Geotechnical Data Report for St. Catherine Island Marsh Creation and Shoreline Protection (PO-179)

Orleans Parish, Louisiana

04.55194080 03 | April 7, 2020

Final

Coastal Protection and Restoration Authority

Document Control

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Client	Coastal Protection and Restoration Authority
Client Address	150 Terrace Ave Baton Rouge, LA 70802
Client Contact	Ms. Jessica Diez

Revision History

Issue	Date	Status	Comments on Content	Prepared By	Checked By	Approved By
01	07 April 2020	Final		LF	SB	EM
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Project Team

Initials	Name	Role
LMD	Lisa de la Fuente, EI	Staff Professional
ERM	Eric R. Marx, PE	Vice President
SB	Samuel Bryant, PE	Vice President

Fugro USA Land, Inc.
4233 Rhoda Drive
Baton Rouge, LA 70816
USA

Coastal Protection and Restoration Authority
150 Terrace Ave
Baton Rouge, LA 70802
USA

April 7, 2020

Dear Ms. Jessica Diez,

Fugro USA Land, Inc. (Fugro) is pleased to present our geotechnical data report for the St. Catherine Island Marsh Creation and Shoreline Protection. We performed our services in accordance with Fugro Proposal No. 04.55184080pro_rev1 and 04.55184080pro_rev1_Additional GEO.

The following report contains a summary of the geotechnical data collection for the project. We appreciate the opportunity to serve CPRA on this project. Please contact us if you have any questions or comments concerning this report or when we may be of further assistance.

Yours faithfully,

Lisa de la Fuente, E.I.
Staff Professional

Samuel M. Bryant, Ph.D., P.E.
Vice President

4/7/2020

Eric R. Marx, P.E.
Vice President

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1. Introduction

1.1 Project Description

The Louisiana Coastal Protection and Restoration Authority (CPRA) is planning to install approximately 19,479 linear feet of shoreline protection along the Lake Pontchartrain shoreline, protecting 120 acres of marsh. In addition, 219 acres of marsh will be created/nourished on the landward side of the planned shoreline protection. The project location is in the southeastern portion of Lake Pontchartrain along the shorelines of St. Catherine Island (SCI) and Bayou Sauvage National Wildlife Refuge (BS NWR), which are separated by Chef Menteur Pass. The overall goal of the project is to create low salinity marsh to help maintain, sustain, and protect habitat for wildlife species which are vital to the balance of Louisiana's coastal ecosystem. Borrow areas for the marsh creation are located north of the project area in Lake Pontchartrain.

The location of the site is illustrated on the Vicinity Map on Plate 1, and a site layout is presented on Plate 2. There are two approximate centers for the project area, one for St. Catherine Island and one for Bayou Sauvage NWR, respectively 584,614.22N; 3,766,917.54E and 582,491.15N; 3,759,215.15E (NAD83 Louisiana State Plane, South Zone, US Survey Feet). Elevations noted herein are based on the North American Vertical Datum 1983 (NAVD88), Geoid 12B, which is the same as 12A but includes Puerto Rico. Survey data obtained by Fugro for explorations are based on the 1983 North American Vertical Datum (NAVD83), Louisiana State Plane South.

1.2 Purpose and Scope

The purpose of the geotechnical engineering study was to explore and evaluate subsurface soil conditions. Subsequent to this data report, Fugro will perform engineering analyses to provide geotechnical recommendations to assist CPRA in the design and construction of the St. Catherine Island Marsh Creation and Shoreline Protection (PO-179) project.

1.3 Authorization and Personnel

Ms. Jessica Diez is the CPRA Project Manager. Mr. Eric Marx, P.E., is the Fugro Project Manager, and Mr. Sam Bryant, P.E., is the Fugro technical lead. Peter Cole, with Fugro, coordinated field exploration. Exploration location and magnetometer survey services were provided by Fugro's survey group in Lafayette, Louisiana, with Mr. Jesse Kibodeaux, as the survey manager.

1.4 Report Applicability

Explorations, laboratory testing, findings, and conclusions presented in this data report are based on the project description, as described herein, and the authorized scope of work. If there are differences or changes in project location or design features from those described herein Fugro should be authorized to review changes, propose additional exploration and/or propose

additional laboratory testing if deemed appropriate. Observations, conclusions, and recommendations may not apply to locations beyond explorations performed for this study and beyond project boundaries.

Fugro prepared this report exclusively for CPRA to guide geotechnical aspects of design and construction of the proposed features. The study was conducted using the standard level of care and diligence normally practiced by recognized engineering firms now performing similar services under similar circumstances in the area. This report, including all illustrations and appendices, should be used in its entirety. This report should be made available for information only and not as a warranty of subsurface conditions.

2. Field Exploration

Field exploration was initially performed for designated shoreline protection and marsh creation areas between February 18 and April 27, 2019. After completing the intial field work, CPRA authorized Fugro to perform exploration within a proposed borrow area and along a secondary restoration feature that was added to the project.

Field exploration procedures, described in detail in Appendix A, included a total of twenty (20) cone penetration test (CPT) soundings and twenty-seven (27) soil borings. Of this total, seven (7) soil borings were performed in Lake Pontchartrain for the borrow site evaluation and the remainder of the explorations were located near the shoreline protection and marsh creation features.

The locations of the field explorations are located on Plate 2 for reference.

3. Laboratory Testing

Laboratory testing was performed to aid material classification, shear strength, and compressibility. Detailed descriptions of the test procedures are presented in Appendix B. Laboratory test results are also presented in Appendix B.

After review of the boring logs, the eastern half of the borrow area included a soil profile that included more clay in the near surface and the western half of the borrow area included a soil profile that was more sand. After discussion with CPRA, one composite samples was created for advanced laboratory testing to model dredging and settling charcterstics. The composite sample was created combining each of the samples obtained to a depth of 15 ft in Borings B-22, B-24, B-25 and B-27. One low-pressure consolidation test and one Settling Column Test was performed on the selected composite sample.

The results of the settling column tests are presented in Appendix C.

4. Geology and Subsurface Conditions

4.1 Site Description

Existing feature information relative to the exploration locations are presented on Plate 2. *Geomorphology and Quaternary Geologic History of the Lower Mississippi River Valley* by Saucier indicates the site is underlain by interdistributary deposits. Elevation contours of the stiffer suballuvial surface from Saucier are presented on Plate 4. Water depths at exploration locations along the shoreline and marsh creation area ranged from 1 ft to 3 ft of brackish to saline water. The water depths in Lake Pontchartrain in the borrow source area ranged from 7 ft to 9 ft.

4.2 Geographic Information System Database

Information developed or obtained for the project was included in a geographic information system (GIS) databased using ESRI (2018) ArcGIS, version 10.4. Data from explorations, i.e., field and laboratory data, was included in a GIS database using Bentley Systems (2018) gINT, version 10. The gINT database file is linked to ArcGIS for processing. CPT electronic data files are included in the ArcGIS database.

4.3 Subsurface Conditions

4.3.1 Cross Sections

Eight subsurface profiles were generated along section lines with similar subsurface conditions. The eight profiles were designated A-A' to H-H'. Example subsurface profiles, presented as Plate 3a and 3h, generally show the distribution of subsurface conditions across the section lines. Profile locations are shown on Plate 2.

4.3.2 Earth Materials

Earth materials encountered at the exploration locations consist primarily of very soft to soft clays with organics present to varying depths below the mudline. At the intersection of the sub-alluvial surface, layers of firm to stiff clays were encountered, primarily at depths greater than 20 ft below the mudline. Silt, sand, and shell deposits were also present in many of the clay layers. Sand and silty sand layers are also exhibited at varying depths and layer thicknesses at select exploration locations. These sand and silty sand layers are more prominent along the shoreline and in channels entering the marsh from Lake Pontchartrain.

In the borrow source area, the western half of the area encountered predominately sandy soils near the surface while the eastern half was predominately clay.

4.3.3 Water Conditions

A nearby CRMS gauge CRMS0002-H01 located on St. Catherine Island, with latitude N 30.1002483 and longitude W89.7917252 indicated a mean water elevation of about EL +0.46 ft, with a range from El -0.78 ft to +2.35 ft between November 1, 2018 through February 28, 2019. A more typical range during the time of exploration shows the water level between El +0.23 ft to +0.60 ft NAVD88 between January 28, 2019 and February 28, 2019.

5. References

ASTM International (2017) "ASTM Compass, Section: 4 Construction," https://compass.astm.org.

Bentley Systems (2018) "gINT Professional, version 10," https://www.bentley.com/en.

Coastwide Reference Monitoring System (CRMS) (2019) https://www.lacoast.gov/crms_viewer2/default.aspx

ESRI (2018) "ArcGIS, version 10.4," https://www.esri.com/en-us/home.

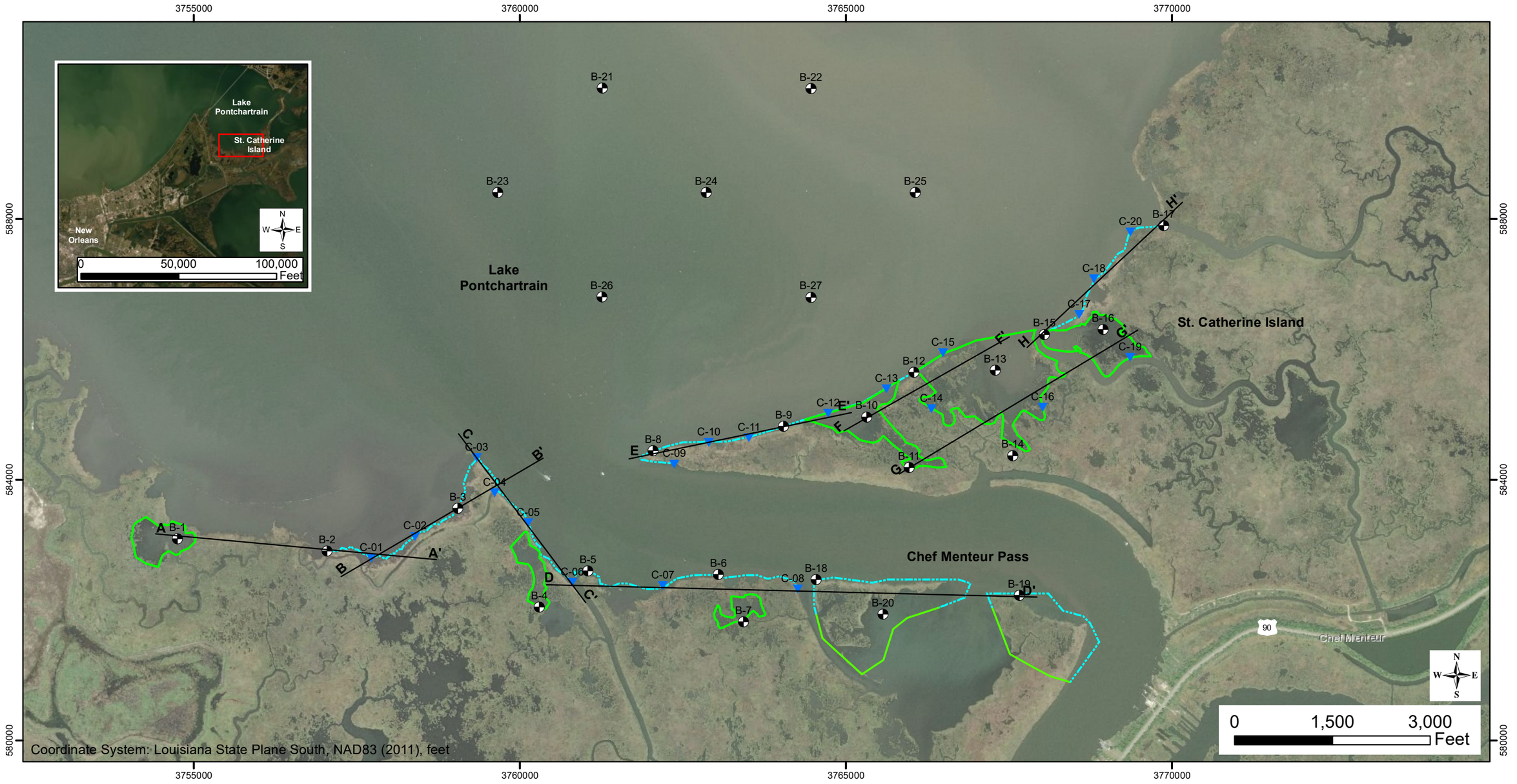
Olson, R.E., Rauch, A.F., Mecham, E.C., and Luke, A.M. (2003) "Self-Weight Consolidation of Large Laboratory Deposits of Clay," Proceedings 12th Pan American Conference on Soil Mechanics and Geotechnical Engineering, MIT, Vol 1, pp. 703-708/

Robertson, P.K. and Cabal, K.L. (2015) "Guide to Cone Penetration Testing for Geotechnical Engineering, 6th Edition," prepared for Gregg Drilling & Testing, Inc.

Saucier, R.T. (1994) "Geomorphology and Quaternary Geologic History of the Lower Mississippi River Valley, Volumes I and II," prepared for The President of the Mississippi River Commission Vicksburg, Mississippi and US Army Corps of Engineers, December.

Plates

Plate 1 - Vicinity Map



Legend

- CPT
- Boring
- Subsurface Profile Location
- Proposed Marsh Creation Area
- Proposed Shoreline Protection

Plate 2 - Site Layout and Exploration Plan

A
N85W

A'
S85E

B-1
45 ft, South

B-2
26 ft, South

C-01
69 ft, South
B-B'

C-02
324 ft, North

ELEVATION (FEET)

DISTANCE (FEET)

Su (ksf)

R_F (%)

qc (tsf)

Legend

CPT-01 — Fugro CPT

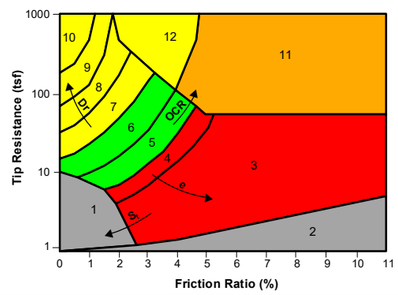
B-1 — Fugro Boring

Soil Descriptions

- High-Plasticity Organic (OH)
- Lean CLAY (CL)
- Fat CLAY (CH)
- Silty SAND (SM)
- 6 — Field SPT N-Value

Undrained Shear Strength Tests

- Unconsolidated Undrained
- Minivane
- Torvane
- Pocket Pen



Zone	Soil Behavior Type	U.S.C.S.
1	Sensitive Fine-grained	OL-CH
2	Organic Material	OL-OH
3	Clay	CH
4	Silty Clay to Clay	CL-CH
5	Clayey Silt to Silty Clay	MH-CL
6	Sandy Silt to Clayey Silt	ML-MH
7	Silty Sand to Sandy Silt	SM-ML
8	Sand to Silty Sand	SM-SP
9	Sand	SW-SP
10	Gravelly Sand to Sand	SW-GW
11	Very Stiff Fine-grained *	CH-CL
12	Sand to Clayey Sand *	SC-SM

*overconsolidated or cemented

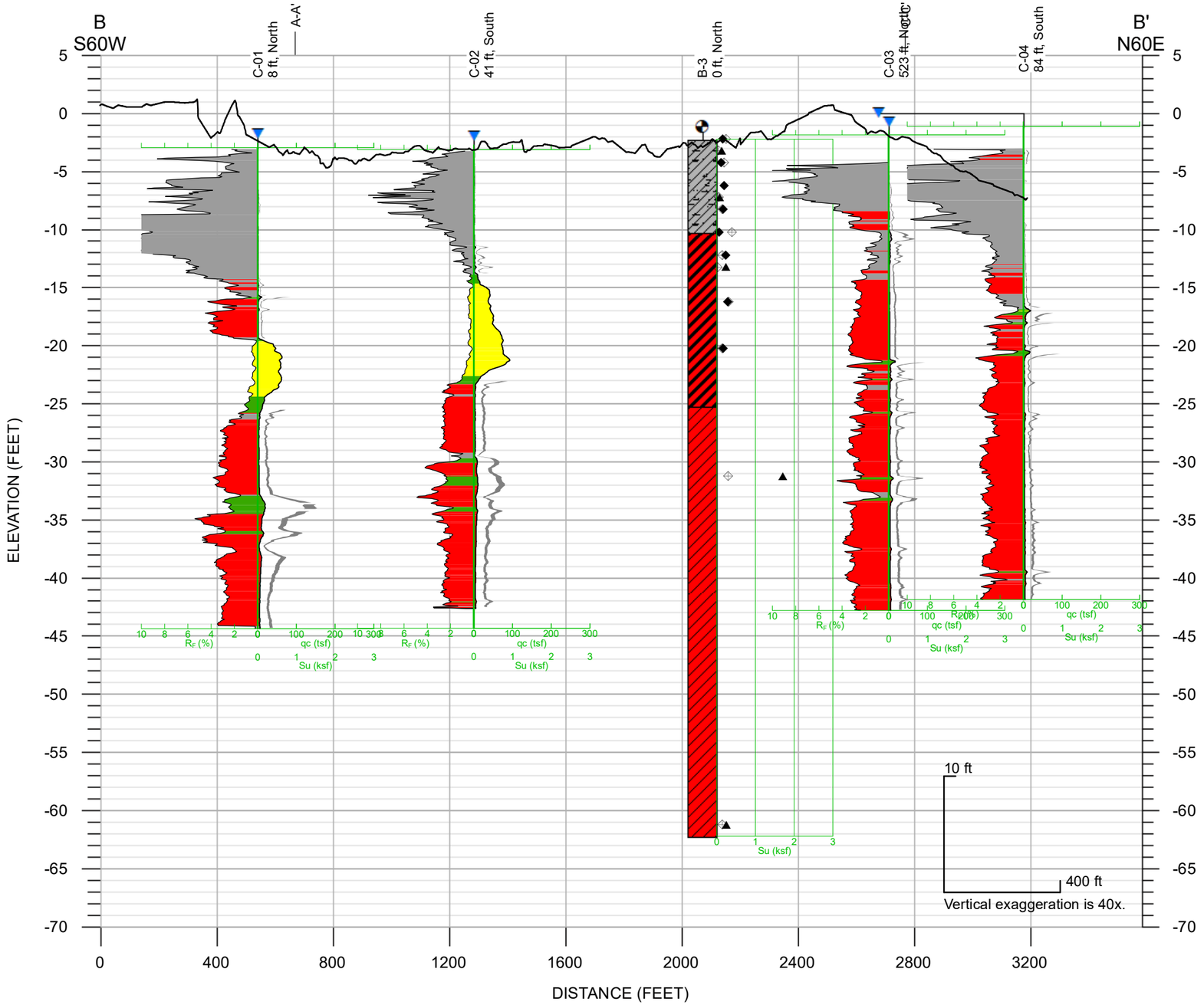
SBT CORRELATION CHART
(Robertson and Campanella, 1988)

10 ft
400 ft
Vertical exaggeration is 40x.

Plate 3a - Profile A to A'

04.55184080 | St. Catherine Island Marsh Creation and Shoreline Protection (PO-179)

N:\Projects\02_2018\04_5518_4080_St_Catherines_Island\Outputs\2019_05_10_Eng_Rpt\mxd\Plate_3a_Profile_A.mxd, 3/28/2020, D.Caja



Legend

CPT-01 — Fugro CPT

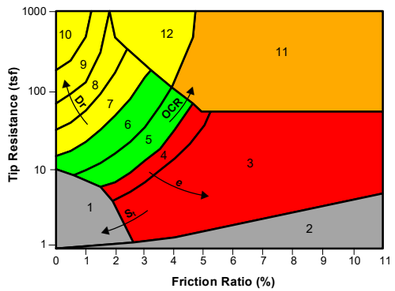
B-1 — Fugro Boring

Soil Descriptions

- High-Plasticity Organic (OH)
- Lean CLAY (CL)
- Fat CLAY (CH)
- 6 — Field SPT N-Value

Undrained Shear Strength Tests

- Unconsolidated Undrained
- Minivane
- Torvane
- Pocket Pen

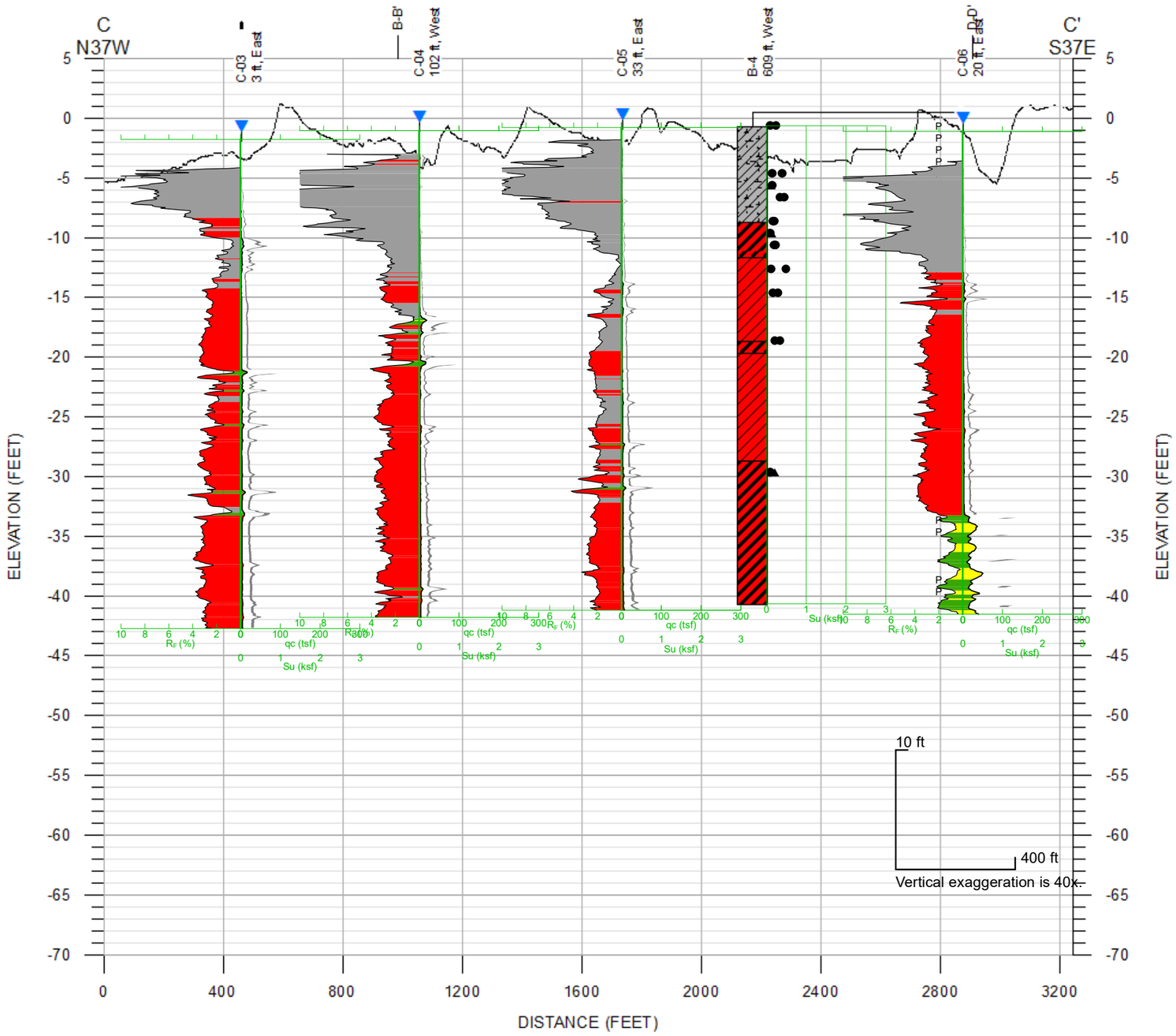


Zone	Soil Behavior Type	U.S.C.S.
1	Sensitive Fine-grained	OL-CH
2	Organic Material	OL-OH
3	Clay	CH
4	Silty Clay to Clay	CL-CH
5	Clayey Silt to Silty Clay	MH-CL
6	Sandy Silt to Clayey Silt	ML-MH
7	Silty Sand to Sandy Silt	SM-ML
8	Sand to Silty Sand	SM-SP
9	Sand	SW-SP
10	Gravelly Sand to Sand	SW-GW
11	Very Stiff Fine-grained *	CH-CL
12	Sand to Clayey Sand *	SC-SM

*overconsolidated or cemented

SBT CORRELATION CHART
(Robertson and Campanella, 1988)

Plate 3b - Profile B to B'



Legend

CPT-01 ▼ Fugro CPT

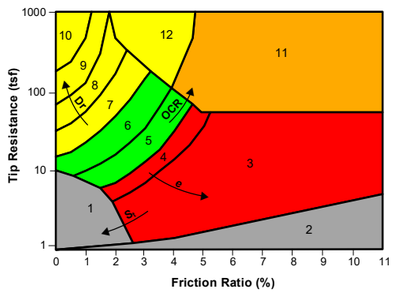
B-1 ◓ Fugro Boring

Soil Descriptions

- High-Plasticity Organic (OH)
- Lean CLAY (CL)
- Fat CLAY (CH)
- 6 Field SPT N-Value

Undrained Shear Strength Tests

- ▲ Unconsolidated Undrained
- ◆ Minivane
- ⌖ Torvane
- ⊗ Pocket Pen

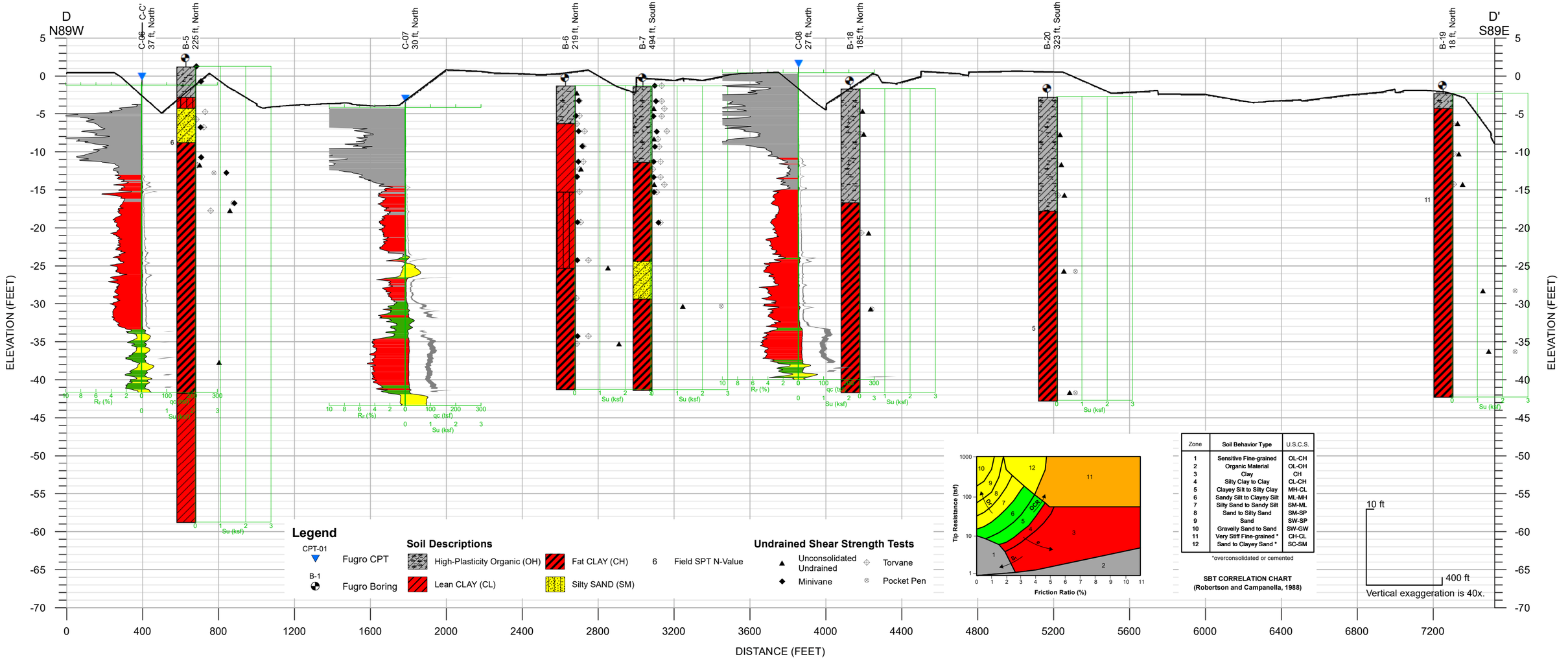


Zone	Soil Behavior Type	U.S.C.S.
1	Sensitive Fine-grained	OL-CH
2	Organic Material	OL-OH
3	Clay	CH
4	Silty Clay to Clay	CL-CH
5	Clayey Silt to Silty Clay	MH-CL
6	Sandy Silt to Clayey Silt	ML-MH
7	Silty Sand to Sandy Silt	SM-ML
8	Sand to Silty Sand	SM-SP
9	Sand	SW-SP
10	Gravelly Sand to Sand	SW-GW
11	Very Stiff Fine-grained *	CH-CL
12	Sand to Clayey Sand *	SC-SM

*overconsolidated or cemented

SBT CORRELATION CHART
(Robertson and Campanella, 1988)

Plate 3c - Profile C to C'

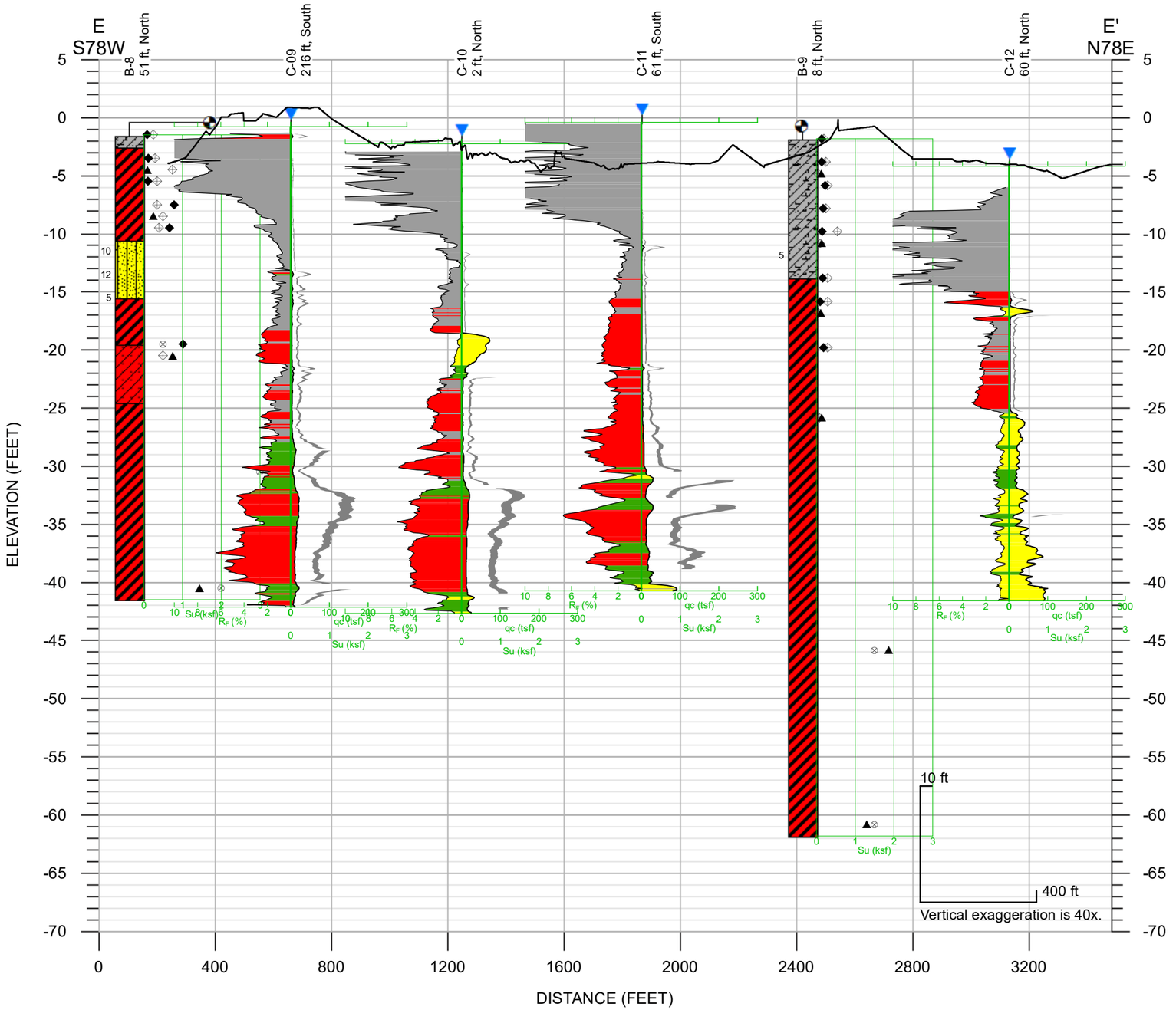


Zone	Soil Behavior Type	U.S.C.S.
1	Sensitive Fine-grained	OL-CH
2	Organic Material	OL-OH
3	Clay	OH
4	Silty Clay to Clay	CL-CH
5	Clayey Silt to Silty Clay	MH-CL
6	Sandy Silt to Clayey Silt	ML-MH
7	Silty Sand to Sandy Silt	SM-ML
8	Sand to Silty Sand	SM-SP
9	Sand	SW-SP
10	Gravelly Sand to Sand	SW-GW
11	Very Stiff Fine-grained *	CH-CL
12	Sand to Clayey Sand *	SC-SM

*overconsolidated or cemented

SBT CORRELATION CHART
(Robertson and Campanella, 1988)

Plate 3d - Profile D to D'



Legend

CPT-01 — Fugro CPT

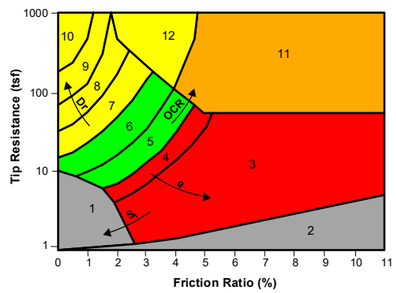
B-1 — Fugro Boring

Soil Descriptions

- High-Plasticity Organic (OH)
- Lean CLAY (CL)
- Fat CLAY (CH)
- Silty SAND (SM)
- 6 — Field SPT N-Value

Undrained Shear Strength Tests

- Unconsolidated Undrained
- Minivane
- Torvane
- Pocket Pen

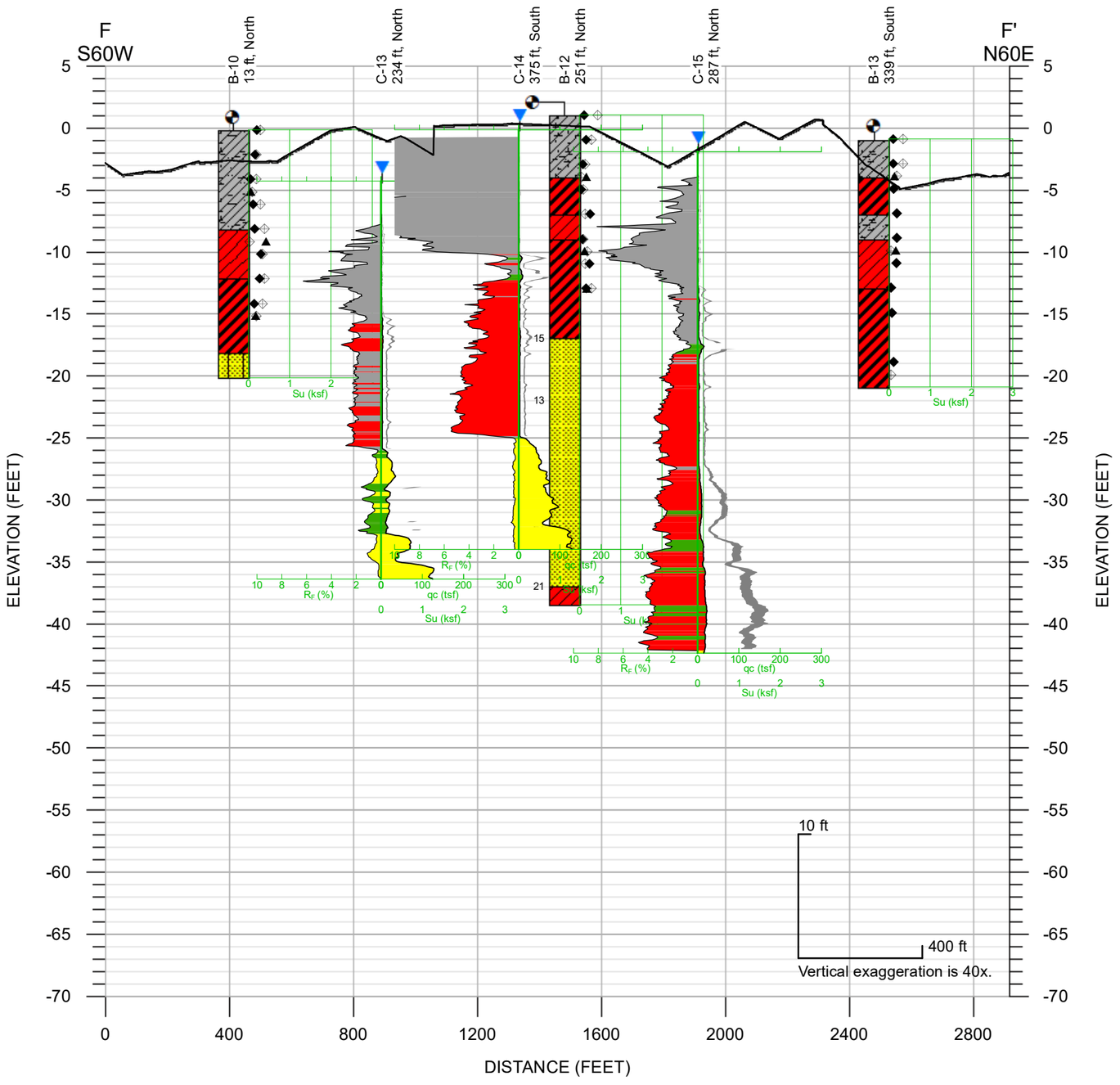


Zone	Soil Behavior Type	U.S.C.S.
1	Sensitive Fine-grained	OL-CH
2	Organic Material	OL-OH
3	Clay	CH
4	Silty Clay to Clay	CL-CH
5	Clayey Silt to Silty Clay	MH-CL
6	Sandy Silt to Clayey Silt	ML-MH
7	Silty Sand to Sandy Silt	SM-ML
8	Sand to Silty Sand	SM-SP
9	Sand	SW-SP
10	Gravelly Sand to Sand	SW-GW
11	Very Stiff Fine-grained *	CH-CL
12	Sand to Clayey Sand *	SC-SM

*overconsolidated or cemented

SBT CORRELATION CHART
(Robertson and Campanella, 1988)

Plate 3e - Profile E to E'



Legend

CPT-01 — Fugro CPT

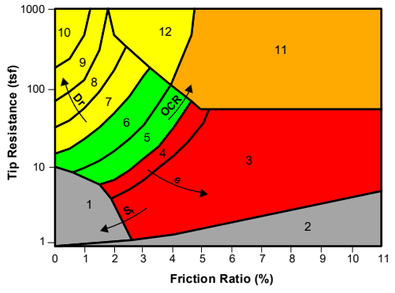
B-1 — Fugro Boring

Soil Descriptions

- High-Plasticity Organic (OH)
- Lean CLAY (CL)
- Fat CLAY (CH)
- Poorly Graded SAND (SP)
- Poorly Graded SAND with Silt (SPSM)
- 6 — Field SPT N-Value

Undrained Shear Strength Tests

- Unconsolidated Undrained
- Minivane
- Torvane
- Pocket Pen



Zone	Soil Behavior Type	U.S.C.S.
1	Sensitive Fine-grained	OL-CH
2	Organic Material	OL-OH
3	Clay	CH
4	Silty Clay to Clay	CL-CH
5	Clayey Silt to Silty Clay	MH-CL
6	Sandy Silt to Clayey Silt	ML-MH
7	Silty Sand to Sandy Silt	SM-ML
8	Sand to Silty Sand	SM-SP
9	Sand	SW-SP
10	Gravelly Sand to Sand	SW-GW
11	Very Stiff Fine-grained *	CH-CL
12	Sand to Clayey Sand *	SC-SM

*overconsolidated or cemented

SBT CORRELATION CHART
(Robertson and Campanella, 1988)

Plate 3f - Profile F to F'

G
S59W

G'
N59E

B-11
8 ft, North

B-14
659 ft, South

C-16
264 ft, South

B-16
280 ft, North

C-19
302 ft, South

ELEVATION (FEET)

DISTANCE (FEET)

Su (ksf)

R_F (%)

qc (tsf)

Zone	Soil Behavior Type	U.S.C.S.
1	Sensitive Fine-grained	OL-CH
2	Organic Material	OL-OH
3	Clay	CH
4	Silty Clay to Clay	CL-CH
5	Clayey Silt to Silty Clay	MH-CL
6	Sandy Silt to Clayey Silt	ML-MH
7	Silty Sand to Sandy Silt	SM-ML
8	Sand to Silty Sand	SM-SP
9	Sand	SW-SP
10	Gravelly Sand to Sand	SW-GW
11	Very Stiff Fine-grained *	CH-CL
12	Sand to Clayey Sand *	SC-SM

*overconsolidated or cemented

SBT CORRELATION CHART
(Robertson and Campanella, 1988)

Tip Resistance (tsf)

Friction Ratio (%)

10 ft

400 ft

Vertical exaggeration is 40x.

Legend

CPT-01 — Fugro CPT

B-1 — Fugro Boring

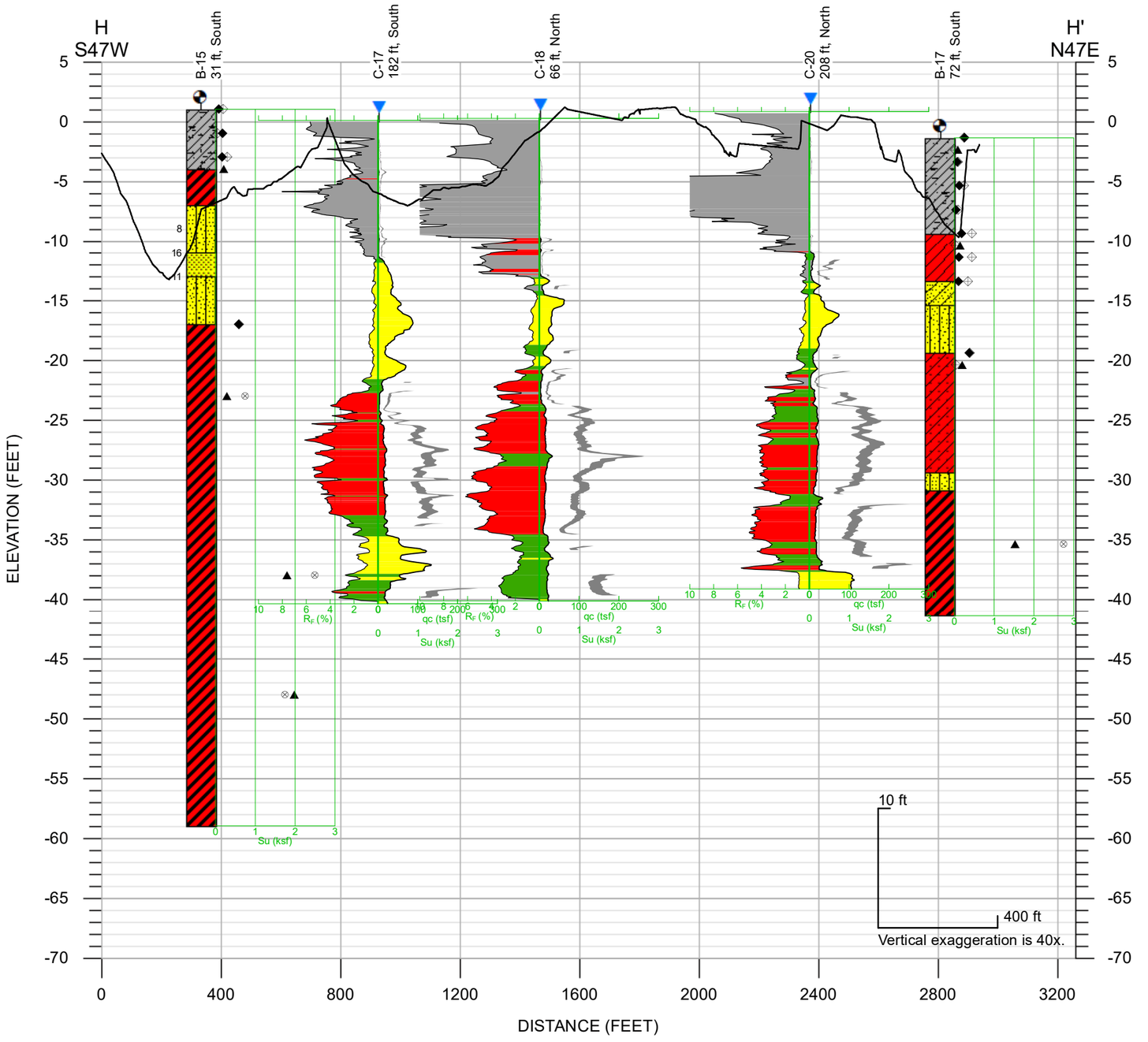
Soil Descriptions

- High-Plasticity Organic (OH)
- Lean CLAY (CL)
- Fat CLAY (CH)
- Clayey SAND (SC)
- Silty SAND (SM)
- Poorly Graded SAND (SP)
- Sandy SILT (MLS)
- 6 — Field SPT N-Value

Undrained Shear Strength Tests

- Unconsolidated Undrained
- Minivane
- Torvane
- Pocket Pen

Plate 3g - Profile G to G'



Legend

CPT-01 — Fugro CPT

B-1 — Fugro Boring

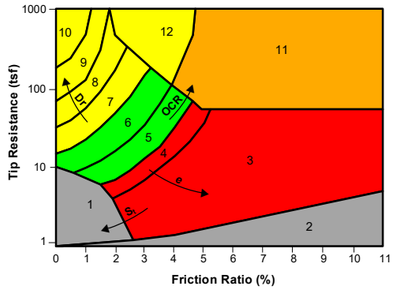
Soil Descriptions

- High-Plasticity Organic (OH)
- Lean CLAY (CL)
- Fat CLAY (CH)
- Clayey SAND (SC)
- Silty SAND (SM)
- Poorly Graded SAND (SP)

6 — Field SPT N-Value

Undrained Shear Strength Tests

- Unconsolidated Undrained
- Minivane
- Torvane
- Pocket Pen

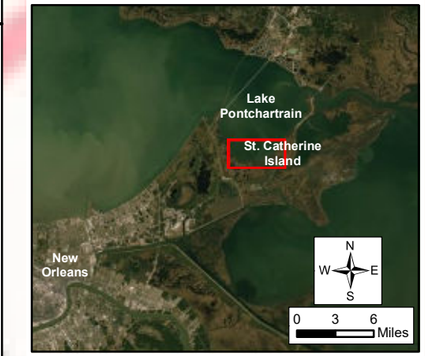


Zone	Soil Behavior Type	U.S.C.S.
1	Sensitive Fine-grained	OL-CH
2	Organic Material	OL-OH
3	Clay	CH
4	Silty Clay to Clay	CL-CH
5	Clayey Silt to Silty Clay	MH-CL
6	Sandy Silt to Clayey Silt	ML-MH
7	Silty Sand to Sandy Silt	SM-ML
8	Sand to Silty Sand	SM-SP
9	Sand	SW-SP
10	Gravelly Sand to Sand	SW-GW
11	Very Stiff Fine-grained *	CH-CL
12	Sand to Clayey Sand *	SC-SM

*overconsolidated or cemented

SBT CORRELATION CHART
(Robertson and Campanella, 1988)

Plate 3h - Profile H to H'



3755000 3760000 3765000 3770000

592000 588000 584000

Lake
Pontchartrain

Chef Menteur Pass

St. Catherine Island

B-1 B-2 B-3 B-4 B-5 B-6 B-7 B-8 B-9 B-10 B-11 B-12 B-13 B-14 B-15 B-16 B-17 B-18 B-19 B-20 B-21 B-22 B-23 B-24 B-25 B-26 B-27

C-01 C-02 C-03 C-04 C-05 C-06 C-07 C-08 C-09 C-10 C-11 C-12 C-13 C-14 C-15 C-16 C-17 C-18 C-19 C-20

N
W
E
S
90

0 1,300 2,600
Feet

Legend

- CPT
- Boring
- Upland Margin Contour (feet, Re. MSL) Refer to Note 2 for source reference. Contour interval is 25 ft.
- Proposed Marsh Creation Area
- Proposed Shoreline Protection

Note:
1. Coordinate system is referenced to Louisiana State Plane, South Zone, NAD83 (2011) feet.
2. Suballuvial surface obtained from Saucier, R. T., 1994, Geomorphology and Quaternary Geologic History of the Lower Mississippi Valley: U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi.

Plate 4 - Suballuvial Surface

Appendix A

Field Exploration

1. Field Exploration

This appendix includes information relating to our field exploration activities for this project. We have included a general discussion on drilling methods, sampling methods, depth-to-water observations, and borehole completion.

1.1 Soil Borings

Field exploration was initially performed between February 18 and April 27, 2019. During the initial exploration phase, Fugro performed a total of seventeen (17) soil borings ranging in depth from 20 ft to 60 ft below the existing ground surface and twenty (20) cone penetration test (CPT) soundings ranging in depth from 30 ft to 40 ft below the existing ground surface. The initial field exploration phase was targeted towards designated shoreline protection and marsh creation areas accessible at that time.

After CPRA performed due diligence of potential borrow areas, a second field investigation program was developed. Specifically, seven (7) soil borings were performed to a depth of 26-ft each within the targeted borrow area and three (3) additional soil borings were performed to a depth of 40-ft each in a secondary restoration area that was identified after the first phase. The second field investigation was conducted between August 15 and August 20, 2019.

Marsh and shoreline soil borings were designated as B-1 through B-20 and borrow borings were designated as Boring B-21 through B-27. All exploration locations were provided by CPRA.

Table 1 summarizes exploration locations, depths, and ground surface elevations. Explorations are approximately located as shown on Plate 2. Explorations were located, cleared from obstructions, and staked prior to commencement of the field exploration program.

Table 1: Exploration Summary

Exploration ID[1]	Northing[2]	Easting[2]	Latitude[3]	Longitude[3]	Mudline Elev[4]	Depth
	Feet	Feet	Degrees	Degrees	Feet	Feet
B-01	582966.97	3754610.36	30.0945	-89.8351	0.448	20
B-02	582899.34	3757042.87	30.0943	-89.8274	-1.361	40
B-03	583561.47	3759054.99	30.0960	-89.8210	-2.287	60
B-04	582039.29	3760296.80	30.0918	-89.8172	-0.769	40
B-05	582590.39	3761044.50	30.0933	-89.8148	1.250	60
B-06	582536.03	3763049.36	30.0930	-89.8084	-1.288	40
B-07	581817.32	3763430.62	30.0910	-89.8073	-1.314	40
B-08	584445.48	3762040.96	30.0983	-89.8115	-1.529	40
B-09	584818.08	3764046.91	30.0993	-89.8052	-1.859	60
B-10	584961.92	3765317.06	30.0996	-89.8012	-0.211	20
B-11	584181.88	3765969.83	30.0975	-89.7991	-0.116	40
B-12	585825.66	3766049.55	30.1020	-89.7988	0.987	40
B-13	585416.44	3766646.22	30.1008	-89.7969	-0.935	20
B-14	584367.11	3767559.02	30.0979	-89.7941	0.631	40
B-15	586407.07	3768039.53	30.1035	-89.7925	0.960	60
B-16	586475.47	3768951.86	30.1037	-89.7896	-0.291	20
B-17	588011.16	3770114.55	30.1078	-89.7859	-1.451	40
B-18	582469.99	3764541.071	30.0945	-89.8351	-1.701	40
B-19	582222.776	3767658.294	30.0943	-89.8274	-2.287	40
B-20	581935.089	3765566.327	30.0928	-89.8037	-2.733	40
B-21	590006.135	3761259.89	30.0920	-89.7939	-6.845	26
B-22	590002.831	3764460.478	30.0913	-89.8005	-7.903	26
B-23	588407.326	3759658.286	30.1136	-89.8138	-5.212	26
B-24	588406.53	3762857.875	30.1135	-89.8037	-7.365	26
B-25	588404.456	3766061.937	30.1093	-89.8189	-8.240	26
B-26	586804.68	3761257.986	30.1092	-89.8088	-6.793	26
B-27	586802.46	3764461.867	30.1091	-89.7987	-8.470	26

Notes:

1. B=Boring
2. Northing/Easting Coordinates are based off NAD83 Louisiana South State Plane Datum
3. Latitude/Longitude Coordinates are based off NAD83 Geographic Coordinates
4. Elevations represent mudline elevations and are based off NAVD88 Geoid 12B

1.2 Survey and Field Coordination

Exploration locations were initially cleared through the Louisiana One Call process. Prior to drilling and performing CPT soundings, exploration locations were surveyed using a magnetometer to assess the potential presence of pipelines or other magnetic obstructions. A closed loop path was surveyed around each exploration location using a Geometrics 858 cesium vapor magnetometer. The loop path enclosed the exploration location and maintained a minimum 25-ft radius or a 25- by 25-foot rectangular cleared area. Cleared locations were marked with a cane pole or buoy with specific flagging as pictured below.

1.3 Boring Logs

Boring logs are presented as Plates A-1 to A-27, with a key to terms and symbols presented as Plates A-49a and 49b. Boring logs present boring number, coordinates, ground surface/mudline elevation, completion date, logger's name, drilling method, drill rig type, backfill method, material descriptions, sampling method, and point-depth related laboratory test results.

1.4 Drilling Methods and Equipment

All borings were drilled with an airboat mounted drilling rig, specifically a Robicheaux Air Boat Drill Unit 38 (ABDU-38), using wet rotary techniques from the mudline. Drilling was performed using wet rotary techniques and drilling fluid was added as needed to stabilize the borehole.

1.5 Soil Sampling Methods

Soil samples were generally taken continuiously from the existing grade to a depth of about 16 feet. After a depth of 16 feet, the boring was sampled at 2-ft intervals to the boring completion depth. Borings were logged by a field technician in general accordance with the *Standard Practice for Description and Identification of Soils (Visual-Manual Procedures)* (ASTM D2488).

Our field procedure for cohesive soil sampling was conducted in general accordance with the *Standard Practice for Thin-Walled Tube Sampling of Soils for Geotechnical Purposes* (ASTM D1587). Undisturbed samples of cohesive soils were generally obtained by hydraulically pushing a 3-inch-diameter, thin-walled tube a distance of about 24 inches. The samples were extruded either in the field (borrow borings) or in our laboratory (marsh and shoreline borings) and visually classified by one of our geotechnical personnel. Field estimates of the undrained shear strength of the recovered samples were obtained by using a calibrated hand penetrometer and/or torvane. Portions of each recovered soil sample were placed into appropriate containers for transportation to our laboratory.

Our field procedure for sampling granular soils was conducted in general accordance with either the *Standard Test Method for Standard Penetration Test and Split-Barrel Sampling of Soils* (ASTM D1586). A description of the SPT tests is presented in Appendix A. A manual hammer was used to obtain the hammer blows for each SPT sample. Our geotechnical personnel recorded the hammer blows for each sampling interval. The SPT N-value, described in Appendix A, is recorded on the boring logs and is uncorrected. The soil samples obtained from the split barrel sampler were visually classified and packaged for transportation to our laboratory.

1.6 Borehole Completion

The soil borings drilled for this study were all backfilled upon completion with cement-bentonite grout from the bottom up. When grout returned to the surface, the boreholes were topped off by pouring grout from the surface.

1.7 Cone Pentration Test Soundings

CPT logs follow the appendix text, as Plates A-28 to A-47, along with a key for the CPT logs as Plate A-48. CPT logs present tip resistance, friction ratio (friction resistance/tip resistance), general soils type, pore pressure measured near by a transducer behind the cone tip, and interpreted strength properties. Table 2 summarizes CPT locations, depths, and other information.

Cone penetration test (CPT) soundings were conducted using an air boat mounted CPT rig. A CPT unit utilizes the self-weight of the equipment to push a cylindrical steel probe into the ground. CPT data is obtained by pushing a series of cylindrical rods, with an instrumented probe at the base, into the soil at a constant rate. The probe consists of a piezocone tip element and a

side-friction sleeve element. Continuous measurements of penetration resistance at the cone tip, friction along the friction sleeve, and pore water pressure were recorded during the penetration tests. During testing, the results were saved electronically for further data reduction in our office.

Table 2: CPT Exploration Summary

Exploration ID[1]	Northing[2]	Easting[2]	Latitude[3]	Longitude[3]	Mudline Elev[4]	Depth
	Feet	Feet	Degrees	Degrees	Feet	Feet
C-1	582798.18	3757723.63	30.0940	-89.8253	-2.999	40
C-2	583132.10	3758389.74	30.0948	-89.8231	-3.168	40
C-3	584340.65	3759336.86	30.0981	-89.8201	-1.904	40
C-4	583799.30	3759612.20	30.0966	-89.8192	-1.173	40
C-5	583338.73	3760127.28	30.0954	-89.8176	-0.899	40
C-6	582417.73	3760804.02	30.0928	-89.8155	-1.232	40
C-7	582374.64	3762193.74	30.0926	-89.8111	-4.145	40
C-8	582318.74	3764264.01	30.0924	-89.8046	0.418	40
C-9	584242.27	3762365.32	30.0978	-89.8105	-0.828	40
C-10	584575.11	3762895.93	30.0987	-89.8088	-2.292	40
C-11	584640.01	3763514.19	30.0988	-89.8069	-0.474	40
C-12	585017.16	3764728.76	30.0998	-89.8030	-4.226	37.5
C-13	585393.88	3765624.29	30.1008	-89.8002	-4.352	32
C-14	585084.21	3766310.89	30.0999	-89.7980	-0.191	34
C-15	585945.02	3766485.97	30.1023	-89.7974	-1.981	40
C-16	585109.12	3768019.17	30.0999	-89.7926	0.190	40
C-17	586528.46	3768579.01	30.1038	-89.7908	0.025	40
C-18	587079.24	3768803.77	30.1053	-89.7900	0.196	40
C-19	585876.33	3769359.87	30.1020	-89.7883	0.455	40
C-20	587800.90	3769365.76	30.1073	-89.7882	0.748	40

Notes:

1. C=CPT
2. Northing/Easting Coordinates are based off NAD83 Louisiana South State Plane Datum
3. Latitude/Longitude Coordinates are based off NAD83 Geographic Coordinates
4. Elevations represent mudline elevations and are based off NAVD88 Geoid 12B

1.8 CPT Hole Completion

CPTs were backfilled upon completion with cement-bentonite grout, using a tremie pipe and topped off at the surface.

LOCATION: See Plate 2

COORDINATES: N 30° 05' 40.3"
W 89° 50' 06.3"

SURFACE EL.: 0.4' NAVD88

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLES	BLOWS PER FOOT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	CLASSIFICATION: UNIT DRY WT, PCF	CLASSIFICATION: PASSING NO. 200 SIEVE, %	CLASSIFICATION: WATER CONTENT, %	CLASSIFICATION: LIQUID LIMIT	CLASSIFICATION: PLASTIC LIMIT	CLASSIFICATION: PLASTICITY INDEX (PI)
					FAT CLAY (CH), very soft to soft, dark gray, with organics							
				N=Push					96	110	31	79
									79			
5							39		120	166	50	116
					- gray, with silt pockets at 6'				102			
									77			
					- gray , with 9-inch sand layer at 9'							
10							42		109			
					- with silty sand below 11'			79	29			
				N=13	**LEAN CLAY (CL)**, soft, gray, with sand pockets and shells	12.0						
15										42	15	27
					- with Fat Clay (CH) seam at 17'				62			
					SILTY SAND (SM), gray and light gray, with shells	18.0		14	22			
20						20.0						
25												
30												
35												
40												

SHEAR STRENGTH

□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Hand Vane ▲ Miniature Vane

KIPS PER SQ FT

0.5 1.0 1.5 2.0 2.5

NOTES:

1. Terms and symbols defined on Plates A-49a and A-49b.
2. Surface elevations represent mudline elevation.

COMPLETION DATE: February 19, 2019
TOTAL DEPTH: 20.0'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 20'
BACKFILL: Cement-Bentonite Grout
LOGGER: V. Le
DRILL RIG: Airboat Mounted Drill Rig
HAMMER TYPE: Automatic

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

LOG OF BORING NO. B-01

Orleans Parish, Louisiana

Project No. 04.55184080

PLATE A-1

FCBR_LOG (FINAL) 2016 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 04/07/20

LOCATION: See Plate 2

COORDINATES: N 30° 05' 39.3"
W 89° 49' 38.7"

SURFACE EL.: -1.4' NAVD88

DEPTH, FT	BLOWS PER FOOT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
		ORGANIC CLAY (OH), very soft, dark brown				281			
						241	415	123	292
				54		82			
5		- dark gray at 4'				325			
				32		136	150	38	112
		FAT CLAY (CH), very soft, gray, with silt and sand pockets	8.0			42			
				64		59			
10						57			
		SILTY SAND (SM), loose, gray	11.0						
	N=6				18	37			
	N=16	**LEAN CLAY (CL)**, stiff, gray	14.0						
15		- with sand pockets at 14'							
		- with silt traces from 18' to 25'				25			
20				102		25			
		- light gray at 23'				25	43	14	29
25									
		- yellowish red and greenish gray, with silt pockets at 28'							
30									
		- tan and greenish gray at 33'		95		26			
		- with silt pockets from 34' to 39'							
35		- light gray at 34'							
		- gray and tan, with silty sand seams below 39'	40.0						
40									

SHEAR STRENGTH

□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Hand Vane ▲ Miniature Vane

KIPS PER SQ FT

0.5 1.0 1.5 2.0 2.5

NOTES:

1. Terms and symbols defined on Plates A-49a and A-49b.
2. Surface elevations represent mudline elevation.

COMPLETION DATE: February 20, 2019
TOTAL DEPTH: 40.0'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 40'
BACKFILL: Cement-Bentonite Grout
LOGGER: V. Le
DRILL RIG: Airboat Mounted Drill Rig
HAMMER TYPE: Automatic

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

LOG OF BORING NO. B-02

Orleans Parish, Louisiana

Project No. 04.55184080

PLATE A-2

FCBR_LOG (FINAL) 2016 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 04/07/20

LOCATION: See Plate 2

COORDINATES: N 30° 05' 45.6"
W 89° 49' 15.7"

SURFACE EL.: -2.3' NAVD88

DEPTH, FT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
0	**ORGANIC CLAY (OH)**, very soft, dark brown				489			
			32		160			
					549	264	65	199
5	- dark gray below 4'				203			
			38		137			
					150			
		8.0						
	FAT CLAY (CH), very soft to soft, light gray				71			
	- with silt pockets 8' to 14'					33	20	13
10	- with Lean Clay (CL) seam at 10'				70			
	N=Push		59		73			
15					48			
						73	24	49
					58			
20								
		23.0						
	LEAN CLAY (CL), stiff, gray and greenish gray				42	45	17	28
25	- greenish gray from 24' to 33'							
	- with shells at 28'							
30			86		35			
	- greenish gray and tan at 33'				36			
35								
	- gray with silt layers below 38'							
40								

CLASSIFICATION

SHEAR STRENGTH

□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Hand Vane ▲ Miniature Vane

KIPS PER SQ FT

0.5 1.0 1.5 2.0 2.5

NOTES:

1. Terms and symbols defined on Plates A-49a and A-49b.
2. Surface elevations represent mudline elevation.

COMPLETION DATE: February 21, 2019
TOTAL DEPTH: 60.0'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 60'
BACKFILL: Cement-Bentonite Grout
LOGGER: V. Le
DRILL RIG: Airboat Mounted Drill Rig
HAMMER TYPE: Automatic

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

LOG OF BORING NO. B-03

Orleans Parish, Louisiana

Project No. 04.55184080

PLATE A-3a

FCBR_LOG (FINAL) 2016 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 04/07/20

LOCATION: See Plate 2

COORDINATES: N 30° 05' 45.6"
W 89° 49' 15.7"

SURFACE EL.: -2.3' NAVD88

DEPTH, FT	WATER LEVEL SYMBOL	SAMPLES	BLOWS PER FOOT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	CLASSIFICATION: UNIT DRY WT, PCF	CLASSIFICATION: PASSING NO. 200 SIEVE, %	CLASSIFICATION: WATER CONTENT, %	CLASSIFICATION: LIQUID LIMIT	CLASSIFICATION: PLASTIC LIMIT	CLASSIFICATION: PLASTICITY INDEX (PI)	SHEAR STRENGTH
45				**LEAN CLAY (CL)**, stiff, gray and greenish gray				30	39	16	23	
50			N=Push									
55								42				
60				- soft, light gray below 58'	60.0	82		42				●
65												
70												
75												
80												

SHEAR STRENGTH

□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Hand Vane ▲ Miniature Vane

KIPS PER SQ FT

0.5 1.0 1.5 2.0 2.5

NOTES:

1. Terms and symbols defined on Plates A-49a and A-49b.
2. Surface elevations represent mudline elevation.

COMPLETION DATE: February 21, 2019
TOTAL DEPTH: 60.0'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 60'
BACKFILL: Cement-Bentonite Grout
LOGGER: V. Le
DRILL RIG: Airboat Mounted Drill Rig
HAMMER TYPE: Automatic

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

LOG OF BORING NO. B-03

Orleans Parish, Louisiana

Project No. 04.55184080

PLATE A-3b

FCBR_LOG (FINAL) 2016 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 04/07/20

LOCATION: See Plate 2

COORDINATES: N 30° 05' 30.4"
W 89° 49' 01.8"

SURFACE EL.: -0.8' NAVD88

DEPTH, FT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
	ORGANIC CLAY (OH), very soft to soft, dark brown and gray				907			
	- dark brown at 2'				521	341	93	248
	- gray below 4'				451			
5			40		111			
					36	165	40	125
	FAT CLAY (CH), soft, gray, with silt pockets	8.0			60			
			56		77			
10					69			
	LEAN CLAY (CL), soft, light gray, with silt pockets	11.0	71		49	45	20	25
					59			
	- with sand and silt below 14'			88	40			
15								
	FAT CLAY (CH), soft, gray, with silt pockets	18.0			69			
	LEAN CLAY (CL), soft, gray	19.0						
20								
	- with sand pockets at 23'				41	42	20	22
25								
	FAT CLAY (CH), soft, gray, with silt pockets	28.0						
			62		63			
30								
	- light gray at 33'							
			34		50			
35								
	- with silt layers at 39'				40			
40		40.0						

SHEAR STRENGTH

□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Hand Vane ▲ Miniature Vane

KIPS PER SQ FT

0.5 1.0 1.5 2.0 2.5

NOTES:

1. Terms and symbols defined on Plates A-49a and A-49b.
2. Surface elevations represent mudline elevation.

COMPLETION DATE: February 21, 2019
TOTAL DEPTH: 40.0'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 40'
BACKFILL: Cement-Bentonite Grout
LOGGER: V. Le
DRILL RIG: Airboat Mounted Drill Rig
HAMMER TYPE: Automatic

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

LOG OF BORING NO. B-04

Orleans Parish, Louisiana

Project No. 04.55184080

PLATE A-4

FCBR_LOG (FINAL) 2016 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 04/07/20

LOCATION: See Plate 2

COORDINATES: N 30° 05' 35.7"
W 89° 48' 53.2"

SURFACE EL.: 1.3' NAVD88

DEPTH, FT	BLOWS PER FOOT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
		ORGANIC CLAY (OH), very soft to soft, dark brown and gray, with peat				257			
						170	207	57	150
	N=WOH	**SILTY CLAY (CL-ML)**, dark gray	4.0				28	23	5
5		**CLAYEY SAND (SC)**, gray	5.5			27			
		- gray below 6'				24			
					24	25			
10	N=6	**FAT CLAY (CH)**, soft to stiff, gray	10.0			52	60	22	38
		- with 5-inch clayey sand layer at 12'				62			
		- with sand pockets at 12.5'		71		49			
15		- with sand seams and partings at 14'				37			
		- with slickensides from 18' to 25'				31			
		- greenish gray, with sand pockets at 18'		89		31			
20		- greenish gray and brown at 23'				36	73	28	45
25		- with sand seams at 28'				53			
		- greenish gray and tan from 29.5' to 40'							
30		- with sand pockets and some slickensides at 33'				32			
35		- with slickensides from 38' to 45'							
				87		33			
40									

CLASSIFICATION

SHEAR STRENGTH

□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Hand Vane ▲ Miniature Vane

KIPS PER SQ FT

0.5 1.0 1.5 2.0 2.5

NOTES:

1. Terms and symbols defined on Plates A-49a and A-49b.
2. Surface elevations represent mudline elevation.

COMPLETION DATE: February 22, 2019
TOTAL DEPTH: 60.0'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 60'
BACKFILL: Cement-Bentonite Grout
LOGGER: V. Le
DRILL RIG: Airboat Mounted Drill Rig
HAMMER TYPE: Automatic

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

LOG OF BORING NO. B-05

Orleans Parish, Louisiana

Project No. 04.55184080

PLATE A-5a

FCBR_LOG (FINAL) 2016 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 04/07/20

LOCATION: See Plate 2

COORDINATES: N 30° 05' 35.7"
W 89° 48' 53.2"

SURFACE EL.: 1.3' NAVD88

DEPTH, FT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
	FAT CLAY (CH), soft to stiff, gray							
	LEAN CLAY (CL), stiff to very stiff, tan and greenish gray	43.0						
45	- tan, with sand traces at 44'				28	35	21	14
	- gray at 48'							
50	- tan and gray, with silt laminations at 49.5'			91	36			
	- gray, with alternating sand and silt seams below 53'				46			
55								
					35			
60		60.0						
65								
70								
75								
80								

SHEAR STRENGTH

□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Hand Vane ▲ Miniature Vane

KIPS PER SQ FT

0.5 1.0 1.5 2.0 2.5

□ 3.5

◇

□ 4.5

NOTES:

1. Terms and symbols defined on Plates A-49a and A-49b.
2. Surface elevations represent mudline elevation.

COMPLETION DATE: February 22, 2019
TOTAL DEPTH: 60.0'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 60'
BACKFILL: Cement-Bentonite Grout
LOGGER: V. Le
DRILL RIG: Airboat Mounted Drill Rig
HAMMER TYPE: Automatic

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

LOG OF BORING NO. B-05

Orleans Parish, Louisiana

Project No. 04.55184080

PLATE A-5b

FCBR_LOG (FINAL) 2016 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 04/07/20

LOCATION: See Plate 2

COORDINATES: N 30° 05' 34.9"
W 89° 48' 30.3"

SURFACE EL.: -1.3' NAVD88

DEPTH, FT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
	ORGANIC CLAY (OH), very soft to soft, dark brown, with peat layers		48		162 108 352 107	235	58	177
5	**LEAN CLAY (CL)**, very soft to soft, gray	5.0	73		48	42	22	20
	FAT CLAY (CH), very soft to soft, gray, with silt and sand seams - with silt and sand seams from 6' to 11'	6.0			60 50 66			
10	- with 7-inch sandy clay layer at 12'		74		48 55			
	SILTY CLAY (CL-ML), soft to firm, gray, with sand pockets - with shell fragments at 14'	14.0			23	24	18	6
15				89	22			
20	- greenish gray and tan below 23'							
	FAT CLAY (CH), firm to stiff, greenish gray and tan - with silt seams at 24'	24.0	94		29			
25	- tan and gray, with wood fragments from 28' to 35'				36			
30								
35	- with silt seams at 35'		95		29			
	- tan and greenish gray, with sand pockets, silt seams and some slickensides below 38'				39	96	32	64
40		40.0						

SHEAR STRENGTH

□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Hand Vane ▲ Miniature Vane

KIPS PER SQ FT

0.5 1.0 1.5 2.0 2.5

NOTES:

1. Terms and symbols defined on Plates A-49a and A-49b.
2. Surface elevations represent mudline elevation.

COMPLETION DATE: February 22, 2019
TOTAL DEPTH: 40.0'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 40'
BACKFILL: Cement-Bentonite Grout
LOGGER: V. Le
DRILL RIG: Airboat Mounted Drill Rig
HAMMER TYPE: Automatic

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

LOG OF BORING NO. B-06

Orleans Parish, Louisiana

Project No. 04.55184080

PLATE A-6

LOCATION: See Plate 2

COORDINATES: N 30° 05' 27.8"
W 89° 48' 26.1"

SURFACE EL.: -1.3' NAVD88

DEPTH, FT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
	ORGANIC CLAY (OH), very soft to soft, dark brown, with peat				401			
					441			
			23		229			
5					262			
					321	140	37	103
			35		151			
	- with 2-inch sandy clay layer at 8.5'				195			
10	**FAT CLAY (CH)**, very soft to soft, gray	10.0			68			
	- with organic traces at 10'		70		51	59	22	37
	- with silt partings at 12'				46			
			67		60			
15	- with 2-inch sand seams at 14.7'				48			
	- with 8-inch sand layer and shells at 18'				25			
20	- with shell fragments and sand pockets at 18.7'							
	CLAYEY SAND (SC), gray, with shell fragments	23.0		26	22			
25								
	FAT CLAY (CH), stiff, greenish gray	28.0						
	- with sand and silt partings at 28'		97		25			
30								
	- tan and gray, with wood traces and slickensides at 33'				48			
35								
	- greenish gray and tan, with silt laminations and ferrous stains at 38'				36			
40		40.0						

SHEAR STRENGTH

□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Hand Vane ▲ Miniature Vane

KIPS PER SQ FT

0.5 1.0 1.5 2.0 2.5

NOTES:

1. Terms and symbols defined on Plates A-49a and A-49b.
2. Surface elevations represent mudline elevation.

COMPLETION DATE: February 22, 2019
TOTAL DEPTH: 40.0'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 40'
BACKFILL: Cement-Bentonite Grout
LOGGER: V. Le
DRILL RIG: Airboat Mounted Drill Rig
HAMMER TYPE: Automatic

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

LOG OF BORING NO. B-07

Orleans Parish, Louisiana

Project No. 04.55184080

PLATE A-7

LOCATION: See Plate 2

COORDINATES: N 30° 05' 53.9"
W 89° 48' 41.5"

SURFACE EL.: -1.5' NAVD88

DEPTH, FT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	BLOWS PER FOOT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
	ORGANIC CLAY (OH), very soft, dark brown and dark gray, with peat	1.0				144			
	FAT CLAY (CH), very soft to firm, dark gray - with organics from 1' to 6' - dark gray and dark brown at 2'			48		83 97 113	83	27	56
5	- gray, with sand seams and pockets at 6'			80		51 42	53	22	31
	- with sand pockets and roots at 8'	9.0			55	44			
10	**SILTY SAND (SM)**, loose to medium, dark gray, with clay pockets		N=10 N=12		17	27			
		14.0							
15	**FAT CLAY (CH)**, firm, gray, with sand pockets and shell fragments		N=5						
		18.0							
20	**SANDY LEAN CLAY (CL)**, firm to stiff, gray and greenish gray, with sand pockets and seams			103		26 23			
		23.0							
25	**FAT CLAY (CH)**, stiff, gray and greenish gray, with sand pockets - with 4-inch clayey sand layer and shells at 23'					21			
	- greenish gray at 28'			100		25	60	22	38
30	- greenish gray and tan below 33'								
35	- with silt seams and shells at 38'			79		43			
40		40.0							

SHEAR STRENGTH

□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Hand Vane ▲ Miniature Vane

KIPS PER SQ FT

0.5 1.0 1.5 2.0 2.5

NOTES:

1. Terms and symbols defined on Plates A-49a and A-49b.
2. Surface elevations represent mudline elevation.

COMPLETION DATE: February 23, 2019
TOTAL DEPTH: 40.0'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 40'
BACKFILL: Cement-Bentonite Grout
LOGGER: V. Le
DRILL RIG: Airboat Mounted Drill Rig
HAMMER TYPE: Automatic

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

LOG OF BORING NO. B-08

Orleans Parish, Louisiana

Project No. 04.55184080

PLATE A-8

LOCATION: See Plate 2

COORDINATES: N 30° 05' 57.4"
W 89° 48' 18.6"

SURFACE EL.: -1.9' NAVD88

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLES	BLOWS PER FOOT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	SHEAR STRENGTH (KIPS PER SQ FT)
					ORGANIC CLAY (OH), very soft to soft, dark brown, with peat				325				
									199				
							35		138				
5									244	201	44	157	
					- dark brown and light gray at 6'				128				
					- gray and dark gray, with sand pockets at 8'				130				
							42		116				
10				N=5	- dark brown and gray at 10'								
						12.0							
					FAT CLAY (CH), very soft to soft, gray - with silt and sand seams from 12' to 16'			100	72	77	24	53	
									68				
15							59		74				
								92	60				
20													
							58		78				
25													
					- with sand traces from 28' to 40'				61	78	27	51	
30													
									79				
35													
									31				
					- with 3-inch sand layer at 38.8'								
40													

SHEAR STRENGTH: ☐ Penetrometer ▼ Unconfined; ◇ Torvane ● Triaxial; △ Hand Vane ▲ Miniature Vane

NOTES:

1. Terms and symbols defined on Plates A-49a and A-49b.
2. Surface elevations represent mudline elevation.

COMPLETION DATE: February 23, 2019
TOTAL DEPTH: 60.0'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 60'
BACKFILL: Cement-Bentonite Grout
LOGGER: V. Le
DRILL RIG: Airboat Mounted Drill Rig
HAMMER TYPE: Automatic

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

LOG OF BORING NO. B-09

Orleans Parish, Louisiana

Project No. 04.55184080

PLATE A-9a

FCBR_LOG (FINAL) 2016 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 04/07/20

LOCATION: See Plate 2

COORDINATES: N 30° 05' 57.4"
W 89° 48' 18.6"

SURFACE EL.: -1.9' NAVD88

DEPTH, FT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
45	**FAT CLAY (CH)**, very soft to soft, gray - stiff below 43' - light gray and greenish gray, with roots at 43'		93		28			
50	- greenish gray from 48' to 55' - with sandy silt seams below 48'				28			
55					34			
60	- greenish gray and tan, with calcareous nodules at 58'	60.0	98		28			
65								
70								
75								
80								

SHEAR STRENGTH

□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Hand Vane ▲ Miniature Vane

KIPS PER SQ FT

0.5 1.0 1.5 2.0 2.5

NOTES:

1. Terms and symbols defined on Plates A-49a and A-49b.
2. Surface elevations represent mudline elevation.

COMPLETION DATE: February 23, 2019
TOTAL DEPTH: 60.0'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 60'
BACKFILL: Cement-Bentonite Grout
LOGGER: V. Le
DRILL RIG: Airboat Mounted Drill Rig
HAMMER TYPE: Automatic

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

LOG OF BORING NO. B-09

Orleans Parish, Louisiana

Project No. 04.55184080

PLATE A-9b

FCBR_LOG (FINAL) 2016 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 04/07/20

LOCATION: See Plate 2

COORDINATES: N 30° 05' 58.7"
W 89° 48' 04.2"

SURFACE EL.: -0.2' NAVD88

DEPTH, FT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
	ORGANIC CLAY (OH), very soft to soft, dark brown, with peat				203			
					250			
5			30		177	349	81	268
					153			
			19		294			
					175			
	- light gray at 7.5'							
	LEAN CLAY (CL), soft to firm, gray	8.0			45	35	20	15
	- with sand traces at 8'				36			
10			87					
	- light gray, with sand partings below 10'				52			
	FAT CLAY (CH), very soft to soft, light gray, with sand partings	12.0		100	72			
	- with shell fragments at 14'				60			
15			70		51			
	- with 2-inch sand layer at 15.8'							
	POORLY GRADED SAND WITH SILT (SP-SM), light gray, with shells and shell fragments	18.0		9	21			
20		20.0						
25								
30								
35								
40								

SHEAR STRENGTH

□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Hand Vane ▲ Miniature Vane

KIPS PER SQ FT

0.5 1.0 1.5 2.0 2.5

NOTES:

1. Terms and symbols defined on Plates A-49a and A-49b.
2. Surface elevations represent mudline elevation.

COMPLETION DATE: February 24, 2019
TOTAL DEPTH: 20.0'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 20'
BACKFILL: Cement-Bentonite Grout
LOGGER: V. Le
DRILL RIG: Airboat Mounted Drill Rig
HAMMER TYPE: Automatic

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

LOG OF BORING NO. B-10

Orleans Parish, Louisiana

Project No. 04.55184080

PLATE A-10

FCBR_LOG (FINAL) 2016 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 04/07/20

LOCATION: See Plate 2

COORDINATES: N 30° 05' 50.8"
W 89° 47' 56.9"

SURFACE EL.: -0.1' NAVD88

DEPTH, FT	BLOWS PER FOOT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
		ORGANIC CLAY (OH), very soft to soft, dark brown, with peat				78			
		- dark brown and dark gray at2'				104			
				40		115			
5		- dark gray at 4'				110	94	27	67
						314			
		- light gray, with sand partings at 8.5'				40	299	77	222
10	N=WOH	**FAT CLAY (CH)**, very soft to soft, gray - with silt partings at 10'	10.0		97	47			
						72	71	23	48
				72		53			
15		- light gray, with silt partings at 14'				51			
		- with sandy silt partings and shells at 18'							
20				66		65			
		POORLY GRADED SAND WITH SILT (SP-SM), gray, with shells and shell fragments	23.5			21			
25									
	N=37	**SILTY SAND (SM)**, dense, gray, with shell fragments	28.0		12	23			
30									
	N=14	**SILTY CLAY (CL-ML)**, stiff, gray, with sand pockets and shell fragments	33.0			29	19	14	5
35									
	N=13	**FAT CLAY (CH)**, stiff, gray, with silt partings	38.0			40			
40			39.5						

SHEAR STRENGTH

□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Hand Vane ▲ Miniature Vane

KIPS PER SQ FT

0.5 1.0 1.5 2.0 2.5

NOTES:

1. Terms and symbols defined on Plates A-49a and A-49b.
2. Surface elevations represent mudline elevation.

COMPLETION DATE: February 24, 2019
TOTAL DEPTH: 39.5'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 39.5'
BACKFILL: Cement-Bentonite Grout
LOGGER: V. Le
DRILL RIG: Airboat Mounted Drill Rig
HAMMER TYPE: Automatic

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

LOG OF BORING NO. B-11

Orleans Parish, Louisiana

Project No. 04.55184080

PLATE A-11

FCBR_LOG (FINAL) 2016 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 04/07/20

LOCATION: See Plate 2

COORDINATES: N 30° 06' 07.1"
W 89° 47' 55.7"

SURFACE EL.: 1.0' NAVD88

DEPTH, FT	BLOWS PER FOOT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
		ORGANIC CLAY (OH), very soft, black, with peat				437			
		- black and dark gray at 2'				249			
						279	235	69	166
5		**FAT CLAY (CH)**, very soft to soft, dark gray, with sandy silt pockets and organics	5.0	69		55			
		- gray at 6'				47			
		LEAN CLAY (CL), soft, light gray	8.0			35			
10			10.0	68		50	37	20	17
		FAT CLAY (CH), very soft to soft, light gray				74			
		- with sandy silt pocket traces and organic traces at 10'		72		37			
		- with 7-inch clayey sand layer at 12'			91	52			
		- with sand seams and pockets below 12'							
15		- with shell fragments below 14'		63		68			
	N=15	**SILTY SAND (SM)**, medium-dense, light gray, with shell fragments	18.0		32	36			
20									
	N=13	- with silt traces at 23'			20	27			
25									
	N=22								
30									
	N=21	**POORLY GRADED SAND (SP)**, medium-dense, light gray	33.0		2	22			
35									
	N=21	**LEAN CLAY (CL)**, very stiff, light gray, with sand and silt partings	38.0			31	44	19	25
40			39.5						

SHEAR STRENGTH

□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Hand Vane ▲ Miniature Vane

KIPS PER SQ FT

0.5 1.0 1.5 2.0 2.5

NOTES:

1. Terms and symbols defined on Plates A-49a and A-49b.
2. Surface elevations represent mudline elevation.

COMPLETION DATE: February 26, 2019
TOTAL DEPTH: 39.5'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 39.5'
BACKFILL: Cement-Bentonite Grout
LOGGER: V. Le
DRILL RIG: Airboat Mounted Drill Rig
HAMMER TYPE: Automatic

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

LOG OF BORING NO. B-12

Orleans Parish, Louisiana

Project No. 04.55184080

PLATE A-12

LOCATION: See Plate 2

COORDINATES: N 30° 06' 02.9"
W 89° 47' 48.9"

SURFACE EL.: -0.9' NAVD88

DEPTH, FT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
	ORGANIC CLAY (OH), very soft, dark brown, with peat				282			
					475	409	164	245
	FAT CLAY (CH), very soft, dark brown and gray	3.0	69		47			
5					67			
	ORGANIC CLAY (OH), soft, dark brown	6.0			302			
	LEAN CLAY (CL), very soft to soft, light gray, with clay and sand pockets	8.0			28	40	23	17
			71		57			
10	With sandy silt seams at 10'				38			
	SANDY LEAN CLAY (CL), very soft, light gray - with 7-inch clayey sand layer at 12'	12.0			51			
					43			
15	- sand seams and pockets 14' to 16'					NP	NP	NP
	- with sand pockets at 18'				75			
20		20.0			38			
25								
30								
35								
40								

SHEAR STRENGTH

□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Hand Vane ▲ Miniature Vane

KIPS PER SQ FT

0.5 1.0 1.5 2.0 2.5

NOTES:

1. Terms and symbols defined on Plates A-49a and A-49b.
2. Surface elevations represent mudline elevation.

COMPLETION DATE: February 25, 2019
TOTAL DEPTH: 20.0'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 20'
BACKFILL: Cement-Bentonite Grout
LOGGER: V. Le
DRILL RIG: Airboat Mounted Drill Rig
HAMMER TYPE: Automatic

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

LOG OF BORING NO. B-13

Orleans Parish, Louisiana

Project No. 04.55184080

PLATE A-13

FCBR_LOG (FINAL) 2016 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 04/07/20

LOCATION: See Plate 2

COORDINATES: N 30° 05' 52.5"
W 89° 47' 38.7"

SURFACE EL.: 0.6' NAVD88

DEPTH, FT	BLOWS PER FOOT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
		ORGANIC CLAY (OH), very soft to soft, dark brown, with peat				566			
						443	408	132	276
						355			
5		**FAT CLAY (CH)**, very soft to soft, dark gray and brown	5.0	47		88			
						76			
		SANDY SILT (ML), very loose, gray, with clay pockets	7.0						
	N=WOH				67	34			
10		**FAT CLAY (CH)**, very soft, gray	10.0			82			
		SANDY FAT CLAY (CH), soft, gray	12.0		70	45			
		FAT CLAY (CH), soft, gray, with sand seams and pockets	14.0			64			
15						63			
		- with few shells at 16'							
		SILTY SAND (SM), medium-dense to dense, gray	18.0						
20	N=20				12	25			
	N=34	- with shell fragments below 23'			26	27			
25									
	N=11	**LEAN CLAY (CL)**, stiff, gray, with sand and silt partings	28.0			28	48	18	30
30		- with sand seams at 28'							
		- greenish gray, with ferrous stains, calcareous nodules, and slickensides at 33'				41			
35									
		- light gray and yellowish red at 38'		95		29			
40			40.0						

SHEAR STRENGTH

□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Hand Vane ▲ Miniature Vane

KIPS PER SQ FT

0.5 1.0 1.5 2.0 2.5

NOTES:

1. Terms and symbols defined on Plates A-49a and A-49b.
2. Surface elevations represent mudline elevation.

COMPLETION DATE: February 25, 2019
TOTAL DEPTH: 40.0'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 40'
BACKFILL: Cement-Bentonite Grout
LOGGER: V. Le
DRILL RIG: Airboat Mounted Drill Rig
HAMMER TYPE: Automatic

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

LOG OF BORING NO. B-14

Orleans Parish, Louisiana

Project No. 04.55184080

PLATE A-14

LOCATION: See Plate 2

COORDINATES: N 30° 06' 12.6"
W 89° 47' 32.9"

SURFACE EL.: 1.0' NAVD88

DEPTH, FT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	BLOWS PER FOOT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
	ORGANIC CLAY (OH), very soft to soft, dark brown					125			
						107	84	22	62
	- dark gray and light gray, with sand partings at 4'					147			
5	**FAT CLAY (CH)**, soft, gray, with sand partings and organics	5.0		82		42			
				81		34	88	27	61
	SILTY SAND (SM), loose, gray	8.0							
10			N=8		15	27			
	POORLY GRADED SAND (SP), medium-dense, light gray	12.0	N=16		2	23			
	SILTY SAND (SM), medium-dense, gray, with clay pockets and shell fragments	14.0	N=11						
15									
	FAT CLAY (CH), firm to stiff, gray	18.0			25	27			
20	- with sand pockets and shell fragments at 18'								
				83		38			
25									
	- with sand pockets at28'					35			
30									
	- with few shell fragments at 33'					36	51	17	34
35									
	- gray and greenish gray, with slickensides at 38'								
40				92		29			

SHEAR STRENGTH

□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Hand Vane ▲ Miniature Vane

KIPS PER SQ FT

0.5 1.0 1.5 2.0 2.5

NOTES:

1. Terms and symbols defined on Plates A-49a and A-49b.
2. Surface elevations represent mudline elevation.

COMPLETION DATE: February 23, 2019
TOTAL DEPTH: 60.0'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 60'
BACKFILL: Cement-Bentonite Grout
LOGGER: V. Le
DRILL RIG: Airboat Mounted Drill Rig
HAMMER TYPE: Automatic

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

LOG OF BORING NO. B-15

Orleans Parish, Louisiana

Project No. 04.55184080

PLATE A-15a

FCBR_LOG (FINAL) 2016 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 04/07/20

LOCATION: See Plate 2

COORDINATES: N 30° 06' 12.6"
W 89° 47' 32.9"

SURFACE EL.: 1.0' NAVD88

DEPTH, FT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	WATER CONTENT, %
45	**FAT CLAY (CH)**, firm to stiff, gray - tan and gray from 43' to 50' - with ferrous stains at 43'			40
50	- with organic traces at 48'		86	37
55	- tan and greenish gray, slightly slickensided below 53'			42
60	with 5-inch sandy silt layer at 59.5'	60.0		47
65				
70				
75				
80				

WATER LEVEL SYMBOL SAMPLES BLOWS PER FOOT

CLASSIFICATION: PASSING NO. 200 SIEVE, %; LIQUID LIMIT; PLASTIC LIMIT; PLASTICITY INDEX (PI)

SHEAR STRENGTH

□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Hand Vane ▲ Miniature Vane

KIPS PER SQ FT

0.5 1.0 1.5 2.0 2.5

NOTES:

1. Terms and symbols defined on Plates A-49a and A-49b.
2. Surface elevations represent mudline elevation.

COMPLETION DATE: February 23, 2019
TOTAL DEPTH: 60.0'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 60'
BACKFILL: Cement-Bentonite Grout
LOGGER: V. Le
DRILL RIG: Airboat Mounted Drill Rig
HAMMER TYPE: Automatic

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

LOG OF BORING NO. B-15

Orleans Parish, Louisiana

Project No. 04.55184080

PLATE A-15b

LOCATION: See Plate 2

COORDINATES: N 30° 06' 13.2"
W 89° 47' 22.6"

SURFACE EL.: -0.3' NAVD88

DEPTH, FT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	BLOWS PER FOOT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
	ORGANIC CLAY (OH), very soft, dark brown					197			
	POORLY GRADED SAND (SP), gray	2.0				19			
						17			
5	**SANDY LEAN CLAY (CL)**, firm, dark brown and gray	4.0	N=7			42	33	18	15
	FAT CLAY (CH), very soft, dark brown and gray, with sand pockets	6.0				26			
	SILTY SAND (SM), very loose, gray	8.0	N=Push						
10	**POORLY GRADED SAND (SP)**, medium-dense, gray, with shell traces	10.0	N=18		8	24			
	CLAYEY SAND (SC), loose, gray and greenish gray, with shell fragments	12.0	N=5		30	34			
	FAT CLAY (CH), stiff, greenish gray, with shell fragments and sand pockets	14.0				38	52	15	37
15	- with sand and silt pockets at 14'			105		21			
						38			
20		20.0							
25									
30									
35									
40									

CLASSIFICATION

SHEAR STRENGTH

□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Hand Vane ▲ Miniature Vane

KIPS PER SQ FT

0.5 1.0 1.5 2.0 2.5

NOTES:

1. Terms and symbols defined on Plates A-49a and A-49b.
2. Surface elevations represent mudline elevation.

COMPLETION DATE: February 26, 2019
TOTAL DEPTH: 20.0'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 20'
BACKFILL: Cement-Bentonite Grout
LOGGER: V. Le
DRILL RIG: Airboat Mounted Drill Rig
HAMMER TYPE: Automatic

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

LOG OF BORING NO. B-16

Orleans Parish, Louisiana

Project No. 04.55184080

PLATE A-16

FCBR_LOG (FINAL) 2016 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 04/07/20

LOCATION: See Plate 2

COORDINATES: N 30° 06' 28.2"
W 89° 47' 09.1"

SURFACE EL.: -1.5' NAVD88

DEPTH, FT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	BLOWS PER FOOT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
	ORGANIC CLAY (OH), very soft to soft, dark brown			36		119 134 128			
5	- with roots at0' - with wood at 2'			39		131 129 85	155	35	120
	SANDY LEAN CLAY (CL), soft, dark brown	8.0		84		48 38			
10	- dark gray below 10'					35 31	33	17	16
15	**SILTY SAND (SM)**, very loose, dark gray and light gray	14.0	N=WOH		20	28			
	SANDY LEAN CLAY (CL), soft, gray, with shell fragments	18.0		85		36 39			
20									
25						43	39	17	22
	SILTY SAND (SM), gray	28.0			21	28			
30	**FAT CLAY (CH)**, stiff, greenish gray, with sand and silt pockets	29.5							
	- tan and brown, with sand and silt laminations at 33'			86		34			
35									
	- tan and gray below 38'					33			
40		40.0							

SHEAR STRENGTH

□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Hand Vane ▲ Miniature Vane

KIPS PER SQ FT

0.5 1.0 1.5 2.0 2.5

NOTES:

1. Terms and symbols defined on Plates A-49a and A-49b.
2. Surface elevations represent mudline elevation.

COMPLETION DATE: February 26, 2019
TOTAL DEPTH: 40.0'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 40'
BACKFILL: Cement-Bentonite Grout
LOGGER: V. Le
DRILL RIG: Airboat Mounted Drill Rig
HAMMER TYPE: Automatic

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

LOG OF BORING NO. B-17

Orleans Parish, Louisiana

Project No. 04.55184080

PLATE A-17

FCBR_LOG (FINAL) 2016 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 04/07/20

LOCATION: See Plate 1

COORDINATES: N 30° 05' 34.1"
W 89° 48' 13.4"

SURFACE EL.: -1.7' NAVD88

DEPTH, FT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
	ORGANIC CLAY (OH), very soft, gray					64	25	39
	- with peat and grass at 0'							
	- OC = 1.06%		64		56			
	- with wood at 2'							
5	- with sand seams traces at 4'							
	- OC = 6.73%		41		112			
	- with sand pockets at 7'							
	- dark gray at 8'							
10			35		148	120	34	86
	- with sand lenses from 11' to 14'				32			
	- brown and gray at 12'							
15						111	34	77
	FAT CLAY (CH), very soft, gray and dark gray	15.0						
	- with sand traces at 18'							
20			48		90			
	- with silt pockets at 23'				92			
25								
	- with silt and sand seams at 28'							
30			52		86			
	- tan and gray, with slickensides at 33'				48	89	33	56
35								
	- gray and brown, with silt pockets at 38'				40			
40		40.0						

CLASSIFICATION

SHEAR STRENGTH

□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Hand Vane ▲ Miniature Vane

KIPS PER SQ FT

0.5 1.0 1.5 2.0 2.5

NOTES:

1. Terms and symbols defined on Plates A-49a and A-49b.
2. Surface elevations represent mudline elevation.

COMPLETION DATE: August 16, 2019
TOTAL DEPTH: 40.0'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 40'
BACKFILL: Cement-Bentonite Grout
LOGGER: V. Le
DRILL RIG: Airboat Mounted Drill Rig
HAMMER TYPE: Automatic

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

LOG OF BORING NO. B-18

Orleans Parish, Louisiana

Project No. 04.55184080

PLATE A-18

FCBR_LOG (FINAL) 2016 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 04/07/20

LOCATION: See Plate 1

COORDINATES: N 30° 05' 31.2"
W 89° 47' 37.9"

SURFACE EL.: -2.3' NAVD88

DEPTH, FT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	BLOWS PER FOOT
	ORGANIC CLAY (OH), very soft, gray, with silt pockets								
	OC = 11.70%	2.0							
	FAT CLAY (CH), very soft to soft, gray, with silt pockets		48		103	97	29	68	
5	- with silt layers at 5'		45		102				
	- with silt seams from 6' to 12'					48	20	28	
			80		42				
10									
	- with sand seams from 12' to 26'		61		75				
						69	27	42	
15									N=11
									N=Push
20									
25									
	- with silt and sand pockets and shells at 26'		91		32				
	- greenish gray, with wood below 28'				34				
30									
	- stiff and gray and greenish gray below 33'								
	- with wood at 33'		94		29				
35									
	- with sand pockets at 38'					51	19	32	
40		40.0			27				

CLASSIFICATION

SHEAR STRENGTH

□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Hand Vane ▲ Miniature Vane

KIPS PER SQ FT

0.5 1.0 1.5 2.0 2.5

NOTES:

1. Terms and symbols defined on Plates A-49a and A-49b.
2. Surface elevations represent mudline elevation.

COMPLETION DATE: August 15, 2019
TOTAL DEPTH: 40.0'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 40'
BACKFILL: Cement-Bentonite Grout
LOGGER: V. Le
DRILL RIG: Airboat Mounted Drill Rig
HAMMER TYPE: Automatic

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

LOG OF BORING NO. B-19

Orleans Parish, Louisiana

Project No. 04.55184080

PLATE A-19

FCBR_LOG (FINAL) 2016 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 04/07/20

LOCATION: See Plate 1

COORDINATES: N 30° 05' 28.7"
W 89° 48' 01.8"

SURFACE EL.: -2.7' NAVD88

DEPTH, FT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	BLOWS PER FOOT
	ORGANIC CLAY (OH), very soft, gray - OC = 11.64%					133	33	100	
5			38		135				
						148	38	110	
10			37		135				
			37		134				
15			38		123	128	36	92	
	FAT CLAY (CH), very soft, gray	15.0							
20									
	- with sand layers at 23'		65		49				
25									
30					54				N=5
					45	84	30	54	
35									
40		40.0	72		52				

SHEAR STRENGTH

□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Hand Vane ▲ Miniature Vane

KIPS PER SQ FT

0.5 1.0 1.5 2.0 2.5

NOTES:

1. Terms and symbols defined on Plates A-49a and A-49b.
2. Surface elevations represent mudline elevation.
3. Water depth measured as 2.8 ft.

COMPLETION DATE: August 15, 2019
TOTAL DEPTH: 40.0'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 40'
BACKFILL: Cement-Bentonite Grout
LOGGER: V. Le
DRILL RIG: Airboat Mounted Drill Rig
HAMMER TYPE: Automatic

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

LOG OF BORING NO. B-20

Orleans Parish, Louisiana

Project No. 04.55184080

PLATE A-20

FCBR_LOG (FINAL) 2016 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 04/07/20

LOCATION: See Plate 1

COORDINATES: N 30° 06' 49.1"
W 89° 48' 49.6"

SURFACE EL.: -6.8' NAVD88

DEPTH, FT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
	CLAYEY SAND (SC), dark gray			25	32			
	- with shell fragments from 2' to 16'				50	28	17	11
			85	27	32			
5					35			
					33	22	15	7
			89		33			
					34			
10					42	27	17	10
			86		28			
					32			
				28	27			
15					32	31	16	15
				27	31			
	- with shell fragments below 18'				32			
20					33	26	16	10
			102		26			
	- with clay pockets at 24'							
25				26	30			
		26.0						
30								
35								
40								

SHEAR STRENGTH

□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Hand Vane ▲ Miniature Vane

KIPS PER SQ FT

0.5 1.0 1.5 2.0 2.5

NOTES:

1. Terms and symbols defined on Plates A-49a and A-49b.
2. Surface elevations represent mudline elevation.
3. Water depth measured as 6.9 ft.

COMPLETION DATE: August 19, 2019
TOTAL DEPTH: 26.0'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 26'
BACKFILL: Cement-Bentonite Grout
LOGGER: V. Le
DRILL RIG: Airboat Mounted Drill Rig
HAMMER TYPE: Automatic

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

LOG OF BORING NO. B-21

Orleans Parish, Louisiana

Project No. 04.55184080

PLATE A-21

FCBR_LOG (FINAL) 2016 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 04/07/20

LOCATION: See Plate 1

COORDINATES: N 30° 06' 48.7"
W 89° 48' 13.2"

SURFACE EL.: -7.9' NAVD88

DEPTH, FT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	SHEAR STRENGTH
	FAT CLAY (CH), very soft, dark gray				105	78	22	56	
	- with organics from 0' to 4'				95				
5	- with shell fragments at 4'				60				
	- with some silt at 6'			80	53				◇
					49				
	LEAN CLAY (CL), very soft, dark gray	8.0			42	41	18	23	◇
10	- with silt pockets and shell fragments at 8'				42				
					44	48	17	31	
15	- with shell fragments at 14'		67		55				
	FAT CLAY (CH), gray	16.0			68	74	25	49	
	- with shell fragments at 18'			97	76				
20					65				
	LEAN CLAY (CL), stiff, gray and tan	22.0			24	45	16	29	□
25			97		20				
		26.0							
30									
35									
40									

SHEAR STRENGTH: □ Penetrometer, ◇ Torvane, △ Hand Vane, Unconfined ▼, Triaxial ●, Miniature Vane ▲; KIPS PER SQ FT: 0.5, 1.0, 1.5, 2.0, 2.5

NOTES:

1. Terms and symbols defined on Plates A-49a and A-49b.
2. Surface elevations represent mudline elevation.
3. Water depth measured as 7.9 ft.

COMPLETION DATE: August 18, 2019
TOTAL DEPTH: 26.0'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 26'
BACKFILL: Cement-Bentonite Grout
LOGGER: V. Le
DRILL RIG: Airboat Mounted Drill Rig
HAMMER TYPE: Automatic

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

LOG OF BORING NO. B-22

Orleans Parish, Louisiana

Project No. 04.55184080

PLATE A-22

FCBR_LOG (FINAL) 2016 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 04/07/20

LOCATION: See Plate 1

COORDINATES: N 30° 06' 33.5"
W 89° 49' 08.1"

SURFACE EL.: -5.2' NAVD88

DEPTH, FT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
	SILTY SAND (SM), dark gray				32			
	- with shell fragments below 2'				28	22	17	5
5			100		26			
				26	27			
					26	21	19	2
10					26			
				26	29			
					29	20	19	1
			97		28			
					28			
	CLAYEY SAND (SC), dark gray, with shell fragments	14.0						
15					33	40	20	20
				46	31			
					46			
			85		33			
20					45			
				40	28	29	14	15
				40	29			
25			92		32			
					31			
		26.0						
30								
35								
40								

CLASSIFICATION

SHEAR STRENGTH

□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Hand Vane ▲ Miniature Vane

KIPS PER SQ FT

0.5 1.0 1.5 2.0 2.5

NOTES:

1. Terms and symbols defined on Plates A-49a and A-49b.
2. Surface elevations represent mudline elevation.
3. Water depth measured as 5.3 ft.

COMPLETION DATE: August 20, 2019
TOTAL DEPTH: 26.0'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 26'
BACKFILL: Cement-Bentonite Grout
LOGGER: V. Le
DRILL RIG: Airboat Mounted Drill Rig
HAMMER TYPE: Automatic

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

LOG OF BORING NO. B-23

Orleans Parish, Louisiana

Project No. 04.55184080

PLATE A-23

FCBR_LOG (FINAL) 2016 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 04/07/20

LOCATION: See Plate 1

COORDINATES: N 30° 06' 33.0"
W 89° 48' 31.6"

SURFACE EL.: -7.4' NAVD88

DEPTH, FT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
0	**CLAYEY SAND (SC)**, dark gray, with clay pockets and shell fragments					29	14	15
				40	33			
5								
	SILTY SAND (SM), dark gray	7.0			32			
				37	33			
10					26	21	15	6
					32	22	15	7
15				37	32			
					29			
	CLAYEY SAND (SC), dark gray	18.0			38	24	14	10
20					36			
			99		24			
25	**SILTY SAND (SM)**, dark gray	25.0			26	19	12	7
30		30.0						
35								
40								

CLASSIFICATION

SHEAR STRENGTH

□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Hand Vane ▲ Miniature Vane

KIPS PER SQ FT
0.5 1.0 1.5 2.0 2.5

NOTES:

1. Terms and symbols defined on Plates A-49a and A-49b.
2. Surface elevations represent mudline elevation.
3. Water depth measured as 7.4 ft.

COMPLETION DATE: August 18, 2019
TOTAL DEPTH: 26.0'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 26'
BACKFILL: Cement-Bentonite Grout
LOGGER: V. Le
DRILL RIG: Airboat Mounted Drill Rig
HAMMER TYPE: Automatic

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

LOG OF BORING NO. B-24

Orleans Parish, Louisiana

Project No. 04.55184080

PLATE A-24

FCBR_LOG (FINAL) 2016 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 04/07/20

LOCATION: See Plate 1

COORDINATES: N 30° 06' 32.6"
W 89° 47' 55.2"

SURFACE EL.: -8.2' NAVD88

DEPTH, FT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
	LEAN CLAY (CL), very soft, dark gray				78			
	- with shell fragments and organics from 0' to 4'			70	41			
5	- gray below 4'				50	41	18	23
	- with shell fragments at 6'				48	47	21	26
			51		84			
	FAT CLAY (CH), very soft, gray	8.0						
	- with some silt at 8'				57			
10	- with some sand at 12'				57	66	22	44
			92		35			
	LEAN CLAY (CL), stiff, gray and tan, with some silt	14.0						
15	- with wood traces at 16'				28			
					25	44	16	28
	FAT CLAY (CH), stiff, gray and tan	18.0		91	31			
			80		25			
20					30	66	23	43
					36			
25	- with some silt at 24'				29			
		26.0						
30								
35								
40								

SHEAR STRENGTH

□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Hand Vane ▲ Miniature Vane

KIPS PER SQ FT

0.5 1.0 1.5 2.0 2.5

NOTES:

1. Terms and symbols defined on Plates A-49a and A-49b.
2. Surface elevations represent mudline elevation.
3. Water depth measured as 8.4 ft.

COMPLETION DATE: August 17, 2019
TOTAL DEPTH: 26.0'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 26'
BACKFILL: Cement-Bentonite Grout
LOGGER: V. Le
DRILL RIG: Airboat Mounted Drill Rig
HAMMER TYPE: Automatic

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

LOG OF BORING NO. B-25

Orleans Parish, Louisiana

Project No. 04.55184080

PLATE A-25

FCBR_LOG (FINAL) 2016 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 04/07/20

LOCATION: See Plate 1

COORDINATES: N 30° 06' 17.4"
W 89° 48' 50.1"

SURFACE EL.: -6.8' NAVD88

DEPTH, FT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	BLOWS PER FOOT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
	SILTY SAND (SM), loose to very loose, dark gray					27	NP	NP	NP
						26			
5			N=7		36	37			
			N=WOH		32	33			
						29	NP	NP	NP
10	**LEAN CLAY (CL)**, dark gray, with sand pockets	10.0			71	46			
						54			
						47	41	15	26
15	**CLAYEY SAND (SC)**, dark gray - with shell fragments at 14'	14.0			19	25			
	LEAN CLAY (CL), gray	17.0				22	29	14	15
						18			
20	- light gray below 20'					31			
						22	46	16	30
25					75	25			
		26.0				32			
30									
35									
40									

CLASSIFICATION

SHEAR STRENGTH

□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Hand Vane ▲ Miniature Vane

KIPS PER SQ FT
0.5 1.0 1.5 2.0 2.5

NOTES:
1. Terms and symbols defined on Plates A-49a and A-49b.
2. Surface elevations represent mudline elevation.
3. Water depth measured as 8.4 ft.

COMPLETION DATE: August 16, 2019
TOTAL DEPTH: 26.0'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 26'
BACKFILL: Cement-Bentonite Grout
LOGGER: V. Le
DRILL RIG: Airboat Mounted Drill Rig
HAMMER TYPE: Automatic

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

LOG OF BORING NO. B-26

Orleans Parish, Louisiana

Project No. 04.55184080

PLATE A-26

FCBR_LOG (FINAL) 2016 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 04/07/20

LOCATION: See Plate 1

COORDINATES: N 30° 06' 17.0"
W 89° 48' 13.7"

SURFACE EL.: -8.5' NAVD88

DEPTH, FT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
	ORGANIC CLAY (OH), dark gray				78			
	- with organics from 0' to 4'							
	- with wood at 2'				153	186	62	124
5	**LEAN CLAY (CL)**, dark gray	5.0		84	61			
					52			
	- with silt lenses at 8'				52	47	22	25
10			56		71			
	- gray below 12'							
	FAT CLAY (CH), dark gray	13.0			62			
	- with silt lenses at 14'			96	59			
15					76	77	26	51
			61		67			
	- with shell fragments at 18'							
20					65			
					83	86	28	58
			52		65			
25					41			
		26.0						
30								
35								
40								

CLASSIFICATION

SHEAR STRENGTH

□ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Hand Vane ▲ Miniature Vane

KIPS PER SQ FT
0.5 1.0 1.5 2.0 2.5

NOTES:

1. Terms and symbols defined on Plates A-49a and A-49b.
2. Surface elevations represent mudline elevation.
3. Water depth measured as 8.7 ft.

COMPLETION DATE: August 17, 2019
TOTAL DEPTH: 26.0'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 26'
BACKFILL: Cement-Bentonite Grout
LOGGER: V. Le
DRILL RIG: Airboat Mounted Drill Rig
HAMMER TYPE: Automatic

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

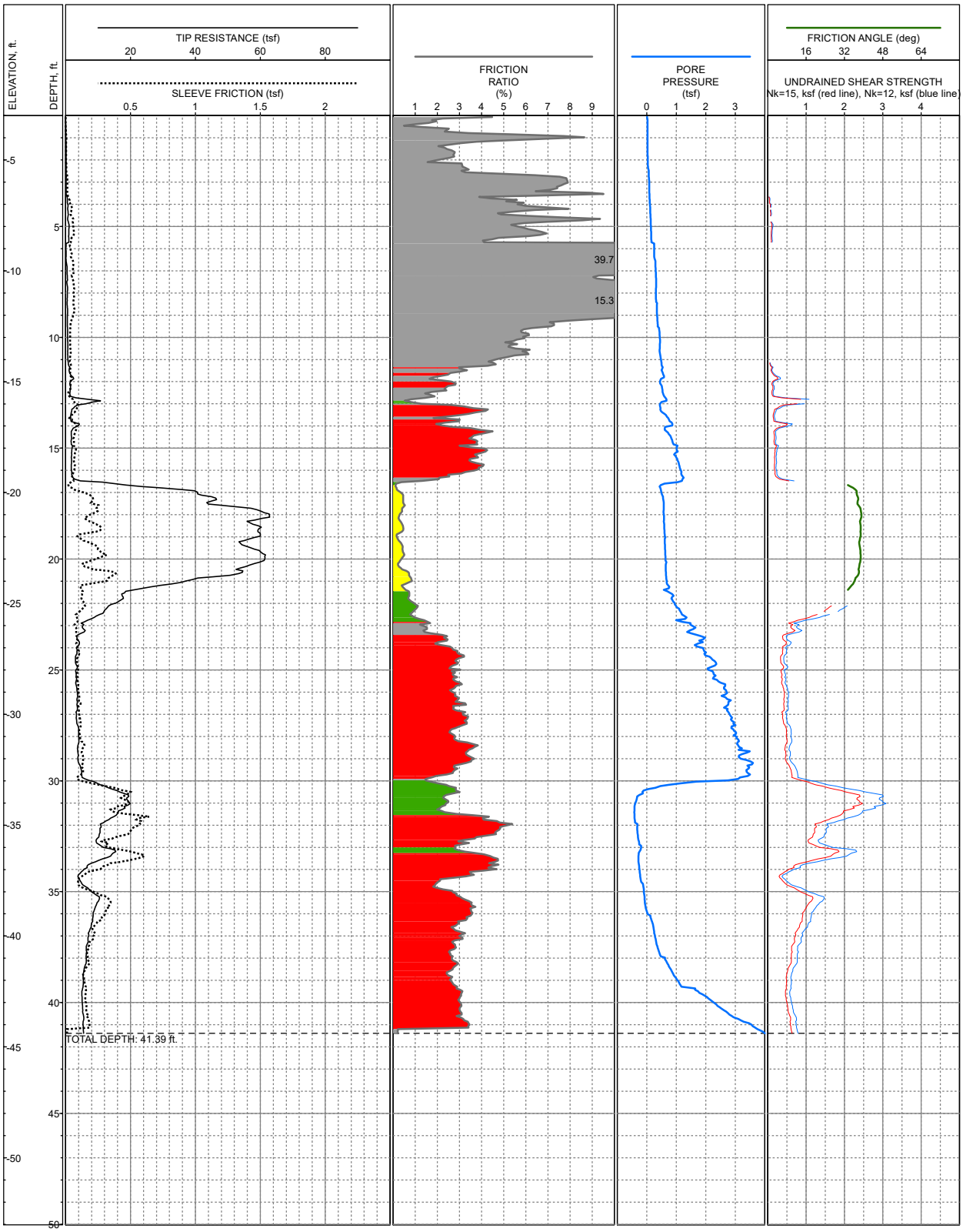
LOG OF BORING NO. B-27

Orleans Parish, Louisiana

Project No. 04.55184080

PLATE A-27

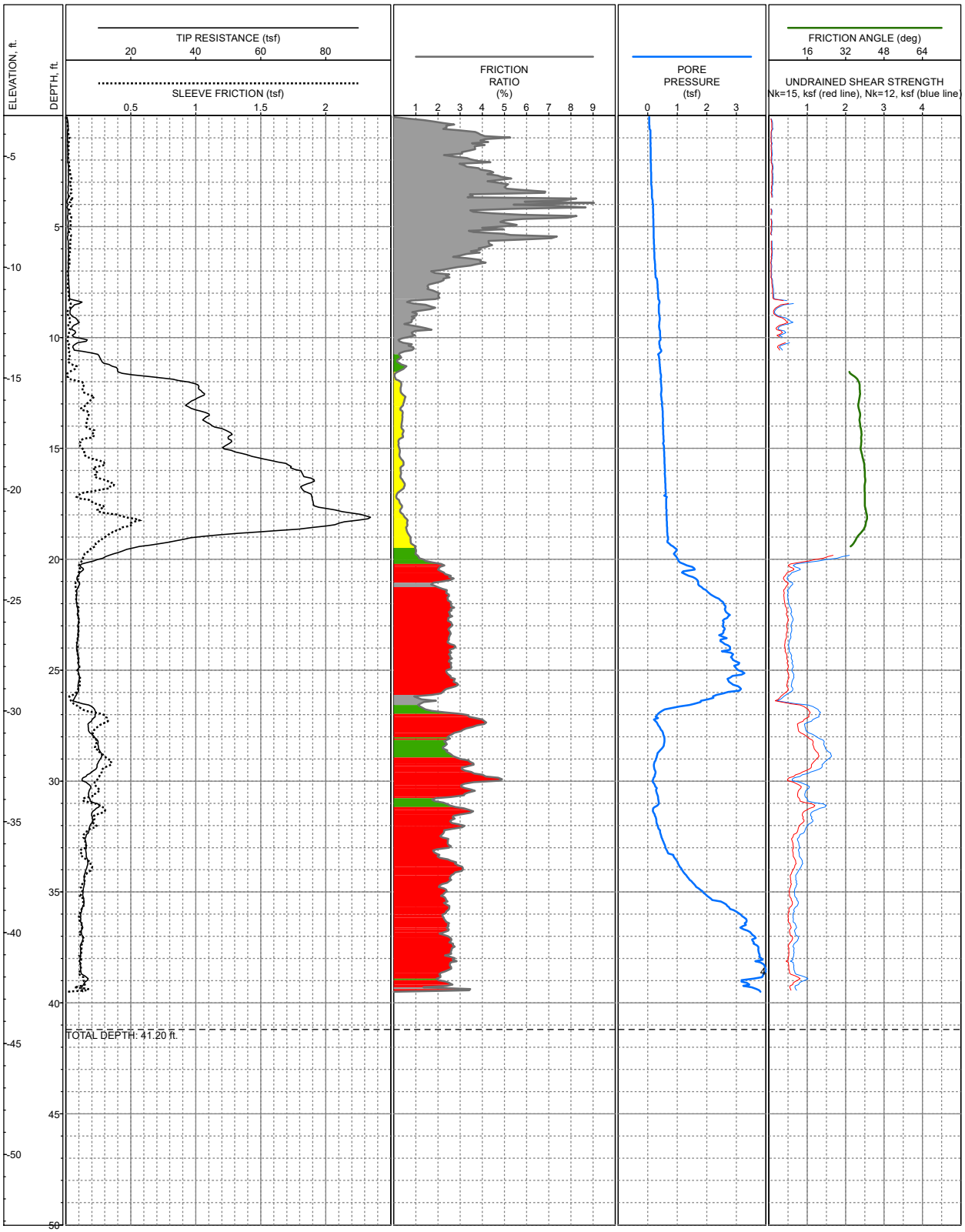
FCBR_LOG (FINAL) 2016 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 04/07/20



LOCATION: E: 3,757,723.6, N: 582,798.2, Louisiana State Plane South, NAD83, Feet
SURFACE EL: -3.0ft +/- NAVD88
COMPLETION DEPTH: 41.39ft
TESTDATE: 4/23/2019

EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Fugro
REVIEWED BY: S. Bryant
CONE AREA RATIO: 0.59

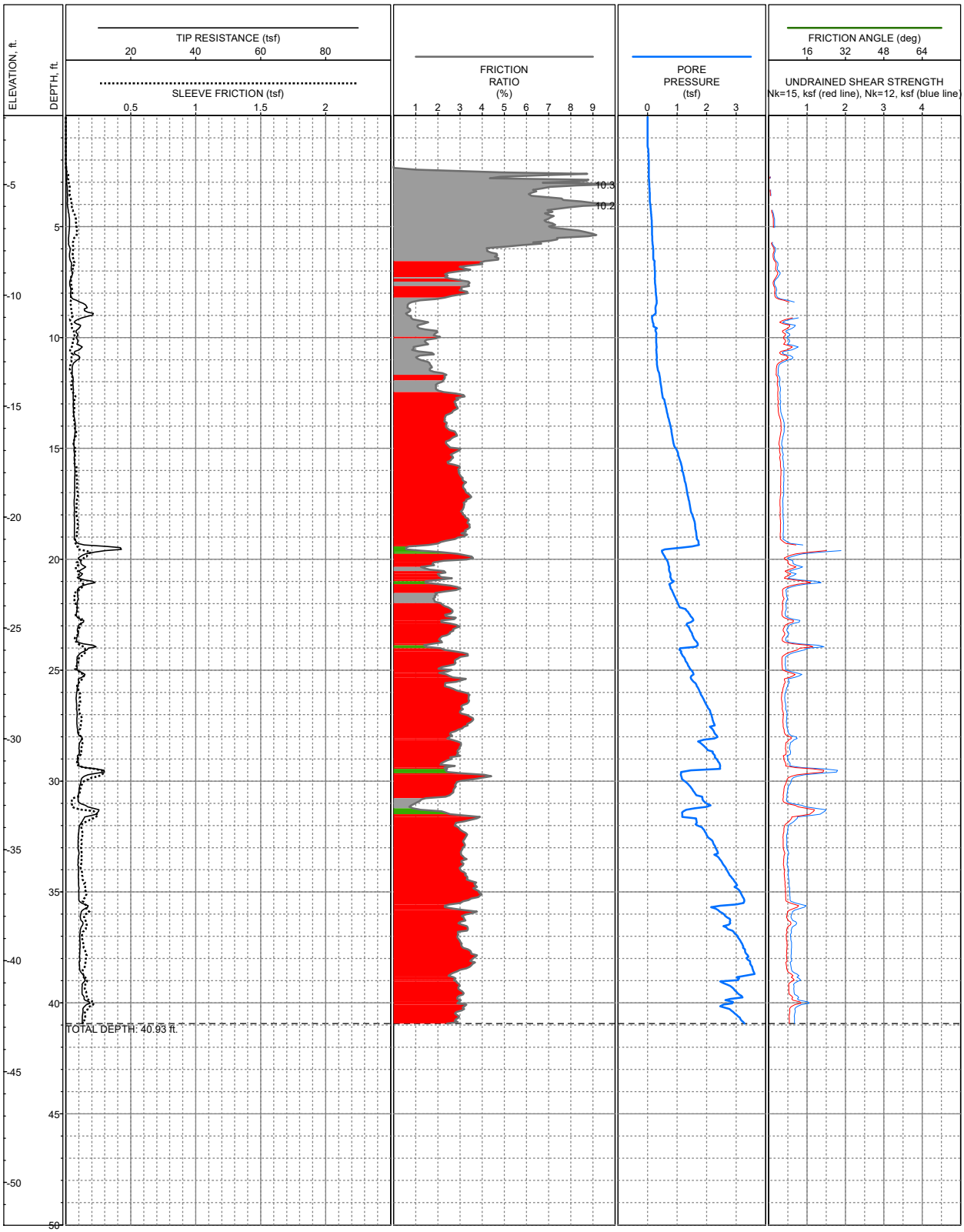
PLATE A-28: LOG OF C-01



LOCATION: E: 3,758,389.7, N: 583,132.1, Louisiana State Plane South, NAD83, Feet
SURFACE EL: -3.2ft +/- NAVD88
COMPLETION DEPTH: 41.20ft
TESTDATE: 4/23/2019

EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Fugro
REVIEWED BY: S. Bryant
CONE AREA RATIO: 0.59

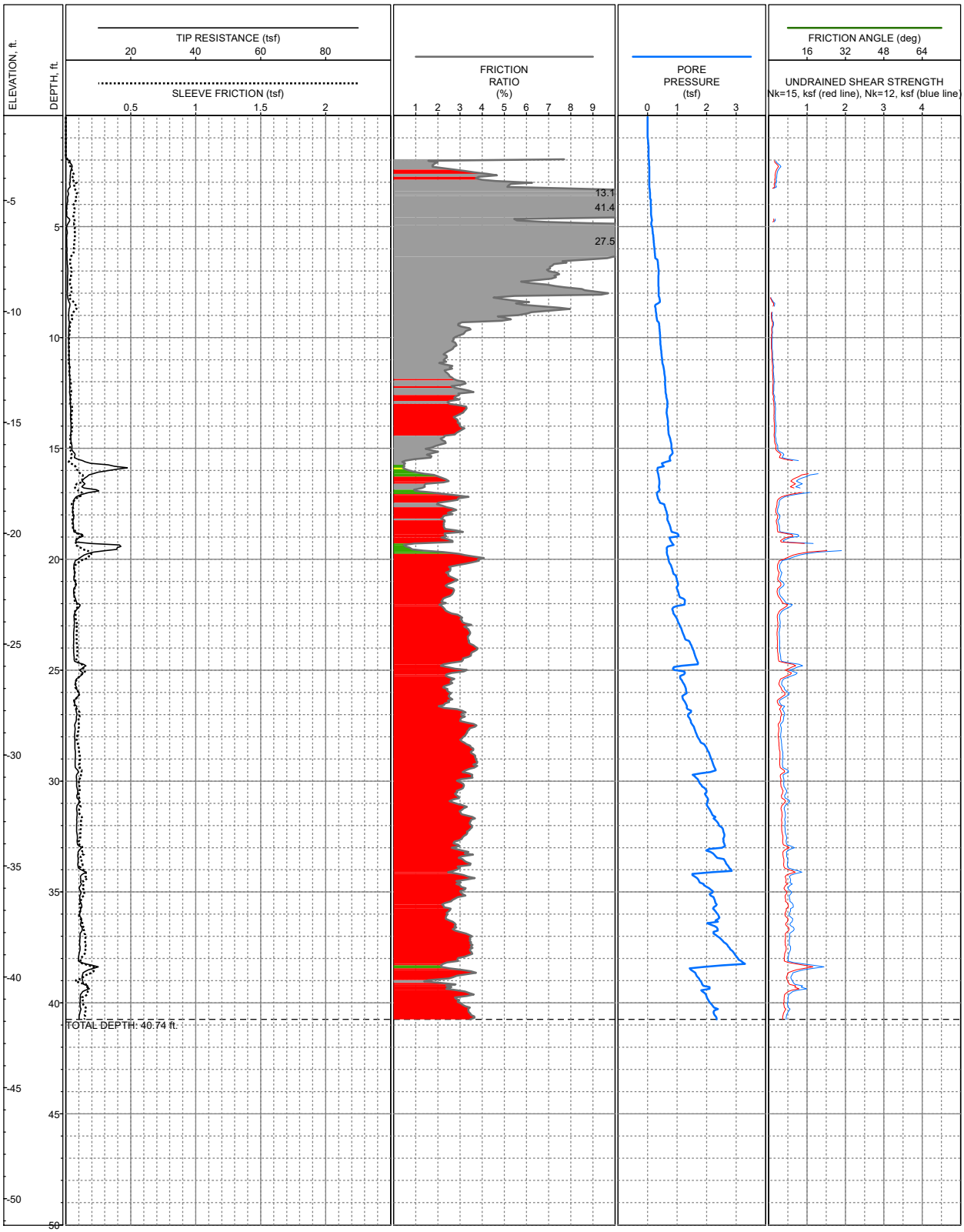
PLATE A-29: LOG OF C-02



LOCATION: E: 3,759,336.9, N: 584,340.6, Louisiana State Plane South, NAD83, Feet
SURFACE EL: -1.9ft +/- NAVD88
COMPLETION DEPTH: 40.93ft
TESTDATE: 4/23/2019

EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Fugro
REVIEWED BY: S. Bryant
CONE AREA RATIO: 0.59

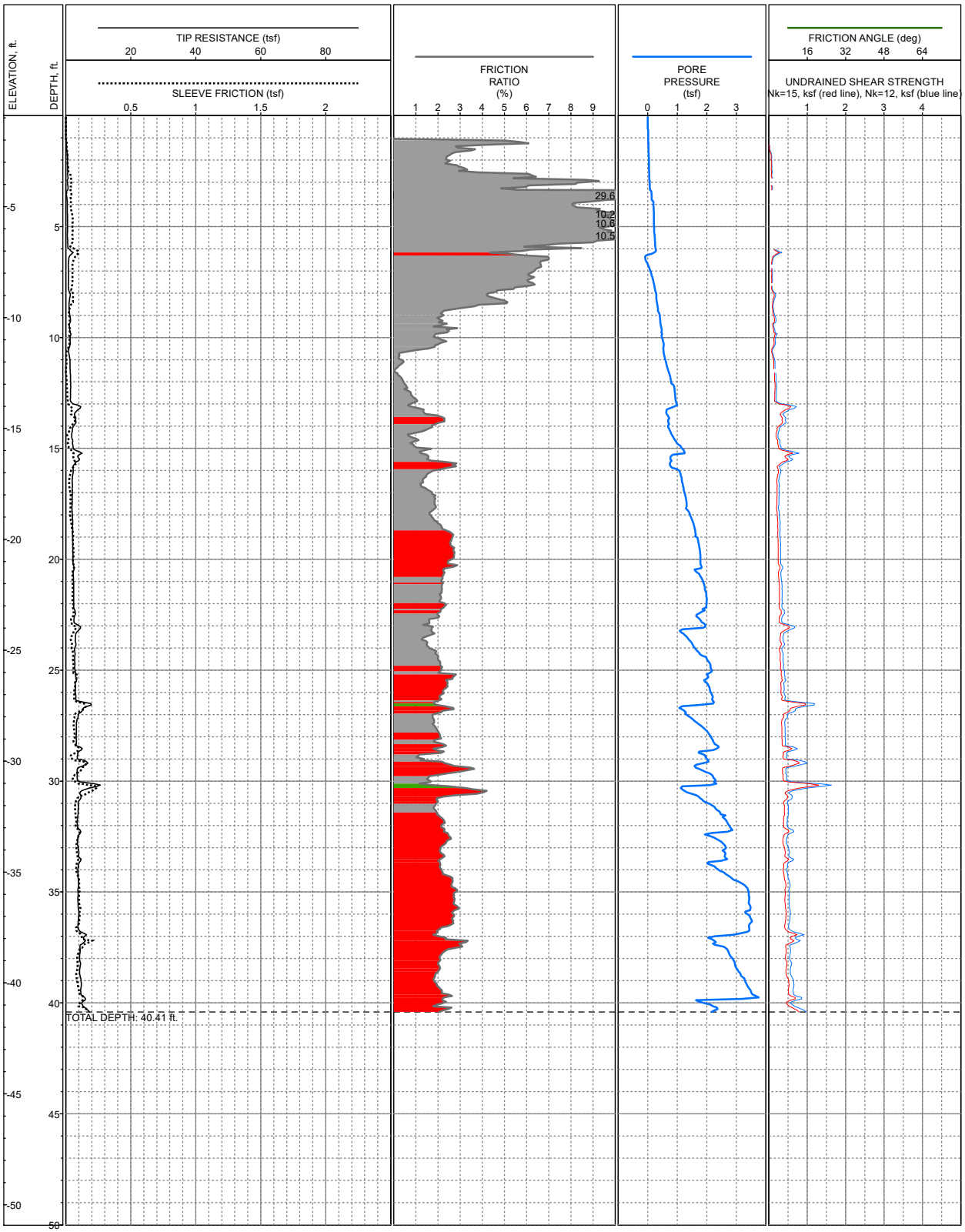
PLATE A-30: LOG OF C-03



LOCATION: E: 3,759,612.2, N: 583,799.3, Louisiana State Plane South, NAD83, Feet
SURFACE EL: -1.2ft +/- NAVD88
COMPLETION DEPTH: 40.74ft
TESTDATE: 4/23/2019

EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Fugro
REVIEWED BY: S. Bryant
CONE AREA RATIO: 0.59

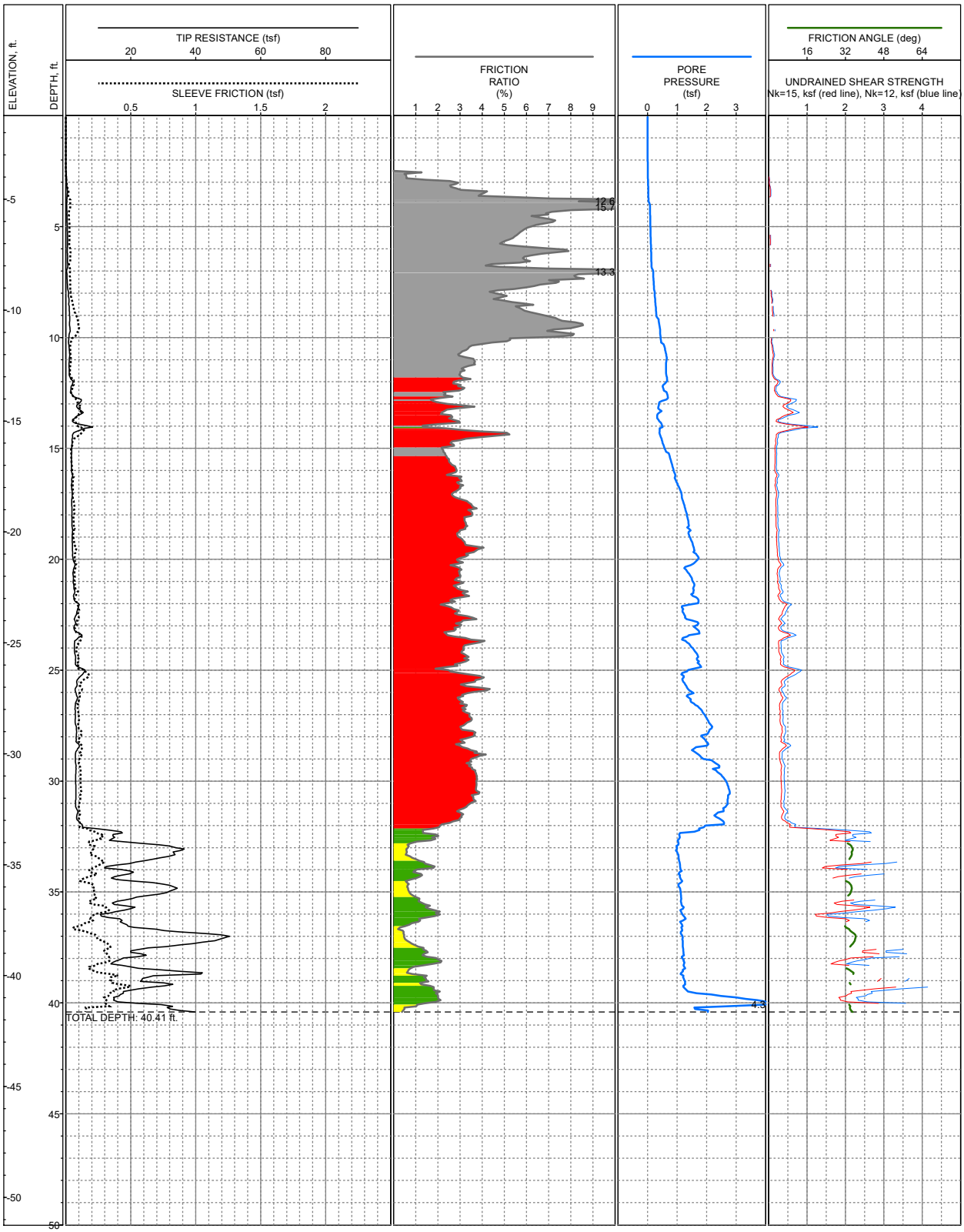
PLATE A-31: LOG OF C-04



LOCATION: E: 3,760,127.3, N: 583,338.7, Louisiana State Plane South, NAD83, Feet
SURFACE EL: -0.9ft +/- NAVD88
COMPLETION DEPTH: 40.41ft
TESTDATE: 4/24/2019

EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Fugro
REVIEWED BY: S. Bryant
CONE AREA RATIO: 0.59

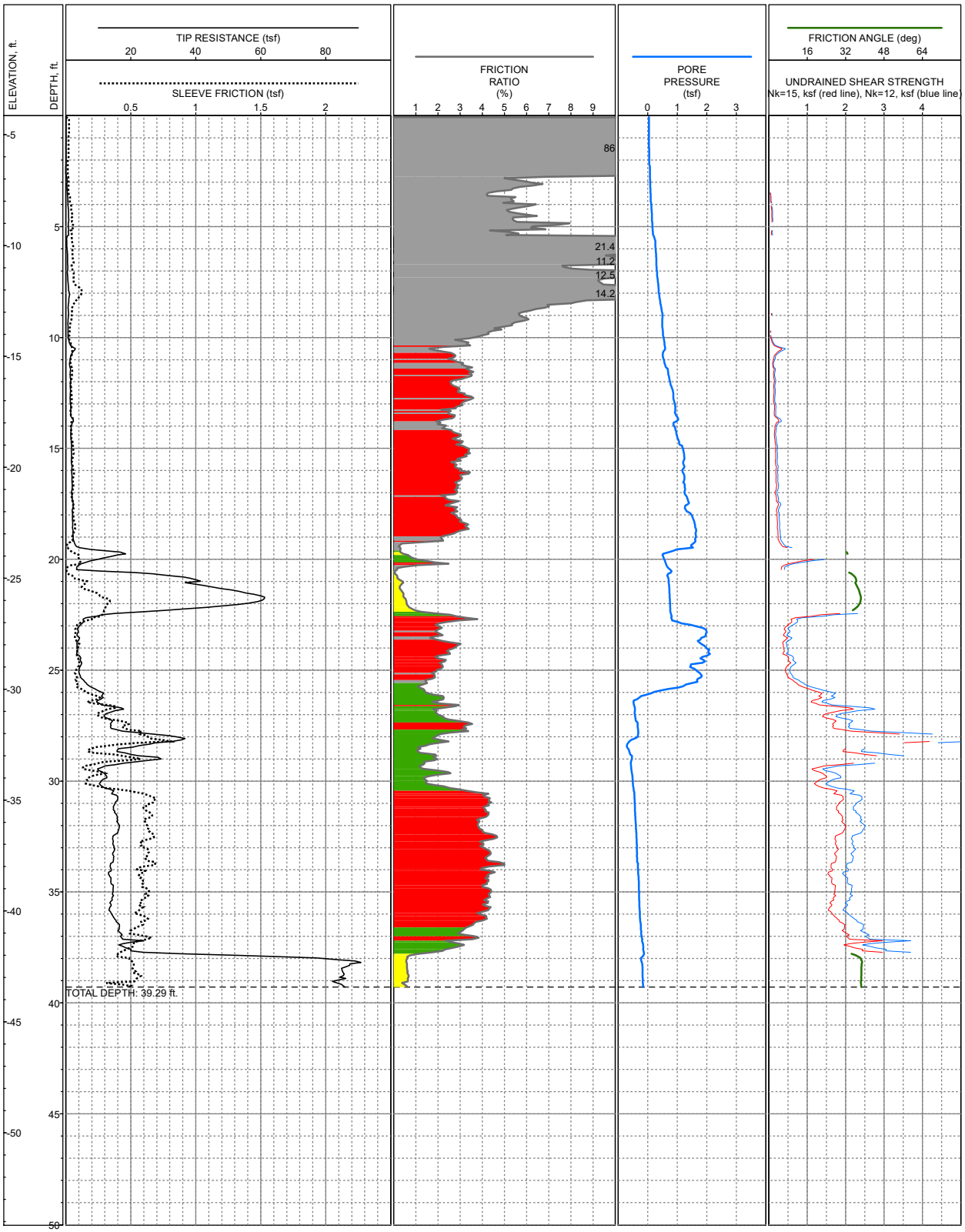
PLATE A-32: LOG OF C-05



LOCATION: E: 3,760,804.0, N: 582,417.7, Louisiana State Plane South, NAD83, Feet
SURFACE EL: -1.2ft +/- NAVD88
COMPLETION DEPTH: 40.41ft
TESTDATE: 4/24/2019

EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Fugro
REVIEWED BY: S. Bryant
CONE AREA RATIO: 0.59

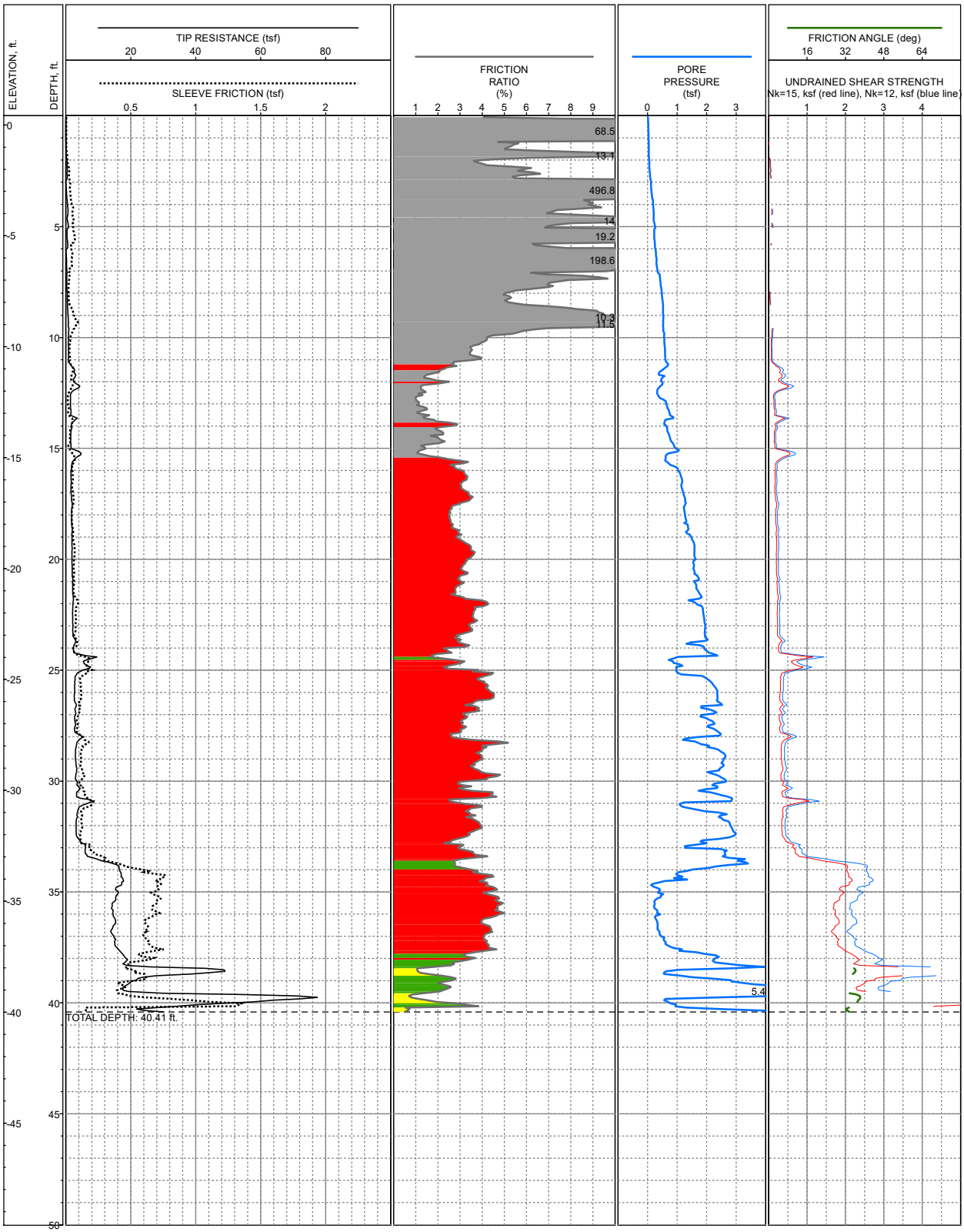
PLATE A-33: LOG OF C-06



LOCATION: E: 3,762,193.7, N: 582,374.6, Louisiana State Plane South, NAD83, Feet
SURFACE EL: -4.1ft +/- NAVD88
COMPLETION DEPTH: 39.29ft
TESTDATE: 4/24/2019

EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Fugro
REVIEWED BY: S. Bryant
CONE AREA RATIO: 0.59

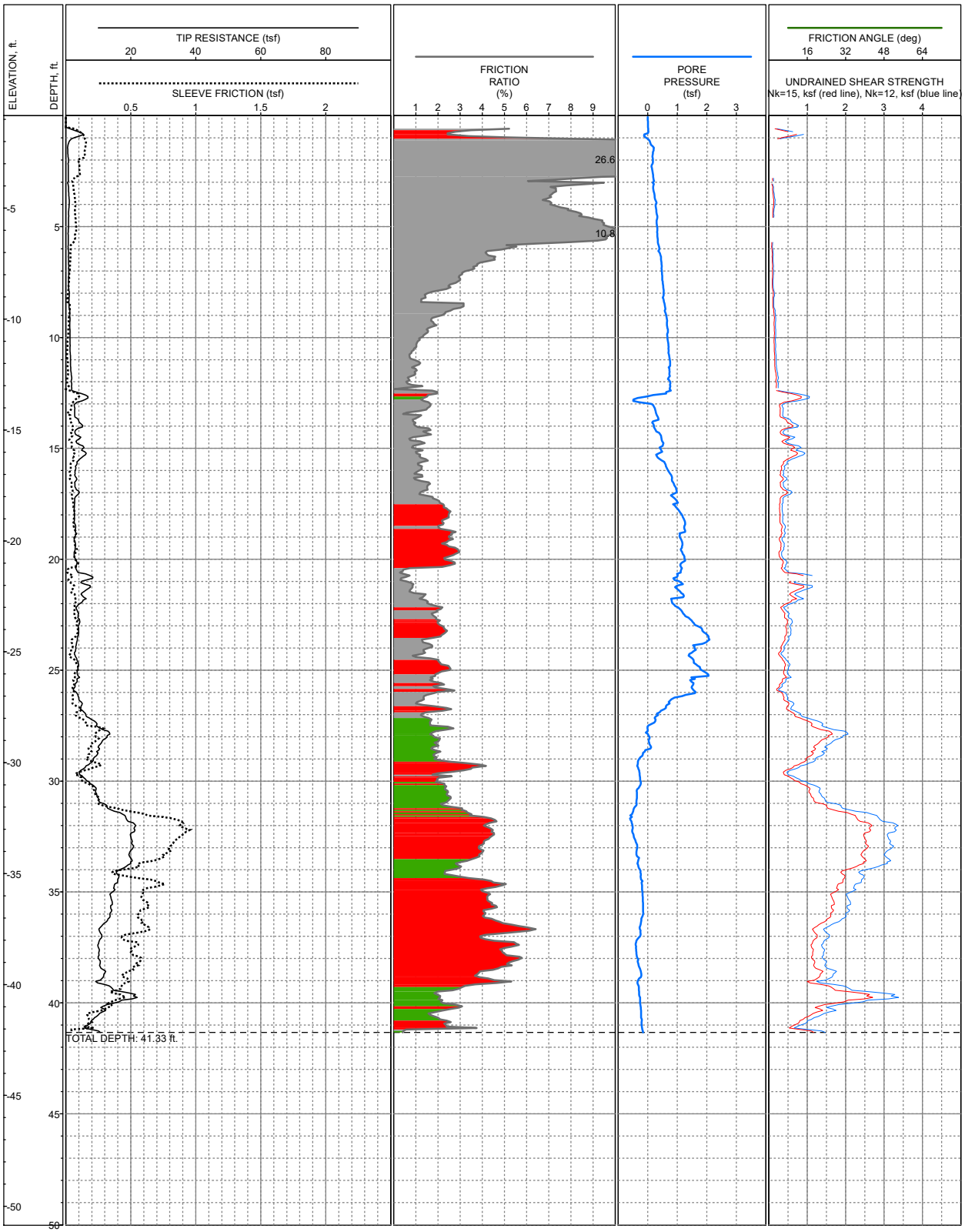
PLATE A-34: LOG OF C-07



LOCATION: E: 3,764,264.0, N: 582,318.7, Louisiana State Plane South, NAD83, Feet
SURFACE EL: 0.4ft +/- NAVD88
COMPLETION DEPTH: 40.41ft
TESTDATE: 4/24/2019

EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Fugro
REVIEWED BY: S. Bryant
CONE AREA RATIO: 0.59

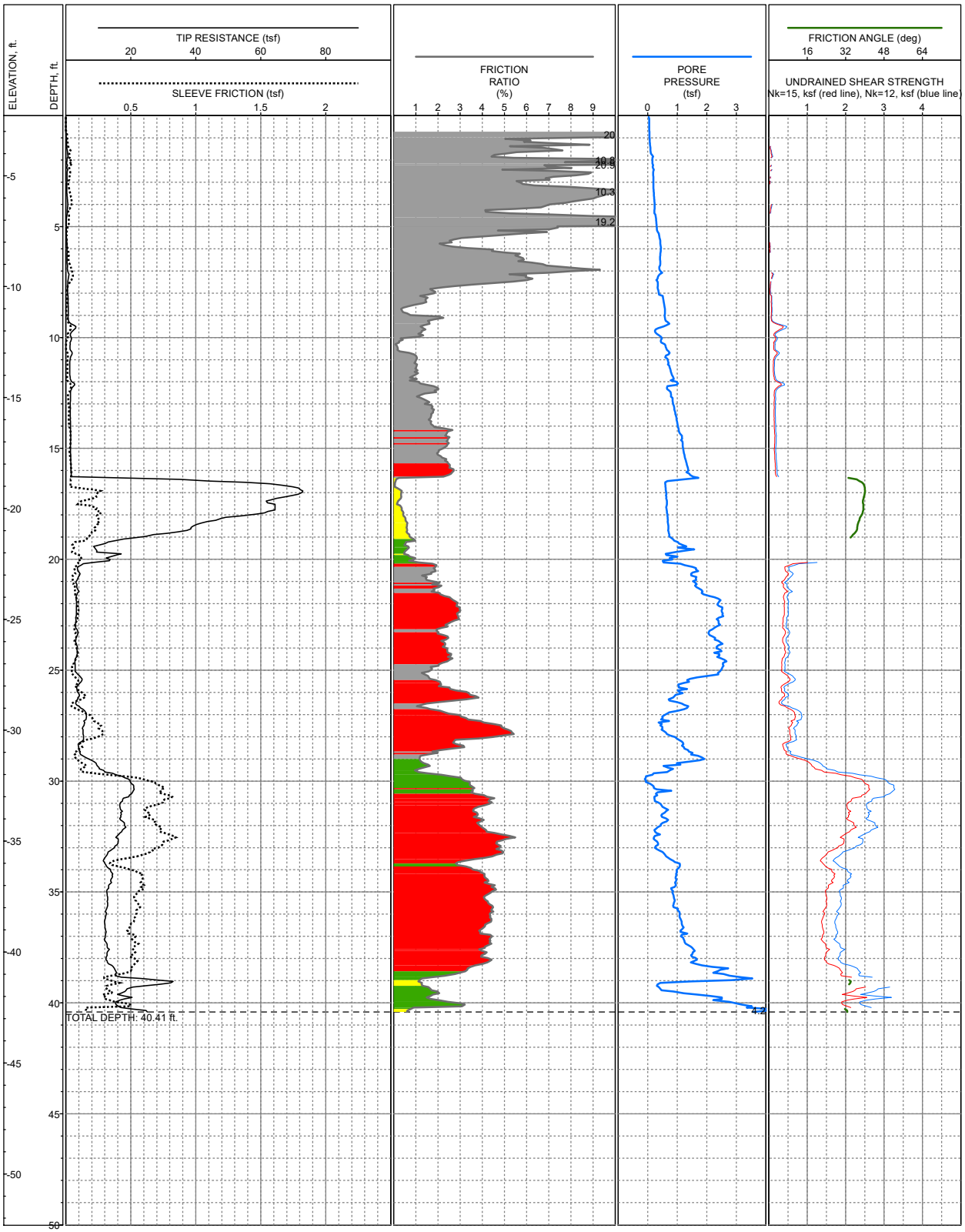
PLATE A-35: LOG OF C-08



LOCATION: E: 3,762,365.3, N: 584,242.3, Louisiana State Plane South, NAD83, Feet
SURFACE EL: -0.8ft +/- NAVD88
COMPLETION DEPTH: 41.33ft
TESTDATE: 4/23/2019

EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Fugro
REVIEWED BY: S. Bryant
CONE AREA RATIO: 0.59

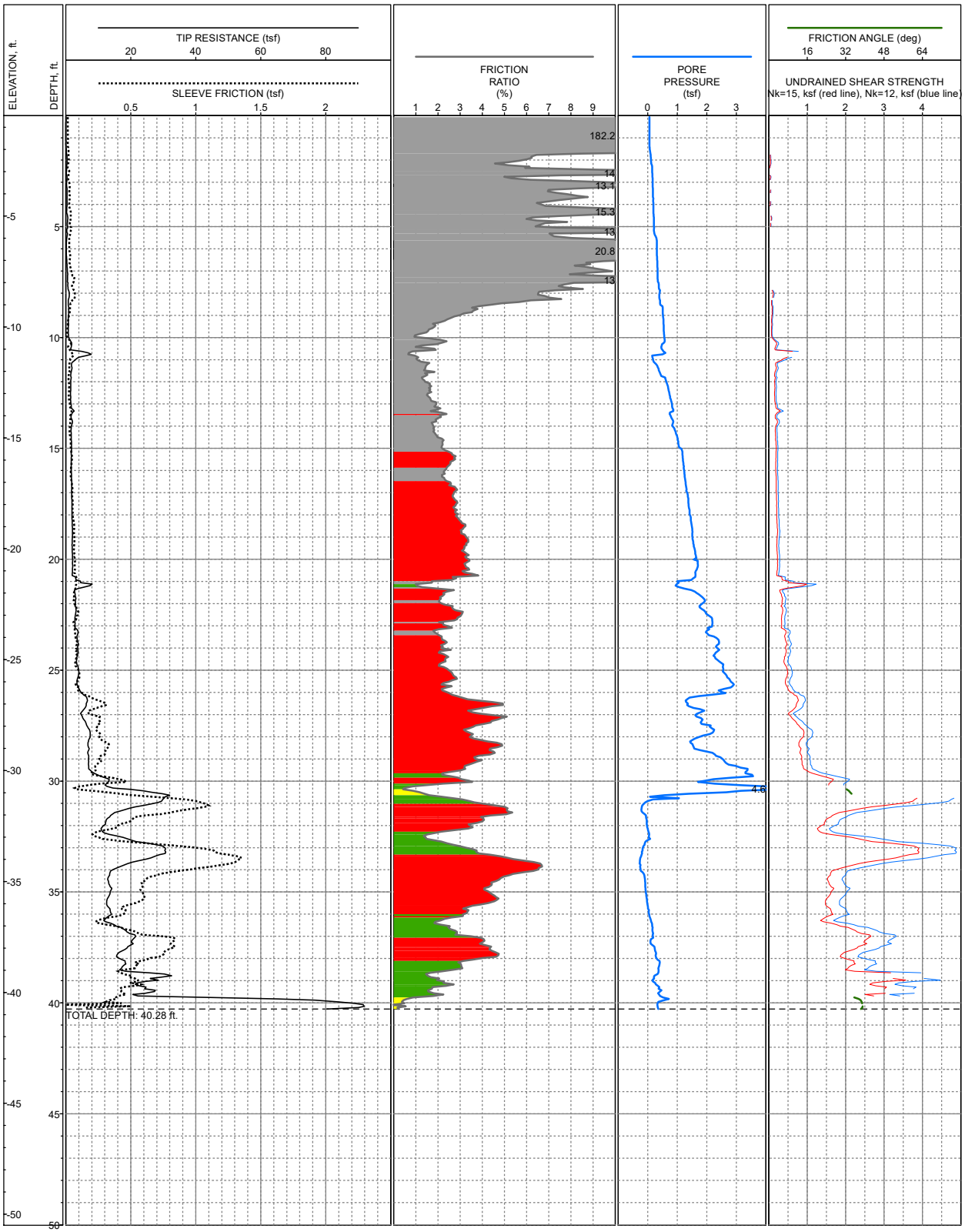
PLATE A-36: LOG OF C-09



LOCATION: E: 3,762,895.9, N: 584,575.1, Louisiana State Plane South, NAD83, Feet
SURFACE EL: -2.3ft +/- NAVD88
COMPLETION DEPTH: 40.41ft
TESTDATE: 4/24/2019

EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Fugro
REVIEWED BY: S. Bryant
CONE AREA RATIO: 0.59

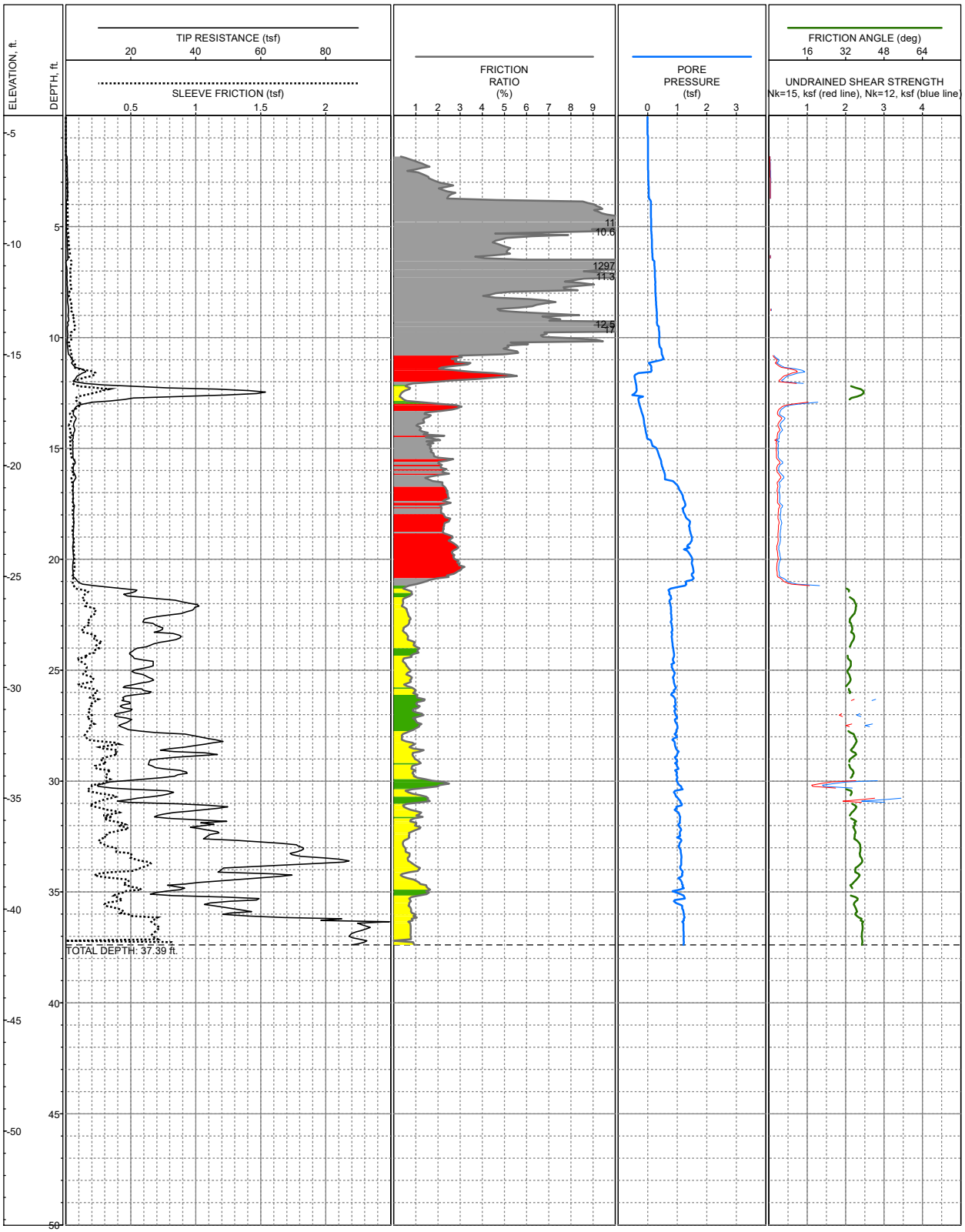
PLATE A-37: LOG OF C-10



LOCATION: E: 3,763,514.2, N: 584,640.0, Louisiana State Plane South, NAD83, Feet
SURFACE EL: -0.5ft +/- NAVD88
COMPLETION DEPTH: 40.28ft
TESTDATE: 4/24/2019

EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Fugro
REVIEWED BY: S. Bryant
CONE AREA RATIO: 0.59

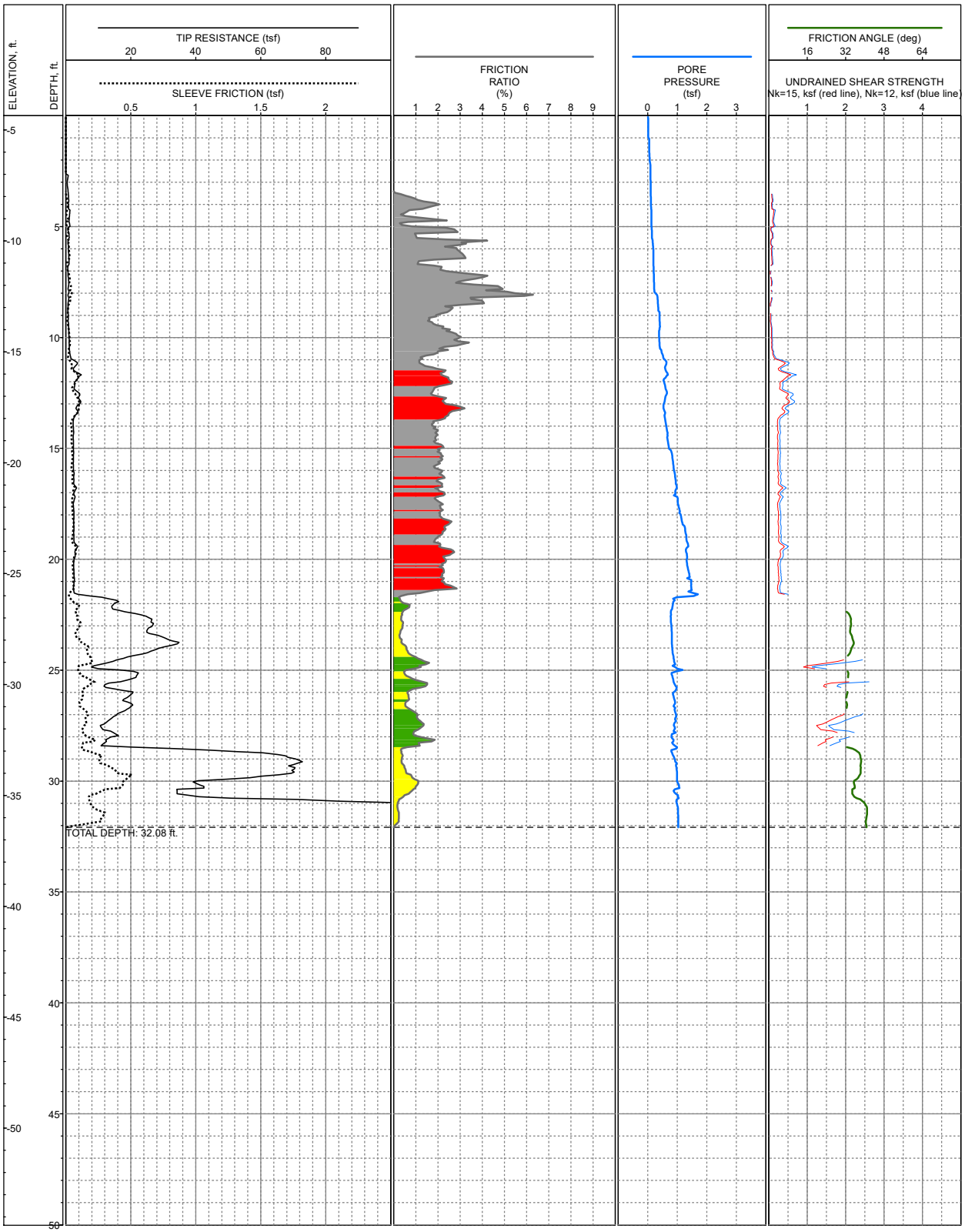
PLATE A-38: LOG OF C-11



LOCATION: E: 3,764,728.8, N: 585,017.2, Louisiana State Plane South, NAD83, Feet
SURFACE EL: -4.2ft +/- NAVD88
COMPLETION DEPTH: 37.39ft
TESTDATE: 4/24/2019

EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Fugro
REVIEWED BY: S. Bryant
CONE AREA RATIO: 0.59

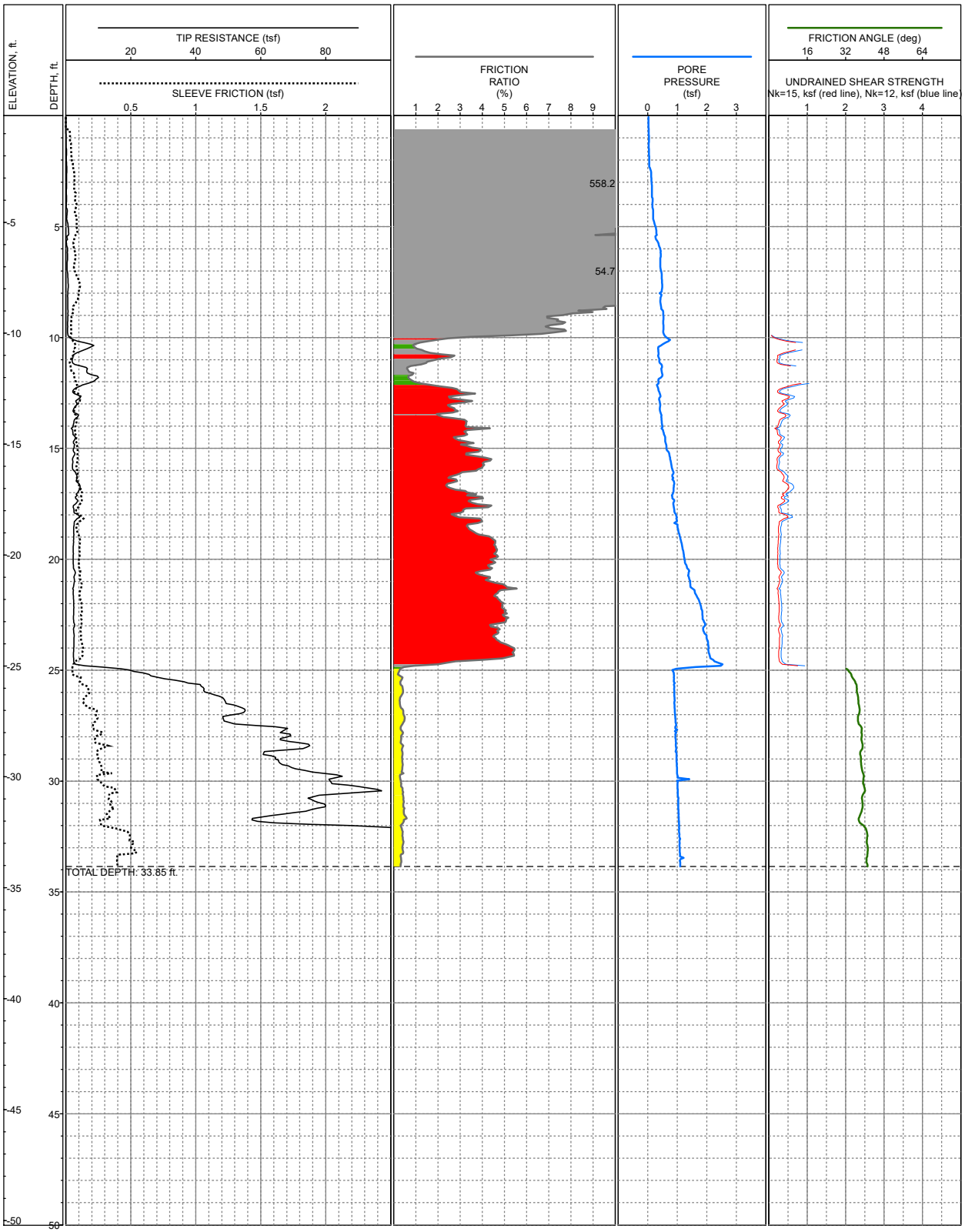
PLATE A-39: LOG OF C-12



LOCATION: E: 3,765,624.3, N: 585,393.9, Louisiana State Plane South, NAD83, Feet
SURFACE EL: -4.4ft +/- NAVD88
COMPLETION DEPTH: 32.08ft
TESTDATE: 4/27/2019

EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Fugro
REVIEWED BY: S. Bryant
CONE AREA RATIO: 0.59

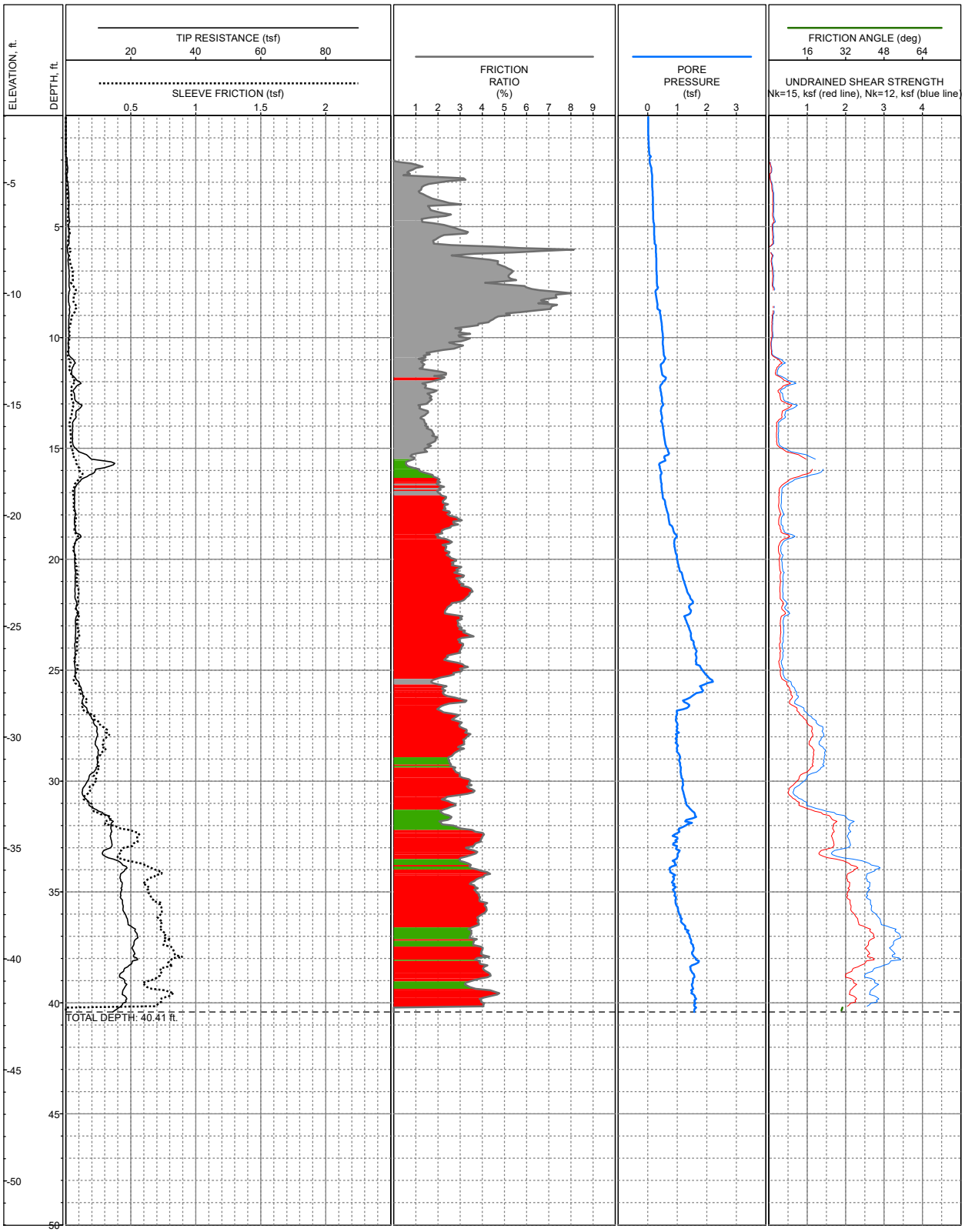
PLATE A-40: LOG OF C-13



LOCATION: E: 3,766,310.9, N: 585,084.2, Louisiana State Plane South, NAD83, Feet
SURFACE EL: -0.2ft +/- NAVD88
COMPLETION DEPTH: 33.85ft
TESTDATE: 4/26/2019

EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Fugro
REVIEWED BY: S. Bryant
CONE AREA RATIO: 0.59

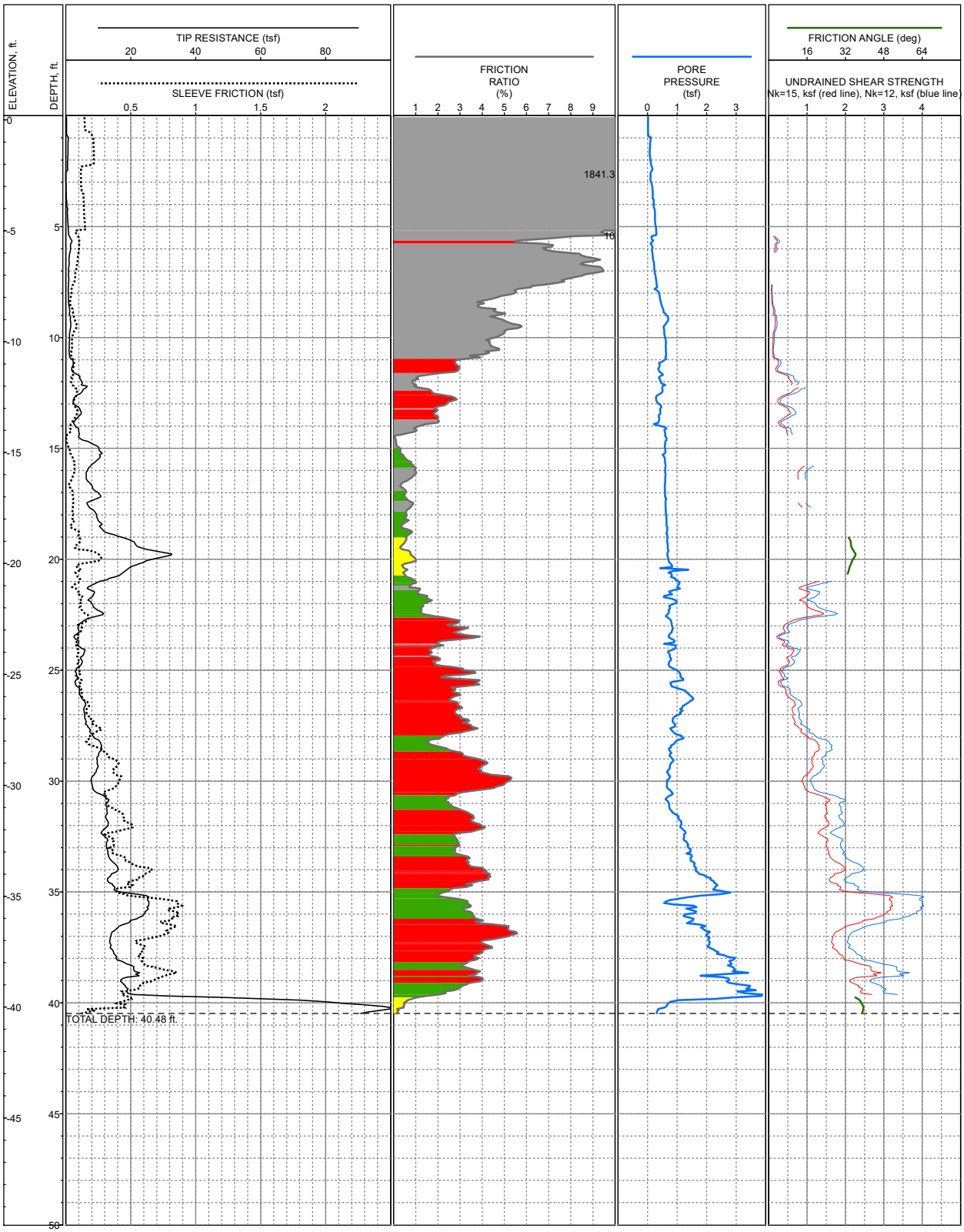
PLATE A-41: LOG OF C-14



LOCATION: E: 3,766,486.0, N: 585,945.0, Louisiana State Plane South, NAD83, Feet
SURFACE EL: -2.0ft +/- NAVD88
COMPLETION DEPTH: 40.41ft
TESTDATE: 4/27/2019

EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Fugro
REVIEWED BY: S. Bryant
CONE AREA RATIO: 0.59

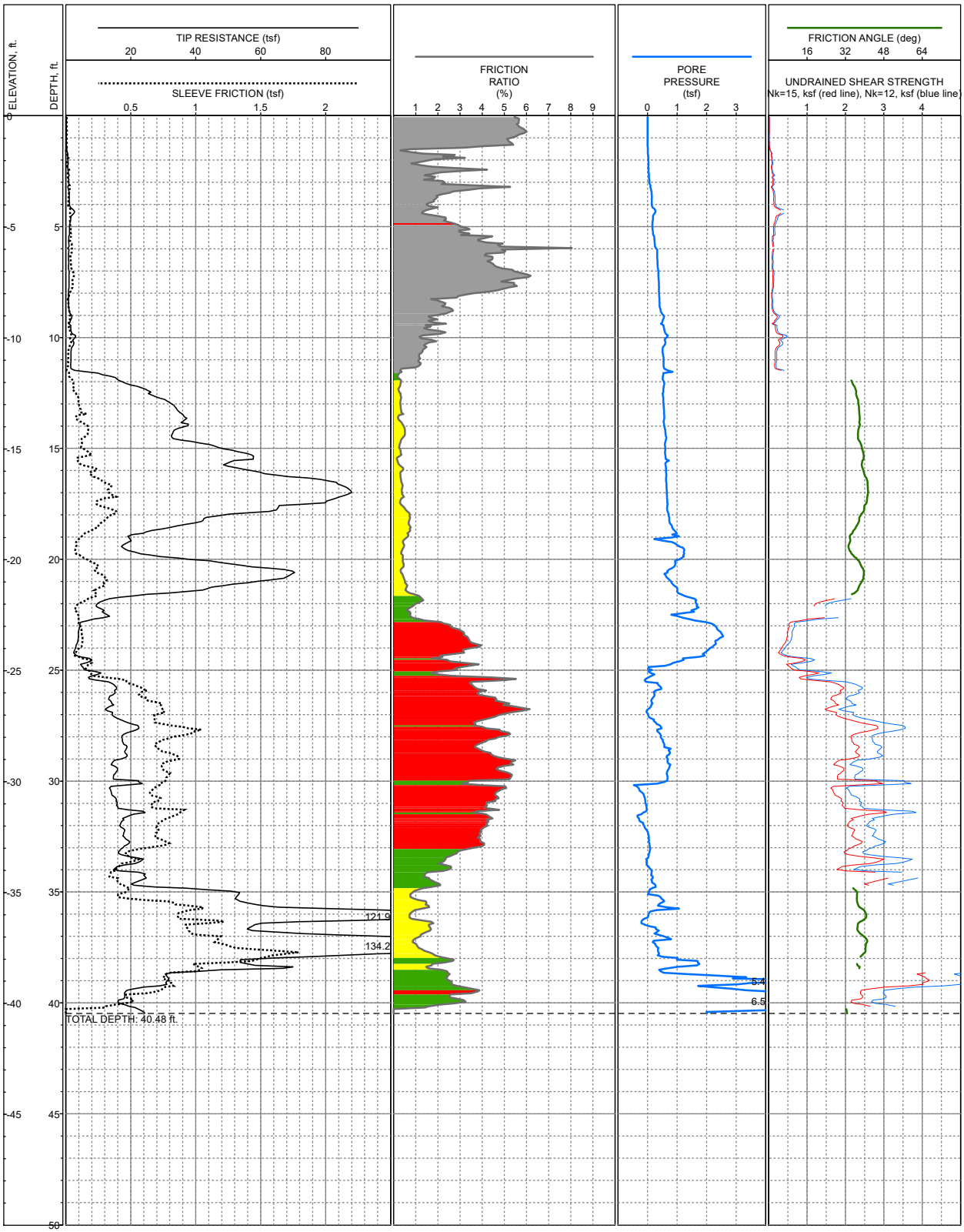
PLATE A-42: LOG OF C-15



LOCATION: E: 3,768,019.2, N: 585,109.1, Louisiana State Plane South, NAD83, Feet
SURFACE EL: 0.2ft +/- NAVD88
COMPLETION DEPTH: 40.48ft
TESTDATE: 4/26/2019

EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Fugro
REVIEWED BY: S. Bryant
CONE AREA RATIO: 0.59

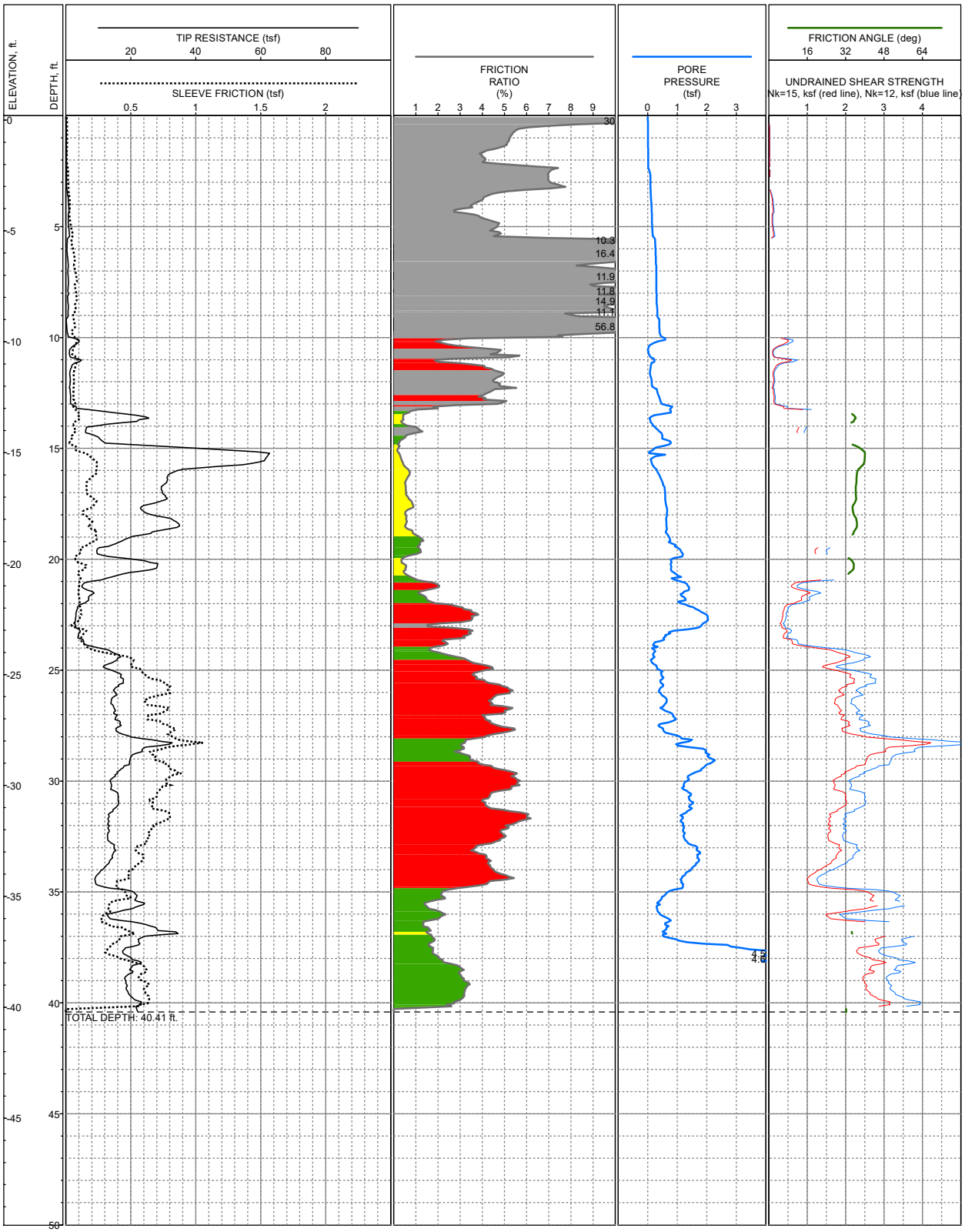
PLATE A-43: LOG OF C-16



LOCATION: E: 3,768,579.0, N: 586,528.5, Louisiana State Plane South, NAD83, Feet
SURFACE EL: 0.0ft +/- NAVD88
COMPLETION DEPTH: 40.48ft
TESTDATE: 4/27/2019

EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Fugro
REVIEWED BY: S. Bryant
CONE AREA RATIO: 0.59

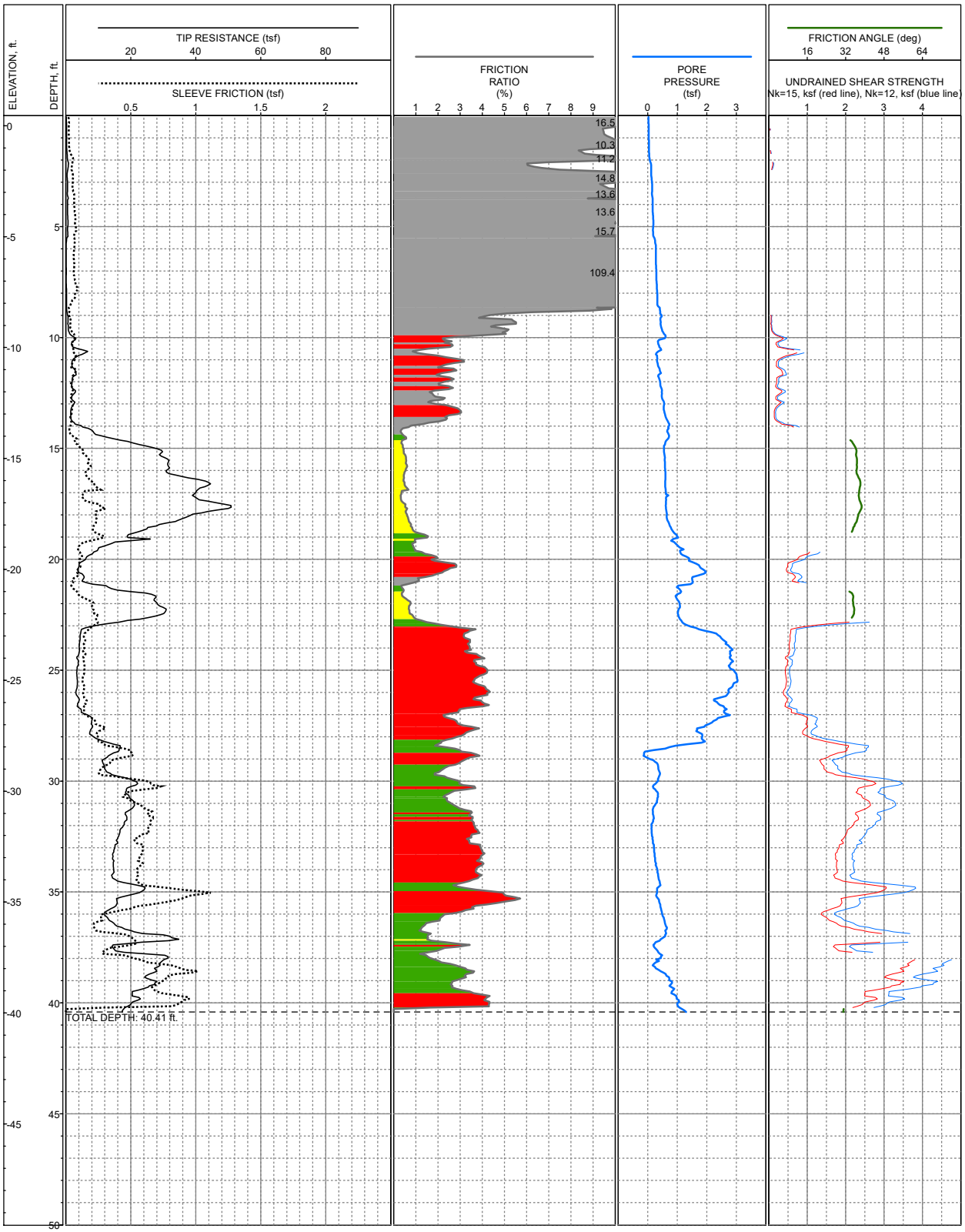
PLATE A-44: LOG OF C-17



LOCATION: E: 3,768,803.8, N: 587,079.2, Louisiana State Plane South, NAD83, Feet
SURFACE EL: 0.2ft +/- NAVD88
COMPLETION DEPTH: 40.41ft
TESTDATE: 4/27/2019

EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Fugro
REVIEWED BY: S. Bryant
CONE AREA RATIO: 0.59

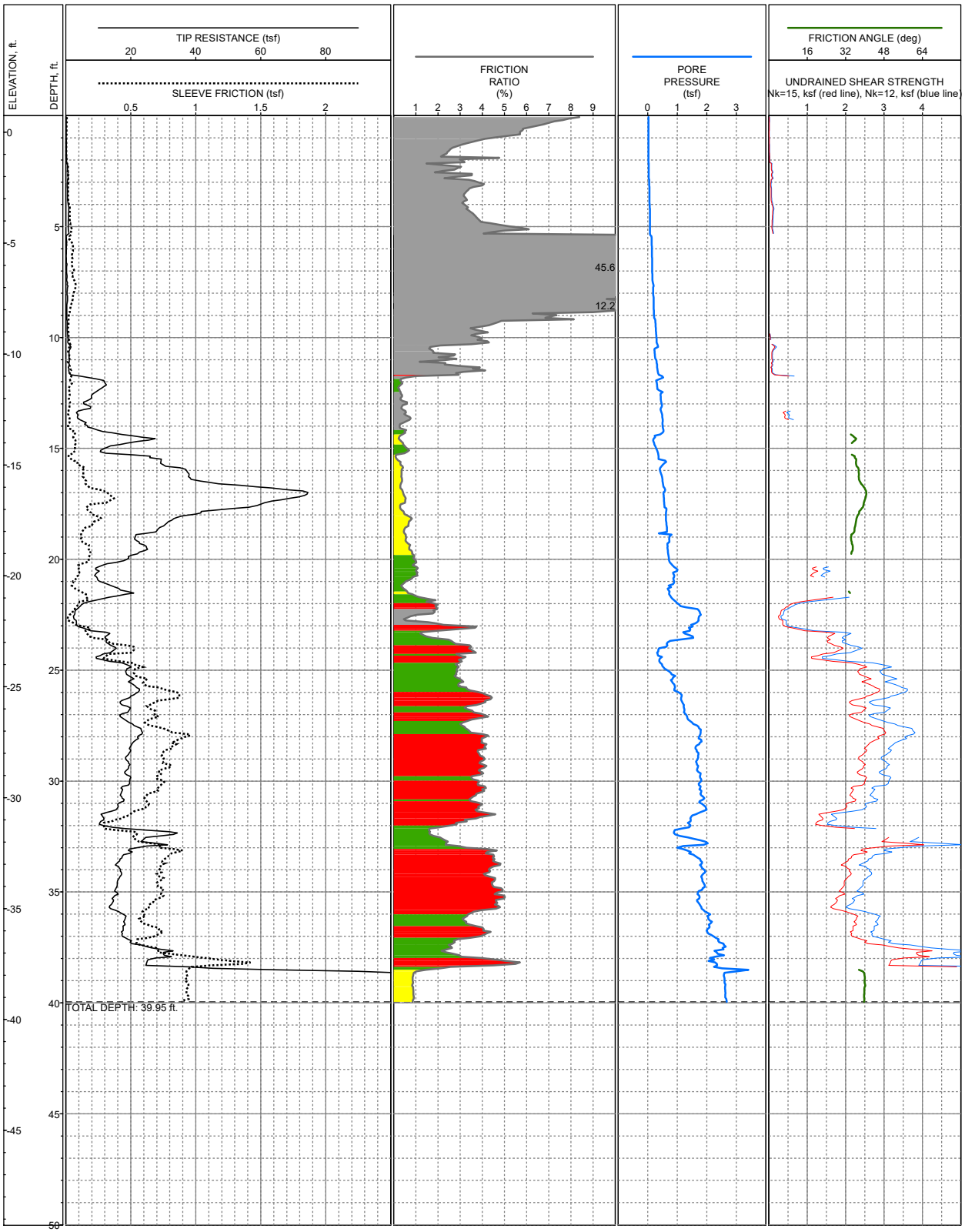
PLATE A-45: LOG OF C-18



LOCATION: E: 3,769,359.9, N: 585,876.3, Louisiana State Plane South, NAD83, Feet
SURFACE EL: 0.5ft +/- NAVD88
COMPLETION DEPTH: 40.41ft
TESTDATE: 4/26/2019

EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Fugro
REVIEWED BY: S. Bryant
CONE AREA RATIO: 0.59

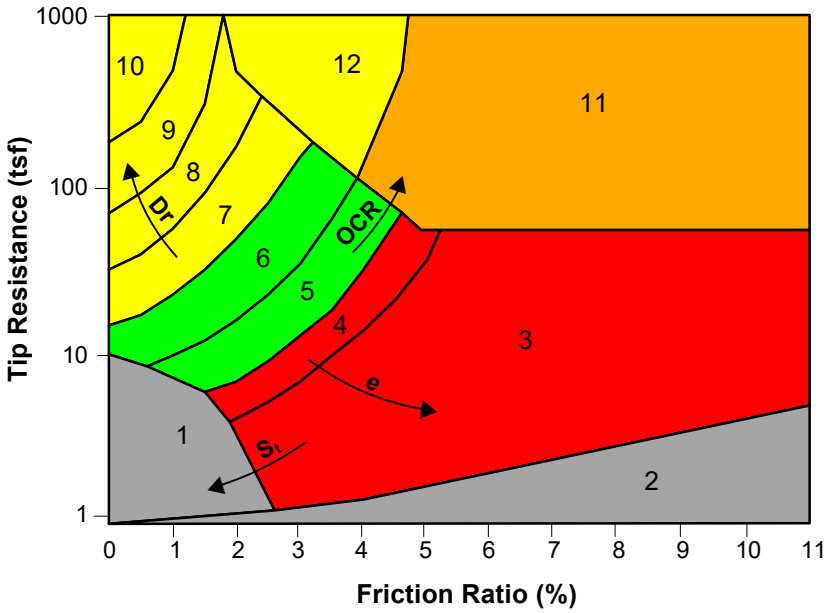
PLATE A-46: LOG OF C-19



LOCATION: E: 3,769,365.8, N: 587,800.9, Louisiana State Plane South, NAD83, Feet
SURFACE EL: 0.7ft +/- NAVD88
COMPLETION DEPTH: 39.95ft
TESTDATE: 4/27/2019

EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Fugro
REVIEWED BY: S. Bryant
CONE AREA RATIO: 0.59

PLATE A-47: LOG OF C-20

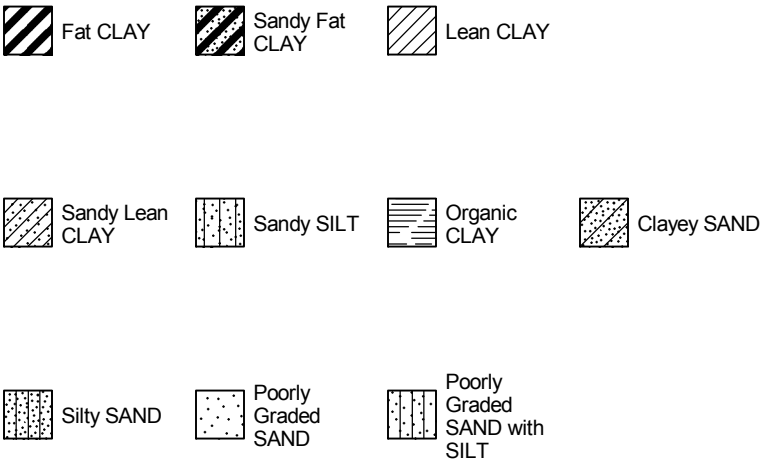


Zone	Soil Behavior Type	U.S.C.S.
1	Sensitive Fine-grained	OL-CH
2	Organic Material	OL-OH
3	Clay	CH
4	Silty Clay to Clay	CL-CH
5	Clayey Silt to Silty Clay	MH-CL
6	Sandy Silt to Clayey Silt	ML-MH
7	Silty Sand to Sandy Silt	SM-ML
8	Sand to Silty Sand	SM-SP
9	Sand	SW-SP
10	Gravelly Sand to Sand	SW-GW
11	Very Stiff Fine-grained *	CH-CL
12	Sand to Clayey Sand *	SC-SM

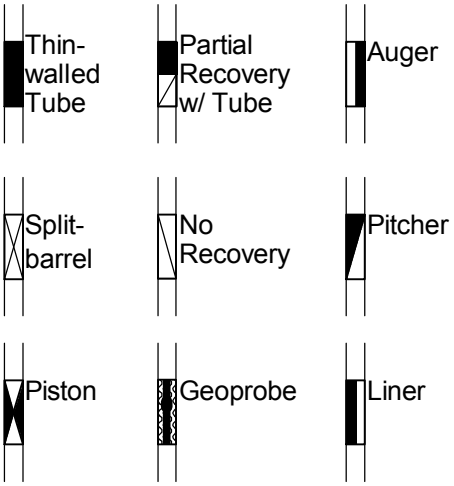
*overconsolidated or cemented

SBT CORRELATION CHART
(Robertson and Campanella, 1988)

SOIL TYPES

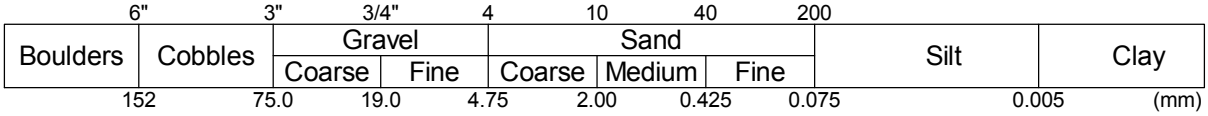


SAMPLER TYPES

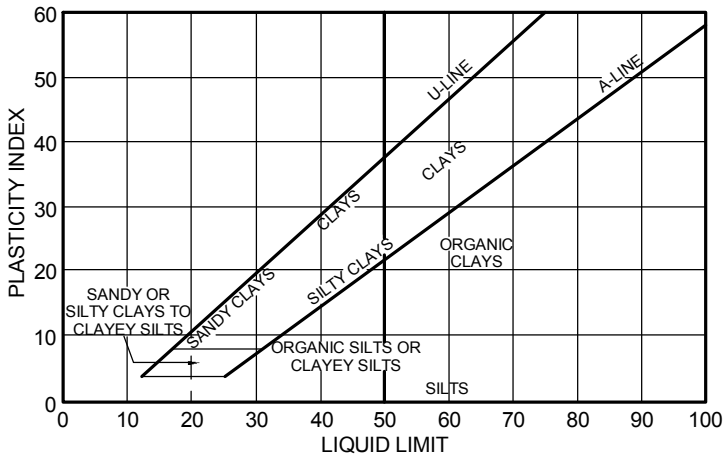


SOIL GRAIN SIZE

U.S. Standard Sieve



PLASTICITY CHART



SOIL STRUCTURE

Slickensided	Having planes of weakness that appear slick and glossy.
Fissured	Containing shrinkage or relief cracks, often filled with fine sand or silt; usually more or less vertical.
Pocket	Inclusion of material of different texture that is smaller than the diameter of the sample.
Parting	Inclusion less than 1/8 inch thick extending through the sample.
Seam	Inclusion 1/8 inch to 3 inches thick extending through the sample.
Layer	Inclusion greater than 3 inches thick extending through the sample.
Laminated	Soil sample composed of alternating partings or seams of different soil type.
Interlayered	Soil sample composed of alternating layers of different soil type.
Intermixed	Soil sample composed of pockets of different soil type and layered or laminated structure is not evident.
Calcareous	Having appreciable quantities of carbonate.
Carbonate	Having more than 50% carbonate content.

FUGRO

TERMS AND SYMBOLS USED ON BORING LOGS

SOIL CLASSIFICATION (1 of 2)

Project No. 04.55184080

PLATE A-49a

STANDARD PENETRATION TEST (SPT)

A 2-in.-OD, 1-3/8-ID split spoon sampler is driven 1.5 ft into undisturbed soil with a 140-pound hammer free falling 30 in. After the sampler is seated 6 in. into undisturbed soil, the number of blows required to drive the sampler the last 12 in. is the Standard Penetration Resistance or "N" value, which is recorded as blows per foot as described below.

SPLIT-BARREL SAMPLER DRIVING RECORD

Blows Per Foot	Description
25	25 blows drove sampler 12 inches, after initial 6 inches of seating.
50/7"	50 blows drove sampler 7 inches, after initial 6 inches of seating.
Ref/3"	50 blows drove sampler 3 inches during initial 6-inch seating interval.

NOTE: To avoid damage to sampling tools, driving is limited to 50 blows during or after seating interval.

DENSITY OF GRANULAR SOILS

Descriptive Term	*Relative Density, %	**Blows Per Foot (SPT)
Very Loose	< 15	0 to 4
Loose	15 to 35	5 to 10
Medium Dense	35 to 65	11 to 30
Dense	65 to 85	31 to 50
Very Dense	> 85	> 50

*Estimated from sampler driving record.

**Requires correction for depth, groundwater level, and grain size.

STRENGTH OF COHESIVE SOILS

Term	Undrained Shear Strength, ksf	Blows Per Foot (SPT) (approximate)
Very Soft	< 0.25	0 to 2
Soft	0.25 to 0.50	2 to 4
Firm	0.50 to 1.00	4 to 8
Stiff	1.00 to 2.00	8 to 16
Very Stiff	2.00 to 4.00	16 to 32
Hard	> 4.00	> 32

SHEAR STRENGTH TEST METHOD

U = Unconfined Q = Unconsolidated - Undrained Triaxial

P = Pocket Penetrometer T = Torvane V = Miniature Vane F = Hand Vane

HAND PENETROMETER CORRECTION

Our experience has shown that the hand penetrometer generally overestimates the in-situ undrained shear strength of over consolidated Pleistocene Gulf Coast clays. These strengths are partially controlled by the presence of macroscopic soil defects such as slickensides, which generally do not influence smaller scale tests like the hand penetrometer. Based on our experience, we have adjusted these field estimates of the undrained shear strength of natural, overconsolidated Pleistocene Gulf Coast soils by multiplying the measured penetrometer reading by a factor of 0.6. These adjusted strength estimates are recorded in the "Shear Strength" column on the boring logs. Except as described in the text, we have not adjusted estimates of the undrained shear strength for projects located outside of the Pleistocene Gulf Coast formations.

Information on each boring log is a compilation of subsurface conditions and soil or rock classifications obtained from the field as well as from laboratory testing of samples. Strata have been interpreted by commonly accepted procedures. The stratum lines on the logs may be transitional and approximate in nature. Water level measurements refer only to those observed at the time and places indicated, and can vary with time, geologic condition, or construction activity.

Appendix B

Laboratory Testing

1. Laboratory Testing

Laboratory testing was performed on selected samples to evaluate pertinent engineering parameters of materials encountered in the borings. Testing was performed in Fugro's laboratories. Laboratory tests were performed in general accordance with applicable ASTM test methods as noted in Table 1. Laboratory test results are summarized on Plates B1-1 to B1-27. Our laboratory tests were performed in general accordance with the appropriate standards as shown in Table 1.

Table 1: Test Types

Description	Designation
Moisture Content	ASTM D2216
Atterberg Limits	ASTM D4318
Dry Unit Weight	ASTM D7263
Percent Finer than a No. 200 Sieve	ASTM D1140
Sieve Analysis	ASTM D422
Unconsolidated Undrained Triaxial Compression	ASTM D2850
One-Dimensional Consolidation	ASTM D2435
Miniature Vane	ASTM D4648
Organic Content	ASTM D2974

1.1 Classification Tests

The classification tests included tests for natural moisture content, liquid and plastic limits (collectively termed Atterberg Limits) and percent finer than the No. 200 sieve. These tests aid in classifying the soils and are used to correlate the results of other tests performed on samples taken from different borings and/or different depths. Classification test results are presented on boring logs in Appendix A and summarized on Plate B1-1 through B1-27. Plates B2-1 to B2-9 present the plasticity charts. The Organic Content test results are included in Table 2 below.

Table 2: Organic Content Results

Boring ID	Depth	Elevation	Organic Content
	Feet	Feet	%
B-05	2	-0.75	11.14
B-06	38	-39.288	28.24
B-07	4	-5.314	16.13
B-09	2	-3.859	6.91
B-10	2	-2.211	21.28
B-12	2	-1.013	11.35

Boring ID	Depth	Elevation	Organic Content
B-14	1	-0.369	27.45
B-18	1	-2.701	1.06
B-18	4	-5.701	6.73
B-19	1	-3.287	11.70
B-20	1	-3.733	11.64

1.2 Gradation Curves

Particle-size or gradation curves for selected samples are presented as Plates B3-1 to B3-15. The particle-size gradation curve created for the composite sample created from the upper 15-ft of Borings B-22, B-24, B-25 and B-27 is included on Plate B3-16.

1.3 Undrained Shear Strength Tests

We measured the undrained shear strength of select undisturbed-samples of cohesive soils by performing either miniature vane tests, or unconsolidated undrained traixial compression tests. Natural moisture contents and dry unit weights were determined as routine parts of the compression tests. The results of the laboratory shear strength tests, along with the field estimates of shear strengths, are presented on boring logs in Appendix A and summarized on Plates B1-1 to B1-27. Stress-strain plots for triaxial tests are presented as Plates B4-1 to B4-70.

1.4 Consolidation

Thirteen (13) consolidation tests were performed to assess compressibility characteristics of foundation soils. Plates B5-1 to B5-13 present void ratio and coefficient of consolidation versus pressure plots.

1.5 Low Pressure Consolidation Tests

One composite sample was created from select borrow source borings for low-pressure consolidation and column settling tests. The composite sample was developed on predominately clay materials encountered in the upper 15 ft from borings B-22, B-24, B-25 and B-27. These borings were selected by CPRA as they contained more clay material that will be used for contained marsh creation. The composite sample was created by placing material from each of the borings into a 5-gallon bucket and then hand mixing to create a blended sample. Portions of the compsosite sample were obtained for classification tests and the remainder of the sample was used for advanced low pressure consolidation tests and settling column tests.

Low-pressure consolidation tests were performed on the composite sample using the guidance outlined in Olson et al (2003). Results are presented on Plates B6-1.

1.6 Settling Column Tests

One settling column test was performed on the composite sample, which was created as described in the previous section.

The column settling test was performed in general accordance with USACE (1987). The tests were performed by Dr. William Moe, with SCTCS Group, LLC. The SCTCS report, dated March 19, 2020, is included as Appendix C.

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (PI)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
2	2.0-3.5	110	31	79	96															
3	4.0-5.0				79				0.14	0.29										
3	5.0-6.0	166	50	116	120	39														
4	6.0-7.0				102				0.16	0.08										
4	7.0-8.0																			
5	8.0-9.0				77				0.14	0.18										
6	10.0-11.0				109	42			0.18	0.18		UU	109	3	0.15		2.3	42	14.6	C
6	11.0-12.0				29		79													
8	16.0-17.0	42	15	27					0.10	0.24										
	17.0-18.0				62															
9	18.0-19.0				22		14		0.28	0.30										

Notes:

NP = Non-Plastic Material

TYPE OF TEST
U - Unconfined Compression
UU - Unconsolidated - Undrained Triaxial
CU - Consolidated - Undrained Triaxial

TYPE OF FAILURE
A - Bulge
B - Single Shear Plane
C - Multiple Shear Plane
D - Vertical Fracture

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

SUMMARY OF TEST RESULTS - BORING B-01

LELAP Lab ID #10001

Orleans Parish, Louisiana

Project No. **04.55184080**

PLATE B1-1

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (PI)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
1	0.0-1.0				281				0.08	0.11										
2	2.0-3.0	415	123	292	241					0.11										
2	3.0-4.0				82	54						UU	82	1	0.10		1.1	54	12.8	A
3	4.0-5.0				325				0.06	0.12										
4	6.0-7.0	150	38	112	136	32				0.13										
5	8.0-9.0				42					0.14										
5	9.0-10.0				59	64						UU	59	3	0.15		1.8	64	15.0	C
6	10.0-11.0				57				0.16	0.10										
7	12.0-13.5				37		18													
9	18.0-19.0				25					1.39										
9	19.0-20.0				25	102						UU	25	5	1.01		1.8	102	14.5	C
10	23.0-24.0	43	14	29	25			0.75												
11	28.0-29.0							1.75												
12	33.0-34.0				26	95		1.50				UU	26	9	1.54		1.4	95	13.9	C

Notes:

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TYPE OF FAILURE
A - Bulge
B - Single Shear Plane
C - Multiple Shear Plane
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St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

SUMMARY OF TEST RESULTS - BORING B-02

LELAP Lab ID #10001

Orleans Parish, Louisiana

Project No. **04.55184080**

PLATE B1-2

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (PI)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
1	0.0-1.0				489				0.10	0.16										
1	1.0-2.0				160	32						UU	160	1	0.14		3.1	32	15.0	A
2	2.0-3.0	264	65	199	549				0.08	0.13										
3	4.0-5.0				203					0.20										
3	5.0-6.0				137	38						UU	137	2	0.09		3.1	38	15.0	C
4	6.0-7.0				150				0.06	0.18										
5	8.0-9.0				71				0.16	0.07										
5	9.0-10.0	33	20	13																
6	10.0-11.0				70				0.01	0.25										
6	11.0-12.0				73	59						UU	73	3	0.24		1.0	59	7.2	C
8	14.0-15.0				48				0.15	0.30										
8	15.0-16.0	73	24	49																
9	18.0-19.0				58				0.06	0.18										
10	23.0-24.0	45	17	28	42			1.25												
11	28.0-29.0							2.00												
11	29.0-30.0				35	86						UU	35	8	1.72		1.8	86	4.0	C
12	33.0-34.0				36			1.50												
14	43.0-44.0	39	16	23	30															
16	53.0-54.0				42															
17	59.0-60.0				42	82						UU	42	16	0.26		2.6	82	15.0	A,C

Notes:

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CU - Consolidated - Undrained Triaxial

TYPE OF FAILURE
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B - Single Shear Plane
C - Multiple Shear Plane
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St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

SUMMARY OF TEST RESULTS - BORING B-03

LELAP Lab ID #10001

Orleans Parish, Louisiana

Project No. **04.55184080**

PLATE B1-3

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (PI)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
1	0.0-1.0				907				0.10	0.09										
2	2.0-3.0	341	93	248	521															
3	4.0-5.0				451				0.16	0.14										
3	5.0-6.0				111	40						UU	111	2	0.11		2.7	40	12.6	A,C
4	6.0-7.0	165	40	125	36				0.14	0.44										
5	8.0-9.0				60				0.08	0.16										
5	9.0-10.0				77	56						UU	77	3	0.13		1.7	56	12.1	C
6	10.0-11.0				69				0.08	0.23										
6	11.0-12.0	45	20	25	49	71														
7	12.0-13.0				59				0.20	0.12										
8	14.0-15.0				40		88		0.12	0.16										
9	18.0-19.0				69				0.14	0.22										
10	23.0-24.0	42	20	22	41				0.10											
11	28.0-29.0								0.24											
11	29.0-30.0				63	62						UU	63	8	0.21		1.3	62	15.0	C
12	33.0-34.0								0.06											
12	34.0-35.0				50	34														
13	38.0-39.0								0.26											
13	39.0-40.0				40															

Notes:

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U - Unconfined Compression
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CU - Consolidated - Undrained Triaxial

TYPE OF FAILURE
A - Bulge
B - Single Shear Plane
C - Multiple Shear Plane
D - Vertical Fracture

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St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

SUMMARY OF TEST RESULTS - BORING B-04

LELAP Lab ID #10001

Orleans Parish, Louisiana

Project No. **04.55184080**

PLATE B1-4

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (PI)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
1	0.0-1.0				257				0.02	0.06										
2	2.0-3.0	207	57	150	170				0.10	0.23										
3	4.0-5.5	28	23	5																
4	6.0-7.0				27				0.16											
4	7.0-8.0				24															
5	8.0-9.0				25		24		0.14	0.22										
6	10.0-11.5	60	22	38	52															
7	12.0-13.0				62				0.10	0.24										
7	13.0-14.0				49	71						UU	49	4	0.19		1.9	71	13.8	C
8	14.0-15.0				37			0.75		1.24										
9	18.0-19.0				31			1.50		1.57										
9	19.0-20.0				31	89						UU	31	5	1.38		1.3	89	14.5	C
10	23.0-24.0	73	28	45	36			1.25												
11	28.0-29.0				53			1.00												
12	33.0-34.0				32			2.00												
13	38.0-39.0							1.50												
13	39.0-40.0				33	87						UU	33	10	0.95		1.7	87	12.8	C
14	43.0-44.0							3.50												
14	44.0-45.0	35	21	14	28															
15	48.0-49.0							2.00												
15	49.0-50.0				36		91													
16	53.0-54.0				46				0.14											
17	58.0-59.0				35			4.50												

Notes:

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TYPE OF FAILURE
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St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

SUMMARY OF TEST RESULTS - BORING B-05

LELAP Lab ID #10001

Orleans Parish, Louisiana

Project No. **04.55184080**

PLATE B1-5

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (PI)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
1	0.0-1.0				162				0.14	0.12										
1	1.0-2.0				108	48						UU	108	1	0.09		2.8	48	14.8	C
2	2.0-3.0	235	58	177	352				0.12	0.21										
3	4.0-5.0				107				0.14	0.10										
3	5.0-6.0	42	22	20	48	73														
4	6.0-7.0				60				0.10	0.29										
5	8.0-9.0				50				0.08	0.20										
6	10.0-11.0				66				0.14	0.27										
6	11.0-12.0				48	74						UU	48	3	0.24		2.5	74	14.0	C
7	12.0-13.0				55				0.14	0.01										
8	14.0-15.0	24	18	6	23				0.30	0.54										
9	18.0-19.0				22		89		0.34	0.21										
10	23.0-24.0							1.00												
10	24.0-25.0				29	94						UU	29	7	1.31		1.0	94	15.0	C
11	28.0-29.0				36			0.75												
12	33.0-34.0							1.25												
12	34.0-35.0				29	95						UU	29	9	1.76		1.5	95	15.0	C
13	38.0-39.0	96	32	64	39			1.00												

Notes:

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TYPE OF FAILURE
A - Bulge
B - Single Shear Plane
C - Multiple Shear Plane
D - Vertical Fracture

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

SUMMARY OF TEST RESULTS - BORING B-06

LELAP Lab ID #10001

Orleans Parish, Louisiana

Project No. **04.55184080**

PLATE B1-6

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (PI)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
1	0.0-1.0				401				0.16	0.12										
2	2.0-3.0				441				0.16	0.17										
2	3.0-4.0				229	23						UU	229	1	0.08		2.4	23	14.8	A
3	4.0-5.0				262				0.16	0.07										
4	6.0-7.0	140	37	103	321				0.24	0.20										
4	7.0-8.0				151	35						UU	151	2	0.09		2.4	35	15.0	C
5	8.0-9.0				195				0.12	0.13										
6	10.0-11.0				68				0.14	0.08										
6	11.0-12.0	59	22	37	51	70														
7	12.0-13.0				46				0.14	0.08										
7	13.0-14.0				60	67						UU	60	4	0.10		0.9	67	11.0	C
8	14.0-15.0				48				0.08	0.09										
9	18.0-19.0				25				0.14	0.27										
10	23.0-24.0				22		26	1.50												
11	28.0-29.0							1.75												
11	29.0-30.0				25	97						UU	25	8	1.23		1.3	97	8.9	C
12	33.0-34.0				48			1.00												
13	38.0-39.0				36			1.25												

Notes:

NP = Non-Plastic Material

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U - Unconfined Compression
UU - Unconsolidated - Undrained Triaxial
CU - Consolidated - Undrained Triaxial

TYPE OF FAILURE
A - Bulge
B - Single Shear Plane
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FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

SUMMARY OF TEST RESULTS - BORING B-07

LELAP Lab ID #10001

Orleans Parish, Louisiana

Project No. **04.55184080**

PLATE B1-7

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (PI)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
1	0.0-1.0				144				0.10	0.10										
2	2.0-3.0	83	27	56	83				0.20	0.12										
2	3.0-4.0				97	48						UU	97	1	0.11		2.1	48	14.8	C
3	4.0-5.0				113				0.14	0.12										
	5.0-6.0																			
4	6.0-7.0	53	22	31	51				0.14	0.80										
4	7.0-8.0				42	80						UU	42	2	0.26		3.6	80	14.8	C
5	8.0-9.0				44		55		0.16	0.67										
7	12.0-13.5				27		17													
9	18.0-19.0				26			0.50		1.03										
9	19.0-20.0				23	103						UU	23	5	0.75		3.0	103	14.5	C
10	23.0-24.0				21			1.25												
11	28.0-29.0							2.00												
11	29.0-30.0	60	22	38	25	100														
12	33.0-34.0							2.00												
13	38.0-39.0							1.25												
13	39.0-40.0				43	79						UU	43	11	1.45		1.5	79	4.0	C

Notes:

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TYPE OF FAILURE
A - Bulge
B - Single Shear Plane
C - Multiple Shear Plane
D - Vertical Fracture

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

SUMMARY OF TEST RESULTS - BORING B-08

LELAP Lab ID #10001

Orleans Parish, Louisiana

Project No. **04.55184080**

PLATE B1-8

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (PI)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
1	0.0-1.0				325				0.08	0.14										
2	2.0-3.0				199				0.10	0.14										
2	3.0-4.0				138	35						UU	138	1	0.12		2.6	35	13.3	C
3	4.0-5.0	201	44	157	244				0.12	0.23										
4	6.0-7.0				128				0.10	0.18										
5	8.0-9.0				130				0.22	0.15										
5	9.0-10.0				116	42						UU	116	3	0.14		1.7	42	15.0	C
7	12.0-13.0	77	24	53	72		100		0.12	0.16										
8	14.0-15.0				68				0.12	0.10										
8	15.0-16.0				74	59						UU	74	4	0.10		2.1	59	14.4	C
9	18.0-19.0				60		92		0.12	0.19										
10	23.0-24.0								0.14											
10	24.0-25.0				78	58						UU	78	7	0.14		1.6	58	15.0	C
11	28.0-29.0	78	27	51	61				0.16											
12	33.0-34.0				79				0.16											
13	38.0-39.0				31				0.20											
14	43.0-44.0							2.25												
14	44.0-45.0				28	93						UU	28	12	1.86		2.1	93	14.6	C
15	48.0-49.0				28			2.25												
16	53.0-54.0				34			2.00												
17	58.0-59.0							1.00												
17	59.0-60.0				28	98						UU	28	16	1.30		2.4	98	15.0	C

Notes:

NP = Non-Plastic Material

TYPE OF TEST
U - Unconfined Compression
UU - Unconsolidated - Undrained Triaxial
CU - Consolidated - Undrained Triaxial

TYPE OF FAILURE
A - Bulge
B - Single Shear Plane
C - Multiple Shear Plane
D - Vertical Fracture

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

SUMMARY OF TEST RESULTS - BORING B-09

LELAP Lab ID #10001

Orleans Parish, Louisiana

Project No. **04.55184080**

PLATE B1-9

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (PI)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
1	0.0-1.0				203				0.12	0.20										
2	2.0-3.0				250				0.08	0.17										
2	3.0-4.0	349	81	268	177	30														
3	4.0-5.0				153				0.08	0.06										
3	5.0-6.0				294	19						UU	294	2	0.06		2.8	19	14.9	C
4	6.0-7.0				175				0.12	0.12										
5	8.0-9.0	35	20	15	45				0.16	0.16										
5	9.0-10.0				36	87						UU	36	3	0.42		6.1	87	15.0	C
6	10.0-11.0				52				0.14	0.30										
7	12.0-13.0				72		100		0.02	0.28										
8	14.0-15.0				60				0.14	0.14										
8	15.0-16.0				51	70						UU	51	4	0.17		2.2	70	15.0	C
9	18.0-19.0				21		9													

Notes:

NP = Non-Plastic Material

TYPE OF TEST
U - Unconfined Compression
UU - Unconsolidated - Undrained Triaxial
CU - Consolidated - Undrained Triaxial

TYPE OF FAILURE
A - Bulge
B - Single Shear Plane
C - Multiple Shear Plane
D - Vertical Fracture

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

SUMMARY OF TEST RESULTS - BORING B-10

LELAP Lab ID #10001

Orleans Parish, Louisiana

Project No. **04.55184080**

PLATE B1-10

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (PI)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
1	0.0-1.0				78				0.04	0.09										
2	2.0-3.0				104				0.12	0.15										
2	3.0-4.0				115	40						UU	115	1	0.11		1.6	40	12.8	C
3	4.0-5.0	94	27	67	110				0.10	0.16										
4	6.0-7.0				314				0.10	0.12										
5	8.0-9.0	299	77	222	40				0.22	0.11										
6	10.0-11.5				47		97													
7	12.0-13.0	71	23	48	72				0.18	0.24										
7	13.0-14.0				53	72						UU	53	4	0.18		2.3	72	14.0	C
8	14.0-15.0				51				0.22	0.12										
9	18.0-19.0								0.10											
9	19.0-20.0				65	66						UU	65	5	0.17		2.8	66	14.5	C
10	23.0-24.0								0.18											
10	24.0-25.0				21															
11	28.0-29.5				23		12													
12	33.0-34.5	19	14	5	29															
10	34.0-25.0																			
13	38.0-39.5				40															

Notes:

NP = Non-Plastic Material

TYPE OF TEST
U - Unconfined Compression
UU - Unconsolidated - Undrained Triaxial
CU - Consolidated - Undrained Triaxial

TYPE OF FAILURE
A - Bulge
B - Single Shear Plane
C - Multiple Shear Plane
D - Vertical Fracture

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

SUMMARY OF TEST RESULTS - BORING B-11

LELAP Lab ID #10001

Orleans Parish, Louisiana

Project No. **04.55184080**

PLATE B1-11

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (PI)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
1	0.0-1.0				437				0.10	0.12										
2	2.0-3.0				249				0.10	0.16										
3	4.0-5.0	235	69	166	279				0.20	0.09										
3	5.0-6.0				55	69						UU	55	2	0.16		5.0	69	15.0	C
4	6.0-7.0				47				0.14	0.05										
5	8.0-9.0				35				0.18	0.27										
5	9.0-10.0	37	20	17	50	68														
6	10.0-11.0				74				0.16	0.08										
6	11.0-12.0				37	72						UU	37	3	0.12		3.6	72	14.9	C
7	12.0-13.0				52		91		0.10	0.25										
8	14.0-15.0				68	63				0.16		UU	68	4	0.18		2.0	63	14.3	C
9	18.0-19.5				36		32													
10	23.0-24.5				27		20													
12	33.0-34.5				22		2													
13	38.0-39.5	44	19	25	31															

Notes:

NP = Non-Plastic Material

TYPE OF TEST
U - Unconfined Compression
UU - Unconsolidated - Undrained Triaxial
CU - Consolidated - Undrained Triaxial

TYPE OF FAILURE
A - Bulge
B - Single Shear Plane
C - Multiple Shear Plane
D - Vertical Fracture

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

SUMMARY OF TEST RESULTS - BORING B-12

LELAP Lab ID #10001

Orleans Parish, Louisiana

Project No. **04.55184080**

PLATE B1-12

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (PI)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
1	0.0-1.0				282				0.14	0.11										
2	2.0-3.0	409	164	245	475				0.14	0.11										
2	3.0-4.0				47	69						UU	47	1	0.14		2.2	69	13.3	C
3	4.0-5.0				67				0.12	0.12										
4	6.0-7.0				302				0.20	0.20										
5	8.0-9.0	40	23	17	28				0.24	0.20										
5	9.0-10.0				57	71						UU	57	3	0.17		2.5	71	13.3	C
6	10.0-11.0				38				0.04	0.19										
7	12.0-13.0				51				0.20	0.06										
8	14.0-15.0				43				0.20	0.08										
8	15.0-16.0	NP	NP	NP																
9	18.0-19.0				75				0.10	0.12										
9	19.0-20.0				38															

Notes:

NP = Non-Plastic Material

TYPE OF TEST
U - Unconfined Compression
UU - Unconsolidated - Undrained Triaxial
CU - Consolidated - Undrained Triaxial

TYPE OF FAILURE
A - Bulge
B - Single Shear Plane
C - Multiple Shear Plane
D - Vertical Fracture

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

SUMMARY OF TEST RESULTS - BORING B-13

LELAP Lab ID #10001

Orleans Parish, Louisiana

Project No. **04.55184080**

PLATE B1-13

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (PI)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
1	0.0-1.0				566				0.12	0.13										
2	2.0-3.0	408	132	276	443				0.06	0.08										
3	4.0-5.0				355				0.20	0.12										
3	5.0-6.0				88	47						UU	88	2	0.09		2.2	47	11.8	C
4	6.0-7.0				76				0.20	0.47										
5	8.0-9.5				34		67													
6	10.0-11.0				82				0.24	0.10										
7	12.0-13.0				45		70		0.24	0.42										
8	14.0-15.0				64				0.10	0.30										
8	15.0-16.0				63															
9	20.0-21.5				25		12													
10	23.0-24.5				27		26													
11	28.0-29.5	48	18	30	28															
12	33.0-34.0				41			1.00												
13	38.0-39.0				29	95		1.75				UU	29	10	1.78		1.2	95	4.6	C

Notes:
OC=27.45%
NP = Non-Plastic Material

TYPE OF TEST
U - Unconfined Compression
UU - Unconsolidated - Undrained Triaxial
CU - Consolidated - Undrained Triaxial

TYPE OF FAILURE
A - Bulge
B - Single Shear Plane
C - Multiple Shear Plane
D - Vertical Fracture

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

SUMMARY OF TEST RESULTS - BORING B-14

LELAP Lab ID #10001

Orleans Parish, Louisiana

Project No. **04.55184080**

PLATE B1-14

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (PI)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
1	0.0-1.0				125				0.08	0.09										
2	2.0-3.0	84	22	62	107				0.28	0.18										
3	4.0-5.0				147				0.12	0.17										
3	5.0-6.0				42	82						UU	42	2	0.21		3.4	82	15.0	A,C
4	6.0-7.0								0.16											
4	7.0-8.0	88	27	61	34	81														
5	10.0-11.5				27		15													
6	12.0-13.5				23		2													
8	18.0-19.0				27		25		0.24	0.59										
9	23.0-24.0							0.50												
9	24.0-25.0				38	83						UU	38	7	0.29		1.3	83	13.0	C
10	28.0-29.0				35			1.00												
11	33.0-34.0	51	17	34	36			0.75												
12	38.0-39.0							1.00												
12	39.0-40.0				29	92						UU	29	11	1.80		1.1	92	7.7	C
13	43.0-44.0				40			1.50												
14	48.0-49.0							1.75												
14	49.0-50.0				37	86						UU	37	13	1.98		1.2	86	6.9	C
15	53.0-54.0				42			2.75												
16	58.0-59.0				47			1.25												

Notes:

NP = Non-Plastic Material

TYPE OF TEST
U - Unconfined Compression
UU - Unconsolidated - Undrained Triaxial
CU - Consolidated - Undrained Triaxial

TYPE OF FAILURE
A - Bulge
B - Single Shear Plane
C - Multiple Shear Plane
D - Vertical Fracture

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

SUMMARY OF TEST RESULTS - BORING B-15

LELAP Lab ID #10001

Orleans Parish, Louisiana

Project No. **04.55184080**

PLATE B1-15

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (PI)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
1	0.0-1.0				197				0.50	0.06										
2	2.0-3.0				19				0.40	1.57										
2	3.0-4.0				17															
3	4.0-5.5	33	18	15	42															
4	6.0-7.0				26				0.20	0.07										
6	10.0-11.5				24		8													
7	12.0-13.5				34		30													
8	14.0-15.0	52	15	37	38			1.00		1.57										
8	15.0-16.0				21	105						UU	21	4	1.46		4.6	105	15.0	C
9	18.0-19.0				38			1.50		1.57										

Notes:

NP = Non-Plastic Material

TYPE OF TEST
U - Unconfined Compression
UU - Unconsolidated - Undrained Triaxial
CU - Consolidated - Undrained Triaxial

TYPE OF FAILURE
A - Bulge
B - Single Shear Plane
C - Multiple Shear Plane
D - Vertical Fracture

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

SUMMARY OF TEST RESULTS - BORING B-16

LELAP Lab ID #10001

Orleans Parish, Louisiana

Project No. **04.55184080**

PLATE B1-16

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (PI)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
1	0.0-1.0				119				0.50	0.26										
1	1.0-2.0				134	36						UU	134	1	0.09		2.3	36	14.8	C
2	2.0-3.0				128				0.20	0.08										
3	4.0-5.0				131				0.50	0.13										
3	5.0-6.0	155	35	120	129	39														
4	6.0-7.0				85				0.20	0.05										
5	8.0-9.0				48				0.90	0.19										
5	9.0-10.0				38	84						UU	38	3	0.14		3.7	84	15.0	C
6	10.0-11.0	33	17	16	35				0.90	0.12										
7	12.0-13.0				31				0.70	0.11										
8	14.0-15.5				28		20													
9	18.0-19.0				36				0.80	0.38										
9	19.0-20.0				39	85						UU	39	5	0.20		1.9	85	14.7	A,B
10	23.0-24.0	39	17	22	43			1.00												
11	28.0-29.0				28		21	1.25												
12	33.0-34.0								1.50											
12	34.0-35.0				34	86						UU	34	9	1.53		1.7	86	15.0	C
13	38.0-39.0				33				1.10											

Notes:

NP = Non-Plastic Material

TYPE OF TEST
U - Unconfined Compression
UU - Unconsolidated - Undrained Triaxial
CU - Consolidated - Undrained Triaxial

TYPE OF FAILURE
A - Bulge
B - Single Shear Plane
C - Multiple Shear Plane
D - Vertical Fracture

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

SUMMARY OF TEST RESULTS - BORING B-17

LELAP Lab ID #10001

Orleans Parish, Louisiana

Project No. **04.55184080**

PLATE B1-17

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (PI)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
1	0.0-1.0								0.20											
1	1.0-2.0																			
2	2.0-3.0	64	25	39					0.10											
2	3.0-4.0				56	64						UU	56	1	0.12		3.1	64	13.0	a,c
3	4.0-5.0								0.20											
4	6.0-7.0				112	41			0.20			UU	112	2	0.17		0.9	41	14.8	C
5	8.0-9.0								0.20											
5	9.0-10.0	120	34	86	148	35														
6	10.0-11.0								0.30											
6	11.0-12.0				32															
8	14.0-15.0	111	34	77					0.40											
9	18.0-19.0								0.60											
9	19.0-20.0				90	48						UU	90	5	0.36		1.2	48	3.4	C
10	23.0-24.0				92				0.30											
11	28.0-29.0								0.60											
11	29.0-30.0				86	52						UU	86	8	0.44		2.0	52	5.1	C
12	33.0-34.0	89	33	56	48				0.20											
13	38.0-39.0				40				0.10											

Notes:

NP = Non-Plastic Material

TYPE OF TEST
U - Unconfined Compression
UU - Unconsolidated - Undrained Triaxial
CU - Consolidated - Undrained Triaxial

TYPE OF FAILURE
A - Bulge
B - Single Shear Plane
C - Multiple Shear Plane
D - Vertical Fracture

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

SUMMARY OF TEST RESULTS - BORING B-18

LELAP Lab ID #10001

Orleans Parish, Louisiana

Project No. **04.55184080**

PLATE B1-18

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (PI)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
1	0.0-1.0								0.28											
1	1.0-2.0																			
2	2.0-3.0	97	29	68	103	48			0.56											
3	4.0-5.0				102	45			0.38			UU	102	1	0.22		2.3	45	13.6	C
4	6.0-7.0								0.42											
4	7.0-8.0	48	20	28																
5	8.0-9.0				42	80			0.68			UU	42	3	0.27		4.1	80	14.3	C
6	10.0-11.0								0.82											
7	12.0-13.0				75	61			1.54			UU	75	3	0.43		2.4	61	7.2	C
7	13.0-14.0	69	27	42																
10	25.0-26.0								1.40											
10	26.0-27.0				32	91						UU	32	7	1.23		1.7	91	15.0	C
11	28.0-29.0								0.20											
11	29.0-30.0				34															
12	33.0-34.0								0.10											
12	34.0-35.0				29	94						UU	29	9	1.46		2.2	94	15.0	C
13	38.0-39.0	51	19	32					0.10											
13	39.0-40.0				27															

Notes:

NP = Non-Plastic Material

TYPE OF TEST
U - Unconfined Compression
UU - Unconsolidated - Undrained Triaxial
CU - Consolidated - Undrained Triaxial

TYPE OF FAILURE
A - Bulge
B - Single Shear Plane
C - Multiple Shear Plane
D - Vertical Fracture

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

SUMMARY OF TEST RESULTS - BORING B-19

LELAP Lab ID #10001

Orleans Parish, Louisiana

Project No. **04.55184080**

PLATE B1-19

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (PI)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
1	0.0-1.0																			
2	2.0-3.0	133	33	100					0.10											
3	4.0-5.0								0.20											
3	5.0-6.0				135	38						UU	135	2	0.15		1.7	38	12.3	C
4	6.0-7.0								0.20											
5	8.0-9.0	148	38	110					0.20											
5	9.0-10.0				135	37						UU	135	3	0.20		2.1	37	14.9	C
6	10.0-11.0								0.20											
7	12.0-13.0								0.46											
7	13.0-14.0				134	37						UU	134	3	0.32		1.2	37	4.0	C
8	14.0-15.0	128	36	92	123	38			0.34											
9	18.0-19.0								0.42											
10	23.0-24.0				49	65			0.50			UU	49	5	0.29		2.6	65	13.5	C
11	30.5-32.0				54															
12	33.0-34.0	84	30	54	45															
13	39.0-40.0				52	72						UU	52	11	0.52		3.1	72	15.0	C

Notes:

NP = Non-Plastic Material

TYPE OF TEST
U - Unconfined Compression
UU - Unconsolidated - Undrained Triaxial
CU - Consolidated - Undrained Triaxial

TYPE OF FAILURE
A - Bulge
B - Single Shear Plane
C - Multiple Shear Plane
D - Vertical Fracture

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

SUMMARY OF TEST RESULTS - BORING B-20

LELAP Lab ID #10001

Orleans Parish, Louisiana

Project No. **04.55184080**

PLATE B1-20

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (PI)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
2	1.0-2.0				32		25													
3	2.0-3.0	28	17	11	50															
4	3.0-4.0				32	85	27													
5	4.0-5.0				35															
7	6.0-7.0	22	15	7	33															
8	7.0-8.0				33	89														
9	8.0-9.0				34															
11	10.0-11.0	27	17	10	42															
12	11.0-12.0				28	86														
13	12.0-13.0				32															
14	13.0-14.0				27		28													
15	14.0-15.0	31	16	15	32															
17	16.0-17.0				31		27													
19	18.0-19.0				32															
21	20.0-21.0	26	16	10	33															
23	22.0-23.0				26	102														
25	24.0-25.0																			
	25.0-26.0				30		26													

Notes:

NP = Non-Plastic Material

TYPE OF TEST
U - Unconfined Compression
UU - Unconsolidated - Undrained Triaxial
CU - Consolidated - Undrained Triaxial

TYPE OF FAILURE
A - Bulge
B - Single Shear Plane
C - Multiple Shear Plane
D - Vertical Fracture

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

SUMMARY OF TEST RESULTS - BORING B-21

LELAP Lab ID #10001

Orleans Parish, Louisiana

Project No. **04.55184080**

PLATE B1-21

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (PI)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
2	1.0-2.0	78	22	56	105															
4	3.0-4.0				95															
6	5.0-6.0				60															
7	6.0-7.0				53		80													
8	7.0-8.0				49				0.26											
10	9.0-10.0	41	18	23	42				0.36											
12	11.0-12.0				42															
14	13.0-14.0	48	17	31	44															
163	15.0-16.0				55	67														
18	17.0-18.0	74	25	49	68															
20	19.0-20.0				76		97													
22	21.0-22.0				65															
24	23.0-24.0	45	16	29	24			1.25												
26	25.0-26.0				20	97														

Notes:

NP = Non-Plastic Material

TYPE OF TEST
U - Unconfined Compression
UU - Unconsolidated - Undrained Triaxial
CU - Consolidated - Undrained Triaxial

TYPE OF FAILURE
A - Bulge
B - Single Shear Plane
C - Multiple Shear Plane
D - Vertical Fracture

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

SUMMARY OF TEST RESULTS - BORING B-22

LELAP Lab ID #10001

Orleans Parish, Louisiana

Project No. **04.55184080**

PLATE B1-22

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (PI)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
2	1.0-2.0				32															
4	3.0-4.0	22	17	5	28															
5	4.0-5.0				26	100														
6	5.0-6.0				27		26													
8	7.0-8.0	21	19	2	26															
10	9.0-10.0				26															
11	10.0-11.0				29		26													
12	11.0-12.0	20	19	1	29															
13	12.0-13.0				28	97														
14	13.0-14.0				28															
16	15.0-16.0	40	20	20	33															
17	16.0-17.0				31		46													
18	17.0-18.0				46															
19	18.0-19.0				33	85														
20	19.0-20.0				45															
22	21.0-22.0	29	14	15	28		40													
24	23.0-24.0				29		40													
25	24.0-25.0				32	92														
26	25.0-26.0				31															

Notes:

NP = Non-Plastic Material

TYPE OF TEST
U - Unconfined Compression
UU - Unconsolidated - Undrained Triaxial
CU - Consolidated - Undrained Triaxial

TYPE OF FAILURE
A - Bulge
B - Single Shear Plane
C - Multiple Shear Plane
D - Vertical Fracture

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

SUMMARY OF TEST RESULTS - BORING B-23

LELAP Lab ID #10001

Orleans Parish, Louisiana

Project No. **04.55184080**

PLATE B1-23

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (PI)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
2	1.0-2.0	29	14	15																
4	3.0-4.0				33		40													
6	5.0-6.0																			
8	7.0-8.0				32															
9	8.0-9.0				33		37													
10	9.0-10.0	21	15	6	26															
12	11.0-12.0																			
14	13.0-14.0	22	15	7	32															
15	14.0-15.0				32		37													
16	15.0-16.0				29															
18	17.0-18.0																			
20	19.0-20.0	24	14	10	38															
22	21.0-22.0				36															
24	23.0-24.0				24	99														
26	25.0-26.0	19	12	7	26															

Notes:

NP = Non-Plastic Material

TYPE OF TEST
U - Unconfined Compression
UU - Unconsolidated - Undrained Triaxial
CU - Consolidated - Undrained Triaxial

TYPE OF FAILURE
A - Bulge
B - Single Shear Plane
C - Multiple Shear Plane
D - Vertical Fracture

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

SUMMARY OF TEST RESULTS - BORING B-24

LELAP Lab ID #10001

Orleans Parish, Louisiana

Project No. **04.55184080**

PLATE B1-24

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (PI)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
2	1.0-2.0				78															
3	2.0-3.0				41		70													
4	3.0-4.0	41	18	23	50															
	4.0-5.0								0.34											
6	5.0-6.0	47	21	26	48															
	6.0-7.0								0.24											
8	7.0-8.0				84	51														
	8.0-9.0								0.22											
10	9.0-10.0				57															
	10.0-11.0								0.22											
12	11.0-12.0	66	22	44	57															
	12.0-13.0								0.03											
14	13.0-14.0				35	92														
16	15.0-16.0				28				0.94											
18	17.0-18.0	44	16	28	25				1.36											
19	18.0-19.0				31		91													
20	19.0-20.0				25	80			1.30											
22	21.0-22.0	66	23	43	30															
	22.0-23.0							1.50												
24	23.0-24.0				36			1.50												
26	25.0-26.0				29			0.75												

Notes:

NP = Non-Plastic Material

TYPE OF TEST
U - Unconfined Compression
UU - Unconsolidated - Undrained Triaxial
CU - Consolidated - Undrained Triaxial

TYPE OF FAILURE
A - Bulge
B - Single Shear Plane
C - Multiple Shear Plane
D - Vertical Fracture

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

SUMMARY OF TEST RESULTS - BORING B-25

LELAP Lab ID #10001

Orleans Parish, Louisiana

Project No. **04.55184080**

PLATE B1-25

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (PI)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
1	1.0-2.0	NP	NP	NP	27															
2	3.0-4.0				26															
3	4.5-6.0				37		36													
4	6.5-8.0				33		32													
5	9.0-10.0	NP	NP	NP	29															
6	10.0-11.0				46		71													
6	11.0-12.0				54															
7	13.0-14.0	41	15	26	47															
8	15.0-16.0				25		19													
9	17.0-18.0	29	14	15	22															
10	19.0-20.0				18															
11	21.0-22.0				31															
12	23.0-24.0	46	16	30	22															
12	24.0-25.0				25		75													
13	25.0-26.0				32															

Notes:

NP = Non-Plastic Material

TYPE OF TEST
U - Unconfined Compression
UU - Unconsolidated - Undrained Triaxial
CU - Consolidated - Undrained Triaxial

TYPE OF FAILURE
A - Bulge
B - Single Shear Plane
C - Multiple Shear Plane
D - Vertical Fracture

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

SUMMARY OF TEST RESULTS - BORING B-26

LELAP Lab ID #10001

Orleans Parish, Louisiana

Project No. **04.55184080**

PLATE B1-26

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (PI)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
2	1.0-2.0				78															
4	3.0-4.0	186	62	124	153															
6	5.0-6.0																			
7	6.0-7.0				61		84													
8	7.0-8.0				52															
10	9.0-10.0	47	22	25	52															
12	11.0-12.0				71	56														
14	13.0-14.0				62															
15	14.0-15.0				59		96		0.22											
16	15.0-16.0	77	26	51	76															
18	17.0-18.0				67	61			0.18											
20	19.0-20.0				65				0.20											
22	21.0-22.0	86	28	58	83				0.24											
24	23.0-24.0				65	52			0.32											
26	25.0-26.0				41															

Notes:

NP = Non-Plastic Material

TYPE OF TEST
U - Unconfined Compression
UU - Unconsolidated - Undrained Triaxial
CU - Consolidated - Undrained Triaxial

TYPE OF FAILURE
A - Bulge
B - Single Shear Plane
C - Multiple Shear Plane
D - Vertical Fracture

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

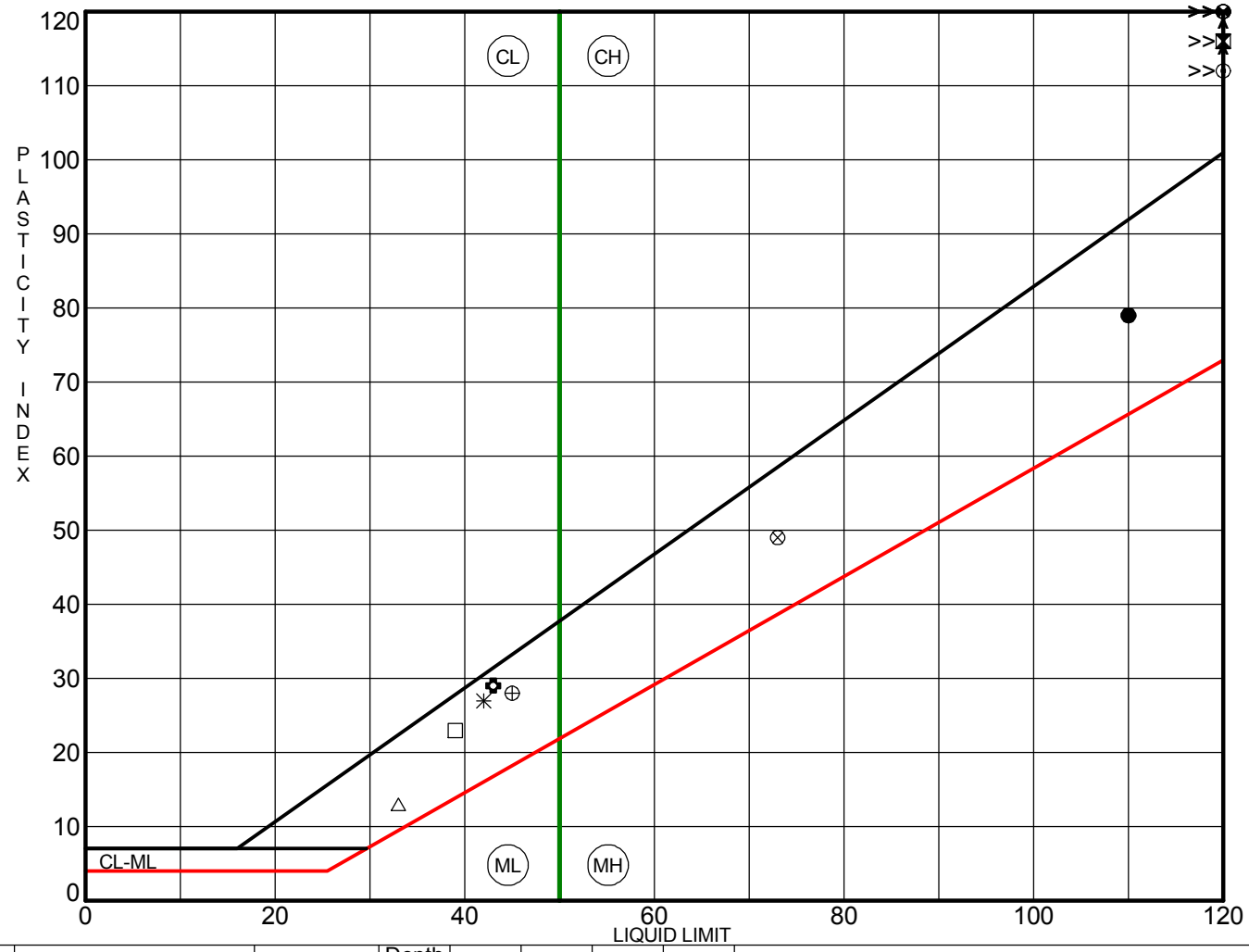
SUMMARY OF TEST RESULTS - BORING B-27

LELAP Lab ID #10001

Orleans Parish, Louisiana

Project No. **04.55184080**

PLATE B1-27



	Sample Source	Sample ID	Depth (ft)	LL	PL	PI	Fines	Visual Classification
●	B-01	2	2.00	110	31	79		CLAY, dark gray, with organics
⊠	B-01	3	5.00	166	50	116		CLAY, dark gray, with organics
✳	B-01	8	16.00	42	15	27		CLAY, gray, with sand pockets
⊗	B-02	2	2.00	415	123	292		CLAY, dark brown
⊙	B-02	4	6.00	150	38	112		CLAY, dark gray
✿	B-02	10	23.00	43	14	29		CLAY, light gray with silt traces
○	B-03	2	2.00	264	65	199		CLAY, dark brown
△	B-03	5	9.00	33	20	13		CLAY, gray, with silt pockets
⊗	B-03	8	15.00	73	24	49		CLAY, light gray
⊕	B-03	10	23.00	45	17	28		CLAY, gray and greenish gray, with silt traces
□	B-03	14	43.00	39	16	23		SILT, gray, with clay pockets
✿	B-04	2	2.00	341	93	248		CLAY, dark brown

Remarks: All tests were performed in general accordance with ASTM Standards D4318, D421, D2217, and D1140. Fines column represent % passing No. 200 sieve.

Note:

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

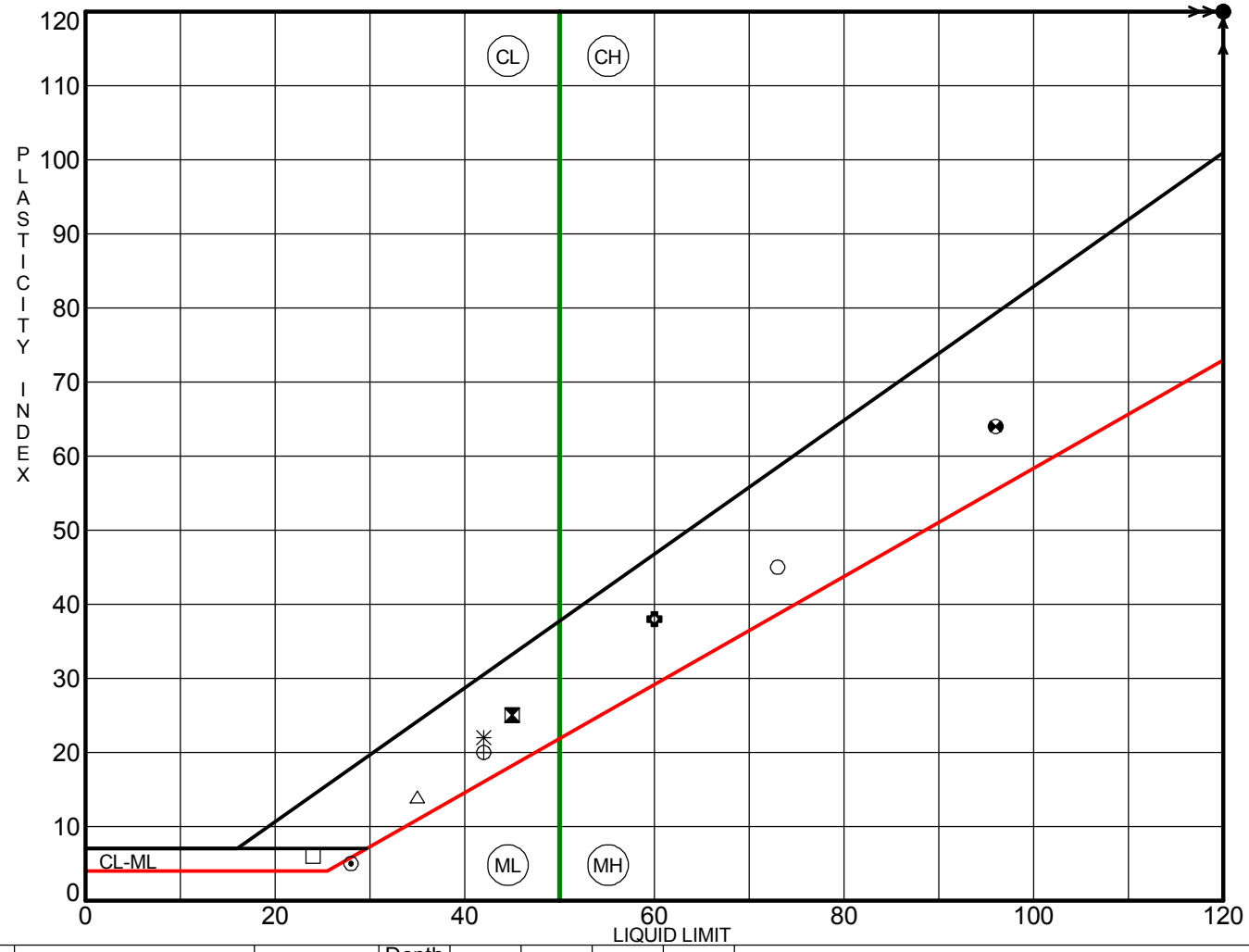
ATTERBERG LIMITS' RESULTS

Orleans Parish, Louisiana

Project No. **04.55184080**

PLATE B2-1

ATTERBERG LIMITS CHART 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 10/01/19



	Sample Source	Sample ID	Depth (ft)	LL	PL	PI	Fines	Visual Classification
●	B-04	4	6.00	165	40	125		CLAY, gray
⊠	B-04	6	11.00	45	20	25		CLAY, light gray, with silt pockets
✳	B-04	10	23.00	42	20	22		CLAY, gray, with silt pockets
⊗	B-05	2	2.00	207	57	150		CLAY, dark brown, with peat
⊙	B-05	3	4.00	28	23	5		CLAY, dark brown, with peat
✿	B-05	6	10.00	60	22	38		CLAY, gray, with sand pockets
○	B-05	10	23.00	73	28	45		CLAY, greenish gray and brown, with slickensides
△	B-05	14	44.00	35	21	14		CLAY, tan and greenish gray, with sand traces
⊗	B-06	2	2.00	235	58	177		CLAY, dark brown, with peat layers
⊕	B-06	3	5.00	42	22	20		CLAY, gray, with silt pockets and seams
□	B-06	8	14.00	24	18	6		CLAY, gray, with sand pockets
⊛	B-06	13	38.00	96	32	64		CLAY, tan and greenish gray, with silt and sand

Remarks: All tests were performed in general accordance with ASTM Standards D4318, D421, D2217, and D1140. Fines column represent % passing No. 200 sieve.

Note:

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

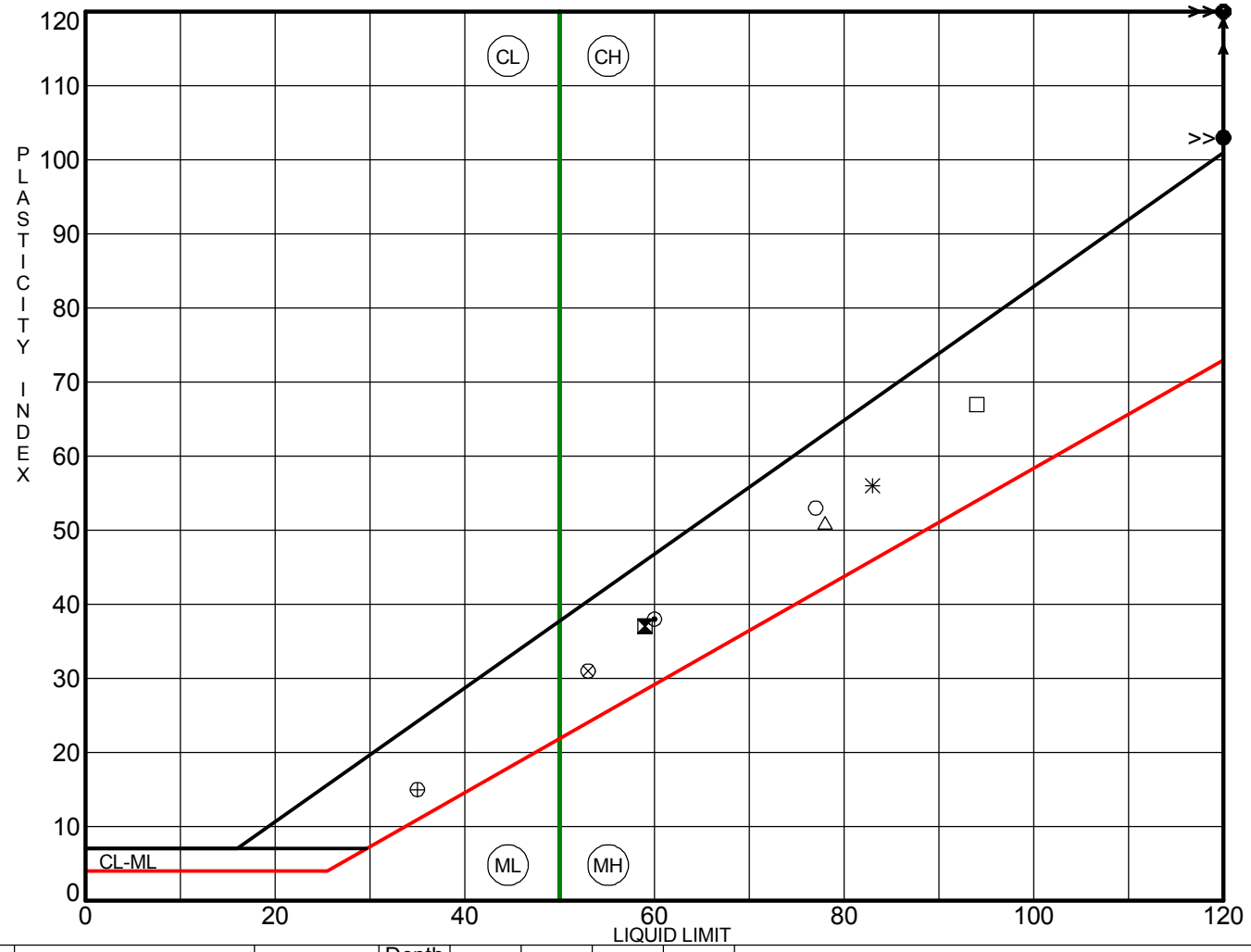
ATTERBERG LIMITS' RESULTS

Orleans Parish, Louisiana

Project No. **04.55184080**

PLATE B2-2

ATTERBERG LIMITS CHART 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 10/01/19



	Sample Source	Sample ID	Depth (ft)	LL	PL	PI	Fines	Visual Classification
●	**B-07**	**4**	**6.00**	**140**	**37**	**103**		CLAY, dark brown, with peat
⊠	**B-07**	**6**	**11.00**	**59**	**22**	**37**		CLAY, gray, with silt partings
✳	**B-08**	**2**	**2.00**	**83**	**27**	**56**		CLAY, dark gray, with organics
⊗	**B-08**	**4**	**6.00**	**53**	**22**	**31**		CLAY, gray, with organics and sand
⊙	**B-08**	**11**	**29.00**	**60**	**22**	**38**		CLAY, greenish gray, with sand
✿	**B-09**	**3**	**4.00**	**201**	**44**	**157**		CLAY, dark brown, with peat and organics
○	**B-09**	**7**	**12.00**	**77**	**24**	**53**	**99.5**	CLAY, gray, with silt and sand seams
△	**B-09**	**11**	**28.00**	**78**	**27**	**51**		CLAY, gray, with sand traces
⊗	**B-10**	**2**	**3.00**	**349**	**81**	**268**		CLAY, dark brown, with peat
⊕	**B-10**	**5**	**8.00**	**35**	**20**	**15**		CLAY, gray, with sand traces
□	**B-11**	**3**	**4.00**	**94**	**27**	**67**		CLAY, dark gray, with peat
❁	**B-11**	**5**	**8.00**	**299**	**77**	**222**		CLAY, dark gray, with peat

Remarks: All tests were performed in general accordance with ASTM Standards D4318, D421, D2217, and D1140. Fines column represent % passing No. 200 sieve.

Note:

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

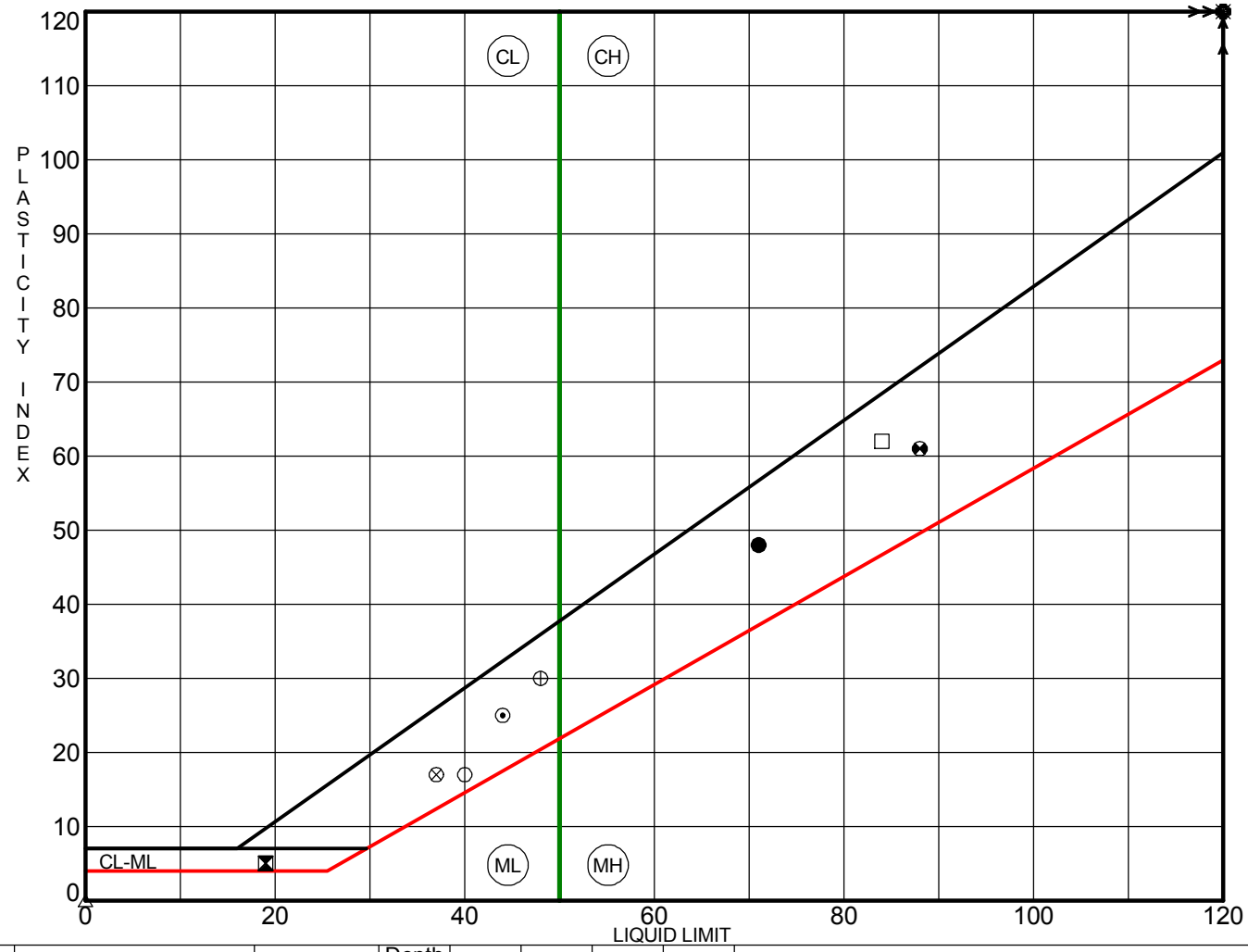
ATTERBERG LIMITS' RESULTS

Orleans Parish, Louisiana

Project No. **04.55184080**

PLATE B2-3

ATTERBERG LIMITS CHART 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 10/01/19



	Sample Source	Sample ID	Depth (ft)	LL	PL	PI	Fines	Visual Classification
●	**B-11**	**7**	**12.00**	**71**	**23**	**48**		CLAY, gray
⊠	**B-11**	**12**	**33.00**	**19**	**14**	**5**		CLAY, gray, with sand pockets and shell fragments
✳	**B-12**	**3**	**4.00**	**235**	**69**	**166**		CLAY, black, with peat
⊗	**B-12**	**5**	**9.00**	**37**	**20**	**17**		CLAY, light gray
⊙	**B-12**	**13**	**38.00**	**44**	**19**	**25**		CLAY, light gray, with sand and silt partings
✿	**B-13**	**2**	**2.00**	**409**	**164**	**245**		CLAY, dark brown, with peat
○	**B-13**	**5**	**8.00**	**40**	**23**	**17**		CLAY, dark brown
△	**B-13**	**8**	**15.00**	**NP**	**NP**	**NP**		NON PLASTIC
⊗	**B-14**	**2**	**2.00**	**408**	**132**	**276**		CLAY, dark brown, with peat
⊕	**B-14**	**11**	**28.00**	**48**	**18**	**30**		CLAY, gray, with sand and silt partings
□	**B-15**	**2**	**2.00**	**84**	**22**	**62**		CLAY, dark bromn
☢	**B-15**	**4**	**7.00**	**88**	**27**	**61**		CLAY, gray, with sand partings and organics

Remarks: All tests were performed in general accordance with ASTM Standards D4318, D421, D2217, and D1140. Fines column represent % passing No. 200 sieve.

Note:

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

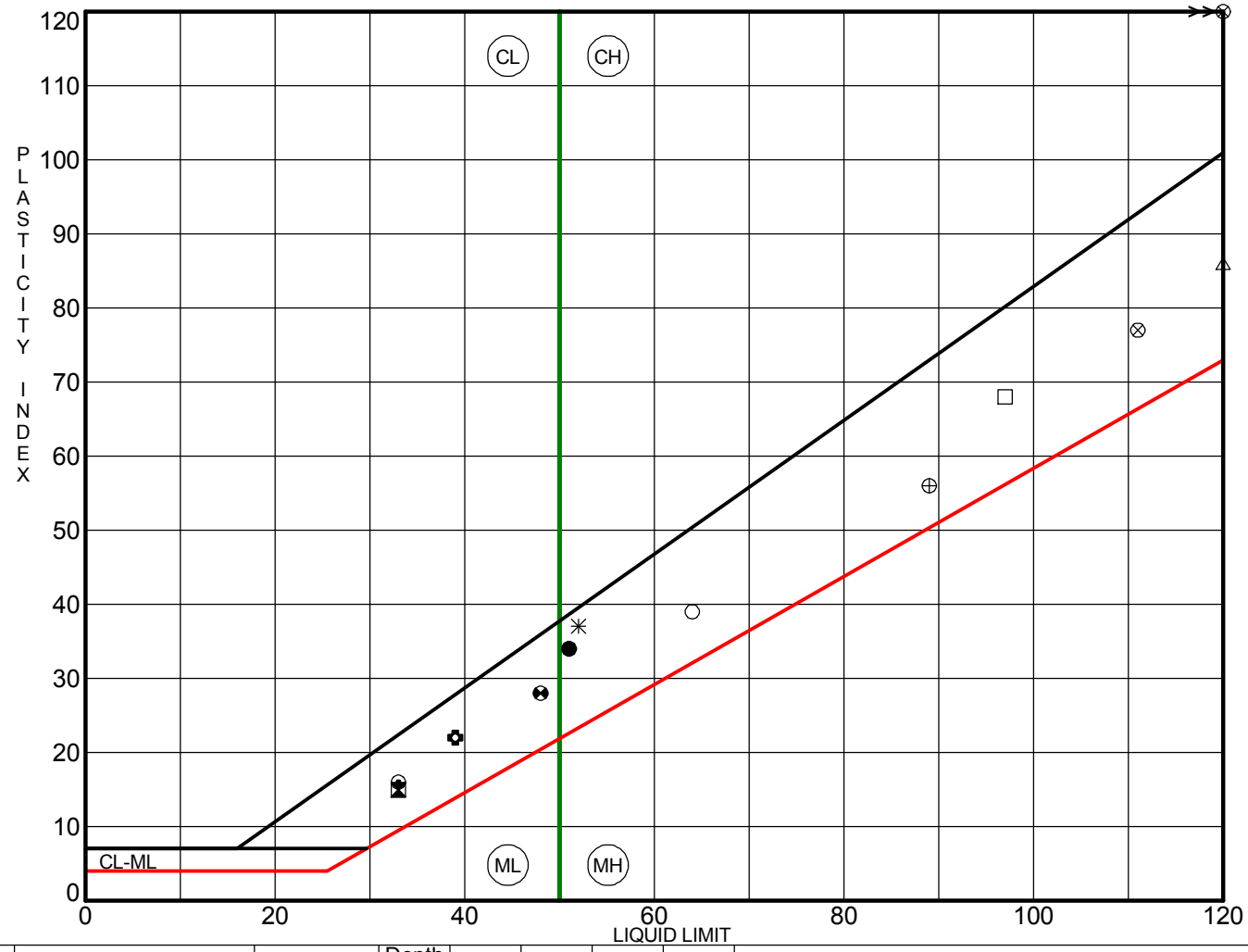
ATTERBERG LIMITS' RESULTS

Orleans Parish, Louisiana

Project No. **04.55184080**

PLATE B2-4

ATTERBERG LIMITS CHART 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 10/01/19



	Sample Source	Sample ID	Depth (ft)	LL	PL	PI	Fines	Visual Classification
●	**B-15**	**11**	**33.00**	**51**	**17**	**34**		CLAY, gray, with shell fragments
⊠	**B-16**	**3**	**4.00**	**33**	**18**	**15**		CLAY, dark brown and gray
✳	**B-16**	**8**	**14.00**	**52**	**15**	**37**		CLAY, greenish gray, with shell fragments and sand pockets
⊗	**B-17**	**3**	**5.00**	**155**	**35**	**120**		CLAY, dark brown
⊙	**B-17**	**6**	**10.00**	**33**	**17**	**16**		CLAY, dark gray
✿	**B-17**	**10**	**23.00**	**39**	**17**	**22**		CLAY, gray, with shell fragments
○	**B-18**	**2**	**2.00**	**64**	**25**	**39**		FAT CLAY
△	**B-18**	**5**	**9.00**	**120**	**34**	**86**		ORGANIC CLAY
⊗	**B-18**	**8**	**14.00**	**111**	**34**	**77**		ORGANIC CLAY
⊕	**B-18**	**12**	**33.00**	**89**	**33**	**56**		FAT CLAY, tan and light gray
□	**B-19**	**2**	**2.00**	**97**	**29**	**68**		FAT CLAY
⊛	**B-19**	**4**	**7.00**	**48**	**20**	**28**		LEAN CLAY

Remarks: All tests were performed in general accordance with ASTM Standards D4318, D421, D2217, and D1140. Fines column represent % passing No. 200 sieve.

Note:

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

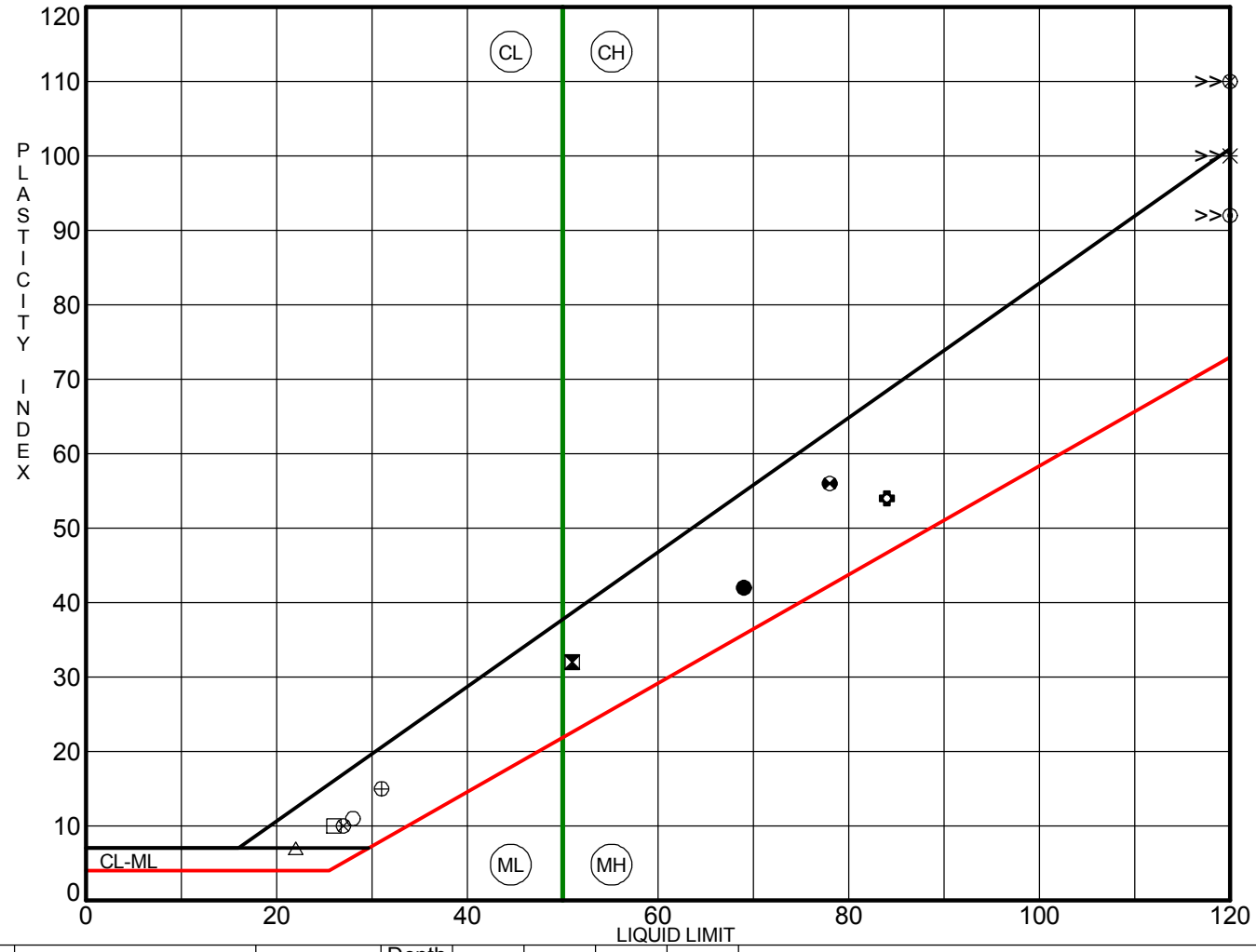
ATTERBERG LIMITS' RESULTS

Orleans Parish, Louisiana

Project No. **04.55184080**

PLATE B2-5

ATTERBERG LIMITS CHART 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 10/01/19



	Sample Source	Sample ID	Depth (ft)	LL	PL	PI	Fines	Visual Classification
●	**B-19**	**7**	**13.00**	**69**	**27**	**42**		FAT CLAY
⊠	**B-19**	**13**	**38.00**	**51**	**19**	**32**		FAT CLAY
✳	**B-20**	**2**	**2.00**	**133**	**33**	**100**		ORGANIC CLAY
⊗	**B-20**	**5**	**8.00**	**148**	**38**	**110**		ORGANIC CLAY
⊙	**B-20**	**8**	**14.00**	**128**	**36**	**92**		ORGANIC CLAY
✿	**B-20**	**12**	**33.00**	**84**	**30**	**54**		FAT CLAY, light gray and brown, with silt pockets
○	**B-21**	**3**	**2.00**	**28**	**17**	**11**		LEAN CLAY, dark gray, with silt pockets
△	**B-21**	**7**	**6.00**	**22**	**15**	**7**		SILTY CLAY (CL-ML), dark gray
⊗	**B-21**	**11**	**10.00**	**27**	**17**	**10**		LEAN CLAY, dark gray, with silt pockets
⊕	**B-21**	**15**	**14.00**	**31**	**16**	**15**		LEAN CLAY, dark gray, with silt pockets and shells
□	**B-21**	**21**	**20.00**	**26**	**16**	**10**		LEAN CLAY, dark gray, with silt pockets and shells
✿	**B-22**	**2**	**1.00**	**78**	**22**	**56**		FAT CLAY, dark gray, with silt pockets

Remarks: All tests were performed in general accordance with ASTM Standards D4318, D421, D2217, and D1140. Fines column represent % passing No. 200 sieve.

Note:

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

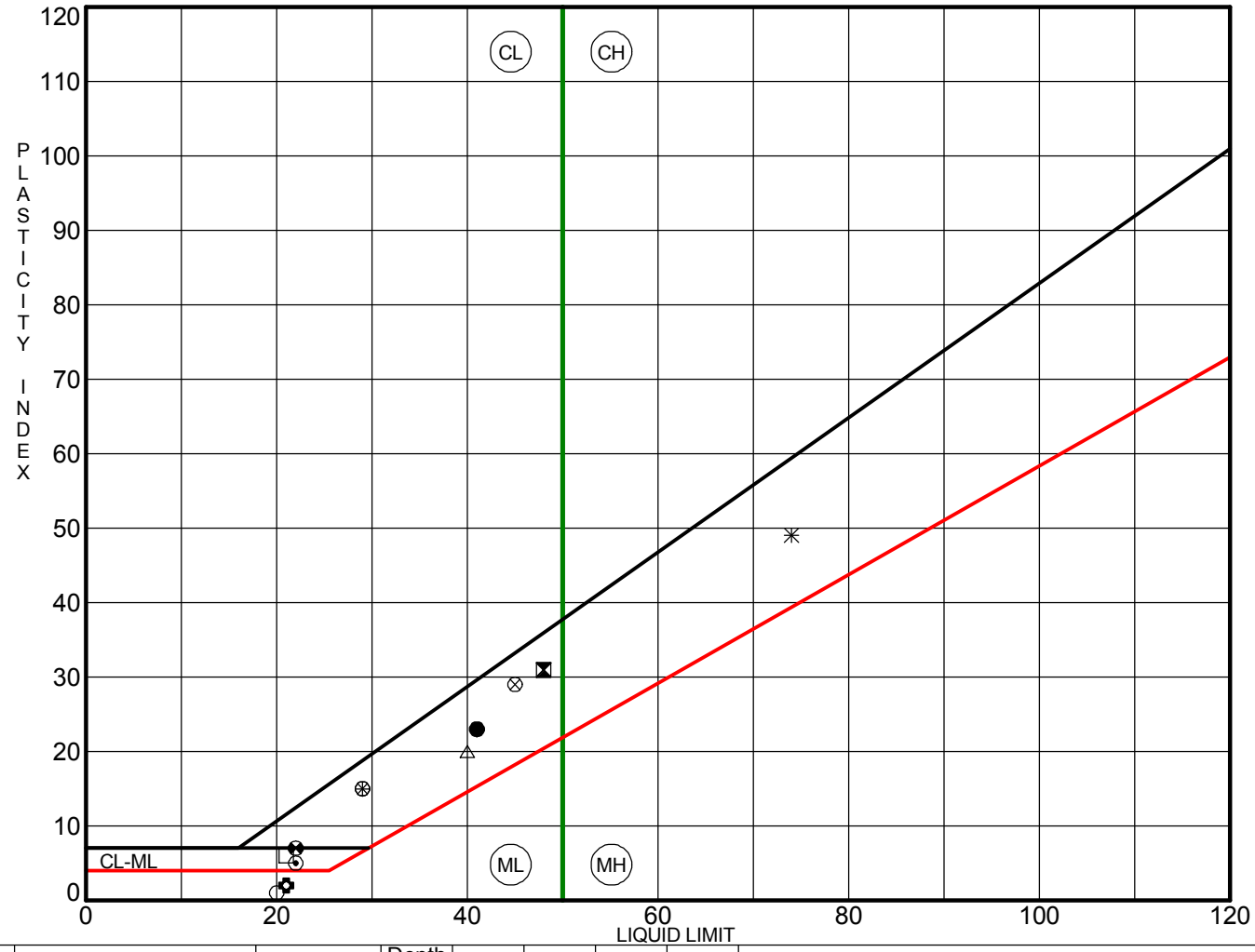
ATTERBERG LIMITS' RESULTS

Orleans Parish, Louisiana

Project No. **04.55184080**

PLATE B2-6

ATTERBERG LIMITS CHART 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 10/01/19



	Sample Source	Sample ID	Depth (ft)	LL	PL	PI	Fines	Visual Classification
●	B-22	10	9.00	41	18	23		LEAN CLAY, dark gray, with silt pockets
⊠	B-22	14	13.00	48	17	31		LEAN CLAY, dark gray, with silt pockets
✳	B-22	18	17.00	74	25	49		FAT CLAY, gray, with silt traces
⊗	B-22	24	23.00	45	16	29		LEAN CLAY, light gray and tan, with silt pockets
⊙	B-23	4	3.00	22	17	5		SILTY CLAY, dark gray
✿	B-23	8	7.00	21	19	2		SILT, dark gray, with clay pockets
○	B-23	12	11.00	20	19	1		SILT, dark gray, with clay pockets and shells
△	B-23	16	15.00	40	20	20		LEAN CLAY, dark gray, with sand traces
⊗	B-23	22	21.00	29	14	15	39.9	CLAYEY SAND (SC), gray, with shell fragments
⊕	B-24	2	1.00	29	14	15		LEAN CLAY, dark gray, with silt pockets and shells
□	B-24	10	9.00	21	15	6		SILTY CLAY dark gray, with shell fragments
❀	B-24	14	13.00	22	15	7		SILTY CLAY, dark gray, with sand pockets

Remarks: All tests were performed in general accordance with ASTM Standards D4318, D421, D2217, and D1140. Fines column represent % passing No. 200 sieve.

Note:

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St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

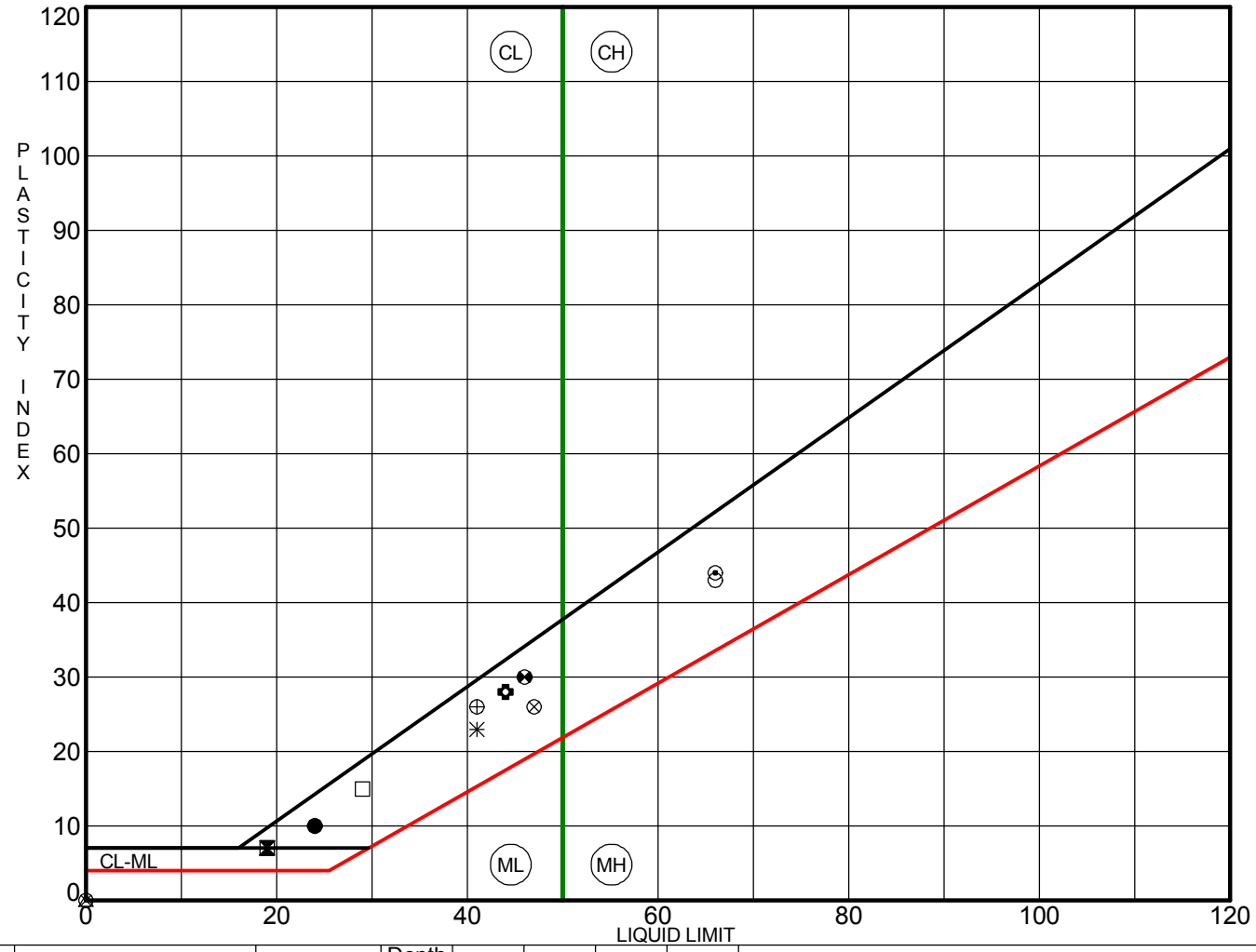
ATTERBERG LIMITS' RESULTS

Orleans Parish, Louisiana

Project No. **04.55184080**

PLATE B2-7

ATTERBERG LIMITS CHART 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 10/01/19



	Sample Source	Sample ID	Depth (ft)	LL	PL	PI	Fines	Visual Classification
●	B-24	20	19.00	24	14	10		LEAN CLAY, dark gray, with silt pockets and shells
⊠	B-24	26	25.00	19	12	7		SILTY CLAY, dark gray, with silt pockets
✳	B-25	4	3.00	41	18	23		LEAN CLAY, dark gray, with silt pockets
⊗	B-25	6	5.00	47	21	26		LEAN CLAY, gray, with silt pockets
⊙	B-25	12	11.00	66	22	44		FAT CLAY, light gray, with silt pockets
✿	B-25	18	17.00	44	16	28		LEAN CLAY, light gray and light brown, with silt pockets
○	B-25	22	21.00	66	23	43		FAT CLAY, yellowish red and light gray, with silt and sand pockets
△	B-26	1	1.00	NP	NP	NP		SILTY SAND, dark gray
⊗	B-26	5	9.00	NP	NP	NP		SILTY SAND, dark gray, with clay pockets
⊕	B-26	7	13.00	41	15	26		LEAN CLAY, dark gray, with sand and silt pockets
□	B-26	9	17.00	29	14	15		LEAN CLAY, light gray and tan, with silt pockets
⊛	B-26	12	23.00	46	16	30		LEAN CLAY, light gray and greenish gray, with silt pockets

Remarks: All tests were performed in general accordance with ASTM Standards D4318, D421, D2217, and D1140. Fines column represent % passing No. 200 sieve.

Note:

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St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

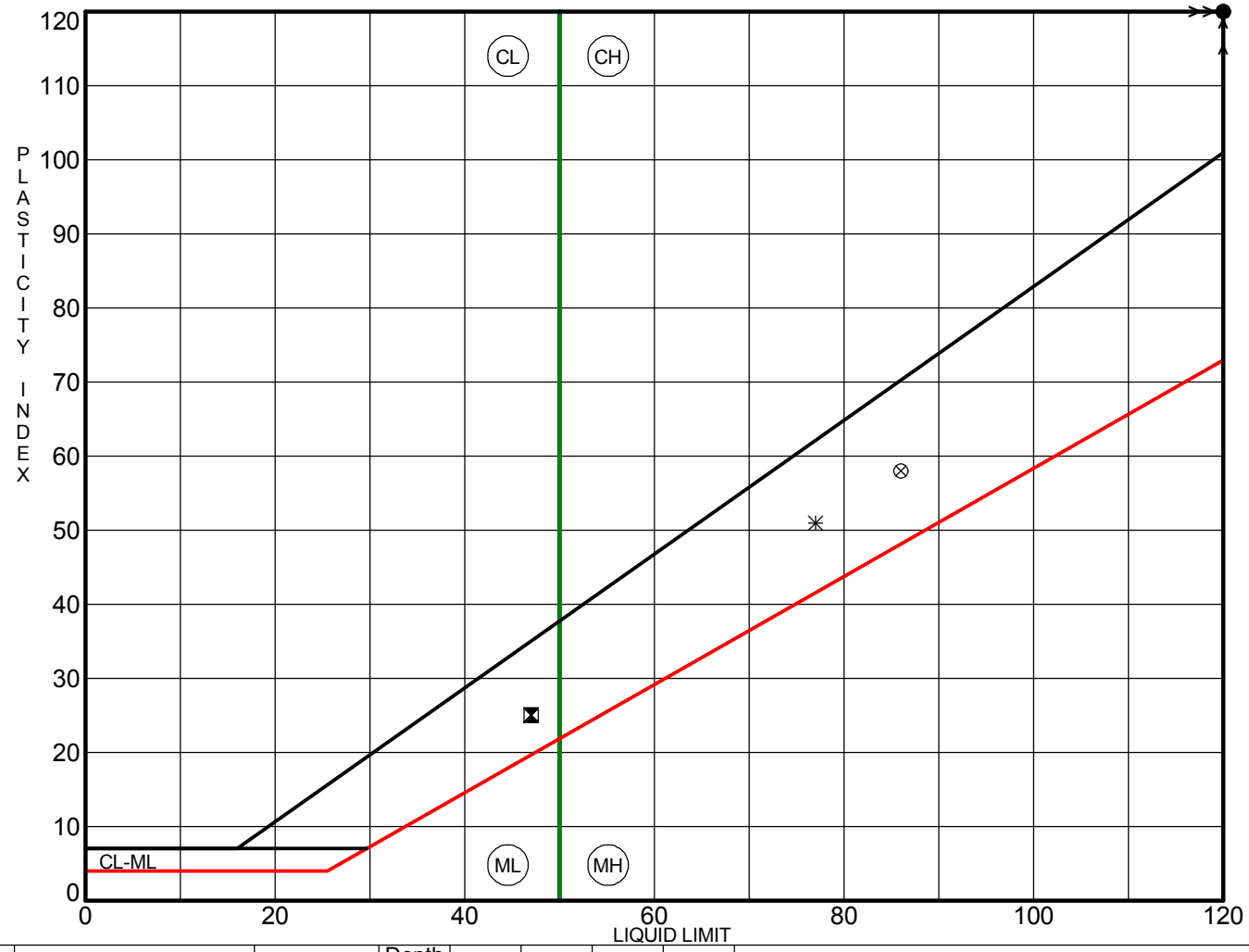
ATTERBERG LIMITS' RESULTS

Orleans Parish, Louisiana

Project No. **04.55184080**

PLATE B2-8

ATTERBERG LIMITS CHART 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 10/01/19



	Sample Source	Sample ID	Depth (ft)	LL	PL	PI	Fines	Visual Classification
●	**B-27**	**4**	**3.00**	**186**	**62**	**124**		ORGANIC CLAY, dark gray, with peat and silt traces
⊠	**B-27**	**10**	**9.00**	**47**	**22**	**25**		LEAN CLAY, dark and light gray, with silt and sand pockets
✳	**B-27**	**16**	**15.00**	**77**	**26**	**51**		FAT CLAY, light gray, with silt traces
⊗	**B-27**	**22**	**21.00**	**86**	**28**	**58**		FAT CLAY, light gray

Remarks: All tests were performed in general accordance with ASTM Standards D4318, D421, D2217, and D1140. Fines column represent % passing No. 200 sieve.

Note:

FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

ATTERBERG LIMITS' RESULTS

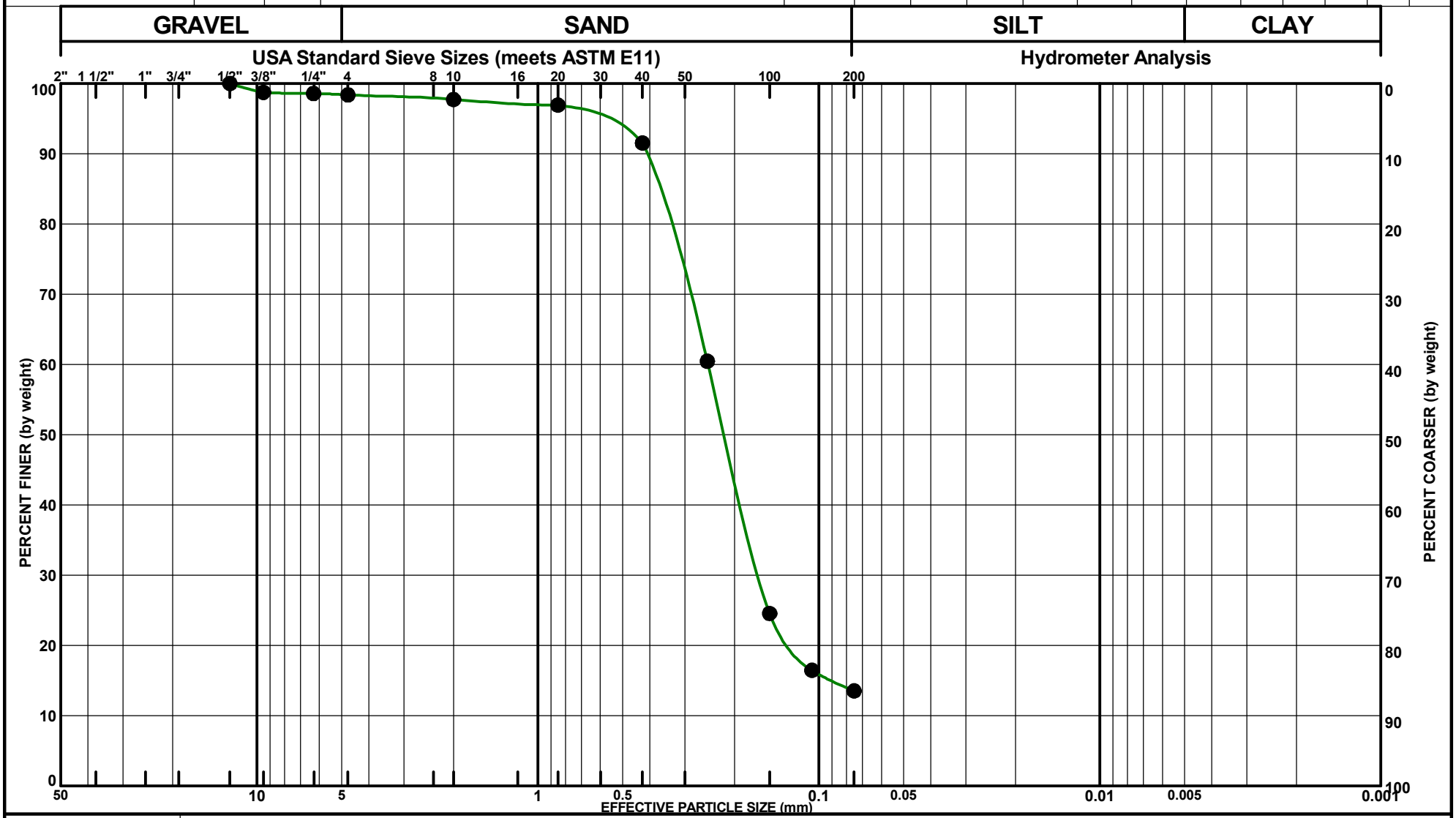
Orleans Parish, Louisiana

Project No. **04.55184080**

PLATE B2-9

ATTERBERG LIMITS CHART 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 10/01/19

Boring Number	Sample Number	Depth (ft)	Material Description	%Gravel	%Sand	%Silt	%Clay	D100	D60	D30	D10	Cc	Cu	LL	PL	PI
● B-01	9	18-19	SILTY SAND (SM)	1.6	84.9			12.5	0.248	0.162						
■																
▲																



FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

Orleans Parish, Louisiana

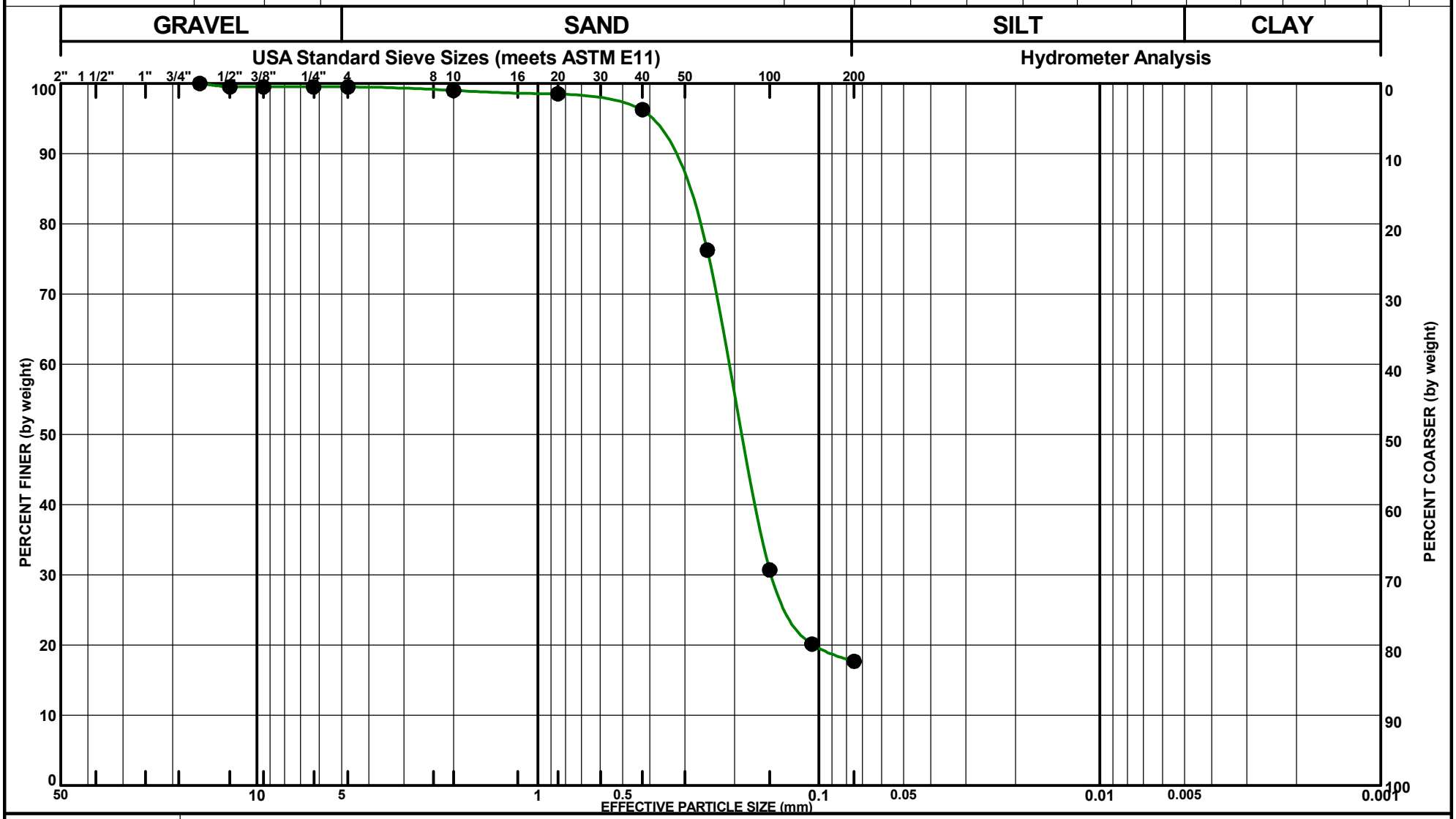
PARTICLE-SIZE ANALYSIS

ASTM D422/D6913/C136

Tested By:	Date Tested:	Reviewed By:	Date Reviewed:	Project No.	
Allen Bentley	3/14/2019			04.55184080	PLATE B3-1

FCBR GSA LANDSCAPE 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 03/30/20

Boring Number	Sample Number	Depth (ft)	Material Description	%Gravel	%Sand	%Silt	%Clay	D100	D60	D30	D10	Cc	Cu	LL	PL	PI
● B-02	7	12-13.5	SILTY SAND, light gray, with shell fragments	0.5	81.8			16	0.208	0.147						
■																
▲																



FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

Orleans Parish, Louisiana

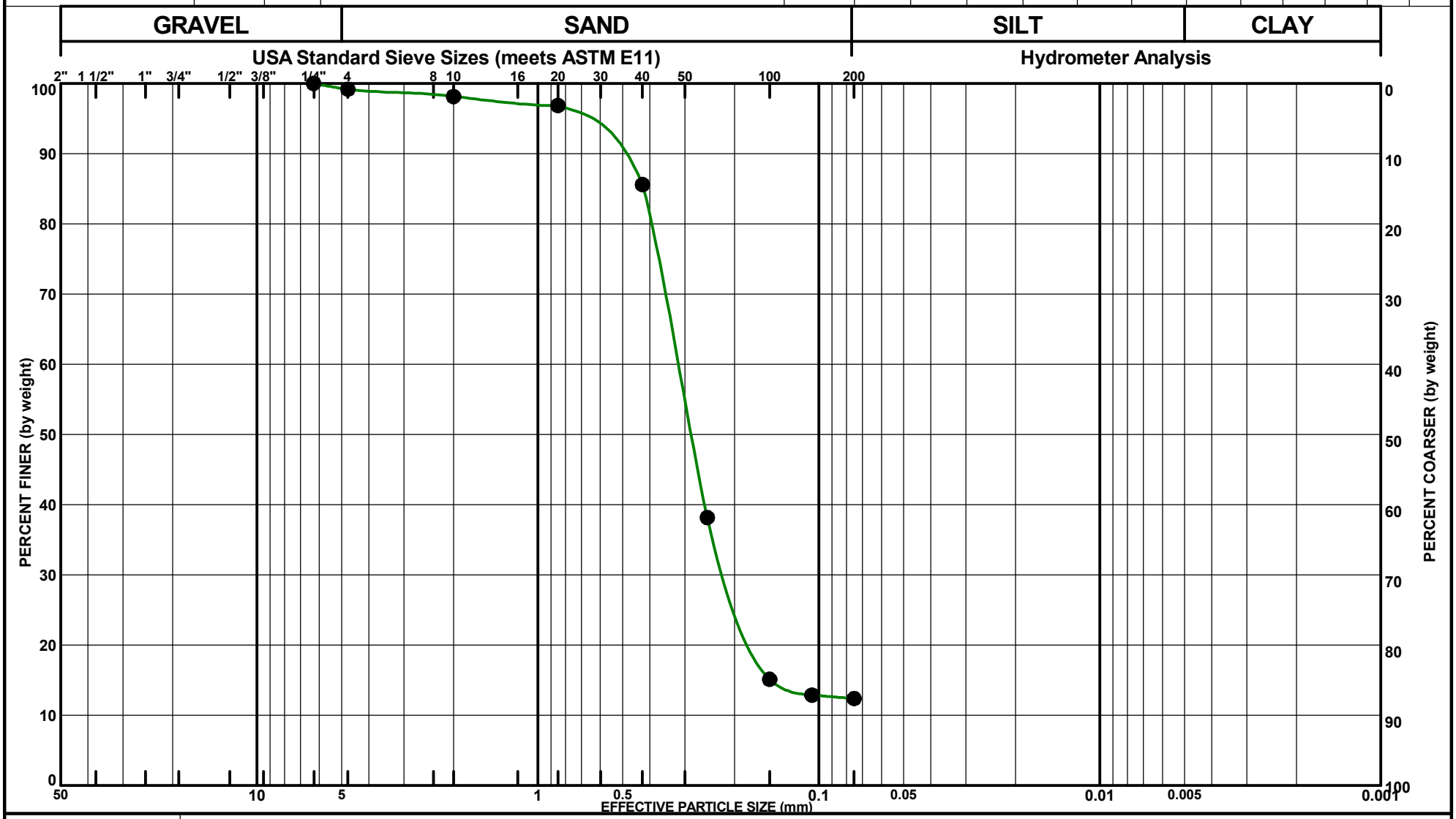
PARTICLE-SIZE ANALYSIS

ASTM D422/D6913/C136

Tested By:	Date Tested:	Reviewed By:	Date Reviewed:	Project No.	
Allen Bentley	1/11/1900			04.55184080	PLATE B3-2

FCBR GSA LANDSCAPE 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 03/30/20

Boring Number	Sample Number	Depth (ft)	Material Description	%Gravel	%Sand	%Silt	%Clay	D100	D60	D30	D10	Cc	Cu	LL	PL	PI
● B-11	11	28-29.5	SILTY SAND (SM), gray, with shell fragments	0.8	86.8			6.3	0.319	0.209						
■																
▲																



FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

Orleans Parish, Louisiana

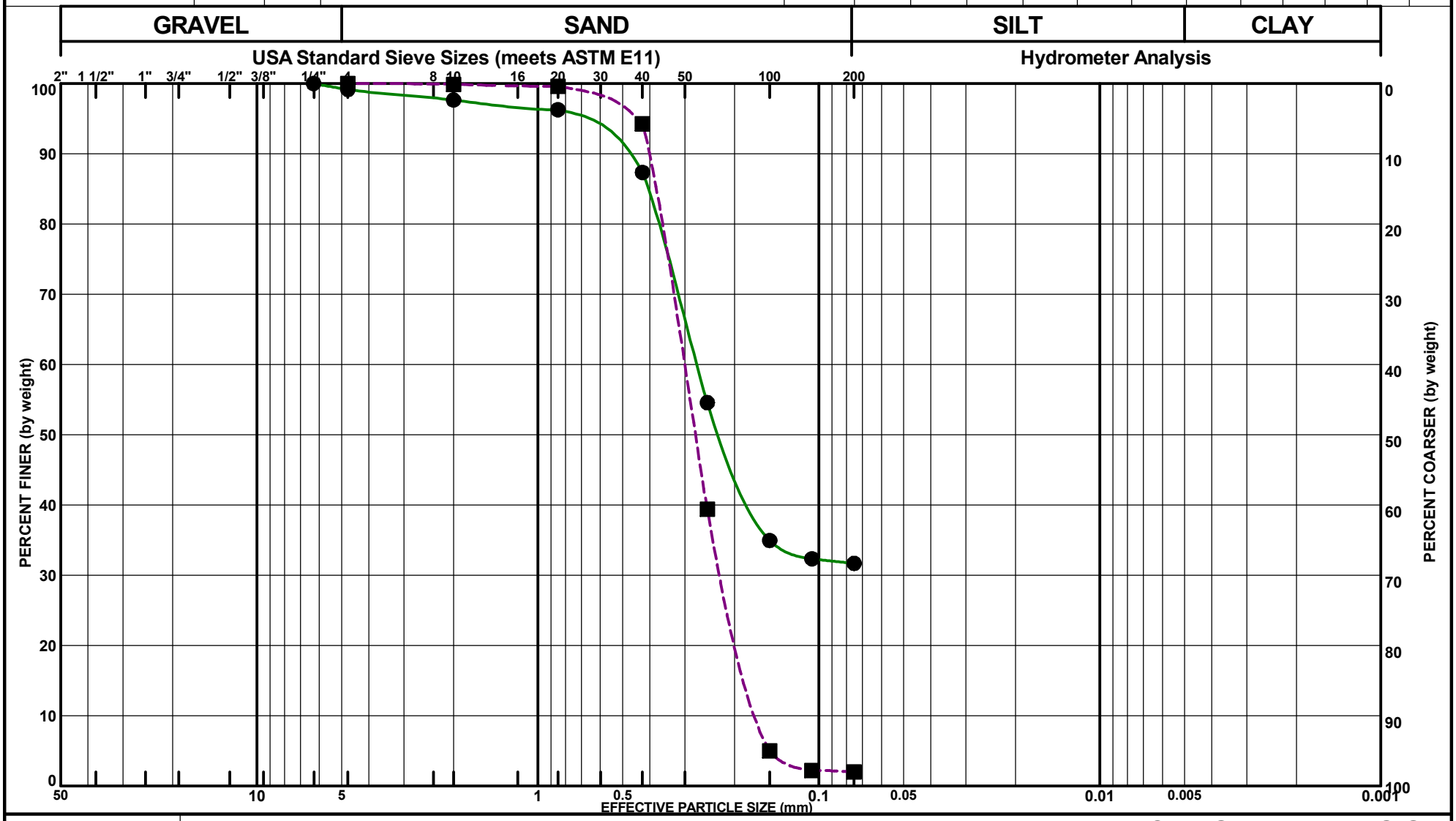
PARTICLE-SIZE ANALYSIS

ASTM D422/D6913/C136

Tested By:	Date Tested:	Reviewed By:	Date Reviewed:	Project No.	
Shamira Serf	4/15/2019			04.55184080	PLATE B3-3

FCBR GSA LANDSCAPE 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 03/30/20

Boring Number	Sample Number	Depth (ft)	Material Description	%Gravel	%Sand	%Silt	%Clay	D100	D60	D30	D10	Cc	Cu	LL	PL	PI
● B-12	9	18-19.5	SILTY SAND, gray, with shell fragments	0.8	67.5			6.3	0.273							
■ B-12	12	33-34.5	POORLY GRADED SAND (SP), gray, with shell fragments	0.0	98.0			4.75	0.305	0.218	0.162	0.96	1.89			
▲																



FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

Orleans Parish, Louisiana

PARTICLE-SIZE ANALYSIS

ASTM D422/D6913/C136

Tested By:	Date Tested:	Reviewed By:	Date Reviewed:	Project No.	
Shamira Serf	4/15/2019			04.55184080	PLATE B3-4

FCBR GSA LANDSCAPE 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 03/30/20

Boring Number	Sample Number	Depth (ft)	Material Description	%Gravel	%Sand	%Silt	%Clay	D100	D60	D30	D10	Cc	Cu	LL	PL	PI
● B-14	7	12-13	SANDY FAT CLAY, gray	0.0	30.5			0.85								
■ B-14	9	20-21.5	SILTY SAND (SM), brown, with shell fragments	0.9	87.6			6.3	0.227	0.159						
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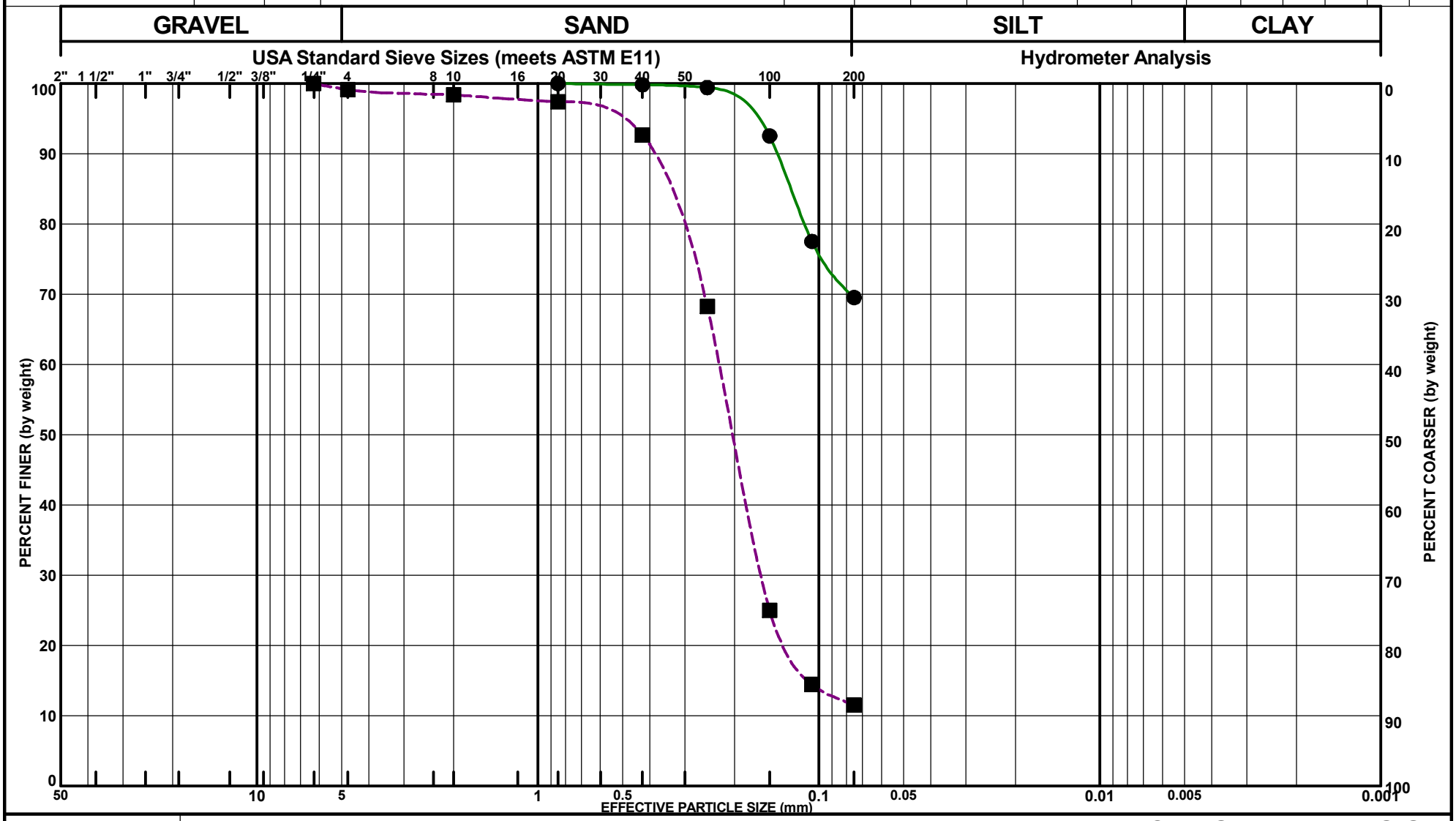


FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

Orleans Parish, Louisiana

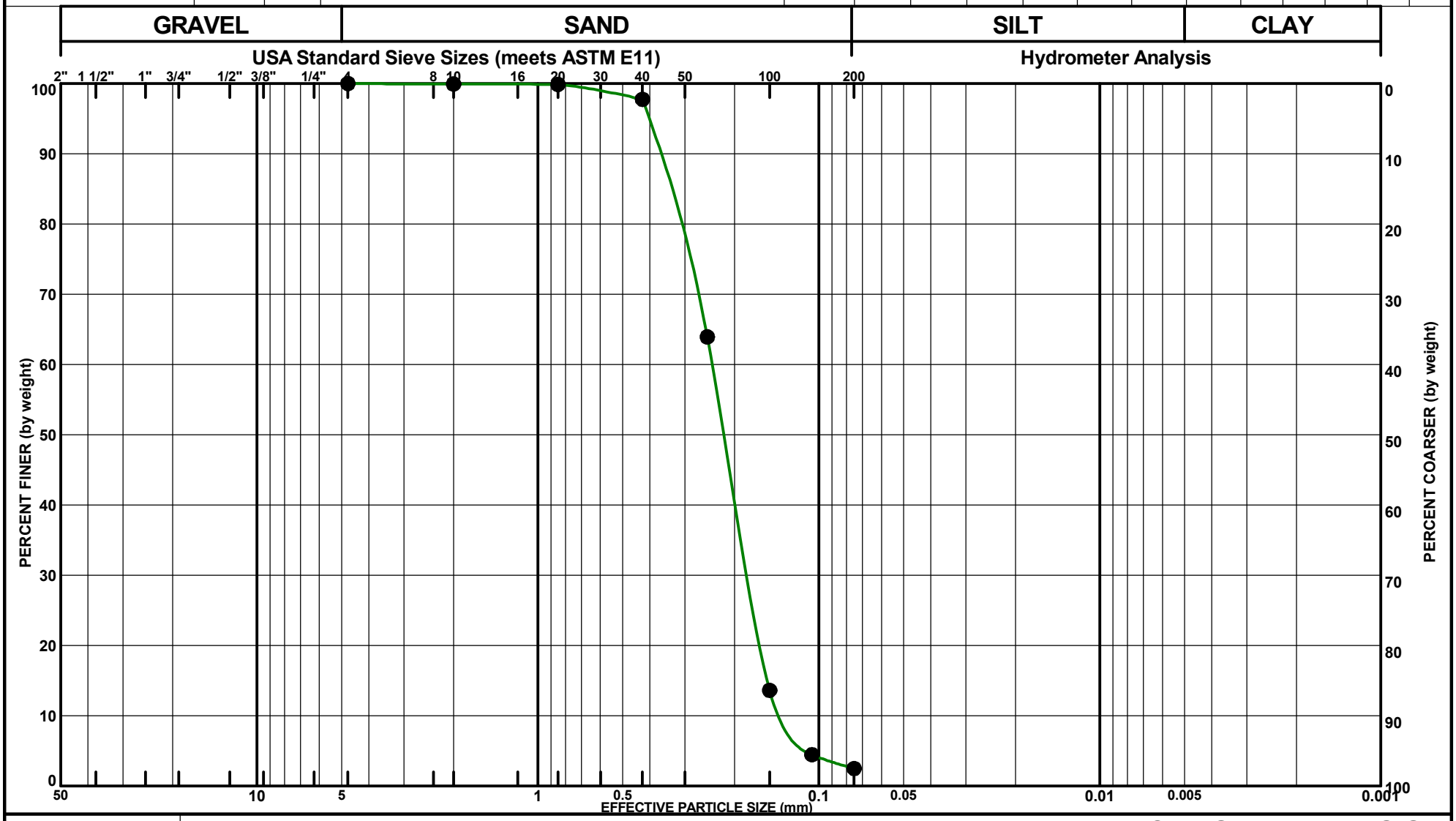
PARTICLE-SIZE ANALYSIS

ASTM D422/D6913/C136

Tested By:	Date Tested:	Reviewed By:	Date Reviewed:	Project No.	
Shamira Serf	4/15/2019			04.55184080	PLATE B3-5

FCBR GSA LANDSCAPE 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 03/30/20

Boring Number	Sample Number	Depth (ft)	Material Description	%Gravel	%Sand	%Silt	%Clay	D100	D60	D30	D10	Cc	Cu	LL	PL	PI
● B-15	6	12-13.5	POORLY GRADED SAND (SP), light gray	0.0	97.5			4.75	0.24	0.177	0.131	1.00	1.84			
■																
▲																



FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

Orleans Parish, Louisiana

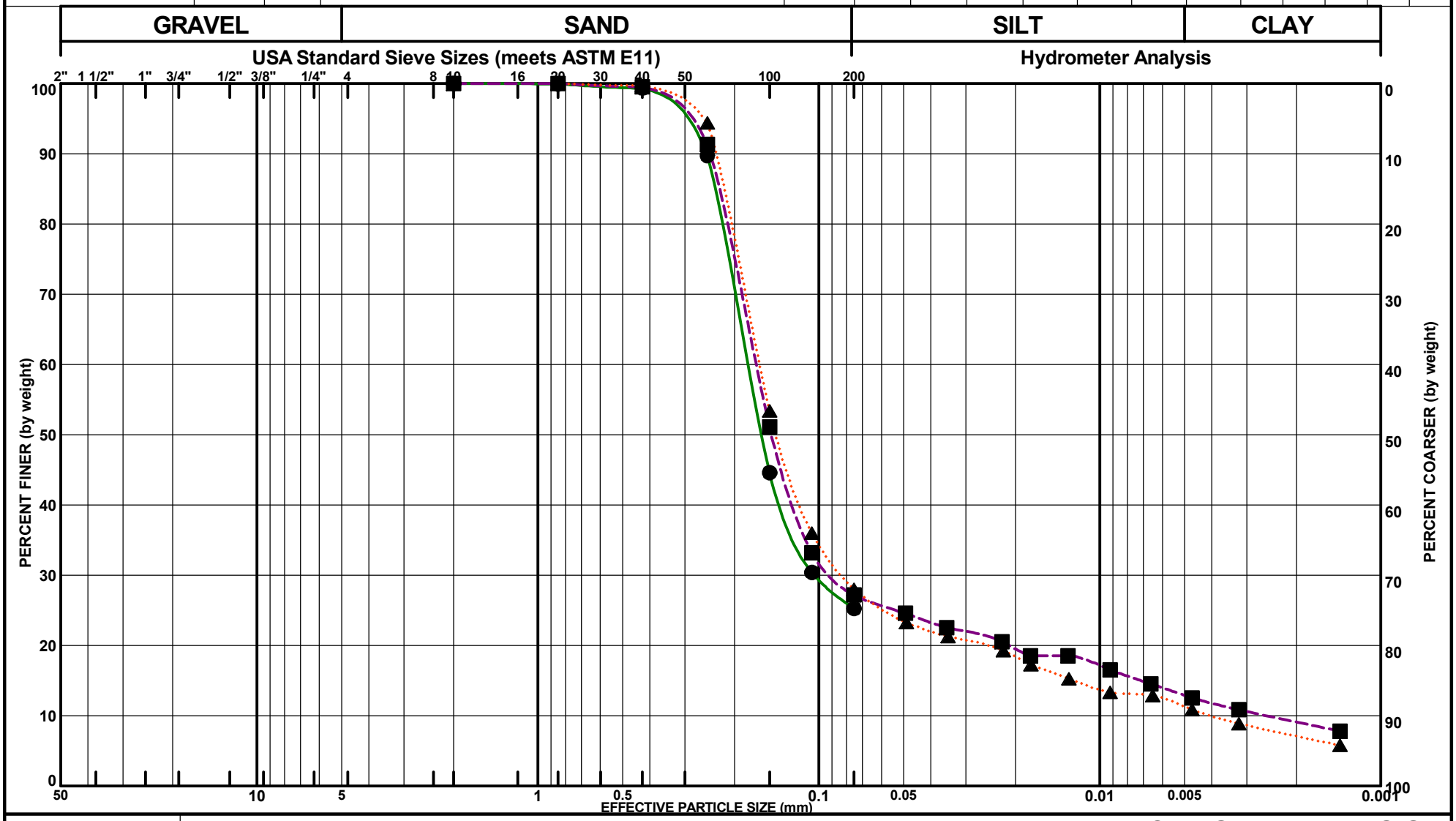
PARTICLE-SIZE ANALYSIS

ASTM D422/D6913/C136

Tested By:	Date Tested:	Reviewed By:	Date Reviewed:	Project No.	
Shamira Serf	4/15/2019			04.55184080	PLATE B3-6

FCBR GSA LANDSCAPE 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 03/30/20

Boring Number	Sample Number	Depth (ft)	Material Description	%Gravel	%Sand	%Silt	%Clay	D100	D60	D30	D10	Cc	Cu	LL	PL	PI
● B-21	2	1-2	CLAYEY SAND, dark gray	0.0	74.7			2	0.179	0.103						
■ B-21	4	3-4	CLAYEY SAND, dark gray, with shell fragments	0.0	72.8	14.3	12.9	2	0.168	0.088	0.003	18.26	66.33			
▲ B-21	14	13-14	CLAYEY SAND, gray	0.0	72.0	16.8	11.3	0.85	0.163	0.082	0.004	10.34	41.09			



FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

Orleans Parish, Louisiana

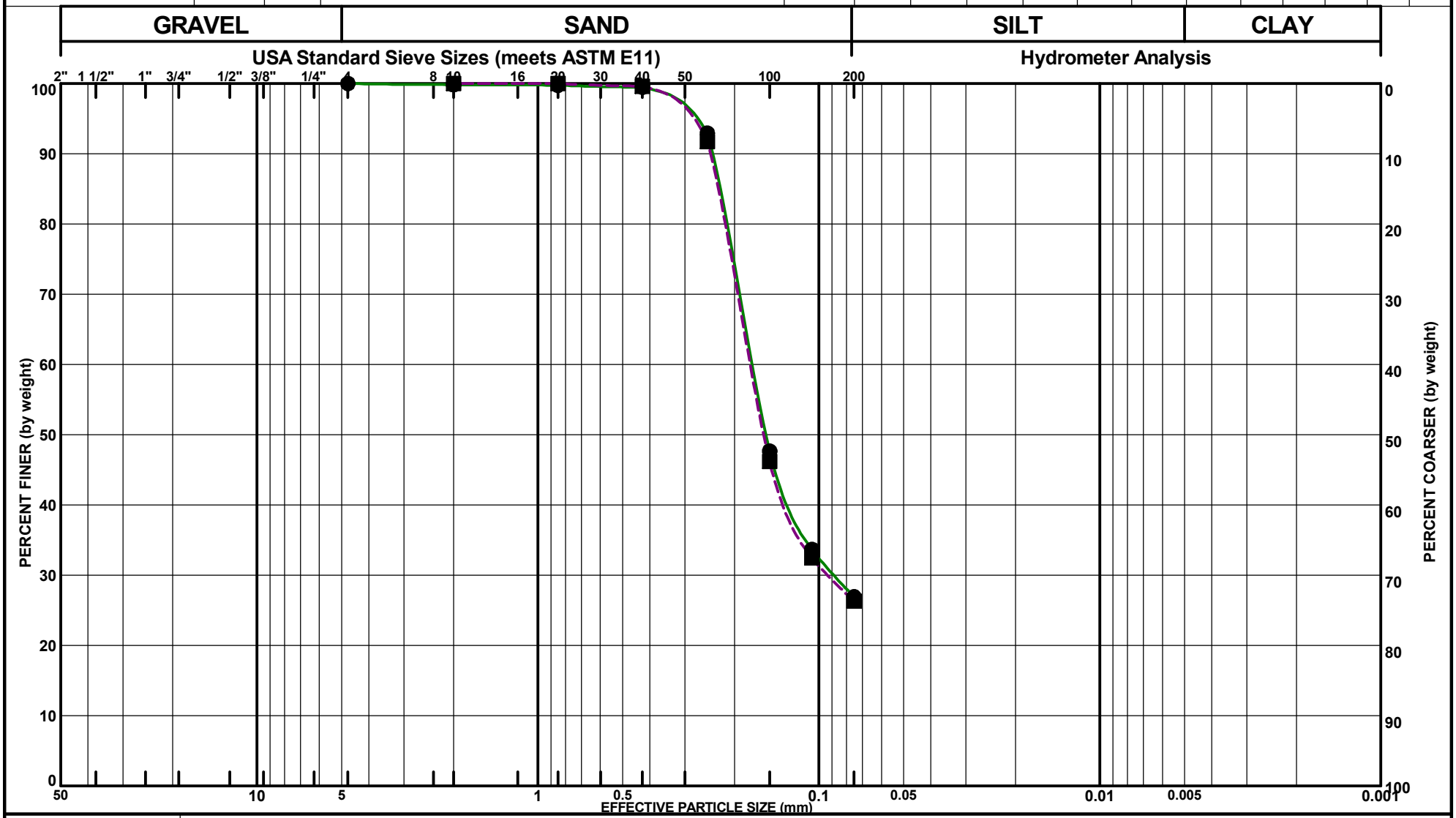
PARTICLE-SIZE ANALYSIS

ASTM D422/D6913/C136

Tested By:	Date Tested:	Reviewed By:	Date Reviewed:	Project No.	
Allen Bentley	9/4/2019			04.55184080	PLATE B3-7

FCBR GSA LANDSCAPE 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 03/30/20

Boring Number	Sample Number	Depth (ft)	Material Description	%Gravel	%Sand	%Silt	%Clay	D100	D60	D30	D10	Cc	Cu	LL	PL	PI
● B-21	17	16-17	CLAYEY SAND, dark gray, with shell fragments	0.0	73.1			4.75	0.172	0.088						
■ B-21		25-26	CLAYEY SAND, dark gray, with shell fragments	0.0	73.7			2	0.175	0.092						
▲																



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St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

Orleans Parish, Louisiana

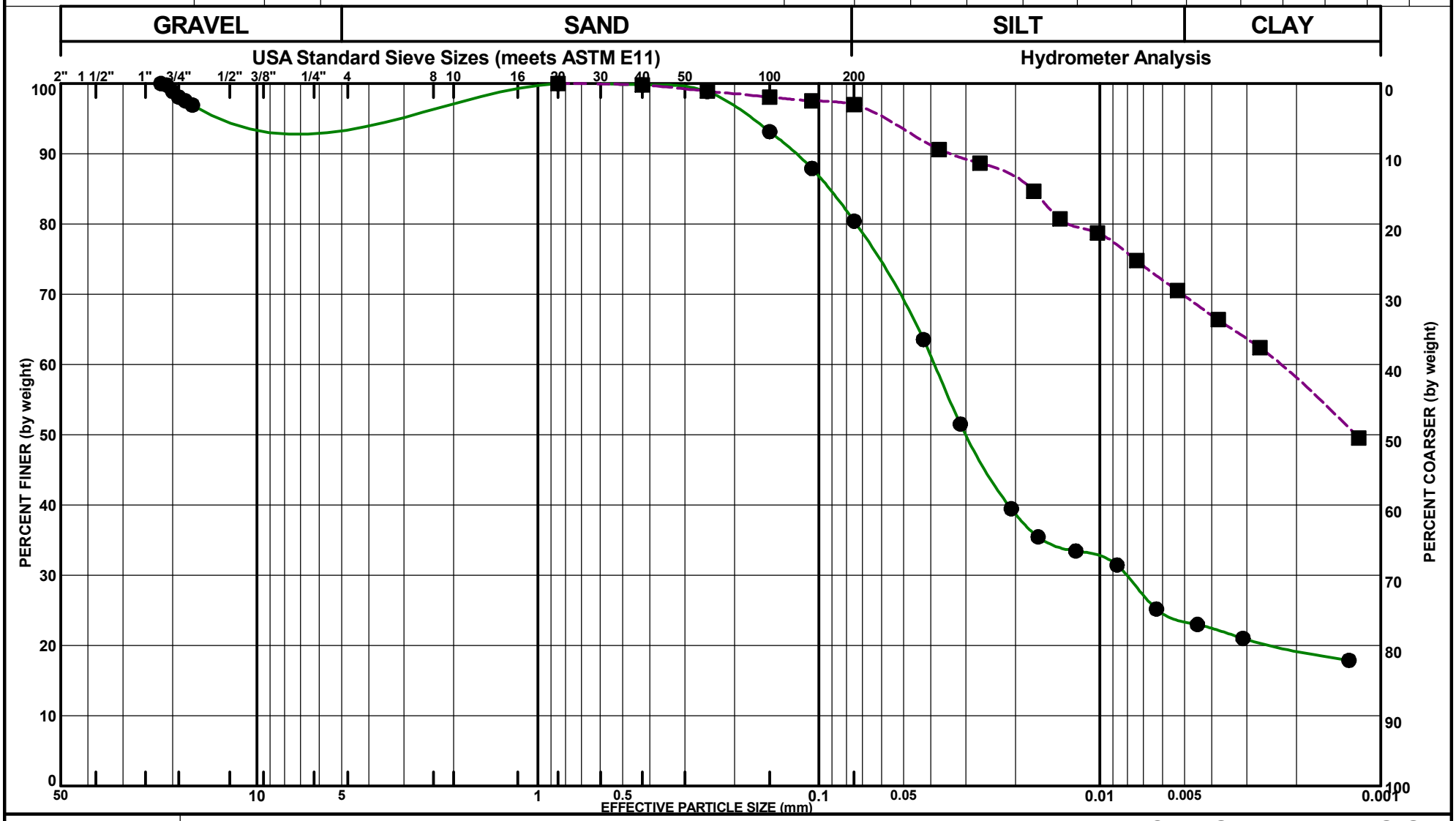
PARTICLE-SIZE ANALYSIS

ASTM D422/D6913/C136

Tested By:	Date Tested:	Reviewed By:	Date Reviewed:	Project No.	PLATE
Allen Bentley	8/28/2019			04.55184080	B3-8

FCBR GSA LANDSCAPE 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 03/30/20

Boring Number	Sample Number	Depth (ft)	Material Description	%Gravel	%Sand	%Silt	%Clay	D100	D60	D30	D10	Cc	Cu	LL	PL	PI
● B-22	7	6-7	FAT CLAY, dark gray, with silt pockets	1.8	17.8	56.7	23.7	0.85	0.039	0.008						
■ B-22	20	19-20	FAT CLAY, gray, with silt traces	0.0	3.0	27.2	69.8	0.85	0.002							
▲																



FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

Orleans Parish, Louisiana

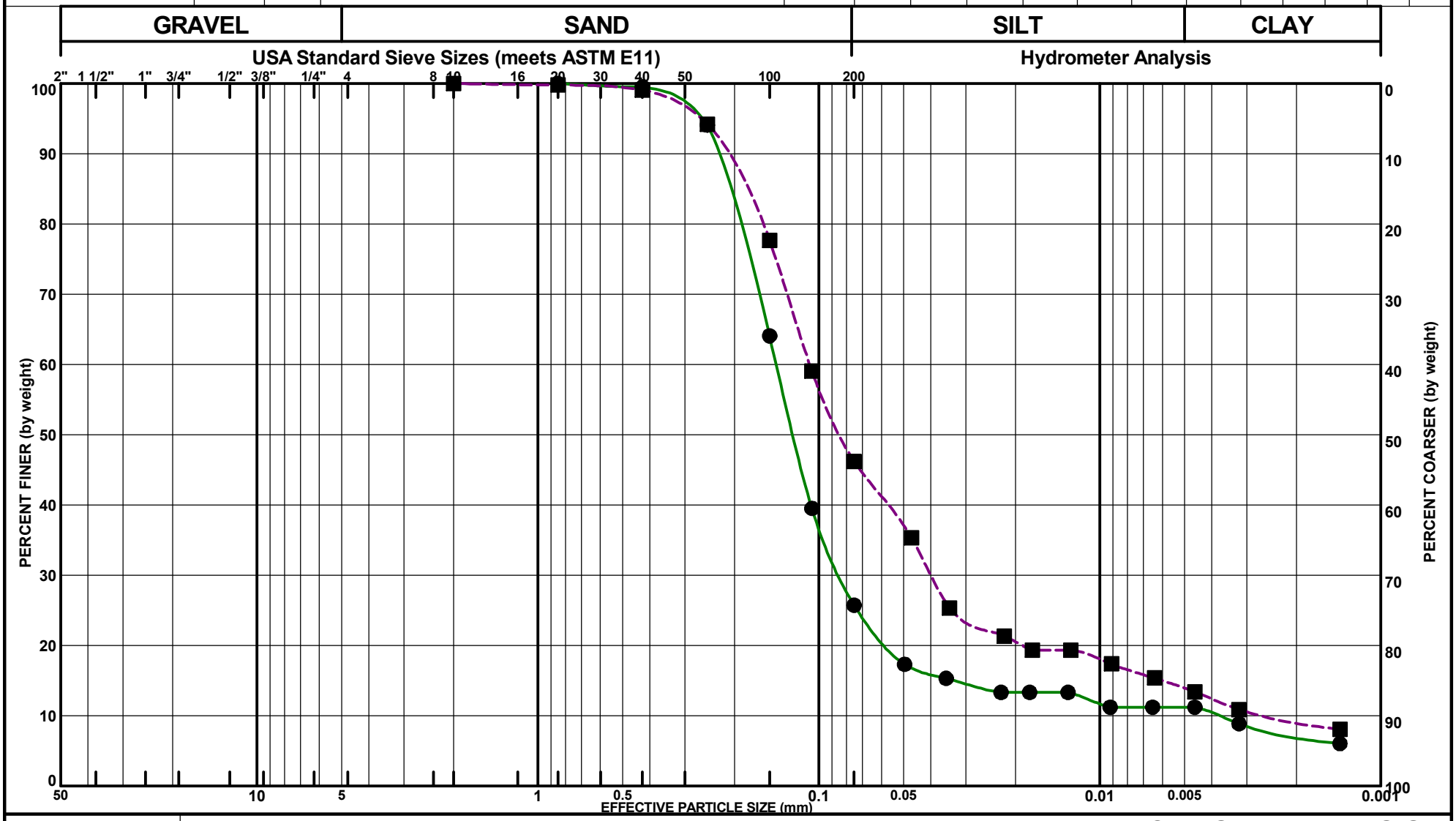
PARTICLE-SIZE ANALYSIS

ASTM D422/D6913/C136

Tested By:	Date Tested:	Reviewed By:	Date Reviewed:	Project No.	
Allen Bentley	9/4/2019			04.55184080	PLATE B3-9

FCBR GSA LANDSCAPE 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 03/30/20

Boring Number	Sample Number	Depth (ft)	Material Description	%Gravel	%Sand	%Silt	%Clay	D100	D60	D30	D10	Cc	Cu	LL	PL	PI
● B-23	11	10-11	SILTY SAND, gray, with clay pockets and shells	0.0	74.3	14.5	11.2	0.85	0.142	0.083	0.004	12.91	37.14			
■ B-23	17	16-17	CLAYEY SAND, dark gray, with shell fragments	0.0	53.8	32.3	13.9	2	0.108	0.04	0.002	5.92	43.76			
▲																



FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

Orleans Parish, Louisiana

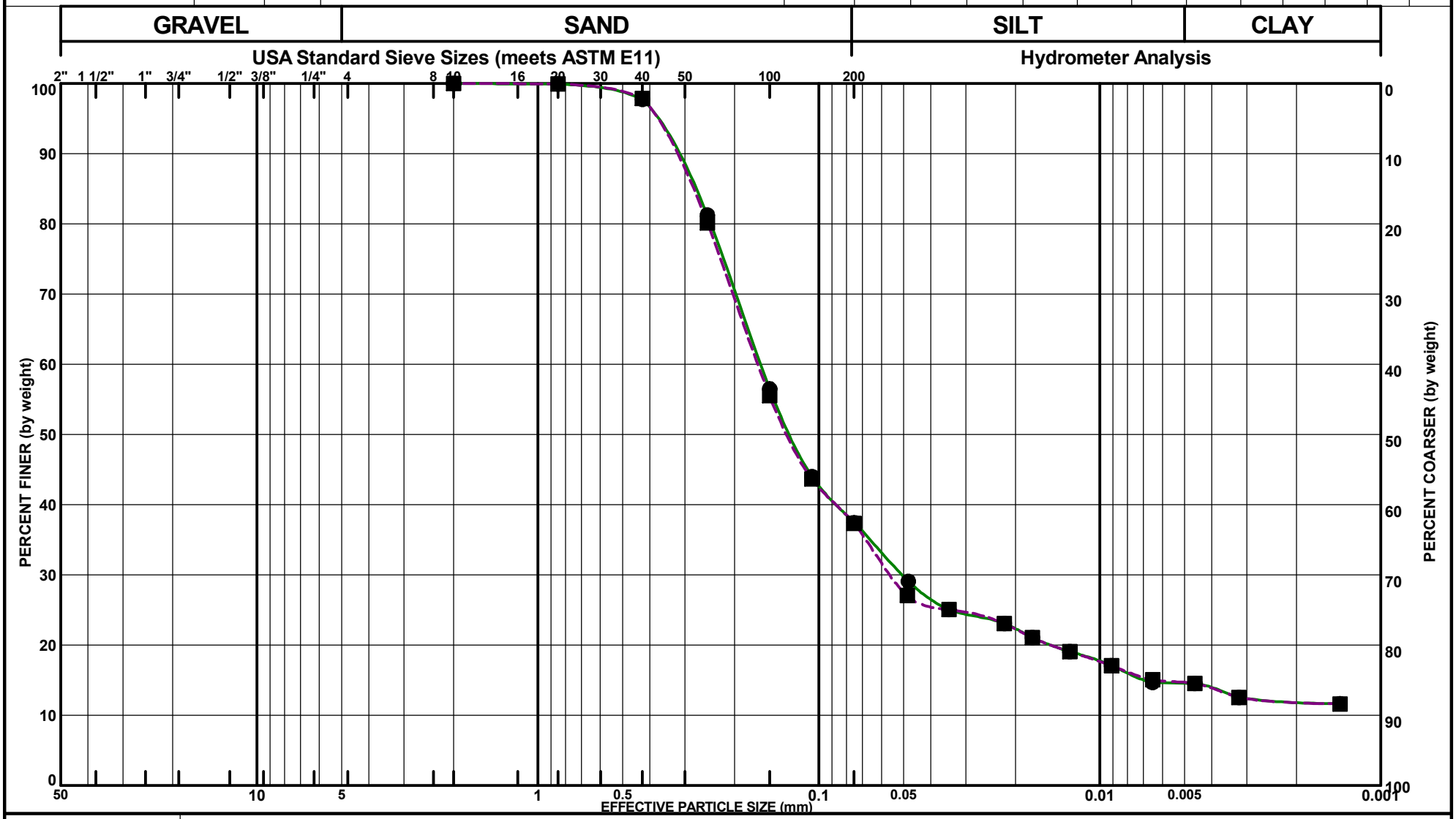
PARTICLE-SIZE ANALYSIS

ASTM D422/D6913/C136

Tested By:	Date Tested:	Reviewed By:	Date Reviewed:	Project No.	PLATE
Allen Bentley	9/4/2019			04.55184080	B3-10

FCBR GSA LANDSCAPE 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 03/30/20

Boring Number	Sample Number	Depth (ft)	Material Description	%Gravel	%Sand	%Silt	%Clay	D100	D60	D30	D10	Cc	Cu	LL	PL	PI
● B-24	9	8-9	SILTY SAND, gray, with clay pockets	0.0	62.6	22.9	14.6	2	0.161	0.051						
■ B-24	15	14-15	SILTY SAND, gray, with clay pockets	0.0	62.7	22.7	14.7	2	0.165	0.055						
▲																



FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

Orleans Parish, Louisiana

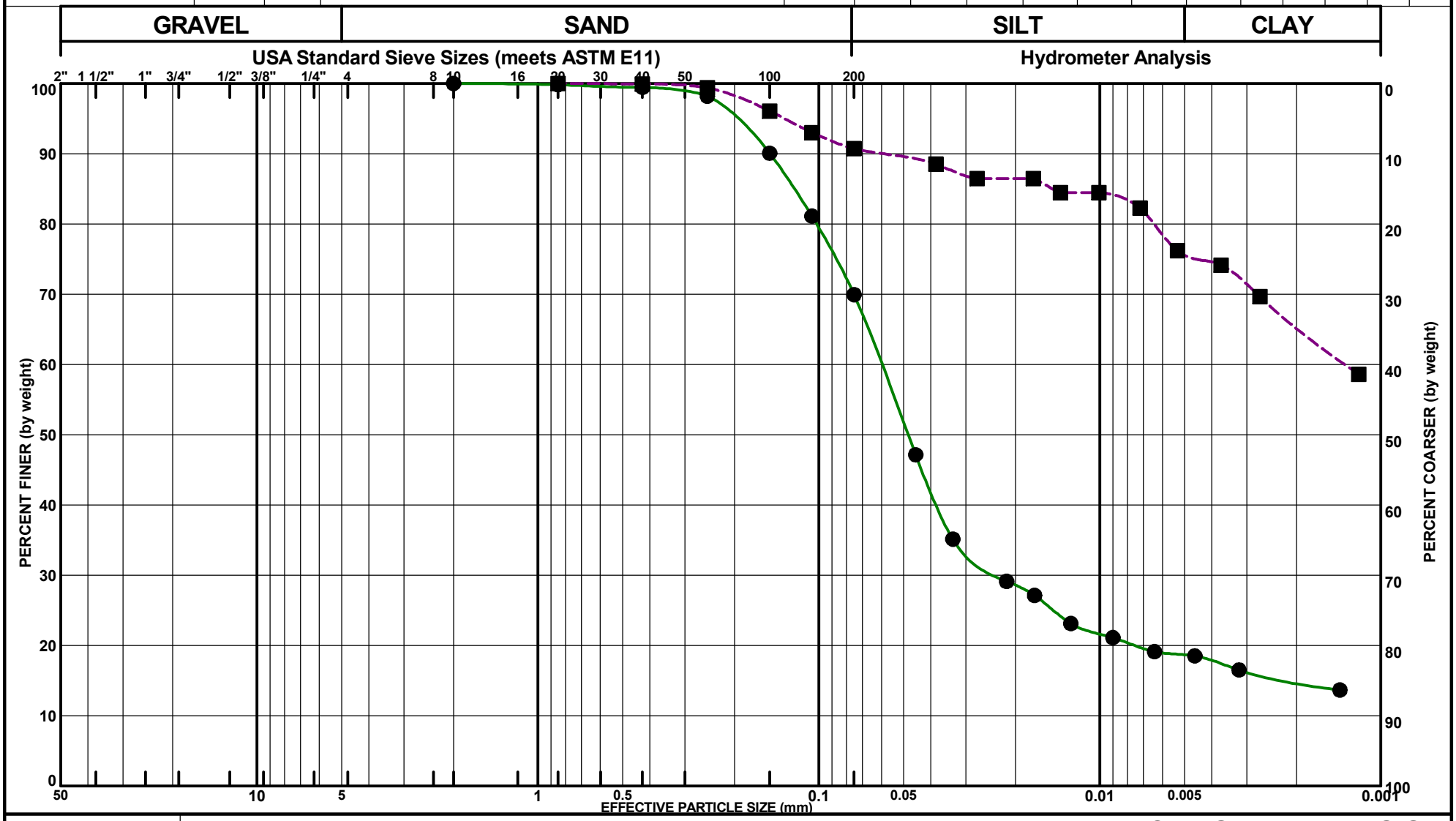
PARTICLE-SIZE ANALYSIS

ASTM D422/D6913/C136

Tested By:	Date Tested:	Reviewed By:	Date Reviewed:	Project No.	PLATE
Shamira Serf	9/6/2019			04.55184080	B3-11

FCBR GSA LANDSCAPE 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 03/30/20

Boring Number	Sample Number	Depth (ft)	Material Description	%Gravel	%Sand	%Silt	%Clay	D100	D60	D30	D10	Cc	Cu	LL	PL	PI
● B-25	3	2-3	LEAN CLAY, dark gray	0.0	30.1	51.3	18.7	2	0.06	0.023						
■ B-25	19	18-19	FAT CLAY, greenish gray and tan, with silt and sand pockets	0.0	9.3	14.9	75.9	0.85	0.001							
▲																



FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

Orleans Parish, Louisiana

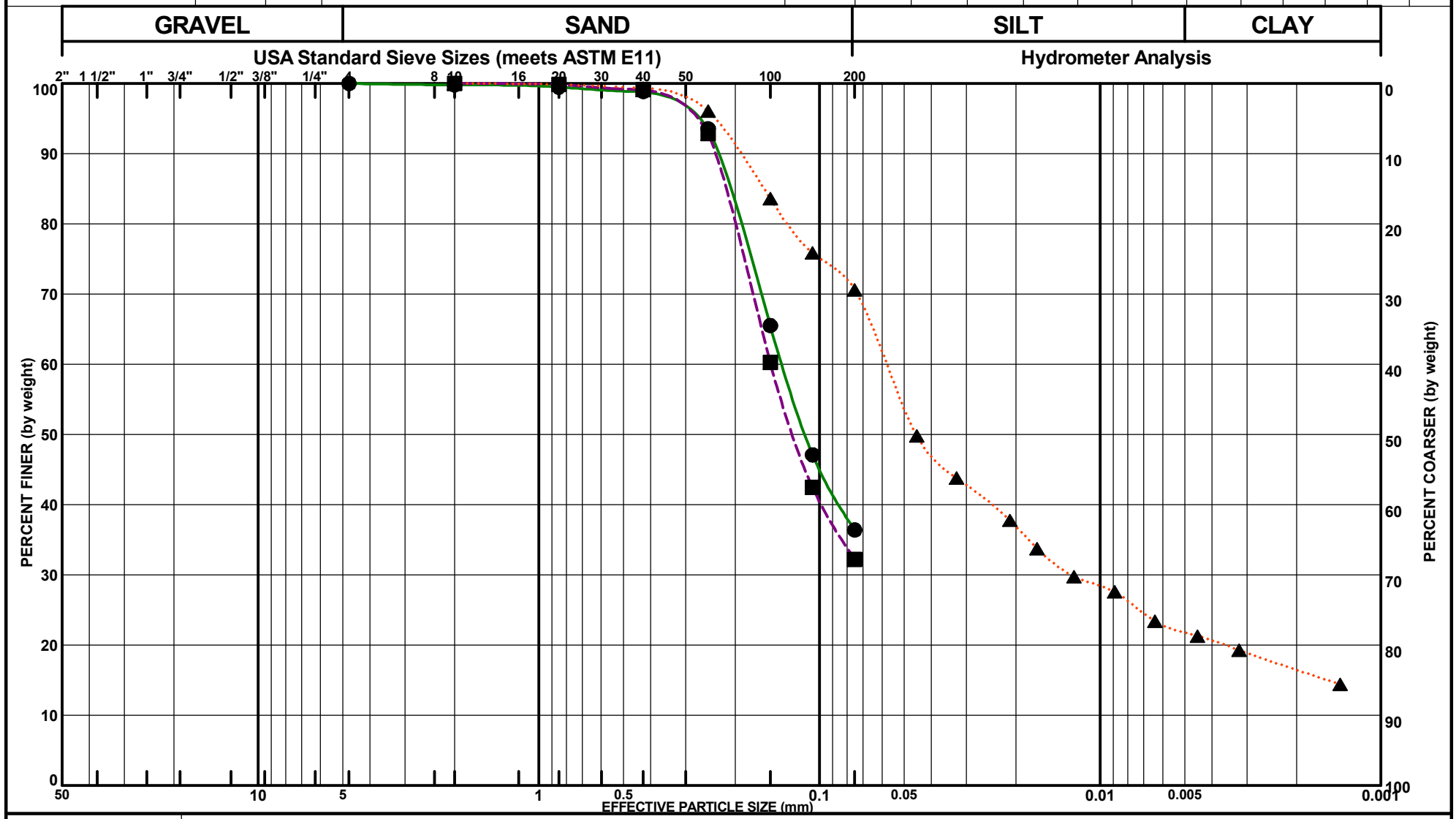
PARTICLE-SIZE ANALYSIS

ASTM D422/D6913/C136

Tested By:	Date Tested:	Reviewed By:	Date Reviewed:	Project No.	
Shamira Serf	9/6/2019			04.55184080	PLATE B3-12

FCBR GSA LANDSCAPE 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 03/30/20

Boring Number	Sample Number	Depth (ft)	Material Description	%Gravel	%Sand	%Silt	%Clay	D100	D60	D30	D10	Cc	Cu	LL	PL	PI
● B-26	3	4.5-6	SILTY SAND, gray and light gray, with clay pockets	0.0	63.6			4.75	0.135							
■ B-26	4	6.5-8	SILTY SAND, gray, with clay pockets	0.0	67.8			2	0.149							
▲ B-26	6	10-11	LEAN CLAY, dark gray	0.0	29.4	48.7	21.9	2	0.058	0.013						



FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

Orleans Parish, Louisiana

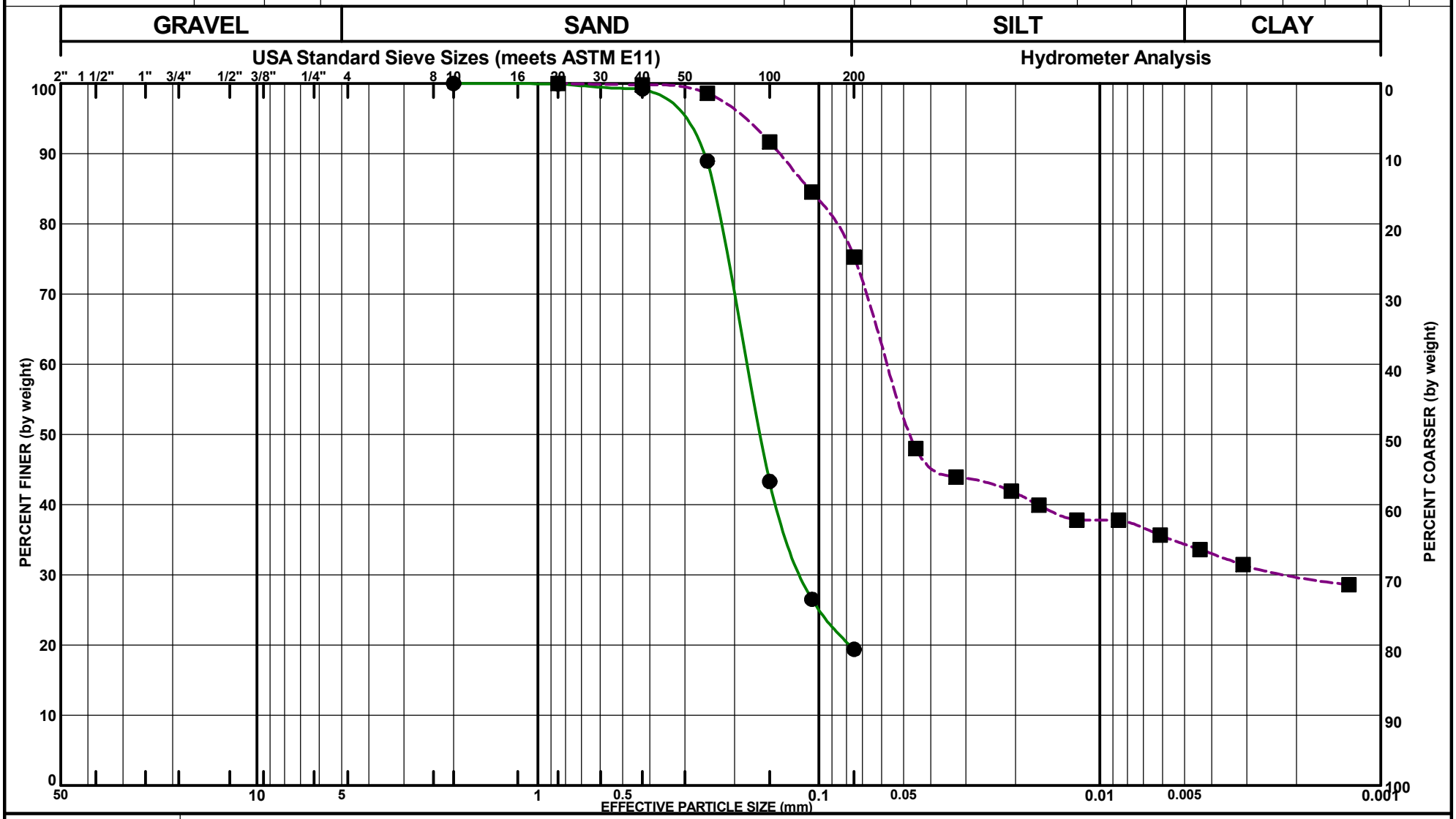
PARTICLE-SIZE ANALYSIS

ASTM D422/D6913/C136

Tested By:	Date Tested:	Reviewed By:	Date Reviewed:	Project No.	
Shamira Serf	9/6/2019			04.55184080	PLATE B3-13

FCBR GSA LANDSCAPE 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 03/30/20

Boring Number	Sample Number	Depth (ft)	Material Description	%Gravel	%Sand	%Silt	%Clay	D100	D60	D30	D10	Cc	Cu	LL	PL	PI
● B-26	8	15-16	CLAYEY SAND, gray, with silt pockets	0.0	80.6			2	0.181	0.114						
■ B-26	12	24-25	LEAN CLAY, gray, with silt pockets	0.0	24.7	40.9	34.4	0.85	0.057	0.002						
▲																



FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

Orleans Parish, Louisiana

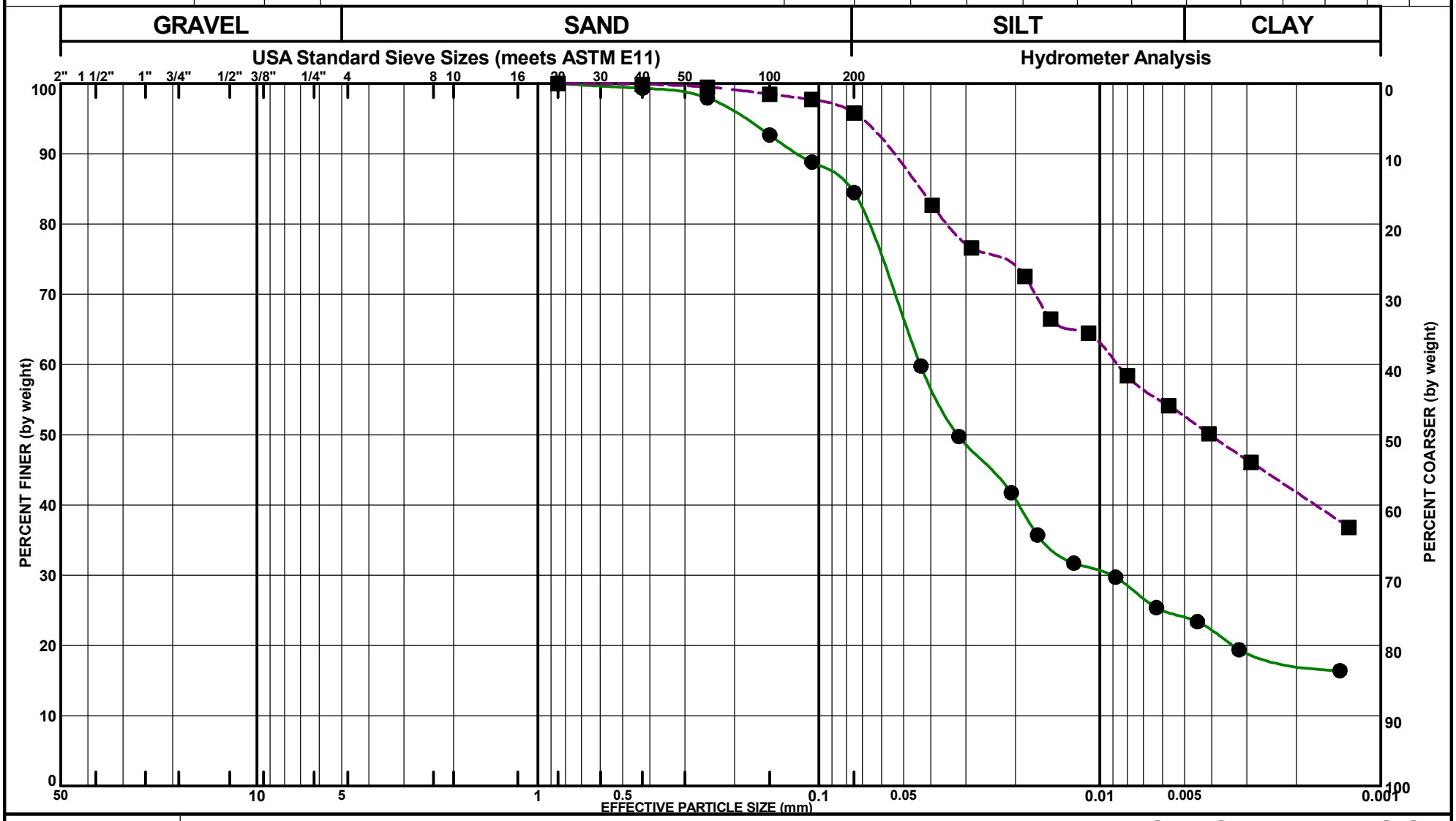
PARTICLE-SIZE ANALYSIS

ASTM D422/D6913/C136

Tested By:	Date Tested:	Reviewed By:	Date Reviewed:	Project No.	
Allen Bentley	9/5/2019			04.55184080	PLATE B3-14

FCBR GSA LANDSCAPE 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 03/30/20

Boring Number	Sample Number	Depth (ft)	Material Description	%Gravel	%Sand	%Silt	%Clay	D100	D60	D30	D10	Cc	Cu	LL	PL	PI
● B-27	7	6-7	LEAN CLAY, gray, and silt and sand pockets	0.0	15.5	60.5	24.0	0.85	0.044	0.009						
■ B-27	15	14-15	FAT CLAY, gray, with some sand and silt traces	0.0	4.2	43.3	52.5	0.85	0.009							
▲																



FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

Orleans Parish, Louisiana

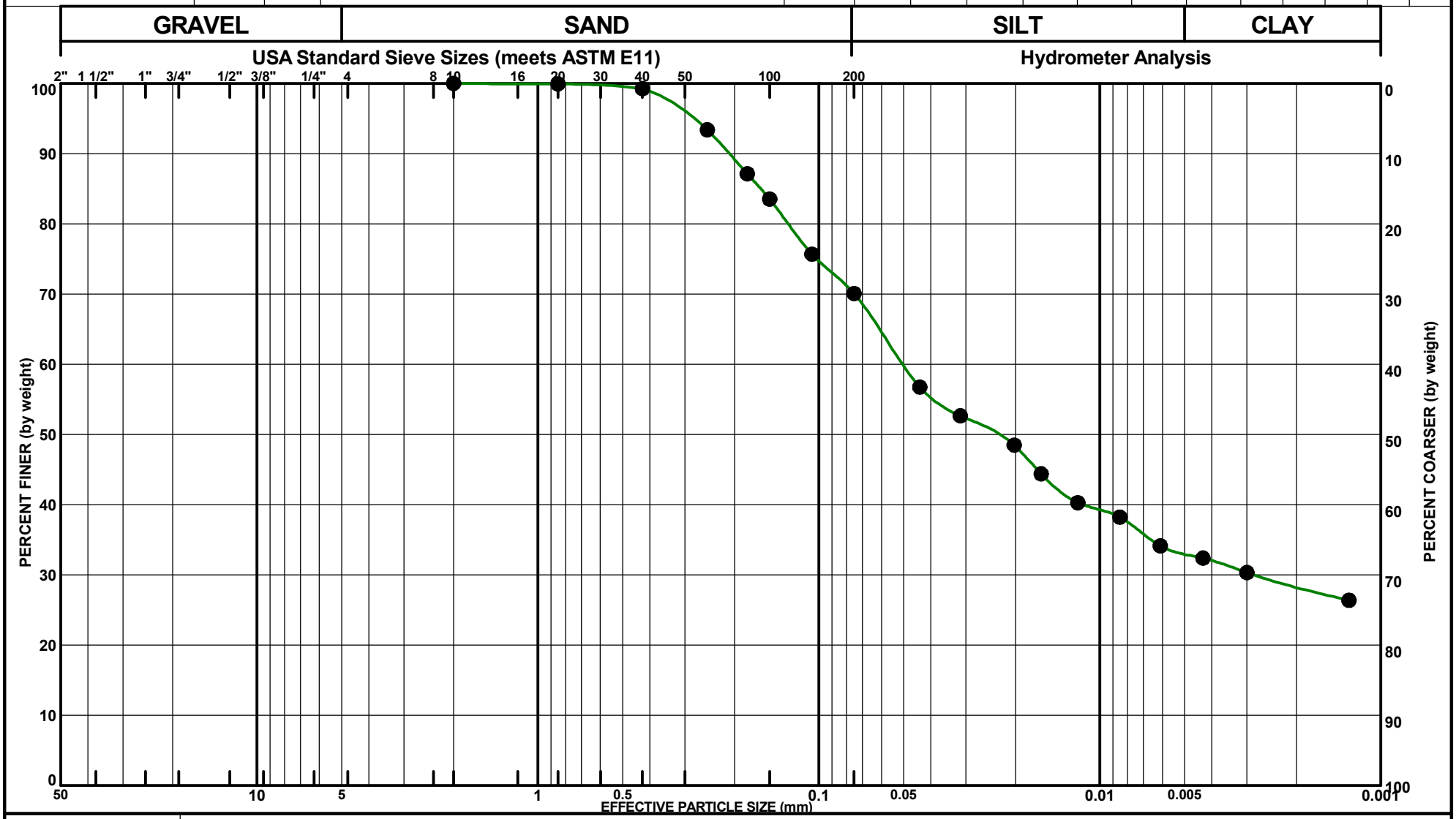
PARTICLE-SIZE ANALYSIS

ASTM D422/D6913/C136

Tested By:	Date Tested:	Reviewed By:	Date Reviewed:	Project No.	PLATE
Allen Bentley	9/5/2019			04.55184080	B3-15

FCBR GSA LANDSCAPE 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 03/30/20

Boring Number	Sample Number	Depth (ft)	Material Description	%Gravel	%Sand	%Silt	%Clay	D100	D60	D30	D10	Cc	Cu	LL	PL	PI
● B-22, B-24, B-25, and B-27		0-15	LEAN CLAY WITH SAND (CL), dark gray, with organics	0.0	29.9	36.9	33.1	2	0.05	0.003				46	16	30
■																
▲																



FUGRO

St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

Orleans Parish, Louisiana

PARTICLE-SIZE ANALYSIS

ASTM D422/D6913/C136

Tested By:	Date Tested:	Reviewed By:	Date Reviewed:	Project No.	
Wes Veitch	2/24/2020			04.55184080	PLATE B3-16

FCBR GSA LANDSCAPE 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 03/30/20

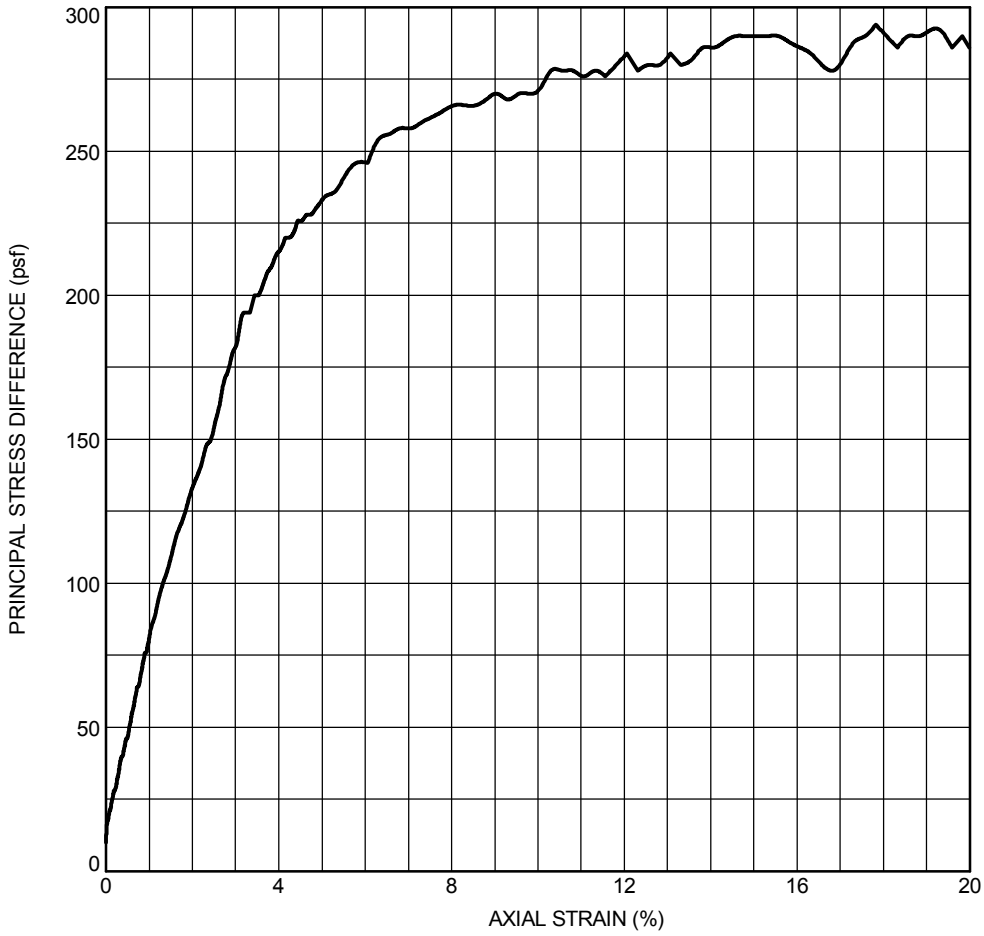
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-01 Depth: 10-11 ft.	Visual Classification: FAT CLAY, dark gray, with organics
Sample Number: 6	
Project No.: 04.55184080 Test Date.: 3/14/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	109.0		
	Dry Density (pcf)	42.1		
	Saturation (%)	98.0		
	Void Ratio	3.00		
	Diameter (inches)	2.84		
	Height (inches)	5.55		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	3.00		
	Deviator Stress (psf)	290		
	Shear Strength (psf)	145		
	Failure Strain (%)	14.6		
	σ_1 Failure (psf):	722		
	σ_3 Failure (psf):	432		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-1

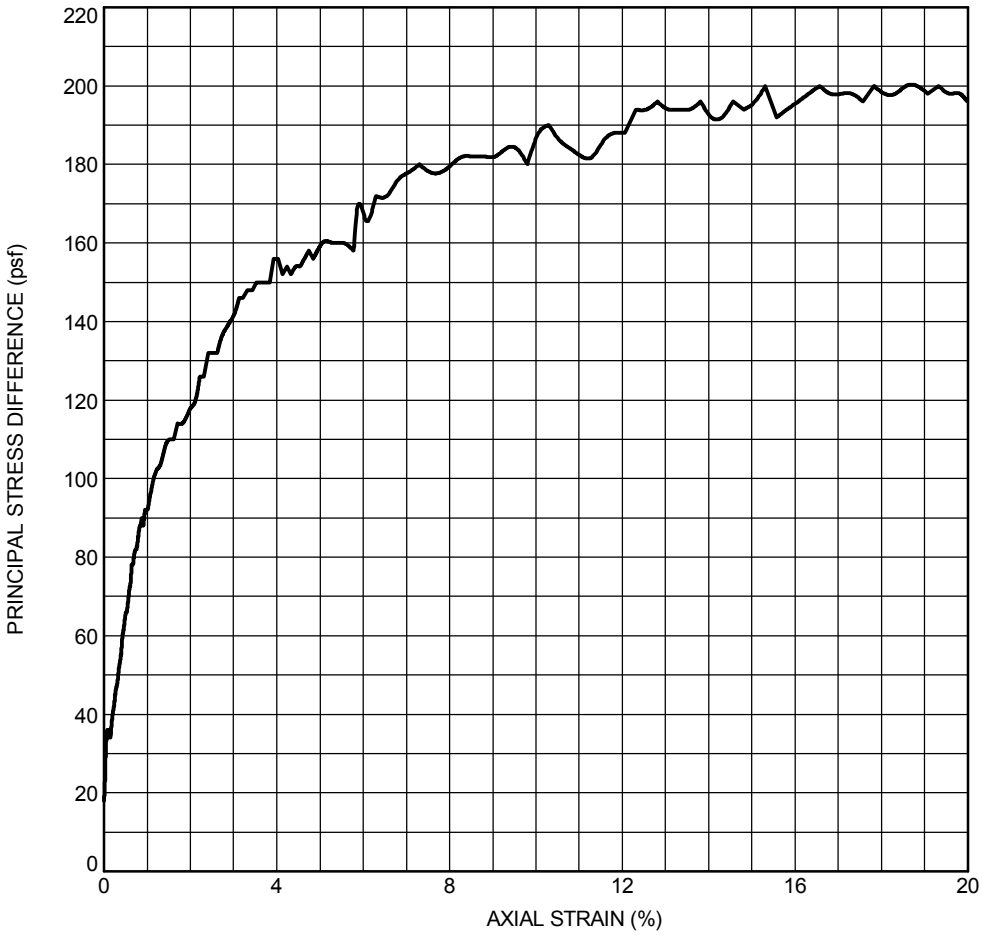
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-02 Depth: 3-4 ft.	Visual Classification: ORGANIC CLAY, dark gray
Sample Number: 2	
Project No.: 04.55184080 Test Date.: 3/14/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	81.9		
	Dry Density (pcf)	53.5		
	Saturation (%)	100.0		
	Void Ratio	2.15		
	Diameter (inches)	2.80		
	Height (inches)	5.59		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	1.00		
	Deviator Stress (psf)	196		
	Shear Strength (psf)	98		
	Failure Strain (%)	12.8		
	σ_1 Failure (psf):	340		
	σ_3 Failure (psf):	144		
	Failure Type:	Bulging		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-2

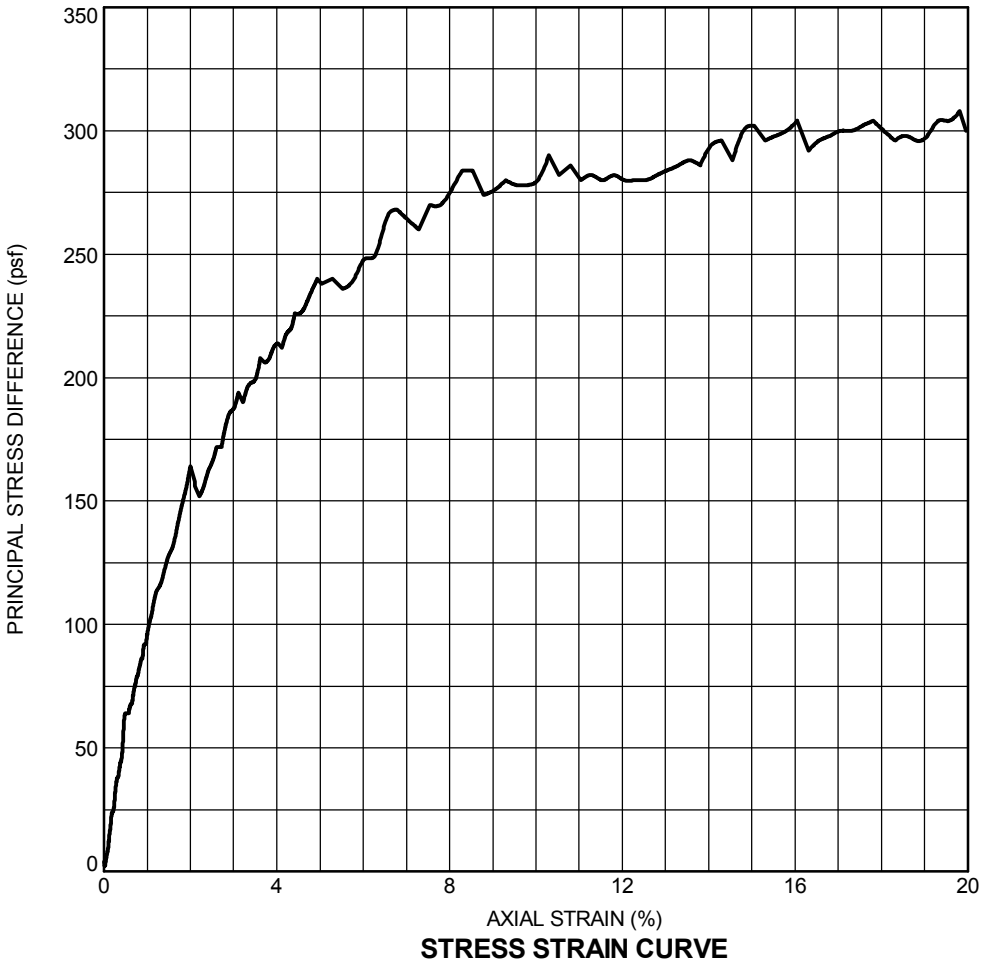
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-02 Depth: 9-10 ft.	Visual Classification: FAT CLAY, gray, with silt and sand pockets
Sample Number: 5	
Project No.: 04.55184080 Test Date.: 3/14/2019	Organic Content (%) ASTM D2974: N/A

Sample No.	1 ●	2 ■	3 ▲
INITIAL Water Content (%)	59.4		
Dry Density (pcf)	64.2		
Saturation (%)	98.7		
Void Ratio	1.62		
Diameter (inches)	2.77		
Height (inches)	5.62		
% Passing #200 Sieve			
Specific Gravity (assumed)	2.70		
Strain Rate (%/min.)	1.0		
Cell Pressure (psi)	3.00		
Deviator Stress (psf)	302		
Shear Strength (psf)	151		
Failure Strain (%)	15.0		
σ_1 Failure (psf):	734		
σ_3 Failure (psf):	432		
Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-3

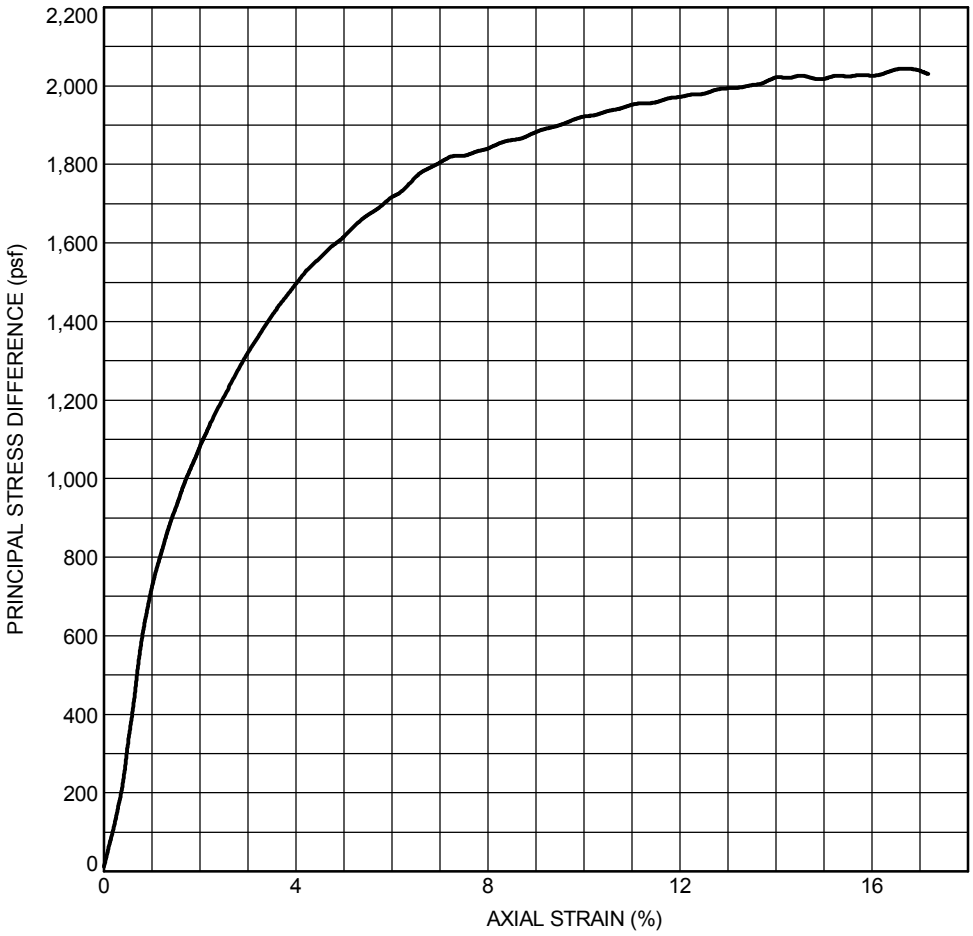
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-02 Depth: 19-20 ft.	Visual Classification: LEAN CLAY, gray, with silt traces
Sample Number: 9	
Project No.: 04.55184080 Test Date.: 3/14/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	25.3		
	Dry Density (pcf)	102.3		
	Saturation (%)	100.0		
	Void Ratio	0.65		
	Diameter (inches)	2.83		
	Height (inches)	5.64		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	5.00		
	Deviator Stress (psf)	2026		
	Shear Strength (psf)	1013		
	Failure Strain (%)	14.5		
	σ_1 Failure (psf):	2746		
	σ_3 Failure (psf):	720		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-4

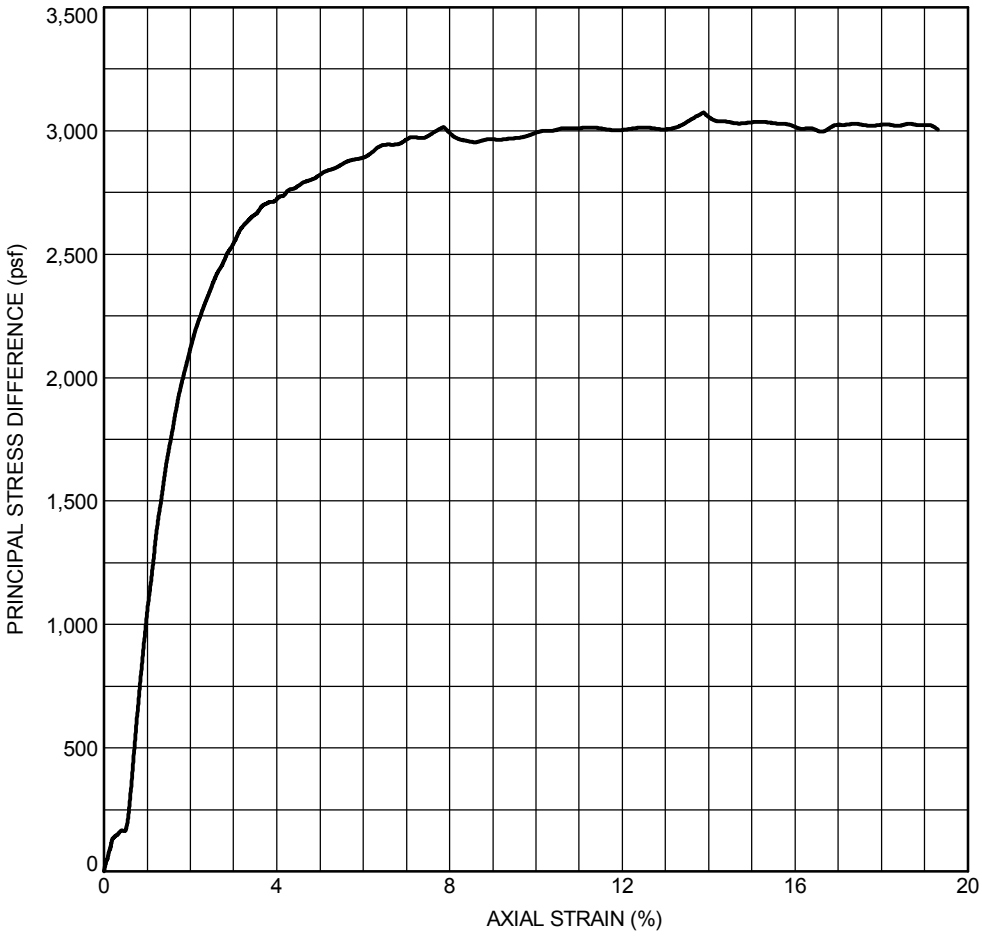
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-02 Depth: 33-34 ft.	Visual Classification: LEAN CLAY, greenish gray, with silt pockets
Sample Number: 12	
Project No.: 04.55184080 Test Date.: 3/14/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	26.2		
	Dry Density (pcf)	94.6		
	Saturation (%)	90.4		
	Void Ratio	0.78		
	Diameter (inches)	2.87		
	Height (inches)	5.59		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	9.00		
	Deviator Stress (psf)	3074		
	Shear Strength (psf)	1537		
	Failure Strain (%)	13.9		
	σ_1 Failure (psf):	4370		
	σ_3 Failure (psf):	1296		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-5

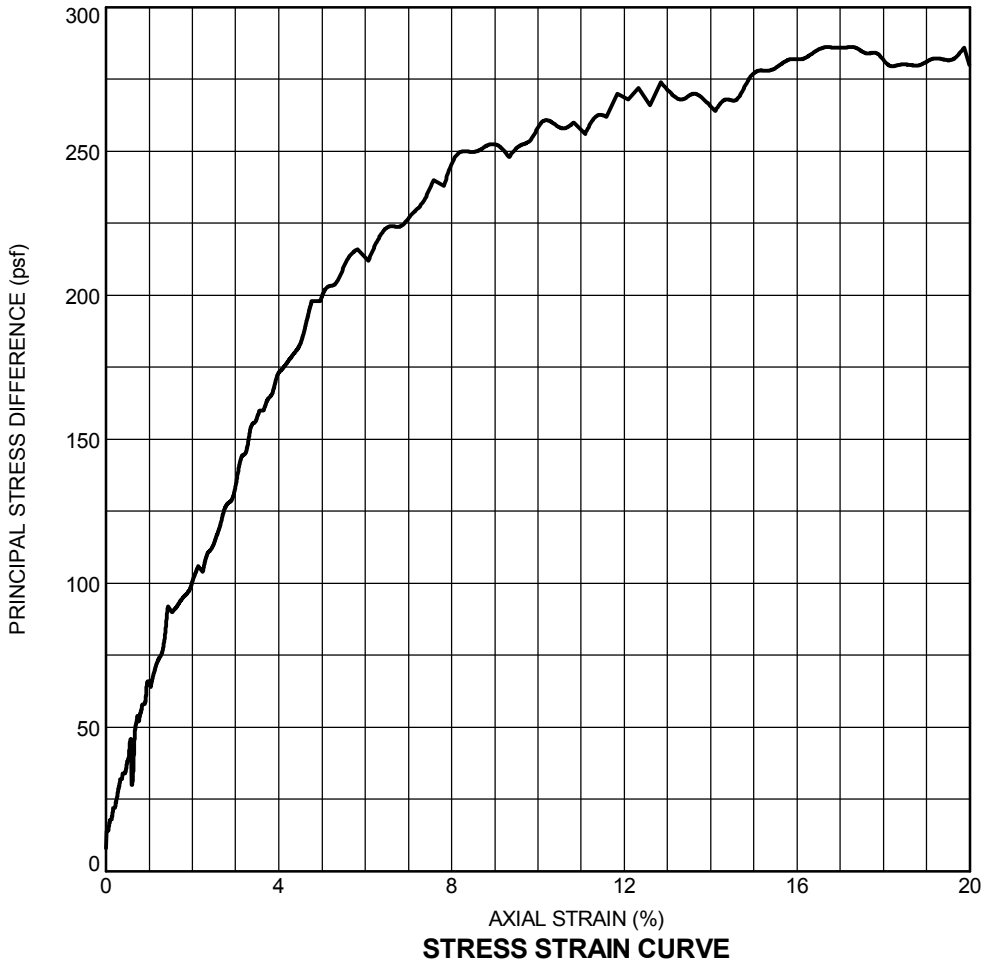
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-03 Depth: 1-2 ft.	Visual Classification: ORGANIC CLAY, dark brown
Sample Number: 1	
Project No.: 04.55184080 Test Date.: 3/14/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	159.6		
	Dry Density (pcf)	31.9		
	Saturation (%)	100.0		
	Void Ratio	3.88		
	Diameter (inches)	2.78		
	Height (inches)	5.60		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.50		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	1.00		
	Deviator Stress (psf)	276		
	Shear Strength (psf)	138		
	Failure Strain (%)	15.0		
	σ_1 Failure (psf):	420		
	σ_3 Failure (psf):	144		
	Failure Type:	Bulging		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-6

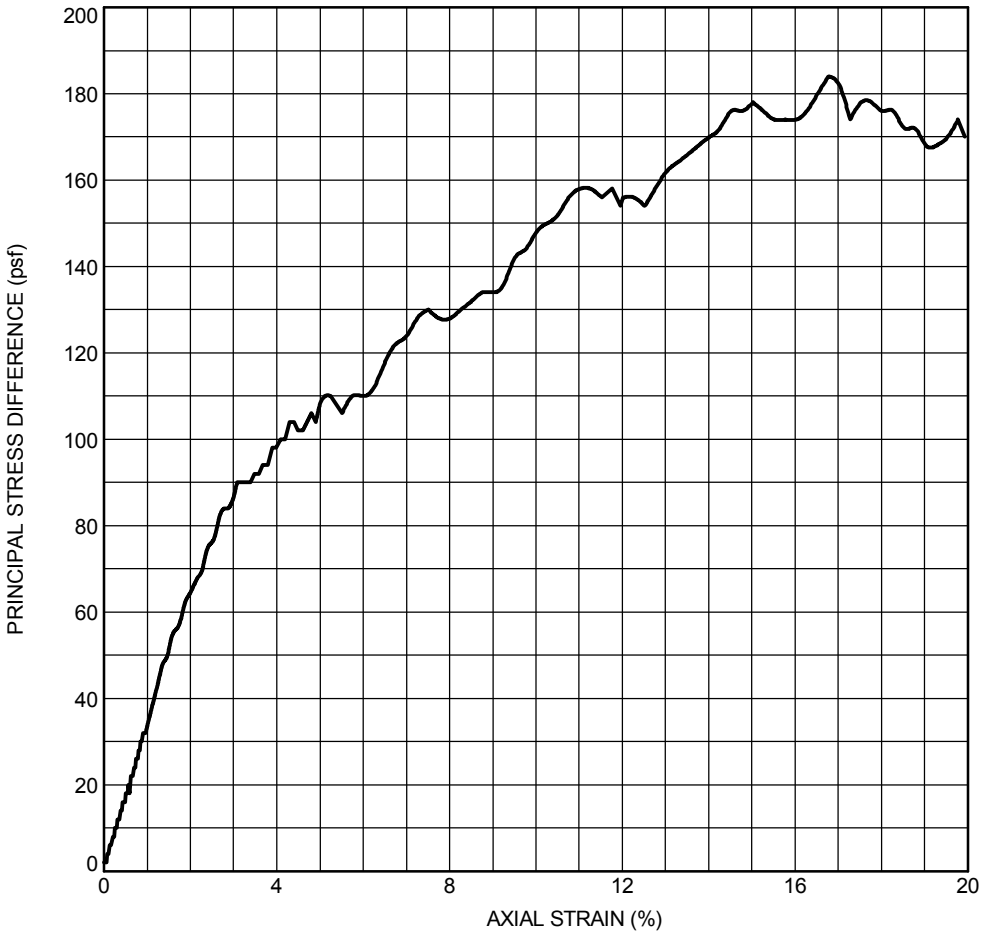
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-03 Depth: 5-6 ft.	Visual Classification: ORGANIC CLAY, dark gray
Sample Number: 3	
Project No.: 04.55184080 Test Date.: 3/15/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	136.5		
	Dry Density (pcf)	37.5		
	Saturation (%)	100.0		
	Void Ratio	3.16		
	Diameter (inches)	2.77		
	Height (inches)	5.55		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.50		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	2.00		
	Deviator Stress (psf)	178		
	Shear Strength (psf)	89		
	Failure Strain (%)	15.0		
	σ_1 Failure (psf):	466		
	σ_3 Failure (psf):	288		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-7

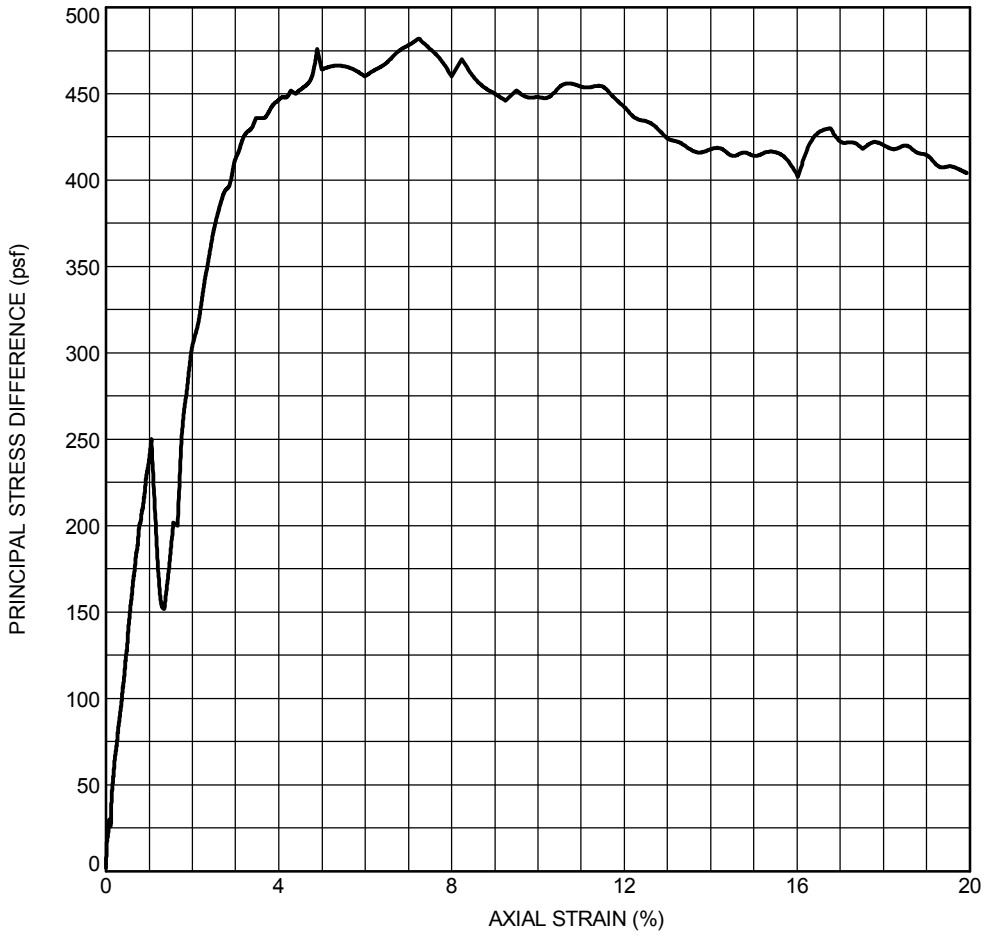
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-03 Depth: 11-12 ft.	Visual Classification: LEAN CLAY, light gray
Sample Number: 6	
Project No.: 04.55184080 Test Date.: 3/15/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	73.4		
	Dry Density (pcf)	59.3		
	Saturation (%)	100.0		
	Void Ratio	1.84		
	Diameter (inches)	2.80		
	Height (inches)	5.59		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	3.00		
	Deviator Stress (psf)	482		
	Shear Strength (psf)	241		
	Failure Strain (%)	7.2		
	σ_1 Failure (psf):	914		
	σ_3 Failure (psf):	432		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-8

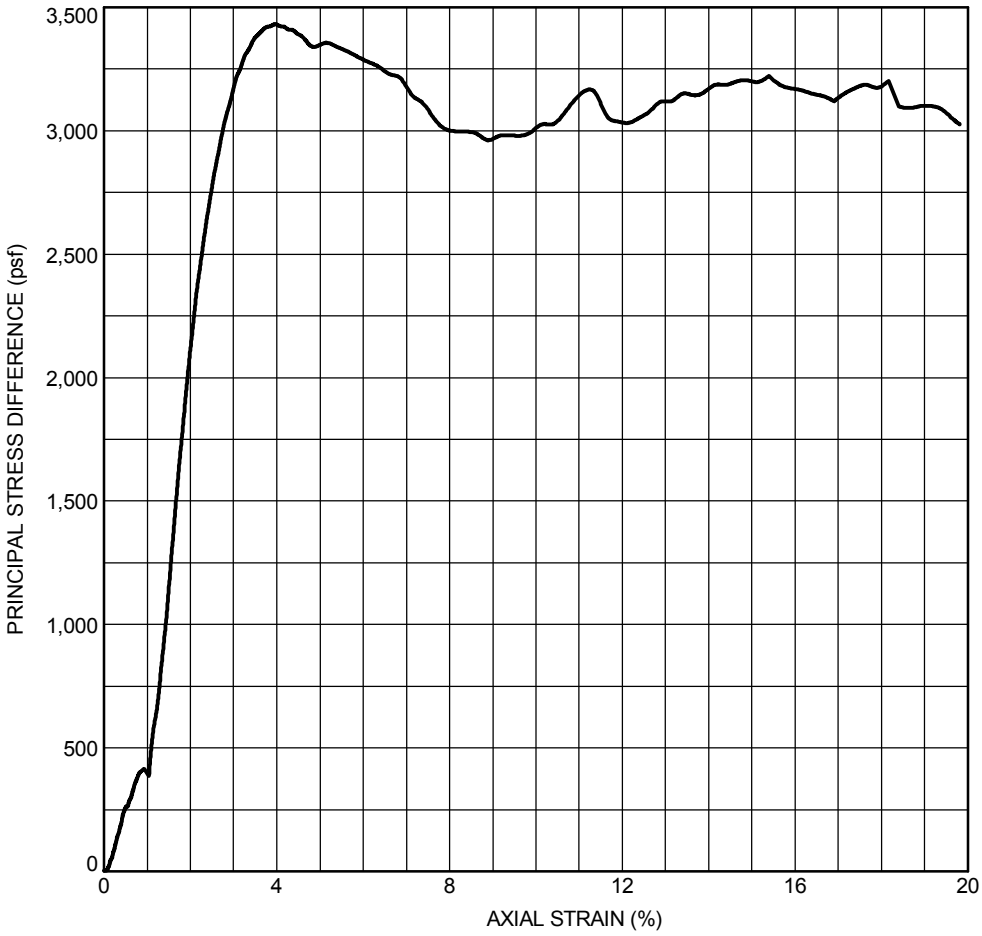
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-03 Depth: 29-30 ft.	Visual Classification: LEAN CLAY, greenish gray, with shells
Sample Number: 11	
Project No.: 04.55184080 Test Date.: 3/15/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	35.1		
	Dry Density (pcf)	86.4		
	Saturation (%)	99.8		
	Void Ratio	0.95		
	Diameter (inches)	2.84		
	Height (inches)	5.62		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	8.00		
	Deviator Stress (psf)	3432		
	Shear Strength (psf)	1716		
	Failure Strain (%)	4.0		
	σ_1 Failure (psf):	4584		
	σ_3 Failure (psf):	1152		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-9

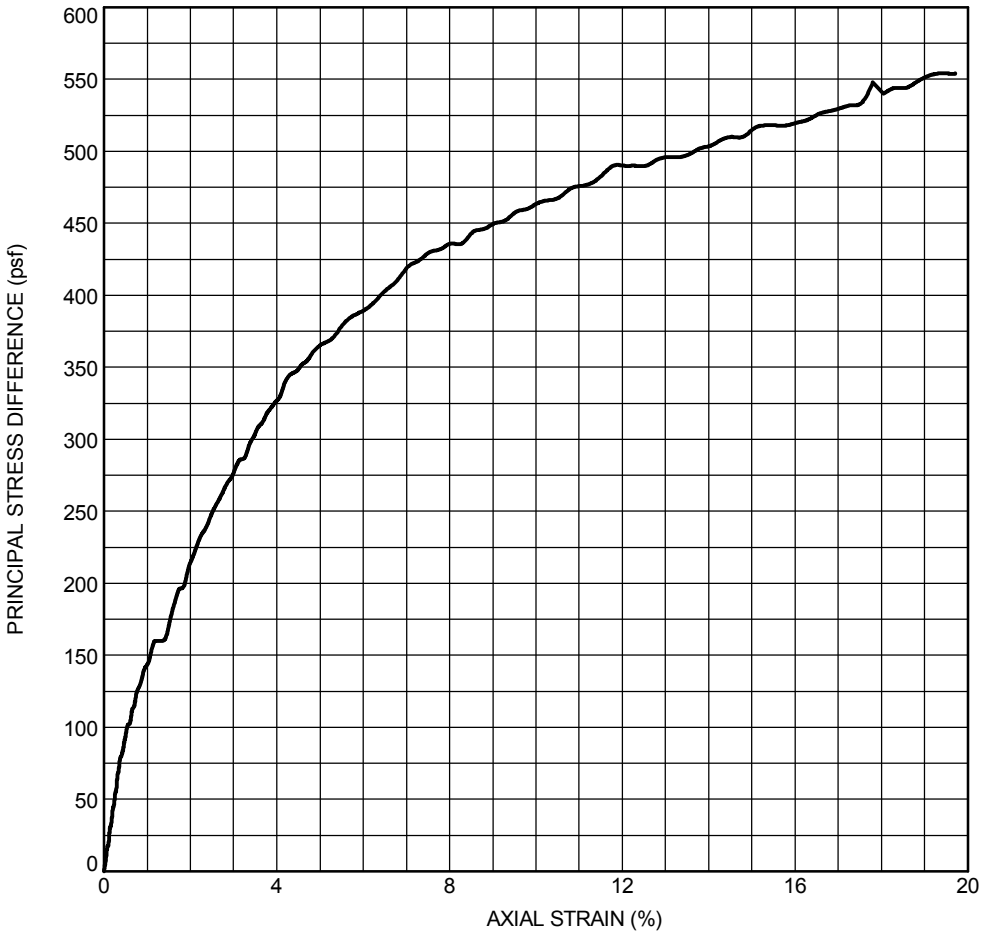
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-03 Depth: 59-60 ft.	Visual Classification: LEAN CLAY, light gray, with silt pockets
Sample Number: 17	
Project No.: 04.55184080 Test Date.: 3/15/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	41.6		
	Dry Density (pcf)	81.7		
	Saturation (%)	100.0		
	Void Ratio	1.06		
	Diameter (inches)	2.84		
	Height (inches)	5.55		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	16.00		
	Deviator Stress (psf)	515		
	Shear Strength (psf)	257		
	Failure Strain (%)	15.0		
	σ_1 Failure (psf):	2819		
	σ_3 Failure (psf):	2304		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

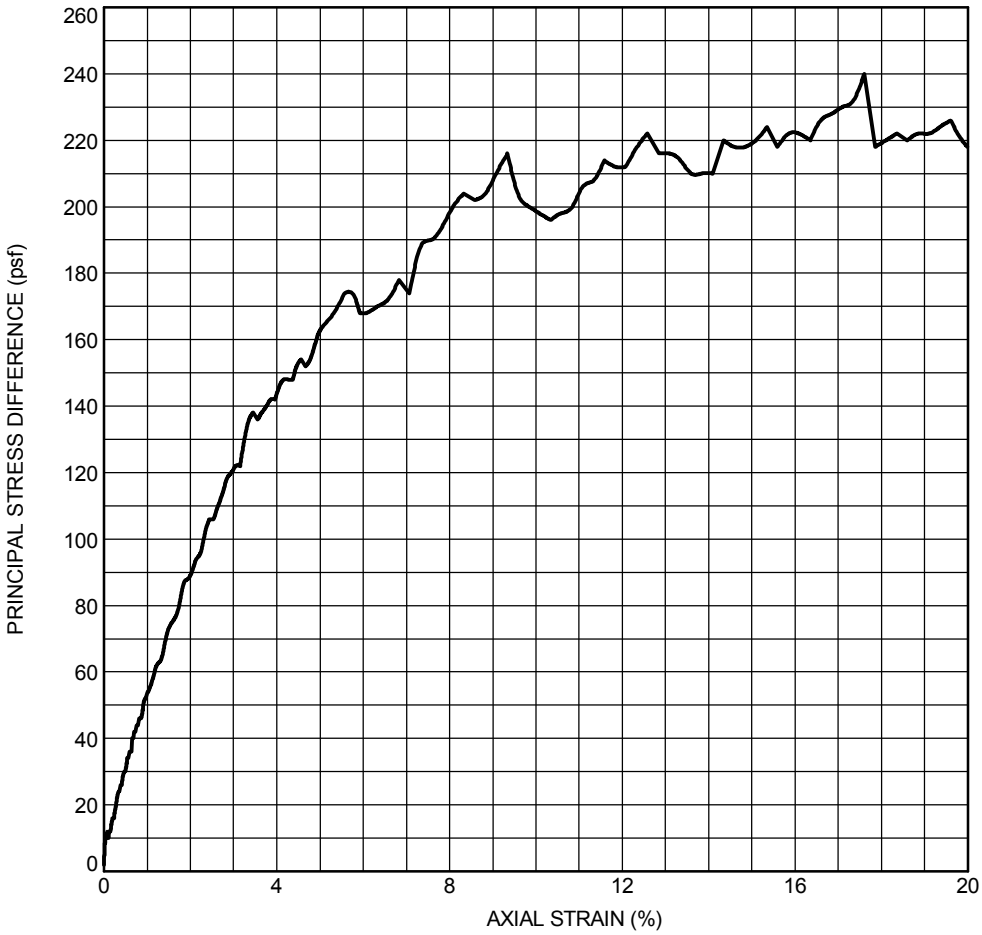
PLATE B4-10

TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-04 Depth: 5-6 ft.	Visual Classification: ORGANIC CLAY, gray, with organics
Sample Number: 3	
Project No.: 04.55184080 Test Date.: 3/15/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	111.1		
	Dry Density (pcf)	39.7		
	Saturation (%)	92.5		
	Void Ratio	3.24		
	Diameter (inches)	2.84		
	Height (inches)	5.55		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	2.00		
	Deviator Stress (psf)	222		
	Shear Strength (psf)	111		
	Failure Strain (%)	12.6		
	σ_1 Failure (psf):	510		
	σ_3 Failure (psf):	288		
	Failure Type:	Multi Shear	Failure Sketch	

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-11

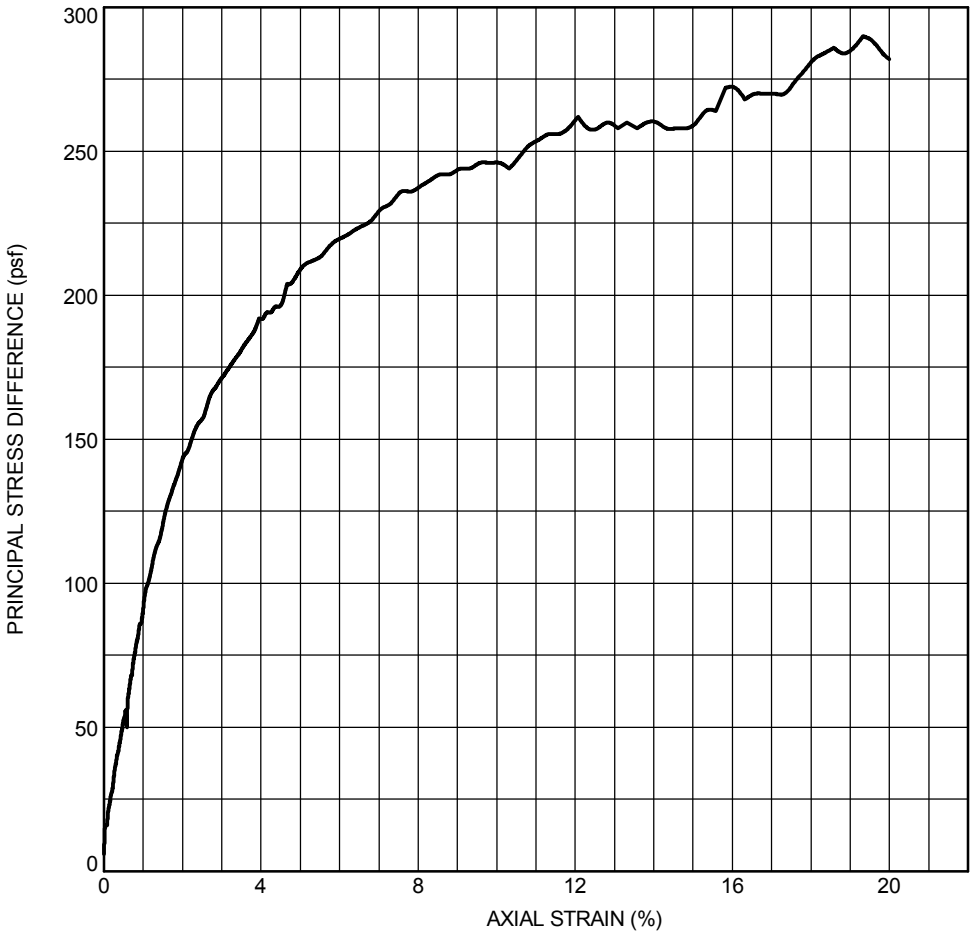
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-04 Depth: 9-10 ft.	Visual Classification: FAT CLAY, gray, with silt pockets
Sample Number: 5	
Project No.: 04.55184080 Test Date.: 3/15/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	76.9		
	Dry Density (pcf)	55.8		
	Saturation (%)	100.0		
	Void Ratio	2.02		
	Diameter (inches)	2.81		
	Height (inches)	5.61		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	3.00		
	Deviator Stress (psf)	262		
	Shear Strength (psf)	131		
	Failure Strain (%)	12.1		
	σ_1 Failure (psf):	694		
	σ_3 Failure (psf):	432		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-12

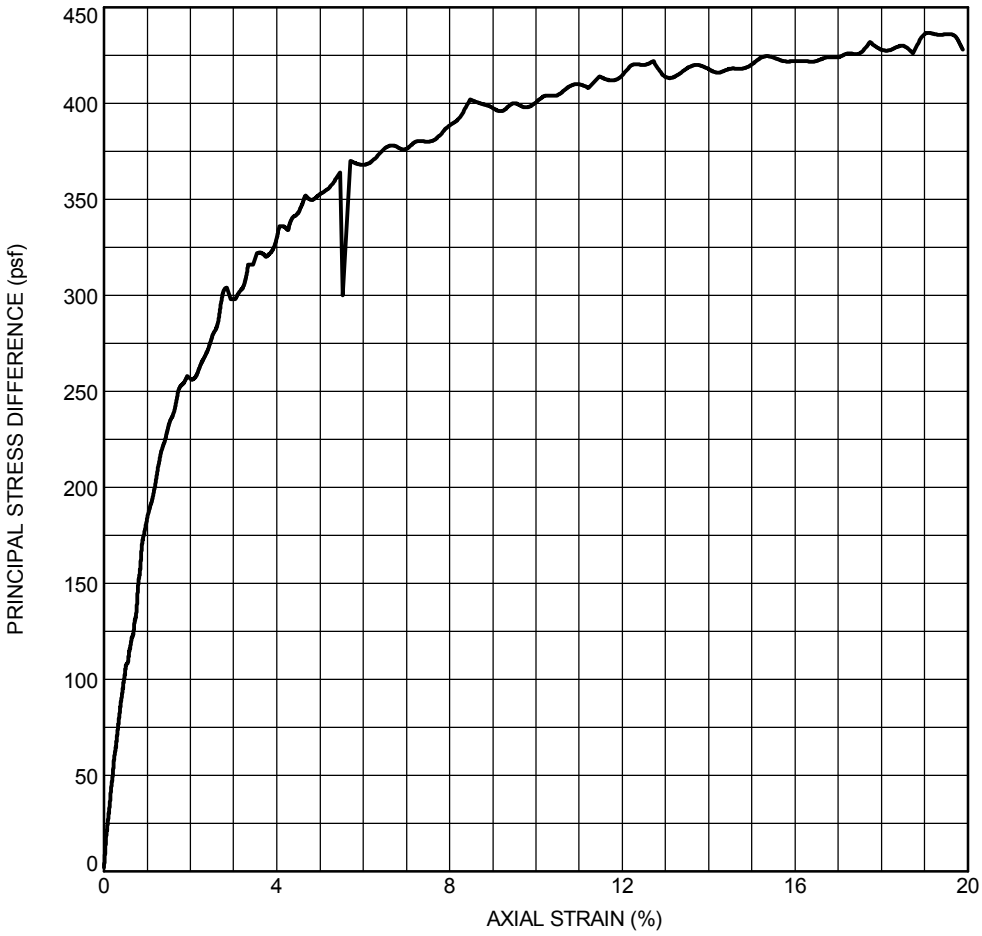
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-04 Depth: 29-30 ft.	Visual Classification: FAT CLAY, gray, with silt pockets
Sample Number: 11	
Project No.: 04.55184080 Test Date.: 3/15/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	62.9		
	Dry Density (pcf)	61.8		
	Saturation (%)	98.2		
	Void Ratio	1.73		
	Diameter (inches)	2.84		
	Height (inches)	5.58		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	8.00		
	Deviator Stress (psf)	420		
	Shear Strength (psf)	210		
	Failure Strain (%)	15.0		
	σ_1 Failure (psf):	1572		
	σ_3 Failure (psf):	1152		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-13

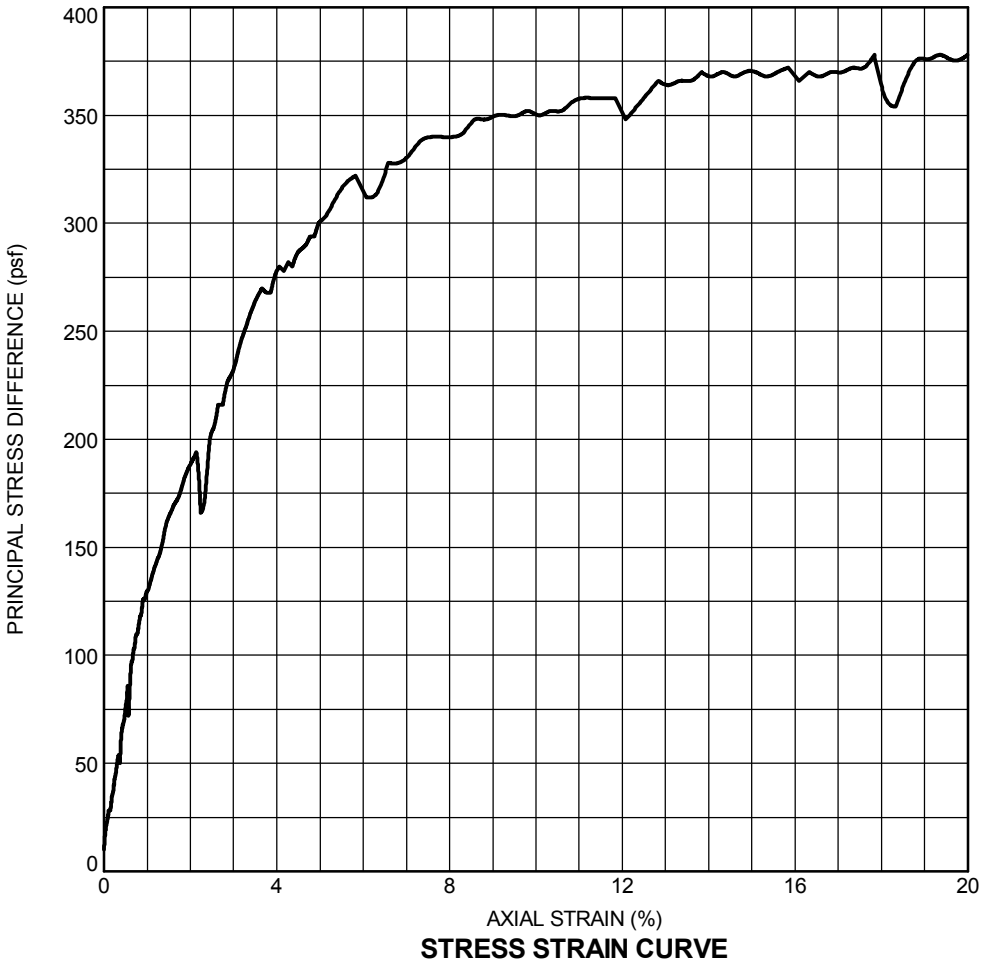
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-05 Depth: 13-14 ft.	Visual Classification: FAT CLAY, gray, with sand
Sample Number: 7	
Project No.: 04.55184080 Test Date.: 3/18/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	49.2		
	Dry Density (pcf)	70.8		
	Saturation (%)	96.2		
	Void Ratio	1.38		
	Diameter (inches)	2.81		
	Height (inches)	5.61		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	4.00		
	Deviator Stress (psf)	370		
	Shear Strength (psf)	185		
	Failure Strain (%)	13.8		
	σ_1 Failure (psf):	946		
	σ_3 Failure (psf):	576		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-14

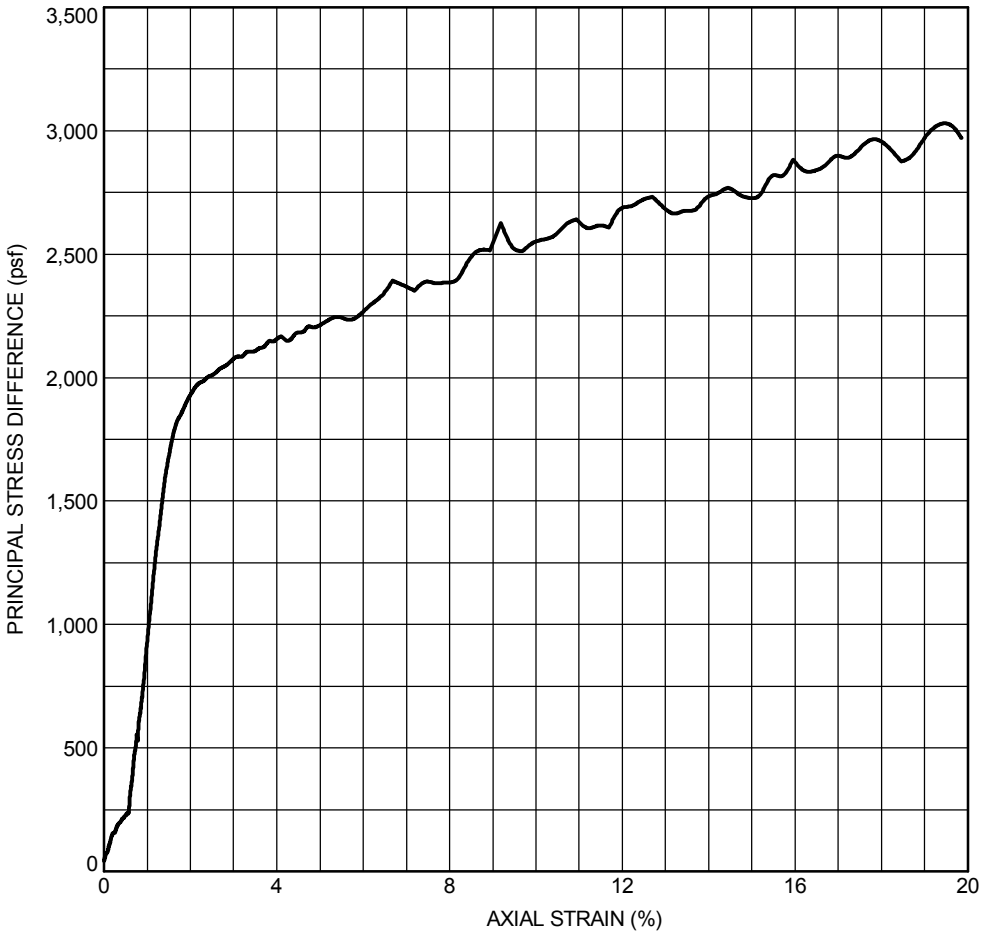
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-05 Depth: 19-20 ft.	Visual Classification: FAT CLAY, greenish gray and tan
Sample Number: 9	
Project No.: 04.55184080 Test Date.: 3/18/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	31.3		
	Dry Density (pcf)	89.4		
	Saturation (%)	95.7		
	Void Ratio	0.88		
	Diameter (inches)	2.88		
	Height (inches)	5.62		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	5.00		
	Deviator Stress (psf)	2768		
	Shear Strength (psf)	1384		
	Failure Strain (%)	14.5		
	σ_1 Failure (psf):	3488		
	σ_3 Failure (psf):	720		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-15

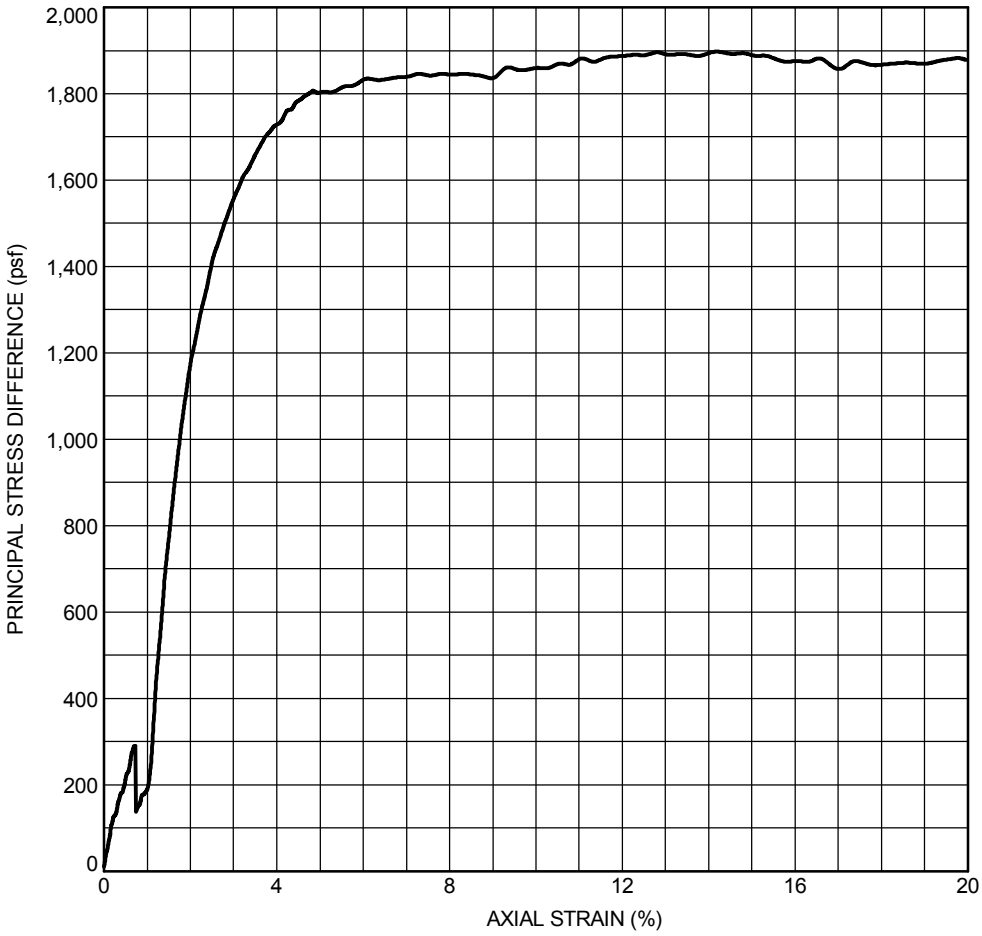
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-05 Depth: 39-40 ft.	Visual Classification: FAT CLAY, tan and greenish gray, with slickensides
Sample Number: 13	
Project No.: 04.55184080 Test Date.: 3/18/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	32.7		
	Dry Density (pcf)	87.2		
	Saturation (%)	94.6		
	Void Ratio	0.93		
	Diameter (inches)	2.87		
	Height (inches)	5.61		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	10.00		
	Deviator Stress (psf)	1896		
	Shear Strength (psf)	948		
	Failure Strain (%)	12.8		
	σ_1 Failure (psf):	3336		
	σ_3 Failure (psf):	1440		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-16

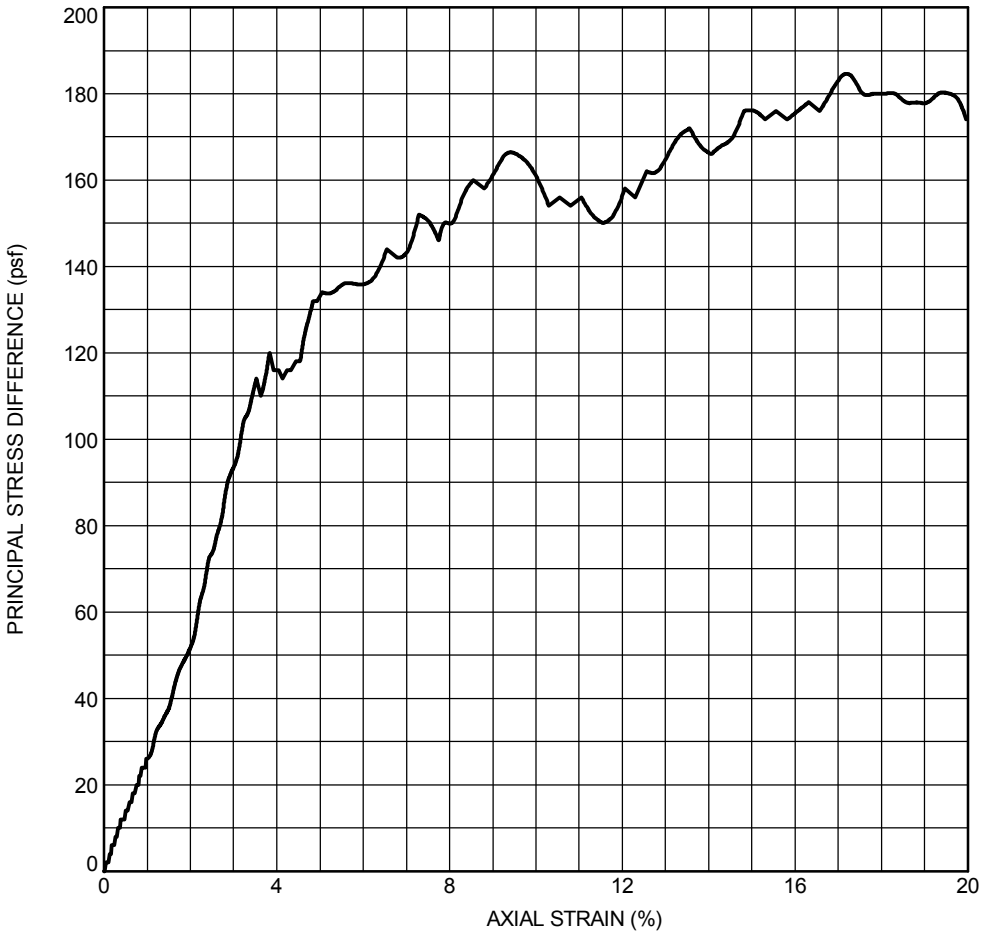
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-06 Depth: 1-2 ft.	Visual Classification: ORGANIC CLAY, dark brown, with peat layers
Sample Number: 1	
Project No.: 04.55184080 Test Date.: 4/4/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	107.9		
	Dry Density (pcf)	48.2		
	Saturation (%)	100.0		
	Void Ratio	2.24		
	Diameter (inches)	2.78		
	Height (inches)	5.57		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.50		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	1.00		
	Deviator Stress (psf)	176		
	Shear Strength (psf)	88		
	Failure Strain (%)	14.8		
	σ_1 Failure (psf):	320		
	σ_3 Failure (psf):	144		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-17

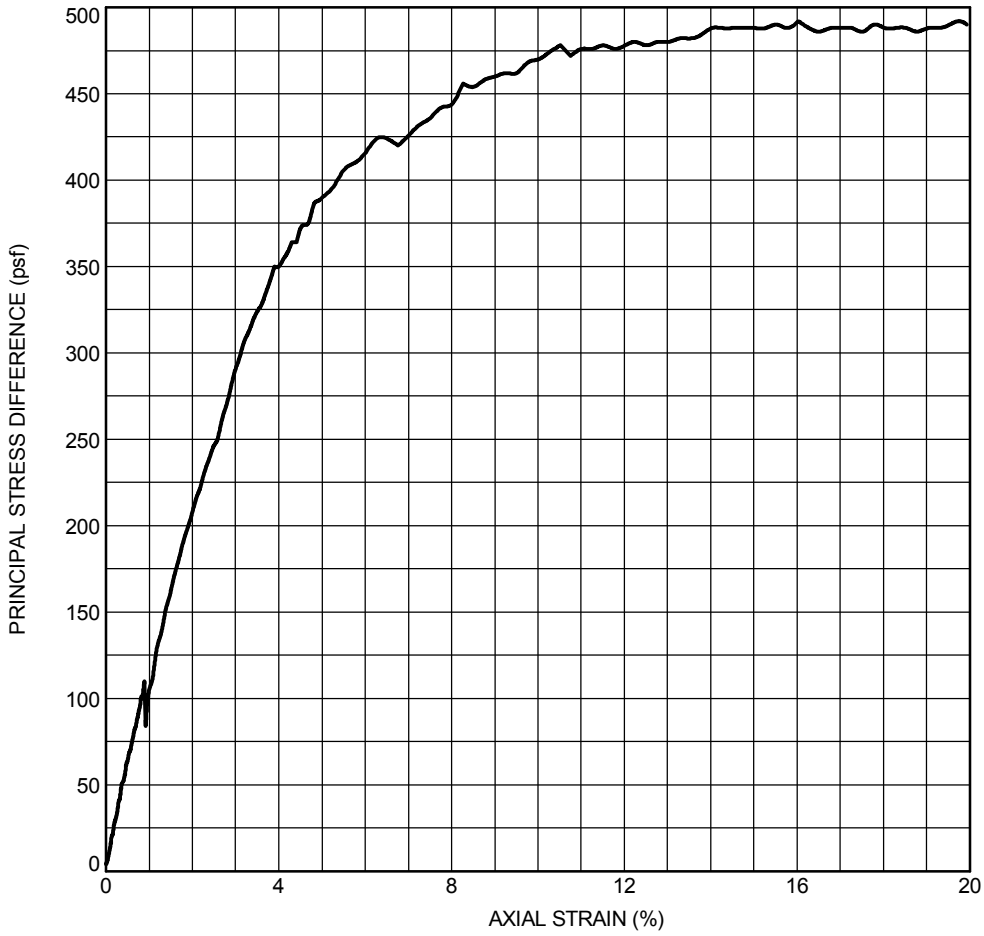
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-06 Depth: 11-12 ft.	Visual Classification: LEAN CLAY, gray, with sand
Sample Number: 6	
Project No.: 04.55184080 Test Date.: 4/4/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	48.0		
	Dry Density (pcf)	73.6		
	Saturation (%)	100.0		
	Void Ratio	1.29		
	Diameter (inches)	2.81		
	Height (inches)	5.58		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	3.00		
	Deviator Stress (psf)	488		
	Shear Strength (psf)	244		
	Failure Strain (%)	14.0		
	σ_1 Failure (psf):	920		
	σ_3 Failure (psf):	432		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-18

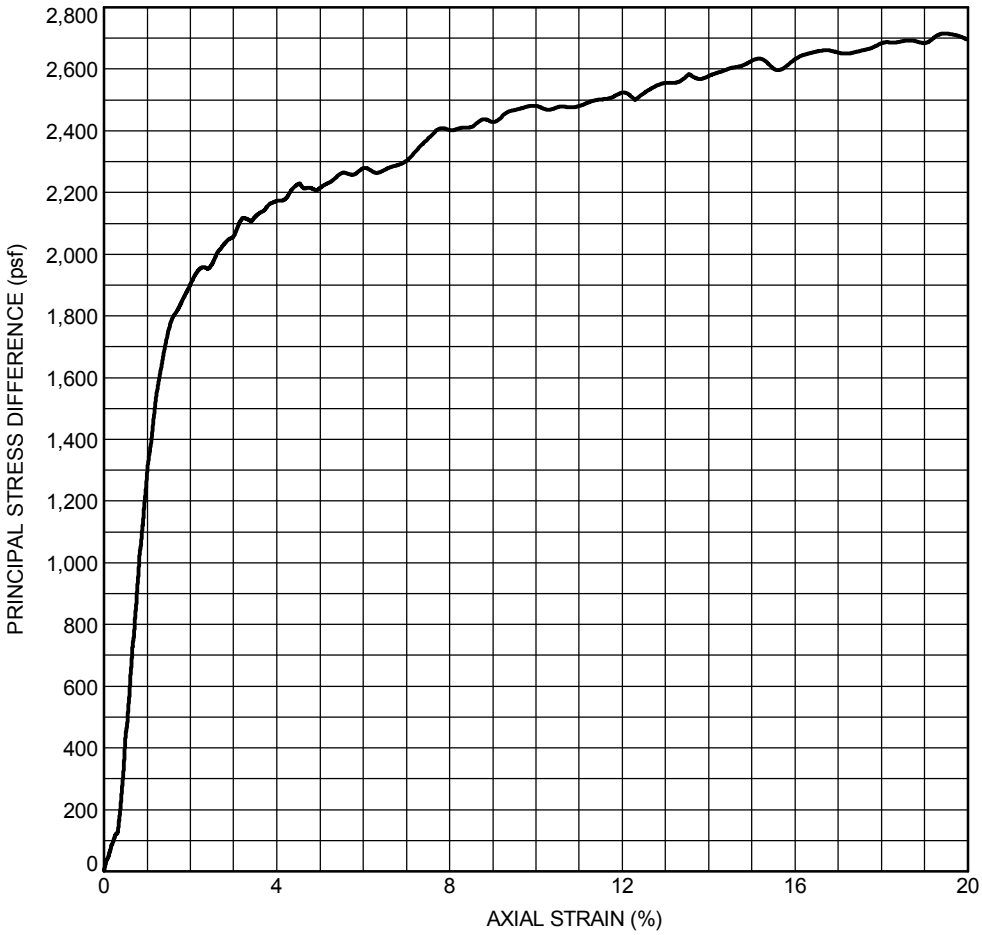
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-06 Depth: 24-25 ft.	Visual Classification: FAT CLAY, greenish gray and tan, with silt seams
Sample Number: 10	
Project No.: 04.55184080 Test Date.: 4/4/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	29.3		
	Dry Density (pcf)	93.9		
	Saturation (%)	99.3		
	Void Ratio	0.79		
	Diameter (inches)	2.86		
	Height (inches)	5.63		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	7.00		
	Deviator Stress (psf)	2627		
	Shear Strength (psf)	1314		
	Failure Strain (%)	15.0		
	σ_1 Failure (psf):	3635		
	σ_3 Failure (psf):	1008		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-19

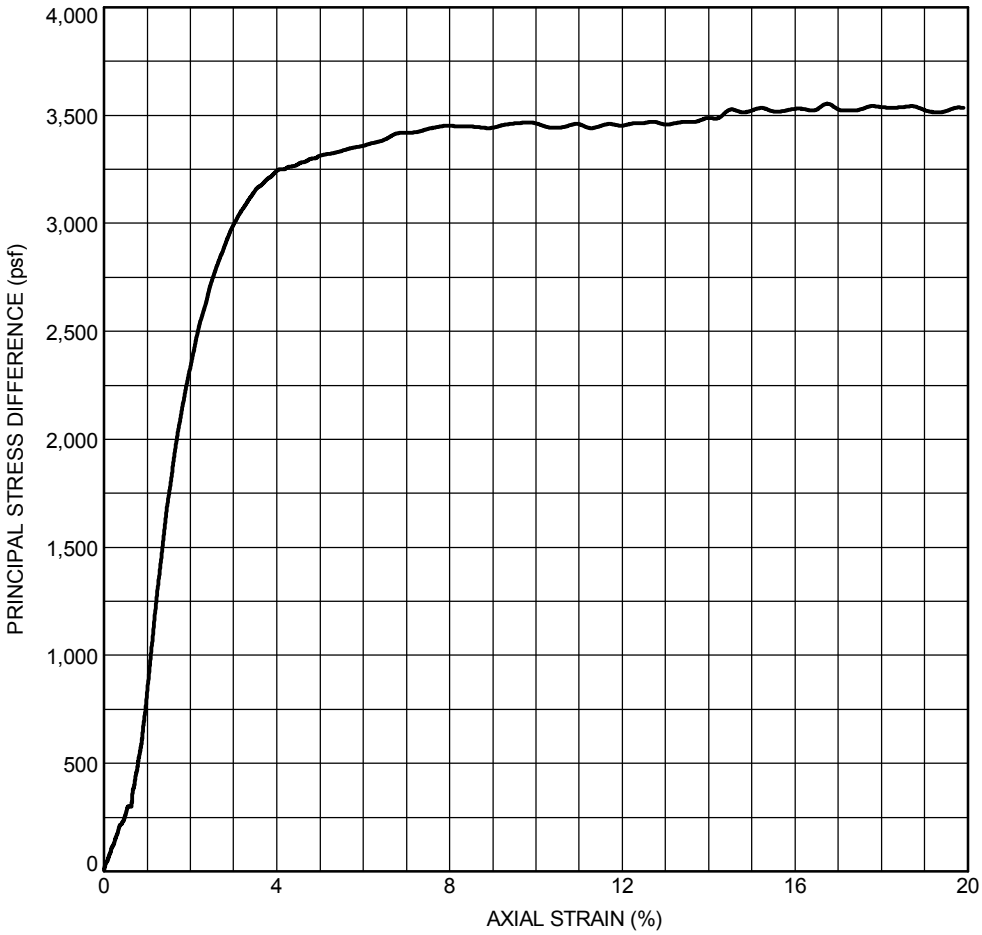
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-06 Depth: 34-35 ft.	Visual Classification: FAT CLAY, gray and tan, with wood fragments
Sample Number: 12	
Project No.: 04.55184080 Test Date.: 4/4/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	28.9		
	Dry Density (pcf)	95.4		
	Saturation (%)	100.0		
	Void Ratio	0.77		
	Diameter (inches)	2.86		
	Height (inches)	5.64		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	9.00		
	Deviator Stress (psf)	3523		
	Shear Strength (psf)	1761		
	Failure Strain (%)	15.0		
	σ_1 Failure (psf):	4819		
	σ_3 Failure (psf):	1296		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-20

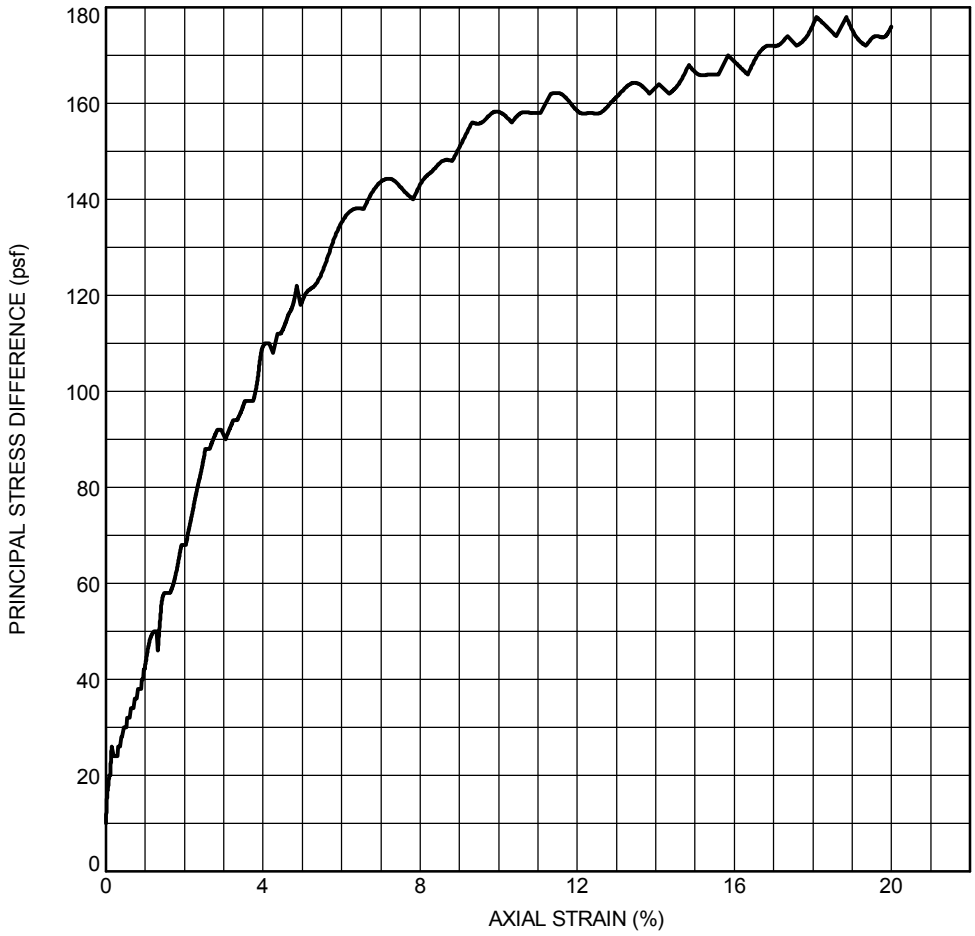
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-07 Depth: 3-4 ft.	Visual Classification: ORGANIC CLAY, dark brown, with peat
Sample Number: 2	
Project No.: 04.55184080 Test Date.: 4/4/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	229.5		
	Dry Density (pcf)	23.1		
	Saturation (%)	99.5		
	Void Ratio	5.77		
	Diameter (inches)	2.77		
	Height (inches)	5.56		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.50		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	1.00		
	Deviator Stress (psf)	168		
	Shear Strength (psf)	84		
	Failure Strain (%)	14.8		
	σ_1 Failure (psf):	312		
	σ_3 Failure (psf):	144		
	Failure Type:	Bulging		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-21

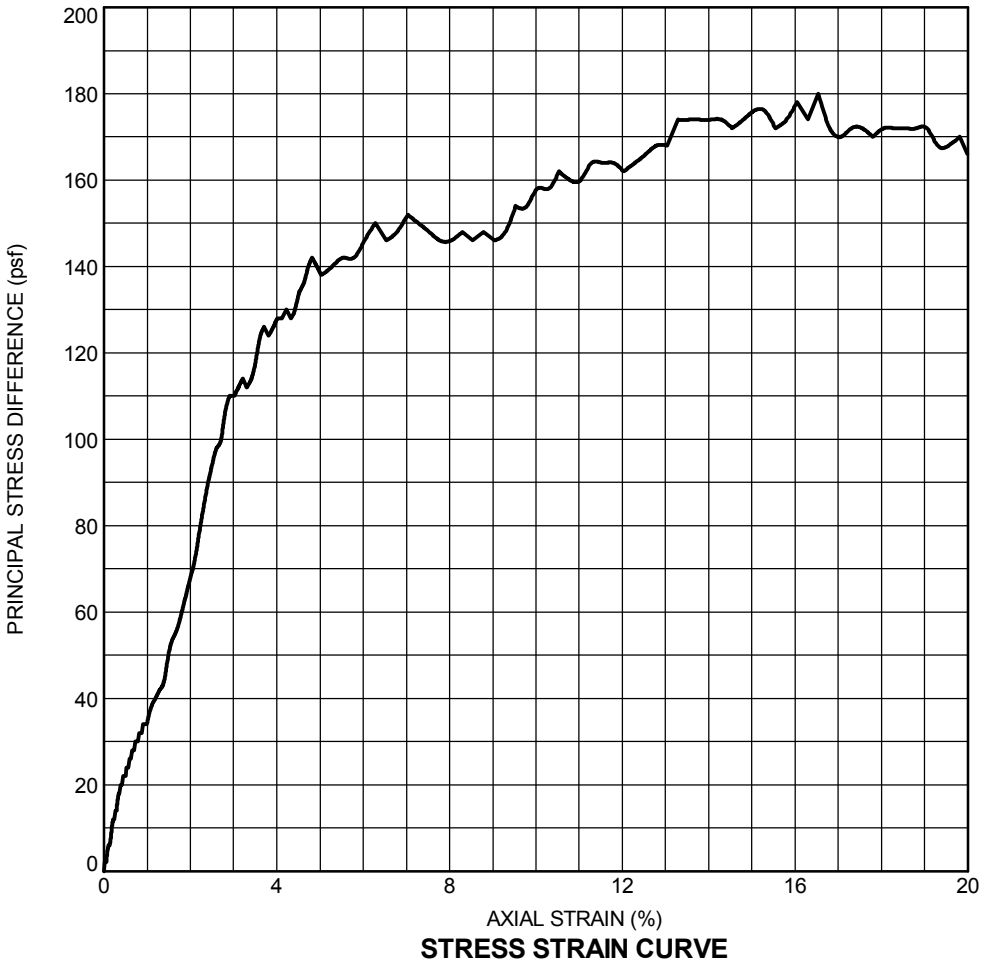
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-07 Depth: 7-8 ft.	Visual Classification: ORGANIC CLAY, dark brown, with peat
Sample Number: 4	
Project No.: 04.55184080 Test Date.: 4/4/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	151.0		
	Dry Density (pcf)	34.8		
	Saturation (%)	100.0		
	Void Ratio	3.48		
	Diameter (inches)	2.78		
	Height (inches)	5.59		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.50		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	2.00		
	Deviator Stress (psf)	176		
	Shear Strength (psf)	88		
	Failure Strain (%)	15.0		
	σ_1 Failure (psf):	464		
	σ_3 Failure (psf):	288		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-22

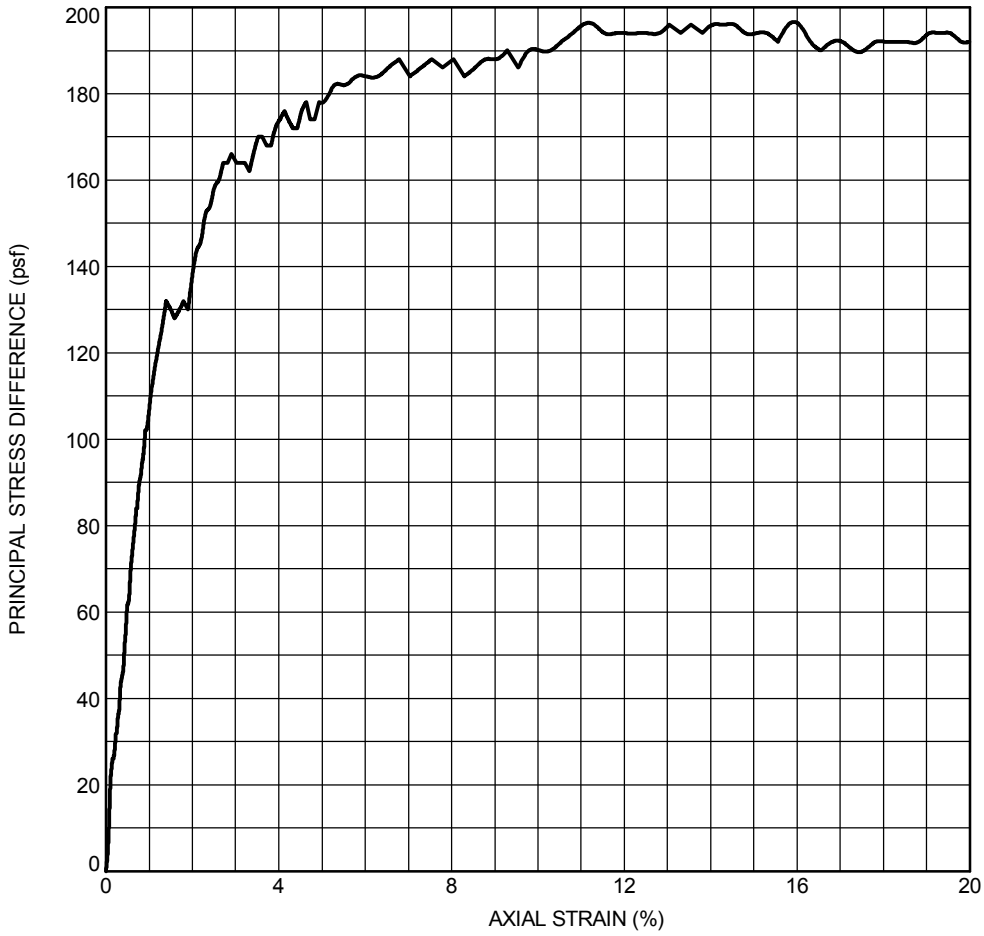
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-07 Depth: 13-14 ft.	Visual Classification: FAT CLAY, gray
Sample Number: 7	
Project No.: 04.55184080 Test Date.: 4/4/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	59.9		
	Dry Density (pcf)	67.4		
	Saturation (%)	100.0		
	Void Ratio	1.50		
	Diameter (inches)	2.76		
	Height (inches)	5.54		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	4.00		
	Deviator Stress (psf)	196		
	Shear Strength (psf)	98		
	Failure Strain (%)	11.0		
	σ_1 Failure (psf):	772		
	σ_3 Failure (psf):	576		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-23

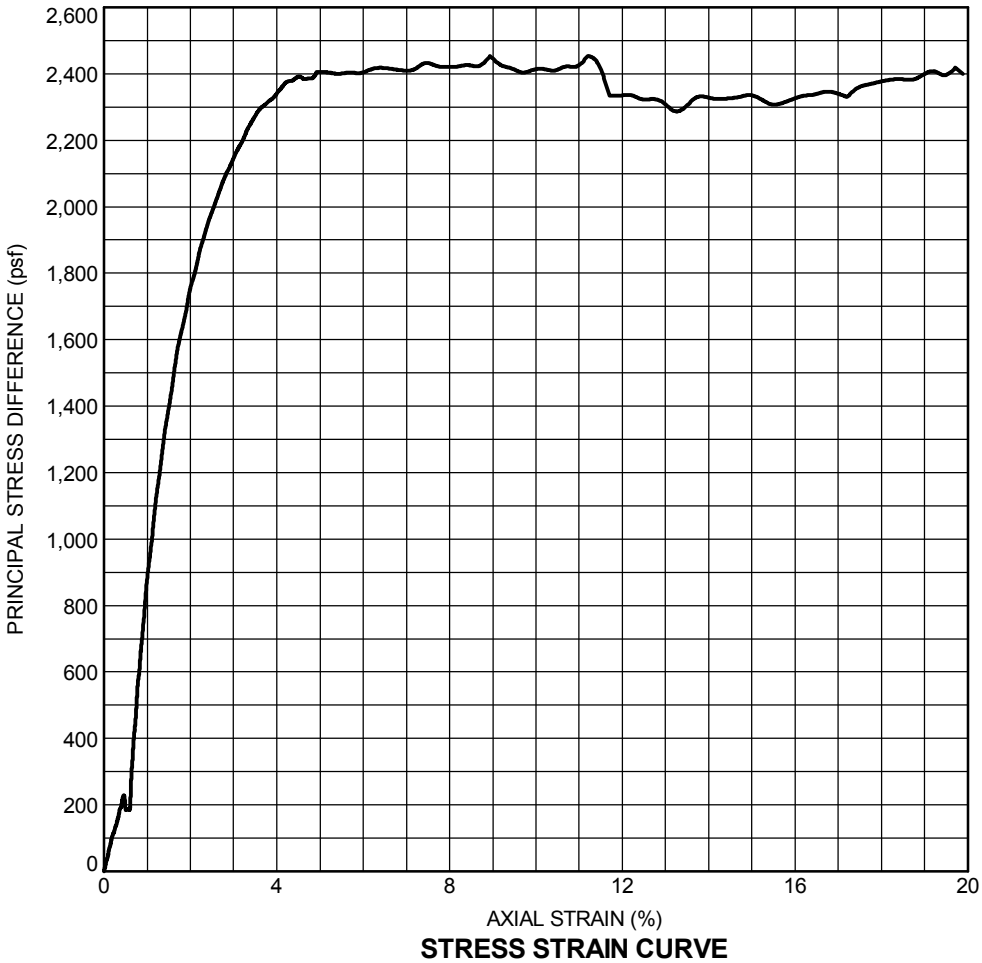
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-07 Depth: 29-30 ft.	Visual Classification: FAT CLAY, greenish gray, with sand and silt
Sample Number: 11	
Project No.: 04.55184080 Test Date.: 4/4/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	24.6		
	Dry Density (pcf)	96.5		
	Saturation (%)	88.9		
	Void Ratio	0.75		
	Diameter (inches)	2.87		
	Height (inches)	5.59		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	8.00		
	Deviator Stress (psf)	2454		
	Shear Strength (psf)	1227		
	Failure Strain (%)	8.9		
	σ_1 Failure (psf):	3606		
	σ_3 Failure (psf):	1152		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-24

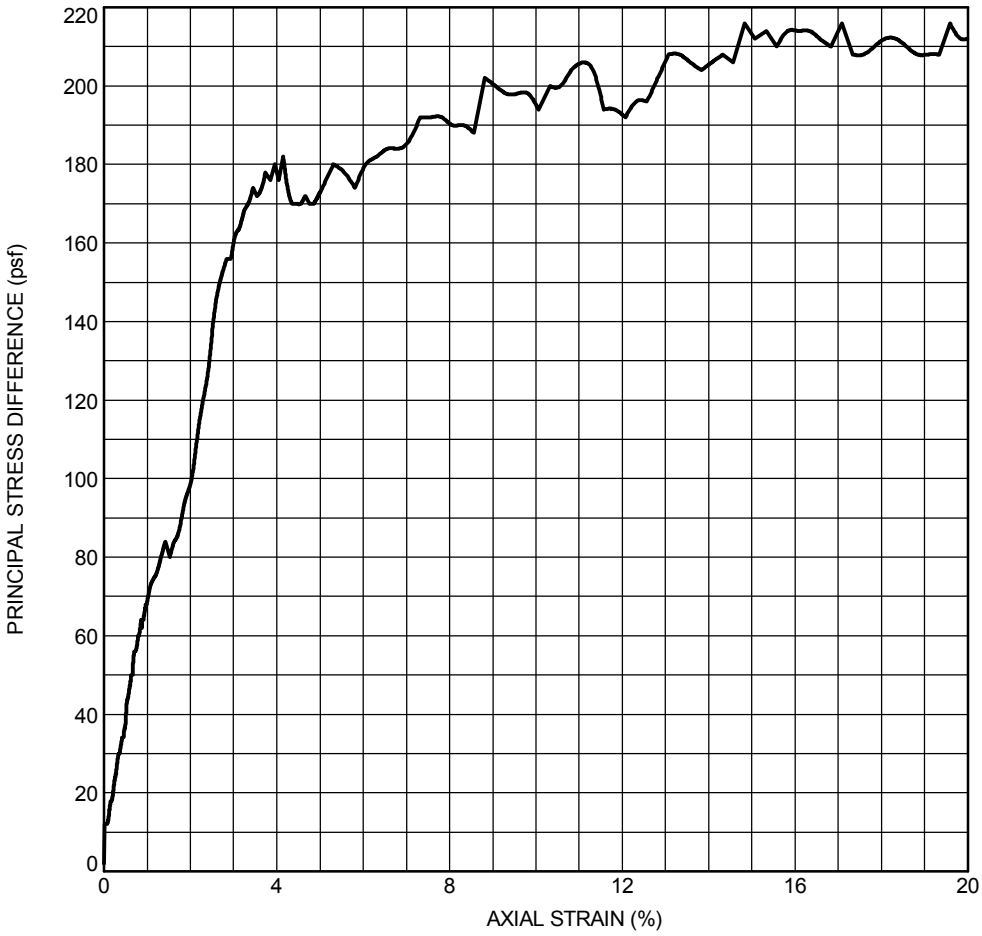
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-08 Depth: 3-4 ft.	Visual Classification: FAT CLAY, dark gray, with organics
Sample Number: 2	
Project No.: 04.55184080 Test Date.: 4/5/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	97.0		
	Dry Density (pcf)	48.4		
	Saturation (%)	100.0		
	Void Ratio	2.48		
	Diameter (inches)	2.79		
	Height (inches)	5.55		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	1.00		
	Deviator Stress (psf)	216		
	Shear Strength (psf)	108		
	Failure Strain (%)	14.8		
	σ_1 Failure (psf):	360		
	σ_3 Failure (psf):	144		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-25

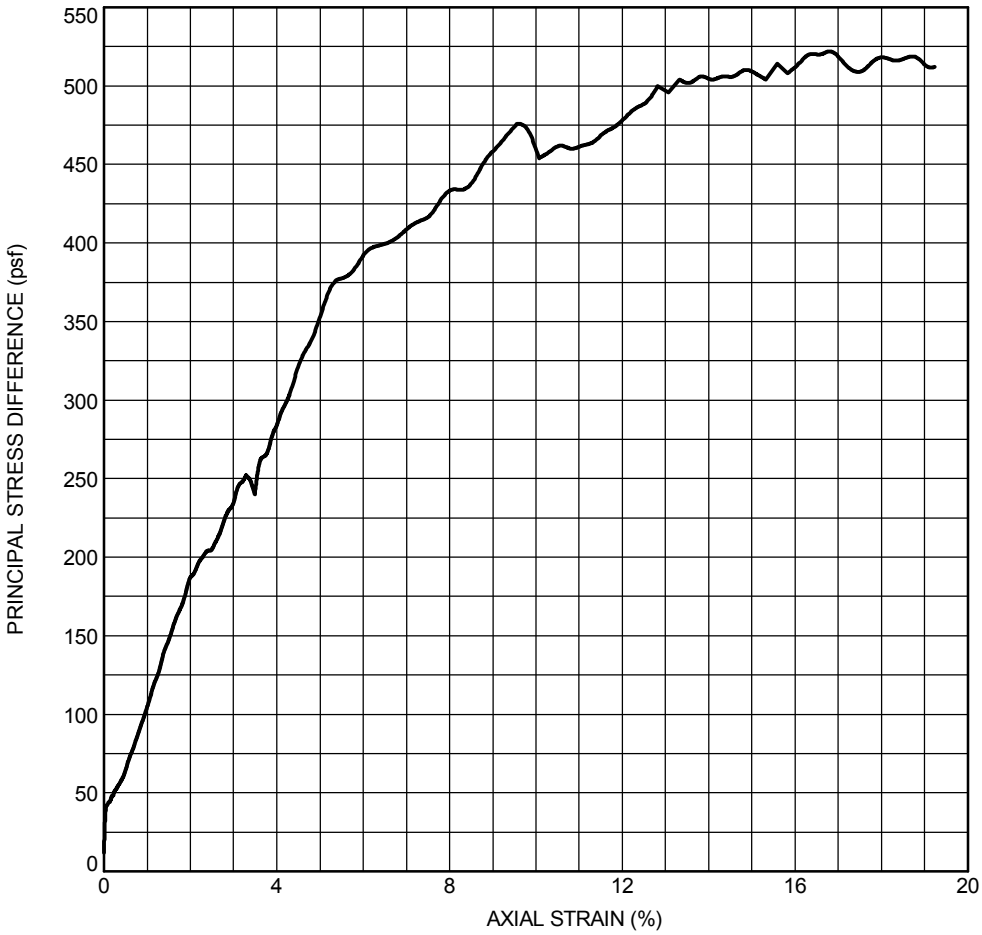
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-08 Depth: 7-8 ft.	Visual Classification: FAT CLAY, dark gray, with sand pockets
Sample Number: 4	
Project No.: 04.55184080 Test Date.: 4/5/2019	Organic Content (%) ASTM D2974: N/A

Sample No.	1 ●	2 ■	3 ▲
INITIAL Water Content (%)	42.0		
Dry Density (pcf)	80.5		
Saturation (%)	100.0		
Void Ratio	1.09		
Diameter (inches)	2.83		
Height (inches)	5.58		
% Passing #200 Sieve			
Specific Gravity (assumed)	2.70		
Strain Rate (%/min.)	1.0		
Cell Pressure (psi)	2.00		
Deviator Stress (psf)	510		
Shear Strength (psf)	255		
Failure Strain (%)	14.8		
σ_1 Failure (psf):	798		
σ_3 Failure (psf):	288		
Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-26

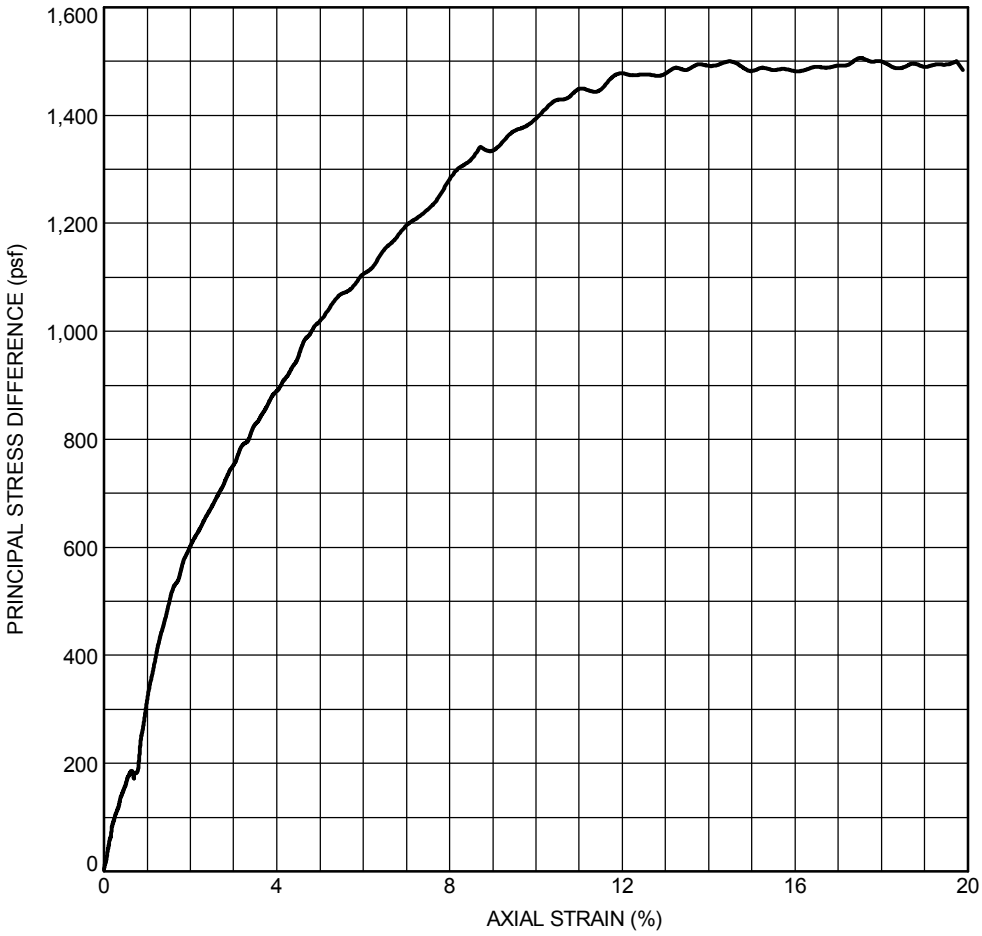
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-08 Depth: 19-20 ft.	Visual Classification: SANDY LEAN CLAY, greenish gray, with sand
Sample Number: 9	
Project No.: 04.55184080 Test Date.: 4/5/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	23.2		
	Dry Density (pcf)	103.4		
	Saturation (%)	99.6		
	Void Ratio	0.63		
	Diameter (inches)	2.85		
	Height (inches)	5.62		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	5.00		
	Deviator Stress (psf)	1500		
	Shear Strength (psf)	750		
	Failure Strain (%)	14.5		
	σ_1 Failure (psf):	2220		
	σ_3 Failure (psf):	720		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-27

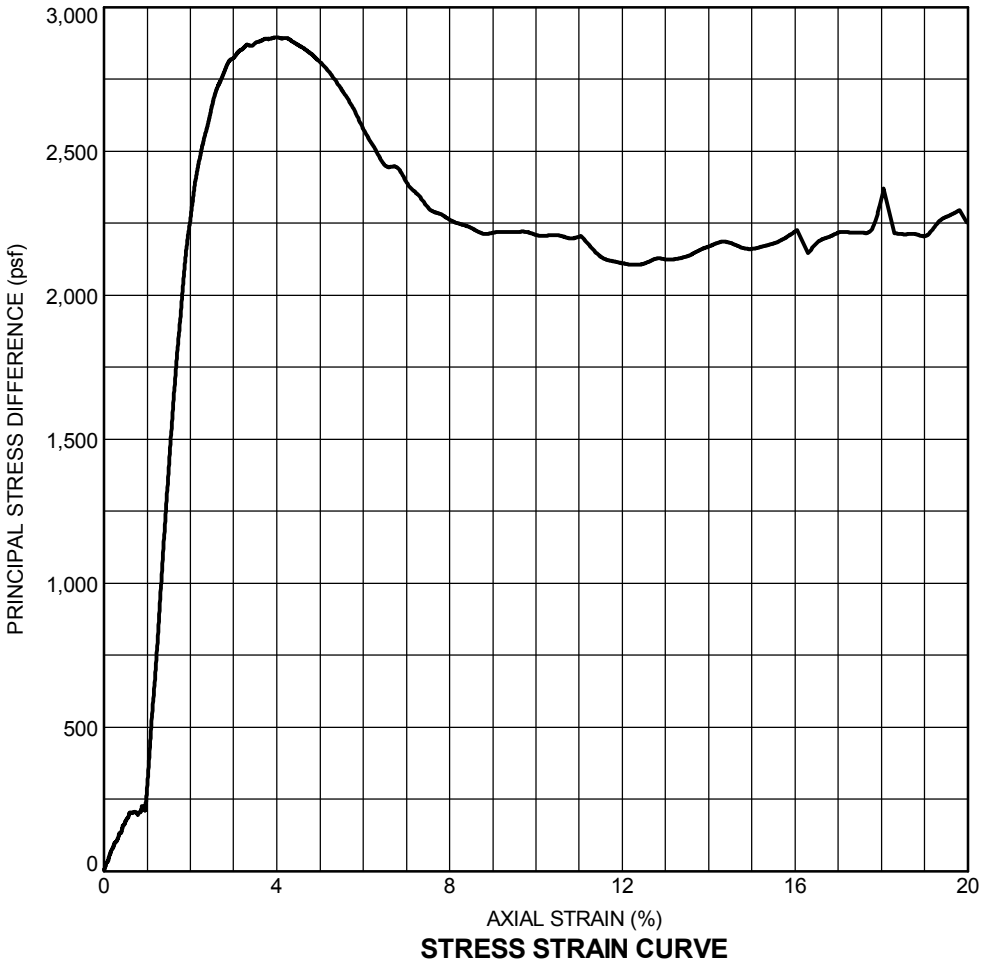
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-08 Depth: 39-40 ft.	Visual Classification: FAT CLAY, greenish gray and tan, with silt and shells
Sample Number: 13	
Project No.: 04.55184080 Test Date.: 4/8/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	42.9		
	Dry Density (pcf)	79.2		
	Saturation (%)	100.0		
	Void Ratio	1.13		
	Diameter (inches)	2.85		
	Height (inches)	5.55		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	11.00		
	Deviator Stress (psf)	2896		
	Shear Strength (psf)	1448		
	Failure Strain (%)	4.0		
	σ_1 Failure (psf):	4480		
	σ_3 Failure (psf):	1584		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-28

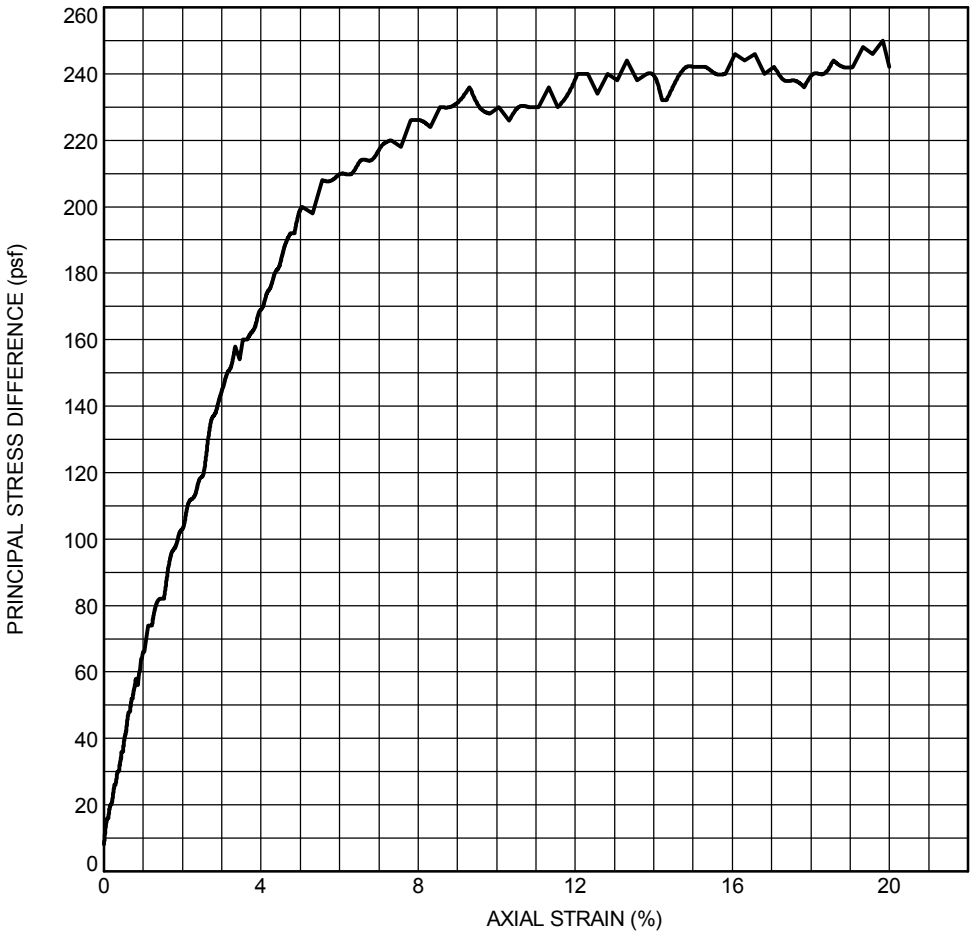
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-09 Depth: 3-4 ft.	Visual Classification: ORGANIC CLAY, dark brown, with peat
Sample Number: 2	
Project No.: 04.55184080 Test Date.: 4/9/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	138.1		
	Dry Density (pcf)	35.4		
	Saturation (%)	100.0		
	Void Ratio	3.41		
	Diameter (inches)	2.78		
	Height (inches)	5.54		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.50		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	1.00		
	Deviator Stress (psf)	244		
	Shear Strength (psf)	122		
	Failure Strain (%)	13.3		
	σ_1 Failure (psf):	388		
	σ_3 Failure (psf):	144		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-29

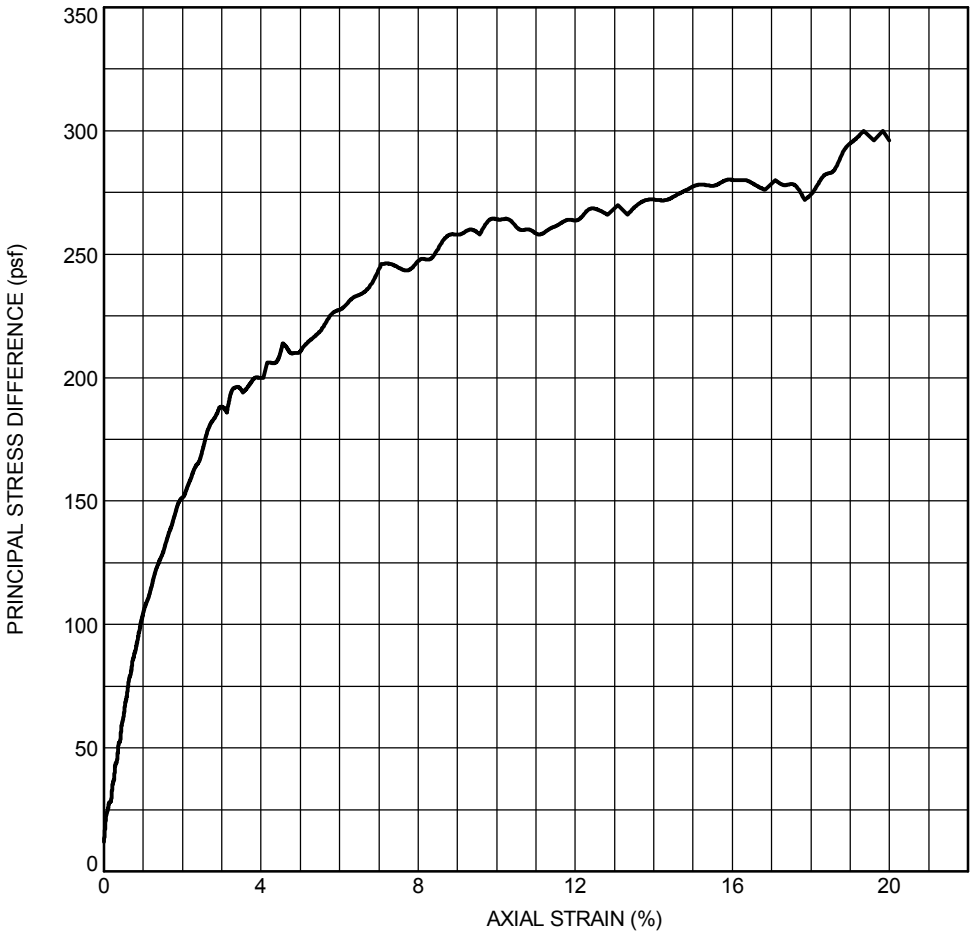
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-09 Depth: 9-10 ft.	Visual Classification: ORGANIC CLAY, dark brown and gray
Sample Number: 5	
Project No.: 04.55184080 Test Date.: 4/9/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	116.1		
	Dry Density (pcf)	42.1		
	Saturation (%)	100.0		
	Void Ratio	2.70		
	Diameter (inches)	2.82		
	Height (inches)	5.61		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.50		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	3.00		
	Deviator Stress (psf)	277		
	Shear Strength (psf)	139		
	Failure Strain (%)	15.0		
	σ_1 Failure (psf):	709		
	σ_3 Failure (psf):	432		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-30

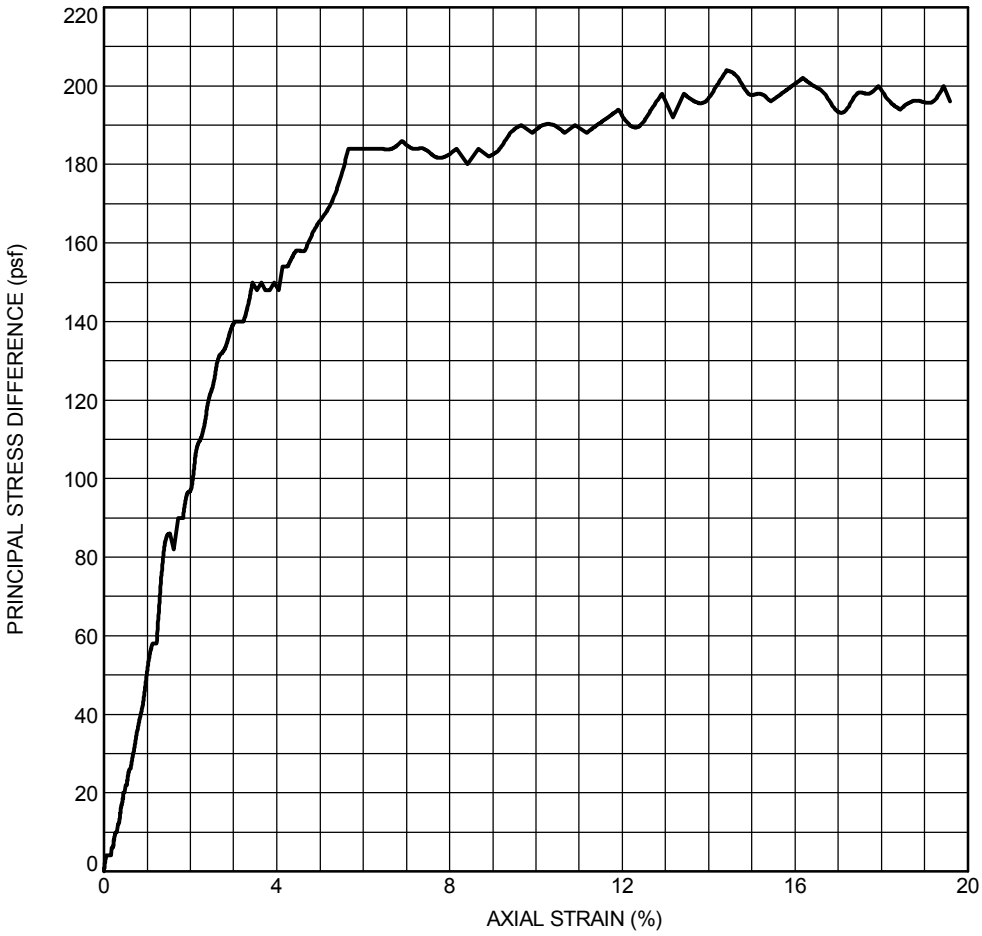
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-09 Depth: 15-16 ft.	Visual Classification: FAT CLAY, gray, with silt and sand
Sample Number: 8	
Project No.: 04.55184080 Test Date.: 4/9/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	74.1		
	Dry Density (pcf)	59.2		
	Saturation (%)	100.0		
	Void Ratio	1.85		
	Diameter (inches)	2.80		
	Height (inches)	5.53		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	4.00		
	Deviator Stress (psf)	204		
	Shear Strength (psf)	102		
	Failure Strain (%)	14.4		
	σ_1 Failure (psf):	780		
	σ_3 Failure (psf):	576		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-31

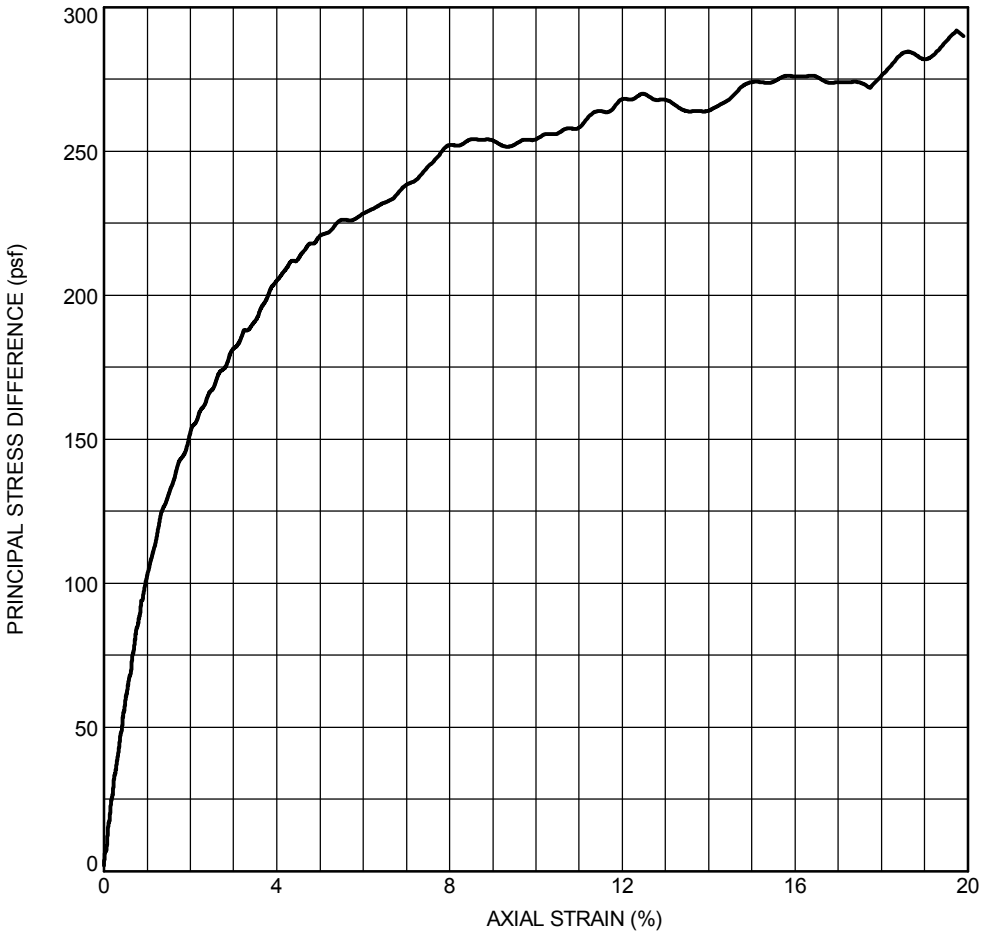
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-09 Depth: 24-25 ft.	Visual Classification: FAT CLAY, gray
Sample Number: 10	
Project No.: 04.55184080 Test Date.: 4/9/2019	Organic Content (%) ASTM D2974: N/A

Sample No.	1 ●	2 ■	3 ▲
INITIAL Water Content (%)	77.8		
Dry Density (pcf)	58.4		
Saturation (%)	100.0		
Void Ratio	1.88		
Diameter (inches)	2.80		
Height (inches)	5.57		
% Passing #200 Sieve			
Specific Gravity (assumed)	2.70		
Strain Rate (%/min.)	1.0		
Cell Pressure (psi)	7.00		
Deviator Stress (psf)	274		
Shear Strength (psf)	137		
Failure Strain (%)	15.0		
σ_1 Failure (psf):	1282		
σ_3 Failure (psf):	1008		
Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-32

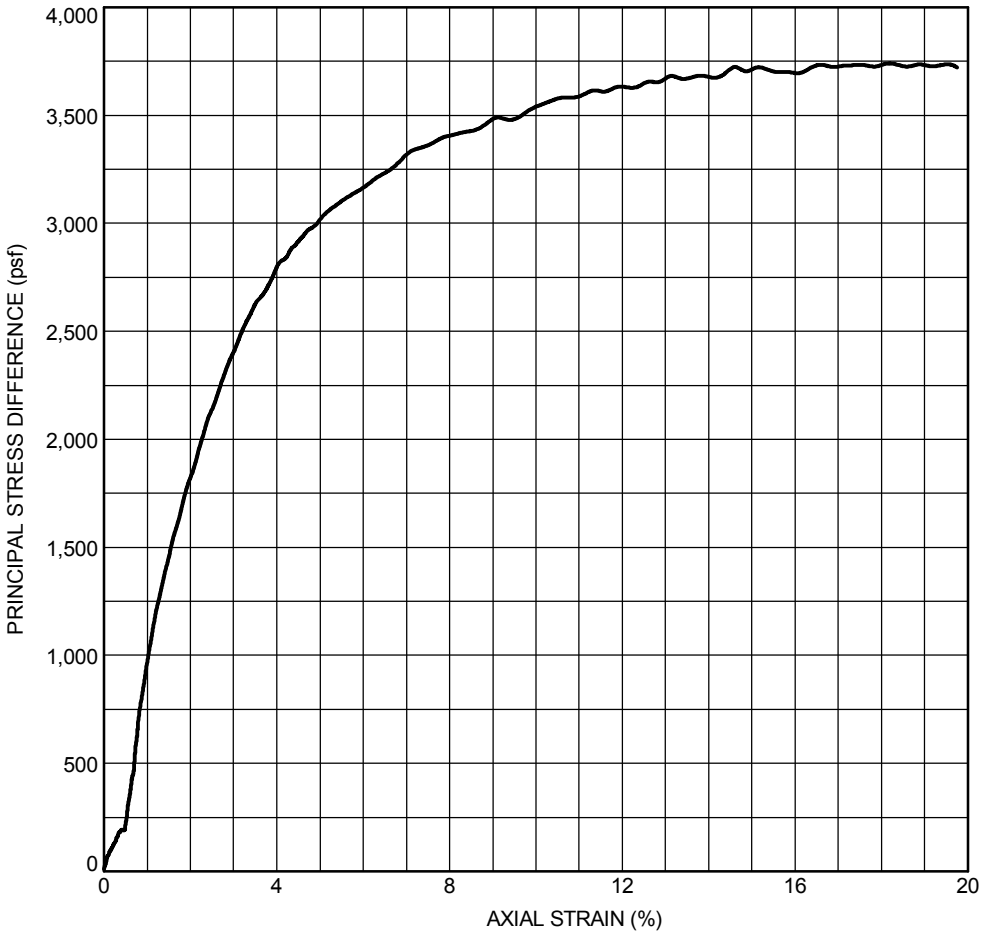
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-09 Depth: 44-45 ft.	Visual Classification: FAT CLAY, greenish gray
Sample Number: 14	
Project No.: 04.55184080 Test Date.: 4/9/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	28.2		
	Dry Density (pcf)	93.4		
	Saturation (%)	94.6		
	Void Ratio	0.80		
	Diameter (inches)	2.86		
	Height (inches)	5.56		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	12.00		
	Deviator Stress (psf)	3724		
	Shear Strength (psf)	1862		
	Failure Strain (%)	14.6		
	σ_1 Failure (psf):	5452		
	σ_3 Failure (psf):	1728		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-33

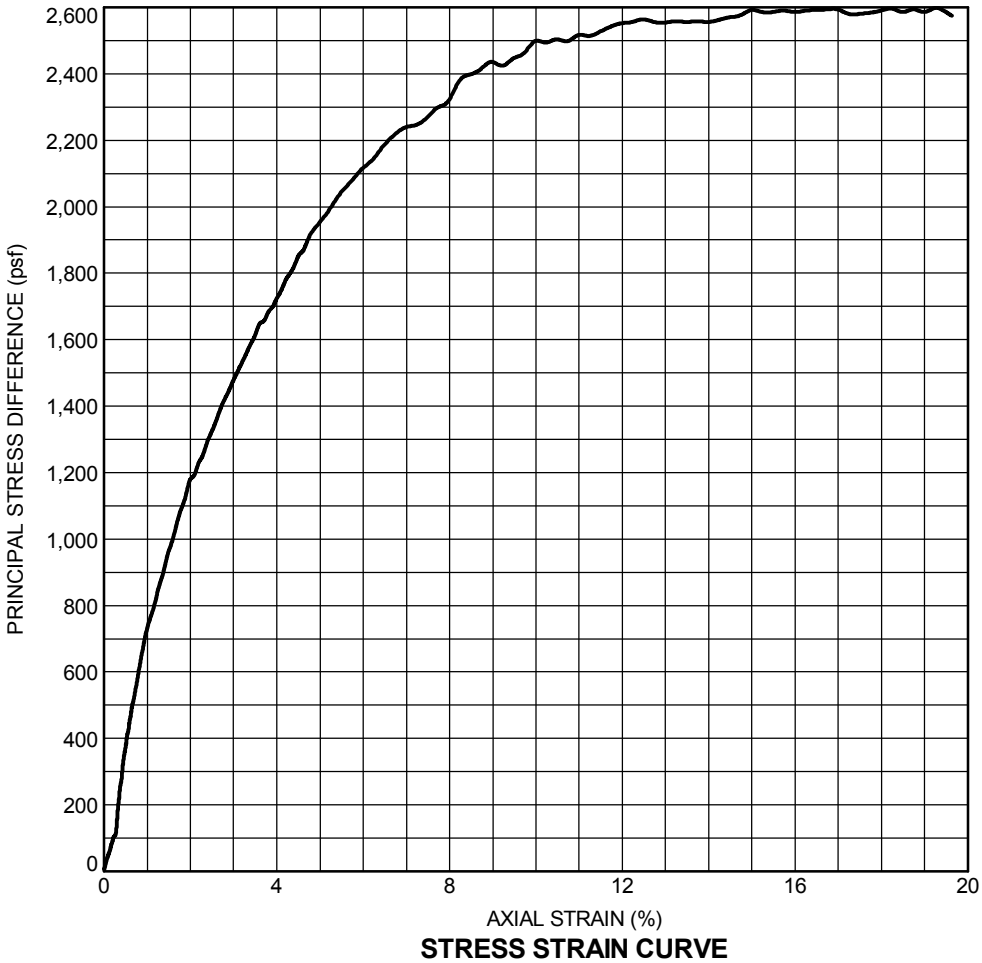
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-09 Depth: 59-60 ft.	Visual Classification: FAT CLAY, greenish gray and tan, with sandy silt seams and calcareous nodules
Sample Number: 17	
Project No.: 04.55184080 Test Date.: 4/9/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	28.3		
	Dry Density (pcf)	97.5		
	Saturation (%)	100.0		
	Void Ratio	0.73		
	Diameter (inches)	2.82		
	Height (inches)	5.61		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	16.00		
	Deviator Stress (psf)	2592		
	Shear Strength (psf)	1296		
	Failure Strain (%)	15.0		
	σ_1 Failure (psf):	4896		
	σ_3 Failure (psf):	2304		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-34

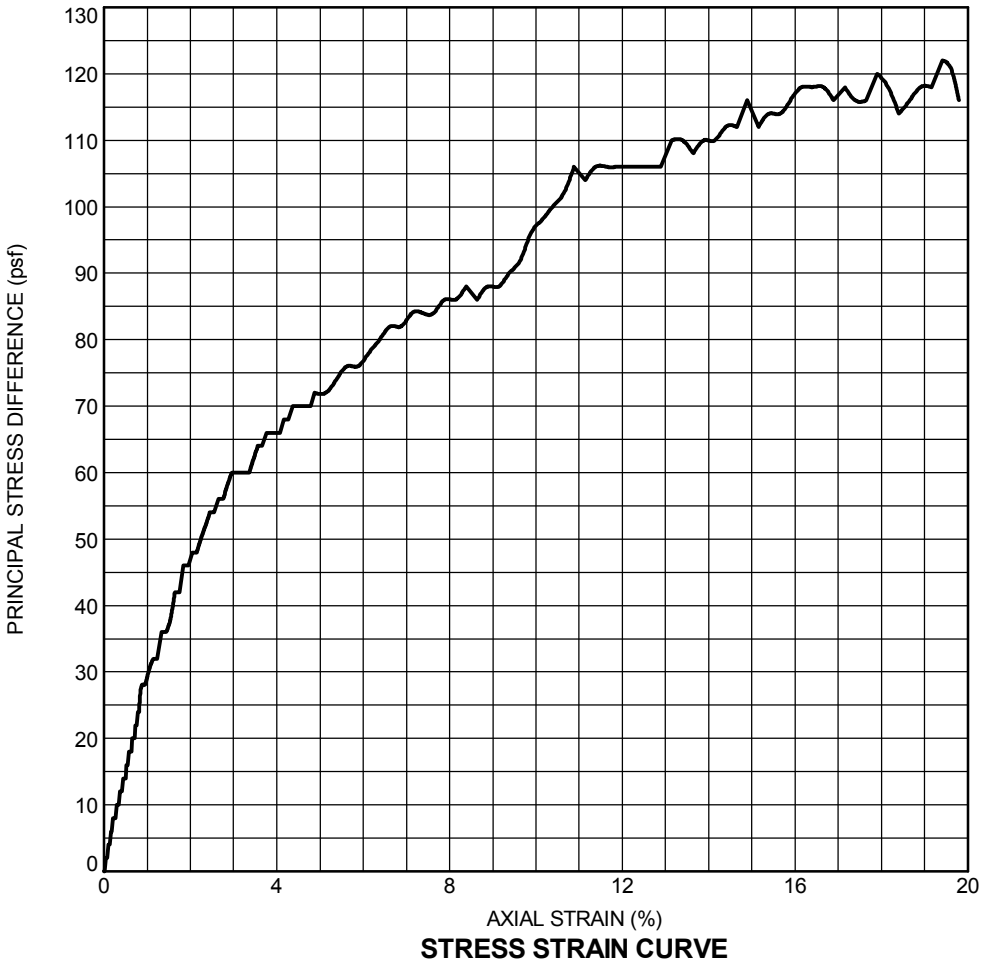
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-10 Depth: 5-6 ft.	Visual Classification: ORGANIC CLAY, dark brown, with peat
Sample Number: 3	
Project No.: 04.55184080 Test Date.: 4/10/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	294.3		
	Dry Density (pcf)	19.1		
	Saturation (%)	100.0		
	Void Ratio	7.15		
	Diameter (inches)	2.81		
	Height (inches)	5.62		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.50		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	2.00		
	Deviator Stress (psf)	116		
	Shear Strength (psf)	58		
	Failure Strain (%)	14.9		
	σ_1 Failure (psf):	404		
	σ_3 Failure (psf):	288		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-35

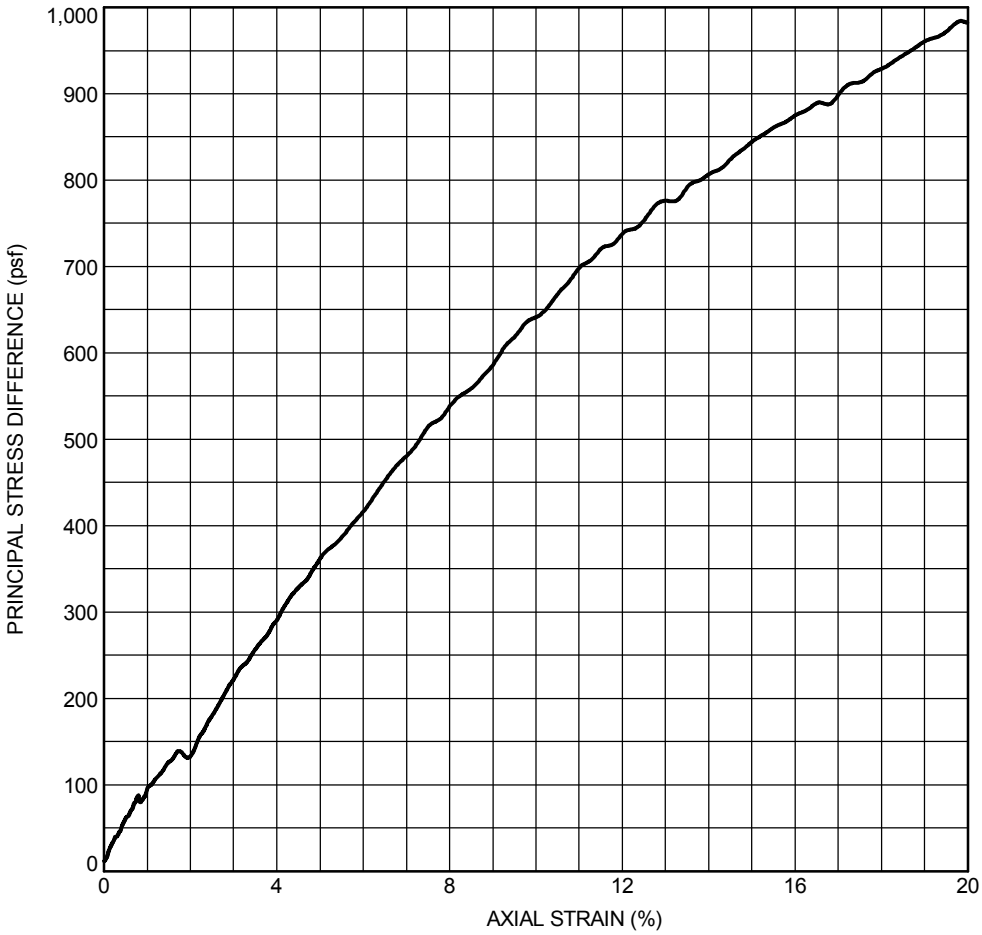
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-10 Depth: 9-10 ft.	Visual Classification: LEAN CLAY, gray, with sand
Sample Number: 5	
Project No.: 04.55184080 Test Date.: 4/10/2019	Organic Content (%) ASTM D2974: N/A

Sample No.	1 ●	2 ■	3 ▲
INITIAL Water Content (%)	36.2		
Dry Density (pcf)	86.7		
Saturation (%)	100.0		
Void Ratio	0.94		
Diameter (inches)	2.80		
Height (inches)	5.56		
% Passing #200 Sieve			
Specific Gravity (assumed)	2.70		
Strain Rate (%/min.)	1.0		
Cell Pressure (psi)	3.00		
Deviator Stress (psf)	844		
Shear Strength (psf)	422		
Failure Strain (%)	15.0		
σ_1 Failure (psf):	1276		
σ_3 Failure (psf):	432		
Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-36

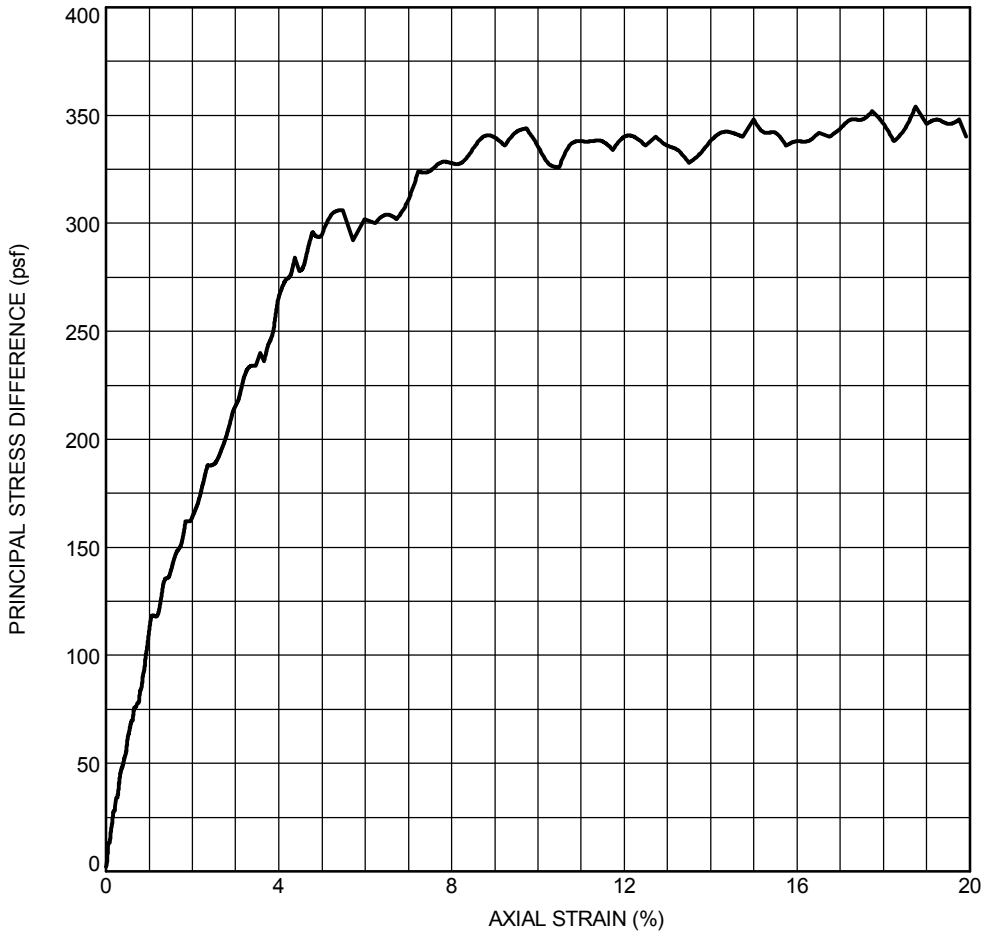
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-10 Depth: 15-16 ft.	Visual Classification: FAT CLAY, light gray, with sand partings
Sample Number: 8	
Project No.: 04.55184080 Test Date.: 4/10/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	51.4		
	Dry Density (pcf)	70.4		
	Saturation (%)	99.3		
	Void Ratio	1.39		
	Diameter (inches)	2.78		
	Height (inches)	5.56		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	4.00		
	Deviator Stress (psf)	348		
	Shear Strength (psf)	174		
	Failure Strain (%)	15.0		
	σ_1 Failure (psf):	924		
	σ_3 Failure (psf):	576		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-37

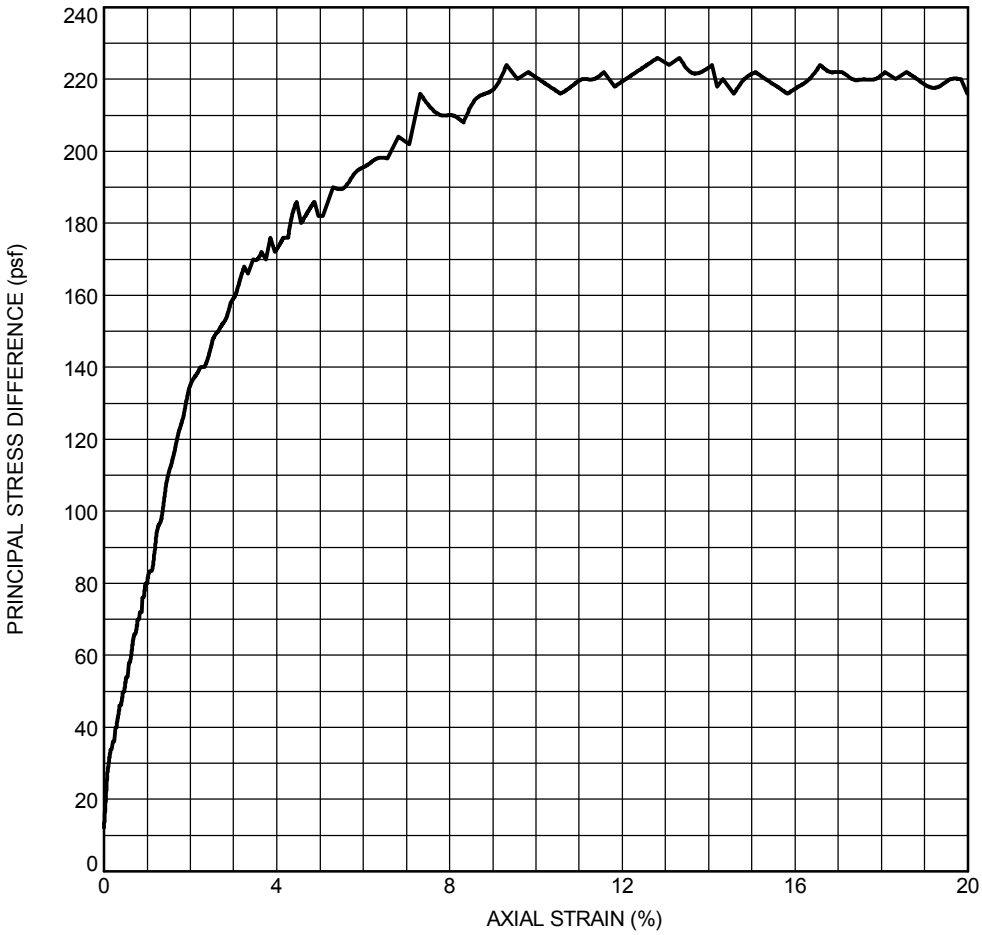
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-11 Depth: 3-4 ft.	Visual Classification: ORGANIC CLAY, dark gray, with peat
Sample Number: 2	
Project No.: 04.55184080 Test Date.: 4/10/2019	Organic Content (%) ASTM D2974: N/A

Sample No.	1 ●	2 ■	3 ▲
INITIAL Water Content (%)	115.5		
Dry Density (pcf)	40.2		
Saturation (%)	100.0		
Void Ratio	2.88		
Diameter (inches)	2.82		
Height (inches)	5.54		
% Passing #200 Sieve			
Specific Gravity (assumed)	2.50		
Strain Rate (%/min.)	1.0		
Cell Pressure (psi)	1.00		
Deviator Stress (psf)	226		
Shear Strength (psf)	113		
Failure Strain (%)	12.8		
σ_1 Failure (psf):	370		
σ_3 Failure (psf):	144		
Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-38

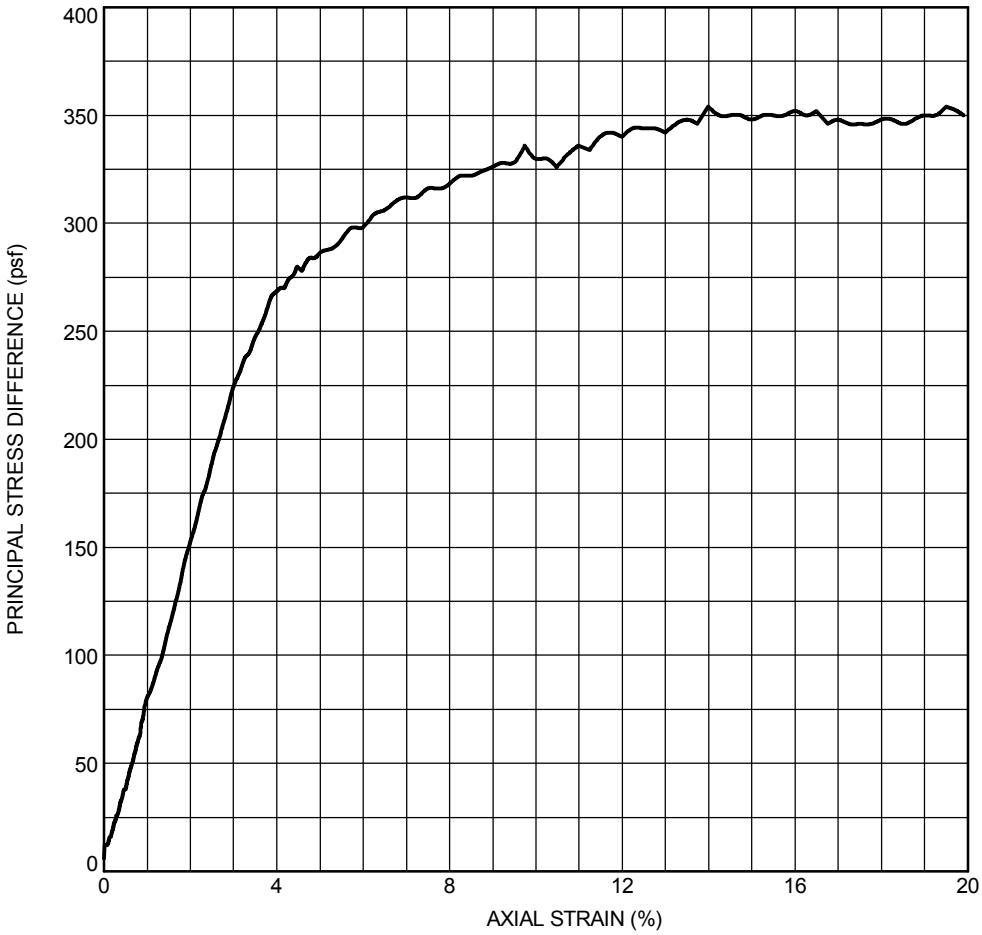
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-11 Depth: 13-14 ft.	Visual Classification: FAT CLAY, gray, with silt partings
Sample Number: 7	
Project No.: 04.55184080 Test Date.: 4/10/2019	Organic Content (%) ASTM D2974: N/A

Sample No.	1 ●	2 ■	3 ▲
INITIAL Water Content (%)	53.5		
Dry Density (pcf)	71.7		
Saturation (%)	100.0		
Void Ratio	1.35		
Diameter (inches)	2.80		
Height (inches)	5.51		
% Passing #200 Sieve			
Specific Gravity (assumed)	2.70		
Strain Rate (%/min.)	1.0		
Cell Pressure (psi)	4.00		
Deviator Stress (psf)	354		
Shear Strength (psf)	177		
Failure Strain (%)	14.0		
σ_1 Failure (psf):	930		
σ_3 Failure (psf):	576		
Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-39

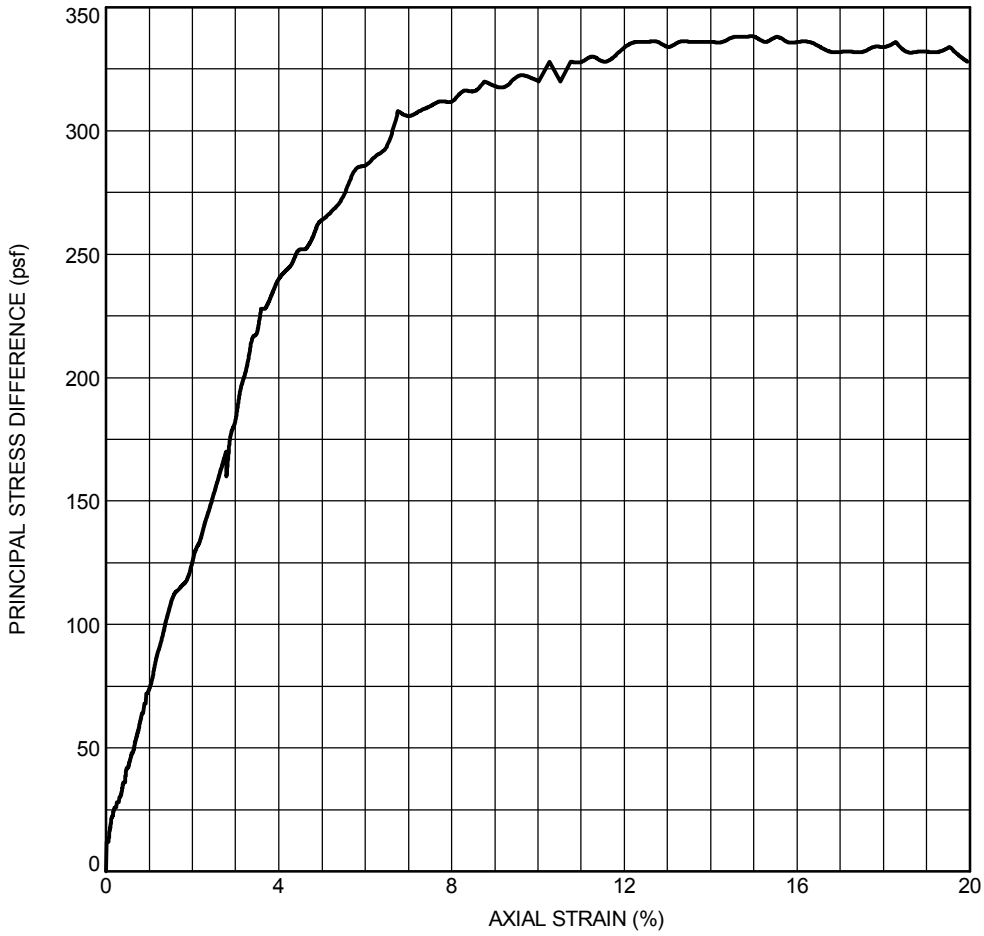
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-11 Depth: 19-20 ft.	Visual Classification: FAT CLAY, gray, with sandy silt partings
Sample Number: 9	
Project No.: 04.55184080 Test Date.: 4/10/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	65.3		
	Dry Density (pcf)	65.7		
	Saturation (%)	100.0		
	Void Ratio	1.56		
	Diameter (inches)	2.80		
	Height (inches)	5.53		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	5.00		
	Deviator Stress (psf)	338		
	Shear Strength (psf)	169		
	Failure Strain (%)	14.5		
	σ_1 Failure (psf):	1058		
	σ_3 Failure (psf):	720		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-40

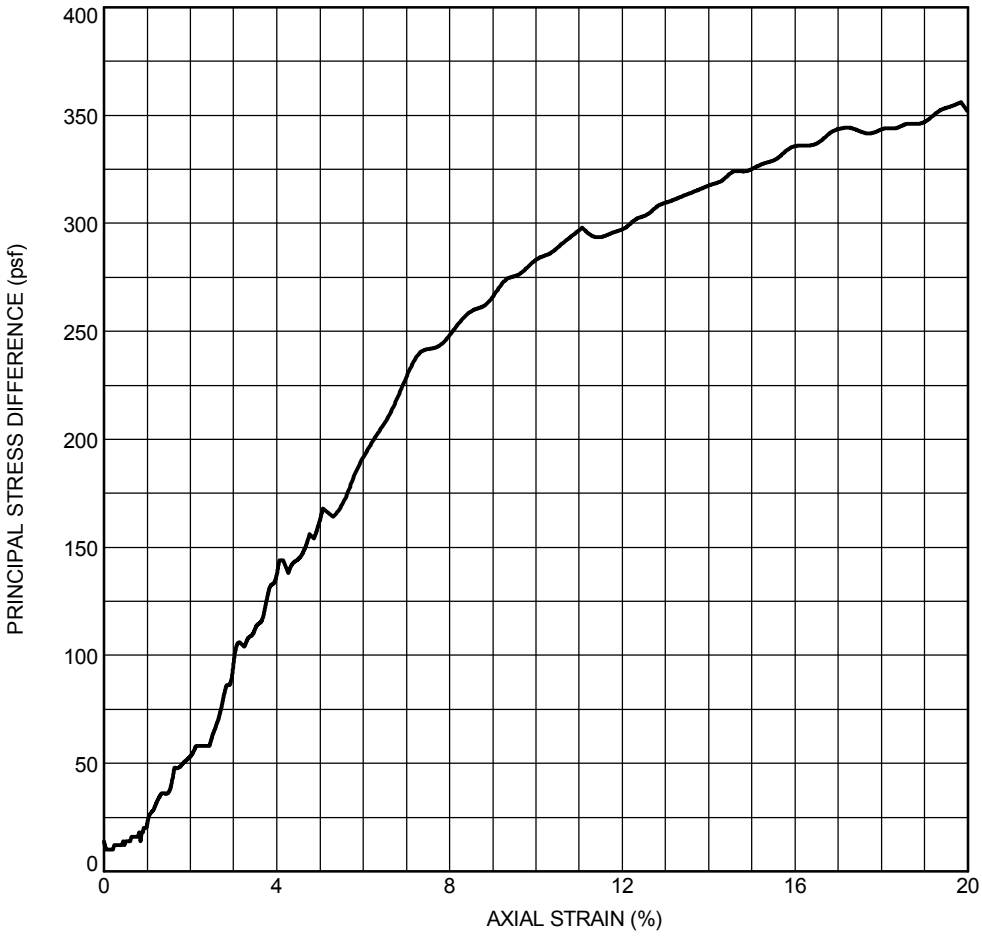
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-12 Depth: 5-6 ft.	Visual Classification: FAT CLAY, dark gray, with sandy silt and organics
Sample Number: 3	
Project No.: 04.55184080 Test Date.: 4/11/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	55.2		
	Dry Density (pcf)	69.5		
	Saturation (%)	100.0		
	Void Ratio	1.42		
	Diameter (inches)	2.84		
	Height (inches)	5.52		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	2.00		
	Deviator Stress (psf)	325		
	Shear Strength (psf)	163		
	Failure Strain (%)	15.0		
	σ_1 Failure (psf):	613		
	σ_3 Failure (psf):	288		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-41

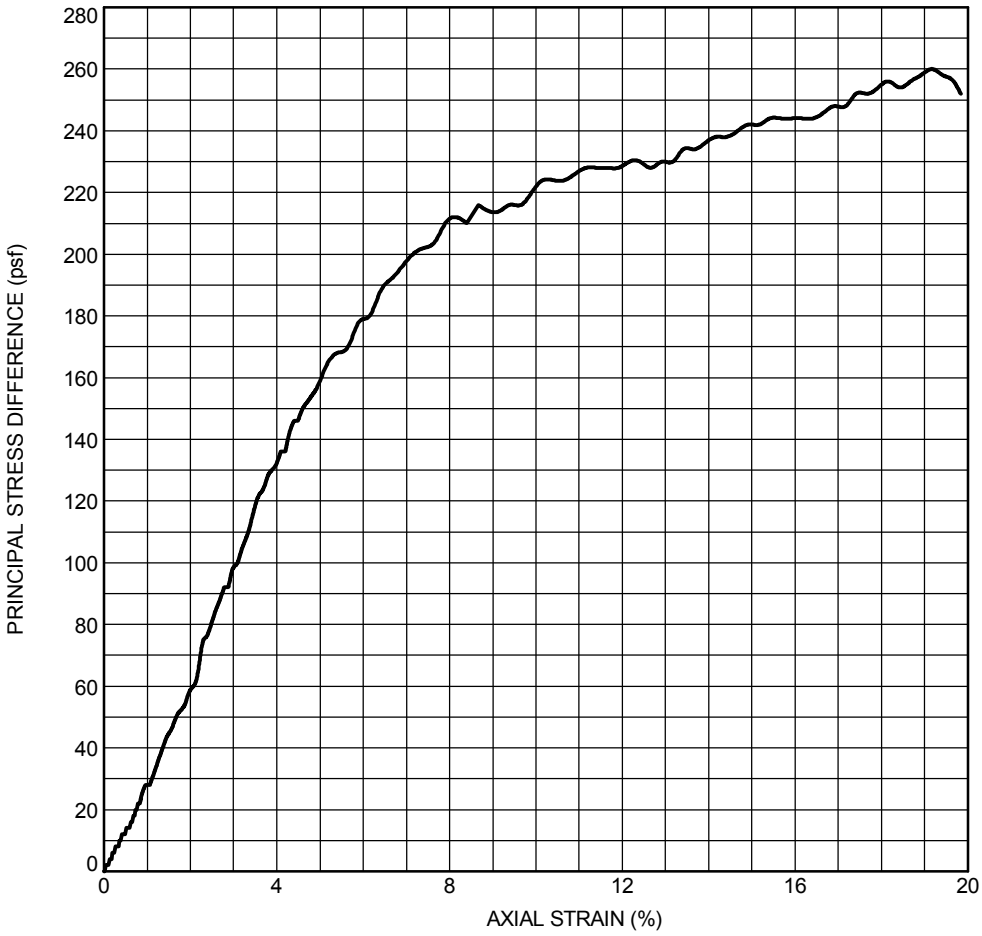
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-12 Depth: 11-12 ft.	Visual Classification: FAT CLAY, light gray, with sand
Sample Number: 6	
Project No.: 04.55184080 Test Date.: 4/11/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	37.1		
	Dry Density (pcf)	71.6		
	Saturation (%)	74.0		
	Void Ratio	1.35		
	Diameter (inches)	2.77		
	Height (inches)	5.55		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	3.00		
	Deviator Stress (psf)	242		
	Shear Strength (psf)	121		
	Failure Strain (%)	14.9		
	σ_1 Failure (psf):	674		
	σ_3 Failure (psf):	432		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-42

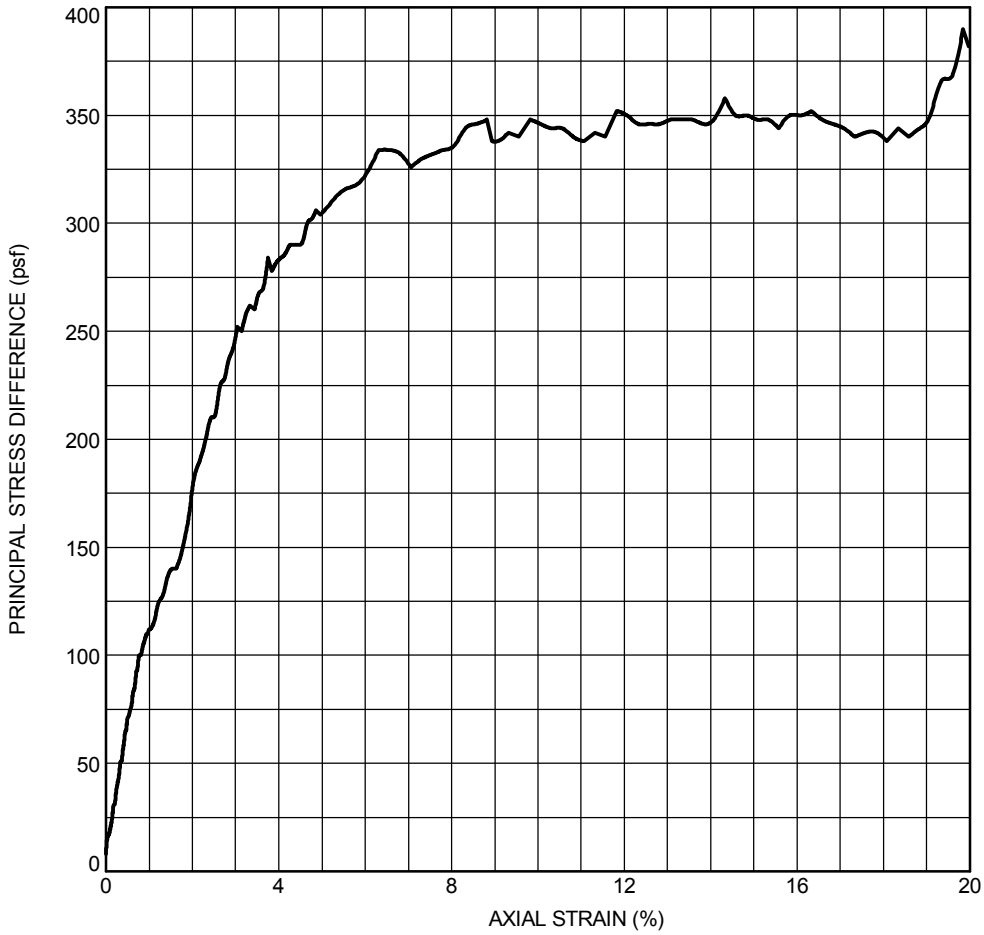
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-12 Depth: 14-15 ft.	Visual Classification: FAT CLAY, light gray, with shell fragments
Sample Number: 8	
Project No.: 04.55184080 Test Date.: 4/11/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	67.8		
	Dry Density (pcf)	62.8		
	Saturation (%)	100.0		
	Void Ratio	1.68		
	Diameter (inches)	2.76		
	Height (inches)	5.54		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	4.00		
	Deviator Stress (psf)	358		
	Shear Strength (psf)	179		
	Failure Strain (%)	14.3		
	σ_1 Failure (psf):	934		
	σ_3 Failure (psf):	576		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-43

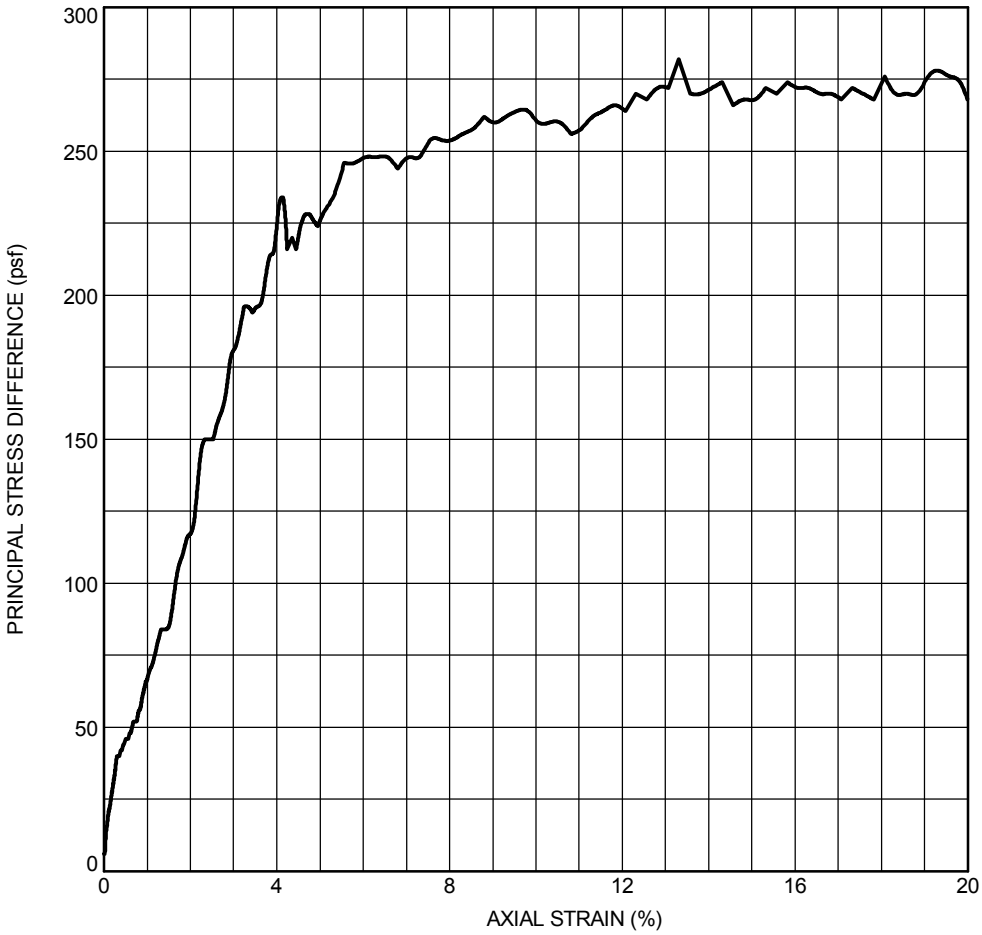
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-13 Depth: 3-4 ft.	Visual Classification: FAT CLAY, dark brown and gray
Sample Number: 2	
Project No.: 04.55184080 Test Date.: 4/11/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	47.0		
	Dry Density (pcf)	68.9		
	Saturation (%)	92.9		
	Void Ratio	1.26		
	Diameter (inches)	2.80		
	Height (inches)	5.57		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.50		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	1.00		
	Deviator Stress (psf)	282		
	Shear Strength (psf)	141		
	Failure Strain (%)	13.3		
	σ_1 Failure (psf):	426		
	σ_3 Failure (psf):	144		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-44

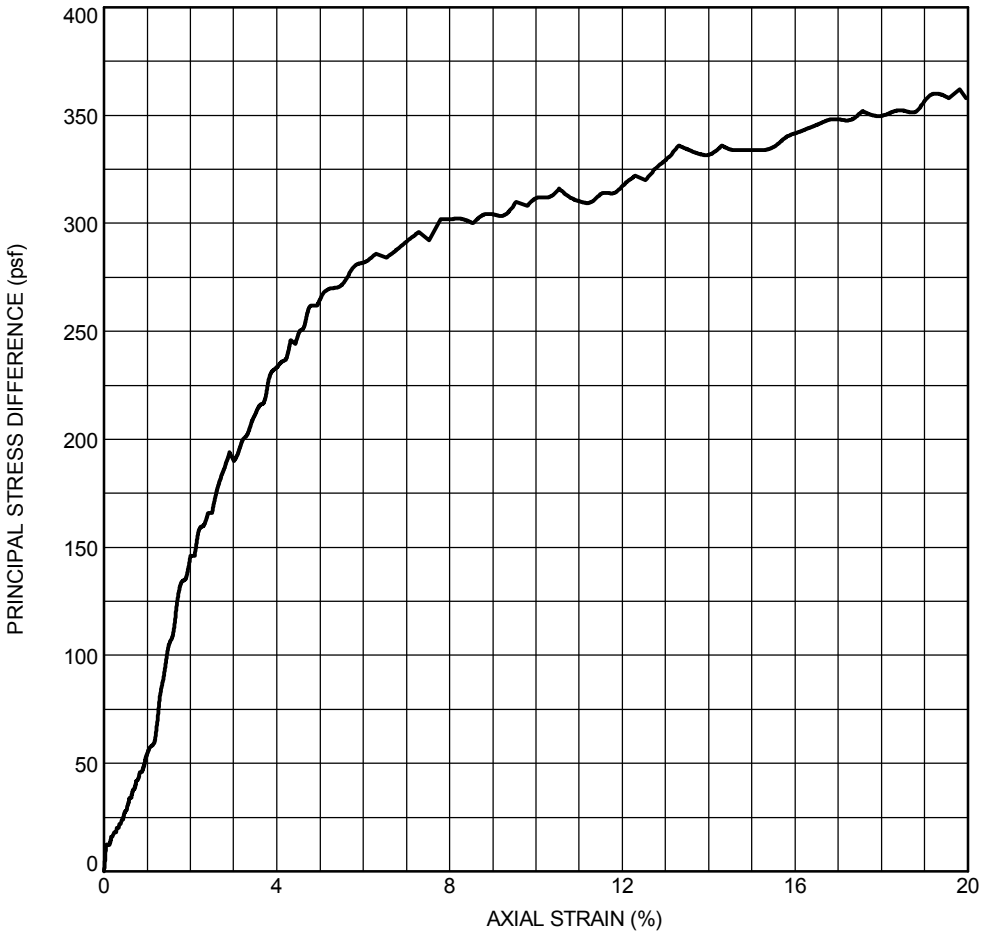
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-13 Depth: 9-10 ft.	Visual Classification: LEAN CLAY, light gray, with sand pockets
Sample Number: 5	
Project No.: 04.55184080 Test Date.: 4/11/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	57.0		
	Dry Density (pcf)	70.8		
	Saturation (%)	100.0		
	Void Ratio	1.38		
	Diameter (inches)	2.83		
	Height (inches)	5.52		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	3.00		
	Deviator Stress (psf)	336		
	Shear Strength (psf)	168		
	Failure Strain (%)	13.3		
	σ_1 Failure (psf):	768		
	σ_3 Failure (psf):	432		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-45

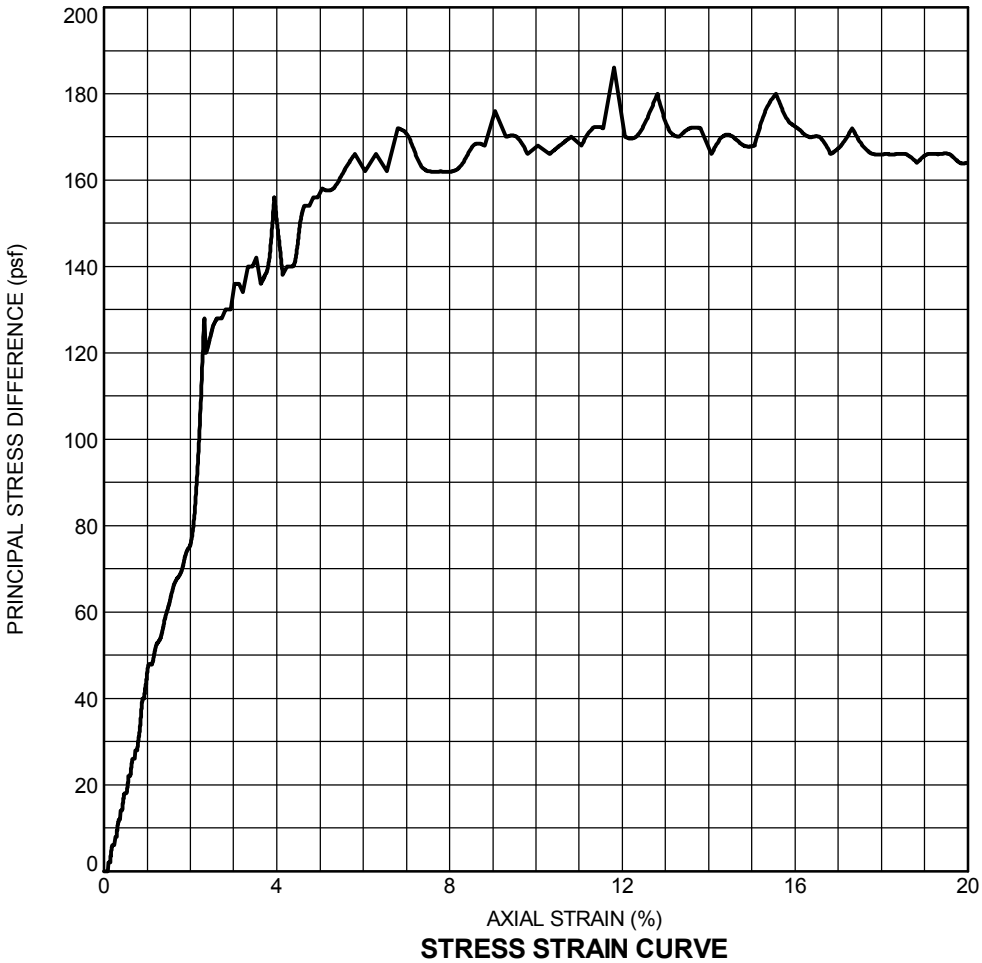
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-14 Depth: 5-6 ft.	Visual Classification: FAT CLAY, dark gray and brown
Sample Number: 3	
Project No.: 04.55184080 Test Date.: 4/12/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	87.9		
	Dry Density (pcf)	47.1		
	Saturation (%)	92.2		
	Void Ratio	2.57		
	Diameter (inches)	2.82		
	Height (inches)	5.58		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	2.00		
	Deviator Stress (psf)	186		
	Shear Strength (psf)	93		
	Failure Strain (%)	11.8		
	σ_1 Failure (psf):	474		
	σ_3 Failure (psf):	288		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-46

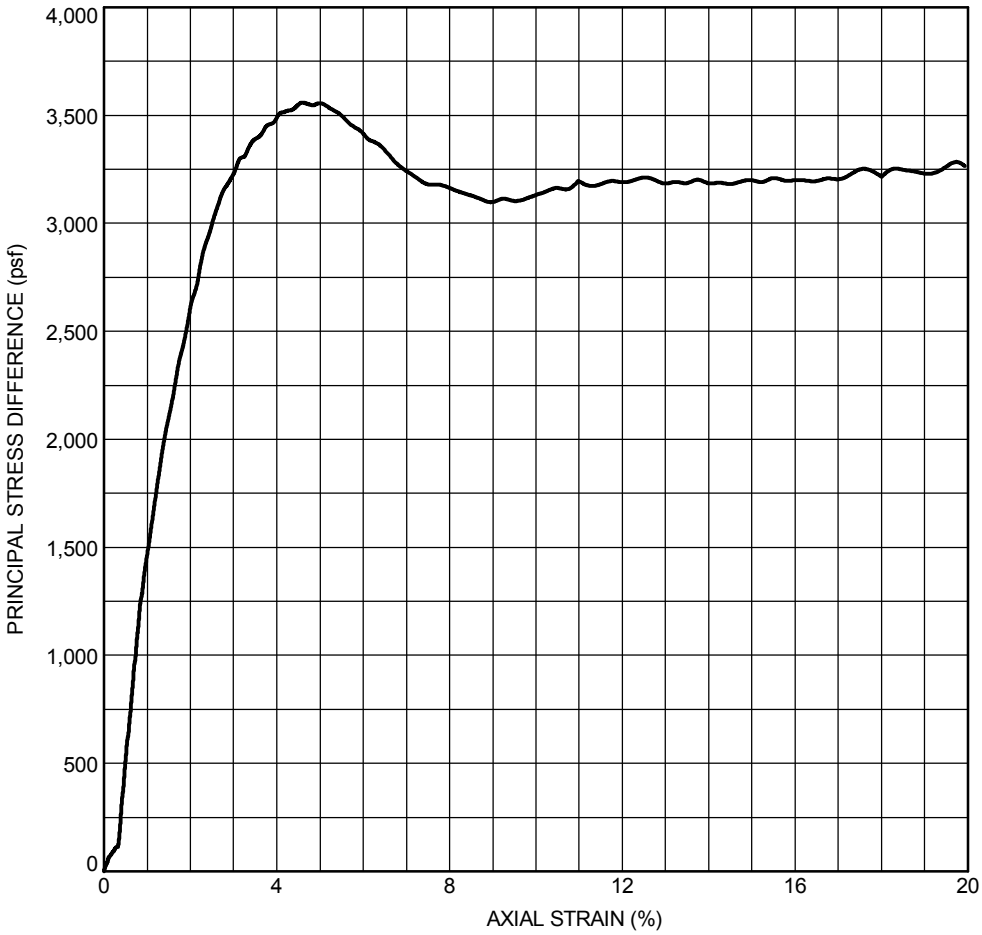
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-14 Depth: 38-39 ft.	Visual Classification: LEAN CLAY, tan and gray
Sample Number: 13	
Project No.: 04.55184080 Test Date.: 4/12/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	29.4		
	Dry Density (pcf)	94.7		
	Saturation (%)	100.0		
	Void Ratio	0.78		
	Diameter (inches)	2.84		
	Height (inches)	5.58		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	10.00		
	Deviator Stress (psf)	3558		
	Shear Strength (psf)	1779		
	Failure Strain (%)	4.6		
	σ_1 Failure (psf):	4998		
	σ_3 Failure (psf):	1440		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

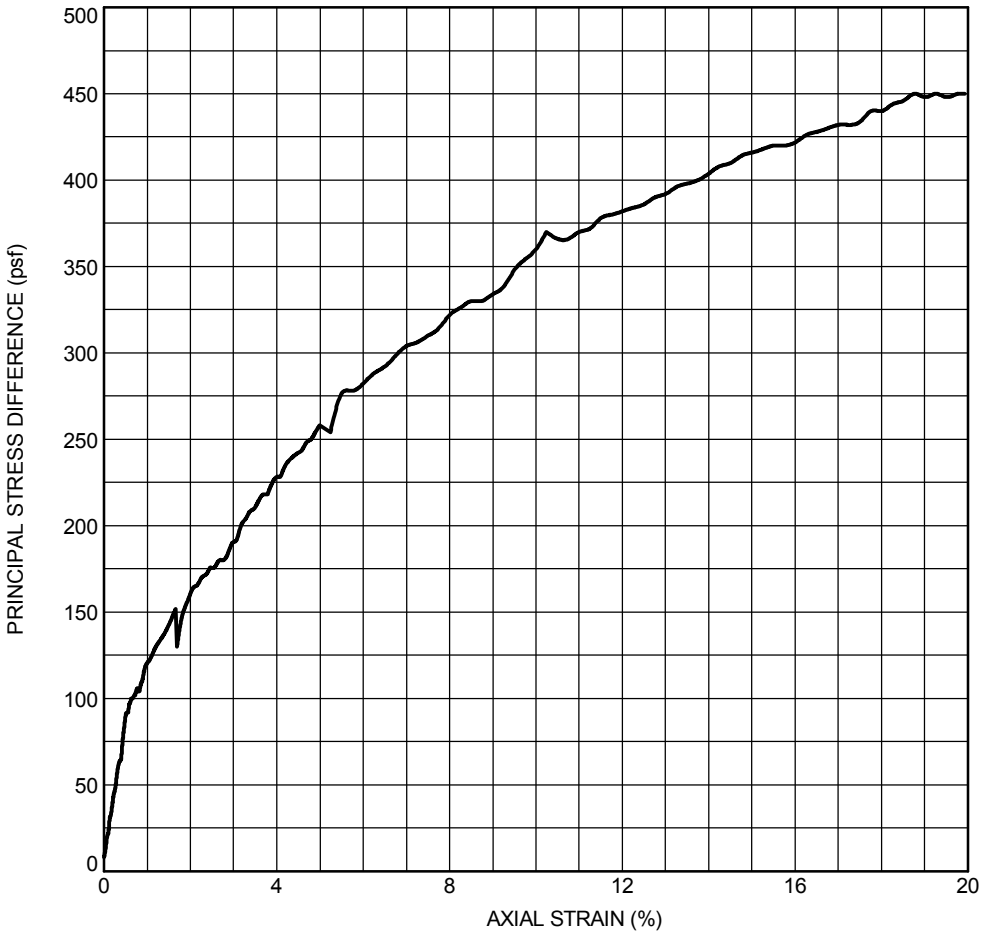
PLATE B4-47

TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-15 Depth: 5-6 ft.	Visual Classification: FAT CLAY, gray, with sand partings
Sample Number: 3	
Project No.: 04.55184080 Test Date.: 4/16/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	41.7		
	Dry Density (pcf)	81.8		
	Saturation (%)			
	Void Ratio			
	Diameter (inches)	2.82		
	Height (inches)	5.54		
	% Passing #200 Sieve			
	Specific Gravity (assumed)			
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	2.00		
	Deviator Stress (psf)	416		
	Shear Strength (psf)	208		
	Failure Strain (%)	15.0		
	σ_1 Failure (psf):	704		
	σ_3 Failure (psf):	288		
	Failure Type:	Multi Shear	Failure Sketch	

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-48

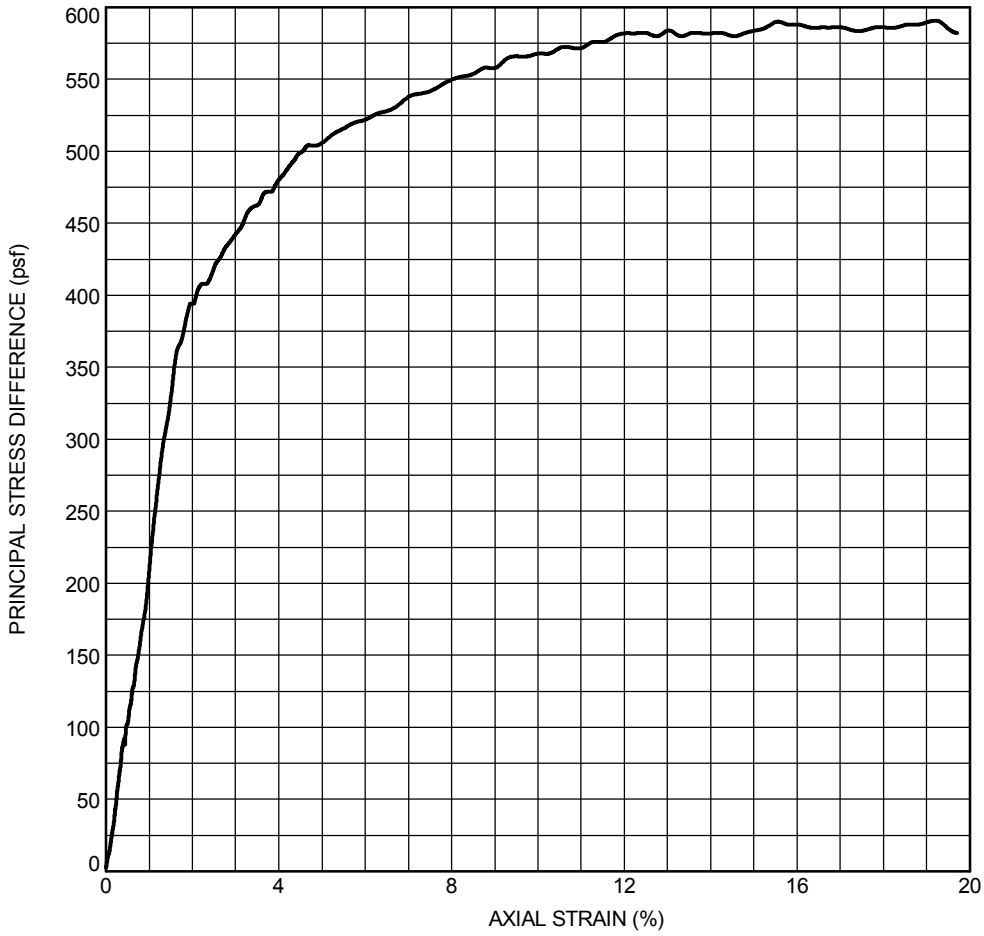
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-15 Depth: 24-25 ft.	Visual Classification: FAT CLAY, gray
Sample Number: 9	
Project No.: 04.55184080 Test Date.: 4/16/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	37.6		
	Dry Density (pcf)	82.8		
	Saturation (%)	98.0		
	Void Ratio	1.04		
	Diameter (inches)	2.81		
	Height (inches)	5.61		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	7.00		
	Deviator Stress (psf)	584		
	Shear Strength (psf)	292		
	Failure Strain (%)	13.0		
	σ_1 Failure (psf):	1592		
	σ_3 Failure (psf):	1008		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-49

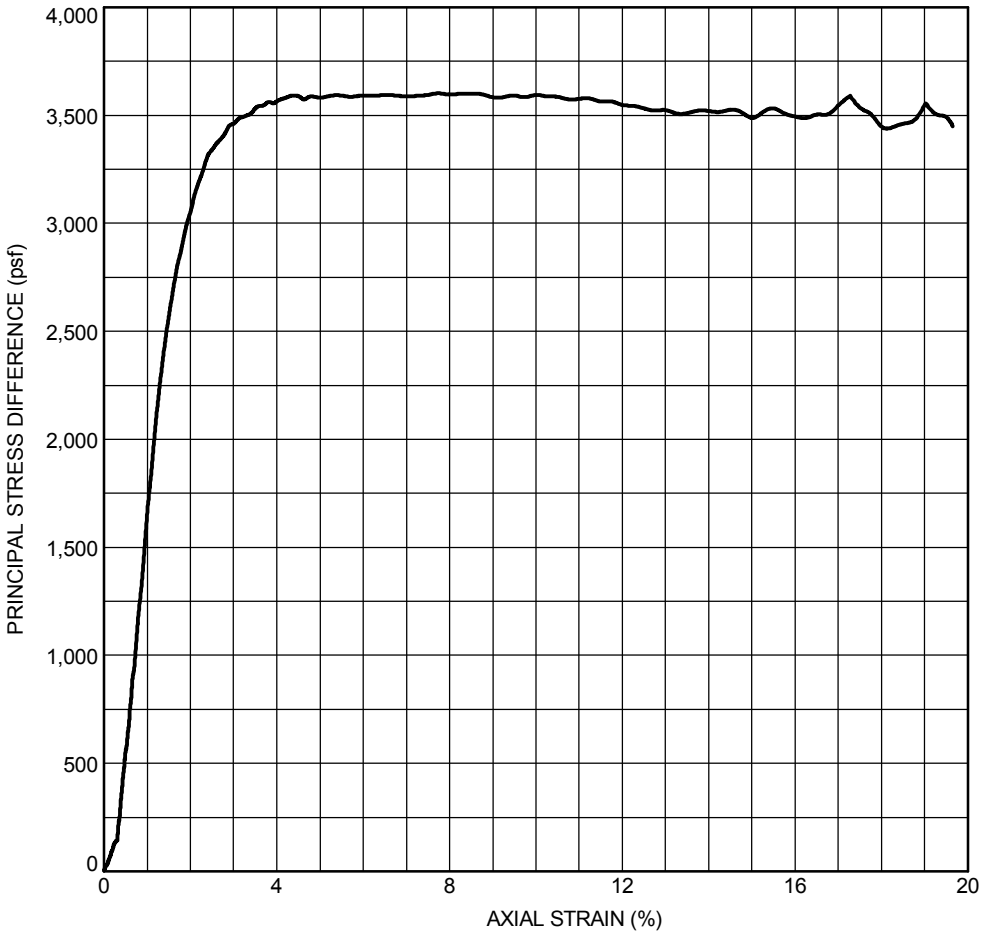
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-15 Depth: 39-40 ft.	Visual Classification: FAT CLAY, greenish gray, with slickensides
Sample Number: 12	
Project No.: 04.55184080 Test Date.: 4/16/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	29.1		
	Dry Density (pcf)	92.1		
	Saturation (%)	94.7		
	Void Ratio	0.83		
	Diameter (inches)	2.86		
	Height (inches)	5.61		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	11.00		
	Deviator Stress (psf)	3602		
	Shear Strength (psf)	1801		
	Failure Strain (%)	7.7		
	σ_1 Failure (psf):	5186		
	σ_3 Failure (psf):	1584		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-50

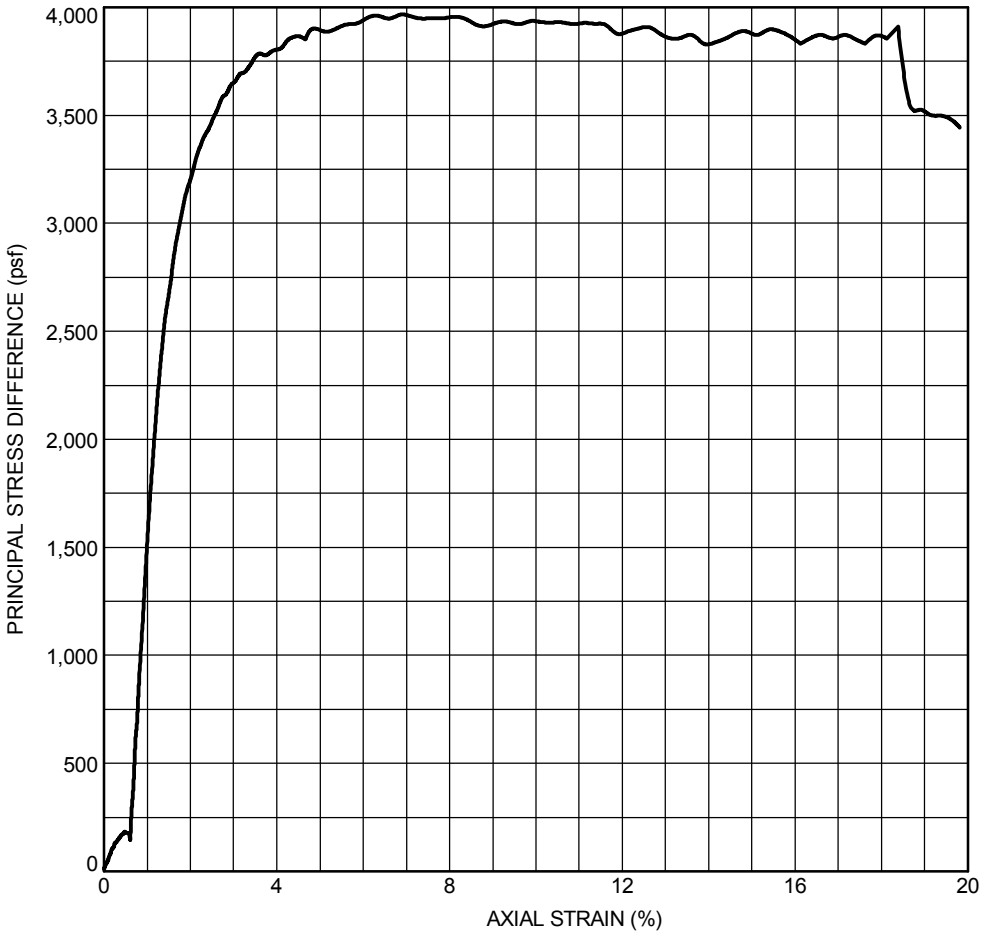
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-15 Depth: 49-50 ft.	Visual Classification: FAT CLAY, tan and greenish gray, with organics traces
Sample Number: 14	
Project No.: 04.55184080 Test Date.: 4/16/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	36.5		
	Dry Density (pcf)	86.2		
	Saturation (%)	100.0		
	Void Ratio	0.95		
	Diameter (inches)	2.85		
	Height (inches)	5.63		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	13.00		
	Deviator Stress (psf)	3966		
	Shear Strength (psf)	1983		
	Failure Strain (%)	6.9		
	σ_1 Failure (psf):	5838		
	σ_3 Failure (psf):	1872		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-51

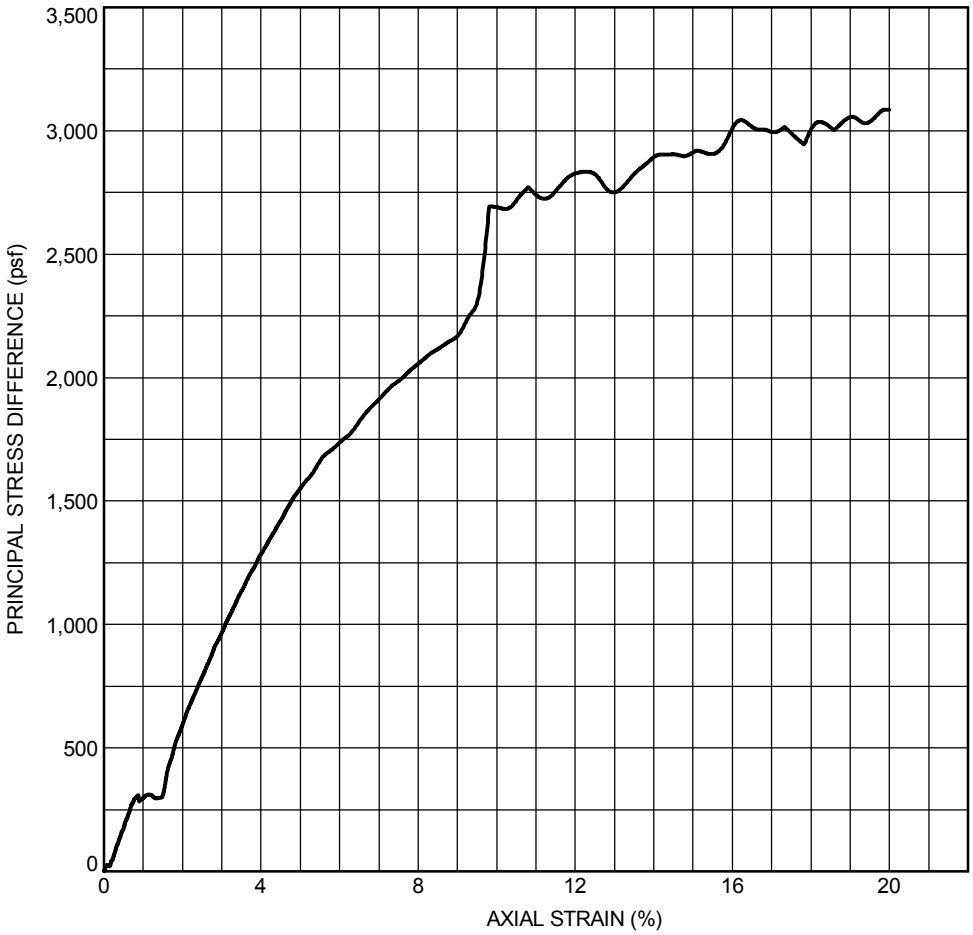
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-16 Depth: 15-16 ft.	Visual Classification: FAT CLAY, greenish gray, with silt pockets
Sample Number: 8	
Project No.: 04.55184080 Test Date.: 4/16/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	20.5		
	Dry Density (pcf)	105.0		
	Saturation (%)	91.4		
	Void Ratio	0.60		
	Diameter (inches)	2.86		
	Height (inches)	5.62		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	4.00		
	Deviator Stress (psf)	2912		
	Shear Strength (psf)	1456		
	Failure Strain (%)	15.0		
	σ_1 Failure (psf):	3488		
	σ_3 Failure (psf):	576		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-52

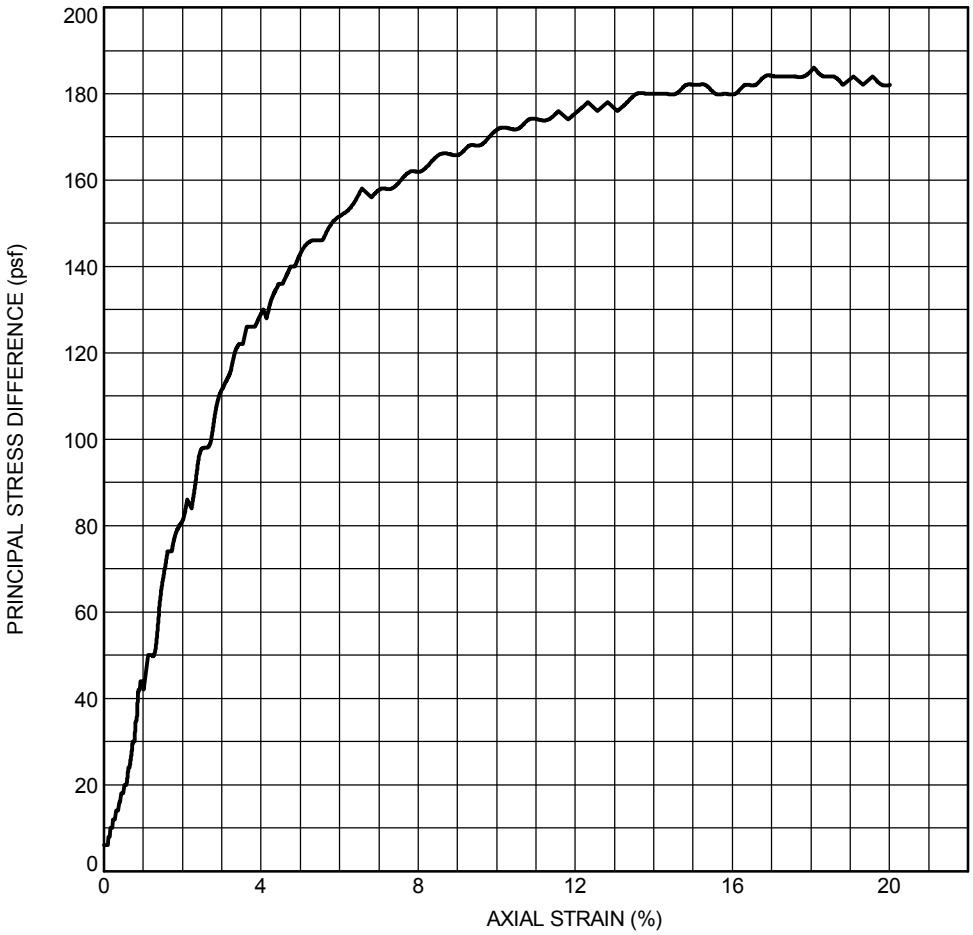
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-17 Depth: 1-2 ft.	Visual Classification: ORGANIC CLAY, dark brown, with wood
Sample Number: 1	
Project No.: 04.55184080 Test Date.: 4/16/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	134.1		
	Dry Density (pcf)	36.3		
	Saturation (%)	100.0		
	Void Ratio	3.30		
	Diameter (inches)	2.80		
	Height (inches)	5.60		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.50		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	1.00		
	Deviator Stress (psf)	182		
	Shear Strength (psf)	91		
	Failure Strain (%)	14.8		
	σ_1 Failure (psf):	326		
	σ_3 Failure (psf):	144		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-53

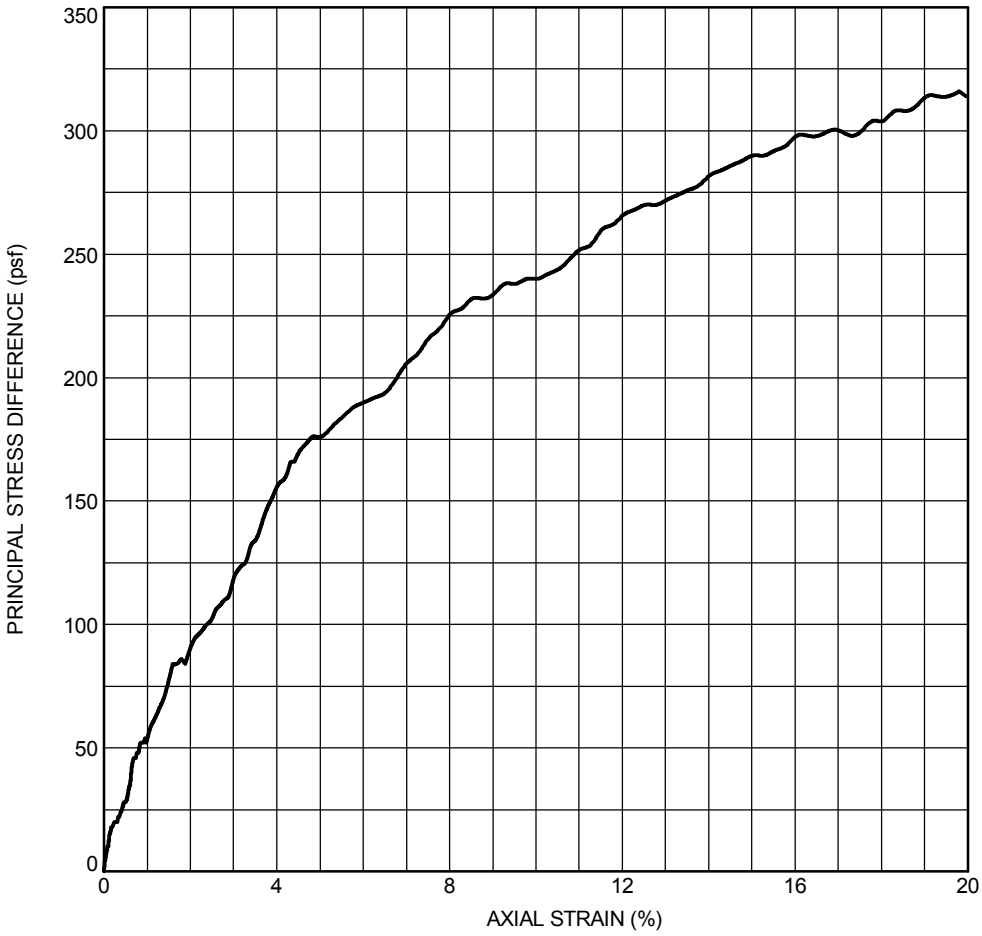
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-17 Depth: 9-10 ft.	Visual Classification: SANDY LEAN CLAY, dark brown
Sample Number: 5	
Project No.: 04.55184080 Test Date.: 4/16/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	37.8		
	Dry Density (pcf)	84.0		
	Saturation (%)	100.0		
	Void Ratio	1.01		
	Diameter (inches)	2.86		
	Height (inches)	5.54		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	3.00		
	Deviator Stress (psf)	290		
	Shear Strength (psf)	145		
	Failure Strain (%)	15.0		
	σ_1 Failure (psf):	722		
	σ_3 Failure (psf):	432		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

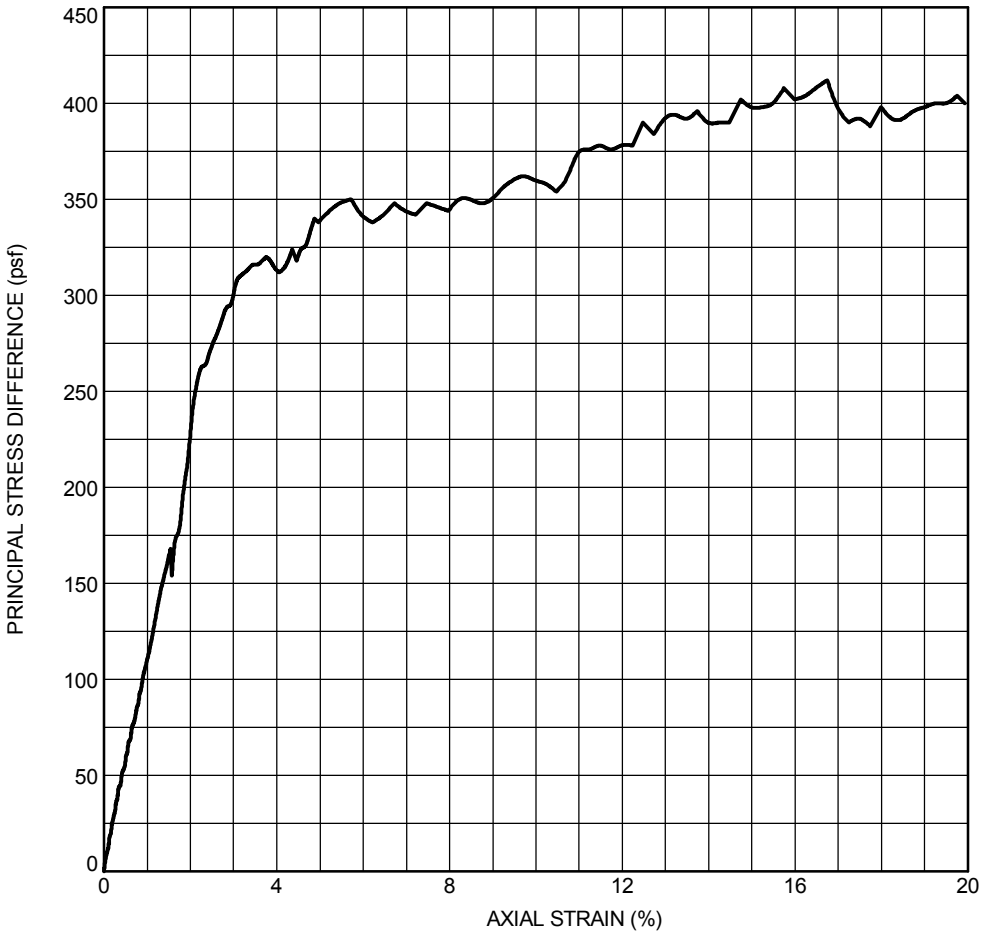
PLATE B4-54

TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-17 Depth: 19-20 ft.	Visual Classification: SANDY LEAN CLAY, gray, with shell fragments
Sample Number: 9	
Project No.: 04.55184080 Test Date.: 4/16/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	39.3		
	Dry Density (pcf)	85.3		
	Saturation (%)	100.0		
	Void Ratio	0.98		
	Diameter (inches)	2.86		
	Height (inches)	5.55		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	5.00		
	Deviator Stress (psf)	402		
	Shear Strength (psf)	201		
	Failure Strain (%)	14.7		
	σ_1 Failure (psf):	1122		
	σ_3 Failure (psf):	720		
	Failure Type:	Shear Plane		Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-55

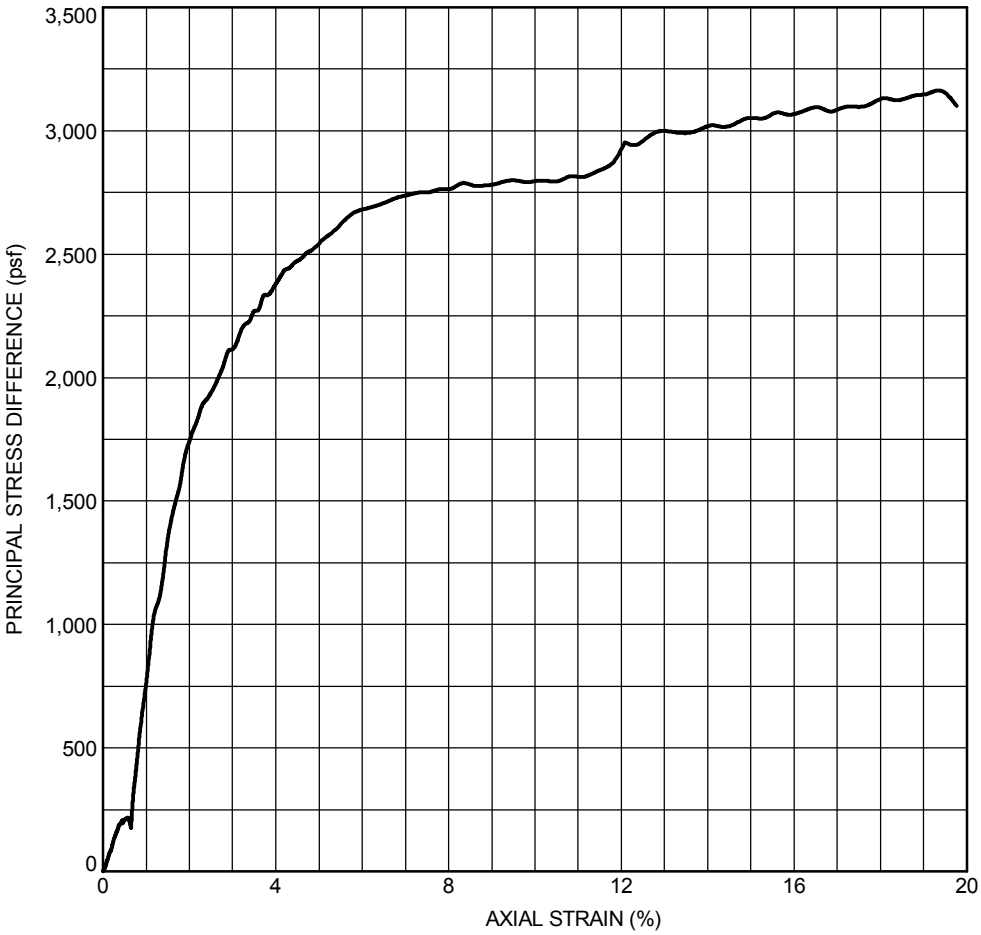
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-17 Depth: 34-35 ft.	Visual Classification: FAT CLAY, tan and gray, with silt laminations
Sample Number: 12	
Project No.: 04.55184080 Test Date.: 4/16/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	34.3		
	Dry Density (pcf)	86.1		
	Saturation (%)	96.6		
	Void Ratio	0.96		
	Diameter (inches)	2.86		
	Height (inches)	5.59		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	9.00		
	Deviator Stress (psf)	3050		
	Shear Strength (psf)	1525		
	Failure Strain (%)	15.0		
	σ_1 Failure (psf):	4346		
	σ_3 Failure (psf):	1296		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

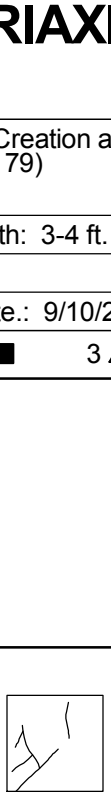
PLATE B4-56

TRIAXIAL SHEAR TEST

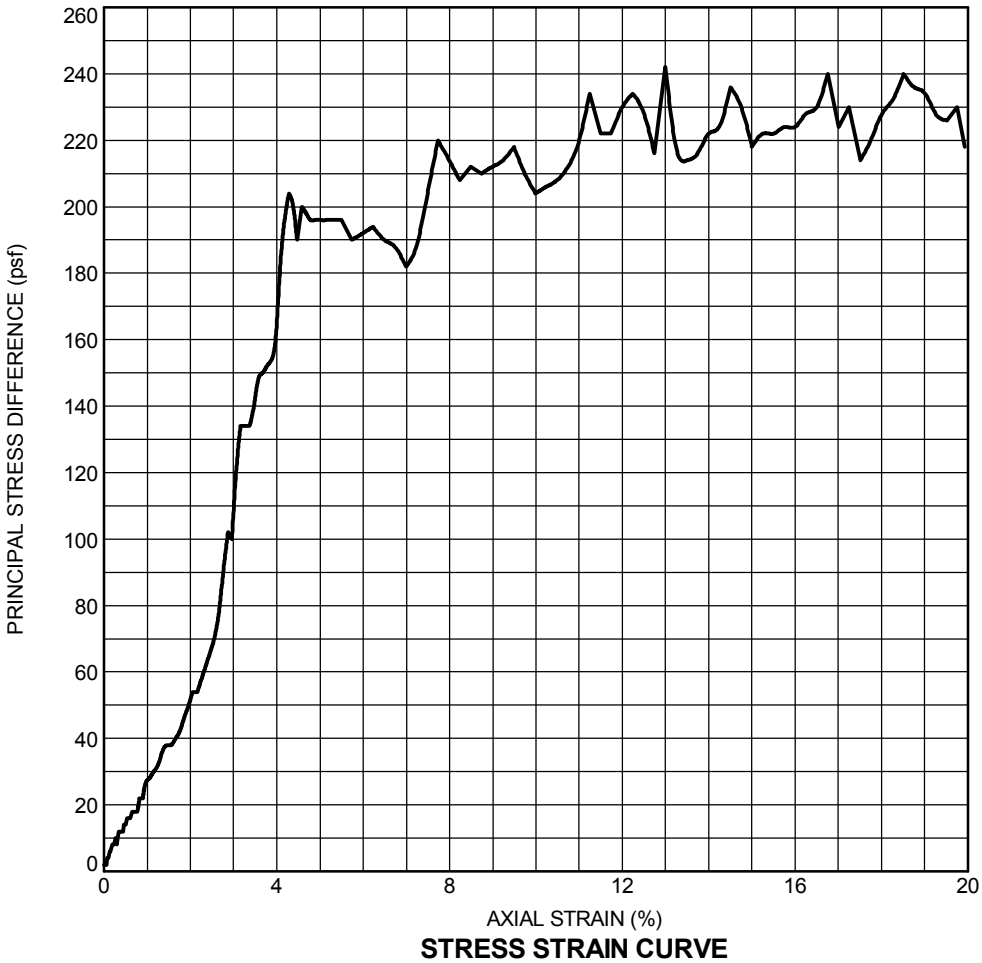
Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-18 Depth: 3-4 ft.	Visual Classification: FAT CLAY, gray
Sample Number: 2	
Project No.: 04.55184080 Test Date.: 9/10/2019	Organic Content (%) ASTM D2974: N/A

Sample No.	1 ●	2 ■	3 ▲
INITIAL Water Content (%)	56.5		
Dry Density (pcf)	64.2		
Saturation (%)	93.7		
Void Ratio	1.63		
Diameter (inches)	2.79		
Height (inches)	5.59		
% Passing #200 Sieve			
Specific Gravity (assumed)	2.70		
Strain Rate (%/min.)	1.0		
Cell Pressure (psi)	1.00		
Deviator Stress (psf)	242		
Shear Strength (psf)	121		
Failure Strain (%)	13.0		
σ_1 Failure (psf):	386		
σ_3 Failure (psf):	144		
Failure Type:	Multi Shear		

Failure Sketch



Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-57

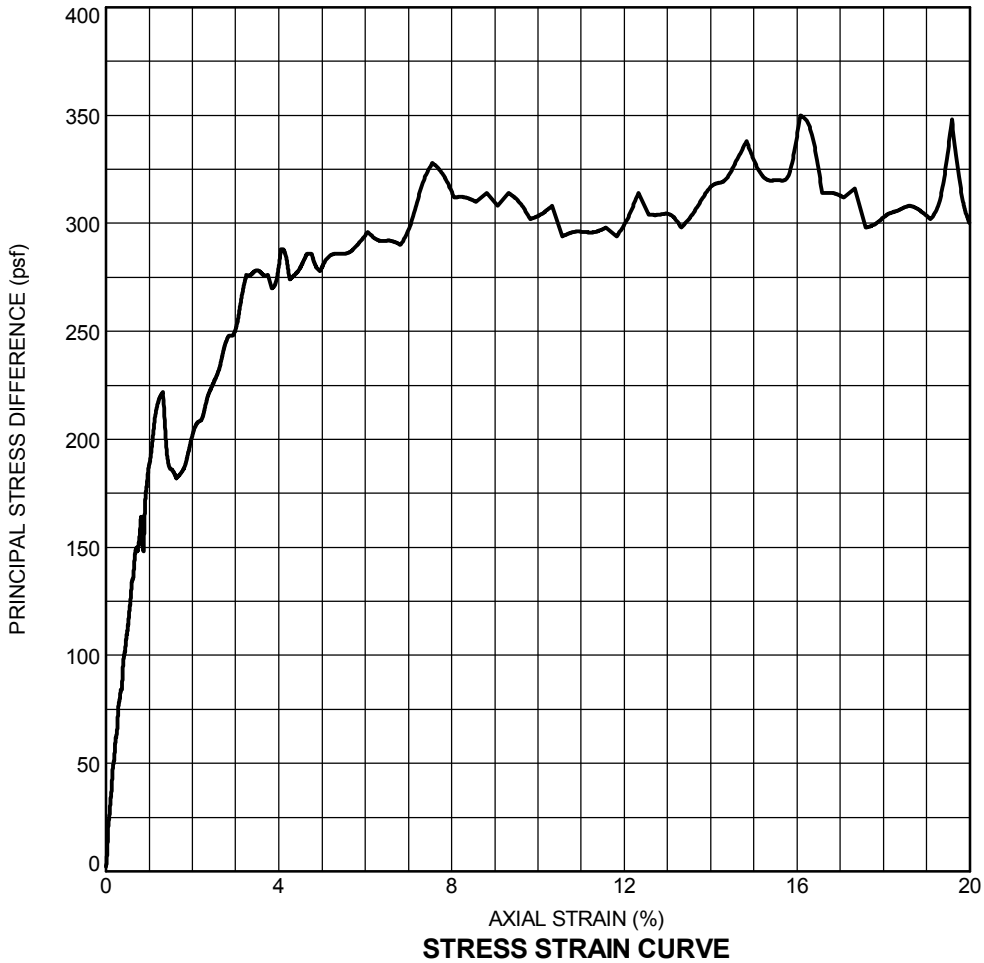
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-18 Depth: 6-7 ft.	Visual Classification: ORGANIC CLAY, gray, with silty sand pockets
Sample Number: 4	
Project No.: 04.55184080 Test Date.: 9/10/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	112.4		
	Dry Density (pcf)	41.1		
	Saturation (%)	97.8		
	Void Ratio	3.10		
	Diameter (inches)	2.82		
	Height (inches)	5.62		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	2.00		
	Deviator Stress (psf)	338		
	Shear Strength (psf)	169		
	Failure Strain (%)	14.8		
	σ_1 Failure (psf):	626		
	σ_3 Failure (psf):	288		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-58

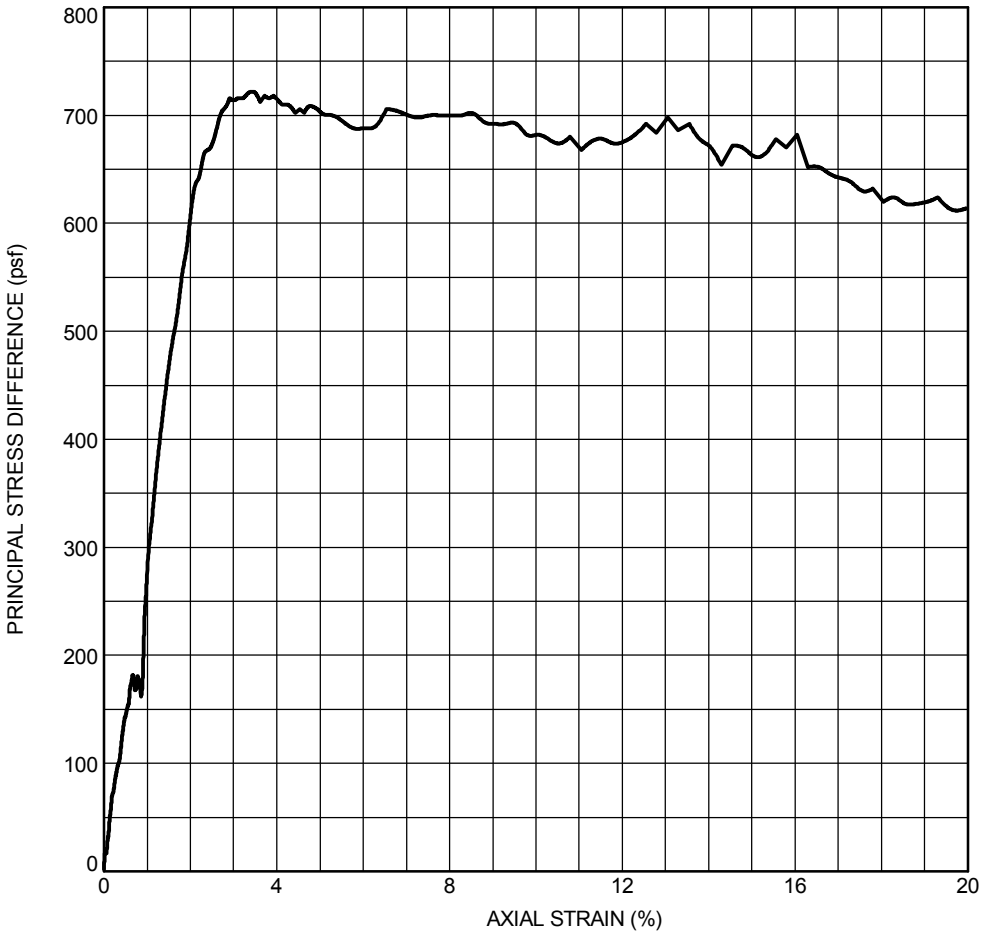
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-18 Depth: 19-20 ft.	Visual Classification: ORGANIC CLAY, gray
Sample Number: 9	
Project No.: 04.55184080 Test Date.: 8/28/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	90.5		
	Dry Density (pcf)	48.1		
	Saturation (%)	100.0		
	Void Ratio	2.24		
	Diameter (inches)	2.83		
	Height (inches)	5.61		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.50		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	5.00		
	Deviator Stress (psf)	722		
	Shear Strength (psf)	361		
	Failure Strain (%)	3.4		
	σ_1 Failure (psf):	1442		
	σ_3 Failure (psf):	720		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-59

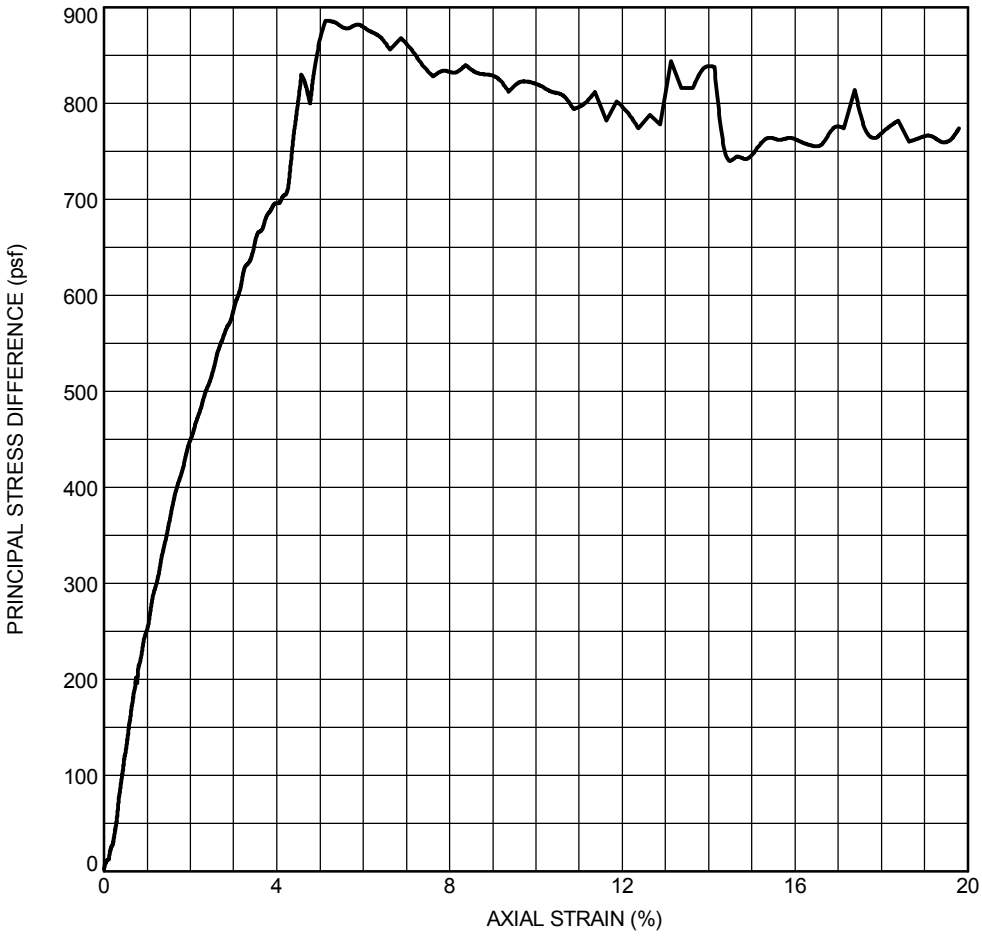
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-18 Depth: 29-30 ft.	Visual Classification: ORGANIC CLAY, gray
Sample Number: 11	
Project No.: 04.55184080 Test Date.: 9/11/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	86.1		
	Dry Density (pcf)	52.0		
	Saturation (%)	100.0		
	Void Ratio	2.00		
	Diameter (inches)	2.82		
	Height (inches)	5.56		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.50		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	8.00		
	Deviator Stress (psf)	886		
	Shear Strength (psf)	443		
	Failure Strain (%)	5.1		
	σ_1 Failure (psf):	2038		
	σ_3 Failure (psf):	1152		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-60

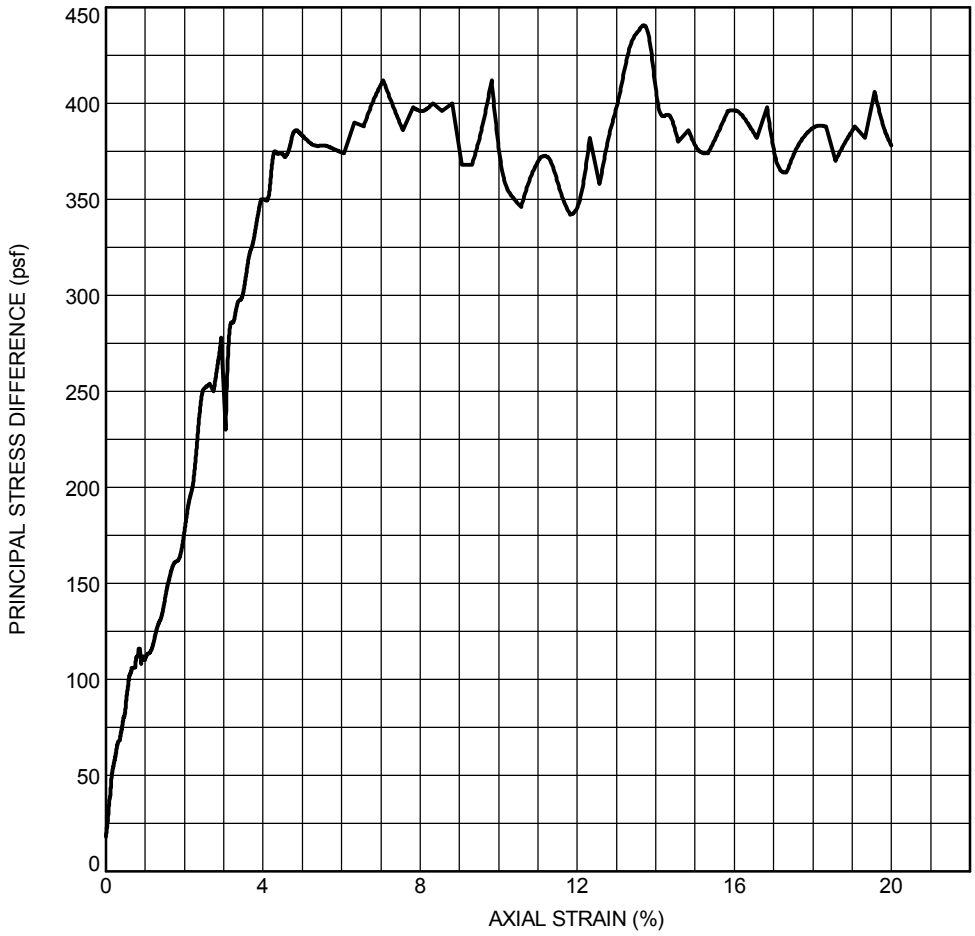
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-19 Depth: 4-5 ft.	Visual Classification: fat clay, DARK GRAY
Sample Number: 3	
Project No.: 04.55184080 Test Date.: 9/11/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	101.9		
	Dry Density (pcf)	45.5		
	Saturation (%)	100.0		
	Void Ratio	2.71		
	Diameter (inches)	2.81		
	Height (inches)	5.55		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	1.00		
	Deviator Stress (psf)	438		
	Shear Strength (psf)	219		
	Failure Strain (%)	13.6		
	σ_1 Failure (psf):	582		
	σ_3 Failure (psf):	144		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-61

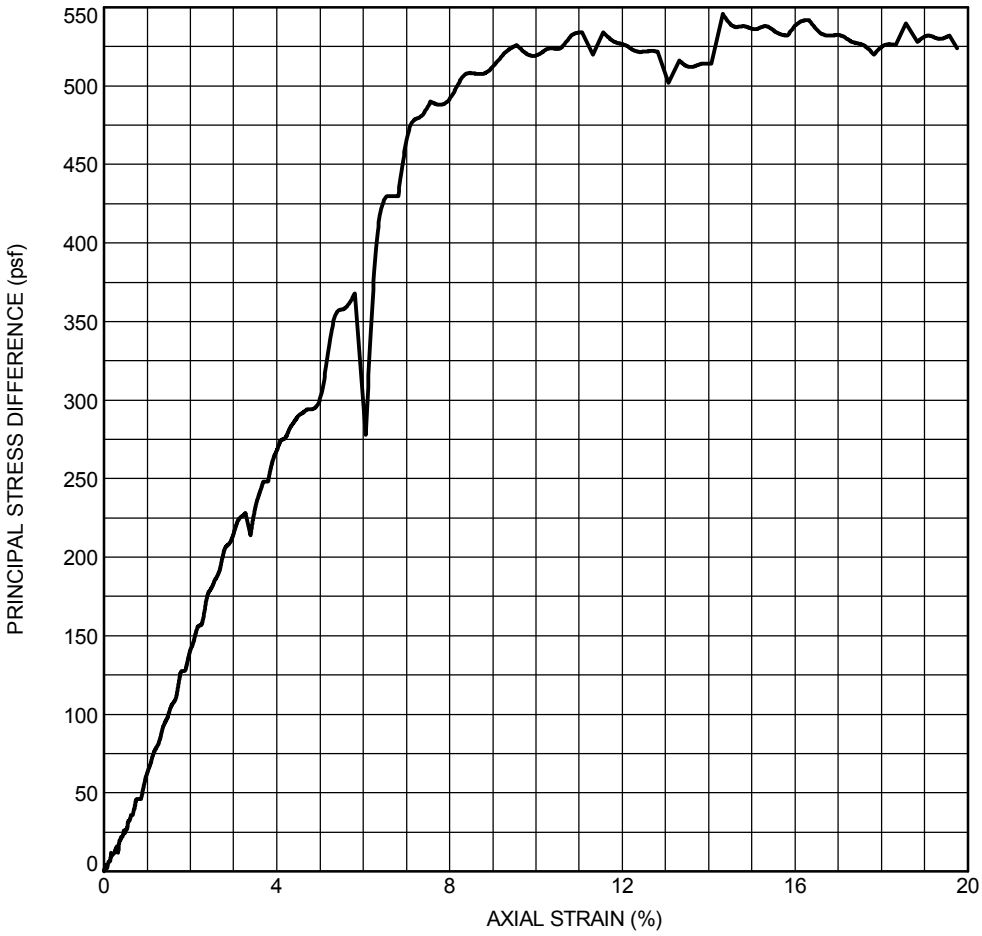
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-19 Depth: 8-9 ft.	Visual Classification: FAT CLAY, gray, with silt pockets
Sample Number: 5	
Project No.: 04.55184080 Test Date.: 9/11/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	42.2		
	Dry Density (pcf)	79.9		
	Saturation (%)	100.0		
	Void Ratio	1.11		
	Diameter (inches)	2.79		
	Height (inches)	5.52		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	3.00		
	Deviator Stress (psf)	546		
	Shear Strength (psf)	273		
	Failure Strain (%)	14.3		
	σ_1 Failure (psf):	978		
	σ_3 Failure (psf):	432		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-62

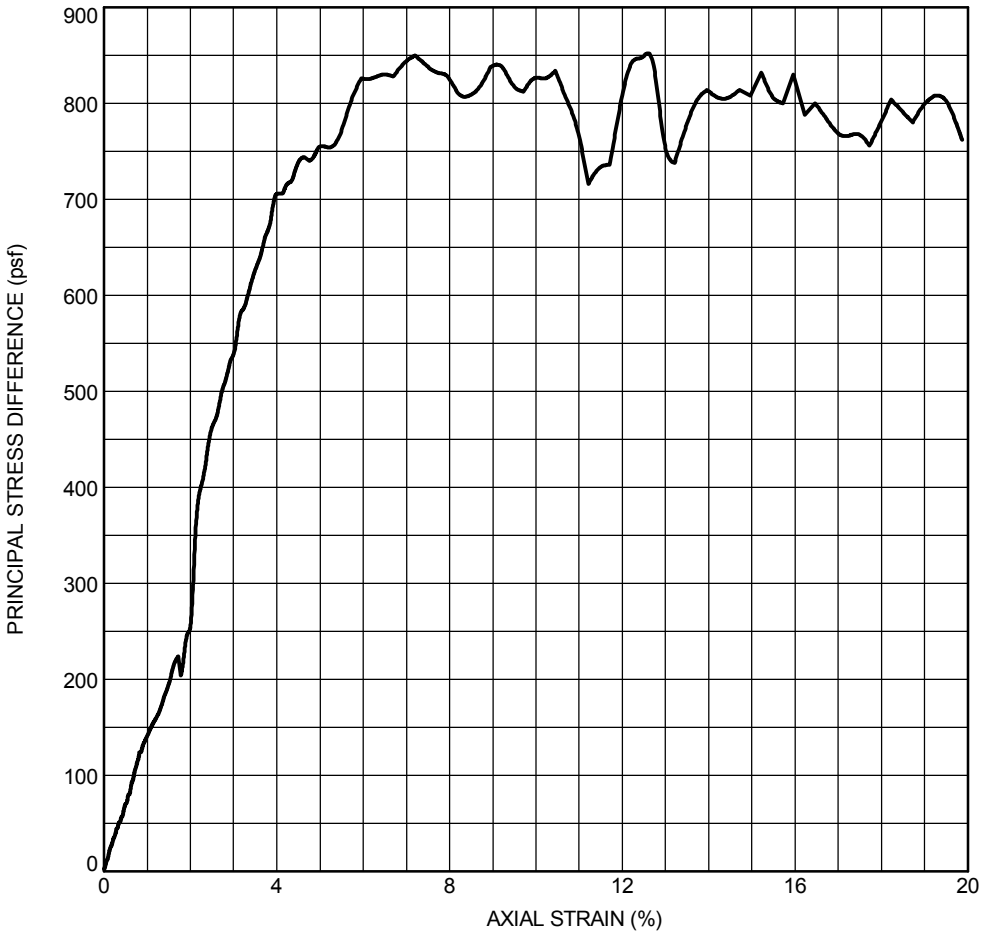
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-19 Depth: 12-13 ft.	Visual Classification: FAT CLAY, gray, with silty sand pockets
Sample Number: 7	
Project No.: 04.55184080 Test Date.: 9/11/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	74.6		
	Dry Density (pcf)	60.5		
	Saturation (%)	100.0		
	Void Ratio	1.78		
	Diameter (inches)	2.81		
	Height (inches)	5.55		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	3.00		
	Deviator Stress (psf)	850		
	Shear Strength (psf)	425		
	Failure Strain (%)	7.2		
	σ_1 Failure (psf):	1282		
	σ_3 Failure (psf):	432		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-63

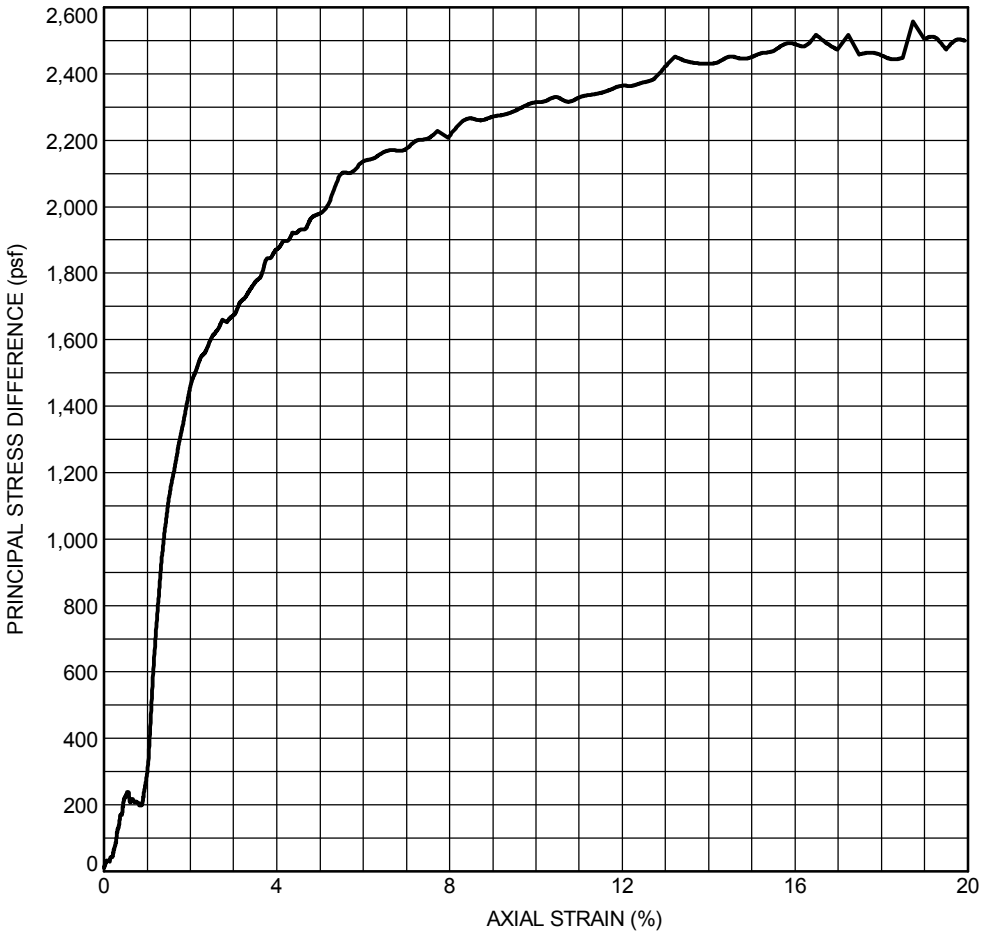
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-19 Depth: 26-27 ft.	Visual Classification: FAT CLAY, dark gray and greenish gray
Sample Number: 10	
Project No.: 04.55184080 Test Date.: 9/11/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	31.9		
	Dry Density (pcf)	91.5		
	Saturation (%)	100.0		
	Void Ratio	0.84		
	Diameter (inches)	2.85		
	Height (inches)	5.64		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	7.00		
	Deviator Stress (psf)	2451		
	Shear Strength (psf)	1226		
	Failure Strain (%)	15.0		
	σ_1 Failure (psf):	3459		
	σ_3 Failure (psf):	1008		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-64

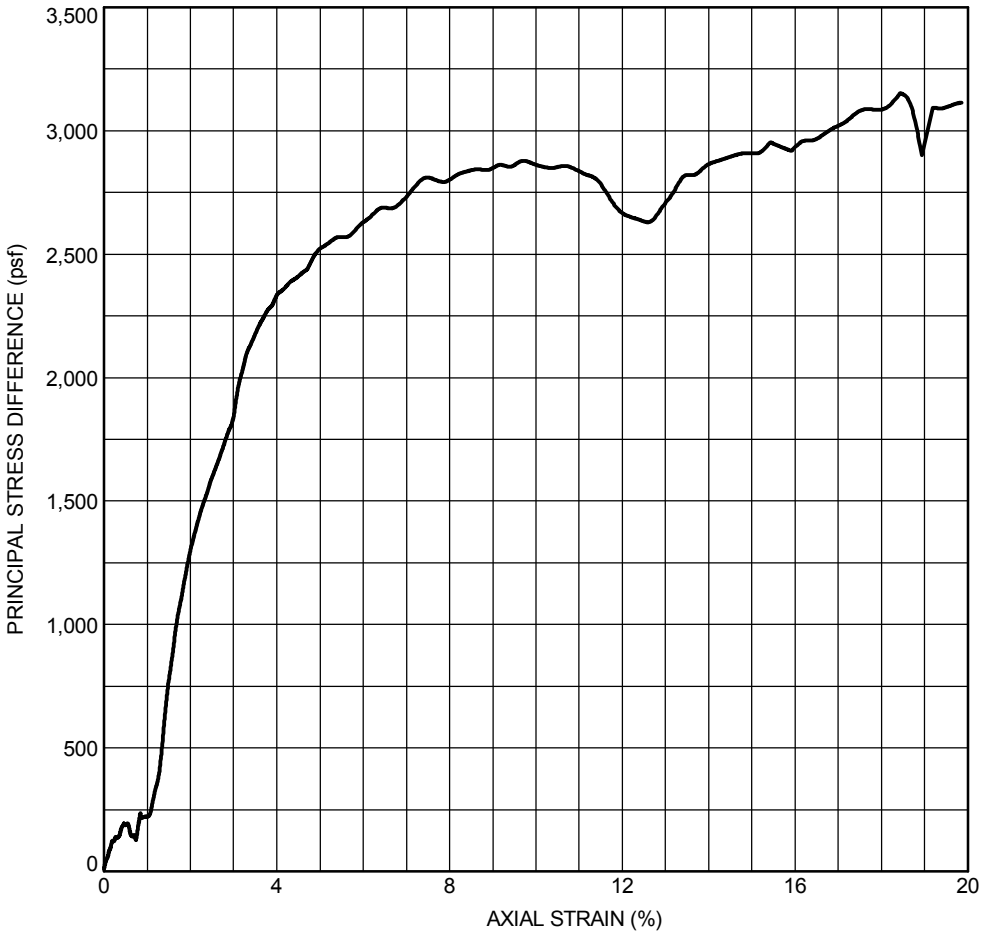
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-19 Depth: 34-35 ft.	Visual Classification: FAT CLAY, greenish gray
Sample Number: 12	
Project No.: 04.55184080 Test Date.: 9/11/2019	Organic Content (%) ASTM D2974: N/A

Sample No.	1 ●	2 ■	3 ▲
INITIAL Water Content (%)	29.2		
Dry Density (pcf)	93.5		
Saturation (%)	98.2		
Void Ratio	0.80		
Diameter (inches)	2.86		
Height (inches)	5.58		
% Passing #200 Sieve			
Specific Gravity (assumed)	2.70		
Strain Rate (%/min.)	1.0		
Cell Pressure (psi)	9.00		
Deviator Stress (psf)	2911		
Shear Strength (psf)	1455		
Failure Strain (%)	15.0		
σ_1 Failure (psf):	4207		
σ_3 Failure (psf):	1296		
Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-65

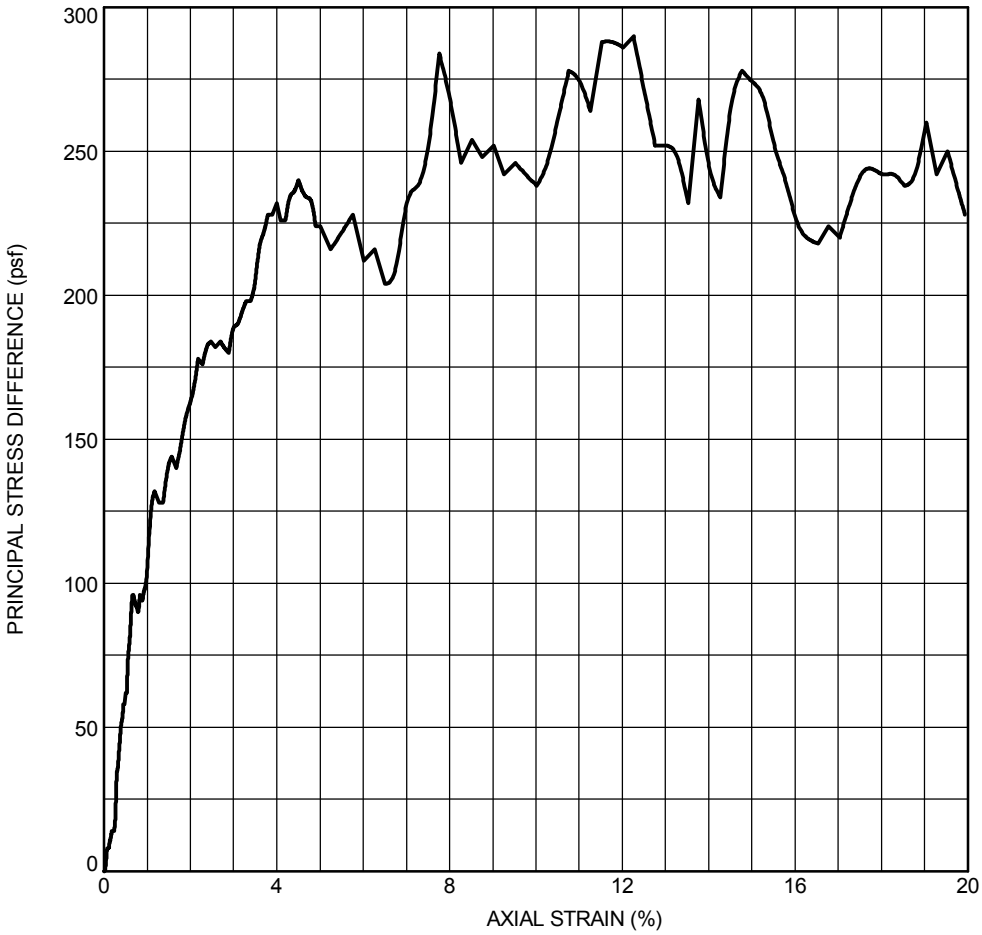
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-20 Depth: 5-6 ft.	Visual Classification: ORGANIC CLAY, dark gray
Sample Number: 3	
Project No.: 04.55184080 Test Date.: 9/12/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	135.2		
	Dry Density (pcf)	37.7		
	Saturation (%)	100.0		
	Void Ratio	3.14		
	Diameter (inches)	2.81		
	Height (inches)	5.61		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.50		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	2.00		
	Deviator Stress (psf)	290		
	Shear Strength (psf)	145		
	Failure Strain (%)	12.3		
	σ_1 Failure (psf):	578		
	σ_3 Failure (psf):	288		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-66

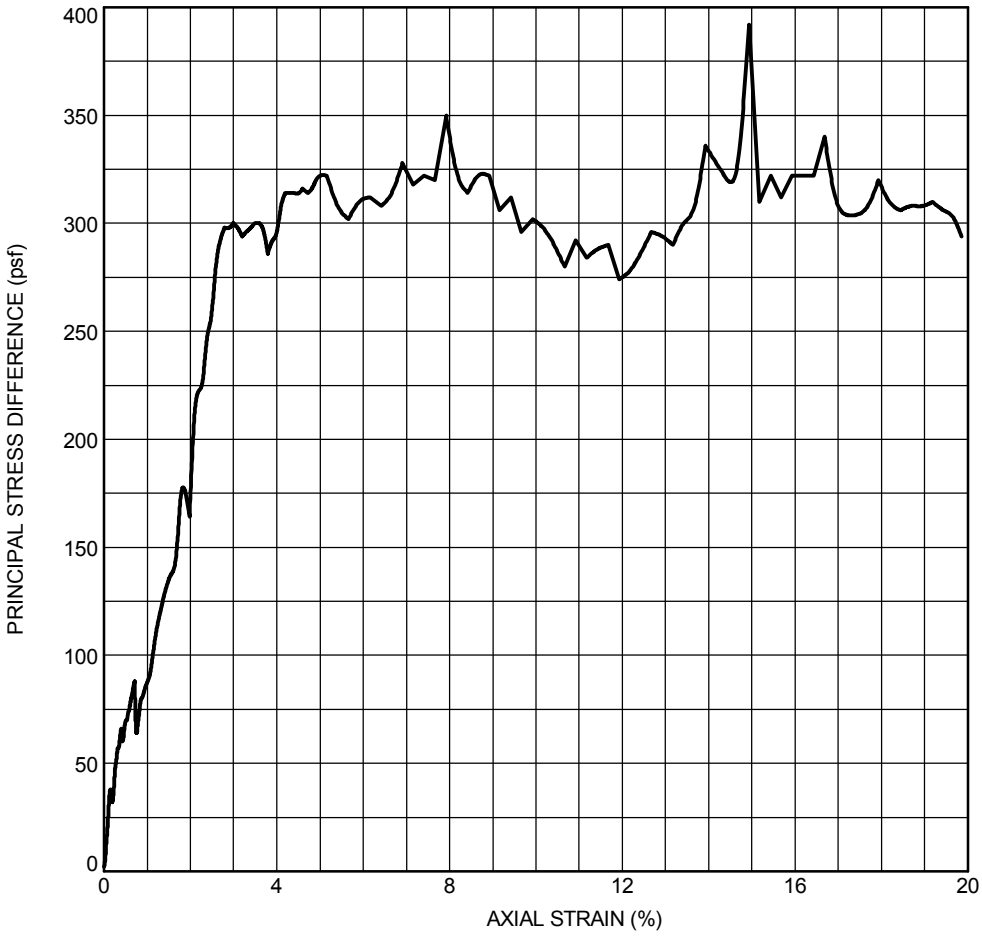
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-20 Depth: 9-10 ft.	Visual Classification: ORGANIC CLAY, dark gray
Sample Number: 5	
Project No.: 04.55184080 Test Date.: 9/12/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	134.6		
	Dry Density (pcf)	36.9		
	Saturation (%)	100.0		
	Void Ratio	3.23		
	Diameter (inches)	2.79		
	Height (inches)	5.61		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.50		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	3.00		
	Deviator Stress (psf)	392		
	Shear Strength (psf)	196		
	Failure Strain (%)	14.9		
	σ_1 Failure (psf):	824		
	σ_3 Failure (psf):	432		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-67

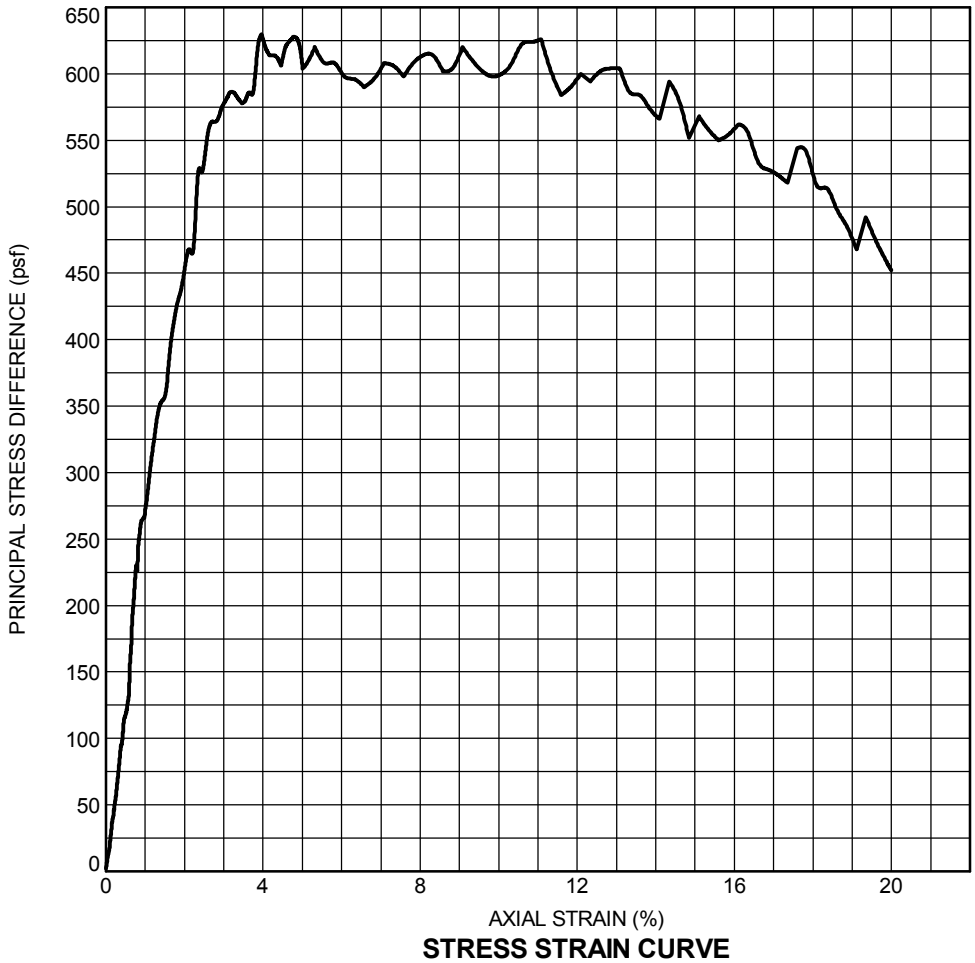
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-20 Depth: 13-14 ft.	Visual Classification: ORGANIC CLAY, dark gray
Sample Number: 7	
Project No.: 04.55184080 Test Date.: 9/12/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	134.4		
	Dry Density (pcf)	37.0		
	Saturation (%)	100.0		
	Void Ratio	3.21		
	Diameter (inches)	2.79		
	Height (inches)	5.61		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.50		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	3.00		
	Deviator Stress (psf)	630		
	Shear Strength (psf)	315		
	Failure Strain (%)	4.0		
	σ_1 Failure (psf):	1062		
	σ_3 Failure (psf):	432		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-68

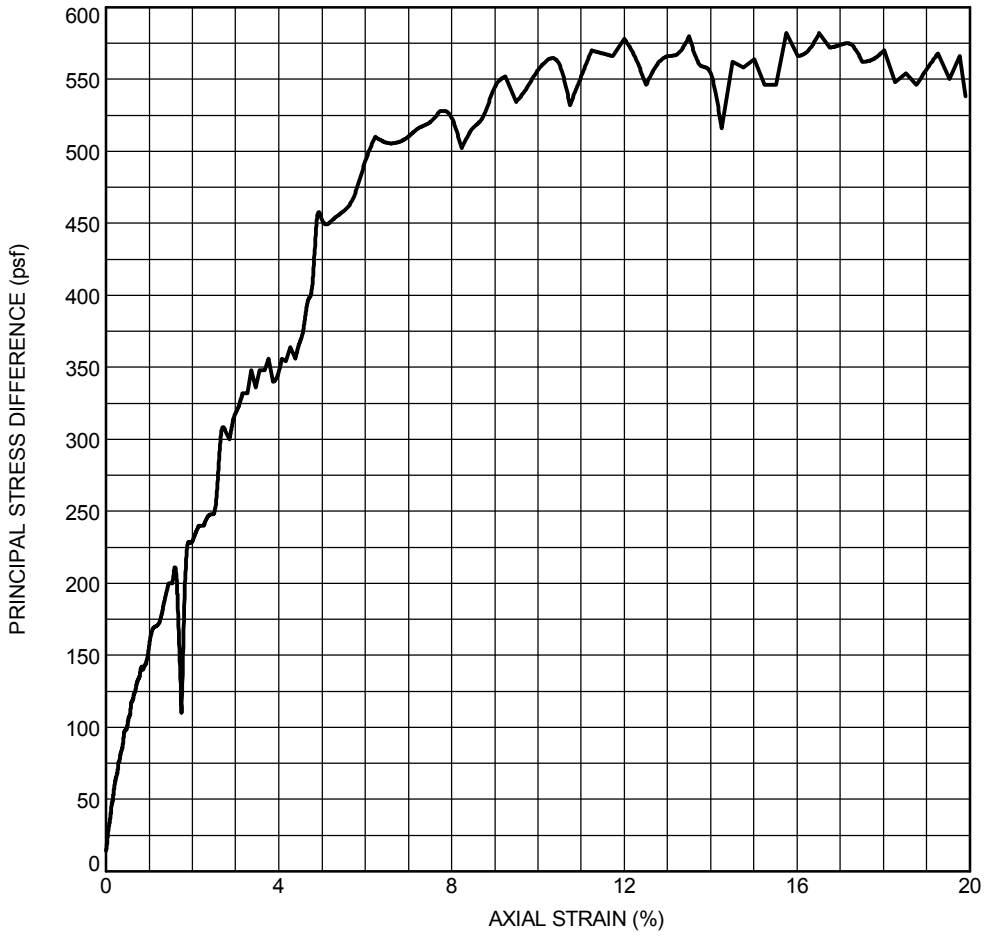
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-20 Depth: 23-24 ft.	Visual Classification: FAT CLAY, gray, with sand pockets
Sample Number: 10	
Project No.: 04.55184080 Test Date.: 9/12/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	48.8		
	Dry Density (pcf)	65.2		
	Saturation (%)	83.1		
	Void Ratio	1.58		
	Diameter (inches)	2.80		
	Height (inches)	5.61		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	5.00		
	Deviator Stress (psf)	580		
	Shear Strength (psf)	290		
	Failure Strain (%)	13.5		
	σ_1 Failure (psf):	1300		
	σ_3 Failure (psf):	720		
	Failure Type:	Multi Shear		

Failure Sketch

Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-69

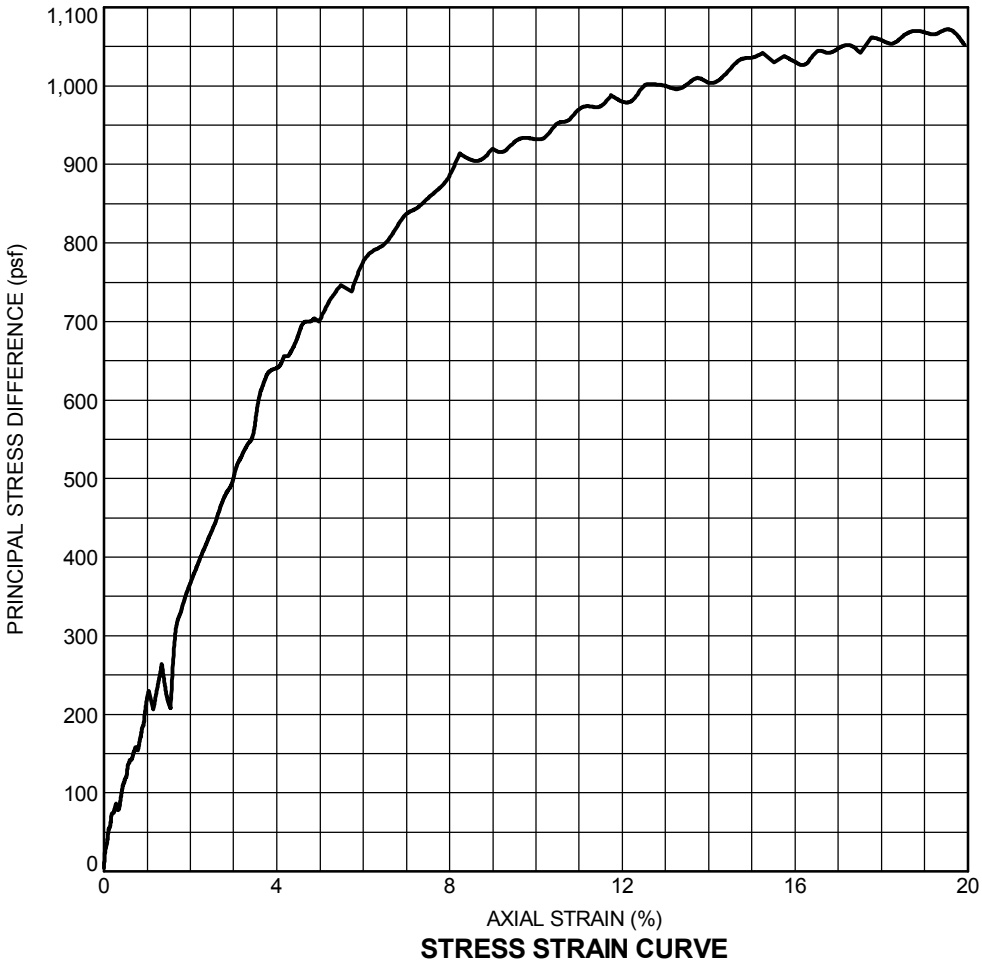
TRIAXIAL SHEAR TEST

Project Name: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179) Orleans Parish, Louisiana	Type of Test: Unconsolidated Undrained ASTM D 2850
Source of Sample: B-20 Depth: 39-40 ft.	Visual Classification: FAT CLAY, greenish gray and gray, with silty sand pockets and gravel
Sample Number: 13	
Project No.: 04.55184080 Test Date.: 9/12/2019	Organic Content (%) ASTM D2974: N/A

	Sample No.	1 ●	2 ■	3 ▲
INITIAL	Water Content (%)	52.0		
	Dry Density (pcf)	71.9		
	Saturation (%)	100.0		
	Void Ratio	1.34		
	Diameter (inches)	2.82		
	Height (inches)	5.59		
	% Passing #200 Sieve			
	Specific Gravity (assumed)	2.70		
	Strain Rate (%/min.)	1.0		
	Cell Pressure (psi)	11.00		
	Deviator Stress (psf)	1036		
	Shear Strength (psf)	518		
	Failure Strain (%)	15.0		
	σ_1 Failure (psf):	2620		
	σ_3 Failure (psf):	1584		
	Failure Type:	Multi Shear		

Failure Sketch

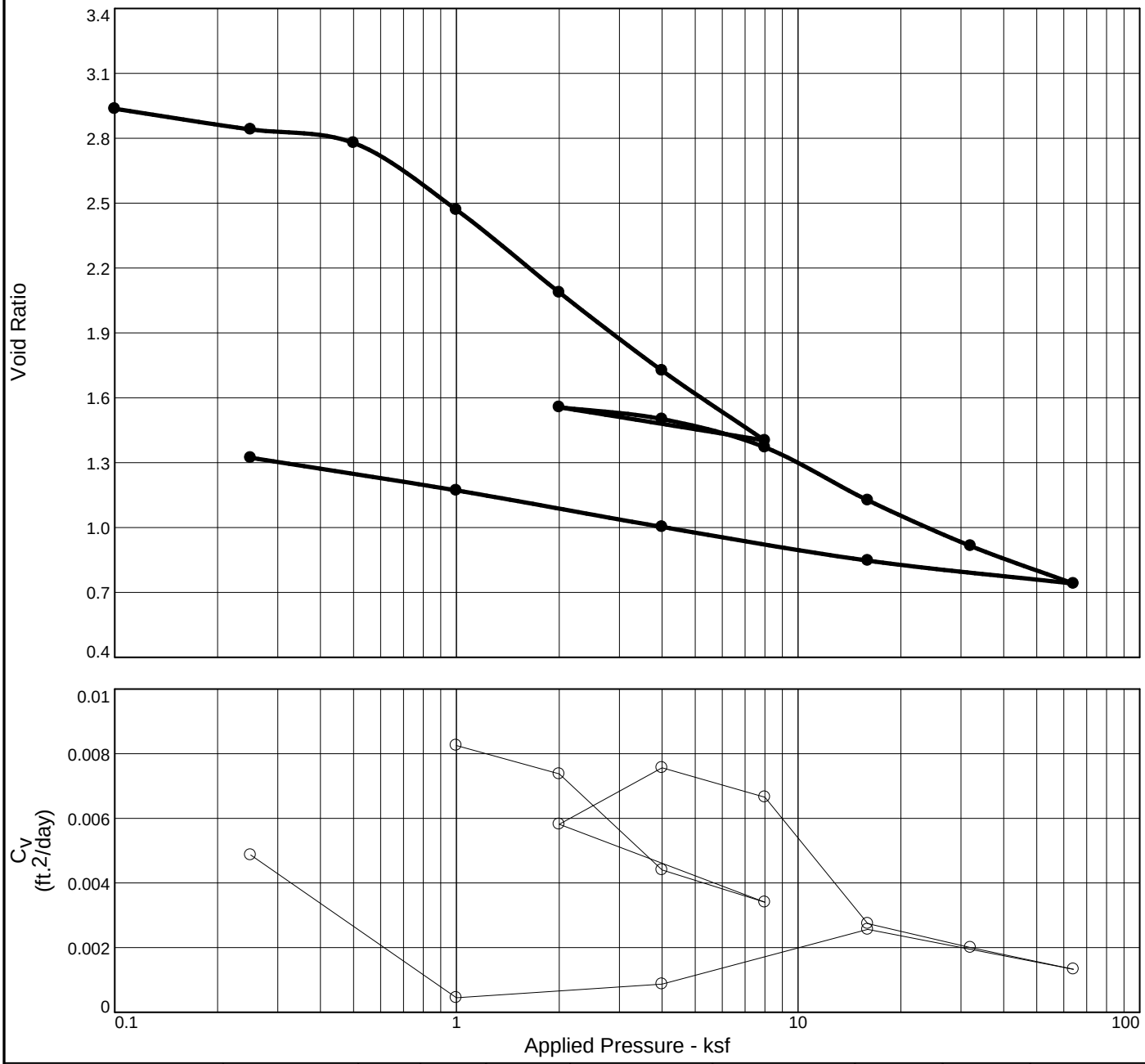
Remarks:
Visual classification in general accordance with ASTM Standard D2487.



STRESS STRAIN CURVE

PLATE B4-70

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
98.4 %	120.5 %	38.8	166	116	2.398		0.6	1.18	0.33	2.936

MATERIAL DESCRIPTION	USCS	AASHTO
FAT CLAY, dark gray, with organics	CH	

Project No. 04.55184080 **Client:** CPRA

Project: ST. CATHERINE ISLAND MARSH CREATION AND SHORELINE PROTECTION (PO-0179)

Source of Sample: B-1 **Depth:** 5.0 **Sample Number:** 3

Fugro USA Land, Inc.

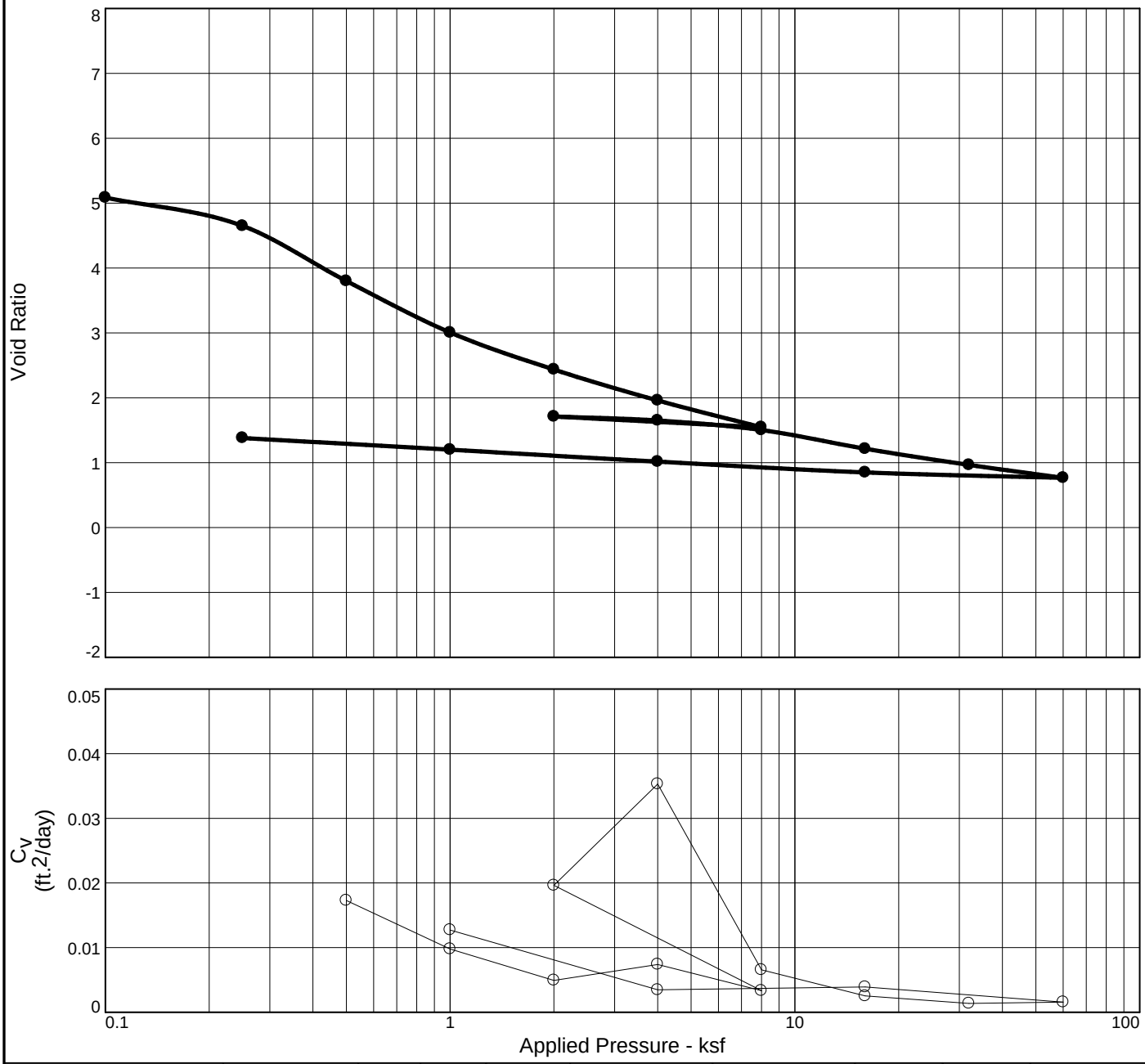
Baton Rouge, LA

Remarks:

Date Tested: 04/29/2019
Tested by: S. Serf
Reviewed by: A. Bull

Plate B5-1

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
67.1 %	136.4 %	31.7	150	112	2.512		0.3	2.86	0.37	5.106

MATERIAL DESCRIPTION	USCS	AASHTO
ORGANIC CLAY, dark gray	OH	

Project No. 04.55184080 **Client:** CPRA

Project: ST. CATHERINE ISLAND MARSH CREATION AND SHORELINE PROTECTION (PO-0179)

Source of Sample: B-2 **Depth:** 6.0 **Sample Number:** 4

Fugro USA Land, Inc.

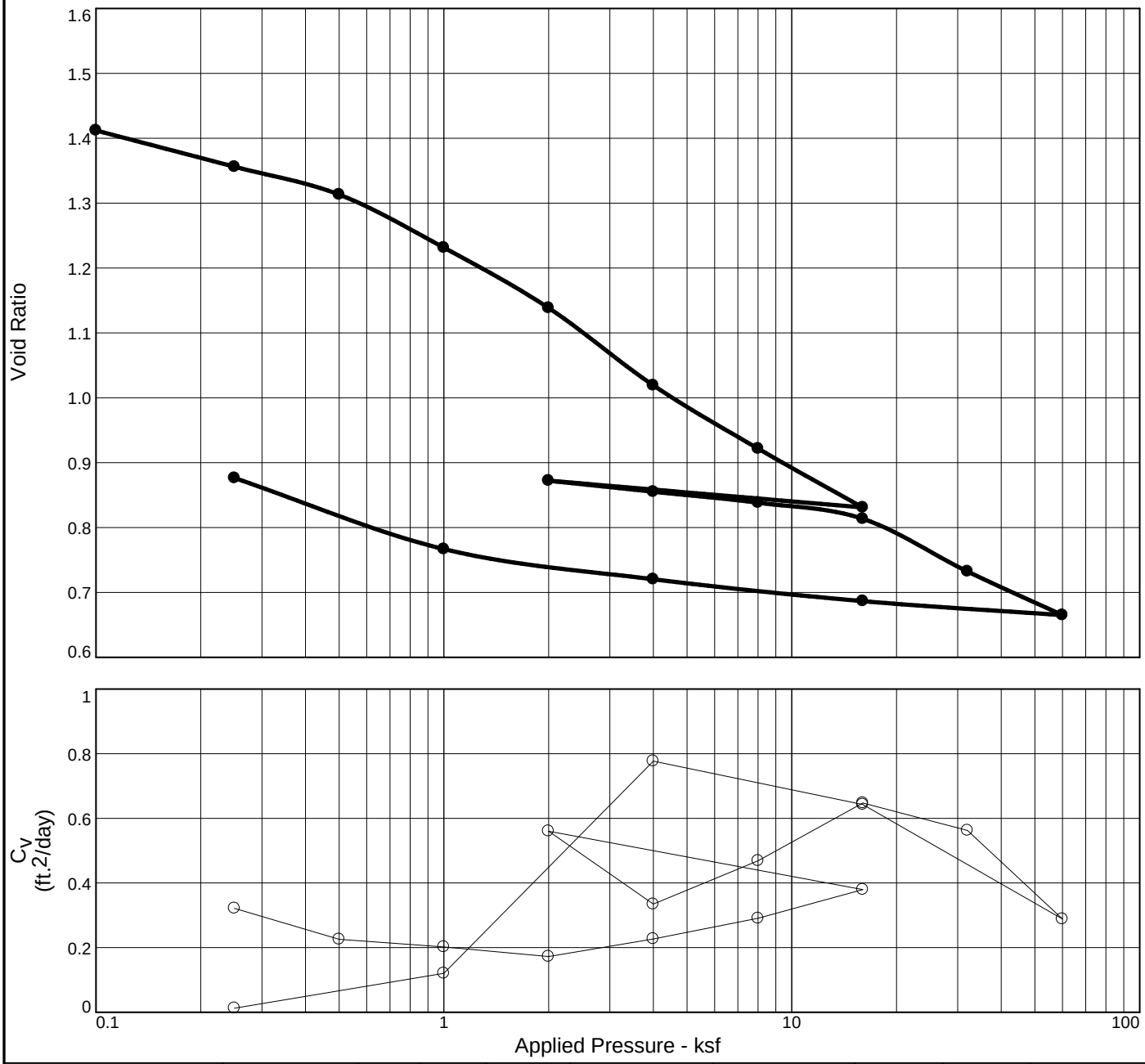
Baton Rouge, LA

Remarks:

Date Tested: 04/29/2019
Tested by: S. Serf
Reviwed by: A. Bull

Plate B5-2

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
91.8 %	49.1 %	71.1	45	25	2.652		0.6	0.34	0.10	1.417

MATERIAL DESCRIPTION	USCS	AASHTO
LEAN CLAY, light gray, with silt pockets	CL	

Project No. 04.55184080 **Client:** CPRA

Project: ST. CATHERINE ISLAND MARSH CREATION AND SHORELINE PROTECTION (PO-0179)

Source of Sample: B-4 **Depth:** 11.0 **Sample Number:** 6

Fugro USA Land, Inc.

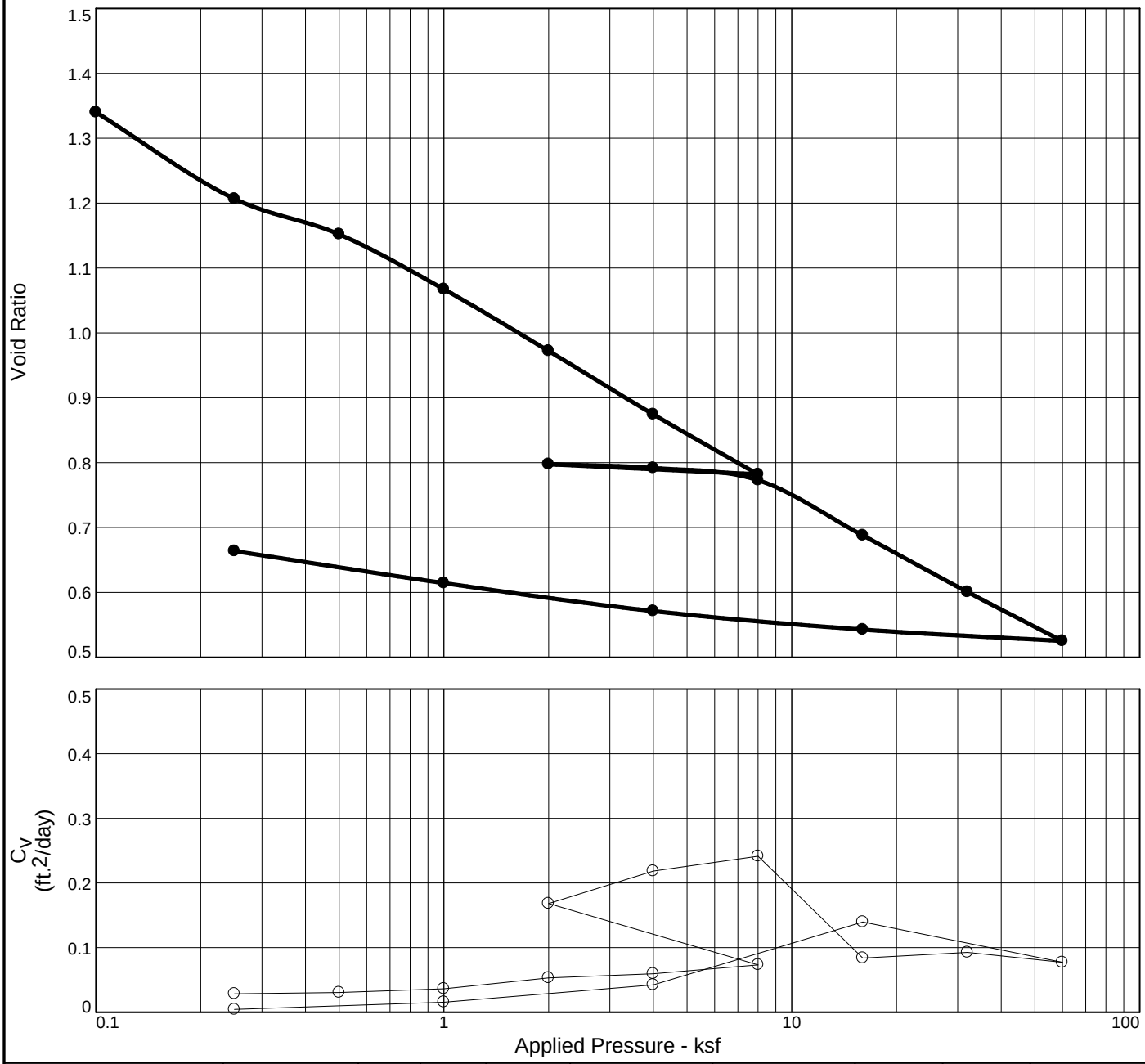
Baton Rouge, LA

Remarks:

Date Tested: 04/29/2019
Tested by: S. Serf
Reviewed by: A. Bull

Plate B5-3

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
95.8 %	48.0 %	73.3	42	20	2.677		0.7	0.35	0.08	1.341

MATERIAL DESCRIPTION	USCS	AASHTO
LEAN CLAY, gray, with silt pockets and seams	CL	

Project No. 04.55184080 **Client:** CPRA

Project: ST. CATHERINE ISLAND MARSH CREATION AND SHORELINE PROTECTION (PO-0179)

Source of Sample: B-6 **Depth:** 5.0 **Sample Number:** 3

Fugro USA Land, Inc.

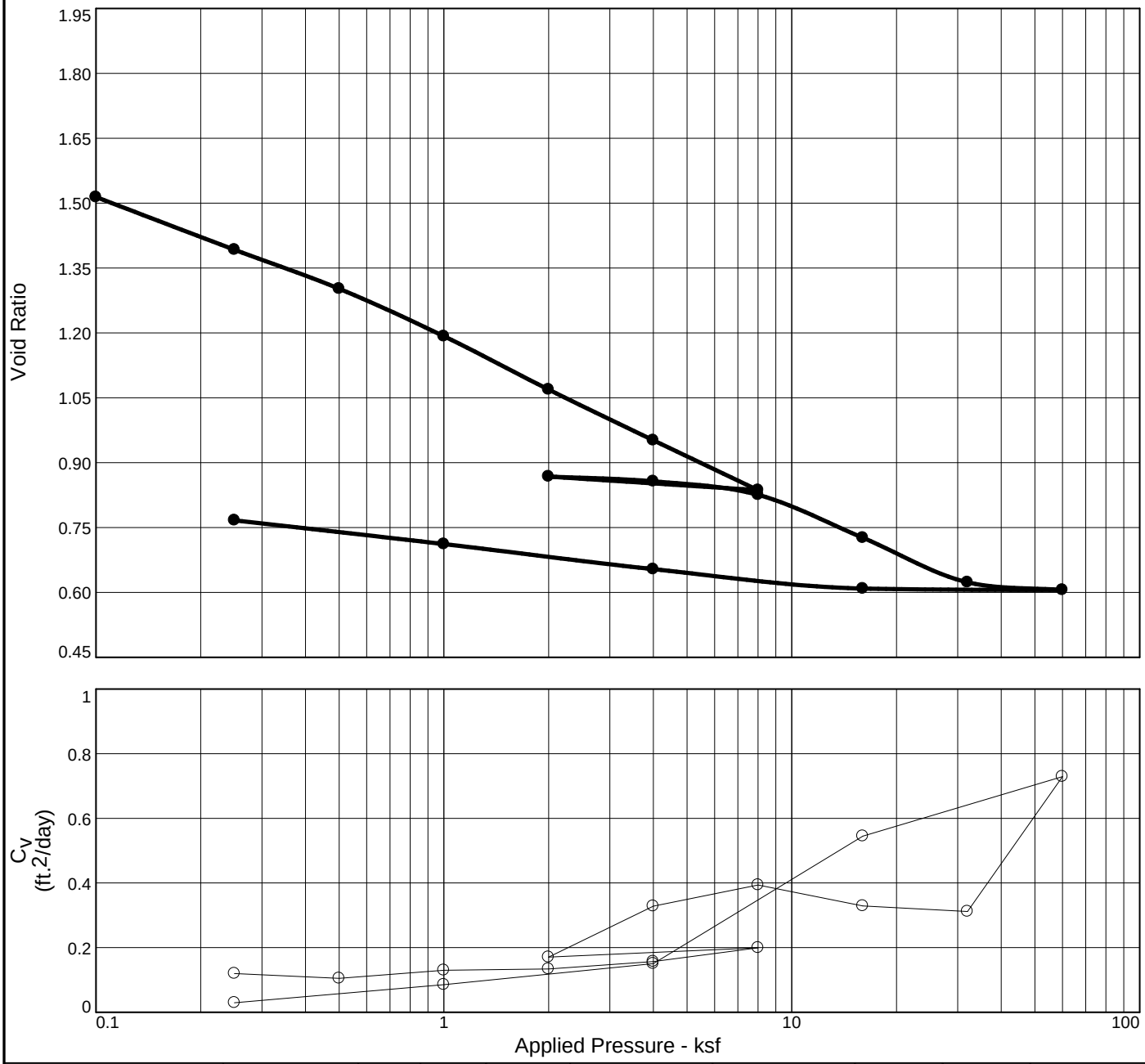
Baton Rouge, LA

Remarks:

Date Tested: 04/02/2019
Tested by: G. Lindsey
Reviewed by: A. Bull

Plate B5-4

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
98.0 %	55.8 %	68.0	59	37	2.659		0.3	0.38	0.10	1.514

MATERIAL DESCRIPTION	USCS	AASHTO
FAT CLAY, gray, with sand pockets	CH	

Project No. 04.55184080 **Client:** CPRA

Project: ST. CATHERINE ISLAND MARSH CREATION AND SHORELINE PROTECTION (PO-0179)

Source of Sample: B-7 **Depth:** 11 **Sample Number:** 6

Fugro USA Land, Inc.

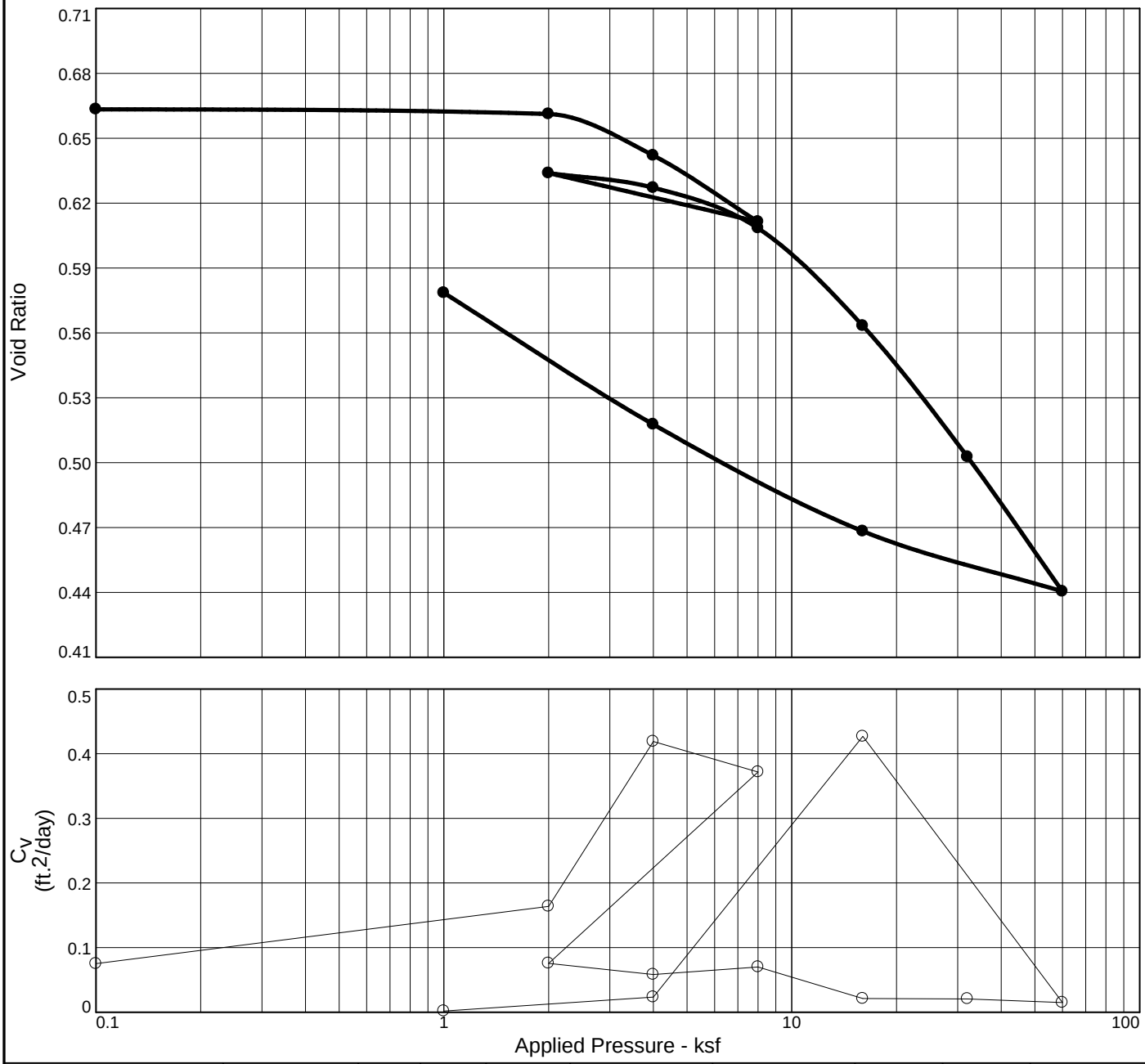
Baton Rouge, LA

Remarks:

Date Tested: 04-02-2019
Tested by: G. Lindsey
Reviewed by: A. Bull

Plate B5-5

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
97.3 %	24.4 %	100.6	60	38	2.663		7.5	0.23	0.07	0.669

MATERIAL DESCRIPTION	USCS	AASHTO
FAT CLAY, greenish gray, with silt pockets	CH	

Project No. 04.55184080 **Client:** CPRA

Project: ST. CATHERINE ISLAND MARSH CREATION AND SHORELINE PROTECTION (PO-0179)

Source of Sample: B-8 **Depth:** 29.0 **Sample Number:** 11

Fugro USA Land, Inc.

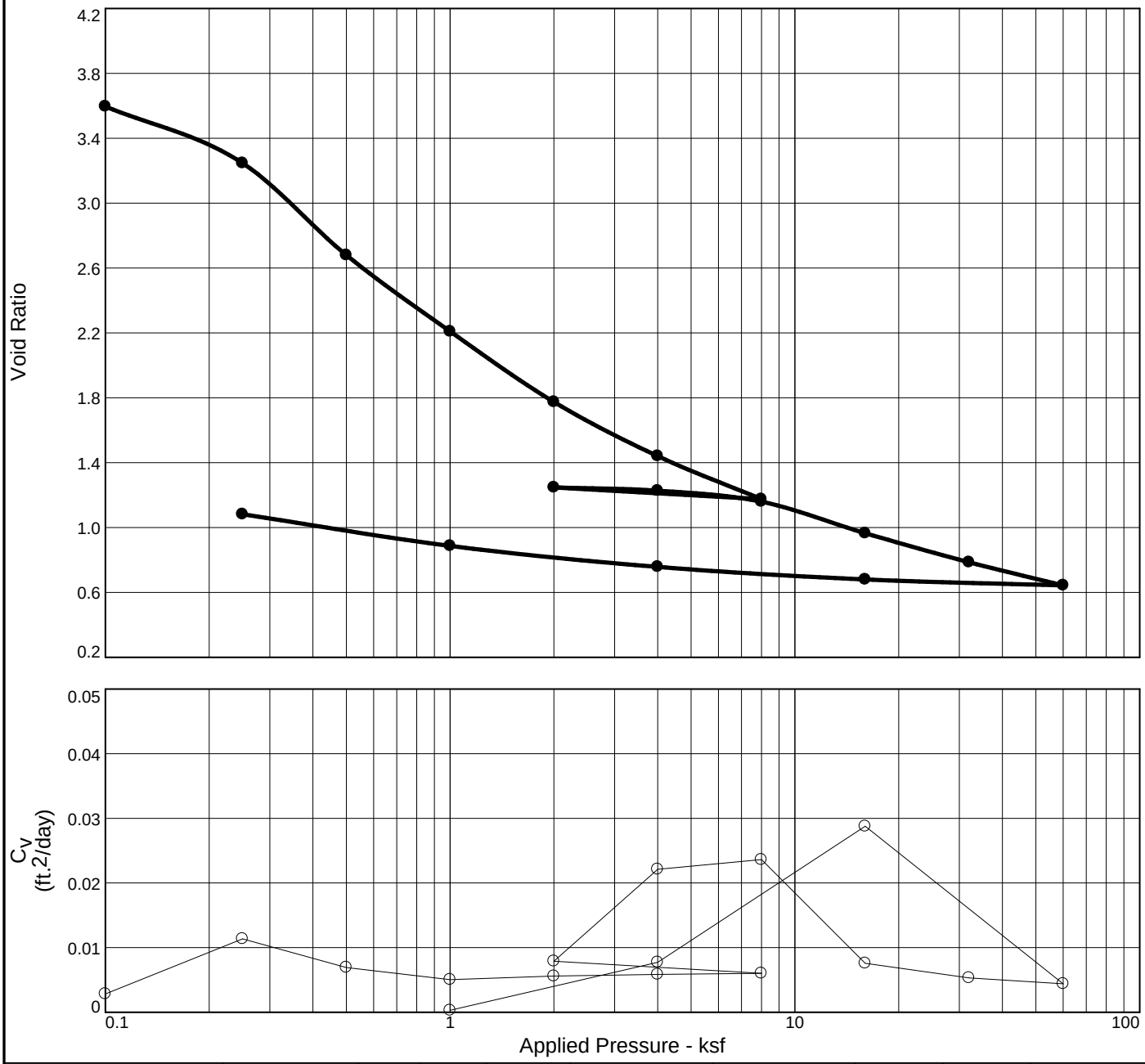
Baton Rouge, LA

Remarks:

Date Tested: 04/02/2019
Tested By: G. Lindsey
Reviewed By: A. Bull

Plate B5-6

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
118.5 %	177.1 %	30.0	391	268	2.413		0.2	1.49	0.22	3.606

MATERIAL DESCRIPTION	USCS	AASHTO
ORGANIC CLAY, dark brown, with peat		

Project No. 04.55184080 **Client:** CPRA

Project: ST. CATHERINE ISLAND MARSH CREATION AND SHORELINE PROTECTION (PO-0179)

Source of Sample: B-10 **Depth:** 3.0 **Sample Number:** 2

Fugro USA Land, Inc.

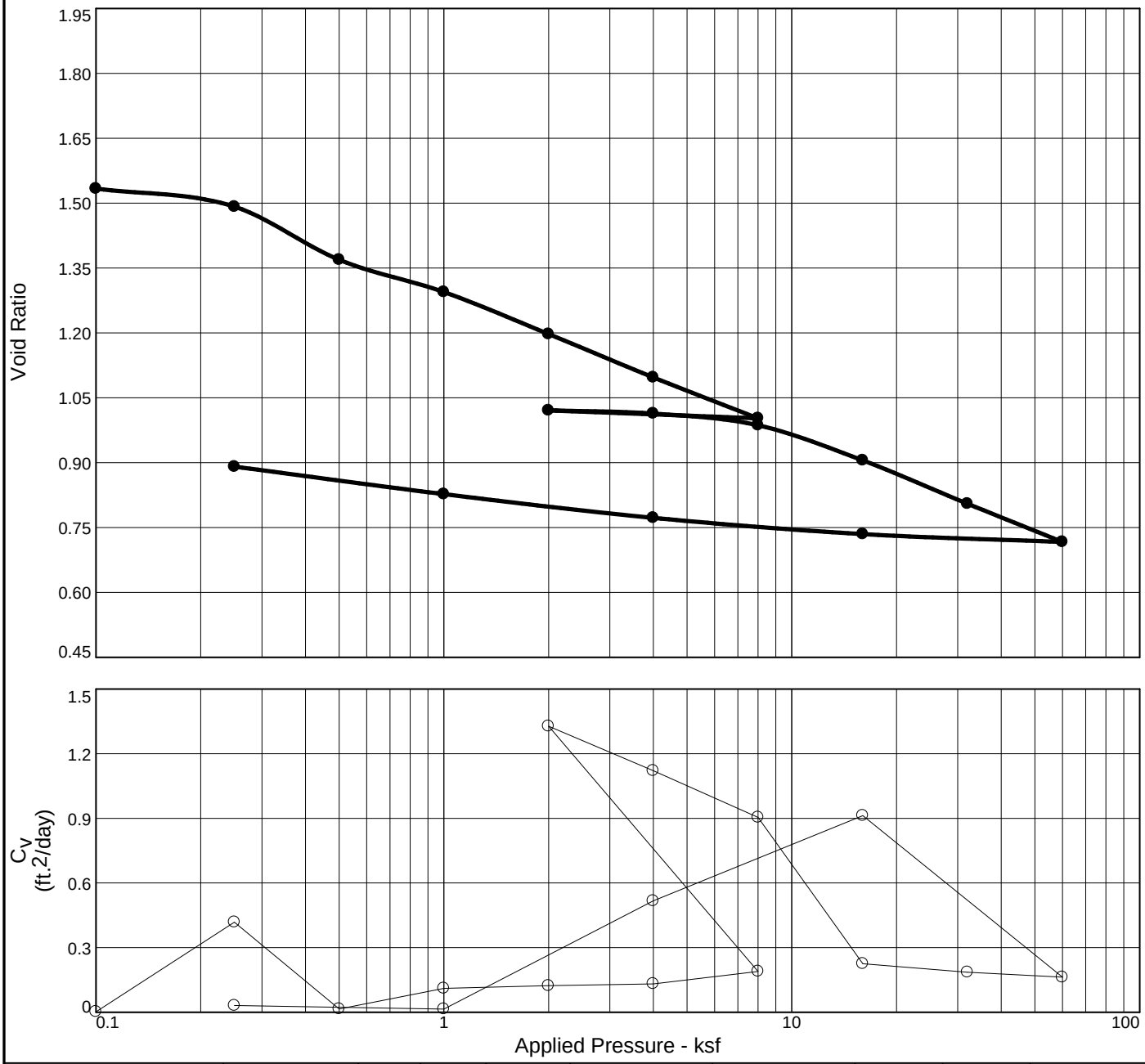
Baton Rouge, LA

Remarks:

Date Tested: 05/15/2019
Tested By: S. Serf
Reviewed By: A. Bull

Plate B5-7

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
84.9 %	49.9 %	67.6	37	17	2.609		0.4	0.35	0.09	1.535

MATERIAL DESCRIPTION	USCS	AASHTO
LEAN CLAY, light gray		

Project No. 04.55184080 **Client:** CPRA

Project: ST. CATHERINE ISLAND MARSH CREATION AND SHORELINE PROTECTION (PO-0179)

Source of Sample: B-12 **Depth:** 9.0 **Sample Number:** 5

Fugro USA Land, Inc.

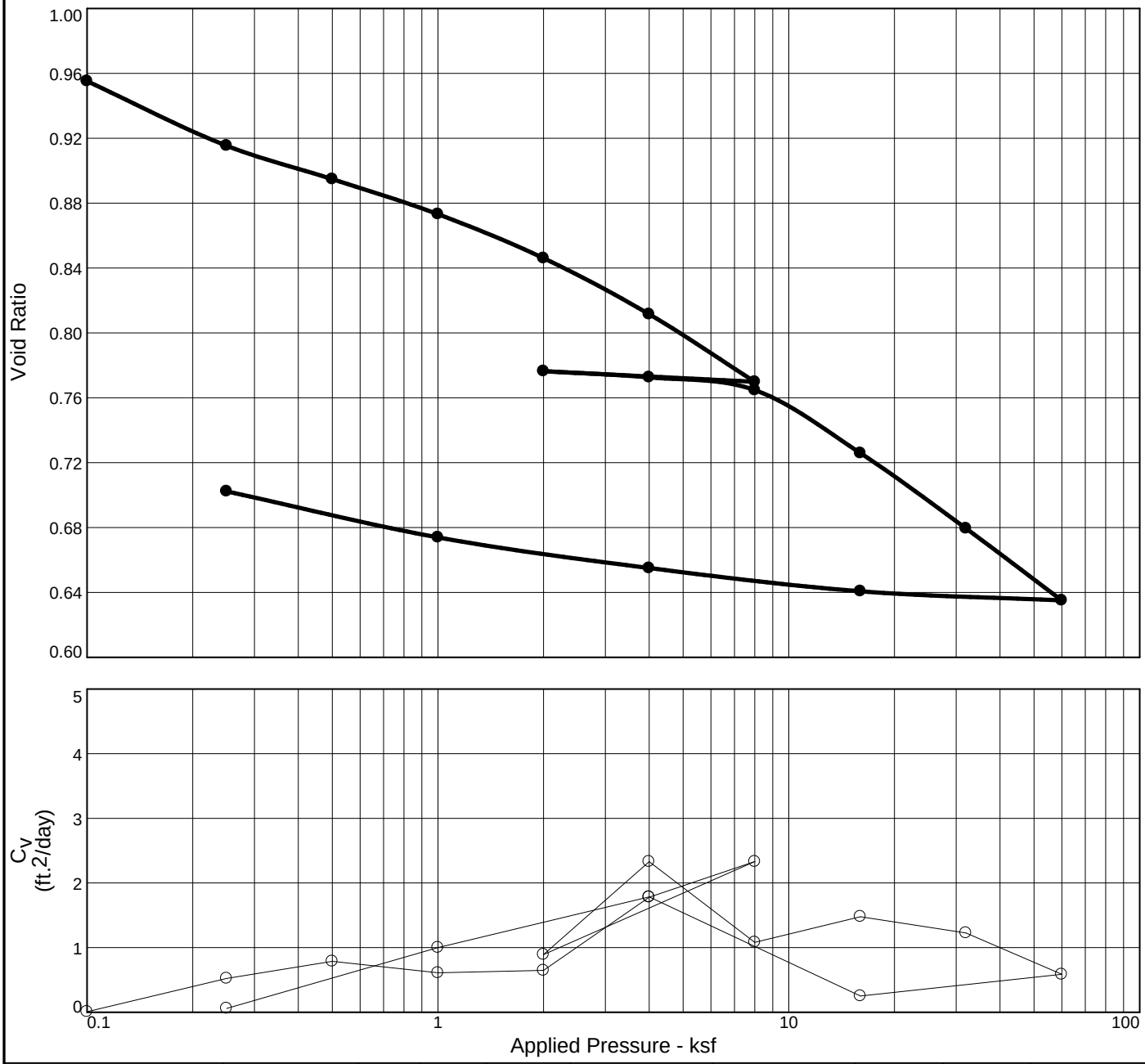
Baton Rouge, LA

Remarks:

Date Tested: 05/15/2019
Tested By: S. Serf
Reviewed By: A. Bull

Plate B5-8

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
91.1 %	33.7 %	88.1	88	61	2.587		2.7	0.16	0.04	0.956

MATERIAL DESCRIPTION	USCS	AASHTO
FAT CLAY, gray, with sand partings and organics		

Project No. 04.55184080 **Client:** CPRA

Project: ST. CATHERINE ISLAND MARSH CREATION AND SHORELINE PROTECTION (PO-0179)

Source of Sample: B-15 **Depth:** 7.0 **Sample Number:** 4

Fugro USA Land, Inc.

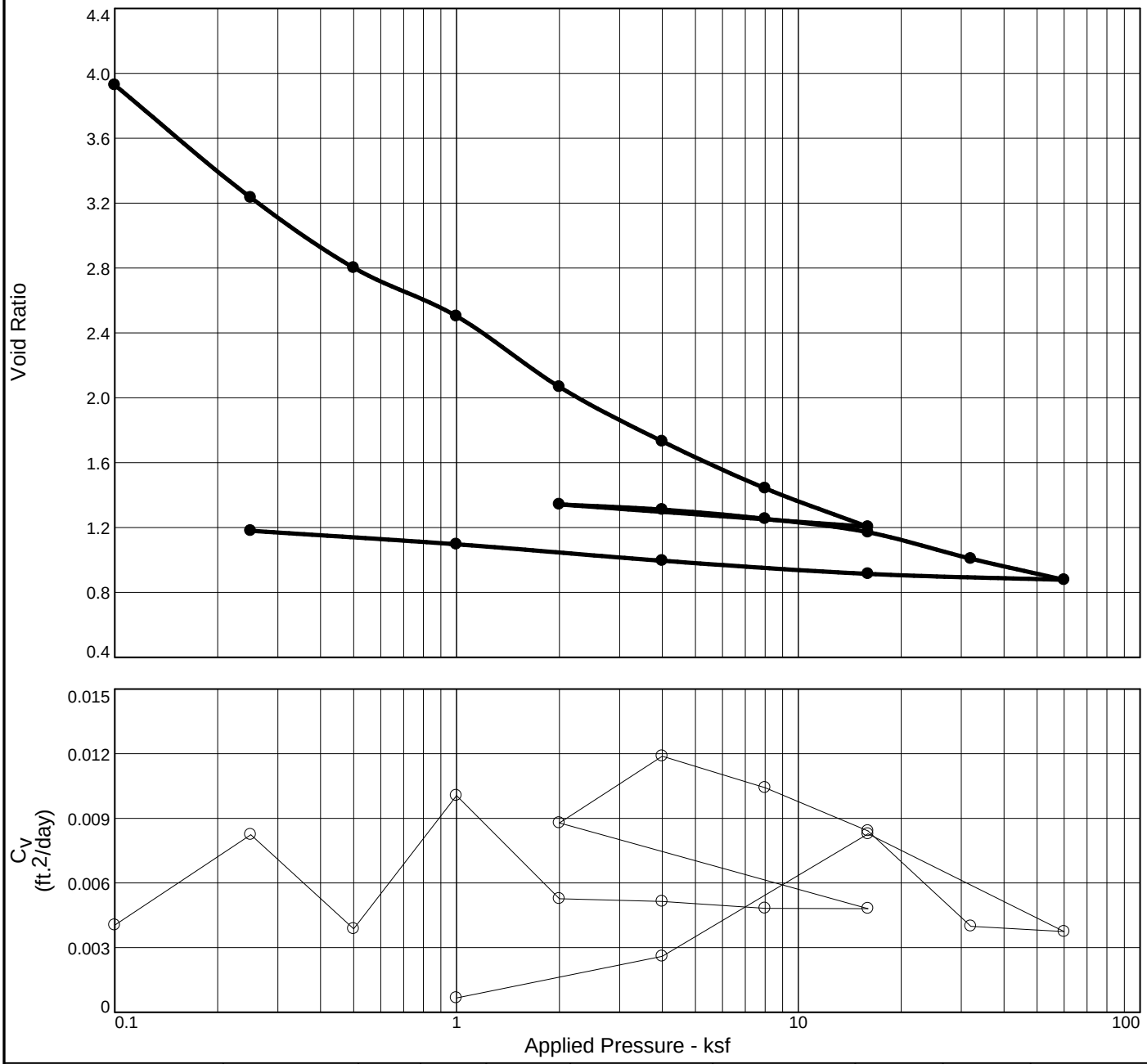
Baton Rouge, LA

Remarks:

Date Tested: 05/15/2019
Tested By: S. Serf
Reviewed By: A. Bull

Plate B5-9

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
85.2 %	128.8 %	39.1	155	120	2.601		0.6	1.68	0.20	3.929

MATERIAL DESCRIPTION	USCS	AASHTO
ORGANIC CLAY, dark brown		

Project No. 04.55184080 **Client:** CPRA

Project: ST. CATHERINE ISLAND MARSH CREATION AND SHORELINE PROTECTION (PO-0179)

Source of Sample: B-17 **Depth:** 5.0 **Sample Number:** 3

Fugro USA Land, Inc.

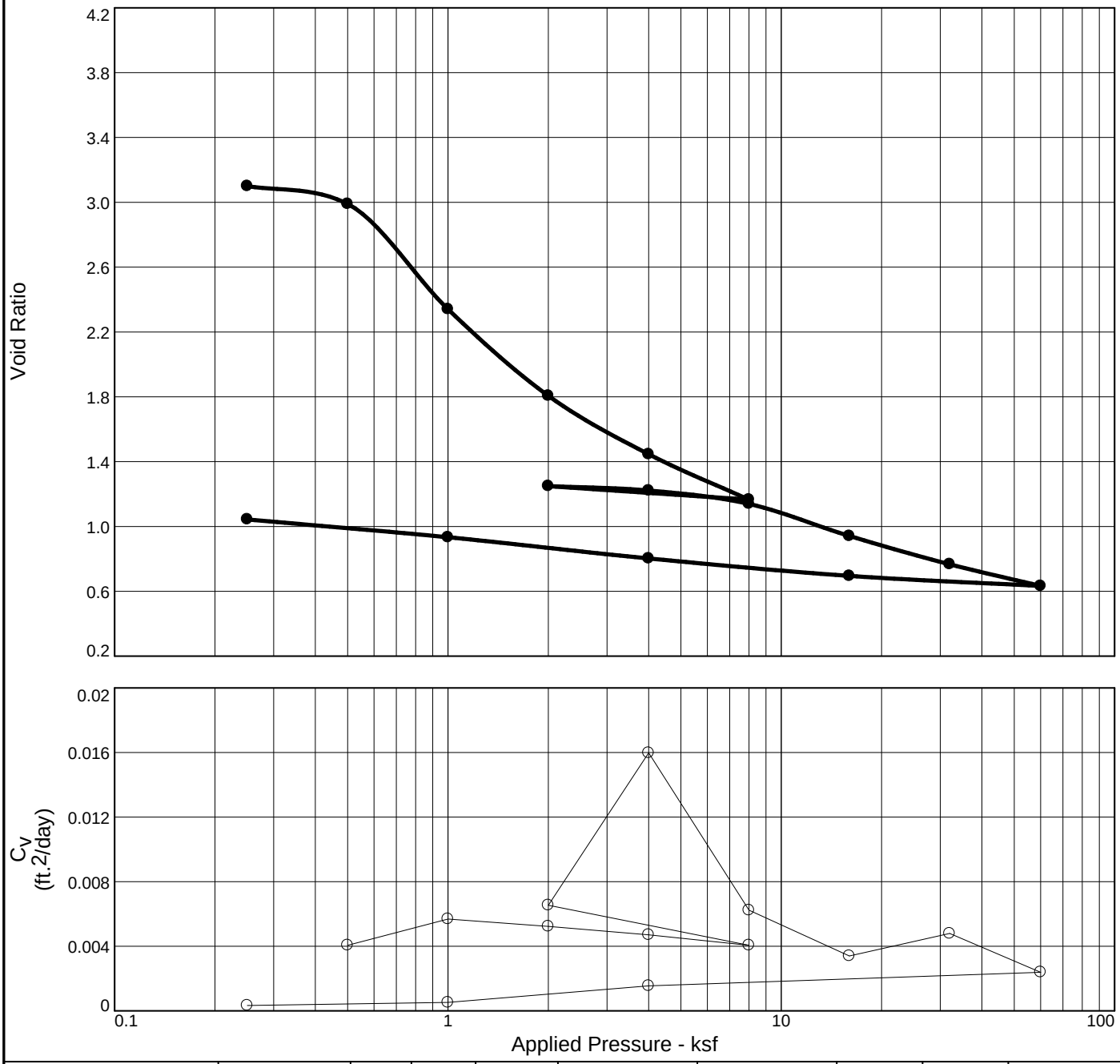
Baton Rouge, LA

Remarks:

Date Tested: 05/20/2019
Tested By: S. Serf
Reviewed By: A. Bull

Plate B5-10

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
123.8 %	147.7 %	34.9	120	86	2.648		0.2	1.90	0.23	3.159

MATERIAL DESCRIPTION	USCS	AASHTO
ORGANIC CLAY, gray	OH	

Project No. 04.55184080 **Client:** CPRA

Project: ST. CATHERINE ISLAND MARSH CREATION AND SHORELINE PROTECTION (PO-0179)

Source of Sample: B-18 **Depth:** 9.0 **Sample Number:** 5

Fugro USA Land, Inc.

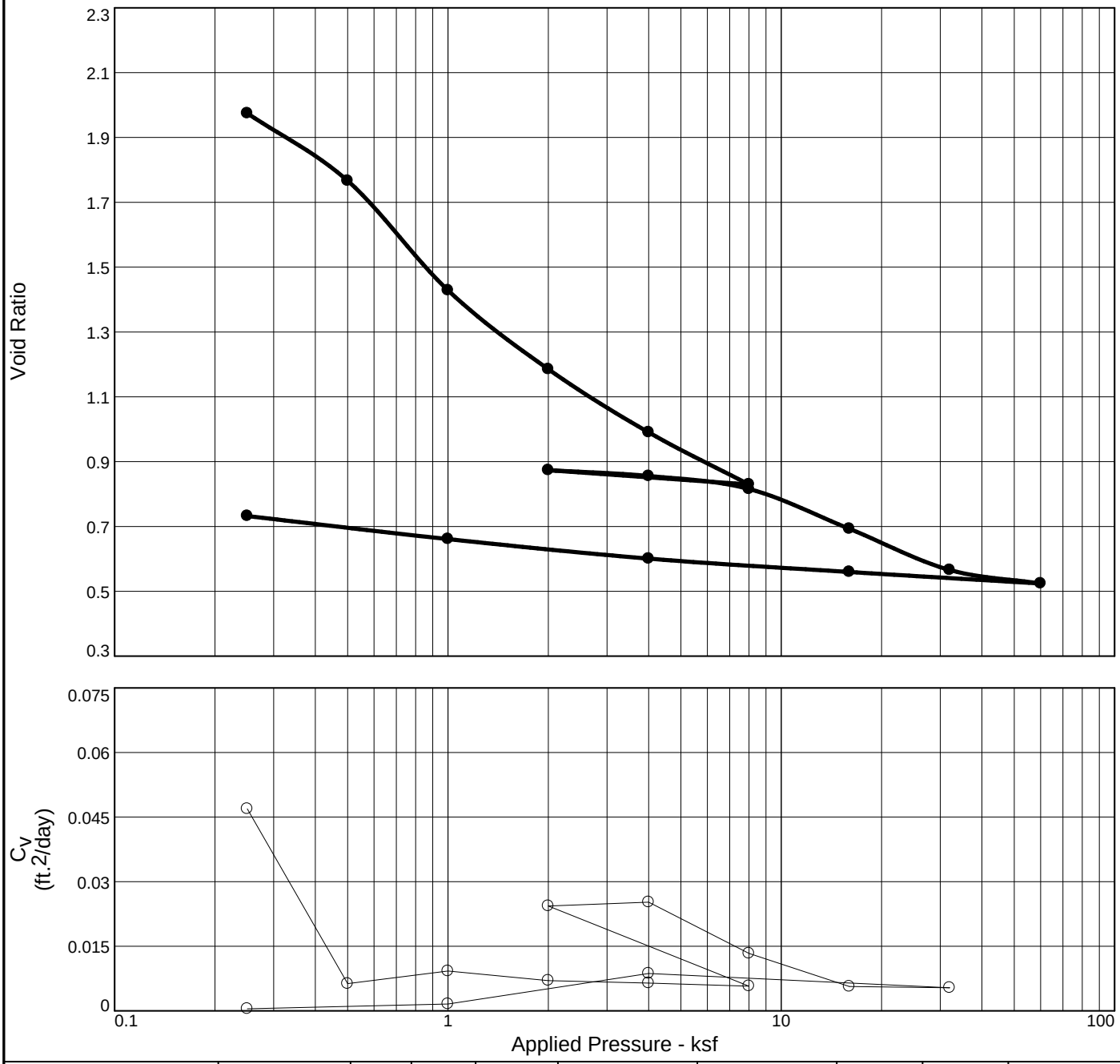
Baton Rouge, LA

Remarks:

Date Tested: 9/16/2019
Tested by: R. Johnson
Reviewed by: E. Marx

Plate B5-11

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
126.4 %	102.6 %	47.5	97	68	2.614	0.04	0.1	0.90	0.13	2.121

MATERIAL DESCRIPTION	USCS	AASHTO
FAT CLAY, gray, with silt pockets	CH	

Project No. 04.55184080 **Client:** CPRA

Project: ST. CATHERINE ISLAND MARSH CREATION AND SHORELINE PROTECTION (PO-0179)

Source of Sample: B-19 **Depth:** 2.0 **Sample Number:** 2

Fugro USA Land, Inc.

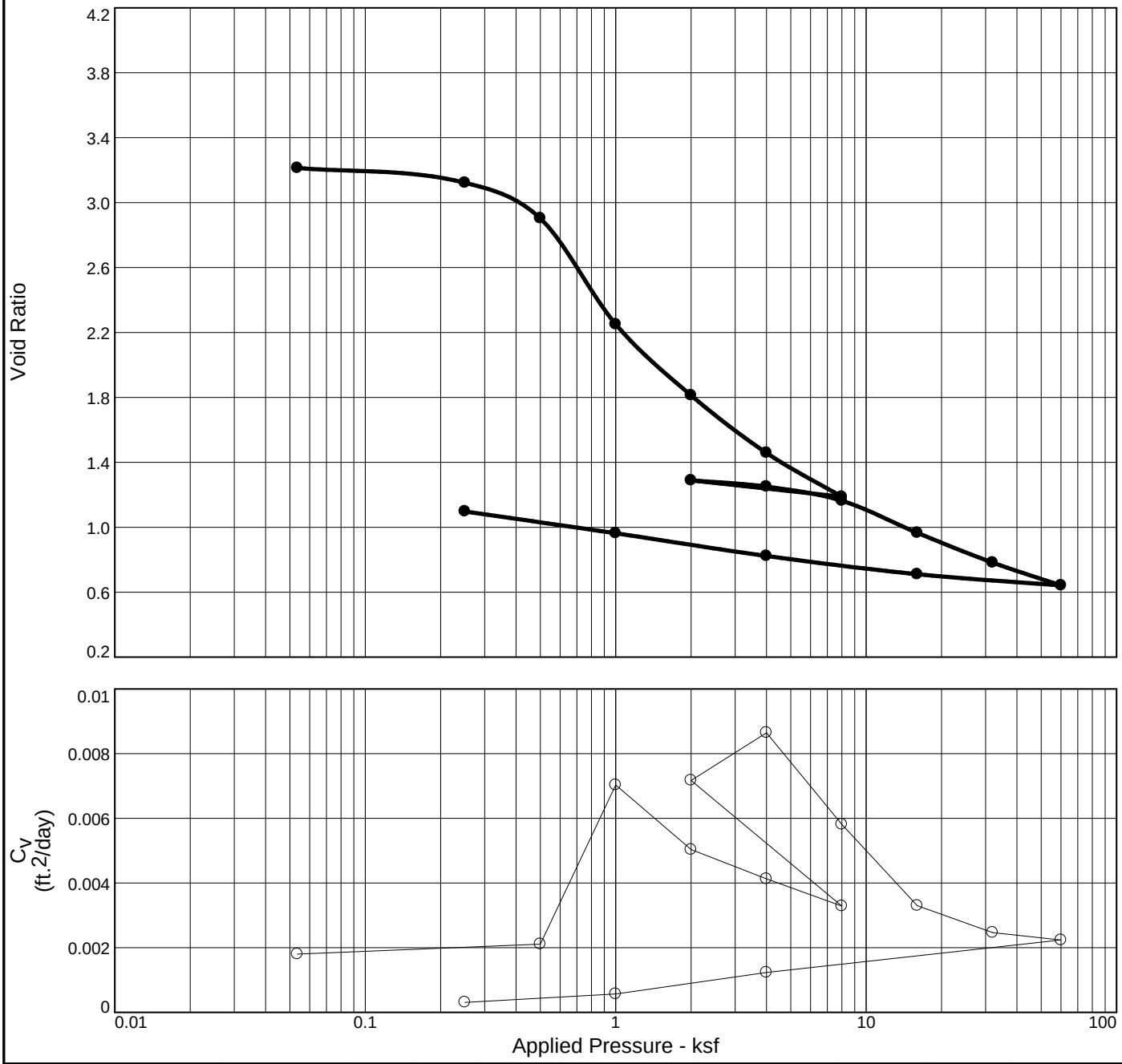
Baton Rouge, LA

Remarks:

Date Tested: 09/16/2019
Tested by: R. Johnson
Reviewed by: E. Marx

Plate B5-12

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
99.7 %	123.3 %	38.4	128	92	2.599		0.2	1.85	0.25	3.214

MATERIAL DESCRIPTION	USCS	AASHTO
ORGANIC CLAY, gray	OH	

Project No. 04.55184080 **Client:** CPRA

Project: ST. CATHERINE ISLAND MARSH CREATION AND SHORELINE PROTECTION (PO-0179)

Source of Sample: B-20 **Depth:** 14.0 **Sample Number:** 8

Fugro USA Land, Inc.

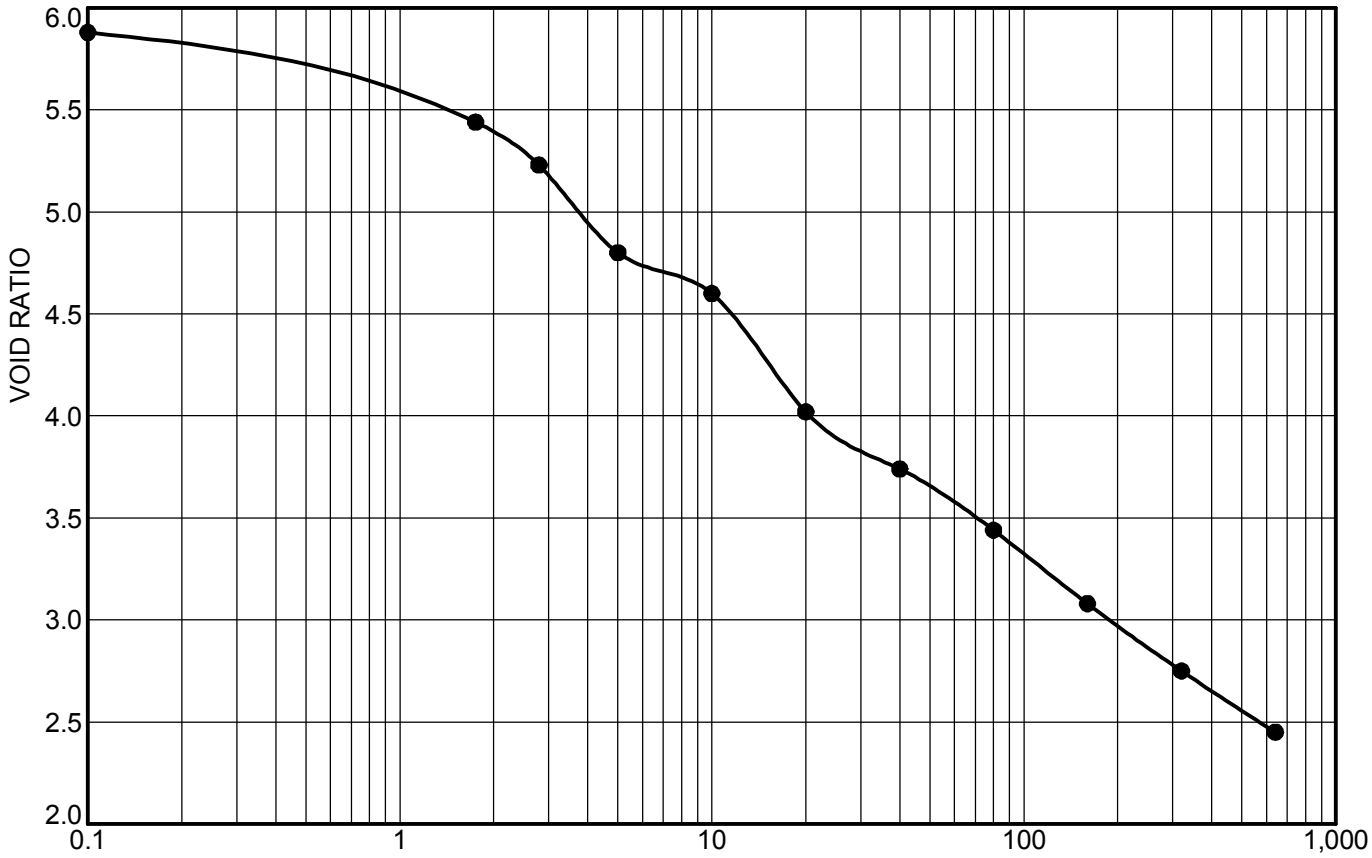
Baton Rouge, LA

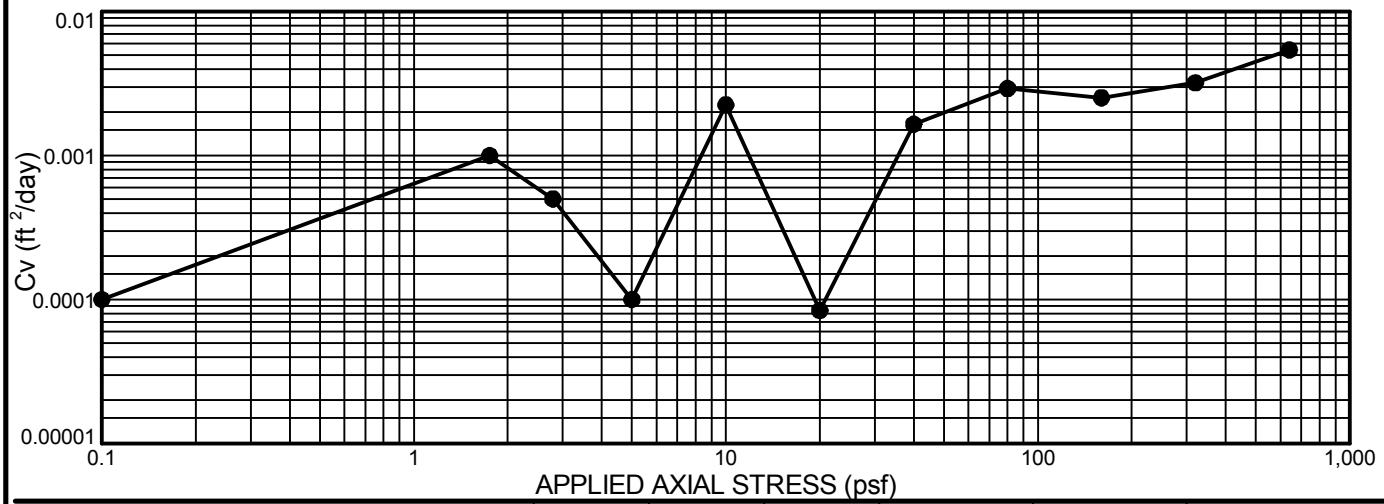
Remarks:

Date Tested: 09/16/2019
Tested by: R. Johnson
Reviewed by: E. Marx

Plate B5-13

SELF-WEIGHT CONSOLIDATION TEST REPORT





Initial			LL	PI	Sp. Gr.	Pc (ksf)	Cc	Initial Void Ratio
Saturation %	Moisture %	Dry Dens.(pcf)						
100.0	115.9%	47.4	46	32	2.607	N/A	1.11	5.880

MATERIAL DESCRIPTION

LEAN CLAY, gray

FUGRO

Project No. 04.55184080 Client: Coastal Protection and Restoration Authority

Project: St. Catherine Island Marsh Creation and Shoreline Protection (PO-0179)

Source of Sample: Composite sample from B-22, B-24, B-25, and B-27

Remarks:
Test Date: 2/21/2020
Tested by: Robert Johson
Reviewed by: Lisa de la Fuente

PLATE B6-1

FCBR CONSOL GEOSYS FORMA SELF WT 04.55184080.GPJ FUGRO DATA TEMPLATE 042610.GDT 04/08/20

Appendix C

Settling Column Testing

Final Report:

Settling Properties of Fine-Grained Sediments: St. Catherine Island Marsh Creation and Shoreline Protection (PO-179) (Fugro Project No. 04.55184080)

Submitted to:

Eric Marx, P.E.
Vice President – Louisiana General Manager
Fugro USA Land, Inc.
4233 Rhoda drive
Baton Rouge, LA 70816
Phone: (225) 800-5402
Email: emarx@fugro.com

Submitted by:

William M. Moe, Ph.D., P.E.
Principal and Project Manager
SCTCS Group LLC
LBTC, Building 3000
8000 Innovation Park Drive
Baton Rouge, LA 70820
Phone: (225) 803-3945
Email: wmoe@sctcs.com

March 19, 2020

1.0 Introduction, Scope, and Objectives

The objective of the testing reported here was to provide an evaluation of the potential settling properties of fine-grained sediments which may be hydraulically dredged in the St. Catherine Island Marsh Creation and Shoreline Protection (PO-179) project (Fugro Project No. 04.55184080).

2.0 Experimental Procedures and Results

2.1 Materials Provided for Testing

Composited sediment and water from the proposed dredge location were provided by Fugro USA Land, Inc. for testing. Sediment buckets were labeled as: 04.55184080 B-22, 24, 25, 27 composite 0-15'. Water buckets were labeled as: 04.55184080 Site Water.

2.2 Pilot-Scale Settling Column Test

As requested by the client, the pilot-scale settling test was conducted targeting an initial particulate concentration of 300 g/L and an initial ponded slurry depth of 6.0 feet. Slurry was prepared by mixing wet, homogenized sediment with water provided from the proposed dredge location. The salinity of the site water, measured gravimetrically with drying at 180 ºC, was 0.72 parts per thousand (ppt). Slurry containing the fine-grained fraction of sediments was obtained by thoroughly mixing the slurry and then allowing coarse grained materials (e.g., sand and shells), to separate by differential settling as described in the US Army Corps of Engineers Manual No. 1110-2-5027[1]. The fine-grained sediment slurry was loaded into a large-scale (8.0 inch ID) column while mixing with air sparging as described in the US Army Corps of Engineers Manual No. 1110-2-5027[1]. Solids concentrations in the slurry at the start of the settling test were measured in samples collected along the height of the column at one foot intervals (see Appendix A for tabulated data). The average particulate concentration at the start of the pilot-scale settling test was 287.6 g/L (close to but slightly below the target concentration of 300 g/L requested by the client).

A clear sediment-water interface was observed shortly (two hours) after the start of the pilot-scale settling test. The height of the sediment-water interface above the bottom of the column was measured and recorded over a period lasting 18 days as depicted in Figure 1 (see Appendix B for tabulated data).

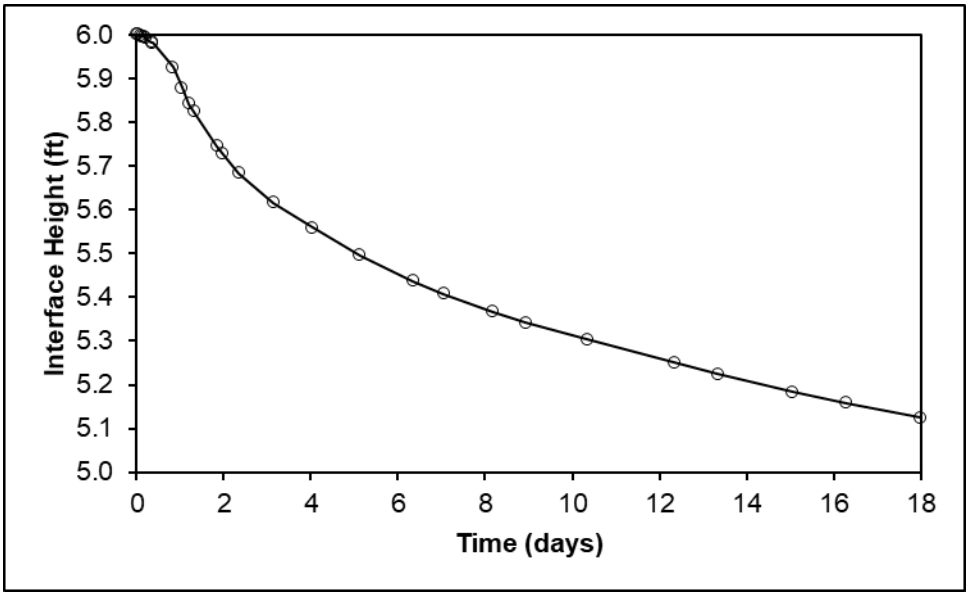


Figure 1. Interface height as a function of time during the pilot-scale settling test of fine grained sediment slurry. Note: y-axis scale in this figure ranges from 5.0 to 6.0 feet.

Sediment-water interface height data for the first 48 hours (2 days) after the start of the pilot-scale settling test are depicted separately in Figure 2. As shown in the figure, the settling rate during the first portion of the test was slow, followed by a somewhat faster essentially linear settling interval and then a transition to slower settling. A linear regression was performed for data in the most rapid linear portion (t=19 to 32 hours), with the resulting equation and correlation coefficient depicted on the graph. The slope of the regression line, which corresponds to the most rapid settling velocity, was 0.0087 ft/hr (0.21 ft/day).

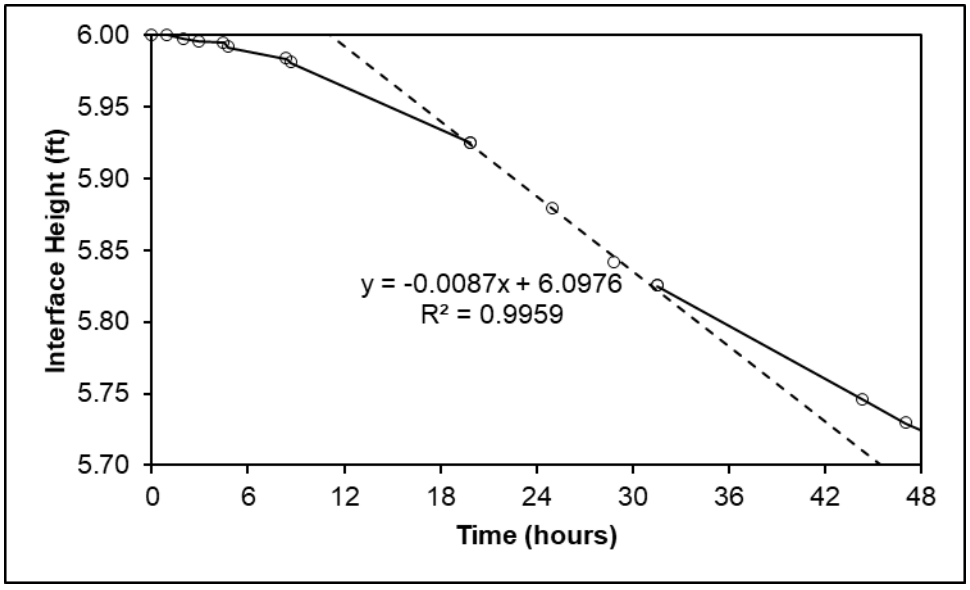


Figure 2. Interface height as a function of time during the zone settling portion of the pilot-scale settling test. Note: y-axis scale in this figure ranges from 5.7 to 6.0 feet.

For the portion of the settling test during which compression settling was clearly observed (t >44 hours), the concentration in the settled solids at each time interval was calculated using the following equation (equation 3-11 in ref. 1).

$$C = \frac{C_o H_i}{H_t}$$

Where:

C = slurry suspended solids concentration at time t (g/L)
C_o = initial slurry suspended solids concentration (g/L)
H_i = initial slurry height (ft)
H_t = height of the interface at time t (ft)

The corresponding suspended solids concentration as a function of time during compression settling is depicted in Figure 3.

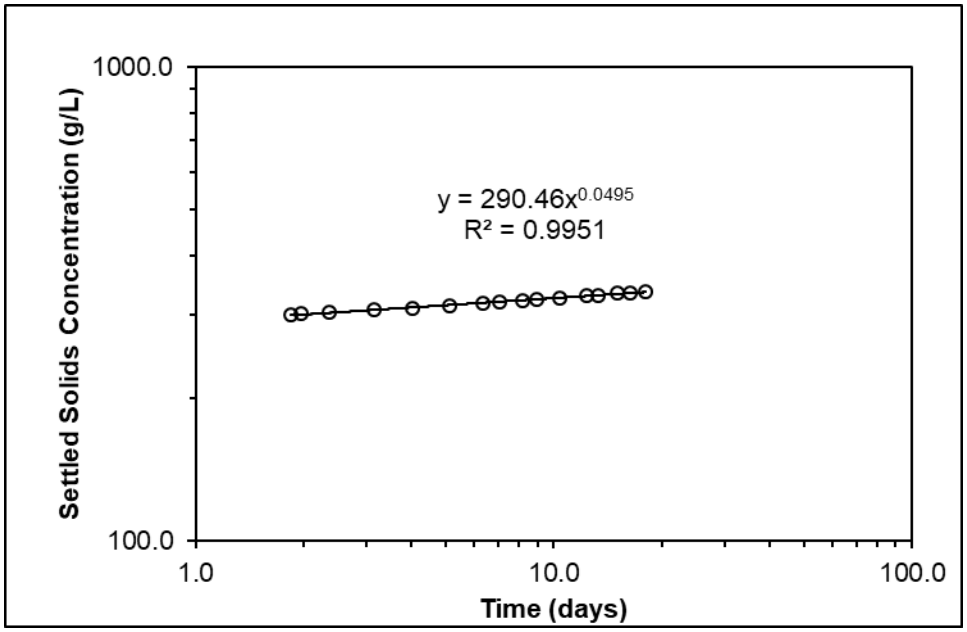


Figure 3. Concentration of settled solids as a function of time during the compression settling portion of the pilot-scale settling test.

For analysis of flocculent settling as described in the US Army Corps of Engineers Manual No. 1110-2-5027[1], water samples were collected from the clarified layer above the sediment-water interface for measurement of total suspended (TSS) following Standard Method 2450D[2]. The TSS concentration in the first of these samples, collected 6.4 days after the start of settling when the sediment-water interface was sufficiently below the uppermost sample port (height of 5.5 ft) to allow sample collection. Because the TSS concentrations in the initial samples collected for characterization of flocculent settling above the sediment-water interface were low, the mass of suspended solids retained on the filters was lower than the 5 mg recommended by the US Army Corps of Engineers Manual No. 1110-2-5027[1] and the 2.5 mg recommended by Standard

Methods[2]. Based on the data collected, the TSS concentration in initial samples from the flocculent settling above the sediment-water interface are reported here as < 25 mg/L (calculated as the minimum residue mass required for acceptable analysis, 2.5 mg, divided by the sample volume filtered, 0.1 L). At the conclusion of the test (t=18 days), a larger water volume from above the sediment-water interface was drained from the column's 5.5 ft port, and TSS concentrations were measured in duplicate 1.0 L samples. Total suspended solids concentrations in the duplicate samples were 6 and 7 mg/L, respectively.

Immediately after the collection of water samples at the end of the compression settling test described above, samples were collected from side ports below the sediment water interface. Starting at the uppermost sampling port that was sufficiently below the sediment water interface to allow sediment collection without entrainment of the overlying water (port at a height of 4.5 ft), at one foot intervals, each side port valve was briefly opened and approximately 100 mL of slurry was expelled. Then, samples were collected for measurement of solids. Resulting data are tabulated in Appendix D. The average experimentally determined particulate concentration at the end of the pilot-scale settling test, 323.2 g/L, was close to but slightly lower than the average concentration calculated by mass balance (336.7 g/L calculated using 3-11 in ref. 1).

Because the pilot-scale settling column test was conducted at a higher than typical initial particulate concentration, to provide supplementary information regarding potential settling behavior that could occur at lower particulate concentrations, a short-term bench-scale experiment was conducted to estimate the particulate concentration where behavior dominated by zone settling would end and compression settling would begin for lower particulate concentrations. Details and tabulated data are presented in Appendix D. The end of what is best described as zone settling and onset of what is best characterized as compression settling occurred at a particulate concentration of approximately 221 g/L in the bench-scale study.

3.0 References

[1] US Army Corps of Engineers (1987) *Engineering and Design - Confined Disposal of Dredged Material*, Engineer Manual No. 1110-2-5027.

[2] American Public Health Association (1998) *Standard Methods for the Examination of Water and Wastewater*, 20th Edition, American Water Works Association, Water Pollution Control Federation, Washington, DC.

Appendix A

Table A1. Particulate concentrations measured in samples collected from side ports at the start (t=0) of the pilot-scale (8 inch ID) settling column test

Port height (ft)[a]	Particulate Conc. (g/L)
1.0	288.0
2.0	287.3
3.0	287.5
4.0	288.0
5.0	287.9
6.0	286.9
Average	**287.6**

[a] As measured from the bottom of the column

Appendix B

Table B1. Height of the sediment-water interface above the bottom of the column as a function of time during the pilot-scale (8 inch ID) column settling test

Elapsed Time (hr)	Elapsed Time (days)	Solids Interface Height (ft)	Head height (ft)	Settled Solids Conc. (g/L)[a]
0.00	0.000	6.000	6.000	287.6
1.00	0.042	6.000	6.000	287.6
2.00	0.083	5.997	6.000	287.7
2.95	0.123	5.996	6.000	287.8
4.50	0.188	5.995	6.000	287.8
4.80	0.200	5.992	6.000	288.0
8.43	0.351	5.983	6.000	288.4
8.68	0.362	5.981	6.000	288.5
19.88	0.828	5.925	6.000	291.2
25.00	1.042	5.879	6.000	293.5
28.88	1.203	5.842	6.000	295.4
31.57	1.315	5.825	6.000	296.2
44.35	1.848	5.746	6.000	300.3
47.08	1.962	5.729	6.000	301.2
56.50	2.354	5.683	6.000	303.6
75.30	3.138	5.617	6.000	307.2
96.80	4.033	5.558	6.000	310.5
123.15	5.131	5.496	6.000	314.0
152.38	6.349	5.438	6.000	317.4
169.22	7.051	5.408	5.958	319.1
196.32	8.180	5.367	5.958	321.5
214.50	8.938	5.342	5.958	323.0
248.32	10.347	5.304	5.958	325.3
296.28	12.345	5.250	5.958	328.7
320.33	13.347	5.225	5.958	330.3
361.43	15.060	5.183	5.958	332.9
391.18	16.299	5.158	5.958	334.5
432.00	18.000	5.125	5.958	336.7

[a] Calculated using equation 3-11 in ref. 1 based on the measured particulate concentrations at t=0 and the height of the sediment-water interface at each time interval.

Appendix C

Table C1. Particulate concentrations measured in samples collected from side ports at the end (t=18 days) of the pilot-scale (8 inch ID) settling column test

Port height (ft)[a]	Particulate Conc. (g/L)
0.5	318.4
1.5	316.2
2.5	326.1
3.5	323.7
4.5	331.8
Average	**323.2**

[a] As measured from the bottom of the column

Appendix D

At the conclusion of the pilot-scale (8 inch ID, 6.0 foot ponded depth) settling column experiment, after collection of samples for measurement of particulate concentrations at the end of the test, 2.0 L of sediment slurry was withdrawn from the midsection of the settled solids in the pilot-scale settling column (port height 2.5 ft). Additional site water was added to dilute the particulate concentration, followed by thorough mixing (15 minutes using a drill-based mixing attachment). Then, a bench-scale settling test was performed to estimate the break between zone and compression settling. For this, a portion of the diluted slurry was transferred to a large (2.0 L nominal volume, 3.1 inch ID) graduated cylinder where it was allowed to quiescently settle. A readily visible sediment-water interface was observed at the top of the slurry shortly after the start of the settling interval in the graduated cylinder (<15 minutes). The height of the solids interface in the graduated cylinder was measured over time as depicted in Figure D1 (see Table D1 for tabulated data). The particulate concentration at the start of the bench-scale settling test was 134.9 g/L, and the ponded slurry height was 18.0 inches.

The relatively distinct break between zone and compression settling occurred at a time of 8.3 hours at a calculated particulate concentration of 220.7 g/L.

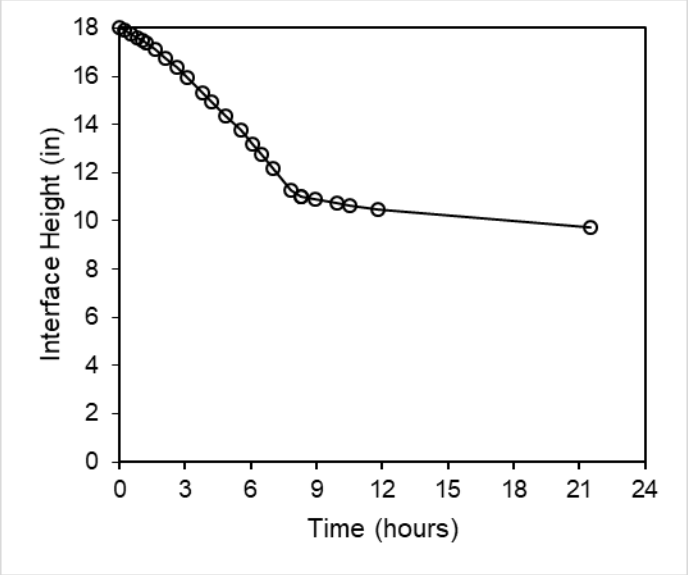


Figure D**1.** Interface height as a function of time during the bench-scale (graduated cylinder) settling test of fine grained sediment slurry.

Table D1. Height of the sediment-water interface above the bottom of the column as a function of time during the bench-scale (graduated cylinder) settling test.

Elapsed Time (hr)	Solids Interface Height (in)	Settled Solids Conc. (g/L)[a]
0.00	18.00	134.9
0.25	17.94	135.4
0.55	17.75	136.8
0.82	17.63	137.8
1.03	17.50	138.8
1.23	17.38	139.8
1.62	17.13	141.8
2.13	16.75	145.0
2.63	16.38	148.3
3.12	15.94	152.4
3.80	15.31	158.6
4.22	14.94	162.6
4.88	14.38	168.9
5.53	13.75	176.6
6.08	13.19	184.1
6.50	12.75	190.4
7.02	12.19	199.2
7.83	11.25	215.8
8.32	11.00	220.7
8.93	10.88	223.3
9.92	10.72	226.5
10.55	10.63	228.5
11.83	10.50	231.3
21.50	9.75	249.0

[a] Calculated using equation 3-11 in ref. 1 based on the measured particulate concentrations at t=0 and the height of the sediment-water interface at each time interval.