

Geotechnical Data Report Addendum 1, Revision 1

East Leeville Marsh Creation & Nourishment (BA-194)
Lafourche Parish, Louisiana

for

Coastal Protection and Restoration Authority

March 17, 2020



GEOENGINEERS 
Earth Science + Technology

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Baton Rouge, Louisiana 70809
225.293.2460

**Geotechnical Data Report
Addendum 1, Revision 1
East Leeville Marsh Creation and Nourishment (BA-194)
Lafourche Parish, Louisiana**

File No. 18274-004-02

March 17, 2020

Prepared for:

Coastal Protection and Restoration Authority
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Prepared by:

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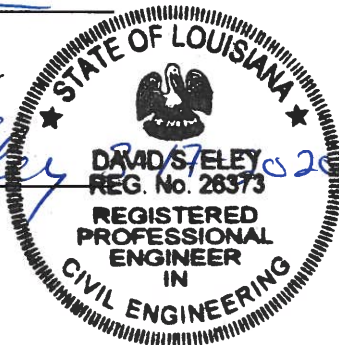


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ARS:DSE:kc



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1.0 INTRODUCTION AND PROJECT UNDERSTANDING

GeoEngineers, Inc. (GeoEngineers) is pleased to present this geotechnical data report addendum to the Coastal Protection and Restoration Authority (CPRA) and Baird, Inc. (Baird) for geotechnical services in support of the East Leeville Marsh Creation and Nourishment (BA-194) project located in Lafourche Parish, Louisiana.

GeoEngineers has previously submitted a geotechnical data report (October 8, 2018) and geotechnical engineering report (October 11, 2018) for the East Leeville Marsh Creation Project. Our design analyzed earthen containment dike construction using borrow material from within the marsh creation cells. Subsequent to our report submittal, CPRA requested GeoEngineers analyze a design utilizing borrow material from the outside of the earthen containment dikes and complete some additional stability and settlement analyses. This addendum presents our additional field exploration and laboratory testing data for the East Leeville Marsh Creation and Nourishment Project and is intended to supplement our October 8, 2018 data report.

Our services for this addendum were performed under a Subconsultant Professional Services Agreement between Baird and GeoEngineers dated January 9, 2020 (Reference No. 12992.101.L.1.Rev0) and in general accordance with our proposal dated January 9, 2020.

This data report addendum contains discussions of our geotechnical exploration and laboratory testing. Our additional engineering recommendations will be presented under separate cover. All elevations described in this report, including figures and appendices, are referenced to the North American Vertical Datum of 1988 (NAVD88), Geoid 12A.

2.0 FIELD EXPLORATION

GeoEngineers performed soil borings in the marsh creation areas of the East Leeville project. A project vicinity map is shown in Figure 1. Field exploration for the data contained in this report was conducted on February 15 and 16, 2020. The exploration locations are shown in Figure 2, and subsurface profiles are provided in Figures 3 through 4. Further details of our field exploration are discussed in Appendix A.

2.1. Survey

Prior to our field exploration, Lonnie G. Harper & Associates, Inc. (LGH) surveyed and staked the boring locations in the field. LGH performed a magnetometer survey at each proposed exploration location to clear a 30-foot radius of any detected anomalies. LGH's report is provided in Appendix B.

2.2. Marsh Creation Area

Our explorations in the marsh creation areas consisted of 6 soil borings to a depth 20 feet below the mudline. The soil borings were completed with a pontoon-mounted drill rig. The soil boring logs and associated laboratory testing results are provided in Appendices C and D, respectively.

3.0 LABORATORY TESTING

Intact very soft to soft semi-cohesive and cohesive samples obtained from the soil borings were subjected to extrusion in the GeoEngineers laboratory. Upon extrusion, each sample was examined to confirm or modify field classifications.

Representative soil samples were selected for laboratory testing consisting of moisture content, dry unit weight, unconsolidated-undrained triaxial compression, organic content, grain size analysis, and/or Atterberg limits.

4.0 VARIATIONS

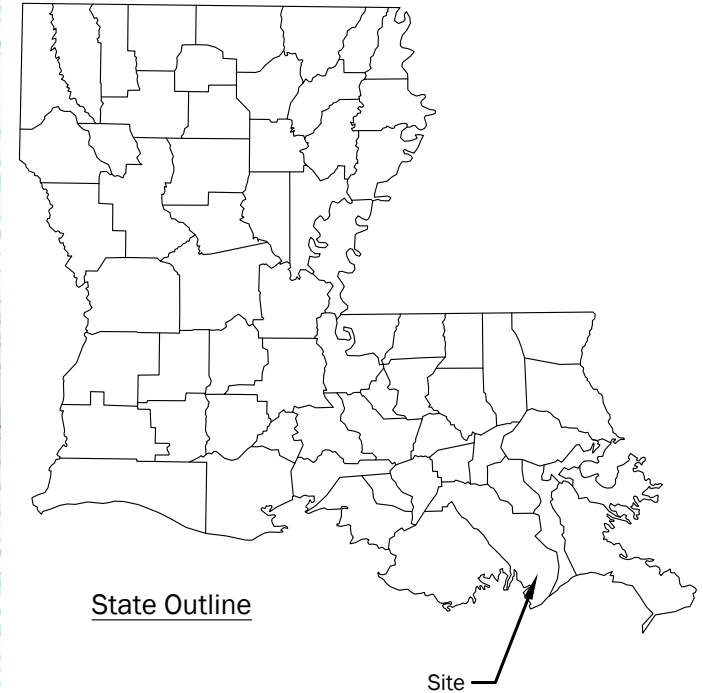
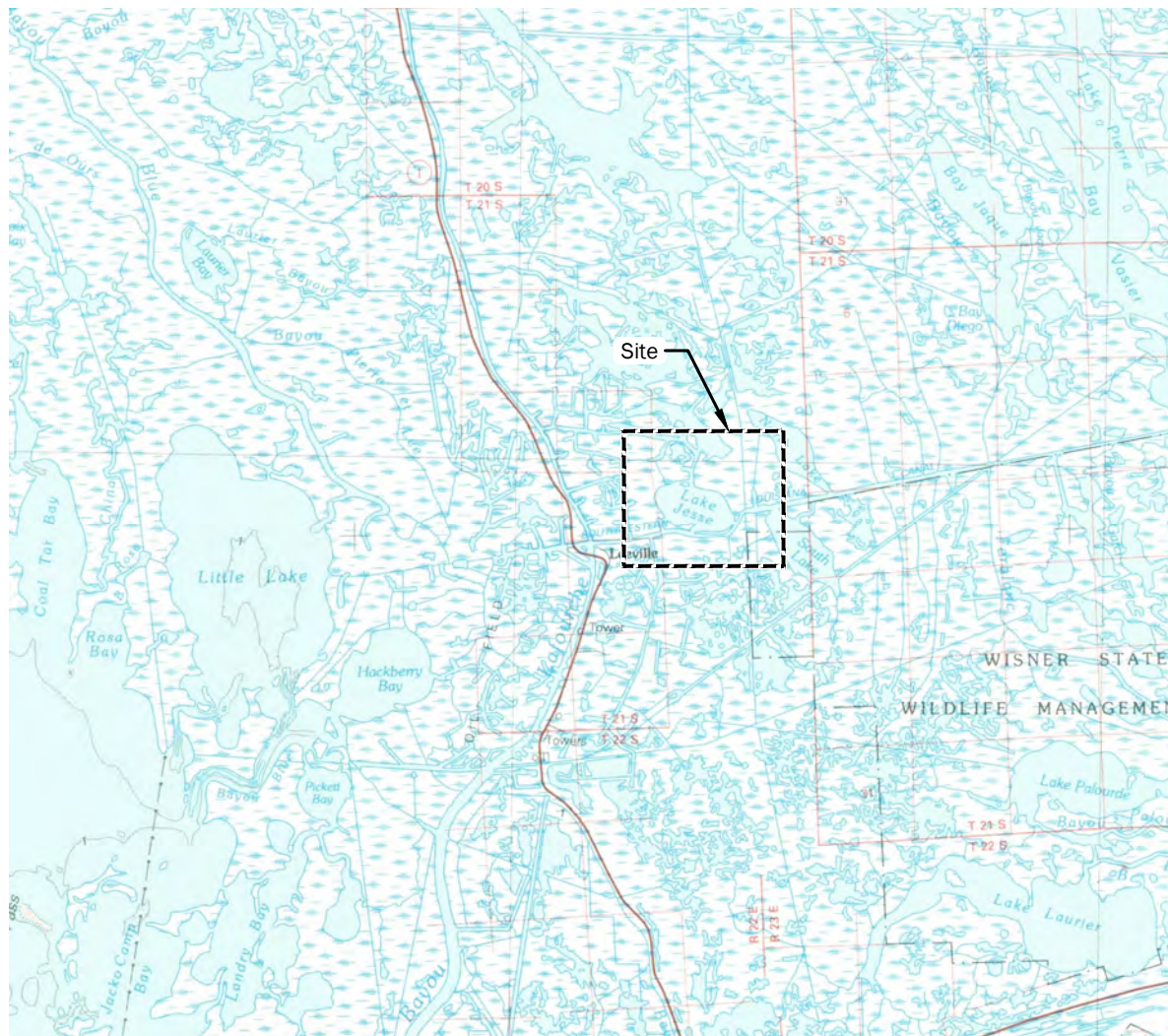
Interpretations of soil conditions, as described in the soil boring logs, are based on field and laboratory data described in this report. Variations in soil conditions are likely to exist between the exploration locations and seasonal variation in surface water and groundwater conditions will occur. Tidal influence should be expected in the project area and must be considered in the project design and construction.

5.0 LIMITATIONS

The information presented in this addendum report is based on field explorations completed for this study and judgements made by GeoEngineers. This report is specific to the East Leeville project site and should not be used other than for the design of the East Leeville Marsh Creation and Nourishment (BA-194) project located in Lafourche Parish, Louisiana. We have provided the requested information for the geotechnical data report in this document.

Within the limitations of scope, schedule, and budget, our services have been executed in accordance with generally accepted practices in the field of geotechnical engineering in this area at the time this report was prepared. No warranty or other conditions expressed or implied should be understood.

Please refer to Appendix E titled “Report Limitations and Guidelines for Use” for additional information pertaining to use of this report.



State Outline

Site

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Topographic image was taken from USGS, Quad: Terrebonne, Dated: 1983

Projection: LA State Plane, South Zone, NAD83, US Foot



Vicinity Map

East Leeville Marsh Creation and Nourishment
(BA-194)

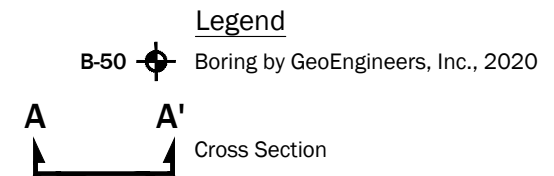
Lafourche Parish, Louisiana



Figure 1



Boring Details			
Boring #	Latitude	Longitude	Depth (ft)
B-50	N29°15'6.55"	W90°12'7.7"	20
B-51	N29°15'17.03"	W90°12'9"	20
B-52	N29°15'47.56"	W90°11'43.76"	20
B-53	N29°15'51.09"	W90°11'31.74"	20
B-54	N29°15'42.47"	W90°11'25.88"	20
B-55	N29°15'38.75"	W90°11'8.74"	20

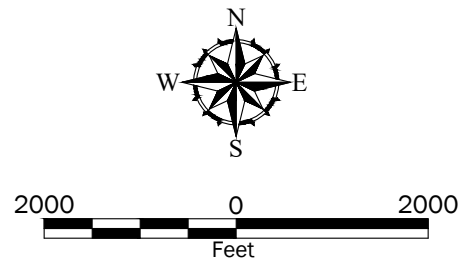


Notes:

1. The locations of all features shown are approximate.
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Data Source: Aerial from Google Earth Pro., Imagery dated 03/20/2019.

Projection: NAD83 Louisiana State Planes, Southern Zone, US Foot



Marsh Creation Area Site Plan

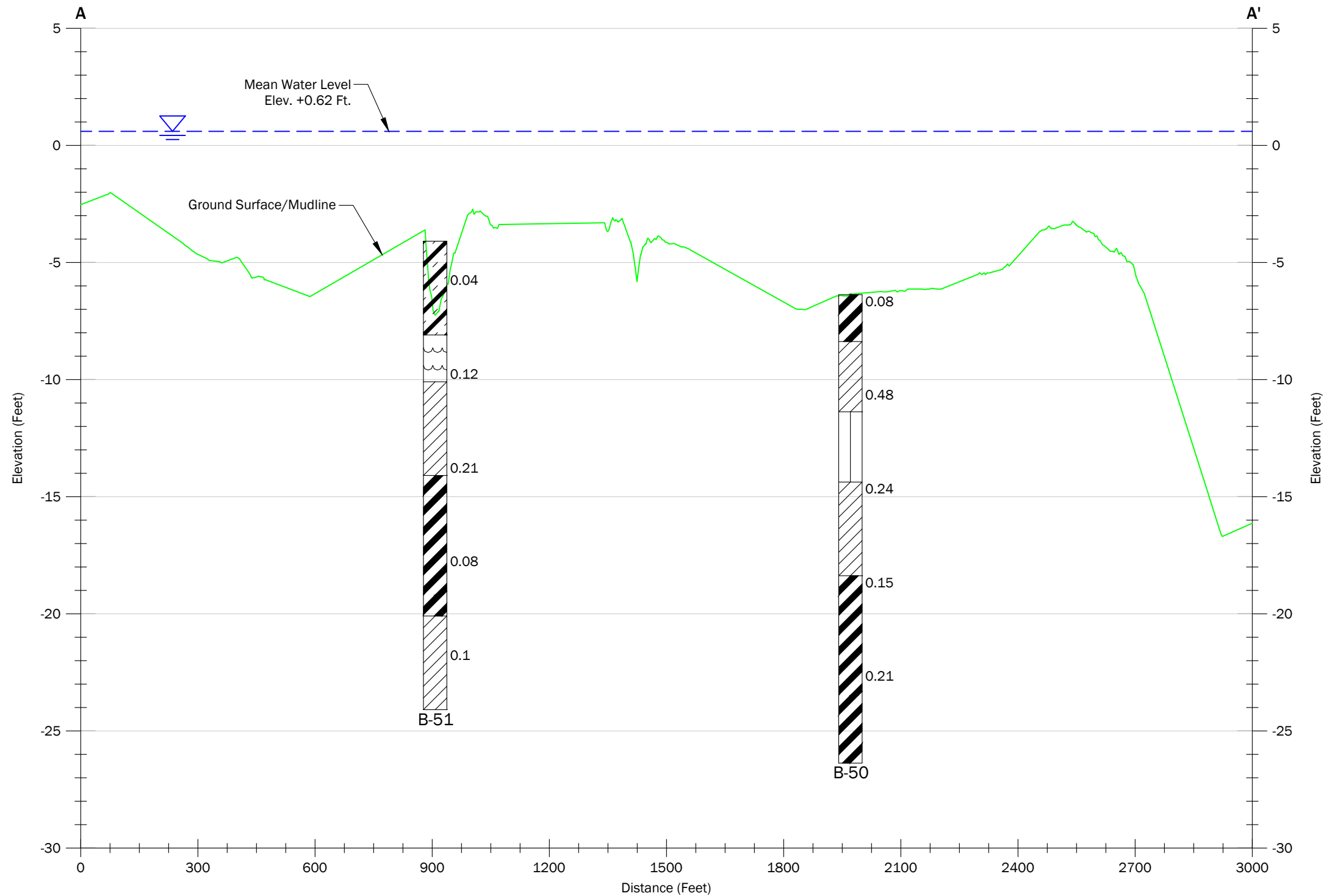
East Leeville Marsh Creation and Nourishment
(BA-194)

Lafourche Parish, Louisiana



Figure 2

P:\18\18274004\CAD\02\Geotech - Data Report\1827400402_F03-04_Subsurface Profile.dwg TAB:F03 - AA Date Exported: 03/17/20 - 15:56 by kcook

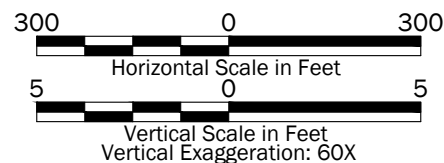


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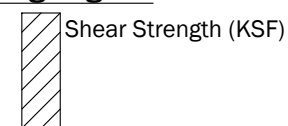
1. Ground surface/mudline obtained from survey provided by CPRA on 7/31/18.
2. Water elevation was provided by CPRA Dated: Sept. 31, 2018.



Soil Classification

	Peat		Sand
	Organic Clay		Clayey Sand
	Silty Clay, Sandy Clay		Silty Sand
	Silt		Sand with Silt
	Clay		Clayey Silt
	Silty Clayey Sand		

Boring Legend



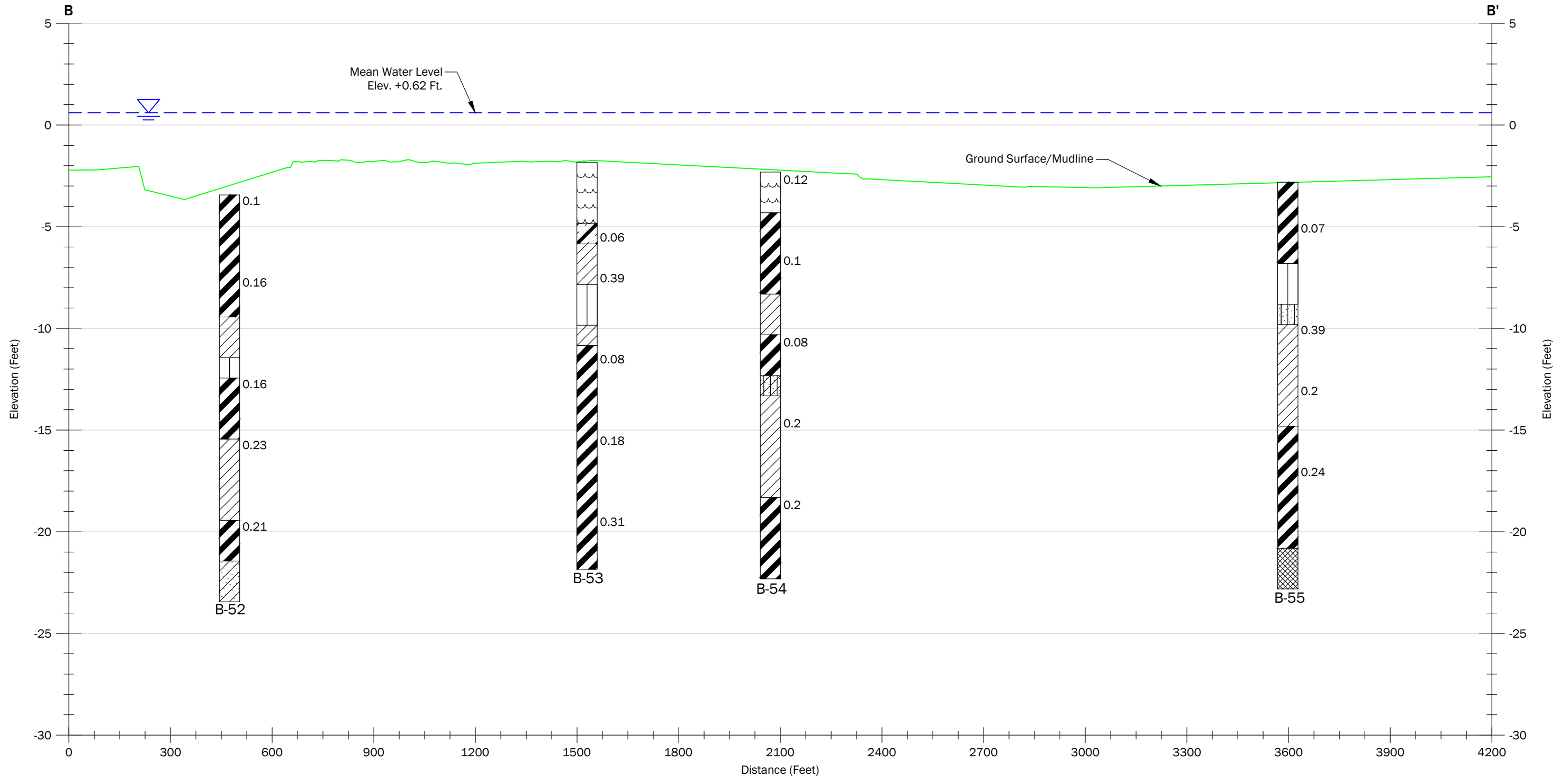
Subsurface Profile A-A'

East Leeville Marsh Creation and Nourishment
(BA-194)
Lafourche Parish, Louisiana



Figure 3

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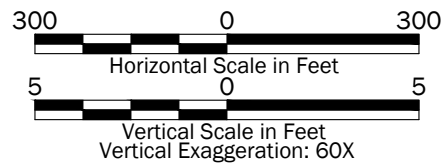


Notes:

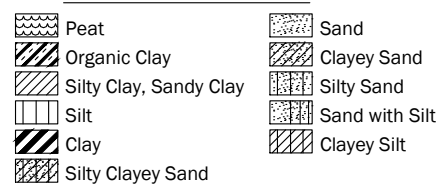
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source:

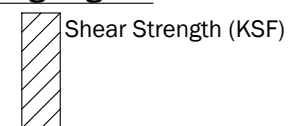
1. Ground surface/mudline obtained from survey provided by CPRA on 7/31/18.
2. Water elevation was provided by CPRA Dated: Sept. 31, 2018.



Soil Classification



Boring Legend



Subsurface Profile B-B'

East Leeville Marsh Creation and Nourishment
(BA-194)
Lafourche Parish, Louisiana



Figure 4

APPENDIX A
Details of Field Exploration

APPENDIX A

DETAILS OF FIELD EXPLORATION

This appendix provides additional information regarding the additional field exploration completed for the East Leeville Marsh Creation and Nourishment (BA-194) project located in Lafourche Parish, Louisiana.

Exploration Coordination

GeoEngineers contacted the “One-Call” utility locator prior to performing the field exploration. CPRA provided the required permits to GeoEngineers for conducting our field exploration. Prior to performing the field exploration, LGH performed a magnetometer survey to clear the exploration locations and staked each soil boring location.


Soil Borings

Soil borings were drilled using a drill rig mounted on a pontoon boat. Soil borings were completed to 20 feet below the existing mudline. All soil borings were advanced in open water and had water depths ranging from approximately 2 feet to 5 feet.

Soil sampling within our soil borings was conducted in general accordance with applicable ASTM standards, including collecting undisturbed-type cohesive and semi-cohesive samples with a three-inch outside diameter (O.D.) steel Shelby tube sampler using an Osterberg piston sampler.

Immediately upon retrieval from the subsurface, each soil sample was examined by our field representative and field classified. Samples collected with Shelby tubes were examined at the bottom end of the sample for field classification. The tubes were then plugged, capped, labeled, and stored upright to reduce the likelihood of sample disturbance during transport to the GeoEngineers soil mechanics laboratory in Baton Rouge, Louisiana. Soil borings were backfilled per Louisiana requirements.

The daily field reports detailing our field exploration activities are included with this appendix.

 11955 Lakeland Park Blvd., Suite 100 Baton Rouge, LA 70809 225.293.2460	Field Report		File Number: 18274-004-02
	Project: East Leeville Marsh Creation		Date: February 15, 2020
	Owner: CPRA	Time of Arrival: 09:35	Report Number: 1
Prepared by: Jed T. Hebert, EI	Location: Lafourche Parish, Louisiana	Time of Departure: 16:25	Page: 1 of 6
Purpose of visit: Geotechnical Exploration	Weather: Sunny, 50s to 70s °F	Travel Time: 3.0 Hours	Permit Number: See below
Upon arrival to the site I assessed personal safety hazards: <input checked="" type="checkbox"/> Yes and/or <input checked="" type="checkbox"/> Referred to Site Safety Plan and Safety Tailgate if applicable Safety Hazards Were Addressed by: <input checked="" type="checkbox"/> Staying Alert to Construction and Equipment Hazards <input checked="" type="checkbox"/> Donning PPE and observing safety standards			

Personnel

GeoEngineers, Inc. Field Representative: Jed Hebert

SER Crew: Mark Billiot (Driller), Nicholas Saulsberry (roughneck), Matthew Anslem (roughneck)

Equipment:

Pontoon Boat Drill Rig

Support Boat

SER Support Truck

GeoEngineers Pickup Truck

Permits:

DNR Office of Coastal Management (Coastal Use) – Department of Natural Resources: P20170922

Department of The Army Corps of Engineers: MVN 2017-01479-CE (PGP II)

One Call Numbers:

200064182, 200064215, 200064214, 200064213

BORING ID	BORING DEPTH (FT)	TODAY (FT)	TO DATE (FT)	% COMPLETE
B-50	20	20	20	100
B-51	20	0	0	0
B-52	20	20	20	100
B-53	20	20	20	100
B-54	20	0	0	0
B-55	20	0	0	0

Activities:

07:00 I, Jed T. Hebert of GeoEngineers, Inc. (GeoEngineers), depart the GeoEngineers Baton Rouge office and travel to the Kayak Boat Launch in Leeville, Louisiana.

09:35 I arrive at the Kayak Boat Launch and wait for the drill crew to arrive.

<input type="checkbox"/> THIS FIELD REPORT IS PRELIMINARY A preliminary report is provided solely as evidence that field observation was performed. Observations and/or conclusions and/or recommendations conveyed in the final report may vary from and shall take precedence over those indicated in a preliminary report.	FIELD REPRESENTATIVE Jed T. Hebert, EI	DATE 02/15/2020
<input checked="" type="checkbox"/> THIS FIELD REPORT IS FINAL A final report is an instrument of professional service. Any conclusions drawn from this report should be discussed with and evaluated by the professional involved.	REVIEWED BY Alicia R. Sellers, PE	DATE 02/17/2020

This report presents opinions formed as a result of our observation of activities relating to our services only. We rely on the contractor to comply with the plans and specification throughout the duration of the project irrespective of the presence of our representative. Our work does not include supervision or direction of the work of others. Our firm will not be responsible for job or site safety of others on this project. **DISCLAIMER:** Any electronic form, facsimile or hard copy of the original document (email, text, table, and/or figure), if provided, and any attachments are only a copy of the original document. The original document is stored by GeoEngineers, Inc. and will serve as the official document of record.

Attachments: Job Hazard Analysis

Distribution: Baird, CPRA

- 09:55 The tractor trailer with the pontoon drill rig arrives at the boat launch. The truck driver begins preparing the drill rig to be launched into the water.
- 10:10 The SER drill crew arrives at the boat launch. I conduct a tailgate safety meeting and all parties review and sign the GeoEngineers Job Hazard Analysis. We load our equipment into the support boat, launch the support boat and drill rig, and prepare to depart the boat launch. I text Bobby Comeaux (Comeaux Consulting Group) to notify him that we are onsite.
- 10:55 We depart the boat launch and travel to Boring B-50.
- 11:10 We arrive at Boring B-50. The drill crew positions the drill rig and prepares for drilling and sampling operations. I measure the water depth to be approximately 3 feet.
- 11:45 The drill crew begins subsurface geotechnical exploration of Boring B-50, sampling continuously from the mudline to approximately 20 feet below the mudline.
- 12:35 The drill crew finishes drilling Boring B-50 and grouts the borehole full depth with a cement-bentonite mixture.
- 12:50 The drill crew and I travel to Boring B-52.
- 13:20 We arrive at Boring B-52. The drill crew positions the drill rig and prepares for drilling and sampling operations. I measure the water depth to be approximately 2 feet and 5 inches.
- 13:30 The drill crew begins subsurface geotechnical exploration of Boring B-52, sampling continuously from the mudline to approximately 20 feet below the mudline.
- 14:10 The drill crew finishes drilling Boring B-52 and grouts the borehole full depth with a cement-bentonite mixture.
- 14:30 The drill crew and I travel to Boring B-53.
- 14:40 We arrive at Boring B-53. The drill crew positions the drill rig and prepares for drilling and sampling operations. I measure the water depth to be approximately 2 feet and 10 inches.
- 14:50 The drill crew begins subsurface geotechnical exploration of Boring B-53, sampling continuously from the mudline to approximately 20 feet below the mudline.
- 15:30 The drill crew finishes drilling Boring B-53 and grouts the borehole full depth with a cement-bentonite mixture.
- 15:45 The drill crew and I travel to Boring B-54.
- 15:50 We arrive at Boring B-54. The drill crew secures the drill rig for the night, and we load our equipment into the support boat.
- 16:05 We depart Boring B-54 and travel to the boat launch.
- 16:15 We arrive at the boat launch, and the drill crew loads the support boat on the trailer. I unload my samples.
- 16:25 All parties depart the boat launch and I travel to the hotel.
- 16:55 I arrive at the hotel in Cutoff, Louisiana.



PRE-DRILL CONDITIONS OF BORING B-50 (FACING SOUTH)



POST-DRILL CONDITIONS OF BORING B-50 (FACING EAST)



PRE-DRILL CONDITIONS OF BORING B-52 (FACING NORTHEAST)



POST-DRILL CONDITIONS OF BORING B-52 (FACING EAST)



PRE-DRILL CONDITIONS OF BORING B-53 (FACING SOUTHWEST)



POST-DRILL CONDITIONS OF BORING B-53 (FACING WEST)



PRE-DRILL CONDITIONS OF BORING B-54 (FACING WEST)



END OF THE DAY CONDITIONS OF BORING B-54 (FACING SOUTHWEST)

JOB HAZARD ANALYSIS

Boring Activities: Drill Movement & Set-up and Structural Tests & Special Inspections

Project Name: East Leeville Marsh Creation and Nourishment (BA-194)		Date: 01/25/2020	Site Location: Leeville, Louisiana
File No: 18274-004-02			
Development Team:	Position/Title:	Reviewed by:	Position/Title:
Jed Hebert	Staff Engineer	Alica Sellers	Project Manager
Minimum Required Protective Equipment: (see critical actions for task-specific requirements)			
PPE	Equipment	Tools	Actions
<input checked="" type="checkbox"/> Hard Hat <input checked="" type="checkbox"/> Eye Protection <input checked="" type="checkbox"/> Hearing Protection <input checked="" type="checkbox"/> Gloves <input checked="" type="checkbox"/> High Visibility Vest <input checked="" type="checkbox"/> Steel Toe Boots <input checked="" type="checkbox"/> Personal Flotation Device	<input type="checkbox"/> Safety Beacons <input type="checkbox"/> Safety Cones <input checked="" type="checkbox"/> First Aid Kit <input checked="" type="checkbox"/> Fire Extinguisher <input checked="" type="checkbox"/> Eye Wash/ Drinking Water <input checked="" type="checkbox"/> Distress Flares <input type="checkbox"/>	<input checked="" type="checkbox"/> Cell Phone/Satellite <input checked="" type="checkbox"/> Digital Camera <input type="checkbox"/> PID <input checked="" type="checkbox"/> GPS <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> Stay Visible <input checked="" type="checkbox"/> Equipment Inspection <input checked="" type="checkbox"/> Work in Pairs <input type="checkbox"/> Safety Control/Traffic Plan <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Job Steps	Potential Hazards	Critical Actions to Mitigate Hazards	
Drive to work site location	Unfamiliar locations, congestion, unpaved roads, mechanical failure, flat tires, vehicle fire, exhaust leaks, vehicle collision, internal projectiles	<ul style="list-style-type: none"> ■ Inspect the vehicle before departure: <ul style="list-style-type: none"> ▪ Check for tire cuts, fluid leaks, flat tires, body damage, windshield cracks, and other damage. ▪ Check lights, wipers, fluid levels, and seat belts. ▪ Ensure the vehicle has a complete and current First Aid kit and fire extinguisher. ▪ Ensure the vehicle is equipped with warning signs and/or flares and that the warning flashers operate. ■ Review maps and photos, plan route, and use GPS and compass skills prior to beginning the trip. ■ Drive defensively. Completion of Defensive Driver Training within the last 12 months is required. ■ Use only vehicles appropriate for the work needs and the driving conditions expected. ■ Place heavy objects behind a secure safety cage if they must be carried in a passenger compartment. ■ Carry and use chock blocks, use parking brake, and don't leave vehicle unattended while it is running. ■ Ensure vehicle has fuel to get you to and from your destinations. ■ Inspect area behind vehicle prior to backing and use spotter. ■ Inform your Project Manager of your destination and estimated time of return. ■ Carry extra food, water and clothing. 	
	Pre-Job Activities	<ul style="list-style-type: none"> ■ Conduct a tailgate safety meeting discussing the jobs, the hazards and the actions that will be taken to prevent injury. ■ Discuss "Stop Work Authority" as it applies to each site member. ■ Discuss appropriate PPE including high visibility clothing and personal flotation device. 	
	Operator Inexperience	<ul style="list-style-type: none"> ■ A minimum two-person crew is required for plots accessed by small powerboats and/or paddlecraft. 	

General watercraft operations		<ul style="list-style-type: none"> ■ All boat operators must meet the licensing and training requirements for the type of boat and area in which they are operating. All operators and crew shall have current First Aid and CPR training. ■ Operators and crew must wear a Coast Guard approved, properly fitted personal flotation device (PFD) at all times. ■ All personnel who use small powerboats and/or paddlecraft must be able to swim.
	Mechanical Failure	<ul style="list-style-type: none"> ■ Perform pre-trip check—be sure all equipment is operational and that safety and survival equipment is onboard. Carry a manufacturer's repair kit and emergency spare parts for powerboats and spare oars/paddles for paddlecraft. ■ Be sure you have sufficient fuel for the round trip if using a powerboat. ■ File a float plan and adhere to check-ins. ■ Secure 24-hour weather forecast prior to departure. ■ In addition to PFDs, always carry the following safety equipment: <ul style="list-style-type: none"> ▪ Maps/charts of the area and a compass ▪ First Aid kit ▪ Flashlight with extra batteries and bulb ▪ Bailing device ▪ Personal communication device such as cell phone or locator beacon ▪ Spare paddles/oars and throw bag/rope in paddlecraft ▪ Additional survival gear such as extra food, space blanket, fire starter and knife
Travel to and from field plot locations	Swamping, Exposure and Lost Boat or Crew	<ul style="list-style-type: none"> ■ Always operate the boat at a safe speed. Never operate a small boat in high winds or rough waves—always check weather reports for the area. Check with local authorities for small-craft advisories. ■ Be alert for "horizon lines" where you cannot see a stretch of stream or river. This indicates a steep drop or low-head dam. Go to shore, scout, and portage around the hazard. ■ Portage rapids and low-head dams—never approach a low-head dam from the downstream side as "keeper hydraulics" will sometimes swamp a small boat and make rescue nearly impossible. ■ Be alert for fallen trees. These create "strainers" which may trap victims under water. Fallen trees are especially dangerous on rivers and streams. Stay well away from fallen trees since limbs and branches may extend underwater far beyond any visible above the water. ■ Give larger craft a wide berth as their wake may swamp a smaller boat.
	Fire	<ul style="list-style-type: none"> ■ Keep gasoline only in approved containers. Clean up any fuel spilled immediately. ■ Smoking is not allowed while refueling or switching gas cans; turn off cell phones and other electronics. ■ Reduce the possibility of static discharge by placing all gas containers on the ground during refueling. Never refill a gas can while it is in a pickup or boat.
	Collision	<ul style="list-style-type: none"> ■ Always operate a boat at a safe speed. ■ Post a lookout to alert operator to submerged/floating hazards such as logs, other boats, and other objects in the water. Give all objects a wide berth to avoid collisions. ■ Be aware of water depth to avoid running aground or hitting a submerged object. ■ Carry a manufacturer's repair kit and emergency spare parts for powerboats, and spare oars/paddles for paddlecraft.
Drill/Boring Activities	Slips, Trips, Falls	<ul style="list-style-type: none"> ■ Keep work area free of excess material and debris. ■ Remove all trip hazards by keeping materials/objects organized and out of walkways. ■ Keep work surfaces dry when possible. ■ Wear appropriate PPE including non-slip rubber boots if working on wet or slick surfaces.

		<ul style="list-style-type: none"> Stay aware of footing and do not run.
	Sharp and/or Elevated Equipment	<ul style="list-style-type: none"> Wear appropriate PPE including steel-toed safety boots, leather gloves and hard hat. Establish communication system between workers involved in moving/attaching sections.
	Heavy Equipment: Lifting/Carrying	<ul style="list-style-type: none"> Use proper lifting technique—at least 2 people to lift and carry sections; use mechanical lift devices whenever possible; bend and lift with legs and arms, not back. Carry samples close to your body and at waist height. Make several trips if necessary. Be aware of your surroundings when walking. Wear nitrile gloves.
Physical Hazards	Fire/Explosion	<ul style="list-style-type: none"> Post "No Smoking" signs around work area and establish designated smoking area off-site. Ensure type ABC, 20-lb, fully-charged fire extinguisher within 25 feet of operation.
	Hearing Protection	<ul style="list-style-type: none"> Wear hearing protection during drilling operations.
	Traffic (including pedestrian)	<ul style="list-style-type: none"> Watch out for moving vehicles and equipment. Inspect area behind vehicle prior to backing. Use a spotter. Be alert to potential hazards that may be created by others. Work within the line of sight of the equipment operator and maintain visual contact when approaching. Wear appropriate PPE including a high visibility vest.
	Heat/Cold Stress	<ul style="list-style-type: none"> Take breaks as needed Consume adequate food and beverages. If possible, adjust work schedule to avoid heat/cold stresses.
Biological Hazards	Insects, Snakes, Wildlife, Vegetation	<ul style="list-style-type: none"> Inspect work areas when arrive at site to identify hazard(s). Use insect repellant as necessary. If employee has bee sting allergy, carry epi-pen. Use caution when opening enclosures. Identify potential for poison ivy/oak/sumac. Stay alert and safe distance away from biological hazards. Wear appropriate PPE including gloves, long sleeves, and long pants.
	Manatees	<ul style="list-style-type: none"> All work, equipment, and vessel operation shall cease if a manatee is spotted within a 50-foot radius of the work area. If a manatee is spotted in or near the project area, all vessels shall operate at no wake/idle speeds within the construction area and at all times while in water where the draft of the vessel provides less than a 4-foot clearance from the bottom. Temporary signs about the manatee conditions shall be posted prior to and during all in-water activities and removed upon completion.
Environmental Hazards	Hydraulic Leaks and Spills	<ul style="list-style-type: none"> Ensure equipment is properly maintained and does not leak. Clean up environmental spills using spill pads to absorb the contaminated soil. Properly dispose of material following I.A.W. local and environmental requirements.
Communication	No communication in case of emergency	<ul style="list-style-type: none"> Verify cell phone is working. Maintain communication with Project Manager throughout job task. Learn the location of geographic dead spots and find alternative transmission locations. Verify location and contact numbers for emergency medical assistance or 911.
	Emergency	<p>Dial 911</p> <p>Hospital Route (Attached)</p>


Required Control Measures: (check the box when complete)

- ☒ Perform a pre-work vehicle and boat inspection (First Aid kit, fire extinguisher).
- ☒ Drive defensively looking out for "the other guy".
- ☒ Operate boat in accordance with safety operating procedures.
- ☒ Conduct a pre-work safety meeting.
- ☒ Use a Safety Watch to monitor equipment Minimum Approach Distance (MAD) and to keep personnel clear if needed.
- ☒ Wear Personal Protective Equipment (PPE).
- ☒ Ensure training is current (First Aid, defensive driving, etc.).
- ☒ Conduct Task Safety Assessments throughout the job.

☐☐☐**Additional Comments:**

Job tasks and procedures shall be performed in accordance with State/Federal OSHA safety regulations, and GeoEngineers Health and Safety Program

DAILY JHA RECORD OF SAFETY MEETINGS**Signature****Date****Signature****Date***Joe Herbert**2/15/20**Mark Bellini**2-15-20**Nicholas J. Sullivan**2-15-20**Martha Crisler**2-15-20*

 11955 Lakeland Park Blvd., Suite 100 Baton Rouge, LA 70809 225.293.2460	Field Report		File Number: 18274-004-02
	Project: East Leeville Marsh Creation		Date: February 16, 2020
	Owner: CPRA	Time of Arrival: 07:30	Report Number: 2
Prepared by: Jed T. Hebert, EI	Location: Lafourche Parish, Louisiana	Time of Departure: 14:55	Page: 1 of 5
Purpose of visit: Geotechnical Exploration	Weather: Rain/Cloudy, 60s to 70s °F	Travel Time: 2.8 Hours	Permit Number: See below
Upon arrival to the site I assessed personal safety hazards: <input checked="" type="checkbox"/> Yes and/or <input checked="" type="checkbox"/> Referred to Site Safety Plan and Safety Tailgate if applicable Safety Hazards Were Addressed by: <input checked="" type="checkbox"/> Staying Alert to Construction and Equipment Hazards <input checked="" type="checkbox"/> Donning PPE and observing safety standards			

Personnel

GeoEngineers, Inc. Field Representative: Jed Hebert

SER Crew: Mark Billiot (Driller), Nicholas Saulsberry (roughneck), Matthew Anslem (roughneck)

Equipment:

Pontoon Boat Drill Rig

Support Boat

SER Support Truck

GeoEngineers Pickup Truck

Permits:

DNR Office of Coastal Management (Coastal Use) – Department of Natural Resources: P20170922

Department of The Army Corps of Engineers: MVN 2017-01479-CE (PGP II)

One Call Numbers:

200064182, 200064215, 200064214, 200064213

BORING ID	BORING DEPTH (FT)	TODAY (FT)	TO DATE (FT)	% COMPLETE
B-50	20	0	20	100
B-51	20	20	20	100
B-52	20	0	20	100
B-53	20	0	20	100
B-54	20	20	20	100
B-55	20	20	20	100

Activities:

07:00 I, Jed T. Hebert of GeoEngineers, Inc. (GeoEngineers), depart the hotel in Cutoff, Louisiana, and travel to the Kayak Boat Launch in Leeville, Louisiana.

07:30 I arrive at the Kayak Boat Launch and wait for the drill crew to arrive.

<input type="checkbox"/> THIS FIELD REPORT IS PRELIMINARY A preliminary report is provided solely as evidence that field observation was performed. Observations and/or conclusions and/or recommendations conveyed in the final report may vary from and shall take precedence over those indicated in a preliminary report.	FIELD REPRESENTATIVE Jed T. Hebert, EI	DATE 02/16/2020
<input checked="" type="checkbox"/> THIS FIELD REPORT IS FINAL A final report is an instrument of professional service. Any conclusions drawn from this report should be discussed with and evaluated by the professional involved.	REVIEWED BY Alicia R. Sellers, PE	DATE 02/17/2020

This report presents opinions formed as a result of our observation of activities relating to our services only. We rely on the contractor to comply with the plans and specification throughout the duration of the project irrespective of the presence of our representative. Our work does not include supervision or direction of the work of others. Our firm will not be responsible for job or site safety of others on this project. **DISCLAIMER:** Any electronic form, facsimile or hard copy of the original document (email, text, table, and/or figure), if provided, and any attachments are only a copy of the original document. The original document is stored by GeoEngineers, Inc. and will serve as the official document of record.

Attachments: Job Hazard Analysis

Distribution: Baird, CPRA

- 07:50 The SER drill crew arrives at the boat launch. Mark Billiot (Driller) and I look at the radar and discuss the weather. We decide to go on standby and wait for the heavy rain in the area to clear.
- 10:15 The weather begins to clear. I conduct a tailgate safety meeting and all parties review and sign the GeoEngineers Job Hazard Analysis (JHA). We load our equipment into the support boat, launch the support boat, and prepare to depart the boat launch. I text Bobby Comeaux (Comeaux Consulting Group) to notify him that we are onsite.
- 10:35 We depart the boat launch and travel to Boring B-54, where we had secured the drill rig the previous day.
- 10:45 We arrive at Boring B-54. The drill crew prepares for drilling and sampling operations. I measure the water depth to be approximately 2 feet.
- 10:55 The drill crew begins subsurface geotechnical exploration of Boring B-54, sampling continuously from the mudline to approximately 20 feet below the mudline.
- 11:25 The drill crew finishes drilling Boring B-54 and grouts the borehole full depth with a cement-bentonite mixture.
- 11:40 The drill crew and I travel to Boring B-55.
- 11:50 We arrive at Boring B-55. The drill crew prepares for drilling and sampling operations. I measure the water depth to be approximately 6 feet.
- 12:00 The drill crew begins subsurface geotechnical exploration of Boring B-55, sampling continuously from the mudline to approximately 20 feet below the mudline.
- 12:35 The drill crew finishes drilling Boring B-55 and grouts the borehole full depth with a cement-bentonite mixture.
- 12:50 The drill crew and I travel to Boring B-51.
- 13:15 We arrive at Boring B-51. The drill crew prepares for drilling and sampling operations. I measure the water depth to be approximately 5 feet.
- 13:20 The drill crew begins subsurface geotechnical exploration of Boring B-51, sampling continuously from the mudline to approximately 20 feet below the mudline.
- 14:00 The drill crew finishes drilling Boring B-51 and grouts the borehole full depth with a cement-bentonite mixture.
- 14:15 The drill crew and I travel back to the boat launch.
- 14:40 We arrive at the boat launch, and the drill crew secures the drill rig under the bridge for the night. The drill crew will load and demobilize the drill rig tomorrow morning (2/17). The drill crew loads the support boat onto their trailer, and I unload my samples.
- 14:55 All parties depart the boat launch, and I travel to the GeoEngineers Baton Rouge office.
- 17:15 I arrive at the GeoEngineers Baton Rouge office and check in my samples.



POST-DRILL CONDITIONS OF BORING B-54 (FACING WEST)



PRE-DRILL CONDITIONS OF BORING B-55 (FACING SOUTHEAST)



POST-DRILL CONDITIONS OF BORING B-55 (FACING SOUTH)



POST-DRILL CONDITIONS OF BORING B-51 (FACING NORTH)



DRILL RIG SECURED UNDER BRIDGE

JOB HAZARD ANALYSIS

Boring Activities: Drill Movement & Set-up and Structural Tests & Special Inspections



Project Name: East Leeville Marsh Creation and Nourishment (BA-194) File No: 18274-004-02		Date: 01/25/2020	Site Location: Leeville, Louisiana
Development Team:	Position/Title:	Reviewed by:	Position/Title:
Jed Hebert	Staff Engineer	Alica Sellers	Project Manager
Minimum Required Protective Equipment: (see critical actions for task-specific requirements)			
PPE	Equipment	Tools	Actions
<input checked="" type="checkbox"/> Hard Hat <input checked="" type="checkbox"/> Eye Protection <input checked="" type="checkbox"/> Hearing Protection <input checked="" type="checkbox"/> Gloves <input checked="" type="checkbox"/> High Visibility Vest <input checked="" type="checkbox"/> Steel Toe Boots <input checked="" type="checkbox"/> Personal Flotation Device	<input type="checkbox"/> Safety Beacons <input type="checkbox"/> Safety Cones <input checked="" type="checkbox"/> First Aid Kit <input checked="" type="checkbox"/> Fire Extinguisher <input checked="" type="checkbox"/> Eye Wash/ Drinking Water <input checked="" type="checkbox"/> Distress Flares <input type="checkbox"/>	<input checked="" type="checkbox"/> Cell Phone/Satellite <input checked="" type="checkbox"/> Digital Camera <input type="checkbox"/> PID <input checked="" type="checkbox"/> GPS <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> Stay Visible <input checked="" type="checkbox"/> Equipment Inspection <input checked="" type="checkbox"/> Work in Pairs <input type="checkbox"/> Safety Control/Traffic Plan <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Job Steps	Potential Hazards	Critical Actions to Mitigate Hazards	
Drive to work site location	Unfamiliar locations, congestion, unpaved roads, mechanical failure, flat tires, vehicle fire, exhaust leaks, vehicle collision, internal projectiles	<ul style="list-style-type: none"> ■ Inspect the vehicle before departure: <ul style="list-style-type: none"> ▪ Check for tire cuts, fluid leaks, flat tires, body damage, windshield cracks, and other damage. ▪ Check lights, wipers, fluid levels, and seat belts. ▪ Ensure the vehicle has a complete and current First Aid kit and fire extinguisher. ▪ Ensure the vehicle is equipped with warning signs and/or flares and that the warning flashers operate. ■ Review maps and photos, plan route, and use GPS and compass skills prior to beginning the trip. ■ Drive defensively. Completion of Defensive Driver Training within the last 12 months is required. ■ Use only vehicles appropriate for the work needs and the driving conditions expected. ■ Place heavy objects behind a secure safety cage if they must be carried in a passenger compartment. ■ Carry and use chock blocks, use parking brake, and don't leave vehicle unattended while it is running. ■ Ensure vehicle has fuel to get you to and from your destinations. ■ Inspect area behind vehicle prior to backing and use spotter. ■ Inform your Project Manager of your destination and estimated time of return. ■ Carry extra food, water and clothing. 	
	Pre-Job Activities	<ul style="list-style-type: none"> ■ Conduct a tailgate safety meeting discussing the jobs, the hazards and the actions that will be taken to prevent injury. ■ Discuss "Stop Work Authority" as it applies to each site member. ■ Discuss appropriate PPE including high visibility clothing and personal flotation device. 	
	Operator Inexperience	<ul style="list-style-type: none"> ■ A minimum two-person crew is required for plots accessed by small powerboats and/or paddlecraft. 	

General watercraft operations		<ul style="list-style-type: none"> ■ All boat operators must meet the licensing and training requirements for the type of boat and area in which they are operating. All operators and crew shall have current First Aid and CPR training. ■ Operators and crew must wear a Coast Guard approved, properly fitted personal flotation device (PFD) at all times. ■ All personnel who use small powerboats and/or paddlecraft must be able to swim.
	Mechanical Failure	<ul style="list-style-type: none"> ■ Perform pre-trip check—be sure all equipment is operational and that safety and survival equipment is onboard. Carry a manufacturer's repair kit and emergency spare parts for powerboats and spare oars/paddles for paddlecraft. ■ Be sure you have sufficient fuel for the round trip if using a powerboat. ■ File a float plan and adhere to check-ins. ■ Secure 24-hour weather forecast prior to departure. ■ In addition to PFDs, always carry the following safety equipment: <ul style="list-style-type: none"> ▪ Maps/charts of the area and a compass ▪ First Aid kit ▪ Flashlight with extra batteries and bulb ▪ Bailing device ▪ Personal communication device such as cell phone or locator beacon ▪ Spare paddles/oars and throw bag/rope in paddlecraft ▪ Additional survival gear such as extra food, space blanket, fire starter and knife
Travel to and from field plot locations	Swamping, Exposure and Lost Boat or Crew	<ul style="list-style-type: none"> ■ Always operate the boat at a safe speed. Never operate a small boat in high winds or rough waves—always check weather reports for the area. Check with local authorities for small-craft advisories. ■ Be alert for “horizon lines” where you cannot see a stretch of stream or river. This indicates a steep drop or low-head dam. Go to shore, scout, and portage around the hazard. ■ Portage rapids and low-head dams—never approach a low-head dam from the downstream side as “keeper hydraulics” will sometimes swamp a small boat and make rescue nearly impossible. ■ Be alert for fallen trees. These create “strainers” which may trap victims under water. Fallen trees are especially dangerous on rivers and streams. Stay well away from fallen trees since limbs and branches may extend underwater far beyond any visible above the water. ■ Give larger craft a wide berth as their wake may swamp a smaller boat.
	Fire	<ul style="list-style-type: none"> ■ Keep gasoline only in approved containers. Clean up any fuel spilled immediately. ■ Smoking is not allowed while refueling or switching gas cans; turn off cell phones and other electronics. ■ Reduce the possibility of static discharge by placing all gas containers on the ground during refueling. Never refill a gas can while it is in a pickup or boat.
	Collision	<ul style="list-style-type: none"> ■ Always operate a boat at a safe speed. ■ Post a lookout to alert operator to submerged/floating hazards such as logs, other boats, and other objects in the water. Give all objects a wide berth to avoid collisions. ■ Be aware of water depth to avoid running aground or hitting a submerged object. ■ Carry a manufacturer's repair kit and emergency spare parts for powerboats, and spare oars/paddles for paddlecraft.
Drill/Boring Activities	Slips, Trips, Falls	<ul style="list-style-type: none"> ■ Keep work area free of excess material and debris. ■ Remove all trip hazards by keeping materials/objects organized and out of walkways. ■ Keep work surfaces dry when possible. ■ Wear appropriate PPE including non-slip rubber boots if working on wet or slick surfaces.

		<ul style="list-style-type: none"> ■ Stay aware of footing and do not run.
	Sharp and/or Elevated Equipment	<ul style="list-style-type: none"> ■ Wear appropriate PPE including steel-toed safety boots, leather gloves and hard hat. ■ Establish communication system between workers involved in moving/attaching sections.
	Heavy Equipment: Lifting/Carrying	<ul style="list-style-type: none"> ■ Use proper lifting technique—at least 2 people to lift and carry sections; use mechanical lift devices whenever possible; bend and lift with legs and arms, not back. ■ Carry samples close to your body and at waist height. Make several trips if necessary. Be aware of your surroundings when walking. ■ Wear nitrile gloves.
Physical Hazards	Fire/Explosion	<ul style="list-style-type: none"> ■ Post “No Smoking” signs around work area and establish designated smoking area off-site. ■ Ensure type ABC, 20-lb, fully-charged fire extinguisher within 25 feet of operation.
	Hearing Protection	<ul style="list-style-type: none"> ■ Wear hearing protection during drilling operations.
	Traffic (including pedestrian)	<ul style="list-style-type: none"> ■ Watch out for moving vehicles and equipment. Inspect area behind vehicle prior to backing. Use a spotter. ■ Be alert to potential hazards that may be created by others. ■ Work within the line of sight of the equipment operator and maintain visual contact when approaching. Wear appropriate PPE including a high visibility vest.
	Heat/Cold Stress	<ul style="list-style-type: none"> ■ Take breaks as needed. ■ Consume adequate food and beverages. ■ If possible, adjust work schedule to avoid heat/cold stresses.
Biological Hazards	Insects, Snakes, Wildlife, Vegetation	<ul style="list-style-type: none"> ■ Inspect work areas when arrive at site to identify hazard(s). ■ Use insect repellant as necessary. ■ If employee has bee sting allergy, carry epi-pen. ■ Use caution when opening enclosures. ■ Identify potential for poison ivy/oak/sumac. ■ Stay alert and safe distance away from biological hazards. ■ Wear appropriate PPE including gloves, long sleeves, and long pants.
	Manatees	<ul style="list-style-type: none"> ■ All work, equipment, and vessel operation shall cease if a manatee is spotted within a 50-foot radius of the work area. ■ If a manatee is spotted in or near the project area, all vessels shall operate at no wake/idle speeds within the construction area and at all times while in water where the draft of the vessel provides less than a 4-foot clearance from the bottom. ■ Temporary signs about the manatee conditions shall be posted prior to and during all in-water activities and removed upon completion.
Environmental Hazards	Hydraulic Leaks and Spills	<ul style="list-style-type: none"> ■ Ensure equipment is properly maintained and does not leak. ■ Clean up environmental spills using spill pads to absorb the contaminated soil. ■ Properly dispose of material following I.A.W. local and environmental requirements.
Communication	No communication in case of emergency	<ul style="list-style-type: none"> ■ Verify cell phone is working. ■ Maintain communication with Project Manager throughout job task. ■ Learn the location of geographic dead spots and find alternative transmission locations. ■ Verify location and contact numbers for emergency medical assistance or 911.
	Emergency	<p>Dial 911</p> <p>Hospital Route (Attached)</p>

Required Control Measures: (check the box when complete)

- ☒ Perform a pre-work vehicle and boat inspection (First Aid kit, fire extinguisher).
- ☒ Drive defensively looking out for "the other guy".
- ☒ Operate boat in accordance with safety operating procedures.
- ☒ Conduct a pre-work safety meeting.
- ☒ Use a Safety Watch to monitor equipment Minimum Approach Distance (MAD) and to keep personnel clear if needed.
- ☒ Wear Personal Protective Equipment (PPE).
- ☒ Ensure training is current (First Aid, defensive driving, etc.).
- ☐ Conduct Task Safety Assessments throughout the job.

☐☐☐**Additional Comments:**

Job tasks and procedures shall be performed in accordance with State/Federal OSHA safety regulations, and GeoEngineers Health and Safety Program

DAILY JHA RECORD OF SAFETY MEETINGS

Signature	Date	Signature	Date
<i>Joe Herbert</i>	2/15/20		
<i>Mark Belliet</i>	2-15-20		
<i>Nicholas Saltsberg</i>	2-15-20		
<i>Matthew Austin</i>	2-15-20		
<i>Justin</i>	2/16/20		
<i>Mark Belliet</i>	2-16-20		
<i>Matthew Austin</i>	2-16-20		
<i>Nicholas Saltsberg</i>	2-16-20		

APPENDIX B
Lonnie G. Harper & Associates, Inc. Survey Report

LAFOURCHE PARISH, LOUISIANA



SOIL EXPLORATION LOCATIONS
SCALE: 1" = 1,500'

POINT NUMBER	NORTHING (US SURVEY FEET)	EASTING (US SURVEY FEET)	LATITUDE (NORTH)	LONGITUDE (WEST)	WATER BOTTOM ELEVATION	WATER DEPTH
B50	275196.61	3641572.90	29 15 06.55315	90 12 07.69524	-2.8	2.7
B51	276244.78	3641392.74	29 15 18.82416	90 17 48.27516	-7.2	7.1
B52	279359.31	3643651.97	29 15 47.55642	90 11 43.76004	-2.3	2.2
B53	279726.77	3644713.26	29 15 51.08947	90 11 31.73750	-2.3	2.3
B54	278845.69	3645274.27	29 15 42.30884	90 11 25.11760	-8.1	7.9
B55	278501.24	3646762.64	29 15 38.75520	90 11 08.73978	-4.3	4.3

NORTH LAKE

SOUTH LAKE

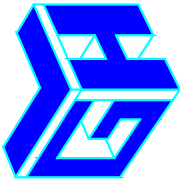
GENERAL NOTES

- ALL DISTANCES AND ELEVATIONS ARE EXPRESSED IN TERMS OF FEET UNLESS OTHERWISE DENOTED.
- THE HORIZONTAL COORDINATES AND ELEVATIONS ON THIS SURVEY ARE REFERENCED TO THE NATIONAL SPATIAL REFERENCE SYSTEM AND WERE DERIVED BY RECENT GPS OBSERVATIONS. THE HORIZONTAL AND VERTICAL DATUMS FOR THIS REFERENCE SYSTEM ARE NAD 83 AND NAVD 88, RESPECTIVELY. THE REFERENCE FRAME FOR NAD 83 AND NAVD 88 IS CURRENTLY 2011, MAF11, PA11 (EPOCH 2010). THE NAVD 88 ELEVATIONS ARE BASED ON GEOID 12B. BASIS OF BEARINGS IS SPC LSZ-1702.
- ALL COORDINATE CONVERSIONS FROM NAD 83 TO WGS84 LAT. & LONG. WERE PERFORMED USING NGS NADCON UTILITY SOFTWARE.
- NO EASEMENTS OR UNDERGROUND UTILITIES WERE DETERMINED OR LOCATED DURING THIS SURVEY.
- A MAGNETOMETER SURVEY WAS PERFORMED AROUND EACH OF THE BORING LOCATIONS SHOWN. NO UNDERGROUND UTILITIES OR OIL/GAS WELLS WERE DETECTED WITHIN 50 FEET OF THE LOCATIONS SHOWN.

NORTH ARROW



REVISION DATE	REVISED BY	DESCRIPTION



LONNIE G. HARPER & ASSOCIATES, INC.
 CIVIL ENGINEERING AND LAND SURVEYING
 2746 HWY. NO. 384, BELL CITY, LOUISIANA 70630
 PHONE: (337) 905-1079 FAX: (337) 905-1076

SOIL EXPLORATION LOCATIONS

GEOENGINEERS, INC.
 BA-194 EAST LEEVILLE MARSH CREATION PROJECT
 LAFOURCHE PARISH, LOUISIANA

SEAL



LONNIE G. HARPER, P.L.S.
 REG. NO. 4326
 LONNIE G. HARPER & ASSOC., INC.
 GRAND CHENIER, LOUISIANA

DRAWN BY	C.L.W.	DATE	02/19/2020
DESIGNED BY	C.L.W.	HOR. SCALE	1" = 1,500'
APPROVED BY	L.G.H.	VERT. SCALE	N.A.
PROJECT NO.	2020-02	SHEET	01 OF 03

APPENDIX C

Soil Boring Logs

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS	
			GRAPH	LETTER		
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES	
		(LITTLE OR NO FINES)		GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES	
		GRAVELS WITH FINES		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES	
		(APPRECIABLE AMOUNT OF FINES)		GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES	
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	SAND AND SANDY SOILS	CLEAN SANDS		SW	WELL-GRADED SANDS, GRAVELLY SANDS
			(LITTLE OR NO FINES)		SP	POORLY-GRADED SANDS, GRAVELLY SAND
MORE THAN 50% RETAINED ON NO. 200 SIEVE	SANDS WITH FINES	(APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES	
		(APPRECIABLE AMOUNT OF FINES)		SC	CLAYEY SANDS, SAND - CLAY MIXTURES	
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY	
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS	
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY	
	MORE THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS
					CH	INORGANIC CLAYS OF HIGH PLASTICITY
					OH	ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS	

NOTE: Multiple symbols are used to indicate borderline or dual soil classifications

Sampler Symbol Descriptions

	2.4-inch I.D. split barrel
	Standard Penetration Test (SPT)
	Shelby tube
	Piston
	Direct-Push
	Bulk or grab
	Continuous Coring

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

"P" indicates sampler pushed using the weight of the drill rig.

"WOH" indicates sampler pushed using the weight of the hammer.

NOTE: The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative of subsurface conditions at other locations or times.

ADDITIONAL MATERIAL SYMBOLS

SYMBOLS		TYPICAL DESCRIPTIONS
GRAPH	LETTER	
	AC	Asphalt Concrete
	CC	Cement Concrete
	CR	Crushed Rock/Quarry Spalls
	SOD	Sod/Forest Duff
	TS	Topsoil

Groundwater Contact



Measured groundwater level in exploration, well, or piezometer



Water level observed at time of exploration

Graphic Log Contact

Distinct contact between soil strata

Approximate contact between soil strata

Material Description Contact

Contact between geologic units

Contact between soil of the same geologic unit

Laboratory / Field Tests

%F	Percent fines
%G	Percent gravel
AL	Atterberg limits
CA	Chemical analysis
CP	Laboratory compaction test
CS	Consolidation test
DD	Dry density
DS	Direct shear
HA	Hydrometer analysis
MC	Moisture content
MD	Moisture content and dry density
Mohs	Mohs hardness scale
OC	Organic content
PM	Permeability or hydraulic conductivity
PI	Plasticity index
PL	Point lead test
PP	Pocket penetrometer
SA	Sieve analysis
TX	Triaxial compression
UC	Unconfined compression
VS	Vane shear

Sheen Classification

NS	No Visible Sheen
SS	Slight Sheen
MS	Moderate Sheen
HS	Heavy Sheen







Key to Exploration Logs



Figure C-1

Start Drilled 2/15/2020	End 2/15/2020	Total Depth (ft) 20	Logged By Checked By JTH ARS	Driller Specialized Environmental Resources, LLC	Drilling Method Wet Rotary
Surface Elevation (ft) Vertical Datum	-3 NAVD88	Hammer Data	Cathead Hammer 140 (lbs) / 30 (in) Drop	Drilling Equipment	Pontoon-Mounted Drill Rig
Latitude Longitude	29.251994 -90.202284	System Datum	Geographic NAD83 (feet)	Depth of water to mudline at time of exploration (ft)	3.0

Notes: Borehole backfilled full depth with cement-bentonite grout.

Elevation (feet)	Depth (feet)	FIELD DATA					Graphic Log	Group Classification	MATERIAL DESCRIPTION	LABORATORY DATA								
		Interval	Recovered (in)	Blows/foot or Pocket Pen (TSF)	Collected Sample	Sample Name				Water Level	Water Content, %	Dry Density, (pcf)	Shear Strength, (KSF)	Confining Pressure, (PSI)	Strain, %	Liquid Limit (LL), %	Plasticity Index (PI), %	Passing No. 200 Sieve, %
0		18	<0.1		1			CH	Dark gray clay with organic matter (very soft)	83	53	0.08	5	10				
5		21	<0.1		2			CL	Dark gray silty clay with organic matter, sand, and shells	97								
		11	<0.1		3				Dark gray sandy silty clay with shells (soft)	32	92.2	0.48	5	7			54	
10		11	<0.1		4			ML	Dark gray sandy silt with shells	30					29	NP		
		20	<0.1		5			CL	Dark gray sandy silty clay (very soft)	38	81.6	0.24	5	15				
15		16	<0.1		6				Gray clay with silt and sand	59								
		16.5	<0.1		7			CH	Dark gray clay with trace sand and shell fragments (very soft)	56	65.5	0.15	5	6				
20		20	<0.1		8				Gray clay with sand pockets and shell fragments	73								
		10.5	<0.1		9				Gray clay with trace sand and shell fragments (very soft)	77	54.6	0.21	6	7				
25		17	<0.1		10				Gray clay with sand seams and shells	37					60	41		

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Locational Survey, Vertical approximated based on DEM.
*Indicates a remold was used for strength testing.

Log of Boring B-50



Project: East Leeville Marsh Creation and Nourishment
Project Location: Lafourche Parish, Louisiana
Project Number: 18274-004-02

Figure C-2
Sheet 1 of 1

Start Drilled 2/15/2020	End 2/15/2020	Total Depth (ft) 20	Logged By Checked By JTH ARS	Driller Specialized Environmental Resources, LLC	Drilling Method Wet Rotary
Surface Elevation (ft) Vertical Datum -5 NAVD88		Hammer Data Cathead Hammer 140 (lbs) / 30 (in) Drop		Drilling Equipment Pontoon-Mounted Drill Rig	
Latitude Longitude 29.254732 -90.202346		System Datum Geographic NAD83 (feet)		Depth of water to mudline at time of exploration (ft) 5.0	
Notes: Borehole backfilled full depth with cement-bentonite grout.					

Elevation (feet)	Depth (feet)	FIELD DATA					MATERIAL DESCRIPTION	LABORATORY DATA								
		Interval	Recovered (in)	Blows/foot or Pocket Pen (TSF)	Collected Sample	Sample Name		Water Level	Graphic Log	Group Classification	Water Content, %	Dry Density, (pcf)	Shear Strength, (ksf)	Confining Pressure, (PSI)	Strain, %	Liquid Limit (LL), %
0 																

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Locational Survey, Vertical approximated based on DEM.
*Indicates a remold was used for strength testing.

Log of Boring B-51














Project: East Leeville Marsh Creation and Nourishment
Project Location: Lafourche Parish, Louisiana
Project Number: 18274-004-02

Figure C-3
Sheet 1 of 1

Start Drilled 2/15/2020	End 2/15/2020	Total Depth (ft) 20	Logged By Checked By JTH ARS	Driller Specialized Environmental Resources, LLC	Drilling Method Wet Rotary
Surface Elevation (ft) Vertical Datum	-2.5 NAVD88	Hammer Data	Cathead Hammer 140 (lbs) / 30 (in) Drop	Drilling Equipment	Pontoon-Mounted Drill Rig
Latitude Longitude	29.263071 -90.195718	System Datum	Geographic NAD83 (feet)	Depth of water to mudline at time of exploration (ft)	2.5

Notes: Borehole backfilled full depth with cement-bentonite grout.

Elevation (feet)	Depth (feet)	FIELD DATA					MATERIAL DESCRIPTION	LABORATORY DATA										
		Interval	Recovered (in)	Blows/foot or Pocket Pen (TSF)	Collected Sample	Sample Name		Water Level	Graphic Log	Group Classification	Water Content, %	Dry Density, (pcf)	Shear Strength, (KSF)	Confining Pressure, (PSI)	Strain, %	Liquid Limit (LL), %	Plasticity Index (PI), %	Passing No. 200 Sieve, %
0 5 10 15 20	0	21	<0.1		1			CH	Dark gray clay with organic matter	82	52	0.1	5	6				
	20		<0.1		2				Gray clay with silt lenses	52								
	23		<0.1		3				Gray clay with sand lenses and silt layers (very soft)	41	79.4	0.16	5	15				
	9		<0.1		4			CL	Gray very silty clay with sand and silt lenses	47					33	11		
	19		<0.1		5			ML	Gray sandy silt with clay	32							60	
	22.5	0.25		6			CH	Gray clay with silt layers (very soft)	65	63.2	0.16	5	5					
	7			7				Gray clay with silt lenses (very soft)	47									
	14		<0.1		8			CL	Gray clay with silt, silt layers, and shell fragments (very soft)	52	64.7	0.23	5	6	48	26		
	20		<0.1		9				Gray clay with silt, trace sand, and shell fragments	53								
	16.5		<0.1		10			CH	Gray clay with silt pockets, trace sand, and shell fragments (very soft)	70	58.2	0.21	6	6				
	22		<0.1		11			SC	Gray clayey sand with silt and shell fragments	44							50	

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Locational Survey, Vertical approximated based on DEM.
*Indicates a remold was used for strength testing.

Log of Boring B-52















Project: East Leeville Marsh Creation and Nourishment
Project Location: Lafourche Parish, Louisiana
Project Number: 18274-004-02

Figure C-4
Sheet 1 of 1

Start Drilled 2/15/2020	End 2/15/2020	Total Depth (ft) 20	Logged By Checked By JTH ARS	Driller Specialized Environmental Resources, LLC	Drilling Method Wet Rotary
Surface Elevation (ft) Vertical Datum -3 NAVD88		Hammer Data Cathead Hammer 140 (lbs) / 30 (in) Drop		Drilling Equipment Pontoon-Mounted Drill Rig	
Latitude Longitude 29.264345 -90.192236		System Datum Geographic NAD83 (feet)		Depth of water to mudline at time of exploration (ft) 3.0	

Notes: Borehole backfilled full depth with cement-bentonite grout.

Elevation (feet)	Depth (feet)	FIELD DATA					Graphic Log	Group Classification	MATERIAL DESCRIPTION	LABORATORY DATA								
		Interval	Recovered (in)	Blows/foot or Pocket Pen (TSF)	Collected Sample	Sample Name				Water Level	Water Content, %	Dry Density, (pcf)	Shear Strength, (KSF)	Confining Pressure, (PSI)	Strain, %	Liquid Limit (LL), %	Plasticity Index (PI), %	Passing No. 200 Sieve, %
0 5 10 15 20	0	16.5	<0.1		1			PT	Brown peat (organic content = 62.9%)	769								
	24	<0.1		2					Brown peat (organic content = 45.5%)	504								
	3						OH	Gray organic clay	146									
	28	<0.1		4			CL	Gray clay with sand and shell fragments (very soft)	37	78.6	0.06	5	15					
	22.5	<0.1		5			ML	Gray sandy silt	36	84.4	0.39	5	15	NP	NP			
	6	<0.1		6			CL	Gray silty clay with sand and organic matter	43								75	
	7						CH	Gray clay with organic matter	37									
	18	<0.1		8					Gray clay with silt lenses and shell fragments (very soft)	87	52.4	0.08	5	8				
	15.5	<0.1		9					Gray clay with silt lenses and shell fragments	47								
	19	0.25		10					Gray clay with silt lenses and shell fragments (very soft)	83	52.4	0.18	5	4				
	21	<0.1		11					Gray clay with silt lenses and shell fragments	78								
	14	<0.1		12					Gray clay with silt lenses, sand lenses, and shell fragments (soft)	89	49.6	0.31	6	3	78	56		

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Locational Survey, Vertical approximated based on DEM.
*Indicates a remold was used for strength testing.

Log of Boring B-53














Project: East Leeville Marsh Creation and Nourishment
Project Location: Lafourche Parish, Louisiana
Project Number: 18274-004-02

Figure C-5
Sheet 1 of 1

Date: 3/10/20 Path: P:\18_18274004\GINT\1827400402.GPJ DBLibrary\Library\GEOENGINEERS_DF_STD_US_JUNE_2017\GLB\GEB8_GEO TECH_LAB_MUDLINE

Start Drilled 2/16/2020	End 2/16/2020	Total Depth (ft) 20	Logged By Checked By JTH ARS	Driller Specialized Environmental Resources, LLC	Drilling Method Wet Rotary
Surface Elevation (ft) Vertical Datum -2 NAVD88		Hammer Data Cathead Hammer 140 (lbs) / 30 (in) Drop		Drilling Equipment Pontoon-Mounted Drill Rig	
Latitude Longitude 29.262096 -90.190323		System Datum Geographic NAD83 (feet)		Depth of water to mudline at time of exploration (ft) 2.0	

Notes: Borehole backfilled full depth with cement-bentonite grout.

Elevation (feet)	Depth (feet)	FIELD DATA					MATERIAL DESCRIPTION	LABORATORY DATA										
		Interval	Recovered (in)	Blows/foot or Pocket Pen (TSF)	Collected Sample	Sample Name		Water Level	Graphic Log	Group Classification	Water Content, %	Dry Density, (pcf)	Shear Strength, (KSF)	Confining Pressure, (PSI)	Strain, %	Liquid Limit (LL), %	Plasticity Index (PI), %	Passing No. 200 Sieve, %
0 5 10 15 20	0	13	<0.1		1			PT	Black peat with shells (very soft)	540	9.9	0.12	5	15				
	20	<0.1		2			CH	Gray clay with organic matter	86									
	21	<0.1		3				Gray clay (very soft)	48	71.1	0.1	5	7	52	31			
	20	<0.1		4			CL	Gray silty clay	48									
	14	<0.1		5			CH	Gray clay with silt layers and sand lenses (very soft)	46	73.5	0.08	5	12					
	13.5	<0.1		6			SCSM	Gray silty clayey sand	29								42	
	20	0.25		7			CL	Gray silty clay with sand and shell fragments	72									
	19.5	<0.1		8				Gray silty clay with sand lenses and shell fragments (very soft)	38	79	0.2	5	15	35	15			
	19	<0.1		9				Gray clay with silt and shell fragments	55									
	13	<0.1		10			CH	Gray clay with silt lenses and shell fragments (very soft)	67	60.6	0.2	6	9					
	13	<0.1		11				Gray clay with silt layers and shells	78									

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Locational Survey, Vertical approximated based on DEM.
*Indicates a remold was used for strength testing.

Log of Boring B-54



Project: East Leeville Marsh Creation and Nourishment
Project Location: Lafourche Parish, Louisiana
Project Number: 18274-004-02

Figure C-6
Sheet 1 of 1

Start Drilled 2/15/2020	End 2/15/2020	Total Depth (ft) 20	Logged By Checked By JTH ARS	Driller Specialized Environmental Resources, LLC	Drilling Method Wet Rotary
Surface Elevation (ft) Vertical Datum -5 NAVD88		Hammer Data Cathead Hammer 140 (lbs) / 30 (in) Drop		Drilling Equipment Pontoon-Mounted Drill Rig	
Latitude Longitude 29.260789 -90.185746		System Datum Geographic NAD83 (feet)		Depth of water to mudline at time of exploration (ft) 5.0	
Notes: Borehole backfilled full depth with cement-bentonite grout.					

Elevation (feet)	Depth (feet)	FIELD DATA					MATERIAL DESCRIPTION	LABORATORY DATA								
		Interval	Recovered (in)	Blows/foot or Pocket Pen (TSF)	Collected Sample	Sample Name		Water Level	Graphic Log	Group Classification	Water Content, %	Dry Density, (pcf)	Shear Strength, (ksf)	Confining Pressure, (PSI)	Strain, %	Liquid Limit (LL), %
0 <																

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Locational Survey, Vertical approximated based on DEM.
*Indicates a remold was used for strength testing.

Log of Boring B-55



Project: East Leeville Marsh Creation and Nourishment
Project Location: Lafourche Parish, Louisiana
Project Number: 18274-004-02

Figure C-7
Sheet 1 of 1

APPENDIX D



Laboratory Testing Results

Soil Boring ID	Depth Interval (ft)	D2488	Test Type	D2216	D2166/D2850		D4318			D422/D1140 /D6913	D2166/D2850					D4648	Comments
		Visual Description		Moisture (%)	Unit Weight (PCF)		Atterberg Limits			%<#200 Sieve	Shear Strength (KSF)	Remolded Strength (KSF)	Failure Strain (%)	Confining Pressure (PSI)	Failure Type	Mini Vane Shear Strength (KSF)	
					Wet	Dry	LL	PL	PI								
B-50	0.0 - 2.0	Very soft dark gray clay with organic matter (CH)	UU	82.9	96.9	53.0					0.08		9.6	5.0	B		
B-50	2.0 - 4.0	Dark gray silty clay with organic matter, sand, and shells (CL)	EXT_MC	97.4													
B-50	4.0 - 6.0	Soft dark gray sandy silty clay with shells (CL)	UU -200	32.1	121.8	92.2				53.9	0.48		7.1	5.0	B		
B-50	6.0 - 8.0	Dark gray sandy silt with shells (ML)	AL EXT_MC	30.3			29	29	NP								Non Plastic
B-50	8.0 - 10.0	Very soft dark gray sandy silty clay (CL)	UU	38.4	113.0	81.6					0.24		15.0	5.0	B		
B-50	10.0 - 12.0	Gray clay with silt and sand (CL)	EXT_MC	59.4													
B-50	12.0 - 14.0	Very soft dark gray clay with trace sand and shell fragments (CH)	UU	56.1	102.2	65.5					0.15		6.1	5.0	B		
B-50	14.0 - 16.0	Gray clay with sand pockets and shell fragments (CH)	EXT_MC	72.7													
B-50	16.0 - 18.0	Very soft gray clay with trace sand and shell fragments (CH)	UU	77.4	96.9	54.6					0.21		7.1	6.0	B		
B-50	18.0 - 20.0	Gray clay with sand seams and shells (CH)	AL EXT_MC	36.7			60	19	41								

Disclaimer: The results presented relate only to those samples tested.

Note: ASTM standard identification numbers shown above each test description.

Multiple Shear = MS Vertical Shear = VS Angle Shear = AS
Slickensided = SLS Bulge = B Crumble = C


 AASHTO ACCREDITED	Technical Responsibility: <u>J. Allen</u>	Summary of Lab Results Project No.: 18274-004-02	East Leeville Marsh Creation and Nourishment	
	Title: <u>QAM</u>		Lafourche Parish, Louisiana	
Date: <u>3.10.2020</u>				Figure D-1

Soil Boring ID	Depth Interval (ft)	D2488	Test Type	D2216	D2166/D2850		D4318			D422/D1140 /D6913	D2166/D2850					D4648	Comments	
		Visual Description		Moisture (%)	Unit Weight (PCF)		Atterberg Limits				%<#200 Sieve	Shear Strength (KSF)	Remolded Strength (KSF)	Failure Strain (%)	Confining Pressure (PSI)	Failure Type		Mini Vane Shear Strength (KSF)
					Wet	Dry	LL	PL	PI									
B-51	0.0 - 2.0	Dark gray organic clay (OH)	AL EXT_MC	167.3			138	54	84									
B-51	2.0 - 4.0	Very soft dark gray organic clay with wood (OH)	UU	101.1	87.1	43.3					0.04		6.8	5.0	B			
B-51	4.0 - 6.0	Dark gray peat with organic clay (PT)	ORG EXT_MC	186.6													OC=17.5%	
B-51	6.0 - 8.0	Very soft gray clay with silt and shells (CL)	UU	40.1	111.6	79.7					0.12		14.4	5.0	B			
B-51	8.0 - 10.0	Gray clay with silt (CL)	EXT_MC	54.2														
B-51	10.0 - 12.0	Very soft gray clay with silt lenses and shell fragments (CH)	UU AL	76.6	99.3	56.2	73	25	48		0.21		4.9	5.0	B			
B-51	12.0 - 14.0	Gray clay with silt lenses and shell fragments (CH)	EXT_MC	70.2														
B-51	14.0 - 16.0	Very soft gray clay with silt lenses and shell fragments (CH)	UU	80.6	93.7	51.9					0.08		7.3	5.0	MS			
B-51	16.0 - 18.0	Gray clay with sand and shell fragments (CL)	EXT_MC	81.5														
B-51	18.0 - 20.0	Very soft gray sandy clay with silt and shell fragments (CL)	UU	31.7	119.6	90.8					0.10		14.6	6.0	B			

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Note: ASTM standard identification numbers shown above each test description.

Multiple Shear = MS Vertical Shear = VS Angle Shear = AS
Slickensided = SLS Bulge = B Crumble = C



Technical Responsibility: K. Allen
Title: QAM
Date: 3.9.2020

Summary of Lab Results
Project No.: 18274-004-02

East Leeville Marsh Creation and Nourishment

Lafourche Parish, Louisiana

GEOENGINEERS 

Figure D-2

Soil Boring ID	Depth Interval (ft)	D2488	Test Type	D2216	D2166/D2850		D4318			D422/D1140 /D6913	D2166/D2850					D4648	Comments
		Visual Description		Moisture (%)	Unit Weight (PCF)		Atterberg Limits				%<#200 Sieve	Shear Strength (KSF)	Remolded Strength (KSF)	Failure Strain (%)	Confining Pressure (PSI)	Failure Type	
					Wet	Dry	LL	PL	PI								
B-52	0.0 - 2.0	Very soft dark gray clay with organic matter (CH)	UU	81.9	94.5	52.0					0.10		5.8	5.0	B		
B-52	2.0 - 4.0	Gray clay with silt lenses (CH)	EXT_MC	52.1													
B-52	4.0 - 6.0	Very soft gray clay with sand lenses and silt layers (CH)	UU	41.4	112.2	79.4					0.16		14.6	5.0	B		
B-52	6.0 - 8.0	Gray very silty clay with sand and silt lenses (CL)	AL EXT_MC	47.4			33	22	11								
B-52	8.0 - 9.0	Gray sandy silt with clay (ML)	-200	32.4						59.5							2 samples
B-52	9.0 - 10.0	Very soft gray clay with silt layers (CH)	UU	64.9	104.2	63.2					0.16		5.3	5.0	B		
B-52	10.0 - 12.0	Gray clay with silt lenses (CH)	EXT_MC	47.3													
B-52	12.0 - 14.0	Very soft gray clay with silt, silt layers, and shell fragments (CL)	UU AL	52.4	98.5	64.7	48	22	26		0.23		6.3	5.0	MS		
B-52	14.0 - 16.0	Gray clay with silt, trace sand, and shell fragments (CL)	EXT_MC	52.5													
B-52	16.0 - 18.0	Very soft gray clay with silt pockets, trace sand, and shell fragments (CH)	UU	69.9	98.9	58.2					0.21		5.8	6.0	MS		
B-52	18.0 - 20.0	Gray clayey sand with silt and shell fragments (SC)	-200	44.2						49.7							

Disclaimer: The results presented relate only to those samples tested.

Note: ASTM standard identification numbers shown above each test description.

Multiple Shear = MS Vertical Shear = VS Angle Shear = AS
 Slickensided = SLS Bulge = B Crumble = C



 Technical Responsibility: <u>K. Allen</u> Title: <u>QAM</u> Date: <u>3.9.2020</u>	Summary of Lab Results Project No.: 18274-004-02	East Leeville Marsh Creation and Nourishment Lafourche Parish, Louisiana
		



Figure D-3

Soil Boring ID	Depth Interval (ft)	D2488	Test Type	D2216	D2166/D2850		D4318			D422/D1140 /D6913	D2166/D2850					D4648	Comments
		Visual Description		Moisture (%)	Unit Weight (PCF)		Atterberg Limits			%<#200 Sieve	Shear Strength (KSF)	Remolded Strength (KSF)	Failure Strain (%)	Confining Pressure (PSI)	Failure Type	Mini Vane Shear Strength (KSF)	
					Wet	Dry	LL	PL	PI								
B-53	0.0 - 2.0	Brown peat (PT)	ORG EXT_MC	768.7													OC=62.9%
B-53	2.0 - 3.0	Brown peat (PT)	ORG EXT_MC	503.6													OC=45.5%
B-53	3.0 - 4.0	Gray organic clay (OH)	EXT_MC	145.7													
B-53	4.0 - 6.0	Very soft gray clay with sand and shell fragments (CL)	UU	37.3	107.9	78.6					0.06		14.9	5.0	B		
B-53	6.0 - 8.0	Gray sandy silt (ML)	UU AL	35.9	114.6	84.4	NP	NP	NP		0.39		15.0	5.0	B		
B-53	8.0 - 9.0	Gray silty clay with sand and organic matter (CL)	-200	42.7						75.2							
B-53	9.0 - 10.0	Gray clay with organic matter (CH)	EXT_MC	36.5													
B-53	10.0 - 12.0	Very soft gray clay with silt lenses and shell fragments (CH)	UU	86.5	97.8	52.4					0.08		8.1	5.0	B		
B-53	12.0 - 14.0	Gray clay with silt lenses and shell fragments (CH)	EXT_MC	46.7													
B-53	14.0 - 16.0	Very soft gray clay with silt lenses and shell fragments (CH)	UU	83.4	96.2	52.4					0.18		4.4	5.0	MS		
B-53	16.0 - 18.0	Gray clay with silt lenses and shell fragments (CH)	EXT_MC	77.6													
B-53	18.0 - 20.0	Soft gray clay with silt lenses, sand lenses, and shell fragments (CH)	UU AL	89.2	93.8	49.6	78	22	56		0.31		3.4	6.0	MS		

Disclaimer: The results presented relate only to those samples tested.

Note: ASTM standard identification numbers shown above each test description.

Multiple Shear = MS Vertical Shear = VS Angle Shear = AS
Slickensided = SLS Bulge = B Crumble = C



 Technical Responsibility: <u>K. Allen</u> Title: <u>QAM</u> Date: <u>3.10.2020</u>	Summary of Lab Results Project No.: 18274-004-02	East Leeville Marsh Creation and Nourishment Lafourche Parish, Louisiana
		 Figure D-4

Soil Boring ID	Depth Interval (ft)	D2488	Test Type	D2216	D2166/D2850		D4318			D422/D1140 /D6913	D2166/D2850					D4648	Comments
		Visual Description		Moisture (%)	Unit Weight (PCF)		Atterberg Limits			%<#200 Sieve	Shear Strength (KSF)	Remolded Strength (KSF)	Failure Strain (%)	Confining Pressure (PSI)	Failure Type	Mini Vane Shear Strength (KSF)	
					Wet	Dry	LL	PL	PI								
B-54	0.0 - 2.0	Very soft black peat with shells (PT)	UU	540.0	63.1	9.9					0.12		15.0	5.0	B		
B-54	2.0 - 4.0	Gray clay with organic matter (CH)	EXT_MC	85.5													
B-54	4.0 - 6.0	Very soft gray clay (CH)	UU AL	47.5	105.0	71.1	52	21	31		0.10		6.6	5.0	B		
B-54	6.0 - 8.0	Gray silty clay (CL)	EXT_MC	48.2													
B-54	8.0 - 10.0	Very soft gray clay with silt layers and sand lenses (CH)	UU	46.4	107.7	73.5					0.08		11.6	5.0	B		
B-54	10.0 - 11.0	Gray silty clayey sand (SC-SM)	-200	29.2						42.0							
B-54	11.0 - 12.0	Gray silty clay with sand and shell fragments (CL)	EXT_MC	72.3													
B-54	12.0 - 14.0	Very soft gray silty clay with sand lenses and shell fragments (CL)	UU AL	37.9	108.9	79.0	35	20	15		0.20		14.9	5.0	B		
B-54	14.0 - 16.0	Gray clay with silt and shell fragments (CL)	EXT_MC	55.2													
B-54	16.0 - 18.0	Very soft gray clay with silt lenses and shell fragments (CH)	UU	67.0	101.2	60.6					0.20		9.1	6.0	MS		
B-54	18.0 - 20.0	Gray clay with silt layers and shells (CH)	EXT_MC	77.9													

Disclaimer: The results presented relate only to those samples tested.

Note: ASTM standard identification numbers shown above each test description.

Multiple Shear = MS Vertical Shear = VS Angle Shear = AS
Slickensided = SLS Bulge = B Crumble = C


 AASHTO ACCREDITED	Technical Responsibility: <u>X. Allen</u>	Summary of Lab Results Project No.: 18274-004-02	East Leeville Marsh Creation and Nourishment		
	Title: <u>QAM</u>		Lafourche Parish, Louisiana		
Date: <u>3.9.2020</u>				Figure D-5	

Soil Boring ID	Depth Interval (ft)	D2488	Test Type	D2216	D2166/D2850		D4318			D422/D1140 /D6913	D2166/D2850					D4648	Comments
		Visual Description		Moisture (%)	Unit Weight (PCF)		Atterberg Limits			%<#200 Sieve	Shear Strength (KSF)	Remolded Strength (KSF)	Failure Strain (%)	Confining Pressure (PSI)	Failure Type	Mini Vane Shear Strength (KSF)	
					Wet	Dry	LL	PL	PI								
B-55	0.0 - 2.0	Gray clay with organic matter (CH)	EXT_MC	60.0													
B-55	2.0 - 4.0	Very soft gray clay with organic matter (CH)	UU	66.3	100.5	60.4					0.07		10.8	5.0	B		
B-55	4.0 - 6.0	Gray silt (ML)	AL EXT_MC	35.0			27	27	NP								Non Plastic
B-55	6.0 - 7.0	Gray silty sand with clay (SM)	-200	30.5						23.7							2 samples
B-55	7.0 - 8.0	Soft gray silty clay with sand (CL)	UU	35.4	116.9	86.3					0.39		10.3	5.0	B		
B-55	8.0 - 10.0	Gray clay with silt and organic matter (CL)	EXT_MC	64.7													
B-55	10.0 - 12.0	Very soft gray silty clay with shell fragments (CL)	UU AL	49.0	108.4	72.8	40	19	21		0.20		12.1	5.0	B		
B-55	12.0 - 14.0	Gray clay with shell fragments (CH)	EXT_MC	90.6													
B-55	14.0 - 16.0	Very soft gray clay with shell fragments (CH)	UU	67.7	99.3	59.2					0.24		3.6	5.0	B		
B-55	16.0 - 18.0	Gray clay with silt lenses and shells (CH)	EXT_MC	61.6													
B-55	18.0 - 20.0	Shells with Gray sand and clay (Mostly shells)	-200	34.0						23.4							

Disclaimer: The results presented relate only to those samples tested.

Note: ASTM standard identification numbers shown above each test description.

Multiple Shear = MS Vertical Shear = VS Angle Shear = AS
Slickensided = SLS Bulge = B Crumble = C



Technical Responsibility: K. Allen
Title: QAM
Date: 3.10.2020

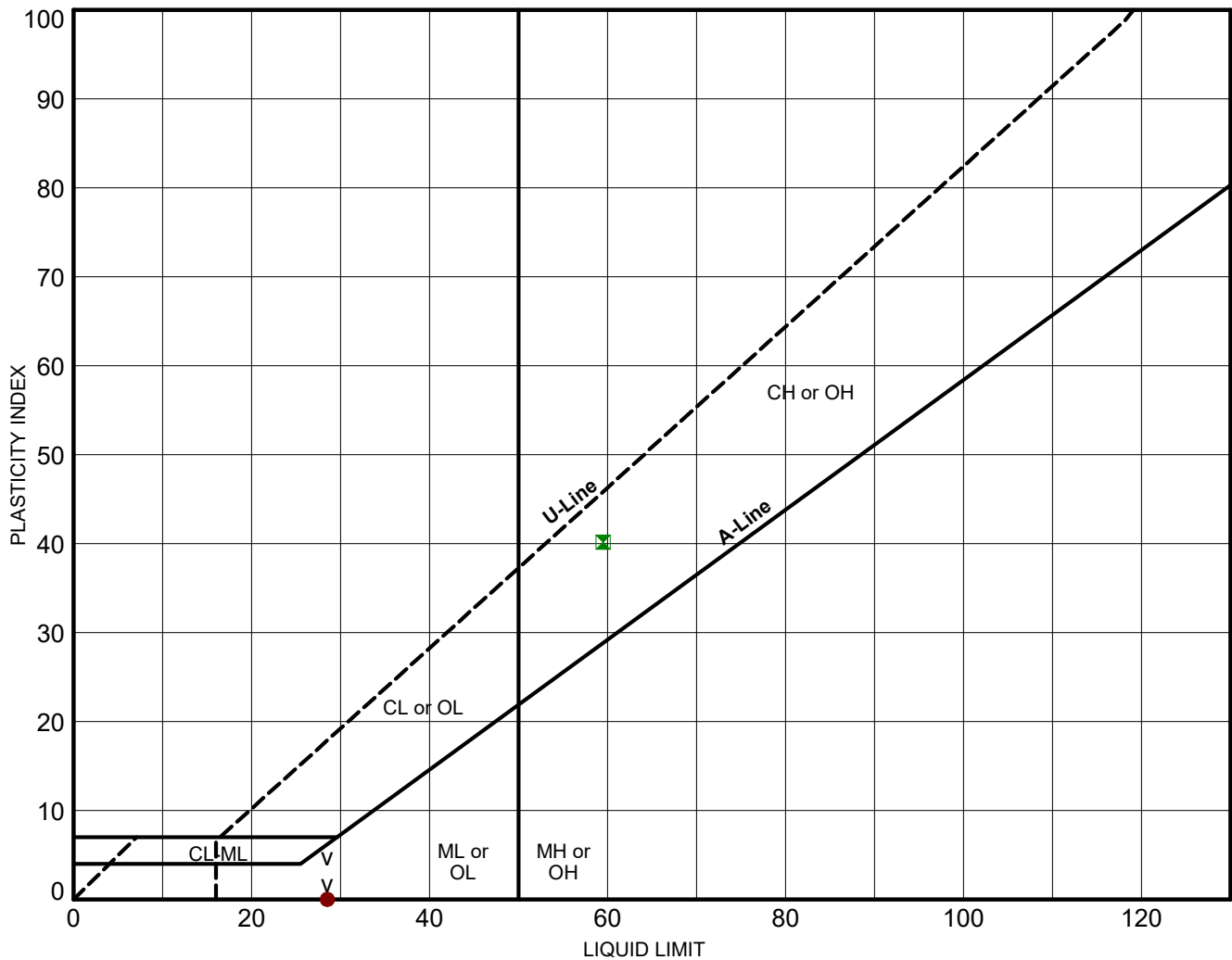
Summary of Lab Results
Project No.: 18274-004-02

East Leeville Marsh Creation and Nourishment

Lafourche Parish, Louisiana


GEOENGINEERS 

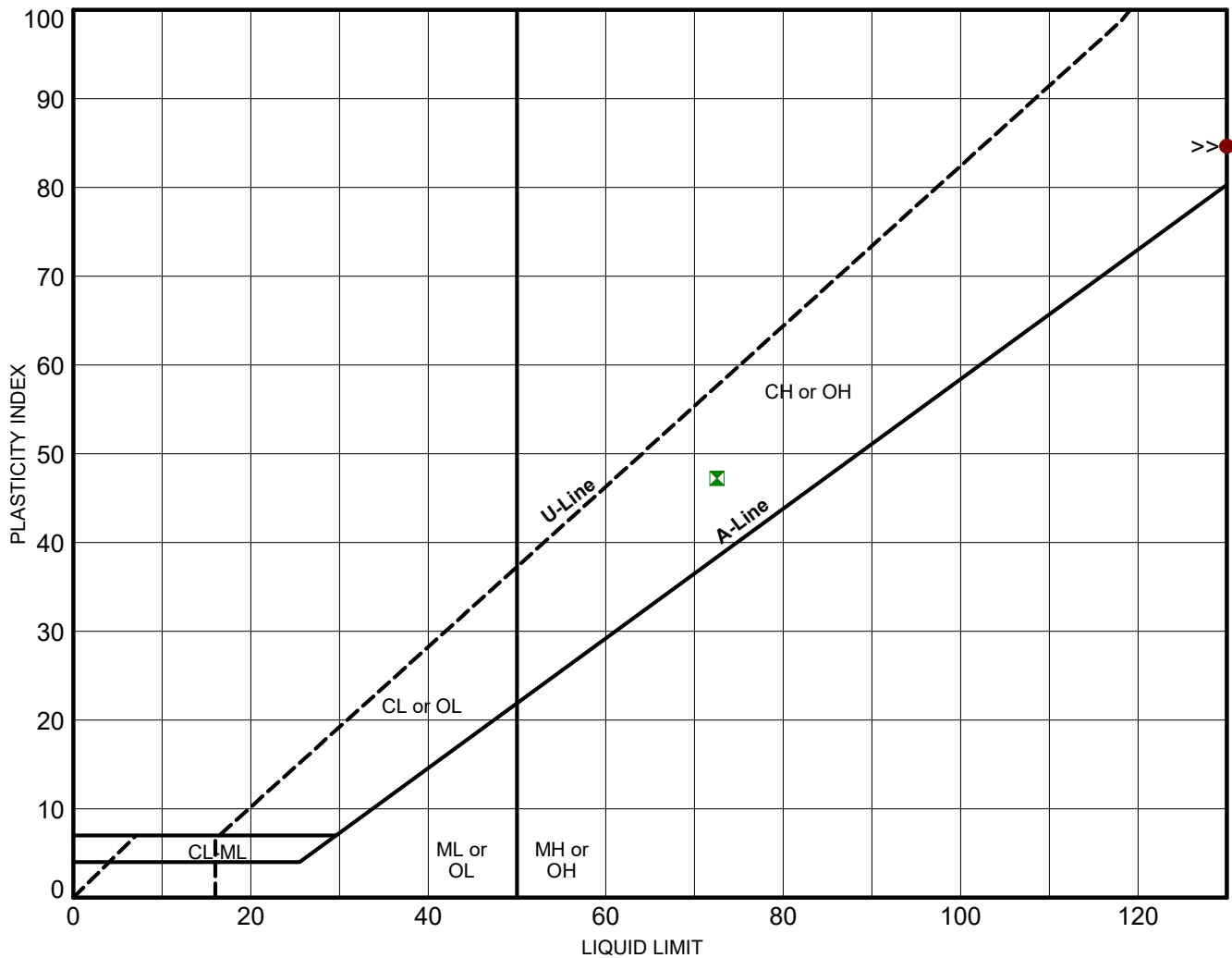
Figure D-6



Soil Boring ID	Depth (ft)	WC	LL	PL	PI	Fines	Classification
● B-50	6.0 - 8.0	30.3	29	29	NP		Dark gray sandy silt with shells (ML)
■ B-50	18.0 - 20.0	36.7	60	19	41		Gray clay with sand seams and shells (CH)


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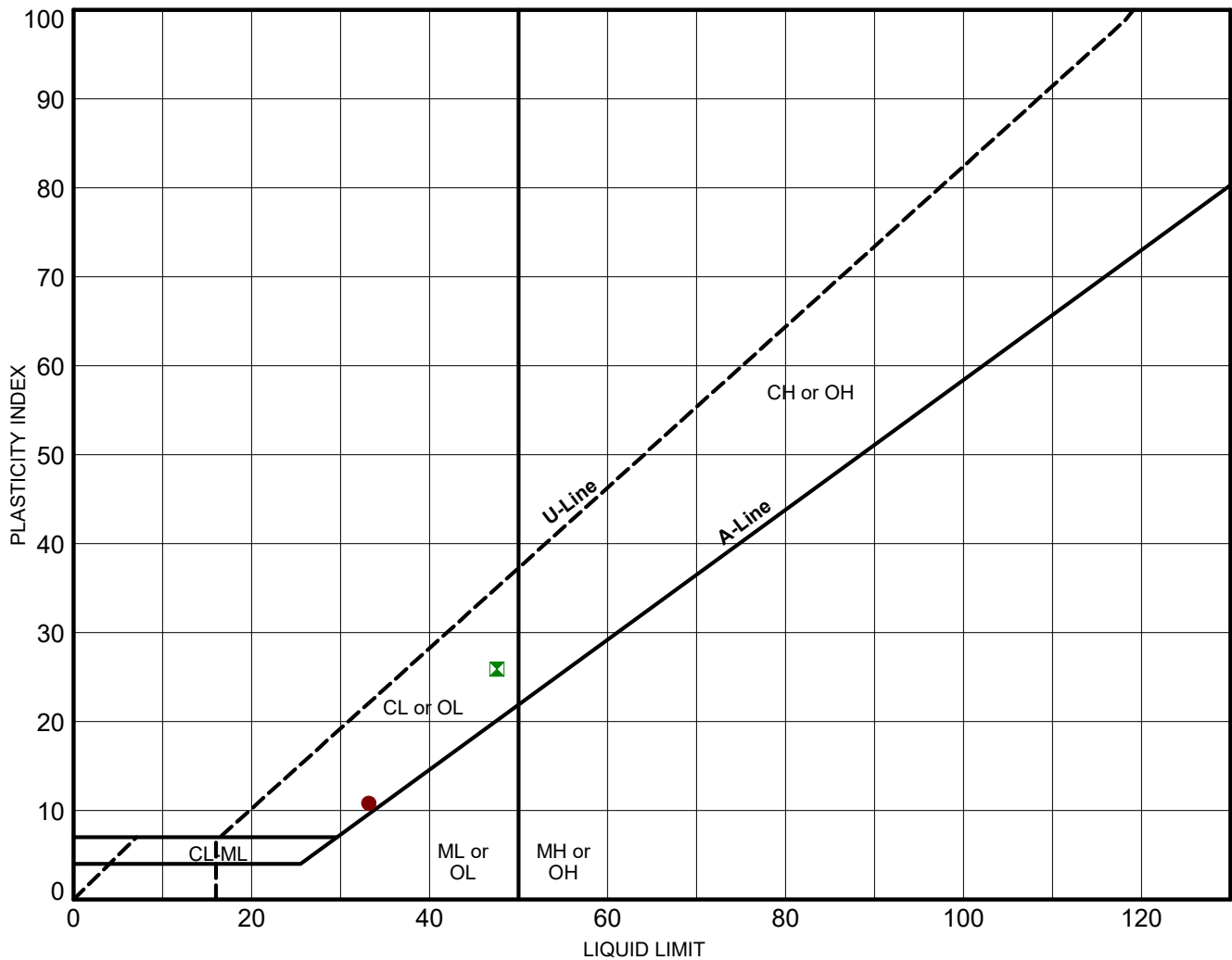
Tested By: FJ/AJ	Date Tested: 2/29/2020	ATTERBERG LIMITS RESULTS ASTM D4318	East Leeville Marsh Creation and Nourishment Lafourche Parish, Louisiana
			
Reviewed By: Karen Allen	Date Reviewed: 3/4/2020	Project No.: 18274-004-02	Figure D-7



Soil Boring ID	Depth (ft)	WC	LL	PL	PI	Fines	Classification
● B-51	0.0 - 2.0	167.3	138	54	84		Dark gray organic clay (OH)
■ B-51	10.0 - 12.0	76.6	73	25	48		Very soft gray clay with silt lenses and shell fragments (CH)


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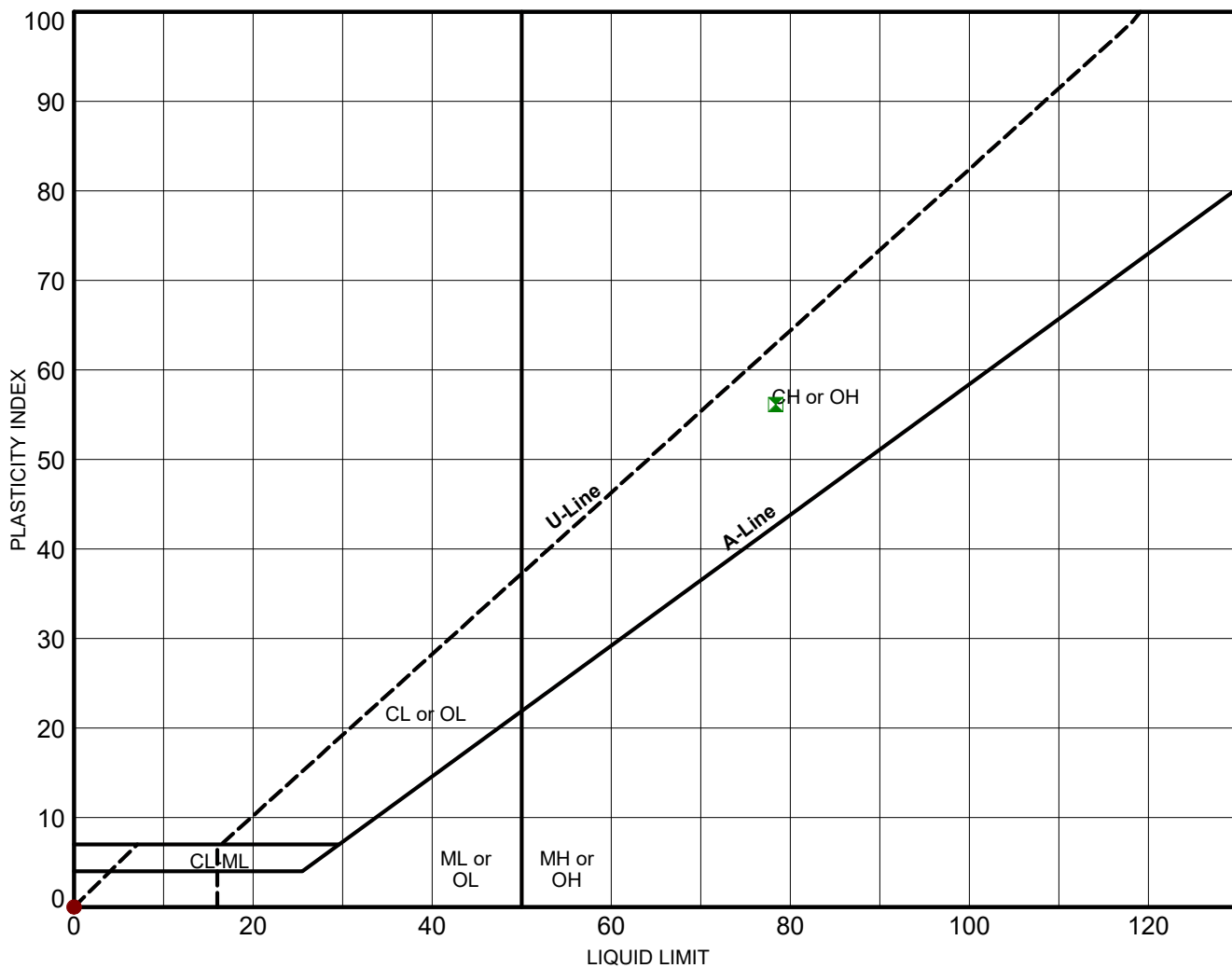
Tested By: CD/AJL	Date Tested: 3/3/2020	ATTERBERG LIMITS RESULTS ASTM D4318	East Leeville Marsh Creation and Nourishment	
Reviewed By: Karen Allen	Date Reviewed: 3/4/2020		Lafourche Parish, Louisiana	
		Project No.: 18274-004-02		Figure D-8



Soil Boring ID	Depth (ft)	WC	LL	PL	PI	Fines	Classification
● B-52	6.0 - 8.0	47.4	33	22	11		Gray very silty clay with sand and silt lenses (CL)
■ B-52	12.0 - 14.0	52.4	48	22	26		Very soft gray clay with silt, silt layers, and shell fragments (CL)


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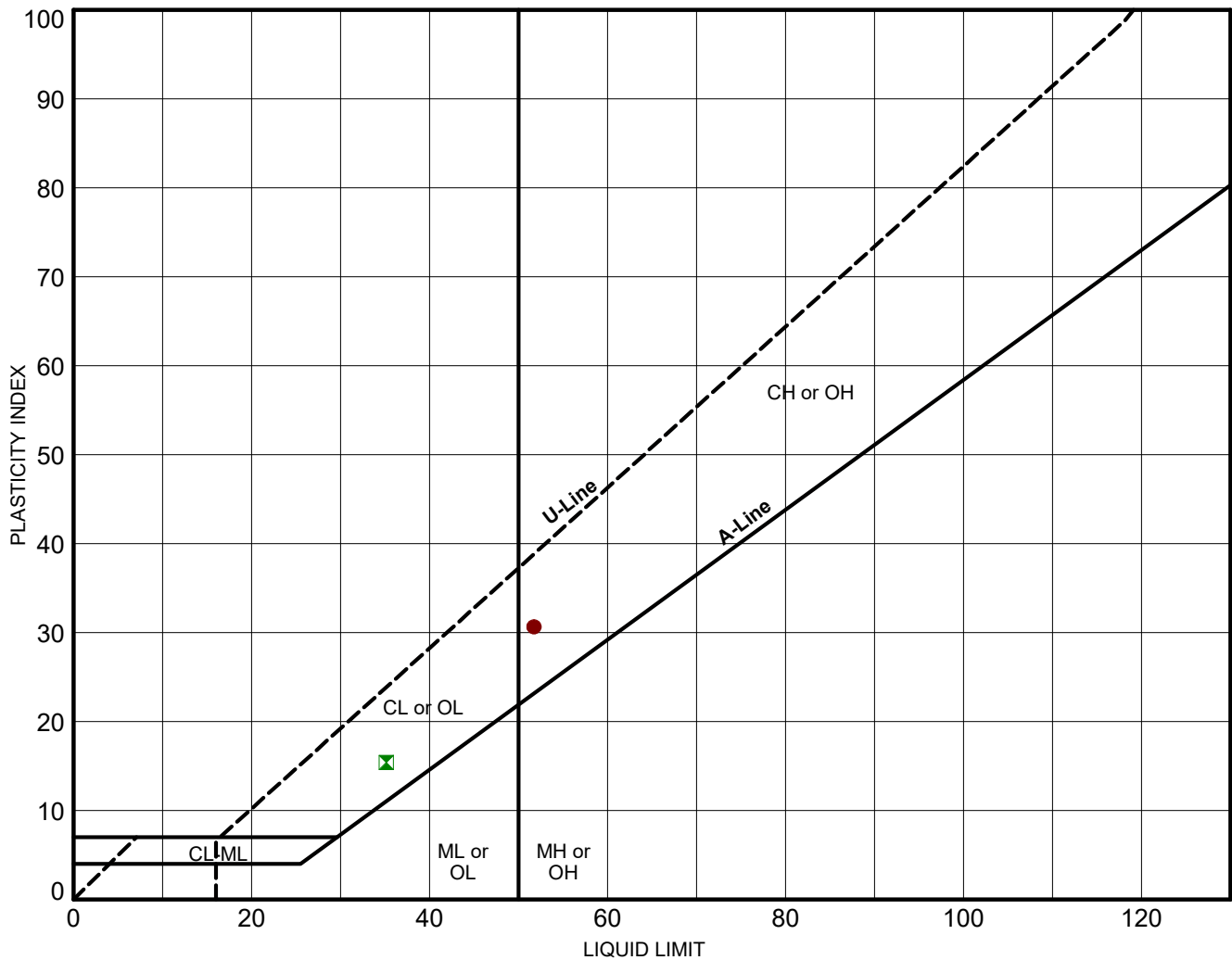
Tested By: FJ/AJL	Date Tested: 3/3/2020	ATTERBERG LIMITS RESULTS ASTM D4318	East Leeville Marsh Creation and Nourishment Lafourche Parish, Louisiana
			
Reviewed By: Karen Allen	Date Reviewed: 3/4/2020	Project No.: 18274-004-02	Figure D-9



Soil Boring ID	Depth (ft)	WC	LL	PL	PI	Fines	Classification
● B-53	6.0 - 8.0	35.9	NP	NP	NP		Gray sandy silt (ML)
■ B-53	18.0 - 20.0	89.2	78	22	56		Soft gray clay with silt lenses, sand lenses, and shell fragments (CH)


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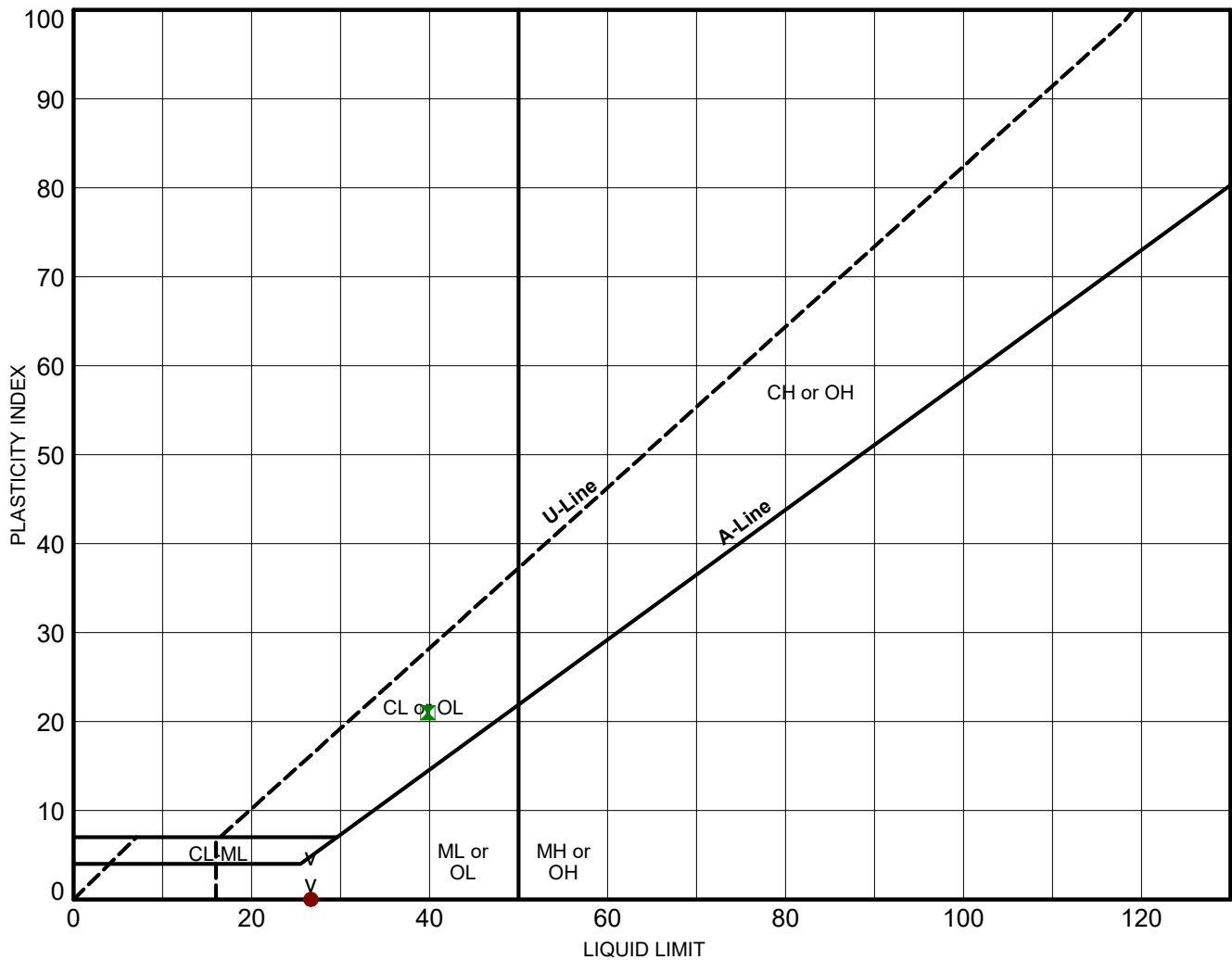
Tested By: FJ/AJL	Date Tested: 3/3/2020	ATTERBERG LIMITS RESULTS ASTM D4318	East Leeville Marsh Creation and Nourishment	
Reviewed By: Karen Allen	Date Reviewed: 3/4/2020		Lafourche Parish, Louisiana	
		Project No.: 18274-004-02		Figure D-10



Soil Boring ID	Depth (ft)	WC	LL	PL	PI	Fines	Classification
● B-54	4.0 - 6.0	47.5	52	21	31		Very soft gray clay (CH)
✕ B-54	12.0 - 14.0	37.9	35	20	15		Very soft gray silty clay with sand lenses and shell fragments (CL)


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Tested By: FJ/AJL	Date Tested: 3/3/2020	ATTERBERG LIMITS RESULTS ASTM D4318	East Leeville Marsh Creation and Nourishment Lafourche Parish, Louisiana
Reviewed By: Karen Allen	Date Reviewed: 3/4/2020	Project No.: 18274-004-02	 Figure D-11

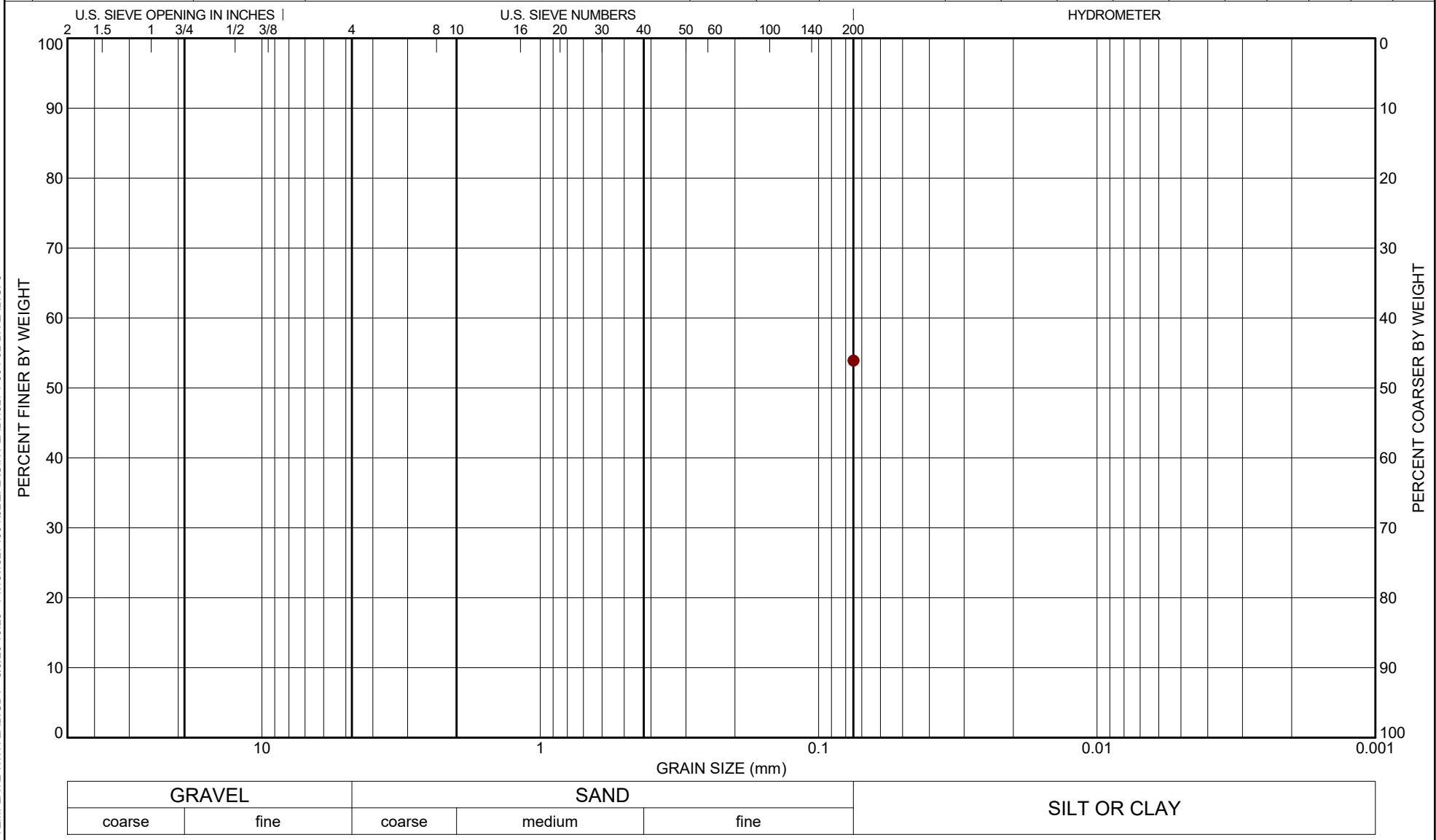



Soil Boring ID	Depth (ft)	WC	LL	PL	PI	Fines	Classification
● B-55	4.0 - 6.0	35.0	27	27	NP		Gray silt (ML)
✚ B-55	10.0 - 12.0	49.0	40	19	21		Very soft gray silty clay with shell fragments (CL)

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Tested By: FJ/AJL	Date Tested: 3/3/2020	ATTERBERG LIMITS RESULTS ASTM D4318	East Leeville Marsh Creation and Nourishment Lafourche Parish, Louisiana
			
Reviewed By: Karen Allen	Date Reviewed: 3/4/2020	Project No.: 18274-004-02	Figure D-12

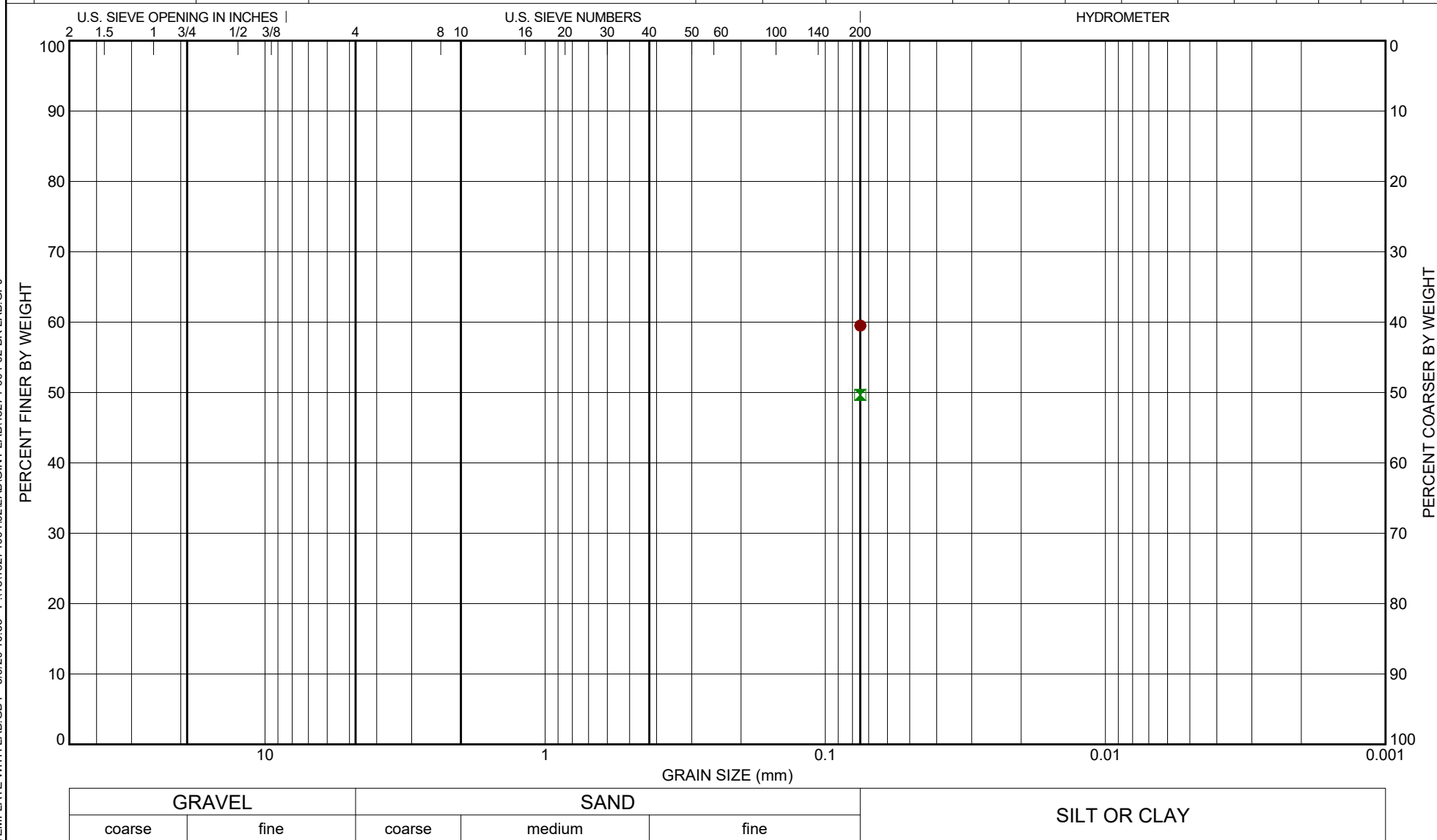
Soil Boring ID	Depth (ft)	Classification	%Gravel	%Sand	%Silt	%Clay	D90	D60	D50	D30	D10	Cc	Cu	LL	PL	PI
B-50	4.0 - 6.0	Soft dark gray sandy silty clay with shells (CL)			53.9											



Tested By: SRT/SLC	Date Tested: 2/25/2020	GRAIN SIZE DISTRIBUTION ASTM D422/D1140/D6913/T88 Project No.: 18274-004-02 <small>Note: This report may not be reproduced, except in full, without written approval of GeoEngineers, Inc. Test results are applicable only to the specific sample on which they were performed, and should not be interpreted as representative of any other samples obtained at other times, depths or locations, or generated by separate operations or processes.</small>	East Leeville Marsh Creation and Nourishment Lafourche Parish, Louisiana	
Reviewed By: Karen Allen	Date Reviewed: 3/4/2020			Figure D-13

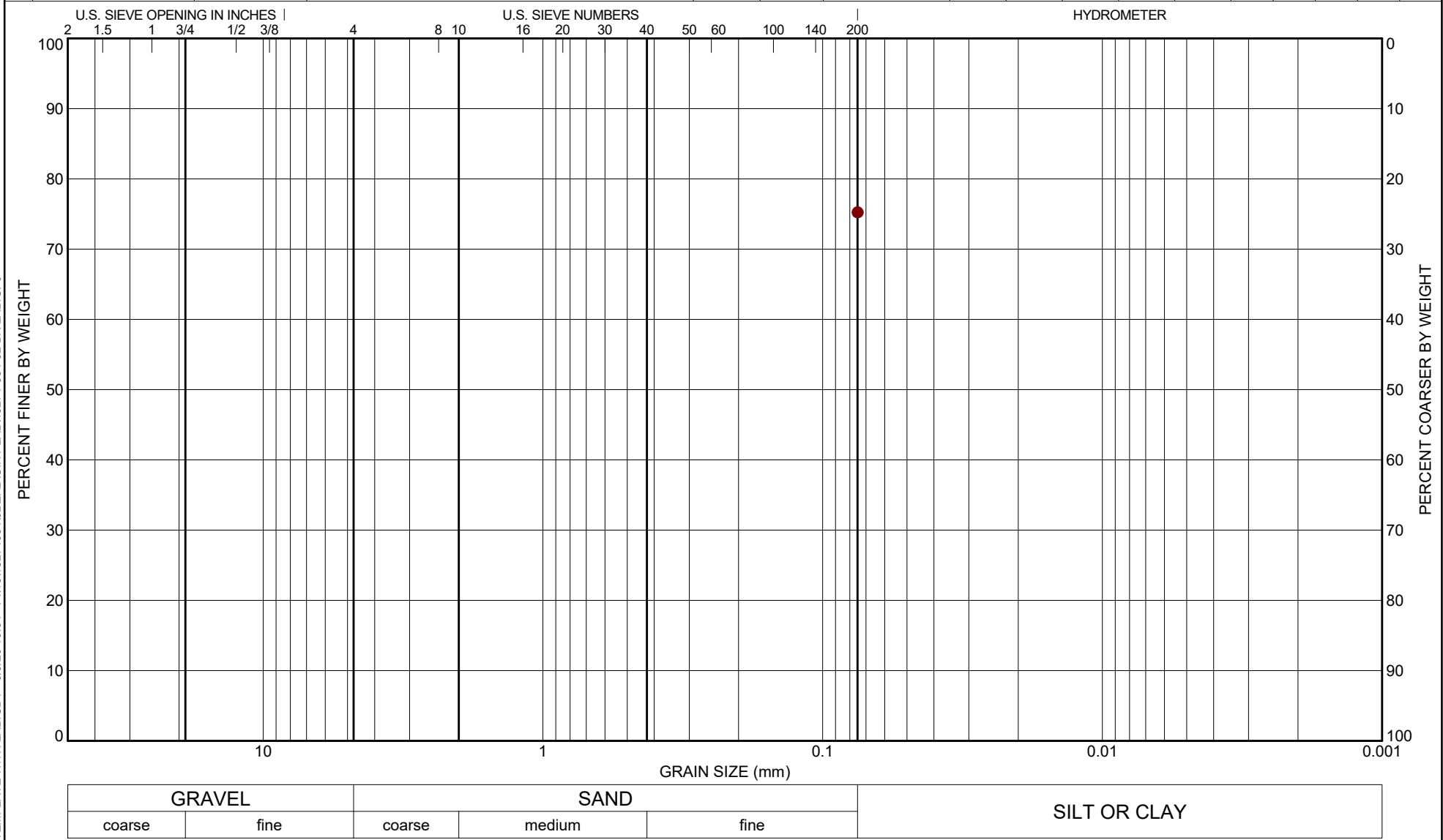
GEI - GRAIN SIZE - GEO TEMPLATE WITH LAB.GDT - 3/9/20 10:33 - P:\1818274004\02\LAB\GINT LAB\18274-004-02 BR LAB.GPJ

Soil Boring ID	Depth (ft)	Classification	%Gravel	%Sand	%Silt	%Clay	D90	D60	D50	D30	D10	Cc	Cu	LL	PL	PI
● B-52	8.0 - 9.0	Gray sandy silt with clay (ML)			59.5											
✱ B-52	18.0 - 20.0	Gray clayey sand with silt and shell fragments (SC)			49.7											



Tested By: SRT	Date Tested: 2/29/2020	GRAIN SIZE DISTRIBUTION ASTM D422/D1140/D6913/T88 Project No.: 18274-004-02 <small>Note: This report may not be reproduced, except in full, without written approval of GeoEngineers, Inc. Test results are applicable only to the specific sample on which they were performed, and should not be interpreted as representative of any other samples obtained at other times, depths or locations, or generated by separate operations or processes.</small>	East Leeville Marsh Creation and Nourishment Lafourche Parish, Louisiana	
Reviewed By: Karen Allen	Date Reviewed: 3/4/2020		GEOENGINEERS	Figure D-14

Soil Boring ID	Depth (ft)	Classification	%Gravel	%Sand	%Silt	%Clay	D90	D60	D50	D30	D10	Cc	Cu	LL	PL	PI
B-53	8.0 - 9.0	Gray silty clay with sand and organic matter (CL)			75.2											




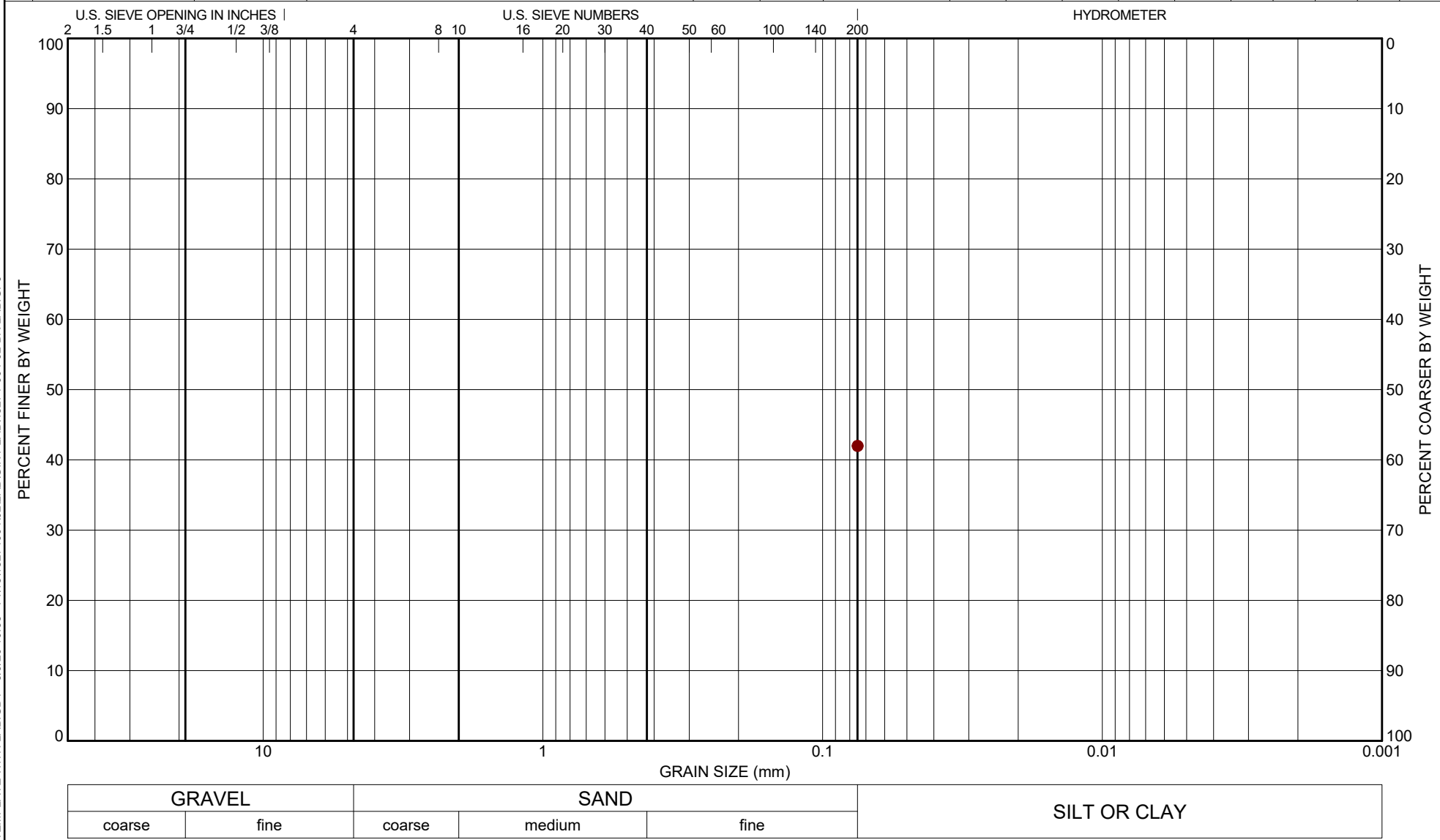

Tested By: SRT	Date Tested: 2/29/2020	GRAIN SIZE DISTRIBUTION ASTM D422/D1140/D6913/T88 Project No.: 18274-004-02 <small>Note: This report may not be reproduced, except in full, without written approval of GeoEngineers, Inc. Test results are applicable only to the specific sample on which they were performed, and should not be interpreted as representative of any other samples obtained at other times, depths or locations, or generated by separate operations or processes.</small>	East Leeville Marsh Creation and Nourishment Lafourche Parish, Louisiana
Reviewed By: Karen Allen	Date Reviewed: 3/4/2020		

Figure D-15

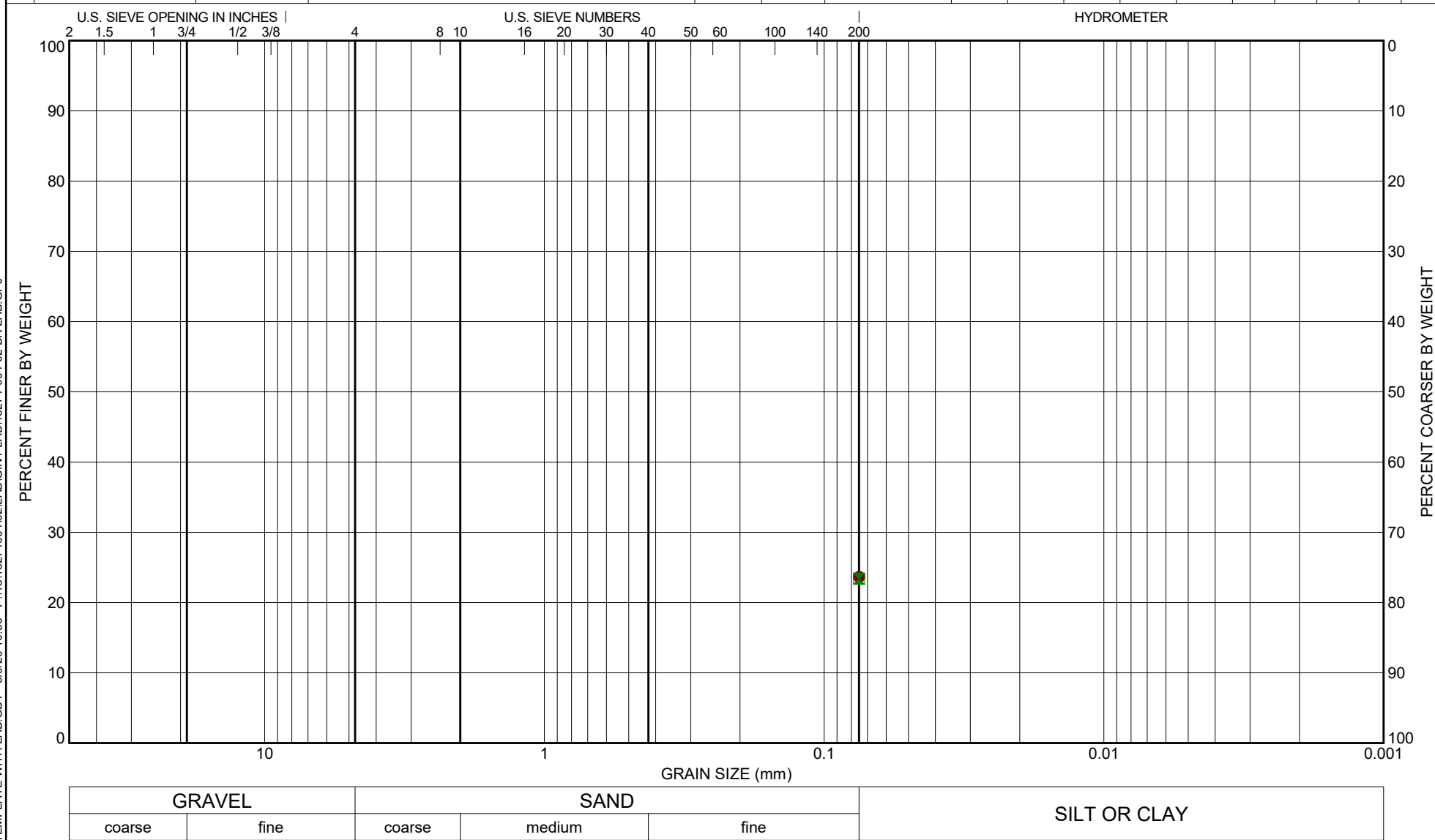
Soil Boring ID	Depth (ft)	Classification	%Gravel	%Sand	%Silt	%Clay	D90	D60	D50	D30	D10	Cc	Cu	LL	PL	PI
B-54	10.0 - 11.0	Gray silty clayey sand (SC-SM)			42.0											



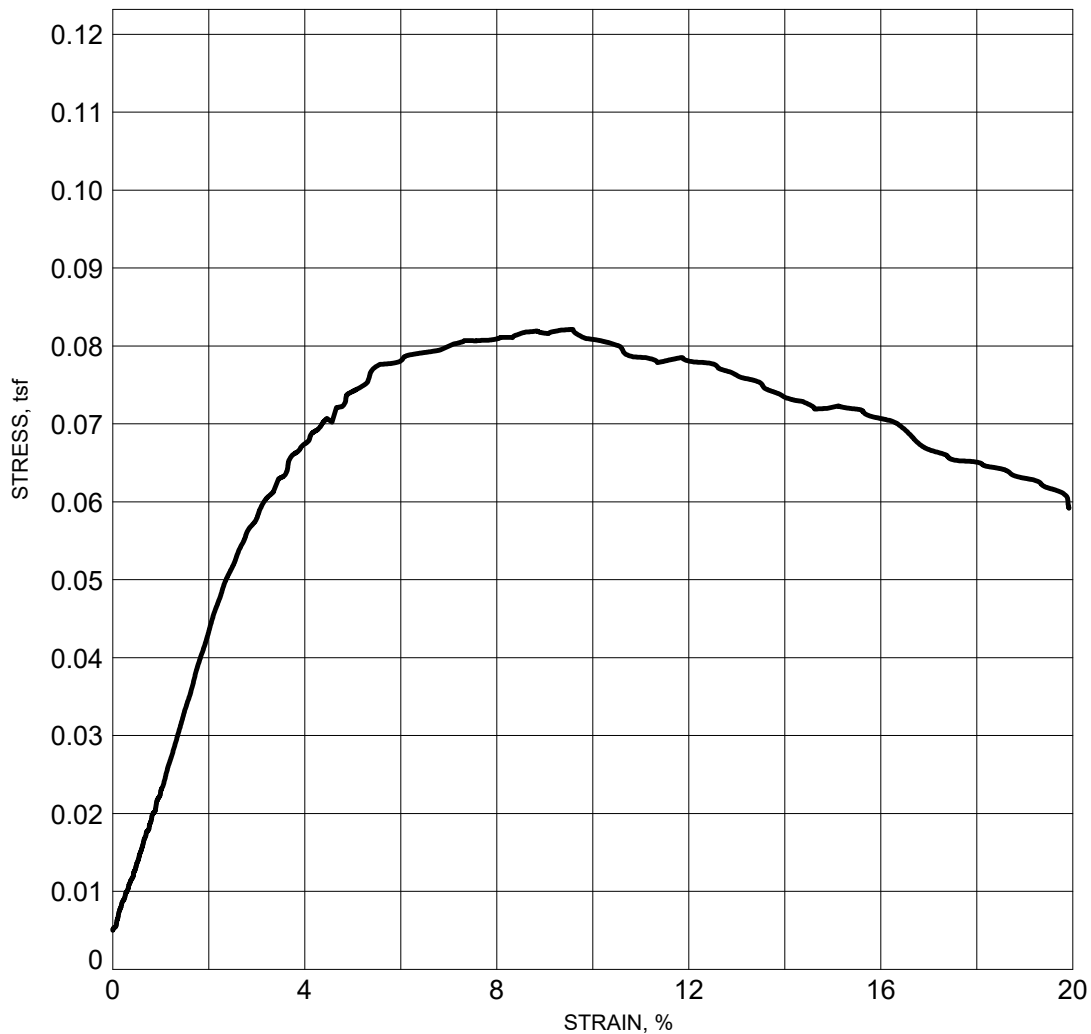
Tested By: SRT/SLC	Date Tested: 3/1/2020	GRAIN SIZE DISTRIBUTION ASTM D422/D1140/D6913/T88 Project No.: 18274-004-02 <small>Note: This report may not be reproduced, except in full, without written approval of GeoEngineers, Inc. Test results are applicable only to the specific sample on which they were performed, and should not be interpreted as representative of any other samples obtained at other times, depths or locations, or generated by separate operations or processes.</small>	East Leeville Marsh Creation and Nourishment Lafourche Parish, Louisiana	
Reviewed By: Karen Allen	Date Reviewed: 3/4/2020			Figure D-16

GEI - GRAIN SIZE - GEO TEMPLATE WITH LAB.GDT - 3/9/20 10:36 - P:\1818274004\02\LAB\GINT LAB\18274-004-02 BR LAB.GPJ

Soil Boring ID	Depth (ft)	Classification	%Gravel	%Sand	%Silt	%Clay	D90	D60	D50	D30	D10	Cc	Cu	LL	PL	PI
● B-55	6.0 - 7.0	Gray silty sand with clay (SM)			23.7											
■ B-55	18.0 - 20.0	Shells with Gray sand and clay (Mostly shells)			23.4											

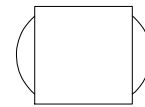


Tested By: SRT/SLC	Date Tested: 3/2/2020	GRAIN SIZE DISTRIBUTION ASTM D422/D1140/D6913/T88 Project No.: 18274-004-02 <small>Note: This report may not be reproduced, except in full, without written approval of GeoEngineers, Inc. Test results are applicable only to the specific sample on which they were performed, and should not be interpreted as representative of any other samples obtained at other times, depths or locations, or generated by separate operations or processes.</small>	East Leeville Marsh Creation and Nourishment Lafourche Parish, Louisiana	
Reviewed By: Karen Allen	Date Reviewed: 3/4/2020		GEOENGINEERS	Figure D-17



Boring ID B-50
 Depth (ft) 0-2
 Water Content, % 82.9
 Wet Density, pcf 96.9
 Dry Density, pcf 53.0
 Saturation, % 102.0
 Void Ratio 2.23
 Specimen Diameter 2.814
 Specimen Height 5.869
 Height/diameter ratio 2.09
 Deviator Stress, tsf 0.082
 Strain, % 9.6
 Confining Pressure (psi) 5.0

Bulge



Failure Sketch

LL = PL = PI =

% 200=

% Organic=

Assumed Gs=2.74

Description: Very soft dark gray clay with organic matter (CH)

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Tested By:
SRT

Date Tested:
2/25/2020

**UNCONSOLIDATED
UNDRAINED
COMPRESSION TEST
ASTM D2850**

Project No.: 18274-004-02

East Leeville Marsh Creation and Nourishment

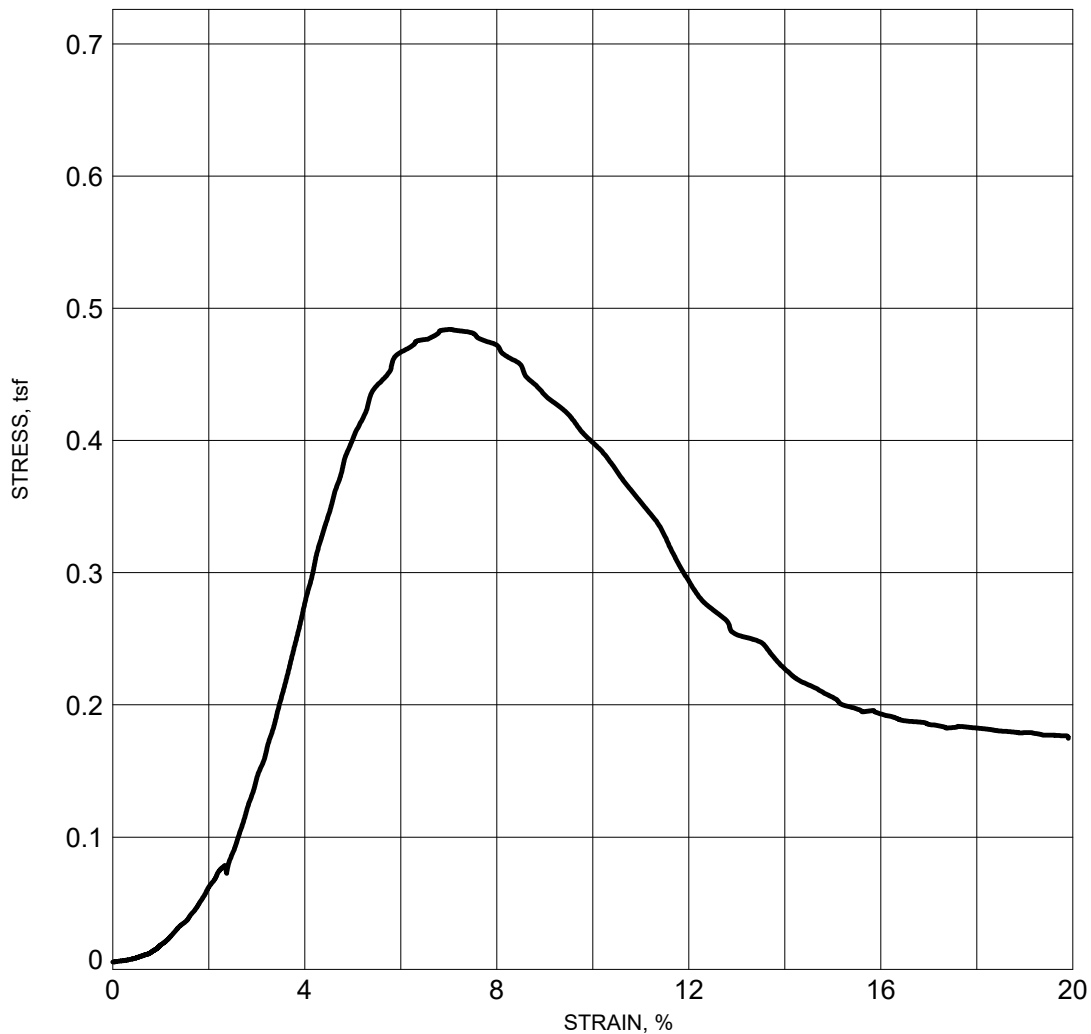
Lafourche Parish, Louisiana



Figure D-18

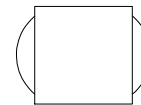
Reviewed By:
Karen Allen

Date Reviewed:
3/4/2020



Boring ID B-50
 Depth (ft) 4-6
 Water Content, % 32.1
 Wet Density, pcf 121.8
 Dry Density, pcf 92.2
 Saturation, % 101.2
 Void Ratio 0.88
 Specimen Diameter 2.877
 Specimen Height 5.781
 Height/diameter ratio 2.01
 Deviator Stress, tsf 0.484
 Strain, % 7.1
 Confining Pressure (psi) 5.0

Bulge



Failure Sketch

LL = PL = PI =

% 200=54

% Organic=

Assumed Gs=2.78

Description: Soft dark gray sandy silty clay with shells (CL)

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Tested By:
SRT

Date Tested:
2/25/2020

**UNCONSOLIDATED
UNDRAINED
COMPRESSION TEST
ASTM D2850**

Project No.: 18274-004-02

East Leeville Marsh Creation and Nourishment

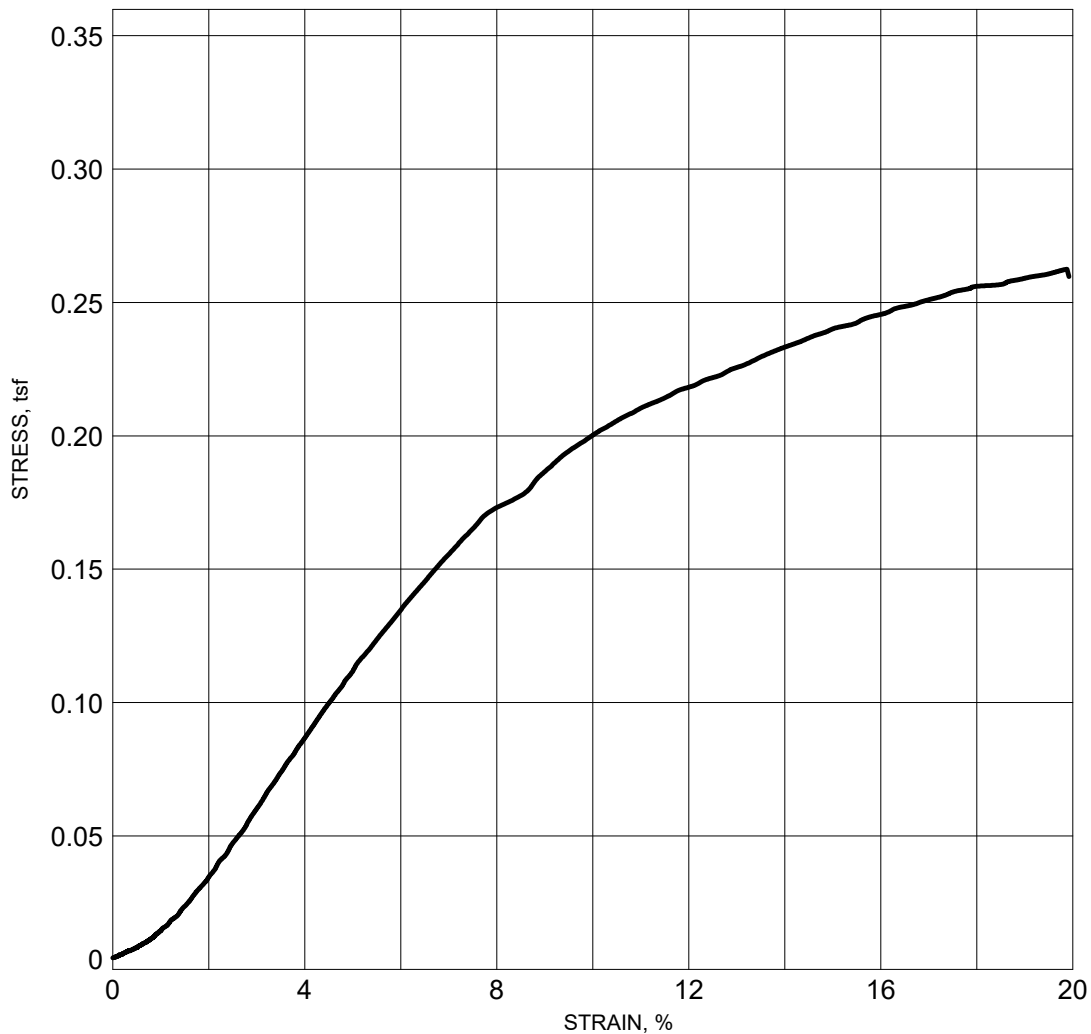
Lafourche Parish, Louisiana



Figure D-19

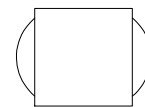
Reviewed By:
Karen Allen

Date Reviewed:
3/4/2020



Boring ID B-50
 Depth (ft) 8-10
 Water Content, % 38.4
 Wet Density, pcf 113.0
 Dry Density, pcf 81.6
 Saturation, % 100.0
 Void Ratio 1.01
 Specimen Diameter 2.853
 Specimen Height 5.714
 Height/diameter ratio 2.00
 Deviator Stress, tsf 0.240
 Strain, % 15.0
 Confining Pressure (psi) 5.0

Bulge



Failure Sketch

LL = PL = PI =

% 200=

% Organic=

Assumed Gs=2.63

Description: Very soft dark gray sandy silty clay (CL)

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Tested By:
SRT

Date Tested:
2/25/2020

**UNCONSOLIDATED
UNDRAINED
COMPRESSION TEST
ASTM D2850**

Project No.: 18274-004-02

East Leeville Marsh Creation and Nourishment

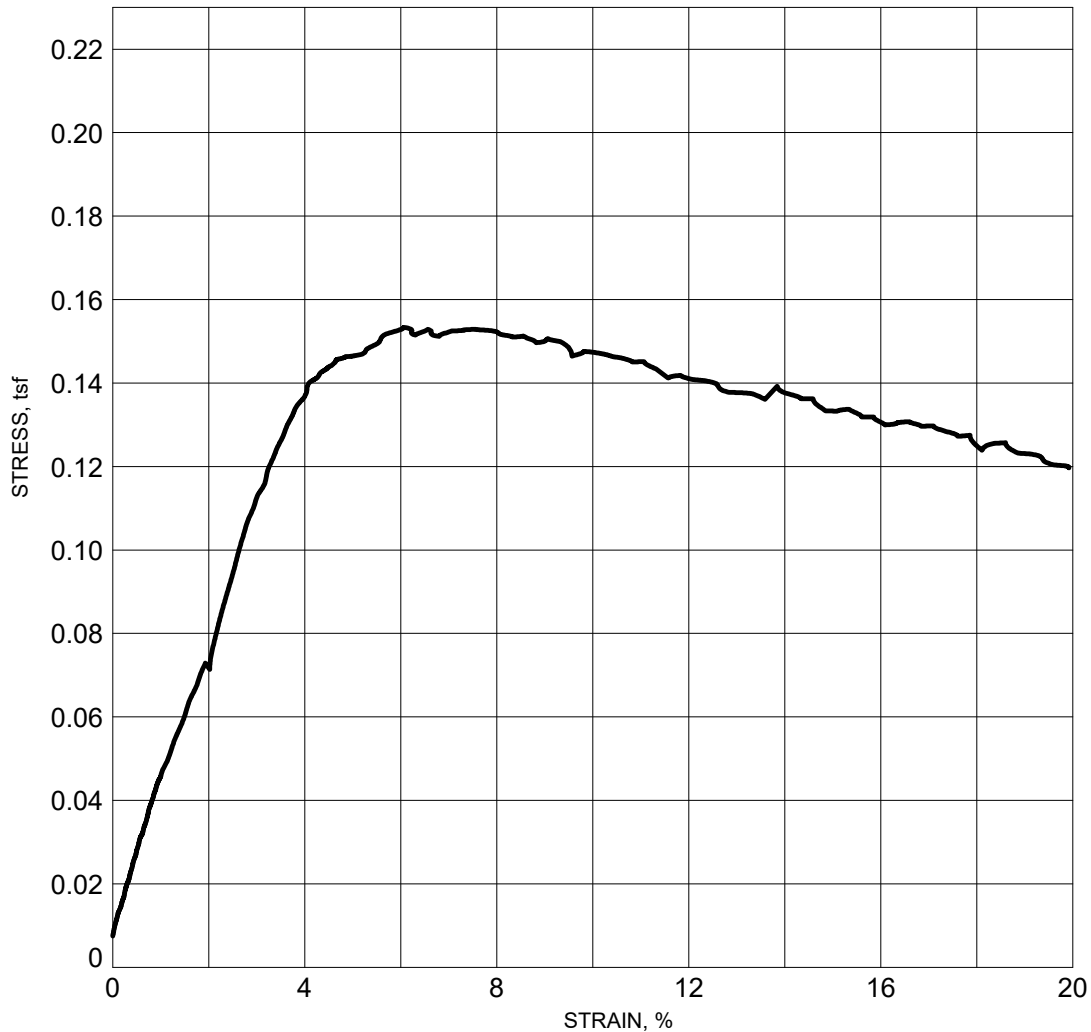
Lafourche Parish, Louisiana



Figure D-20

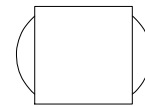
Reviewed By:
Karen Allen

Date Reviewed:
3/4/2020



Boring ID B-50
 Depth (ft) 12-14
 Water Content, % 56.1
 Wet Density, pcf 102.2
 Dry Density, pcf 65.5
 Saturation, % 100.0
 Void Ratio 1.43
 Specimen Diameter 2.837
 Specimen Height 5.909
 Height/diameter ratio 2.08
 Deviator Stress, tsf 0.153
 Strain, % 6.1
 Confining Pressure (psi) 5.0

Bulge



Failure Sketch

LL = PL = PI =

% 200= % Organic= Assumed Gs=2.55

Description: Very soft dark gray clay with trace sand and shell fragments (CH)

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Tested By:
SRT

Date Tested:
2/25/2020

Reviewed By:
Karen Allen

Date Reviewed:
3/4/2020

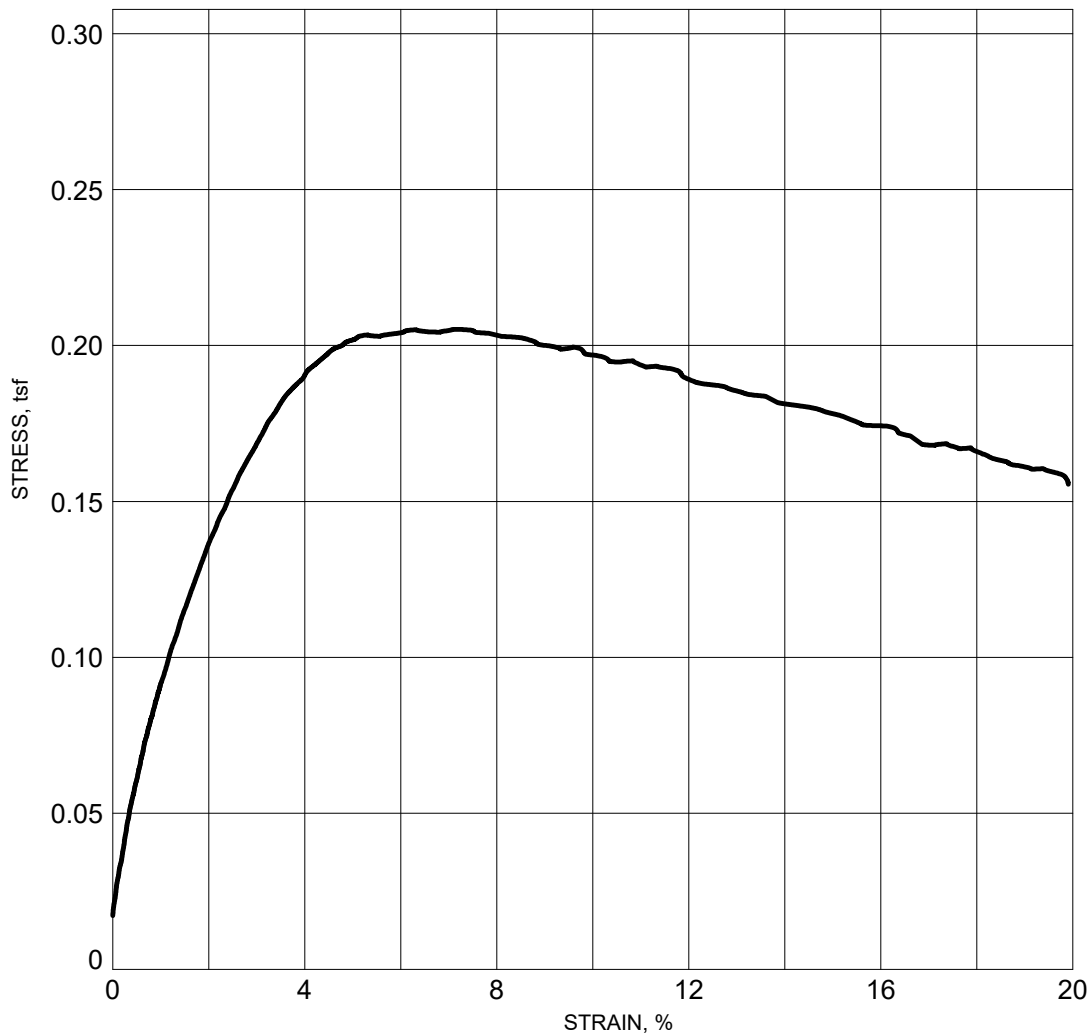
**UNCONSOLIDATED
UNDRAINED
COMPRESSION TEST
ASTM D2850**
 Project No.: 18274-004-02

East Leeville Marsh Creation and Nourishment

Lafourche Parish, Louisiana

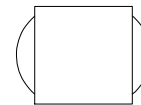


Figure D-21



Boring ID B-50
 Depth (ft) 16-18
 Water Content, % 77.4
 Wet Density, pcf 96.9
 Dry Density, pcf 54.6
 Saturation, % 99.9
 Void Ratio 2.11
 Specimen Diameter 2.875
 Specimen Height 5.810
 Height/diameter ratio 2.02
 Deviator Stress, tsf 0.205
 Strain, % 7.1
 Confining Pressure (psi) 6.0

Bulge



Failure Sketch

LL = PL = PI =

% 200= % Organic= Assumed Gs=2.72

Description: Very soft gray clay with trace sand and shell fragments (CH)

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Tested By:
SRT

Date Tested:
2/25/2020

**UNCONSOLIDATED
UNDRAINED
COMPRESSION TEST
ASTM D2850**

Project No.: 18274-004-02

East Leeville Marsh Creation and Nourishment

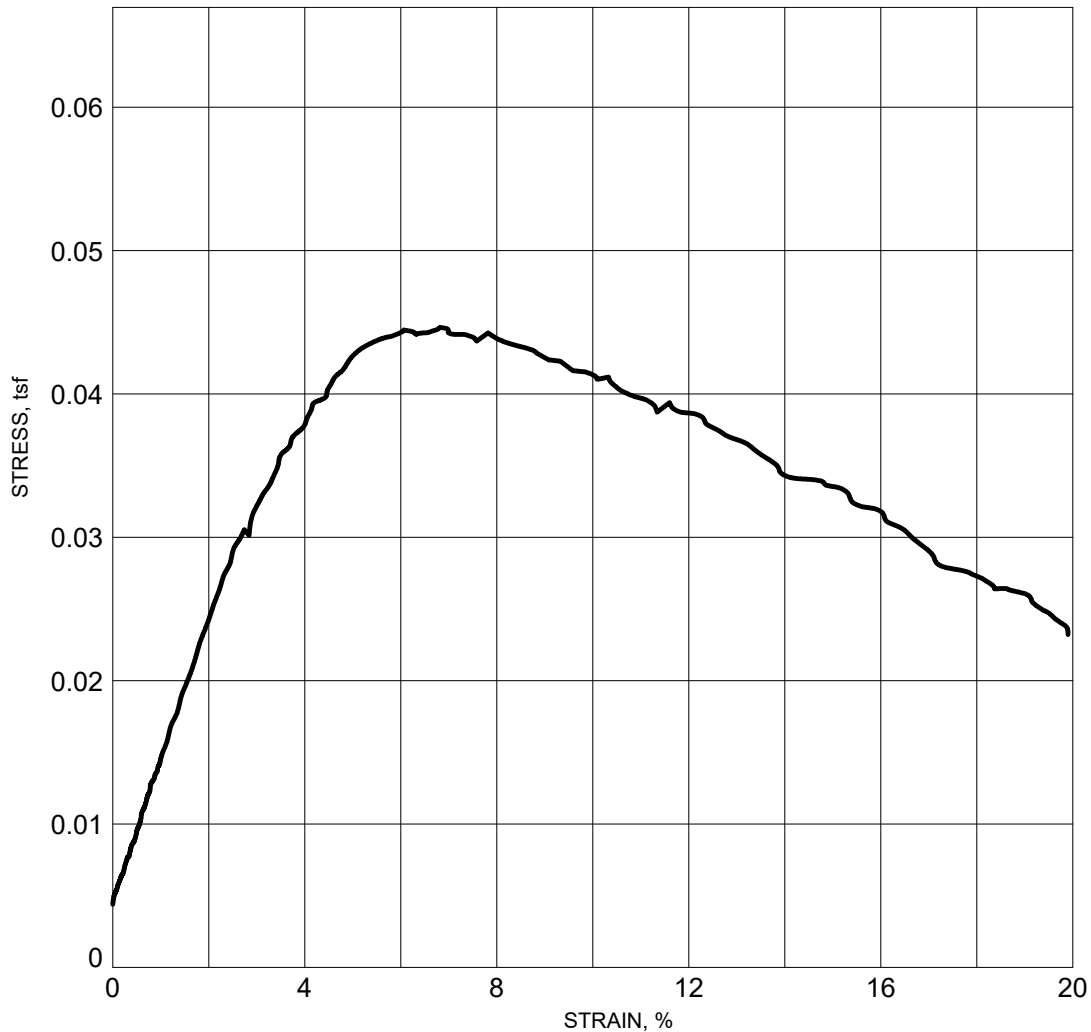
Lafourche Parish, Louisiana



Figure D-22

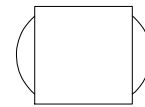
Reviewed By:
Karen Allen

Date Reviewed:
3/4/2020



Boring ID B-51
 Depth (ft) 2-4
 Water Content, % 101.1
 Wet Density, pcf 87.1
 Dry Density, pcf 43.3
 Saturation, % 100.1
 Void Ratio 2.34
 Specimen Diameter 2.848
 Specimen Height 5.846
 Height/diameter ratio 2.05
 Deviator Stress, tsf 0.045
 Strain, % 6.8
 Confining Pressure (psi) 5.0

Bulge



Failure Sketch

LL = PL = PI =

% 200= % Organic= Assumed Gs=2.32

Description: Very soft dark gray organic clay with wood (OH)

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Tested By:
SRT

Date Tested:
2/28/2020

**UNCONSOLIDATED
UNDRAINED
COMPRESSION TEST
ASTM D2850**

Project No.: 18274-004-02

East Leeville Marsh Creation and Nourishment

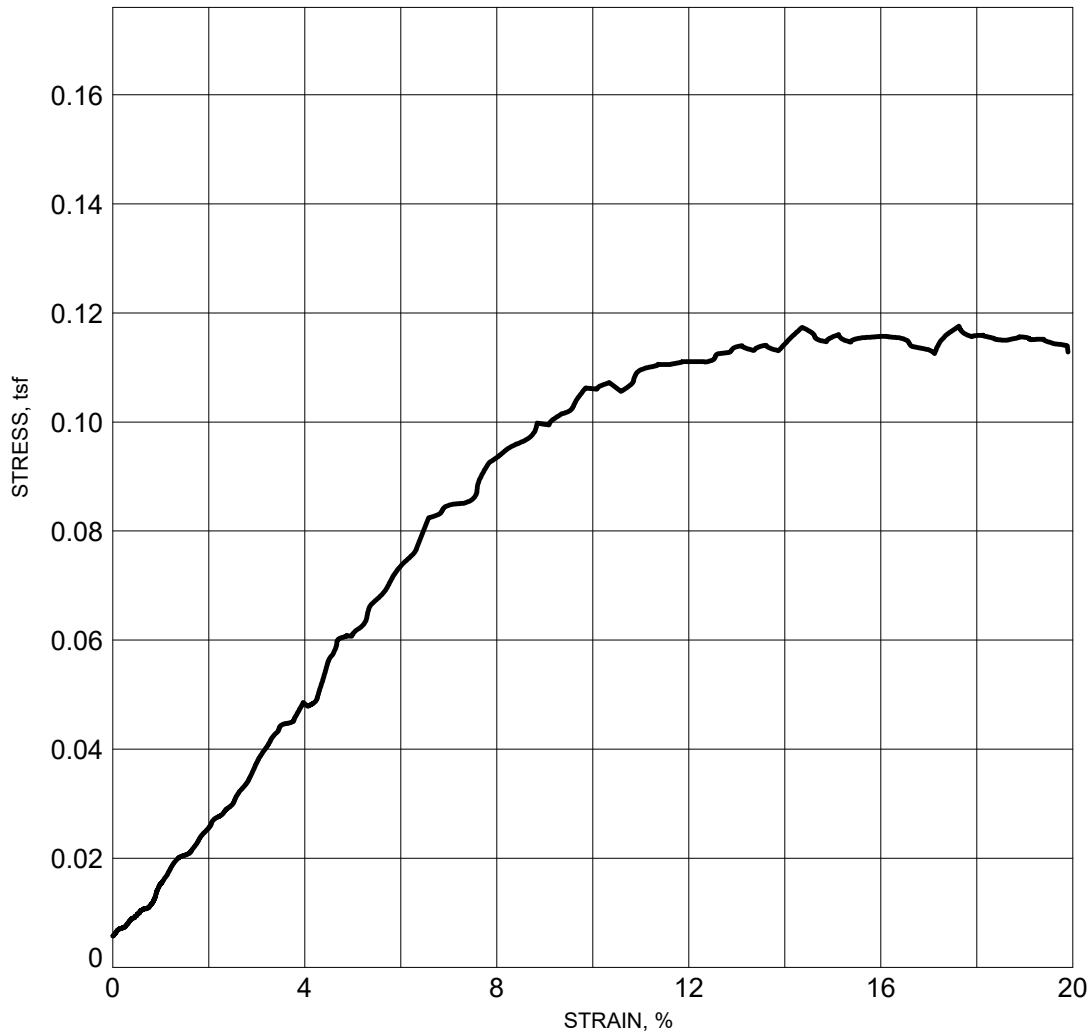
Lafourche Parish, Louisiana



Figure D-23

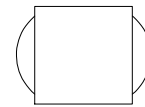
Reviewed By:
Karen Allen

Date Reviewed:
3/4/2020



Boring ID B-51
 Depth (ft) 6-8
 Water Content, % 40.1
 Wet Density, pcf 111.6
 Dry Density, pcf 79.7
 Saturation, % 99.9
 Void Ratio 1.05
 Specimen Diameter 2.874
 Specimen Height 5.838
 Height/diameter ratio 2.03
 Deviator Stress, tsf 0.117
 Strain, % 14.4
 Confining Pressure (psi) 5.0

Bulge



Failure Sketch

LL = PL = PI =

% 200=

% Organic=

Assumed Gs=2.62

Description: Very soft gray clay with silt and shells (CL)

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Tested By:
SRT

Date Tested:
2/28/2020

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COMPRESSION TEST
ASTM D2850**

Project No.: 18274-004-02

East Leeville Marsh Creation and Nourishment

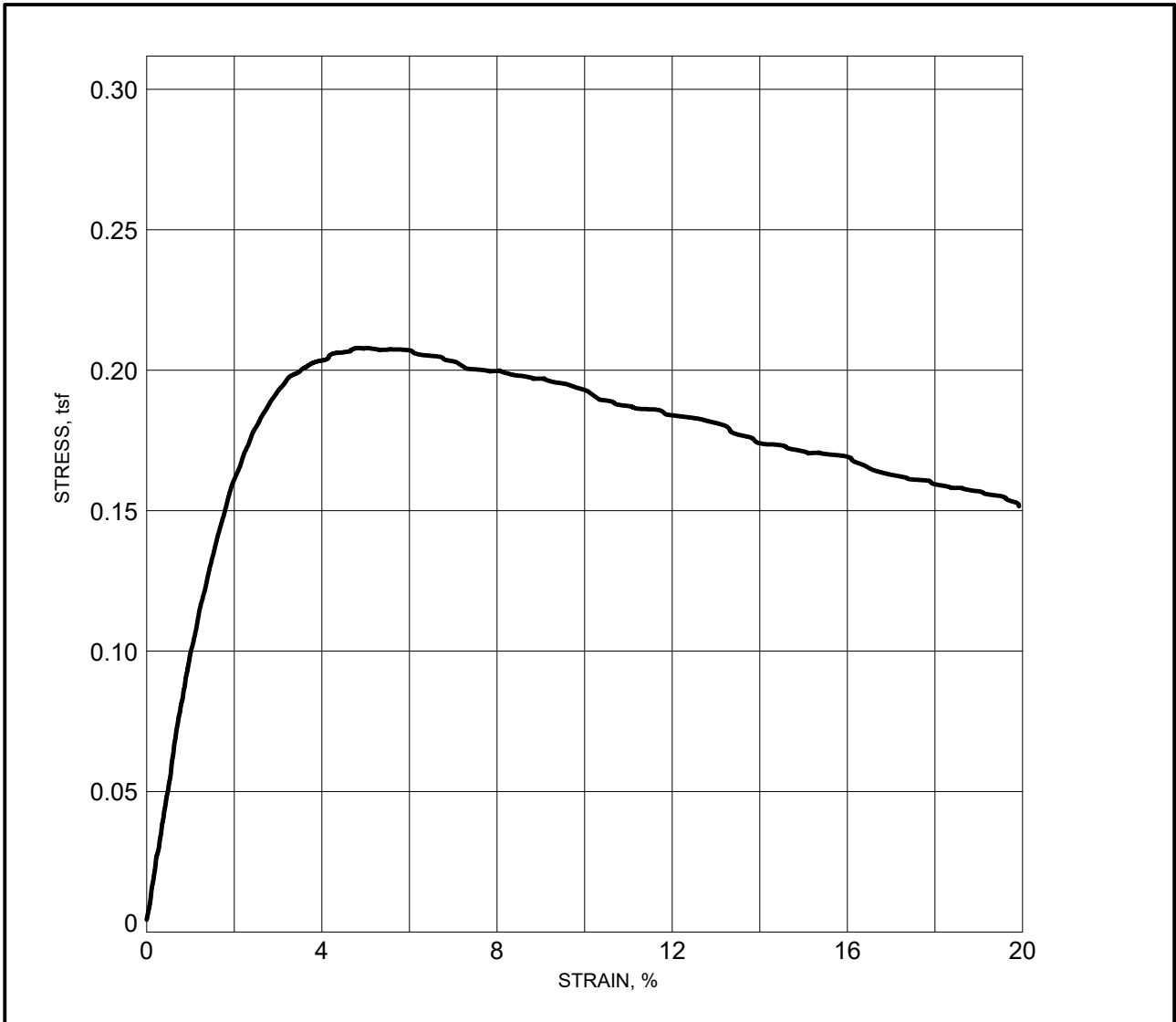
Lafourche Parish, Louisiana

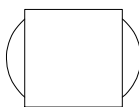


Figure D-24

Reviewed By:
Karen Allen

Date Reviewed:
3/4/2020



Boring ID B-51 Depth (ft) 10-12 Water Content, % 76.6 Wet Density, pcf 99.3 Dry Density, pcf 56.2 Saturation, % 102.9 Void Ratio 2.04 Specimen Diameter 2.845 Specimen Height 5.995 Height/diameter ratio 2.11 Deviator Stress, tsf 0.208 Strain, % 4.9 Confining Pressure (psi) 5.0	<div style="text-align: center;"> <p>Bulge</p>  <p>Failure Sketch</p> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> LL = 73 PL = 25 PI = 48 </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> % 200= % Organic= Assumed Gs=2.74 </div>
Description: Very soft gray clay with silt lenses and shell fragments (CH)	

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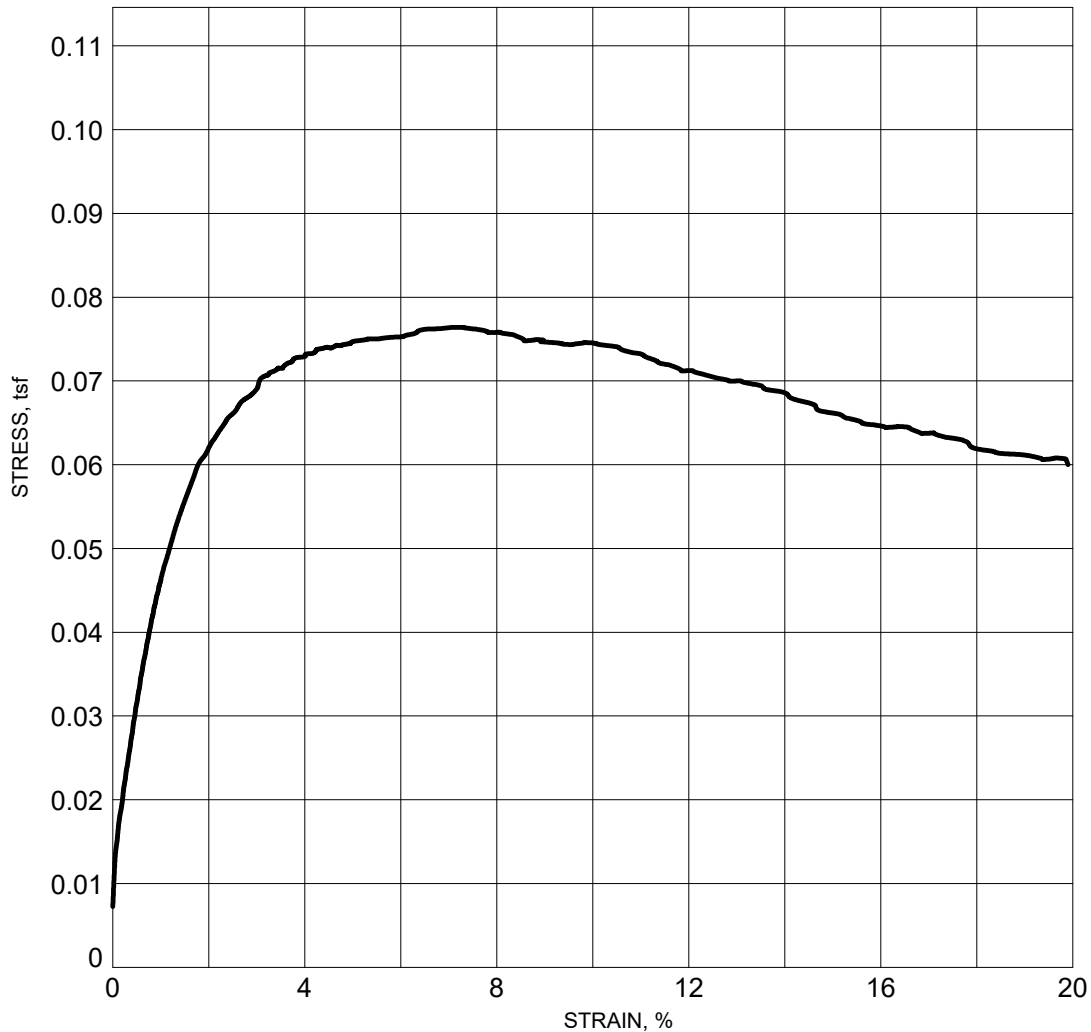
Tested By: SRT	Date Tested: 2/28/2020	UNCONSOLIDATED UNDRAINED COMPRESSION TEST ASTM D2850 Project No.: 18274-004-02	East Leeville Marsh Creation and Nourishment Lafourche Parish, Louisiana	
Reviewed By: Karen Allen	Date Reviewed: 3/4/2020			

Figure D-25



Boring ID B-51
 Depth (ft) 14-16
 Water Content, % 80.6
 Wet Density, pcf 93.7
 Dry Density, pcf 51.9
 Saturation, % 100.1
 Void Ratio 2.03
 Specimen Diameter 2.859
 Specimen Height 5.919
 Height/diameter ratio 2.07
 Deviator Stress, tsf 0.076
 Strain, % 7.3
 Confining Pressure (psi) 5.0

Multiple Shear




Failure Sketch

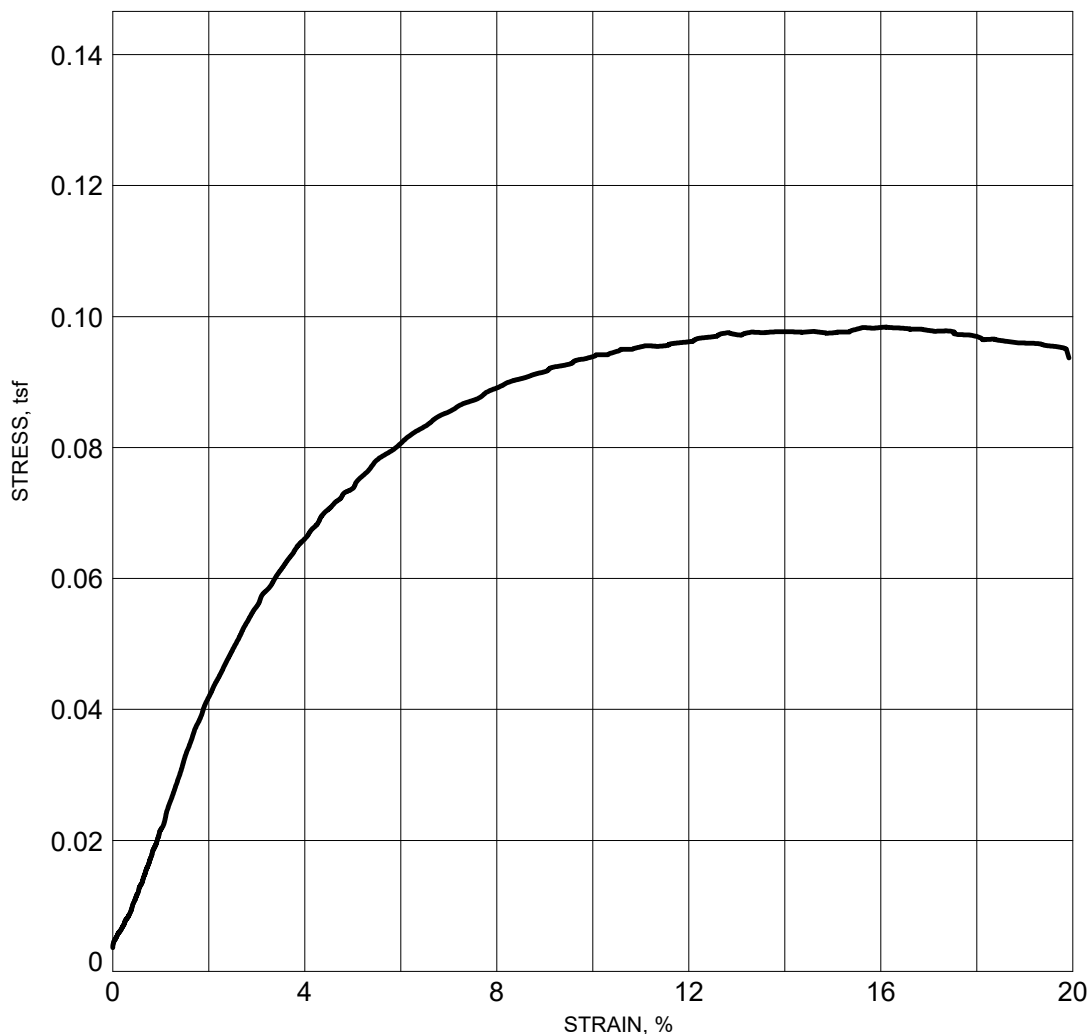
LL = PL = PI =

% 200= % Organic= Assumed Gs=2.52

Description: Very soft gray clay with silt lenses and shell fragments (CH)

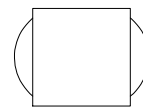
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Boring ID B-51
 Depth (ft) 18-20
 Water Content, % 31.7
 Wet Density, pcf 119.6
 Dry Density, pcf 90.8
 Saturation, % 99.9
 Void Ratio 0.86
 Specimen Diameter 2.890
 Specimen Height 5.746
 Height/diameter ratio 1.99
 Deviator Stress, tsf 0.098
 Strain, % 14.6
 Confining Pressure (psi) 6.0

Bulge



Failure Sketch

LL = PL = PI =

% 200= % Organic= Assumed Gs=2.7

Description: Very soft gray sandy clay with silt and shell fragments (CL)

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SRT

Date Tested:
2/28/2020

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ASTM D2850**

Project No.: 18274-004-02

East Leeville Marsh Creation and Nourishment

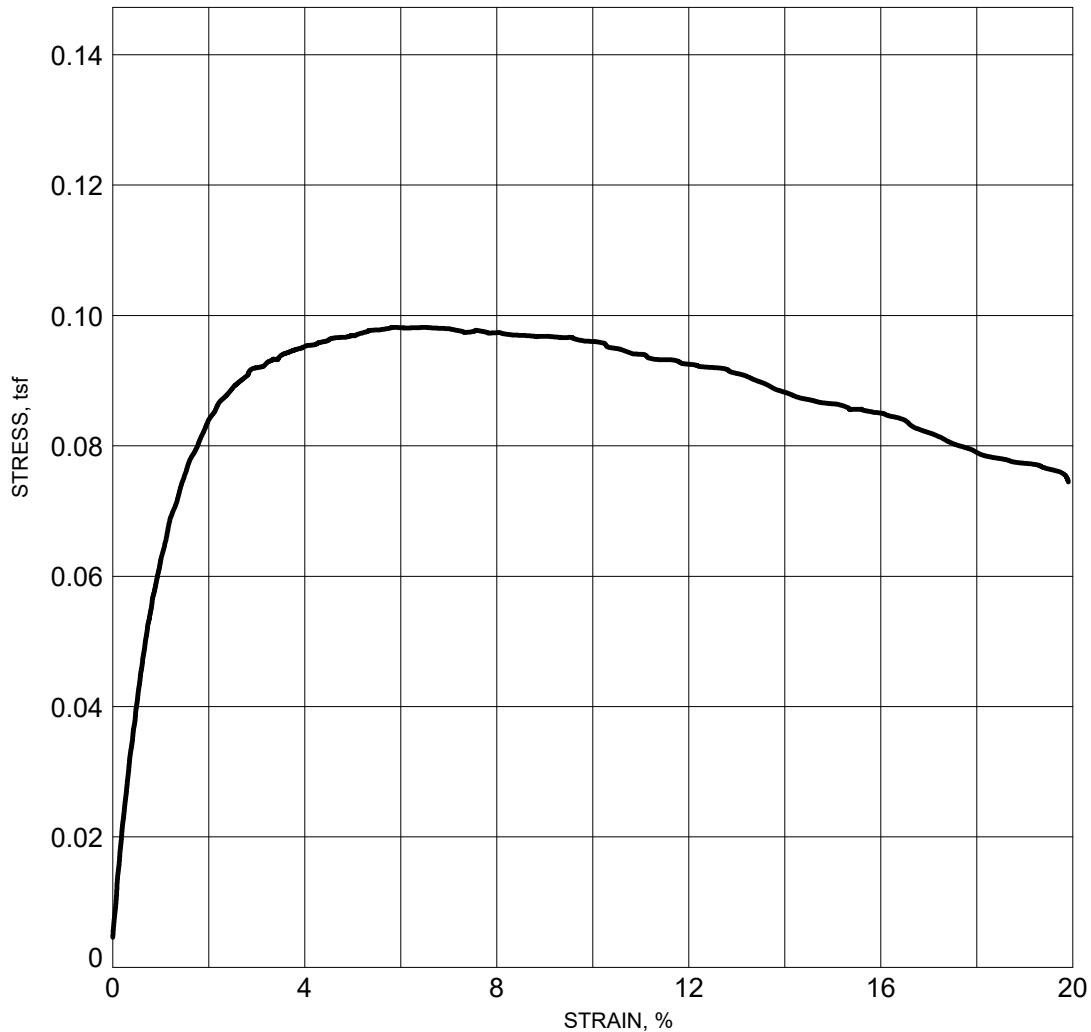
Lafourche Parish, Louisiana

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Karen Allen

Date Reviewed:
3/4/2020

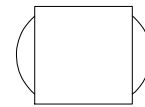
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Figure D-27



Boring ID B-52
 Depth (ft) 0-2
 Water Content, % 81.9
 Wet Density, pcf 94.5
 Dry Density, pcf 52.0
 Saturation, % 100.0
 Void Ratio 2.15
 Specimen Diameter 2.879
 Specimen Height 5.960
 Height/diameter ratio 2.07
 Deviator Stress, tsf 0.098
 Strain, % 5.8
 Confining Pressure (psi) 5.0

Bulge



Failure Sketch

LL = PL = PI =

% 200=

% Organic=

Assumed Gs=2.62

Description: Very soft dark gray clay with organic matter (CH)

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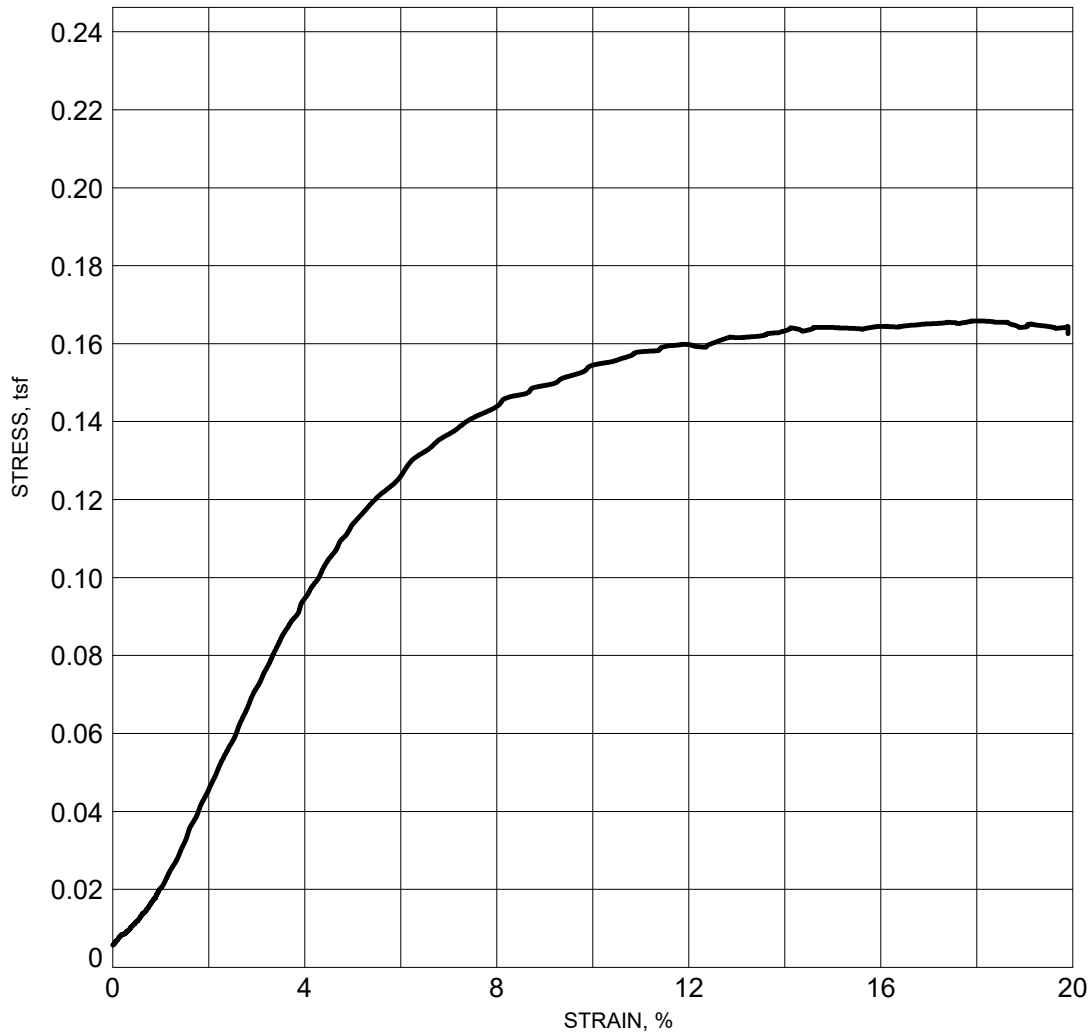
Lafourche Parish, Louisiana



Figure D-28

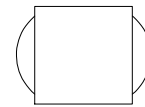
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Karen Allen

Date Reviewed:
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Boring ID B-52
 Depth (ft) 4-6
 Water Content, % 41.4
 Wet Density, pcf 112.2
 Dry Density, pcf 79.4
 Saturation, % 100.0
 Void Ratio 1.12
 Specimen Diameter 2.890
 Specimen Height 5.774
 Height/diameter ratio 2.00
 Deviator Stress, tsf 0.164
 Strain, % 14.6
 Confining Pressure (psi) 5.0

Bulge



Failure Sketch

LL = PL = PI =

% 200= % Organic= Assumed Gs=2.69

Description: Very soft gray clay with sand lenses and silt layers (CH)

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East Leeville Marsh Creation and Nourishment

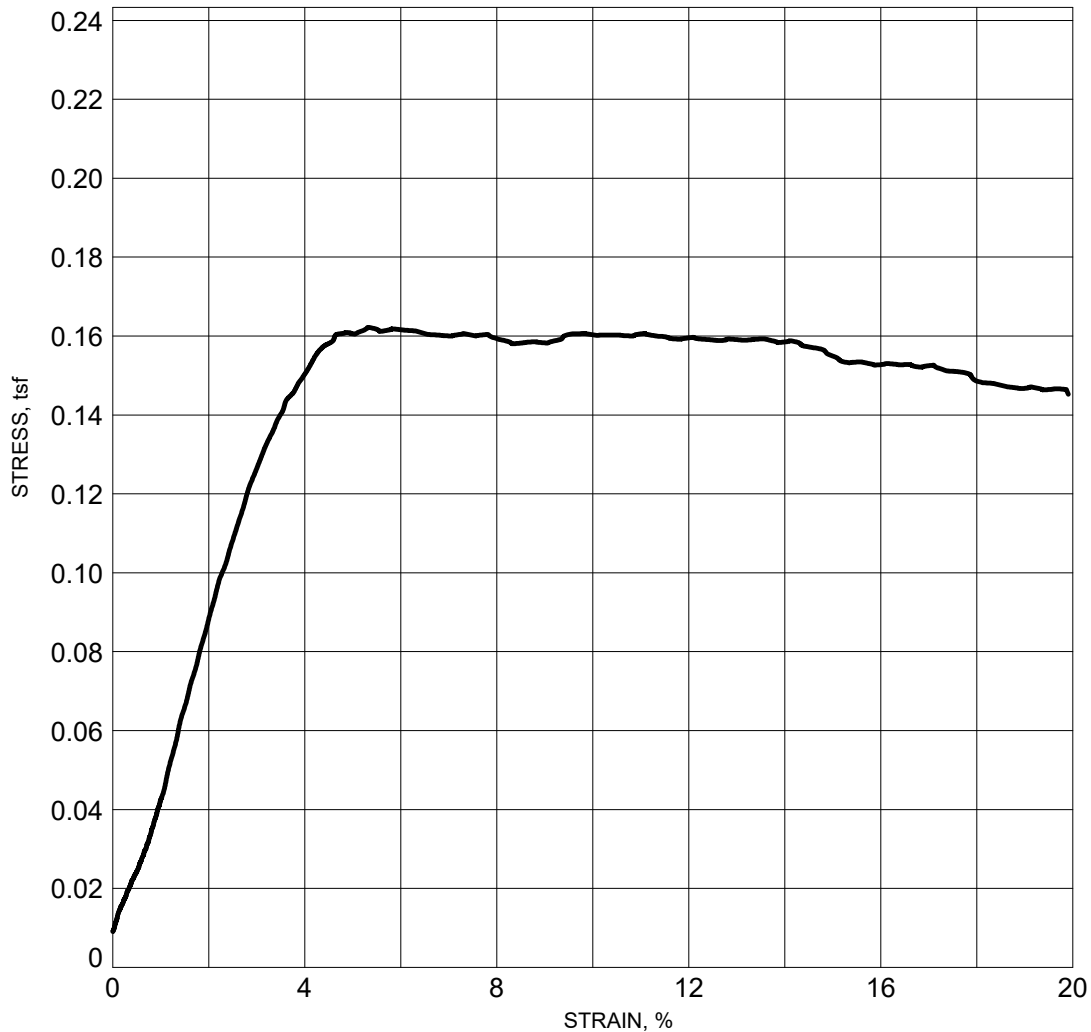
Lafourche Parish, Louisiana

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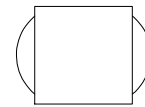
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Figure D-29



Boring ID B-52
 Depth (ft) 9-10
 Water Content, % 64.9
 Wet Density, pcf 104.2
 Dry Density, pcf 63.2
 Saturation, % 104.3
 Void Ratio 1.71
 Specimen Diameter 2.846
 Specimen Height 5.921
 Height/diameter ratio 2.08
 Deviator Stress, tsf 0.162
 Strain, % 5.3
 Confining Pressure (psi) 5.0

Bulge



Failure Sketch

LL = PL = PI =

% 200=

% Organic=

Assumed Gs=2.74

Description: Very soft gray clay with silt layers (CH)

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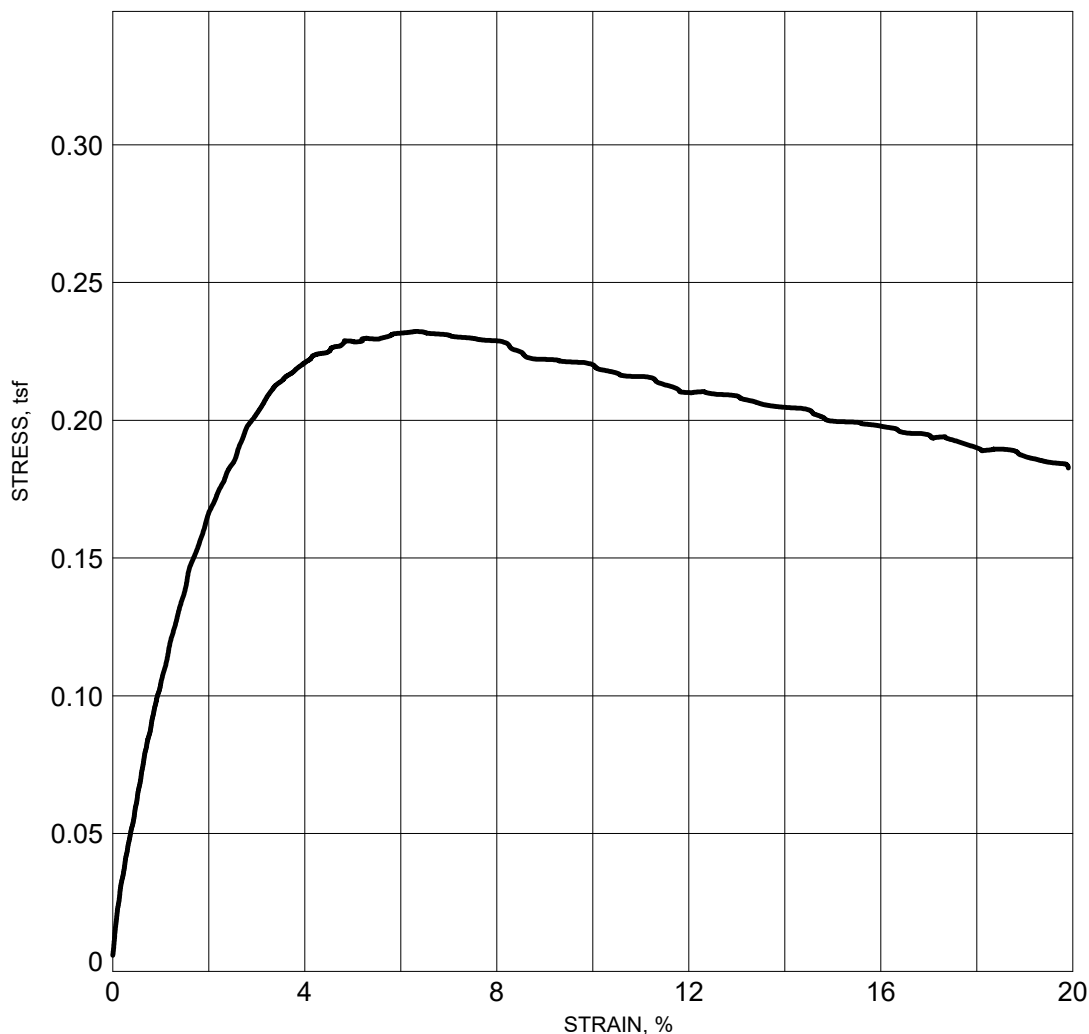
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Figure D-30



Boring ID B-52
 Depth (ft) 12-14
 Water Content, % 52.4
 Wet Density, pcf 98.5
 Dry Density, pcf 64.7
 Saturation, % 87.3
 Void Ratio 1.64
 Specimen Diameter 2.866
 Specimen Height 5.987
 Height/diameter ratio 2.09
 Deviator Stress, tsf 0.232
 Strain, % 6.3
 Confining Pressure (psi) 5.0

Multiple Shear



Failure Sketch

LL = 48 PL = 22 PI = 26

% 200= % Organic= Assumed Gs=2.74

Description: Very soft gray clay with silt, silt layers, and shell fragments (CL)

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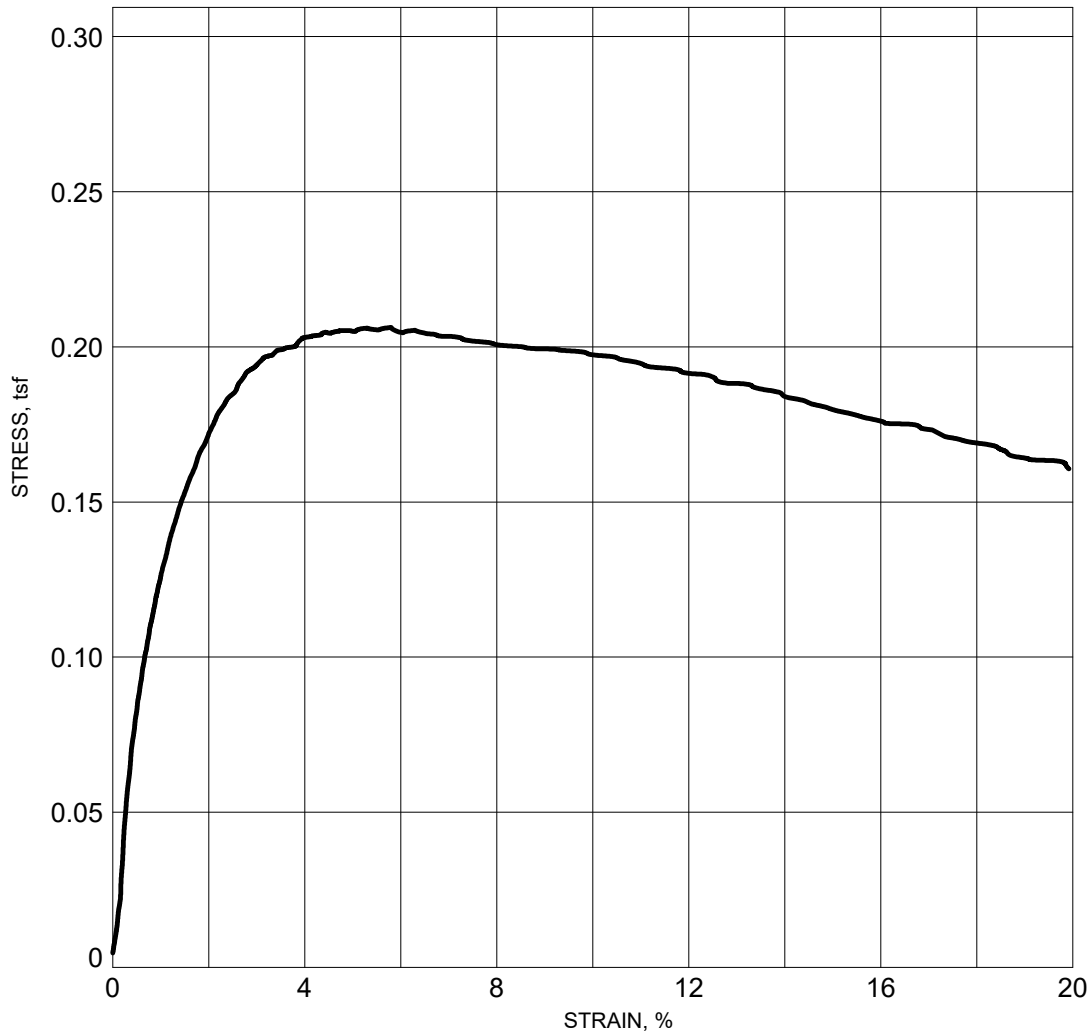
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East Leeville Marsh Creation and Nourishment
 Lafourche Parish, Louisiana



Figure D-31



Boring ID B-52
 Depth (ft) 16-18
 Water Content, % 69.9
 Wet Density, pcf 98.9
 Dry Density, pcf 58.2
 Saturation, % 100.0
 Void Ratio 1.87
 Specimen Diameter 2.847
 Specimen Height 5.986
 Height/diameter ratio 2.10
 Deviator Stress, tsf 0.206
 Strain, % 5.8
 Confining Pressure (psi) 6.0

Multiple Shear



Failure Sketch

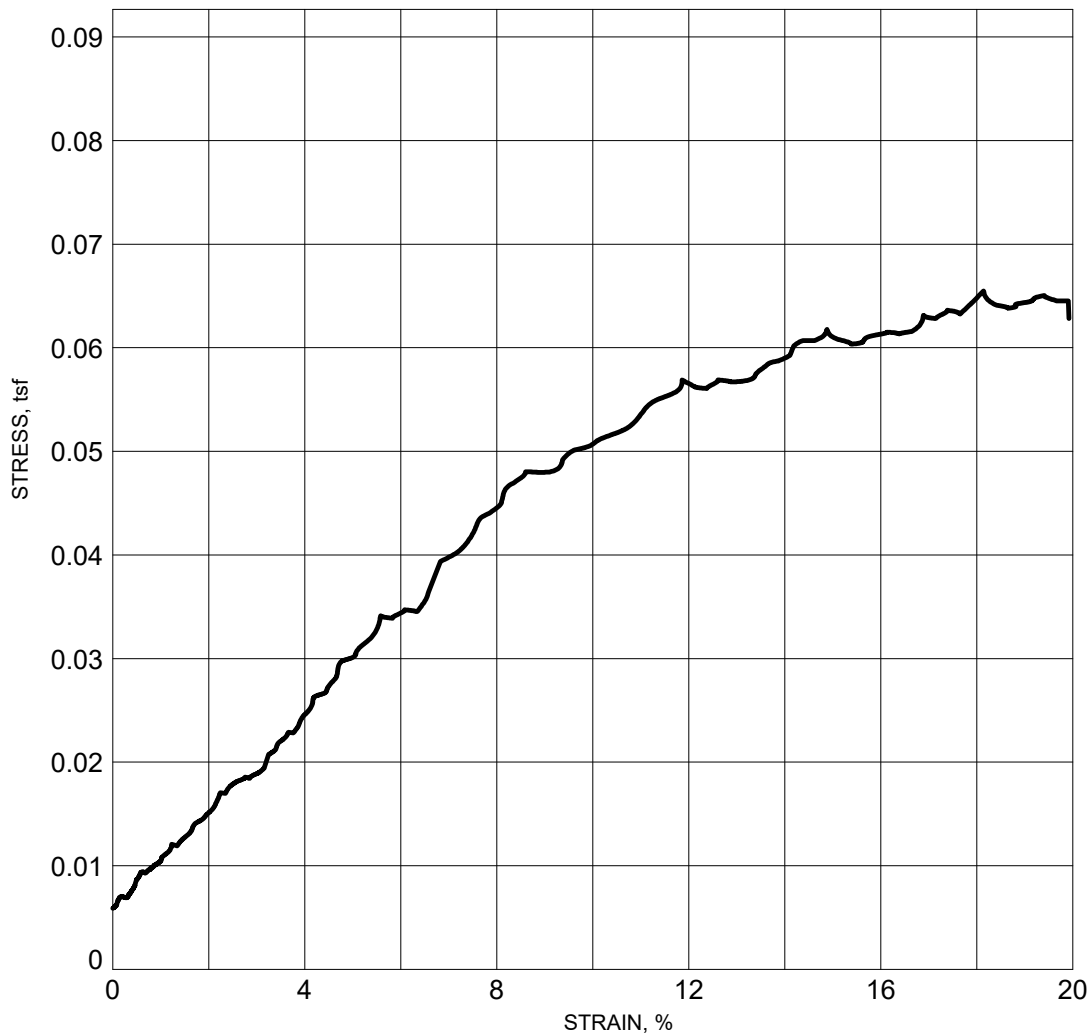
LL = PL = PI =

% 200= % Organic= Assumed Gs=2.68

Description: Very soft gray clay with silt pockets, trace sand, and shell fragments (CH)

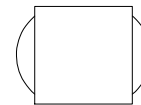
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Boring ID B-53
 Depth (ft) 4-6
 Water Content, % 37.3
 Wet Density, pcf 107.9
 Dry Density, pcf 78.6
 Saturation, % 86.9
 Void Ratio 1.18
 Specimen Diameter 2.847
 Specimen Height 5.999
 Height/diameter ratio 2.11
 Deviator Stress, tsf 0.062
 Strain, % 14.9
 Confining Pressure (psi) 5.0

Bulge



Failure Sketch

LL = PL = PI =

% 200= % Organic= Assumed Gs=2.74

Description: Very soft gray clay with sand and shell fragments (CL)

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East Leeville Marsh Creation and Nourishment

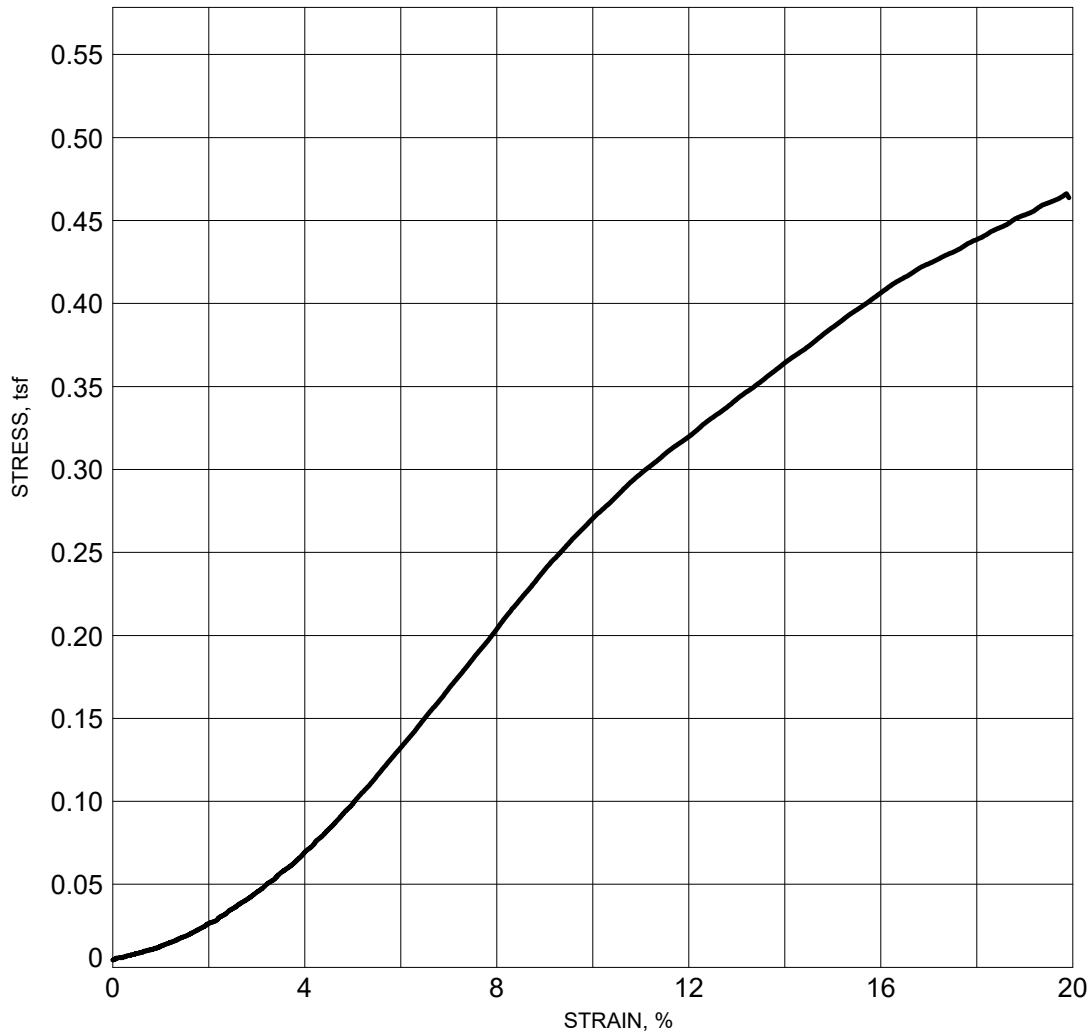
Lafourche Parish, Louisiana

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Karen Allen

Date Reviewed:
3/4/2020

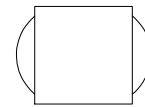
GEOENGINEERS

Figure D-33



Boring ID B-53
 Depth (ft) 6-8
 Water Content, % 35.9
 Wet Density, pcf 114.6
 Dry Density, pcf 84.4
 Saturation, % 95.8
 Void Ratio 1.03
 Specimen Diameter 2.852
 Specimen Height 5.998
 Height/diameter ratio 2.10
 Deviator Stress, tsf 0.386
 Strain, % 15.0
 Confining Pressure (psi) 5.0

Bulge



Failure Sketch

LL = NP

PL = NP

PI = NP

% 200=

% Organic=

Assumed Gs=2.74

Description: Gray sandy silt (ML)

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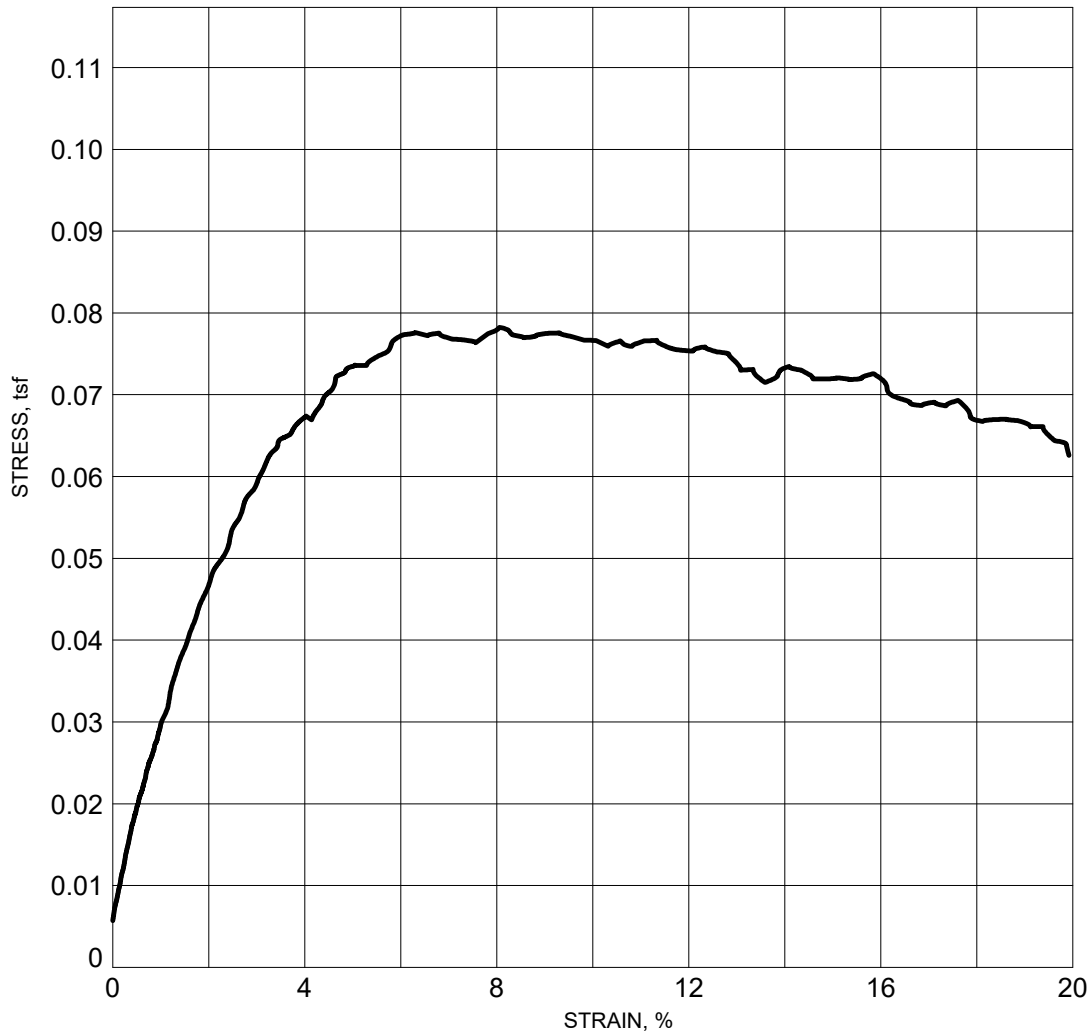
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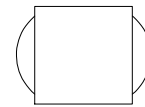
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Figure D-34



Boring ID B-53
 Depth (ft) 10-12
 Water Content, % 86.5
 Wet Density, pcf 97.8
 Dry Density, pcf 52.4
 Saturation, % 104.6
 Void Ratio 2.28
 Specimen Diameter 2.870
 Specimen Height 5.917
 Height/diameter ratio 2.06
 Deviator Stress, tsf 0.078
 Strain, % 8.1
 Confining Pressure (psi) 5.0

Bulge



Failure Sketch

LL = PL = PI =

% 200= % Organic= Assumed Gs=2.76

Description: Very soft gray clay with silt lenses and shell fragments (CH)

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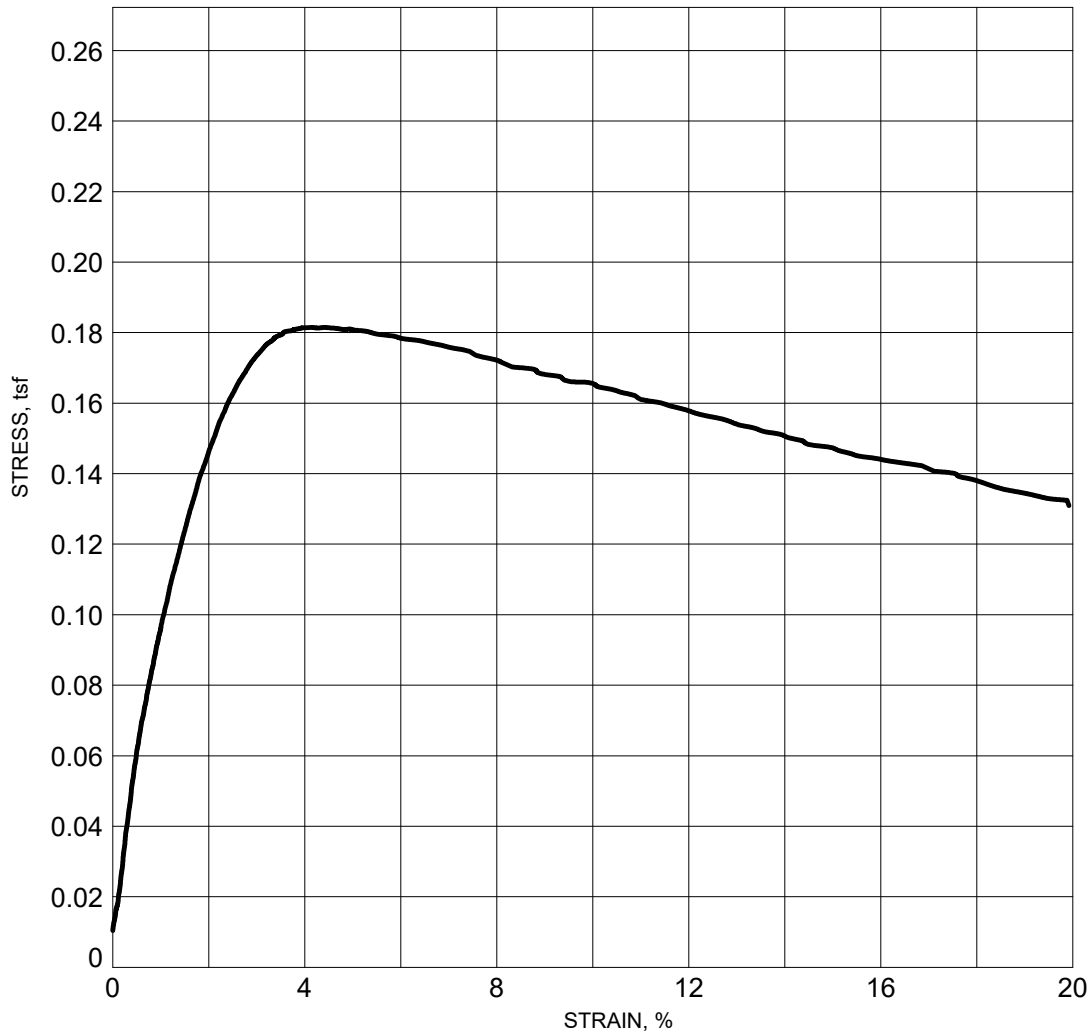
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Figure D-35



Boring ID B-53
 Depth (ft) 14-16
 Water Content, % 83.4
 Wet Density, pcf 96.2
 Dry Density, pcf 52.4
 Saturation, % 100.7
 Void Ratio 2.28
 Specimen Diameter 2.848
 Specimen Height 5.945
 Height/diameter ratio 2.09
 Deviator Stress, tsf 0.181
 Strain, % 4.4
 Confining Pressure (psi) 5.0

Multiple Shear



Failure Sketch

LL = PL = PI =

% 200= % Organic= Assumed Gs=2.76

Description: Very soft gray clay with silt lenses and shell fragments (CH)

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Date Tested:
2/29/2020

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Karen Allen

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3/4/2020

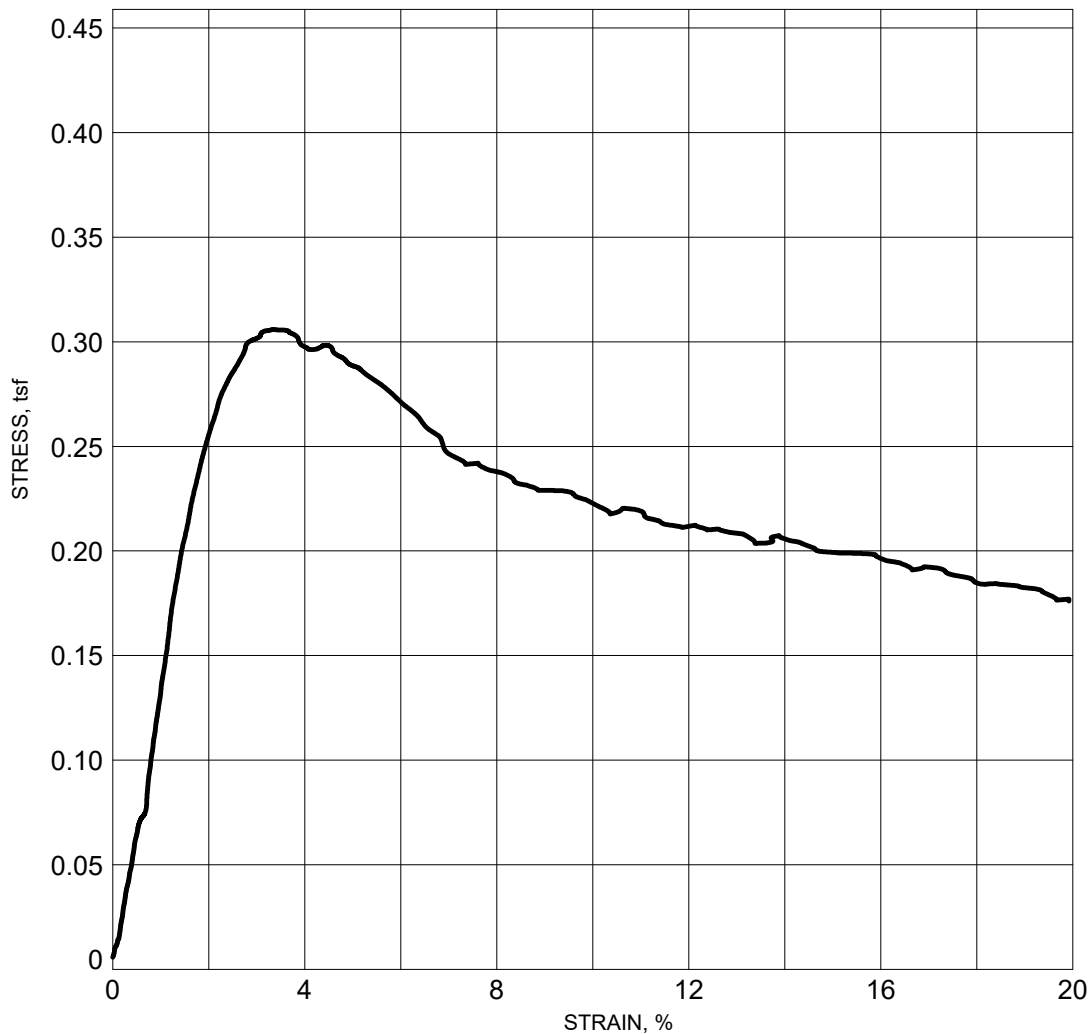
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 Project No.: 18274-004-02

East Leeville Marsh Creation and Nourishment

Lafourche Parish, Louisiana



Figure D-36



Boring ID B-53
 Depth (ft) 18-20
 Water Content, % 89.2
 Wet Density, pcf 93.8
 Dry Density, pcf 49.6
 Saturation, % 99.7
 Void Ratio 2.45
 Specimen Diameter 2.864
 Specimen Height 5.986
 Height/diameter ratio 2.09
 Deviator Stress, tsf 0.306
 Strain, % 3.4
 Confining Pressure (psi) 6.0

Multiple Shear



Failure Sketch

LL = 78 PL = 22 PI = 56

% 200= % Organic= Assumed Gs=2.74

Description: Soft gray clay with silt lenses, sand lenses, and shell fragments (CH)

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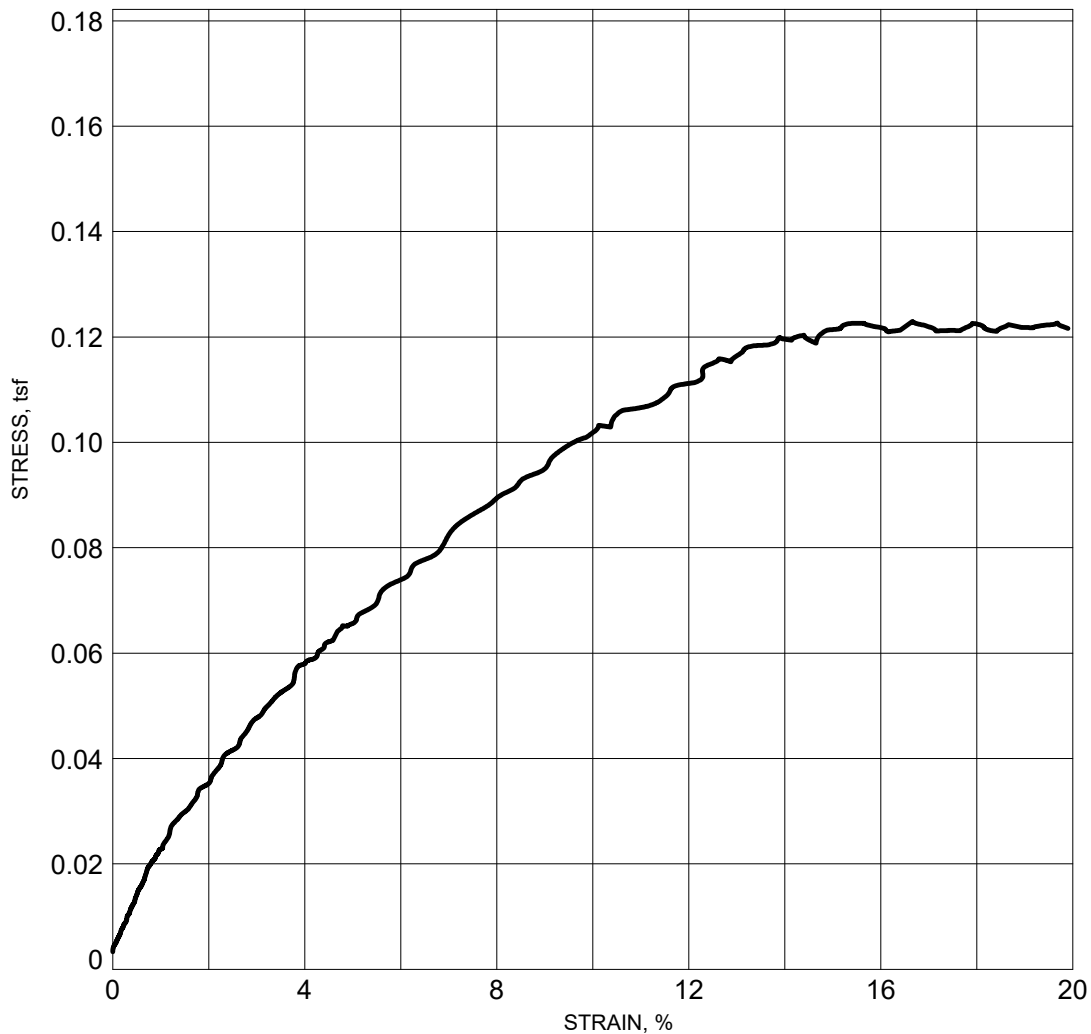
Lafourche Parish, Louisiana

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Karen Allen

Date Reviewed:
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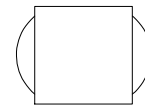
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Figure D-37



Boring ID B-54
 Depth (ft) 0-2
 Water Content, % 540.0
 Wet Density, pcf 63.1
 Dry Density, pcf 9.9
 Saturation, % 93.6
 Void Ratio 10.38
 Specimen Diameter 2.861
 Specimen Height 5.988
 Height/diameter ratio 2.09
 Deviator Stress, tsf 0.121
 Strain, % 15.0
 Confining Pressure (psi) 5.0

Bulge



Failure Sketch

LL = PL = PI =

% 200=

% Organic=

Assumed Gs=1.8

Description: Very soft black peat with shells (PT)

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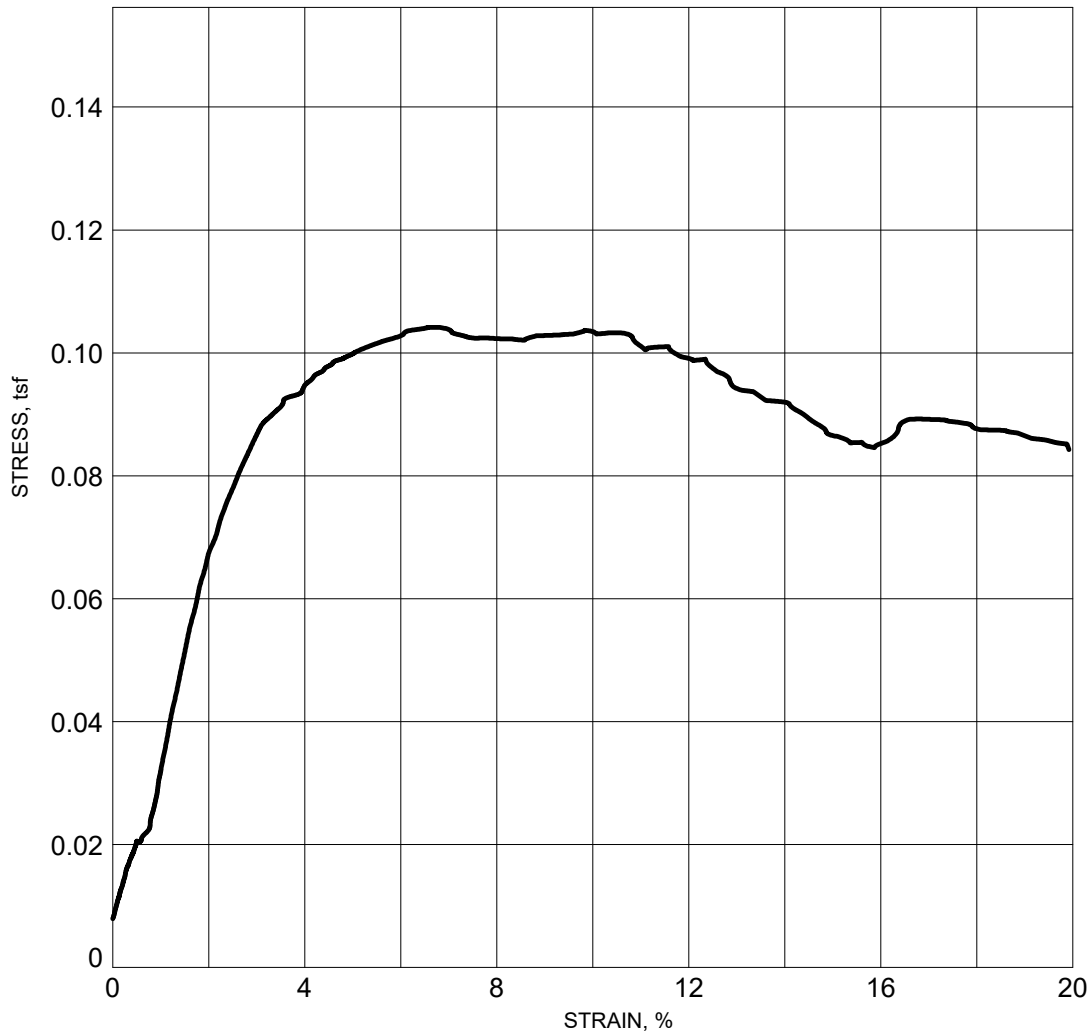
Lafourche Parish, Louisiana



Figure D-38

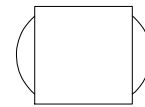
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Boring ID B-54
 Depth (ft) 4-6
 Water Content, % 47.5
 Wet Density, pcf 105.0
 Dry Density, pcf 71.1
 Saturation, % 96.5
 Void Ratio 1.28
 Specimen Diameter 2.878
 Specimen Height 5.880
 Height/diameter ratio 2.04
 Deviator Stress, tsf 0.104
 Strain, % 6.6
 Confining Pressure (psi) 5.0

Bulge



Failure Sketch

LL = 52 PL = 21 PI = 31

% 200= % Organic= Assumed Gs=2.6

Description: Very soft gray clay (CH)

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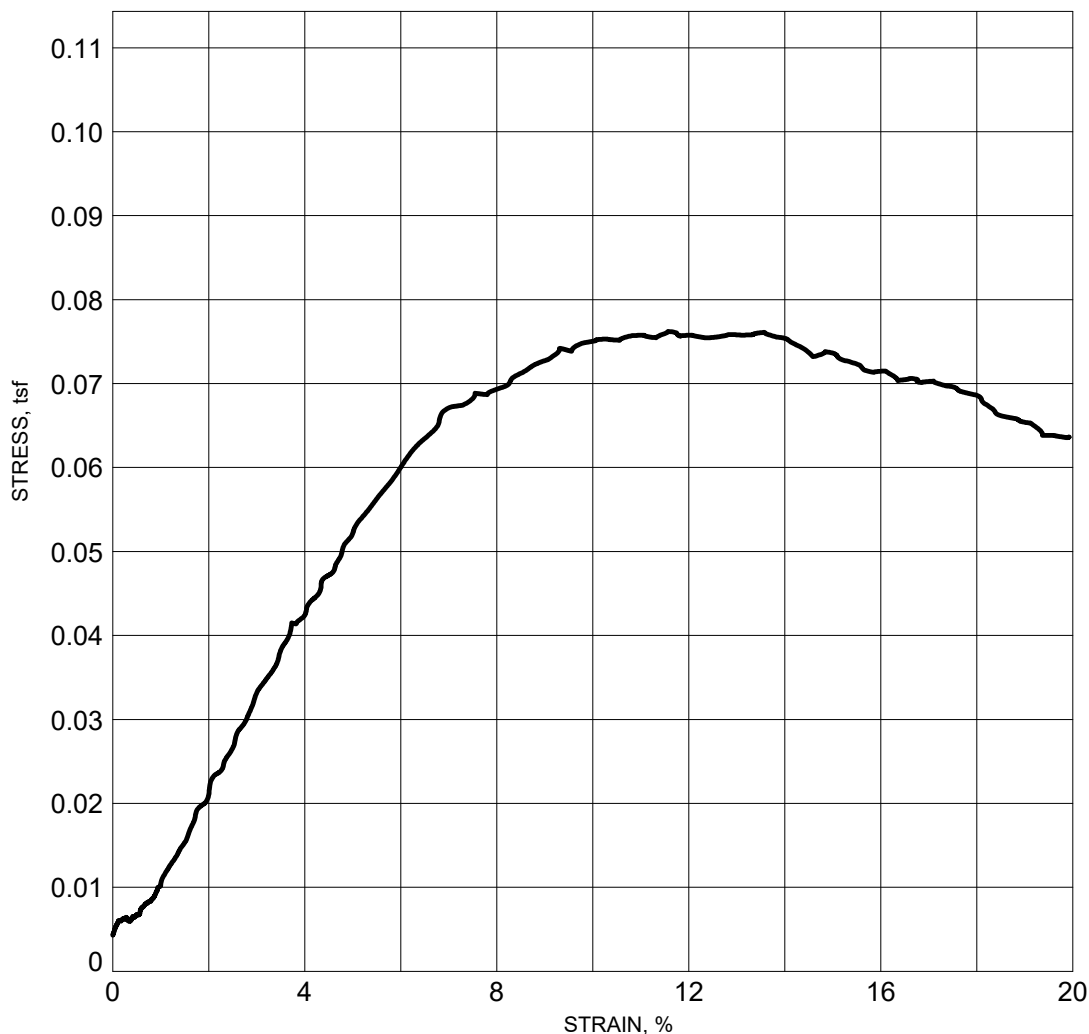
Lafourche Parish, Louisiana



Figure D-39

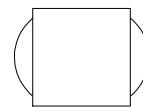
Reviewed By:
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Date Reviewed:
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Boring ID B-54
 Depth (ft) 8-10
 Water Content, % 46.4
 Wet Density, pcf 107.7
 Dry Density, pcf 73.5
 Saturation, % 100.0
 Void Ratio 1.21
 Specimen Diameter 2.891
 Specimen Height 5.723
 Height/diameter ratio 1.98
 Deviator Stress, tsf 0.076
 Strain, % 11.6
 Confining Pressure (psi) 5.0

Bulge



Failure Sketch

LL = PL = PI =

% 200=

% Organic=

Assumed Gs=2.6

Description: Very soft gray clay with silt layers and sand lenses (CH)

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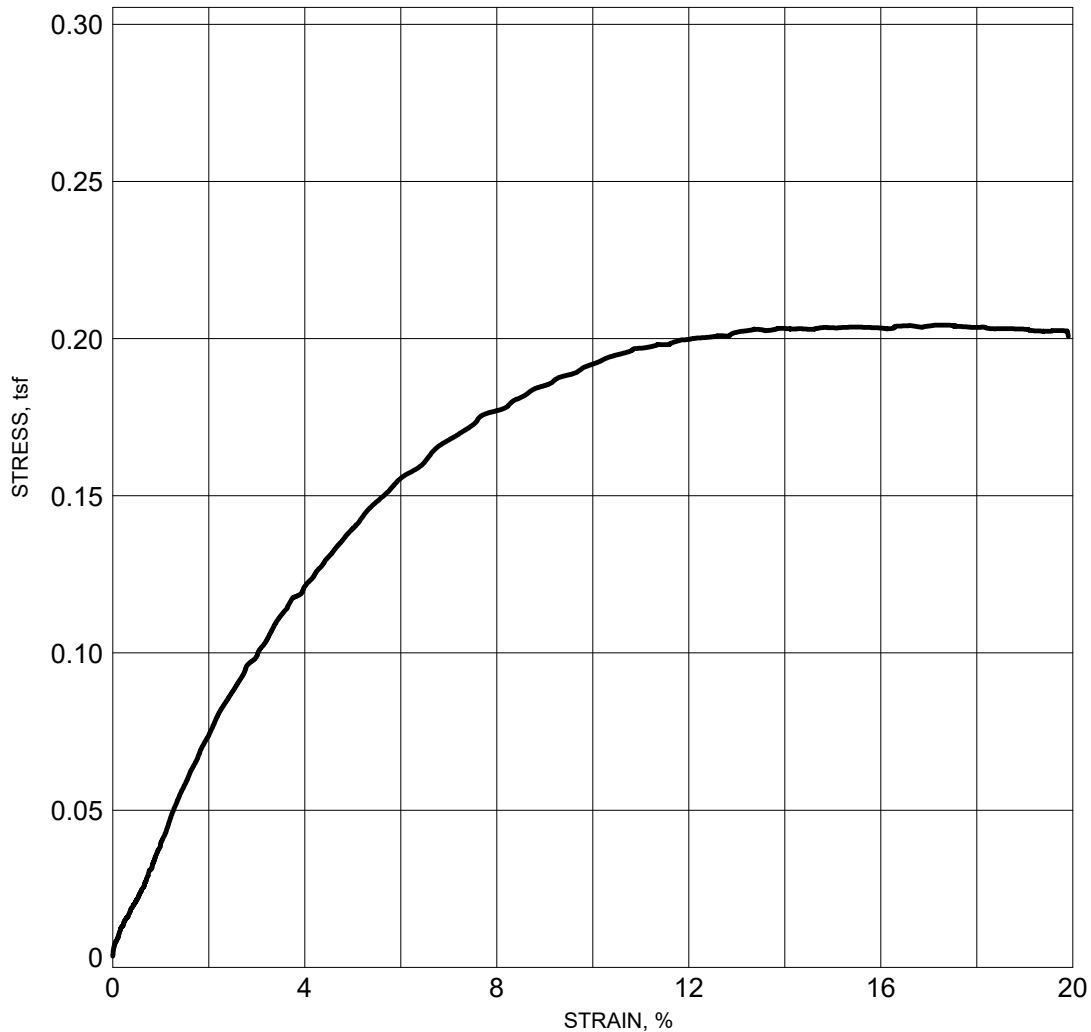
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COMPRESSION TEST
ASTM D2850**
 Project No.: 18274-004-02

East Leeville Marsh Creation and Nourishment
 Lafourche Parish, Louisiana

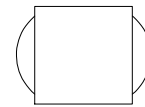


Figure D-40



Boring ID B-54
 Depth (ft) 12-14
 Water Content, % 37.9
 Wet Density, pcf 108.9
 Dry Density, pcf 79.0
 Saturation, % 93.5
 Void Ratio 1.05
 Specimen Diameter 2.885
 Specimen Height 5.788
 Height/diameter ratio 2.01
 Deviator Stress, tsf 0.204
 Strain, % 14.9
 Confining Pressure (psi) 5.0

Bulge



Failure Sketch

LL = 35 PL = 20 PI = 15

% 200= % Organic= Assumed Gs=2.6

Description: Very soft gray silty clay with sand lenses and shell fragments (CL)

Note: This report may not be reproduced, except in full, without written approval of GeoEngineers, Inc. Test results are applicable only to the specific sample on which they were performed, and should not be interpreted as representative of any other samples obtained at other times, depths or locations, or generated by separate operations or processes.

Tested By:
SRT

Date Tested:
3/1/2020

**UNCONSOLIDATED
UNDRAINED
COMPRESSION TEST
ASTM D2850**

Project No.: 18274-004-02

East Leeville Marsh Creation and Nourishment

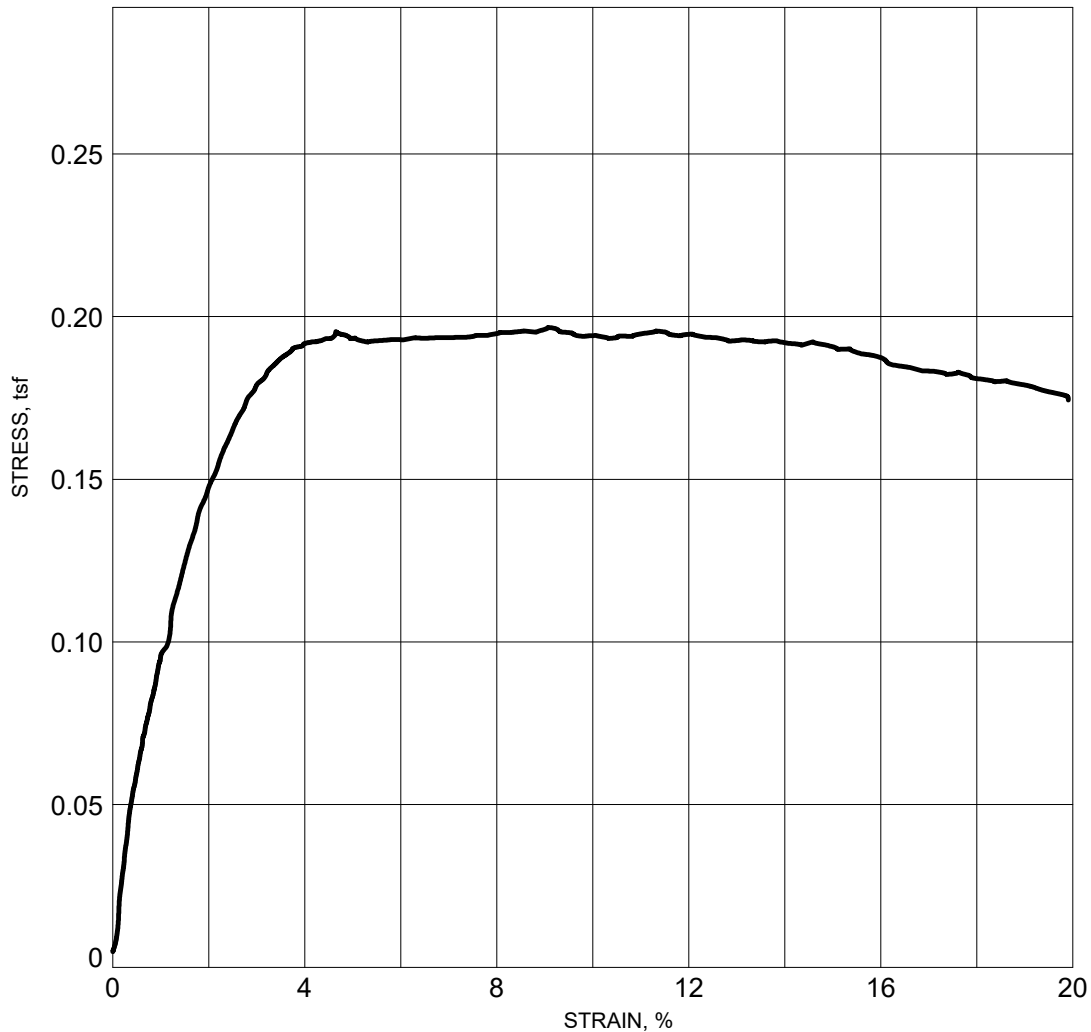
Lafourche Parish, Louisiana

Reviewed By:
Karen Allen

Date Reviewed:
3/4/2020

GEOENGINEERS 

Figure D-41



Boring ID	B-54
Depth (ft)	16-18
Water Content, %	67.0
Wet Density, pcf	101.2
Dry Density, pcf	60.6
Saturation, %	101.6
Void Ratio	1.78
Specimen Diameter	2.853
Specimen Height	5.947
Height/diameter ratio	2.08
Deviator Stress, tsf	0.197
Strain, %	9.1
Confining Pressure (psi)	6.0

Multiple Shear



Failure Sketch

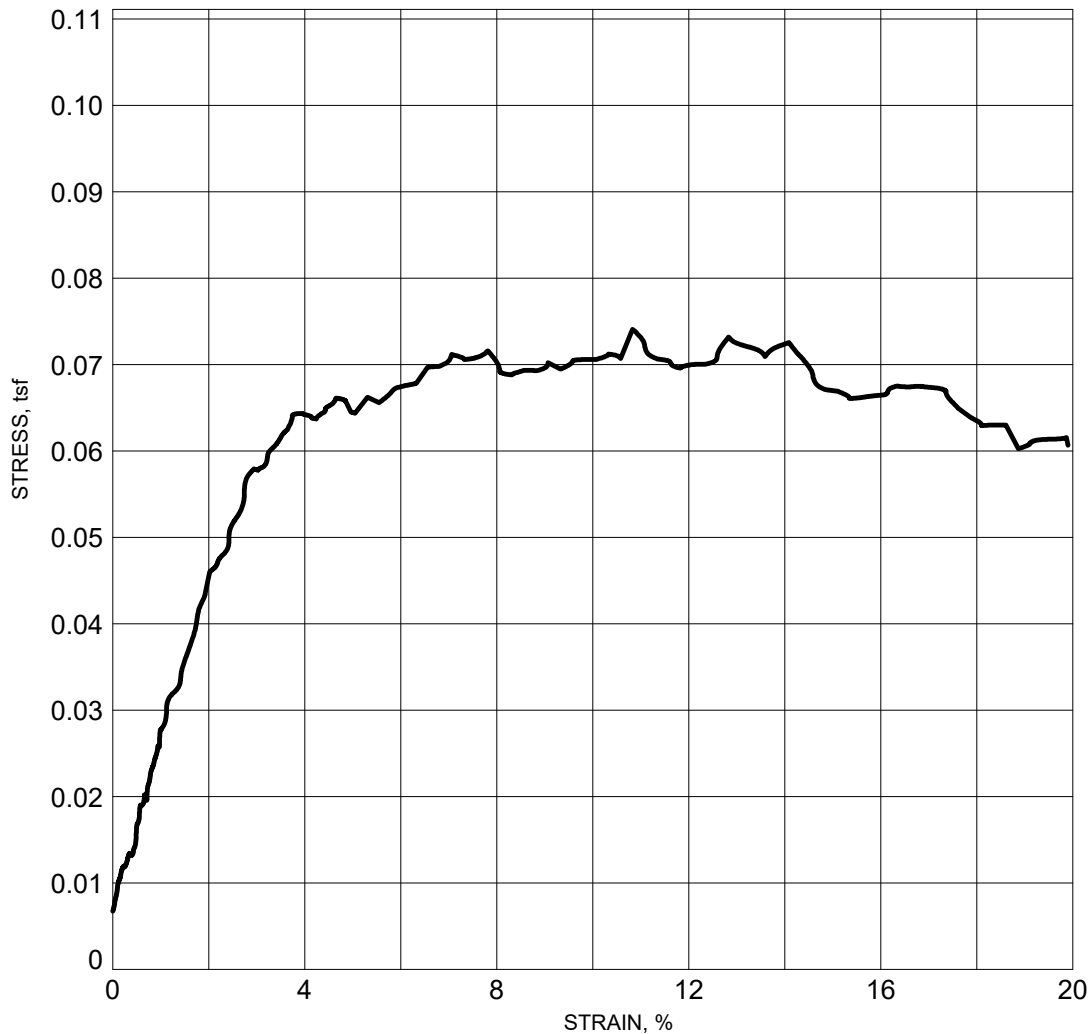
LL = PL = PI =

% 200= % Organic= Assumed Gs=2.7

Description: Very soft gray clay with silt lenses and shell fragments (CH)

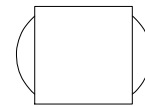
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Tested By: SRT	Date Tested: 3/1/2020	UNCONSOLIDATED UNDRAINED COMPRESSION TEST ASTM D2850 Project No.: 18274-004-02	East Leeville Marsh Creation and Nourishment Lafourche Parish, Louisiana	
Reviewed By: Karen Allen	Date Reviewed: 3/4/2020			Figure D-42



Boring ID B-55
 Depth (ft) 2-4
 Water Content, % 66.3
 Wet Density, pcf 100.5
 Dry Density, pcf 60.4
 Saturation, % 100.1
 Void Ratio 1.79
 Specimen Diameter 2.829
 Specimen Height 5.885
 Height/diameter ratio 2.08
 Deviator Stress, tsf 0.074
 Strain, % 10.8
 Confining Pressure (psi) 5.0

Bulge



Failure Sketch

LL = PL = PI =

% 200=

% Organic=

Assumed Gs=2.7

Description: Very soft gray clay with organic matter (CH)

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Tested By:
SRT

Date Tested:
3/2/2020

Reviewed By:
Karen Allen

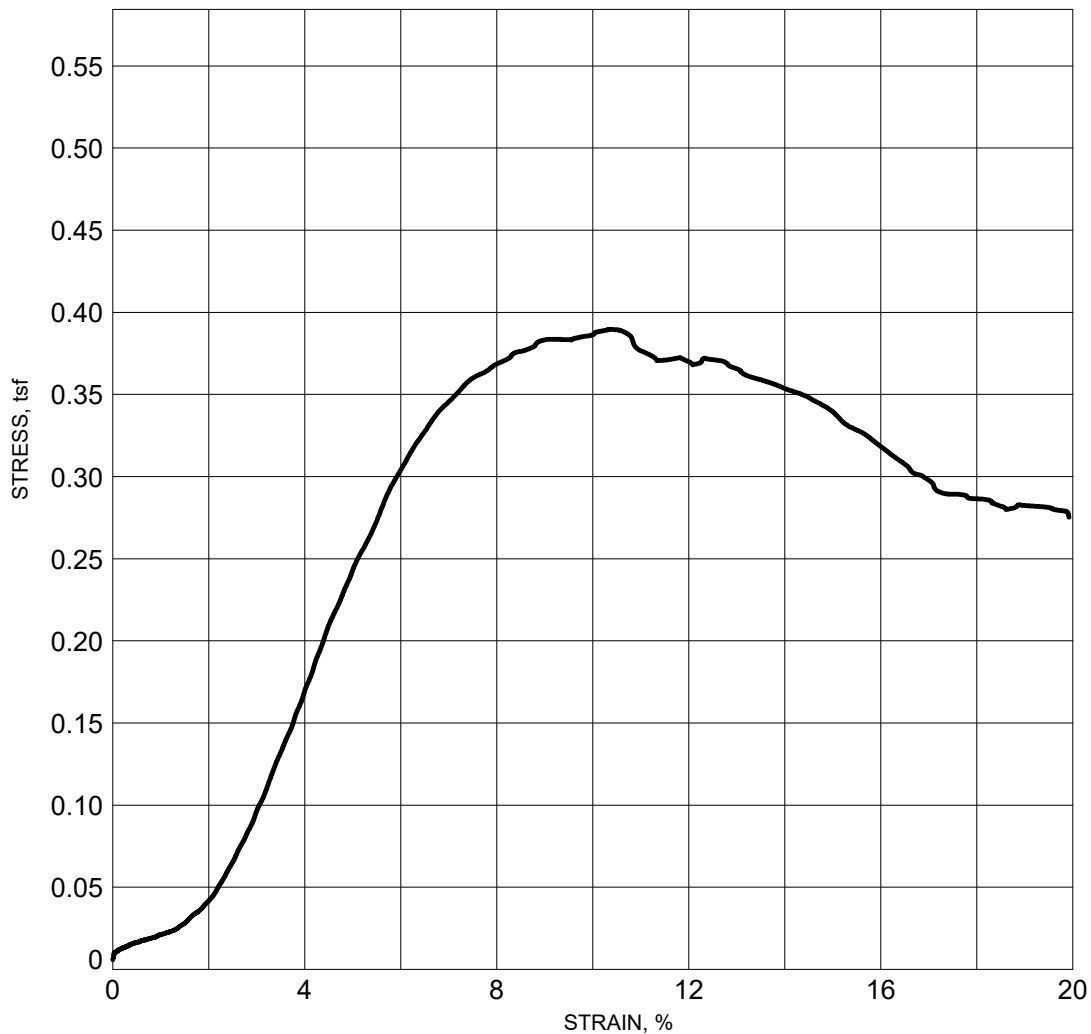
Date Reviewed:
3/4/2020

**UNCONSOLIDATED
UNDRAINED
COMPRESSION TEST
ASTM D2850**
 Project No.: 18274-004-02

East Leeville Marsh Creation and Nourishment
 Lafourche Parish, Louisiana

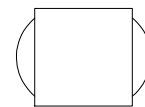


Figure D-43



Boring ID B-55
 Depth (ft) 7-8
 Water Content, % 35.4
 Wet Density, pcf 116.9
 Dry Density, pcf 86.3
 Saturation, % 100.1
 Void Ratio 0.96
 Specimen Diameter 2.835
 Specimen Height 5.711
 Height/diameter ratio 2.01
 Deviator Stress, tsf 0.390
 Strain, % 10.3
 Confining Pressure (psi) 5.0

Bulge



Failure Sketch

LL = PL = PI =

% 200=

% Organic=

Assumed Gs=2.71

Description: Soft gray silty clay with sand (CL)

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Tested By:
SRT

Date Tested:
3/2/2020

**UNCONSOLIDATED
UNDRAINED
COMPRESSION TEST
ASTM D2850**

Project No.: 18274-004-02

East Leeville Marsh Creation and Nourishment

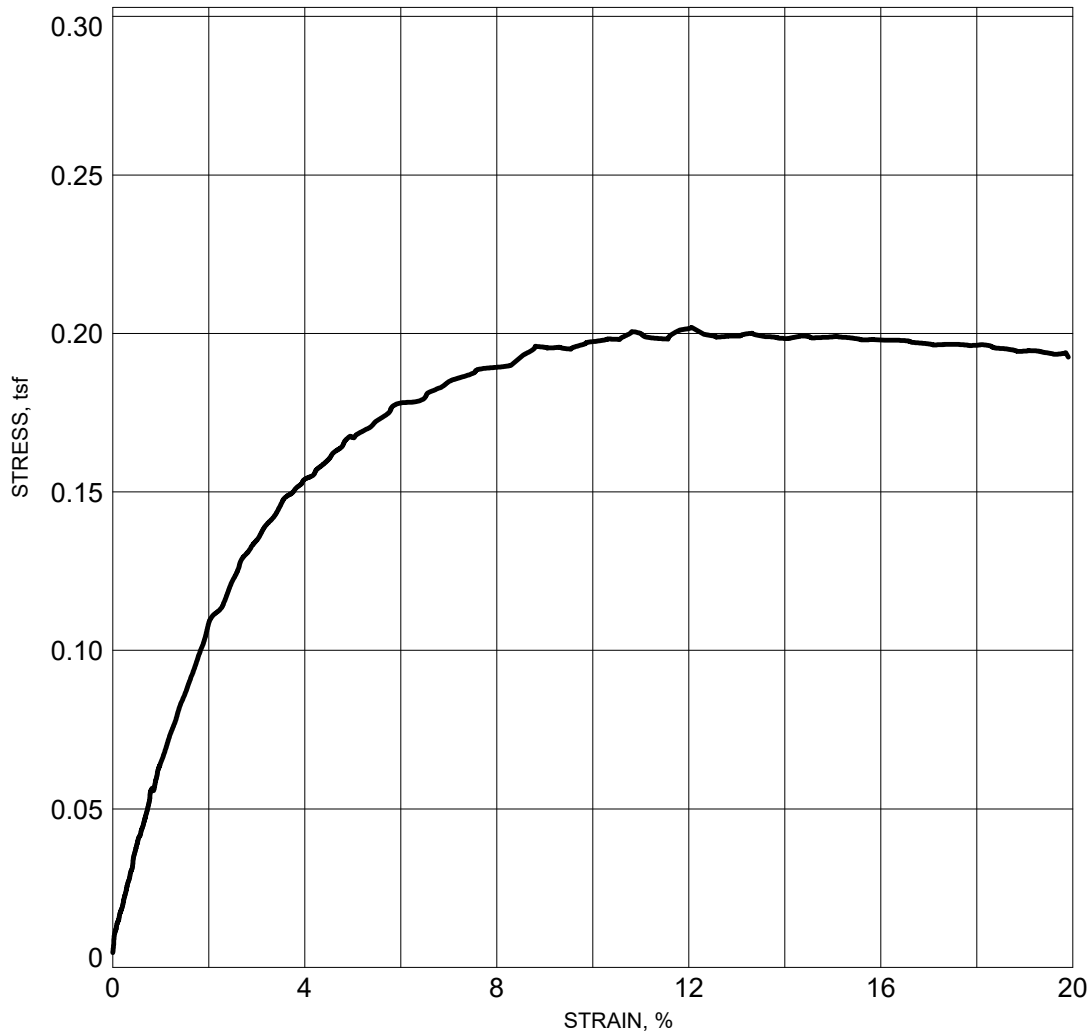
Lafourche Parish, Louisiana



Figure D-44

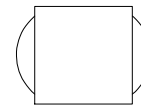
Reviewed By:
Karen Allen

Date Reviewed:
3/4/2020



Boring ID B-55
 Depth (ft) 10-12
 Water Content, % 49.0
 Wet Density, pcf 108.4
 Dry Density, pcf 72.8
 Saturation, % 100.0
 Void Ratio 1.33
 Specimen Diameter 2.871
 Specimen Height 5.958
 Height/diameter ratio 2.08
 Deviator Stress, tsf 0.202
 Strain, % 12.1
 Confining Pressure (psi) 5.0

Bulge



Failure Sketch

LL = 40 PL = 19 PI = 21

% 200=

% Organic=

Assumed Gs=2.72

Description: Very soft gray silty clay with shell fragments (CL)

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Tested By:
SRT

Date Tested:
3/2/2020

Reviewed By:
Karen Allen

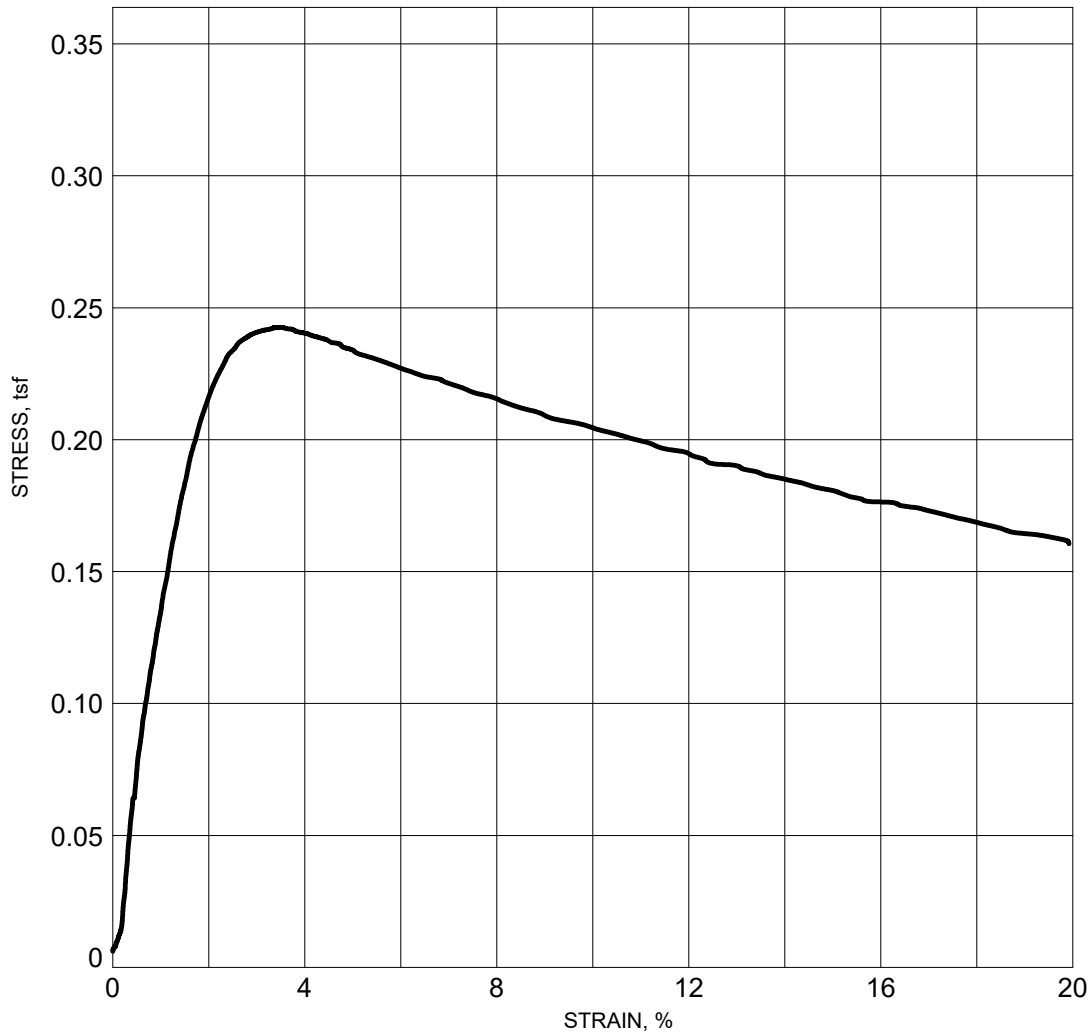
Date Reviewed:
3/4/2020

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COMPRESSION TEST
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 Project No.: 18274-004-02

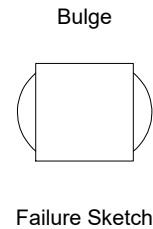
East Leeville Marsh Creation and Nourishment
 Lafourche Parish, Louisiana



Figure D-45



Boring ID B-55
 Depth (ft) 14-16
 Water Content, % 67.7
 Wet Density, pcf 99.3
 Dry Density, pcf 59.2
 Saturation, % 100.1
 Void Ratio 1.79
 Specimen Diameter 2.855
 Specimen Height 5.973
 Height/diameter ratio 2.09
 Deviator Stress, tsf 0.243
 Strain, % 3.6
 Confining Pressure (psi) 5.0



LL = PL = PI =

% 200= % Organic= Assumed Gs=2.65

Description: Very soft gray clay with shell fragments (CH)

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Tested By:
SRT

Date Tested:
3/2/2020

Reviewed By:
Karen Allen

Date Reviewed:
3/4/2020

**UNCONSOLIDATED
UNDRAINED
COMPRESSION TEST
ASTM D2850**
 Project No.: 18274-004-02

East Leeville Marsh Creation and Nourishment
 Lafourche Parish, Louisiana



Figure D-46

APPENDIX D

LABORATORY TESTING RESULTS

This appendix provides additional information regarding the laboratory testing completed on soil boring samples obtained from the marsh creation areas for the East Leeville Marsh Creation and Nourishment (BA-194) project located in Lafourche Parish, Louisiana.

General

Soil samples obtained from the explorations were transported to our soil mechanics laboratory in Baton Rouge, Louisiana, and examined to confirm or modify field classifications. Representative soil samples were selected for laboratory testing consisting of moisture content determinations, organic content determinations, Atterberg Limits tests, sieve analyses, and unconsolidated undrained triaxial tests. The laboratory testing procedures are discussed in more detail below.

Moisture Content

Moisture content tests were completed for representative samples in general accordance with ASTM D2216. The results of these tests are presented on the logs at the respective sample depths.

Organic Content

Organic content tests were completed for representative samples in general accordance with ASTM D2974. The results of these tests are presented on the logs at the respective sample depths.

Atterberg Limits

Atterberg Limits tests were performed on selected fine-grained soil samples in general accordance with ASTM D4318. The tests were used to classify the soil as well as to evaluate its index properties. The results of the Atterberg Limits testing are shown on the logs at the respective sample depths.

Grain Size Analysis

Sieve analyses were performed on selected samples in general accordance with ASTM D422, ASTM D1140, ASTM D6913. The results of these analyses were plotted and classified in general accordance with the Unified Soil Classification System (USCS) and are included with this appendix. The percentage passing the U.S. No. 200 sieve is shown on the boring logs at the respective sample depths.

Unconsolidated Undrained Triaxial Compression Tests

Unconsolidated undrained (UU) triaxial compression tests were performed on selected cohesive soil samples obtained from the borings. The tests were used to evaluate shear strength characteristics and were completed in general accordance with ASTM D2850. The results of the testing are presented on the logs at their respective sample depths.

APPENDIX E

Report Limitations and Guidelines for Use

APPENDIX E

REPORT LIMITATIONS AND GUIDELINES FOR USE

This appendix provides information to help you manage your risks with respect to the use of this report.

Geotechnical Services Are Performed for Specific Purposes, Persons and Projects

This report addendum has been prepared exclusively for the East Leeville Marsh Creation and Nourishment (BA-194) project in Lafourche Parish, Louisiana as requested by the Coastal Protection and Restoration Authority and Baird, Inc. The information contained herein is not applicable to other sites.

GeoEngineers, Inc. (GeoEngineers) structures our services to meet the specific needs of our clients. No party other than CPRA and Baird may rely on the product of our services unless we agree to such reliance in advance and in writing. This is to provide our firm with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions. Within the limitations of scope, schedule and budget, our services have been executed in accordance with our Agreement with the Client and generally accepted geotechnical practices in this area at the time this report was prepared. Use of this report is not recommended for any purpose or project except the one originally contemplated.

A Geotechnical Engineering or Geologic Report Is Based on a Unique Set of Project-Specific Factors

This addendum report has been prepared for the East Leeville Marsh Creation and Nourishment (BA-194) project located in Lafourche Parish, Louisiana. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, it is important not to rely on this report if it was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

For example, changes that can affect the applicability of this report include those that affect:

- the function of the proposed structure;
- elevation, configuration, location, orientation or weight of the proposed structure;
- composition of the design team; or
- project ownership.

If important changes are made after the date of this report, we recommend that GeoEngineers be given the opportunity to review our interpretations and recommendations. Based on that review, we can provide written modifications or confirmation, as appropriate.

Subsurface Conditions Can Change

This geotechnical or geologic report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by man-made events

such as construction on or adjacent to the site, or by natural events such as hurricanes, floods, earthquakes, slope instability or groundwater fluctuations. If more than a few months have passed since issuance of our report or work product, or if any of the described events may have occurred, please contact GeoEngineers before applying this report for its intended purpose so that we may evaluate whether changed conditions affect the continued reliability or applicability of our conclusions and recommendations.

Most Geotechnical and Geologic Findings Are Professional Opinions

Our interpretations of subsurface conditions are based on field observations from widely spaced sampling locations at the site. Site exploration identifies the specific subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied our professional judgment to render an informed opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ, sometimes significantly, from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

Do Not Redraw the Exploration Logs

Geotechnical engineers and geologists prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. The logs included in a geotechnical engineering or geologic report should never be redrawn for inclusion in architectural or other design drawings. Photographic or electronic reproduction is acceptable, but separating logs from the report can create a risk of misinterpretation.

Give Contractors a Complete Report and Guidance

To help prevent costly problems associated with unanticipated subsurface conditions, we recommend giving contractors the complete geotechnical engineering or geologic report but preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report's accuracy is limited. In addition, encourage them to confer with GeoEngineers and/or to conduct additional study to obtain the specific types of information they need or prefer.

Contractors Are Responsible for Site Safety on Their Own Construction Projects

Our geotechnical recommendations are not intended to direct the contractor's procedures, methods, schedule or management of the work site. The contractor is solely responsible for job site safety and for managing construction operations to minimize risks to on-site personnel and adjacent properties.

Read These Provisions Closely

It is important to recognize that the geoscience practices (geotechnical engineering, geology and environmental science) are less exact than other engineering and natural science disciplines. Without this understanding, there may be expectations that could lead to disappointments, claims and disputes. GeoEngineers includes these explanatory "limitations" provisions in our reports to help reduce such risks. Please confer with GeoEngineers if you need to know more how these "Report Limitations and Guidelines for Use" apply to your project or site.

Biological Pollutants

GeoEngineers' Scope of Work specifically excludes the investigation, detection, prevention or assessment of the presence of Biological Pollutants. Accordingly, this report does not include any interpretations, recommendations, findings or conclusions regarding the detecting, assessing, preventing or abating of Biological Pollutants, and no conclusions or inferences should be drawn regarding Biological Pollutants as they may relate to this project. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria and viruses, and/or any of their byproducts.

A Client that desires these specialized services is advised to obtain them from a consultant who offers services in this specialized field.

