Alabama State Port Authority

Addendum to R&P or Specification Booklet

Project Name APMT Phase IV Yard Expansion

Project No. 11261 **Task No.** 01 **Addendum No.** 1

To: Prospective Bidders **Date:** 4/15/2024

The following Phase III Subsurface Investigation and Phase IV Geotechnical Report files are hereby included in the bid documents by this addendum.

Item	Description
1.	APMT Phase IV Geotechnical Report
2.	FOR REFERENCE ONLY - Phase III Dock Extension Soil Borings

Please indicate your receipt of this addendum by adding the addendum number in the appropriate place in your Requisition & Proposal or Specification Book.

Project Manager:

_____ **4/15/2024**

Kyle Strachan, P.E.
Project Engineer

Item 1: APMT Phase IV Geotechnical Report

Subsurface Investigation and Geotechnical Engineering Report Proposed APM Terminal – Phase IV Mobile, Alabama

Submitted to:

Alabama Port Authority
Port of Mobile
250 N. Water Street
Mobile, AL 36602

Submitted by:

APTIM Port Services, LLC
3600 Springhill Business Park
Suite 200
Mobile, AL 36608

Project No. M4477

June 21, 2022

Port of Mobile
Alabama Port Authority
250 N. Water Street
Mobile, AL 36602

Attention: Mr. Josh Bell, P.E.

Subject: Subsurface Investigation and Geotechnical Engineering Report – APM Terminals Phase IV, Mobile, Alabama

Dear Mr. Bell,

As requested, we have performed the investigation for the above referenced project. If you have any questions or need further information, please contact us at your earliest convenience.

Sincerely,

R. Graham Forsythe, P.E.
Senior Geotechnical Engineer

06/21/2022

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1.0 INTRODUCTION

Aptim Port Services, LLC (APTIM) is herein presenting this report for the Proposed APM Terminal – Phase IV expansion in Mobile, Alabama. This geotechnical engineering investigation was performed in accordance with Chapter 18 of the International Building Code (IBC), 2018 Edition. Chapter 18 of the IBC contains criteria for geotechnical investigations, excavation and grading, presumptive load-bearing values of soil, and design criteria for walls, retaining walls, and foundations.

The purpose of this investigation is to evaluate the subsurface conditions at the site of a proposed container terminal expansion and provide recommendations for design criteria and site preparation. This report presents the results of APTIM's subsurface and geotechnical engineering investigation. Section 2.0 of this report contains a description of the site and its topography while Section 3.0 describes the physiography and geology of the area. Section 4.0 outlines the subsurface exploration activities that were performed, Section 5.0 discusses the subsurface conditions encountered, and Section 6.0 provides the Seismic Site Class and associated acceleration design parameters. Sections 7.0 and 8.0 describe site preparation for the slip and upland areas of the site and Section 9.0 discusses considerations for final subgrade preparation. Finally, Section 10.0 provides a brief summary of our conclusions and recommendations.

1.1 Objectives

Based on the requirements of the project and the geotechnical conditions at the site, the primary geotechnical challenges that will impact the project design is settlement and stability of the subgrade for the proposed heavily loaded pavement sections and stabilization of the marine deposits for the retaining wall that is to be constructed as part of the project. The purpose of this geotechnical evaluation is to address these issues and provide geotechnical related recommendations for design.

1.2 Project Information

The project is comprised of two different areas within the proposed site. On the east side is a marine slip with docks ("slip area") connected to the Mobile River and covers an area of approximately 13.1 acres. The west side ("upland area") is approximately 18.8 acres of land. The project will involve constructing a wall along the east side of the slip area and filling it in with clean sand backfill as well as raising the entire site to an elevation to match the existing terminal to the south. Due to a stratum of compressible marine sediments that exists in varying degrees across the site, surcharge loads will be utilized to consolidate these weak layers and minimize long-term settlement of the constructed facilities.

2.0 SITE DESCRIPTION AND TOPOGRAPHY

2.1 Site Description

The project is in Mobile, Alabama at the Port of Mobile. As shown below in Figure 1, it is bounded by a marine repair facility to the north, the existing APM Container Terminal to the south, the Mobile River to the east, and several rail lines to the west. Previously, this area was the site of a coal terminal. Historical imagery shows a barge handling pier to the north and a wharf to the south side of the slip as well as associated conveyors and large stockpiles of coal positioned to the west side of the site. At the time of our investigation the slip area was empty and contained the 700' x 80' concrete wharf along the south side. The upland area to the west is covered with tall grass and contains large stockpiles of soil material.

Figure 1 – Site for Proposed APM Terminals Phase IV

2.2 Topography

In the following descriptions, all elevations are referenced to the NAVD (88) datum unless stated otherwise

The water level in the slip area fluctuates with the Mobile River and generally varies approximately between EL -0.5 to 2.0 ft. (MLLW) with the mudline at an average depth at EL -31.5. The concrete wharf along the south is at an approximate elevation of 8.8 ft, with the areas north and south of the slip at an average elevation of approximately 9.4 ft.

The outer perimeter of the upland area ranges from elevation 9.5 to 10.0 ft., however the interior of the site varies up to EL 30.6 ft. in the area of the material stockpiles.

2.3 Site Hydrogeology

Based on the permeable nature of the subgrade soils, groundwater is expected to be unconfined and reside within the soil zone at a slightly higher elevation as the adjacent river. In several areas, however, relatively thin layers of low permeability clays and silts were noted as high as EL 5.0 ft. In these cases, ground water can be trapped at higher elevations in localized areas, often referred to as a "perched" water table.

3.0 PHYSIOGRAPHY AND GEOLOGY

The site is in the Coastal Lowlands District of the East Coast Gulf Coastal Plain along the west side of the Mobile-Tensaw River Delta. This delta is formed by the confluence of the Alabama and Tombigbee Rivers which combine to form the Mobile River. The Mobile River then divides into several major distributaries, which are the Tensaw, Appalachee and Blakeley Rivers.

The delta itself covers over 400 square miles of swamps, marshes, and river bottomlands. It receives water from 100,000 miles of rivers and streams in the Mobile River Drainage Basin, one of the largest in the world covering 44,000 square miles over the states of Alabama, Mississippi, Georgia, and Tennessee.

Soils along this part of the Mobile River are primarily Alluvial and Low Terrace deposits of the Holocene period, consisting of varicolored fine to coarse quartz sand with clay lenses and gravel. This is underlain by the Citronelle Formation, which is the dominant stratum from the Pleistocene Period and is comprised of deeply weathered, very fine to coarse quartz sand with lenticular beds of clay and clayey sand. Soil layers displayed in the boring logs for this site also show intermittent deposits of organics, which are typical for river and stream valleys in this region.

4.0 FIELD EXPLORATION

Between the dates of November 28, 2021, and April 28, 2022, a total of twenty (20) soil test borings and six (6) Cone Penetrometer Test soundings (CPT) were performed for this project. The test locations and depths were determined by APTIM based on the scope of the project and a review of historical soil information. Individual test locations were staked in the field by use of a hand-held GPS unit with the elevation at the as-drilled locations determined by survey and a local tide gauge. Prior to the start of drilling activities, utility clearances were obtained using historical drawings, the Alabama One Call system, and APA personnel. The approximate test locations are shown on a Test Location Plan in Appendix A.

4.1 Soil Test Borings (Marine) – Fill Area

Drilling of the marine soil test borings (B-1 through B-11) was conducted during the period November 28 through December 15, 2021, by Challenge Engineering and Testing, Inc. of Mobile, Alabama. On April 27 & 28, 2022, three (3) additional borings (B-1A, B-2A & B-3A) were conducted along the alignment of the proposed wall to define the soil conditions more closely. The drilling was performed with barge-mounted Simco 4000 drilling rig using conventional mud rotary drilling techniques. Soil samples were obtained using split-barrel samplers with Standard Penetration Tests (SPT) in accordance with ASTM Method D1586 at selected depths within the test borings.

4.2 Soil Test Borings – Upland Area

Drilling of the soil test borings in the upland area (B-12 through B-17) was accomplished during the period February 24 through March 4, 2022, by Southern Earth Sciences, Inc. (SESI) of Mobile, Alabama. The drilling was performed with truck-mounted CME drilling rigs using conventional mud rotary and auger drilling techniques. As with the marine borings, split-barrel samplers were used with Standard Penetration Tests (SPT) in accordance with ASTM Method D1586. Undisturbed samples were obtained with 3-inch diameter Shelby Tubes in accordance with ASTM Method D1587.

All samples obtained in the field were classified in the laboratory by an APTIM geotechnical engineer in accordance with the Unified Soil Classification System (USCS). Logs showing the subsurface conditions encountered at each of the test locations are included in Appendix B.

4.3 Cone Penetrometer Test Soundings

CPT soundings were obtained during on February 22 and 23, 2022 by SESI. The soundings were performed using a truck-mounted Hogentogler 20-ton electronic CPT rig operated in accordance with ASTM D-5778. Soil types and correlations between cone resistance and soil behavior were interpreted from methods recommended by Robertson (1990, 2009, 2010). Logs which graphically show the cone tip resistance, side friction, equivalent SPT N_{60} values and interpreted soil type at each sounding location are included in Appendix C.

4.4 Ground Water Table

During the performance of the soil borings in the upland area, the depth of the ground water was recorded at time of drilling. Immediately following the CPT soundings, the ground water level was measured using an electronic sounding device and recorded, however in some instances the sounding hole collapsed before the measurements could be obtained. In these cases, the elevation of the ground water table is estimated based on values from adjacent test holes as well as the pore pressure behavior noted in the

individual CPT sounding. Ground water elevations are shown on the individual boring and CPT sounding logs.

A review of the data shows that the depth to ground water varies across the site. Considering the sandy nature of the soils and that the elevations of the adjacent waterways vary little over time, it is reasonable to conclude that groundwater contours will mimic river level. The only exception would occur where the aforementioned layers of less permeable soils (clays, silts) exist at shallow depths, and which may result in a "perched" water table.

It must be noted that the depth to groundwater measurements represent the depths at which groundwater inflow was noted or the depth to groundwater after the completion of the test boring or CPT sounding, but they may not represent the final equilibrated groundwater depths. Further, fluctuations in the level of the ground water table may also occur due to variations in elevation, rainfall, river level, drainage, temperature, types of soil encountered, and other factors not evident at the time measurements were made.

4.5 Soil Laboratory Testing

To define the characteristics of the soils more closely, representative soil samples were selected for testing to determine their approximate strengths, compression characteristics, and index properties as well. The results of the laboratory tests are shown on the individual boring logs and on the summary sheets in Appendix 4.

4.5.1 Classification Tests

Classification tests determine the routine index properties of the soils, including the fines content (sieve analysis), Atterberg Limits (Liquid Limit (LL), Plastic Limit (PL) and Plasticity Index (PI)) so that the soils can be classified in accordance with the USCS. Further, other characteristics and indices of the soil can be derived using correlations with these tests results.

4.5.2 Natural Moisture Content Tests

Natural moisture content tests were performed on a number of samples collected, as shown on the individual boring logs and summary tables in Appendix 4. Analytical results for the natural moisture content tests can be qualitatively compared to the results of the classification tests, particularly the LL and PI, to determine if the natural moisture is less than or greater than the LL of the soil or if the moisture is in the range in which the soil will behave as a plastic solid. Natural moisture analytical results can also be compared to the results of compaction testing to determine whether soils are too dry or to wet to be properly compacted.

4.5.3 Consolidation Tests

Consolidation tests are performed to determine two values that are used for calculating settlement of soil due to consolidation, resulting from dissipation of excess pore water pressure due to applied loads. These two values are the compression index, Cc, recompression index Cr, and the coefficient of consolidation, Cv. The compression index represents the change in void ratio of the soil as vertical stress is increased during the consolidation test. The coefficient of consolidation relates to the change in pore water pressure with time and the change in vertical stress with time.

5.0 SUBSURFACE CONDITIONS ENCOUNTERED

5.1 Slip Fill Area

All elevations listed in the marine borings are referenced to the MLLW datum.

Conditions encountered in the marine borings were similar. Beneath the mudline, which varied from EL -14.2 to EL -35.3, very loose, black organic silt and sand was noted to depths between EL -24.2 to EL -52.8. This was underlain by loose to dense sands with varying amounts of shell and gravel to the depth of the deepest boring at EL -102.0. The only significant exceptions occurred in the following borings:

- Boring B-1A displayed loose to very loose sand from EL –17.3 to EL -38.8 and very soft to stiff clay to EL -51.8.
- Boring B-2 showed layers of stiff clay between EL -86.0 and -91.0 and from EL -96.0 to the depth of the boring at EL -100.0.
- Boring B-2A displayed a layer of very soft clay from EL -36.5 to EL -41.5.
- Boring B-3 exhibited medium to stiff clay from EL -28.5 to EL -46.5 and from EL -83.5 to the depth of the boring at EL -100.0.
- Boring B-3A showed very soft to soft clay from EL -27.4 to EL -47.4
- Boring B-6 displayed stiff to very stiff clay between EL -60.0 and -65.0 and from EL -90.0 to EL -95.0.
- Boring B-7 showed very stiff clay from EL -89.2 to the depth of the boring at EL -98.2.
- Boring B-10 exhibited a stratum of very stiff clay from EL -96.1 to the depth of the boring at EL -100.1.

5.2 Upland Area

5.2.1 Soil Borings

Subsurface conditions encountered in the borings varied, and they will be discussed separately. Depths and elevations as shown on the boring logs are referenced to the ground surface at the time the borings were performed.

Beneath a 3-foot layer of coal, Boring B-12 showed loose to medium sand to 10 feet followed by loose to very loose sands and silts to 28 feet. This was followed by medium sand to the depth of the boring at 51½ feet.

Under a 2-foot layer of medium gravel, Boring B-13 exhibited medium silt to 13 feet, medium sand to 33 feet, very loose silt to 43 feet, medium to very dense sand to 98 feet and stiff clay to the depth of the boring at 101½ feet.

Below a layer of asphalt paving, Boring B-14 showed loose to dense sand to 10 feet, followed by very loose to loose silt to 23 feet, and loose to medium sand to the depth of the boring at 51½ feet.

Boring B-15 showed very loose to medium sand to 10 feet, a layer of very loose silt with wood to 13 feet, and very loose to medium sand to the depth of the boring at 51.5 feet.

Under loose surface soils and organics, Boring B-16 exhibited a very dense layer of coal to 6½ feet where refusal conditions were encountered. Attempts to penetrate further into this material resulted in very hard drilling conditions and the boring was terminated at this point.

Boring B-17 displayed loose to medium sand to 13 feet, underlain by very dense silt to 18 feet, and loose to dense sand to the depth of the boring at 51½ feet.

5.2.2 CPT Soundings

Under a surface layer of compacted gravelly sand, CPT No. 2 showed medium to very dense sand and silty sand to 18 feet, followed by soft to medium clay and loose silt to 33 feet, medium to dense sand to 72 feet, medium clay to 79 feet, and dense sand to the depth of the sounding at 100 feet.

CPT Nos. 3 and 4 exhibited medium to very dense sand to 10 feet, followed by soft to very soft clay interlaced with lenses of loose sand to 20 feet, very loose to medium sand to 37 feet, medium to dense sand to 72 feet, medium clay to 77 feet and dense to very dense sand to the depth of the soundings at 100 feet.

Below a two-foot layer of compacted gravelly sand, CPT No. 5 displayed loose to medium sand to 7 feet, very loose to loose sand and silt to 19 feet, medium to dense sand with intermittent layers of medium clay to 92 feet and very dense sand to the depth of the sounding at 100 feet.

Beneath loose surface soils and a layer of very dense coal to 7 feet, CPT No. 6 showed medium sand and silty sand interlaced with layers of medium clay to 43 feet, soft clay to 45 feet, medium to dense sand to 76 feet, medium clay to 80 feet, and dense to very dense sand to the depth of the sounding at 100 feet.

Underlying loose surface soils, CPT No. 11 presented medium sand to 8 feet, soft to very soft clay to 13 feet, and medium to dense sand to the depth of the sounding at 100 feet.

CPT Soundings 1, 7, 8, 9 10 and 12 met refusal conditions at shallow depths. Based on the previous use of the site and the conditions observed in the borings, this condition is, in all probability, the result two factors:

- The surface soils in the subgrade contain heavily compacted fines that were consolidated from the weight of stockpiles.
- The stockpiles of soil are comprised of highly desiccated sand-clay containing moderate amounts of gravel and boulders.

5.3 Generalized Soil Profiles (Marine)

Due to differing conditions, design and construction of the wall will likely be separated into three sections, as follows:

1. Wall 1 – from the south side of the slip traversing north to the northwest corner of the APM dock.
2. Wall 2 – crossing the east side of the slip from the northwest corner of the dock to the north side of the slip.
3. Wall 3 – an east to west connector from the end of Wall 2 to the east corner of the existing wall along the north side of the slip.

A planned outline of the retaining wall sections is shown below in Figure 2.

Figure 2 – Proposed Retaining Wall Sections

Using information from the marine borings for this project and a previous exploration for the extension of the adjacent dock, generalized soil profiles were established for each section of the wall.

EL at Top of Soil Layer (ft)	*Soil Type*	*Unit Weight, γ*	*Friction Angle, Φ*	*Cohesion, c*
13	Fill sand	115 pcf	30°	-
-26	Organic silt	85 pcf	20°	45
-50	Medium sand	115 pcf	32°	-
-62	Dense sand	120 pcf	35°	-
-81	Stiff clay	112 pcf	23° (drained)	1500 psf (undrained)
-97	Medium Sand	115	32°	-

Table 1 – Wall 1 Soil Properties

EL at Top of Soil Layer (ft)	Soil Type	Unit Weight, γ	Friction Angle, Φ	Cohesion, c
13	Fill sand	115 pcf	30°	-
-28	Organic silt	85 pcf	20°	45
-52	Medium sand	115 pcf	32°	-
-62	Dense sand	120 pcf	35°	-
-82	Stiff clay	112 pcf	23° (drained)	1500 psf (undrained)
-97	Medium Sand	115	32°	-

Table 2 – Wall 2 Soil Properties

EL at Top of Soil Layer (ft)	Soil Type	Unit Weight, γ	Friction Angle, Φ	Cohesion, c
13	Fill sand	115 pcf	30°	-
-20	Organic silt	85 pcf	20°	-
-27	Very soft organic clay with wood	105 pcf	20° (drained)	250 psf (undrained)
-47	Medium sand	115 pcf	32°	-
-70	Dense sand	120 pcf	35°	-
-85	Stiff clay	112 pcf	23° (drained)	1250 psf (undrained)
-97	Medium Sand	115	32°	-

Table 3 – Wall 3 Soil Properties

Due to the surcharge effect from the storage of coal over the years, subsurface conditions in the upland area and along the north and south sides of the slip varied markedly. Instead of attempting to create a generalized soil profile, conditions were analyzed using individual boring and sounding logs for each of the corresponding areas.

6.0 SEISMIC CONSIDERATIONS

6.1 Seismic Site Class

Based on the conditions encountered in the subsurface investigation, and in accordance with Table 20.3-1 of ASCE-7 (American Society of Civil Engineers), this site would best be classified as Site Class “E” (Soft Clay Soil).

6.2 Design Spectral Response Parameters

In accordance with Sections 11.4.1 through 11.4.5 of ASCE 7-10, design acceleration parameters were determined for an earthquake having a 2% probability of exceedance in a 50-year period. The results of these calculations, expressed as a percent of the gravitational force (g) are as follows:

Five-Percent Damped Design Spectral Response Acceleration Parameters

Short Periods (0.2 sec) S_{DS} = 11.0 %g

1-Second Periods S_{D1} = 9.6 %g

A typical design response spectrum is shown in Figure 3 below.

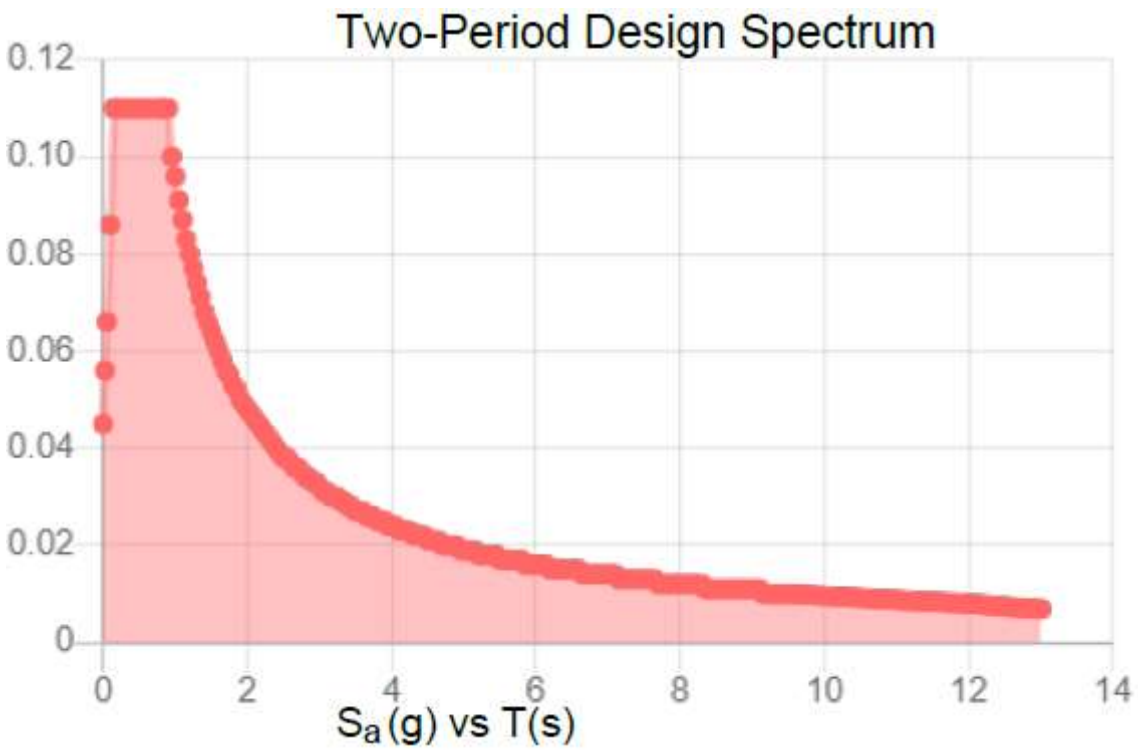

Figure 3 – Seismic Design Response Spectrum

7.0 SITE PREPARATION – SLIP AREA

As shown in the soil profiles in the slip area, the initial stratum of soil from the mudline down to approximately EL -55 is a layer of very loose organic silt. This type of soil is highly compressible and will settle considerably under load. Due to the relatively low permeability of this material, it could take years to accomplish without providing a drainage path for the excess pore water pressures generated by loading. Further, this unstable layer may require strengthening to prevent uneven displacement during fill, thereby minimizing uplift of the wall and reducing active earth pressure against the inside of the wall. The following is a generalized sequence for preparation of the site for the final construction of the terminal and associated appurtenances and should be considered as a basic overview. Specific details and sequencing concerning the execution of the different phases should be provided in the construction drawings and specifications.

7.1 Retaining Wall

Prior to filling in the slip, a retaining wall will be constructed along the east side of the site to establish a boundary and contain the fill material. To allow for displacement of the water within the slip during fill operations, a weir will be constructed within the wall to allow for discharge into the river.

7.2 Initial Slip Fill

Initial fill should be placed within the entire area of the slip. Fill material should be a granular material, free of organics, debris, or deleterious material with less than 10% passing the No. 200 sieve. It should be placed as evenly and uniformly as possible across the fill area to a height of approximately EL 5.0. To prevent shear failure of the underlying soft soils, often referred to as “mud wave”, the fill should not exceed a slope of 1 vertical to 10 horizontal. Further, once the fill reaches an elevation of -25.0, the difference in elevation across the entire slip should not exceed a maximum of 5 feet. After the fill is placed above the water table, it may be hauled in with trucks and pushed into place with a bulldozer to the desired subgrade elevation.

Based on a recent hydrographic survey, it may require as much as 558,000 yd^3 to fill in the slip to EL 5.0[1]. It should be noted that as much as 5 feet of settlement could occur in some areas during initial fill due to compression of the silt layer. Additional material, meeting the requirements as outlined above, will be required to achieve the desired subgrade elevation at 5.0 ft.

[1] Based on an assumed shrinkage factor of 0.77.

7.3 Ground Modification

Ground modification may then be used to stabilize and strengthen the weak layer adjacent to an area inside the retaining wall. This will be necessary to prevent having to surcharge adjacent to the wall, which would require a much larger wall. Ground modification techniques, such as deep soil mixing or jet grouting could be used in the layer of organic silt along the inside of the constructed wall. To ensure the entire layer of questionable soil is improved, it should be mixed from the existing mudline down to a depth of at least EL -55. In lieu of soil mixing/grouting, controlled modulus columns could be installed from the sand layer below the silt to an elevation above the water table. A load transfer platform would then be installed over the columns to support the loads of the paved surface. Vibro-replacement techniques, often referred to as “stone columns”, should not be used as the safety of the wall cannot be assured due to the possibility of additional stresses imposed. The approximate area to be improved is shown in Figure 4 below.

Figure 4 – Proposed Area of Ground Modification

7.4 Installation of Prefabricated Vertical Drains (PVD)

Prefabricated vertical drains (PVD), often referred to as “wick drains”, will be inserted into the organic silt to act as a drainage path for excess pore water pressure which will induce and accelerate compression of this material and minimize the time required for consolidation. These drains are comprised of a band-shaped plastic core wrapped in a

geotextile fabric and are installed by direct push or vibratory methods. When installed in a rectangular or triangular grid spacing into compressible layers, they provide a shorter drainage path for the water contained in the layer of interest and therefore accelerate the rate of consolidation settlement. An example of a PVD is shown in Figure 5 below.

Figure 5 – Typical PVD Wick Drain

It is estimated that approximately 1,445,000 linear feet of the drains will be installed over a 7.5-acre area and will require 8 weeks to complete. Once they are installed, the self-weight of initial fill on the silt layer will result in water being discharged from the top of the drains at approximately EL 5.0. **It must be emphasized; the level of fill along the wall must be maintained below the elevation of the weir to ensure proper discharge of water and prevent unnecessary hydrostatic load from being applied to the wall**. The approximate area where PVD will be Installed is shown in Figure 6 below.

Figure 6 – Proposed Area for PVD Installation

7.5 Surcharge Load

After installation of the PVD system, a surcharge will be placed over the area of the slip to provide additional load on the compressible silt and accelerate the compression time. On the east side, the toe of the embankment should be maintained a minimum of 75 feet away from the wall. The higher the load, the more quickly the consolidation of the compressible soils, however it should not exceed a height of EL 30.0 ft. Any soil type may be used for surcharge, including the materials stockpiles onsite. However, it is recommended that up to approximately EL 10.0 ft., the surcharge fill meet the requirements of Section 7.2 above. The approximate area of the surcharge load is shown in Figure 7 below.

The elevation of the surcharge load should not vary more than ten feet across the site. Elevations should be recorded on a weekly basis, along with the readings of the settlement plates.

Figure 7 – Proposed Area of Slip Surcharge

7.6 Instrumentation

To monitor the consolidation progress of the of the organic silt layer and determine when the desired degree of settlement has been achieved, instrumentation should be placed across the entire surcharge area. This would consist of settlement plates to monitor the displacement of the subgrade as the compressible layer consolidates as well as vibrating wire piezometers to measure the decay of excess pore pressures in the silt.

7.6.1 Settlement Plates

A settlement plate consists of a base plate attached to a reference rod (riser) which is placed on the subgrade prior to the addition of the surcharge embankment. A surveyor then establishes the reference elevation of the top of the rod. As the compressible layer settles, the entire system moves down with the soil and the elevation of the rod tailpiece is established at regular intervals by survey. The elevations are continually plotted to show the time rate and degree of settlement. A typical settlement plate arrangement is shown in Figure 8 below.

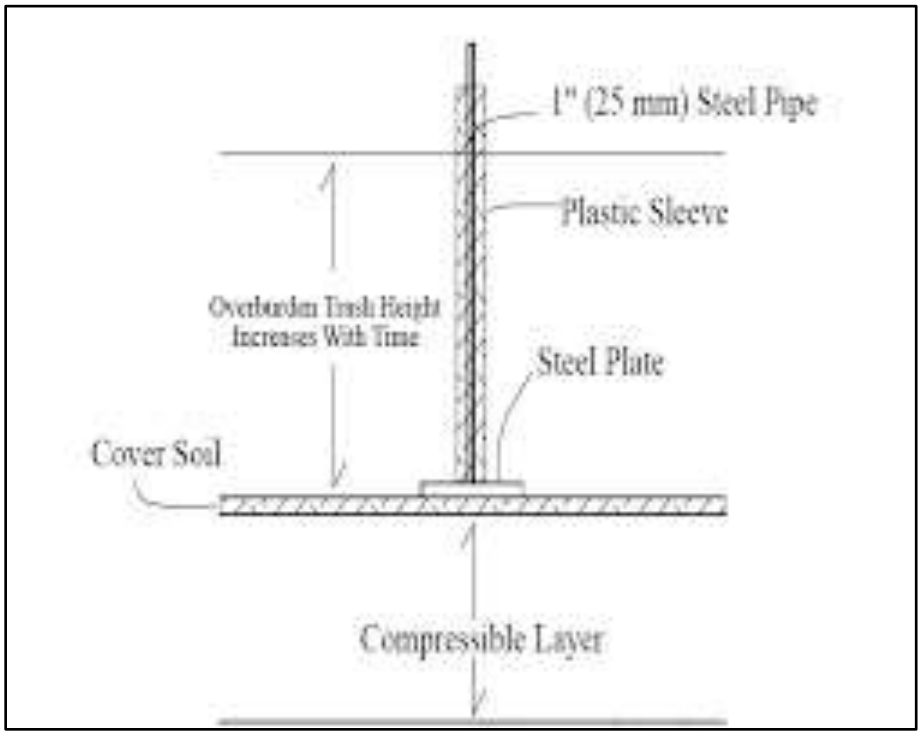

Figure 8 – Typical Settlement Plate

7.6.2 Piezometers

Vibrating wire piezometers would be installed in boreholes after the construction of the surcharge embankment. The vibrating wire transducer inside the piezometer converts water pressure to a frequency signal via a diaphragm, a tensioned steel wire, and an electromagnetic coil. As the load on the layer of interest is increased, the pore pressure (water) in the soil layer will show a corresponding increase. The piezometer is read on a periodic basis using a data reader device and the data is plotted much in the same manner as the settlement plate.

In the compressible layer, settlement occurs relatively quickly at first as the voids in the soil are compressed, slowing down over time as the deformation and pore pressure dissipation decreases and tends towards an asymptotic value. After enough data has been obtained, the settlement curve can be predicted using mathematical analyses and the time to the desired degree of consolidation and remaining settlement can be approximated. The desired percentage of total settlement is usually determined by a project engineer based the constructed facilities and their ability to tolerate long-term settlement. Proposed locations for the settlement plates and piezometers are shown

below in Figure 9. The project geotechnical engineer may suggest additional plates and piezometers prior to construction.

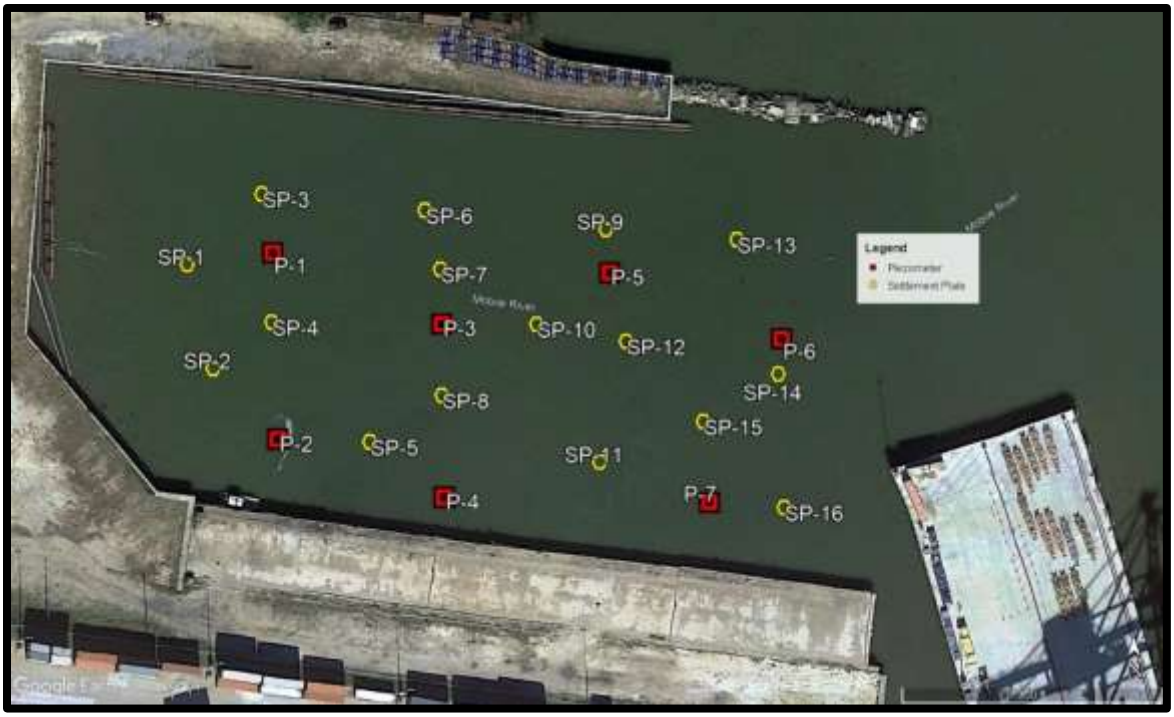

Figure 9 – Proposed Settlement Plate and Piezometer Locations

7.6.1 Recorded Data

As mentioned previously, the elevation of the surcharge load should be recorded weekly interval during installation. Once the surcharge load is in place, the piezometers should be installed and should be read on a weekly basis along with the settlement plates. The project geotechnical engineer will track the settlement data on a continuous basis and may increase the time between readings as the rate of settlement decreases.

8.0 SITE PREPARATION – UPLAND AREA

The upland area consists of all the land west of the slip to the west edge of the property. Preparation for this part of the project will differ markedly from the slip area as the corresponding silt layer is consolidated to a large degree and will not experience the same amount of long-term settlement from the final loading of the terminal. Further, placing surcharge in this area will not be limited by the same concerns as the slip area.

8.1 Site Clearing

Initially, the site should be cleared, grubbed, and stripped of all soils containing roots, organic matter, debris and remnants of any previous structures including old

foundations, utility lines, etc. It is expected that as much as 6 to 8 inches of soil may need to be undercut to remove the surface organics; however, this should be verified prior to construction by performing shovel samples over the site. On the south side of the upland area, the detention pond should be undercut to the level of the underlying sand and the containment berms cut down and stockpiled. Stockpiled soils on site can be used for surcharge, however coal and any other questionable materials such as wood or debris should be disposed of off-site. The remaining surface soils should be thoroughly and uniformly compacted in place, and any soft or yielding areas should be undercut and backfilled with thoroughly compacted material. Existing soils should be compacted *as much as practicable*, but not to any particular standard.

8.2 Surcharge

The northern part of the upland site has been heavily surcharged over the years with stockpiles of coal and soil and no compressive settlement is expected. Based on the results of the cone penetrometer tests, calculations indicate as much as two (2) to three (3) inches of settlement could be expected in the areas surrounding the slip (CPT Nos. 2, 3, and 4) and in the south part of the upland area (CPT Nos. 5, 6 and 11). Since these zones are adjacent to areas containing underground structures such as walls, paved areas, foundations, etc., the settlement would be differential across a short distance and the resulting angular distortion could cause distress to the finished pavements. Based on these conditions, we would recommend that these areas be surcharged. The recommended total area of upland surcharge is shown in Figure 10 below.

Figure 10 – Proposed Area of Upland Surcharge

While it is probably not feasible to remove all the potential settlement, the intent should be to remove as much as practicable given the time constraints and the availability of surcharge material. A review of the CPT data shows the compressible strata are relatively thin and, in some cases, contain layers of more permeable soils. Based on these conditions and the expense of installation, it was decided not to employ PVDs in the upland area. A further analysis of the results from the field exploration indicates that a fair amount of consolidation of the compressible soils may be accomplished in a relatively short period of time. Therefore, we would recommend that the surcharge period be initiated as soon as possible to maximize the duration of consolidation. Finally, it is preferable to use heavier loads for a short period of time vice spreading the surcharge material over the whole area of interest.

As previously mentioned, existing soil stockpiled on the site could be used for surcharge. Using this available material we recommend a "rolling surcharge" be performed where the load is moved to different locations at intervals. Using a site survey, it is estimated that as much as 177,000 cu. yds. of material are available in the current onsite stockpiles. To achieve a surcharge height of approximately 30 feet, this material would be placed over an area of approximately 4.8 acres[2].

[2] Based on an assumed bulking factor of 1.3

A further review of the results of the field exploration shows that in most cases, the surface soils are densely compacted and may be capable of bridging across these weaker areas, however that cannot be predicted with any accuracy. The initial surcharge should be conducted in Surcharge Area 1 on the south side of the site over the detention pond area, as shown Figure 11 below. Settlement plates, as outlined above in Section 7.6.1, should be placed in the locations as shown in the figure. Once the full surcharge load is established, the project geotechnical engineer will monitor the settlement data. If it is apparent that the denser layers of surface soils are sufficiently bridging the weaker layers, surcharge of the upland area may be terminated. Otherwise, the surcharge load will be moved to another area for further evaluation.

Figure 11 – Initial Surcharge Sites in the Upland Area

9.0 FINAL SUBGRADE PREPARATION

9.1 Final Grading

After clearing of the surcharge materials, the remaining surface soils should be stripped of any remaining organics, coal fines, debris, or deleterious materials. The entire site should then undercut to the desired subgrade elevation which will allow for establishing the recommended thickness of pavement base course. In areas where backfill is required, it should meet the requirements as outlined in Section 9.3 below.

9.2 Proof-Rolling

The subgrade should be thoroughly compacted in place and proof-rolled with several passes of a loaded tandem-axle dump truck in the presence of the project geotechnical engineer or his representative. Any soft or yielding areas should be undercut and replaced with thoroughly compacted backfill.

9.3 Backfill and Fill

Backfill and fill should be a granular material with a maximum of 30% passing the No. 200 sieve. It should be placed in thin lifts of 12-inch thickness, loose measurement, and compacted to 95% of its maximum dry density within ± 2% of its optimum moisture content in accordance with ASTM D 1557 (Modified Proctor). If the final layers of backfill and fill could be used as the base material for a soil-cement base course, they need not be compacted prior to mixing.

Material currently stockpiled on site would not be suitable for backfill and fill.

9.4 Site Drainage

Mobile, Alabama receives the highest amount of precipitation in the contiguous 48 states, usually exceeding an average of five (5) inches per month. Further, it is generally composed of a series of high-intensity storms of generally short duration. The backfill and fill soils, referenced above, are of low permeability and therefore water will tend to collect in low areas. Further, these materials, when wetted, will retain moisture for long periods and can undergo significant weakening if disturbed in the presence of excess moisture. For these reasons, the following recommendations are provided:

- Prior to construction, a proper Grading and Drainage Plan should be developed. In the initial stages of site development, effective drainage must be established and modified as necessary during construction such that positive surface drainage is provided away from the construction areas. In areas where it may be necessary to excavate weaker soils and replace this material with compacted backfill, control of moisture and drainage is vital.
- Construction activities, especially those involving rubber-tired equipment, should be curtailed when the site is wet.
- Preparation of the subgrade in short sections may be practical since inclement weather cannot be predicted and would have an adverse effect on this operation. Undercutting of weak surface soils exposed to rainfall and construction traffic may be required if adequate precautions are not taken by the contractor.

9.5 Excavation and Trenching

Excavations at this site, if required, will require careful preparation. While the water table is expected to be below EL 5.0, seepage into an excavation through the sandy

surface soils from either runoff or a perched water table should be anticipated (see Section 4.4 above). In accordance with Appendix A of 29 CFR 1926, Subpart P, soils at this site would be considered as Type C. Excavations, even relatively shallow in depth, may be subject to sloughing and possible intrusion of water. All relevant safety precautions should be adhered to when working in deeper excavations. In deeper excavations, dewatering may be required.

10.0 CONCLUSIONS AND RECOMMENDATIONS

10.1 Conclusions

The following conclusions are based on the information obtained during the subsurface investigation:

1. A total of twenty (20) soil test borings were drilled for this project. Fourteen (14) of the borings were made in the slip area using barge-mounted equipment, and the remaining borings were conducted in the upland area and on land on either side of the slip. Six (6) Cone Penetrometer Test Soundings were obtained in the upland areas. The borings, CPT soundings, and associated laboratory testing provided detailed information on the types, depths, and physical condition of the soils underlying the site. This information was utilized for developing site preparation criteria and will be used for determining properties for design of the wall and heavy pavement sections.
2. Subsurface conditions in the slip are typical for the alluvial deposits in this area of the Mobile, River. Essentially, a layer of very loose, organic silt is underlain by sands of reasonable density. Along the sides of the slip, layers of sand fill were evident from approximately EL -15 ft., sloping down to a depth of EL -30 ft.
3. Approximately 558,000 yd^3 of sand will be required to fill the slip to EL 5.0, not accounting for settlement during fill operations.
4. In the marine borings, numerous attempts were made to obtain undisturbed samples of the organic silt stratum but were unsuccessful. Data from published studies of a similar nature was used in our analyses.
5. The conditions in the upland area are characteristic of reclaimed land over alluvial soils A review of the conditions across the upland site indicate that the near surface soils are dense to very dense. Historical photographs of the site show large stockpiles of coal in the north and west parts of the site. It is assumed that these areas are sufficiently surcharged such that settlement would not be of concern.
6. Boring B-16 on the western edge of the upland area was terminated due to extremely hard drilling conditions. Six (6) other soundings were planned but were terminated due to refusal conditions (> 1000 tsf) at shallow depths. These

stiff layers are underlain primarily by strata of sand interlaced with layers of very loose to loose silt and soft clays. Calculations indicate that as much as 2 to 3 inches of settlement could occur in these areas.

7. There is approximately 177,000 yd^3 of material stockpiled in the upland area that would be available for surcharge.
8. Surcharge of the potentially compressible layers of silt may be unsuccessful due to the "bridging" effect of the stiff surficial soils. Since the design loads for terminal would be considerably lower than the planned surcharge loading, it is assumed the stiffness of the pavement would inhibit long-term settlement.
9. Groundwater depths ranged from EL1.6 ft to EL 5.8 ft.
10. There are no known active tectonic faults within 200 km of the site. The site is best classified as Site Class "E", (Soft Clay Soil).

10.2 Recommendations

Based on our engineering studies and analyses, the following recommendations are provided:

1. Groundwater may be encountered during excavations and temporary dewatering should be anticipated.
2. After construction of the containment wall, clean sand should be used as fill in the slip area. Proper management of the fill progress will be required to prevent shear failure of the layers of organic silt ("mud wave").
3. Prefabricated vertical drains, followed by the addition of a surcharge load, should be used to speed up the consolidation of the compressible soils.
4. Since surcharge operations can expose the new wall to high stresses, ground modification strategies will be necessary adjacent to the wall.
5. Settlement plates and piezometers should be employed to monitor the progress of the consolidation of the compressible soils. Data should be recorded at regular intervals.
6. A trial surcharge should be conducted in the upland area using the material stockpiled onsite. This will determine if surcharging other areas adjacent to the slip would be productive.

11.0 REFERENCES

American Society Of Civil Engineers. *ASCE 7 Hazard Tool*. n.d. Web tool. 10 January 2022. <https://asce7hazardtool.online/>.

American Society of Civil Engineers. *ASCE 7-10 Minimum Design Loads for Buildings and Other Structures*. Reston, VA: ASCE, 2010.

American Society of Testing and Materials. *ASTM D1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort*. Testing Standard. West Conshohocken, PA: ASTM International, 2012. Document.

—. *ASTM D1586 Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils*. Testing Standard. West Conshohocken, PA: ASTM International, 2011. Document.

—. *ASTM D1587 Standard Practice for Thin-Walled Tube Sampling of Soils for Geotechnical Purposes*. Testing Standard. West Conshohocken, PA: ASTM International, 2012. Document.

—. *ASTM D2216 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass*. Testing Standard. West Conshohocken, PA: ASTM International, 2010. Document.

—. *ASTM D2487 Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)*. Testing Standard. West Conshohocken, PA: ASTM International, 2011. Document.

—. *ASTM D4318 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils*. Testing Standard. West Conshohocken, PA: ASTM International, 2010. Document.

—. *ASTM D5778 Standard Test Method for Electronic Friction Cone and Piezocone Penetration Testing of Soils*. Testing Standard. West Conshohocken, PA: ASTM International, 2012. Document.

International Code Council. *2018 International Building Code*. Country Club Hills, IL: International Code Council, 2017. Document.

Knappen Tippets Abbett Engineering Company. *Ore Terminal, Mobile, Alabama Main Wharf*. New York: Tennessee Coal and Iron Division, United States Steel Company, 4 February 1952. Engineering Drawings.

Lunne, T., Powell, J., Robertson, P. *Cone Penetration Testing in Geotechnical Practice*. Boca Raton, FL: CRC Press, 1997. Book.

Robertson, P.K. "Estimating In-Situ State Parameter and Friction Angle in Sandy Soils from CPT." *2nd International Symposium on Cone Penetration Testing*. Huntington Beach, 2010. CPT 10.

—. "Soil Behaviour Type from the CPT: An Update." *2nd International Symposium on Cone Penetration Testing*. Huntington Beach, 2010. CPT 10.

—. "Soil Classification Using the Cone Penetration Test." *Canadian Geotechnical Journal* 27.1 (1990): 151-158.

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Proposed APM Terminals
Phase IV
Mobile, Alabama

Appendix A

Test Location Plan

Project No. M4477
June 21, 2022


Test Location Plan
Legend
CPT Sounding
CPT Sounding (Refusal at grade)
Soil Boring
B-16
CPT-8 (Deleted)
CPT-10 (Deleted)
CPT-7 (Deleted)
CPT-12 (Deleted)
B-14
CPT-9 (Deleted)
CPT-3
CPT-4
B-11
B-7
B-3A
B-3
B-2A
B-17
CPT-6
B-9
B-4
B-6
B-2
B-13
B-10
CPT-11
B-8
B-15
CPT-5
B-5
B-1
CPT-2
B-12
B-1A
CPT-1 (Deleted)
Google Earth

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Proposed APM Terminals
Phase IV
Mobile, Alabama

Appendix B

CPT Sounding Logs

Project No. M4477
June 21, 2022

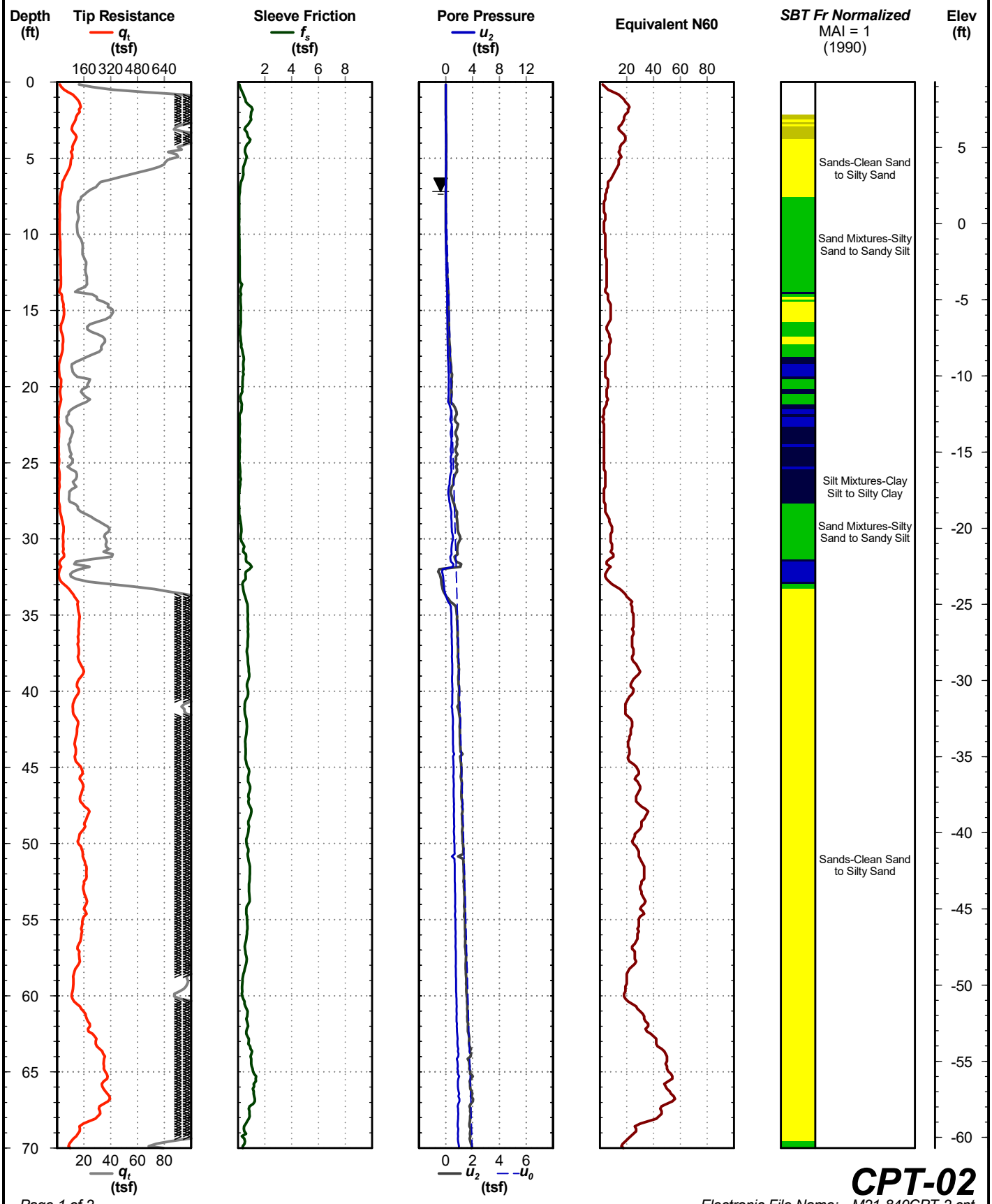
APTIM

APMT PH IV
(Mobile,Alabama)

Project Number: M4477

Latitude: 30.67048
Longitude: 88.03767
Elevation: 9.3

Date: Feb. 22, 2022
Test ID: CPT-02
Estimated Water Depth: 7.19 ft



CPT REPORT - DYNAMIC PORTRAIT PH IV CPT.GPJ CPT TEST.GPJ 4/11/22

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CPT-02

Electronic File Name: M21-840CPT-2.cpt

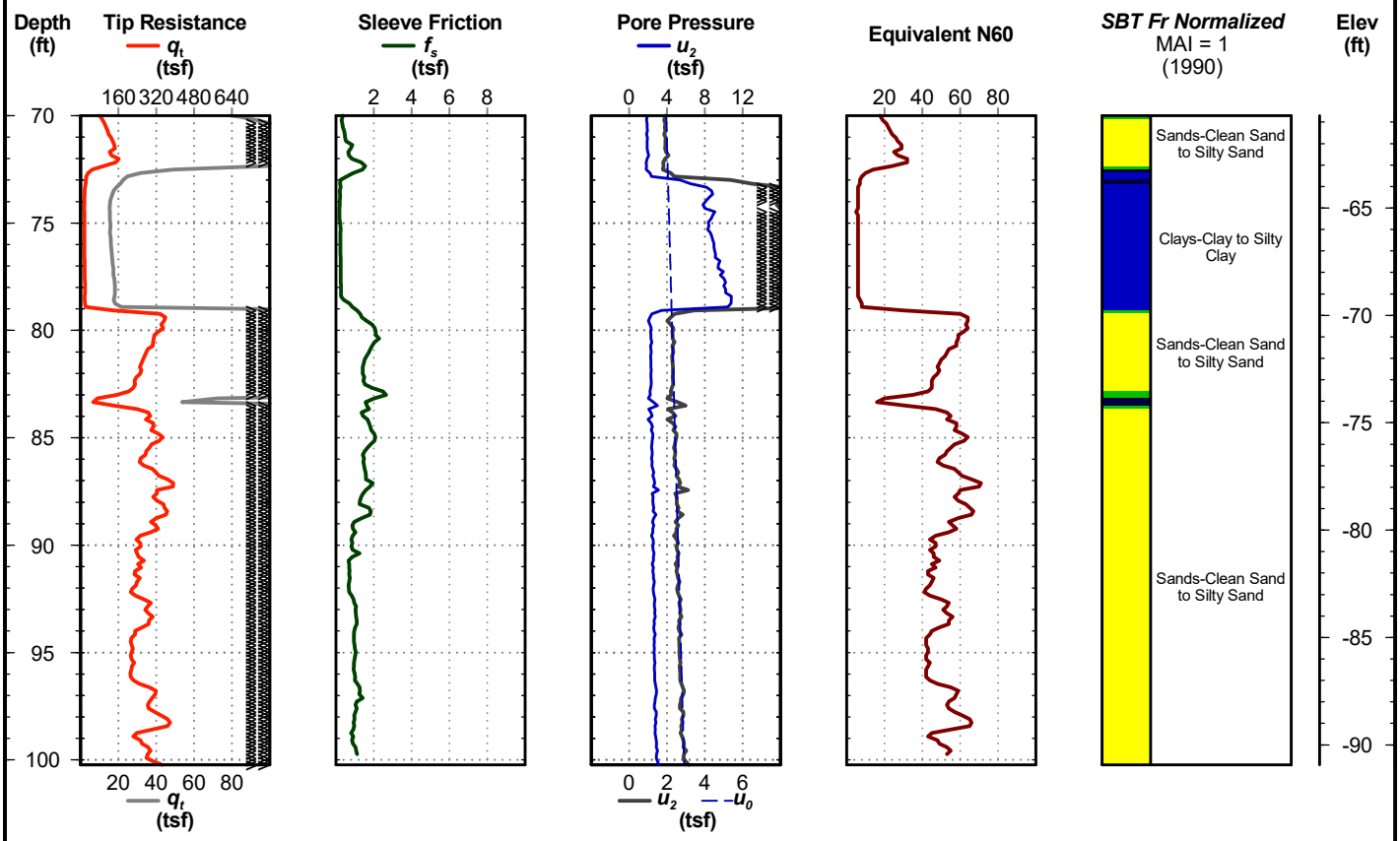
APTIM

APMT PH IV
(Mobile,Alabama)

Project Number: M4477

Latitude: 30.67048
Longitude: 88.03767
Elevation: 9.3

Date: Feb. 22, 2022
Test ID: CPT-02
Estimated Water Depth: 7.19 ft



CPT REPORT - DYNAMIC PORTRAIT PH IV CPT.GPJ CPT TEST.GPJ 4/11/22

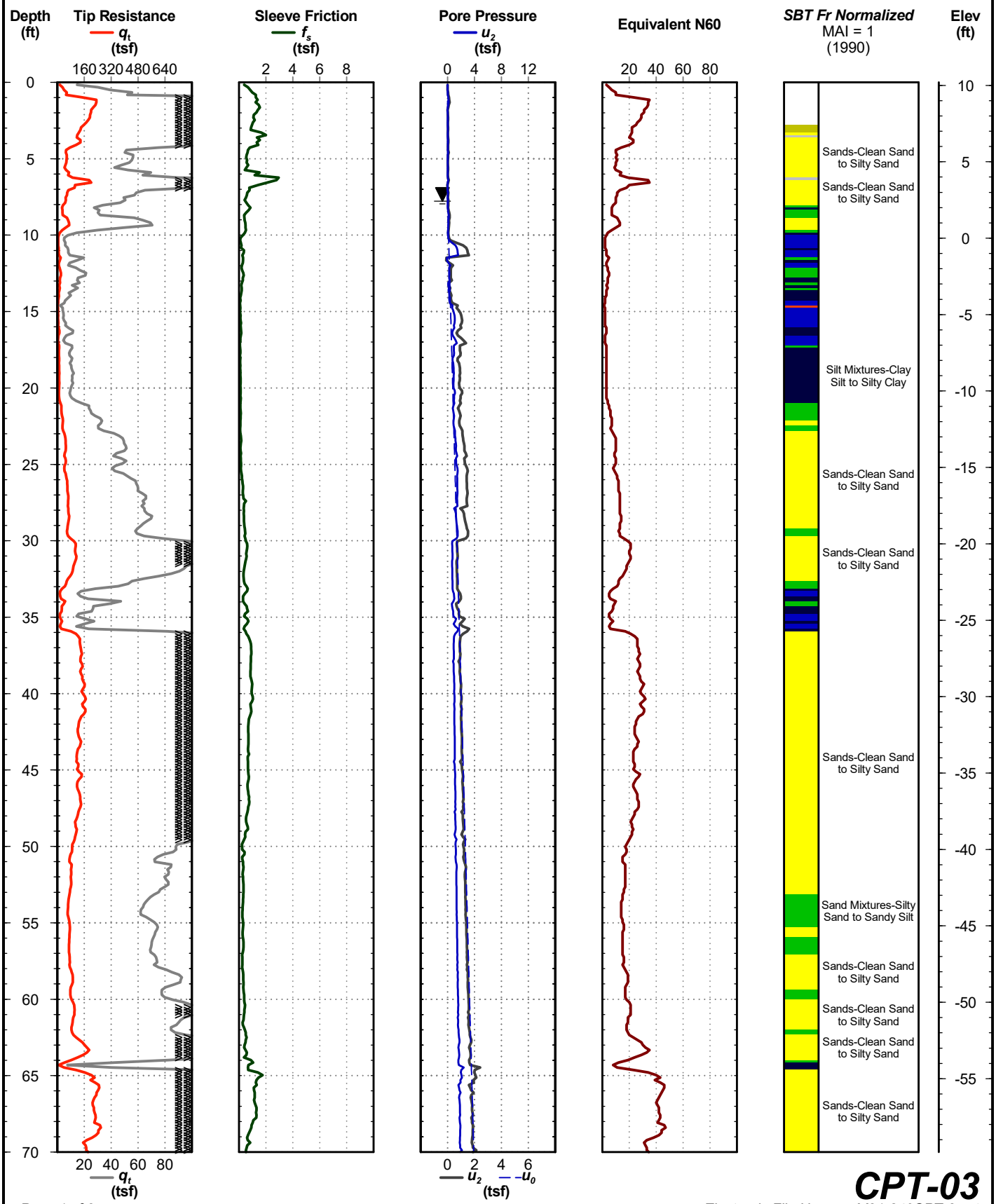
APTIM

APMT PH IV
(Mobile,Alabama)

Project Number: M4477

Latitude: 30.6718
Longitude: 88.03821
Elevation: 10.2

Date: Feb. 22, 2022
Test ID: CPT-03
Estimated Water Depth: 7.78 ft



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CPT-03

Electronic File Name: M21-840CPT-3.cpt

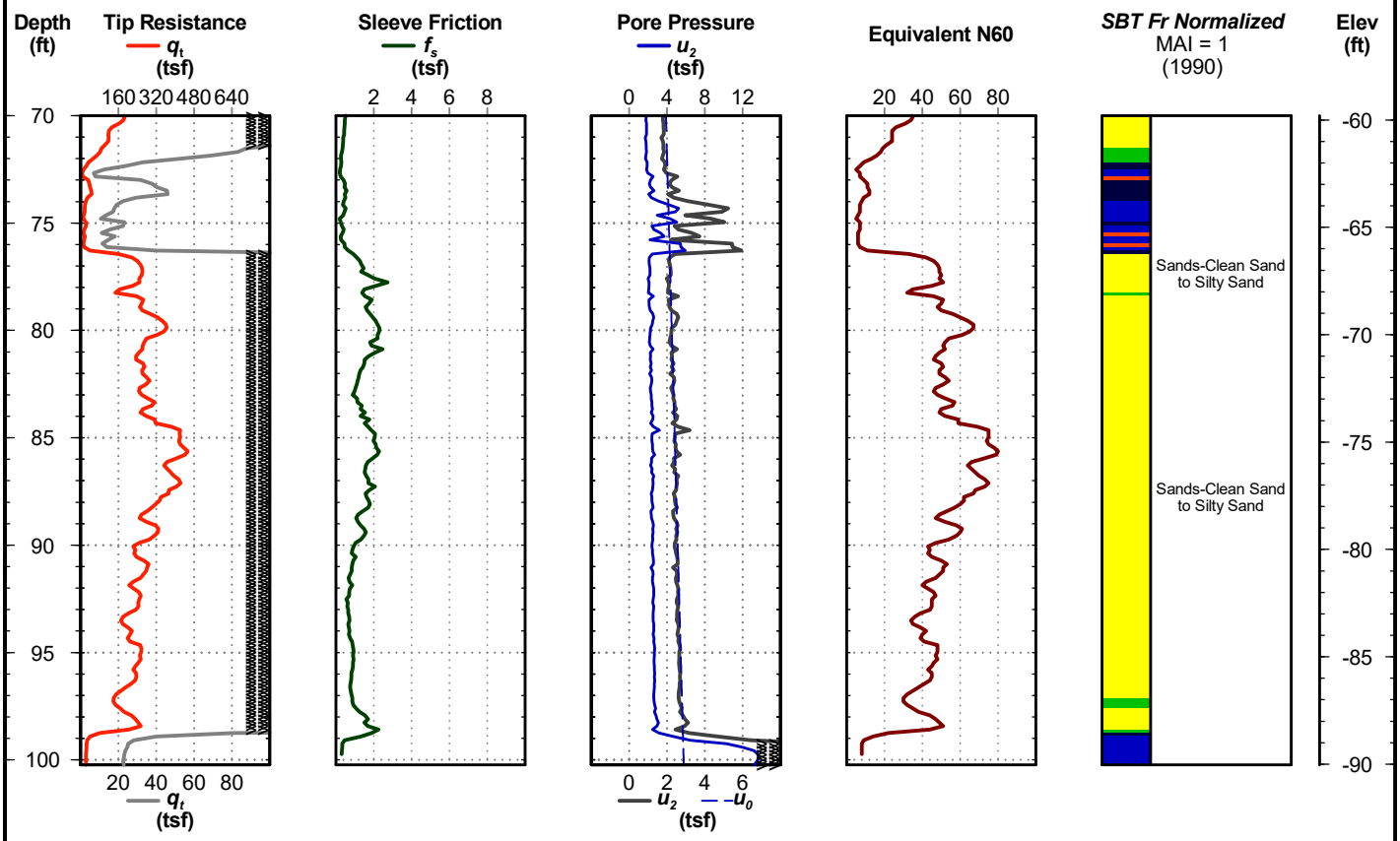
APTIM

APMT PH IV
(Mobile,Alabama)

Project Number: M4477

Latitude: 30.6718
Longitude: 88.03821
Elevation: 10.2

Date: Feb. 22, 2022
Test ID: CPT-03
Estimated Water Depth: 7.78 ft



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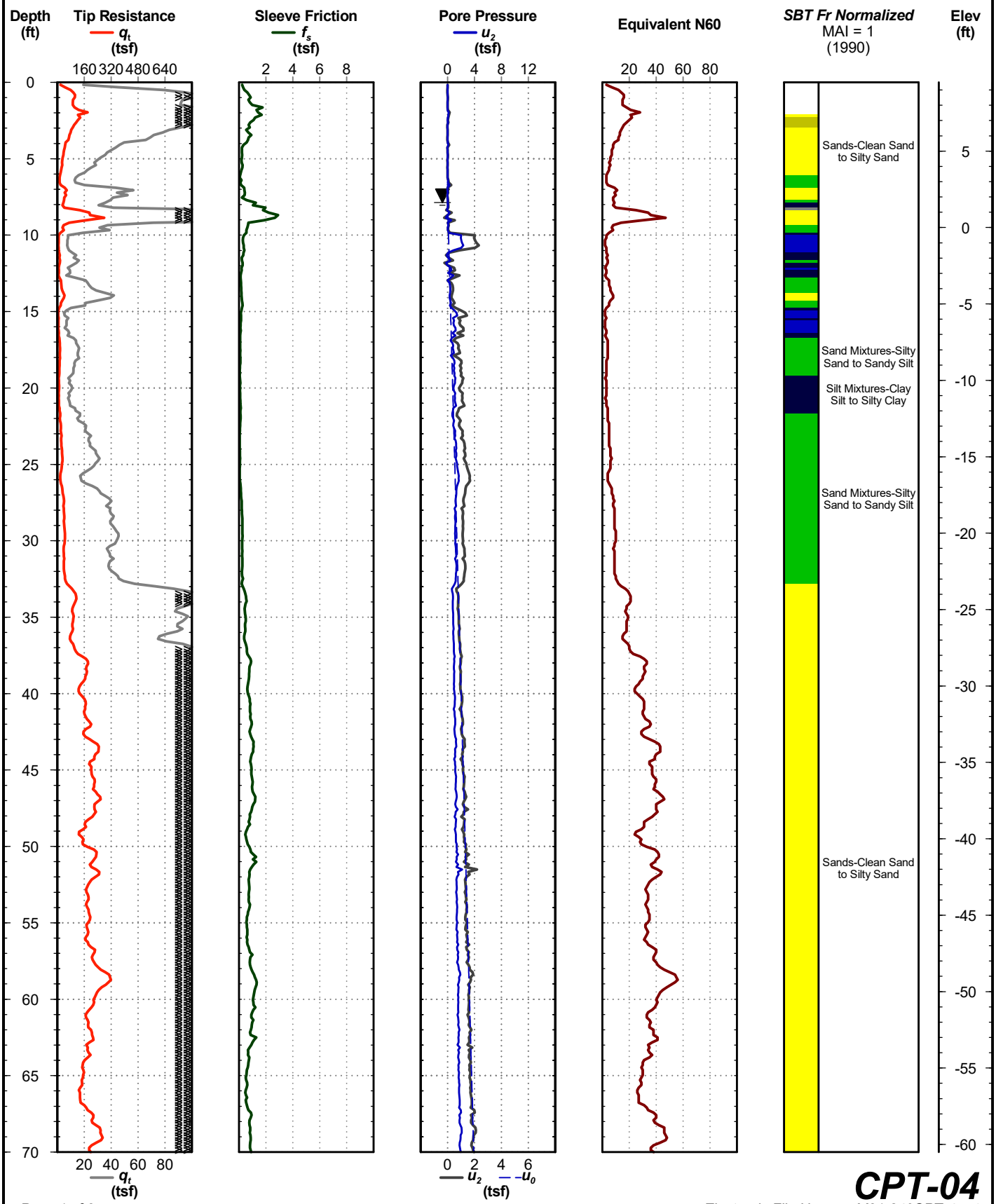
APTIM

APMT PH IV
(Mobile,Alabama)

Project Number: M4477

Latitude: 30.67177
Longitude: 88.03666
Elevation: 9.5

Date: Feb. 22, 2022
Test ID: CPT-04
Estimated Water Depth: 7.87 ft



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CPT-04

Electronic File Name: M21-840CPT-4.cpt

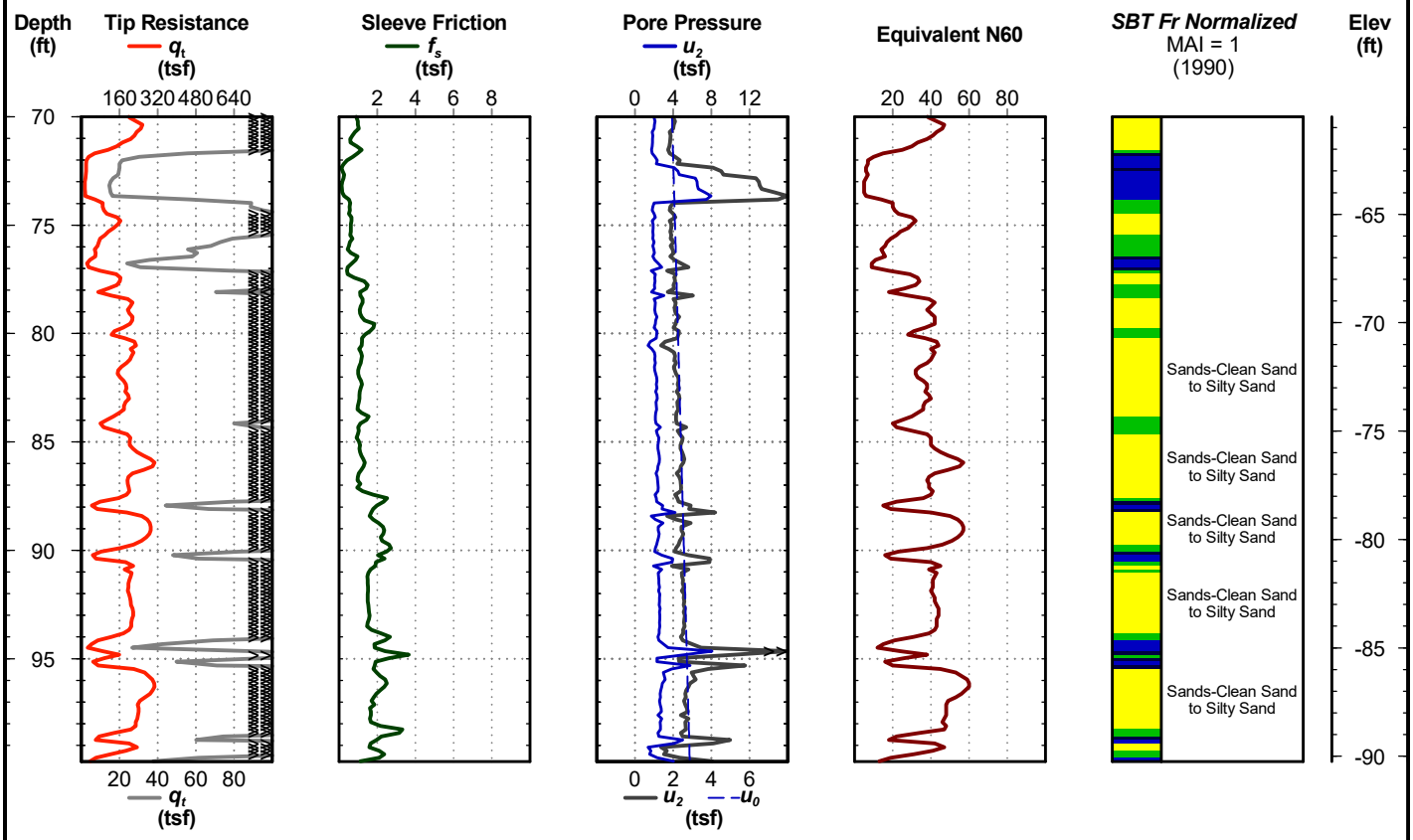
APTIM

APMT PH IV
(Mobile,Alabama)

Project Number: M4477

Latitude: 30.67177
Longitude: 88.03666
Elevation: 9.5

Date: Feb. 22, 2022
Test ID: CPT-04
Estimated Water Depth: 7.87 ft



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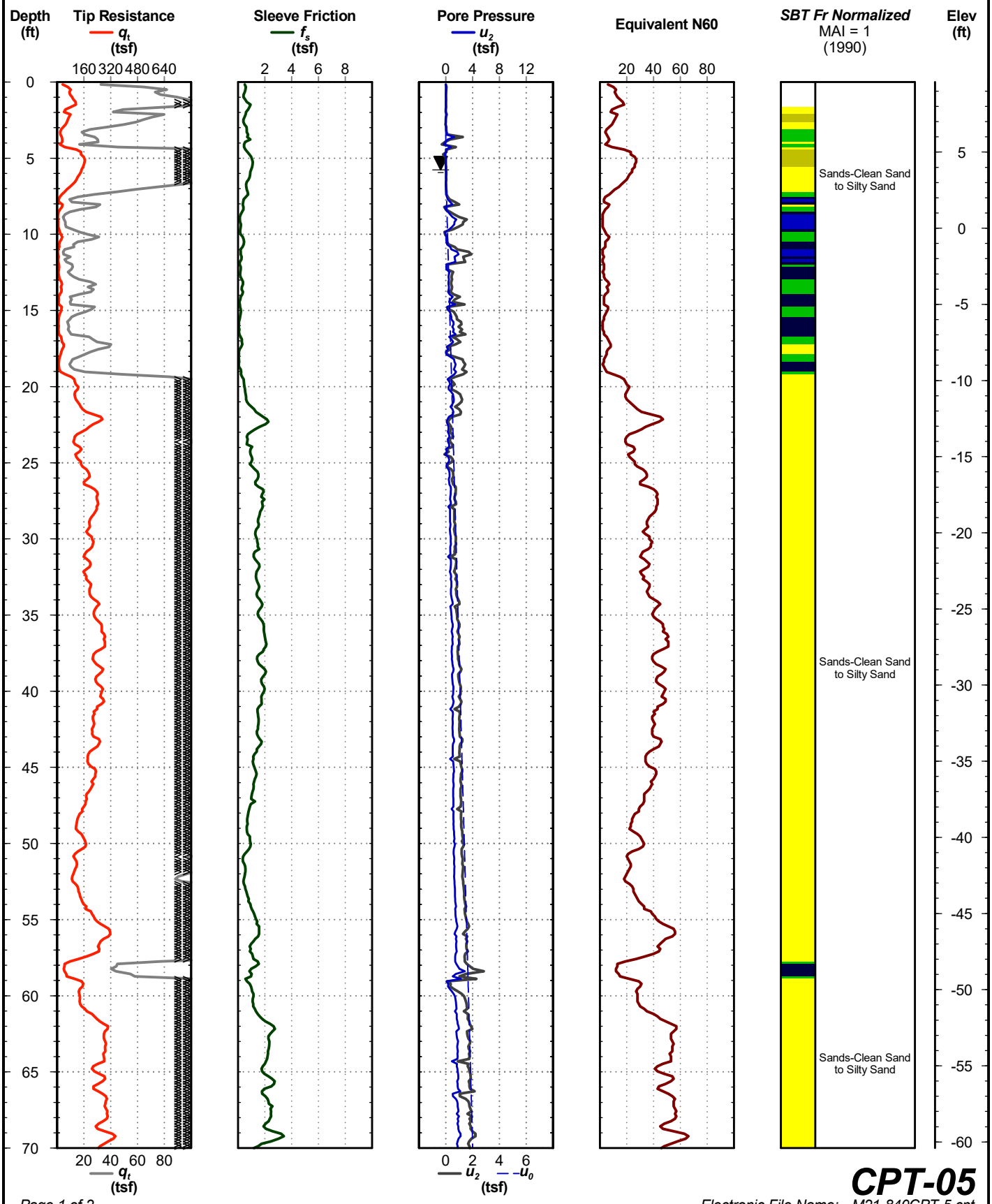
APMT PH IV
(Mobile,Alabama)

Project Number: M4477

Latitude: 30.67066
Longitude: 88.03893
Elevation: 9.6

Date: Feb. 22, 2022
Test ID: CPT-05
Estimated Water Depth: 5.77 ft



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CPT-05

Electronic File Name: M21-840CPT-5.cpt

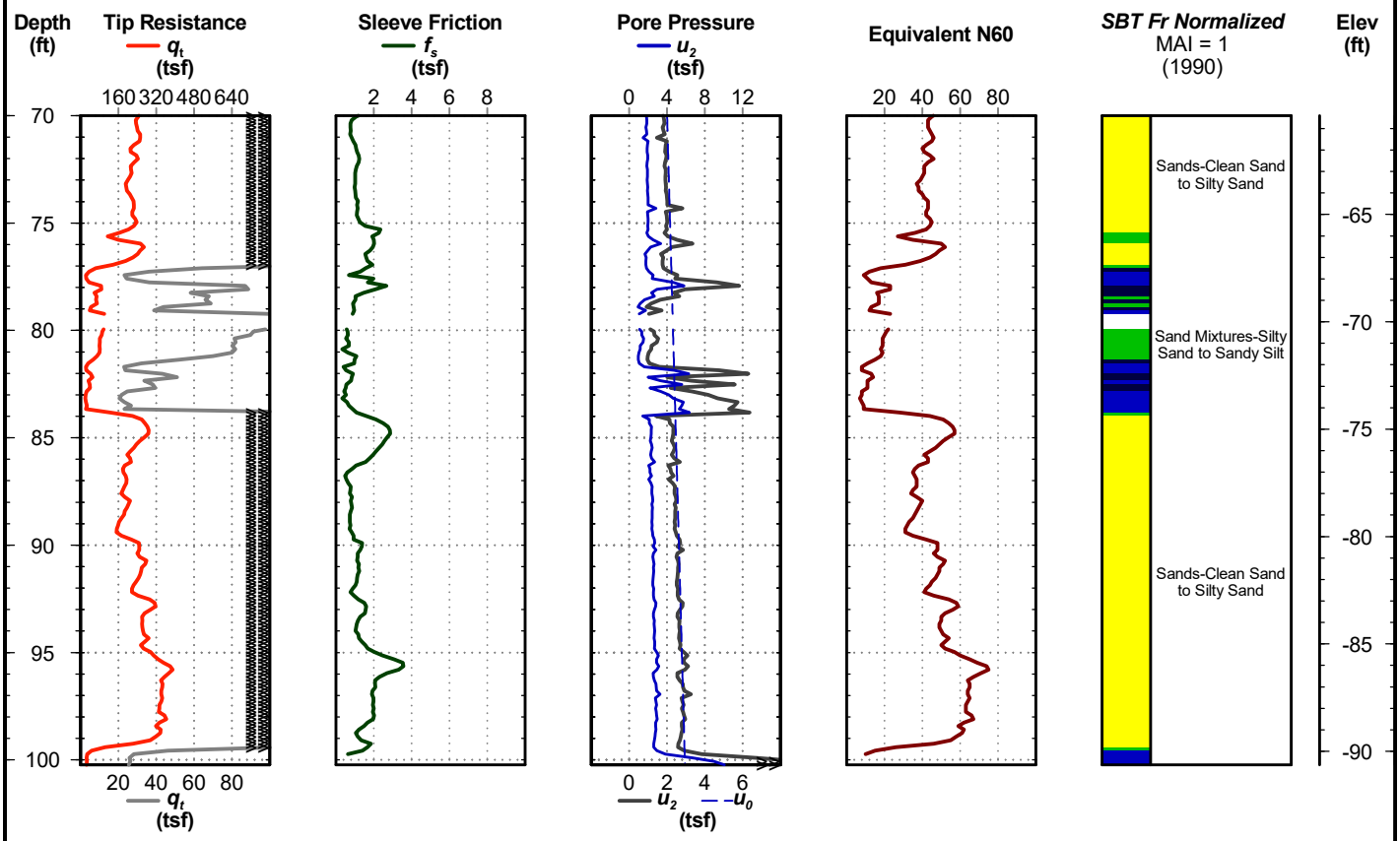
APTIM

APMT PH IV
(Mobile,Alabama)

Project Number: M4477

Latitude: 30.67066
Longitude: 88.03893
Elevation: 9.6

Date: Feb. 22, 2022
Test ID: CPT-05
Estimated Water Depth: 5.77 ft



CPT REPORT - DYNAMIC PORTRAIT PH IV CPT.GPJ CPT TEST.GPJ 4/11/22

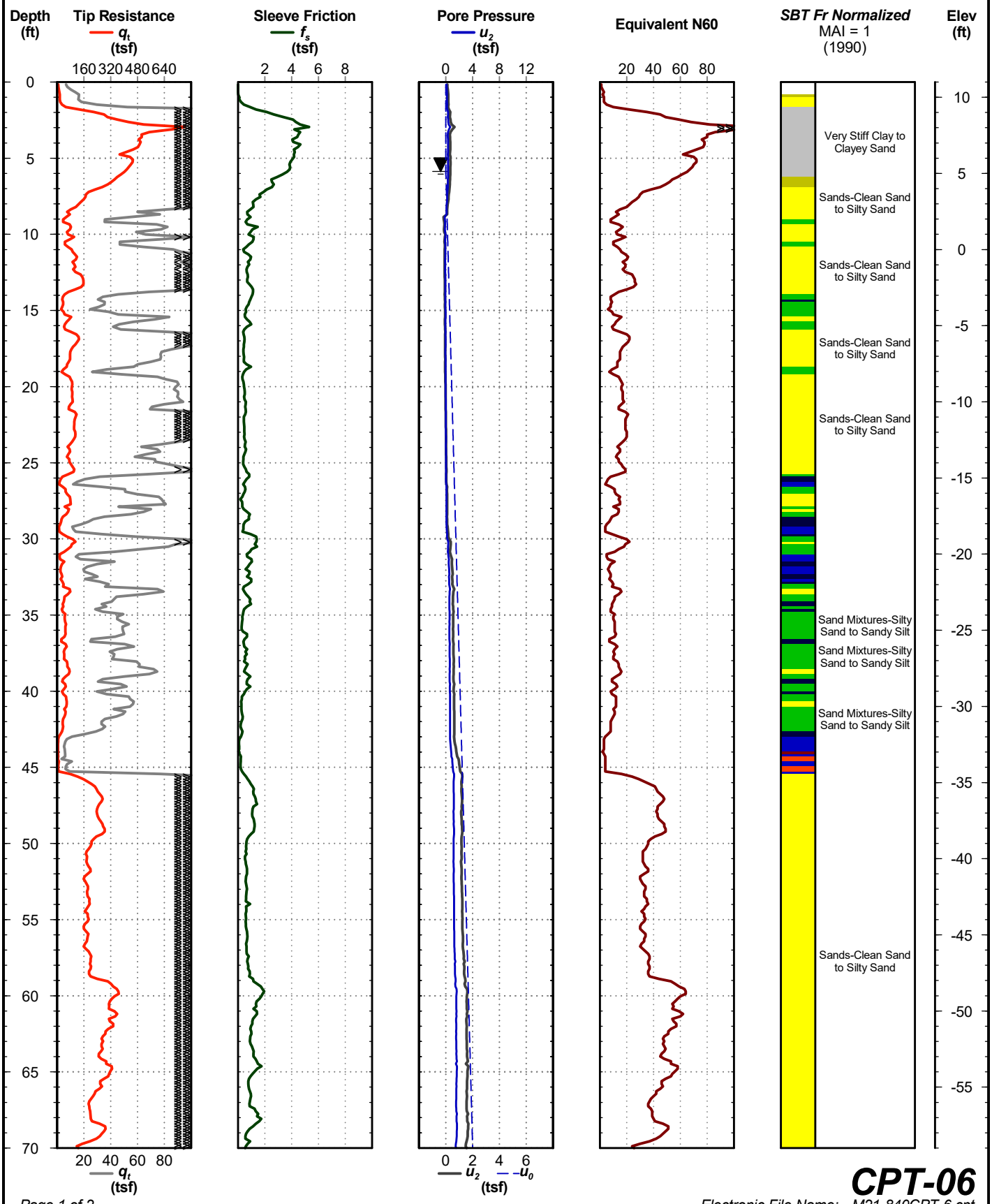
APTIM

APMT PH IV
(Mobile,Alabama)

Project Number: M4477

Latitude: 30.6713
Longitude: 88.03916
Elevation: 11.0

Date: Feb. 23, 2022
Test ID: CPT-06
Estimated Water Depth: 5.87 ft



CPT REPORT - DYNAMIC PORTRAIT PH IV.CPT.GPJ CPT TEST.GPJ 4/11/22

CPT-06

Electronic File Name: M21-840CPT-6.cpt

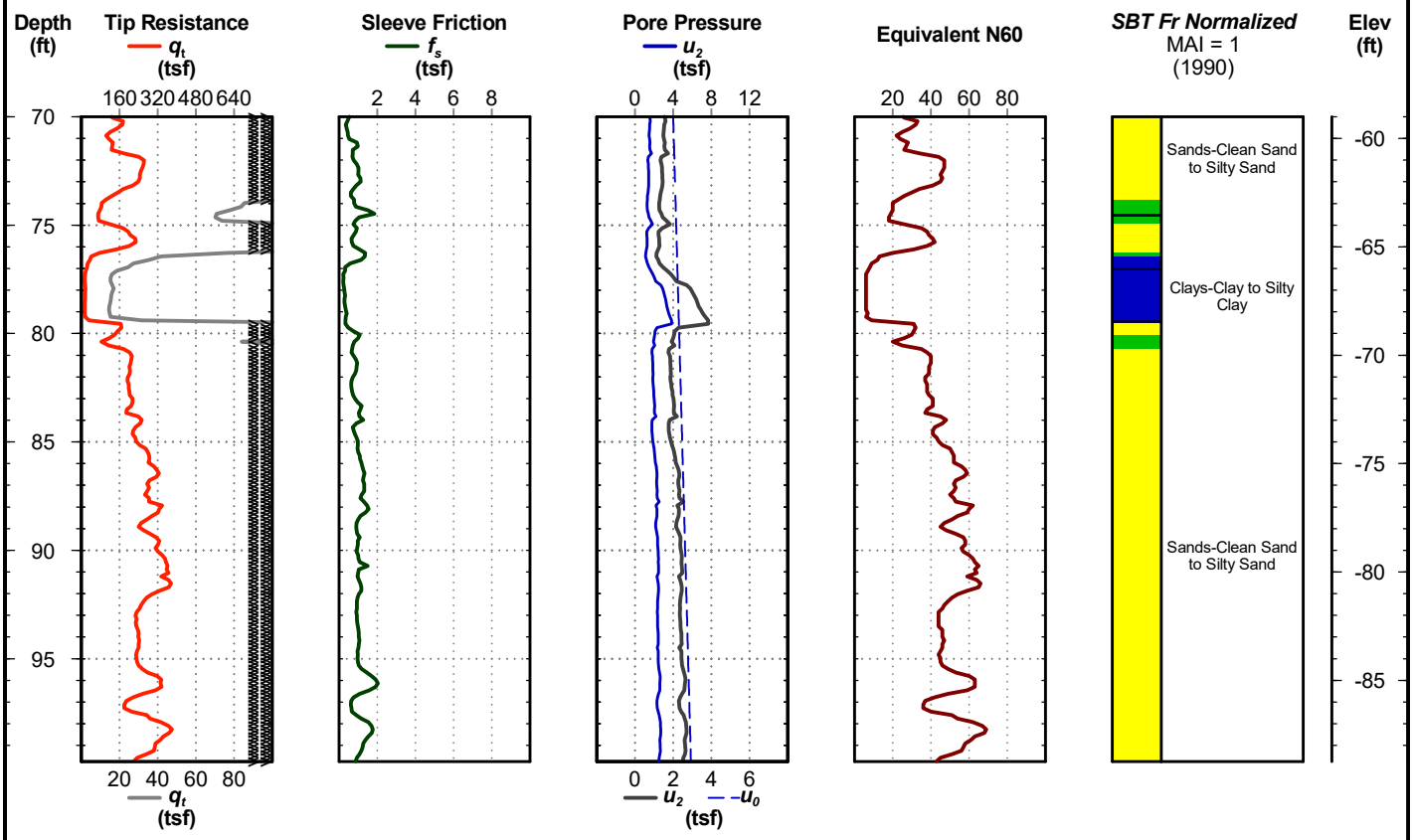
APTIM

APMT PH IV
(Mobile,Alabama)

Project Number: M4477

Latitude: 30.6713
Longitude: 88.03916
Elevation: 11.0

Date: Feb. 23, 2022
Test ID: CPT-06
Estimated Water Depth: 5.87 ft



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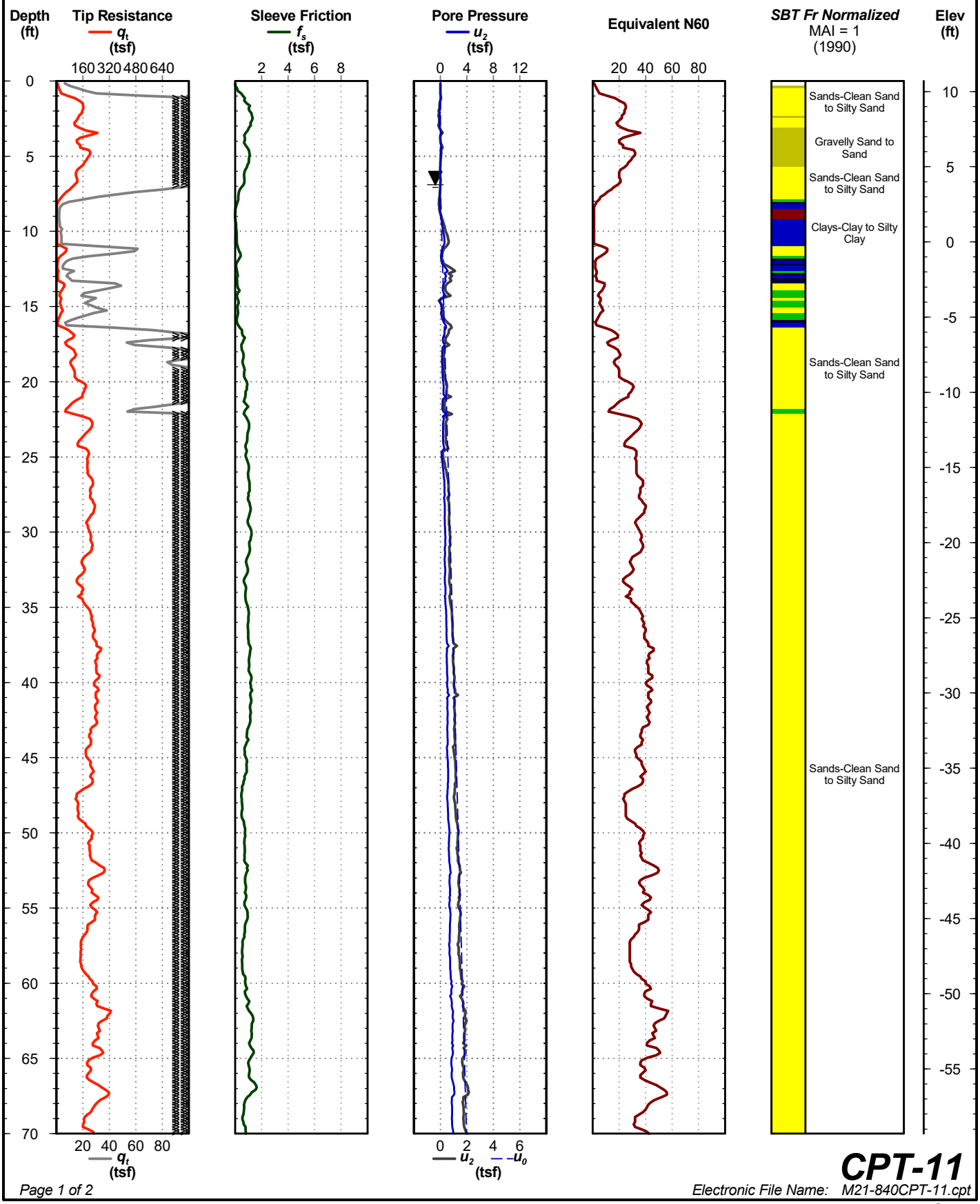
APTIM

APMT PH IV
(Mobile,Alabama)

Project Number: M4477

Latitude: 30.67079
Longitude: 88.04128
Elevation: 10.7

Date: Feb. 22, 2022
Test ID: CPT-11
Estimated Water Depth: 6.89 ft



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CPT-11

Electronic File Name: M21-840CPT-11.cpt

APTIM

APMT PH IV
(Mobile,Alabama)

Project Number: M4477

Latitude: 30.67079
Longitude: 88.04128
Elevation: 10.7

Date: Feb. 22, 2022
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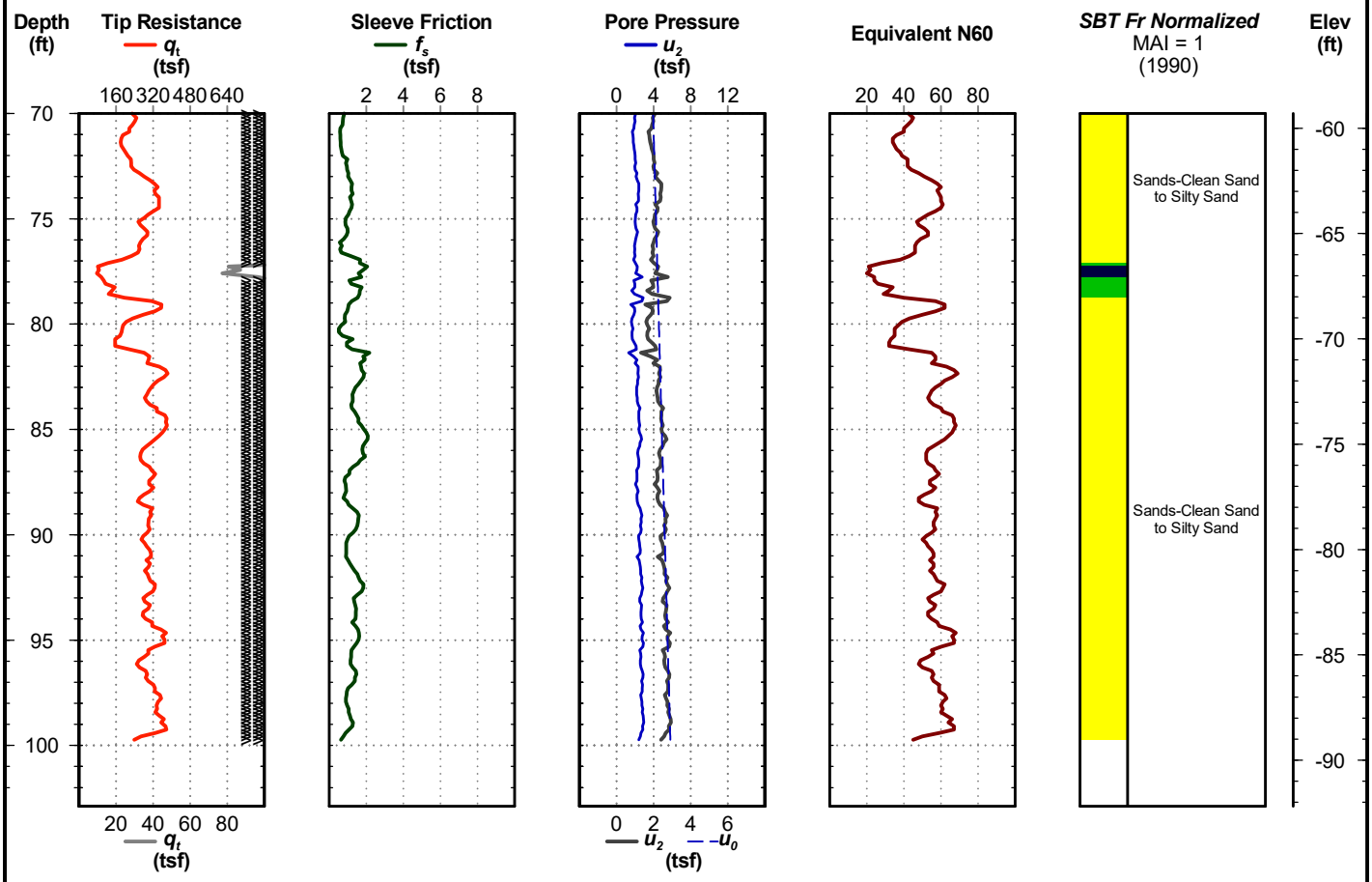
Estimated Water Depth: 6.89 ft



CPT REPORT - DYNAMIC PORTRAIT PH IV CPT.GPJ CPT TEST.GPJ 4/11/22

Proposed APM Terminals
Phase IV
Mobile, Alabama

Appendix C

Soil Boring Logs

Project No. M4477
June 21, 2022

APTIM
3600 Springhill Business Park Suite 200
Mobile, AL 36608
Telephone: 251-344-1913

KEY TO SYMBOLS

PROJECT: APMT Phase IV	**PROJECT NO:** M4477
LOCATION: Mobile, AL	**CLIENT:** Alabama Port Authority

LITHOLOGIC SYMBOLS
(Unified Soil Classification System)


ASPHALT: Asphalt


CH: USCS High Plasticity Clay


CL: USCS Low Plasticity Clay


COAL: Coal


GP: USCS Poorly-graded Gravel


GP-GM: USCS Poorly-graded Gravel with Silt


MH: USCS Elastic Silt


ML: USCS Silt


OH: USCS High Plasticity Organic silt or clay


OL: USCS Low Plasticity Organic silt or clay


SC: USCS Clayey Sand


SM: USCS Silty Sand


SP-SM: USCS Poorly-graded Sand with Silt

SAMPLER SYMBOLS


Grab Sample


Shelby Tube


Standard Penetration Test

WELL CONSTRUCTION SYMBOLS

ABBREVIATIONS

LL - LIQUID LIMIT (%)
PI - PLASTIC INDEX (%)
W - MOISTURE CONTENT (%)
DD - DRY DENSITY (PCF)
NP - NON PLASTIC
-200 - PERCENT PASSING NO. 200 SIEVE
PP - POCKET PENETROMETER (TSF)
WOH - WEIGHT OF HAMMER
WOR - WEIGHT OF ROD

TV - TORVANE
PID - PHOTOIONIZATION DETECTOR
UC - UNCONFINED COMPRESSION
ppm - PARTS PER MILLION


Water Level at Time Drilling, or as Shown


Water Level at End of Drilling, or as Shown


Water Level After 24 Hours, or as Shown

APTIM
3600 Springhill Business Park Suite 200
Mobile, AL 36608
Telephone: 251-344-1913

BORING NUMBER B-01

PROJECT: APMT Phase IV			**PROJECT NO:** M4477	
LOCATION: Mobile, AL			**CLIENT:** Alabama Port Authority	
STARTED: 11/28/21	**COMPLETED:** 11/28/21	**EL:** -31.01 ft NAVD 88	**LATITUDE:** 30.670583 deg	**LONGITUDE:** 88.0358833 deg

DRILLING CONTRACTOR: Challenge Engineering and Testing, Inc.
DRILLING METHOD: Mud Rotary
LOGGED BY: Toby Watson **CHECKED BY:** Graham Forsythe
NOTES: Set 47 feet of 4-inch casing

GROUND WATER LEVELS:
AT TIME OF DRILLING ---
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
0		(OH) Very loose black organic SILT	SPT S-1	90	0-0-0 (0)		31.2
							-35
5			SPT S-2	90	0-0-0 (0)		83.6
							-40
10			SPT S-3	90	0-0-0 (0)		26.9
							-45
15			SPT S-4	90	0-0-0 (0)		86.5
		18.0 -49.0					
		(SP-SM) Loose tan silty medium SAND					-50
20			SPT S-5	70	6-4-3 (7)		
							-55
25			SPT S-6	70	4-4-2 (6)		
		...becomes medium dense, medium to coarse, with some gravel					-60
30			SPT S-7	60	2-5-10 (15)		
		...becomes dense, tan and orange, with trace gravel					-65
35			SPT S-8	80	8-10-25 (35)		
							-70
40							

SPT N VALUE
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

(Continued Next Page)

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BORING NUMBER B-01

PROJECT: APMT Phase IV | **PROJECT NO:** M4477

LOCATION: Mobile, AL | **CLIENT:** Alabama Port Authority

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
40		(SP-SM) Loose tan silty medium SAND *(continued)*	SPT S-9	90	9-14-28 (42)		
		...becomes medium dense					-75
45			SPT S-10	90	7-14-14 (28)		
							-80
50		...becomes very dense, tan	SPT S-11	90	18-20-37 (57)		
51.5		Bottom of borehole at 51.5 feet.					-82.5

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

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BORING NUMBER B-01A

PROJECT: APMT Phase IV			**PROJECT NO:** M4477	
LOCATION: Mobile, AL			**CLIENT:** Alabama Port Authority	
STARTED: 4/27/22	**COMPLETED:** 4/27/22	**EL:** -14.8 ft NAVD 88	**LATITUDE:** 30.6701 deg	**LONGITUDE:** 88.03515 deg
DRILLING CONTRACTOR: Challenge Engineering and Testing, Inc.			**GROUND WATER LEVELS:**	
DRILLING METHOD: Mud Rotary			**AT TIME OF DRILLING** ---	
LOGGED BY: Toby Watson	**CHECKED BY:** Graham Forsythe		**AT END OF DRILLING** ---	
NOTES: Set 32 feet of 4-inch casing			**AFTER DRILLING** ---	

DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	ELEVATION (ft)
0	(OL) Very loose black organic SILT with little tan and gray silty SAND	SPT 1	90	0-0-0 (0)	-15
2.5					-17.3
	(SM) Very loose black silty fine SAND	SPT 2	80	0-0-0 (0)	-20
10	...with pieces of wood	SPT 3	90	1-2-2 (4)	-25
	...becomes gray, with wood	SPT 4	90	1-1-1 (2)	-30
20		SPT 5	80	1-2-2 (4)	-35
	...becomes loose				
24.0					-38.8
25	(CL) Loose gray silty SAND changing to gray sandy CLAY	SPT 6	90	2-2-3 (5)	-40
30	...becomes very soft	SPT 7	90	0-1-1 (2)	-45
35	..becomes medium stiff, with trace gravel	SPT 8	90	3-3-4 (7)	-50
37.0					-51.8
	(SM) Medium dense gray silty fine SAND	SPT 9	80	2-5-6 (11)	
40					

POCKET PEN (tsf)

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

(Continued Next Page)

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BORING NUMBER B-01A

PROJECT: APMT Phase IV | **PROJECT NO:** M4477

LOCATION: Mobile, AL | **CLIENT:** Alabama Port Authority

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
40							-55
45		(SM) Medium dense gray silty fine SAND *(continued)* ...becomes loose 45.0 -59.8	SPT 10	90	4-3-4 (7)		

▲ SPT N VALUE ▲ 20 40 60 80
PL MC LL 20 40 60 80
☐ FINES CONTENT (%) ☐ 20 40 60 80

Bottom of borehole at 45.0 feet.

APTIM BORING WITH PLOTS - APTIM STD BORINGS WITH SOIL COMPONENTS.GDT - 5/18/22 11:01 - H:\PROJECT FOLDERS\M4400\4477 - ASPA - INVESTIGATION FOR APM PHASE IV\GEOTECHNICAL\FIELD\PH IV BORINGS.GPJ

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BORING NUMBER B-02

PROJECT: APMT Phase IV			**PROJECT NO:** M4477	
LOCATION: Mobile, AL			**CLIENT:** Alabama Port Authority	
STARTED: 12/2/21	**COMPLETED:** 12/14/21	**EL:** -28.91 ft NAVD 88	**LATITUDE:** 30.67105 deg	**LONGITUDE:** 88.035517 deg

DRILLING CONTRACTOR: Challenge Engineering and Testing, Inc.
DRILLING METHOD: Mud Rotary
LOGGED BY: Toby Watson **CHECKED BY:** Graham Forsythe
NOTES: Set 61 feet of 4-inch casing

GROUND WATER LEVELS:
AT TIME OF DRILLING ---
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
0		(OH) Very loose black organic SILT	SPT S-1	80	0-0-0 (0)		-30
			SPT S-2	80	0-0-0 (0)		-35
10			SPT S-3	90	0-0-0 (0)		-40
15			SPT S-4	90	0-0-0 (0)		-45
20			SPT S-5	90	0-0-1 (1)		-50
		23.0 -51.9					
25		(SP-SM) Medium dense gray silty medium SAND with trace gravel	SPT S-6	80	5-7-6 (13)		-55
30		...becomes loose, medium to coarse, with some gravel	SPT S-7	90	3-4-5 (9)		-60
35		...becomes medium dense, tan and gray	SPT S-8	80	4-6-9 (15)		-65
40							

SPT N VALUE: 20 40 60 80
PL MC LL: 20 40 60 80
FINES CONTENT (%): 20 40 60 80

(Continued Next Page)

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BORING NUMBER B-02

PROJECT: APMT Phase IV | **PROJECT NO:** M4477

LOCATION: Mobile, AL | **CLIENT:** Alabama Port Authority

DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
40	(SP-SM) Medium dense gray silty medium SAND with trace gravel *(continued)*	SPT S-9	80	8-12-8 (20)		-70
	...becomes dense, tan, with trace gravel					
45		SPT S-10	80	10-18-17 (35)		-75
	...becomes very dense					
50		SPT S-11	70	12-25-34 (59)		-80
	...becomes dense, gray and orange, with some gravel					
55		SPT S-12	75	10-20-25 (45)		-85
	58.0 -86.9					
	(CH) Stiff gray CLAY					
60		SPT S-13	95	4-6-8 (14)		-90
	63.0 -91.9					
	(SP-SM) Medium dense gray silty medium SAND with some gravel					
65		SPT S-14	90	9-12-14 (26)		-95
	68.0 -96.9					
	(CH) Very stiff blue and green CLAY					
70		SPT S-15	95	8-10-12 (22)		-100
	71.5 -100.4					

Bottom of borehole at 71.5 feet.

SPT N VALUE: 20 40 60 80

PL MC LL: 20 40 60 80

FINES CONTENT (%): 20 40 60 80

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BORING NUMBER B-02A

PROJECT: APMT Phase IV			**PROJECT NO:** M4477	
LOCATION: Mobile, AL			**CLIENT:** Alabama Port Authority	
STARTED: 4/28/22	**COMPLETED:** 4/28/22	**EL:** -24.5 ft NAVD 88	**LATITUDE:** 30.67135 deg	**LONGITUDE:** 88.03545 deg

DRILLING CONTRACTOR: Challenge Engineering and Testing, Inc.
DRILLING METHOD: Mud Rotary
LOGGED BY: Toby Watson **CHECKED BY:** Graham Forsythe
NOTES: Set 43 feet of 4-inch casing

GROUND WATER LEVELS:
AT TIME OF DRILLING ---
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
0		(OL) Very loose black organic SILT	SPT 1	80	0-0-0 (0)		-25
			SPT 2	90	0-0-0 (0)		
5							-30
7.0							
		(ML) Very loose black clayey SILT	SPT 3	90	0-0-0 (0)		
10							-35
12.0		-36.5					
		(CH) Very soft gray and black CLAY	SPT 4	80	0-0-0 (0)		
15							-40
17.0		-41.5					
		(SM) Very loose tan silty medium SAND	SPT 5	80	1-2-1 (3)		
20							-45
		...becomes medium dense					
25		-49.5	SPT 6	90	4-6-5 (11)		
25.0		Bottom of borehole at 25.0 feet.					

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

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BORING NUMBER B-03

PROJECT: APMT Phase IV			**PROJECT NO:** M4477	
LOCATION: Mobile, AL			**CLIENT:** Alabama Port Authority	
STARTED: 12/15/21	**COMPLETED:** 12/15/21	**EL:** -21 ft NAVD 88	**LATITUDE:** 30.671517 deg	**LONGITUDE:** 88.035567 deg
DRILLING CONTRACTOR: Challenge Engineering and Testing, Inc.			**GROUND WATER LEVELS:**	
DRILLING METHOD: Mud Rotary			**AT TIME OF DRILLING** ---	
LOGGED BY: Toby Watson	**CHECKED BY:** Graham Forsythe		**AT END OF DRILLING** ---	
NOTES: Set 39 feet of 4-inch casing			**AFTER DRILLING** ---	

DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	ELEVATION (ft)
0	(OH) Very loose black organic SILT	SPT S-1	80	0-0-0 (0)	
3.0					-24.0
	(CL) Very soft gray CLAY				
5		SPT S-2	90	0-0-0 (0)	-25
10	...becomes medium stiff, with a 3-inch lens of gray sand	SPT S-3	90	2-2-3 (5)	-30
		SH T-1	68		
14.5					-35.5
15	(CH) Medium gray CLAY	SPT S-4	95	1-2-5 (7)	-35
		SH T-2	71		
19.5					-40.5
20	(MH) Loose gray SILT	SPT S-5	90	2-3-6 (9)	-40
25					-45
25.5					-46.5
	(SP-SM) Loose gray SILT changing to loose gray silty fine SAND	SPT S-6	90	1-3-6 (9)	
30	...becomes medium dense	SPT S-7	40	8-10-12 (22)	-50
35	...becomes fine to medium, with trace gravel	SPT S-8	80	7-11-11 (22)	-55
40	...becomes loose, orange, with some gravel				-60

POCKET PEN (tsf)

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

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BORING NUMBER B-03

PROJECT: APMT Phase IV | **PROJECT NO:** M4477

LOCATION: Mobile, AL | **CLIENT:** Alabama Port Authority

DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
40	(SP-SM) Loose gray SILT changing to loose gray silty fine SAND *(continued)*	SPT S-9	80	7-5-3 (8)		-65
45	...becomes dense, tan	SPT S-10	90	12-18-15 (33)		-70
50		SPT S-11	85	17-23-20 (43)		-75
55	...with trace gravel	SPT S-12	80	14-16-19 (35)		-80
60	...becomes very dense, pink	SPT S-13	80	18-32-34 (66)		-85
63.0						-84.0
65	(CH) Stiff gray CLAY with cemented pebbles	SPT S-14	95	2-4-6 (10)		-90
68.0						-89.0
70	(MH) Medium gray SILT	SPT S-15	95	3-5-6 (11)		-95
75		SPT S-16	95	4-8-11 (19)		-100
79.0						-100.0

Bottom of borehole at 79.0 feet.

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

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BORING NUMBER B-03A

PROJECT: APMT Phase IV			**PROJECT NO:** M4477	
LOCATION: Mobile, AL			**CLIENT:** Alabama Port Authority	
STARTED: 4/28/22	**COMPLETED:** 4/28/22	**EL:** -20.4 ft NAVD 88	**LATITUDE:** 30.67153 deg	**LONGITUDE:** 88.0357 deg
DRILLING CONTRACTOR: Challenge Engineering and Testing, Inc.			**GROUND WATER LEVELS:**	
DRILLING METHOD: Mud Rotary			**AT TIME OF DRILLING** ---	
LOGGED BY: Toby Watson	**CHECKED BY:** Graham Forsythe		**AT END OF DRILLING** ---	
NOTES: Set 32 feet of 4-inch casing			**AFTER DRILLING** ---	

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
0		(OH) Very loose black organic SILT	SPT 1	75	0-0-0 (0)		
5			SPT 2	90	0-0-0 (0)		-25
		7.0 -27.4 (OH) Very soft gray organic CLAY with wood					
10			SPT 3	90	1-1-1 (2)		-30
		12.0 -32.4 (CH) Very soft gray CLAY					
15			SPT 4	95	1-0-2 (2)		-35
		...becomes soft					
20			SPT 5	95	1-1-2 (3)		-40
		...becomes very soft					
25			SPT 6	90	2-1-1 (2)		-45
		27.0 -47.4 (SP-SM) Medium dense orange silty SAND with trace gravel					
30		30.0 -50.4	SPT 7	85	4-6-8 (14)		-50

Bottom of borehole at 30.0 feet.

SPT N VALUE: 20 40 60 80
PL MC LL: 20 40 60 80
☐ FINES CONTENT (%) ☐: 20 40 60 80

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BORING NUMBER B-04

PROJECT: APMT Phase IV			**PROJECT NO:** M4477	
LOCATION: Mobile, AL			**CLIENT:** Alabama Port Authority	
STARTED: 12/13/21	**COMPLETED:** 12/13/21	**EL:** -27.81 ft NAVD 88	**LATITUDE:** 30.67125 deg	**LONGITUDE:** 88.036217 deg

DRILLING CONTRACTOR: Challenge Engineering and Testing, Inc.
DRILLING METHOD: Mud Rotary
LOGGED BY: Toby Watson **CHECKED BY:** Graham Forsythe
NOTES: Set 51 feet of 4-inch casing

GROUND WATER LEVELS:
AT TIME OF DRILLING ---
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
0		(OH) Very loose black organic SILT	SPT S-1	80	0-0-0 (0)		-30
5			SPT S-2	90	0-0-0 (0)		-35
10			SPT S-3	90	0-0-0 (0)		-40
15			SPT S-4	90	0-0-0 (0)		-45
		18.0 / -45.8					
20		(SP-SM) Medium dense gray silty medium SAND	SPT S-5	90	2-5-10 (15)		-50
25			SPT S-6	80	2-5-8 (13)		-55
30		...becomes tan ...with trace gravel	SPT S-7	80	3-5-8 (13)		-60
		33.0 / -60.8					
35		(SC) Medium tan clayey fine SAND	SPT S-8	90	3-7-15 (22)		-65
		38.0 / -65.8					
40		(SP-SM) Dense pink silty fine SAND					

SPT N VALUE: 20 40 60 80
PL MC LL: 20 40 60 80
FINES CONTENT (%): 20 40 60 80

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BORING NUMBER B-04

PROJECT: APMT Phase IV | **PROJECT NO:** M4477

LOCATION: Mobile, AL | **CLIENT:** Alabama Port Authority

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
40		(SP-SM) Dense pink silty fine SAND *(continued)*	SPT S-9	90	12-16-25 (41)		-70
45			SPT S-10	90	10-20-26 (46)		-75
50		...becomes medium dense, pink and tan	SPT S-11	90	10-12-8 (20)		-80
		53.0 -80.8 (SC) Medium orange and gray clayey fine SAND					
55		56.5 -84.3	SPT S-12	90	5-8-9 (17)		

▲ SPT N VALUE ▲ 20 40 60 80
PL MC LL 20 40 60 80
☐ FINES CONTENT (%) ☐ 20 40 60 80

Bottom of borehole at 56.5 feet.

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BORING NUMBER B-05

PROJECT: APMT Phase IV			**PROJECT NO:** M4477	
LOCATION: Mobile, AL			**CLIENT:** Alabama Port Authority	
STARTED: 12/8/21	**COMPLETED:** 12/8/21	**EL:** -34.21 ft NAVD 88	**LATITUDE:** 30.670617 deg	**LONGITUDE:** 88.03675 deg
DRILLING CONTRACTOR: Challenge Engineering and Testing, Inc.			**GROUND WATER LEVELS:**	
DRILLING METHOD: Mud Rotary			**AT TIME OF DRILLING** ---	
LOGGED BY: Toby Watson	**CHECKED BY:** Graham Forsythe		**AT END OF DRILLING** ---	
NOTES: Set 60 feet of 4-inch casing			**AFTER DRILLING** ---	

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
0		(OH) Very loose black and gray organic SILT	SPT S-1	90	0-0-0 (0)		-35 / 52.7
5			SPT S-2	90	0-0-0 (0)		-40 / 06.6
10			SPT S-3	80	0-0-0 (0)		-45 / 65.5
15			SPT S-4	90	0-0-0 (0)		-50 / 71.8
		18.0 -52.2					
20		(SP-SM) Medium dense light light yellow silty medium SAND	SPT S-5	70	3-5-8 (13)		-55
25		...becomes orange, with lenses of pink CLAY	SPT S-6	90	4-6-10 (16)		-60
30		...becomes dense, pink and yellow	SPT S-7	90	8-15-19 (34)		-65
35		...becomes yellow	SPT S-8	90	12-17-15 (32)		-70
40		...becomes medium dense, gray, with trace gravel					

▲ SPT N VALUE ▲ 20 40 60 80
PL MC LL 20 40 60 80
☐ FINES CONTENT (%) ☐ 20 40 60 80

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BORING NUMBER B-05

PROJECT: APMT Phase IV | **PROJECT NO:** M4477

LOCATION: Mobile, AL | **CLIENT:** Alabama Port Authority

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
40		(SP-SM) Medium dense light light yellow silty medium SAND *(continued)*	SPT S-9	90	5-10-12 (22)		-75
		...becomes dense					
45			SPT S-10	90	8-20-18 (38)		-80
		46.5 -80.7 Bottom of borehole at 46.5 feet.					

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

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BORING NUMBER B-06

PROJECT: APMT Phase IV			**PROJECT NO:** M4477	
LOCATION: Mobile, AL			**CLIENT:** Alabama Port Authority	
STARTED: 12/1/21	**COMPLETED:** 12/1/21	**EL:** -32.91 ft NAVD 88	**LATITUDE:** 30.671117 deg	**LONGITUDE:** 88.036767 deg
DRILLING CONTRACTOR: Challenge Engineering and Testing, Inc.			**GROUND WATER LEVELS:**	
DRILLING METHOD: Mud Rotary			**AT TIME OF DRILLING** ---	
LOGGED BY: Toby Watson	**CHECKED BY:** Graham Forsythe		**AT END OF DRILLING** ---	
NOTES: Set 57 feet of 4-inch casing			**AFTER DRILLING** ---	

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
0		(OH) Very loose black organic SILT	SPT S-1	80	0-0-0 (0)		-35
5			SPT S-2	90	0-0-0 (0)		-40
10			SPT S-3	90	0-0-0 (0)		-45
15			SPT S-4	90	0-0-0 (0)		-50
		18.0 -50.9					
20		(SM) Loose gray and black silty medium SAND	SPT S-5	80	3-3-4 (7)		-55
25		...becomes medium dense, light orange, with trace gravel	SPT S-6	70	12-12-10 (22)		-60
		28.0 -60.9					
30		(CH) Stiff gray CLAY changing to orange silty SAND	SPT S-7	80	3-4-6 (10)		-65
		31.0 -63.9					
35		(SP-SM) Medium dense orange medium silty SAND ...becomes light yellow	SPT S-8	80	6-8-10 (18)		-70
40		...becomes pink					

▲ SPT N VALUE ▲ 20 40 60 80
PL MC LL 20 40 60 80
☐ FINES CONTENT (%) ☐ 20 40 60 80

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BORING NUMBER B-06

PROJECT: APMT Phase IV | **PROJECT NO:** M4477

LOCATION: Mobile, AL | **CLIENT:** Alabama Port Authority

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
40		(SP-SM) Medium dense orange medium silty SAND *(continued)*	SPT S-9	80	8-12-14 (26)		-75
45		...becomes dense, tan, with a 3-inch lens of gray clayey sand	SPT S-10	75	6-12-19 (31)		-80
50		...becomes very dense, light orange	SPT S-11	70	17-23-25 (48)		-85
55		...becomes gray, with trace gravel	SPT S-12	90	18-23-27 (50)		-90
		58.0 -90.9					
60		(CH) Very stiff gray CLAY, with decayed wood	SPT S-13	95	5-8-12 (20)		-95
		63.0 -95.9					
65		(SP-SM) Medium dense gray silty medium SAND, with some gravel	SPT S-14	90	8-12-16 (28)		-100
		69.5 -102.4					

Bottom of borehole at 69.5 feet.

SPT N VALUE
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

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BORING NUMBER B-07

PROJECT: APMT Phase IV			**PROJECT NO:** M4477	
LOCATION: Mobile, AL			**CLIENT:** Alabama Port Authority	
STARTED: 12/6/21	**COMPLETED:** 12/7/21	**EL:** -22.11 ft NAVD 88	**LATITUDE:** 30.67155 deg	**LONGITUDE:** 88.036817 deg

DRILLING CONTRACTOR: Challenge Engineering and Testing, Inc.
DRILLING METHOD: Mud Rotary
LOGGED BY: Toby Watson **CHECKED BY:** Graham Forsythe
NOTES: Set 40 feet of 4-inch casing

GROUND WATER LEVELS:
AT TIME OF DRILLING ---
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
0		(OH) Very loose black organic SILT	SPT S-1	90	0-0-1 (1)		
		2.5 -24.6					-25
		(SP-SM) Loose gray silty medium SAND, with some gravel					
5			SPT S-2	80	1-2-2 (4)		-30
		...becomes medium dense					
10			SPT S-3	80	3-4-7 (11)		-35
		...becomes coarse					
15			SPT S-4	90	3-5-9 (14)		-40
		...becomes pink					
20			SPT S-5	80	2-4-8 (12)		-45
		...becomes yellow, with trace gravel					
25			SPT S-6	60	4-8-12 (20)		-50
30			SPT S-7	75	7-11-12 (23)		-55
		...becomes pink and yellow, with some gravel					
35			SPT S-8	80	4-10-12 (22)		-60
40							

▲ SPT N VALUE ▲ 20 40 60 80
PL MC LL 20 40 60 80
☐ FINES CONTENT (%) ☐ 20 40 60 80

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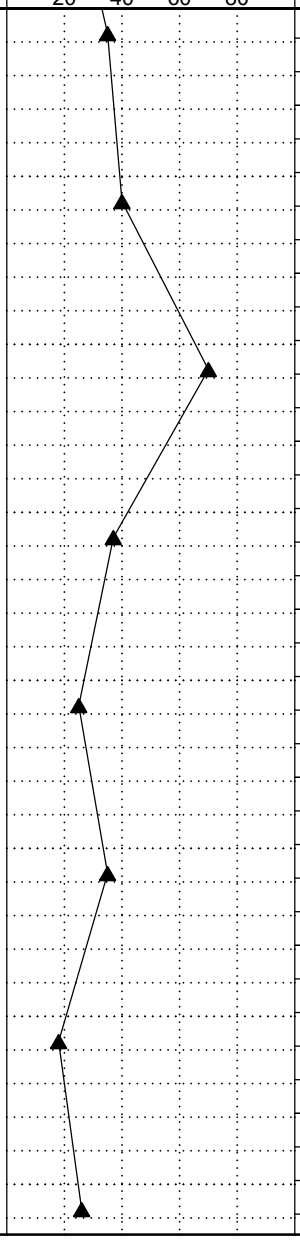
BORING NUMBER B-07

PROJECT: APMT Phase IV | **PROJECT NO:** M4477

LOCATION: Mobile, AL | **CLIENT:** Alabama Port Authority

DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
40	(SP-SM) Loose gray silty medium SAND, with some gravel *(continued)*	SPT S-9	90	12-15-20 (35)		-65
45	...becomes dense, light red	SPT S-10	80	15-19-21 (40)		-70
50	...becomes very dense	SPT S-11	90	19-29-41 (70)		-75
55	...becomes dense	SPT S-12	90	11-16-21 (37)		-80
60	...becomes medium dense, tan	SPT S-13	85	11-11-14 (25)		-85
65	...becomes dense, with some gravel	SPT S-14	50	11-14-21 (35)		-90
68.0						-90.1
70	(MH) Medium gray SILT	SPT S-15	85	6-9-9 (18)		-95
75						
76.5		SPT S-16	60	10-12-14 (26)		-98.6

Bottom of borehole at 76.5 feet.



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BORING NUMBER B-08

PROJECT: APMT Phase IV			**PROJECT NO:** M4477	
LOCATION: Mobile, AL			**CLIENT:** Alabama Port Authority	
STARTED: 12/9/21	**COMPLETED:** 12/9/21	**EL:** -35.71 ft NAVD 88	**LATITUDE:** 30.6708 deg	**LONGITUDE:** 88.037283 deg
DRILLING CONTRACTOR: Challenge Engineering and Testing, Inc.			**GROUND WATER LEVELS:**	
DRILLING METHOD: Mud Rotary			**AT TIME OF DRILLING** ---	
LOGGED BY: Toby Watson	**CHECKED BY:** Graham Forsythe		**AT END OF DRILLING** ---	
NOTES: Set 60 feet of 4-inch casing			**AFTER DRILLING** ---	

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
0		(OH) Very loose black organic SILT	SPT S-1	70	0-0-0 (0)		
			SPT S-2	70	0-0-0 (0)		-40
5							
			SPT S-3	90	0-0-0 (0)		-45
10							
			SPT S-4	90	0-0-0 (0)		-50
15							
		18.0 (SP-SM) Medium dense tan silty medium SAND -53.7	SPT S-5	80	8-12-14 (26)		-55
20							
		...becomes white	SPT S-6	80	10-10-9 (19)		-60
25							
		...becomes orange, with trace gravel	SPT S-7	80	5-6-7 (13)		-65
30							
		...becomes tan	SPT S-8	80	8-10-14 (24)		-70
35							
40							-75

▲ SPT N VALUE ▲ 20 40 60 80
PL MC LL 20 40 60 80
☐ FINES CONTENT (%) ☐ 20 40 60 80

75.8
11.2

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BORING NUMBER B-08

PROJECT: APMT Phase IV | **PROJECT NO:** M4477

LOCATION: Mobile, AL | **CLIENT:** Alabama Port Authority

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
40		(SP-SM) Medium dense tan silty medium SAND *(continued)*	SPT S-9	90	10-11-12 (23)		
		...becomes dense					-80
45			SPT S-10	90	14-19-23 (42)		
		46.5 -82.2					

Bottom of borehole at 46.5 feet.

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

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BORING NUMBER B-09

PROJECT: APMT Phase IV			**PROJECT NO:** M4477	
LOCATION: Mobile, AL			**CLIENT:** Alabama Port Authority	
STARTED: 12/9/21	**COMPLETED:** 12/10/21	**EL:** -31.31 ft NAVD 88	**LATITUDE:** 30.6713 deg	**LONGITUDE:** 88.037333 deg
DRILLING CONTRACTOR: Challenge Engineering and Testing, Inc.			**GROUND WATER LEVELS:**	
DRILLING METHOD: Mud Rotary			**AT TIME OF DRILLING** ---	
LOGGED BY: Toby Watson	**CHECKED BY:** Graham Forsythe		**AT END OF DRILLING** ---	
NOTES: Set 46 feet of 4-inch casing			**AFTER DRILLING** ---	

DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
0	(OH) Very loose black organic SILT	SPT S-1	80	0-0-0 (0)		
5		SPT S-2	80	0-0-0 (0)		-35
10		SPT S-3	90	0-0-0 (0)		-40
15	...decayed wood with some black silt	SPT S-4	90	9-8-17 (25)		-45
18.0	(SP-SM) Medium gray silty medium SAND with trace gravel					-49.3
20		SPT S-5	90	4-4-4 (8)		-50
23.0	(SC) Medium dense red and pink clayey medium SAND with trace gravel					-54.3
25		SPT S-6	90	4-4-5 (9)		-55
28.0	(SP-SM) Loose tan, tan and gray silty medium SAND with trace gravel					-59.3
30		SPT S-7	90	4-3-4 (7)		-60
35	...becomes medium dense	SPT S-8	90	4-12-15 (27)		-65
40	...becomes gray					-70

SPT N VALUE
20 40 60 80
PL MC LL
20 40 60 80
FINES CONTENT (%)
20 40 60 80

-03.9
-02.9

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BORING NUMBER B-09

PROJECT: APMT Phase IV | **PROJECT NO:** M4477

LOCATION: Mobile, AL | **CLIENT:** Alabama Port Authority

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
40		(SP-SM) Loose tan, tan and gray silty medium SAND with trace gravel *(continued)*	SPT S-9	90	12-14-16 (30)		
							-75
45			SPT S-10	90	8-10-14 (24)		
		...becomes dense					-80
50			SPT S-11	90	12-14-21 (35)		
		51.5 -82.8 Bottom of borehole at 51.5 feet.					

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

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BORING NUMBER B-10

PROJECT: APMT Phase IV			**PROJECT NO:** M4477	
LOCATION: Mobile, AL			**CLIENT:** Alabama Port Authority	
STARTED: 11/30/21	**COMPLETED:** 11/30/21	**EL:** -29.01 ft NAVD 88	**LATITUDE:** 30.671067 deg	**LONGITUDE:** 88.037783 deg

DRILLING CONTRACTOR: Challenge Engineering and Testing, Inc.
DRILLING METHOD: Mud Rotary
LOGGED BY: Toby Watson **CHECKED BY:** Graham Forsythe
NOTES: Set 44 feet of 4-inch casing

GROUND WATER LEVELS:
AT TIME OF DRILLING ---
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
0		(OH) Very loose black organic SILT	SPT S-1	90	0-0-0 (0)		-30
		3.0 -32.0					
		(SM) Loose black silty SAND with some wood					
5			SPT S-2	90	2-3-3 (6)		-35
		...becomes gray					
10			SPT S-3	90	2-2-3 (5)		-40
		...becomes tan, with trace gravel					
15			SPT S-4	90	3-4-6 (10)		-45
		18.0 -47.0					
		(SP-SM) Medium dense tan silty fine SAND with trace gravel					
20			SPT S-5	90	3-6-9 (15)		-50
25			SPT S-6	90	6-8-10 (18)		-55
		...becomes light orange					
30			SPT S-7	90	8-10-12 (22)		-60
		...becomes red					
35			SPT S-8	80	8-10-14 (24)		-65
		...becomes dense, tan					
40							

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

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BORING NUMBER B-10

PROJECT: APMT Phase IV | **PROJECT NO:** M4477

LOCATION: Mobile, AL | **CLIENT:** Alabama Port Authority

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
40		(SP-SM) Medium dense tan silty fine SAND with trace gravel *(continued)*	SPT S-9	90	14-18-20 (38)		-70
		43.0 / -72.0					
45		(GP) Medium dense GRAVEL (1/4-inch to 3/4-inch) with some tan silty sand	SPT S-10	90	7-8-9 (17)		-75
		48.0 / -77.0					
50		(SP-SM) Dense tan medium SAND with some gravel	SPT S-11	90	14-18-20 (38)		-80
55		...becomes very dense	SPT S-12	90	20-26-35 (61)		-85
60			SPT S-13	100	23-50/5"		-90
65			SPT S-14	70	15-20-26 (46)		-95
		68.0 / -97.0					
70		(MH) Medium gray SILT	SPT S-15	95	9-11-14 (25)		-100
		71.5 / -100.5					

▲ SPT N VALUE ▲ (20 40 60 80)
PL MC LL (20 40 60 80)
☐ FINES CONTENT (%) ☐ (20 40 60 80)

Bottom of borehole at 71.5 feet.

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BORING NUMBER B-11

PROJECT: APMT Phase IV			**PROJECT NO:** M4477	
LOCATION: Mobile, AL			**CLIENT:** Alabama Port Authority	
STARTED: 12/3/21	**COMPLETED:** 12/6/21	**EL:** -14.61 ft NAVD 88	**LATITUDE:** 30.671633 deg	**LONGITUDE:** 88.037783 deg
DRILLING CONTRACTOR: Challenge Engineering and Testing, Inc.			**GROUND WATER LEVELS:**	
DRILLING METHOD: Mud Rotary			**AT TIME OF DRILLING** ---	
LOGGED BY: Toby Watson	**CHECKED BY:** Graham Forsythe		**AT END OF DRILLING** ---	
NOTES: Set 35 feet of 4-inch casing			**AFTER DRILLING** ---	

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
0		(OH) Very loose black organic SILT with fine sand	SPT S-1	90	0-0-0 (0)		-15
		3.0 -17.6					
		(SP-SM) Medium dense tan silty fine SAND					
5			SPT S-2	90	2-4-6 (10)		-20
		...becomes white					
10			SPT S-3	90	2-6-7 (13)		-25
		...becomes yellow					
15			SPT S-4	90	3-5-9 (14)		-30
		...becomes white					
20			SPT S-5	90	4-7-12 (19)		-35
25			SPT S-6	90	5-5-9 (14)		-40
30			SPT S-7	90	5-6-9 (15)		-45
		...becomes loose, light orange, with trace gravel					
35			SPT S-8	75	4-4-4 (8)		-50
40							

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

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BORING NUMBER B-11

PROJECT: APMT Phase IV | **PROJECT NO:** M4477

LOCATION: Mobile, AL | **CLIENT:** Alabama Port Authority

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
40		(SP-SM) Medium dense tan silty fine SAND *(continued)*	SPT S-9	80	6-8-12 (20)		-55
45		...becomes medium dense, tan	SPT S-10	80	5-4-7 (11)		-60
50		...becomes loose	SPT S-11	80	4-4-4 (8)		-65
55		...becomes medium dense	SPT S-12	90	6-6-7 (13)		-70
60		...becomes very dense, with some gravel and shell	SPT S-13	80	11-26-31 (57)		-75
65			SPT S-14	70	21-31-36 (67)		-80
70			SPT S-15	70	20-30-38 (68)		-85
		71.5 -86.1 Bottom of borehole at 71.5 feet.					

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

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BORING NUMBER B-12

PROJECT: APMT Phase IV			**PROJECT NO:** M4477	
LOCATION: Mobile, AL			**CLIENT:** Alabama Port Authority	
STARTED: 3/4/22	**COMPLETED:** 3/4/22	**EL:** 9.282 ft NAVD 88	**LATITUDE:** 30.6702 deg	**LONGITUDE:** 88.03658 deg

DRILLING CONTRACTOR: Southern Earth Sciences, Inc.
DRILLING METHOD: Mud Rotary
LOGGED BY: Derrick Harris **CHECKED BY:** Graham Forsythe
NOTES: Installed 7.5 feet of flight-auger

GROUND WATER LEVELS:
AT TIME OF DRILLING 7.00 ft / Elev 2.28 ft
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
0	COAL	GB 1	33			
3.0						6.3
	(SP-SM) Medium dense black and tan silty fine SAND	SPT 2	83	6-5-7 (12)		
5		SPT 3	89	8-7-9 (16)		
	...becomes loose, gray	SPT 4	94	6-6-2 (8)		
9.5						-0.2
10	(ML) Very loose gray sandy SILT	SPT 5	78	5-2-1 (3)		
13.0						-3.7
	(SM) Loose gray silty fine SAND	SPT 6	83	5-3-2 (5)		
15						
18.0						-8.7
	(ML) Very loose gray sandy SILT with shell	SPT 7	89	2-1-2 (3)		
20						
25		SPT 8	94	0-0-0 (0)		
28.0						-18.7
	(SP-SM) Medium dense gray and orange silty fine SAND	SPT 9	83	4-7-13 (20)		
30						
	...becomes gray and white, medium					
35		SPT 10	72	7-10-9 (19)		
	...becomes tan and white					
40						

SPT N VALUE 20 40 60 80
PL MC LL 20 40 60 80
FINES CONTENT (%) 20 40 60 80

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BORING NUMBER B-12

PROJECT: APMT Phase IV | **PROJECT NO:** M4477

LOCATION: Mobile, AL | **CLIENT:** Alabama Port Authority

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
40		(SP-SM) Medium dense gray and orange silty fine SAND *(continued)*	SPT 11	72	10-12-10 (22)		
		...becomes tan					-35
45			SPT 12	56	9-13-13 (26)		
							-40
50			SPT 13	56	8-12-13 (25)		
		51.5 -42.2					

Bottom of borehole at 51.5 feet.

▲ SPT N VALUE ▲ 20 40 60 80
PL MC LL 20 40 60 80
☐ FINES CONTENT (%) ☐ 20 40 60 80

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BORING NUMBER B-13

PROJECT: APMT Phase IV			**PROJECT NO:** M4477	
LOCATION: Mobile, AL			**CLIENT:** Alabama Port Authority	
STARTED: 2/24/22	**COMPLETED:** 2/24/22	**EL:** 10.773 ft NAVD 88	**LATITUDE:** 30.67104 deg	**LONGITUDE:** 88.03836 deg

DRILLING CONTRACTOR: Southern Earth Sciences, Inc.
DRILLING METHOD: Mud Rotary
LOGGED BY: Jacob Sheffield **CHECKED BY:** Graham Forsythe
NOTES: Installed 5 feet of flight-auger. Hard drilling from 43'-45', 52'-55', and 65'-70'.

GROUND WATER LEVELS:
AT TIME OF DRILLING 5.00 ft / Elev 5.77 ft
AT END OF DRILLING ---
1070 hrs AFTER DRILLING 4.50 ft / Elev 6.27 ft

DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
0	(GP-GM) Medium dense GRAVEL with silty sand	SPT 1	56	11-10-2 (12)		10
2.0						
	(SP-SM) Dense orange and tan silty fine SAND	SPT 2	83	11-14-16 (30)		
4.5 (8.8)						
5	(ML) Medium dense tan and gray sandy SILT	SPT 3	72	11-9-7 (16)		5
		SPT 4	83	2-5-5 (10)		
10		SPT 5	78	2-1-2 (3)		0
13.0 (-2.2)						
	(SP-SM) Medium dense gray silty fine SAND	SPT 6	94	3-5-6 (11)		-5
15						
	...becomes loose	SPT 7	72	4-3-3 (6)		-10
20						
	...becomes medium coarse, with trace shell	SPT 8	67	2-3-3 (6)		-15
25						
		SPT 9	72	2-3-3 (6)		-20
30						
33.0 (-22.2)						
	(ML) Very loose gray SILT with sand	SPT 10	78	2-1-1 (2)		-25
35						
40						

SPT N VALUE: 20 40 60 80
PL MC LL: 20 40 60 80
FINES CONTENT (%): 20 40 60 80

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BORING NUMBER B-13

PROJECT: APMT Phase IV | **PROJECT NO:** M4477

LOCATION: Mobile, AL | **CLIENT:** Alabama Port Authority

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
40		(ML) Very loose gray SILT with sand *(continued)*	SPT 11	94	0-2-3 (5)		-30
		43.0 -32.2 (SP-SM) Medium dense gray silty medium SAND					
45			SPT 12	78	8-10-15 (25)		-35
		...becomes fine, gray and tan					
50			SPT 13	72	10-12-12 (24)		-40
55			SPT 14	61	6-7-8 (15)		-45
60			SPT 15	83	10-22-18 (40)		-50
		...becomes medium coarse, gray and orange					
65			SPT 16	72	11-13-12 (25)		-55
		...becomes tan					
70			SPT 17	78	12-9-13 (22)		-60
		...becomes coarse, gray, tan and orange, with trace gravel					
75			SPT 18	61	7-11-12 (23)		-65
80			SPT 19	56	10-11-9 (20)		-70
		...becomes very dense					
85			SPT		14-25-26		

SPT N VALUE
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

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BORING NUMBER B-13

PROJECT: APMT Phase IV | **PROJECT NO:** M4477

LOCATION: Mobile, AL | **CLIENT:** Alabama Port Authority

DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
	(SP-SM) Medium dense gray silty medium SAND *(continued)*	20		(51)		-75
90	...becomes dense	SPT 21	61	12-20-24 (44)		-80
95		SPT 22	56	9-15-17 (32)		-85
	98.0 (CH) Stiff gray CLAY -87.2					
100		SPT 23	94	3-4-5 (9)		-90
	101.5 -90.7					

▲ SPT N VALUE ▲ (20 40 60 80)
PL MC LL (20 40 60 80)
☐ FINES CONTENT (%) ☐ (20 40 60 80)

Bottom of borehole at 101.5 feet.

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BORING NUMBER B-14

PROJECT: APMT Phase IV			**PROJECT NO:** M4477	
LOCATION: Mobile, AL			**CLIENT:** Alabama Port Authority	
STARTED: 2/25/22	**COMPLETED:** 2/25/22	**EL:** 9.373 ft NAVD 88	**LATITUDE:** 30.67202 deg	**LONGITUDE:** 88.03793 deg

DRILLING CONTRACTOR: Southern Earth Sciences, Inc.
DRILLING METHOD: Mud Rotary
LOGGED BY: Jacob Sheffield **CHECKED BY:** Graham Forsythe
NOTES: Installed 10 feet of flight-auger. Hard drilling from 47' to 50'.

GROUND WATER LEVELS:
AT TIME OF DRILLING 7.00 ft / Elev 2.37 ft
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
0		0.8 Asphalt 8.5	SPT 1	83	8-12-10 (22)		
		1.5 (SP-SM) Medium tan fine SAND 7.9					
		(SP-SM) Dense orange SAND with trace gravel	SPT 2	94	10-16-22 (38)		
5		...becomes medium dense, black and tan	SPT 3	94	8-9-9 (18)		5
		▽ ...becomes loose, gray	SPT 4	78	6-5-2 (7)		
10		9.5 -0.1 (ML) Loose gray sandy SILT	SPT 5	94	0-2-2 (4)		0
15			SPT 6	78	1-1-0 (1)		-5
20		...becomes very loose	SPT 7	94	2-0-1 (1)		-10
		23.0 -13.6 (SP-SM) Loose gray silty fine SAND					-15
25			SPT 8	94	3-3-4 (7)		
30			SPT 9	61	3-3-3 (6)		-20
		...becomes medium dense, tan and white, medium coarse					
35			SPT 10	56	5-5-6 (11)		-25
		...becomes tan, with trace gravel					
40							-30

SPT N VALUE
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

(Continued Next Page)

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Telephone: 251-344-1913

BORING NUMBER B-14

PROJECT: APMT Phase IV | **PROJECT NO:** M4477

LOCATION: Mobile, AL | **CLIENT:** Alabama Port Authority

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
40		(SP-SM) Loose gray silty fine SAND *(continued)*	SPT 11	56	7-10-14 (24)		
45			SPT 12	56	9-10-12 (22)		-35
50		...becomes tan and gray, with trace gravel	SPT 13	56	9-12-13 (25)		-40
		51.5 -42.1 Bottom of borehole at 51.5 feet.					

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

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BORING NUMBER B-15

PROJECT: APMT Phase IV			**PROJECT NO:** M4477	
LOCATION: Mobile, AL			**CLIENT:** Alabama Port Authority	
STARTED: 3/3/22	**COMPLETED:** 3/3/22	**EL:** 8.5 ft NAVD 88	**LATITUDE:** 30.67073 deg	**LONGITUDE:** 88.0398 deg
DRILLING CONTRACTOR: Southern Earth Sciences, Inc.			**GROUND WATER LEVELS:**	
DRILLING METHOD: Mud Rotary			▽ **AT TIME OF DRILLING** 4.00 ft / Elev 4.50 ft	
LOGGED BY: Jacob Sheffield	**CHECKED BY:** Graham Forsythe		**AT END OF DRILLING** ---	
NOTES: Installed 5 feet of flight-auger.			**AFTER DRILLING** ---	

DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
0	0.3 Coal 8.3	SPT 1	33	2-2-3 (5)		
	(SP-SM) Medium brown and tan silty fine SAND					
	▽ ...becomes very loose, tan and brown, with wood	SPT 2	94	6-7-6 (13)		5
5		SPT 3	94	3-2-1 (3)		
	...becomes medium, tan and brown, medium coarse	SPT 4	72	3-6-7 (13)		0
	9.5 -1.0					
10	(ML) Very loose gray SILT with wood	SPT 5	94	2-2-1 (3)		
	13.0 -4.5					-5
	(SM) Very loose gray silty fine SAND					
15		SPT 6	67	2-1-1 (2)		
	...becomes loose					-10
20		SPT 7	94	2-2-3 (5)		
	...becomes medium dense, tan					-15
25		SPT 8	72	9-12-12 (24)		
	...becomes brown and tan					-20
30		SPT 9	61	9-11-15 (26)		
	...becomes tan					-25
35		SPT 10	72	9-10-13 (23)		
	...becomes medium coarse					-30
40						

▲ SPT N VALUE ▲ 20 40 60 80
PL MC LL 20 40 60 80
☐ FINES CONTENT (%) ☐ 20 40 60 80

(Continued Next Page)

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BORING NUMBER B-15

PROJECT: APMT Phase IV | **PROJECT NO:** M4477

LOCATION: Mobile, AL | **CLIENT:** Alabama Port Authority

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
40		(SM) Very loose gray silty fine SAND *(continued)*	SPT 11	56	9-10-12 (22)		
							-35
45			SPT 12	67	3-10-14 (24)		
		...becomes tan and white, with shell					-40
50			SPT 13	56	9-12-14 (26)		
		51.5 -43.0					

SPT N VALUE: 20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Bottom of borehole at 51.5 feet.

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BORING NUMBER B-16

PROJECT: APMT Phase IV			**PROJECT NO:** M4477	
LOCATION: Mobile, AL			**CLIENT:** Alabama Port Authority	
STARTED: 3/4/22	**COMPLETED:** 3/4/22	**EL:** 10.075 ft NAVD 88	**LATITUDE:** 30.67313 deg	**LONGITUDE:** 88.03979 deg

DRILLING CONTRACTOR: Southern Earth Sciences, Inc.
DRILLING METHOD: Mud Rotary
LOGGED BY: Jacob Sheffield **CHECKED BY:** Graham Forsythe
NOTES: Installed 5 feet of flight-auger. Refusal.at 7'.

GROUND WATER LEVELS:
AT TIME OF DRILLING ---
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
0		2-inch layer of sand with organics followed by COAL	SPT 1	67	1-4-6 (10)		10
		Very dense black COAL	SPT 2	94	40-34-21 (55)		
5			SPT 3	72	4-5-7 (12)		5
	6.5	3.6					

Refusal conditions. Attempts to core thorough with a rock roller bit unsuccessful.
Bottom of borehole at 6.5 feet.

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

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BORING NUMBER B-17

PROJECT: APMT Phase IV			**PROJECT NO:** M4477	
LOCATION: Mobile, AL			**CLIENT:** Alabama Port Authority	
STARTED: 3/4/22	**COMPLETED:** 3/4/22	**EL:** 23.356 ft NAVD 88	**LATITUDE:** 30.67146 deg	**LONGITUDE:** 88.04069 deg

DRILLING CONTRACTOR: Southern Earth Sciences, Inc.
DRILLING METHOD: Mud Rotary
LOGGED BY: Derrick Harris **CHECKED BY:** Graham Forsythe
NOTES: Installed 15 feet of flight-auger. Hard drilling from 13' to 15'.

GROUND WATER LEVELS:
AT TIME OF DRILLING ---
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
0	(SP-SM) Loose brown and orange fine SAND with trace gravel	SPT 1	78	3-2-2 (4)		20
		SPT 2	89	2-3-2 (5)		
5		SPT 3	83	3-2-2 (4)		15
	...becomes medium dense, brown and tan, with silt lenses and trace gravel	SPT 4	89	2-2-2 (4)		
10		SPT 5	89	4-6-7 (13)		10
13.0	10.4					
	(ML) Tan fine SAND changing to very dense brown SILT with gravel	SPT 6	100	31-50/4"		5
15						
18.0	5.4					
20	(SP-SM) Medium dense tan and white silty fine SAND	SPT 7	78	8-15-13 (28)		0
	...becomes loose, gray and brown, with wood					
25		SPT 8	94	2-3-3 (6)		-5
	...becomes gray					
30		SPT 9	78	7-10-9 (19)		-10
	...becomes dense, gray and white					
35		SPT 10	83	11-15-20 (35)		-15
40						

SPT N VALUE
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

(Continued Next Page)

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BORING NUMBER B-17

PROJECT: APMT Phase IV | **PROJECT NO:** M4477

LOCATION: Mobile, AL | **CLIENT:** Alabama Port Authority

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
40		(SP-SM) Medium dense tan and white silty fine SAND *(continued)*	SPT 11	83	9-14-16 (30)		
		...becomes medium dense					-20
45			SPT 12	72	8-12-15 (27)		
		...becomes tan and yellow					-25
50			SPT 13	78	7-7-8 (15)		
51.5		Bottom of borehole at 51.5 feet.					-28.1

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

APTIM

Proposed APM Terminals
Phase IV
Mobile, Alabama

Appendix D

Laboratory Test Data

Project No. M4477
June 21, 2022

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SUMMARY OF LABORATORY RESULTS

PROJECT: APMT Phase IV | **PROJECT NO:** M4477

LOCATION: Mobile, AL | **CLIENT:** Alabama Port Authority

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	Class-ification	Water Content (%)	Dry Density (pcf)	Satur-ation (%)	Void Ratio
B-01	1.0	107	41	66	0.075	97	OH	271.2			
B-01	6.0	82	37	45	0.075	99	OH	183.6			
B-01	11.0	94	44	50	0.075	100	OH	226.9			
B-01	16.0	105	45	60	0.075	99	OH	188.5			
B-02	21.0	75	47	28	0.075	91	OH	163.6			
B-03	11.0	35	19	16	0.075	54	CL	43.0			
B-03	13.0	23	15	8	0.075	67	CL	43.3			
B-03	16.0	72	33	39	0.075	95	CH	41.5			
B-03	18.0	71	26	45	0.075	98	CH	38.8			
B-03	21.0	70	34	36	0.075	96	MH	42.9			
B-03	66.0	60	29	31	0.075	84	CH	40.1			
B-03	71.0	79	38	41	0.075	99	MH				
B-03	79.0	66	26	40	0.075	95	CH	56.5			
B-05	1.0	95	51	44				252.7			
B-05	6.0	79	42	37	0.075	99	OH	206.6			
B-05	11.0	92	46	46	0.075	96	OH	165.5			
B-05	16.0	60	31	29	0.075	69	OH	171.8			
B-08	6.0	83	37	46	0.075	99	OH	175.8			
B-08	11.0	96	46	50	0.075	99	OH	211.2			
B-09	6.0	93	50	43	0.075	99	OH	203.9			
B-09	11.0	87	42	45	0.075	86	OH	202.9			
B-12	11.0				0.075	61		37.5			
B-12	16.0				0.075	10		28.2			
B-13	11.0				0.075	50		35.6			
B-14	11.0				0.075	35		50.3			
B-14	16.0				0.075	78		56.5			
B-15	11.0	44	41	3	0.075	71	ML	78.6			
B-15	16.0				0.075	29		36.4			
B-15	21.0				0.075	13		31.1			
B-17	26.0				0.075	95		54.4			

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CERTIFICATIONS

Project: M21-840
Pace Project No.: 20236726

Pace Analytical Services New Orleans

Florida Department of Health (NELAC): E87595
Illinois Environmental Protection Agency: 0025721
Kansas Department of Health and Environment (NELAC): E-10266
Louisiana Dept. of Environmental Quality (NELAC/LELAP): 02006
Texas Commission on Env. Quality (NELAC): T104704405-09-TX
U.S. Dept. of Agriculture Foreign Soil Import: P330-10-00119

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: M21-840
Pace Project No.: 20236726

Lab ID	Sample ID	Matrix	Date Collected	Date Received
20236726001	**MB-1 S-1**	Solid	03/03/22 14:02	03/04/22 15:09
20236726002	**MB-1 S-2**	Solid	03/03/22 14:02	03/04/22 15:09
20236726003	**MB-5 S-1**	Solid	03/03/22 14:02	03/04/22 15:09
20236726004	**MB-5 S-5**	Solid	03/03/22 14:02	03/04/22 15:09

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SAMPLE ANALYTE COUNT

Project: M21-840
Pace Project No.: 20236726

Lab ID	Sample ID	Method	Analysts	Analytes Reported
20236726001	**MB-1 S-1**	SM 2540G	GGG1	1
		Moisture	DWR	1
20236726002	**MB-1 S-2**	SM 2540G	GGG1	1
		Moisture	DWR	1
20236726003	**MB-5 S-1**	SM 2540G	GGG1	1
		Moisture	DWR	1
20236726004	**MB-5 S-5**	SM 2540G	GGG1	1
		Moisture	DWR	1

PASI-N = Pace Analytical Services - New Orleans

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ANALYTICAL RESULTS

Project: M21-840
Pace Project No.: 20236726

Sample: MB-1 S-1 **Lab ID: 20236726001** Collected: 03/03/22 14:02 Received: 03/04/22 15:09 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
2540G Total Volatile Solids	Analytical Method: SM 2540G Pace Analytical Services - New Orleans							
Total Volatile Solids	**10**	%	0.10	1		03/09/22 07:04		D6
Percent Moisture	Analytical Method: Moisture Pace Analytical Services - New Orleans							
Percent Moisture	**64.6**	%	0.50	1		03/11/22 15:48		

Sample: MB-1 S-2 **Lab ID: 20236726002** Collected: 03/03/22 14:02 Received: 03/04/22 15:09 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
2540G Total Volatile Solids	Analytical Method: SM 2540G Pace Analytical Services - New Orleans							
Total Volatile Solids	**196**	%	0.10	1		03/09/22 07:04		
Percent Moisture	Analytical Method: Moisture Pace Analytical Services - New Orleans							
Percent Moisture	**60.5**	%	0.50	1		03/11/22 15:48		

Sample: MB-5 S-1 **Lab ID: 20236726003** Collected: 03/03/22 14:02 Received: 03/04/22 15:09 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
2540G Total Volatile Solids	Analytical Method: SM 2540G Pace Analytical Services - New Orleans							
Total Volatile Solids	**7.6**	%	0.10	1		03/09/22 07:04		
Percent Moisture	Analytical Method: Moisture Pace Analytical Services - New Orleans							
Percent Moisture	**63.8**	%	0.50	1		03/11/22 15:49		

Sample: MB-5 S-5 **Lab ID: 20236726004** Collected: 03/03/22 14:02 Received: 03/04/22 15:09 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
2540G Total Volatile Solids	Analytical Method: SM 2540G Pace Analytical Services - New Orleans							
Total Volatile Solids	**6.6**	%	0.10	1		03/09/22 07:04		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: M21-840
Pace Project No.: 20236726

Sample: MB-5 S-5 **Lab ID: 20236726004** Collected: 03/03/22 14:02 Received: 03/04/22 15:09 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	Analytical Method: Moisture Pace Analytical Services - New Orleans							
Percent Moisture	**45.1**	%	0.50	1		03/11/22 15:49		

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: M21-840
Pace Project No.: 20236726

QC Batch: 249454
QC Batch Method: SM 2540G
Analysis Method: SM 2540G
Analysis Description: 2540G Total Volatile Solids
Laboratory: Pace Analytical Services - New Orleans
Associated Lab Samples: 20236726001, 20236726002, 20236726003, 20236726004

METHOD BLANK: 1184949 Matrix: Solid
Associated Lab Samples: 20236726001, 20236726002, 20236726003, 20236726004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Volatile Solids	%	ND	0.10	03/09/22 07:04	

SAMPLE DUPLICATE: 1184950

Parameter	Units	20236726001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Volatile Solids	%	10	7.9	23	20	D6

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: M21-840
Pace Project No.: 20236726

QC Batch: 249887
QC Batch Method: Moisture
Analysis Method: Moisture
Analysis Description: Dry Weight/Percent Moisture
Laboratory: Pace Analytical Services - New Orleans

Associated Lab Samples: 20236726001, 20236726002, 20236726003, 20236726004

SAMPLE DUPLICATE: 1187184

Parameter	Units	20236470001 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	73.3	73.7	1	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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QUALIFIERS

Project: M21-840
Pace Project No.: 20236726

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Reported results are not rounded until the final step prior to reporting. Therefore, calculated parameters that are typically reported as "Total" may vary slightly from the sum of the reported component parameters.

ANALYTE QUALIFIERS

D6 The precision between the sample and sample duplicate exceeded laboratory control limits.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: M21-840
Pace Project No.: 20236726

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
20236726001	**MB-1 S-1**	SM 2540G	249454		
20236726002	**MB-1 S-2**	SM 2540G	249454		
20236726003	**MB-5 S-1**	SM 2540G	249454		
20236726004	**MB-5 S-5**	SM 2540G	249454		
20236726001	**MB-1 S-1**	Moisture	249887		
20236726002	**MB-1 S-2**	Moisture	249887		
20236726003	**MB-5 S-1**	Moisture	249887		
20236726004	**MB-5 S-5**	Moisture	249887		

CONSOLIDATION TEST REPORT

Coefficients of Consolidation and Secondary Consolidation

No.	Load (tsf)	C_v (ft.2/day)	C_α	No.	Load (tsf)	C_v (ft.2/day)	C_α	No.	Load (tsf)	C_v (ft.2/day)	C_α
2	0.25	0.012	0.010								
3	0.50	0.007	0.008								
5	2.00	0.007	0.015								
6	4.00	0.012	0.010								
7	8.00	0.016	0.011								
8	4.00	0.050									
9	2.00	0.029									

Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Swell Press. (tsf)	Swell %	e_o
Sat.	Moist.											
95.2 %	43.3 %	76.9	23	8	2.8		0.4	0.44	0.07			1.272

MATERIAL DESCRIPTION	USCS	AASHTO
GREY SANDY CLAY	CL	A-4(3)

Project No. M21-840 **Client:** APTIM

Project: APTIM PHASE IV AT ASPA

Location: SH-3 **Depth:** 12'-14' **Sample Number:** T-1

SOUTHERN EARTH SCIENCES

Mobile, Alabama

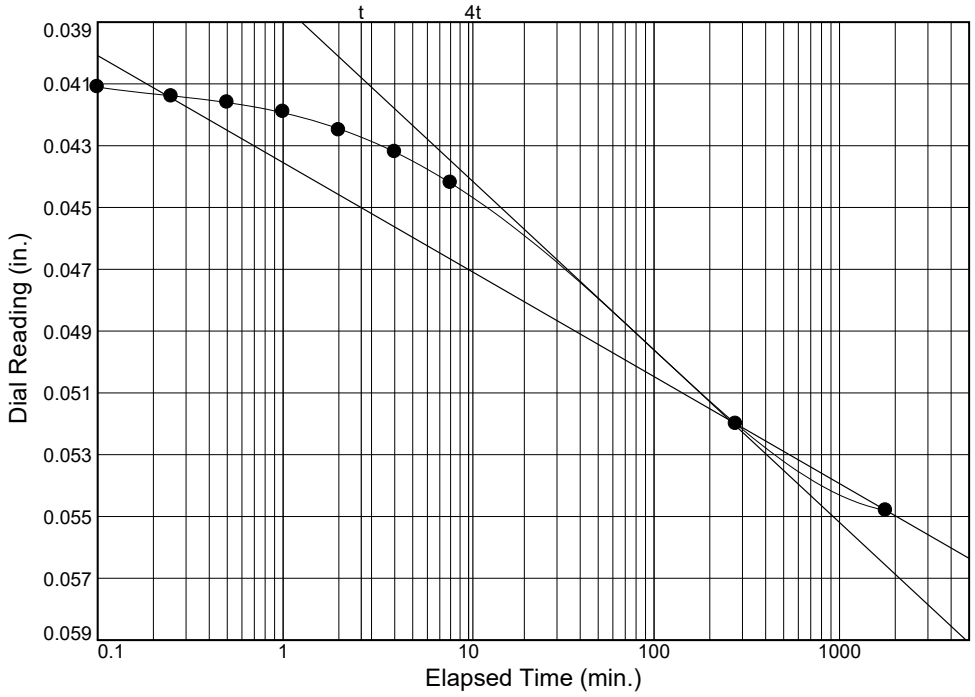
Remarks:

Figure

Dial Reading vs. Time

Project No.: M21-840
Project: APTIM PHASE IV AT ASPA

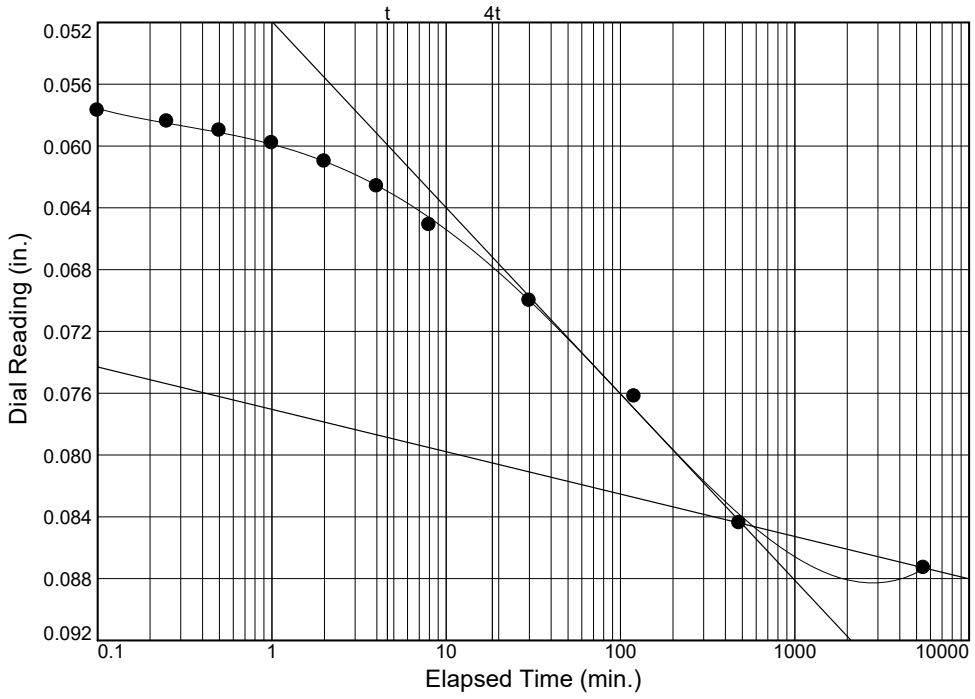
Location: SH-3 Depth: 12'-14' Sample Number: T-1



Load No.= 2
Load= 0.25 tsf
D_0 = 0.0408
D_{50} = 0.0463
D_{100} = 0.0519
T_{50} = 24.39 min.

C_v @ T_{50}
0.012 ft.^{2}/day

C_α = 0.010



Load No.= 3
Load= 0.50 tsf
D_0 = 0.0580
D_{50} = 0.0712
D_{100} = 0.0844
T_{50} = 38.87 min.

C_v @ T_{50}
0.007 ft.^{2}/day

C_α = 0.008

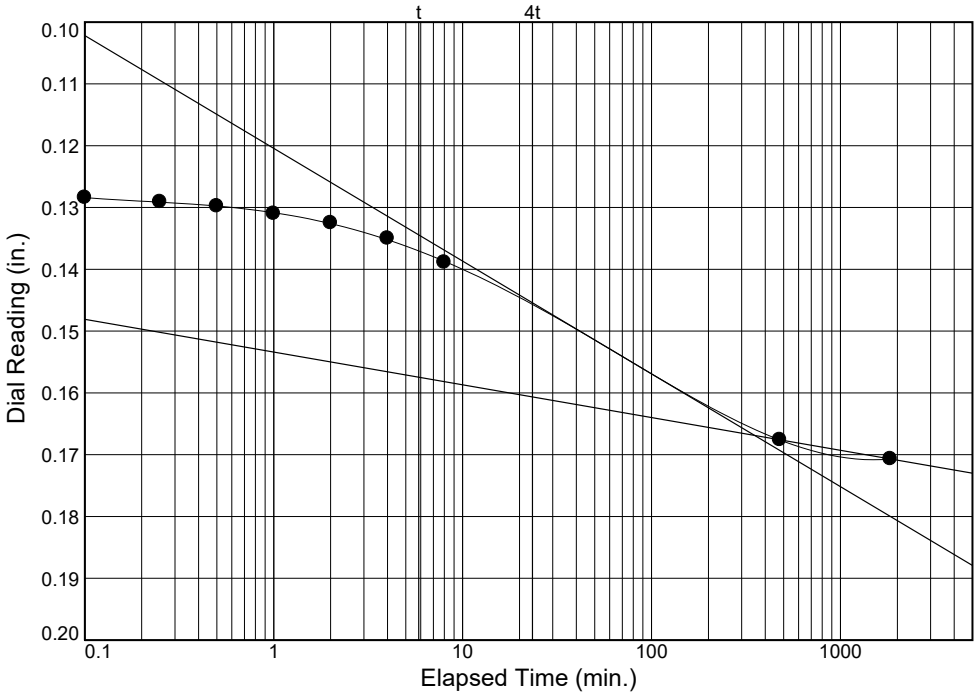
Figure

SOUTHERN EARTH SCIENCES

Dial Reading vs. Time

Project No.: M21-840
Project: APTIM PHASE IV AT ASPA

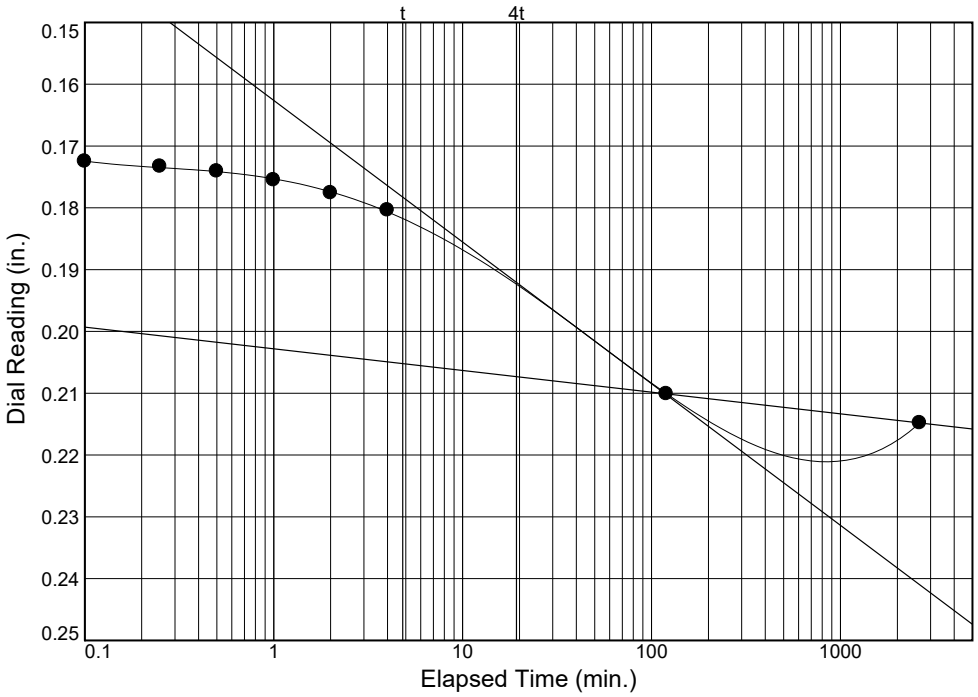
Location: SH-3 Depth: 12'-14' Sample Number: T-1



Load No.= 5
Load= 2.00 tsf
D_0 = 0.1284
D_{50} = 0.1476
D_{100} = 0.1669
T_{50} = 30.48 min.

C_v @ T_{50}
0.007 ft.^{2}/day

C_α = 0.015



Load No.= 6
Load= 4.00 tsf
D_0 = 0.1711
D_{50} = 0.1906
D_{100} = 0.2101
T_{50} = 15.77 min.

C_v @ T_{50}
0.012 ft.^{2}/day

C_α = 0.010

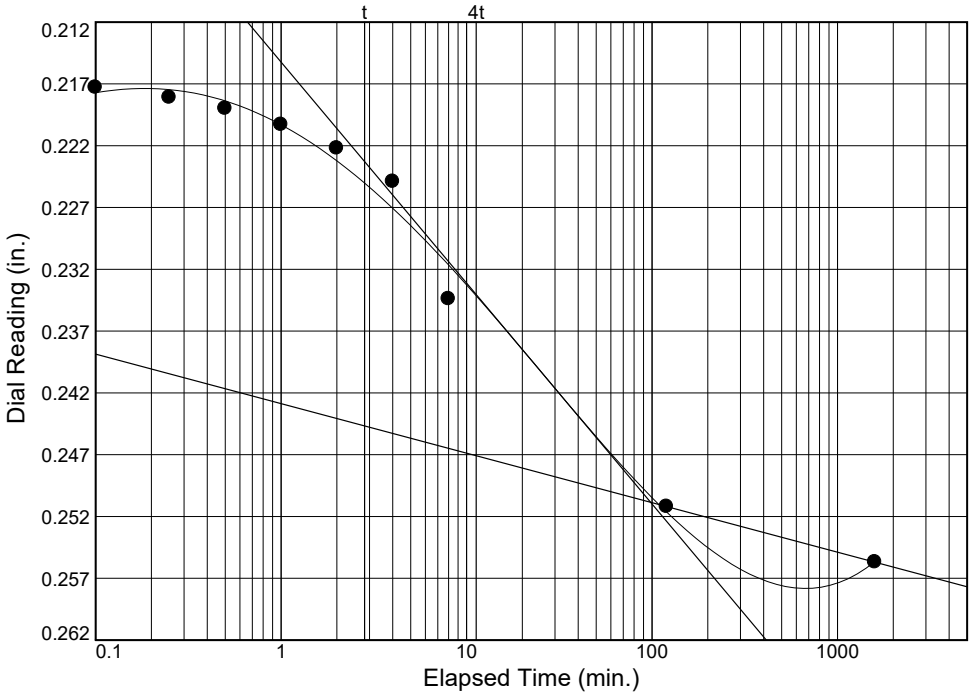
Figure

SOUTHERN EARTH SCIENCES

Dial Reading vs. Time

Project No.: M21-840
Project: APTIM PHASE IV AT ASPA

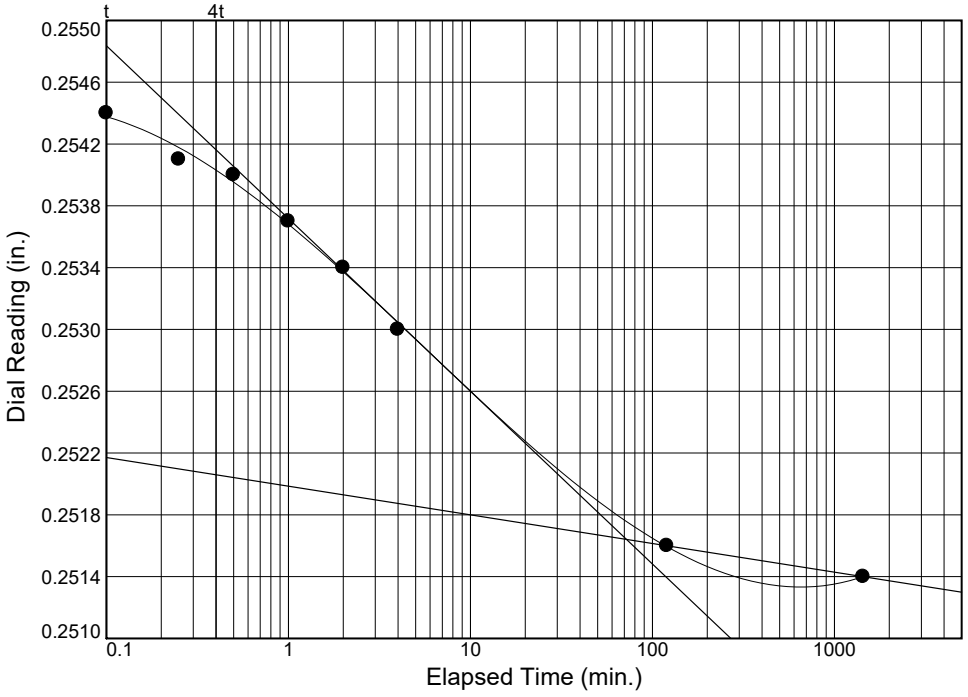
Location: SH-3 Depth: 12'-14' Sample Number: T-1



Load No.= 7
Load= 8.00 tsf
D_0 = 0.2159
D_{50} = 0.2334
D_{100} = 0.2509
T_{50} = 10.16 min.

C_v @ T_{50}
0.016 ft.^{2}/day

C_α = 0.011



Load No.= 8
Load= 4.00 tsf
D_0 = 0.2547
D_{50} = 0.2532
D_{100} = 0.2516
T_{50} = 3.00 min.

C_v @ T_{50}
0.050 ft.^{2}/day

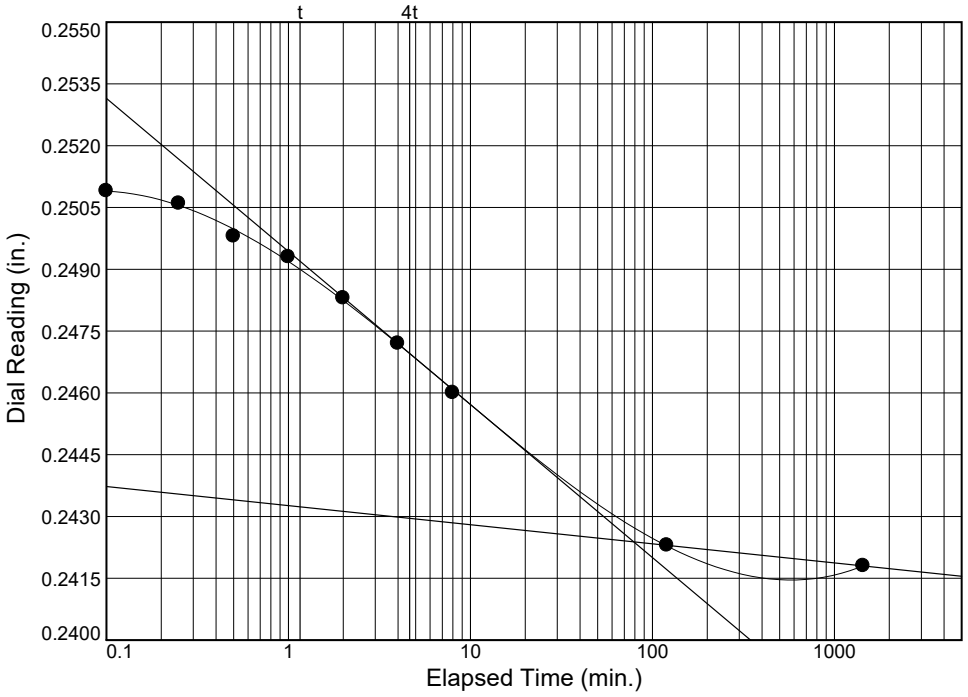
Figure

SOUTHERN EARTH SCIENCES

Dial Reading vs. Time

Project No.: M21-840
Project: APTIM PHASE IV AT ASPA

Location: SH-3 Depth: 12'-14' Sample Number: T-1



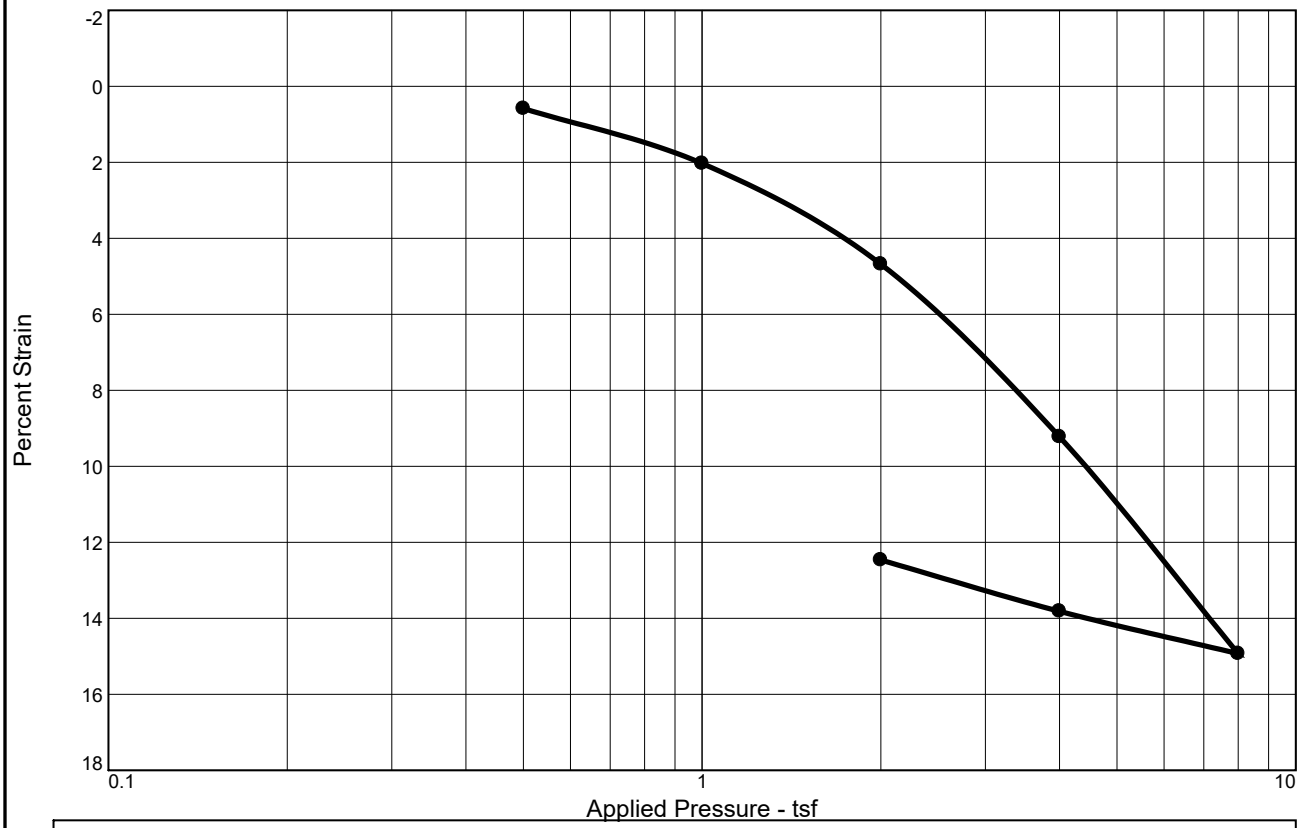
Load No.= 9
Load= 2.00 tsf
D_0 = 0.2510
D_{50} = 0.2467
D_{100} = 0.2424
T_{50} = 5.38 min.

C_v @ T_{50}
0.029 ft.^{2}/day

Figure

SOUTHERN EARTH SCIENCES

CONSOLIDATION TEST REPORT



Coefficients of Consolidation and Secondary Consolidation

No.	Load (tsf)	C_v (ft.2/day)	C_α	No.	Load (tsf)	C_v (ft.2/day)	C_α	No.	Load (tsf)	C_v (ft.2/day)	C_α
1	0.50	0.089	0.001								
2	1.00	0.024	0.002								
3	2.00	0.017	0.005								
4	4.00	0.011	0.010								
5	8.00	0.009	0.007								
6	4.00	0.016									
7	2.00	0.011									

Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Swell Press. (tsf)	Swell %	e_o
Sat.	Moist.											
96.3 %	38.8 %	82.1	71	45	2.8		2.1	0.41	0.09			1.129

MATERIAL DESCRIPTION	USCS	AASHTO
GREY FAT CLAY	CH	A-7-6(51)

Project No. M21-840 **Client:** APTIM

Project: APTIM PHASE IV AT ASPA

Location: SH-3 **Depth:** 17'-19' **Sample Number:** T-2

SOUTHERN EARTH SCIENCES

Mobile, Alabama

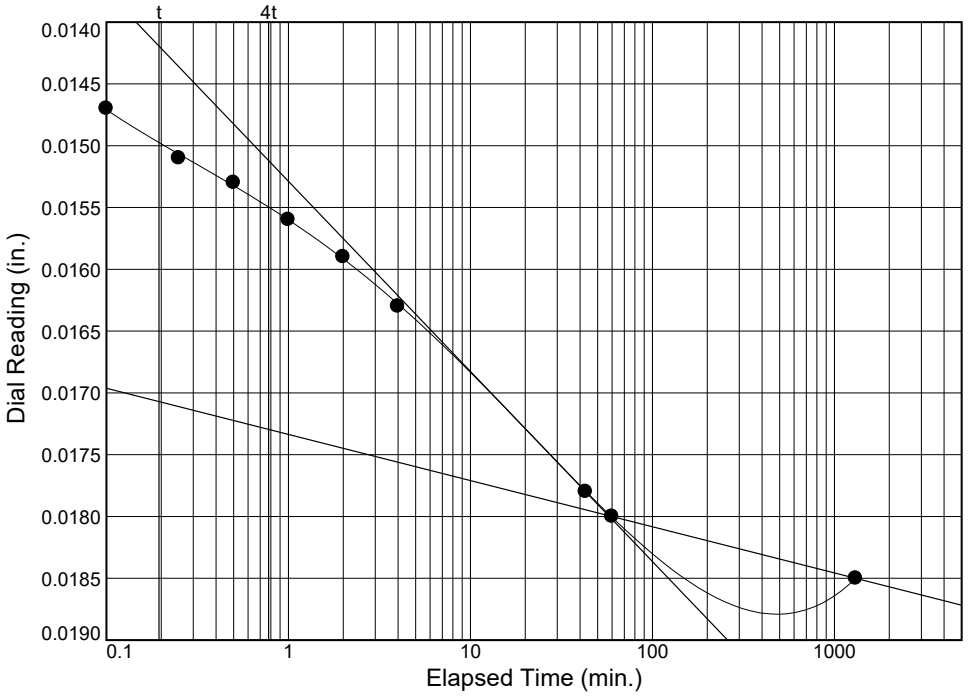
Remarks:

Figure

Dial Reading vs. Time

Project No.: M21-840
Project: APTIM PHASE IV AT ASPA

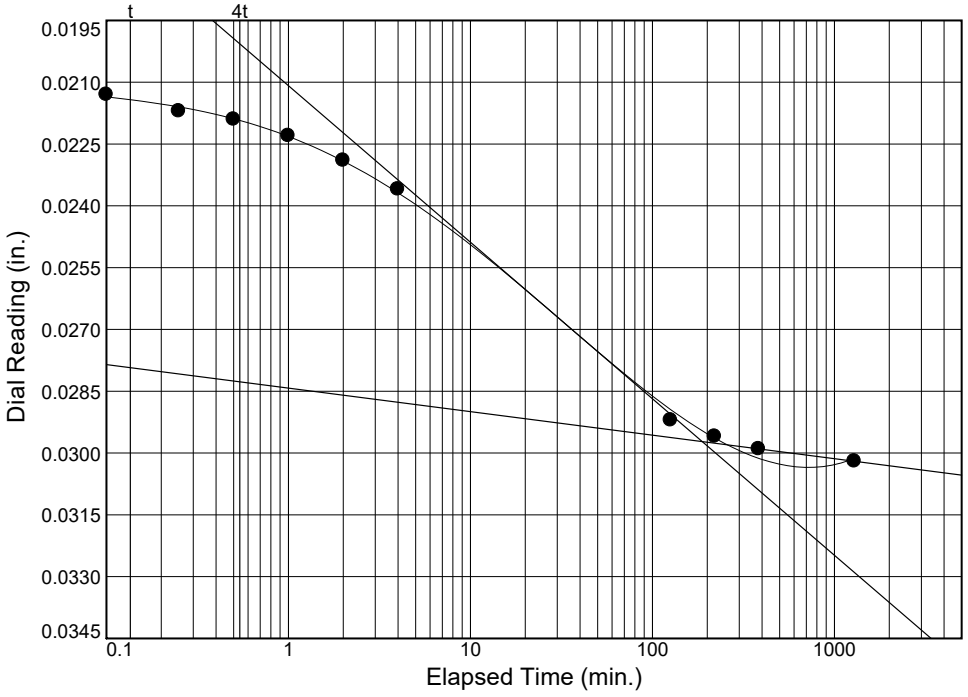
Location: SH-3 Depth: 17'-19' Sample Number: T-2



Load No.= 1
Load= 0.50 tsf
D_0 = 0.0145
D_{50} = 0.0162
D_{100} = 0.0180
T_{50} = 3.61 min.

C_v @ T_{50}
0.089 ft.^{2}/day

C_α = 0.001



Load No.= 2
Load= 1.00 tsf
D_0 = 0.0209
D_{50} = 0.0253
D_{100} = 0.0297
T_{50} = 12.81 min.

C_v @ T_{50}
0.024 ft.^{2}/day

C_α = 0.002

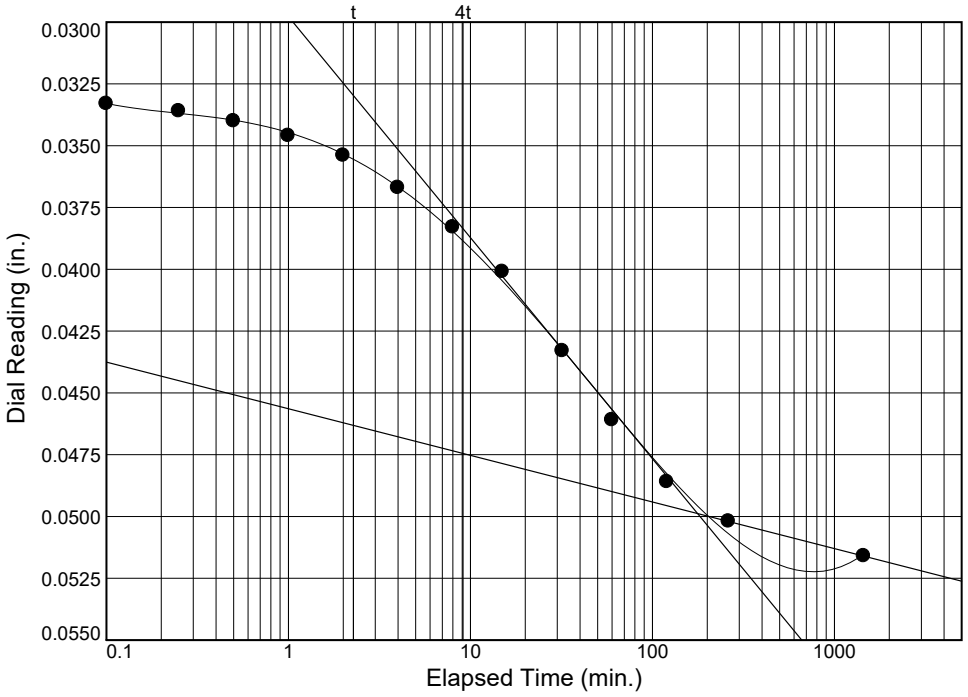
Figure

SOUTHERN EARTH SCIENCES

Dial Reading vs. Time

Project No.: M21-840
Project: APTIM PHASE IV AT ASPA

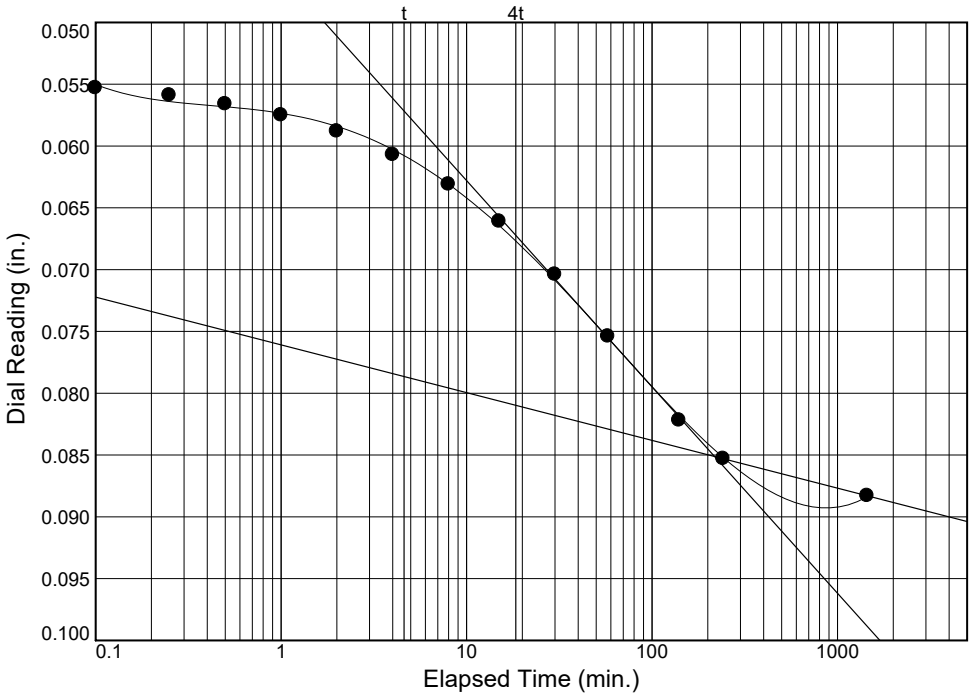
Location: SH-3 Depth: 17'-19' Sample Number: T-2



Load No.= 3
Load= 2.00 tsf
D_0 = 0.0322
D_{50} = 0.0411
D_{100} = 0.0499
T_{50} = 17.72 min.

C_v @ T_{50}
0.017 ft.^{2}/day

C_α = 0.005



Load No.= 4
Load= 4.00 tsf
D_0 = 0.0539
D_{50} = 0.0695
D_{100} = 0.0851
T_{50} = 24.46 min.

C_v @ T_{50}
0.011 ft.^{2}/day

C_α = 0.010

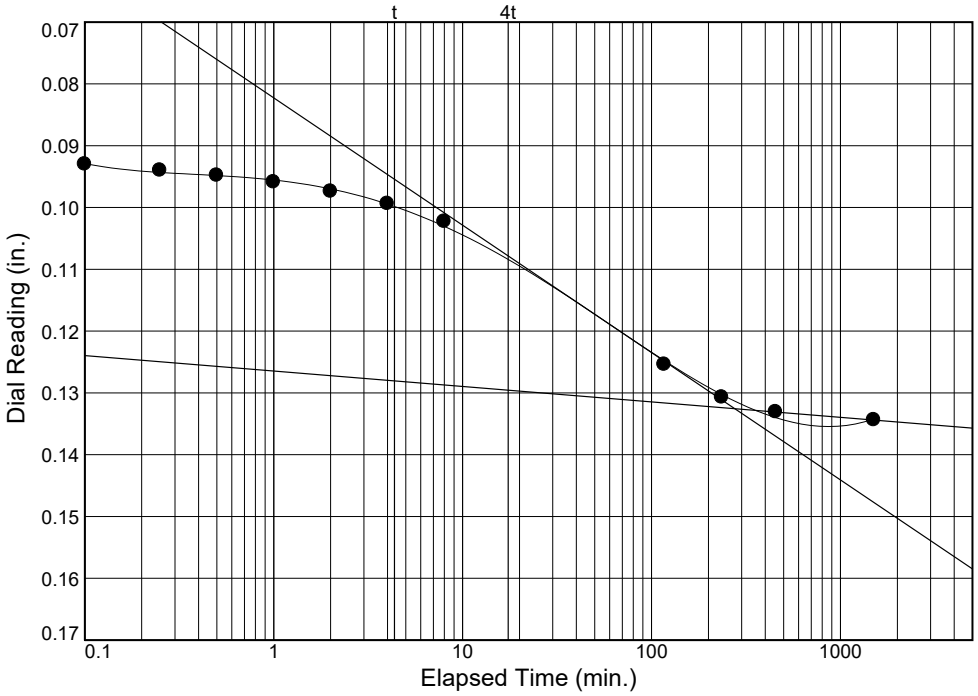
Figure

SOUTHERN EARTH SCIENCES

Dial Reading vs. Time

Project No.: M21-840
Project: APTIM PHASE IV AT ASPA

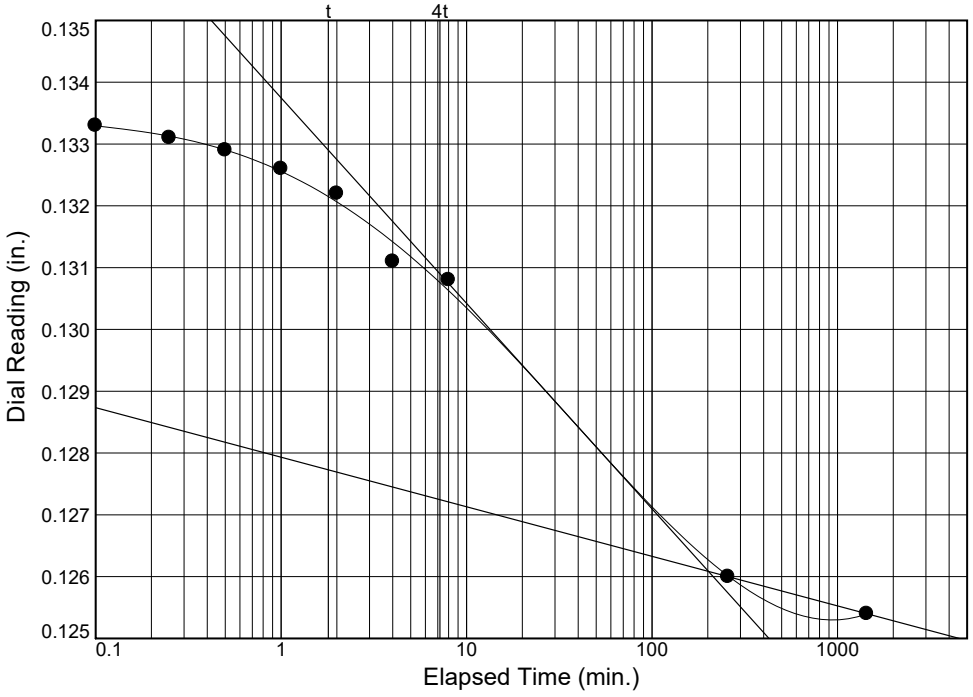
Location: SH-3 Depth: 17'-19' Sample Number: T-2



Load No.= 5
Load= 8.00 tsf
D_0 = 0.0913
D_{50} = 0.1119
D_{100} = 0.1326
T_{50} = 26.94 min.

C_v @ T_{50}
0.009 ft.^{2}/day

C_α = 0.007



Load No.= 6
Load= 4.00 tsf
D_0 = 0.1335
D_{50} = 0.1298
D_{100} = 0.1261
T_{50} = 14.98 min.

C_v @ T_{50}
0.016 ft.^{2}/day

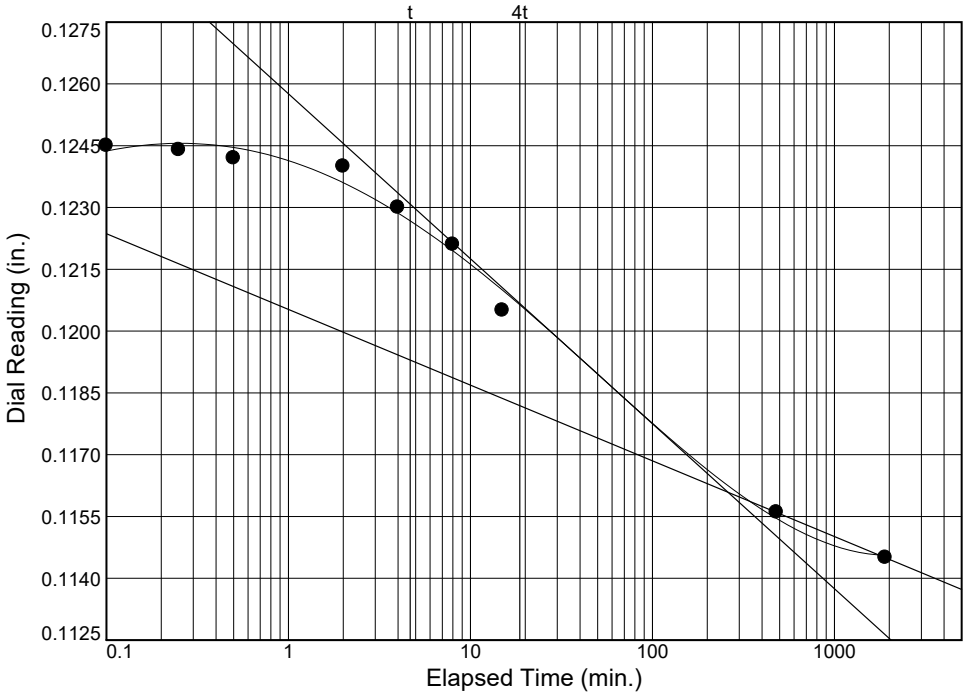
Figure

SOUTHERN EARTH SCIENCES

Dial Reading vs. Time

Project No.: M21-840
Project: APTIM PHASE IV AT ASPA

Location: SH-3 Depth: 17'-19' Sample Number: T-2



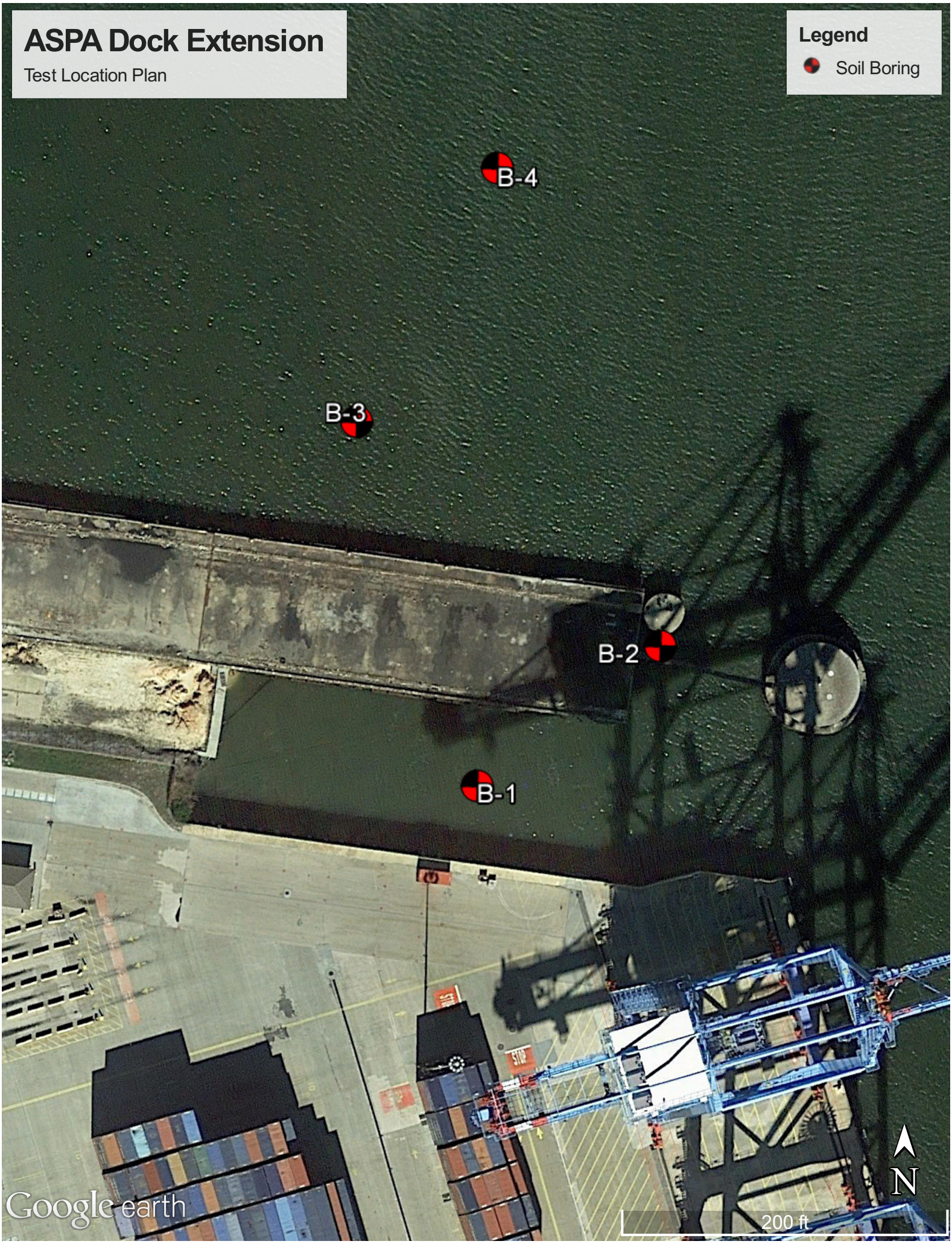
Load No.= 7
Load= 2.00 tsf
D_0 = 0.1247
D_{50} = 0.1204
D_{100} = 0.1161
T_{50} = 21.54 min.

C_v @ T_{50}
0.011 ft.^{2}/day

Figure

SOUTHERN EARTH SCIENCES

Item 2: For Reference Only–Phase III Dock Extension Soil Borings


ASPA Dock Extension
Test Location Plan
Legend
Soil Boring
B-4
B-3
B-2
B-1
N
200 ft
Google earth

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KEY TO SYMBOLS

PROJECT: ASPA-APM Terminal Dock Extension	**PROJECT NO:** 4111
LOCATION: Mobile, AL	**CLIENT:** Alabama State Ports Authority

LITHOLOGIC SYMBOLS
(Unified Soil Classification System)

- CH: USCS High Plasticity Clay
- CL: USCS Low Plasticity Clay
- ML: USCS Silt
- SC: USCS Clayey Sand
- SM: USCS Silty Sand
- SP: USCS Poorly-graded Sand
- SP-SM: USCS Poorly-graded Sand with Silt

SAMPLER SYMBOLS

- Standard Penetration Test

WELL CONSTRUCTION SYMBOLS

ABBREVIATIONS

LL - LIQUID LIMIT (%)
PI - PLASTIC INDEX (%)
W - MOISTURE CONTENT (%)
DD - DRY DENSITY (PCF)
NP - NON PLASTIC
-200 - PERCENT PASSING NO. 200 SIEVE
PP - POCKET PENETROMETER (TSF)
WOH - WEIGHT OF HAMMER
WOR - WEIGHT OF ROD

TV - TORVANE
PID - PHOTOIONIZATION DETECTOR
UC - UNCONFINED COMPRESSION
ppm - PARTS PER MILLION
Water Level at Time Drilling, or as Shown
Water Level at End of Drilling, or as Shown
Water Level After 24 Hours, or as Shown

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BORING NUMBER B-01

PROJECT: ASPA-APM Terminal Dock Extension			**PROJECT NO:** 4111	
LOCATION: Mobile, AL			**CLIENT:** Alabama State Ports Authority	
STARTED: 01/11/17	**COMPLETED:** 01/15/17	**EL:** -12.85 ft MSL	**LATITUDE:** 30.669916 deg	**LONGITUDE:** 88.034839 deg
DRILLING CONTRACTOR: Challenge Engineering and Testing			**GROUND WATER LEVELS:**	
DRILLING METHOD: Mud Rotary			**AT TIME OF DRILLING** ---	
LOGGED BY: Jay Thompson	**CHECKED BY:** Graham Forsythe		**AT END OF DRILLING** ---	
NOTES:			**AFTER DRILLING** ---	

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
0		(ML) Very loose black organic SILT	SPT 1	89	0-0-0 (0)		-15
5			SPT 2	89	0-0-0 (0)		-20
10		...with debris	SPT 3	89	0-0-0 (0)		-25
13.0							-25.9
15		(SM) Very loose tan silty SAND	SPT 4	83	2-1-2 (3)		-30
20			SPT 5	89	2-2-3 (5)		-35
23.0							-35.9
25		(CL) Soft gray CLAY	SPT 6	89	2-3-4 (7)		-40
28.0							-40.9
30		(SM) Medium dense gray fine silty SAND	SPT 7	89	10-5-6 (11)		-45
35		...becomes gray and tan, medium					

SPT N VALUE
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

(Continued Next Page)

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BORING NUMBER B-01

PROJECT: ASPA-APM Terminal Dock Extension | **PROJECT NO:** 4111

LOCATION: Mobile, AL | **CLIENT:** Alabama State Ports Authority

DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
35	(SM) Medium dense gray fine silty SAND *(continued)*	SPT 8	89	5-5-12 (17)		-50
40		SPT 9	89	5-7-12 (19)		-55
45	...with some gravel	SPT 10	89	6-8-12 (20)		-60
50	....becomes gray to orange, trace gravel	SPT 11	89	7-8-11 (19)		-65
55	...becomes orange	SPT 12	89	6-8-12 (20)		-70
58.0						-70.9
60	(SP-SM) Medium dense gray silty SAND with trace gravel	SPT 13	89	11-14-18 (32)		-75
65		SPT 14	89	12-16-18 (34)		-80
68.0						-80.9
70	(CH) Very stiff gray CLAY with trace sand	SPT 15	83	7-9-12 (21)		-85
75						

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

(Continued Next Page)

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BORING NUMBER B-01

PROJECT: ASPA-APM Terminal Dock Extension | **PROJECT NO:** 4111

LOCATION: Mobile, AL | **CLIENT:** Alabama State Ports Authority

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
75		(CH) Very stiff gray CLAY with trace sand *(continued)*	SPT 16	89	8-9-10 (19)		-90
		78.0 -90.9 (SP) Dense medium gray SAND with trace gravel					
80			SPT 17	83	14-23-34 (57)		-95
		...becomes very dense					
85			SPT 18	89	26-34-42 (76)		-100
90			SPT 19	89	20-28-38 (66)		-105
		...becomes medium to coarse					
95			SPT 20	88	19-50/2"		-110
100			SPT 21	80	50/5"		-115
105			SPT 22	80	50/5"		-120
110		111.5 -124.4	SPT 23	80	50/5"		

▲ SPT N VALUE ▲ (20 40 60 80)
PL MC LL (20 40 60 80)
☐ FINES CONTENT (%) ☐ (20 40 60 80)

Bottom of borehole at 111.5 feet.

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BORING NUMBER B-02

PROJECT: ASPA-APM Terminal Dock Extension			**PROJECT NO:** 4111	
LOCATION: Mobile, AL			**CLIENT:** Alabama State Ports Authority	
STARTED: 01/19/18	**COMPLETED:** 01/22/18	**EL:** -21 ft MSL	**LATITUDE:** 30.67015 deg	**LONGITUDE:** 88.034483 deg
DRILLING CONTRACTOR: Challenge Engineering and Testing			**GROUND WATER LEVELS:**	
DRILLING METHOD: Mud Rotary			**AT TIME OF DRILLING** ---	
LOGGED BY: Jay Thompson	**CHECKED BY:** Graham Forsythe		**AT END OF DRILLING** ---	
NOTES:			**AFTER DRILLING** ---	

DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
0	(ML) Very loose black organic SILT	SPT 1	89	0-0-0 (0)		
5		SPT 2	89	0-0-0 (0)		-25
8.0						
	(SM) Loose gray silty SAND					-29.0
10		SPT 3	89	0-1-3 (4)		-30
15		SPT 4	89	3-2-1 (3)		-35
18.0						-39.0
	(CL) Soft gray CLAY					
20		SPT 5	89	2-1-1 (2)	0.25	-40
23.0						-44.0
	(CH) Soft gray CLAY					
25		SPT 6	89	1-1-1 (2)	0.50	-45
30		SPT 7	89	1-2-2 (4)	0.50	-50
33.0						-54.0
	(SM) Medium dense fine gray sIlty SAND					
35						-55

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

(Continued Next Page)

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BORING NUMBER B-02

PROJECT: ASPA-APM Terminal Dock Extension | **PROJECT NO:** 4111

LOCATION: Mobile, AL | **CLIENT:** Alabama State Ports Authority

DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
35	(SM) Medium dense fine gray sIlty SAND *(continued)*	SPT 8	39	2-3-3 (6)		
38.0						-59.0
	(SP-SM) Dense medium gray silty SAND					-60
40		SPT 9	72	10-15-23 (38)		
	...becomes medium dense					-65
45		SPT 10	83	8-10-15 (25)		
48.0						-69.0
	(SP) Dense medium gray silty SAND					-70
50		SPT 11	83	12-18-24 (42)		
	...becomes very dense, orange and tan					-75
55		SPT 12	89	14-30-33 (63)		
	...with some pea gravel					-80
60		SPT 13	89	15-38-40 (78)		
63.0						-84.0
	(SM) Medium dense medium tan silty SAND with clay and some gravel					-85
65		SPT 14	72	7-7-8 (15)		
68.0						-89.0
	(CH) Stiff gray CLAY					-90
70		SPT 15	94	5-7-9 (16)	0.75	
73.0						-94.0
	(SM) Dense fine gray silty SAND with trace clay					-95
75						

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

(Continued Next Page)

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BORING NUMBER B-02

PROJECT: ASPA-APM Terminal Dock Extension | **PROJECT NO:** 4111

LOCATION: Mobile, AL | **CLIENT:** Alabama State Ports Authority

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
75		(SM) Dense fine gray silty SAND with trace clay *(continued)*	SPT 16	89	7-14-20 (34)		
		78.0 / -99.0 (SP-SM) Dense fine gray silty SAND with trace gravel					-100
80			SPT 17	89	10-15-21 (36)		
		83.0 / -104.0 (CL) Stiff greenish-gray sandy CLAY					-105
85			SPT 18	89	5-6-8 (14)	1.00	
		88.0 / -109.0 (SM) Dense greenish-gray silty SAND					-110
90			SPT 19	89	10-18-23 (41)		
		93.0 / -114.0 (SP) Dense medium gray SAND					-115
95			SPT 20	89	15-20-24 (44)		
							-120
100			SPT 21	45	18-50/5"		>>
							-125
105			SPT 22	45	10-50/5"		>>
		106.5 / -127.5 Bottom of borehole at 106.5 feet.					

▲ SPT N VALUE ▲ (20 40 60 80)
PL MC LL (20 40 60 80)
☐ FINES CONTENT (%) ☐ (20 40 60 80)

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BORING NUMBER B-03

PROJECT: ASPA-APM Terminal Dock Extension			**PROJECT NO:** 4111	
LOCATION: Mobile, AL			**CLIENT:** Alabama State Ports Authority	
STARTED: 01/23/18	**COMPLETED:** 01/24/18	**EL:** -33.8 ft MSL	**LATITUDE:** 30.670516 deg	**LONGITUDE:** 88.0351 deg
DRILLING CONTRACTOR: Challenge Engineering and Testing			**GROUND WATER LEVELS:**	
DRILLING METHOD: Mud Rotary			**AT TIME OF DRILLING** ---	
LOGGED BY: Jay Thompson	**CHECKED BY:** Graham Forsythe		**AT END OF DRILLING** ---	
NOTES: Set 60 feet of 4" steel casing			**AFTER DRILLING** ---	

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
0		(ML) Very loose black organic SILT	SPT 1	89	0-0-0 (0)		-35
5			SPT 2	89	0-0-0 (0)		-40
10			SPT 3	89	0-0-0 (0)		-45
15		...with some pieces of wood	SPT 4	89	1-0-0 (0)		-50
18.0							-51.8
20		(SM) Medium dense medium orange silty SAND with trace gravel	SPT 5	89	7-7-7 (14)		-55
25		...becomes gray and tan	SPT 6	89	7-6-8 (14)		-60
28.0							-61.8
30		(SP) Dense medium tan SAND	SPT 7	89	17-19-21 (40)		-65
35		...becomes medium to coarse					

SPT N VALUE 20 40 60 80
PL MC LL 20 40 60 80
☐ FINES CONTENT (%) ☐ 20 40 60 80

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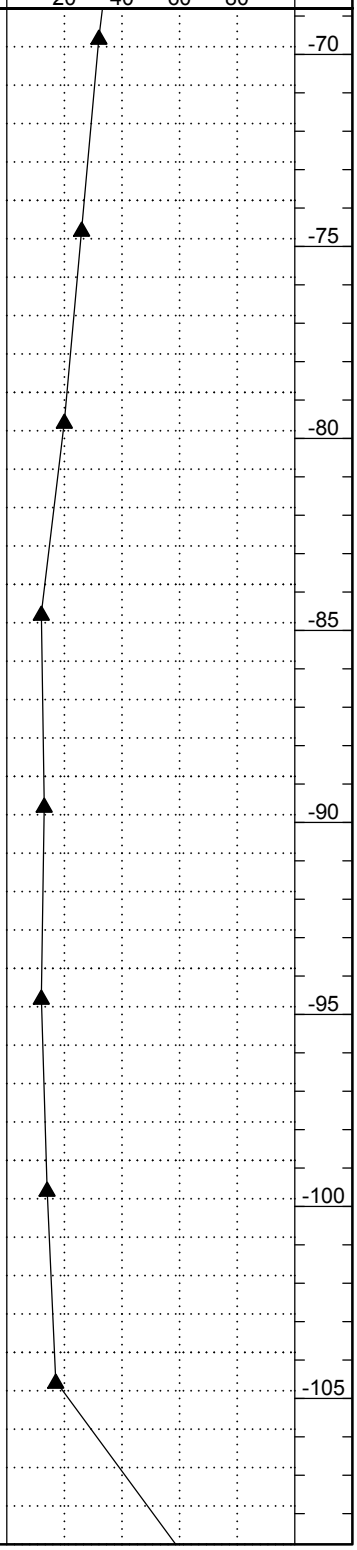
BORING NUMBER B-03

PROJECT: ASPA-APM Terminal Dock Extension | **PROJECT NO:** 4111

LOCATION: Mobile, AL | **CLIENT:** Alabama State Ports Authority

DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
35	(SP) Dense medium tan SAND *(continued)*	SPT 8	89	12-15-17 (32)		-70
	...becomes medium dense with trace gravel					
40		SPT 9	89	12-12-14 (26)		-75
45		SPT 10	89	8-9-11 (20)		-80
	48.0 -81.8					
	(CH) Stiff gray CLAY					
50		SPT 11	89	5-6-6 (12)		-85
55		SPT 12	83	5-5-8 (13)		-90
	...becomes greenish-gray					
60		SPT 13	89	4-5-7 (12)		-95
	63.0 -96.8					
	(SM) Medium dense medium greenish-gray silty SAND					
65		SPT 14	89	6-6-8 (14)		-100
	68.0 -101.8					
	(SC) Medium dense greenish-gray clayey SAND					
70		SPT 15	83	5-5-12 (17)		-105
	73.0 -106.8					
75	(SP) Very dense medium tan and gray SAND with trace gravel					

SPT N VALUE: 20 40 60 80
PL MC LL: 20 40 60 80
☐ FINES CONTENT (%) ☐: 20 40 60 80



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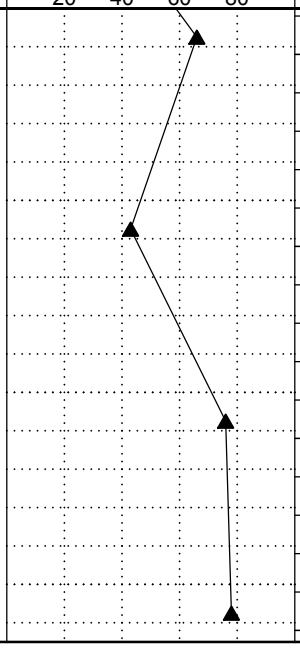
BORING NUMBER B-03

PROJECT: ASPA-APM Terminal Dock Extension | **PROJECT NO:** 4111

LOCATION: Mobile, AL | **CLIENT:** Alabama State Ports Authority

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
75		(SP) Very dense medium tan and gray SAND with trace gravel *(continued)*	SPT 16	89	22-32-34 (66)		-110
		...becomes dense					
80			SPT 17	89	17-20-23 (43)		-115
		...becomes very dense					
85			SPT 18	89	17-35-41 (76)		-120
90			SPT 19	89	14-38-40 (78)		-125
		91.5 -125.3 Bottom of borehole at 91.5 feet.					

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80



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BORING NUMBER B-04

PROJECT: ASPA-APM Terminal Dock Extension			**PROJECT NO:** 4111	
LOCATION: Mobile, AL			**CLIENT:** Alabama State Ports Authority	
STARTED: 01/25/18	**COMPLETED:** 01/26/18	**EL:** -33.3 ft MSL	**LATITUDE:** 30.67095 deg	**LONGITUDE:** 88.0348 deg
DRILLING CONTRACTOR: Challenge Engineering and Testing			**GROUND WATER LEVELS:**	
DRILLING METHOD: Mud Rotary			**AT TIME OF DRILLING** ---	
LOGGED BY: Jay Thompson	**CHECKED BY:** Graham Forsythe		**AT END OF DRILLING** ---	
NOTES: Set 60 feet of 4" steel casing			**AFTER DRILLING** ---	

DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
0	(ML) Very loose black organic SILT	SPT 1	89	0-0-0 (0)		-35
5		SPT 2	89	0-0-0 (0)		-40
10		SPT 3	89	0-0-0 (0)		-45
15		SPT 4	89	0-0-0 (0)		-50
18.0						-51.3
20	(SP-SM) Medium dense medium gray and tan silty SAND	SPT 5	72	3-4-5 (9)		-55
23.0						-56.3
25	(SP) Medium dense medium tan SAND with some gravel	SPT 6	78	5-6-8 (14)		-60
30	...becomes tan and orange	SPT 7	78	4-5-7 (12)		-65
35						

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

(Continued Next Page)

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BORING NUMBER B-04

PROJECT: ASPA-APM Terminal Dock Extension | **PROJECT NO:** 4111

LOCATION: Mobile, AL | **CLIENT:** Alabama State Ports Authority

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
35		(SP) Medium dense medium tan SAND with some gravel *(continued)*	SPT 8	83	5-5-5 (10)		-70
40			SPT 9	89	12-15-17 (32)		-75
45			SPT 10	89	12-12-19 (31)		-80
50			SPT 11	89	12-14-17 (31)		-85
53.0							-86.3
55		(CH) Stiff gray CLAY	SPT 12	94	5-5-7 (12)	1.25	-90
60			SPT 13	94	4-4-7 (11)	1.25	-95
63.0							-96.3
65		(SM) Medium fine gray and green silty SAND	SPT 14	89	8-8-12 (20)		-100
70			SPT 15	89	14-14-12 (26)		-105
73.0							-106.3
75		(SP) Dense fine gray SAND					

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

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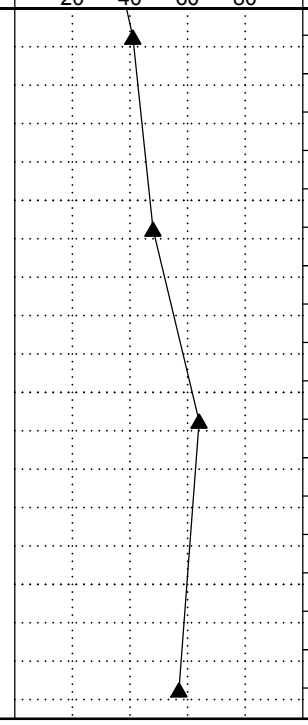
BORING NUMBER B-04

PROJECT: ASPA-APM Terminal Dock Extension | **PROJECT NO:** 4111

LOCATION: Mobile, AL | **CLIENT:** Alabama State Ports Authority

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	ELEVATION (ft)
75		(SP) Dense fine gray SAND *(continued)*	SPT 16	89	14-20-21 (41)		-110
80			SPT 17	89	14-17-31 (48)		-115
85		...becomes very dense, medium, with some gravel	SPT 18	78	30-33-31 (64)		-120
90							-125
93.5			SPT 19	78	38-32-25 (57)		-126.8

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80



Bottom of borehole at 93.5 feet.