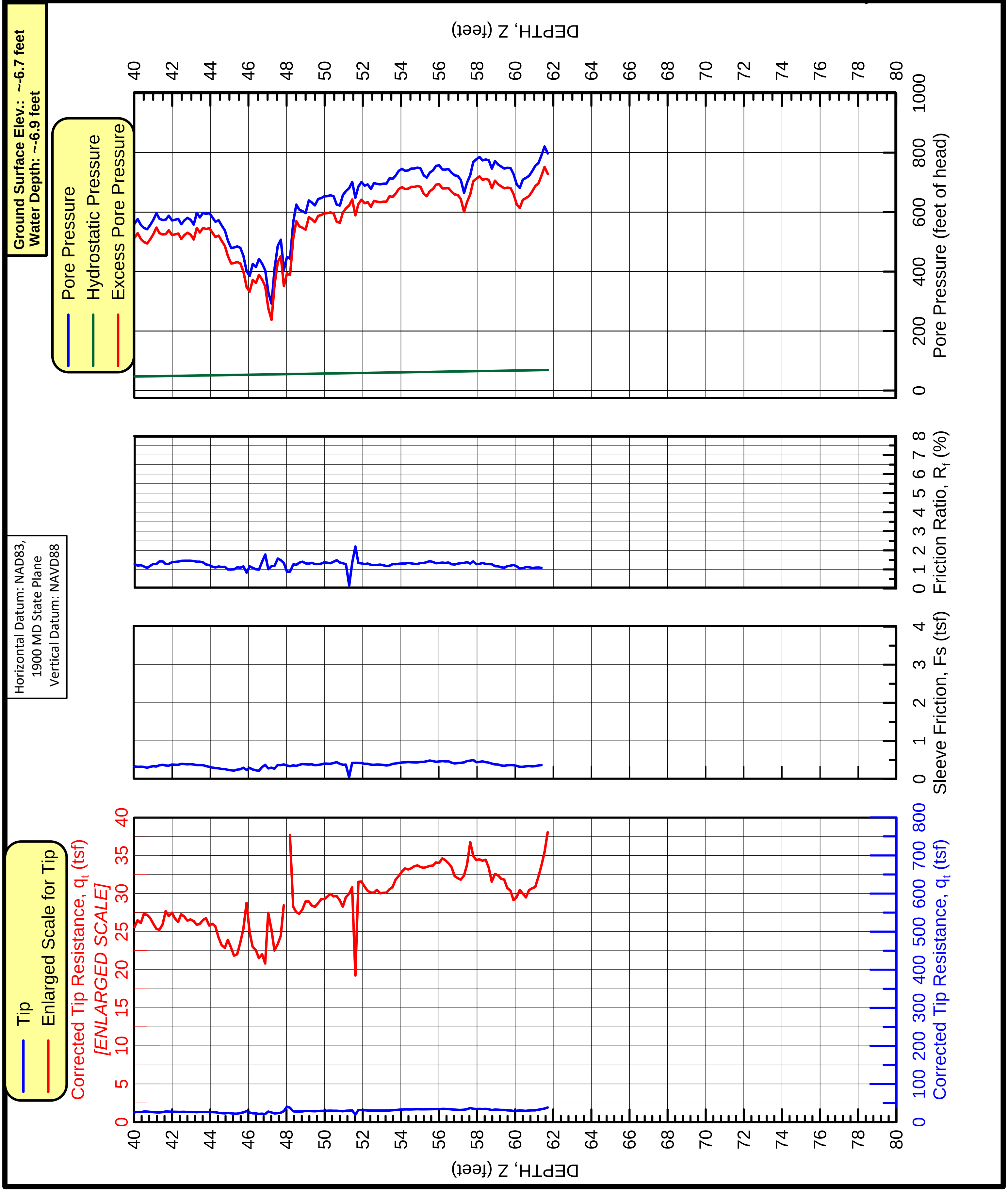
LOCATION: Dorchester County, Maryland N241,405 E1,525,234

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 5/26/20

SOUNDING

CPT-223

CONE PENETROMETER TEST RESULTS



PROJECT: Barren Island

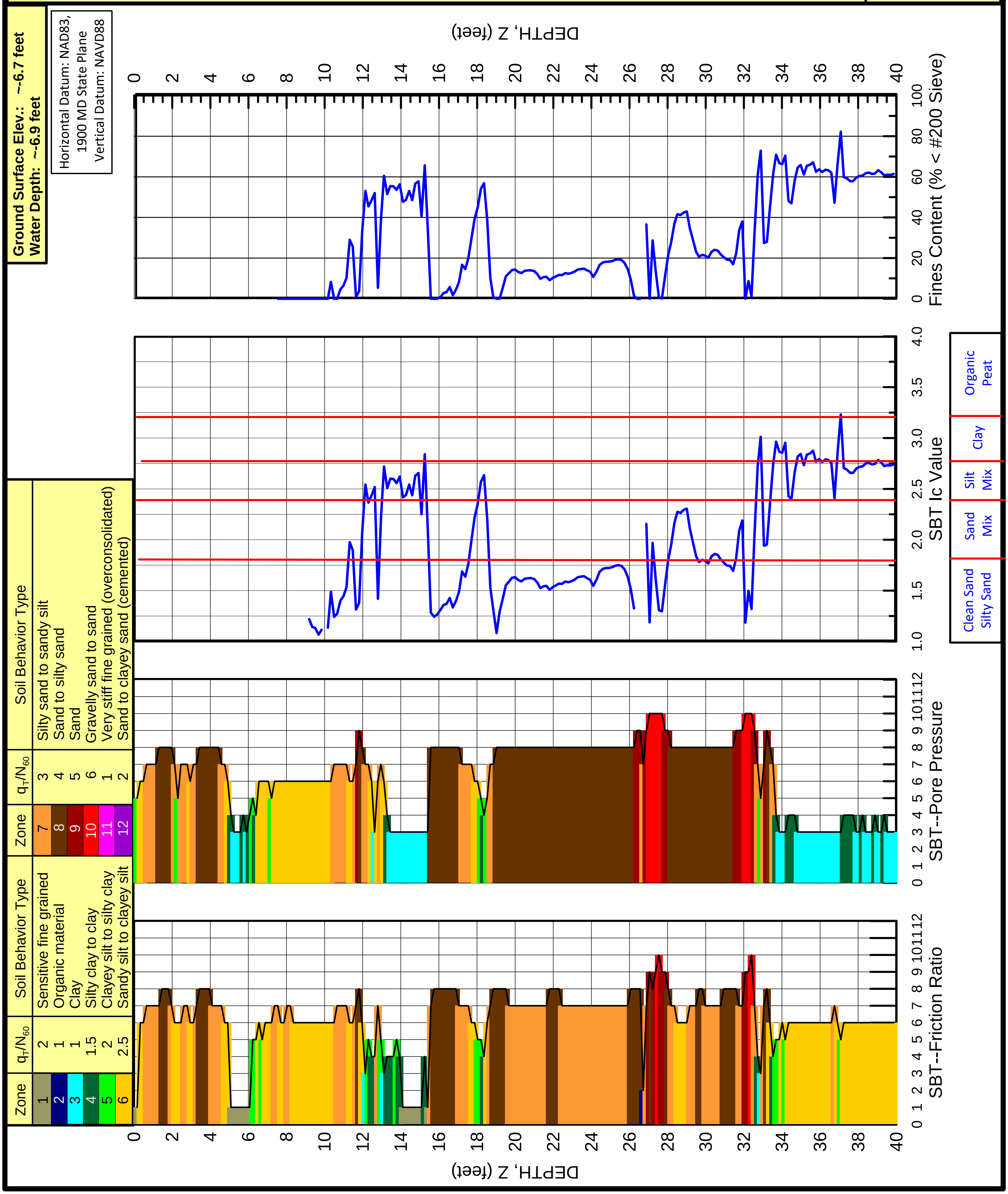
LOCATION: Dorchester County, Maryland N241,405 E1,525,234

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 5/26/20

SOUNDING

CPT-223

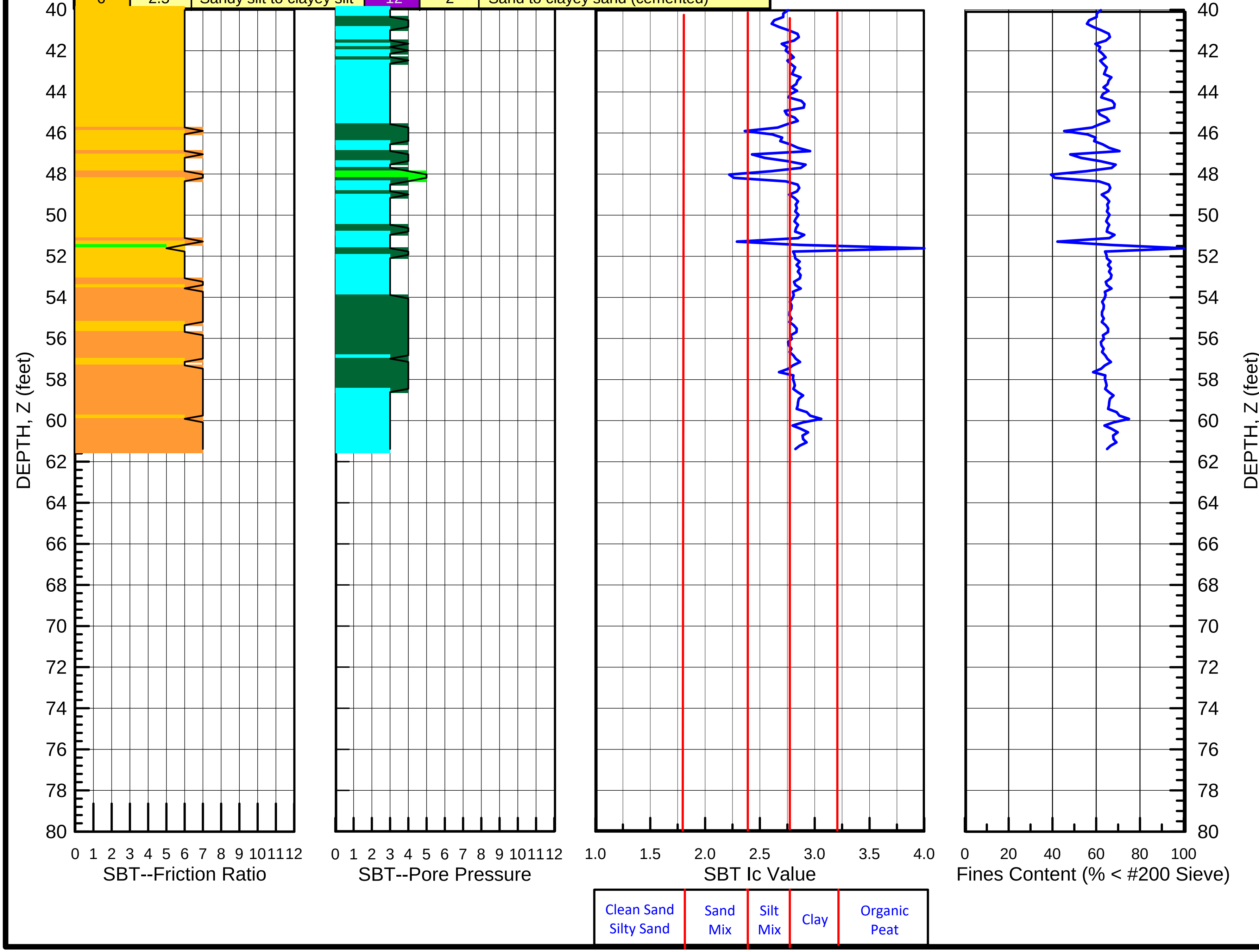
CPT--SOIL BEHAVIOR TYPE CLASSIFICATION



Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~-6.7 feet
Water Depth: ~-6.9 feet

Horizontal Datum: NAD83,
1900 MD State Plane
Vertical Datum: NAVD88



PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N241,405 E1,525,234

CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 5/26/20

SOUNDING
CPT-223

PROJECT: Barren Island

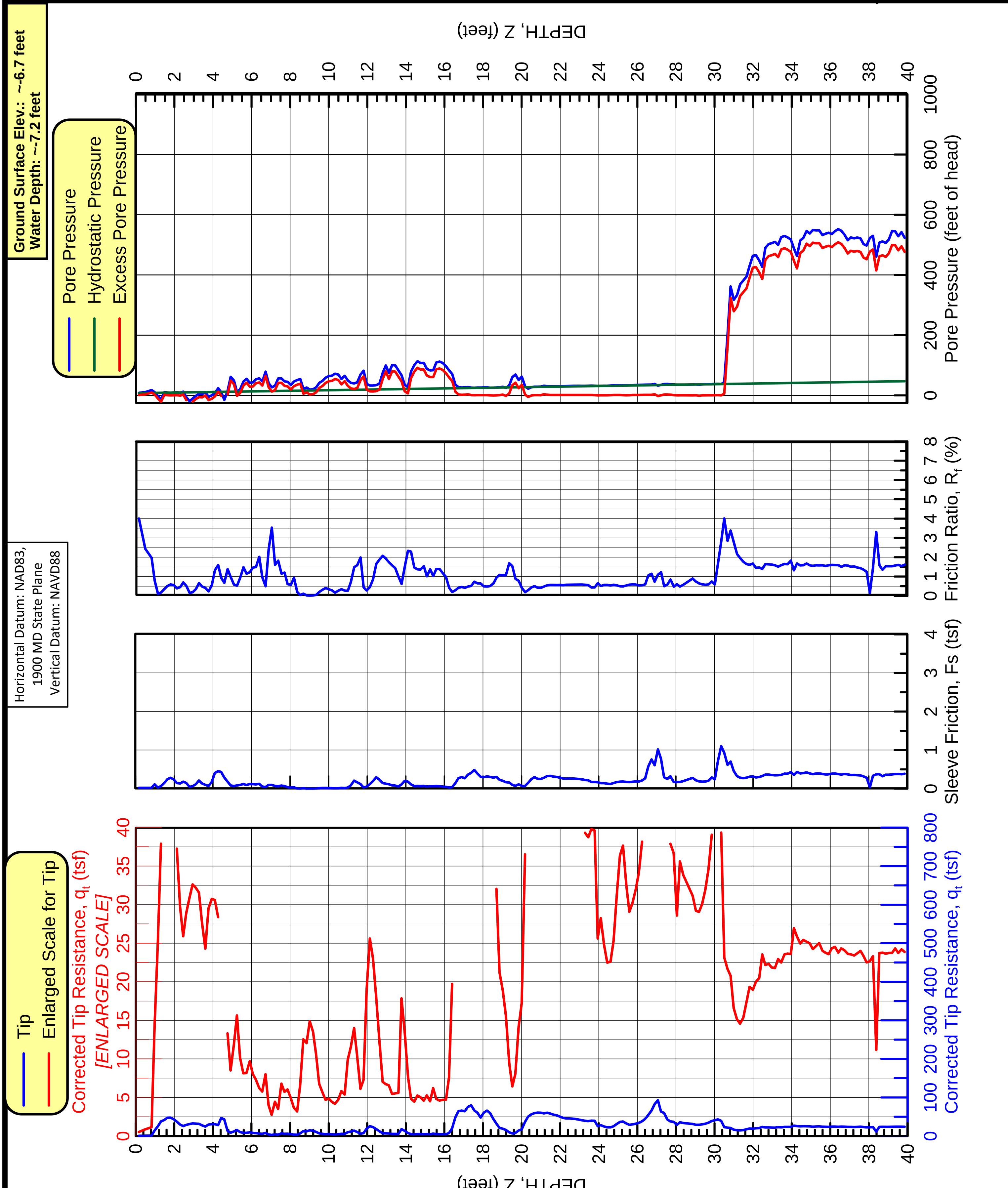
LOCATION: Dorchester County, Maryland N240,905 E1,525,280

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 5/26/20

SOUNDING

CPT-224

CONE PENETROMETER TEST RESULTS



PROJECT: Barren Island

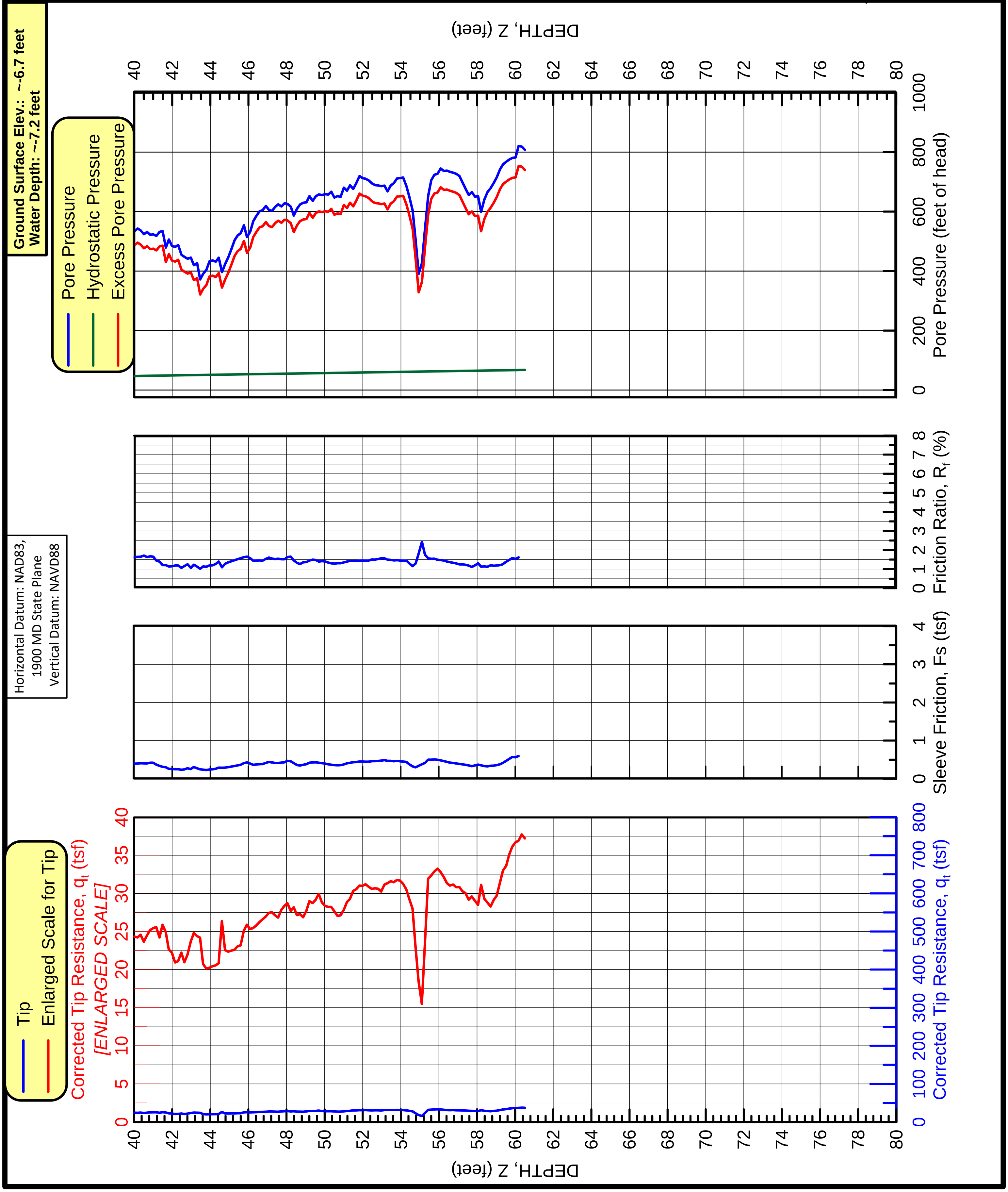
LOCATION: Dorchester County, Maryland N240,905 E1,525,280

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 5/26/20

SOUNDING

CPT-224

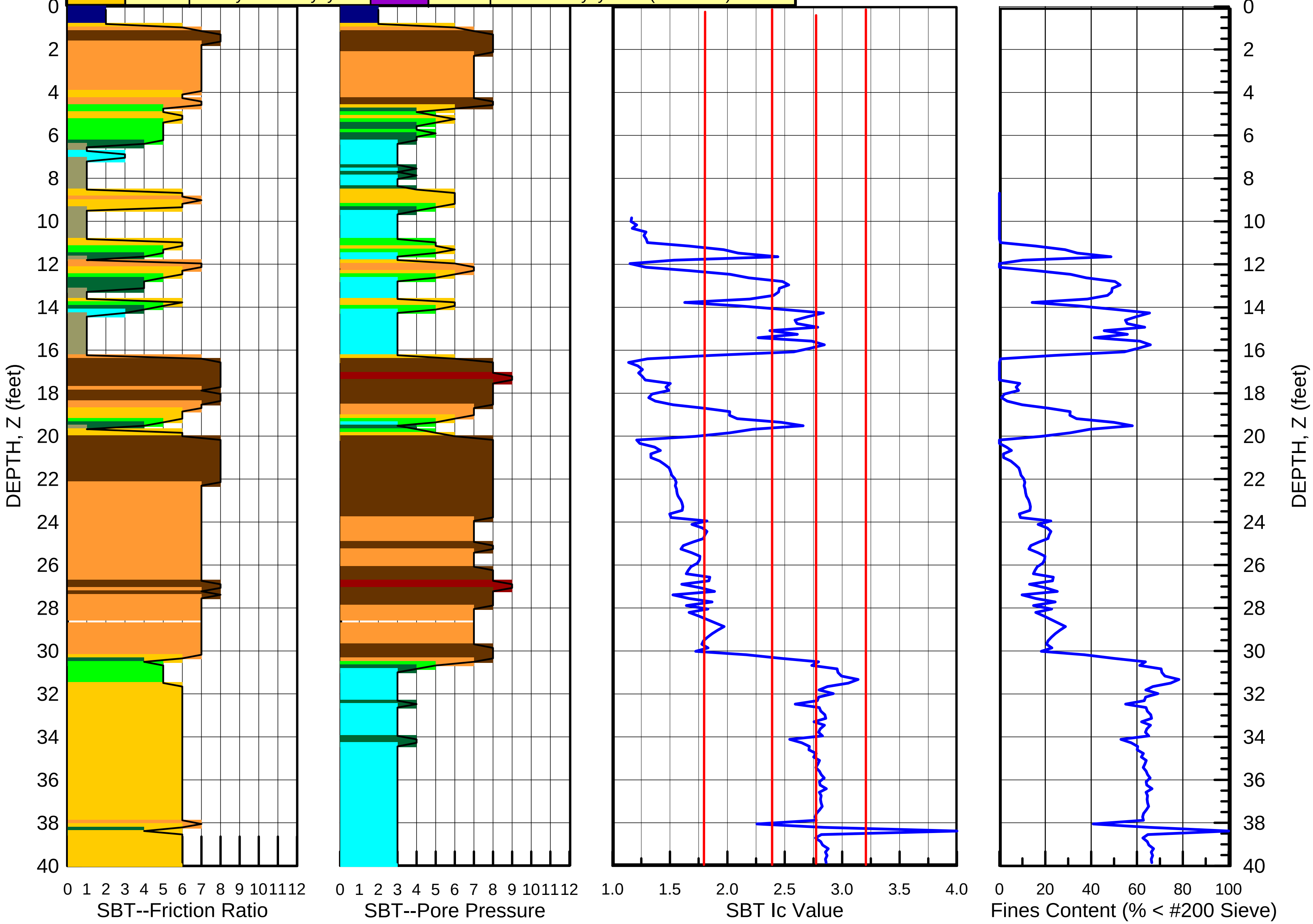
CONE PENETROMETER TEST RESULTS



Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~-6.7 feet
Water Depth: ~-7.2 feet

Horizontal Datum: NAD83,
1900 MD State Plane
Vertical Datum: NAVD88



Clean Sand Silty Sand	Sand Mix	Silt Mix	Clay	Organic Peat

CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N240,905 E1,525,280

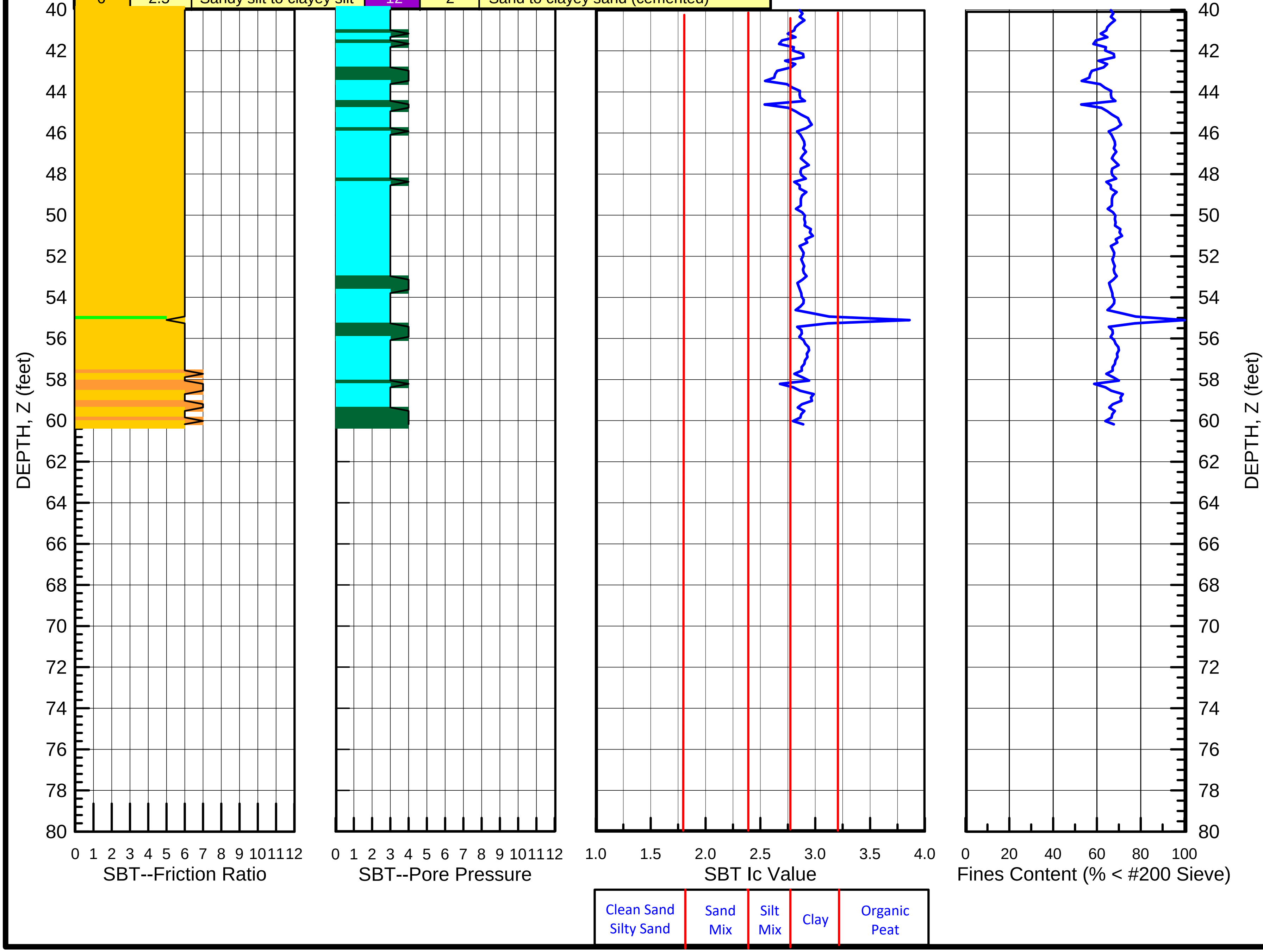
IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 5/26/20

SOUNDING
CPT-224

Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~-6.7 feet
Water Depth: ~-7.2 feet

Horizontal Datum: NAD83, 1900 MD State Plane
Vertical Datum: NAVD88



CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N240,905 E1,525,280

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 5/26/20

SOUNDING
CPT-224

PROJECT: Barren Island

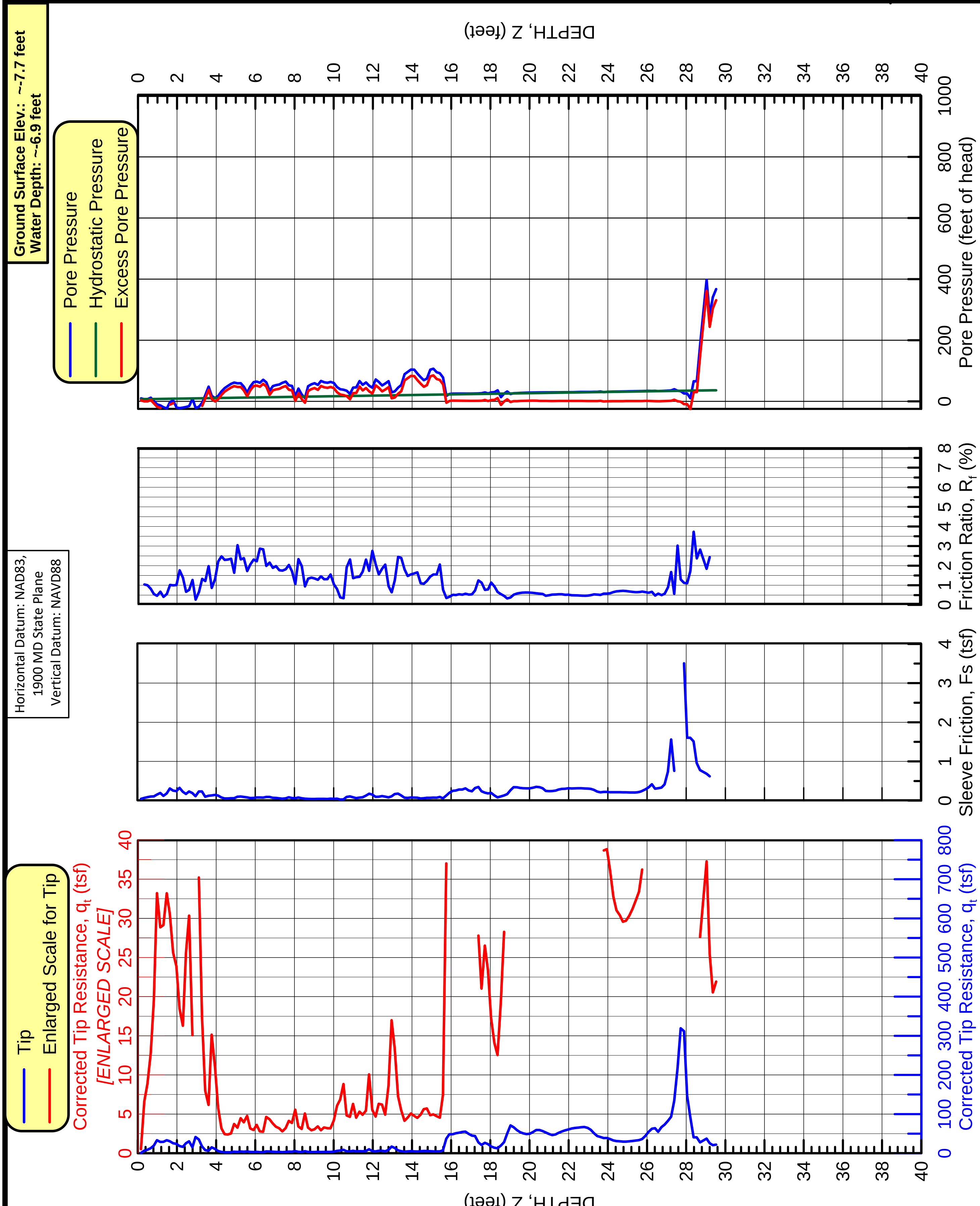
LOCATION: Dorchester County, Maryland N240,449 E1,525,379

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger,P.E.,F. ASCE,D GE
SOUNDING DATE: 5/23/20

SOUNDING

CPT-225

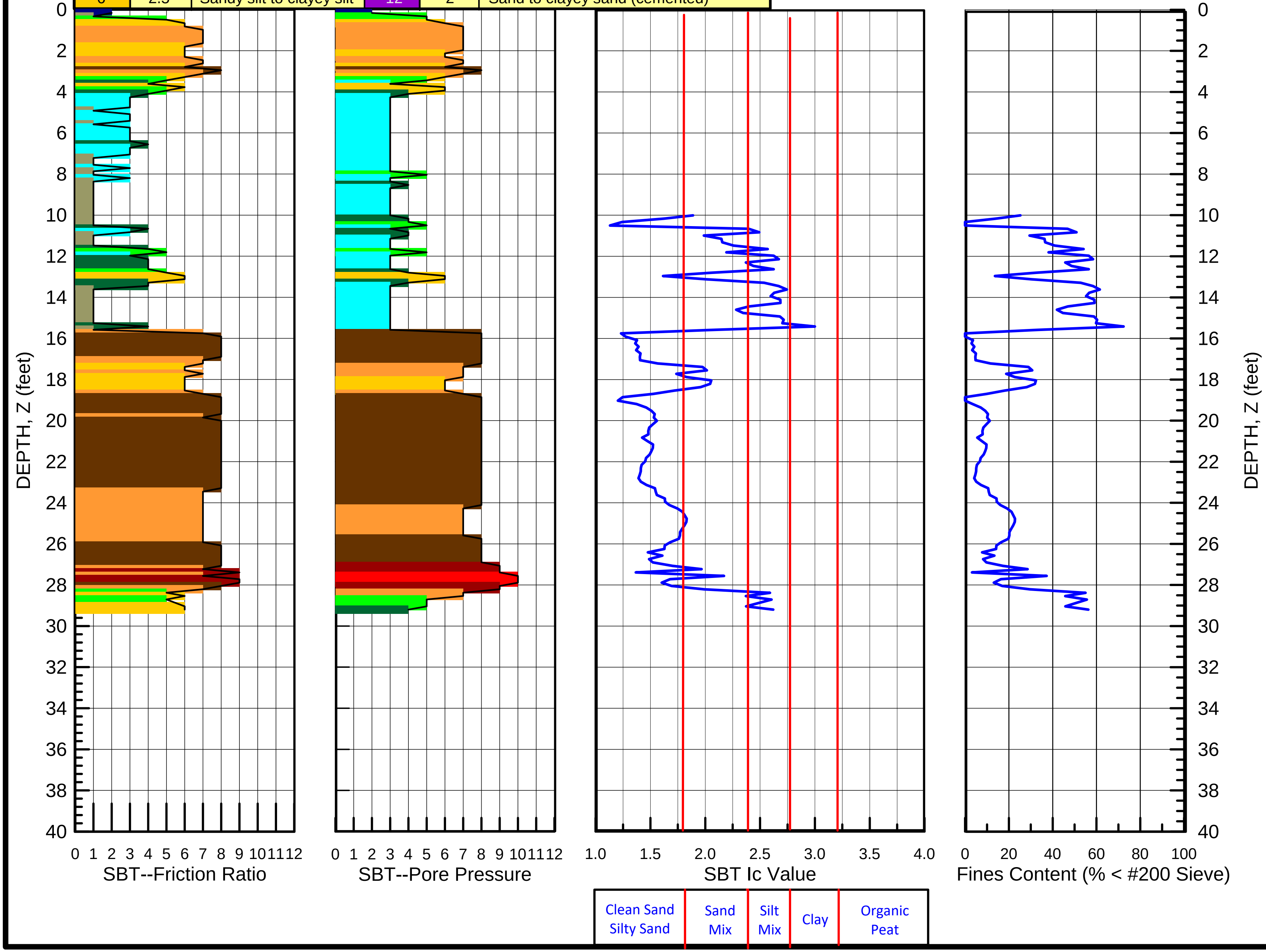
CONE PENETROMETER TEST RESULTS



Zone	q_T/N_{60}	Soil Behavior Type	Zone	q_T/N_{60}	Soil Behavior Type
1	2	Sensitive fine grained	7	3	Silty sand to sandy silt
2	1	Organic material	8	4	Sand to silty sand
3	1	Clay	9	5	Sand
4	1.5	Silty clay to clay	10	6	Gravelly sand to sand
5	2	Clayey silt to silty clay	11	1	Very stiff fine grained (overconsolidated)
6	2.5	Sandy silt to clayey silt	12	2	Sand to clayey sand (cemented)

Ground Surface Elev.: ~-7.7 feet
Water Depth: ~-6.9 feet

Horizontal Datum: NAD83,
1900 MD State Plane
Vertical Datum: NAVD88



PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N240,449 E1,525,379

CPT--SOIL BEHAVIOR TYPE CLASSIFICATION

IN-SITU SOIL TESTING, L.C.
Engineer: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 5/23/20

SOUNDING
CPT-225

DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL) SNDG. NO. :DMT-201
In-Situ Soil Testing, L.C. Page 1a
JOB FILE: Barren Island FILE NO. : 2020-45
LOCATION: Dorchester County, Maryland--N234,050.7 E1,531,411.0
SNDG.BY : R. Failmezger SNDG. DATE: 6/19/20
ANAL.BY : Roger Failmezger, P.E., F. ASCE, D. GE ANAL. DATE: 6/19/20

ANALYSIS PARAMETERS: LO RANGE = 9.92 TSF ROD DIAM. = 2.36 IN BL.THICK. = 0.59 IN SU FACTOR = 1
SURF.ELEV. = -5.2 FT LO GAGE 0 = 0.00 TSF FR.RED.DIA. = 2.64 IN BL.WIDTH = 3.78 IN PHI FACTOR = 1
WATER DEPTH = -5.9 FT HI GAGE 0 = 0.00 TSF LIN.ROD WT. = 8.0 LBF/FTDELTA-A = 0.26 TSF OCR FACTOR = 1
SP.GR.WATER = 1.026 CAL GAGE 0 = 0.00 TSF DELTA/PHI = 0.5 DELTA-B = 0.76 TSF M FACTOR = 1
MAX SU ID = 0.6 SU OPTION = 0 MIN PHI ID = 1.2 OCR OPTION = 0 K0 FACTOR = 1
UNIT CONVERSIONS: 1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI 1 M = 3.2808 FT

Z (FT)	ELEV (FT)	THRUST (LBF)	A (TSF)	B (TSF)	C (TSF)	DA (TSF)	DB (TSF)	ZMRNG (TSF)	ZMLO (TSF)	ZMHI (TSF)	ZMCAL (TSF)	P0 (TSF)	P1 (TSF)	P2 (TSF)	U0 (TSF)	GAMMA (PCF)	SVP (TSF)
*****	******	******	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	******	******	******
0.7	-5.9	22	0.18	1.34	0.04	0.26	0.76	9.92	0.00	0.00	0.00	0.43	0.57	0.30	0.210	94.8	0.016
1.3	-6.6	22	0.24	1.39	0.14	0.26	0.76	9.92	0.00	0.00	0.00	0.49	0.63	0.40	0.232	94.8	0.026
2.0	-7.2	22	0.25	1.34	0.21	0.26	0.76	9.92	0.00	0.00	0.00	0.51	0.57	0.47	0.253	94.8	0.035
2.6	-7.9	22	0.40	1.52	0.30	0.26	0.76	9.92	0.00	0.00	0.00	0.66	0.76	0.56	0.274	94.8	0.046
3.3	-8.5	22	0.43	1.53	0.32	0.26	0.76	9.92	0.00	0.00	0.00	0.69	0.77	0.58	0.294	94.8	0.056
3.9	-9.2	22	0.49	1.64	0.37	0.26	0.76	9.92	0.00	0.00	0.00	0.74	0.88	0.63	0.315	94.8	0.066
4.6	-9.8	44	0.48	1.73	0.33	0.26	0.76	9.92	0.00	0.00	0.00	0.73	0.97	0.60	0.336	94.8	0.076
5.2	-10.5	22	0.49	1.64	0.38	0.26	0.76	9.92	0.00	0.00	0.00	0.74	0.88	0.64	0.357	94.8	0.087
5.9	-11.2	88	0.55	1.73	0.42	0.26	0.76	9.92	0.00	0.00	0.00	0.80	0.97	0.68	0.378	94.8	0.096
6.6	-11.8	44	0.58	1.72	0.48	0.26	0.76	9.92	0.00	0.00	0.00	0.84	0.96	0.74	0.400	94.8	0.106
7.2	-12.5	44	0.57	1.82	0.43	0.26	0.76	9.92	0.00	0.00	0.00	0.82	1.05	0.69	0.421	94.8	0.117
7.9	-13.1	44	0.71	1.89	0.54	0.26	0.76	9.92	0.00	0.00	0.00	0.96	1.13	0.80	0.442	94.8	0.126
8.5	-13.8	44	0.73	1.91	0.60	0.26	0.76	9.92	0.00	0.00	0.00	0.98	1.15	0.86	0.462	94.8	0.137
9.2	-14.4	110	0.81	2.05	0.63	0.26	0.76	9.92	0.00	0.00	0.00	1.06	1.28	0.89	0.483	94.8	0.147
9.8	-15.1	154	0.87	2.12	0.71	0.26	0.76	9.92	0.00	0.00	0.00	1.12	1.36	0.97	0.504	94.8	0.157
10.5	-15.7	198	0.99	2.27	0.76	0.26	0.76	9.92	0.00	0.00	0.00	1.24	1.50	1.02	0.525	94.8	0.167
11.2	-16.4	265	1.05	2.38	0.84	0.26	0.76	9.92	0.00	0.00	0.00	1.31	1.62	1.10	0.547	94.8	0.177
11.8	-17.1	309	1.06	2.36	0.85	0.26	0.76	9.92	0.00	0.00	0.00	1.32	1.60	1.11	0.568	94.8	0.187
12.5	-17.7	265	1.09	2.38	0.89	0.26	0.76	9.92	0.00	0.00	0.00	1.34	1.62	1.15	0.589	94.8	0.197
13.1	-18.4	287	1.13	2.37	0.95	0.26	0.76	9.92	0.00	0.00	0.00	1.38	1.61	1.21	0.610	94.8	0.208
13.8	-19.0	309	1.21	2.54	0.99	0.26	0.76	9.92	0.00	0.00	0.00	1.46	1.77	1.25	0.631	94.8	0.217
14.4	-19.7	331	1.33	2.67	1.06	0.26	0.76	9.92	0.00	0.00	0.00	1.57	1.91	1.33	0.651	94.8	0.228
15.1	-20.3	353	1.20	2.55	1.01	0.26	0.76	9.92	0.00	0.00	0.00	1.44	1.79	1.27	0.672	94.8	0.238
15.7	-21.0	551	1.24	2.59	1.04	0.26	0.76	9.92	0.00	0.00	0.00	1.48	1.83	1.31	0.694	94.8	0.247
16.4	-21.7	639	1.32	2.54	1.14	0.26	0.76	9.92	0.00	0.00	0.00	1.57	1.77	1.40	0.715	94.8	0.258
17.4	-22.6	882	1.29	2.61	1.17	0.26	0.76	9.92	0.00	0.00	0.00	1.55	1.85	1.43	0.746	94.8	0.272
17.7	-23.0	860	1.42	2.70	1.25	0.26	0.76	9.92	0.00	0.00	0.00	1.67	1.94	1.51	0.757	94.8	0.278
18.4	-23.6	838	1.32	2.68	0.95	0.26	0.76	9.92	0.00	0.00	0.00	1.56	1.92	1.21	0.778	101.1	0.289
19.0	-24.3	838	1.60	2.94	1.35	0.26	0.76	9.92	0.00	0.00	0.00	1.84	2.18	1.61	0.799	94.8	0.301
19.7	-24.9	882	1.65	2.96	1.41	0.26	0.76	9.92	0.00	0.00	0.00	1.90	2.20	1.67	0.820	94.8	0.310
20.3	-25.6	992	1.58	3.00	1.23	0.26	0.76	9.92	0.00	0.00	0.00	1.82	2.23	1.49	0.840	101.1	0.322
21.0	-26.2	1103	1.16	2.68	0.71	0.26	0.76	9.92	0.00	0.00	0.00	1.40	1.92	0.97	0.862	101.1	0.333
21.7	-26.9	1103	1.09	2.55	0.69	0.26	0.76	9.92	0.00	0.00	0.00	1.33	1.79	0.95	0.883	101.1	0.346
22.3	-27.6	2867	2.54	7.79	0.58	0.26	0.76	9.92	0.00	0.00	0.00	2.59	7.03	0.85	0.904	112.9	0.360
23.0	-28.2	3506	3.26	9.82	0.61	0.26	0.76	9.92	0.00	0.00	0.00	3.24	9.06	0.87	0.925	119.2	0.377
23.6	-28.9	3638	4.12	12.16	0.68	0.26	0.76	9.92	0.00	0.00	0.00	4.03	11.40	0.94	0.946	119.2	0.395
24.3	-29.5	2514	5.00	7.23	3.07	0.26	0.76	9.92	0.00	0.00	0.00	5.20	6.47	3.33	0.967	107.3	0.411
24.9	-30.2	2007	5.40	8.07	2.77	0.26	0.76	9.92	0.00	0.00	0.00	5.57	7.31	3.03	0.988	112.9	0.426
25.6	-30.8	2315	3.16	5.51	1.12	0.26	0.76	9.92	0.00	0.00	0.00	3.36	4.75	1.38	1.010	107.3	0.442
26.2	-31.5	4410	2.14	7.14	0.67	0.26	0.76	9.92	0.00	0.00	0.00	2.20	6.38	0.93	1.030	112.9	0.456
26.9	-32.2	5954	2.57	7.60	0.73	0.26	0.76	9.92	0.00	0.00	0.00	2.63	6.84	0.99	1.051	112.9	0.473
27.6	-32.8	6571	3.17	10.72	0.77	0.26	0.76	9.92	0.00	0.00	0.00	3.11	9.96	1.03	1.072	119.2	0.490
28.2	-33.5	3969	2.51	7.11	0.73	0.26	0.76	9.92	0.00	0.00	0.00	2.59	6.35	0.99	1.093	112.9	0.507
28.9	-34.1	3572	2.34	4.59	1.10	0.26	0.76	9.92	0.00	0.00	0.00	2.54	3.83	1.36	1.114	101.1	0.521
29.5	-34.8	4410	3.13	8.48	0.82	0.26	0.76	9.92	0.00	0.00	0.00	3.17	7.72	1.09	1.135	112.9	0.536
30.2	-35.4	7497	5.07	15.53	0.86	0.26	0.76	9.92	0.00	0.00	0.00	4.87	14.77	1.12	1.157	119.2	0.552
30.8	-36.1	8600	6.92	19.87	0.89	0.26	0.76	9.92	0.00	0.00	0.00	6.59	19.11	1.15	1.178	125.4	0.571
31.5	-36.7	7497	3.93	11.90	0.92	0.26	0.76	9.92	0.00	0.00	0.00	3.84	11.14	1.18	1.199	119.2	0.591
32.2	-37.4	6020	3.90	10.65	0.93	0.26	0.76	9.92	0.00	0.00	0.00	3.88	9.89	1.19	1.219	119.2	0.609
32.8	-38.1	5821	3.57	10.33	0.95	0.26	0.76	9.92	0.00	0.00	0.00	3.55	9.56	1.21	1.240	119.2	0.627
33.5	-38.7	8930	3.82	11.16	0.98	0.26	0.76	9.92	0.00	0.00	0.00	3.77	10.40	1.24	1.261	119.2	0.645
34.1	-39.4	9702	5.12	14.42	0.99	0.26	0.76	9.92	0.00	0.00	0.00	4.96	13.66	1.25	1.282	119.2	0.663
34.8	-40.0	12017	6.39	16.10	1.02	0.26	0.76	9.92	0.00	0.00	0.00	6.21	15.34	1.28	1.304	125.4	0.683
35.4	-40.7	11201	1.63	4.18	1.00	0.26	0.76	9.92	0.00	0.00	0.00	1.82	3.41	1.26	1.325	107.3	0.699
36.1	-41.3	8600	5.16	13.38	2.15	0.26	0.76	9.92	0.00	0.00	0.00	5.06	12.62	2.41	1.346	119.2	0.716
36.7	-42.0	6395	8.80	12.57	5.95	0.26	0.76	9.92	0.00	0.00	0.00	8.93	11.81	6.21	1.367	112.9	0.733
37.4	-42.7	6042	8.38	11.78	4.75	0.26	0.76	9.92	0.00	0.00	0.00	8.53	11.01	5.01	1.387	112.9	0.750
38.1	-43.3	10319	6.12	17.95	1.23	0.26	0.76	9.92	0.00	0.00	0.00	5.84	17.18	1.49	1.408	125.4	0.767
38.7	-44.0	12216	6.98	23.98	1.32	0.26	0.76	9.92	0.00	0.00	0.00	6.45	23.22	1.58	1.429	125.4	0.787
39.4	-44.6	9768	11.53	15.87	7.31	0.26	0.76	9.92	0.00	0.00	0.00	11.62	15.11	7.57	1.450	119.2	0.807
40.0	-45.3	7453	12.45	16.88	8.88	0.26	0.76	9.92	0.00	0.00	0.00	12.55	16.12	9.15	1.472	119.2	0.825
40.7	-45.9	5733	13.63	20.34	9.32	0.26	0.76	9.92	0.00	0.00	0.00	13.61	19.58	9.58	1.493	119.2	0.843
41.3	-46.6	5777	14.38	21.11	10.06	0.26	0.76	9.92	0.00	0.00	0.00	14.36	20.35	10.33	1.514	119.2	0.861
42.0	-47.2	5799	14.94	21.53	10.35	0.26	0.76	9.92	0.00	0.00	0.00	14.92	20.77	10.61	1.535	119.2	0.879
42.7	-47.9	9812	15.57	21.70	10.92	0.26	0.76	9.92	0.00	0.00	0.00	15.58	20.94	11.18	1.556	119.2	0.898

DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL) SNDG. NO. : DMT-201

In-Situ Soil Testing, L.C. Page 2

JOB FILE: Barren Island FILE NO. :2020-45

LOCATION: Dorchester County, Maryland--N234,050.7 E1,531,411.0

SNDG.BY : R. Failmezger SNDG. DATE: 6/19/20

ANAL.BY : Roger Failmezger, P.E., F. ASCE, D. GE ANAL. DATE: 6/19/20

ANALYSIS PARAMETERS: LO RANGE = 9.92 TSF ROD DIAM. = 2.36 IN BL.THICK. = 0.59 IN SU FACTOR = 1

SURF.ELEV. = -5.2 FT LO GAGE 0 = 0.00 TSF FR.RED.DIA. = 2.64 IN BL.WIDTH = 3.78 IN PHI FACTOR = 1

WATER DEPTH = -5.9 FT HI GAGE 0 = 0.00 TSF LIN.ROD WT. = 8.0 LBF/FTDELTA-A = 0.26 TSF OCR FACTOR = 1

SP.GR.WATER = 1.026 CAL GAGE 0 = 0.00 TSF

DELTA / PHI 0.5 DELTA - B = 0.76 TSF M FACTOR = 1

MAX SU ID = 0.6 SU OPTION = 0 MIN PHI ID = 1.2 OCR OPTION = 0 K0 FACTOR = 1

UNIT CONVERSIONS: 1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI 1 M = 3.2808 FT

Z (FT)	ELEV (FT)	KD	ID	UD	ED (TSF)	K0	SU (TSF)	QD (TSF)	PHI (DEG)	SIGFF (TSF)	PHIO (DEG)	PC (TSF)	OCR	M (TSF)	SOIL TYPE
*****	******	*****	*****	*****	******	*****	*****	*****	*****	******	*****	*****	*****	******	************
0.7	-5.9	14.14	0.64	0.42	5	2.27						0.33	21.1	14	MUD
1.3	-6.6	10.24	0.50	0.63	4	1.87	0.04					0.33	12.8	11	MUD
2.0	-7.2	7.15	0.26	0.85	2	1.48	0.04					0.26	7.3	5	MUD
2.6	-7.9	8.26	0.29	0.77	4	1.63	0.06					0.42	9.1	8	MUD
3.3	-8.5	6.97	0.22	0.74	3	1.46	0.06					0.40	7.0	6	MUD
3.9	-9.2	6.51	0.31	0.72	4	1.39	0.06					0.42	6.3	9	MUD
4.6	-9.8	5.16	0.61	0.66	8	1.19						0.33	4.4	16	MUD
5.2	-10.5	4.50	0.34	0.72	4	1.08	0.05					0.30	3.5	7	MUD
5.9	-11.2	4.44	0.38	0.70	5	1.07	0.06					0.33	3.5	9	MUD
6.6	-11.8	4.14	0.27	0.78	4	1.01	0.06					0.33	3.1	6	MUD
7.2	-12.5	3.46	0.57	0.67	8	0.88	0.05					0.27	2.4	11	MUD
7.9	-13.1	4.12	0.32	0.69	5	1.01	0.07					0.39	3.1	9	MUD
8.5	-13.8	3.81	0.32	0.75	5	0.95	0.06					0.38	2.7	8	MUD
9.2	-14.4	3.96	0.38	0.69	7	0.98	0.07					0.43	2.9	11	MUD
9.8	-15.1	3.90	0.39	0.76	8	0.97	0.08					0.45	2.8	13	MUD
10.5	-15.7	4.28	0.37	0.70	9	1.04	0.09					0.54	3.3	15	MUD
11.2	-16.4	4.26	0.42	0.73	11	1.03	0.10					0.57	3.2	18	MUD
11.8	-17.1	3.98	0.38	0.72	9	0.98	0.09					0.54	2.9	16	MUD
12.5	-17.7	3.77	0.38	0.75	9	0.94	0.09					0.53	2.7	15	MUD
13.1	-18.4	3.70	0.30	0.78	8	0.93	0.09					0.54	2.6	11	MUD
13.8	-19.0	3.80	0.38	0.75	11	0.95	0.10					0.60	2.7	17	MUD
14.4	-19.7	4.04	0.37	0.73	11	0.99	0.13					0.68	3.0	19	MUD
15.1	-20.3	3.25	0.44	0.78	11	0.84	0.09					0.51	2.1	16	MUD
15.7	-21.0	3.20	0.43	0.77	11	0.83	0.09					0.51	2.1	16	MUD
16.4	-21.7	3.30	0.24	0.80	7	0.85	0.10					0.56	2.2	9	MUD
17.4	-22.6	2.91	0.39	0.86	10	0.77	0.09					0.49	1.8	14	MUD
17.7	-23.0	3.28	0.30	0.83	9	0.84	0.11					0.61	2.2	13	MUD
18.4	-23.6	2.70	0.46	0.55	13	0.72	0.09					0.46	1.6	15	SILTY CLAY
19.0	-24.3	3.48	0.33	0.78	11	0.88	0.14					0.71	2.4	17	MUD
19.7	-24.9	3.47	0.29	0.79	10	0.88	0.14					0.73	2.4	15	MUD
20.3	-25.6	3.04	0.43	0.67	15	0.79	0.11					0.62	1.9	19	SILTY CLAY
21.0	-26.2	1.60	0.99	0.20	18	0.43						0.24	0.7	16	SILT
21.7	-26.9	1.28	1.04	0.15	16	0.33						0.17	0.5	14	SILT
22.3	-27.6	4.68	2.64	-0.03	155	0.72		30.4	38.9	0.58	36.2	1.22	3.4	281	SILTY SAND
23.0	-28.2	6.15	2.51	-0.03	201	0.89		35.8	39.1	0.62	36.6	1.99	5.3	417	SILTY SAND
23.6	-28.9	7.82	2.39	0.00	256	1.12		35.3	38.2	0.64	35.7	3.31	8.4	582	SILTY SAND
24.3	-29.5	10.30	0.30	0.56	44	1.87	0.70					5.30	12.9	112	CLAY
24.9	-30.2	10.76	0.38	0.44	61	1.92	0.77					5.89	13.8	155	SILTY CLAY
25.6	-30.8	5.32	0.59	0.16	48	1.21	0.33					2.04	4.6	90	SILTY CLAY
26.2	-31.5	2.57	3.56	-0.09	145	0.38		50.1	41.4	0.76	39.4	0.46	1.0	191	SAND
26.9	-32.2	3.34	2.67	-0.04	146	0.42		66.7	42.8	0.79	40.9	0.62	1.3	222	SILTY SAND
27.6	-32.8	4.16	3.36	-0.02	238	0.52		72.3	42.7	0.82	40.9	0.97	2.0	413	SAND
28.2	-33.5	2.95	2.52	-0.07	131	0.49		44.2	39.7	0.84	37.7	0.78	1.5	183	SILTY SAND
28.9	-34.1	2.73	0.91	0.17	45	0.73						0.85	1.6	53	SILT
29.5	-34.8	3.81	2.22	-0.02	158	0.60		47.7	39.5	0.88	37.6	1.25	2.3	254	SILTY SAND
30.2	-35.4	6.71	2.67	-0.01	343	0.88		78.0	41.4	0.92	39.7	3.01	5.5	738	SILTY SAND
30.8	-36.1	9.46	2.31	-0.01	434	1.23		85.5	40.9	0.95	39.2	6.08	10.6	1064	SILTY SAND
31.5	-36.7	4.47	2.76	-0.01	254	0.58		81.5	42.1	0.99	40.5	1.44	2.4	453	SILTY SAND
32.2	-37.4	4.37	2.26	-0.01	209	0.64		64.6	40.4	1.00	38.8	1.66	2.7	363	SILTY SAND
32.8	-38.1	3.68	2.61	-0.01	209	0.55		63.5	40.4	1.03	38.8	1.28	2.0	335	SILTY SAND
33.5	-38.7	3.88	2.65	-0.01	230	0.47		98.8	43.0	1.09	41.6	1.06	1.7	381	SILTY SAND
34.1	-39.4	5.55	2.36	-0.01	302	0.70		103.9	42.4	1.11	41.1	2.34	3.5	592	SILTY SAND
34.8	-40.0	7.20	1.86	0.00	316	0.88		126.6	42.9	1.15	41.6	3.83	5.6	693	SILTY SAND
35.4	-40.7	0.70	3.27	-0.13	55									47	SILTY SAND
36.1	-41.3	5.19	2.04	0.29	262	0.70		91.4	41.3	1.19	40.0	2.45	3.4	496	SILTY SAND
36.7	-42.0	10.31	0.38	0.64	100	1.87	1.25					9.47	12.9	253	SILTY CLAY
37.4	-42.7	9.53	0.35	0.51	87	1.78	1.16					8.56	11.4	212	CLAY
38.1	-43.3	5.77	2.56	0.02	394	0.76		109.1	41.8	1.27	40.6	3.09	4.0	790	SILTY SAND
38.7	-44.0	6.37	3.34	0.03	582	0.80		129.1	42.4	1.32	41.3	3.62	4.6	1227	SAND
39.4	-44.6	12.61	0.34	0.60	121	2.12	1.77					14.26	17.7	329	CLAY
40.0	-45.3	13.43	0.32	0.69	124	2.20	1.96					16.09	19.5	345	CLAY
40.7	-45.9	14.38	0.49	0.67	207	2.29	2.18					18.29	21.7	589	SILTY CLAY
41.3	-46.6	14.91	0.47	0.69	208	2.34	2.34					19.77	23.0	599	SILTY CLAY
42.0	-47.2	15.23	0.44	0.68	203	2.37	2.44					20.86	23.7	588	SILTY CLAY
42.7	-47.9	15.62	0.38	0.69	187	2.41	2.58					22.15	24.7	545	SILTY CLAY

DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL) SNDG. NO. :DMT-201
In-Situ Soil Testing, L.C. Page 2a
JOB FILE: Barren Island FILE NO. : 2020-45
LOCATION: Dorchester County, Maryland--N234,050.7 E1,531,411.0
SNDG.BY : R. Failmezger SNDG. DATE: 6/19/20
ANAL.BY : Roger Failmezger, P.E., F. ASCE, D. GE ANAL. DATE: 6/19/20

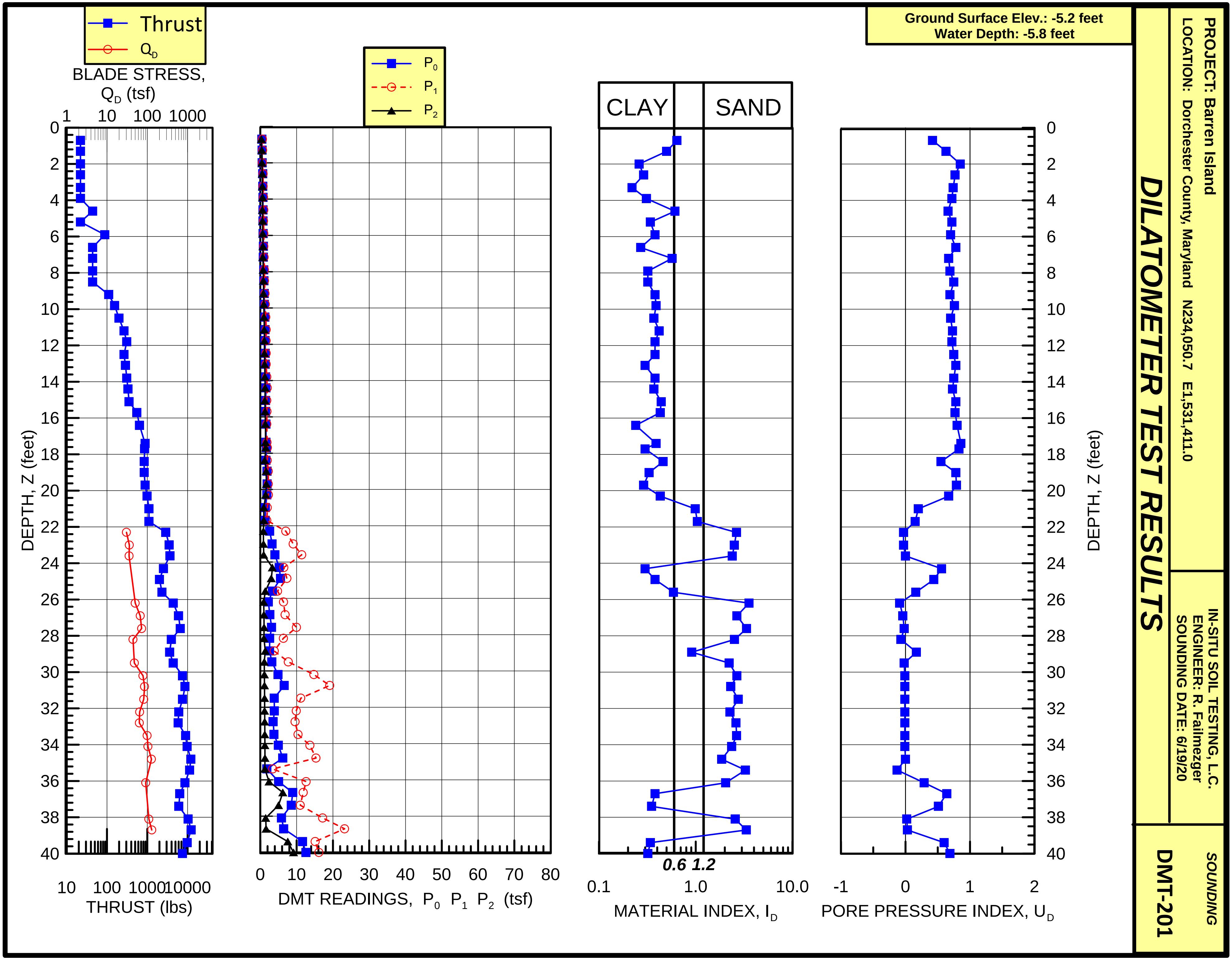
ANALYSIS PARAMETERS: LO RANGE = 10.36 TSF ROD DIAM. = 0.93 IN BL.THICK. = 0.02 IN SU FACTOR = 1
SURF.ELEV. = -17.1 FT LO GAGE 0 = 0.00 TSF FR.RED.DIA. = 1.04 IN BL.WIDTH = 0.15 IN PHI FACTOR = 1
WATER DEPTH = -5.9 FT HI GAGE 0 = 0.00 TSF LIN.ROD WT. = 5.4 LBF/FTDELTA-A = 0.27 TSF OCR FACTOR = 1
SP.GR.WATER = 1.026 CAL GAGE 0 = 0.00 TSF DELTA/PHI = 0.5 DELTA-B = 0.79 TSF M FACTOR = 1
MAX SU ID = 0.6 SU OPTION = 0 MIN PHI ID = 1.2 OCR OPTION = 0 K0 FACTOR = 1
UNIT CONVERSIONS: 1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI 1 M = 3.2808 FT

Z (FT)	ELEV (FT)	THRUST (LBF)	A (TSF)	B (TSF)	C (TSF)	DA (TSF)	DB (TSF)	ZMRNG (TSF)	ZMLO (TSF)	ZMHI (TSF)	ZMCAL (TSF)	P0 (TSF)	P1 (TSF)	P2 (TSF)	U0 (TSF)	GAMMA (PCF)	SVP (TSF)
43.3	-48.6	6571	13.46	19.24	9.60	0.26	0.76	9.92	0.00	0.00	0.00	13.48	18.48	9.87	1.576	119.2	0.916
44.0	-49.2	6439	13.47	19.23	9.48	0.26	0.76	9.92	0.00	0.00	0.00	13.49	18.47	9.74	1.597	119.2	0.933
44.6	-49.9	6571	11.63	16.88	8.02	0.26	0.76	9.92	0.00	0.00	0.00	11.68	16.12	8.28	1.619	119.2	0.952
45.3	-50.5	7894	13.02	18.25	9.05	0.26	0.76	9.92	0.00	0.00	0.00	13.07	17.49	9.31	1.640	119.2	0.970
45.9	-51.2	7343	15.04	19.54	11.13	0.26	0.76	9.92	0.00	0.00	0.00	15.13	18.78	11.39	1.661	119.2	0.989
46.6	-51.8	7188	14.05	18.65	9.77	0.26	0.76	9.92	0.00	0.00	0.00	14.14	17.88	10.03	1.682	119.2	1.006
47.2	-52.5	7343	15.86	20.38	11.57	0.26	0.76	9.92	0.00	0.00	0.00	15.94	19.62	11.83	1.703	119.2	1.024
47.9	-53.1	7519	12.95	17.23	9.73	0.26	0.76	9.92	0.00	0.00	0.00	13.04	16.46	9.99	1.724	119.2	1.043
48.6	-53.8	8159	10.76	14.27	8.04	0.26	0.76	9.92	0.00	0.00	0.00	10.90	13.51	8.30	1.745	119.2	1.061
49.2	-54.5	8070	10.46	13.22	7.68	0.26	0.76	9.92	0.00	0.00	0.00	10.64	12.45	7.94	1.766	112.9	1.078
49.9	-55.1	8489	8.54	13.39	4.56	0.26	0.76	9.92	0.00	0.00	0.00	8.61	12.63	4.82	1.787	112.9	1.094
50.5	-55.8	9151	10.15	13.08	7.23	0.26	0.76	9.92	0.00	0.00	0.00	10.31	12.32	7.50	1.808	112.9	1.110
51.2	-56.4	8974	11.69	15.84	8.59	0.26	0.76	9.92	0.00	0.00	0.00	11.80	15.08	8.85	1.829	119.2	1.128
51.8	-57.1	9371	13.75	18.38	10.58	0.26	0.76	9.92	0.00	0.00	0.00	13.83	17.62	10.84	1.850	119.2	1.145
52.5	-57.7	9923	15.18	20.78	11.64	0.26	0.76	9.92	0.00	0.00	0.00	15.21	20.01	11.90	1.871	119.2	1.164
53.1	-58.4	10341	15.41	21.07	12.03	0.26	0.76	9.92	0.00	0.00	0.00	15.44	20.31	12.29	1.892	119.2	1.182
53.8	-59.1	10518	14.85	19.80	11.79	0.26	0.76	9.92	0.00	0.00	0.00	14.91	19.04	12.05	1.914	119.2	1.200
54.5	-59.7	10187	15.18	22.19	11.11	0.26	0.76	9.92	0.00	0.00	0.00	15.14	21.42	11.37	1.935	119.2	1.218
55.1	-60.4	10099	18.05	25.65	13.67	0.26	0.76	9.92	0.00	0.00	0.00	17.99	24.89	13.93	1.955	128.5	1.238
55.8	-61.0	10760	18.88	26.98	14.01	0.26	0.76	9.92	0.00	0.00	0.00	18.78	26.21	14.27	1.976	128.5	1.259
56.4	-61.7	10849	17.50	23.63	13.76	0.26	0.76	9.92	0.00	0.00	0.00	17.51	22.86	14.02	1.997	128.5	1.280
57.1	-62.3	11444	18.34	26.81	12.89	0.26	0.76	9.92	0.00	0.00	0.00	18.23	26.05	13.15	2.018	128.5	1.302
57.7	-63.0	11598	18.57	25.41	14.34	0.26	0.76	9.92	0.00	0.00	0.00	18.54	24.65	14.61	2.039	128.5	1.323
58.4	-63.6	12128	18.74	26.79	14.00	0.26	0.76	9.92	0.00	0.00	0.00	18.65	26.03	14.26	2.060	128.5	1.344
59.1	-64.3	12392	18.44	26.13	13.96	0.26	0.76	9.92	0.00	0.00	0.00	18.36	25.37	14.22	2.082	128.5	1.365
59.7	-65.0	13054	18.06	25.93	13.33	0.26	0.76	9.92	0.00	0.00	0.00	17.98	25.17	13.59	2.103	128.5	1.386
60.4	-65.6	13627	18.44	25.37	13.74	0.26	0.76	9.92	0.00	0.00	0.00	18.41	24.61	14.00	2.123	128.5	1.407
61.0	-66.3	14112	17.75	25.82	12.04	0.26	0.76	9.92	0.00	0.00	0.00	17.65	25.06	12.30	2.144	128.5	1.428
61.7	-66.9	14068	15.39	22.64	10.72	0.26	0.76	9.92	0.00	0.00	0.00	15.34	21.88	10.98	2.165	119.2	1.448
62.3	-67.6	14818	18.28	25.11	14.23	0.26	0.76	9.92	0.00	0.00	0.00	18.25	24.35	14.49	2.186	128.5	1.468
63.0	-68.2	15964	18.75	26.34	14.05	0.26	0.76	9.92	0.00	0.00	0.00	18.69	25.58	14.31	2.207	128.5	1.489
63.6	-68.9	15832	18.91	27.00	13.95	0.26	0.76	9.92	0.00	0.00	0.00	18.81	26.24	14.21	2.229	128.5	1.511
64.3	-69.6	16251	18.74	26.78	14.06	0.26	0.76	9.92	0.00	0.00	0.00	18.65	26.02	14.32	2.250	128.5	1.532
65.0	-70.2	16229	17.53	24.16	13.76	0.26	0.76	9.92	0.00	0.00	0.00	17.51	23.40	14.02	2.271	128.5	1.552
65.6	-70.9	16868	16.99	22.81	13.61	0.26	0.76	9.92	0.00	0.00	0.00	17.01	22.05	13.87	2.292	119.2	1.572
66.3	-71.5	17199	17.70	23.99	13.91	0.26	0.76	9.92	0.00	0.00	0.00	17.70	23.23	14.17	2.312	128.5	1.592
66.9	-72.2	17662	19.90	27.52	14.74	0.26	0.76	9.92	0.00	0.00	0.00	19.83	26.76	15.00	2.333	128.5	1.613
67.6	-72.8	18235	21.07	29.75	15.63	0.26	0.76	9.92	0.00	0.00	0.00	20.94	28.99	15.89	2.354	128.5	1.635
68.2	-73.5	18434	21.62	32.03	15.29	0.26	0.76	9.92	0.00	0.00	0.00	21.41	31.27	15.56	2.376	128.5	1.656
68.9	-74.1	18743	22.49	31.53	16.30	0.26	0.76	9.92	0.00	0.00	0.00	22.35	30.77	16.56	2.397	128.5	1.677
69.6	-74.8	20110	22.87	32.82	16.00	0.26	0.76	9.92	0.00	0.00	0.00	22.69	32.06	16.27	2.418	128.5	1.698
70.2	-75.5	20793	23.06	33.24	16.45	0.26	0.76	9.92	0.00	0.00	0.00	22.86	32.48	16.71	2.439	128.5	1.719
70.9	-76.1	21433	23.91	33.27	17.95	0.26	0.76	9.92	0.00	0.00	0.00	23.75	32.51	18.21	2.460	128.5	1.740
71.5	-76.8	22226	25.20	35.36	18.03	0.26	0.76	9.92	0.00	0.00	0.00	25.00	34.60	18.29	2.481	128.5	1.761
72.2	-77.4	22337	24.76	35.15	17.87	0.26	0.76	9.92	0.00	0.00	0.00	24.55	34.39	18.13	2.501	128.5	1.783
72.8	-78.1	23108	22.10	32.17	15.40	0.26	0.76	9.92	0.00	0.00	0.00	21.91	31.40	15.66	2.522	128.5	1.804
73.5	-78.7	24894	19.71	29.36	9.05	0.26	0.76	9.92	0.00	0.00	0.00	19.54	28.60	9.31	2.544	128.5	1.825
74.1	-79.4	25159	11.35	26.76	3.49	0.26	0.76	9.92	0.00	0.00	0.00	10.89	26.00	3.75	2.565	125.4	1.846
74.8	-80.1	24431	11.39	16.52	6.38	0.26	0.76	9.92	0.00	0.00	0.00	11.44	15.75	6.64	2.586	119.2	1.865
75.5	-80.7	24321	12.25	17.54	6.56	0.26	0.76	9.92	0.00	0.00	0.00	12.30	16.78	6.82	2.607	119.2	1.883

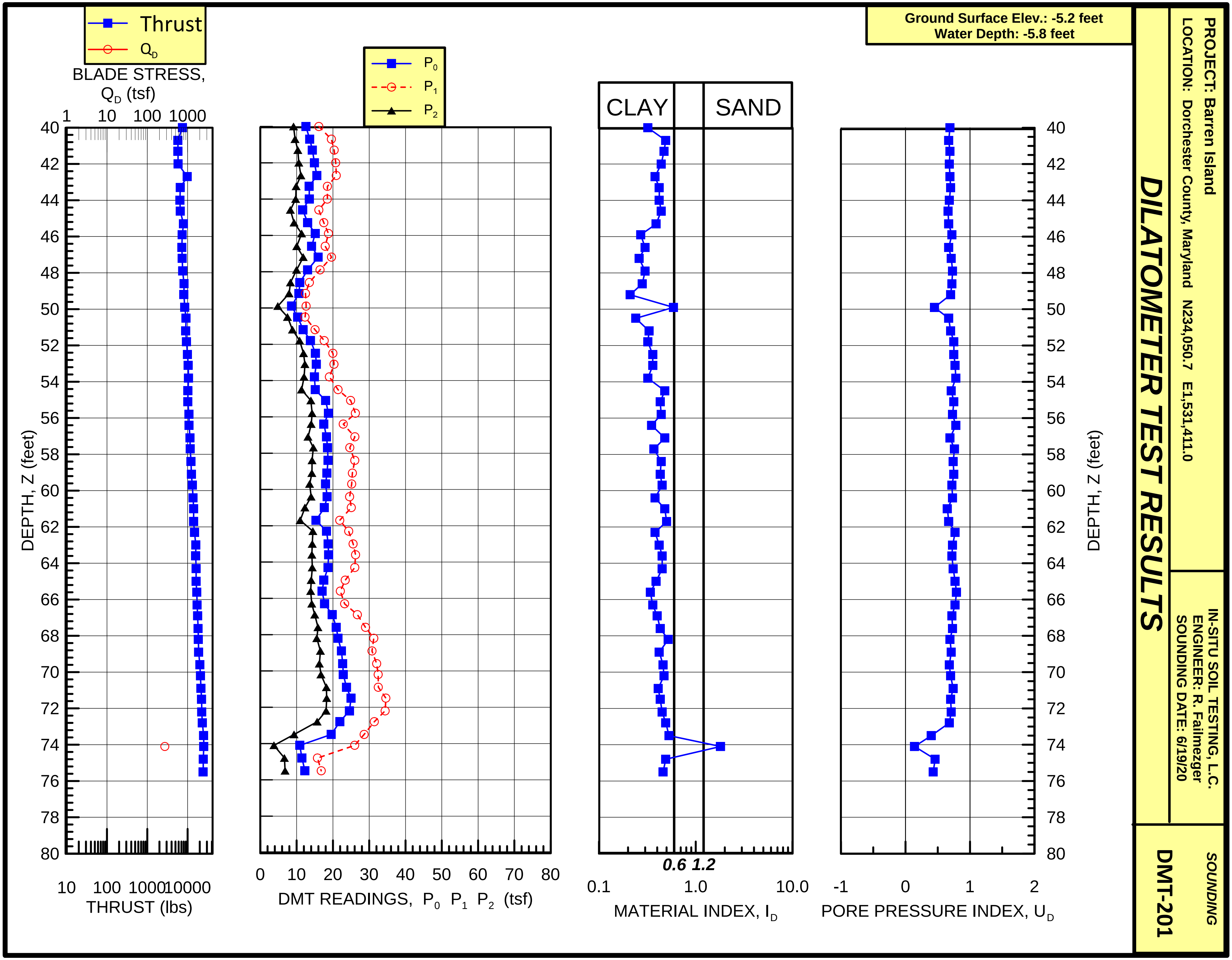
DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL) SNDG. NO. : DMT-201
In-Situ Soil Testing, L.C. Page 2
JOB FILE: Barren Island FILE NO. :2020-45
LOCATION: Dorchester County, Maryland--N234,050.7 E1,531,411.0
SNDG.BY : R. Failmezger SNDG. DATE: 6/19/20
ANAL.BY : Roger Failmezger, P.E., F. ASCE, D. GE ANAL. DATE: 6/19/20

ANALYSIS PARAMETERS: LO RANGE = 10.36 TSF ROD DIAM. = 0.93 IN BL.THICK. = 0.02 IN SU FACTOR = 1
SURF.ELEV. = -17.1 FT LO GAGE 0 = 0.00 TSF FR.RED.DIA. = 1.04 IN BL.WIDTH = 0.15 IN PHI FACTOR = 1
WATER DEPTH = -5.9 FT HI GAGE 0 = 0.00 TSF LIN.ROD WT. = 5.4 LBF/FTDELTA-A = 0.27 TSF OCR FACTOR = 1
SP.GR.WATER = 1.026 CAL GAGE 0 = 0.00 TSF;
DELTA / PHI = 0.5 DELTA - B = 0.79 TSF M FACTOR = 1
MAX SU ID = 0.6 SU OPTION = 0 MIN PHI ID = 1.2 OCR OPTION = 0 K0 FACTOR = 1
UNIT CONVERSIONS: 1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI 1 M = 3.2808 FT

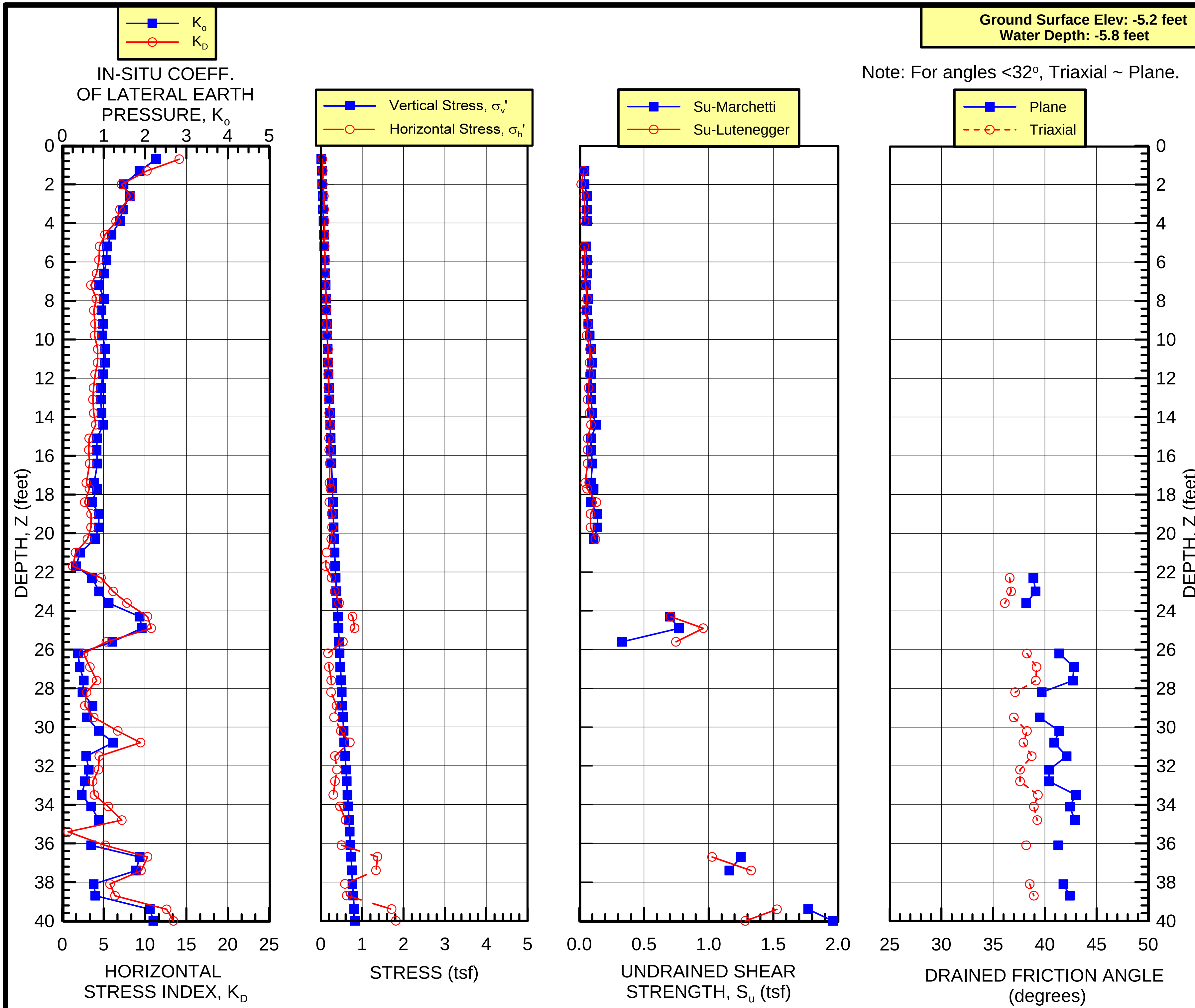
Z (FT)	ELEV (FT)	KD	ID	UD	ED (TSF)	K0	SU (TSF)	QD (TSF)	PHI (DEG)	SIGFF (TSF)	PHIO (DEG)	PC (TSF)	OCR	M (TSF)	SOIL TYPE
*****	******	*****	*****	*****	******	*****	*****	*****	*****	******	*****	*****	*****	******	************
43.3	-48.6	13.00	0.42	0.70	173	2.16	2.09					16.98	18.5	477	SILTY CLAY
44.0	-49.2	12.74	0.42	0.68	172	2.13	2.08					16.77	18.0	471	SILTY CLAY
44.6	-49.9	10.57	0.44	0.66	155	1.90	1.68					12.78	13.4	394	SILTY CLAY
45.3	-50.5	11.78	0.39	0.67	153	2.03	1.96					15.43	15.9	407	SILTY CLAY
45.9	-51.2	13.63	0.27	0.72	126	2.22	2.39					19.73	20.0	354	CLAY
46.6	-51.8	12.37	0.30	0.67	131	2.10	2.16					17.28	17.2	352	CLAY
47.2	-52.5	13.90	0.26	0.71	127	2.25	2.55					21.09	20.6	358	CLAY
47.9	-53.1	10.86	0.30	0.73	119	1.94	1.90					14.60	14.0	306	CLAY
48.6	-53.8	8.63	0.28	0.72	91	1.68	1.45					10.38	9.8	213	CLAY
49.2	-54.5	8.23	0.21	0.70	63	1.63	1.39					9.79	9.1	145	CLAY
49.9	-55.1	6.24	0.59	0.45	140	1.35	1.00					6.45	5.9	282	SILTY CLAY
50.5	-55.8	7.66	0.24	0.67	70	1.55	1.31					9.02	8.1	155	CLAY
51.2	-56.4	8.84	0.33	0.70	114	1.70	1.59					11.45	10.2	270	CLAY
51.8	-57.1	10.46	0.32	0.75	132	1.89	1.99					15.13	13.2	335	CLAY
52.5	-57.7	11.46	0.36	0.75	167	2.00	2.27					17.74	15.2	438	SILTY CLAY
53.1	-58.4	11.46	0.36	0.77	169	2.00	2.31					18.01	15.2	444	SILTY CLAY
53.8	-59.1	10.83	0.32	0.78	143	1.93	2.18					16.74	13.9	370	CLAY
54.5	-59.7	10.84	0.48	0.71	218	1.93	2.21					17.02	14.0	562	SILTY CLAY
55.1	-60.4	12.95	0.43	0.75	240	2.15	2.81					22.81	18.4	658	SILTY CLAY
55.8	-61.0	13.35	0.44	0.73	258	2.19	2.98					24.33	19.3	715	SILTY CLAY
56.4	-61.7	12.11	0.35	0.78	186	2.07	2.67					21.26	16.6	499	CLAY
57.1	-62.3	12.46	0.48	0.69	271	2.10	2.82					22.58	17.3	735	SILTY CLAY
57.7	-63.0	12.48	0.37	0.76	212	2.11	2.87					23.00	17.4	574	SILTY CLAY
58.4	-63.6	12.34	0.44	0.74	256	2.09	2.88					22.99	17.1	691	SILTY CLAY
59.1	-64.3	11.93	0.43	0.75	243	2.05	2.80					22.13	16.2	648	SILTY CLAY
59.7	-65.0	11.45	0.45	0.72	250	2.00	2.70					21.10	15.2	656	SILTY CLAY
60.4	-65.6	11.57	0.38	0.73	215	2.01	2.78					21.75	15.5	568	SILTY CLAY
61.0	-66.3	10.86	0.48	0.65	257	1.94	2.60					20.00	14.0	662	SILTY CLAY
61.7	-66.9	9.10	0.50	0.67	228	1.73	2.12					15.38	10.6	546	SILTY CLAY
62.3	-67.6	10.94	0.38	0.77	212	1.94	2.70					20.81	14.2	547	SILTY CLAY
63.0	-68.2	11.06	0.42	0.73	239	1.96	2.78					21.46	14.4	621	SILTY CLAY
63.6	-68.9	10.98	0.45	0.72	258	1.95	2.80					21.53	14.3	667	SILTY CLAY
64.3	-69.6	10.71	0.45	0.74	256	1.92	2.75					20.98	13.7	656	SILTY CLAY
65.0	-70.2	9.81	0.39	0.77	205	1.82	2.50					18.57	12.0	506	SILTY CLAY
65.6	-70.9	9.36	0.34	0.79	175	1.76	2.38					17.46	11.1	426	CLAY
66.3	-71.5	9.66	0.36	0.77	192	1.80	2.51					18.57	11.7	473	SILTY CLAY
66.9	-72.2	10.85	0.40	0.72	240	1.93	2.93					22.55	14.0	619	SILTY CLAY
67.6	-72.8	11.38	0.43	0.73	279	1.99	3.16					24.61	15.1	732	SILTY CLAY
68.2	-73.5	11.50	0.52	0.69	342	2.00	3.25					25.35	15.3	900	SILTY CLAY
68.9	-74.1	11.90	0.42	0.71	292	2.05	3.42					27.08	16.1	779	SILTY CLAY
69.6	-74.8	11.94	0.46	0.68	326	2.05	3.49					27.56	16.2	868	SILTY CLAY
70.2	-75.5	11.88	0.47	0.70	334	2.05	3.51					27.71	16.1	888	SILTY CLAY
70.9	-76.1	12.23	0.41	0.74	304	2.08	3.69					29.36	16.9	817	SILTY CLAY
71.5	-76.8	12.79	0.43	0.70	333	2.14	3.94					31.83	18.1	909	SILTY CLAY
72.2	-77.4	12.37	0.45	0.71	341	2.10	3.82					30.60	17.2	922	SILTY CLAY
72.8	-78.1	10.75	0.49	0.68	330	1.92	3.25					24.86	13.8	846	SILTY CLAY
73.5	-78.7	9.31	0.53	0.40	314	1.76	2.75					20.11	11.0	762	SILTY CLAY
74.1	-79.4	4.51	1.81	0.14	524	0.57		271.9	42.5	3.09	42.6	4.40	2.4	916	SILTY SAND
74.8	-80.1	4.75	0.49	0.46	149	1.12	1.21					7.19	3.9	260	SILTY CLAY
75.5	-80.7	5.14	0.46	0.43	156	1.18	1.35					8.22	4.4	283	SILTY CLAY



PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N234,050.7 E1,531,411.0
DILATOMETER TEST RESULTS
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 6/19/20
SOUNDING
DMT-201
Ground Surface Elev.: -5.2 feet
Water Depth: -5.8 feet
Thrust
Q_D
BLADE STRESS, Q_D (tsf)
THRUST (lbs)
DEPTH, Z (feet)
P_0
P_1
P_2
DMT READINGS, P_0 P_1 P_2 (tsf)
CLAY
SAND
0.6 1.2
MATERIAL INDEX, I_D
PORE PRESSURE INDEX, U_D



DILATOMETER TEST RESULTS
PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N234,050.7 E1,531,411.0
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 6/19/20
SOUNDING
DMT-201
Ground Surface Elev.: -5.2 feet
Water Depth: -5.8 feet
Thrust
Q_D
BLADE STRESS, Q_D (tsf)
1 10 100 1000
10 100 1000 10000
THRUST (lbs)
DEPTH, Z (feet)
P_0
P_1
P_2
DMT READINGS, P_0 P_1 P_2 (tsf)
0 10 20 30 40 50 60 70 80
CLAY
SAND
0.6 1.2
0.1 1.0 10.0
MATERIAL INDEX, I_D
-1 0 1 2
PORE PRESSURE INDEX, U_D
40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80



INTERPRETED DMT STRENGTH PARAMETERS

PROJECT: Barren Island

LOCATION: Dorchester County, Maryland N234,050.7 E1,531,411.0

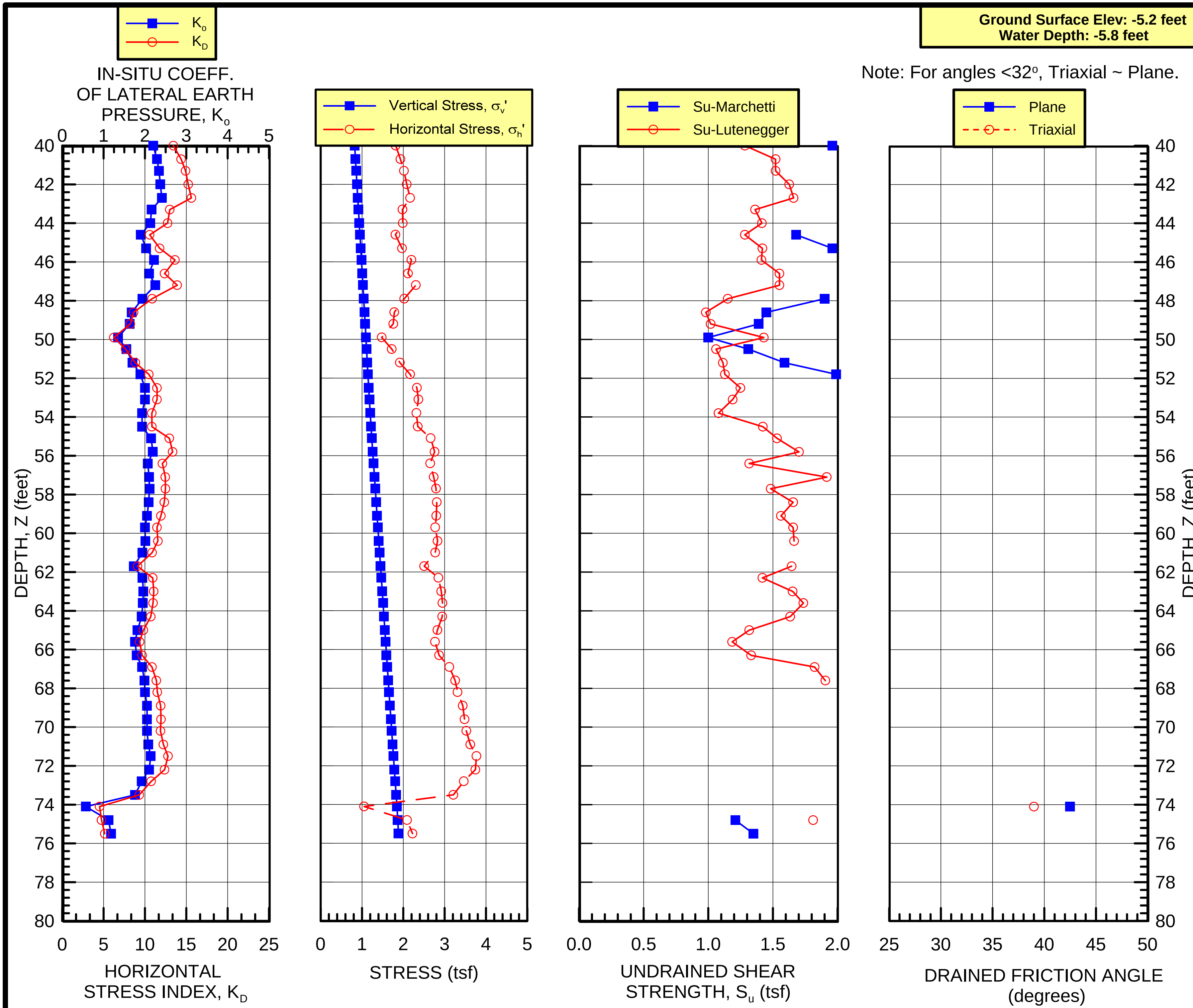
IN-SITU SOIL TESTING, L.C.

ENGINEER: R. Failmezger, P.E., F. ASCE, D GE

SOUNDING DATE: 6/19/20

SOUNDING

DMT-201



INTERPRETED DMT STRENGTH PARAMETERS

PROJECT: Barren Island

LOCATION: Dorchester County, Maryland N234,050.7 E1,531,411.0

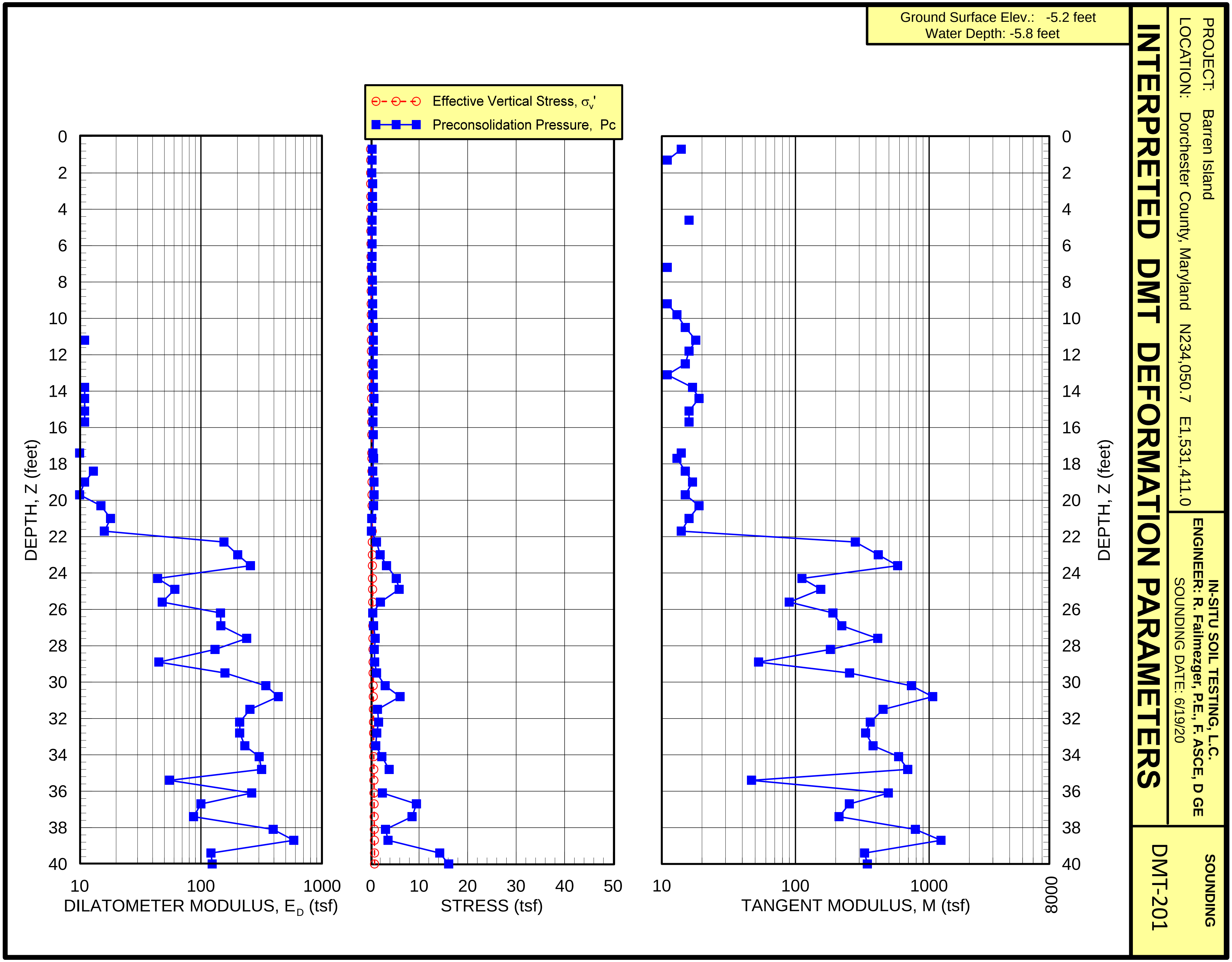
IN-SITU SOIL TESTING, L.C.

ENGINEER: R. Failmezger, P.E., F. ASCE, D GE

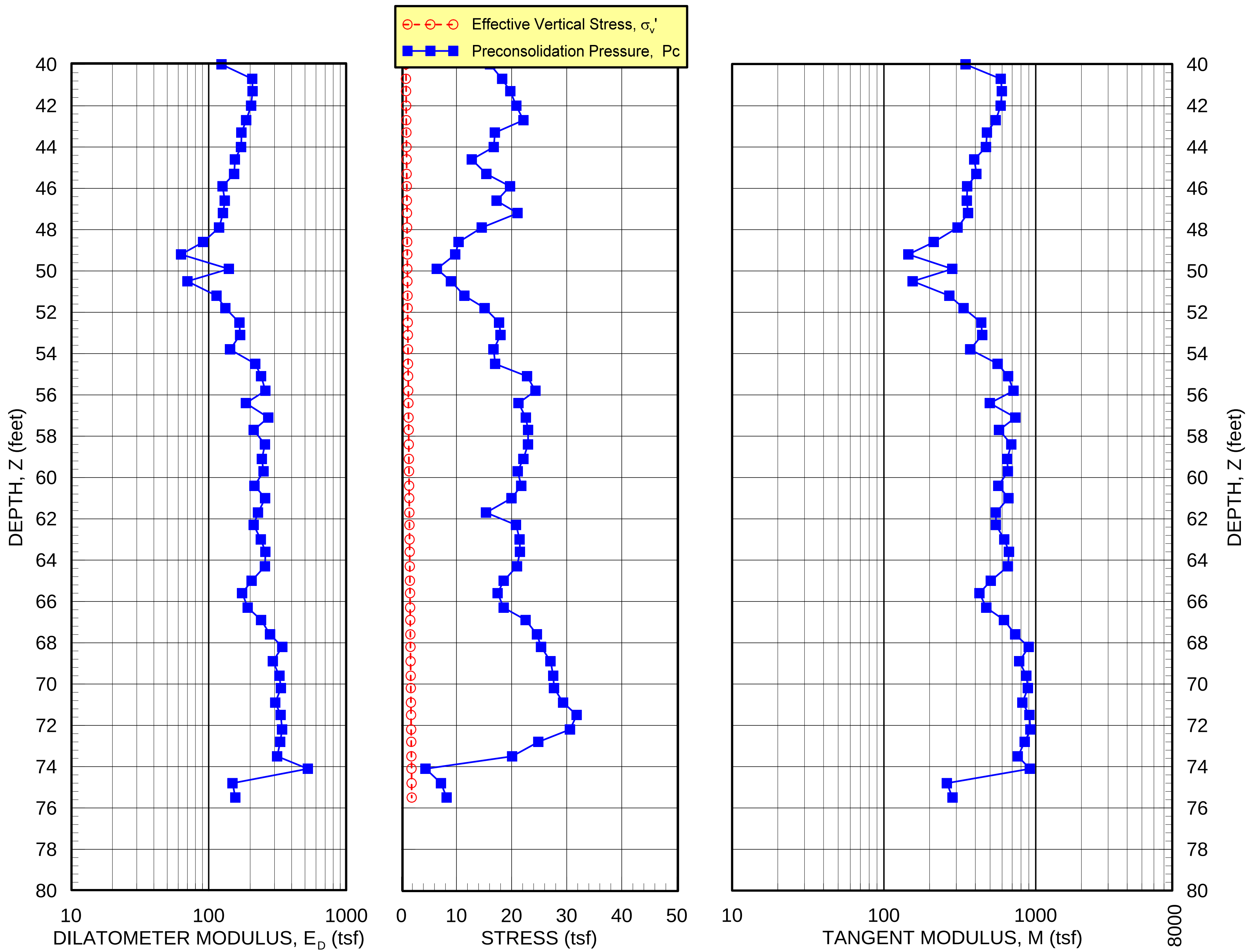
SOUNDING DATE: 6/19/20

SOUNDING

DMT-201


Ground Surface Elev.: -5.2 feet
Water Depth: -5.8 feet
Effective Vertical Stress, σv'
Preconsolidation Pressure, Pc
DEPTH, Z (feet)
DILATOMETER MODULUS, ED (tsf)
STRESS (tsf)
TANGENT MODULUS, M (tsf)
INTERPRETED DMT DEFORMATION PARAMETERS
PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N234,050.7 E1,531,411.0
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/19/20
SOUNDING
DMT-201

Ground Surface Elev.: -5.2 feet
Water Depth: -5.8 feet



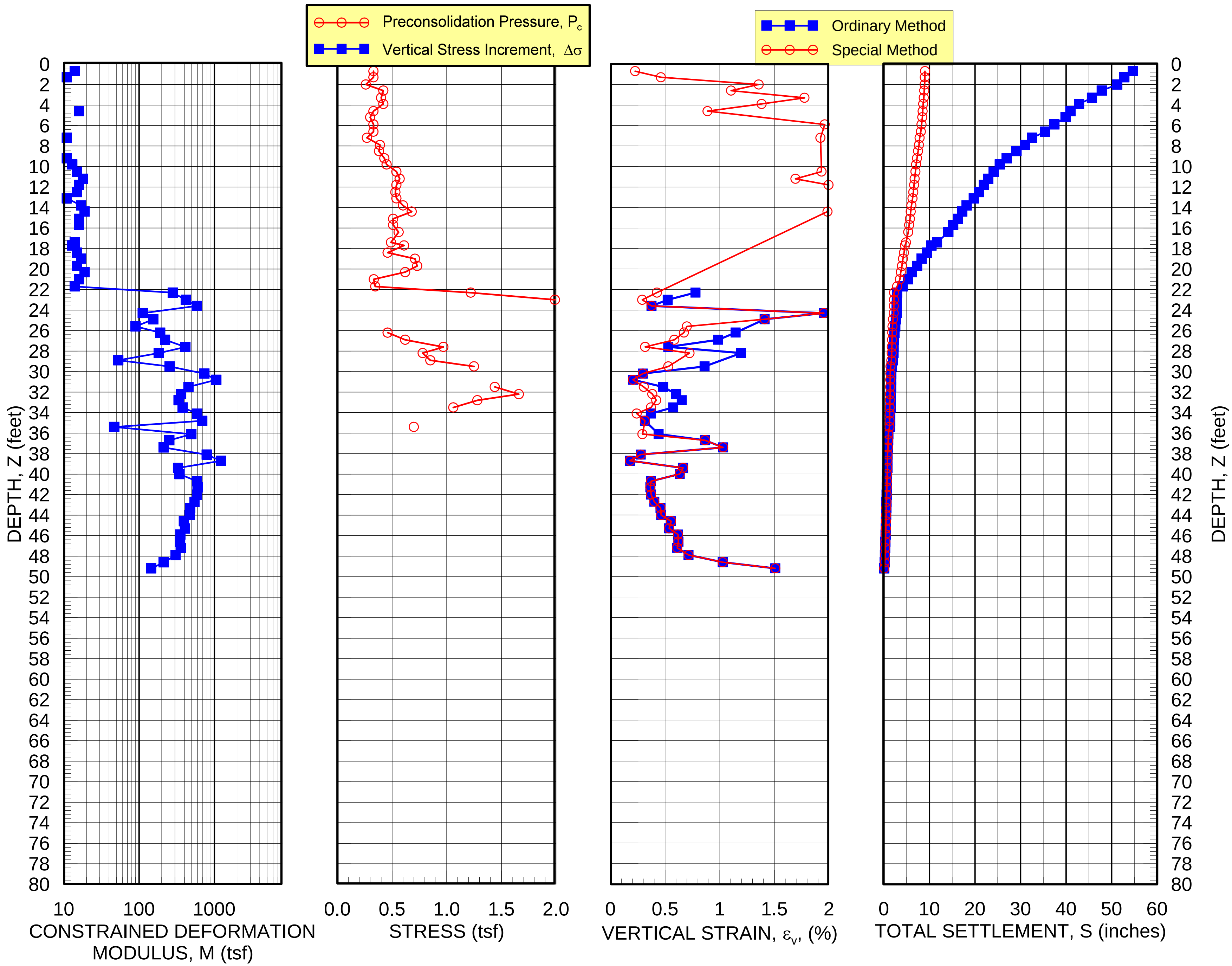
INTERPRETED DMT DEFORMATION PARAMETERS

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N234,050.7 E1,531,411.0

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/19/20

SOUNDING
DMT-201

Ground Surface Elev.: -5.2 feet
Water Depth: -5.8 feet



PREDICTED DMT SETTLEMENT

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N234,050.7 E1,531,411.0

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/19/20

SOUNDING
DMT-201

DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL) SNDG. NO. :DMT-202
In-Situ Soil Testing, L.C. Page 1a
JOB FILE: Barren Island FILE NO. : 2020-45
LOCATION: Dorchester County, Maryland--N234,650.7 E1,529,551.0
SNDG.BY : R. Failmezger SNDG. DATE: 6/19/20
ANAL.BY : Roger Failmezger, P.E., F. ASCE, D. GE ANAL. DATE: 6/19/20

ANALYSIS PARAMETERS: LO RANGE = 9.92 TSF ROD DIAM. = 2.36 IN BL.THICK. = 0.59 IN SU FACTOR = 1
SURF.ELEV. = -5.2 FT LO GAGE 0 = 0.00 TSF FR.RED.DIA. = 2.64 IN BL.WIDTH = 3.78 IN PHI FACTOR = 1
WATER DEPTH = -5.9 FT HI GAGE 0 = 0.00 TSF LIN.ROD WT. = 8.0 LBF/FTDELTA-A = 0.24 TSF OCR FACTOR = 1
SP.GR.WATER = 1.030 CAL GAGE 0 = 0.00 TSF DELTA/PHI = 0.5 DELTA-B = 0.79 TSF M FACTOR = 1
MAX SU ID = 0.6 SU OPTION = 0 MIN PHI ID = 1.2 OCR OPTION = 0 K0 FACTOR = 1
UNIT CONVERSIONS: 1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI 1 M = 3.2808 FT

Z (FT)	ELEV (FT)	THRUST (LBF)	A (TSF)	B (TSF)	C (TSF)	DA (TSF)	DB (TSF)	ZMRNG (TSF)	ZMLO (TSF)	ZMHI (TSF)	ZMCAL (TSF)	P0 (TSF)	P1 (TSF)	P2 (TSF)	U0 (TSF)	GAMMA (PCF)	SVP (TSF)
*****	******	******	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	******	******	******
0.7	-5.9	22	0.11	1.44		0.24	0.79	9.92	0.00	0.00	0.00	0.34	0.65		0.211	94.8	0.016
1.3	-6.6	22	0.21	1.63	0.04	0.24	0.79	9.92	0.00	0.00	0.00	0.43	0.84	0.28	0.232	107.3	0.028
2.0	-7.2	44	0.27	1.60	0.10	0.24	0.79	9.92	0.00	0.00	0.00	0.50	0.80	0.34	0.254	94.8	0.040
2.6	-7.9	22	0.37	1.55	0.25	0.24	0.79	9.92	0.00	0.00	0.00	0.60	0.75	0.49	0.275	94.8	0.050
3.3	-8.5	22	0.42	1.59	0.31	0.24	0.79	9.92	0.00	0.00	0.00	0.65	0.79	0.55	0.295	94.8	0.060
3.9	-9.2	44	0.47	1.71	0.29	0.24	0.79	9.92	0.00	0.00	0.00	0.70	0.92	0.53	0.316	94.8	0.070
4.6	-9.8	44	0.55	1.69	0.39	0.24	0.79	9.92	0.00	0.00	0.00	0.79	0.90	0.63	0.337	94.8	0.080
5.2	-10.5	176	0.60	1.77	0.48	0.24	0.79	9.92	0.00	0.00	0.00	0.82	0.98	0.72	0.359	94.8	0.090
5.9	-11.2	154	0.62	1.87	0.52	0.24	0.79	9.92	0.00	0.00	0.00	0.85	1.08	0.76	0.380	94.8	0.100
6.6	-11.8	154	0.69	1.93	0.58	0.24	0.79	9.92	0.00	0.00	0.00	0.92	1.14	0.82	0.401	94.8	0.111
7.2	-12.5	132	0.78	2.07	0.63	0.24	0.79	9.92	0.00	0.00	0.00	1.01	1.27	0.87	0.422	94.8	0.120
7.9	-13.1	110	0.78	2.07	0.61	0.24	0.79	9.92	0.00	0.00	0.00	1.01	1.27	0.85	0.444	94.8	0.131
8.5	-13.8	265	0.94	3.17	0.35	0.24	0.79	9.92	0.00	0.00	0.00	1.12	2.38	0.60	0.465	107.3	0.142
9.2	-14.4	1103	2.98	7.78	0.09	0.24	0.79	9.92	0.00	0.00	0.00	3.03	6.98	0.33	0.485	107.3	0.157
9.8	-15.1	2426	3.64	12.32	0.14	0.24	0.79	9.92	0.00	0.00	0.00	3.50	11.53	0.38	0.506	119.2	0.172
10.5	-15.7	3969	4.80	13.52	0.09	0.24	0.79	9.92	0.00	0.00	0.00	4.66	12.73	0.33	0.527	119.2	0.191
11.2	-16.4	4410	4.88	14.67	0.28	0.24	0.79	9.92	0.00	0.00	0.00	4.68	13.87	0.52	0.549	119.2	0.209
11.8	-17.1	5292	5.25	13.86	0.31	0.24	0.79	9.92	0.00	0.00	0.00	5.12	13.07	0.55	0.570	113.6	0.226
12.5	-17.7	6461	4.04	13.38	0.19	0.24	0.79	9.92	0.00	0.00	0.00	3.86	12.59	0.43	0.591	119.2	0.243
13.1	-18.4	6240	4.76	13.42	0.38	0.24	0.79	9.92	0.00	0.00	0.00	4.62	12.62	0.62	0.612	119.2	0.261
13.8	-19.0	6924	3.35	10.36	0.37	0.24	0.79	9.92	0.00	0.00	0.00	3.29	9.56	0.61	0.633	119.2	0.280
14.4	-19.7	7166	4.02	11.88	0.40	0.24	0.79	9.92	0.00	0.00	0.00	3.92	11.09	0.64	0.655	119.2	0.298
15.1	-20.3	7541	3.09	10.14	0.42	0.24	0.79	9.92	0.00	0.00	0.00	3.03	9.34	0.66	0.675	119.2	0.315
15.7	-21.0	8666	4.26	14.07	0.44	0.24	0.79	9.92	0.00	0.00	0.00	4.06	13.28	0.68	0.696	119.2	0.334
16.4	-21.7	8423	4.84	13.75	0.46	0.24	0.79	9.92	0.00	0.00	0.00	4.69	12.96	0.70	0.717	119.2	0.352
17.1	-22.3	8203	3.39	10.33	0.49	0.24	0.79	9.92	0.00	0.00	0.00	3.34	9.53	0.73	0.739	119.2	0.370
17.7	-23.0	8070	2.80	9.41	0.48	0.24	0.79	9.92	0.00	0.00	0.00	2.76	8.61	0.72	0.760	113.6	0.387
18.4	-23.6	8644	4.27	13.13	0.52	0.24	0.79	9.92	0.00	0.00	0.00	4.12	12.34	0.76	0.781	119.2	0.404
19.0	-24.3	8114	3.33	9.31	0.52	0.24	0.79	9.92	0.00	0.00	0.00	3.32	8.52	0.76	0.802	119.2	0.422
19.7	-24.9	9261	2.58	9.40	0.55	0.24	0.79	9.92	0.00	0.00	0.00	2.53	8.60	0.79	0.823	113.6	0.440
20.3	-25.6	11664	6.28	18.47	0.58	0.24	0.79	9.92	0.00	0.00	0.00	5.97	17.67	0.82	0.845	125.4	0.457
21.0	-26.2	12811	7.42	22.70	0.66	0.24	0.79	9.92	0.00	0.00	0.00	6.95	21.90	0.90	0.865	125.4	0.477
21.7	-26.9	12987	5.01	15.84	0.57	0.24	0.79	9.92	0.00	0.00	0.00	4.76	15.04	0.81	0.886	119.2	0.497
22.3	-27.6	13098	4.79	16.15	0.61	0.24	0.79	9.92	0.00	0.00	0.00	4.52	15.36	0.85	0.907	119.2	0.515
23.0	-28.2	8511	3.62	11.23	0.66	0.24	0.79	9.92	0.00	0.00	0.00	3.54	10.44	0.90	0.928	119.2	0.533
23.6	-28.9	7982	2.72	8.62	0.66	0.24	0.79	9.92	0.00	0.00	0.00	2.72	7.83	0.90	0.950	113.6	0.550
24.3	-29.5	9085	2.26	7.28	0.69	0.24	0.79	9.92	0.00	0.00	0.00	2.30	6.48	0.93	0.971	113.6	0.566
24.9	-30.2	11113	3.11	9.95	0.69	0.24	0.79	9.92	0.00	0.00	0.00	3.06	9.16	0.93	0.992	119.2	0.584
25.6	-30.8	11003	2.94	11.17	0.90	0.24	0.79	9.92	0.00	0.00	0.00	2.83	10.38	1.14	1.013	119.2	0.601
26.2	-31.5	8357	3.87	5.76	2.50	0.24	0.79	9.92	0.00	0.00	0.00	4.07	4.97	2.74	1.035	107.3	0.617
26.9	-32.2	6858	2.68	4.01	1.85	0.24	0.79	9.92	0.00	0.00	0.00	2.91	3.22	2.09	1.055	94.8	0.630
27.6	-32.8	6769	2.39	6.02	0.78	0.24	0.79	9.92	0.00	0.00	0.00	2.51	5.23	1.02	1.076	113.6	0.643
28.2	-33.5	7299	3.33	10.24	0.81	0.24	0.79	9.92	0.00	0.00	0.00	3.28	9.45	1.05	1.097	119.2	0.660
28.9	-34.1	8181	4.06	11.45	0.86	0.24	0.79	9.92	0.00	0.00	0.00	3.99	10.66	1.10	1.118	119.2	0.678
29.5	-34.8	7806	4.44	12.10	0.87	0.24	0.79	9.92	0.00	0.00	0.00	4.34	11.31	1.11	1.140	119.2	0.696
30.2	-35.4	6020	4.12	11.07	0.88	0.24	0.79	9.92	0.00	0.00	0.00	4.07	10.27	1.12	1.161	119.2	0.714
30.8	-36.1	5711	3.17	9.12	0.88	0.24	0.79	9.92	0.00	0.00	0.00	3.16	8.33	1.12	1.182	113.6	0.731
31.5	-36.7	4829	2.54	6.90	0.88	0.24	0.79	9.92	0.00	0.00	0.00	2.61	6.11	1.12	1.203	113.6	0.748
32.2	-37.4	5777	2.46	4.18	1.39	0.24	0.79	9.92	0.00	0.00	0.00	2.67	3.38	1.63	1.225	101.1	0.761
32.8	-38.1	5931	3.08	5.41	1.87	0.24	0.79	9.92	0.00	0.00	0.00	3.26	4.61	2.11	1.245	107.3	0.775
33.5	-38.7	5909	3.92	5.80	2.98	0.24	0.79	9.92	0.00	0.00	0.00	4.11	5.01	3.22	1.266	107.3	0.788
34.1	-39.4	5821	3.79	5.95	2.91	0.24	0.79	9.92	0.00	0.00	0.00	3.98	5.16	3.15	1.287	107.3	0.803
34.8	-40.0	5601	3.97	5.69	3.16	0.24	0.79	9.92	0.00	0.00	0.00	4.18	4.90	3.40	1.308	101.1	0.815
35.4	-40.7	5998	4.16	6.02	3.43	0.24	0.79	9.92	0.00	0.00	0.00	4.35	5.23	3.67	1.330	107.3	0.829
36.1	-41.3	5270	3.33	4.95	2.63	0.24	0.79	9.92	0.00	0.00	0.00	3.54	4.16	2.87	1.351	101.1	0.841
36.7	-42.0	4873	3.13	5.84	1.87	0.24	0.79	9.92	0.00	0.00	0.00	3.29	5.04	2.11	1.372	107.3	0.855
37.4	-42.7	5160	3.73	6.73	2.36	0.24	0.79	9.92	0.00	0.00	0.00	3.87	5.94	2.60	1.393	107.3	0.870
38.1	-43.3	5160	4.16	6.55	2.93	0.24	0.79	9.92	0.00	0.00	0.00	4.33	5.75	3.17	1.414	107.3	0.883
38.7	-44.0	4851	4.82	7.11	3.73	0.24	0.79	9.92	0.00	0.00	0.00	5.00	6.32	3.97	1.436	107.3	0.897
39.4	-44.6	4631	5.20	7.45	4.13	0.24	0.79	9.92	0.00	0.00	0.00	5.38	6.66	4.37	1.456	107.3	0.911
40.0	-45.3	441	5.92	8.37	4.56	0.24	0.79	9.92	0.00	0.00	0.00	6.09	7.58	4.80	1.477	107.3	0.925
40.7	-45.9	7056	2.31	15.06	1.08	0.24	0.79	9.92	0.00	0.00	0.00	1.96	14.27	1.32	1.498	113.6	0.941
41.3	-46.6	24255	8.91	36.46	1.12	0.24	0.79	9.92	0.00	0.00	0.00	7.82	35.66	1.36	1.520	125.4	0.958

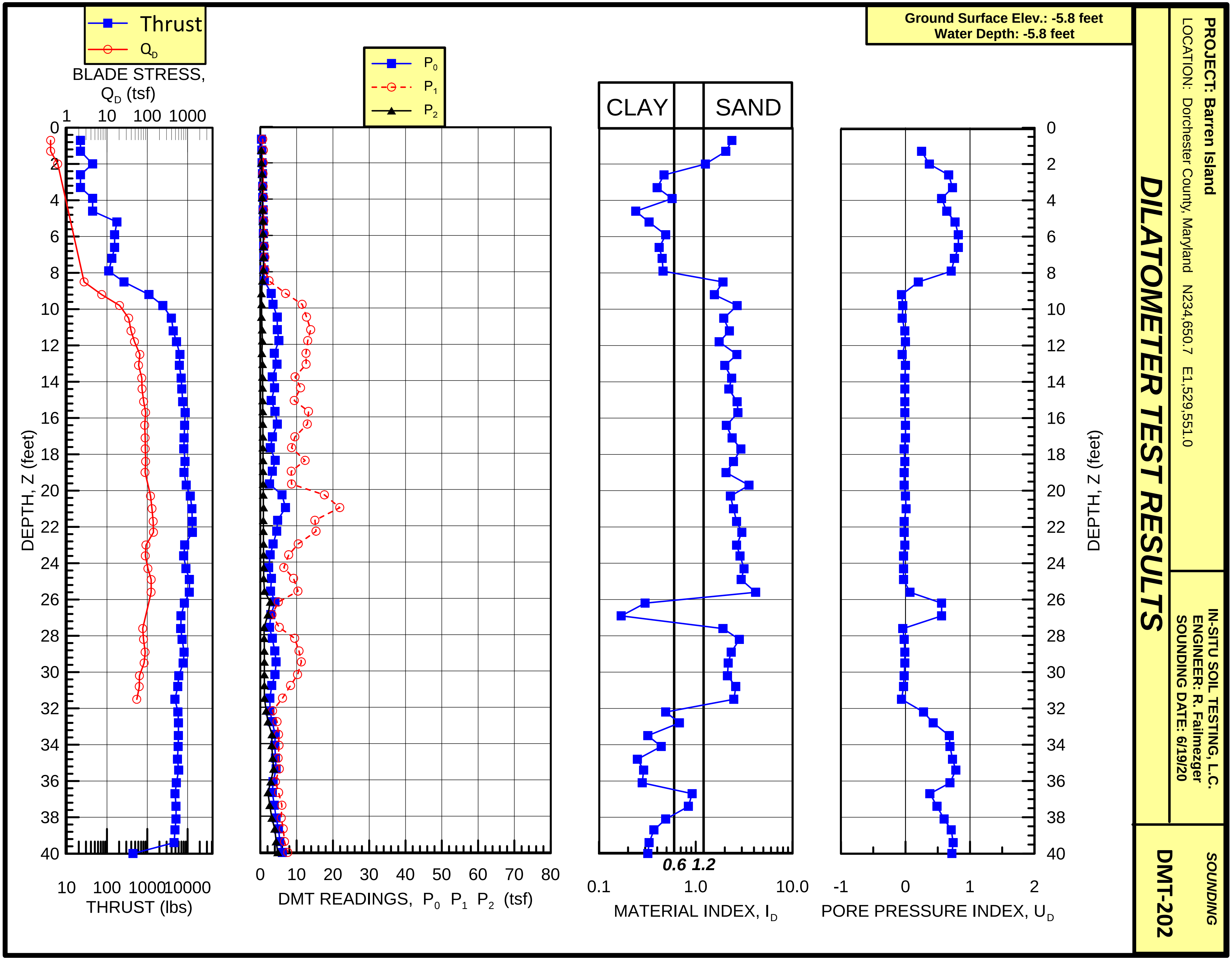
DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL)
In-Situ Soil Testing, L.C.
JOB FILE: Barren Island
LOCATION: Dorchester County, Maryland--N234,650.7 E1,529,551.0
SNDG.BY : R. Failmezger
ANAL.BY : Roger Failmezger, P.E., F. ASCE, D. GE

SNDG. NO. : DMT-202
Page 2
FILE NO. :2020-45

SNDG. DATE: 6/19/20
ANAL. DATE: 6/19/20

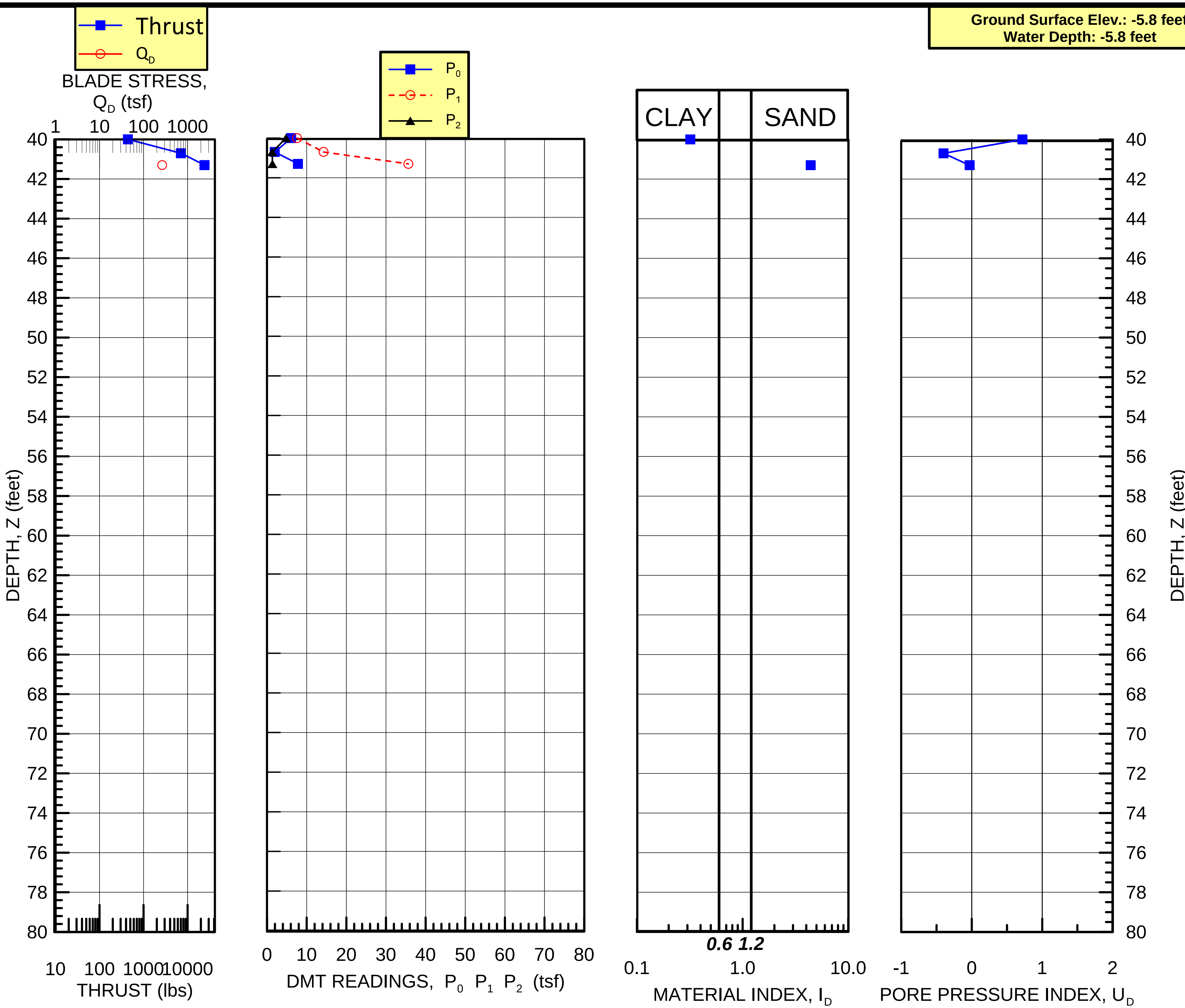
ANALYSIS PARAMETERS: LO RANGE = 9.92 TSF ROD DIAM. = 2.36 IN BL.THICK. = 0.59 IN SU FACTOR = 1
SURF.ELEV. = -5.2 FT LO GAGE 0 = 0.00 TSF FR.RED.DIA. = 2.64 IN BL.WIDTH = 3.78 IN PHI FACTOR = 1
WATER DEPTH = -5.9 FT HI GAGE 0 = 0.00 TSF LIN.ROD WT. = 8.0 LBF/FTDELTA-A = 0.24 TSF OCR FACTOR = 1
SP.GR.WATER = 1.030 CAL GAGE 0 = 0.00 TSF;
DELTA / PHI = 0.5 DELTA - B = 0.79 TSF M FACTOR = 1
MAX SU ID = 0.6 SU OPTION = 0 MIN PHI ID = 1.2 OCR OPTION = 0 K0 FACTOR = 1
UNIT CONVERSIONS: 1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI 1 M = 3.2808 FT

Z (FT)	ELEV (FT)	KD	ID	UD	ED (TSF)	K0	SU (TSF)	QD (TSF)	PHI (DEG)	SIGFF (TSF)	PHIO (DEG)	PC (TSF)	OCR	M (TSF)	SOIL TYPE
*****	******	*****	*****	*****	******	*****	*****	*****	*****	******	*****	*****	*****	******	************
0.7	-5.9	8.26	2.37		10	1.34		0.4	31.0	0.02	21.0	0.19	11.9	25	MUD
1.3	-6.6	7.12	2.05	0.25	14	1.34		0.4	25.9	0.04	16.2	0.33	11.9	30	SILTY SAND
2.0	-7.2	6.12	1.26	0.37	10	1.21		0.6	26.3	0.06	17.5	0.35	8.9	22	MUD
2.6	-7.9	6.49	0.47	0.67	5	1.39	0.05					0.31	6.3	10	MUD
3.3	-8.5	5.93	0.40	0.73	5	1.31	0.05					0.32	5.4	9	MUD
3.9	-9.2	5.47	0.57	0.56	7	1.24	0.05					0.33	4.8	15	MUD
4.6	-9.8	5.63	0.24	0.64	4	1.26	0.06					0.41	5.0	7	MUD
5.2	-10.5	5.20	0.33	0.77	5	1.19	0.06					0.40	4.4	9	MUD
5.9	-11.2	4.64	0.49	0.82	8	1.10	0.06					0.38	3.7	14	MUD
6.6	-11.8	4.70	0.42	0.82	7	1.11	0.07					0.42	3.8	14	MUD
7.2	-12.5	4.89	0.45	0.76	9	1.14	0.08					0.49	4.0	16	MUD
7.9	-13.1	4.35	0.46	0.71	9	1.05	0.07					0.44	3.4	15	MUD
8.5	-13.8	4.60	1.92	0.20	44	0.98		2.7	28.2	0.21	22.6	0.73	5.1	77	SILTY SAND
9.2	-14.4	16.23	1.56	-0.06	138	2.26		7.4	32.5	0.24	27.7	6.33	40.4	406	SANDY SILT
9.8	-15.1	17.35	2.68	-0.04	279	2.27		20.5	37.9	0.28	33.9	6.51	37.8	841	SILTY SAND
10.5	-15.7	21.65	1.95	-0.05	280	2.74		34.5	39.6	0.31	36.0	10.48	54.9	905	SILTY SAND
11.2	-16.4	19.77	2.23	-0.01	319	2.50		39.5	40.1	0.34	36.8	9.41	45.0	1003	SILTY SAND
11.8	-17.1	20.10	1.75	0.00	277	2.52		48.2	40.7	0.38	37.6	10.28	45.5	873	SANDY SILT
12.5	-17.7	13.47	2.67	-0.05	303	1.61		65.5	43.3	0.41	40.5	4.54	18.7	843	SILTY SAND
13.1	-18.4	15.34	2.00	0.00	278	1.89		60.8	42.1	0.44	39.3	6.66	25.5	807	SILTY SAND
13.8	-19.0	9.52	2.36	-0.01	217	1.09		73.0	44.2	0.47	41.7	2.46	8.8	535	SILTY SAND
14.4	-19.7	10.97	2.20	-0.01	248	1.30		73.9	43.5	0.50	41.0	3.66	12.3	644	SILTY SAND
15.1	-20.3	7.46	2.68	-0.01	219	0.81		81.3	44.8	0.54	42.5	1.58	5.0	491	SILTY SAND
15.7	-21.0	10.08	2.74	-0.01	319	1.16		91.0	44.2	0.56	42.0	3.29	9.9	802	SILTY SAND
16.4	-21.7	11.29	2.08	0.00	287	1.35		86.3	43.3	0.60	41.0	4.65	13.2	750	SILTY SAND
17.1	-22.3	7.03	2.38	0.00	215	0.77		88.4	44.5	0.63	42.4	1.69	4.6	469	SILTY SAND
17.7	-23.0	5.17	2.93	-0.02	204	0.51		88.9	45.1	0.66	43.1	0.81	2.1	390	SILTY SAND
18.4	-23.6	8.26	2.46	-0.01	285	0.97		91.1	43.7	0.68	41.7	2.78	6.9	664	SILTY SAND
19.0	-24.3	5.97	2.06	-0.02	181	0.67		87.9	44.1	0.72	42.1	1.44	3.4	364	SILTY SAND
19.7	-24.9	3.88	3.56	-0.02	211									354	SAND
20.3	-25.6	11.20	2.29	0.00	406	1.32		120.4	43.7	0.77	41.8	5.79	12.7	1060	SILTY SAND
21.0	-26.2	12.74	2.46	0.01	519	1.52		130.5	43.5	0.80	41.7	7.91	16.6	1416	SILTY SAND
21.7	-26.9	7.80	2.65	-0.02	357	0.83		139.9	45.2	0.85	43.5	2.61	5.3	813	SILTY SAND
22.3	-27.6	7.01	3.00	-0.02	376	0.72		142.2	45.4	0.88	43.8	2.08	4.0	825	SILTY SAND
23.0	-28.2	4.89	2.65	-0.01	240	0.58		92.7	43.4	0.90	41.8	1.32	2.5	446	SILTY SAND
23.6	-28.9	3.22	2.88	-0.03	177	0.36		89.4	43.8	0.93	42.2	0.54	1.0	267	SILTY SAND
24.3	-29.5	2.34	3.16	-0.03	145	0.16		103.9	45.3	0.97	43.8	0.14	0.2	180	SILTY SAND
24.9	-30.2	3.55	2.95	-0.03	212	0.29		124.9	45.5	1.00	44.1	0.42	0.7	337	SILTY SAND
25.6	-30.8	3.01	4.17	0.07	262	0.21		124.5	45.7	1.03	44.3	0.25	0.4	382	SAND
26.2	-31.5	4.92	0.30	0.56	31	1.15	0.42					2.52	4.1	55	CLAY
26.9	-32.2	2.94	0.17	0.56	10	0.77	0.23					1.15	1.8	14	MUD
27.6	-32.8	2.22	1.92	-0.04	95	0.31		76.9	42.2	1.08	40.8	0.44	0.7	102	SILTY SAND
28.2	-33.5	3.30	2.83	-0.02	214	0.46		80.6	41.8	1.10	40.4	0.96	1.5	327	SILTY SAND
28.9	-34.1	4.23	2.33	-0.01	232	0.57		88.6	41.9	1.13	40.5	1.53	2.3	397	SILTY SAND
29.5	-34.8	4.61	2.17	-0.01	241	0.64		83.3	41.1	1.16	39.8	1.96	2.8	431	SILTY SAND
30.2	-35.4	4.07	2.13	-0.02	215	0.63		63.9	39.4	1.17	38.0	1.86	2.6	359	SILTY SAND
30.8	-36.1	2.72	2.60	-0.03	180	0.46		63.3	39.7	1.20	38.4	0.99	1.4	239	SILTY SAND
31.5	-36.7	1.88	2.48	-0.06	121	0.38		54.9	39.0	1.22	37.6	0.67	0.9	121	SILTY SAND
32.2	-37.4	1.90	0.49	0.28	25	0.52	0.16					0.70	0.9	21	SILTY CLAY
32.8	-38.1	2.60	0.68	0.43	47	0.69						1.16	1.5	53	CLAYEY SILT
33.5	-38.7	3.61	0.32	0.68	31	0.91	0.37					1.98	2.5	45	CLAY
34.1	-39.4	3.35	0.44	0.69	41	0.86	0.33					1.80	2.2	56	SILTY CLAY
34.8	-40.0	3.51	0.25	0.73	25	0.89	0.37					1.96	2.4	35	CLAY
35.4	-40.7	3.65	0.29	0.78	30	0.92	0.39					2.12	2.6	45	CLAY
36.1	-41.3	2.60	0.28	0.69	21	0.70	0.26					1.27	1.5	24	CLAY
36.7	-42.0	2.24	0.92	0.38	61	0.61						1.02	1.2	61	SILT
37.4	-42.7	2.85	0.84	0.49	72	0.75						1.51	1.7	89	CLAYEY SILT
38.1	-43.3	3.30	0.49	0.60	49	0.85	0.37					1.93	2.2	68	SILTY CLAY
38.7	-44.0	3.97	0.37	0.71	46	0.98	0.47					2.62	2.9	71	SILTY CLAY
39.4	-44.6	4.30	0.33	0.74	45	1.04	0.52					3.01	3.3	73	CLAY
40.0	-45.3	4.98	0.32	0.72	52	1.16	0.64					3.84	4.2	92	CLAY
40.7	-45.9	0.49	26.61	-0.40	427									363	SAND
41.3	-46.6	6.57	4.42	-0.03	966	0.66		264.2	45.5	1.64	44.8	3.27	3.4	2063	SAND



Ground Surface Elev.: -5.8 feet
Water Depth: -5.8 feet
Thrust
Q_D
BLADE STRESS, Q_D (tsf)
1 10 100 1000
DEPTH, Z (feet)
10 100 1000 10000
THRUST (lbs)
P_0
P_1
P_2
DMT READINGS, P_0 P_1 P_2 (tsf)
CLAY
SAND
0.6 1.2
0.1 1.0 10.0
MATERIAL INDEX, I_D
-1 0 1 2
PORE PRESSURE INDEX, U_D
DEPTH, Z (feet)
DILATOMETER TEST RESULTS
PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N234,650.7 E1,529,551.0
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 6/19/20
SOUNDING
DMT-202

Ground Surface Elev.: -5.8 feet
Water Depth: -5.8 feet

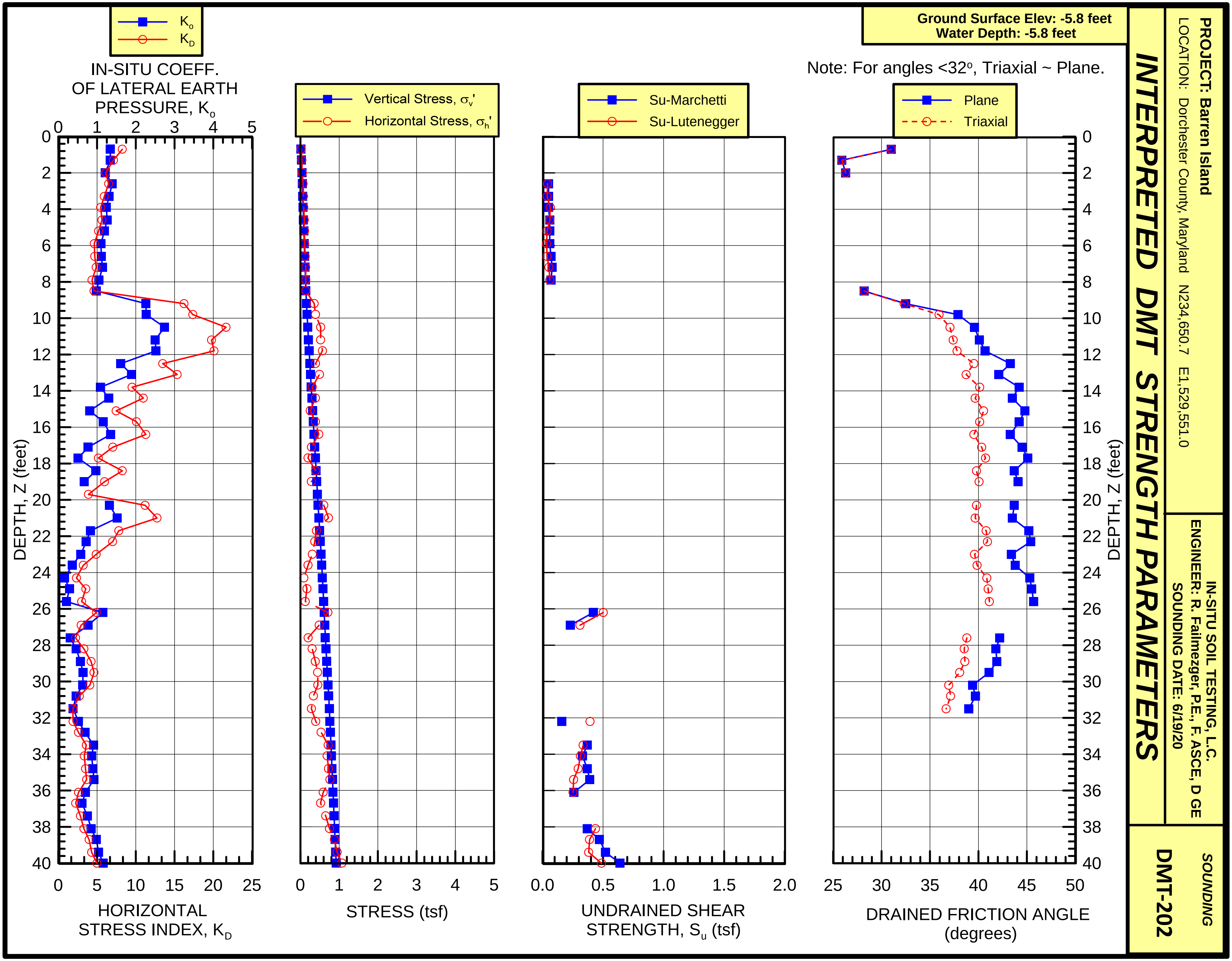


PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N234,650.7 E1,529,551.0

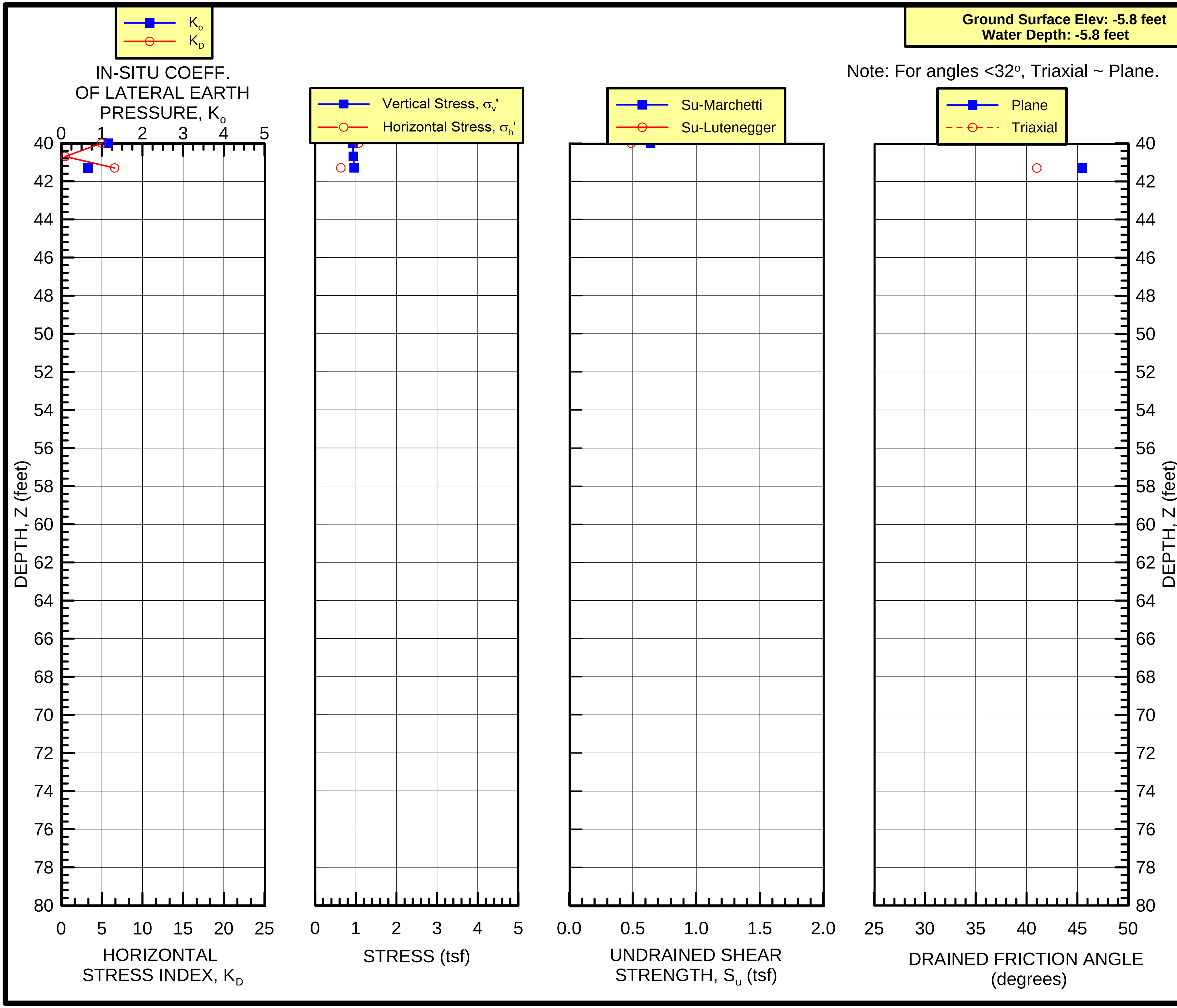
DILATOMETER TEST RESULTS

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 6/19/20

SOUNDING
DMT-202



PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N234,650.7 E1,529,551.0
INTERPRETED DMT STRENGTH PARAMETERS
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/19/20
SOUNDING
DMT-202
Ground Surface Elev: -5.8 feet
Water Depth: -5.8 feet
Note: For angles <32°, Triaxial ~ Plane.
K_o
K_D
IN-SITU COEFF. OF LATERAL EARTH PRESSURE, K_o
HORIZONTAL STRESS INDEX, K_D
DEPTH, Z (feet)
Vertical Stress, σ_v'
Horizontal Stress, σ_h'
STRESS (tsf)
Su-Marchetti
Su-Lutenegger
UNDRAINED SHEAR STRENGTH, S_u (tsf)
Plane
Triaxial
DRAINED FRICTION ANGLE (degrees)



INTERPRETED DMT STRENGTH PARAMETERS

PROJECT: Barren Island

LOCATION: Dorchester County, Maryland N234,650.7 E1,529,551.0

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/19/20

SOUNDING

DMT-202

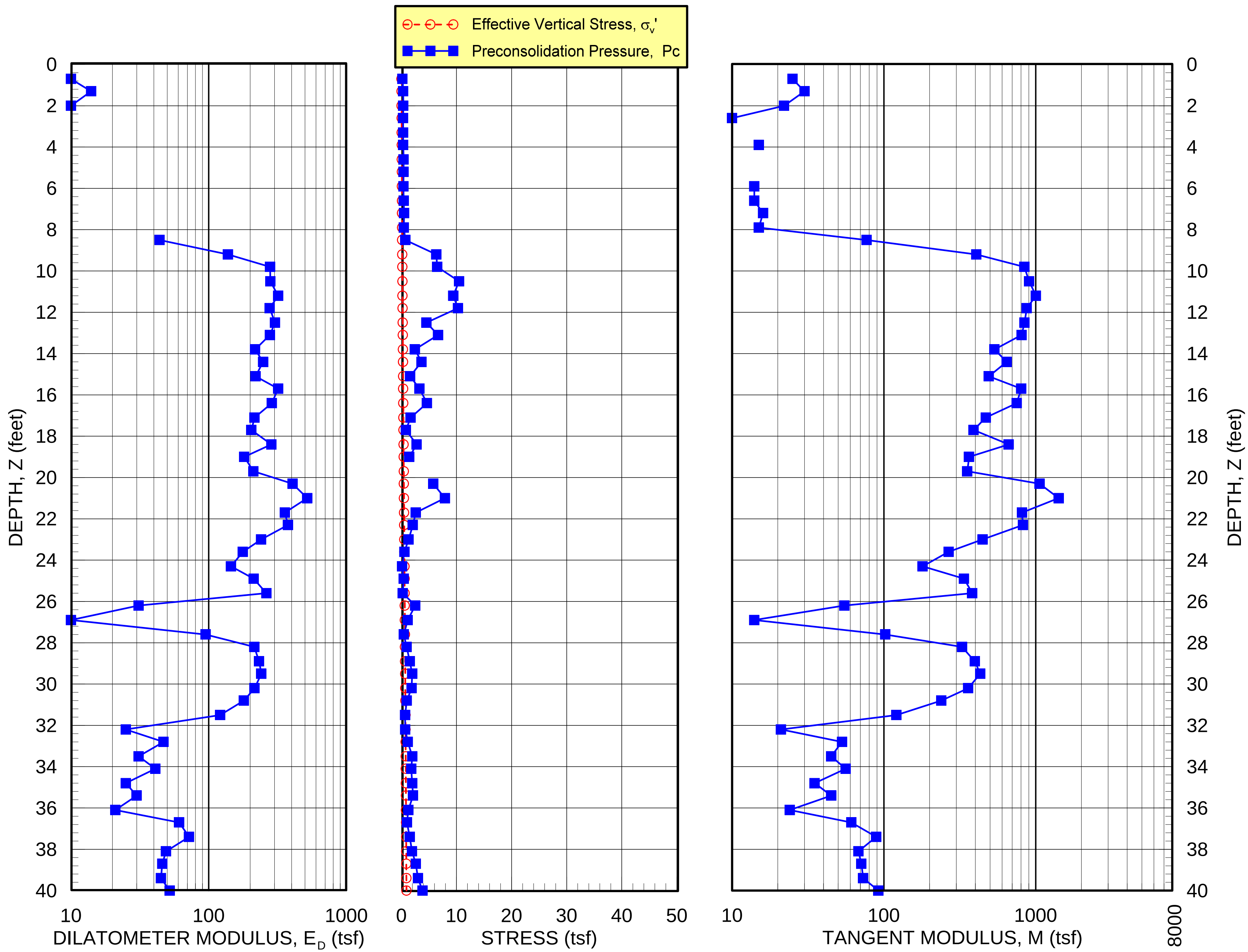
Ground Surface Elev.: -5.8 feet
Water Depth: -5.8 feet

INTERPRETED DMT DEFORMATION PARAMETERS

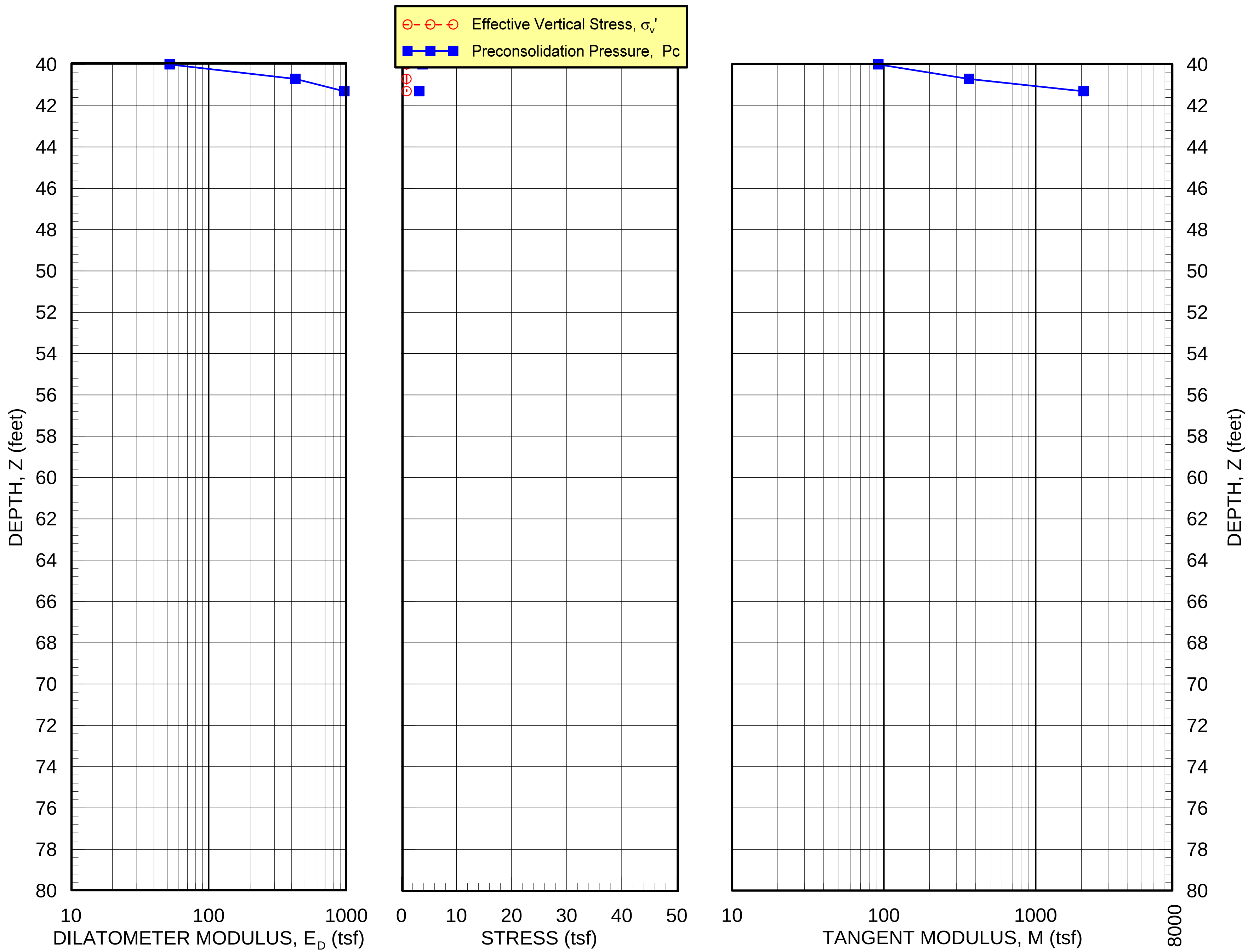
PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N234,650.7 E1,529,551.0

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/19/20

SOUNDING
DMT-202



Ground Surface Elev.: -5.8 feet
Water Depth: -5.8 feet

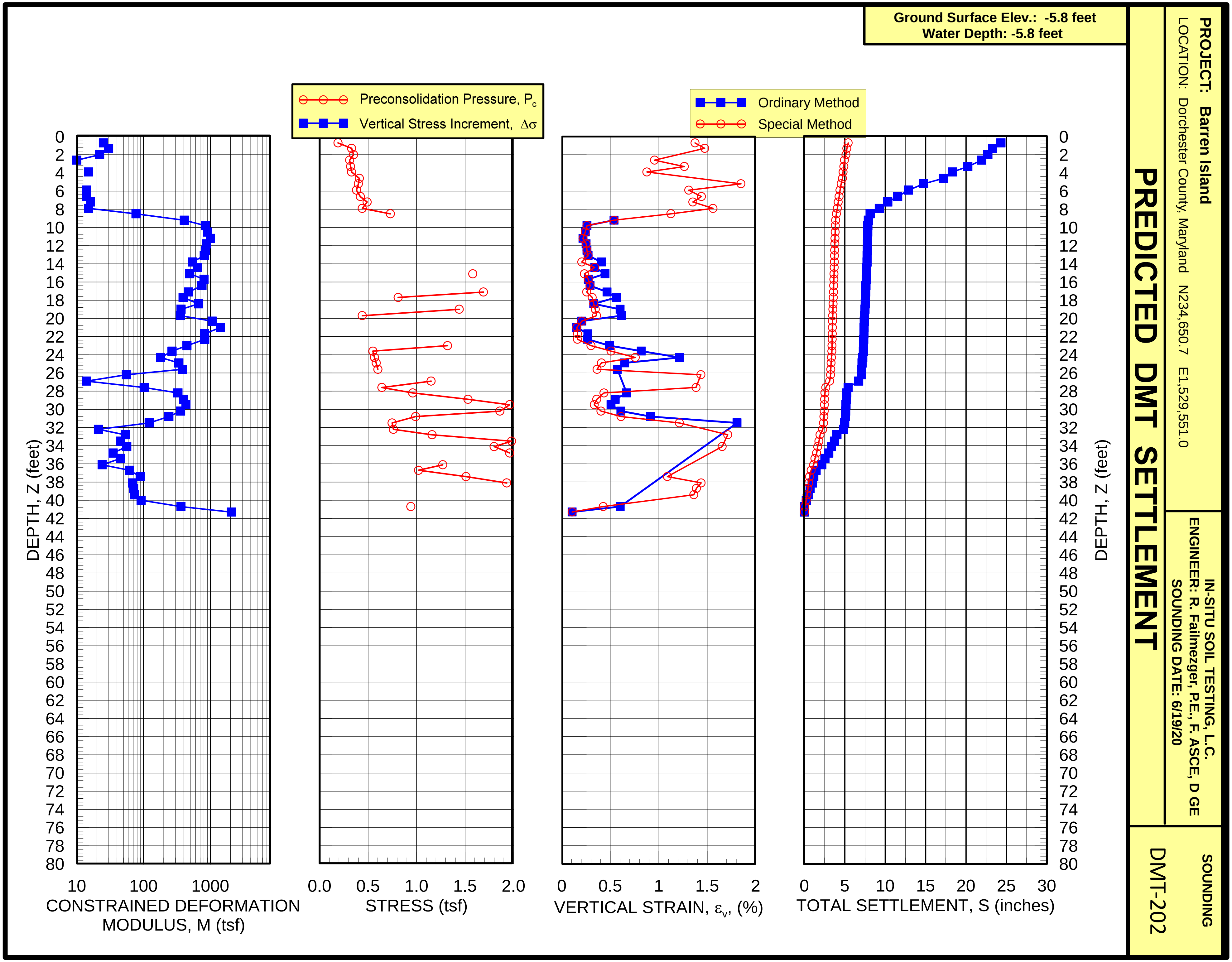


INTERPRETED DMT DEFORMATION PARAMETERS

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N234,650.7 E1,529,551.0

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/19/20

SOUNDING
DMT-202


Ground Surface Elev.: -5.8 feet
Water Depth: -5.8 feet
PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N234,650.7 E1,529,551.0
PREDICTED DMT SETTLEMENT
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/19/20
SOUNDING
DMT-202
Preconsolidation Pressure, P_c
Vertical Stress Increment, $\Delta\sigma$
Ordinary Method
Special Method
DEPTH, Z (feet)
CONSTRAINED DEFORMATION MODULUS, M (tsf)
STRESS (tsf)
VERTICAL STRAIN, ε_v, (%)
TOTAL SETTLEMENT, S (inches)

DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL)   SNDG. NO. :DMT-203
In-Situ Soil Testing, L.C.   Page 1a
JOB FILE: Barren Island   FILE NO. : 2020-45
LOCATION: Dorchester County, Maryland--N235,740.7 E1,527,949.3
SNDG.BY : R. Failmezger   SNDG. DATE: 6/20/20
ANAL.BY : Roger Failmezger, P.E., F. ASCE, D. GE   ANAL. DATE: 6/20/20

ANALYSIS PARAMETERS: LO RANGE = 9.92 TSF ROD DIAM. = 2.36 IN BL.THICK. = 0.59 IN SU FACTOR = 1
SURF.ELEV. = -6.6 FT LO GAGE 0 = 0.00 TSF FR.RED.DIA. = 2.64 IN BL.WIDTH = 3.78 IN PHI FACTOR = 1
WATER DEPTH = -6.9 FT HI GAGE 0 = 0.00 TSF LIN.ROD WT. = 8.0 LBF/FTDELTA-A = 0.29 TSF OCR FACTOR = 1
SP.GR.WATER = 1.030 CAL GAGE 0 = 0.00 TSF DELTA/PHI = 0.5 DELTA-B = 0.68 TSF M FACTOR = 1
MAX SU ID = 0.6 SU OPTION = 0 MIN PHI ID = 1.2 OCR OPTION = 0 K0 FACTOR = 1
UNIT CONVERSIONS: 1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI 1 M = 3.2808 FT

Z (FT)	ELEV (FT)	THRUST (LBF)	A (TSF)	B (TSF)	C (TSF)	DA (TSF)	DB (TSF)	ZMRNG (TSF)	ZMLO (TSF)	ZMHI (TSF)	ZMCAL (TSF)	P0 (TSF)	P1 (TSF)	P2 (TSF)	U0 (TSF)	GAMMA (PCF)	SVP (TSF)
*****	******	******	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	******	******	******
0.7	-7.2	551	0.61	4.44	-0.03	0.29	0.68	9.92	0.00	0.00	0.00	0.75	3.76	0.26	0.242	107.3	0.016
1.3	-7.9	1830	1.70	6.53	-0.05	0.29	0.68	9.92	0.00	0.00	0.00	1.81	5.85	0.24	0.264	113.6	0.030
2.0	-8.5	5402	2.09	9.10	0.02	0.29	0.68	9.92	0.00	0.00	0.00	2.08	8.43	0.31	0.285	113.6	0.047
2.6	-9.2	4653	4.73	14.90	0.09	0.29	0.68	9.92	0.00	0.00	0.00	4.56	14.22	0.39	0.306	119.2	0.064
3.3	-9.8	7210	4.09	14.28	0.08	0.29	0.68	9.92	0.00	0.00	0.00	3.93	13.60	0.38	0.327	119.2	0.082
3.9	-10.5	10011	6.77	23.86	0.10	0.29	0.68	9.92	0.00	0.00	0.00	6.25	23.18	0.40	0.349	125.4	0.101
4.6	-11.2	6328	4.90	16.98	0.11	0.29	0.68	9.92	0.00	0.00	0.00	4.64	16.30	0.41	0.370	125.4	0.121
5.2	-11.8	9217	4.37	7.61	1.34	0.29	0.68	9.92	0.00	0.00	0.00	4.55	6.93	1.63	0.390	113.6	0.140
5.9	-12.5	4697	2.98	6.68	0.30	0.29	0.68	9.92	0.00	0.00	0.00	3.13	6.00	0.60	0.411	107.3	0.155
6.6	-13.1	4675	2.08	5.86	0.24	0.29	0.68	9.92	0.00	0.00	0.00	2.23	5.18	0.53	0.432	107.3	0.169
7.2	-13.8	4917	1.65	3.92	0.51	0.29	0.68	9.92	0.00	0.00	0.00	1.88	3.24	0.80	0.454	101.1	0.182
7.9	-14.4	8467	1.62	5.69	0.15	0.29	0.68	9.92	0.00	0.00	0.00	1.75	5.01	0.44	0.475	113.6	0.196
8.5	-15.1	7321	1.23	3.82	0.15	0.29	0.68	9.92	0.00	0.00	0.00	1.44	3.14	0.44	0.496	101.1	0.210
9.2	-15.7	4167	1.52	4.78	0.18	0.29	0.68	9.92	0.00	0.00	0.00	1.70	4.10	0.47	0.517	107.3	0.223
9.8	-16.4	3131	1.29	3.29	0.41	0.29	0.68	9.92	0.00	0.00	0.00	1.53	2.61	0.70	0.539	101.1	0.236
10.5	-17.1	2271	1.56	4.13	0.50	0.29	0.68	9.92	0.00	0.00	0.00	1.76	3.46	0.79	0.560	101.1	0.248
11.2	-17.7	3947	1.86	3.47	1.02	0.29	0.68	9.92	0.00	0.00	0.00	2.12	2.79	1.32	0.580	101.1	0.260
11.8	-18.4	2668	1.25	3.14	0.51	0.29	0.68	9.92	0.00	0.00	0.00	1.50	2.46	0.80	0.601	101.1	0.272
12.5	-19.0	3462	1.53	2.82	1.04	0.29	0.68	9.92	0.00	0.00	0.00	1.82	2.14	1.34	0.622	94.8	0.283
13.1	-19.7	1918	1.58	2.89	1.21	0.29	0.68	9.92	0.00	0.00	0.00	1.85	2.21	1.50	0.644	101.1	0.294
13.8	-20.3	1786	1.60	3.12	0.94	0.29	0.68	9.92	0.00	0.00	0.00	1.86	2.44	1.23	0.665	101.1	0.307
14.4	-21.0	1852	1.43	2.96	0.77	0.29	0.68	9.92	0.00	0.00	0.00	1.69	2.29	1.06	0.686	101.1	0.318
15.1	-21.7	2624	1.25	3.52	0.61	0.29	0.68	9.92	0.00	0.00	0.00	1.48	2.84	0.90	0.707	101.1	0.331
15.7	-22.3	2337	1.55	4.48	0.65	0.29	0.68	9.92	0.00	0.00	0.00	1.74	3.80	0.94	0.728	107.3	0.343
16.4	-23.0	2293	1.85	4.31	0.69	0.29	0.68	9.92	0.00	0.00	0.00	2.07	3.63	0.98	0.750	101.1	0.357
17.1	-23.6	2227	1.94	4.97	0.73	0.29	0.68	9.92	0.00	0.00	0.00	2.13	4.29	1.02	0.770	107.3	0.370
17.7	-24.3	11731	2.35	4.12	0.95	0.29	0.68	9.92	0.00	0.00	0.00	2.60	3.45	1.24	0.791	101.1	0.383
18.4	-24.9	8026	2.26	3.63	1.37	0.29	0.68	9.92	0.00	0.00	0.00	2.53	2.95	1.66	0.812	101.1	0.395
19.0	-25.6	13076	2.29	4.22	1.09	0.29	0.68	9.92	0.00	0.00	0.00	2.53	3.54	1.38	0.834	101.1	0.407
19.7	-26.2	5821	2.11	5.06	0.58	0.29	0.68	9.92	0.00	0.00	0.00	2.31	4.38	0.88	0.855	107.3	0.421
20.3	-26.9	6108	4.18	14.60	0.57	0.29	0.68	9.92	0.00	0.00	0.00	4.00	13.92	0.87	0.876	119.2	0.436
21.0	-27.6	6725	3.93	14.04	0.61	0.29	0.68	9.92	0.00	0.00	0.00	3.76	13.36	0.90	0.897	119.2	0.454
21.7	-28.2	6725	4.68	16.64	0.62	0.29	0.68	9.92	0.00	0.00	0.00	4.42	15.96	0.91	0.918	119.2	0.473
22.3	-28.9	5777	3.51	10.78	0.61	0.29	0.68	9.92	0.00	0.00	0.00	3.49	10.11	0.90	0.940	119.2	0.491
23.0	-29.5	4917	3.12	7.63	0.85	0.29	0.68	9.92	0.00	0.00	0.00	3.24	6.95	1.14	0.960	107.3	0.506
23.6	-30.2	15656	4.10	23.28	0.67	0.29	0.68	9.92	0.00	0.00	0.00	3.49	22.60	0.96	0.981	119.2	0.523
24.3	-30.8	27563	21.74	58.63	2.83	0.29	0.68	9.92	0.00	0.00	0.00	20.23	57.95	3.12	1.002	134.8	0.544

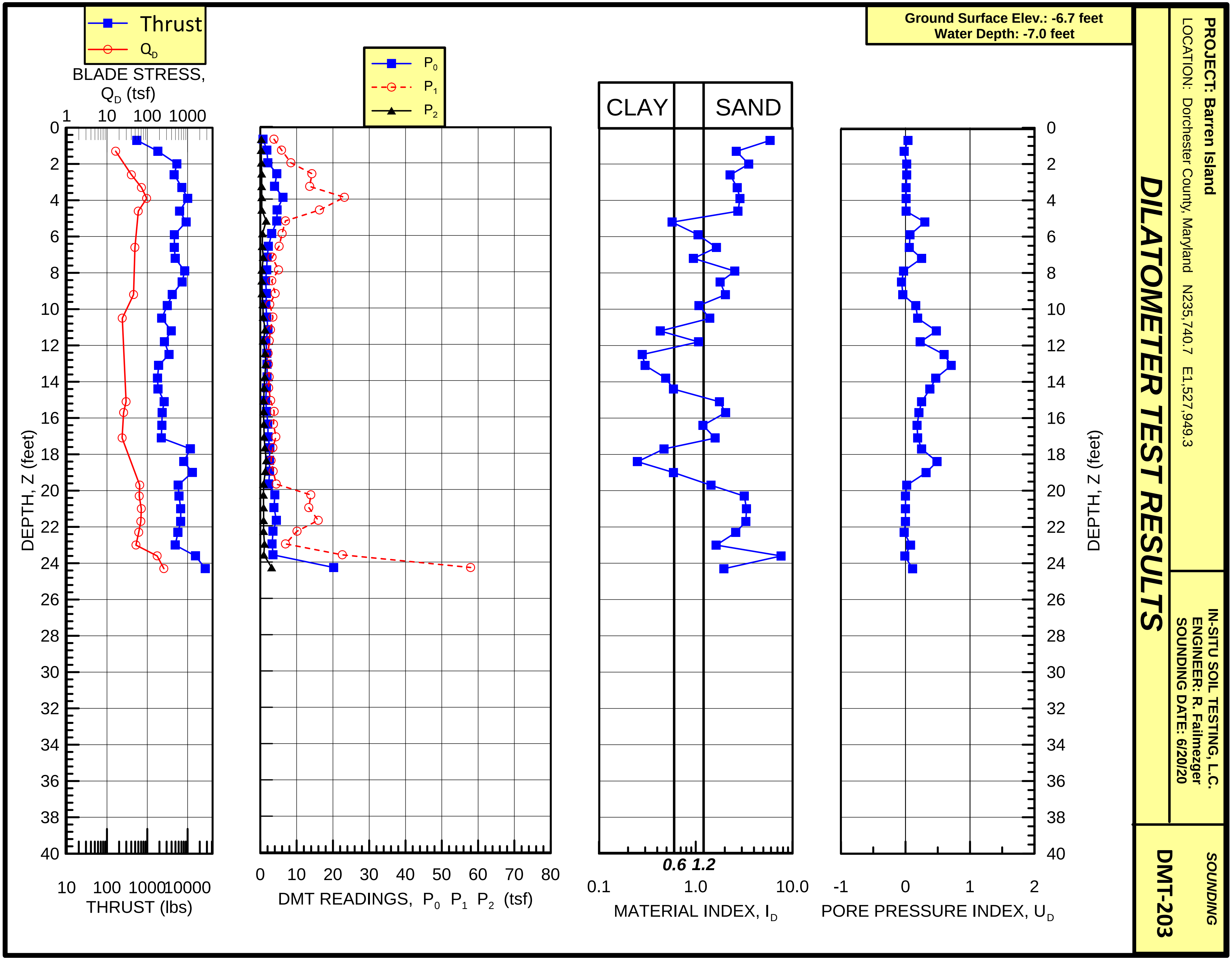
DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL)
In-Situ Soil Testing, L.C.
JOB FILE: Barren Island
LOCATION: Dorchester County, Maryland--N235,740.7 E1,527,949.3
SNDG.BY : R. Failmezger
ANAL.BY : Roger Failmezger, P.E., F. ASCE, D. GE

SNDG. NO. : DMT-203

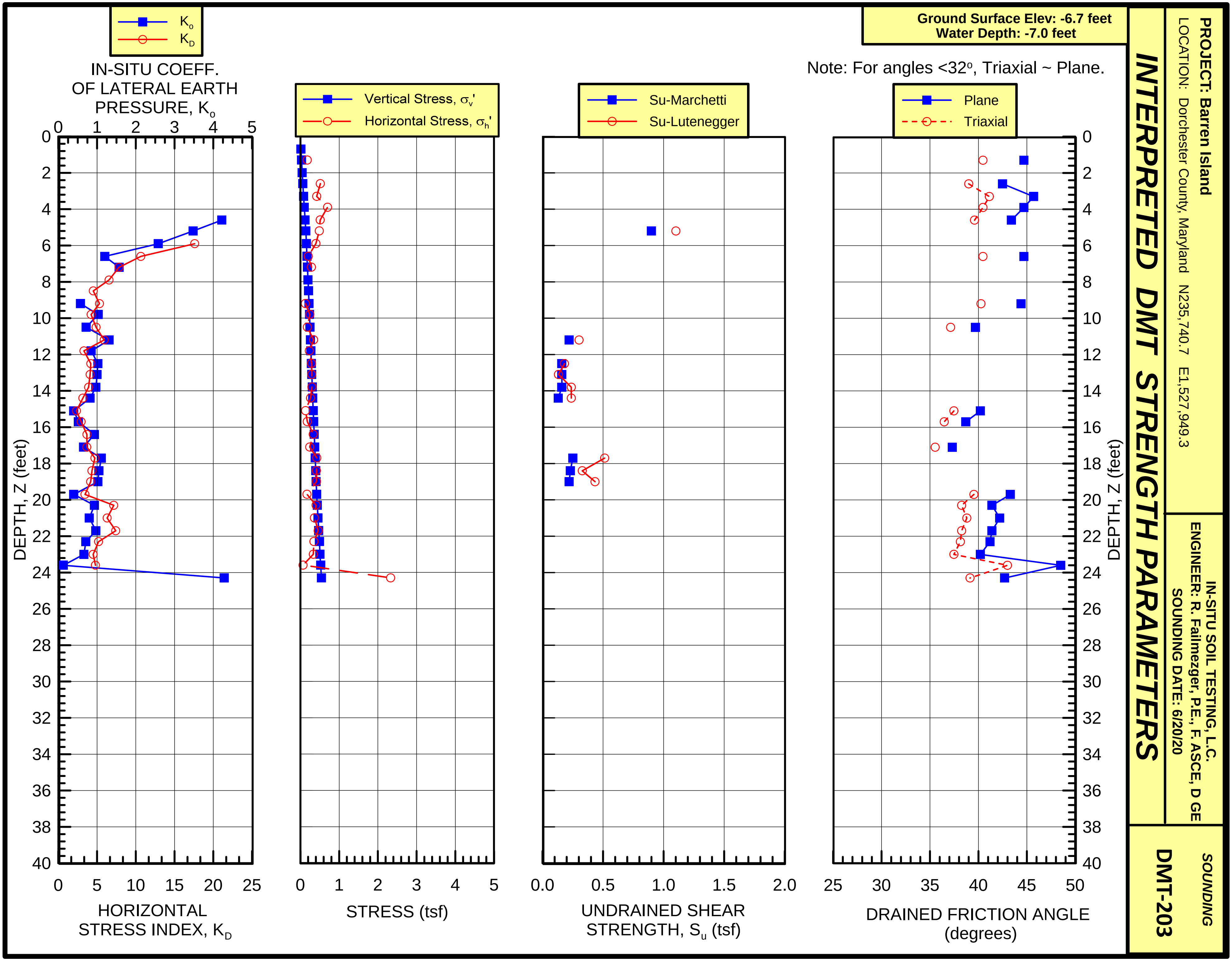
FILE NO. :2020-45
SNDG. DATE: 6/20/20
ANAL. DATE: 6/20/20

ANALYSIS PARAMETERS: LO RANGE = 9.92 TSF ROD DIAM. = 2.36 IN BL.THICK. = 0.59 IN SU FACTOR = 1
SURF.ELEV. = -6.6 FT LO GAGE 0 = 0.00 TSF FR.RED.DIA. = 2.64 IN BL.WIDTH = 3.78 IN PHI FACTOR = 1
WATER DEPTH = -6.9 FT HI GAGE 0 = 0.00 TSF LIN.ROD WT. = 8.0 LBF/FTDELTA-A = 0.29 TSF OCR FACTOR = 1
SP.GR.WATER = 1.030 CAL GAGE 0 = 0.00 TSF;
DELTA / PHI = 0.5 DELTA - B = 0.68 TSF M FACTOR = 1
MAX SU ID = 0.6 SU OPTION = 0 MIN PHI ID = 1.2 OCR OPTION = 0 K0 FACTOR = 1
UNIT CONVERSIONS: 1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI 1 M = 3.2808 FT

Z (FT)	ELEV (FT)	KD	ID	UD	ED (TSF)	K0	SU (TSF)	QD (TSF)	PHI (DEG)	SIGFF (TSF)	PHIO (DEG)	PC (TSF)	OCR	M (TSF)	SOIL TYPE
*****	******	*****	*****	*****	******	*****	*****	*****	*****	******	*****	*****	*****	******	************
0.7	-7.2	32.70	5.87	0.04	104									378	SAND
1.3	-7.9	49.99	2.63	-0.02	140	5.93		16.4	44.7	0.05	38.9	7.13	231.7	565	SILTY SAND
2.0	-8.5	38.27	3.54	0.02	220									830	SAND
2.6	-9.2	66.53	2.27	0.02	335	8.04		40.4	42.5	0.10	37.4	28.86	451.0	1439	SILTY SAND
3.3	-9.8	43.82	2.69	0.01	336	5.13		71.7	45.7	0.14	41.6	14.07	171.4	1309	SILTY SAND
3.9	-10.5	58.33	2.87	0.01	588	6.94		96.4	44.7	0.18	40.8	31.71	313.3	2449	SILTY SAND
4.6	-11.2	35.14	2.74	0.01	405	4.22		59.8	43.4	0.21	39.5	14.93	123.0	1493	SILTY SAND
5.2	-11.8	29.85	0.57	0.30	82	3.48	0.90					9.46	67.8	292	SILTY CLAY
5.9	-12.5	17.60	1.06	0.07	99	2.58						4.59	29.7	303	SILT
6.6	-13.1	10.65	1.64	0.06	102	1.20		49.2	44.7	0.29	41.5	1.81	10.7	262	SANDY SILT
7.2	-13.8	7.83	0.95	0.25	47	1.57						1.52	8.4	106	SILT
7.9	-14.4	6.54	2.54	-0.03	113									239	SILTY SAND
8.5	-15.1	4.51	1.79	-0.06	58									103	SANDY SILT
9.2	-15.7	5.31	2.03	-0.04	84	0.57		45.6	44.4	0.38	41.6	0.57	2.6	159	SILTY SAND
9.8	-16.4	4.23	1.08	0.16	38	1.03						0.76	3.2	62	SILT
10.5	-17.1	4.87	1.40	0.19	58	0.72		23.9	39.7	0.41	36.5	0.86	3.4	105	SANDY SILT
11.2	-17.7	5.91	0.43	0.48	23	1.31	0.22					1.41	5.4	46	SILTY CLAY
11.8	-18.4	3.30	1.07	0.23	33	0.85						0.60	2.2	47	SILT
12.5	-19.0	4.19	0.28	0.60	11	1.02	0.16					0.90	3.2	19	MUD
13.1	-19.7	4.10	0.30	0.71	13	1.00	0.16					0.90	3.1	20	CLAY
13.8	-20.3	3.91	0.49	0.47	20	0.97	0.16					0.87	2.8	31	SILTY CLAY
14.4	-21.0	3.17	0.59	0.38	21	0.82	0.13					0.65	2.0	27	SILTY CLAY
15.1	-21.7	2.34	1.76	0.25	47	0.40		29.8	40.2	0.54	37.6	0.34	1.0	53	SANDY SILT
15.7	-22.3	2.94	2.04	0.21	71	0.52		25.8	38.7	0.56	36.0	0.57	1.7	97	SILTY SAND
16.4	-23.0	3.69	1.19	0.18	54	0.93						0.93	2.6	82	SILT
17.1	-23.6	3.68	1.59	0.19	75	0.65		23.7	37.3	0.60	34.7	0.94	2.5	115	SANDY SILT
17.7	-24.3	4.72	0.47	0.25	29	1.11	0.25					1.46	3.8	51	SILTY CLAY
18.4	-24.9	4.34	0.25	0.49	15	1.05	0.23					1.33	3.3	24	CLAY
19.0	-25.6	4.17	0.59	0.32	35	1.02	0.22					1.28	3.1	56	SILTY CLAY
19.7	-26.2	3.44	1.44	0.02	72	0.40		65.0	43.3	0.71	41.4	0.52	1.2	105	SANDY SILT
20.3	-26.9	7.15	3.18	0.00	345	0.93		63.0	41.4	0.72	39.3	2.67	6.1	760	SILTY SAND
21.0	-27.6	6.30	3.35	0.00	333	0.80		71.0	42.2	0.76	40.2	2.09	4.6	699	SAND
21.7	-28.2	7.41	3.30	0.00	401	0.97		69.0	41.4	0.78	39.4	3.10	6.6	897	SILTY SAND
22.3	-28.9	5.19	2.60	-0.02	230	0.71		61.3	41.2	0.81	39.3	1.70	3.5	440	SILTY SAND
23.0	-29.5	4.49	1.63	0.08	129	0.66		52.3	40.2	0.84	38.3	1.47	2.9	223	SANDY SILT
23.6	-30.2	4.79	7.64	-0.01	663	0.13		175.7	48.5	0.92	47.2	0.10	0.2	1234	SAND
24.3	-30.8	35.38	1.96	0.11	1309	4.28		258.1	42.7	0.91	41.1	69.63	128.1	4838	SILTY SAND



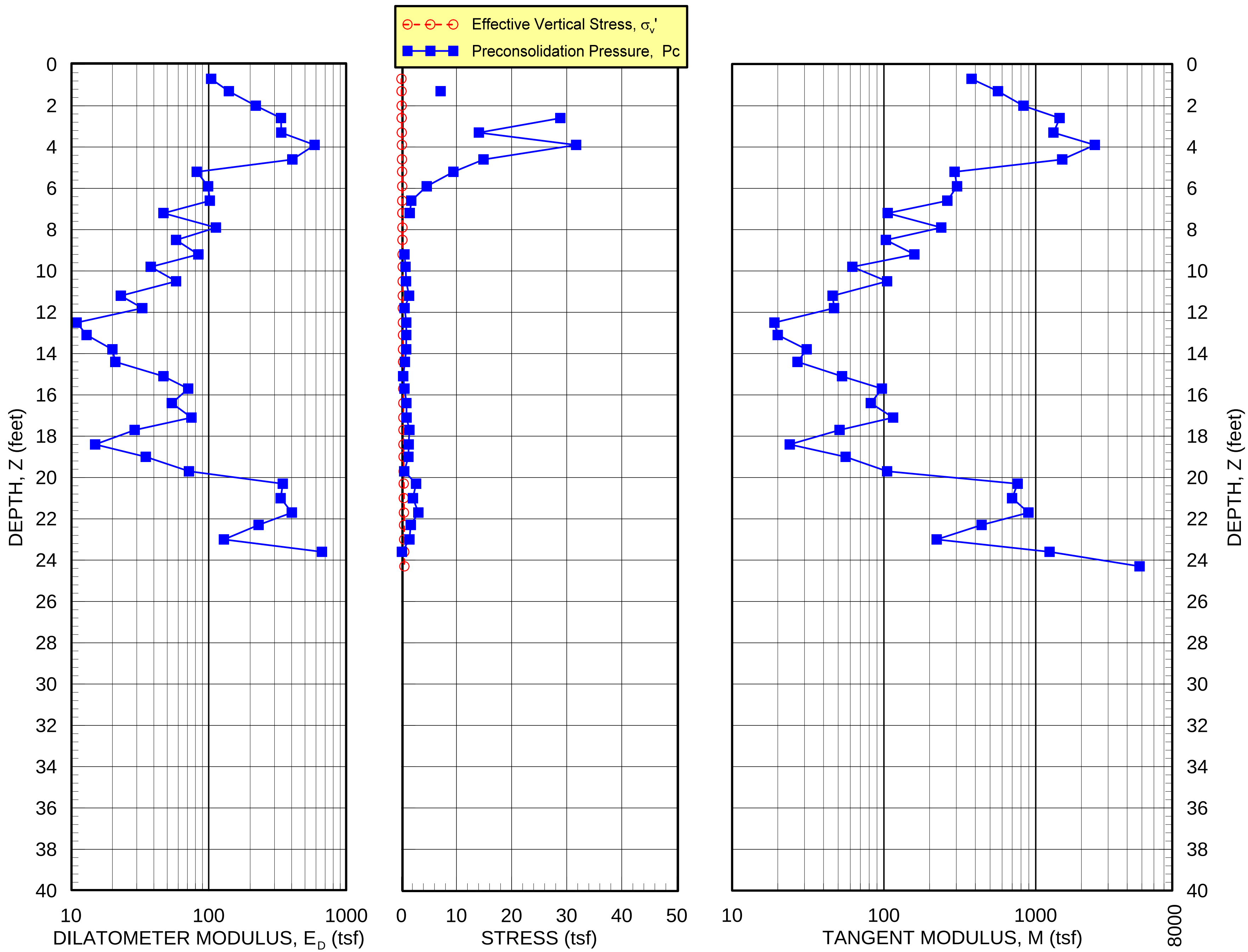
Thrust
Q_D
BLADE STRESS, Q_D (tsf)
1 10 100 1000
THRUST (lbs)
10 100 1000 10000
DEPTH, Z (feet)
P_0
P_1
P_2
DMT READINGS, P_0 P_1 P_2 (tsf)
0 10 20 30 40 50 60 70 80
CLAY
SAND
0.6 1.2
0.1 1.0 10.0
MATERIAL INDEX, I_D
-1 0 1 2
PORE PRESSURE INDEX, U_D
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40
Ground Surface Elev.: -6.7 feet
Water Depth: -7.0 feet
DILATOMETER TEST RESULTS
PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N235,740.7 E1,527,949.3
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 6/20/20
SOUNDING
DMT-203


PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N235,740.7 E1,527,949.3
INTERPRETED DMT STRENGTH PARAMETERS
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/20/20
SOUNDING
DMT-203
Ground Surface Elev: -6.7 feet
Water Depth: -7.0 feet
Note: For angles <32°, Triaxial ~ Plane.
K_o
K_D
IN-SITU COEFF. OF LATERAL EARTH PRESSURE, K_o
HORIZONTAL STRESS INDEX, K_D
DEPTH, Z (feet)
Vertical Stress, σ_v'
Horizontal Stress, σ_h'
STRESS (tsf)
Su-Marchetti
Su-Lutenegger
UNDRAINED SHEAR STRENGTH, S_u (tsf)
Plane
Triaxial
DRAINED FRICTION ANGLE (degrees)
DEPTH, Z (feet)

INTERPRETED DMT DEFORMATION PARAMETERS

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N235,740.7 E1,527,949.3

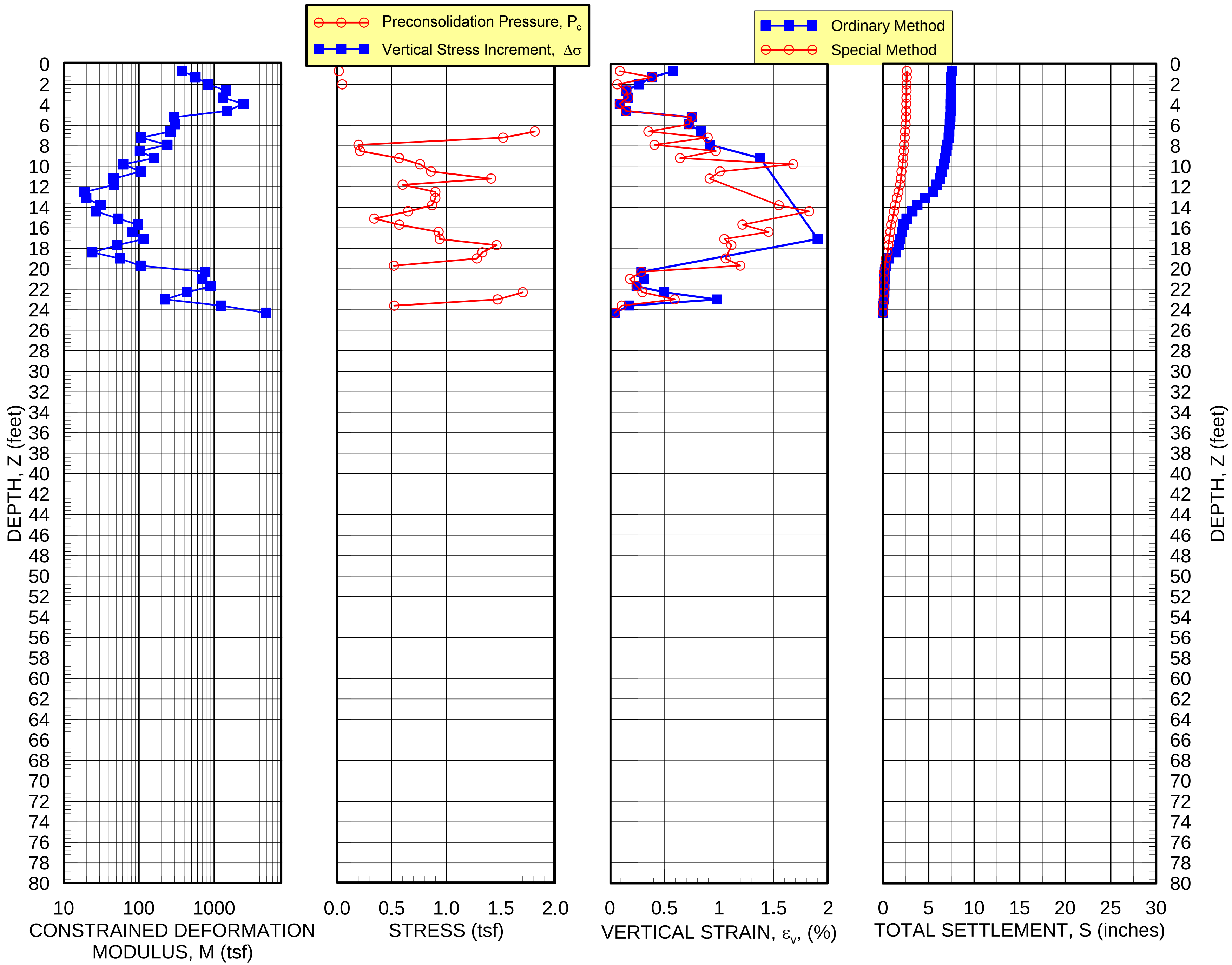
Ground Surface Elev.: -6.7 feet
Water Depth: -7.0 feet



IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/20/20

SOUNDING
DMT-203

Ground Surface Elev.: -6.7 feet
Water Depth: -7.0 feet



PREDICTED DMT SETTLEMENT

PROJECT: Barren Island

LOCATION: Dorchester County, Maryland N235,740.7 E1,527,949.3

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/20/20

SOUNDING
DMT-203

DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL) SNDG. NO. :DMT-204
In-Situ Soil Testing, L.C. Page 1a
JOB FILE: Barren Island FILE NO. : 2020-45
LOCATION: Dorchester County, Maryland--N237,591.9 E1,527,175.0
SNDG.BY : R. Failmezger SNDG. DATE: 6/20/20
ANAL.BY : Roger Failmezger, P.E., F. ASCE, D. GE ANAL. DATE: 6/20/20

ANALYSIS PARAMETERS: LO RANGE = 9.92 TSF ROD DIAM. = 2.36 IN BL.THICK. = 0.59 IN SU FACTOR = 1
SURF.ELEV. = -6.9 FT LO GAGE 0 = 0.00 TSF FR.RED.DIA. = 2.64 IN BL.WIDTH = 3.78 IN PHI FACTOR = 1
WATER DEPTH = -6.6 FT HI GAGE 0 = 0.00 TSF LIN.ROD WT. = 8.0 LBF/FTDELTA-A = 0.26 TSF OCR FACTOR = 1
SP.GR.WATER = 1.030 CAL GAGE 0 = 0.00 TSF DELTA/PHI = 0.5 DELTA-B = 0.73 TSF M FACTOR = 1
MAX SU ID = 0.6 SU OPTION = 0 MIN PHI ID = 1.2 OCR OPTION = 0 K0 FACTOR = 1
UNIT CONVERSIONS: 1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI 1 M = 3.2808 FT

Z (FT)	ELEV (FT)	THRUST (LBF)	A (TSF)	B (TSF)	C (TSF)	DA (TSF)	DB (TSF)	ZMRNG (TSF)	ZMLO (TSF)	ZMHI (TSF)	ZMCAL (TSF)	P0 (TSF)	P1 (TSF)	P2 (TSF)	U0 (TSF)	GAMMA (PCF)	SVP (TSF)
*****	******	******	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	******	******	******
0.7	-7.5	838	0.38	2.60	-0.03	0.26	0.73	9.92	0.00	0.00	0.00	0.57	1.87	0.23	0.232	107.3	0.016
1.3	-8.2	2514	1.22	5.30	-0.01	0.26	0.73	9.92	0.00	0.00	0.00	1.33	4.57	0.25	0.254	113.6	0.030
2.0	-8.9	2271	2.11	7.12	0.04	0.26	0.73	9.92	0.00	0.00	0.00	2.17	6.39	0.30	0.275	113.6	0.047
2.6	-9.5	3859	2.68	10.73		0.26	0.73	9.92	0.00	0.00	0.00	2.59	10.00		0.295	119.2	0.064
3.3	-10.2	7144	5.43	20.16	0.14	0.26	0.73	9.92	0.00	0.00	0.00	5.00	19.43	0.40	0.316	125.4	0.084
3.9	-10.8	6880	7.65	23.15	0.11	0.26	0.73	9.92	0.00	0.00	0.00	7.19	22.41	0.38	0.337	125.4	0.103
4.6	-11.5	4101	4.51	8.63	0.75	0.26	0.73	9.92	0.00	0.00	0.00	4.61	7.90	1.01	0.359	113.6	0.121
5.2	-12.1	3682	5.92	11.84	0.31	0.26	0.73	9.92	0.00	0.00	0.00	5.93	11.11	0.57	0.380	113.6	0.138
5.9	-12.8	4388	4.30	8.83	0.18	0.26	0.73	9.92	0.00	0.00	0.00	4.38	8.10	0.44	0.401	113.6	0.153
6.6	-13.5	3859	3.50	7.42	0.21	0.26	0.73	9.92	0.00	0.00	0.00	3.61	6.69	0.47	0.422	113.6	0.169
7.2	-14.1	7210	2.04	5.55	0.18	0.26	0.73	9.92	0.00	0.00	0.00	2.17	4.82	0.44	0.444	107.3	0.185
7.9	-14.8	7629	1.71	4.31	0.09	0.26	0.73	9.92	0.00	0.00	0.00	1.89	3.58	0.35	0.465	101.1	0.197
8.5	-15.4	3638	1.92	4.56	0.44	0.26	0.73	9.92	0.00	0.00	0.00	2.10	3.83	0.70	0.485	107.3	0.211
9.2	-16.1	2470	2.29	4.09	1.47	0.26	0.73	9.92	0.00	0.00	0.00	2.51	3.36	1.73	0.506	101.1	0.224
9.8	-16.7	1852	2.34	4.11	1.53	0.26	0.73	9.92	0.00	0.00	0.00	2.56	3.38	1.80	0.527	101.1	0.236
10.5	-17.4	1896	1.92	3.71	0.92	0.26	0.73	9.92	0.00	0.00	0.00	2.14	2.98	1.18	0.549	101.1	0.248
11.2	-18.0	2029	1.55	3.77	0.75	0.26	0.73	9.92	0.00	0.00	0.00	1.74	3.04	1.01	0.570	101.1	0.260
11.8	-18.7	1852	1.27	3.19	0.51	0.26	0.73	9.92	0.00	0.00	0.00	1.49	2.46	0.77	0.591	101.1	0.272
12.5	-19.4	1808	1.59	2.98	0.98	0.26	0.73	9.92	0.00	0.00	0.00	1.83	2.24	1.24	0.612	101.1	0.284
13.1	-20.0	1632	1.96	3.40	1.47	0.26	0.73	9.92	0.00	0.00	0.00	2.20	2.67	1.73	0.633	101.1	0.296
13.8	-20.7	1566	1.96	3.50	1.25	0.26	0.73	9.92	0.00	0.00	0.00	2.19	2.77	1.51	0.655	101.1	0.309
14.4	-21.3	1698	1.73	4.34	0.84	0.26	0.73	9.92	0.00	0.00	0.00	1.91	3.61	1.10	0.675	101.1	0.321
15.1	-22.0	2051	2.10	4.62	0.91	0.26	0.73	9.92	0.00	0.00	0.00	2.29	3.89	1.17	0.696	101.1	0.333
15.7	-22.6	1521	2.28	4.21	1.05	0.26	0.73	9.92	0.00	0.00	0.00	2.50	3.48	1.32	0.717	101.1	0.345
16.4	-23.3	3771	2.31	4.36	0.95	0.26	0.73	9.92	0.00	0.00	0.00	2.52	3.63	1.21	0.739	101.1	0.357
17.1	-23.9	2293	2.11	5.66	0.87	0.26	0.73	9.92	0.00	0.00	0.00	2.24	4.93	1.13	0.760	113.6	0.371
17.7	-24.6	2602	2.45	5.21	0.81	0.26	0.73	9.92	0.00	0.00	0.00	2.63	4.48	1.08	0.781	107.3	0.386
18.4	-25.3	4234	1.99	5.43	0.56	0.26	0.73	9.92	0.00	0.00	0.00	2.13	4.70	0.82	0.802	113.6	0.401
19.0	-25.9	3925	2.57	5.26	1.13	0.26	0.73	9.92	0.00	0.00	0.00	2.75	4.53	1.39	0.823	107.3	0.417
19.7	-26.6	3131	2.83	5.56	0.99	0.26	0.73	9.92	0.00	0.00	0.00	3.01	4.83	1.25	0.845	107.3	0.430
20.3	-27.2	4123	2.57	5.63	0.54	0.26	0.73	9.92	0.00	0.00	0.00	2.72	4.90	0.80	0.865	107.3	0.445
21.0	-27.9	11246	6.25	26.92	0.58	0.26	0.73	9.92	0.00	0.00	0.00	5.53	26.19	0.85	0.886	125.4	0.461
21.7	-28.5	17221	14.99	47.31	0.95	0.26	0.73	9.92	0.00	0.00	0.00	13.69	46.58	1.21	0.907	134.8	0.483
22.3	-29.2	15281	18.60	49.08	1.06	0.26	0.73	9.92	0.00	0.00	0.00	17.39	48.35	1.33	0.928	134.8	0.506
23.0	-29.9	14928	16.68	47.41	1.11	0.26	0.73	9.92	0.00	0.00	0.00	15.46	46.68	1.37	0.950	134.8	0.529
23.6	-30.5	16758	13.51	35.64	0.88	0.26	0.73	9.92	0.00	0.00	0.00	12.72	34.91	1.14	0.971	134.8	0.552
24.3	-31.2	16052	9.96	26.10	0.78	0.26	0.73	9.92	0.00	0.00	0.00	9.46	25.37	1.04	0.992	125.4	0.574
24.9	-31.8	18081	8.43	23.22	0.77	0.26	0.73	9.92	0.00	0.00	0.00	8.00	22.49	1.03	1.013	125.4	0.594
25.6	-32.5	18963	5.05	13.75	0.77	0.26	0.73	9.92	0.00	0.00	0.00	4.93	13.02	1.03	1.035	119.2	0.614
26.2	-33.1	18963	3.06	9.82	0.77	0.26	0.73	9.92	0.00	0.00	0.00	3.03	9.09	1.03	1.055	113.6	0.631
26.9	-33.8	18434	2.40	8.25	0.79	0.26	0.73	9.92	0.00	0.00	0.00	2.42	7.52	1.05	1.076	113.6	0.646
27.6	-34.4	16714	2.10	7.27	0.77	0.26	0.73	9.92	0.00	0.00	0.00	2.15	6.54	1.03	1.097	113.6	0.663
28.2	-35.1	13406	5.66	8.47	3.92	0.26	0.73	9.92	0.00	0.00	0.00	5.83	7.74	4.18	1.118	113.6	0.679
28.9	-35.8	10805	5.72	8.30	4.40	0.26	0.73	9.92	0.00	0.00	0.00	5.90	7.57	4.66	1.140	113.6	0.695
29.5	-36.4	9283	5.56	8.01	4.40	0.26	0.73	9.92	0.00	0.00	0.00	5.75	7.28	4.66	1.161	107.3	0.710
30.2	-37.1	7519	5.46	7.88	4.14	0.26	0.73	9.92	0.00	0.00	0.00	5.65	7.15	4.41	1.182	107.3	0.725
30.8	-37.7	7122	5.47	7.69	4.30	0.26	0.73	9.92	0.00	0.00	0.00	5.67	6.96	4.56	1.203	107.3	0.738
31.5	-38.4	6571	5.44	8.00	4.11	0.26	0.73	9.92	0.00	0.00	0.00	5.63	7.27	4.37	1.225	107.3	0.753
32.2	-39.0	6086	5.05	7.57	3.52	0.26	0.73	9.92	0.00	0.00	0.00	5.24	6.84	3.78	1.245	107.3	0.766
32.8	-39.7	6615	5.32	7.67	4.16	0.26	0.73	9.92	0.00	0.00	0.00	5.52	6.94	4.42	1.266	107.3	0.781
33.5	-40.4	5865	5.29	7.57	3.90	0.26	0.73	9.92	0.00	0.00	0.00	5.49	6.84	4.17	1.287	107.3	0.794
34.1	-41.0	5909	4.70	6.73	3.51	0.26	0.73	9.92	0.00	0.00	0.00	4.91	6.00	3.77	1.308	107.3	0.809
34.8	-41.7	5976	4.42	6.37	3.45	0.26	0.73	9.92	0.00	0.00	0.00	4.62	5.64	3.71	1.330	107.3	0.823
35.4	-42.3	6284	4.66	6.80	3.57	0.26	0.73	9.92	0.00	0.00	0.00	4.87	6.07	3.83	1.351	107.3	0.837
36.1	-43.0	6218	4.74	6.88	3.70	0.26	0.73	9.92	0.00	0.00	0.00	4.95	6.15	3.96	1.372	107.3	0.851
36.7	-43.6	6372	4.61	6.72	3.54	0.26	0.73	9.92	0.00	0.00	0.00	4.82	5.99	3.80	1.393	107.3	0.865
37.4	-44.3	6527	4.62	6.39	3.67	0.26	0.73	9.92	0.00	0.00	0.00	4.84	5.66	3.94	1.414	107.3	0.879
38.1	-44.9	7695	4.70	6.64	3.60	0.26	0.73	9.92	0.00	0.00	0.00	4.91	5.91	3.86	1.436	107.3	0.894
38.7	-45.6	6880	4.83	6.83	3.88	0.26	0.73	9.92	0.00	0.00	0.00	5.04	6.10	4.14	1.456	107.3	0.907
39.4	-46.3	7012	4.79	6.82	3.75	0.26	0.73	9.92	0.00	0.00	0.00	5.00	6.09	4.01	1.477	107.3	0.922
40.0	-46.9	7541	5.12	7.20	4.11	0.26	0.73	9.92	0.00	0.00	0.00	5.32	6.47	4.37	1.498	107.3	0.935
40.7	-47.6	7343	5.45	7.66	4.31	0.26	0.73	9.92	0.00	0.00	0.00	5.65	6.93	4.57	1.520	107.3	0.950
41.3	-48.2	7519	5.64	8.48	4.14	0.26	0.73	9.92	0.00	0.00	0.00	5.80	7.75	4.41	1.541	113.6	0.965
42.0	-48.9	7607	6.10	8.34	4.72	0.26	0.73	9.92	0.00	0.00	0.00	6.30	7.61	4.98	1.562	107.3	0.980
42.7	-49.5	8247	6.23	9.29	4.61	0.26	0.73	9.92	0.00	0.00	0.00	6.39	8.56	4.88	1.583	113.6	0.995

DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL) SNDG. NO. : DMT-204

In-Situ Soil Testing, L.C. Page 2

JOB FILE: Barren Island FILE NO. :2020-45

LOCATION: Dorchester County, Maryland--N237,591.9 E1,527,175.0

SNDG.BY : R. Failmezger SNDG. DATE: 6/20/20

ANAL.BY : Roger Failmezger, P.E., F. ASCE, D. GE ANAL. DATE: 6/20/20

ANALYSIS PARAMETERS: LO RANGE = 9.92 TSF ROD DIAM. = 2.36 IN BL.THICK. = 0.59 IN SU FACTOR = 1

SURF.ELEV. = -6.9 FT LO GAGE 0 = 0.00 TSF FR.RED.DIA. = 2.64 IN BL.WIDTH = 3.78 IN PHI FACTOR = 1

WATER DEPTH = -6.6 FT HI GAGE 0 = 0.00 TSF LIN.ROD WT. = 8.0 LBF/FTDELTA-A = 0.26 TSF OCR FACTOR = 1

SP.GR.WATER = 1.030 CAL GAGE 0 = 0.00 TSF;

DELTA / PHI = 0.5 DELTA - B = 0.73 TSF M FACTOR = 1

MAX SU ID = 0.6 SU OPTION = 0 MIN PHI ID = 1.2 OCR OPTION = 0 K0 FACTOR = 1

UNIT CONVERSIONS: 1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI 1 M = 3.2808 FT

Z (FT)	ELEV (FT)	KD	ID	UD	ED (TSF)	K0	SU (TSF)	QD (TSF)	PHI (DEG)	SIGFF (TSF)	PHIO (DEG)	PC (TSF)	OCR	M (TSF)	SOIL TYPE
*****	******	*****	*****	*****	******	*****	*****	*****	*****	******	*****	*****	*****	******	************
0.7	-7.5	21.91	3.77	-0.01	45									145	SAND
1.3	-8.2	34.94	3.02	0.00	113									414	SILTY SAND
2.0	-8.9	40.43	2.23	0.01	146	4.87		20.6	43.1	0.08	37.7	7.68	164.0	560	SILTY SAND
2.6	-9.5	35.89	3.23		257	4.23		37.5	44.8	0.10	40.1	7.74	120.9	954	SILTY SAND
3.3	-10.2	56.40	3.08	0.02	500	6.73		67.4	44.2	0.15	39.9	24.92	299.9	2071	SILTY SAND
3.9	-10.8	66.37	2.22	0.01	528	8.05		58.2	41.6	0.17	37.2	48.55	470.4	2268	SILTY SAND
4.6	-11.5	35.07	0.77	0.15	114	3.80						10.59	87.2	421	CLAYEY SILT
5.2	-12.1	40.41	0.93	0.03	180	4.10						14.95	108.8	686	SILT
5.9	-12.8	25.95	0.93	0.01	129	3.22						8.37	54.5	438	SILT
6.6	-13.5	18.80	0.97	0.01	106	2.68						5.60	33.0	331	SILT
7.2	-14.1	9.35	1.54	0.00	92	0.83		78.7	47.4	0.32	44.6	1.03	5.6	224	SANDY SILT
7.9	-14.8	7.22	1.18	-0.08	58	1.49						1.46	7.4	127	SILT
8.5	-15.4	7.65	1.07	0.13	61	1.55						1.71	8.1	135	SILT
9.2	-16.1	8.93	0.43	0.61	29	1.71	0.32					2.31	10.3	71	SILTY CLAY
9.8	-16.7	8.61	0.40	0.62	28	1.67	0.32					2.30	9.8	67	SILTY CLAY
10.5	-17.4	6.42	0.52	0.40	29	1.38	0.23					1.53	6.2	60	SILTY CLAY
11.2	-18.0	4.51	1.10	0.38	45	1.08						0.93	3.6	77	SILT
11.8	-18.7	3.30	1.09	0.20	33	0.85						0.60	2.2	47	SILT
12.5	-19.4	4.28	0.34	0.52	15	1.04	0.16					0.93	3.3	24	CLAY
13.1	-20.0	5.29	0.30	0.70	17	1.21	0.22					1.35	4.6	30	CLAY
13.8	-20.7	5.00	0.37	0.56	20	1.16	0.21					1.28	4.2	35	SILTY CLAY
14.4	-21.3	3.86	1.37	0.34	58	0.69		17.7	36.3	0.51	33.3	0.92	2.9	93	SANDY SILT
15.1	-22.0	4.77	1.02	0.30	56	1.12						1.29	3.9	98	SILT
15.7	-22.6	5.14	0.56	0.34	34	1.18	0.25					1.50	4.4	63	SILTY CLAY
16.4	-23.3	4.98	0.63	0.27	39	1.16						1.48	4.1	69	CLAYEY SILT
17.1	-23.9	4.00	1.81	0.25	93	0.68		24.1	37.3	0.60	34.6	1.06	2.9	152	SILTY SAND
17.7	-24.6	4.78	1.00	0.16	65	1.12						1.50	3.9	114	SILT
18.4	-25.3	3.32	1.93	0.02	89	0.47		46.9	41.5	0.67	39.3	0.62	1.5	131	SILTY SAND
19.0	-25.9	4.62	0.93	0.29	62	1.10						1.53	3.7	106	SILT
19.7	-26.6	5.02	0.85	0.19	64	1.16						1.81	4.2	115	CLAYEY SILT
20.3	-27.2	4.19	1.17	-0.03	75	1.02						1.41	3.2	123	SILT
21.0	-27.9	10.06	4.45	-0.01	717	1.18		117.1	43.8	0.78	42.0	4.69	10.2	1797	SAND
21.7	-28.5	26.45	2.57	0.02	1141	3.23		160.0	42.0	0.80	40.1	35.89	74.3	3905	SILTY SAND
22.3	-29.2	32.51	1.88	0.02	1074	4.04		127.8	39.9	0.84	37.9	61.70	121.9	3885	SILTY SAND
23.0	-29.9	27.40	2.15	0.03	1084	3.41		129.5	40.3	0.88	38.5	45.07	85.1	3742	SILTY SAND
23.6	-30.5	21.25	1.89	0.01	770	2.61		158.3	42.0	0.92	40.4	26.68	48.3	2475	SILTY SAND
24.3	-31.2	14.75	1.88	0.01	552	1.78		160.5	43.1	0.97	41.6	12.95	22.5	1583	SILTY SAND
24.9	-31.8	11.75	2.08	0.00	503	1.34		188.8	44.5	1.01	43.1	7.83	13.2	1334	SILTY SAND
25.6	-32.5	6.35	2.08	0.00	281	0.50		209.5	47.1	1.06	45.9	1.32	2.1	584	SILTY SAND
26.2	-33.1	3.13	3.07	-0.01	210									314	SILTY SAND
26.9	-33.8	2.08	3.80	-0.02	176									200	SAND
27.6	-34.4	1.59	4.16	-0.06	152									137	SAND
28.2	-35.1	6.94	0.40	0.65	66	1.45	0.71					4.73	7.0	141	SILTY CLAY
28.9	-35.8	6.85	0.35	0.74	57	1.44	0.71					4.75	6.8	122	CLAY
29.5	-36.4	6.47	0.33	0.76	53	1.39	0.68					4.43	6.2	109	CLAY
30.2	-37.1	6.17	0.34	0.72	52	1.34	0.65					4.20	5.8	104	CLAY
30.8	-37.7	6.05	0.29	0.75	45	1.33	0.65					4.16	5.6	89	CLAY
31.5	-38.4	5.85	0.37	0.72	57	1.30	0.64					4.01	5.3	112	SILTY CLAY
32.2	-39.0	5.21	0.40	0.63	55	1.20	0.55					3.41	4.5	101	SILTY CLAY
32.8	-39.7	5.45	0.34	0.74	49	1.23	0.61					3.73	4.8	93	CLAY
33.5	-40.4	5.29	0.32	0.68	47	1.21	0.58					3.62	4.6	87	CLAY
34.1	-41.0	4.45	0.30	0.68	38	1.07	0.48					2.82	3.5	64	CLAY
34.8	-41.7	4.01	0.31	0.72	35	0.99	0.43					2.43	3.0	54	CLAY
35.4	-42.3	4.19	0.34	0.71	42	1.02	0.46					2.65	3.2	67	CLAY
36.1	-43.0	4.20	0.34	0.72	42	1.02	0.47					2.70	3.2	68	CLAY
36.7	-43.6	3.96	0.34	0.70	41	0.98	0.45					2.52	2.9	63	CLAY
37.4	-44.3	3.90	0.24	0.73	28	0.97	0.45					2.50	2.8	43	CLAY
38.1	-44.9	3.89	0.29	0.70	34	0.97	0.45					2.53	2.8	53	CLAY
38.7	-45.6	3.95	0.29	0.75	37	0.98	0.47					2.63	2.9	56	CLAY
39.4	-46.3	3.82	0.31	0.72	38	0.95	0.46					2.54	2.7	57	CLAY
40.0	-46.9	4.09	0.30	0.75	40	1.00	0.50					2.85	3.0	64	CLAY
40.7	-47.6	4.35	0.31	0.74	45	1.05	0.55					3.19	3.4	73	CLAY
41.3	-48.2	4.42	0.45	0.67	67	1.06	0.57					3.33	3.4	112	SILTY CLAY
42.0	-48.9	4.83	0.28	0.72	46	1.13	0.65					3.87	4.0	80	CLAY
42.7	-49.5	4.83	0.45	0.68	75	1.13	0.66					3.94	4.0	133	SILTY CLAY

DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL)
In-Situ Soil Testing, L.C.
JOB FILE: Barren Island
LOCATION: Dorchester County, Maryland--N237,591.9 E1,527,175.0
SNDG.BY : R. Failmezger
ANAL.BY : Roger Failmezger, P.E., F. ASCE, D. GE

SNDG. NO. :DMT-204

FILE NO. : 2020-45

SNDG. DATE: 6/20/20
ANAL. DATE: 6/20/20

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ANALYSIS PARAMETERS:   LO RANGE    = 10.36 TSF  ROD DIAM.    =  0.93 IN    BL.THICK.  =  0.02 IN    SU  FACTOR = 1
SURF.ELEV.  = -22.6 FT LO  GAGE 0 =  0.00 TSF  FR.RED.DIA. =  1.04 IN    BL.WIDTH   =  0.15 IN    PHI FACTOR = 1
WATER DEPTH =  -6.6 FT HI  GAGE 0 =  0.00 TSF  LIN.ROD WT. =   5.4 LBF/FTDELTA-A    =  0.27 TSF   OCR FACTOR = 1
SP.GR.WATER = 1.030    CAL GAGE 0 =  0.00 TSF  DELTA/PHI   =   0.5       DELTA-B    =  0.76 TSF   M  FACTOR  = 1
MAX SU ID   =   0.6    SU OPTION  =     0      MIN PHI ID  =   1.2       OCR OPTION =     0       K0 FACTOR  = 1
UNIT CONVERSIONS:      1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI    1 M = 3.2808 FT
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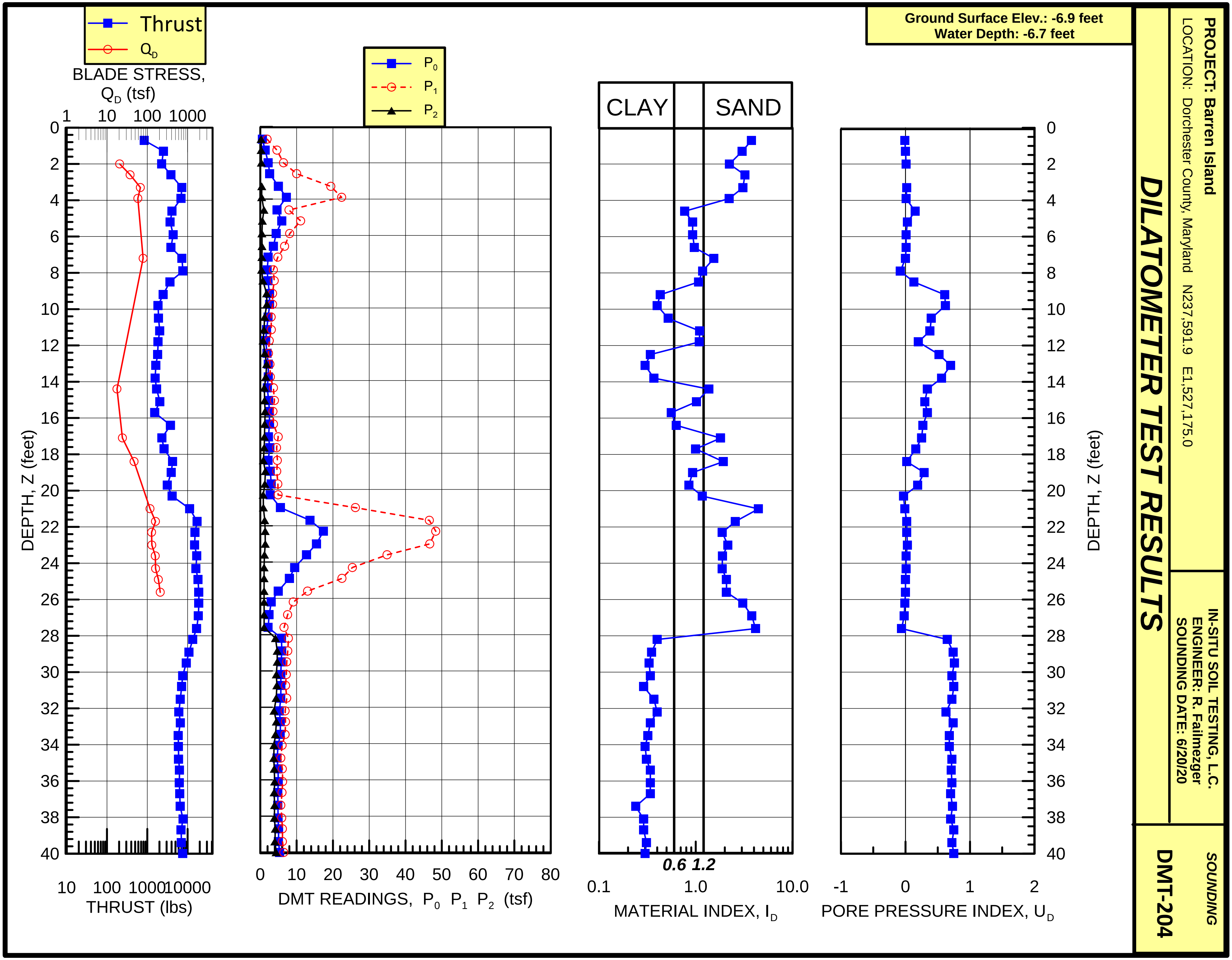
Z (FT)	ELEV (FT)	THRUST (LBF)	A (TSF)	B (TSF)	C (TSF)	DA (TSF)	DB (TSF)	ZMRNG (TSF)	ZMLO (TSF)	ZMHI (TSF)	ZMCAL (TSF)	P0 (TSF)	P1 (TSF)	P2 (TSF)	U0 (TSF)	GAMMA (PCF)	SVP (TSF)
*****	******	******	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	******	******	******
43.3	-50.2	8136	6.37	9.20	4.87	0.26	0.73	9.92	0.00	0.00	0.00	6.54	8.47	5.13	1.604	113.6	1.011
44.0	-50.9	8225	6.59	9.58	4.99	0.26	0.73	9.92	0.00	0.00	0.00	6.74	8.85	5.25	1.626	113.6	1.027
44.6	-51.5	8048	6.88	9.70	5.24	0.26	0.73	9.92	0.00	0.00	0.00	7.05	8.97	5.50	1.646	113.6	1.043
45.3	-52.2	9063	6.86	9.86	5.50	0.26	0.73	9.92	0.00	0.00	0.00	7.02	9.12	5.76	1.667	113.6	1.060
45.9	-52.8	8644	7.19	10.22	5.78	0.26	0.73	9.92	0.00	0.00	0.00	7.35	9.49	6.04	1.688	113.6	1.075
46.6	-53.5	8798	7.92	10.61	6.41	0.26	0.73	9.92	0.00	0.00	0.00	8.10	9.88	6.67	1.709	113.6	1.092
47.2	-54.1	8489	6.94	9.51	5.88	0.26	0.73	9.92	0.00	0.00	0.00	7.12	8.78	6.14	1.731	113.6	1.108
47.9	-54.8	8842	7.20	9.71	5.77	0.26	0.73	9.92	0.00	0.00	0.00	7.39	8.98	6.03	1.752	113.6	1.123
48.6	-55.4	8555	7.48	10.07	5.93	0.26	0.73	9.92	0.00	0.00	0.00	7.65	9.34	6.19	1.773	113.6	1.140
49.2	-56.1	8511	7.72	10.40	6.16	0.26	0.73	9.92	0.00	0.00	0.00	7.89	9.67	6.42	1.794	113.6	1.156
49.9	-56.8	8644	7.72	10.75	6.02	0.26	0.73	9.92	0.00	0.00	0.00	7.87	10.02	6.28	1.816	113.6	1.172
50.5	-57.4	9063	7.60	10.21	5.96	0.26	0.73	9.92	0.00	0.00	0.00	7.78	9.48	6.22	1.836	113.6	1.188
51.2	-58.1	8930	7.53	9.98	6.17	0.26	0.73	9.92	0.00	0.00	0.00	7.72	9.25	6.43	1.857	113.6	1.205
51.8	-58.7	8776	7.41	9.89	6.08	0.26	0.73	9.92	0.00	0.00	0.00	7.60	9.16	6.34	1.878	113.6	1.220
52.5	-59.4	9614	7.64	10.12	6.31	0.26	0.73	9.92	0.00	0.00	0.00	7.83	9.39	6.57	1.899	113.6	1.236
53.1	-60.0	9526	7.48	9.87	6.19	0.26	0.73	9.92	0.00	0.00	0.00	7.66	9.14	6.45	1.921	113.6	1.253
53.8	-60.7	9129	7.46	9.78	6.23	0.26	0.73	9.92	0.00	0.00	0.00	7.66	9.05	6.49	1.942	113.6	1.268
54.5	-61.4	9217	7.54	9.96	6.24	0.26	0.73	9.92	0.00	0.00	0.00	7.73	9.23	6.50	1.963	113.6	1.285
55.1	-62.0	9217	7.75	10.21	6.39	0.26	0.73	9.92	0.00	0.00	0.00	7.93	9.48	6.65	1.984	113.6	1.301
55.8	-62.7	8026	7.60	10.33	6.40	0.26	0.73	9.92	0.00	0.00	0.00	7.78	9.59	6.66	2.006	113.6	1.316
56.4	-63.3	9989	7.83	10.34	6.44	0.26	0.73	9.92	0.00	0.00	0.00	8.02	9.60	6.70	2.026	113.6	1.333
57.1	-64.0	9790	7.89	10.37	6.51	0.26	0.73	9.92	0.00	0.00	0.00	8.08	9.64	6.78	2.047	113.6	1.349
57.7	-64.6	9812	7.96	10.41	6.61	0.26	0.73	9.92	0.00	0.00	0.00	8.14	9.68	6.87	2.068	113.6	1.366
58.4	-65.3	8820	7.87	10.29	6.54	0.26	0.73	9.92	0.00	0.00	0.00	8.06	9.56	6.80	2.089	113.6	1.381
59.1	-65.9	11246	7.67	10.12	6.47	0.26	0.73	9.92	0.00	0.00	0.00	7.86	9.39	6.73	2.111	113.6	1.398
59.7	-66.6	10408	7.68	10.38	6.33	0.26	0.73	9.92	0.00	0.00	0.00	7.86	9.65	6.59	2.132	113.6	1.414
60.4	-67.3	10452	7.44	9.97	6.16	0.26	0.73	9.92	0.00	0.00	0.00	7.63	9.24	6.42	2.153	113.6	1.429
61.0	-67.9	10496	7.18	9.80	5.91	0.26	0.73	9.92	0.00	0.00	0.00	7.36	9.07	6.17	2.174	113.6	1.446
61.7	-68.6	10716	6.83	10.04	5.44	0.26	0.73	9.92	0.00	0.00	0.00	6.97	9.31	5.70	2.194	113.6	1.462
62.3	-69.2	11709	6.51	9.16	5.07	0.26	0.73	9.92	0.00	0.00	0.00	6.69	8.43	5.33	2.216	113.6	1.478
63.0	-69.9	14663	6.04	13.12	2.24	0.26	0.73	9.92	0.00	0.00	0.00	6.00	12.39	2.51	2.237	113.6	1.494
63.6	-70.5	16912	9.49	19.92	1.92	0.26	0.73	9.92	0.00	0.00	0.00	9.28	19.19	2.18	2.258	122.3	1.512
64.3	-71.2	24696	8.20	30.78	1.94	0.26	0.73	9.92	0.00	0.00	0.00	7.38	30.05	2.20	2.279	125.4	1.532
65.0	-71.8	22513	15.53	41.09	2.32	0.26	0.73	9.92	0.00	0.00	0.00	14.56	40.36	2.58	2.301	134.8	1.553
65.6	-72.5	15810	8.29	16.30	2.15	0.26	0.73	9.92	0.00	0.00	0.00	8.20	15.57	2.41	2.322	122.3	1.574
66.3	-73.2	14046	6.65	9.68	4.22	0.26	0.73	9.92	0.00	0.00	0.00	6.81	8.95	4.48	2.343	113.6	1.592
66.9	-73.8	14575	5.70	10.96	2.84	0.26	0.73	9.92	0.00	0.00	0.00	5.75	10.23	3.10	2.364	113.6	1.608
67.6	-74.5	16471	4.02	12.48	2.27	0.26	0.73	9.92	0.00	0.00	0.00	3.90	11.75	2.53	2.384	113.6	1.624
68.2	-75.1	19999	6.33	8.56	4.64	0.26	0.73	9.92	0.00	0.00	0.00	6.53	7.83	4.90	2.406	107.3	1.639
68.9	-75.8	21344	10.48	17.41	5.47	0.26	0.73	9.92	0.00	0.00	0.00	10.45	16.68	5.73	2.427	122.3	1.656
69.6	-76.4	17287	20.17	34.26	9.30	0.26	0.73	9.92	0.00	0.00	0.00	19.77	33.53	9.56	2.448	131.7	1.677
70.2	-77.1	17067	16.01	23.63	8.67	0.26	0.73	9.92	0.00	0.00	0.00	15.94	22.89	8.93	2.469	119.2	1.697
70.9	-77.8	22557	13.86	30.54	1.94	0.26	0.73	9.92	0.00	0.00	0.00	13.34	29.81	2.20	2.490	131.7	1.716
71.2	-78.1	27563	22.54	59.47	2.47	0.26	0.73	9.92	0.00	0.00	0.00	21.01	58.74	2.74	2.501	134.8	1.728

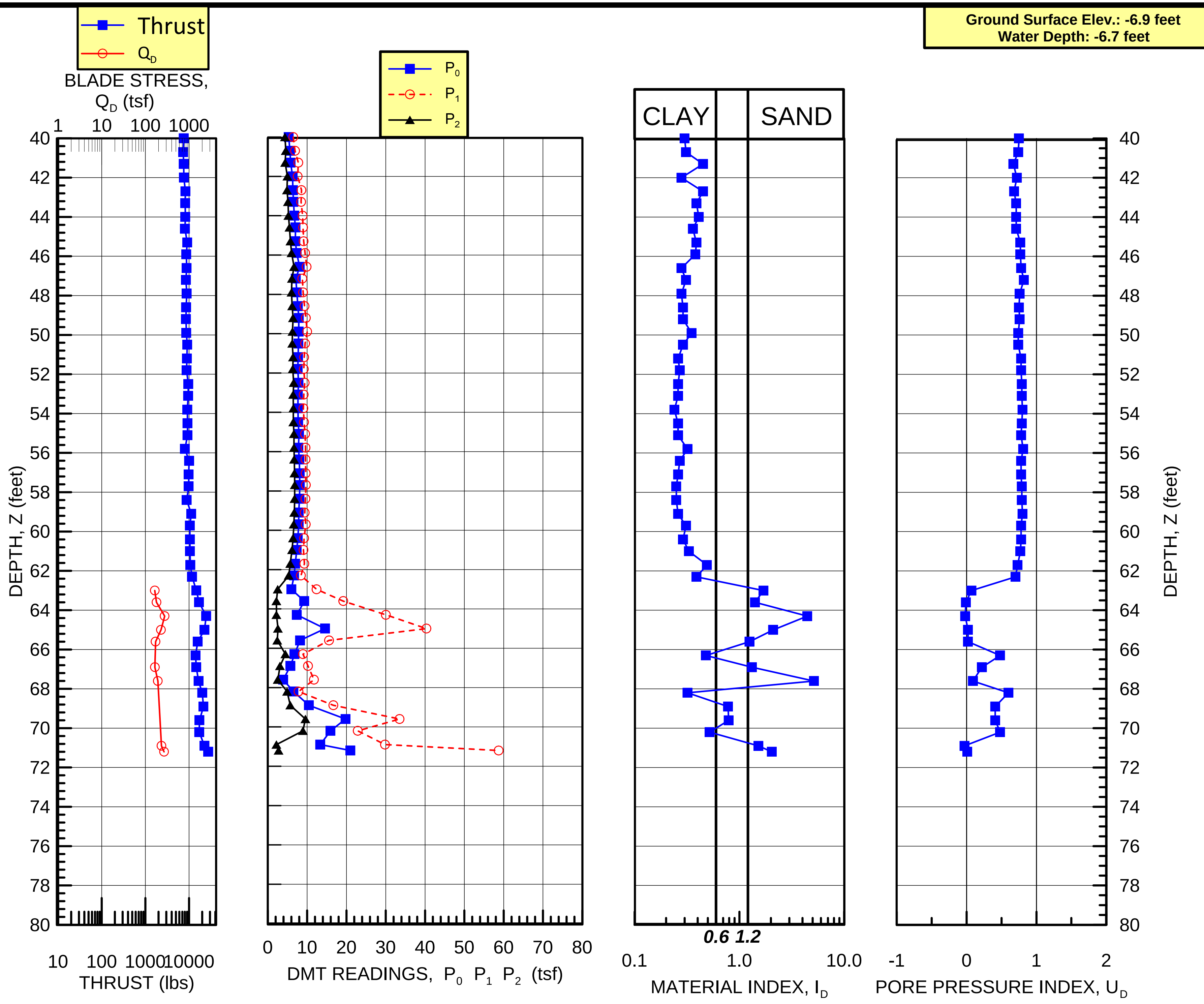
DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL) SNDG. NO. : DMT-204
In-Situ Soil Testing, L.C. Page 2
JOB FILE: Barren Island FILE NO. :2020-45
LOCATION: Dorchester County, Maryland--N237,591.9 E1,527,175.0
SNDG.BY : R. Failmezger SNDG. DATE: 6/20/20
ANAL.BY : Roger Failmezger, P.E., F. ASCE, D. GE ANAL. DATE: 6/20/20

ANALYSIS PARAMETERS: LO RANGE = 10.36 TSF ROD DIAM. = 0.93 IN BL.THICK. = 0.02 IN SU FACTOR = 1
SURF.ELEV. = -22.6 FT LO GAGE 0 = 0.00 TSF FR.RED.DIA. = 1.04 IN BL.WIDTH = 0.15 IN PHI FACTOR = 1
WATER DEPTH = -6.6 FT HI GAGE 0 = 0.00 TSF LIN.ROD WT. = 5.4 LBF/FTDELTA-A = 0.27 TSF OCR FACTOR = 1
SP.GR.WATER = 1.030 CAL GAGE 0 = 0.00 TSF;
DELTA / PHI = 0.5 DELTA - B = 0.76 TSF M FACTOR = 1
MAX SU ID = 0.6 SU OPTION = 0 MIN PHI ID = 1.2 OCR OPTION = 0 K0 FACTOR = 1
UNIT CONVERSIONS: 1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI 1 M = 3.2808 FT

Z (FT)	ELEV (FT)	KD	ID	UD	ED (TSF)	K0	SU (TSF)	QD (TSF)	PHI (DEG)	SIGFF (TSF)	PHIO (DEG)	PC (TSF)	OCR	M (TSF)	SOIL TYPE
*****	******	*****	*****	*****	******	*****	*****	*****	*****	******	*****	*****	*****	******	************
43.3	-50.2	4.88	0.39	0.71	67	1.14	0.68					4.06	4.0	118	SILTY CLAY
44.0	-50.9	4.99	0.41	0.71	73	1.16	0.71					4.27	4.2	131	SILTY CLAY
44.6	-51.5	5.18	0.36	0.71	67	1.19	0.75					4.60	4.4	121	SILTY CLAY
45.3	-52.2	5.05	0.39	0.77	73	1.17	0.74					4.50	4.2	132	SILTY CLAY
45.9	-52.8	5.27	0.38	0.77	74	1.20	0.79					4.88	4.5	137	SILTY CLAY
46.6	-53.5	5.85	0.28	0.78	62	1.30	0.92					5.84	5.3	120	CLAY
47.2	-54.1	4.87	0.31	0.82	57	1.14	0.74					4.44	4.0	101	CLAY
47.9	-54.8	5.02	0.28	0.76	55	1.16	0.78					4.72	4.2	99	CLAY
48.6	-55.4	5.16	0.29	0.75	58	1.19	0.82					5.00	4.4	106	CLAY
49.2	-56.1	5.27	0.29	0.76	62	1.21	0.86					5.25	4.5	114	CLAY
49.9	-56.8	5.17	0.35	0.74	74	1.19	0.85					5.16	4.4	136	SILTY CLAY
50.5	-57.4	5.00	0.29	0.74	58	1.16	0.82					4.97	4.2	105	CLAY
51.2	-58.1	4.86	0.26	0.78	53	1.14	0.80					4.81	4.0	94	CLAY
51.8	-58.7	4.69	0.27	0.78	54	1.11	0.78					4.60	3.8	93	CLAY
52.5	-59.4	4.80	0.26	0.79	54	1.13	0.81					4.83	3.9	94	CLAY
53.1	-60.0	4.59	0.26	0.79	51	1.09	0.77					4.57	3.7	87	CLAY
53.8	-60.7	4.51	0.24	0.80	48	1.08	0.77					4.51	3.6	81	CLAY
54.5	-61.4	4.49	0.26	0.79	52	1.07	0.77					4.53	3.5	88	CLAY
55.1	-62.0	4.57	0.26	0.78	53	1.09	0.80					4.73	3.6	91	CLAY
55.8	-62.7	4.38	0.32	0.81	63	1.05	0.77					4.48	3.4	104	CLAY
56.4	-63.3	4.49	0.27	0.78	55	1.07	0.80					4.71	3.5	93	CLAY
57.1	-64.0	4.47	0.26	0.78	54	1.07	0.81					4.73	3.5	91	CLAY
57.7	-64.6	4.45	0.25	0.79	53	1.07	0.81					4.75	3.5	89	CLAY
58.4	-65.3	4.32	0.25	0.79	52	1.04	0.79					4.59	3.3	86	CLAY
59.1	-65.9	4.12	0.26	0.80	53	1.01	0.76					4.31	3.1	85	CLAY
59.7	-66.6	4.05	0.31	0.78	62	1.00	0.75					4.25	3.0	97	CLAY
60.4	-67.3	3.83	0.29	0.78	56	0.95	0.71					3.94	2.8	85	CLAY
61.0	-67.9	3.59	0.33	0.77	60	0.91	0.66					3.60	2.5	86	CLAY
61.7	-68.6	3.27	0.49	0.73	81	0.84	0.60					3.15	2.2	110	SILTY CLAY
62.3	-69.2	3.03	0.39	0.70	61	0.79	0.54					2.83	1.9	76	SILTY CLAY
63.0	-69.9	2.52	1.70	0.07	221	0.38		164.2	41.5	2.48	41.2	1.46	1.0	263	SANDY SILT
63.6	-70.5	4.64	1.41	-0.01	343	0.65		179.8	41.1	2.51	40.9	4.35	2.9	603	SANDY SILT
64.3	-71.2	3.33	4.45	-0.02	786	0.33		276.1	44.4	2.60	44.3	1.38	0.9	1215	SAND
65.0	-71.8	7.90	2.10	0.02	895	1.03		227.8	41.2	2.58	41.1	11.58	7.5	2042	SILTY SAND
65.6	-72.5	3.73	1.25	0.02	256	0.55		171.0	40.8	2.60	40.7	3.18	2.0	392	SANDY SILT
66.3	-73.2	2.81	0.48	0.48	74	0.74	0.53					2.70	1.7	89	SILTY CLAY
66.9	-73.8	2.10	1.32	0.22	156	0.34		164.8	41.2	2.66	41.1	1.23	0.8	151	SANDY SILT
67.6	-74.5	0.94	5.15	0.09	272	0.12		193.1	42.9	2.74	42.9	0.19	0.1	231	SAND
68.2	-75.1	2.51	0.32	0.60	45	0.67	0.48					2.34	1.4	49	CLAY
68.9	-75.8	4.84	0.78	0.41	216	1.13						6.58	4.0	382	CLAYEY SILT
69.6	-76.4	10.34	0.79	0.41	477	1.88						21.74	13.0	1208	CLAYEY SILT
70.2	-77.1	7.94	0.52	0.48	241	1.59	2.09					14.58	8.6	546	SILTY CLAY
70.9	-77.8	6.32	1.52	-0.03	571	0.84		233.4	41.3	2.85	41.3	8.46	4.9	1176	SANDY SILT
71.2	-78.1	10.71	2.04	0.01	1309	1.39		267.3	40.7	2.86	40.7	23.33	13.5	3359	SILTY SAND



Thrust
Q_D
BLADE STRESS, Q_D (tsf)
1 10 100 1000
DEPTH, Z (feet)
10 100 1000 10000
THRUST (lbs)
P_0
P_1
P_2
0 10 20 30 40 50 60 70 80
DMT READINGS, P_0 P_1 P_2 (tsf)
CLAY
SAND
0.6 1.2
0.1 1.0 10.0
MATERIAL INDEX, I_D
-1 0 1 2
PORE PRESSURE INDEX, U_D
Ground Surface Elev.: -6.9 feet
Water Depth: -6.7 feet
DILATOMETER TEST RESULTS
PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N237,591.9 E1,527,175.0
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 6/20/20
SOUNDING
DMT-204



DILATOMETER TEST RESULTS

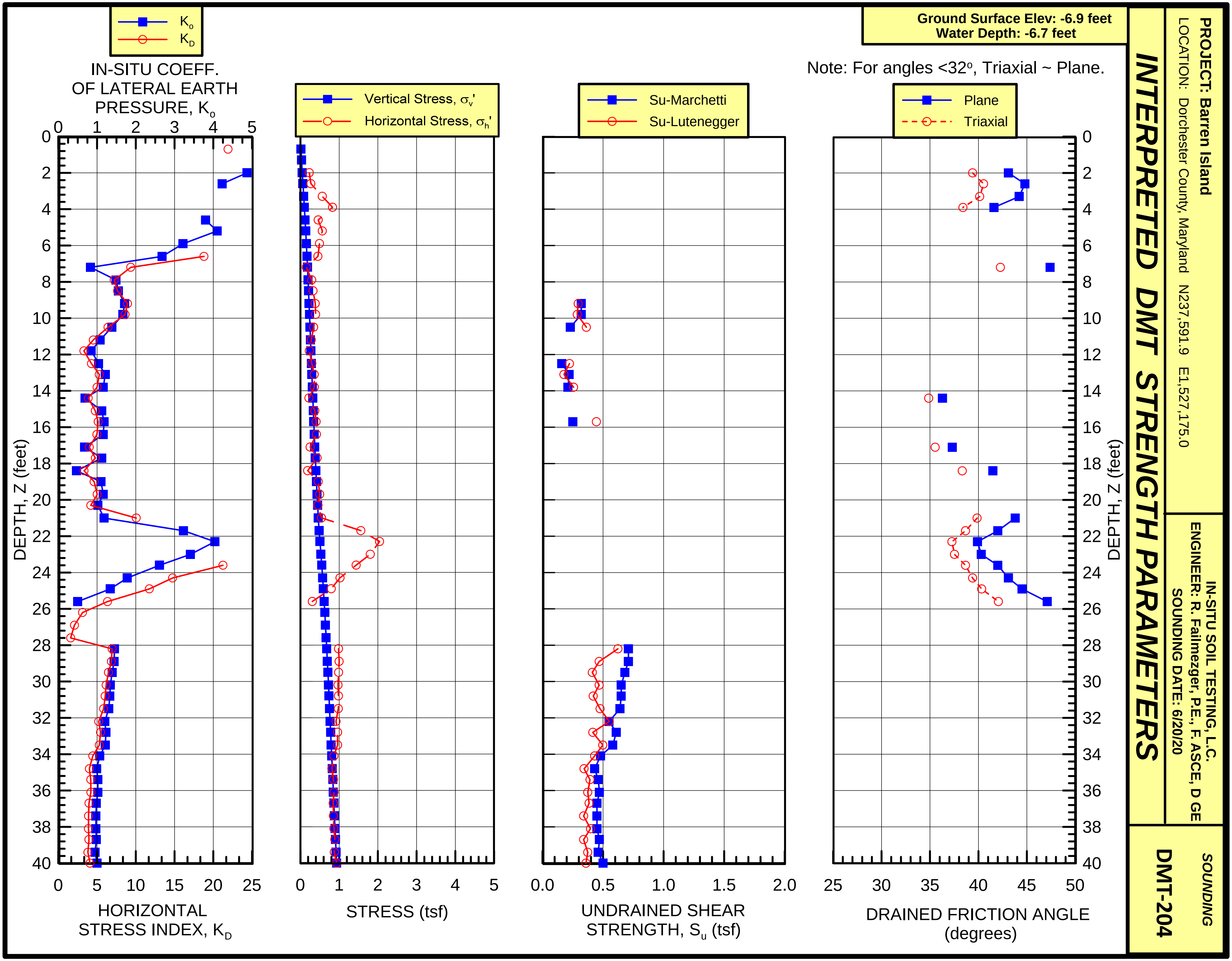
PROJECT: Barren Island

LOCATION: Dorchester County, Maryland N237,591.9 E1,527,175.0

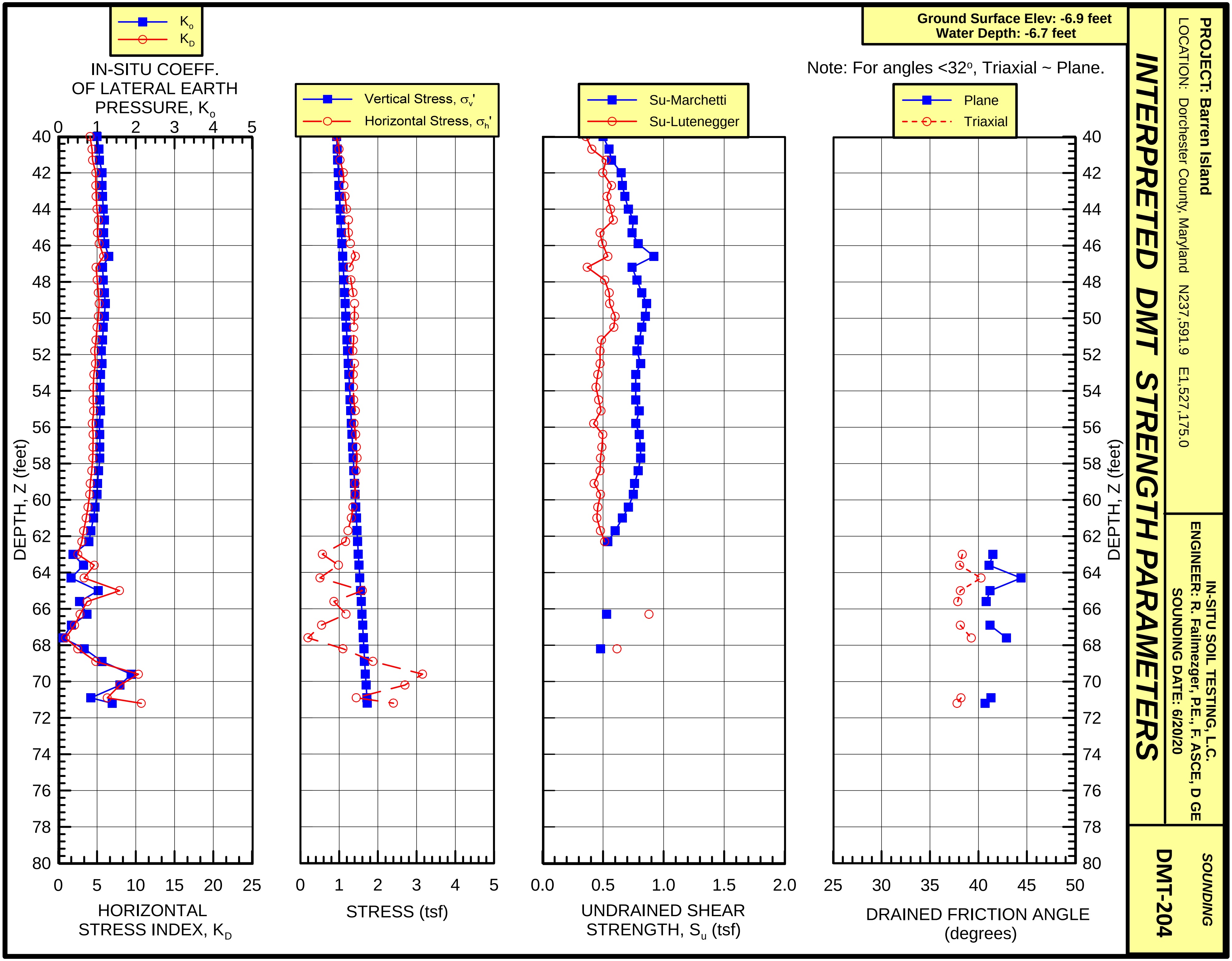
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 6/20/20

SOUNDING

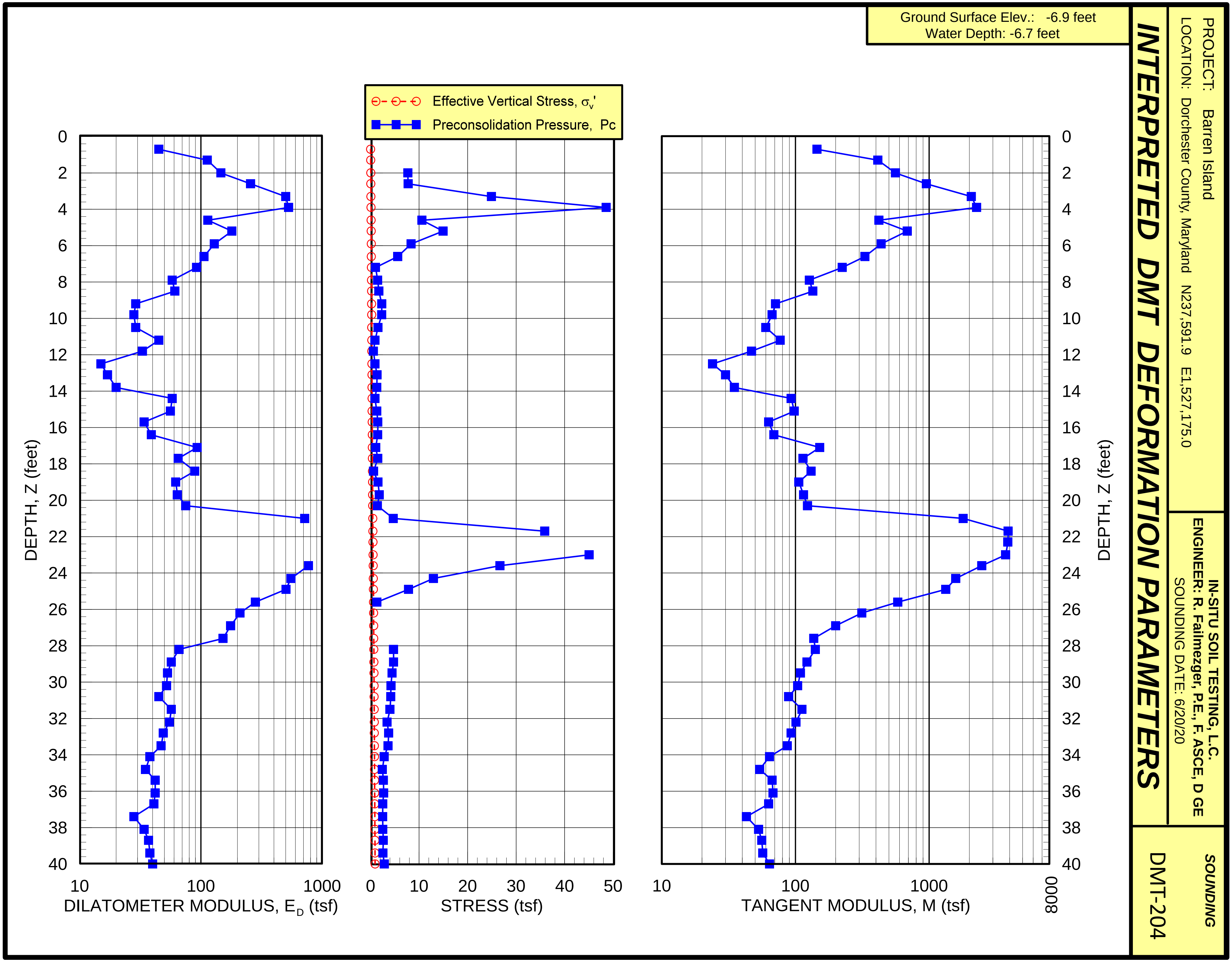
DMT-204



Ground Surface Elev: -6.9 feet
Water Depth: -6.7 feet
PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N237,591.9 E1,527,175.0
INTERPRETED DMT STRENGTH PARAMETERS
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/20/20
SOUNDING
DMT-204
Note: For angles <32°, Triaxial ~ Plane.
K_o
K_D
IN-SITU COEFF. OF LATERAL EARTH PRESSURE, K_o
DEPTH, Z (feet)
HORIZONTAL STRESS INDEX, K_D
Vertical Stress, σ_v'
Horizontal Stress, σ_h'
STRESS (tsf)
Su-Marchetti
Su-Lutenegger
UNDRAINED SHEAR STRENGTH, S_u (tsf)
Plane
Triaxial
DRAINED FRICTION ANGLE (degrees)

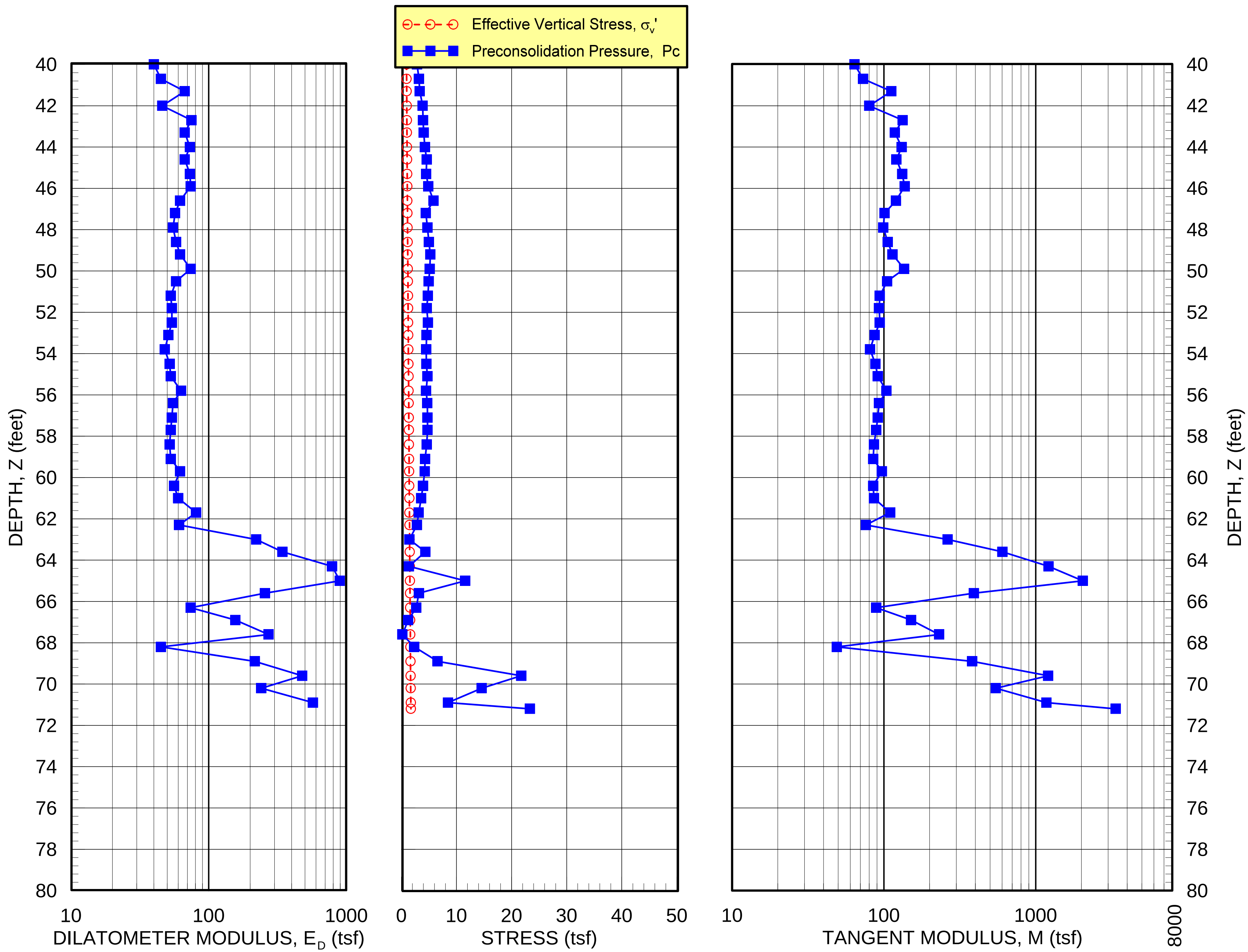


Ground Surface Elev: -6.9 feet
Water Depth: -6.7 feet
Note: For angles <32°, Triaxial ~ Plane.
Ko
KD
IN-SITU COEFF. OF LATERAL EARTH PRESSURE, Ko
Vertical Stress, σv'
Horizontal Stress, σh'
Su-Marchetti
Su-Lutenegger
Plane
Triaxial
DEPTH, Z (feet)
HORIZONTAL STRESS INDEX, KD
STRESS (tsf)
UNDRAINED SHEAR STRENGTH, Su (tsf)
DRAINED FRICTION ANGLE (degrees)
INTERPRETED DMT STRENGTH PARAMETERS
PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N237,591.9 E1,527,175.0
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/20/20
SOUNDING
DMT-204



Ground Surface Elev.: -6.9 feet
Water Depth: -6.7 feet
Effective Vertical Stress, σ_v'
Preconsolidation Pressure, Pc
DEPTH, Z (feet)
DILATOMETER MODULUS, E_D (tsf)
STRESS (tsf)
TANGENT MODULUS, M (tsf)
INTERPRETED DMT DEFORMATION PARAMETERS
PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N237,591.9 E1,527,175.0
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/20/20
SOUNDING
DMT-204

Ground Surface Elev.: -6.9 feet
Water Depth: -6.7 feet



INTERPRETED DMT DEFORMATION PARAMETERS

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N237,591.9 E1,527,175.0

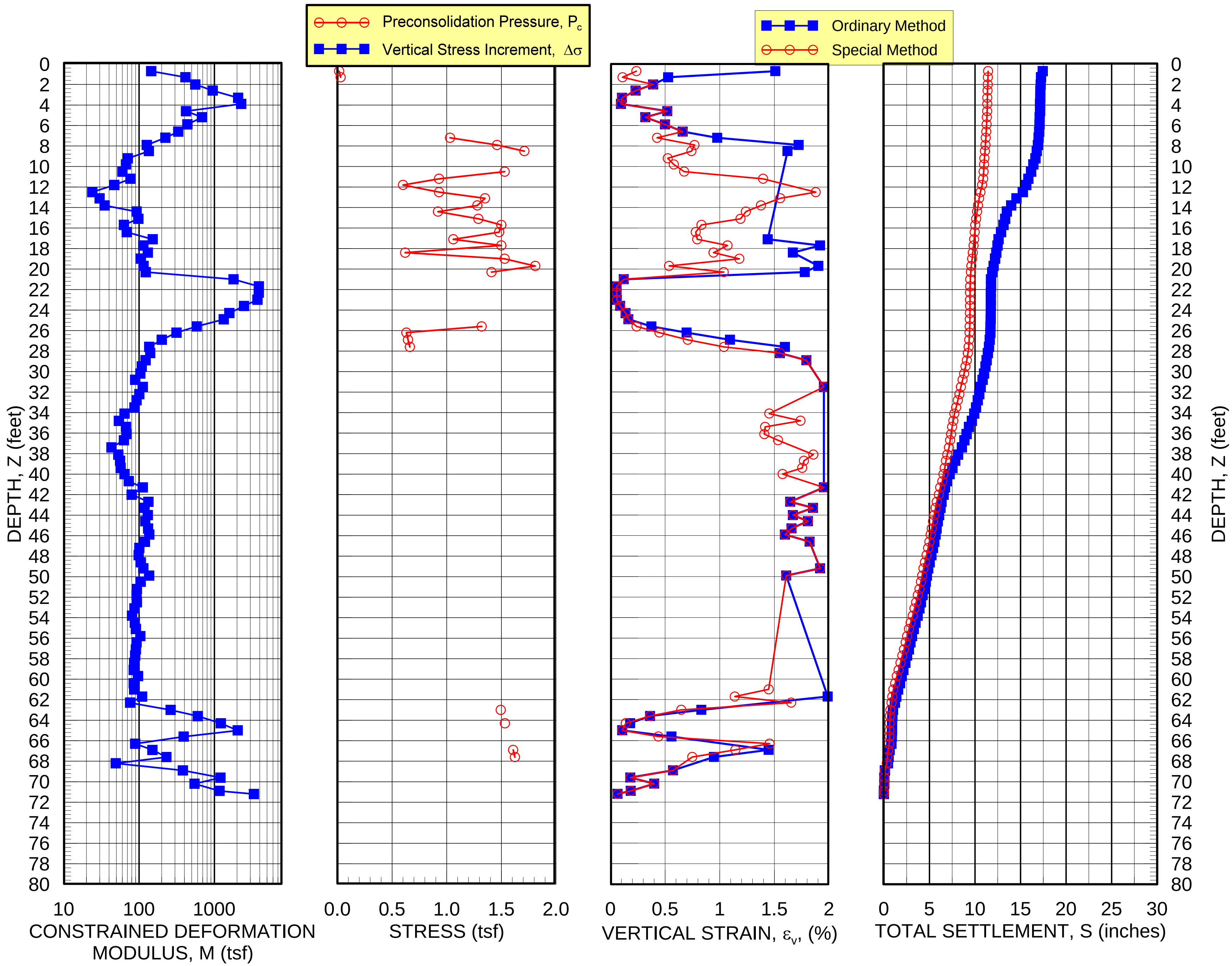
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/20/20

SOUNDING
DMT-204

PREDICTED DMT SETTLEMENT

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N237,591.9 E1,527,175.0

Ground Surface Elev.: -6.9 feet
Water Depth: -6.7 feet



IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/20/20

SOUNDING
DMT-204

DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL)   SNDG. NO. :DMT-205
In-Situ Soil Testing, L.C.   Page 1a
JOB FILE: Barren Island   FILE NO. : 2020-45
LOCATION: Dorchester County, Maryland--N237,591.9 E1,527,175.0
SNDG.BY : R. Failmezger   SNDG. DATE: 6/23/20
ANAL.BY : Roger Failmezger, P.E., F. ASCE, D. GE   ANAL. DATE: 6/23/20

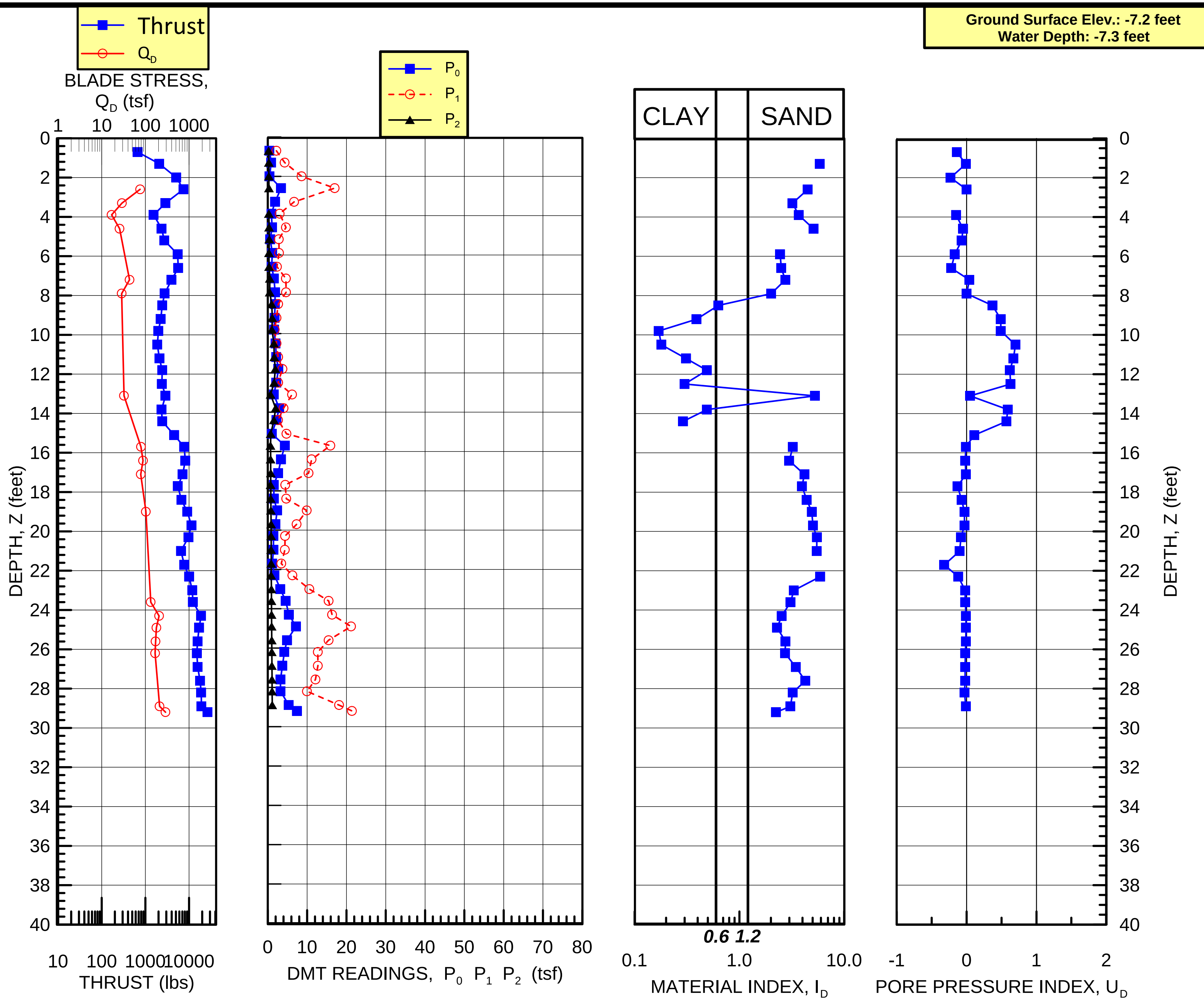
ANALYSIS PARAMETERS: LO RANGE = 9.92 TSF ROD DIAM. = 2.36 IN BL.THICK. = 0.59 IN SU FACTOR = 1
SURF.ELEV. = -7.2 FT LO GAGE 0 = 0.00 TSF FR.RED.DIA. = 2.64 IN BL.WIDTH = 3.78 IN PHI FACTOR = 1
WATER DEPTH = -7.2 FT HI GAGE 0 = 0.00 TSF LIN.ROD WT. = 8.0 LBF/FT DELTA-A = 0.29 TSF OCR FACTOR = 1
SP.GR.WATER = 1.030 CAL GAGE 0 = 0.00 TSF DELTA/PHI = 0.5 DELTA-B = 0.85 TSF M FACTOR = 1
MAX SU ID = 0.6 SU OPTION = 0 MIN PHI ID = 1.2 OCR OPTION = 0 K0 FACTOR = 1
UNIT CONVERSIONS: 1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI 1 M = 3.2808 FT

Z (FT)	ELEV (FT)	THRUST (LBF)	A (TSF)	B (TSF)	C (TSF)	DA (TSF)	DB (TSF)	ZMRNG (TSF)	ZMLO (TSF)	ZMHI (TSF)	ZMCAL (TSF)	P0 (TSF)	P1 (TSF)	P2 (TSF)	U0 (TSF)	GAMMA (PCF)	SVP (TSF)
*****	******	******	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	******	******	******
0.7	-7.9	662	0.21	3.02	-0.06	0.29	0.85	9.92	0.00	0.00	0.00	0.42	2.17	0.23	0.254	107.3	0.016
1.3	-8.5	2073	0.73	5.14	-0.02	0.29	0.85	9.92	0.00	0.00	0.00	0.86	4.29	0.27	0.275	107.3	0.029
2.0	-9.2	5094	0.54	9.44	-0.03	0.29	0.85	9.92	0.00	0.00	0.00	0.45	8.59	0.26	0.295	107.3	0.044
2.6	-9.8	7431	3.72	17.85	0.01	0.29	0.85	9.92	0.00	0.00	0.00	3.36	17.01	0.30	0.316	119.2	0.060
3.3	-10.5	2889	1.79	7.54		0.29	0.85	9.92	0.00	0.00	0.00	1.85	6.69		0.337	113.6	0.077
3.9	-11.2	1544	0.73	3.85	-0.02	0.29	0.85	9.92	0.00	0.00	0.00	0.93	3.01	0.27	0.359	107.3	0.092
4.6	-11.8	2337	0.95	5.46	0.05	0.29	0.85	9.92	0.00	0.00	0.00	1.08	4.61	0.34	0.380	107.3	0.106
5.2	-12.5	2712	0.43	3.64	0.09	0.29	0.85	9.92	0.00	0.00	0.00	0.62	2.80	0.39	0.401	107.3	0.120
5.9	-13.1	5468	0.92	3.71	0.01	0.29	0.85	9.92	0.00	0.00	0.00	1.13	2.86	0.30	0.422	107.3	0.135
6.6	-13.8	5645	0.75	3.17	0.03	0.29	0.85	9.92	0.00	0.00	0.00	0.98	2.33	0.32	0.444	107.3	0.148
7.2	-14.4	3969	1.42	5.45	0.22	0.29	0.85	9.92	0.00	0.00	0.00	1.57	4.60	0.51	0.465	113.6	0.164
7.9	-15.1	2756	1.70	5.48	0.20	0.29	0.85	9.92	0.00	0.00	0.00	1.86	4.64	0.49	0.485	113.6	0.180
8.5	-15.7	2426	1.57	3.49	0.70	0.29	0.85	9.92	0.00	0.00	0.00	1.82	2.64	0.99	0.506	101.1	0.194
9.2	-16.4	2249	1.47	3.06	0.84	0.29	0.85	9.92	0.00	0.00	0.00	1.74	2.21	1.13	0.527	101.1	0.206
9.8	-17.1	1985	1.29	2.60	0.76	0.29	0.85	9.92	0.00	0.00	0.00	1.58	1.75	1.05	0.549	94.8	0.217
10.5	-17.7	1874	1.69	3.07	1.26	0.29	0.85	9.92	0.00	0.00	0.00	1.97	2.22	1.56	0.570	94.8	0.227
11.2	-18.4	2095	1.88	3.48	1.35	0.29	0.85	9.92	0.00	0.00	0.00	2.15	2.63	1.64	0.591	101.1	0.238
11.8	-19.0	2426	2.46	4.57	1.62	0.29	0.85	9.92	0.00	0.00	0.00	2.70	3.73	1.91	0.612	101.1	0.251
12.5	-19.7	2381	1.90	3.48	1.32	0.29	0.85	9.92	0.00	0.00	0.00	2.17	2.63	1.61	0.633	101.1	0.262
13.1	-20.3	2889	1.46	7.01	0.41	0.29	0.85	9.92	0.00	0.00	0.00	1.53	6.16	0.70	0.655	113.6	0.277
13.8	-21.0	2337	2.66	4.84	1.70	0.29	0.85	9.92	0.00	0.00	0.00	2.90	4.00	1.99	0.675	107.3	0.291
14.4	-21.7	2426	1.91	3.46	1.25	0.29	0.85	9.92	0.00	0.00	0.00	2.18	2.61	1.55	0.696	101.1	0.305
15.1	-22.3	4564	0.92	5.60	0.46	0.29	0.85	9.92	0.00	0.00	0.00	1.03	4.75	0.75	0.717	107.3	0.317
15.7	-23.0	7718	4.58	16.77	0.40	0.29	0.85	9.92	0.00	0.00	0.00	4.32	15.92	0.69	0.739	119.2	0.334
16.4	-23.6	8203	3.45	12.00	0.43	0.29	0.85	9.92	0.00	0.00	0.00	3.37	11.15	0.72	0.760	119.2	0.352
17.1	-24.3	7122	2.70	11.20	0.47	0.29	0.85	9.92	0.00	0.00	0.00	2.63	10.36	0.76	0.781	119.2	0.370
17.7	-24.9	5513	1.38	5.27	0.42	0.29	0.85	9.92	0.00	0.00	0.00	1.53	4.43	0.71	0.802	107.3	0.386
18.4	-25.6	6681	1.40	5.54	0.48	0.29	0.85	9.92	0.00	0.00	0.00	1.55	4.70	0.77	0.823	107.3	0.400
19.0	-26.2	9107	2.44	10.75	0.51	0.29	0.85	9.92	0.00	0.00	0.00	2.38	9.91	0.80	0.845	113.6	0.416
19.7	-26.9	11312	1.90	8.17	0.54	0.29	0.85	9.92	0.00	0.00	0.00	1.93	7.33	0.84	0.865	113.6	0.431
20.3	-27.6	9658	1.27	5.23	0.55	0.29	0.85	9.92	0.00	0.00	0.00	1.43	4.38	0.85	0.886	107.3	0.447
21.0	-28.2	6527	1.28	5.19	0.56	0.29	0.85	9.92	0.00	0.00	0.00	1.44	4.34	0.86	0.907	107.3	0.460
21.7	-28.9	7784	0.94	4.27	0.57	0.29	0.85	9.92	0.00	0.00	0.00	1.13	3.42	0.87	0.928	107.3	0.475
22.3	-29.5	9989	1.64	7.09	0.56	0.29	0.85	9.92	0.00	0.00	0.00	1.71	6.24	0.86	0.950	107.3	0.489
23.0	-30.2	11841	3.26	11.41	0.64	0.29	0.85	9.92	0.00	0.00	0.00	3.19	10.57	0.93	0.971	119.2	0.505
23.6	-30.8	12238	4.77	16.33	0.64	0.29	0.85	9.92	0.00	0.00	0.00	4.54	15.48	0.93	0.992	119.2	0.523
24.3	-31.5	18831	5.57	17.19	0.66	0.29	0.85	9.92	0.00	0.00	0.00	5.35	16.35	0.95	1.013	125.4	0.542
24.9	-32.2	16979	7.54	22.02	0.69	0.29	0.85	9.92	0.00	0.00	0.00	7.16	21.17	0.98	1.035	125.4	0.562
25.6	-32.8	15656	5.11	16.32	0.72	0.29	0.85	9.92	0.00	0.00	0.00	4.90	15.47	1.01	1.055	119.2	0.582
26.2	-33.5	15038	4.31	13.56	0.73	0.29	0.85	9.92	0.00	0.00	0.00	4.20	12.72	1.02	1.076	119.2	0.599
26.9	-34.1	15722	3.84	13.57	0.75	0.29	0.85	9.92	0.00	0.00	0.00	3.71	12.73	1.04	1.097	119.2	0.617
27.6	-34.8	17861	3.34	12.97	0.78	0.29	0.85	9.92	0.00	0.00	0.00	3.21	12.12	1.08	1.118	119.2	0.636
28.2	-35.4	18963	3.26	10.82	0.79	0.29	0.85	9.92	0.00	0.00	0.00	3.23	9.97	1.09	1.140	119.2	0.654
28.9	-36.1	19184	5.65	18.97	0.84	0.29	0.85	9.92	0.00	0.00	0.00	5.33	18.12	1.13	1.161	125.4	0.673
29.2	-36.4	26460	7.79	22.26		0.29	0.85	9.92	0.00	0.00	0.00	7.41	21.41		1.171	125.4	0.683

DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL)   SNDG. NO. : DMT-205
In-Situ Soil Testing, L.C.   Page 2
JOB FILE: Barren Island   FILE NO. :2020-45
LOCATION: Dorchester County, Maryland--N237,591.9 E1,527,175.0
SNDG.BY : R. Failmezger   SNDG. DATE: 6/23/20
ANAL.BY : Roger Failmezger, P.E., F. ASCE, D. GE   ANAL. DATE: 6/23/20

ANALYSIS PARAMETERS: LO RANGE = 9.92 TSF   ROD DIAM. = 2.36 IN   BL.THICK. = 0.59 IN   SU FACTOR = 1
SURF.ELEV. = -7.2 FT   LO GAGE 0 = 0.00 TSF   FR.RED.DIA. = 2.64 IN   BL.WIDTH = 3.78 IN   PHI FACTOR = 1
WATER DEPTH = -7.2 FT   HI GAGE 0 = 0.00 TSF   LIN.ROD WT. = 8.0 LBF/FT   DELTA-A = 0.29 TSF   OCR FACTOR = 1
SP.GR.WATER = 1.030   CAL GAGE 0 = 0.00 TSF;
DELTA / PHI = 0.5   DELTA - B = 0.85 TSF   M FACTOR = 1
MAX SU ID = 0.6   SU OPTION = 0   MIN PHI ID = 1.2   OCR OPTION = 0   K0 FACTOR = 1
UNIT CONVERSIONS: 1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI   1 M = 3.2808 FT

Z (FT)	ELEV (FT)	KD	ID	UD	ED (TSF)	K0	SU (TSF)	QD (TSF)	PHI (DEG)	SIGFF (TSF)	PHIO (DEG)	PC (TSF)	OCR	M (TSF)	SOIL TYPE
*****	******	*****	*****	*****	******	*****	*****	*****	*****	******	*****	*****	*****	******	************
0.7	-7.9	10.49	10.67	-0.14	61									155	SAND
1.3	-8.5	19.68	5.86	-0.01	119									374	SAND
2.0	-9.2	3.46	53.63	-0.23	283									447	SAND
2.6	-9.8	50.76	4.49	0.00	474	5.82		75.8	47.5	0.10	43.2	12.57	209.7	1913	SAND
3.3	-10.5	19.59	3.21		168	2.29		29.0	44.5	0.14	40.1	2.85	37.0	527	SILTY SAND
3.9	-11.2	6.13	3.69	-0.15	72	0.72		16.8	43.6	0.16	39.3	0.35	3.8	150	SAND
4.6	-11.8	6.53	5.10	-0.05	123	0.67		25.6	45.2	0.18	41.3	0.38	3.6	262	SAND
5.2	-12.5	1.79	10.12	-0.07	76									76	SAND
5.9	-13.1	5.26	2.45	-0.17	61									115	SILTY SAND
6.6	-13.8	3.61	2.51	-0.22	47									74	SILTY SAND
7.2	-14.4	6.74	2.75	0.04	105	0.68		43.4	45.5	0.28	42.3	0.60	3.6	227	SILTY SAND
7.9	-15.1	7.66	2.01	0.00	96	0.97		28.6	42.0	0.30	38.5	1.21	6.7	217	SILTY SAND
8.5	-15.7	6.77	0.63	0.37	28	1.43						1.29	6.7	60	CLAYEY SILT
9.2	-16.4	5.90	0.39	0.49	17	1.30	0.18					1.12	5.4	32	SILTY CLAY
9.8	-17.1	4.75	0.17	0.49	6	1.12	0.14					0.84	3.9	10	MUD
10.5	-17.7	6.17	0.18	0.70	8	1.34	0.21					1.32	5.8	18	MUD
11.2	-18.4	6.54	0.31	0.67	17	1.40	0.23					1.51	6.4	34	CLAY
11.8	-19.0	8.38	0.49	0.62	35	1.64	0.33					2.34	9.3	82	SILTY CLAY
12.5	-19.7	5.86	0.30	0.63	16	1.30	0.22					1.40	5.4	31	CLAY
13.1	-20.3	3.18	5.26	0.05	161	0.45		32.3	41.6	0.46	38.8	0.39	1.4	241	SAND
13.8	-21.0	7.64	0.49	0.59	38	1.55	0.34					2.36	8.1	85	SILTY CLAY
14.4	-21.7	4.88	0.29	0.57	15	1.14	0.21					1.22	4.0	26	CLAY
15.1	-22.3	1.00	11.74	0.11	129									110	SAND
15.7	-23.0	10.74	3.24	-0.01	402	1.29		79.3	43.3	0.56	40.9	3.99	12.0	1034	SILTY SAND
16.4	-23.6	7.41	2.99	-0.02	270	0.81		88.2	44.7	0.60	42.5	1.76	5.0	604	SILTY SAND
17.1	-24.3	4.99	4.18	-0.01	268	0.52		78.4	44.7	0.63	42.6	0.78	2.1	508	SAND
17.7	-24.9	1.89	3.96	-0.13	100									105	SAND
18.4	-25.6	1.79	4.40	-0.07	110									111	SAND
19.0	-26.2	3.69	4.91	-0.03	261	0.22		102.7	46.6	0.72	44.8	0.19	0.5	427	SAND
19.7	-26.9	2.48	5.04	-0.03	187									241	SAND
20.3	-27.6	1.21	5.49	-0.08	102									88	SAND
21.0	-28.2	1.15	5.48	-0.10	101									86	SAND
21.7	-28.9	0.41	11.89	-0.32	80									68	SAND
22.3	-29.5	1.57	5.91	-0.12	157									140	SAND
23.0	-30.2	4.41	3.31	-0.02	256									457	SAND
23.6	-30.8	6.79	3.08	-0.02	380	0.72		132.5	44.9	0.89	43.4	2.10	4.0	822	SILTY SAND
24.3	-31.5	7.99	2.54	-0.01	382	0.71		206.2	46.9	0.94	45.5	2.26	4.2	878	SILTY SAND
24.9	-32.2	10.90	2.29	-0.01	487	1.22		178.7	44.8	0.96	43.3	6.23	11.1	1255	SILTY SAND
25.6	-32.8	6.60	2.76	-0.01	367	0.63		171.3	45.9	1.00	44.6	1.85	3.2	783	SILTY SAND
26.2	-33.5	5.21	2.73	-0.02	295	0.43		166.7	46.3	1.03	45.0	0.94	1.6	568	SILTY SAND
26.9	-34.1	4.22	3.46	-0.02	313									548	SAND
27.6	-34.8	3.29	4.26	-0.02	309									474	SAND
28.2	-35.4	3.20	3.23	-0.03	234									353	SILTY SAND
28.9	-36.1	6.20	3.07	-0.01	444	0.53		211.4	46.6	1.16	45.4	1.58	2.3	925	SILTY SAND
29.2	-36.4	9.14	2.24		485	0.84		288.6	47.0	1.18	45.9	3.87	5.7	1175	SILTY SAND



DILATOMETER TEST RESULTS

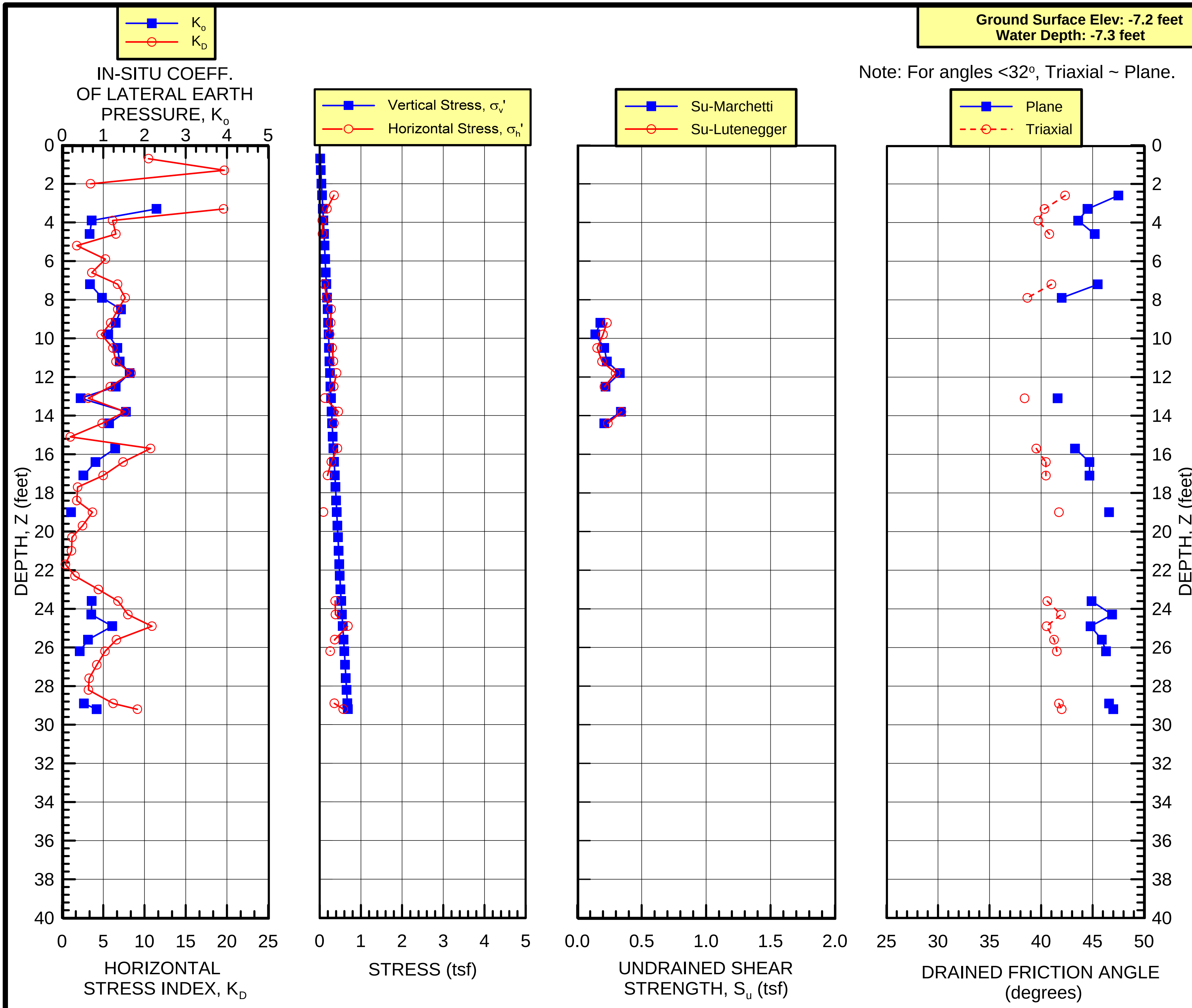
PROJECT: Barren Island

LOCATION: Dorchester County, Maryland N239,209.8 E1,526,059.2

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 6/23/20

SOUNDING

DMT-205



INTERPRETED DMT STRENGTH PARAMETERS

PROJECT: Barren Island

LOCATION: Dorchester County, Maryland N239,209.8 E1,526,059.2

IN-SITU SOIL TESTING, L.C.

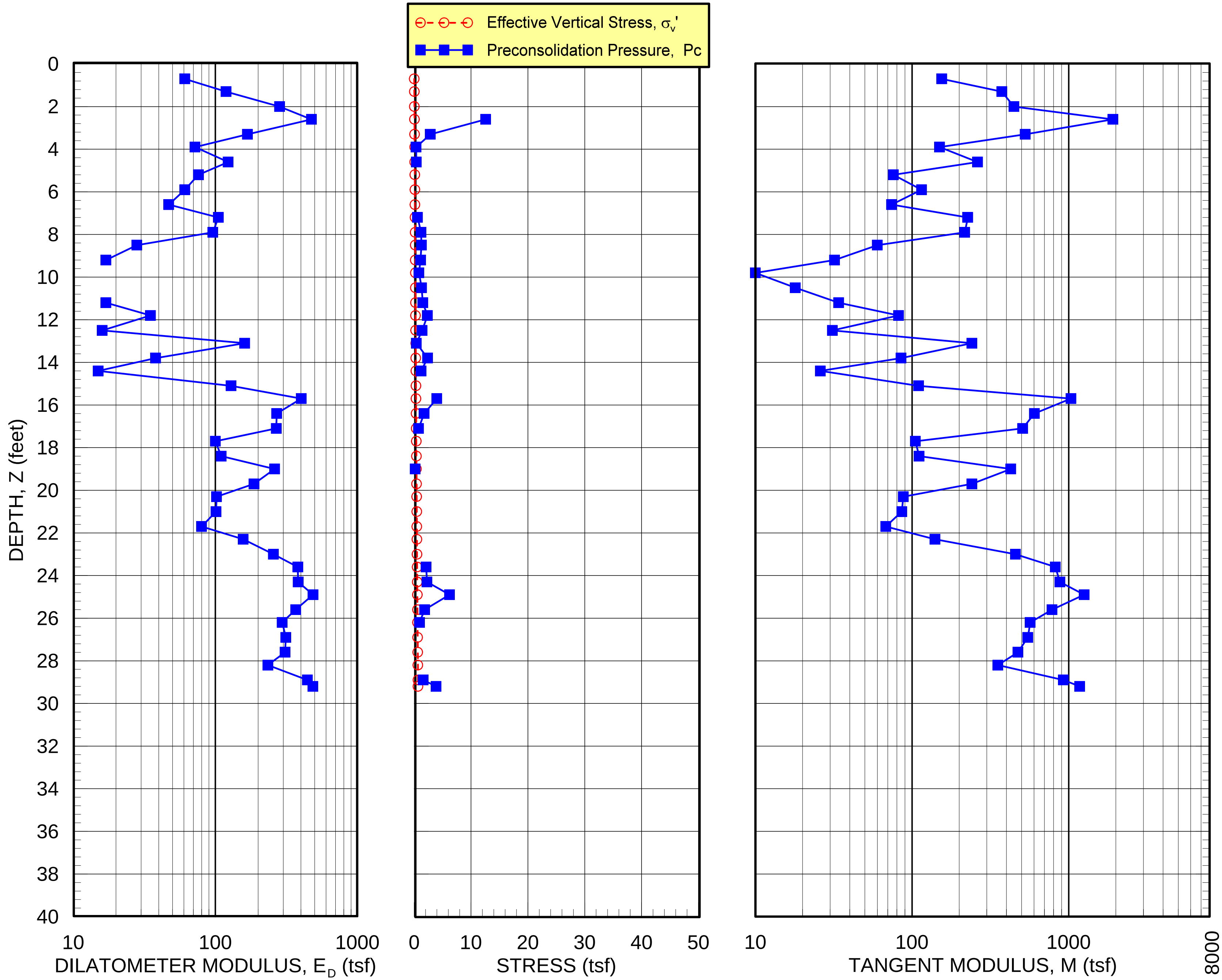
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE

SOUNDING DATE: 6/23/20

SOUNDING

DMT-205

Ground Surface Elev.: -7.2 feet
Water Depth: -7.3 feet



PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N239,209.8 E1,526,059.2

INTERPRETED DMT DEFORMATION PARAMETERS

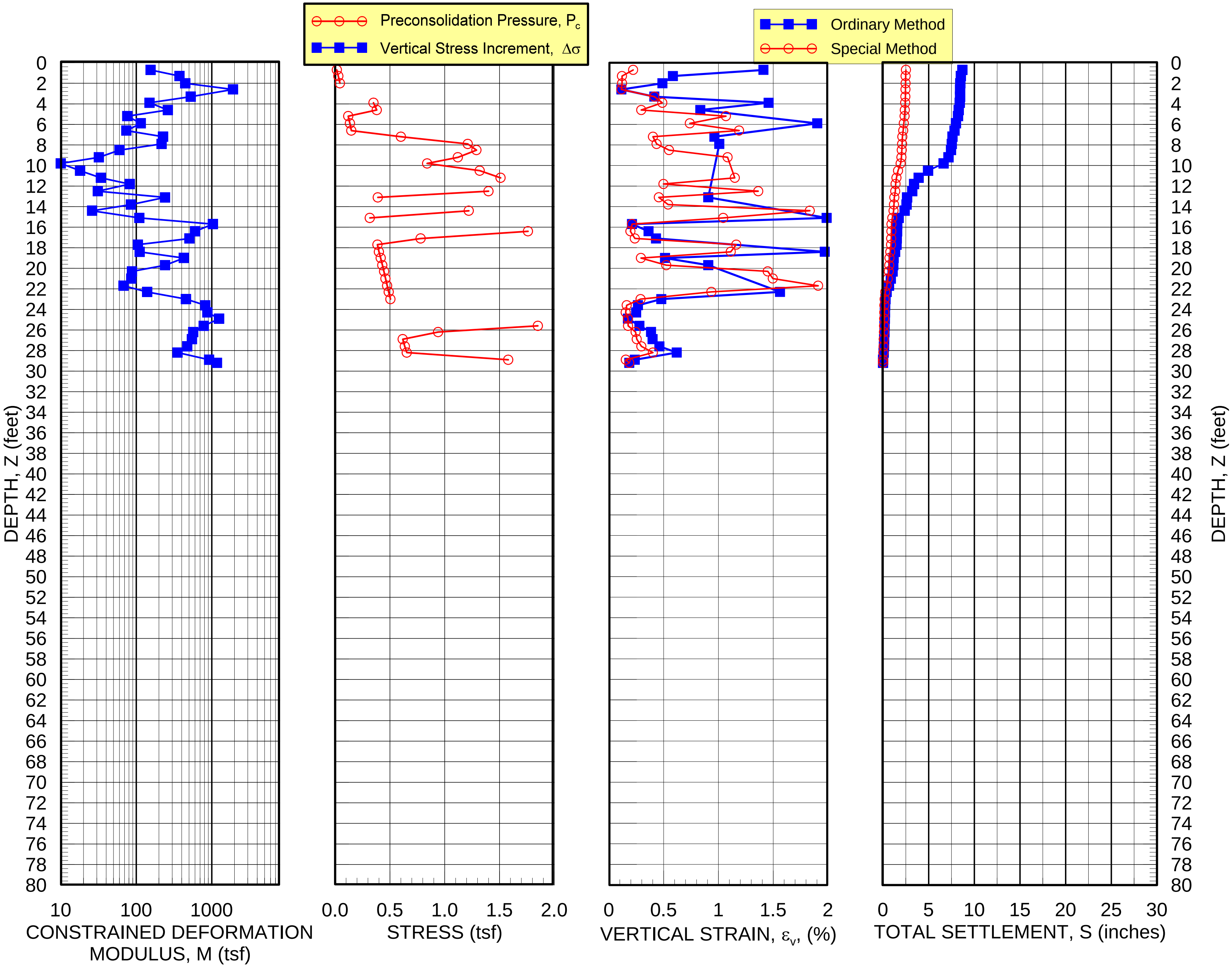
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/23/20

SOUNDING
DMT-205

Ground Surface Elev.: -7.2 feet
Water Depth: -7.3 feet

PREDICTED DMT SETTLEMENT

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N239,209.8 E1,526,059.2



IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/23/20

SOUNDING
DMT-205

DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL) SNDG. NO. :DMT-206
In-Situ Soil Testing, L.C. Page 1a
JOB FILE: Barren Island FILE NO. : 2020-45
LOCATION: Dorchester County, Maryland--N240,904.4 E1,525,276.0
SNDG.BY : R. Failmezger SNDG. DATE: 6/26/20
ANAL.BY : Roger Failmezger, P.E., F. ASCE, D. GE ANAL. DATE: 6/26/20

ANALYSIS PARAMETERS: LO RANGE = 9.92 TSF ROD DIAM. = 2.36 IN BL.THICK. = 0.59 IN SU FACTOR = 1
SURF.ELEV. = -6.9 FT LO GAGE 0 = 0.00 TSF FR.RED.DIA. = 2.64 IN BL.WIDTH = 3.78 IN PHI FACTOR = 1
WATER DEPTH = -7.5 FT HI GAGE 0 = 0.00 TSF LIN.ROD WT. = 8.0 LBF/FTDELTA-A = 0.30 TSF OCR FACTOR = 1
SP.GR.WATER = 1.030 CAL GAGE 0 = 0.00 TSF DELTA/PHI = 0.5 DELTA-B = 0.64 TSF M FACTOR = 1
MAX SU ID = 0.6 SU OPTION = 0 MIN PHI ID = 1.2 OCR OPTION = 0 K0 FACTOR = 1
UNIT CONVERSIONS: 1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI 1 M = 3.2808 FT

Z (FT)	ELEV (FT)	THRUST (LBF)	A (TSF)	B (TSF)	C (TSF)	DA (TSF)	DB (TSF)	ZMRNG (TSF)	ZMLO (TSF)	ZMHI (TSF)	ZMCAL (TSF)	P0 (TSF)	P1 (TSF)	P2 (TSF)	U0 (TSF)	GAMMA (PCF)	SVP (TSF)
*****	******	******	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	******	******	******
0.7	-7.5	22	0.06	1.18	-0.03	0.30	0.64	9.92	0.00	0.00	0.00	0.35	0.54	0.27	0.264	94.8	0.016
1.3	-8.2	1279	0.43	3.17		0.30	0.64	9.92	0.00	0.00	0.00	0.64	2.54		0.285	107.3	0.028
2.0	-8.9	2734	2.90	7.56	0.04	0.30	0.64	9.92	0.00	0.00	0.00	3.02	6.92	0.34	0.306	113.6	0.043
2.6	-9.5	2426	2.71	8.12	0.01	0.30	0.64	9.92	0.00	0.00	0.00	2.80	7.49	0.31	0.327	119.2	0.060
3.3	-10.2	2315	1.73	7.01	0.07	0.30	0.64	9.92	0.00	0.00	0.00	1.82	6.37	0.38	0.349	113.6	0.077
3.9	-10.8	2999	1.94	7.84	0.10	0.30	0.64	9.92	0.00	0.00	0.00	1.99	7.20	0.41	0.370	113.6	0.093
4.6	-11.5	2668	0.97	4.68	0.04	0.30	0.64	9.92	0.00	0.00	0.00	1.14	4.04	0.34	0.390	107.3	0.109
5.2	-12.1	2756	1.37	3.98		0.30	0.64	9.92	0.00	0.00	0.00	1.59	3.34		0.411	101.1	0.121
5.9	-12.8	3440	1.14	4.74	0.08	0.30	0.64	9.92	0.00	0.00	0.00	1.31	4.10	0.39	0.432	107.3	0.135
6.6	-13.5	2933	1.93	4.59	0.25	0.30	0.64	9.92	0.00	0.00	0.00	2.15	3.96	0.55	0.454	107.3	0.148
7.2	-14.1	2602	1.69	5.68	0.18	0.30	0.64	9.92	0.00	0.00	0.00	1.84	5.04	0.48	0.475	113.6	0.164
7.9	-14.8	3285	1.63	3.45	0.42	0.30	0.64	9.92	0.00	0.00	0.00	1.89	2.81	0.72	0.496	101.1	0.177
8.5	-15.4	3462	0.90	3.30	0.21	0.30	0.64	9.92	0.00	0.00	0.00	1.13	2.66	0.51	0.517	107.3	0.191
9.2	-16.1	2183	1.09	3.37	0.17	0.30	0.64	9.92	0.00	0.00	0.00	1.33	2.74	0.47	0.539	107.3	0.205
9.8	-16.7	1632	1.16	2.54	0.50	0.30	0.64	9.92	0.00	0.00	0.00	1.44	1.90	0.80	0.560	101.1	0.218
10.5	-17.4	1367	1.14	3.15	0.38	0.30	0.64	9.92	0.00	0.00	0.00	1.39	2.52	0.68	0.580	101.1	0.230
11.2	-18.0	1676	2.07	4.06	0.85	0.30	0.64	9.92	0.00	0.00	0.00	2.32	3.42	1.15	0.601	101.1	0.242
11.8	-18.7	2492	1.37	5.72	0.34	0.30	0.64	9.92	0.00	0.00	0.00	1.50	5.08	0.65	0.622	107.3	0.255
12.5	-19.4	2117	2.13	5.39	0.60	0.30	0.64	9.92	0.00	0.00	0.00	2.32	4.75	0.90	0.644	107.3	0.269
13.1	-20.0	1940	2.26	4.10	1.14	0.30	0.64	9.92	0.00	0.00	0.00	2.52	3.47	1.44	0.665	101.1	0.282
13.8	-20.7	1808	1.66	5.74	0.38	0.30	0.64	9.92	0.00	0.00	0.00	1.81	5.11	0.68	0.686	113.6	0.296
14.4	-21.3	2007	2.38	4.19	1.64	0.30	0.64	9.92	0.00	0.00	0.00	2.64	3.55	1.94	0.707	101.1	0.310
15.1	-22.0	1985	2.07	3.92	1.17	0.30	0.64	9.92	0.00	0.00	0.00	2.33	3.28	1.47	0.728	101.1	0.323
15.7	-22.6	2756	1.74	2.93	1.33	0.30	0.64	9.92	0.00	0.00	0.00	2.04	2.30	1.63	0.750	94.8	0.334
16.4	-23.3	4344	1.60	8.45	0.44	0.30	0.64	9.92	0.00	0.00	0.00	1.61	7.81	0.74	0.770	113.6	0.347
17.1	-23.9	5402	3.90	11.45	0.49	0.30	0.64	9.92	0.00	0.00	0.00	3.87	10.82	0.79	0.791	119.2	0.364
17.7	-24.6	5821	3.45	11.59	0.49	0.30	0.64	9.92	0.00	0.00	0.00	3.39	10.95	0.79	0.812	119.2	0.382
18.4	-25.3	4388	2.72	9.29	0.51	0.30	0.64	9.92	0.00	0.00	0.00	2.75	8.65	0.81	0.834	113.6	0.399
19.0	-25.9	3572	1.65	4.81	0.55	0.30	0.64	9.92	0.00	0.00	0.00	1.84	4.18	0.86	0.855	107.3	0.414
19.7	-26.6	4145	1.40	6.77	0.53	0.30	0.64	9.92	0.00	0.00	0.00	1.48	6.13	0.84	0.876	107.3	0.428
20.3	-27.2	7762	3.58	10.92	0.57	0.30	0.64	9.92	0.00	0.00	0.00	3.56	10.28	0.88	0.897	119.2	0.445
21.0	-27.9	7409	3.45	9.99	0.60	0.30	0.64	9.92	0.00	0.00	0.00	3.47	9.35	0.90	0.918	119.2	0.462
21.7	-28.5	7166	3.15	8.96	0.63	0.30	0.64	9.92	0.00	0.00	0.00	3.22	8.32	0.93	0.940	113.6	0.479
22.3	-29.2	6372	2.93	8.75	0.63	0.30	0.64	9.92	0.00	0.00	0.00	3.00	8.11	0.93	0.960	113.6	0.496
23.0	-29.9	7695	2.64	8.13	0.65	0.30	0.64	9.92	0.00	0.00	0.00	2.71	7.50	0.95	0.981	113.6	0.512
23.6	-30.5	5557	2.68	7.59	0.68	0.30	0.64	9.92	0.00	0.00	0.00	2.79	6.95	0.98	1.002	113.6	0.528
24.3	-31.2	6042	1.95	6.20	0.67	0.30	0.64	9.92	0.00	0.00	0.00	2.09	5.56	0.97	1.023	113.6	0.544
24.9	-31.8	5777	2.10	6.09	0.68	0.30	0.64	9.92	0.00	0.00	0.00	2.24	5.45	0.98	1.045	113.6	0.561
25.6	-32.5	5402	2.12	6.06	0.73	0.30	0.64	9.92	0.00	0.00	0.00	2.28	5.42	1.03	1.066	113.6	0.576
26.2	-33.1	5336	2.38	6.88	0.73	0.30	0.64	9.92	0.00	0.00	0.00	2.51	6.24	1.03	1.087	113.6	0.592
26.9	-33.8	5513	0.82	1.81	0.75	0.30	0.64	9.92	0.00	0.00	0.00	1.13	1.17	1.05	1.108	94.8	0.606
27.6	-34.4	4542	2.03	5.37	0.80	0.30	0.64	9.92	0.00	0.00	0.00	2.21	4.73	1.11	1.130	107.3	0.617
28.2	-35.1	4807	1.87	4.56	0.81	0.30	0.64	9.92	0.00	0.00	0.00	2.09	3.93	1.12	1.150	107.3	0.632
28.9	-35.8	4388	1.90	5.08	0.82	0.30	0.64	9.92	0.00	0.00	0.00	2.09	4.45	1.13	1.171	107.3	0.645
29.5	-36.4	4498	2.80	9.69	0.86	0.30	0.64	9.92	0.00	0.00	0.00	2.81	9.05	1.16	1.192	113.6	0.661
30.2	-37.1	4388	8.00	12.77	4.48	0.30	0.64	9.92	0.00	0.00	0.00	8.11	12.13	4.78	1.213	113.6	0.677
30.8	-37.7	4498	9.55	12.45	6.60	0.30	0.64	9.92	0.00	0.00	0.00	9.76	11.82	6.90	1.235	113.6	0.693
31.5	-38.4	5226	11.78	15.48	8.24	0.30	0.64	9.92	0.00	0.00	0.00	11.94	14.85	8.54	1.256	119.2	0.710
32.2	-39.0	5248	13.58	18.13	9.23	0.30	0.64	9.92	0.00	0.00	0.00	13.71	17.50	9.53	1.277	119.2	0.729
32.8	-39.7	5535	14.49	19.12	9.94	0.30	0.64	9.92	0.00	0.00	0.00	14.61	18.48	10.24	1.298	119.2	0.746
33.5	-40.4	6240	14.20	18.71	9.71	0.30	0.64	9.92	0.00	0.00	0.00	14.32	18.07	10.01	1.319	119.2	0.764
34.1	-41.0	5579	16.51	21.26	10.87	0.30	0.64	9.92	0.00	0.00	0.00	16.62	20.62	11.17	1.340	119.2	0.783
34.8	-41.7	5314	16.52	21.19	10.88	0.30	0.64	9.92	0.00	0.00	0.00	16.63	20.56	11.18	1.361	119.2	0.801
35.4	-42.3	5733	16.32	21.01	10.95	0.30	0.64	9.92	0.00	0.00	0.00	16.43	20.37	11.25	1.382	119.2	0.818
36.1	-43.0	5954	16.24	20.63	10.88	0.30	0.64	9.92	0.00	0.00	0.00	16.38	19.99	11.18	1.403	119.2	0.837
36.7	-43.6	6218	14.33	18.45	9.75	0.30	0.64	9.92	0.00	0.00	0.00	14.48	17.81	10.05	1.425	119.2	0.855
37.4	-44.3	6284	14.45	18.14	10.29	0.30	0.64	9.92	0.00	0.00	0.00	14.62	17.51	10.60	1.446	119.2	0.873
38.1	-44.9	6549	14.46	18.26	10.14	0.30	0.64	9.92	0.00	0.00	0.00	14.62	17.62	10.44	1.467	119.2	0.892
38.7	-45.6	7629	16.05	20.32	10.74	0.30	0.64	9.92	0.00	0.00	0.00	16.18	19.68	11.05	1.488	119.2	0.909
39.4	-46.3	7762	16.37	20.78	10.89	0.30	0.64	9.92	0.00	0.00	0.00	16.50	20.14	11.19	1.509	119.2	0.927
40.0	-46.9	7872	14.90	19.20	10.35	0.30	0.64	9.92	0.00	0.00	0.00	15.03	18.56	10.65	1.531	119.2	0.946
40.7	-47.6	8203	14.20	17.97	10.65	0.30	0.64	9.92	0.00	0.00	0.00	14.36	17.33	10.95	1.551	119.2	0.964
41.3	-48.2	8159	12.56	16.07	9.52	0.30	0.64	9.92	0.00	0.00	0.00	12.74	15.43	9.82	1.572	119.2	0.981
42.0	-48.9	8048	11.21	14.05	8.24	0.30	0.64	9.92	0.00	0.00	0.00	11.42	13.42	8.54	1.593	113.6	0.999
42.7	-49.5	8952	10.21	12.66	7.50	0.30	0.64	9.92	0.00	0.00	0.00	10.44	12.03	7.80	1.615	113.6	1.015

DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL) SNDG. NO. : DMT-206
In-Situ Soil Testing, L.C. Page 2
JOB FILE: Barren Island FILE NO. :2020-45
LOCATION: Dorchester County, Maryland--N240,904.4 E1,525,276.0
SNDG.BY : R. Failmezger SNDG. DATE: 6/26/20
ANAL.BY : Roger Failmezger, P.E., F. ASCE, D. GE ANAL. DATE: 6/26/20

ANALYSIS PARAMETERS: LO RANGE = 9.92 TSF ROD DIAM. = 2.36 IN BL.THICK. = 0.59 IN SU FACTOR = 1
SURF.ELEV. = -6.9 FT LO GAGE 0 = 0.00 TSF FR.RED.DIA. = 2.64 IN BL.WIDTH = 3.78 IN PHI FACTOR = 1
WATER DEPTH = -7.5 FT HI GAGE 0 = 0.00 TSF LIN.ROD WT. = 8.0 LBF/FTDELTA-A = 0.30 TSF OCR FACTOR = 1
SP.GR.WATER = 1.030 CAL GAGE 0 = 0.00 TSF;
DELTA / PHI = 0.5 DELTA - B = 0.64 TSF M FACTOR = 1
MAX SU ID = 0.6 SU OPTION = 0 MIN PHI ID = 1.2 OCR OPTION = 0 K0 FACTOR = 1
UNIT CONVERSIONS: 1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI 1 M = 3.2808 FT

Z (FT)	ELEV (FT)	KD	ID	UD	ED (TSF)	K0	SU (TSF)	QD (TSF)	PHI (DEG)	SIGFF (TSF)	PHIO (DEG)	PC (TSF)	OCR	M (TSF)	SOIL TYPE
*****	******	*****	*****	*****	******	*****	*****	*****	*****	******	*****	*****	*****	******	************
0.7	-7.5	5.92	2.01	0.08	6	1.03		0.5	32.2	0.02	22.4	0.10	6.4	13	MUD
1.3	-8.2	12.82	5.33		66									180	SAND
2.0	-8.9	63.34	1.44	0.01	136	7.66		23.3	42.3	0.07	36.6	17.70	413.0	575	SANDY SILT
2.6	-9.5	41.15	1.90	-0.01	163	5.03		20.8	41.3	0.10	36.0	10.99	183.4	625	SILTY SAND
3.3	-10.2	19.09	3.09	0.02	158	2.30		22.7	43.2	0.13	38.5	2.88	37.4	492	SILTY SAND
3.9	-10.8	17.47	3.20	0.02	181	2.07		30.1	43.9	0.16	39.6	2.83	30.4	547	SILTY SAND
4.6	-11.5	6.88	3.90	-0.06	101	0.67		29.2	45.8	0.19	42.1	0.40	3.6	219	SAND
5.2	-12.1	9.69	1.49		61	1.13		28.9	43.9	0.21	40.1	1.14	9.4	150	SANDY SILT
5.9	-12.8	6.51	3.19	-0.05	97									207	SILTY SAND
6.6	-13.5	11.41	1.07	0.06	63	1.99						2.24	15.1	165	SILT
7.2	-14.1	8.35	2.34	0.00	111	1.06		26.8	41.9	0.27	38.3	1.31	8.0	260	SILTY SAND
7.9	-14.8	7.83	0.66	0.16	32	1.57						1.49	8.4	72	CLAYEY SILT
8.5	-15.4	3.20	2.51	-0.01	53	0.24		39.4	45.7	0.32	42.8	0.09	0.5	78	SILTY SAND
9.2	-16.1	3.82	1.81	-0.09	49	0.53		24.0	41.4	0.34	38.1	0.41	2.0	78	SILTY SAND
9.8	-16.7	4.04	0.52	0.28	16	0.99	0.11					0.66	3.0	25	SILTY CLAY
10.5	-17.4	3.51	1.40	0.12	40	0.62		14.8	37.4	0.37	33.9	0.54	2.4	58	SANDY SILT
11.2	-18.0	7.09	0.65	0.32	39	1.47						1.74	7.2	82	CLAYEY SILT
11.8	-18.7	3.44	4.09	0.03	124	0.50		27.6	41.0	0.42	38.0	0.44	1.7	195	SAND
12.5	-19.4	6.21	1.45	0.15	85	0.94		21.0	37.9	0.44	34.7	1.53	5.7	172	SANDY SILT
13.1	-20.0	6.54	0.52	0.42	33	1.40	0.27					1.80	6.4	68	SILTY CLAY
13.8	-20.7	3.78	2.95	-0.01	115	0.66		19.2	37.4	0.48	34.3	0.78	2.6	189	SILTY SAND
14.4	-21.3	6.22	0.47	0.64	31	1.35	0.28					1.83	5.9	64	SILTY CLAY
15.1	-22.0	4.95	0.60	0.47	33	1.15	0.22					1.33	4.1	58	SILTY CLAY
15.7	-22.6	3.85	0.20	0.68	9	0.96	0.17					0.93	2.8	14	MUD
16.4	-23.3	2.41	7.44	-0.03	215	0.28		49.6	43.4	0.58	41.1	0.21	0.6	271	SAND
17.1	-23.9	8.48	2.25	0.00	241	1.10		54.6	41.2	0.61	38.9	3.09	8.5	566	SILTY SAND
17.7	-24.6	6.74	2.94	-0.01	262	0.85		61.1	42.2	0.64	40.0	1.99	5.2	566	SILTY SAND
18.4	-25.3	4.79	3.09	-0.01	205	0.67		46.9	41.0	0.66	38.7	1.22	3.1	381	SILTY SAND
19.0	-25.9	2.38	2.37	0.00	81	0.39		40.4	40.7	0.69	38.5	0.41	1.0	97	SILTY SAND
19.7	-26.6	1.41	7.69	-0.07	161									137	SAND
20.3	-27.2	6.00	2.52	-0.01	233	0.71		83.4	43.4	0.75	41.5	1.66	3.7	476	SILTY SAND
21.0	-27.9	5.51	2.31	-0.01	205	0.67		79.9	43.1	0.78	41.2	1.50	3.3	400	SILTY SAND
21.7	-28.5	4.74	2.25	0.00	177	0.57		78.0	43.0	0.80	41.2	1.17	2.4	322	SILTY SAND
22.3	-29.2	4.10	2.52	-0.02	177	0.53		69.7	42.4	0.82	40.6	0.99	2.0	302	SILTY SAND
23.0	-29.9	3.39	2.75	-0.02	166	0.37		86.0	43.9	0.87	42.3	0.54	1.1	256	SILTY SAND
23.6	-30.5	3.38	2.33	-0.01	144	0.48		61.3	41.4	0.88	39.7	0.85	1.6	218	SILTY SAND
24.3	-31.2	1.96	3.26	-0.05	120	0.25		69.3	42.8	0.92	41.2	0.26	0.5	131	SILTY SAND
24.9	-31.8	2.15	2.66	-0.05	111									125	SILTY SAND
25.6	-32.5	2.09	2.61	-0.03	110	0.32		61.5	41.5	0.96	39.9	0.42	0.7	120	SILTY SAND
26.2	-33.1	2.39	2.64	-0.04	129	0.38		60.1	41.0	0.98	39.4	0.57	1.0	159	SILTY SAND
26.9	-33.8	0.03	2.52	-3.08	1									1	MUD
27.6	-34.4	1.75	2.34	-0.02	88	0.33		52.2	40.0	1.01	38.4	0.44	0.7	79	SILTY SAND
28.2	-35.1	1.48	1.97	-0.04	64	0.29		55.7	40.5	1.04	38.9	0.33	0.5	54	SILTY SAND
28.9	-35.8	1.42	2.56	-0.05	81	0.31		50.9	39.7	1.05	38.1	0.38	0.6	70	SILTY SAND
29.5	-36.4	2.44	3.88	-0.02	217	0.45		50.2	39.0	1.08	37.4	0.84	1.3	277	SAND
30.2	-37.1	10.19	0.58	0.52	140	1.86	1.14					8.58	12.7	352	SILTY CLAY
30.8	-37.7	12.30	0.24	0.66	71	2.09	1.47					11.79	17.0	193	CLAY
31.5	-38.4	15.05	0.27	0.68	101	2.36	1.94					16.54	23.3	291	CLAY
32.2	-39.0	17.07	0.31	0.66	132	2.54	2.34					20.64	28.3	396	CLAY
32.8	-39.7	17.84	0.29	0.67	135	2.60	2.53					22.67	30.4	409	CLAY
33.5	-40.4	17.01	0.29	0.67	131	2.53	2.44					21.56	28.2	390	CLAY
34.1	-41.0	19.52	0.26	0.64	139	2.74	2.98					27.36	35.0	435	CLAY
34.8	-41.7	19.07	0.26	0.64	136	2.70	2.95					27.00	33.7	424	CLAY
35.4	-42.3	18.38	0.26	0.66	137	2.65	2.88					26.06	31.8	420	CLAY
36.1	-43.0	17.89	0.24	0.65	125	2.61	2.85					25.54	30.5	383	CLAY
36.7	-43.6	15.27	0.26	0.66	116	2.38	2.39					20.37	23.8	335	CLAY
37.4	-44.3	15.08	0.22	0.69	100	2.36	2.40					20.41	23.4	290	CLAY
38.1	-44.9	14.76	0.23	0.68	104	2.33	2.38					20.14	22.6	299	CLAY
38.7	-45.6	16.16	0.24	0.65	121	2.46	2.72					23.68	26.0	358	CLAY
39.4	-46.3	16.16	0.24	0.65	126	2.46	2.78					24.15	26.0	373	CLAY
40.0	-46.9	14.28	0.26	0.68	122	2.28	2.43					20.30	21.5	348	CLAY
40.7	-47.6	13.29	0.23	0.73	103	2.19	2.27					18.50	19.2	285	CLAY
41.3	-48.2	11.37	0.24	0.74	94	1.99	1.90					14.76	15.0	245	CLAY
42.0	-48.9	9.84	0.20	0.71	69	1.82	1.61					11.99	12.0	172	CLAY
42.7	-49.5	8.69	0.18	0.70	55	1.68	1.40					10.04	9.9	129	CLAY

DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL)   SNDG. NO. :DMT-206
In-Situ Soil Testing, L.C.   Page 2a
JOB FILE: Barren Island   FILE NO. : 2020-45
LOCATION: Dorchester County, Maryland--N240,904.4 E1,525,276.0
SNDG.BY : R. Failmezger   SNDG. DATE: 6/26/20
ANAL.BY : Roger Failmezger, P.E., F. ASCE, D. GE   ANAL. DATE: 6/26/20

ANALYSIS PARAMETERS: LO RANGE = 10.36 TSF   ROD DIAM. = 0.93 IN   BL.THICK. = 0.02 IN   SU FACTOR = 1
SURF.ELEV. = -22.6 FT   LO GAGE 0 = 0.00 TSF   FR.RED.DIA. = 1.04 IN   BL.WIDTH = 0.15 IN   PHI FACTOR = 1
WATER DEPTH = -7.5 FT   HI GAGE 0 = 0.00 TSF   LIN.ROD WT. = 5.4 LBF/FT   DELTA-A = 0.31 TSF   OCR FACTOR = 1
SP.GR.WATER = 1.030   CAL GAGE 0 = 0.00 TSF   DELTA/PHI = 0.5   DELTA-B = 0.67 TSF   M FACTOR = 1
MAX SU ID = 0.6   SU OPTION = 0   MIN PHI ID = 1.2   OCR OPTION = 0   K0 FACTOR = 1
UNIT CONVERSIONS: 1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI   1 M = 3.2808 FT

Z (FT)	ELEV (FT)	THRUST (LBF)	A (TSF)	B (TSF)	C (TSF)	DA (TSF)	DB (TSF)	ZMRNG (TSF)	ZMLO (TSF)	ZMHI (TSF)	ZMCAL (TSF)	P0 (TSF)	P1 (TSF)	P2 (TSF)	U0 (TSF)	GAMMA (PCF)	SVP (TSF)
*****	******	******	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	******	******	******
43.3	-50.2	8930	9.97	12.80	7.93	0.30	0.64	9.92	0.00	0.00	0.00	10.18	12.16	8.24	1.636	113.6	1.031
44.0	-50.9	9018	10.77	13.97	7.91	0.30	0.64	9.92	0.00	0.00	0.00	10.96	13.33	8.22	1.657	113.6	1.047
44.6	-51.5	9107	12.53	18.05	9.27	0.30	0.64	9.92	0.00	0.00	0.00	12.60	17.41	9.57	1.678	119.2	1.065
45.3	-52.2	9967	13.73	18.99	10.54	0.30	0.64	9.92	0.00	0.00	0.00	13.81	18.35	10.85	1.699	119.2	1.083
45.9	-52.8	10143	14.36	19.70	11.24	0.30	0.64	9.92	0.00	0.00	0.00	14.44	19.06	11.55	1.721	119.2	1.100
46.6	-53.5	10275	15.01	21.09	11.64	0.30	0.64	9.92	0.00	0.00	0.00	15.05	20.45	11.94	1.741	119.2	1.119
47.2	-54.1	10893	15.65	21.61	11.89	0.30	0.64	9.92	0.00	0.00	0.00	15.70	20.97	12.19	1.762	119.2	1.137
47.9	-54.8	11246	15.25	21.72	11.46	0.30	0.64	9.92	0.00	0.00	0.00	15.28	21.08	11.77	1.783	119.2	1.155
48.6	-55.4	10937	15.16	20.21	12.27	0.30	0.64	9.92	0.00	0.00	0.00	15.25	19.58	12.57	1.804	119.2	1.173
49.2	-56.1	11047	16.58	23.00	12.79	0.30	0.64	9.92	0.00	0.00	0.00	16.61	22.36	13.09	1.826	128.5	1.192
49.9	-56.8	10562	15.95	21.45	12.73	0.30	0.64	9.92	0.00	0.00	0.00	16.03	20.82	13.03	1.847	119.2	1.212
50.5	-57.4	11620	15.62	21.01	12.53	0.30	0.64	9.92	0.00	0.00	0.00	15.70	20.37	12.83	1.868	119.2	1.231
51.2	-58.1	11775	17.07	23.26	13.13	0.30	0.64	9.92	0.00	0.00	0.00	17.11	22.62	13.44	1.889	128.5	1.250
51.8	-58.7	11753	18.04	24.91	13.50	0.30	0.64	9.92	0.00	0.00	0.00	18.05	24.27	13.80	1.911	128.5	1.272
52.5	-59.4	11113	17.61	24.50	13.54	0.30	0.64	9.92	0.00	0.00	0.00	17.62	23.87	13.84	1.931	128.5	1.292
53.1	-60.0	11334	17.61	24.66	13.28	0.30	0.64	9.92	0.00	0.00	0.00	17.61	24.02	13.58	1.952	128.5	1.313
53.8	-60.7	11819	18.20	25.35	13.87	0.30	0.64	9.92	0.00	0.00	0.00	18.19	24.71	14.18	1.973	128.5	1.334
54.5	-61.4	12238	17.50	24.25	13.47	0.30	0.64	9.92	0.00	0.00	0.00	17.51	23.62	13.77	1.994	128.5	1.356
55.1	-62.0	13406	17.08	23.20	13.29	0.30	0.64	9.92	0.00	0.00	0.00	17.12	22.56	13.59	2.016	128.5	1.377
55.8	-62.7	13649	18.34	25.33	14.04	0.30	0.64	9.92	0.00	0.00	0.00	18.34	24.69	14.34	2.037	128.5	1.398
56.4	-63.3	14178	18.12	25.13	14.03	0.30	0.64	9.92	0.00	0.00	0.00	18.12	24.49	14.33	2.058	128.5	1.419
57.1	-64.0	13583	16.99	23.18	13.33	0.30	0.64	9.92	0.00	0.00	0.00	17.03	22.54	13.63	2.079	119.2	1.439
57.7	-64.6	14685	16.54	22.17	13.15	0.30	0.64	9.92	0.00	0.00	0.00	16.61	21.54	13.46	2.099	119.2	1.456
58.4	-65.3	15170	16.15	21.14	13.10	0.30	0.64	9.92	0.00	0.00	0.00	16.26	20.50	13.40	2.121	119.2	1.475
59.1	-65.9	15501	16.38	21.26	13.18	0.30	0.64	9.92	0.00	0.00	0.00	16.48	20.62	13.48	2.142	119.2	1.493
59.7	-66.6	16097	17.73	23.65	13.94	0.30	0.64	9.92	0.00	0.00	0.00	17.78	23.01	14.24	2.163	128.5	1.513
60.4	-67.3	16273	19.71	26.88	13.31	0.30	0.64	9.92	0.00	0.00	0.00	19.70	26.25	13.61	2.184	128.5	1.534

DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL) SNDG. NO. : DMT-206
In-Situ Soil Testing, L.C.
JOB FILE: Barren Island FILE NO. :2020-45
LOCATION: Dorchester County, Maryland--N240,904.4 E1,525,276.0
SNDG.BY : R. Failmezger SNDG. DATE: 6/26/20
ANAL.BY : Roger Failmezger, P.E., F. ASCE, D. GE ANAL. DATE: 6/26/20

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ANALYSIS PARAMETERS:   LO RANGE   = 10.36 TSF  ROD DIAM.    =  0.93 IN    BL.THICK.  =  0.02 IN    SU  FACTOR = 1
SURF.ELEV.  = -22.6 FT LO  GAGE 0 =  0.00 TSF  FR.RED.DIA. =  1.04 IN    BL.WIDTH   =  0.15 IN    PHI FACTOR = 1
WATER DEPTH =  -7.5 FT HI  GAGE 0 =  0.00 TSF  LIN.ROD WT. =   5.4 LBF/FTDELTA-A    =  0.31 TSF    OCR FACTOR = 1
SP.GR.WATER = 1.030     CAL GAGE 0 =  0.00 TSF;
                                                  DELTA / PHI =   0.5       DELTA - B =  0.67 TSF    M FACTOR = 1
MAX SU ID   =   0.6    SU OPTION  =     0      MIN PHI ID  =   1.2      OCR OPTION =     0       K0 FACTOR  = 1
UNIT CONVERSIONS:      1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI    1 M = 3.2808 FT
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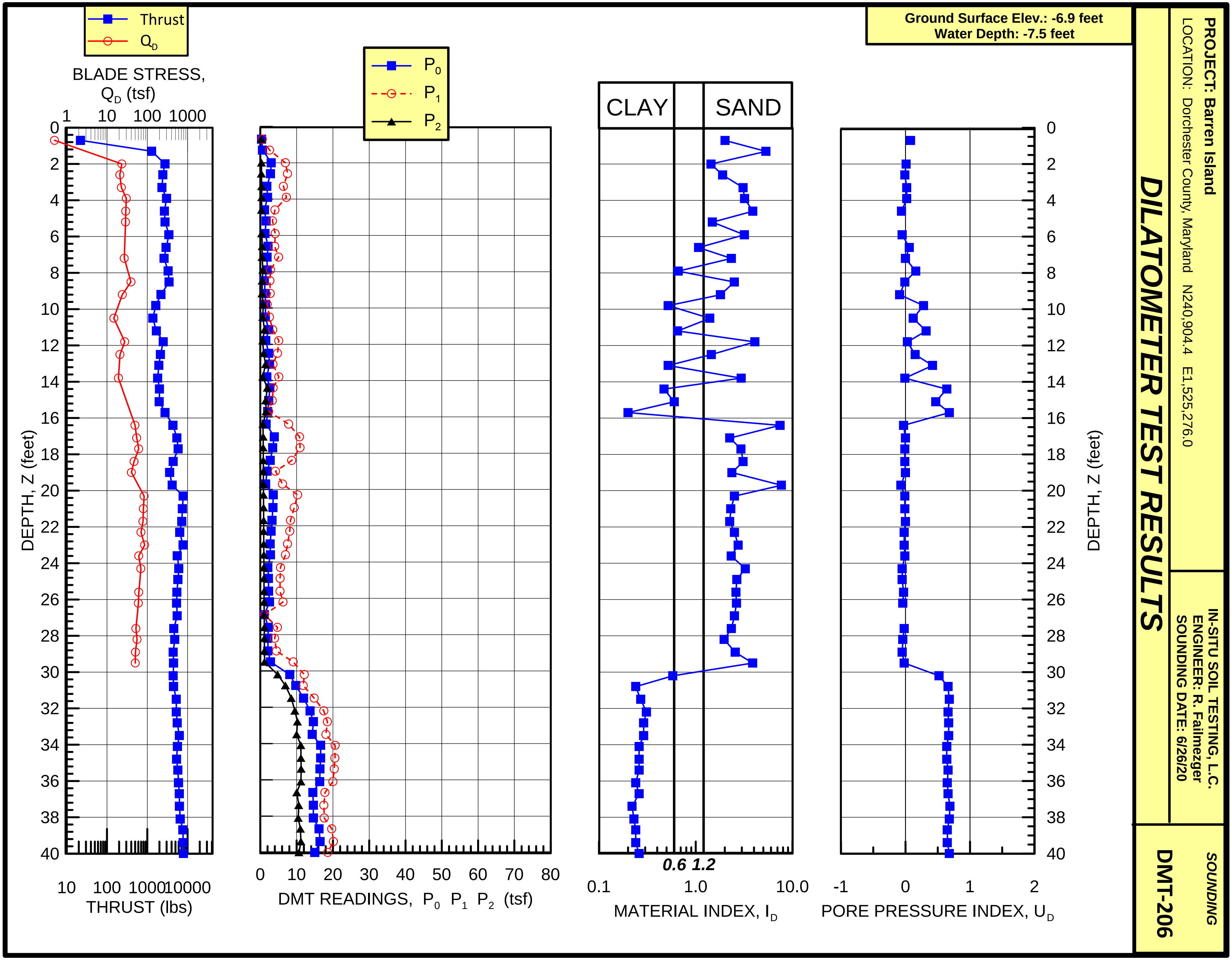
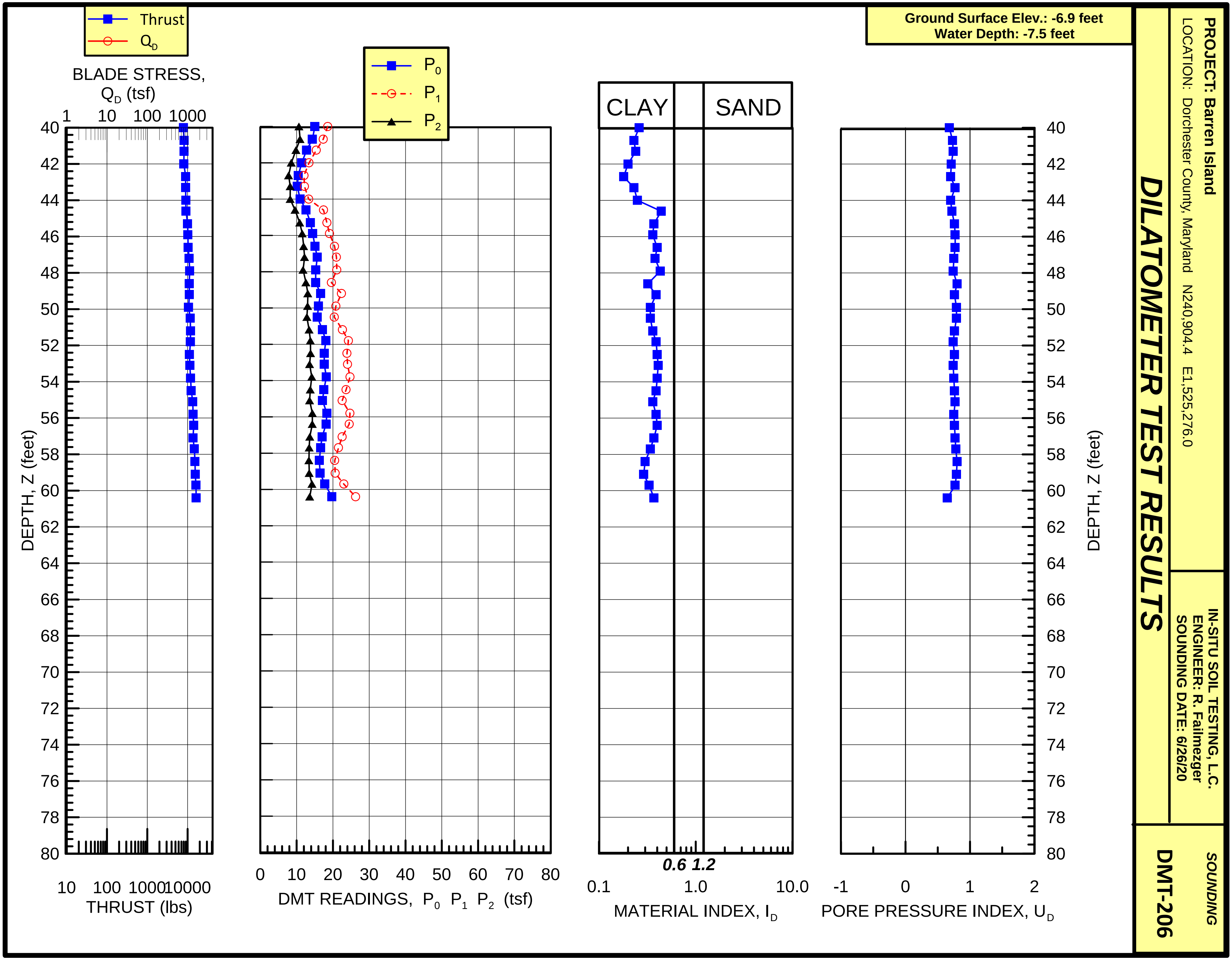
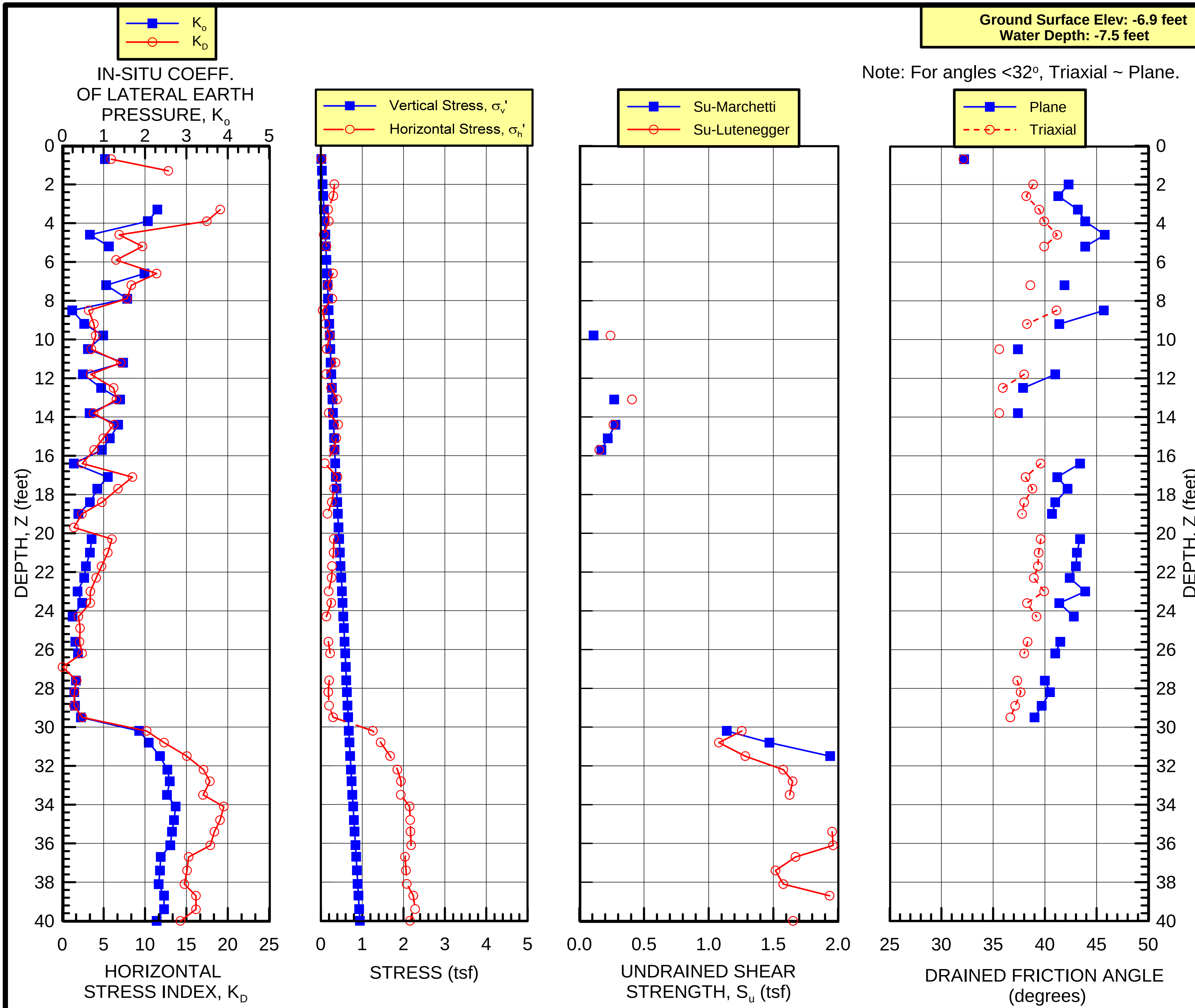
Z (FT)	ELEV (FT)	KD	ID	UD	ED (TSF)	K0	SU (TSF)	QD (TSF)	PHI (DEG)	SIGFF (TSF)	PHIO (DEG)	PC (TSF)	OCR	M (TSF)	SOIL TYPE
*****	******	*****	*****	*****	******	*****	*****	*****	*****	******	*****	*****	*****	******	************
43.3	-50.2	8.28	0.23	0.77	69	1.63	1.34					9.47	9.2	159	CLAY
44.0	-50.9	8.89	0.25	0.70	82	1.71	1.48					10.73	10.2	195	CLAY
44.6	-51.5	10.26	0.44	0.72	167	1.87	1.81					13.65	12.8	422	SILTY CLAY
45.3	-52.2	11.19	0.37	0.76	158	1.97	2.05					15.89	14.7	410	SILTY CLAY
45.9	-52.8	11.55	0.36	0.77	161	2.01	2.17					16.98	15.4	423	SILTY CLAY
46.6	-53.5	11.90	0.40	0.77	187	2.05	2.29					18.08	16.2	499	SILTY CLAY
47.2	-54.1	12.26	0.38	0.75	183	2.08	2.41					19.24	16.9	493	SILTY CLAY
47.9	-54.8	11.69	0.43	0.74	201	2.02	2.31					18.13	15.7	532	SILTY CLAY
48.6	-55.4	11.47	0.32	0.80	150	2.00	2.29					17.88	15.2	394	CLAY
49.2	-56.1	12.39	0.39	0.76	199	2.10	2.57					20.53	17.2	540	SILTY CLAY
49.9	-56.8	11.70	0.34	0.79	166	2.03	2.42					19.06	15.7	441	CLAY
50.5	-57.4	11.24	0.34	0.79	162	1.98	2.34					18.19	14.8	423	CLAY
51.2	-58.1	12.18	0.36	0.76	191	2.08	2.63					20.92	16.7	514	SILTY CLAY
51.8	-58.7	12.69	0.39	0.74	216	2.13	2.82					22.71	17.9	589	SILTY CLAY
52.5	-59.4	12.14	0.40	0.76	217	2.07	2.70					21.53	16.7	582	SILTY CLAY
53.1	-60.0	11.92	0.41	0.74	222	2.05	2.69					21.28	16.2	593	SILTY CLAY
53.8	-60.7	12.15	0.40	0.75	227	2.07	2.80					22.27	16.7	608	SILTY CLAY
54.5	-61.4	11.44	0.39	0.76	212	2.00	2.64					20.61	15.2	556	SILTY CLAY
55.1	-62.0	10.97	0.36	0.77	189	1.95	2.55					19.60	14.2	489	SILTY CLAY
55.8	-62.7	11.66	0.39	0.75	220	2.02	2.79					21.89	15.7	583	SILTY CLAY
56.4	-63.3	11.32	0.40	0.76	221	1.99	2.72					21.20	14.9	578	SILTY CLAY
57.1	-64.0	10.39	0.37	0.77	191	1.88	2.48					18.80	13.1	485	SILTY CLAY
57.7	-64.6	9.96	0.34	0.78	171	1.83	2.38					17.82	12.2	427	CLAY
58.4	-65.3	9.58	0.30	0.80	147	1.79	2.30					16.99	11.5	362	CLAY
59.1	-65.9	9.61	0.29	0.79	143	1.79	2.34					17.27	11.6	353	CLAY
59.7	-66.6	10.32	0.33	0.77	182	1.88	2.59					19.58	12.9	459	CLAY
60.4	-67.3	11.42	0.37	0.65	228	2.00	2.98					23.24	15.1	596	SILTY CLAY



Thrust
Q_D
BLADE STRESS, Q_D (tsf)
1 10 100 1000
DEPTH, Z (feet)
10 100 1000 10000
THRUST (lbs)
P_0
P_1
P_2
0 10 20 30 40 50 60 70 80
DMT READINGS, P_0 P_1 P_2 (tsf)
CLAY
SAND
0.6 1.2
0.1 1.0 10.0
MATERIAL INDEX, I_D
-1 0 1 2
PORE PRESSURE INDEX, U_D
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40
Ground Surface Elev.: -6.9 feet
Water Depth: -7.5 feet
PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N240,904.4 E1,525,276.0
DILATOMETER TEST RESULTS
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 6/26/20
SOUNDING
DMT-206



Thrust
Q_D
BLADE STRESS, Q_D (tsf)
1 10 100 1000
DEPTH, Z (feet)
40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80
10 100 1000 10000
THRUST (lbs)
P_0
P_1
P_2
0 10 20 30 40 50 60 70 80
DMT READINGS, P_0 P_1 P_2 (tsf)
CLAY
SAND
0.6 1.2
0.1 1.0 10.0
MATERIAL INDEX, I_D
-1 0 1 2
PORE PRESSURE INDEX, U_D
Ground Surface Elev.: -6.9 feet
Water Depth: -7.5 feet
DILATOMETER TEST RESULTS
PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N240,904.4 E1,525,276.0
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 6/26/20
SOUNDING
DMT-206



INTERPRETED DMT STRENGTH PARAMETERS

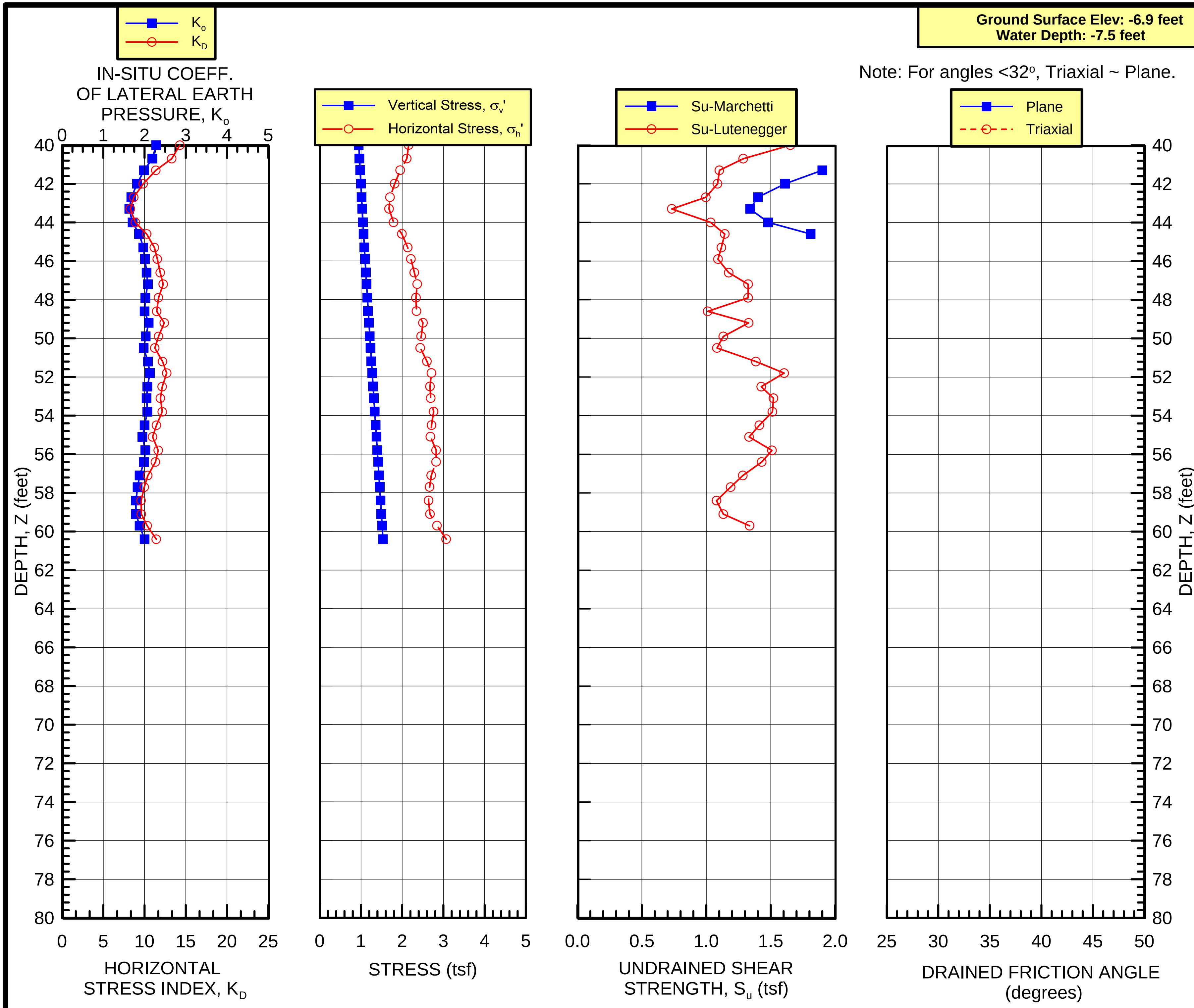
PROJECT: Barren Island

LOCATION: Dorchester County, Maryland N240,904.4 E1,525,276.0

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/26/20

SOUNDING
DMT-206

INTERPRETED DMT STRENGTH PARAMETERS



PROJECT: Barren Island

LOCATION: Dorchester County, Maryland N240,904.4 E1,525,276.0

IN-SITU SOIL TESTING, L.C.

ENGINEER: R. Failmezger, P.E., F. ASCE, D GE

SOUNDING DATE: 6/26/20

SOUNDING

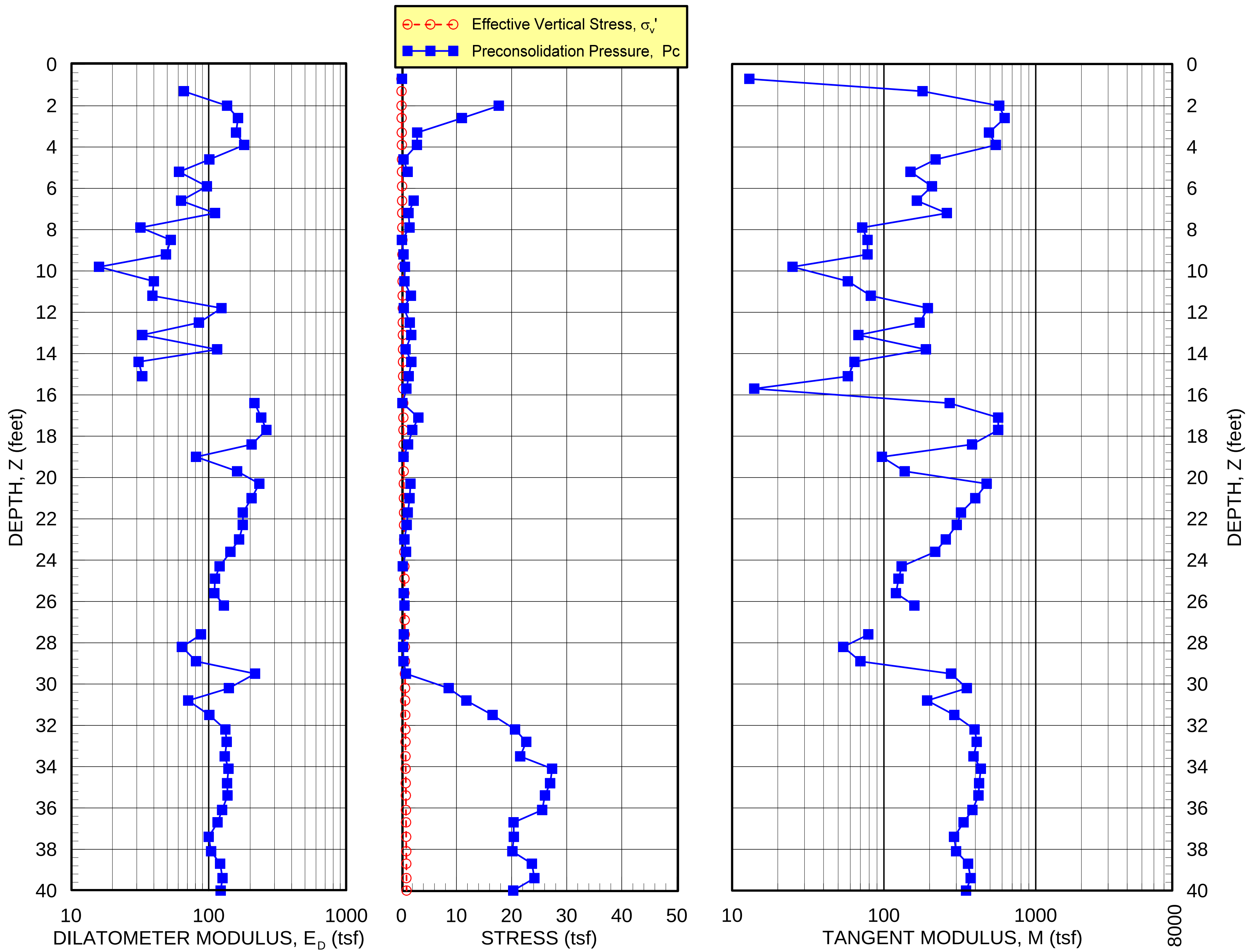
DMT-206

INTERPRETED DMT DEFORMATION PARAMETERS

PROJECT: Barren Island

LOCATION: Dorchester County, Maryland N240,904.4 E1,525,276.0

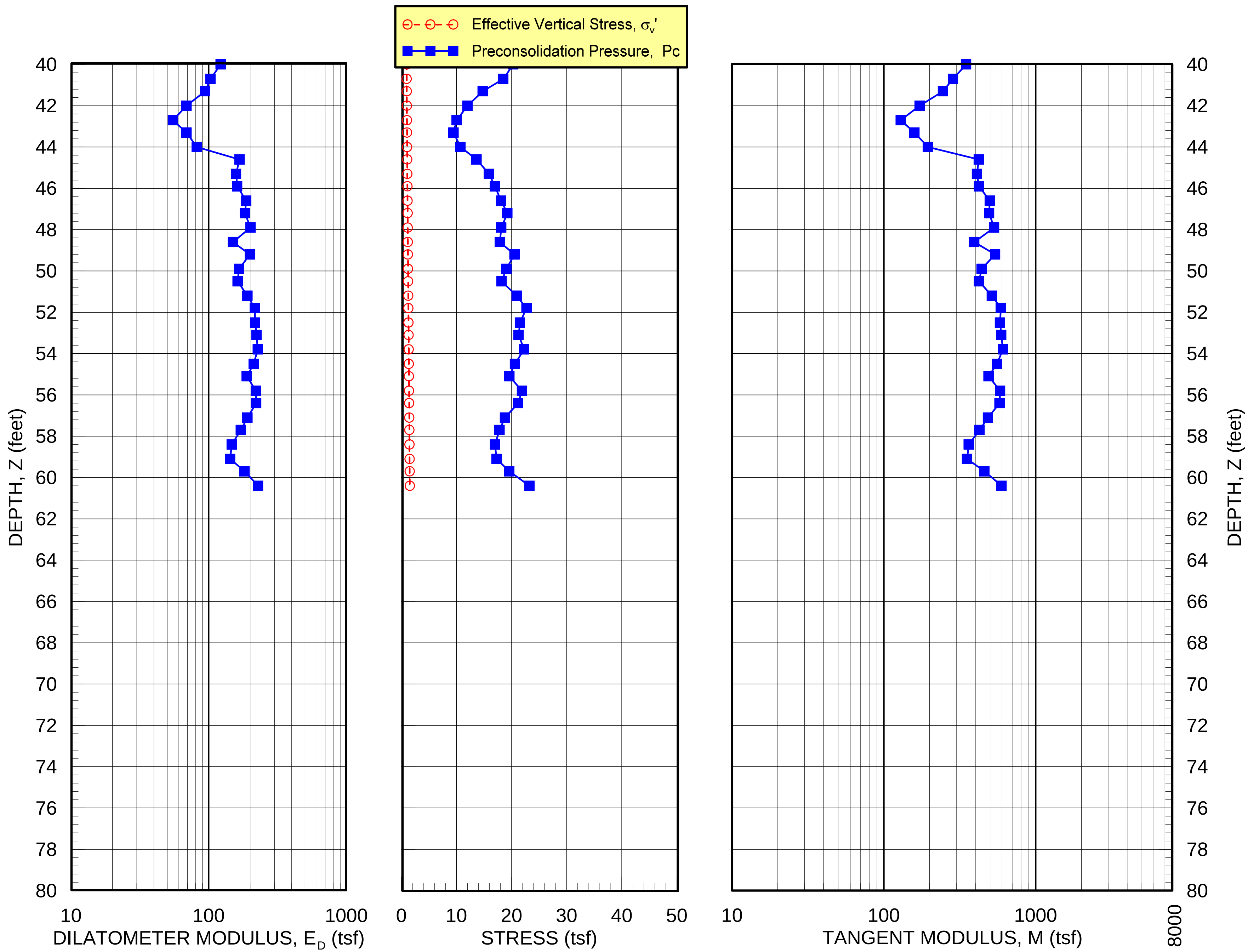
Ground Surface Elev.: -6.9 feet
Water Depth: -7.5 feet



IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/26/20

SOUNDING
DMT-206

Ground Surface Elev.: -6.9 feet
Water Depth: -7.5 feet

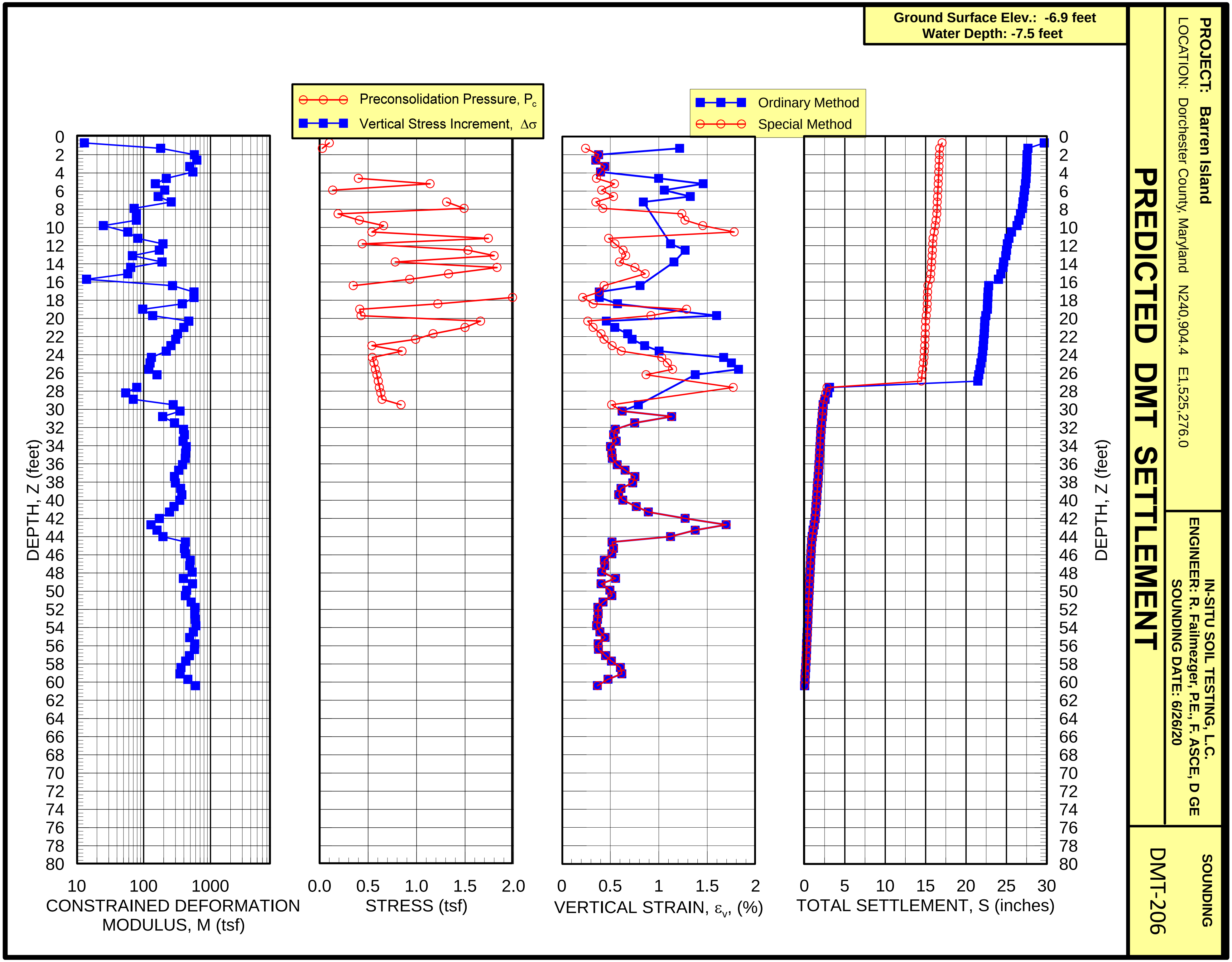


INTERPRETED DMT DEFORMATION PARAMETERS

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N240,904.4 E1,525,276.0

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/26/20

SOUNDING
DMT-206


Ground Surface Elev.: -6.9 feet
Water Depth: -7.5 feet
Preconsolidation Pressure, P_c
Vertical Stress Increment, $\Delta\sigma$
Ordinary Method
Special Method
DEPTH, Z (feet)
CONSTRAINED DEFORMATION MODULUS, M (tsf)
STRESS (tsf)
VERTICAL STRAIN, ε_v, (%)
TOTAL SETTLEMENT, S (inches)
PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N240,904.4 E1,525,276.0
PREDICTED DMT SETTLEMENT
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/26/20
SOUNDING
DMT-206

DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL) SNDG. NO. :DMT-207
In-Situ Soil Testing, L.C. Page 1a
JOB FILE: Barren Island FILE NO. : 2020-45
LOCATION: Dorchester County, Maryland--N242,819.3 E1,524,861.6
SNDG.BY : R. Failmezger SNDG. DATE: 6/26/20
ANAL.BY : Roger Failmezger, P.E., F. ASCE, D. GE ANAL. DATE: 6/26/20

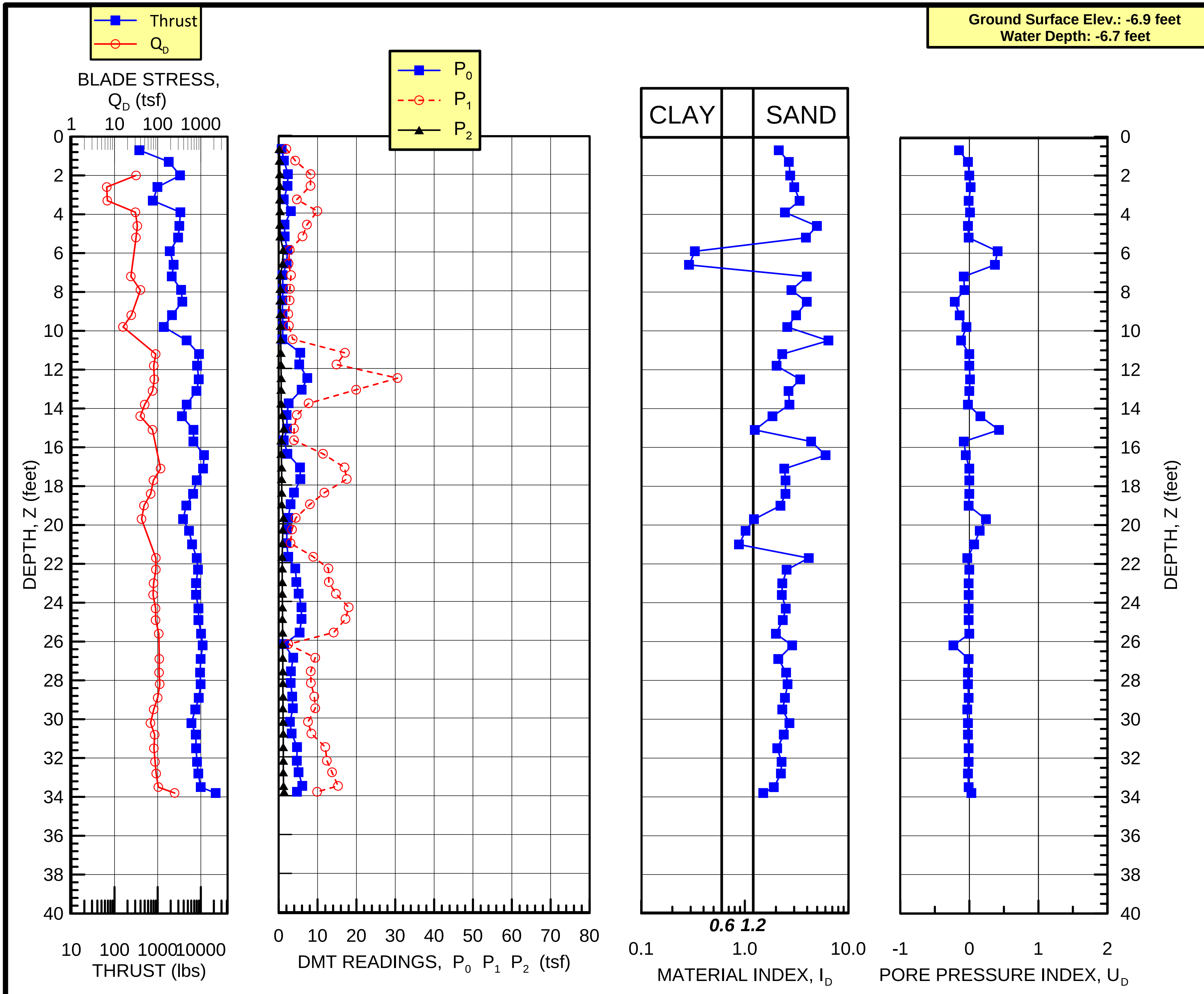
ANALYSIS PARAMETERS: LO RANGE = 9.92 TSF ROD DIAM. = 2.36 IN BL.THICK. = 0.59 IN SU FACTOR = 1
SURF.ELEV. = -6.9 FT LO GAGE 0 = 0.00 TSF FR.RED.DIA. = 2.64 IN BL.WIDTH = 3.78 IN PHI FACTOR = 1
WATER DEPTH = -6.6 FT HI GAGE 0 = 0.00 TSF LIN.ROD WT. = 8.0 LBF/FTDELTA-A = 0.27 TSF OCR FACTOR = 1
SP.GR.WATER = 1.030 CAL GAGE 0 = 0.00 TSF DELTA/PHI = 0.5 DELTA-B = 0.64 TSF M FACTOR = 1
MAX SU ID = 0.6 SU OPTION = 0 MIN PHI ID = 1.2 OCR OPTION = 0 K0 FACTOR = 1
UNIT CONVERSIONS: 1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI 1 M = 3.2808 FT

Z (FT)	ELEV (FT)	THRUST (LBF)	A (TSF)	B (TSF)	C (TSF)	DA (TSF)	DB (TSF)	ZMRNG (TSF)	ZMLO (TSF)	ZMHI (TSF)	ZMCAL (TSF)	P0 (TSF)	P1 (TSF)	P2 (TSF)	U0 (TSF)	GAMMA (PCF)	SVP (TSF)
*****	******	******	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	******	******	******
0.7	-7.5	375	0.57	2.61	-0.13	0.27	0.64	9.92	0.00	0.00	0.00	0.79	1.97	0.15	0.232	107.3	0.016
1.3	-8.2	1808	1.21	4.90	-0.04	0.27	0.64	9.92	0.00	0.00	0.00	1.35	4.26	0.23	0.254	107.3	0.029
2.0	-8.9	3308	2.39	8.83	0.01	0.27	0.64	9.92	0.00	0.00	0.00	2.39	8.20	0.28	0.275	113.6	0.045
2.6	-9.5	992	2.28	8.83	0.06	0.27	0.64	9.92	0.00	0.00	0.00	2.27	8.20	0.33	0.295	113.6	0.061
3.3	-10.2	772	1.20	5.32	0.03	0.27	0.64	9.92	0.00	0.00	0.00	1.32	4.69	0.30	0.316	113.6	0.077
3.9	-10.8	3352	3.18	10.61	0.09	0.27	0.64	9.92	0.00	0.00	0.00	3.13	9.97	0.37	0.337	119.2	0.094
4.6	-11.5	3175	1.51	7.90	0.06	0.27	0.64	9.92	0.00	0.00	0.00	1.51	7.27	0.33	0.359	113.6	0.112
5.2	-12.1	2977	1.50	6.79	0.09	0.27	0.64	9.92	0.00	0.00	0.00	1.56	6.15	0.37	0.380	113.6	0.127
5.9	-12.8	1918	2.00	3.49	0.89	0.27	0.64	9.92	0.00	0.00	0.00	2.24	2.85	1.16	0.401	101.1	0.142
6.6	-13.5	2337	1.83	3.18	0.76	0.27	0.64	9.92	0.00	0.00	0.00	2.08	2.55	1.03	0.422	101.1	0.153
7.2	-14.1	2117	0.82	3.81	0.13	0.27	0.64	9.92	0.00	0.00	0.00	0.99	3.17	0.40	0.444	107.3	0.167
7.9	-14.8	3506	0.91	3.51	0.15	0.27	0.64	9.92	0.00	0.00	0.00	1.10	2.87	0.42	0.465	107.3	0.181
8.5	-15.4	3726	0.77	3.46	0.11	0.27	0.64	9.92	0.00	0.00	0.00	0.96	2.82	0.39	0.485	107.3	0.195
9.2	-16.1	2139	0.78	3.11	0.17	0.27	0.64	9.92	0.00	0.00	0.00	0.98	2.47	0.44	0.506	107.3	0.209
9.8	-16.7	1389	0.92	3.28	0.23	0.27	0.64	9.92	0.00	0.00	0.00	1.12	2.64	0.50	0.527	107.3	0.223
10.5	-17.4	4675	0.81	4.24	0.23	0.27	0.64	9.92	0.00	0.00	0.00	0.96	3.60	0.50	0.549	107.3	0.237
11.2	-18.0	9085	5.85	17.71	0.30	0.27	0.64	9.92	0.00	0.00	0.00	5.57	17.07	0.57	0.570	125.4	0.254
11.8	-18.7	8225	5.49	15.51	0.32	0.27	0.64	9.92	0.00	0.00	0.00	5.30	14.88	0.60	0.591	125.4	0.275
12.5	-19.4	8974	8.21	31.23	0.38	0.27	0.64	9.92	0.00	0.00	0.00	7.37	30.59	0.65	0.612	125.4	0.294
13.1	-20.0	7916	6.32	20.58	0.37	0.27	0.64	9.92	0.00	0.00	0.00	5.92	19.94	0.64	0.633	125.4	0.314
13.8	-20.7	4697	2.54	8.35	0.34	0.27	0.64	9.92	0.00	0.00	0.00	2.57	7.72	0.62	0.655	113.6	0.333
14.4	-21.3	3638	1.92	5.28	0.63	0.27	0.64	9.92	0.00	0.00	0.00	2.07	4.65	0.90	0.675	113.6	0.349
15.1	-22.0	6769	1.96	4.59	1.04	0.27	0.64	9.92	0.00	0.00	0.00	2.15	3.96	1.32	0.696	101.1	0.363
15.7	-22.6	6725	1.17	4.57	0.40	0.27	0.64	9.92	0.00	0.00	0.00	1.32	3.94	0.67	0.717	107.3	0.376
16.4	-23.3	11885	2.42	12.06	0.40	0.27	0.64	9.92	0.00	0.00	0.00	2.26	11.42	0.67	0.739	113.6	0.392
17.1	-23.9	11268	5.78	17.59	0.49	0.27	0.64	9.92	0.00	0.00	0.00	5.51	16.95	0.76	0.760	125.4	0.409
17.7	-24.6	8048	5.89	18.16	0.51	0.27	0.64	9.92	0.00	0.00	0.00	5.60	17.52	0.78	0.781	125.4	0.429
18.4	-25.3	6637	4.06	12.39	0.52	0.27	0.64	9.92	0.00	0.00	0.00	3.96	11.76	0.79	0.802	119.2	0.449
19.0	-25.9	4586	3.04	8.69	0.53	0.27	0.64	9.92	0.00	0.00	0.00	3.07	8.05	0.80	0.823	113.6	0.466
19.7	-26.6	3881	2.26	5.02	0.95	0.27	0.64	9.92	0.00	0.00	0.00	2.43	4.38	1.22	0.845	107.3	0.480
20.3	-27.2	5314	1.92	4.06	0.78	0.27	0.64	9.92	0.00	0.00	0.00	2.13	3.42	1.05	0.865	101.1	0.494
21.0	-27.9	6284	1.81	3.67	0.70	0.27	0.64	9.92	0.00	0.00	0.00	2.03	3.04	0.97	0.886	101.1	0.505
21.7	-28.5	8048	2.50	9.54	0.60	0.27	0.64	9.92	0.00	0.00	0.00	2.46	8.91	0.87	0.907	113.6	0.520
22.3	-29.2	8577	4.42	13.45	0.65	0.27	0.64	9.92	0.00	0.00	0.00	4.28	12.81	0.92	0.928	119.2	0.537
23.0	-29.9	7718	4.69	13.55	0.65	0.27	0.64	9.92	0.00	0.00	0.00	4.56	12.91	0.92	0.950	119.2	0.555
23.6	-30.5	7695	5.35	15.37	0.67	0.27	0.64	9.92	0.00	0.00	0.00	5.16	14.73	0.94	0.971	119.2	0.573
24.3	-31.2	8842	6.17	18.65	0.69	0.27	0.64	9.92	0.00	0.00	0.00	5.87	18.01	0.96	0.992	125.4	0.592
24.9	-31.8	8820	6.14	17.84	0.70	0.27	0.64	9.92	0.00	0.00	0.00	5.87	17.21	0.97	1.013	125.4	0.613
25.6	-32.5	10143	5.55	14.78	0.74	0.27	0.64	9.92	0.00	0.00	0.00	5.41	14.15	1.01	1.035	119.2	0.632
26.2	-33.1	11025	1.20	3.11	0.70	0.27	0.64	9.92	0.00	0.00	0.00	1.42	2.47	0.97	1.055	107.3	0.647
26.9	-33.8	9900	3.75	10.03	0.78	0.27	0.64	9.92	0.00	0.00	0.00	3.75	9.40	1.05	1.076	119.2	0.664
27.6	-34.4	9614	3.11	8.91	0.79	0.27	0.64	9.92	0.00	0.00	0.00	3.14	8.27	1.06	1.097	113.6	0.681
28.2	-35.1	9923	3.09	8.93	0.80	0.27	0.64	9.92	0.00	0.00	0.00	3.11	8.29	1.08	1.118	113.6	0.697
28.9	-35.8	8996	3.47	9.80	0.84	0.27	0.64	9.92	0.00	0.00	0.00	3.47	9.17	1.11	1.140	119.2	0.714
29.5	-36.4	7387	3.65	10.04	0.80	0.27	0.64	9.92	0.00	0.00	0.00	3.65	9.41	1.08	1.161	119.2	0.732
30.2	-37.1	6064	2.85	8.18	0.88	0.27	0.64	9.92	0.00	0.00	0.00	2.90	7.55	1.15	1.182	113.6	0.750
30.8	-37.7	7651	3.31	9.05	0.90	0.27	0.64	9.92	0.00	0.00	0.00	3.34	8.41	1.17	1.203	113.6	0.765
31.5	-38.4	7740	4.82	12.63	0.91	0.27	0.64	9.92	0.00	0.00	0.00	4.75	12.00	1.18	1.225	119.2	0.783
32.2	-39.0	8136	4.75	13.04	0.93	0.27	0.64	9.92	0.00	0.00	0.00	4.66	12.40	1.20	1.245	119.2	0.801
32.8	-39.7	8732	5.25	14.37	0.91	0.27	0.64	9.92	0.00	0.00	0.00	5.12	13.73	1.18	1.266	119.2	0.818
33.5	-40.4	9945	6.26	15.92	0.99	0.27	0.64	9.92	0.00	0.00	0.00	6.10	15.28	1.26	1.287	125.4	0.838
33.8	-40.7	22050	4.70	10.54	1.12	0.27	0.64	9.92	0.00	0.00	0.00	4.72	9.91	1.39	1.298	113.6	0.847

DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL) SNDG. NO. : DMT-207
In-Situ Soil Testing, L.C. Page 2
JOB FILE: Barren Island FILE NO. :2020-45
LOCATION: Dorchester County, Maryland--N242,819.3 E1,524,861.6
SNDG.BY : R. Failmezger SNDG. DATE: 6/26/20
ANAL.BY : Roger Failmezger, P.E., F. ASCE, D. GE ANAL. DATE: 6/26/20

ANALYSIS PARAMETERS: LO RANGE = 9.92 TSF ROD DIAM. = 2.36 IN BL.THICK. = 0.59 IN SU FACTOR = 1
SURF.ELEV. = -6.9 FT LO GAGE 0 = 0.00 TSF FR.RED.DIA. = 2.64 IN BL.WIDTH = 3.78 IN PHI FACTOR = 1
WATER DEPTH = -6.6 FT HI GAGE 0 = 0.00 TSF LIN.ROD WT. = 8.0 LBF/FTDELTA-A = 0.27 TSF OCR FACTOR = 1
SP.GR.WATER = 1.030 CAL GAGE 0 = 0.00 TSF;
DELTA / PHI = 0.5 DELTA - B = 0.64 TSF M FACTOR = 1
MAX SU ID = 0.6 SU OPTION = 0 MIN PHI ID = 1.2 OCR OPTION = 0 K0 FACTOR = 1
UNIT CONVERSIONS: 1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI 1 M = 3.2808 FT

Z (FT)	ELEV (FT)	KD	ID	UD	ED (TSF)	K0	SU (TSF)	QD (TSF)	PHI (DEG)	SIGFF (TSF)	PHIO (DEG)	PC (TSF)	OCR	M (TSF)	SOIL TYPE
*****	******	*****	*****	*****	******	*****	*****	*****	*****	******	*****	*****	*****	******	************
0.7	-7.5	35.58	2.13	-0.15	41									152	SILTY SAND
1.3	-8.2	36.65	2.67	-0.02	101									377	SILTY SAND
2.0	-8.9	47.07	2.75	0.00	201	5.56		31.5	45.2	0.07	40.1	9.05	201.9	800	SILTY SAND
2.6	-9.5	32.31	3.01	0.02	206	4.13		6.6	35.7	0.09	29.4	8.83	144.9	743	SILTY SAND
3.3	-10.2	12.91	3.39	-0.01	117	1.76		6.8	37.2	0.13	31.6	1.69	21.9	322	SAND
3.9	-10.8	29.65	2.45	0.01	237	3.62		30.5	41.9	0.16	37.5	8.79	93.4	837	SILTY SAND
4.6	-11.5	10.36	4.99	-0.02	199	1.13		33.7	45.2	0.19	41.4	1.08	9.6	506	SAND
5.2	-12.1	9.23	3.91	-0.01	160	1.06		31.4	44.2	0.22	40.6	1.05	8.3	387	SAND
5.9	-12.8	13.05	0.33	0.41	21	2.16	0.32					2.64	18.7	57	CLAY
6.6	-13.5	10.77	0.29	0.37	17	1.93	0.28					2.12	13.8	42	CLAY
7.2	-14.1	3.30	3.97	-0.08	76	0.40		23.9	43.0	0.28	39.6	0.20	1.2	116	SAND
7.9	-14.8	3.49	2.82	-0.07	62	0.25		39.8	46.0	0.31	43.0	0.10	0.6	97	SILTY SAND
8.5	-15.4	2.41	3.97	-0.21	65									81	SAND
9.2	-16.1	2.28	3.13	-0.14	52	0.32		24.5	42.1	0.34	39.0	0.16	0.7	63	SILTY SAND
9.8	-16.7	2.65	2.58	-0.04	53	0.49		15.7	38.4	0.37	34.9	0.33	1.5	69	SILTY SAND
10.5	-17.4	1.73	6.42	-0.12	92									90	SAND
11.2	-18.0	19.67	2.30	0.00	399	2.35		90.0	43.5	0.43	40.8	9.93	39.0	1253	SILTY SAND
11.8	-18.7	17.19	2.03	0.00	332	2.08		81.1	43.0	0.46	40.4	8.39	30.6	1000	SILTY SAND
12.5	-19.4	22.96	3.43	0.01	806	2.82		83.5	41.8	0.49	39.1	16.70	56.7	2648	SAND
13.1	-20.0	16.81	2.65	0.00	487	2.07		76.1	42.0	0.52	39.5	9.62	30.6	1455	SILTY SAND
13.8	-20.7	5.74	2.70	-0.02	179	0.73		49.9	42.2	0.55	39.7	1.28	3.8	359	SILTY SAND
14.4	-21.3	4.00	1.85	0.16	90	0.57		39.5	41.1	0.57	38.6	0.77	2.2	146	SILTY SAND
15.1	-22.0	4.00	1.25	0.43	63	0.37		75.6	45.1	0.62	43.0	0.42	1.1	100	SANDY SILT
15.7	-22.6	1.59	4.38	-0.08	91									82	SAND
16.4	-23.3	3.88	6.04	-0.05	318									533	SAND
17.1	-23.9	11.61	2.41	0.00	397	1.35		116.6	44.0	0.69	42.1	5.45	13.3	1049	SILTY SAND
17.7	-24.6	11.21	2.48	0.00	413	1.41		79.7	41.7	0.71	39.7	6.04	14.1	1079	SILTY SAND
18.4	-25.3	7.05	2.47	0.00	270	0.91		68.8	41.8	0.75	39.8	2.60	5.8	591	SILTY SAND
19.0	-25.9	4.83	2.21	-0.01	172	0.70		48.2	40.1	0.76	38.1	1.53	3.3	316	SILTY SAND
19.7	-26.6	3.31	1.23	0.24	68	0.53		42.3	39.6	0.78	37.6	0.89	1.9	96	SANDY SILT
20.3	-27.2	2.56	1.02	0.15	45	0.69						0.73	1.5	51	SILT
21.0	-27.9	2.26	0.88	0.07	35	0.61						0.62	1.2	35	CLAYEY SILT
21.7	-28.5	2.99	4.15	-0.03	223	0.29		90.7	44.4	0.89	42.8	0.35	0.7	325	SAND
22.3	-29.2	6.24	2.54	0.00	295	0.77		90.9	42.7	0.90	41.0	2.32	4.3	615	SILTY SAND
23.0	-29.9	6.51	2.31	-0.01	290	0.85		80.3	41.6	0.92	39.9	2.82	5.1	611	SILTY SAND
23.6	-30.5	7.31	2.28	-0.01	332	0.97		78.4	41.0	0.95	39.3	3.75	6.5	735	SILTY SAND
24.3	-31.2	8.22	2.49	-0.01	422	1.07		89.5	41.3	0.98	39.7	4.73	8.0	979	SILTY SAND
24.9	-31.8	7.93	2.33	-0.01	394	1.04		89.4	41.2	1.01	39.6	4.60	7.5	900	SILTY SAND
25.6	-32.5	6.93	2.00	0.00	303	0.87		106.1	42.4	1.05	40.9	3.41	5.4	654	SILTY SAND
26.2	-33.1	0.57	2.87	-0.23	37									31	SILTY SAND
26.9	-33.8	4.03	2.11	-0.01	196	0.47		109.0	43.4	1.12	42.1	1.11	1.7	325	SILTY SAND
27.6	-34.4	3.00	2.51	-0.02	179	0.33		107.8	43.7	1.15	42.5	0.58	0.9	252	SILTY SAND
28.2	-35.1	2.86	2.59	-0.02	180	0.31		111.7	43.9	1.18	42.7	0.52	0.7	247	SILTY SAND
28.9	-35.8	3.26	2.45	-0.01	197	0.41		99.9	42.7	1.20	41.5	0.89	1.2	293	SILTY SAND
29.5	-36.4	3.40	2.31	-0.03	199	0.50		80.8	41.1	1.21	39.8	1.23	1.7	303	SILTY SAND
30.2	-37.1	2.29	2.70	-0.02	161	0.39		68.1	40.3	1.23	39.0	0.75	1.0	192	SILTY SAND
30.8	-37.7	2.79	2.38	-0.02	176	0.41		85.2	41.4	1.27	40.2	0.89	1.2	236	SILTY SAND
31.5	-38.4	4.51	2.06	-0.01	252	0.66		81.8	40.3	1.28	39.1	2.27	2.9	442	SILTY SAND
32.2	-39.0	4.26	2.27	-0.01	269	0.61		86.9	40.6	1.33	39.4	2.06	2.6	461	SILTY SAND
32.8	-39.7	4.70	2.24	-0.02	299	0.67		92.4	40.7	1.36	39.6	2.47	3.0	540	SILTY SAND
33.5	-40.4	5.74	1.91	-0.01	318	0.78		103.5	40.9	1.39	39.8	3.55	4.2	631	SILTY SAND
33.8	-40.7	4.04	1.51	0.03	180	0.14		248.0	47.8	1.47	47.0	0.19	0.2	292	SANDY SILT



PROJECT: Barren Island

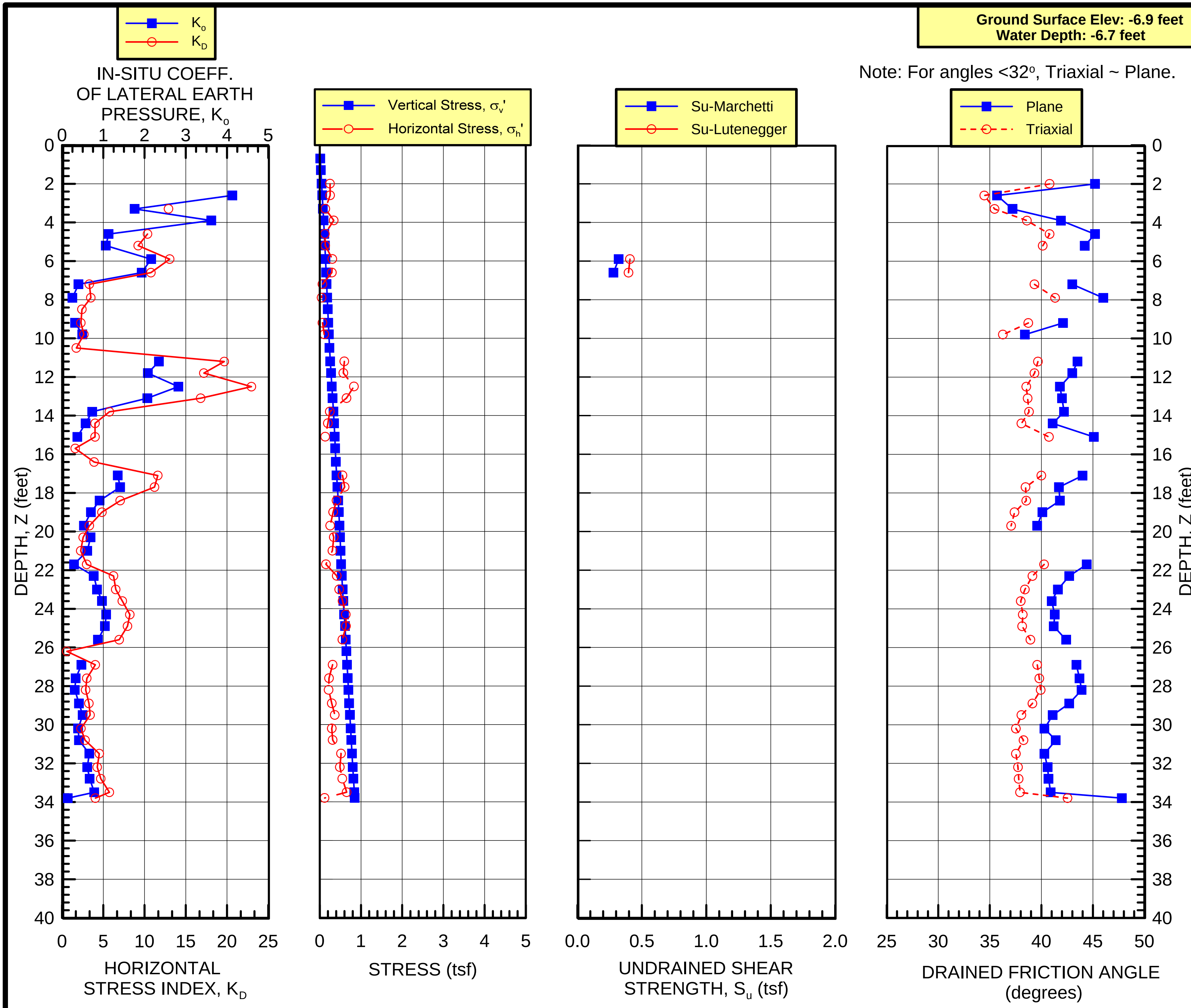
LOCATION: Dorchester County, Maryland N242,819.3 E1,524,861.6

DILATOMETER TEST RESULTS

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 6/26/20

SOUNDING

DMT-207



INTERPRETED DMT STRENGTH PARAMETERS

PROJECT: Barren Island

LOCATION: Dorchester County, Maryland N242,819.3 E1,524,861.6

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/26/20

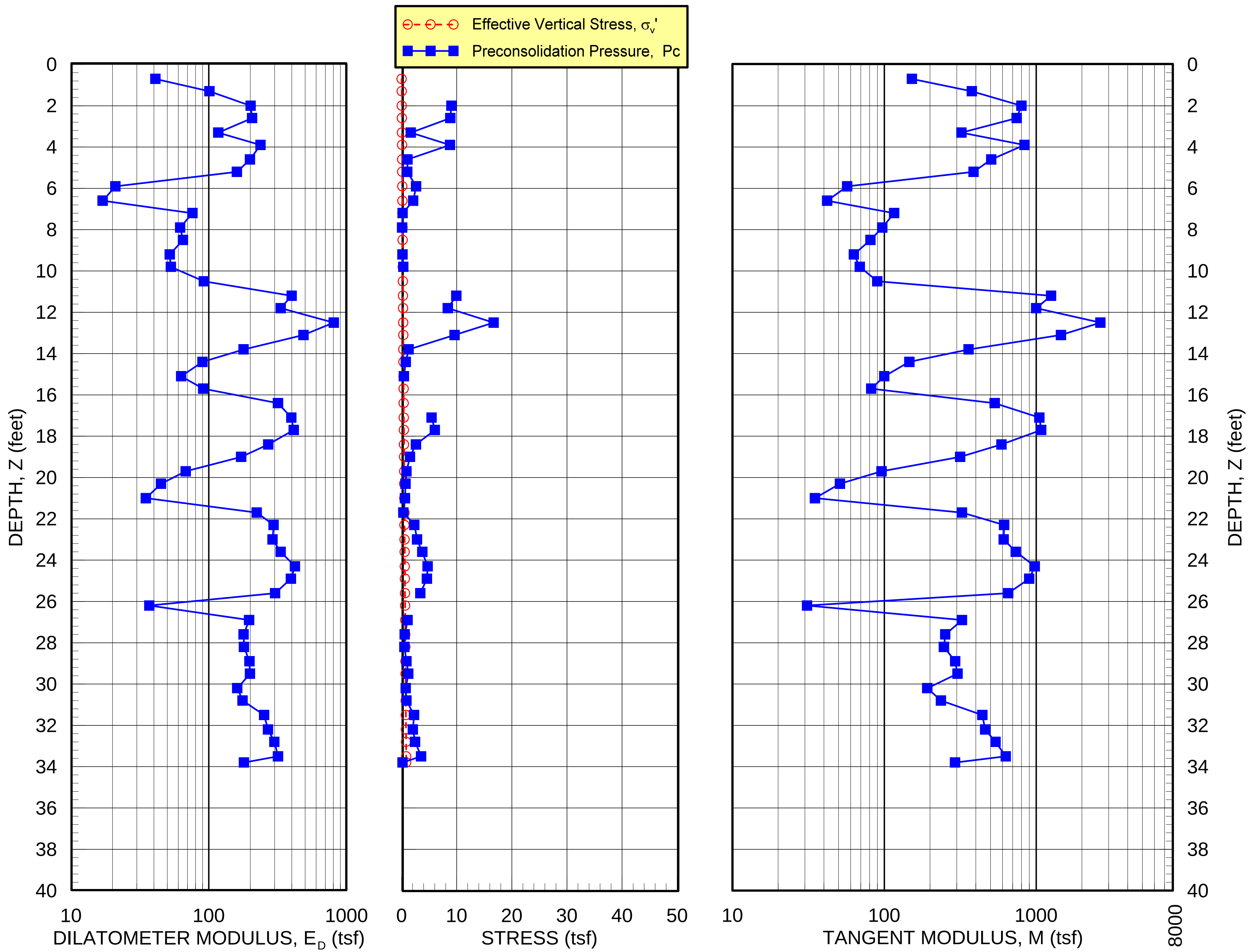
SOUNDING

DMT-207

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N242,819.3 E1,524,861.6

INTERPRETED DMT DEFORMATION PARAMETERS

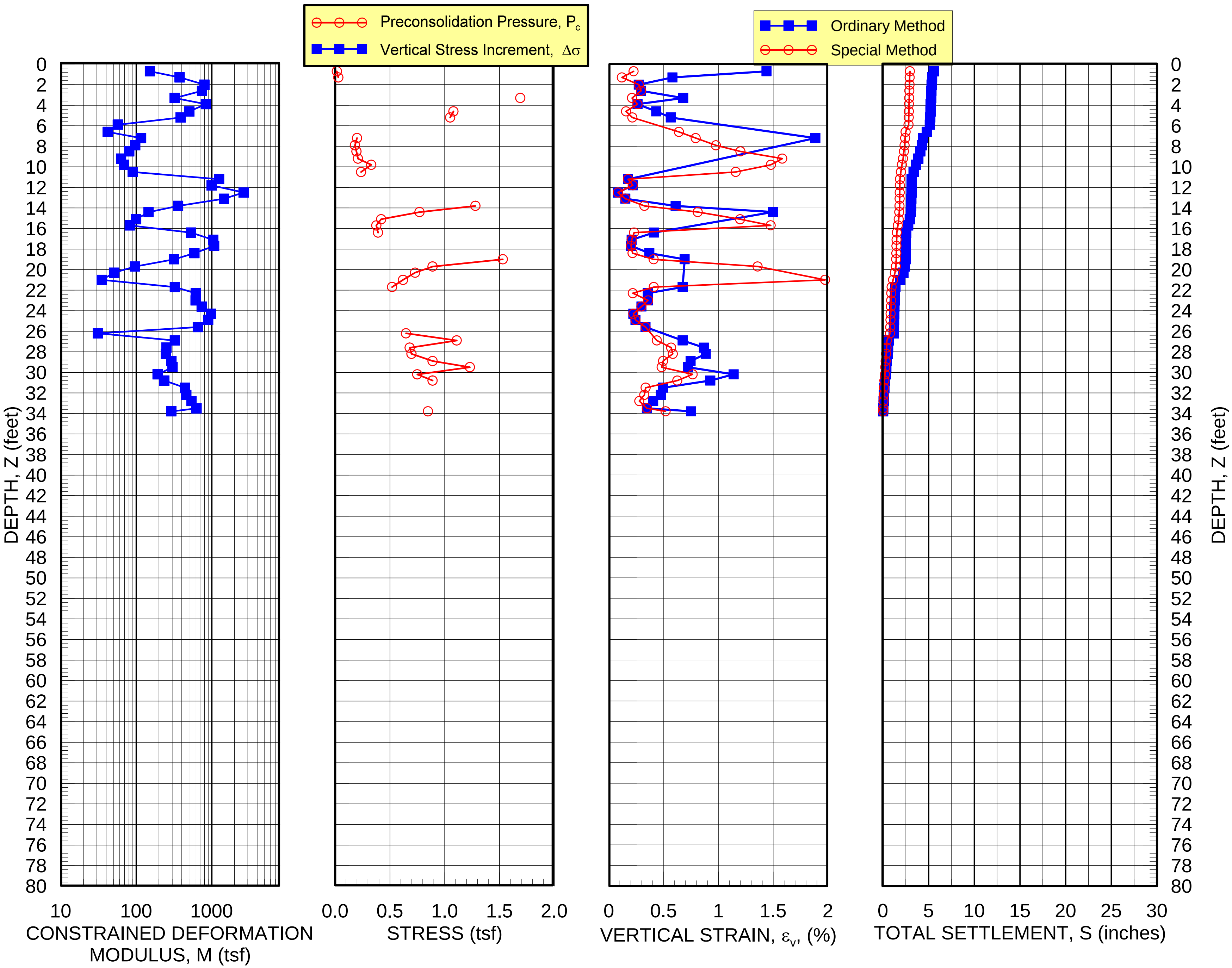
Ground Surface Elev.: -6.9 feet
Water Depth: -6.7 feet



IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/26/20

SOUNDING
DMT-207

Ground Surface Elev.: -6.9 feet
Water Depth: -6.7 feet



PREDICTED DMT SETTLEMENT

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N242,819.3 E1,524,861.6

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/26/20

SOUNDING
DMT-207

DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL) SNDG. NO. :DMT-208
In-Situ Soil Testing, L.C. Page 1a
JOB FILE: Barren Island FILE NO. : 2020-45
LOCATION: Dorchester County, Maryland--N246,667.7 E1,523,051.1--Tore membrane at 3.6 and
SNDG.BY : R. Failmezger SNDG. DATE: 6/22/20
ANAL.BY : Roger Failmezger, P.E., F. ASCE, D. GE ANAL. DATE: 6/22/20

ANALYSIS PARAMETERS: LO RANGE = 9.92 TSF ROD DIAM. = 2.36 IN BL.THICK. = 0.59 IN SU FACTOR = 1
SURF.ELEV. = -8.5 FT LO GAGE 0 = 0.00 TSF FR.RED.DIA. = 2.64 IN BL.WIDTH = 3.78 IN PHI FACTOR = 1
WATER DEPTH = -8.5 FT HI GAGE 0 = 0.00 TSF LIN.ROD WT. = 8.0 LBF/FTDELTA-A = 0.28 TSF OCR FACTOR = 1
SP.GR.WATER = 1.030 CAL GAGE 0 = 0.00 TSF DELTA/PHI = 0.5 DELTA-B = 0.68 TSF M FACTOR = 1
MAX SU ID = 0.6 SU OPTION = 0 MIN PHI ID = 1.2 OCR OPTION = 0 K0 FACTOR = 1
UNIT CONVERSIONS: 1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI 1 M = 3.2808 FT

Z	ELEV	THRUST	A	B	C	DA	DB	ZMRNG	ZMLO	ZMHI	ZMCAL	P0	P1	P2	U0	GAMMA	SVP
(FT)	(FT)	(LBF)	(TSF)	(TSF)	(TSF)	(TSF)	(TSF)	(TSF)	(TSF)	(TSF)	(TSF)	(TSF)	(TSF)	(TSF)	(TSF)	(PCF)	(TSF)
*****	******	******	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	******	******	******
0.7	-9.2	88	0.16	1.31	0.02	0.28	0.68	9.92	0.00	0.00	0.00	0.43	0.63	0.30	0.295	94.8	0.016
1.3	-9.8	970	0.64	3.62	0.05	0.28	0.68	9.92	0.00	0.00	0.00	0.81	2.94	0.33	0.316	107.3	0.028
2.0	-10.5	2007	1.00	5.35	0.06	0.28	0.68	9.92	0.00	0.00	0.00	1.12	4.67	0.34	0.337	107.3	0.042
2.6	-11.2	1852	2.06	7.05	0.11	0.28	0.68	9.92	0.00	0.00	0.00	2.14	6.37	0.40	0.359	113.6	0.057
3.3	-11.8	1411	1.47	6.14	0.09	0.28	0.68	9.92	0.00	0.00	0.00	1.57	5.46	0.38	0.380	113.6	0.073
3.9	-12.5	684	0.78	2.99	0.07	0.28	0.68	9.92	0.00	0.00	0.00	1.00	2.31	0.35	0.401	107.3	0.088
4.6	-13.1	992	0.80	3.83	0.09	0.28	0.68	9.92	0.00	0.00	0.00	0.98	3.15	0.38	0.422	107.3	0.102
5.2	-13.8	1808	0.67	3.23	0.11	0.28	0.68	9.92	0.00	0.00	0.00	0.87	2.55	0.40	0.444	107.3	0.116
5.9	-14.4	2205	0.97	3.78	0.06	0.28	0.68	9.92	0.00	0.00	0.00	1.16	3.10	0.34	0.465	107.3	0.131
6.6	-15.1	2315	0.86	3.69	0.14	0.28	0.68	9.92	0.00	0.00	0.00	1.04	3.01	0.42	0.485	107.3	0.144
7.2	-15.7	2337	0.67	2.77	0.19	0.28	0.68	9.92	0.00	0.00	0.00	0.90	2.09	0.47	0.506	107.3	0.159
7.9	-16.4	1477	0.90	3.11	0.23	0.28	0.68	9.92	0.00	0.00	0.00	1.12	2.43	0.51	0.527	107.3	0.172
8.5	-17.1	1235	1.02	3.72	0.24	0.28	0.68	9.92	0.00	0.00	0.00	1.22	3.04	0.52	0.549	107.3	0.187
9.2	-17.7	2161	1.23	7.85	0.28	0.28	0.68	9.92	0.00	0.00	0.00	1.23	7.17	0.56	0.570	113.6	0.201
9.8	-18.4	3175	2.11	5.40	0.26	0.28	0.68	9.92	0.00	0.00	0.00	2.28	4.72	0.54	0.591	107.3	0.217
10.5	-19.0	5292	3.75	15.61	0.31	0.28	0.68	9.92	0.00	0.00	0.00	3.49	14.93	0.60	0.612	119.2	0.233
11.2	-19.7	6527	5.21	18.76	0.35	0.28	0.68	9.92	0.00	0.00	0.00	4.87	18.08	0.64	0.633	125.4	0.253
12.1	-20.7	6791	6.20	20.01	0.39	0.28	0.58	9.92	0.00	0.00	0.00	5.84	19.43	0.67	0.665	125.4	0.282
12.5	-21.0	6615	5.08	16.60	0.41	0.28	0.58	9.92	0.00	0.00	0.00	4.83	16.01	0.69	0.675	119.2	0.292
13.1	-21.7	5843	4.80	16.42	0.40	0.28	0.58	9.92	0.00	0.00	0.00	4.55	15.84	0.68	0.696	119.2	0.310
13.8	-22.3	2558	2.13	4.30	0.63	0.28	0.58	9.92	0.00	0.00	0.00	2.35	3.72	0.91	0.717	101.1	0.325
14.4	-23.0	4631	2.07	3.80	1.22	0.28	0.58	9.92	0.00	0.00	0.00	2.31	3.22	1.50	0.739	101.1	0.337
15.1	-23.6	7277	2.37	8.89	0.45	0.28	0.58	9.92	0.00	0.00	0.00	2.37	8.31	0.73	0.760	113.6	0.352
15.7	-24.3	8754	3.37	10.84	0.48	0.28	0.58	9.92	0.00	0.00	0.00	3.32	10.25	0.76	0.781	119.2	0.369
16.4	-24.9	6813	2.36	6.91	0.47	0.28	0.58	9.92	0.00	0.00	0.00	2.45	6.33	0.75	0.802	113.6	0.385
17.1	-25.6	4167	1.94	3.71	0.82	0.28	0.58	9.92	0.00	0.00	0.00	2.18	3.12	1.11	0.823	101.1	0.400
17.7	-26.2	2977	1.53	4.11	0.58	0.28	0.58	9.92	0.00	0.00	0.00	1.73	3.53	0.87	0.845	107.3	0.412
18.4	-26.9	5270	3.54	11.06	0.55	0.28	0.58	9.92	0.00	0.00	0.00	3.49	10.47	0.84	0.865	119.2	0.429
19.0	-27.6	7453	4.00	12.36	0.58	0.28	0.58	9.92	0.00	0.00	0.00	3.90	11.78	0.87	0.886	119.2	0.447
19.7	-28.2	7210	3.57	12.21	0.62	0.28	0.58	9.92	0.00	0.00	0.00	3.47	11.63	0.90	0.907	119.2	0.465
20.3	-28.9	6902	3.41	11.13	0.63	0.28	0.58	9.92	0.00	0.00	0.00	3.35	10.54	0.91	0.928	119.2	0.483
21.0	-29.5	6240	4.10	12.89	0.65	0.28	0.58	9.92	0.00	0.00	0.00	3.99	12.31	0.93	0.950	119.2	0.501
21.7	-30.2	5998	3.13	9.39	0.66	0.28	0.58	9.92	0.00	0.00	0.00	3.14	8.80	0.94	0.971	119.2	0.520
22.3	-30.8	8004	3.49	10.86	0.69	0.28	0.58	9.92	0.00	0.00	0.00	3.45	10.27	0.97	0.992	119.2	0.538
23.0	-31.5	8004	3.11	9.64	0.70	0.28	0.58	9.92	0.00	0.00	0.00	3.11	9.05	0.98	1.013	119.2	0.555
23.6	-32.2	8423	3.17	10.53	0.71	0.28	0.58	9.92	0.00	0.00	0.00	3.13	9.95	0.99	1.035	119.2	0.574
24.3	-32.8	8732	3.08	10.23	0.74	0.28	0.58	9.92	0.00	0.00	0.00	3.05	9.65	1.02	1.055	119.2	0.592
24.9	-33.5	8622	3.36	10.07	0.76	0.28	0.58	9.92	0.00	0.00	0.00	3.35	9.49	1.04	1.076	119.2	0.610
25.6	-34.1	8159	3.05	9.27	0.78	0.28	0.58	9.92	0.00	0.00	0.00	3.06	8.69	1.06	1.097	113.6	0.627
26.2	-34.8	8247	2.99	9.03	0.80	0.28	0.58	9.92	0.00	0.00	0.00	3.01	8.45	1.09	1.118	113.6	0.643
26.9	-35.4	8555	3.36	10.57	0.84	0.28	0.58	9.92	0.00	0.00	0.00	3.33	9.98	1.12	1.140	119.2	0.660
27.6	-36.1	8930	4.06	11.94	0.87	0.28	0.58	9.92	0.00	0.00	0.00	3.99	11.36	1.15	1.161	119.2	0.679
28.2	-36.7	9129	4.08	12.29	0.89	0.28	0.58	9.92	0.00	0.00	0.00	4.00	11.70	1.17	1.182	119.2	0.696
28.9	-37.4	9107	4.97	13.60	0.93	0.28	0.58	9.92	0.00	0.00	0.00	4.87	13.02	1.21	1.203	119.2	0.715
29.5	-38.1	9217	4.67	13.57	0.94	0.28	0.58	9.92	0.00	0.00	0.00	4.55	12.99	1.22	1.225	119.2	0.733
30.2	-38.7	9151	3.92	12.01	0.92	0.28	0.58	9.92	0.00	0.00	0.00	3.83	11.42	1.20	1.245	119.2	0.751
30.8	-39.4	10319	4.69	14.25	0.96	0.28	0.58	9.92	0.00	0.00	0.00	4.53	13.67	1.24	1.266	119.2	0.769
31.5	-40.0	11091	5.48	15.83	1.00	0.28	0.58	9.92	0.00	0.00	0.00	5.29	15.24	1.28	1.287	119.2	0.787
32.2	-40.7	11664	5.83	16.11	1.02	0.28	0.58	9.92	0.00	0.00	0.00	5.64	15.52	1.31	1.308	119.2	0.805
32.8	-41.3	11510	5.17	14.33	1.01	0.28	0.58	9.92	0.00	0.00	0.00	5.03	13.75	1.29	1.330	119.2	0.824
33.5	-42.0	10893	4.74	12.65	1.05	0.28	0.58	9.92	0.00	0.00	0.00	4.67	12.07	1.34	1.351	119.2	0.841
34.1	-42.7	10871	4.22	13.18	1.04	0.28	0.58	9.92	0.00	0.00	0.00	4.09	12.59	1.33	1.372	119.2	0.859
34.8	-43.3	11532	4.27	12.26	1.10	0.28	0.58	9.92	0.00	0.00	0.00	4.20	11.67	1.38	1.393	119.2	0.878
35.4	-44.0	11775	4.50	12.04	1.10	0.28	0.58	9.92	0.00	0.00	0.00	4.45	11.45	1.38	1.414	119.2	0.896
36.1	-44.6	12105	4.87	13.09	1.13	0.28	0.58	9.92	0.00	0.00	0.00	4.78	12.51	1.41	1.436	119.2	0.914
36.7	-45.3	9504	4.33	11.60	1.14	0.28	0.58	9.92	0.00	0.00	0.00	4.29	11.01	1.42	1.456	119.2	0.932
37.4	-45.9	10650	3.61	11.40	1.14	0.28	0.58	9.92	0.00	0.00	0.00	3.55	10.82	1.42	1.477	119.2	0.950
38.1	-46.6	11995	5.56	16.42	1.21	0.28	0.58	9.92	0.00	0.00	0.00	5.35	15.84	1.49	1.498	119.2	0.968
38.7	-47.2	12061	5.27	14.82	1.23	0.28	0.58	9.92	0.00	0.00	0.00	5.12	14.24	1.51	1.520	119.2	0.987
39.4	-47.9	10386	5.99	16.28	1.26	0.28	0.58	9.92	0.00	0.00	0.00	5.80	15.69	1.55	1.541	119.2	1.004
40.0	-48.6	10011	2.35	8.18	1.09	0.28	0.58	9.92	0.00	0.00	0.00	2.38	7.60	1.37	1.562	113.6	1.022
40.7	-49.2	8974	5.01	8.49	2.00	0.28	0.58	9.92	0.00	0.00	0.00	5.17	7.90	2.29	1.583	113.6	1.038
41.3	-49.9	8445	8.64	12.74	5.60	0.28	0.58	9.92	0.00	0.00	0.00	8.77	12.15	5.88	1.604	113.6	1.053
42.0	-50.5	9283	10.91	15.17	8.00	0.28	0.58	9.92	0.00	0.00	0.00	11.02	14.58	8.28	1.626	119.2	1.071
42.7	-51.2	10430	11.15	15.04	8.51	0.28	0.58	9.92	0.00	0.00	0.00	11.29	14.46	8.79	1.646	119.2	1.089

DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL) SNDG. NO. : DMT-208
In-Situ Soil Testing, L.C. Page 2
JOB FILE: Barren Island FILE NO. :2020-45
LOCATION: Dorchester County, Maryland--N246,667.7 E1,523,051.1--Tore membrane at 3.6 and
SNDG.BY : R. Failmezger SNDG. DATE: 6/22/20
ANAL.BY : Roger Failmezger, P.E., F. ASCE, D. GE ANAL. DATE: 6/22/20

ANALYSIS PARAMETERS: LO RANGE = 9.92 TSF ROD DIAM. = 2.36 IN BL.THICK. = 0.59 IN SU FACTOR = 1
SURF.ELEV. = -8.5 FT LO GAGE 0 = 0.00 TSF FR.RED.DIA. = 2.64 IN BL.WIDTH = 3.78 IN PHI FACTOR = 1
WATER DEPTH = -8.5 FT HI GAGE 0 = 0.00 TSF LIN.ROD WT. = 8.0 LBF/FTDELTA-A = 0.28 TSF OCR FACTOR = 1
SP.GR.WATER = 1.030 CAL GAGE 0 = 0.00 TSF;
DELTA / PHI = 0.5 DELTA - B = 0.68 TSF M FACTOR = 1
MAX SU ID = 0.6 SU OPTION = 0 MIN PHI ID = 1.2 OCR OPTION = 0 K0 FACTOR = 1
UNIT CONVERSIONS: 1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI 1 M = 3.2808 FT

Z (FT)	ELEV (FT)	KD	ID	UD	ED (TSF)	K0	SU (TSF)	QD (TSF)	PHI (DEG)	SIGFF (TSF)	PHIO (DEG)	PC (TSF)	OCR	M (TSF)	SOIL TYPE
*****	******	*****	*****	*****	******	*****	*****	*****	*****	******	*****	*****	*****	******	************
0.7	-9.2	8.53	1.48	0.05	7	1.21		1.0	38.1	0.02	29.6	0.16	9.9	16	MUD
1.3	-9.8	18.06	4.25	0.03	74									226	SAND
2.0	-10.5	18.58	4.57	0.01	123	1.92		21.0	47.6	0.07	42.9	1.12	26.7	380	SAND
2.6	-11.2	31.24	2.38	0.02	147	3.83		16.3	41.4	0.09	36.0	6.02	105.9	525	SILTY SAND
3.3	-11.8	16.28	3.27	0.00	135	2.05		13.3	40.9	0.13	35.8	2.19	30.0	400	SILTY SAND
3.9	-12.5	6.83	2.17	-0.08	45	1.01		6.9	37.8	0.15	32.6	0.60	6.7	97	SILTY SAND
4.6	-13.1	5.48	3.87	-0.08	75	0.78		10.5	40.1	0.17	35.4	0.42	4.1	149	SAND
5.2	-13.8	3.67	3.93	-0.11	58	0.38		20.5	44.3	0.20	40.6	0.14	1.1	95	SAND
5.9	-14.4	5.34	2.79	-0.17	67	0.61		24.2	43.9	0.22	40.2	0.37	2.8	132	SILTY SAND
6.6	-15.1	3.87	3.51	-0.12	68									114	SAND
7.2	-15.7	2.44	3.09	-0.10	42	0.21		26.9	44.8	0.27	41.5	0.05	0.4	53	SILTY SAND
7.9	-16.4	3.41	2.23	-0.03	46	0.53		16.4	40.2	0.28	36.5	0.32	1.9	69	SILTY SAND
8.5	-17.1	3.59	2.72	-0.04	63	0.61		13.5	38.2	0.30	34.4	0.44	2.3	100	SILTY SAND
9.2	-17.7	3.27	8.99	-0.01	206	0.45		24.1	41.8	0.33	38.5	0.29	1.4	315	SAND
9.8	-18.4	7.76	1.45	-0.03	85	1.00		32.7	41.5	0.37	38.4	1.53	7.1	191	SANDY SILT
10.5	-19.0	12.33	3.98	-0.01	397	1.50		53.1	42.7	0.39	39.8	3.77	16.2	1071	SAND
11.2	-19.7	16.77	3.13	0.00	458	2.06		63.2	42.2	0.42	39.4	7.60	30.2	1372	SILTY SAND
12.1	-20.7	18.31	2.63	0.00	472	2.28		63.5	41.3	0.47	38.6	10.47	37.1	1449	SILTY SAND
12.5	-21.0	14.24	2.69	0.00	388	1.76		64.6	42.0	0.49	39.4	6.45	22.1	1100	SILTY SAND
13.1	-21.7	12.42	2.93	0.00	392	1.57		56.9	41.4	0.51	38.8	5.40	17.4	1060	SILTY SAND
13.8	-22.3	5.01	0.84	0.12	48	1.16						1.36	4.2	86	CLAYEY SILT
14.4	-23.0	4.65	0.58	0.49	31	1.10	0.21					1.25	3.7	54	SILTY CLAY
15.1	-23.6	4.58	3.69	-0.02	206	0.42		80.8	45.4	0.61	43.4	0.51	1.5	376	SAND
15.7	-24.3	6.90	2.72	-0.01	240	0.73		94.8	45.0	0.63	43.0	1.51	4.1	522	SILTY SAND
16.4	-24.9	4.29	2.34	-0.03	135	0.45		75.5	44.5	0.66	42.5	0.61	1.6	232	SILTY SAND
17.1	-25.6	3.39	0.70	0.21	32	0.87						0.91	2.3	46	CLAYEY SILT
17.7	-26.2	2.15	2.03	0.03	63	0.40		33.7	39.6	0.68	37.3	0.41	1.0	67	SILTY SAND
18.4	-26.9	6.12	2.66	-0.01	242	0.83		54.7	41.0	0.71	38.9	2.03	4.7	500	SILTY SAND
19.0	-27.6	6.76	2.61	-0.01	274	0.83		78.6	42.7	0.75	40.8	2.23	5.0	587	SILTY SAND
19.7	-28.2	5.50	3.20	0.00	283	0.67		77.4	42.9	0.78	41.0	1.55	3.3	561	SILTY SAND
20.3	-28.9	5.02	2.97	-0.01	250	0.63		74.3	42.6	0.81	40.7	1.39	2.9	474	SILTY SAND
21.0	-29.5	6.06	2.74	-0.01	289	0.82		64.9	41.1	0.84	39.2	2.32	4.6	594	SILTY SAND
21.7	-30.2	4.19	2.60	-0.01	196	0.57		64.9	41.6	0.87	39.8	1.18	2.3	338	SILTY SAND
22.3	-30.8	4.56	2.79	-0.01	237	0.55		87.2	43.1	0.91	41.5	1.21	2.2	428	SILTY SAND
23.0	-31.5	3.77	2.83	-0.02	206	0.44		88.4	43.4	0.94	41.8	0.82	1.5	338	SILTY SAND
23.6	-32.2	3.65	3.25	-0.02	237									384	SILTY SAND
24.3	-32.8	3.37	3.31	-0.02	229									356	SAND
24.9	-33.5	3.73	2.70	-0.01	213	0.44		95.2	43.2	1.02	41.8	0.90	1.5	346	SILTY SAND
25.6	-34.1	3.13	2.86	-0.02	195	0.38		91.0	43.1	1.05	41.6	0.68	1.1	289	SILTY SAND
26.2	-34.8	2.94	2.88	-0.02	189	0.36		92.3	43.1	1.09	41.7	0.62	1.0	269	SILTY SAND
26.9	-35.4	3.31	3.04	-0.01	231	0.41		95.0	42.9	1.11	41.5	0.82	1.2	356	SILTY SAND
27.6	-36.1	4.17	2.60	0.00	256	0.53		97.3	42.5	1.14	41.1	1.40	2.1	440	SILTY SAND
28.2	-36.7	4.04	2.74	0.00	267	0.52		99.7	42.5	1.17	41.2	1.34	1.9	454	SILTY SAND
28.9	-37.4	5.12	2.23	0.00	283	0.68		96.8	41.7	1.19	40.4	2.32	3.2	533	SILTY SAND
29.5	-38.1	4.53	2.54	0.00	293	0.60		99.2	41.9	1.22	40.7	1.86	2.5	524	SILTY SAND
30.2	-38.7	3.45	2.93	-0.02	263	0.45		101.0	42.4	1.25	41.2	1.10	1.5	413	SILTY SAND
30.8	-39.4	4.25	2.79	-0.01	317	0.54		112.2	42.5	1.28	41.4	1.62	2.1	553	SILTY SAND
31.5	-40.0	5.08	2.49	0.00	346	0.65		118.8	42.4	1.32	41.3	2.36	3.0	653	SILTY SAND
32.2	-40.7	5.37	2.28	0.00	343	0.68		124.4	42.4	1.35	41.3	2.67	3.3	663	SILTY SAND
32.8	-41.3	4.50	2.35	-0.01	303	0.56		124.8	42.7	1.38	41.6	1.90	2.3	536	SILTY SAND
33.5	-42.0	3.94	2.23	0.00	257	0.51		119.0	42.5	1.41	41.5	1.56	1.8	423	SILTY SAND
34.1	-42.7	3.17	3.12	-0.02	294	0.40		120.8	42.8	1.44	41.8	1.00	1.2	443	SILTY SAND
34.8	-43.3	3.19	2.67	-0.01	259	0.39		128.3	43.1	1.47	42.1	0.99	1.1	385	SILTY SAND
35.4	-44.0	3.39	2.31	-0.01	243	0.42		130.4	42.9	1.50	42.0	1.16	1.3	367	SILTY SAND
36.1	-44.6	3.66	2.31	-0.01	268	0.46		133.2	42.8	1.53	41.9	1.40	1.5	424	SILTY SAND
36.7	-45.3	3.05	2.37	-0.01	233	0.44		104.9	41.4	1.55	40.5	1.25	1.3	331	SILTY SAND
37.4	-45.9	2.18	3.51	-0.03	253	0.29		120.8	42.7	1.60	41.8	0.56	0.6	296	SAND
38.1	-46.6	3.97	2.73	0.00	364	0.52		130.6	42.1	1.62	41.3	1.89	2.0	613	SILTY SAND
38.7	-47.2	3.65	2.53	0.00	316	0.48		132.2	42.3	1.65	41.5	1.63	1.6	504	SILTY SAND
39.4	-47.9	4.24	2.32	0.00	343	0.61		110.9	40.7	1.66	39.9	2.54	2.5	589	SILTY SAND
40.0	-48.6	0.80	6.36	-0.24	181									153	SAND
40.7	-49.2	3.45	0.77	0.20	95	0.88						2.43	2.3	135	CLAYEY SILT
41.3	-49.9	6.80	0.47	0.60	118	1.43	1.06					7.10	6.7	247	SILTY CLAY
42.0	-50.5	8.77	0.38	0.71	123	1.69	1.49					10.75	10.0	292	SILTY CLAY
42.7	-51.2	8.85	0.33	0.74	111	1.70	1.53					11.08	10.2	262	CLAY

DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL) SNDG. NO. :DMT-208
In-Situ Soil Testing, L.C. Page 2a
JOB FILE: Barren Island FILE NO. : 2020-45
LOCATION: Dorchester County, Maryland--N246,667.7 E1,523,051.1--Tore membrane at 3.6 and
SNDG.BY : R. Failmezger SNDG. DATE: 6/22/20
ANAL.BY : Roger Failmezger, P.E., F. ASCE, D. GE ANAL. DATE: 6/22/20

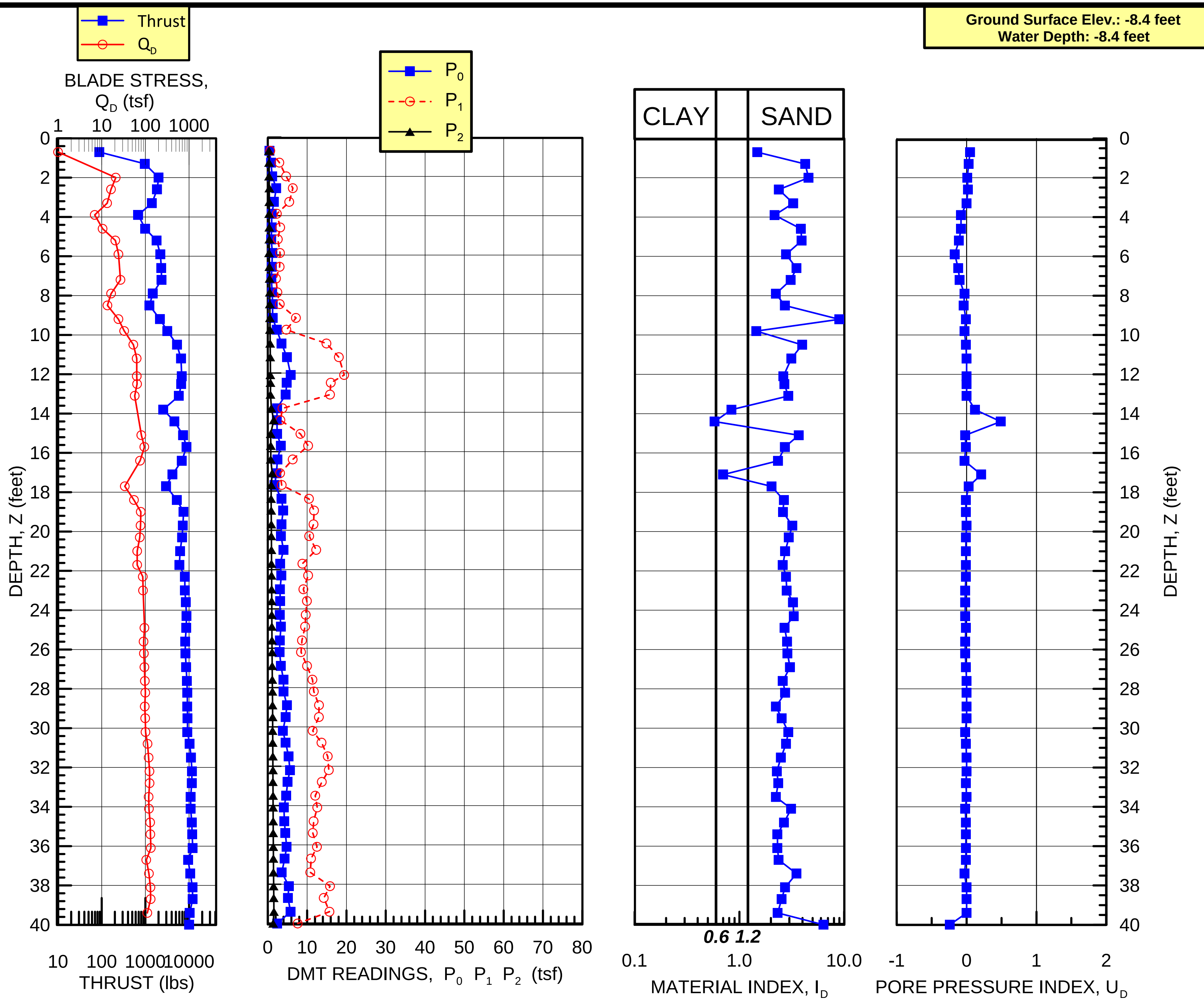
ANALYSIS PARAMETERS: LO RANGE = 10.36 TSF ROD DIAM. = 0.93 IN BL.THICK. = 0.02 IN SU FACTOR = 1
SURF.ELEV. = -27.9 FT LO GAGE 0 = 0.00 TSF FR.RED.DIA. = 1.04 IN BL.WIDTH = 0.15 IN PHI FACTOR = 1
WATER DEPTH = -8.5 FT HI GAGE 0 = 0.00 TSF LIN.ROD WT. = 5.4 LBF/FTDELTA-A = 0.29 TSF OCR FACTOR = 1
SP.GR.WATER = 1.030 CAL GAGE 0 = 0.00 TSF DELTA/PHI = 0.5 DELTA-B = 0.71 TSF M FACTOR = 1
MAX SU ID = 0.6 SU OPTION = 0 MIN PHI ID = 1.2 OCR OPTION = 0 K0 FACTOR = 1
UNIT CONVERSIONS: 1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI 1 M = 3.2808 FT

Z (FT)	ELEV (FT)	THRUST (LBF)	A (TSF)	B (TSF)	C (TSF)	DA (TSF)	DB (TSF)	ZMRNG (TSF)	ZMLO (TSF)	ZMHI (TSF)	ZMCAL (TSF)	P0 (TSF)	P1 (TSF)	P2 (TSF)	U0 (TSF)	GAMMA (PCF)	SVP (TSF)
*****	******	******	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	******	******	******
43.3	-51.8	10496	12.36	16.62	9.47	0.28	0.58	9.92	0.00	0.00	0.00	12.48	16.04	9.75	1.667	119.2	1.107
44.0	-52.5	10011	13.94	19.90	10.37	0.28	0.58	9.92	0.00	0.00	0.00	13.97	19.31	10.65	1.688	119.2	1.125
44.6	-53.1	7673	15.00	21.46	10.85	0.28	0.58	9.92	0.00	0.00	0.00	15.00	20.88	11.13	1.709	119.2	1.143
45.3	-53.8	8908	15.74	22.78	10.94	0.28	0.58	9.92	0.00	0.00	0.00	15.71	22.20	11.22	1.731	128.5	1.163
45.9	-54.5	11003	15.68	22.47	11.31	0.28	0.58	9.92	0.00	0.00	0.00	15.67	21.88	11.59	1.752	119.2	1.183
46.6	-55.1	8291	14.80	21.59	10.63	0.28	0.58	9.92	0.00	0.00	0.00	14.79	21.01	10.91	1.773	119.2	1.201
47.2	-55.8	8732	15.57	22.30	11.28	0.28	0.58	9.92	0.00	0.00	0.00	15.56	21.72	11.56	1.794	119.2	1.219
47.9	-56.4	8732	15.38	22.04	11.22	0.28	0.58	9.92	0.00	0.00	0.00	15.37	21.45	11.50	1.816	119.2	1.237
48.6	-57.1	11929	14.63	20.46	11.09	0.28	0.58	9.92	0.00	0.00	0.00	14.66	19.88	11.37	1.836	119.2	1.255
49.2	-57.7	13340	14.19	19.95	10.75	0.28	0.58	9.92	0.00	0.00	0.00	14.23	19.37	11.04	1.857	119.2	1.274
49.9	-58.4	9636	13.31	18.13	10.15	0.28	0.58	9.92	0.00	0.00	0.00	13.39	17.55	10.43	1.878	119.2	1.291
50.5	-59.1	9636	12.07	16.62	9.00	0.28	0.58	9.92	0.00	0.00	0.00	12.16	16.04	9.28	1.899	119.2	1.309
51.2	-59.7	11907	11.13	14.98	8.69	0.28	0.58	9.92	0.00	0.00	0.00	11.26	14.40	8.97	1.921	119.2	1.328
51.8	-60.4	11400	11.32	15.15	8.82	0.28	0.58	9.92	0.00	0.00	0.00	11.45	14.56	9.10	1.942	119.2	1.346
52.5	-61.0	10606	13.04	18.07	9.53	0.28	0.58	9.92	0.00	0.00	0.00	13.11	17.49	9.81	1.963	119.2	1.363
53.1	-61.7	11223	16.53	24.54	10.27	0.28	0.58	9.92	0.00	0.00	0.00	16.45	23.96	10.55	1.984	128.5	1.383
53.8	-62.3	11885	18.43	26.90	11.83	0.28	0.58	9.92	0.00	0.00	0.00	18.33	26.32	12.11	2.006	128.5	1.404
54.5	-63.0	13539	17.70	26.79	11.24	0.28	0.58	9.92	0.00	0.00	0.00	17.57	26.20	11.53	2.026	128.5	1.426
55.1	-63.6	13318	18.29	27.57	11.56	0.28	0.58	9.92	0.00	0.00	0.00	18.16	26.99	11.84	2.047	128.5	1.447
55.8	-64.3	14134	21.99	31.55	12.27	0.28	0.58	9.92	0.00	0.00	0.00	21.83	30.97	12.55	2.068	128.5	1.468
56.4	-65.0	14465	23.30	34.46	14.64	0.28	0.58	9.92	0.00	0.00	0.00	23.07	33.88	14.92	2.089	128.5	1.489
57.1	-65.6	16185	26.49	37.63		0.28	0.58	9.92	0.00	0.00	0.00	26.26	37.04		2.111	128.5	1.511

DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL) SNDG. NO. : DMT-208
In-Situ Soil Testing, L.C. Page 2
JOB FILE: Barren Island FILE NO. :2020-45
LOCATION: Dorchester County, Maryland--N246,667.7 E1,523,051.1--Tore membrane at 3.6 and
SNDG.BY : R. Failmezger SNDG. DATE: 6/22/20
ANAL.BY : Roger Failmezger, P.E., F. ASCE, D. GE ANAL. DATE: 6/22/20

ANALYSIS PARAMETERS: LO RANGE = 10.36 TSF ROD DIAM. = 0.93 IN BL.THICK. = 0.02 IN SU FACTOR = 1
SURF.ELEV. = -27.9 FT LO GAGE 0 = 0.00 TSF FR.RED.DIA. = 1.04 IN BL.WIDTH = 0.15 IN PHI FACTOR = 1
WATER DEPTH = -8.5 FT HI GAGE 0 = 0.00 TSF LIN.ROD WT. = 5.4 LBF/FTDELTA-A = 0.29 TSF OCR FACTOR = 1
SP.GR.WATER = 1.030 CAL GAGE 0 = 0.00 TSF;
DELTA / PHI = 0.5 DELTA - B = 0.71 TSF M FACTOR = 1
MAX SU ID = 0.6 SU OPTION = 0 MIN PHI ID = 1.2 OCR OPTION = 0 K0 FACTOR = 1
UNIT CONVERSIONS: 1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI 1 M = 3.2808 FT

Z (FT)	ELEV (FT)	KD	ID	UD	ED (TSF)	K0	SU (TSF)	QD (TSF)	PHI (DEG)	SIGFF (TSF)	PHIO (DEG)	PC (TSF)	OCR	M (TSF)	SOIL TYPE
*****	******	*****	*****	*****	******	*****	*****	*****	*****	******	*****	*****	*****	******	************
43.3	-51.8	9.76	0.33	0.75	123	1.81	1.76					13.12	11.9	306	CLAY
44.0	-52.5	10.91	0.44	0.73	186	1.94	2.07					15.87	14.1	479	SILTY CLAY
44.6	-53.1	11.63	0.44	0.71	204	2.02	2.28					17.81	15.6	539	SILTY CLAY
45.3	-53.8	12.03	0.46	0.68	224	2.06	2.41					19.09	16.4	601	SILTY CLAY
45.9	-54.5	11.77	0.45	0.71	216	2.03	2.38					18.77	15.9	572	SILTY CLAY
46.6	-55.1	10.84	0.48	0.70	216	1.93	2.18					16.77	14.0	555	SILTY CLAY
47.2	-55.8	11.29	0.45	0.71	214	1.98	2.33					18.13	14.9	559	SILTY CLAY
47.9	-56.4	10.96	0.45	0.71	211	1.95	2.29					17.57	14.2	546	SILTY CLAY
48.6	-57.1	10.22	0.41	0.74	181	1.86	2.12					15.98	12.7	456	SILTY CLAY
49.2	-57.7	9.71	0.42	0.74	179	1.81	2.01					14.98	11.8	441	SILTY CLAY
49.9	-58.4	8.92	0.36	0.74	144	1.71	1.84					13.30	10.3	343	SILTY CLAY
50.5	-59.1	7.84	0.38	0.72	135	1.58	1.59					11.04	8.4	302	SILTY CLAY
51.2	-59.7	7.04	0.34	0.75	109	1.47	1.41					9.45	7.1	233	CLAY
51.8	-60.4	7.07	0.33	0.75	108	1.47	1.43					9.64	7.2	232	CLAY
52.5	-61.0	8.18	0.39	0.70	151	1.62	1.74					12.27	9.0	348	SILTY CLAY
53.1	-61.7	10.46	0.52	0.59	261	1.89	2.40					18.27	13.2	663	SILTY CLAY
53.8	-62.3	11.62	0.49	0.62	278	2.02	2.79					21.86	15.6	733	SILTY CLAY
54.5	-63.0	10.90	0.56	0.61	300	1.94	2.61					20.09	14.1	774	SILTY CLAY
55.1	-63.6	11.13	0.55	0.61	307	1.97	2.72					21.06	14.6	798	SILTY CLAY
55.8	-64.3	13.46	0.46	0.53	317	2.21	3.50					28.75	19.6	881	SILTY CLAY
56.4	-65.0	14.09	0.52	0.61	375	2.27	3.76					31.30	21.0	1060	SILTY CLAY
57.1	-65.6	15.99	0.45		375	2.44	4.47					38.66	25.6	1102	SILTY CLAY



PROJECT: Barren Island

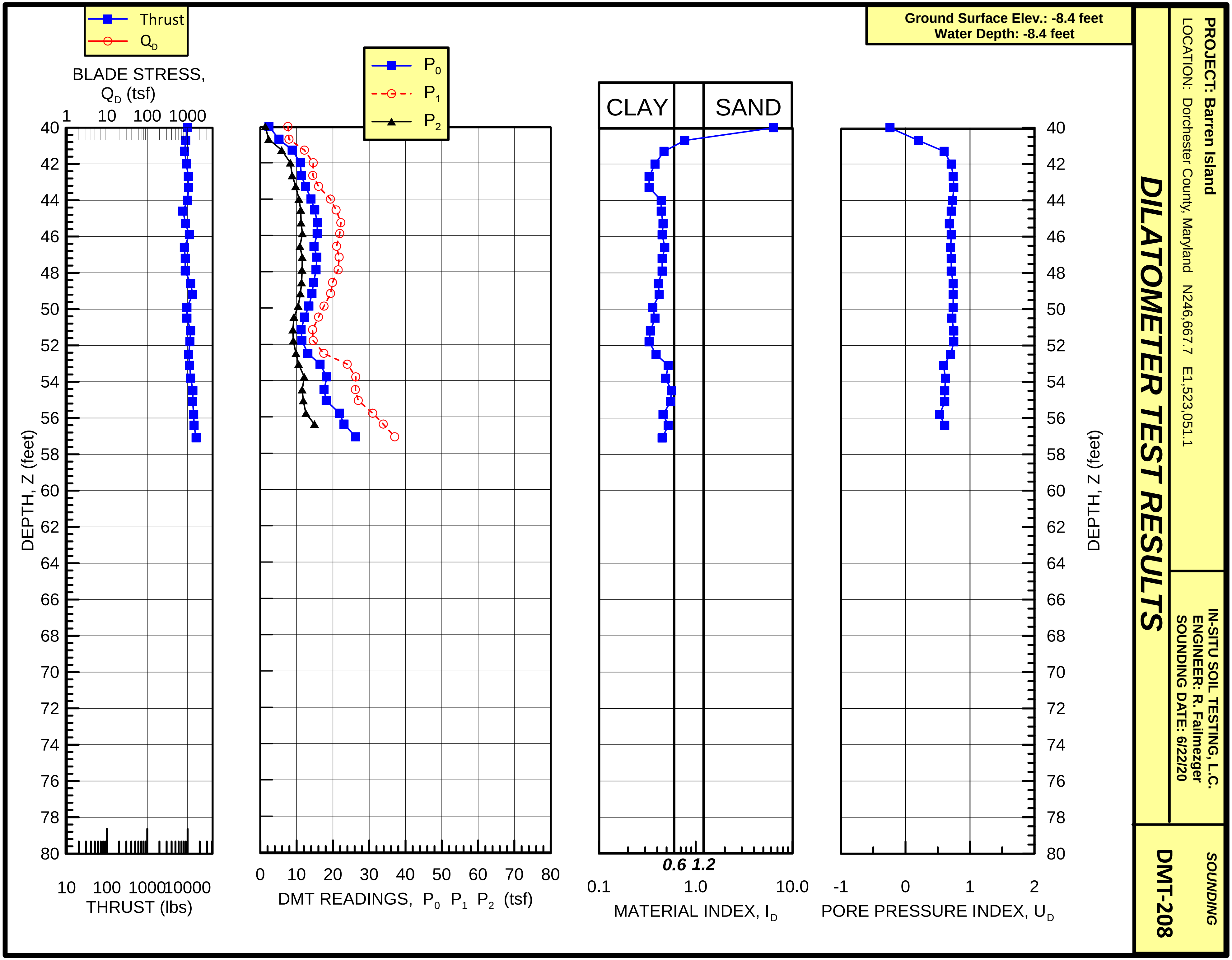
LOCATION: Dorchester County, Maryland N246,667.7 E1,523,051.1

DILATOMETER TEST RESULTS

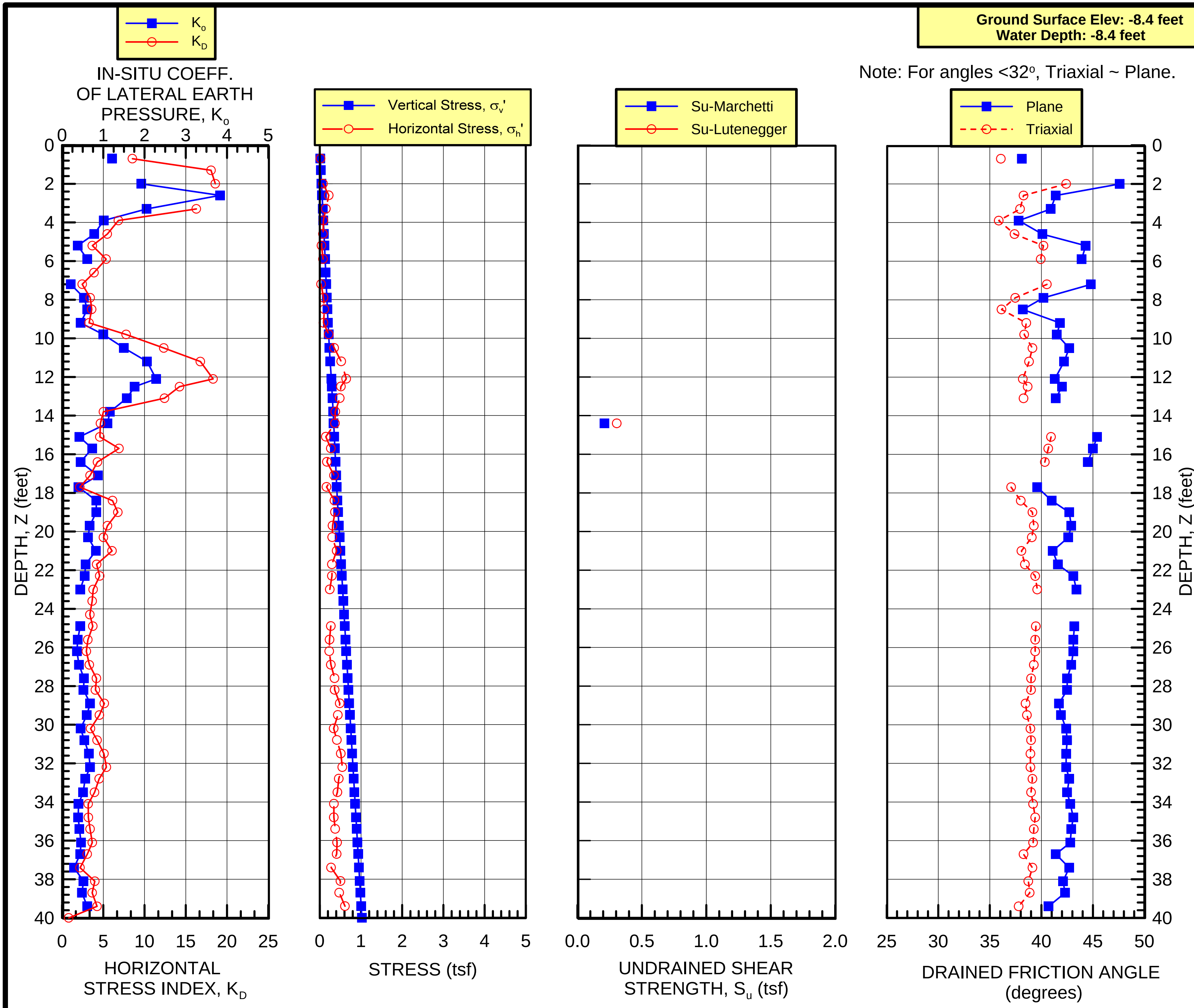
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 6/22/20

SOUNDING

DMT-208



Thrust
Q_D
BLADE STRESS, Q_D (tsf)
1 10 100 1000
DEPTH, Z (feet)
10 100 1000 10000
THRUST (lbs)
P_0
P_1
P_2
0 10 20 30 40 50 60 70 80
DMT READINGS, P_0 P_1 P_2 (tsf)
CLAY
SAND
0.6 1.2
0.1 1.0 10.0
MATERIAL INDEX, I_D
-1 0 1 2
PORE PRESSURE INDEX, U_D
40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80
Ground Surface Elev.: -8.4 feet
Water Depth: -8.4 feet
DILATOMETER TEST RESULTS
PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N246,667.7 E1,523,051.1
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 6/22/20
SOUNDING
DMT-208

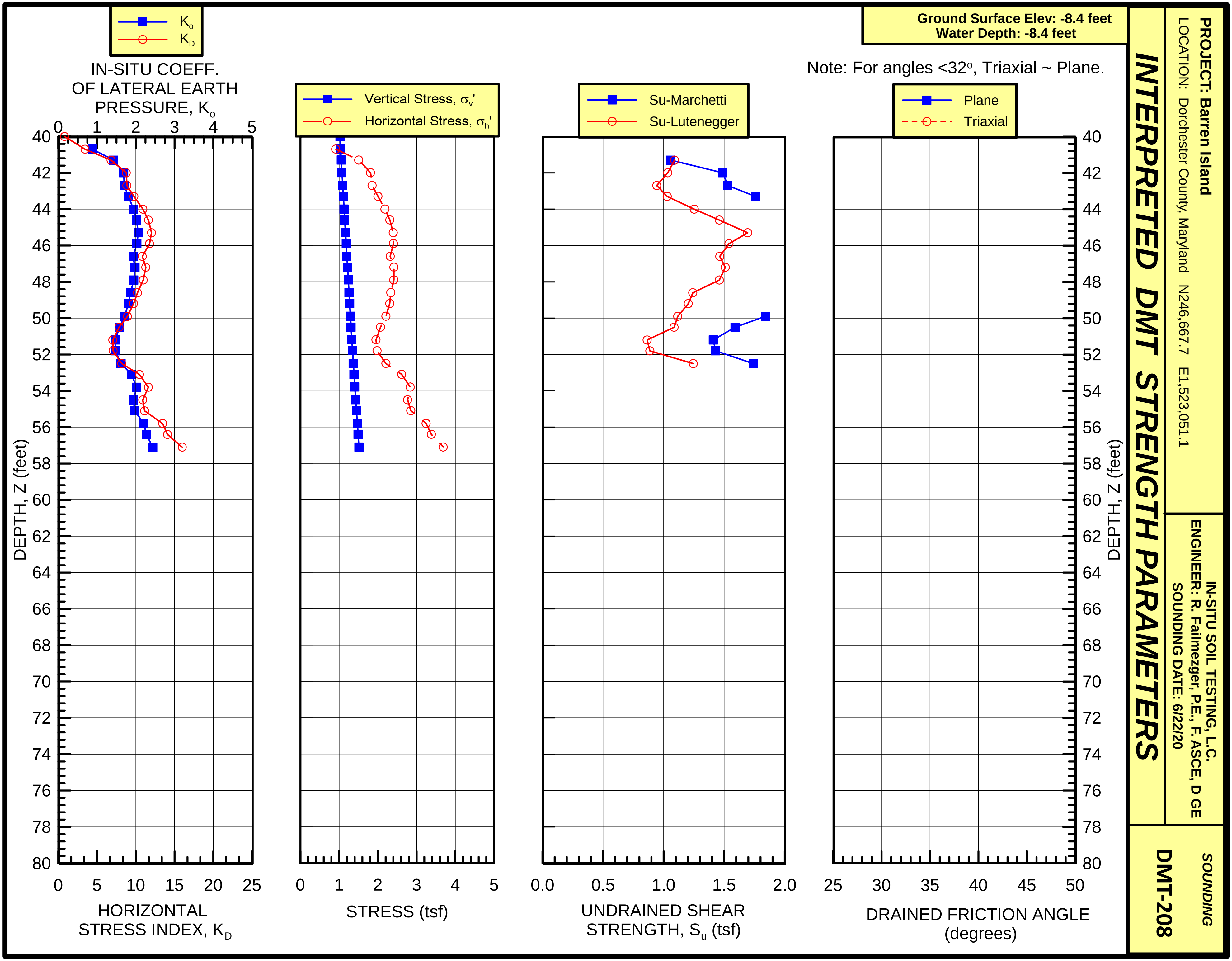


INTERPRETED DMT STRENGTH PARAMETERS

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N246,667.7 E1,523,051.1

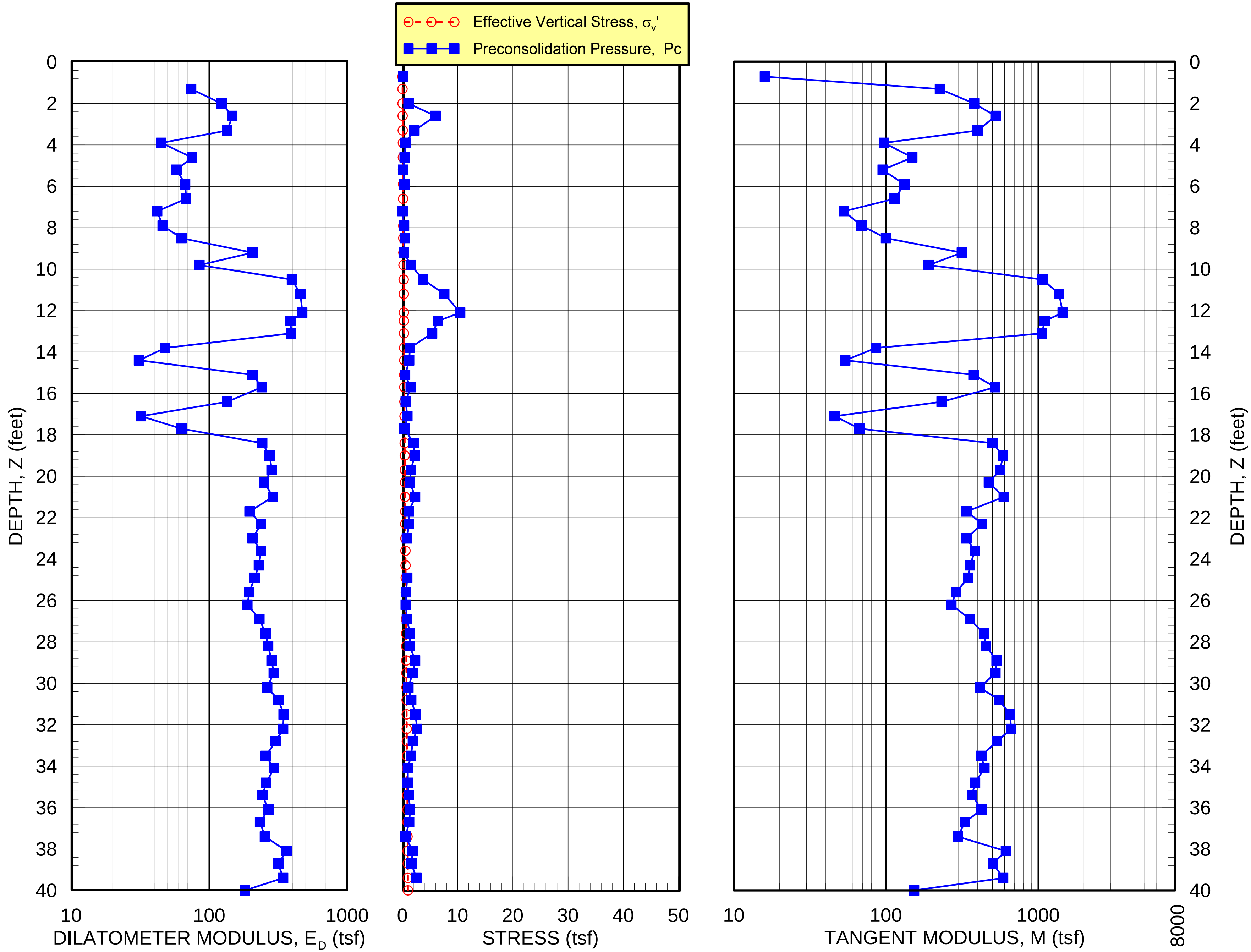
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/22/20

SOUNDING
DMT-208



Ground Surface Elev: -8.4 feet
Water Depth: -8.4 feet
Note: For angles <32°, Triaxial ~ Plane.
K$_o$
K$_D$
IN-SITU COEFF. OF LATERAL EARTH PRESSURE, K$_o$
Vertical Stress, σ$_v$'
Horizontal Stress, σ$_h$'
Su-Marchetti
Su-Lutenegger
Plane
Triaxial
DEPTH, Z (feet)
HORIZONTAL STRESS INDEX, K$_D$
STRESS (tsf)
UNDRAINED SHEAR STRENGTH, S$_u$ (tsf)
DRAINED FRICTION ANGLE (degrees)
INTERPRETED DMT STRENGTH PARAMETERS
PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N246,667.7 E1,523,051.1
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/22/20
SOUNDING
DMT-208

Ground Surface Elev.: -8.4 feet
Water Depth: -8.4 feet



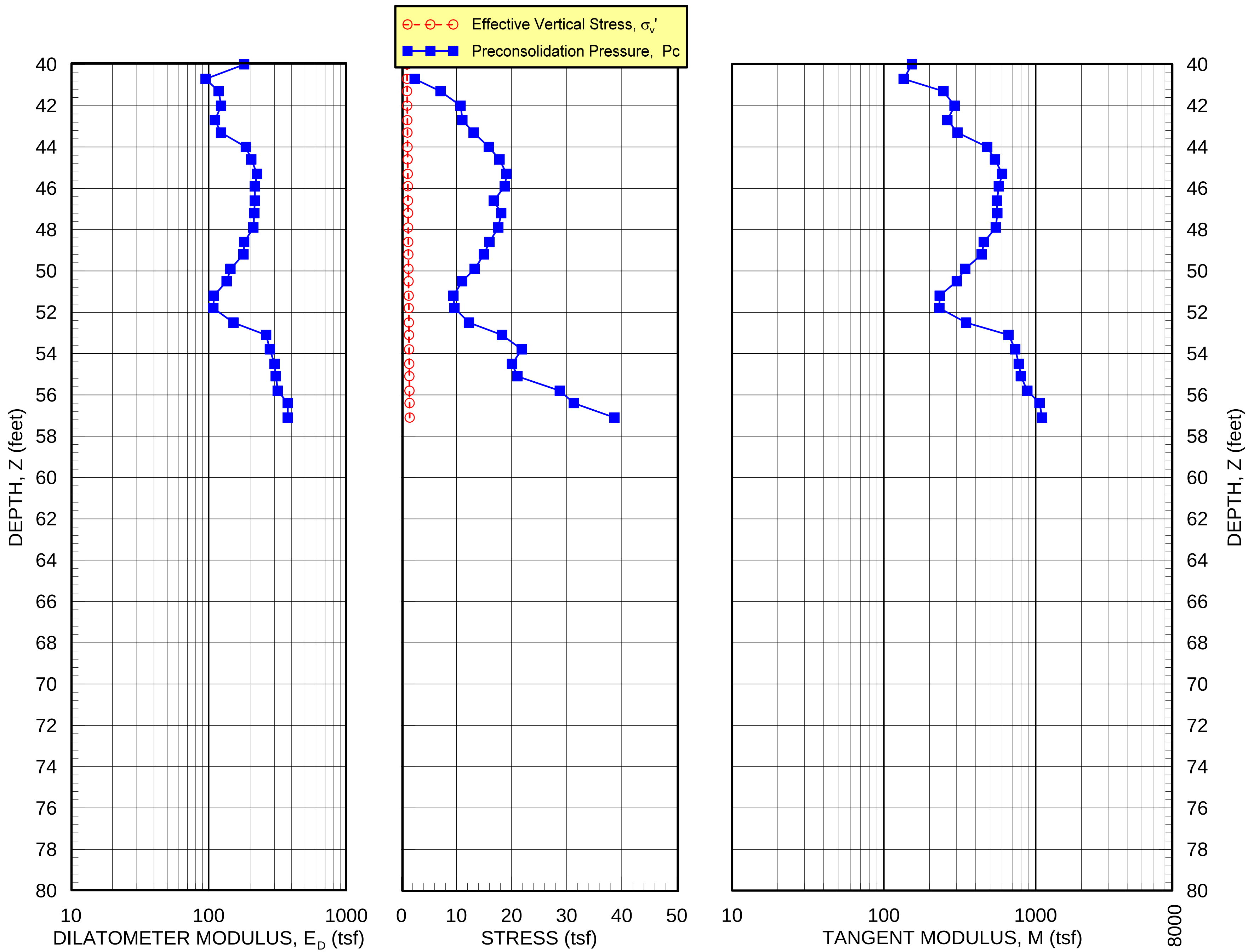
INTERPRETED DMT DEFORMATION PARAMETERS

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N246,667.7 E1,523,051.1

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/22/20

SOUNDING
DMT-208

Ground Surface Elev.: -8.4 feet
Water Depth: -8.4 feet



INTERPRETED DMT DEFORMATION PARAMETERS

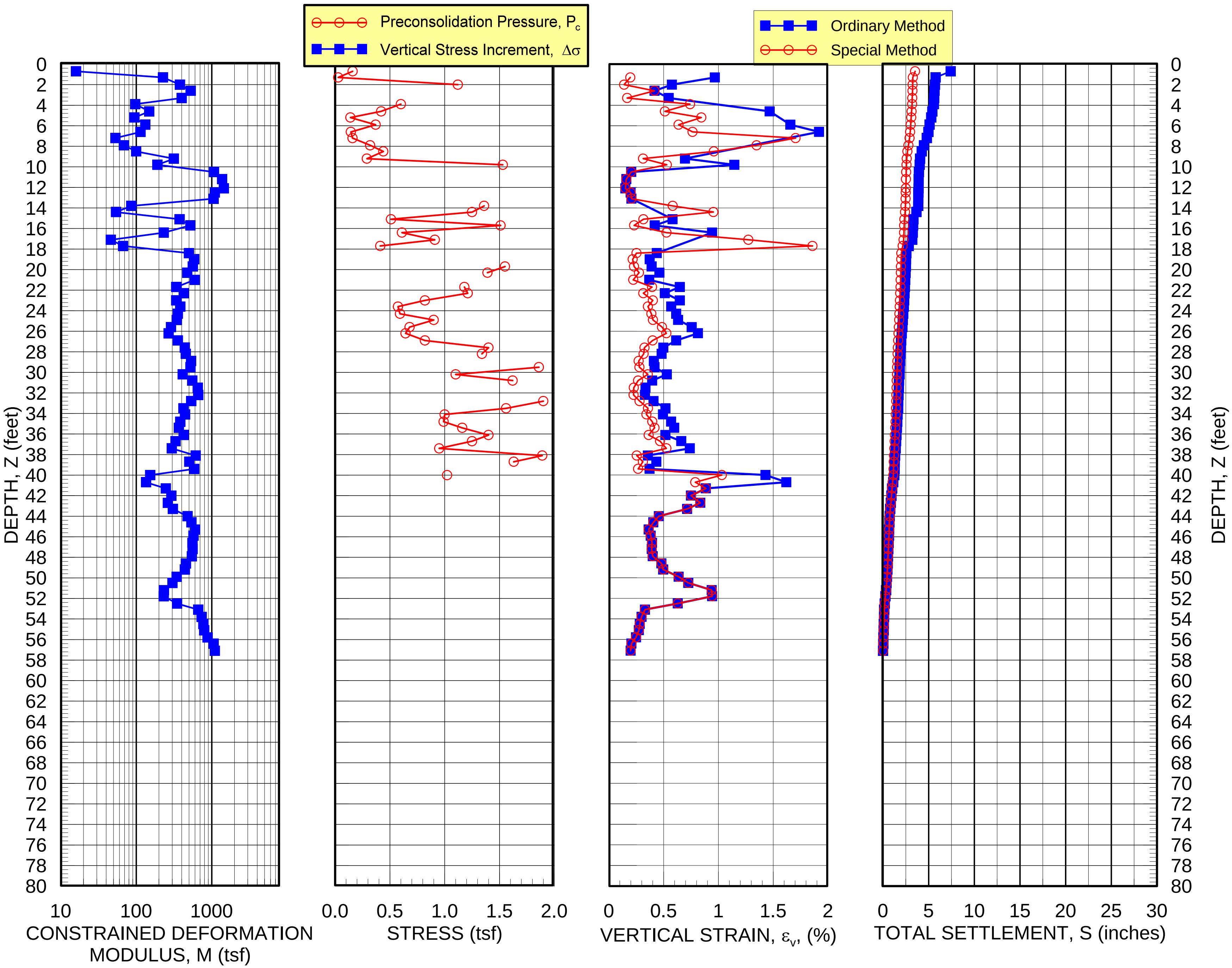
PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N246,667.7 E1,523,051.1

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/22/20

SOUNDING
DMT-208

Ground Surface Elev.: -8.4 feet
Water Depth: -8.4 feet

PREDICTED DMT SETTLEMENT



PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N246,667.7 E1,523,051.1

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/22/20

SOUNDING
DMT-208

DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL) SNDG. NO. :DMT-209

In-Situ Soil Testing, L.C. Page 1a

JOB FILE: Barren Island FILE NO. : 2020-45

LOCATION: Dorchester County, Maryland--N246,066.0 E1,526,665.7

SNDG.BY : R. Failmezger SNDG. DATE: 6/27/20

ANAL.BY : Roger Failmezger, P.E., F. ASCE, D. GE ANAL. DATE: 6/27/20

ANALYSIS PARAMETERS: LO RANGE = 9.92 TSF ROD DIAM. = 2.36 IN BL.THICK. = 0.59 IN SU FACTOR = 1

SURF.ELEV. = -3.3 FT LO GAGE 0 = 0.00 TSF FR.RED.DIA. = 2.64 IN BL.WIDTH = 3.78 IN PHI FACTOR = 1

WATER DEPTH = -4.6 FT HI GAGE 0 = 0.00 TSF LIN.ROD WT. = 8.0 LBF/FTDELTA-A = 0.24 TSF OCR FACTOR = 1

SP.GR.WATER = 1.030 CAL GAGE 0 = 0.00 TSF DELTA/PHI = 0.5 DELTA-B = 0.63 TSF M FACTOR = 1

MAX SU ID = 0.6 SU OPTION = 0 MIN PHI ID = 1.2 OCR OPTION = 0 K0 FACTOR = 1

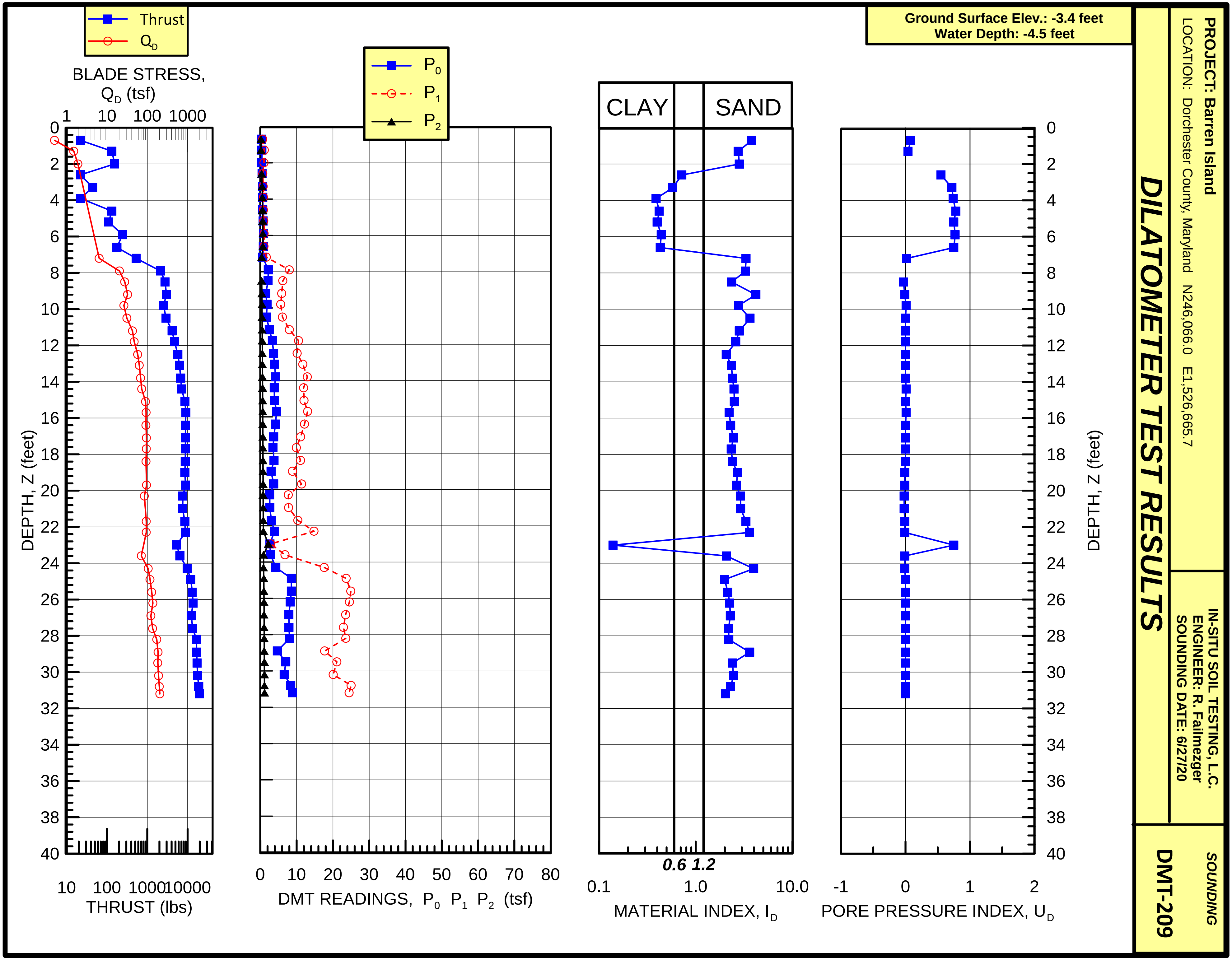
UNIT CONVERSIONS: 1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI 1 M = 3.2808 FT

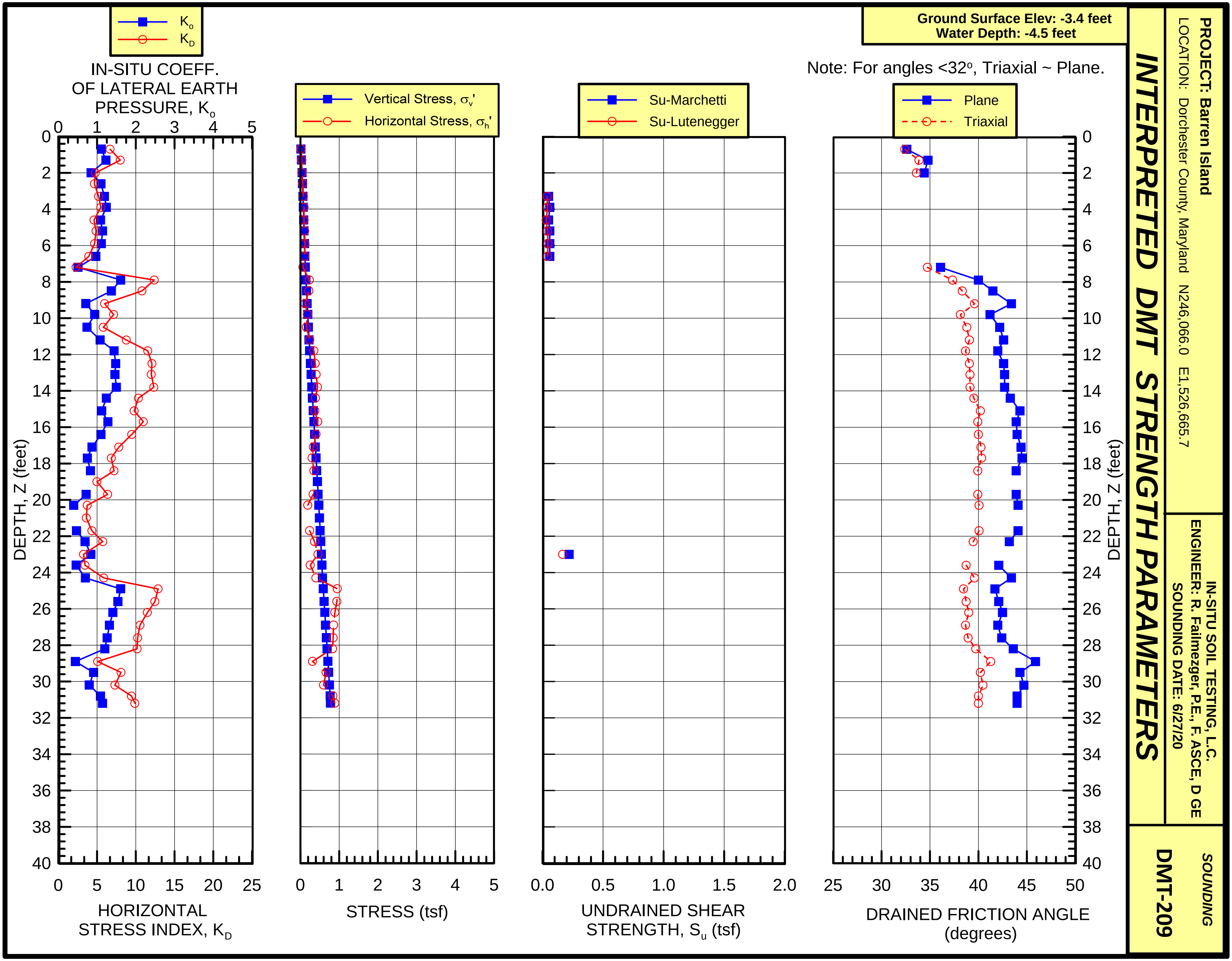
Z	ELEV	THRUST	A	B	C	DA	DB	ZMRNG	ZMLO	ZMHI	ZMCAL	P0	P1	P2	U0	GAMMA	SVP
(FT)	(FT)	(LBF)	(TSF)	(TSF)	(TSF)	(TSF)	(TSF)	(TSF)	(TSF)	(TSF)	(TSF)	(TSF)	(TSF)	(TSF)	(TSF)	(PCF)	(TSF)
*****	******	******	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	******	******	******
0.7	-3.9	22	0.05	1.29	-0.06	0.24	0.63	9.92	0.00	0.00	0.00	0.27	0.67	0.18	0.169	107.3	0.016
1.3	-4.6	132	0.22	1.71	-0.04	0.24	0.63	9.92	0.00	0.00	0.00	0.43	1.09	0.20	0.190	107.3	0.029
2.0	-5.2	154	0.21	1.64		0.24	0.63	9.92	0.00	0.00	0.00	0.42	1.01		0.211	107.3	0.044
2.6	-5.9	22	0.26	1.31	0.14	0.24	0.63	9.92	0.00	0.00	0.00	0.49	0.68	0.38	0.232	94.8	0.056
3.3	-6.6	44	0.37	1.42	0.26	0.24	0.63	9.92	0.00	0.00	0.00	0.60	0.79	0.50	0.254	94.8	0.066
3.9	-7.2	22	0.46	1.48	0.34	0.24	0.63	9.92	0.00	0.00	0.00	0.69	0.86	0.58	0.275	94.8	0.076
4.6	-7.9	132	0.46	1.48	0.37	0.24	0.63	9.92	0.00	0.00	0.00	0.69	0.86	0.61	0.295	94.8	0.086
5.2	-8.5	110	0.55	1.60	0.43	0.24	0.63	9.92	0.00	0.00	0.00	0.78	0.97	0.67	0.316	94.8	0.096
5.9	-9.2	243	0.61	1.68	0.48	0.24	0.63	9.92	0.00	0.00	0.00	0.84	1.05	0.72	0.337	94.8	0.106
6.6	-9.8	176	0.58	1.64	0.46	0.24	0.63	9.92	0.00	0.00	0.00	0.81	1.01	0.70	0.359	94.8	0.116
7.2	-10.5	529	0.48	2.28	0.15	0.24	0.63	9.92	0.00	0.00	0.00	0.68	1.65	0.39	0.380	107.3	0.128
7.9	-11.2	2139	2.21	8.60		0.24	0.63	9.92	0.00	0.00	0.00	2.18	7.98		0.401	113.6	0.143
8.5	-11.8	2756	2.10	6.84	0.13	0.24	0.63	9.92	0.00	0.00	0.00	2.14	6.21	0.37	0.422	113.6	0.160
9.2	-12.5	2977	1.46	6.51	0.19	0.24	0.63	9.92	0.00	0.00	0.00	1.49	5.89	0.43	0.444	113.6	0.175
9.8	-13.1	2536	1.77	6.25	0.24	0.24	0.63	9.92	0.00	0.00	0.00	1.84	5.63	0.48	0.465	113.6	0.192
10.5	-13.8	2911	1.66	6.71	0.25	0.24	0.63	9.92	0.00	0.00	0.00	1.69	6.09	0.49	0.485	113.6	0.208
11.2	-14.4	4123	2.50	8.64	0.27	0.24	0.63	9.92	0.00	0.00	0.00	2.47	8.02	0.51	0.506	113.6	0.224
11.8	-15.1	4741	3.41	11.16	0.29	0.24	0.63	9.92	0.00	0.00	0.00	3.31	10.53	0.53	0.527	119.2	0.241
12.5	-15.7	5733	3.75	10.78	0.32	0.24	0.63	9.92	0.00	0.00	0.00	3.67	10.16	0.56	0.549	119.2	0.259
13.1	-16.4	6262	4.03	12.33	0.33	0.24	0.63	9.92	0.00	0.00	0.00	3.89	11.70	0.57	0.570	119.2	0.278
13.8	-17.1	6769	4.41	13.58	0.35	0.24	0.63	9.92	0.00	0.00	0.00	4.23	12.96	0.60	0.591	119.2	0.295
14.4	-17.7	7056	4.00	12.55	0.40	0.24	0.63	9.92	0.00	0.00	0.00	3.85	11.92	0.64	0.612	119.2	0.313
15.1	-18.4	8600	4.03	12.67	0.41	0.24	0.63	9.92	0.00	0.00	0.00	3.88	12.05	0.65	0.633	119.2	0.332
15.7	-19.0	9018	4.66	13.65	0.44	0.24	0.63	9.92	0.00	0.00	0.00	4.49	13.02	0.68	0.655	119.2	0.350
16.4	-19.7	8820	4.30	12.80	0.44	0.24	0.63	9.92	0.00	0.00	0.00	4.16	12.17	0.68	0.675	119.2	0.367
17.1	-20.3	8908	3.82	11.73	0.47	0.24	0.63	9.92	0.00	0.00	0.00	3.71	11.11	0.71	0.696	119.2	0.386
17.7	-21.0	8798	3.55	10.55	0.48	0.24	0.63	9.92	0.00	0.00	0.00	3.49	9.93	0.72	0.717	119.2	0.404
18.4	-21.7	8710	3.88	11.69	0.49	0.24	0.63	9.92	0.00	0.00	0.00	3.78	11.07	0.73	0.739	119.2	0.422
19.0	-22.3	8533	3.00	9.50	0.49	0.24	0.63	9.92	0.00	0.00	0.00	2.95	8.87	0.73	0.760	119.2	0.441
19.7	-23.0	8908	3.82	12.01	0.52	0.24	0.63	9.92	0.00	0.00	0.00	3.70	11.38	0.76	0.781	119.2	0.458
20.3	-23.6	7585	2.58	8.34	0.53	0.24	0.63	9.92	0.00	0.00	0.00	2.58	7.72	0.77	0.802	113.6	0.476
21.0	-24.3	7497	2.61	8.43	0.55	0.24	0.63	9.92	0.00	0.00	0.00	2.60	7.80	0.79	0.823	113.6	0.492
21.7	-24.9	8533	3.15	10.95	0.57	0.24	0.63	9.92	0.00	0.00	0.00	3.05	10.33	0.81	0.845	119.2	0.508
22.3	-25.6	8776	4.17	15.42	0.61	0.24	0.63	9.92	0.00	0.00	0.00	3.88	14.79	0.85	0.865	119.2	0.527
23.0	-26.2	5336	2.42	3.52	1.97	0.24	0.63	9.92	0.00	0.00	0.00	2.65	2.89	2.21	0.886	94.8	0.541
23.6	-26.9	6439	2.77	7.42	0.65	0.24	0.63	9.92	0.00	0.00	0.00	2.82	6.80	0.89	0.907	113.6	0.554
24.3	-27.6	9812	4.68	18.25	0.65	0.24	0.63	9.92	0.00	0.00	0.00	4.28	17.62	0.89	0.928	119.2	0.571
24.9	-28.2	11973	9.03	24.28	0.74	0.24	0.63	9.92	0.00	0.00	0.00	8.55	23.66	0.98	0.950	125.4	0.590
25.6	-28.9	13010	9.11	25.57	0.75	0.24	0.63	9.92	0.00	0.00	0.00	8.57	24.94	0.99	0.971	125.4	0.611
26.2	-29.5	13671	8.78	25.17	0.78	0.24	0.63	9.92	0.00	0.00	0.00	8.25	24.54	1.02	0.992	125.4	0.631
26.9	-30.2	12282	8.37	24.13	0.78	0.24	0.63	9.92	0.00	0.00	0.00	7.87	23.50	1.02	1.013	125.4	0.650
27.6	-30.8	13384	8.37	23.53	0.80	0.24	0.63	9.92	0.00	0.00	0.00	7.90	22.91	1.04	1.035	125.4	0.671
28.2	-31.5	16560	8.58	24.20	0.84	0.24	0.63	9.92	0.00	0.00	0.00	8.08	23.57	1.08	1.055	125.4	0.691
28.9	-32.2	16692	5.06	18.35	0.84	0.24	0.63	9.92	0.00	0.00	0.00	4.69	17.73	1.08	1.076	119.2	0.710
29.5	-32.8	17155	7.43	21.72	0.87	0.24	0.63	9.92	0.00	0.00	0.00	7.01	21.09	1.11	1.097	125.4	0.730
30.2	-33.5	17706	6.99	20.71	0.90	0.24	0.63	9.92	0.00	0.00	0.00	6.59	20.09	1.14	1.118	125.4	0.750
30.8	-34.1	18919	8.96	25.65	0.91	0.24	0.63	9.92	0.00	0.00	0.00	8.40	25.02	1.15	1.140	125.4	0.769
31.2	-34.4	19602	9.35	25.09	0.94	0.24	0.63	9.92	0.00	0.00	0.00	8.85	24.46	1.18	1.150	125.4	0.780

DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL) SNDG. NO. : DMT-209
In-Situ Soil Testing, L.C. Page 2
JOB FILE: Barren Island FILE NO. :2020-45
LOCATION: Dorchester County, Maryland--N246,066.0 E1,526,665.7
SNDG.BY : R. Failmezger SNDG. DATE: 6/27/20
ANAL.BY : Roger Failmezger, P.E., F. ASCE, D. GE ANAL. DATE: 6/27/20

ANALYSIS PARAMETERS: LO RANGE = 9.92 TSF ROD DIAM. = 2.36 IN BL.THICK. = 0.59 IN SU FACTOR = 1
SURF.ELEV. = -3.3 FT LO GAGE 0 = 0.00 TSF FR.RED.DIA. = 2.64 IN BL.WIDTH = 3.78 IN PHI FACTOR = 1
WATER DEPTH = -4.6 FT HI GAGE 0 = 0.00 TSF LIN.ROD WT. = 8.0 LBF/FTDELTA-A = 0.24 TSF OCR FACTOR = 1
SP.GR.WATER = 1.030 CAL GAGE 0 = 0.00 TSF;
DELTA / PHI = 0.5 DELTA - B = 0.63 TSF M FACTOR = 1
MAX SU ID = 0.6 SU OPTION = 0 MIN PHI ID = 1.2 OCR OPTION = 0 K0 FACTOR = 1
UNIT CONVERSIONS: 1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI 1 M = 3.2808 FT

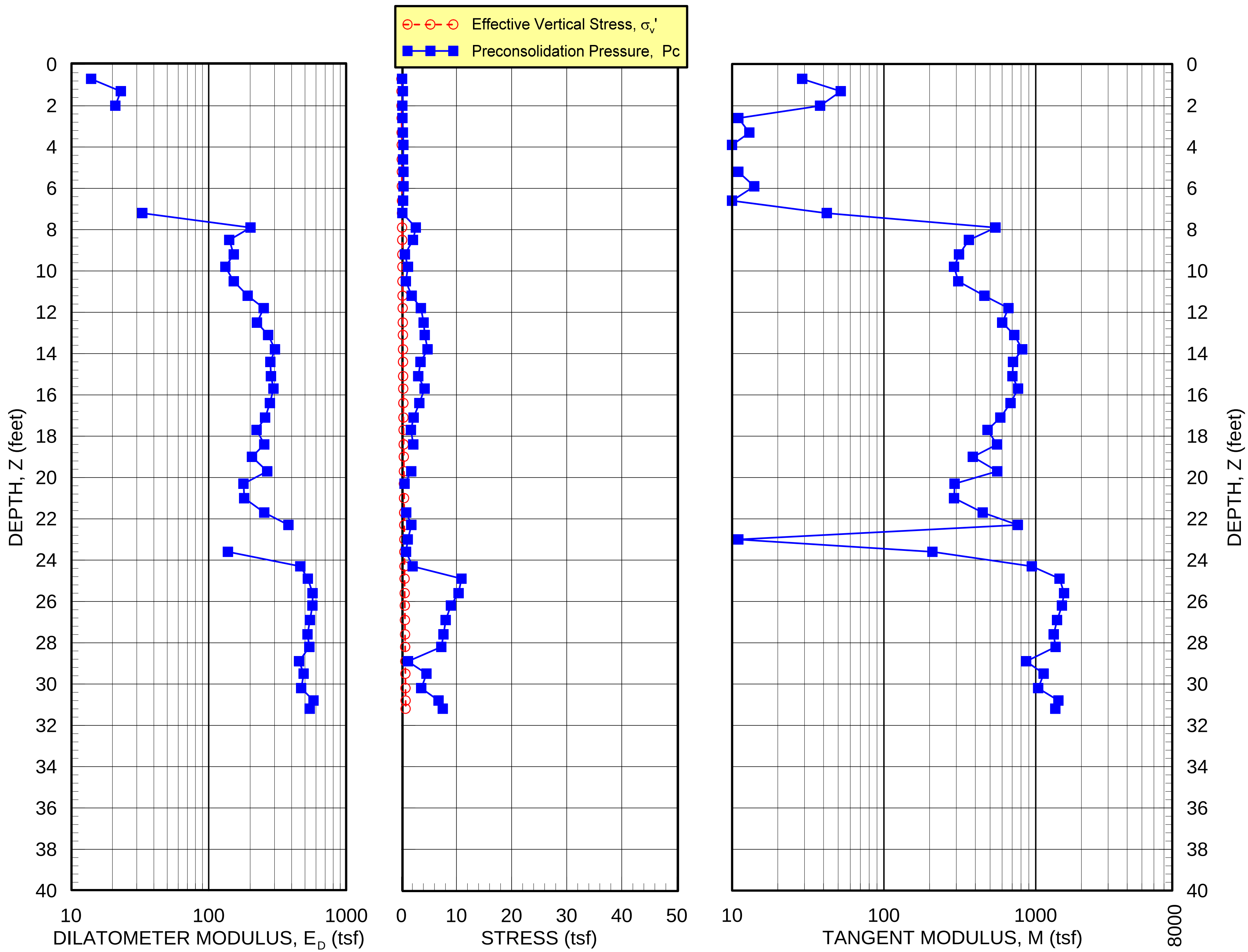
Z (FT)	ELEV (FT)	KD	ID	UD	ED (TSF)	K0	SU (TSF)	QD (TSF)	PHI (DEG)	SIGFF (TSF)	PHIO (DEG)	PC (TSF)	OCR	M (TSF)	SOIL TYPE
*****	******	*****	*****	*****	******	*****	*****	*****	*****	******	*****	*****	*****	******	************
0.7	-3.9	6.68	3.77	0.08	14	1.11		0.5	32.6	0.02	22.9	0.13	7.7	29	SAND
1.3	-4.6	8.00	2.76	0.04	23	1.23		1.5	34.8	0.04	26.9	0.29	9.8	52	SILTY SAND
2.0	-5.2	4.78	2.82		21	0.85		1.9	34.4	0.07	27.2	0.19	4.3	38	SILTY SAND
2.6	-5.9	4.65	0.72	0.55	6	1.10						0.21	3.7	11	MUD
3.3	-6.6	5.20	0.58	0.72	7	1.19	0.05					0.29	4.4	13	MUD
3.9	-7.2	5.49	0.39	0.74	5	1.24	0.06					0.37	4.8	10	MUD
4.6	-7.9	4.60	0.42	0.78	5	1.09	0.05					0.31	3.7	9	MUD
5.2	-8.5	4.87	0.40	0.75	6	1.14	0.06					0.39	4.0	11	MUD
5.9	-9.2	4.68	0.44	0.77	7	1.11	0.06					0.40	3.8	14	MUD
6.6	-9.8	3.93	0.43	0.75	7	0.97	0.06					0.33	2.9	10	MUD
7.2	-10.5	2.29	3.32	0.02	33	0.51		6.4	36.1	0.21	31.3	0.19	1.5	42	SAND
7.9	-11.2	12.38	3.26		201	1.61		20.4	40.0	0.24	36.0	2.63	18.3	544	SILTY SAND
8.5	-11.8	10.80	2.36	-0.03	141	1.37		27.6	41.5	0.26	37.9	2.11	13.2	363	SILTY SAND
9.2	-12.5	5.97	4.19	-0.01	152	0.71		32.4	43.4	0.29	40.1	0.65	3.7	313	SAND
9.8	-13.1	7.14	2.77	0.01	132	0.94		26.3	41.2	0.31	37.8	1.19	6.2	290	SILTY SAND
10.5	-13.8	5.80	3.65	0.00	152	0.74		31.2	42.2	0.34	39.0	0.81	3.9	309	SAND
11.2	-14.4	8.77	2.82	0.00	192	1.08		42.8	42.6	0.38	39.6	1.88	8.4	459	SILTY SAND
11.8	-15.1	11.54	2.60	0.00	251	1.44		47.4	42.0	0.41	39.1	3.55	14.7	661	SILTY SAND
12.5	-15.7	12.08	2.07	0.00	224	1.48		57.7	42.6	0.44	39.8	4.05	15.6	602	SILTY SAND
13.1	-16.4	12.00	2.34	0.00	270	1.46		63.3	42.7	0.47	40.1	4.25	15.3	723	SILTY SAND
13.8	-17.1	12.32	2.40	0.00	303	1.50		68.2	42.7	0.49	40.1	4.77	16.1	816	SILTY SAND
14.4	-17.7	10.34	2.49	0.01	280	1.24		72.8	43.3	0.53	40.8	3.49	11.1	709	SILTY SAND
15.1	-18.4	9.79	2.51	0.00	283	1.12		90.6	44.3	0.56	42.1	3.06	9.2	703	SILTY SAND
15.7	-19.0	10.97	2.22	0.01	295	1.28		93.5	43.9	0.60	41.7	4.20	12.0	765	SILTY SAND
16.4	-19.7	9.47	2.30	0.00	278	1.10		92.5	44.0	0.63	41.8	3.27	8.9	682	SILTY SAND
17.1	-20.3	7.80	2.46	0.00	257	0.87		95.2	44.4	0.66	42.4	2.21	5.7	585	SILTY SAND
17.7	-21.0	6.84	2.33	0.00	223	0.75		94.8	44.5	0.69	42.5	1.75	4.3	481	SILTY SAND
18.4	-21.7	7.19	2.40	0.00	253	0.83		93.0	43.9	0.72	42.0	2.15	5.1	556	SILTY SAND
19.0	-22.3	4.98	2.70	-0.01	206									386	SILTY SAND
19.7	-23.0	6.36	2.64	-0.01	266	0.72		95.8	43.9	0.77	42.1	1.81	3.9	559	SILTY SAND
20.3	-23.6	3.73	2.90	-0.02	179	0.40		84.5	44.1	0.80	42.4	0.60	1.2	292	SILTY SAND
21.0	-24.3	3.62	2.92	-0.02	181									290	SILTY SAND
21.7	-24.9	4.33	3.31	-0.01	253	0.47		94.2	44.1	0.87	42.4	0.88	1.7	448	SAND
22.3	-25.6	5.73	3.61	-0.01	379	0.69		94.3	43.2	0.89	41.6	1.83	3.5	763	SAND
23.0	-26.2	3.26	0.14	0.75	8	0.84	0.22					1.16	2.1	11	MUD
23.6	-26.9	3.45	2.08	-0.01	138	0.46		71.1	42.1	0.93	40.4	0.85	1.5	209	SILTY SAND
24.3	-27.6	5.87	3.98	-0.01	462	0.70		105.3	43.4	0.96	41.8	2.05	3.6	943	SAND
24.9	-28.2	12.88	1.99	0.00	524	1.61		116.8	41.7	0.98	40.1	10.91	18.5	1436	SILTY SAND
25.6	-28.9	12.46	2.15	0.00	568	1.54		128.7	42.1	1.02	40.6	10.37	17.0	1538	SILTY SAND
26.2	-29.5	11.50	2.25	0.00	566	1.41		137.5	42.5	1.05	41.1	8.99	14.3	1489	SILTY SAND
26.9	-30.2	10.54	2.28	0.00	543	1.32		122.9	42.0	1.09	40.5	8.05	12.4	1383	SILTY SAND
27.6	-30.8	10.23	2.19	0.00	521	1.26		135.6	42.4	1.13	41.1	7.65	11.4	1313	SILTY SAND
28.2	-31.5	10.17	2.20	0.00	538	1.20		171.5	43.6	1.17	42.4	7.26	10.5	1352	SILTY SAND
28.9	-32.2	5.08	3.62	0.00	453	0.44		184.7	45.9	1.22	44.8	1.18	1.7	865	SAND
29.5	-32.8	8.10	2.39	0.00	489	0.91		182.3	44.3	1.24	43.2	4.56	6.3	1129	SILTY SAND
30.2	-33.5	7.30	2.47	0.00	469	0.80		190.2	44.7	1.27	43.6	3.62	4.8	1038	SILTY SAND
30.8	-34.1	9.44	2.29	0.00	576	1.09		198.3	44.0	1.31	43.0	6.75	8.8	1411	SILTY SAND
31.2	-34.4	9.88	2.03	0.00	542	1.14		204.8	44.0	1.33	43.0	7.51	9.6	1348	SILTY SAND


Thrust
Q_D
BLADE STRESS, Q_D (tsf)
1 10 100 1000
P_0
P_1
P_2
CLAY
SAND
Ground Surface Elev.: -3.4 feet
Water Depth: -4.5 feet
DEPTH, Z (feet)
10 100 1000 10000
THRUST (lbs)
0 10 20 30 40 50 60 70 80
DMT READINGS, P_0 P_1 P_2 (tsf)
0.6 1.2
0.1 1.0 10.0
MATERIAL INDEX, I_D
-1 0 1 2
PORE PRESSURE INDEX, U_D
PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N246,066.0 E1,526,665.7
DILATOMETER TEST RESULTS
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 6/27/20
SOUNDING
DMT-209



PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N246,066.0 E1,526,665.7
INTERPRETED DMT STRENGTH PARAMETERS
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/27/20
SOUNDING
DMT-209
Ground Surface Elev: -3.4 feet
Water Depth: -4.5 feet
Note: For angles <32°, Triaxial ~ Plane.
K_o
K_D
IN-SITU COEFF. OF LATERAL EARTH PRESSURE, K_o
HORIZONTAL STRESS INDEX, K_D
DEPTH, Z (feet)
Vertical Stress, σ_v'
Horizontal Stress, σ_h'
STRESS (tsf)
Su-Marchetti
Su-Lutenegger
UNDRAINED SHEAR STRENGTH, S_u (tsf)
Plane
Triaxial
DRAINED FRICTION ANGLE (degrees)

Ground Surface Elev.: -3.4 feet
Water Depth: -4.5 feet

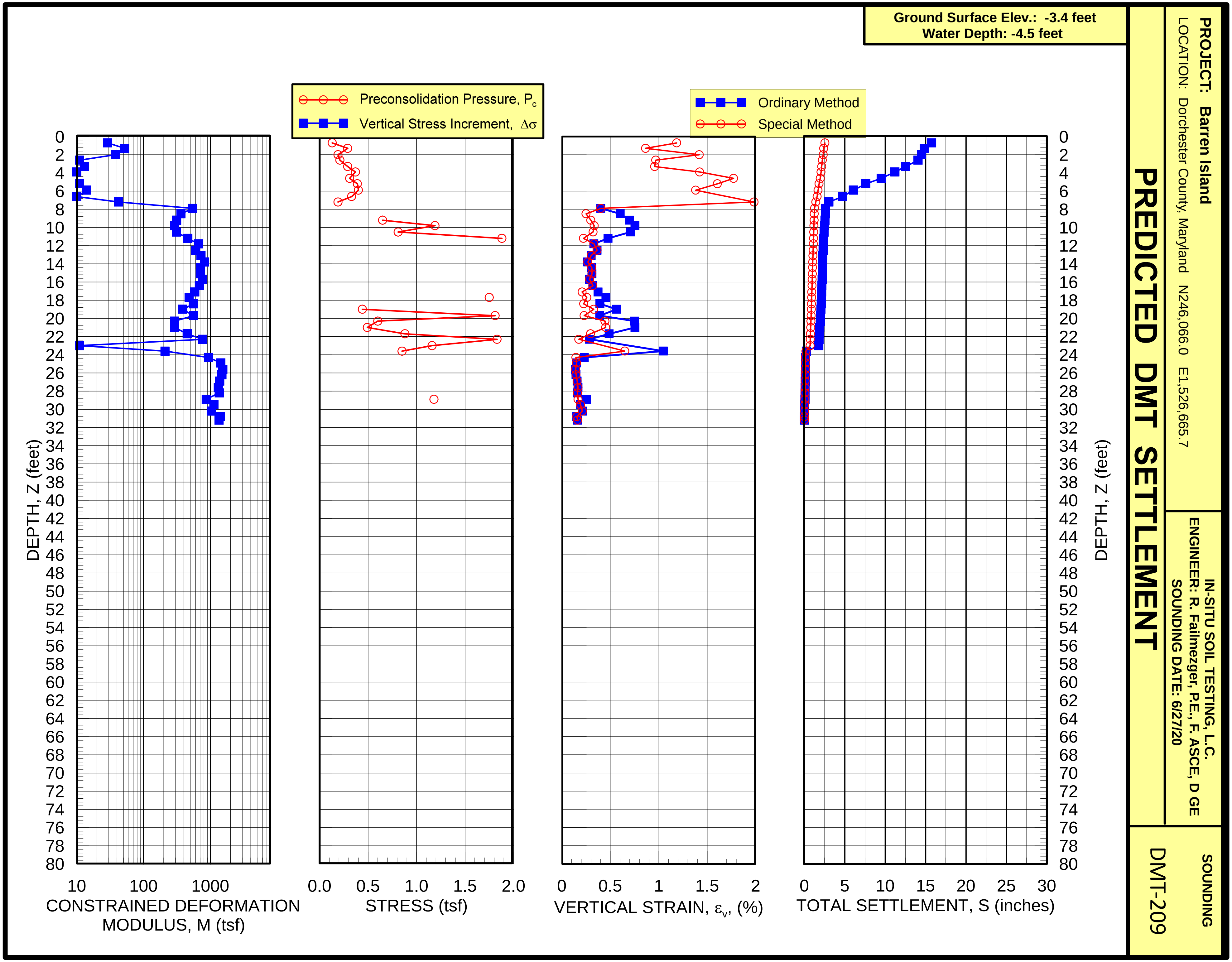


INTERPRETED DMT DEFORMATION PARAMETERS

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N246,066.0 E1,526,665.7

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/27/20

SOUNDING
DMT-209



Ground Surface Elev.: -3.4 feet
Water Depth: -4.5 feet
PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N246,066.0 E1,526,665.7
PREDICTED DMT SETTLEMENT
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/27/20
SOUNDING
DMT-209
Preconsolidation Pressure, P_c
Vertical Stress Increment, $\Delta\sigma$
Ordinary Method
Special Method
DEPTH, Z (feet)
CONSTRAINED DEFORMATION MODULUS, M (tsf)
STRESS (tsf)
VERTICAL STRAIN, ε_v, (%)
TOTAL SETTLEMENT, S (inches)

DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL) SNDG. NO. :DMT-210
In-Situ Soil Testing, L.C. Page 1a
JOB FILE: Barren Island FILE NO. : 2020-45
LOCATION: Dorchester County, Maryland--N247,278.4 E1,524,554.3
SNDG.BY : R. Failmezger SNDG. DATE: 6/26/20
ANAL.BY : Roger Failmezger, P.E., F. ASCE, D. GE ANAL. DATE: 6/26/20

ANALYSIS PARAMETERS: LO RANGE = 9.92 TSF ROD DIAM. = 2.36 IN BL.THICK. = 0.59 IN SU FACTOR = 1
SURF.ELEV. = -4.6 FT LO GAGE 0 = 0.00 TSF FR.RED.DIA. = 2.64 IN BL.WIDTH = 3.78 IN PHI FACTOR = 1
WATER DEPTH = -4.3 FT HI GAGE 0 = 0.00 TSF LIN.ROD WT. = 8.0 LBF/FTDELTA-A = 0.24 TSF OCR FACTOR = 1
SP.GR.WATER = 1.030 CAL GAGE 0 = 0.00 TSF DELTA/PHI = 0.5 DELTA-B = 0.65 TSF M FACTOR = 1
MAX SU ID = 0.6 SU OPTION = 0 MIN PHI ID = 1.2 OCR OPTION = 0 K0 FACTOR = 1
UNIT CONVERSIONS: 1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI 1 M = 3.2808 FT

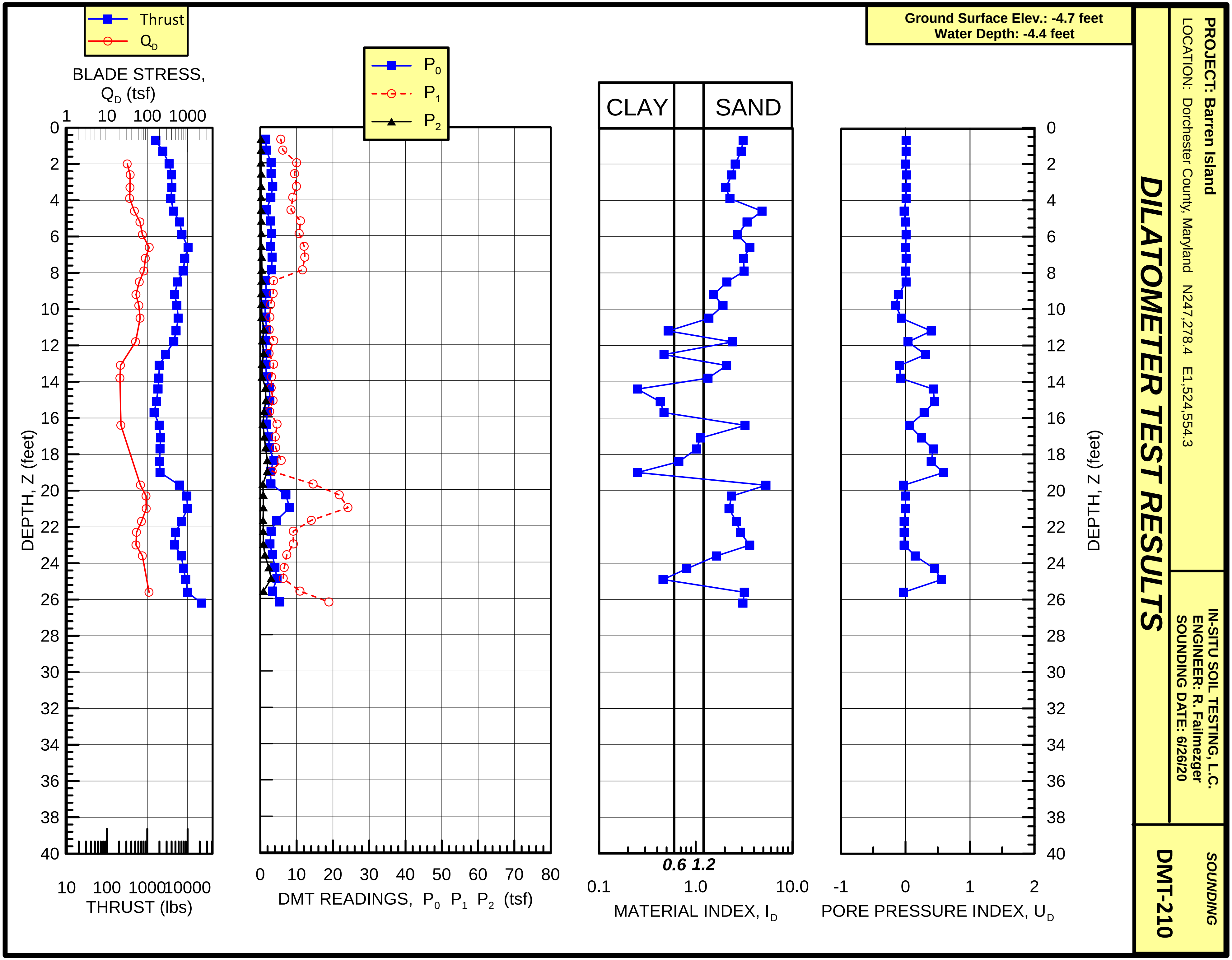
Z (FT)	ELEV (FT)	THRUST (LBF)	A (TSF)	B (TSF)	C (TSF)	DA (TSF)	DB (TSF)	ZMRNG (TSF)	ZMLO (TSF)	ZMHI (TSF)	ZMCAL (TSF)	P0 (TSF)	P1 (TSF)	P2 (TSF)	U0 (TSF)	GAMMA (PCF)	SVP (TSF)
*****	******	******	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	******	******	******
0.7	-5.2	1632	1.45	6.28	-0.06	0.24	0.65	9.92	0.00	0.00	0.00	1.49	5.64	0.18	0.159	113.6	0.016
1.3	-5.9	2426	1.68	6.86	-0.05	0.24	0.65	9.92	0.00	0.00	0.00	1.70	6.21	0.19	0.180	113.6	0.031
2.0	-6.6	3506	3.06	10.67	-0.04	0.24	0.65	9.92	0.00	0.00	0.00	2.96	10.02	0.20	0.200	119.2	0.049
2.6	-7.2	3991	3.03	10.07	0.03	0.24	0.65	9.92	0.00	0.00	0.00	2.96	9.43	0.27	0.221	119.2	0.067
3.3	-7.9	4057	3.50	10.61	0.03	0.24	0.65	9.92	0.00	0.00	0.00	3.42	9.96	0.27	0.242	119.2	0.086
3.9	-8.5	3837	2.96	9.57	0.04	0.24	0.65	9.92	0.00	0.00	0.00	2.92	8.93	0.28	0.264	119.2	0.103
4.6	-9.2	4454	1.76	9.10	0.01	0.24	0.65	9.92	0.00	0.00	0.00	1.68	8.46	0.25	0.285	113.6	0.120
5.2	-9.8	6328	2.90	11.70	0.06	0.24	0.65	9.92	0.00	0.00	0.00	2.75	11.06	0.30	0.306	119.2	0.138
5.9	-10.5	7254	3.25	11.35	0.10	0.24	0.65	9.92	0.00	0.00	0.00	3.12	10.70	0.34	0.327	119.2	0.156
6.6	-11.2	10275	3.08	12.73	0.10	0.24	0.65	9.92	0.00	0.00	0.00	2.88	12.08	0.34	0.349	119.2	0.173
7.2	-11.8	8467	3.45	12.91	0.17	0.24	0.65	9.92	0.00	0.00	0.00	3.26	12.27	0.41	0.370	119.2	0.192
7.9	-12.5	7806	3.25	12.25	0.16	0.24	0.65	9.92	0.00	0.00	0.00	3.08	11.60	0.40	0.390	119.2	0.210
8.5	-13.1	5623	1.33	4.31	0.18	0.24	0.65	9.92	0.00	0.00	0.00	1.46	3.66	0.42	0.411	107.3	0.226
9.2	-13.8	4763	1.51	4.20	0.06	0.24	0.65	9.92	0.00	0.00	0.00	1.66	3.55	0.30	0.432	101.1	0.239
9.8	-14.4	5424	1.11	3.49	0.09	0.24	0.65	9.92	0.00	0.00	0.00	1.27	2.84	0.33	0.454	107.3	0.253
10.5	-15.1	5843	1.20	3.27	0.18	0.24	0.65	9.92	0.00	0.00	0.00	1.38	2.62	0.42	0.475	101.1	0.265
11.2	-15.7	5182	1.58	3.10	0.77	0.24	0.65	9.92	0.00	0.00	0.00	1.79	2.45	1.01	0.496	101.1	0.278
11.8	-16.4	4542	1.32	4.33	0.31	0.24	0.65	9.92	0.00	0.00	0.00	1.45	3.69	0.55	0.517	107.3	0.290
12.5	-17.1	2822	1.60	3.06	0.69	0.24	0.65	9.92	0.00	0.00	0.00	1.81	2.41	0.93	0.539	101.1	0.304
13.1	-17.7	1985	1.42	4.30	0.23	0.24	0.65	9.92	0.00	0.00	0.00	1.56	3.65	0.47	0.560	107.3	0.316
13.8	-18.4	1940	1.48	3.74	0.25	0.24	0.65	9.92	0.00	0.00	0.00	1.65	3.09	0.49	0.580	101.1	0.330
14.4	-19.0	1852	2.29	3.63	1.18	0.24	0.65	9.92	0.00	0.00	0.00	2.51	2.99	1.42	0.601	101.1	0.341
15.1	-19.7	1676	2.44	4.16	1.29	0.24	0.65	9.92	0.00	0.00	0.00	2.64	3.51	1.53	0.622	101.1	0.354
15.7	-20.3	1477	1.74	3.22	0.78	0.24	0.65	9.92	0.00	0.00	0.00	1.95	2.57	1.02	0.644	101.1	0.365
16.4	-21.0	1985	1.50	5.27	0.48	0.24	0.65	9.92	0.00	0.00	0.00	1.60	4.62	0.72	0.665	107.3	0.379
17.1	-21.7	2139	2.15	4.77	0.85	0.24	0.65	9.92	0.00	0.00	0.00	2.31	4.12	1.09	0.686	107.3	0.394
17.7	-22.3	2073	2.29	4.87	1.21	0.24	0.65	9.92	0.00	0.00	0.00	2.44	4.22	1.45	0.707	107.3	0.407
18.4	-23.0	2007	3.60	6.41	1.69	0.24	0.65	9.92	0.00	0.00	0.00	3.75	5.76	1.93	0.728	107.3	0.422
19.0	-23.6	2073	2.53	3.89	1.68	0.24	0.65	9.92	0.00	0.00	0.00	2.75	3.25	1.92	0.750	101.1	0.434
19.7	-24.3	6240	3.26	15.18	0.46	0.24	0.65	9.92	0.00	0.00	0.00	2.94	14.53	0.70	0.770	119.2	0.449
20.3	-24.9	9592	7.50	22.38	0.56	0.24	0.65	9.92	0.00	0.00	0.00	7.04	21.74	0.80	0.791	125.4	0.469
21.0	-25.6	9923	8.61	24.80	0.60	0.24	0.65	9.92	0.00	0.00	0.00	8.09	24.15	0.84	0.812	125.4	0.489
21.7	-26.2	6990	4.69	14.70	0.52	0.24	0.65	9.92	0.00	0.00	0.00	4.47	14.05	0.76	0.834	119.2	0.507
22.3	-26.9	5005	3.02	9.73	0.56	0.24	0.65	9.92	0.00	0.00	0.00	2.96	9.08	0.80	0.855	119.2	0.526
23.0	-27.6	4785	2.72	9.75	0.61	0.24	0.65	9.92	0.00	0.00	0.00	2.66	9.10	0.85	0.876	113.6	0.543
23.6	-28.2	6946	3.27	7.94	1.02	0.24	0.65	9.92	0.00	0.00	0.00	3.32	7.30	1.26	0.897	107.3	0.559
24.3	-28.9	7916	3.93	7.23	2.09	0.24	0.65	9.92	0.00	0.00	0.00	4.04	6.59	2.33	0.918	107.3	0.572
24.9	-29.5	8974	4.44	6.94	2.75	0.24	0.65	9.92	0.00	0.00	0.00	4.59	6.30	2.99	0.940	107.3	0.587
25.6	-30.2	9967	3.47	11.57	0.65	0.24	0.65	9.92	0.00	0.00	0.00	3.34	10.92	0.89	0.960	119.2	0.602
26.2	-30.8	22050	5.77	19.54		0.24	0.65	9.92	0.00	0.00	0.00	5.37	18.90		0.981	125.4	0.621

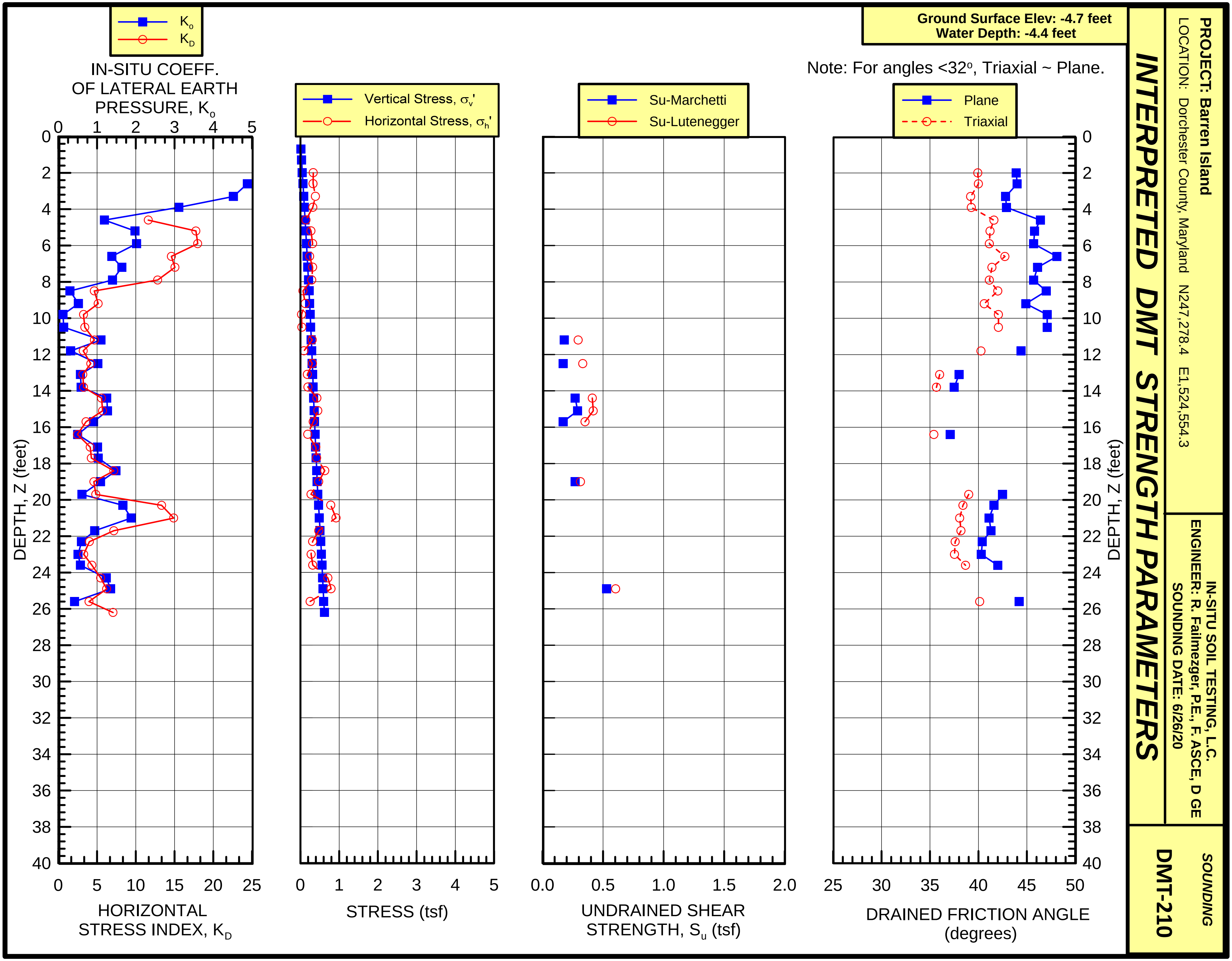
DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL)
In-Situ Soil Testing, L.C.
JOB FILE: Barren Island
LOCATION: Dorchester County, Maryland--N247,278.4 E1,524,554.3
SNDG.BY : R. Failmezger
ANAL.BY : Roger Failmezger, P.E., F. ASCE, D. GE

SNDG. NO. : DMT-210
Page 2
FILE NO. :2020-45
SNDG. DATE: 6/26/20
ANAL. DATE: 6/26/20

ANALYSIS PARAMETERS: LO RANGE = 9.92 TSF ROD DIAM. = 2.36 IN BL.THICK. = 0.59 IN SU FACTOR = 1
SURF.ELEV. = -4.6 FT LO GAGE 0 = 0.00 TSF FR.RED.DIA. = 2.64 IN BL.WIDTH = 3.78 IN PHI FACTOR = 1
WATER DEPTH = -4.3 FT HI GAGE 0 = 0.00 TSF LIN.ROD WT. = 8.0 LBF/FTDELTA-A = 0.24 TSF OCR FACTOR = 1
SP.GR.WATER = 1.030 CAL GAGE 0 = 0.00 TSF;
DELTA / PHI = 0.5 DELTA - B = 0.65 TSF M FACTOR = 1
MAX SU ID = 0.6 SU OPTION = 0 MIN PHI ID = 1.2 OCR OPTION = 0 K0 FACTOR = 1
UNIT CONVERSIONS: 1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI 1 M = 3.2808 FT

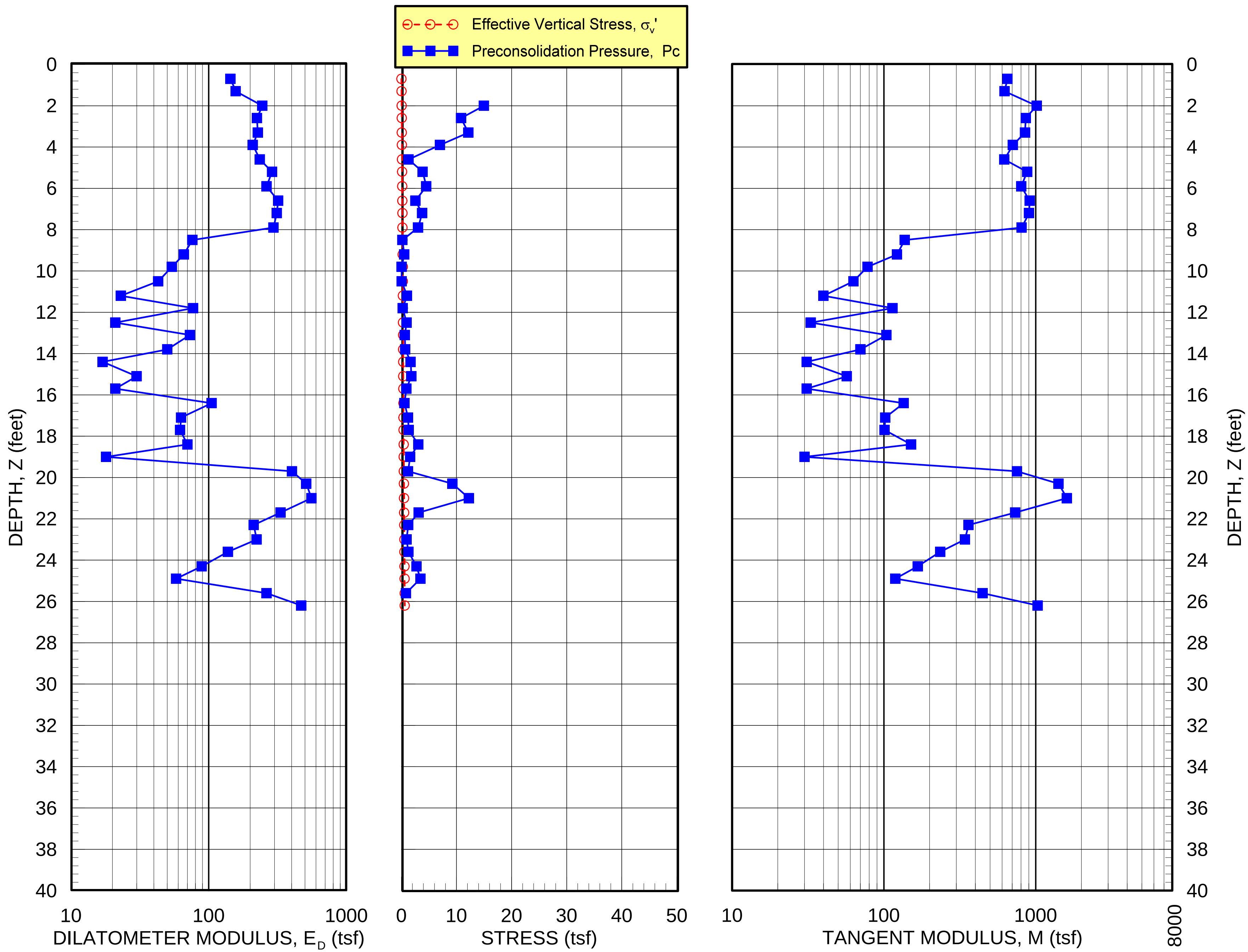
Z (FT)	ELEV (FT)	KD	ID	UD	ED (TSF)	K0	SU (TSF)	QD (TSF)	PHI (DEG)	SIGFF (TSF)	PHIO (DEG)	PC (TSF)	OCR	M (TSF)	SOIL TYPE
*****	******	*****	*****	*****	******	*****	*****	*****	*****	******	*****	*****	*****	******	************
0.7	-5.2	85.29	3.10	0.01	144									651	SILTY SAND
1.3	-5.9	48.08	2.95	0.01	157									623	SILTY SAND
2.0	-6.6	56.52	2.56	0.00	245	6.77		31.8	43.9	0.08	38.6	14.98	306.5	1014	SILTY SAND
2.6	-7.2	40.87	2.36	0.02	224	4.88		37.6	44.0	0.11	39.3	10.82	161.5	860	SILTY SAND
3.3	-7.9	37.41	2.05	0.01	227	4.52		37.2	42.8	0.15	38.2	12.16	142.9	850	SILTY SAND
3.9	-8.5	25.72	2.26	0.01	209	3.11		36.4	42.9	0.18	38.8	7.01	67.8	708	SILTY SAND
4.6	-9.2	11.61	4.85	-0.02	235	1.19		47.7	46.4	0.21	42.9	1.31	10.9	621	SAND
5.2	-9.8	17.76	3.40	0.00	288	1.98		65.9	45.8	0.24	42.4	3.87	28.2	878	SAND
5.9	-10.5	17.99	2.71	0.01	263	2.02		75.5	45.7	0.27	42.5	4.52	29.1	803	SILTY SAND
6.6	-11.2	14.59	3.63	0.00	319	1.38		111.4	48.1	0.30	45.3	2.55	14.6	912	SAND
7.2	-11.8	15.05	3.12	0.01	312	1.64		89.4	46.1	0.33	43.2	3.76	19.6	903	SILTY SAND
7.9	-12.5	12.82	3.17	0.00	295	1.40		82.5	45.7	0.35	42.9	3.04	14.5	808	SILTY SAND
8.5	-13.1	4.64	2.10	0.01	76	0.30		63.0	47.0	0.39	44.5	0.19	0.8	137	SILTY SAND
9.2	-13.8	5.15	1.53	-0.11	66	0.52		52.5	44.9	0.41	42.2	0.52	2.2	122	SANDY SILT
9.8	-14.4	3.25	1.92	-0.15	54	0.12		61.7	47.1	0.44	44.7	0.04	0.2	78	SILTY SAND
10.5	-15.1	3.42	1.37	-0.06	43	0.14		66.3	47.1	0.46	44.8	0.05	0.2	63	SANDY SILT
11.2	-15.7	4.65	0.52	0.40	23	1.10	0.18					1.03	3.7	40	SILTY CLAY
11.8	-16.4	3.21	2.40	0.04	77	0.32		51.3	44.4	0.49	42.0	0.24	0.8	114	SILTY SAND
12.5	-17.1	4.19	0.47	0.31	21	1.02	0.17					0.96	3.2	33	SILTY CLAY
13.1	-17.7	3.16	2.09	-0.09	73	0.57		21.6	38.0	0.51	35.1	0.62	2.0	104	SILTY SAND
13.8	-18.4	3.26	1.34	-0.08	50	0.59		21.0	37.5	0.53	34.6	0.70	2.1	70	SANDY SILT
14.4	-19.0	5.57	0.25	0.43	17	1.25	0.27					1.69	4.9	31	CLAY
15.1	-19.7	5.71	0.43	0.45	30	1.27	0.29					1.82	5.1	57	SILTY CLAY
15.7	-20.3	3.58	0.47	0.29	21	0.91	0.17					0.91	2.5	31	SILTY CLAY
16.4	-21.0	2.47	3.24	0.06	105	0.50		22.1	37.1	0.61	34.5	0.56	1.5	135	SILTY SAND
17.1	-21.7	4.12	1.12	0.25	63	1.01						1.21	3.1	102	SILT
17.7	-22.3	4.26	1.02	0.43	62	1.03						1.33	3.3	101	SILT
18.4	-23.0	7.16	0.67	0.40	70	1.49						3.08	7.3	151	CLAYEY SILT
19.0	-23.6	4.59	0.25	0.59	18	1.09	0.27					1.59	3.7	30	CLAY
19.7	-24.3	4.84	5.33	-0.03	402	0.61		67.5	42.5	0.75	40.6	1.21	2.7	752	SAND
20.3	-24.9	13.33	2.35	0.00	511	1.67		93.2	41.6	0.78	39.6	9.27	19.8	1414	SILTY SAND
21.0	-25.6	14.89	2.21	0.00	557	1.88		94.0	41.1	0.81	39.1	12.25	25.1	1604	SILTY SAND
21.7	-26.2	7.16	2.63	-0.02	332	0.94		71.8	41.3	0.85	39.4	3.15	6.2	732	SILTY SAND
22.3	-26.9	4.01	2.90	-0.02	212	0.60		53.9	40.4	0.87	38.5	1.25	2.4	361	SILTY SAND
23.0	-27.6	3.28	3.62	-0.02	223	0.51		52.4	40.3	0.90	38.4	0.94	1.7	342	SAND
23.6	-28.2	4.34	1.64	0.15	138	0.57		75.4	42.0	0.93	40.4	1.29	2.3	235	SANDY SILT
24.3	-28.9	5.46	0.81	0.45	89	1.24						2.75	4.8	167	CLAYEY SILT
24.9	-29.5	6.24	0.46	0.56	58	1.35	0.53					3.46	5.9	119	SILTY CLAY
25.6	-30.2	3.96	3.18	-0.03	263	0.42		110.6	44.2	1.02	42.8	0.84	1.4	446	SILTY SAND
26.2	-30.8	7.06	3.08		470									1031	SILTY SAND


Thrust
Q_D
BLADE STRESS, Q_D (tsf)
1 10 100 1000
DEPTH, Z (feet)
10 100 1000 10000
THRUST (lbs)
P_0
P_1
P_2
0 10 20 30 40 50 60 70 80
DMT READINGS, P_0 P_1 P_2 (tsf)
CLAY
SAND
0.6 1.2
0.1 1.0 10.0
MATERIAL INDEX, I_D
-1 0 1 2
PORE PRESSURE INDEX, U_D
DEPTH, Z (feet)
Ground Surface Elev.: -4.7 feet
Water Depth: -4.4 feet
DILATOMETER TEST RESULTS
PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N247,278.4 E1,524,554.3
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 6/26/20
SOUNDING
DMT-210



K_o
K_D
IN-SITU COEFF. OF LATERAL EARTH PRESSURE, K_o
HORIZONTAL STRESS INDEX, K_D
DEPTH, Z (feet)
Vertical Stress, σ_v'
Horizontal Stress, σ_h'
STRESS (tsf)
Su-Marchetti
Su-Lutenegger
UNDRAINED SHEAR STRENGTH, S_u (tsf)
Note: For angles <32°, Triaxial ~ Plane.
Plane
Triaxial
DRAINED FRICTION ANGLE (degrees)
Ground Surface Elev: -4.7 feet
Water Depth: -4.4 feet
INTERPRETED DMT STRENGTH PARAMETERS
PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N247,278.4 E1,524,554.3
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/26/20
SOUNDING
DMT-210

Ground Surface Elev.: -4.7 feet
Water Depth: -4.4 feet



INTERPRETED DMT DEFORMATION PARAMETERS

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N247,278.4 E1,524,554.3

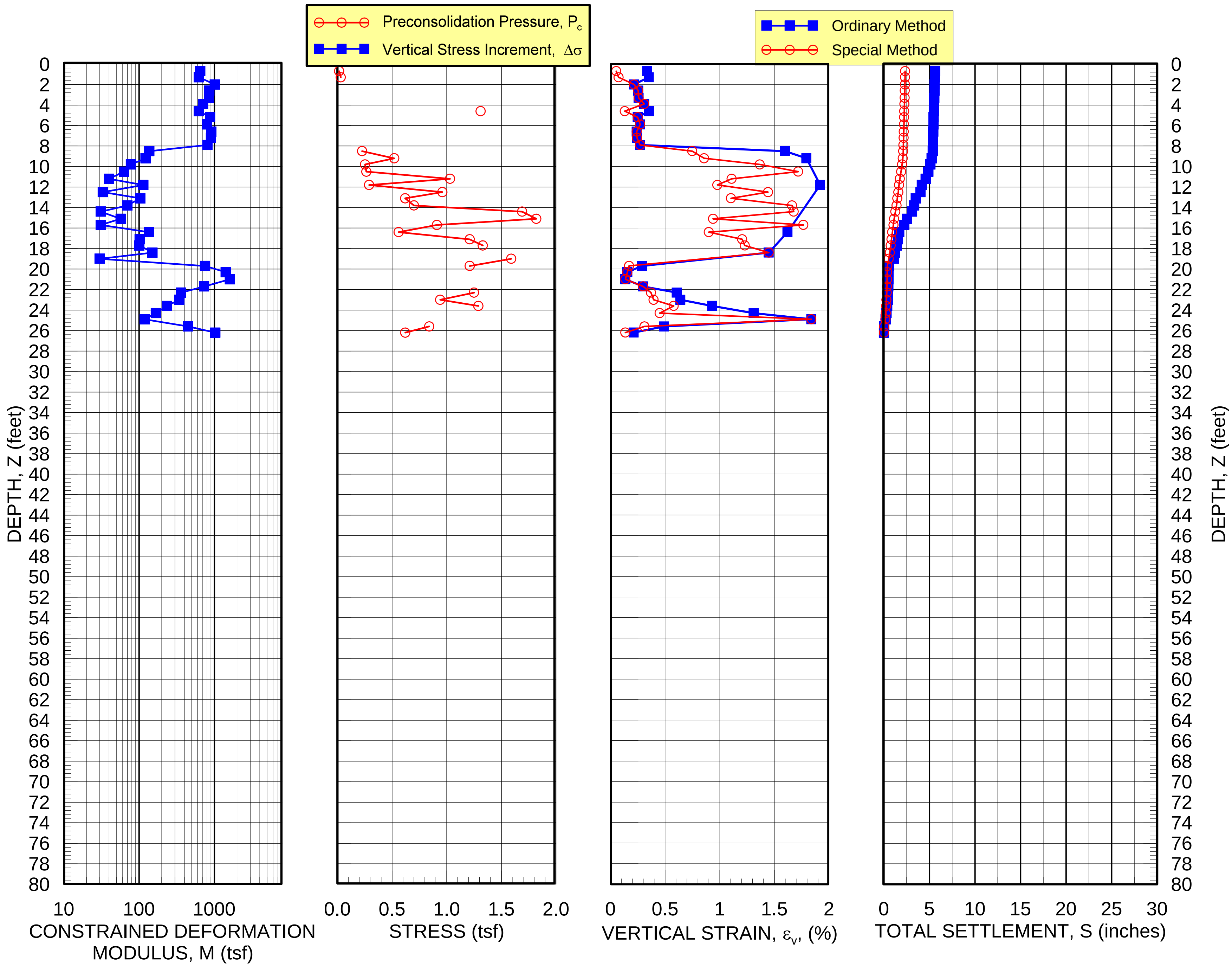
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/26/20

SOUNDING
DMT-210

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N247,278.4 E1,524,554.3

PREDICTED DMT SETTLEMENT

Ground Surface Elev.: -4.7 feet
Water Depth: -4.4 feet



IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/26/20

SOUNDING
DMT-210

DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL) SNDG. NO. :DMT-211
In-Situ Soil Testing, L.C. Page 1a
JOB FILE: Barren Island FILE NO. : 2020-45
LOCATION: Dorchester County, Maryland--N244,588.1 E1,524,059.9
SNDG.BY : R. Failmezger SNDG. DATE: 6/27/20
ANAL.BY : Roger Failmezger, P.E., F. ASCE, D. GE ANAL. DATE: 6/27/20

ANALYSIS PARAMETERS: LO RANGE = 9.92 TSF ROD DIAM. = 2.36 IN BL.THICK. = 0.59 IN SU FACTOR = 1
SURF.ELEV. = -5.2 FT LO GAGE 0 = 0.00 TSF FR.RED.DIA. = 2.64 IN BL.WIDTH = 3.78 IN PHI FACTOR = 1
WATER DEPTH = -5.9 FT HI GAGE 0 = 0.00 TSF LIN.ROD WT. = 8.0 LBF/FTDELTA-A = 0.25 TSF OCR FACTOR = 1
SP.GR.WATER = 1.030 CAL GAGE 0 = 0.00 TSF DELTA/PHI = 0.5 DELTA-B = 0.57 TSF M FACTOR = 1
MAX SU ID = 0.6 SU OPTION = 0 MIN PHI ID = 1.2 OCR OPTION = 0 K0 FACTOR = 1
UNIT CONVERSIONS: 1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI 1 M = 3.2808 FT

Z (FT)	ELEV (FT)	THRUST (LBF)	A (TSF)	B (TSF)	C (TSF)	DA (TSF)	DB (TSF)	ZMRNG (TSF)	ZMLO (TSF)	ZMHI (TSF)	ZMCAL (TSF)	P0 (TSF)	P1 (TSF)	P2 (TSF)	U0 (TSF)	GAMMA (PCF)	SVP (TSF)
*****	******	******	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	******	******	******
0.7	-5.9	772	1.17	5.29	-0.03	0.25	0.57	9.92	0.00	0.00	0.00	1.25	4.72	0.22	0.211	113.6	0.016
1.3	-6.6	2580	1.20	7.02		0.25	0.57	9.92	0.00	0.00	0.00	1.20	6.44		0.232	113.6	0.031
2.0	-7.2	3065	1.88	8.32	0.04	0.25	0.57	9.92	0.00	0.00	0.00	1.85	7.75	0.29	0.254	113.6	0.048
2.6	-7.9	3285	2.90	9.25	0.07	0.25	0.57	9.92	0.00	0.00	0.00	2.88	8.68	0.32	0.275	119.2	0.065
3.3	-8.5	3440	2.43	7.91	0.09	0.25	0.57	9.92	0.00	0.00	0.00	2.45	7.34	0.34	0.295	113.6	0.082
3.9	-9.2	4167	2.57	8.49	0.06	0.25	0.57	9.92	0.00	0.00	0.00	2.57	7.91	0.31	0.316	119.2	0.099
4.6	-9.8	5182	2.38	8.57	0.13	0.25	0.57	9.92	0.00	0.00	0.00	2.36	8.00	0.38	0.337	113.6	0.116
5.2	-10.5	5954	3.35	12.12	0.16	0.25	0.57	9.92	0.00	0.00	0.00	3.21	11.55	0.41	0.359	119.2	0.134
5.9	-11.2	6461	4.43	13.23	0.18	0.25	0.57	9.92	0.00	0.00	0.00	4.28	12.65	0.43	0.380	119.2	0.151
6.6	-11.8	6505	2.64	9.43	0.20	0.25	0.57	9.92	0.00	0.00	0.00	2.59	8.85	0.45	0.401	119.2	0.169
7.2	-12.5	6461	3.17	9.90	0.20	0.25	0.57	9.92	0.00	0.00	0.00	3.13	9.32	0.45	0.422	119.2	0.188
7.9	-13.1	5513	1.32	5.40	0.22	0.25	0.57	9.92	0.00	0.00	0.00	1.40	4.82	0.47	0.444	107.3	0.204
8.5	-13.8	5380	2.36	6.50	0.27	0.25	0.57	9.92	0.00	0.00	0.00	2.44	5.93	0.52	0.465	107.3	0.218
9.2	-14.4	5513	1.00	2.80	0.30	0.25	0.57	9.92	0.00	0.00	0.00	1.20	2.22	0.55	0.485	101.1	0.231
9.8	-15.1	4322	1.05	2.99	0.26	0.25	0.57	9.92	0.00	0.00	0.00	1.25	2.41	0.51	0.506	101.1	0.243
10.5	-15.7	4145	1.17	3.35	0.23	0.25	0.57	9.92	0.00	0.00	0.00	1.36	2.78	0.48	0.527	101.1	0.255
11.2	-16.4	4388	0.95	3.67	0.29	0.25	0.57	9.92	0.00	0.00	0.00	1.11	3.10	0.54	0.549	107.3	0.268
11.8	-17.1	3859	1.13	3.10	0.40	0.25	0.57	9.92	0.00	0.00	0.00	1.33	2.53	0.65	0.570	101.1	0.282
12.5	-17.7	9592	2.51	16.92	0.32	0.25	0.57	9.92	0.00	0.00	0.00	2.08	16.35	0.57	0.591	119.2	0.296
13.1	-18.4	15082	12.83	37.12	0.45	0.25	0.57	9.92	0.00	0.00	0.00	11.91	36.55	0.70	0.612	134.8	0.317
13.8	-19.0	15082	12.70	36.01	0.44	0.25	0.57	9.92	0.00	0.00	0.00	11.82	35.43	0.69	0.633	134.8	0.340
14.4	-19.7	14619	10.17	31.89	0.44	0.25	0.57	9.92	0.00	0.00	0.00	9.38	31.32	0.69	0.655	134.8	0.363
15.1	-20.3	15148	10.26	31.42	0.48	0.25	0.57	9.92	0.00	0.00	0.00	9.50	30.85	0.73	0.675	134.8	0.386
15.7	-21.0	14112	9.04	27.77	0.48	0.25	0.57	9.92	0.00	0.00	0.00	8.39	27.20	0.73	0.696	125.4	0.408
16.4	-21.7	15788	7.27	24.20	0.47	0.25	0.57	9.92	0.00	0.00	0.00	6.71	23.63	0.72	0.717	125.4	0.428
17.1	-22.3	17750	5.05	16.67	0.49	0.25	0.57	9.92	0.00	0.00	0.00	4.76	16.10	0.74	0.739	119.2	0.448
17.7	-23.0	14090	2.14	8.80	0.50	0.25	0.57	9.92	0.00	0.00	0.00	2.10	8.23	0.75	0.760	113.6	0.465
18.4	-23.6	12061	1.90	4.38	0.69	0.25	0.57	9.92	0.00	0.00	0.00	2.07	3.81	0.94	0.781	101.1	0.478
19.0	-24.3	12899	1.68	6.04	0.51	0.25	0.57	9.92	0.00	0.00	0.00	1.75	5.47	0.76	0.802	113.6	0.493
19.7	-24.9	18037	5.67	21.22	0.57	0.25	0.57	9.92	0.00	0.00	0.00	5.18	20.65	0.82	0.823	125.4	0.511
20.3	-25.6	18235	8.15	23.72	0.64	0.25	0.57	9.92	0.00	0.00	0.00	7.66	23.15	0.89	0.845	125.4	0.531
21.0	-26.2	15700	7.46	21.63	0.66	0.25	0.57	9.92	0.00	0.00	0.00	7.05	21.06	0.91	0.865	125.4	0.551
21.7	-26.9	12591	6.45	19.37	0.65	0.25	0.57	9.92	0.00	0.00	0.00	6.10	18.79	0.90	0.886	125.4	0.571
22.3	-27.6	10452	6.33	19.23	0.66	0.25	0.57	9.92	0.00	0.00	0.00	5.97	18.66	0.91	0.907	125.4	0.591
23.0	-28.2	9702	4.29	14.05	0.67	0.25	0.57	9.92	0.00	0.00	0.00	4.09	13.48	0.92	0.928	119.2	0.611
23.6	-28.9	9923	2.84	3.97	2.22	0.25	0.57	9.92	0.00	0.00	0.00	3.08	3.39	2.47	0.950	94.8	0.624
24.3	-29.5	9702	3.24	7.16	0.86	0.25	0.57	9.92	0.00	0.00	0.00	3.33	6.59	1.11	0.971	107.3	0.637
24.9	-30.2	9393	3.81	5.40	2.10	0.25	0.57	9.92	0.00	0.00	0.00	4.02	4.82	2.35	0.992	107.3	0.650
25.6	-30.8	9018	3.24	4.89	1.63	0.25	0.57	9.92	0.00	0.00	0.00	3.45	4.31	1.88	1.013	101.1	0.664
26.2	-31.5	9327	2.47	8.50	0.93	0.25	0.57	9.92	0.00	0.00	0.00	2.46	7.92	1.18	1.035	113.6	0.678
26.9	-32.2	7850	4.97	7.13	3.97	0.25	0.57	9.92	0.00	0.00	0.00	5.16	6.56	4.22	1.055	107.3	0.693
27.6	-32.8	4895	5.18	7.17	4.20	0.25	0.57	9.92	0.00	0.00	0.00	5.37	6.60	4.45	1.076	107.3	0.707
28.2	-33.5	4741	5.07	7.02	4.17	0.25	0.57	9.92	0.00	0.00	0.00	5.27	6.44	4.42	1.097	107.3	0.721
28.9	-34.1	4410	4.97	6.92	4.08	0.25	0.57	9.92	0.00	0.00	0.00	5.17	6.35	4.33	1.118	107.3	0.735
29.5	-34.8	4939	4.48	6.57	3.46	0.25	0.57	9.92	0.00	0.00	0.00	4.67	5.99	3.71	1.140	107.3	0.750
30.2	-35.4	5579	3.65	5.32	2.86	0.25	0.57	9.92	0.00	0.00	0.00	3.86	4.75	3.11	1.161	107.3	0.763
30.8	-36.1	4631	2.93	4.49	2.08	0.25	0.57	9.92	0.00	0.00	0.00	3.15	3.92	2.33	1.182	101.1	0.777
31.5	-36.7	4123	2.62	4.08	1.83	0.25	0.57	9.92	0.00	0.00	0.00	2.84	3.51	2.08	1.203	101.1	0.788
32.2	-37.4	3749	2.38	4.69	1.50	0.25	0.57	9.92	0.00	0.00	0.00	2.56	4.11	1.75	1.225	101.1	0.801
32.8	-38.1	434	2.13	4.44	1.26	0.25	0.57	9.92	0.00	0.00	0.00	2.31	3.86	1.51	1.245	101.1	0.813
33.5	-38.7	4586	2.20	4.22	1.34	0.25	0.57	9.92	0.00	0.00	0.00	2.39	3.64	1.59	1.266	101.1	0.825
34.1	-39.4	4829	2.46	4.88	1.35	0.25	0.57	9.92	0.00	0.00	0.00	2.63	4.30	1.60	1.287	101.1	0.837
34.8	-40.0	5204	3.35	8.00	1.29	0.25	0.57	9.92	0.00	0.00	0.00	3.41	7.42	1.55	1.308	113.6	0.851
35.4	-40.7	5998	3.35	6.62	1.09	0.25	0.57	9.92	0.00	0.00	0.00	3.48	6.04	1.34	1.330	107.3	0.867
36.1	-41.3	5931	3.18	7.57	1.04	0.25	0.57	9.92	0.00	0.00	0.00	3.26	6.99	1.29	1.351	113.6	0.881
36.7	-42.0	6527	2.33	6.95	1.16	0.25	0.57	9.92	0.00	0.00	0.00	2.39	6.38	1.41	1.372	113.6	0.897
37.4	-42.7	6284	3.84	9.51	0.71	0.25	0.57	9.92	0.00	0.00	0.00	3.85	8.94	0.96	1.393	119.2	0.915
38.1	-43.3	6615	3.35	4.94	1.14	0.25	0.57	9.92	0.00	0.00	0.00	3.56	4.36	1.39	1.414	101.1	0.929
38.7	-44.0	7607	2.88	8.34	1.13	0.25	0.57	9.92	0.00	0.00	0.00	2.90	7.77	1.38	1.436	113.6	0.944
39.4	-44.6	8666	3.65	12.88	1.18	0.25	0.57	9.92	0.00	0.00	0.00	3.49	12.31	1.43	1.456	119.2	0.960
40.0	-45.3	11642	5.54	19.35	1.20	0.25	0.57	9.92	0.00	0.00	0.00	5.15	18.77	1.45	1.477	119.2	0.979
40.7	-45.9	13605	9.50	28.05	1.28	0.25	0.57	9.92	0.00	0.00	0.00	8.86	27.48	1.53	1.498	125.4	0.998
41.3	-46.6	11532	6.90	20.79	1.36	0.25	0.57	9.92	0.00	0.00	0.00	6.49	20.21	1.61	1.520	125.4	1.018
42.0	-47.2	7806	7.64	10.57	5.53	0.25	0.57	9.92	0.00	0.00	0.00	7.79	9.99	5.78	1.541	113.6	1.037
42.7	-47.9	8225	7.73	10.37	5.84	0.25	0.57	9.92	0.00	0.00	0.00	7.88	9.79	6.09	1.562	113.6	1.052

DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL) SNDG. NO. : DMT-211
In-Situ Soil Testing, L.C. Page 2
JOB FILE: Barren Island FILE NO. :2020-45
LOCATION: Dorchester County, Maryland--N244,588.1 E1,524,059.9
SNDG.BY : R. Failmezger SNDG. DATE: 6/27/20
ANAL.BY : Roger Failmezger, P.E., F. ASCE, D. GE ANAL. DATE: 6/27/20

ANALYSIS PARAMETERS: LO RANGE = 9.92 TSF ROD DIAM. = 2.36 IN BL.THICK. = 0.59 IN SU FACTOR = 1
SURF.ELEV. = -5.2 FT LO GAGE 0 = 0.00 TSF FR.RED.DIA. = 2.64 IN BL.WIDTH = 3.78 IN PHI FACTOR = 1
WATER DEPTH = -5.9 FT HI GAGE 0 = 0.00 TSF LIN.ROD WT. = 8.0 LBF/FTDELTA-A = 0.25 TSF OCR FACTOR = 1
SP.GR.WATER = 1.030 CAL GAGE 0 = 0.00 TSF;
DELTA / PHI = 0.5 DELTA - B = 0.57 TSF M FACTOR = 1
MAX SU ID = 0.6 SU OPTION = 0 MIN PHI ID = 1.2 OCR OPTION = 0 K0 FACTOR = 1
UNIT CONVERSIONS: 1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI 1 M = 3.2808 FT

Z (FT)	ELEV (FT)	KD	ID	UD	ED (TSF)	K0	SU (TSF)	QD (TSF)	PHI (DEG)	SIGFF (TSF)	PHIO (DEG)	PC (TSF)	OCR	M (TSF)	SOIL TYPE
*****	******	*****	*****	*****	******	*****	*****	*****	*****	******	*****	*****	*****	******	************
0.7	-5.9	66.66	3.32	0.01	120									517	SAND
1.3	-6.6	30.52	5.40		182									646	SAND
2.0	-7.2	33.34	3.70	0.02	205	3.82		30.5	46.3	0.08	41.5	4.67	97.4	745	SAND
2.6	-7.9	40.05	2.23	0.02	201	4.83		30.1	43.0	0.10	38.1	10.51	161.8	767	SILTY SAND
3.3	-8.5	26.25	2.27	0.02	170	3.13		33.3	43.8	0.14	39.3	5.60	68.2	579	SILTY SAND
3.9	-9.2	22.66	2.38	0.00	186	2.67		41.4	44.3	0.17	40.3	4.94	49.8	608	SILTY SAND
4.6	-9.8	17.41	2.78	0.02	195	1.94		54.0	45.8	0.20	42.2	3.15	27.1	591	SILTY SAND
5.2	-10.5	21.33	2.93	0.02	289	2.48		60.2	44.8	0.23	41.2	5.76	43.2	931	SILTY SAND
5.9	-11.2	25.73	2.15	0.01	290	3.08		62.7	43.6	0.26	40.1	10.02	66.1	987	SILTY SAND
6.6	-11.8	12.93	2.85	0.02	217	1.39		68.9	45.9	0.29	42.9	2.44	14.4	596	SILTY SAND
7.2	-12.5	14.42	2.29	0.01	215	1.65		66.8	44.7	0.32	41.7	3.70	19.7	612	SILTY SAND
7.9	-13.1	4.71	3.56	0.03	119	0.22		61.9	47.8	0.35	45.2	0.10	0.5	219	SAND
8.5	-13.8	9.08	1.76	0.03	121	1.03		57.0	44.4	0.37	41.6	1.71	7.8	291	SANDY SILT
9.2	-14.4	3.11	1.42	0.09	35									48	SANDY SILT
9.8	-15.1	3.06	1.56	0.01	41	0.23		49.1	45.6	0.42	43.0	0.11	0.5	55	SANDY SILT
10.5	-15.7	3.23	1.73	-0.06	49	0.30		46.8	44.7	0.44	42.1	0.19	0.8	70	SANDY SILT
11.2	-16.4	2.08	3.58	-0.01	69	0.09		50.6	45.8	0.46	43.4	0.02	0.1	78	SAND
11.8	-17.1	2.67	1.61	0.10	42	0.28		43.8	43.9	0.48	41.4	0.18	0.6	51	SANDY SILT
12.5	-17.7	5.01	9.61	-0.01	495									941	SAND
13.1	-18.4	35.62	2.18	0.01	855	4.32		139.1	42.4	0.53	39.9	41.76	131.7	3166	SILTY SAND
13.8	-19.0	32.88	2.11	0.00	820	3.99		139.6	42.4	0.57	40.0	38.33	112.6	2971	SILTY SAND
14.4	-19.7	24.00	2.52	0.00	761	2.88		142.1	43.3	0.62	41.1	21.21	58.4	2535	SILTY SAND
15.1	-20.3	22.82	2.42	0.01	741	2.74		147.9	43.3	0.65	41.2	20.38	52.7	2431	SILTY SAND
15.7	-21.0	18.86	2.44	0.00	653	2.26		139.7	43.4	0.69	41.4	14.73	36.1	2023	SILTY SAND
16.4	-21.7	13.99	2.82	0.00	587	1.58		164.5	45.0	0.73	43.2	7.79	18.2	1654	SILTY SAND
17.1	-22.3	9.00	2.82	0.00	394	0.79		194.1	47.4	0.77	45.7	2.29	5.1	947	SILTY SAND
17.7	-23.0	2.88	4.58	-0.01	213									302	SAND
18.4	-23.6	2.69	1.35	0.12	61									74	SANDY SILT
19.0	-24.3	1.93	3.90	-0.04	129									138	SAND
19.7	-24.9	8.53	3.55	0.00	537									1267	SAND
20.3	-25.6	12.85	2.27	0.01	537	1.45		190.5	44.9	0.91	43.4	8.16	15.4	1470	SILTY SAND
21.0	-26.2	11.22	2.27	0.01	487	1.29		163.6	44.3	0.94	42.8	6.70	12.2	1268	SILTY SAND
21.7	-26.9	9.12	2.44	0.00	441	1.08		131.0	43.5	0.96	42.0	4.87	8.5	1065	SILTY SAND
22.3	-27.6	8.57	2.50	0.00	441	1.07		107.1	42.3	0.99	40.8	4.82	8.2	1039	SILTY SAND
23.0	-28.2	5.19	2.96	0.00	326	0.62		104.7	43.2	1.02	41.7	1.74	2.9	627	SILTY SAND
23.6	-28.9	3.40	0.15	0.72	11	0.87	0.27					1.43	2.3	16	MUD
24.3	-29.5	3.71	1.38	0.06	113	0.41		107.5	43.8	1.08	42.4	0.85	1.3	173	SANDY SILT
24.9	-30.2	4.66	0.26	0.45	28	1.10	0.41					2.43	3.7	48	CLAY
25.6	-30.8	3.66	0.36	0.36	30	0.92	0.31					1.71	2.6	44	SILTY CLAY
26.2	-31.5	2.11	3.82	0.10	189	0.20		106.6	44.2	1.15	43.0	0.22	0.3	217	SAND
26.9	-32.2	5.91	0.34	0.77	49	1.31	0.60					3.76	5.4	95	CLAY
27.6	-32.8	6.07	0.29	0.79	43	1.33	0.63					4.00	5.7	85	CLAY
28.2	-33.5	5.78	0.28	0.80	41	1.29	0.60					3.78	5.2	79	CLAY
28.9	-34.1	5.50	0.29	0.79	41	1.24	0.57					3.56	4.8	77	CLAY
29.5	-34.8	4.71	0.38	0.73	46	1.11	0.48					2.85	3.8	79	SILTY CLAY
30.2	-35.4	3.54	0.33	0.72	31	0.90	0.34					1.86	2.4	44	CLAY
30.8	-36.1	2.53	0.39	0.58	27	0.68	0.23					1.12	1.4	29	SILTY CLAY
31.5	-36.7	2.07	0.41	0.53	23	0.56	0.18					0.84	1.1	21	SILTY CLAY
32.2	-37.4	1.66	1.17	0.40	54	0.45						0.61	0.8	46	SILT
32.8	-38.1	1.31	1.47	0.25	54	0.75		6.2	21.0	1.11	18.8	1.37	1.7	46	SANDY SILT
33.5	-38.7	1.37	1.11	0.28	44	0.36						0.46	0.6	37	SILT
34.1	-39.4	1.61	1.24	0.23	57	0.37		55.3	38.4	1.36	37.1	0.67	0.8	49	SANDY SILT
34.8	-40.0	2.47	1.91	0.11	139	0.48		57.5	38.1	1.38	36.9	1.17	1.4	165	SILTY SAND
35.4	-40.7	2.48	1.19	0.00	89	0.67						1.21	1.4	100	SILT
36.1	-41.3	2.16	1.96	-0.03	129	0.41		66.6	39.1	1.44	37.9	0.94	1.1	139	SILTY SAND
36.7	-42.0	1.13	3.92	0.04	139	0.25		76.3	40.4	1.48	39.4	0.35	0.4	118	SAND
37.4	-42.7	2.69	2.07	-0.18	176	0.48		69.1	38.8	1.49	37.8	1.34	1.5	226	SILTY SAND
38.1	-43.3	2.31	0.37	-0.01	28	0.63	0.24					1.17	1.3	28	SILTY CLAY
38.7	-44.0	1.55	3.32	-0.04	169									149	SAND
39.4	-44.6	2.11	4.35	-0.01	306	0.34		98.1	41.2	1.60	40.3	0.74	0.8	352	SAND
40.0	-45.3	3.75	3.71	-0.01	473	0.50		127.3	42.0	1.64	41.2	1.74	1.8	779	SAND
40.7	-45.9	7.38	2.53	0.00	646	0.98		138.3	41.1	1.65	40.2	6.62	6.6	1439	SILTY SAND
41.3	-46.6	4.89	2.75	0.02	476	0.68		122.0	41.0	1.69	40.2	3.22	3.2	888	SILTY SAND
42.0	-47.2	6.03	0.35	0.68	76	1.32	0.91					5.79	5.6	151	SILTY CLAY
42.7	-47.9	6.01	0.30	0.72	66	1.32	0.92					5.86	5.6	131	CLAY

DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL) SNDG. NO. :DMT-211
In-Situ Soil Testing, L.C. Page 2a
JOB FILE: Barren Island FILE NO. : 2020-45
LOCATION: Dorchester County, Maryland--N244,588.1 E1,524,059.9
SNDG.BY : R. Failmezger SNDG. DATE: 6/27/20
ANAL.BY : Roger Failmezger, P.E., F. ASCE, D. GE ANAL. DATE: 6/27/20

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ANALYSIS PARAMETERS:    LO RANGE   = 10.36 TSF  ROD DIAM.    =  0.93 IN    BL.THICK.  =  0.02 IN     SU  FACTOR = 1
SURF.ELEV.  = -17.1 FT LO  GAGE 0 =  0.00 TSF  FR.RED.DIA. =  1.04 IN    BL.WIDTH   =  0.15 IN     PHI FACTOR = 1
WATER DEPTH =  -5.9 FT HI  GAGE 0 =  0.00 TSF  LIN.ROD WT. =   5.4 LBF/FTDELTA-A    =  0.26 TSF    OCR FACTOR = 1
SP.GR.WATER = 1.030    CAL GAGE 0 =  0.00 TSF  DELTA/PHI   =   0.5       DELTA-B    =  0.60 TSF    M  FACTOR  = 1
MAX SU ID   =   0.6    SU OPTION  =     0      MIN PHI ID  =   1.2       OCR OPTION =     0        K0 FACTOR  = 1
UNIT CONVERSIONS:      1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI    1 M = 3.2808 FT
```

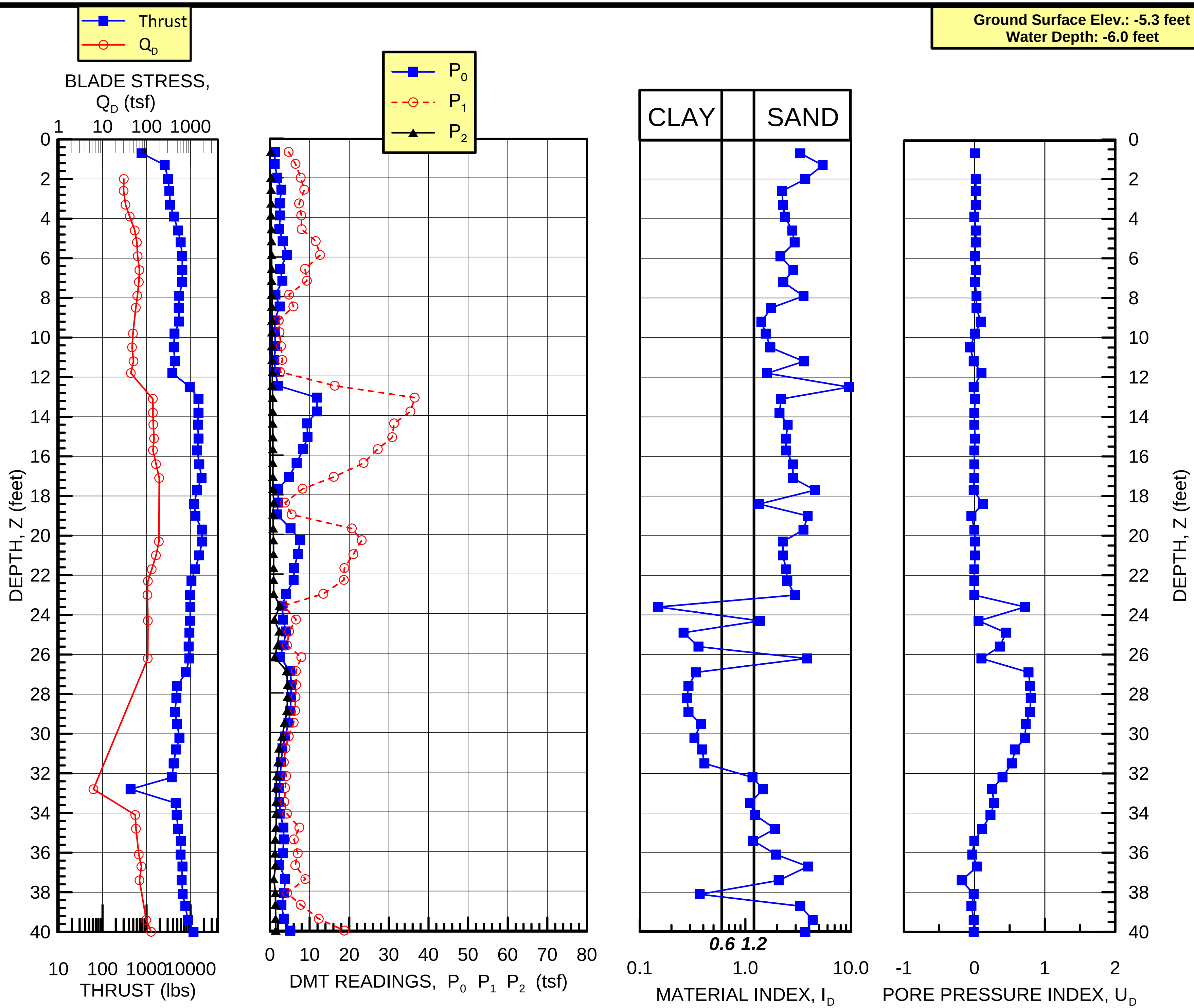
Z (FT)	ELEV (FT)	THRUST (LBF)	A (TSF)	B (TSF)	C (TSF)	DA (TSF)	DB (TSF)	ZMRNG (TSF)	ZMLO (TSF)	ZMHI (TSF)	ZMCAL (TSF)	P0 (TSF)	P1 (TSF)	P2 (TSF)	U0 (TSF)	GAMMA (PCF)	SVP (TSF)
*****	******	******	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	******	******	******
43.3	-48.6	19272	10.69	36.80	1.32	0.25	0.57	9.92	0.00	0.00	0.00	9.68	36.23	1.57	1.583	134.8	1.072

JOB FILE: Barren Island FILE NO. :2020-45
LOCATION: Dorchester County, Maryland--N244,588.1 E1,524,059.9
SNDG.BY : R. Failmezger SNDG. DATE: 6/27/20
ANAL.BY : Roger Failmezger, P.E., F. ASCE, D. GE ANAL. DATE: 6/27/20

```
ANALYSIS PARAMETERS:   LO RANGE   = 10.36 TSF  ROD DIAM.   =  0.93 IN    BL.THICK.  =  0.02 IN    SU  FACTOR = 1
SURF.ELEV.  = -17.1 FT LO  GAGE 0 =  0.00 TSF  FR.RED.DIA. =  1.04 IN    BL.WIDTH   =  0.15 IN    PHI FACTOR = 1
WATER DEPTH =  -5.9 FT HI  GAGE 0 =  0.00 TSF  LIN.ROD WT. =   5.4 LBF/FTDELTA-A    =  0.26 TSF    OCR FACTOR = 1
SP.GR.WATER = 1.030     CAL GAGE 0 =  0.00 TSF;
                                                 DELTA / PHI =   0.5      DELTA - B =  0.60 TSF    M FACTOR = 1
MAX SU ID   =   0.6    SU OPTION  =     0      MIN PHI ID  =   1.2      OCR OPTION =     0       K0 FACTOR  = 1
UNIT CONVERSIONS:      1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI    1 M = 3.2808 FT
```

Z (FT)	ELEV (FT)	KD	ID	UD	ED (TSF)	K0	SU (TSF)	QD (TSF)	PHI (DEG)	SIGFF (TSF)	PHIO (DEG)	PC (TSF)	OCR	M (TSF)	SOIL TYPE
*****	******	*****	*****	*****	******	*****	*****	*****	*****	******	*****	*****	*****	******	************
43.3	-48.6	7.55	3.28	0.00	921	0.92		201.2	42.8	1.80	42.1	6.63	6.2	2079	SILTY SAND

Ground Surface Elev.: -5.3 feet
Water Depth: -6.0 feet



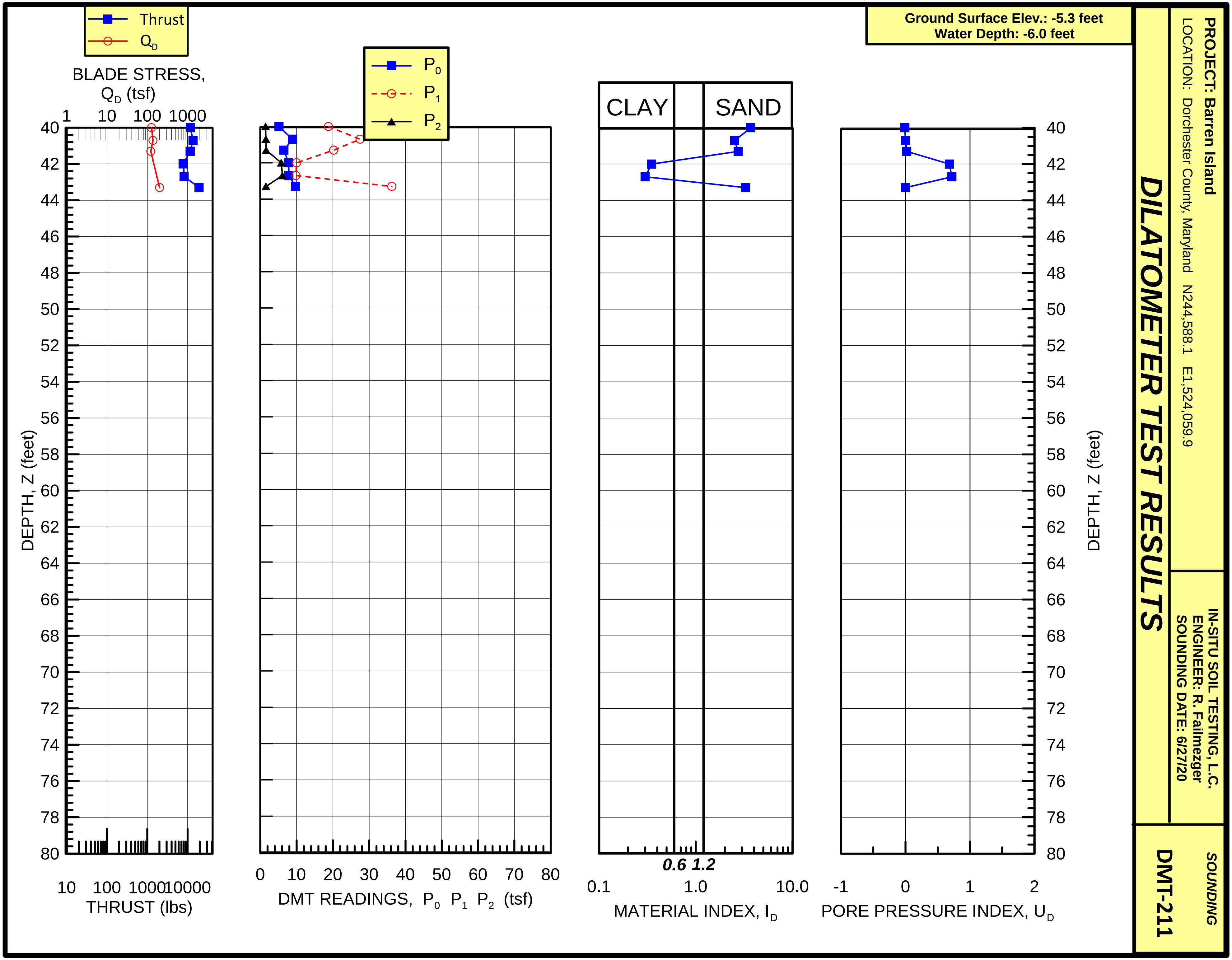
DILATOMETER TEST RESULTS

PROJECT: Barren Island

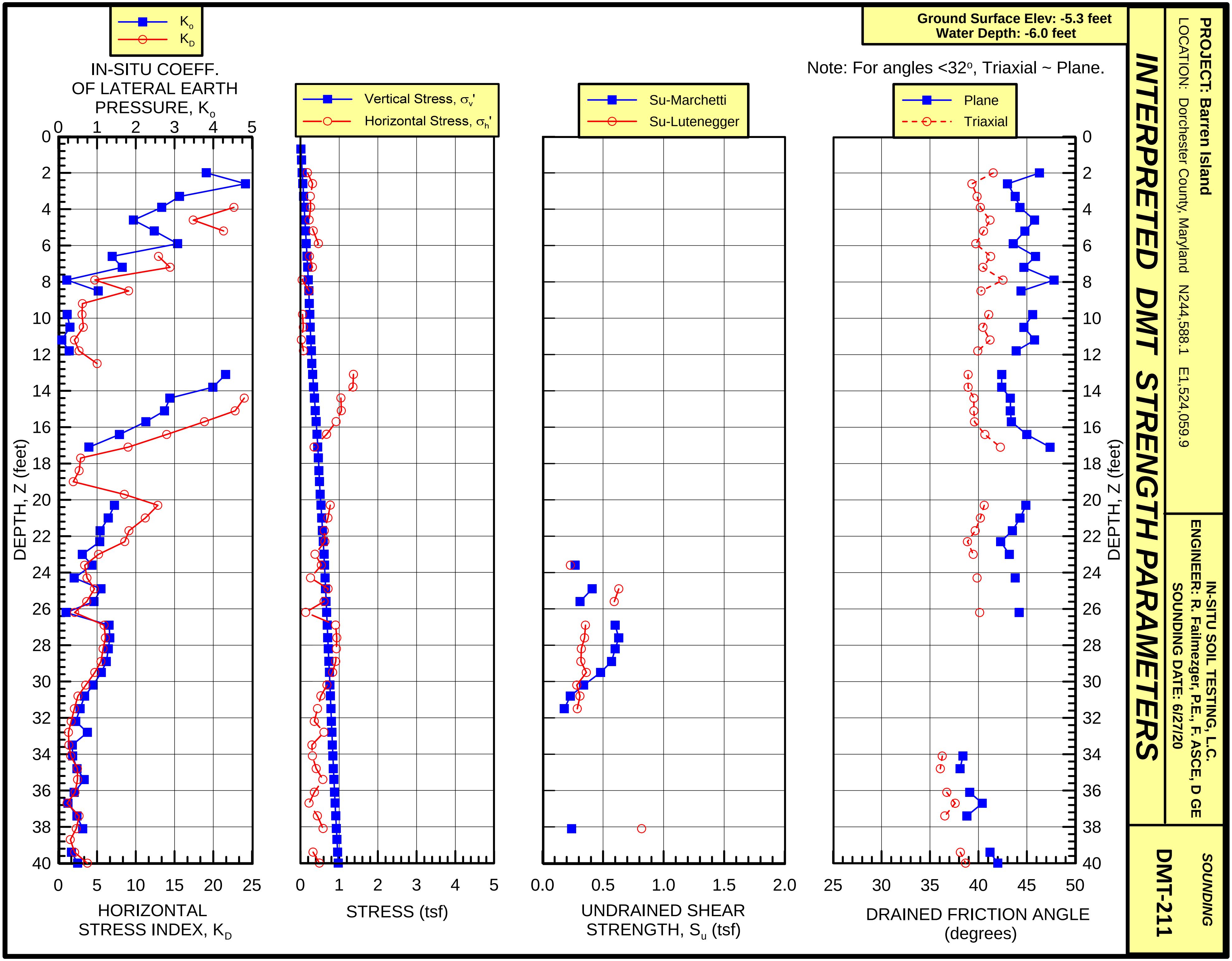
LOCATION: Dorchester County, Maryland N244,588.1 E1,524,059.9

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 6/27/20

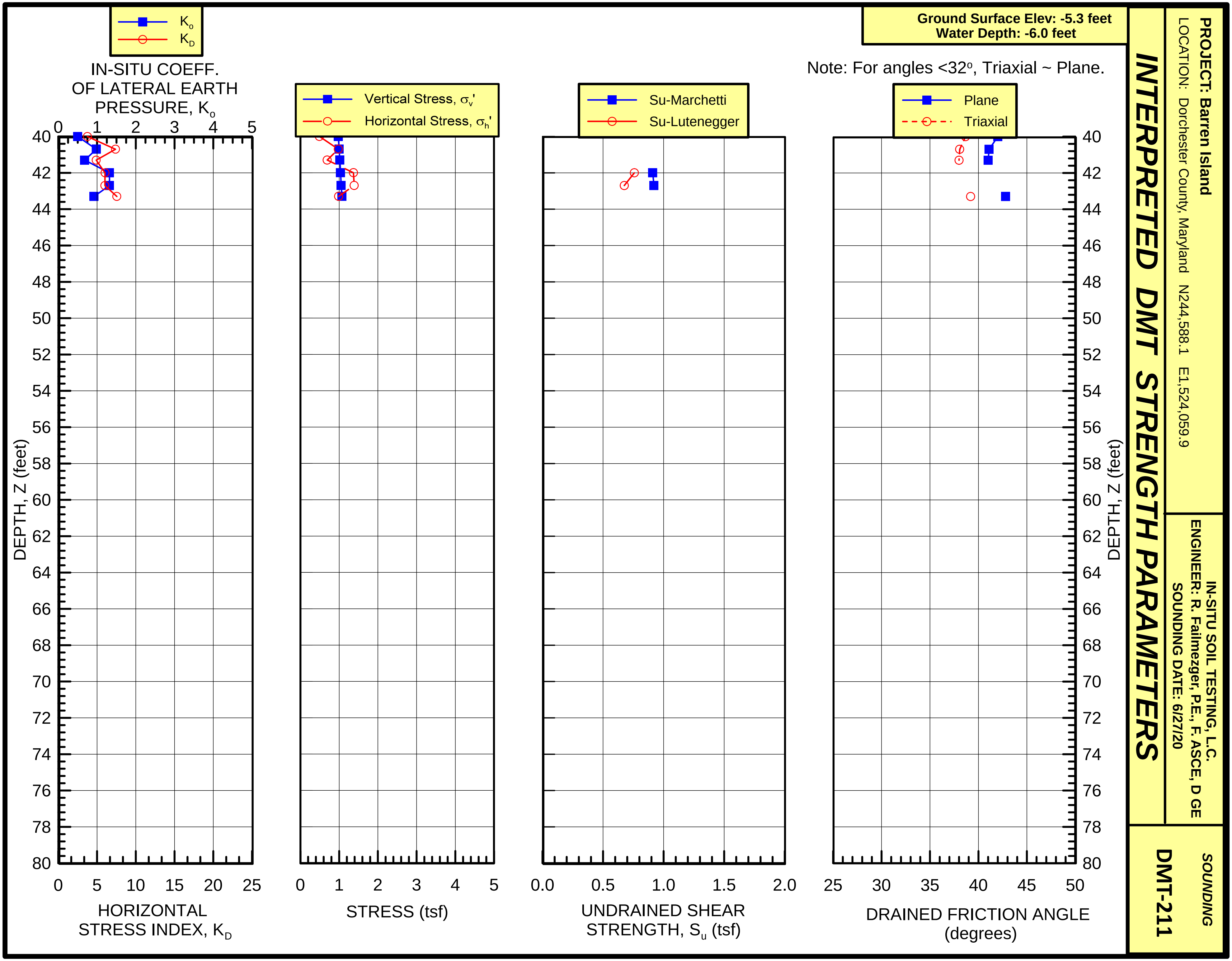
SOUNDING
DMT-211



PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N244,588.1 E1,524,059.9
DILATOMETER TEST RESULTS
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 6/27/20
SOUNDING
DMT-211
Ground Surface Elev.: -5.3 feet
Water Depth: -6.0 feet
Thrust
Q_D
BLADE STRESS, Q_D (tsf)
1
10
100
1000
THRUST (lbs)
10
100
1000
10000
DEPTH, Z (feet)
40
42
44
46
48
50
52
54
56
58
60
62
64
66
68
70
72
74
76
78
80
P_0
P_1
P_2
DMT READINGS, P_0 P_1 P_2 (tsf)
0
10
20
30
40
50
60
70
80
CLAY
SAND
0.6 1.2
0.1
1.0
10.0
MATERIAL INDEX, I_D
-1
0
1
2
PORE PRESSURE INDEX, U_D

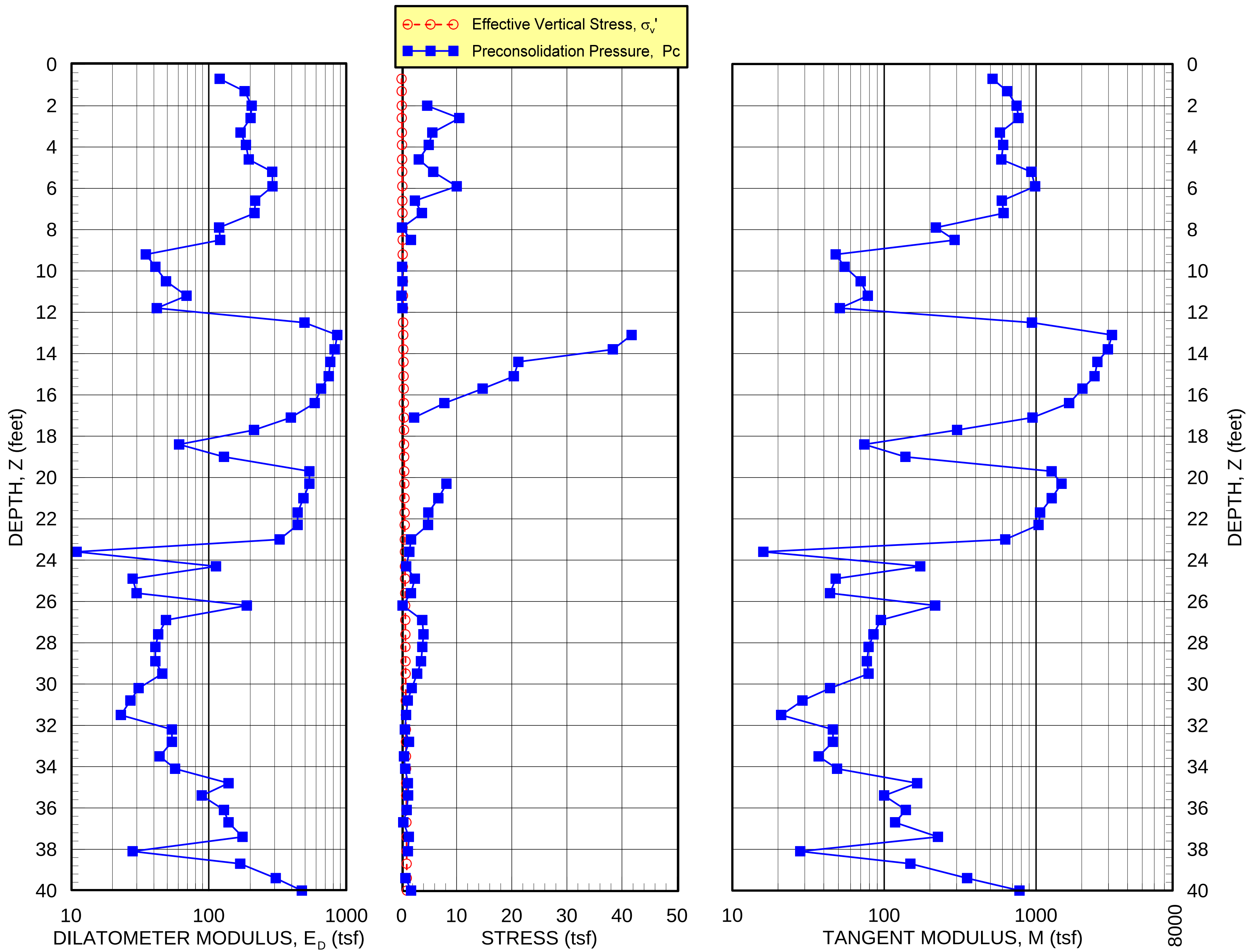


Ko
KD
IN-SITU COEFF. OF LATERAL EARTH PRESSURE, Ko
HORIZONTAL STRESS INDEX, KD
DEPTH, Z (feet)
Vertical Stress, σv'
Horizontal Stress, σh'
STRESS (tsf)
Su-Marchetti
Su-Lutenegger
UNDRAINED SHEAR STRENGTH, Su (tsf)
Plane
Triaxial
DRAINED FRICTION ANGLE (degrees)
Note: For angles <32º, Triaxial ~ Plane.
Ground Surface Elev: -5.3 feet
Water Depth: -6.0 feet
INTERPRETED DMT STRENGTH PARAMETERS
PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N244,588.1 E1,524,059.9
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/27/20
SOUNDING
DMT-211



PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N244,588.1 E1,524,059.9
INTERPRETED DMT STRENGTH PARAMETERS
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/27/20
SOUNDING
DMT-211
Ground Surface Elev: -5.3 feet
Water Depth: -6.0 feet
Note: For angles <32°, Triaxial ~ Plane.
K_o
K_D
IN-SITU COEFF. OF LATERAL EARTH PRESSURE, K_o
Vertical Stress, σ_v'
Horizontal Stress, σ_h'
Su-Marchetti
Su-Lutenegger
Plane
Triaxial
DEPTH, Z (feet)
HORIZONTAL STRESS INDEX, K_D
STRESS (tsf)
UNDRAINED SHEAR STRENGTH, S_u (tsf)
DRAINED FRICTION ANGLE (degrees)

Ground Surface Elev.: -5.3 feet
Water Depth: -6.0 feet



INTERPRETED DMT DEFORMATION PARAMETERS

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N244,588.1 E1,524,059.9

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/27/20

SOUNDING
DMT-211

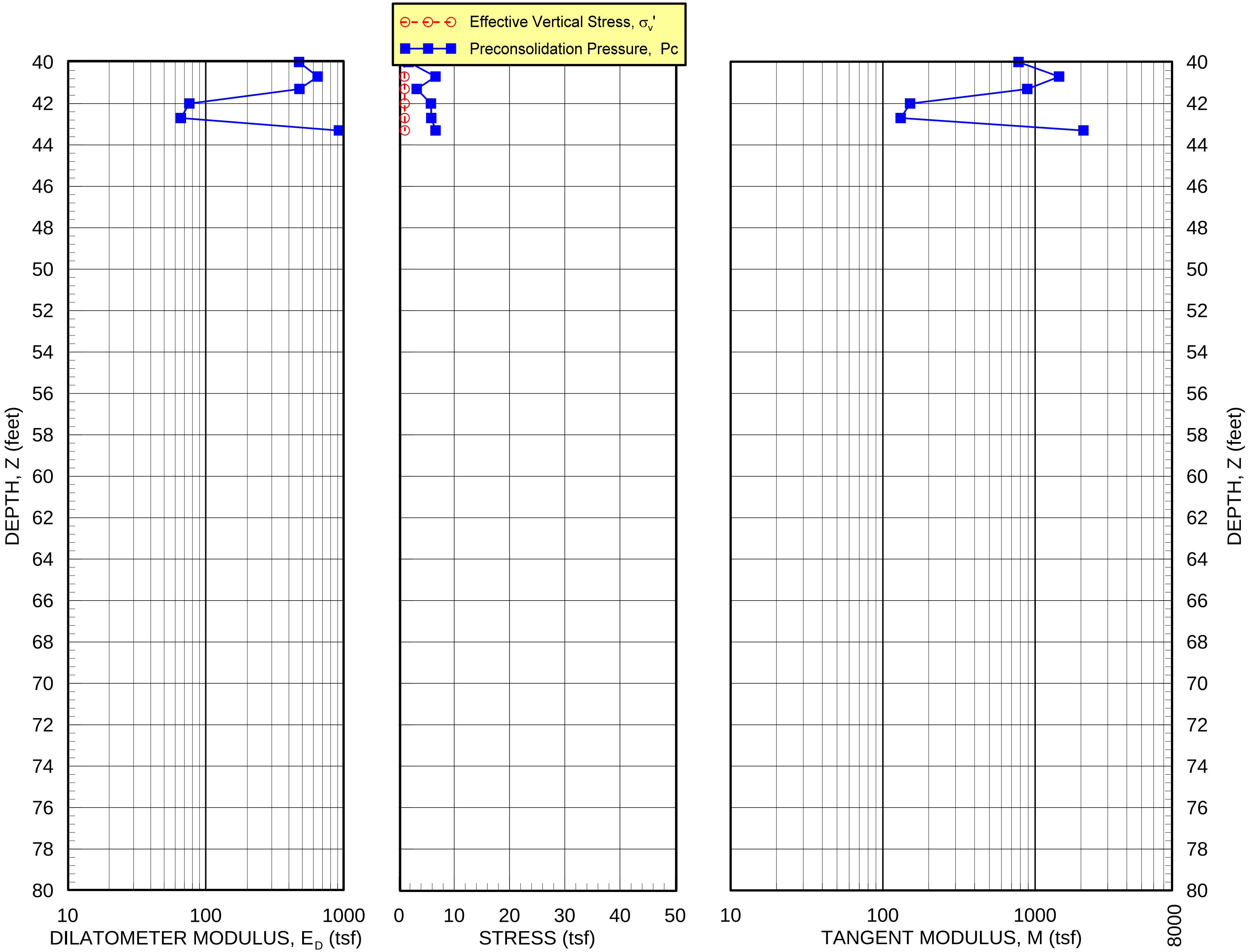
INTERPRETED DMT DEFORMATION PARAMETERS

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N244,588.1 E1,524,059.9

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/27/20

SOUNDING
DMT-211

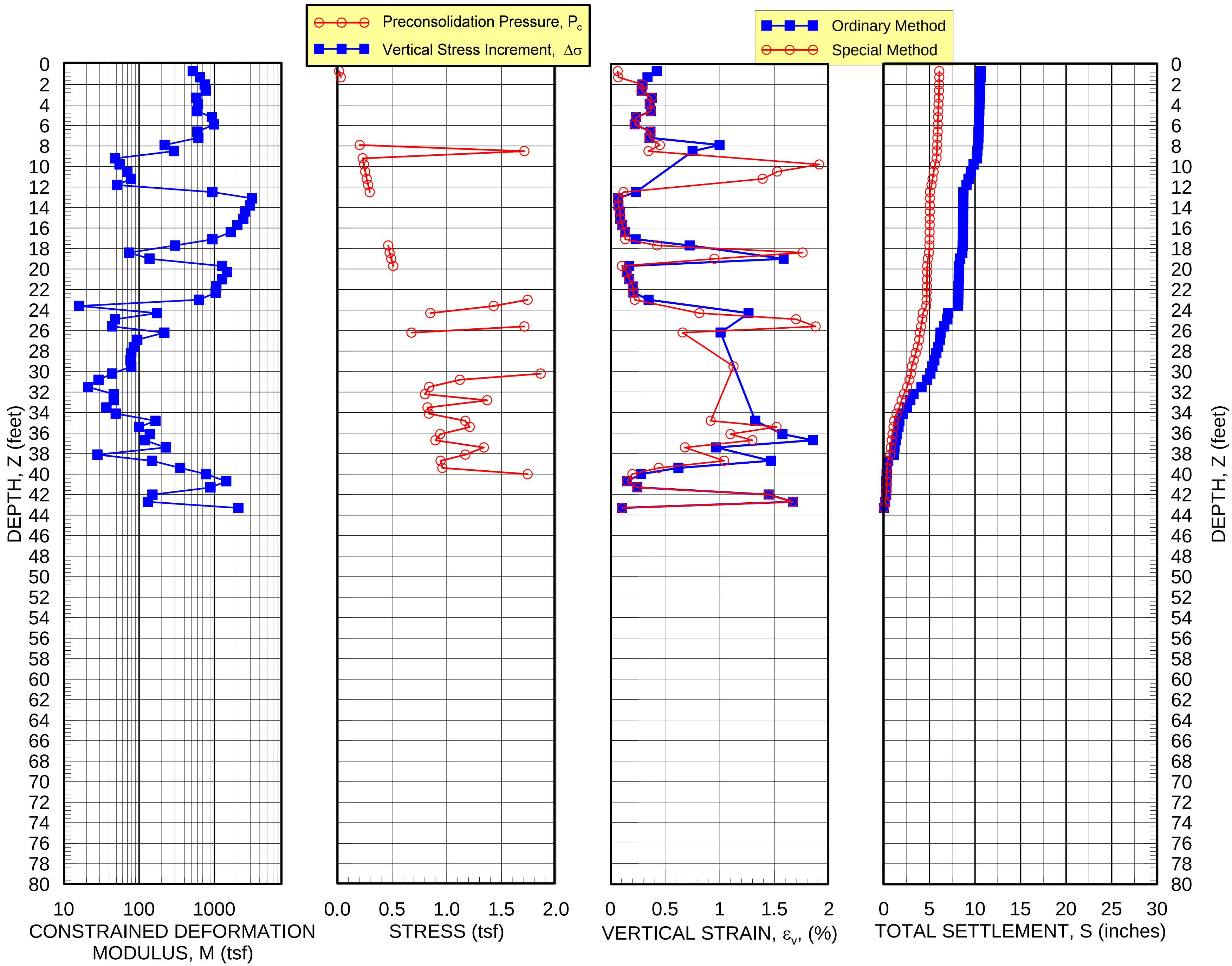
Ground Surface Elev.: -5.3 feet
Water Depth: -6.0 feet



PREDICTED DMT SETTLEMENT

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N244,588.1 E1,524,059.9

Ground Surface Elev.: -5.3 feet
Water Depth: -6.0 feet



IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/27/20

SOUNDING
DMT-211

DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL)
In-Situ Soil Testing, L.C.
JOB FILE: Barren Island
LOCATION: Dorchester County, Maryland--N239,820.1 E1,526,185.7
SNDG.BY : R. Failmezger
ANAL.BY : Roger Failmezger, P.E., F. ASCE, D. GE

SNDG. NO. :DMT-212
Page 1a
FILE NO. : 2020-45

SNDG. DATE: 6/25/20
ANAL. DATE: 6/25/20

ANALYSIS PARAMETERS:	LO RANGE = 9.92 TSF	ROD DIAM. = 2.36 IN	BL.THICK. = 0.59 IN	SU FACTOR = 1
SURF.ELEV. = -4.9 FT	LO GAGE 0 = 0.00 TSF	FR.RED.DIA. = 2.64 IN	BL.WIDTH = 3.78 IN	PHI FACTOR = 1
WATER DEPTH = -4.9 FT	HI GAGE 0 = 0.00 TSF	LIN.ROD WT. = 8.0 LBF/FT	DELTA-A = 0.29 TSF	OCR FACTOR = 1
SP.GR.WATER = 1.030	CAL GAGE 0 = 0.00 TSF	DELTA/PHI = 0.5	DELTA-B = 0.77 TSF	M FACTOR = 1
MAX SU ID = 0.6	SU OPTION = 0	MIN PHI ID = 1.2	OCR OPTION = 0	K0 FACTOR = 1

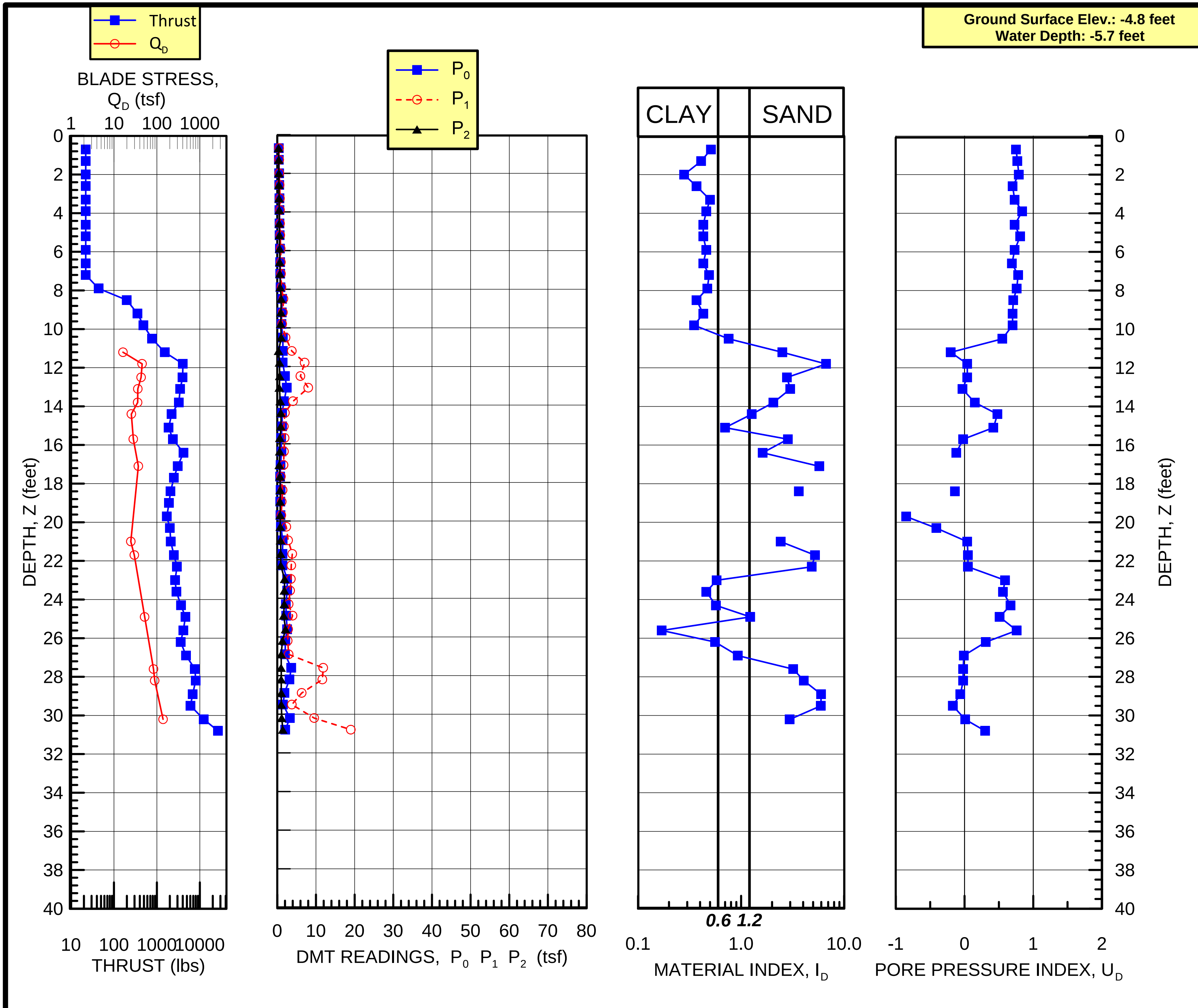
UNIT CONVERSIONS: 1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI 1 M = 3.2808 FT

Z (FT)	ELEV (FT)	THRUST (LBF)	A (TSF)	B (TSF)	C (TSF)	DA (TSF)	DB (TSF)	ZMRNG (TSF)	ZMLO (TSF)	ZMHI (TSF)	ZMCAL (TSF)	P0 (TSF)	P1 (TSF)	P2 (TSF)	U0 (TSF)	GAMMA (PCF)	SVP (TSF)
*****	******	******	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	******	******	******
0.7	-5.6	22	0.08	1.24	0.03	0.29	0.77	9.92	0.00	0.00	0.00	0.38	0.47	0.32	0.180	94.8	0.016
1.3	-6.2	22	0.13	1.27	0.07	0.29	0.77	9.92	0.00	0.00	0.00	0.42	0.50	0.37	0.200	94.8	0.026
2.0	-6.9	22	0.17	1.29	0.11	0.29	0.77	9.92	0.00	0.00	0.00	0.46	0.52	0.41	0.221	94.8	0.035
2.6	-7.5	22	0.22	1.38	0.14	0.29	0.77	9.92	0.00	0.00	0.00	0.51	0.61	0.43	0.242	94.8	0.046
3.3	-8.2	22	0.26	1.46	0.18	0.29	0.77	9.92	0.00	0.00	0.00	0.54	0.69	0.47	0.264	94.8	0.056
3.9	-8.9	22	0.28	1.47	0.23	0.29	0.77	9.92	0.00	0.00	0.00	0.56	0.70	0.52	0.285	94.8	0.066
4.6	-9.5	22	0.30	1.48	0.22	0.29	0.77	9.92	0.00	0.00	0.00	0.58	0.71	0.51	0.306	94.8	0.076
5.2	-10.2	22	0.34	1.53	0.28	0.29	0.77	9.92	0.00	0.00	0.00	0.63	0.76	0.57	0.327	94.8	0.086
5.9	-10.8	22	0.42	1.64	0.31	0.29	0.77	9.92	0.00	0.00	0.00	0.70	0.87	0.61	0.349	94.8	0.096
6.6	-11.5	22	0.47	1.69	0.34	0.29	0.77	9.92	0.00	0.00	0.00	0.75	0.92	0.64	0.370	94.8	0.106
7.2	-12.1	22	0.49	1.73	0.40	0.29	0.77	9.92	0.00	0.00	0.00	0.77	0.96	0.69	0.390	94.8	0.116
7.9	-12.8	44	0.57	1.84	0.46	0.29	0.77	9.92	0.00	0.00	0.00	0.86	1.06	0.75	0.411	94.8	0.126
8.5	-13.5	198	0.99	2.35	0.73	0.29	0.77	9.92	0.00	0.00	0.00	1.27	1.58	1.02	0.432	94.8	0.137
9.2	-14.1	353	0.87	2.21	0.65	0.29	0.77	9.92	0.00	0.00	0.00	1.15	1.44	0.94	0.454	94.8	0.146
9.8	-14.8	485	0.78	2.05	0.60	0.29	0.77	9.92	0.00	0.00	0.00	1.06	1.27	0.89	0.475	94.8	0.157
10.5	-15.4	772	1.18	2.92	0.72	0.29	0.77	9.92	0.00	0.00	0.00	1.44	2.15	1.01	0.496	101.1	0.168
11.2	-16.1	1521	1.25	4.52	0.04	0.29	0.77	9.92	0.00	0.00	0.00	1.43	3.75	0.33	0.517	107.3	0.181
11.8	-16.7	4013	1.37	7.85	0.28	0.29	0.77	9.92	0.00	0.00	0.00	1.39	7.08	0.57	0.539	113.6	0.196
12.5	-17.4	3969	1.89	6.75	0.32	0.29	0.77	9.92	0.00	0.00	0.00	1.99	5.98	0.62	0.560	113.6	0.212
13.1	-18.0	3484	2.41	8.79	0.24	0.29	0.77	9.92	0.00	0.00	0.00	2.44	8.02	0.53	0.580	113.6	0.228
13.8	-18.7	3241	1.56	4.84	0.48	0.29	0.77	9.92	0.00	0.00	0.00	1.73	4.07	0.77	0.601	107.3	0.243
14.4	-19.4	2205	0.96	2.75	0.62	0.29	0.77	9.92	0.00	0.00	0.00	1.22	1.97	0.91	0.622	101.1	0.256
15.1	-20.0	1874	1.00	2.48	0.62	0.29	0.77	9.92	0.00	0.00	0.00	1.27	1.71	0.91	0.644	101.1	0.268
15.7	-20.7	2359	0.73	2.65	0.37	0.29	0.77	9.92	0.00	0.00	0.00	0.98	1.88	0.66	0.665	107.3	0.282
16.4	-21.3	4167	0.82	2.51	0.34	0.29	0.77	9.92	0.00	0.00	0.00	1.09	1.73	0.64	0.686	101.1	0.294
17.1	-22.0	3043	0.58	2.38	0.24	0.29	0.77	9.92	0.00	0.00	0.00	0.85	1.61	0.53	0.707	107.3	0.308
17.7	-22.6	2492	0.44	1.69	0.40	0.29	0.77	9.92	0.00	0.00	0.00	0.73	0.92	0.69	0.728	94.8	0.319
18.4	-23.3	2073	0.62	2.15	0.44	0.29	0.77	9.92	0.00	0.00	0.00	0.89	1.38	0.73	0.750	107.3	0.332
19.0	-23.9	1918	0.52	1.93	0.43	0.29	0.77	9.92	0.00	0.00	0.00	0.79	1.16	0.72	0.770	107.3	0.346
19.7	-24.6	1698	0.53	1.82	0.48	0.29	0.77	9.92	0.00	0.00	0.00	0.81	1.04	0.77	0.791	94.8	0.358
20.3	-25.3	2007	0.71	3.09	0.47	0.29	0.77	9.92	0.00	0.00	0.00	0.94	2.32	0.76	0.812	107.3	0.370
21.0	-25.9	2095	1.18	3.57	0.56	0.29	0.77	9.92	0.00	0.00	0.00	1.41	2.80	0.86	0.834	107.3	0.384
21.7	-26.6	2492	1.17	4.65	0.58	0.29	0.77	9.92	0.00	0.00	0.00	1.34	3.87	0.88	0.855	107.3	0.398
22.3	-27.2	2933	1.16	4.38	0.61	0.29	0.77	9.92	0.00	0.00	0.00	1.35	3.61	0.90	0.876	107.3	0.412
23.0	-27.9	2646	2.31	4.29	1.59	0.29	0.77	9.92	0.00	0.00	0.00	2.56	3.52	1.88	0.897	101.1	0.425
23.6	-28.5	2844	2.31	4.09	1.55	0.29	0.77	9.92	0.00	0.00	0.00	2.57	3.32	1.84	0.918	101.1	0.437
24.3	-29.2	3638	1.95	3.71	1.50	0.29	0.77	9.92	0.00	0.00	0.00	2.21	2.93	1.80	0.940	101.1	0.449
24.9	-29.9	4608	2.09	4.72	1.35	0.29	0.77	9.92	0.00	0.00	0.00	2.31	3.95	1.64	0.960	101.1	0.461
25.6	-30.5	4123	2.24	3.56	1.86	0.29	0.77	9.92	0.00	0.00	0.00	2.53	2.79	2.15	0.981	94.8	0.473
26.2	-31.2	3572	1.83	3.48	1.04	0.29	0.77	9.92	0.00	0.00	0.00	2.09	2.70	1.34	1.002	101.1	0.483
26.9	-31.8	4763	1.76	3.71	0.72	0.29	0.77	9.92	0.00	0.00	0.00	2.01	2.93	1.01	1.023	101.1	0.496
27.6	-32.5	7673	3.72	12.64	0.70	0.29	0.77	9.92	0.00	0.00	0.00	3.61	11.87	0.99	1.045	119.2	0.511
28.2	-33.1	8004	3.27	12.43	0.73	0.29	0.77	9.92	0.00	0.00	0.00	3.15	11.66	1.02	1.066	119.2	0.529
28.9	-33.8	6791	1.75	7.08	0.75	0.29	0.77	9.92	0.00	0.00	0.00	1.84	6.31	1.04	1.087	107.3	0.545
29.5	-34.4	6064	1.31	4.53	0.75	0.29	0.77	9.92	0.00	0.00	0.00	1.49	3.76	1.04	1.108	107.3	0.560
30.2	-35.1	12326	3.26	10.33	0.87	0.29	0.77	9.92	0.00	0.00	0.00	3.25	9.55	1.16	1.130	119.2	0.575
30.8	-35.8	26460	2.58	19.79	1.13	0.29	0.77	9.92	0.00	0.00	0.00	2.07	19.02	1.42	1.150	113.6	0.592

DILATOMETER DATA LISTING & INTERPRETATION (BASED ON THE 1988 DILATOMETER MANUAL) SNDG. NO. : DMT-212
In-Situ Soil Testing, L.C. Page 2
JOB FILE: Barren Island FILE NO. :2020-45
LOCATION: Dorchester County, Maryland--N239,820.1 E1,526,185.7
SNDG.BY : R. Failmezger SNDG. DATE: 6/25/20
ANAL.BY : Roger Failmezger, P.E., F. ASCE, D. GE ANAL. DATE: 6/25/20

```
ANALYSIS PARAMETERS:   LO RANGE   =  9.92 TSF  ROD DIAM.    =  2.36 IN    BL.THICK.  =  0.59 IN    SU  FACTOR = 1
SURF.ELEV.  =  -4.9 FT LO  GAGE 0 =  0.00 TSF  FR.RED.DIA. =  2.64 IN    BL.WIDTH   =  3.78 IN    PHI FACTOR = 1
WATER DEPTH =  -4.9 FT HI  GAGE 0 =  0.00 TSF  LIN.ROD WT. =   8.0 LBF/FTDELTA-A    =  0.29 TSF    OCR FACTOR = 1
SP.GR.WATER = 1.030     CAL GAGE 0 =  0.00 TSF;
                                                 DELTA / PHI =   0.5       DELTA - B =  0.77 TSF    M FACTOR = 1
MAX SU ID   =   0.6    SU OPTION  =     0      MIN PHI ID  =   1.2      OCR OPTION =     0      K0 FACTOR  = 1
UNIT CONVERSIONS:      1 BAR = 1.019 KGF/CM2 = 100 KPA = 1.044 TSF = 14.51 PSI    1 M = 3.2808 FT
```

Z (FT)	ELEV (FT)	KD	ID	UD	ED (TSF)	K0	SU (TSF)	QD (TSF)	PHI (DEG)	SIGFF (TSF)	PHIO (DEG)	PC (TSF)	OCR	M (TSF)	SOIL TYPE
*****	******	*****	*****	*****	******	*****	*****	*****	*****	******	*****	*****	*****	******	************
0.7	-5.6	12.24	0.51	0.75	3	2.08	0.03					0.26	16.9	9	MUD
1.3	-6.2	8.28	0.41	0.77	3	1.63	0.03					0.24	9.2	7	MUD
2.0	-6.9	6.56	0.28	0.79	2	1.40	0.03					0.23	6.4	5	MUD
2.6	-7.5	5.76	0.37	0.70	3	1.28	0.04					0.24	5.2	6	MUD
3.3	-8.2	5.06	0.50	0.73	5	1.17	0.04					0.24	4.2	9	MUD
3.9	-8.9	4.29	0.46	0.84	4	1.04	0.04					0.22	3.3	7	MUD
4.6	-9.5	3.73	0.43	0.73	4	0.93	0.03					0.20	2.6	6	MUD
5.2	-10.2	3.52	0.43	0.81	4	0.89	0.04					0.21	2.4	6	MUD
5.9	-10.8	3.68	0.46	0.73	5	0.92	0.04					0.25	2.6	8	MUD
6.6	-11.5	3.62	0.43	0.69	5	0.91	0.05					0.27	2.5	8	MUD
7.2	-12.1	3.30	0.49	0.78	6	0.85	0.05					0.25	2.2	8	MUD
7.9	-12.8	3.52	0.47	0.76	7	0.89	0.05					0.30	2.4	10	MUD
8.5	-13.5	6.13	0.37	0.71	10	1.34	0.13					0.78	5.7	21	MUD
9.2	-14.1	4.72	0.43	0.70	10	1.11	0.09					0.56	3.8	18	MUD
9.8	-14.8	3.77	0.35	0.70	7	0.94	0.07					0.42	2.7	10	MUD
10.5	-15.4	5.62	0.76	0.55	25	1.26						0.84	5.0	47	CLAYEY SILT
11.2	-16.1	5.08	2.52	-0.20	80	0.76		16.2	39.2	0.29	35.4	0.69	3.8	151	SILTY SAND
11.8	-16.7	4.35	6.69	0.04	197	0.38		45.2	45.7	0.33	42.8	0.23	1.2	351	SAND
12.5	-17.4	6.76	2.79	0.04	139	0.79		42.8	43.6	0.35	40.7	0.98	4.6	299	SILTY SAND
13.1	-18.0	8.15	3.00	-0.03	193	1.04		35.9	41.7	0.38	38.6	1.75	7.7	450	SILTY SAND
13.8	-18.7	4.67	2.06	0.15	81	0.59		35.6	42.4	0.41	39.5	0.62	2.5	145	SILTY SAND
14.4	-19.4	2.32	1.27	0.48	26	0.37		25.4	40.9	0.43	37.9	0.24	0.9	28	SANDY SILT
15.1	-20.0	2.35	0.70	0.42	16	0.63						0.34	1.3	16	CLAYEY SILT
15.7	-20.7	1.12	2.85	-0.02	31	0.20		28.2	41.6	0.47	38.9	0.08	0.3	26	SILTY SAND
16.4	-21.3	1.36	1.62	-0.12	22									19	SANDY SILT
17.1	-22.0	0.43	5.75	-1.31	27	0.04		37.0	43.4	0.52	41.0			23	SAND
17.7	-22.6	0.01	70.55	-14.68	6									5	MUD
18.4	-23.3	0.41	3.64	-0.14	17									15	SAND
19.0	-23.9	0.08	13.52	-1.87	13									10	SAND
19.7	-24.6	0.06	10.30	-0.85	8									7	MUD
20.3	-25.3	0.33	11.15	-0.41	48									41	SAND
21.0	-25.9	1.49	2.43	0.04	48	0.36		24.7	38.2	0.63	35.7	0.29	0.7	41	SILTY SAND
21.7	-26.6	1.22	5.21	0.05	88	0.29		29.8	39.4	0.65	37.0	0.21	0.5	75	SAND
22.3	-27.2	1.13	4.86	0.05	78									67	SAND
23.0	-27.9	3.90	0.58	0.59	33	0.97	0.22					1.20	2.8	51	SILTY CLAY
23.6	-28.5	3.76	0.46	0.56	26	0.94	0.21					1.17	2.7	40	SILTY CLAY
24.3	-29.2	2.83	0.57	0.67	25	0.75	0.16					0.77	1.7	30	SILTY CLAY
24.9	-29.9	2.91	1.23	0.51	57	0.42		51.8	41.4	0.76	39.4	0.57	1.2	73	SANDY SILT
25.6	-30.5	3.26	0.17	0.76	9	0.84	0.19					1.01	2.1	13	MUD
26.2	-31.2	2.25	0.56	0.31	21	0.61	0.13					0.58	1.2	21	SILTY CLAY
26.9	-31.8	2.00	0.93	-0.01	32	0.54						0.49	1.0	28	SILT
27.6	-32.5	5.03	3.21	-0.02	286	0.62		83.4	42.9	0.86	41.2	1.42	2.8	545	SILTY SAND
28.2	-33.1	3.95	4.07	-0.02	295	0.45		88.9	43.6	0.90	42.0	0.82	1.6	500	SAND
28.9	-33.8	1.37	5.99	-0.06	156									132	SAND
29.5	-34.4	0.68	5.95	-0.17	78									67	SAND
30.2	-35.1	3.69	2.97	0.01	219	0.24		139.1	46.3	0.99	45.0	0.31	0.5	357	SILTY SAND
30.8	-35.8	1.54	18.57	0.30	589									516	SAND

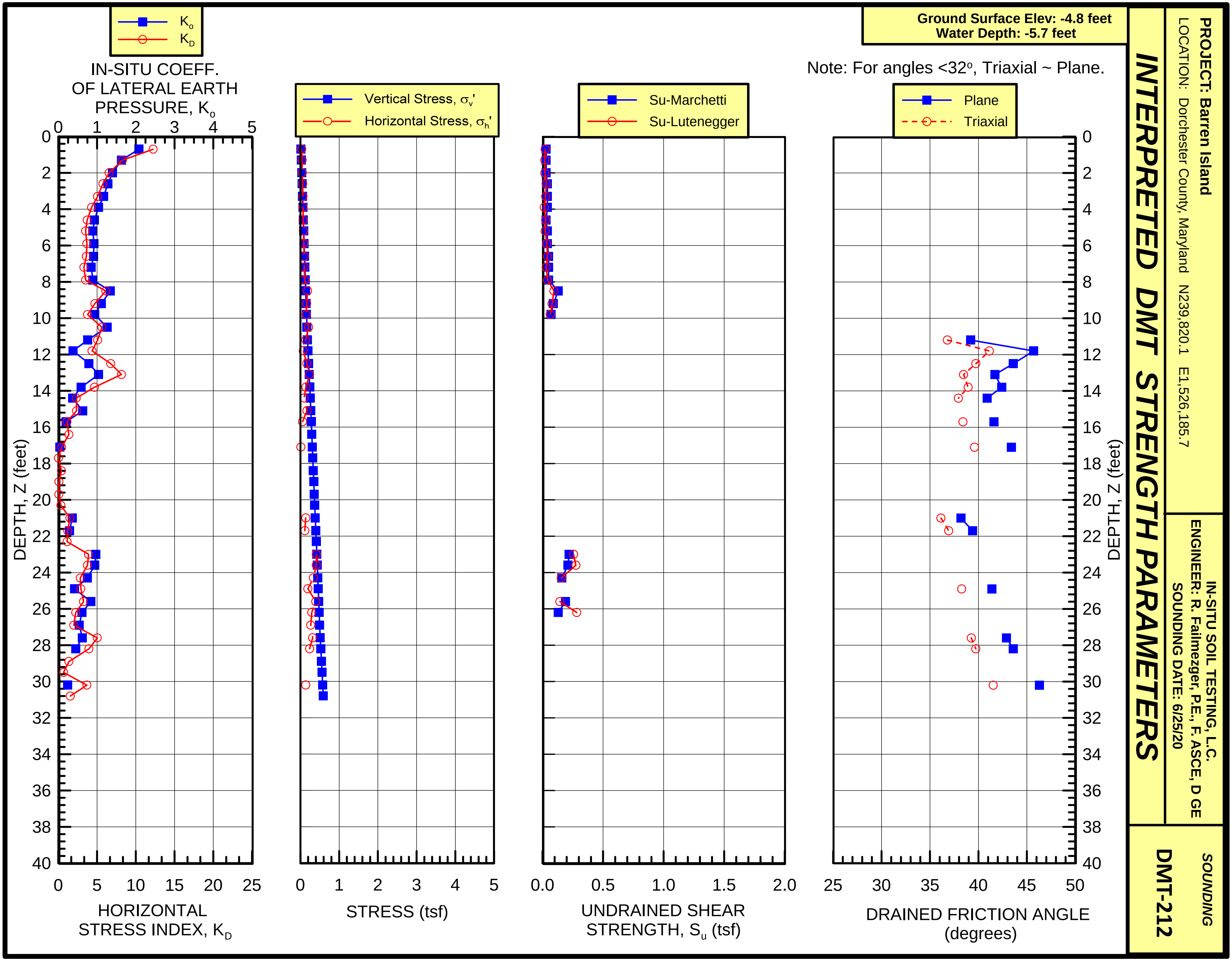


DILATOMETER TEST RESULTS

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N239,820.1 E1,526,185.7

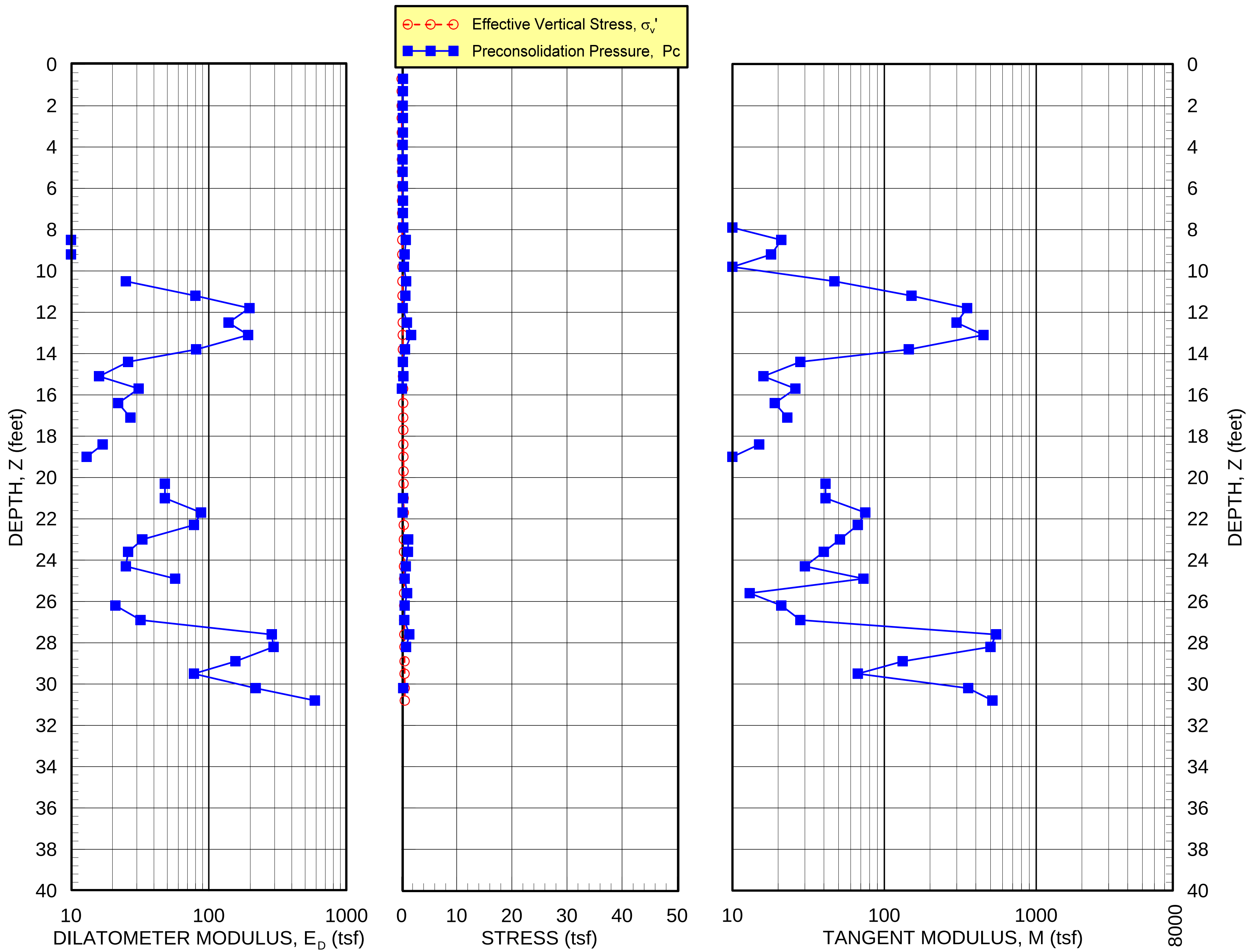
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 6/25/20

SOUNDING
DMT-212



INTERPRETED DMT STRENGTH PARAMETERS
PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N239,820.1 E1,526,185.7
IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/25/20
SOUNDING
DMT-212
Ground Surface Elev: -4.8 feet
Water Depth: -5.7 feet
Note: For angles <32º, Triaxial ~ Plane.
K_o
K_D
IN-SITU COEFF. OF LATERAL EARTH PRESSURE, K_o
HORIZONTAL STRESS INDEX, K_D
DEPTH, Z (feet)
Vertical Stress, σ_v'
Horizontal Stress, σ_h'
STRESS (tsf)
Su-Marchetti
Su-Lutenegger
UNDRAINED SHEAR STRENGTH, S_u (tsf)
Plane
Triaxial
DRAINED FRICTION ANGLE (degrees)

Ground Surface Elev.: -4.8 feet
Water Depth: -5.7 feet



INTERPRETED DMT DEFORMATION PARAMETERS

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N239,820.1 E1,526,185.7

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/25/20

SOUNDING
DMT-212

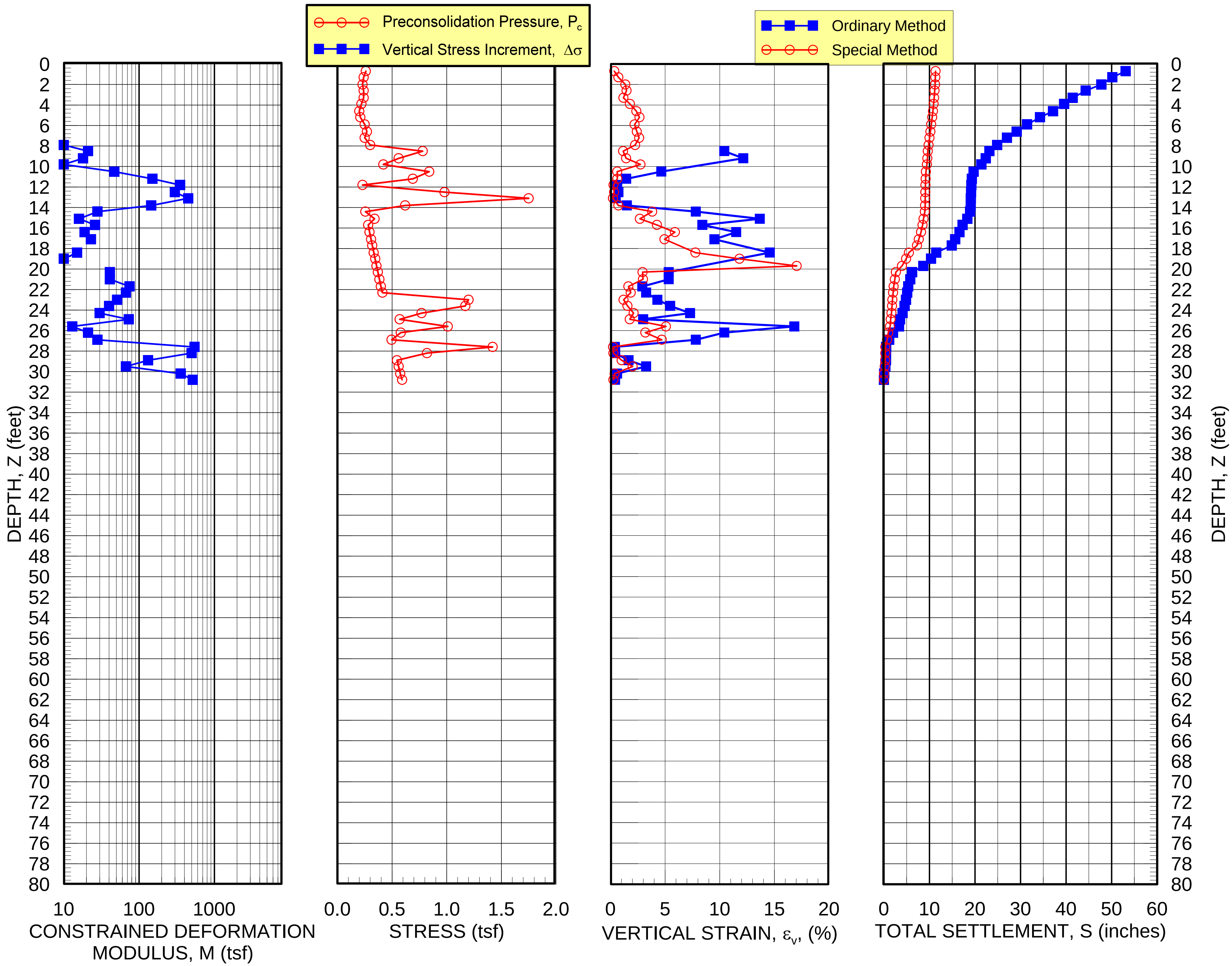
Ground Surface Elev.: -4.8 feet
Water Depth: -5.7 feet

PREDICTED DMT SETTLEMENT

PROJECT: Barren Island
LOCATION: Dorchester County, Maryland N239,820.1 E1,526,185.7

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger, P.E., F. ASCE, D GE
SOUNDING DATE: 6/25/20

SOUNDING
DMT-212



PRESENTATION OF SITE INVESTIGATION RESULTS

Midbay Island Phase I – Barren Island

Prepared for:

Soil and Land Use Technology, Inc. (SaLUT-TLB)

ConeTec Job No: 20-54-21144

Project Start Date: 07/27/2020
Project End Date: 07/31/2020
Revision Date: 09/15/2020

Prepared by:

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CONETEC

Introduction

The enclosed report presents the results of the site investigation program conducted by ConeTec Inc. for SaLUT-TLB in the waters surrounding Barren Island nearby Fishing Creek, Maryland. The program consisted of 13 electric field vane shear tests (VST) at 8 locations selected and numbered under the direction of SaLUT-TLB personnel. The purpose of the program was to evaluate existing site conditions.

Project Information

Project	
Client	SaLUT-TLB
Project	Midbay Island Phase I - Barren Island
ConeTec project number	20-54-21144

A map from CESIUM including the VST test locations is presented below.

Rig Description	Deployment System	Test Type
Mobile Drill B-57 Truck Rig	Drill Head/winch line	VST

Coordinates			
Test Type	Collection Method	EPSG Number	Comments
VST	GPS Survey	3559	Coordinates provided by client

Electronic Field Vane Shear Test (VST)	
Depth reference	Depths are referenced to the existing ground surface at the time of each test.
Load cell capacity	100 Nm
Additional comments	In cases where the load cell capacity was exceeded, the actual in-situ undrained shear strength is greater than calculated. Due to the nature of conducting VST on a spud-barge, results are affected by tides, wind, and any movement of the barge and or casing. Peak and remolded stress values were determined based on an assumed trend between the peaks and troughs of the curves. Several shallow tests showed extremely low test results. This is not due to equipment errors or malfunctions as the proper QA/QC procedures were followed throughout the project. The results seem to be suggest ground disturbance or other phenomena outside of ConeTec testing control.

Limitations

This report has been prepared for the exclusive use of SaLUT-TLB (Client) for the project titled "Midbay Island Phase I - Barren Island". The report's contents may not be relied upon by any other party without the express written permission of ConeTec Inc. (ConeTec). ConeTec has provided site investigation services, prepared the factual data reporting, and provided geotechnical parameter calculations consistent with current best practices. No other warranty, expressed or implied, is made.

The information presented in the report document and the accompanying data set pertain to the specific project, site conditions and objectives described to ConeTec by the Client. In order to properly understand the factual data, assumptions and calculations, reference must be made to the documents provided and their accompanying data sets, in their entirety.

The electric field vane system is manufactured by Adara Systems Ltd., a subsidiary of ConeTec. An illustration of the uphole vane system configuration is presented in Figure eVST.

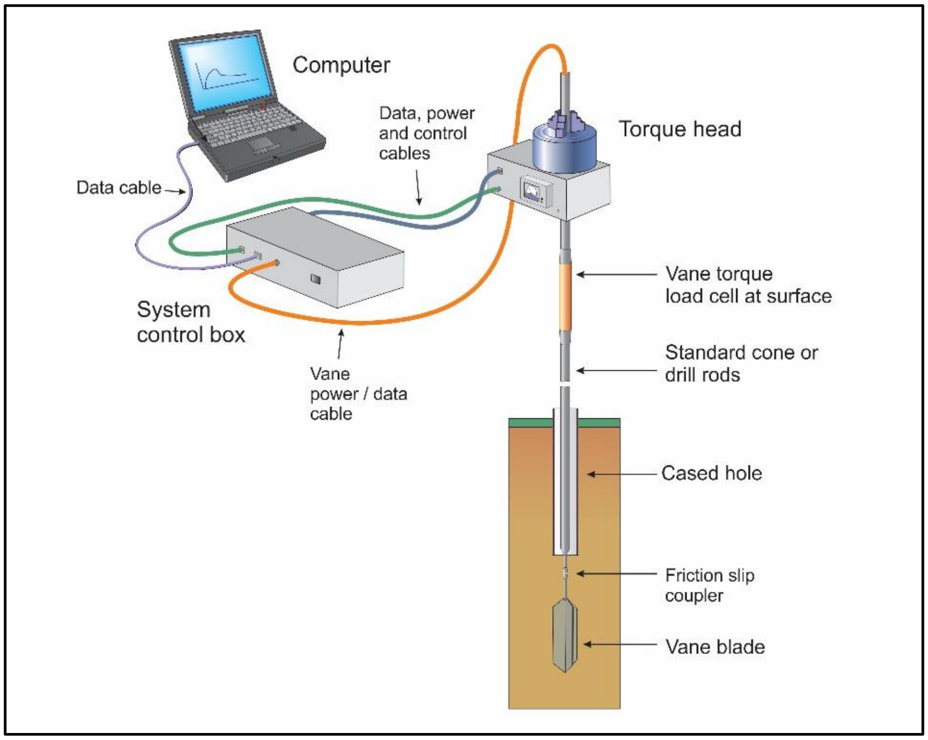


Figure eVST. Illustration of the uphole electric field vane system configuration

The vane system is designed with an array of strain gauges in a load cell that measure the applied torque. The torque signal is amplified and converted to digital data within the tool and transmitted to the data acquisition system through a shielded cable. The system uses a friction slip coupler to permit the free slip or play of approximately fifteen degrees between the rods and the vane blade in order to isolate and record rod friction from the soil before rotation of the vane blade starts. The system is designed to use vane blades of various sizes and configurations that connect to the friction slip coupler. The vane blades manufactured by Adara have dimensions and tolerances that are in general accordance with the current ASTM D2573 standards. In very soft soil conditions and at the request of the client, ConeTec may use a large diameter vane blade that exceeds the ASTM D2573 maximum size specifications in order to maximize torque resolution. In very stiff soil conditions and at the request of the client, ConeTec may use a smaller diameter vane blade than the minimum size specified in ASTM D2573 in order to obtain a peak torque below the capacity of the load cell.

The electric motor (capable of 100 Newton-meters of torque) is designed to clamp onto and rotate the rods and vane blade at a constant rate.

ConeTec's calibration criteria of the load cells are in accordance with the current ASTM D2573 standard.

The data acquisition system consists of a computer that records the vane data every 0.2 degrees of rotation. The system records the following parameters and saves them to a file as the test is conducted:

- Torque in Newton-meters
- Rotation in degrees
- Elapsed time in seconds (from the start of the test)

All testing is performed in accordance to ConeTec's field vane testing operating procedures and in general accordance with the current ASTM D2573 standard. For additional information on vane shear testing refer to Greig et al. (1987).

Prior to the start of a vane shear test profile, a suitable sized vane blade is selected, the vane system is powered on and the vane load cell baseline reading is recorded with the load cell hanging freely in a vertical position.

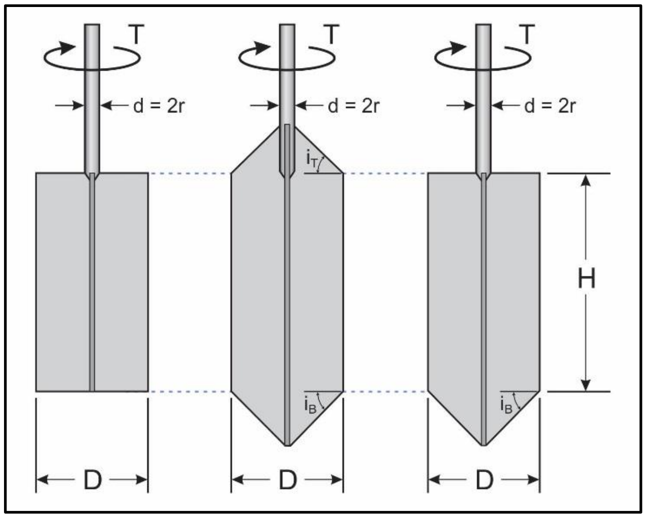
The vane blade, slip coupler and rods are advanced to the desired test depth through a cased hole, typically using AWJ drill rods or one-meter length rods with an outer diameter of 1.5 inches (38.1 millimeters). Test depths are referenced to the middle of the rectangular portion of the vane blade. The motor rotates the rods at a near constant rate up to and beyond the yield stress (peak) until the load remains near constant (post peak). Following post peak readings, the vane blade is then rapidly rotated clockwise ten times to completely remold the soil. The test procedure is repeated in order to record the remolded strength of the soil. The vane blade is then advanced to the next depth and the procedure is repeated or the vane blade is retracted to allow for drilling and vane blade size changes. Once the vane profile is complete, the final baseline of the load cell is recorded and compared to previous reading as a QA/QC check.

Undrained shear strength from the field vane, $(S_u)_{fv}$, is calculated from torque measurements using the following general equation (ASTM D2573) taking into consideration the case of rectangular or tapered ends at the top and/or bottom of the vane blade.

$$(S_u)_{fv} = \frac{12 \cdot T_{max}}{\pi D^2 \left(\frac{D}{\cos(i_T)} + \frac{D}{\cos(i_B)} + 6H \right)}$$

where:

$(S_u)_{fv}$	=	undrained shear strength from the field vane
T_{max}	=	maximum value of torque
D	=	vane diameter
H	=	height of the rectangular portion of the vane
i_T	=	angle of taper at vane top (with respect to horizontal)
i_B	=	angle of taper at vane bottom (with respect to horizontal)



For rectangular vane blades where H/D = 2, the above equation simplifies to:

$$(S_u)_{fv} = \frac{6 \cdot T_{max}}{7\pi D^3}$$

The recorded rod friction is subtracted from the peak and remolded torque. No correction factors are applied to the vane results to derive the mobilized shear strength ($\tau_{mobilized}$).

A summary of the vane shear tests, a table of results and individual VST plots are provided in the relevant appendices. Tabular data in Excel format is provided in the data release folder.

References

ASTM D2573 / D2573M-18, 2018, “Standard Test Method for Field Vane Shear Test in Saturated Fine-Grained Soils”, ASTM International, West Conshohocken, PA. DOI: 10.1520/D2573_D2573M-18.

Greig, J.W., R.G. Campanella and P.K. Robertson, 1987, “Comparison of Field Vane Results With Other In-Situ Test Results”, International Symposium on Laboratory and Field Vane Shear Strength Testing, ASTM, Tampa, FL, Proceedings.

The appendices listed below are included in the report:

- Electronic Field Vane Shear Test Profile Summary and Results
- Electronic Field Vane Shear Test Plots

Electric Field Vane Shear Test Profile Summary and Results

CONETEC	Job Number:	20-54-21144
	Client:	SaLUT
	Project:	Midbay Isand Phase I - Barren Island
	Start Date:	27-Jul-2020
	End Date:	31-Jul-2020

ELECTRIC FIELD VANE SHEAR TEST SUMMARY

Sounding ID	File Name	Date From	Date To	Northing[1] (ft)	Easting[1] (ft)	Surface Elevation[2] (ft)
B-201B-1	20-54-21144_VST_B-201B-1	27-Jul-2020	27-Jul-2020	245750.36	1526910.24	-2.68
B-201B-2	20-54-21144_VST_B-201B-2	27-Jul-2020	27-Jul-2020	245750.36	1526910.24	-2.68
B-201B-3	20-54-21144_VST_B-201B-3	27-Jul-2020	27-Jul-2020	245750.36	1526910.24	-2.68
B-201C-1	20-54-21144_VST_B-201C-1	31-Jul-2020	31-Jul-2020	245682.99	1526794.66	-2.26
B-201C-2	20-54-21144_VST_B-201C-2	31-Jul-2020	31-Jul-2020	245682.99	1526794.66	-2.26
B-224B	20-54-21144_VST_B-224B	29-Jul-2020	29-Jul-2020	240886.80	1525286.90	-6.56
B-227B-1	20-54-21144_VST_B-227B-1	29-Jul-2020	29-Jul-2020	239008.68	1524988.87	-9.46
B-227B-2	20-54-21144_VST_B-227B-2	29-Jul-2020	29-Jul-2020	239008.68	1524988.87	-9.46
B-230B-1	20-54-21144_VST_B-230B-1	30-Jul-2020	30-Jul-2020	238457.89	1526682.55	-6.39
B-230B-2	20-54-21144_VST_B-230B-2	30-Jul-2020	30-Jul-2020	238457.89	1526682.55	-6.39
B-232B	20-54-21144_VST_B-232B	29-Jul-2020	29-Jul-2020	237577.57	1527172.55	-7.06
B-244B	20-54-21144_VST_B-244B	31-Jul-2020	31-Jul-2020	234036.95	1531418.32	-5.11
B-246B	20-54-21144_VST_B-246B	30-Jul-2020	30-Jul-2020	239821.16	1526181.98	-5.11

1. Coordinates are referenced to the Maryland state plane coordinate system and are client provided.
2. Elevations were recorded at the same time as the coordinates and are client proivided.

Job Number: 20-54-21144
Client: SaLUT
Project: Midbay Island Phase I - Barren Island
Start Date: 27-Jul-2020
End Date: 31-Jul-2020

ELECTRIC FIELD VANE SHEAR TEST TIMING

Sounding ID	Date	Test Depth[1] (ft)	Vane Insertion Time (HH:mm)	Peak Test Start Time (HH:mm)	Insertion to Start Interval (min)	Start to Failure Interval (sec)	Peak Test Avg Rate (deg/sec)	Remolding Completion Time (HH:mm)	Remold Test Start Time (HH:mm)	Remolding to Start Interval (min)	Remold Test Avg Rate (deg/sec)	Refer to Notation Number
B-201B-1	27-Jul-2020	7.0	08:53	08:56	3	1315	0.13					2
B-201B-2	27-Jul-2020	8.0	09:37	09:40	4	596	0.07	09:54	09:55	2	0.06	
B-201B-3	27-Jul-2020	41.0	11:57	12:02	5	275	0.03					3
B-201C-1	31-Jul-2020	7.0	10:49	10:52	3	245	0.11	11:01	11:01	1	0.11	
B-201C-2	31-Jul-2020	41.0	11:46	11:49	3	290	0.12	12:00	12:00	1	0.12	
B-224B	29-Jul-2020	35.0	12:05	12:07	3	279	0.04	12:21	12:23	2	0.04	
B-227B-1	29-Jul-2020	6.0	15:26	15:28	3	260	0.05	15:38	15:40	2	0.08	
B-227B-2	29-Jul-2020	30.0	16:24	16:27	3	479	0.12	16:42	16:43	1	0.12	
B-230B-1	30-Jul-2020	4.0	08:40	08:42	3	233	0.12	08:58	08:58	1	0.12	
B-230B-2	30-Jul-2020	14.0	09:37	09:39	3	266	0.12	09:48	09:49	1	0.12	
B-232B	29-Jul-2020	13.0	14:01	14:05	5	254	0.04	14:18	14:18	1	0.06	
B-244B	31-Jul-2020	7.0	08:34	08:38	4	226	0.12	08:47	08:48	1	0.11	
B-246B	30-Jul-2020	7.0	10:42	10:47	6	170	0.11	10:56	10:57	2	0.12	

1. Test depths are referenced to the middle of the vane.
2. Did not conduct remold test due to soft soil conditions.
3. Exceeded the capacity of the load cell on the peak test. Low rotation angle recorded due to data recording issues.

Job Number:	20-54-21144
Client:	SaLUT
Project:	Midbay Island Phase I - Barren Island
Start Date:	27-Jul-2020
End Date:	31-Jul-2020

ELECTRIC FIELD VANE SHEAR TEST RESULTS

Sounding ID	File Name	Date	Load Cell Serial Number	Load Cell Location	Casing/Drillout Depth (ft)	Test Depth[1] (ft)	Test Elevation (ft)	Vane Diameter D (mm)	Vane Height H (mm)	Top Taper Angle i_T (deg)	Bottom Taper Angle i_B (deg)	Vane Factor (kPa/Nm)	Peak Torque (Nm)	Remolded Torque (Nm)	Peak Stress (tsf)	Remolded Stress (tsf)	Peak Frictional Stress (tsf)	Remolded Frictional Stress (tsf)	Su Peak (tsf)	Su Remolded (tsf)	Sensitivity	Refer to Notation Number
B-201B-1	20-54-21144_VST_B-201B-1	27-Jul-2020	AVLC-034	Surface	5.0	7.0	-9.68	75	150	45	45	0.6106	4.34		0.03		0.01		0.02			2
B-201B-2	20-54-21144_VST_B-201B-2	27-Jul-2020	AVLC-034	Surface	5.0	8.0	-10.68	75	150	45	45	0.6106	2.26	1.38	0.01	0.01	0.01	0.00	0.01	0.01	1	4
B-201B-3	20-54-21144_VST_B-201B-3	27-Jul-2020	AVLC-034	Surface	39.0	41.0	-43.68	50	100	45	45	2.0608	105.95		2.28		1.12		1.16			3
B-201C-1	20-54-21144_VST_B-201C-1	31-Jul-2020	AVLC-034	Surface	5.0	7.0	-9.26	75	150	45	45	0.6106	16.11	2.47	0.10	0.02	0.01	0.00	0.10	0.01	8	4
B-201C-2	20-54-21144_VST_B-201C-2	31-Jul-2020	AVLC-034	Surface	39.0	41.0	-43.26	40	80	45	45	4.0249	72.64	39.36	3.05	1.65	0.49	0.37	2.56	1.29	2	
B-224B	20-54-21144_VST_B-224B	29-Jul-2020	AVLC-034	Surface	32.0	35.0	-41.56	40	80	45	45	4.0249	58.95	31.06	2.48	1.31	0.36	0.28	2.11	1.03	2	
B-227B-1	20-54-21144_VST_B-227B-1	29-Jul-2020	AVLC-034	Surface	4.0	6.0	-15.46	75	150	45	45	0.6106	17.21	1.50	0.11	0.01	0.01	0.01	0.10	0.00	22	
B-227B-2	20-54-21144_VST_B-227B-2	29-Jul-2020	AVLC-034	Surface	28.0	30.0	-39.46	40	80	45	45	4.0249	76.53	35.06	3.22	1.47	0.61	0.11	2.60	1.36	2	
B-230B-1	20-54-21144_VST_B-230B-1	30-Jul-2020	AVLC-034	Surface	2.0	4.0	-10.39	75	150	45	45	0.6106	3.27	1.13	0.02	0.01	0.00	0.00	0.02	0.00	4	4
B-230B-2	20-54-21144_VST_B-230B-2	30-Jul-2020	AVLC-034	Surface	12.0	14.0	-20.39	75	150	45	45	0.6106	4.68	1.61	0.03	0.01	0.01	0.00	0.02	0.01	4	4
B-232B	20-54-21144_VST_B-232B	29-Jul-2020	AVLC-034	Surface	11.0	13.0	-20.06	75	150	45	45	0.6106	28.86	4.45	0.18	0.03	0.01	0.00	0.17	0.02	7	
B-244B	20-54-21144_VST_B-244B	31-Jul-2020	AVLC-034	Surface	5.0	7.0	-12.11	75	150	45	45	0.6106	9.52	1.16	0.06	0.01	0.01	0.00	0.05	0.00	11	4
B-246B	20-54-21144_VST_B-246B	30-Jul-2020	AVLC-034	Surface	4.0	7.0	-12.11	75	150	45	45	0.6106	8.20	1.65	0.05	0.01	0.01	0.00	0.05	0.01	6	4

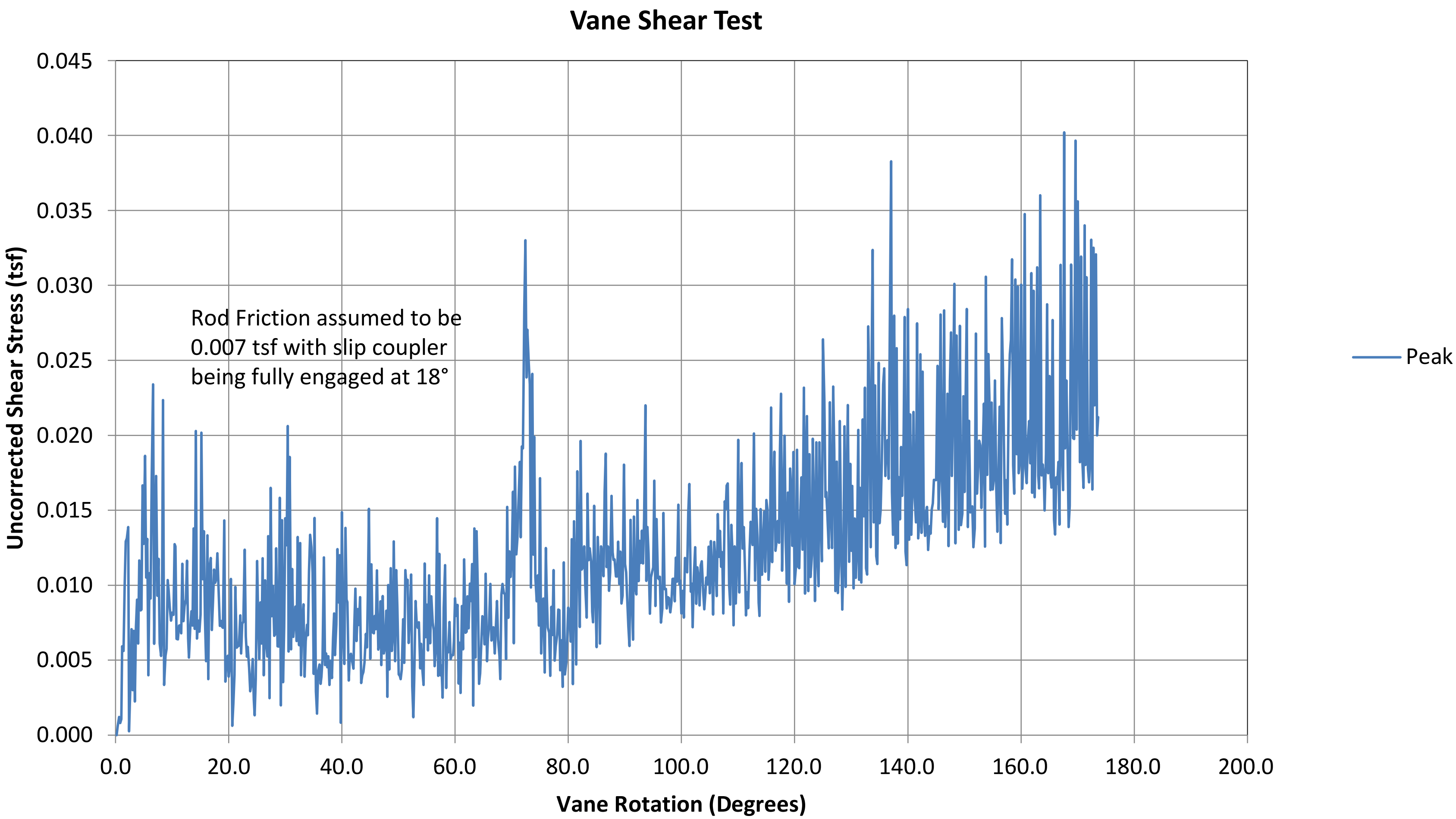
1. Test depths are referenced to the middle of the vane.
2. Did not conduct remold test due to soft soil conditions.
3. Exceeded the capacity of the load cell on the peak test. Low rotation angle recorded due to data recording issues.
4. Low results have been confirmed as accurate data; may be true soil conditions or the results of soil disturbance.

Electric Field Vane Shear Test Plots

Job Number: 20-54-21144
Client: SaLUT
Project: Midbay Island Phase I - Barren Island
Sounding: B-201B-1

Test Date: 27-Jul-2020 08:56
Test Depth (ft): 7.00
Test Elevation (ft): -9.68
Vane Type: Adara solid double tapered 75 x 150 mm (45°, 45°)

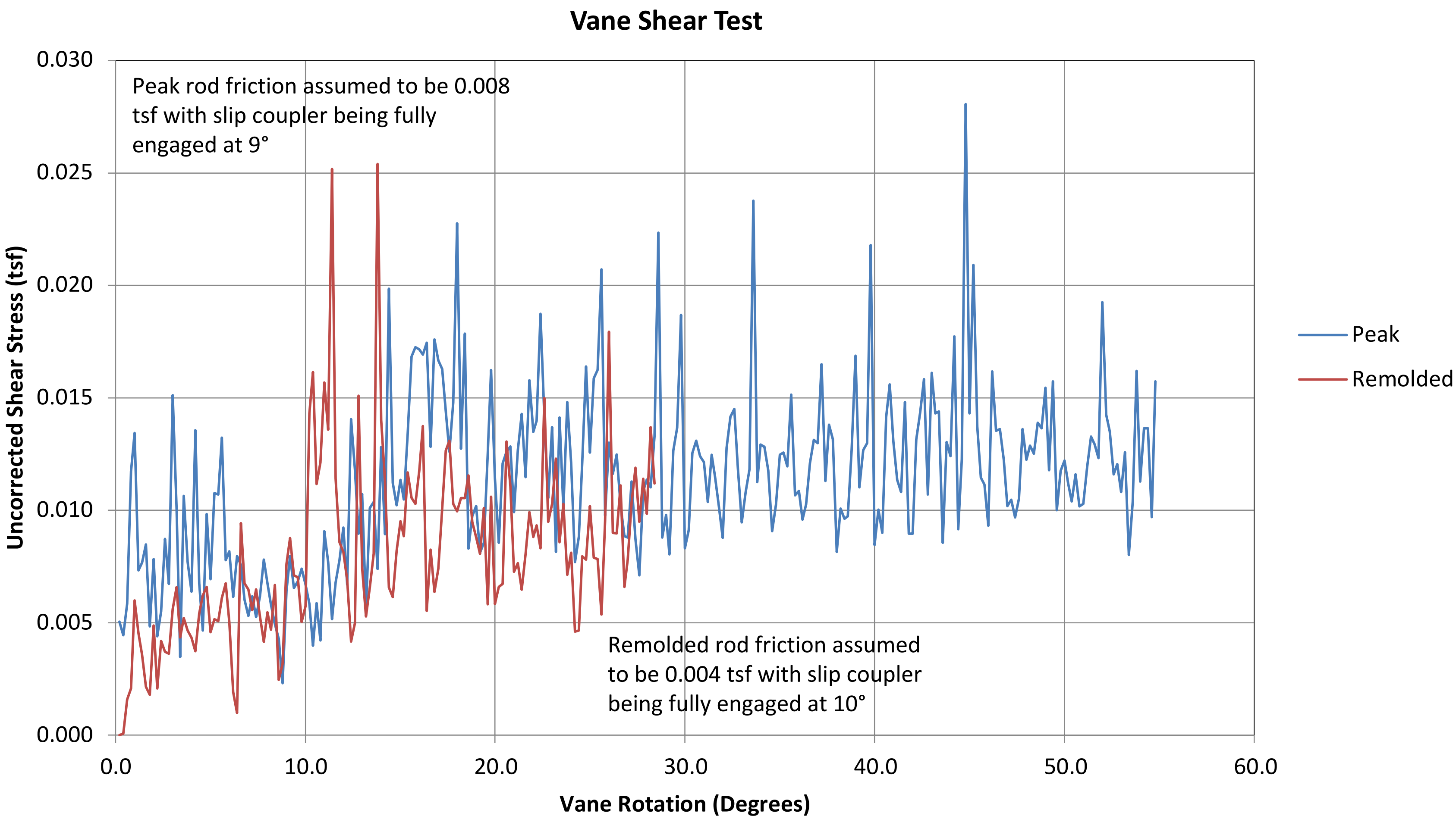
Coordinate System: Maryland State Plane
Northing (ft): 245750.3608
Easting (ft): 1526910.239
Surface Elevation (ft): -2.68



Job Number: 20-54-21144
Client: SaLUT
Project: Midbay Island Phase I - Barren Island
Sounding: B-201B-2

Test Date: 27-Jul-2020 09:40
Test Depth (ft): 8.00
Test Elevation (ft): -10.68
Vane Type: Adara solid double tapered 75 x 150 mm (45°, 45°)

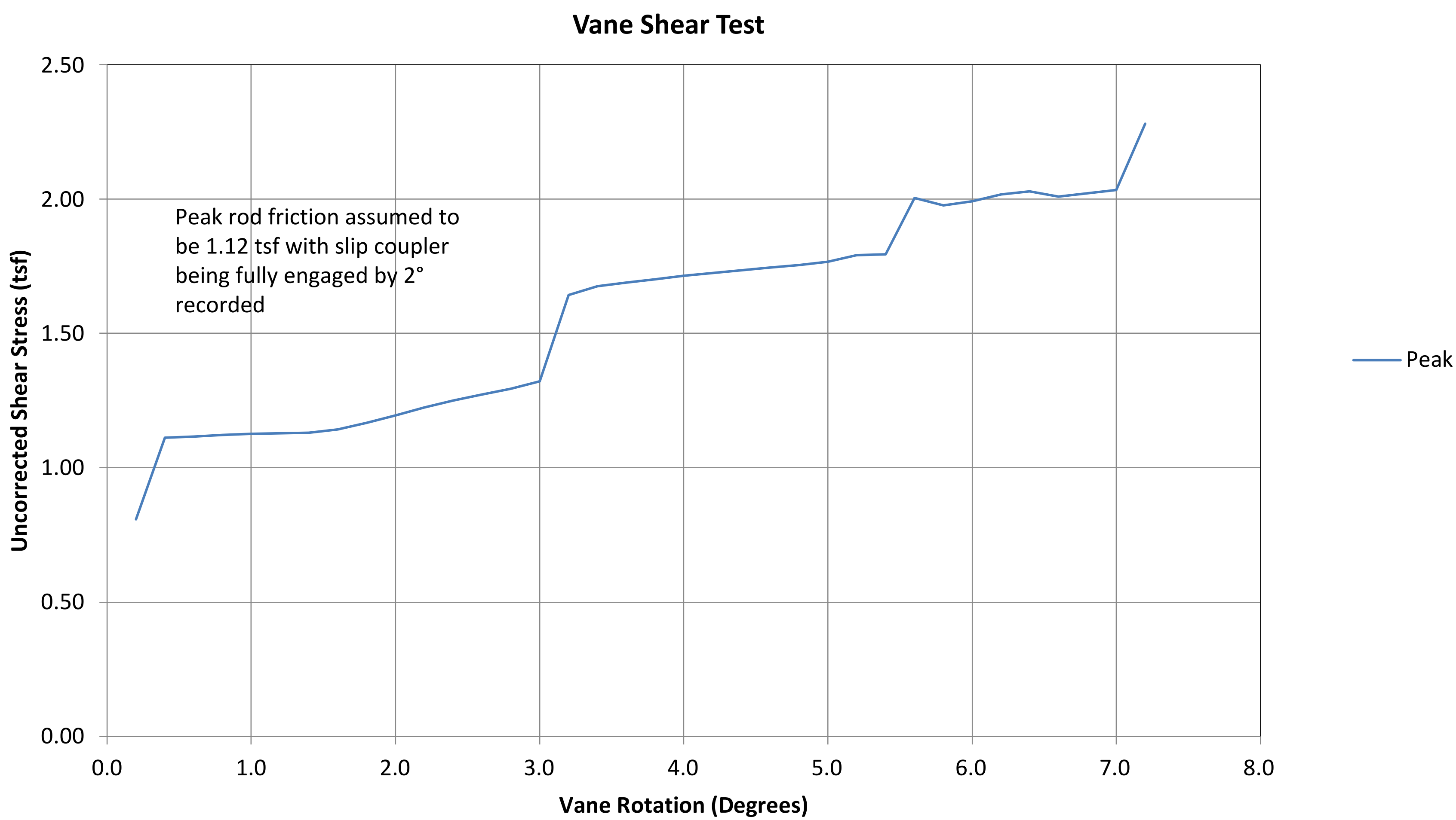
Coordinate System: Maryland State Plane
Northing (ft): 245750.3608
Easting (ft): 1526910.239
Surface Elevation (ft): -2.68



Job Number: 20-54-21144
Client: SaLUT
Project: Midbay Island Phase I - Barren Island
Sounding: B-201B-3

Test Date: 27-Jul-2020 12:02
Test Depth (ft): 41.00
Test Elevation (ft): -43.68
Vane Type: Adara solid double tapered 50 x 100 mm (45°, 45°)

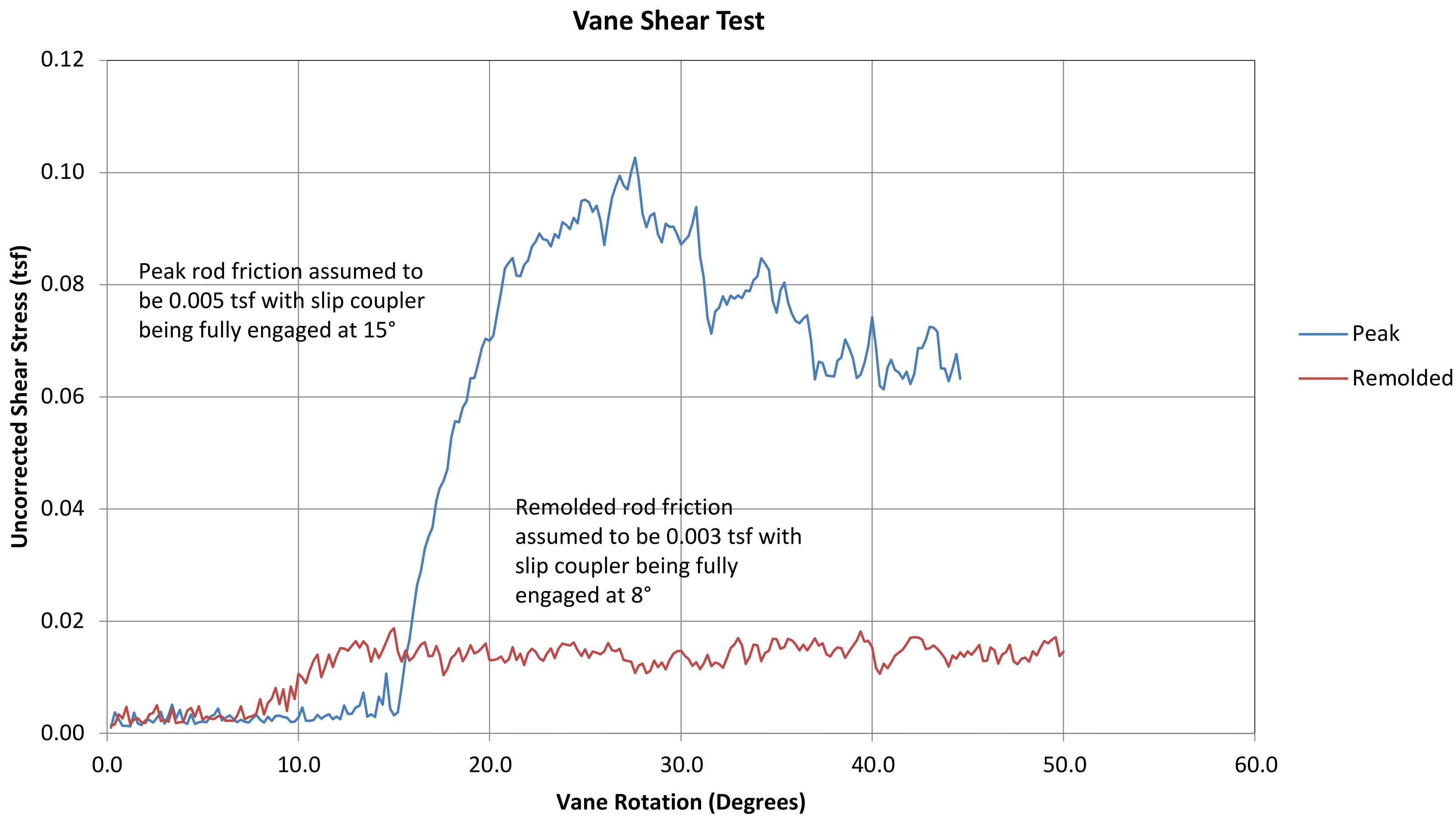
Coordinate System: Maryland State Plane
Northing (ft): 245750.3608
Easting (ft): 1526910.239
Surface Elevation (ft): -2.68



Job Number: 20-54-21144
Client: SaLUT
Project: Midbay Island Phase I - Barren Island
Sounding: B-201C-1

Test Date: 31-Jul-2020 10:52
Test Depth (ft): 7.00
Test Elevation (ft): -9.26
Vane Type: Adara solid double tapered 75 x 150 mm (45°, 45°)

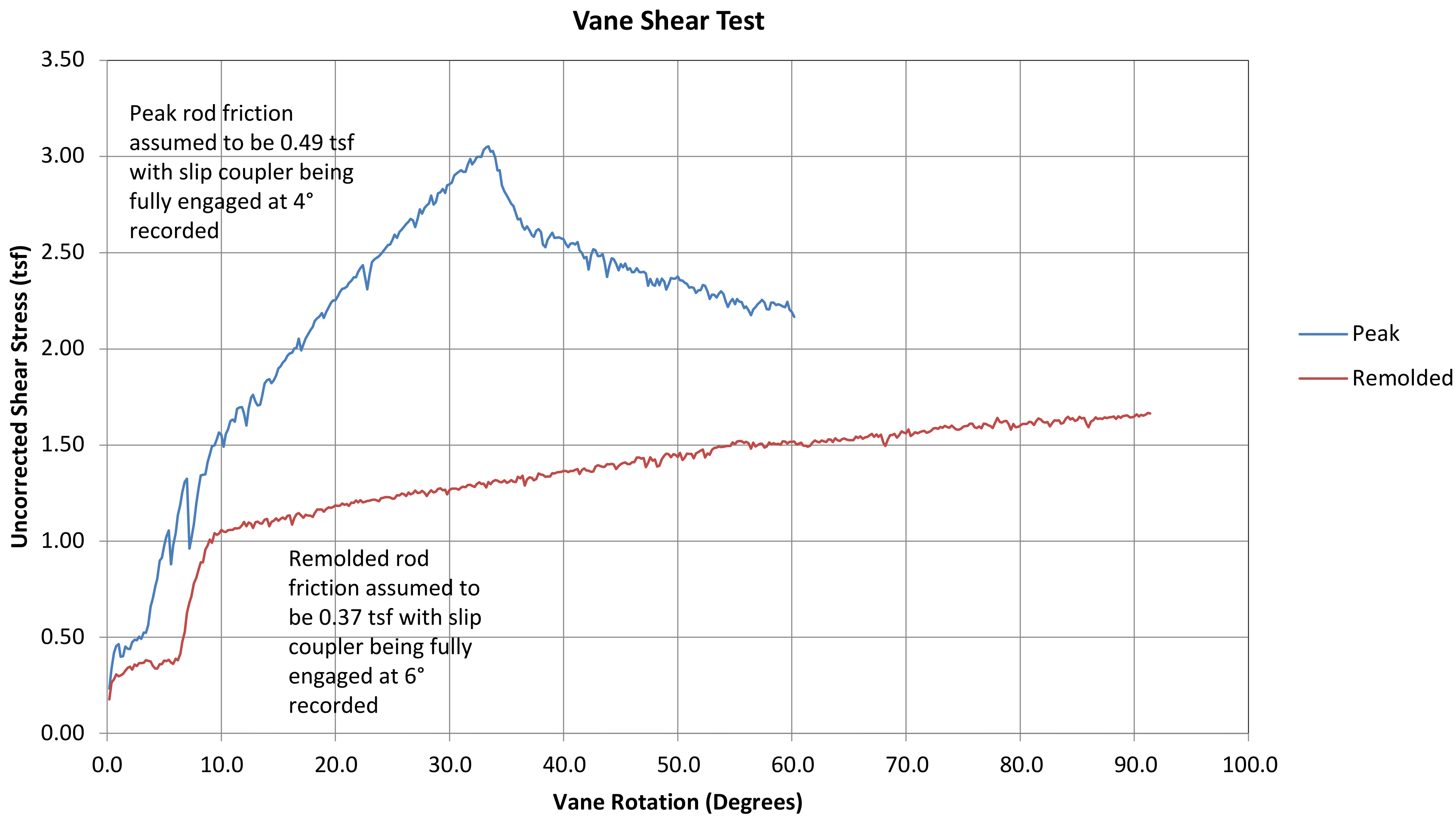
Coordinate System: Maryland State Plane
Northing (ft): 245682.9915
Easting (ft): 1526794.6607
Surface Elevation (ft): -2.26



Job Number: 20-54-21144
Client: SaLUT
Project: Midbay Island Phase I - Barren Island
Sounding: B-201C-2

Test Date: 31-Jul-2020 11:49
Test Depth (ft): 41.00
Test Elevation (ft): -43.26
Vane Type: Adara solid double tapered 40 x 80 mm (45°, 45°)

Coordinate System: Maryland State Plane
Northing (ft): 245682.9915
Easting (ft): 1526794.6607
Surface Elevation (ft): -2.26

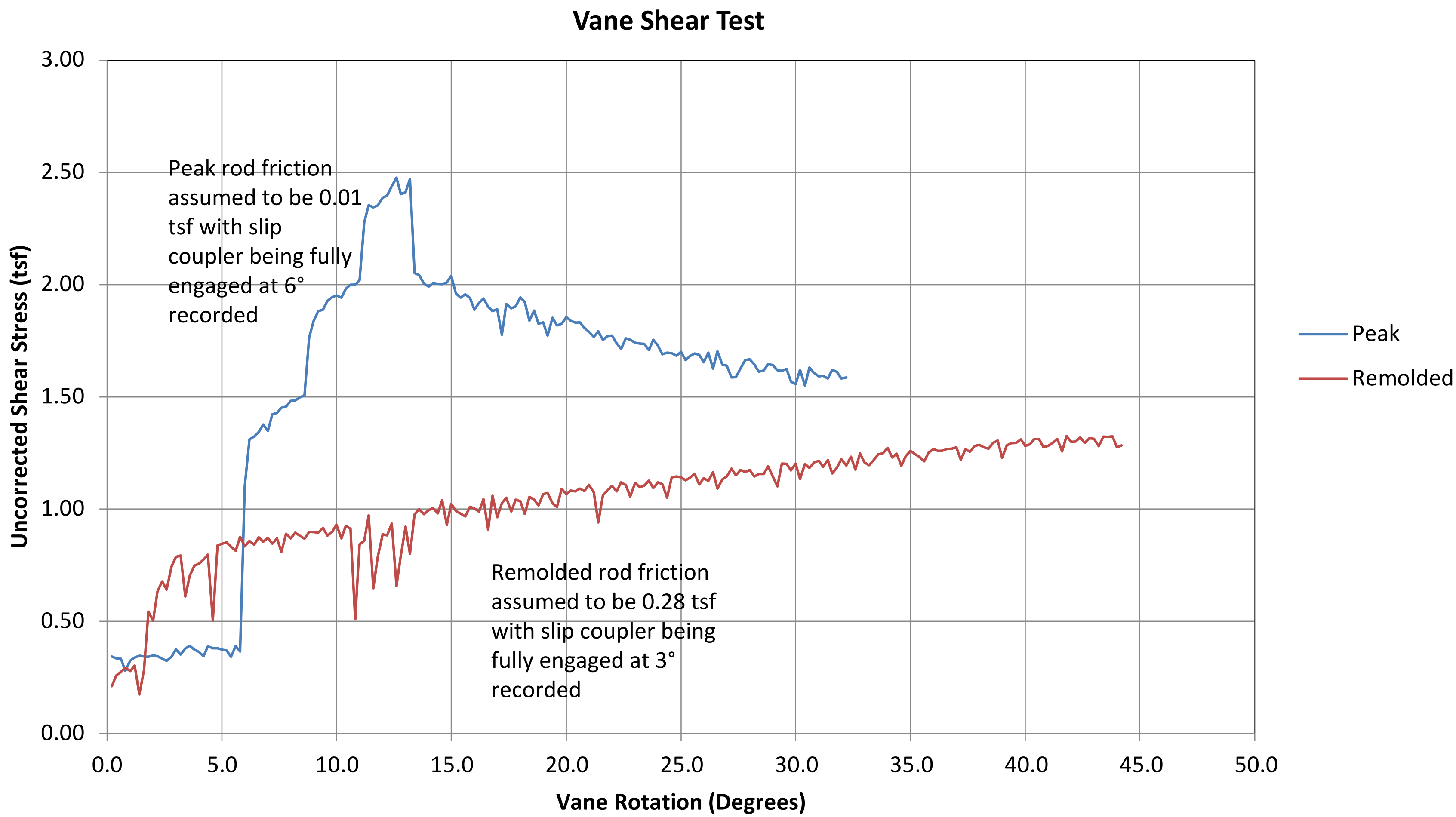


CONETEC

Job Number: 20-54-21144
Client: SaLUT
Project: Midbay Island Phase I - Barren Island
Sounding: B-224B

Test Date: 29-Jul-2020 12:07
Test Depth (ft): 35.00
Test Elevation (ft): -41.56
Vane Type: Adara solid double tapered 40 x 80 mm (45°, 45°)

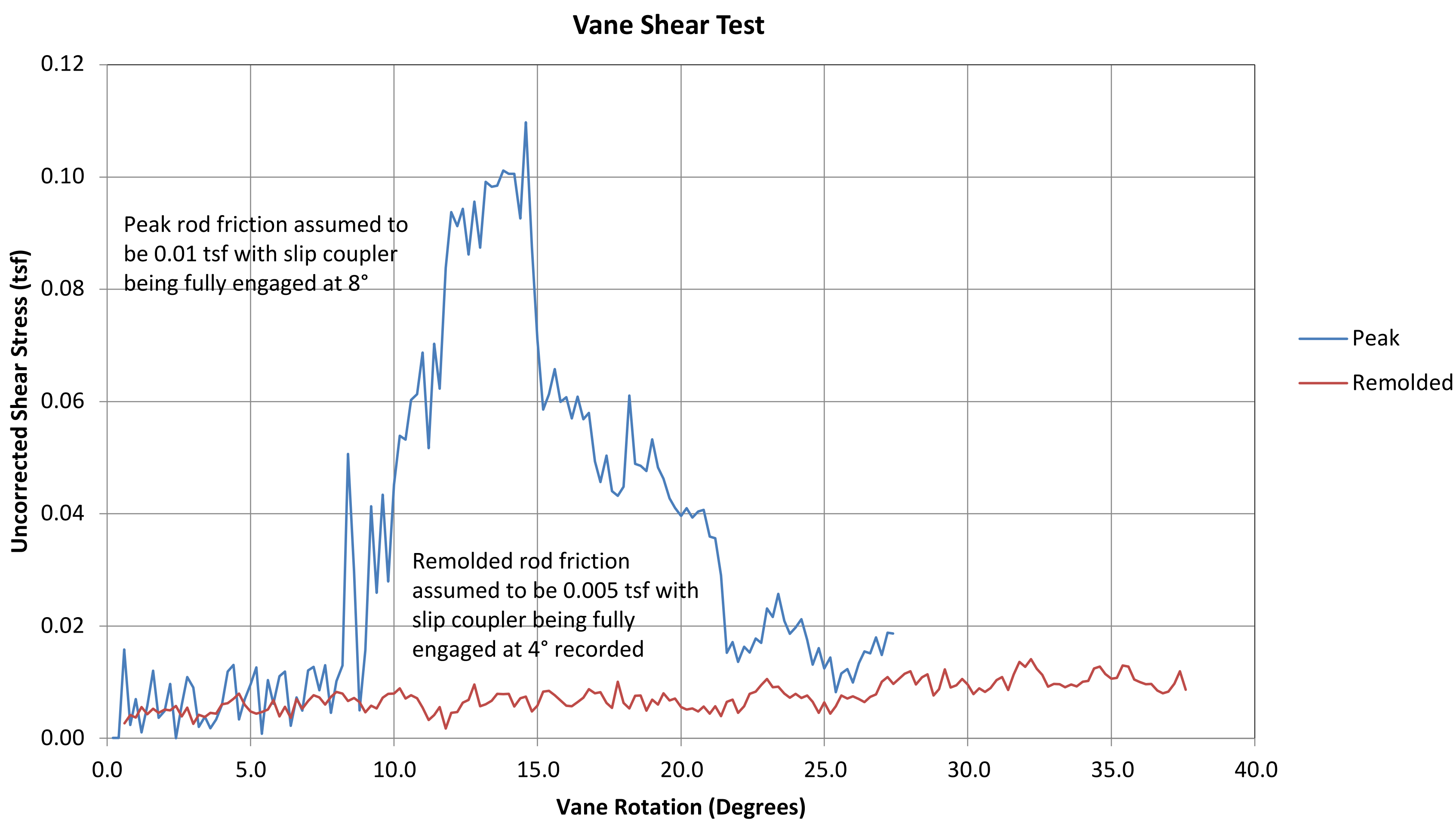
Coordinate System: Maryland State Plane
Northing (ft): 240886.8
Easting (ft): 1525286.9
Surface Elevation (ft): -6.56



Job Number: 20-54-21144
Client: SaLUT
Project: Midbay Island Phase I - Barren Island
Sounding: B-227B-1

Test Date: 29-Jul-2020 15:28
Test Depth (ft): 6.00
Test Elevation (ft): -15.46
Vane Type: Adara solid double tapered 75 x 150 mm (45°, 45°)

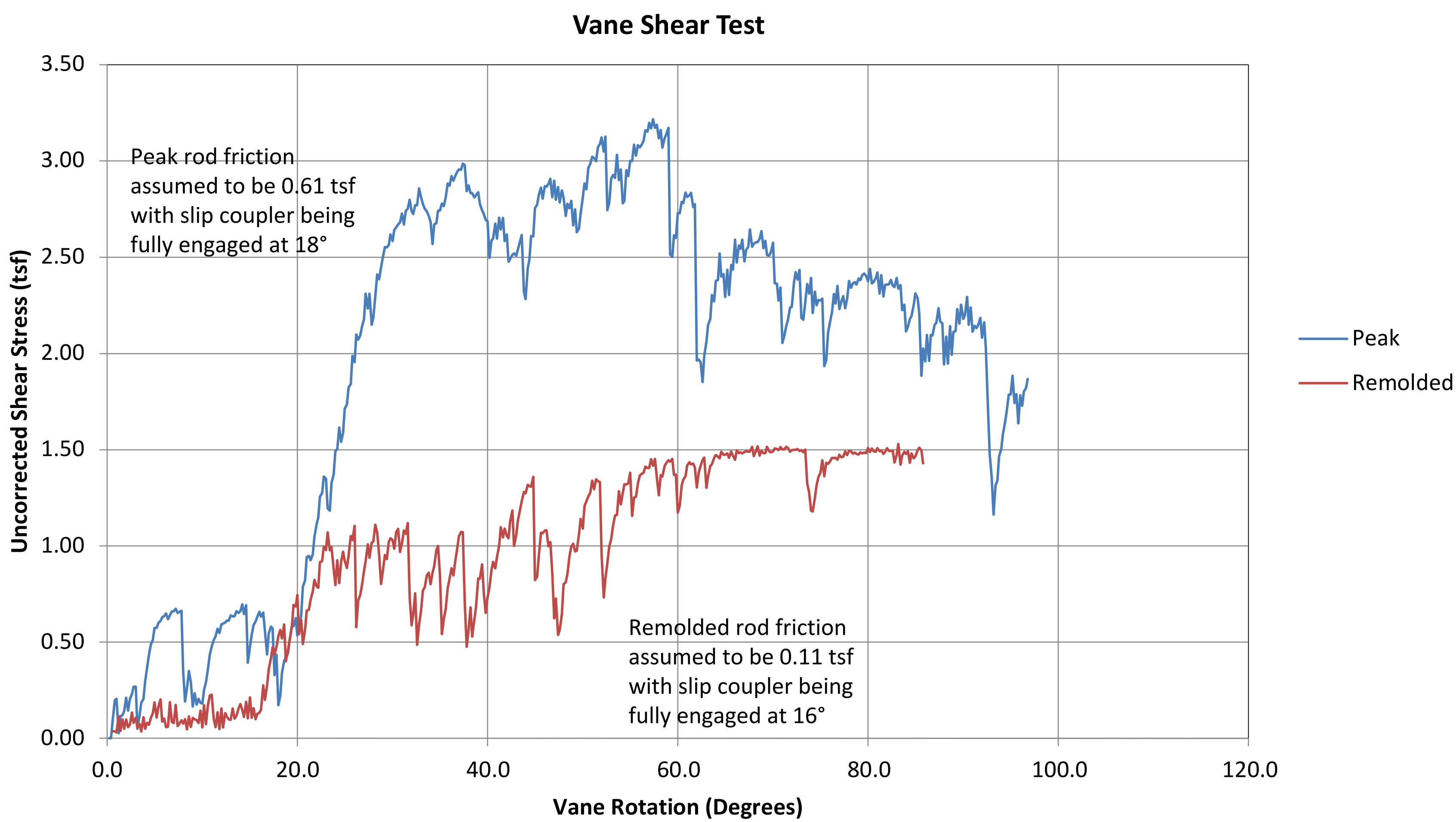
Coordinate System: Maryland State Plane
Northing (ft): 239008.6794
Easting (ft): 1524988.8677
Surface Elevation (ft): -9.46



Job Number: 20-54-21144
Client: SaLUT
Project: Midbay Island Phase I - Barren Island
Sounding: B-227B-2

Test Date: 29-Jul-2020 16:27
Test Depth (ft): 30.00
Test Elevation (ft): -39.46
Vane Type: Adara solid double tapered 40 x 80 mm (45°, 45°)

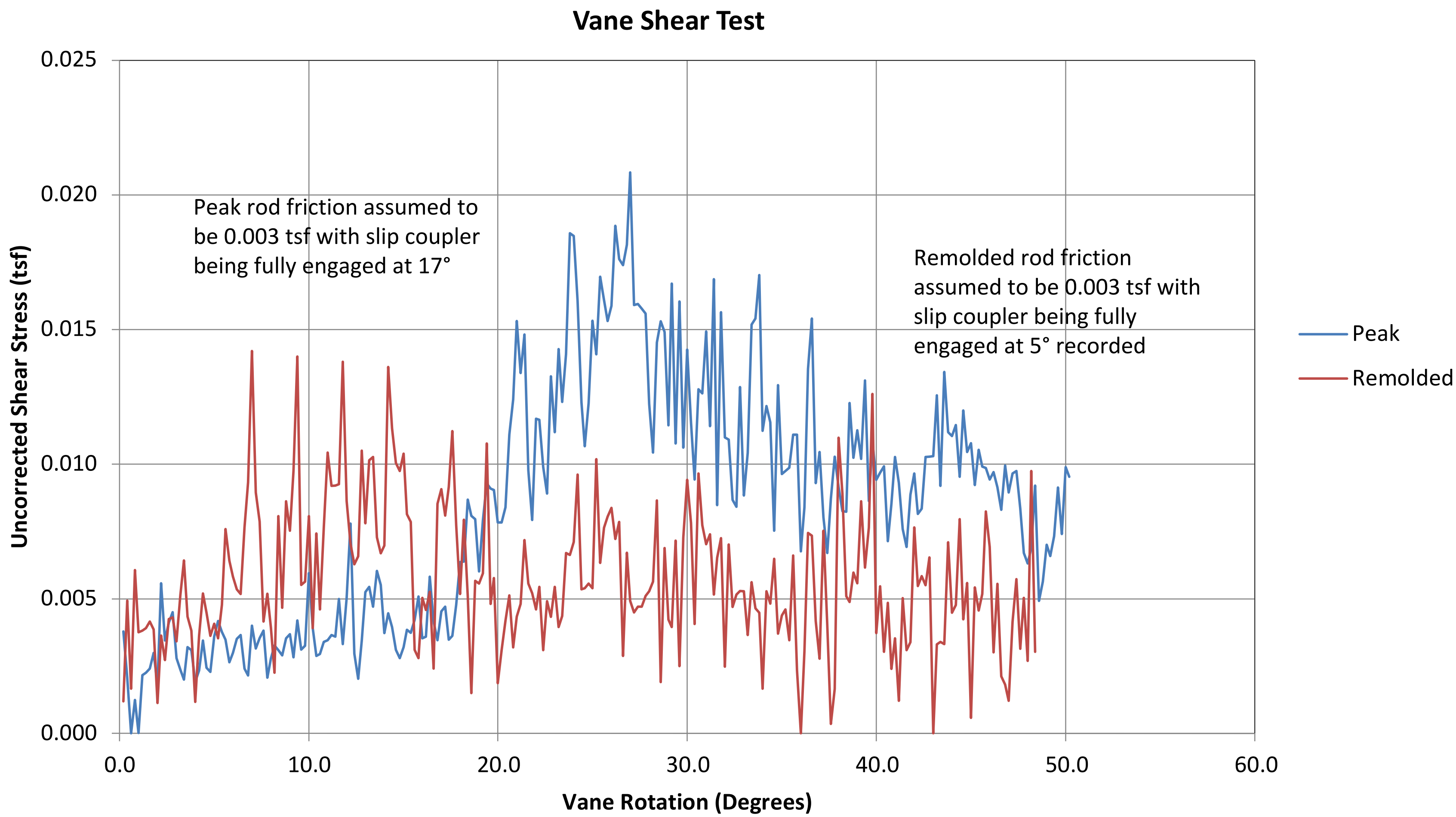
Coordinate System: Maryland State Plane
Northing (ft): 239008.6794
Easting (ft): 1524988.8677
Surface Elevation (ft): -9.46



Job Number: 20-54-21144
Client: SaLUT
Project: Midbay Island Phase I - Barren Island
Sounding: B-230B-1

Test Date: 30-Jul-2020 08:42
Test Depth (ft): 4.00
Test Elevation (ft): -10.39
Vane Type: Adara solid double tapered 75 x 150 mm (45°, 45°)

Coordinate System: Maryland State Plane
Northing (ft): 238457.8886
Easting (ft): 1526682.5478
Surface Elevation (ft): -6.39

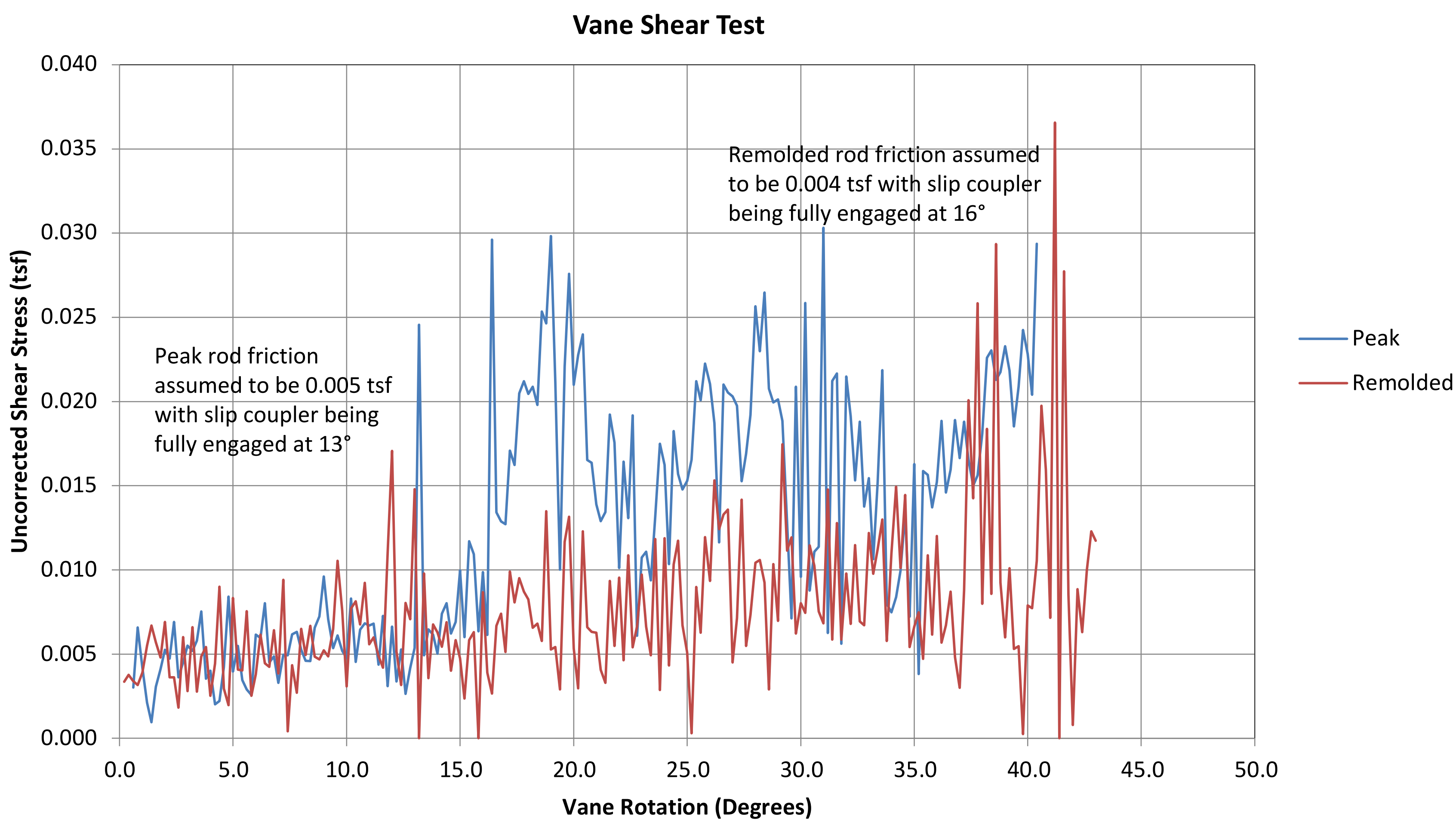


CONETEC

Job Number: 20-54-21144
Client: SaLUT
Project: Midbay Island Phase I - Barren Island
Sounding: B-230B-2

Test Date: 30-Jul-2020 09:39
Test Depth (ft): 14.00
Test Elevation (ft): -20.39
Vane Type: Adara solid double tapered 75 x 150 mm (45°, 45°)

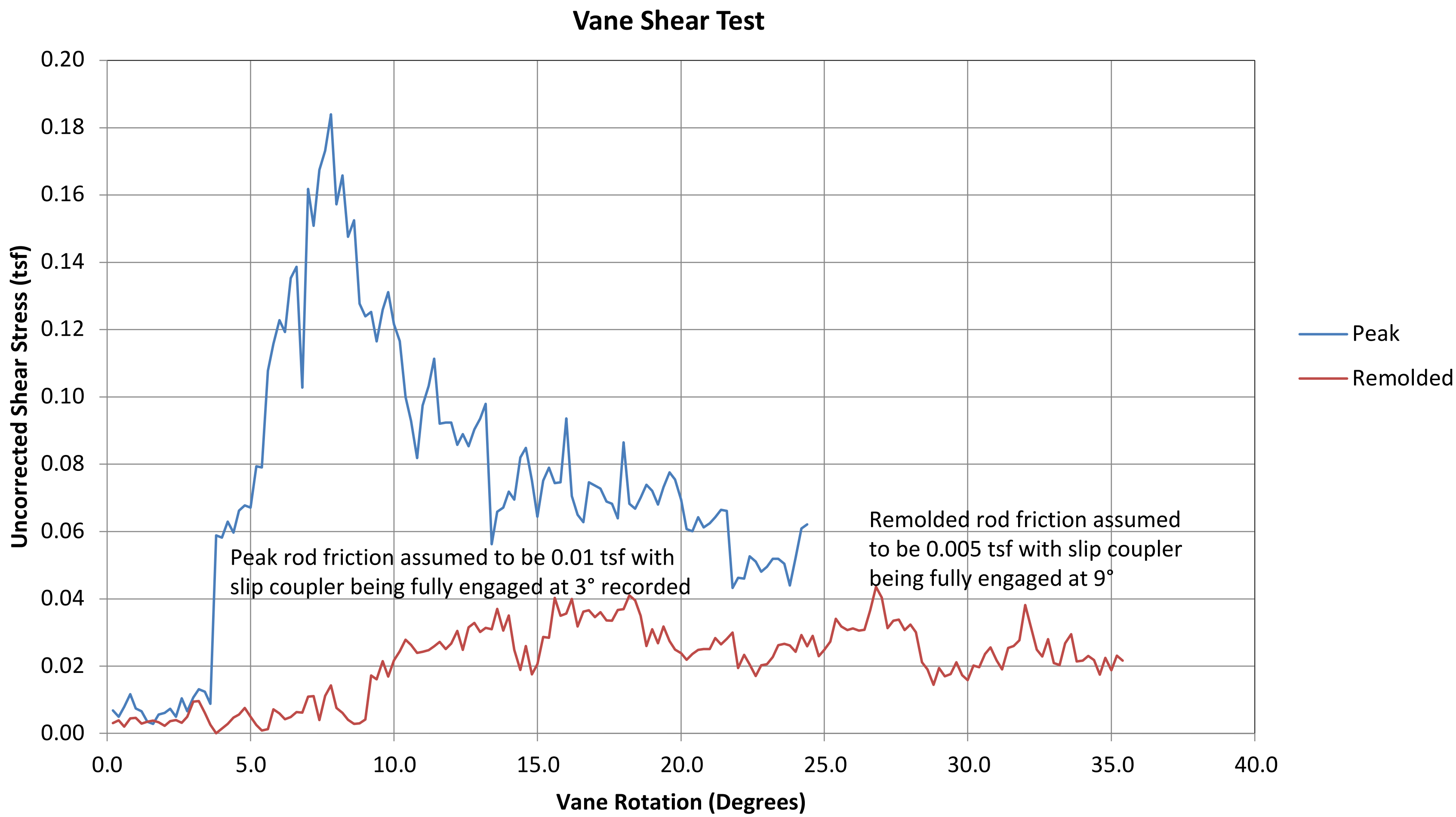
Coordinate System: Maryland State Plane
Northing (ft): 238457.8886
Easting (ft): 1526682.5478
Surface Elevation (ft): -6.39



Job Number: 20-54-21144
Client: SaLUT
Project: Midbay Island Phase I - Barren Island
Sounding: B-232B

Test Date: 29-Jul-2020 14:05
Test Depth (ft): 13.00
Test Elevation (ft): -20.06
Vane Type: Adara solid double tapered 75 x 150 mm (45°, 45°)

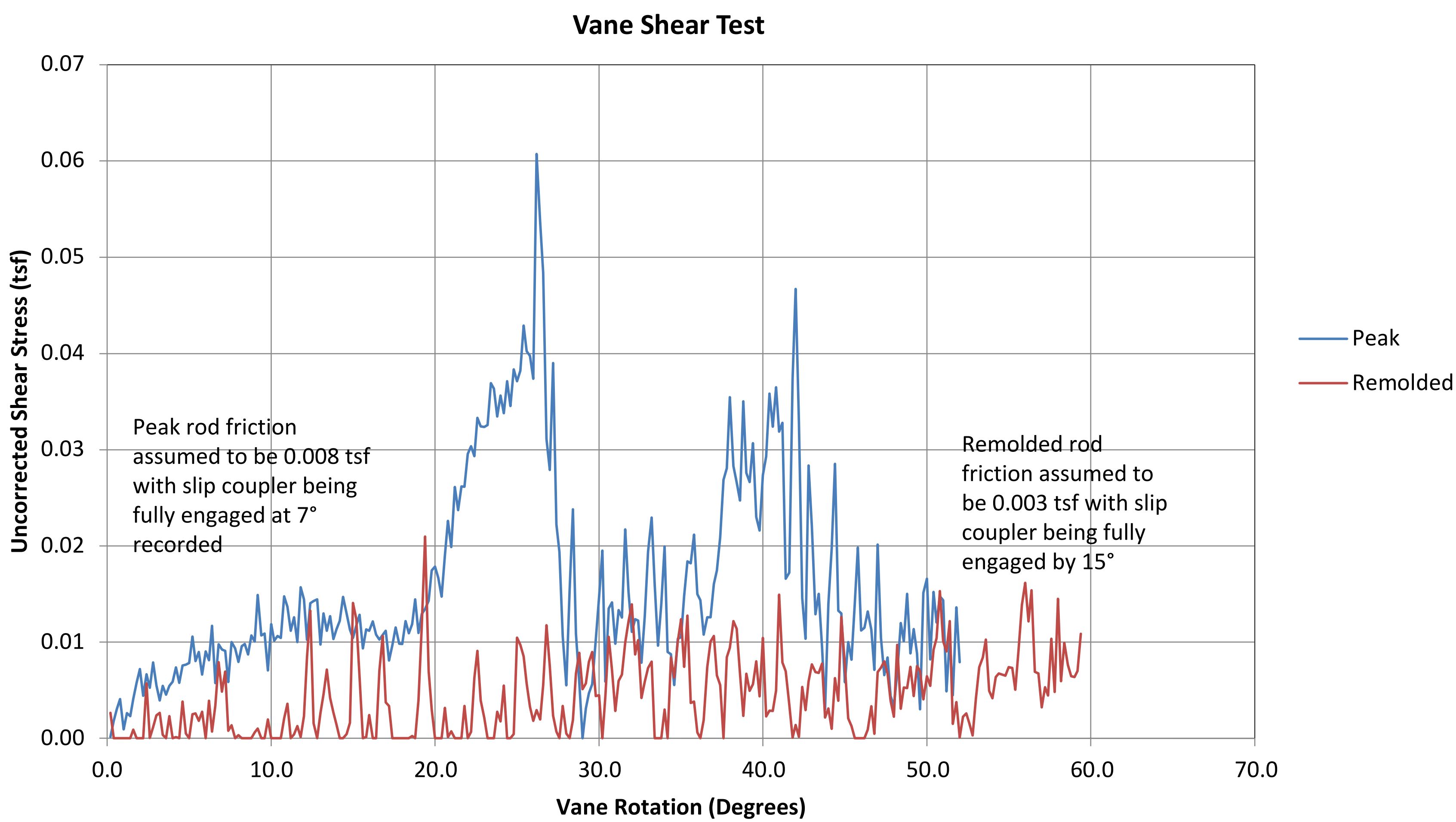
Coordinate System: Maryland State Plane
Northing (ft): 237577.573
Easting (ft): 1527172.545
Surface Elevation (ft): -7.06



Job Number: 20-54-21144
Client: SaLUT
Project: Midbay Island Phase I - Barren Island
Sounding: B-244B

Test Date: 31-Jul-2020 08:38
Test Depth (ft): 7.00
Test Elevation (ft): -12.11
Vane Type: Adara solid double tapered 75 x 150 mm (45°, 45°)

Coordinate System: Maryland State Plane
Northing (ft): 234036.9502
Easting (ft): 1531418.3156
Surface Elevation (ft): -5.11

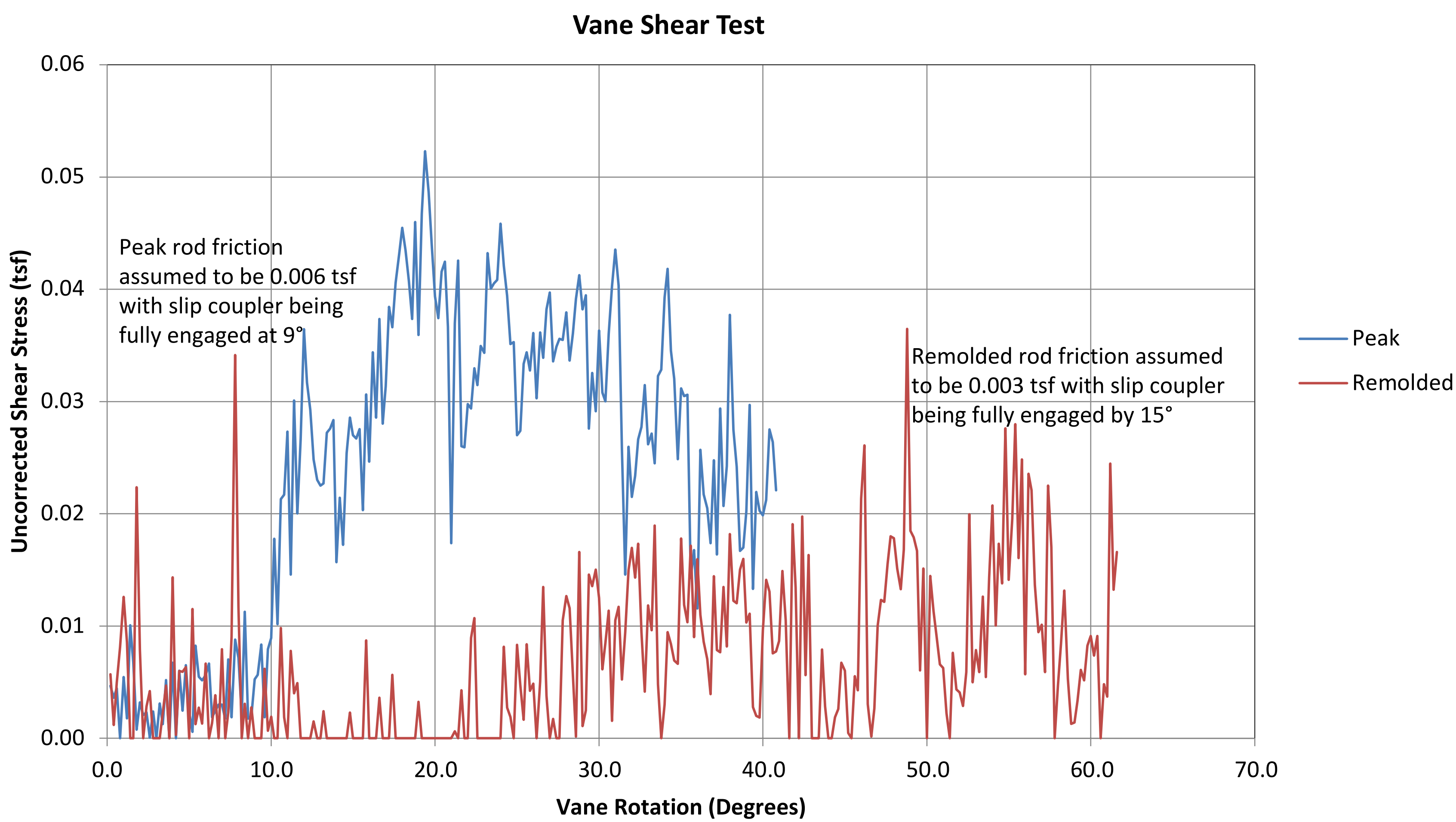


CONETEC

Job Number: 20-54-21144
Client: SaLUT
Project: Midbay Island Phase I - Barren Island
Sounding: B-246B

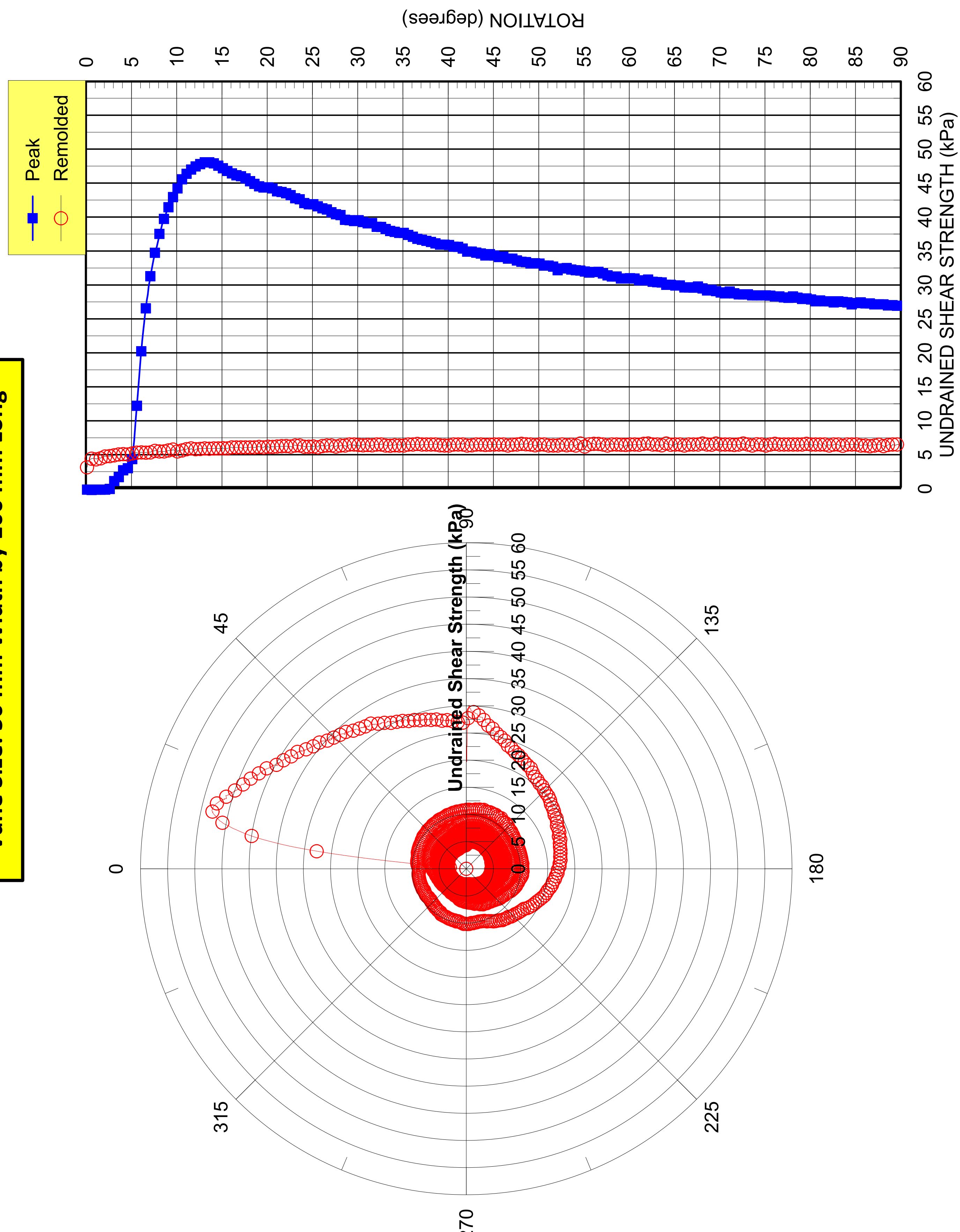
Test Date: 30-Jul-2020 10:47
Test Depth (ft): 7.00
Test Elevation (ft): -12.11
Vane Type: Adara solid double tapered 75 x 150 mm (45°, 45°)

Coordinate System: Maryland State Plane
Northing (ft): 239821.1604
Easting (ft): 1526181.983
Surface Elevation (ft): -5.11

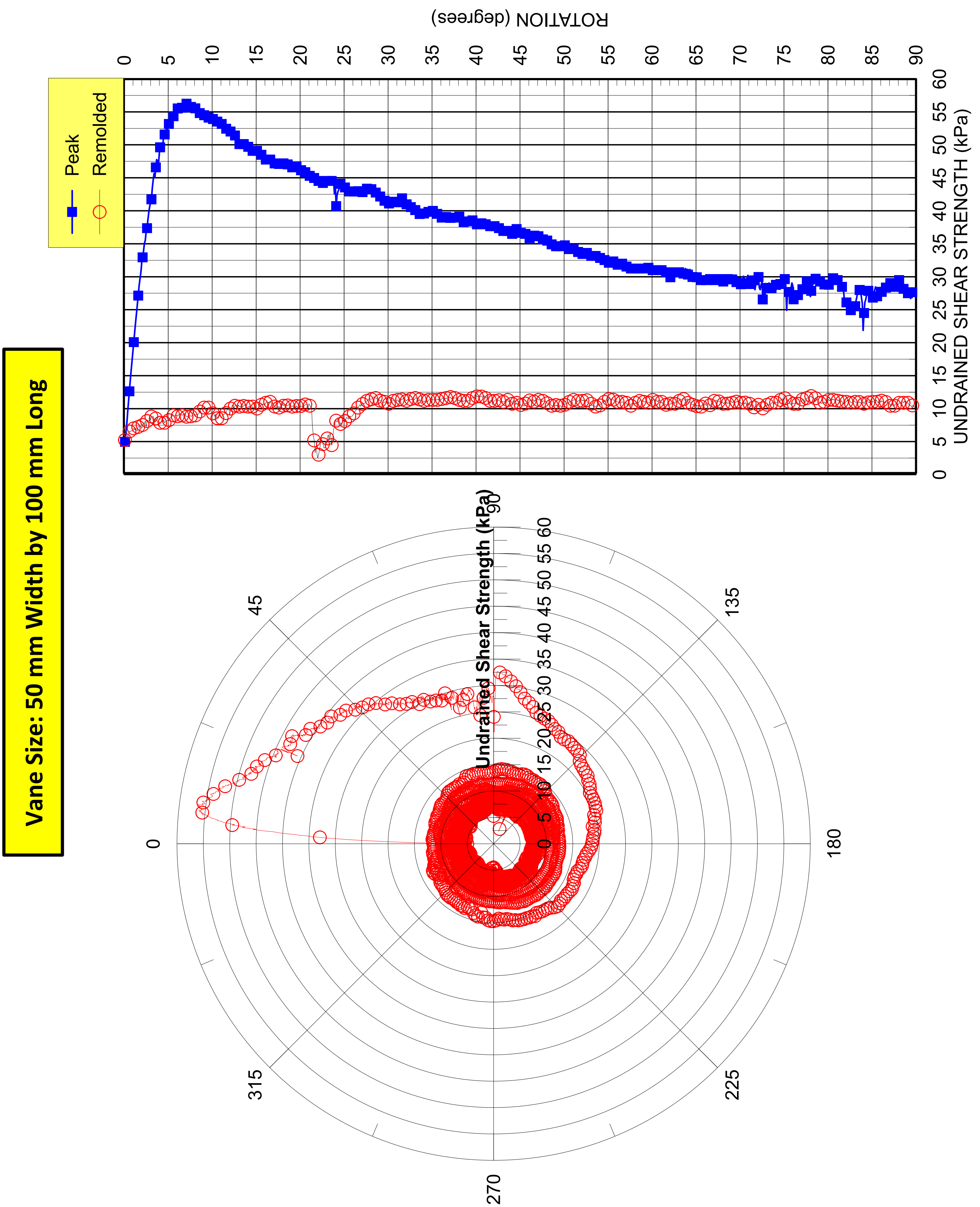


PROJECT: Barren Island **LOCATION:** Barren Island, Maryland	**IN-SITU SOIL TESTING, L.C.** **ENGINEER: R. Failmezger** **SOUNDING DATE: 2/10/2021**	**SOUNDING** **B-302**
VANE SHEAR TEST RESULTS		Depth: 6.0 feet

Vane Size: 50 mm Width by 100 mm Long



PROJECT: Barren Island LOCATION: Barren Island, Maryland	IN-SITU SOIL TESTING, L.C. ENGINEER: R. Failmezger SOUNDING DATE: 2/10/2021	SOUNDING B-303
VANE SHEAR TEST RESULTS		Depth: 6.0 feet

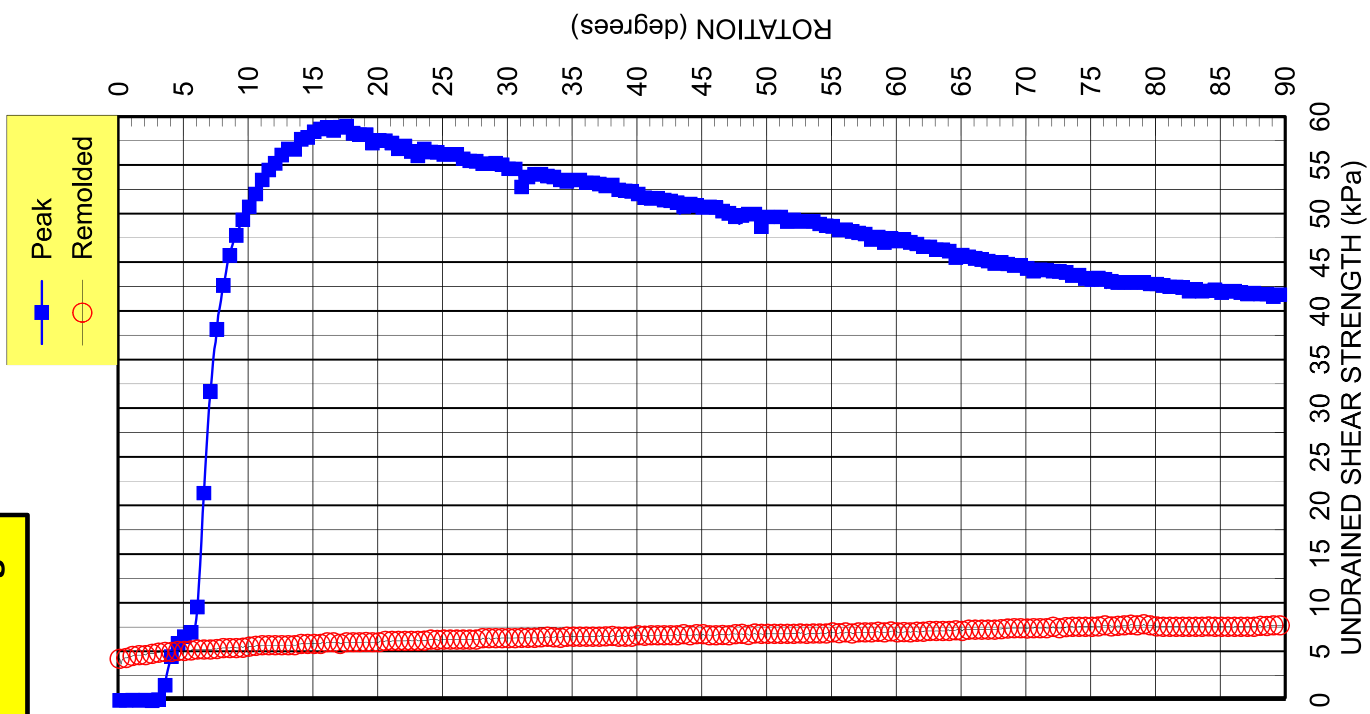


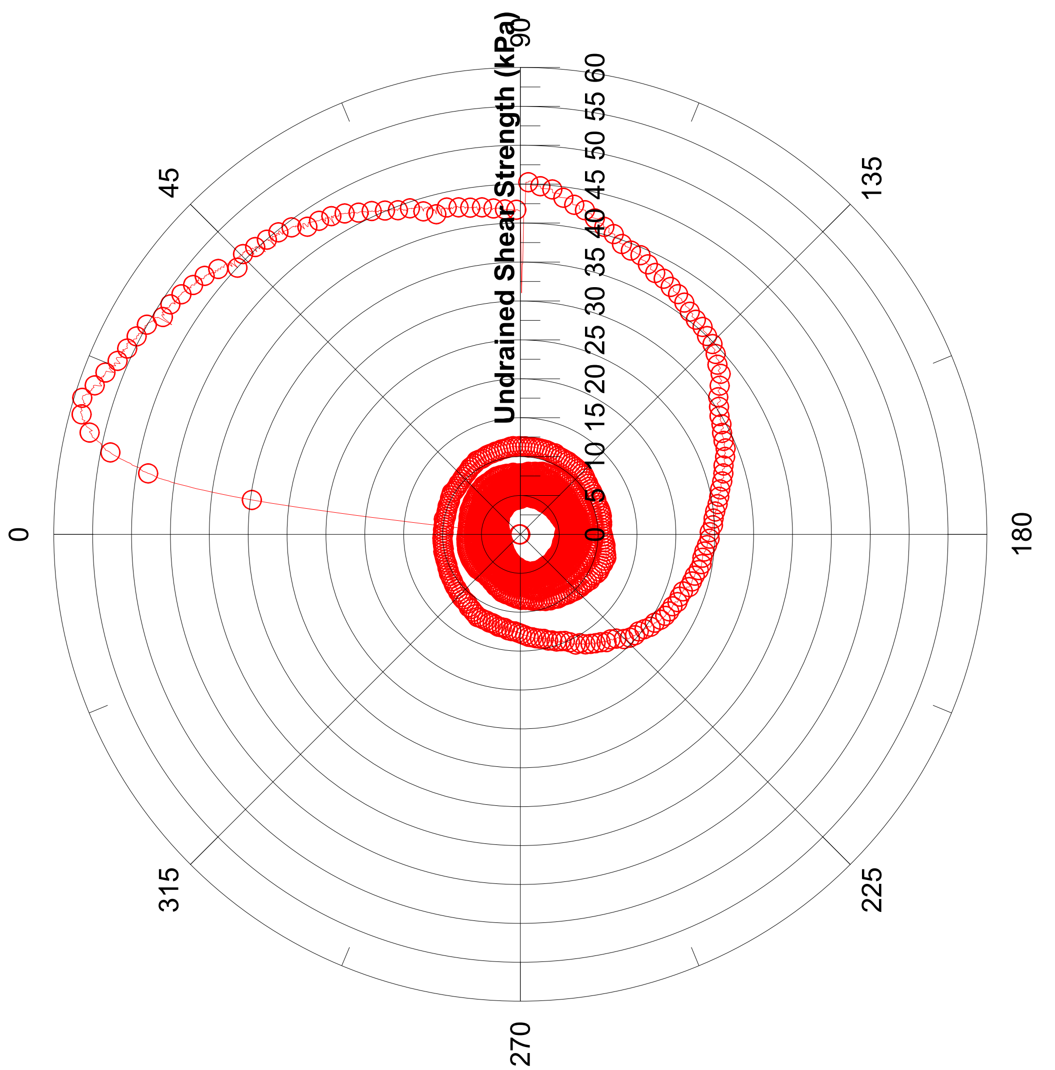
PROJECT: Barren Island LOCATION: Barren Island, Maryland	IN-SITU SOIL TESTING, L.C. ENGINEER: R. Failmezger SOUNDING DATE: 2/10/2021	SOUNDING B-304

VANE SHEAR TEST RESULTS

Depth: 4.0 feet

Vane Size: 50 mm Width by 100 mm Long



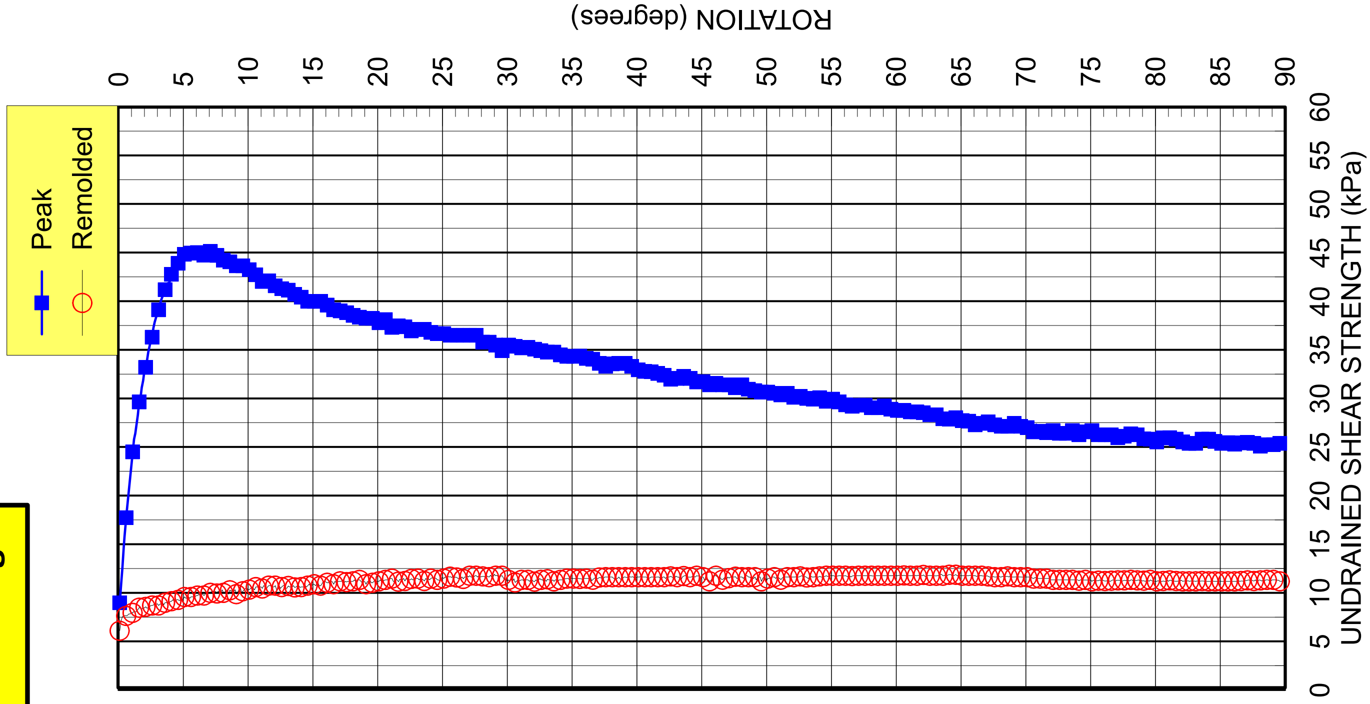


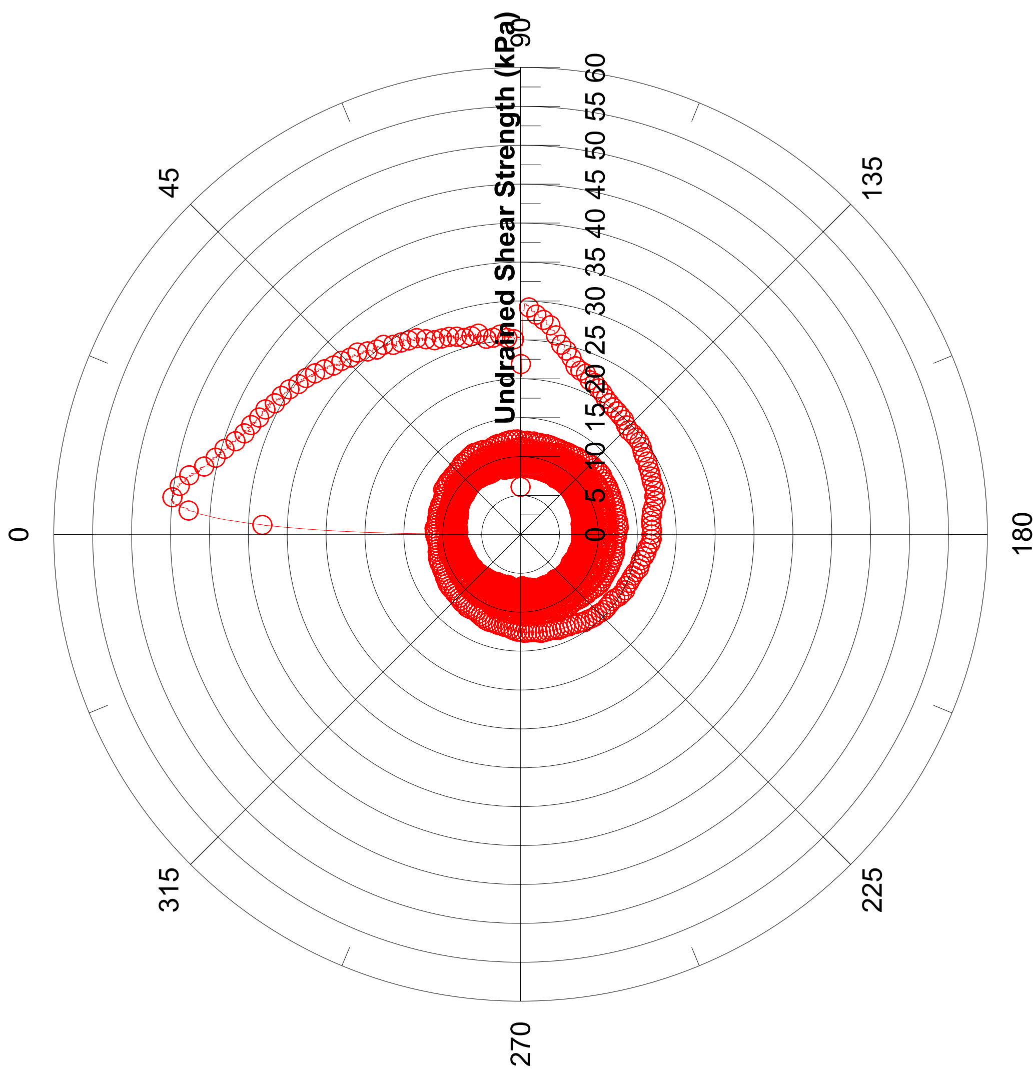
PROJECT: Barren Island LOCATION: Barren Island, Maryland	IN-SITU SOIL TESTING, L.C. ENGINEER: R. Failmezger SOUNDING DATE: 2/10/2021	SOUNDING B-305

VANE SHEAR TEST RESULTS

Depth: 10.0 feet

Vane Size: 50 mm Width by 100 mm Long





US Army Corps of Engineers ®
Baltimore District

MDOT
MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND PORT ADMINISTRATION

MARK	DESCRIPTION	DATE	APPR.

US ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
BALTIMORE, MARYLAND

ENGINEERING DIVISION

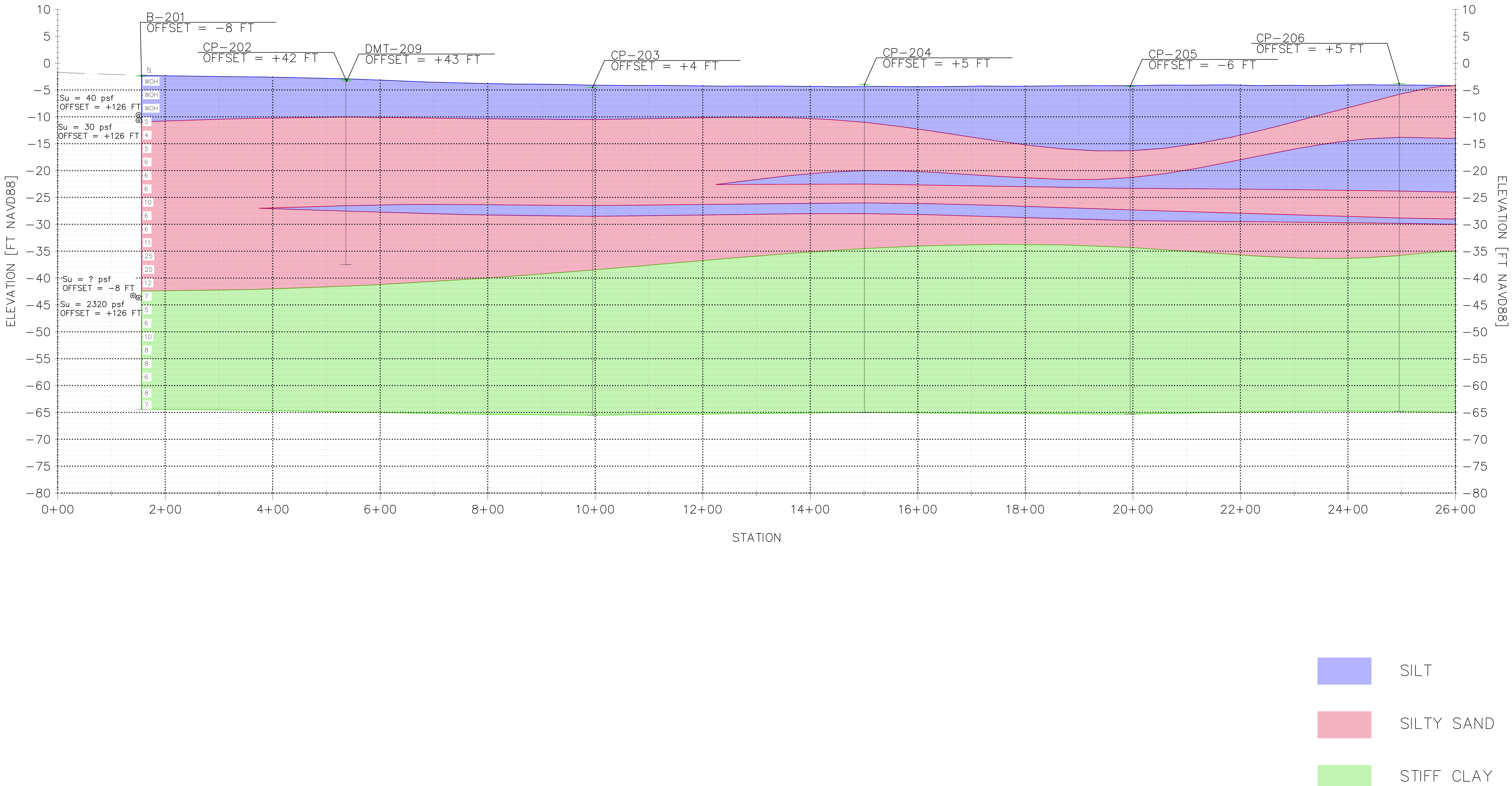
DESIGN BY:
DRAWN BY:
SBMT BY:
PLOT SCALE: 1" = 1'
SIZE: 22" x 34"
ISSUE DATE:
CKD BY:
PLOT DATE:
FILE NAME: BARRENISLANDPROFILES.DWG
SOLICITATION NO.: --
CONTRACT NO.: --
FILE / MAP NUMBER:

CHESAPEAKE BAY
MARYLAND

BARREN ISLAND
GEOLOGIC PROFILES
1 OF 9

SHEET IDENTIFICATION
B-1

BARREN ISLAND PROFILE STA. 0+00 to STA. 26+00



US Army Corps of Engineers ®
Baltimore District

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND PORT ADMINISTRATION

MARK	DESCRIPTION	DATE	APPR.

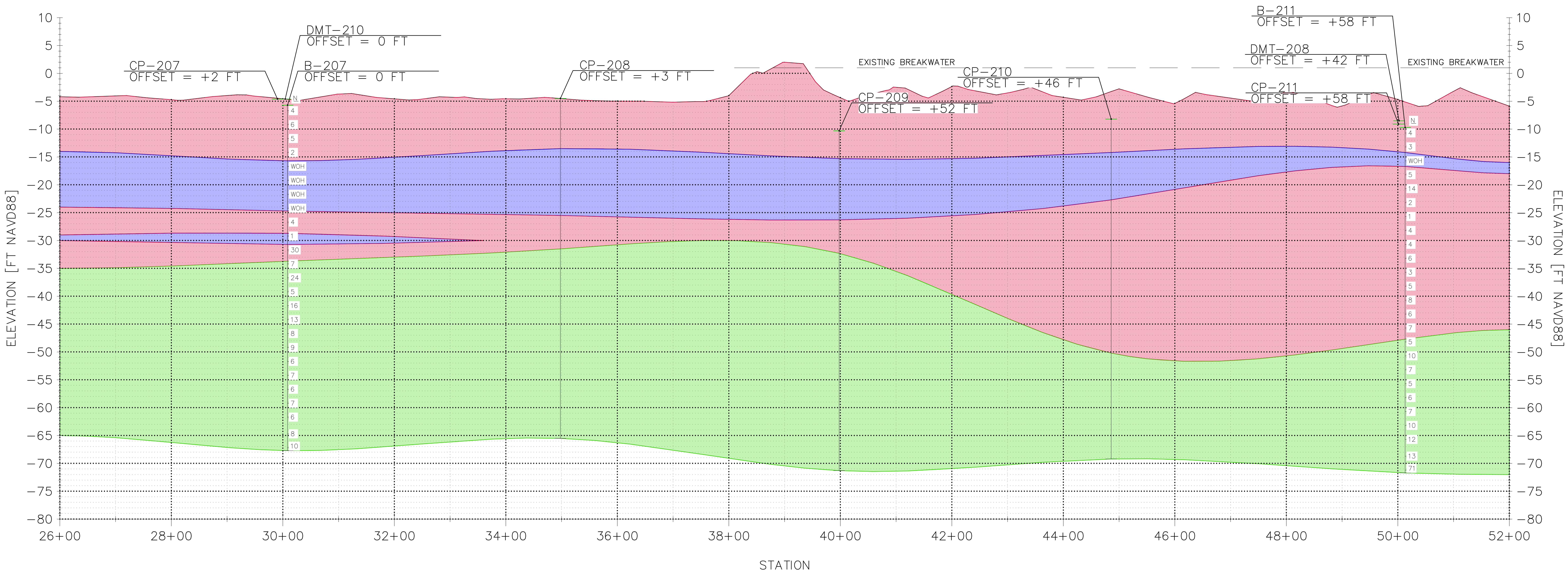
ISSUE DATE: | SOLICITATION NO.: -- | CONTRACT NO.: -- | FILE / MAP NUMBER:
DESIGN BY: | DRAWN BY: | CKD BY: | SBMT BY: | PLOT DATE: | PLOT SCALE: 1"= 1' | SIZE: 22" x 34" | FILE NAME: BARRENISLANDPROFILES.DWG

US ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
BALTIMORE, MARYLAND
ENGINEERING DIVISION

CHESAPEAKE BAY, MARYLAND
BARREN ISLAND
GEOLOGIC PROFILES
1 OF 9

SHEET IDENTIFICATION
B-1

BARREN ISLAND PROFILE STA. 26+00 to STA. 52+00



SILT

SILTY SAND

STIFF CLAY

US Army Corps of Engineers ®
Baltimore District

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND PORT ADMINISTRATION

MARK	DESCRIPTION	DATE	APPR.

ISSUE DATE: | SOLICITATION NO.: | CONTRACT NO.: | FILE / MAP NUMBER:
DESIGN BY: | DRAWN BY: | CKD BY: | SBMT BY: | PLOT DATE: | PLOT SCALE: | SIZE: 22" x 34" | FILE NAME: BARRENISLANDPROFILES.DWG

US ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
BALTIMORE, MARYLAND

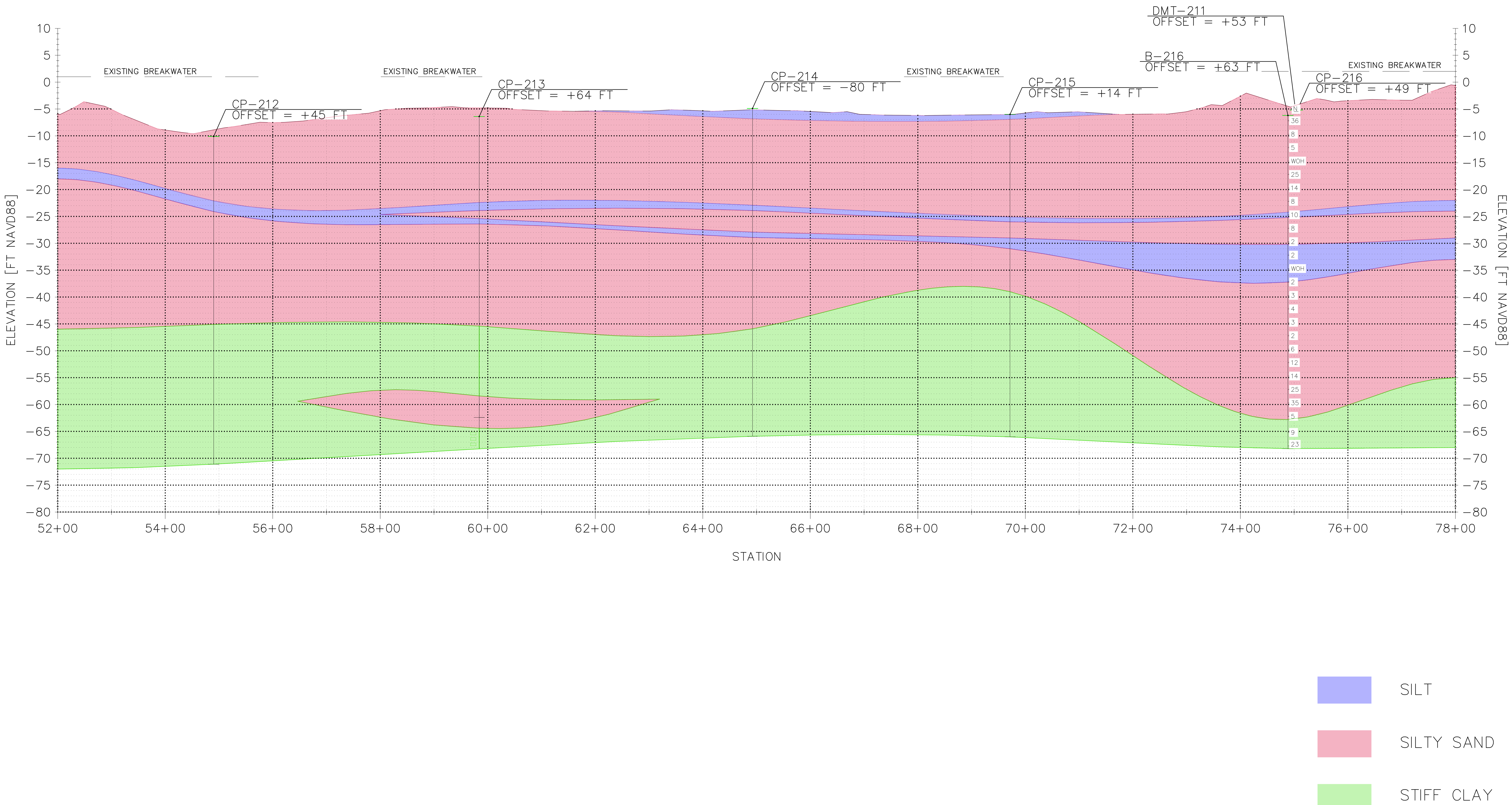
ENGINEERING DIVISION

CHESAPEAKE BAY
MARYLAND

BARREN ISLAND
GEOLOGIC PROFILES
2 OF 9

SHEET IDENTIFICATION
B-2

BARREN ISLAND PROFILE STA. 52+00 to STA. 78+00



US Army Corps of Engineers ®
Baltimore District

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND PORT ADMINISTRATION

MARK	DESCRIPTION	DATE	APPR.

DESIGN BY: | DRAWN BY: | SBMT BY: | PLOT SCALE: 1:1 | SIZE: 22" x 34"
ISSUE DATE: | SOLICITATION NO.: | CKD BY: | CONTRACT NO.: | PLOT DATE: | FILE / MAP NUMBER: | FILE NAME: BARRENISLANDPROFILES.DWG

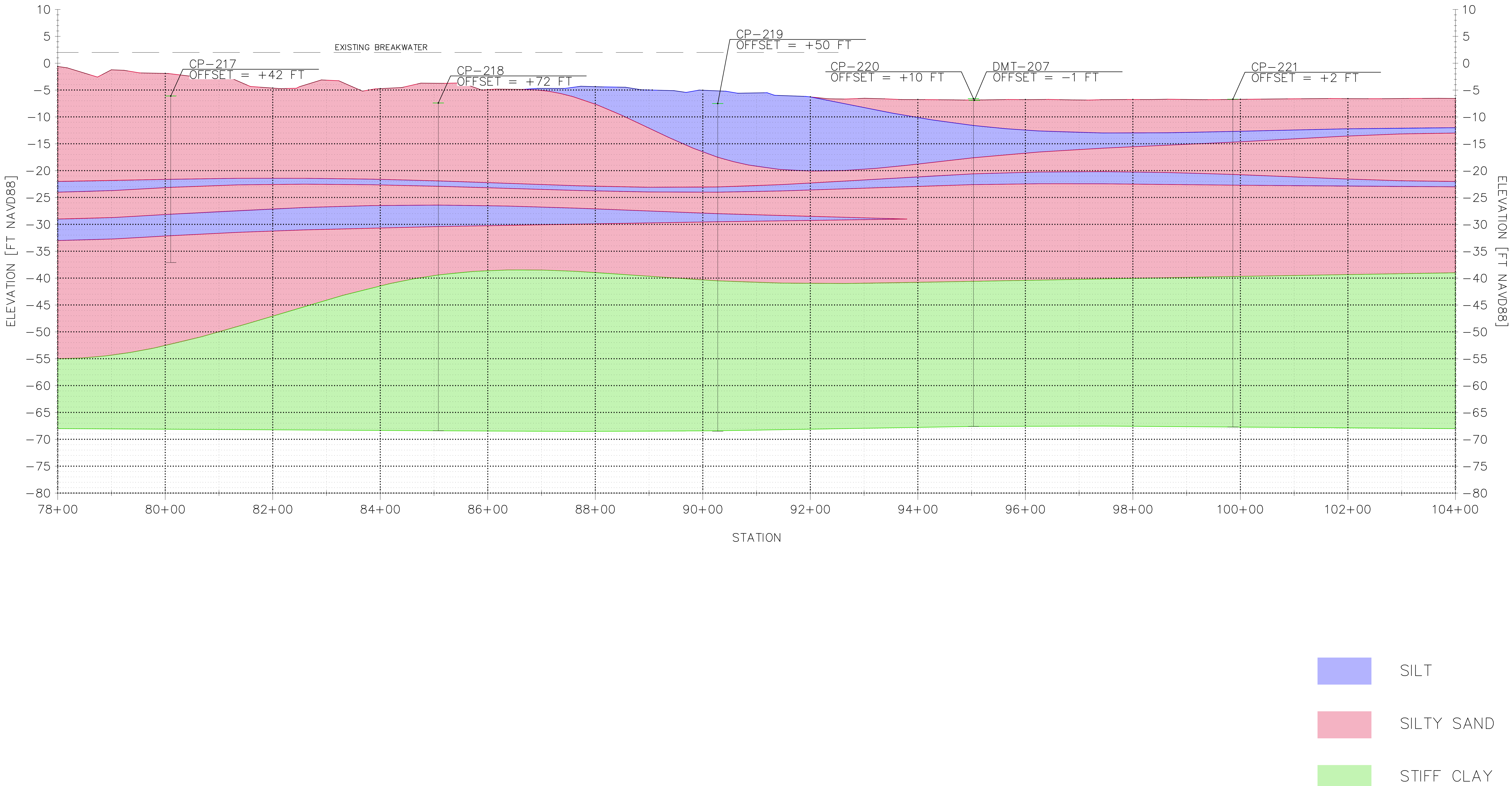
US ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
BALTIMORE, MARYLAND
ENGINEERING DIVISION

CHESAPEAKE BAY
MARYLAND

BARREN ISLAND
GEOLOGIC PROFILES
3 OF 9

SHEET IDENTIFICATION
B-3

BARREN ISLAND PROFILE STA. 78+00 to STA. 104+00



US Army Corps of Engineers ®
Baltimore District

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND PORT ADMINISTRATION

MARK	DESCRIPTION	DATE	APPR.

DESIGN BY: | DRAWN BY: | SBMT BY: | PLOT SCALE: 1" = 1" | SIZE: 22" x 34"
CKD BY: | PLOT DATE: | FILE NAME: BARRENISLANDPROFILES.DWG
ISSUE DATE: | SOLICITATION NO.: | CONTRACT NO.: | FILE / MAP NUMBER:

US ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
BALTIMORE, MARYLAND

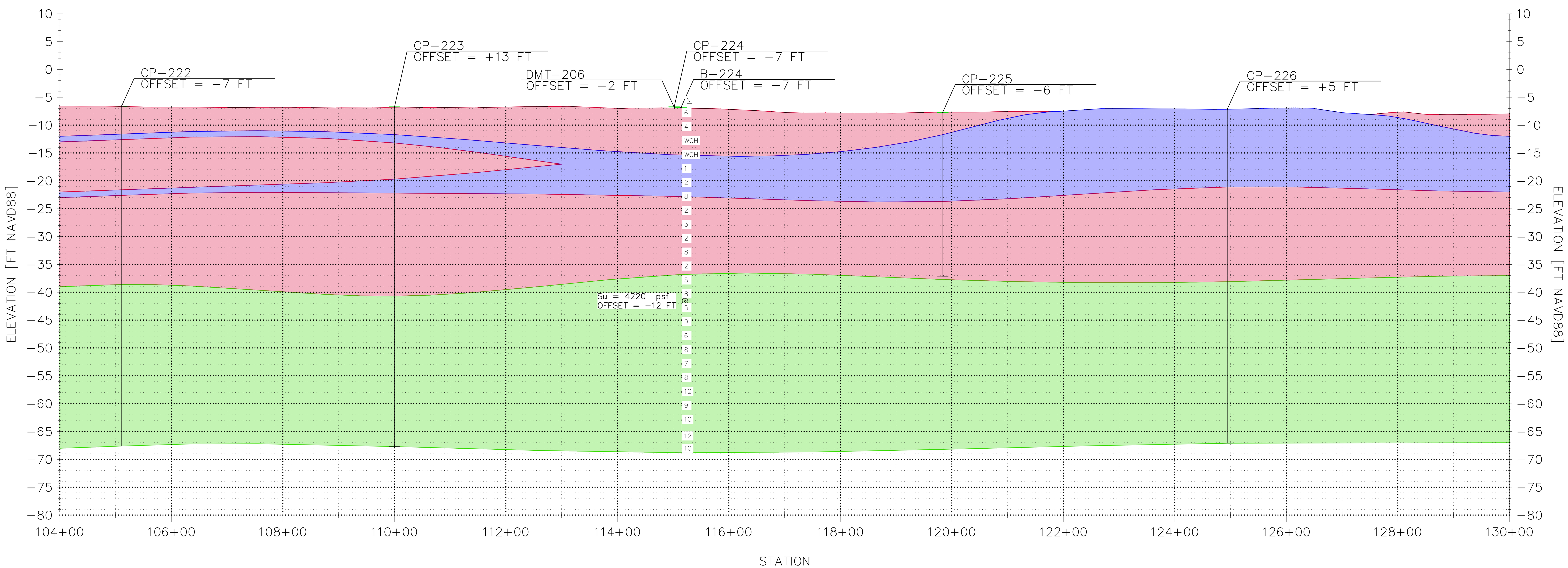
ENGINEERING DIVISION

CHESAPEAKE BAY — MARYLAND

BARREN ISLAND
GEOLOGIC PROFILES
4 OF 9

SHEET IDENTIFICATION
B-4

BARREN ISLAND PROFILE STA. 104+00 to STA. 130+00



SILT

SILTY SAND

STIFF CLAY

US Army Corps of Engineers ®
Baltimore District

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND PORT ADMINISTRATION

MARK	DESCRIPTION	DATE	APPR.

DESIGN BY:	ISSUE DATE:
DRAWN BY:	CKD BY:
SBMT BY:	PLOT DATE:
PLOT SCALE: 1" = 1'	SOLICITATION NO.:
SIZE: 22" x 34"	CONTRACT NO.:
FILE NAME: BARRENISLANDPROFILES.DWG	FILE / MAP NUMBER:

US ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
BALTIMORE, MARYLAND

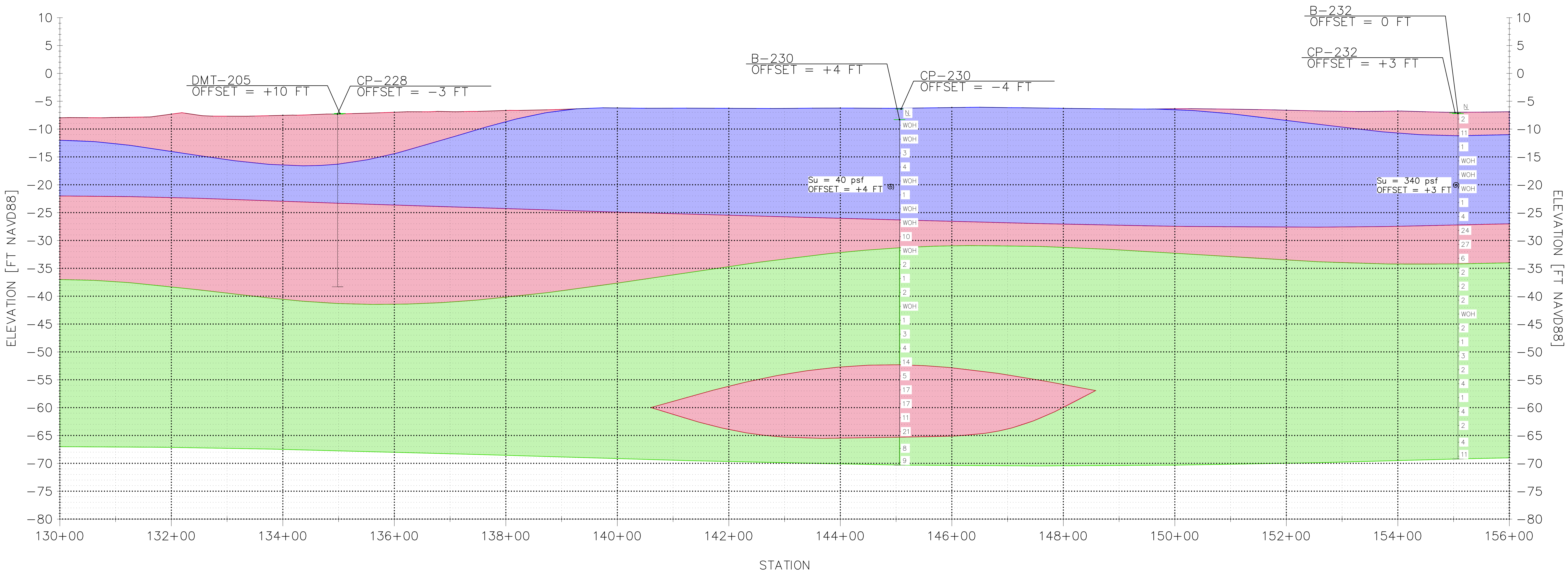
ENGINEERING DIVISION

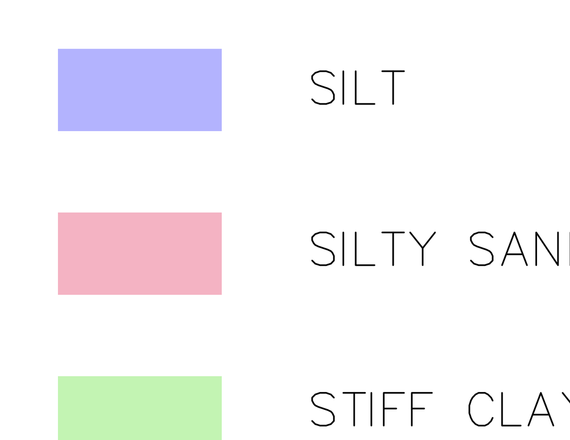
CHESAPEAKE BAY MARYLAND

BARREN ISLAND
GEOLOGIC PROFILES
5 OF 9

SHEET IDENTIFICATION
B-5

BARREN ISLAND PROFILE STA. 130+00 to STA. 156+00





US Army Corps of Engineers ®
Baltimore District

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND PORT ADMINISTRATION

MARK | DATE | DESCRIPTION | APPR.

DESIGN BY: | DRAWN BY: | CKD BY: | ISSUE DATE: | SOLICITATION NO.: | CONTRACT NO.: | FILE / MAP NUMBER:
SBMT BY: | PLOT SCALE: 1"=1' | PLOT DATE: | SIZE: 22" x 34" | FILE NAME: BARRENISLANDPROFILES.DWG

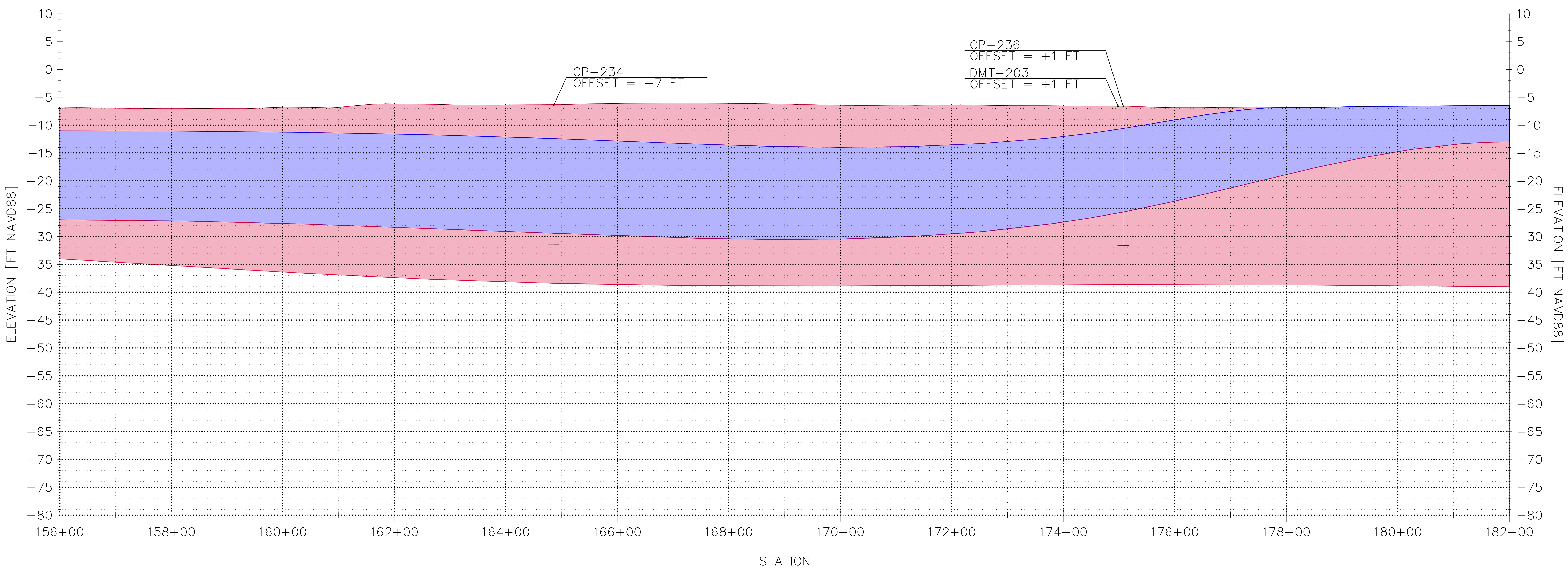
US ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
BALTIMORE, MARYLAND
ENGINEERING DIVISION

CHESAPEAKE BAY
MARYLAND

BARREN ISLAND
GEOLOGIC PROFILES
6 OF 9

SHEET IDENTIFICATION
B-6

BARREN ISLAND PROFILE STA. 156+00 to STA. 182+00



US Army Corps of Engineers ®
Baltimore District

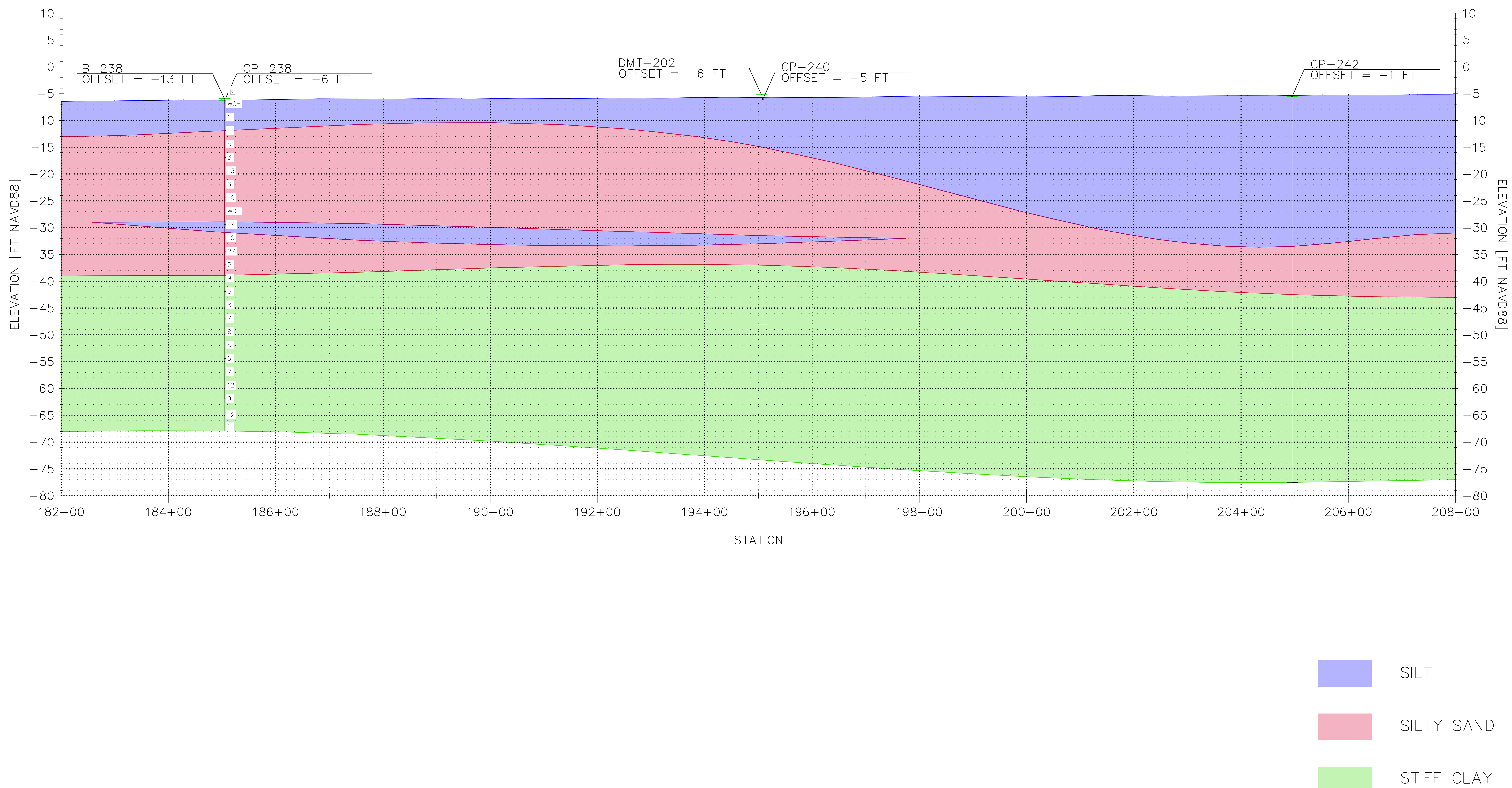
MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND PORT ADMINISTRATION

US ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
BALTIMORE, MARYLAND
ENGINEERING DIVISION

CHESAPEAKE BAY MARYLAND
BARREN ISLAND
GEOLOGIC PROFILES
7 OF 9

SHEET IDENTIFICATION
B-7

BARREN ISLAND PROFILE STA. 182+00 to STA. 208+00



US Army Corps of Engineers ®
Baltimore District

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND PORT ADMINISTRATION

MARK	DESCRIPTION	DATE	APPR.

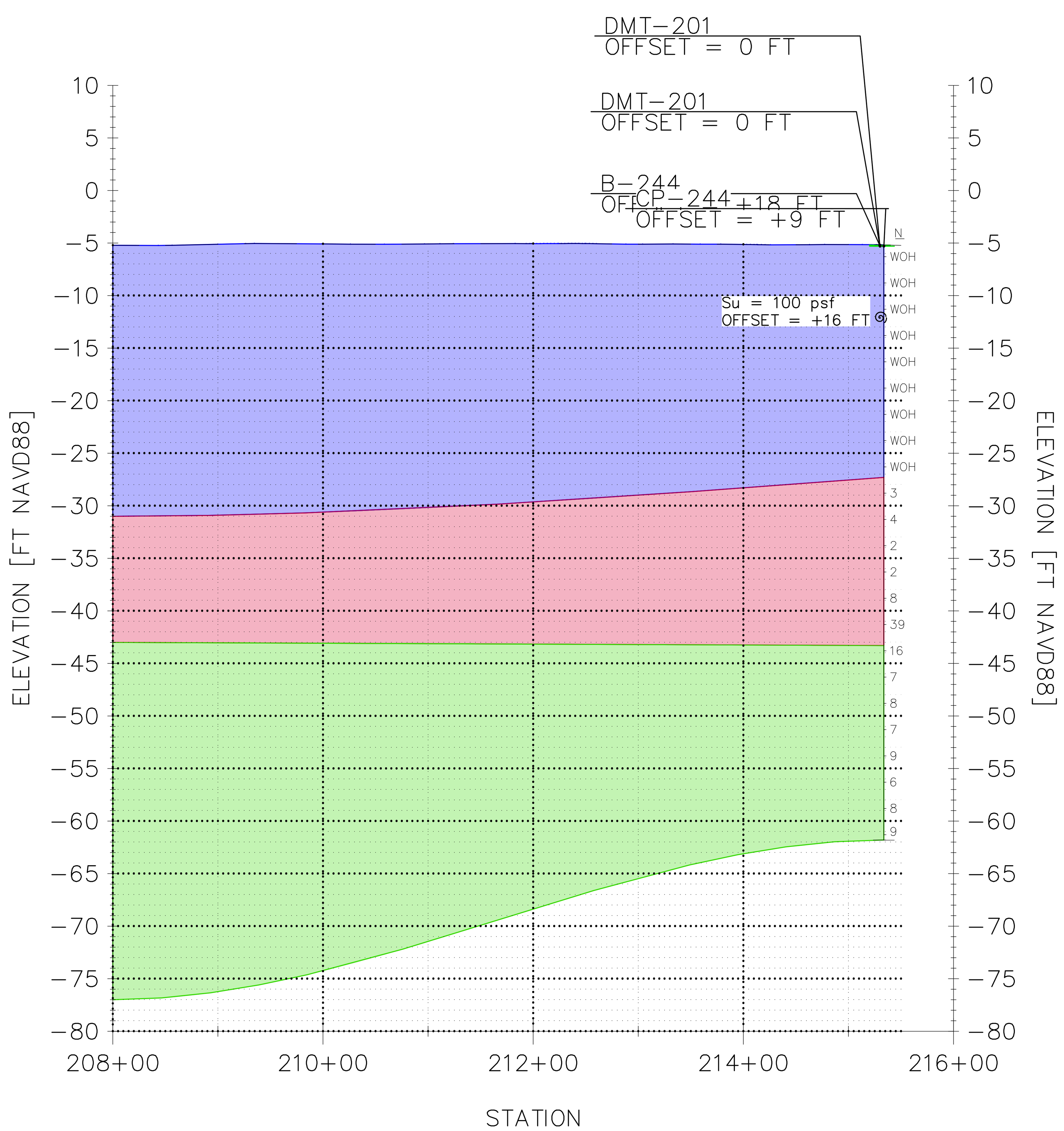
DESIGN BY: | DRAWN BY: | SBMT BY: | PLOT SCALE: | SIZE: 22" x 34"
ISSUE DATE: | SOLICITATION NO.: | CONTRACT NO.: | FILE / MAP NUMBER:
CKD BY: | PLOT DATE: | FILE NAME: BARRENISLANDPROFILES.DWG

US ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
BALTIMORE, MARYLAND
ENGINEERING DIVISION

CHESAPEAKE BAY MARYLAND
BARREN ISLAND
GEOLOGIC PROFILES
8 OF 9

SHEET IDENTIFICATION
B-8

BARREN ISLAND PROFILE STA. 208+00 to STA. 216+00



SILT

SILTY SAND

STIFF CLAY

US Army Corps of Engineers ®
Baltimore District

MDOT
MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND PORT ADMINISTRATION

MARK	DESCRIPTION	DATE	APPR.

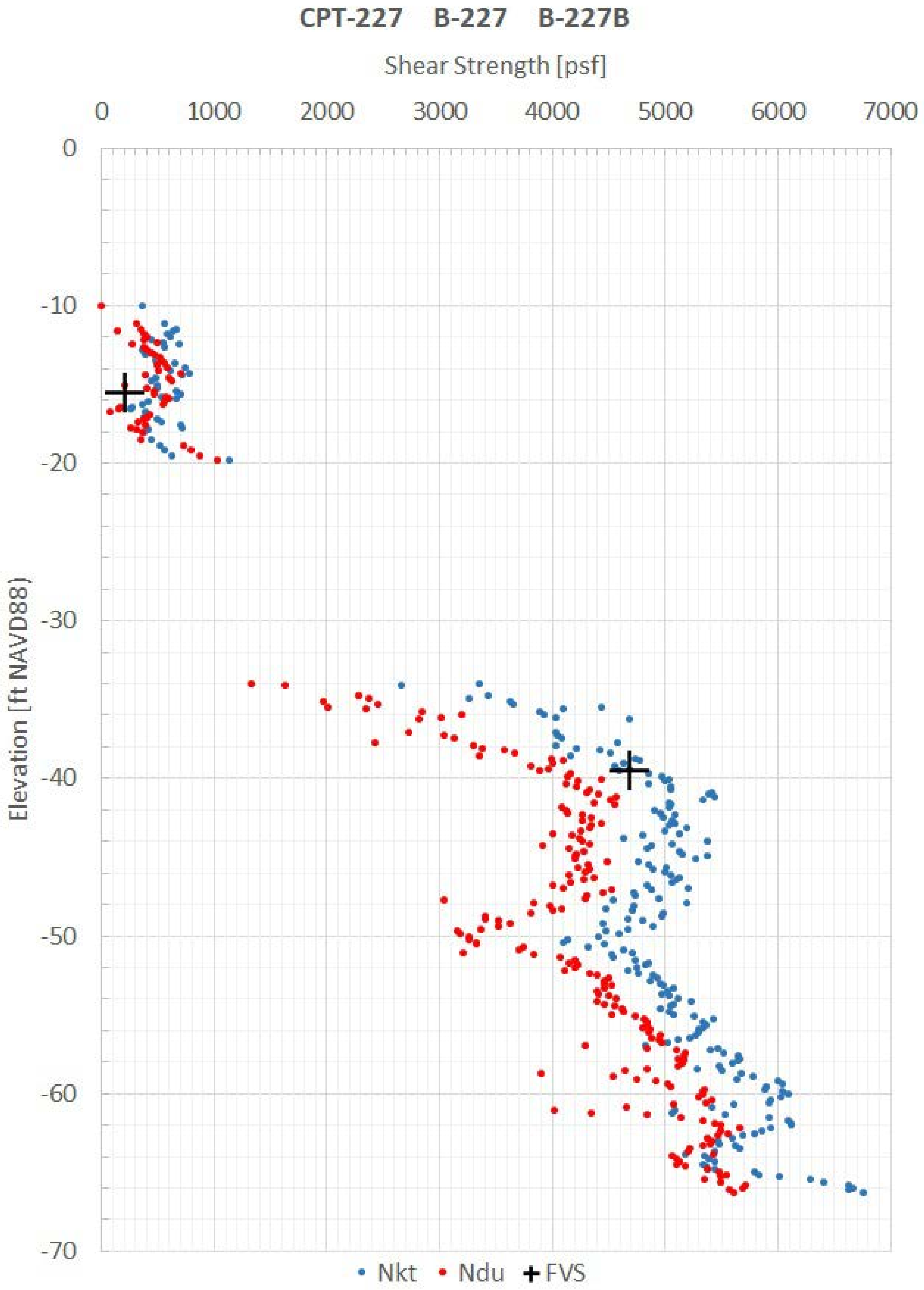
ISSUE DATE: | SOLICITATION NO.: | CONTRACT NO.: | FILE / MAP NUMBER:
DESIGN BY: | DRAWN BY: | CKD BY: | SBMT BY: | PLOT DATE: | PLOT SCALE: | SIZE: 22" x 34" | FILE NAME: BARRENISLANDPROFILES.DWG

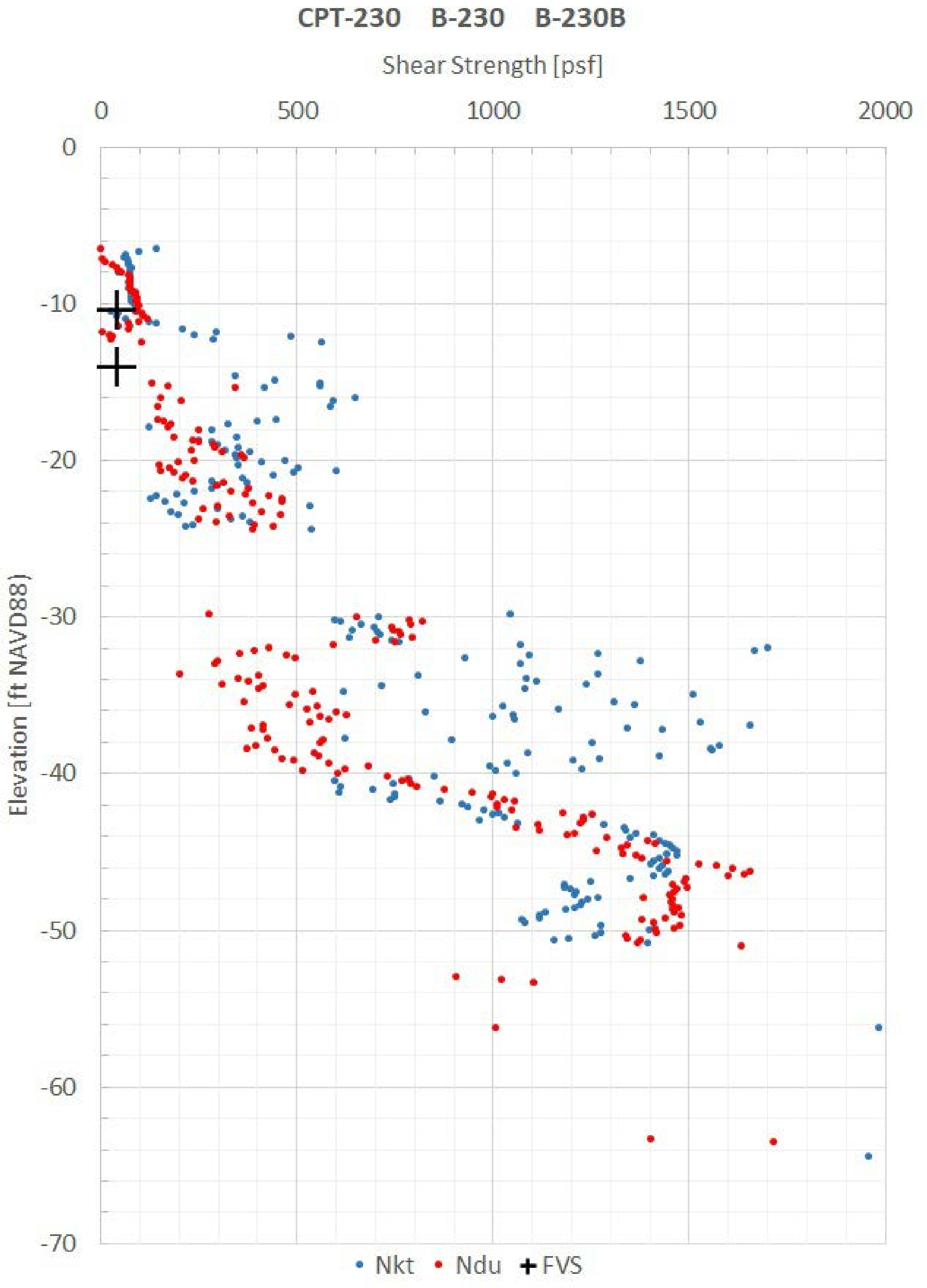
US ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
BALTIMORE, MARYLAND
ENGINEERING DIVISION

CHESAPEAKE BAY
MARYLAND
BARREN ISLAND
GEOLOGIC PROFILES
9 OF 9

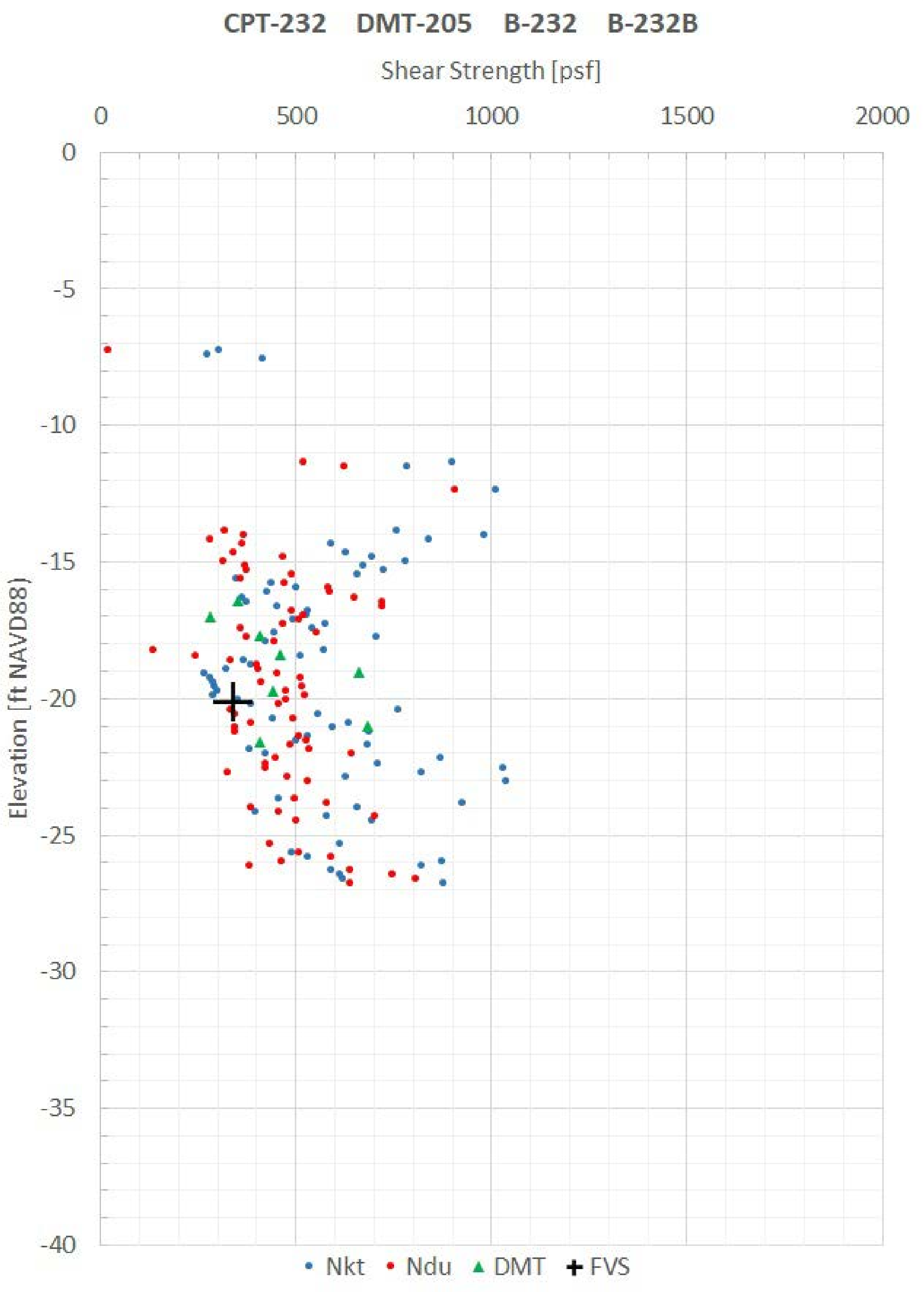
SHEET IDENTIFICATION
B-9

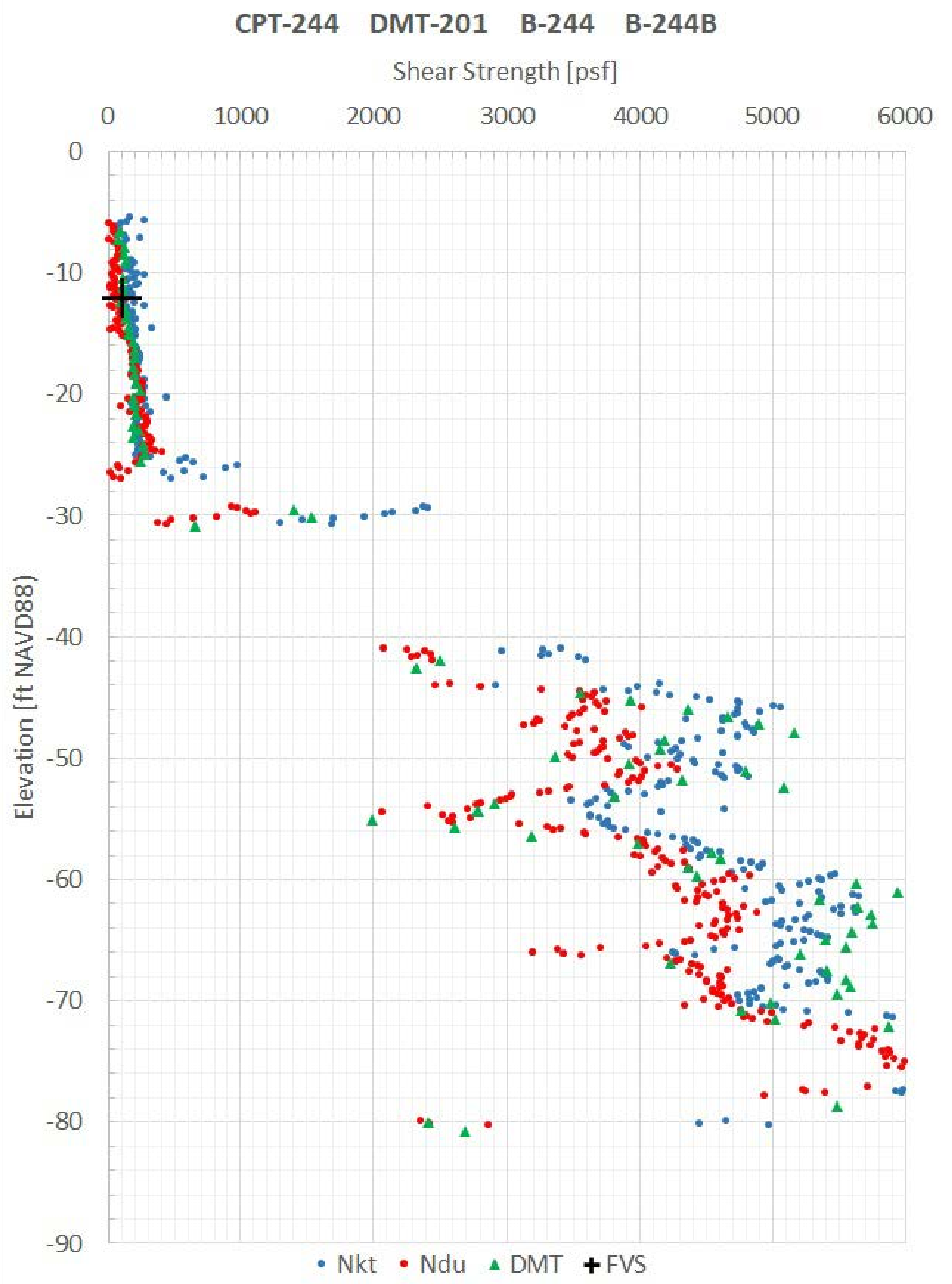
CPT-224 DMT-206 B-224 B-224B
Shear Strength [psf]
0
1000
2000
3000
4000
5000
6000
7000
0
-10
-20
-30
-40
-50
-60
-70
Elevation [ft NAVD88]
Nkt
Ndu
FVS


CPT-227 B-227 B-227B
Shear Strength [psf]
0
1000
2000
3000
4000
5000
6000
7000
0
-10
-20
-30
-40
-50
-60
-70
Elevation [ft NAVD88)
Nkt
Ndu
FVS

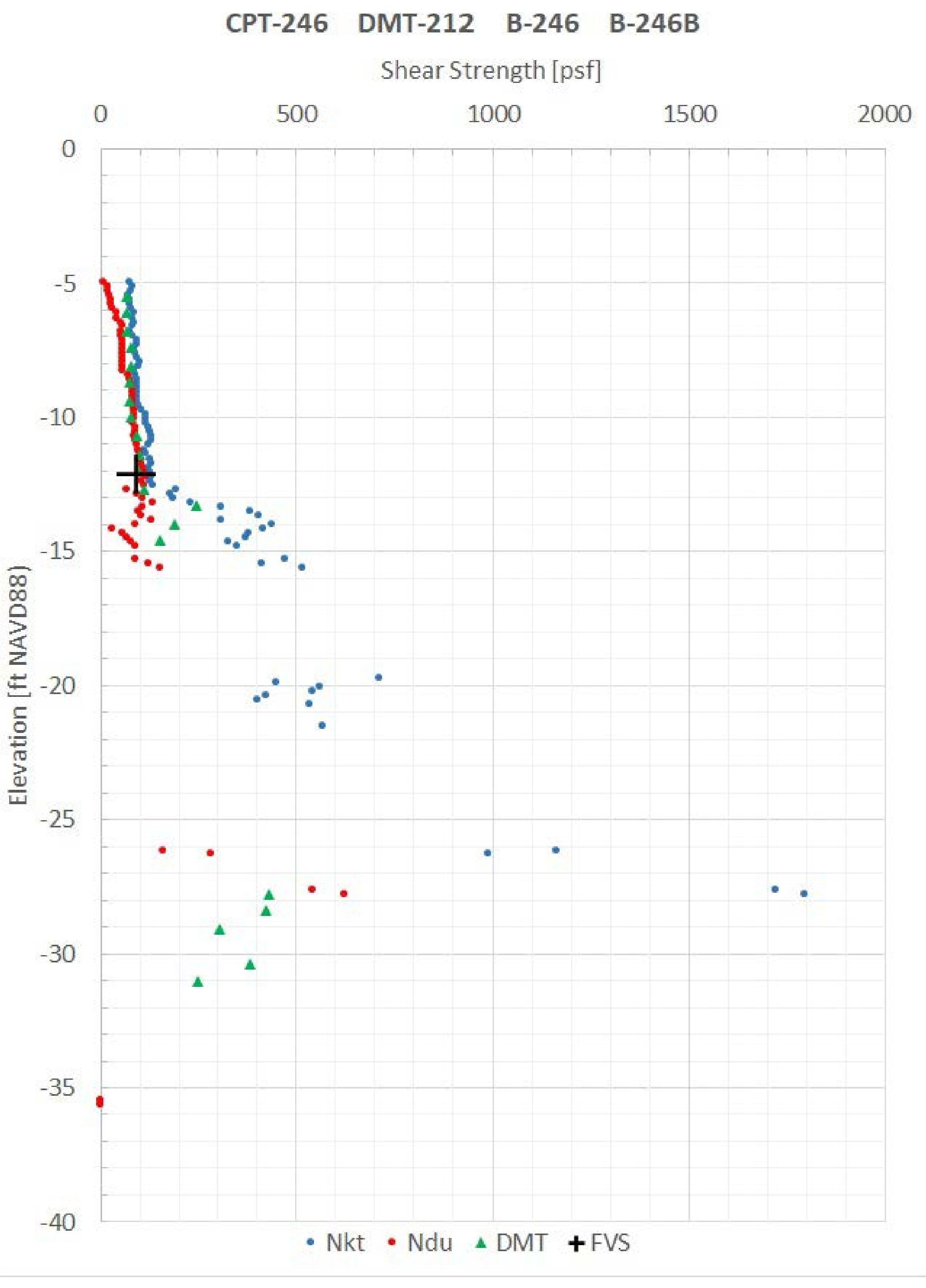


CPT-230 B-230 B-230B
Shear Strength [psf]
0
500
1000
1500
2000
0
-10
-20
-30
-40
-50
-60
-70
Elevation [ft NAVD88)
Nkt
Ndu
FVS


CPT-232 DMT-205 B-232 B-232B
Shear Strength [psf]
0
500
1000
1500
2000
0
-5
-10
-15
-20
-25
-30
-35
-40
Elevation [ft NAVD88)
Nkt
Ndu
DMT
FVS

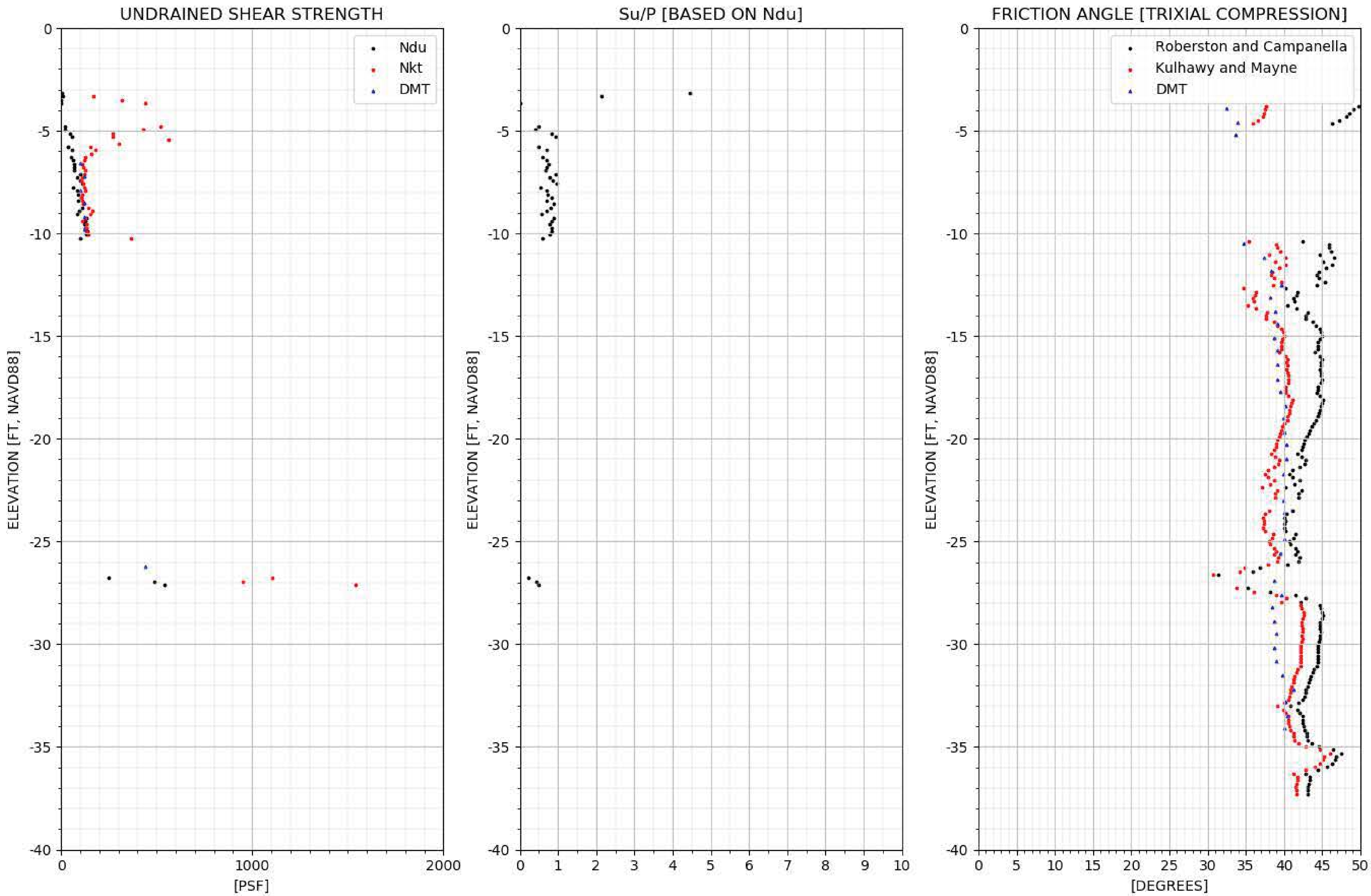


CPT-244 DMT-201 B-244 B-244B
Shear Strength [psf]
0
1000
2000
3000
4000
5000
6000
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Elevation [ft NAVD88)
Nkt
Ndu
DMT
FVS

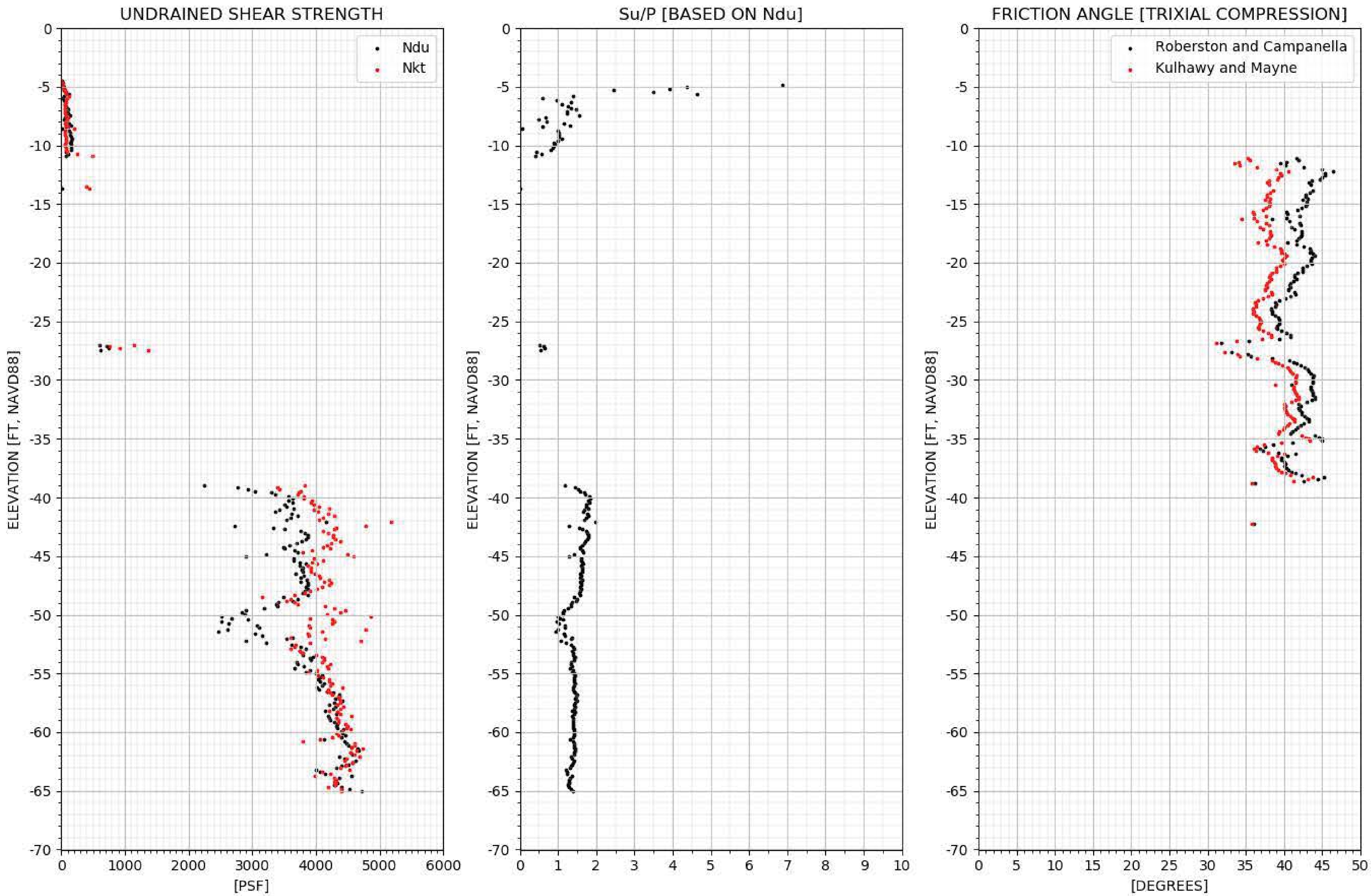


CPT-246 DMT-212 B-246 B-246B
Shear Strength [psf]
0
500
1000
1500
2000
0
-5
-10
-15
-20
-25
-30
-35
-40
Elevation [ft NAVD88]
Nkt
Ndu
DMT
FVS

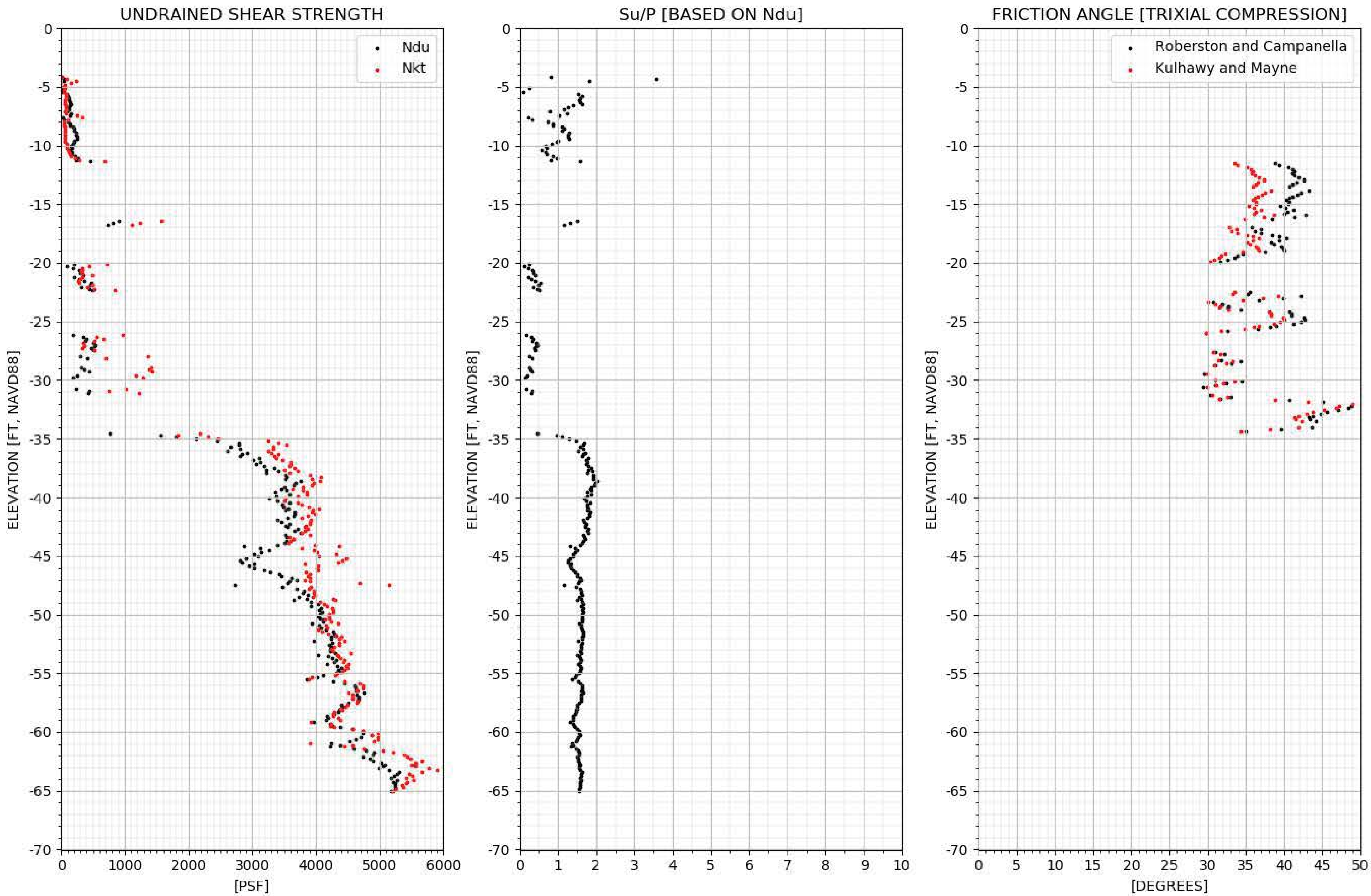
CPT-202 SHEAR STRENGTH



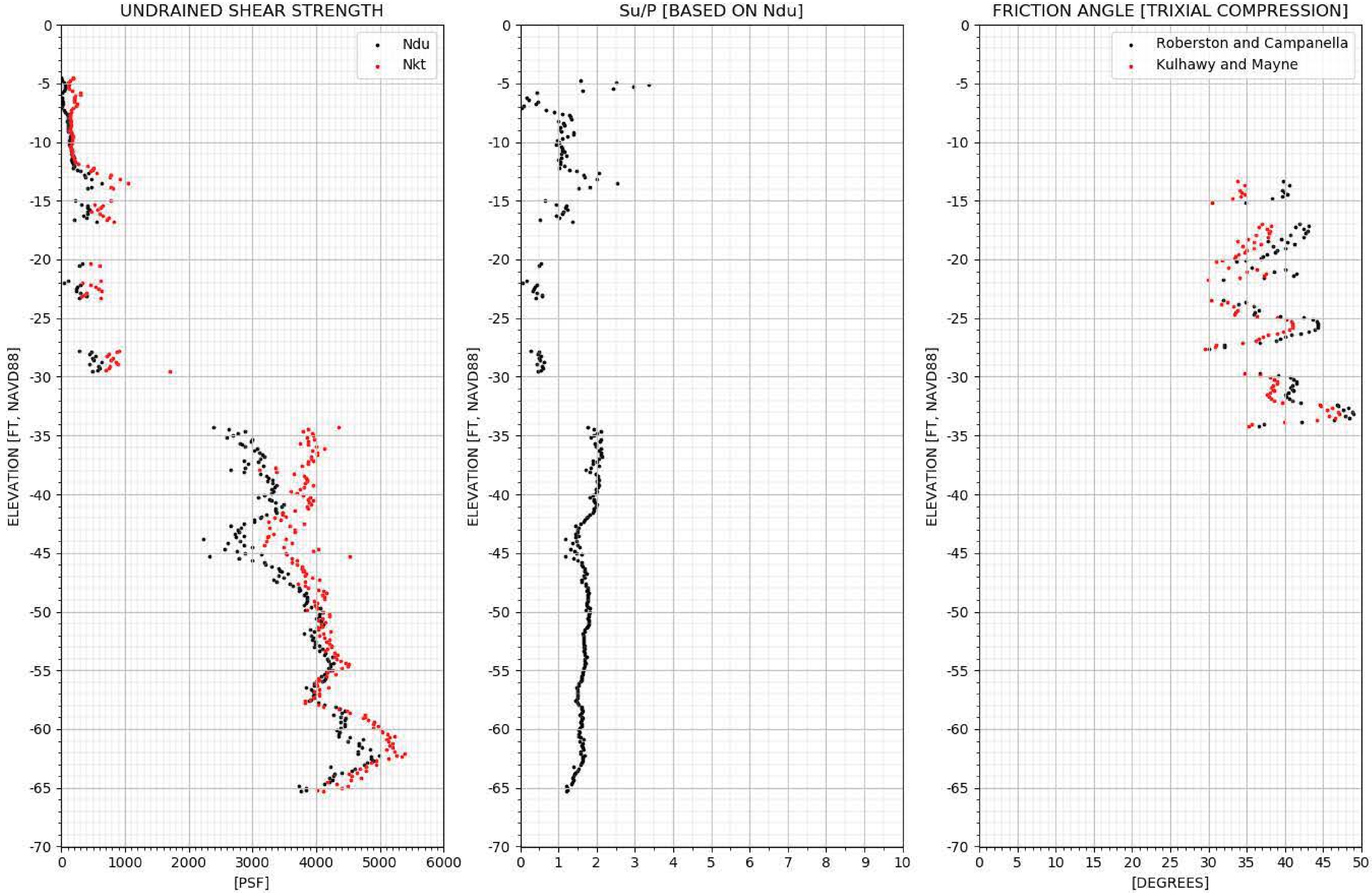
CPT-203 SHEAR STRENGTH



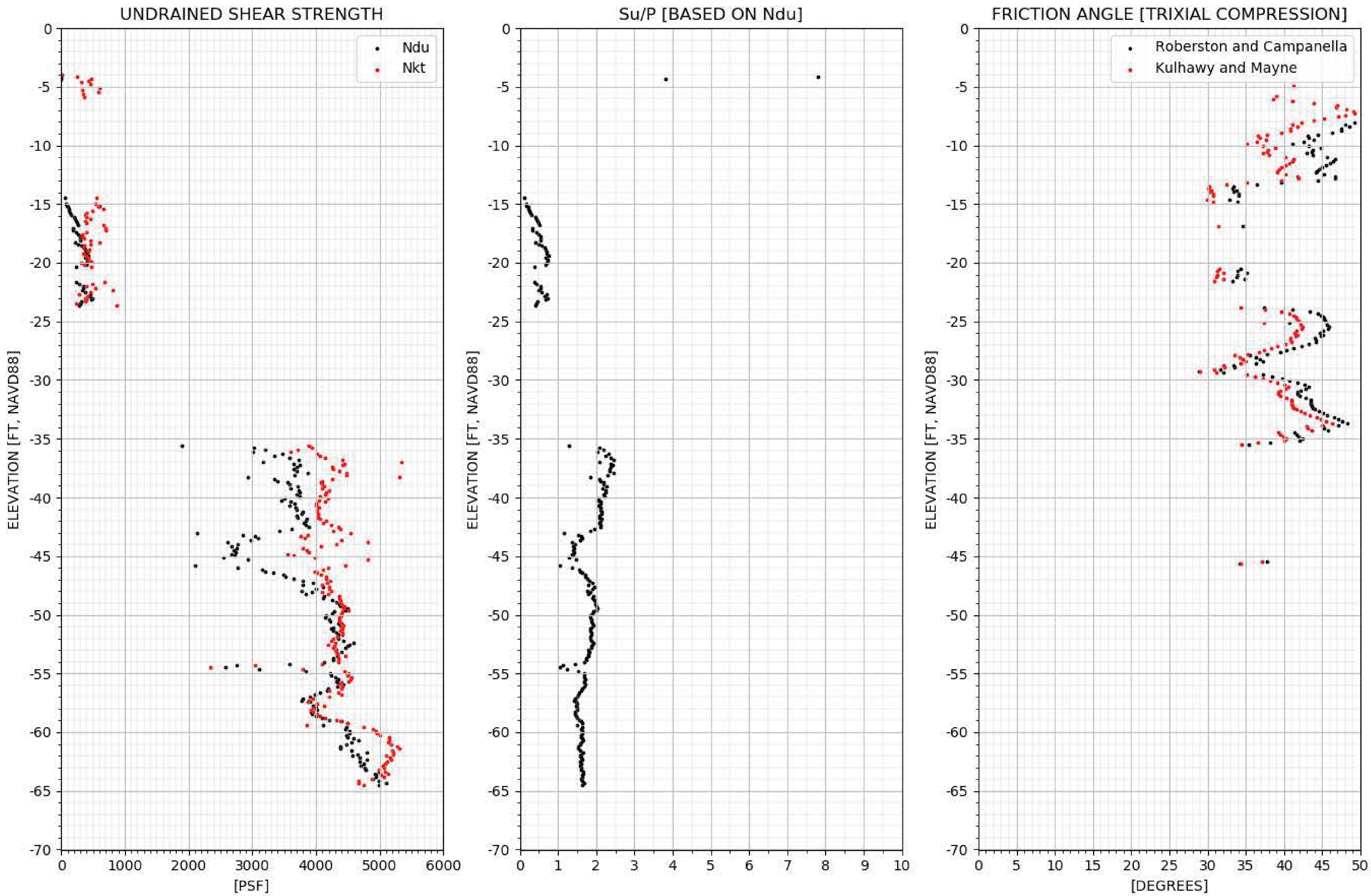
CPT-204 SHEAR STRENGTH

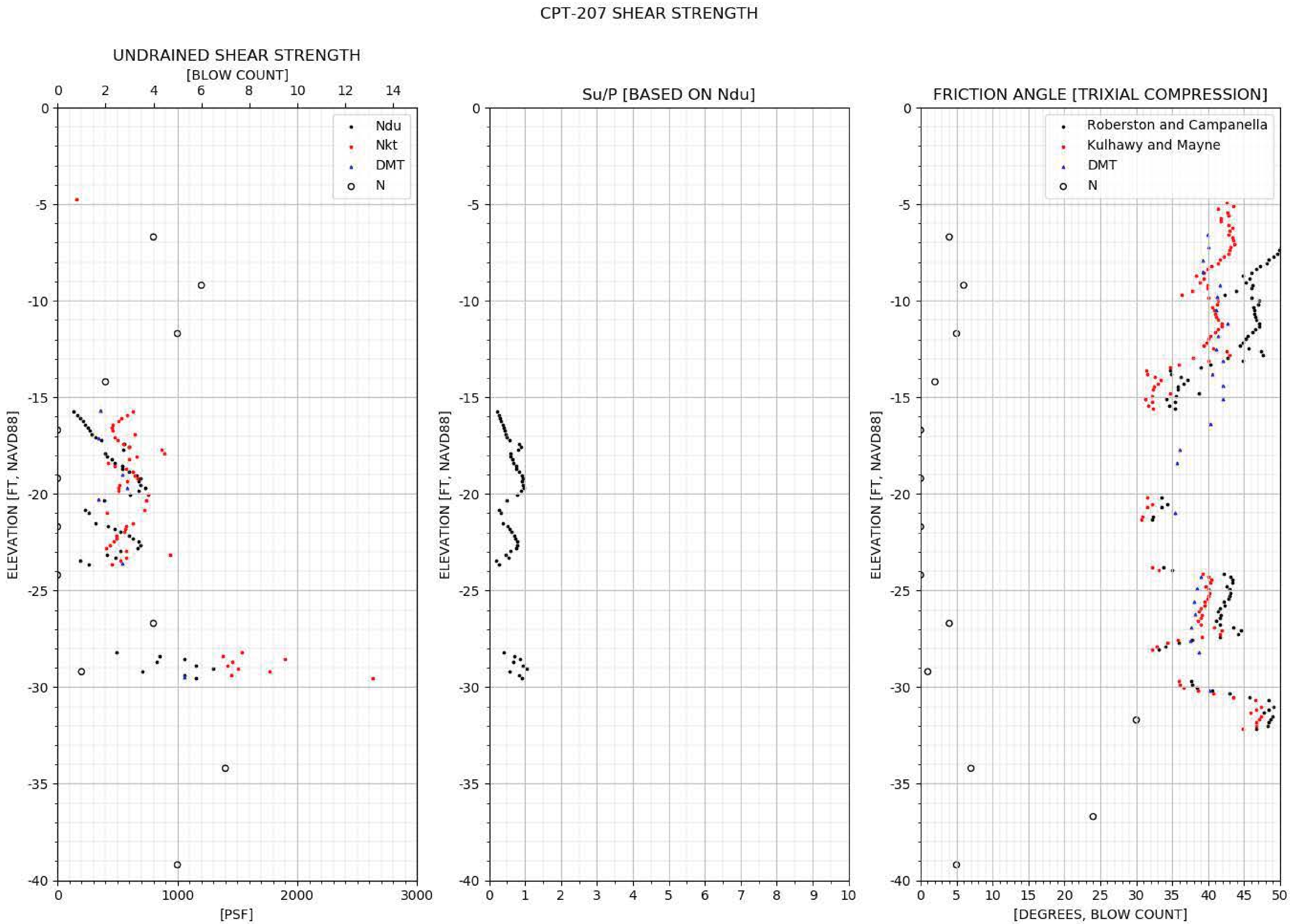


CPT-205 SHEAR STRENGTH

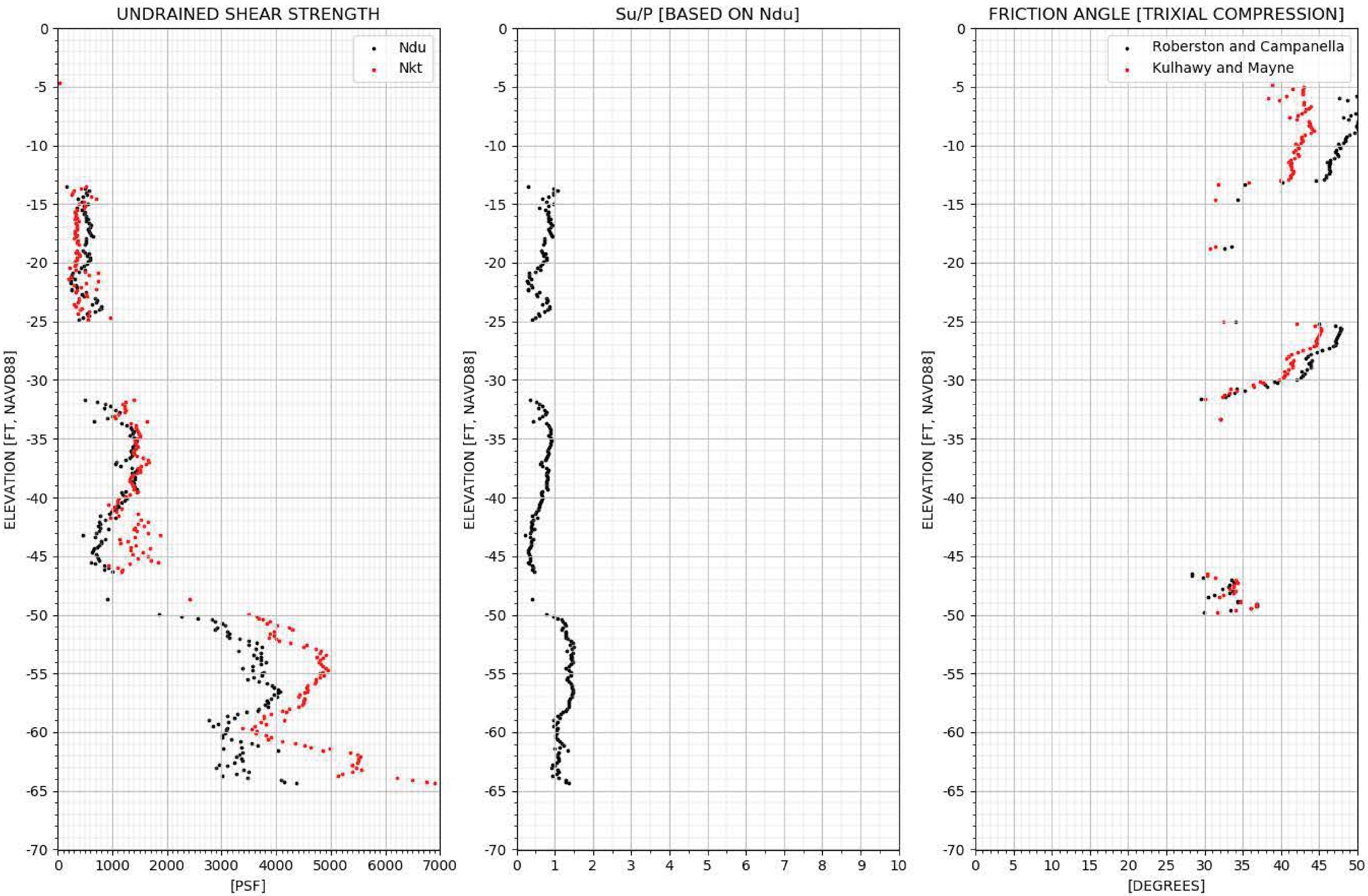


CPT-206 SHEAR STRENGTH

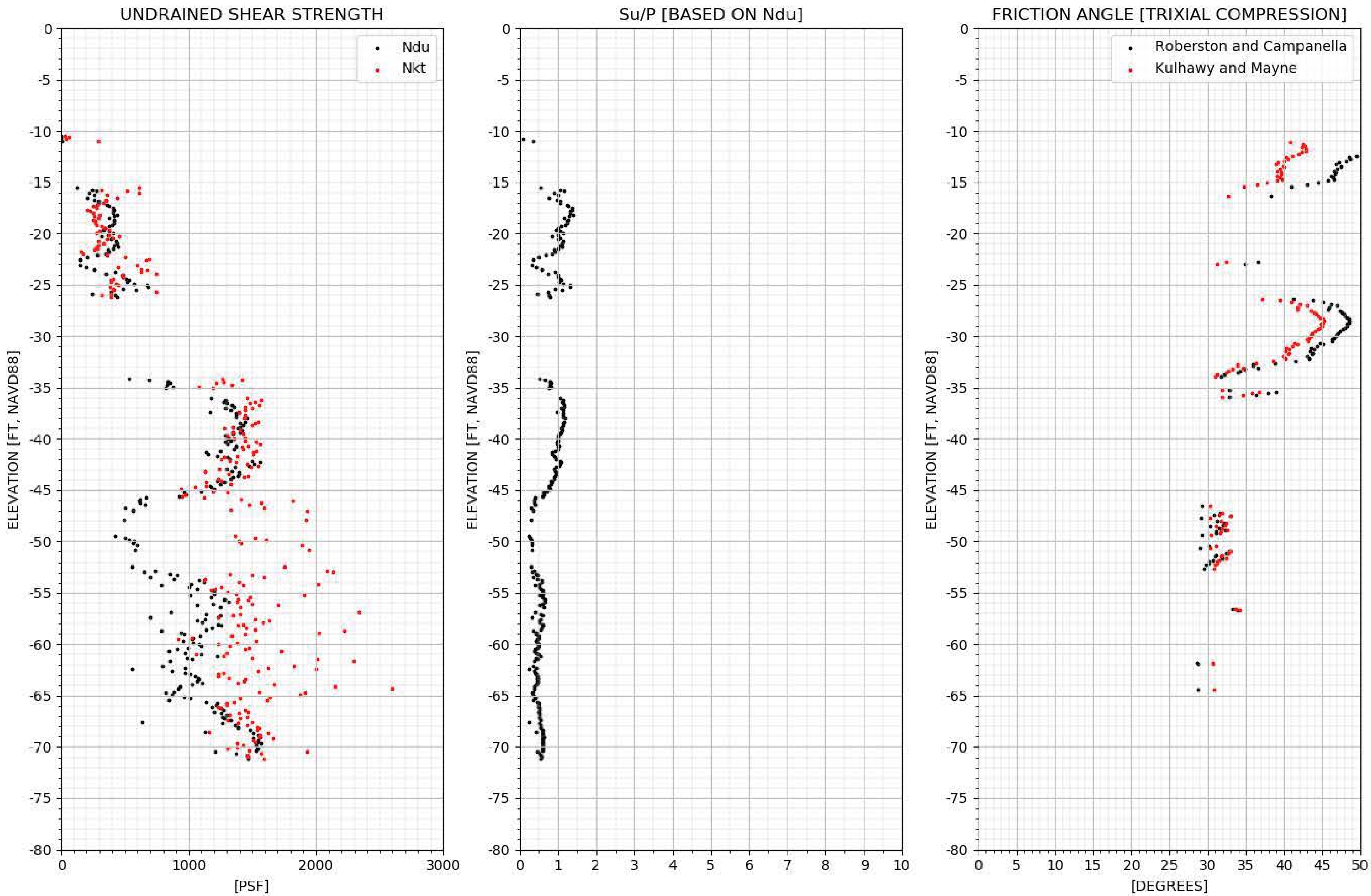


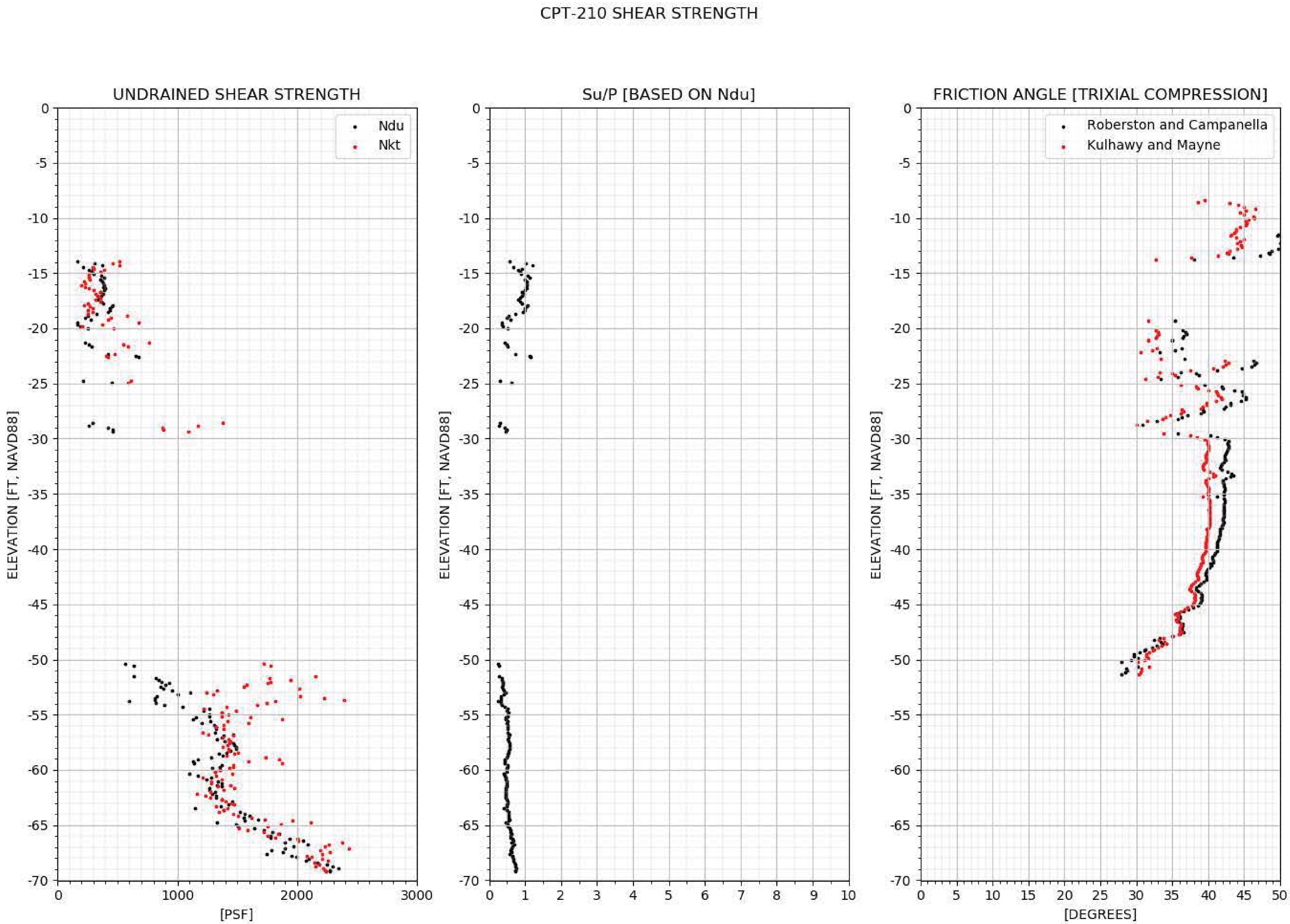

CPT-207 SHEAR STRENGTH
UNDRAINED SHEAR STRENGTH
[BLOW COUNT]
Ndu
Nkt
DMT
N
ELEVATION [FT, NAVD88]
[PSF]
Su/P [BASED ON Ndu]
FRICTION ANGLE [TRIXIAL COMPRESSION]
Roberston and Campanella
Kulhawy and Mayne
[DEGREES, BLOW COUNT]

CPT-208 SHEAR STRENGTH



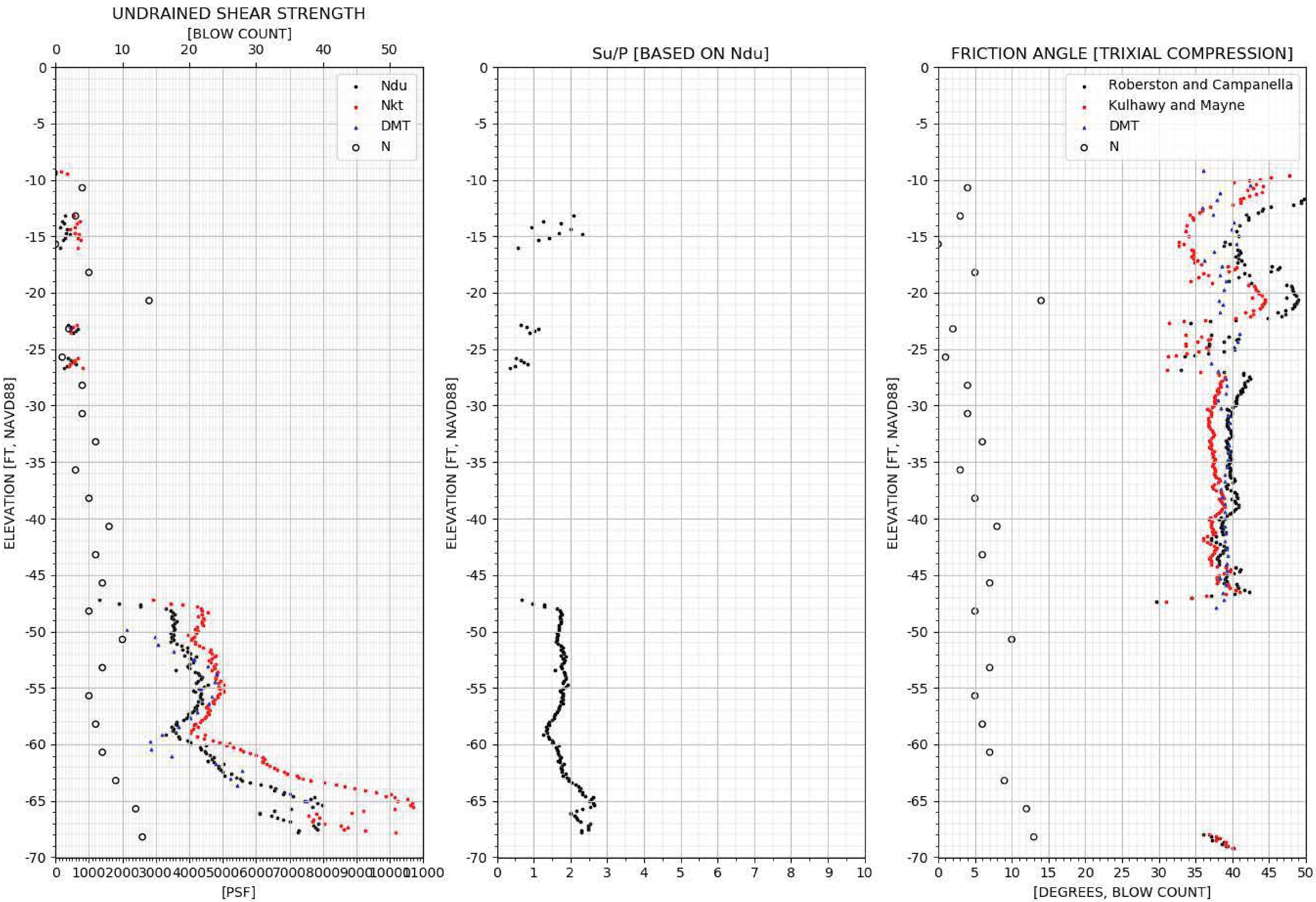
CPT-209 SHEAR STRENGTH



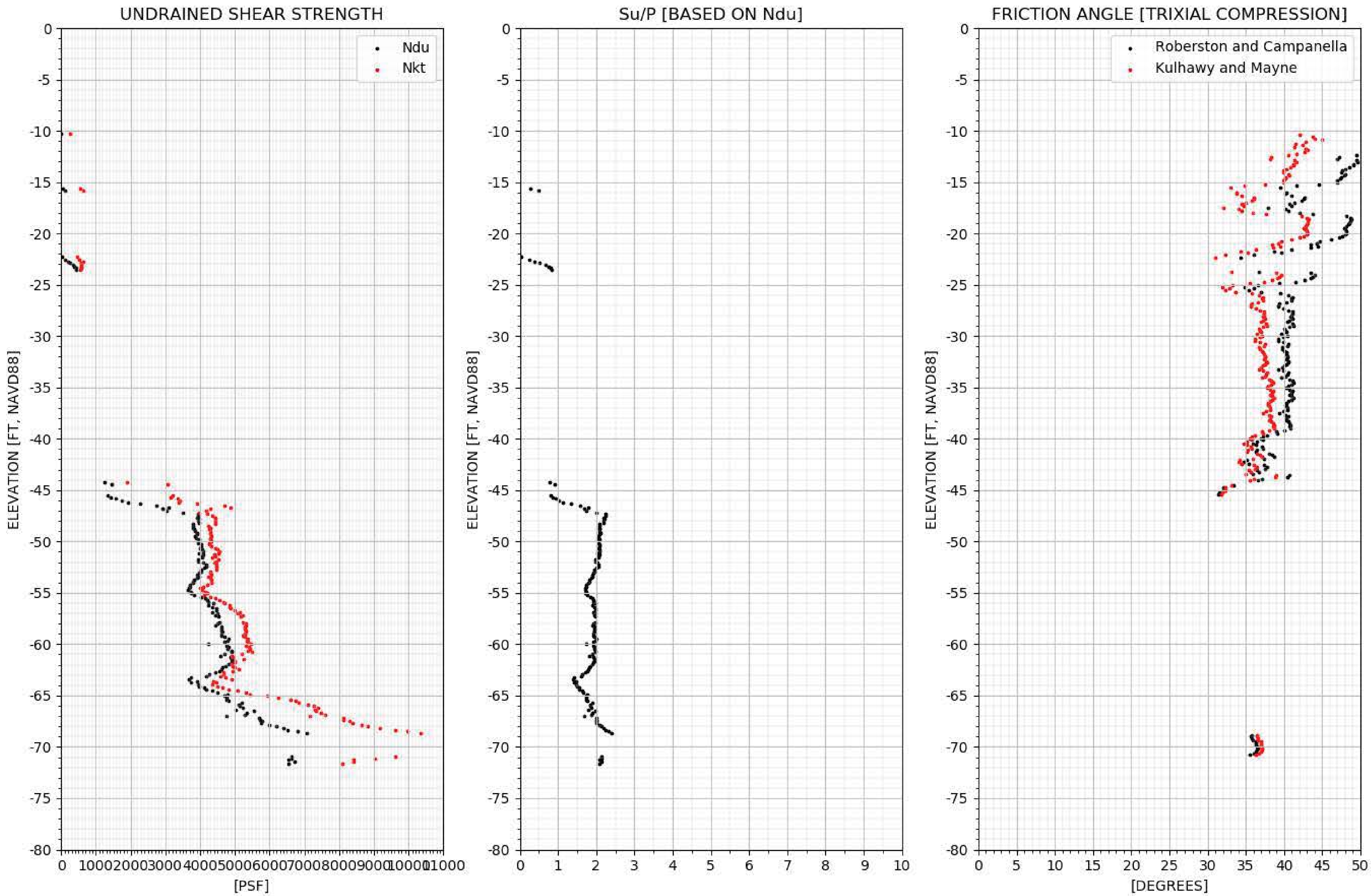


CPT-210 SHEAR STRENGTH
UNDRAINED SHEAR STRENGTH
Ndu
Nkt
ELEVATION [FT, NAVD88]
[PSF]
Su/P [BASED ON Ndu]
ELEVATION [FT, NAVD88]
FRICTION ANGLE [TRIXIAL COMPRESSION]
Roberston and Campanella
Kulhawy and Mayne
ELEVATION [FT, NAVD88]
[DEGREES]

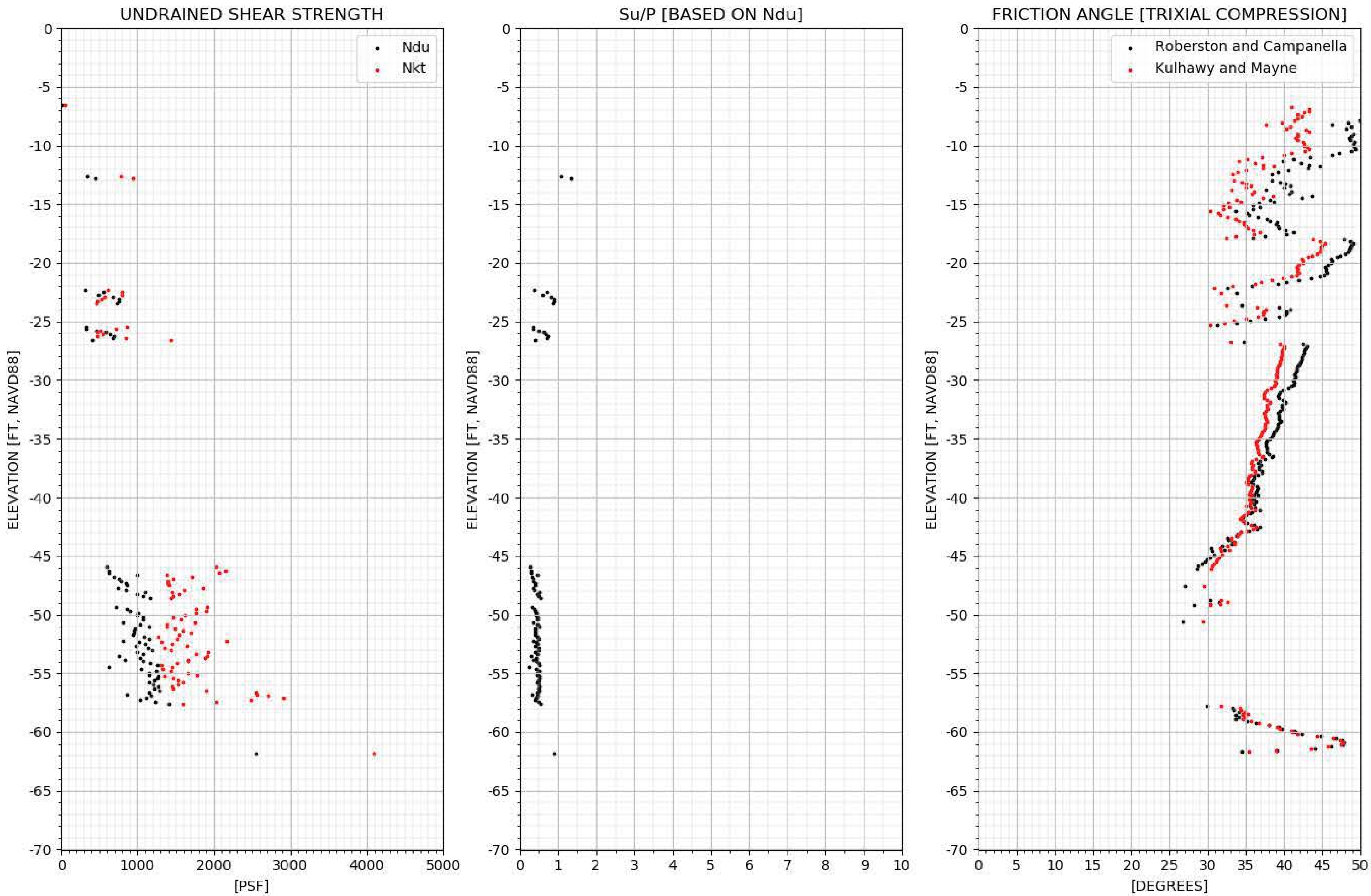
CPT-211 SHEAR STRENGTH

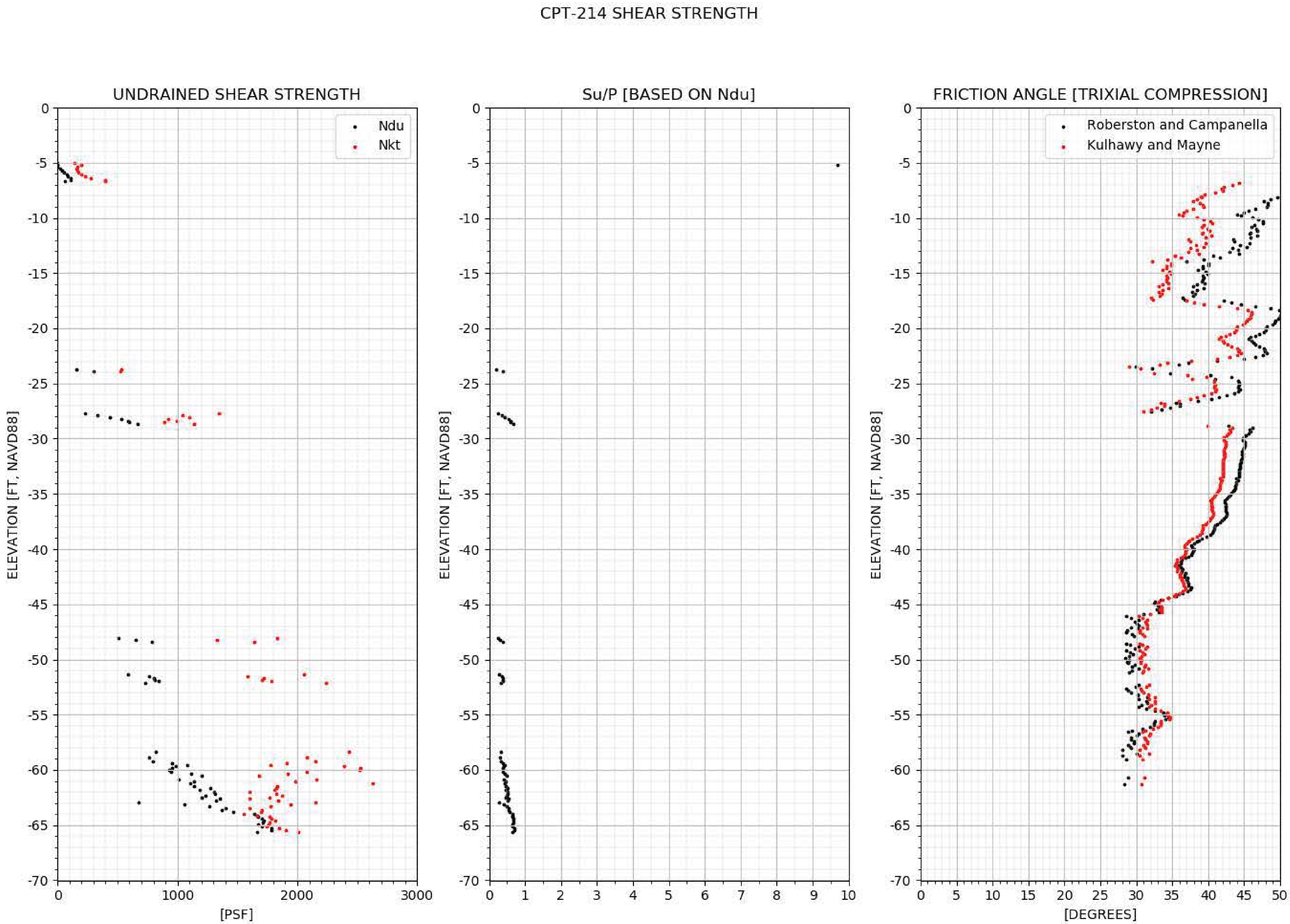


CPT-212 SHEAR STRENGTH

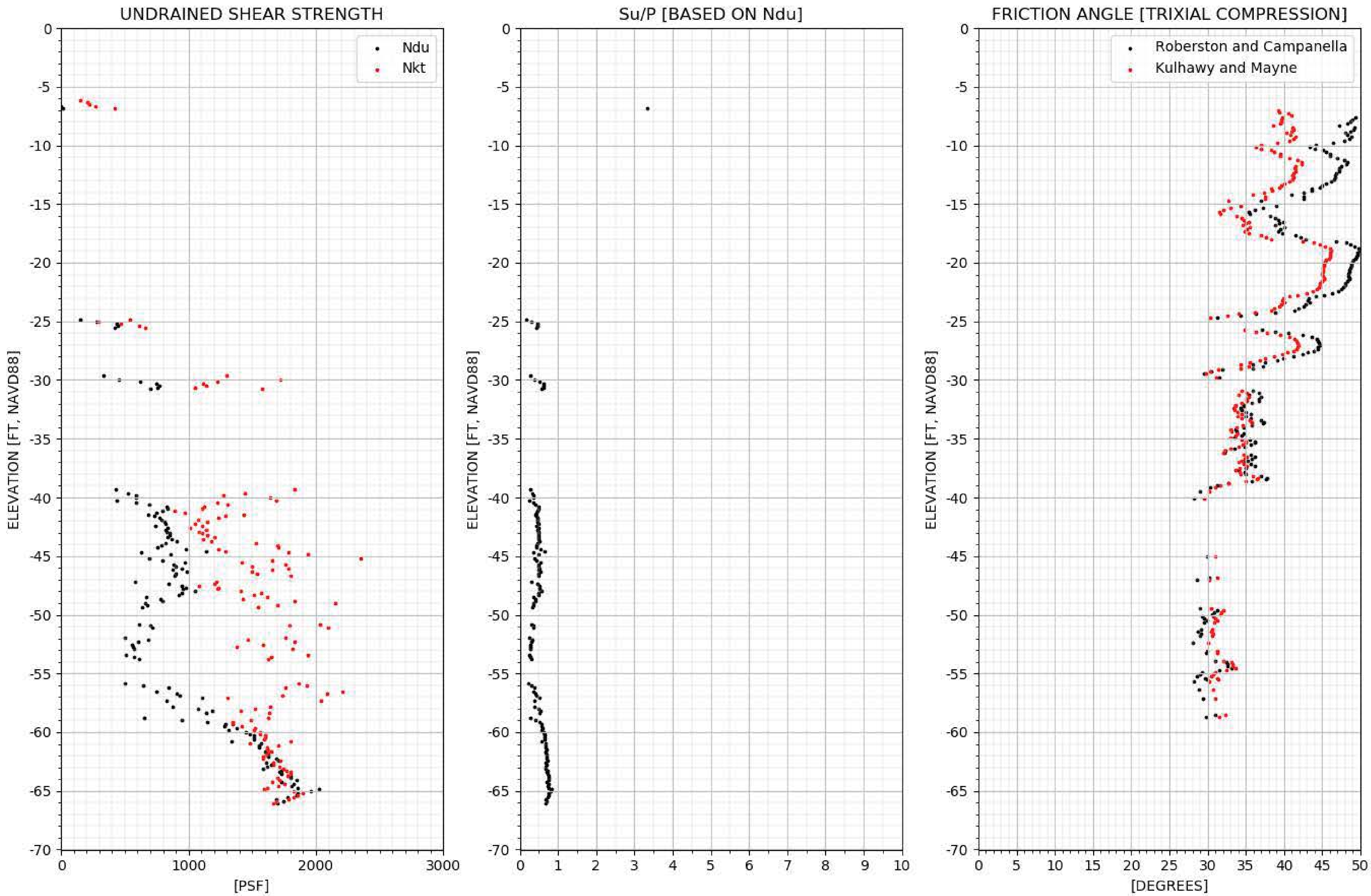


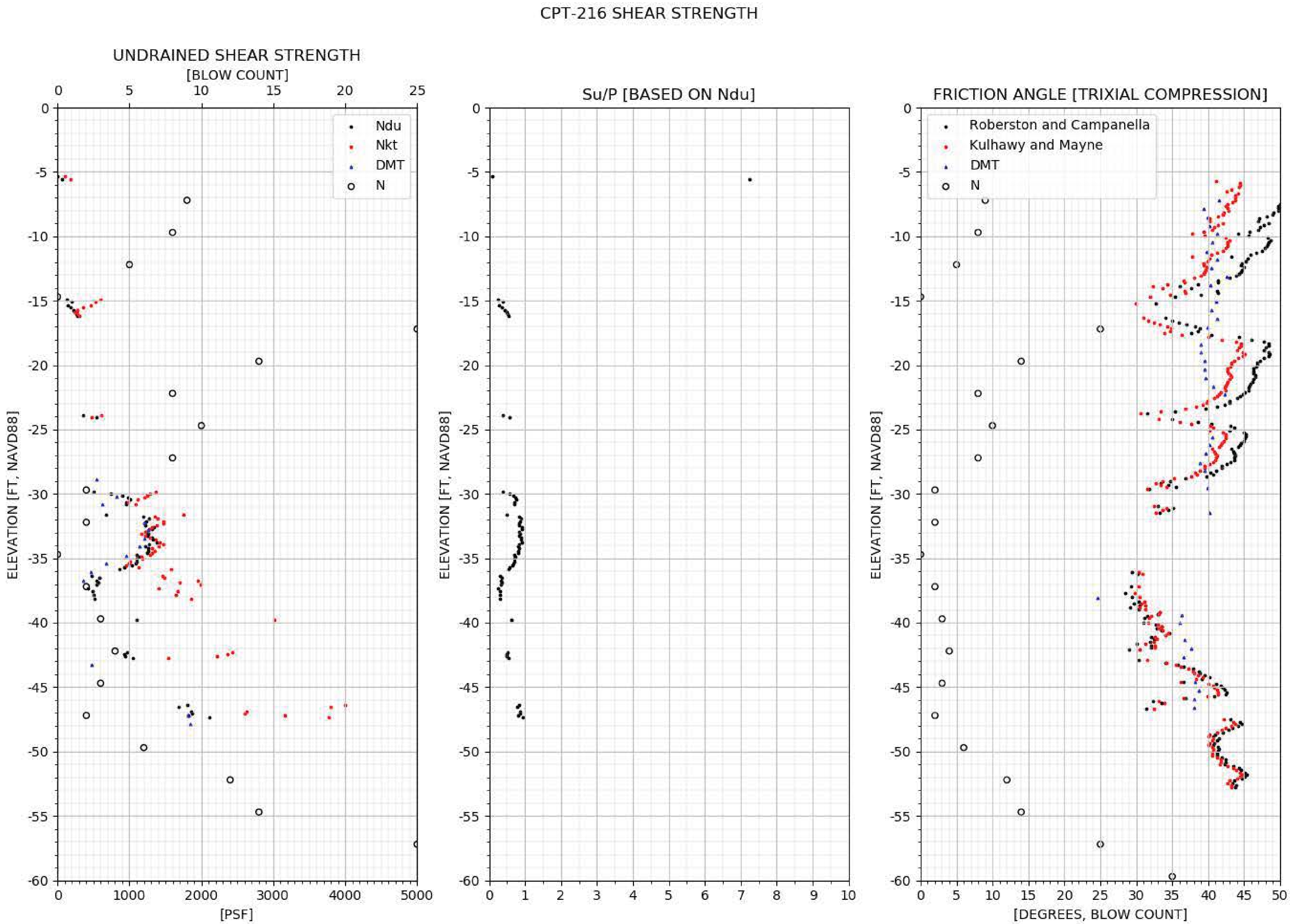
CPT-213 SHEAR STRENGTH




CPT-214 SHEAR STRENGTH
UNDRAINED SHEAR STRENGTH
Ndu
Nkt
ELEVATION [FT, NAVD88]
[PSF]
Su/P [BASED ON Ndu]
ELEVATION [FT, NAVD88]
FRICTION ANGLE [TRIXIAL COMPRESSION]
Roberston and Campanella
Kulhawy and Mayne
ELEVATION [FT, NAVD88]
[DEGREES]

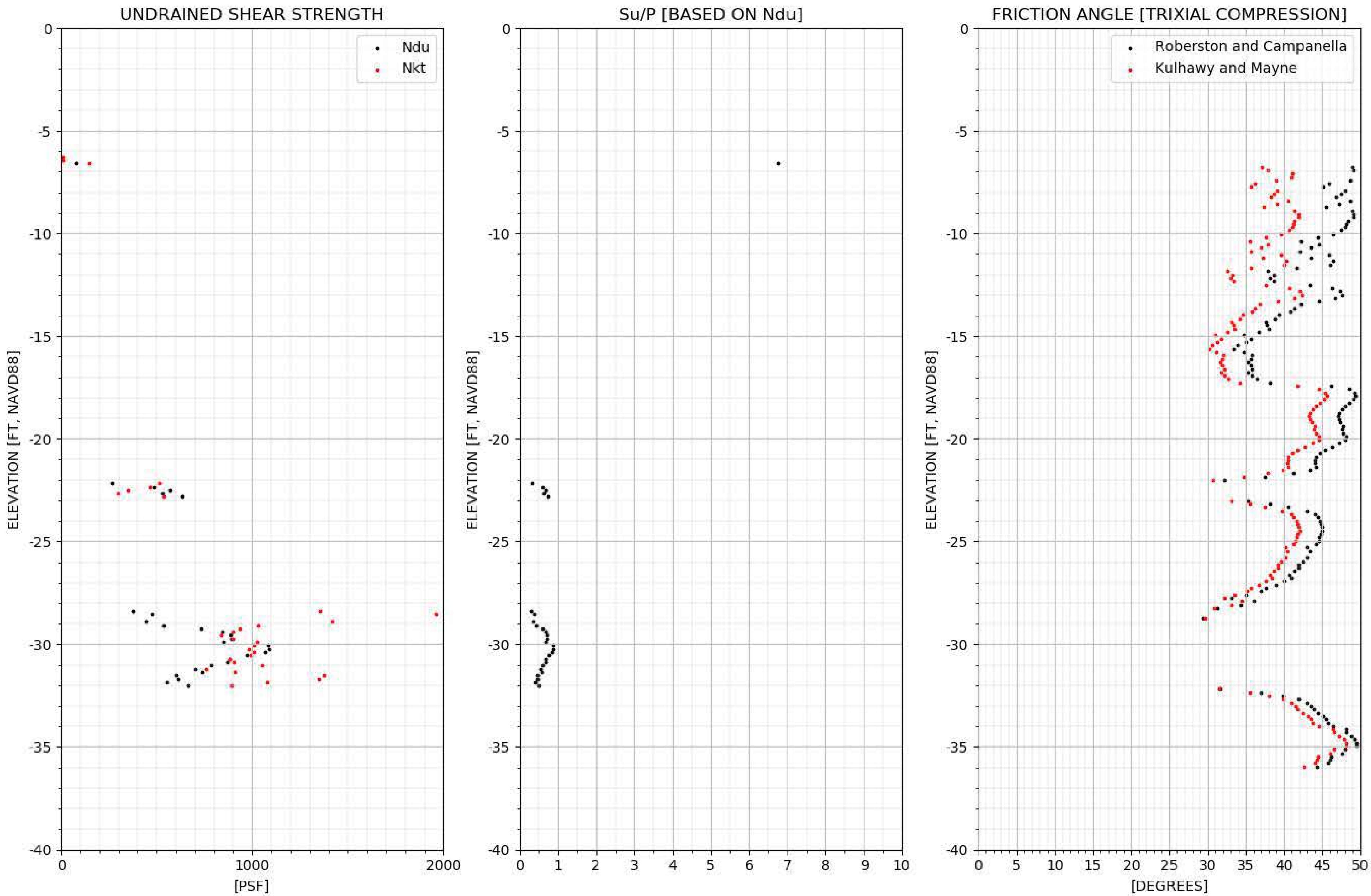
CPT-215 SHEAR STRENGTH

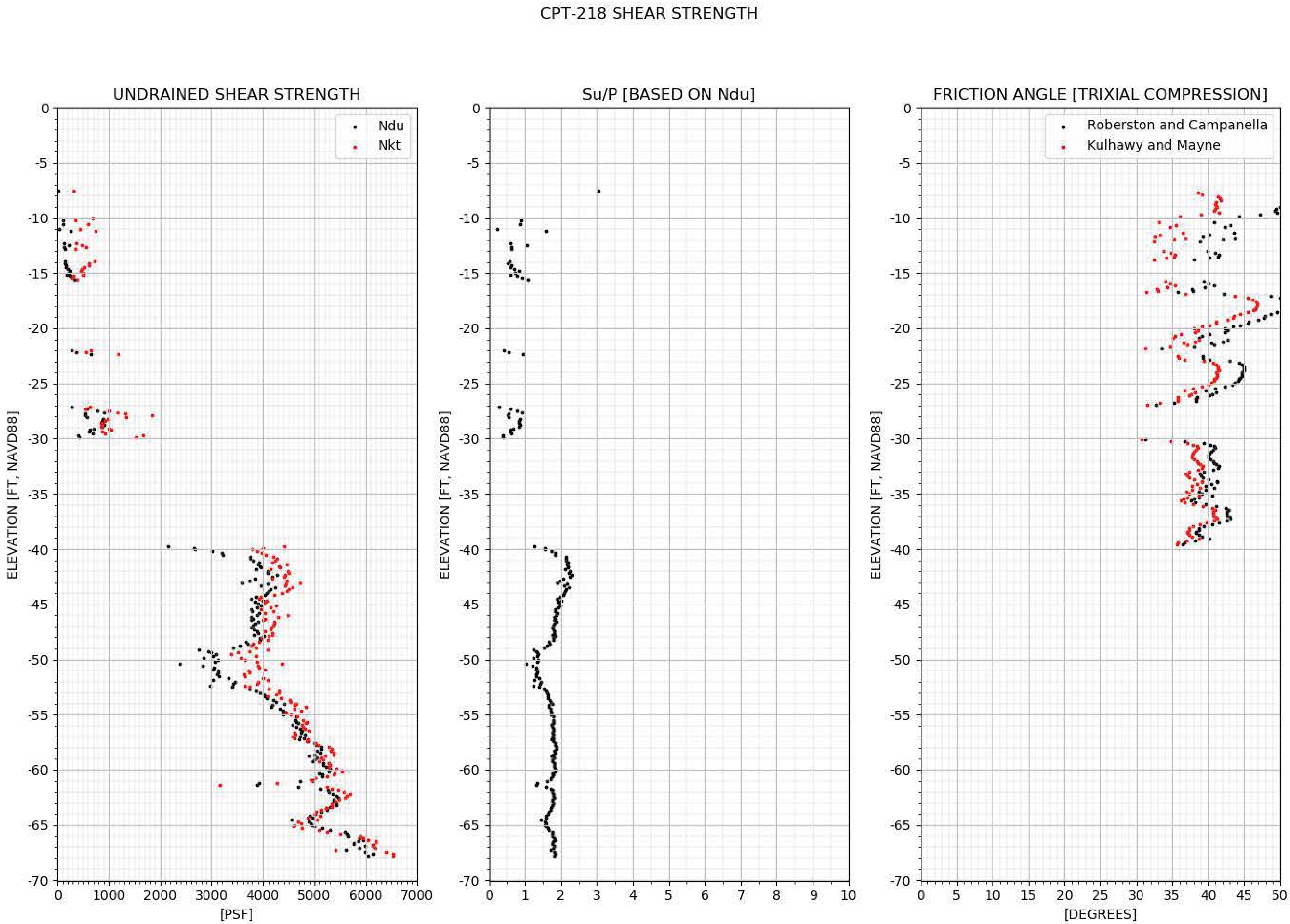




CPT-216 SHEAR STRENGTH
UNDRAINED SHEAR STRENGTH
[BLOW COUNT]
Ndu
Nkt
DMT
N
ELEVATION [FT, NAVD88]
[PSF]
Su/P [BASED ON Ndu]
ELEVATION [FT, NAVD88]
FRICTION ANGLE [TRIXIAL COMPRESSION]
Roberston and Campanella
Kulhawy and Mayne
DMT
N
ELEVATION [FT, NAVD88]
[DEGREES, BLOW COUNT]

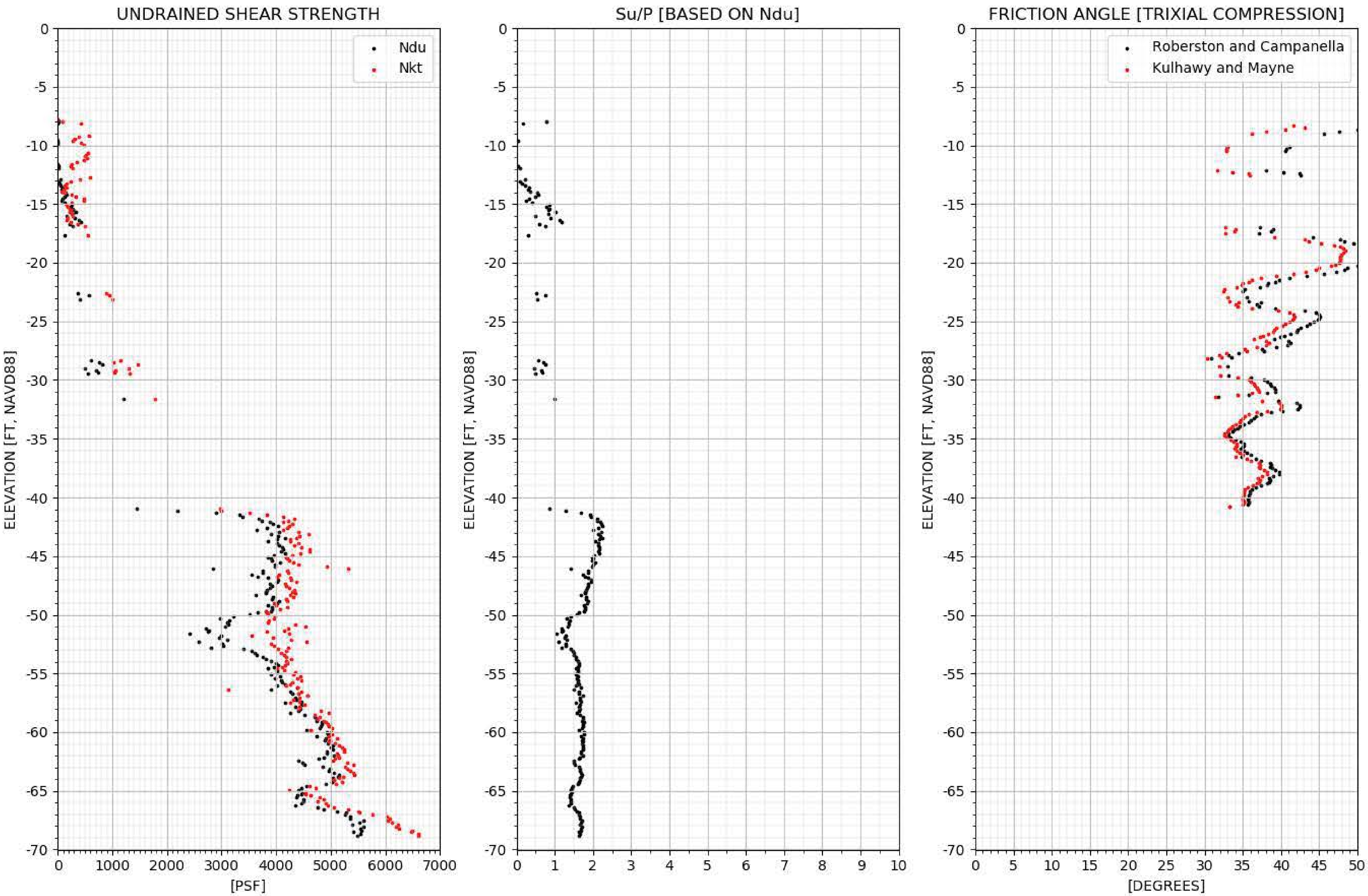
CPT-217 SHEAR STRENGTH



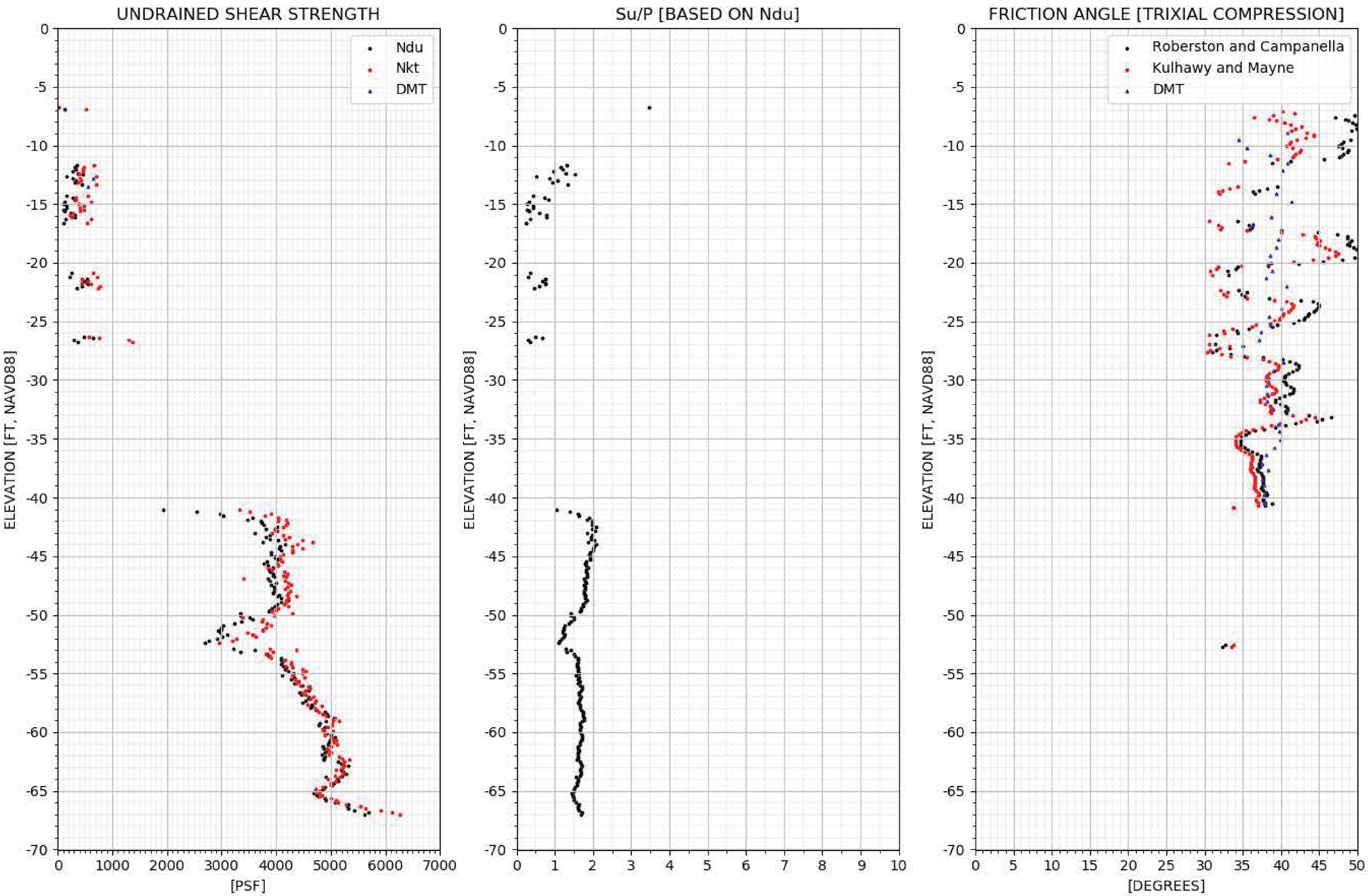


CPT-218 SHEAR STRENGTH
UNDRAINED SHEAR STRENGTH
Ndu
Nkt
ELEVATION [FT, NAVD88]
[PSF]
Su/P [BASED ON Ndu]
FRICTION ANGLE [TRIXIAL COMPRESSION]
Roberston and Campanella
Kulhawy and Mayne
[DEGREES]

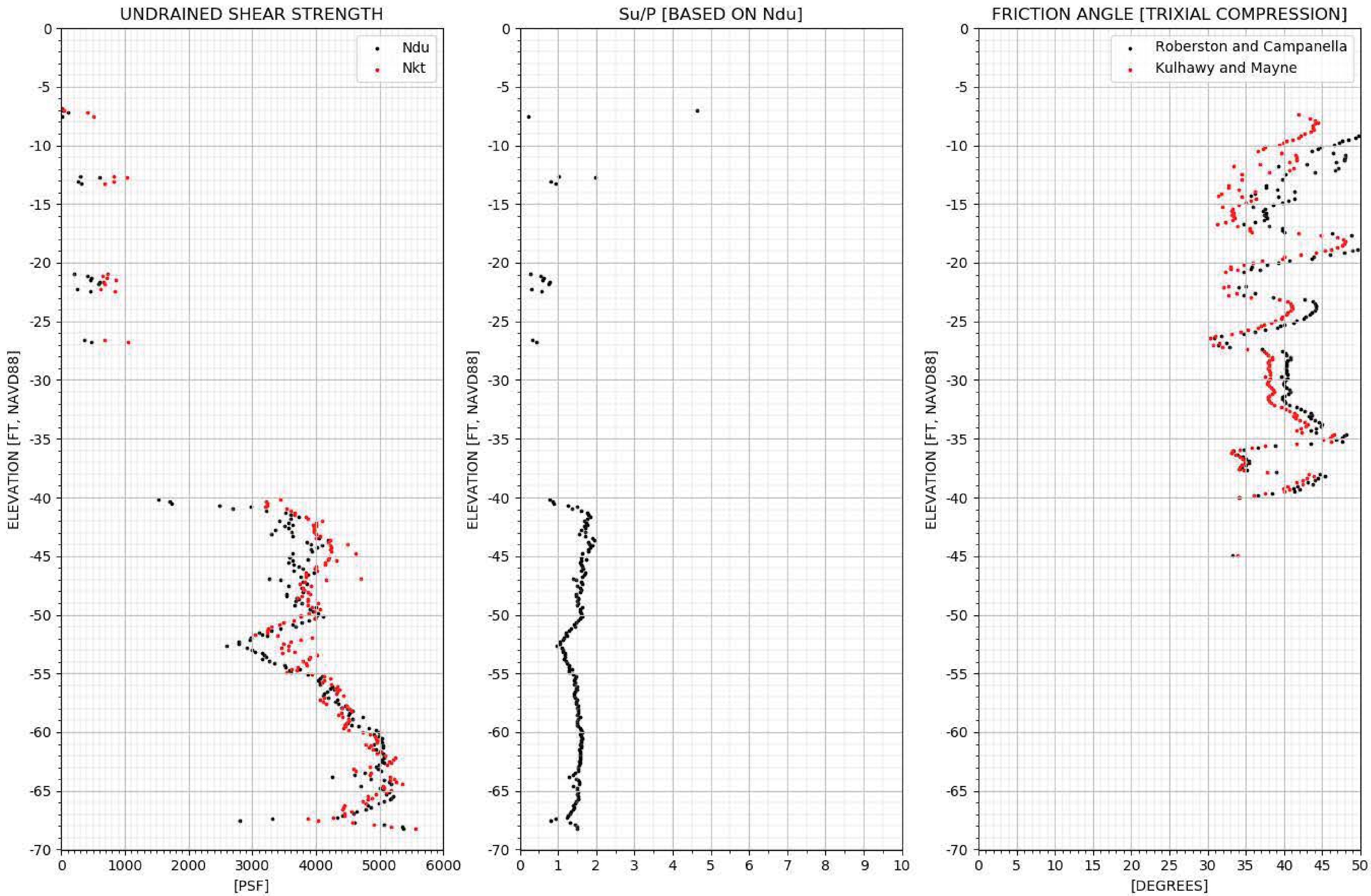
CPT-219 SHEAR STRENGTH



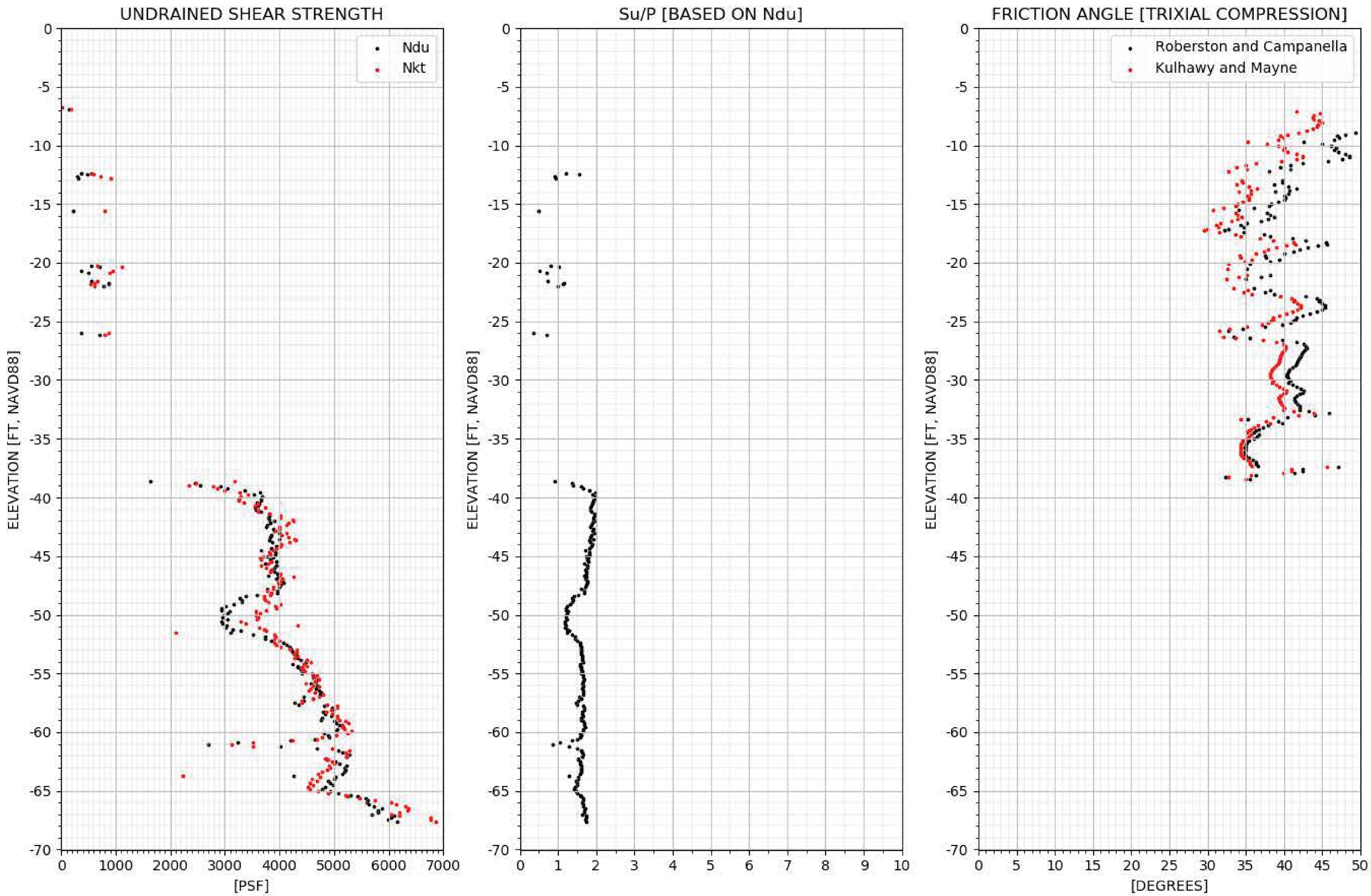
CPT-220 SHEAR STRENGTH



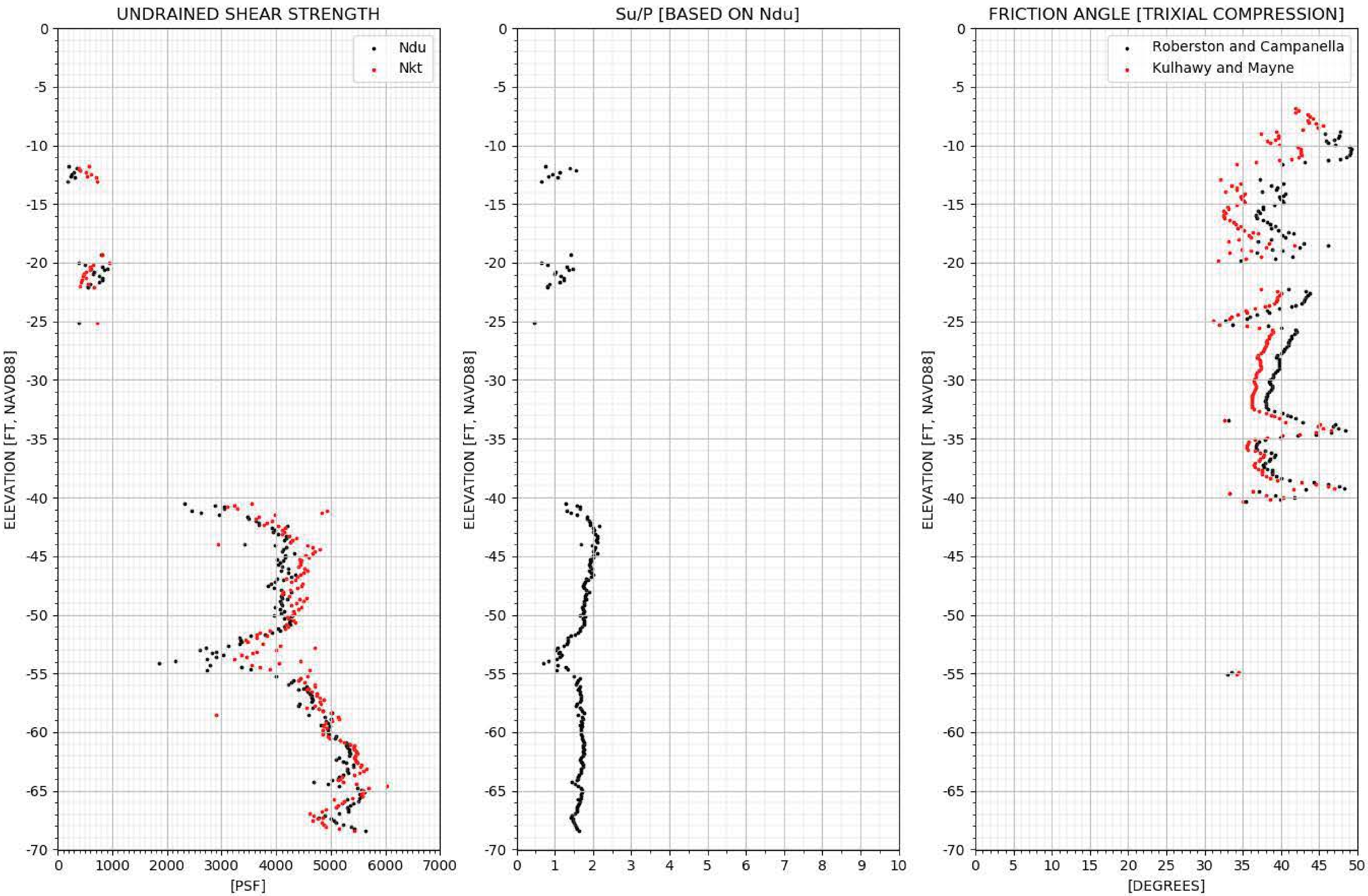
CPT-221 SHEAR STRENGTH

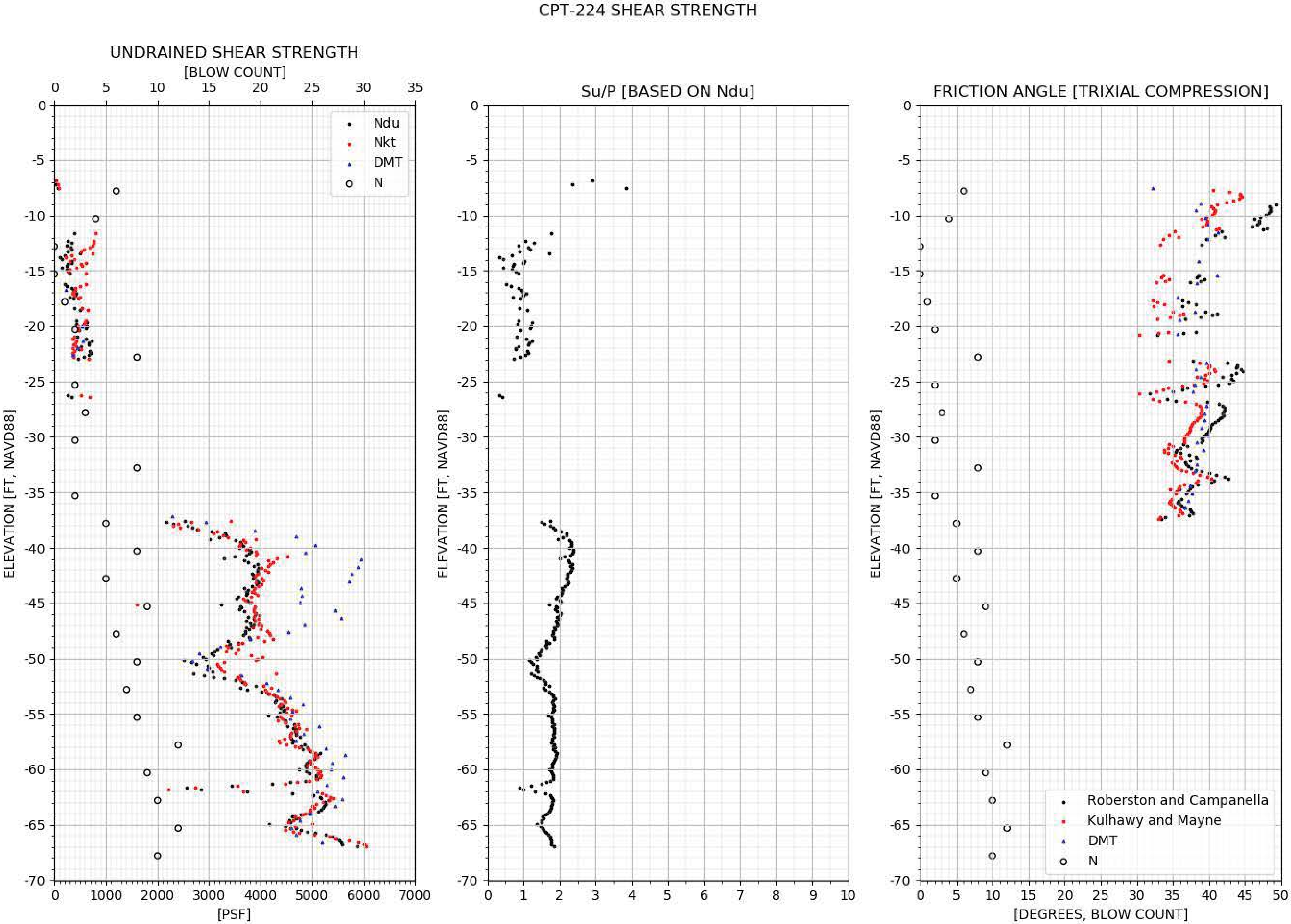


CPT-222 SHEAR STRENGTH



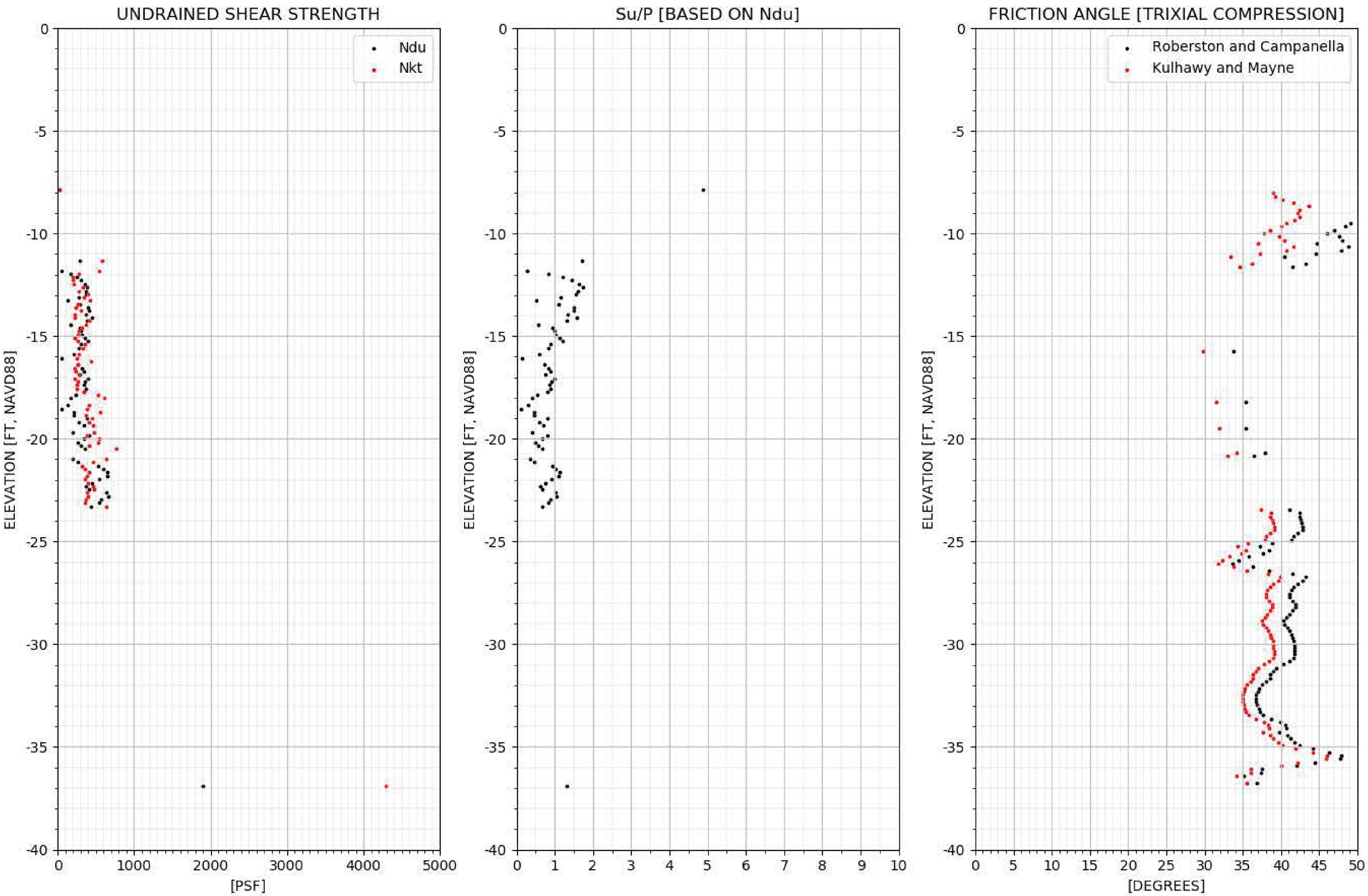
CPT-223 SHEAR STRENGTH

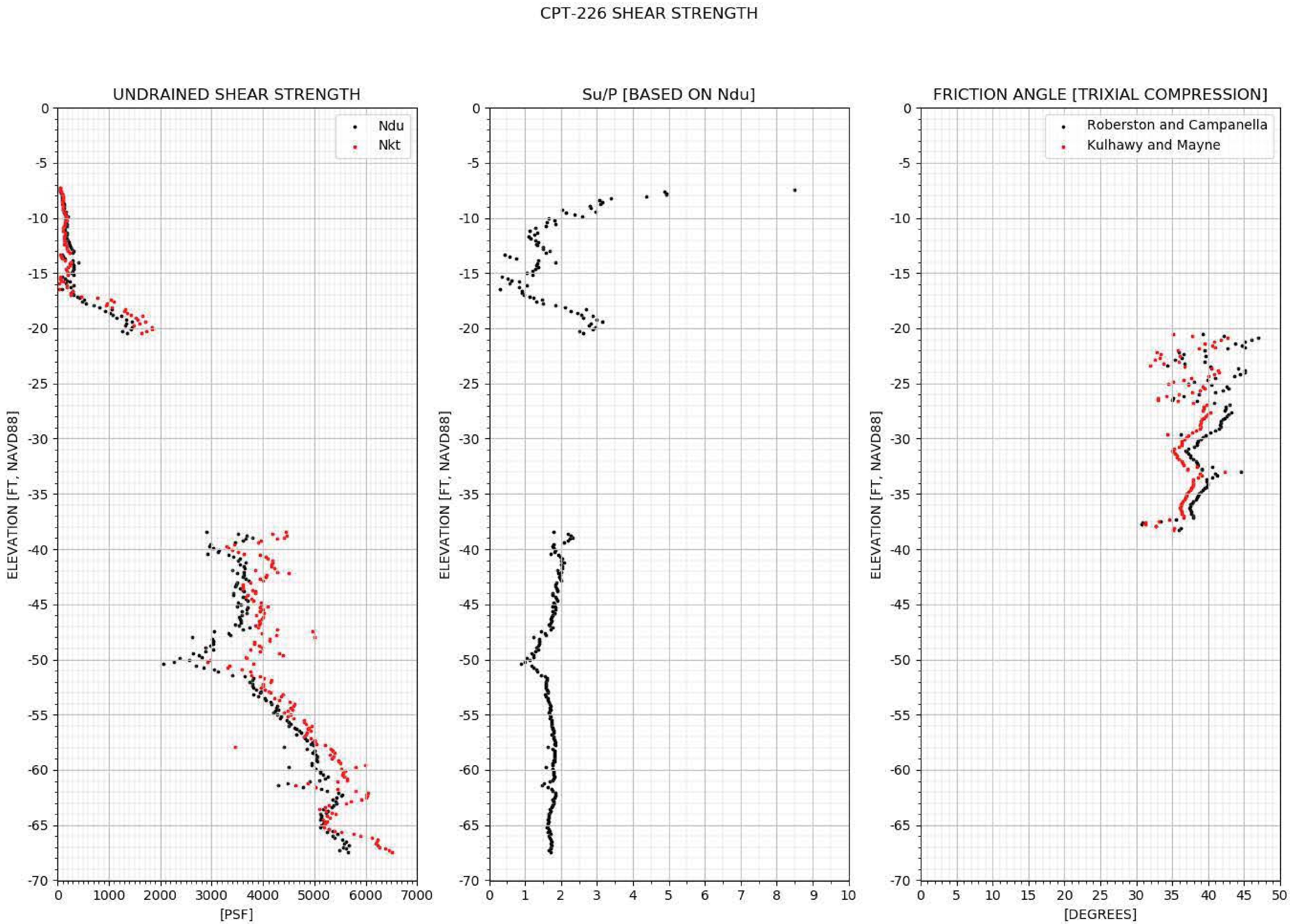




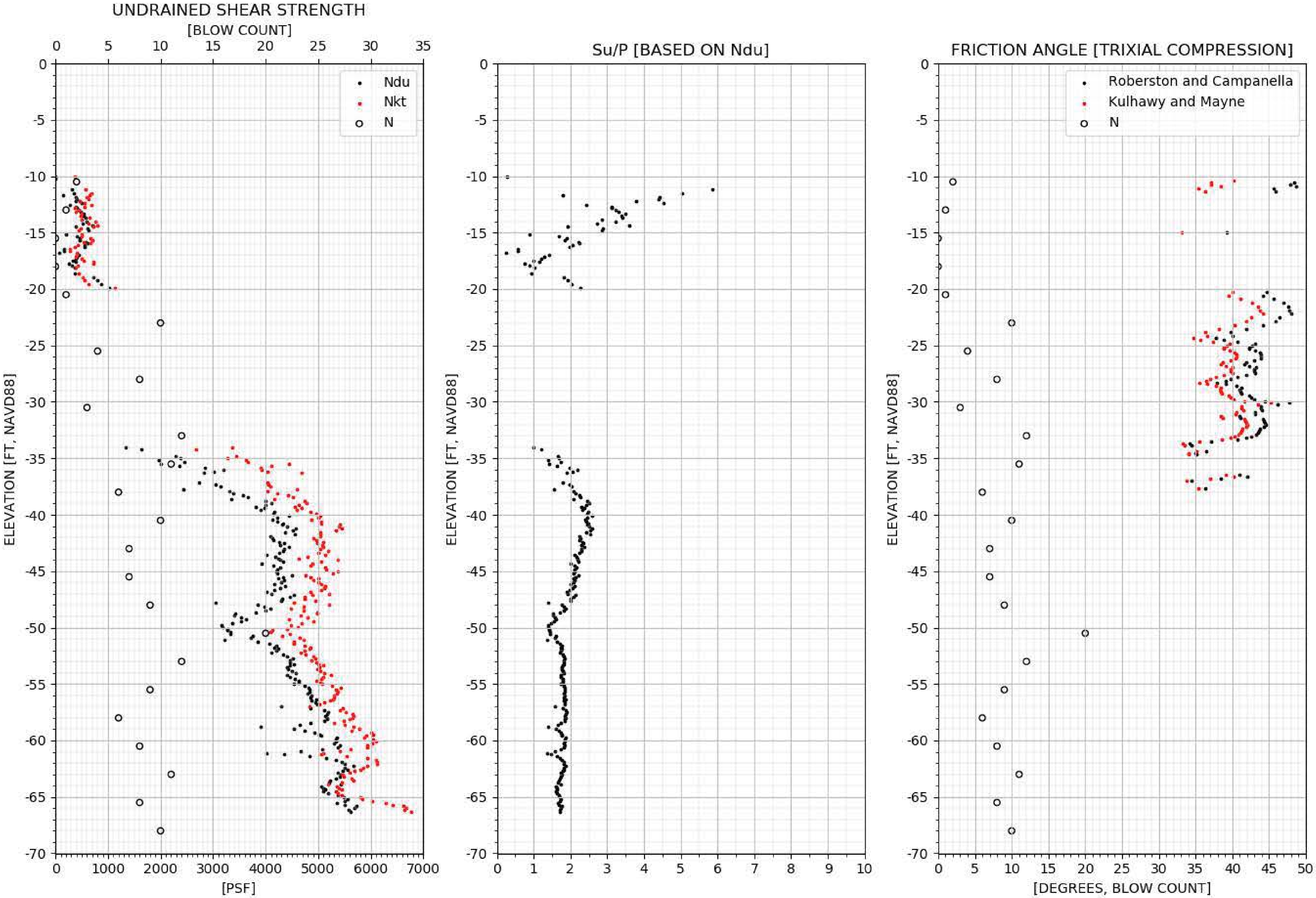
CPT-224 SHEAR STRENGTH
UNDRAINED SHEAR STRENGTH
[BLOW COUNT]
ELEVATION [FT, NAVD88]
[PSF]
Ndu
Nkt
DMT
N
Su/P [BASED ON Ndu]
FRICTION ANGLE [TRIXIAL COMPRESSION]
[DEGREES, BLOW COUNT]
Roberston and Campanella
Kulhawy and Mayne

CPT-225 SHEAR STRENGTH

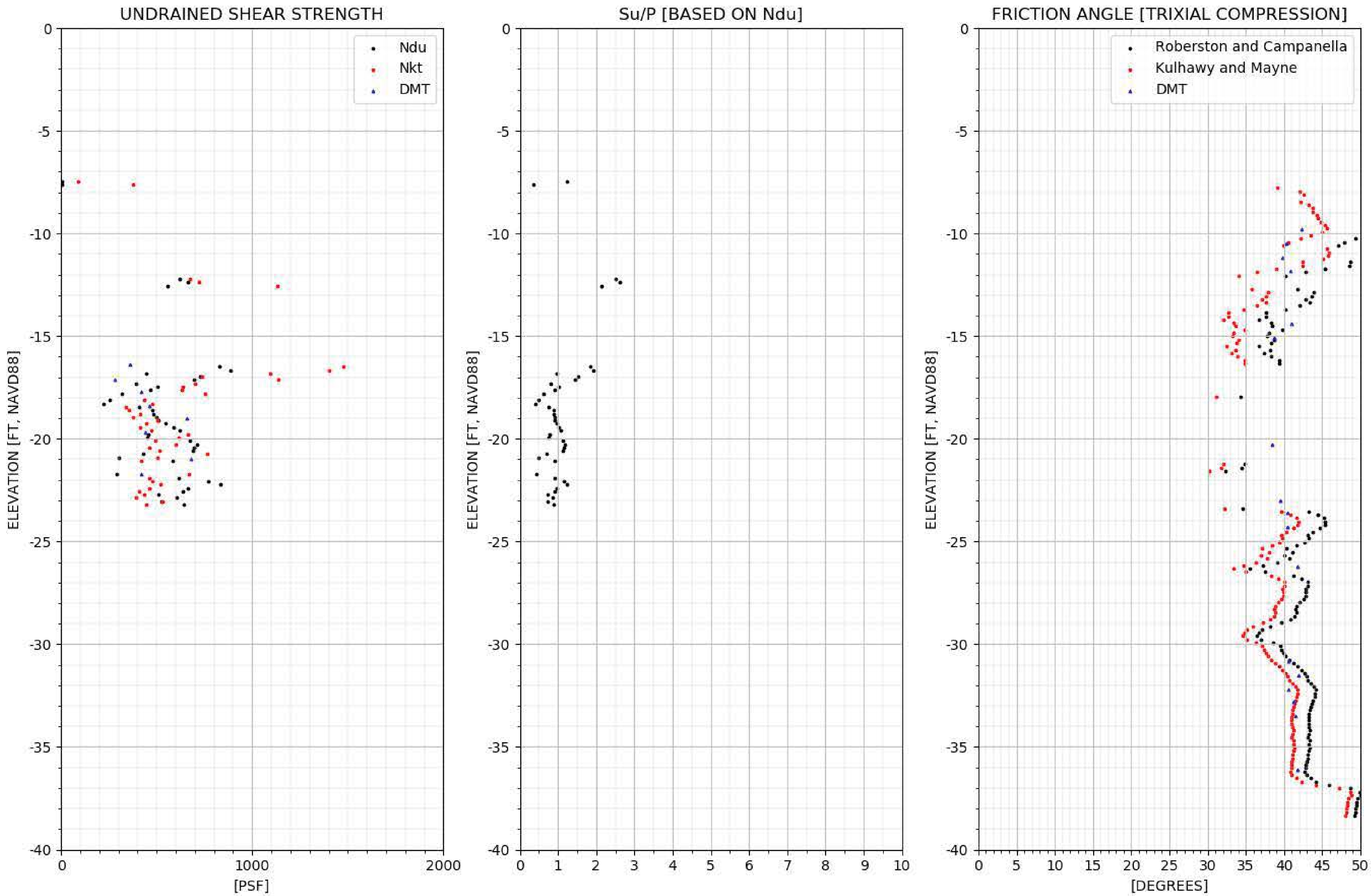



CPT-226 SHEAR STRENGTH
UNDRAINED SHEAR STRENGTH
Ndu
Nkt
ELEVATION [FT, NAVD88]
[PSF]
0
1000
2000
3000
4000
5000
6000
7000
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
-55
-60
-65
-70
Su/P [BASED ON Ndu]
0
1
2
3
4
5
6
7
8
9
10
FRICTION ANGLE [TRIXIAL COMPRESSION]
Roberston and Campanella
Kulhawy and Mayne
[DEGREES]
0
5
10
15
20
25
30
35
40
45
50

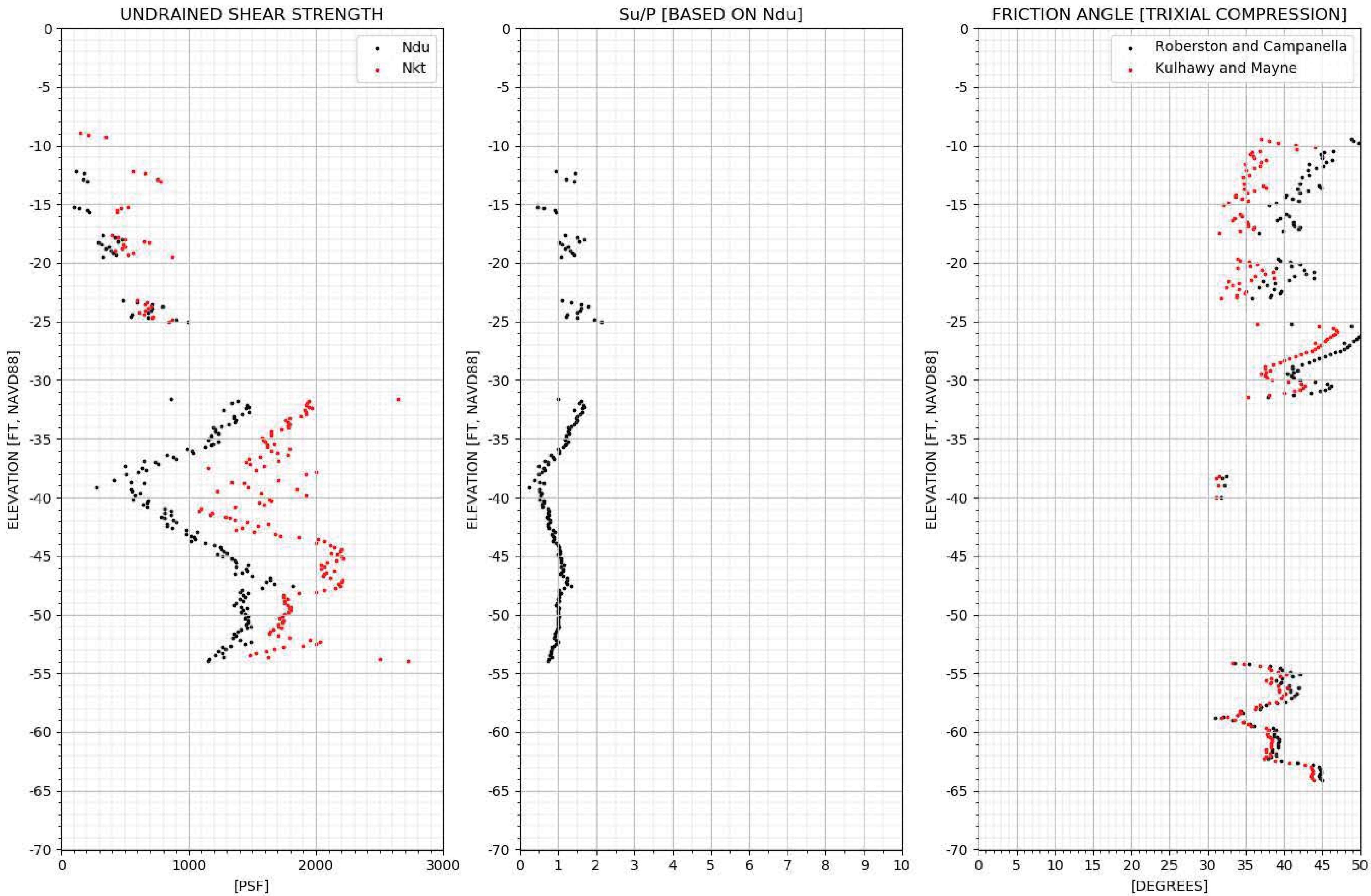
CPT-227 SHEAR STRENGTH

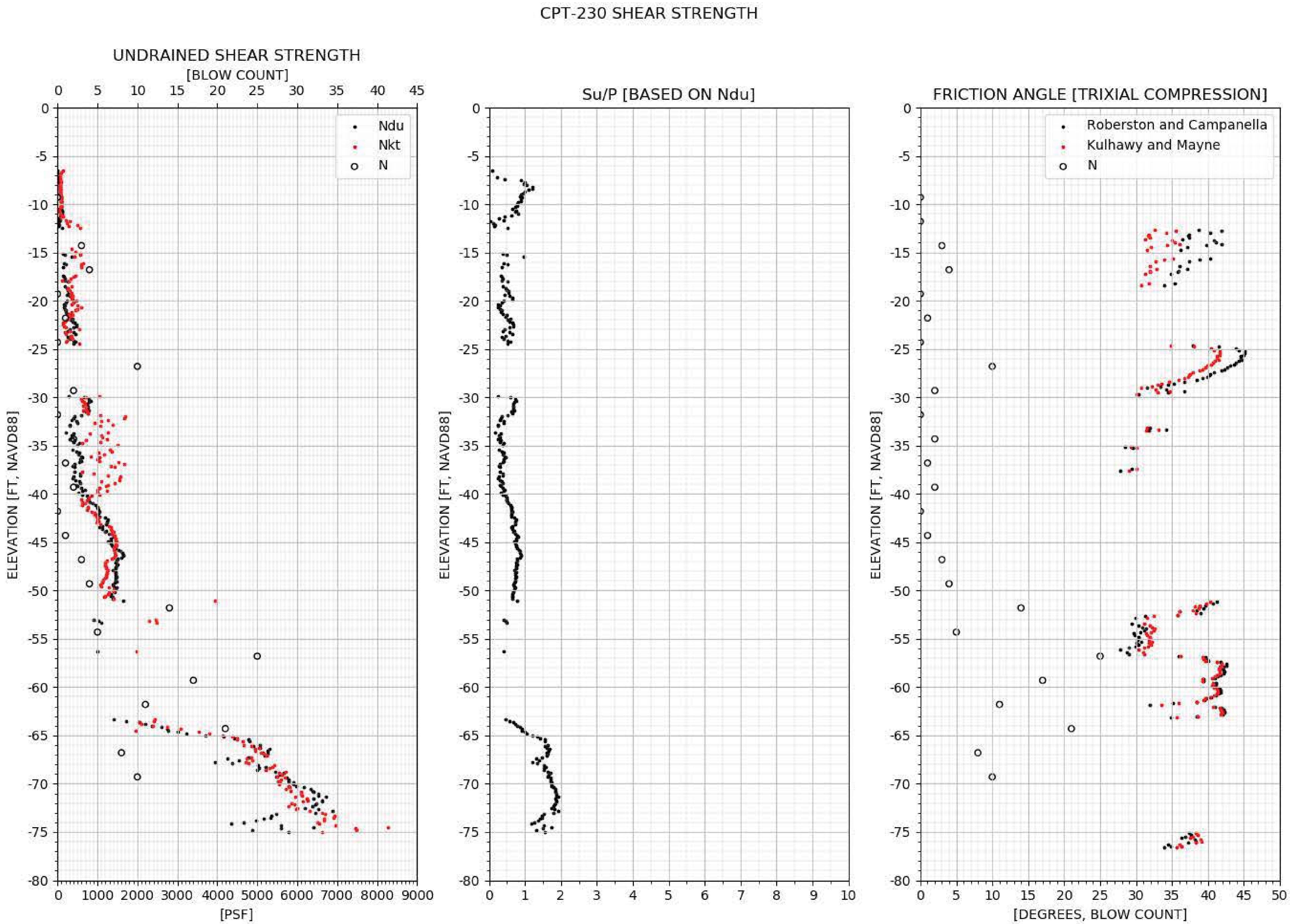


CPT-228 SHEAR STRENGTH

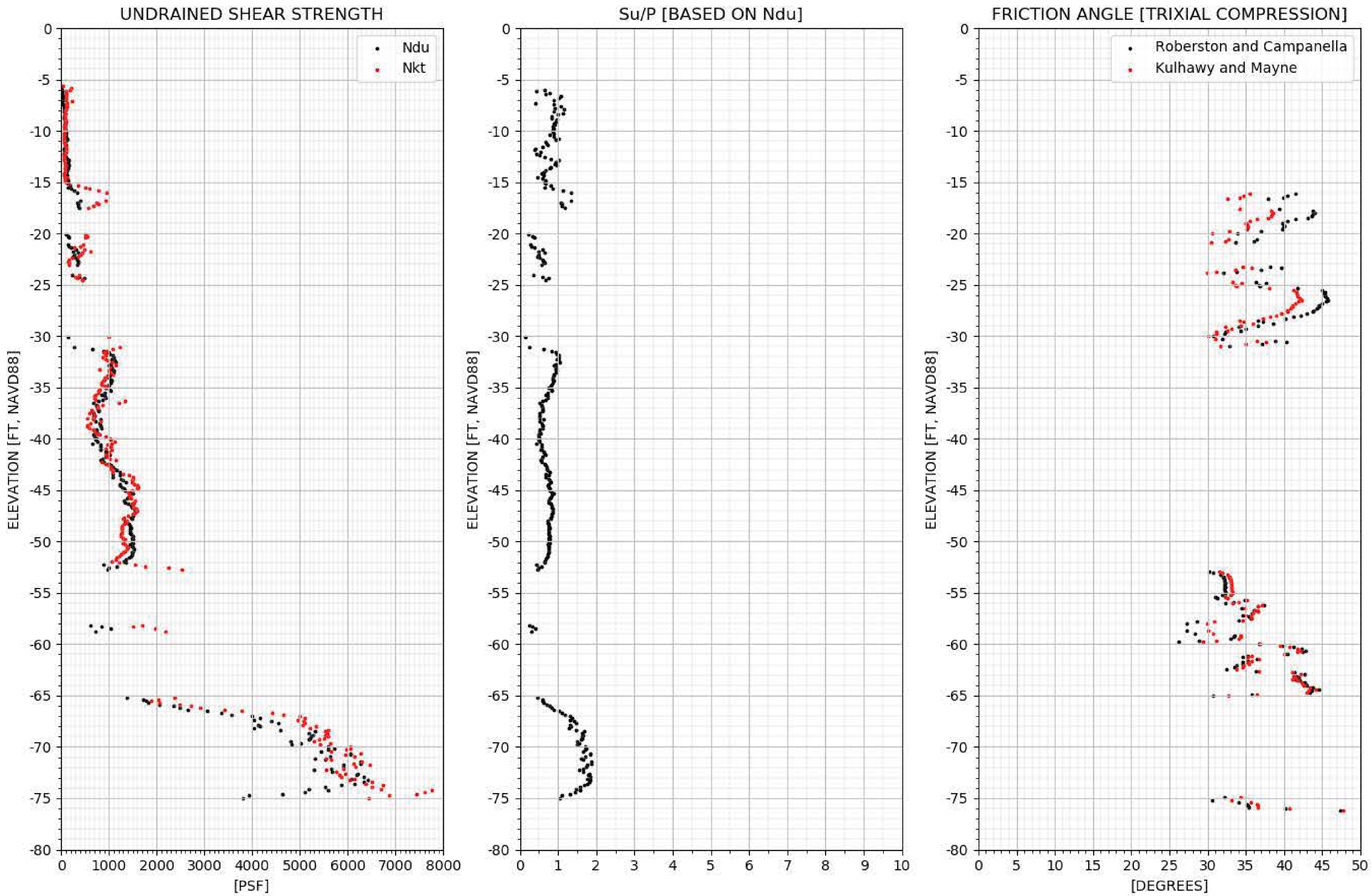


CPT-229 SHEAR STRENGTH

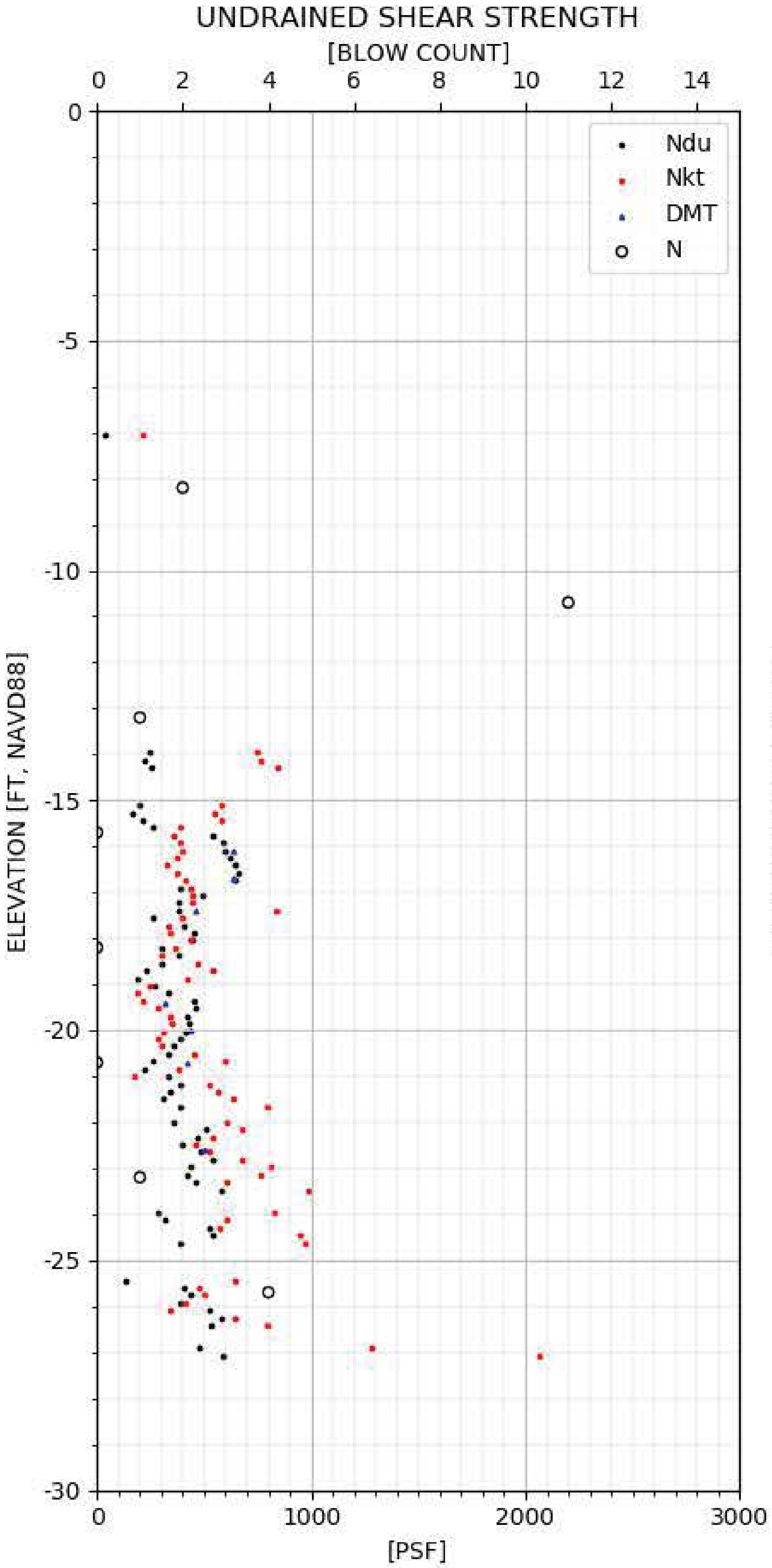


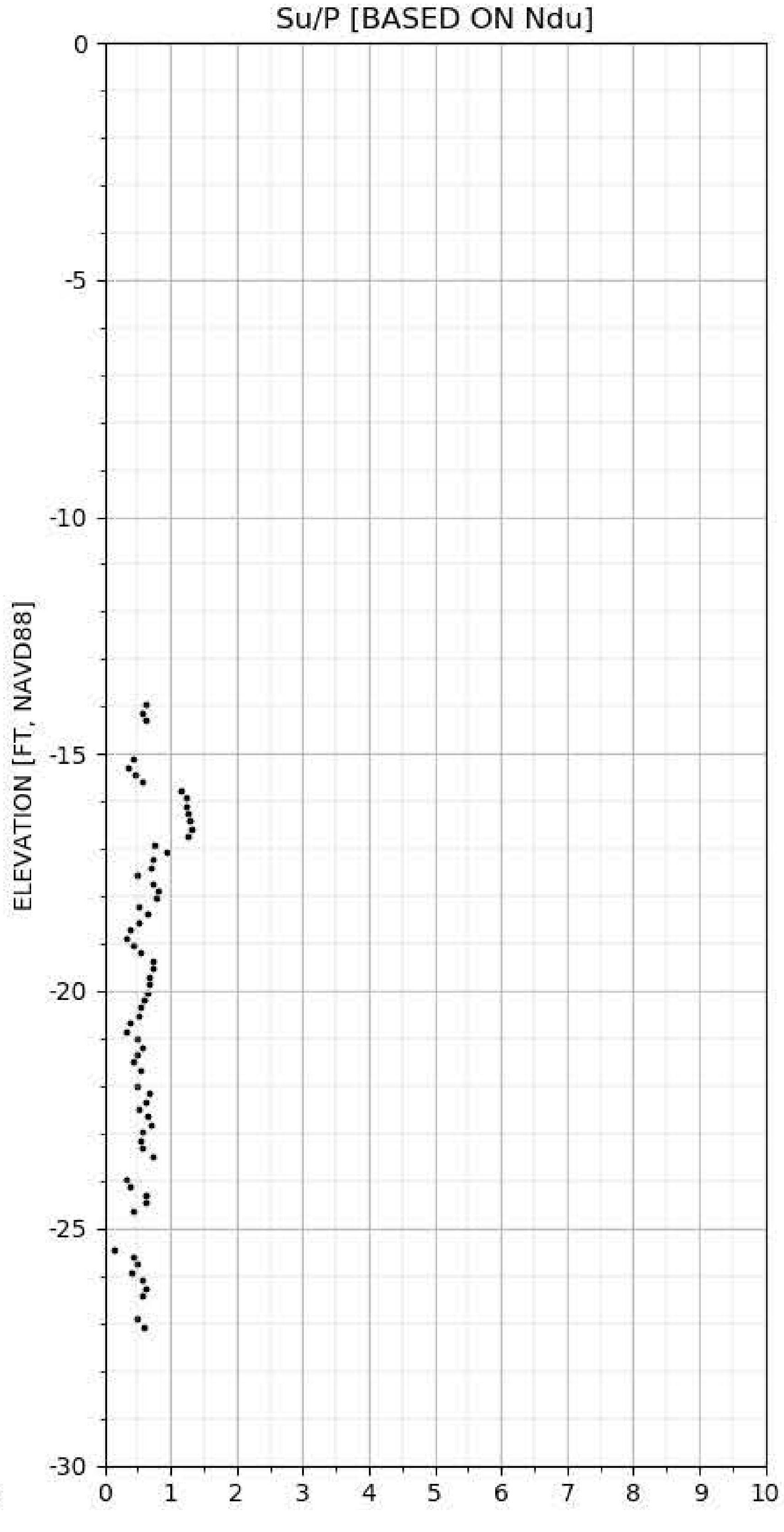

CPT-230 SHEAR STRENGTH
UNDRAINED SHEAR STRENGTH
[BLOW COUNT]
Ndu
Nkt
N
ELEVATION [FT, NAVD88]
[PSF]
Su/P [BASED ON Ndu]
ELEVATION [FT, NAVD88]
FRICTION ANGLE [TRIXIAL COMPRESSION]
Roberston and Campanella
Kulhawy and Mayne
N
ELEVATION [FT, NAVD88]
[DEGREES, BLOW COUNT]

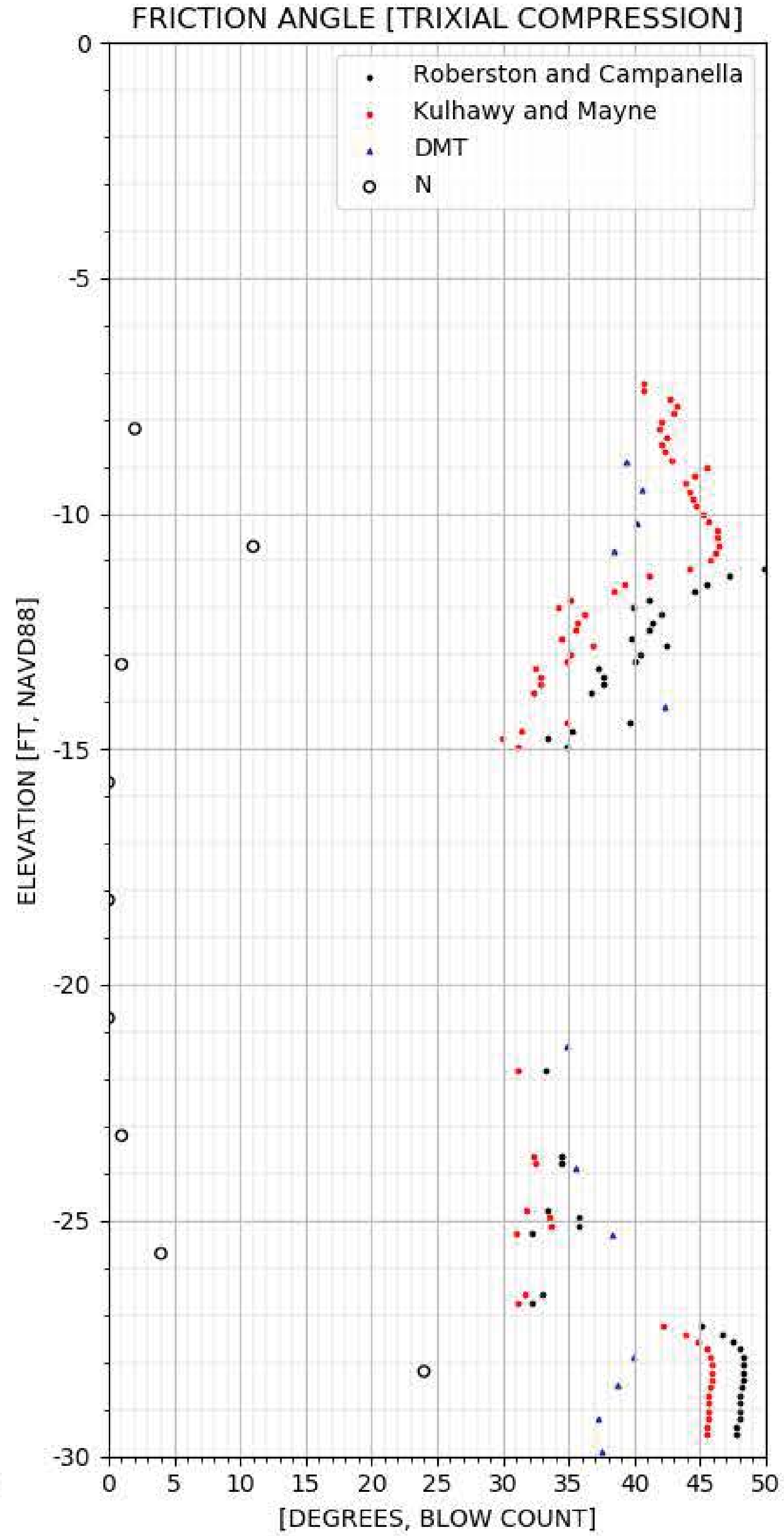
CPT-231 SHEAR STRENGTH



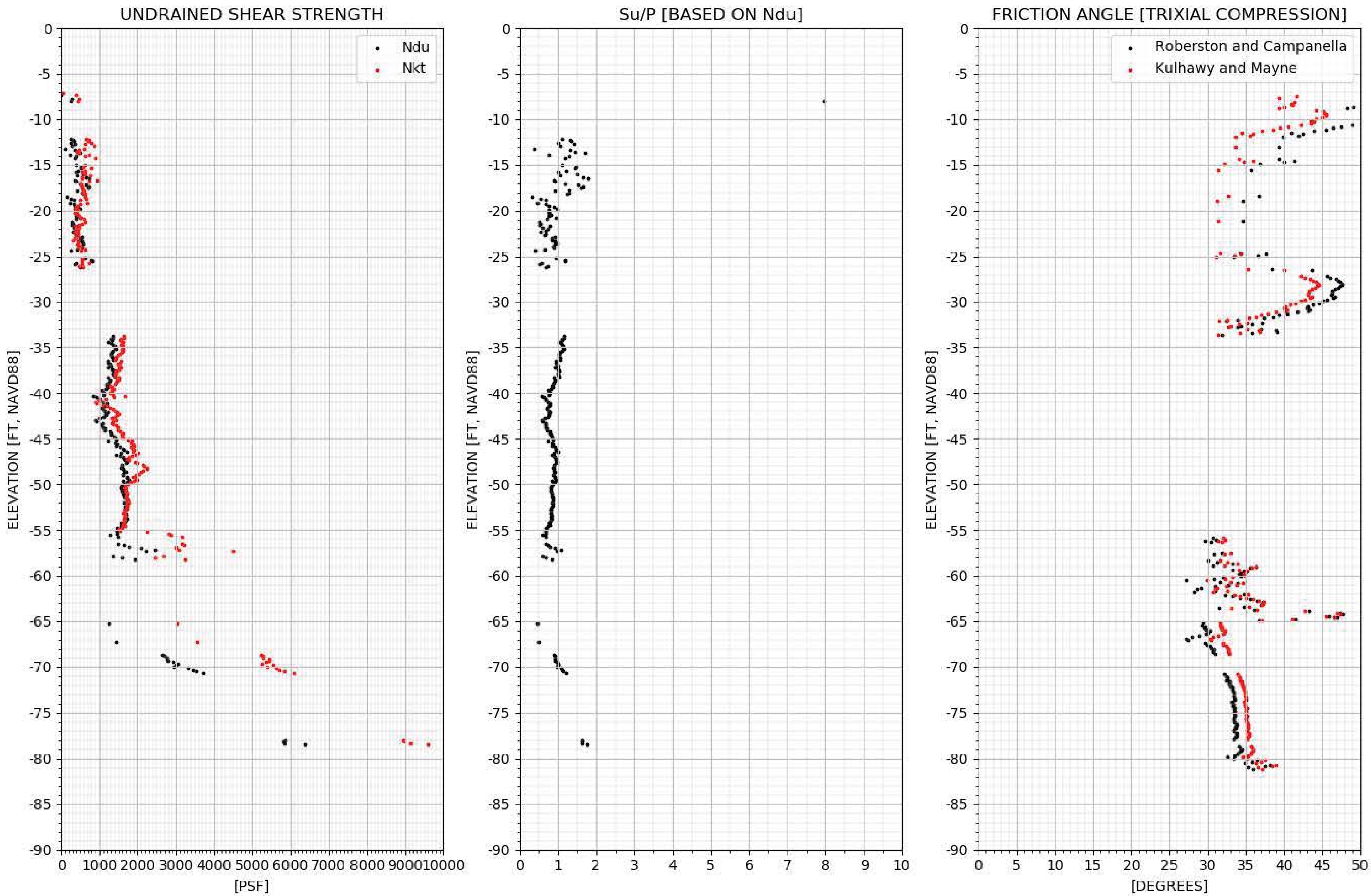
CPT-232 SHEAR STRENGTH

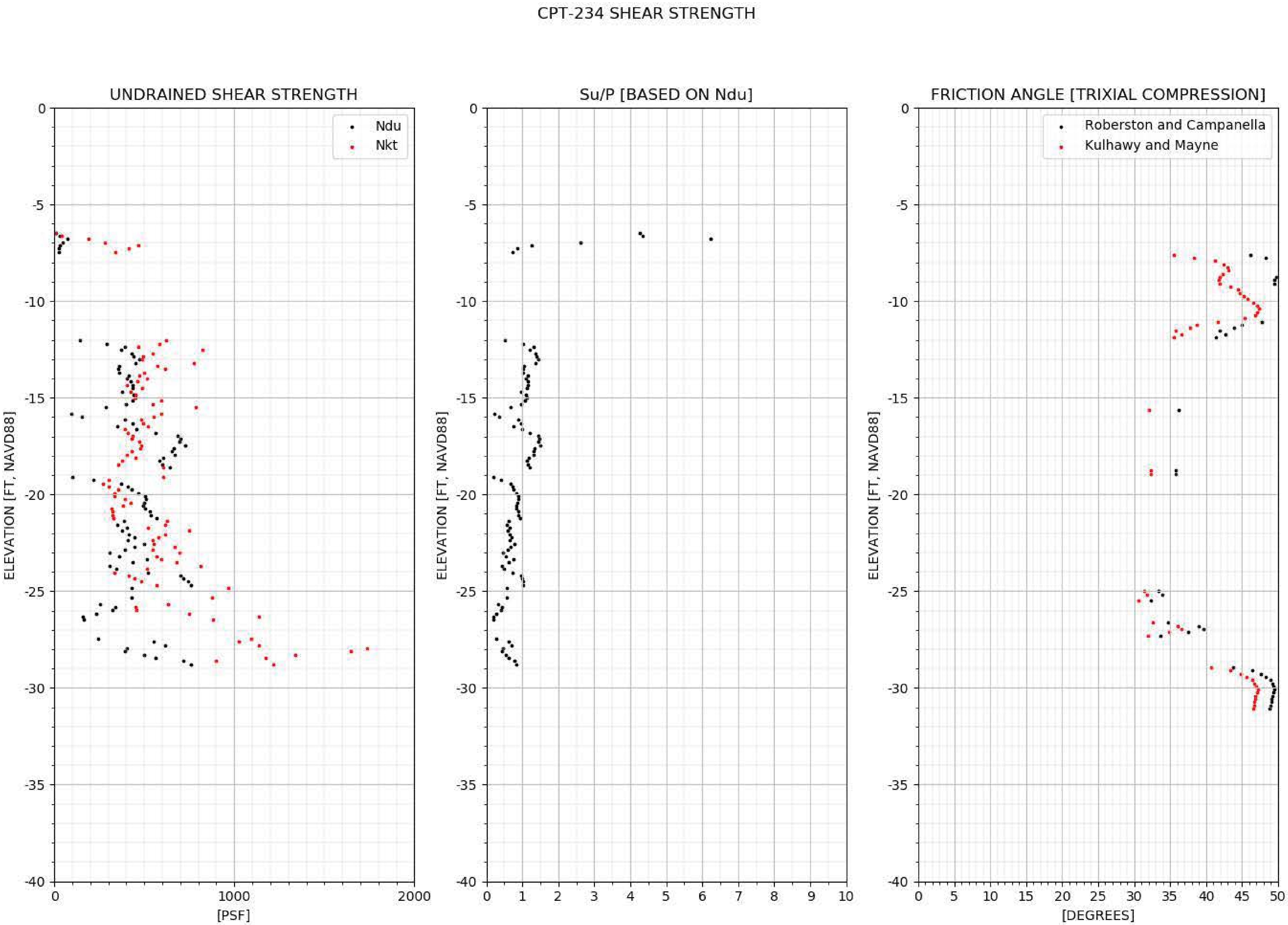






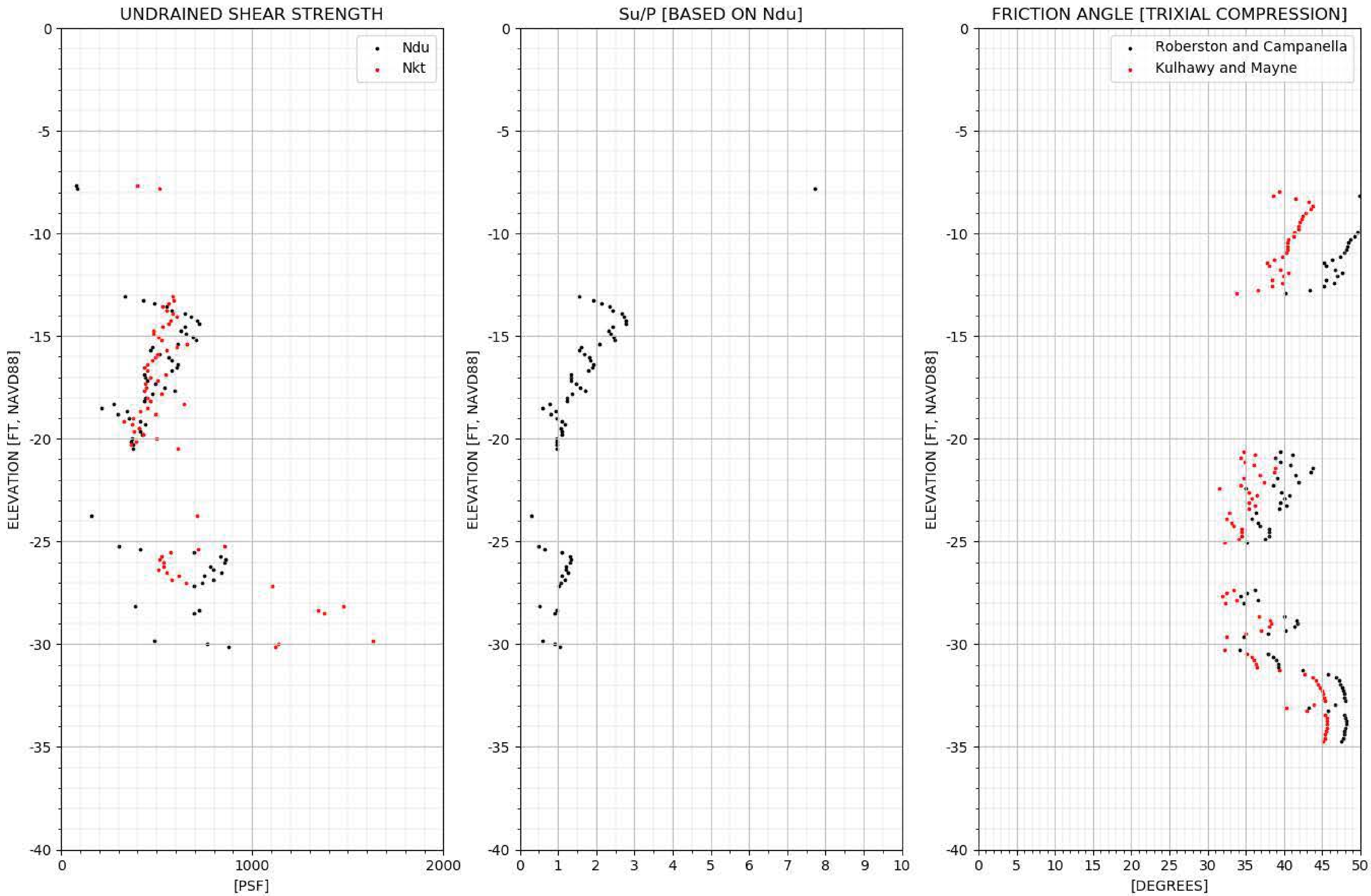
CPT-233 SHEAR STRENGTH



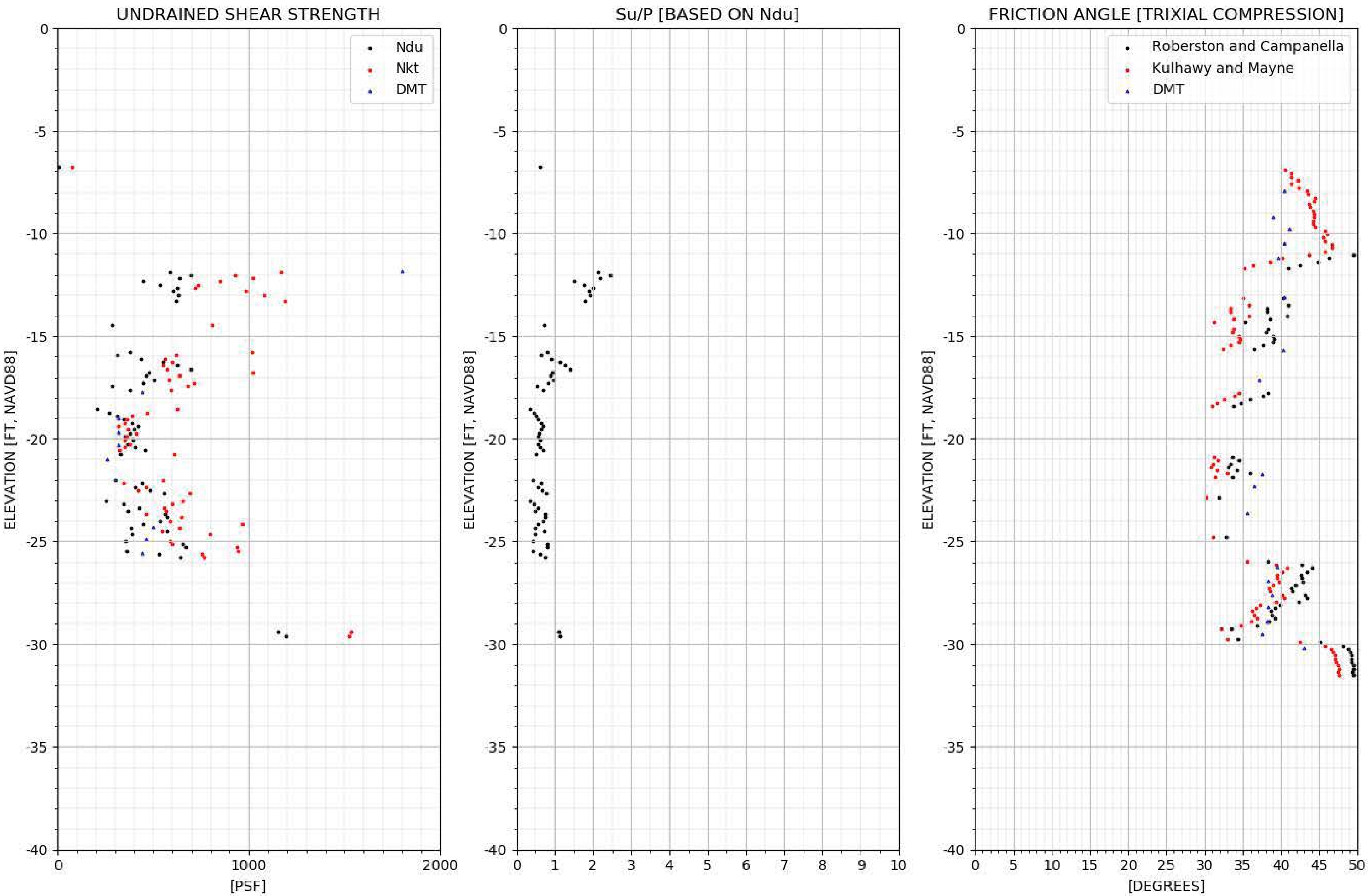


CPT-234 SHEAR STRENGTH
UNDRAINED SHEAR STRENGTH
Ndu
Nkt
ELEVATION [FT, NAVD88]
[PSF]
0
-5
-10
-15
-20
-25
-30
-35
-40
0
1000
2000
Su/P [BASED ON Ndu]
0
1
2
3
4
5
6
7
8
9
10
FRICTION ANGLE [TRIXIAL COMPRESSION]
Roberston and Campanella
Kulhawy and Mayne
[DEGREES]
0
5
10
15
20
25
30
35
40
45
50

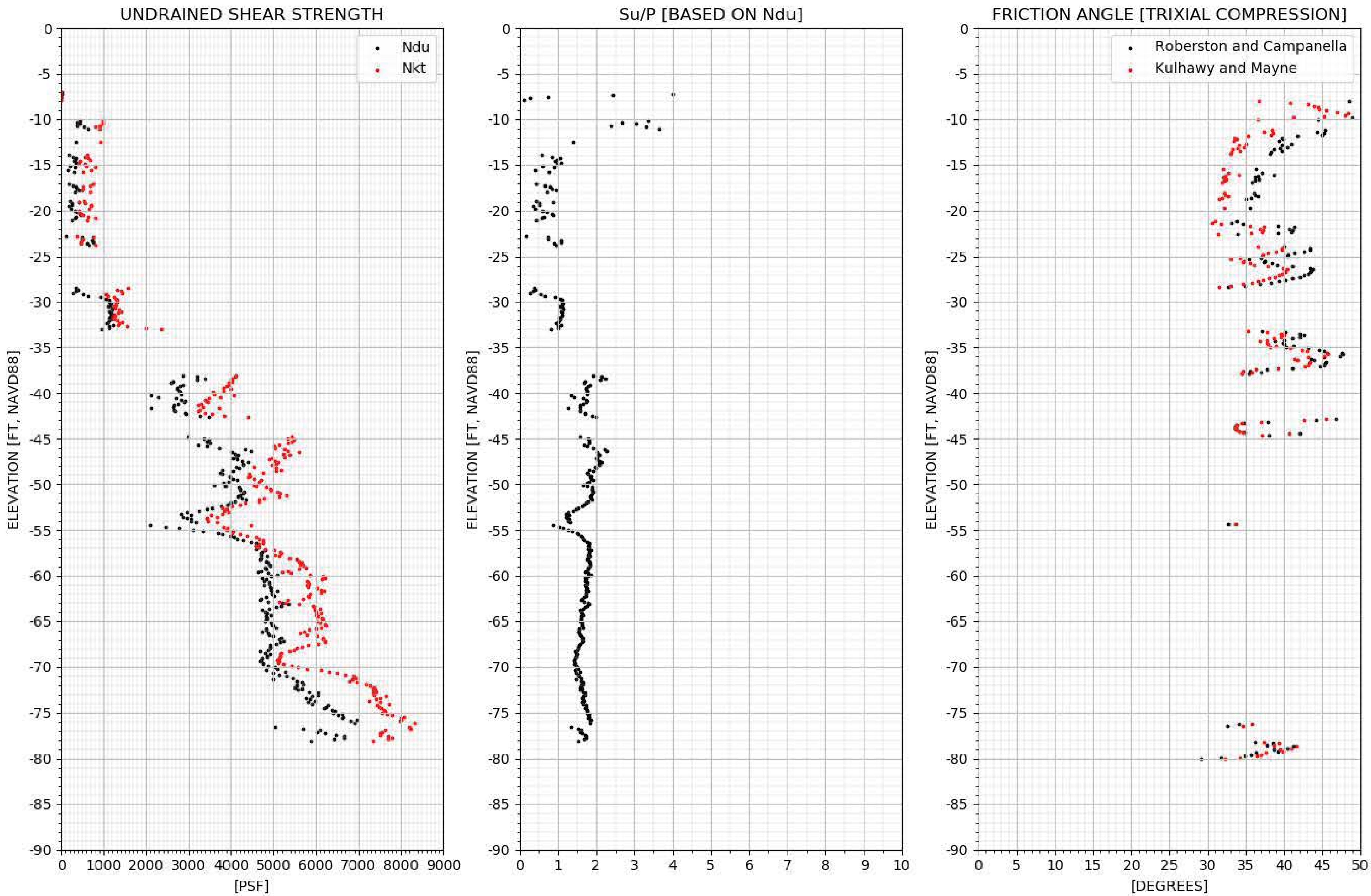
CPT-235 SHEAR STRENGTH



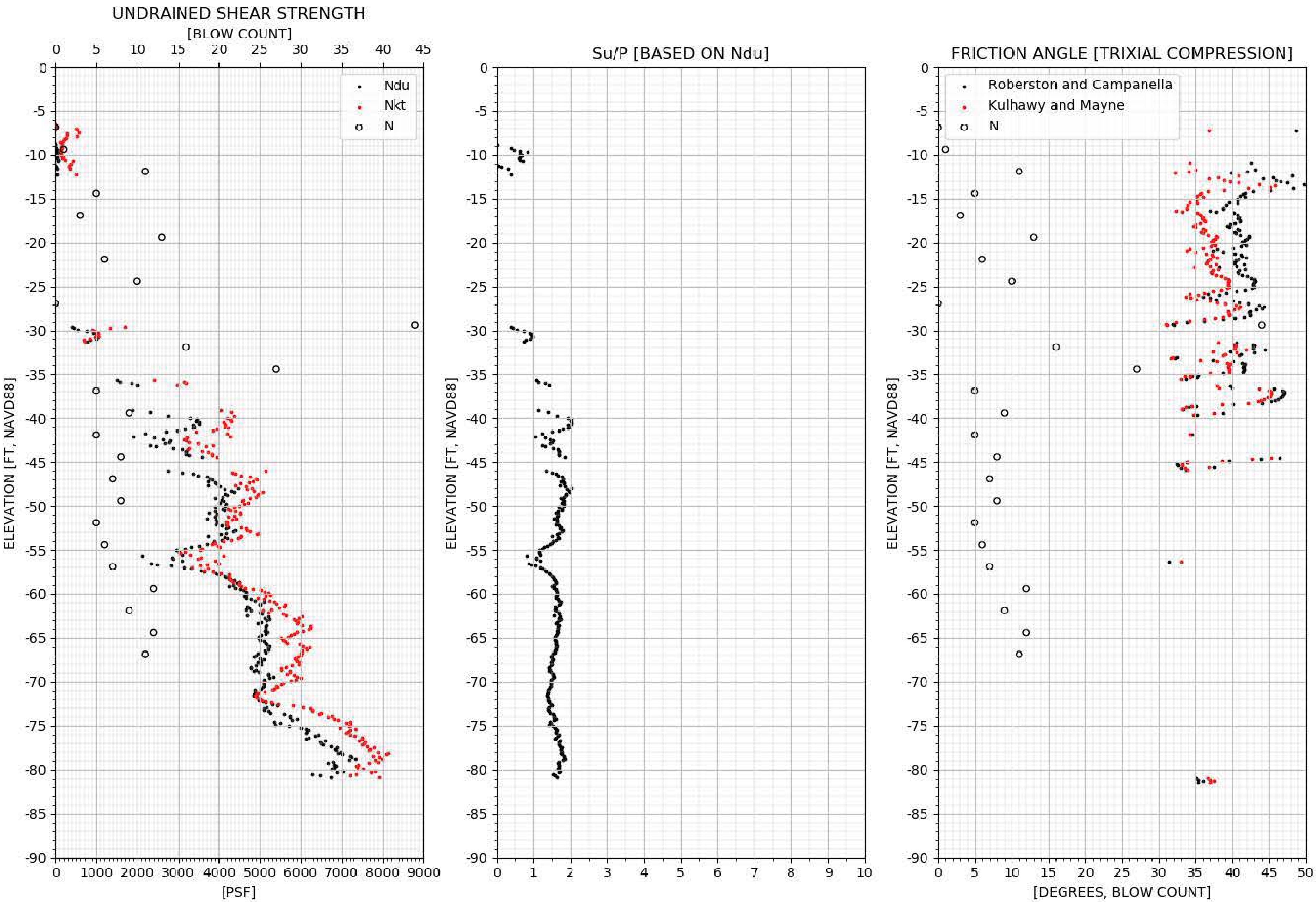
CPT-236 SHEAR STRENGTH



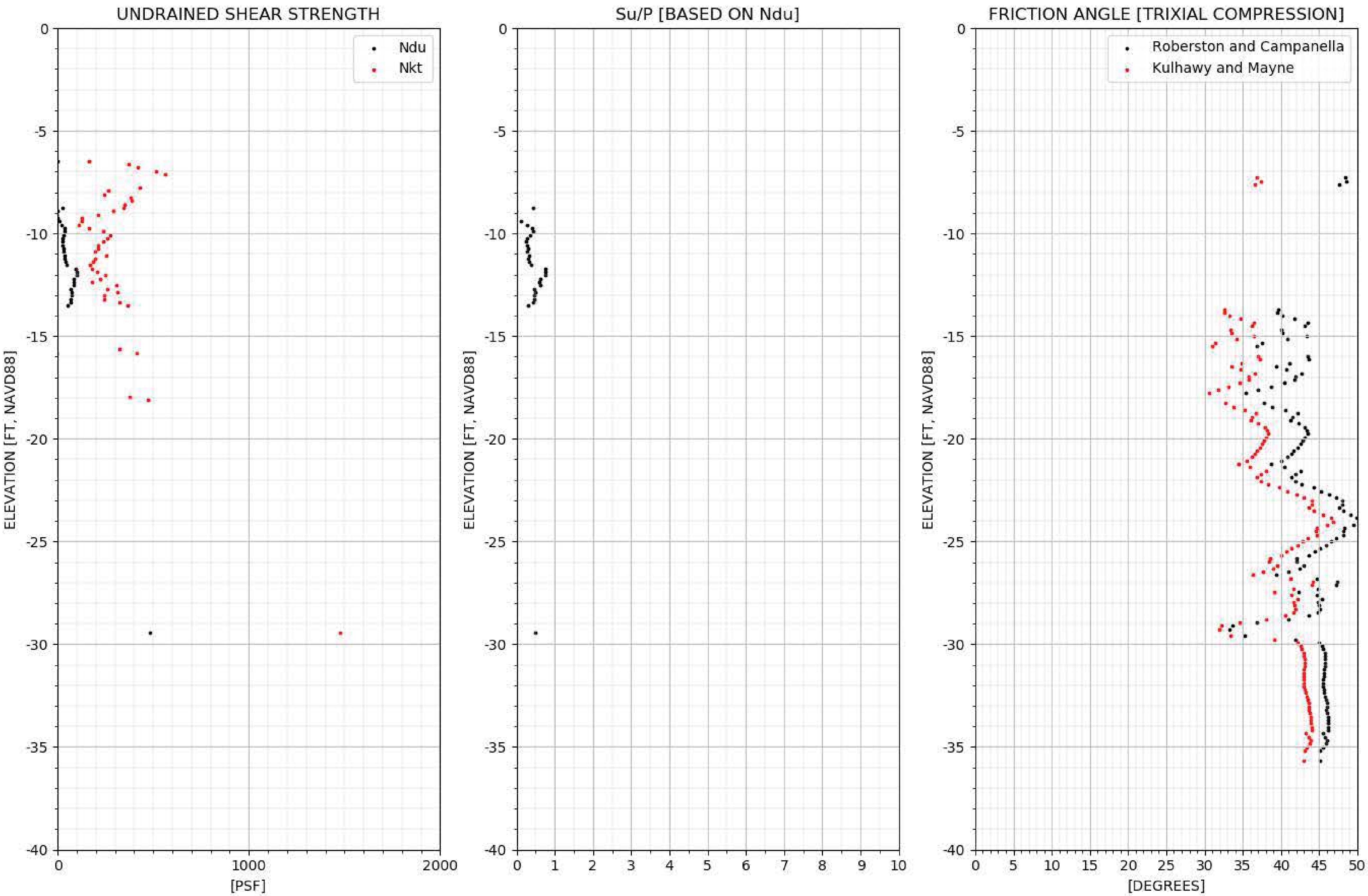
CPT-237 SHEAR STRENGTH



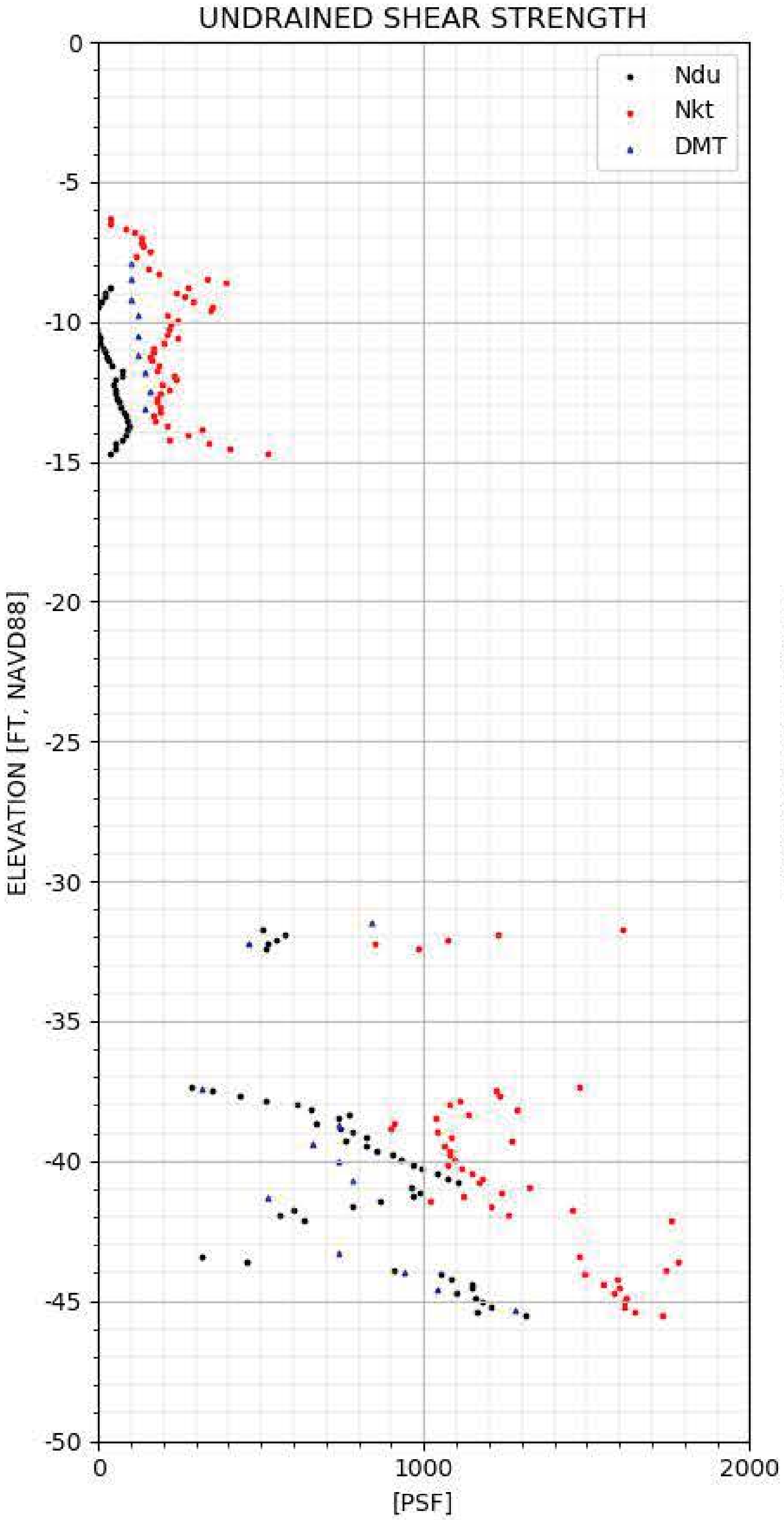
CPT-238 SHEAR STRENGTH

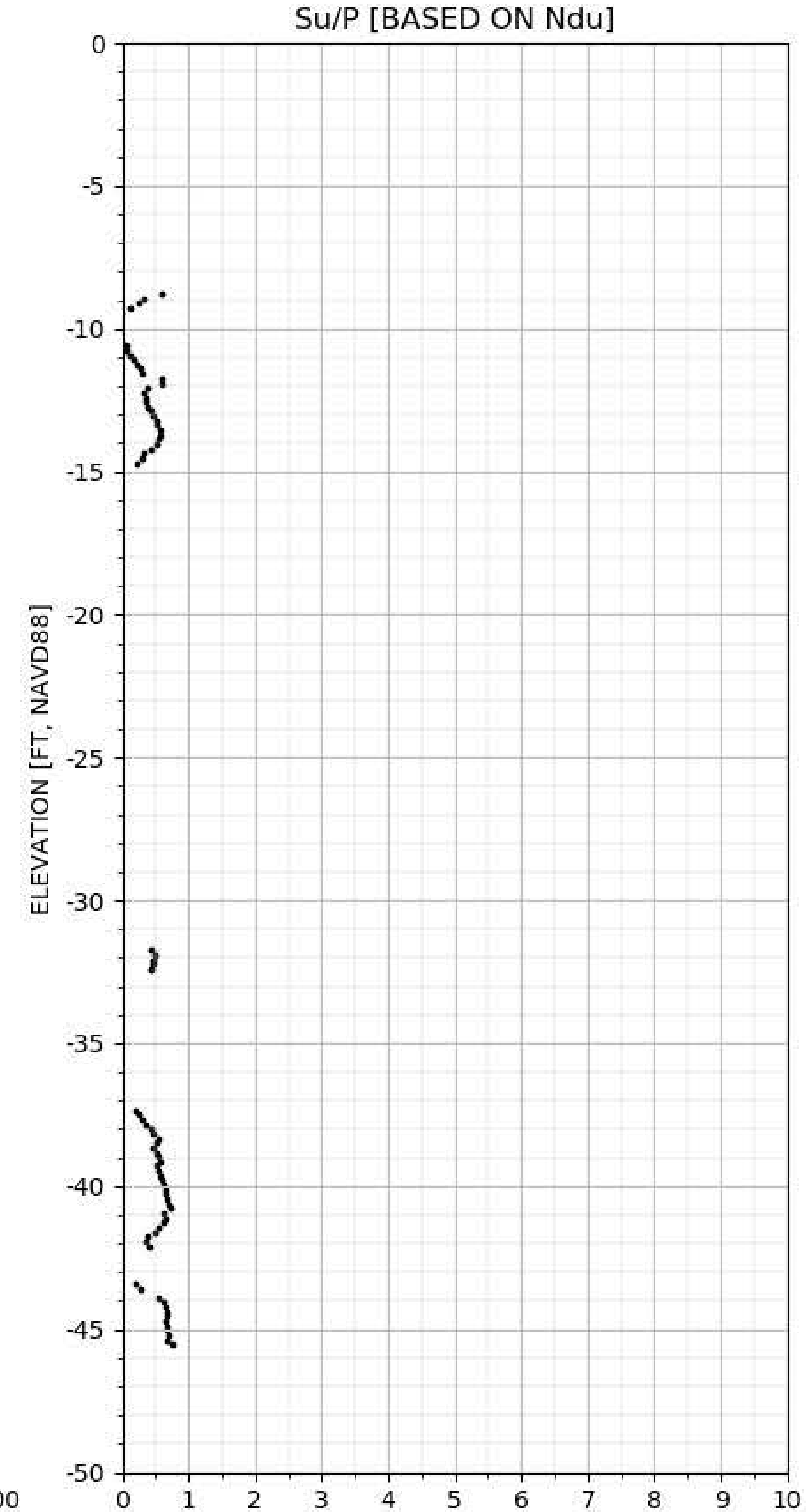


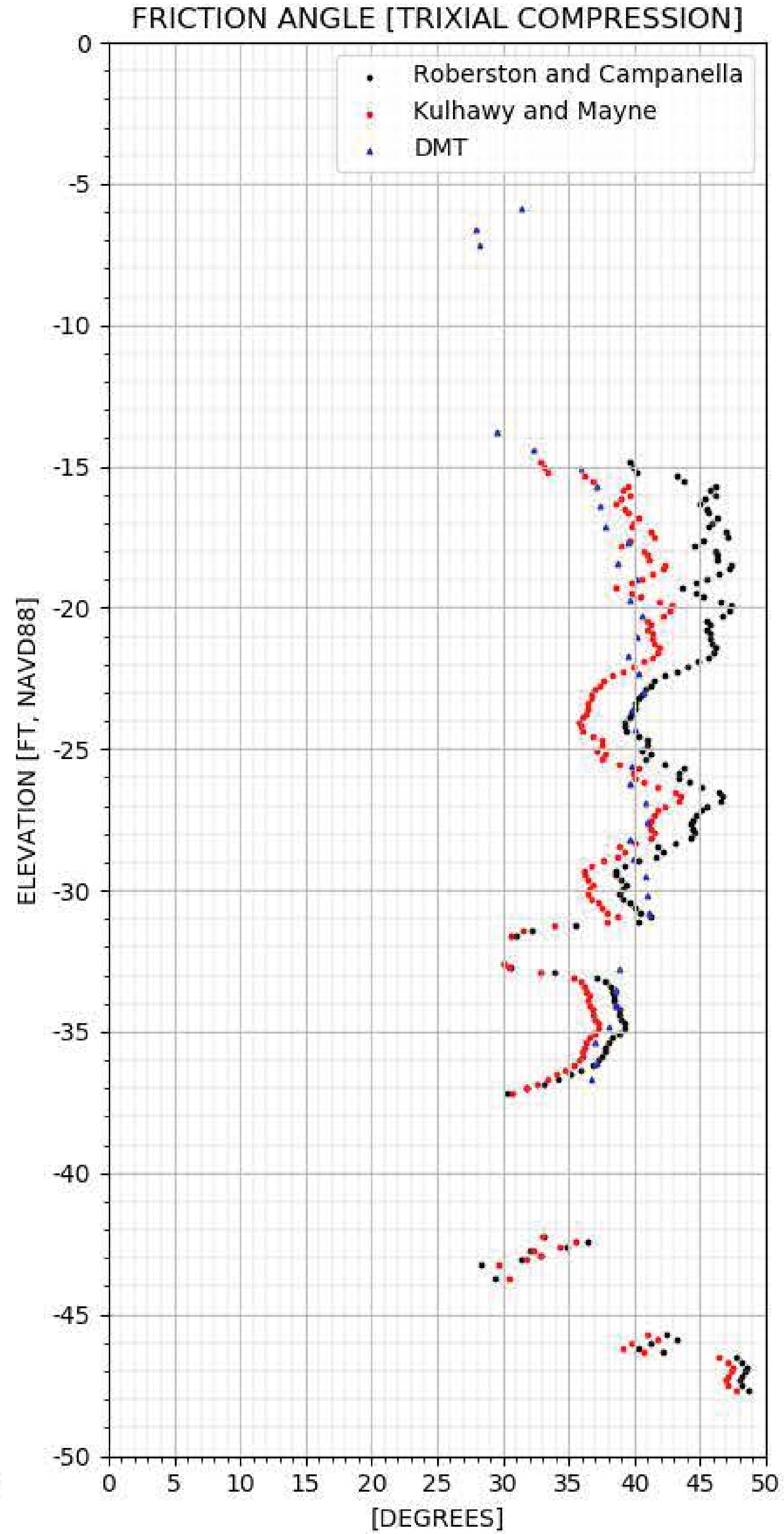
CPT-239 SHEAR STRENGTH



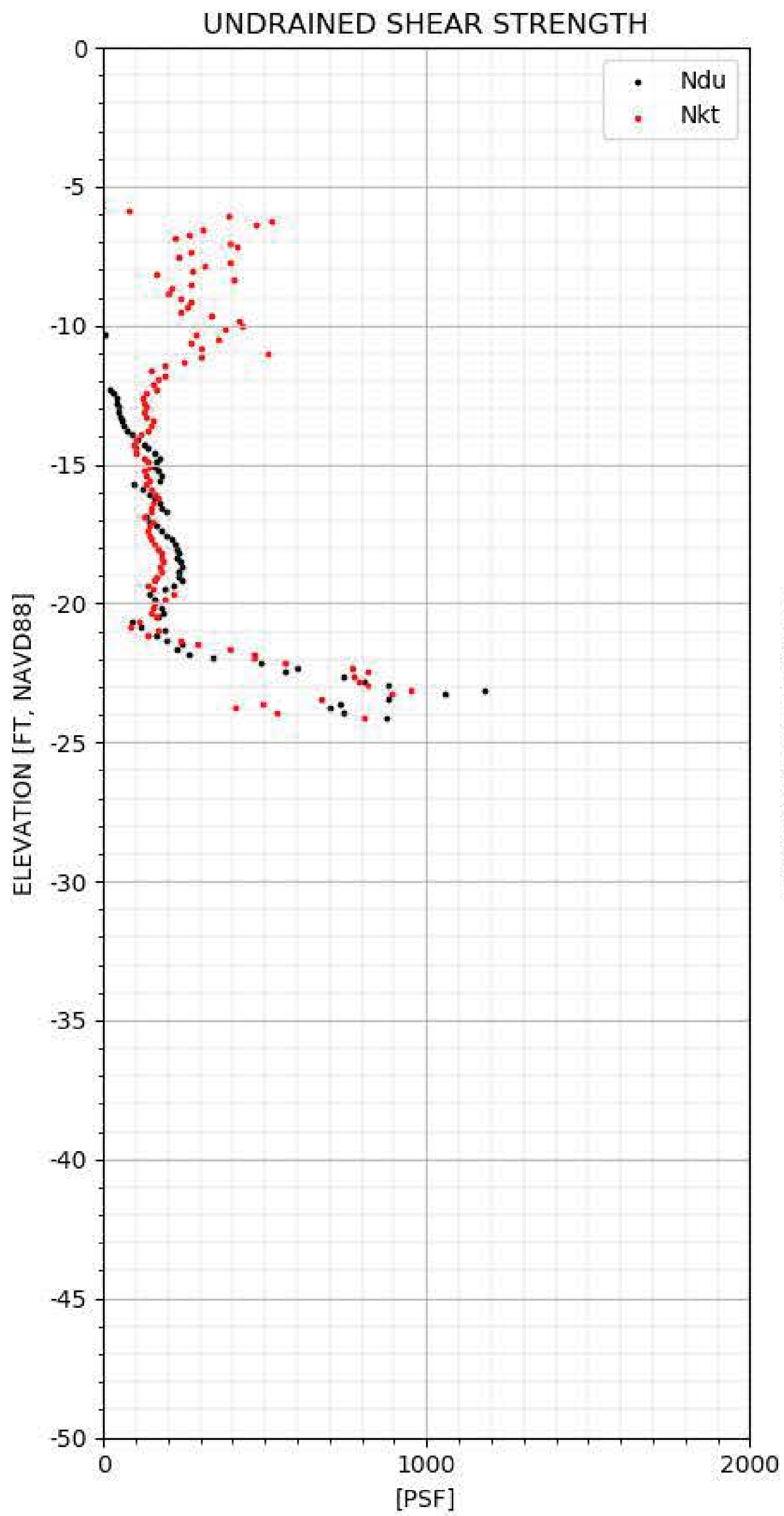
CPT-240 SHEAR STRENGTH

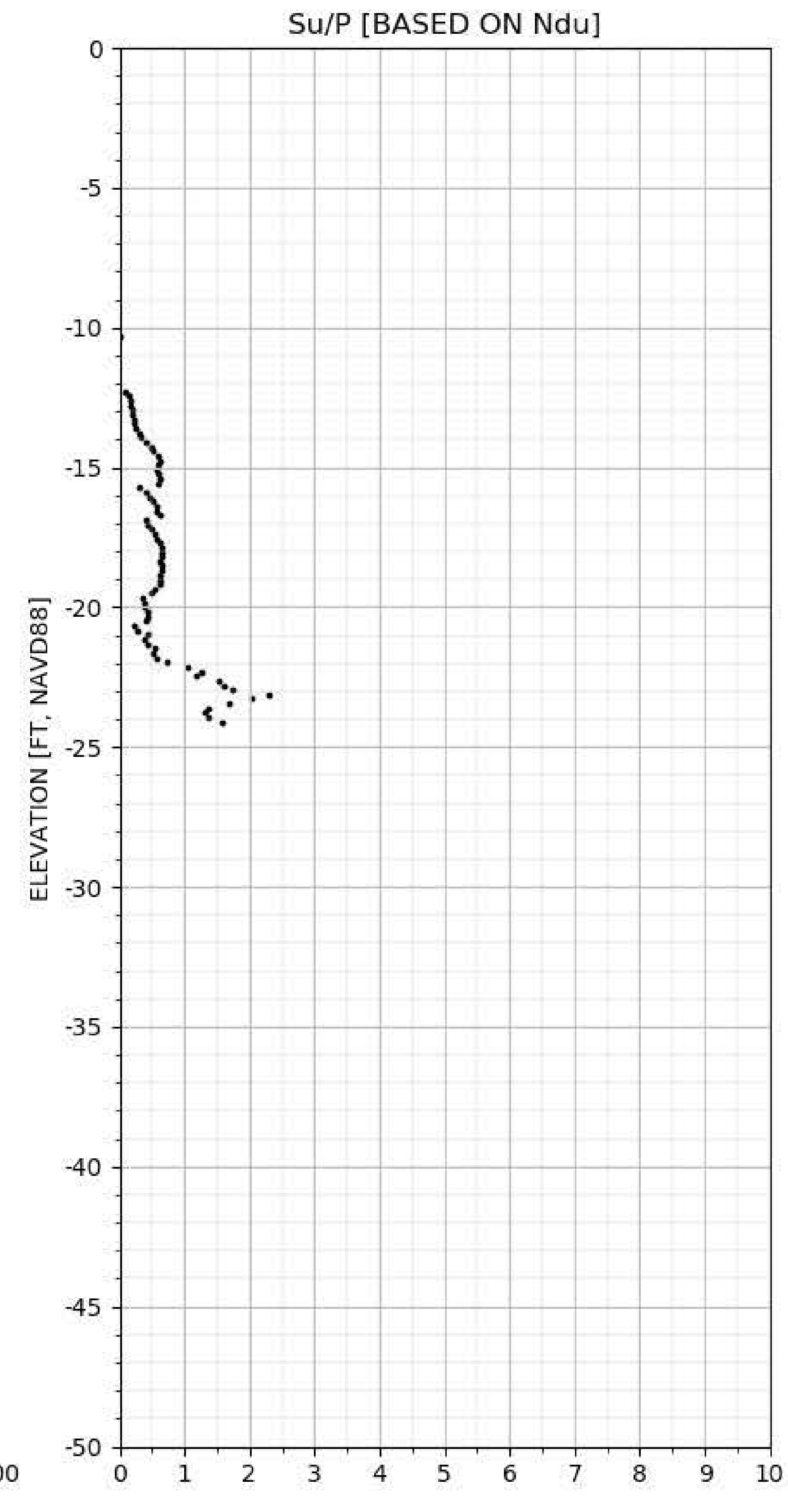


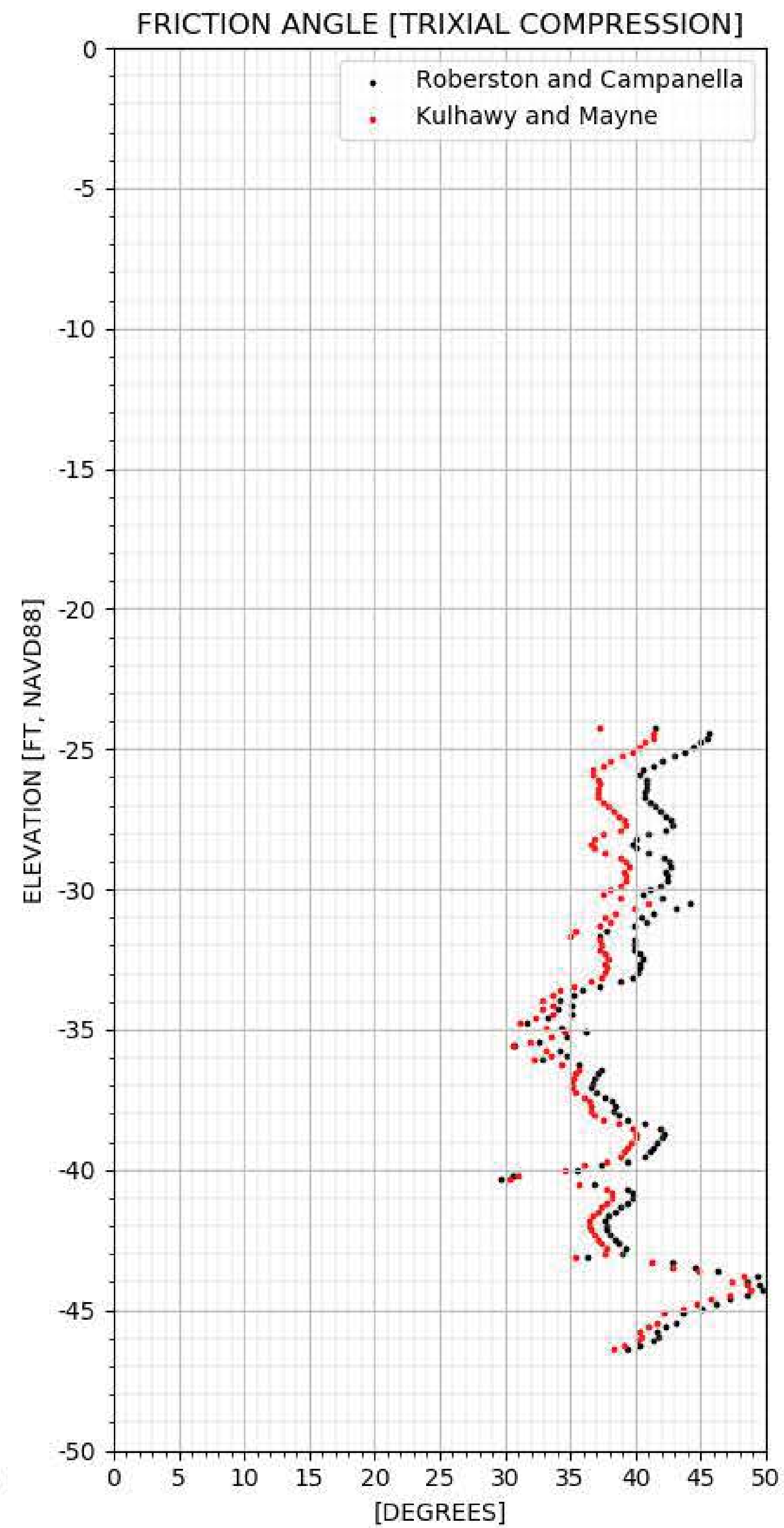




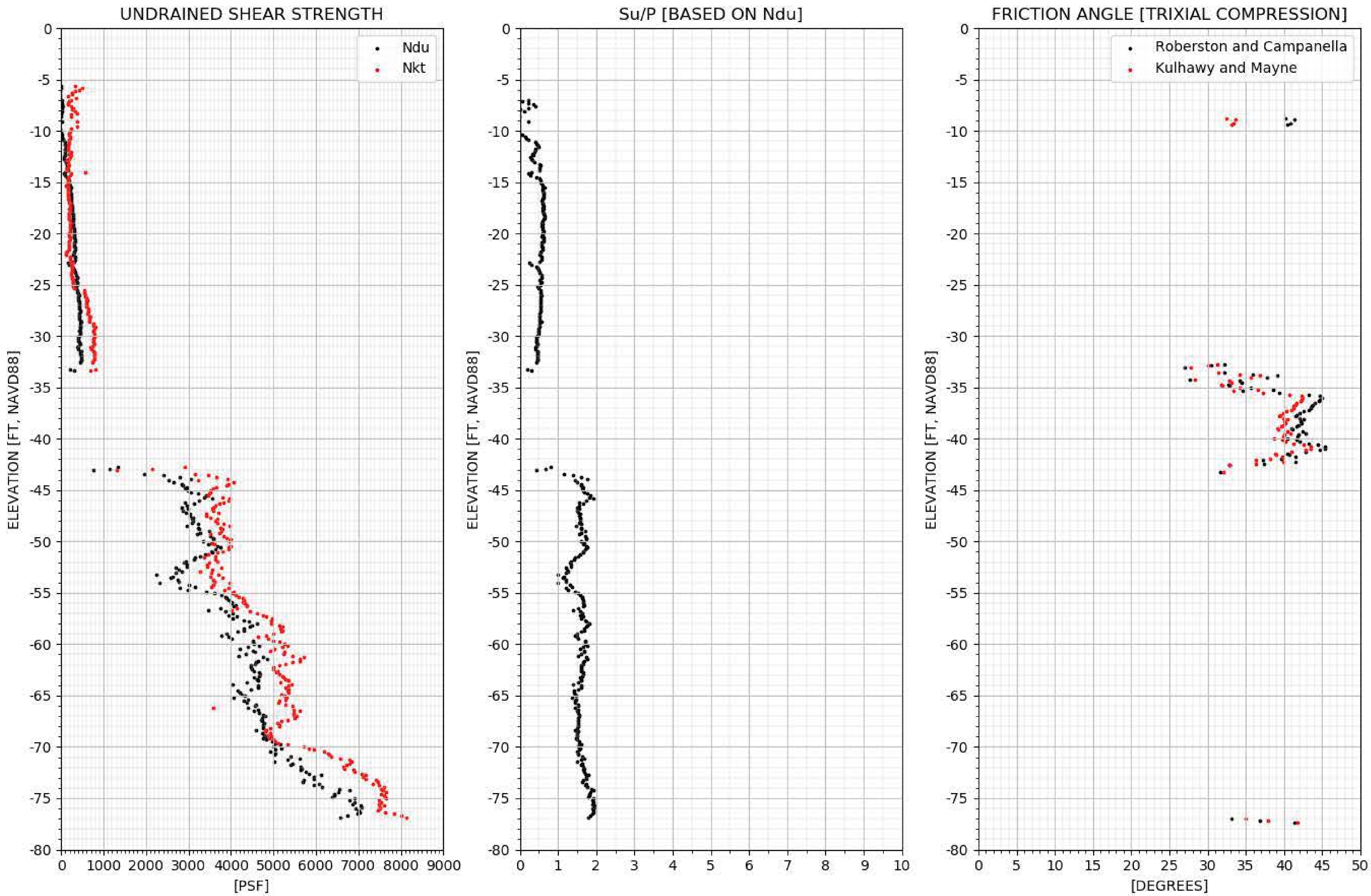
CPT-241 SHEAR STRENGTH



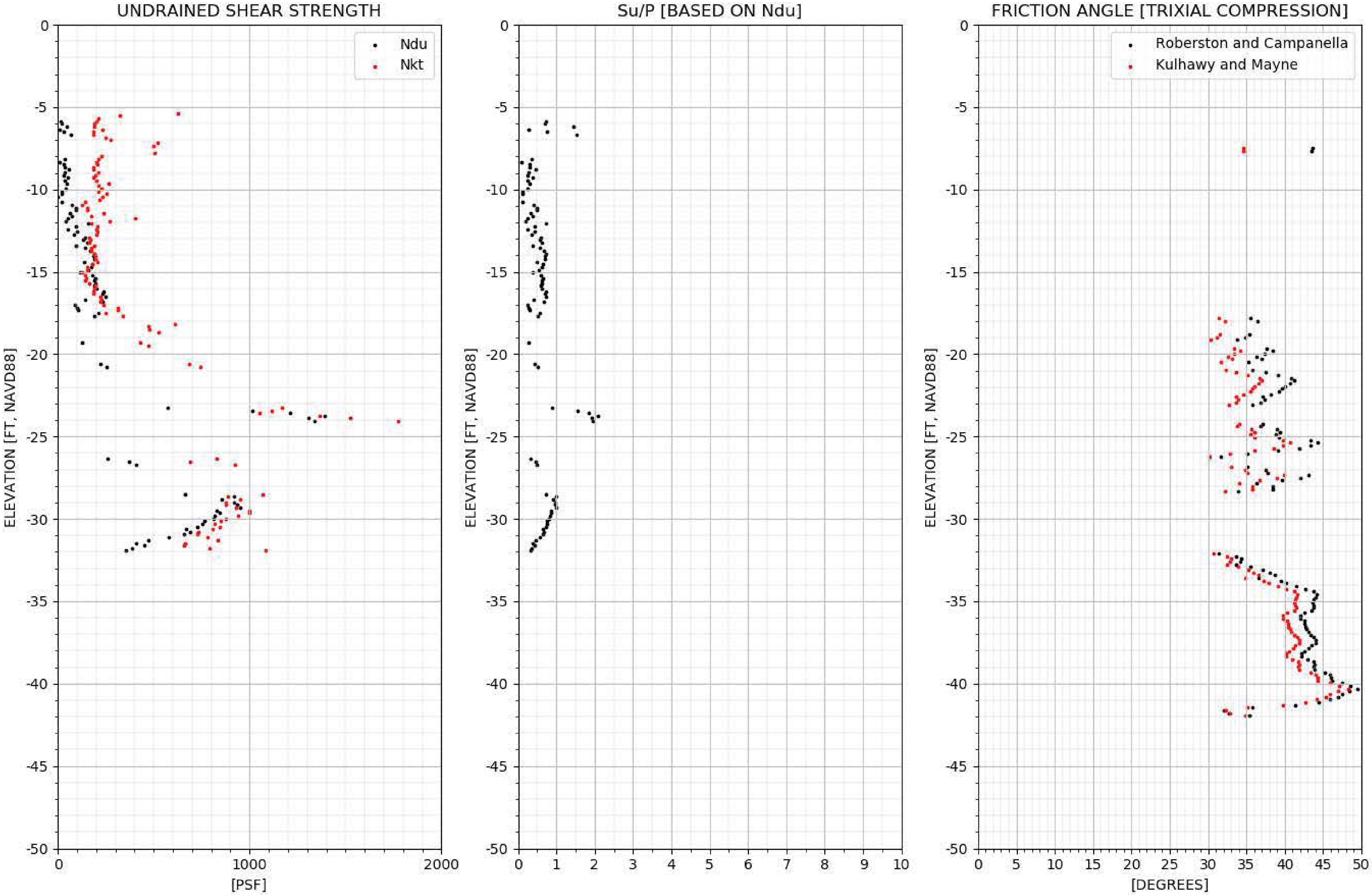




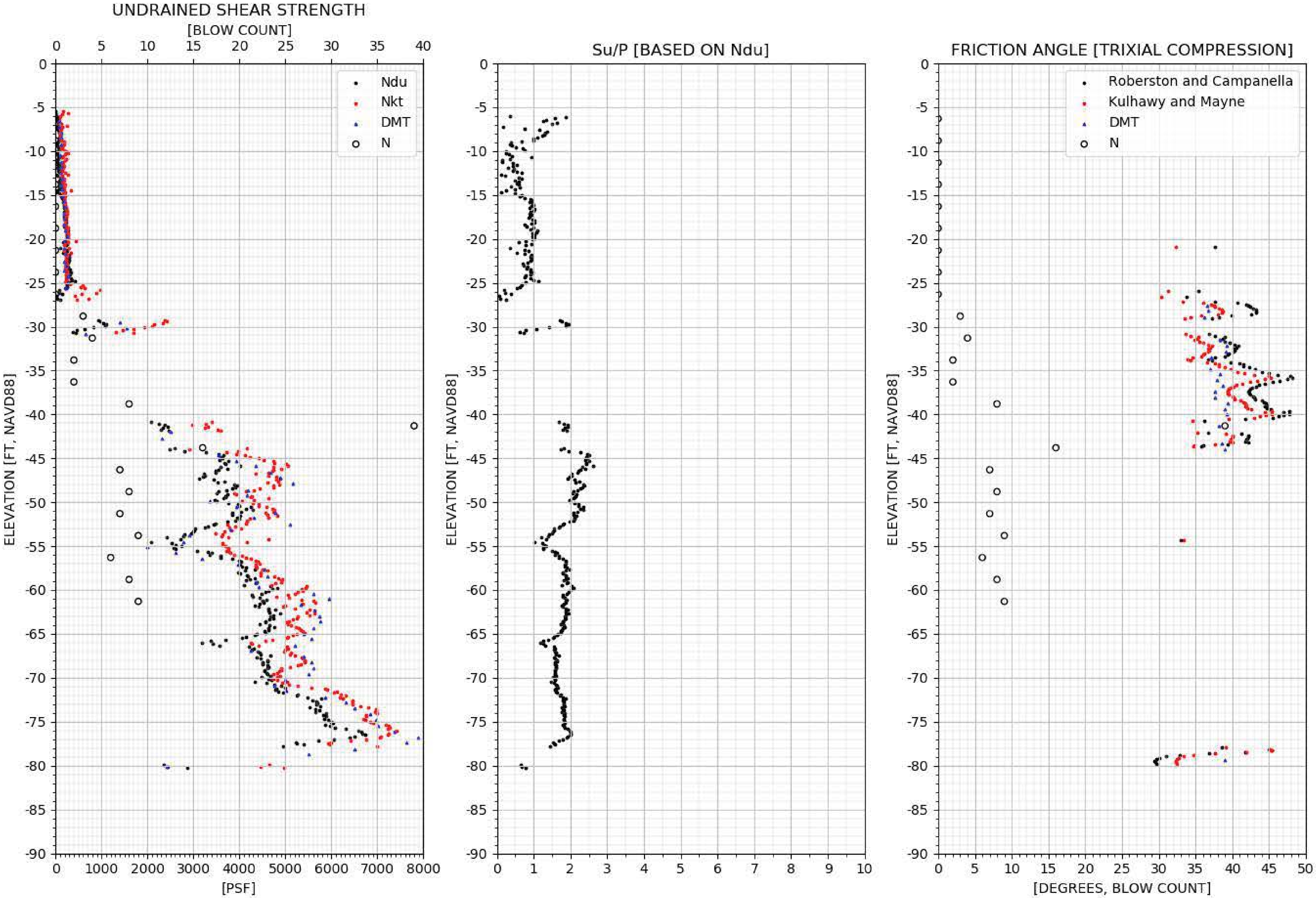
CPT-242 SHEAR STRENGTH

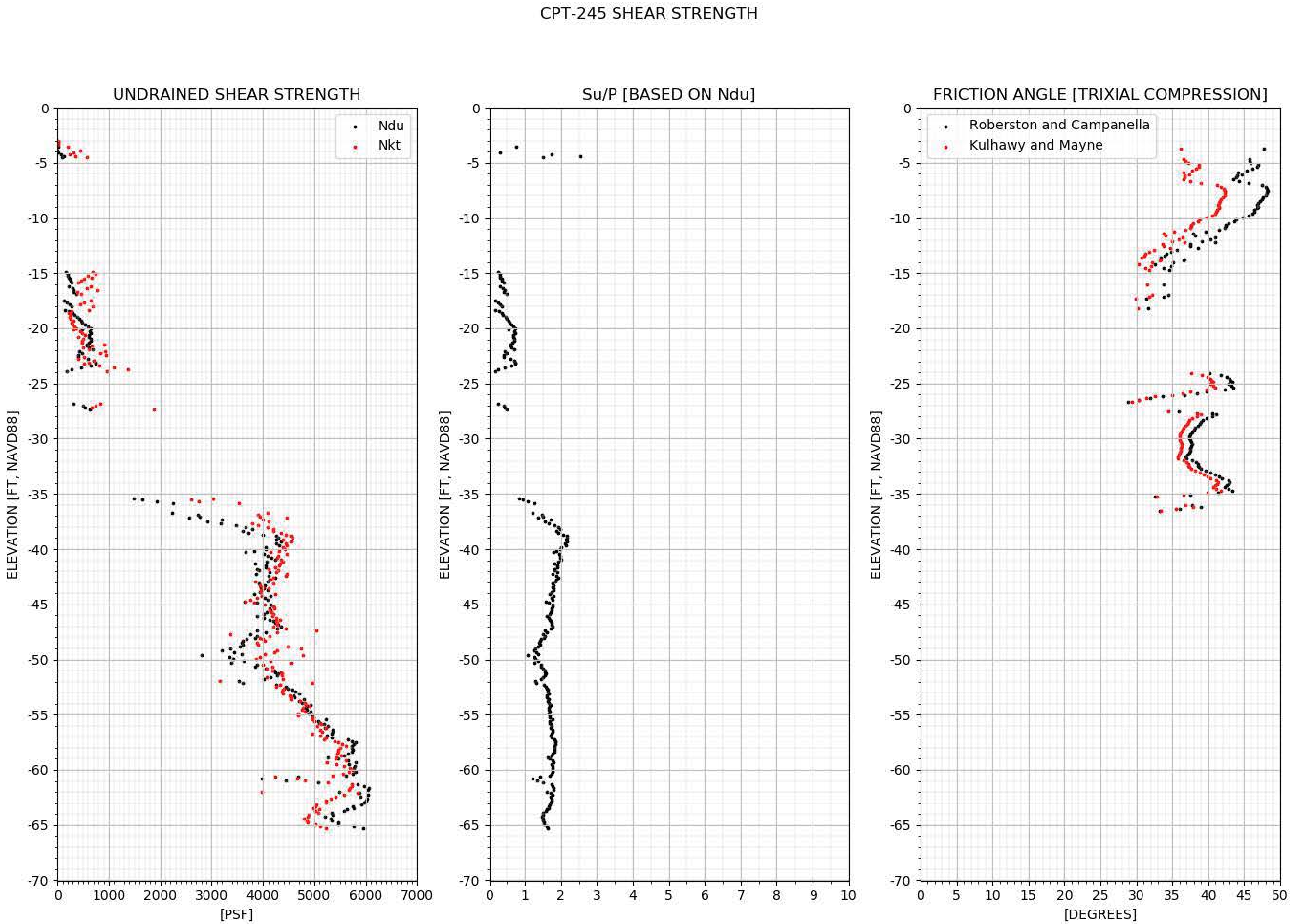


CPT-243 SHEAR STRENGTH

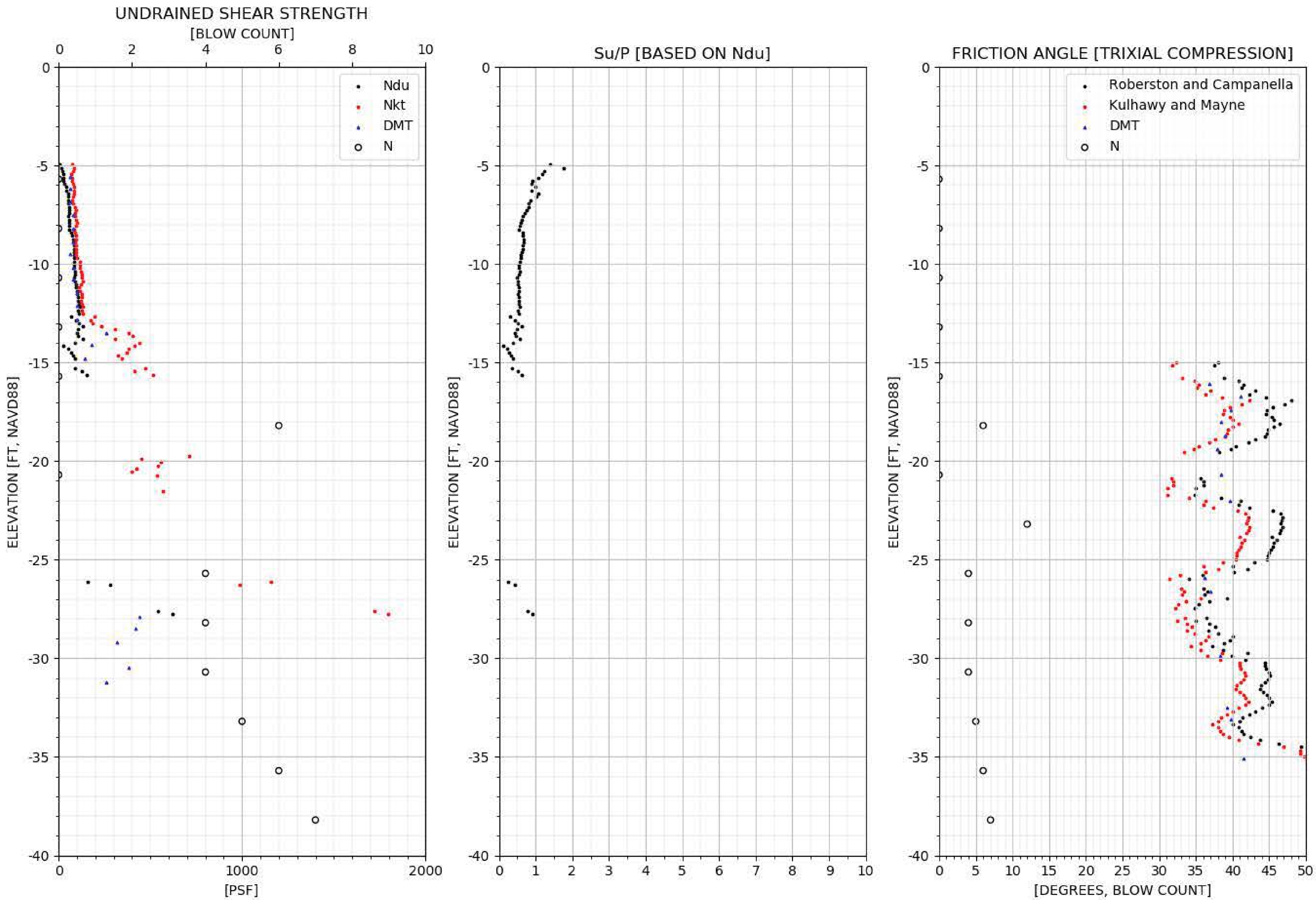


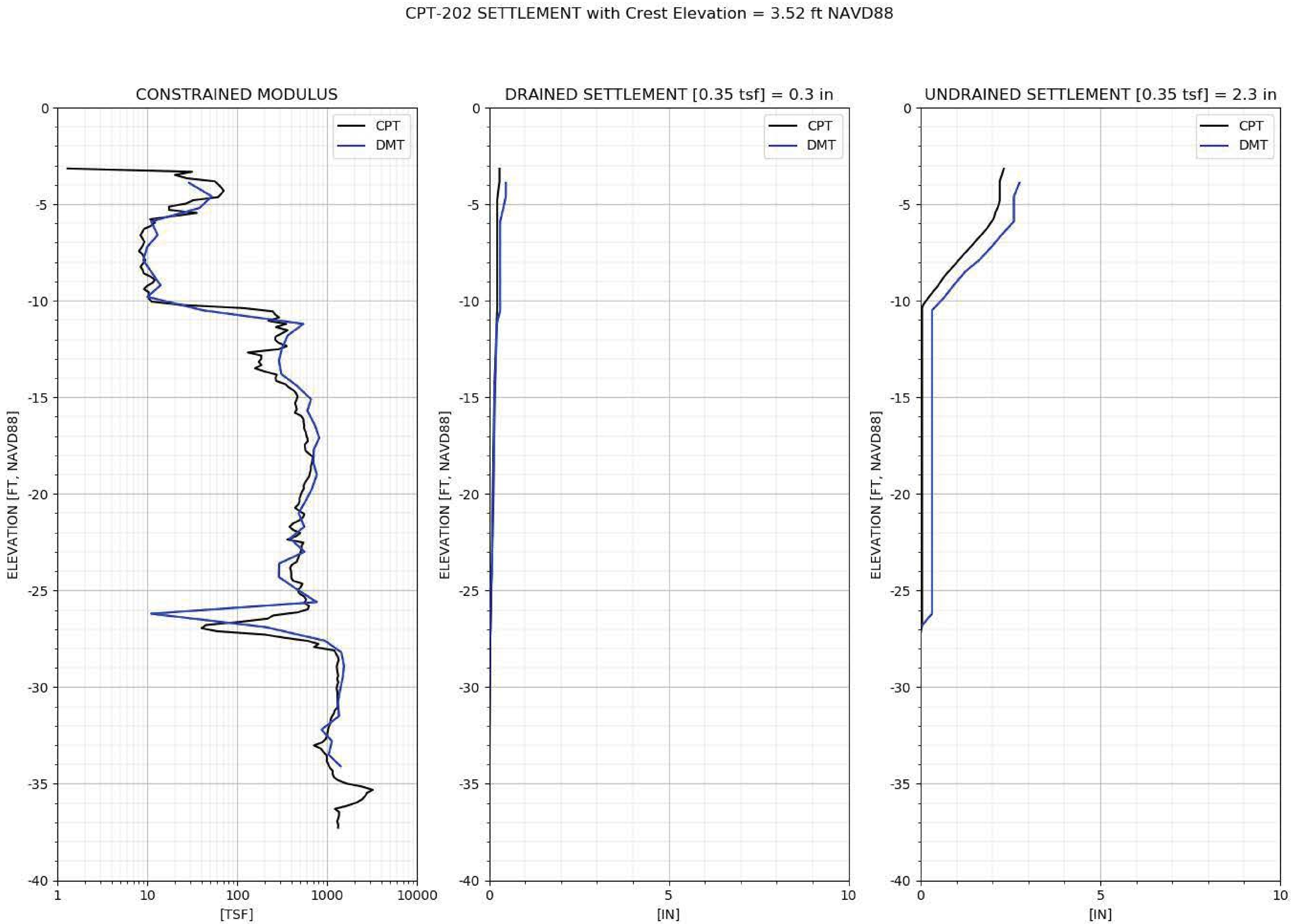
CPT-244 SHEAR STRENGTH



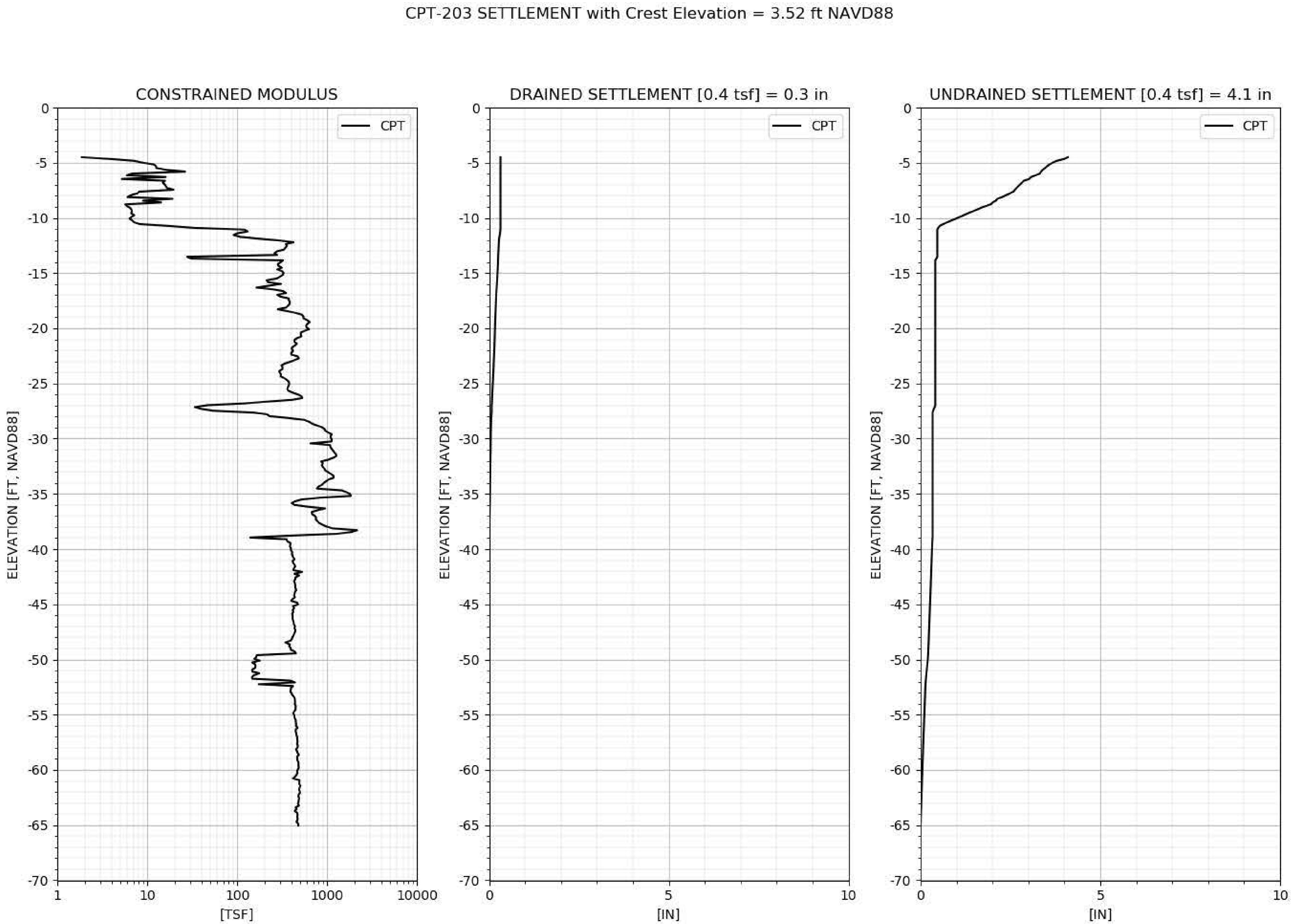

CPT-245 SHEAR STRENGTH
UNDRAINED SHEAR STRENGTH
Ndu
Nkt
ELEVATION [FT, NAVD88]
[PSF]
Su/P [BASED ON Ndu]
ELEVATION [FT, NAVD88]
FRICTION ANGLE [TRIXIAL COMPRESSION]
Roberston and Campanella
Kulhawy and Mayne
ELEVATION [FT, NAVD88]
[DEGREES]

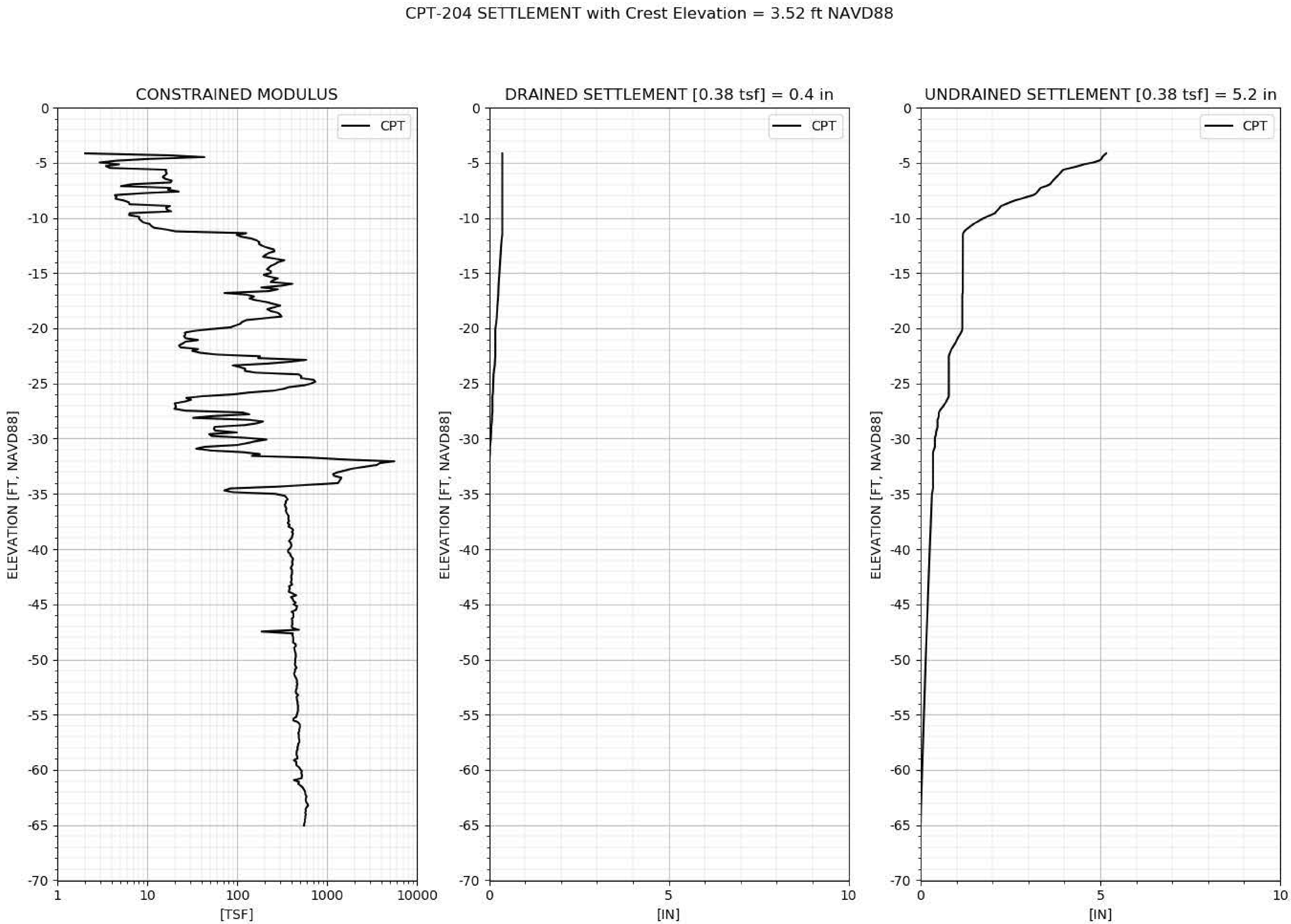
CPT-246 SHEAR STRENGTH



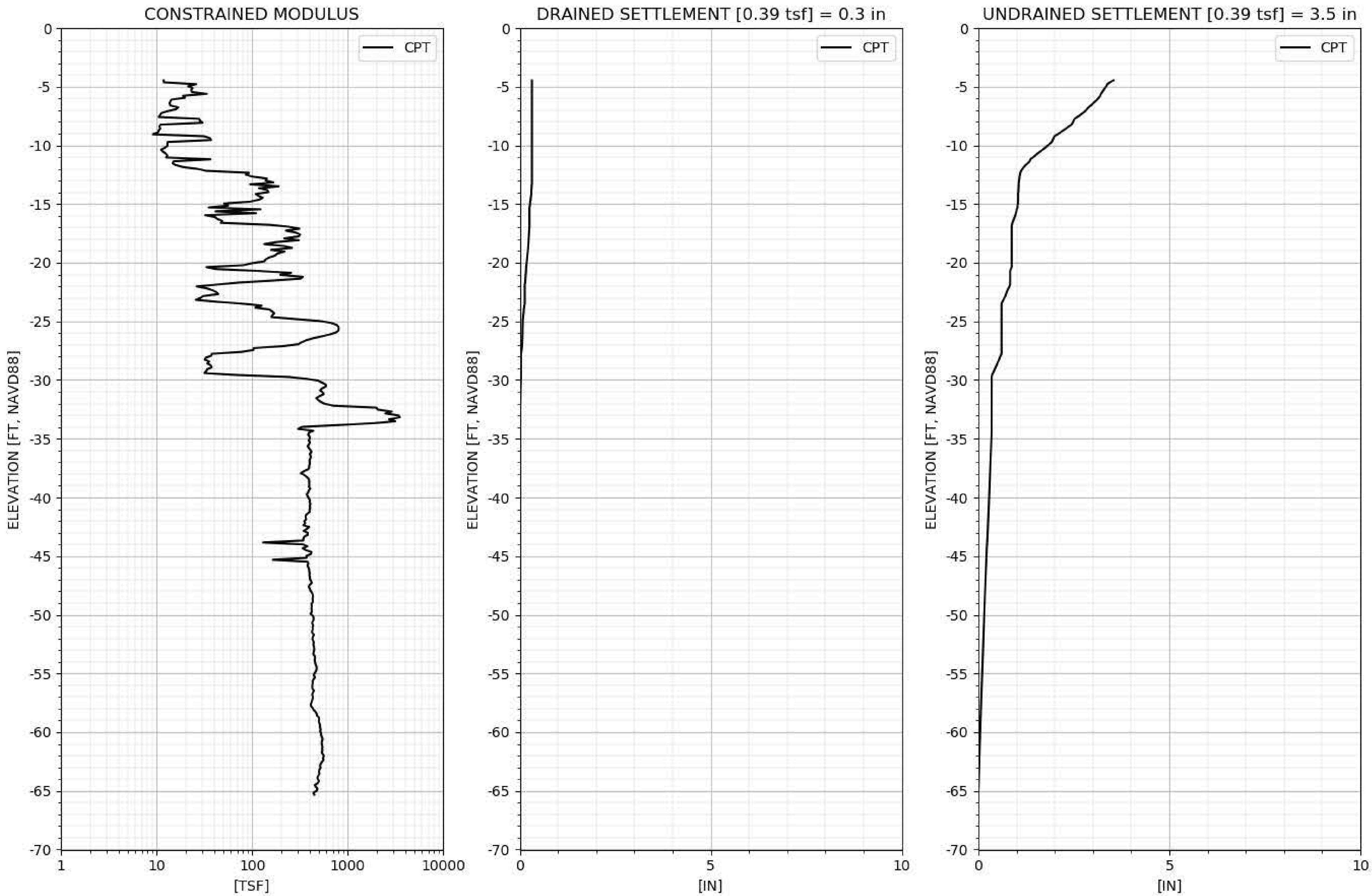


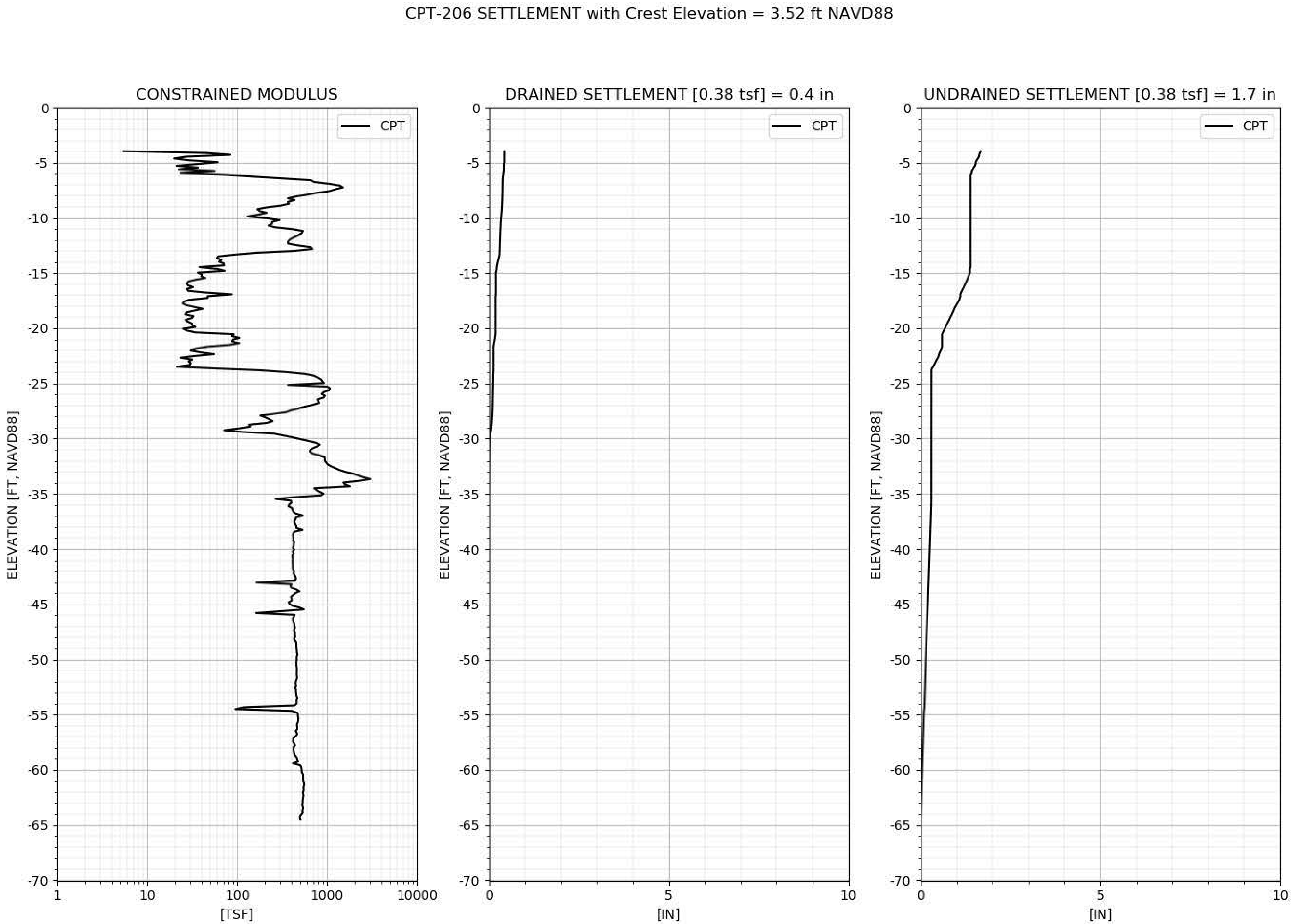
CPT-202 SETTLEMENT with Crest Elevation = 3.52 ft NAVD88
CONSTRAINED MODULUS
DRAINED SETTLEMENT [0.35 tsf] = 0.3 in
UNDRAINED SETTLEMENT [0.35 tsf] = 2.3 in
CPT
DMT
ELEVATION [FT, NAVD88]
0
-5
-10
-15
-20
-25
-30
-35
-40
1
10
100
1000
10000
[TSF]
0
5
10
[IN]


CPT-203 SETTLEMENT with Crest Elevation = 3.52 ft NAVD88
CONSTRAINED MODULUS
DRAINED SETTLEMENT [0.4 tsf] = 0.3 in
UNDRAINED SETTLEMENT [0.4 tsf] = 4.1 in
CPT
ELEVATION [FT, NAVD88]
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
-55
-60
-65
-70
1
10
100
1000
10000
[TSF]
0
5
10
[IN]

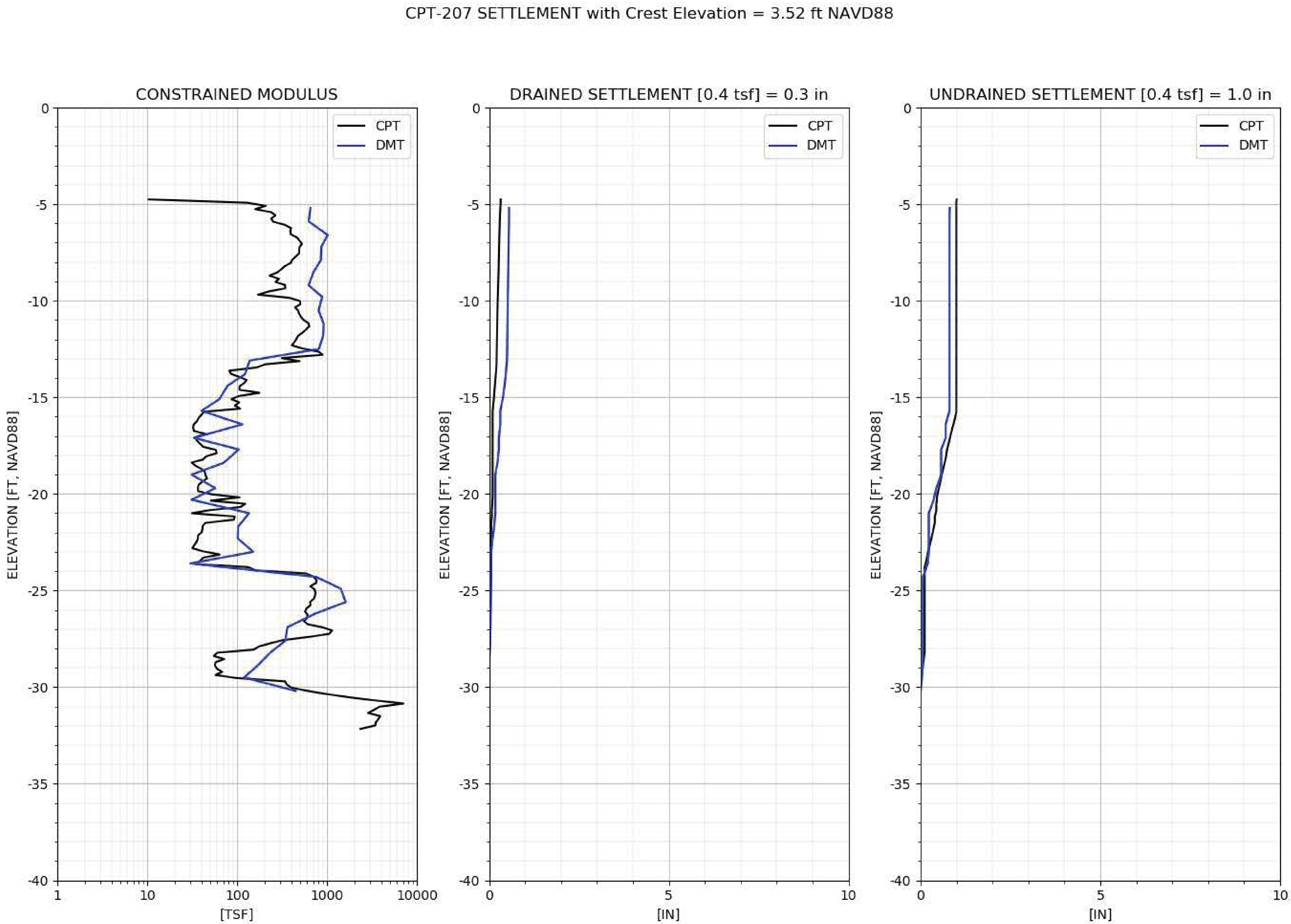

CPT-204 SETTLEMENT with Crest Elevation = 3.52 ft NAVD88
CONSTRAINED MODULUS
DRAINED SETTLEMENT [0.38 tsf] = 0.4 in
UNDRAINED SETTLEMENT [0.38 tsf] = 5.2 in
CPT
ELEVATION [FT, NAVD88]
[TSF]
[IN]
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
-55
-60
-65
-70
1
10
100
1000
10000
5

CPT-205 SETTLEMENT with Crest Elevation = 3.52 ft NAVD88

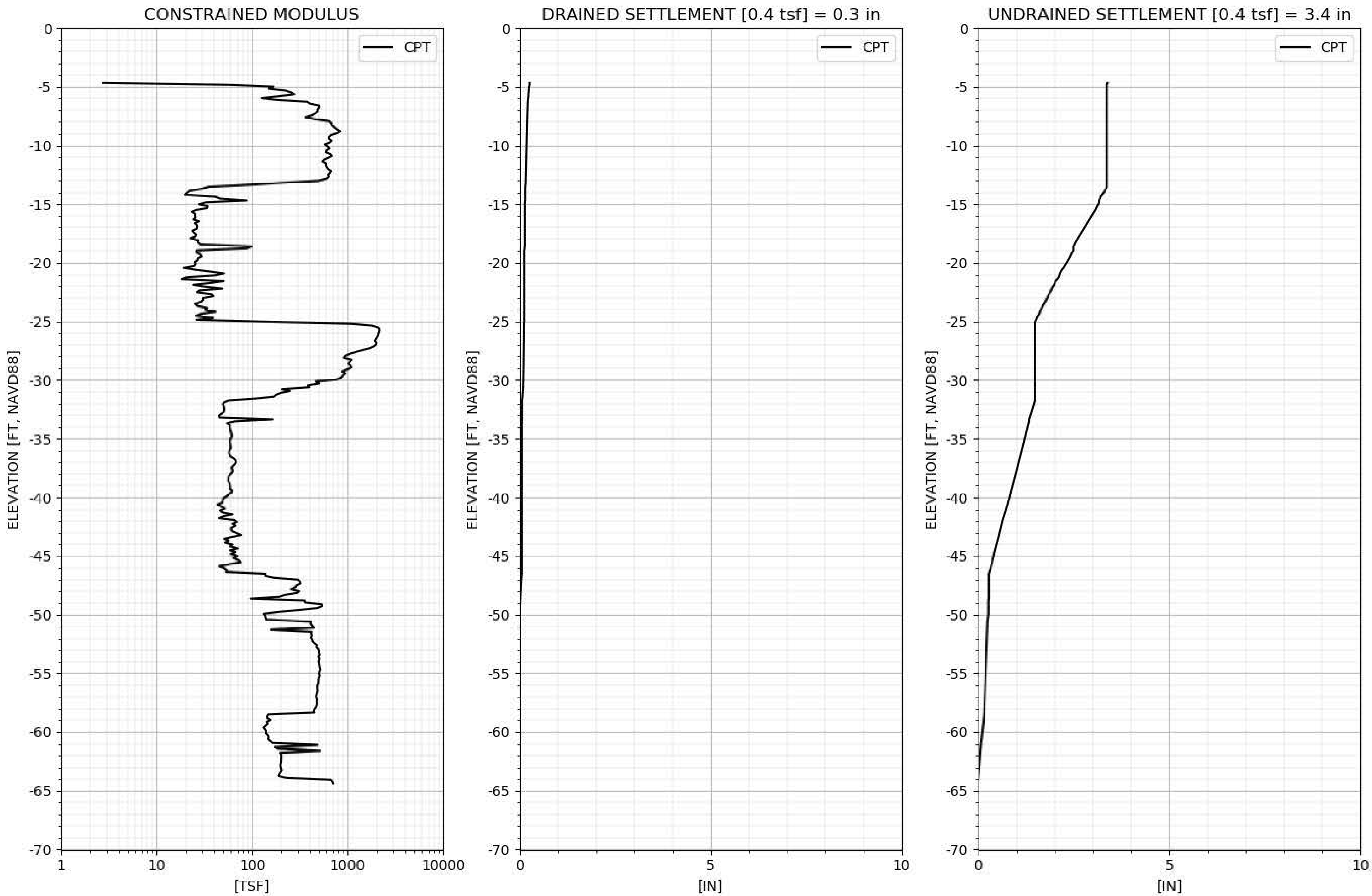




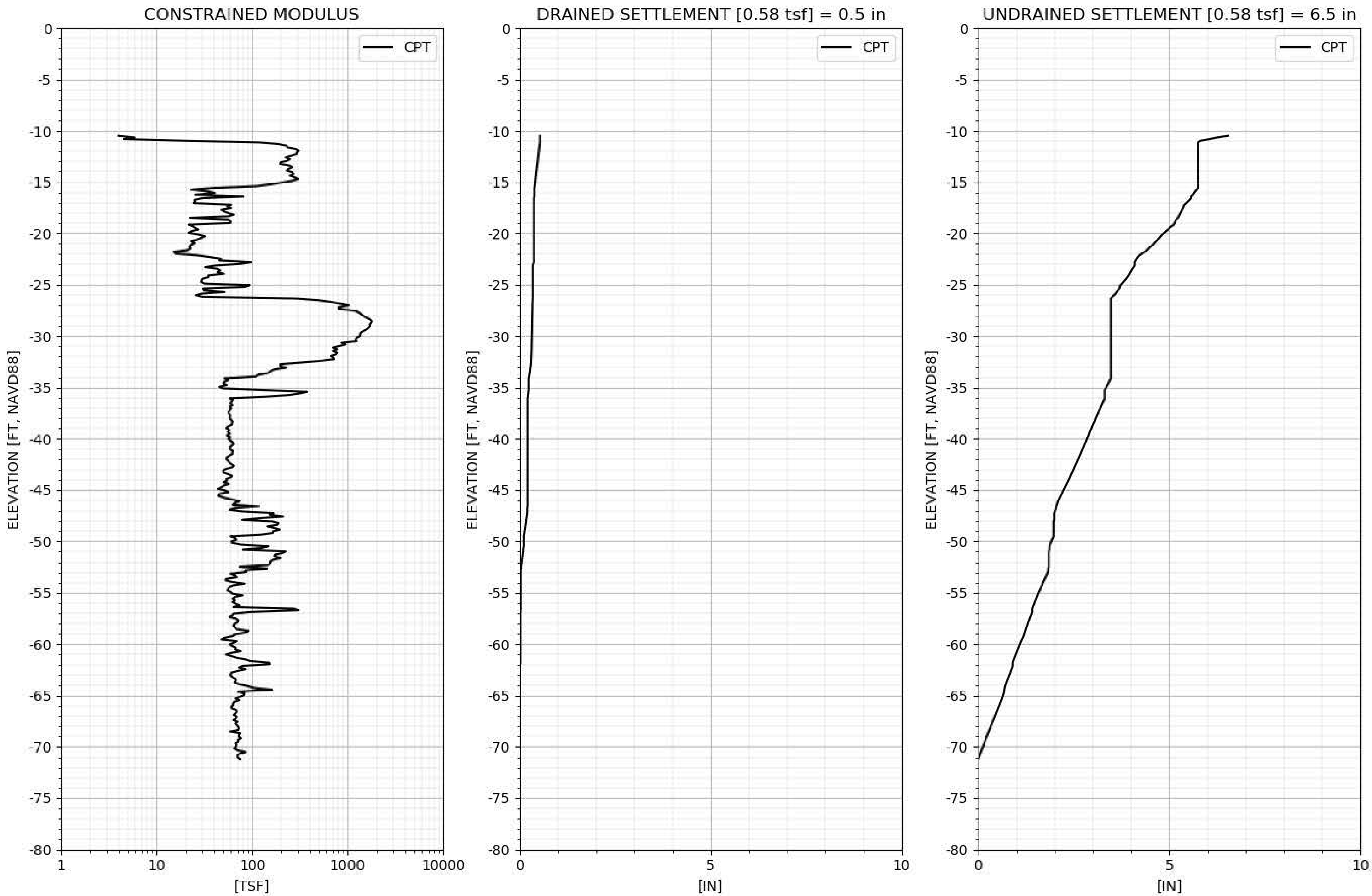
CPT-206 SETTLEMENT with Crest Elevation = 3.52 ft NAVD88
CONSTRAINED MODULUS
DRAINED SETTLEMENT [0.38 tsf] = 0.4 in
UNDRAINED SETTLEMENT [0.38 tsf] = 1.7 in
CPT
ELEVATION [FT, NAVD88]
[TSF]
[IN]
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
-55
-60
-65
-70
1
10
100
1000
10000
5


CPT-207 SETTLEMENT with Crest Elevation = 3.52 ft NAVD88
CONSTRAINED MODULUS
DRAINED SETTLEMENT [0.4 tsf] = 0.3 in
UNDRAINED SETTLEMENT [0.4 tsf] = 1.0 in
CPT
DMT
ELEVATION [FT, NAVD88]
[TSF]
[IN]
0
-5
-10
-15
-20
-25
-30
-35
-40
1
10
100
1000
10000
0
5
10

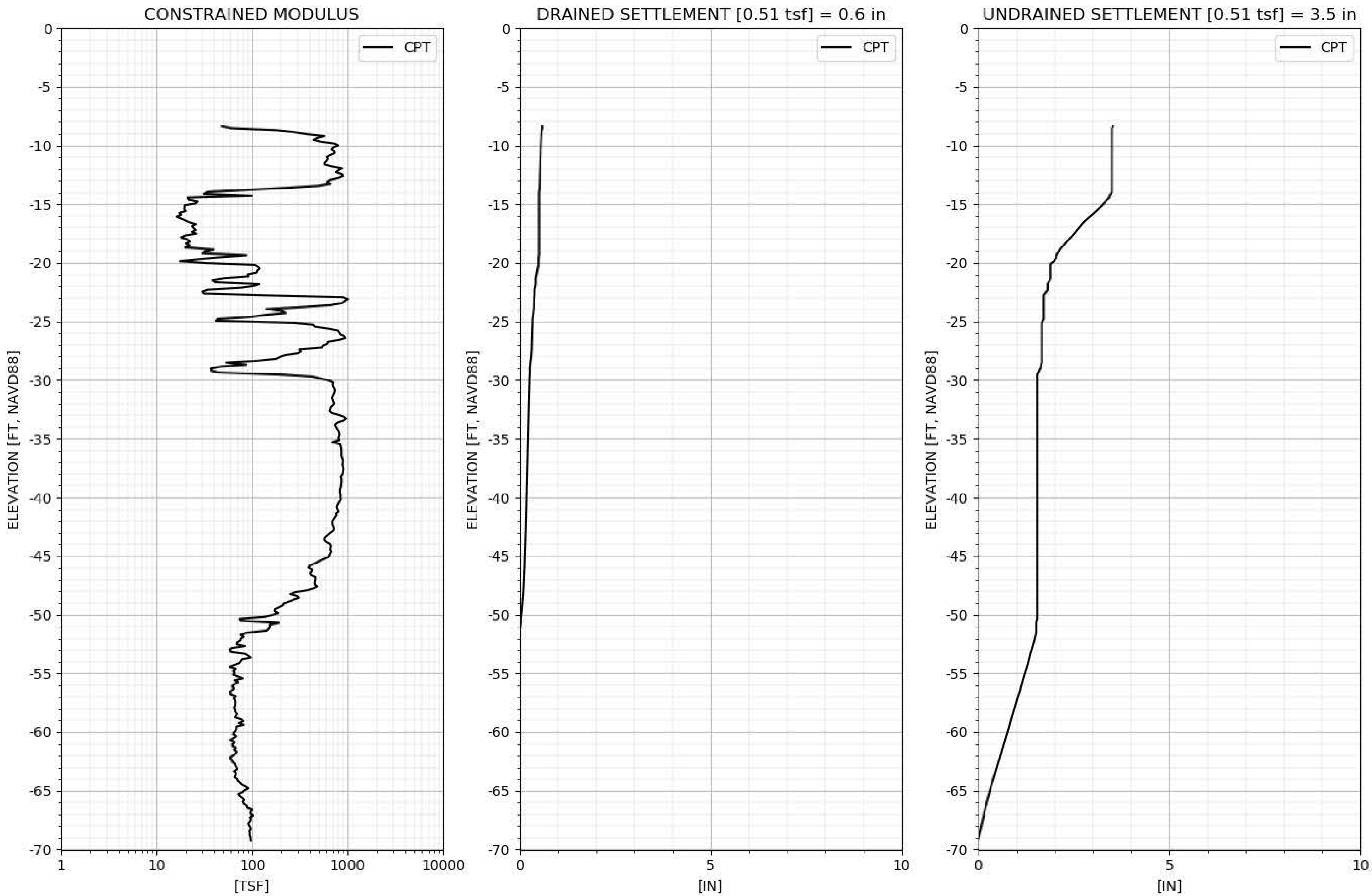
CPT-208 SETTLEMENT with Crest Elevation = 3.52 ft NAVD88



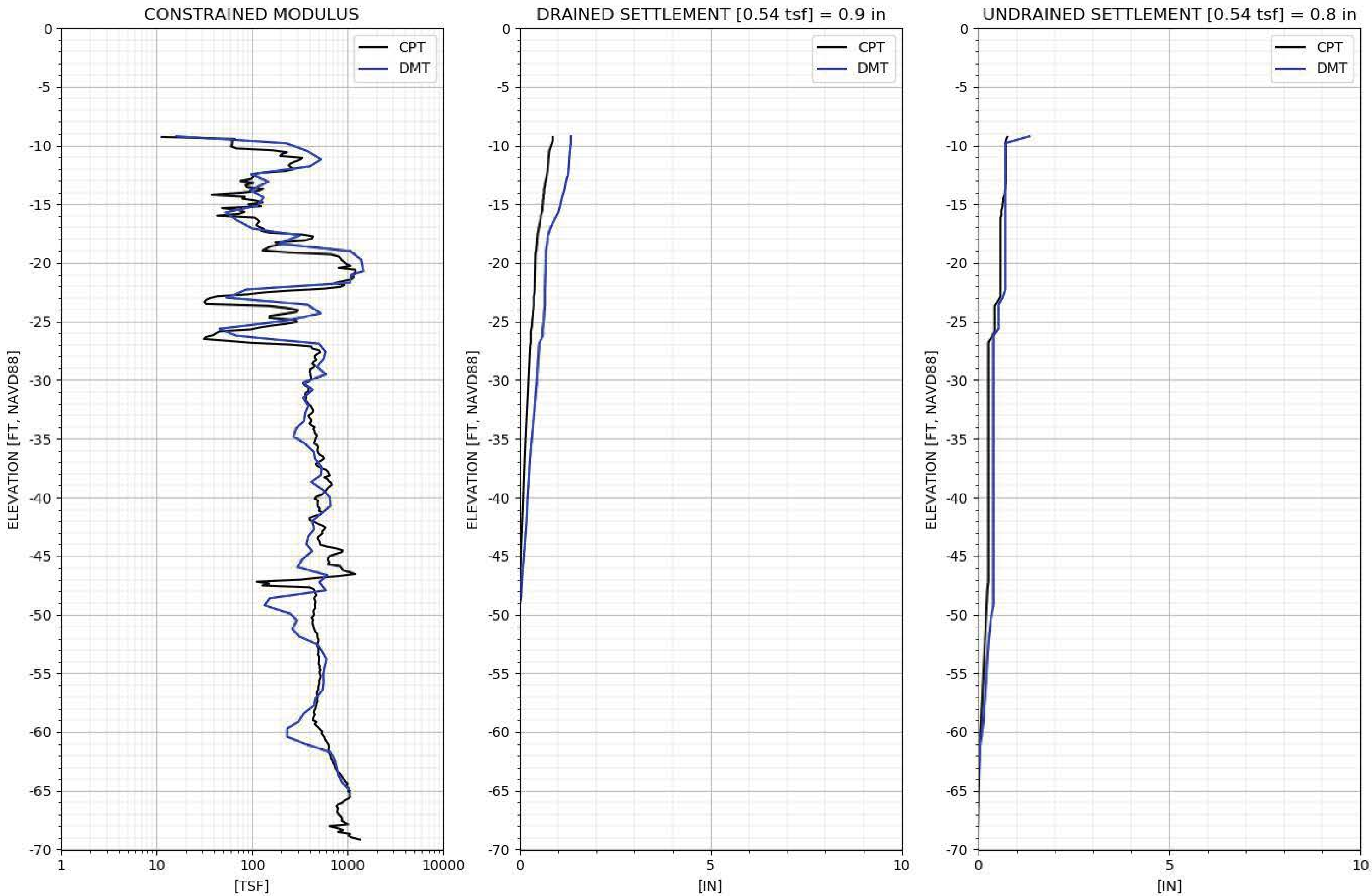
CPT-209 SETTLEMENT with Crest Elevation = 3.52 ft NAVD88

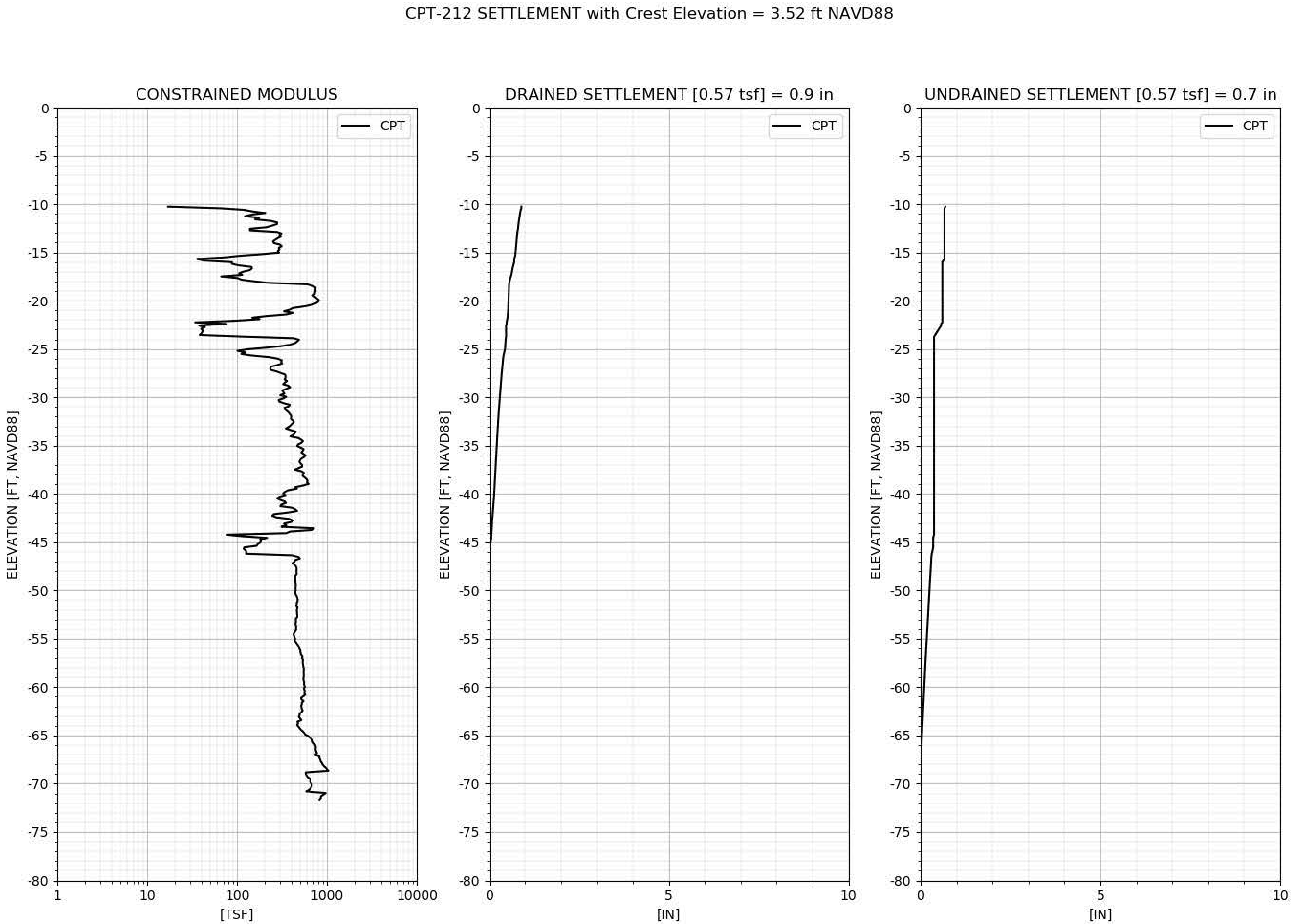


CPT-210 SETTLEMENT with Crest Elevation = 3.52 ft NAVD88

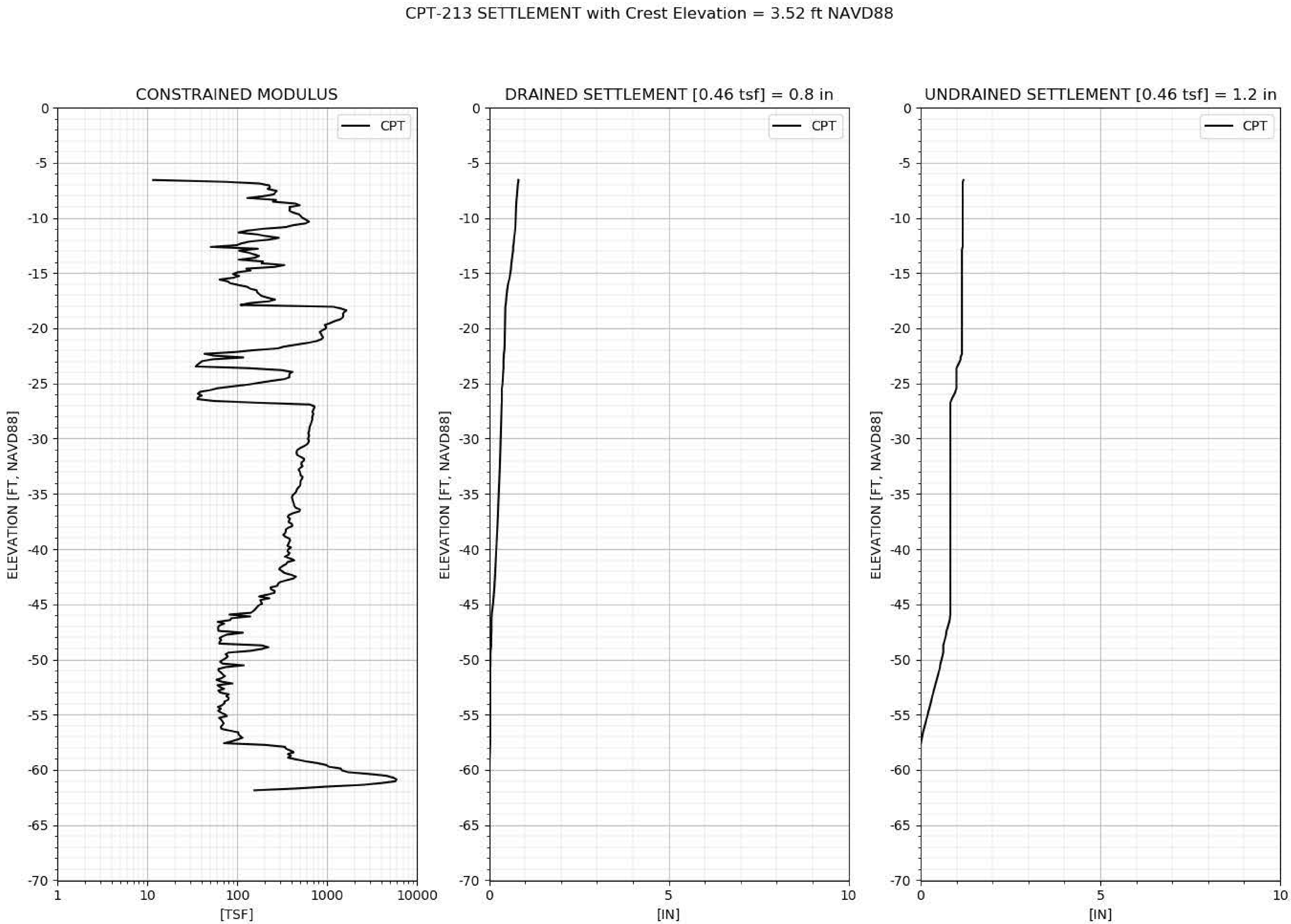


CPT-211 SETTLEMENT with Crest Elevation = 3.52 ft NAVD88



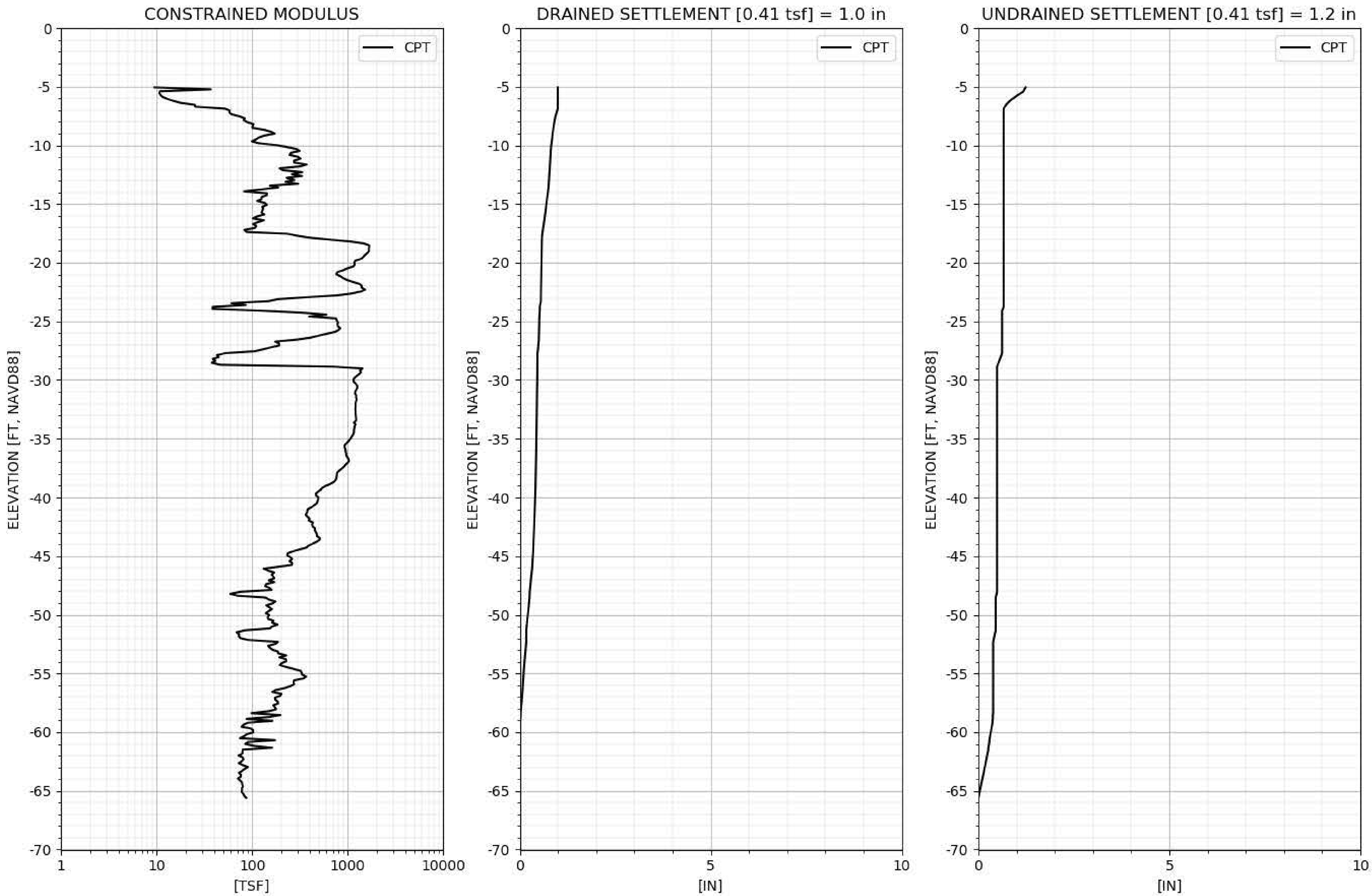


CPT-212 SETTLEMENT with Crest Elevation = 3.52 ft NAVD88
CONSTRAINED MODULUS
DRAINED SETTLEMENT [0.57 tsf] = 0.9 in
UNDRAINED SETTLEMENT [0.57 tsf] = 0.7 in
CPT
ELEVATION [FT, NAVD88]
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
-55
-60
-65
-70
-75
-80
1
10
100
1000
10000
[TSF]
0
5
10
[IN]

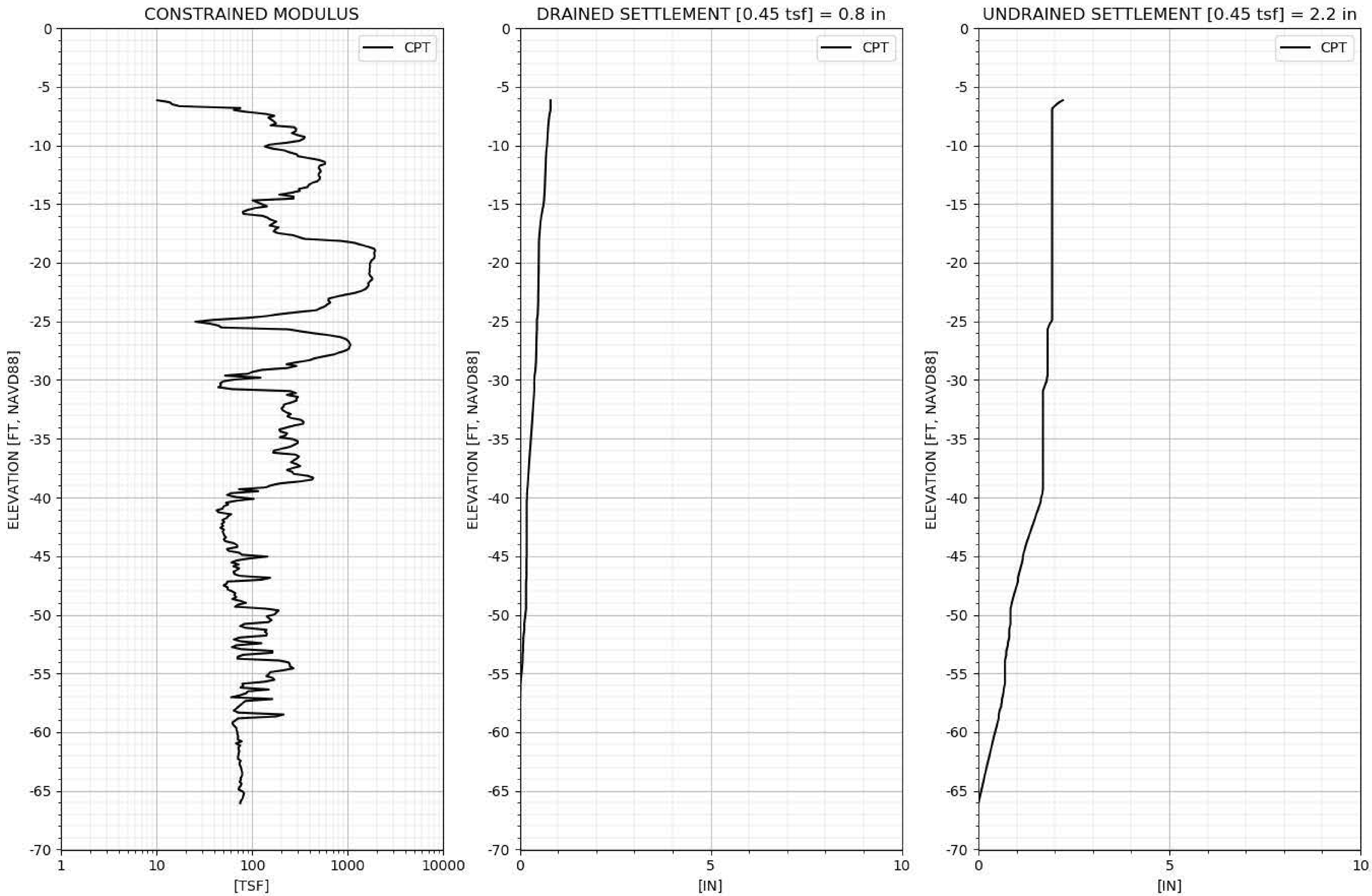


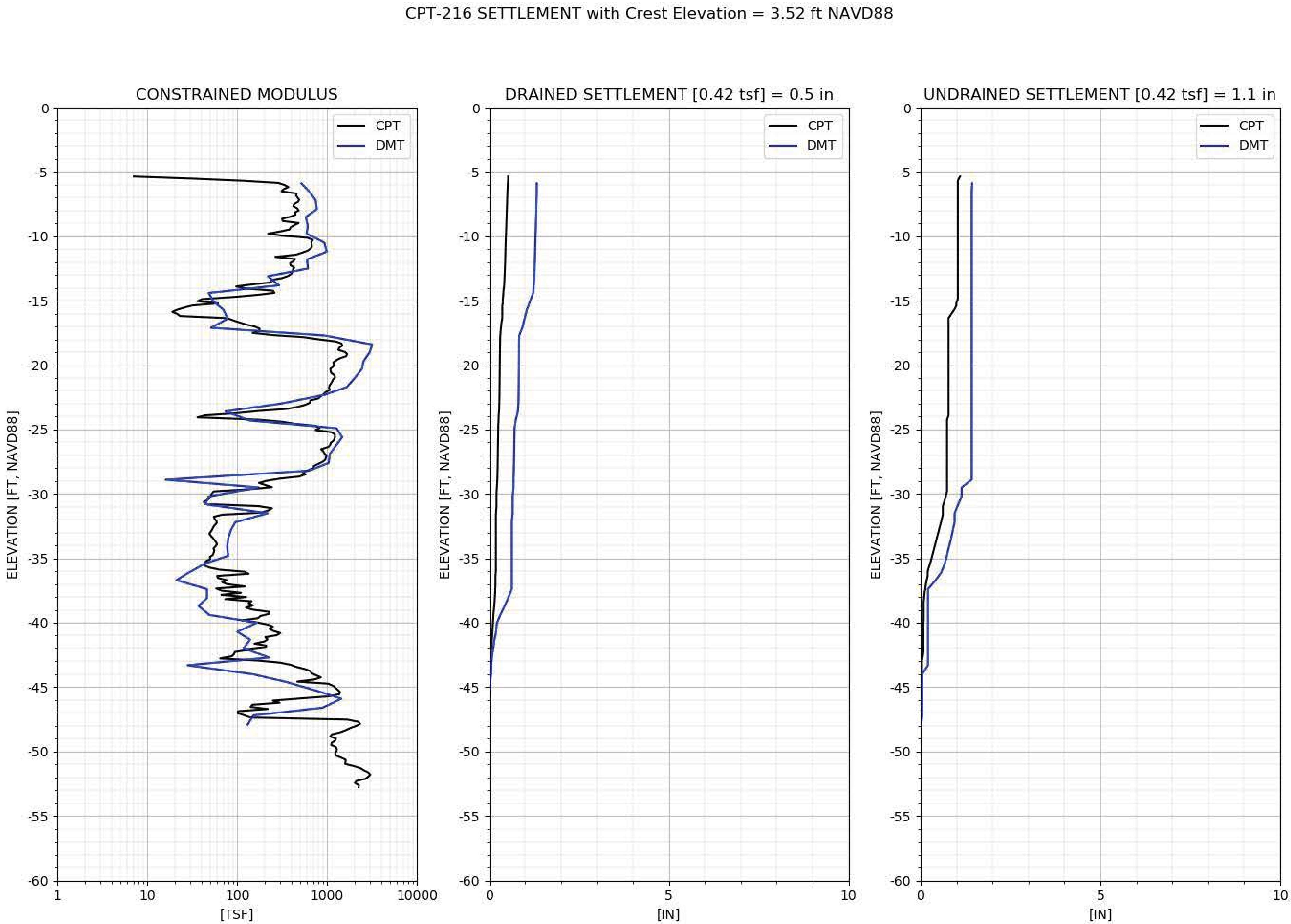
CPT-213 SETTLEMENT with Crest Elevation = 3.52 ft NAVD88
CONSTRAINED MODULUS
DRAINED SETTLEMENT [0.46 tsf] = 0.8 in
UNDRAINED SETTLEMENT [0.46 tsf] = 1.2 in
CPT
ELEVATION [FT, NAVD88]
[TSF]
[IN]
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
-55
-60
-65
-70
1
10
100
1000
10000
0
5
10

CPT-214 SETTLEMENT with Crest Elevation = 3.52 ft NAVD88

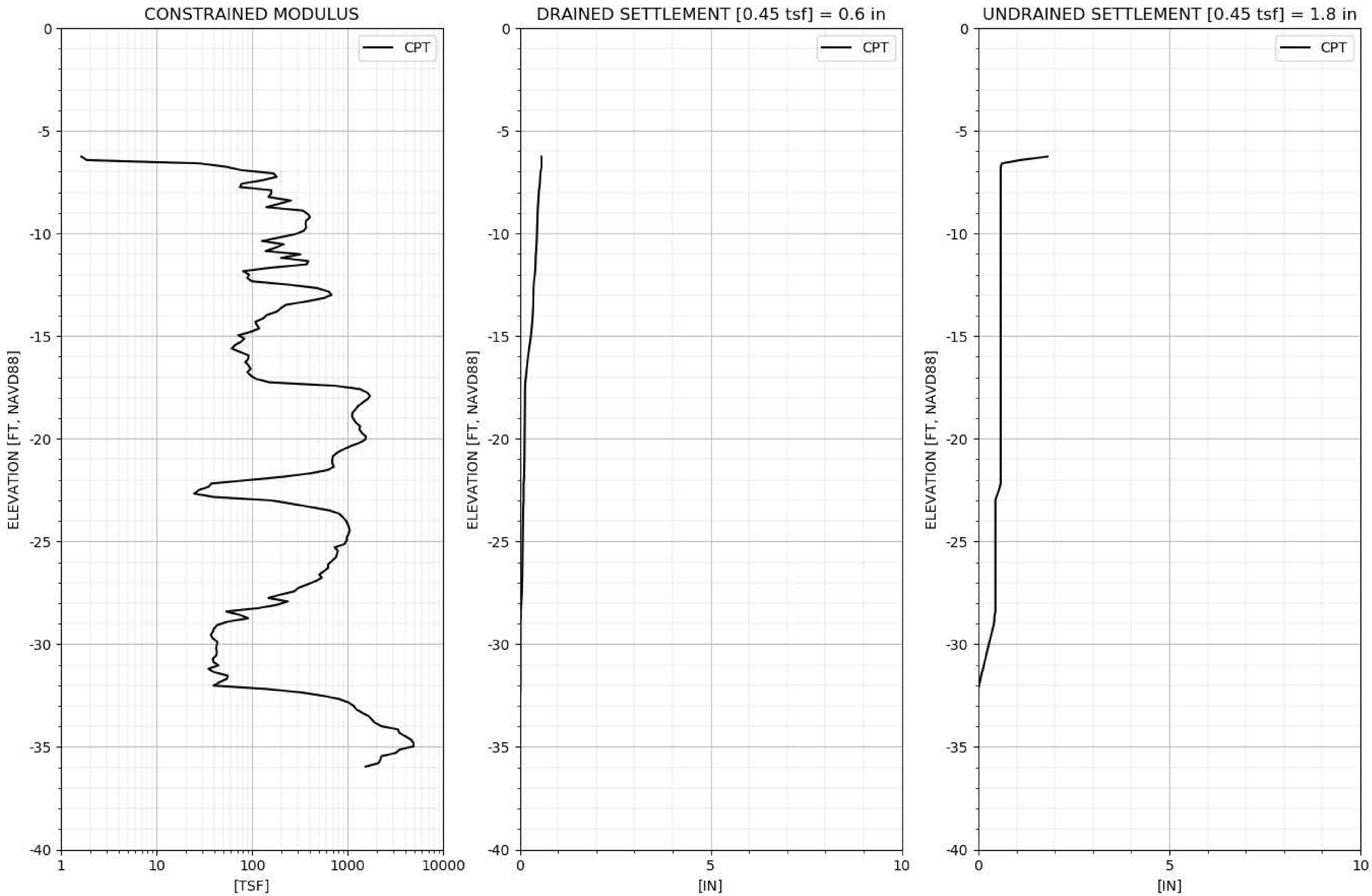


CPT-215 SETTLEMENT with Crest Elevation = 3.52 ft NAVD88

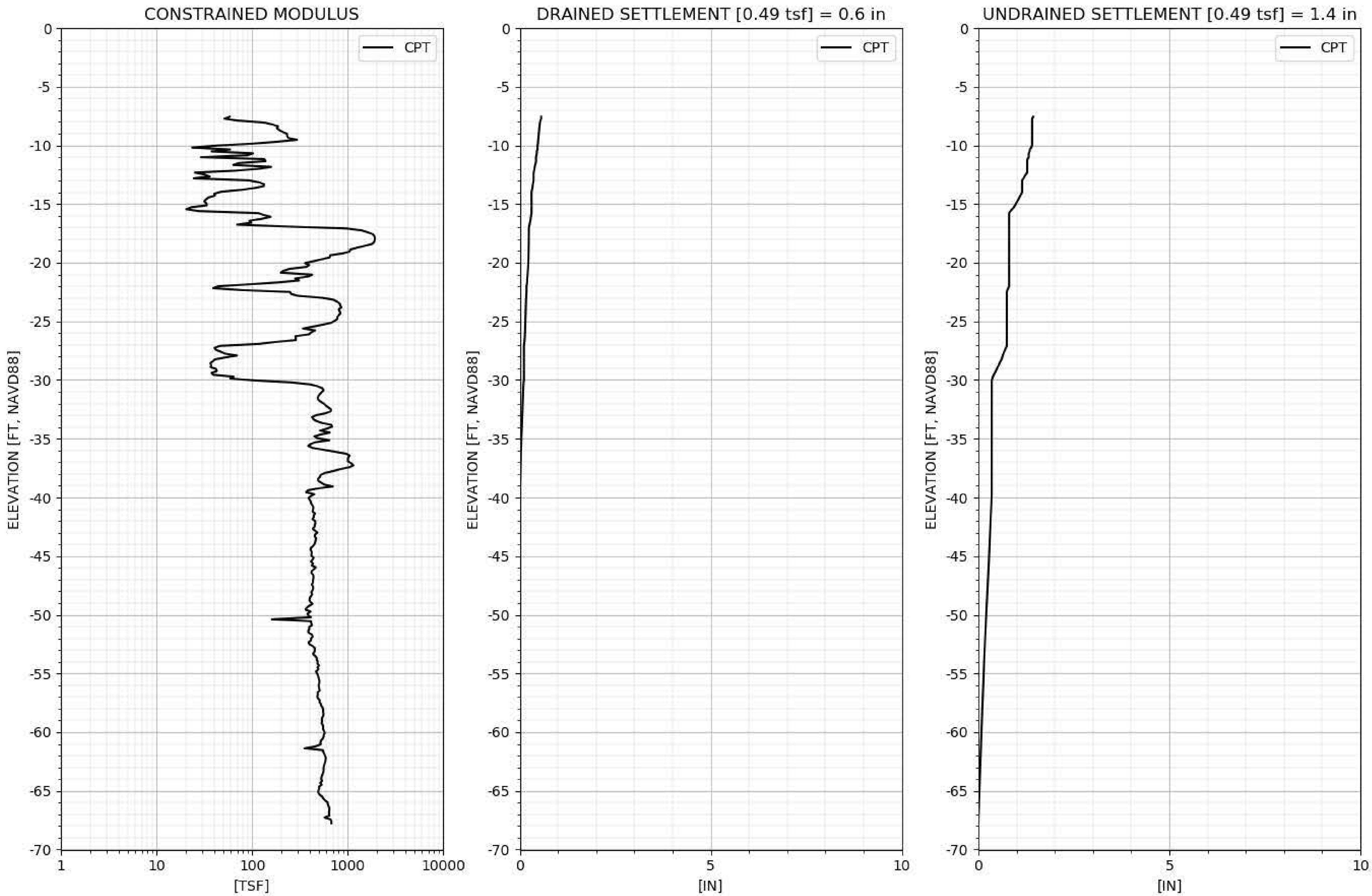



CPT-216 SETTLEMENT with Crest Elevation = 3.52 ft NAVD88
CONSTRAINED MODULUS
DRAINED SETTLEMENT [0.42 tsf] = 0.5 in
UNDRAINED SETTLEMENT [0.42 tsf] = 1.1 in
CPT
DMT
ELEVATION [FT, NAVD88]
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
-55
-60
1
10
100
1000
10000
[TSF]
0
5
10
[IN]

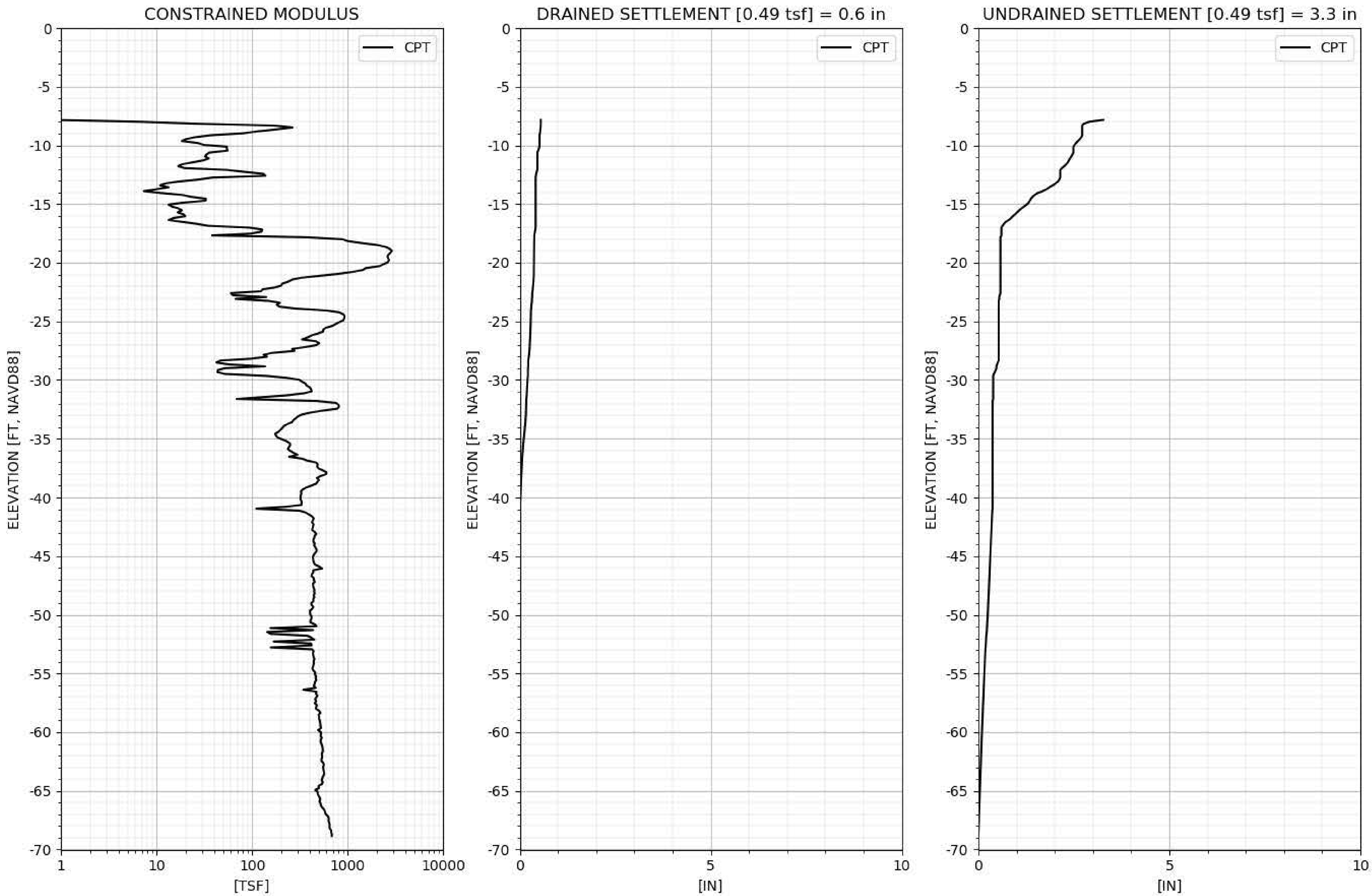
CPT-217 SETTLEMENT with Crest Elevation = 3.52 ft NAVD88



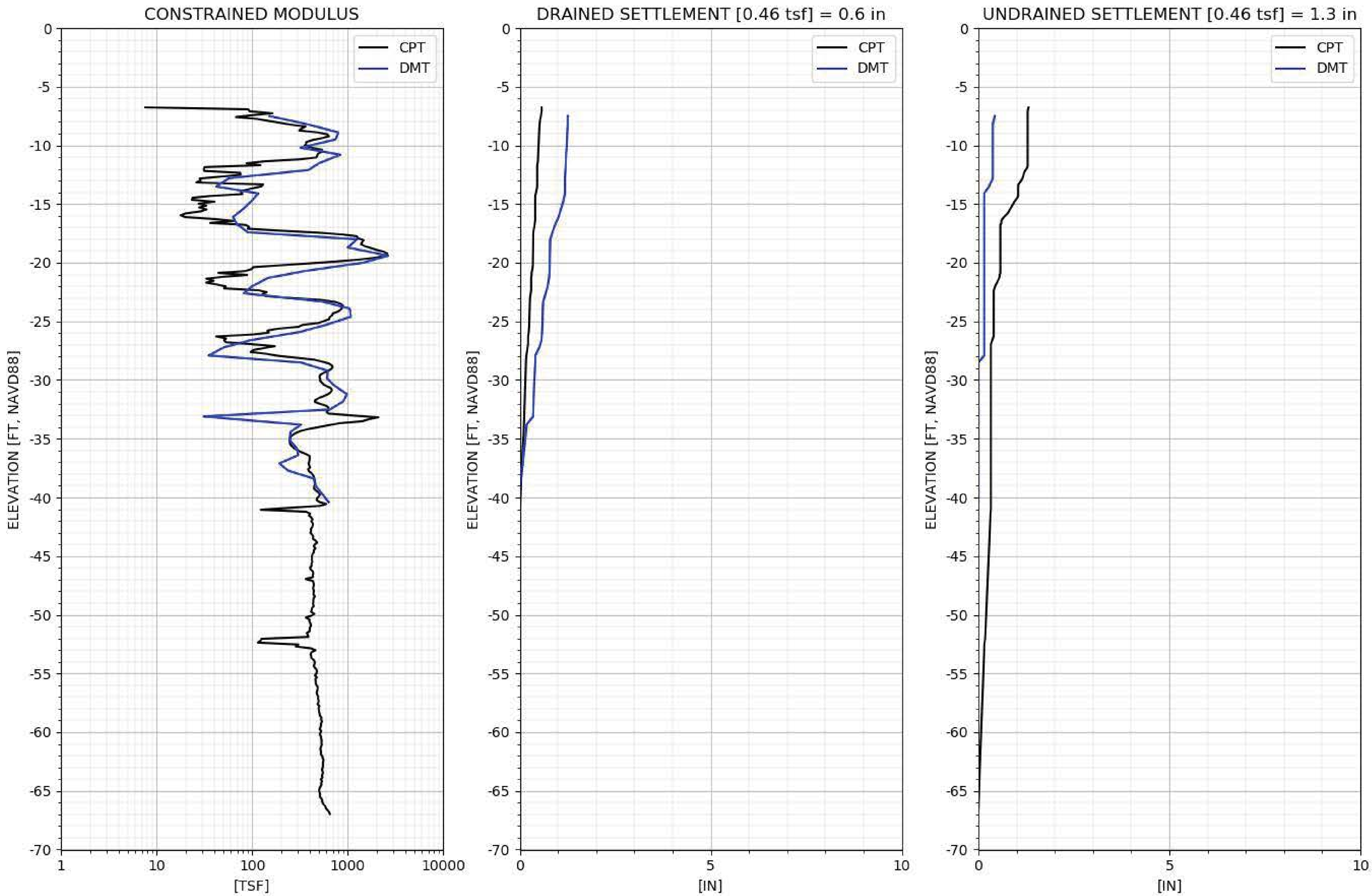
CPT-218 SETTLEMENT with Crest Elevation = 3.52 ft NAVD88



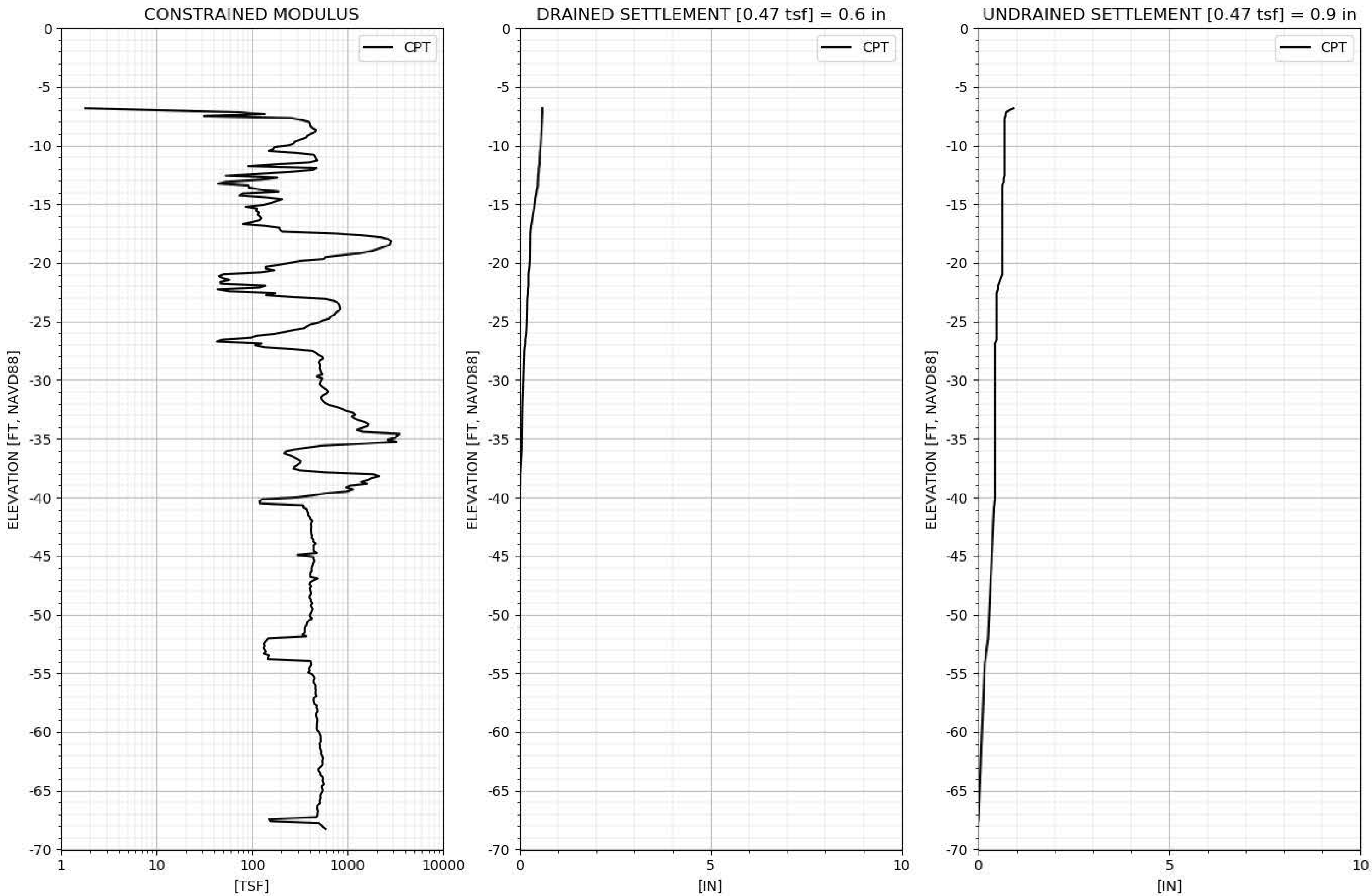
CPT-219 SETTLEMENT with Crest Elevation = 3.52 ft NAVD88



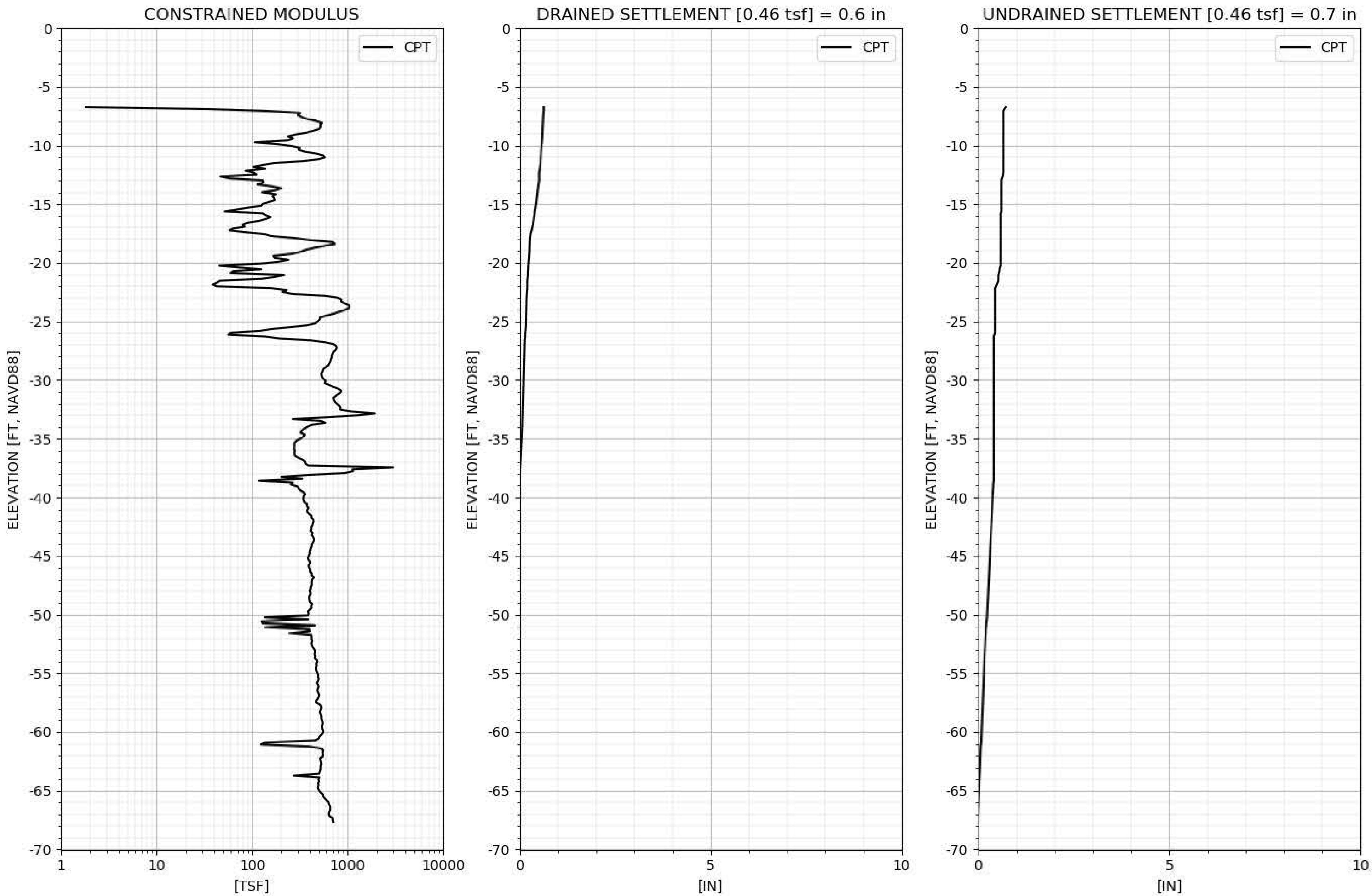
CPT-220 SETTLEMENT with Crest Elevation = 3.52 ft NAVD88



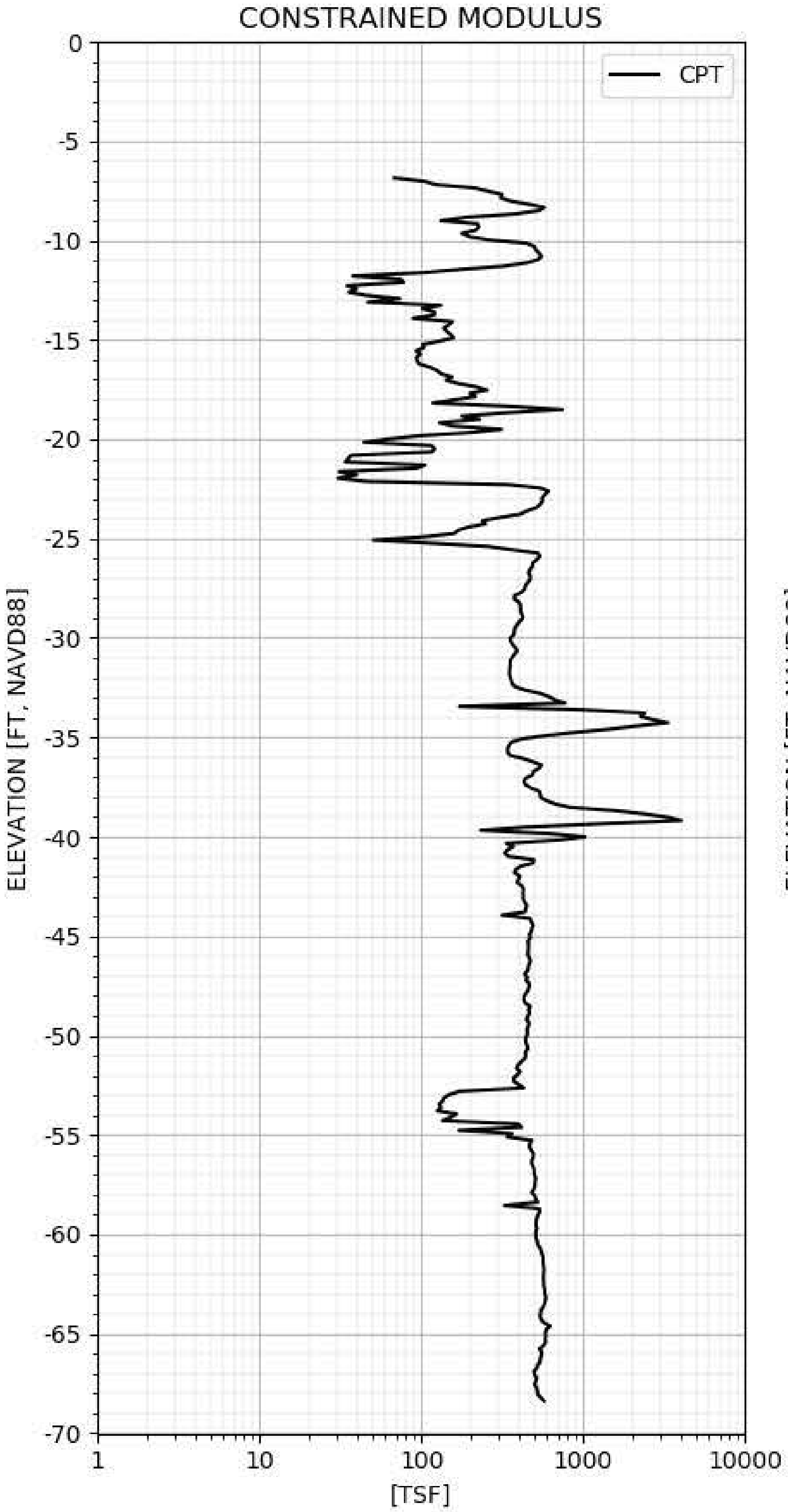
CPT-221 SETTLEMENT with Crest Elevation = 3.52 ft NAVD88

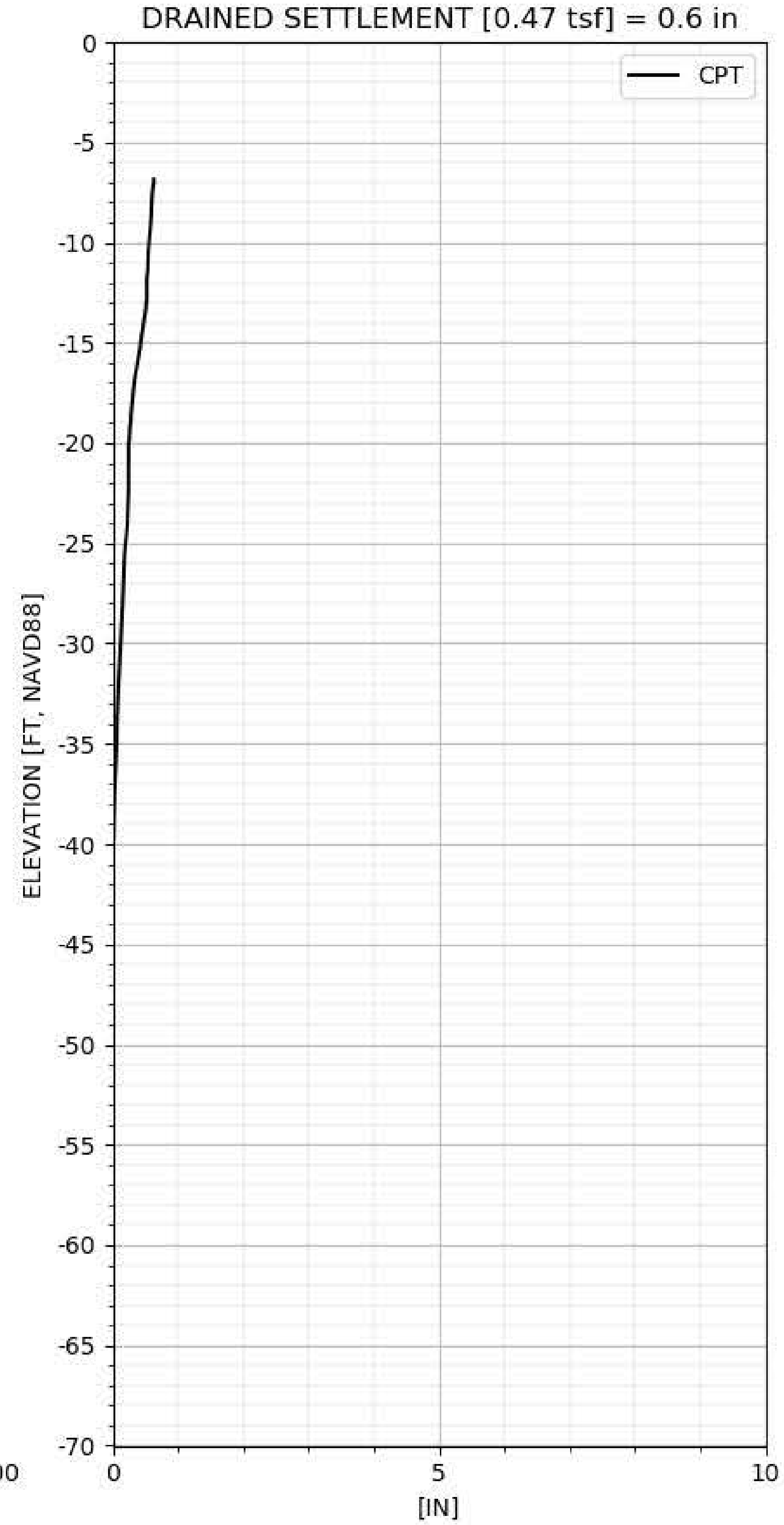


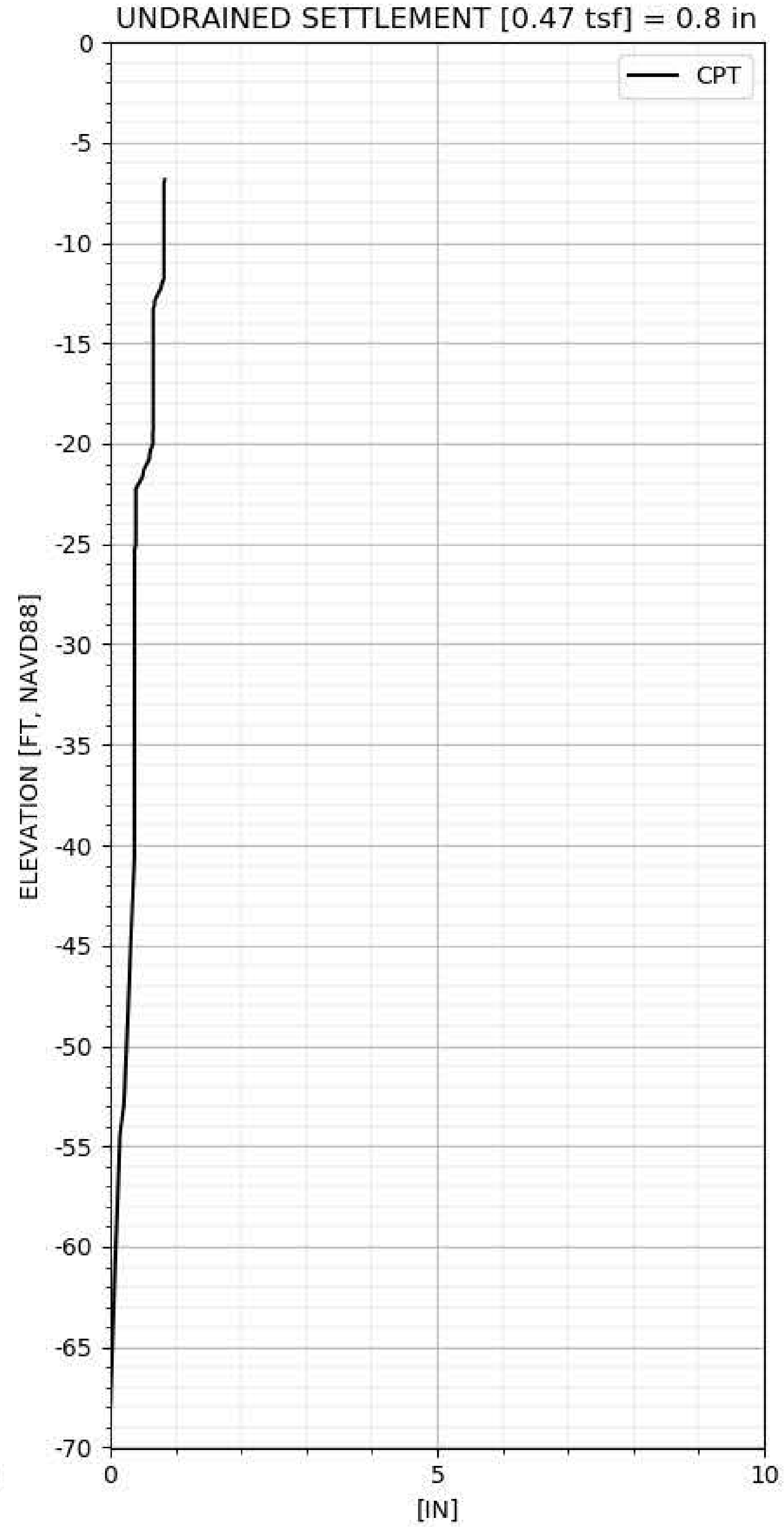
CPT-222 SETTLEMENT with Crest Elevation = 3.52 ft NAVD88



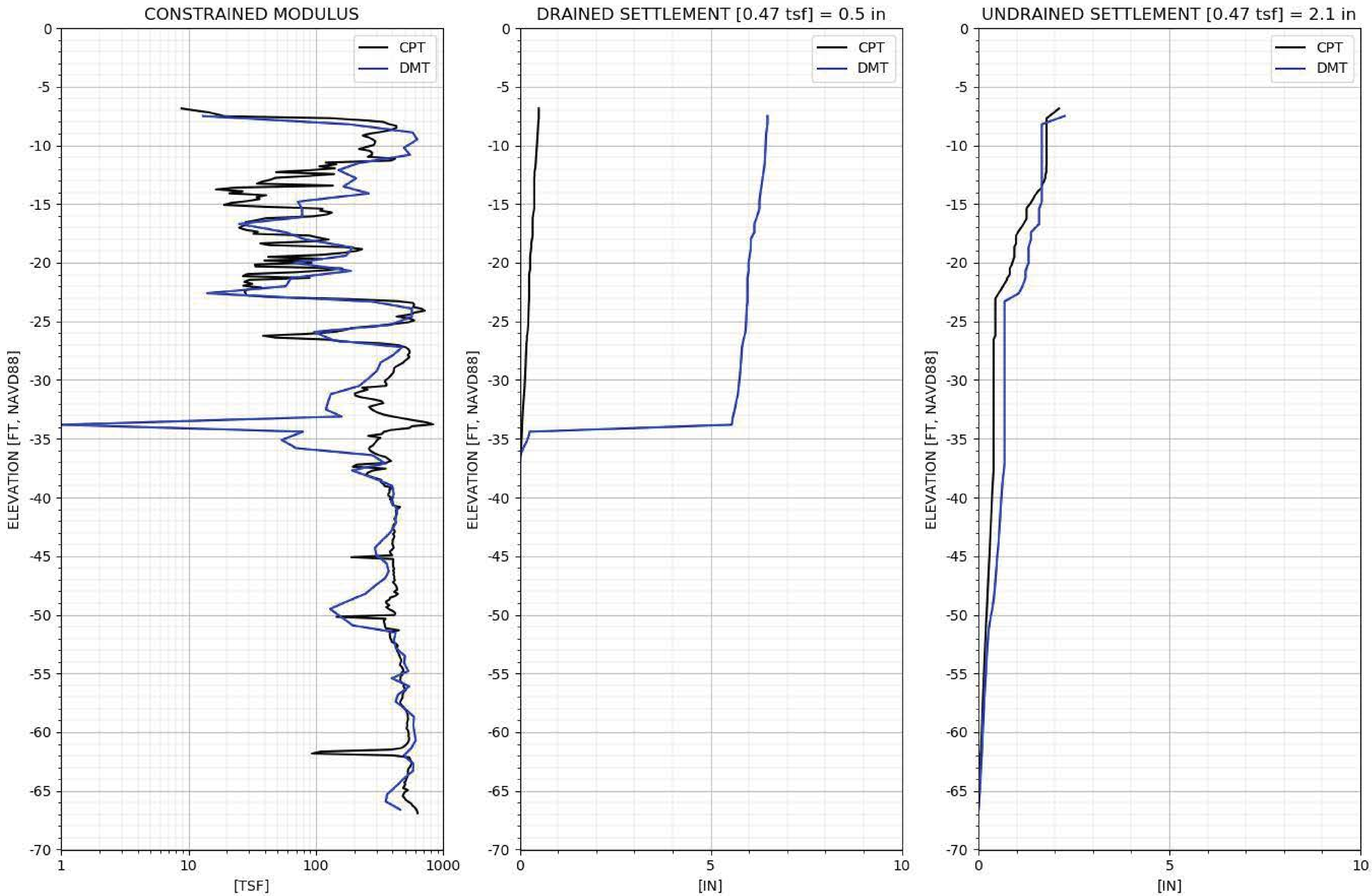
CPT-223 SETTLEMENT with Crest Elevation = 3.52 ft NAVD88



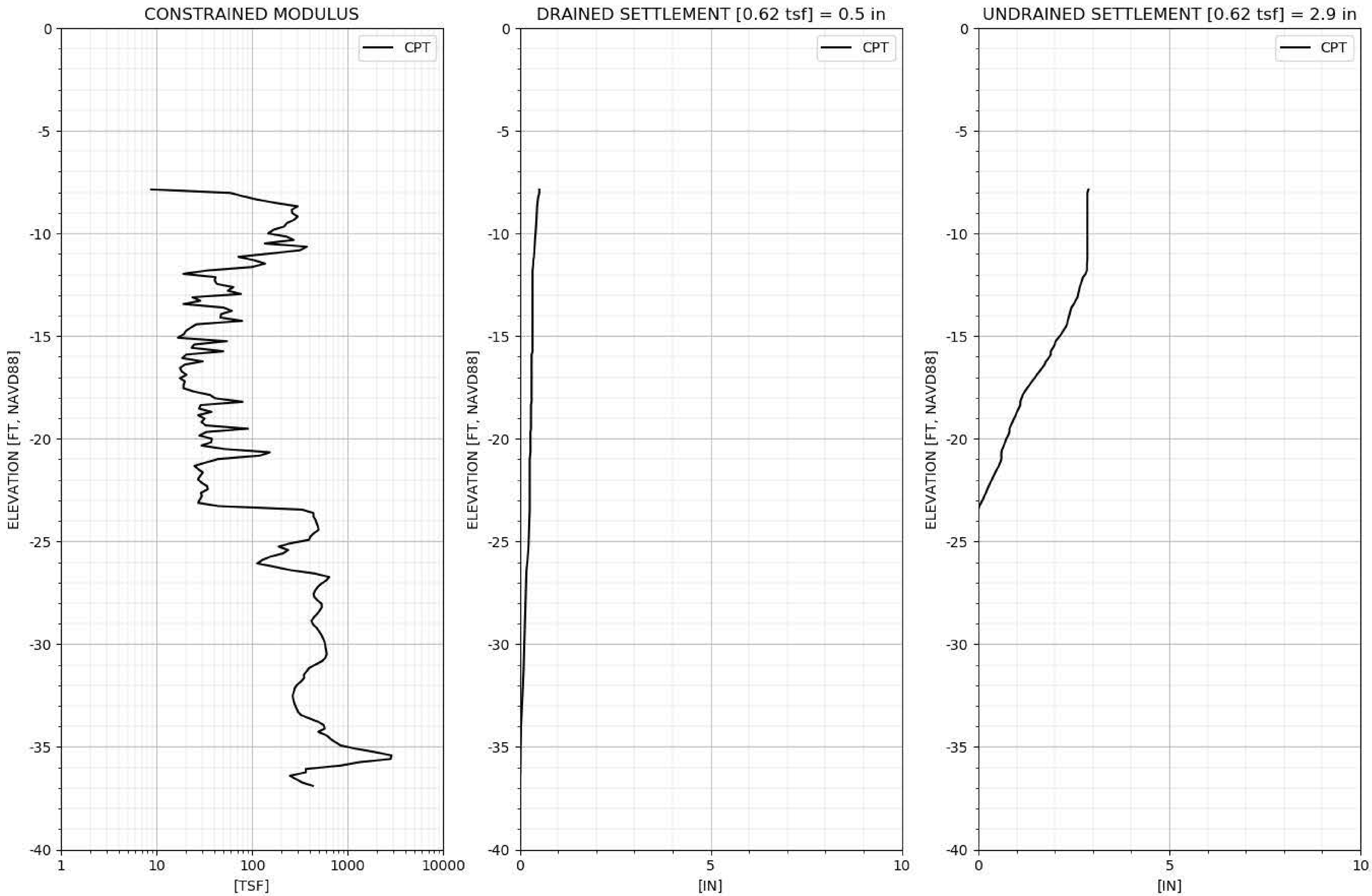




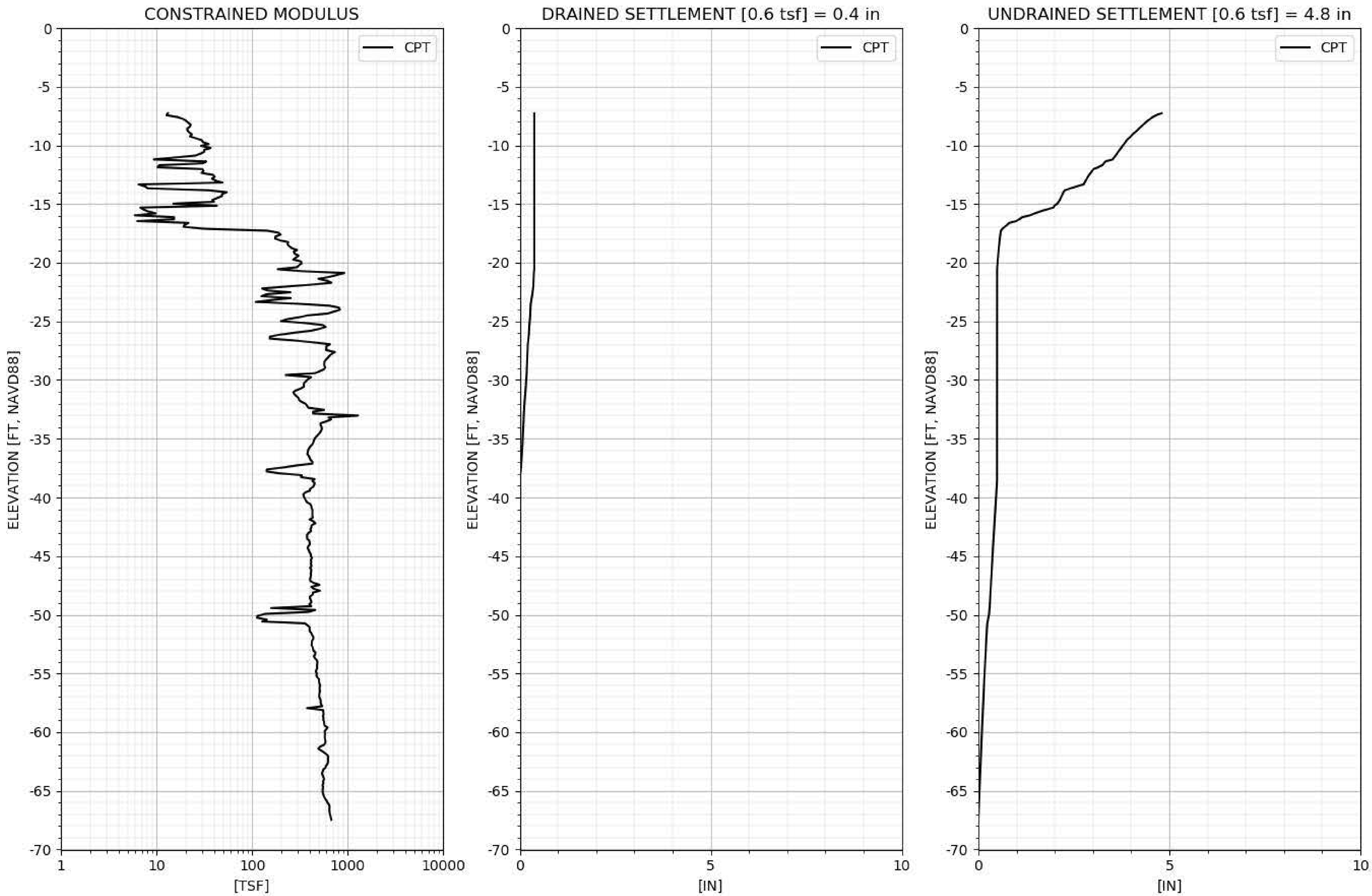
CPT-224 SETTLEMENT with Crest Elevation = 3.52 ft NAVD88



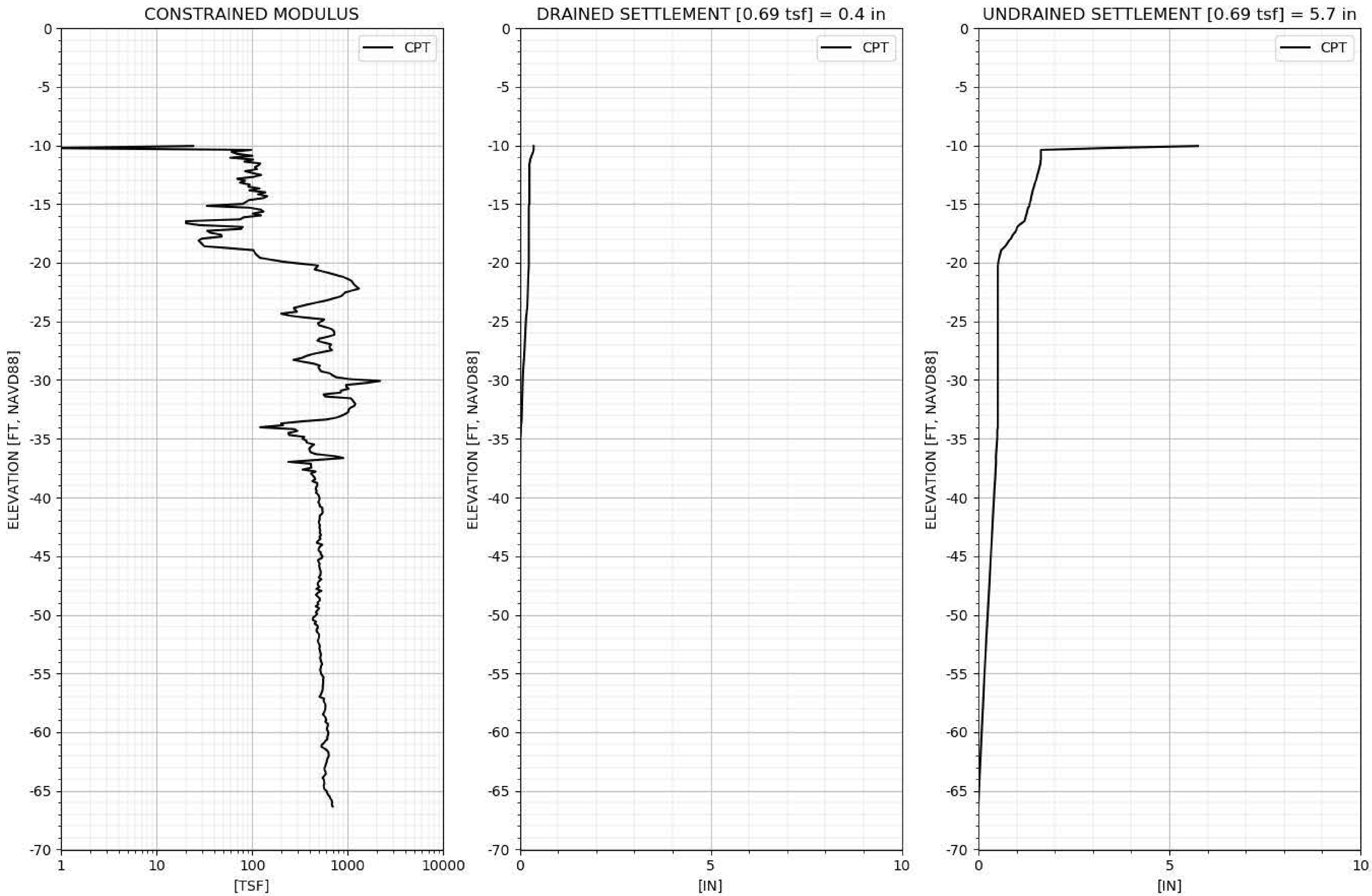
CPT-225 SETTLEMENT with Crest Elevation = 5.52 ft NAVD88



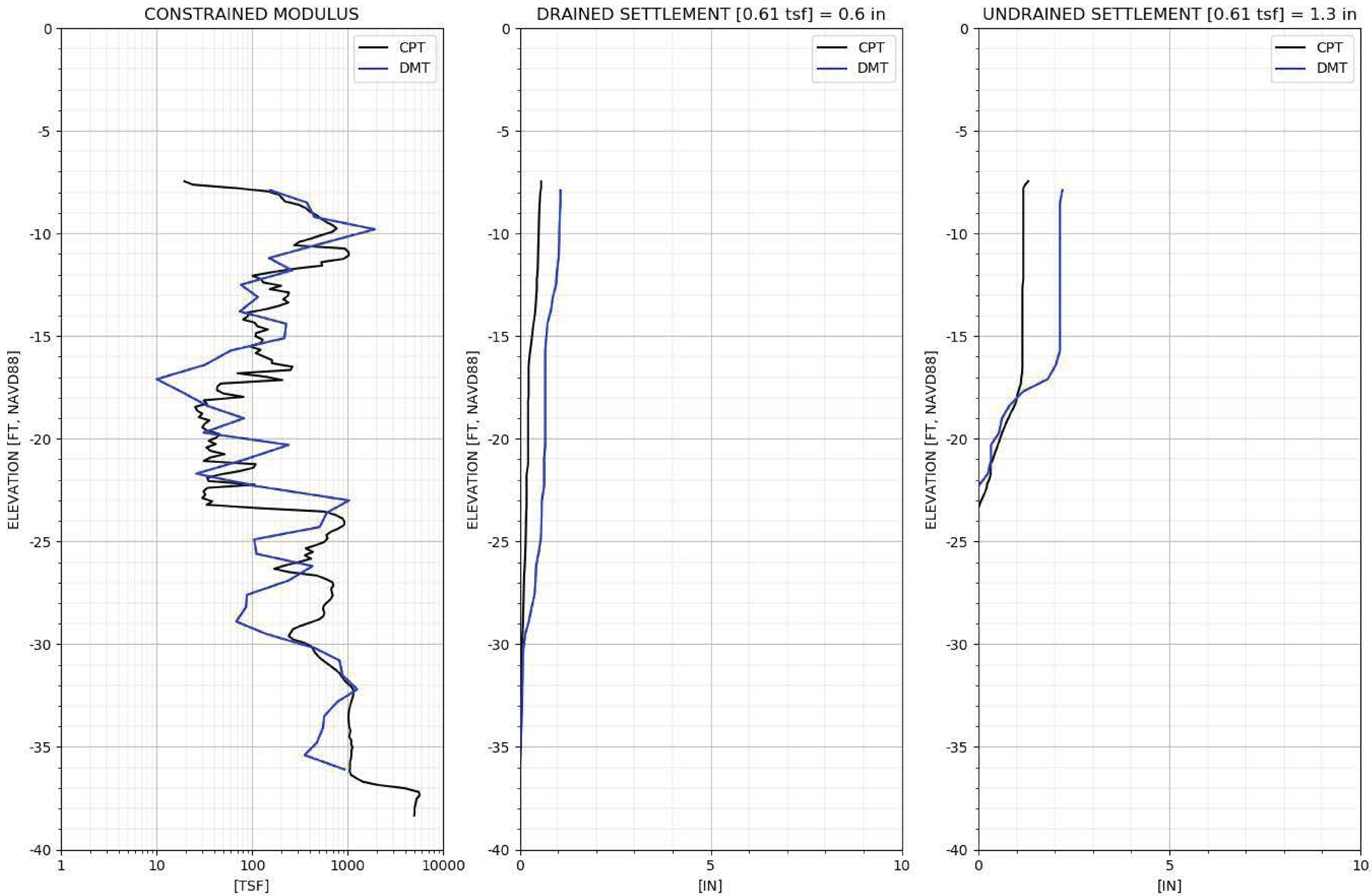
CPT-226 SETTLEMENT with Crest Elevation = 5.52 ft NAVD88



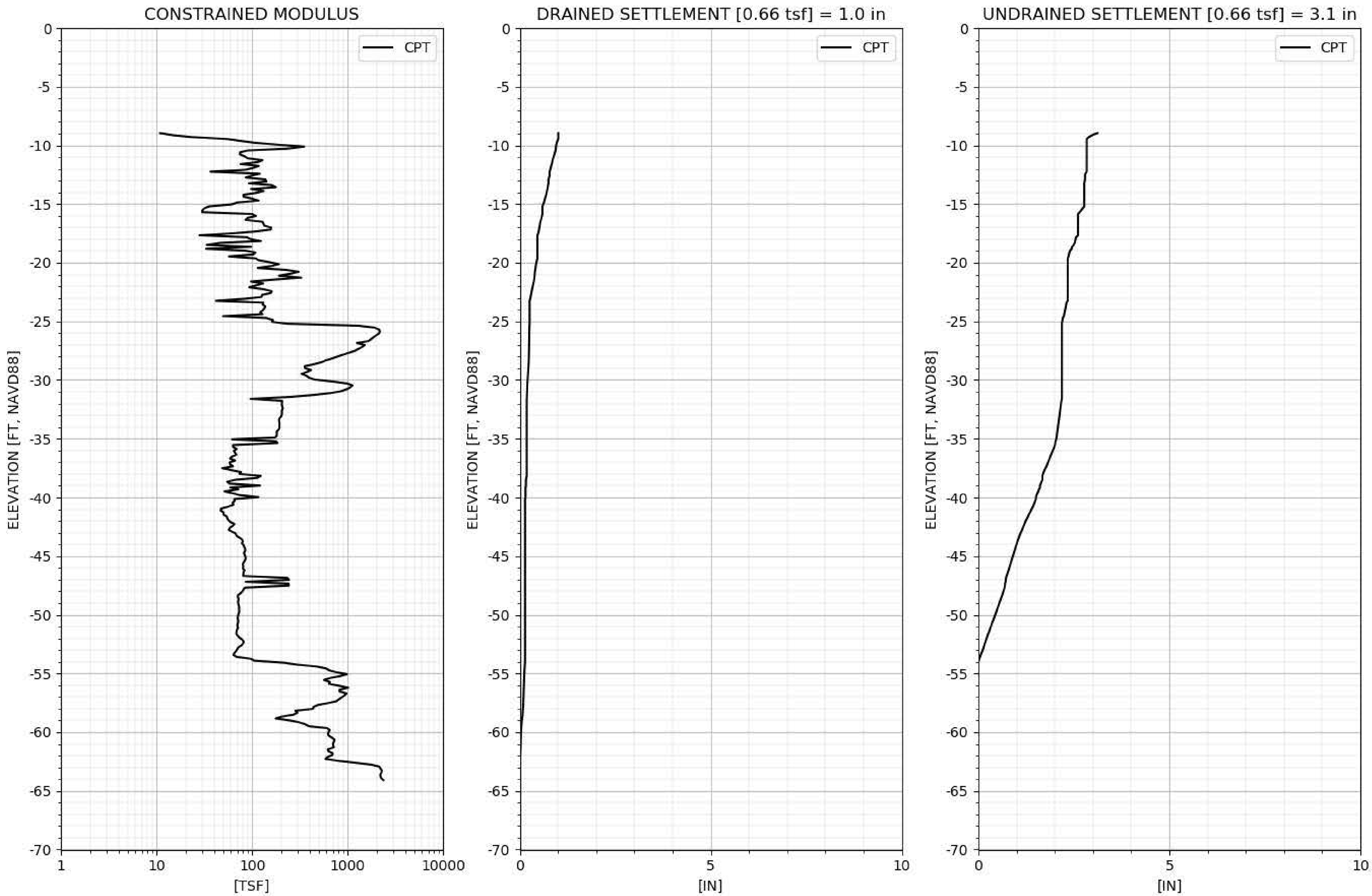
CPT-227 SETTLEMENT with Crest Elevation = 5.52 ft NAVD88



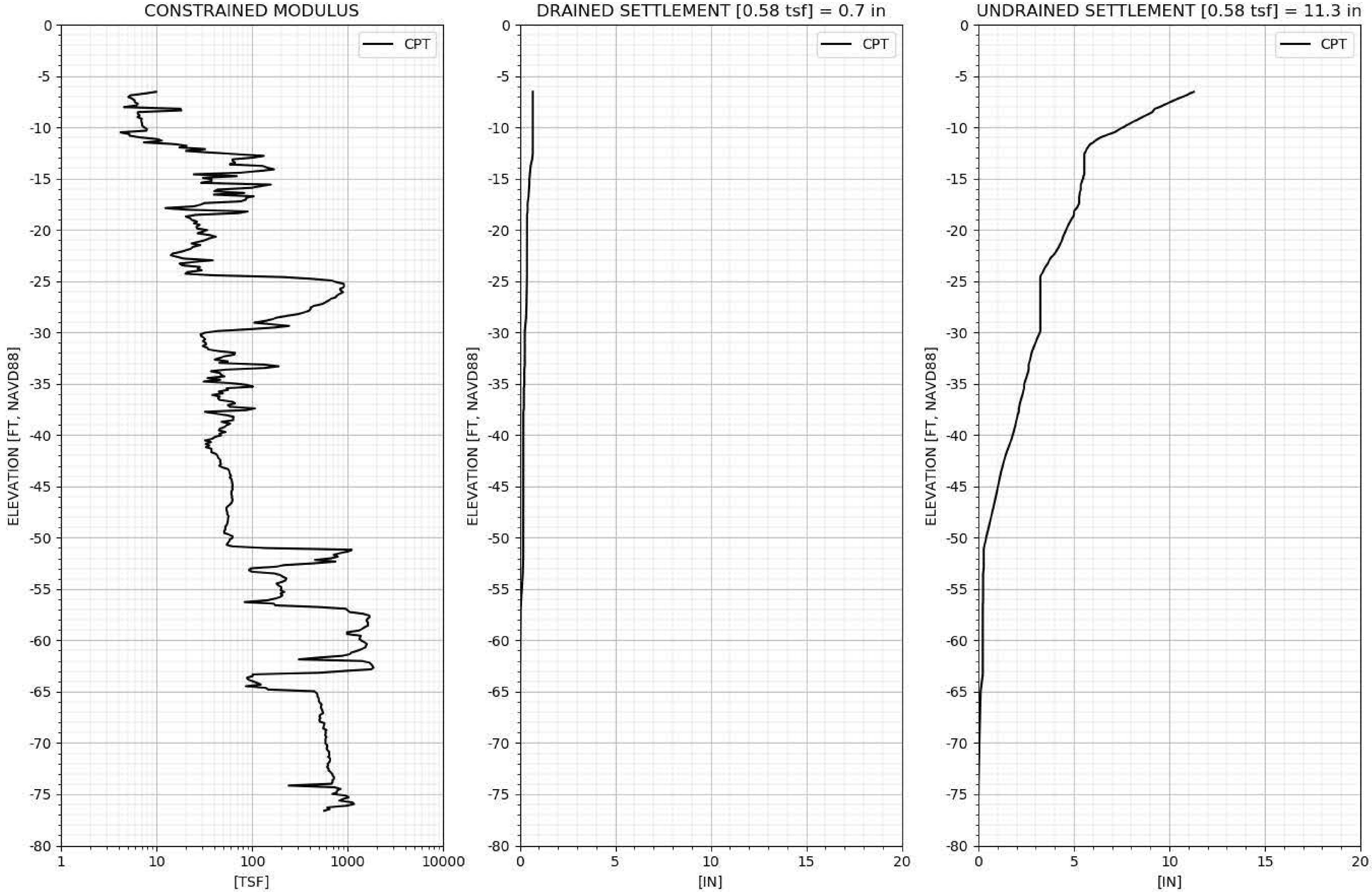
CPT-228 SETTLEMENT with Crest Elevation = 5.52 ft NAVD88



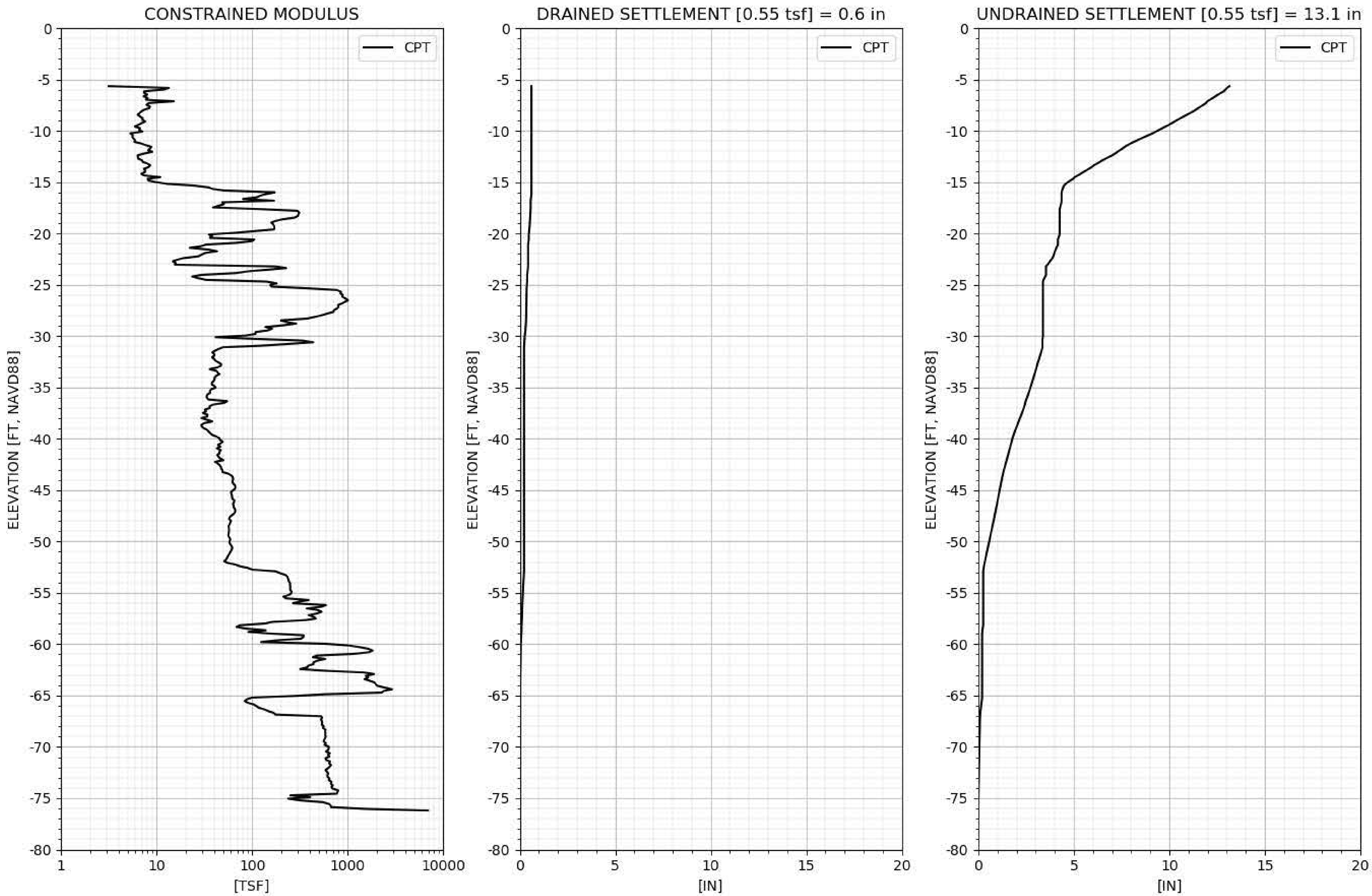
CPT-229 SETTLEMENT with Crest Elevation = 5.52 ft NAVD88



CPT-230 SETTLEMENT with Crest Elevation = 5.52 ft NAVD88



CPT-231 SETTLEMENT with Crest Elevation = 5.52 ft NAVD88



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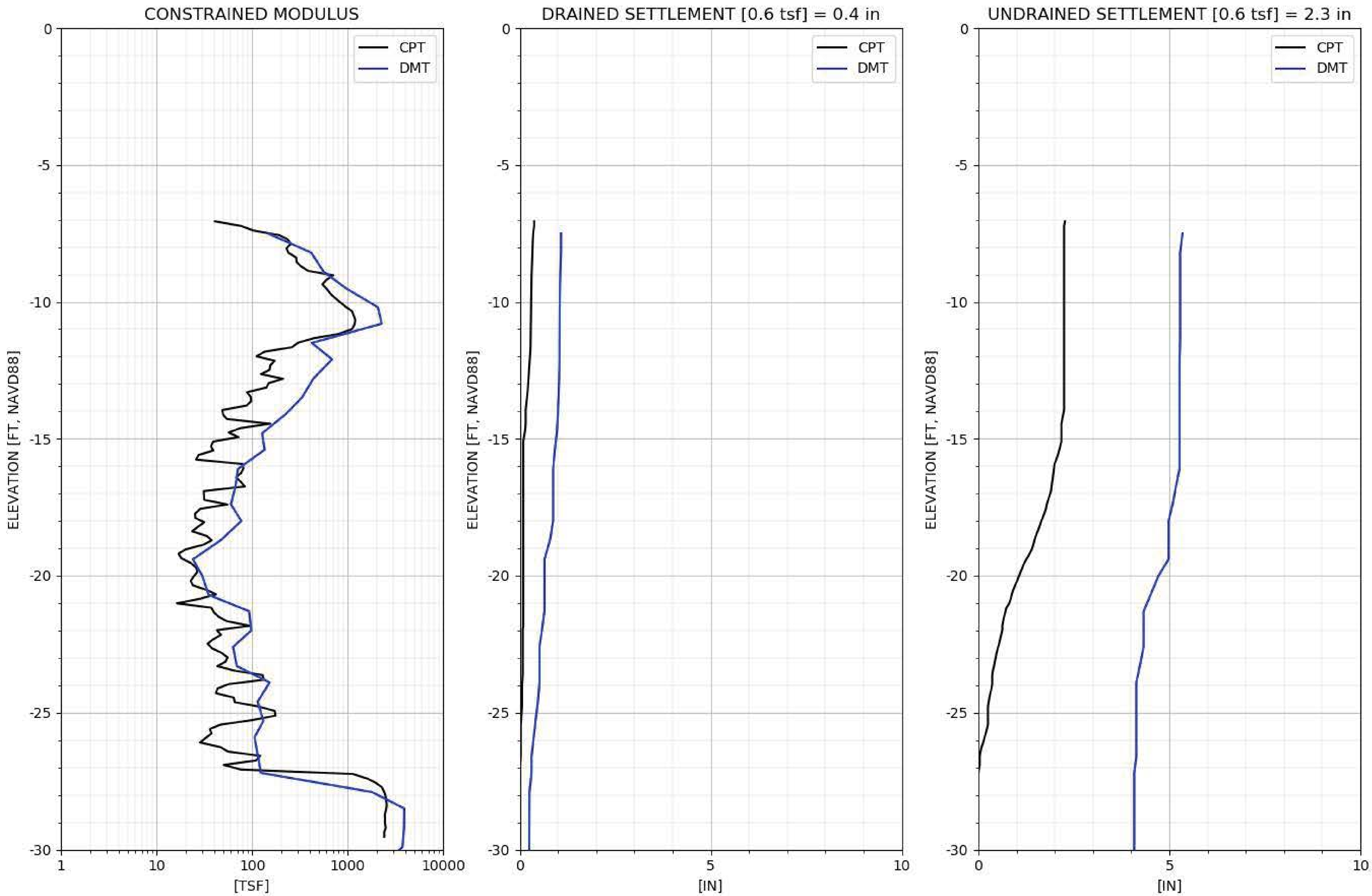
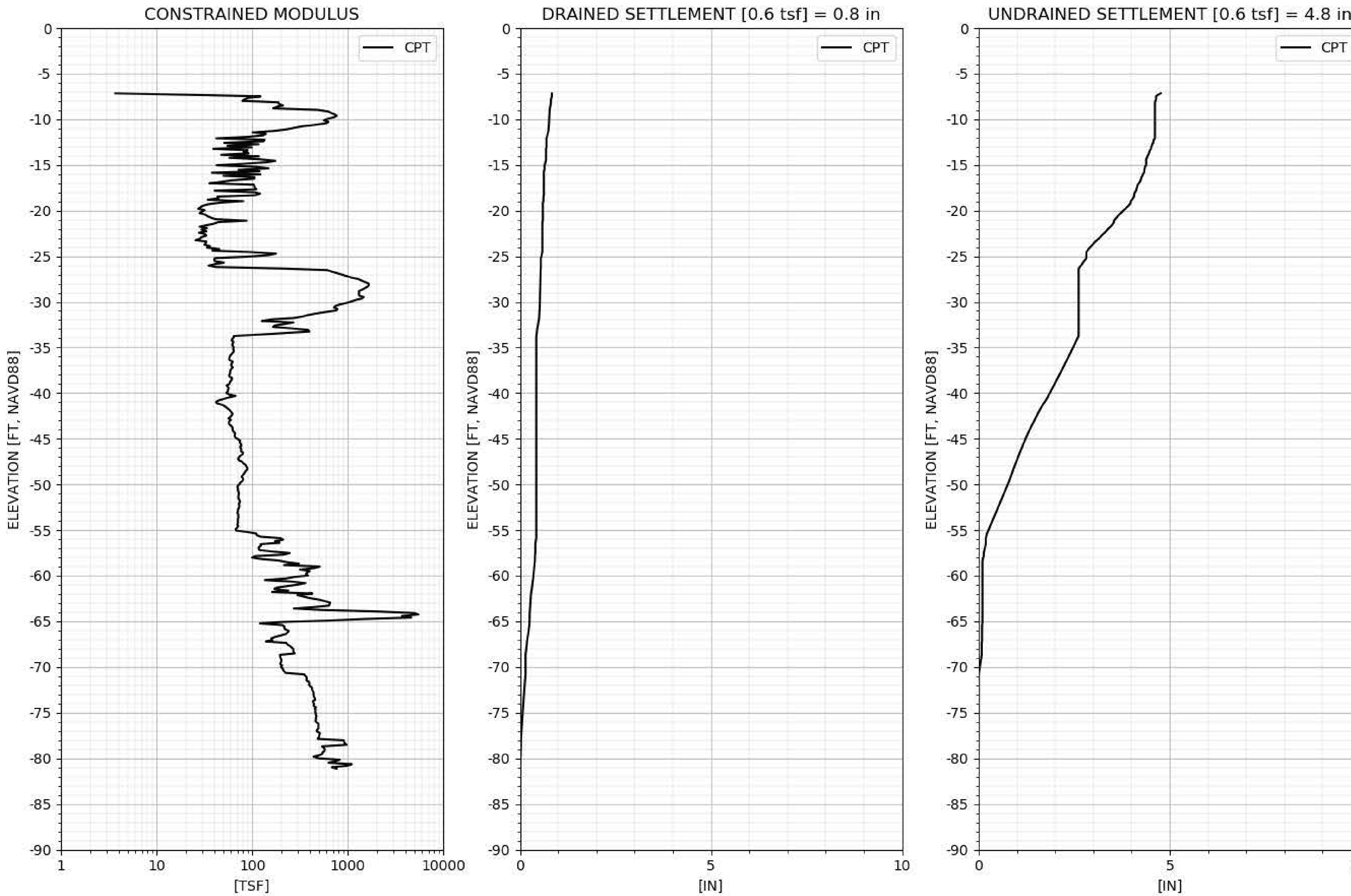
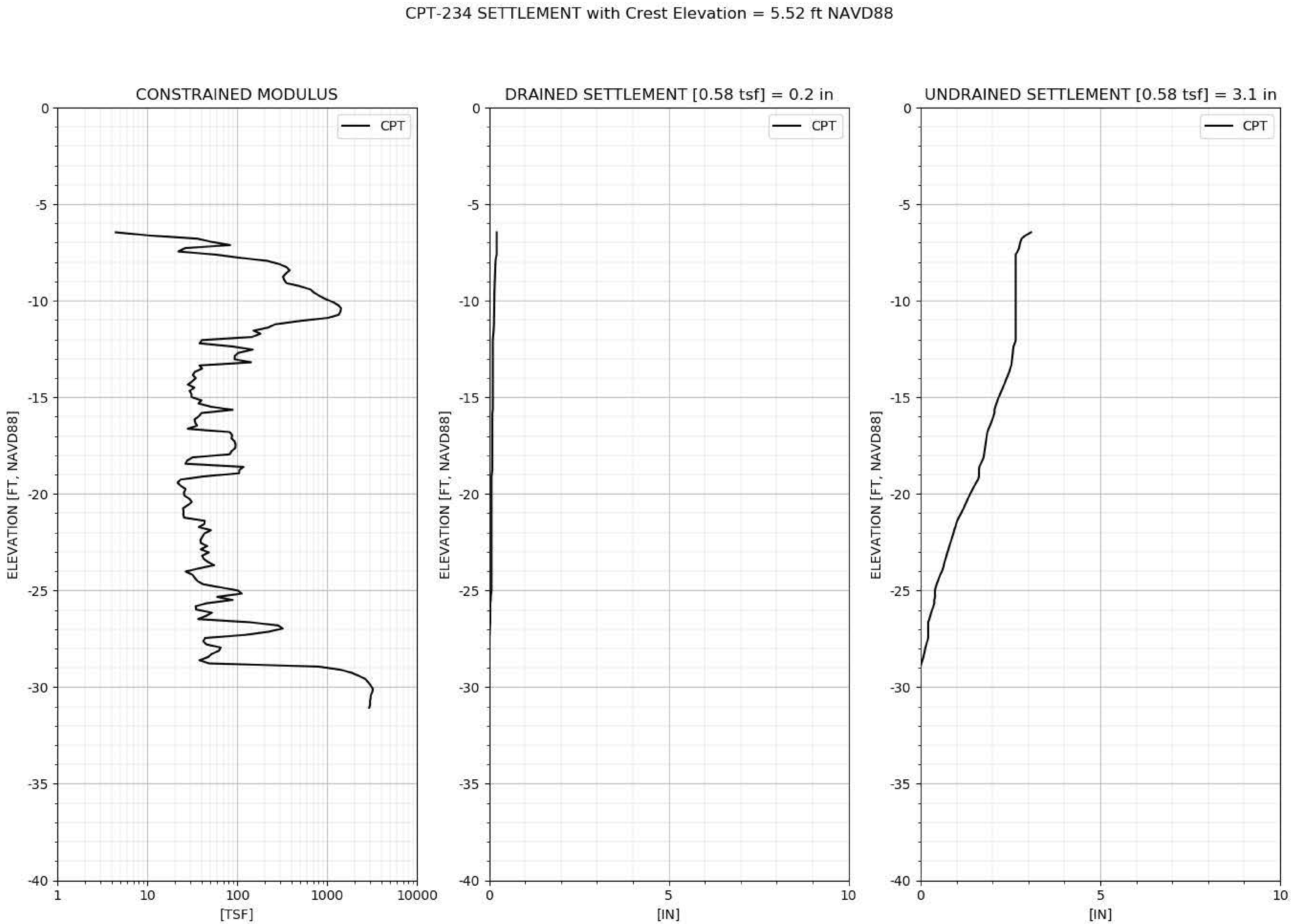
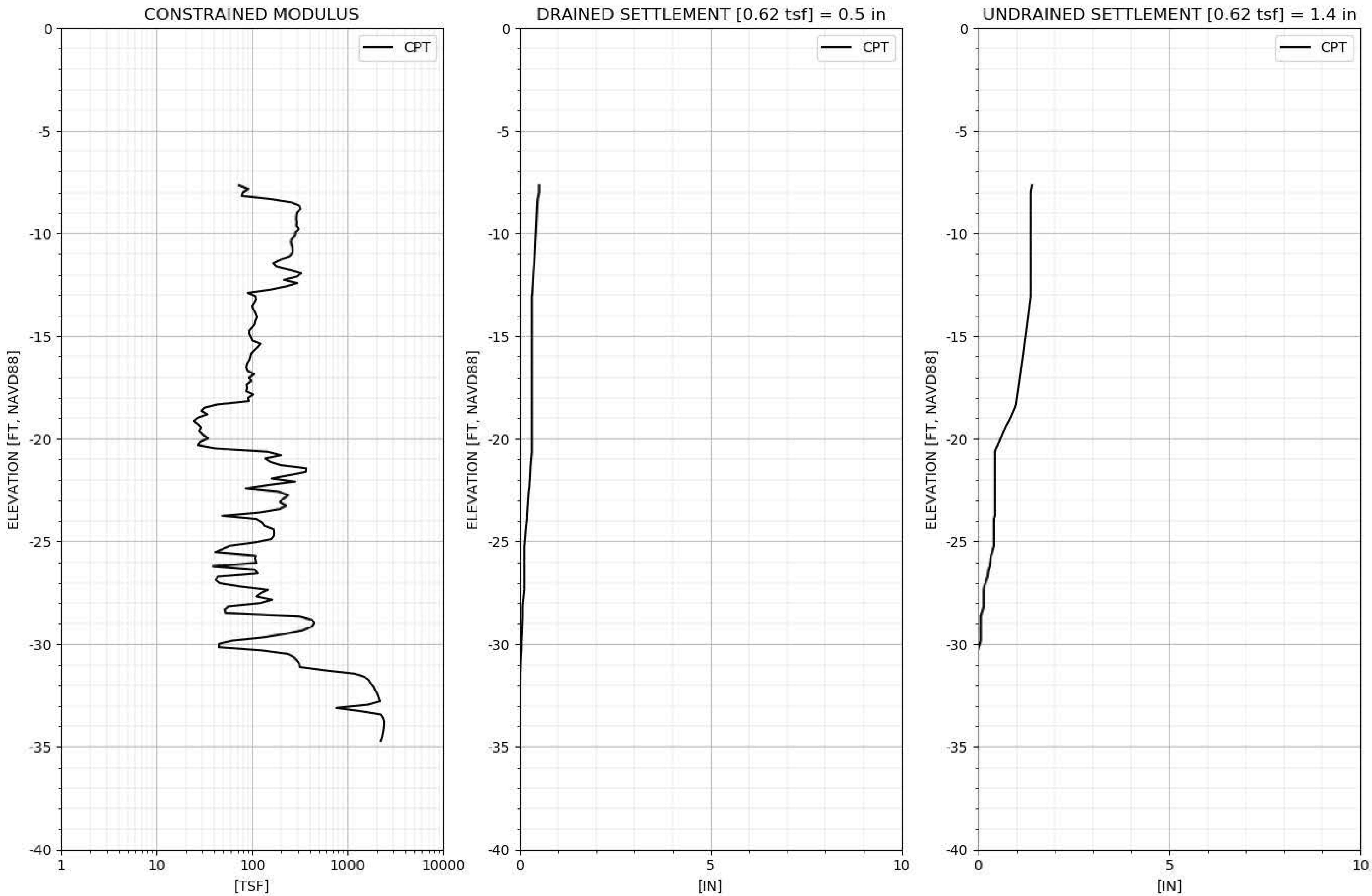


CPT-233 SETTLEMENT with Crest Elevation = 5.52 ft NAVD88

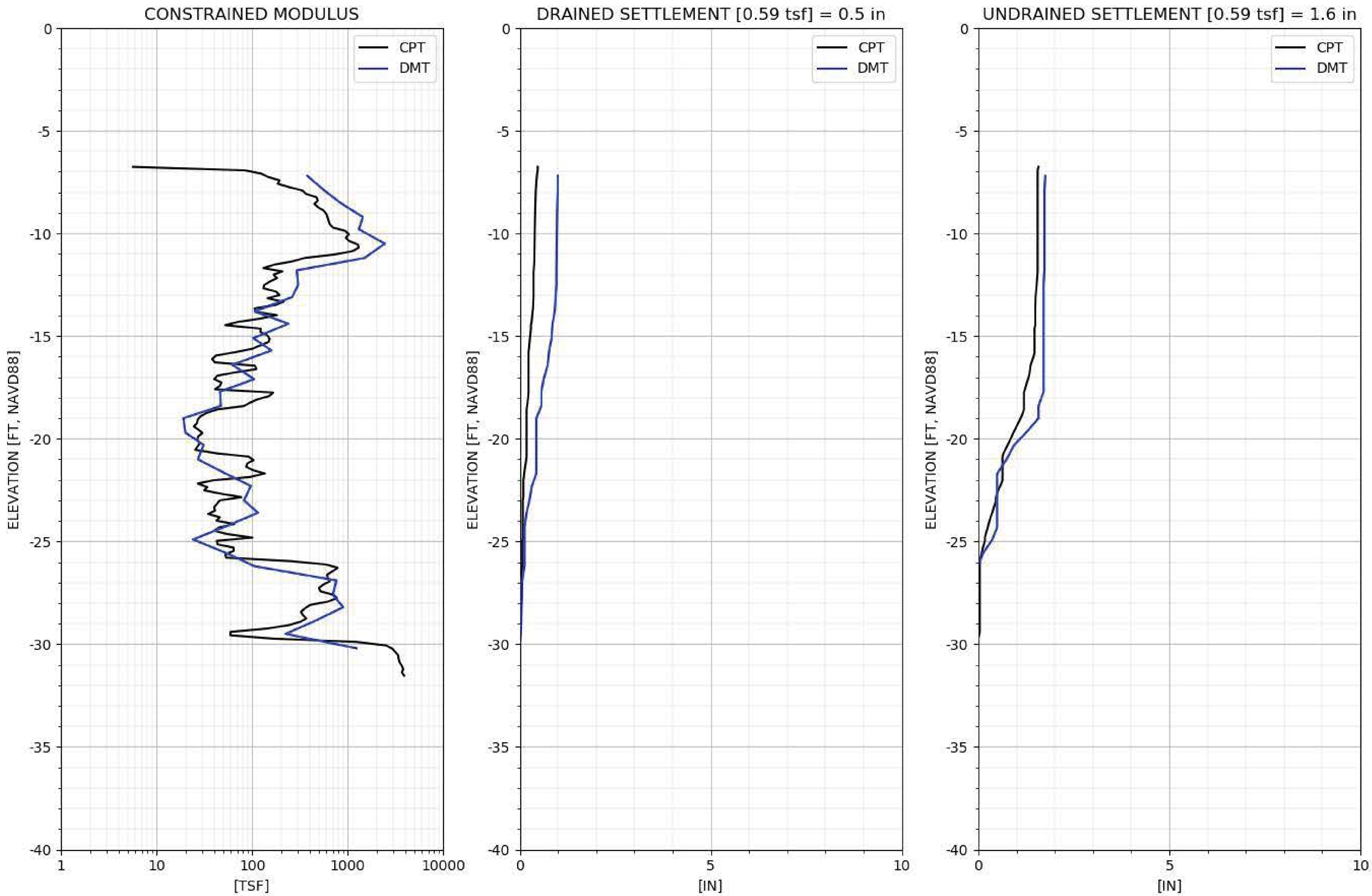



CPT-234 SETTLEMENT with Crest Elevation = 5.52 ft NAVD88
CONSTRAINED MODULUS
DRAINED SETTLEMENT [0.58 tsf] = 0.2 in
UNDRAINED SETTLEMENT [0.58 tsf] = 3.1 in
CPT
ELEVATION [FT, NAVD88]
0
-5
-10
-15
-20
-25
-30
-35
-40
1
10
100
1000
10000
[TSF]
0
5
10
[IN]

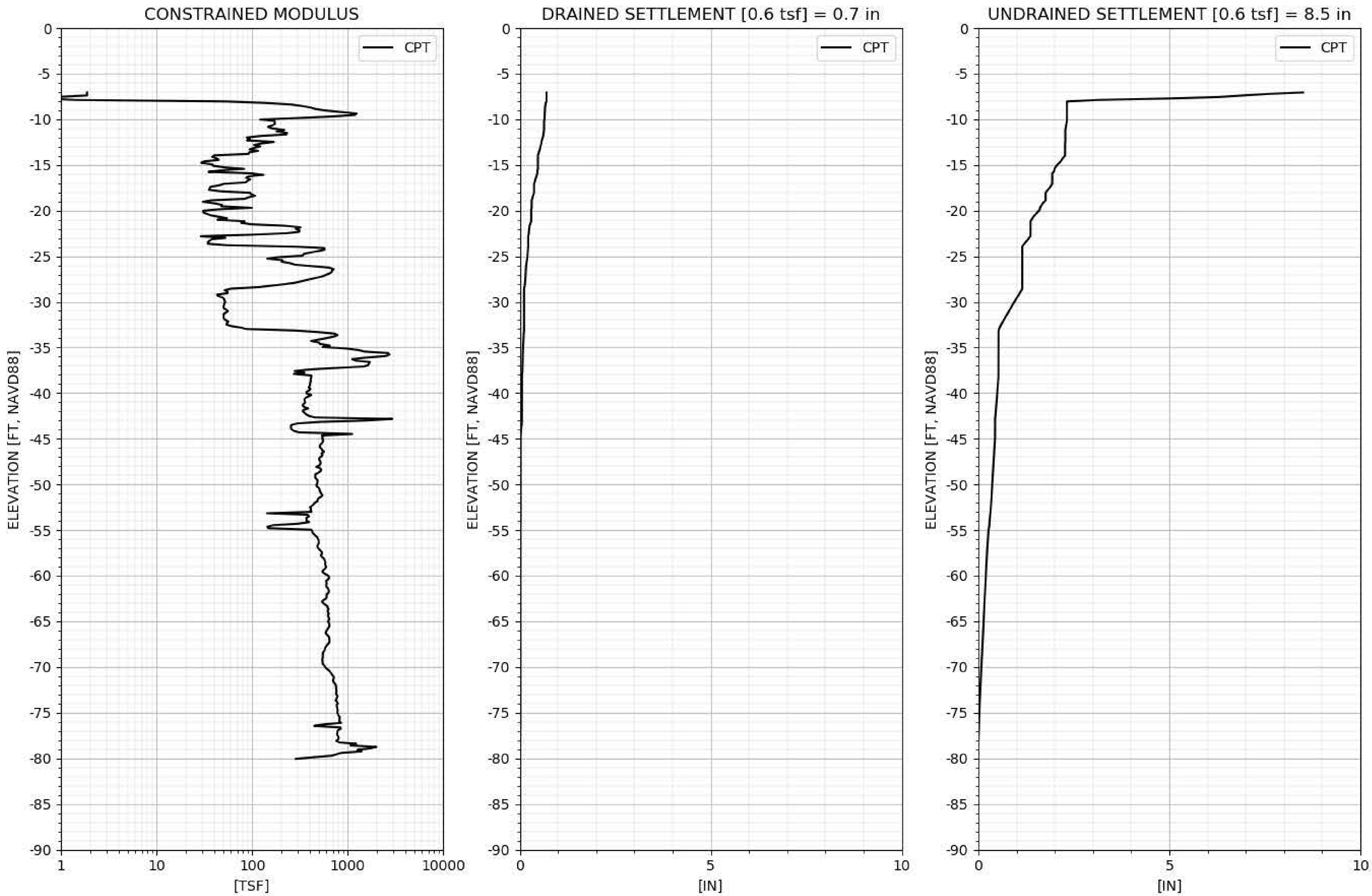
CPT-235 SETTLEMENT with Crest Elevation = 5.52 ft NAVD88



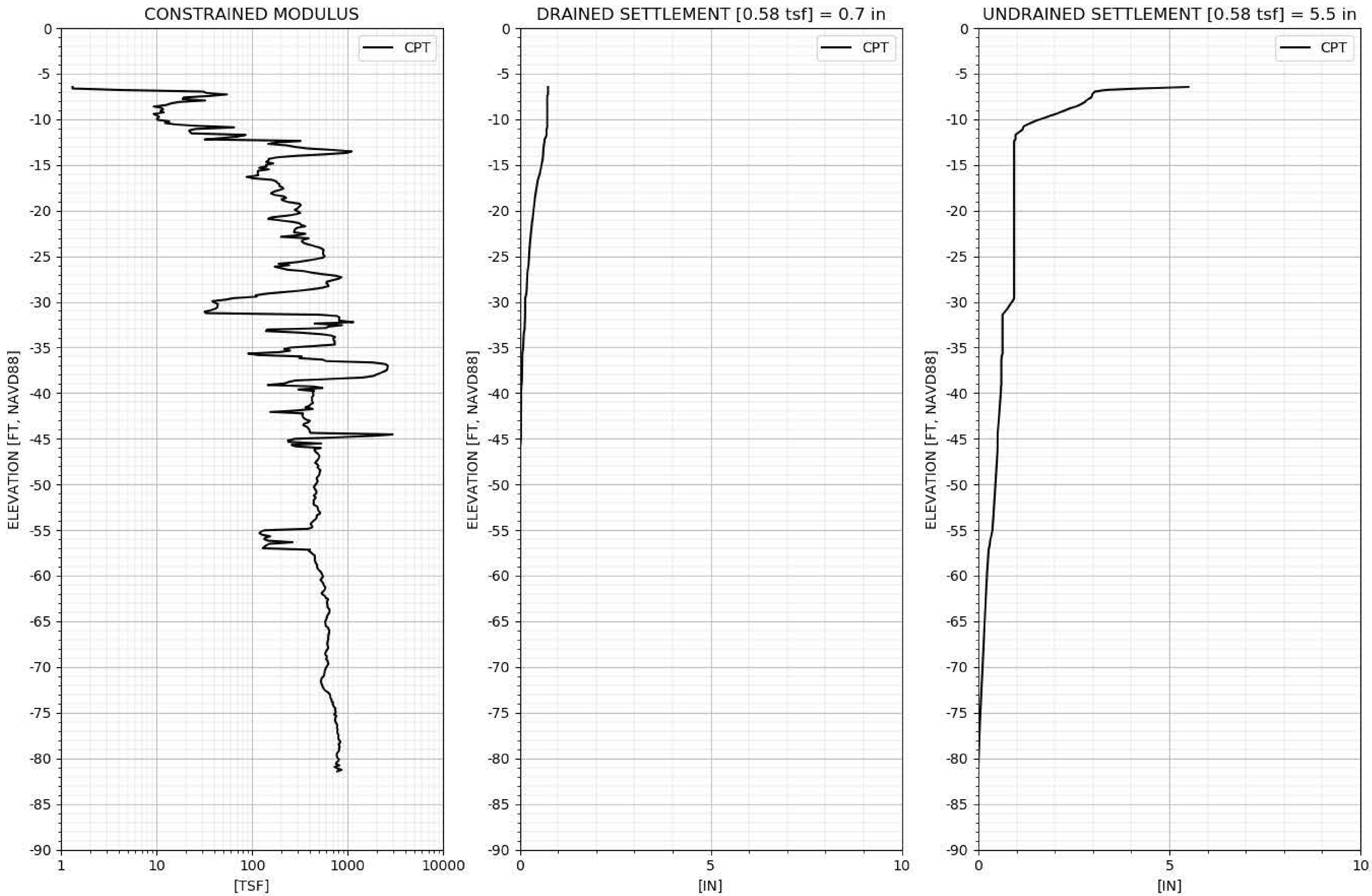
CPT-236 SETTLEMENT with Crest Elevation = 5.52 ft NAVD88

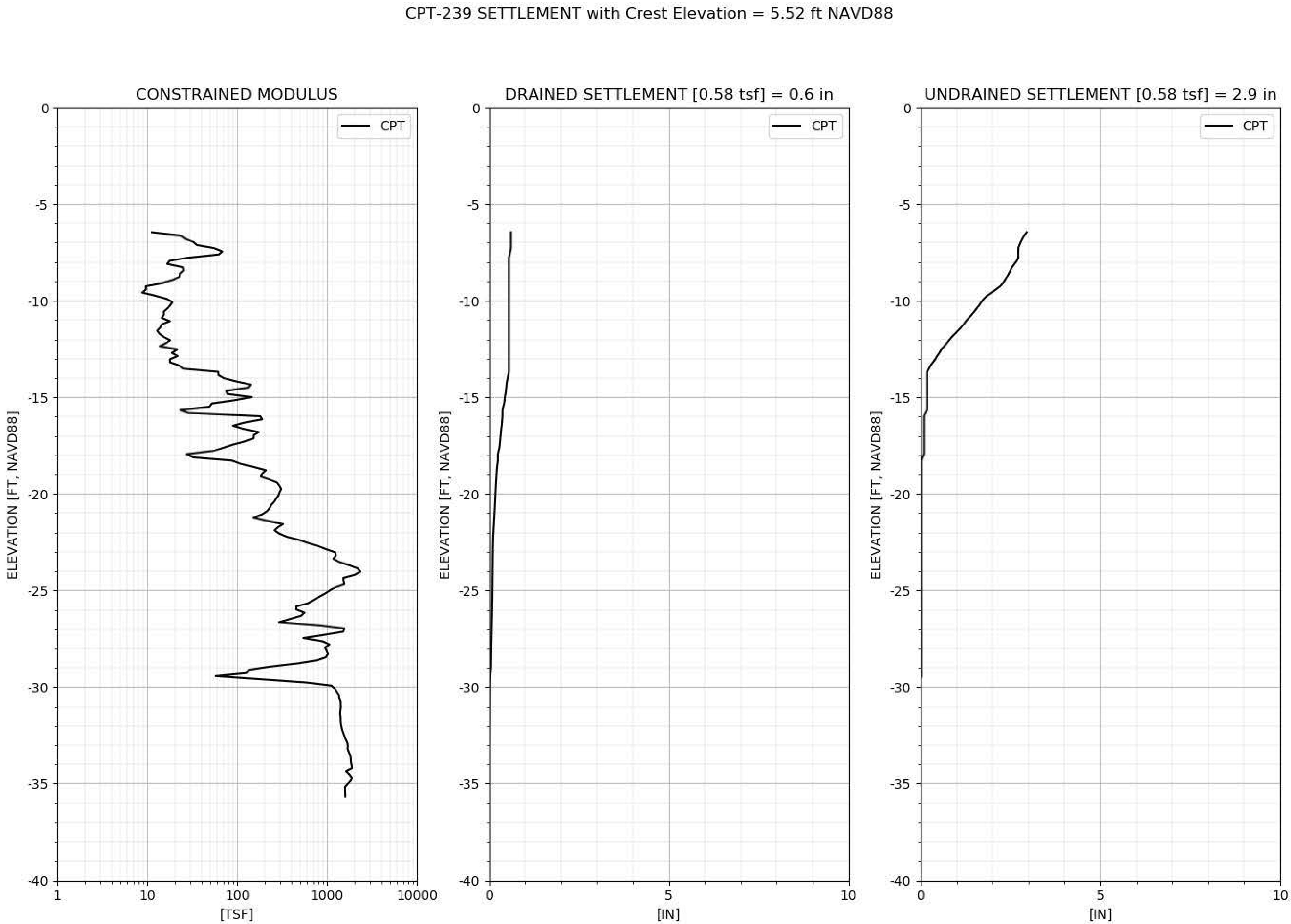


CPT-237 SETTLEMENT with Crest Elevation = 5.52 ft NAVD88

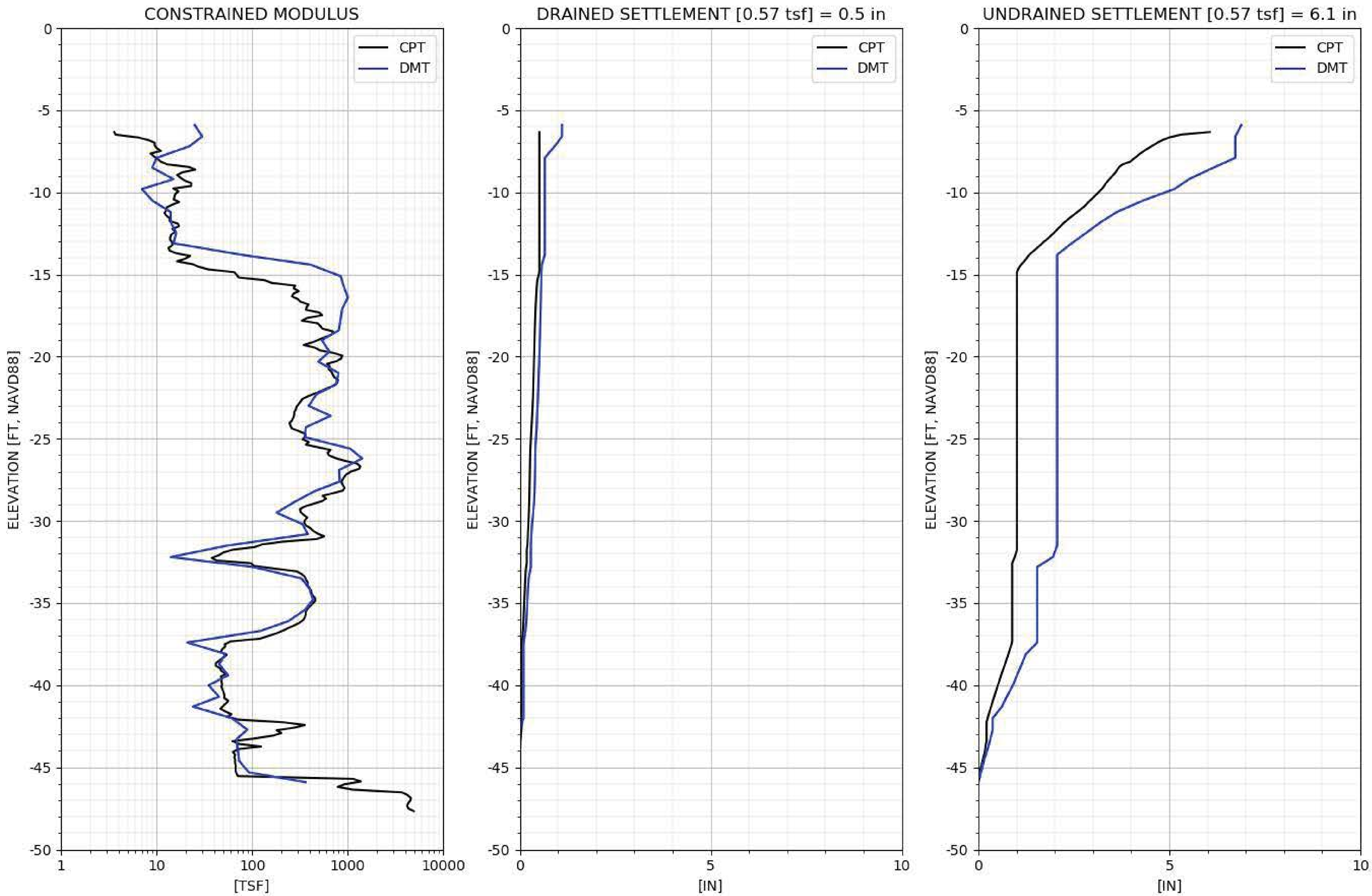


CPT-238 SETTLEMENT with Crest Elevation = 5.52 ft NAVD88

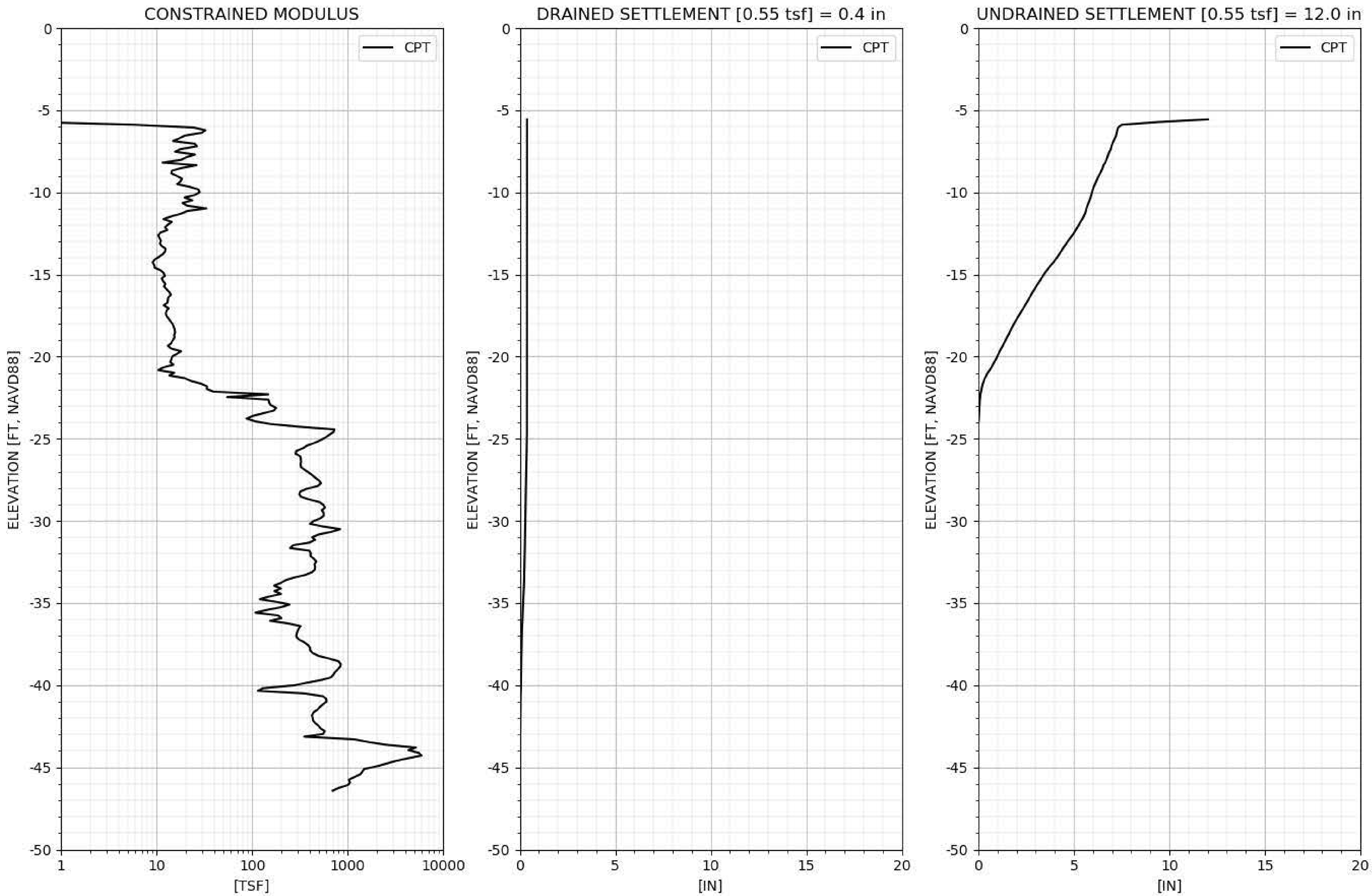


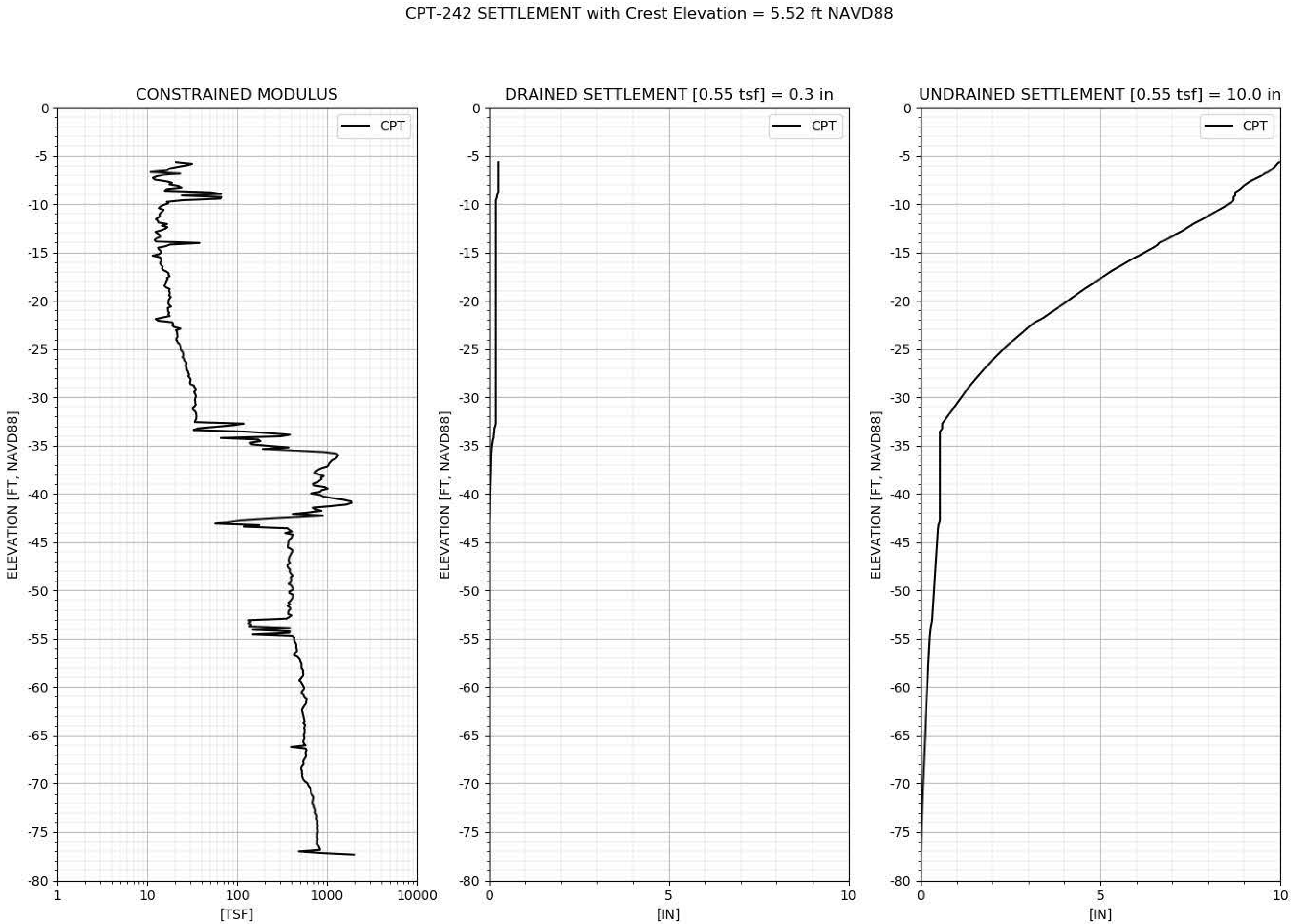

CPT-239 SETTLEMENT with Crest Elevation = 5.52 ft NAVD88
CONSTRAINED MODULUS
DRAINED SETTLEMENT [0.58 tsf] = 0.6 in
UNDRAINED SETTLEMENT [0.58 tsf] = 2.9 in
CPT
ELEVATION [FT, NAVD88]
0
-5
-10
-15
-20
-25
-30
-35
-40
1
10
100
1000
10000
[TSF]
0
5
10
[IN]

CPT-240 SETTLEMENT with Crest Elevation = 5.52 ft NAVD88



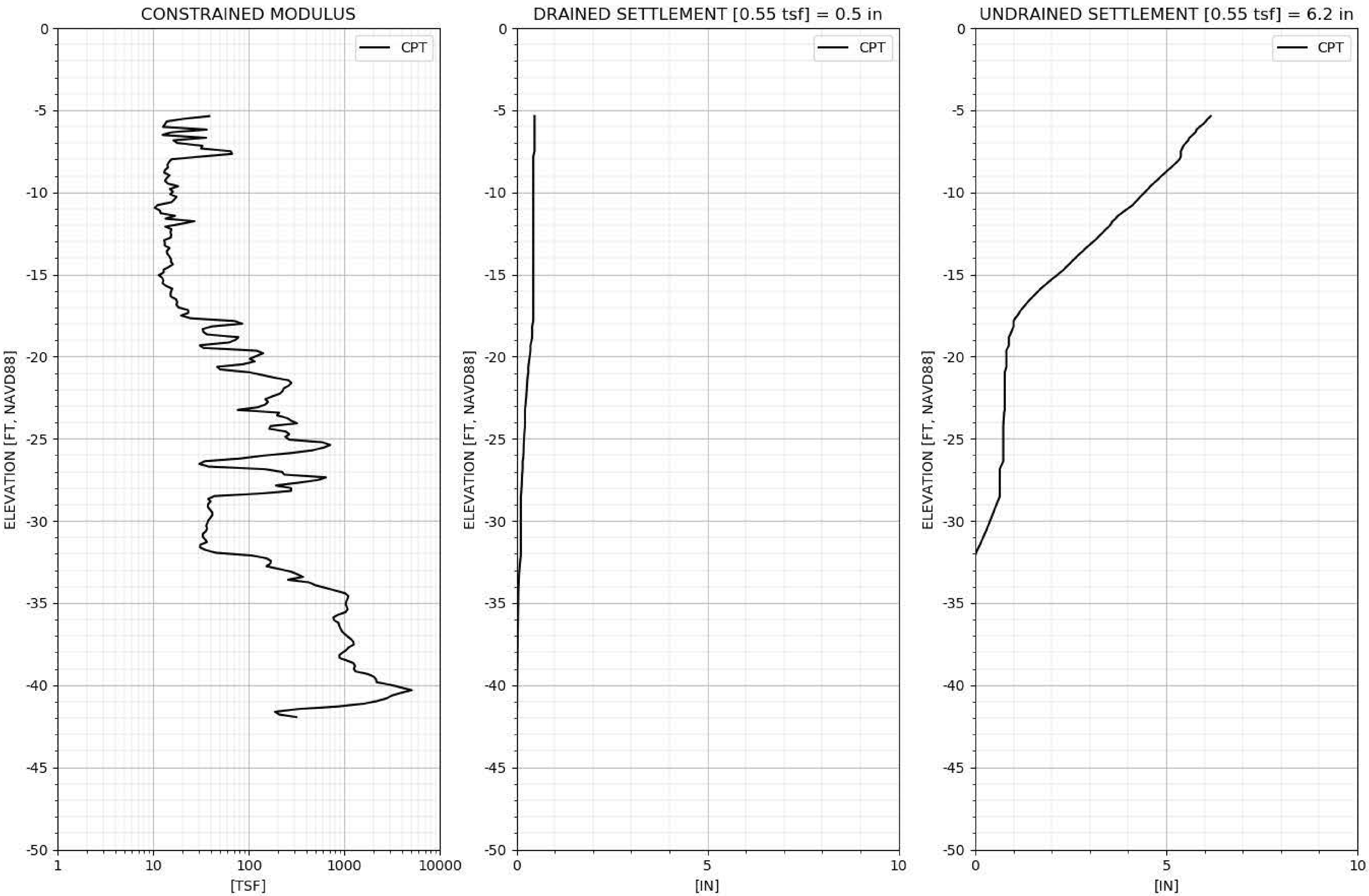
CPT-241 SETTLEMENT with Crest Elevation = 5.52 ft NAVD88



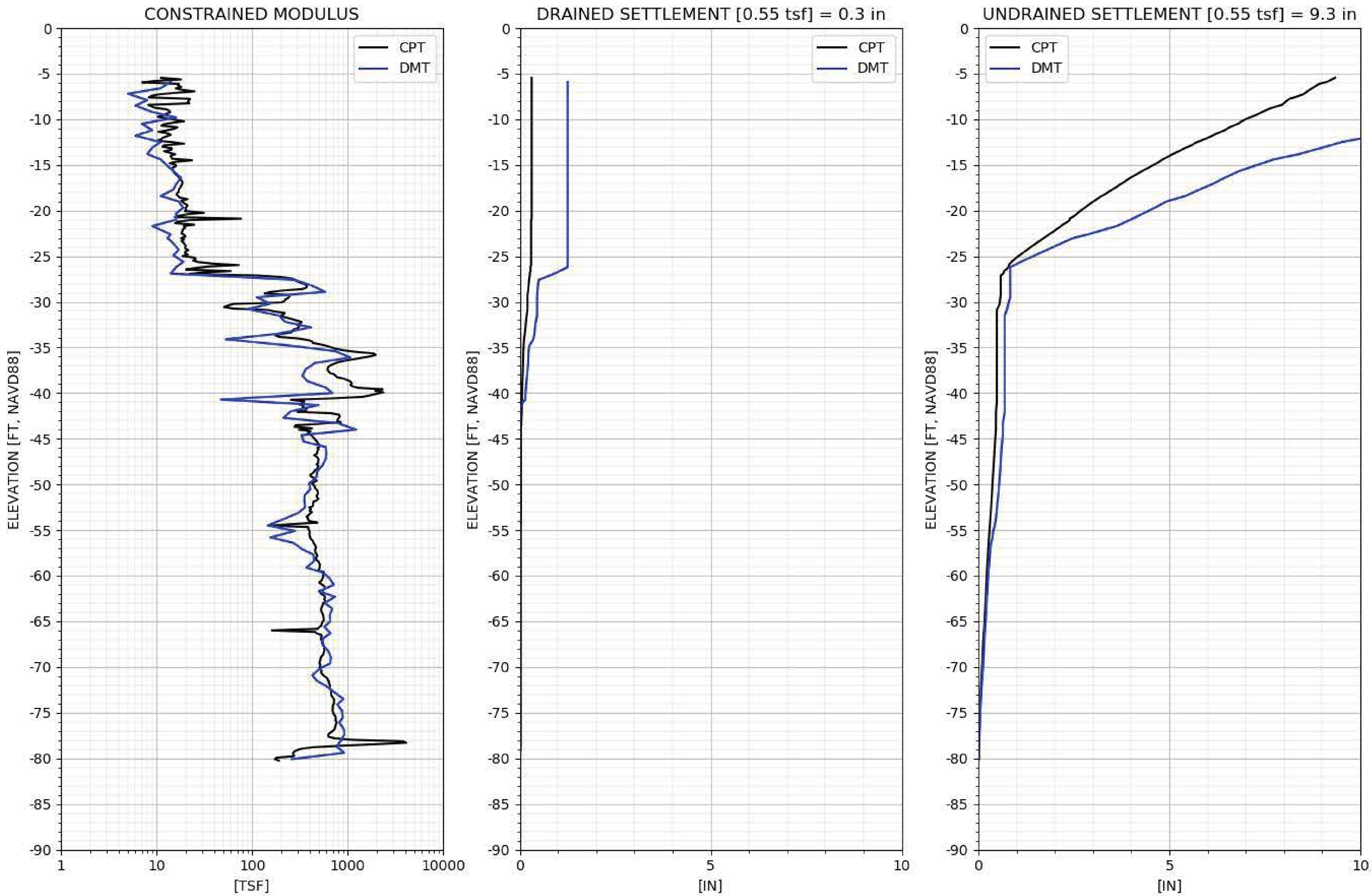


CPT-242 SETTLEMENT with Crest Elevation = 5.52 ft NAVD88
CONSTRAINED MODULUS
DRAINED SETTLEMENT [0.55 tsf] = 0.3 in
UNDRAINED SETTLEMENT [0.55 tsf] = 10.0 in
CPT
ELEVATION [FT, NAVD88]
[TSF]
[IN]
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
-55
-60
-65
-70
-75
-80
1
10
100
1000
10000
5

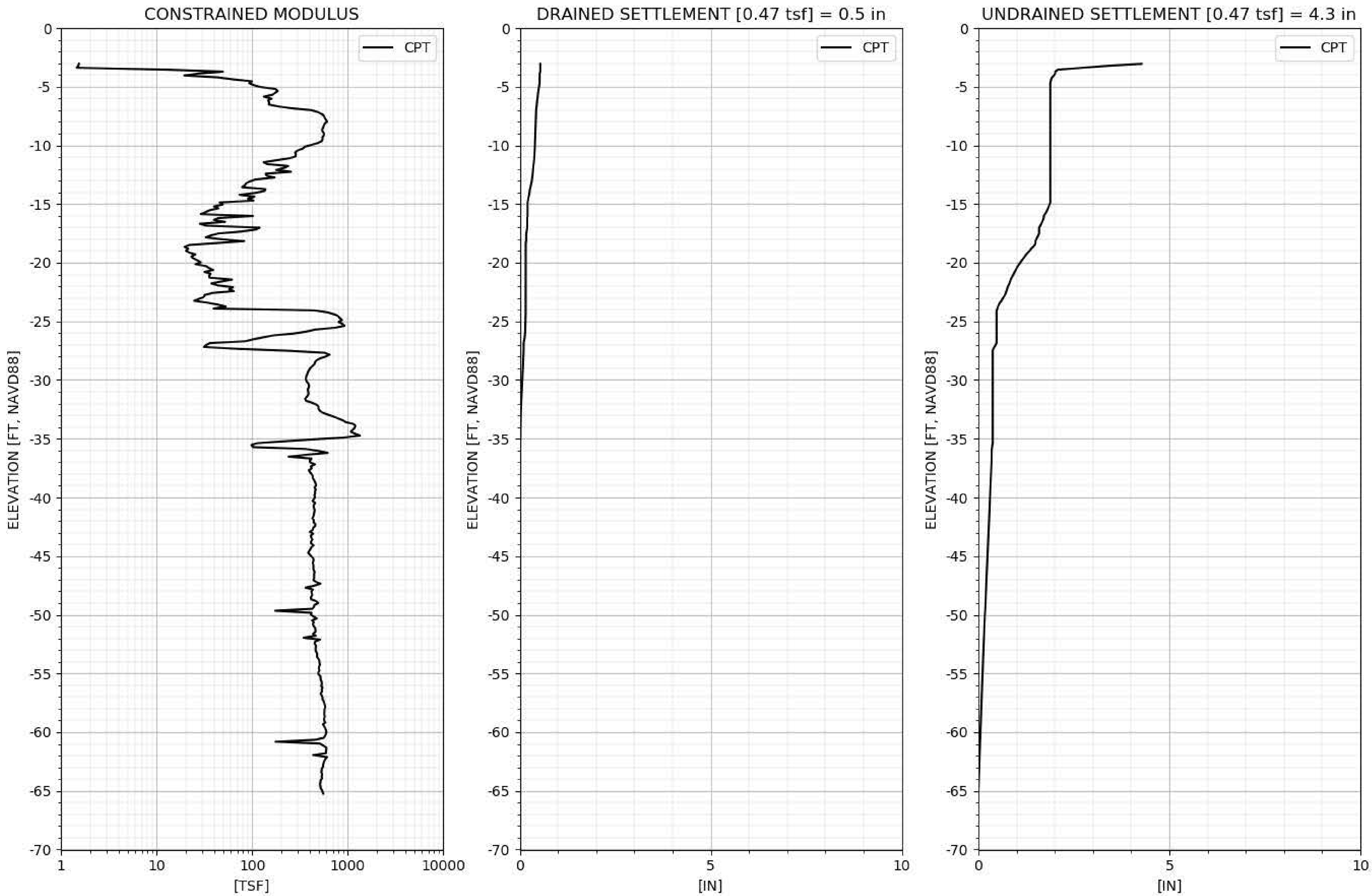
CPT-243 SETTLEMENT with Crest Elevation = 5.52 ft NAVD88

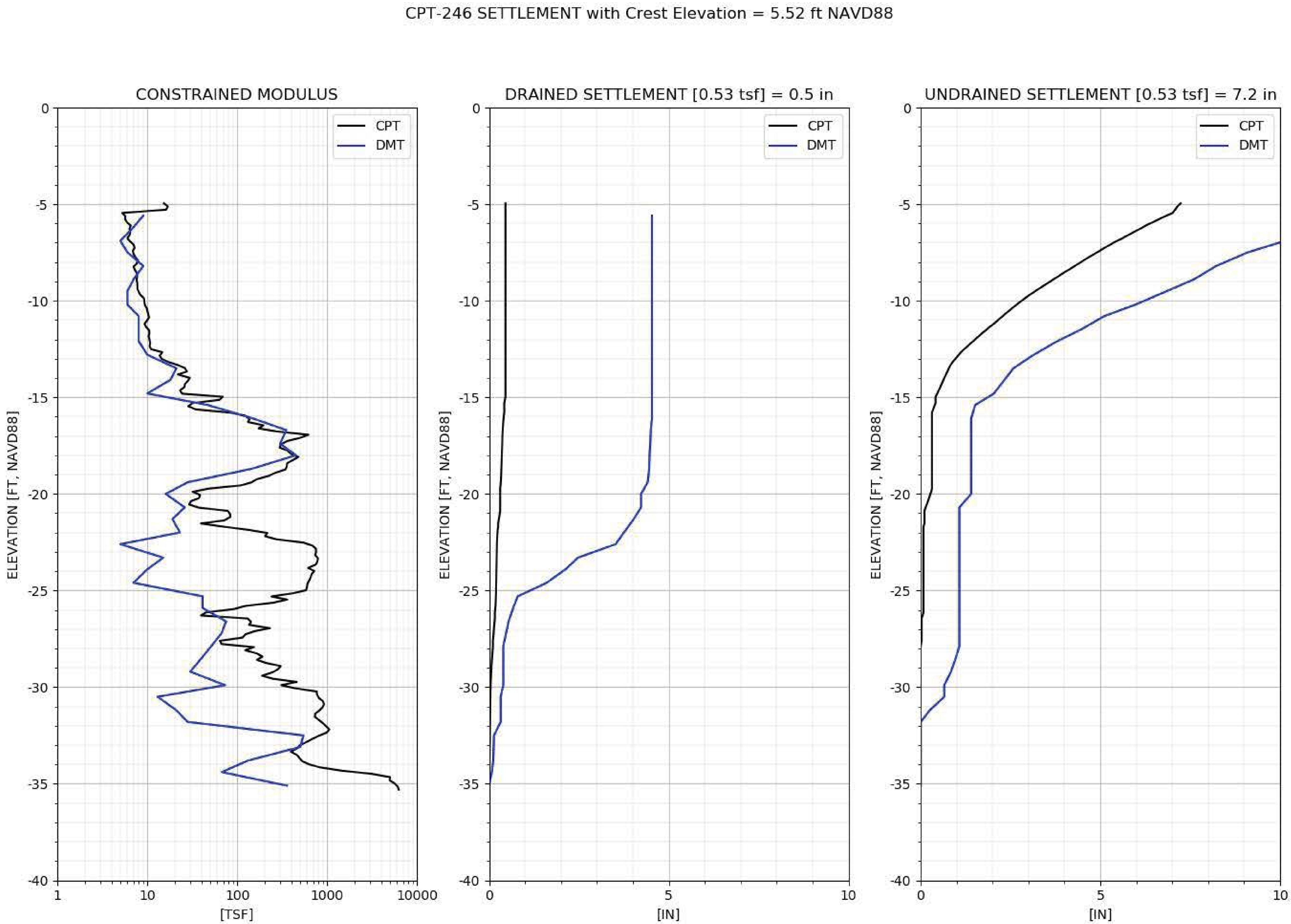


CPT-244 SETTLEMENT with Crest Elevation = 5.52 ft NAVD88



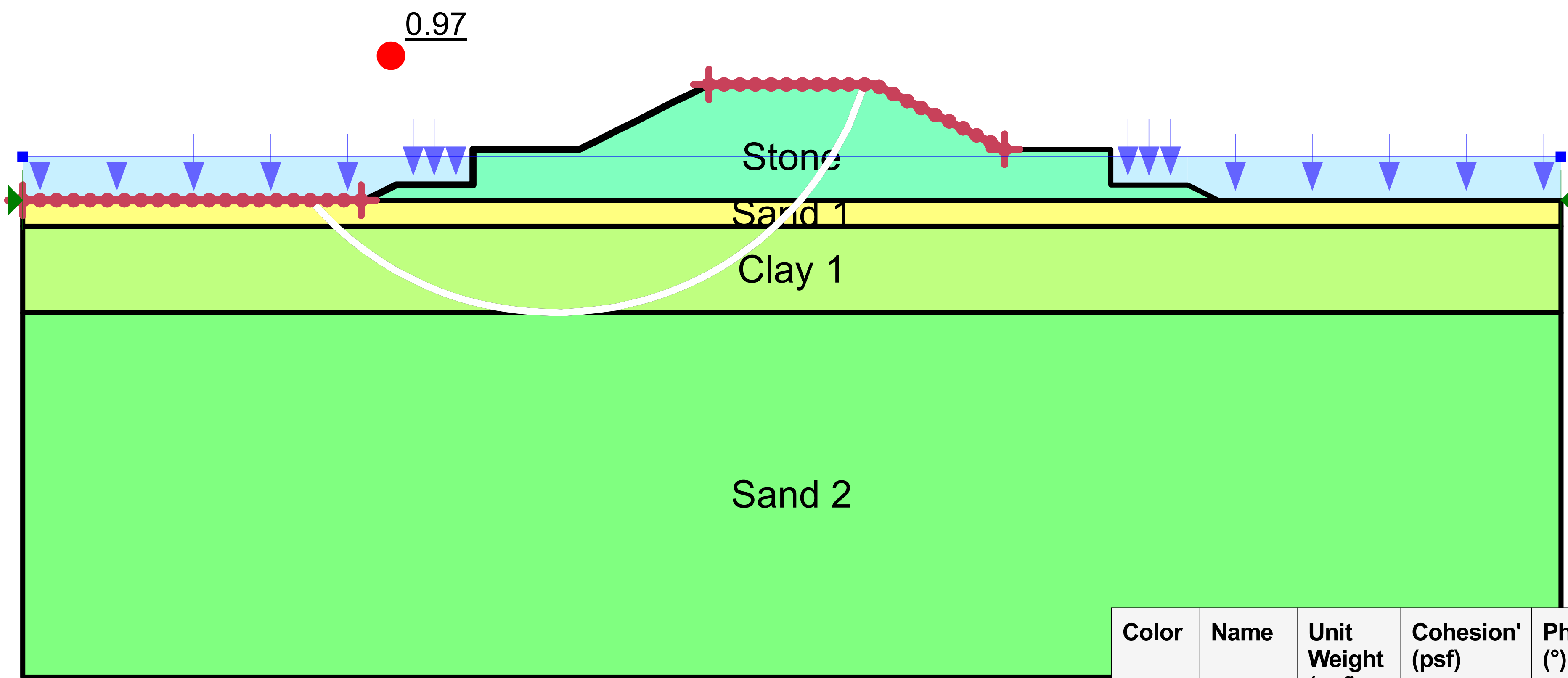
CPT-245 SETTLEMENT with Crest Elevation = 5.52 ft NAVD88





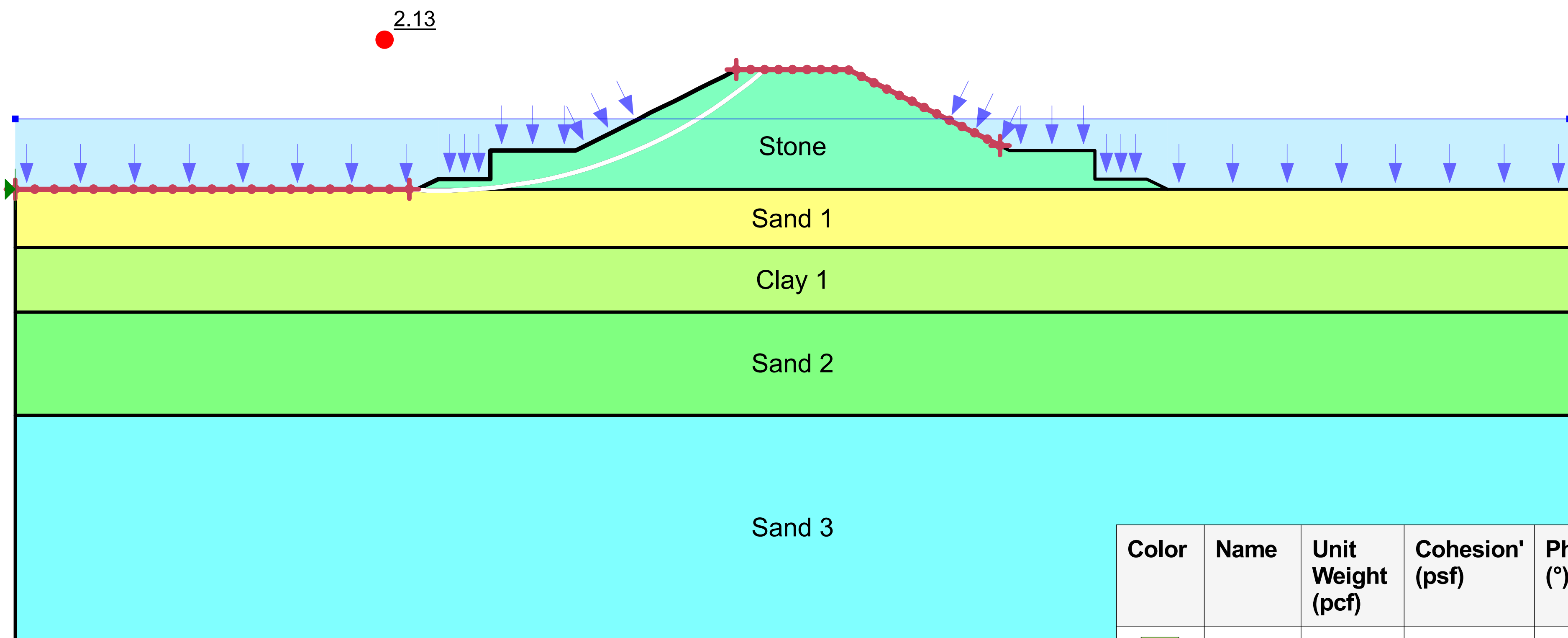
CPT-246 SETTLEMENT with Crest Elevation = 5.52 ft NAVD88
CONSTRAINED MODULUS
DRAINED SETTLEMENT [0.53 tsf] = 0.5 in
UNDRAINED SETTLEMENT [0.53 tsf] = 7.2 in
CPT
DMT
ELEVATION [FT, NAVD88]
[TSF]
[IN]
0
-5
-10
-15
-20
-25
-30
-35
-40
1
10
100
1000
10000
5

Northeast Sill at CP-202



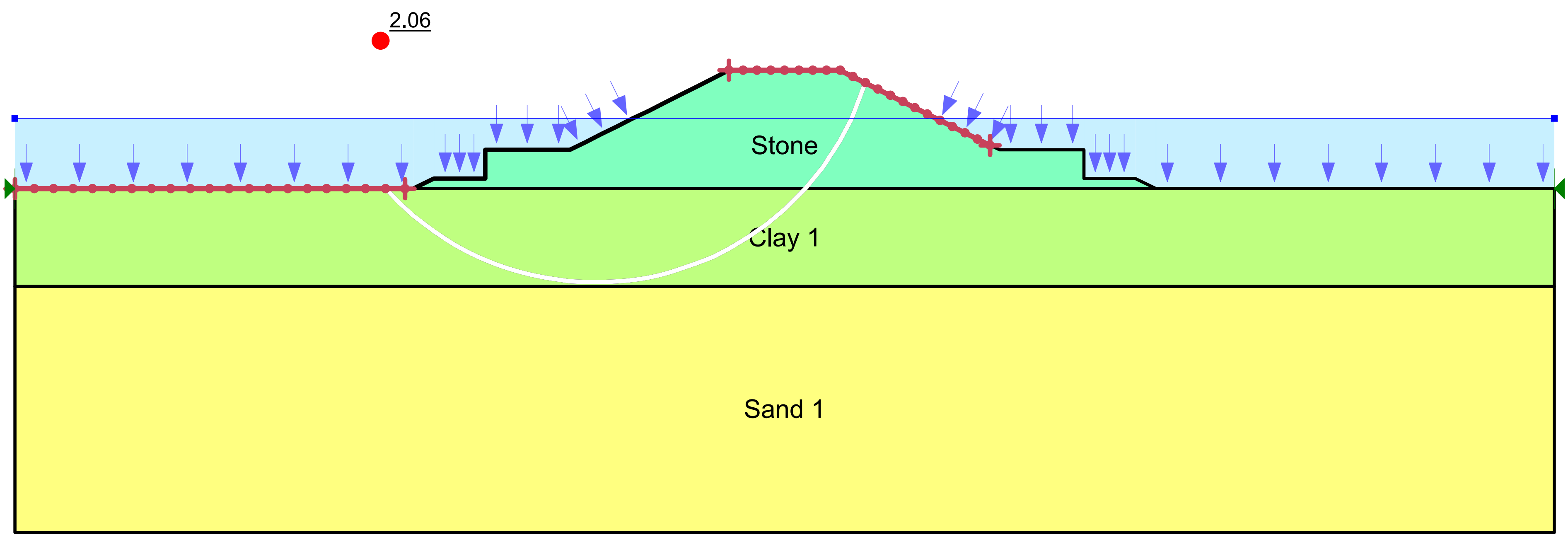
Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Clay 1	85	100	0
	Sand 1	90	0	32
	Sand 2	120	0	36
	Stone	125	0	40

Existing Sill at CP-210



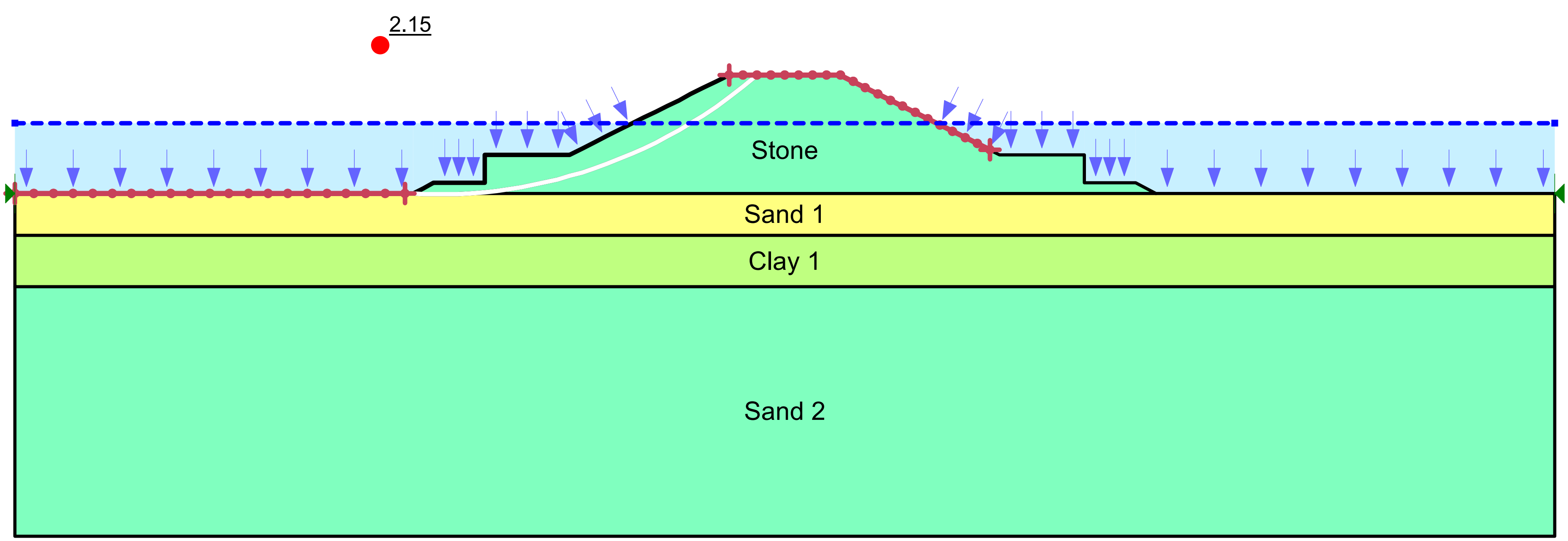
Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Clay 1	95	350	0
	Sand 1	115	0	36
	Sand 2	120	0	30
	Sand 3	125	0	36
	Stone	125	0	40

Existing Sill at CP-219



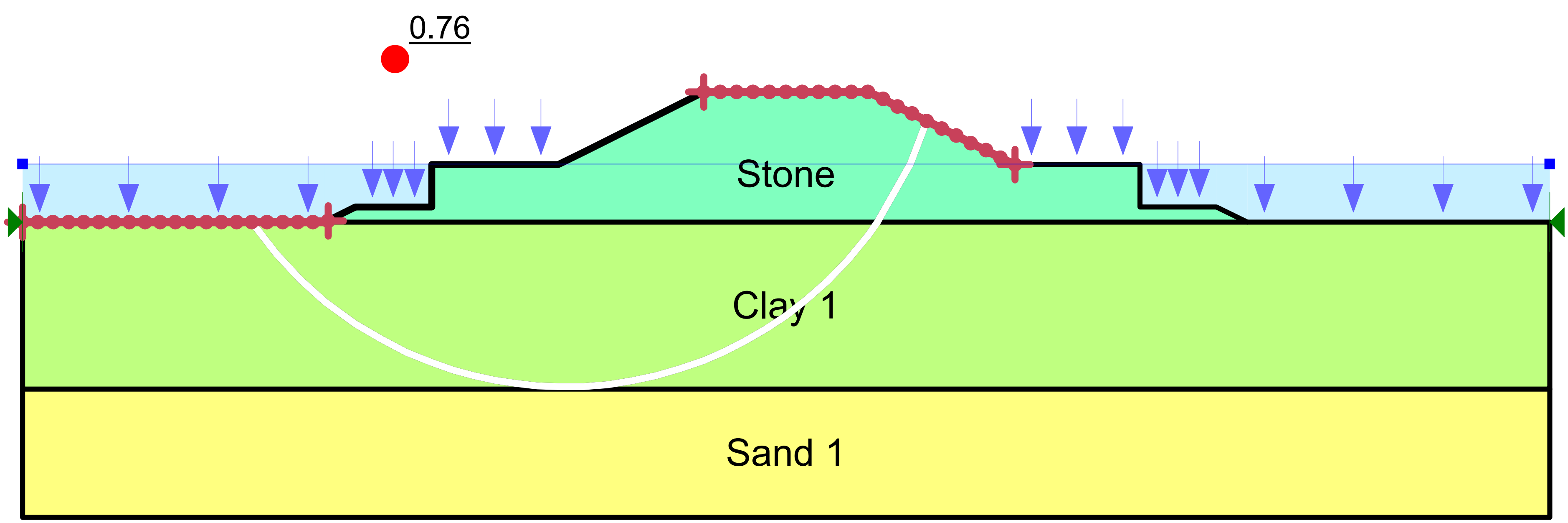
Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Clay 1	100	350	0
	Sand 1	120	0	32
	Stone	125	0	40

Southwest Sill at CP-220



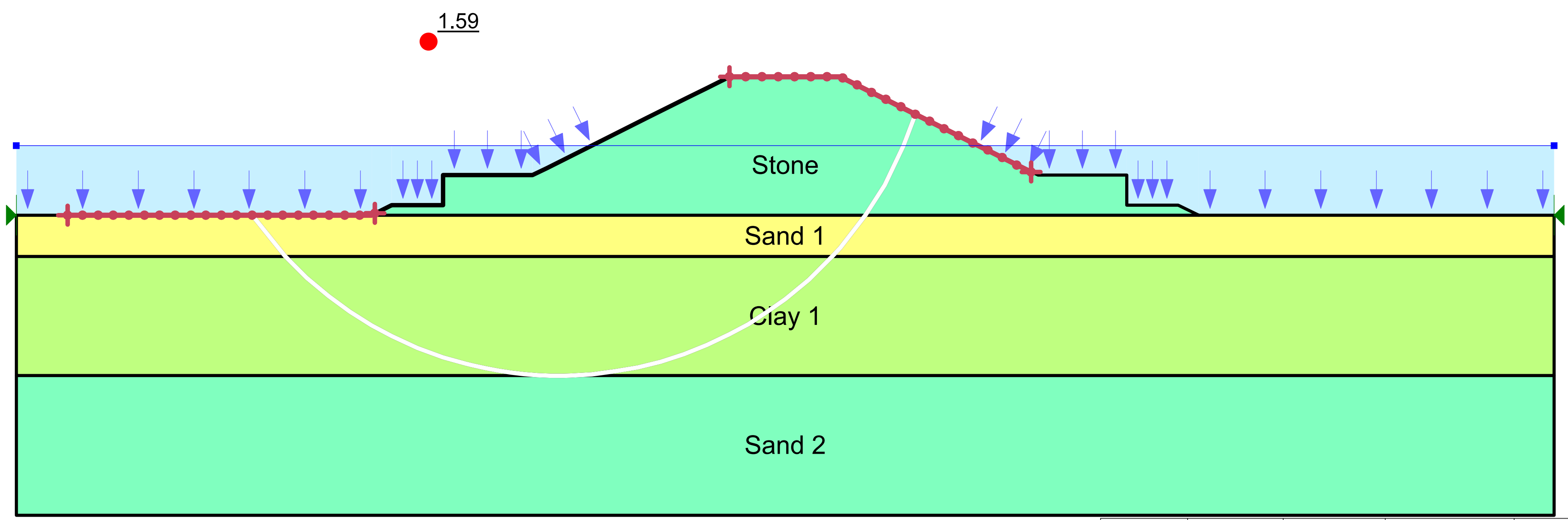
Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Clay 1	95	500	0
	Sand 1	120	0	40
	Sand 2	120	0	35
	Stone	125	0	40

Southeast Sill at CP-246



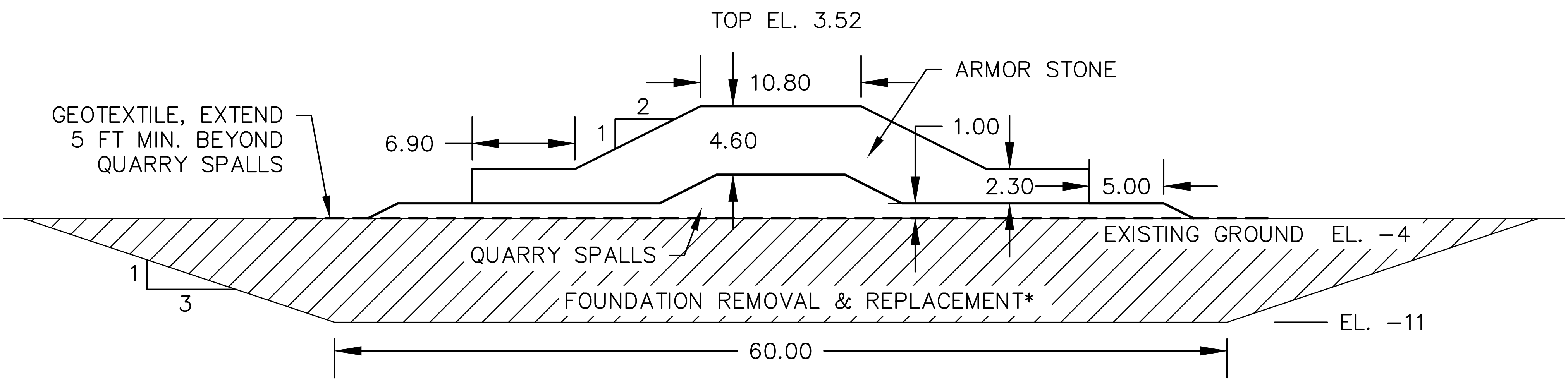
Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Clay 1	90	100	0
	Sand 1	115	0	36
	Stone	125	0	40

Breakwater at CP-225



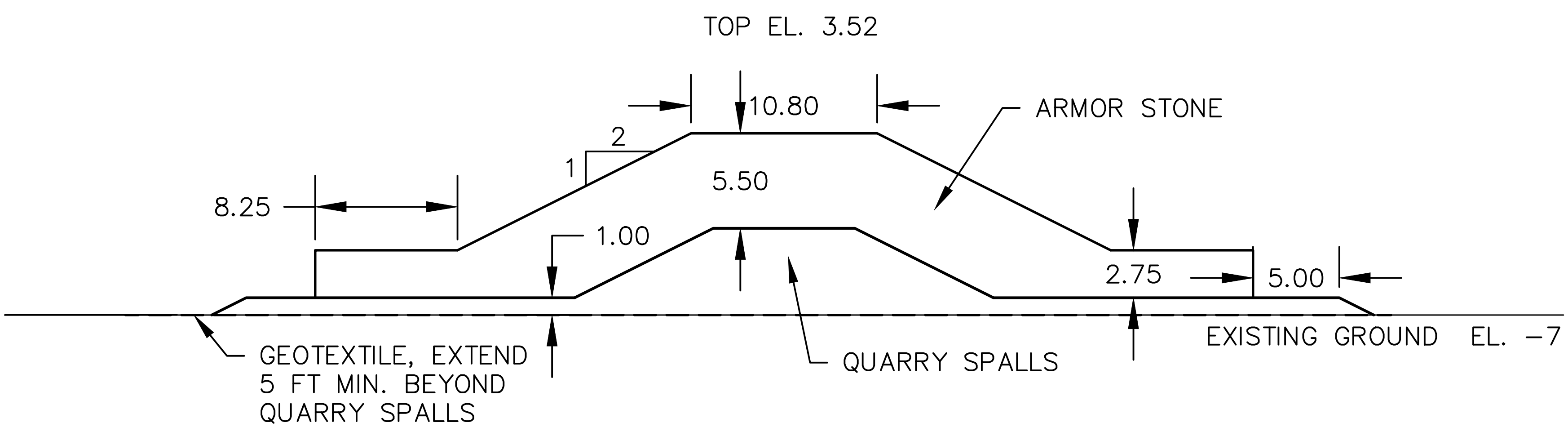
Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Clay 1	100	300	0
	Sand 1	110	0	40
	Sand 2	120	0	38
	Stone	125	0	40

NORTHEAST SILL

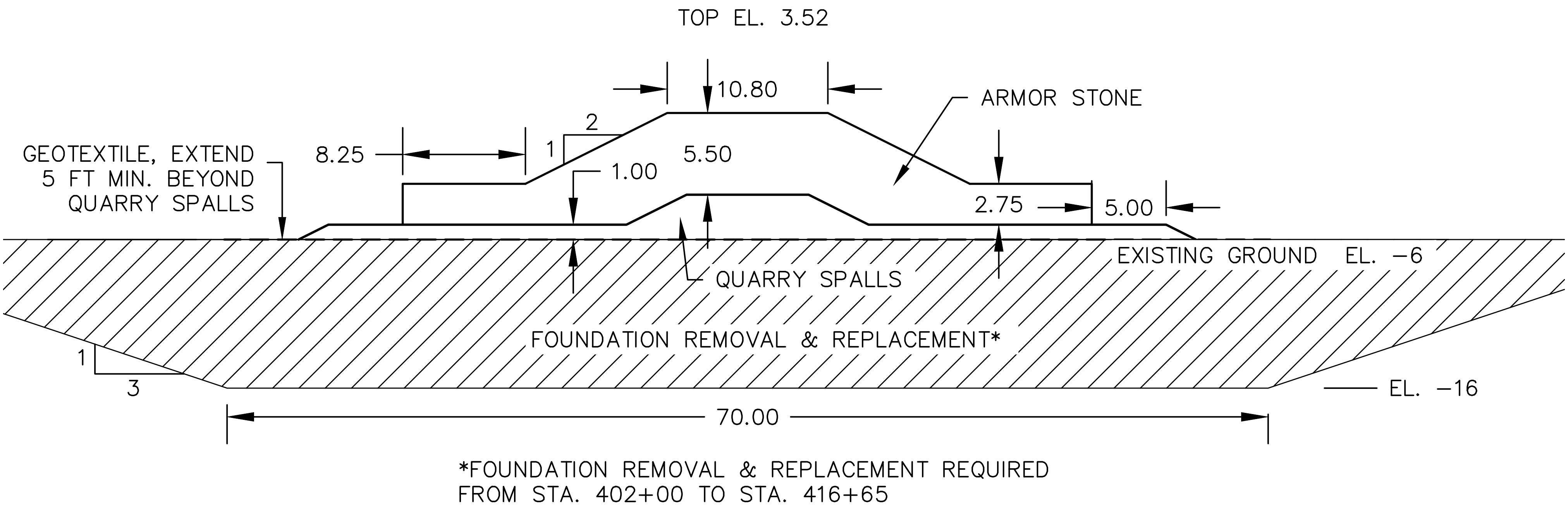


*FOUNDATION REMOVAL & REPLACEMENT REQUIRED
FROM STA. 100+00 TO STA. 125+00

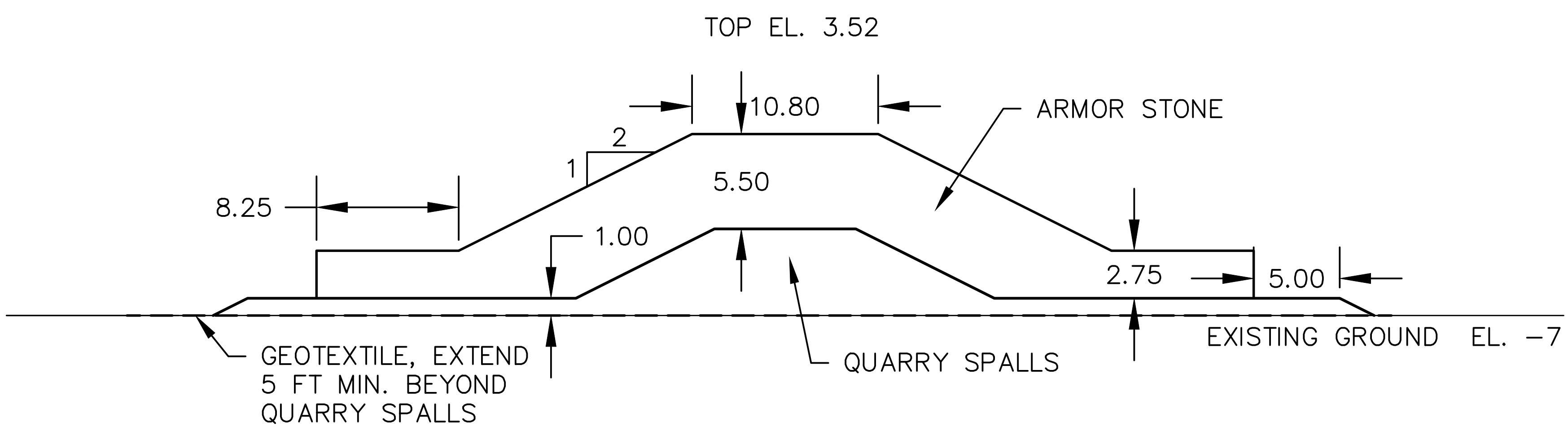
SOUTHWEST SILL



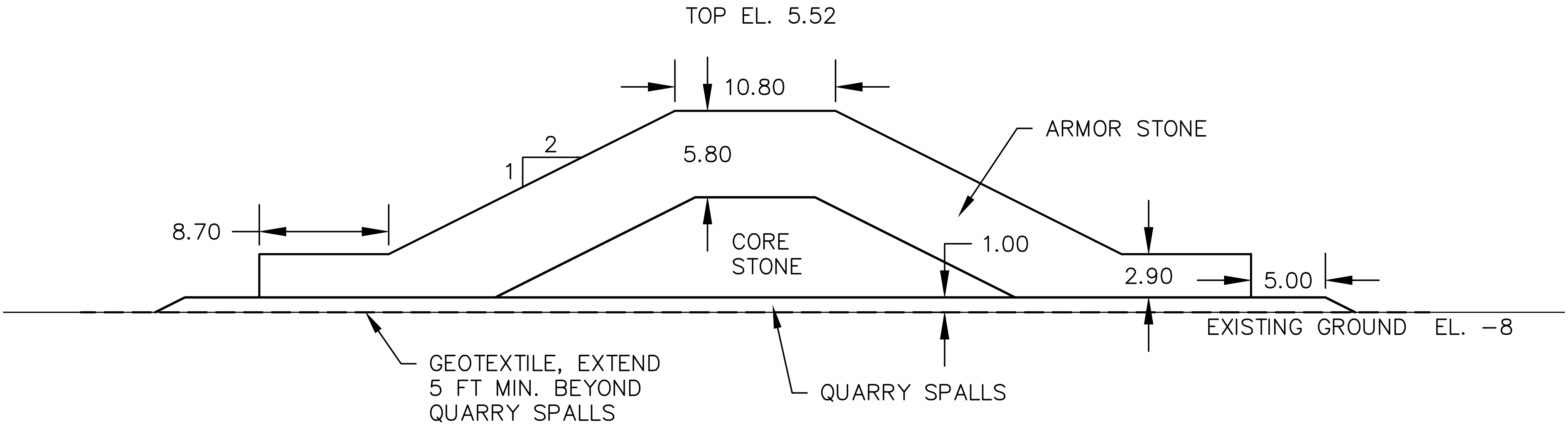
SOUTHEAST SILL



EXISTING SILL



BREAKWATER


TOP EL. 5.52
10.80
5.80
2
1
ARMOR STONE
8.70
CORE
STONE
1.00
2.90
5.00
EXISTING GROUND EL. −8
GEOTEXTILE, EXTEND
5 FT MIN. BEYOND
QUARRY SPALLS
QUARRY SPALLS

APPENDIX E

BARREN ISLAND DESIGN DECISION REGISTER

Mid-Chesapeake Bay Island Ecosystem Restoration (MBI); Barren Island - Decision Register

Decision Milestone:IN-House Design

Category	No.	Key Decision	Associated Risk/Discussion/Alts Considered	Alternatives Considered	Rationale for Decision	Implications (Short & Long Term)	Review/Vertical Team Comments	Outcome (Updates Prior to Next Meeting)
Design Tech								
	1	When does the In-House team begin Cadd work?	[Wait until Scope/Schedule, H&H, and Geotech return analysis.][Begin basic file preparation, lay down alignment from Feasibility study.]	Begin basic file preparation, lay down alignment from feasibility study will begin on 29JUL2020	Basic Cadd work is not contingent on H&H, geotech. Feasibility study provides an alignmnet that can be shifted with later input from H&H and geotech	Dam & Safety Cadd support brought in earlier than anticipated		
Geotech								
	2	What alignment should Geotech plan their schedule for?	Choosing a shorter alignment may not be supported by h&h modeling; choosing a shorter alignment may avoid the poor foundation, but the schedule would not allow for increased design efforts if the alignmnet had to be made longer	Alternative alignments under analysis, borrow area identified; shorter alignment	In order to build the schedule, the most conservative option is to plan to design the full alignment overtop of soil that needs to be replaced. The alignment can always be truncated in the future.	Alignment will be determined by modeling, schedule may be set today and then alignment changed later in the same day		
H&H								
	3	Bird Island Alignment, long vs short breakwater	Alt 1 - just island protection, no breakwater Alt 2 - full breakwater Alt 3 - short breakwater Alt 4 - 2 islands extended from short breakwater Alt 5 - segmented breakwaters extended from short breakwater	Longer alignment depicted in the feasibility study vs several iterations of shorter runs. Analysis based on velocities	Developed by Dr. Angie Sowers from ERDC modeling data:*The long breakwater (8200 ft) is not justified due to: 1. Don't see evidence in modeling data that it improves conditions for SAV any further than the short breakwater 2. High velocities modeled for the tip of the long breakwater 3. Poor foundation and additional impact associated with foundation replacement 4. Additional costs not justified 5. An area of reduced velocities is evident in the shadow of the breakwater, but much of the value to SAV can be gained from Alt 01 which performs under most conditions as well if not better than the other alternatives. 6. Modeling does not demonstrate that a continuous breakwater is needed to provide for conditions suitable to SAV. Alt 01 consistently provided for the current conditions or improved velocities. 7. There are some points where velocities increase slightly with addition of any breakwater structure.	Siginificant cost savings in not building the longer breakwater. We have avoided not just the increased quantities of stone necessary for the longer alignment, but we are no longer forced to construct in areas with poor foundation material. Poor foundation material would also increase the risk of larger future maintenance costs.		
H&H								
	4	Sill and Breakwater Final height	1) Breakwater and Sill built to current needs 2) Breakwater and sill built with resiliency in mind 3) Breakwater and Sill built to final predictted sea level rise criterai	2) Breakwater and sill built with resiliency in mind 3) Breakwater and Sill built to final predictted sea level rise criterai	The breakwater and the sill will be designed fo	The maximum area of impact will be accounted for at the 35% design. Project costs will be greater than initially anticiapted; the bulk of a larger structure is found in the base, volume-wise. Planning for resiliency increases upfront costs but allows for modification at a future date. The height of the structures will be set at current needs with the base wide enough for future needs.		
H&H								
	5	Need for southern breakwater	{ Current design criteria calls for a breakwater to protect the SAV found east of Barren. H&H modeling shows that no alignment of any breakwater significantly affects the stability of the SAV}{ In the authorization, bird habitat is called out as a potential addition to any breakwater. Bird habitat is a necessary component of habitat restoration.}{Bird islands add more complex diffraction analysis.}	1) No breakwater, no bird islands 2) Truncated breakwater of 100 meters from the southern portion of Barren Isalnd and three ird islands	We will incorporate bird islands as the segmented portion of a southern breakwater. The need for these islands may not show out in the hydraulic modeling (SAV are not in danger), however, other stakeholders may require it as a facet of habitat restoration. We will continue to carry the islands forward for permitting purposes at this point.	Adding the islands to the project will add siginifcant costs in design and construction for facets of the project we are not authorized to construct. Adding the islands will increase the overall impact to the bay bottom		
Civil								
	6	Change in the SE breakwater	Current issues with curvature in the alignmnet. Shifting the alignment will imit available wetland creation space.	Subassembly was changed	Removing the curve at Sta 414 fixes the corridor issues	Alignment shifted beyond the original place		
Civil								
	7	Shift the NE alignment to on shore protection	Full alignment of NE sill will require foundation remediation. Full alignment may be causing increased velocities in Tar Bay	Option 1: Design, permit, construct Station 100 to 138 stone sill structure. Option 2: Design, build, permit, cosntruct stone sill from Station 125 to 138 Option 3: Soft shoreline design	Option 2 was chosen. The critical path for permitting is maintained while foundation remediation is removed from Phase 1. The increased velocities in Tar Bay is unaccounted for and only occurs under extrememly low probability storms. Adjacent property owner was not in favor of a soft shoreline. Chosen option provides for dredge disposal at a future date	The extent of the Phase 1 NE sill does not provide for immediate storage of dredge disposal and does not provide full protection of the adjacent shoreline. Project costs are limited due to the removal of foundation remediation. Project environmental impacts are limited due to no need for borrow dredging.		
Geotech								
	8	Shift the SE alignment closer to the existing shoreline.	Shifting the alignmnet towards the shore moves it away from an area requiring foundation remediation.	Option 1 to mimic the feasibility study alignment…Option 2 is to move the alignment along the shoreline	The team opted to move the sill closer to the shore inorder to avoid costly foundation replacement.	Immediate loss of Honga River dredge disposal area. Reduced cost in construction due to no foundation remediation required. Less material available for wetland creation at Barren Isalnd. Immediate decrease in environmental impacts due to no need for sand borrow area dredging.		
Coastal								
	9	Shift the Bird Islands to the south	Stakeholders requested greater separation of bird islands from main body of Barren to recude mammalian predation. Pushing too far south moves the islands beyond the original footprint of the island.	Option 1: extend the islands farther south. Option 2: reduce number of islands to two	Team opted to move the islands south and reduce from 3 to 2. Installation too close to Barren Island would make the bird habitat ineffective. Leeward and Seaward stone structures added to reduce velocities through the segmented breakwater.	New alignment requires further diffraction analysis from ERDC, input from ERDC on spacing of stone structures, input from ERDC on total number of structures		
CHOOSE CATEG								
	10	Breakwater Bird Island Alignment (4/22/2021)	Current 2 bird island alignment (8.5 acres) is proposed farther south than the original soil borings accounted for.	Shifting and rotating alignment back onto the former island, mulitple locations considered	Geotech informed the team that shifting the alignment 100 feet to the south and west from the line of existing borings would be acceptable. We will make the shift to allow more of the proposed southerm bird island (Island M) to be located near known accetable strength in situ soil	Higher risk in encountering poor material the farther we stray from soil borings.		
CHOOSE CATEG								
	11	Breakwater Bird Island Alignment (4/28/2021)	Removal and refinement of breakwater alignment. Options to remove the rock reefs seaward and leeward of the gap between Islands A and M. Option to remove the breakwater south of Island M	Keep or remove the rock reefs. Keep the alignment extended beyond the southern bird alignment	Modeling indicated that the rock reefs were not needed. By increasing the size of the island shoreline (continuing the breakwater alignment around the footprint of the shoreline), any fetch that traverses through the opening between the islands would be caught by the against the toe of the southern edge of the brid islands.	Rock structures are reduced. Bay bottom impacts are reduced. Wave energy dissipation is still maintained.		
CHOOSE CATEG								
	12							
CHOOSE CATEG								
	13							
CHOOSE CATEG								
	14							
CHOOSE CATEG								
	15							
CHOOSE CATEG								
	16							
CHOOSE CATEG								
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	18							
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	19							
CHOOSE CATEG								
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CHOOSE CATEG								
	21							