

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

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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

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

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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

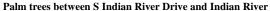
Site sloping downward to the north and east

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.

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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

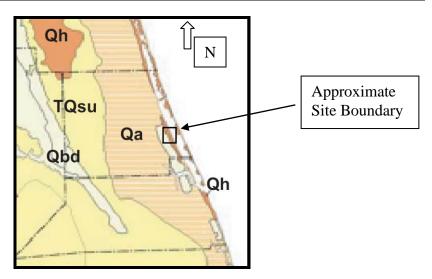
Based on the Soil Survey for St. Lucie County, Florida, as prepared by the U.S. Department of Agriculture Natural Resources Conservation Service, the predominant soil types existing within the site area are described in the following table. The Soil Survey Map is also shown on Figure 2 in the Appendix 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 $\frac{3}{8}$ 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 El75 feet								

GENERAL SOIL PROFILE: PIPE CROSSINGS (Borings P-1 through P-4)							
TYPICAL	DEPTH (ft)						
FROM	то	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:

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

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 OUALITY 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.

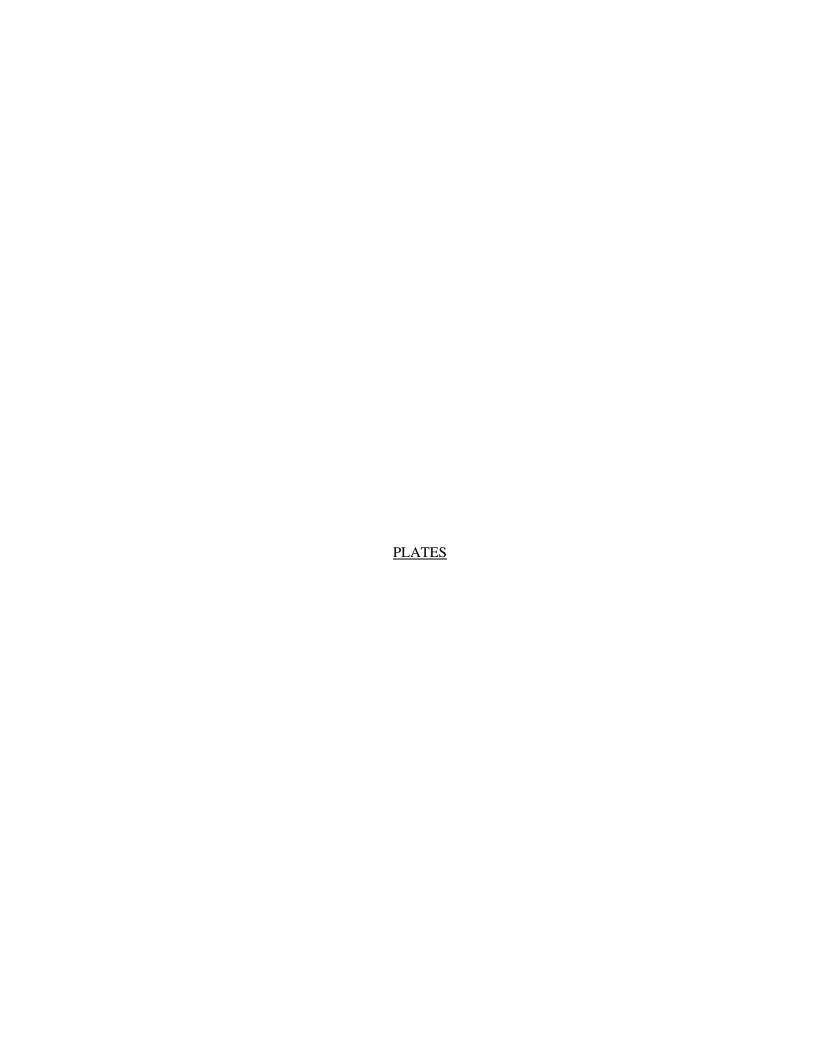
A representative number of field in-place density tests should be made in the upper two feet of compacted natural soil subgrades for sturctures, in each lift of compacted backfill and fill, and in the upper 12 inches below the bearing levels in the footing excavation Density tests are recommended to 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.

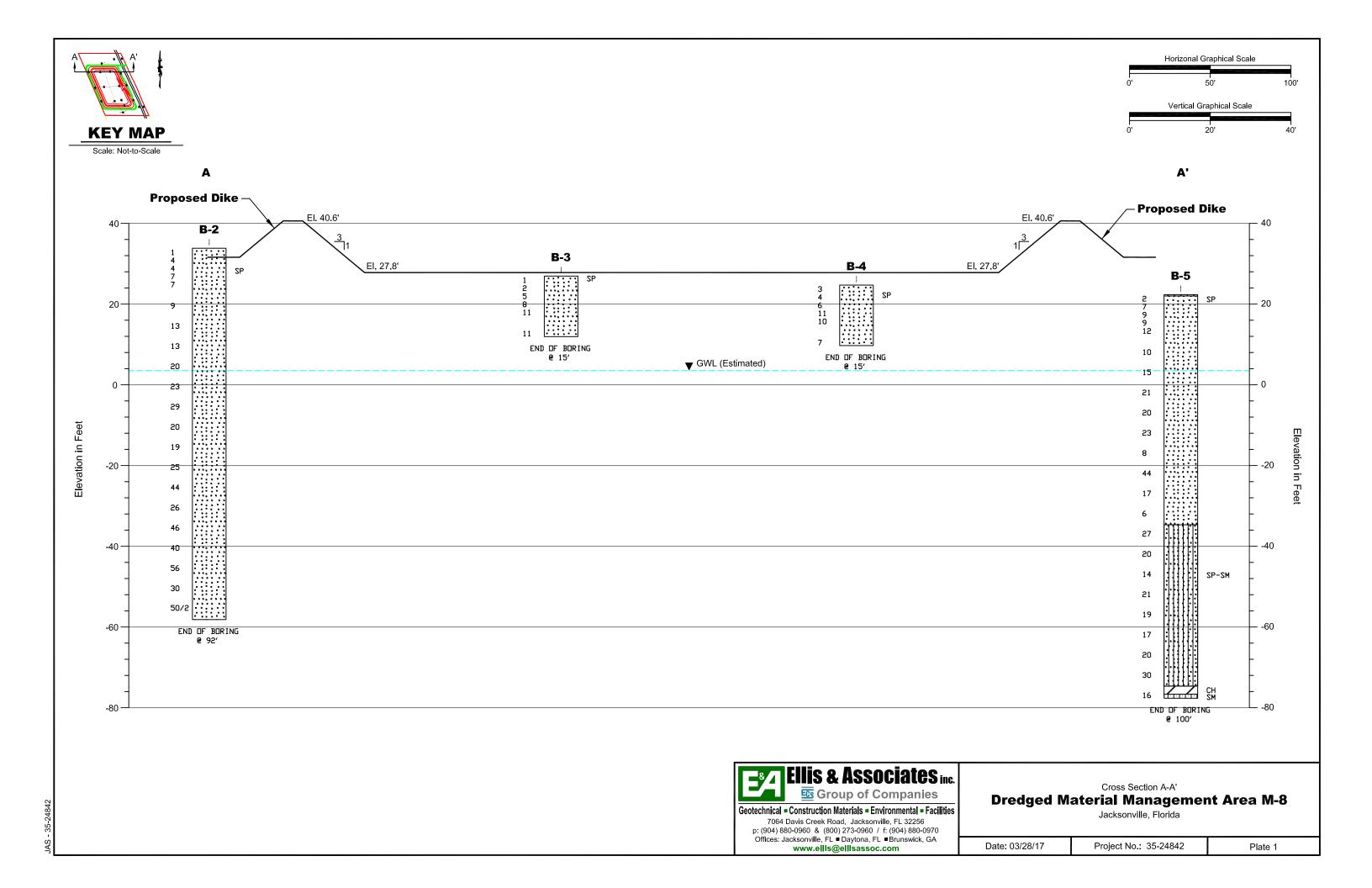
9.0 REPORT LIMITATIONS

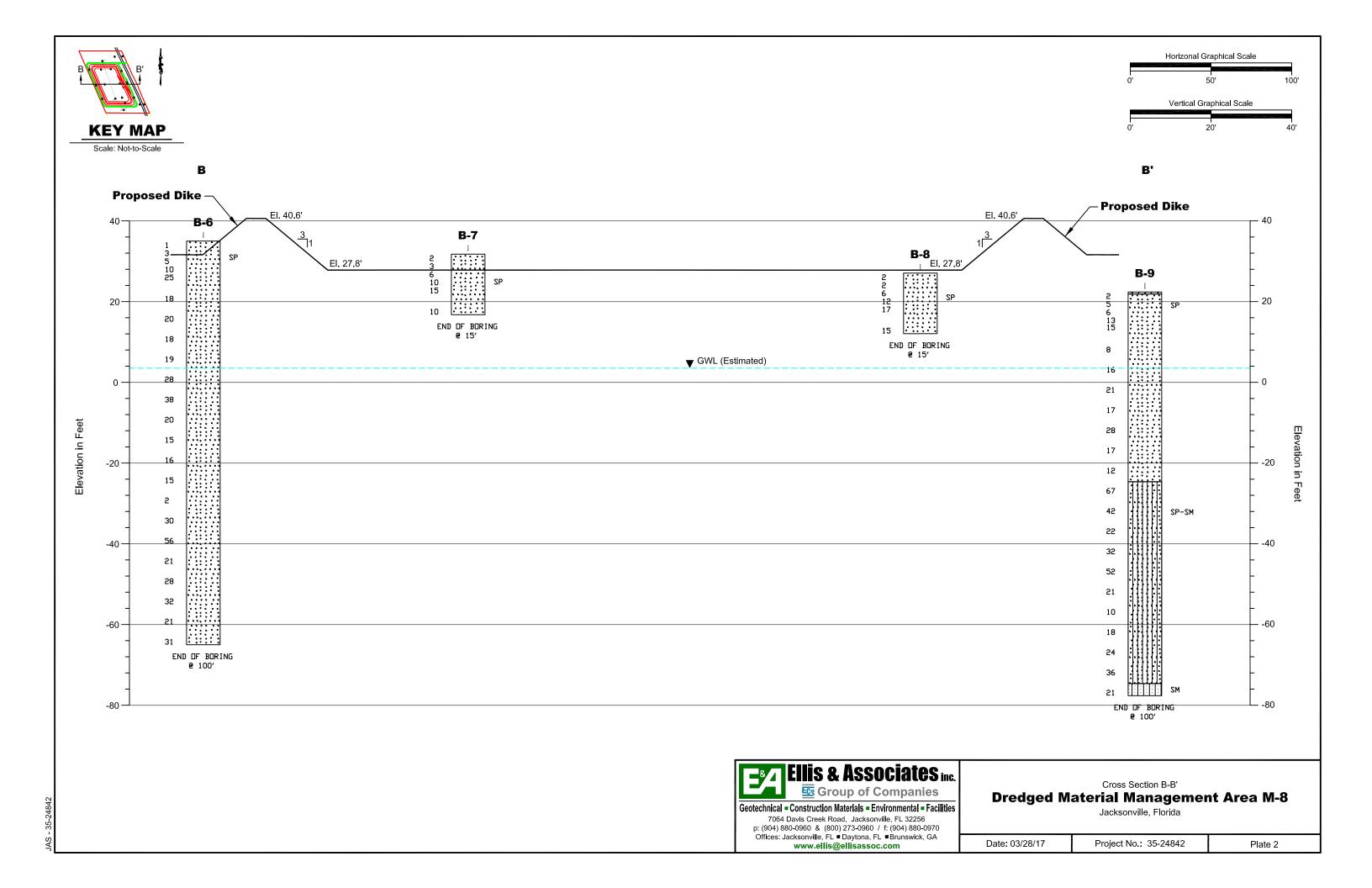
Our geotechnical exploration has been performed, our findings obtained, and our recommendations prepared, in accordance with generally accepted geotechnical engineering principles and practices. Ellis & Associates, Inc. is not responsible for any independent conclusions, interpretation, opinions, or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

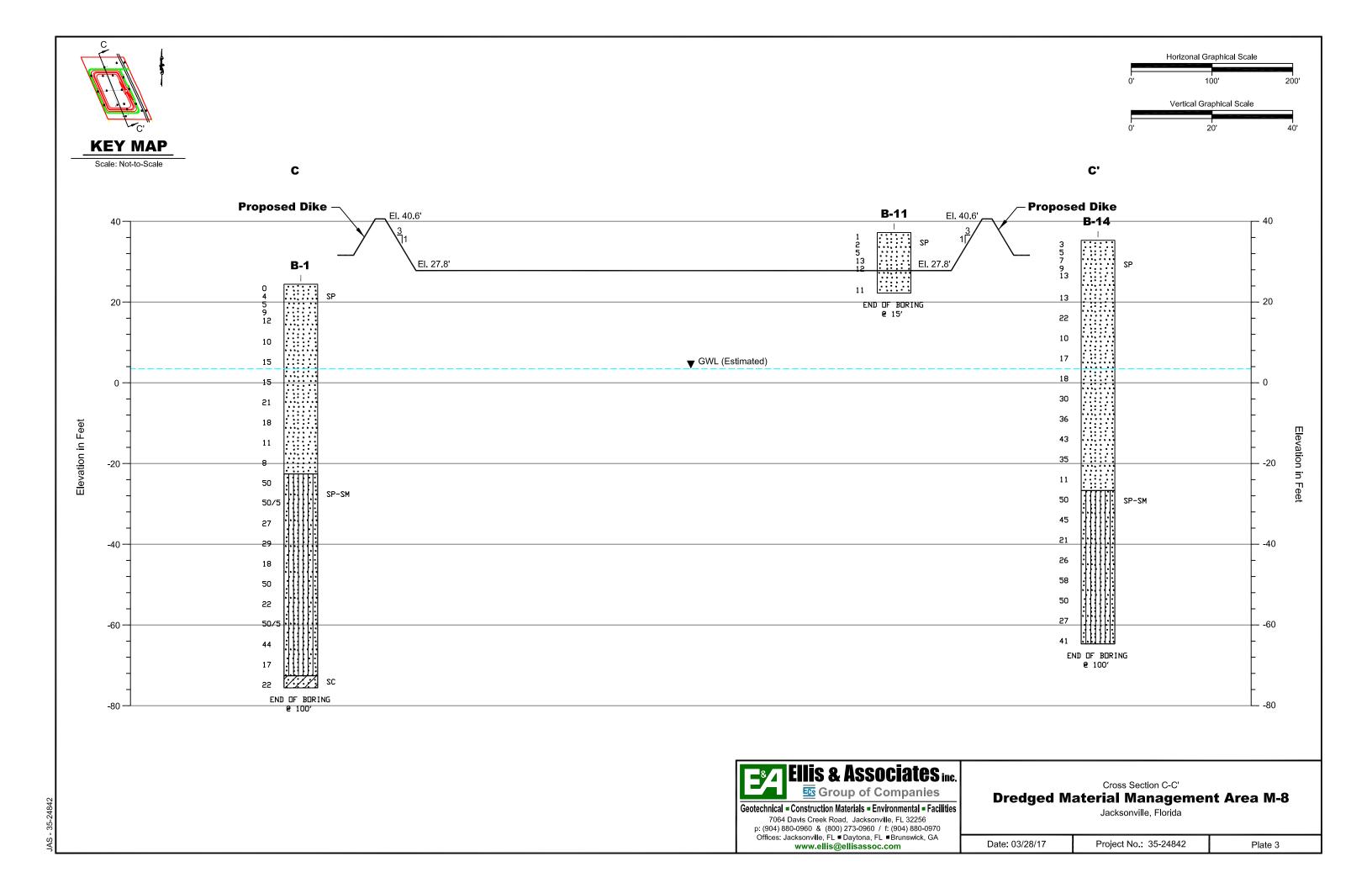
Our scope of services was intended to evaluate the soil conditions within the zone of soil influenced by the foundation system. Our scope of services does not address geologic conditions, such as sinkholes or soil conditions existing below the depth of the soil borings.

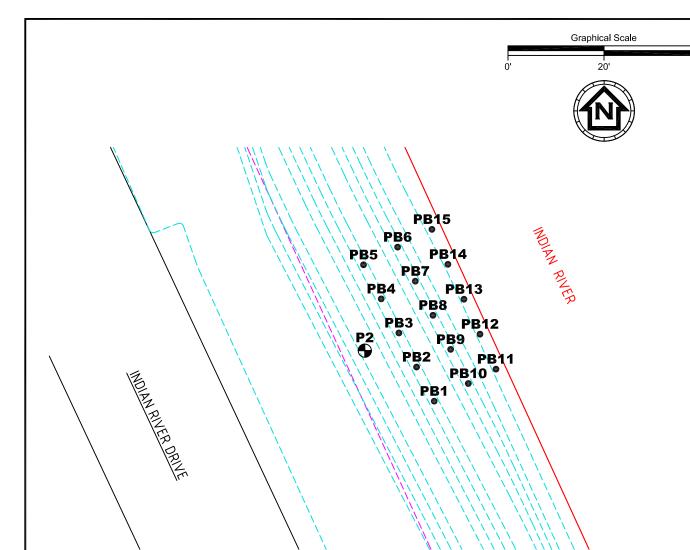
This report does not reflect any variations that may occur adjacent to or between soil borings. The discovery of any site or subsurface condition during construction that deviates from the data obtained during this geotechnical exploration should be reported to us for our evaluation. Also, in the event 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.











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

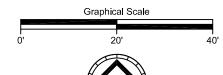


Geotechnical = Construction Materials = Environmental = Facilities

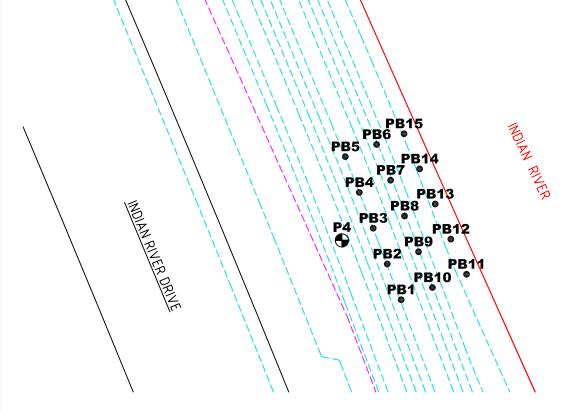
7064 Davis Creek Road, Jacksonville, FL 32256 p: (904) 880-0960 & (800) 273-0960 / f: (904) 880-0970 Offices: Jacksonville, FL ■ Daytona, FL ■ Brunswick, GA www.ellis@ellisassoc.com Muck Probe Location Plan (SPT P2 Area)

Dredged Material Management Area M-8

St. Lucie County, Florida







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
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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

Ellis & Associates Inc.

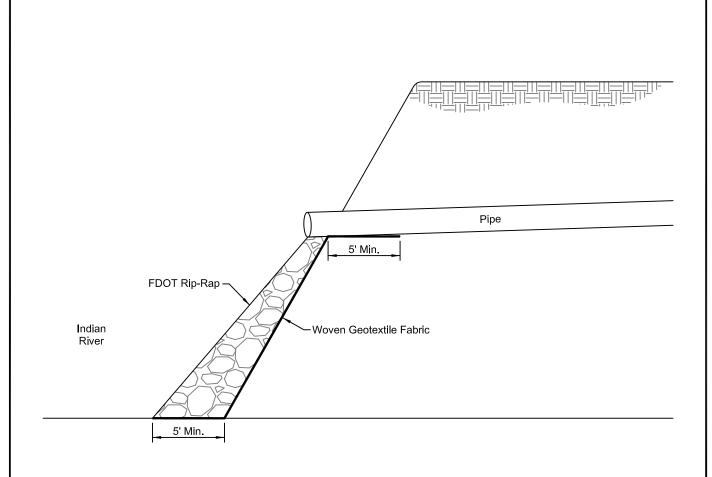
Geotechnical = Construction Materials = Environmental = Facilities

7064 Davis Creek Road, Jacksonville, FL 32256 p: (904) 880-0960 & (800) 273-0960 / f: (904) 880-0970 Offices: Jacksonville, FL ■ Daytona, FL ■ Brunswick, GA www.ellis@ellisassoc.com 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



Scale: Not-to-Scale



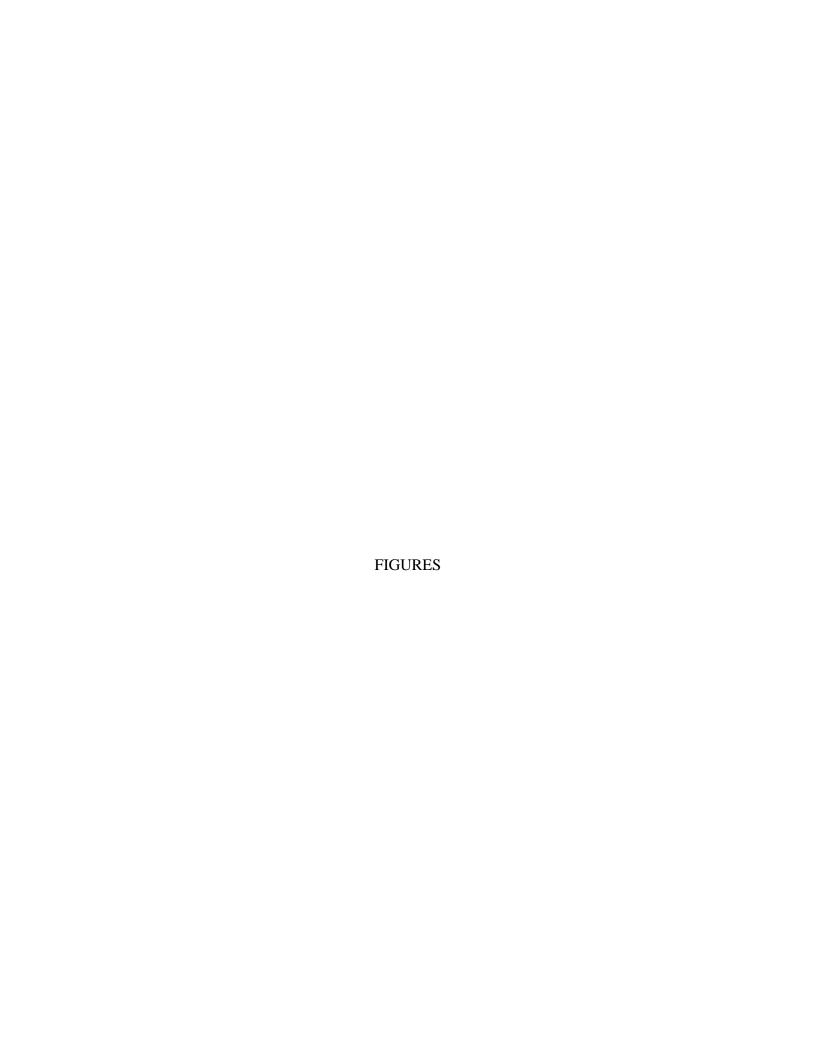
Geotechnical = Construction Materials = Environmental = Facilities

7064 Davis Creek Road, Jacksonville, FL 32256 p: (904) 880-0960 & (800) 273-0960 / f: (904) 880-0970 Offices: Jacksonville, FL ■ Daytona, FL ■ Brunswick, GA www.ellis@ellisassoc.com Slope Protection Detail

Dredged Material Management Area M-8

St. Lucie County, Florida

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







Geotechnical - Construction Materials - Environmental - Facilities

7064 Davis Creek Road, Jacksonville, FL 32256 p: (904) 880-0960 & (800) 273-0960 / f: (904) 880-0970
Offices: Jacksonville, FL ■ Daytona, FL ■ Brunswick, GA
www.ellis@ellisassoc.com 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

Project No.: 35-24842

Date: 03/30/17





LEGEND

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



Geotechnical - Construction Materials - Environmental - Facilities

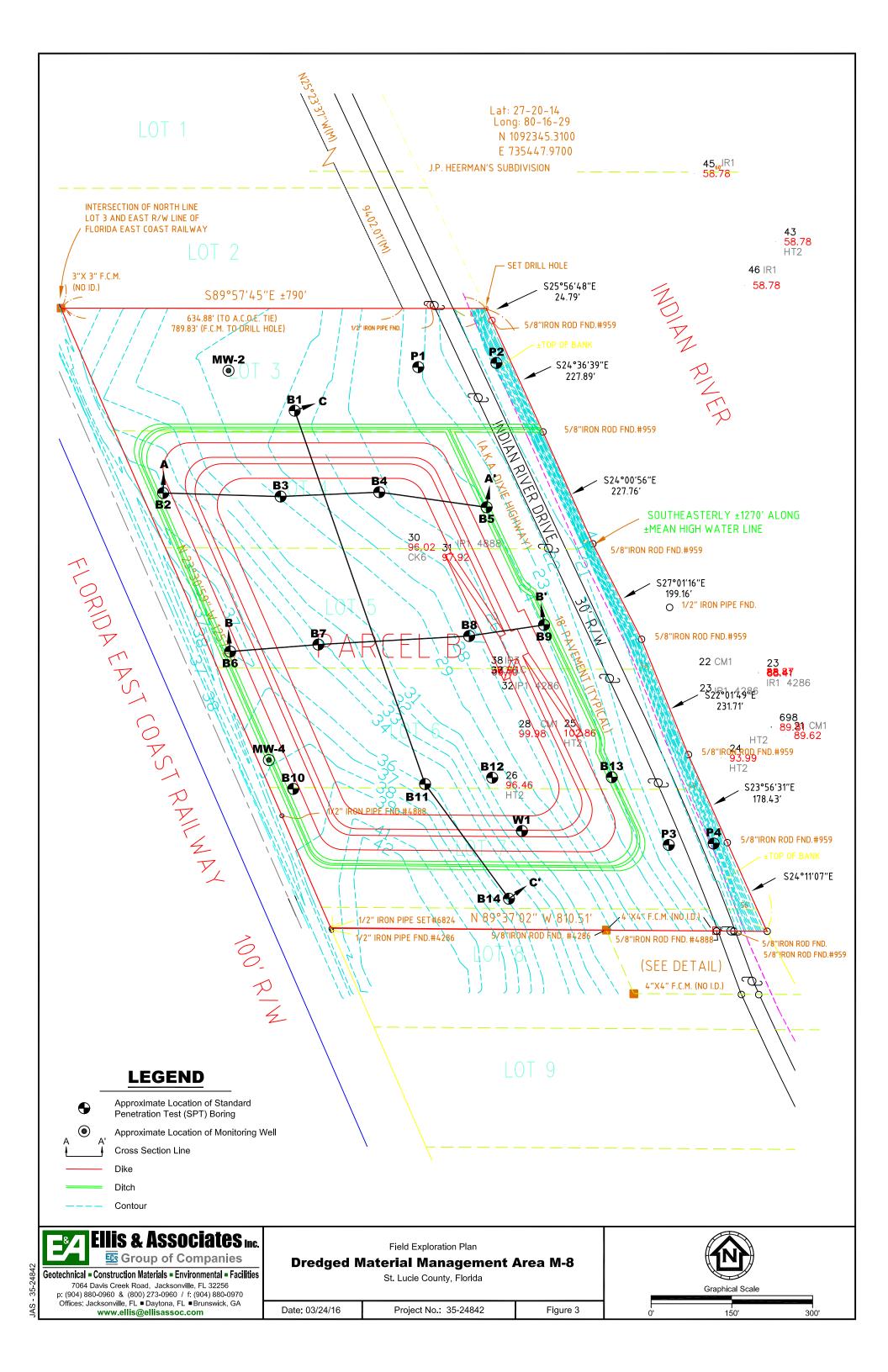
7064 Davis Creek Road, Jacksonville, FL 32256 p: (904) 880-0960 & (800) 273-0960 / f: (904) 880-0970
Offices: Jacksonville, FL ■ Daytona, FL ■ Brunswick, GA
www.ellis@ellisassoc.com Soil Survey of St. Lucie County

Dredged Material Management Area M-8

St. Lucie County, Florida Approximate Scale: 1"=300'

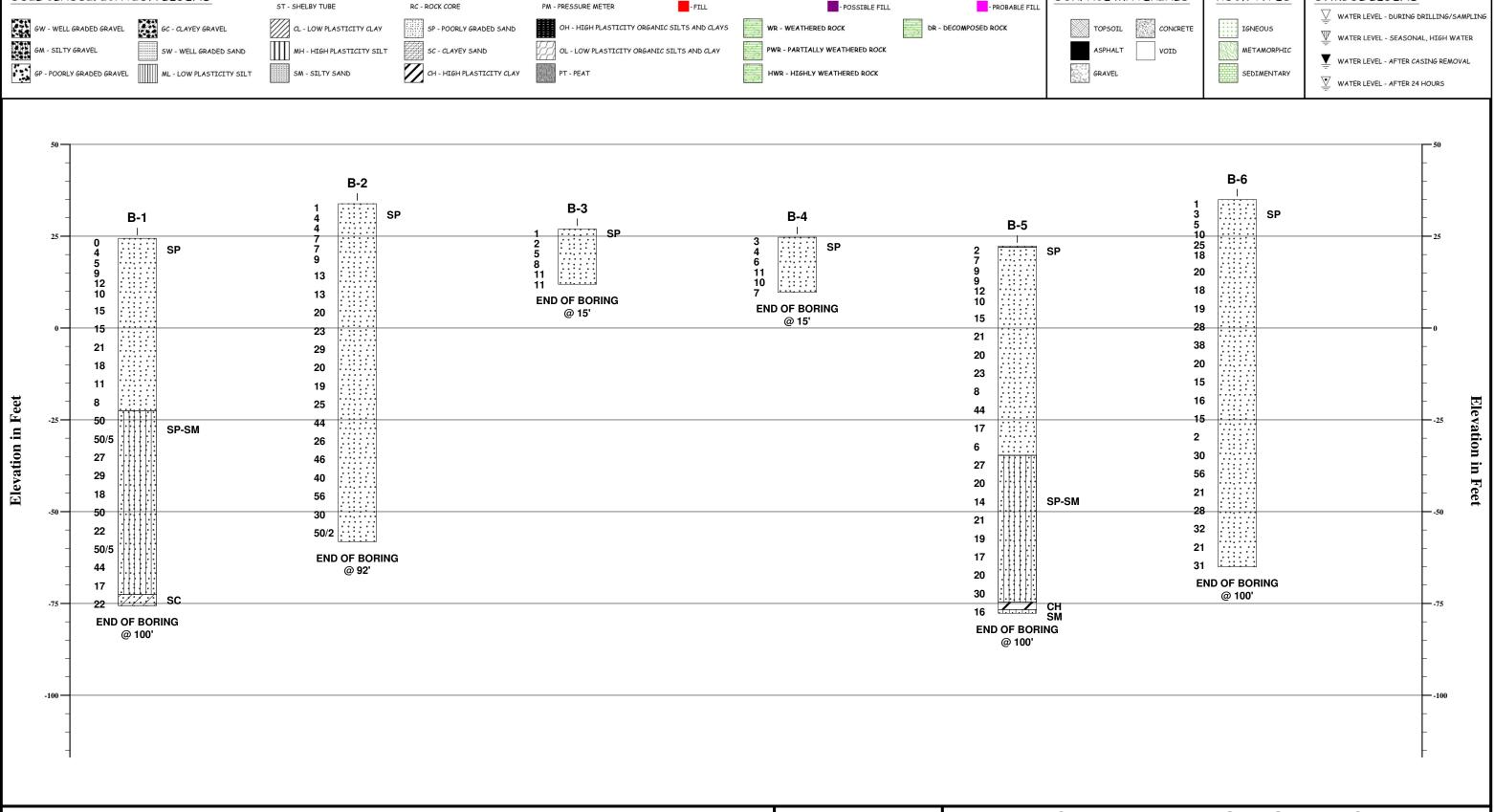
Site boundaries depicted are approximate

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



APPENDIX A

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



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.

SOIL CLASSIFICATION LEGEND



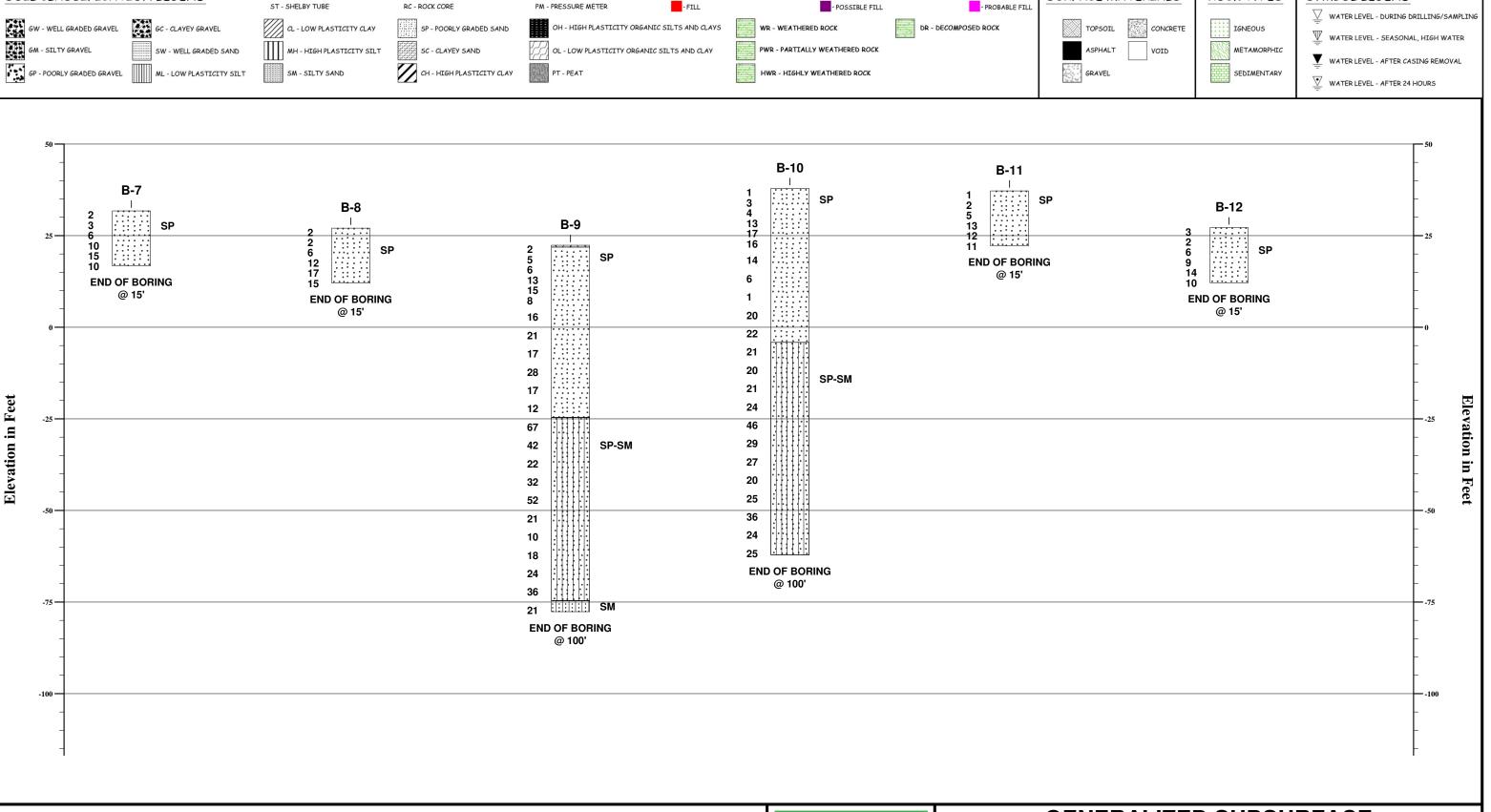
GENERALIZED SUBSURFACE SOIL PROFILE

Dredged Material Management Area M-8
Florida Inland Navigation District
South Indian River Drive, St. Lucie County, St. Lucie
ROJECT NO.: 24842 DATE: 3/28/2017 VERTICAL SCALE: 1"=25"

SURFACE MATERIALS

ROCK TYPES

SYMBOL LEGEND



- 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.

SOIL CLASSIFICATION LEGEND



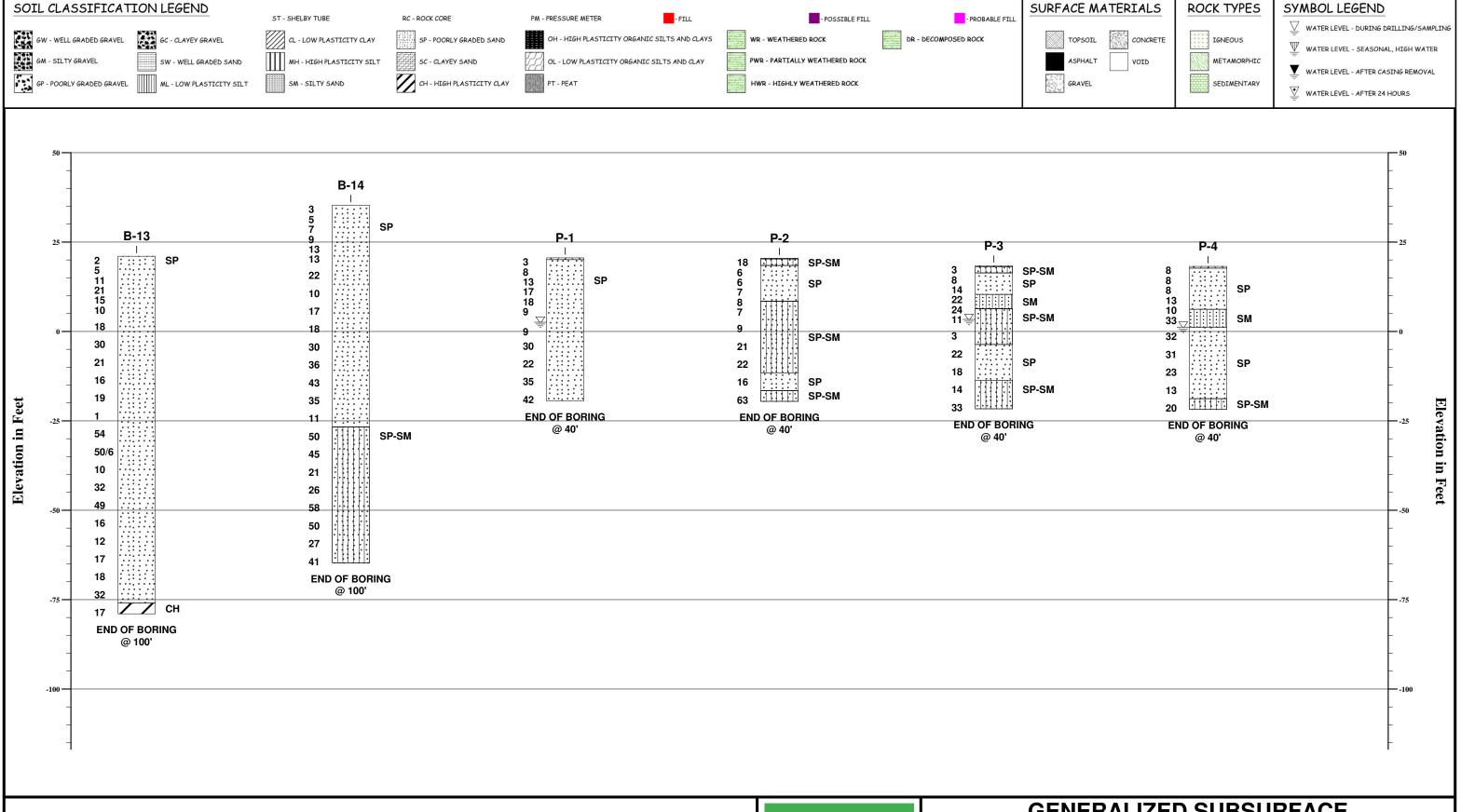
GENERALIZED SUBSURFACE SOIL PROFILE

Dredged Material Management Area M-8
Florida Inland Navigation District
South Indian River Drive, St. Lucie County, St. Lucie
ROJECT NO.: 24842 DATE: 3/28/2017 VERTICAL SCALE: 1"=25"

SURFACE MATERIALS

ROCK TYPES

SYMBOL LEGEND



- 1 SEE INDIVIDUAL BORING LOG AND GEOTECHNICAL REPORT FOR ADDITIONAL INFORMATION.
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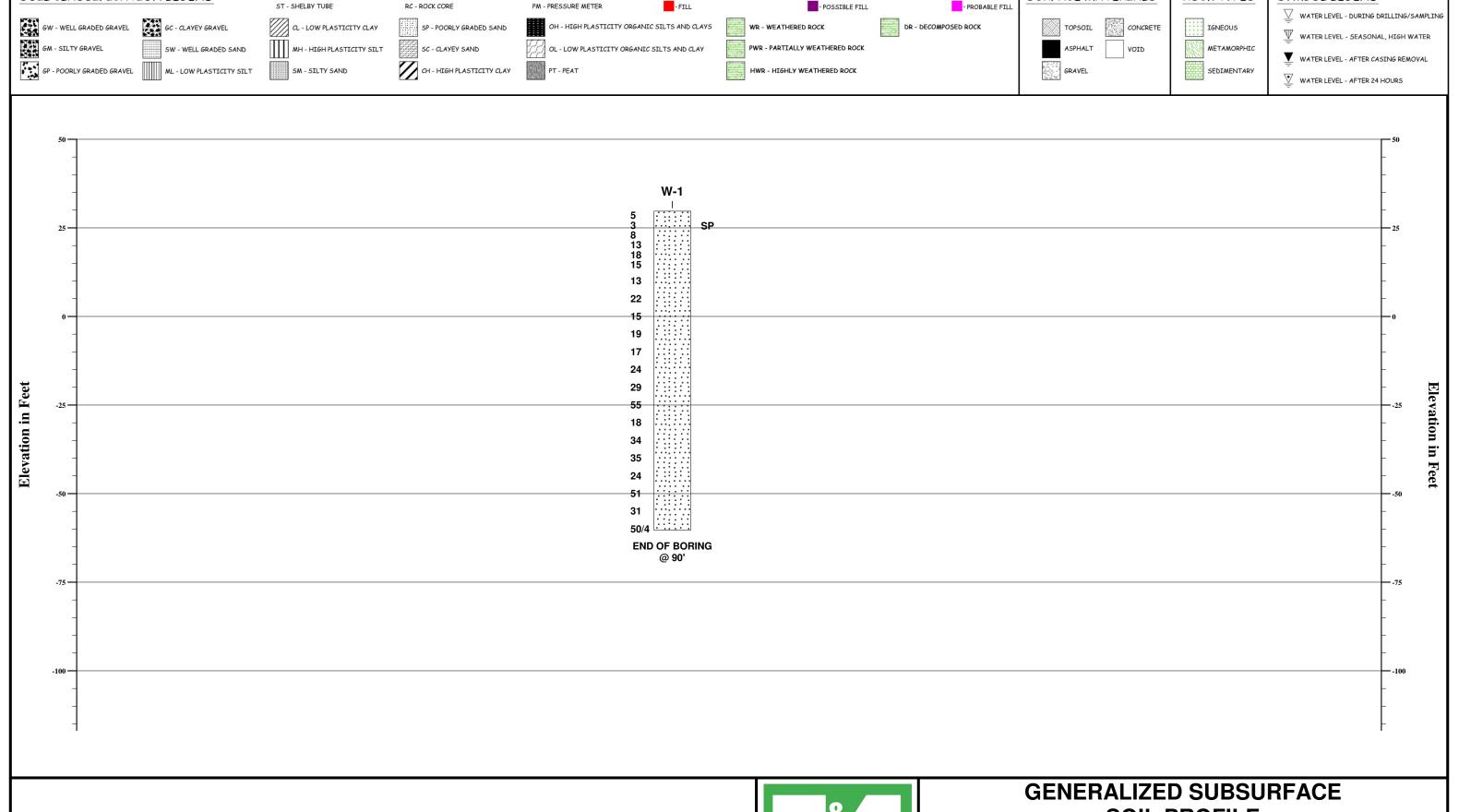


GENERALIZED SUBSURFACE SOIL PROFILE

ROCK TYPES

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

DATE: 3/28/2017



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.

SOIL CLASSIFICATION LEGEND



SOIL PROFILE

Dredged Material Management Area M-8
Florida Inland Navigation District
South Indian River Drive, St. Lucie County, St. Lucie
ROJECT NO.: 24842 DATE: 3/28/2017 VERTICAL SCALE: 1"=25"

SURFACE MATERIALS

ROCK TYPES

SYMBOL LEGEND

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	S-2	SS	24	24					_	2 2 2	⊗ -4				
5—	S-3	SS	24	24					30	3 2 2 2	⊗ –4				
	S-4	SS	24	24	(SP) FINE SAN	ND, Orange Bro	wn, Moist, Loos	e		4 4 3	7				
_										4 4 4 3					
10 —	S-5	SS	24	24						4 4	4.9				
_															
15	S-6	SS	18	18					20	3 3 6	9-&				
_															
_						ND, Tan, Moist t	to Wet, Medium								
	S-7	SS	18	18	Dense				15	3 6	13-⊗				
20 —										7					
_															
									<u> </u>	3					
25 —	S-8	SS	18	18						6 7	13				
_															
									_						
20 —	S-9	SS	18	18					5	6 8 12	20-(\			
30 —									∄		L ONTINUEI	<u> </u> ריי	\ NI=\	(T D/	AGE
	TH	E STR	ATIFIC	CATION	I LINES REPRESENT	THE APPROXIMAT	E BOUNDARY LINE	S BETWEE	N SOIL T						NUL.
Ţ WL				ws 🗌		BORING STARTE				1	E IN DEPTH				
₩ WL(S	HW)		<u>*</u>	WL(AC	R)	BORING COMPLE	TED 01/18/17	,		НАМ	MER TYPE Auto				
₩ WL						RIG ATV	FOREMA	N D. Fra	ncis	DRIL	LING METHOD SI	PT			

CLIENT							JOB#	ВО	PRING #		SHEET			
Florida PROJECT N	Inla	and I	Na	vigat	ion District		24842 ARCHITECT-ENGI	NEER	B-2		2 OF	4	& 	4
Dredge SITE LOCA	ed M	late	<u>rial</u>	Mar	nagement Are	a M-8	Taylor Engi	<u>neerin</u>	g, Inc.		CALIBR	ATED PE	ECS Group of C	
											1	2	3 4	5+
NORTHING	india	<u> </u>	IVE	EASTIN	ve, St. Lucie	STATION TL					ROCK QUAI	LITY DE	SIGNATION & REC	COVERY
												10%	60% 80%	100%
		Ш	(N) .	<u> </u>	DESCRIPTION OF M	IATERIAL	ENG	LISH UNIT			PLASTIC LIMIT %		WATER NTENT %	LIQUID LIMIT %
(FT)	E NO.	E TYP	SAMPLE DIST. (IN)	RECOVERY (IN)	BOTTOM OF CASING	g 🔀	LOSS OF CIRCUL	_ATION 🔀	WATER LEVELS ELEVATION (FT)	9/S	*		•	\longrightarrow
ОЕРТН (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPL	RECO	SURFACE ELEVATION	ON 33.83			WATE	BLOWS/6"	(⊗51	ANDARI BL	D PENETRATION LOWS/FT 30 40	50+
					(SP) FINE SAN Dense	ND, Tan, Moist t	to Wet, Medium							
									_					
	S-10	SS	18	18					<u> </u>	7 11	2	23-🛇		
35 —										12				
									_					
	=												\	
	S-11	ss	18	18					-5	9 12 17		29	-	
40												/	/	
					(SP) FINE SAN	ND, Dark Gray,	Wet. Medium							
					Dense to Very	Dense	rrot, modium		-10	6				
45	S-12	SS	18	18						8 12	20-	\bigotimes		
_														
				<u> </u>					-15	6				
50	S-13	SS	18	18						8 11	19∹	8)		
	S-14	SS	18	18					-20	8 11	2	4 2-	-25	
55				.0					_	14	_			
									_					
S-15 SS 18 18									-25	14 20			44->	
60										24				
	ı	1		I	I			<u> :::::</u>	::::d	CC	NTINUE	D O	N NEXT F	PAGE.
	THE	STRA	TIFIC	CATION	I LINES REPRESENT	THE APPROXIMAT	E BOUNDARY LINE	S BETWE	EN SOIL TYF	ES. IN-	SITU THE TRANS	ITION M	IAY BE GRADUAL	·
Ų WL				ws□	WD⊠	BORING STARTE	D 01/18/17	7		CAVE	IN DEPTH			
₩ WL(SH	W)		<u></u>	WL(AC	CR)	BORING COMPLE	ETED 01/18/17	7		HAM	MER TYPE Auto			
₩L						RIG ATV	FOREMA	N D. Fra	ancis	DRILI	LING METHOD S	PT		

CLIENT							JOB#	BOF	RING #		SHEET			
Florid	a Inla	and	Na	vigat	ion District		24842 ARCHITECT-ENG	GINEER	B-2		3 OF	4	=	8.
Dredo	ged N	<u>late</u>	<u>rial</u>	Mar	agement Are	a M-8	Taylor Eng	gineering	ı, Inc.		CALIBRA		NETROMETER TO	
South	Indi	an F	live	er Dri	ve, St. Lucie	County, FL					BOCK OLIAI	ITY DE	3 4 SIGNATION &	5 ₊
NORTHIN	IG			EASTIN	IG	STATION					RQD%		REC.%	
				_	DESCRIPTION OF M	IATEDIAL		IGLISH UNITS	,		20%	10%	60% 80%	6 100%
		М	N	<u> </u>	DESCRIPTION OF W	IATEMAL					PLASTIC LIMIT %		VATER NTENT %	LIQUID LIMIT %
(FT)	E NO.	E TY	E DIS	ERY (BOTTOM OF CASING	G 🔀	LOSS OF CIRC	JLATION M	I EVE	9/9	*		•	
ОЕРТН (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	SURFACE ELEVATION			1	WATER LEVELS ELEVATION (FT)	BLOWS/6"	⊗ST	ANDARI BL 20	O PENETRATION OWS/FT 30 40	ON 50+
					│ (SP) FINE SAN	ND, Dark Gray, Dense	Wet, Medium	/	<u> </u>					
_					(SP) FINE SAN	ND, Gray, Wet,	Medium Dens	Э	-					
	S-16	ss	18	18					-30	9 12 14		26-⊗		
65 —														
_									_					
_						ND, Gray to Tan Dense, Contair		1	_					
_	S-17	ss	18	18	Fragments				-35	17 20			2	16-⊗
70 —										26				
_									-					
_									E					/
_				-					-40	17			/	'
75—	S-18	SS	18	18						19 21			40-⊗	
									_					
_														
_														
_	S-19	ss	18	18					-45	20 22				56->
80 —									E	34				
													/	
_	S-20	99	18	18					-50	15 15		3(p-⊗	
85 —	3-20	33	10	10						15		30		
_														
-	\$-21	SS	2	2					-55	50/2				50/2
	<u> </u>								-55					
90 —									_					
_														
										CC	NTINUE	D OI	N NEXT	PAGE.
	THE	STRA	TIFIC	CATION	I LINES REPRESENT	THE APPROXIMAT	E BOUNDARY LIN	ES BETWEEN	N SOIL TYP	ES. IN-	SITU THE TRANS	ITION M	AY BE GRADU	JAL.
≟ Mr				ws□	WD⊠	BORING STARTE	D 01/18/	17		CAVE	IN DEPTH			
₩ WL(S	HW)		<u>=</u>	WL(AC	R)	BORING COMPLE				HAM	MER TYPE Auto			
₩ WL						RIG ATV	FOREM	ıan D. Frai	ncis	DRILL	ING METHOD S	PT		

CLIENT							JOB#	В	ORING #			SHEET		-	
Florida PROJECT	a Inl	and	Na	vigat	ion District		24842 ARCHITECT-ENGII	NEER	B-	2	4	OF 4	∤ :	&	ı
Dredg SITE LOC	ed N	/late	<u>rial</u>	Man	agement A	rea M-8	Taylor Engi	<u>neerir</u>	ng, Inc.		T-0-	CALIBRATED P	ECS Gro	oup of Compan	ies
South	Indi	an E	2iv.c	r Dri	vo St.Luci	County El					1	2	3	4 5	+
NORTHIN	G G	<u> </u>	live	EASTIN	iG	STATION FL					I		esignation - Rec.%		≣RY
						1					20°	% 40%	60% 80	0% 100	0%
	Ö	/PE	ST. (IN)	(IN)	DESCRIPTION OF BOTTOM OF CAS		ENG	LISH UN	II	(L	PLAS LIMIT **	% C	WATER ONTENT %	LI	IQUID MIT %
ОЕРТН (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	VEF	SURFACE ELEVA		LUSS OF CINCUL	ATION Z	WATER LEVELS	ELEVATION (F1) BLOWS/6"		⊗STANDAI	RD PENETRAT		-∆
DE	SA	SA	SA	R	∏(SP) FINE S	AND, Gray to Tar	. Wet Medium	П	×		10			10 50 :)+
					Dense to Ve	ry Dense, Contair	ns Shell								
_					Fragments END OF BC	RING @ 92'		-	-60)					
95 —															
_															
									-65	5					
100 —															
_															
_															
_															
_									-70						
105															
_															
_															
_															
_									-75	5					
110 —															
_															
_									_						
_									-80						
 115 <i>-</i>															
_															
_															
_															
									-85	5					
120 —															
									_						
								· 		· 					
	THI	STRA	ATIFIC	CATION	I LINES REPRESE	NT THE APPROXIMAT	E BOUNDARY LINES	BETWE	EN SOIL T	YPES. IN	-SITU THE	TRANSITION	MAY BE GRAI	DUAL.	
₩L				ws□	WD⊠	BORING STARTE	D 01/18/17	•		CAV	E IN DEPTI	Н			
₩ WL(SI	HW)		<u>=</u>	WL(AC	R)	BORING COMPLE				+	IMER TYPE				
₩ WL						RIG ATV	FOREMA	N D. F	rancis	DRIL	LING MET	HOD SPT			

CLIENT							JOB#	BORI	NG#		SH	EET		
Florida PROJECT	a Inl	and	Na	vigat	on District		24842 ARCHITECT-ENGINE	ER	B-3		1 0)F 1	=	8.
Dredo	ed N	<u>Mate</u>	<u>rial</u>	Man	agement Area	a M-8	Taylor Engin	eering.	, Inc.		CA	LIBRATED PE	ECS Group	of Companies
South	Indi	an F	Rive	er Dri	ve, St. Lucie (County, FL					11	2	3 4	5+
NORTHIN	G		Ī	EASTIN	G	STATION					RQD		SIGNATION & I	
					DECODIDION OF M	ATERIAL					20%	40%	60% 80%	100%
		ш	<u>N</u>	<u> </u>	DESCRIPTION OF M.	ATERIAL	ENGLI	SH UNITS			PLASTIC LIMIT %		WATER NTENT %	LIQUID LIMIT %
(FT)	N O N	ΤΥP	E DIST	ERY (BOTTOM OF CASINO	a —	LOSS OF CIRCULA	ION M	LEVE ION (9/	*		•	-
ОЕРТН (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	SURFACE ELEVATIO	DN 26.94			WATER LEVELS ELEVATION (FT)	BLOWS/6"	(€	STANDARI BL	O PENETRATIO OWS/FT	ON
0 _	Ŋ	Ŋ	Ŋ	Œ	(SP) FINE SAN	ND, Gray, Moist	, Very Loose to		<u>≯ ⊡</u>	WOLL	10	20	30 40	50+ :
_	S-1	SS	24	24	Loose	•	•		_	WOH WOH	I \ :			
_	D4S- 287		60	<u> </u>					<u> </u>		0.1			
_	S-2	SS	24	24						1 1	2.7			
5—	∖S-3	SS	24	24					_	3 2	5-⊗			
	\0-0	33	24	24					_	3				
_	S-4	SS	24	24					20	3 4 4	8-8			
_					(SP) FINE SAN	JD Orange Bro	wn Moiet			5	\			
_	S-5	ss	24	24	Medium Dense		wii, woist,			6 5	11-🛇			
10 —										5				
_														
_									15 					
_									_	5				
15—	S-6	SS	18	18						5	11-⊗			
					END OF BORI	NG @ 15'			L					
_									<u> </u>					
_									Ė.					
_														
20									_					
_														
_									 5					
25 —									_					
25 —														
_									<u> </u>					
_														
_									_					
30 —									_					
	1	'		1 1				ı	ı -	1 1	· · · · ·	<u> </u>		· · ·
¥ WL ∣		E STR		ws 🗌	UNES REPRESENT WD ✓	THE APPROXIMAT BORING STARTE	D 01/18/17	BETWEEN	SOIL TYP		SITU THE TR.	ANSITION M	AY BE GRADU	IAL.
₩ WL(S			<u></u>	WL(AC	R)	BORING COMPLE				HAMI	MER TYPE A	uto		
₩L						RIG ATV	FOREMAN	D. Fran	cis	DRIL	LING METHO	SPT		
						l								

CLIENT							JOB#	BC	ORING#		SHEE	Т		
Florid	a Inl	and	Na	vigat	ion District		24842 ARCHITECT-ENG	NEER	B-4		1 OF	1	:	&
Dredo	ed N	<u>Mate</u>	<u>erial</u>	Mar	nagement Are	ea M-8	Taylor Eng	<u>neerin</u>	ıg, Inc.		CALIBI		NETROMETER T	
South	Indi	an F	Rive	r Dr	ve, St. Lucie	County, FL					BOCK OUT	2 N ITY DE	SIGNATION A	4 5+ & RECOVERY
NORTHIN	IG			EASTIN	NG .	STATION					RQD%	—	REC.%	
					DESCRIPTION OF N	AATERIAI	- FN/	GLISH UNI	те	1	20%	40%	60% 80	0% 100%
F	Ö.	ГУРЕ	SAMPLE DIST. (IN)	SY (IN)	BOTTOM OF CASIN		LOSS OF CIRCU				PLASTIC LIMIT %		WATER NTENT %	LIQUID LIMIT %
ОЕРТН (FT)	SAMPLE NO.	SAMPLE TYPE	AMPLE [RECOVERY (IN)	SURFACE ELEVATI				WATER LEVELS ELEVATION (FT)	BLOWS/6"	⊗s		D PENETRAT .OWS/FT	TION
0 _	S-1	SS	24	24	(SP) FINE SA Medium Dens	ND, Gray, Moist e	, Very Loose to		<u> </u>	WOH 2 1	—————————————————————————————————————	20	30 4	0 50+
_	290 S-2	SS	60 24	24						2 2 2	0.2			
									20	2 3 3 3	4			
5—	291 S-3/	SS	120 \24	24						3 4 4	0.2			
	S-4 D4S- \ <u>285</u> /	SS	24 60	24	(SD) FINE SA	ND, Orange Bro	was Moiet			5 6 8 7	11-🛇			
10	S-5	SS	24	24	Medium Dens		iwii, ivioist,		15	5 5 6	10-⊗			
_									<u> </u>					
15—	S-6	SS	18	18	END OF BOR	INC @ 15'			10	4 3 4	● ⊗-7 2.6			
_					END OF BOR	ING @ 15			_					
_														
20 —									<u>-</u> -					
_														
									_					
25 —									0					
_									<u>-</u>					
30 —									 -5					
V		E STR			LINES REPRESENT				EN SOIL TYF			SITION M	IAY BE GRAD	DUAL.
₩ WL(S				WS WL(AC		BORING STARTE					E IN DEPTH MER TYPE Auto			
₩ WL			-			RIG ATV		AN D. Fra	ancis		LING METHOD (

CLIENT							JOB#	BOI	RING#		SHEET	Γ			
Florid	a Inl	and	Na	vigat	ion District		24842 ARCHITECT-ENG	GINEER	B-5		1 OF	4	:	&//	
Dredo	ed N	<u> Mate</u>	rial	Mar	nagement Are	a M-8	Taylor Eng	gineering	g, Inc.		CALIBE	RATED PE	ECS Gr	oup of Compa	nies
											1	2	3		5,+
NORTHIN	II IUI IG	<u> </u>	nive	EASTIN	ive, St. Lucie	STATION TE					ROCK QUA RQD%	LITY DE	SIGNATION REC.%		ERY
												40%			00%
			<u>N</u>	9	DESCRIPTION OF M	IATERIAL	EN	IGLISH UNIT			PLASTIC		WATER		LIQUID
Ę.	ON	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	BOTTOM OF CASING	G 👚	LOSS OF CIRC	ULATION 🚾	WATER LEVELS ELEVATION (FT)		LIMIT %	CC	ONTENT %	L	.IMIT % ──△
ОЕРТН (FT)	SAMPLE NO.	APLE	APLE	SOVE	SURFACE ELEVATION	DN 22.34			TERL	BLOWS/6"	⊗sı	ΓANDAR RI	D PENETRA LOWS/FT	ΓΙΟΝ	
O	SAN	SAN	SAN	REC				N/A	WA.	1 BFC	10	20		40 <u>5</u>	i0+
	S-1	ss	24	24	Topsoil Depth (SP) FINE SAN	[4.00°] ND, Gray, Moist	, Very Loose			1 1	⊗-2				
_					(SP) FINE SAN	ND, Orange, Mo	nist Verv Loos	e to	_ 20	2					
	S-2	ss	24	24			701, VOIY 2000			3 4	7-📎				
S-2 SS 24 24 Medium Dense 5—S-3 SS 24 24										4	_1.6				
5— S-3 SS 24 24 —————————————————————————————————									_	4 5 5	● 9-⊗				
_	_									5 4					
	S-4	SS	24	24					15	5	9-8				
_	9.5	99	24	24					_	6 6	12:				
10 —	3-3			24						6 7	120				
_															
_									- 10						
_									10						
	S-6	SS	18	18					_	3 4	10-⊗				
15 —										6	\setminus				
_									_						
_						ND, Gray, Moist	to Wet, Mediu	ım	5						
_					Dense					5					
20	S-7	SS	18	18						6 9	15-⊗				
									_						
_											\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	\			
_												\			
_	S-8	SS	18	18						7 10	2	1			
25 —									_	11		Ţ			
									_						
_									<u>-</u> -5						
_									_	7					
S-9 SS 18 18										9	20	-♦			
30 —									<u></u>					<u> </u>	
										CC	ONTINUE	DO	N NEX	TPA	GE.
	TH	E STR	ATIFI	CATION	LINES REPRESENT	THE APPROXIMAT	E BOUNDARY LIN	IES BETWEE	N SOIL TYP	ES. IN-	SITU THE TRANS	SITION N	MAY BE GRAI	DUAL.	
≟ WL				ws□	WD⊠	BORING STARTE	D 01/17/	17		CAVI	E IN DEPTH				
₩ WL(S	HW)		<u>=</u>	WL(AC	CR)	BORING COMPLE	O1/18/	17		НАМ	MER TYPE Auto)			
₩ wL						RIG ATV	FORE	MAN D. Fra	ancis	DRIL	LING METHOD S	SPT			

CLIENT							JOB#		BORING #	ŧ		SHEET	-		
Florida PROJECT	a Inla	and_	Na	vigat	ion District		248 ARCHITECT	342 -ENGINEER	l	B-5		2 OF	4	:	8
Dredg SITE LOCA	ed N	<u>/late</u>	<u>rial</u>	Mar	nagement Are	a M-8	Taylor I	Enginee	ring, In	<u>C.</u>		CALIBR	ATED PEN	ECS Gro	oup of Companies TONS/FT2
South	Indi	an F	Rive	er Dri	ve, St. Lucie	County, FL						1	2	3 .	4 5+
NORTHING	G			EASTIN	IG I	STATION						RQD%	—— -		& RECOVERY
										-		20%	40%	60% 80	0% 100%
	o.	YPE	IST. (IN)	(IN)	DESCRIPTION OF M BOTTOM OF CASING		LOSS OF C	ENGLISH		N (FT)		PLASTIC LIMIT %		NATER NTENT %	LIQUID LIMIT %
DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	SURFACE ELEVATION				WATER LEVELS	ELEVATION (FT)	BLOWS/6"	⊗st	ANDARI BL	D PENETRAT OWS/FT	ΓΙΟΝ
	Ŋ	Ŋ	Ŋ	<u> </u>		ND, Gray, Moist	to Wet, M	edium	<u> </u>	Ξ	ā	10	20	30 4	0 50+
					Dense					-10					
	S-10	SS	18	18					<u> </u>		7 10		23-⊗		
35 —	3-10	33	10	10							13	•	23 %		
									_						
					(SP) FINE SAN Dense	ND, Dark Gray,	Wet, Medi	um		-15					
	S-11	SS	18	18					_		4 4 4	8-⊗			
40											4				
					(SP) FINE SAN	ND, Gray, Wet,	Loose to D	lense		-20					
					Contains Shell	Fragments	20000 10 2	01100,	_		17				44
45	S-12	SS	18	18					_		21 23			,	×
										-25					
	S-13	SS	18	18							9 10	17−⊗			
50 —									_		7				
									_	00					
									_	-30					
55	S-14	SS	18	18					_		5 3 3	6-8 23	3.4−●		
						SAND WITH S				-35					
	Q 15	99	1Ω	10	Medium Dense	e, Contains She	II Fragmen	its			9 14		27-0	>	
S-15 SS 18 18 60											13		21	У .	
													/_	\	TDAGE
	T1 15	OTD:	A T I C ! *	OATIO*	LUNES DEDDESCRIT	THE ADDDOVIMAT	E DOLINIO A CV	/ I INICO DET	WEEN OO''	TVD		NTINUE			
₩L	iHt	51K/	-\ I I I I (ws 🗌	I LINES REPRESENT WD ⊠	BORING STARTE		17/17	VVEEN SUII	LITPE		SITU THE TRANS	III ON M	AT BE GHAL	JUAL.
₩ WL(SH	HW)		<u>_</u>	WL(AC		BORING COMPLE		18/17		+		MER TYPE Auto)		
₩ WL				•		RIG ATV		REMAN D.	Francis	+		LING METHOD S			

CLIENT							JOB#		BORING	#		SHEET		
Florid	a Inla	and_	Na	vigat	ion District		2484 ARCHITECT-EI	2 NGINEER		B-5		3 OF 4		4
Dredo	ged N	<u>/late</u>	rial	Man	agement Are	a M-8	Taylor Er	ngineer	ring, Ir	nc.		CALIBRATED PE	ECS Group of	
Courth	المطا	an F):	~ D~	va Ct Lucia	County El						1 2	3 4	5,+
NORTHIN	I IIIQI IG	<u>an r</u>	ive 	EASTIN	ve, St. Lucie	STATION STATION						ROCK QUALITY DE RQD% ——		COVERY
												20% 40%	60% 80%	100%
			<u> </u>		DESCRIPTION OF M	IATERIAL	- I	ENGLISH U	I			PLASTIC	WATER	LIQUID
	o	YPE	SAMPLE DIST. (IN)	RECOVERY (IN)	BOTTOM OF CASING	a T	LOSS OF CIR	CLII ATION	1 21002				NTENT %	LIMIT %
H (F)	Z 빌	'LE T	LE D	VER			2000 01 0111	OOLATION		ATIO	9/S/		D PENETRATION	
ОЕРТН (FT)	SAMPLE NO	SAMPLE TYPE	SAMF	RECC	SURFACE ELEVATION	DN 22.34			T MOX	WALLEN LEVELS ELEVATION (FT)	BLOWS/6"	10 20	_OWS/FT 30 40	50+
						SAND WITH S						<u> </u>	30	
_	1				Medium Dense	e, Contains She	ıı Fragments			- -40		/		
_	S-16	99	18	18						_	6 7	20-		
65 —	0-10		10	10							13	200		
_										_				
_										- -45				
										-				
-	S-17	ss	18	18						_	6 7	1.4-🛇		
70 —										_	7			
_										_				
_										50				
_										_		\		
_	S-18	ss	18	18						-	7 10	21-🕸		
75 —										_	11			
_	1									_				
_	1									55				
_										_	13			
	S-19	SS	18	18						-	9	19-⊗		
80 —										-				
_										-				
_					(SP-SM) FINE	SAND WITH S e, Contains Cen	ILT, Gray, W	et,		- -60				
_					Fragments	o, comanio con	nontoa oana			-	7			
85 —	S-20	SS	18	18						-	8 9	17-⊗		
	1									_				
_	1				(00.01) 50.15	0.4115.14471.1.0				-		\		
_					(SP-SM) FINE Medium Dense	SAND WITH S to Dense, Cor	ILI, Ian, We Itains Cemer	t, ited		- -65		\		
_	S-21	SS	18	18	Sand Fragmer					_	9	13.8-● ⊗-20		
90 —	3-21	33	10	10				ļ		_	11	13.8 🛡 🛇 20		
_	1									_				
	1							ı				<u> </u>		
											CC	NTINUED O	N NEXT	PAGE.
	THE	STRA	ATIFIC	CATION	I LINES REPRESENT	THE APPROXIMAT	E BOUNDARY L	INES BET\	WEEN SO	IL TYP	ES. IN-	SITU THE TRANSITION M	IAY BE GRADUA	L.
≟ Mr				ws□	WD⊠	BORING STARTE	D 01/17	7/17			CAVE	IN DEPTH		
₩ WL(S	HW)		<u>*</u>	WL(AC		BORING COMPLE	TED 01/18	3/17			HAMN	MER TYPE Auto		
₩L						RIG ATV	FORE	MAN D.	Francis	, [DRILL	ING METHOD SPT		

CLIENT	JOB#	BORING #	SHEET	
Florida Inland Navigation District	24842 ARCHITECT-ENGINE	B-5	4 OF 4	-8/
Dredged Material Management Area M-8	3 Taylor Engin	eering, Inc.	CALIBRATED PEI	ECS Group of Companies NETROMETER TONS/FT2
South Indian River Drive St. Lucie Coun	tv Fl		1 2	3 4 5+
South Indian River Drive, St. Lucie Coun	i, . =		ROCK QUALITY DE RQD% ——	SIGNATION & RECOVERY - REC.% ———
DESCRIPTION OF MATERIA	5000		20% 40%	60% 80% 100%
\(\\ \) \(\)		SH UNITS (E)	LIMIT % CO	WATER LIQUID NTENT %
(£ S E S E BOTTOM OF CASING ■ BOTTOM O	LOSS OF CIRCULA	TION (X001/NOI)	X CTANDAD	
SA SA DE	2.34	WATER LEVELS ELEVATION (FT)	STANDAR BL 10 20	D PENETRATION LOWS/FT 30 40 50+
— Medium Dense to De	WITH SILT, Tan, Wet, nse, Contains Cemented	-70	\	
S-22 SS 18 18 Sand Fragments		1:	5 3	0⊗
95 —			5	
3				
(CH) SANDY FAT CI	AY, Gray, Moist, Very Stif	-75		
S-23 SS 18 18 (SM) SILTY FINE SA	ND, Gray, Wet, Medium	4	5	
100 Dense, Contains She END OF BORING @	II Fragments 100'		Ĭ	
		-80		
105—				
3				
		-85		
110 —				
3				
		-90		
115—				
]]				
3				
120 —				
=				
		-100		
THE STRATIFICATION LINES REPRESENT THE AP	PROXIMATE BOUNDARY LINES IG STARTED 01/17/17		IN-SITU THE TRANSITION N	AY BE GRADUAL.
WIIV -	IG COMPLETED 01/18/17		AMMER TYPE Auto	
₩ WL RIG A			RILLING METHOD SPT	

CLIENT							JOB#	BOR	RING #		SHE	ET			
Florida PROJECT	a Inl	and	Na	vigat	ion District		24842 ARCHITECT-ENGII	NEER	B-6		10	F 4	:	&	
Dredg SITE LOC	ed N	/late	<u>rial</u>	Mar	nagement Are	a M-8	Taylor Engi	neering	ı, Inc.		CAL	IBRATED PE	ECS Gro	oup of Compar	nies
South	Indi	an E	Dive	r Dri	vo St Lucio	County El					11	2	3	4 5	+
NORTHIN	G	<u> </u>	live	EASTIN	ve, St. Lucie	STATION STATION					ROCK Q RQD%		SIGNATION REC.%		ERY -
											20%	40%			0%
			(N		DESCRIPTION OF M	IATERIAL	ENG	LISH UNITS			PLASTIC		WATER		.IQUID
F	ġ.	ΓΥΡΕ	SAMPLE DIST. (IN)	RECOVERY (IN)	BOTTOM OF CASING	g 🔀	LOSS OF CIRCUL	ATION ∑100%	WATER LEVELS ELEVATION (FT)		LIMIT %	CC	ONTENT %	LI	IMIT % ─∕\
ОЕРТН (FT)	SAMPLE NO.	SAMPLE TYPE	IPLE I	OVEF	SURFACE ELEVATION	ON 34.98			'ERL	BLOWS/6"	\otimes	STANDAR	D PENETRA	ΓΙΟΝ	
	SAN	SAN	SAN	REC				1111 2111	WAJ	_	10	20	LOWS/FT	10 5	0+
0	S-1	SS	24	24	(SP) FINE SAN	ND, Light Gray,	Moist, Very Loo	se	_	1 WOH	⊗ −1				
_									_	1 1					
_	S-2	ss	24	24					<u> </u>	1	⊗ –3				
_										2 2 2					
5—	S-3	SS	24	24					30	3 2	5-🛇				
_									_	4					
_	S-4	SS	24	24					<u>-</u>	4 6 6	10-⊗				
	0.5		0.4		(SP) FINE SAN Medium Dense	ND, Orange Bro	wn, Moist,		-	6 10		25	5		
10	S-5	SS	24	24	Medium Dense)			25	15 10			,		
_									_						
_									_			/			
_	S-6	ss	18	18					_	6 9	1.5	3-⊗			
15 —			-10	"					20	9					
_															
_															
_									_						
_	S-7	SS	18	18						6 10 10		20-🛇			
20 —									15 -						
_															
_															
_	S-8	SS	18	18						6 6	10				
25 —	3-0		10	10					10	12	10	3-⊗			
_									<u> </u>						
					(SP) FINE SAN	ND, Light Brown	. Wet Medium	101111							
_					Dense to Dens		i, rrot, modium								
_	S-9	SS	18	18					_	6 9	1	9-⊗			
30 —									5	10					
										CC	UNITNO	ED O	N NEX	T PA	GE.
	TH	E STR	ATIFI	CATION	LINES REPRESENT	THE APPROXIMAT	E BOUNDARY LINES	S BETWEEN	N SOIL TYP	ES. IN-	SITU THE TRA	NSITION N	MAY BE GRAI	DUAL.	
Ţ WL				ws□	WD⊠	BORING STARTE	D 01/23/17	7		CAVE	E IN DEPTH				
₩ WL(S	HW)		<u>*</u>	WL(AC		BORING COMPLE	TED 01/25/17	,		HAMI	MER TYPE M	anual			
₩ wL						RIG ATV	FOREMA	N D. Reg	ister	DRIL	LING METHOD	SPT			

CLIENT							JOB#	ВО	RING #		SHEET		
Florida PROJECT	a Inla	and_	Na	vigat	ion District		24842 ARCHITECT-ENG	NEER	B-6		2 OF 4	┦┪	8.
Dredg	ed N	/late	rial	Mar	agement Are	a M-8	Taylor Eng	neerin	g, Inc.		CALIBRATED PE	ECS Group	of Companies
											1 2	3 4	5+
NORTHIN	G G	<u>an r</u>	TIVE	EASTIN	ve, St. Lucie	STATION					ROCK QUALITY DE RQD% ——	ESIGNATION & F	ECOVERY
											20% 40%	60% 80%	100%
			<u>Z</u>	9	DESCRIPTION OF M	IATERIAL	ENG	GLISH UNIT				WATER	LIQUID
Œ.	ON	TYPE	DIST.	ERY (II	BOTTOM OF CASING	g 👅	LOSS OF CIRCU	LATION 🔀	LEVEL (F	9	LIMIT % CO	ONTENT %	LIMIT %
БЕРТН (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	SURFACE ELEVATION	ON 34.98			WATER LEVELS ELEVATION (FT)	BLOWS/6"	⊗STANDAF B 10 20	RD PENETRATIO LOWS/FT 30 40	N 50+
					(SP) FINE SAN Dense to Dens	ND, Light Brown	n, Wet, Medium		_				
												\	
_	S-10	SS	18	18					_	10 12	28	<u>\</u>	
35 —	5-10			10					<u> </u>	16	20		
_													
										10			
40	S-11	SS	18	18					-5	20 18		38-⊗	
									_				
	S-12	ss	18	18					_	5 9 11	20-⊗		
45 —									-10	''			
_					(SP) FINE SAN Medium Dense	ND, Brown, Wet	t, Very Loose to						
	S-13	SS	18	18					<u> </u>	3 7	15-⊗		
50	- 10								-15	8			
									_				
										4			
55 —	S-14	SS	18	18					-20	8 8	16-⊗		
	S-15	ss	18	18					<u></u>	2 6 9	15-⊗		
60 —									-25	9			
		I		ı				<u> :::::</u>			DNTINUED O	N NEVT	DAGE
	TUI	CTD.	ΔΤΙΕΙ	CATION	I I INES DEDDESENT	THE APPROVIMAT	E BOLINDADA LIVIE	Q RETME	EN SOIL TVD		SITU THE TRANSITION N		
₩L	1111	_ 31 H/		ws 🗌		BORING STARTE			LIN SOIL I YP		E IN DEPTH	VIAT DE GRADU	٦٤.
₩ WL(SH	HW)			WL(AC		BORING COMPLE					MER TYPE Manual		
Ţ WL					•	RIG ATV		N D. Re	egister		LING METHOD SPT		

CLIENT							JOB#	BOF	RING #		SHEET	-		
Florid PROJECT	a Inl	and	Na	vigat	ion District		24842 ARCHITECT-ENG	NEER	B-6		3 OF	4	=	8.
Dredo	ged N	<u>Mate</u>	<u>rial</u>	Mar	agement Are	a M-8	Taylor Eng	ineering	ı, Inc.		CALIBR	ATED PEN	ECS Group	of Companies
South	ı Indi	an F	Rive	er Dri	ve, St. Lucie	County, FL					1 POOK OUA	2 UTV DE	3 4 SIGNATION &	5 ₊
NORTHIN	NG			EASTIN	IG	STATION					ROCK QUA RQD%	—— -		
											20%	40%	60% 80%	100%
		ш	<u> </u>	Î	DESCRIPTION OF M	IATERIAL	EN	GLISH UNITS			PLASTIC LIMIT %		WATER NTENT %	LIQUID LIMIT %
(FT)	E NO.	ETYP	E DIS	ERY (BOTTOM OF CASING	G 🗶	LOSS OF CIRCU	LATION M	LEVE	9/	*		•	
ОЕРТН (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	SURFACE ELEVATION				WATER LEVELS ELEVATION (FT)	BLOWS/6"	⊗ST 10	ANDARI BL 20	D PENETRATIO LOWS/FT 30 40	ON 50+
					(SP) FINE SAN Medium Dense	ND, Brown, Wet	, Very Loose to							
_										2				
65—	S-16	SS	18	18					-30	2 1 1	⊗-2			
_														
_	-					ND, Gray, Wet,	Medium Dense	,	_					
_					Contains Shell	Fragments			E	10				
70 —	S-17	SS	18	18					_ 35	14 16		3	0	
_														
_					(SP) FINE SAN	ND, Gray, Wet,	Medium Dense	to	-					
	S-18		18	10	very Dense, w	loderate Cemer	itation		E	20 26				50
75 —	3-10	33	10	18					-40	30				56-⊗
_	1								<u> -</u>					
-	S-19	SS	18	18						14 12		\otimes		
80 —									-45 -	9	2	1		
_	1								_			\	\	
-	S-20	SS	18	18						9 14 14		28-	\Diamond	
85 									-50					
_									<u> </u>					
_														
90—	S-21	SS	18	18					 55	14 18 14			32-	
90 —									-55					
_	1										\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	<u> </u>	/	- DAG=
											NTINUE			
₩L	THI	E STR/	ATIFIC	WS	I LINES REPRESENT WD ⊠	THE APPROXIMAT BORING STARTE			N SOIL TYF		SITU THE TRANS IN DEPTH	SITION M	IAY BE GRADU	IAL.
₩L(S	SHW)		<u>_</u>	WL(AC		BORING COMPLE					MER TYPE Man	ual		
<u></u> ₩L	-,		=	=,,	,	RIG ATV		N D. Reg	gister		LING METHOD S			

CLIENT							JOB#		BORING #		SHEET		
Florida PROJECT N	Inla	and_	Nav	vigat	ion District		ARCHIT	24842 ECT-ENGINEER	B-6	6	4 OF 4	┦┦₹	
Dredge SITE LOCA	ed N	<u>1ate</u>	<u>rial</u>	Mar	nagement Are	ea M-8	Taylo	or Enginee	ring, Inc.		CALIBRATED F	ECS Group o	of Companies
South I	India	an F	Rive	r Dri	ve, St. Lucie	County, FL					1 2	3 4	5 ₊
NORTHING	ì		Ī	EASTIN	NG	STATION					ROCK QUALITY D	- REC.% -	——
					DECODIDATION OF A	4ATEDIAL			1		20% 40%	60% 80%	100%
	o	YPE	IST. (IN)	(SE)	DESCRIPTION OF I		1.099.1	ENGLISH OF CIRCULATIO			PLASTIC LIMIT % C	WATER ONTENT %	LIQUID LIMIT %
ОЕРТН (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	SURFACE ELEVATI		2000	OI OINOCLATIO	WATER LEVELS	BLOWS/6"		RD PENETRATION	
	SA	SA	SA	W		ND, Gray, Wet,		n Dense to	× I	B	10 20	30 40	50+
	2 00	00		10	Very Dense, N	Moderate Cemer	ntation			6			
95	5-22	SS	18	18					-60	13 8	21 🛇		
											\	\	
										10			
100	S-23	ss	18	18					-65	12 17 14		31 🛇	
					END OF BOR	ING @ 100'			<u> </u>				
105 —									-70				
									<u> </u>				
110 —													
									<u> </u>				
115 —									-80				
IЗ													
									<u> </u>				
									_				
120 —													
		I			I				L	I			
	THE	STRA	ATIFIC	CATION	I LINES REPRESEN	T THE APPROXIMAT	E BOUNI	DARY LINES BET	WEEN SOIL TY	PES. IN-	SITU THE TRANSITION	MAY BE GRADUA	AL.
₩L				ws 🗌		BORING STARTE		01/23/17	· · · · · ·		E IN DEPTH		
₩ WL(SH\	W)		<u>*</u>	WL(AC	CR)	BORING COMPLE	ETED	01/25/17		НАМ	MER TYPE Manual		
₩ WL						RIG ATV		FOREMAN D.	Register	DRIL	LING METHOD SPT		

CLIENT							JOB#	BORING #		SHEE	Т		
Florida	Inla	and	Nα	/igat	ion District		24842	B-7		1 OF	1		E
PROJECT N	NAME						ARCHITECT-ENGINEER						
Dredge SITE LOCA	ed N	<u>late</u>	<u>rial</u>	Mar	agement Area	a M-8	Taylor Enginee	ring, Inc.	1	CALIB	RATED PEN	ECS Group o	of Companies
										1	2	3 4	5+
NORTHING	iriai	<u>a 11 F</u>	nive I	EASTIN	ve, St. Lucie (STATION TL				ROCK QUA	ALITY DE	SIGNATION & FI • REC.% -	ECOVERY
										20%	40%	60% 80%	100%
			<u> </u>	a final section	DESCRIPTION OF M	ATERIAL	ENGLISH	I		PLASTIC		WATER	LIQUID
F.	ġ.	TYPE	DIST.	RY (II)	BOTTOM OF CASING	a T	LOSS OF CIRCULATION	N EVER (XXXXX		LIMIT %	CO	NTENT %	LIMIT %
ОЕРТН (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	SURFACE ELEVATION	ON 31.75		WATER LEVELS ELEVATION (FT)	BLOWS/6"	⊗s	TANDARI BL	D PENETRATIO .OWS/FT	N
0	SA	SA	SA	쀭	(SD) FINIE SAN	JD Light Gray	Moist, Very Loose		1	10 :	20	30 40	50+ :
	S-1	ss	24	24	to Loose	ND, Light Gray,	Worst, very Loose	_	1 1	⊗ -2			
	D4S		60					30	1 2	1.5			
	S-2	SS	24	24					1 2 3	⊗ –3			
		00	0.4	0.4					3 2	1.5			
5—\(\frac{3}{2}\)	S-3	SS	24	24				-	3	Ø ⊗-6			
	S-4	ss	24	24				25	4 4 6	10			
					(SP) FINE SAN	JD Orange Bro	wn, Moist, Loose		5 4				
	S-5	ss	24	24	to Medium Der		WII, MOIST, LOOSE		8 7	15->			
10									6				
								20					
	04S- 286		60							●-2.9			
								_	4				
15	S-6	SS	18	18					5 5	10-⊗			
					END OF BORI	NG @ 15'							
								15					
								_					
								E					
20 —								_					
								10					
								<u> </u>					
25 —								_					
								_					
								5					
								E					
30 —								F	1 L				
	THE	STRA	ATIFIC	CATION	I LINES REPRESENT	THE APPROXIMAT	E BOUNDARY LINES BET	WEEN SOIL TYP	PES. IN-S	SITU THE TRAN	SITION M	IAY BE GRADUA	AL.
₩L N	IE			ws□	WD⊠	BORING STARTE	D 01/24/17		CAVE	IN DEPTH			
₩ WL(SH\	W)		<u>*</u>	WL(AC	FR)	BORING COMPLE	ETED 01/24/17		HAMM	IER TYPE Mai	nual		
₩ WL						RIG ATV	FOREMAN D.	Register	DRILL	ING METHOD	SPT		

CLIENT							JOB#	-	BORING #			SHEET		
Florida PROJECT	a Inl	and	Na	vigat	ion District		2484 ARCHITECT-E	12 NGINEER	B-8	3	1	OF 1	│	8.
Dredg SITE LOCA	ed N	/late	<u>rial</u>	Mar	agement Are	ea M-8	Taylor E	ngineeri	ing, Inc.		-0-		NETROMETER TO	of Companies
South	Indi	an F	Rive	r Dri	ve, St. Lucie	County, FL					1 ROC	2 K QUALITY DE	3 4 ESIGNATION & I	5 ₊ + RECOVERY
NORTHIN	G			EASTIN	lG	STATION						QD% —		
			<u> </u>		DESCRIPTION OF N	MATERIAL		ENGLISH U			PLAS ⁻	'	WATER	LIQUID
F.	ON	TYPE	DIST. (NI) YE	BOTTOM OF CASIN	ig 🔀	LOSS OF CIF	RCULATION	EVELS		LIMIT *	% CC	ONTENT %	LIMIT %
ОЕРТН (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	SURFACE ELEVATI	on 27.05			WATER LEVELS ELEVATION (FT)	BLOWS/6"	10	В	RD PENETRATION LOWS/FT 30 40	DN 50+
0	S-1	SS	24	24	(SP) FINE SA to Medium De	ND, Light Gray, nse	Moist, Very	Loose		1 1 1	⊘ -2	20	30 40	50+
	D4S S-2	SS	60 24	24					25	1 WOH 2	0.2 ⊗–2			
5—	∖S-3	SS	24	24				::		2 2 3 3	6-⊗			
	S-4	SS	24	24					20	4 6 5 7	12	⊗		
	S-5	SS	24	24						6 7 8		17		
10				24						9 8				
					(SD) FINE SA	ND, Orange Bro	wa Moiet		15					
					Medium Dens		JWII, IVIOISI,			3				
15	S-6	SS	18	18	END OF DOD	INIO O 151				8 7	1	5-⊗		
					END OF BOR	ING @ 15								
									10					
									_					
20 —														
									<u> </u>					
_									_					
25 —														
									0					
									-					
30 —														
				1	ı			ı	⊢	1		·	<u> </u>	:
		E STR	ATIFI	CATION	I LINES REPRESENT	THE APPROXIMAT	E BOUNDARY I	LINES BETW	VEEN SOIL TY	PES. IN-	SITU THE	TRANSITION I	MAY BE GRADU	AL.
<u></u> ₩L 1				ws 🗌		BORING STARTE					E IN DEPTH			
₩ WL(SH	HW)		<u>*</u>	WL(AC	FR)	BORING COMPLE						Manual		
≟ Mr						RIG ATV	FOR	EMAN D. F	Register	DRIL	LING METH	HOD SPT		

CLIENT							JOB#	BOR	ING #		SHEET	Γ			
Florid	a Inl	and	Na	vigat	ion District		24842 ARCHITECT-ENGIN	IEER	B-9		1 OF	4	:	- &//	
Dredo	ed N	<u>//ate</u>	rial	Mar	nagement Are	a M-8	Taylor Engir	neering	, Inc.		CALIBE	ATED PE	ECS G	roup of Compa	anies
											1	2	3		5,+
NORTHIN	II IUI IG	<u> </u>	nive	EASTIN	ve, St. Lucie	STATION TL					ROCK QUA RQD%	LITY DE	SIGNATION - REC.%		ERY
												40%			00%
			<u> </u>	Î	DESCRIPTION OF M	ATERIAL	ENGL	LISH UNITS			PLASTIC LIMIT %		WATER ONTENT %		LIQUID .IMIT %
(FT)	NO.	: TYPE	: DIST	ERY (I	BOTTOM OF CASING	a 🔃	LOSS OF CIRCULA	ATION M	LEVE ION (F	<u>"</u> 9	*		• · · · · · · · · · · · · · · · · · · ·		
ОЕРТН (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	SURFACE ELEVATION	DN 22.36			WATER LEVELS ELEVATION (FT)	BLOWS/6"	⊗sī	TANDAR Bl	D PENETRA _OWS/FT	TION	
0 _	/S	/S	Ś	<u> </u>	Topsoil Depth	[6.00"]			≥ <u>iii</u>	1	10	20	30	40 5	50+ :
_	S-1	SS	24	24			, Very Loose to		<u> -</u>	WOH 2 1	⊗ -2				
_	S-2	SS	24	24	20030				20	1	5				
_	3-2	33	24	24					₽	3 3	3-0				
5 —	S-3	SS	24	24					E	3 3 3	6-⊗				
					(SP) FINE SAN	ND, Orange Bro	wn, Moist, Loose		‡	4 5					
_	S-4	SS	24	24	to Medium Der				15	6 7 6	13-🛇				
	S-5	SS	18	18					<u> </u>	8 7	15				
10 —									E	8					
_									E						
_									10		/				
_										2					
15 —	S-6	SS	18	18					<u> -</u>	3 5	8-⊗				
_									E		<u> </u>				
					(SP) FINE SAN	ND, Light Brown	n, Moist to Wet,		<u> -</u> 5						
_					Medium Dense				-	6					
20	S-7	SS	18	18						8	16-🛇				
											\	1			
_												\			
_									<u> </u>			Ì			
	S-8	SS	18	18						10 10 11	21	1-📎			
25 —									_						
_									F						
_									E-5						
_	S-9	SS	18	18					<u> </u>	6 8 9	17-8)			
30 —										9		\			
										CC	ONTINUE	DO	N NEX	(T PA	GE.
	TH	E STR	ATIFIC	CATION	LINES REPRESENT	THE APPROXIMAT	E BOUNDARY LINES	BETWEEN	SOIL TYP	ES. IN-	SITU THE TRANS	SITION M	MAY BE GRA	DUAL.	
≟ Mr				ws□		BORING STARTE	D 01/30/17			CAVE	E IN DEPTH				
₩ WL(S	HW)		<u>*</u>	WL(AC	CR)	BORING COMPLE	TED 01/31/17			HAM	MER TYPE Man	ıual			
₩ wL						RIG ATV	FOREMAN	N D. Reg	ister	DRIL	LING METHOD S	SPT			

CLIENT							JOB#	[1	BORING #		SHEET		
Florida PROJECT N	Inla	and_	Na	vigat	ion District		2484 ARCHITECT-EI	2 NGINEER	B-9)	2 OF 4	┤┃ ╛	8.
Dredge SITE LOCA	ed N	<u>late</u>	rial	Mar	nagement Are	a M-8	Taylor Er	gineer	ing, Inc.			ECS Group	
South I	India	an F	Rive	r Dri	ve, St. Lucie	County, FL					1 2 ROCK QUALITY D	3 4	5 ₊ +
NORTHING	à			EASTIN	NG I	STATION					RQD% ——	- REC.% -	HECOVERY
											20% 40%	60% 80%	100%
	ō.	YPE	IST. (IN)	(II)	DESCRIPTION OF M BOTTOM OF CASING		LOSS OF CIR	ENGLISH U			PLASTIC LIMIT % C	WATER ONTENT %	LIQUID LIMIT %
ОЕРТН (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	SURFACE ELEVATION				WATER LEVELS	BLOWS/6"	⊗ STANDA	RD PENETRATION	DN
	S	S	S	-		ND, Light Brown	n, Moist to We	et,	<u></u>	В	10 20	30 40	50+
					Medium Dense	9			-10				
										8			
35	S-10	SS	18	18					<u> </u>	12 16	2	3-⊗	
											/	/	
									— —-15				
										6			
40	S-11	SS	18	18						8 9	17−⊗		
-													
						ND, Gray Brown	ı, Wet, Mediu	m	-20				
					Dense					4			
45	S-12	SS	18	18						5 7	12+🛇		
					(SP-SM) FINE	SAND WITH S	ILT, Gray, W	et,	-25				
					Fragments	e to Very Dense	,, Contains S	nell	<u> </u>	24 37			67
50	S-13	SS	18	18						37 30			× /
									_				
									-30				
	244	00		10					<u> </u>	21		40.6	
55	S-14	55	18	18						20 22		42-0	У
									-35				
	S-15	00	18	18					<u> </u>	10 11	22-⊗		
60	3-13	33	10	10						11	22 0		
-										1 1		\	
										CC	ONTINUED C	N NEXT	PAGE.
	THE	STR	ATIFIC			THE APPROXIMAT			VEEN SOIL TY	PES. IN-	SITU THE TRANSITION	MAY BE GRADU	AL.
ÿ WL				ws		BORING STARTE	D 01/30	/17		CAVE	E IN DEPTH		
₩ WL(SH)	W)		<u>=</u>	WL(AC	CR)	BORING COMPLE	TED 01/31	/17		HAM	MER TYPE Manual		
₩ WL						RIG ATV	FORE	MAN D. F	Register	DRILI	LING METHOD SPT		

CLIENT							JOB#		BORII	NG#		SHEET		
Florid PROJECT	la Inla	and_	Na	vigat	ion District		ARCH	24842 ITECT-ENGINEE	R	B-9		3 OF 4	8	4
Dredo	ged N	<u>/late</u>	<u>rial</u>	Mar	agement Are	ea M-8	Tay	lor Engine	ering,	Inc.	ı	CALIBRATED PE	ECS Group of	
South	. Indi	an F	Rive	ır Dri	va St Lucia	County El						1 2	3 4	5,+
NORTHIN	NG	<u> </u>	1100	EASTIN	ve, St. Lucie	STATION						ROCK QUALITY DE RQD% ——		COVERY
												20% 40%	60% 80%	100%
			<u> </u>	9	DESCRIPTION OF I	MATERIAL		ENGLISI	H UNITS	.S. (T			WATER	LIQUID LIMIT %
Ē	o S	TYPE	DIST	IRY (II	BOTTOM OF CASIN	IG 🔀	LOSS	OF CIRCULATION	ON ∑100%	EVEL	-0	LIMIT % CC	ONTENT %	
ОЕРТН (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	SURFACE ELEVATI	on 22.36				WATER LEVELS ELEVATION (FT)	BLOWS/6"	⊗STANDAR BI 10 20	D PENETRATION LOWS/FT 30 40	J 50+
_					(SP-SM) FINE	SAND WITH Se to Very Dense	SILT, G	iray, Wet,						
_					\Fragments	-		/						
_	S-16	ss	18	18	Loose to Dens	SAND WITH Se, Moderate Ce	ementa	iray, vvet, ation			10 13		32-&	
65 —										_	19			
_	1									_				
_	1													
										_	10			
70 —	S-17	SS	18	18						_	17 35			52-⊗
_										_				
-										 50				
-										_				
-	S-18	ss	18	18						_	20 11			
75 —										-	10	21		
_	1									_				
														
_										_	4			
80 —	S-19	SS	18	18						_	3 7	10		
_										_				
-	1									-60				
										_				
_	S-20	ss	18	18						<u> </u>	8 8	18-⊗		
85 —										_	10	\		
_	1									_		\		
]											\setminus		
_	0.04	00	40	10						_	9			
90 —	S-21	SS	18	18						_	13 11	24-⊗	\	
_														
	1			1						L	1 L		<u> </u>	
		. 0.7.5	\ T.F.	3AT/3:	LLINEO DEDOSOS	THE ADDROV	TE DO: "	ID A DV LINES	-T.A.F	00" 7"		ONTINUED O		
V	THE	STRA							IWEEN	SOIL TYP		SITU THE TRANSITION N	JIAY BE GRADUA	L.
∰ Mr				ws 🗌		BORING STARTE		01/30/17				IN DEPTH		
₩ WL(S	SHW)		<u>=</u>	WL(AC	R)	BORING COMPLE	ETED	01/31/17			HAM	MER TYPE Manual		
₹ wL						RIG ATV		FOREMAN [). Regi	ster	DRILL	ING METHOD SPT		

CLIENT							JOB#	BC	ORING#		SHEET		
Florida PROJECT	a Inla	and_	Nav	<u>vigat</u>	ion District		24842 ARCHITECT-ENG	SINEER	B-9		4 OF 4		3/4
Dredg SITE LOCA	ed N	<u>1ate</u>	<u>rial</u>	Man	nagement Are	ea M-8	Taylor Eng	<u>iineerin</u>	ıg, Inc.		CALIBRATED F	ECS Group of	
South	Indi	an F	Rive	r Dri	ve, St. Lucie	County, FL					1 2 BOCK OHALITY D	3 4 ESIGNATION & RI	5 ₊ +
NORTHING	G			EASTIN	NG	STATION					RQD% ——	- REC.% —	
			<u> </u>		DESCRIPTION OF I	MATERIAL	EN	IGLISH UNI	TS	1	20% 40% PLASTIC	60% 80%	100%
(£	Ö.	TYPE	DIST. (II	RY (IN)	BOTTOM OF CASIN	IG 🔀	LOSS OF CIRCU	JLATION 🔀	EVELS ON (FT)		PLASTIC LIMIT % C	WATER ONTENT %	LIQUID LIMIT %
ОЕРТН (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	SURFACE ELEVATI	on 22.36			WATER LEVELS ELEVATION (FT)	BLOWS/6"	⊗STANDA	RD PENETRATION BLOWS/FT 30 40	N 50+
				_		SAND WITH S se, Moderate Ce		,	-70		10 20	30 40	50+
	S-22	ss	18	18						18 15 21		36	
95 —													
					(SM) SILTY F Dense	INE SAND, Gray	y, Wet, Mediun	า	-75				
	S-23	SS	18	18	Dense					4	21 🛇		
100					END OF BOR	ING @ 100'				15			
									-80				
105													
									_				
110													
_													
									-90				
115—													
120 —									_				
									-100				
¥ WL	THE	STRA		ws 🗌		BORING STARTE			EN SOIL TYF		SITU THE TRANSITION IN DEPTH	MAY BE GRADUA	L.
₩ WL(SH	HW)			WL(AC		BORING COMPLE					MER TYPE Manual		
₩L						RIG ATV	FOREM	IAN D. Re	egister	DRIL	LING METHOD SPT		

CLIENT							JOB#	BOF	RING#		SHEE	Т			
Florida PROJECT	a Inl	and	Na	vigat	ion District		24842 ARCHITECT-ENG	INEER	B-10)	1 OF	4	:	- &./	
Dredg SITE LOC	ed N	<u>Mate</u>	<u>erial</u>	Mar	agement Are	a M-8	Taylor Eng	ineering	g, Inc.		CALIB		NETROMETER	Group of Comp	!
South	Indi	an F	Rive	r Dri	ve, St. Lucie	County, FL					POCK OU	2 ALITY DE	3 SIGNATION	4 1 0 DECO	5+ VEDV
NORTHIN	G			EASTIN	IG	STATION					RQD%				<u>-</u>
											20%	40%	60%	80% 1	00%
(Ö	YPE	SAMPLE DIST. (IN)	(NE)	DESCRIPTION OF M BOTTOM OF CASING		EN LOSS OF CIRCU	GLISH UNIT			PLASTIC LIMIT %		WATER INTENT %		LIQUID LIMIT %
ОЕРТН (FT)	SAMPLE NO.	SAMPLE TYPE	MPLE D	RECOVERY (IN)	SURFACE ELEVATION		LOGO OF OFFICE	<u>ZATION Z</u>	WATER LEVELS ELEVATION (FT)	BLOWS/6"		STANDAR BL	D PENETRA LOWS/FT	ATION	
0 _	S-1	SS	% 24	24	(SP) FINE SAN	ND, Light Gray,	Moist, Very Lo	ose		る 1 WOH	10	20	30	40	50+
_	3-1	33	24	24	to Loose				_	1 1					
_	S-2	SS	24	24					35	1 2 2 2	⊗-3				
5—	S-3	SS	24	24						2 2 4	⊗-4				
<u> </u>	S-4	SS	24	24	(SP) FINE SAN Medium Dense	ND, Orange Bro e	wn, Moist,			6 5 8	13-8				
	S-5	SS	18	18					30	10 8 9	17-0	≫ I			
10 —															
_															
_						ND, Light Browr Medium Dense			25						
15—	S-6	SS	18	18	·					4 7 9	16-⊗				
									20						
_	S-7	SS	18	18						5 7 7	14->				
20 —										/					
_	S-8	SS	18	18					15	2 3	6-⊗				
25 —										3					
									E						
_									10						
30 —	S-9	SS	18	18						1 WOH	⊗ −1				
_				1				<u> ::::::</u>	<u>::</u> -	ı I	ONTINUE	ED O	N NEX	KT PA	AGE.
	TH	E STR	ATIFIC	CATION	I LINES REPRESENT	THE APPROXIMAT	E BOUNDARY LIN	ES BETWEE	N SOIL TYF						
Ų wL				ws	WD ⊠	BORING STARTE	D 01/25/	7		CAVE	IN DEPTH				
₩ WL(SI	HW)		<u>*</u>	WL(AC	R)	BORING COMPLE	ETED 01/25/	7		НАМ	MER TYPE Ma	nual			
₩ wL						RIG ATV	FOREM	AN D. Reg	gister	DRILI	LING METHOD	SPT			

CLIENT							JOB#		BORING	à #		SHEET		
Florida PROJECT	a Inl	and	Na	vigat	ion District		24 ARCHITEC	842 T-ENGINEER		B-10)	2 OF 4	┦┃┛	4
Dredo	ed N	<u>/late</u>	<u>rial</u>	Mar	nagement Are	a M-8	Taylor	<u>Enginee</u>	ring, lı	nc.		- CALIBRATED P	ECS Group of	
South	Indi	an F	Rive	r Dri	ve, St. Lucie	County, FL					}	1 2	3 4	5 ₊ +
NORTHIN	IG		Ī	EASTIN	NG	STATION						ROCK QUALITY D RQD% ——	- REC.% —	ECOVERY
												20% 40%	60% 80%	100%
<u> </u>	Ö	YPE	SAMPLE DIST. (IN)	(IN)	DESCRIPTION OF M BOTTOM OF CASING		LOSS OF	ENGLISH CIRCULATIO		N (FT)		PLASTIC LIMIT % C	WATER ONTENT %	LIQUID LIMIT %
ОЕРТН (FT)	SAMPLE NO.	SAMPLE TYPE	MPLE D	RECOVERY (IN)	SURFACE ELEVATION					WATER LEVELS ELEVATION (FT)	BLOWS/6"		RD PENETRATION BLOWS/FT	_
DEI	SAI	SAI	SAI	H.	(OD) FINE OAN	ND, Light Brown	Moiet to	\Mot			BLC	10 20	30 40	50+ :
<u> </u>						Medium Dense		wei,		_				
_										- 5				
-	S-10	ss	18	18						_	7 9	20-⊗		
35 —										_	11			
_									_	_				
_										_				
_									_	- 0	7			
	S-11	SS	18	18					_	_	11 11	22-🛇		
40 —									_	_				
_										_				
_					(SP-SM) FINE Medium Dense	SAND WITH S	ILT, Brow	n, Wet,		 -5				
_	0.10		10	10	Wiodiani Bonot	,				_	7	21		
45 —	S-12	55	18	18						_	10 11	21-⊗		
										_				
_										_				
_										 -10				
-	S-13	ss	18	18						_	5 9	20-🛇		
50 —										_	11			
_										_				
_										— − -15				
_										15	4			
55—	S-14	SS	18	18						_	9 12	21-🛇		
										_		\		
_										_				
_										- -20				
-	S-15	SS	18	18						_	5 10	24-⊗	,	
60 —										_	14			
-										-				
											CC	NTINUED C	N NEXT	PAGE.
	THI	STR	ATIFI	CATION	I LINES REPRESENT	THE APPROXIMAT	E BOUNDAF	RY LINES BET	WEEN SC	OIL TYP	ES. IN-	SITU THE TRANSITION	MAY BE GRADUA	L.
≟ Mr				ws□	WD⊠	BORING STARTE	D 01	/25/17		T	CAVE	IN DEPTH		
₩ WL(S	HW)		<u>*</u>	WL(AC	CR)	BORING COMPLE	TED 01	/25/17			HAMN	MER TYPE Manual		
₩ WL						RIG ATV	F	OREMAN D.	Registe	er	DRILL	ING METHOD SPT		

CLIENT							JOB#		BORII	NG#		SHEET		
Florid	a Inl	and	Na	vigat	ion District		2	4842		B-10)	3 OF 4	<u></u> &	
PROJECT	Г NAME						ARCHITE	CT-ENGINEE	R					
Dredo	ged N	<u>/late</u>	rial	Man	agement Are	a M-8	Taylo	<u>r Engine</u>	ering,	Inc.		O ALIDDATED DE	ECS Group of Companies	
				Б.	0							1 2	NETROMETER TONS/FT2 3 4 5+	
NORTHIN	<u>I INQI</u> IG	an F	(IVE	<u>er Dri</u> Eastin	ve, St. Lucie	STATION FL						ROCK QUALITY DE	SIGNATION & RECOVER' - REC.% ———	.Υ
												20% 40%	60% 80% 100%	, D
			Ê		DESCRIPTION OF M	ATERIAL		ENGLIS	H UNITS	w C			WATER LIQU	
F	9	ΓΥPE	DIST.	NI) YE	BOTTOM OF CASING	a 🖿	LOSS O	F CIRCULATI	ON 2002	EVEL!		LIMIT % CC	ONTENT % LIMIT	
ОЕРТН (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	SURFACE ELEVATION	on 37.89				WATER LEVELS ELEVATION (FT)	BLOWS/6"	STANDAF	D PENETRATION LOWS/FT	
DEF	SAN	SAN	SAN	REC				147 .	шин	WA'	BLC	10 20	30 40 50+	
_					Medium Dense					_				
-					(SP-SM) FINE Medium Dense	SAND WITH SI to Dense, Con	ILT, Gra	y, Wet, ell			21			
	S-16	ss	18	18	Fragments	, 10 2 0 1.00, 001.				_	18		46->	
65 —														
_										_ 30				
_	S-17	SS	18	18						Ė.	13 14	30) -⊗	
70 —	3-17	33	10	10							15	23	,	
-														
										_				
_														
-	S-18	ss	18	18						_	16 15 12	27-	*	
75 —											12	/	′	
_						SAND WITH SI to Dense, Wea				_ 40				
_	0.10	00	10	10	Contains Shell		00	intation,		_	9	20		
80 —	S-19	33	18	18						_	10	20−⊗		
-	1													
-	-									_				
_														
_	S-20	ss	18	18						_	14 13 12	25-🛇)	
85 —										E				
										_				
_										_ 50				
_	S-21	SS	10	10						_	16		20	
90 —	3-21	33	18	18						_	24 12		36-⊗	
_														
	1									<u> </u>	L		<u> </u>	
											CC	NTINUED O	N NEXT PAG	iΕ.
	THI	STRA	ATIFIC	CATION	LINES REPRESENT	THE APPROXIMATE	E BOUNDA	ARY LINES B	ETWEEN	SOIL TYP	ES. IN-	SITU THE TRANSITION N	MAY BE GRADUAL.	
≟ Mr				ws□	WD 🖂	BORING STARTE	D ()1/25/17			CAVE	IN DEPTH		
₩ WL(S	HW)		<u>=</u>	WL(AC	R)	BORING COMPLE	TED (1/25/17			HAM	MER TYPE Manual		
₩L						RIG ATV	-	FOREMAN	D. Regi	ster	DRILL	ING METHOD SPT		

Florida Inland Navigation District 24842 B-10 4 OF 4 PRODUCTION PRODUCTION SOUTH Indian River Drive, St. Lucio County, FL STATION SOUTH Indian River Drive, St. Lucio County, FL STATION SOUTH Indian River Drive, St. Lucio County, FL STATION SOUTH Indian River Drive, St. Lucio County, FL STATION SOUTH Indian River Drive, St. Lucio County, FL STATION SOUTH Indian River Drive, St. Lucio County, FL STATION SOUTH Indian River Drive, St. Lucio County, FL STATION SOUTH Indian River Drive, St. Lucio County, FL STATION SOUTH INDIAN SOUTH INDIA	CLIENT	JOB#	-	BORING #		SHEET		
DIRECORD MAINTENANCE DRIVE, St. Lucie County, FL. SOUTH Indian River Drive, St. Lucie County, FL. MORTHRING RASTNO DESCRIPTION OF MATERIAL ENSUSH LINTS SOUTH MICHAEL STRONG MATERIAL MATERIAL STRONG MATERIAL SOUTH MICHAEL STRONG MATERIAL SOUTH MATERIAL STRONG MATE	Florida Inland Navigation District	2 ARCHITE	:4842 ECT-ENGINEER	B-10)	4 OF 4	8	4
SOUTH Indian River Drive, St. Lucie County, FL Control Contro	Dredged Material Management Arestrate LOCATION	a M-8 Taylo	<u>r Engineeri</u>	ing, Inc.				
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNCARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.	South Indian River Drive, St. Lucie	County, FL					+ +	'
DESCRIPTION OF MATERIAL ENGLISH UNITE STATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL	NORTHING EASTING	STATION				RQD% —	- REC.% —	
CSP-SM) FINE SAND WITH SILT, Gray, Wet, Medium Dense, Weak Cementation, Contains Shell Fragments S-22 SS 18 18	DESCRIPTION OF M	ATERIAL	ENGLISH U	NITS				•
SP-SM FINE SAND WITH SILT, Gray, Wet, Medium Dense to Dense, Weak Cementation, Contains Shell Fragments	(F) ON STATE BOTTOM OF CASING	LOSS O	OF CIRCULATION	EVELS ON (FT)		LIMIT % CC		LIMIT %
SP-SM FINE SAND WITH SILT, Gray, Wet, Medium Dense to Dense, Weak Cementation, Contains Shell Fragments	SAMPLE SA	ON 37.89		WATER L	9/SMOTE	BI	_OWS/FT	
95	(SP-SM) FINE Medium Dense	to Dense, Weak Ceme				10 20	30 40	50+
S-23 SS 18 18 END OF BORING @ 100'	S-22 SS 18 18	Fragments			16	24 🛇		
100	95 —							
S-23 SS 18 18 END OF BORING @ 100' 105	(SP-SM) FINE	SAND WITH SILT, Gra	ıy, Wet,	-60				
1105 —		, Weak Cementation			14	25⊗		
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.	100 END OF BORI	NG @ 100'		-	11			
1105 — — — — — — — — — — — — — — — — — — —								
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES, IN-SITU THE TRANSITION MAY BE GRADUAL.								
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.	105—			_				
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.				-				
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.				-70				
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.								
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.	110 —			E				
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.								
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.				-75				
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.	115—			<u> </u>				
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.								
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.				-80				
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.				_				
	120 —							
				F				
			'	·			<u> </u>	
I ¥ WL WS□ WD⊠ BORING STARTED 01/25/17 CAVE IN DEPTH				VEEN SOIL TYP	PES. IN-	SITU THE TRANSITION N	IAY BE GRADUAI	
	•							
₩ WL(SHW) ₩ WL(ACR) BORING COMPLETED 01/25/17 HAMMER TYPE Manual ₩ WL RIG ATV FOREMAN D. Register DRILLING METHOD SPT				Register				

CLIENT							JOB#		BORING	#			SHEET				
Florid PROJECT	a Inl	and	Na	vigat	ion District		248 ARCHITECT	342 ENGINEER	I	<u>B-11</u>		1	1 OF 1			- &	4
Dredo	ed N	<u>Mate</u>	<u>rial</u>	Mar	agement Are	ea M-8	Taylor E	<u>Enginee</u>	ring, Ir	<u>1C.</u>		-0-	CALIBRAT		ETROMET	Group of Co	-T2
South	Indi	an F	Rive	r Dr	ve, St. Lucie	County, FL						BO(CK QUALI	TY DES	3 IGNATIO	4 N & REC	5 ₊
NORTHIN	IG			EASTIN	IG	STATION						F	RQD% -		REC	.% —	_
				1	DESCRIPTION OF N	AATERIAI		ENGLISH	LINITO		1	20	% 40)%	60%	80%	100%
F	Ŏ.	YPE	JIST. (IN)	(IN)	BOTTOM OF CASIN		LOSS OF C		II.	N (FT)		PLAS LIMIT Ж	Γ%		ATER ITENT %		LIQUID LIMIT %
ОЕРТН (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	SURFACE ELEVATI				MATER N	WALLEN LEVELS ELEVATION (FT)	BLOWS/6"	, , ,		NDARD BLO	PENETF DWS/FT	RATION	
0 _	ഗ് S-1	SS	24	24	(SP) FINE SA to Loose	ND, Light Gray,	Moist, Ver	y Loose			1 WOH 1		0 2	0	30	40	50+
_	S-2	SS	24	24					<u> </u>	- 35	1 1 WOH	⊗-2					
_ 										-	2 1 2 2						
5 —	\ <u>S-3</u>	SS	24	24	(SP) FINE SA	ND, Orange Bro	wn. Moist.			- -	2 3 5 6	5-⊗					
	S-4 D4S- \284/	SS	24 60	24	Medium Dens		,			- 30	5 8 7 6	0.7	. ⇒				
-	S-5	SS	24	24						-	6 6 5	12	\Diamond				
10 —									_	-							
_	S-6 SS 18 18 18																
15—	S-6	SS	18	18					<u> </u>	-	4 5 6	11-(⊗				
_					END OF BOR	ING @ 15'				-							
_										- 20 -							
									F	_							
20 —										_							
_									F	_							
									E	– 15 –							
_										_							
25 —										_							
-									F	_							
										- 10							
									F	_							
_									F	-							
30 —									F	-							
	TH	E STR	ATIFIC	CATION	I LINES REPRESENT	THE APPROXIMAT	E BOUNDARY	LINES BET	WEEN SO	IL TYP	ES. IN-	SITU THE	TRANSIT	TION MA	AY BE GF	RADUAL.	
<u></u> WL				ws		BORING STARTE		24/17				IN DEPT					
₩ WL(S			<u>=</u>	WL(AC	R)	BORING COMPLE		24/17			НАМІ	MER TYPE	E Manu	al			
₩ WL						RIG ATV	FO	REMAN D.	Registe	er T	DRIL	LING MET	HOD SF	 PT			

CLIENT							JOB#	BORIN	NG#		SH	EET		
Florida PROJECT	a Inl	and	Nav	<u>/igat</u>	ion District		24842 ARCHITECT-ENGINE	ER	B-12		1 C)F 1		8.
Dredo	ed N	<u>Mate</u>	<u>rial</u>	Mar	agement Are	a M-8	Taylor Engin	<u>ering,</u>	Inc.		CAI	IBRATED PE	ECS Group	of Companies NS/FT2
South	Indi	an F	Rive	r Dri	ve, St. Lucie	County, FL					11	2	3 4	5+
NORTHIN	IG		Ī	EASTIN	IG :	STATION					RQD ^o		SIGNATION & F - REC.% -	RECOVERY
											20%	40%	60% 80%	100%
(F	NO.	TYPE	SAMPLE DIST. (IN)	RY (IN)	DESCRIPTION OF M		ENGLI	SH UNITS	WATER LEVELS ELEVATION (FT)	ŧ.	PLASTIC LIMIT %		WATER NTENT %	LIQUID LIMIT %
ОЕРТН (FT)	SAMPLE NO.	SAMPLE TYPE	AMPLE	RECOVERY (IN)	SURFACE ELEVATION	DN 27.15			WATER LEVELS ELEVATION (FT)	BLOWS/6"		BL	D PENETRATIC LOWS/FT	
0 _	S-1	SS	24	24	(SP) FINE SAN to Medium Der		Moist, Very Loos	,	<u> </u>	1 1 2	⊗-3	20	30 40	50+
_	S-2	SS	24	24					25 	1 1 1	⊗ -2			
5—	\S-3	SS	24	24						1 2 3 3	6-⊗			
	S-4	SS	24	24						4 5 4 5	0.7 9-×			
	D4S S-5	SS	60 24	24						3 4 7	0.7	3		
10 —	0-3									7 7		,		
	D4S2		60		(SP) FINE SAN	ND, Orange Bro	own, Moist, Loose		 15 		●-2.7			
_	S-6	SS	18	18					_	5 6	10			
15					END OF BORI	NG @ 15'		- 11171117	_	4				
_						J			_					
_														
_									_					
20 —									_					
									_					
_									_ 5					
									_					
									_					
25 —									_					
_									_					
									0					
									_					
30 —									_					
-				I	I			I L	_	l	<u> </u>	<u> </u>	<u> </u>	<u> </u>
	71.	- OT-	٨٣١٢١	ATIO:	I I INFO DEDDECENT	THE ADDROVING	T DOLINDADVI INTO		SOU T/5	-0 111	OITH THE TO	MICITION	IAV DE ODAS:	Δ1
Ų WL ∣		E SIK		ws 🗆		BORING STARTE	D 01/24/17	PET VVEEN S	SOIL TYPE		SITU THE TRA	ANOITION M	IAT DE GRADU	ML.
₩ WL(S	HW)		<u>*</u>	WL(AC	R)	BORING COMPLE	TED 01/24/17			HAM	MER TYPE [/	lanual		
₩ WL						RIG ATV	FOREMAN	D. Regis	ster	DRILI	LING METHOL	SPT		

CLIENT							JOB#	BORING	#		SHEET		
Florida PROJECT	a Inl	and	Na	vigat	ion District		24842 ARCHITECT-ENGIN		<u>B-13</u>		1 OF 4		7 4
Dredg SITE LOC	ed N	∕late	<u>rial</u>	Mar	agement Are	a M-8	Taylor Engir	neering, Ir	1C.		CALIBRATED PE	ECS Group of	
South	Indi	an F	Rive	er Dri	ve, St. Lucie	County, FL					1 2	3 4	5+
NORTHIN	G			EASTIN	IG	STATION					ROCK QUALITY DE RQD% ——		——
			$\overline{}$		DESCRIPTION OF M	IATERIAI	ENG	ISH UNITS			20% 40%	60% 80%	100%
	Ċ.	/PE	ST. (IN	(N)	BOTTOM OF CASING		LOSS OF CIRCULA		VELS			WATER ONTENT %	LIQUID LIMIT %
ОЕРТН (FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	SURFACE ELEVATION		LOSS OF CINCUL	ATION MAX	WAI ER LEVELS ELEVATION (FT)	BLOWS/6"	⊗STANDAR	ED PENETRATION	
O	SAN	SAN	SAN) H			Moist, Very Loos		ELE	1 BLO	10 20	30 40 : :	50+ :
	S-1	SS	24	24	(SF) FINE SAI	ND, Light Gray,	Moist, very Loos	,	-20	1 1 1	⊗ −2		
	S-2	SS	24	24	(SP) FINE SAN to Medium Der		wn, Moist, Loos		-	2 2 3	5-&		
5 -	S-3	SS	24	24					- -	4 4 5 6	11-8		
	S-4	SS	24	24					– 15 –	8 11 10 11	21->		
	S-5	SS	24	24					-	10 4 8	15-⊗		
10 —				-					_	7 9			
_								_	- 10				
									_				
_	S-6	SS	18	18					_	4 5 5	10-⊗		
15 —									- -5	5			
_					(SP) FINE SAN	ND, Light Browr	n, Moist to Wet,	_	_				
	0.7		40	10	Medium Dense	e			_	6	1000		
20 —	S-7	SS	18	18					_	9	18-⊗		
									- 0 -				
_								_	_	9	`		
25 —	S-8	SS	18	18					_	16 14	3	0-⊗	
									- -5		/		
									_				
30 —	S-9	SS	18	18					_	6 11 10	21-8		
				I	I			<u> </u>		CC	DNTINUED O	N NEXT	PAGE.
	THI	E STR	ATIFI	CATION	I LINES REPRESENT	THE APPROXIMAT	E BOUNDARY LINES	BETWEEN SO	OIL TYPE	ES. IN-	SITU THE TRANSITION N	MAY BE GRADUA	L.
₩L				ws□		BORING STARTE	D 01/26/17			CAVE	E IN DEPTH		
₩ WL(SI	HW)		<u>=</u>	WL(AC	R)	BORING COMPLE	TED 01/27/17			HAMI	MER TYPE Manual		
∰ WL						RIG ATV	FOREMAN	D. Registe	er	DRIL	LING METHOD SPT		

CLIENT						JOB#	BORI	NG#		SHEET		
 Florida In	land	Na	viaat	ion District		2484	2	B-13	3	2 OF 4	— &	1
PROJECT NAM	E	u	rigat	ion Blothot		ARCHITECT-EN	GINEER				│ 	
Dredged	Mate	rial	Mar	agement Are	a M-8	Taylor En	gineering	, Inc.			ECS Group of Co	
SITE LOCATION										CALIBRATED PE	NETROMETER TONS/F	T2 5+
South Ind	ian F	Rive	er Dri	ve, St. Lucie	County, FL					ROCK QUALITY DE	ESIGNATION & REC	•
Nontrinta			L/10111		31711014					RQD% —— 20% 40%	- REC.% ——	100%
		<u> </u>		DESCRIPTION OF M	ATERIAL	E	NGLISH UNITS		T	•	-	'
	핊	ST. (II	<u> </u>		_		\\	ÆLS (FT)		LIMIT % CC	WATER ONTENT %	LIQUID LIMIT %
H (FT)		LE DI	VERY	BOTTOM OF CASING		LOSS OF CIRC	CULATION ME	RLE	9/S	X STANDAE	RD PENETRATION	
DEPTH (FT) SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	SURFACE ELEVATION	DN 21.05			WATER LEVELS ELEVATION (FT)	BLOWS/6"	10 20	LOWS/FT	50+
	0)	0,	<u> </u>		ND, Light Brown	, Moist to We	t,	-10		10 20	30 40	50+
-				Medium Dense	ND, Brown, Wet	Medium De	nse					
				to Very Loose	,,,							
S-10	ss	18	18						7	16-⊗		
35									9			
								-15				
								_	7	\		
S-11	ss	18	18					_	9	19-🛇		
40												
												
IЭ								_				
									1			
S-12	SS	18	18						WOH 1	8 -1		
								_ 25				
				(25) = 11 = 2								
I 🚽				Contains Shell	ID, Gray, Wet, \ Fragments	ery Dense,						
S-13	SS	18	18		•			_	19 27			54
50	33		10					_	27			
1 -								— -30				
1 4				(SD) FINE SAN	ND, Gray, Wet, V	/ary Dansa		_				
1 -				Moderate Cem	entation	very Dense,		_				
S-14	SS	6	6						50/6		50/	6-⊗
55 —												
								-35				
				(SP) FINE SAN	ND, Gray, Wet, I	oose to Den	se,					
				Weak Cementa						10		
S-15	ss	18	18						6 5 5	×		
60 —												
				l				-40				
									CC	ONTINUED O	N NEXT P	AGE.
TH	IE STR	ATIFI	CATION	LINES REPRESENT	THE APPROXIMATE	BOUNDARY LI	NES BETWEEN	SOIL TYP	PES. IN-	SITU THE TRANSITION N	MAY BE GRADUAL.	
₩L			ws□	WD⊠	BORING STARTED	01/26	/17		CAVE	IN DEPTH		
₩ WL(SHW)		<u></u>	WL(AC	ER)	BORING COMPLE	TED 01/27	/17		HAMI	MER TYPE Manual		
₩ WL					RIG ATV	FORE	MAN D. Regi	ister	DRILI	LING METHOD SPT		

CLIENT							JOB#		BORING	i #		SHEET		
Florid PROJEC	la Inl	and	Na	vigat	ion District		ARCHIT	24842 ECT-ENGINEER	R	B-13		3 OF 4	5	4
Dredo	ged N	<u>//ate</u>	<u>rial</u>	Mar	nagement Are	a M-8	Taylo	or Enginee	ering, Ir	nc.		CALIBRATED PE	ECS Group o	
South	ı Indi	an F	Rive	r Dri	ve, St. Lucie	County, FL						1 2	3 4	5 ₊
NORTHIN	NG			EASTIN	NG	STATION						ROCK QUALITY DE RQD% ——		——
												20% 40%	60% 80%	100%
			<u>N</u>	9	DESCRIPTION OF N	MATERIAL		ENGLISH	I .	ų E			WATER ONTENT %	LIQUID LIMIT %
F.	Ŏ.	TYPE	DIST	RY (II	BOTTOM OF CASIN	G 🔀	LOSS	OF CIRCULATIO	N ∑100% N	ON (F		*		
DЕРТН (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	SURFACE ELEVATION	ON 21.05			DN MOX	WAI EK LEVELS ELEVATION (FT)	BLOWS/6"	⊗STANDAR BI 10 20	D PENETRATION LOWS/FT 30 40	N 50+
_					(SP) FINE SAI Weak Cement	ND, Gray, Wet,	Loose t	o Dense,	_	_				
_					Weak Gement	allon				_				
-	S-16	ss	18	18						_	14 14		32+⊗	
65 —										_	18			
_	1								_	- -45				
_	1									_			\setminus	
_										-	10			
	S-17	SS	18	18					_	_	31 18			49
70 —									_	_				
_										 -50				
_										_				
_	0.40		-10	10					_	_	9	16		
75 	S-18	SS	18	18					_	_	9 7			
_										- -55				
_										_				
_									_	_				
_	S-19	ss	18	18						-	4 6	12 🛇		
80 —										-	6	\		
-										-60				
_									_	_		\		
_									_	_	8			
	S-20	SS	18	18					_	_	9	17-🛇		
85 —									<u> </u>	- 65				
_									_	05 -				
_									_	_				
_	S-21	SS	18	18						_	9	18-⊗		
90 —	0 21			10					_	_	10	100		
_]								<u> </u>	- -70				
	1	١									ı [
			_								CC	NTINUED O	N NEXT	PAGE.
	THI	E STR	ATIFIC	CATION	LINES REPRESENT	THE APPROXIMAT	E BOUND	ARY LINES BE	TWEEN SC	OIL TYPI	ES. IN-	SITU THE TRANSITION N	MAY BE GRADUA	L.
≟ WL				ws□	WD⊠	BORING STARTE	.D	01/26/17			CAVE	IN DEPTH		
₩ WL(S	EHW)		<u></u>	WL(AC	ER)	BORING COMPLE	ETED	01/27/17		\Box	HAMN	MER TYPE Manual		
₩ wL						RIG ATV		FOREMAN D	. Registe	er	DRILL	ING METHOD SPT		

CLIENT	JOB#	BORING #		SHEET		
Florida Inland Navigation District	24842 ARCHITECT-ENGIN	B-13	<u> </u>	4 OF 4	& 	4
Dredged Material Management Area M-8 SITE LOCATION	Taylor Engir	eering, Inc.		CALIBRATED PER	ECS Group of O	
South Indian River Drive, St. Lucie County, FL	_			1 2 ROCK QUALITY DE	3 4 SIGNATION & RE	5 ₊
NORTHING EASTING STATION				RQD% —	REC.% —	
DESCRIPTION OF MATERIAL	ENGL	ISH UNITS	\Box	20% 40% PLASTIC \	60% 80% WATER	100% LIQUID
DESCRIPTION OF MATERIAL ON BOTTOM OF CASING SAMPLE DISTRIBUTION SAMPLE DISTRIBUTION ON BOTTOM OF CASING SURFACE ELEVATION 21.05	LOSS OF CIRCULA	MATER LEVELS ELEVATION (FT)	9		NTENT %	LIMIT %
SOVERY (FT) SAMPLE DIST. SAMPLE DIST. SAMPLE TYPE SOLUTION OF CASING TO STAND THE TYPE SOLUTION OF CASING T		WATER	BLOWS/6"	⊗STANDAR BL 10 20	D PENETRATION LOWS/FT 30 40	50+
S-22 SS 18 18 95			9 14 18		32	
		-75				
(CH) FAT CLAY WITH SAN	ID, Gray, Wet, Very					
S-23 SS 18 18			10 5 12	17⊗		
END OF BORING @ 100'		-80				
105 —						
3		-85				
		-90				
115—						
		-95				
120 —		-100				
THE STRATIFICATION LINES REPRESENT THE APPROXIM		BETWEEN SOIL TYPE			IAY BE GRADUAL	
$\begin{tabular}{lllllllllllllllllllllllllllllllllll$				MER TYPE Manual		
₩ WL RIG ATV		D. Register		ING METHOD SPT		

CLIENT							JOB#	BORIN	NG#		SHEET		
Florida PROJECT	Inla NAME	and_	Na	vigat	ion District		24842 ARCHITECT-ENGINI	EER	B-14	-	1 OF 4		4
Dredge SITE LOCA	ed N	<u>/late</u>	<u>rial</u>	Man	agement Are	a M-8	Taylor Engin	eering,	Inc.			ECS Group of	
South	Indi	an F	Rive	r Dri	ve, St. Lucie	County, FL					1 2 ROCK QUALITY DE	3 4 ESIGNATION & RE	5 ₊
NORTHING	3			EASTIN	IG :	STATION					RQD% ——	- REC.% —	
					DESCRIPTION OF M	ATERIAL	ENGL	ISH UNITS			20% 40%	60% 80%	100%
(L:	NO.	TYPE	DIST. (IN	RY (IN)	BOTTOM OF CASING	g T	LOSS OF CIRCULA		EVELS ON (FT)			WATER DITENT %	LIQUID LIMIT %
DЕРТН (FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	SURFACE ELEVATION	ON 35.31			WATER LEVELS ELEVATION (FT)	BLOWS/6"	⊗STANDAF B 10 20	RD PENETRATION LOWS/FT 30 40	J 50+
0 _	S-1	SS	24	24	(SP) FINE SAN	ND, Light Gray,	Moist, Loose		35	1 WOH 3		30 40	50+
	S-2	SS	24	24						3 3 2 3	5-⊗		
5—	S-3	SS	24	24						3 2 3 4	7-🕸		
	S-4	SS	24	24					30 	4 5 4	9-⊗		
-	S-5	SS	18	18						5 5 5 7	13-8		
10									 25	6			
									<u> </u>				
					(SP) FINE SAN to Medium Der		nge, Moist, Loose						
	S-6	SS	18	18					<u> </u>	6 4 9	13-⊗		
15									20				
_													
									_				
20	S-7	ss	18	18					_	5 8 14	22-🛇		
									— 15 — —				
					(SP) FINE SAN Medium Dense	ND, Light Browr	n, Moist, Loose to		<u> </u>				
	S-8	ss	18	18					<u> </u>	4 5 5	10-⊗		
25													
									_	4			
30 -	S-9	SS	18	18					 5	7 10	17-🛇		
										CC	ONTINUED O	N NEXT	PAGE.
_	THE	STR	ATIFIC	CATION	LINES REPRESENT	THE APPROXIMAT	E BOUNDARY LINES	BETWEEN	SOIL TYP	ES. IN-	SITU THE TRANSITION N	MAY BE GRADUA	L.
₩ WL				ws 🗌	WD⊠	BORING STARTE					E IN DEPTH		
₩ WL(SH	łW)		<u>=</u>	WL(AC	R)	BORING COMPLE					MER TYPE Manual		
₩ WL						RIG ATV	FOREMAN	D. Regis	ster	DRIL	LING METHOD SPT		

CLIENT							JOB#	BOF	IING #		SHEET		
Florid PROJECT	a Inl	and	Na	vigat	ion District		24842 ARCHITECT-ENGIN	EER	B-14	1	2 OF 4	▏┃ ┋	74
	ed N	Лate	rial	Mar	nagement Are	a M-8	Taylor Engir		, Inc.			ECS Group of	
											CALIBRATED	PENETROMETER TON	5/F12 5 _/ +
South NORTHIN	<u>Indi</u> IG	<u>an F</u>	Rive I	<u>r Dri</u> Eastin	ive, St. Lucie	County, FL STATION						DESIGNATION & RE	COVERY
											RQD% —— 20% 40%	- REC.% — 60% 80%	100%
					DESCRIPTION OF M	IATERIAL	ENGL	ISH UNITS	1		PLASTIC	WATER	LIQUID
(F	Ö.	TYPE	DIST. (RY (IN)	BOTTOM OF CASIN	G 👅	LOSS OF CIRCULA	ATION MOZ	EVELS ON (FT)			CONTENT %	LIMIT %
ОЕРТН (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	SURFACE ELEVATION	ON 35.31			WATER LEVELS ELEVATION (FT)	BLOWS/6"		ARD PENETRATION BLOWS/FT	
	σ	S	S	ш.		ND, Light Browr E Loose to Dens	n, Moist, Loose to)	> <u> </u>	<u> </u>	10 20	30 40	50+
_					Wediain Dense	e Loose to Dens	56						
_	S-10	22	18	18					E	7 7	18-⊗		
35 —	0-10			10						11	10 %		
_											\		
									_				
_	S-11	SS	18	18						7 13		30-⊗	
40 —									<u> </u>	17			
-													
_									<u> </u>				
_	S-12	SS	18	18					E	8 18		36-⊗	
45 —									-10	18			
_												\	
=					(SP) FINE SAI Dense to Dens		t, Loose Medium					\	
_	S-13	SS	18	18						10 17		43-	
50 —									-15	26			
_									_				
_													
_	S-14	SS	18	18					_	11 14 21		35-×	
55 —									-20	21			
=													
_									E				
_	S-15	SS	18	18					_	3 5 6	11-8		
60 —									-25				
	, '			1	1			[ia	CC	NTINUED (ON NEXT	PAGE.
	THI	E STR	ATIFI	CATION	I LINES REPRESENT	THE APPROXIMAT	E BOUNDARY LINES	BETWEEN	N SOIL TYF	PES. IN-	SITU THE TRANSITION	I MAY BE GRADUA	L.
≟ WL				ws□	WD⊠	BORING STARTE	D 01/25/17			CAVE	E IN DEPTH		
₩ WL(S	HW)		<u>=</u>	WL(AC	CR)	BORING COMPLE	ETED 01/26/17			HAMI	MER TYPE Manual		
∰ WL						RIG ATV	FOREMAN	D. Reg	jister	DRIL	LING METHOD SPT		

CLIENT							JOB#		BORING #	ŧ		SHEET		
Florid	a Inla	and	Na	vigat	ion District		248 ARCHITECT-	42 ENGINEER	E	3-14		3 OF 4		4
Dredo	ged N	<u>late</u>	<u>rial</u>	Man	agement Are	a M-8	Taylor E	ngineer	ing, In	C.		CALIBRATED PE	ECS Group of	
South	Indi	an D)ivo	r Dri	vo St.Lucio	County El						1 2	3 4	5+
NORTHIN	NG	<u> </u>	IIVE	EASTIN	ve, St. Lucie	STATION STATION						ROCK QUALITY DE RQD% ——		COVERY
												20% 40%	60% 80%	100%
			<u> </u>		DESCRIPTION OF M	IATERIAL		ENGLISH L		Ē			WATER	LIQUID
F.	9	TYPE	DIST.	4Y (II)	BOTTOM OF CASIN	G 👅	LOSS OF C	RCULATION	1002	P) NC		LIMIT % CC	ONTENT %	LIMIT %
ОЕРТН (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	SURFACE ELEVATION	ON 35.31			WATER LEVELS	ELEVATION (FT)	BLOWS/6"	STANDAR	RD PENETRATION LOWS/FT	ı
DEF	SAN	SAN	SAN	REC				16	× ×	"	BLC	10 20	30 40	50+
_	1				(SP) FINE SAI	ND, Brown, Wet se	t, Loose Me	dium						
_						SAND WITH S		Net,						50
-	S-16	ss	18	18	Donoo, oonta	no onen i ragini	onto				20 30 20			*
65 —										-30	20			
_	1							1						
_						SAND WITH Se to Very Dense		Wet,						
_					Cementation,	Contains Shell F	Fragments				16			
70 —	S-17	SS	18	18						05	18 27		45	8
_										-35				
-								1						
-								i.						
	S-18	ss	18	18							10 10	21-8		
75 —										-40	11			
_]						
-														
_								1			7	\		
80—	S-19	SS	18	18							11 15	26-€	₹ .	
										-45				
_														
_														
_	S-20	ss	18	18							19 21			58-⊗
85 —										-50	37			
_	1													
_	1													
_											0.1			
	S-21	ss	18	18							21 32 18			50-
90 —										-55			/	
_	-													
											CC	NTINUED O	N NEXT	PAGE.
	THE	STRA	TIFIC	CATION	I LINES REPRESENT	THE APPROXIMAT	E BOUNDARY	LINES BETV	WEEN SOI	L TYPE	S. IN-S	SITU THE TRANSITION N	MAY BE GRADUA	L.
Ţ WL				ws□	WD⊠	BORING STARTE	D 01/2	25/17			CAVE	IN DEPTH		
₩ WL(S	SHW)		<u>*</u>	WL(AC	R)	BORING COMPLE	ETED 01/2	26/17			HAMN	MER TYPE Manual		
₩L						RIG ATV	FO	REMAN D.	Register	.	DRILL	LING METHOD SPT		

CLIENT					JOB#	BORING #		SHEET		
Florida Inland	Na	vigat	ion District		24842 ARCHITECT-ENGII	JEER B	-14	4 OF 4		
Dredged Mate	<u>rial</u>	Mar	nagement Are	ea M-8	Taylor Engi	neering, Inc).		ECS Group of	;/FT2
South Indian F	Rive	r Dri	ve, St. Lucie	County, FL				POCK QUALITY DI		5 ₊ + COVERY
			Incorporation of					RQD% —— 20% 40%	- REC.% — 60% 80%	100%
I) IO. YPE	IST. (IN)	(IN)	DESCRIPTION OF N BOTTOM OF CASIN		LOSS OF CIRCUL	LISH UNITS	N (FT)	*	WATER ONTENT %	LIQUID LIMIT %
DEPTH (FT) SAMPLE NO. SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	SURFACE ELEVATI			MATER LEVELS	ELEVATION (FT) BLOWS/6"	⊗STANDAF E	RD PENETRATION LOWS/FT	
	S	<u> </u>	Medium Dens	SAND WITH Se to Very Dense	, Weak		ш	10 20	30 40	50+
S-22 SS	18	18	Cementation,	Contains Shell F	Fragments		15 14 13	27-	\otimes	
95							-60			
			(SP-SM) FINE Dense, Weak	SAND WITH S Cementation	ILT, Gray, Wet,					
S-23 SS	18	18					14 19 22	· I	41 🛇	
			END OF BOR	ING @ 100'			-65			
105							70			
							70			
110							-75			
115							-80			
120 —							-85			
			•			•	•			·
	ATIFIC							N-SITU THE TRANSITION I	MAY BE GRADUAL	
₩L(SHW)	<u>*</u>	WS WL(AC		BORING STARTE BORING COMPLE			_	VE IN DEPTH MMER TYPE Manual		
₩ WL				RIG ATV		N D. Register	+	ILLING METHOD SPT		

CLIENT							JOB#		BORING #			SHEET		
Florid	a Inl	and	Na	vigat	ion District		2 ARCHITE	4842 ECT-ENGINEER	F	P-1		1 OF 2	│ 	4
Dredo	ged N	<u>Mate</u>	<u>rial</u>	Mar	nagement Are	a M-8	Taylo	r Enginee	ring, Inc) <u>. </u>			ECS Group o	S/FT2
South	Indi	an F	Rive	r Dr	ve, St. Lucie	County, FL						1 2 ROCK QUALITY D	3 4 ESIGNATION & B	5 ₊
NORTHIN	IG			EASTIN	NG	STATION							- REC.% -	
					DECODIDATION OF M	IATEDIAL		5 11011011			_	20% 40%	60% 80%	100%
F	O	rype	OIST. (IN)	SY (IN)	DESCRIPTION OF M BOTTOM OF CASING		LOSS O	ENGLISH F CIRCULATIO	l l	ON (FT)		PLASTIC LIMIT % C	WATER ONTENT %	LIQUID LIMIT %
ОЕРТН (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	SURFACE ELEVATION	ON 20.60			WATER LEVELS	ELEVATION (FT)	BLOWS/6"	E	RD PENETRATIOI BLOWS/FT 30 40	
0 _	S-1	SS	24	24		ND, Light Gray t		ge Brown,	K(//K(/	20	1 1 2	⊗-3	30 40	50+
_	S-2	SS	24	24	Moist, Loose to	o Medium Dens	е				3 3 4 4	8-8		
5—	S-3	SS	24	24							5 6 6	13-8		
	S-4	SS	24	24						15	7 7 7 9	●-2.5 17-⊗		
<u>-</u>											8 8 10 9			
10	S-5	SS	24	24						10	9	18-⊗		
_														
_						ND, Light Brown								
					Dense, Contai	ns Cemented S	and Len	ses	_		2	<i></i>		
15—	S-6	SS	18	18							3 6	9-⊗		
_									<u> </u>	5				
_					(SP) FINE SAN	ND, Light Brown	to Grav	/ Moist to						
						Dense to Dense			¥					
-	S-7	SS	18	18							3 4 5	9-⊗ 20.5-		
20 —											5			
_									_					
_									<u> </u>					
_											9			
25 —	S-8	SS	18	18							14 16	,	30-⊗	
_									- -	5				
_									_				/	
-	S-9	SS	18	18							9 10	22-⊗		
30 —									<u> </u>	10	12			
											CC	NTINUED C	N NEXT	PAGE.
<u> </u>		E STR				THE APPROXIMAT			WEEN SOIL	TYPES	S. IN-S	SITU THE TRANSITION	MAY BE GRADUA	L.
¥ WL	18			ws 🗌	WD⊠	BORING STARTE	D (01/17/17			CAVE	IN DEPTH		
• ' '						BORING COMPLE	TED (01/17/17		+		MER TYPE Manual		
				(,,,,	,					+				
₩ WL						RIG ATV		FOREMAN			DRILL	LING METHOD		

CLIENT	JOB#	BORING #		SHEET		
Florida Inland Navigation District PROJECT NAME	24842 ARCHITECT-ENGINEER	P-1		2 OF 2	┦	4
Dredged Material Management Area M-8 SITE LOCATION	Taylor Enginee	ring, Inc.	1	CALIBRATED P	ECS Group of	
				1 2	3 4	5,+
South Indian River Drive, St. Lucie County, FL	-			ROCK QUALITY D	ESIGNATION & RE	COVERY
				20% 40%	60% 80%	100%
DESCRIPTION OF MATERIAL	ENGLISH			PLASTIC	WATER	LIQUID
(F) ON ON ON ON ON ON ON ON ON O	LOSS OF CIRCULATION	ION F		LIMIT % C	ONTENT %	LIMIT %
SURFACE ELEVATION OF MATERIAL SAMPLE NO. SAMPLE NO.		WATER LEVELS ELEVATION (FT)	BLOWS/6"	⊗STANDA I 10 20	RD PENETRATION BLOWS/FT 30 40	50+
(SP) FINE SAND, Light Brown Wet, Medium Dense to Den	wn to Gray, Moist to se			10 20	30 40	50+
S-10 SS 18 18			9 15		35-⊗	
35		-15	20			
			8		\	
S-11 SS 18 18 END OF BORING @ 40'			15 27		42 ⊗	
END OF BORNING @ 40		-20				
]]						
45—		-25				
1 3						
		E				
50—						
		-30				
		E				
55 —		-				
		-35				
]]						
		-				
60 —		-40				
		⊢	1 L	i i	<u> </u>	:
THE STRATIFICATION LINES REPRESENT THE APPROXIM	ATE BOUNDARY LINES RET	WEEN SOIL TYP	PES. IN-9	SITU THE TRANSITION	MAY BE GRADI IA	L.
₩ W W W BORING STAR				IN DEPTH	DE GHADOA	
₩ WL(SHW) ₩ WL(ACR) BORING COMF	PLETED 01/17/17		HAMN	MER TYPE Manual		
₩ RIG ATV	FOREMAN		DRILL	ING METHOD		

CLIENT							JOB#		BORING	i #		SHEET		
Florid PROJECT	a Inl	and	Na	vigat	ion District		24 ARCHITEC	1842 CT-ENGINEER		P-2		1 OF 2		4
Dredo	ged N	<u>Mate</u>	<u>rial</u>	Mar	nagement Are	a M-8	Taylor	Enginee	ring, Ir	nc.			ECS Group of NETROMETER TONS	;/FT2
South	Indi	an F	Rive	r Dri	ve, St. Lucie	County, FL						1 2 ROCK QUALITY DE	3 4	5 ₊
NORTHIN	IG			EASTIN	NG I	STATION						RQD% ——		——
												20% 40%	60% 80%	100%
			(N)	Î	DESCRIPTION OF M	IATERIAL		ENGLISH		2 F			WATER ONTENT %	LIQUID LIMIT %
Ē	Ŏ.	TYPE	DIST	IRY (I	BOTTOM OF CASING	g 🔀	LOSS OF	CIRCULATIO	N 200%	ON (F		*	•	
ОЕРТН (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	SURFACE ELEVATION	ON 20.47			N >100%	WAI EK LEVELS ELEVATION (FT)	BLOWS/6"	⊗STANDAR BI	D PENETRATION LOWS/FT	
0 _	/S	/S	/S	<u> </u>	\Topsoil Depth	[2.00"]			<u>}</u>	≥ <u>ଘ</u> −20	6	10 20	30 40	50+
_	S-1	SS	24	24	(SP-SM) FINE	SAND WITH S	ILT, Ligh	t Brown,		_	9	18-⊗		
_						ND, Dark Gray t	o Orange	e, Moist,		_	6 3	6		
_	S-2	SS	24	24	Loose to Medio	um Dense				_	3 3 2	$raket{igotimes}$		
5—	S-3	SS	24	24						-	2	6-⊗		
	3-3	33	24	24						- 15	3 3 3			
_	S-4	SS	24	24					- -	-	3 4 3	7		
_									_	_	5 4			
_	S-5	ss	24	24						_	4 4	♦ ⊗ 8		
10									_	- 10	5	3.9		
_										_				
_					(SP-SM) FINE	SAND WITH S	ILT, Orar	nge to		_				
_					Light Brown, W	Vet, Loose to Mo	edium De	ense		_	3			
	S-6	SS	18	18						_	3 4	7-🛇		
15—										- 5				
_										-				
_										-				
	S-7	SS	18	18						_	3 4	9–⊗		
20 —										- 0	5			
_										_				
_										_				
_										_	8	\		
25—	S-8	SS	18	18						_	9 12	21-🕸		
										- -5				
_										_				
_										_				
-	S-9	SS	18	18						_	7 10	22+⊗		
30 —										- 10	12			
	•	'		'	·				, 24 T P P P P P	10	CC	ONTINUED O	N NEXT	PAGE.
	TH	E STR	ATIFI	CATION	I LINES REPRESENT	THE APPROXIMAT	E BOUNDA	RY LINES BET	WEEN SC	OIL TYPI		SITU THE TRANSITION M		
Ţ WL				ws 🗌		BORING STARTE		1/17/17				E IN DEPTH		
₩ WL(S	HW)		<u>_</u>	WL(AC	CR)	BORING COMPLE	TED 0	1/17/17		\dashv	HAMI	MER TYPE Auto		
₩ WL RIG ATV FOREMAN D.							Francis	;	DRILI	LING METHOD SPT				

CLIENT	JOB#	BORING #		SHEET	
Florida Inland Navigation District PROJECT NAME	24842 ARCHITECT-ENGINEER	P-2		2 OF 2	8/
Dredged Material Management Area M-8 SITE LOCATION	Taylor Enginee	ering, Inc.	1	CALIBRATED PER	ECS Group of Companies NETROMETER TONS/FT2
South Indian River Drive, St. Lucie County, FL				1 2	3 4 5+ SIGNATION & RECOVERY
NORTHING EASTING STATION				RQD% ——	
DESCRIPTION OF MATERIAL	ENGLISH	LIMITE		20% 40%	60% 80% 100%
				LIMIT % CO	NATER LIQUID NTENT % LIMIT %
(L) ON LE SION OF CASING BOTTOM OF CASI	LOSS OF CIRCULATION	R LEV	9/S	(C) STANDAR	
DESCRIPTION OF MATERIAL (II) BOTTOM OF CASING SURFACE ELEVATION SURFACE ELEVATION 20.47		WATER LEVELS ELEVATION (FT)	BLOWS/6"	BL 10 20	D PENETRATION .OWS/FT 30 40 50+
(SP-SM) FINE SAND WITH Light Brown, Wet, Loose to N					
(SP) FINE SAND, Light Brow					
S-10 SS 18 18			6 7	16-⊗	
35 -		1.	9	10 🛇	
		-15			
(SP-SM) FINE SAND WITH	SILT, Gray, Wet,				
Very Dense, Contains Shell	Fragments		16		
S-11 SS 18 18 40			26 37		⊗
END OF BORING @ 40'		-20			
🚽					
		-25			
-					
50 —		-30			
3					
-					
55 —		-35			
3					
3					
60 —		 			
-		-40			
THE STRATIFICATION LINES REPRESENT THE APPROXIMA	ATE BOUNDARY LINES BE	TWEEN SOIL TYPE	ES. IN-S	ITU THE TRANSITION N	IAY BE GRADUAL.
₩S WD WD BORING START	TED 01/17/17		CAVE	IN DEPTH	
₩ WL(SHW) ₩ WL(ACR) BORING COMP	LETED 01/17/17		НАММ	ER TYPE Auto	
₩ RIG ATV	FOREMAN D	. Francis	DRILLI	NG METHOD SPT	

CLIENT							JOB#		BORIN	IG#		SHEET	Π		
Florida	ılnl	and	Na	vinat	ion District		,	24842		P-3		1 OF 2			& //
PROJECT	NAME	and	iva	vigat	ION DISTRICT			ECT-ENGINEE	:R	1 -0		1 1012		-	
Dredge	ed N	/late	rial	Mar	agement Are	a M-8	 Taylo	or Engine	erina.	Inc.				ECS Group o	of Companies
SITE LOCA	NOITA								<u> </u>					ETROMETER TON	
South	Indi	an F	live	r Dri	ve, St. Lucie	County, FL						1 2 BOCK QUALIT		3 4 SIGNATION & F	5+ ECOVERY
NORTHING	3			EASTIN	IG :	STATION						RQD% —			
						ATERIAL						20% 409	%	60% 80%	100%
		ш	<u>N</u>	î	DESCRIPTION OF M	ATERIAL		ENGLIS	H UNITS	SJ E		PLASTIC LIMIT %		VATER NTENT %	LIQUID LIMIT %
Ē.	Ŏ.	T	DIST	BY (I	BOTTOM OF CASING	a T	LOSS	OF CIRCULATI	ON 200%	LEVE ION (9	*		•	$\overline{}$
ОЕРТН (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	SURFACE ELEVATION	N 18.38				WATER LEVELS ELEVATION (FT)	BLOWS/6"	⊗STAN	NDARD BL) PENETRATIO OWS/FT	N
0	SA	SA	SA	H H	Topsoil Depth	[4 00"]			N/AN/	<u></u>	1	10 20)	30 40	50+ :
	S-1	ss	24	24		SAND WITH S	ILT, Gr	ay, Moist,			1	⊗-3			
					Loose (SP) FINE SAN	ND, Gray to Bro	wn Mo	niet		_	2 2 3				
	S-2	ss	24	24	Medium Dense		· · · · · · · · · · · · · · · · · · ·			_ 15	3 5 5	8-8			
										_	7				
5 —	S-3	SS	24	24						_	7 7	14-🛇			
										_	12				
	S-4	SS	24	24						_	11 11 12	22	\otimes		
						WEATHERED I				10	17 12				
I →	S-5	SS	24	24	SAMPLED AS Medium Dense	SILTY SAND, 1	Γan, Μα	oist,		_	12 16	24	1-∞		
10										_		/	/		
									-						
					(SP-SM) FINE Medium Dense	SAND WITH S	ILT, Br	own, Moist,		_					
					wiedium Dense	;				 5	4				
15	S-6	SS	18	18						<u>—</u> ∑	5 6	● ⊗-11			
										- -					
					(OD OM) FINIS	OAND WITH O				_					
						SAND WITH Slown, Wet, Loos		mains							
	S-7	ss	18	18							2	⊗-3			
20										_	2				
										_					
					(SP) FINE SAN	ND, Gray to Bro	wn, We	et, Medium		_					
					Dense	•				_ -5					
	S-8	ss	18	18						_	9 11 11	22	\otimes		
25 —										_	''				
										_					
										_					
										-10	5				
	S-9	SS	18	18							7 11	18-⊗			
30															
											CC	ONTINUED	10	NEXT	PAGE.
	THE	STRA	ATIFIC	CATION	I LINES REPRESENT	THE APPROXIMAT	E BOUNI	DARY LINES BI	TWEEN S	SOIL TYP	ES. IN-	SITU THE TRANSITI	ON M	AY BE GRADUA	AL.
<u></u> ₩L 1	5			ws	WD⊠	BORING STARTE	D	01/16/17			CAVE	E IN DEPTH			
₩ WL(SH			<u>*</u>	WL(AC	:R)	BORING COMPLE	TED	01/16/17			HAMI	MER TYPE Auto			
ÿ WL RIG ATV							FOREMAN [D. Franc	is	DRILI	LING METHOD SP	 Т			

CLIENT							JOB#		BORING	à #		SHEET			
Florid	a Inl	and	Na	vigat	ion District		2 ARCHITI	24842 ECT-ENGINEER	R	P-3		2 OF 2	2	=	8.
					nagement Are	a M-8	Taylo	or Enginee	ering, lı	nc.		CALIBRA	TED PE	ECS Grou	p of Companies DNS/FT ²
Couth	Indi	an F) ive	. Dr	ivo Ct Lucio	County El						11	2	3 4	5+
NORTHIN	IG IG	<u> </u>	TIVE	EASTIN	ive, St. Lucie	STATION						RQD% -		SIGNATION & REC.% 60% 80%	
			<u>-</u>	Π	DESCRIPTION OF N	MATERIAL		ENGLISH	UNITS		1	•	•		•
F	Ŏ.	TYPE	DIST. (II	(IN) YF	BOTTOM OF CASIN	g 🖿	LOSS C	OF CIRCULATIO		EVELS ON (FT)		PLASTIC LIMIT %		VATER NTENT %	LIQUID LIMIT %
ОЕРТН (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	SURFACE ELEVATION	on 18.38			- - - - - - - - -	WATER LEVELS ELEVATION (FT)	BLOWS/6"		ANDARI BL	D PENETRATI	
		0)	0)	"		ND, Gray to Bro	wn, We	t, Medium		<u>> ш</u> _	ш	10	20	30 40	50+
_					Dense (SP-SM) FINE Wet, Medium	SAND WITH S	ILT, Gra	ay Brown,		_					
_ 	S-10	SS	18	18	vvet, iviedidiii	Delise				 -15 	3	1:4-\&			
35 —										-	8				
_						SAND WITH S		ay, Wet,		_					
	S-11	SS	18	18	Dense, Contai	ns Shell Fragmo	ents			- -20	8 14			33-8	
40 —	0-11			10	END OF BOR	ING @ 40'				_	19			33 🛇	
										_					
_									E	– – -25					
_										_					
45 —										_					
_										_					
_										-30					
50 —										_					
_										_					
									-	_ 05					
_									E	 -35 					
55 										_					
_										_					
_										- -40					
60									-	_					
_									-	_					
¥ wL		E STRA	ATIFIC	WS 🗌	N LINES REPRESENT	THE APPROXIMAT BORING STARTE		01/16/17	TWEEN SC	OIL TYP		SITU THE TRANSI	TION M	AY BE GRADI	JAL.
₩ WL(S			<u></u>	WL(AC		BORING COMPLE		01/16/17				MER TYPE Auto			
₩ WL RIG ATV								FOREMAN D	. Francis	s	DRIL	LING METHOD S	PT		

CLIENT						JOB#	E	BORING #		SHEET	П		
Florida Inl	and I	Nav	via a t	ion District		248	42	P-4		1 OF 2		— 8	3/1
PROJECT NAME	anu i	vav	vigai	IOH DISTRICT		ARCHITECT-	ENGINEER	Γ-4	-	1 1012		-	
Dredged N	<u> Mater</u>	rial	Mar	agement Are	a M-8	Taylor E	ngineeri	ng, Inc.				ECS Group of	
												ETROMETER TON 3 4	S/F12 5 _. +
South Indi	<u>an R</u>	live	r Dri Eastin	ve, St. Lucie	County, FL						Y DES	SIGNATION & RE	COVERY
			_,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		0.7					RQD% — 20% 409	- -	REC.% — 60% 80%	100%
				DESCRIPTION OF M	ATERIAL		ENGLISH UN	NITS	+				•
	М	Ĭ.	<u> </u>					_		PLASTIC LIMIT %		VATER NTENT %	LIQUID LIMIT %
(FT)	7	E DIS	ERY	BOTTOM OF CASING	g 🗶	LOSS OF CI	RCULATION)		9/	*		•	\longrightarrow
DEPTH (FT)	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	SURFACE ELEVATION	DN 18.21			WATER LEVELS ELEVATION (FT)	BLOWS/6"	⊗STAN	NDARD BL) PENETRATION OWS/FT	1
0 0	<i>\S</i>	Ś	<u> </u>	_ Topsoil Depth	[6 00"]			<u> </u>	2	10 20 : :)	30 40	50+ :
S-1	ss	24	24	(SP) FINE SAN	ND, Brown Gray	to Brown,	Moist,	_	4 4	8-⊗			
				Loose to Medio	um Dense				3				
S-2	SS	24	24					15	4	8-🛇			
									4				
5 — S-3	SS	24	24						4	8-&			
									7 6				
S-4	SS	24	24						6 7 7	13-🛇			
								10	4 4				
S-5	SS	24	24						6	10-⊗			
10													
					WEATHERED I								
				SAMPLED AS	SILTY SAND,	Tan, Moist,	Dense	5	5		`		
S-6	SS	18	18						18 15			33-⊗	
15 —													
1 3 1				2 2 2 2	ND, Orange to E	Brown, Wet,		——————————————————————————————————————					
				Medium Dense	e to Dense			0	10				
S-7	SS	18	18						12 20		3	32-⊗	
								E,					
S-8	SS	18	18					-5	9 15		2	1_0	
25	33	10	10					_	16		3	1-8	
											/	/	
								-10					
	SS	18	18						10 11	23	- ✓		
30									12		Γ		
	ı		1				<u> </u>		000			LNEVE	
	_ OTD *	TICI	NATIO:	LLINEO DEDDECERT	THE ADDROVING	E BOUND & DY	LINEO DETV	IEEN OO'' T''		NTINUED			
	ESIKA			I LINES REPRESENT				EEN SUIL IYI			UN M	AT BE GRADUA	L.
₩ WI (SHW)			WI (AC	WD 🗵	BORING COMPLE		6/17			IN DEPTH MER TYPE Auto			
₩ WL(SHW) ₩ WL(ACR) BORING COMPLE W WL RIG ATV							6/17 REMAN M . F	- oster		ING METHOD SP	т		

CLIENT							JOB#		BORING	G #		SHEE	T		1
Florid	a Inl	and	Na	vigat	ion District		ARCHI	24842 FECT-ENGINEER		P-4		2 OF	2	=	8.
Dredo	ed N	/late	<u>rial</u>	Mar	nagement Are	ea M-8	Tayl	or Enginee	ering, I	nc.		CALIE	BRATED PE	ECS Group	of Companies
South	Indi	an F	Rive	r Dri	iva St Lucia	County El						11	2	3 4	5,+
NORTHIN	IG	<u>u</u>		EASTIN	ive, St. Lucie	STATION						RQD%			
			\Box	1	DESCRIPTION OF N	/ATERIAI		ENGLISH	PTIMIT			20%	40%	60% 80%	100%
		'PE	SAMPLE DIST. (IN)	<u> </u>			1000	OF CIRCULATIO	I	/ELS		PLASTIC LIMIT %		WATER ONTENT %	LIQUID LIMIT %
ОЕРТН (FT)	SAMPLE NO.	SAMPLE TYPE	PLE DI	RECOVERY (IN)	BOTTOM OF CASIN		LUSS	OF CIRCULATIC	N /1004/	WATER LEVELS ELEVATION (FT)	BLOWS/6"	 	STANDAR	D PENETRATIO	——∆ N
DEP.	SAM	SAM	SAM	REC						WAT	BLO	10	20 20	LOWS/FT 30 40	50+
					Medium Dens	ND, Orange to E e to Dense	Brown,	Wet,		<u>-</u>					
_									<u> </u>	 -15			/		
35—	S-10	SS	18	18						<u> </u>	4 5 8	13-⊗			
										<u> </u>					
						SAND WITH S				- -)	\		
				<u> </u>	Wet, Medium	Dense, Contains	s Shell	Fragments		 -20	2				
40 —	S-11	SS	18	18	END OF BOR	ING @ 40'				_	7 13	2	0-⊗		
_										- 					
_										. 05					
_										 -25 					
45 —										_					
										<u> </u>					
_									_	- -30					
50										 -					
										-					
_										- -					
									-	 -35					
55 —										_					
_										-					
_										 10					
_															
60 —															
	1				I				ı L	_	1	<u> </u>	- !	<u>i</u>	<u> </u>
	ТШ	= STP	ATIF!	CATION	LINES REPRESENT	THE APPROYIMAT	E BOLINI	DARY I INF RE	TWEEN S	OII TYP	ES IN	SITU THE TRAN	ISITION N	MAY BE GRADU	AI
¥ wL		_ 0111/		ws 🗌		BORING STARTE		01/16/17		J.E 11F		E IN DEPTH	.5	DE GRADO	· •
₩ WL(S			<u>*</u>	WL(AC	CR)	BORING COMPLE	ETED	01/16/17			НАМ	MER TYPE Aut	to		
							DRILI	LING METHOD	SPT						

CLIENT	CLIENT JOB#							BORIN	IG#		SHEET		
Florida PROJECT	a Inl	and	Na	vigat	ion District		24842 ARCHITECT-ENGI	NEER	W-1		1 OF 3	8	4
Dredg SITE LOC	ed N	Mate	<u>rial</u>	Mar	agement Are	a M-8	Taylor Engi	neering,	Inc.			ECS Group of	S/FT2
South	Indi	an F	Rive	r Dri	ve, St. Lucie	County, FL					1 2 ROCK QUALITY DE	3 4 SIGNATION & RE	5 ₊ COVERY
NORTHIN	G			EASTIN	lG	STATION					RQD% ——	- REC.% —	
			Î	Τ	DESCRIPTION OF M	IATERIAL	ENC	GLISH UNITS			20% 40% PLASTIC	60% 80%	100% LIQUID
Ĺ.	NO.	TYPE	DIST. (II	AY (IN)	BOTTOM OF CASING	g 🔀	LOSS OF CIRCUI	ATION 200%	EVELS ON (FT)			WATER DINTENT %	LIMIT %
ОЕРТН (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	SURFACE ELEVATION	ON 29.71			WATER LEVELS ELEVATION (FT)	BLOWS/6"	В	D PENETRATION LOWS/FT	
0 _	S-1	SS	24	24	(SP) FINE SAN to Medium Dei		Moist, Very Loc	se	<u>> ш</u> - -	1 2 3	10 20 5-⊗	30 40	50+
	S-2	SS	24	24						1 1 2	⊗ -3		
5 -	S-3	SS	24	24					 - 25 -	3 4 4 4	8-8		
	S-4	SS	24	24					 	5 6 6 7	13-&		
	S-5	SS	24	24	(SP) FINE SAN Medium Dense	ND, Orange Bro	own, Moist,		<u>-</u> - -	6 5 9	18-⊗		
10 —									<u> </u>	8			
									_				
_									_	4			
15—	S-6	SS	18	18					15 	7 8	15-⊗		
									_				
_					(SP) FINE SAN Medium Dense	ND, Light Browr e	n, Moist to Wet,		_				
20—	S-7	SS	18	18					 10	4 6 7	13-🛇		
									- - -				
									_ 	7			
25—	S-8	SS	18	18					5 5	10 12	22-🛇		
									_				
									<u>-</u> -				
30 —	S-9	SS	18	18					 0 	8 7 8	15-⊗		
,	,	. '			•					CC	ONTINUED O	N NEXT	PAGE.
	TH	E STR	ATIFIC	CATION	I LINES REPRESENT	THE APPROXIMAT	E BOUNDARY LINE	S BETWEEN S	SOIL TYP	ES. IN-	SITU THE TRANSITION N	MAY BE GRADUA	L.
₩ WL				ws 🗌		BORING STARTE					E IN DEPTH		
₩ WL(SI	HW)		<u></u>	WL(AC	:R)	BORING COMPLE					MER TYPE Manual		
₩ WL	₩L RIG ATV FOREMAN D. Regist								ter	DRIL	LING METHOD SPT		

CLIENT							JOB#	BOR	ING#		SHEET		
Florida PROJECT	a Inla	and_	Na	vigat	ion District		24842 ARCHITECT-ENGI	NEER	W-1		2 OF 3		4
Dredge SITE LOCA	ed N	<u>late</u>	<u>rial</u>	Mar	agement Are	a M-8	Taylor Engi	neering	, Inc.		CALIBRATED PE	ECS Group of C	
South	Indi	an F	Rive	er Dri	ve, St. Lucie	County, FL					1 2 ROCK QUALITY DE	3 4	5 ₊
NORTHING	G			EASTIN	IG	STATION					RQD% ——	- REC.% —	
				T	DESCRIPTION OF M	IATERIAL	FNG	LISH UNITS	:	1	20% 40%	60% 80%	100%
E	Ö	ΓΥΡΕ	OIST. (IN	K (IN)	BOTTOM OF CASING		LOSS OF CIRCUI		1			WATER ONTENT %	LIQUID LIMIT %
DЕРТН (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	SURFACE ELEVATION	DN 29.71			WATER LEVELS ELEVATION (FT)	BLOWS/6"	BI	D PENETRATION LOWS/FT	
	S	S	S	<u>«</u>	(SP) FINE SAN Medium Dense		n, Moist to Wet,		<u>\$</u>	В	10 20	30 40	50+
									F				
35	S-10	ss	18	18					-5	6 8 11	19-🛇		
					(SP) FINE SAN	ND, Brown, Wet	t, Medium Dens	е					
	S-11	SS	18	18					-10	3 7 10	17-⊗		
40										10			
									E				
	S-12	ss	18	18						6	24-⊗		
45 —									-15	13			
_ 									E				
	S-13	SS	18	18						8 11	29	} -⊗	
50	0 10								-20	18			
					(SP) FINE SAN	ND, Gray, Wet,	Medium Dense	to					
	S-14	SS	18	18	Very Dense, C	ontains Shell F	ragments			23 30			55-8
55 —	3-14	33		10					-25	25			35 🛇
									E	6	18		
60	S-15	SS	18	18					-30	7 11			
				I	I				<u>1</u> _	CC	NTINUED O	N NEXT I	PAGE.
	THE	STRA	ATIFIC	CATION	I LINES REPRESENT	THE APPROXIMAT	E BOUNDARY LINE	S BETWEEN	N SOIL TYF		SITU THE TRANSITION N		
Ţ WL				ws□	WD⊠	BORING STARTE	D 01/26/17	7		CAVE	IN DEPTH		
₩ WL(SH	HW)		<u>=</u>	WL(AC	R)	BORING COMPLE	TED 01/26/17	7		HAMI	MER TYPE Manual		
₩ RIG ATV							FOREMA	N D. Reg	ister	DRIL	LING METHOD SPT		

CLIENT	LIENT JOB# BOP						BORING #	#		SHEET			
Florida PROJECT	a Inla	and_	Na	vigat	ion District		24 ARCHITEC	842 T-ENGINEER	\	W-1		3 OF 3	8./
Dredo	ed N	<u>late</u>	<u>rial</u>	Mar	agement Are	a M-8	Taylor	Enginee	ring, In	<u>c.</u>		CALIBRATED P	ECS Group of Companies ENETROMETER TONS/FT2
South	Indi	an F	Rive	r Dri	ve, St. Lucie	County, FL						1 2	3 4 5+
NORTHIN	IG			EASTIN	IG	STATION						RQD% ——	ESIGNATION & RECOVERY - REC.% ———
					DESCRIPTION OF N	AATEDIAL						20% 40%	60% 80% 100%
		щ	(N	<u> </u>				ENGLISH	I	<u>[</u>			WATER LIQUID ONTENT % LIMIT %
4 (FT)	В N N	E TY	E DIS	ÆRY	BOTTOM OF CASIN	G 🔛	LOSS OF	CIRCULATIO	<u>1 200%</u>	NOIL	9/S	X COTANDA	
ОЕРТН (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	SURFACE ELEVATI				WATER LEVELS	ELEVATION (FT)	BLOWS/6"	⊗STANDAR E 10 20	RD PENETRATION BLOWS/FT 30 40 50+
-					Very Dense, C	ND, Gray, Wet, Contains Shell F	ragments			•			
_					(SP) FINE SA Very Dense, V	ND, Gray, Wet, Veak Cementat	Medium Dion, Contain	ense to ins Shell			18		
65 —	S-16	SS	18	18	Fragments		ŕ		_	-35	19 15		34-🛇
										-			
_										-			
-													
70	S-17	ss	18	18					<u> </u>	-40	8 13 22		35-🛇
70 —													
_										-			
										-			
	S-18	ss	18	18						· · -45	9 11 13	24-&	
75 -									<u> </u>				
_										-			
_									#### 	-			
_	S-19	SS	18	18						· · -50	37 20 31		51-
80 —									<u> </u>				
_										-			
										3			
_	S-20	SS	18	18						· · -55	12 13 18		31-8
85 —											10		
_													
_										-			
	S-21	SS	10	10							50 50/4		50/4-🛇
90 —					END OF BOR	ING @ 90'		,		· -60			
_]									-			
	THE	STRA	ATIFIC	CATION	I LINES REPRESENT	THE APPROXIMAT	ΓΕ BOUNDAR	RY LINES BET	WEEN SOI	L TYP	ES. IN-	SITU THE TRANSITION	MAY BE GRADUAL.
— WL				ws□		BORING STARTE		/26/17		_		IN DEPTH	
₩ WL(S	HW)		<u> </u>	WL(AC	R)	BORING COMPL		/26/17		_	HAM	MER TYPE Manual	
₩ wl RIG ATV							F	OREMAN D.	Register	r	DRILL	LING 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.



KEY TO SOIL CLASSIFICATION

<u>Description of Compactness or Consistency in Relation</u>
<u>To Standard Penetration Resistance</u>

	Granular Material	s
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)

- MA 10	R DIVISION	Group		Y CLASSIFICATION CRITERIA	SOIL DESCRIPTION
WAJO	R DIVISION	Symbol	FINER THAN 200 SIEVE %	SUPPLEMENTARY REQUIREMENTS	SOIL DESCRIPTION
	Gravelly soils	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
-	(over half of coarse fraction larger than	GP	<5*	Not meeting above gradation for GW	Gap graded or uniform gravels, sandy gravels
Coarse grained	No. 4)	GM	>12*	PI less than 4 or below A-line	Silty gravels, silty sandy gravels
(over 50% by weight		GC	>12*	PI over 7 above A-line	Clayey gravels, clayey sandy gravels
coarser than No.	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
200 sieve)		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
	Low compressibility	ML	Plasticity chart		Silts, very fine sands, silty or clayey fine sands, micaceous silts
Fine grained	(liquid limit less	CL	Plasticity chart		Low plasticity clays, sandy or silty clays
(over 50%	than 50)	OL	Plasticity chart,	organic odor or color	Organic silts and clays of low plasticity
finer than No. 200	High compressibility	МН	Plasticity chart		Micaceous silts, diatomaceous silts, volcanic ash
sieve)	(liquid limit more	СН	Plasticity chart		Highly plastic clays and sandy clays
	than 50)	ОН	Plasticity chart,	organic odor or color	Organic silts and clays of high plasticity
Soils with fibr	ous 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

	Atterberg Limits ³ Percent Moisture - Density (Corr.) ⁵											
Sample Source	Sample Number	Depth (feet)	MC ¹ (%)	Soil Type ²	LL	PL	PI	Passing No. 200 Sieve ⁴	Maximum Density (pcf)	Optimum Moisture (%)	CBR Value ⁶	Other
B-2				0.5								
	S-5 S-14	8.00 - 10.00 53.50 - 55.00	4.9 24.2	SP SP				1.3 2.6				
B-3	0 14	30.30 - 33.00		OI .				2.0				
	D4S-287 S-2	0.00 - 5.00 2.00 - 4.00	0.1 2.7	SP SP				0.5 0.8	106.0	14.0		
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 S-6	4.00 - 6.00	0.2	SP SP				0.1				
B-5	3-0	13.50 - 15.00	2.6	3P				0.7				
D-3	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	D43	0.00 - 5.00	0.2	Jr .				U. <i>1</i>	105.4	13.1		
D-11	D4S-284	5.00 - 10.00	0.7	SP				1.0	108.7	13.1		
	<u></u>	2,00 10,00	J.,	<u> </u>				110				

Laboratory Tacting Cummary

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, PI: 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



7064 Davis Creek Road Ph: (904) 880-0960 Jacksonville, Florida 32256 Fax: (904) 880-0970

	Atterberg Limits ³ Percent Moisture - Density (Corr.) ⁵							Page 1			
Sample Source	Sample Number	Depth (feet)	MC1 (%)	Soil Type ²	LL	PL	PI	Passing No. 200 Sieve ⁴		Optimum Moisture (%)	Other
B-12	D4S S-4 D4S2	5.00 - 10.00 6.00 - 8.00 10.00 - 15.00	0.7 0.7 2.7	SP SP SP				0.5 1.1 0.0	108.7	14.4	OC=0.05
P-1	S-4 S-7	6.00 - 8.00 18.50 - 20.00	2.5 20.5	SP SP				1.5 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, PI: Plastic Limit, PI: Plasticity Index, CBR: California Bearing Ratio, OC: Organic Content (ASTM D 2974)

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Printed On: Friday, March 24, 2017



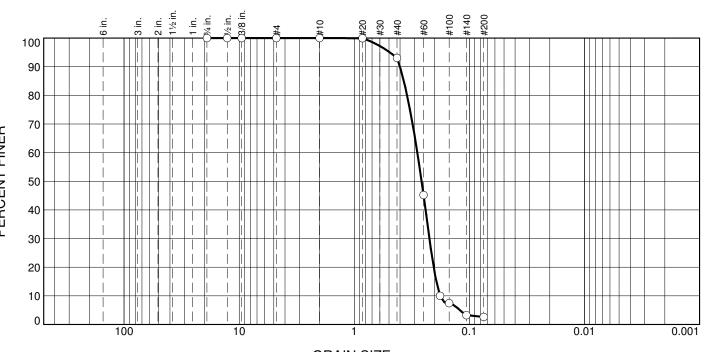
7064 Davis Creek Road Ph: (904) 880-0960 Jacksonville, Florida 32256 Fax: (904) 880-0970

Particle Size Distribution Report

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

Client: Florida Inland Navigation District

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



ַ ַ	GRAIN SIZE - mm.								
3	9/ . 2"	% Gravel	% 9	Sand	% Fines				
5	% +3 "	% Gravei	Coarse	Fine	Silt	Clay			
5	0	0	7	90	3				

SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(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		

	<u>Material Description</u>	<u>n</u>				
Dark Gray Fine	Sana					
PL=	Atterberg Limits LL=	PI=				
D ₈₅ = 0.3714 D ₃₀ = 0.2222 C _u = 1.57	Coefficients D ₆₀ = 0.2830 D ₁₅ = 0.1938 C _c = 0.97	D ₅₀ = 0.2598 D ₁₀ = 0.1800				
USCS= SP	Classification USCS= SP AASHTO=					
<u>Remarks</u>						

^{* (}no specification provided)

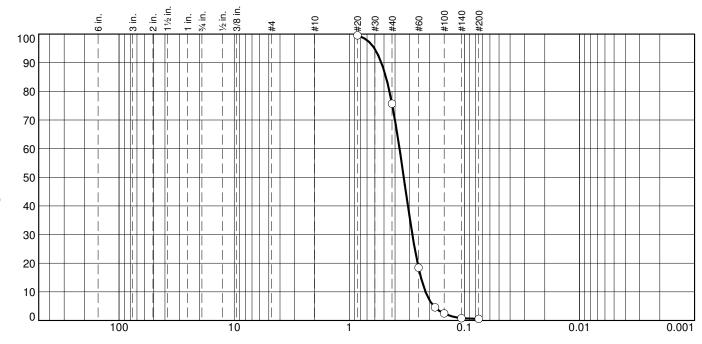
Particle Size Distribution Report

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

Client: Florida Inland Navigation District

Depth: 0.00-5.00

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



ַ פַ	GRAIN SIZE - mm.								
3	9/ . 2"	% Gravel	% 9	Sand	% Fines				
5	% +3"		Coarse	Fine	Silt	Clay			
				75	1				

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

		<u>1</u>
Gray Fine Sand		
PL=	Atterberg Limits LL=	PI=
D ₈₅ = 0.4802 D ₃₀ = 0.2829 C _u = 1.68	Coefficients D ₆₀ = 0.3660 D ₁₅ = 0.2383 C _c = 1.01	D ₅₀ = 0.3364 D ₁₀ = 0.2174
USCS= SP	Classification AASHTC)=
	Remarks	

⁽no specification provided)

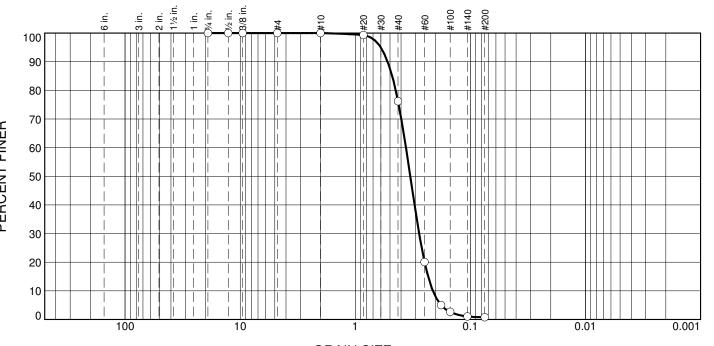
Particle Size Distribution Report

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:



²_		GRAIN SIZE - mm.				
3	9/ . 2!!	9/ Crovel	% Sand		% Fines	
51	% +3"	% Gravel	Coarse	Fine	Silt	Clay
=	0	0	24	75	1	

SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(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		

Material Description					
Gray Fine Sand					
PL=	Atterberg Limits	PI=			
FL=	LL=	r I=			
D ₈₅ = 0.4778 D ₃₀ = 0.2784 C _u = 1.71	D ₆₀ = 0.3628 D ₁₅ = 0.2328 C _c = 1.01	D ₅₀ = 0.3327 D ₁₀ = 0.2117			
USCS= SP	Classification AASHT	·O=			
	<u>Remarks</u>				

^{* (}no specification provided)

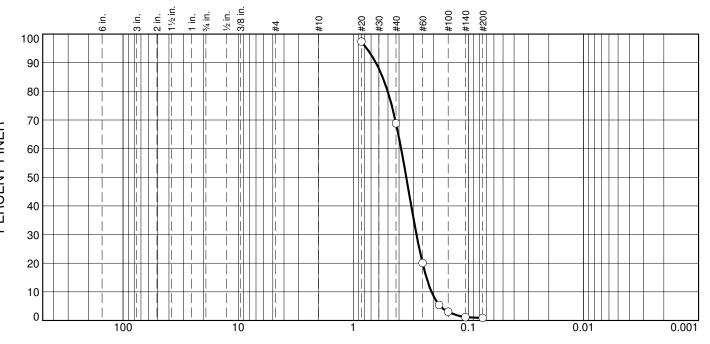
Particle Size Distribution Report

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:



<u>ַ</u>	GRAIN SIZE - mm.					
3	% +3"	% Gravel	% \$	Sand	% Fines	
5	/6 +3	% Gravei	Coarse	Fine	Silt	Clay
-				68	1	

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

<u>N</u>	Material Description				
Gray Fine Sand					
	Atterberg Limits				
PL=	LL=	PI=			
D ₈₅ = 0.5563 D ₃₀ = 0.2821 C _u = 1.84	Coefficients D ₆₀ = 0.3840 D ₁₅ = 0.2314 C _C = 0.99	D ₅₀ = 0.3463 D ₁₀ = 0.2091			
USCS= SP	Classification AASHT	O=			
	<u>Remarks</u>				

Figure

^{* (}no specification provided)

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicitive of

Particle Size Distribution Report

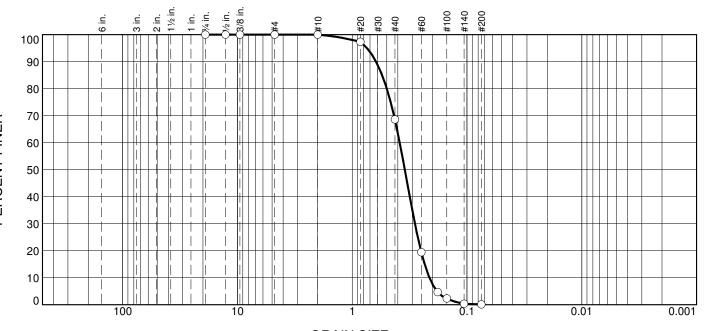
Project: Dredged Material Management Area M-8

Project No.: 24842

Client: Florida Inland Navigation District

Source of Sample: B-4 Sample Number: S-3 Depth: 4

Date: 2-22-17



 GRAIN SIZE - mm.

 %+3"
 % Gravel
 % Sand
 % Fines

 Coarse
 Fine
 Silt
 Clay

 0
 0
 31
 69
 0

SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(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		
*			

Material Description Lt. Gray Fine SA				
PL=	Atterberg Limits LL=	PI=		
D ₈₅ = 0.5495 D ₃₀ = 0.2841 C _u = 1.81	Coefficients D ₆₀ = 0.3859 D ₁₅ = 0.2340 C _C = 0.98	D ₅₀ = 0.3483 D ₁₀ = 0.2126		
USCS= SP	Classification AASHT	O=		
	<u>Remarks</u>			

* (no specification provided) Figure

Tested By: CA Checked By: JS

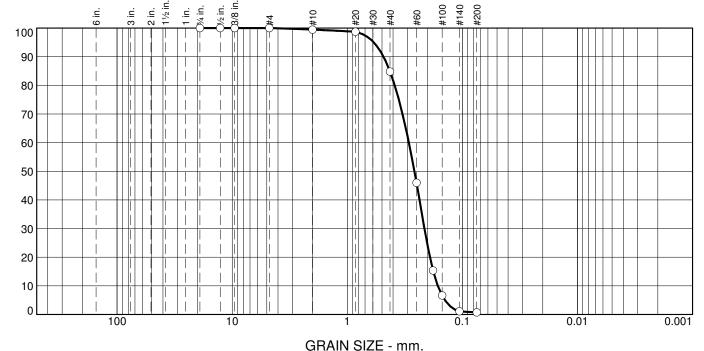
Particle Size Distribution Report

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

Client: Florida Inland Navigation District

Depth: 13.5

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



#30 #20

09#

% Graver Coarse Fine Silt Clay 0 1 14 84 1	Γ	0/ .0"	9/ Craval	% Sand		% Fines	
0 1 14 84 1	5	% +3"	% Gravel	Coarse	Fine	Silt	Clay
		0	1	14	84	1	

SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(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		

	Material Description Orange Brown Fine Sand					
PL=	Atterberg Limits LL=	PI=				
D ₈₅ = 0.4269 D ₃₀ = 0.2134 C _U = 1.78	Coefficients D ₆₀ = 0.2915 D ₁₅ = 0.1790 C _c = 0.95	D ₅₀ = 0.2607 D ₁₀ = 0.1636				
USCS= SP	Classification AASHT	O=				
	Remarks					

⁽no specification provided)

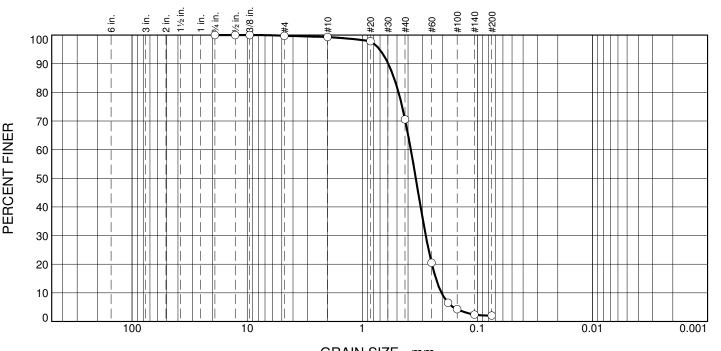
Particle Size Distribution Report

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

Client: Florida Inland Navigation District

Source of Sample: B-5 Sample Number: S-3

Date:



 GRAIN SIZE - mm.

 % +3"
 % Gravel
 % Sand
 % Fines

 Coarse
 Fine
 Silt
 Clay

 0
 1
 28
 69
 2

SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(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		

<u>N</u> Orange Fine Sar	Material Description Orange Fine Sand				
J					
PL=	Atterberg Limits LL=	PI=			
D ₈₅ = 0.5292 D ₃₀ = 0.2806 C _u = 1.85	Coefficients D ₆₀ = 0.3786 D ₁₅ = 0.2291 C _C = 1.01	D ₅₀ = 0.3429 D ₁₀ = 0.2048			
USCS= SP	Classification AASHT	O=			
	<u>Remarks</u>				

^{* (}no specification provided)

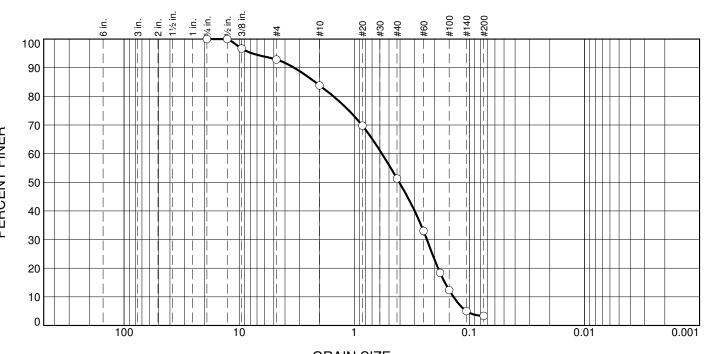
Particle Size Distribution Report

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

Client: Florida Inland Navigation District

Depth: 53.5

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



ַ ∠	GRAIN SIZE - mm.					
3	9/ . 2"	9/ Crovel	% Sand		% Fines	
% +3"	% Gravel	Coarse	Fine	Silt	Clay	
5	0	16	33	48	3	

SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(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		

<u> </u>	Material Description				
Gray Fine Sand					
PL=	Atterberg Limits	PI=			
	Coefficients				
D ₈₅ = 2.1937 D ₃₀ = 0.2337 C _u = 4.19	D ₆₀ = 0.5758 D ₁₅ = 0.1635	D ₅₀ = 0.4071 D ₁₀ = 0.1374			
O _u = 4.19	$C_{C}^{*}=0.69$				
USCS= SP	<u>Classification</u> AASHT	O=			
	<u>Remarks</u>				

⁽no specification provided)

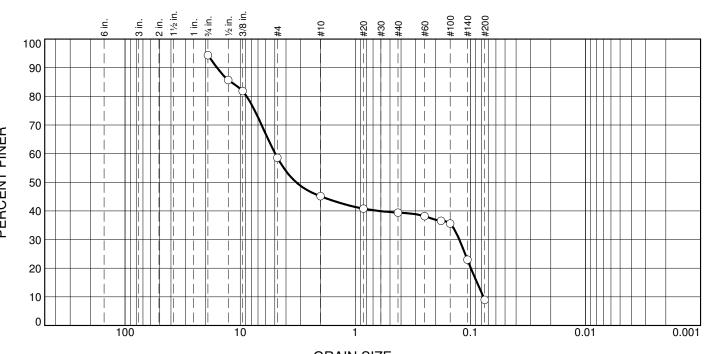
Particle Size Distribution Report

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

Client: Florida Inland Navigation District

Depth: 88.5

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



GRAIN SIZE - mm % Sand % Fines % +3" % Gravel Coarse Fine Silt Clay 9 6 30

SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(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						
PL=	Atterberg Limits LL=	PI=					
D ₈₅ = 12.0403 D ₃₀ = 0.1246 C _u = 64.51	Coefficients D ₆₀ = 4.9702 D ₁₅ = 0.0876 C _C = 0.04	D ₅₀ = 3.2610 D ₁₀ = 0.0770					
USCS= SP-SM	Classification AASHTC)=					
	<u>Remarks</u>						

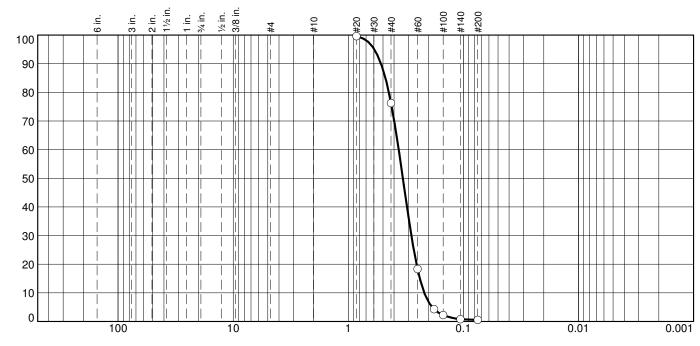
⁽no specification provided)

Particle Size Distribution Report

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

Client: Florida Inland Navigation District

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



GRAIN SIZE - mm.							
9/ . 3"	% Gı	ravel	% Sand		% Fines		
% +3"	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
					75	1	

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

<u>!</u>	Material Description				
Gray Fine Sand					
PL=	Atterberg Limits	PI=			
rL=	LL=	ri=			
D ₈₅ = 0.4755 D ₃₀ = 0.2828 C _U = 1.67	$\begin{array}{c} \underline{\text{Coefficients}} \\ D_{60} = 0.3647 \\ D_{15} = 0.2389 \\ C_{\text{C}} = 1.00 \end{array}$	D ₅₀ = 0.3355 D ₁₀ = 0.2184			
USCS= SP	Classification AASHT	0=			
	<u>Remarks</u>				

^{* (}no specification provided)

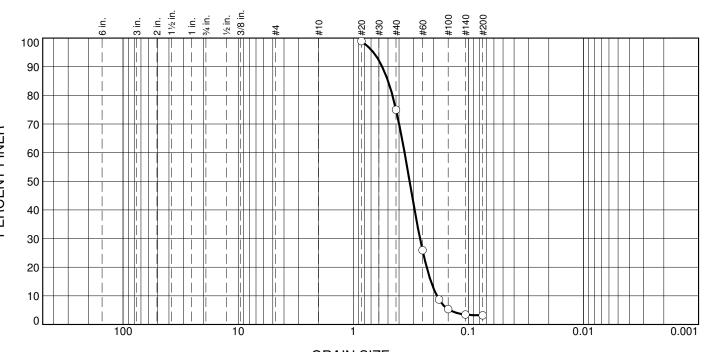
Particle Size Distribution Report

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

Client: Florida Inland Navigation District

Depth: 10.00-15.00

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



GRAIN SIZE - mm. % Fines % Gravel % Sand % +3" Coarse **Fine** Coarse Medium Fine Silt Clay 72 3

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

Material Description FINE SAND, Orange Brown					
PL=	Atterberg Limits	PI=			
D ₈₅ = 0.4988 D ₃₀ = 0.2628 C _u = 1.91	Coefficients D ₆₀ = 0.3584 D ₁₅ = 0.2112 C _C = 1.03	D ₅₀ = 0.3240 D ₁₀ = 0.1877			
USCS=	Classification AASHT	O=			
<u>Remarks</u>					

⁽no specification provided)

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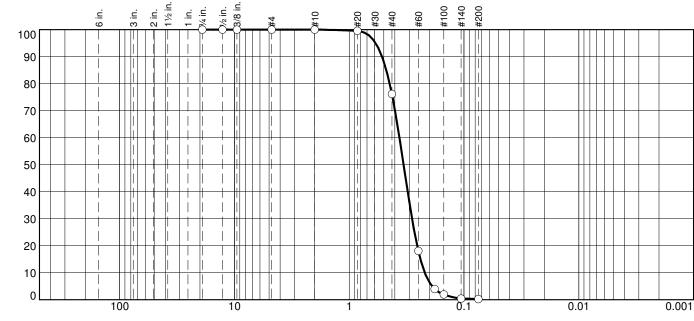
Particle Size Distribution Report

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

Client: Florida Inland Navigation District

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

Date:



 GRAIN SIZE - mm.

 % +3"
 % Gravel
 % Sand
 % Fines

 Coarse
 Fine
 Silt
 Clay

 0
 0
 24
 76
 0

SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(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		
*			

Material Description Lt Gray Fine SA					
PL=	Atterberg Limits LL=	PI=			
D ₈₅ = 0.4754 D ₃₀ = 0.2835 C _u = 1.66	Coefficients D ₆₀ = 0.3652 D ₁₅ = 0.2400 C _c = 1.00	D ₅₀ = 0.3361 D ₁₀ = 0.2199			
USCS= SP	Classification AASHTO)=			
	<u>Remarks</u>				

* (no specification provided) Figure

Tested By: CA Checked By: JS

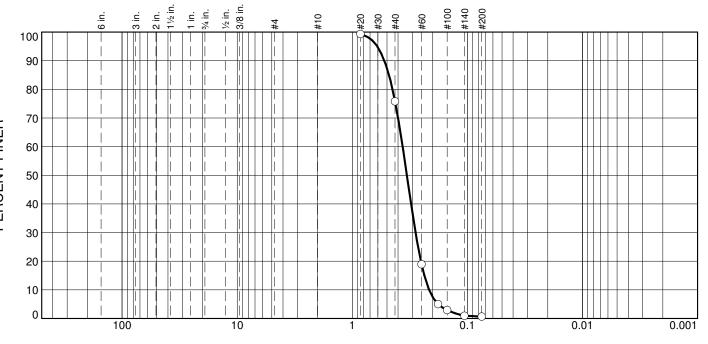
Particle Size Distribution Report

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

Client: Florida Inland Navigation District

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

Date:



	GRAIN SIZE - mm.							
9/ - 9!!			avel % Sand		% Fines			
ı	% +3"	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
I						75	1	

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

Material Description					
Gray Fine Sand					
PL=	Atterberg Limits LL=	PI=			
D ₈₅ = 0.4798 D ₃₀ = 0.2816 C _U = 1.70	$\begin{array}{c} \underline{\text{Coefficients}} \\ D_{60} = 0.3652 \\ D_{15} = 0.2364 \\ C_{\text{C}} = 1.01 \end{array}$	D ₅₀ = 0.3354 D ₁₀ = 0.2148			
USCS= SP	Classification AASHT	O=			
	<u>Remarks</u>				

^{* (}no specification provided)

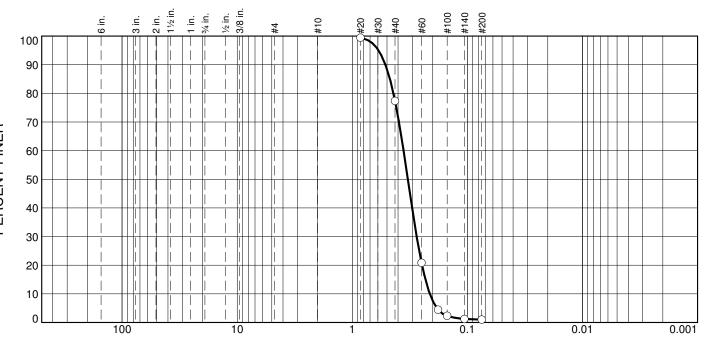
Particle Size Distribution Report

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:



?	GRAIN SIZE - mm.					
•	% +3"	9/ Crovel	% Sand		% Fines	
,	% +3	% Gravel	Coarse	Fine	Silt	Clay
				76	1	

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

_	Material Description (SP) FINE SAND, Light Gray, Moist, Very Loose to Loose					
PL=	Atterberg Limits LL=	PI=				
D ₈₅ = 0.4708 D ₃₀ = 0.2754 C _U = 1.69	Coefficients D ₆₀ = 0.3586 D ₁₅ = 0.2313 C _C = 1.00	D ₅₀ = 0.3289 D ₁₀ = 0.2119				
USCS= SP	Classification AASHT	O=				
<u>Remarks</u>						

Figure

^{* (}no specification provided)

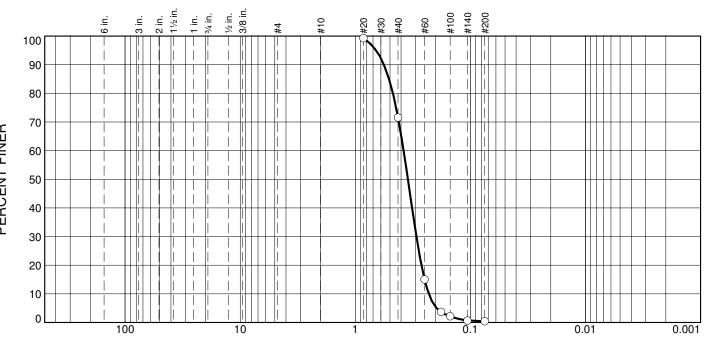
Particle Size Distribution Report

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

Client: Florida Inland Navigation District

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

Date:



?	GRAIN SIZE - mm.							
9/ . 2"		% Gı	ravel % Sand		% Fines			
5	% +3"	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
=						72	0	

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

<u>N</u>	Material Description						
Gray Fine Sand							
PL=	Atterberg Limits LL=	PI=					
D ₈₅ = 0.5093 D ₃₀ = 0.2940 C _u = 1.66	Coefficients D ₆₀ = 0.3804 D ₁₅ = 0.2499 C _C = 0.99	D ₅₀ = 0.3491 D ₁₀ = 0.2296					
USCS= SP	Classification AASHT	O=					
	<u>Remarks</u>						

^{* (}no specification provided)

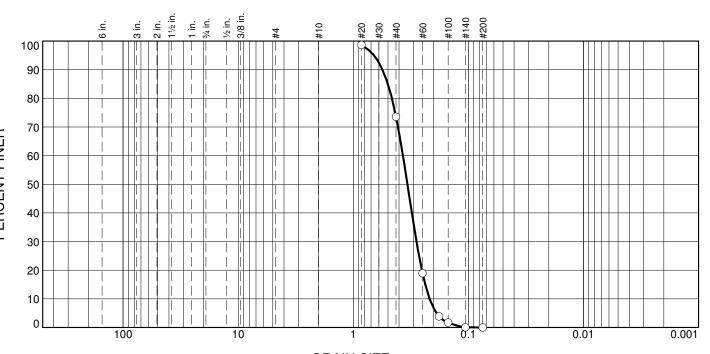
Particle Size Distribution Report

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

Client: Florida Inland Navigation District

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

Date:



 GRAIN SIZE - mm.

 % -3"
 % Gravel
 % Sand
 % Fines

 Coarse
 Fine
 Coarse
 Medium
 Fine
 Silt
 Clay

 74
 0
 0

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

Material Description							
Brown Fine San	d						
PL=	Atterberg Limits LL=	PI=					
D ₈₅ = 0.5006 D ₃₀ = 0.2821 C _u = 1.71	$\begin{array}{c} \underline{\text{Coefficients}} \\ \text{D}_{60} = 0.3703 \\ \text{D}_{15} = 0.2368 \\ \text{C}_{\text{C}} = 0.99 \end{array}$	D ₅₀ = 0.3384 D ₁₀ = 0.2170					
Classification USCS= SP AASHTO=							
<u>Remarks</u>							

Figure

⁽no specification provided)

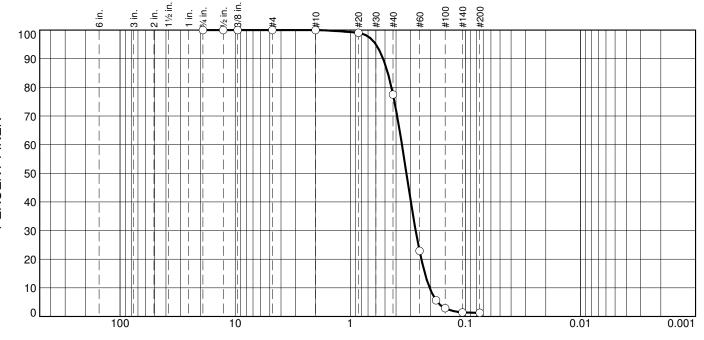
Particle Size Distribution Report

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:



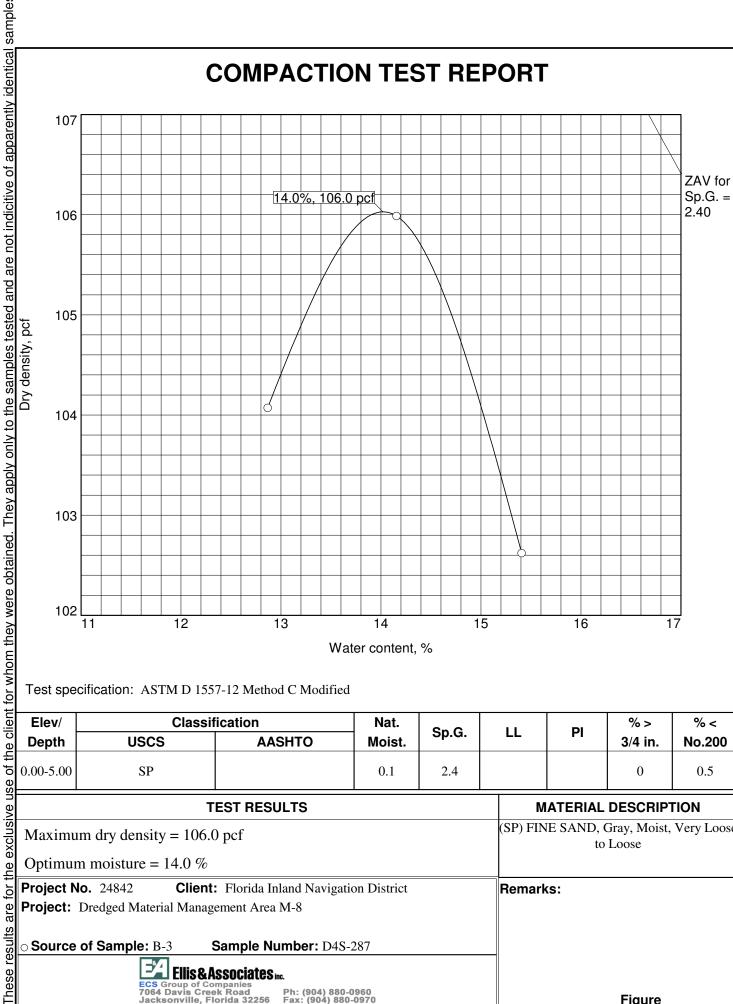
⅊	GRAIN SIZE - mm.							
=[9/ . 2"	% Gravel	% Sand		% Fines			
5	% +3"		Coarse	Fine	Silt	Clay		
5	0	0	23	76	1			

SIEVE	PERCENT	SPEC.*	PASS?
SIZE	FINER	PERCENT	(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		

Material Description							
Gray Fine Sand							
PL=	Atterberg Limits	PI=					
D ₈₅ = 0.4719 D ₃₀ = 0.2702 C _u = 1.74	Coefficients D ₆₀ = 0.3558 D ₁₅ = 0.2244 C _C = 1.00	D ₅₀ = 0.3252 D ₁₀ = 0.2043					
USCS= SP	Classification USCS= SP AASHTO=						
<u>Remarks</u>							

^{* (}no specification provided)

COMPACTION TEST REPORT



Test specification: ASTM D 1557-12 Method C Modified

₫	Elev/	Classif	ication	Nat. Moist.	Sp.G.	Sm C 11		DI	% >	% <
D D	Depth	USCS	AASHTO			LL	PI	3/4 in.	No.200	
Ξ 5 9	0.00-5.00	SP		0.1	2.4			0	0.5	

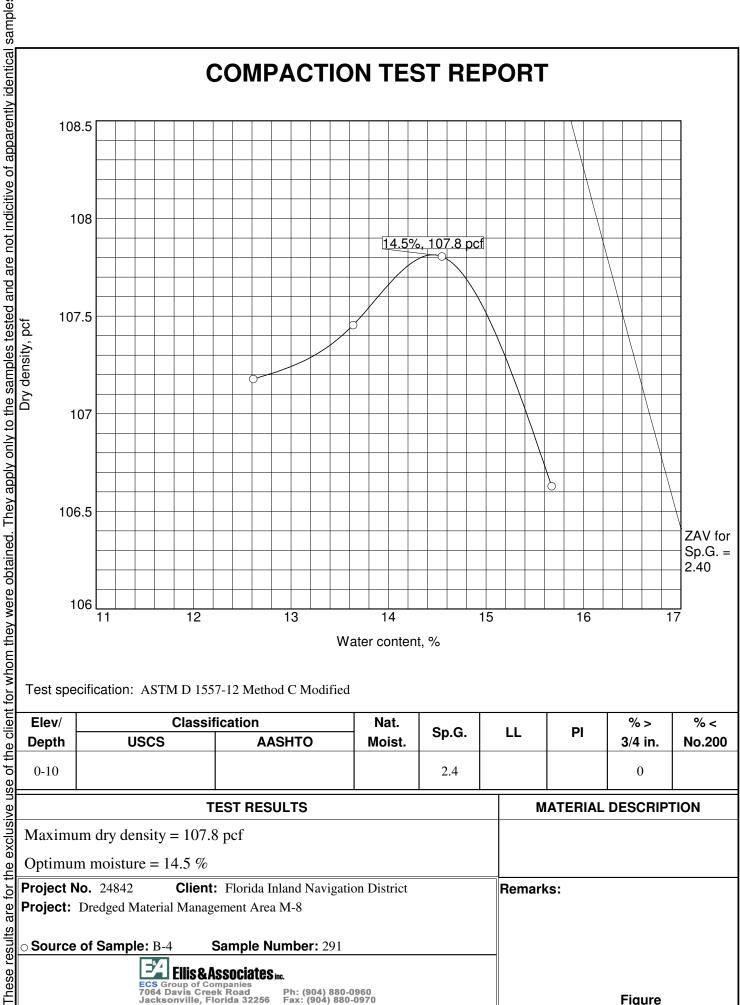
TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 106.0 pcf	(SP) FINE SAND, Gray, Moist, Very Loose to Loose
Optimum moisture = 14.0 %	
Project No. 24842 Client: Florida Inland Navigation District	Remarks:
Project: Dredged Material Management Area M-8	
○ Source of Sample: B-3 Sample Number: D4S-287	

○ Source of Sample: B-3 Ellis & Associates inc.

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

Figure

COMPACTION TEST REPORT

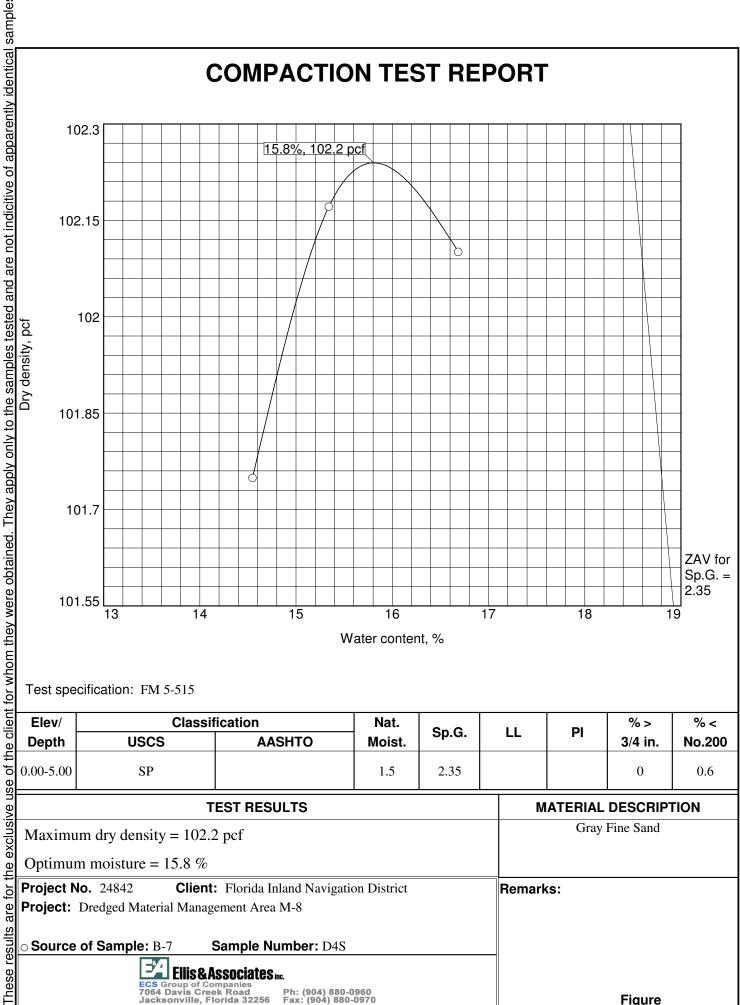


Test specification: ASTM D 1557-12 Method C Modified

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

0-10				2.4			0		
	TEST RESULTS					MATERIAL DESCRIPTION			
Maximu	um dry density = 107.8	3 pcf							
Optimu	m moisture = 14.5 %								
Project N	Project No. 24842 Client: Florida Inland Navigation District				Remark	(S:			
Project:	Dredged Material Manag	ement Area M-8							
		.							
○ Source	of Sample: B-4	Sample Number: 291							
		SSOCIATES inc.							
	ECS Group of Co 7064 Davis Cree Jacksonville, Fl	ek Road Ph: (904) 880-0					Figure		

COMPACTION TEST REPORT

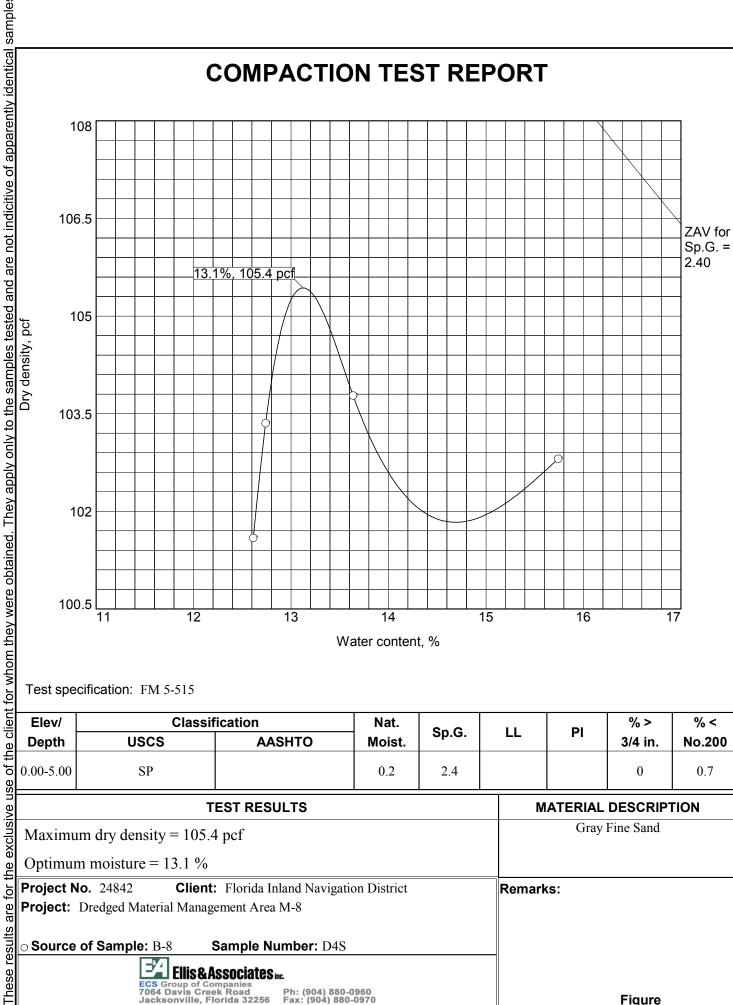


Test specification: FM 5-515

Elev/	Classi	fication	Nat. Moist.	Sp.G.	.G. LL	PI	% >	% <
Depth	USCS	AASHTO					3/4 in.	No.200
5 0.00-5.00	SP		1.5	2.35			0	0.6

á L						
Š	TEST RESULTS					IAL DESCRIPTION
Maximu	Maximum dry density = 102.2 pcf			G	Fray Fine Sand	
Optimun	Optimum moisture = 15.8 %					
Project N	lo. 24842 Client	: Florida Inland Navigation	on District		Remarks:	
Project:	Dredged Material Manag	ement Area M-8				
Source	of Sample: B-7	Sample Number: D4S				
2	E#4 Ellis&Associates inc.					
	ECS Group of Co 7064 Davis Cre Jacksonville, F					Figure

COMPACTION TEST REPORT

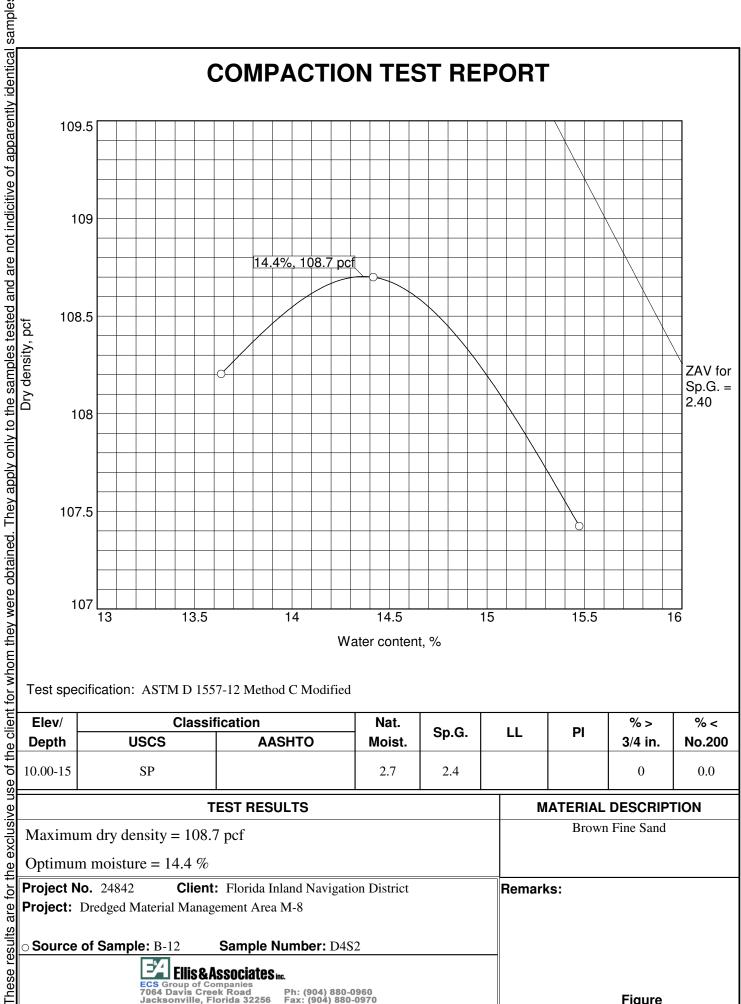


Test specification: FM 5-515

=	Elev/	Classif	ication	Nat.	en C	11	PI	% >	% <
c e	Depth	USCS	AASHTO	Moist.	Sp.G.	LL	PI	3/4 in.	No.200
) OI III	0.00-5.00	SP		0.2	2.4			0	0.7

8								
	Т	EST RESULTS			М	ATERIAL	DESCRIPT	ION
Maximu	Taximum dry density = 105.4 pcf				Gray	Fine Sand		
Optimu	m moisture = 13.1 %							
Project N	roject No. 24842 Client: Florida Inland Navigation District					(S:		
Project:	Dredged Material Manag	ement Area M-8						
⊙ Source	of Sample: B-8	Sample Number: D4S						
<u>{</u>	Ellis & Associates inc.							
-	ECS Group of Companies 7064 Davis Creek Road Jacksonville, Florida 32256 Ph: (904) 880-0960 Fax: (904) 880-0970						Figure	

COMPACTION TEST REPORT



Test specification: ASTM D 1557-12 Method C Modified

ECS Group of Companies 7064 Davis Creek Road Jacksonville, Florida 32256

Elev/	Elev/ Classification		Nat.	Sp.G.	11	PI	% >	% <
Depth	USCS	AASHTO	Moist.	აp.G.	LL	PI	3/4 in.	No.200
10.00-15	SP		2.7	2.4			0	0.0

)	
TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 108.7 pcf	Brown Fine Sand
Optimum moisture = 14.4 %	
Project No. 24842 Client: Florida Inland Navigation District	Remarks:
Project: Dredged Material Management Area M-8	
○ Source of Sample: B-12 Sample Number: D4S2	
FILIS & Associates in	

Figure

Ph: (904) 880-0960 Fax: (904) 880-0970



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 Manag	ement 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

Where: Kt = coefficient of permeability at

temperature, T

Q = volume of discharge, cm3

Kt = QL/thA

L = length of soil sample, cm

t = time, sec

h = total head, cm

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

101ago 1 011110abinty, 1120, 0111/000 = _______

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

Dry Density = 102.6 pcf Moisture = 14.3

Maximum Dry Density = pcf % Comp=

A = cross-section area, cm2

K20=[Ut/U20]Kt

Where:

Ut = Viscosity of water at temperature, T



Project No.:	35-24842	Tested By:	CMA	Date:	3/9/2017 Lab No.:		
Location:	B4	From:	0.5'-10'	Hole Number:			
Project:	Dredged Material Mana	gement Area M-8					
Client: Florida Inland Navigation District							
Sample:							
Н	leight, cm = 11.61	Diameter, cm =	15.23 Area, cm2 =	182.29 Constant	Head, cm = 110.81		
Wt. of Samp	ole + Mold = 6718.1				<u></u>		

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

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

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=

A = cross-section area, cm2

K20=[Ut/U20]Kt

Where:

Ut = Viscosity of water at temperature, T



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 =

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

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

A = cross-section area, cm2

K20=[Ut/U20]Kt

Where:

Ut = Viscosity of water at temperature, T



Project No.:	35-24842	Tested By:	CMA	Date:	2/24/2017	Lab No.:	
Location	R7	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

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

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



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



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



Project No.:	35-24842	Tested By:	CMA	Date:	2/24/2017	Lab No.:	
Location:	B11	From:	5-10	Hole Number:		·-	
Project:	Dredged Material Mana	agement 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



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

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



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

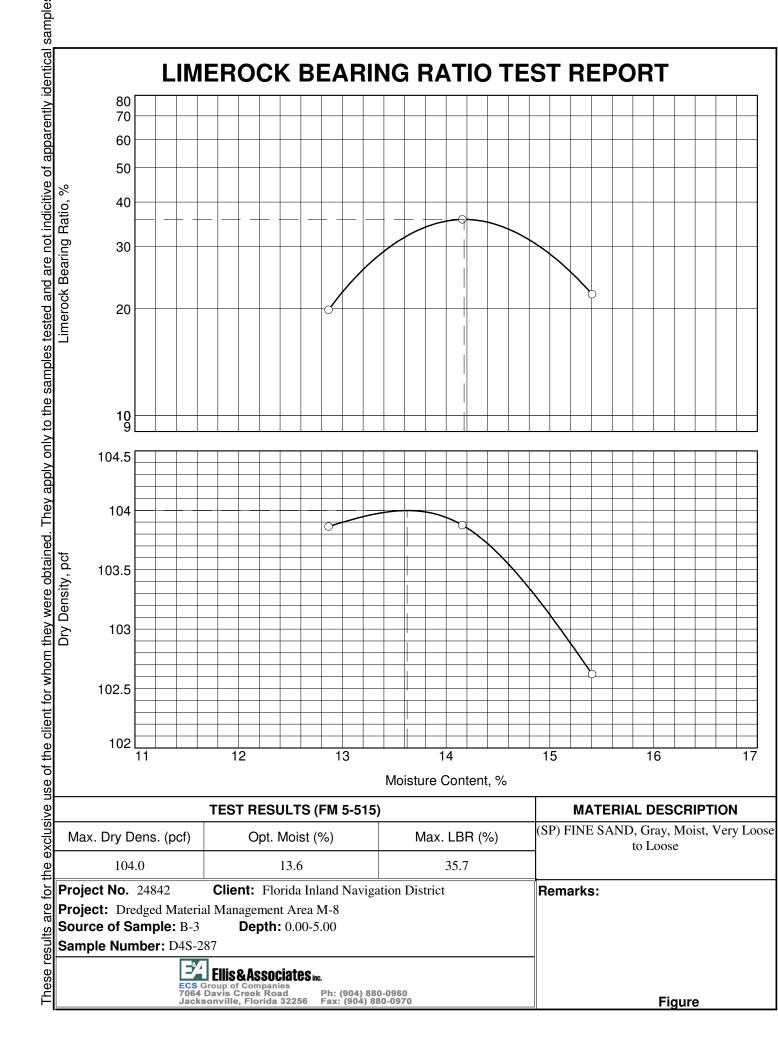
h = total head, cm

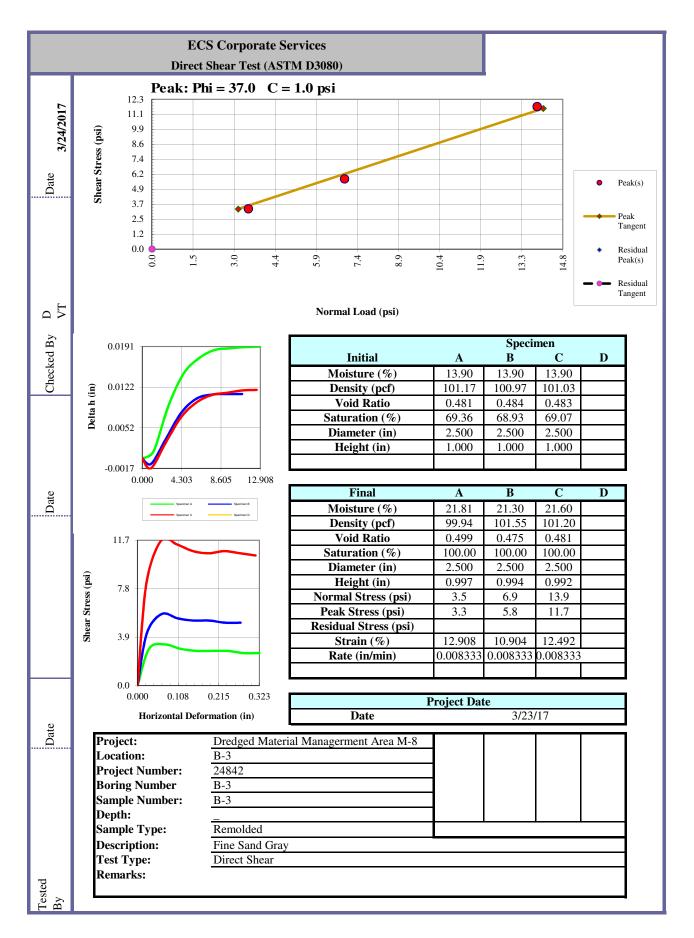
A = cross-section area, cm2

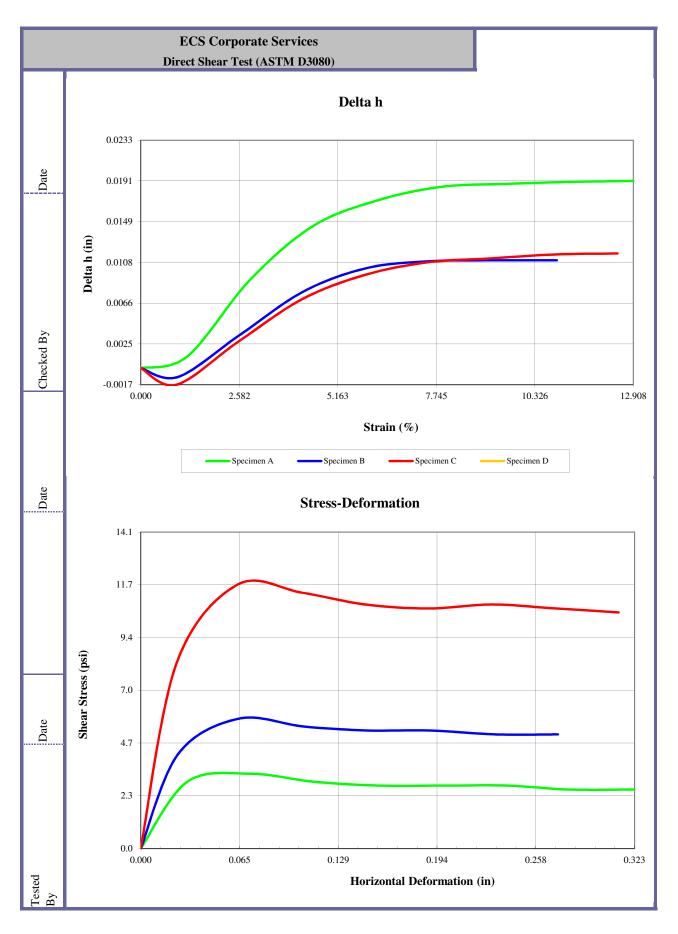
K20=[Ut/U20]Kt

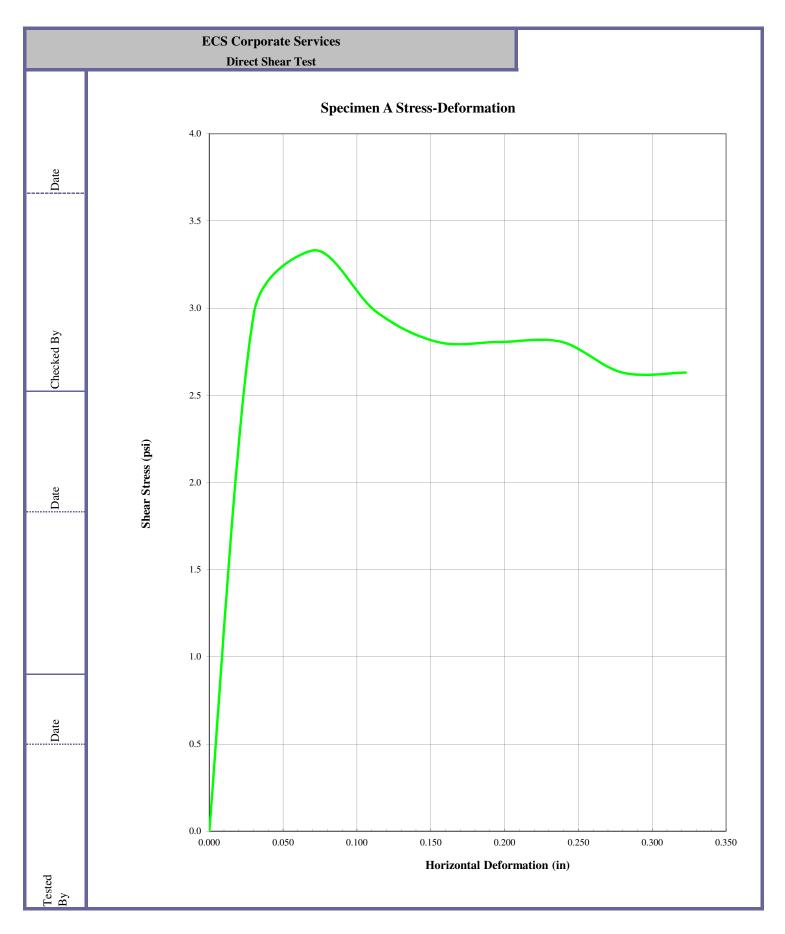
Where:

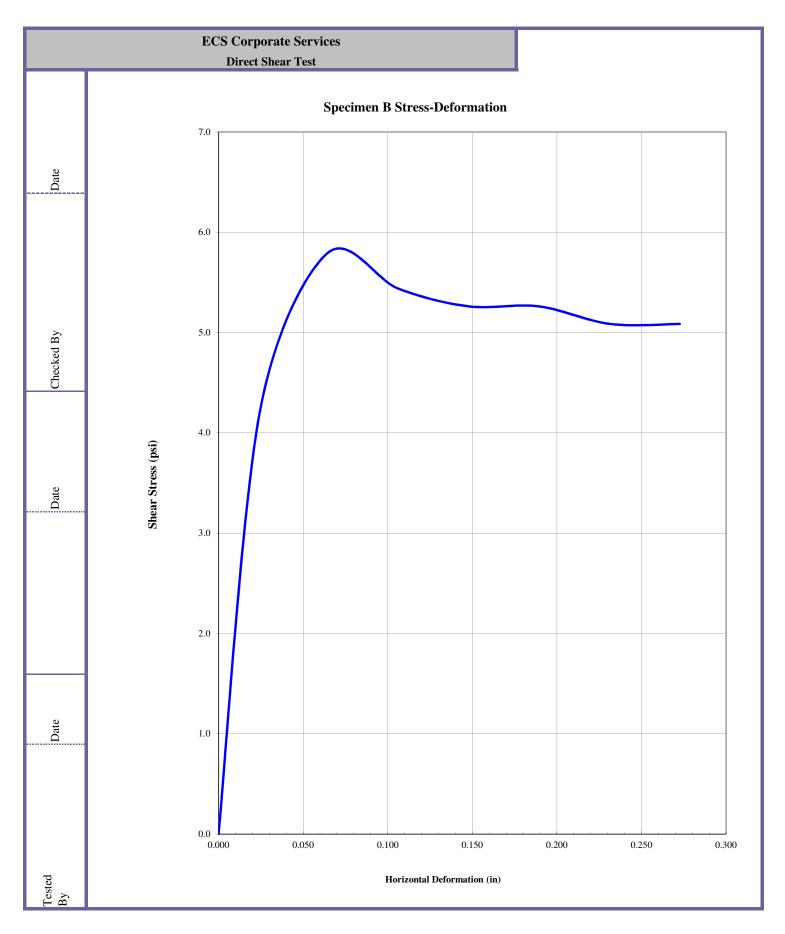
Ut = Viscosity of water at temperature, T

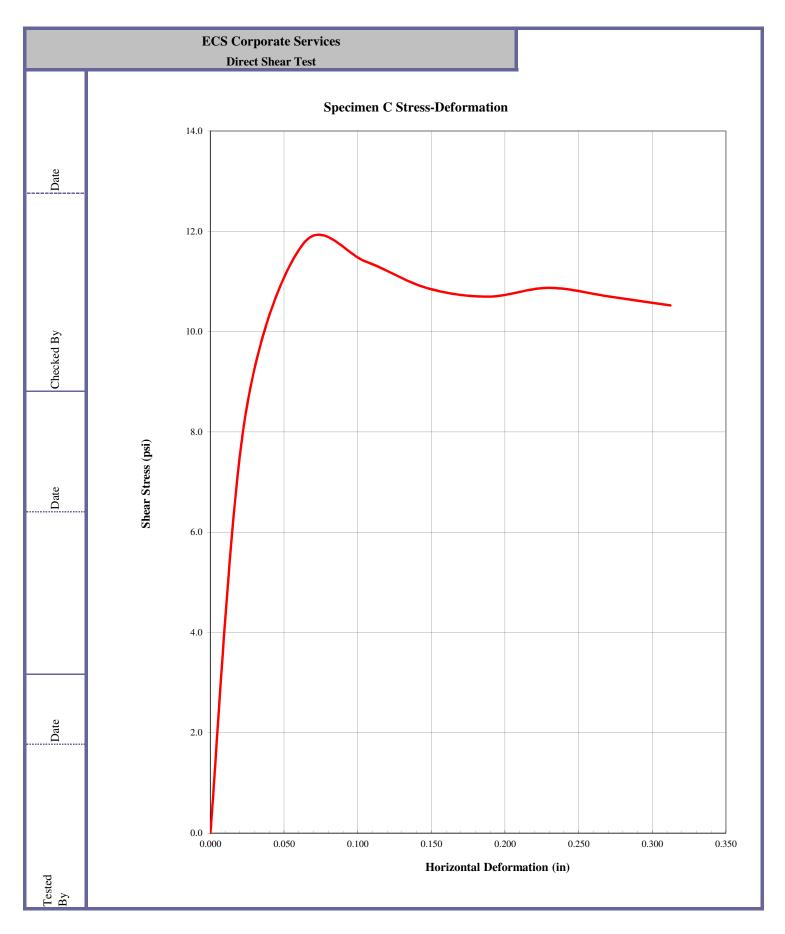


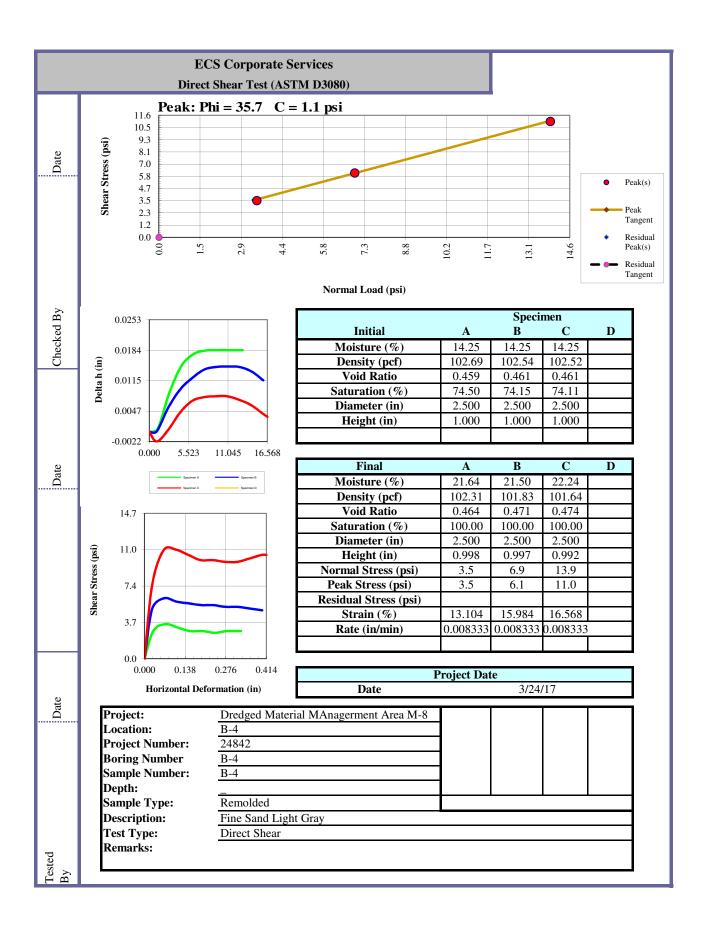


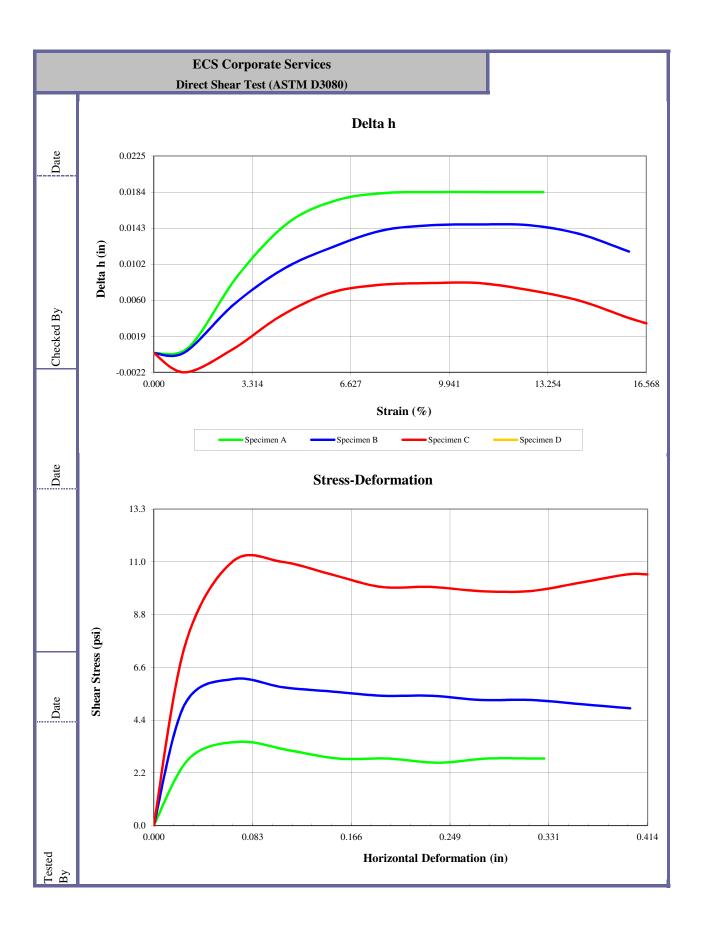


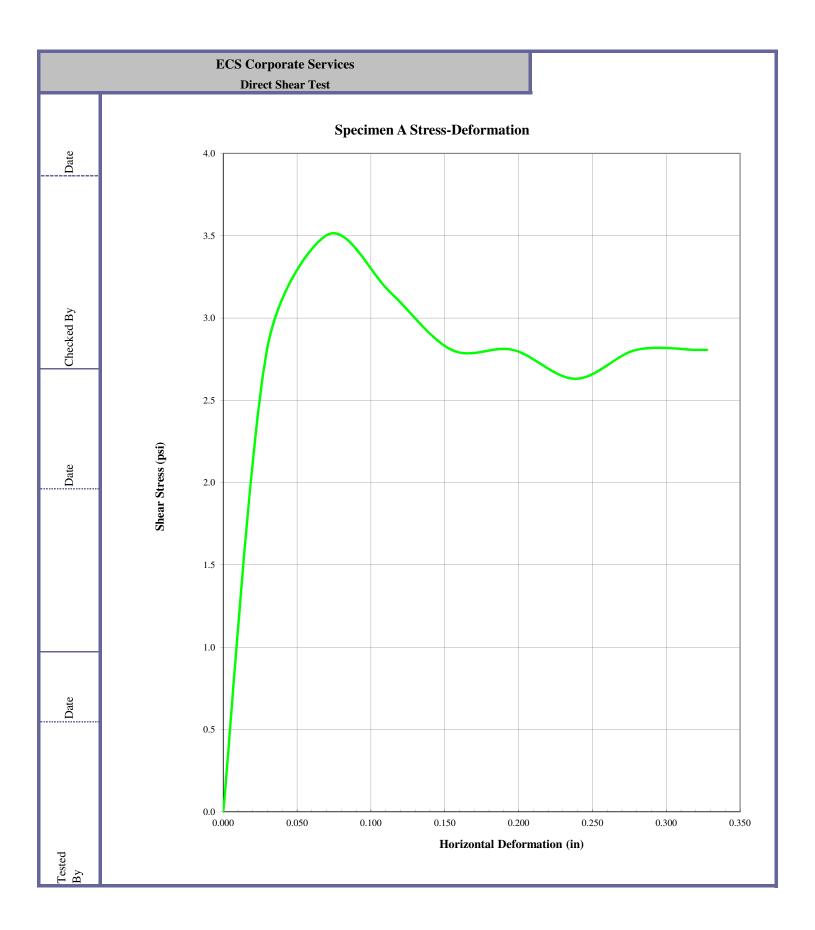


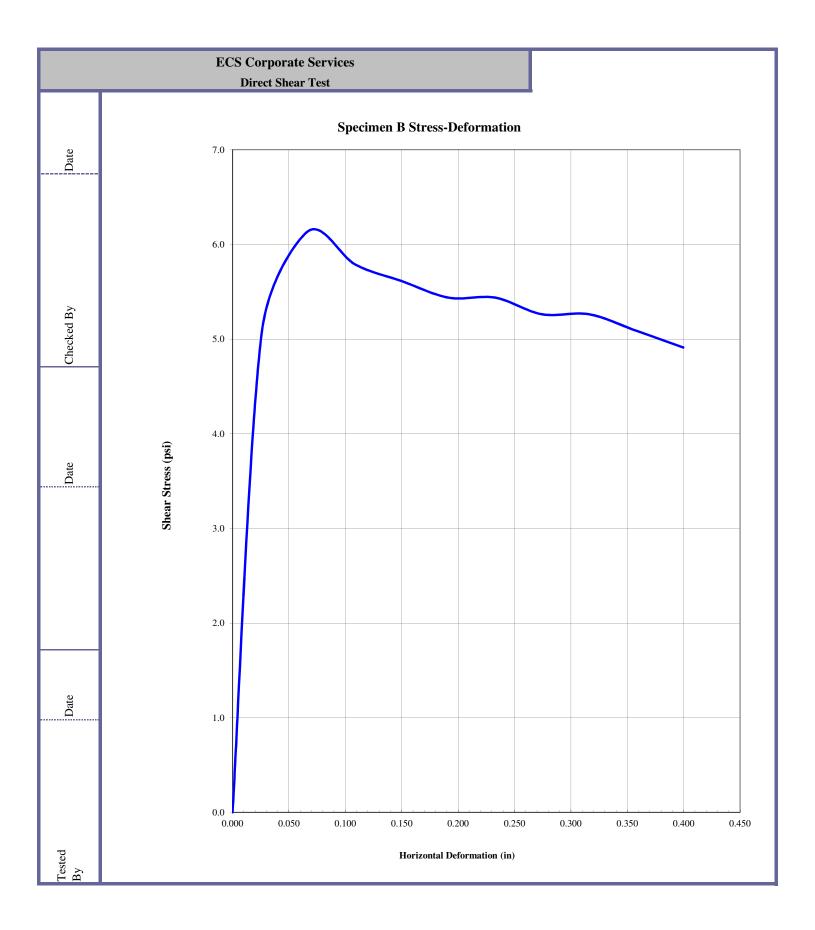


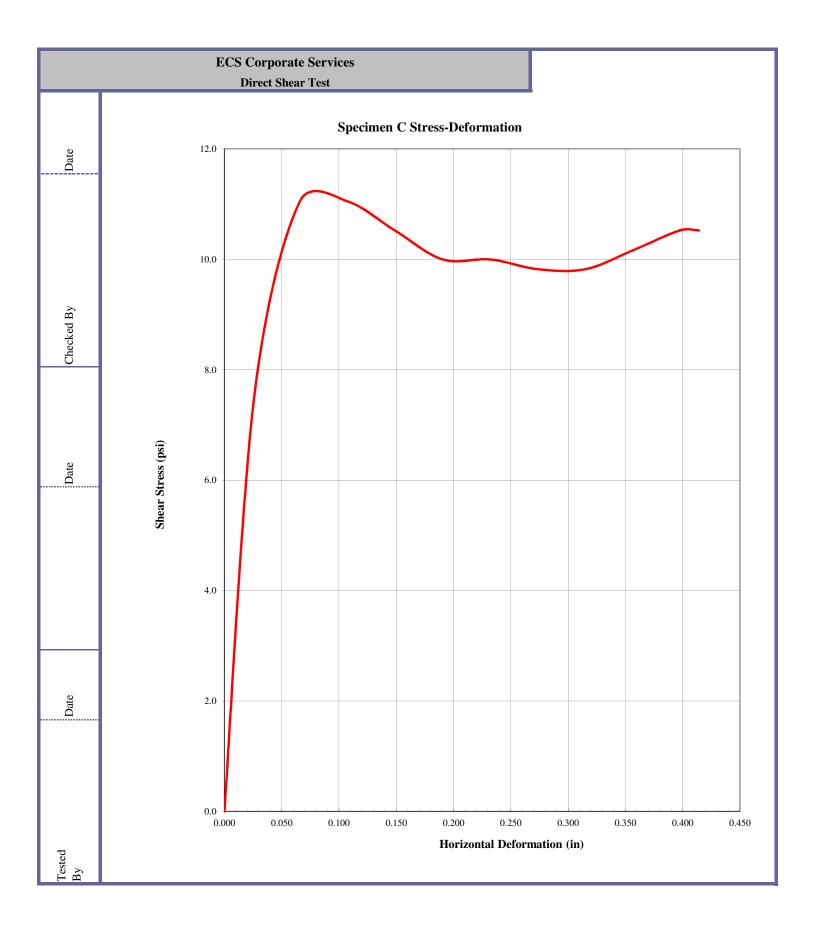


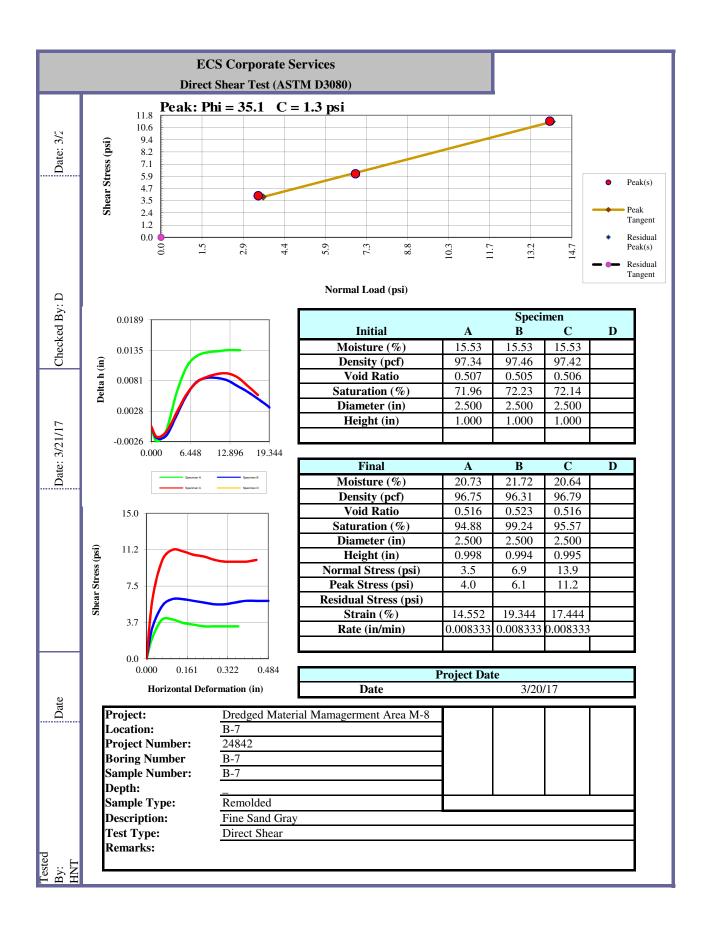


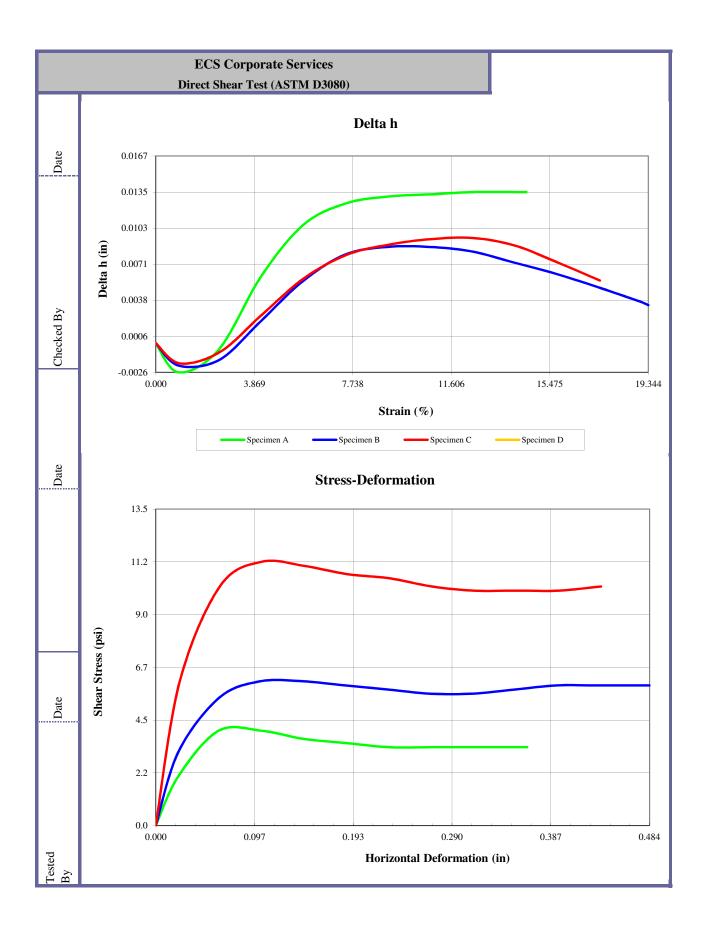


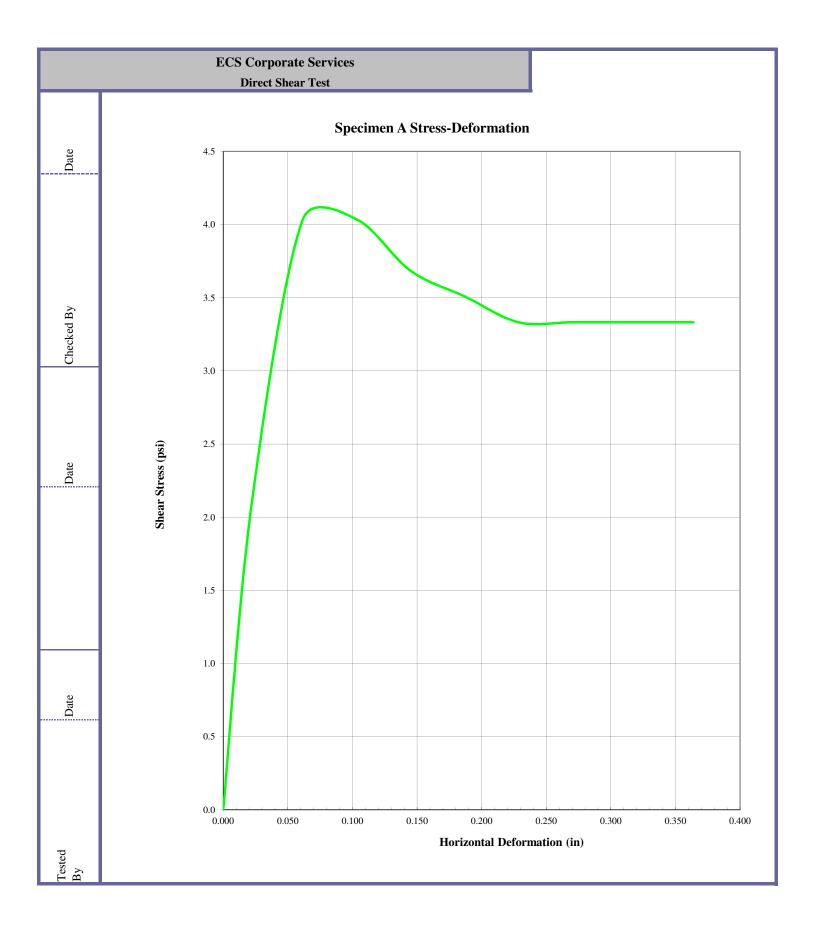


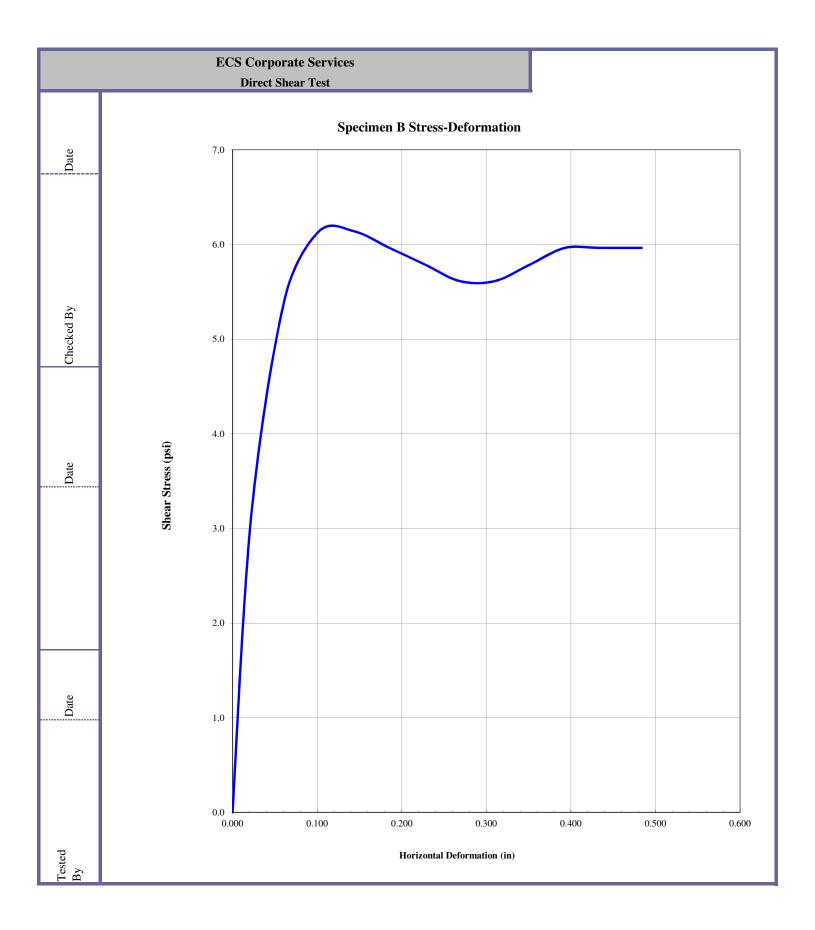


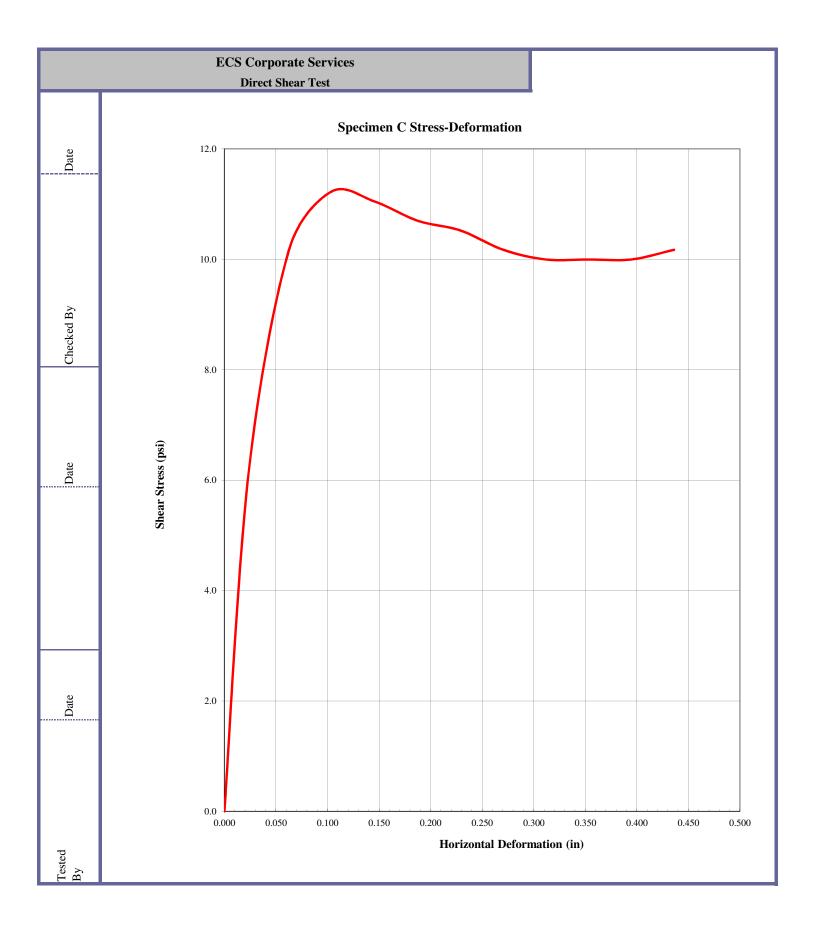


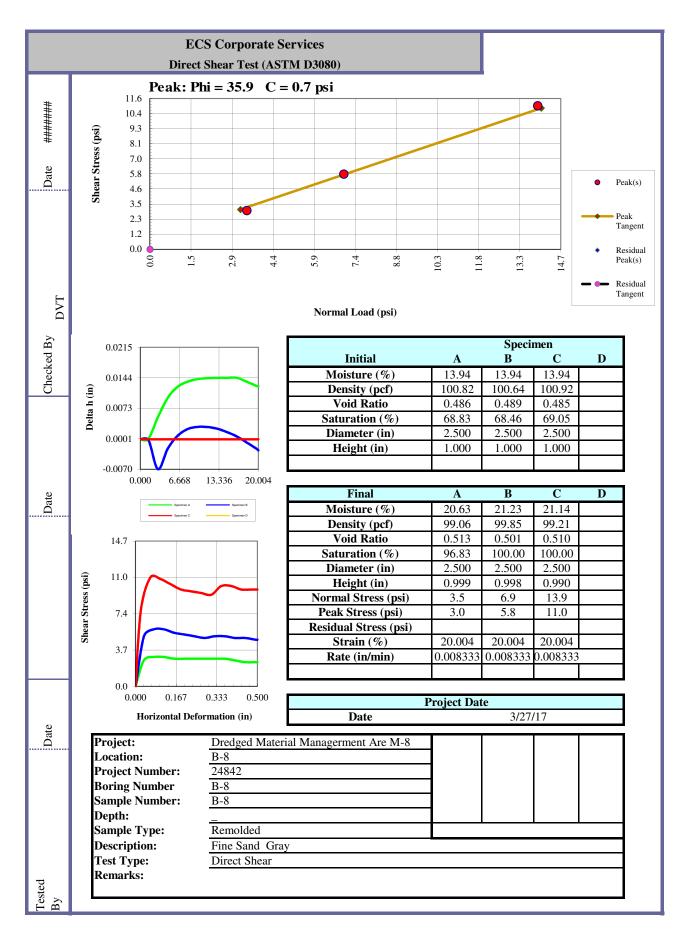


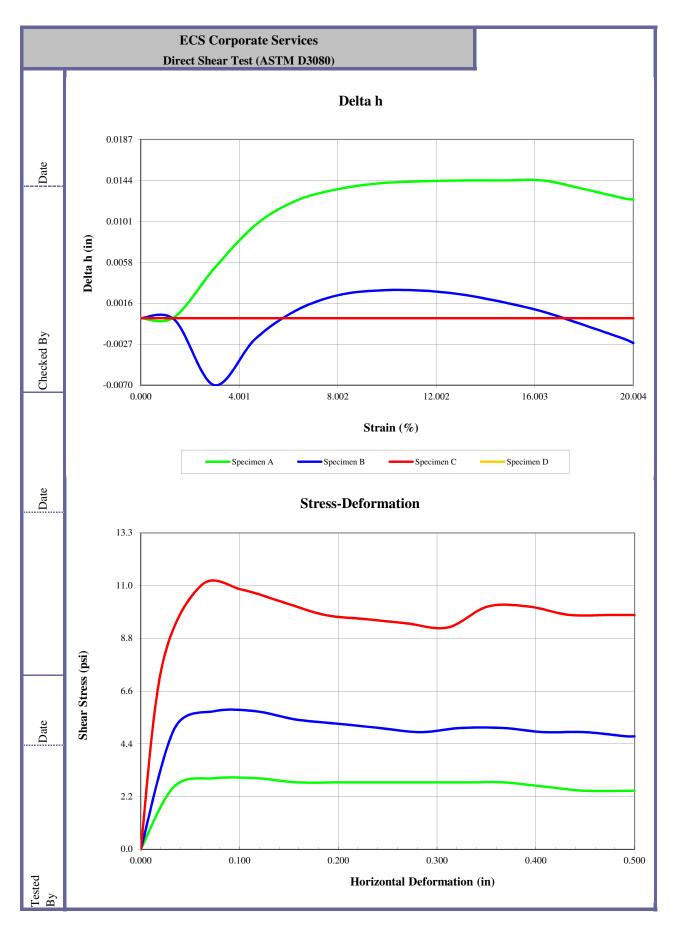


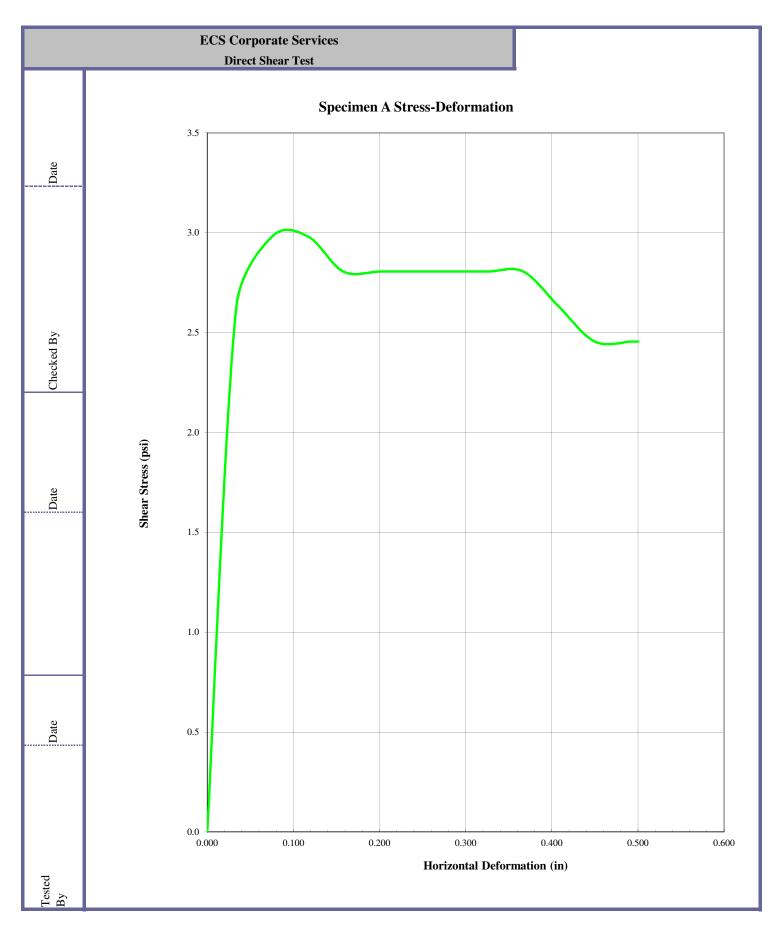


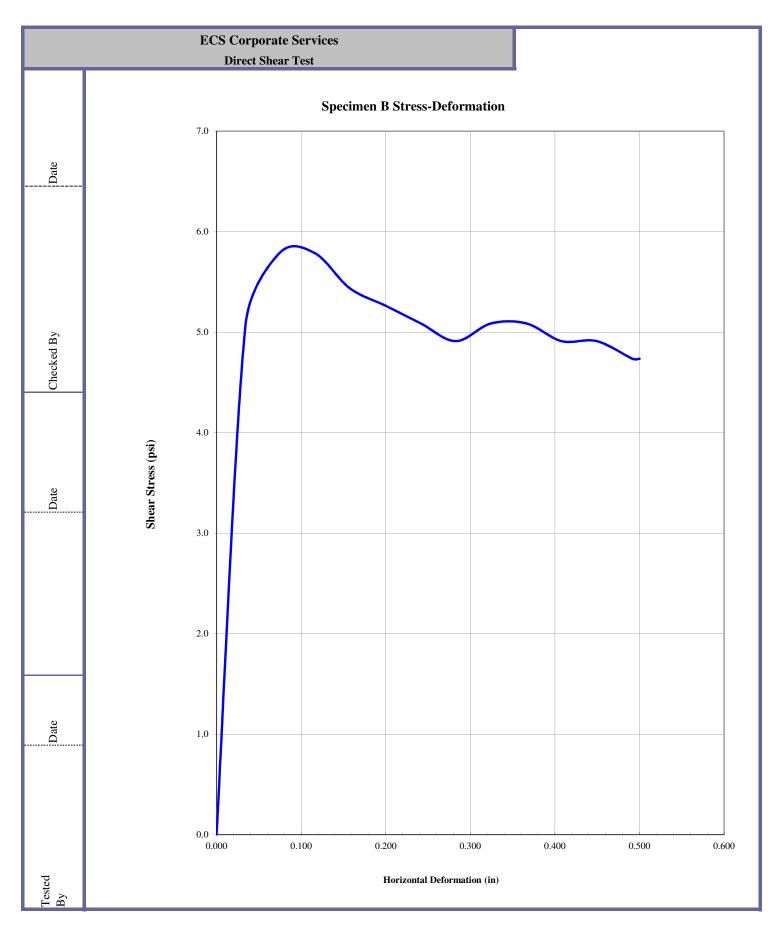


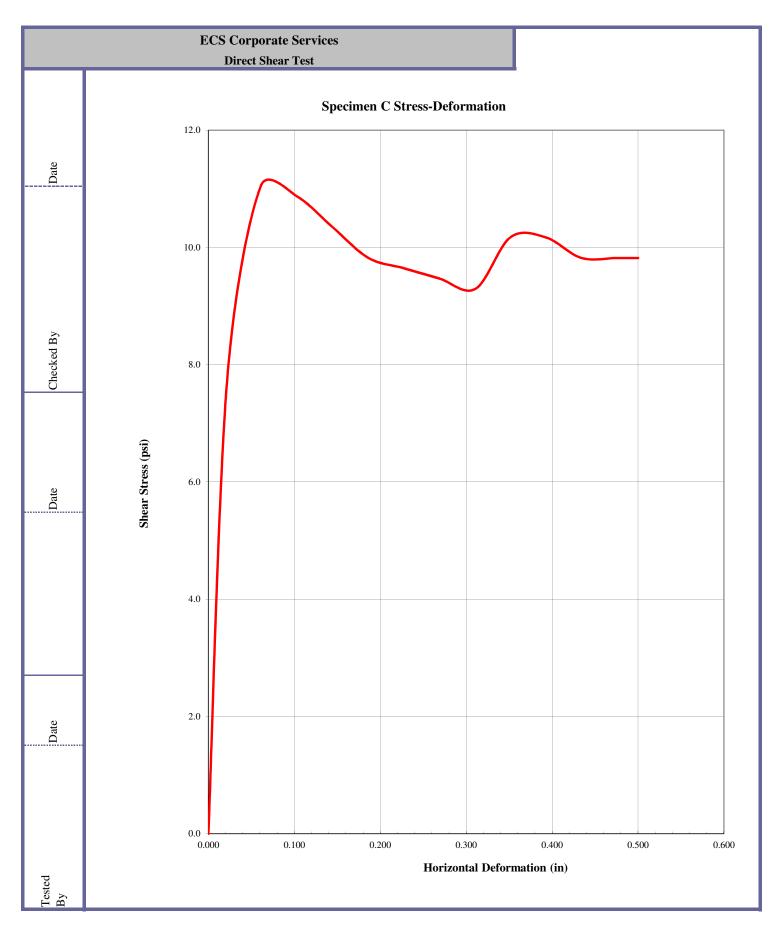


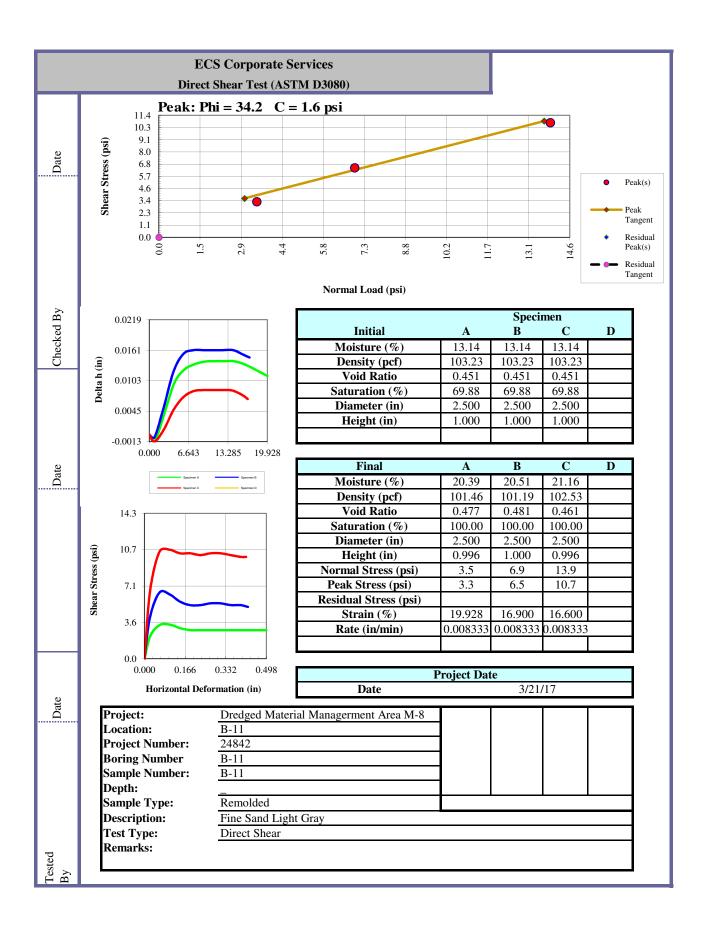


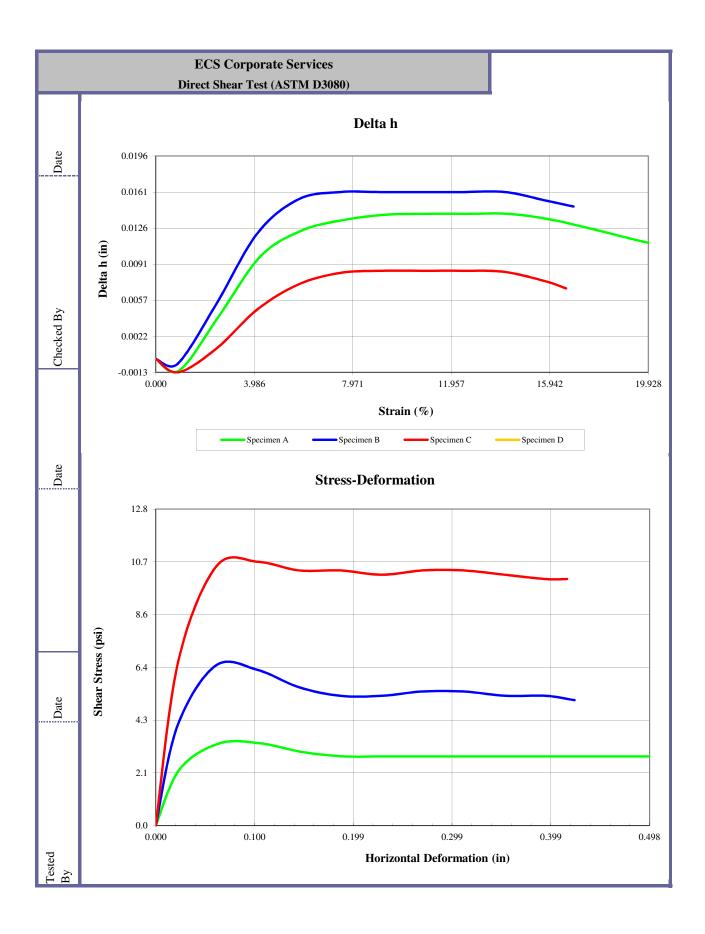


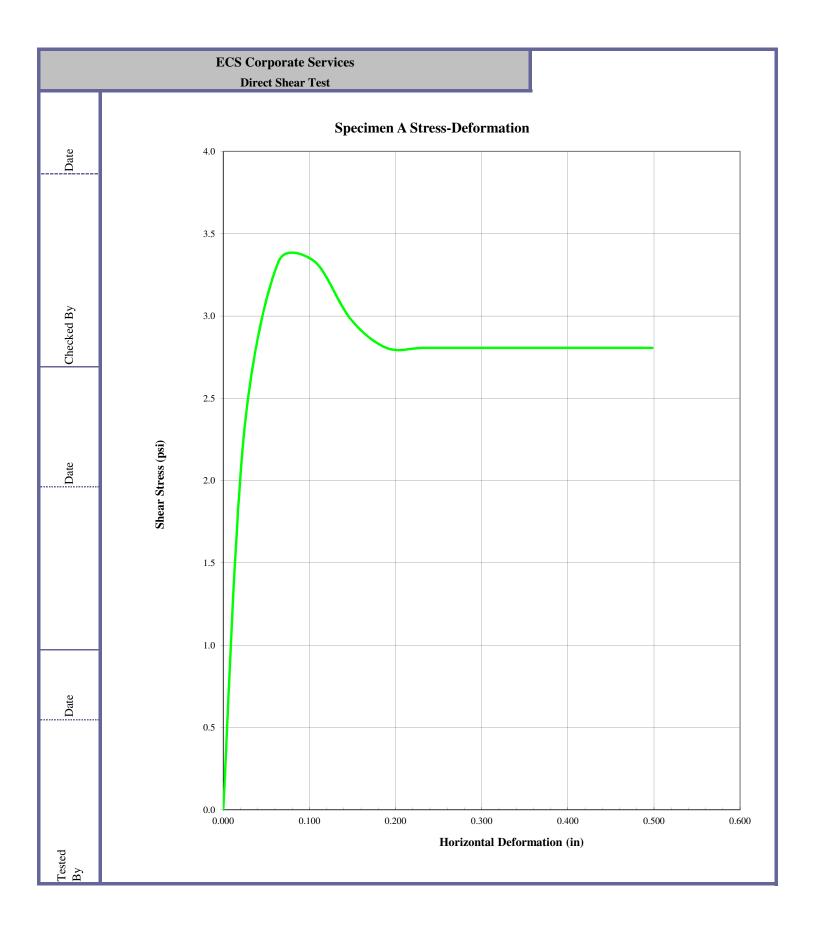


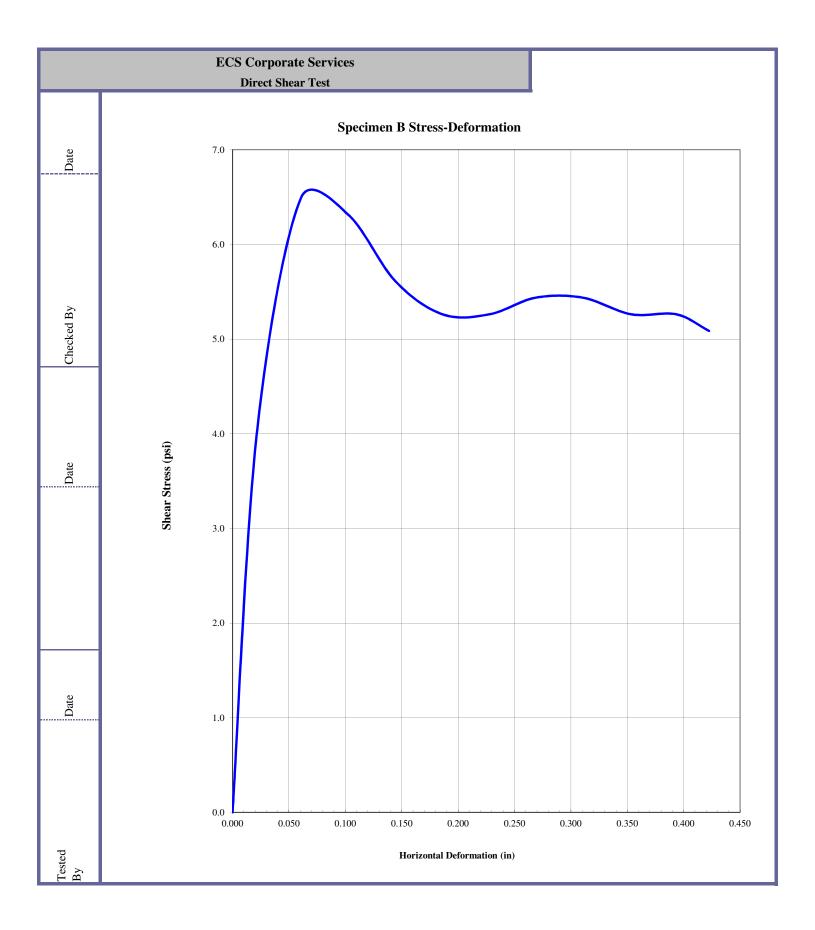


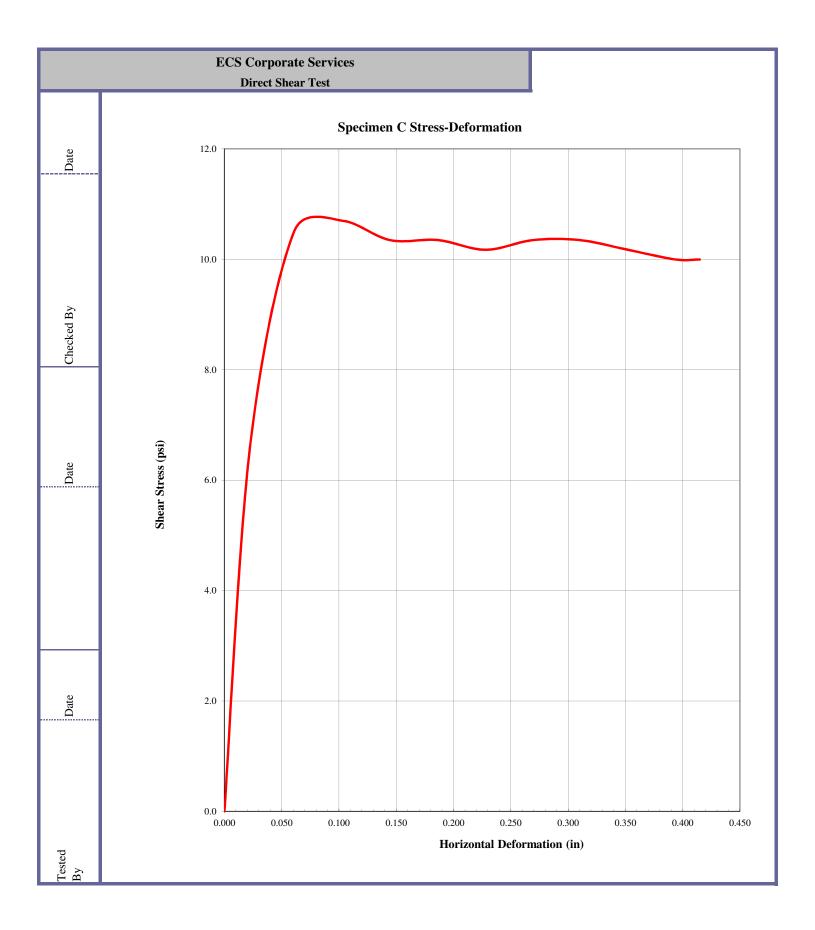


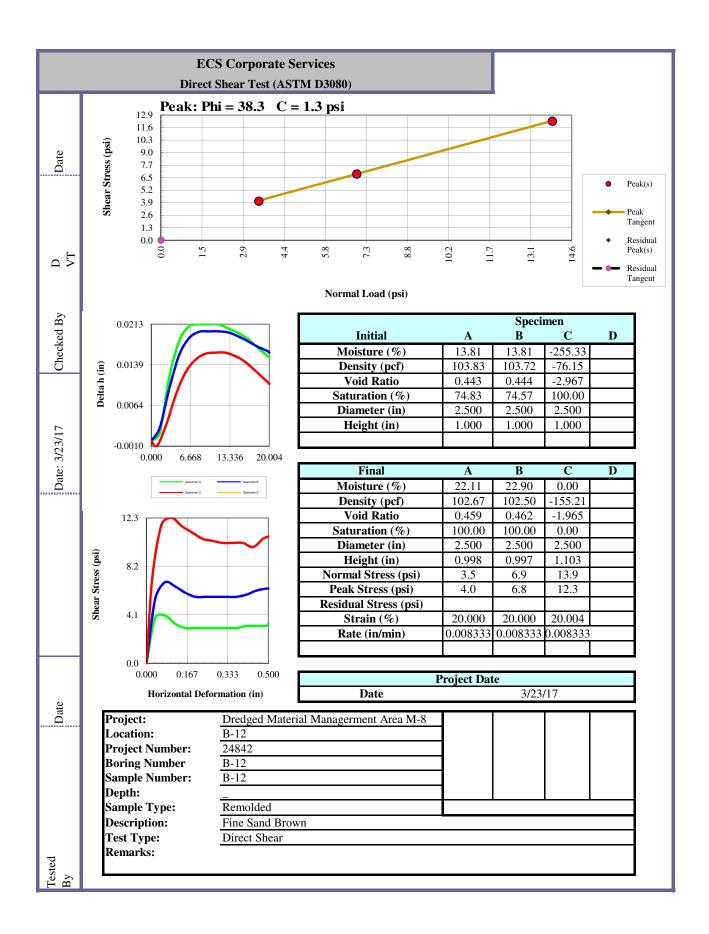


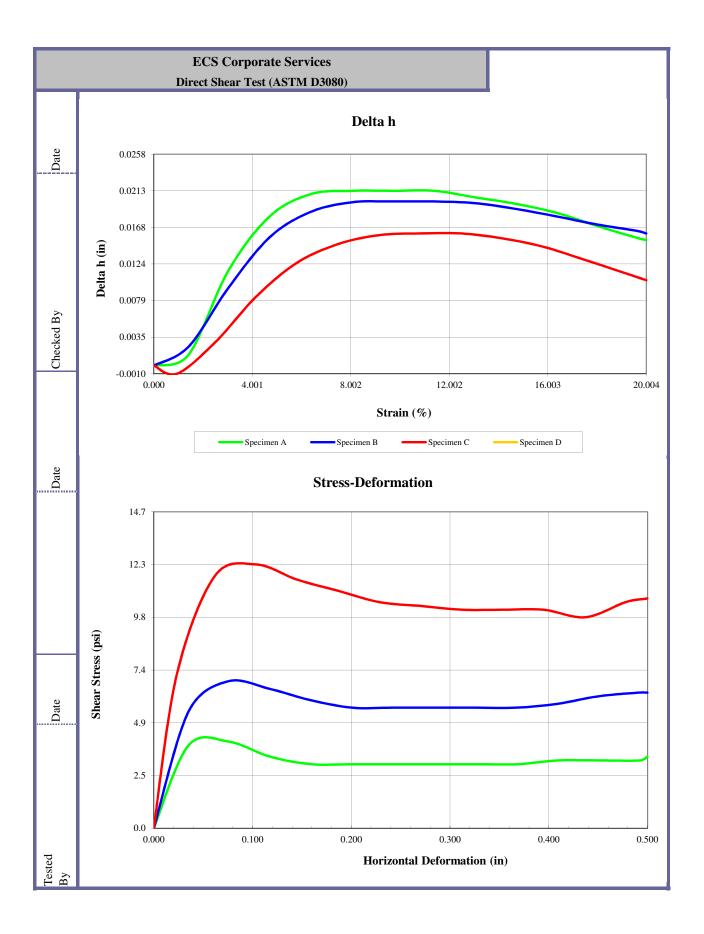


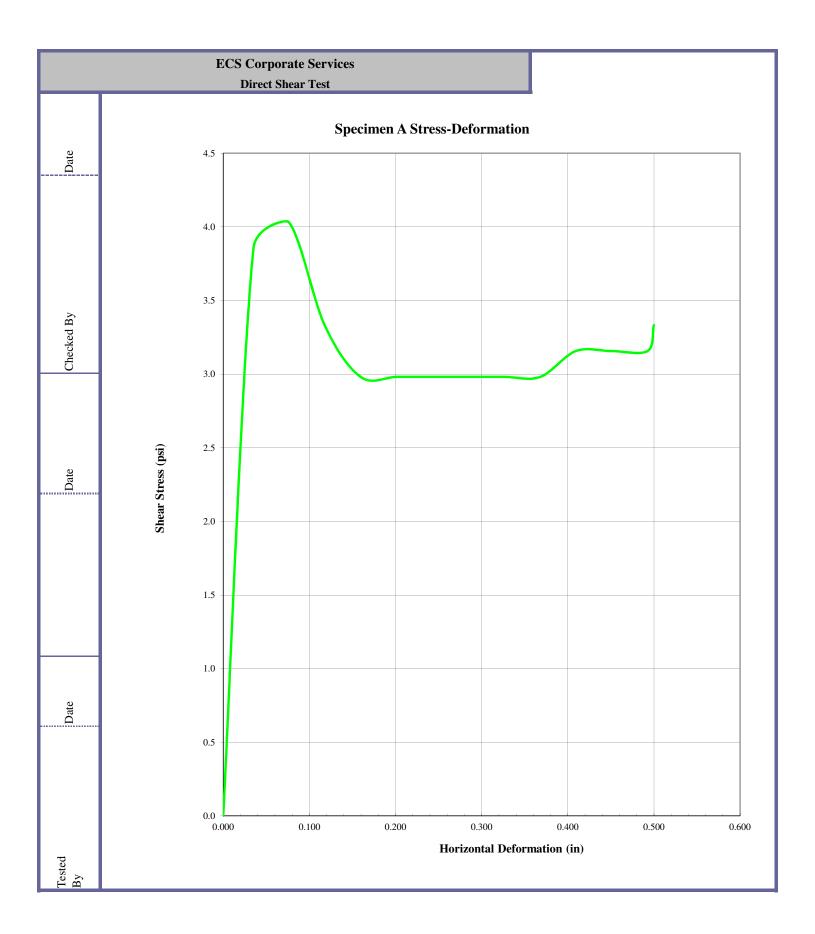


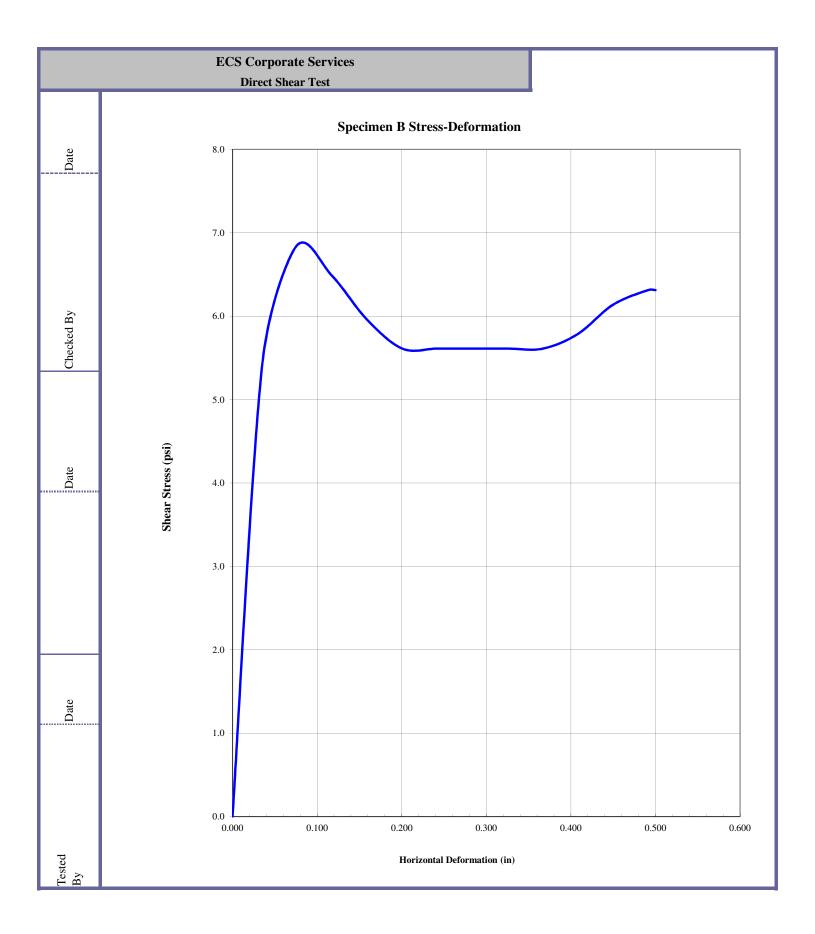


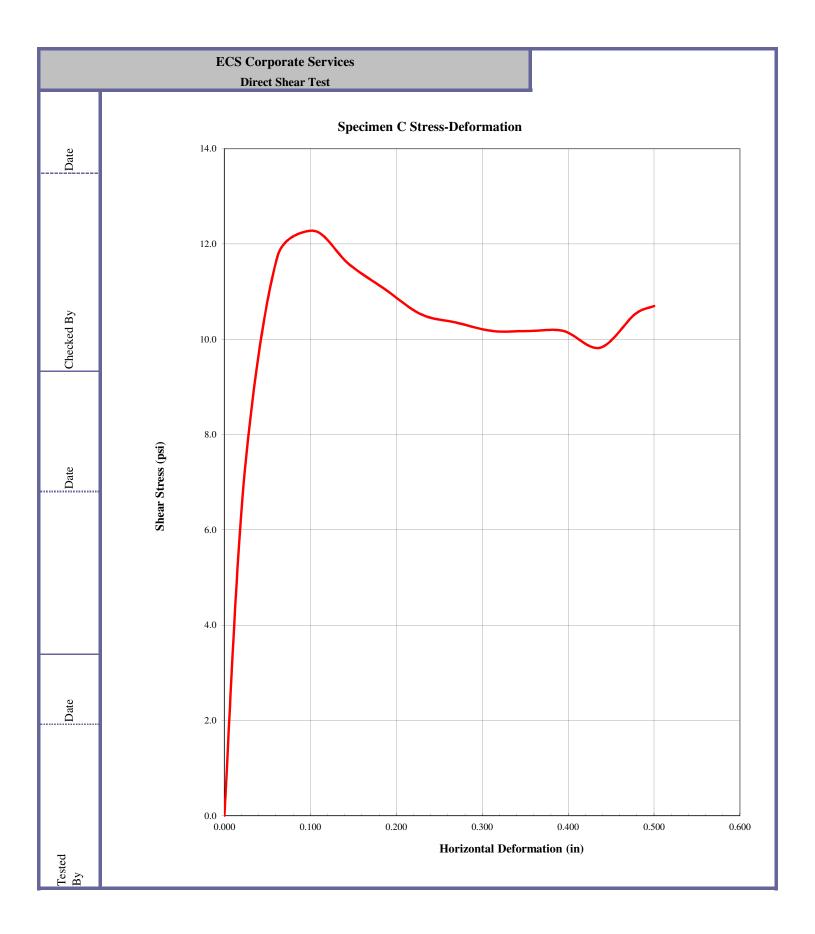












LABORATORY TEST PROCEDURES

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



FALLING HEAD FIELD PERMEABILITY TEST

Project: Dredged Material Management Area M-8
Client: Florida Inland Navigation District
Project No.: 35-24842
Test No.: 1

 Location: B-9
 Tested By: D. Register

 Depth: 8.5-10
 Date: 2/15/2017

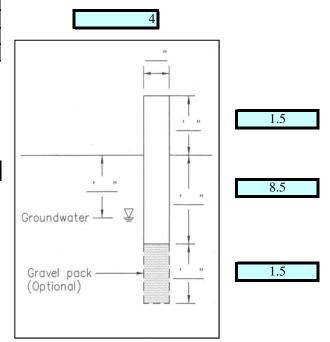
Elapsed	Water			t2-t1			k
Time, min	Depth, cm	h1, cm	h2, cm	seconds	LN(h1/h2)	8*L*(t2-t1)	cm/sec
3	17.15	304.80	287.66	180	0.05789	65836.8	1.994E-04
6	31.75	287.66	273.05	180	0.05211	65836.8	1.795E-04
9	45.09	273.05	259.72	180	0.05007	65836.8	1.725E-04
12	58.42	259.72	246.38	180	0.05271	65836.8	1.816E-04
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

		L=Void Area Below Pipe	
	Test Depth	[Feet]	h ₁ [Feet]
Above Ground			1.5
Water level			25.0
Below ground	8.5	1.5	10.0

	water depth
Time [min]	[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

25





FALLING HEAD FIELD PERMEABILITY TEST

Project: Dredged Material Management Area M-8 **Project No.:** 35-24842 Test No.: 1

Client: Florida Inland Navigation District

Location: B-14 Tested By: D. Register **Depth:** 18.5-20 **Date:** 2/15/2017

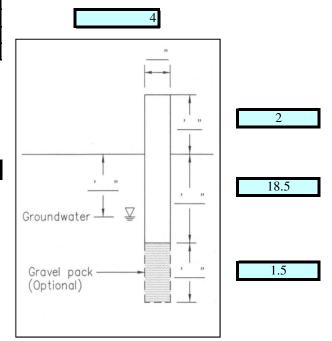
Elapsed	Water			t2-t1			k
Time, min	Depth, cm	h1, cm	h2, cm	seconds	LN(h1/h2)	8*L*(t2-t1)	cm/sec
3	5.08	624.84	619.76	180	0.00816	65836.8	2.812E-05
6	9.53	619.76	615.32	180	0.00720	65836.8	2.480E-05
9	12.07	615.32	612.78	180	0.00414	65836.8	1.425E-05
12	14.61	612.78	610.24	180	0.00415	65836.8	1.431E-05
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

		L=Void Area	
		Below Pipe	
	Test Depth	[Feet]	h ₁ [Feet]
Above Ground			2.0
Water level			25.0
Below ground	18.5	1.5	20.5

	water depth
Time [min]	[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

25



APPENDIX D

	Depth	Dilatometer Control	Dilatometer Control	Corrected A- reading	Corrected B-	Porewater Pressure	Soil Total Unit	Effective Vertical	Dilatometer horizontal	Dilatometer Material	Dilatometer Modulus	Tangent drained constrained	
Location		Reading	Reading				Weight	Stress	Stress Index	Index	Modulus	modulus	SOIL TYPE
	Z	Α	В	P0	P1	U0	GAMMA	SVP	KD	ID	ED	M	
	(M)	(BAR)	(BAR)	(BAR)	(BAR)	(BAR)	(T/M3)	(BAR)			(BAR)	(BAR)	
	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

Location	Depth	Dilatometer Control Reading	Dilatometer Control Reading	Corrected A- reading	Corrected B- reading	Porewater Pressure	Soil Total Unit Weight	Effective Vertical Stress	Dilatometer horizontal Stress Index	Dilatometer Material Index	Dilatometer Modulus	Tangent drained constrained modulus	SOIL TYPE
	Z	Α	В	P0	P1	U0	GAMMA	SVP	KD	ID	ED	M	
	(M)	(BAR)	(BAR)	(BAR)	(BAR)	(BAR)	(T/M3)	(BAR)			(BAR)	(BAR)	
	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
В3	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

Location	Depth	Dilatometer Control Reading	Dilatometer Control Reading	Corrected A- reading	- Corrected B- reading	Porewater Pressure	Soil Total Unit Weight	Effective Vertical Stress	Dilatometer horizontal Stress Index	Dilatometer Material Index	Dilatometer Modulus	Tangent drained constrained modulus	SOIL TYPE
	Z	Α	В	P0	P1	U0	GAMMA	SVP	KD	ID	ED	M	
	(M)	(BAR)	(BAR)	(BAR)	(BAR)	(BAR)	(T/M3)	(BAR)			(BAR)	(BAR)	
	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
В9	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

Location	Depth	Dilatometer Control Reading	Dilatometer Control Reading	Corrected A reading	- Corrected B- reading	Porewater Pressure	Soil Total Unit Weight	Effective Vertical Stress	Dilatometer horizontal Stress Index	Dilatometer Material Index	Dilatometer Modulus	Tangent drained constrained modulus	SOIL TYPE
	Z	Α	В	P0	P1	U0	GAMMA	SVP	KD	ID	ED	M	
	(M)	(BAR)	(BAR)	(BAR)	(BAR)	(BAR)	(T/M3)	(BAR)			(BAR)	(BAR)	
	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
B10	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	Dilatometer Control Reading	Dilatometer Control Reading	Corrected A-reading	- Corrected B- reading	Porewater Pressure	Soil Total Unit Weight	Effective Vertical Stress	Dilatometer horizontal Stress Index	Dilatometer Material Index	Dilatometer Modulus	Tangent drained constrained modulus	SOIL TYPE
	Z	Α	В	P0	P1	U0	GAMMA	SVP	KD	ID	ED	M	
	(M)	(BAR)	(BAR)	(BAR)	(BAR)	(BAR)	(T/M3)	(BAR)			(BAR)	(BAR)	
	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
B10	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.

Report Date: 3/28/2017

Executive Summary

Project Information
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 013 mi	From .1325 mi	From .265 mi	From .51 - 1.0 mi	Greater than 1 Mile	Totals
FDEP DATABASES		'					ļ.
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	0.50	0	0	0	N/A	N/A	0
Wells(WELLSADOHC)							
FDOH Well Surveillance Program Private Water	0.50	0	0	0	N/A	N/A	0
Wells(WELLSADOHN)							
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

*** Disclaimer ***

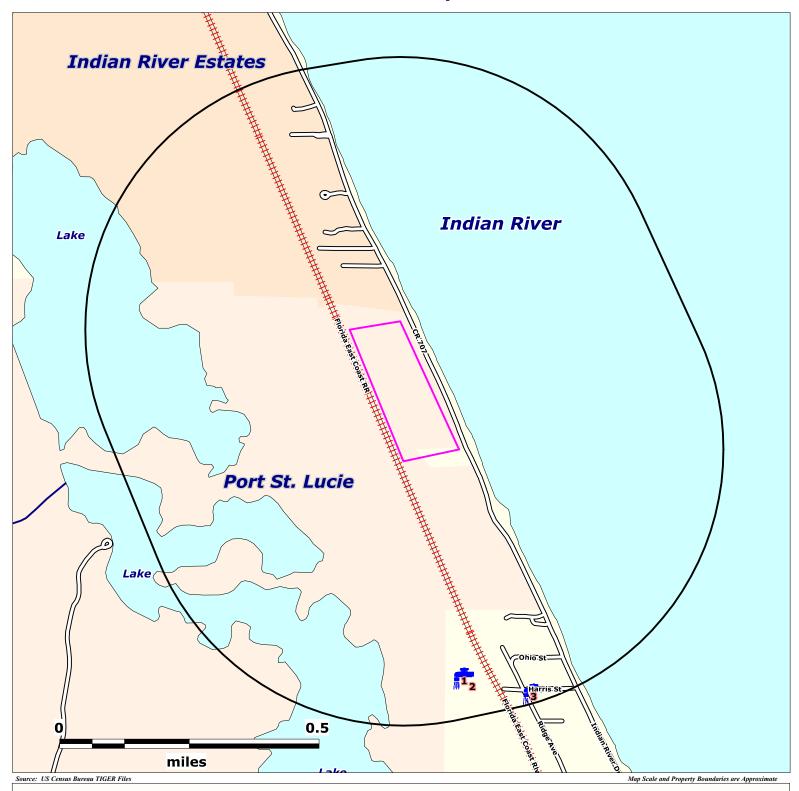
Please understand that the regulatory databases we utilize were not originally intended for our use, but rather for the source agency's internal tracking of sites for which they have jurisdiction or other interest. As a result of this difference in intended use, their data is frequently found to be incomplete or inaccurate, and is less than ideal for our use. Additionally, limitations exist in mapping data detail and accuracy. Our report is not to be relied upon for any purpose other than to "point" at approximate locations where further evaluation may be warranted. No conclusion can be based solely upon our report. Rather, our report should be used in conjunction with other relevant information to direct your attention at potential problem areas; which should be followed up by site inspections, interviews with relevant personnel and regulatory file review. Readers proceed at their own risk in relying upon this data, in whole or in part, for use within any evaluation. The EDM Service Request Form contains more detailed language with regard to such limitations, the terms of which the reader must accept in their entirety before utilizing this report. If the signed contract is not available to the reader, EDM will gladly furnish a copy upon request. Requests via email authorization are construed to be in accordance with these terms.





Water Well Research Report Street Map





Subject Property

DMMA M-8 Port St Lucie, Florida

EDM Job No: 23796 March 28, 2017



Centroid Latitude: 27 18' 44.8092" Centroid Longitude: -80 15' 44.3988"

Approximate Site Boundary

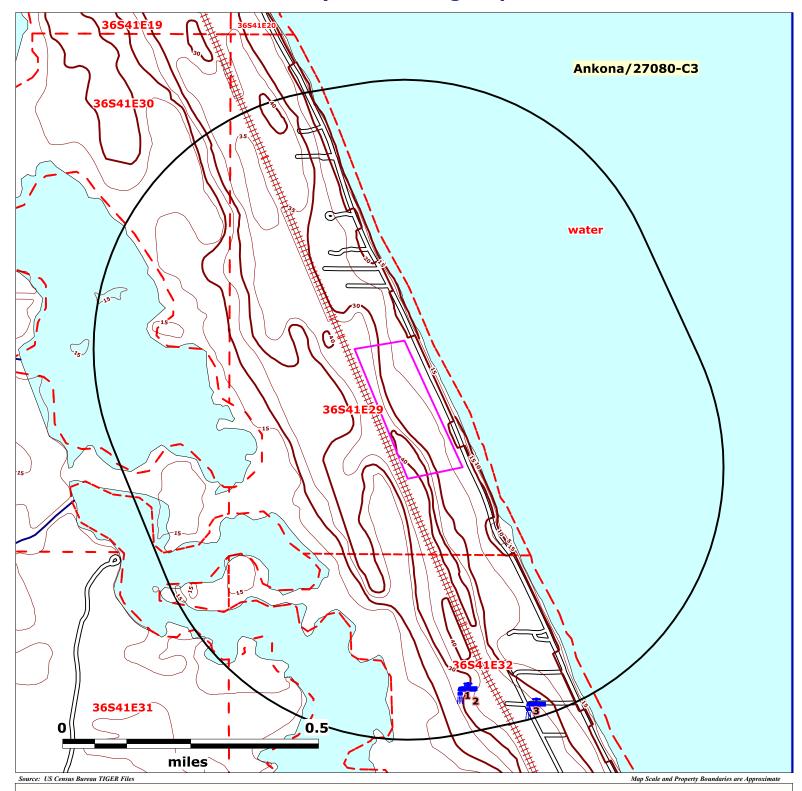


Private Water Well System -1/2 mile



Water Well Research Report Physical Setting Map





Subject Property

DMMA M-8 Port St Lucie, Florida

EDM Job No: 23796 March 28, 2017



Name/12345-A1

USGS Quadrangle





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 - Page 1 of 1

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) Report Date: 3/28/2017 WELLSFWMD Page 1 of 1 PERMIT NO, APPL NO, PROJECT NAME AND PERMIT TYPE : WELL LOCATION: MAP ID NUMBER: Dist (Miles): 0.60 SECTION: **ELLSFWMD** 56-01509-W Direction: S TOWNSHIP: 020920-8 SOUTH CANOE LAUNCH AREA/OFFICE PERMIT TYPE: General STATION COUNTY ST LUCIE FACILITY ID: 123495 WATER USE Public Water Supply

FAC NAME: 2

PUMP TYPE: Jet
USE STATUS: Primary

LAND USE: Public Water Supply

FAC TYPE: WELL

PUMP CAP: 20

SOURCE: Surficial Aquifer System

CASING DEPTH: 100



FAC STATUS: Proposed

PUMP DEPTH:

WELL DEPTH: 120

ACRES SRVD: 5

WELL DIA: 2

WATER MANAGEMENT DISTRICT WELL DATA

Report Date: 3/28/2017 (WELLSFWMD) WELLSFWMD Page 1 of 1





WATER MANAGEMENT DISTRICT WELL DATA

(WELLSFWMD) Report Date: 3/28/2017 WELLSFWMD Page 1 of 1



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)

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

National Oceanic & Atmospheric Administration

National Environmental Satellite, Data, and Information Service

Station: NETTLES ISLAND, FL US GHCND:USC00086092

Date							nperature	(F)									Precip	oitation (Ir	nches)			
Elem ->	TAVG	TMAX	TMIN	HTDD	CLDD	EMXT		EMNT		DX90	DX32	DT32	DT00	PRCP	EMXP		SNOW	EMSD		DP01	DP05	DP10
Month	Maaa	Mean	Mean		Cooling	Lliaboot	High	Lawaat	Low	Number of Days			Total	Grea Obse		9	Snow, Slee	et	Nu	mber of Da	ays	
Month	Mean	Max.	Min	Degree Days	Degree Days	Highest	High Date	Lowest	Date			Min <= 32	Min <= 0	Total	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.

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

National Oceanic & Atmospheric Administration

Station: NETTLES ISLAND. FL US GHCND: USC00086092

National Environmental Satellite, Data, and Information Service

Station. I	VEIILE9 I	SLAND, F	L US GH	JND.U3C	00000032																	
Date						Ten	nperature	(F)									Precip	itation (Ir	ches)			
Elem ->	TAVG	TMAX	TMIN	HTDD	CLDD	EMXT		EMNT		DX90	DX32	DT32	DT00	PRCP	EMXP		SNOW	EMSD		DP01	DP05	DP10
Manth	Mann	Mean	Mean	Heating			High Date	ligh Lowest Low			Total	Grea Obse		S	Snow, Slee	t	Nu	mber of Da	ays			
Month	Mean	Max.	Min	Degree Days	Degree Days	Highest	Date	Lowest	Date Ma		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	80				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.

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

National Oceanic & Atmospheric Administration

Station: NETTLES ISLAND, FL US GHCND:USC00086092

National Environmental Satellite, Data, and Information Service

Date		•				Ten	nperature	(F)									Precip	oitation (Ir	nches)			
Elem ->	TAVG	TMAX	TMIN	HTDD	CLDD	EMXT		EMNT		DX90	DX32	DT32	DT00	PRCP	EMXP		SNOW	EMSD		DP01	DP05	DP10
Month	Maan	Mean	Mean	Heating	Cooling	Lighoot	High Date	Lowest	Low		Number	of Days		Total	Grea Obse		93	Snow, Slee	et	Nu	mber of Da	ays
Month	Mean	Max.	Min	Degree Days	Degree Days	Highest	Date	Lowest	Date	Max >= 90			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

(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.

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

National Oceanic & Atmospheric Administration

Station: NETTLES ISLAND. FL US GHCND: USC00086092

National Environmental Satellite, Data, and Information Service

Station. I	VEIILE9 I	SLAND, F	L US GH	SND.USC	00000032																	
Date						Ten	nperature	(F)									Precip	itation (Ir	ches)			
Elem ->	TAVG	TMAX	TMIN	HTDD	CLDD	EMXT		EMNT		DX90	DX32	DT32	DT00	PRCP	EMXP		SNOW	EMSD		DP01	DP05	DP10
Month	Maga	Mean	Mean	Heating			High	Lawast	Low	Number of Days			Tatal	Grea Obse		9	Snow, Slee	t	Nu	mber of Da	ays	
Month	Mean	Max.	Min	Degree Days	Degree Days	Highest	High Date	Lowest	Date	Max >= 90	Max <= 32	Min <= 32	Min <= 0	Total	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

(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.

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

National Oceanic & Atmospheric Administration

National Environmental Satellite, Data, and Information Service

Station: NETTLES ISLAND. FL US GHCND: USC00086092

Date						Ten	nperature	(F)									Precir	oitation (In	iches)			
Elem ->	TAVG	TMAX	TMIN	HTDD	CLDD	EMXT	i por utur o	EMNT		DX90	DX32	DT32	DT00	PRCP	EMXP		SNOW	, ,	.0.100)	DP01	DP05	DP10
		Mean	Mean	Heating			High		Low	Number of Days			Grea Obse	atest erved	S	Snow, Slee	et	Nur	mber of Da	ays		
Month	Mean	Max.	Min	Degree Days	Degree Days	Highest	High Date	Lowest	Date	Max >= 90	Max <= 32	Min <= 32	Min <= 0	Total	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

(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.

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

National Oceanic & Atmospheric Administration

Station: NETTLES ISLAND. FL US GHCND: USC00086092

National Environmental Satellite, Data, and Information Service

Station: r	LITELO	IOLAND, I	L 00 011	C14D.000	00000032									1								
Date						Ter	nperature	(F)									Precip	oitation (Ir	nches)			
Elem ->	TAVG	TMAX	TMIN	HTDD	CLDD	EMXT		EMNT		DX90	DX32	DT32	DT00	PRCP	EMXP		SNOW	EMSD		DP01	DP05	DP10
Manada		Mean	Mean	Heating	Cooling	I li ala a at	Hiah		Low	Number of Days			T-4-1	Grea Obse		5	Snow, Slee	et	Nu	mber of Da	ays	
Month	Mean	Max.	Min	Degree Days	Degree Days	Highest	High Date	Lowest	Date	Max >= 90	Max <= 32	Min <= 32	Min <= 0	Total	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

(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.