DREDGED MATERIAL MANAGEMENT AREA M-8 CONSTRUCTION

ST. LUCIE COUNTY, FLORIDA

APPENDIX D

Geotechnical Report

10151 Deerwood Park Blvd
Bldg 300, Suite 300
Jacksonville, Florida 32256
Certificate of Authorization #4815
Phone: (904) 731-7040
Fax: (904) 731-9847
www.TaylorEngineering.com
(Taylor Engineering Contract No. C2016-053)

Ellis & Associates inc.
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Geotechnical ▪ Construction Materials ▪ Environmental ▪ Facilities

REPORT OF
GEOTECHNICAL EXPLORATION
DREDGED MATERIAL MANAGEMENT AREA M-8
ST. LUCIE COUNTY, FLORIDA
E&A PROJECT NO. 35-24842
CLIENT ID: 0H16

Prepared for:

Florida Inland Navigation District
1314 Marcinski Road
Jupiter, Florida 33477

Prepared by:

Ellis & Associates, Inc.
7064 Davis Creek Road
Jacksonville, Florida 32257

April 18, 2017

Ellis & Associates inc.
ECS Group of Companies
Geotechnical ▪ Construction Materials ▪ Environmental ▪ Facilities

April 18, 2017

Mr. Mark Crosley
Florida Inland Navigation District
1314 Marcinski Road
Jupiter, Florida 33477

Reference: Report of Geotechnical Exploration
Dredged Material Management Area M-8
St. Lucie County, Florida
E&A Project No. 35-24842
Client ID: 0H16

Dear Mr. Crosley:

As requested and authorized by you, Ellis & Associates, Inc. (E&A) has completed a geotechnical exploration for the subject project. This exploration was performed in accordance with the Agreement for Engineering Services dated January 5, 2017. The exploration was performed to evaluate the general subsurface conditions within the proposed dredged material management area, and to provide soil parameters, foundation recommendations for the weir structure, and pipeline recommendations.

We appreciate this opportunity to be of service as your geotechnical consultant on this phase of the project, and we look forward to providing the materials testing and observation that will be required during the construction phase. If you have any questions, or if we may be of any further service, please contact us.

Very truly yours,
ELLIS & ASSOCIATES, INC.

_____
Chris M. Egan, P.E.
Project Engineer
Registered, Florida No. 79645

_____
David W. Spangler, P.E.
Senior Project Engineer
Registered, Florida No. 58770

Distribution:
Mr. Mark Crosley – Florida Inland Navigation District 1 pdf
Mr. Jerry Scarborough, P.E. – Taylor Engineering, Inc. 1 pdf
Mr. William Aley, P.G. – Taylor Engineering, Inc. 1 pdf

CME/DWS/JNG

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1.0 PROJECT INFORMATION

1.1 Site Location and General Conditions

The proposed Dredged Material Management Area (DMMA) M-8 is located approximately 3.5 miles east of Port St. Lucie in St. Lucie County, Florida. The site is bounded on the west by the Florida East Coast Railroad, on the east by South Indian River Drive (see photograph below), on the south by Walton Scrub Preserve, and on the north by single family residences. The general site location is shown on Figure 1 in the Appendix of this report.

Railroad tracks along the west side of the project site

Site sloping downward to the north and east

At the time of our exploration, the site was undeveloped, consisting of an herbaceous/forested upland. The site was generally sloping with a slope downward to the north and east with a topographic high of approximately EL. 42 feet at the southwest portion of the site and a topographic low of approximately EL. 22 feet at the northeast portion of the site, west of Indian River Drive. Surface water was not observed near planned structural areas at the time of our exploration.

Based on the provided site topographic information and our site observations, the site slopes steeply down to the Indian River at an elevation of approximately EL. 4 feet with a change in elevation of of approximately 13 feet. In the upland area (southwest portion of the project site), the surface cover consisted mainly of low grasses and scattered brush and trees.

Palm trees between S Indian River Drive and Indian River

Slope adjacent to S Indian River Drive down to Indian River

1.2 Project Description

You provided project information via several discussions and several documents provided as part of the Request for Proposal dated November 23, 2016. We were provided with a copy of a preliminary site plan for the subject site, prepared by Taylor Engineering, Inc. This plan indicates the boundary limits for the property, the existing roadways adjacent to the site, the layout of the proposed construction, and the requested boring locations.

We understand the proposed construction includes a permanent DMMA with a containment area of approximately 9.67 acres and capacity of approximately 84,268 cubic yards. The DMMA will consist of a rectangular alignment dike, roadway around the exterior of the dike with an entrance from Indian River Drive, and a perimeter ditch around the roadway. The perimeter ditch will be utilized for stormwater control. Additionally, inflow and outfall pipes will be constructed at the northern and southern portions of the dike that will cross under Indian River Drive and outfall to the Indian River. A weir, located on the southern portion of the DMMA will also be constructed.

Based on the preliminary design information, the dike will have a top elevation of EL. 40.6 feet NGVD, a crest width of approximately 12 feet, and side slopes of approximately 3H:1V. The interior portion of the DMMA will be excavated to an average elevation of approximately EL. 27.8 feet NGVD and the material excavated will be utilized to construct the surrounding dike. The approximate height of the surrounding dike is 12.8 feet.

If actual fill/cut heights vary from these conditions, then the recommendations in this report may need to be re-evaluated. We should be contacted if any of the above project information is incorrect so that we may reevaluate our recommendations.

2.0 PUBLIC RECORD DESKTOP REVIEW

2.1 Review of Soil Survey Map

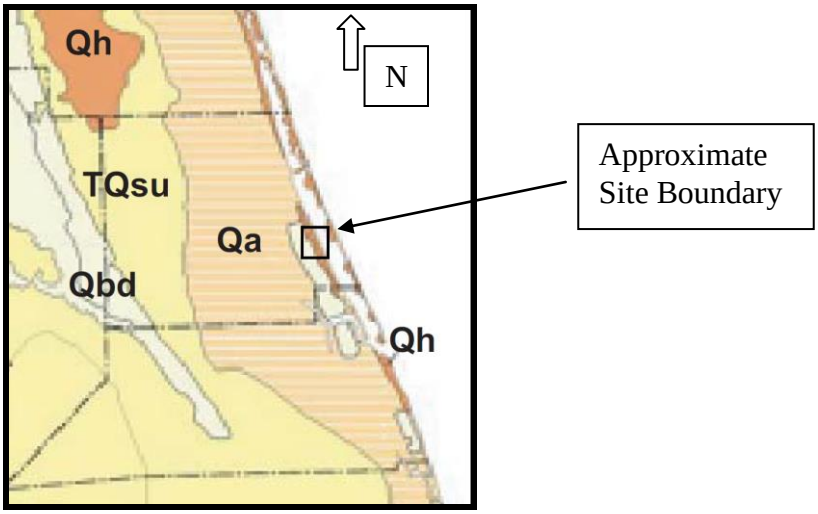
Based on the Soil Survey for St. Lucie County, Florida, as prepared by the U.S. Department of Agriculture Natural Resources Conservation Service, the predominant soil types existing within the site area are described in the following table. The Soil Survey Map is also shown on Figure 2 in the Appendix of this report.

Soil Type Characteristics by Mapping Unit (per USDA)				
Map Unit Symbol	**Map Unit Name**	**Typical Profile**	**Hydrology**	**Estimated Seasonal High Groundwater Level (in)**
28	Paola sand, 0 to 5 percent slopes	*0 to 80 inches* sand	Excessively Drained	More than 80
42	St. Lucie sand, 0 to 8 percent slopes	*0 to 80 inches* sand	Excessively Drained	More than 80

2.2 Regional Physiography and Geology

The site is located on the mainland part of the Atlantic Coastal Ridge, which consists of an elongated one quarter mile to one half mile wide ridge that extends the length of St. Lucie County. The Atlantic Coastal Ridge was formed by wind and wave action on relic beach ridges. Elevations along this ridge range from approximately sea level to approximately 60 feet above sea level.

Based on the Geologic Map of the State of Florida, as prepared by the Florida Geological Survey, the geology of the site is mapped as Holocene sediments underlain by the Anastasia Formation (see the Geologic Map of St. Lucie County below). The Holocene sediments include quartz sands, carbonate sands and muds, and organics. Below the Holocene sediments, the Anastasia Formation (Qa) is composed of interbedded sands and coquinoid limestones. Coquina is one of the most recognized rock formations that generally exists as an orangish brown whole and fragmented mollusk shells cemented by calcite. Sands generally occur as light gray to tan and orangish brown and vary from unconsolidated to moderately hardened with varying amounts of fossiliferous beds. The Anastasia Formation (Qa) forms part of the surficial aquifer system.



Geologic Map of St. Lucie County

2.3 Historical Aerial Photograph Review

Historical aerial photographs were reviewed from 1940, 1958, 1970, 1994, 1999, 2004 through 2007, 2009, 2010, 2012, 2014, and 2016. Based on our review of the aerial photographs, the site appears to have always been a vacant wooded parcel. No significant development or changes were observed from the aerial photography between 1940 and 2016.

2.4 Wells, Septic Tanks, and Ponds

Several databases were referenced to indicate water wells within an approximate one half mile radius of the project site. Florida Water Management Districts Well Data, FDEP Drinking Water Program Office/Public Water Supply Data, FDOH SuperAct Community Water Well Data, and FDOH SuperAct Non-Community Water Well Data were utilized to locate adjacent wells. Based on the referenced databases, three water wells were identified approximately one half mile south of the project site. Please reference the Environmental Data Report located in Appendix E for further details regarding adjacent water wells.

The Florida Department of Health (FDOH) database was utilized to identify any septic tanks within an approximate one half mile radius of the project site. Based on the results of the FDOH data base for septic tanks, no septic tanks are located within approximate one half mile of the project site. We note that residences are located to the north of the project site. However, public records did not indicate that these residences were using septic tank systems.

Based on aerial photography, no stormwater ponds exist in the vicinity of the project site. However, we do note that the navigable Indian River is located east of the project site and it appears that navigable waters are present to the west of the site within the Savannas Preserve State Park.

2.5 Historical Rainfall and Groundwater Levels

Historical rainfall records from the National Oceanic and Atmospheric Administration (NOAA) were collected for the period between January 2011 and December 2016 at the Nettles Island station. The monthly rainfall totals are presented in Appendix F of this report.

Two monitoring wells (installed by others) were read during our field exploration. Based on the documentation provided by your office, we measured the water levels in monitoring wells MW-2 (near

Boring B-1) and MW-4 (near Boring B-10). The groundwater level in MW-2 was approximately 25.2 feet below the existing ground surface (approximate elevation EL. 4.2 feet) and MW-4 was approximately 34.4 feet below the existing ground surface (approximate elevation EL. 3.4 feet).

3.0 FIELD EXPLORATION

We performed a field exploration between January 18, 2017 and February 25, 2017. Our boring locations were surveyed by Whidden Surveying & Mapping, Inc. and are indicated on the attached Field Exploration Plan (Figure 2). The boring locations on the referenced Field Exploration Plan should be considered accurate only to the degree implied by the method of measurement used. The boring elevations were also provided by Whidden Suveying & Mapping, Inc.

3.1 SPT Borings

We located and performed 19 Standard Penetration Test (SPT) borings, drilled to depths of approximately 15 feet to 100 feet below the existing ground surface, in general accordance with the methodology outlined in ASTM D 1586 to explore the subsurface conditions within the area of the proposed DMMA. Split-spoon soil samples recovered during performance of the borings were visually classified in the field and representative portions of the samples were transported to our laboratory for further evaluation. A summary of the field procedures is included in Appendix A.

3.2 Hand Probe Soundings

30 hand probe soundings, which were advanced by manually inserting an approximate ⅜ inch steel rod in to the ground, were performed along the slope east of Indian River Drive down to the River. The probes were performed on an approximate 10 foot grid pattern to explore for existing slope protection near the proposed inlet and outlet pipe locations. The results of the probe borings are presented on Plates 4 and 5 in the Appendix of this report.

3.3 Field Permeability Test

We performed two field permeability tests adjacent to boring locations B9 and B14. The field permeability tests were performed by installing a solid-walled, open-bottom PVC casing snugly fit into a four inch diameter, 10 foot and 20 foot deep auger borehole, respectively. The bottom one and a half feet of the pipe was filled with silica sand or gravel, and the pipe was then raised one foot above the bottom of the borehole. The pipe was filled to the top with water. Since permeable sandy soils were encountered in the boring, the test was conducted as a "falling head" test in which the rate of water drop within the pipe was measured over a 30 minute period.

3.4 Dilatometer Soundings

Due to the presence of the very loose sands as encountered in the SPT borings, Dilatometer soundings were performed within the dike area using a Marchetti flat plate dilatometer in general accordance with the methodology outlined in ASTM D6635. This data was used to model the compressibility of the encountered sand layer with respect to the added stresses of the proposed fill. The Dilatometer soundings were performed adjacent to Borings B1, B3, B9 and B10 at depths between 2 feet and 29 feet below the existing ground surface. The dilatometer sounding data is presented in Appendix D.

4.0 LABORATORY TESTING

A geotechnical engineer classified representative soil samples obtained during our field exploration using the Unified Soil Classification System (USCS) in general accordance with ASTM D 2488. A Key to the Soil Classification System is included in Appendix A.

Selected samples of the soils encountered during the field exploration were subjected to quantitative laboratory testing to better define the composition of the soils encountered and to provide data for correlation to their anticipated strength and compressibility characteristics. The laboratory testing determined the moisture, fines, and organic contents, modified Proctor values, Limerock Bearing Ratio (LBR) values, remolded permeability, and remolded friction angles of selected soil samples. The results of the direct shear testing (remolded friction angle), laboratory permeability modified Proctor values (ASTM D 1557), and LBR are summarized in the table below. Detailed results of the laboratory testing are included in Appendix B.

Remolded Laboratory Testing Summary							
Boring Location	**Soil Type (USCS)**	**Depth (feet)**	**Permeability (ft/day)**	**Peak Friction Angle (degrees)**	**Maximum Density (pcf)**	**Optimum Moisture Content (%)**	**LBR (%)**
B-3	SP	0.5-5	8.7	37.0	106.0	14.0	35.7
B-4	SP	0.5-10	5.8	35.7	107.8	14.5	22.8
B-7	SP	0.5-2	6.2	35.1	102.2	15.8	--
B-7	SP	10-15	3.5	--	--	--	--
B-8	SP	0.5-5	8.6	35.9	105.4	13.1	--
B-11	SP	5-10	9.2	34.2	108.7	13.1	--
B-12	SP	5-10	8.5	--	--	--	--
B-12	SP	10-15	3.6	38.3	108.7	14.4	--

5.0 GENERAL SUBSURFACE CONDITIONS

5.1 General Soil Profile

Select cross sections are shown in Plates 1 through 3 in the Appendix of this report. Generalized subsurface soil profiles and detailed boring records are included in Appendix A. It should be understood that the soil conditions will likely vary between the boring locations and the transition lines shown on the borings logs should be considered approximate. The following table summarizes the soil conditions encountered.

GENERAL SOIL PROFILE: DMMA AREA (Borings B-1 through B-14)			
TYPICAL DEPTH (ft)			
FROM	**TO**	**SOIL DESCRIPTION**	**USCS(1)**
0	90	Very Loose to Very Dense Fine Sand and Fine Sand with Silt	SP, SP-SM
90	100	Medium Dense Clayey Sand, Medium Dense Silty Sand, Very Stiff Clay*	SC, SM, CH

(1) Unified Soil Classification System

- Where encountered, clay and clayey sand was encountered at elevations deeper then El. -75 feet

GENERAL SOIL PROFILE: PIPE CROSSINGS (Borings P-1 through P-4)			
TYPICAL DEPTH (ft)			
FROM	**TO**	**SOIL DESCRIPTION**	**USCS[(1)]**
0	40	Very Loose to Dense Fine Sand and Fine Sand with Silt	SP, SP-SM
(1) Unified Soil Classification System			

Note that Borings P3 and P-4 encountered a layer of highly weathered limestone at depths between approximately eight feet and 12 feet, and 12 feet and 17 feet below the existing ground surface, respectively.

5.2 Groundwater Level

Groundwater was not encountered at each boring location within the containment area within the upper 10 feet of drilling. After a depth of 10 feet, drilling mud is introduced into the borehole to stabilize the borehole and prevent them from collapsing. After drilling mud is introduced, it is difficult to determine the water level within the borehole. Groundwater was recorded in Borings P-1, P-3, and P-4 between elevation of approximately El. 1.2 feet and El. 3.6 feet. As previously mentioned, two monitoring wells were observed during our site visit. The groundwater levels varied between approximately 25.2 feet (MW-2) and 34.4 feet (MW-4) below the existing ground surface (between approximate elevations of El. 3.4 feet and El. 4.2 feet, respectively). We note that groundwater levels will fluctuate due to tidal fluctuations, seasonal climatic variations, surface water runoff patterns, construction operations, and other interrelated factors. The groundwater depth at each boring location is noted on the Generalized Subsurface Profiles and on the Log of Boring records.

6.0 DESIGN RECOMMENDATIONS

6.1 General

Our geotechnical engineering evaluation of the site and subsurface conditions at the property, with respect to the planned construction and our recommendations for site preparation and foundation support, are based on (1) our site observations, (2) the field and laboratory test data obtained, (3) our understanding of the project information and structural conditions as presented in this report, and (4) our experience with similar soil and loading conditions.

If the stated structural or grading conditions are incorrect, or should the location of the structure, pipeline, or dike areas be changed, please contact us so that we can review our recommendations. Also, the discovery of any site or subsurface conditions during construction that deviate from the data obtained during this geotechnical exploration should also be reported to us for our evaluation.

The recommendations in the subsequent sections of this report present design and construction techniques that are appropriate for the planned construction. We recommend that Ellis & Associates, Inc. be provided the opportunity to review the foundation plans and earthwork specifications to verify that our recommendations have been properly interpreted and implemented.

6.2 Weir Foundation Design Recommendations

We understand that a concrete weir will be constructed towards the southern portion of the DMMA. This structure would be approximately 10 feet high and will transmit its weight to the ground.

Based on the results of our exploration, we consider the subsurface conditions at the site adaptable for support of the proposed weir structure on a properly designed conventional shallow foundation system. Provided the site preparation and earthwork construction recommendations outlined in Section 7.0 of this report are performed, the following parameters may be used for foundation design.

6.2.1 Bearing Pressure

The maximum allowable net soil bearing pressure for use in shallow foundation design should not exceed 2,500 psf. Net bearing pressure is defined as the soil bearing pressure at the foundation bearing level in excess of the natural overburden pressure at that level. The foundations should be designed based on the maximum load that could be imposed by all loading conditions.

6.2.2 Foundation Size

The minimum widths recommended for any isolated footing, continuous wall footing, and/or mat foundations are 24 inches, 18 inches, and 36 inches, respectively. Even though the maximum allowable soil bearing pressure may not be achieved, these width recommendations should control the size of the foundations.

6.2.3 Bearing Depth

The foundations should bear at a depth of at least 12 inches below the exterior final grades to provide confinement to the bearing level soils. It is recommended that stormwater be diverted away from the structure exterior to reduce the possibility of erosion beneath the footings or mat foundation.

6.2.4 Bearing Material

The foundations may bear in either the compacted suitable natural soils or compacted structural fill. The bearing level soils, after compaction, should exhibit densities equivalent to 95 percent of the modified Proctor maximum dry density (ASTM D 1557) to a depth of at least one foot below foundation bearing levels.

6.2.5 Settlement Estimates

Post-construction settlements of the structure will be influenced by several interrelated factors, such as (1) subsurface stratification and strength/compressibility characteristics; (2) foundation size, bearing level, applied loads, and resulting bearing pressures beneath the foundations; and (3) site preparation and earthwork construction techniques used by the contractor. Our settlement estimates for the structure are based on the use of site preparation/earthwork construction techniques as recommended in Section 7.0 of this report. Any deviation from these recommendations could result in an increase in the estimated post-construction settlements of the structure.

Due to the sandy nature of the near-surface soils, we expect the majority of settlement to occur in an elastic manner and fairly rapidly during construction. Using the recommended maximum bearing pressure, the supplied/assumed maximum structural loads, and the field and laboratory test data that we have correlated to geotechnical strength and compressibility characteristics of the subsurface soils, we estimate that total settlements of the structure could be on the order of one inch or less.

Differential settlements result from variations in applied bearing pressures and compressibility characteristics of the subsurface soils. Because of the general uniformity of the weir foundation structure and the subsurface conditions and the recommended site preparation and earthwork construction techniques outlined in Section 7.0, we anticipate that differential settlements of the structure should be within tolerable magnitudes.

6.3 Dike Considerations

6.3.1 Design Parameters

We recommend that the following table be utilized in the slope stability and seepage analyses for the dike.

Recommended Soil Parameters				
Elevation (feet)	**Permeability (cm/sec)**	**Peak Friction Angle (degrees)**	**Dry Density (pcf)**	**Saturated Density (pcf)**
40.6 to 30	0.0028	35	105	115
30 to 25	0.0021	32	100	112
25 to 10	0.0009	32	105	115

Based on our understanding of the proposed construction and the encountered soil properties, we do not anticipate that soil parameters will be required for soils deeper than elevation El. -10 feet. Should additional soil parameters be required, we recommend that our office be contacted to provide additional recommendations.

6.3.2 Design Construction Considerations

Based on the boring results and classification of the soil samples, the fine, poorly-graded sands in the borings are considered suitable for use as fill soil. These soils were encountered in the borings through the proposed borrow area and to depths up to approximately 60 feet below the existing ground surface. The soils containing surficial organic material will require removal and are unsuitable as structural fill. The organic soils could be used in landscape areas.

We note that the natural moisture content of the sampled material is well below the optimum moisture content of the sands. Moisture conditioning will likely be required during earthwork operations.

We recommend that the material within two feet of the dike subgrade footprint and extending five feet beyond be compacted to a minimum of 98 percent of the modified Proctor method (ASTM D1557) in order to provide a more uniform bearing strata for the dike construction. The on site soils may be used within this zone.

We recommend that once the site contractor is selected, an embankment pilot field test be performed to demonstrate that the contractor has the proper equipment for the anticipated soil and fill conditions. During this pilot test, the fill lifts and number of compactor passes will be determined to meet compaction density. We anticipate that (1) careful compaction will be required due to the poorly graded, uniform sand soil, and (2) wetting of the soils will be required to compact the material as described in Section 7.0 of this report. We recommend that Ellis & Associates, Inc. be on site during the embankment field test to observe and test the soils.

We recommend that dike slopes be 3H:1V or flatter. Slopes must be protected as soon as possible to prevent erosion due to weather, especially rainfall and wind. Protection may be accomplished with grass.

6.3.3 Anticipated Dike Settlement

Based on the provided cross sections, the proposed dike embankments will be constructed to approximately El. 40.6 feet, with heights of approximately 10.8 feet. Settlement analyses were performed for the dikes. For this analysis, soil parameters were based on our interpretation of the results

of the SPT borings, laboratory testing, and dilatometer testing. We have also assumed that the site preparation and earthwork recommendations presented in Section 7.0 of this report are implemented. Based on our analysis, we estimate the following:

- Long-term Settlement 1 inch or less
- Differential Settlement less than ½ inch

We anticipate that immediate settlement to occur during construction or within approximately two to four weeks after start of construction.

6.4 Pipeline Support Recommendations

We consider the subsurface conditions at the site capable of supporting the proposed pipelines when constructed upon properly prepared subgrade soils. Provided the site preparation and earthwork construction recommendations outlined in Section 7.0 of this report are performed, the following parameters may be used for design.

6.4.1 Design Parameters

We anticipate the buried structures will exert little or no net downward pressure on the soils; rather, the structures may be subject to hydrostatic uplift pressure when the structures are empty. Below grade structures should be designed to resist lateral earth pressures and hydrostatic uplift pressures appropriate for their depth below existing grade and the normal seasonal high groundwater table.

The walls of the manhole structures should be designed to resist at-rest lateral earth pressures, with equivalent fluid densities above and below the water table being as follows:

Above Water Table - Equivalent Fluid Density 53 pcf

Below Water Table - Equivalent Fluid Density 84 pcf

The above design values assume granular backfill around the pipelines and to a minimum distance of 5 feet behind the manhole structures. Lateral pressure distributions in accordance with the above do not take into account forces from construction equipment, wheel loads or other surcharge loads.

6.4.2 Uplift Protection

Invert elevations of the inlet and outflow pipes were not available to our office at the time of this report preparation. Although we do not anticipate that the pipes will be below the groundwater elevation, we have provided the following recommendations to be used if the pipes or structures are planned to be constructed below the groundwater.

When the water level within below-grade structures is maintained at or above the surrounding groundwater level, no net buoyancy will occur to the structure. However, for sanitary manhole structures, a positive means of uplift protection may be necessary. Hydrostatic uplift forces can be resisted in several ways including:

1. Addition of dead weight to the structure.
2. Mobilizing the dead weight of the soil surrounding the structure through extension of footings outside the perimeter of the structure.

At your request, we would be pleased to assist you in evaluating uplift protection requirements.

6.4.3 Lateral Forces

Horizontal forces which act on structures such as thrust and anchor blocks can be resisted to some extent by the earth pressures that develop in contact with the buried perpendicular face of the block structure, and by shearing resistance mobilized along the base of the block structures and subgrade interface. Allowable passive earth pressure resistance may be estimated using the following equivalent fluid densities:

Above Water Table-Equivalent Fluid Density	100 pcf
Below Water Table-Equivalent Fluid Density	60 pcf

A factor of safety of three is used in the above values. It is assumed the block structures are surrounded by well compacted sand backfill extending at least five feet horizontally beyond the vertical bearing face.

The allowable sliding shearing resistance mobilized along the base of the block structure may be determined by the following formula:

$$P = 1/3V \tan (2/3\ \varphi)$$

Where P = Allowable shearing resistance force
V = Net vertical force (total weight of block and soil overlying the structure minus hydrostatic uplift forces)
φ = Angle of internal friction = 30 degrees

The following unit weights can be used to calculate the weight of the overburden soil:

Moist Soil	=	100 pcf
Saturated Soil	=	112 pcf

6.4.4 Slope Protection

We understand that the pipelines will exit through the existing slope adjacent to the Indian River. Based on the results of the probe boring exploration performed near each pipe penetration location, it is our opinion that rip-rap or other form of slope protection does exist within the slope. We were unable to determine the material that was used within the slope because of the existing concrete mat covering. However, the probe borings encountered varying depths to refusal (Plates 4 and 5).

We recommend that after the pipes are constructed, additional shore protection be provided at the pipe inlet and outfalls. We recommend that a woven separation fabric be placed over the slope, within a minimum of five feet of all directions of the pipe and rip-rap material be placed to provide armoring along the slope. We recommend that the rip-rap material meet the requirements of the Florida Department of Transportation. Please see the detail included as Plate 6 in the Appendix of this report.

7.0 SITE PREPARATION AND EARTHWORK RECOMMENDATIONS

Site preparation as outlined in this section should be performed to provide more uniform foundation and dike bearing conditions, to reduce the potential for post-construction settlements.

7.1 Clearing and Stripping

Prior to construction, the location of existing underground utilities within the construction area should be established. Provisions should then be made to relocate interfering utilities to appropriate locations. Underground pipes that are not properly removed or plugged may serve as conduits for subsurface erosion, which may subsequently lead to excessive settlement of overlying structures.

The "footprint" of the proposed dike and roadway plus a minimum additional margin of five feet should be stripped of all surface vegetation, stumps, debris, organic topsoil, or other deleterious materials. During grubbing operations, roots with a diameter greater than 0.5-inch, stumps, or small roots in a concentrated state, should be grubbed and completely removed.

Based on the results of our field exploration, it should be anticipated that six to 12 inches of topsoil and soils containing significant amounts of organic materials may be encountered across the site. The actual depths of unsuitable soils and materials should be determined by Ellis & Associates, Inc. using visual observation and judgment during earthwork operations. Any topsoil removed from the structural areas can be stockpiled and used subsequently in areas to be grassed.

7.2 Compaction

After completing the clearing and stripping operations and installing the temporary groundwater control measures (if required), the exposed surface or subgrade should be compacted with a vibratory drum roller having a minimum static, at-drum weight, with a minimum of 20 tons. Typically, the material should exhibit moisture contents within ±2 percentage points of the modified Proctor optimum moisture content (ASTM D 1557) during the compaction operations. Compaction should continue until densities of at least 95 percent of the modified Proctor maximum dry density (ASTM D 1557) have been achieved within the upper 2 feet of the compacted natural soils at the site.

Should the bearing level soils experience pumping and soil strength loss during the compaction operations, compaction work should be immediately terminated, and (1) the disturbed soils should be removed and backfilled with compacted structural fill, or (2) the excess moisture content within the disturbed soils should be allowed to dissipate before recompacting.

Care should be exercised to avoid damaging any nearby structures, including the adjacent railroad and roadway, while the compaction operation is underway. Prior to commencing compaction, owners of the adjacent structures should be notified, and the existing conditions of the structures should be documented with photographs and survey (if deemed necessary). Compaction should cease if deemed detrimental to adjacent structures, and Ellis & Associates, Inc. should be contacted immediately. We recommend the vibratory roller remain a minimum of 50 feet from existing structures. Within this zone, use of a track-mounted bulldozer, or a vibratory roller operating in the static mode, is recommended.

7.3 Dike Structural Fill Soils

Due to the poor graded, uniform nature of the on site sand soils proposed to be used for the dike construction, it is recommended to conduct an embankment pilot field test to determine the compaction parameters based on the available compaction equipment; this equipment must have a minimum weight of 20 tons. The intent of the pilot field test is to determine the lift thickness, water content, and number of passes to comply with density requirements.

Structural fill required for site development should be placed in loose lifts not exceeding 12 inches in thickness when compacted by the use of the above described vibratory drum roller. The lift thickness should be reduced to 8 inches if the roller operates in the static mode or if track-mounted compaction equipment is used. If hand-held compaction equipment is used, the lift thickness should be further reduced to 6 inches.

Structural fill is defined as a non-plastic, inorganic, granular soil having less than 10 percent material passing the No. 200 mesh sieve and containing less than four percent organic material. The fine sand and fine sand with silt, without roots, as encountered in the borings, are suitable as fill materials and, with proper moisture control, should densify using conventional compaction methods. Typically, the material should exhibit moisture contents within ±2 percentage points of the modified Proctor optimum

moisture content (ASTM D 1557) during the compaction operations. Compaction should continue until densities of at least 95 percent of the modified Proctor maximum dry density (ASTM D 1557) have been achieved within each lift of the compacted structural fill.

We recommend that the dike slopes be protected from erosion as soon as practical. Because of the low fines content of the borrow material, it is our opinion that the dike slopes will likely be susceptible to erosion from surface water and wind.

7.4 Weir Foundation Area

After satisfactory placement and compaction of the required structural fill, the foundation area may be excavated to the planned bearing levels. The foundation bearing level soils, after compaction, should exhibit densities equivalent to 95 percent of the modified Proctor maximum dry density (ASTM D 1557) to a depth of one foot below the bearing level. For confined areas, such as the footing excavations, any compactive effort should be provided by a lightweight vibratory sled or roller having a total weight on the order of 500 to 2,000 pounds.

8.0 QUALITY CONTROL TESTING

Ellis & Associates, Inc. should be retained to perform the construction material testing and observations required for this project, to verify that our recommendations have been satisfied. We are the most qualified to address problems that may arise during construction, since we are familiar with the intent of our engineering design.

A representative number of field in-place density tests should be made in the upper two feet of compacted natural soil subgrades for sturctures, in each lift of compacted backfill and fill, and in the upper 12 inches below the bearing levels in the footing excavation Density tests are recommended to verify that satisfactory compaction operations have been performed. We recommend density testing be performed at one location for every 5,000 square feet of dike area and/or lift, and at least three locations within the weir foundation footprint.

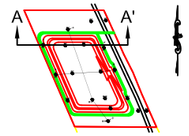
9.0 REPORT LIMITATIONS

Our geotechnical exploration has been performed, our findings obtained, and our recommendations prepared, in accordance with generally accepted geotechnical engineering principles and practices. Ellis & Associates, Inc. is not responsible for any independent conclusions, interpretation, opinions, or recommendations made by others based on the data contained in this report.

Our scope of services was intended to evaluate the soil conditions within the zone of soil influenced by the foundation system. Our scope of services does not address geologic conditions, such as sinkholes or soil conditions existing below the depth of the soil borings.

This report does not reflect any variations that may occur adjacent to or between soil borings. The discovery of any site or subsurface condition during construction that deviates from the data obtained during this geotechnical exploration should be reported to us for our evaluation. Also, in the event of any change to the supplied/assumed structural conditions or the locations of the structures, please contact us so that we can review our recommendations. We recommend that we be provided the opportunity to review the foundation plans and earthwork specifications to verify that our recommendations have been properly interpreted and implemented.

PLATES



KEY MAP

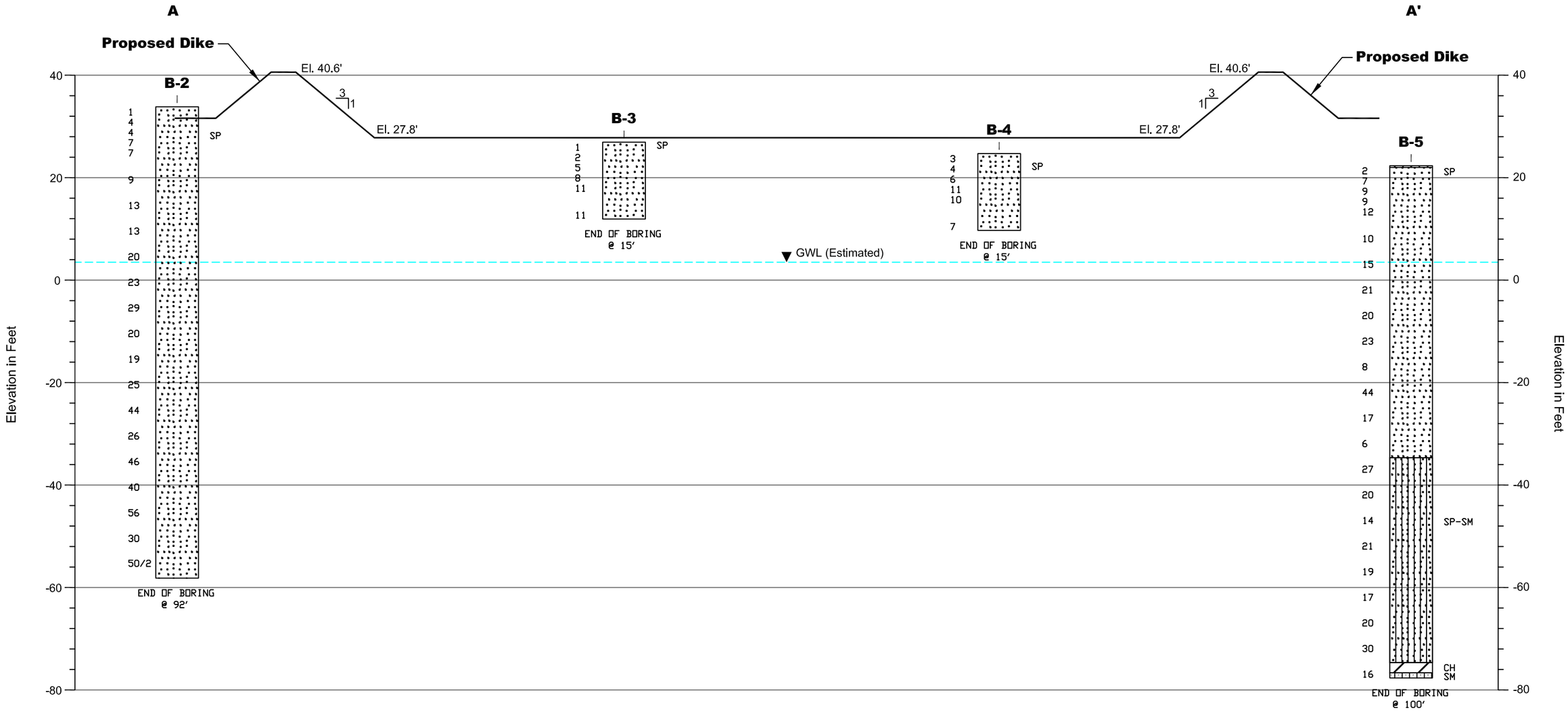
Scale: Not-to-Scale

Horizonal Graphical Scale

0' 50' 100'

Vertical Graphical Scale

0' 20' 40'



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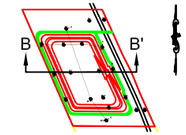
Cross Section A-A'

Dredged Material Management Area M-8

Jacksonville, Florida

Date: 03/28/17	Project No.: 35-24842	Plate 1

JAS - 35-24842



KEY MAP

Scale: Not-to-Scale

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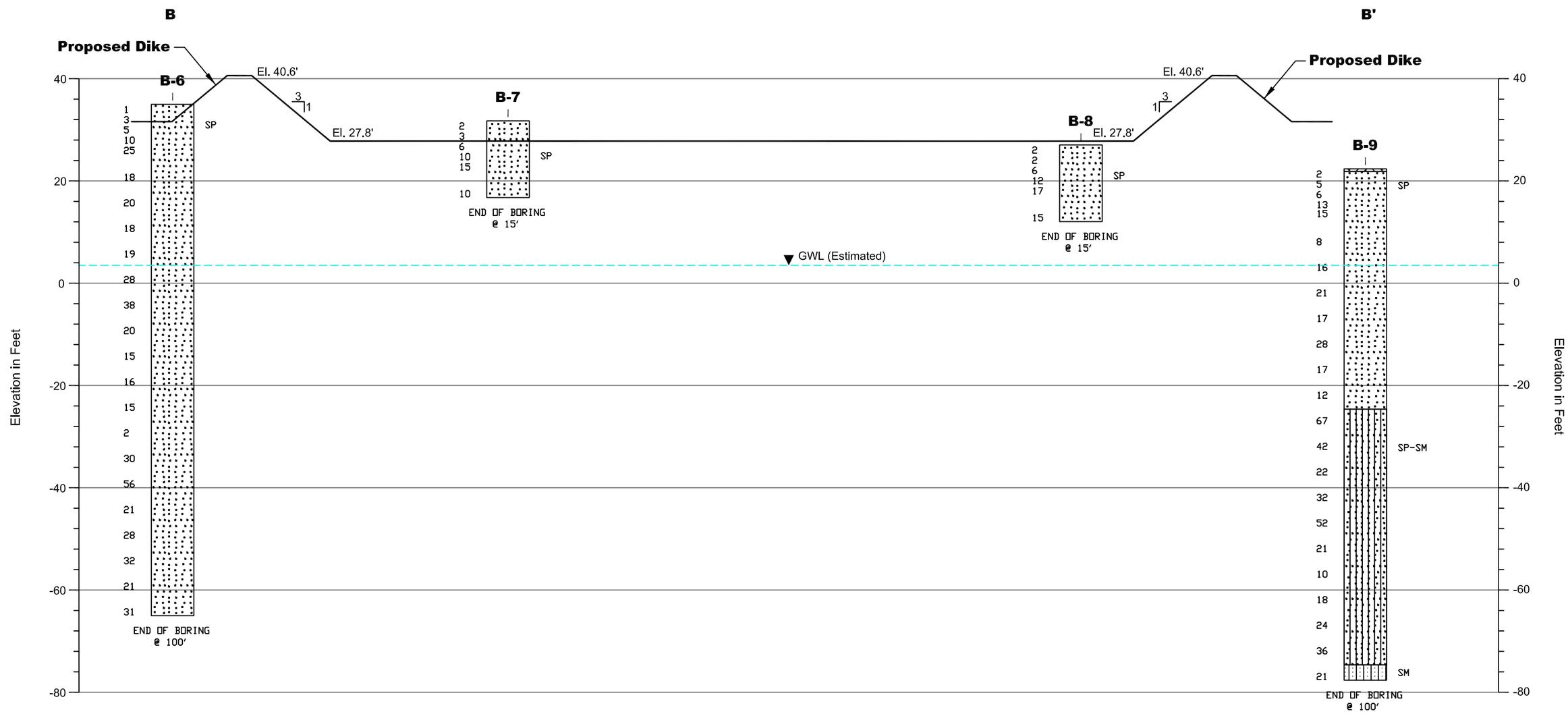
0' 50' 100'

Vertical Graphical Scale

0' 20' 40'



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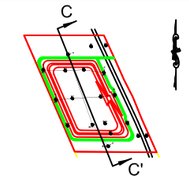
Cross Section B-B'

Dredged Material Management Area M-8

Jacksonville, Florida

Date: 03/28/17	Project No.: 35-24842	Plate 2

JAS - 35-24842



KEY MAP

Scale: Not-to-Scale

Horizonal Graphical Scale

0' 100' 200'

Vertical Graphical Scale

0' 20' 40'

C

C'

Proposed Dike

El. 40.6'

3

1

El. 27.8'

B-1

0
4
5
9
12
SP

10
15
15
21
18
11
8
50
50/5
27
29
18
50
22
50/5
44
17
22
SP-SM

SC

END OF BORING
@ 100'

GWL (Estimated)

B-11

1
2
5
13
12
SP

11

END OF BORING
@ 15'

Proposed Dike

B-14

3
5
7
9
13
SP

13
22
10
17
18
30
36
43
35
11
50
45
21
26
58
50
27
41
SP-SM

END OF BORING
@ 100'

Elevation in Feet

40
20
0
-20
-40
-60
-80

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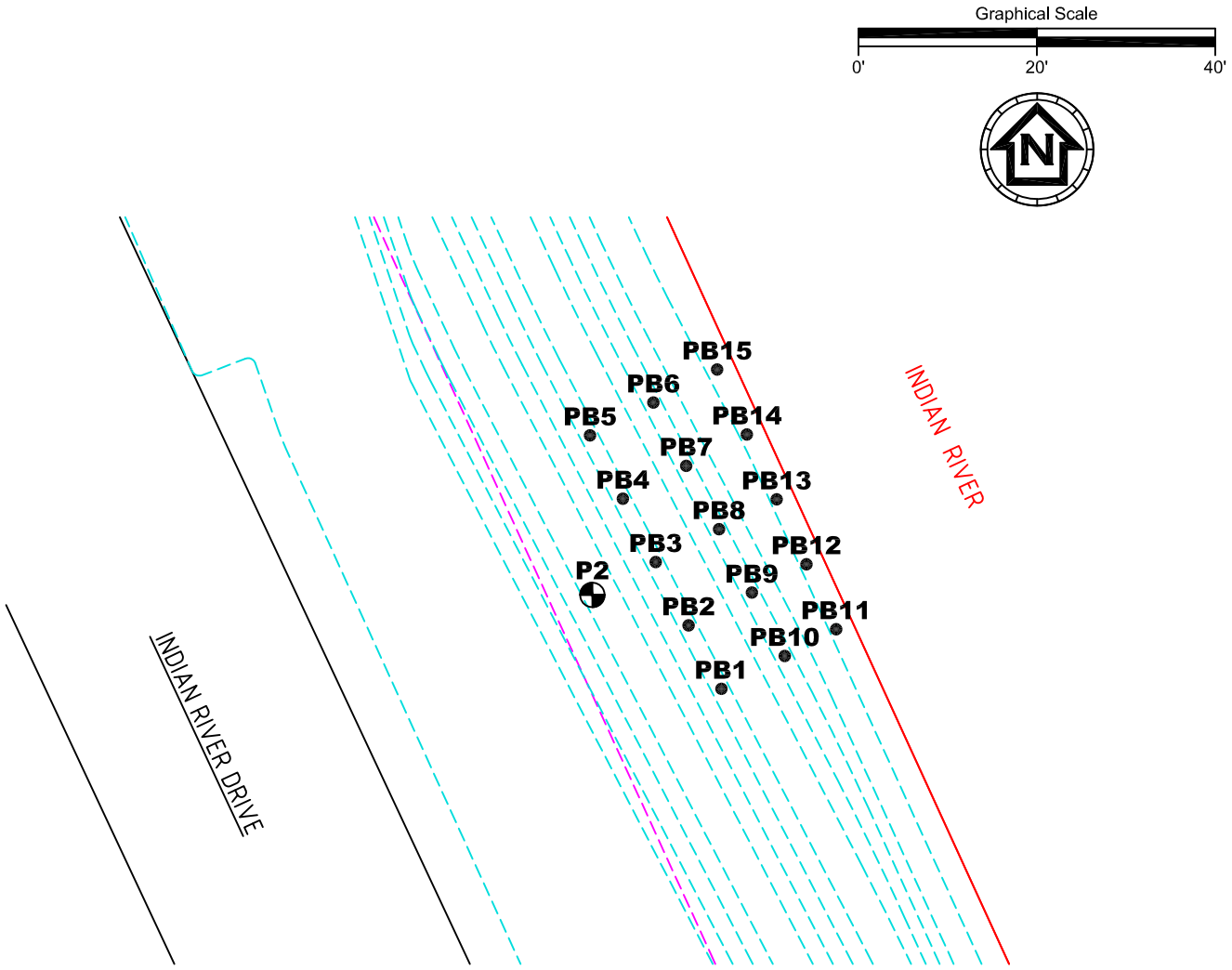
Cross Section C-C'

Dredged Material Management Area M-8

Jacksonville, Florida

Date: 03/28/17	Project No.: 35-24842	Plate 3

JAS - 35-24842



Probe No.	Probe Depth
1	1'6"
2	1'6"
3	2'0"
4	4'0"
5	3'0"
6	1'8"
7	1'2"
8	1'2"

Probe No.	Probe Depth
9	1'0"
10	3'0"
11	0'6"
12	0'6"
13	4'0"
14	3'0"
15	2'0"

LEGEND

- Approximate Location of Standard Penetration Test (SPT) Boring
- Approximate Location of Muck Probe

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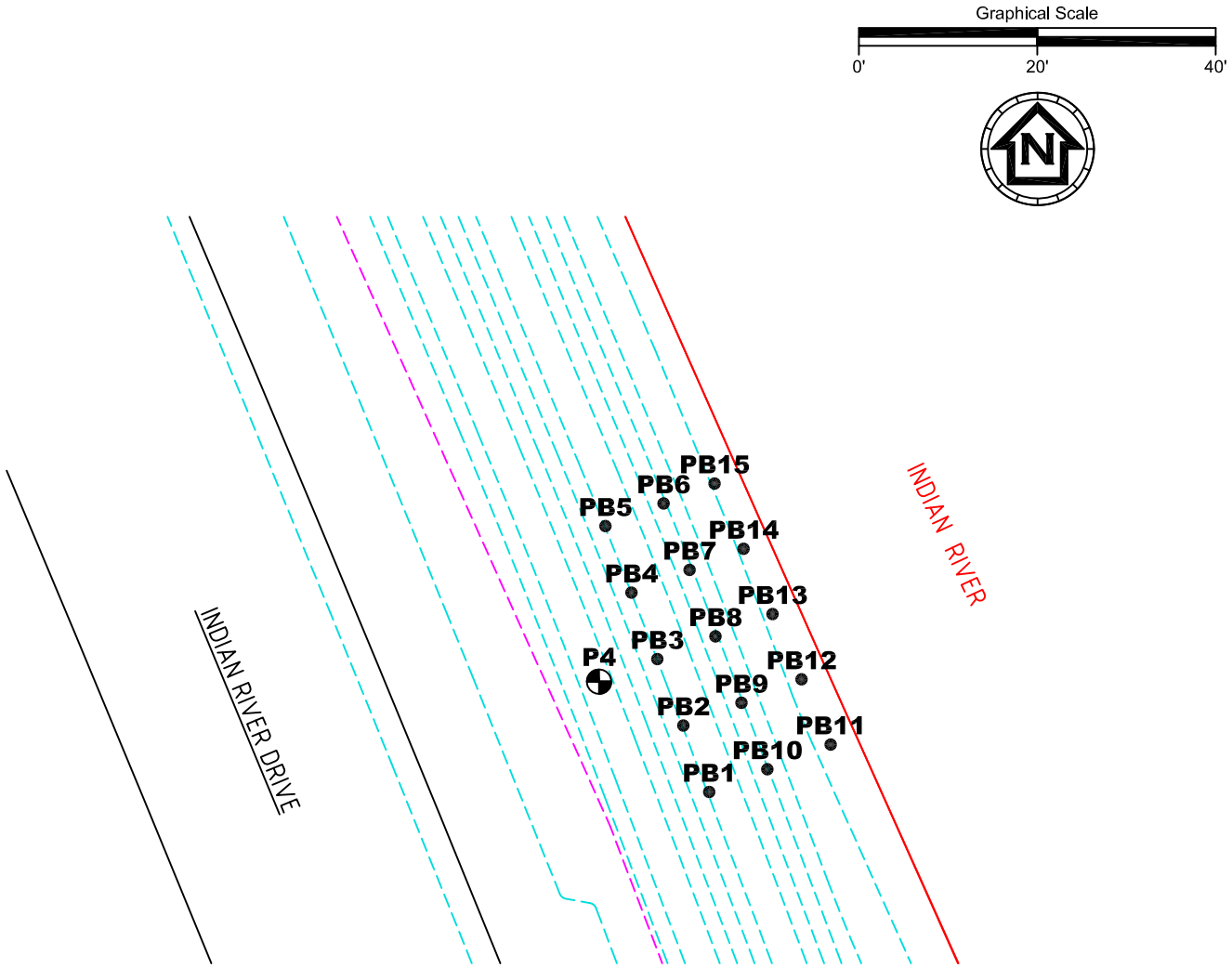
Muck Probe Location Plan (SPT P2 Area)

Dredged Material Management Area M-8

St. Lucie County, Florida

Date: 03/28/17	Project No.: 35-24842	Plate 4

JAS - 35-24842



Probe No.	Probe Depth
1	4'0"
2	2'0"
3	0'6"
4	4'0"
5	2'0"
6	2'0"
7	2'3"
8	2'6"

Probe No.	Probe Depth
9	2'0"
10	2'0"
11	0'6"
12	0'6"
13	0'6"
14	0'6"
15	0'6"

LEGEND

- Approximate Location of Standard Penetration Test (SPT) Boring
- Approximate Location of Muck Probe

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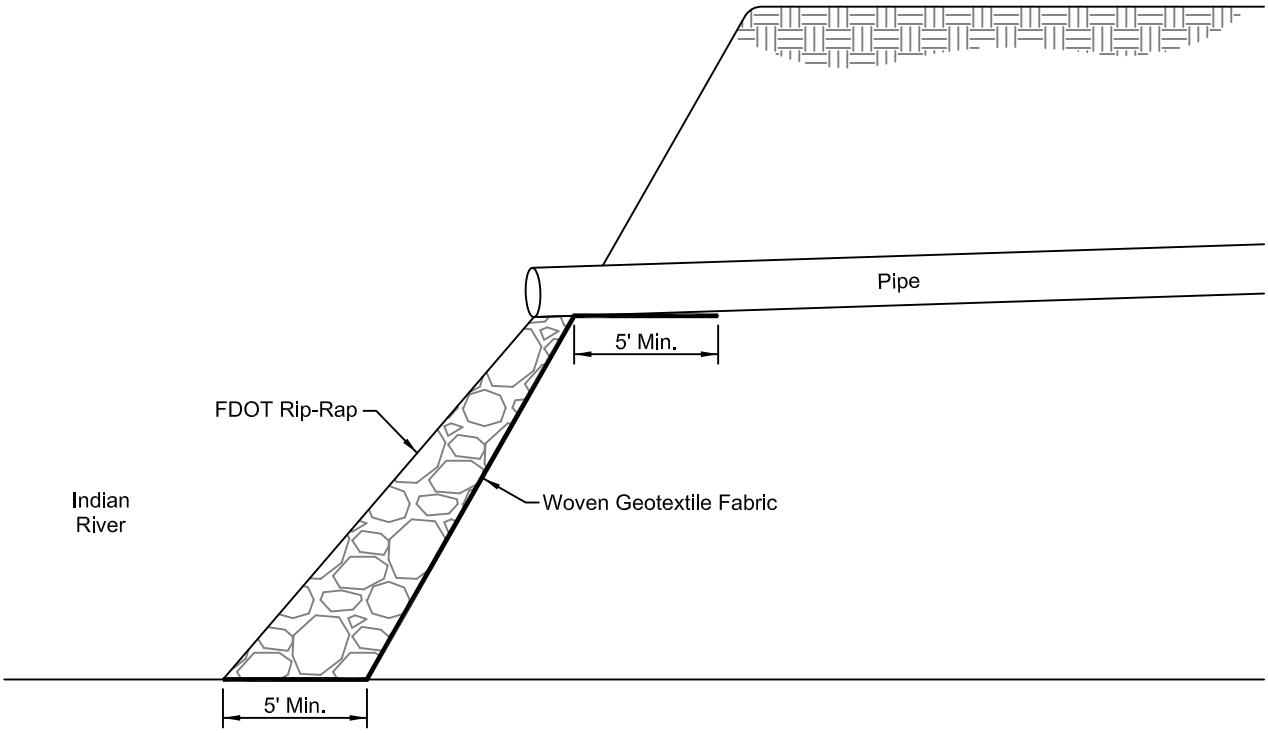
Muck Probe Location Plan (SPT P4 Area)

Dredged Material Management Area M-8

St. Lucie County, Florida

Date: 03/28/17	Project No.: 35-24842	Plate 5

JAS - 35-24842



Scale: Not-to-Scale

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Slope Protection Detail

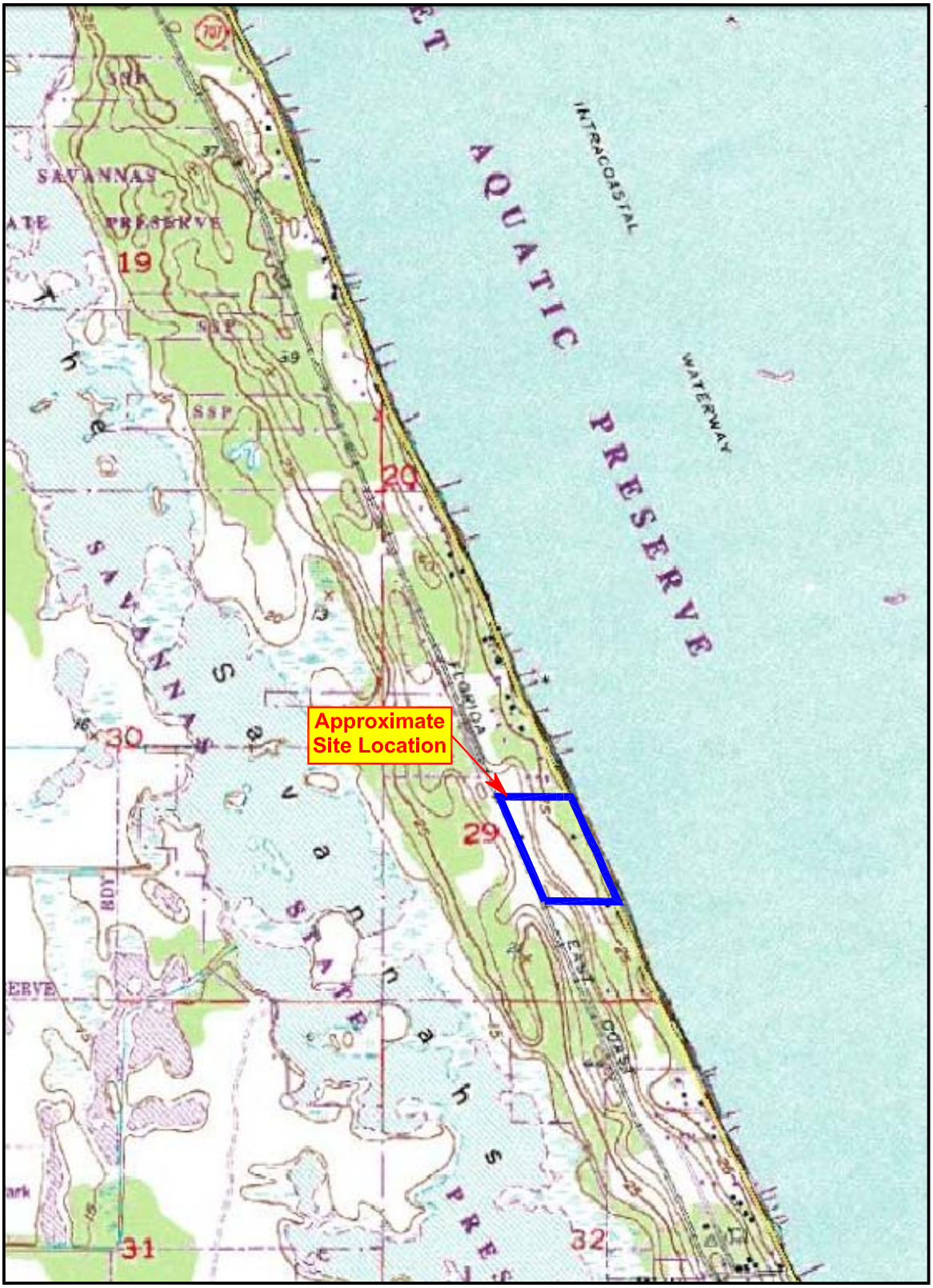
Dredged Material Management Area M-8

St. Lucie County, Florida

Date: 03/30/17	Project No.: 35-24842	Plate 6

JAS - 35-24842

FIGURES



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Site Vicinity/Topographic Map

Dredged Material Management Area M-8

U.S. Geological Survey 7.5 Minute - Topographic Map
Ankona, Florida Quadrangle
Date 1948, Revised 1983
Site Boundaries Depicted are Approximate

Date: 03/30/17	Project No.: 35-24842	Figure 1

JAS - 35-24842

LEGEND

28 Paola sand, 0 to 5 % slopes
42 St. Lucie fine sand, 0 to 8 % slopes

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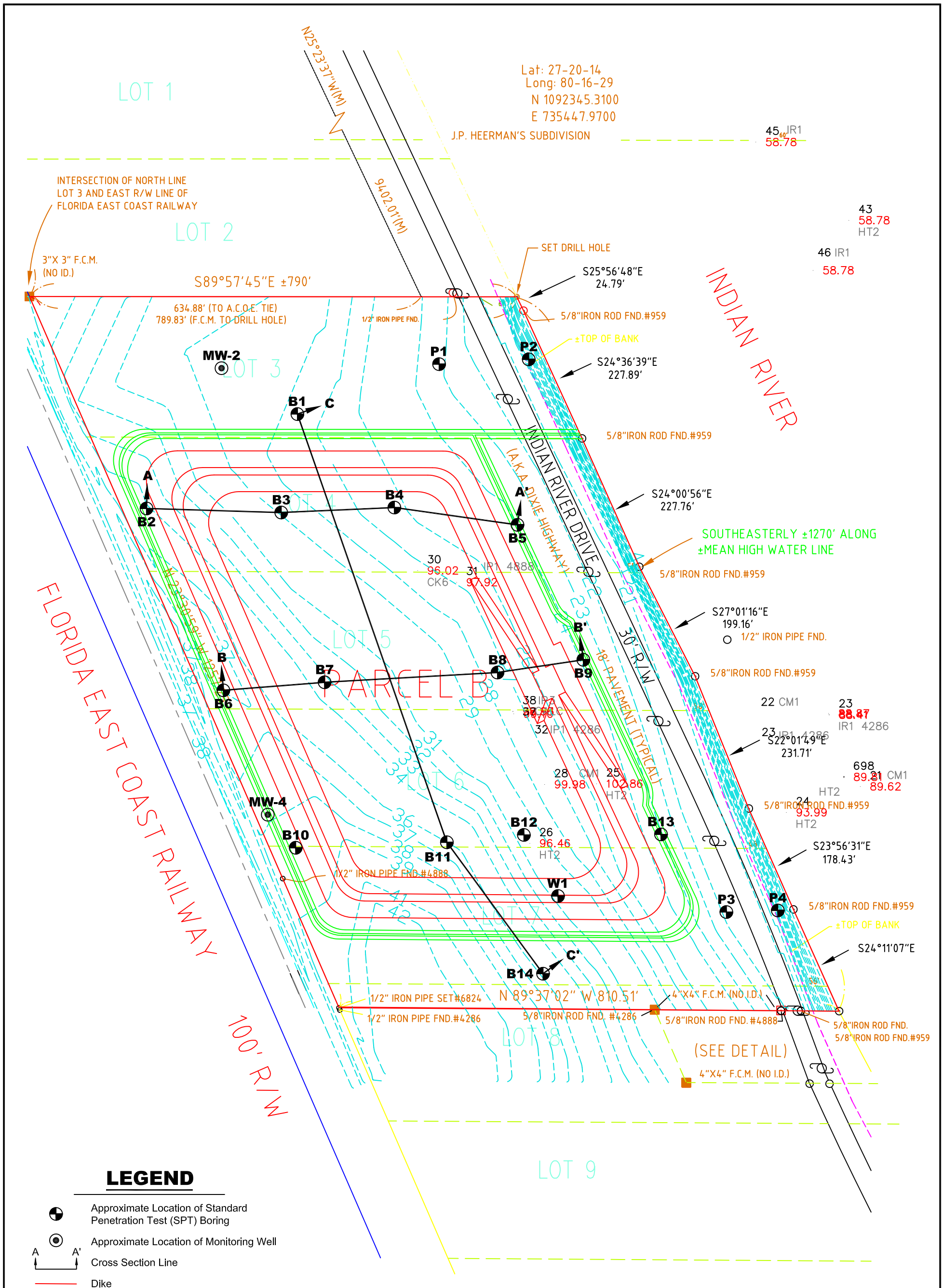
Soil Survey of St. Lucie County

Dredged Material Management Area M-8

St. Lucie County, Florida
Approximate Scale: 1"=300'
Site boundaries depicted are approximate

Date: 03/30/17	Project No.: 35-24842	Figure 2

JAS - 35-24842



LEGEND

- Approximate Location of Standard Penetration Test (SPT) Boring
- Approximate Location of Monitoring Well
- A — A' Cross Section Line
- Dike
- Ditch
- Contour

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Field Exploration Plan

Dredged Material Management Area M-8

St. Lucie County, Florida

Date: 03/24/16	Project No.: 35-24842	Figure 3

Graphical Scale
0' 150' 300'

JAS - 35-24842

APPENDIX A

GENERALIZED SUBSURFACE PROFILES
SOIL BORING LOGS
FIELD EXPLORATION PROCEDURES
KEY TO SOIL CLASSIFICATION

SOIL CLASSIFICATION LEGEND

GW - WELL GRADED GRAVEL
GM - SILTY GRAVEL
GP - POORLY GRADED GRAVEL
GC - CLAYEY GRAVEL
SW - WELL GRADED SAND
ML - LOW PLASTICITY SILT
ST - SHELBY TUBE
CL - LOW PLASTICITY CLAY
MH - HIGH PLASTICITY SILT
SM - SILTY SAND
RC - ROCK CORE
SP - POORLY GRADED SAND
SC - CLAYEY SAND
CH - HIGH PLASTICITY CLAY
PM - PRESSURE METER
OH - HIGH PLASTICITY ORGANIC SILTS AND CLAYS
OL - LOW PLASTICITY ORGANIC SILTS AND CLAY
PT - PEAT
- FILL
- POSSIBLE FILL
- PROBABLE FILL
WR - WEATHERED ROCK
PWR - PARTIALLY WEATHERED ROCK
HWR - HIGHLY WEATHERED ROCK
DR - DECOMPOSED ROCK

SURFACE MATERIALS

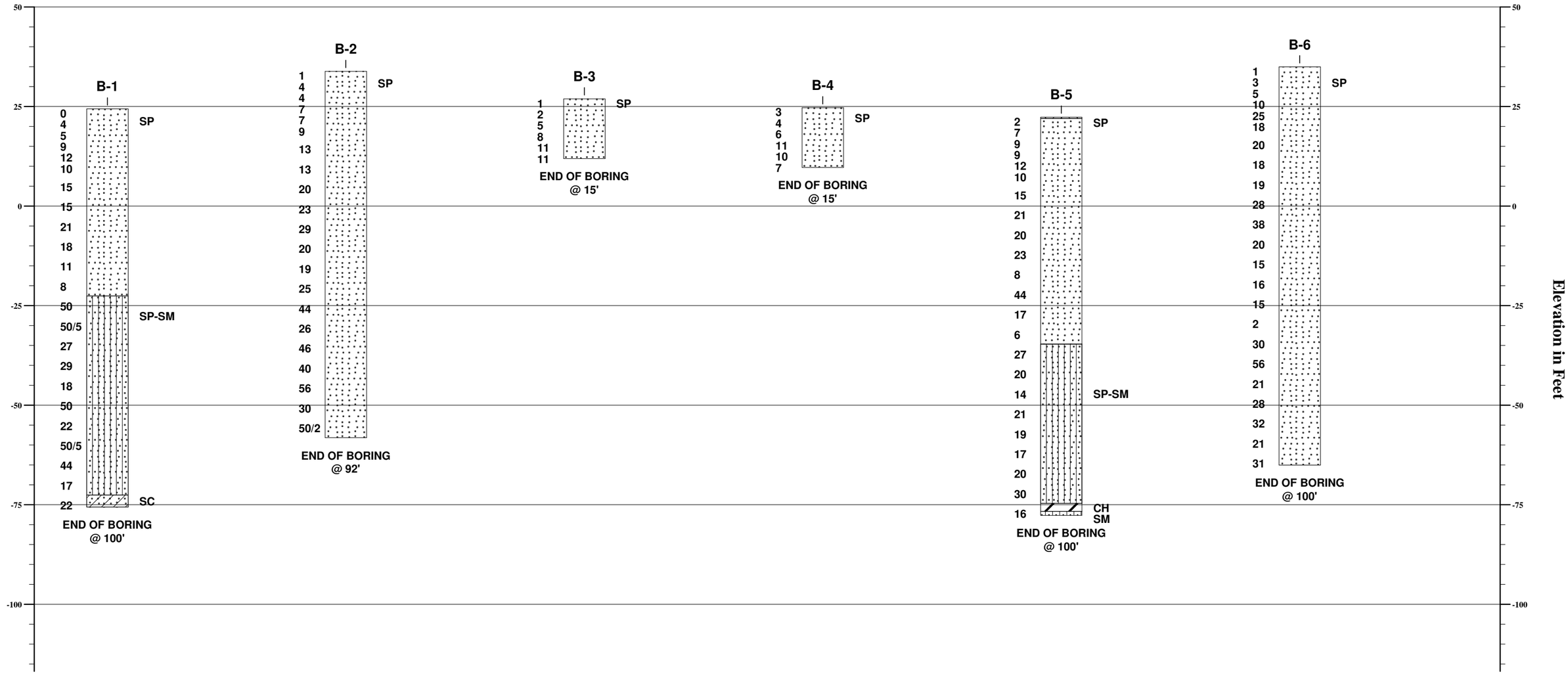
TOPSOIL
ASPHALT
GRAVEL
CONCRETE
VOID

ROCK TYPES

IGNEOUS
METAMORPHIC
SEDIMENTARY

SYMBOL LEGEND

WATER LEVEL - DURING DRILLING/SAMPLING
WATER LEVEL - SEASONAL, HIGH WATER
WATER LEVEL - AFTER CASING REMOVAL
WATER LEVEL - AFTER 24 HOURS



NOTES:
1 SEE INDIVIDUAL BORING LOG AND GEOTECHNICAL REPORT FOR ADDITIONAL INFORMATION.
2 PENETRATION TEST RESISTANCE IN BLOWS PER FOOT (ASTM D1586).
3 HORIZONTAL DISTANCES ARE NOT TO SCALE.

ECS Group of Companies

GENERALIZED SUBSURFACE SOIL PROFILE

Dredged Material Management Area M-8
Florida Inland Navigation District
South Indian River Drive, St. Lucie County, St. Lucie

PROJECT NO.: 24842 | DATE: 3/28/2017 | VERTICAL SCALE: 1"=25'

SOIL CLASSIFICATION LEGEND

GW - WELL GRADED GRAVEL
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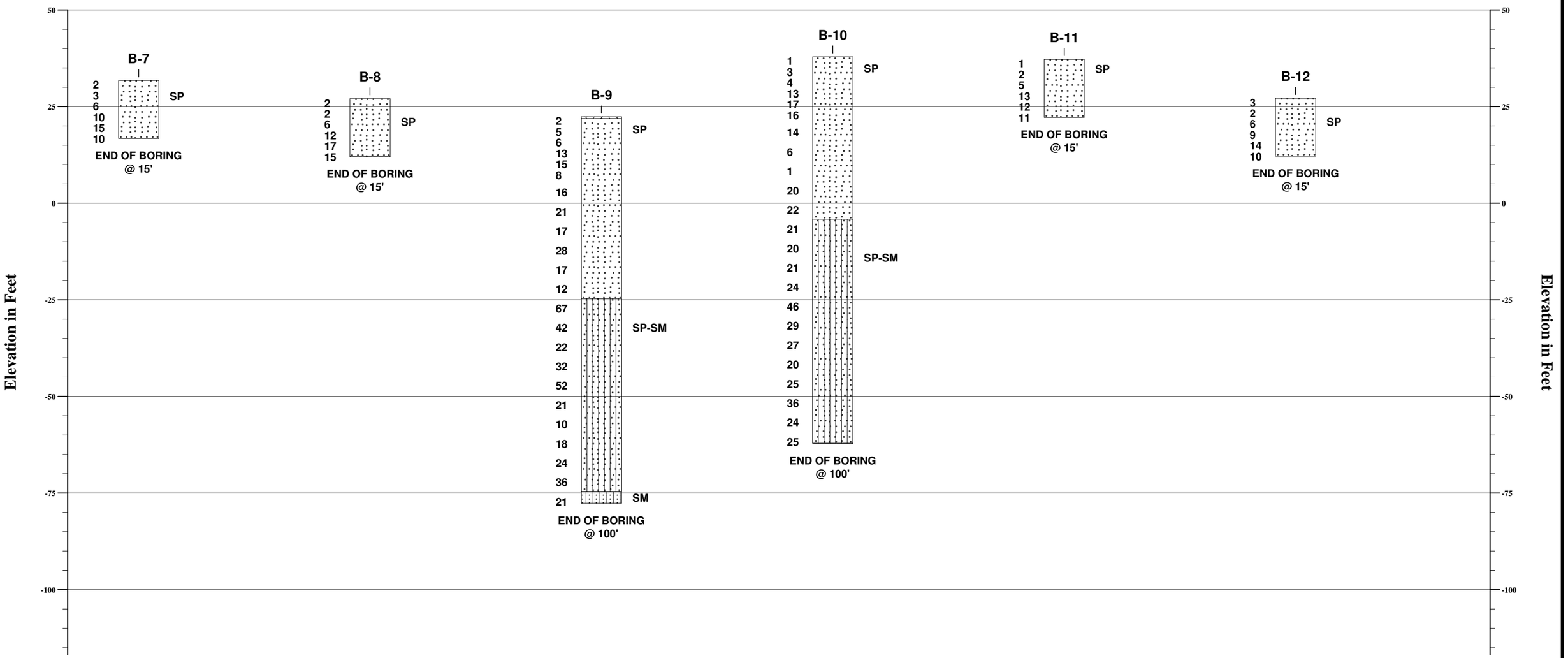

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ECS Group of Companies

GENERALIZED SUBSURFACE SOIL PROFILE

Dredged Material Management Area M-8
Florida Inland Navigation District
South Indian River Drive, St. Lucie County, St. Lucie

PROJECT NO.: 24842	DATE: 3/28/2017	VERTICAL SCALE: 1"=25'

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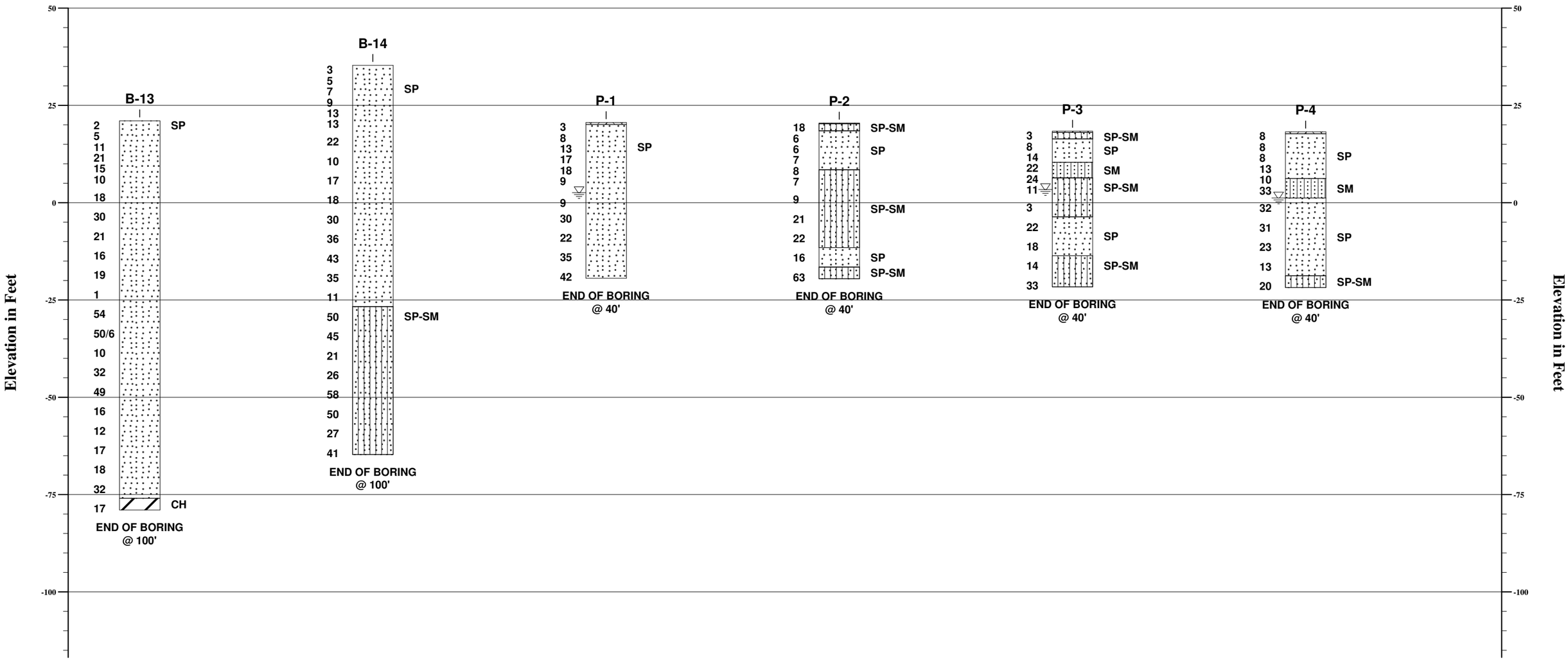

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ECS Group of Companies

GENERALIZED SUBSURFACE SOIL PROFILE

Dredged Material Management Area M-8
Florida Inland Navigation District
South Indian River Drive, St. Lucie County, St. Lucie

PROJECT NO.: 24842	DATE: 3/28/2017	VERTICAL SCALE: 1"=25'

SOIL CLASSIFICATION LEGEND

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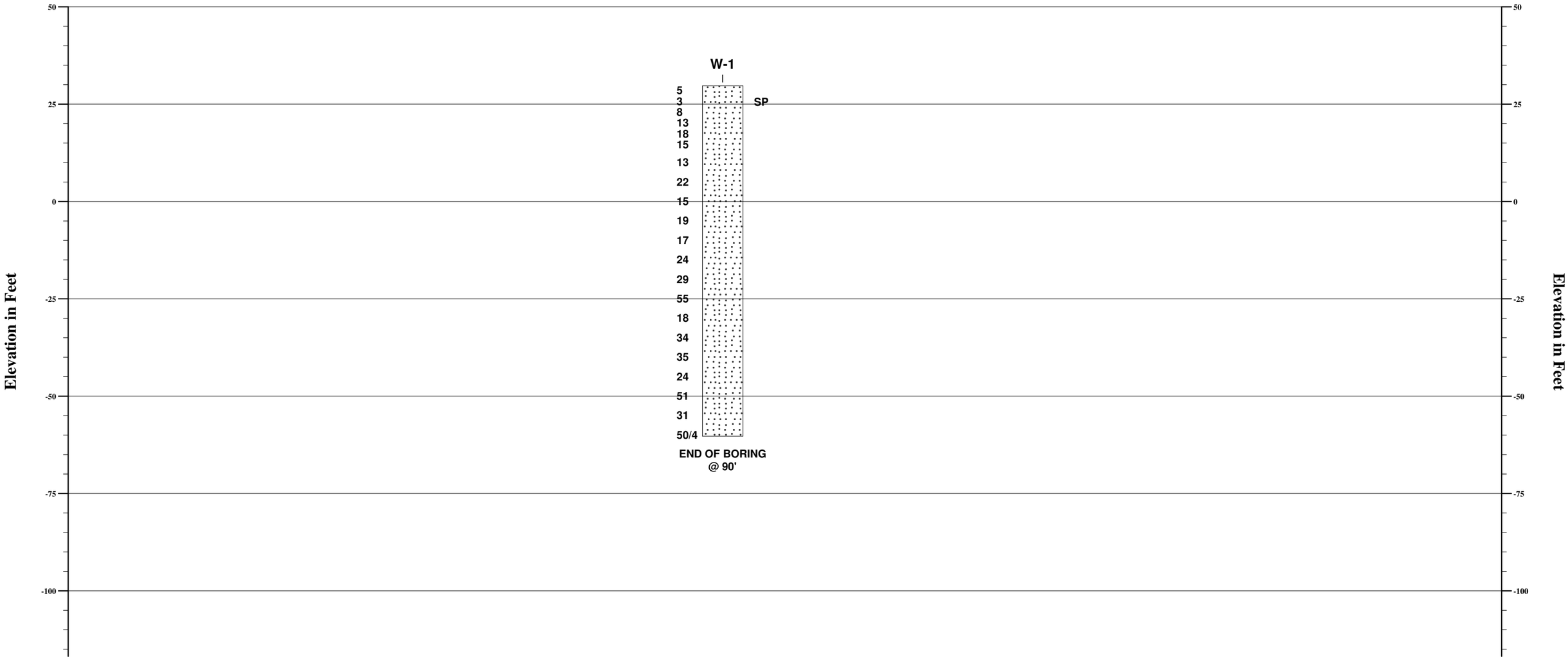

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ECS Group of Companies

GENERALIZED SUBSURFACE SOIL PROFILE

Dredged Material Management Area M-8
Florida Inland Navigation District
South Indian River Drive, St. Lucie County, St. Lucie

PROJECT NO.: 24842 | DATE: 3/28/2017 | VERTICAL SCALE: 1"=25'

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	B-1	1 OF 4

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — - REC.% — : 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION (100%)

SURFACE ELEVATION 24.42

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	24	24	(SP) FINE SAND, Gray, Moist, Very Loose to Loose		20	WOH WOH WOH
	S-2	SS	24	24				1 1 2
5	S-3	SS	24	24				2 2 3
	S-4	SS	24	24	(SP) FINE SAND, Orange, Moist, Loose to Medium Dense		15	3 4 4
	S-5	SS	24	24				5 5 6
10								6 6 6
	S-6	SS	18	18			10	3 5 5
15								
					(SP) FINE SAND, Light Brown, Moist to Wet, Medium Dense		5	6 7 8
20	S-7	SS	18	18				
	S-8	SS	18	18			0	6 7 8
25								
	S-9	SS	18	18			-5	6 9 12
30								

0 4 5 9 12 10 15 15 21

CONTINUED ON NEXT PAGE.

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

WL WS ☐ WD ☒	BORING STARTED 01/19/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/30/17	HAMMER TYPE Manual
WL	RIG ATV FOREMAN D. Register	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	B-1	2 OF 4

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 24.42

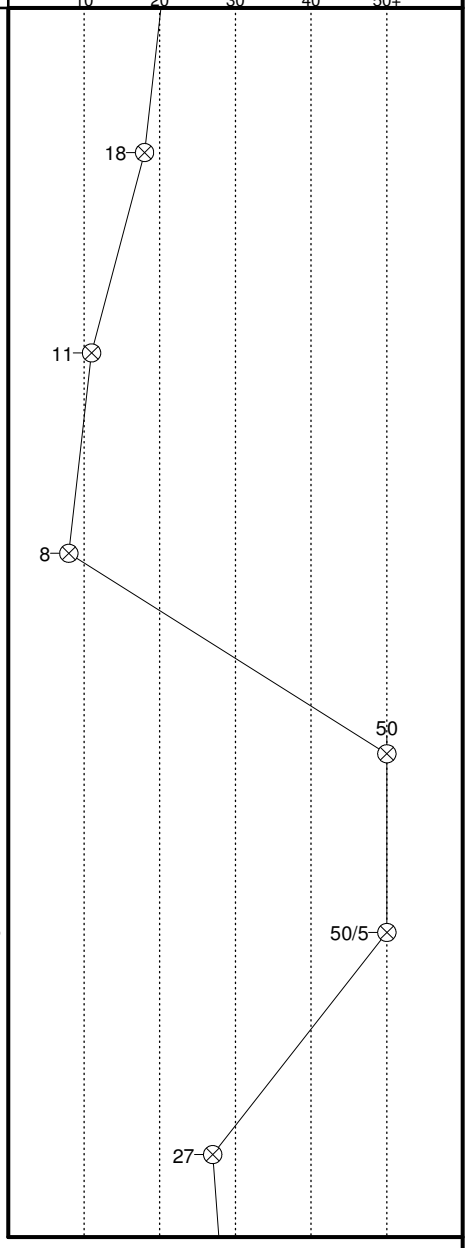
CALIBRATED PENETROMETER TONS/FT²: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — REC.%: 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					(SP) FINE SAND, Light Brown, Moist to Wet, Medium Dense			
35	S-10	SS	18	18			-10	7 9 9
40	S-11	SS	18	18			-15	3 5 6
					(SP) FINE SAND, Gray, Wet, Loose			
45	S-12	SS	18	18			-20	4 4 4
					(SP-SM) FINE SAND WITH SILT, Gray, Wet, Very Dense, Contains Shell Fragments			
50	S-13	SS	18	18			-25	13 23 27
	S-14	SS	5	5			-30	50/5
55					(SP-SM) FINE SAND WITH SILT, Gray, Wet, Very Dense Medium Dense to Dense, Weak Cementation			
60	S-15	SS	18	18			-35	10 15 12



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

WL WS ☐ WD ☒	BORING STARTED 01/19/17		CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/30/17		HAMMER TYPE Manual
WL	RIG ATV	FOREMAN D. Register	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	B-1	3 OF 4

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — - REC.% — : 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 24.42

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
	S-16	SS	18	18		-40	13 12 17
65							
	S-17	SS	18	18		-45	7 8 10
70							
	S-18	SS	18	18		-50	7 23 27
75							
	S-19	SS	18	18		-55	9 11 11
80							
	S-20	SS	5	5		-60	50/5
85							
	S-21	SS	18	18		-65	16 14 30
90							

(SP-SM) FINE SAND WITH SILT, Gray, Wet, Very Dense Medium Dense to Dense, Weak Cementation

29 18 50 22 50/5 44

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

WL WS ☐ WD ☒	BORING STARTED 01/19/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/30/17	HAMMER TYPE Manual
WL	RIG ATV FOREMAN D. Register	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	B-1	4 OF 4

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — REC.% — 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 24.42

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
95	S-22	SS	18	18			-70	15 10 7
					(SC) CLAYEY FINE SAND, Gray, Wet, Medium Dense			
100	S-23	SS	18	18			-75	17 12 10
					END OF BORING @ 100'			
105							-80	
110							-85	
115							-90	
120							-95	

17 22

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

WL WS ☐ WD ☒	BORING STARTED 01/19/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/30/17	HAMMER TYPE Manual
WL	RIG ATV FOREMAN D. Register	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	B-2	1 OF 4

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — - REC.% — : 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 33.83

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	24	24	(SP) FINE SAND, Gray, Moist, Very Loose to Loose		30	WOH WOH
	S-2	SS	24	24				1 1
5	S-3	SS	24	24				2 2
	S-4	SS	24	24	(SP) FINE SAND, Orange Brown, Moist, Loose		25	2 2
	S-5	SS	24	24				3 4
10								4 4
	S-6	SS	18	18			20	4 3
15								4 4
					(SP) FINE SAND, Tan, Moist to Wet, Medium Dense			3 4
	S-7	SS	18	18			15	4 3
20								3 6
	S-8	SS	18	18			10	6 7
25								3 6
								7
	S-9	SS	18	18			5	6
30								8
								12

1, 4, 4, 7, 7, 4.9, 9, 13, 13, 20

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

WL WS ☐ WD ☒	BORING STARTED 01/18/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/18/17	HAMMER TYPE Auto
WL	RIG ATV FOREMAN D. Francis	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	B-2	2 OF 4

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — - REC.% — : 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 33.83

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					(SP) FINE SAND, Tan, Moist to Wet, Medium Dense		0	7 11 12
35	S-10	SS	18	18				
	S-11	SS	18	18			-5	9 12 17
40								
					(SP) FINE SAND, Dark Gray, Wet, Medium Dense to Very Dense		-10	6 8 12
45	S-12	SS	18	18				
	S-13	SS	18	18			-15	6 8 11
50								
	S-14	SS	18	18			-20	8 11 14
55								
	S-15	SS	18	18			-25	14 20 24
60								

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

WL WS ☐ WD ☒	BORING STARTED 01/18/17		CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/18/17		HAMMER TYPE Auto
WL	RIG ATV	FOREMAN D. Francis	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	B-2	3 OF 4

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — - REC.% — : 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

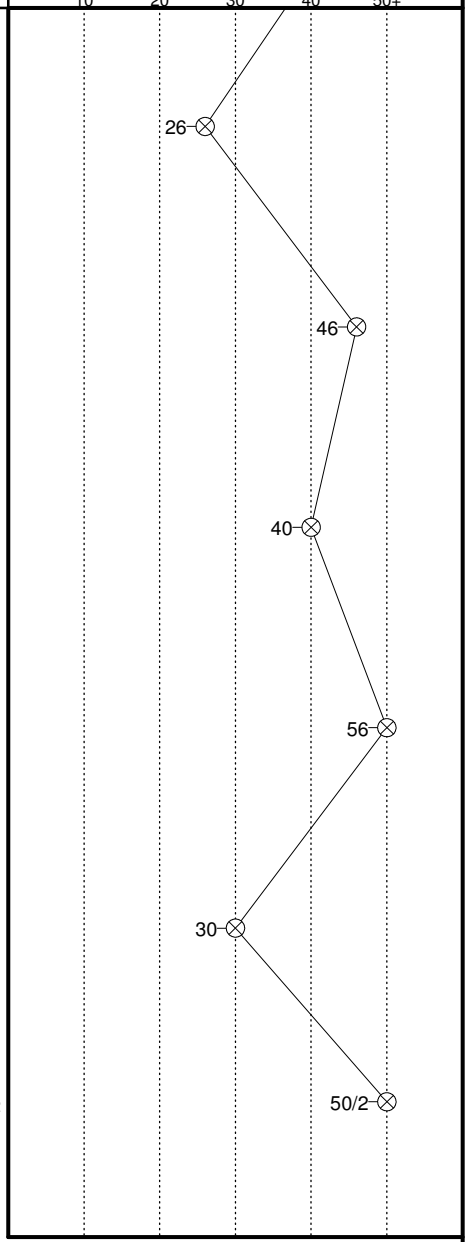
STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION (100%)

SURFACE ELEVATION 33.83

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					(SP) FINE SAND, Dark Gray, Wet, Medium Dense to Very Dense			
					(SP) FINE SAND, Gray, Wet, Medium Dense		-30	9 12 14
65	S-16	SS	18	18				
					(SP) FINE SAND, Gray to Tan, Wet, Medium Dense to Very Dense, Contains Shell Fragments		-35	17 20 26
70	S-17	SS	18	18				
	S-18	SS	18	18			-40	17 19 21
75								
	S-19	SS	18	18			-45	20 22 34
80								
	S-20	SS	18	18			-50	15 15 15
85								
	S-21	SS	2	2			-55	50/2
90								



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

WL WS ☐ WD ☒	BORING STARTED 01/18/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/18/17	HAMMER TYPE Auto
WL	RIG ATV FOREMAN D. Francis	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	B-2	4 OF 4

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION

South Indian River Drive, St. Lucie County, FL

NORTHING	EASTING	STATION

CALIBRATED PENETROMETER TONS/FT2
1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY
RQD% — - REC.% —
20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT
10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION

SURFACE ELEVATION 33.83

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
95					(SP) FINE SAND, Gray to Tan, Wet, Medium Dense to Very Dense, Contains Shell Fragments		-60	
					END OF BORING @ 92'			
100							-65	
105							-70	
110							-75	
115							-80	
120							-85	

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

WL WS ☐ WD ☒	BORING STARTED 01/18/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/18/17	HAMMER TYPE Auto
WL	RIG ATV FOREMAN D. Francis	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	B-3	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — - REC.% — : 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

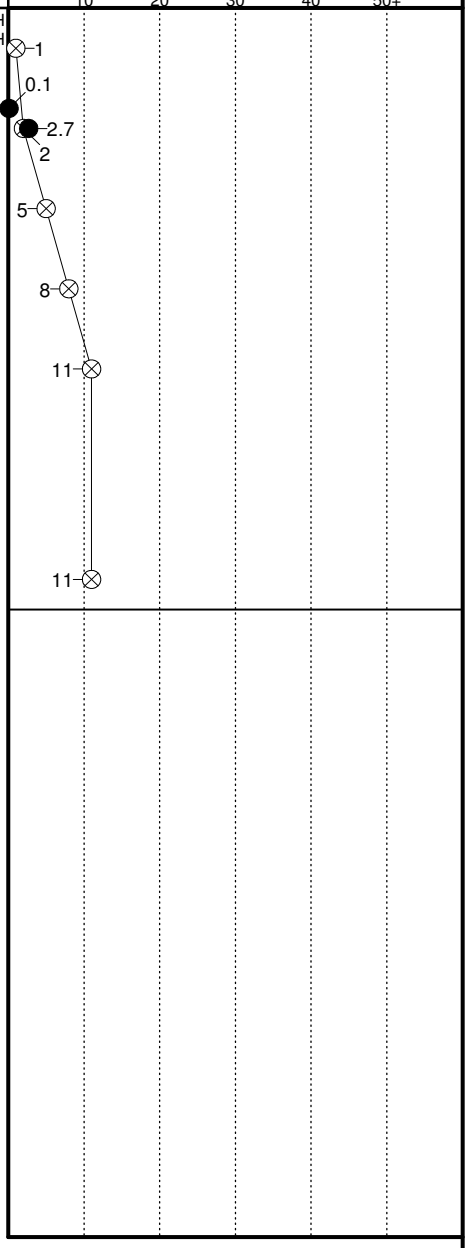
STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 26.94

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	24	24	(SP) FINE SAND, Gray, Moist, Very Loose to Loose		25	WOH WOH 1 1 1 1 1 1 3 2 3 3 3 4 4 5 5 6 5 5
	D4S-287 S-2	SS	60 24	24				
5	S-3	SS	24	24			20	
	S-4	SS	24	24				
	S-5	SS	24	24	(SP) FINE SAND, Orange Brown, Moist, Medium Dense		15	
10								
	S-6	SS	18	18				5 5 6
15					END OF BORING @ 15'		10	
20							5	
25							0	
30								



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

WL NE WS ☐ WD ☒	BORING STARTED 01/18/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/18/17	HAMMER TYPE Auto
WL	RIG ATV FOREMAN D. Francis	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	B-4	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING	EASTING	STATION

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING ▰ LOSS OF CIRCULATION (100%)

SURFACE ELEVATION 24.71

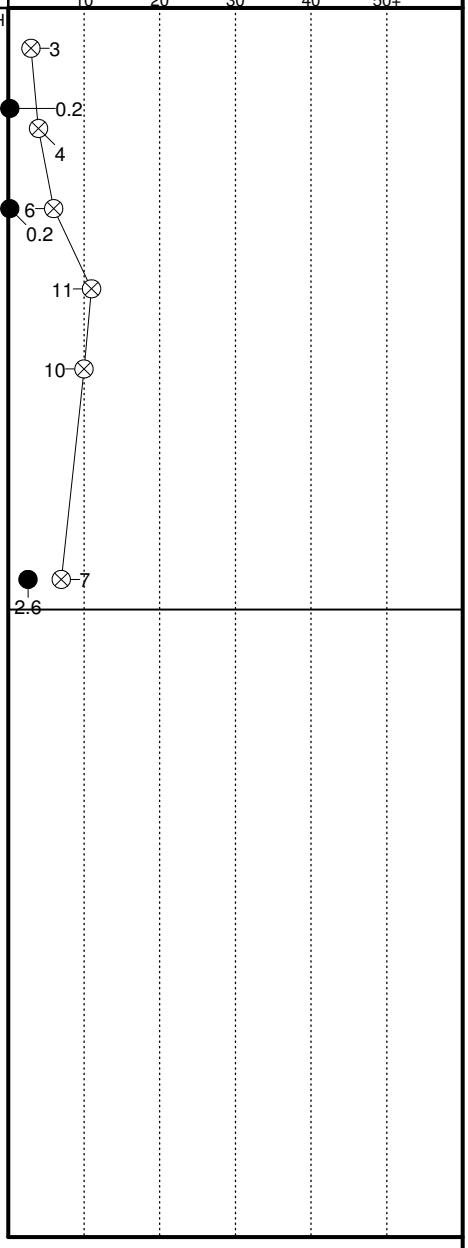
DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	24	24	(SP) FINE SAND, Gray, Moist, Very Loose to Medium Dense			WOH 2 1 2
	290 S-2	SS	60 24	24				2 2 2 2 3
5	291 S-3	SS	120 24	24			20	3 3 3 3 4
	S-4 D4S-285	SS	24 60	24				4 5 6 8 7
	S-5	SS	24	24	(SP) FINE SAND, Orange Brown, Moist, Medium Dense to Loose		15	5 5 6
10								
	S-6	SS	18	18			10	4 3 4
15					END OF BORING @ 15'			
20							5	
25							0	
30							-5	

CALIBRATED PENETROMETER TONS/FT²: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — REC.% — 20% 40% 60% 80% 100%

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+



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

WL NE WS ☐ WD ☒	BORING STARTED 01/18/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/18/17	HAMMER TYPE Auto
WL	RIG ATV FOREMAN D. Francis	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	B-5	1 OF 4

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — - REC.% — : 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION (100%)

SURFACE ELEVATION 22.34

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	24	24	Topsoil Depth [4.00"] (SP) FINE SAND, Gray, Moist, Very Loose			1 1 1 2
	S-2	SS	24	24	(SP) FINE SAND, Orange, Moist, Very Loose to Medium Dense		20	3 3 4 4
5	S-3	SS	24	24				4 4 5 5
	S-4	SS	24	24			15	5 4 5 6
	S-5	SS	24	24				6 6 6 7
10							10	
	S-6	SS	18	18				3 4 6
15								
					(SP) FINE SAND, Gray, Moist to Wet, Medium Dense		5	
	S-7	SS	18	18				5 6 9
20							0	
	S-8	SS	18	18				7 10 11
25							-5	
	S-9	SS	18	18				7 9 11
30								

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

WL WS ☐ WD ☒	BORING STARTED 01/17/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/18/17	HAMMER TYPE Auto
WL	RIG ATV FOREMAN D. Francis	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	B-5	2 OF 4

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — - REC.% — : 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

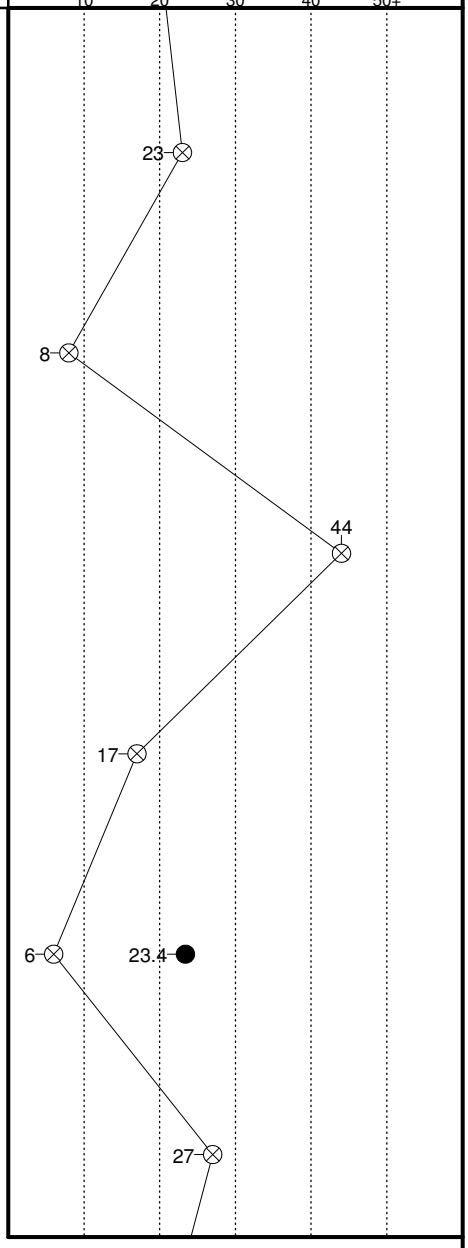
STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 22.34

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					(SP) FINE SAND, Gray, Moist to Wet, Medium Dense		-10	
	S-10	SS	18	18				7 10 13
35								
					(SP) FINE SAND, Dark Gray, Wet, Medium Dense		-15	
	S-11	SS	18	18				4 4 4
40								
					(SP) FINE SAND, Gray, Wet, Loose to Dense, Contains Shell Fragments		-20	
	S-12	SS	18	18				17 21 23
45								
							-25	
	S-13	SS	18	18				9 10 7
50								
							-30	
	S-14	SS	18	18				5 3 3
55								
					(SP-SM) FINE SAND WITH SILT, Gray, Wet, Medium Dense, Contains Shell Fragments		-35	
	S-15	SS	18	18				9 14 13
60								



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

WL WS ☐ WD ☒	BORING STARTED 01/17/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/18/17	HAMMER TYPE Auto
WL	RIG ATV FOREMAN D. Francis	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	B-5	3 OF 4

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — - REC.% — : 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 22.34

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					(SP-SM) FINE SAND WITH SILT, Gray, Wet, Medium Dense, Contains Shell Fragments		-40	
65	S-16	SS	18	18				6 7 13
							-45	
70	S-17	SS	18	18				6 7 7
							-50	
75	S-18	SS	18	18				7 10 11
							-55	
80	S-19	SS	18	18				13 9 10
					(SP-SM) FINE SAND WITH SILT, Gray, Wet, Medium Dense, Contains Cemented Sand Fragments		-60	
85	S-20	SS	18	18				7 8 9
							-65	
90	S-21	SS	18	18	(SP-SM) FINE SAND WITH SILT, Tan, Wet, Medium Dense to Dense, Contains Cemented Sand Fragments			9 9 11

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

WL WS ☐ WD ☒	BORING STARTED 01/17/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/18/17	HAMMER TYPE Auto
WL	RIG ATV FOREMAN D. Francis	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	B-5	4 OF 4

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — - REC.% — : 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION 100%

SURFACE ELEVATION 22.34

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					(SP-SM) FINE SAND WITH SILT, Tan, Wet, Medium Dense to Dense, Contains Cemented Sand Fragments		-70	
95	S-22	SS	18	18				15 15 15
					(CH) SANDY FAT CLAY, Gray, Moist, Very Stiff		-75	
	S-23	SS	18	18				4 6 10
100					(SM) SILTY FINE SAND, Gray, Wet, Medium Dense, Contains Shell Fragments			
					END OF BORING @ 100'		-80	
105							-85	
110							-90	
115							-95	
120							-100	

30

16

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

WL WS ☐ WD ☒	BORING STARTED 01/17/17		CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/18/17		HAMMER TYPE Auto
WL	RIG ATV	FOREMAN D. Francis	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	B-6	1 OF 4

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — - REC.% — : 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION (100%)

SURFACE ELEVATION 34.98

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	24	24	(SP) FINE SAND, Light Gray, Moist, Very Loose to Loose			1 WOH
	S-2	SS	24	24				1 1
5	S-3	SS	24	24			30	1 1
	S-4	SS	24	24				1 2
	S-5	SS	24	24	(SP) FINE SAND, Orange Brown, Moist, Medium Dense			2 2
10							25	2 3
	S-6	SS	18	18				2 4
15							20	4 4
	S-7	SS	18	18				4 6
20							15	6 6
	S-8	SS	18	18				6 10
25							10	15 10
	S-9	SS	18	18	(SP) FINE SAND, Light Brown, Wet, Medium Dense to Dense			6 9 9
30							5	6 10 10
								6 6 12
								6 9 10

1 WOH 1 3 5 10 25 18 20 18 19

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

WL WS ☐ WD ☒	BORING STARTED 01/23/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/25/17	HAMMER TYPE Manual
WL	RIG ATV FOREMAN D. Register	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	B-6	2 OF 4

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — - REC.% — : 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

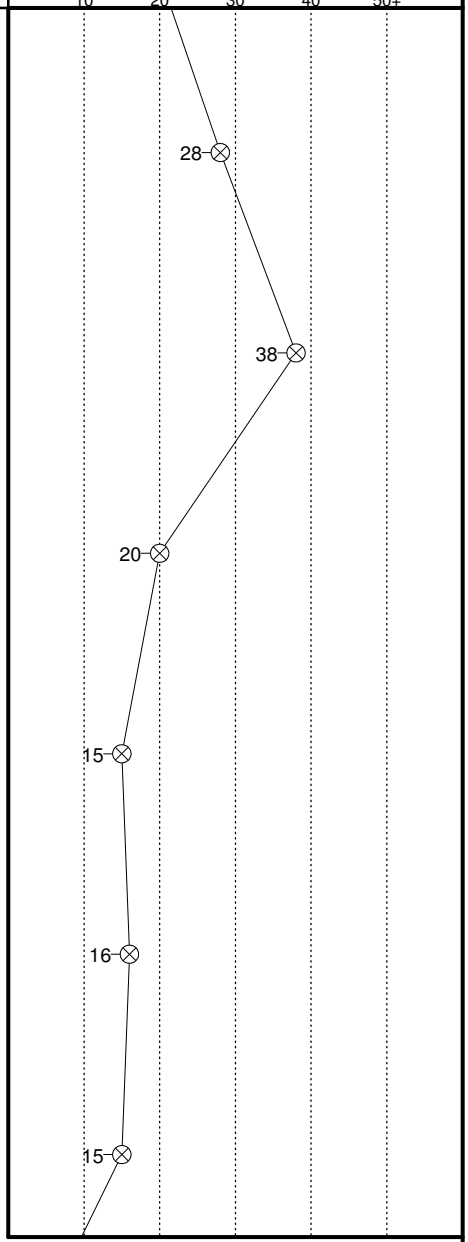
STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION (100%)

SURFACE ELEVATION 34.98

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					(SP) FINE SAND, Light Brown, Wet, Medium Dense to Dense			
	S-10	SS	18	18				10 12 16
35							0	
	S-11	SS	18	18				10 20 18
40							-5	
	S-12	SS	18	18				5 9 11
45							-10	
					(SP) FINE SAND, Brown, Wet, Very Loose to Medium Dense			
	S-13	SS	18	18				3 7 8
50							-15	
	S-14	SS	18	18				4 8 8
55							-20	
	S-15	SS	18	18				2 6 9
60							-25	



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

WL WS ☐ WD ☒	BORING STARTED 01/23/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/25/17	HAMMER TYPE Manual
WL	RIG ATV FOREMAN D. Register	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	B-6	3 OF 4

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — - REC.% — : 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

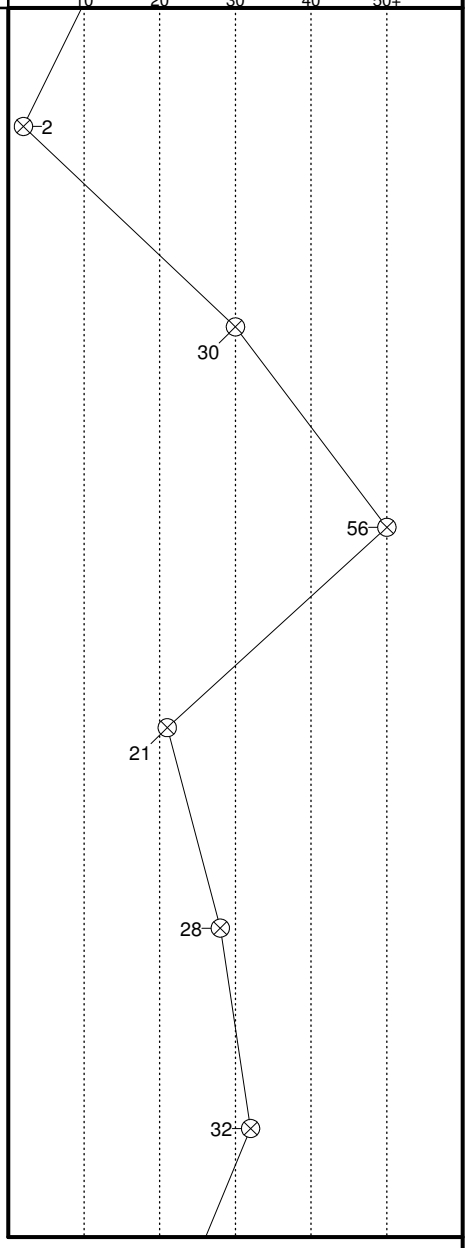
STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION (100%)

SURFACE ELEVATION 34.98

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					(SP) FINE SAND, Brown, Wet, Very Loose to Medium Dense			2 1 1
65	S-16	SS	18	18			-30	
					(SP) FINE SAND, Gray, Wet, Medium Dense, Contains Shell Fragments			10 14 16
70	S-17	SS	18	18			-35	
					(SP) FINE SAND, Gray, Wet, Medium Dense to Very Dense, Moderate Cementation			20 26 30
75	S-18	SS	18	18			-40	
	S-19	SS	18	18				14 12 9
80							-45	
	S-20	SS	18	18				9 14 14
85							-50	
	S-21	SS	18	18				14 18 14
90							-55	



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

WL WS ☐ WD ☒	BORING STARTED 01/23/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/25/17	HAMMER TYPE Manual
WL	RIG ATV FOREMAN D. Register	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	B-6	4 OF 4

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — - REC.% — : 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 34.98

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					(SP) FINE SAND, Gray, Wet, Medium Dense to Very Dense, Moderate Cementation			
95	S-22	SS	18	18			-60	6 13 8
	S-23	SS	18	18				12 17 14
100					END OF BORING @ 100'		-65	
105							-70	
110							-75	
115							-80	
120							-85	

21 31

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

WL WS ☐ WD ☒	BORING STARTED 01/23/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/25/17	HAMMER TYPE Manual
WL	RIG ATV FOREMAN D. Register	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	B-7	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — - REC.% — : 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 31.75

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	24	24	(SP) FINE SAND, Light Gray, Moist, Very Loose to Loose		30	1 1 1 1 1 2
	D4S S-2	SS	60 24	24				1 2 2 3 3
5	S-3	SS	24	24				2 4 3 4 4
	S-4	SS	24	24			25	6 5 4 8 7
	S-5	SS	24	24	(SP) FINE SAND, Orange Brown, Moist, Loose to Medium Dense			6
10	D4S-286		60				20	
	S-6	SS	18	18				4 5 5
15					END OF BORING @ 15'		15	
20							10	
25							5	
30								

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

WL NE WS ☐ WD ☒	BORING STARTED 01/24/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/24/17	HAMMER TYPE Manual
WL	RIG ATV FOREMAN D. Register	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	B-8	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — - REC.% — : 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

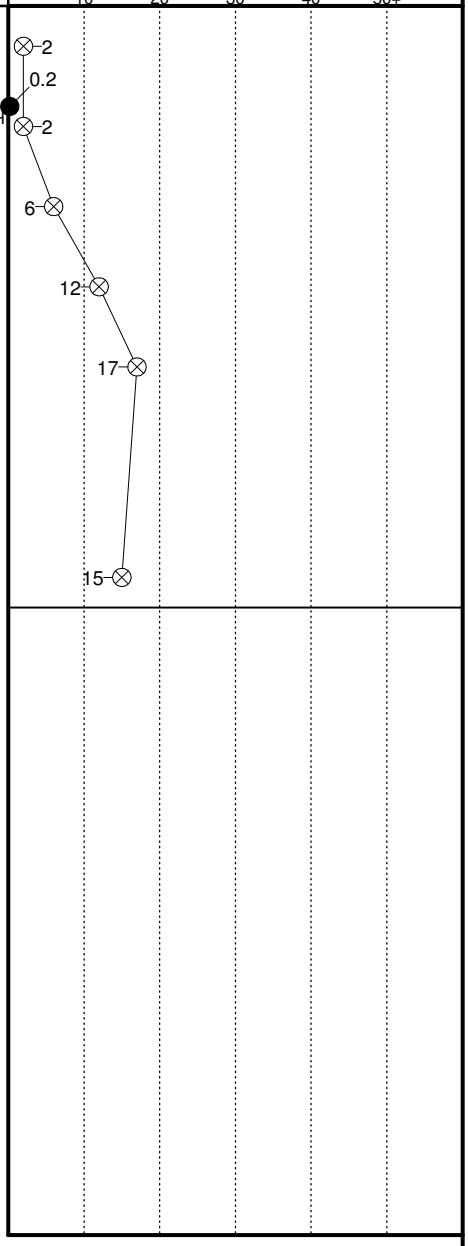
STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 27.05

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	24	24	(SP) FINE SAND, Light Gray, Moist, Very Loose to Medium Dense		25	1 1 1 1 1 1 WOH
	D4S S-2	SS	60 24	24				2 2 2 3 3 4
5	S-3	SS	24	24				6 5 7 6 7 8
	S-4	SS	24	24			20	9 8
	S-5	SS	24	24				
10							15	
	S-6	SS	18	18	(SP) FINE SAND, Orange Brown, Moist, Medium Dense			3 8 7
15					END OF BORING @ 15'		10	
20							5	
25							0	
30								



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

WL NE WS ☐ WD ☒	BORING STARTED 01/24/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/24/17	HAMMER TYPE Manual
WL	RIG ATV FOREMAN D. Register	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	B-9	1 OF 4

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — REC.% — 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

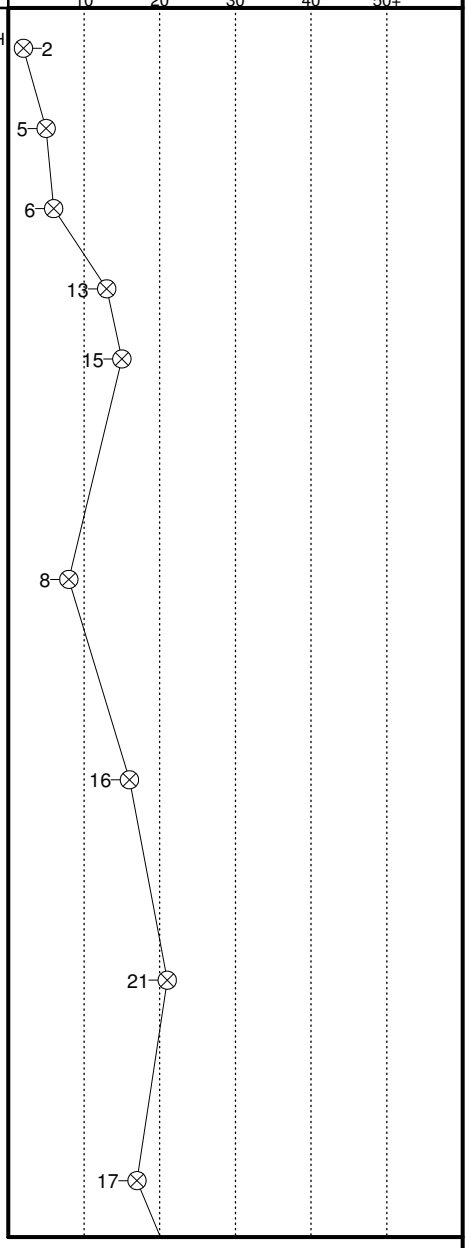
STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 22.36

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	24	24	Topsoil Depth [6.00"] (SP) FINE SAND, Gray, Moist, Very Loose to Loose		20	1 WOH 2
	S-2	SS	24	24				1 1 2
5	S-3	SS	24	24				3 3 3
	S-4	SS	24	24	(SP) FINE SAND, Orange Brown, Moist, Loose to Medium Dense		15	3 3 4 5 6 7
	S-5	SS	18	18				6 8 7 8
10							10	
	S-6	SS	18	18				2 3 5
15					(SP) FINE SAND, Light Brown, Moist to Wet, Medium Dense		5	
	S-7	SS	18	18				6 8 8
20							0	
	S-8	SS	18	18				10 10 11
25							-5	
	S-9	SS	18	18				6 8 9
30								



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

WL WS ☐ WD ☒	BORING STARTED 01/30/17		CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/31/17		HAMMER TYPE Manual
WL	RIG ATV	FOREMAN D. Register	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	B-9	2 OF 4

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — - REC.% — : 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION (100%)

SURFACE ELEVATION 22.36

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					(SP) FINE SAND, Light Brown, Moist to Wet, Medium Dense		-10	
35	S-10	SS	18	18				8 12 16
							-15	
40	S-11	SS	18	18				6 8 9
					(SP) FINE SAND, Gray Brown, Wet, Medium Dense		-20	
45	S-12	SS	18	18				4 5 7
					(SP-SM) FINE SAND WITH SILT, Gray, Wet, Medium Dense to Very Dense,, Contains Shell Fragments		-25	
50	S-13	SS	18	18				24 37 30
							-30	
55	S-14	SS	18	18				21 20 22
							-35	
60	S-15	SS	18	18				10 11 11

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

WL WS ☐ WD ☒	BORING STARTED 01/30/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/31/17	HAMMER TYPE Manual
WL	RIG ATV FOREMAN D. Register	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	B-9	3 OF 4

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — - REC.% — : 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 22.36

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					(SP-SM) FINE SAND WITH SILT, Gray, Wet, Medium Dense to Very Dense,, Contains Shell Fragments		-40	
	S-16	SS	18	18	(SP-SM) FINE SAND WITH SILT, Gray, Wet, Loose to Dense, Moderate Cementation			10 13 19
65							-45	
	S-17	SS	18	18				10 17 35
70							-50	
	S-18	SS	18	18				20 11 10
75							-55	
	S-19	SS	18	18				4 3 7
80							-60	
	S-20	SS	18	18				8 8 10
85							-65	
	S-21	SS	18	18				9 13 11
90								

CONTINUED ON NEXT PAGE.

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

WL WS ☐ WD ☒	BORING STARTED 01/30/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/31/17	HAMMER TYPE Manual
WL	RIG ATV FOREMAN D. Register	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	B-9	4 OF 4

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — - REC.% — : 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

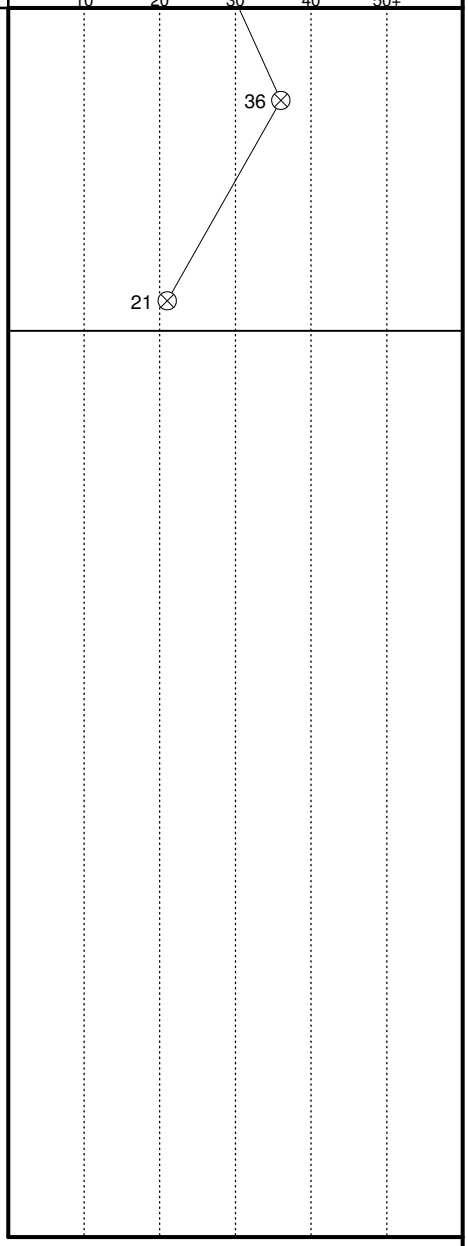
STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION 100%

SURFACE ELEVATION 22.36

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					(SP-SM) FINE SAND WITH SILT, Gray, Wet, Loose to Dense, Moderate Cementation		-70	18 15 21
95	S-22	SS	18	18				
					(SM) SILTY FINE SAND, Gray, Wet, Medium Dense		-75	
	S-23	SS	18	18				4 6 15
100					END OF BORING @ 100'		-80	
105							-85	
110							-90	
115							-95	
120							-100	



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

WL WS ☐ WD ☒	BORING STARTED 01/30/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/31/17	HAMMER TYPE Manual
WL	RIG ATV FOREMAN D. Register	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	B-10	1 OF 4

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — - REC.% — : 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION 100%

SURFACE ELEVATION 37.89

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	24	24	(SP) FINE SAND, Light Gray, Moist, Very Loose to Loose		35	1 WOH 1
	S-2	SS	24	24				1 1 1
5	S-3	SS	24	24				1 2 2
	S-4	SS	24	24	(SP) FINE SAND, Orange Brown, Moist, Medium Dense		30	2 2 2
	S-5	SS	18	18				2 4 6
10								5 8 8
					(SP) FINE SAND, Light Brown, Moist to Wet, Very Loose to Medium Dense		25	10 8 9
	S-6	SS	18	18				4 7 9
15							20	
	S-7	SS	18	18				5 7 7
20								
							15	
	S-8	SS	18	18				2 3 3
25								
							10	
	S-9	SS	18	18				1 WOH 1
30								

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

WL WS ☐ WD ☒	BORING STARTED 01/25/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/25/17	HAMMER TYPE Manual
WL	RIG ATV FOREMAN D. Register	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	B-10	2 OF 4

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION

South Indian River Drive, St. Lucie County, FL

NORTHING	EASTING	STATION

CALIBRATED PENETROMETER TONS/FT2
1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY
RQD% — - REC.% —
20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT
10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

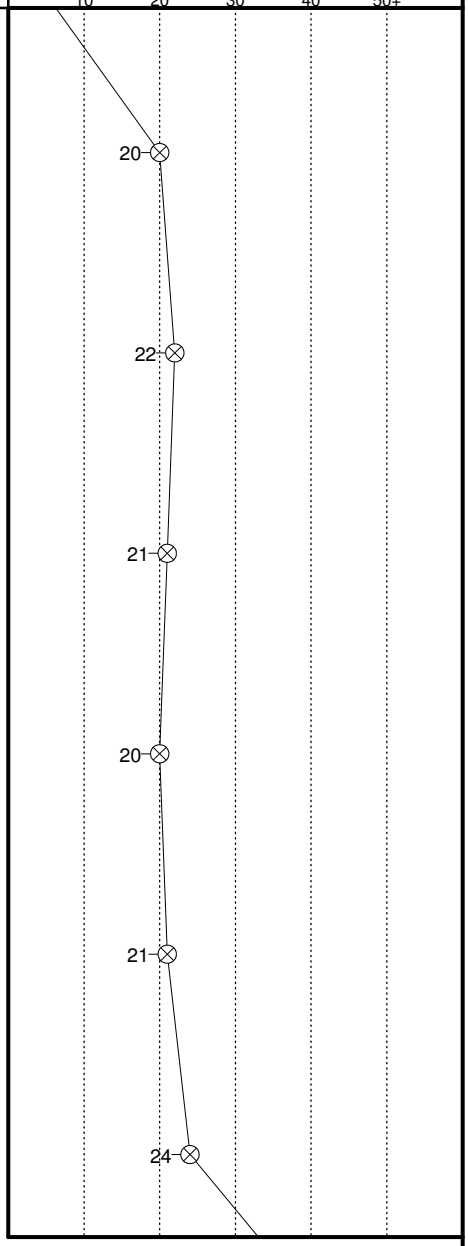
BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 37.89

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
						5	
	S-10	SS	18	18			7 9 11
35						0	
	S-11	SS	18	18			7 11 11
40						-5	
	S-12	SS	18	18			7 10 11
45						-10	
	S-13	SS	18	18			5 9 11
50						-15	
	S-14	SS	18	18			4 9 12
55						-20	
	S-15	SS	18	18			5 10 14
60							

(SP) FINE SAND, Light Brown, Moist to Wet, Very Loose to Medium Dense

(SP-SM) FINE SAND WITH SILT, Brown, Wet, Medium Dense



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

WL WS ☐ WD ☒	BORING STARTED 01/25/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/25/17	HAMMER TYPE Manual
WL	RIG ATV FOREMAN D. Register	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	B-10	3 OF 4

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — - REC.% — : 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 37.89

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					(SP-SM) FINE SAND WITH SILT, Brown, Wet, Medium Dense			
					(SP-SM) FINE SAND WITH SILT, Gray, Wet, Medium Dense to Dense, Contains Shell Fragments		-25	21 18 28
65	S-16	SS	18	18				
							-30	13 14 15
70	S-17	SS	18	18				
							-35	16 15 12
75	S-18	SS	18	18				
					(SP-SM) FINE SAND WITH SILT, Gray, Wet, Medium Dense to Dense, Weak Cementation, Contains Shell Fragments		-40	9 10 10
80	S-19	SS	18	18				
							-45	14 13 12
85	S-20	SS	18	18				
							-50	16 24 12
90	S-21	SS	18	18				

CONTINUED ON NEXT PAGE.

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

WL WS ☐ WD ☒	BORING STARTED 01/25/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/25/17	HAMMER TYPE Manual
WL	RIG ATV FOREMAN D. Register	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	B-10	4 OF 4

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — REC.% — 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 37.89

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					(SP-SM) FINE SAND WITH SILT, Gray, Wet, Medium Dense to Dense, Weak Cementation, Contains Shell Fragments		-55	15 16 8
95	S-22	SS	18	18				24
					(SP-SM) FINE SAND WITH SILT, Gray, Wet, Medium Dense, Weak Cementation		-60	10 14 11
	S-23	SS	18	18				25
100					END OF BORING @ 100'			
							-65	
105								
							-70	
110								
							-75	
115								
							-80	
120								

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

WL WS ☐ WD ☒	BORING STARTED 01/25/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/25/17	HAMMER TYPE Manual
WL	RIG ATV FOREMAN D. Register	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	B-11	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — - REC.% — : 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 37.23

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	24	24	(SP) FINE SAND, Light Gray, Moist, Very Loose to Loose		35	1 WOH 1
	S-2	SS	24	24				1 WOH 2
5	S-3	SS	24	24				1 2 3
	S-4 D4S-284	SS	24 60	24	(SP) FINE SAND, Orange Brown, Moist, Medium Dense		30	5 6 5
	S-5	SS	24	24				8 7 6
10							25	6 6 5
	S-6	SS	18	18				4 5 6
15					END OF BORING @ 15'		20	
20							15	
25							10	
30								

1 WOH 1 1 1 WOH 2 1 2 2 3 5 6 5 8 7 6 6 6 5 4 5 6

1 — WOH — 2 — 5 — 13 — 0.7 — 12 — 11

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

WL NE WS ☐ WD ☒	BORING STARTED 01/24/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/24/17	HAMMER TYPE Manual
WL	RIG ATV FOREMAN D. Register	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	B-12	1 OF 1

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — - REC.% — : 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 27.15

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	24	24	(SP) FINE SAND, Light Gray, Moist, Very Loose to Medium Dense		25	1 1 2
	S-2	SS	24	24				1 1 1
5	S-3	SS	24	24				1 1 2
	S-4 D4S	SS	24 60	24			20	3 3 4
	S-5	SS	24	24				5 4 5
10	D4S2		60		(SP) FINE SAND, Orange Brown, Moist, Loose		15	3 4 7
	S-6	SS	18	18				7 7 5
15					END OF BORING @ 15'		10	6 4
20							5	
25							0	
30								

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

WL NE WS ☐ WD ☒	BORING STARTED 01/24/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/24/17	HAMMER TYPE Manual
WL	RIG ATV FOREMAN D. Register	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	B-13	1 OF 4

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — - REC.% — : 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

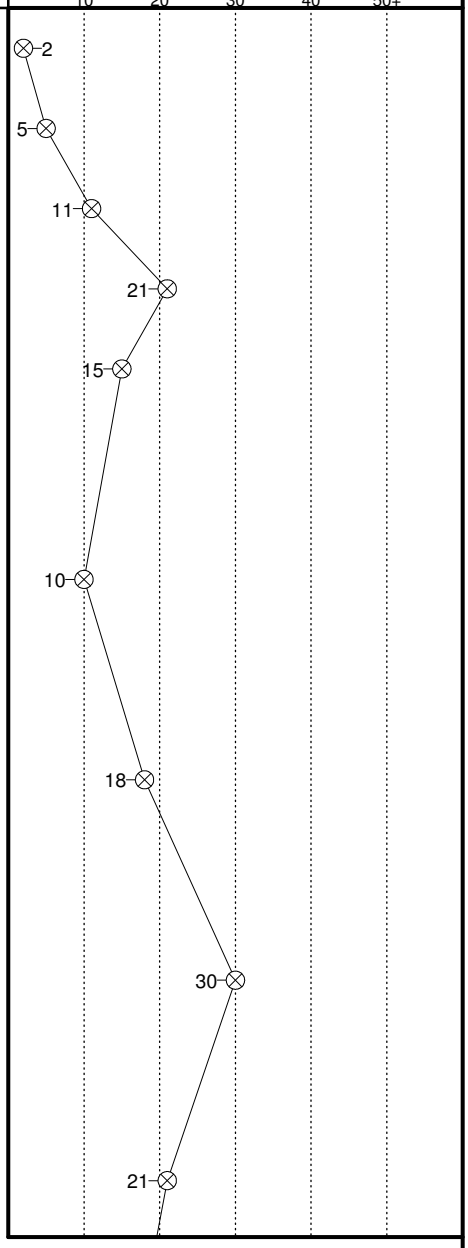
STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION (100%)

SURFACE ELEVATION 21.05

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	24	24	(SP) FINE SAND, Light Gray, Moist, Very Loose		20	1 1 1
	S-2	SS	24	24	(SP) FINE SAND, Orange Brown, Moist, Loose to Medium Dense			1 2 2
5	S-3	SS	24	24			15	3 4 4
	S-4	SS	24	24				5 6 8
	S-5	SS	24	24				11 10 11
10							10	10 4 8
	S-6	SS	18	18				7 9
15							5	4 5 5
					(SP) FINE SAND, Light Brown, Moist to Wet, Medium Dense			
	S-7	SS	18	18				6 9 9
20							0	
	S-8	SS	18	18				9 16 14
25							-5	
	S-9	SS	18	18				6 11 10
30								



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

WL WS ☐ WD ☒	BORING STARTED 01/26/17		CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/27/17		HAMMER TYPE Manual
WL	RIG ATV	FOREMAN D. Register	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	B-13	2 OF 4

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — - REC.% — : 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION 100%

SURFACE ELEVATION 21.05

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					(SP) FINE SAND, Light Brown, Moist to Wet, Medium Dense		-10	
					(SP) FINE SAND, Brown, Wet, Medium Dense to Very Loose			
	S-10	SS	18	18				4 7 9
35							-15	
	S-11	SS	18	18				7 9 10
40							-20	
	S-12	SS	18	18				1 WOH 1
45							-25	
					(SP) FINE SAND, Gray, Wet, Very Dense, Contains Shell Fragments			
	S-13	SS	18	18				19 27 27
50							-30	
					(SP) FINE SAND, Gray, Wet, Very Dense, Moderate Cementation			
	S-14	SS	6	6				50/6
55							-35	
					(SP) FINE SAND, Gray, Wet, Loose to Dense, Weak Cementation			
	S-15	SS	18	18				6 5 5
60							-40	

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

WL WS ☐ WD ☒	BORING STARTED 01/26/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/27/17	HAMMER TYPE Manual
WL	RIG ATV FOREMAN D. Register	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	B-13	3 OF 4

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — - REC.% — : 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION 100%

SURFACE ELEVATION 21.05

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
	S-16	SS	18	18		-45	14 14 18
65							
	S-17	SS	18	18		-50	10 31 18
70							
	S-18	SS	18	18		-55	9 9 7
75							
	S-19	SS	18	18		-60	4 6 6
80							
	S-20	SS	18	18		-65	8 9 8
85							
	S-21	SS	18	18		-70	9 8 10
90							

(SP) FINE SAND, Gray, Wet, Loose to Dense, Weak Cementation

32 49 16 12 17 18

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

WL WS ☐ WD ☒	BORING STARTED 01/26/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/27/17	HAMMER TYPE Manual
WL	RIG ATV FOREMAN D. Register	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	B-13	4 OF 4

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — - REC.% — : 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION (100%)

SURFACE ELEVATION 21.05

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
95	S-22	SS	18	18			-75	9 14 18
					(CH) FAT CLAY WITH SAND, Gray, Wet, Very Stiff			
	S-23	SS	18	18				10 5 12
100					END OF BORING @ 100'		-80	
105							-85	
110							-90	
115							-95	
120							-100	

32

17

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

WL WS ☐ WD ☒	BORING STARTED 01/26/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/27/17	HAMMER TYPE Manual
WL	RIG ATV FOREMAN D. Register	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	B-14	1 OF 4

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION

South Indian River Drive, St. Lucie County, FL

NORTHING	EASTING	STATION

CALIBRATED PENETROMETER TONS/FT2 (1, 2, 3, 4, 5+)

ROCK QUALITY DESIGNATION & RECOVERY
RQD% — - REC.%
20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT
10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION (100%)

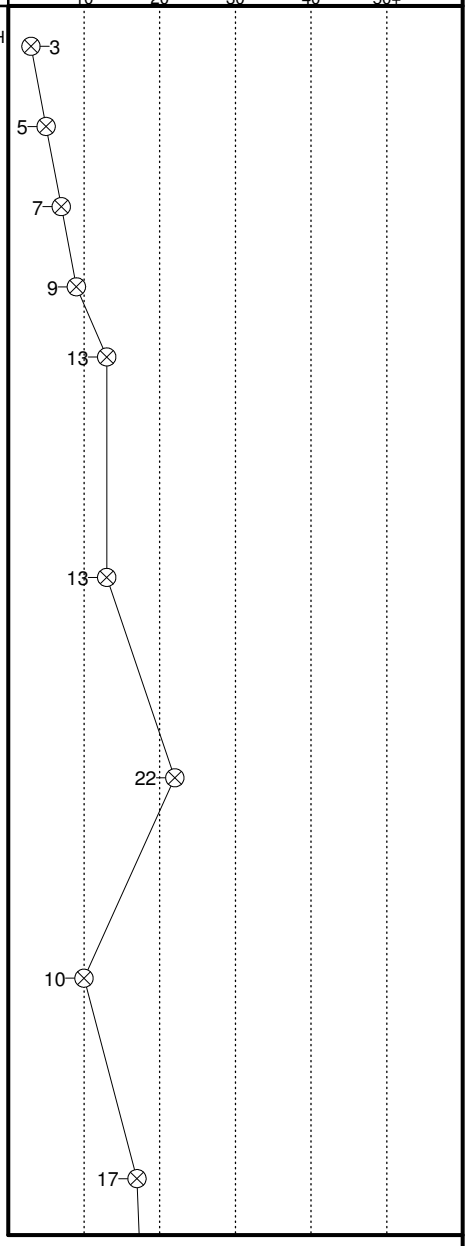
SURFACE ELEVATION 35.31

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	24	24		35	1 WOH
	S-2	SS	24	24			3 3 3
5	S-3	SS	24	24		30	2 3 3
	S-4	SS	24	24			2 3 4
	S-5	SS	18	18			4 5 5
10						25	5 7 6
	S-6	SS	18	18			6 4 9
15						20	
	S-7	SS	18	18			5 8 14
20						15	
	S-8	SS	18	18			4 5 5
25						10	
	S-9	SS	18	18			4 7 10
30						5	

(SP) FINE SAND, Light Gray, Moist, Loose

(SP) FINE SAND, Brown Orange, Moist, Loose to Medium Dense

(SP) FINE SAND, Light Brown, Moist, Loose to Medium Dense Loose to Dense



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

WL WS ☐ WD ☒	BORING STARTED 01/25/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/26/17	HAMMER TYPE Manual
WL	RIG ATV FOREMAN D. Register	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	B-14	2 OF 4

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — REC.% — 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

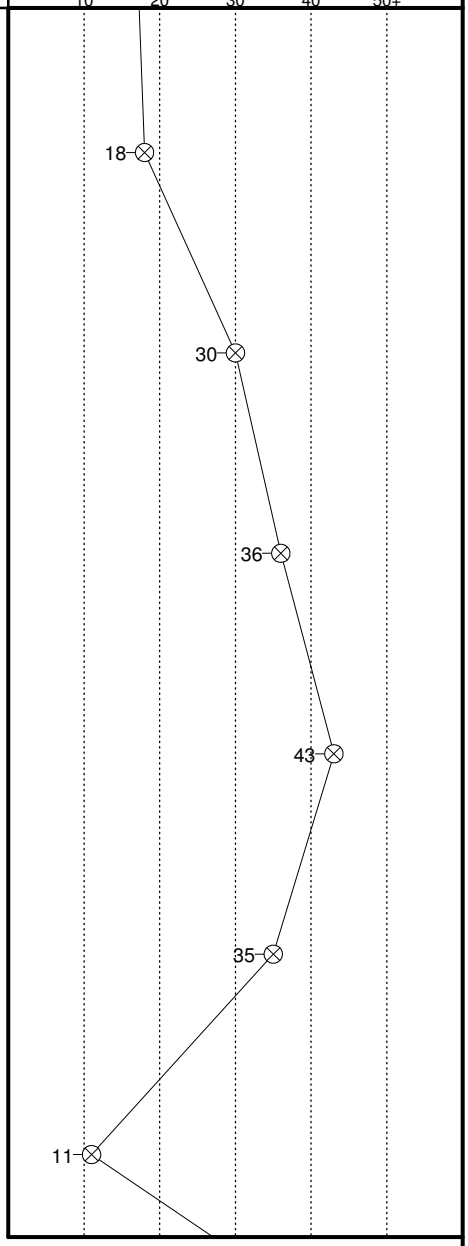
STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION (100%)

SURFACE ELEVATION 35.31

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					(SP) FINE SAND, Light Brown, Moist, Loose to Medium Dense Loose to Dense			
35	S-10	SS	18	18			0	7 7 11
40	S-11	SS	18	18			-5	7 13 17
45	S-12	SS	18	18			-10	8 18 18
					(SP) FINE SAND, Brown, Wet, Loose Medium Dense to Dense			
50	S-13	SS	18	18			-15	10 17 26
55	S-14	SS	18	18			-20	11 14 21
60	S-15	SS	18	18			-25	3 5 6



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

WL WS ☐ WD ☒	BORING STARTED 01/25/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/26/17	HAMMER TYPE Manual
WL	RIG ATV FOREMAN D. Register	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	B-14	3 OF 4

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — REC.%; 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION (100%)

SURFACE ELEVATION 35.31

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
	S-16	SS	18	18		-30	20 30 20
65							
	S-17	SS	18	18		-35	16 18 27
70							
	S-18	SS	18	18		-40	10 10 11
75							
	S-19	SS	18	18		-45	7 11 15
80							
	S-20	SS	18	18		-50	19 21 37
85							
	S-21	SS	18	18		-55	21 32 18
90							

(SP) FINE SAND, Brown, Wet, Loose Medium Dense to Dense

(SP-SM) FINE SAND WITH SILT, Gray, Wet, Dense, Contains Shell Fragments

(SP-SM) FINE SAND WITH SILT, Gray, Wet, Medium Dense to Very Dense, Weak Cementation, Contains Shell Fragments

50 45 21 26 58 50

CONTINUED ON NEXT PAGE.

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

WL WS ☐ WD ☒	BORING STARTED 01/25/17		CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/26/17		HAMMER TYPE Manual
WL	RIG ATV	FOREMAN D. Register	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	B-14	4 OF 4

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — - REC.% — : 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION 100%

SURFACE ELEVATION 35.31

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					(SP-SM) FINE SAND WITH SILT, Gray, Wet, Medium Dense to Very Dense, Weak Cementation, Contains Shell Fragments			15 14 13
95	S-22	SS	18	18			-60	
					(SP-SM) FINE SAND WITH SILT, Gray, Wet, Dense, Weak Cementation			14 19 22
100	S-23	SS	18	18	END OF BORING @ 100'		-65	
105							-70	
110							-75	
115							-80	
120							-85	

27 41

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

WL WS ☐ WD ☒	BORING STARTED 01/25/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/26/17	HAMMER TYPE Manual
WL	RIG ATV FOREMAN D. Register	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	P-1	1 OF 2

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION

South Indian River Drive, St. Lucie County, FL

NORTHING	EASTING	STATION

CALIBRATED PENETROMETER TONS/FT2 (1, 2, 3, 4, 5+)

ROCK QUALITY DESIGNATION & RECOVERY
RQD% — - REC.% —
20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT
10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING ▰ LOSS OF CIRCULATION (100%)

SURFACE ELEVATION 20.60

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	24	24		20	1 1 2
	S-2	SS	24	24			2 3 3
5	S-3	SS	24	24		15	4 4 5
	S-4	SS	24	24			6 6 7
	S-5	SS	24	24		10	7 7 7
10							9 8 8
	S-6	SS	18	18		5	10 9 9
15							9 2 3
	S-7	SS	18	18		0	6 3 4
20							5 9 14
	S-8	SS	18	18		-5	16 9 10
25							12
	S-9	SS	18	18		-10	
30							

Topsoil Depth [6.00"]

(SP) FINE SAND, Light Gray to Orange Brown, Moist, Loose to Medium Dense

(SP) FINE SAND, Light Brown, Moist, Medium Dense, Contains Cemented Sand Lenses

(SP) FINE SAND, Light Brown to Gray, Moist to Wet, Medium Dense to Dense

3 8 13 2.5 17 18 9 9 20.5 30 22

CONTINUED ON NEXT PAGE.

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

WL 18 WS ☐ WD ☒	BORING STARTED 01/17/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/17/17	HAMMER TYPE Manual
WL	RIG ATV FOREMAN	DRILLING METHOD

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	P-1	2 OF 2

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — - REC.% — : 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 20.60

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					(SP) FINE SAND, Light Brown to Gray, Moist to Wet, Medium Dense to Dense			
35	S-10	SS	18	18			-15	9 15 20
40	S-11	SS	18	18			-20	8 15 27
					END OF BORING @ 40'			
45							-25	
50							-30	
55							-35	
60							-40	

S-10: 35 (N-value)

S-11: 42 (N-value)

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

WL 18 WS ☐ WD ☒	BORING STARTED 01/17/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/17/17	HAMMER TYPE Manual
WL	RIG ATV FOREMAN	DRILLING METHOD

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	P-2	1 OF 2

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 20.47

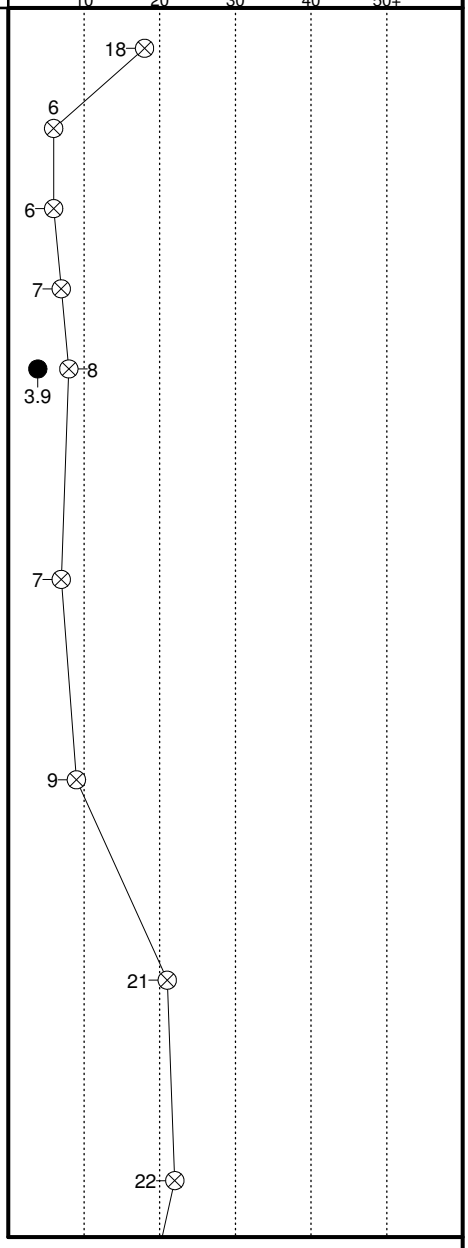
DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	24	24	Topsoil Depth [2.00"] (SP-SM) FINE SAND WITH SILT, Light Brown, Moist, Medium Dense	20	6 9 9
	S-2	SS	24	24	(SP) FINE SAND, Dark Gray to Orange, Moist, Loose to Medium Dense		6 6 6
5	S-3	SS	24	24		15	2 3 3
	S-4	SS	24	24			3 4 3
	S-5	SS	24	24			5 4 4
10						10	4 5
	S-6	SS	18	18	(SP-SM) FINE SAND WITH SILT, Orange to Light Brown, Wet, Loose to Medium Dense		3 3 4
15						5	
	S-7	SS	18	18			3 4 5
20						0	
	S-8	SS	18	18			8 9 12
25						-5	
	S-9	SS	18	18			7 10 12
30						-10	

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY
RQD% — - REC.% —
20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT
10 20 30 40 50+



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

WL WS ☐ WD ☒	BORING STARTED 01/17/17		CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/17/17		HAMMER TYPE Auto
WL	RIG ATV	FOREMAN D. Francis	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	P-2	2 OF 2

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — - REC.% — : 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 20.47

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					(SP-SM) FINE SAND WITH SILT, Orange to Light Brown, Wet, Loose to Medium Dense			
					(SP) FINE SAND, Light Brown, Wet, Medium Dense			
35	S-10	SS	18	18			-15	6 7 9
					(SP-SM) FINE SAND WITH SILT, Gray, Wet, Very Dense, Contains Shell Fragments			
40	S-11	SS	18	18			-20	16 26 37
					END OF BORING @ 40'			
45							-25	
50							-30	
55							-35	
60							-40	

16

63

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

WL WS ☐ WD ☒	BORING STARTED 01/17/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/17/17	HAMMER TYPE Auto
WL	RIG ATV FOREMAN D. Francis	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	P-3	1 OF 2

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION (100%)

SURFACE ELEVATION 18.38

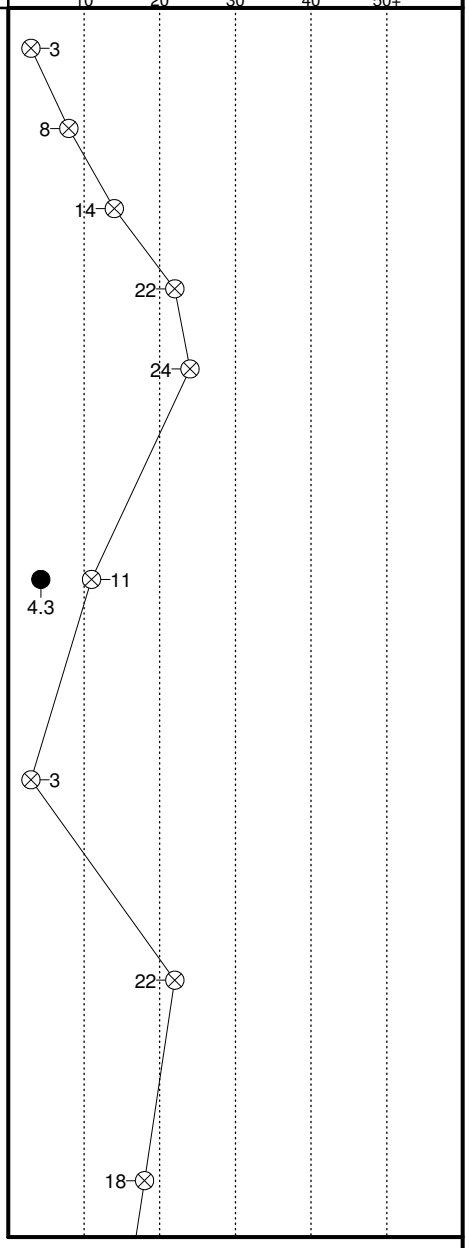
CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — REC.% — 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	24	24	Topsoil Depth [4.00"] (SP-SM) FINE SAND WITH SILT, Gray, Moist, Loose			1 1 2
	S-2	SS	24	24	(SP) FINE SAND, Gray to Brown, Moist, Medium Dense		15	2 3 3
5	S-3	SS	24	24				5 5 7
	S-4	SS	24	24				7 7 8
	S-5	SS	24	24	(SM) HIGHLY WEATHERED LIMESTONE SAMPLED AS SILTY SAND, Tan, Moist, Medium Dense		10	12 11 11
10								12 17 12
					(SP-SM) FINE SAND WITH SILT, Brown, Moist, Medium Dense		5	12 16 4
	S-6	SS	18	18		▽		5 6
15								
					(SP-SM) FINE SAND WITH SILT, Contains Roots, Dark Brown, Wet, Loose		0	
	S-7	SS	18	18				2 1 2
20								
					(SP) FINE SAND, Gray to Brown, Wet, Medium Dense		-5	
	S-8	SS	18	18				9 11 11
25								
							-10	
	S-9	SS	18	18				5 7 11
30								



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

▽ WL 15 WS ☐ WD ☒	BORING STARTED 01/16/17	CAVE IN DEPTH
▽ WL(SHW) ▼ WL(ACR)	BORING COMPLETED 01/16/17	HAMMER TYPE Auto
▽ WL	RIG ATV FOREMAN D. Francis	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	P-3	2 OF 2

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — - REC.% — : 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

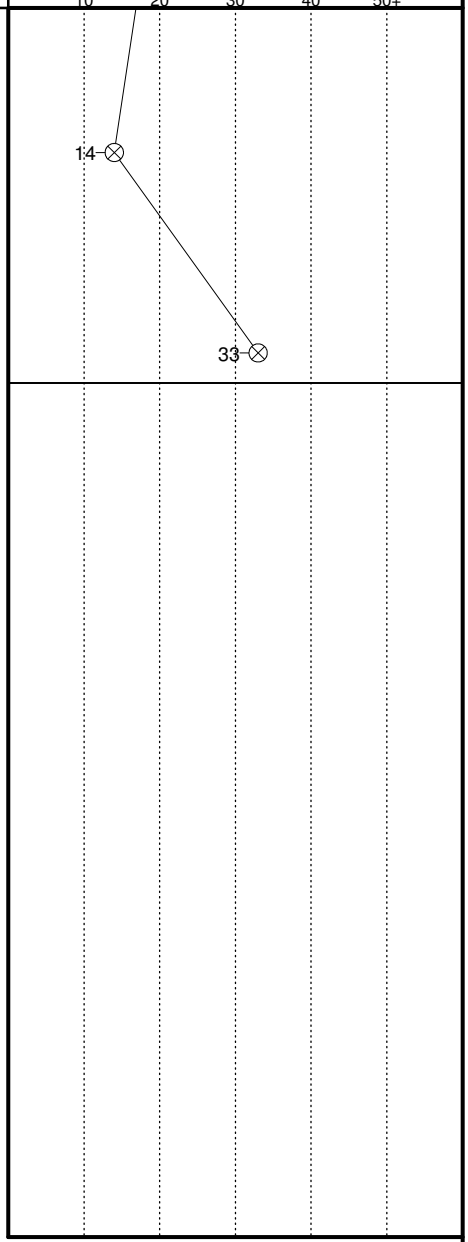
STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 18.38

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					(SP) FINE SAND, Gray to Brown, Wet, Medium Dense			
					(SP-SM) FINE SAND WITH SILT, Gray Brown, Wet, Medium Dense		-15	
	S-10	SS	18	18				3 6 8
35								
					(SP-SM) FINE SAND WITH SILT, Gray, Wet, Dense, Contains Shell Fragments		-20	
	S-11	SS	18	18				8 14 19
40					END OF BORING @ 40'			
							-25	
45								
							-30	
50								
							-35	
55								
							-40	
60								



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

WL 15 WS ☐ WD ☒	BORING STARTED 01/16/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/16/17	HAMMER TYPE Auto
WL	RIG ATV FOREMAN D. Francis	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	P-4	1 OF 2

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION (100%)

SURFACE ELEVATION 18.21

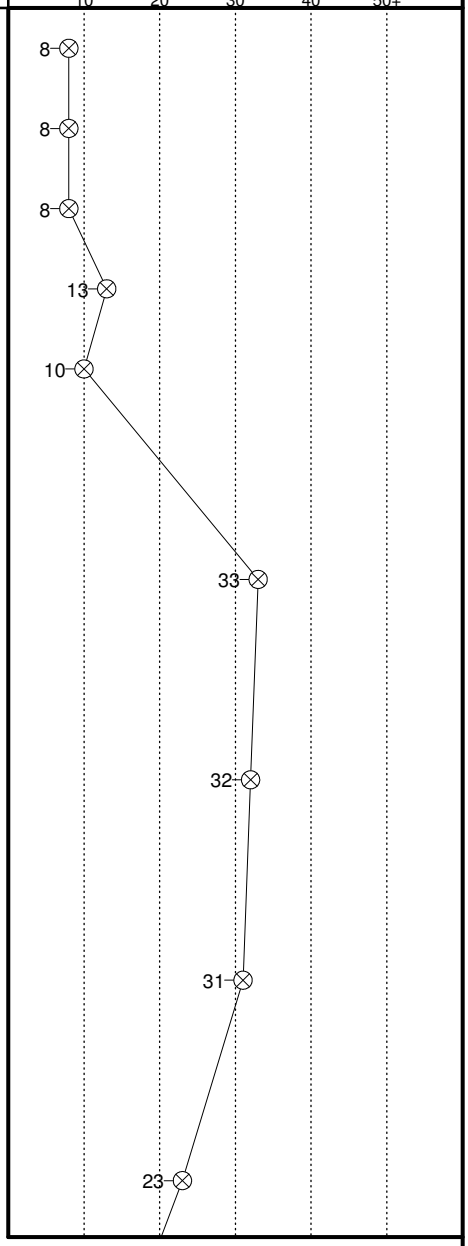
DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	24	24	Topsoil Depth [6.00"] (SP) FINE SAND, Brown Gray to Brown, Moist, Loose to Medium Dense	15	2 4 4
	S-2	SS	24	24			4 3 3
5	S-3	SS	24	24		10	3 4 4
	S-4	SS	24	24			4 4 4
	S-5	SS	24	24		5	4 4 4
10					(SM) HIGHLY WEATHERED LIMESTONE SAMPLED AS SILTY SAND, Tan, Moist, Dense		4 7 6
	S-6	SS	18	18		0	6 7 7
15					(SP) FINE SAND, Orange to Brown, Wet, Medium Dense to Dense		4 4 6
	S-7	SS	18	18		-5	6 5 18
20							15 10 12
	S-8	SS	18	18		-10	20 9 15
25							16 10 11
	S-9	SS	18	18			12
30							

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY
RQD% — - REC.%
20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT
10 20 30 40 50+



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

WL 17 WS ☐ WD ☒	BORING STARTED 01/16/17		CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/16/17		HAMMER TYPE Auto
WL	RIG ATV	FOREMAN M. Foster	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	P-4	2 OF 2

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — - REC.% — : 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION 100%

SURFACE ELEVATION 18.21

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					(SP) FINE SAND, Orange to Brown, Wet, Medium Dense to Dense		-15	
35	S-10	SS	18	18				4 5 8
					(SP-SM) FINE SAND WITH SILT, Light Brown, Wet, Medium Dense, Contains Shell Fragments		-20	
40	S-11	SS	18	18				2 7 13
					END OF BORING @ 40'		-25	
45							-30	
50							-35	
55							-40	
60								

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

WL 17 WS ☐ WD ☒	BORING STARTED 01/16/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/16/17	HAMMER TYPE Auto
WL	RIG ATV FOREMAN M. Foster	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	W-1	1 OF 3

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — - REC.% — : 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

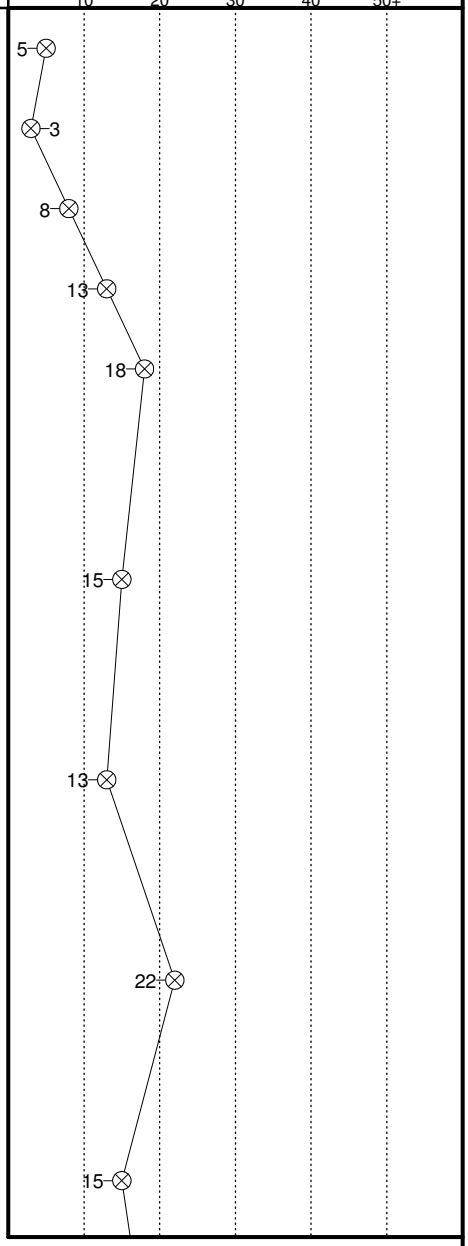
STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 29.71

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	24	24	(SP) FINE SAND, Light Gray, Moist, Very Loose to Medium Dense			1 2 3 2
	S-2	SS	24	24				1 1 2 3
5	S-3	SS	24	24			25	4 4 4 5
	S-4	SS	24	24				6 6 7 6
	S-5	SS	24	24	(SP) FINE SAND, Orange Brown, Moist, Medium Dense			5 9 9 8
10							20	
	S-6	SS	18	18				4 7 8
15							15	
					(SP) FINE SAND, Light Brown, Moist to Wet, Medium Dense			
	S-7	SS	18	18				4 6 7
20							10	
	S-8	SS	18	18				7 10 12
25							5	
	S-9	SS	18	18				8 7 8
30							0	



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

WL WS ☐ WD ☒	BORING STARTED 01/26/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/26/17	HAMMER TYPE Manual
WL	RIG ATV FOREMAN D. Register	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	W-1	2 OF 3

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — - REC.% — : 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

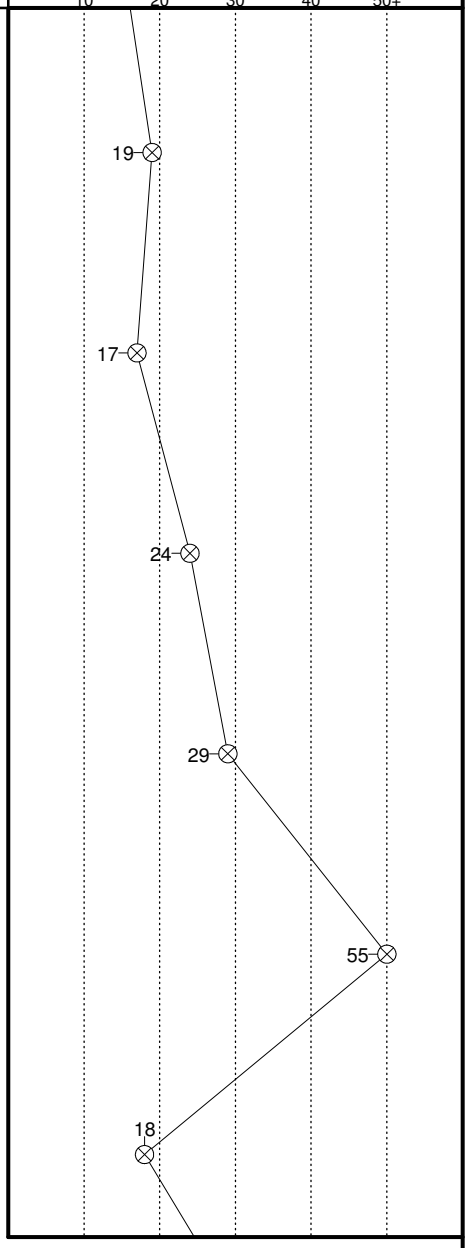
STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION (100%)

SURFACE ELEVATION 29.71

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
					(SP) FINE SAND, Light Brown, Moist to Wet, Medium Dense			
	S-10	SS	18	18			-5	6 8 11
35								
					(SP) FINE SAND, Brown, Wet, Medium Dense			
	S-11	SS	18	18			-10	3 7 10
40								
	S-12	SS	18	18			-15	6 11 13
45								
	S-13	SS	18	18			-20	8 11 18
50								
					(SP) FINE SAND, Gray, Wet, Medium Dense to Very Dense, Contains Shell Fragments			
	S-14	SS	18	18			-25	23 30 25
55								
	S-15	SS	18	18			-30	6 7 11
60								



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

WL WS ☐ WD ☒	BORING STARTED 01/26/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/26/17	HAMMER TYPE Manual
WL	RIG ATV FOREMAN D. Register	DRILLING METHOD SPT

CLIENT	JOB #	BORING #	SHEET
Florida Inland Navigation District	24842	W-1	3 OF 3

PROJECT NAME	ARCHITECT-ENGINEER
Dredged Material Management Area M-8	Taylor Engineering, Inc.

SITE LOCATION: South Indian River Drive, St. Lucie County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT2: 1 2 3 4 5+

ROCK QUALITY DESIGNATION & RECOVERY: RQD% — REC.%; 20% 40% 60% 80% 100%

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

STANDARD PENETRATION BLOWS/FT: 10 20 30 40 50+

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 29.71

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
	S-16	SS	18	18		-35	18 19 15
65							
	S-17	SS	18	18		-40	8 13 22
70							
	S-18	SS	18	18		-45	9 11 13
75							
	S-19	SS	18	18		-50	37 20 31
80							
	S-20	SS	18	18		-55	12 13 18
85							
	S-21	SS	10	10		-60	50 50/4
90							

(SP) FINE SAND, Gray, Wet, Medium Dense to Very Dense, Contains Shell Fragments

(SP) FINE SAND, Gray, Wet, Medium Dense to Very Dense, Weak Cementation, Contains Shell Fragments

END OF BORING @ 90'

34 35 24 51 31 50/4

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

WL WS ☐ WD ☒	BORING STARTED 01/26/17	CAVE IN DEPTH
WL(SHW) WL(ACR)	BORING COMPLETED 01/26/17	HAMMER TYPE Manual
WL	RIG ATV FOREMAN D. Register	DRILLING METHOD SPT

FIELD EXPLORATION PROCEDURES

Standard Penetration Test (SPT) Borings

The Standard Penetration Test (SPT) borings were made in general accordance with the latest revision of ASTM D 1586, "Penetration Test and Split-Barrel Sampling of Soils". The borings were advanced by rotary (or "wash-n-chop") drilling techniques. At 2 ½ to 5 foot intervals, a split-barrel sampler inserted to the borehole bottom and driven 18 inches into the soil using a 140 pound hammer falling on the average 30 inches per hammer blow. The number of hammer blows for the final 12 inches of penetration is termed the "penetration resistance, blow count, or N-value". This value is an index to several in-place geotechnical properties of the material tested, such as relative density and Young's Modulus.

After driving the sampler 18 inches (or less if in hard rock-like material), the sampler was retrieved from the borehole and representative samples of the material within the split-barrel were containerized and sealed. After completing the drilling operations, the samples for each boring were transported to our laboratory where they were examined by our engineer in order to verify the driller's field classification. The retrieved samples will be kept in our facility for a period of six (6) months unless directed otherwise.

Ellis & Associates inc.

KEY TO SOIL CLASSIFICATION

Description of Compactness or Consistency in Relation
To Standard Penetration Resistance

Granular Materials		
Relative Density	**Safety Hammer SPT N-Value (Blow/Foot)**	**Automatic Hammer SPT N-Value (Blow/Foot)**
Very Loose	Less than 4	Less than 3
Loose	4 – 10	3 – 8
Medium Dense	10 – 30	8 – 24
Dense	30 – 50	24 – 40
Very Dense	Greater than 50	Greater than 40

Silts and Clays		
Consistency	**Safety Hammer SPT N-Value (Blow/Foot)**	**Automatic Hammer SPT N-Value (Blow/Foot)**
Very Soft	Less than 2	Less than 1
Soft	2 – 4	1 – 3
Firm	4 – 8	3 – 6
Stiff	8 – 15	6 – 12
Very Stiff	15 – 30	12 – 24
Hard	Greater than 30	Greater than 24

DESCRIPTION OF SOIL COMPOSITION**

(Unified Soil Classification System)

MAJOR DIVISION		Group Symbol	LABORATORY CLASSIFICATION CRITERIA		SOIL DESCRIPTION
			FINER THAN 200 SIEVE %	SUPPLEMENTARY REQUIREMENTS	
Coarse grained (over 50% by weight coarser than No. 200 sieve)	Gravelly soils (over half of coarse fraction larger than No. 4)	GW	<5*	D_{60}/D_{10} greater than 4, $D_{30}^2 / (D_{60} \times D_{10})$ between 1 & 3	Well graded gravels, sandy gravels
		GP	<5*	Not meeting above gradation for GW	Gap graded or uniform gravels, sandy gravels
		GM	>12*	PI less than 4 or below A-line	Silty gravels, silty sandy gravels
		GC	>12*	PI over 7 above A-line	Clayey gravels, clayey sandy gravels
	Sandy soils (over half of coarse fraction finer than No. 4)	SW	<5*	D_{60}/D_{10} greater than 6, $D_{30}^2 / (D_{60} \times D_{10})$ between 1 & 3	Well graded sands, gravelly sands
		SP	<5*	Not meeting above gradation requirements	Gap graded or uniform sands, gravelly sands
		SM	>12*	PI less than 4 or below A-line	Silty sands, silty gravelly sands
		SC	>12*	PI over 7 and above A-line	Clayey sands, clayey gravelly sands
Fine grained (over 50% by weight finer than No. 200 sieve)	Low compressibility (liquid limit less than 50)	ML	Plasticity chart		Silts, very fine sands, silty or clayey fine sands, micaceous silts
		CL	Plasticity chart		Low plasticity clays, sandy or silty clays
		OL	Plasticity chart, organic odor or color		Organic silts and clays of low plasticity
	High compressibility (liquid limit more than 50)	MH	Plasticity chart		Micaceous silts, diatomaceous silts, volcanic ash
		CH	Plasticity chart		Highly plastic clays and sandy clays
		OH	Plasticity chart, organic odor or color		Organic silts and clays of high plasticity
Soils with fibrous organic matter		PT	Fibrous organic matter; will char, burn or glow		Peat, sandy peats, and clayey peat

* For soils having 5 to 12 percent passing the No. 200 sieve, use a dual symbol such as SP-SM.
** Standard Classification of Soils for Engineering Purposes (ASTM D 2487)

SAND/GRAVEL DESCRIPTION MODIFIERS	
Modifier	**Sand/Gravel Content**
Trace	<15%
With	15% to 29%
Sandy/Gravelly	>29%

ORGANIC MATERIAL MODIFIERS	
Modifier	**Organic Content**
Trace	1% to 2%
Few	2% to 4%
Some	4% to 8%
Many	>8%

SILT/CLAY DESCRIPTION MODIFIERS	
Modifier	**Silt/Clay Content**
Trace	<5%
With	5% to12%
Silty/Clayey	13% to 35%
Very	>35%

APPENDIX B

LABORATORY TESTING SUMMARY
LABORATORY TEST PROCEDURES

Laboratory Testing Summary

Sample Source	Sample Number	Depth (feet)	MC[1] (%)	Soil Type[2]	Atterberg Limits[3]			Percent Passing No. 200 Sieve[4]	Moisture - Density (Corr.)[5]		CBR Value[6]	Other
					LL	PL	PI		Maximum Density (pcf)	Optimum Moisture (%)		
B-2												
	S-5	8.00 - 10.00	4.9	SP				1.3				
	S-14	53.50 - 55.00	24.2	SP				2.6				
B-3												
	D4S-287	0.00 - 5.00	0.1	SP				0.5	106.0	14.0		
	S-2	2.00 - 4.00	2.7	SP				0.8				
B-4												
	291	0-10.00 - 10.00							107.8	14.5		
	290	0.00 - 5.00	0.2	SP				0.9				OC=0.28
	S-3	4.00 - 6.00	0.2	SP				0.1				
	S-6	13.50 - 15.00	2.6	SP				0.7				
B-5												
	S-3	4.00 - 6.00	1.6	SP				2.1				
	S-14	53.50 - 55.00	23.4	SP				3.3				
	S-21	88.50 - 90.00	13.8	SP-SM				9.0				
B-6												
B-7												
	D4S	0.00 - 5.00	1.5	SP				0.6	102.2	15.8		OC=0.10
	S-3	4.00 - 6.00	1.5	SP				0.2				
	D4S-286	10.00 - 15.00	2.9					3.2				
B-8												
	D4S	0.00 - 5.00	0.2	SP				0.7	105.4	13.1		
B-11												
	D4S-284	5.00 - 10.00	0.7	SP				1.0	108.7	13.1		

Notes: 1. ASTM D 2216, 2. ASTM D 2487, 3. ASTM D 4318, 4. ASTM D 1140, 5. See test reports for test method, 6. See test reports for test method

Definitions: MC: Moisture Content, Soil Type: USCS (Unified Soil Classification System), LL: Liquid Limit, PL: Plastic Limit, PI: Plasticity Index, CBR: California Bearing Ratio, OC: Organic Content (ASTM D 2974)

Project No.	**24842**
Project Name:	**Dredged Material Management Area M-8**
PM:	**Chris Egan**
PE:	**David Spangler**
Printed On:	**Friday, March 24, 2017**

Ellis & Associates inc.
ECS Group of Companies
7064 Davis Creek Road
Jacksonville, Florida 32256
Ph: (904) 880-0960
Fax: (904) 880-0970

Laboratory Testing Summary

Sample Source	Sample Number	Depth (feet)	MC[1] (%)	Soil Type[2]	Atterberg Limits[3]			Percent Passing No. 200 Sieve[4]	Moisture - Density (Corr.)[5]		CBR Value[6]	Other
					LL	PL	PI		Maximum Density (pcf)	Optimum Moisture (%)		
B-12												
	D4S	5.00 - 10.00	0.7	SP				0.5				OC=0.05
	S-4	6.00 - 8.00	0.7	SP				1.1				
	D4S2	10.00 - 15.00	2.7	SP				0.0	108.7	14.4		
P-1												
	S-4	6.00 - 8.00	2.5	SP				1.5				
	S-7	18.50 - 20.00	20.5	SP				1.2				
P-2												
	S-5	8.00 - 10.00	3.9	SP				2.2				
P-3												
	S-6	13.50 - 15.00	4.3	SP-SM				5.9				

Notes: 1. ASTM D 2216, 2. ASTM D 2487, 3. ASTM D 4318, 4. ASTM D 1140, 5. See test reports for test method, 6. See test reports for test method

Definitions: MC: Moisture Content, Soil Type: USCS (Unified Soil Classification System), LL: Liquid Limit, PL: Plastic Limit, PI: Plasticity Index, CBR: California Bearing Ratio, OC: Organic Content (ASTM D 2974)

Project No.	**24842**
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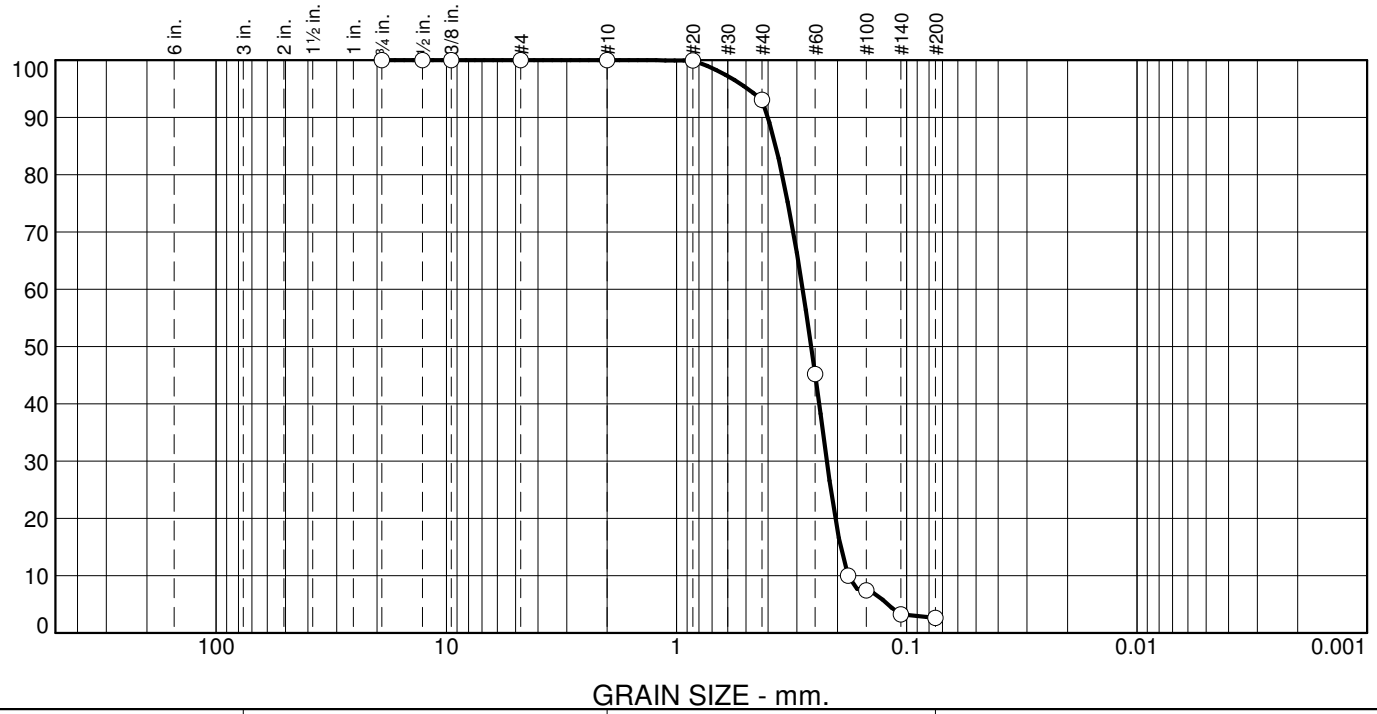
Ellis & Associates inc.
ECS Group of Companies
7064 Davis Creek Road
Jacksonville, Florida 32256
Ph: (904) 880-0960
Fax: (904) 880-0970

Particle Size Distribution Report

Project: Dredged Material Management Area M-8 **Project No.:** 24842

Client: Florida Inland Navigation District

Source of Sample: B-2 **Depth:** 53.5
Sample Number: S-14 **Date:**



% +3"	% Gravel	% Sand		% Fines	
		Coarse	Fine	Silt	Clay
0	0	7	90	3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100		
1/2"	100		
3/8"	100		
#4	100		
#10	100		
#20	100		
#40	93		
#60	45		
#80	10		
#100	7		
#140	3		
#200	2.6		

* (no specification provided)

Material Description

Dark Gray Fine Sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.3714 D_{60}= 0.2830 D_{50}= 0.2598
D_{30}= 0.2222 D_{15}= 0.1938 D_{10}= 0.1800
C_u= 1.57 C_c= 0.97

Classification

USCS= SP AASHTO=

Remarks

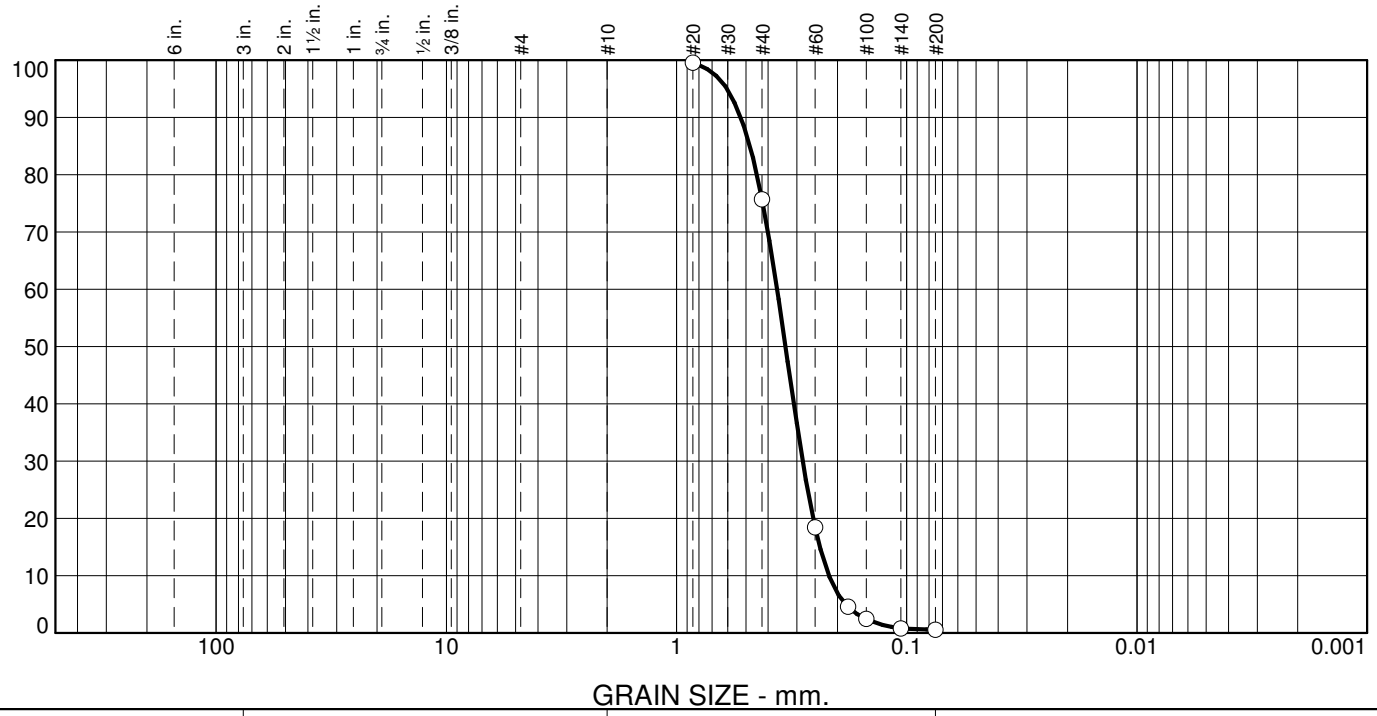
Figure

Particle Size Distribution Report

Project: Dredged Material Management Area M-8 **Project No.:** 24842

Client: Florida Inland Navigation District

Source of Sample: B-3 **Depth:** 0.00-5.00
Sample Number: D4S-287 **Date:**



% +3"	% Gravel	% Sand		% Fines	
		Coarse	Fine	Silt	Clay
			75	1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#20	100		
#40	76		
#60	18		
#80	5		
#100	2		
#140	1		
#200	0.5		

Material Description

Gray Fine Sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.4802 D_{60}= 0.3660 D_{50}= 0.3364
D_{30}= 0.2829 D_{15}= 0.2383 D_{10}= 0.2174
C_u= 1.68 C_c= 1.01

Classification

USCS= SP AASHTO=

Remarks

* (no specification provided)

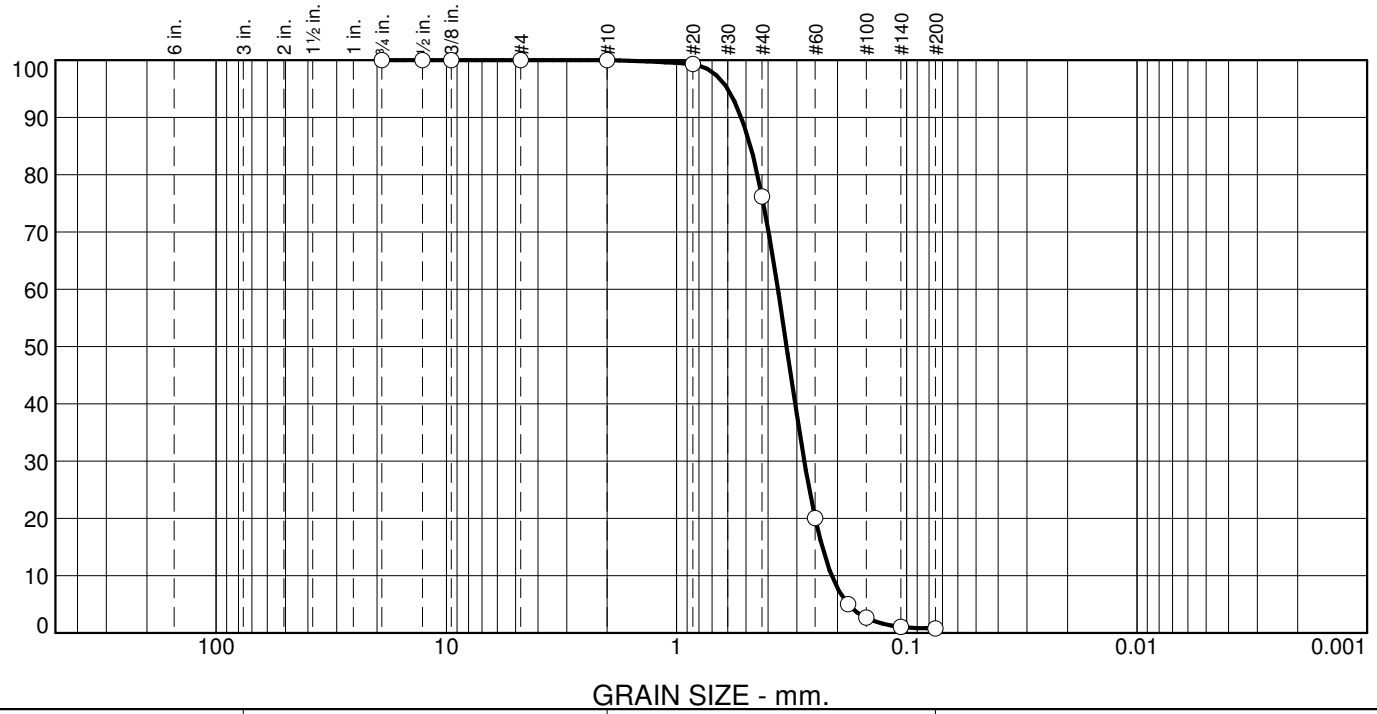
Figure

Particle Size Distribution Report

Project: Dredged Material Management Area M-8 **Project No.:** 24842

Client: Florida Inland Navigation District

Source of Sample: B-3 **Depth:** 2
Sample Number: S-2 **Date:**



% +3"	% Gravel	% Sand		% Fines	
		Coarse	Fine	Silt	Clay
0	0	24	75	1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100		
1/2"	100		
3/8"	100		
#4	100		
#10	100		
#20	99		
#40	76		
#60	20		
#80	5		
#100	3		
#140	1		
#200	0.8		

* (no specification provided)

Material Description

Gray Fine Sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.4778 D_{60}= 0.3628 D_{50}= 0.3327
D_{30}= 0.2784 D_{15}= 0.2328 D_{10}= 0.2117
C_u= 1.71 C_c= 1.01

Classification

USCS= SP AASHTO=

Remarks

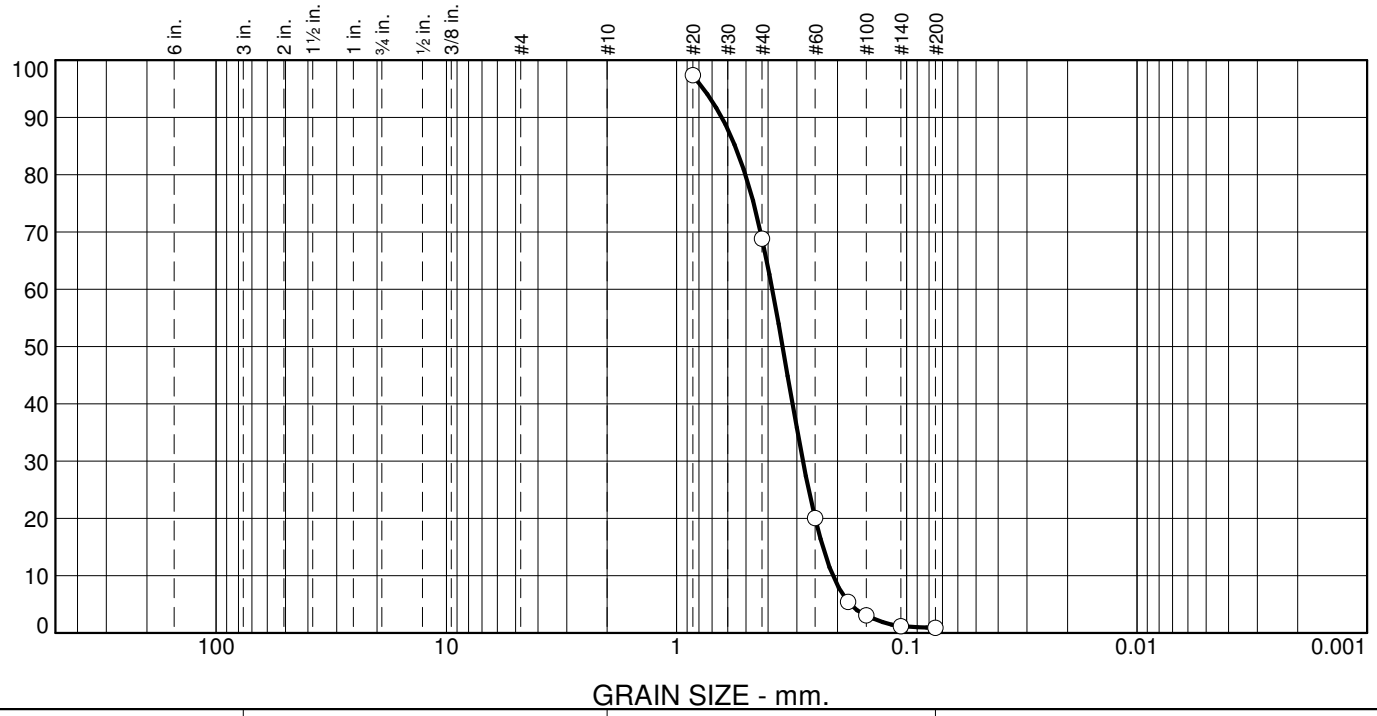
Figure

Particle Size Distribution Report

Project: Dredged Material Management Area M-8 **Project No.:** 24842

Client: Florida Inland Navigation District

Source of Sample: B-4 **Depth:** 0.00-5.00
Sample Number: 290 **Date:**



% +3"	% Gravel	% Sand		% Fines	
		Coarse	Fine	Silt	Clay
			68	1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#20	97		
#40	69		
#60	20		
#80	5		
#100	3		
#140	1		
#200	0.9		

Material Description

Gray Fine Sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.5563 D_{60}= 0.3840 D_{50}= 0.3463
D_{30}= 0.2821 D_{15}= 0.2314 D_{10}= 0.2091
C_u= 1.84 C_c= 0.99

Classification

USCS= SP AASHTO=

Remarks

* (no specification provided)

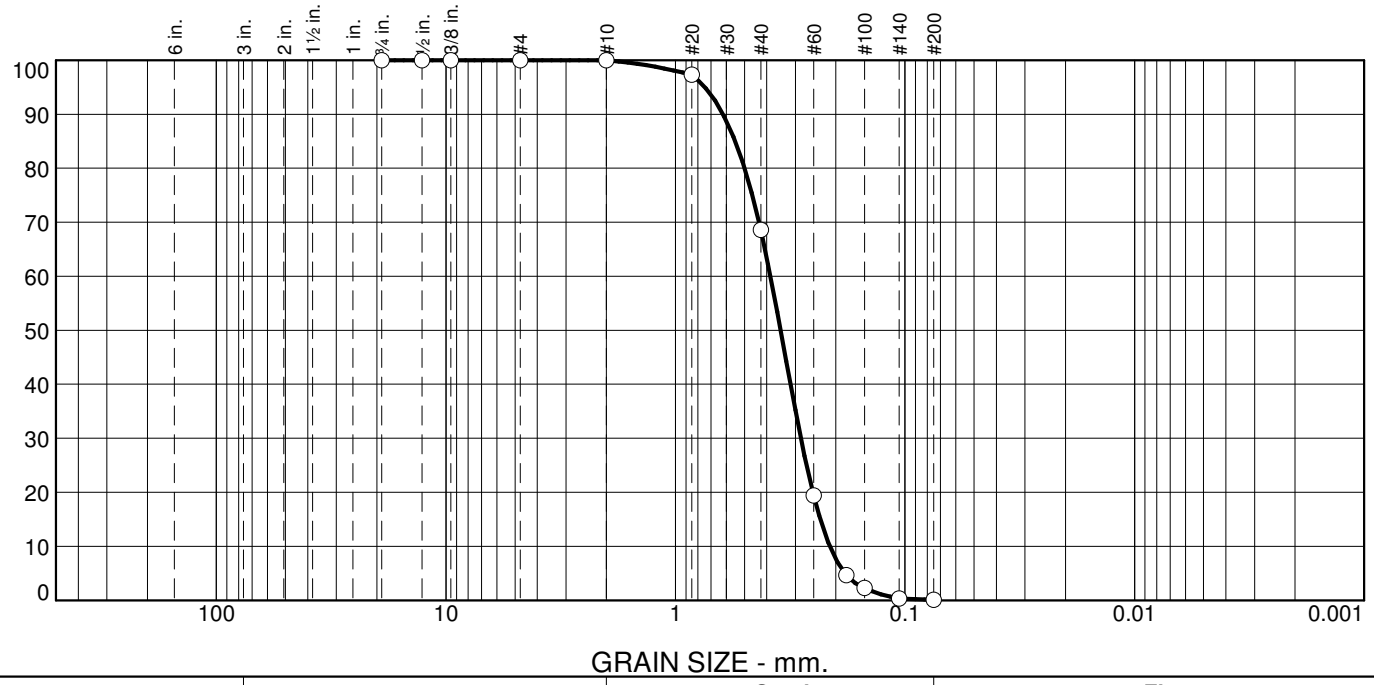
Figure

Particle Size Distribution Report

Project: Dredged Material Management Area M-8 **Project No.:** 24842

Client: Florida Inland Navigation District

Source of Sample: B-4 **Depth:** 4
Sample Number: S-3 **Date:** 2-22-17



% +3"	% Gravel	% Sand		% Fines	
		Coarse	Fine	Silt	Clay
0	0	31	69	0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100		
1/2"	100		
3/8"	100		
#4	100		
#10	100		
#20	97		
#40	69		
#60	19		
#80	5		
#100	2		
#140	0		
#200	0.1		

* (no specification provided)

Material Description

Lt. Gray Fine SA

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.5495 D_{60}= 0.3859 D_{50}= 0.3483
D_{30}= 0.2841 D_{15}= 0.2340 D_{10}= 0.2126
C_u= 1.81 C_c= 0.98

Classification

USCS= SP AASHTO=

Remarks

Figure

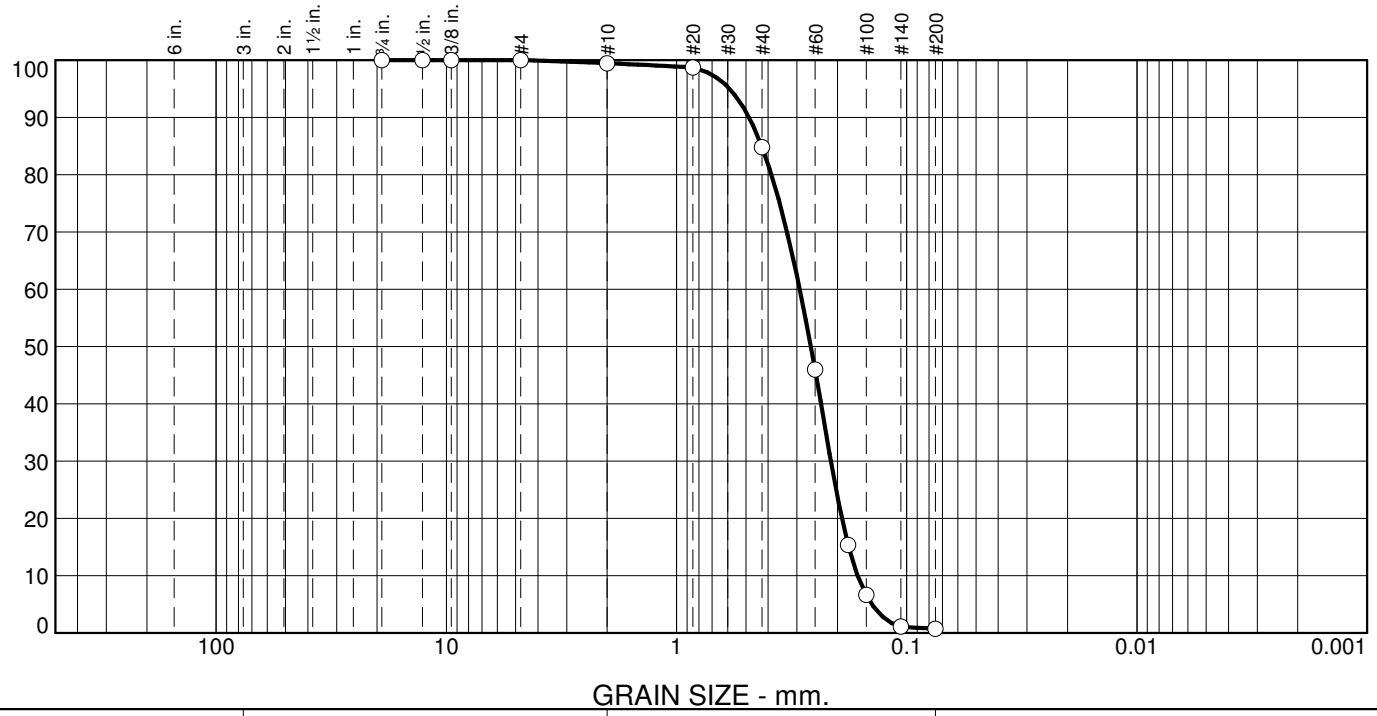
Tested By: CA **Checked By:** JS

Particle Size Distribution Report

Project: Dredged Material Management Area M-8 **Project No.:** 24842

Client: Florida Inland Navigation District

Source of Sample: B-4 **Depth:** 13.5
Sample Number: S-6 **Date:**



% +3"	% Gravel	% Sand		% Fines	
		Coarse	Fine	Silt	Clay
0	1	14	84	1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100		
1/2"	100		
3/8"	100		
#4	100		
#10	99		
#20	99		
#40	85		
#60	46		
#80	15		
#100	7		
#140	1		
#200	0.7		

* (no specification provided)

Material Description

Orange Brown Fine Sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.4269 D_{60}= 0.2915 D_{50}= 0.2607
D_{30}= 0.2134 D_{15}= 0.1790 D_{10}= 0.1636
C_u= 1.78 C_c= 0.95

Classification

USCS= SP AASHTO=

Remarks

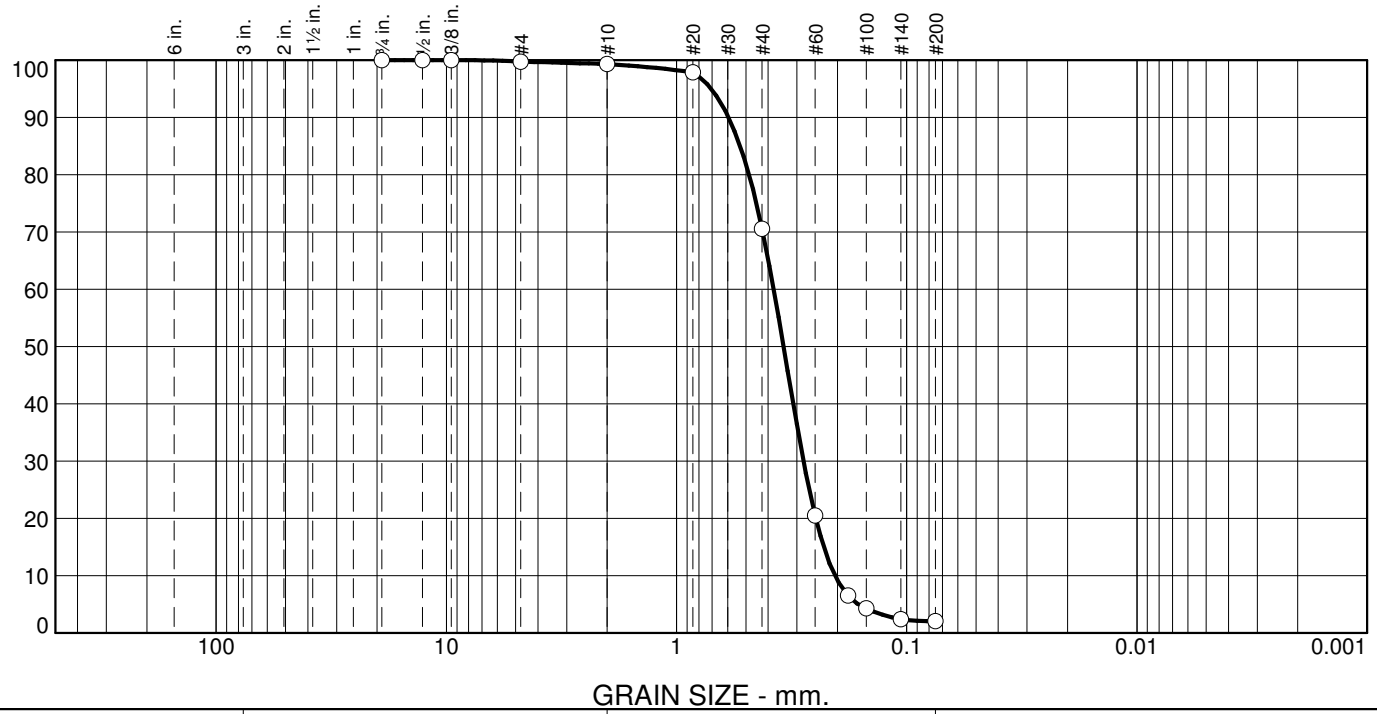
Figure

Particle Size Distribution Report

Project: Dredged Material Management Area M-8 **Project No.:** 24842

Client: Florida Inland Navigation District

Source of Sample: B-5 **Depth:** 4
Sample Number: S-3 **Date:**



% +3"	% Gravel	% Sand		% Fines	
		Coarse	Fine	Silt	Clay
0	1	28	69	2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100		
1/2"	100		
3/8"	100		
#4	100		
#10	99		
#20	98		
#40	71		
#60	20		
#80	7		
#100	4		
#140	2		
#200	2.1		

* (no specification provided)

Material Description

Orange Fine Sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.5292 D_{60}= 0.3786 D_{50}= 0.3429
D_{30}= 0.2806 D_{15}= 0.2291 D_{10}= 0.2048
C_u= 1.85 C_c= 1.01

Classification

USCS= SP AASHTO=

Remarks

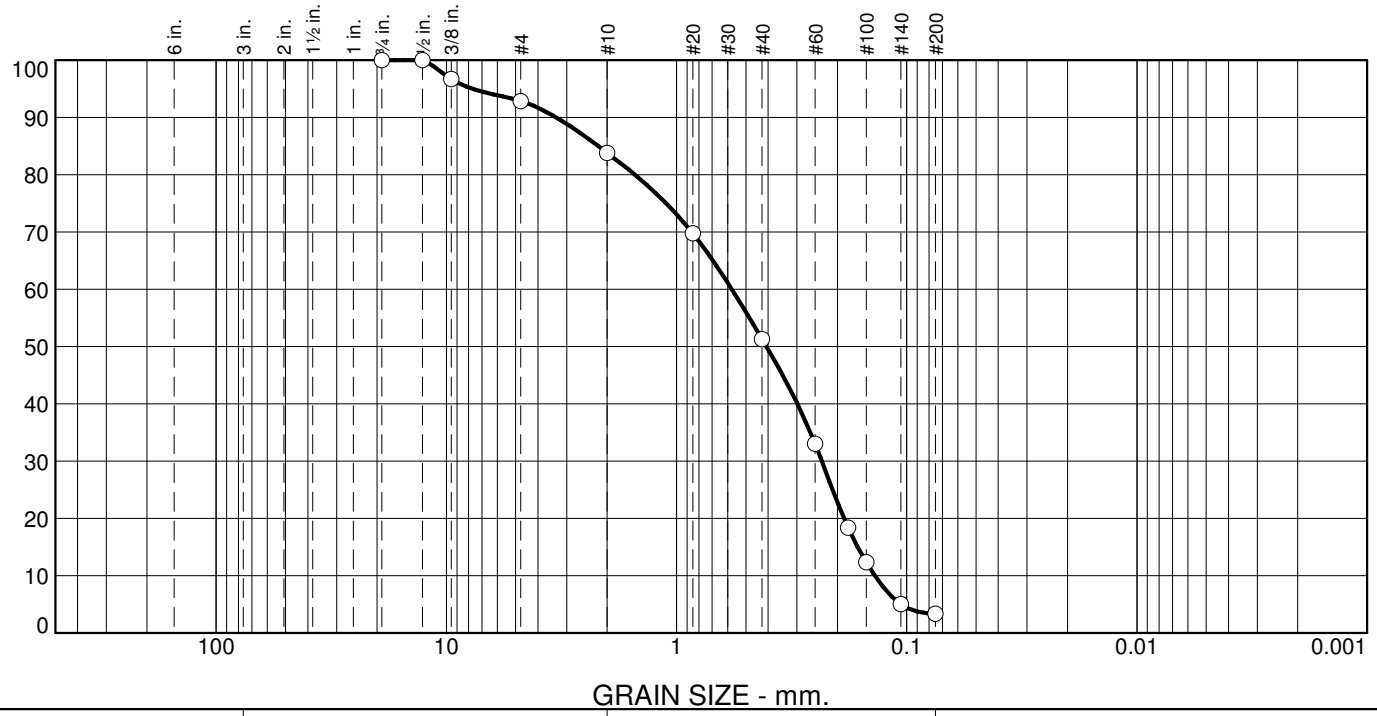
Figure

Particle Size Distribution Report

Project: Dredged Material Management Area M-8 **Project No.:** 24842

Client: Florida Inland Navigation District

Source of Sample: B-5 **Depth:** 53.5
Sample Number: S-14 **Date:**



% +3"	% Gravel	% Sand		% Fines	
		Coarse	Fine	Silt	Clay
0	16	33	48	3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100		
1/2"	100		
3/8"	97		
#4	93		
#10	84		
#20	70		
#40	51		
#60	33		
#80	18		
#100	12		
#140	5		
#200	3.3		

* (no specification provided)

Material Description

Gray Fine Sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 2.1937 D_{60}= 0.5758 D_{50}= 0.4071
D_{30}= 0.2337 D_{15}= 0.1635 D_{10}= 0.1374
C_u= 4.19 C_c= 0.69

Classification

USCS= SP AASHTO=

Remarks

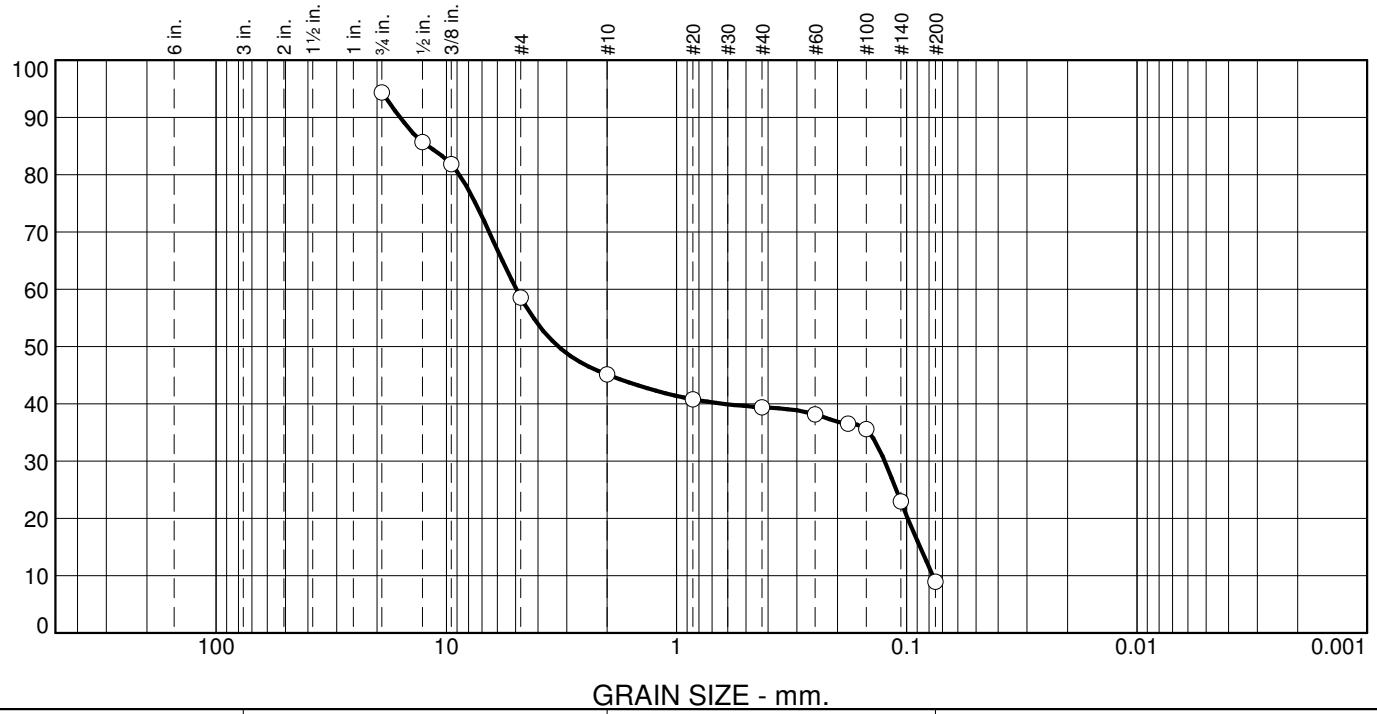
Figure

Particle Size Distribution Report

Project: Dredged Material Management Area M-8 **Project No.:** 24842

Client: Florida Inland Navigation District

Source of Sample: B-5 **Depth:** 88.5
Sample Number: S-21 **Date:**



% +3"	% Gravel	% Sand		% Fines	
		Coarse	Fine	Silt	Clay
		6	30	9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	94		
1/2"	86		
3/8"	82		
#4	59		
#10	45		
#20	41		
#40	39		
#60	38		
#80	37		
#100	36		
#140	23		
#200	9.0		

Material Description

Tan Fine Sand with Silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 12.0403 D_{60}= 4.9702 D_{50}= 3.2610
D_{30}= 0.1246 D_{15}= 0.0876 D_{10}= 0.0770
C_u= 64.51 C_c= 0.04

Classification

USCS= SP-SM AASHTO=

Remarks

* (no specification provided)

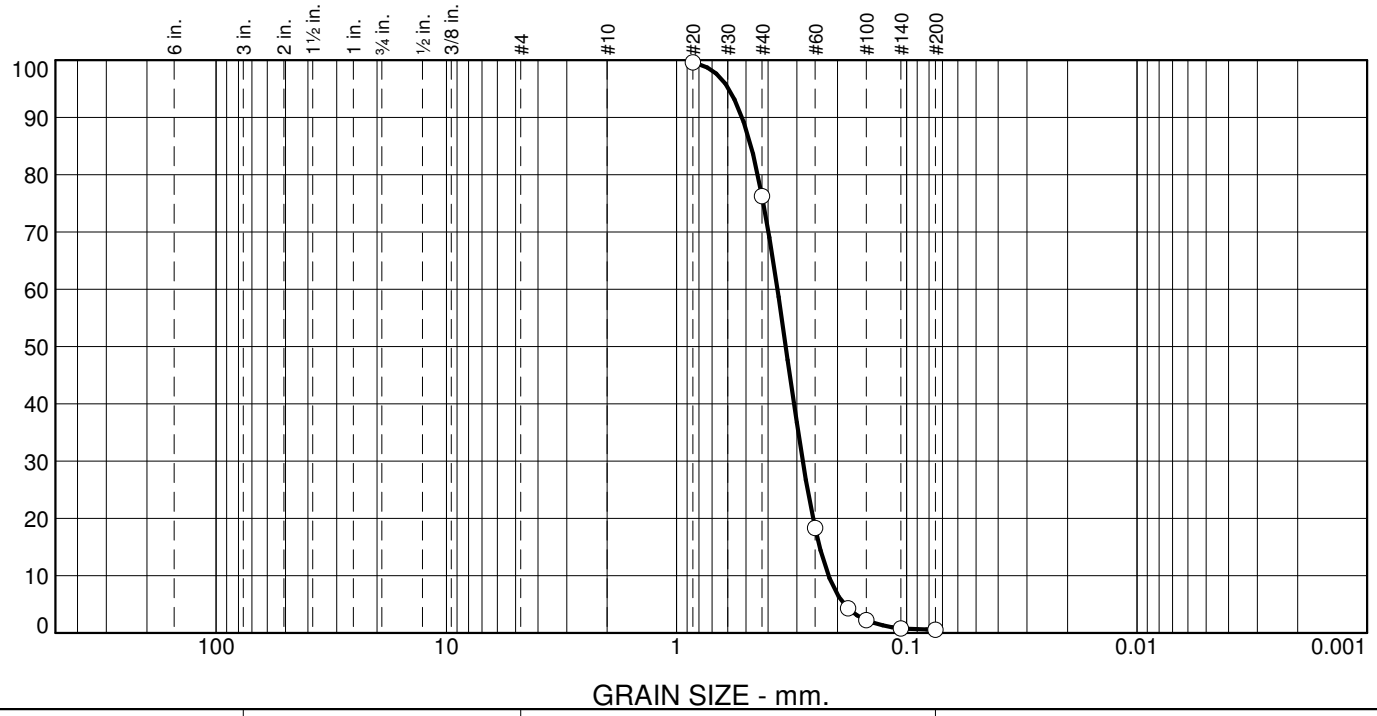
Figure

Particle Size Distribution Report

Project: Dredged Material Management Area M-8 **Project No.:** 24842

Client: Florida Inland Navigation District

Source of Sample: B-7 **Depth:** 0.00-5.00
Sample Number: D4S **Date:**



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
					75	1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#20	100		
#40	76		
#60	18		
#80	4		
#100	2		
#140	1		
#200	0.6		

Material Description

Gray Fine Sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.4755 D_{60}= 0.3647 D_{50}= 0.3355
D_{30}= 0.2828 D_{15}= 0.2389 D_{10}= 0.2184
C_u= 1.67 C_c= 1.00

Classification

USCS= SP AASHTO=

Remarks

* (no specification provided)

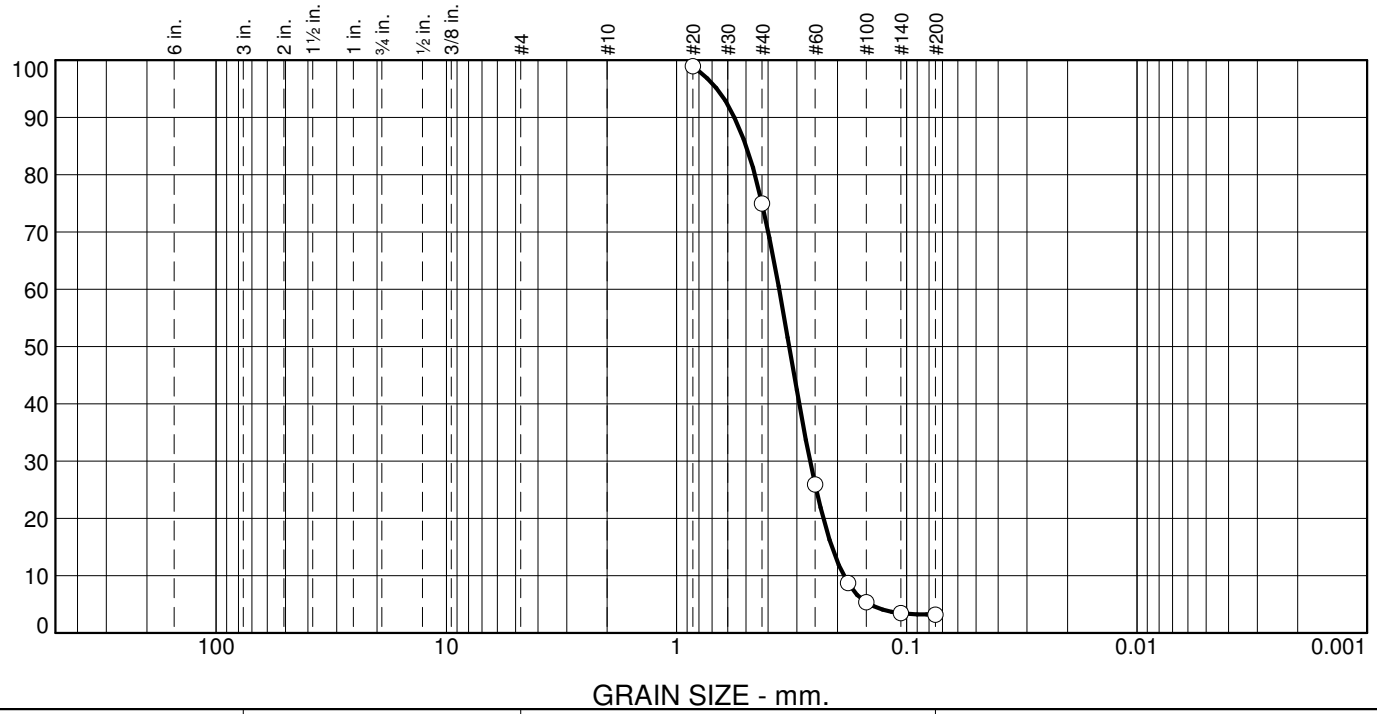
Figure

Particle Size Distribution Report

Project: Dredged Material Management Area M-8 **Project No.:** 24842

Client: Florida Inland Navigation District

Source of Sample: B-7 **Depth:** 10.00-15.00
Sample Number: D4S-286 **Date:**



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
					72	3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#20	99		
#40	75		
#60	26		
#80	9		
#100	5		
#140	3		
#200	3.2		

* (no specification provided)

Material Description

FINE SAND, Orange Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.4988 D_{60}= 0.3584 D_{50}= 0.3240
D_{30}= 0.2628 D_{15}= 0.2112 D_{10}= 0.1877
C_u= 1.91 C_c= 1.03

Classification

USCS= AASHTO=

Remarks

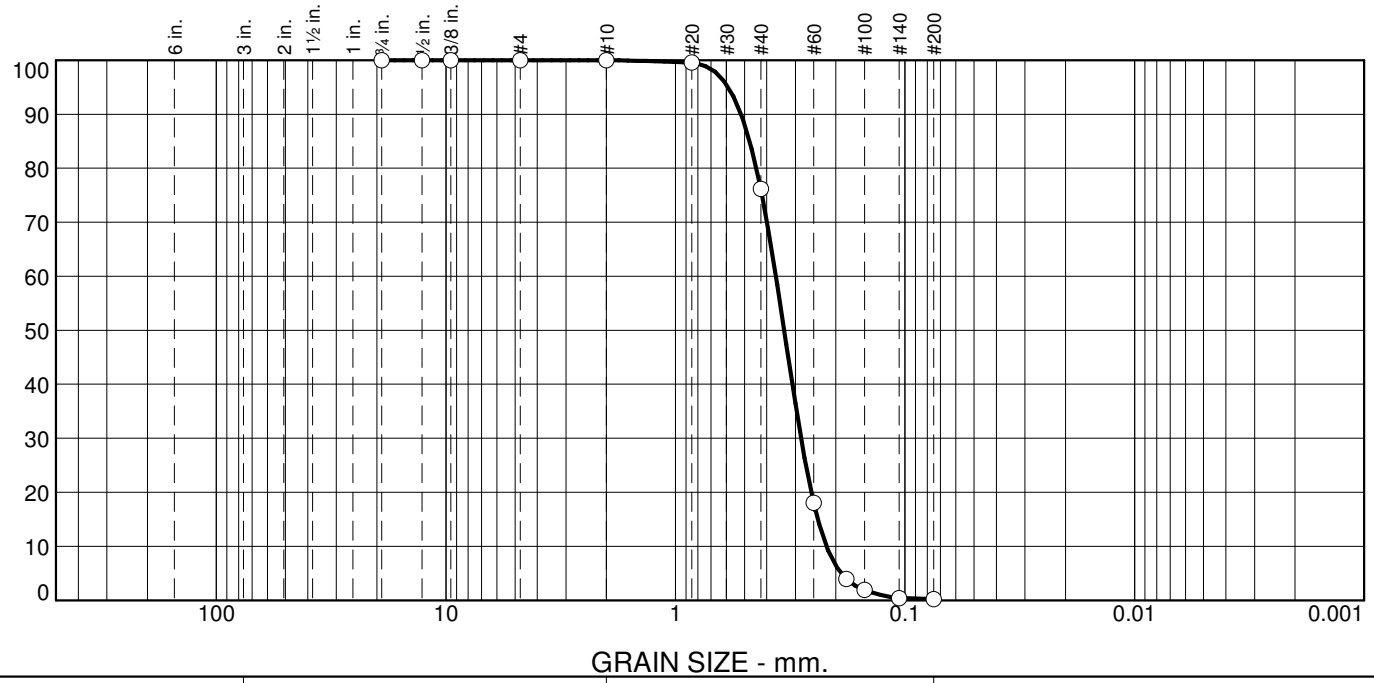
Figure

Particle Size Distribution Report

Project: Dredged Material Management Area M-8 **Project No.:** 24842

Client: Florida Inland Navigation District

Source of Sample: B-7 **Depth:** 4
Sample Number: S-3 **Date:**



% +3"	% Gravel	% Sand		% Fines	
		Coarse	Fine	Silt	Clay
0	0	24	76	0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100		
1/2"	100		
3/8"	100		
#4	100		
#10	100		
#20	100		
#40	76		
#60	18		
#80	4		
#100	2		
#140	0		
#200	0.2		

* (no specification provided)

Material Description

Lt Gray Fine SA

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.4754 D_{60}= 0.3652 D_{50}= 0.3361
D_{30}= 0.2835 D_{15}= 0.2400 D_{10}= 0.2199
C_u= 1.66 C_c= 1.00

Classification

USCS= SP AASHTO=

Remarks

Figure

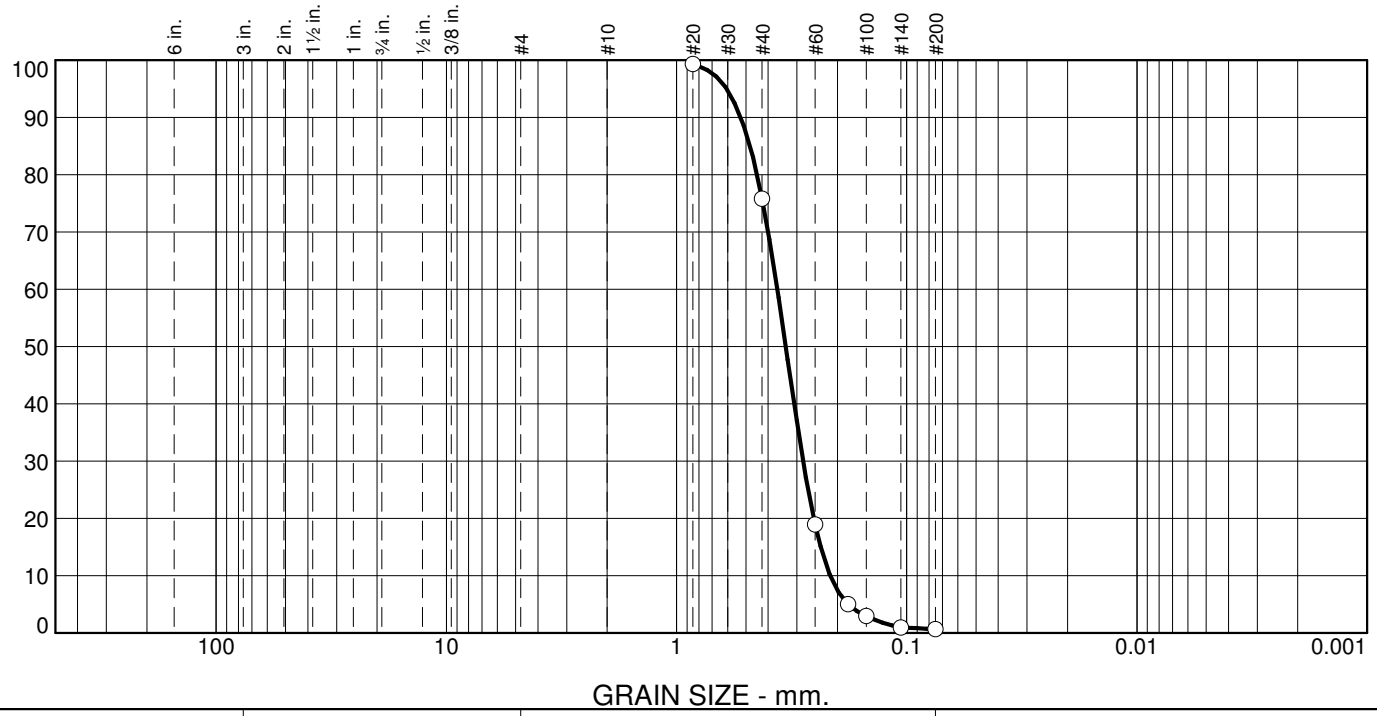
Tested By: CA **Checked By:** JS

Particle Size Distribution Report

Project: Dredged Material Management Area M-8 **Project No.:** 24842

Client: Florida Inland Navigation District

Source of Sample: B-8 **Depth:** 0.00-5.00
Sample Number: D4S **Date:**



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
					75	1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#20	99		
#40	76		
#60	19		
#80	5		
#100	3		
#140	1		
#200	0.7		

Material Description

Gray Fine Sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.4798 D_{60}= 0.3652 D_{50}= 0.3354
D_{30}= 0.2816 D_{15}= 0.2364 D_{10}= 0.2148
C_u= 1.70 C_c= 1.01

Classification

USCS= SP AASHTO=

Remarks

* (no specification provided)

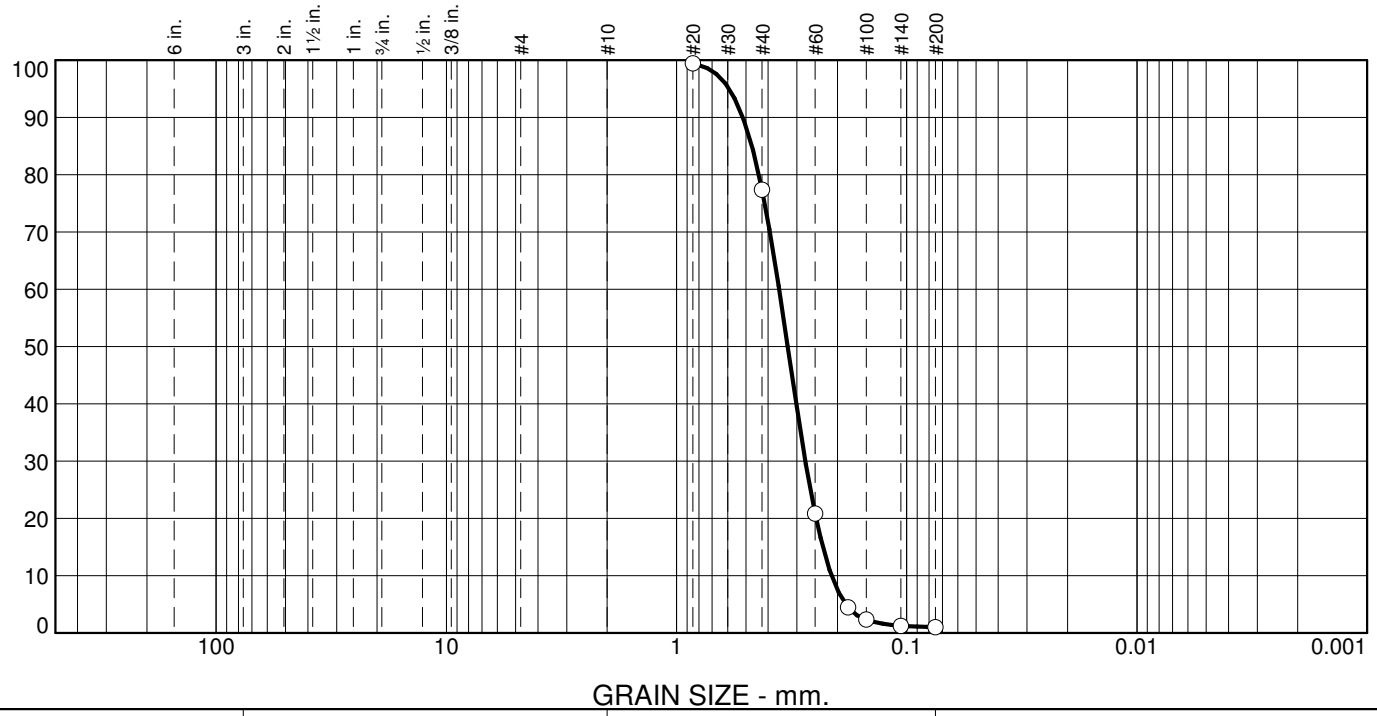
Figure

Particle Size Distribution Report

Project: Dredged Material Management Area M-8 **Project No.:** 24842

Client: Florida Inland Navigation District

Source of Sample: B-11 **Depth:** 5.00-10.00
Sample Number: D4S-284 **Date:**



% +3"	% Gravel	% Sand		% Fines	
		Coarse	Fine	Silt	Clay
			76	1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#20	99		
#40	77		
#60	21		
#80	4		
#100	2		
#140	1		
#200	1.0		

* (no specification provided)

Material Description

(SP) FINE SAND, Light Gray, Moist, Very Loose to Loose

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.4708 D_{60}= 0.3586 D_{50}= 0.3289
D_{30}= 0.2754 D_{15}= 0.2313 D_{10}= 0.2119
C_u= 1.69 C_c= 1.00

Classification

USCS= SP AASHTO=

Remarks

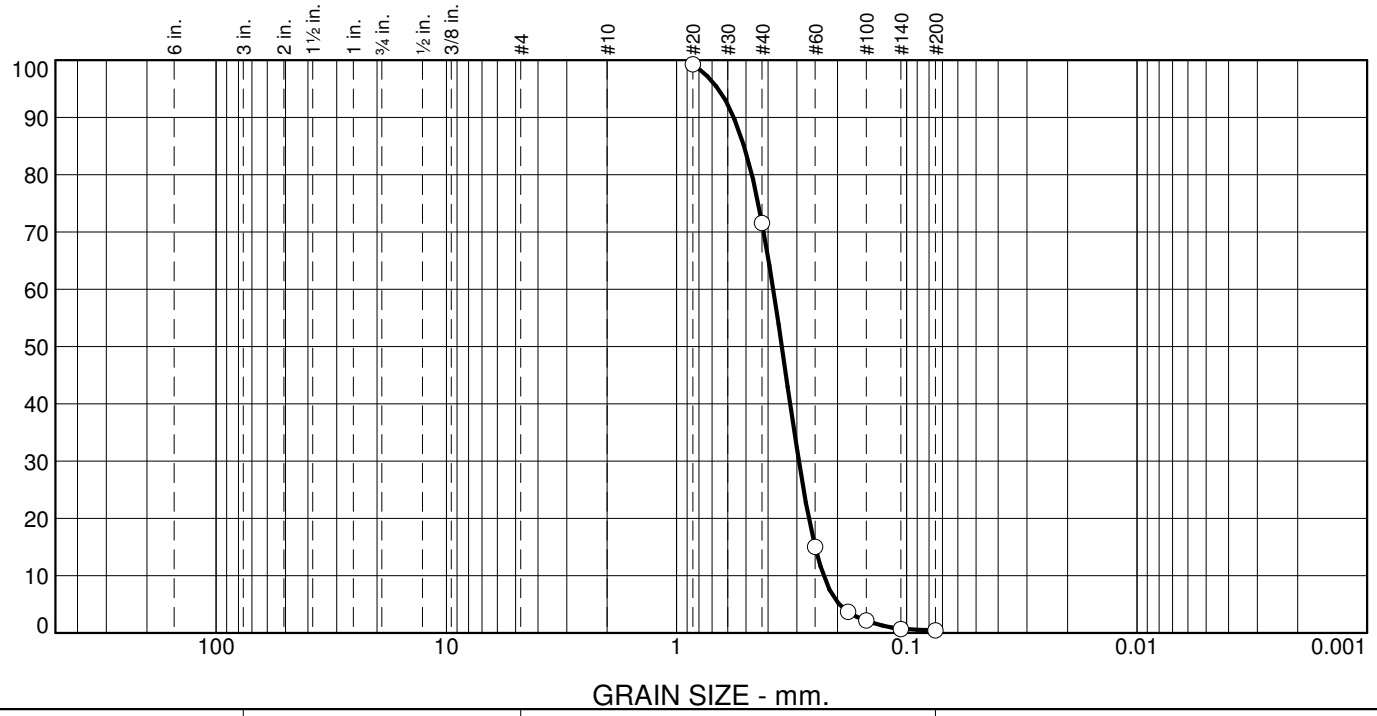
Figure

Particle Size Distribution Report

Project: Dredged Material Management Area M-8 **Project No.:** 24842

Client: Florida Inland Navigation District

Source of Sample: B-12 **Depth:** 5.00-10.0
Sample Number: D4S **Date:**



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
					72	0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#20	99		
#40	72		
#60	15		
#80	4		
#100	2		
#140	1		
#200	0.5		

Material Description

Gray Fine Sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.5093 D_{60}= 0.3804 D_{50}= 0.3491
D_{30}= 0.2940 D_{15}= 0.2499 D_{10}= 0.2296
C_u= 1.66 C_c= 0.99

Classification

USCS= SP AASHTO=

Remarks

* (no specification provided)

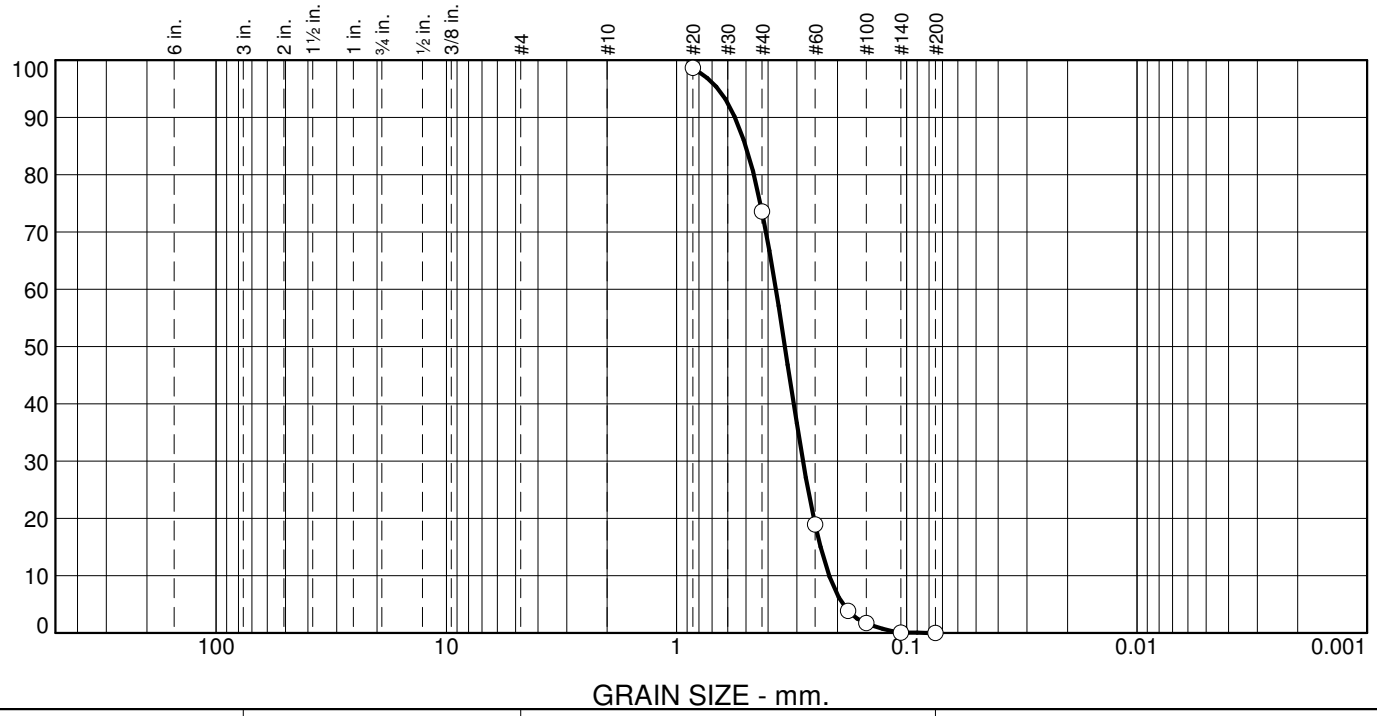
Figure

Particle Size Distribution Report

Project: Dredged Material Management Area M-8 **Project No.:** 24842

Client: Florida Inland Navigation District

Source of Sample: B-12 **Depth:** 10.00-15
Sample Number: D4S2 **Date:**



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
					74	0	0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)

* (no specification provided)

Material Description

Brown Fine Sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.5006 D_{60}= 0.3703 D_{50}= 0.3384
D_{30}= 0.2821 D_{15}= 0.2368 D_{10}= 0.2170
C_u= 1.71 C_c= 0.99

Classification

USCS= SP AASHTO=

Remarks

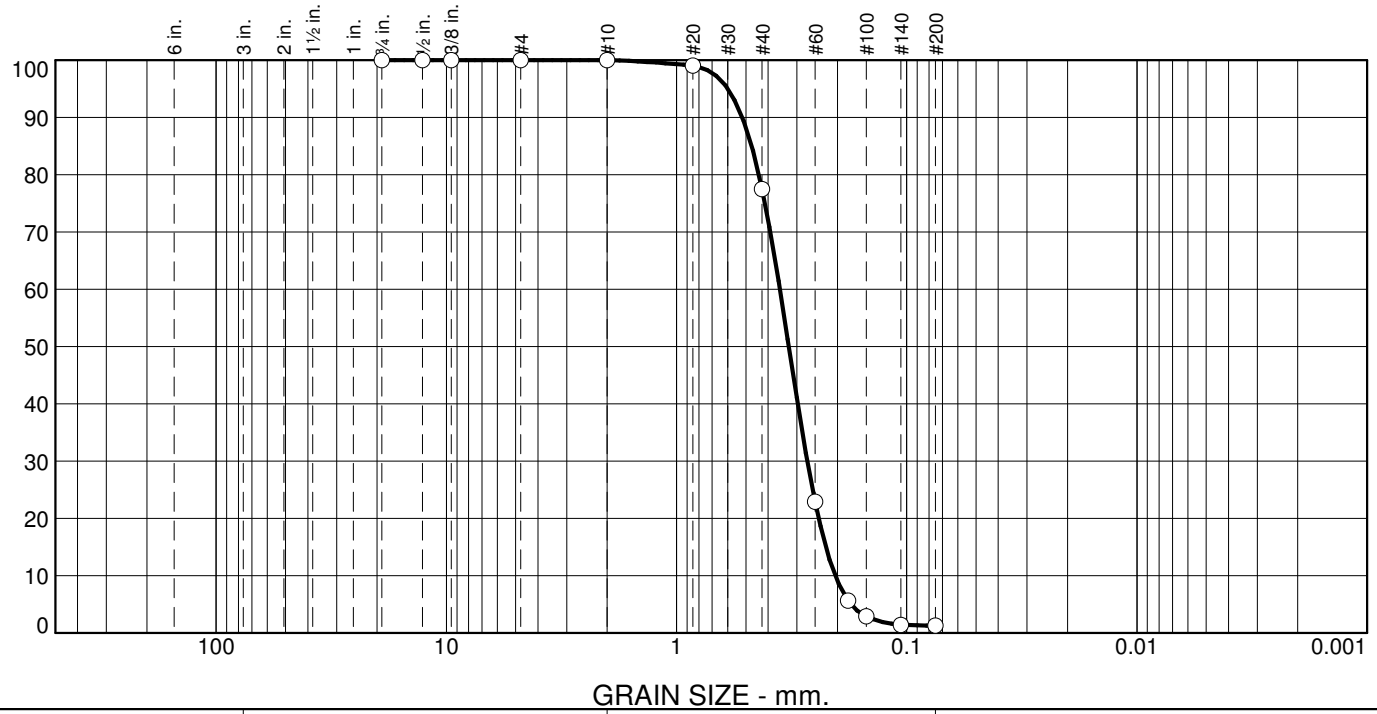
Figure

Particle Size Distribution Report

Project: Dredged Material Management Area M-8 **Project No.:** 24842

Client: Florida Inland Navigation District

Source of Sample: B-2 **Depth:** 8
Sample Number: S-5 **Date:**



% +3"	% Gravel	% Sand		% Fines	
		Coarse	Fine	Silt	Clay
0	0	23	76	1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100		
1/2"	100		
3/8"	100		
#4	100		
#10	100		
#20	99		
#40	77		
#60	23		
#80	6		
#100	3		
#140	1		
#200	1.3		

* (no specification provided)

Material Description

Gray Fine Sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.4719 D_{60}= 0.3558 D_{50}= 0.3252
D_{30}= 0.2702 D_{15}= 0.2244 D_{10}= 0.2043
C_u= 1.74 C_c= 1.00

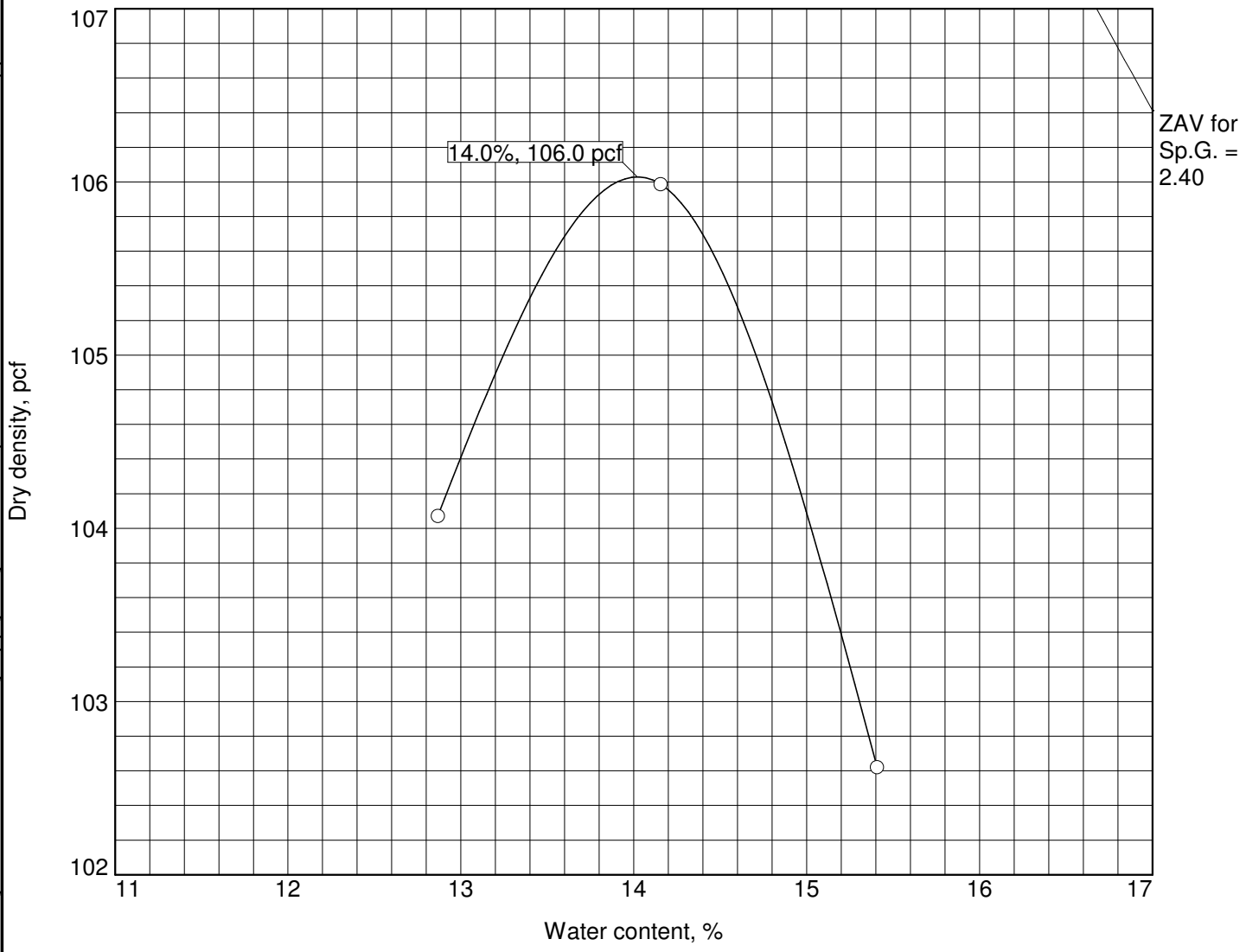
Classification

USCS= SP AASHTO=

Remarks

Figure

COMPACTION TEST REPORT



Test specification: ASTM D 1557-12 Method C Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/4 in.	% < No.200
	USCS	AASHTO						
0.00-5.00	SP		0.1	2.4			0	0.5

TEST RESULTS

Maximum dry density = 106.0 pcf

Optimum moisture = 14.0 %

MATERIAL DESCRIPTION

(SP) FINE SAND, Gray, Moist, Very Loose to Loose

Project No. 24842 **Client:** Florida Inland Navigation District

Project: Dredged Material Management Area M-8

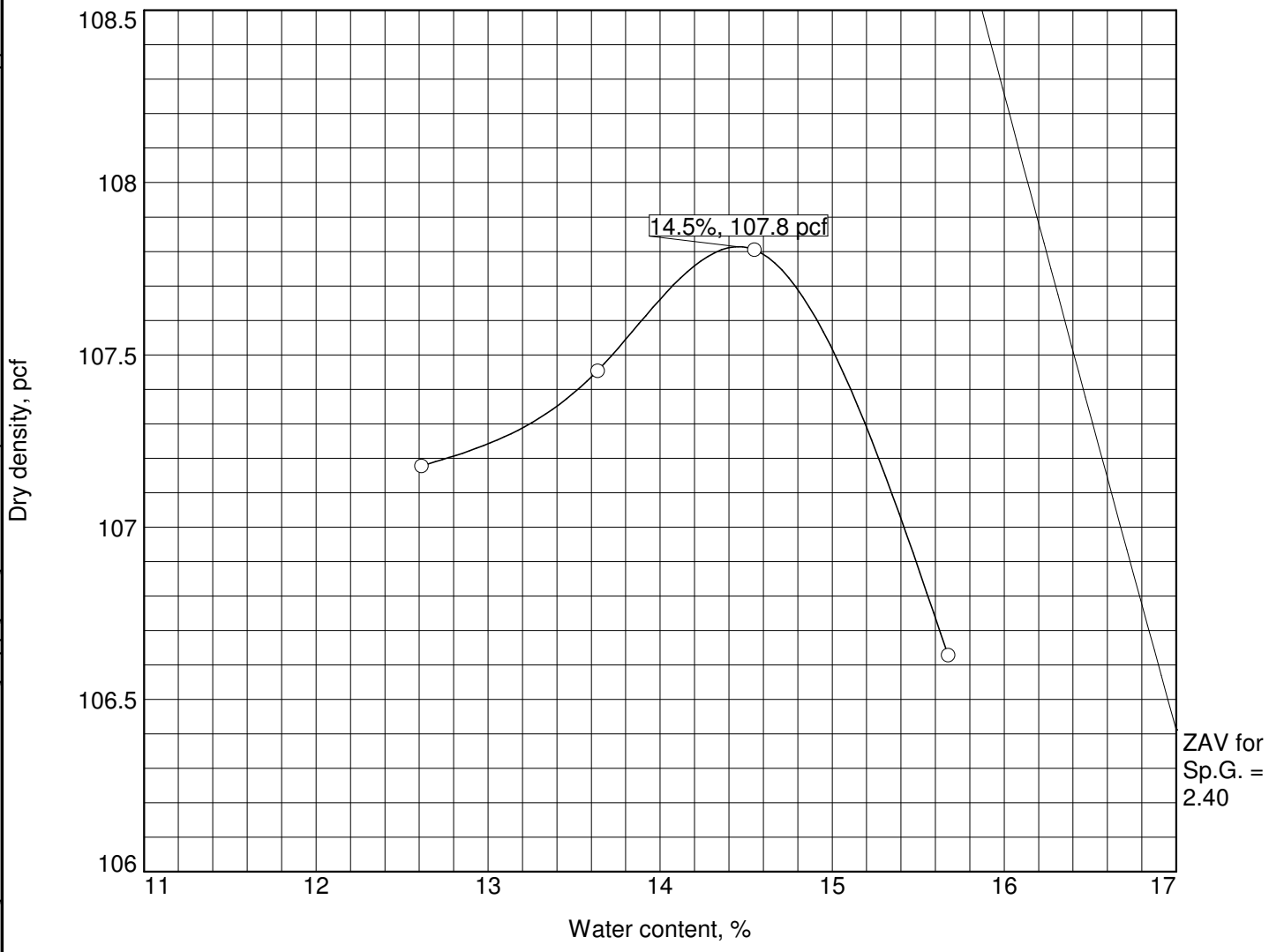
○ **Source of Sample:** B-3 **Sample Number:** D4S-287

Remarks:

Ellis & Associates inc.
ECS Group of Companies
7064 Davis Creek Road Ph: (904) 880-0960
Jacksonville, Florida 32256 Fax: (904) 880-0970

Figure

COMPACTION TEST REPORT



Test specification: ASTM D 1557-12 Method C Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/4 in.	% < No.200
	USCS	AASHTO						
0-10				2.4			0	

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 107.8 pcf Optimum moisture = 14.5 %	

Project No. 24842 **Client:** Florida Inland Navigation District
Project: Dredged Material Management Area M-8

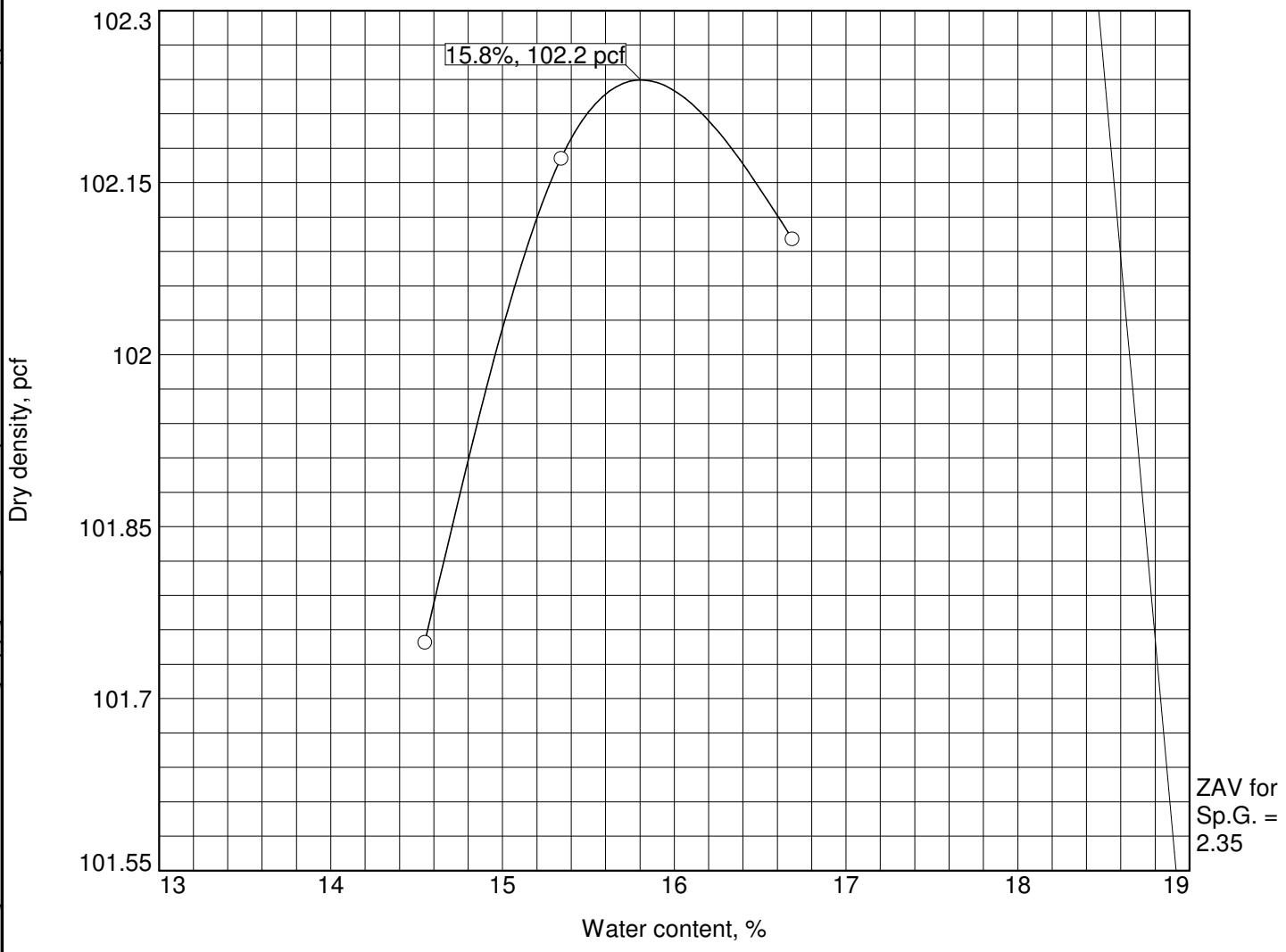
○ **Source of Sample:** B-4 **Sample Number:** 291

Remarks:

Ellis & Associates inc.
ECS Group of Companies
7064 Davis Creek Road Ph: (904) 880-0960
Jacksonville, Florida 32256 Fax: (904) 880-0970

Figure

COMPACTION TEST REPORT



Test specification: FM 5-515

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/4 in.	% < No.200
	USCS	AASHTO						
0.00-5.00	SP		1.5	2.35			0	0.6

TEST RESULTS

Maximum dry density = 102.2 pcf

Optimum moisture = 15.8 %

MATERIAL DESCRIPTION

Gray Fine Sand

Project No. 24842 **Client:** Florida Inland Navigation District

Project: Dredged Material Management Area M-8

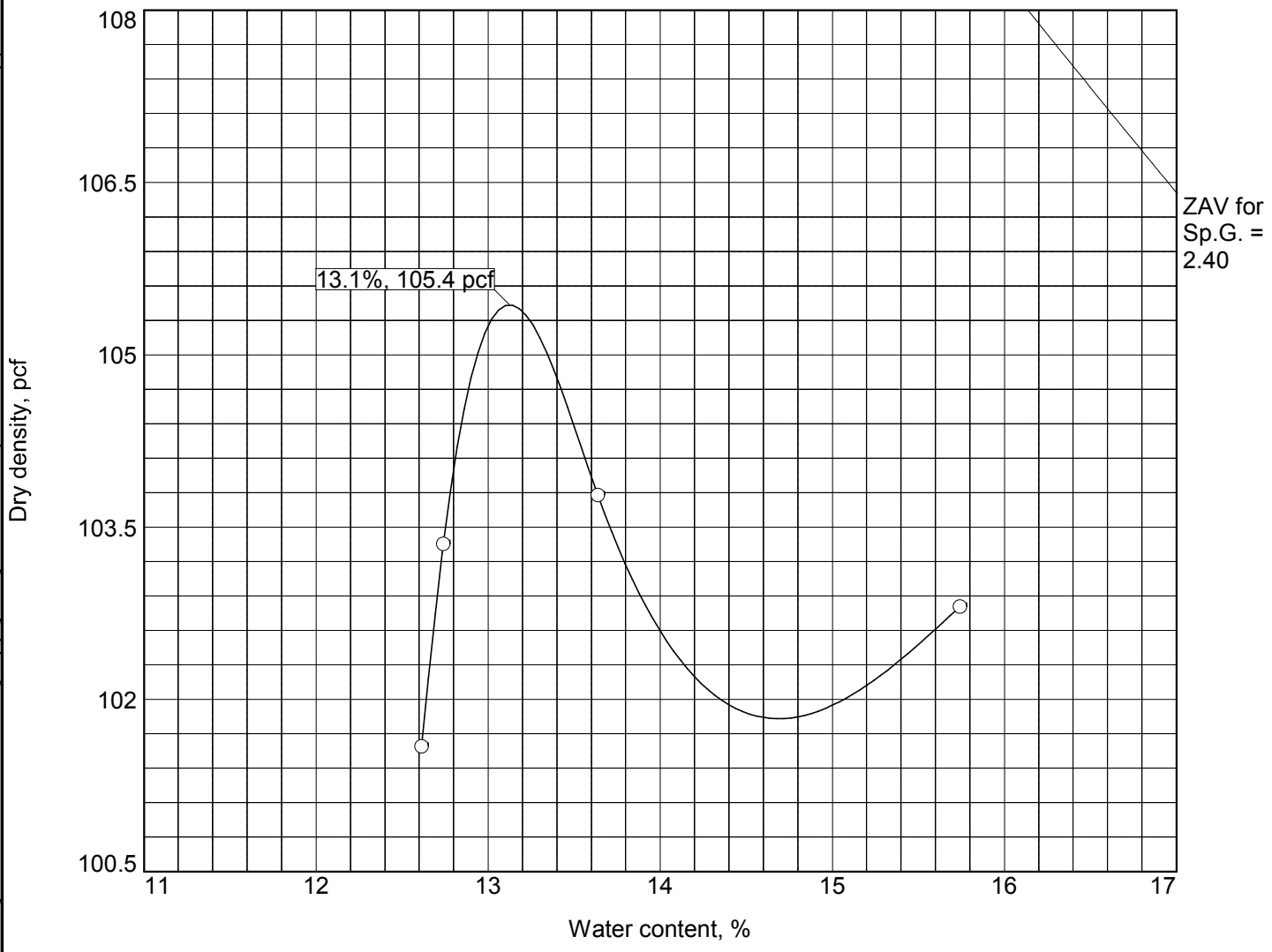
○ **Source of Sample:** B-7 **Sample Number:** D4S

Remarks:

Ellis & Associates inc.
ECS Group of Companies
7064 Davis Creek Road Ph: (904) 880-0960
Jacksonville, Florida 32256 Fax: (904) 880-0970

Figure

COMPACTION TEST REPORT



Test specification: FM 5-515

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/4 in.	% < No.200
	USCS	AASHTO						
0.00-5.00	SP		0.2	2.4			0	0.7

TEST RESULTS

Maximum dry density = 105.4 pcf

Optimum moisture = 13.1 %

MATERIAL DESCRIPTION

Gray Fine Sand

Project No. 24842 **Client:** Florida Inland Navigation District

Project: Dredged Material Management Area M-8

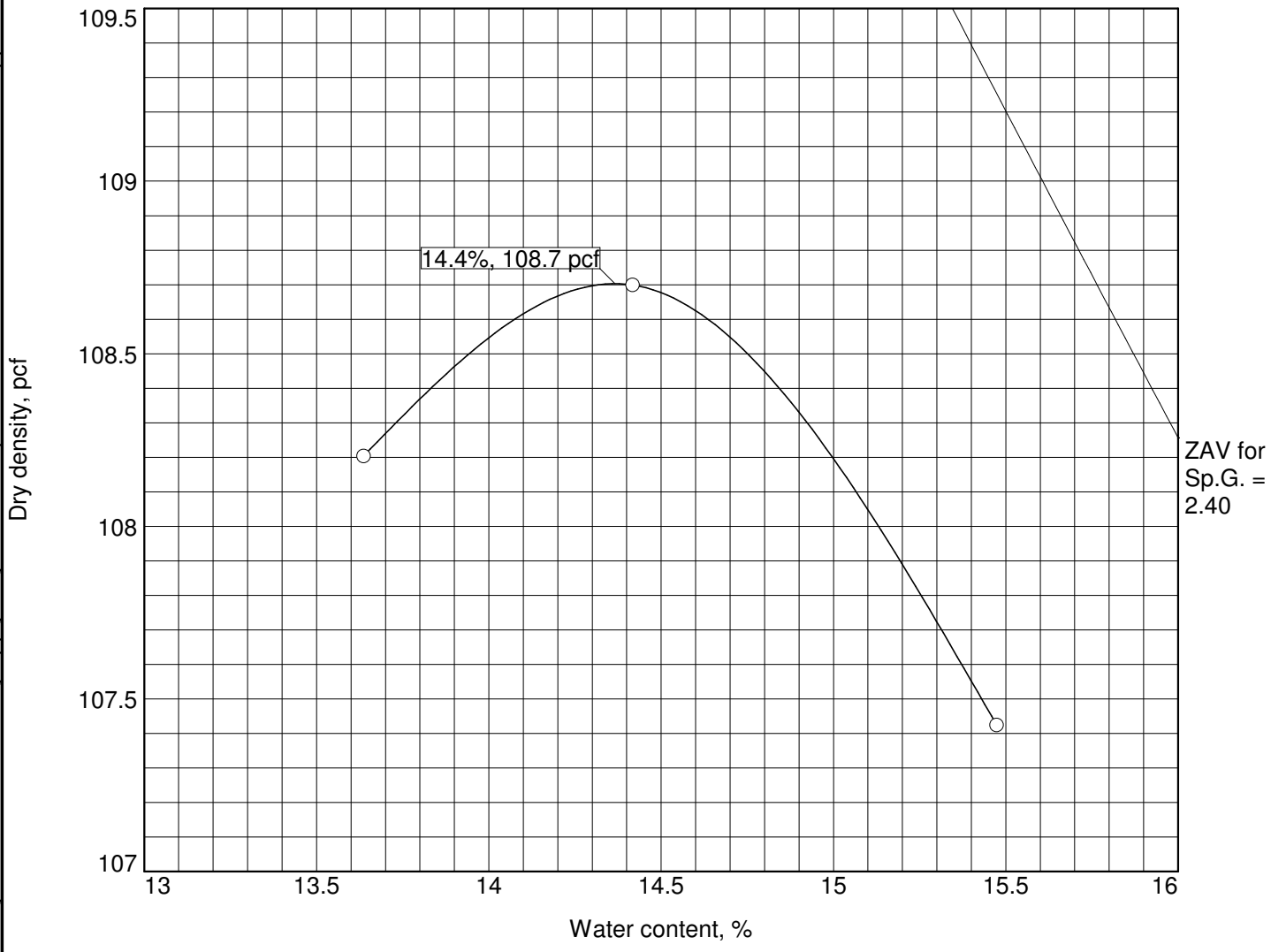
○ **Source of Sample:** B-8 **Sample Number:** D4S

Remarks:

Ellis & Associates inc.
ECS Group of Companies
7064 Davis Creek Road Ph: (904) 880-0960
Jacksonville, Florida 32256 Fax: (904) 880-0970

Figure

COMPACTION TEST REPORT



Test specification: ASTM D 1557-12 Method C Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/4 in.	% < No.200
	USCS	AASHTO						
10.00-15	SP		2.7	2.4			0	0.0

TEST RESULTS

Maximum dry density = 108.7 pcf

Optimum moisture = 14.4 %

MATERIAL DESCRIPTION

Brown Fine Sand

Project No. 24842 **Client:** Florida Inland Navigation District

Project: Dredged Material Management Area M-8

○ **Source of Sample:** B-12 **Sample Number:** D4S2

Remarks:

Ellis & Associates inc.
ECS Group of Companies
7064 Davis Creek Road Ph: (904) 880-0960
Jacksonville, Florida 32256 Fax: (904) 880-0970

Figure

Ellis & Associates inc.

PERMEABILITY OF GRANULAR SOILS
(CONSTANT HEAD METHOD)

Project No.: 35-24842 **Tested By:** CMA **Date:** 3/9/2017 **Lab No.:**
Location: B-3 **From:** 0.5'-5' **Hole Number:**
Project: Dredged Material Management Area M-8
Client: Florida Inland Navigation District

Sample:

Height, cm = 11.60 Diameter, cm = 15.25 Area, cm2 = 182.75 Constant Head, cm = 110.81
Wt. of Sample + Mold = 6785.8
Weight of Mold = 2797
Weight of Sample = 3988.8
Mold Number = P4 Test Number =

Time	Minutes	Seconds	Temperature	Volume, ml	Permeability
12:00 PM	0	0			
12:05 PM	5	300	22	5908.8	1.076E-02
12:10 PM	10	600	22	6104.4	5.557E-03
12:15 PM	15	900	22	6395.3	3.881E-03
12:20 PM	20	1200	22	6594.5	3.001E-03
12:25 PM	25	1500	22	6774.1	2.466E-03
12:30 PM	30	1800	22	6913.9	2.098E-03
12:35 PM	35	2100	22	7104.6	1.848E-03
12:40 PM	40	2400	22	7247.4	1.649E-03
12:45 PM	45	2700	22	7398.0	1.496E-03
12:50 PM	50	3000	22	7573.2	1.379E-03
12:55 PM	55	3300	22	7799.8	1.291E-03
1:00 PM	60	3600	22	8007.2	1.215E-03

Average Permeability, K20, cm/sec = 3.053E-03

Average Permeability, K20, ft/day = 8.655E+00

Dry Density = 102.6 pcf Moisture = 14.3

Maximum Dry Density = pcf % Comp=

Kt = QL/thA

Where: Kt = coefficient of permeability at temperature, T
Q = volume of discharge, cm3
L = length of soil sample, cm
t = time, sec
h = total head, cm
A = cross-section area, cm2

K20=[Ut/U20]Kt

Where:
Ut = Viscosity of water at temperature, T
U20 = Viscosity of water at 20 deg. C

Ellis & Associates inc.

PERMEABILITY OF GRANULAR SOILS
(CONSTANT HEAD METHOD)

Project No.: 35-24842 **Tested By:** CMA **Date:** 3/9/2017 **Lab No.:**
Location: B4 **From:** 0.5'-10' **Hole Number:**
Project: Dredged Material Management Area M-8
Client: Florida Inland Navigation District

Sample:

Height, cm = 11.61 Diameter, cm = 15.23 Area, cm2 = 182.29 Constant Head, cm = 110.81
Wt. of Sample + Mold = 6718.1
Weight of Mold = 2797
Weight of Sample = 3921.1
Mold Number = P6 Test Number =

Time	Minutes	Seconds	Temperature	Volume, ml	Permeability
12:00 PM	0	0			
12:05 PM	5	300	22	3964.4	7.241E-03
12:10 PM	10	600	22	4145.4	3.786E-03
12:15 PM	15	900	22	4260.6	2.594E-03
12:20 PM	20	1200	22	4400.0	2.009E-03
12:25 PM	25	1500	22	4548.1	1.661E-03
12:30 PM	30	1800	22	4678.7	1.424E-03
12:35 PM	35	2100	22	4779.3	1.247E-03
12:40 PM	40	2400	22	4888.1	1.116E-03
12:45 PM	45	2700	22	5003.4	1.015E-03
12:50 PM	50	3000	22	5071.0	9.262E-04
12:55 PM	55	3300	22	5210.1	8.651E-04
1:00 PM	60	3600	22	5355.6	8.152E-04

Average Permeability, K20, cm/sec = 2.058E-03

Average Permeability, K20, ft/day = 5.835E+00

Dry Density = 100.8 pcf Moisture = 14.3
Maximum Dry Density = pcf % Comp=

Kt = QL/thA

Where: Kt = coefficient of permeability at temperature, T
Q = volume of discharge, cm3
L = length of soil sample, cm
t = time, sec
h = total head, cm
A = cross-section area, cm2

K20=[Ut/U20]Kt

Where:
Ut = Viscosity of water at temperature, T
U20 = Viscosity of water at 20 deg. C

Ellis & Associates inc.

PERMEABILITY OF GRANULAR SOILS
(CONSTANT HEAD METHOD)

Project No.: 35-24842 **Tested By:** CMA **Date:** 2/24/2017 **Lab No.:**
Location: B7 - Loose Compact. **From:** 0.5'-2.0' **Hole Number:**
Project: Dredged Material Management Area M-8
Client: Florida Inland Navigation District

Sample:

Height, cm = 11.61 Diameter, cm = 15.23 Area, cm2 = 182.29 Constant Head, cm = 110.81
Wt. of Sample + Mold = 6834
Weight of Mold = 2797
Weight of Sample = 4037
Mold Number = P6 Test Number =

Time	Minutes	Seconds	Temperature	Volume, ml	Permeability
12:00 PM	0	0			
12:05 PM	5	300	22	4435.4	8.101E-03
12:10 PM	10	600	22	4656.2	4.252E-03
12:15 PM	15	900	22	4821.7	2.936E-03
12:20 PM	20	1200	22	5057.8	2.310E-03
12:25 PM	25	1500	22	5281.4	1.929E-03
12:30 PM	30	1800	22	5298.2	1.613E-03
12:35 PM	35	2100	22	5453.2	1.423E-03
12:40 PM	40	2400	22	5626.3	1.285E-03
12:45 PM	45	2700	22	6009.6	1.220E-03
12:50 PM	50	3000	22	6066.1	1.108E-03
12:55 PM	55	3300	22	6109.1	1.014E-03
1:00 PM	60	3600	22	6153.0	9.365E-04

Average Permeability, K20, cm/sec = 2.344E-03

Average Permeability, K20, ft/day = 6.644E+00

Dry Density = 102.7 pcf Moisture = 15.6
Maximum Dry Density = 102.3 pcf % Comp= 100.3

Kt = QL/thA

Where: Kt = coefficient of permeability at temperature, T
Q = volume of discharge, cm3
L = length of soil sample, cm
t = time, sec
h = total head, cm
A = cross-section area, cm2

K20=[Ut/U20]Kt

Where:
Ut = Viscosity of water at temperature, T
U20 = Viscosity of water at 20 deg. C

Ellis & Associates inc.

PERMEABILITY OF GRANULAR SOILS
(CONSTANT HEAD METHOD)

Project No.: 35-24842 **Tested By:** CMA **Date:** 2/24/2017 **Lab No.:**
Location: B7 **From:** 0.5'-2.0' **Hole Number:**
Project: Dredged Material Management Area M-8
Client: Florida Inland Navigation District

Sample:

Height, cm = 11.61 Diameter, cm = 15.24 Area, cm2 = 182.43 Constant Head, cm = 110.81
Wt. of Sample + Mold = 6679
Weight of Mold = 2797
Weight of Sample = 3882
Mold Number = P3 Test Number =

Time	Minutes	Seconds	Temperature	Volume, ml	Permeability
12:00 PM	0	0			
12:05 PM	5	300	22	4070.1	7.423E-03
12:10 PM	10	600	22	4101.6	3.740E-03
12:15 PM	15	900	22	4105.5	2.496E-03
12:20 PM	20	1200	22	4220.2	1.924E-03
12:25 PM	25	1500	22	4246.5	1.549E-03
12:30 PM	30	1800	22	4332.2	1.317E-03
12:35 PM	35	2100	22	4418.5	1.151E-03
12:40 PM	40	2400	22	4418.2	1.007E-03
12:45 PM	45	2700	22	4419.8	8.957E-04
12:50 PM	50	3000	22	4456.8	8.129E-04
12:55 PM	55	3300	22	4444.4	7.369E-04
1:00 PM	60	3600	22	4455.6	6.772E-04

Kt = QL/thA

Where: Kt = coefficient of permeability at temperature, T
Q = volume of discharge, cm3
L = length of soil sample, cm
t = time, sec
h = total head, cm
A = cross-section area, cm2

Average Permeability, K20, cm/sec = 1.978E-03
Average Permeability, K20, ft/day = 5.606E+00

Dry Density = 98.9 pcf Moisture = 15.4
Maximum Dry Density = 102.3 pcf % Comp= 96.7

K20=[Ut/U20]Kt
Where:
Ut = Viscosity of water at temperature, T
U20 = Viscosity of water at 20 deg. C

Ellis & Associates inc.

PERMEABILITY OF GRANULAR SOILS
(CONSTANT HEAD METHOD)

Project No.: 35-24842 **Tested By:** CMA **Date:** 3/11/2017 **Lab No.:**
Location: B7 **From:** 10-15 **Hole Number:**
Project: Dredged Material Management Area M-8
Client: Florida Inland Navigation District

Sample:

Height, cm = 11.61 Diameter, cm = 15.23 Area, cm2 = 182.29 Constant Head, cm = 110.81
Wt. of Sample + Mold = 6889
Weight of Mold = 2840
Weight of Sample = 4049
Mold Number = P6 Test Number =

Time	Minutes	Seconds	Temperature	Volume, ml	Permeability
12:00 PM	0	0			
12:10 PM	10	600	22	2287.1	2.089E-03
12:20 PM	20	1200	22	4932.8	2.252E-03
12:30 PM	30	1800	22	3088.5	9.402E-04
12:40 PM	40	2400	22	3411.1	7.788E-04
12:50 PM	50	3000	22	3785.7	6.915E-04
1:00 PM	60	3600	22	4106.8	6.251E-04

Average Permeability, K20, cm/sec = 1.229E-03

Average Permeability, K20, ft/day = 3.485E+00

Dry Density = 103.9 pcf Moisture = 14.5
Maximum Dry Density = 102.2 pcf % Comp= 101.7

Kt = QL/thA

Where: Kt = coefficient of permeability at temperature, T
Q = volume of discharge, cm3
L = length of soil sample, cm
t = time, sec
h = total head, cm
A = cross-section area, cm2

K20=[Ut/U20]Kt

Where:
Ut = Viscosity of water at temperature, T
U20 = Viscosity of water at 20 deg. C

Ellis & Associates inc.

PERMEABILITY OF GRANULAR SOILS
(CONSTANT HEAD METHOD)

Project No.: 35-24842 **Tested By:** CMA **Date:** 2/24/2017 **Lab No.:**
Location: B8 **From:** 0.5-5 **Hole Number:**
Project: Dredged Material Management Area M-8
Client: Florida Inland Navigation District

Sample:

Height, cm = 11.61 Diameter, cm = 15.23 Area, cm2 = 182.29 Constant Head, cm = 110.81
Wt. of Sample + Mold = 6766.3
Weight of Mold = 2840
Weight of Sample = 3926.3
Mold Number = P6 Test Number =

Time	Minutes	Seconds	Temperature	Volume, ml	Permeability
12:00 PM	0	0			
12:05 PM	5	300	22	4961.5	9.062E-03
12:10 PM	10	600	22	5121.4	4.677E-03
12:15 PM	15	900	22	5278.0	3.213E-03
12:20 PM	20	1200	22	5407.6	2.469E-03
12:25 PM	25	1500	22	5385.5	1.967E-03
12:30 PM	30	1800	22	5356.7	1.631E-03
12:35 PM	35	2100	22	6420.5	1.675E-03
12:40 PM	40	2400	22	6213.4	1.419E-03
12:45 PM	45	2700	22	5587.6	1.134E-03

Average Permeability, K20, cm/sec = 3.028E-03

Average Permeability, K20, ft/day = 8.582E+00

Dry Density = 100.6 pcf Moisture = 14.7
Maximum Dry Density = 105.4 pcf % Comp= 95.5

Kt = QL/thA

Where: Kt = coefficient of permeability at temperature, T
Q = volume of discharge, cm3
L = length of soil sample, cm
t = time, sec
h = total head, cm
A = cross-section area, cm2

K20=[Ut/U20]Kt

Where:
Ut = Viscosity of water at temperature, T
U20 = Viscosity of water at 20 deg. C

Ellis & Associates inc.

PERMEABILITY OF GRANULAR SOILS
(CONSTANT HEAD METHOD)

Project No.: 35-24842 **Tested By:** CMA **Date:** 2/24/2017 **Lab No.:**
Location: B11 **From:** 5-10 **Hole Number:**
Project: Dredged Material Management Area M-8
Client: Florida Inland Navigation District

Sample:

Height, cm = 11.61 Diameter, cm = 15.23 Area, cm2 = 182.29 Constant Head, cm = 110.81
Wt. of Sample + Mold = 6766.3
Weight of Mold = 2840
Weight of Sample = 3926.3
Mold Number = P6 Test Number =

Time	Minutes	Seconds	Temperature	Volume, ml	Permeability
12:00 PM	0	0			
12:10 PM	10	600	22	8354.8	7.630E-03
12:20 PM	20	1200	22	7968.1	3.638E-03
12:30 PM	30	1800	22	8969.9	2.731E-03
12:40 PM	40	2400	22	10004.2	2.284E-03
12:50 PM	50	3000	22	9198.1	1.680E-03
1:00 PM	60	3600	22	9517.4	1.449E-03

Average Permeability, K20, cm/sec = 3.235E-03

Average Permeability, K20, ft/day = 9.171E+00

Dry Density = 100.4 pcf Moisture = 15.0
Maximum Dry Density = 108.7 pcf % Comp= 92.3

Kt = QL/thA

Where: Kt = coefficient of permeability at temperature, T
Q = volume of discharge, cm3
L = length of soil sample, cm
t = time, sec
h = total head, cm
A = cross-section area, cm2

K20=[Ut/U20]Kt

Where:
Ut = Viscosity of water at temperature, T
U20 = Viscosity of water at 20 deg. C

Ellis & Associates inc.

PERMEABILITY OF GRANULAR SOILS
(CONSTANT HEAD METHOD)

Project No.: 35-24842 **Tested By:** CMA **Date:** 2/24/2017 **Lab No.:**
Location: B12 **From:** 5-10 **Hole Number:**
Project: Dredged Material Management Area M-8
Client: Florida Inland Navigation District

Sample:

Height, cm = 11.60 Diameter, cm = 15.25 Area, cm2 = 182.75 Constant Head, cm = 110.81
Wt. of Sample + Mold = 6772.3
Weight of Mold = 2814
Weight of Sample = 3958.3
Mold Number = P4 Test Number =

Time	Minutes	Seconds	Temperature	Volume, ml	Permeability
12:00 PM	0	0			
12:05 PM	5	300	22	4935.5	8.985E-03
12:10 PM	10	600	22	5064.1	4.610E-03
12:15 PM	15	900	22	5219.8	3.168E-03
12:20 PM	20	1200	22	5435.3	2.474E-03
12:25 PM	25	1500	22	5395.6	1.965E-03
12:30 PM	30	1800	22	5410.5	1.642E-03
12:35 PM	35	2100	22	6084.5	1.582E-03
12:40 PM	40	2400	22	5850.6	1.331E-03
12:45 PM	45	2700	22	5621.5	1.137E-03

Average Permeability, K20, cm/sec = 2.988E-03

Average Permeability, K20, ft/day = 8.470E+00

Dry Density = 100.1 pcf Moisture = 16.2

Maximum Dry Density = pcf % Comp= #DIV/0!

Kt = QL/thA

Where: Kt = coefficient of permeability at temperature, T
Q = volume of discharge, cm3
L = length of soil sample, cm
t = time, sec
h = total head, cm
A = cross-section area, cm2

K20=[Ut/U20]Kt

Where:
Ut = Viscosity of water at temperature, T
U20 = Viscosity of water at 20 deg. C

Ellis & Associates inc.

PERMEABILITY OF GRANULAR SOILS
(CONSTANT HEAD METHOD)

Project No.: 35-24842 **Tested By:** CMA **Date:** 3/9/2017 **Lab No.:**
Location: B12 **From:** 10-15 **Hole Number:**
Project: Dredged Material Management Area M-8
Client: Florida Inland Navigation District

Sample:

Height, cm = 11.61 Diameter, cm = 15.23 Area, cm2 = 182.29 Constant Head, cm = 110.81
Wt. of Sample + Mold = 6889
Weight of Mold = 2840
Weight of Sample = 4049
Mold Number = P6 Test Number =

Time	Minutes	Seconds	Temperature	Volume, ml	Permeability
12:00 PM	0	0			
12:10 PM	10	600	22	2443.3	2.231E-03
12:20 PM	20	1200	22	5087.9	2.323E-03
12:30 PM	30	1800	22	2965.6	9.028E-04
12:40 PM	40	2400	22	3358.7	7.668E-04
12:50 PM	50	3000	22	3763.2	6.873E-04
1:00 PM	60	3600	22	4120.5	6.272E-04

Average Permeability, K20, cm/sec = 1.256E-03

Average Permeability, K20, ft/day = 3.562E+00

Dry Density = 103.9 pcf Moisture = 14.5
Maximum Dry Density = 102.2 pcf % Comp= 101.7

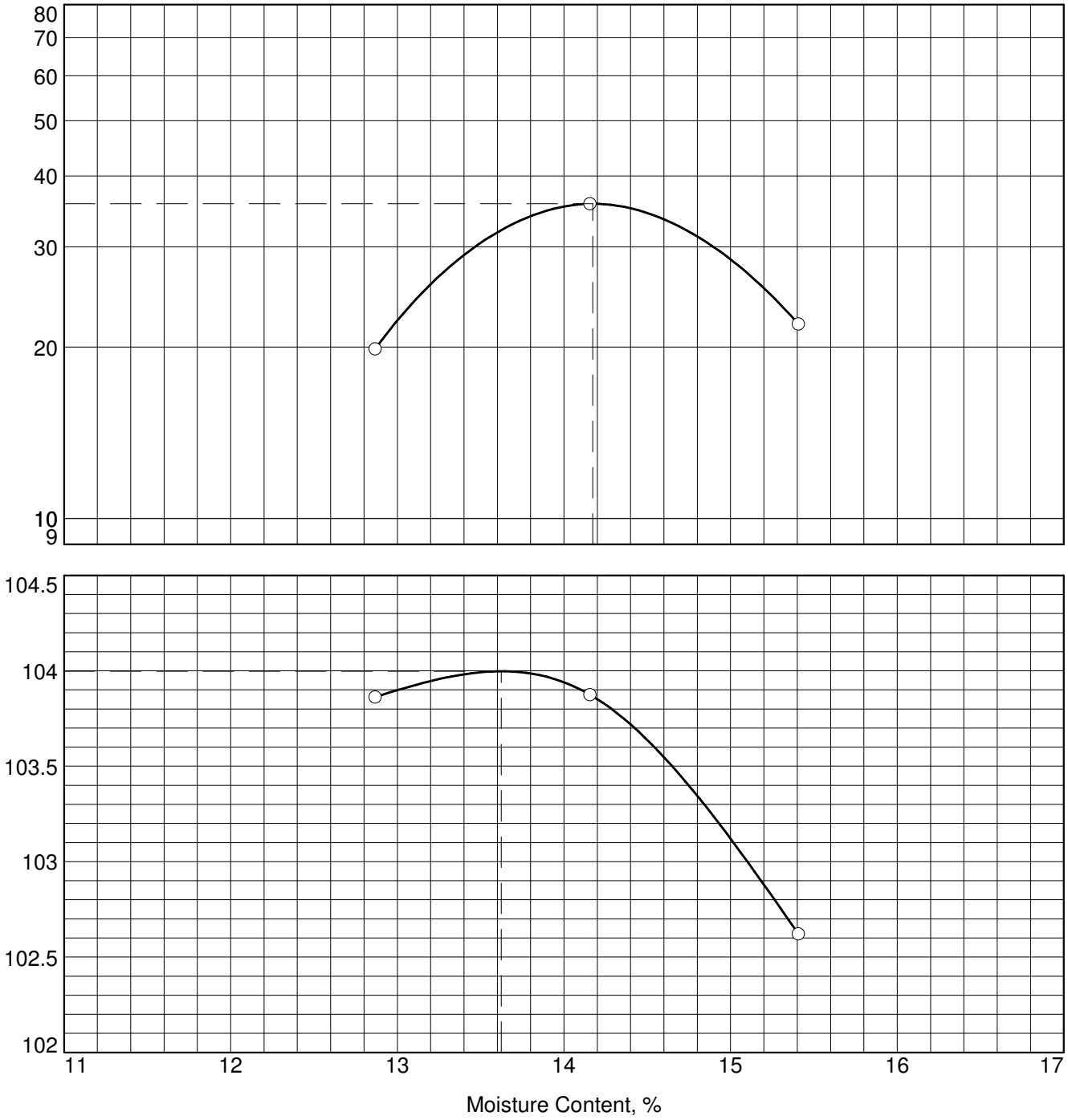
Kt = QL/thA

Where: Kt = coefficient of permeability at temperature, T
Q = volume of discharge, cm3
L = length of soil sample, cm
t = time, sec
h = total head, cm
A = cross-section area, cm2

K20=[Ut/U20]Kt

Where:
Ut = Viscosity of water at temperature, T
U20 = Viscosity of water at 20 deg. C

LIMEROCK BEARING RATIO TEST REPORT



TEST RESULTS (FM 5-515)			MATERIAL DESCRIPTION
Max. Dry Dens. (pcf)	Opt. Moist (%)	Max. LBR (%)	(SP) FINE SAND, Gray, Moist, Very Loose to Loose
104.0	13.6	35.7	

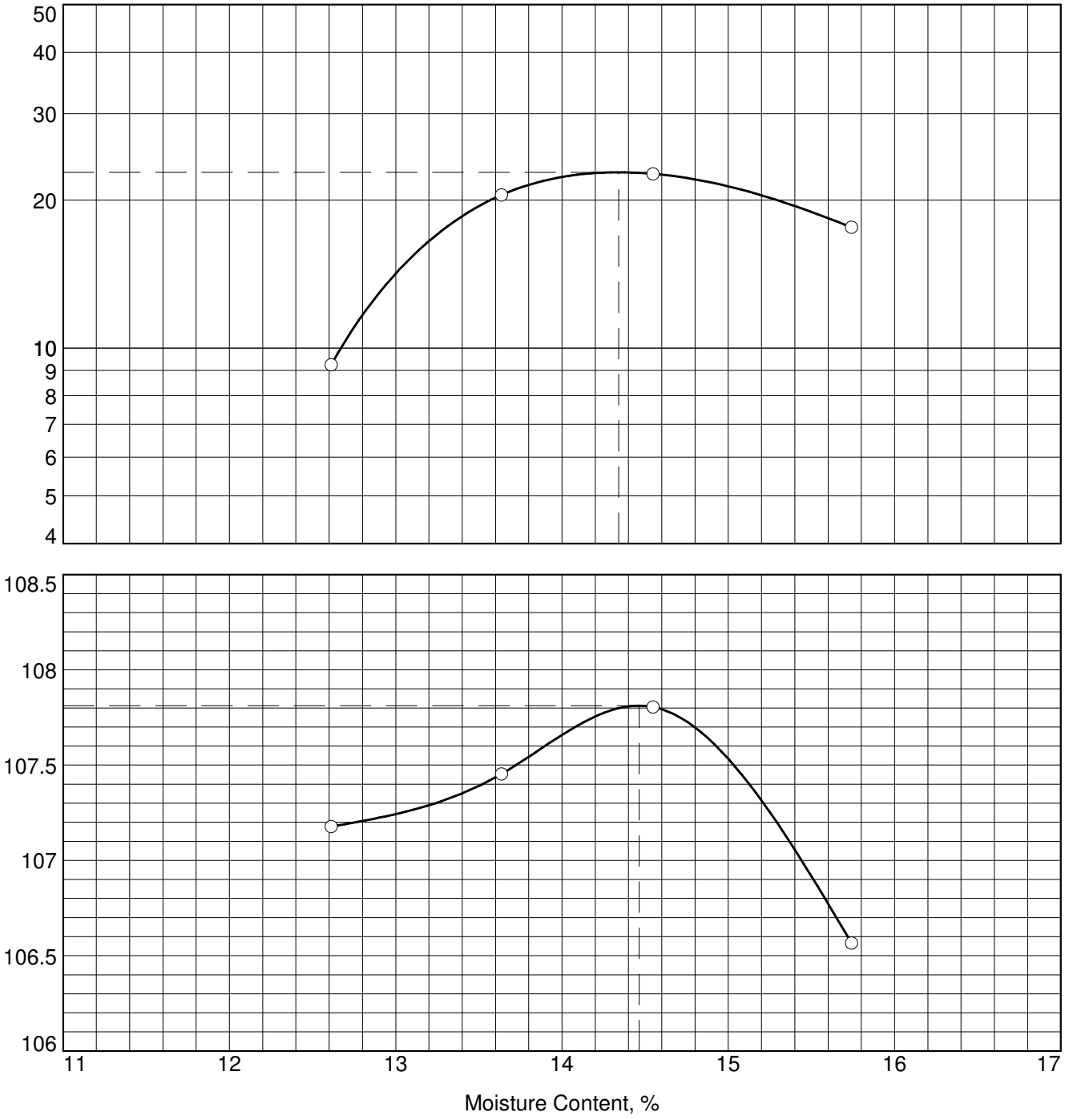
Project No. 24842 **Client:** Florida Inland Navigation District
Project: Dredged Material Management Area M-8
Source of Sample: B-3 **Depth:** 0.00-5.00
Sample Number: D4S-287

Remarks:

Ellis & Associates inc.
ECS Group of Companies
7064 Davis Creek Road
Jacksonville, Florida 32256
Ph: (904) 880-0960
Fax: (904) 880-0970

Figure

LIMEROCK BEARING RATIO TEST REPORT



TEST RESULTS (FM 5-515)			MATERIAL DESCRIPTION
Max. Dry Dens. (pcf)	Opt. Moist (%)	Max. LBR (%)	Light Brown Fine Sand
107.8	14.5	22.8	

Project No. 24842 **Client:** Florida Inland Navigation District
Project: Dredged Material Management Area M-8
Source of Sample: B-4 **Depth:** 0-10
Sample Number: 291

Remarks:

Ellis & Associates inc.
ECS Group of Companies
7064 Davis Creek Road
Jacksonville, Florida 32256
Ph: (904) 880-0960
Fax: (904) 880-0970

Figure

ECS Corporate Services

Direct Shear Test (ASTM D3080)

Date 3/24/2017

D VT

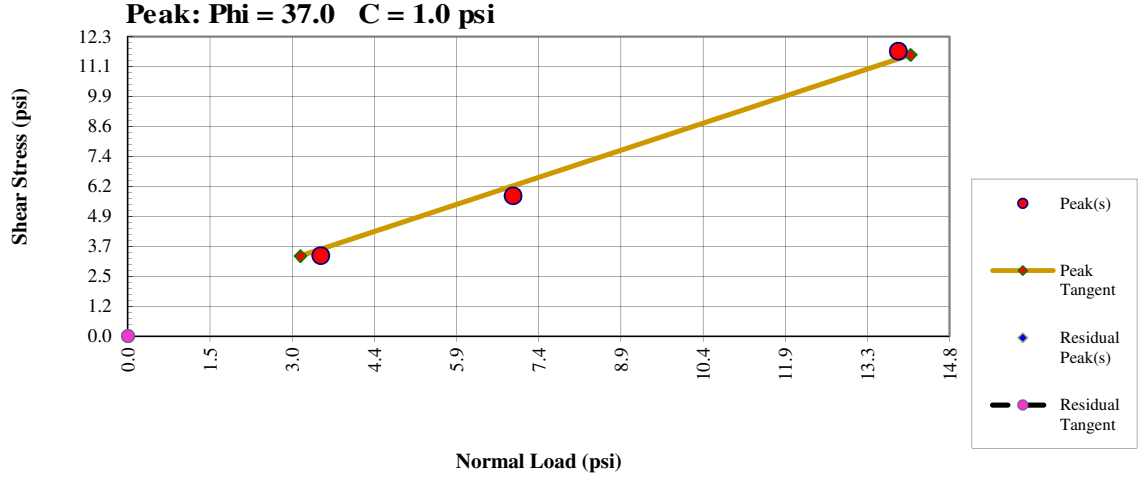
Checked By

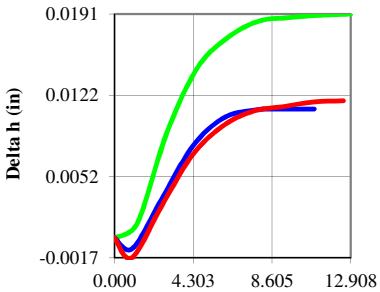
Date

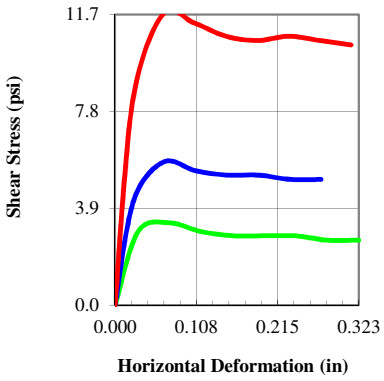
Date

Tested By

Peak: Phi = 37.0 C = 1.0 psi







Initial	Specimen A	B	C	D
Moisture (%)	13.90	13.90	13.90	
Density (pcf)	101.17	100.97	101.03	
Void Ratio	0.481	0.484	0.483	
Saturation (%)	69.36	68.93	69.07	
Diameter (in)	2.500	2.500	2.500	
Height (in)	1.000	1.000	1.000	

Final	A	B	C	D
Moisture (%)	21.81	21.30	21.60	
Density (pcf)	99.94	101.55	101.20	
Void Ratio	0.499	0.475	0.481	
Saturation (%)	100.00	100.00	100.00	
Diameter (in)	2.500	2.500	2.500	
Height (in)	0.997	0.994	0.992	
Normal Stress (psi)	3.5	6.9	13.9	
Peak Stress (psi)	3.3	5.8	11.7	
Residual Stress (psi)				
Strain (%)	12.908	10.904	12.492	
Rate (in/min)	0.008333	0.008333	0.008333	

Project Date	
Date	3/23/17

Project:	Dredged Material Managerment Area M-8
Location:	B-3
Project Number:	24842
Boring Number	B-3
Sample Number:	B-3
Depth:	_
Sample Type:	Remolded
Description:	Fine Sand Gray
Test Type:	Direct Shear
Remarks:	

ECS Corporate Services

Direct Shear Test (ASTM D3080)

Date

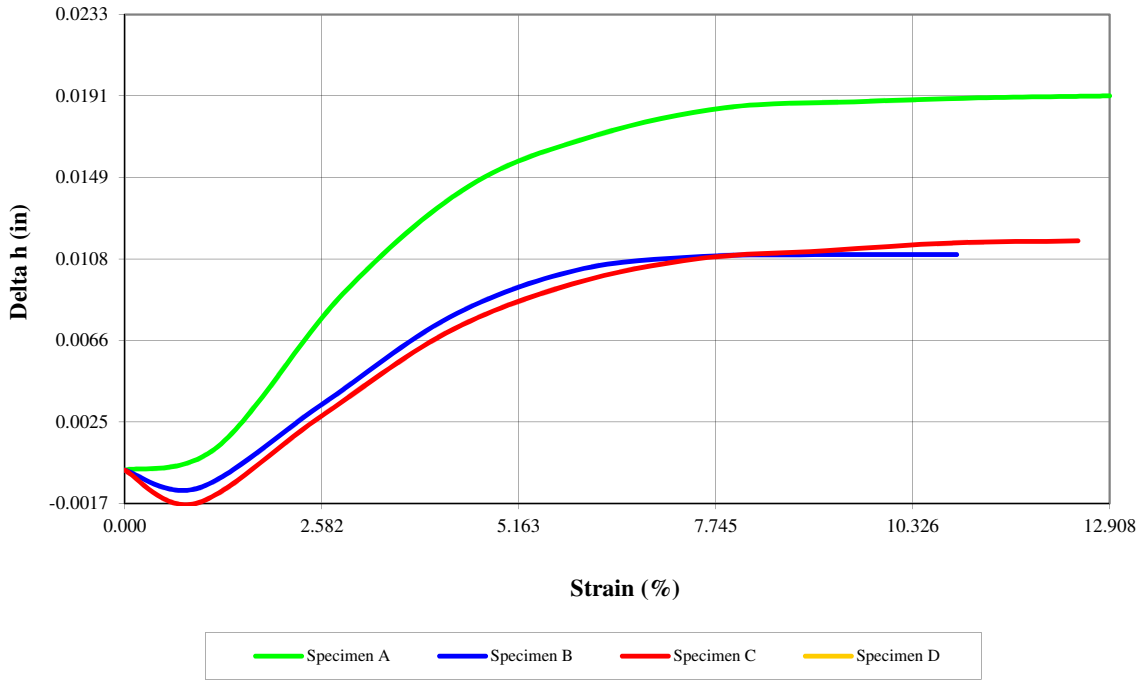
Checked By

Date

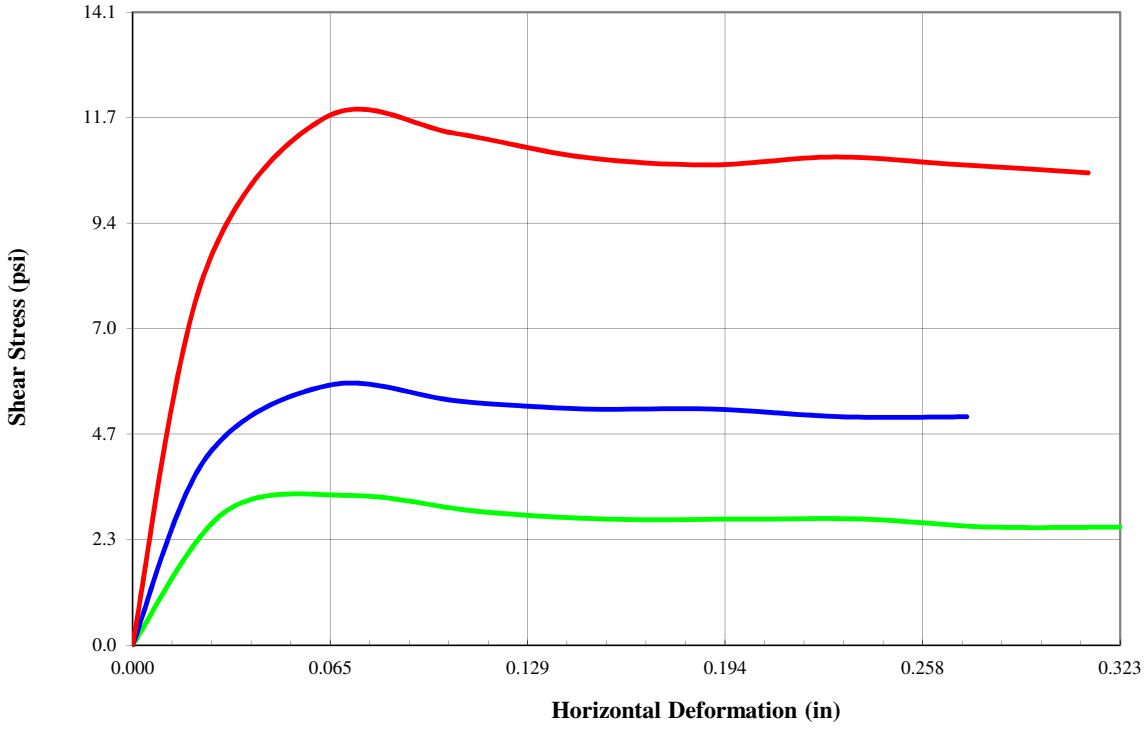
Date

Tested By

Delta h



Stress-Deformation



122146-1.HSD

ECS Corporate Services

Direct Shear Test

Date

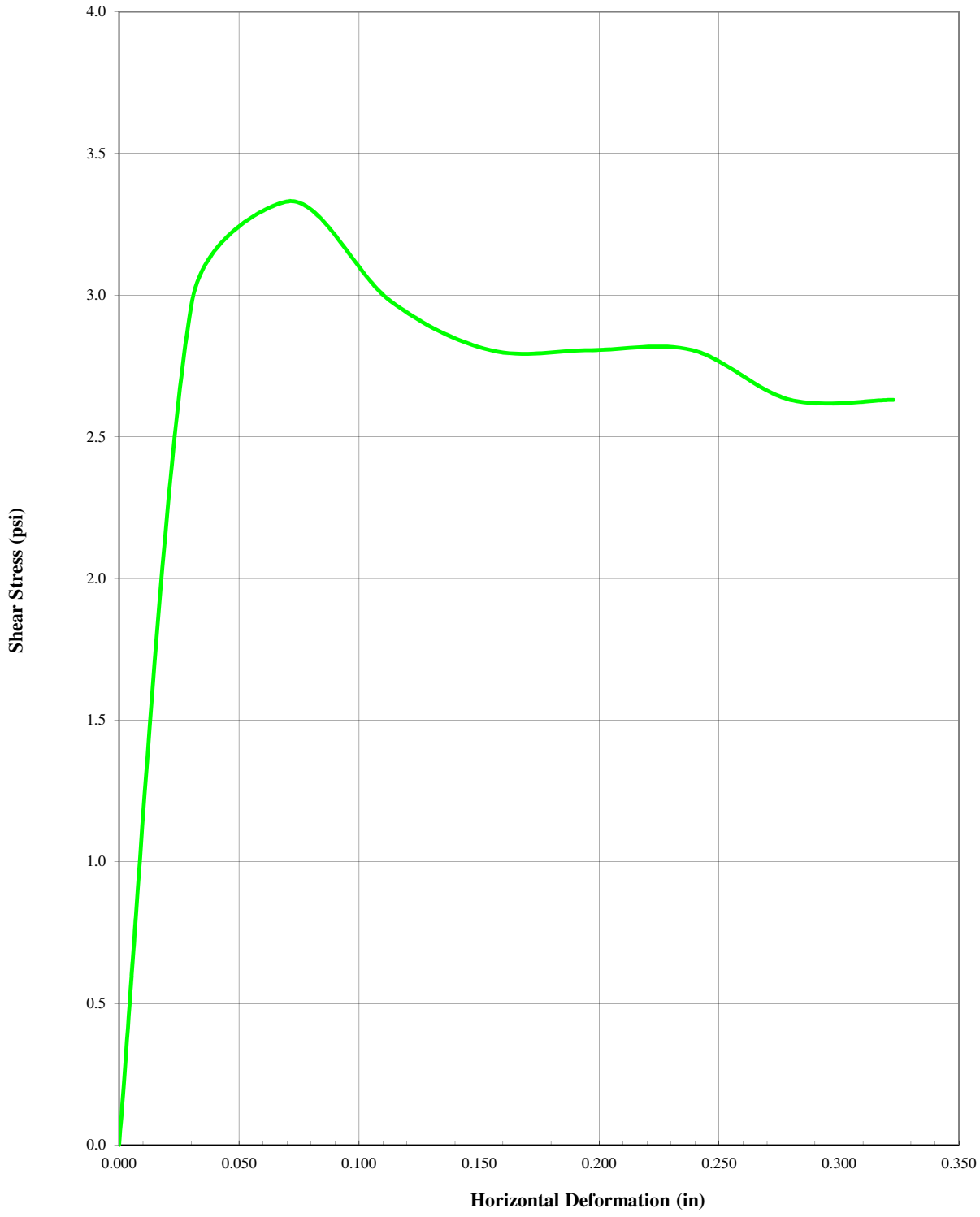
Checked By

Date

Date

Tested By

Specimen A Stress-Deformation



122146-1.HSD

ECS Corporate Services

Direct Shear Test

Date

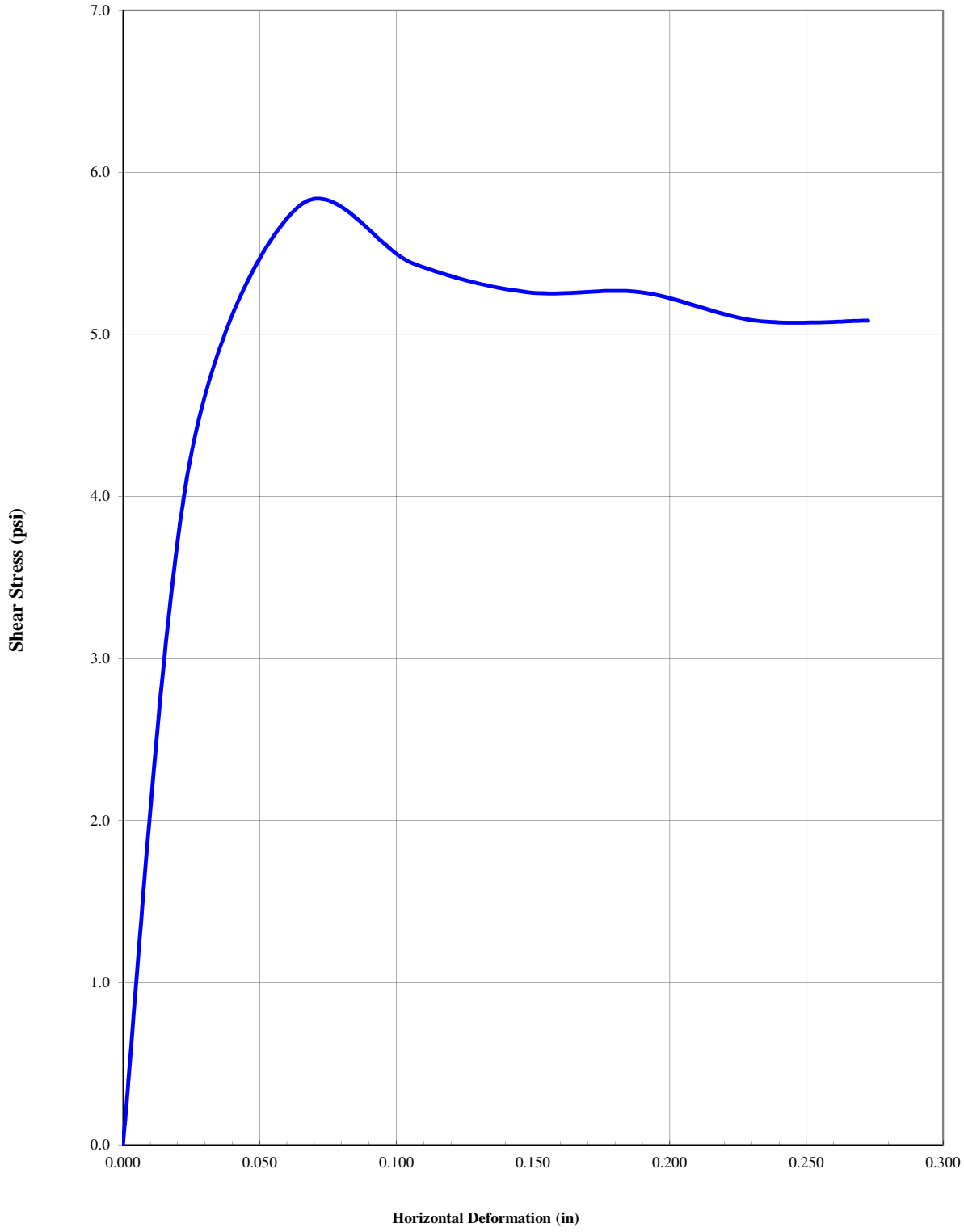
Checked By

Date

Date

Tested By

Specimen B Stress-Deformation



122146-1.HSD

ECS Corporate Services

Direct Shear Test

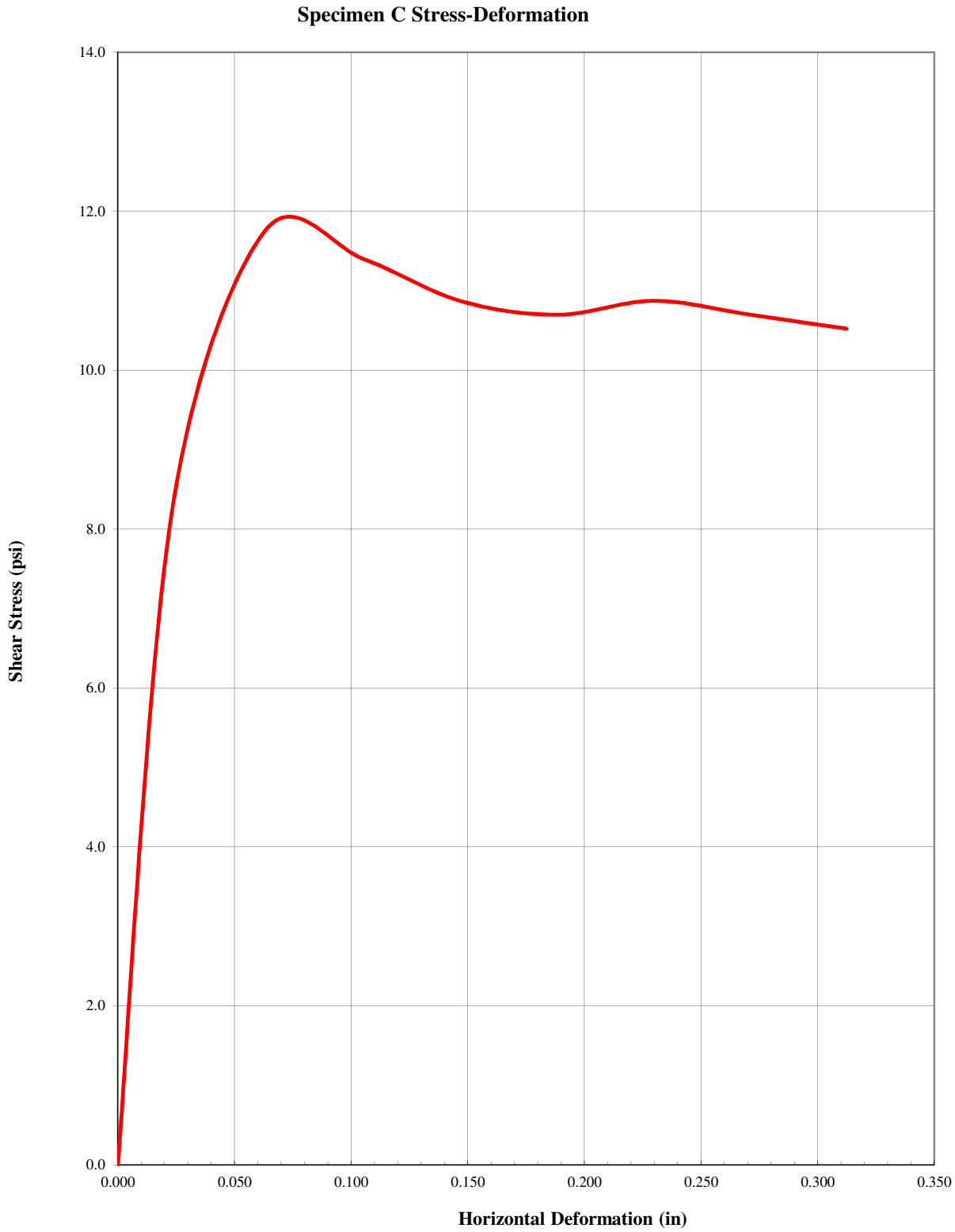
Date

Checked By

Date

Date

Tested By



122146-1.HSD

ECS Corporate Services

Direct Shear Test (ASTM D3080)

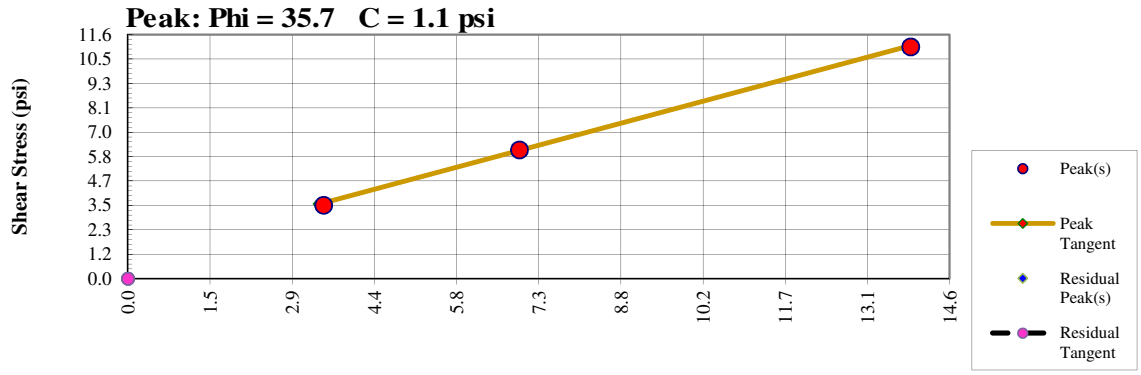
Date

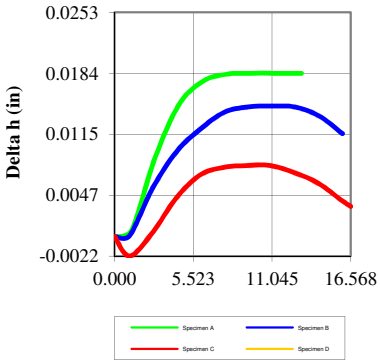
Checked By

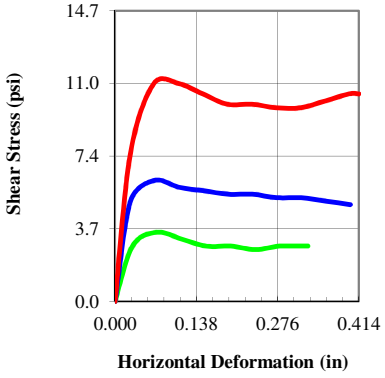
Date

Date

Tested By







Initial	Specimen A	B	C	D
Moisture (%)	14.25	14.25	14.25	
Density (pcf)	102.69	102.54	102.52	
Void Ratio	0.459	0.461	0.461	
Saturation (%)	74.50	74.15	74.11	
Diameter (in)	2.500	2.500	2.500	
Height (in)	1.000	1.000	1.000	

Final	A	B	C	D
Moisture (%)	21.64	21.50	22.24	
Density (pcf)	102.31	101.83	101.64	
Void Ratio	0.464	0.471	0.474	
Saturation (%)	100.00	100.00	100.00	
Diameter (in)	2.500	2.500	2.500	
Height (in)	0.998	0.997	0.992	
Normal Stress (psi)	3.5	6.9	13.9	
Peak Stress (psi)	3.5	6.1	11.0	
Residual Stress (psi)				
Strain (%)	13.104	15.984	16.568	
Rate (in/min)	0.008333	0.008333	0.008333	

Project Date	
Date	3/24/17

Project:	Dredged Material MAnagerment Area M-8
Location:	B-4
Project Number:	24842
Boring Number	B-4
Sample Number:	B-4
Depth:	_
Sample Type:	Remolded
Description:	Fine Sand Light Gray
Test Type:	Direct Shear
Remarks:	

ECS Corporate Services

Direct Shear Test (ASTM D3080)

Date

Checked By

Date

Date

Tested By

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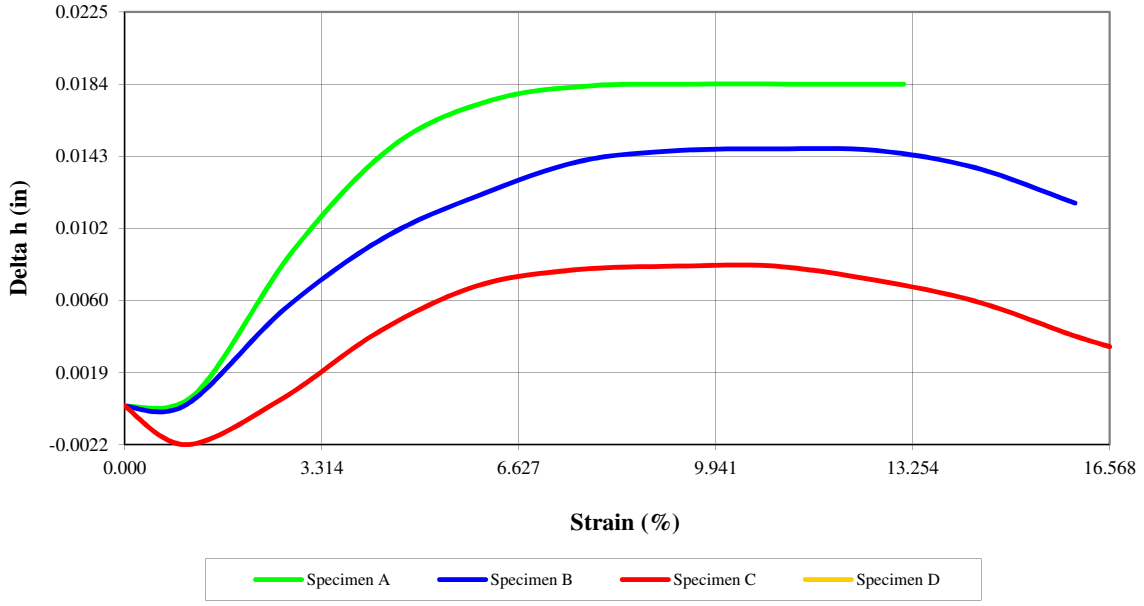
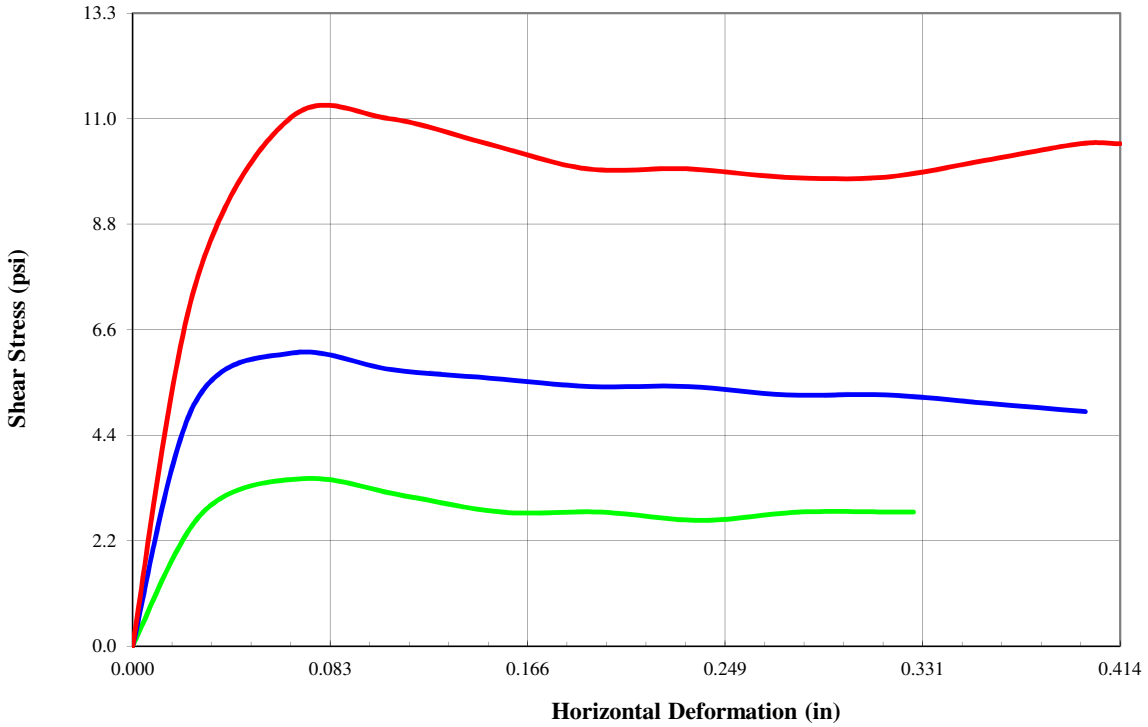


Stress-Deformation



122146-2.HSD

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Direct Shear Test

Date

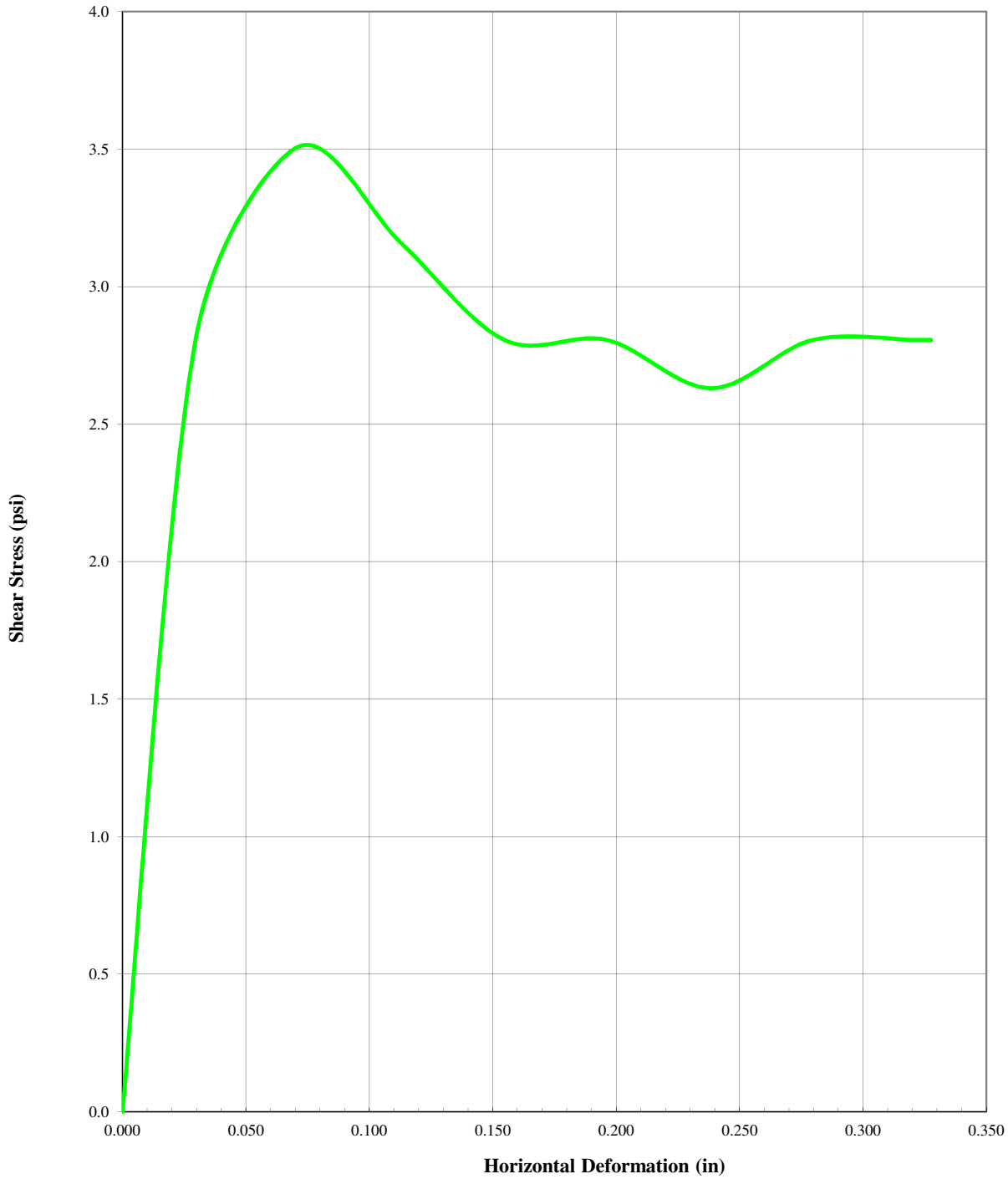
Checked By

Date

Date

Tested By

Specimen A Stress-Deformation



122146-2.HSD

ECS Corporate Services

Direct Shear Test

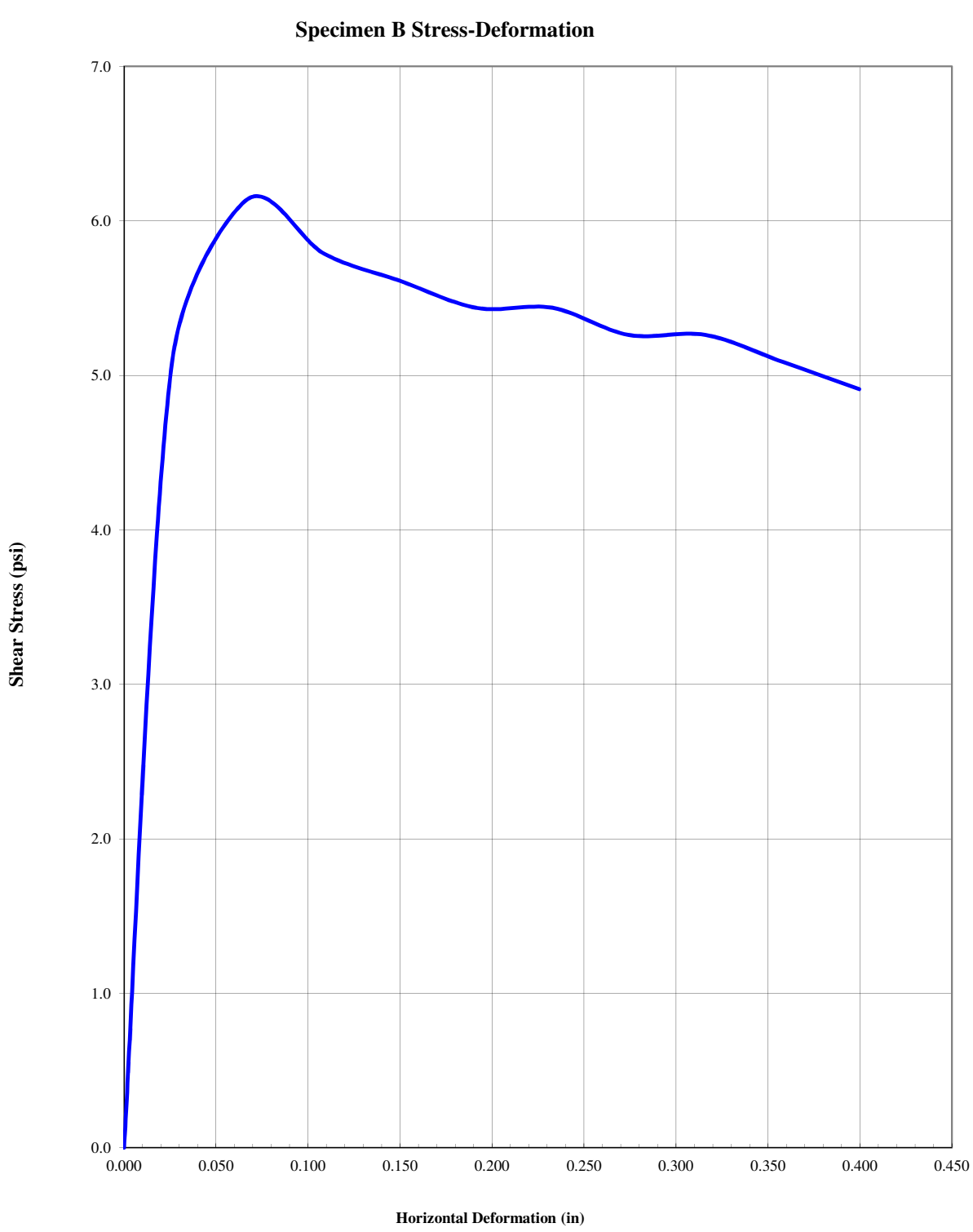
Date

Checked By

Date

Date

Tested By



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ECS Corporate Services

Direct Shear Test

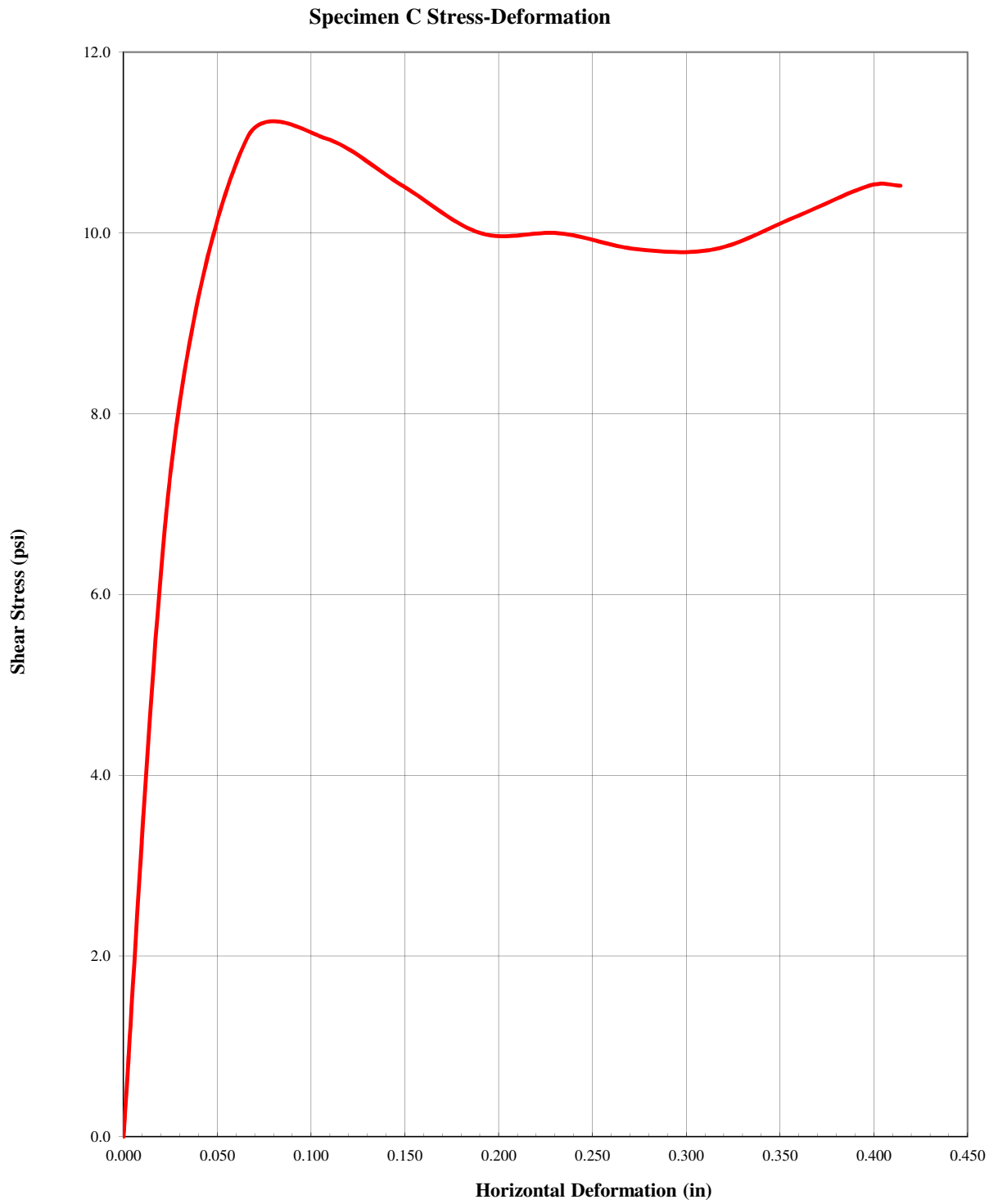
Date

Checked By

Date

Date

Tested By



122146-2.HSD

ECS Corporate Services

Direct Shear Test (ASTM D3080)

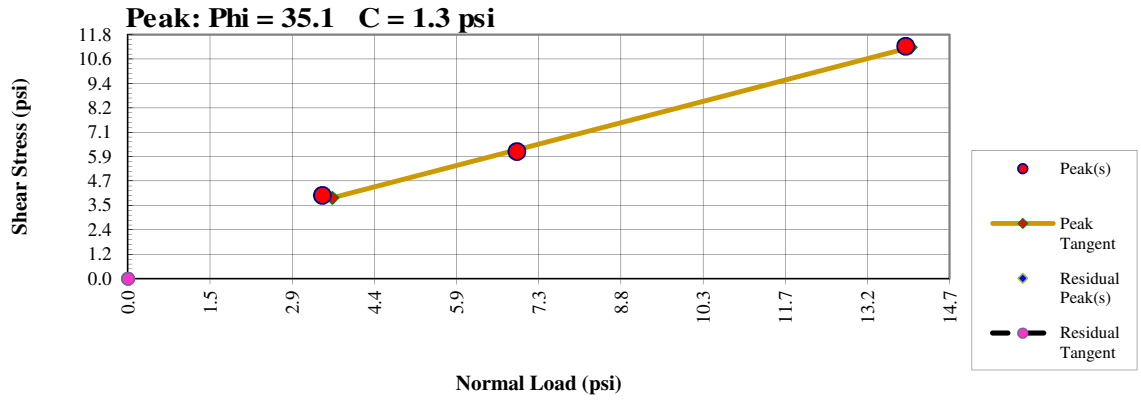
Date: 3/2

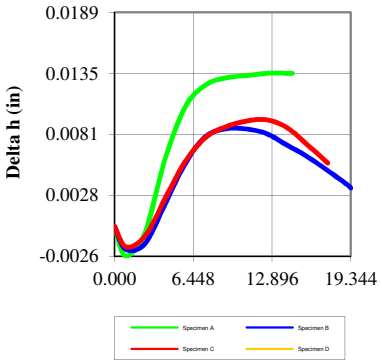
Checked By: D

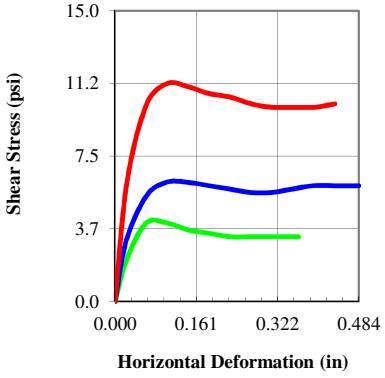
Date: 3/21/17

Date

Tested By: HNT







Initial	Specimen A	B	C	D
Moisture (%)	15.53	15.53	15.53	
Density (pcf)	97.34	97.46	97.42	
Void Ratio	0.507	0.505	0.506	
Saturation (%)	71.96	72.23	72.14	
Diameter (in)	2.500	2.500	2.500	
Height (in)	1.000	1.000	1.000	

Final	A	B	C	D
Moisture (%)	20.73	21.72	20.64	
Density (pcf)	96.75	96.31	96.79	
Void Ratio	0.516	0.523	0.516	
Saturation (%)	94.88	99.24	95.57	
Diameter (in)	2.500	2.500	2.500	
Height (in)	0.998	0.994	0.995	
Normal Stress (psi)	3.5	6.9	13.9	
Peak Stress (psi)	4.0	6.1	11.2	
Residual Stress (psi)				
Strain (%)	14.552	19.344	17.444	
Rate (in/min)	0.008333	0.008333	0.008333	

Project Date	
Date	3/20/17

Project:	Dredged Material Mamagerment Area M-8
Location:	B-7
Project Number:	24842
Boring Number	B-7
Sample Number:	B-7
Depth:	–
Sample Type:	Remolded
Description:	Fine Sand Gray
Test Type:	Direct Shear
Remarks:	

ECS Corporate Services

Direct Shear Test (ASTM D3080)

Date

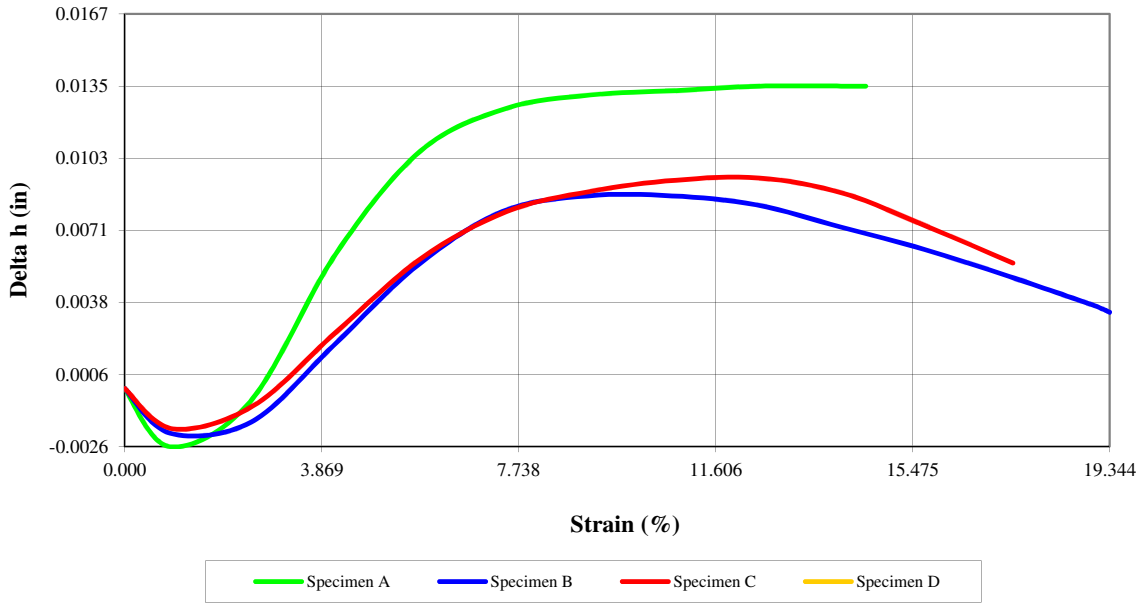
Checked By

Date

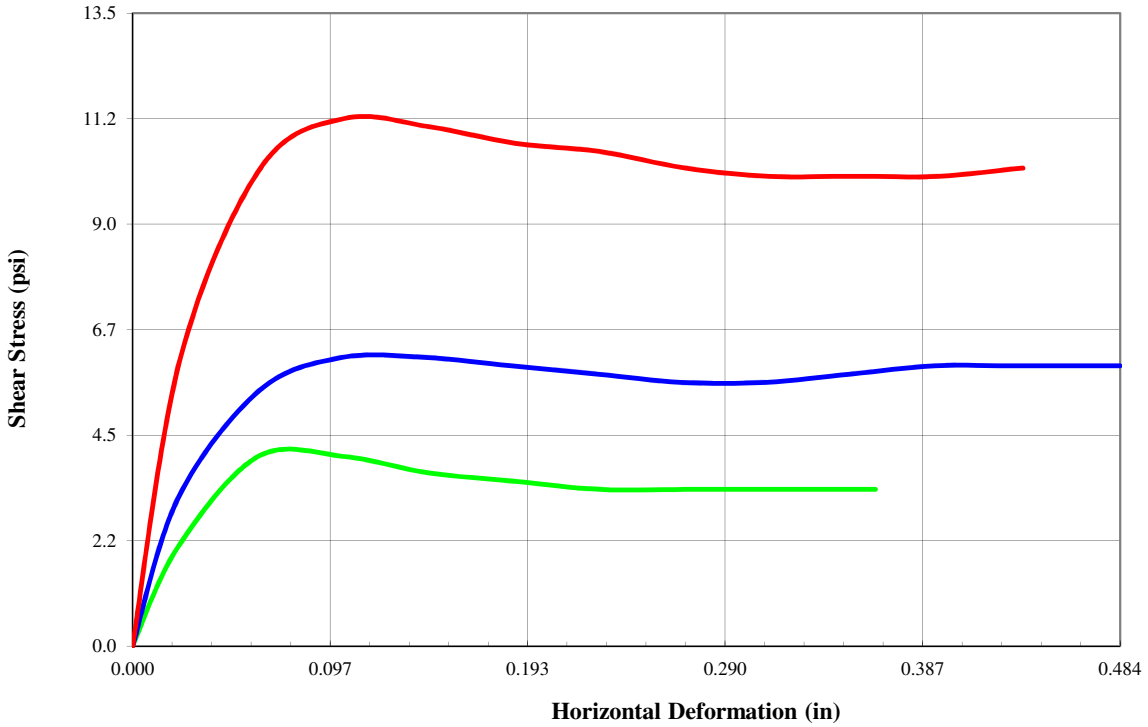
Date

Tested By

Delta h



Stress-Deformation



122146-3.HSD

ECS Corporate Services

Direct Shear Test

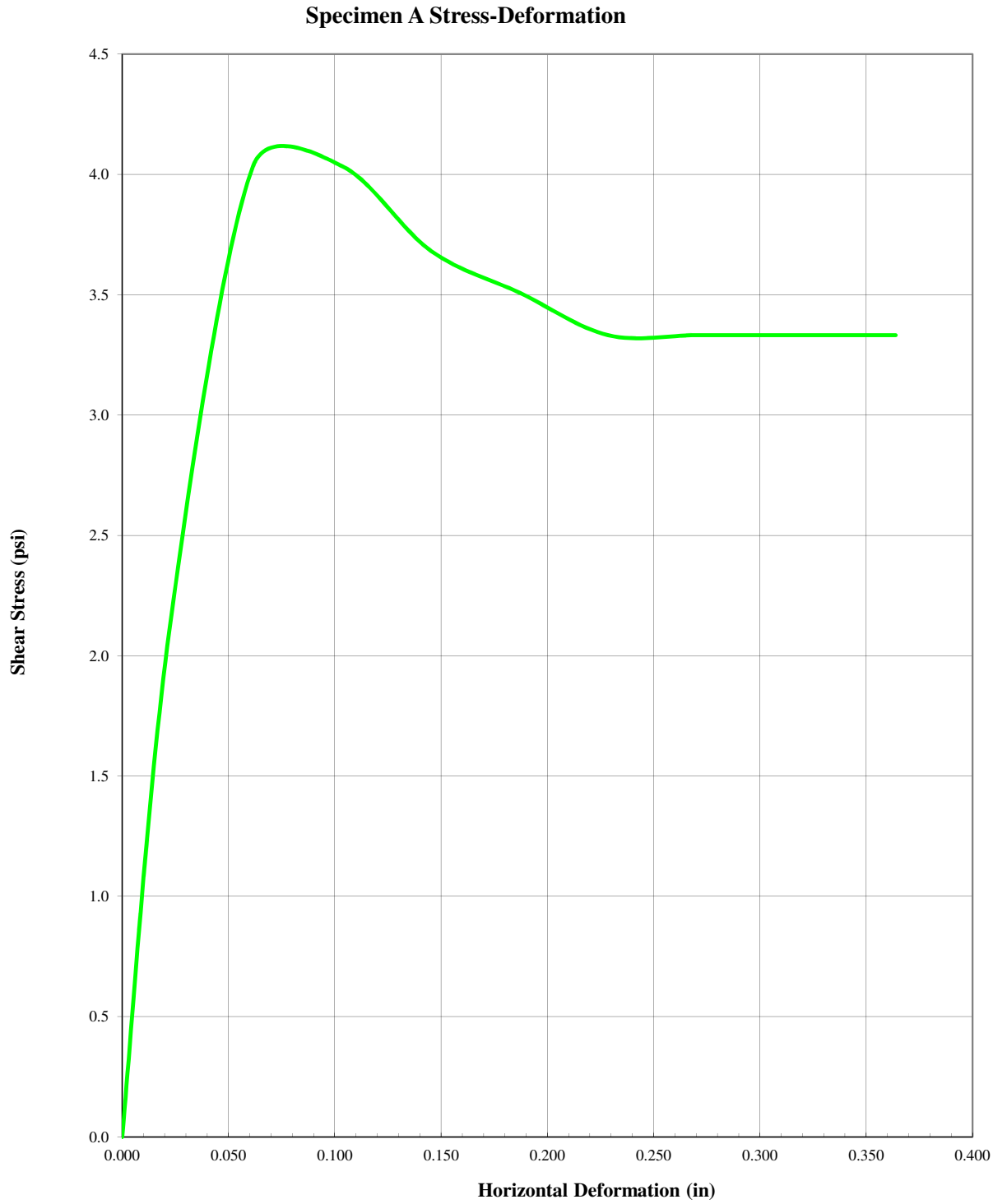
Date

Checked By

Date

Date

Tested By



122146-3.HSD

ECS Corporate Services

Direct Shear Test

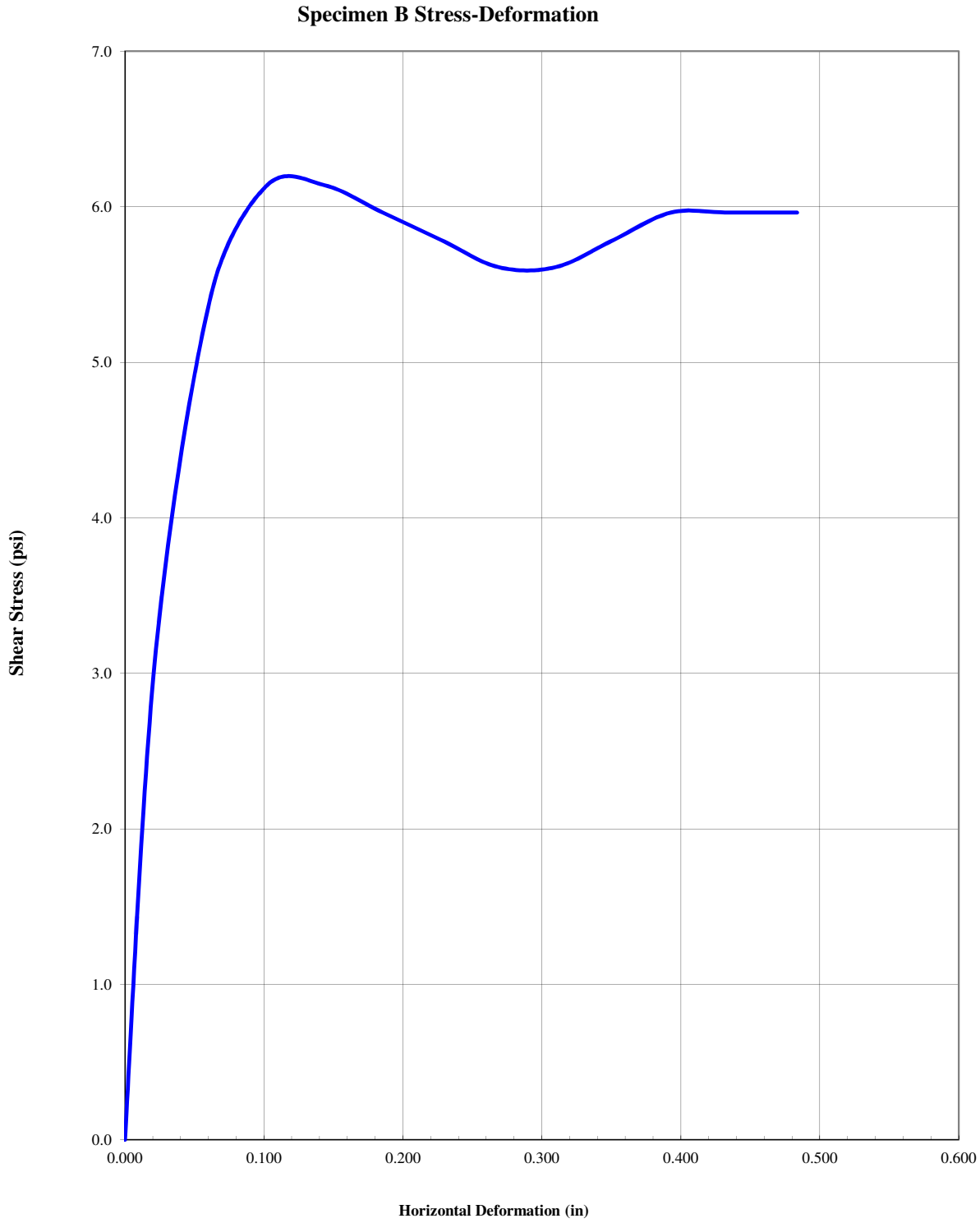
Date

Checked By

Date

Date

Tested By



122146-3.HSD

ECS Corporate Services

Direct Shear Test

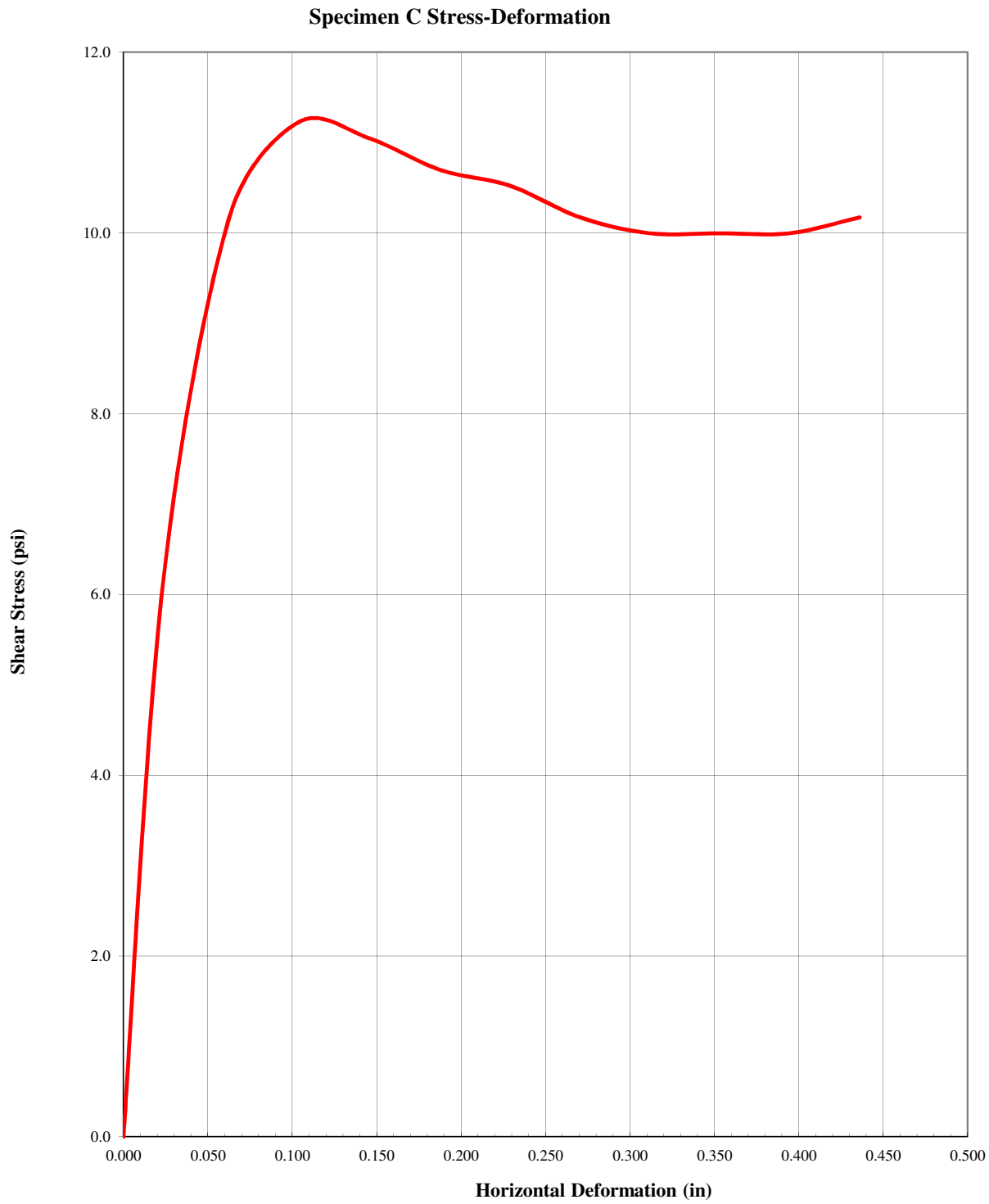
Date

Checked By

Date

Date

Tested By



122146-3.HSD

ECS Corporate Services

Direct Shear Test (ASTM D3080)

Date ########

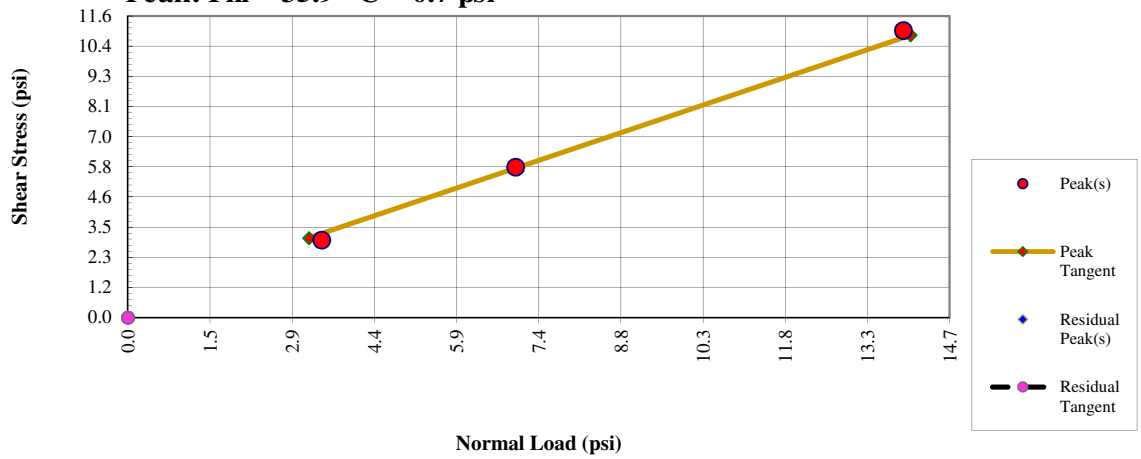
Checked By DVT

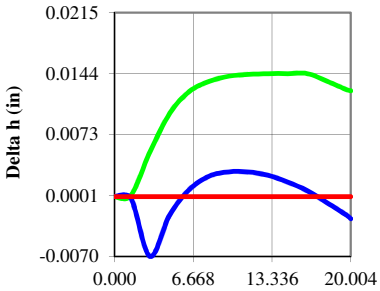
Date

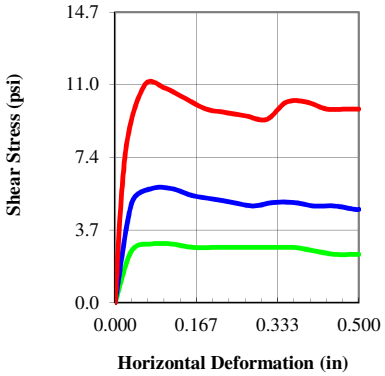
Date

Tested By

Peak: Phi = 35.9 C = 0.7 psi







Initial	Specimen A	B	C	D
Moisture (%)	13.94	13.94	13.94	
Density (pcf)	100.82	100.64	100.92	
Void Ratio	0.486	0.489	0.485	
Saturation (%)	68.83	68.46	69.05	
Diameter (in)	2.500	2.500	2.500	
Height (in)	1.000	1.000	1.000	

Final	A	B	C	D
Moisture (%)	20.63	21.23	21.14	
Density (pcf)	99.06	99.85	99.21	
Void Ratio	0.513	0.501	0.510	
Saturation (%)	96.83	100.00	100.00	
Diameter (in)	2.500	2.500	2.500	
Height (in)	0.999	0.998	0.990	
Normal Stress (psi)	3.5	6.9	13.9	
Peak Stress (psi)	3.0	5.8	11.0	
Residual Stress (psi)				
Strain (%)	20.004	20.004	20.004	
Rate (in/min)	0.008333	0.008333	0.008333	

Project Date	
Date	3/27/17

Project:	Dredged Material Managerment Are M-8
Location:	B-8
Project Number:	24842
Boring Number	B-8
Sample Number:	B-8
Depth:	_
Sample Type:	Remolded
Description:	Fine Sand Gray
Test Type:	Direct Shear
Remarks:	

ECS Corporate Services

Direct Shear Test (ASTM D3080)

Date

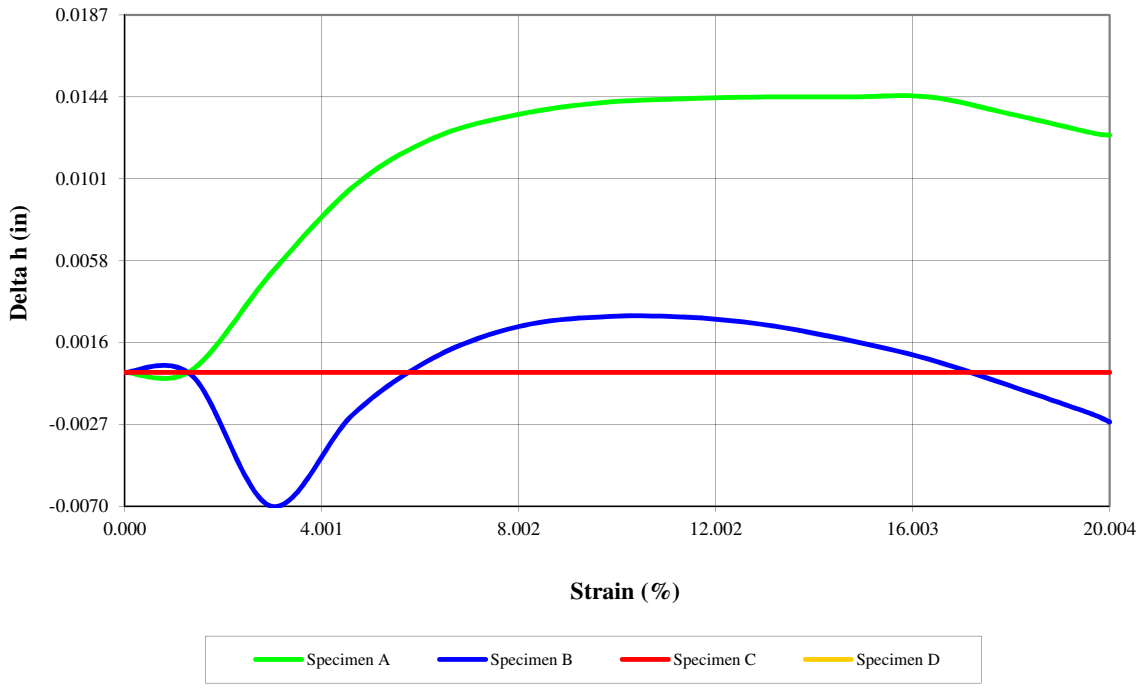
Checked By

Date

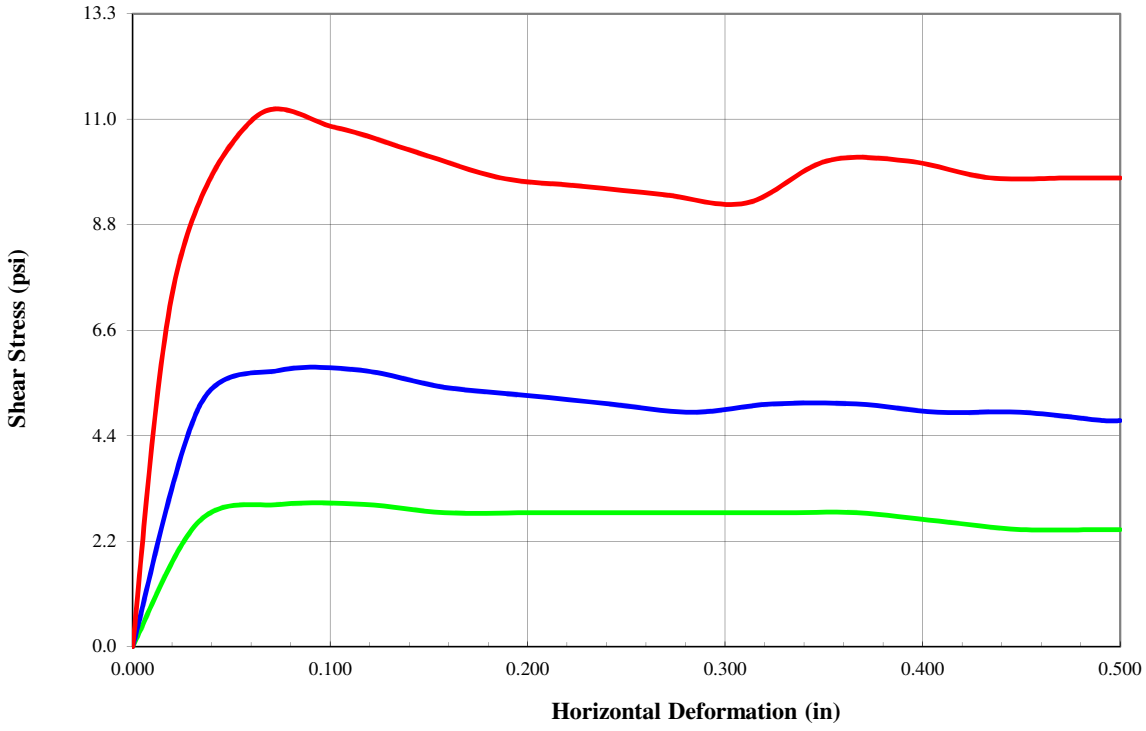
Date

Tested By

Delta h



Stress-Deformation



122146-4.HSD

ECS Corporate Services

Direct Shear Test

Date

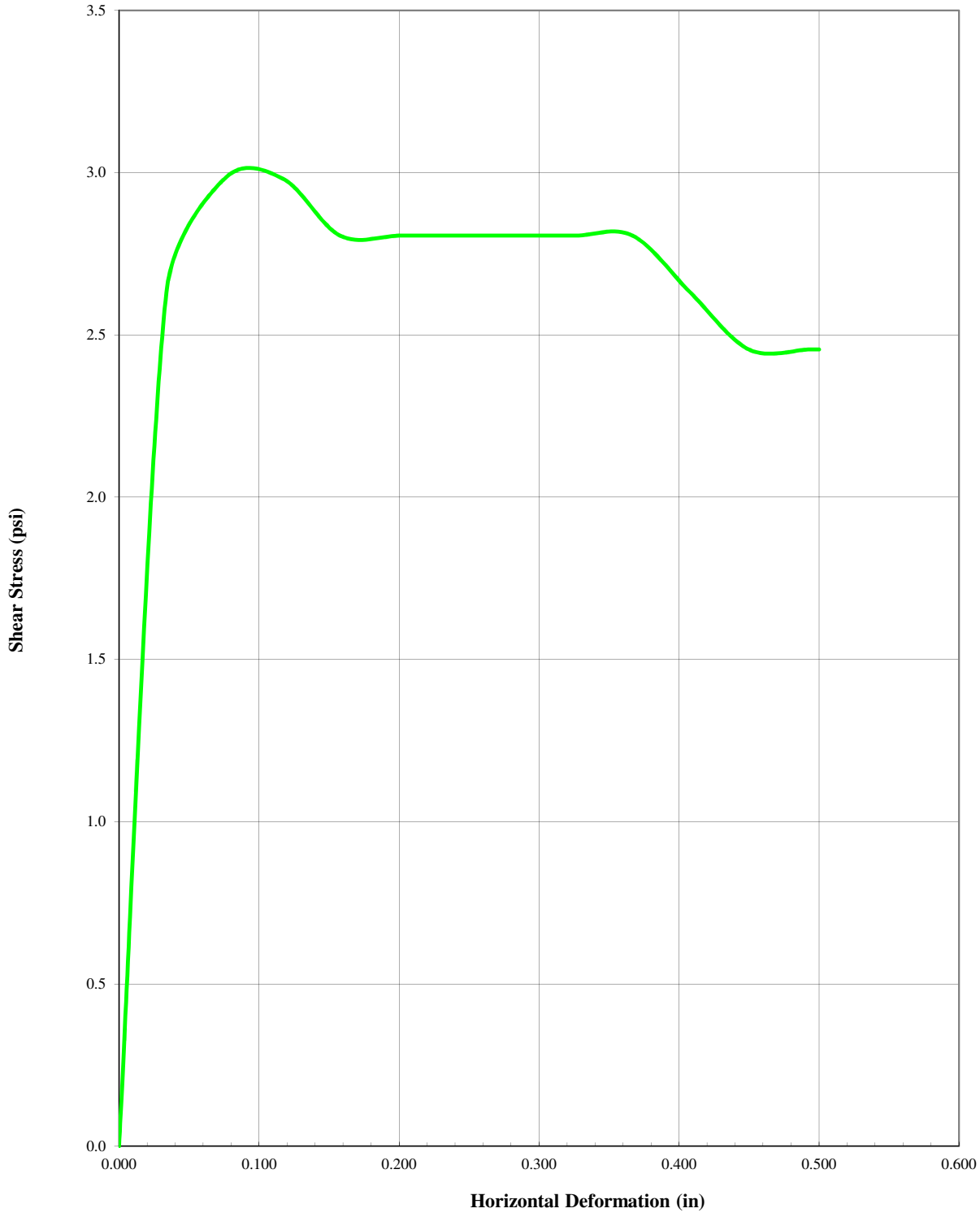
Checked By

Date

Date

Tested By

Specimen A Stress-Deformation



122146-4.HSD

ECS Corporate Services

Direct Shear Test

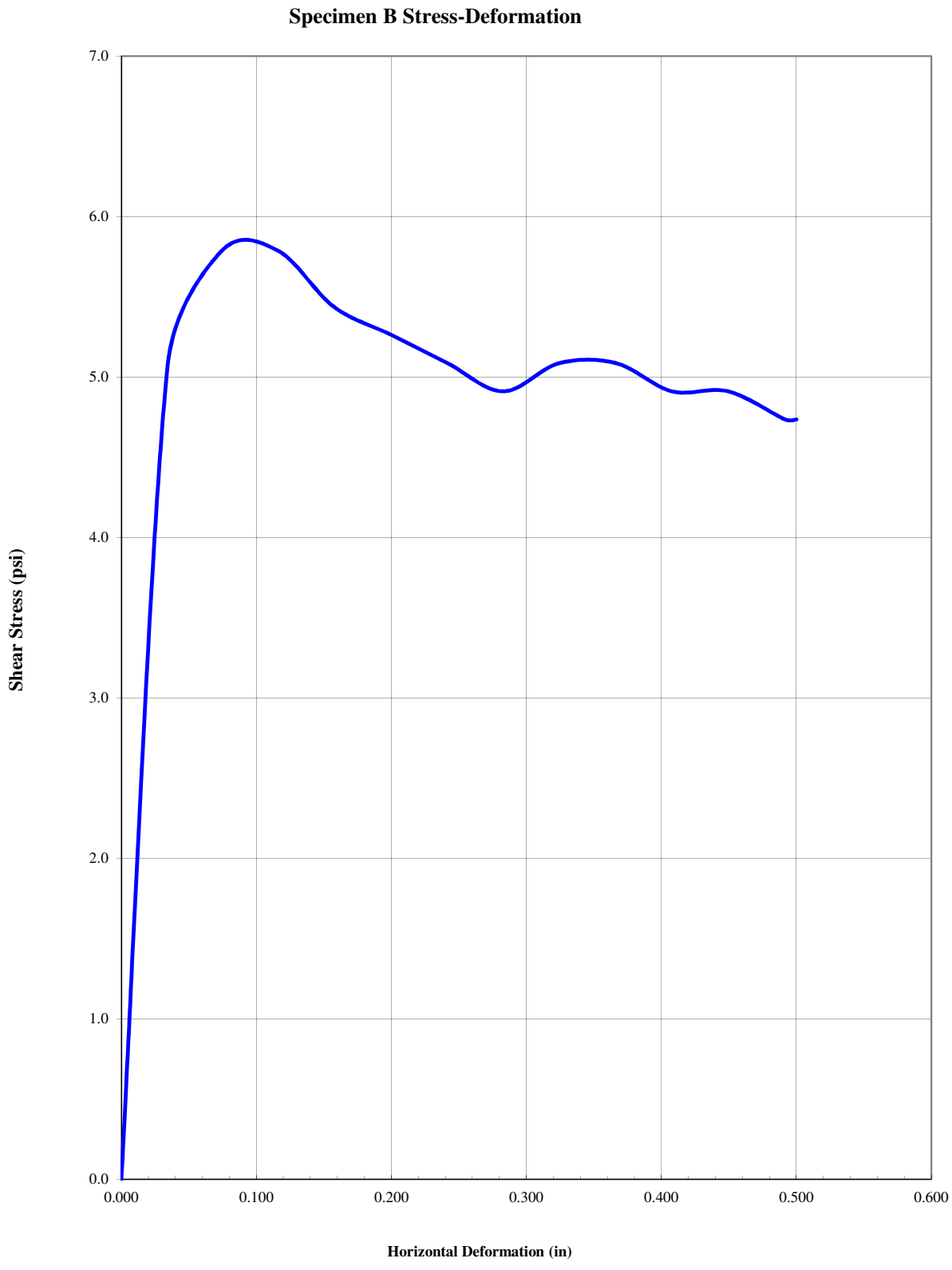
Tested By

Date

Checked By

Date

Date



122146-4.HSD

ECS Corporate Services

Direct Shear Test

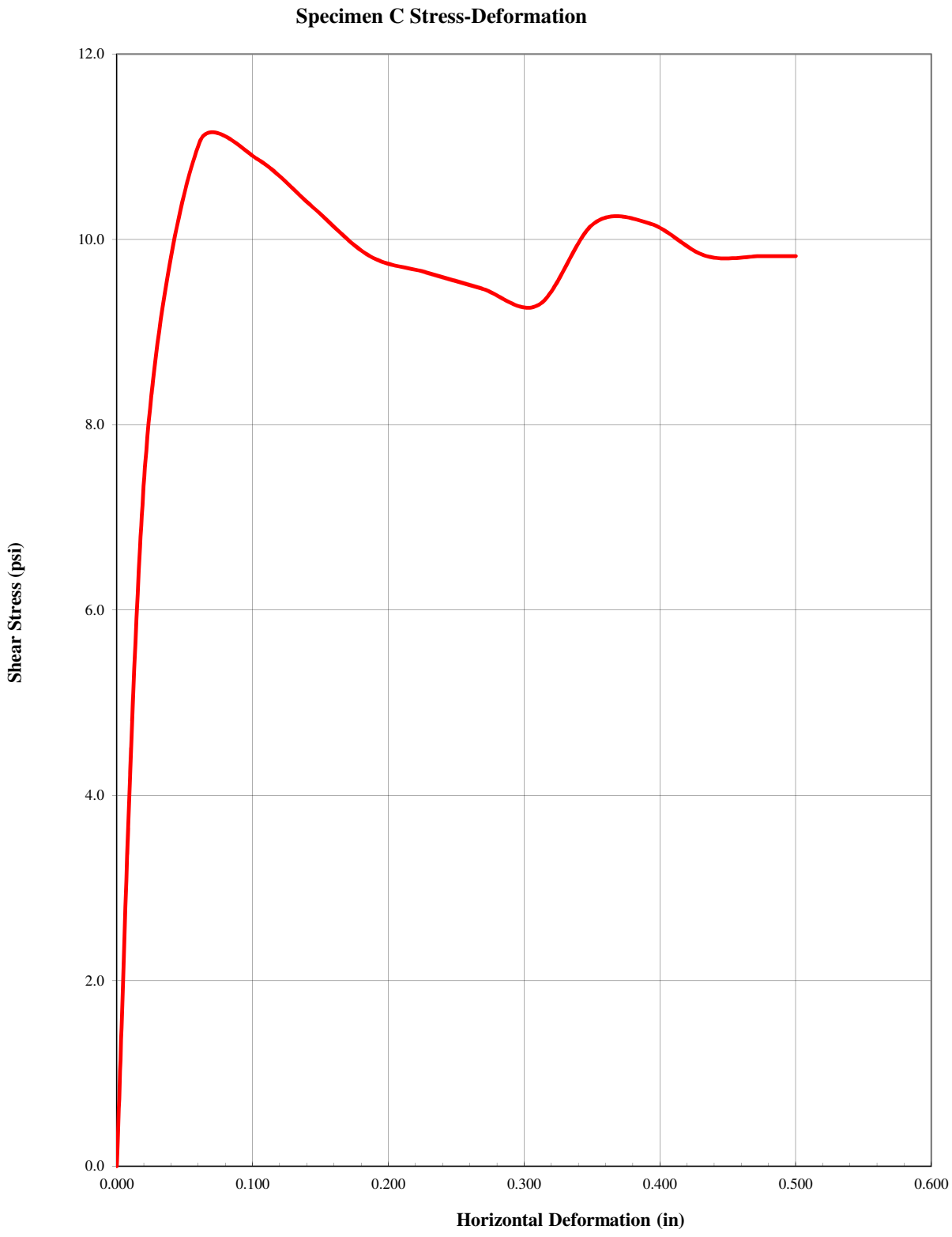
Date

Checked By

Date

Date

Tested By



122146-4.HSD

ECS Corporate Services

Direct Shear Test (ASTM D3080)

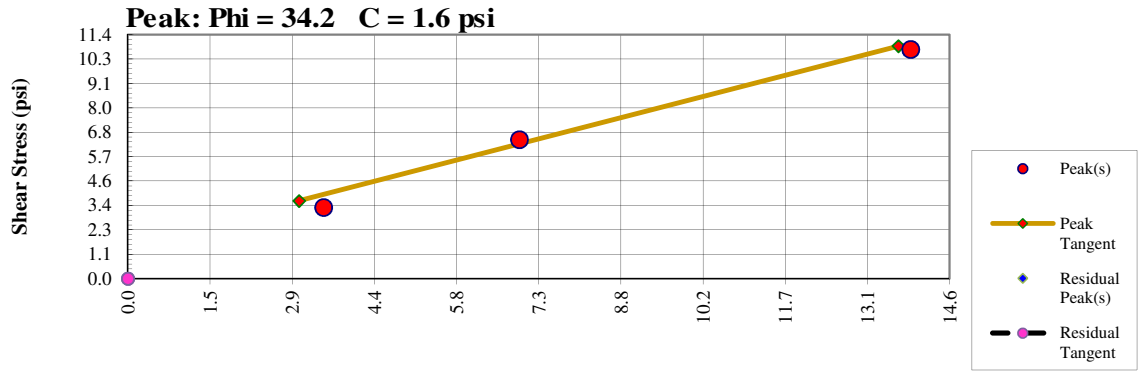
Date

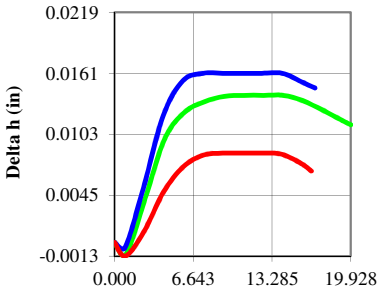
Checked By

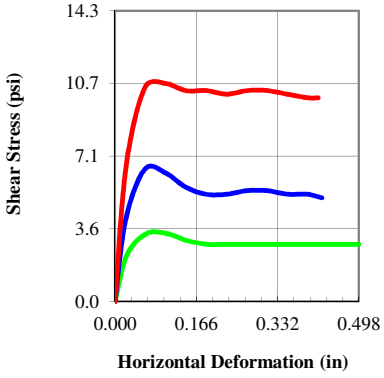
Date

Date

Tested By







Initial	Specimen A	B	C	D
Moisture (%)	13.14	13.14	13.14	
Density (pcf)	103.23	103.23	103.23	
Void Ratio	0.451	0.451	0.451	
Saturation (%)	69.88	69.88	69.88	
Diameter (in)	2.500	2.500	2.500	
Height (in)	1.000	1.000	1.000	

Final	A	B	C	D
Moisture (%)	20.39	20.51	21.16	
Density (pcf)	101.46	101.19	102.53	
Void Ratio	0.477	0.481	0.461	
Saturation (%)	100.00	100.00	100.00	
Diameter (in)	2.500	2.500	2.500	
Height (in)	0.996	1.000	0.996	
Normal Stress (psi)	3.5	6.9	13.9	
Peak Stress (psi)	3.3	6.5	10.7	
Residual Stress (psi)				
Strain (%)	19.928	16.900	16.600	
Rate (in/min)	0.008333	0.008333	0.008333	

Project Date	
Date	3/21/17

Project:	Dredged Material Managerment Area M-8
Location:	B-11
Project Number:	24842
Boring Number	B-11
Sample Number:	B-11
Depth:	_
Sample Type:	Remolded
Description:	Fine Sand Light Gray
Test Type:	Direct Shear
Remarks:	

ECS Corporate Services

Direct Shear Test (ASTM D3080)

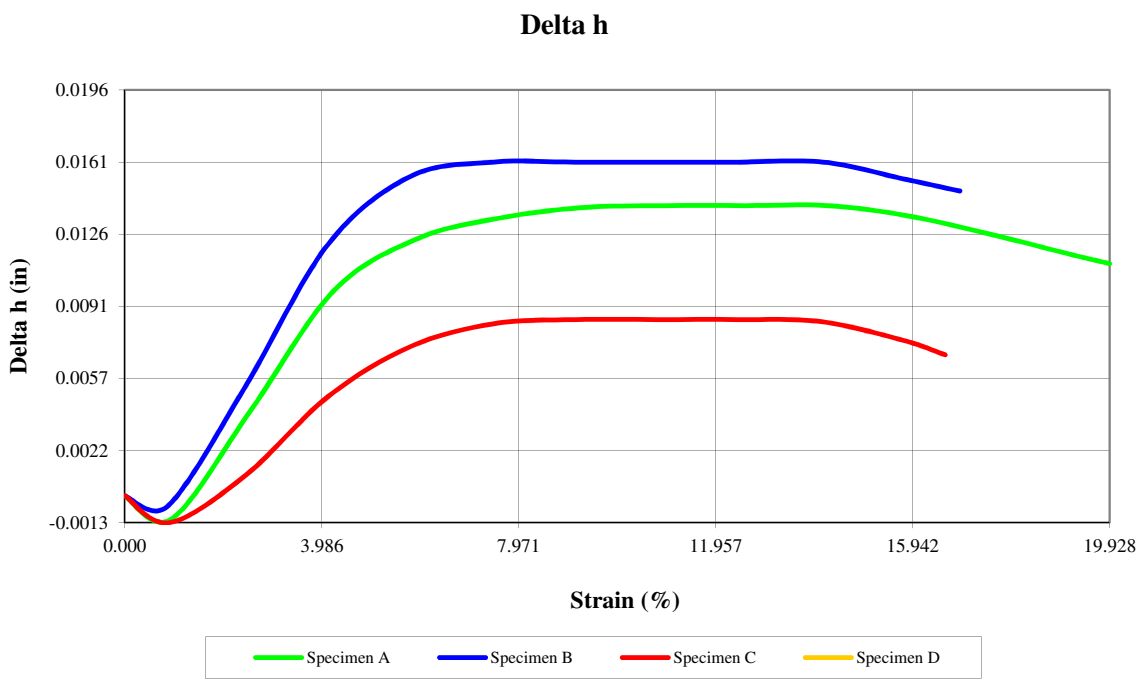
Date

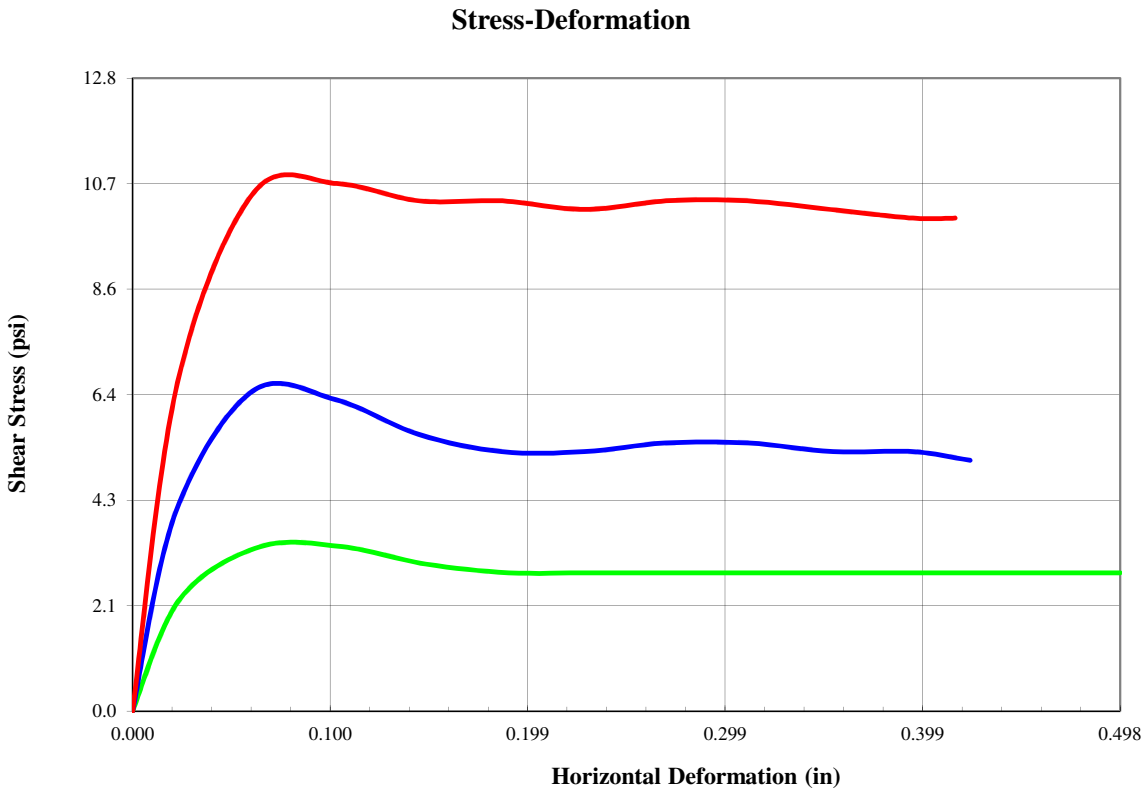
Checked By

Date

Date

Tested By





122143-5.HSD

ECS Corporate Services

Direct Shear Test

Date

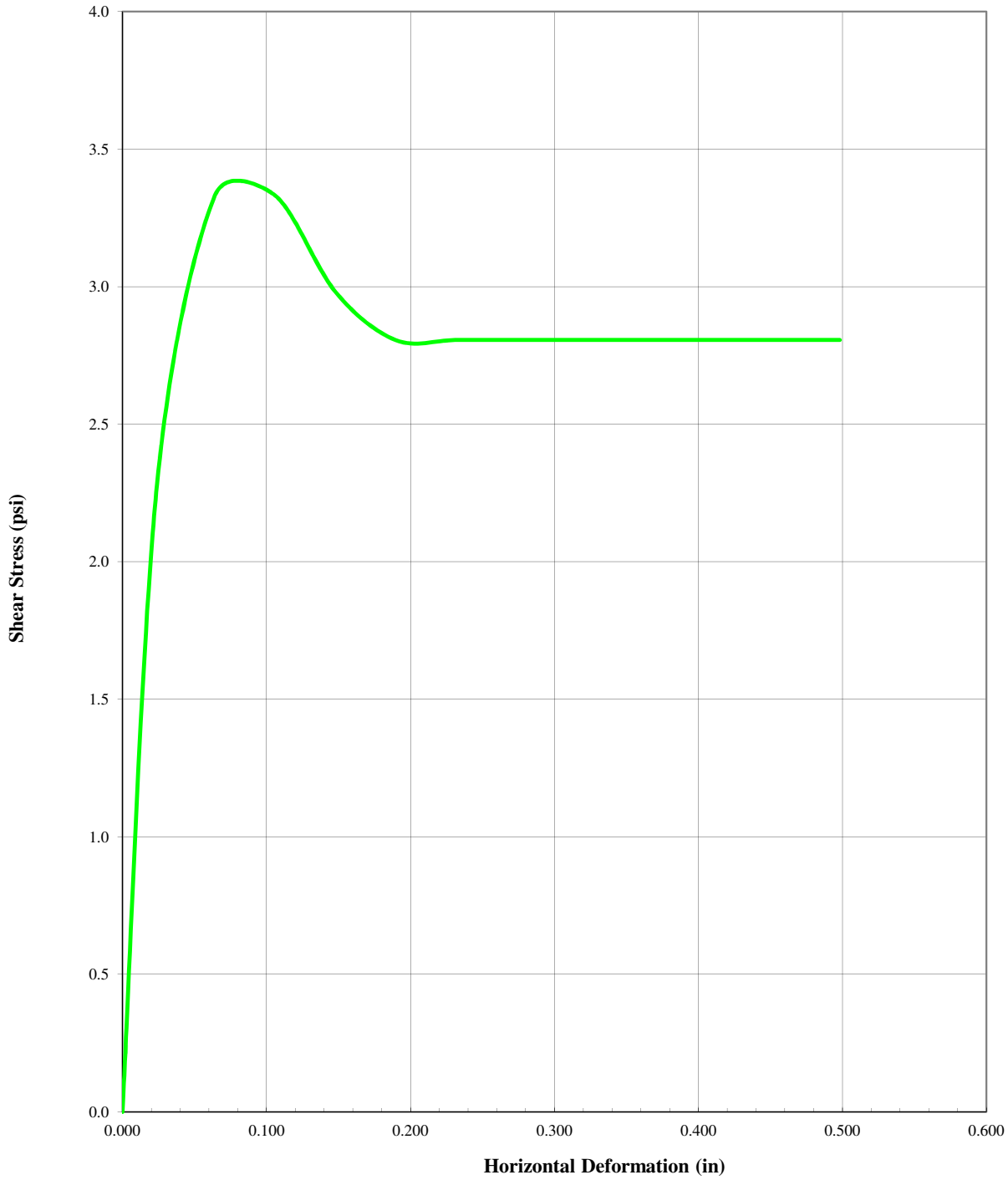
Checked By

Date

Date

Tested By

Specimen A Stress-Deformation



122143-5.HSD

ECS Corporate Services

Direct Shear Test

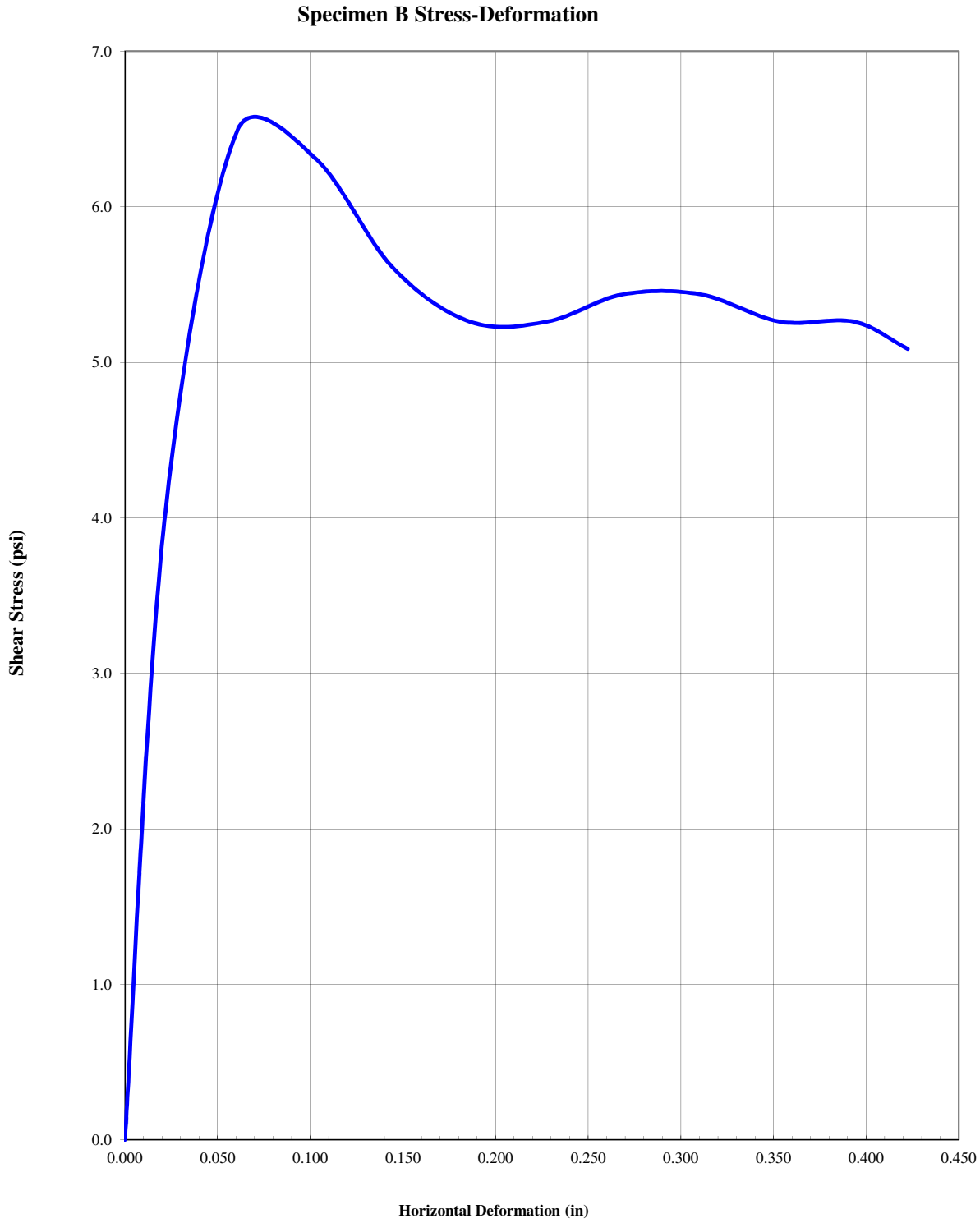
Date

Checked By

Date

Date

Tested By



122143-5.HSD

ECS Corporate Services

Direct Shear Test

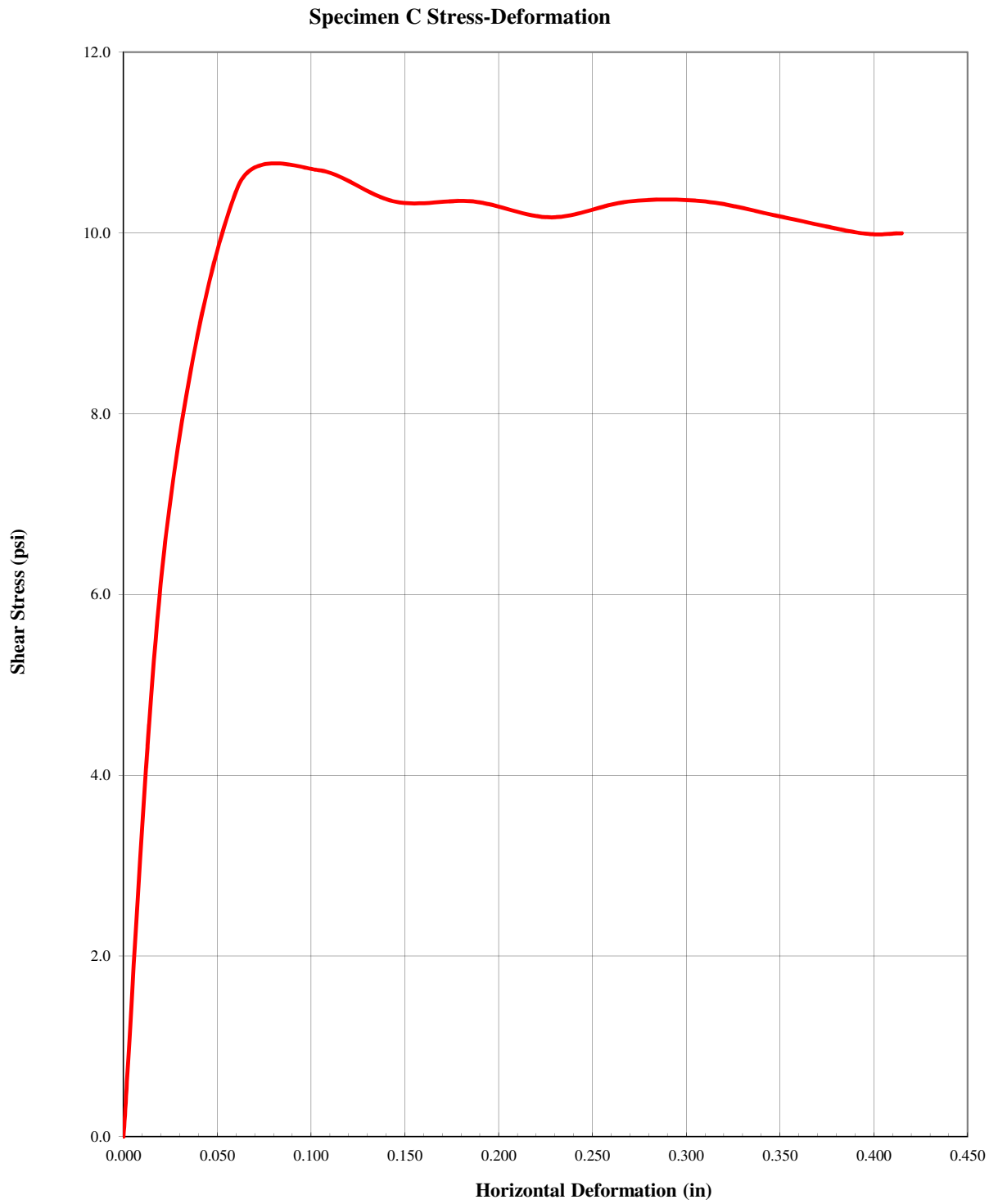
Date

Checked By

Date

Date

Tested By



122143-5.HSD

ECS Corporate Services

Direct Shear Test (ASTM D3080)

Date

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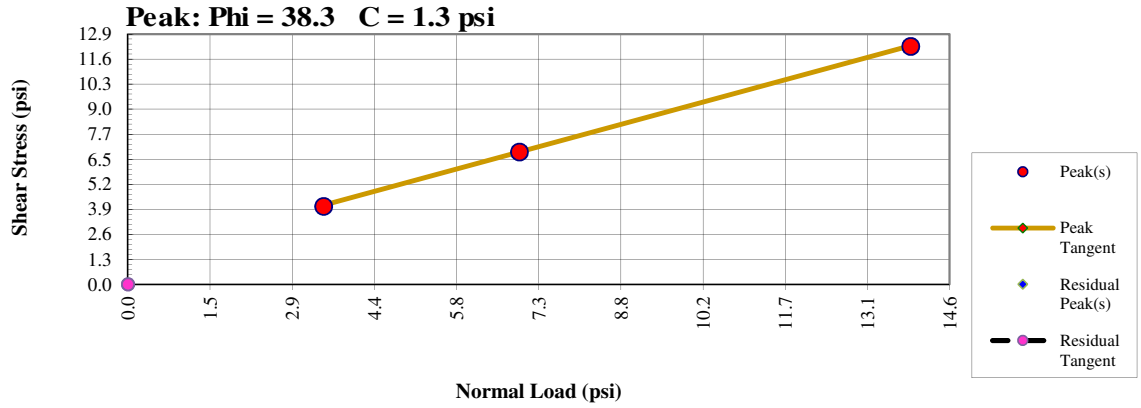
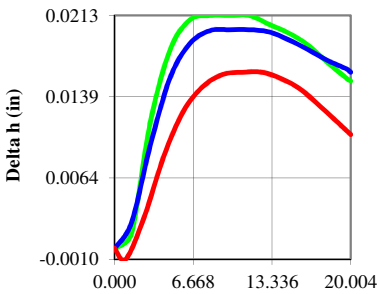
Checked By

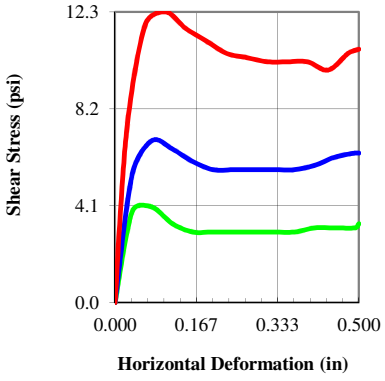
Date: 3/23/17

Date

Tested By







Initial	Specimen A	B	C	D
Moisture (%)	13.81	13.81	-255.33	
Density (pcf)	103.83	103.72	-76.15	
Void Ratio	0.443	0.444	-2.967	
Saturation (%)	74.83	74.57	100.00	
Diameter (in)	2.500	2.500	2.500	
Height (in)	1.000	1.000	1.000	

Final	A	B	C	D
Moisture (%)	22.11	22.90	0.00	
Density (pcf)	102.67	102.50	-155.21	
Void Ratio	0.459	0.462	-1.965	
Saturation (%)	100.00	100.00	0.00	
Diameter (in)	2.500	2.500	2.500	
Height (in)	0.998	0.997	1.103	
Normal Stress (psi)	3.5	6.9	13.9	
Peak Stress (psi)	4.0	6.8	12.3	
Residual Stress (psi)				
Strain (%)	20.000	20.000	20.004	
Rate (in/min)	0.008333	0.008333	0.008333	

Project Date	
Date	3/23/17

Project:	Dredged Material Managerment Area M-8
Location:	B-12
Project Number:	24842
Boring Number	B-12
Sample Number:	B-12
Depth:	–
Sample Type:	Remolded
Description:	Fine Sand Brown
Test Type:	Direct Shear
Remarks:	

122146-6.HSD

ECS Corporate Services

Direct Shear Test (ASTM D3080)

Date

Checked By

Date

Date

Tested By

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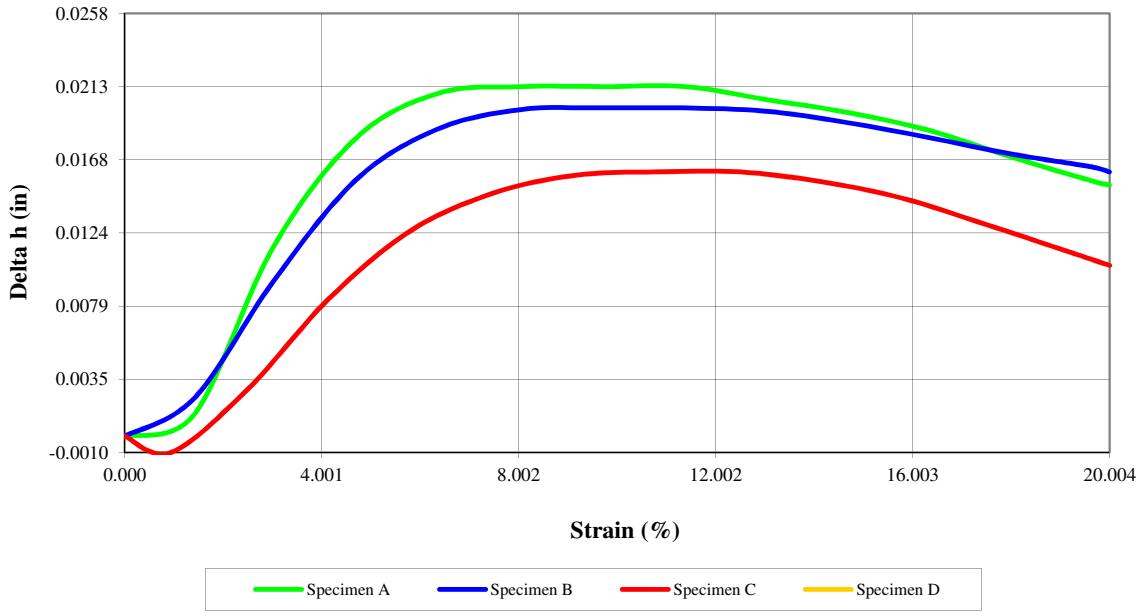
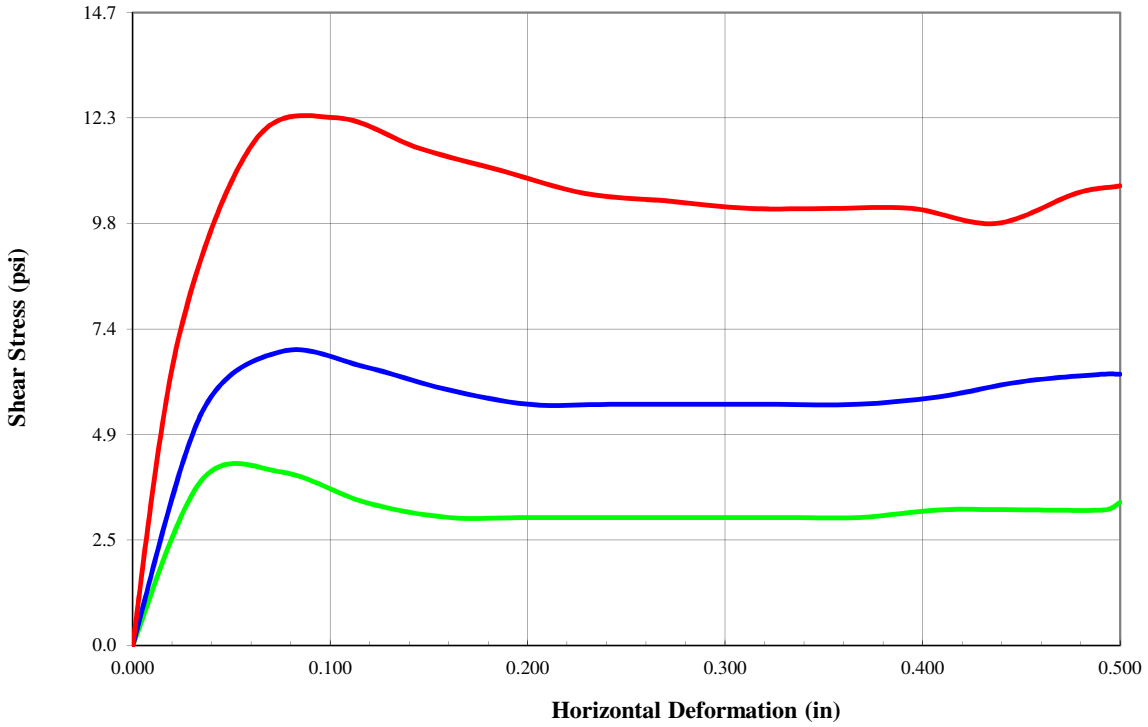


Stress-Deformation



122146-6.HSD

ECS Corporate Services

Direct Shear Test

Date

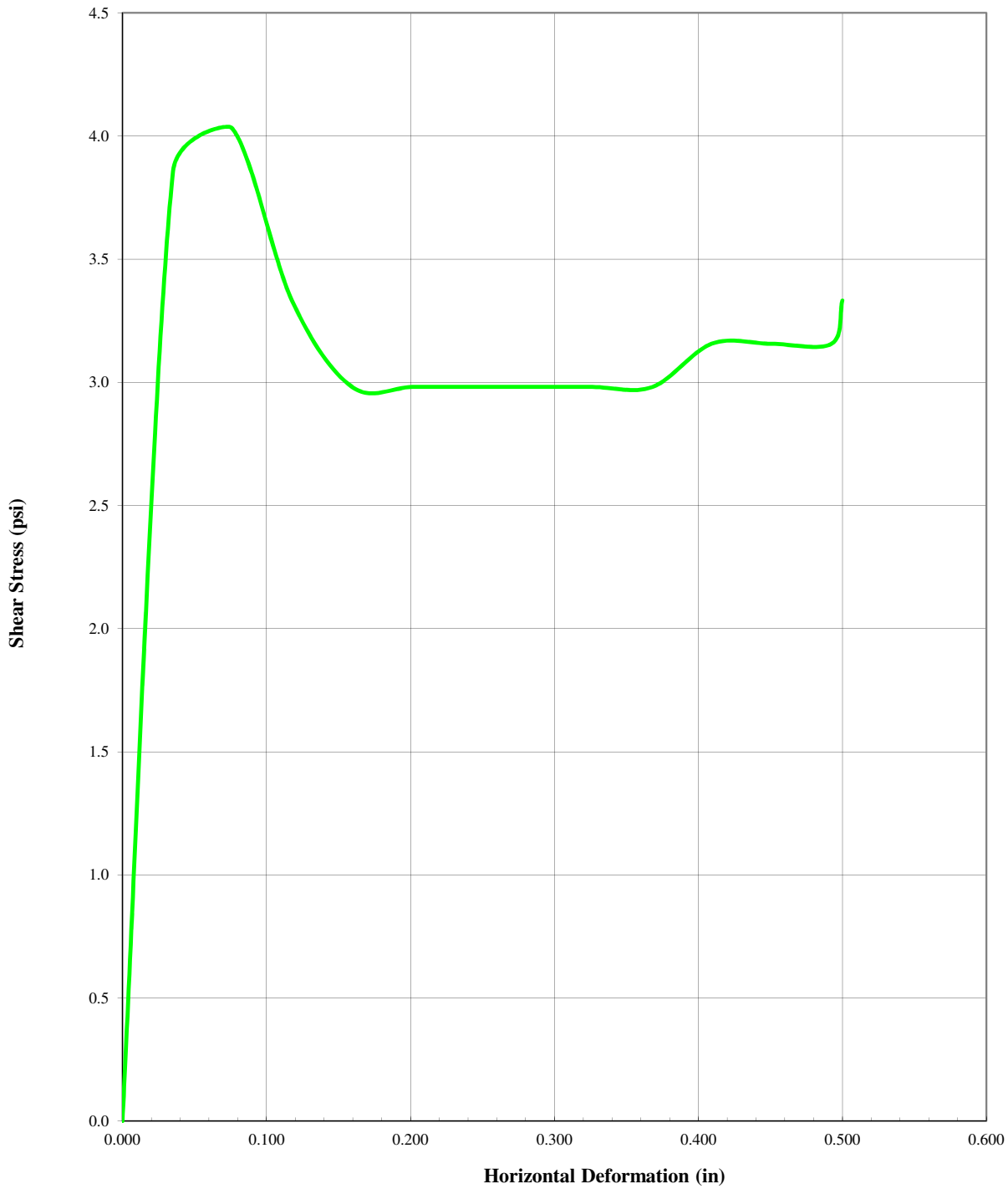
Checked By

Date

Date

Tested By

Specimen A Stress-Deformation



122146-6.HSD

ECS Corporate Services

Direct Shear Test

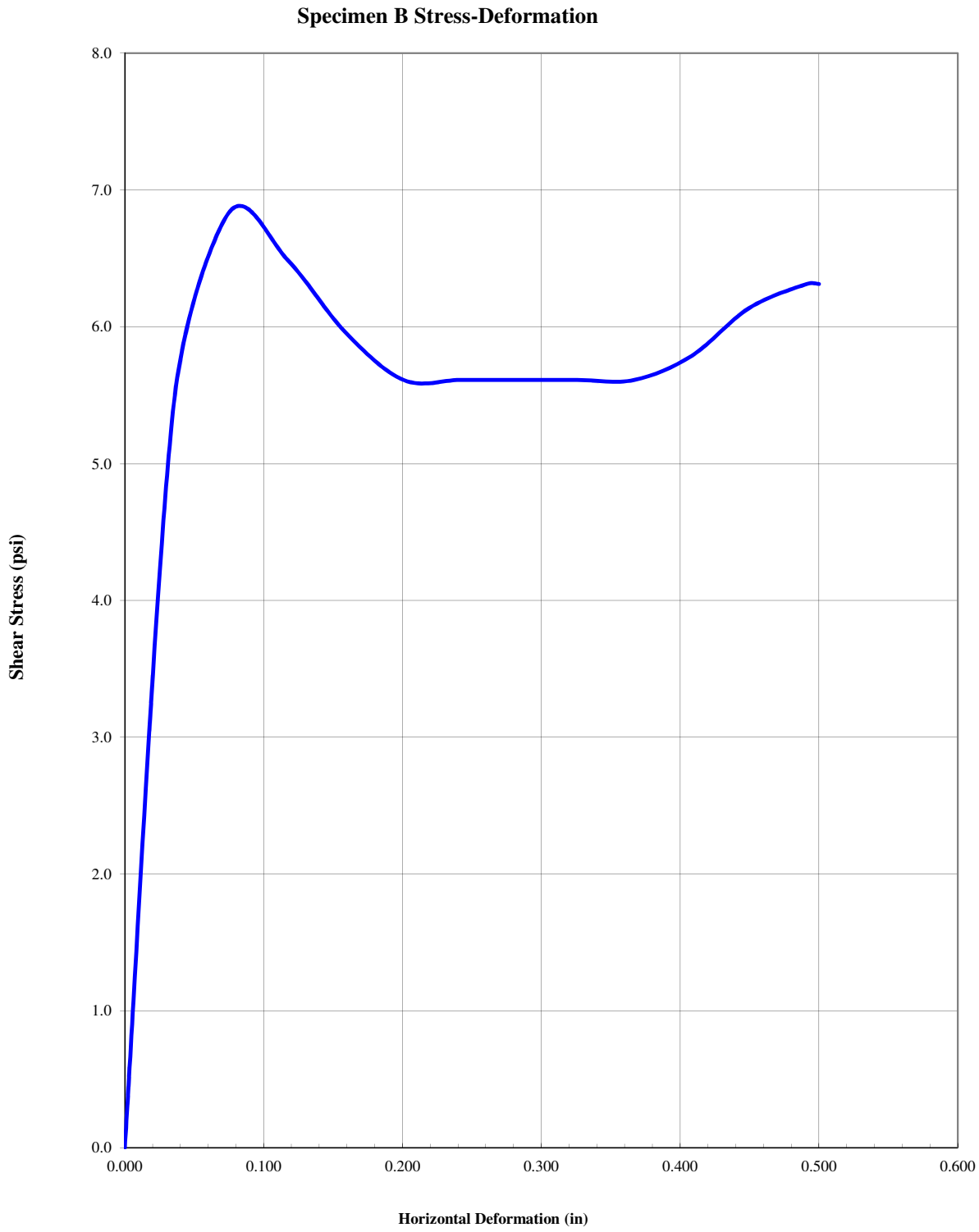
Date

Checked By

Date

Date

Tested By



122146-6.HSD

ECS Corporate Services

Direct Shear Test

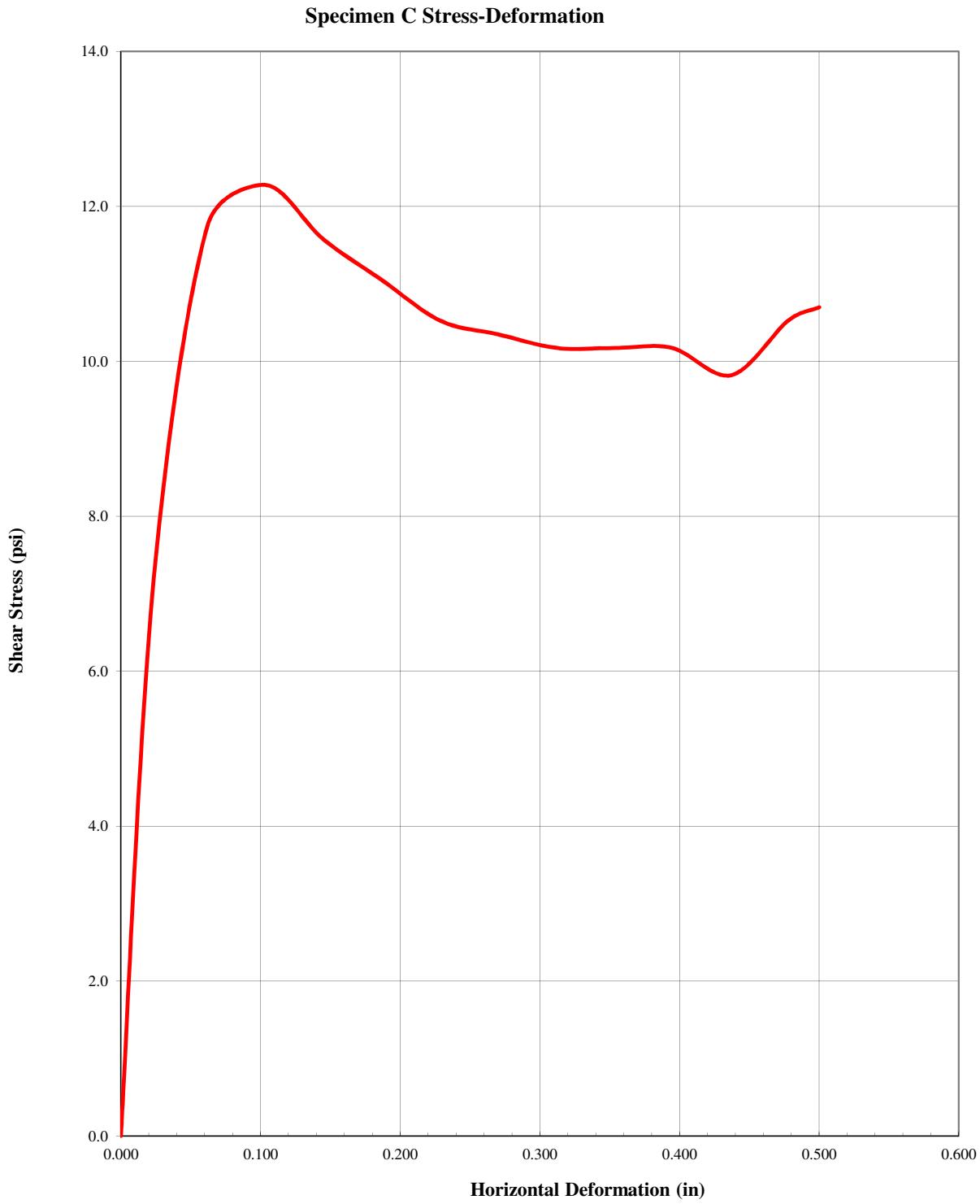
Date

Checked By

Date

Date

Tested By



122146-6.HSD

LABORATORY TEST PROCEDURES

Percent Fines Content

The percent fines or material passing the No. 200 mesh sieve of the sample tested was determined in general accordance with the latest revision of ASTM D 1140. The percent fines are the soil particles in the silt and clay size range.

Natural Moisture Content

The water content of the sample tests was determined in general accordance with the latest revision of ASTM D 2216. The water content is defined as the ratio of "pore" or "free" water in a given mass of material to the mass of solid material particles.

Organic Loss on Ignition (Percent Organics)

The organic loss on ignition or percent organic material in the sample tested was determined in general accordance with ASTM D 2974. The percent organics is the material, expressed as a percentage, which is burned off in a muffle furnace at 455±10 degrees Celsius.

APPENDIX C

FIELD PERMEABILITY TEST DATA

Ellis & Associates inc.
ECS Group of Companies

FALLING HEAD FIELD PERMEABILITY TEST

Project: Dredged Material Management Area M-8
Client: Florida Inland Navigation District
Location: B-9
Depth: 8.5-10

Project No.: 35-24842
Test No.: 1
Tested By: D. Register
Date: 2/15/2017

Elapsed Time, min	Water Depth, cm	h1, cm	h2, cm	t2-t1 seconds	LN(h1/h2)	8*L*(t2-t1)	k cm/sec
3	17.15	304.80	287.66	180	0.05789	65836.8	1.994E-04
6	31.75	287.66	273.05	180	0.05211	65836.8	1.795E-04
9	45.09	273.05	259.72	180	0.05007	65836.8	1.725E-04
12	58.42	259.72	246.38	180	0.05271	65836.8	1.816E-04
15	71.12	246.38	233.68	180	0.05292	65836.8	1.823E-04
18	83.19	233.68	221.62	180	0.05301	65836.8	1.826E-04
21	96.52	221.62	208.28	180	0.06206	65836.8	2.138E-04
24	103.51	208.28	201.30	180	0.03411	65836.8	1.175E-04
27	112.40	201.30	192.41	180	0.04517	65836.8	1.556E-04
30	121.92	192.41	182.88	180	0.05077	65836.8	1.749E-04

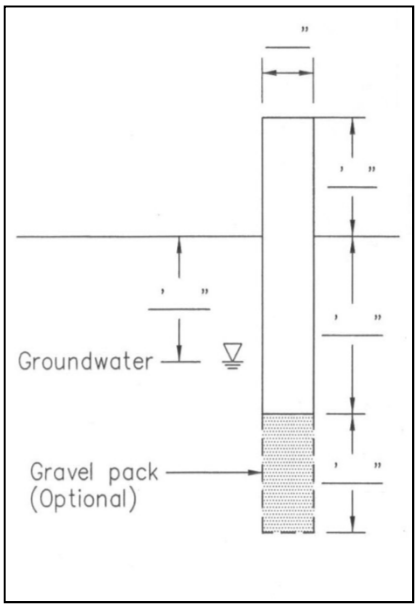
Average Permeability, kh, cm/sec = **1.760E-04**
Average Permeability, kh, ft/day = 0.498843829
Average Permeability, kh, in/min = 4.157E-03

	Test Depth	L=Void Area Below Pipe [Feet]	h_1 [Feet]
Above Ground			1.5
Water level			25.0
Below ground	8.5	1.5	10.0

Time [min]	water depth [in]
0	0
3	6.75
6	12.5
9	17.75
12	23
15	28
18	32.75
21	38
24	40.75
27	44.25
30	48

4

25



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Ellis & Associates inc.
ECS Group of Companies

FALLING HEAD FIELD PERMEABILITY TEST

Project: Dredged Material Management Area M-8
Client: Florida Inland Navigation District
Location: B-14
Depth: 18.5-20

Project No.: 35-24842
Test No.: 1
Tested By: D. Register
Date: 2/15/2017

Elapsed Time, min	Water Depth, cm	h1, cm	h2, cm	t2-t1 seconds	LN(h1/h2)	8*L*(t2-t1)	k cm/sec
3	5.08	624.84	619.76	180	0.00816	65836.8	2.812E-05
6	9.53	619.76	615.32	180	0.00720	65836.8	2.480E-05
9	12.07	615.32	612.78	180	0.00414	65836.8	1.425E-05
12	14.61	612.78	610.24	180	0.00415	65836.8	1.431E-05
15	16.83	610.24	608.01	180	0.00365	65836.8	1.257E-05
18	19.05	608.01	605.79	180	0.00366	65836.8	1.262E-05
21	21.59	605.79	603.25	180	0.00420	65836.8	1.447E-05
24	23.81	603.25	601.03	180	0.00369	65836.8	1.272E-05
27	26.35	601.03	598.49	180	0.00424	65836.8	1.459E-05
30	27.94	598.49	596.90	180	0.00266	65836.8	9.150E-06

Average Permeability, kh, cm/sec = **1.576E-05**
Average Permeability, kh, ft/day = 0.044673015
Average Permeability, kh, in/min = 3.723E-04

	Test Depth	L=Void Area Below Pipe [Feet]	h_1 [Feet]
Above Ground			2.0
Water level			25.0
Below ground	18.5	1.5	20.5

Time [min]	water depth [in]
0	0
3	2
6	3.75
9	4.75
12	5.75
15	6.625
18	7.5
21	8.5
24	9.375
27	10.375
30	11

4

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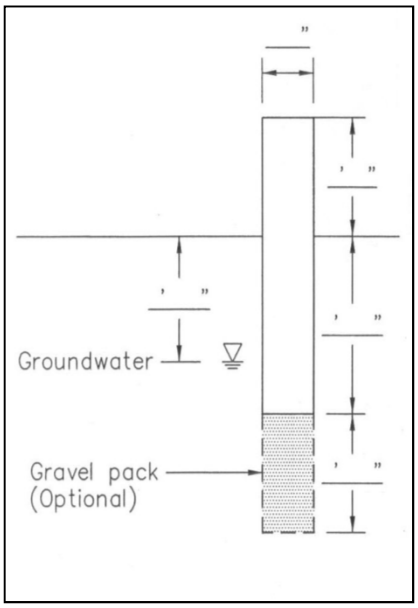

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APPENDIX D

DILATOMETER TEST DATA

DILATOMETER TEST DATA

Location	Depth Z (M)	Dilatometer Control Reading A (BAR)	Dilatometer Control Reading B (BAR)	Corrected A-reading P0 (BAR)	Corrected B-reading P1 (BAR)	Porewater Pressure U0 (BAR)	Soil Total Unit Weight GAMMA (T/M3)	Effective Vertical Stress SVP (BAR)	Dilatometer horizontal Stress Index KD	Dilatometer Material Index ID	Dilatometer Modulus ED (BAR)	Tangent drained constrained modulus M (BAR)	SOIL TYPE
	0.61	0.7	6.5	-0.15	0.55	0	1.7	0.11	2.55	20.25	197	258	SAND
	0.91	0.5	7.4	-0.15	0.55	0	1.7	0.16	0.16	273	237	201	SAND
	1.22	1.6	7.8	-0.15	0.55	0	1.8	0.213	5.44	5.25	211	417	SAND
	1.53	1.4	6.7	-0.15	0.55	0	1.8	0.268	3.75	5.12	179	294	SAND
	1.83	2.3	11.5	-0.15	0.55	0	1.9	0.323	5.3	5.4	321	625	SAND
	2.13	2.6	13	-0.15	0.55	0	1.9	0.378	5.15	5.38	364	701	SAND
	2.44	3.6	18.5	-0.15	0.55	0	1.9	0.436	6.25	5.59	528	1105	SAND
B1	2.74	2.3	18.5	-0.15	0.55	0	1.9	0.492	2.76	12.2	576	796	SAND
	3.05	1.8	15.5	-0.15	0.55	0	1.8	0.548	1.8	14.18	485	489	SAND
	3.35	3.2	17	-0.15	0.55	0	1.9	0.603	3.95	5.91	488	826	SAND
	3.65	3.5	19	-0.15	0.55	0	1.9	0.659	3.94	6.11	550	930	SAND
	3.96	3.7	21	-0.15	0.55	0	1.9	0.717	3.77	6.56	616	1018	SAND
	4.27	4.3	20.5	-0.15	0.55	0	2	0.776	4.33	4.94	576	1021	SAND
	4.57	4.2	20.5	-0.15	0.55	0	2	0.835	3.9	5.13	579	974	SAND
	4.88	4.5	19.5	-0.15	0.55	0	2	0.896	4.04	4.23	532	911	SAND

DILATOMETER TEST DATA

Location	Depth Z (M)	Dilatometer Control Reading A (BAR)	Dilatometer Control Reading B (BAR)	Corrected A-reading P0 (BAR)	Corrected B-reading P1 (BAR)	Porewater Pressure U0 (BAR)	Soil Total Unit Weight GAMMA (T/M3)	Effective Vertical Stress SVP (BAR)	Dilatometer horizontal Stress Index KD	Dilatometer Material Index ID	Dilatometer Modulus ED (BAR)	Tangent drained constrained modulus M (BAR)	SOIL TYPE
	0.61	0.3	6.3	-0.15	0.55	0	1.7	0.11	1.36	37.33	194	165	SAND
	0.91	1.5	7.4	-0.15	0.55	0	1.8	0.162	6.66	5.37	200	430	SAND
	1.22	2	9.3	-0.15	0.55	0	1.8	0.216	6.96	4.81	251	549	SAND
	1.53	2.3	11	-0.15	0.55	0	1.9	0.273	6.37	5.02	302	637	SAND
	1.83	2.7	14.5	-0.15	0.55	0	1.9	0.328	6.03	6.05	415	856	SAND
	2.13	3.3	15	-0.15	0.55	0	1.9	0.384	6.72	4.59	412	887	SAND
B3	2.44	4	18.5	-0.15	0.55	0	1.9	0.442	7.11	4.71	514	1132	SAND
	2.74	4.7	19.5	-0.15	0.55	0	2	0.5	7.67	3.95	525	1191	SAND
	3.05	5.5	24.5	-0.15	0.55	0	2	0.56	7.89	4.42	678	1554	SAND
	3.35	3.5	21	-0.15	0.55	0	1.9	0.618	4.04	7.2	623	1067	SAND
	3.65	2.5	21	-0.15	0.55	0	1.9	0.674	2.14	13.15	659	767	SAND
	3.96	3.7	22.5	-0.15	0.55	0	1.9	0.732	3.59	7.35	670	1080	SAND
	4.27	4.9	25	-0.15	0.55	0	2	0.791	4.76	5.49	718	1332	SAND

DILATOMETER TEST DATA

Location	Depth Z (M)	Dilatometer Control Reading A (BAR)	Dilatometer Control Reading B (BAR)	Corrected A-reading P0 (BAR)	Corrected B-reading P1 (BAR)	Porewater Pressure U0 (BAR)	Soil Total Unit Weight GAMMA (T/M3)	Effective Vertical Stress SVP (BAR)	Dilatometer horizontal Stress Index KD	Dilatometer Material Index ID	Dilatometer Modulus ED (BAR)	Tangent drained constrained modulus M (BAR)	SOIL TYPE
	0.61	1.4	9.5	-0.15	0.55	0	1.8	0.11	7.86	9.35	281	643	SAND
	0.91	1.7	12.5	-0.15	0.55	0	1.8	0.163	6.32	10.6	379	796	SAND
	1.22	2.4	13.5	-0.15	0.55	0	1.9	0.219	7.82	6.55	390	891	SAND
	1.52	3.2	15.5	-0.15	0.55	0	1.9	0.275	8.92	5.09	434	1041	SAND
B9	1.83	4.2	19.5	-0.15	0.55	0	2	0.335	9.88	4.73	543	1351	SAND
	2.13	8.3	29.5	-0.15	0.55	0	2	0.393	18.07	3.07	758	2319	SILTY SAND
	2.44	4.5	25	-0.15	0.55	0	2	0.454	7.36	6.31	732	1636	SAND
	2.74	4.5	24	-0.15	0.55	0	2	0.513	6.62	5.91	696	1490	SAND
	3.35	5.9	24	-0.15	0.55	0	2	0.633	7.69	3.82	645	1465	SAND

DILATOMETER TEST DATA

Location	Depth Z (M)	Dilatometer Control Reading A (BAR)	Dilatometer Control Reading B (BAR)	Corrected A-reading P0 (BAR)	Corrected B-reading P1 (BAR)	Porewater Pressure U0 (BAR)	Soil Total Unit Weight GAMMA (T/M3)	Effective Vertical Stress SVP (BAR)	Dilatometer horizontal Stress Index KD	Dilatometer Material Index ID	Dilatometer Modulus ED (BAR)	Tangent drained constrained modulus M (BAR)	SOIL TYPE
B10	0.61	0.3	7.5	-0.15	0.55	0	1.7	1.266	0.12	45.33	236	201	SAND
	0.91	2	9.4	-0.15	0.55	0	1.8	1.318	1.14	4.9	255	217	SAND
	1.22	2.2	9.5	-0.15	0.55	0	1.8	1.372	1.24	4.25	251	214	SAND
	1.52	2.4	12	-0.15	0.55	0	1.9	1.427	1.25	5.4	335	285	SAND
	1.83	2.8	13.5	-0.15	0.55	0	1.9	1.485	1.44	5.07	375	319	SAND
	2.13	2.8	13	-0.15	0.55	0	1.9	1.54	1.4	4.76	357	304	SAND
	2.44	2.5	29	-0.15	0.55	0	1.9	1.598	0.65	26.22	951	808	SAND

Location	Depth Z (M)	Dilatometer Control Reading A (BAR)	Dilatometer Control Reading B (BAR)	Corrected A-reading P0 (BAR)	Corrected B-reading P1 (BAR)	Porewater Pressure U0 (BAR)	Soil Total Unit Weight GAMMA (T/M3)	Effective Vertical Stress SVP (BAR)	Dilatometer horizontal Stress Index KD	Dilatometer Material Index ID	Dilatometer Modulus ED (BAR)	Tangent drained constrained modulus M (BAR)	SOIL TYPE
B10	7.01	0.3	4.3	-0.15	0.55	0	1.7	1.266	0.12	24	125	106	SAND
	7.32	0.2	5.1	-0.15	0.55	0	1.7	1.318	0.04	90	156	133	SAND
	7.6	3.5	25	-0.15	0.55	0	1.9	1.367	1.68	9.65	769	730	SAND
	7.9	3.5	18	-0.15	0.55	0	1.9	1.423	1.86	5.6	514	533	SAND
	8.23	3.5	14	-0.15	0.55	0	1.9	1.485	1.92	3.73	368	392	SAND
	8.53	2.2	10	-0.15	0.55	0	1.9	1.541	1.09	4.63	270	229	SAND
	8.84	0.4	40	-0.15	0.55	0	1.8	1.597	0.16	156.8	1360	1156	SAND

APPENDIX E

ENVIRONMENTAL DATA REPORT – WATER WELL RESEARCH REPORT

Environmental Data Report

Water Well Research Report

DMMA M-8

Port St Lucie, Florida

Prepared For:

Ellis & Associates, Inc.
7064 Davis Creek Road
Jacksonville, FL 32256

Prepared By:

Environmental Data Management, Inc.
2840 West Bay Drive, Suite 208
Largo, Florida 33770

March 28, 2017

Environmental Data Management, Inc.
2840 West Bay Drive, Suite 208
Largo, Florida 33770
Tel. (727) 586-1700
http://www.edm-net.com

March 28, 2017

Chris Egan
Ellis & Associates, Inc.
7064 Davis Creek Road
Jacksonville, FL 32256

Subject: **Water Well Research Report - EDM Project #23796**

Dear Mr. egan

Thank you for choosing Environmental Data Management, Inc. The following report provides the results of our well data research that you requested for the following location:

DMMA M-8

Port St Lucie, Florida

The following database records were researched for this report. The distances searched from the Subject Property are indicated.

- **Florida Water Management Districts Well Data (*WMD) - 1/2 Mile**
- **FDEP Drinking Water Program Office/Public Water Supply Data (FLPWS) - 1/2 Mile**
- **FDOH SuperAct Community Water Well Data (WELLSADOHC) - 1/2 Mile**
- **FDOH SuperAct Non- Community Water Well Data (WELLSADOHN) - 1/2 Mile**

EDM has obtained water well information from the various Florida Water Management District databases, the FDEP Drinking Water Program Office's Public Water System database and the FDOH SuperAct Water Well database. In most cases, the data contains the Latitude and Longitude of the well system, or address information, which is used by EDM to plot these locations within our Geographic Information System (GIS). However, some data records do not contain adequate location information to allow plotting within our GIS and therefore do not appear in this report. Upon request, EDM will be happy to conduct a detailed search of our databases based upon any additional criteria that you supply.

The EDM Well Data report consists of a Map of the Study Area showing the location of any well systems, relative to the Subject Property. Well sites found within the research area are labeled with a Map ID Number and the corresponding data for each well site can be found in the "Detail Reports" section of the report.

Thank you for selecting EDM as your data research provider. If you have any questions regarding this report or our service in general, please feel free to contact us. We appreciate the opportunity to be of service to you and look forward to working with you in the future.

ENVIRONMENTAL DATA MANAGEMENT, INC.

Executive Summary

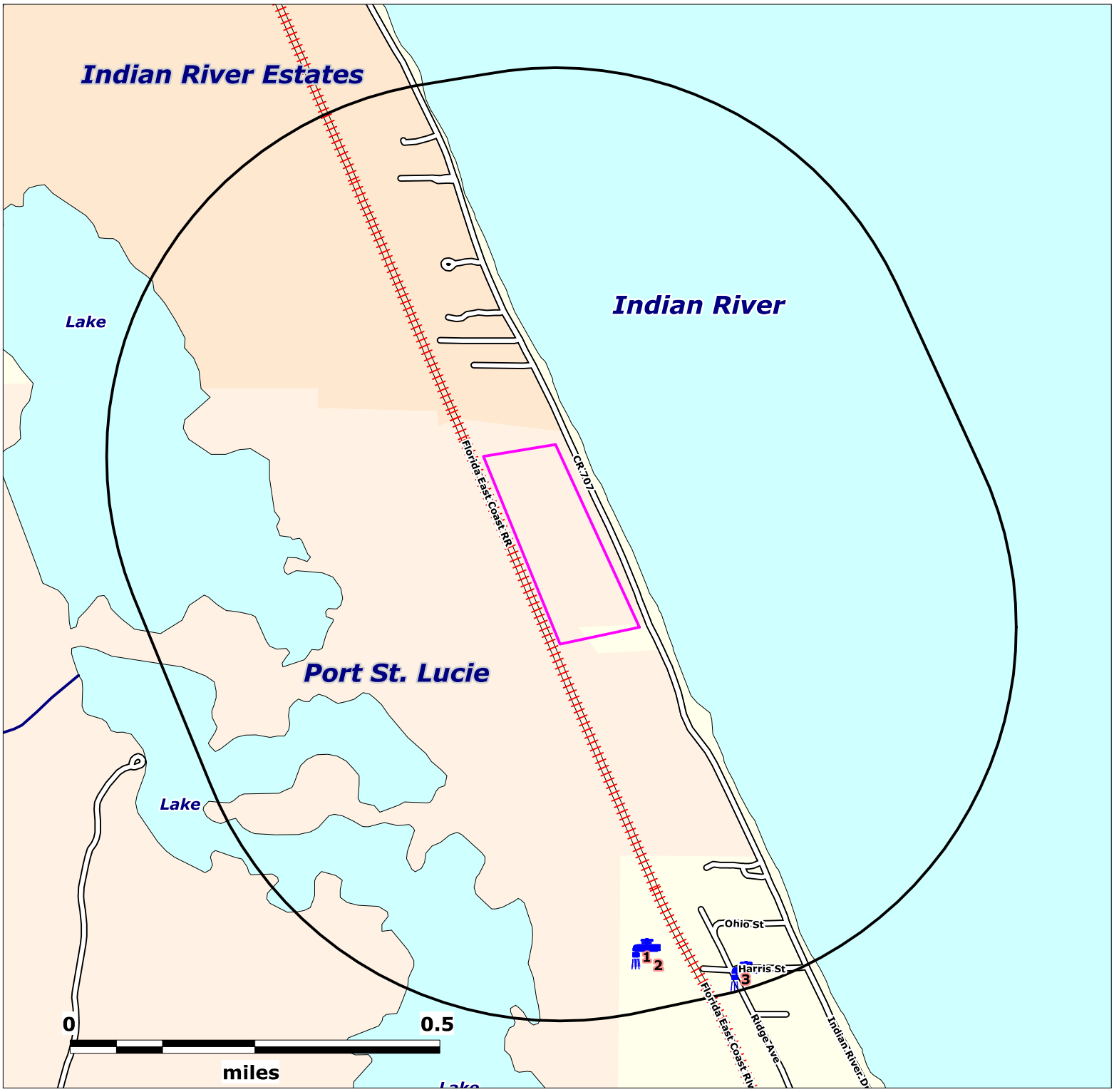
Report Date: 3/28/2017

Client Information	Project Information
Ellis & Associates, Inc. 7064 Davis Creek Road Jacksonville FL 32256 Client Job No: 35-24842 Client P.O. No:	Water Well Research Report DMMA M-8 Port St Lucie, Florida EDM Job No# 23796

The following table displays the databases that were included in the research provided, the respective search distance for each database and the number of records identified for each database. The distance values indicated are measured from the centroid of the Subject Property. The absence of records in this table and the Site Summary Tables indicates that our research found no data for other sites located within the specified search distances.

	Search Radius (Miles)	From 0 - .13 mi	From .13 - .25 mi	From .26 - .5 mi	From .51 - 1.0 mi	Greater than 1 Mile	Totals
FDEP DATABASES							
FDEP Public Water System Basic Facility Report(FLPWS)	0.50	0	0	0	N/A	N/A	**0**
FDOH DATABASES							
FDOH Well Surveillance Program Public Water Wells(WELLSADOHC)	0.50	0	0	0	N/A	N/A	**0**
FDOH Well Surveillance Program Private Water Wells(WELLSADOHN)	0.50	0	0	0	N/A	N/A	**0**
WMD DATABASES							
SFWMD Water Use Regulation Facility Site Report(WELLSFWMD)	0.50	0	0	3	0	N/A	**3**
SJRWMD Water Well and Pump Permit Report(WELLSJRWMD)	0.50	0	0	0	N/A	N/A	**0**
SWFWMD Public Water Supply Report(SWFWMDPUB)	0.50	0	0	0	N/A	N/A	**0**
SWFWMD Domestic Water Supply Report(SWFWMDDOM)	0.50	0	0	0	N/A	N/A	**0**

Water Well Research Report
Street Map



Source: US Census Bureau TIGER Files

Map Scale and Property Boundaries are Approximate

Subject Property

DMMA M-8
Port St Lucie, Florida

EDM Job No: 23796
March 28, 2017

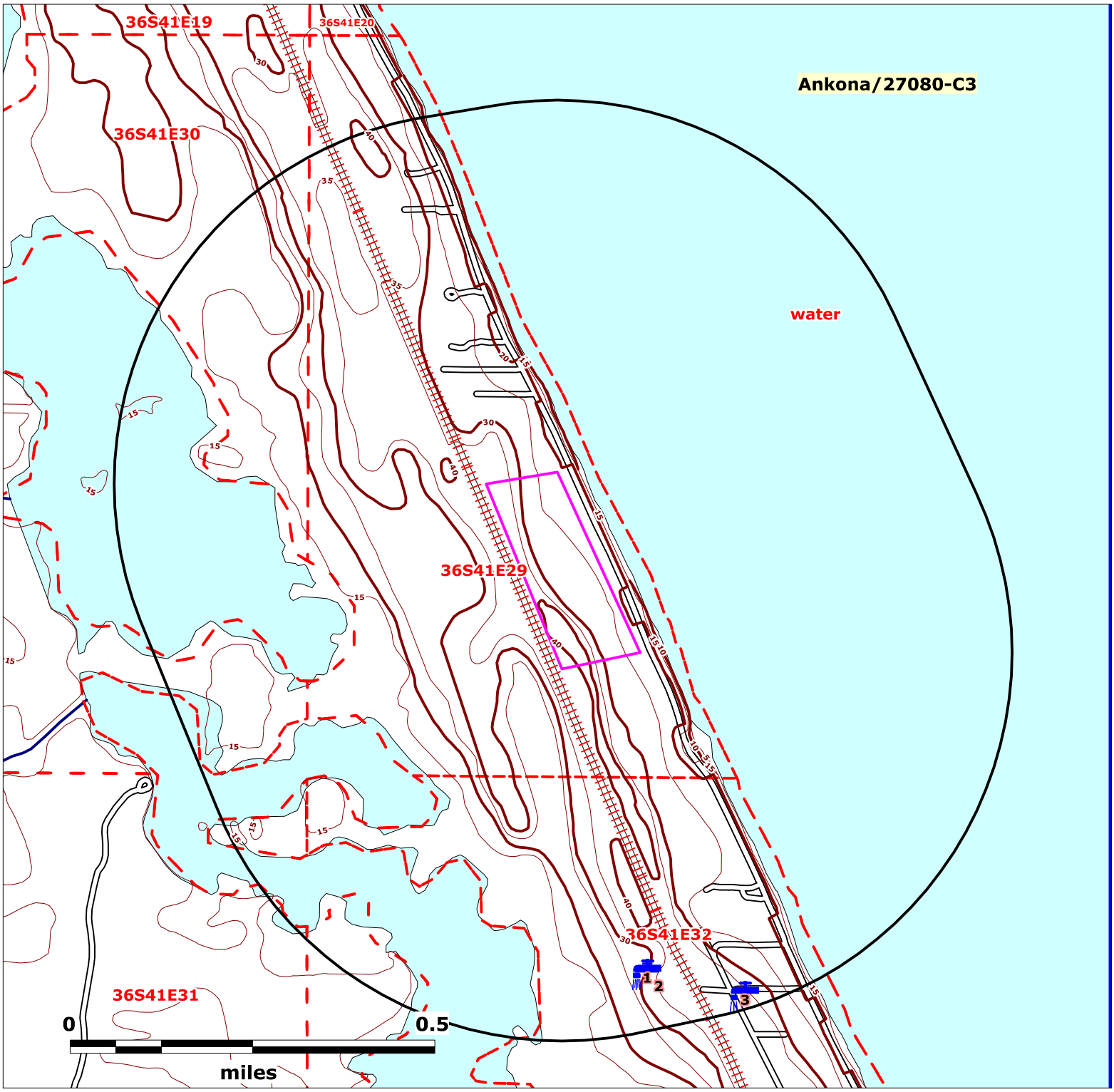
Public Water Supply System-1/2 mile

Private Water Well System -1/2 mile

Approximate Site Boundary

Centroid Latitude: 27 18' 44.8092"
Centroid Longitude: -80 15' 44.3988"

Water Well Research Report
Physical Setting Map



Source: US Census Bureau TIGER Files

Map Scale and Property Boundaries are Approximate

Subject Property

DMMA M-8
Port St Lucie, Florida

EDM Job No: 23796
March 28, 2017

1234S56E
Sec/Twp/Rng

Name/12345-A1
USGS Quadrangle

Public Water Supply System-1/2 mile

Private Water Well System -1/2 mile

Approximate Site Boundary

Centroid Latitude: 27 18' 44.8092"
Centroid Longitude: -80 15' 44.3988"

ENVIRONMENTAL DATA MANAGEMENT

Water Well Research Report

Site Summary Table

Report Date: 3/28/2017

MapID Prgm List	Fac ID No	Site Dist(mi) Direction	Site Name	Site Address
1				
WELLSFWMD	56-01509-W/020920-8/123495	0.60 S	SOUTH CANOE LAUNCH AREA/OFFICE	, FL
2				
WELLSFWMD	56-01509-W/020920-8/107322	0.60 S	SOUTH CANOE LAUNCH AREA/OFFICE	, FL
3				
WELLSFWMD	56-02554-W/061109-4/195595	0.67 SE	WALTON COMMUNITY CENTER	, FL

WATER MANAGEMENT DISTRICT WELL DATA

(WELLSFWMD)

PERMIT NO, APPL NO, PROJECT NAME AND PERMIT TYPE :

56-01509-W
020920-8
SOUTH CANOE LAUNCH AREA/OFFICE
PERMIT TYPE: General

WELL LOCATION:

SECTION:
TOWNSHIP:
RANGE:
STATION COUNTY ST LUCIE
FACILITY ID: 123495

MAP ID NUMBER: 1
Dist (Miles): 0.60
Direction: S

WELLSFWMD

WATER USE Public Water Supply

FAC STATUS:	Proposed			**FAC TYPE:**	WELL	**FAC NAME:**	2
ACRES SRVD:	5	**PUMP DEPTH:**		**PUMP CAP:**	20	**PUMP TYPE:**	Jet
WELL DIA:	2	**WELL DEPTH:**	120	**CASING DEPTH:**	100	**USE STATUS:**	Primary
		SOURCE:	Surficial Aquifer System			**LAND USE:**	Public Water Supply

WATER MANAGEMENT DISTRICT WELL DATA

(WELLSFWMD)

PERMIT NO, APPL NO, PROJECT NAME AND PERMIT TYPE :

56-01509-W
020920-8
SOUTH CANOE LAUNCH AREA/OFFICE
PERMIT TYPE: General

WELL LOCATION:

SECTION:
TOWNSHIP:
RANGE:
STATION COUNTY ST LUCIE
FACILITY ID: 107322

MAP ID NUMBER: 2
Dist (Miles): 0.60
Direction: S

WELLSFWMD

WATER USE Public Water Supply

FAC STATUS:	Existing			**FAC TYPE:**	WELL	**FAC NAME:**	1
ACRES SRVD:	5	**PUMP DEPTH:**		**PUMP CAP:**	0	**PUMP TYPE:**	Jet
WELL DIA:	2	**WELL DEPTH:**	120	**CASING DEPTH:**	100	**USE STATUS:**	Abandoned
		SOURCE:	Surficial Aquifer System			**LAND USE:**	Public Water Supply

WATER MANAGEMENT DISTRICT WELL DATA

(WELLSFWMD)

PERMIT NO, APPL NO, PROJECT NAME AND PERMIT TYPE :

56-02554-W
061109-4
WALTON COMMUNITY CENTER
PERMIT TYPE: General

WELL LOCATION:

SECTION:
TOWNSHIP:
RANGE:
STATION COUNTY ST LUCIE
FACILITY ID: 195595

MAP ID NUMBER: 3
Dist (Miles): 0.67
Direction: SE

WELLSFWMD

WATER USE Public Water Supply

FAC STATUS:	Proposed			**FAC TYPE:**	WELL	**FAC NAME:**	Well
ACRES SRVD:	1	**PUMP DEPTH:**		**PUMP CAP:**	30	**PUMP TYPE:**	Centrifugal
WELL DIA:	2	**WELL DEPTH:**	130	**CASING DEPTH:**	110	**USE STATUS:**	Primary

SOURCE: Surficial Aquifer System

LAND USE: Public Water Supply

Agency List Descriptions

Florida Department of Environmental Protection (FDEP)

FDEP Public Water System Basic Facility Report(FLPWS)

The FDEP Dinking Water Program Basic Facility Report contains information on the location and type of public water systems regulated by the department.

Agency File Date: 10/26/2015 **Received by EDM:** 12/23/2015 **EDM Database Updated:** 12/28/2015

Florida Department of Health (FDOH)

FDOH Well Surveillance Program Public Water Wells(WELLSADOHC)

The FDOH Well Surveillance group manages several programs to identify and monitor areas in Florida where contaminated drinking water is suspected and may pose a threat to public health. The section coordinates with the County Health Departments to locate potable wells and conduct water sampling for contaminants of concern. This report contains data on public water wells that is contained in the Well Surveillance Program database.

Agency File Date: 3/4/2016 **Received by EDM:** 3/4/2016 **EDM Database Updated:** 6/8/2016

FDOH Well Surveillance Program Private Water Wells(WELLSADOHN)

The FDOH Well Surveillance group manages several programs to identify and monitor areas in Florida where contaminated drinking water is suspected and may pose a threat to public health. The section coordinates with the County Health Departments to locate potable wells and conduct water sampling for contaminants of concern. This report contains data on private water wells that is contained in the Well Surveillance Program database.

Agency File Date: 3/4/2016 **Received by EDM:** 3/4/2016 **EDM Database Updated:** 6/8/2016

Florida Water Management District (WMD)

SWFWMD Domestic Water Supply Report(SWFWMDDOM)

The Southwest Florida Water Management District (SWFWMD) Well Construction Permit database contains information on the location and characteristics of SWFWMD Domestic Water Supply wells. Due to gross locational inaccuracies in the data prior to 2007, only data related to Permits issued after January 2007 is presented.

Agency File Date: 1/17/2017 **Received by EDM:** 1/17/2017 **EDM Database Updated:** 1/25/2017

SWFWMD Public Water Supply Report(SWFWMDPUB)

The Southwest Florida Water Management District (SWFWMD) Water Use Permit and Well Construction Permit databases contain information on the location and characteristics of SWFWMD Pulic Water Supply wells and withdrawal points.

Agency File Date: 7/11/2016 **Received by EDM:** 7/11/2016 **EDM Database Updated:** 1/25/2017

SFWMD Water Use Regulation Facility Site Report(WELLSFWMD)

The South Florida Water Management District (SFWMD) Water Use Regulation Facility Site database contains information on permitted SFWMD well, pump and culvert locations as specified on Water Use Permits.

Agency File Date: 1/16/2015 **Received by EDM:** 1/16/2015 **EDM Database Updated:** 1/16/2015

SJRWMD Water Well and Pump Permit Report(WELLSJRWMD)

The St Johns River Water Management District (SJRWMD) Consumptive Use Well Permit Database contains information on the location and characteristics of SJRWMD permitted water well stations.

Agency File Date: 1/11/2016 **Received by EDM:** 1/11/2016 **EDM Database Updated:** 1/14/2016

APPENDIX F

HISTORICAL MONTHLY RAINFALL AMOUNTS (2011-2016)

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Global Summary of the Month for 2011

Generated on 03/28/2017

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Elev: 10 ft. Lat: 27.2877° N Lon: -80.2214° W

Station: **NETTLES ISLAND, FL US GHCND:USC00086092**

Date	Temperature (F)													Precipitation (Inches)								
Elem ->	TAVG	TMAX	TMIN	HTDD	CLDD	EMXT		EMNT		DX90	DX32	DT32	DT00	PRCP	EMXP		SNOW	EMSD		DP01	DP05	DP10
Month	Mean	Mean Max.	Mean Min	Heating Degree Days	Cooling Degree Days	Highest	High Date	Lowest	Low Date	Number of Days				Total	Greatest Observed		Snow, Sleet			Number of Days		
										Max >= 90	Max <= 32	Min <= 32	Min <= 0		Amount	Date	Total Fall	Max Depth	Max Date	>=.10	>=.50	>=1.0
Jan	62.9	71.1	54.8	106	46	83	20	40	13	0	0	0	0	3.13	1.60	26				5	3	1
Feb	67.5	73.3	61.8	38	110	84	08	51	15	0	0	0	0	0.36	0.30	11				1	0	0
Mar	69.6	76.1	63.1	10	154	87	31	51	12	0	0	0	0	2.46	1.60	29				3	2	1
Apr	76.4	81.0	71.8	0	343	88	13	64	06	0	0	0	0	1.68	0.60	15				4	1	0
May	77.4	82.1	72.7	0	385	93	12	61	18	1	0	0	0	1.35	0.85	15				2	2	0
Jun	81.0	85.5	76.5	0	480	97	15	73	16	3	0	0	0	2.37	0.95	15				4	2	0
Jul	82.5	86.5	78.6	0	526	89	22	74	09	0	0	0	0	1.57	0.75	09				2	2	0
Aug	83.5	89.4	77.6	0	574	95	28	71	09	14	0	0	0	8.93	2.40	03				15	5	3
Sep	82.1	86.8	77.4	0	514	94	09	74	08	3	0	0	0	6.92	2.41	08				12	3	2
Oct	76.7	81.9	71.6	0	364	89	01	59	24	0	0	0	0	9.03	1.60	19				9	8	4
Nov	73.5	78.4	68.5	0	246	87	18	56	05	0	0	0	0	2.54	0.95	18				4	2	0
Dec	70.2	75.5	64.8	12	168	80	13	51	28	0	0	0	0	8.04	5.15	10				5	3	2

Notes

(Blank) Data element not reported or missing.

\+ Occurred on one or more previous dates during the month. The date in the Date field is the last day of occurrence.

A Accumulated amount.

X Monthly means or totals based on incomplete time series.

T Trace Amount.

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Global Summary of the Month for 2012

Generated on 03/28/2017

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Elev: 10 ft. Lat: 27.2877° N Lon: -80.2214° W

Station: **NETTLES ISLAND, FL US GHCND:USC00086092**

Date	Temperature (F)													Precipitation (Inches)								
Elem ->	TAVG	TMAX	TMIN	HTDD	CLDD	EMXT		EMNT		DX90	DX32	DT32	DT00	PRCP	EMXP		SNOW	EMSD		DP01	DP05	DP10
Month	Mean	Mean Max.	Mean Min	Heating Degree Days	Cooling Degree Days	Highest	High Date	Lowest	Low Date	Number of Days				Total	Greatest Observed		Snow, Sleet			Number of Days		
										Max >= 90	Max <= 32	Min <= 32	Min <= 0		Amount	Date	Total Fall	Max Depth	Max Date	>=.10	>=.50	>=1.0
Jan	65.5	72.4	58.7	76	93	81	02	40	04	0	0	0	0	0.13	0.10	28				0	0	0
Feb	70.1	75.0	65.2	32	181	89	25	42	13	0	0	0	0	1.62	0.80	08				3	1	0
Mar	73.6	77.5	69.6	0	265	85	04	57	05	0	0	0	0	1.11	0.45	12				3	0	0
Apr	74.4	79.8	68.9	0	281	90	07	58	24	1	0	0	0	1.45	0.85	21				2	2	0
May	78.4	83.0	73.9	0	416	90	31	71	18	1	0	0	0	4.48	1.50	29				8	3	1
Jun	80.5	85.2	75.7	0	464	91	05	72	09	2	0	0	0	3.08	1.00	09				5	3	1
Jul	81.4	85.4	77.5	0	509	91	28	71	23	1	0	0	0	3.80	1.13	23				7	3	1
Aug	82.2	86.8	77.6	0	534	92	20	72	25	4	0	0	0	11.33	4.25	27				11	7	3
Sep	81.7	86.4	77.0	0	500	92	09	71	06	3	0	0	0	7.40	2.47	15				10	5	3
Oct	78.1	83.3	73.0	4	411	88	07	51	30	0	0	0	0	6.77	1.30	15				10	7	2
Nov	68.7	75.2	62.3	12	124	81	05	53	24	0	0	0	0	1.82	0.97	16				2	2	0
Dec	69.2	76.2	62.3	47	179	83	19	42	23	0	0	0	0	2.74	0.90	09				7	1	0

Notes

(Blank) Data element not reported or missing.

\+ Occurred on one or more previous dates during the month. The date in the Date field is the last day of occurrence.

A Accumulated amount.

X Monthly means or totals based on incomplete time series.

T Trace Amount.

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Global Summary of the Month for 2013

Generated on 03/28/2017

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Elev: 10 ft. Lat: 27.2877° N Lon: -80.2214° W

Station: **NETTLES ISLAND, FL US GHCND:USC00086092**

Date	Temperature (F)													Precipitation (Inches)								
Elem ->	TAVG	TMAX	TMIN	HTDD	CLDD	EMXT		EMNT		DX90	DX32	DT32	DT00	PRCP	EMXP		SNOW	EMSD		DP01	DP05	DP10
Month	Mean	Mean Max.	Mean Min	Heating Degree Days	Cooling Degree Days	Highest	High Date	Lowest	Low Date	Number of Days				Total	Greatest Observed		Snow, Sleet			Number of Days		
										Max >= 90	Max <= 32	Min <= 32	Min <= 0		Amount	Date	Total Fall	Max Depth	Max Date	>=.10	>=.50	>=1.0
Jan	70.2	75.4	65.0	7	167	83	18	49	18	0	0	0	0	1.13	0.30	20				4	0	0
Feb	67.8	74.4	61.1	49	127	88	25	44	17	0	0	0	0	2.44	2.00	15				2	1	1
Mar	63.6	70.9	56.2	103	59	85	25	43	04	0	0	0	0	0.90	0.55	19				2	1	0
Apr	75.3	79.2	71.3	0	297	85	21	59	06	0	0	0	0	1.70	1.00	05				2	2	1
May	76.6	81.6	71.6	0	329	89	24	62	07	0	0	0	0	6.59	1.55	21				6	6	3
Jun	80.8	84.8	76.9	0	459	93	15	71	08	1	0	0	0	3.73	1.40	07				7	3	1
Jul	80.9	85.3	76.5	0	478	92	24	72	22	2	0	0	0	8.78	2.70	15				16	4	2
Aug	82.4	86.0	78.8	0	538	91	06	74	31	2	0	0	0	5.68	1.50	31				8	3	3
Sep	81.6	86.8	76.4	0	482	91	27	72	27	4	0	0	0	8.93	2.10	24				11	7	3
Oct	79.4	84.7	74.1	0	447	89	23	67	28	0	0	0	0	1.15	0.35	10				3	0	0
Nov	74.9	79.4	70.4	3	264	86	03	45	28	0	0	0	0	3.99	1.65	21				8	2	2
Dec	72.4	76.8	68.1	2	232	83	11	57	17	0	0	0	0	3.19	1.75	02				5	2	1

Notes

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A Accumulated amount.

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T Trace Amount.

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Global Summary of the Month for 2014

Generated on 03/28/2017

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Elev: 10 ft. Lat: 27.2877° N Lon: -80.2214° W

Station: **NETTLES ISLAND, FL US GHCND:USC00086092**

Date	Temperature (F)													Precipitation (Inches)								
Elem ->	TAVG	TMAX	TMIN	HTDD	CLDD	EMXT		EMNT		DX90	DX32	DT32	DT00	PRCP	EMXP		SNOW	EMSD		DP01	DP05	DP10
Month	Mean	Mean Max.	Mean Min	Heating Degree Days	Cooling Degree Days	Highest	High Date	Lowest	Low Date	Number of Days				Total	Greatest Observed		Snow, Sleet			Number of Days		
										Max >= 90	Max <= 32	Min <= 32	Min <= 0		Amount	Date	Total Fall	Max Depth	Max Date	>=.10	>=.50	>=1.0
Jan	65.1	73.0	57.3	97	101	82	07	42	20	0	0	0	0	6.60	3.50	30				5	3	3
Feb	70.0	76.4	63.6	15	145	83	27	47	14	0	0	0	0	2.50	1.10	13				6	1	1
Mar	70.1	77.1	63.1	4	138	84	13	51	08	0	0	0	0	2.08	0.60	25				4	2	0
Apr	73.8	78.6	69.0	0	238	87	26	62	21	0	0	0	0	0.46	0.16	18				1	0	0
May	78.9	82.5	75.3	0	404	91	25	67	05	1	0	0	0	1.75	0.65	16				6	1	0
Jun	81.0	86.1	75.9	0	480	92	13	71	15	5	0	0	0	8.99	2.50	02				9	7	3
Jul	84.0	88.8	79.1	0	588	94	29	75	05	13	0	0	0	5.43	1.52	23				8	4	1
Aug	85.1	89.8	80.5	0	624	95	12	76	05	17	0	0	0	4.70	2.03	05				7	2	2
Sep	81.9	86.1	77.8	0	492	89	17	74	23	0	0	0	0	8.93	2.80	08				12	7	3
Oct	78.7	84.1	73.4	0	412	90	03	66	18	2	0	0	0	2.44	0.95	02				5	2	0
Nov	70.3	76.6	64.0	17	177	85	25	50	02	0	0	0	0	2.41	0.82	10				4	2	0
Dec	72.6	78.5	66.8	6	228	87	28	54	11	0	0	0	0	1.65	0.80	25				3	2	0

Notes

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A Accumulated amount.

X Monthly means or totals based on incomplete time series.

T Trace Amount.

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Global Summary of the Month for 2015

Generated on 03/28/2017

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Elev: 10 ft. Lat: 27.2877° N Lon: -80.2214° W

Station: **NETTLES ISLAND, FL US GHCND:USC00086092**

Date	Temperature (F)													Precipitation (Inches)								
Elem ->	TAVG	TMAX	TMIN	HTDD	CLDD	EMXT		EMNT		DX90	DX32	DT32	DT00	PRCP	EMXP		SNOW	EMSD		DP01	DP05	DP10
Month	Mean	Mean Max.	Mean Min	Heating Degree Days	Cooling Degree Days	Highest	High Date	Lowest	Low Date	Number of Days				Total	Greatest Observed		Snow, Sleet			Number of Days		
										Max >= 90	Max <= 32	Min <= 32	Min <= 0		Amount	Date	Total Fall	Max Depth	Max Date	>=.10	>=.50	>=1.0
Jan														2.10	0.78	01				4	2	0
Feb	66.1	72.8	59.4	48	79	83	25	43	20	0	0	0	0	3.43	1.35	10				4	3	1
Mar	75.4	79.6	71.3	0	323	87	23	59	30	0	0	0	0	3.88	1.55	01				4	2	2
Apr	80.7	85.0	76.4	0	441	96	27	66	01	5	0	0	0	3.18	1.27	21				5	2	1
May														1.77	0.50	05				4	1	0
Jul														4.91	0.87	01				10	4	0
Aug														4.01	1.23	01				7	3	2
Sep														15.32	7.11	17				11	6	2
Oct														1.09	0.48	29				2	0	0
Nov														3.74	1.04	19				8	2	1
Dec														4.18	1.12	04				9	4	1

Notes

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T Trace Amount.

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Global Summary of the Month for 2016

Generated on 03/28/2017

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Elev: 10 ft. Lat: 27.2877° N Lon: -80.2214° W

Station: **NETTLES ISLAND, FL US GHCND:USC00086092**

Date	Temperature (F)													Precipitation (Inches)								
Elem ->	TAVG	TMAX	TMIN	HTDD	CLDD	EMXT		EMNT		DX90	DX32	DT32	DT00	PRCP	EMXP		SNOW	EMSD		DP01	DP05	DP10
Month	Mean	Mean Max.	Mean Min	Heating Degree Days	Cooling Degree Days	Highest	High Date	Lowest	Low Date	Number of Days				Total	Greatest Observed		Snow, Sleet			Number of Days		
										Max >= 90	Max <= 32	Min <= 32	Min <= 0		Amount	Date	Total Fall	Max Depth	Max Date	>=.10	>=.50	>=1.0
Jan														9.76	2.90	28				10	7	4
Feb														2.89	1.96	16				3	2	1
Mar														2.56	0.64	20				7	1	0
Apr														1.49	0.88	15				3	1	0
May														11.42	4.07	20				7	6	3
Jun														3.48	1.12	09				6	2	2
Jul														0.25	0.14	19				1	0	0
Aug														5.89	1.25	30				11	3	2
Nov														0.63	0.35	05				1	0	0
Dec														1.21	0.58	07				3	1	0

Notes

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