State of Louisiana

JOHN BEL EDWARDS
GOVERNOR

REQUEST FOR INFORMATION (RFI)
ARTIFICIAL REEF PRODUCT INFORMATION

RFI NO. 2503-19-04

ADDENDUM 1

MARCH 28, 2019

The Coastal Protection and Restoration Authority of Louisiana (CPRA) shall reserve the right to modify the RFI should a change be identified that is in the best interest of the State of Louisiana.

Respondents shall acknowledge this addendum, and any other addendum issued, on the enclosed Addendum Acknowledgement Form or in the transmittal letter included with the submittal.

Questions and Answers

1) Discussed at the Friday meeting was providing the power point presentation given on March 15th? Will that be posted soon?

   RESPONSE: The presentation is attached.

2) The RFI document states under General Background and Information - 3.1 Survey Data (Page 2) ”nearshore elevations range from -2.0 to -6.0 ft NAVD88…”, but also indicates certain evaluations should be performed with a mudline at -3.0 ft. NAVD88. Should all calculations be performed with the -3.0 ft. mudline as the basis, or is a separate design requested for a mudline of a different elevation? (i.e. -5.0ft NAVD88)?

   RESPONSE: All calculations should be performed assuming a depth of -3.0 ft NAVD88. As per 6.0 EVALUATION CRITERIA AND METHODOLOGY, 3.b from the RFI, if the product configuration exceeds allowable bearing capacities at -3.0 ft NAVD88, product manufacturer may submit calculations for an alternate elevation. If an alternate elevation is proposed, the hydrodynamic modeling will be performed at the alternate elevation.

3) During the March 15th meeting, indication was given that a Marine Mattress foundation was anticipated. As this will have consequences on the bearing capacity and cost of the product, does CPRA require a Marine Mattress foundation? If so, which mattress product should be used for the design, and can CPRA please provide the specifications for said mattress? If it is not required, does CPRA expect separate with mattress and without mattress designs be provided for each product alternative?”

   RESPONSE: A marine mattress is not currently considered as a foundation below any product configuration. The marine mattress discussion was for a sloped revetment configuration free of any additional products. The presentation mentioned that a geocomposite (geogrid and geotextile stitched together) is anticipated to be placed under the products to distribute the weight across the length and width of the breakwater.

4) Will PO-146 monitoring data be available to be utilized for this project?

RESPONSE: Monitoring data will not be made available.

5) Once the products have been selected for construction, will there be one large contract for the entire project or multiple contracts?

RESPONSE: As per 17.0 POST-RFI COORDINATION of the RFI, one construction contract is anticipated to be awarded, although this may be altered as design and funding evaluations progress.

6) How will the manufacturer be required to verify their capacities of production to CPRA and contractor based on potential volumes expected with the project? Secondly, will there be a stated Notice to Proceed for manufacturing individually that allows for the addition of contract days?

RESPONSE: At this time, the submittal for the RFI does not require verification of capacity of production. It is currently anticipated that two NTPs will be provided to the construction contractor: 1) to begin product manufacturing, and 2) to mobilize to the project site, although this may be altered as design and funding evaluations progress.

7) Section 2 on Breakwater Bearing Pressure Calculations: I understand these calculations to be based solely on the product itself without any type of geogrid being considered at this point?

RESPONSE: A geocomposite (geogrid and geotextile stitched together) is anticipated to be placed under the products to distribute the weight over the footprint of the breakwater. Calculations submitted should assume the geocomposite is placed beneath their proposed products.

8) Will the design engineers be calculating these bearing pressures with geogrid or is that something product manufacturer needs to provide, given the acceptable loads are between 350-450 PSF?

RESPONSE: The design engineers will be performing a check of bearing pressures provided by the manufacturers. Product manufacturers shall perform their own bearing pressure calculations.

9) Estimated elevation of marsh substrate shoreward of the breakwater?

RESPONSE: Elevations of the upland marsh varies from approximately +1.5 ft NAVD88 to +2.0 ft NAVD88.

10) Critical to the engineering of the Reefmaker System is the surface friction of our piling. We would like to request geotechnical boring logs for the project. If not boring logs are available, we would request the engineer's assessment of the substrate bearing capacity from top of the substrate to a level of 100 feet.

RESPONSE: See attached boring logs.

11) Since our product is supported by a piling, additional geotechnical information is useful in recommending a configuration for the project site. Can you provide lateral and axial pile capacity curves for 12" timber and 12" steel piles?

RESPONSE: Lateral and axial pile capacity curves have not been performed for the project. See attached boring logs.

12) Can you provide a soil boring (or multiple soil borings) that is representative of the proposed breakwater locations?

RESPONSE: See attached boring logs.

13) Will the fluids dynamic numeric model that is to be used for the evaluation of products for the stated RFI be the same as the model used for the demonstration project and to generate the report, "Living Shoreline Demonstration Project –Coastal Engineering and Alternatives Analysis," by Carter et al., Coastal & Harbor Engineering, Inc. (October 9, 2014)?

RESPONSE: The commercial computational fluid dynamics (CFD) software FLOW-3D (FlowScience) will be used for the evaluation products for the RFI. This is the same CFD software used in the stated report, although certain details of the model setup and forcing conditions have changed.

14) Has the model been calibrated and/or modified since the 2014 report for all products that are currently on the demonstration site shoreline as installed? If not, please state reasoning.

RESPONSE: The model was re-calibrated and validated using measured gauge data.

15) Please illustrate the accuracy of the model for all products used on the demonstration project.

RESPONSE: Modeled transmitted wave heights for a discrete subsample of wave conditions were found to have a relative error between +/- 30% with a median error of only 2.5%. While modeled transmission of discrete waves is a good indication of model accuracy, a more important metric would be the long-term simulation of cumulative wave power. The model results were found to have a relative error in cumulative transmitted wave power of, on average, 34%, with a persistent positive bias (meaning model results over-estimate cumulative transmitted wave power). There are several contributing factors to these errors including (1) short-crestedness of measured wave data, (2) angle correction of measured incident waves, (3) non-uniformity in structure fabrication and layout, and (4) variations in bathymetry from model. Finally, the ultimate goal of the project is to reduce shoreline retreat. The PO-148 project design goal was to reduce shoreline retreat by 50%. Measured shoreline retreat rates for the first year after construction of PO-148 have reduced by 36% to 64%, or 49.8% on average across the project shoreline. This information and understanding of model performance was used to develop the performance requirements for wave transmission stated in 5.0 EVALUATION CRITERIA AND METHODOLOGY of the RFI.

16) Will wave transmission coefficients obtained by physical laboratory modeling be given more weight than wave transmission results obtained by numerical simulation?

RESPONSE: The evaluation was developed to ensure all product configurations submitted are evaluated under the conditions anticipated at the project site. Physical modeling results may be submitted as supplementary information, but will not take the place of the evaluation specified. If physical modeling data submitted as supplementary information conflicts with results of the specified evaluation, the physical modeling data

may be considered, at the discretion of CPRA, in the event that the physical modeling is performed using the specified scenarios and in the product configuration specified in the submittal. However, no modification to the evaluation process is considered at this time.

17) Will only the wave transmission coefficients obtained by numerical modeling be used to estimate shoreline response or will coefficients obtained by physical modeling be considered as well?

RESPONSE: The evaluation for this RFI only includes wave transmission coefficients. See response to Question 16.

ATTACHMENTS:

1. Addendum Acknowledgement Form
2. Pre-Submittal Meeting Presentation
3. Pre-Submittal Meeting Sign In Sheet
4. Boring Logs

State of Louisiana

JOHN BEL EDWARDS
GOVERNOR

REQUEST FOR INFORMATION (RFI)
ARTIFICIAL REEF PRODUCT INFORMATION

RFI NO. 2503-19-04

ADDENDUM ACKNOWLEDGEMENT FORM

Respondent acknowledges receipt of the following Addenda:

Addendum Number	Dated

Product Manufacturer: _____

Printed Name:_ _____

Signature: _____

Request for Information (RFI)
Artificial Reef Product Information

RFI No. 2503-19-04

1. Introduction

- CPRA conducting engineering and design activities for PO-0174 Biloxi Marsh Living Shoreline Project
- Primary goal
  - Reduce shoreline recession rates
  - Enhance local oyster production

  - Marsh-fringing artificial reef breakwaters
  - Self-sustaining living breakwaters

1. Introduction

- RFI intends to solicit information from artificial reef product manufacturers
- Objective: Develop list of approved equivalent product configurations
- CPRA will use information received through RFI, supplemented with engineering analyses, to evaluate product configurations to determine applicability for use at Project site
- Evaluation criteria specified within RFI and discussed later
- All products must be able to be installed by third-party contractor

1. Introduction

- Product configurations that meet requirements will be placed on a Preliminary List of Approved Equivalent Products
- Coordination will be required Post-RFI process
- RFI is exclusive to this Project.
- Only submittals that meet specified requirements will be considered.
- Failure to be selected will not preclude manufacturer from participating in other CPRA projects.
- RFI process is intended to be inclusive.
- No incumbents.

2. Location


Biloxi Marsh Living Shoreline (U.S. District LA-01)
Morgan Harbor
Treasure Bay
Bayou la Loutre
Lake Eloi
ST BERNARD PARISH
Eloi Bay
14 miles of shoreline
9 to 11 miles of breakwater
Arkansas
Mississippi
Louisiana
Texas
0 0.5 1 Miles
N
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

2. Location

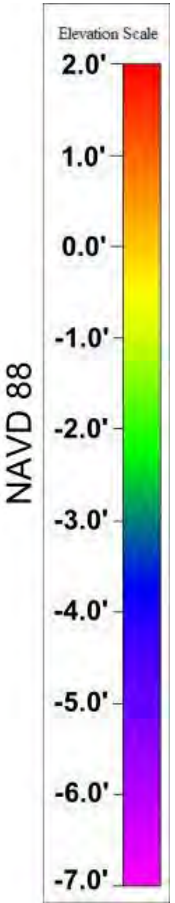
3. General Background and Information

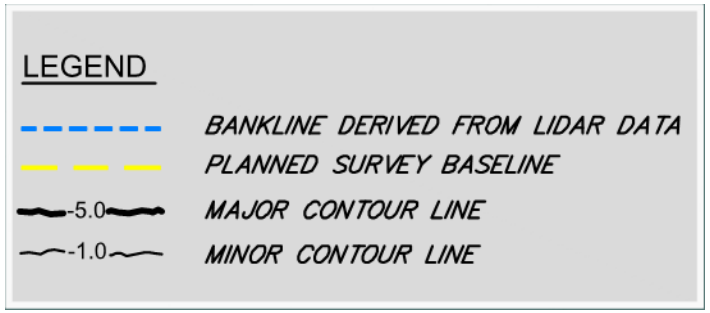
- Artificial reef products are anticipated to be installed along the shoreline in continuous breakwater segments
- No longer than 1,000 feet
- No wider than 35 feet
- Gaps between breakwater segments between will be 100 to 500 feet
- Breakwaters may be positioned landward/seaward to provide gap protection
- Landward toe anticipated to be at -3.0 ft NAVD88, but may vary between -2.0 and -6.0 ft NAVD88

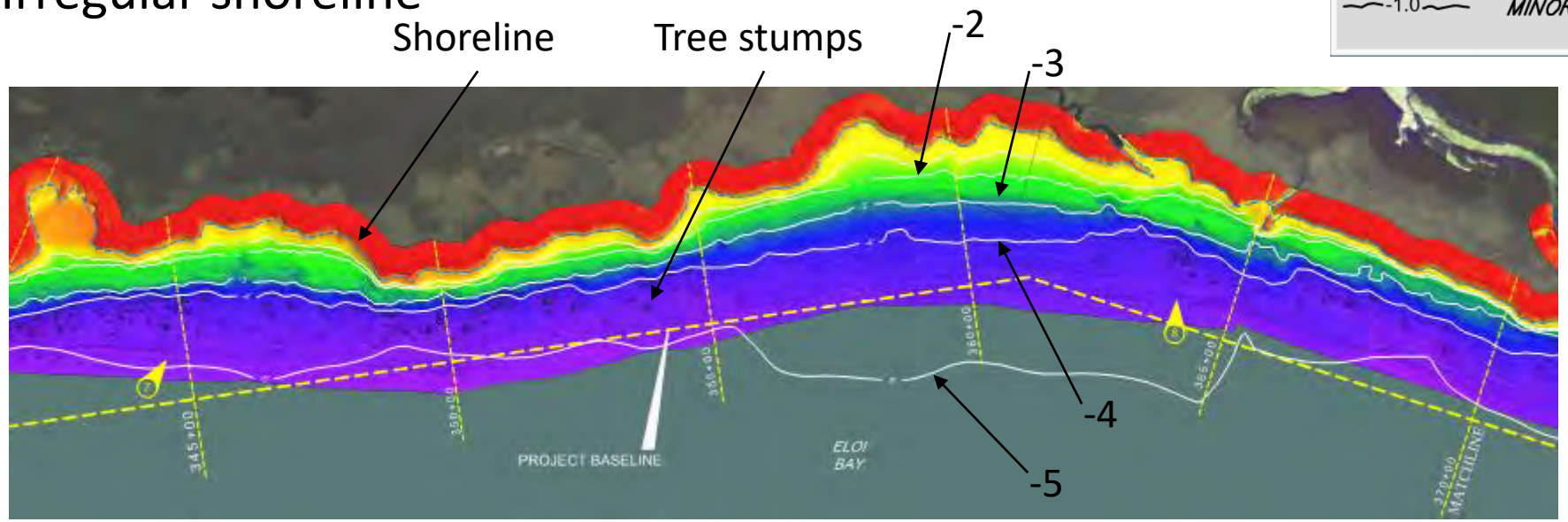
3. General Background and Information

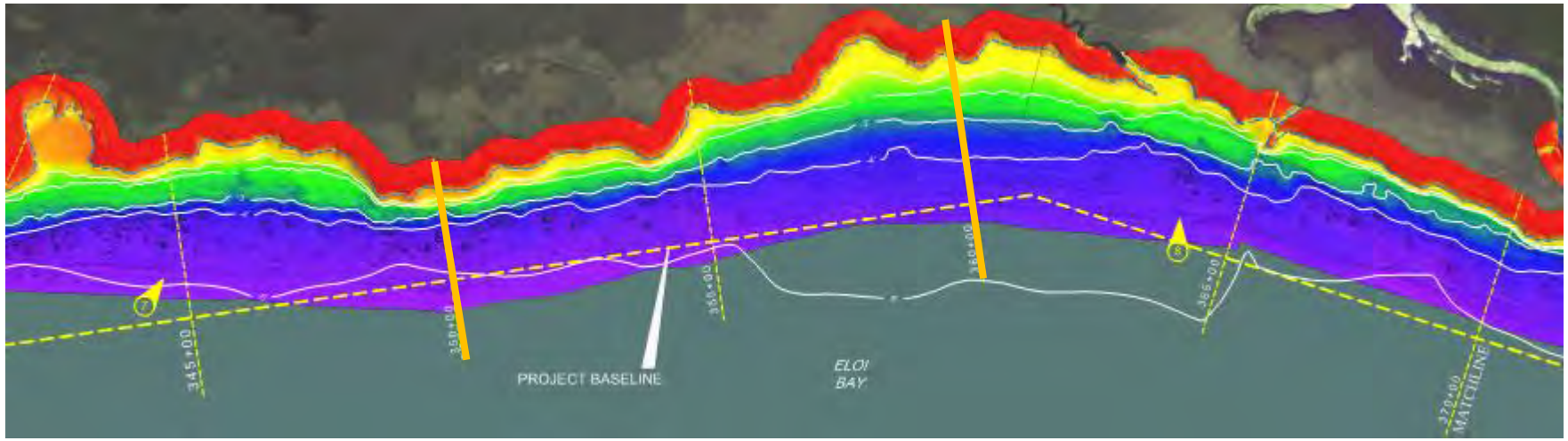
3. General Background and Information

- Bathymetry
  - Nearshore elevations range from -2.0 to -6.0 ft NAVD88
  - Survey data included as Appendix B of RFI
  - Tree stump hazards along certain portions of Project site
  - Irregular shoreline









HORIZONTAL SCALE: 1" = 100'
100' 50' 0' 100'
VERTICAL SCALE: 1" = 10'
10' 5' 0' 10'

STATE OF LOUISIANA
Evan M. Thibodeaux
License No. 5
PROFESSIONAL
5-9-18
LAND SURVEYOR

NOTES
1. ALL PROFILES SHOWN LOOKING TOWARD THE BASELINE END.
2. ALL GRID COORDINATES ARE EXPRESSED IN LOUISIANA STATE PLANE, SOUTH ZONE, NAD83, IN U.S. SURVEY FEET.
3. VERTICAL DATUM FOR ALL ELEVATIONS IS NAVD88 (GEOID12A), IN U.S. SURVEY FEET.
4. SEE SHEETS 25-56 AND SHEETS 57-60 FOR 1 MILE TRANSECTS.

LEGEND
T. BAKER SMITH, LLC SURVEY (09/02/17 - 12/19/17)
T. BAKER SMITH, LLC SURVEY (04/14/13 - 06/26/13)

BASELINE

ELOI BAY
52'
MHW = +1.0'
MLW = -0.5'
STA. 350+00

ELOI BAY
41'
MHW = +1.0'
MLW = -0.5'
STA. 360+00

5 0 -5 -10
-4+00 -3+00 -2+00 -1+00 0 1+00 2+00 3+00 4+00 5+00 6+00 7+00 8+00 9+00

3. General Background and Information

- Tides

Tidal Datum	Elevation (ft., NAVD88)
Mean Higher High Water (MHHW)	1.10
Mean Sea Level (MSL)	0.31
Mean Lower Low Water (MLLW)	-0.48
Extreme Low Water (ELW)	-3.00

- Extreme Design (Hurricane) Conditions:
  - Category 1 (10 year storm)
  - Maximum water level = +9.8 ft NAVD88
  - Maximum wave height = 6.3 ft
  - Maximum wave periods = 12.6 sec

3. General Background and Information

- Design Conditions
  - Wave heights 1 to 2.5 ft
  - Wave periods 2 to 4 sec
  - Water levels from MLLW to MHHW + 1.7 ft
- Geotechnical Data
  - Soils mostly clay and peat
  - Allowable bearing capacities from 350 to 450 psf

Tidal Datum	Elevation (ft., NAVD88)
Mean Higher High Water (MHHW)	1.10
Mean Sea Level (MSL)	0.31
Mean Lower Low Water (MLLW)	-0.48
Extreme Low Water (ELW)	-3.00

3. General Background and Information

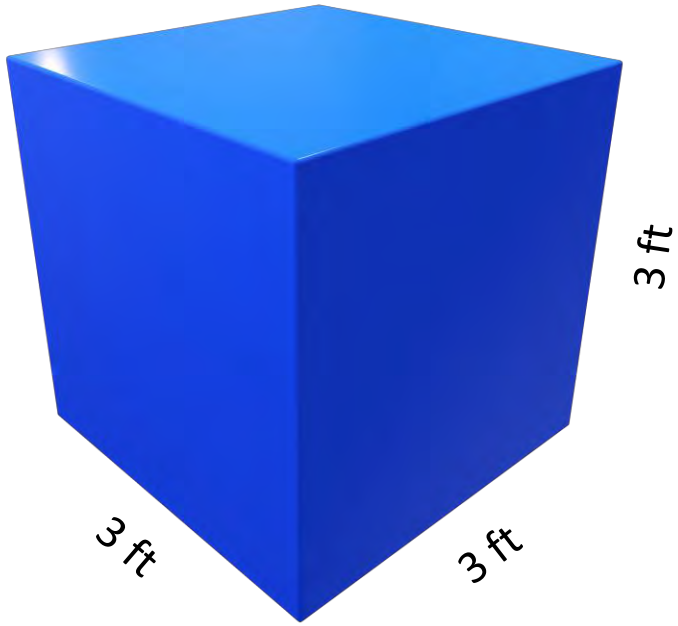
- Products and product configurations shall have a life expectancy of greater than 20 years and be maintenance free
- Portions of the site may require marine mattress in revetment (direct slope protection) orientation. Submission for marine mattress in this orientation is <u>not</u> required.

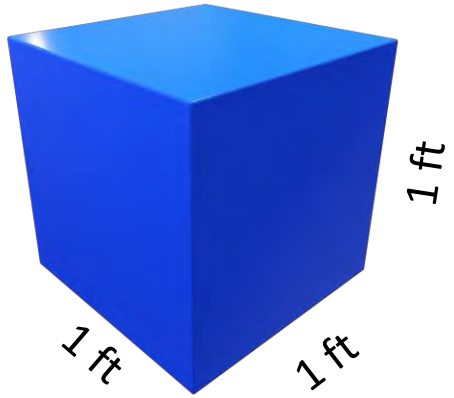
4. Minimum Required Information

- This Project is not a demonstration project. New or theoretical products or product configurations are not anticipated to be evaluated.
- Proposed product configurations shall have a minimum of three separate installations on property not owned or affiliated with manufacturer.
- Manufacturers may submit up to two products, and up to two product configurations of each product.

4. Minimum Required Information

- Product
  - A single unit or assembly of units. Submission of the same unit with different dimensions would be considered two products.





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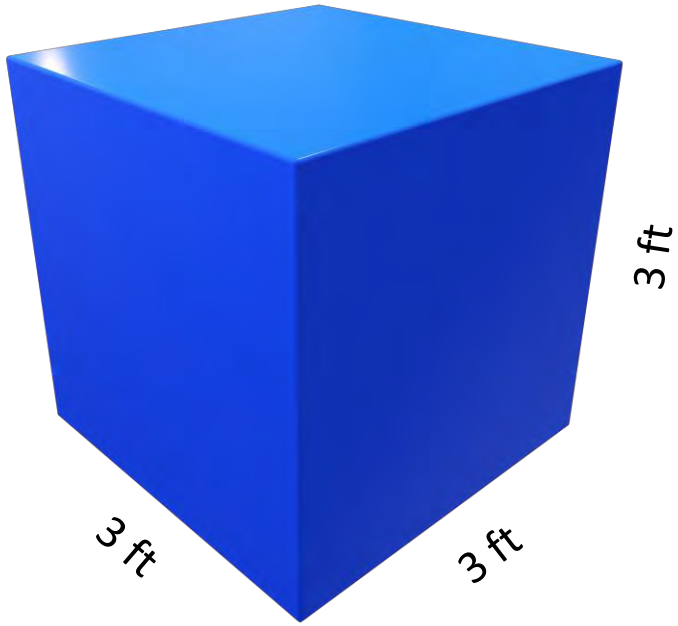
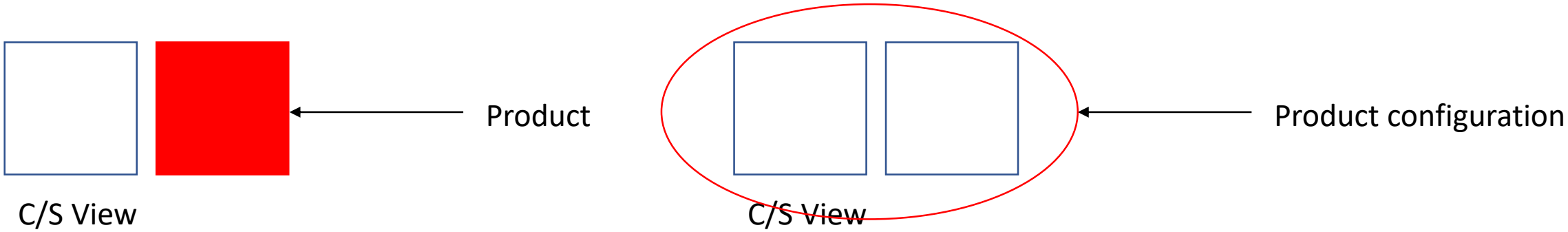


4. Minimum Required Information

- Product
  - A single unit or assembly of units. Submission of the same unit with different dimensions would be considered two products.

4. Minimum Required Information

- Product configuration
  - An arrangement or layout of product to create a breakwater. Submission of an arrangement showing 2 rows wide of a product along the shoreline would be considered one product configuration. Submission of a similar arrangement showing 3 rows wide of the same product would be considered a second product configuration.



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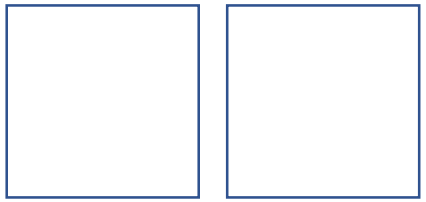

C/S View

C/S View

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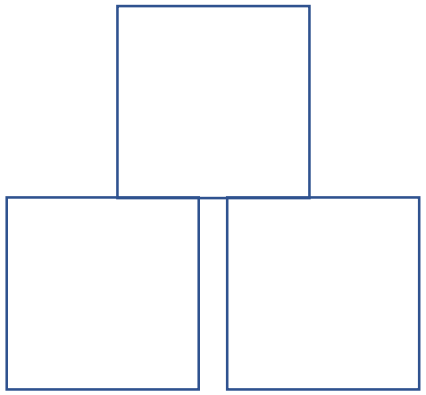
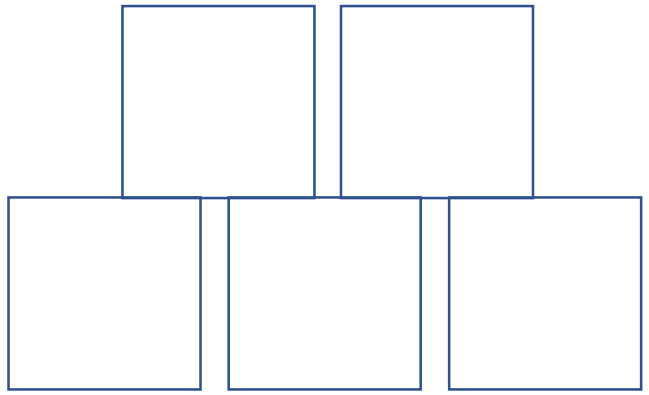


C/S View



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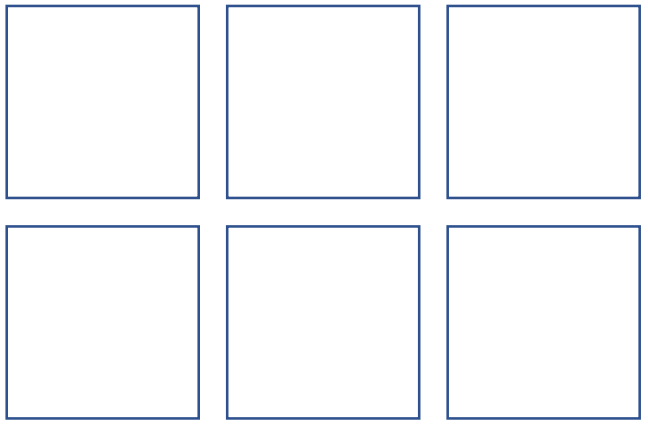
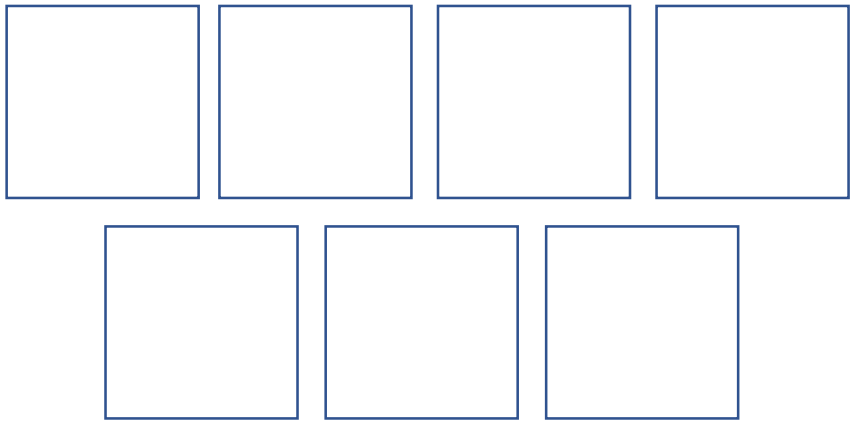


Plan View



Plan View

4. Minimum Required Information

- Minimum required information to be submitted per product configuration.
- Referring to previous CPRA projects for data is not sufficient and will not meet minimum required standards.
- Failure to submit minimum required information will preclude product consideration.

4. Minimum Required Information

- Background Information
  - Manufacturer’s name and location;
  - Manufacturer’s contact information (name, title, address, phone number, and email address);
  - Proof of patent or non-infringement per product and/or product configuration (if applicable);
  - Product geometry for individual units and assembled product configuration recommended for the Project. Details shall include, at a minimum:
    - Plan, cross section, and profile views including terminations (ends);
    - Minimum turning radius (both seaward and landward turns);
    - Method of turning to accommodate irregular shoreline and bathymetry;
    - Installed unit spacing and maximum spacing tolerance.

4. Minimum Required Information

- Background Information
  - Constraints on product configuration installation (e.g., geotechnical conditions, water depth, wave environment, and similar);
  - Product weight (on dry land);
  - Product density (in units of pounds per cubic foot);
  - Three-dimensional rendering of the product and assembled product configuration, in digital 3D solid in AutoCAD (*.dwg or *.dxf) format;
  - Materials list;
  - Manufacturing and installation procedures (including pictures), production rates, and equipment;
  - Quantifiable unit rejection criteria (crack height and width, surface defects height, width, and depth, or similar);
  - Repair criteria, procedures, and materials;
  - Stockpiling methods and limitations including stacking (if applicable); and
  - Evidence of ability of oysters to grow on the product

4. Minimum Required Information

- Breakwater Bearing Pressure Calculations
  - Calculations to consider three-dimensional shape of the product and configuration, minimum spacing tolerance, water level, and sea water density.
  - Calculations to assume a breakwater length of 1,000 feet in the product configuration proposed.
  - Provide detailed bearing pressure calculations for each:
    - Product configuration on dry land
    - Product configuration installed at -3.0 ft NAVD88 with tide at ELW
    - Product configuration installed at -3.0 ft NAVD88 with tide at MLLW
    - Product configuration installed at -3.0 ft NAVD88 with tide at MSL
    - Product configuration installed at -3.0 ft NAVD88 with tide at MHHW

4. Minimum Required Information

- Previous Projects and References
  - List of installed locations (limit to no more than 10 installations)
  - Project information for at least the three most recent/applicable locations
    - Site location
    - Length and width of project
    - Product installed
    - Configuration and quantity of product installed;
    - Start and stop date of manufacturing;
    - Client contact information;
    - Construction costs (separately as manufacturing, transportation, and installation costs);
    - Installation method;
    - Installing contractor contact information; and
    - Problems and/or lessons learned during construction (separately as manufacturing, transportation, and installation).

5. Supplementary Information

- The following is supplementary information that is requested to be submitted per product configuration. Submittal of this information is optional (not required).
- Evidence of wave transmission reduction for the anticipated site conditions. In order of preference, this information may include the following:
  - Field-measured wave transmission data,
  - Laboratory-measured wave transmission data,
  - Numerical modeling wave transmission data, and/or
  - Analytical or empirical methods based on engineering data;
- Materials testing results;
- Any other information that demonstrates the benefits of the product.

6. Evaluation Criteria and Methodology

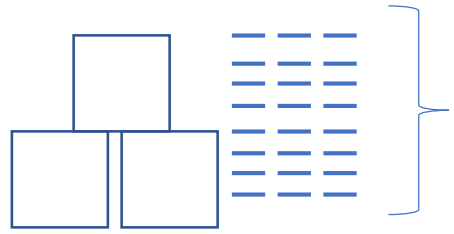
- All minimum required information submitted will be evaluated to determine product configuration applicability to Project.
- Evaluation will be performed in the following order, eliminating products that fail to meet the required criteria with each successive evaluation criteria:
  - Statement acknowledging conditions specified in RFI, as modified by addendum
  - Addendum Acknowledgement Form
  - Evaluation of minimum required information

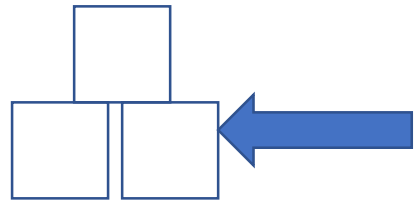
6. Evaluation Criteria and Methodology

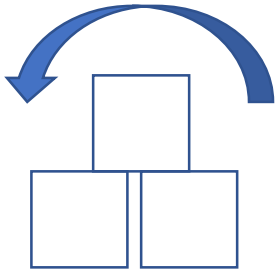
- Evaluation of minimum required information
  - Review of background information (manufacturer's name, proof of patent, etc.) for completeness.
  - Review of bearing pressure calculations for completeness and accuracy.
    - Assumptions made shall be defined and must be appropriate for the Project site.
    - CPRA reserves the right to question and refute assumptions used in the calculations.
    - A geogrid and/or geotextile is anticipated to be placed under the products to distribute the weight over the footprint of the breakwater.
    - Product configurations shall not exceed the allowable bearing capacities at the ELW level. If the product configuration exceeds allowable bearing capacities, product manufacturer may submit calculations for an alternate elevation.
  - Review of previous projects for completeness. CPRA reserves the right to contact the client and installing contractor to discuss the product and product configuration performance.

6. Evaluation Criteria and Methodology

- Evaluation of product configuration under extreme design (hurricane) conditions.
  - Water levels, wave heights, and wave periods will be varied to determine the maximum overturning and sliding forces on each product and product configuration during a 10-year return period storm.
  - All product configurations will be evaluated under the same conditions.
  - Products and product configurations must achieve a factor of safety of 1.1 against sliding and overturning during the maximum sliding and overturning forces.







6. Evaluation Criteria and Methodology

- Evaluation to be determined by performing hydrodynamic modeling of the product(s) and product configuration(s) for extreme and design conditions using computational fluid dynamics software for detailed 3-dimensional modeling
- The product configuration(s) will be modeled with the landward toe of the product configuration placed at -3.0 ft NAVD88 and using the maximum spacing tolerance submitted.
- Hydrodynamic modeling may be performed at an alternate elevation if requested due to geotechnical limitations; however, CPRA will not make any modifications to the product(s) or product configuration(s) submitted in an effort to improve performance for initial evaluation.

6. Evaluation Criteria and Methodology

- Evaluation of product configuration's ability to attenuate waves under design conditions.
- Product configurations must achieve an attenuation coefficient as follows:

Tidal Datum	Kt
MHHW + 1.7 ft	Average < 0.95
MHHW	Average < 0.75
MSL	Average < 0.62
MLLW	Average < 0.50

$$K_t = \frac{H_{transmitted}}{H_{incident}}$$

Case	Hi (ft)	Tp (sec)	Modeled Ht (ft)	Kt (Ht / Hi)
1	1	2		
2	1	3		
3	1	4		
4	1.5	2		
5	1.5	3		
6	1.5	4		
7	2	2		
8	2	3		
9	2	4		
10	2.5	2		
11	2.5	3		
12	2.5	4		
Avg				

6. Evaluation Criteria and Methodology

- Evaluation of product configuration's ability to attenuate waves under design conditions.
- Product configurations must achieve an attenuation coefficient as follows:

Tidal Datum	Kt
MHHW + 1.7 ft	Average < 0.95
MHHW	Average < 0.75
MSL	Average < 0.62
MLLW	Average < 0.50

$$K_t = \frac{H_{transmitted}}{H_{incident}}$$

Example

Case	Hi (ft)	Tp (sec)	Modeled Ht (ft)	Kt (Ht / Hi)
1	1	2	0.80	0.80
2	1	3	0.83	0.83
3	1	4	0.85	0.85
4	1.5	2	1.30	0.87
5	1.5	3	1.35	0.90
6	1.5	4	1.40	0.93
7	2	2	1.80	0.90
8	2	3	1.85	0.93
9	2	4	1.90	0.95
10	2.5	2	2.40	0.96
11	2.5	3	2.45	0.98
12	2.5	4	2.50	1.00
Avg				0.91

6. Evaluation Criteria and Methodology

- Product configurations that fail to meet the requirements or cannot meet Project site conditions will be removed from further consideration for use on the Project.
- Product configurations meeting the requirements will be placed on a Preliminary List of Approved Equivalent Products for the Project.
- Any information included as supplemental information will not be included in the evaluation.

7. Deliverables

- The following deliverables are required for evaluation
  - Minimum required information

8. Schedule

Event	Estimated Date
RFI Posting	February 20, 2019
Pre-Submittal Meeting	March 15, 2019
RFI Questions Due	March 20, 2019 @ 3:00pm
Responses to Questions Posted	March 28, 2019
RFI Submittal Due	April 17, 2019 @ 3:00pm
Preliminary List of Approved Equivalent Products	Approx. 60 days
Final List of Approved Equivalent Products	Approx. January 2020
Construction	Approx. July 2020

- Schedule is estimated and may be modified depending on the number of submitted responses and environmental permitting.
- Purpose of pre-submittal meeting is for product manufacturers to obtain clarification on the requirements of the RFI and to receive answers to relevant questions.
- Impromptu questions will be permitted and spontaneous answers will be provided, the only official answer or position of the State will be stated in writing in response to written questions. Therefore, all questions should be submitted in writing even if an answer is given to an oral question. After the meeting, the questions will be researched and the official response will be posted on the Internet.

9. Conditions

1. Responding to this RFI or selection as an approved equivalent product does not constitute a contractual obligation by CPRA or the Project design team.
2. A product configuration shall be removed from consideration for the Project if it is determined that fraudulent or misleading information was submitted at any time during the Project.
3. CPRA reserves the right to remove a product configuration from consideration for the Project in the event of a patent contest or legal challenge.
4. Product manufacturers may withdraw their participation from the Project at any time with written notice to CPRA.
5. The engineering and design process for the Project is anticipated to occur after the product evaluation. Additional information may be requested from the product manufacturer during this process. Product manufacturers are expected to work collaboratively with the design team and CPRA. Failure to work collaboratively may result in a product being removed from consideration for the Project.
6. Products must be able to be installed by a third-party construction contractor.

10. Submittal Requirements

- Questions about RFI should be directed to Micaela Coner, by email at CPRAcontracts@la.gov.
- Emails must be addressed with subject line “PO-0174 Artificial Reef Product Request for Information”
- Emails must be received by March 20, 2019 at 3:00 PM local time
- Questions received after the deadline will not be considered or answered.
- Failure to submit questions by the deadline will not be grounds for protest.

10. Submittal Requirements

- Official responses to all questions submitted by product manufacturers will be posted at http://coastal.la.gov/resources/rfps-rsiqs-contracts/contracts-and-grants/.
- Responses to RFI are due by April 17, 2019 at 3:00 PM local time.
- Responses received after the deadline will not be considered or reviewed.
- Fax or email submissions are not acceptable.
- Product manufacturers mailing their submittals should allow sufficient delivery time to ensure receipt by the time specified.
- Product manufacturers shall submit the information in electronic media format (CD, USB drive, or similar; 2 copies) along with a transmittal letter. The transmittal letter shall reference “PO-0174 Artificial Reef Product Request for Information”.

10. Submittal Requirements

- Two copies of the electronic media and transmittal letter shall be submitted.
- All electronic media shall include the product manufacturer's name.
- Unless otherwise specified, all electronic files shall be submitted in Adobe (*.pdf) format.
- Timely submission of the required information is the responsibility of the product manufacturer. Submittals must be delivered at manufacturer's expense to:

  Allison Richard

  Executive Staff Officer

  Coastal Protection and Restoration Authority

  150 Terrace Avenue

  Baton Rouge, LA 70802

11. Blackout Period

- To ensure fair consideration and consistent and accurate dissemination of information for all product manufacturers, communications with the Project design team or CPRA, except as authorized in Section 10.0 SUBMITTAL REQUIREMENTS, shall be prohibited for the duration of the RFI process.
- During the blackout period no person affiliated with an RFI submittal team may lobby, contact, or otherwise discuss the RFI with the Project design team or CPRA.
- Violation of this provision shall result in disqualification from consideration for the Project on whose behalf the lobbying occurred.
- The blackout period shall expire upon announcement of the Preliminary List of Approved Equivalent Products.

12. Addendum

- CPRA may issue addendums to modify this RFI as deemed appropriate.
- Addendums and clarifications to this RFI will be available at http://coastal.la.gov/resources/rfps-rsiqs-contracts/contracts-and-grants/.
- Each addendum shall be acknowledged by an authorized company representative in the transmittal letter included with the submittal.

13. Ownership of Submittal

- All materials submitted in response to this RFI shall become property of CPRA.
- Selection or rejection of submittal does not affect this right.

14. Proprietary Information

- Only information which is in the nature of legitimate trade secrets or non-published financial data may be deemed proprietary or confidential.
- Any material within a submittal identified as such must be clearly marked in the submittal and will be handled in accordance with the Louisiana Public Records Act, R.S. 44: 1-44 and applicable rules and regulations.
- Any submittal marked as confidential or proprietary in its entirety may be rejected without further consideration or recourse.

15. Cost of Preparing Submittal

- Costs associated with developing the submittal and any other expenses incurred by product manufacturers in responding to this RFI are entirely the responsibility of the manufacturer and shall not be reimbursed in any manner by CPRA.

16. Errors and Omissions in Submittal

- CPRA is not liable for any errors in submittals.
- CPRA reserves the right to make corrections or amendments due to minor errors identified in submittals by CPRA or the product manufacturers.
- CPRA, at its option, has the right to request clarification or additional information from the manufacturers.

17. Post-RFI Coordination

- After the conclusion of the RFI process, the Project design team and CPRA will work collaboratively with each of the product manufacturers included on the Preliminary List of Approved Equivalent Product Configurations to improve the performance of product configurations at the Project site.
- Detailed engineering and alternative analyses is anticipated to be performed by the design team to evaluate various product configurations.
- Product configurations may be removed from consideration for the Project if they are determined to contain design defects, flaws, or similar instance that could result in a design failure.

17. Post-RFI Coordination

- A Final List of Approved Equivalent Product Configurations will be developed and included in the For Bid documents for public bidding by prospective construction contractors.
- The For Bid documents are anticipated to include, among other items, design details within the plans and a comprehensive technical specification for each product or product configuration (as applicable).
  - Developed in collaboration with product manufacturers
- It is anticipated that the For Bid plans will delineate the Project shoreline into discrete segments with multiple product configurations eligible for installation to maximize Project performance and adapt to the variation in site conditions.

17. Post-RFI Coordination

- It is anticipated that the bid form for construction will list each delineated segment as a single bid item for a fully installed product configuration selected by the contractor.

DESCRIPTION:	☒ Base Bid or ❑ Alt.# ___ Reef Breakwater STA 200+00 to STA 210+00			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
1	1,000	Linear feet		

DESCRIPTION:	☒ Base Bid or ❑ Alt.# ___ Reef Breakwater STA 210+00 to STA 220+00			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
2	1,000	Linear feet		

Example

- Ultimately, it will be the contractor's sole decision to select the product configuration he/she wishes to install from the eligible list for each delineated segment of Project shoreline.

17. Post-RFI Coordination

- Not all product configurations are anticipated to be included for each delineated segment.

Example

Station	Allowable Product Configurations
100+00 to 110+00	Product Configuration 1, Product Configuration 2, Product Configuration 5
110+00 to 120+00	Product Configuration 3, Product Configuration 8
120+00 to 130+00	Product Configuration 6, Product Configuration 12

- Inclusion on the Final List of Approved Equivalent Product Configurations and For Bid documents does not guarantee selection by the contractor.
- One construction contract is anticipated to be awarded.
- The For Bid plans and technical specifications will be site specific to the Project. Reuse or repurposing may be in violation of Louisiana Statutes, Title 37, Chapter 8.

Request for Information (RFI)
Artificial Reef Product Information

RFI No. 2503-19-04

Questions: CPRAcontracts@la.gov

Attendance Record

Date	Sponsoring Organization	Location
15-Mar-19	Coastal Protection and Restoration Authority	150 Terrace Avenue, Baton Rouge, LA Room 401

Purpose
PO-0174 Biloxi Marsh Living Shoreline Non-mandatory Pre-submittal Meeting
10:00 AM

Name	Job title/Organization	Email	Telephone
Cody Colvin, P.E.	Product Engineer / Premier	ccolvin@premier-concrete.com	225-328-0645
Brayton Duncan	Proj. at manager / Premier	bduncan@premier-concrete.com	225-421-7600
Wade Mire	Special Projects/IFI	wmire@ind-fab.com	225-802-8431
Casey Connor	PM / Mott MacDonald	casey.connor@mottmac.com	904 512 0370
Josh Carter	Mott MacDonald	joshua.carter@mottmac.com	504-383-9785
SCOTT BARTKOWSKI	LSSI	SBARTKOWSKI@LIVINGSHORELINESOLUTION.COM	850-375-6622
NOLAN SIMONEAUX	MANAGER / BERTUCCI	NOLANS@BERTUCCICORP.COM	504-835-0303
David Chambers	CPRA Ops Eng	david.chambers@la.gov	504-280-4089
Micaela Coner	CPRA	micaela.coner@gmail.com	225-342-1952
Steve Underwood	Neel-Schaffer	steve.Underwood@Neel-Schaffer.com	225-337-2365
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DON CONRAD	FORTERRA	don.conrad@forterrabp.com	504 439 5627

SUPPLEMENTAL DATA COLLECTION
AND SUMMARY DATA REPORT
BILOXI MARSH LIVING SHORELINE PROJECT
PO-0174

ST. BERNARD PARISH, LOUISIANA

Ardaman & Associates, Inc.

CORPORATE HEADQUARTERS

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Louisiana: Baton Rouge, Monroe, New Orleans, Shreveport

Ardaman & Associates, Inc.

Geotechnical, Environmental and
Materials Consultants

December 20, 2018
AAI File: 17-2828

Mott MacDonald
10415 Morado Circle
Building One, Suite 300
Austin, Texas 78759

Attention: Josh Carter, D. CE, P.E.

Re: Supplemental Data Collection and Summary Data Report
Biloxi Marsh Living Shoreline Project PO-0174
St. Bernard Parish, Louisiana

Ardaman has completed the supplemental field and laboratory geotechnical data collection portion of the Biloxi Marsh Living Shoreline Project (PO-0174) project as outlined in Ardaman's Data Gap Analysis technical memorandum. This summary data report provides the results of the supplemental data collection phase as well as an inclusive summary of the geotechnical data collected to-date for the project area, including historical USACE borings and Cone Penetrometer Test (CPT) soundings and Ardaman's 2012 to 2015 geotechnical investigation for the Living Shoreline Demonstration Project. A discussion of the supplemental field exploration and laboratory testing results are provided in the attached Data Report. This work was authorized by Mott MacDonald, LLC Subcontractor Agreement executed May 24, 2017.

We will be pleased to discuss any questions you may have concerning this data report.

Sincerely,
ARDAMAN & ASSOCIATES, INC.

STATE OF LOUISIANA
12/20/18
MARK L WOODWARD
License No. 24208
PROFESSIONAL ENGINEER
IN
CIVIL ENGINEERING

R. AUSTIN NALL, P. E.
PROJECT ENGINEER

MARK L. WOODWARD, P.E.
SENIOR GEOTECHNICAL ENGINEER

(3) originals

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Florida: Bartow, Cocoa, Fort Myers, Miami, Orlando, Port St. Lucie, Sarasota, Tallahassee, Tampa, West Palm Beach

TABLE OF CONTENTS

LIST OF FIGURES

SUPPLEMENTAL DATA COLLECTION AND SUMMARY DATA REPORT BILOXI MARSH LIVING SHORELINE PROJECT PO-0174 ST. BERNARD PARISH, LOUISIANA

Results and findings of the supplemental field and laboratory geotechnical data collection portion of the Biloxi Marsh Living Shoreline Project (PO-0174) are provided herein. Also included in this data report is an inclusive summary of the geotechnical data collected to-date for the project area, including historical USACE borings and Cone Penetrometer Test (CPT) soundings and Ardaman's 2012 to 2015 geotechnical investigation for the Living Shoreline Demonstration Project.

SECTION 1. GENERAL PROJECT INFORMATION

1.1 Project Description

The Biloxi Marsh Living Shoreline Project (Biloxi Marsh) aims to reduce shoreline recession and enhance local oyster production along approximately 12 miles of shoreline on Eloi Bay through the use of man-made, bioengineered oyster reefs. The bioengineered oyster reefs will be designed to attenuate wave energies and reduce water velocities, which have contributed to the marsh's accelerating recession. It is understood the man-made reefs will be designed to promote natural oyster growth with the intent of forming self-sustaining living shoreline protection structures.

The scope of work associated with the supplemental field and laboratory geotechnical data collection portion of the project consisted of performing twelve (12) marine soil borings, designated "NB" boring, to depths of 16 ft. below the existing mudline within close proximity to the marsh's edge. The soil boring locations were selected based upon recommendations made in Ardaman's Data Gap Analysis technical memorandum and subsequently approved by the Coastal Protection and Restoration Authority (CPRA).

1.2 Site Location and Description

The Biloxi Marsh project site is aligned on approximately 12 miles of marsh shoreline on Eloi Bay and approximately as shown on Figure 1. Also shown on Figure 1 is the approximate alignment of the existing Living Shoreline Demonstration Project (PO-148), which will be briefly discussed later in this report, and a section of proposed alignment for the Biloxi Marsh project that was ultimately removed from the project. The project is located near the mouth of Bayou La Loutre into Chandeleur Sound. The shoreline along the project alignment generally consists of receding salt marsh.

1.3 Geology

Based on geologic mapping of the project area published by the U.S. Army Corps of Engineers (USACE), the project site is located within an area characterized by Holocene age marsh deposits near the ground surface. The near surface marsh deposits are predominantly underlain by interdistributary undifferentiated clays to approximately Elev. -50 ft. to -60 ft., where prodelta deposits have been geologically mapped to begin. Layers of intradelta deposits of sandy soil are expected to interlay these interdistributary clay deposits.

Natural levee and point bar deposits of Bayou La Loutre typically consisting of silts and sands exist in the upper 10 to 20 ft. in the general vicinity of the bayou, which was once a distributary of the Mississippi River. Pleistocene age soil are expected to exist below approximately Elev. -120 ft. A map and cross section views of the results of the geological investigation performed by USACE of the project area is provided on Figures 2A and 2B. A comparison between the shoreline shown on the 2015 satellite image provided on Figure 1 and the shoreline shown on the geologic map developed from data collected between 1988 and 1990 provides a general indication of the magnitude of shoreline recession that has occurred over the past approximately 30 years.

SECTION 2. EXISTING DATA

As previously mentioned, this Data Report presents an inclusive summary of geotechnical data collected to-date for the project, including historical USACE borings and Cone Penetrometer Test (CPT) soundings and Ardaman's 2012 to 2015 geotechnical investigation for the Living Shoreline Demonstration Project (PO-148).

2.1 USACE Mississippi River Gulf Outlet Ecosystem Restoration Study

The USACE performed a feasibility study of restoration to the greater Mississippi River Gulf Outlet (MRGO) area, marsh nutrition, and development to the greater Lake Borgne area ecosystem. The results of the study are provided in a report titled "Mississippi River Gulf Outlet Ecosystem Restoration Plan Final Feasibility Study," dated February 2012. A portion of the field exploration for the study included the performance of four (4) undisturbed five-inch diameter soil borings and four (4) Cone Penetrometer Test (CPT) soundings in the general Biloxi Marsh project area during the 2009 calendar year. The field explorations were performed to Elev. -60 to -65 ft. in approximately 3 feet of water at locations approximately shown in plan on Figure 3.

A USACE location plan of its field exploration along with logs of the CPT soundings and borings performed in the general vicinity of Biloxi Marsh project are provided in Appendix A. Also included in the appendix are the results of consolidation tests performed on select samples obtained during the performance of the USACE borings. Further analysis and discussion of the results of the soil borings and CPT soundings was previously provided in Ardaman's Data Gap Analysis technical memorandum dated June 21, 2017.

2.2 Living Shoreline Demonstration Project (PO-148)

Ardaman performed a geotechnical investigation for use in design of the now existing Living Shoreline Demonstration Project (PO-148), or "Demonstration Project." The results of this investigation are provided in Ardaman Report No. 113-12-84-2909 dated February 2, 1015. The field exploration for the project included performing twenty (20) soil borings to depths of 20 to 40 ft. below the existing mudlines in water depths of approximately 2 ft. at locations near the shoreline. The field exploration also included twenty-one (21) 2 ft. deep push cores near the banks of the shorelines. Ten (10) grab samples were also collected along each of four (4) 200 ft. long transects. The locations of the borings, push cores, and grab samples were established by Coast and Harbor Engineering, Inc. (CHE). The location plan of the field investigations has been reproduced and is provided on Figure 4 and Appendix B, for reference. Also included in the appendix are logs of the borings and push cores as well as descriptions of the grab samples. Results of consolidation tests performed on select samples obtained during the performance of the borings are also presented in the appendix. It should be noted, many of the borings, push cores, and grab samples were located outside of the proposed Demonstration Project alignment and in the area of the Biloxi Marsh project or in Treasure Bay.

2.3 Biloxi Marsh Living Shoreline Project (PO-0174) – Data Gap Analysis

The first task of Ardaman's scope of work for the Biloxi Marsh project was to perform a Data Gap Analysis of existing geotechnical related data in the vicinity of the project site as well as a review of furnished construction and performance data of the existing Demonstration Project. At the request of the CPRA, the Data Gap Analysis also provided a cursory review of three (3) other existing living shoreline projects in southern Louisiana; the LA-16 Non-Rock Alternatives to Shoreline Protection, the LA-08 Bio-Engineered Oyster Reef Demonstration, and the TE-45 Terrebonne Bay Shore Protection Demonstration.

The results of the Data Gap Analysis was provided in Ardaman Technical Memorandum No. 17-84-2828 dated June 21, 2017. Based on the review of the available data and the data gaps identified, the memorandum provided recommendations with regard to a supplemental field and laboratory data collection phase for the Biloxi Marsh project.

SECTION 3. SUPPLEMENTAL DATA COLLECTION

The following sections describe the supplemental field and laboratory data collection performed based upon the data gaps identified and recommendations made in the Data Gap Analysis technical memorandum.

3.1 Soil Borings

Twelve (12) undisturbed general-type 3-inch diameter soil borings were performed at designated locations identified in the Data Gap Analysis along the project alignment and approximately as shown in plan on Figure 5. The soil borings were performed between May 14 and 16, 2018 with rotary-type drilling equipment mounted on an airboat. The GPS coordinates, water surface elevations, and depths to mudline were recorded by T. Baker Smith during the performance of a

magnetometer survey of the proposed boring locations on May 8, 2018. The recorded data is summarized in Table 2.2. The estimated mudline and boring termination elevations are also provided on Table 2.2.

Table 2.2 Soil Boring Details

Boring	GPS Coordinates		Elev. (feet, NAVD88)		
	Latitude	Longitude	Water Surface	Mudline	Boring Terminated
NB-02	29° 47' 28.61" N	89° 23' 02.53" W	0.5	-3.4	-19.4
NB-03	29° 47' 29.19" N	89° 22' 46.14" W	0.5	-3.1	-19.1
NB-04	29° 47' 17.78" N	89° 22' 33.23" W	0.6	-2.8	-18.8
NB-05	29° 47' 03.34" N	89° 22' 27.30" W	0.6	-3.3	-19.3
NB-07	29° 46' 51.00" N	89° 21' 54.79" W	0.6	-2.6	-18.6
NB-09	29° 46' 59.57" N	89° 21' 01.52" W	0.5	-3.5	-19.5
NB-11	29° 46' 40.07" N	89° 19' 38.87" W	0.5	-3.4	-19.4
NB-12	29° 45' 50.11" N	89° 18' 51.47" W	0.3	-3.5	-19.5
NB-14	29° 45' 398.8" N	89° 17' 46.47" W	0.3	-3.2	-19.2
NB-15	29° 46' 07.52" N	89° 17' 36.2" W	0.3	-3.5	-19.5
NB-16	29° 46' 41.72" N	89° 17' 36.88" W	0.2	-3.7	-19.7
NB-18	29° 47' 41.27" N	89° 17' 48.56" W	-0.1	-4.9	-20.9

The soil borings were conducted in general accordance with the methodology outlined in ASTM D1587. The borings were sampled continuously in 24-inch increments using a 3-inch diameter Shelby tube pushed hydraulically into the soil in one continuous stroke per increment. Upon retrieval, the exposed ends of the sample were visually classified and the sample was measured to determine the length of the retrieved sample. The tube was then sealed with expandable disk-type seals and plastic caps. Each tube was then labeled, placed in a vertical tube rack, and transported daily to Ardaman's New Orleans branch laboratory for extrusion and testing.

A total of 96 Shelby tube samples were collected during the field exploration program. Sample recovery lengths were measured in the field and upon extrusion in the laboratory. In general, sample recovery ranged from 20 to 24 inches out of the total 24-inch sample stroke and averaged 97% recovery.

Two summary location plans of the field data investigation locations discussed herein are presented on Figures 6 and 7. A fence plot cross section of logs of the soil borings and push cores performed by Ardaman is provided on Figure 8.

SECTION 4. LABORATORY TESTING

4.1 Laboratory Testing Overview

Upon receipt of the Shelby tube soil samples at the laboratory, and under the supervision of a geotechnical engineer, laboratory technicians began the sample extrusion process and laboratory testing program. In light of the very soft character of the samples, sample extrusion was coordinated with specimen selection and testing to minimize sample disturbance by avoiding even short-term wrapping with plastic once outside the sampling tube. In order to preserve representative portions for strength and consolidation testing, 7-inch and 3-inch segments were cut from the bottom of the tube samples (which typically exhibits the least sampling disturbance effects) using a lubricated, fine-toothed band saw and sealed in the sampling tube section. The remaining "upper" portion of the tube sample was extruded and visually classified by the engineer.

Hand-operated miniature Torvane shear strength tests were also performed on the ends of the samples primarily to assess strength variability within the sample group. This procedure enabled evaluation of the corresponding classification and index strength data to guide selection of the most representative or potentially more critical samples for the more sophisticated strength and consolidation testing. Based on the evaluation of the extruded "upper" portion of samples, the engineer assigned Unconsolidated-Undrained (UU) triaxial compression tests to the 7-inch sections and consolidation tests to the 3-inch sections. Atterberg limit tests were assigned primarily to select blocks that underwent strength testing and grain sizes tests (percent passing the No. 200 sieve) were performed on select samples. Moisture content and unit weight tests were generally assigned on the extruded "upper" portion of the samples. Samples that were not immediately tested were preserved in a humidity-controlled storage room.

In order to avoid disturbance that might otherwise occur due to bonding of the sample to the inside of the galvanized steel sampling tube during the testing program period, a specialized technique was used for manual extrusion of samples from the 7- and 3-inch cut sections. This technique includes inserting a thin wire between the edge of the sample and inside face of the tube for the length of the sample. The wire is thin held taught to enable wire-cutting around the circumference of the sample prior to careful manual extrusion. This technique was developed and is standard practice in the geotechnical laboratory at the Massachusetts Institute of Technology (Germaine and Germaine, 2009).

A summary of the laboratory tests performed is provided in Table 3.1.

Table 3.1 Laboratory Testing Summary

Test Method	ASTM Reference	Number of Tests Performed
Unconsolidated Undrained (UU) Triaxial Compression Test	D2850	47
Atterberg Limit Determination	D4318	45
Moisture Content	D2216	163
Grain Size Analysis	D1140	6
Unit Weight Determination	D2937	82
Organic Content	D2974	5
Consolidation Test	D2435	6

The results of all the laboratory index and strength tests are tabulated on the boring logs at the appropriate sample and elevation in Appendix C. A more detailed discussion of the laboratory test results are provided in the following sections.

4.2 Classification and Index Testing

4.2.1 Visual Classification

Visual classification included description of soil color, consistency and soil type, and identification of structural conditions (lenses, layers, etc.) and variations (organic, etc.). Visual classifications for the soil samples are incorporated into the soil boring logs in Appendix C.

4.2.2 Moisture Content and Unit Weight

Moisture Content determinations (ASTM D2216) were performed on each sample in conjunction with the sample extrusion process. Wet unit weights, or wet densities, were computed based on measurements taken after the soil sample blocks were trimmed for UU triaxial compression testing or specifically for unit weight measurement. Wet unit weight and moisture content values for each sample measured are included on the soil boring logs in Appendix C.

4.2.3 Atterberg Limits

Atterberg limit determinations (ASTM D4318) were performed on selected samples to assist in soil classification and to enable correlation to pertinent clay behavior properties. The Atterberg limit data consist of measured Liquid Limit (LL) and Plastic Limit (PL) values from which the Plasticity Index (PI = LL – PL) is derived. The individual test data are included on the boring logs in Appendix C.

4.2.4 Particle Size Distribution

Fines content determinations (ASTM D1140) were performed on selected samples. The test results, in terms of percent fines (i.e., percent by dry weight finer than the U.S. No. 200 sieve size, 0.074 mm, or combined silt and clay fraction) are included on the soil boring logs in Appendix C.

4.2.5 Organic Content

Organic matter content determinations (ASTM D2974) were performed using Test Method C (440°C) on selected samples that appeared to contain relatively high amounts of organic matter. The test results in terms of percent organic (i.e., percent by dry weight) are included on the soil boring logs in Appendix C.

4.3 Strength Tests

4.3.1 Unconsolidated-Undrained Triaxial Compression Tests

Unconsolidated-undrained (UU) triaxial compression tests (ASTM D2850) were performed on specimens trimmed from selected samples. Results of these strength tests are included on the soil boring logs in Appendix C.

4.4 Consolidation Tests

One-dimension consolidation tests using incremental loading (ASTM D2435) were performed on selected samples to enable assessment of stress history and determination of one-dimensional stress-deformation and time-rate of consolidation characteristics of the cohesive subsoils. Due to the generally very soft consistency of the soils encountered at the site, the consolidation tests utilized half-increment loading. The individual test results, in terms of vertical strain and coefficient of consolidation versus effective vertical stress, and data summary tables are presented in Appendix C.

4.4.1 Compression Characteristics

The Compression Ratio, CR, is defined as the slope of the virgin compression portion of the percent strain, ε_v, versus log σ'_{vc} curve and can be used to predict the magnitude of consolidation settlements for normally consolidated foundation clays. The Recompression Ratio, RR, is defined as the slope of the recompression portion of the ε_v versus log σ'_{vc} curve. Because the initial recompression behavior in the laboratory test can be influenced by sample disturbance (sampling stress relaxation, etc.), an unload-reload sequence is typically included to enable better assessment of *in situ* recompression behavior.

4.4.2 Coefficient of Consolidation

The coefficient of consolidation, c_v, is a parameter that quantifies the time-rate of consolidation and is dependent on, among other things, the material type and stress history. Coefficients of consolidation were computed using square root and logarithm of time curve fitting techniques for each load increment applied during the consolidation tests. The relationship between the laboratory measured coefficient of consolidation (taken as the arithmetic average of the two curve fitting techniques) and the applied effective stress is presented for each test on the figures in Appendix C.

4.4.3 Preconsolidation Pressure

Any elements within the natural ground clay having a preconsolidation pressure equal to the *in situ* vertical effective stress (i.e., $\sigma'_{vc} = \sigma'_p$) is considered to be normally consolidated. Elements with *in situ* vertical effective stresses less than the maximum past pressure are considered to be overconsolidated (higher past stresses may be associated with post-deposition drained creep or overburden soil removed through erosion). These two stresses define the stress history of a clay element which, in turn, strongly influences its undrained shear strength and future compression behavior when loaded. Determination of the maximum past pressure is, therefore, critical to the evaluation. This determination involves estimating the vertical effective stress at which the transition from recompression to virgin compression occurs. Since the actual ε_v versus log σ'_{vc} curves measured in the laboratory do not consist simply of the two linear portions as discussed above, the conventional Casagrande construction (Casagrande, 1936) technique was used in our evaluation of the laboratory data to provide an estimate of the maximum past pressure. Estimated maximum past pressure, σ'_p, values are included on the individual test summary plots in Appendix C.

NOTES

- Biloxi Marsh Living Shoreline Alignment (PO-0174)
- In-Place Biloxi Marsh Living Shoreline Demonstration Project Alignment (PO-148)
- Alignment Removed from Project

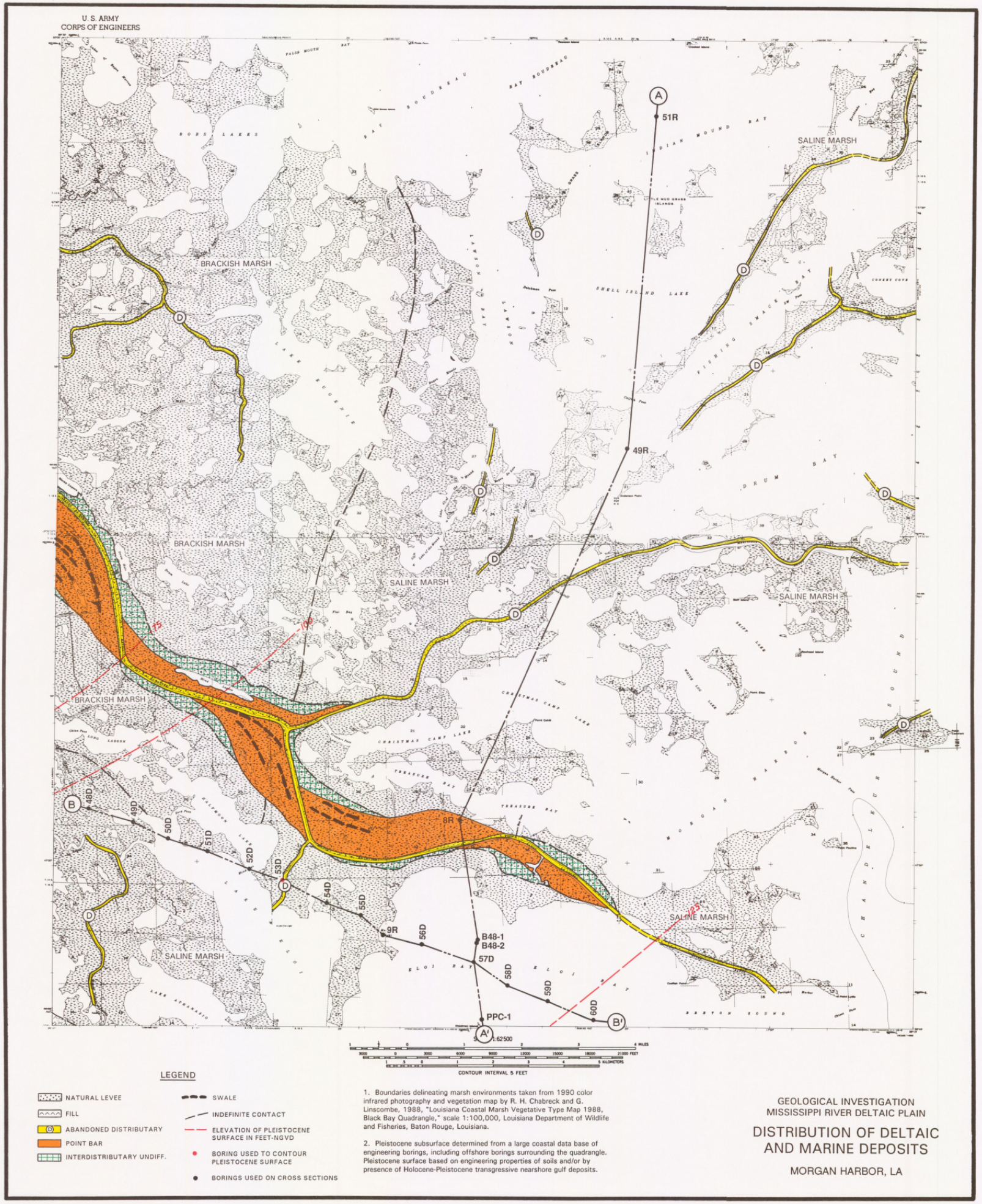
Biloxi Marsh Living Shoreline Project (PO-0174)
Eloi Bay
St. Bernard Parish, Louisiana

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

ENG	Drawn by:	Checked by:
R.A.N.	R.A.N.	M.W.
File No.:	Date:	FIGURE:
17-2828	12/18/18	No. 1

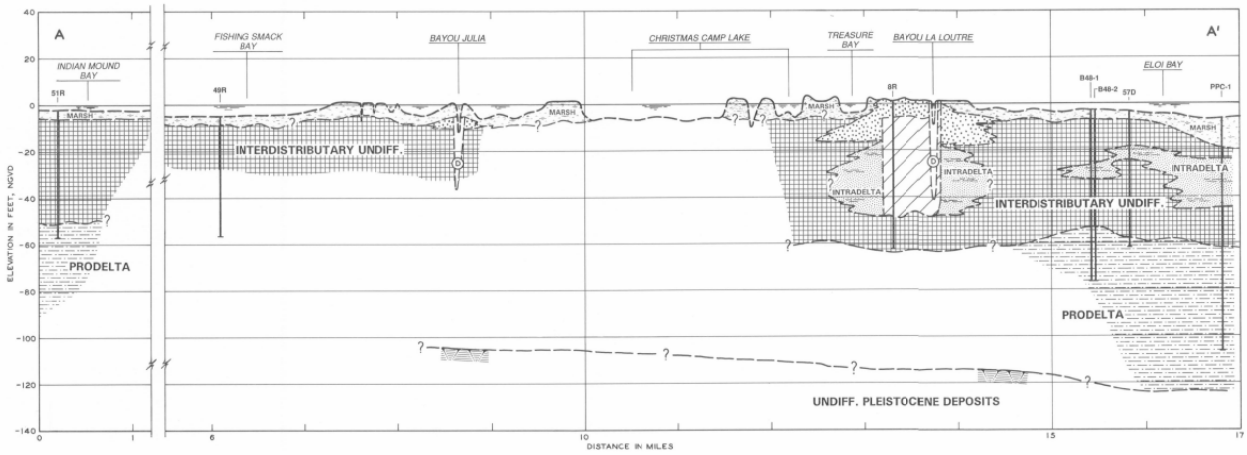
Title:

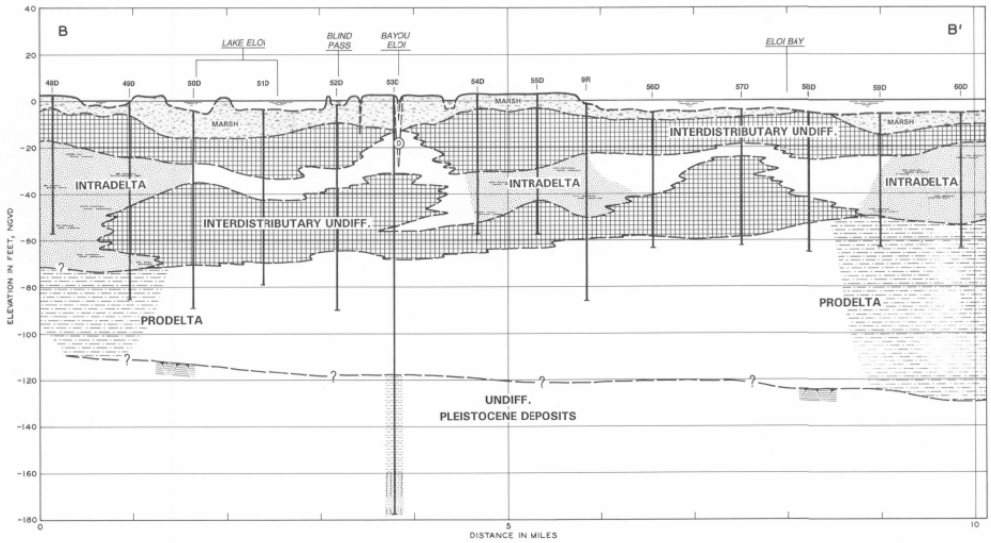
Project Alignments



MORGAN HARBOR (a)

Figure No. 2A





LEGEND

ENVIRONMENTS OF DEPOSITION

- NATURAL LEVEE
- ABANDONED DISTRIBUTARY
- POINT BAR
- INTRADELTA
- INTERDISTRIBUTARY UNDIFF.
- PRODELTA
- NEARSHORE GULF
- PLEISTOCENE SURFACE

LITHOLOGIC TYPES

- SAND
- CLAY
- SILTY SAND
- SILT

GEOLOGICAL INVESTIGATION
MISSISSIPPI RIVER DELTAIC PLAIN

SECTIONS A-A' AND B-B'

MORGAN HARBOR, LA

MORGAN HARBOR (b)

Figure No. 2B

NOTES

- Biloxi Marsh Living Shoreline Alignment (PO-0174)
- In-Place Biloxi Marsh Living Shoreline Demonstration Project Alignment (PO-148)
- Alignment Removed from Project

Boring, CPT, Push Core, Grab Bag Location

Biloxi Marsh
Living Shoreline Project
(PO-0174)
Eloi Bay
St. Bernard Parish, Louisiana

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

ENG	Drawn by:	Checked by:
R.A.N.	R.A.N.	M.W.
File No.:	Date:	FIGURE:
17-2828	12/18/18	No. 3

Title:

USACE Boring and CPT Sounding Location Plan

NOTES

- Biloxi Marsh Living Shoreline Alignment (PO-0174)
- In-Place Biloxi Marsh Living Shoreline Demonstration Project Alignment (PO-148)
- Alignment Removed from Project

Boring, CPT, Push Core, Grab Bag Location

Biloxi Marsh Living Shoreline Project (PO-0174)
Eloi Bay
St. Bernard Parish, Louisiana

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

ENG	Drawn by:	Checked by:
R.A.N.	R.A.N.	M.W.
File No.:	Date:	FIGURE:
17-2828	12/18/18	No. 4

Title:
PO-148 Biloxi Marsh Demonstration Project Boring Location Plan

NOTES

- Biloxi Marsh Living Shoreline Alignment (PO-0174)
- In-Place Biloxi Marsh Living Shoreline Demonstration Project Alignment (PO-148)
- Alignment Removed from Project

Boring, CPT, Push Core, Grab Bag Location

Biloxi Marsh Living Shoreline Project (PO-0174)
Eloi Bay
St. Bernard Parish, Louisiana

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

ENG	Drawn by:	Checked by:
R.A.N.	R.A.N.	M.W.
File No.:	Date:	FIGURE:
17-2828	12/18/18	No. 5

Title:
PO-0174 Supplemental Investigation Boring Location Plan

NOTES

- Biloxi Marsh Living Shoreline Alignment (PO-0174)
- In-Place Biloxi Marsh Living Shoreline Demonstration Project Alignment (PO-148)
- Alignment Removed from Project

Boring, CPT, Push Core, Grab Bag Location

Biloxi Marsh
Living Shoreline Project
(PO-0174)
Eloi Bay
St. Bernard Parish, Louisiana

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

ENG	Drawn by:	Checked by:
R.A.N.	R.A.N.	M.W.
File No.:	Date:	FIGURE:
17-2828	12/18/18	No. 6

Title:

Summary Location Plan

NOTES

- Biloxi Marsh Living Shoreline Alignment (PO-0174)
- In-Place Biloxi Marsh Living Shoreline Demonstration Project Alignment (PO-148)
- Alignment Removed from Project

Boring, CPT, Push Core, Grab Bag Location

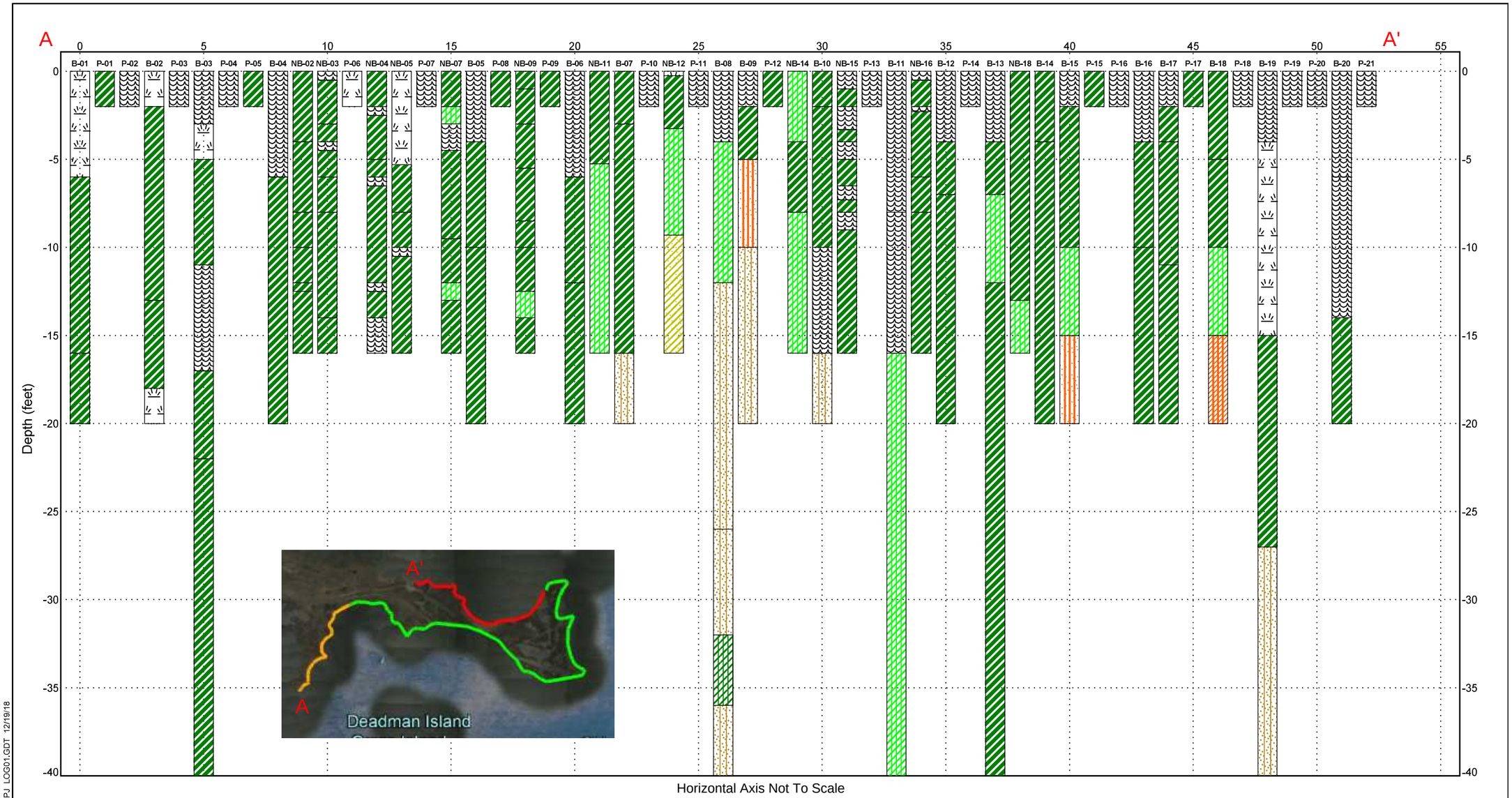
Biloxi Marsh Living Shoreline Project (PO-0174)
Eloi Bay
St. Bernard Parish, Louisiana

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

ENG	Drawn by:	Checked by:
R.A.N.	R.A.N.	M.W.
File No.:	Date:	FIGURE:
17-2828	12/18/18	No. 7

Title:

Summary Location Plan



Notes: See individual logs for soil descriptions.

Biloxi Marsh Living Shoreline (P0-0174)
Eloi Bay

Mott MacDonald
10415 Morado Circle, Suite 300
Project Number: 17-2828

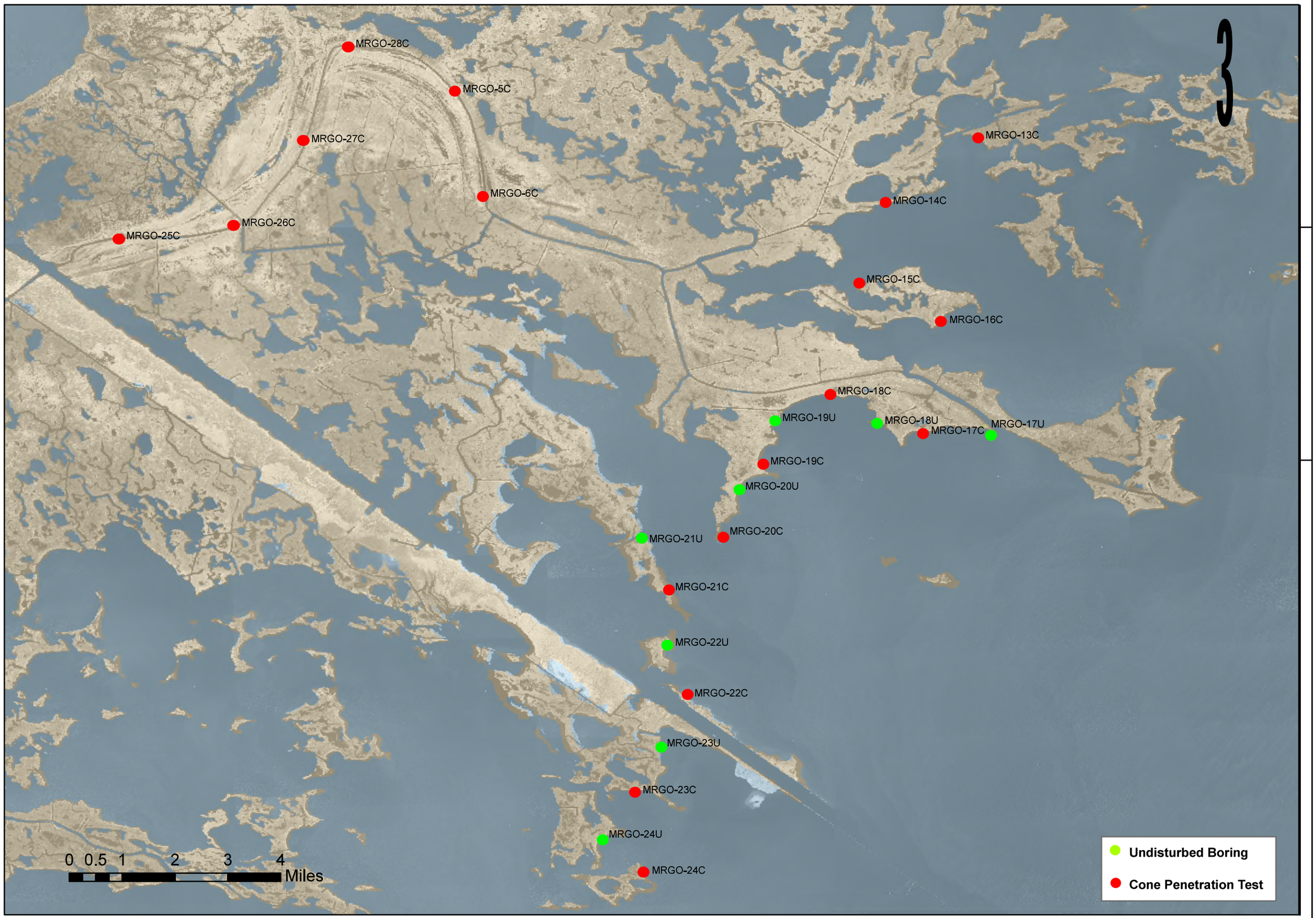
ARD CROSS SECTION 17-2828 - 9-4-2018.GPJ LOG01.GDT 12/19/18

Figure No. 8

APPENDIX A. HISTORICAL USACE DATA

This Appendix contains the following:

- USACE Location Plan
- Soil Boring Logs
- CPT Sounding Logs
- Laboratory Consolidation Test Results



3

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR

MARK	DESCRIPTION	DATE	APPR

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
MISSISSIPPI VALLEY DIVISION

DESIGNED BY: KAC
DWN BY: KAC
CKD BY: PAD
SUBMITTED BY:
FILE NAME: Borings and CPTs_3.mxd
SIZE:
PLOT SCALE:
DATE: 06/25/2010
SOLICITATION NO.:
CONTRACT NO.:
FILE NO:
PLOT DATE:

MISSISSIPPI RIVER GULF OUTLET (MRGO)
ECOSYSTEM RESTORATION FEASIBILITY STUDY

BORING AND CPT LOCATION MAP

SHEET IDENTIFICATION NUMBER
FIGURE ED-F-2
SHEET 3 of 3

BOR. MRGO-17U (07-022135)
STA. N 29° 46'57.74" W 89° 20'41.17"

WATER TABLE 0 FT.
Date: 11/16/2009

W or D10 GROUND EL. -3.3

ELEVATIONS IN FEET - N.A.V.D.

0 −10 −20 −30 −40 −50 −60 −70

SM,rt
So
So,SM,rt
So
So,Wd
CS
So,CS,rt
So,CS
So
vSo
So
So
CS
So,CS
So
M
M
So
So
(46)
(35)
(32)
(2)
(21)
(48)

TEST DATA

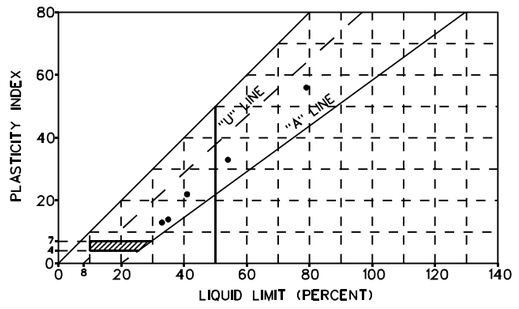
WATER CONTENT
% WATER, DRY WEIGHT
0 20 40 60 80 100 120 140

SHEAR STRENGTH
TONS / SQ.FT.
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8

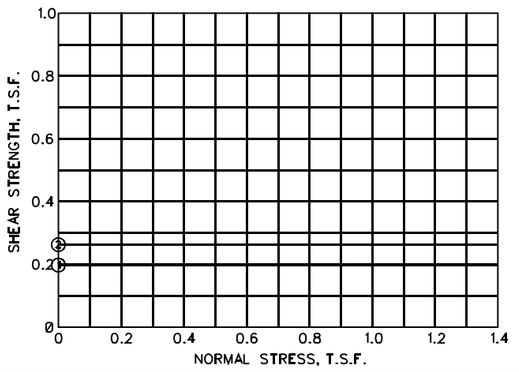
WET DENSITY
POUNDS / CU.FT.
60 80 100 120 140

NORMAL STRESS
TONS / SQ.FT.
0.0 1.0 2.0 3.0

PLASTICITY CHART



SHEAR STRENGTH DATA



TABULAR TEST DATA

ENVELOPE NO.	ENVELOPE EL.	TYPE	STRENGTH Φ	STRENGTH c - TSF	CLASS
1	-20.4	Q	0.0	0.198	CL
2	-28.4	Q	0.0	0.263	CL

NOTES

- ○ - (UC) UNCONFINED COMPRESSION TEST
- ■ - (Q) UNCONSOLIDATED - UNDRAINED TRIAXIAL SHEAR TEST
- ▲ - (R) CONSOLIDATED - UNDRAINED TRIAXIAL SHEAR TEST
- ⊡ - (S) CONSOLIDATED - DRAINED DIRECT SHEAR TEST

ω_P ω_N ω_L ATTERBERG LIMITS

BORING WAS TAKEN WITH A 5 INCH DIAMETER STEEL TUBE PISTON TYPE SAMPLER.
FOR SOIL BORING LEGEND SEE PLATE A.
FOR LOCATION OF BORINGS SEE PLATE
FOR DETAILED TEST DATA SEE

US ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT

(U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
MISSISSIPPI VALLEY DIVISION

SHEET IDENTIFICATION NUMBER

BOR. MRGO-18U (07-022135)
STA. N 29° 47' 01.74" W 89° 22' 26.18"

WATER TABLE 0 FT.
Date: 11/14/2009

W or D10

GROUND EL. -2.8

ELEVATIONS IN FEET - N.A.V.D.

0
-10
-20
-30
-40
-50
-60
-70

TEST DATA

WATER CONTENT
% WATER, DRY WEIGHT
0 20 40 60 80 100 120 140

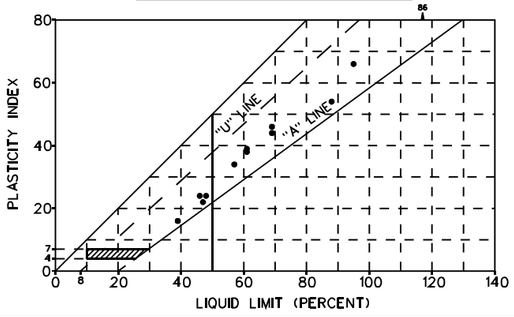
SHEAR STRENGTH
TONS / SQ.FT.
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8

WET DENSITY
POUNDS / CU.FT.
60 80 100 120 140

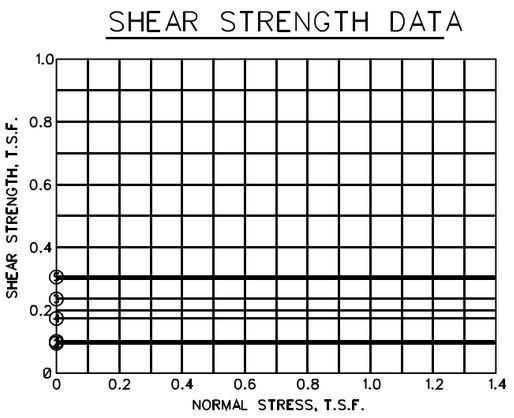
NORMAL STRESS
TONS / SQ.FT.
0.0 1.0 2.0 3.0

185
167
176

PLASTICITY CHART



SHEAR STRENGTH DATA



TABULAR TEST DATA

ENVELOPE NO.	ENVELOPE EL.	TYPE	STRENGTH Φ	STRENGTH c - TSF	CLASS
1	-11.9	0	0.0	0.101	CH
2	-19.9	0	0.0	0.095	CH
3	-39.9	0	0.0	0.236	CH
4	-47.9	0	0.0	0.174	CL
5	-55.9	0	0.0	0.306	CH

NOTES

- ○ - (UC) UNCONFINED COMPRESSION TEST
- ■ - (Q) UNCONSOLIDATED - UNDRAINED TRIAXIAL SHEAR TEST
- ▲ - (R) CONSOLIDATED - UNDRAINED TRIAXIAL SHEAR TEST
- ⊡ - (S) CONSOLIDATED - DRAINED DIRECT SHEAR TEST
- ω_P ω_N ω_L ATTERBERG LIMITS

BORING WAS TAKEN WITH A 5 INCH DIAMETER STEEL TUBE PISTON TYPE SAMPLER.
FOR SOIL BORING LEGEND SEE PLATE A.
FOR LOCATION OF BORINGS SEE PLATE
FOR DETAILED TEST DATA SEE

US ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT

(U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
MISSISSIPPI VALLEY DIVISION)

DESIGNED
DRAWN
SUBMITTED
APPROVED
DATE
SUBMISSION NO.
CONTRACT NO.
FILE NUMBER
PLOT DATE
PLOT SCALE
SHEET

SHEET IDENTIFICATION NUMBER

ELEVATIONS IN FEET - N.A.V.D.

BOR. MRGO-19U (07-022135)
STA. N 29° 47'04.74" W 89° 24'06.18"

WATER TABLE 0 FT.
Date: 11/13/2009

W or D/D

GROUND EL. -2.8

TEST DATA

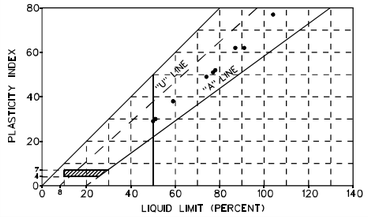
WATER CONTENT
% WATER, DRY WEIGHT
0 20 40 60 80 100 120 140

SHEAR STRENGTH
TONS / SQ.FT.
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8

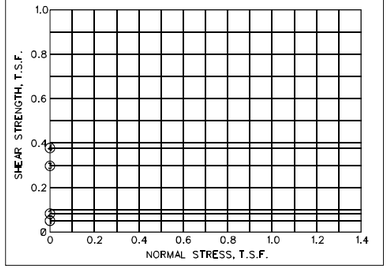
WET DENSITY
POUNDS / CU.FT.
60 80 100 120 140

NORMAL STRESS
TONS / SQ.FT.
0.0 1.0 2.0 3.0

PLASTICITY CHART



SHEAR STRENGTH DATA



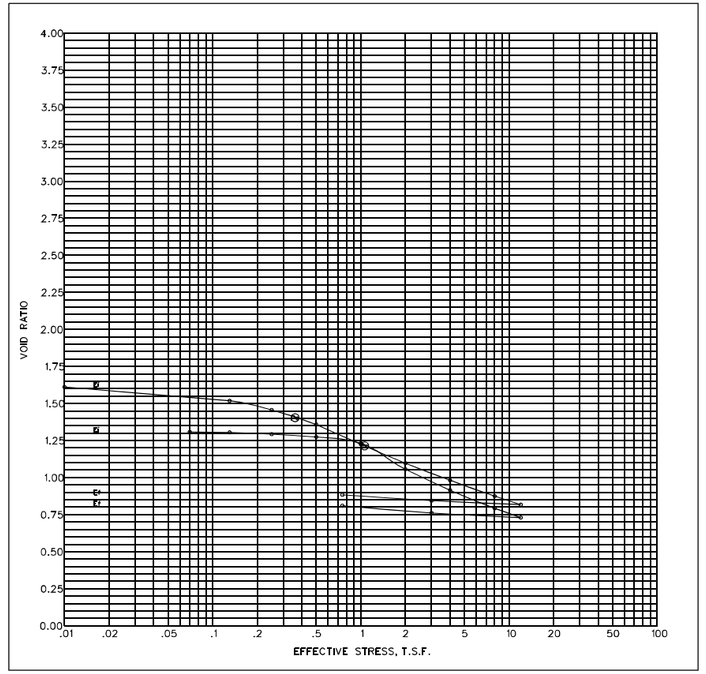
TABULAR TEST DATA

ENVELOPE NO.	ENVELOPE EL.	TYPE	STRENGTH Φ	STRENGTH C - TSF	CLASS
1	-19.9	Q	0.0	0.051	CH
2	-23.9	Q	0.0	0.083	CH
3	-48.5	Q	0.0	0.298	CH
4	-56.9	Q	0.0	0.378	CH
5	-20.5	C	0.0	0.000	CH
6	-49.1	C	0.0	0.000	CH

NOTES

○ - (UC) UNCONFINED COMPRESSION TEST
■ - (Q) UNCONSOLIDATED - UNDRAINED TRIAXIAL SHEAR TEST
▲ - (R) CONSOLIDATED - UNDRAINED TRIAXIAL SHEAR TEST
⊡ - (S) CONSOLIDATED - DRAINED DIRECT SHEAR TEST
ωP ωN ωL ATTERBERG LIMITS

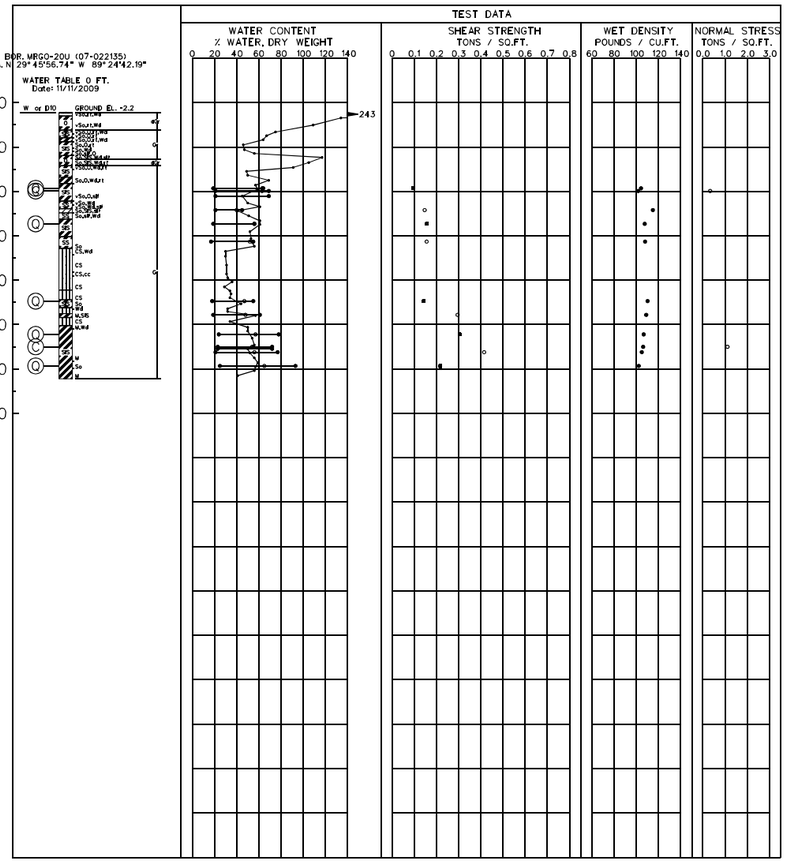
BORING WAS TAKEN WITH A 5 INCH DIAMETER STEEL TUBE PISTON TYPE SAMPLER.
FOR SOIL BORING LEGEND SEE PLATE A.
FOR LOCATION OF BORINGS SEE PLATE
FOR DETAILED TEST DATA SEE



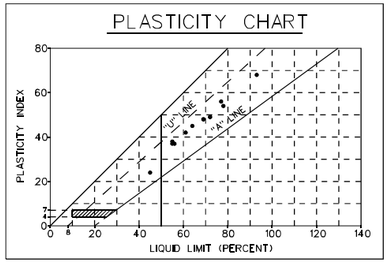
US ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT

U.S. ARMY ENGINEER DISTRICT
VICKSBURG, MISSISSIPPI
MISSISSIPPI VALLEY DIVISION

SHEET IDENTIFICATION NUMBER



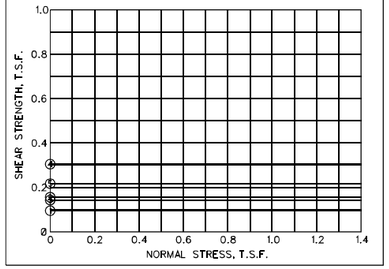
PLASTICITY CHART



TABULAR TEST DATA

ENVELOPE NO.	EL.	TYPE	STRENGTH Φ	STRENGTH c - TSF	CLASS
1	-19.3	Q	0.0	0.095	CH
2	-27.3	Q	0.0	0.156	CH
3	-44.7	Q	0.0	0.143	CH
4	-52.2	Q	0.0	0.305	CH
5	-59.3	Q	0.0	0.217	CH
6	-19.9	C	0.0	0.000	CH
7	-55.0	C	0.0	0.000	CH

SHEAR STRENGTH DATA

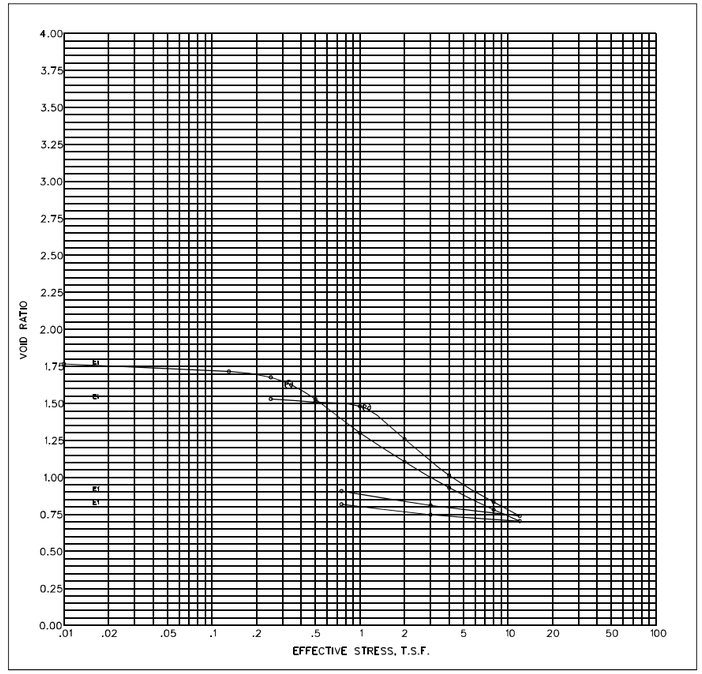


NOTES

- ○ - (UC) UNCONFINED COMPRESSION TEST
- ■ - (Q) UNCONSOLIDATED - UNDRAINED TRIAXIAL SHEAR TEST
- ▲ - (R) CONSOLIDATED - UNDRAINED TRIAXIAL SHEAR TEST
- ⊡ - (S) CONSOLIDATED - DRAINED DIRECT SHEAR TEST

ω_P ω_N ω_L ATTERBERG LIMITS

BORING WAS TAKEN WITH A 5 INCH DIAMETER STEEL TUBE PISTON TYPE SAMPLER.
FOR SOIL BORING LEGEND SEE PLATE A.
FOR LOCATION OF BORINGS SEE PLATE
FOR DETAILED TEST DATA SEE



US ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT

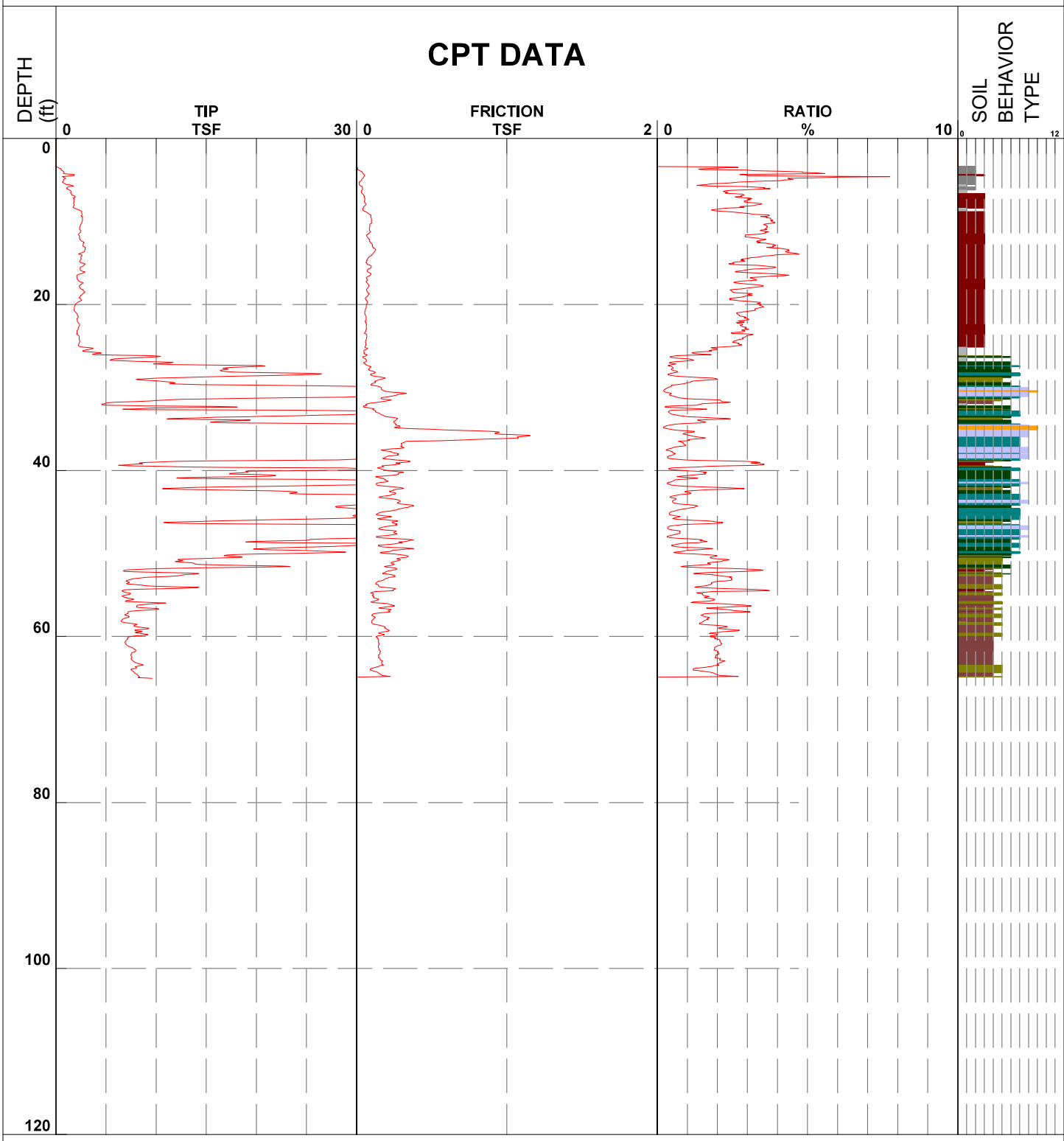
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
MISSISSIPPI VALLEY DIVISION

SHEET IDENTIFICATION NUMBER

MRGO Ecosystems Restoration

Job Number	04.0022-0135	CPT Number	MRGO_017C	Location	29 46' 52.2"N 89 21'41.2"E
Operator	Glenn Johnson	Date and Tin	13-Nov-2009 12:15:21	Cone Number	F7.5CKE2HAW21513
Client	USACE	Elevation	-1.8		

Water 3'6"



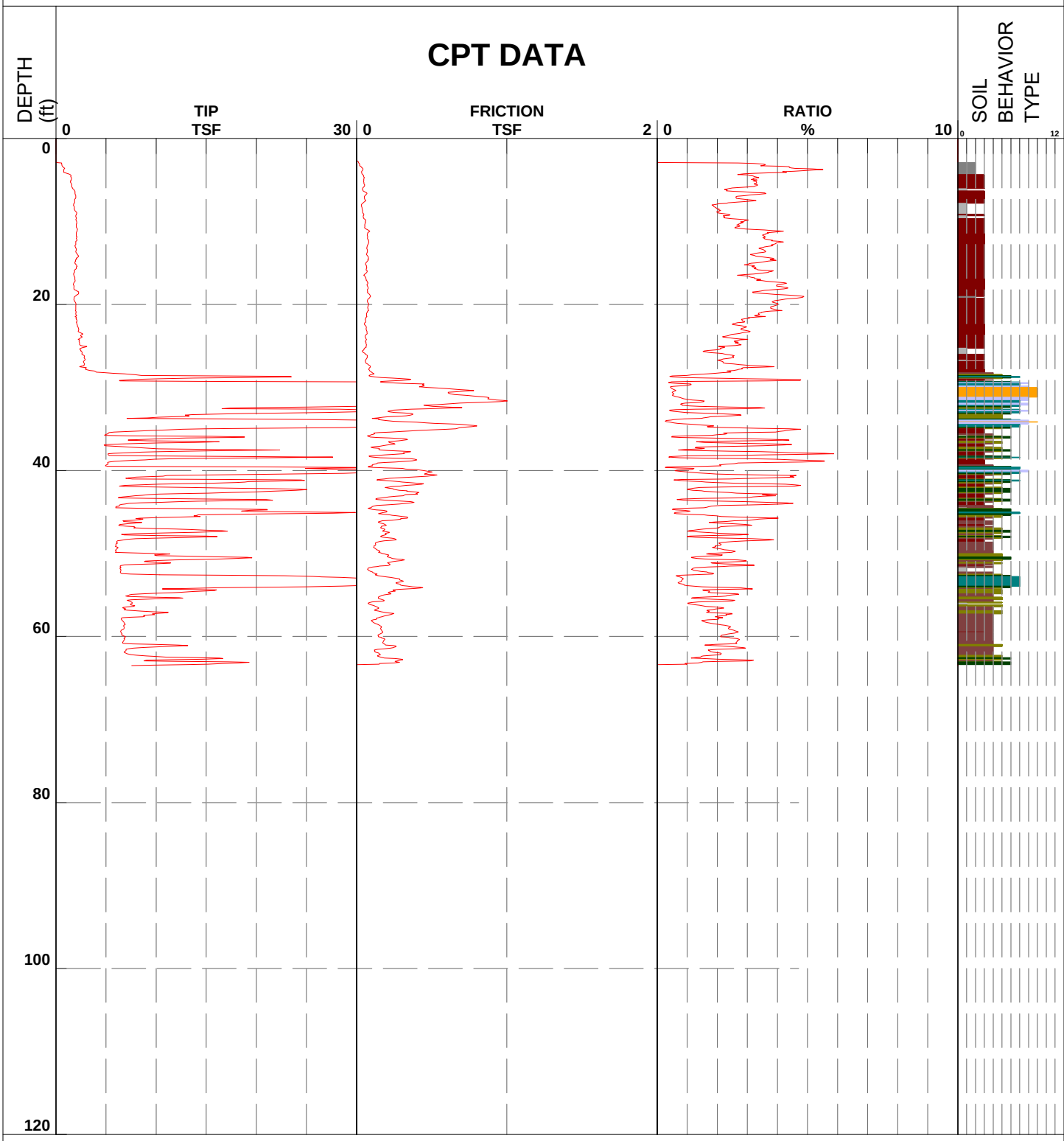
1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Robertson et al. 1986 * Overconsolidated or Cemented

MRGO Ecosystems Restoration

Job Number	04.0022-0135	CPT Number	MRGO_018C	Location	29 47' 30.0"N 89 23' 14.5"E
Operator	Glenn Johnson	Date and Tin	14-Nov-2009 09:12:24	Cone Number	F7.5CKE2HAW21513
Client	USACE	Elevation	-2.2		

Water 3'0"



1 - sensitive fine grained
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3 - clay
4 - silty clay to clay
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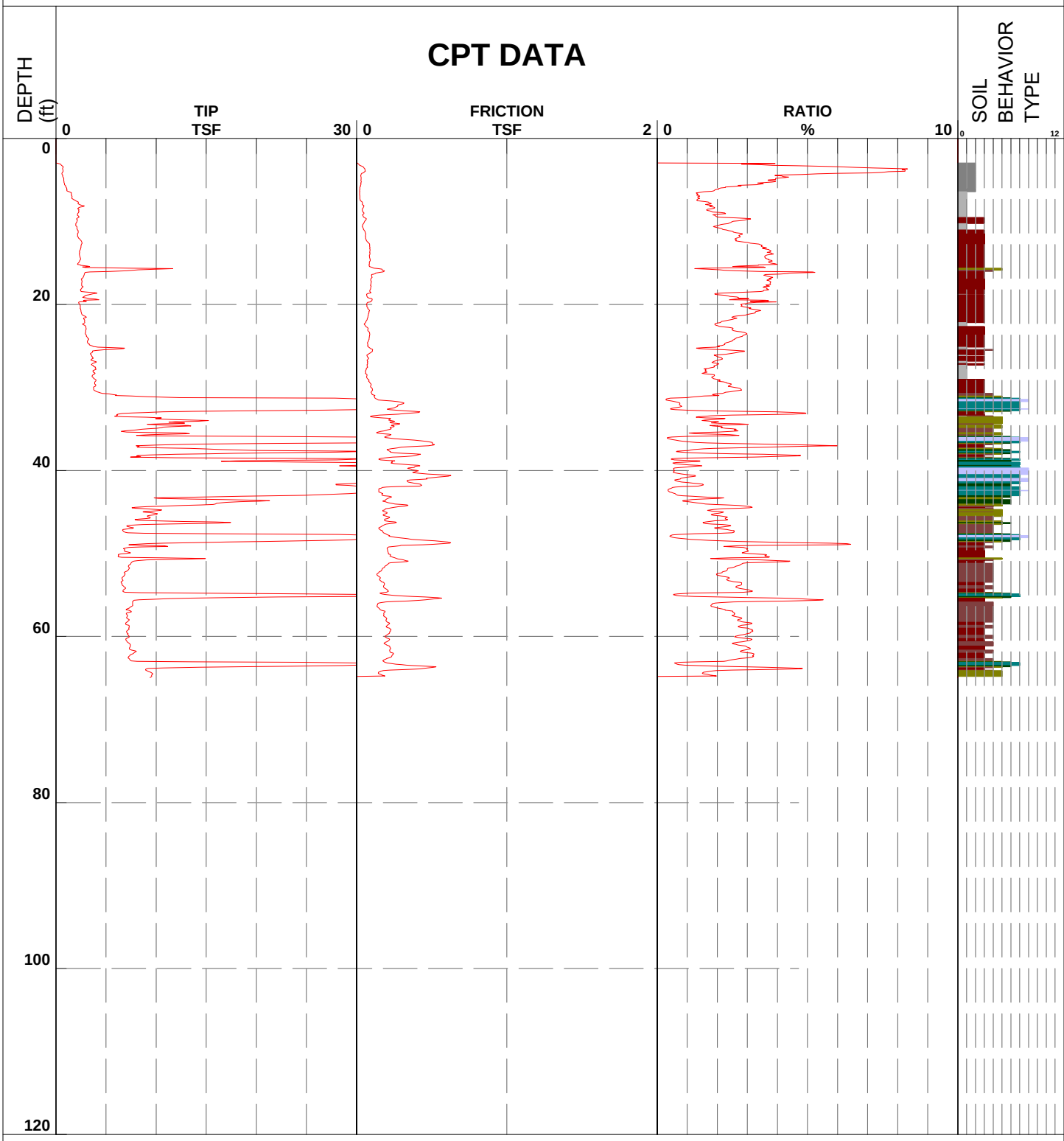
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Robertson et al. 1986 * Overconsolidated or Cemented

MRGO Ecosystems Restoration

Job Number	04.0022-0135	CPT Number	MRGO_019C	Location	29 46'18.8"N 89 24' 21.2"E
Operator	Glenn Johnson	Date and Tin	14-Nov-2009 11:57:17	Cone Number	F7.5CKE2HAW21513
Client	USACE	Elevation	-2.3		

Water 3'0"



1 - sensitive fine grained
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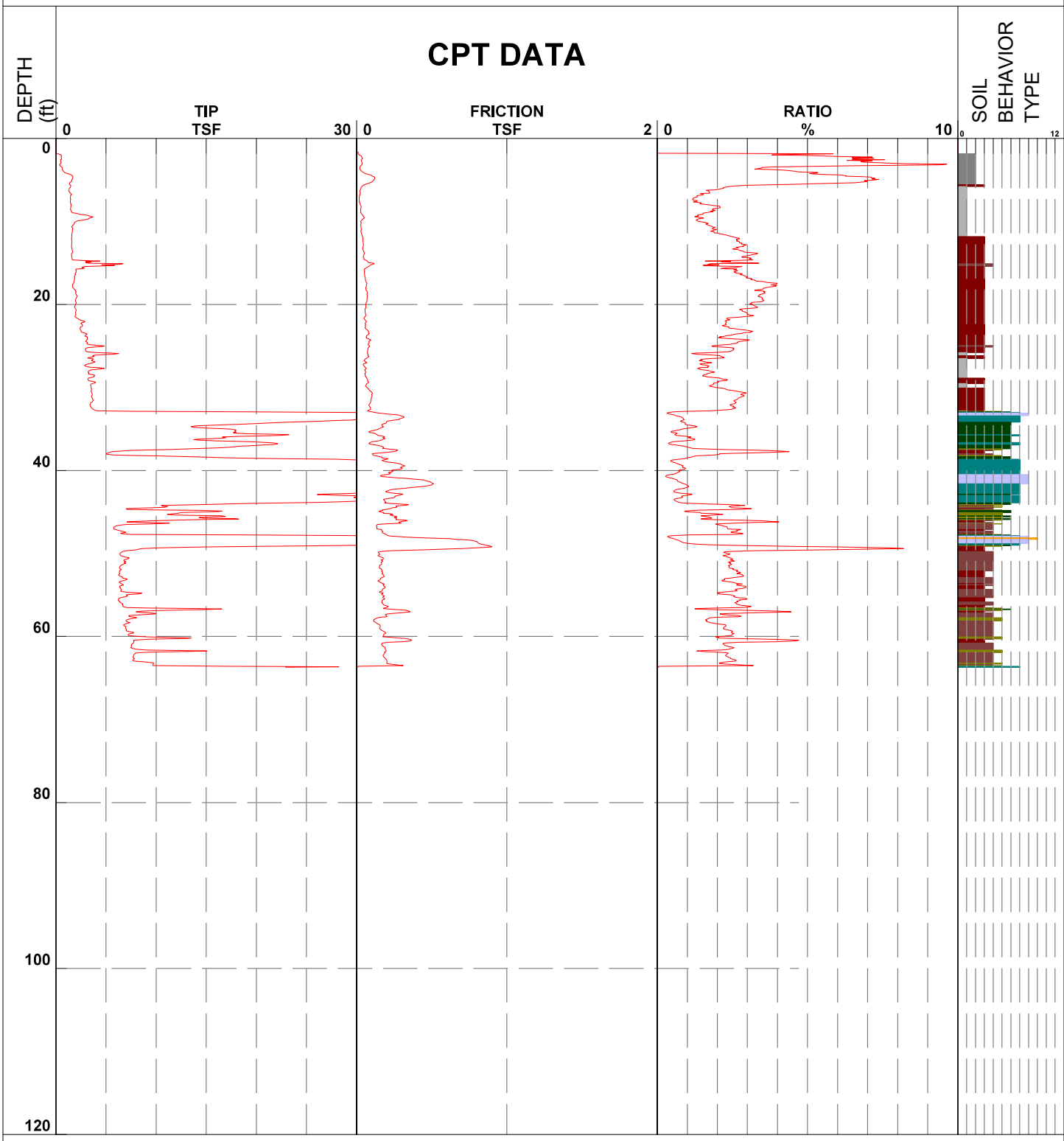
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Robertson et al. 1986 * Overconsolidated or Cemented

MRGO Ecosystems Restoration

Job Number	04.0022-0135	CPT Number	MRGO_020C	Location	29 45' 16.2'N 89 25' 03.4"E
Operator	Glenn Johnson	Date and Tin	15-Nov-2009 08:51:28	Cone Number	F7.5CKE2HAW21513
Client	USACE	Elevation	-2.7		

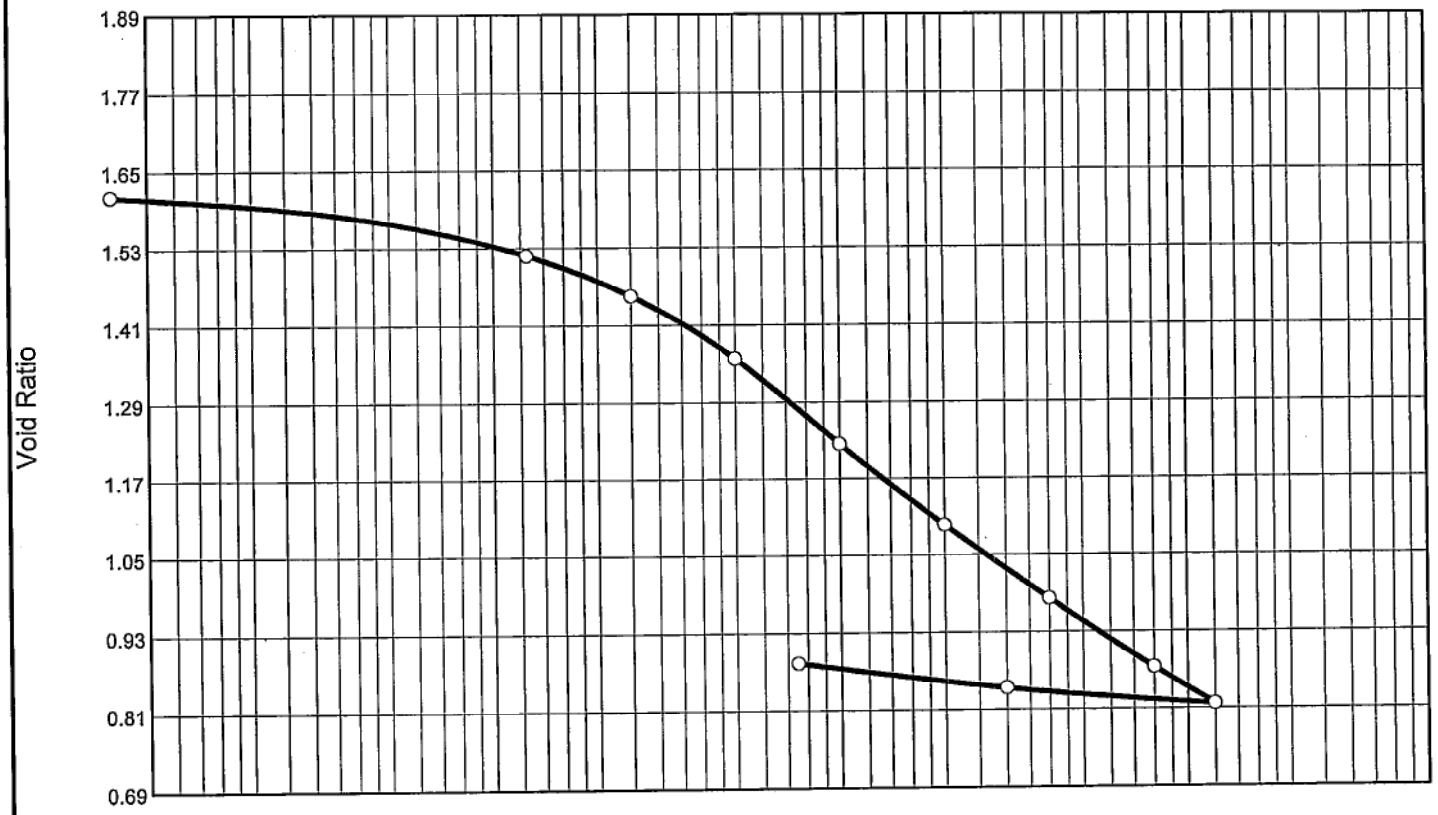
Water 1.77'

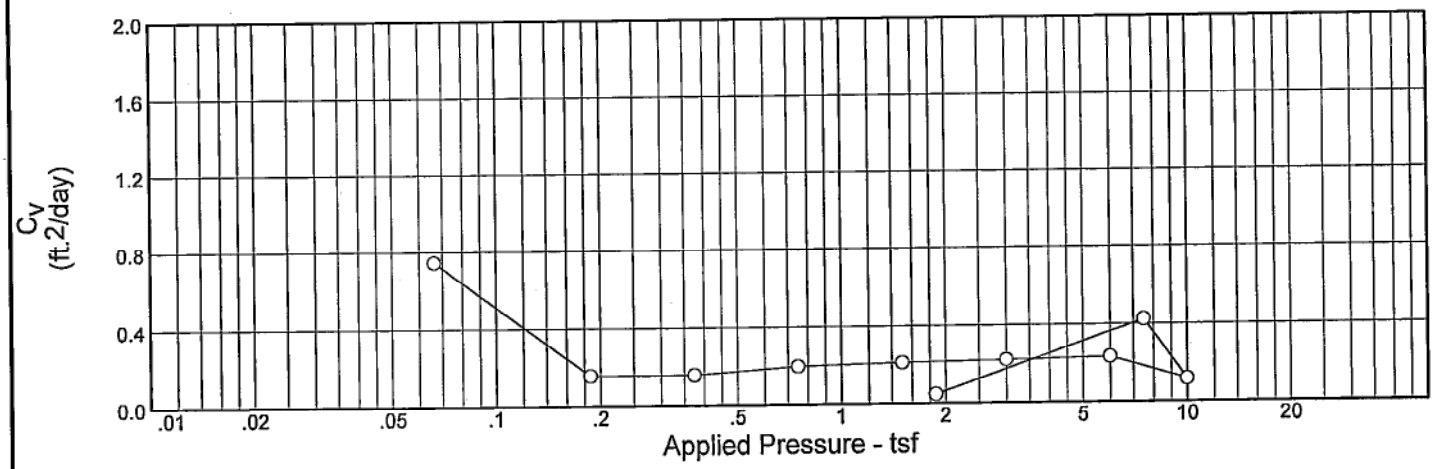


1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Robertson et al. 1986 * Overconsolidated or Cemented

CONSOLIDATION TEST REPORT





Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
102.7 %	60.8 %	65.0	59	38	2.72	0.36	0.44	1.610

MATERIAL DESCRIPTION	USCS	AASHTO
VSO GR CH3 W/ ARS ML	CH3	

Project No. 07-022135 **Client:** U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La

Source: MRGO-19U **Sample No.:** 5C **Elev./Depth:** 17.7

FFEBJV, LLC

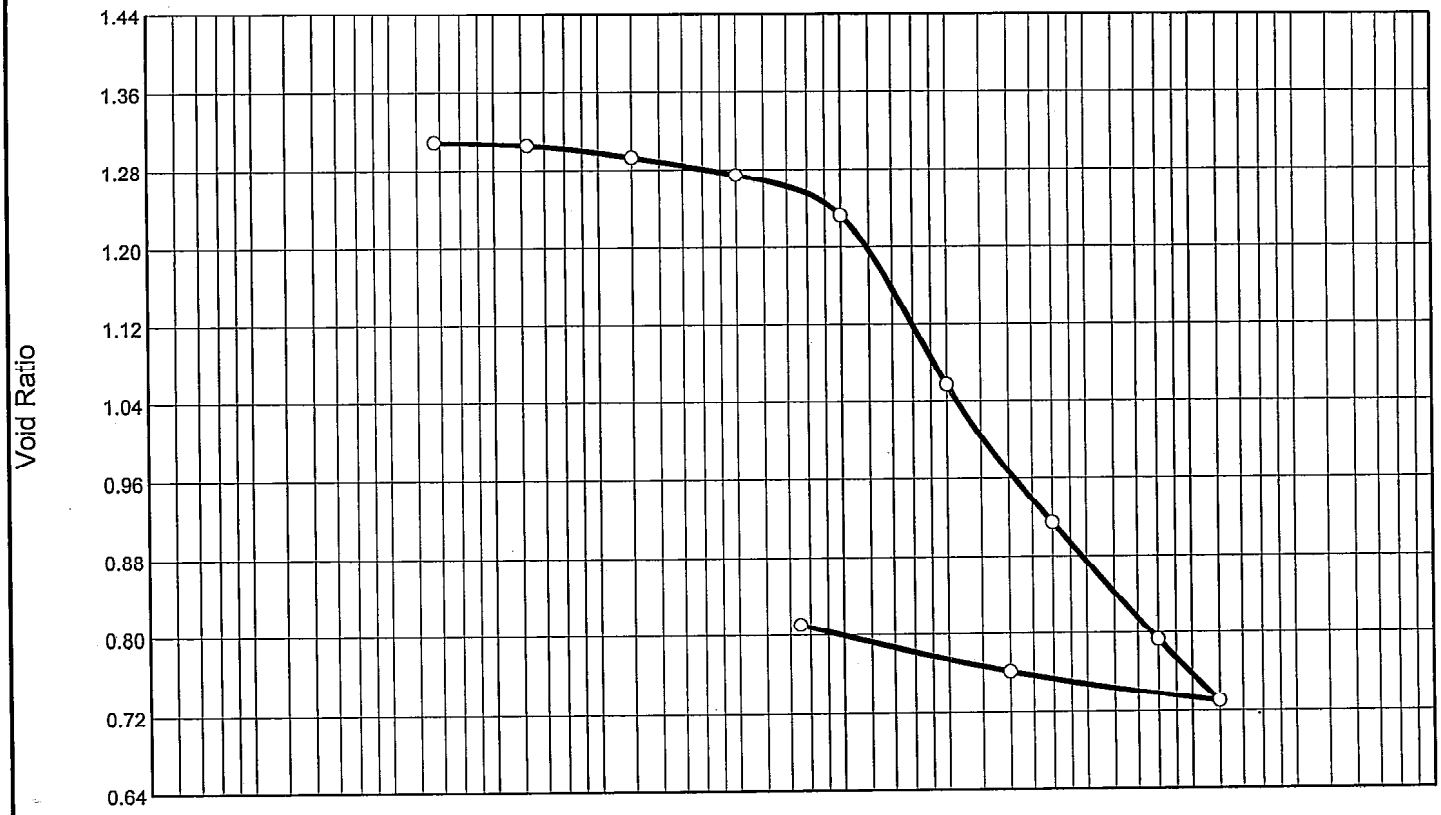
St Rose, LA

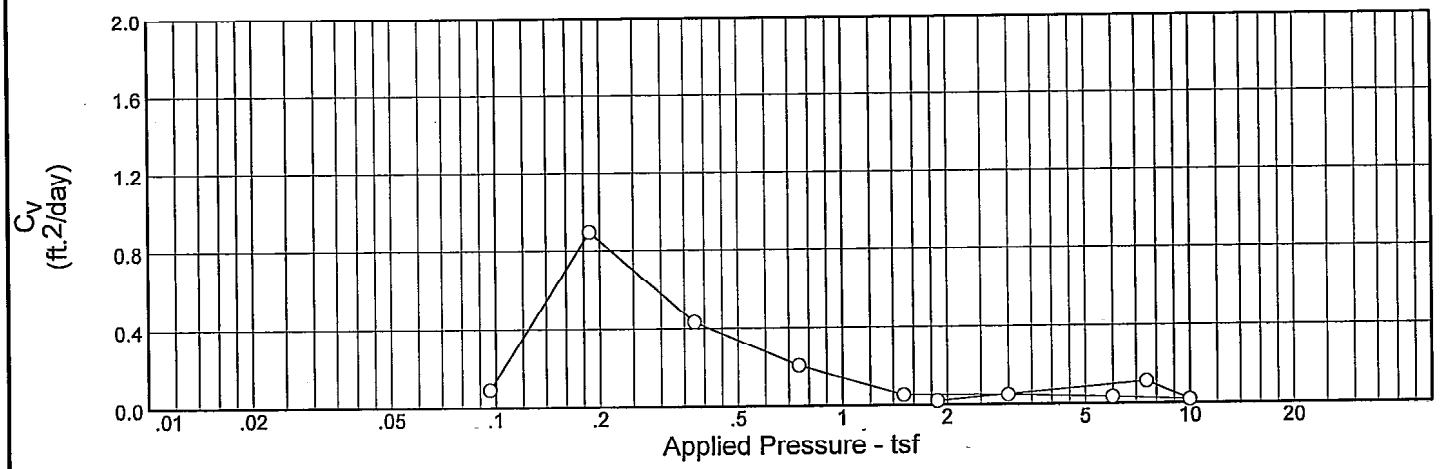
Remarks:

Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

CONSOLIDATION TEST REPORT





Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
97.3 %	46.7 %	73.9	51	30	2.74	1.06	0.62	1.314

MATERIAL DESCRIPTION	USCS	AASHTO
M GR CH2 W/ LNS & LYS ML, SL	CH2	

Project No. 07-022135 **Client:** U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La

Source: MRGO-19U **Sample No.:** 14C **Elev./Depth:** 46.3

FFEBJV, LLC

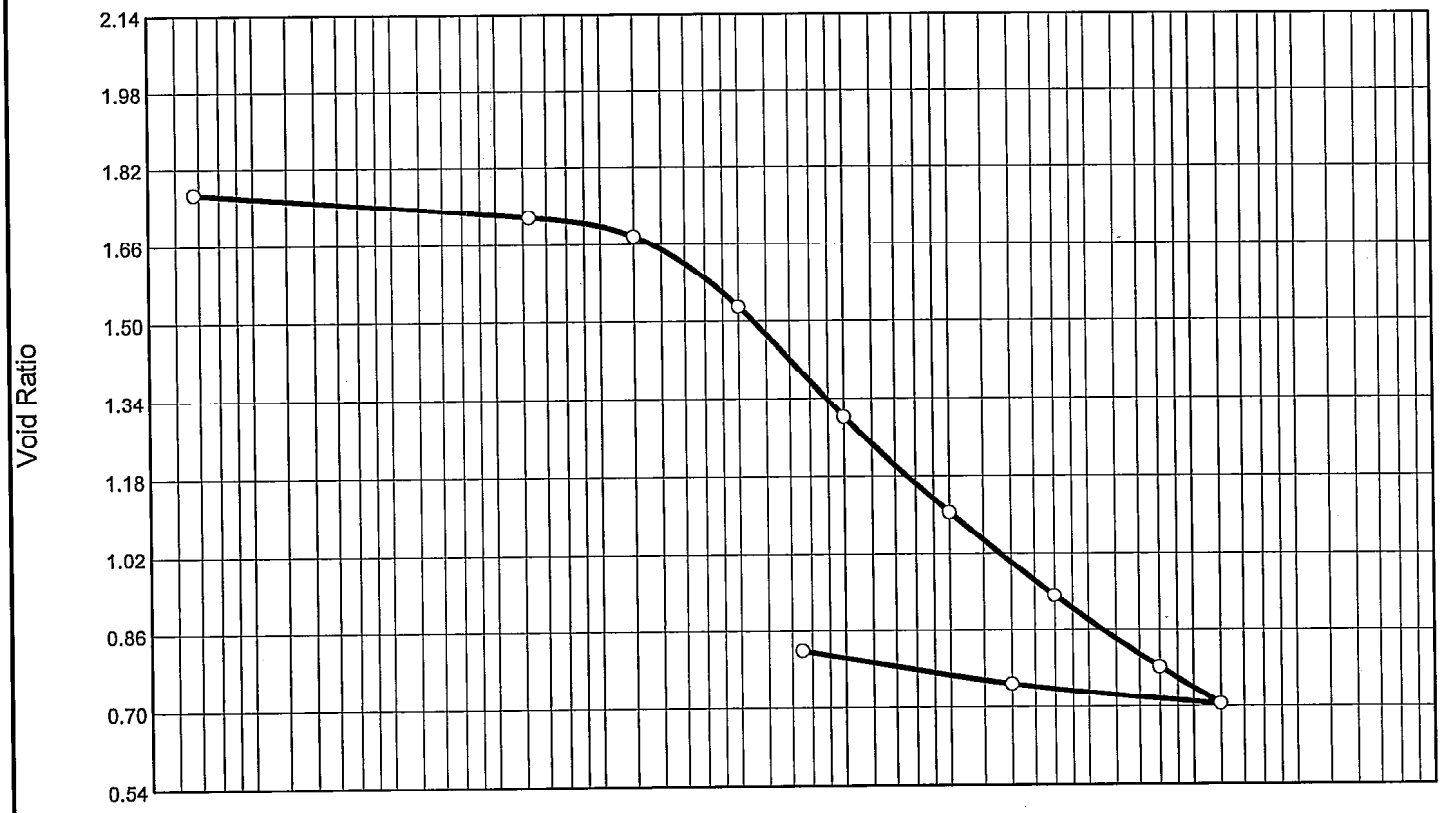
St Rose, LA

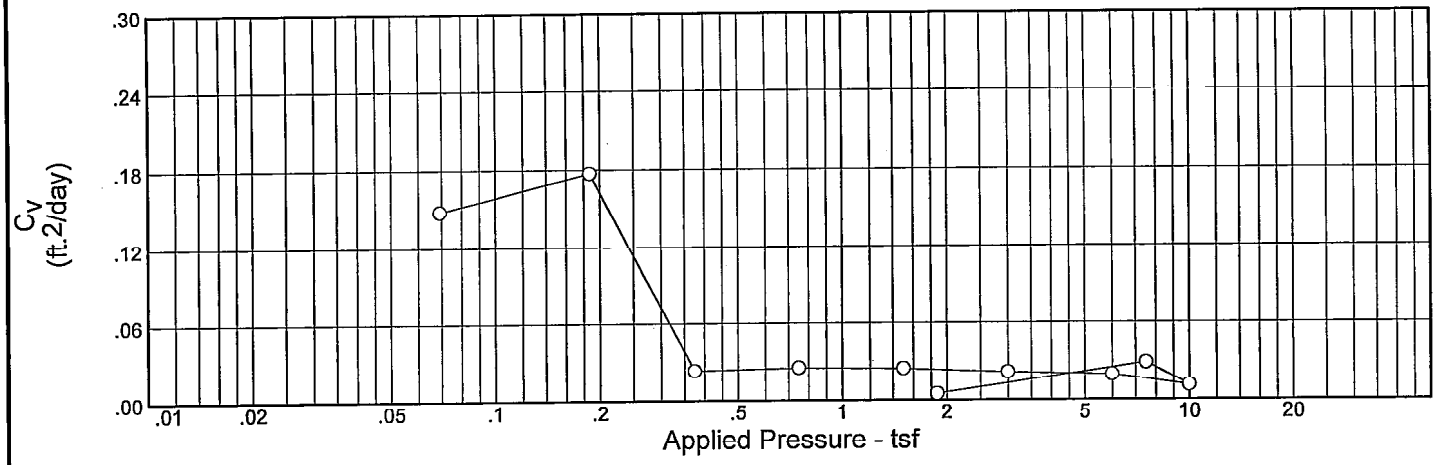
Remarks:

Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

CONSOLIDATION TEST REPORT





Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
98.2 %	63.1 %	62.0	69	48	2.75	0.33	0.73	1.768

MATERIAL DESCRIPTION	USCS	AASHTO
VSO GR CH3 W/ ARS ML, O, SIF	CH3	

Project No. 07-022135 **Client:** U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La

Source: MRGO-20U **Sample No.:** 5C **Elev./Depth:** 17.7

FFEBJV, LLC

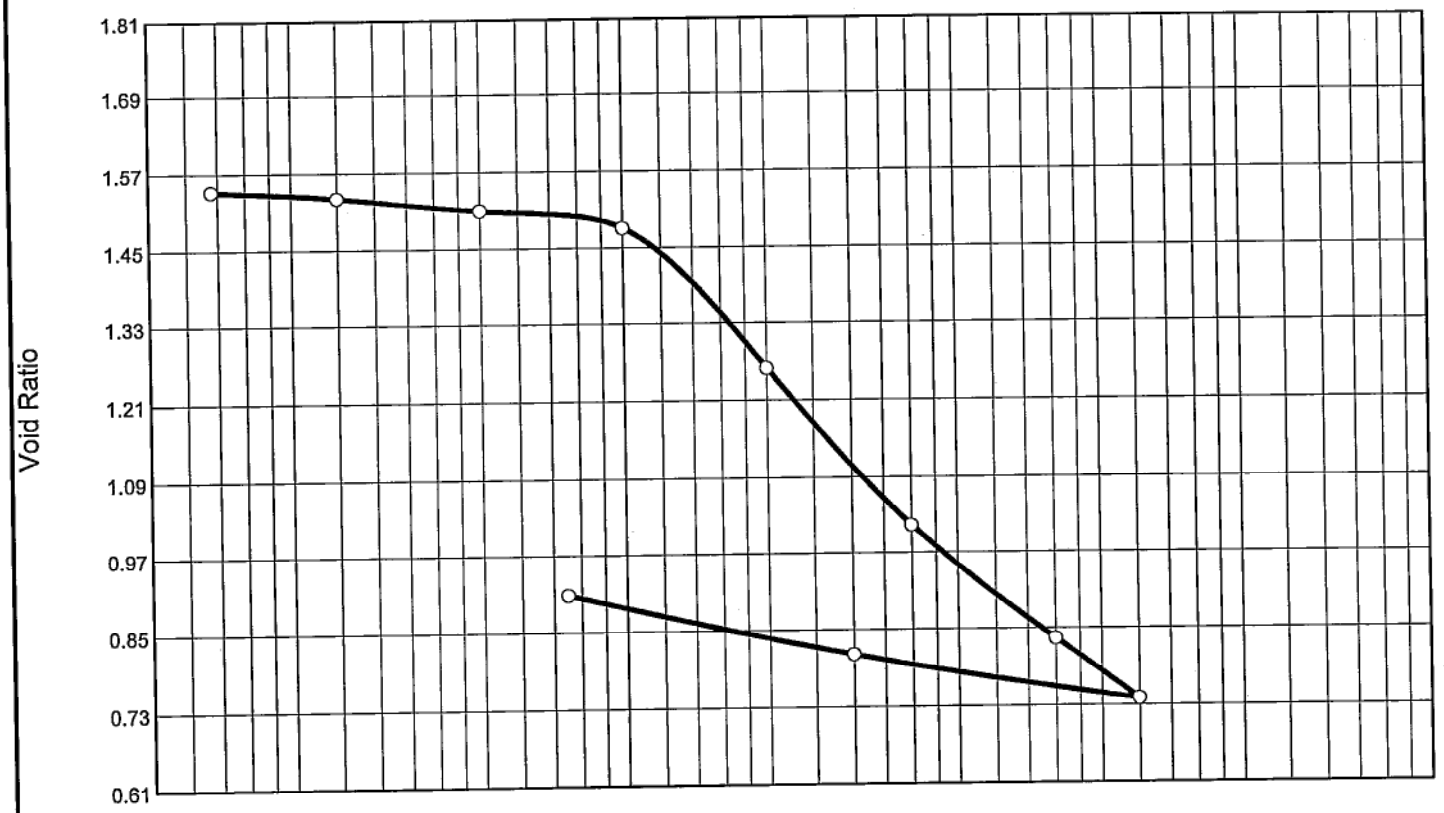
St Rose, LA

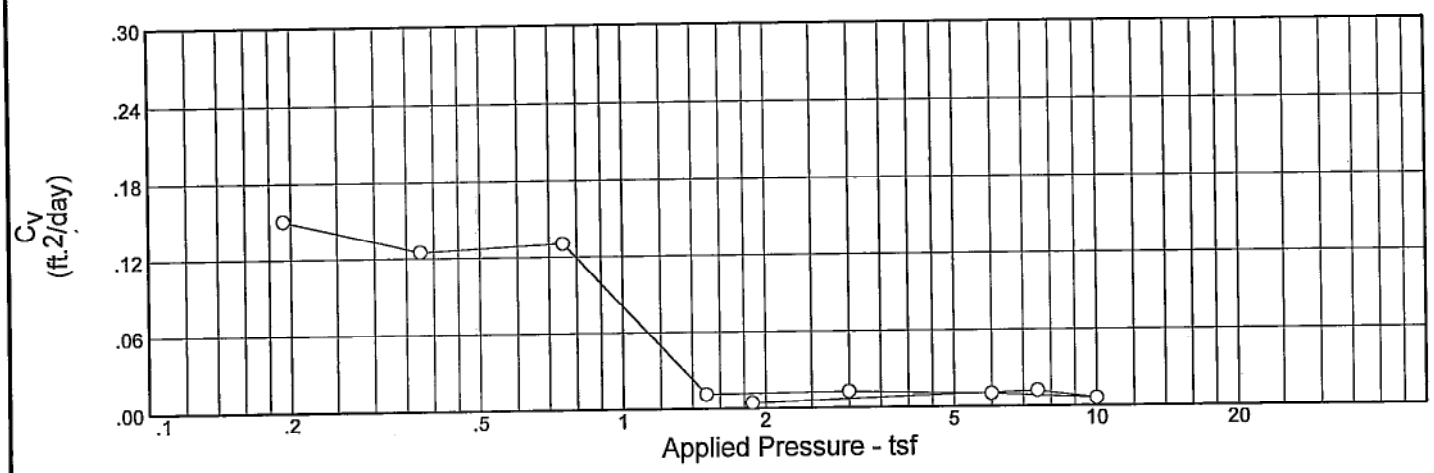
Remarks:

Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

CONSOLIDATION TEST REPORT





Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
96.0 %	53.9 %	67.7	72	49	2.77	1.11	0.85	1.555

MATERIAL DESCRIPTION	USCS	AASHTO
M GR CH4 W/ LNS & LYS ML	CH4	

Project No. 07-022135 **Client:** U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La

Source: MRGO-20U **Sample No.:** 14B **Elev./Depth:** 52.8

FFEBJV, LLC

St Rose, LA

Remarks:

Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

APPENDIX B. PO-148 BILOXI MARSH DEMONSTRATION PROJECT - FIELD AND LABORATORY DATA

This Appendix contains the following:

- Soil Boring Location Plan
- Soil Borings Logs
- Push Core Logs
- Grab Bag Visual Classifications and Moisture Contents
- Laboratory Consolidation Test Results

NOTES

- Biloxi Marsh Living Shoreline Alignment (PO-0174)
- In-Place Biloxi Marsh Living Shoreline Demonstration Project Alignment (PO-148)
- Alignment Removed from Project

Boring, CPT, Push Core, Grab Bag Location

Biloxi Marsh Living Shoreline Project (PO-0174)
Eloi Bay
St. Bernard Parish, Louisiana

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

ENG	Drawn by:	Checked by:
R.A.N.	R.A.N.	M.W.
File No.:	Date:	FIGURE:
17-2828	12/18/18	No. 4

Title:
PO-148 Biloxi Marsh Demonstration Project Boring Location Plan

Living Shoreline Demonstration
Bayou LaLoutre
St. Bernard Parish
Hopedale, Louisiana

Tetra Tech, Inc.
748 Main Street - Suite B
Baton Rouge, Louisiana 70802

LOG OF SOIL BORING B-01

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 12-2909
Date: 8/22/13
Logged by: J. Garner
Driller: Nick
Rig: Barge

Location: Lat. 29° 45' 25.8"
Long. 89° 25' 0.2"
Surface Elevation: (ft., NGVD)

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			0.0 (P)	0.08 t=1.0	180	77	276	73	203		28.8		Very soft dark brown PEAT (Pt)
			0.0 (P)		337	76							
					244	72	247	71	176	64			
			0.5 (P)		196	76							
	5				525	69							
			0.5 (P)	0.12 t=3.0	54	110	41	16	25	95			Very soft gray CLAY (CH)
			0.5 (P)		37	95							with organic
	10				55	98							
			0.5 (P)	0.09 t=5.0	62	103							
				0.16 t=6.0	71	123							
			0.5 (P)		65	103	67	19	48	96			
				0.17 t=6.0	83	94							
	15		0.5 (P)		52	108							
					54	101							
			0.5 (P)	0.25 t=7.0	73	99							Soft gray CLAY (CH)
					83	110							with organic
			0.5 (P)										
	20				78	90							Boring completed at 20 ft.
	25												
	30												
	35												
	40												
	45												
	50												

Ground Water Level Data

Boring Advancement Method

4" Nom. Dia. Short Flight Auger:
0 to 6 ft.
4" Dia. Rotary Wash:
6 to 20 ft.

Boring Abandonment Method

Borehole grouted upon completion

Notes

t = Lateral Confining Pressure (psi).

Strata Boundaries May Not Be Exact

ARD LOG01R 12-2909.GPJ LOG01.GDT 10/21/14

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Hopedale, Louisiana

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Baton Rouge, Louisiana 70802

LOG OF SOIL BORING B-02

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 12-2909
Date: 8/22/13
Logged by: J. Garner
Driller: Nick
Rig: Barge

Location: Lat. 29° 46' 12.7"
Long. 89° 24' 16.4"
Surface Elevation: (ft., NGVD)

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			0.0 (P)	0.07	173	81	285	84	201		27.0		Very soft dark brown PEAT (Pt)
					293	78							
			0.0 (P)	0.09	97	89	117	29	88				Very soft gray CLAY (CH)
					103	83							
	5		0.5 (P)										with organic
			0.5 (P)	0.08	66	102							
					92	96							
			0.5 (P)	0.15	107	91							
	10				73	90							
			0.5 (P)										
					117	70							
			0.5 (P)	0.15	100	90							
					55	92							Very soft gray CLAY (CH)
	15		0.5 (P)				92	21	71				with organic
					90	79							
			0.5 (P)										
					67	92							
			0.5 (P)				214	50	164	75	24.6		Very soft dark gray PEAT (Pt)
	20				215	74							Boring completed at 20 ft.
	25												
	30												
	35												
	40												
	45												
	50												

Ground Water Level Data

Boring Advancement Method

4" Nom. Dia. Short Flight Auger:
0 to 6 ft.
4" Dia. Rotary Wash:
6 to 20 ft.

Boring Abandonment Method

Borehole grouted upon completion

Notes

Strata Boundaries May Not Be Exact

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Hopedale, Louisiana

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LOG OF SOIL BORING B-03

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 12-2909
Date: 8/29/13
Logged by: J. Garner
Driller: Will
Rig: Barge

Location: Lat. 29° 45' 44.2"
Long. 89° 24' 6.4"
Surface Elevation: (ft., NGVD)

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
	0		0.5 (P)	0.08	101	90	98	23	75		8.5		Very soft DARK brown ORGANIC CLAY (OH) with clay layers
			0.5 (P)	0.23	167	77							
			0.5 (P)	t=2.0	43	111							
	5		0.5 (P)		263	69							Very soft DARK brown PEAT (Pt)
			0.5 (P)	0.14	55	94							Very soft gray CLAY (CH)
			0.5 (P)	t=3.0	77	99							
	10		0.5 (P)		67	83							
			0.5 (P)	0.08	86	94	88	25	63				
			0.5 (P)		103	94							Very soft DARK gray ORGANIC CLAY (OH)
			0.5 (P)		139	80							
	15		0.5 (P)	0.16	125	86							
			0.5 (P)	t=6.0	156	88							
			0.5 (P)		60	112							Very soft gray CLAY (CH)
			0.5 (P)										
	20				71	103							
			0.5 (P)	0.37	41	111							Very soft to soft gray CLAY (CH)
	25			t=10.0	41	108							
			0.5 (P)	0.21	49	107							
	30			t=12.0	44	100							
			0.5 (P)	0.16	49	108							
	35			t=14.0	38	98							
			0.5 (P)	0.20	52	107							
	40			t=16.0	48	102							Boring completed at 40 ft.
	45												
	50												

Ground Water Level Data

Boring Advancement Method

4" Nom. Dia. Short Flight Auger:
0 to 6 ft.
4" Dia. Rotary Wash:
6 to 40 ft.

Boring Abandonment Method

Borehole grouted upon completion

Notes

Strata Boundaries May Not Be Exact

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LOG OF SOIL BORING B-04

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 12-2909
Date: 8/20/13
Logged by: J. Garner
Driller: Will
Rig: Barge

Location: Lat. 29° 47' 29.9"
Long. 89° 23' 27.7"
Surface Elevation: (ft., NGVD)

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			0.5 (P)	0.17	127	88	176	42	134		19.4		Very soft dark brown ORGANIC CLAY (OH)
					120	84							
			0.5 (P)	0.11	152	81	94	24	70	100			with clay layers
					166	84							
	5		0.5 (P)	0.11	59	103	76	23	53				
				t=2.0	120	94							
			0.5 (P)	0.10	71	96							Very soft gray CLAY (CH)
				t=4.0	96	100							
			0.5 (P)										with organic
	10				88	72							
			0.5 (P)	0.21	57	103	86	25	61	99			
				t=6.0	65	104							
			0.5 (P)	0.16	77	91							
				t=7.0	90	91							
	15		0.5 (P)				128	32	96	98			
					99	89							
			0.5 (P)	0.12	112	90							
				t=8.0	99	93							
			0.5 (P)										
	20				84	87							Boring completed at 20 ft.
	25												
	30												
	35												
	40												
	45												
	50												

Ground Water Level Data

Boring Advancement Method

4" Nom. Dia. Short Flight Auger:
0 to 8 ft.
4" Dia. Rotary Wash:
8 to 20 ft.

Boring Abandonment Method

Borehole grouted upon completion

Notes

Strata Boundaries May Not Be Exact

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LOG OF SOIL BORING B-05

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 12-2909
Date: 8/20/13
Logged by: J. Garner
Driller: Will
Rig: Barge

Location: Lat. 29° 46' 54.4"
Long. 89° 21' 36.4"
Surface Elevation: (ft., NGVD)

FIELD DATA				LABORATORY DATA										
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			0.5 (P)	0.14 t=1.0	121	84	130	34	96		13.6		Very soft dark brown ORGANIC CLAY (OH)
			0.5 (P)		140	84							
					129	93							
	5		0.5 (P)	0.24 t=3.0	55	103							Very soft gray CLAY (CH)
			1.0 (P)	0.10 t=3.0	41	107							
					69	100							
			0.5 (P)		77	91							
	10				43	94							
			1.0 (P)										Soft to medium stiff gray CLAY (CH)
			0.5 (P)	0.61 t=6.0	50	100							
					44	111							
				0.26 t=6.0	56	106							
	15		0.5 (P)		64	105							
					70	100							
			0.5 (P)										
					91	94							
			0.5 (P)	0.30 t=8.0	69	98							
	20				59	90							Boring completed at 20 ft.
	25												
	30												
	35												
	40												
	45												
	50												

Ground Water Level Data

Boring Advancement Method

4" Nom. Dia. Short Flight Auger:
0 to 8 ft.
4" Dia. Rotary Wash:
8 to 20 ft.

Boring Abandonment Method

Borehole grouted upon completion

Notes

t = Lateral Confining Pressure (psi).

Strata Boundaries May Not Be Exact

ARD LOG01R 12-2909.GPJ LOG01.GDT 10/21/14

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Hopedale, Louisiana

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Baton Rouge, Louisiana 70802

LOG OF SOIL BORING B-06

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 12-2909
Date: 8/26/13
Logged by: JP
Driller: DA
Rig: Barge

Location: Lat. 29° 46' 46.9"
Long. 89° 19' 52.4"
Surface Elevation: (ft., NGVD)

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
	0		0.0 (P)	0.11 t=1.0	116	89	90	23	67		8.3		Very soft gray ORGANIC CLAY (OH)
			0.0 (P)		90	82							
			0.0 (P)		105	80							
	5		0.0 (P)		95	84							
			0.5 (P)	0.28 t=3.0	67	99							Soft gray CLAY (CH)
			0.0 (P)		108	91	49	21	28				with organic & silt layers
	10		0.0 (P)	0.25 t=6.0	72	90							
					66	102							
					95	89							
			0.0 (P)	0.20 t=7.0	43	114							Soft to medium stiff gray CLAY (CH)
			0.75 (P)		41	88	55	21	34				
	15		0.0 (P)	0.33 t=8.0	33	114							
					50	112							
			0.0 (P)	0.52 t=9.0	43	103							
	20				35	122							Boring completed at 20 ft.
					43	110							
	25												
	30												
	35												
	40												
	45												
	50												

Ground Water Level Data

Boring Advancement Method

4" Dia. Rotary Wash:
to 20 ft.

Boring Abandonment Method

Borehole grouted upon completion

Notes

t = Lateral Confining Pressure (psi).

Strata Boundaries May Not Be Exact

ARD LOG01R 12-2909.GPJ LOG01.GDT 10/21/14

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Bayou LaLoutre
St. Bernard Parish
Hopedale, Louisiana

Tetra Tech, Inc.
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Baton Rouge, Louisiana 70802

LOG OF SOIL BORING B-07

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 12-2909
Date: 8/26/13
Logged by: JP
Driller: DA
Rig: Barge

Location:

Surface Elevation: (ft., NGVD)

FIELD DATA				LABORATORY DATA										
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			0.0 (P)	0.05 t=1.0	95 116	73 78	139	43	96		17.2		Very soft dark brown CLAY (CH)
			0.25 (P)										with organic
	5		0.25 (P)	0.08 t=2.0	82 69	100 102	49	16	33	100			Very soft gray CLAY (CH)
			0.0 (P)	0.21 t=3.0	56 50	109 111							with silt layers
			0.0 (P)	0.20 t=4.0	48	115	43	19	24	100			
	10		0.0 (P)		63	109							
			0.0 (P)	0.14 t=6.0	67	103							
	15		0.0 (P)		30	109							
			0.0 (P)	1.28 t=7.0	64 27	102 125							Loose gray SILTY SAND (SM)
	20		0.0 (P)		28	121							
													Boring completed at 20 ft.
	25												
	30												
	35												
	40												
	45												
	50												

Ground Water Level Data

Boring Advancement Method

4" Dia. Rotary Wash:
to 20 ft.

Boring Abandonment Method

Borehole grouted upon completion

Notes

t = Lateral Confining Pressure (psi).

Strata Boundaries May Not Be Exact

ARD LOG01R 12-2909.GPJ LOG01.GDT 10/21/14

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Bayou LaLoutre
St. Bernard Parish
Hopedale, Louisiana

Tetra Tech, Inc.
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Baton Rouge, Louisiana 70802

LOG OF SOIL BORING B-08

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 12-2909
Date: 8/26/13
Logged by: J. Garner
Driller: Nick
Rig: Barge

Location: Lat. 29° 45' 50.6"
Long. 89° 18' 33.5"
Surface Elevation: (ft., NGVD)

FIELD DATA				LABORATORY DATA										
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			0.0 (P)	0.12	132	84	108	32	76		15.4		Very soft dark gray ORGANIC CLAY (OH)
			No (P)		121	72							
					120	81							
	5		0.0 (P)	0.29	35	123	48	18	30				Very soft to soft gray SILTY CLAY (CL)
					32	111							
			0.0 (P)	0.16	39	115							with clay layers
					34	117							
			0.5 (P)										
	10				34	112							
			0.5 (P)	0.16	52	107							
					53	107							
			1.0 (P)	1.81	28	126							Loose gray SILTY SAND (SM)
					26	115							
	15		0.0 (P)							34			
					24	117							
			3-3-5										
	20		4-3-7										
	25		4-6-6										
			1.0 (P)	1.18	21	133				31			Loose gray SILTY SAND (SM)
	30				18	119							
			1.0 (P)	0.26	35	115							Soft gray SILTY CLAY (CL)
	35				29	109							
													Loose gray SILTY SAND (SM)
			4-4-8										
	40												Boring completed at 40 ft.
	45												
	50												

Ground Water Level Data

Boring Advancement Method

4" Nom. Dia. Short Flight Auger:
0 to 8 ft.
4" Dia. Rotary Wash:
8 to 40 ft.

Boring Abandonment Method

Borehole grouted upon completion

Notes

Strata Boundaries May Not Be Exact

ARD LOG01R 12-2909.GPJ LOG01.GDT 10/21/14

Living Shoreline Demonstration
Bayou LaLoutre
St. Bernard Parish
Hopedale, Louisiana

Tetra Tech, Inc.
748 Main Street - Suite B
Baton Rouge, Louisiana 70802

LOG OF SOIL BORING B-09

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 12-2909
Date: 8/26/13
Logged by: J. Garner
Driller: Nick
Rig: Barge

Location: Lat. 29° 45' 33.9"
Long. 89° 18' 19.2"
Surface Elevation: (ft., NGVD)

FIELD DATA				LABORATORY DATA										
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
	0		0.0 (P)	0.11 t=1.0	108 104	88 79	92	27	65		12.3		Very soft dark gray ORGANIC CLAY (OH)
			0.0 (P)	0.15 t=2.0	59 52	107 95							Very soft dark gray CLAY (CH)
	5		1.0 (P)										
			1.0 (P)	2.58 t=3.0	28 25 36	126 130 108				77			Loose gray SANDY SILT (ML)
			0.5 (P)		27	115							
	10		0.5 (P)	0.19 t=5.0	68	101							Loose gray SILTY SAND (SM)
			0.5 (P)	0.74 t=6.0	30 26	110 124				61			with clay and organic clay layers
	15		0.0 (P)	0.17 t=6.0	35 214	109 77							
			0.0 (P)	2.43 t=7.0	34 23	110 128							
			0.0 (P)		29	114							
	20				26	113				22			Boring completed at 20 ft.
	25												
	30												
	35												
	40												
	45												
	50												

Ground Water Level Data

Boring Advancement Method

4" Nom. Dia. Short Flight Auger:
0 to 6 ft.
4" Dia. Rotary Wash:
6 to 20 ft.

Boring Abandonment Method

Borehole grouted upon completion

Notes

t = Lateral Confining Pressure (psi).

Strata Boundaries May Not Be Exact

ARD LOG01R 12-2909.GPJ LOG01.GDT 10/21/14

Living Shoreline Demonstration
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St. Bernard Parish
Hopedale, Louisiana

Tetra Tech, Inc.
748 Main Street - Suite B
Baton Rouge, Louisiana 70802

LOG OF SOIL BORING B-10

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 12-2909
Date: 8/27/13
Logged by: J. Garner
Driller: Nick
Rig: Barge

Location: Lat. 29° 45' 50"
Long. 89° 17' 14.2"
Surface Elevation: (ft., NGVD)

FIELD DATA				LABORATORY DATA										
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			0.5 (P)	0.11	220	79	70	29	41		7.7		Very soft dark brown CLAY (CH)
				t=1.0	182	83							
			1.0 (P)	0.21	66	99							with organic
				t=2.0	66	88							Very soft to soft gray CLAY (CH)
	5		0.5 (P)	0.27	74	102	90	22	68	99			
				t=2.0	60	103							with trace organic
			0.5 (P)										
					75	93							
			1.0 (P)	0.14	75	96	135	31	104	95			
	10			t=4.0	88	93							
			0.5 (P)										Very soft dark gray ORGANIC CLAY (OH)
					112	95							
			0.5 (P)	0.18	103	91							
				t=6.0	141	93							
	15		0.5 (P)	0.24	104	90	59	16	43	99			
				t=6.0	88	95							
			2.5 (P)										Loose gray SILTY SAND (SM)
					32	104							
			1.0 (P)	1.94	27	122							
	20			t=8.0	30	126							
													Boring completed at 20 ft.
	25												
	30												
	35												
	40												
	45												
	50												

Ground Water Level Data

Boring Advancement Method

4" Nom. Dia. Short Flight Auger:
0 to 6 ft.
4" Dia. Rotary Wash:
6 to 20 ft.

Boring Abandonment Method

Borehole grouted upon completion

Notes

t = Lateral Confining Pressure (psi).

Strata Boundaries May Not Be Exact

ARD LOG01R 12-2909.GPJ LOG01.GDT 10/21/14

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LOG OF SOIL BORING B-11

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 12-2909
Date: 8/26/13
Logged by: J. Garner
Driller: Nick
Rig: Barge

Location: Lat. 29° 46' 25.3"
Long. 89° 17' 36.8"
Surface Elevation: (ft., NGVD)

FIELD DATA				LABORATORY DATA										
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
	0		0.0 (P)	0.21	142	86	140	33	107		8.3		Very soft dark brown ORGANIC CLAY (OH)
			0.0 (P)	t=1.0	111	77							
				0.07	110	93							
				t=2.0	253	83							
	5		0.5 (P)										
			0.5 (P)	0.13	107	91							
				t=4.0	157	82							
			0.0 (P)	0.15	105	67							Very soft dark gray ORGANIC CLAY (OH)
	10			t=5.0	124	79							
			0.5 (P)										
					100	94							
			0.5 (P)	0.18	65	102	218	70	148				
				t=7.0	154	87							
	15		0.5 (P)										
					126	100							
			0.5 (P)	0.24	37	118							Very soft to soft gray SILTY CLAY (CL)
				t=8.0	60	94							
			0.5 (P)										with clay layers
	20				31	110							
			0.5 (P)	0.28	44	112	49	22	27				
	25			t=11.0	68	100							
			0.5 (P)	0.81	27	124							
	30			t=13.0	50	110							
			0.5 (P)	0.19	59	107							
	35			t=15.0	51	109							
			0.5 (P)	2.45	28	124							
	40			t=17.0	51	110							Boring completed at 40 ft.
	45												
	50												

Ground Water Level Data

Boring Advancement Method

4" Nom. Dia. Short Flight Auger:
0 to 8 ft.
4" Dia. Rotary Wash:
8 to 40 ft.

Boring Abandonment Method

Borehole grouted upon completion

Notes

t = Lateral Confining Pressure (psi).

Strata Boundaries May Not Be Exact

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Hopedale, Louisiana

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Baton Rouge, Louisiana 70802

LOG OF SOIL BORING B-12

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 12-2909
Date: 8/28/13
Logged by: J. Garner
Driller: Nick
Rig: Barge

Location: Lat. 29° 46' 58.9"
Long. 89° 17' 30.3"
Surface Elevation: (ft., NGVD)

FIELD DATA				LABORATORY DATA										
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
	0		0.0 (P)	0.15	117	88	120	35	85		11.4		Very soft dark gray ORGANIC CLAY (OH)
			0.5 (P)	t=1.0	155	78							
				0.12	128	89							
				t=2.0	103	79							
	5		0.5 (P)	0.22	75	97	104	27	77				Very soft gray CLAY (CH) with organic
				t=2.0	82	91							
			0.5 (P)										
					39	103							Soft gray CLAY (CH)
			0.5 (P)	0.27	47	83	67	21	46				
	10			t=4.0	34	112							
			0.5 (P)	0.32	44	114							
				t=5.0	36	107							
			0.5 (P)										
					77	98							
	15		0.5 (P)	0.32	59	106	53	27	26				
				t=6.0	67	106							
			0.5 (P)										
					59	86							
			0.5 (P)	0.28	79	96							
	20			t=8.0	83	94							Boring completed at 20 ft.
	25												
	30												
	35												
	40												
	45												
	50												

Ground Water Level Data

Boring Advancement Method

4" Nom. Dia. Short Flight Auger:
0 to 8 ft.
4" Dia. Rotary Wash:
8 to 20 ft.

Boring Abandonment Method

Borehole grouted upon completion

Notes

t = Lateral Confining Pressure (psi).

Strata Boundaries May Not Be Exact

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Hopedale, Louisiana

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LOG OF SOIL BORING B-13

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 12-2909
Date: 8/28/13
Logged by: J. Garner
Driller: Nick
Rig: Barge

Location: Lat. 29° 47' 30.5"
Long. 89° 17' 53.8"
Surface Elevation: (ft., NGVD)

Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			0.0 (P)	0.10	82	96	84	22	62		11.4		Very soft dark gray ORGANIC CLAY (OH)
				t=1.0	104	85							
			0.5 (P)	0.21	84	96	108	18	90	99			
				t=1.0	194	82							
	5		1.0 (P)	0.37	50	110	113	29	84				Soft gray CLAY (CH)
				t=2.0	46	95							
			1.0 (P)	0.38	49	111							
				t=3.0	34	94							Soft gray SILTY CLAY (CL) with silt layers
			0.5 (P)	0.36	40	115							
	10			t=4.0	36	106							
			0.5 (P)	1.50	30	124	29	26	3				
				t=5.0	37	113							
			0.5 (P)	0.36	64	103							Very soft to soft gray CLAY (CH)
				t=6.0	70	106							with organic
	15		0.5 (P)	0.16	50	110							
				t=6.0	47	101							
			0.5 (P)	0.37	57	107							
				t=7.0	65	105							
			0.5 (P)	0.31	118	87	165	40	125	99			
	20			t=8.0	115	100							
			0.5 (P)	0.32	59	103							
	25			t=10.0	142	102							
			0.5 (P)	0.26	66	102	109	27	82	98			
	30			t=12.0	81	97							
			0.5 (P)	0.21	82	96							
	35			t=14.0	82	88							
			1.0 (P)	0.25	85	94							
	40			t=16.0	96	87							Boring completed at 40 ft.
	45												
	50												

Ground Water Level Data

Boring Advancement Method

4" Nom. Dia. Short Flight Auger:
0 to 8 ft.
4" Dia. Rotary Wash:
8 to 40 ft.

Boring Abandonment Method

Borehole grouted upon completion

Notes

t = Lateral Confining Pressure (psi).

Strata Boundaries May Not Be Exact

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Hopedale, Louisiana

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LOG OF SOIL BORING B-14

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 12-2909
Date: 8/24/13
Logged by: JP
Driller: DA
Rig: Airboat

Location: Lat. 29° 47' 53.1"
Long. 89° 17' 38.6"
Surface Elevation: (ft., NGVD)

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			0.0 (P)	0.13 t=1.0	102	90	77	21	56		8.2		Very soft dark gray CLAY (CH)
			0.0 (P)		111	83							with organic
					96	84							
	5		0.0 (P)	0.30 t=3.0	52	108							Soft gray CLAY (CH)
					52	104							
			0.0 (P)	0.44 t=3.0	43	112	74	20	54				with silt layers
					48	112							
			1.0 (P)										
	10				41	109							
			0.5 (P)	0.22 t=5.0	48	113							
					62	94							
			0.5 (P)										
					44	111							
	15		0.5 (P)	0.56 t=6.0	35	120	62	21	41				
					37	106							
			0.0 (P)										
					41	111							
			0.5 (P)	0.14 t=8.0	46	110							
	20				43	117							Boring completed at 20 ft.
	25												
	30												
	35												
	40												
	45												
	50												

Ground Water Level Data

Boring Advancement Method

4" Dia. Rotary Wash:
to 20 ft.

Boring Abandonment Method

Borehole grouted upon completion

Notes

t = Lateral Confining Pressure (psi).

Strata Boundaries May Not Be Exact

ARD LOG01R 12-2909.GPJ LOG01.GDT 10/21/14

Living Shoreline Demonstration
Bayou LaLoutre
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LOG OF SOIL BORING B-15

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 12-2909
Date: 8/23/13
Logged by: JP
Driller: DA
Rig: Airboat

Location: Lat. 29° 47' 53.6"
Long. 89° 18' 4.7"
Surface Elevation: (ft., NGVD)

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
	0		0.0 (P)	0.18 t=1.0	95 208	91 72	102	27	75		16.4		Very soft dark brown ORGANIC CLAY (OH)
			0.0 (P)	0.19 t=2.0	60 63	105 100							Very soft gray CLAY (CH)
	5		0.0 (P)		145	75							with organic
			0.25 (P)	0.11 t=3.0	66 57	101 108	91	40	51				
			0.25 (P)		49	105							
	10		0.5 (P)	0.28 t=5.0	44 39	115 110							Soft gray SILTY CLAY (CL)
			0.0 (P)	0.28 t=6.0	46 41	112 99	39	19	20				
	15		0.0 (P)										
			0.0 (P)	0.28 t=7.0	40 39	116 101							Loose gray SANDY SILT (ML)
			0.25 (P)	0.52 t=8.0	32 31	130 106				68			with clay layers
	20												Boring completed at 20 ft.
	25												
	30												
	35												
	40												
	45												
	50												

Ground Water Level Data

Boring Advancement Method

4" Dia. Rotary Wash:
to 20 ft.

Boring Abandonment Method

Borehole grouted upon completion

Notes

t = Lateral Confining Pressure (psi).

Strata Boundaries May Not Be Exact

ARD LOG01R 12-2909.GPJ LOG01.GDT 10/21/14

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Hopedale, Louisiana

Tetra Tech, Inc.
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LOG OF SOIL BORING B-16

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 12-2909
Date: 8/22/13
Logged by: JP
Driller: DA
Rig: Airboat

Location: Lat. 29° 47' 9"
Long. 89° 18' 43.1"
Surface Elevation: (ft., NGVD)

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			0.0 (P)	0.08	171	78	127	30	97		14.9		Very soft dark gray ORGANIC CLAY (OH)
			0.0 (P)	t=1.0 0.11	160 129	78 85							
				t=2.0	106	84							
	5		0.0 (P)	0.22	60	101							Very soft to soft gray CLAY (CH)
				t=2.0	60	93							
			0.5 (P)	0.31									
				t=3.0	41	103							
			1.25 (P)				72	NP	72				
	10				42	125							
			1.0 (P)	0.61	41	113							Soft to medium stiff gray CLAY (CH)
				t=5.0	41	104							
			0.75 (P)										
					42	113							
	15		0.5 (P)	0.27	47	111	53	20	33				
				t=6.0	40	108							
			1.0 (P)										
					39	112							
			0.0 (P)	0.30	36	121							
	20			t=8.0	36	108							Boring completed at 20 ft.
	25												
	30												
	35												
	40												
	45												
	50												

Ground Water Level Data

Boring Advancement Method

4" Dia. Rotary Wash:
to 20 ft.

Boring Abandonment Method

Borehole grouted upon completion

Notes

t = Lateral Confining Pressure (psi).

Strata Boundaries May Not Be Exact

ARD LOG01R 12-2909.GPJ LOG01.GDT 10/21/14

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Hopedale, Louisiana

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LOG OF SOIL BORING B-17

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 12-2909
Date: 8/24/13
Logged by: JP
Driller: DA
Rig: Airboat

Location: Lat. 29° 47' 59"
Long. 89° 19' 10.1"
Surface Elevation: (ft., NGVD)

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
	0			0.15 t=1.0	176 167	79 76	41	33	8		8.7		Very soft dark brown ORGANIC CLAY (OH)
					101	76							Very soft brown CLAY (CH) with organic
	5			0.19 t=3.0 0.40 t=3.0 0.09 t=5.0	67 67 50 50 69 47	99 88 109 114 100 101	85	25	60				Very soft to soft gray CLAY (CH)
	10												
	15			0.72 t=7.0 0.35 t=8.0 0.25 t=9.0	44 44 43 51 51 40 49 39	116 112 104 95 110 106 109 103	68 77	21 25	47 52				Soft to medium stiff gray CLAY (CH)
	20												Boring completed at 20 ft.
	25												
	30												
	35												
	40												
	45												
	50												

Ground Water Level Data

Boring Advancement Method

4" Dia. Rotary Wash:
to 20 ft.

Boring Abandonment Method

Borehole grouted upon completion

Notes

t = Lateral Confining Pressure (psi).

Strata Boundaries May Not Be Exact

ARD LOG01R 12-2909.GPJ LOG01.GDT 10/21/14

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Hopedale, Louisiana

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LOG OF SOIL BORING B-18

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 12-2909
Date: 8/22/13
Logged by: JP
Driller: DA
Rig: Airboat

Location: Lat. 29° 47' 0.6"
Long. 89° 20' 9.8"
Surface Elevation: (ft., NGVD)

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
	0		0.0 (P)	0.21	66	98	98	27	71		5.7		Very soft dark gray CLAY (CH)
			0.0 (P)	0.16 t=1.0	70 98	88 93							with organic
	5		0.25 (P)		108	83							
			0.0 (P)	0.12 t=3.0	63	104	65	20	45				Very soft gray CLAY (CH)
			0.5 (P)	0.13 t=4.0	53 59	100 105							
	10		0.25 (P)		55	102							Soft to medium stiff
			0.25 (P)	0.22 t=6.0	35 40	119 117	50	20	30				gray SILTY CLAY (CL)
	15		0.75 (P)		36	110							
			0.0 (P)	0.82 t=6.0	32 30	108 125							Loose gray CLAYEY SILT (ML)
			0.5 (P)		32	102				94			
	20				34	107							Boring completed at 20 ft.
	25												
	30												
	35												
	40												
	45												
	50												

Ground Water Level Data

Boring Advancement Method

4" Dia. Rotary Wash:
to 20 ft.

Boring Abandonment Method

Borehole grouted upon completion

Notes

t = Lateral Confining Pressure (psi).

Strata Boundaries May Not Be Exact

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Hopedale, Louisiana

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Baton Rouge, Louisiana 70802

LOG OF SOIL BORING B-19

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 12-2909
Date: 8/21/13
Logged by: JP
Driller: DA
Rig: Airboat

Location: Lat. 29° 47' 49.9"
Long. 89° 20' 56.3"
Surface Elevation: (ft., NGVD)

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
	0		0.0 (P)		137	74	126	38	88		16.3		Very soft dark brown ORGANIC CLAY (OH)
			0.0 (P)	0.12 t=2.0	112	89							
					142	79							
	5		0.0 (P)										Very soft dark brown PEAT (Pt)
			0.0 (P)	0.08 t=3.0	225	74	286	64	222				
					340	67							
			0.0 (P)				202	63	139				
	10		0.0 (P)	0.15 t=5.0	170	74							
					294	74							
			0.0 (P)		246	89							
					282	76							
	15		0.0 (P)		97	76							Very soft gray CLAY (CH)
			0.0 (P)		86	91							with organic
			0.0 (P)	0.10 t=8.0	92	94	76	22	54				
	20				86	116							
	25		0.0 (P)	0.21 t=10.0	72	99							
					85	84							
	30		0.25 (P)		34	105				58			Loose gray SILTY SAND (SM)
	35		0.25 (P)		28	114							
	40		0.0 (P)	1.66 t=16.0	29	119				32			
					27	111							Boring completed at 40 ft.
	45												
	50												

Ground Water Level Data	Boring Advancement Method	Notes
	4" Dia. Rotary Wash: to 40 ft.	
	Boring Abandonment Method	
	Borehole grouted upon completion	Strata Boundaries May Not Be Exact

ARD LOG01R 12-2909.GPJ LOG01.GDT 10/21/14

Living Shoreline Demonstration
Bayou LaLoutre
St. Bernard Parish
Hopedale, Louisiana

Tetra Tech, Inc.
748 Main Street - Suite B
Baton Rouge, Louisiana 70802

LOG OF SOIL BORING B-20

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 12-2909
Date: 8/21/13
Logged by: JP
Driller: DA
Rig: Airboat

Location: Lat. 29° 47' 54.7"
Long. 89° 21' 43.7"
Surface Elevation: (ft., NGVD)

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			0.0 (P)		172	74	120	31	89		17.0		Very soft dark brown ORGANIC CLAY (OH)
			0.0 (P)		199	81							
	5		0.5 (P)	0.11 t=2.0	144 116	85 73	128	38	90				
			0.0 (P)	0.10 t=3.0	85 89	94 92							Very soft dark gray ORGANIC CLAY (OH)
			0.0 (P)		140	87							
	10		0.0 (P)	0.14 t=5.0	113 159	84 91	166	53	113				
			0.0 (P)		174	73							
	15		0.75 (P)	0.15 t=6.0	71 55	102 83	171	44	127				Very soft gray CLAY (CH)
			0.75 (P)		47	105							
			0.0 (P)	0.16 t=7.0	59 69	103 105							
	20												Boring completed at 20 ft.
	25												
	30												
	35												
	40												
	45												
	50												

Ground Water Level Data

Boring Advancement Method

4" Dia. Rotary Wash:
to 20 ft.

Boring Abandonment Method

Borehole grouted upon completion

Notes

Strata Boundaries May Not Be Exact

ARD LOG01R 12-2909.GPJ LOG01.GDT 10/21/14

Biloxi Marsh Living Shoreline
(P0-0174)
Eloi Bay
St. Bernard Parish, Louisiana

Mott MacDonald
10415 Morado Circle, Suite 300
Austin, TX 78759

LOG OF SOIL BORING P-01

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 17-2828
Date: 8/22/18
Logged by: Black
Driller:
Rig:

Location: Lat. 29° 45' 25.7"
Long. 89° 24' 59.8"
Surface Elevation: 0 (ft. NGVD)

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			0.0 (P)	0.15 t=1.0	134	84	121	31	90		8.9		Very soft brown CLAY (CH) with organic
					228	70							
													Boring completed at 2 ft.
	5												
	10												
	15												

Ground Water Level Data

Boring Advancement Method

Push Core
0 to 2 ft.

Boring Abandonment Method

Notes

t = Lateral Confining Pressure (psi).

Strata Boundaries May Not Be Exact

ARD LOG01R 17-2828 - 9-4-2018.GPJ LOG01.GDT 12/20/18

Biloxi Marsh Living Shoreline
(P0-0174)
Eloi Bay
St. Bernard Parish, Louisiana

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Austin, TX 78759

LOG OF SOIL BORING P-02

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 17-2828
Date: 8/22/18
Logged by: Black
Driller:
Rig:

Location: Lat. 29° 46' 4.4"
Long. 89° 24' 38.7"
Surface Elevation: 0 (ft. NGVD)

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			0.0 (P)	0.17 t=1.0	132	88	127	34	93		10.8		Very soft brown ORGANIC CLAY (OH)
					205	77							
													Boring completed at 2 ft.
	5												
	10												
	15												

Ground Water Level Data	Boring Advancement Method	Notes
	Push Core 0 to 2 ft.	t = Lateral Confining Pressure (psi).
	Boring Abandonment Method	

Strata Boundaries May Not Be Exact

ARD LOG01R 17-2828 - 9-4-2018.GPJ LOG01.GDT 12/20/18

Biloxi Marsh Living Shoreline
(P0-0174)
Eloi Bay
St. Bernard Parish, Louisiana

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LOG OF SOIL BORING P-03

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 17-2828
Date: 8/22/18
Logged by: Black
Driller:
Rig:

Location: Lat. 29° 46' 12.8"
Long. 89° 24' 16.2"
Surface Elevation: 0 (ft. NGVD)

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			0.0 (P)	0.12 t=1.0	264	77	103	26	77		10.8		Very soft brown ORGANIC CLAY (OH)
					225	73							
													Boring completed at 2 ft.
	5												
	10												
	15												

Ground Water Level Data	Boring Advancement Method	Notes
	Push Core 0 to 2 ft.	t = Lateral Confining Pressure (psi).
	Boring Abandonment Method	
		Strata Boundaries May Not Be Exact

ARD LOG01R 17-2828 - 9-4-2018.GPJ LOG01.GDT 12/20/18

Biloxi Marsh Living Shoreline
(P0-0174)
Eloi Bay
St. Bernard Parish, Louisiana

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Austin, TX 78759

LOG OF SOIL BORING P-04

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 17-2828
Date: 8/22/18
Logged by: Black
Driller:
Rig:

Location: Lat. 29° 46' 44.3"
Long. 89° 24' 7.1"
Surface Elevation: 0 (ft. NGVD)

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			0.0 (P)	0.16 t=1.0	190	81	101	28	73		10.2		Very soft brown ORGANIC CLAY (OH)
					280	74							
													Boring completed at 2 ft.
	5												
	10												
	15												

Ground Water Level Data	Boring Advancement Method	Notes
	Push Core 0 to 2 ft.	t = Lateral Confining Pressure (psi).
	Boring Abandonment Method	
		Strata Boundaries May Not Be Exact

ARD LOG01R 17-2828 - 9-4-2018.GPJ LOG01.GDT 12/20/18

Biloxi Marsh Living Shoreline
(P0-0174)
Eloi Bay
St. Bernard Parish, Louisiana

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Austin, TX 78759

LOG OF SOIL BORING P-05

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 17-2828
Date: 8/23/13
Logged by: Black
Driller:
Rig:

Location: Lat. 29° 47' 22.1"
Long. 89° 23' 49.5"
Surface Elevation: 0 (ft. NGVD)

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			0.0 (P)	0.12 t=1.0	149	84	101	26	75		8.5		Very soft brown CLAY (CH) with organic
					120	79							
													Boring completed at 2 ft.
	5												
	10												
	15												

Ground Water Level Data	Boring Advancement Method	Notes
	Push Core 0 to 2 ft.	t = Lateral Confining Pressure (psi).
	Boring Abandonment Method	

Strata Boundaries May Not Be Exact

ARD LOG01R 17-2828 - 9-4-2018.GPJ LOG01.GDT 12/20/18

Biloxi Marsh Living Shoreline
(P0-0174)
Eloi Bay
St. Bernard Parish, Louisiana

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Austin, TX 78759

LOG OF SOIL BORING P-06

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 17-2828
Date: 8/23/13
Logged by: Black
Driller:
Rig:

Location: Lat. 29° 47' 26.7"
Long. 89° 22' 34.6"
Surface Elevation: 0 (ft. NGVD)

FIELD DATA				LABORATORY DATA										
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			0.0 (P)	0.22 t=1.0	233	70	320	122	198		42.5		Very soft dark brown PEAT (Pt)
					233	63							
													Boring completed at 2 ft.
	5												
	10												
	15												

Ground Water Level Data	Boring Advancement Method	Notes
	Push Core 0 to 2 ft.	t = Lateral Confining Pressure (psi).
	Boring Abandonment Method	
		Strata Boundaries May Not Be Exact

ARD LOG01R 17-2828 - 9-4-2018.GPJ LOG01.GDT 12/20/18

Biloxi Marsh Living Shoreline
(P0-0174)
Eloi Bay
St. Bernard Parish, Louisiana

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Austin, TX 78759

LOG OF SOIL BORING P-07

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 17-2828
Date: 8/23/13
Logged by: Black
Driller:
Rig:

Location: Lat. 29° 46' 57.4"
Long. 89° 22' 10.3"
Surface Elevation: 0 (ft. NGVD)

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			0.0 (P)	0.14 t=1.0	232	76	119	36	83		12.7		Very soft brown ORGANIC CLAY (OH)
					171	73							
													Boring completed at 2 ft.
	5												
	10												
	15												

Ground Water Level Data	Boring Advancement Method	Notes
	Push Core 0 to 2 ft.	t = Lateral Confining Pressure (psi).
	Boring Abandonment Method	
		Strata Boundaries May Not Be Exact

ARD LOG01R 17-2828 - 9-4-2018.GPJ LOG01.GDT 12/20/18

Biloxi Marsh Living Shoreline
(P0-0174)
Eloi Bay
St. Bernard Parish, Louisiana

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LOG OF SOIL BORING P-08

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 17-2828
Date: 8/21/13
Logged by: Black
Driller:
Rig:

Location: Lat. 29° 47' 0.1"
Long. 89° 21' 14"
Surface Elevation: 0 (ft. NGVD)

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			0.0 (P)	0.18 t=1.0	67	103	81	23	58		3.3		Very soft gray CLAY (CH)
					61	89							
													Boring completed at 2 ft.
	5												
	10												
	15												

Ground Water Level Data	Boring Advancement Method	Notes
	Push Core 0 to 2 ft.	t = Lateral Confining Pressure (psi).
	Boring Abandonment Method	

Strata Boundaries May Not Be Exact

ARD LOG01R 17-2828 - 9-4-2018.GPJ LOG01.GDT 12/20/18

Biloxi Marsh Living Shoreline
(P0-0174)
Eloi Bay
St. Bernard Parish, Louisiana

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Austin, TX 78759

LOG OF SOIL BORING P-09

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 17-2828
Date: 8/23/13
Logged by: Black
Driller:
Rig:

Location: Lat. 29° 46' 58.5"
Long. 89° 20' 19.4"
Surface Elevation: 0 (ft. NGVD)

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			0.0 (P)	0.52 t=1.0	42	112	63	19	44		2.4		Medium stiff gray CLAY (CH)
					43	106							
													Boring completed at 2 ft.
	5												
	10												
	15												

Ground Water Level Data	Boring Advancement Method	Notes
	Push Core 0 to 2 ft.	t = Lateral Confining Pressure (psi).
	Boring Abandonment Method	

Strata Boundaries May Not Be Exact

ARD LOG01R 17-2828 - 9-4-2018.GPJ LOG01.GDT 12/20/18

Biloxi Marsh Living Shoreline
(P0-0174)
Eloi Bay
St. Bernard Parish, Louisiana

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Austin, TX 78759

LOG OF SOIL BORING P-10

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 17-2828
Date: 8/25/13
Logged by: JP
Driller:
Rig:

Location: Lat. 29° 46' 0.3"
Long. 89° 18' 55.4"
Surface Elevation: 0 (ft. NGVD)

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			0.0 (P)	0.17 t=1.0	150	81	99	23	76		16.5		Very soft brown ORGANIC CLAY (OH)
					133	73							
													Boring completed at 2 ft.
	5												
	10												
	15												

Ground Water Level Data	Boring Advancement Method	Notes
	Push Core 0 to 2 ft.	t = Lateral Confining Pressure (psi).
	Boring Abandonment Method	
		Strata Boundaries May Not Be Exact

ARD LOG01R 17-2828 - 9-4-2018.GPJ LOG01.GDT 12/20/18

Biloxi Marsh Living Shoreline
(P0-0174)
Eloi Bay
St. Bernard Parish, Louisiana

Mott MacDonald
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Austin, TX 78759

LOG OF SOIL BORING P-11

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 17-2828
Date: 8/25/13
Logged by: JP
Driller:
Rig:

Location: Lat. 29° 45' 48.8"
Long. 89° 18' 35"
Surface Elevation: 0 (ft. NGVD)

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			0.0 (P)	0.14 t=1.0	140	84	65	27	38		14.2		Very soft brown ORGANIC CLAY (OH)
					96	79							
													Boring completed at 2 ft.
	5												
	10												
	15												

Ground Water Level Data	Boring Advancement Method	Notes
	Push Core 0 to 2 ft.	t = Lateral Confining Pressure (psi).
	Boring Abandonment Method	

Strata Boundaries May Not Be Exact

ARD LOG01R 17-2828 - 9-4-2018.GPJ LOG01.GDT 12/20/18

Biloxi Marsh Living Shoreline
(P0-0174)
Eloi Bay
St. Bernard Parish, Louisiana

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Austin, TX 78759

LOG OF SOIL BORING P-12

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 17-2828
Date: 8/25/13
Logged by: JP
Driller:
Rig:

Location: Lat. 29° 45' 39.5"
Long. 89° 17' 50.3"
Surface Elevation: 0 (ft. NGVD)

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			0.0 (P)	0.17 t=1.0	81	98	81	26	55		7.9		Very soft brown CLAY (CH) with organic
					93	84							
													Boring completed at 2 ft.
	5												
	10												
	15												

Ground Water Level Data

Boring Advancement Method

Push Core
0 to 2 ft.

Boring Abandonment Method

Notes

t = Lateral Confining Pressure (psi).

Strata Boundaries May Not Be Exact

ARD LOG01R 17-2828 - 9-4-2018.GPJ LOG01.GDT 12/20/18

Biloxi Marsh Living Shoreline
(P0-0174)
Eloi Bay
St. Bernard Parish, Louisiana

Mott MacDonald
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Austin, TX 78759

LOG OF SOIL BORING P-13

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 17-2828
Date: 8/25/13
Logged by: JP
Driller:
Rig:

Location: Lat. 29° 46' 10.5"
Long. 89° 17' 37.6"
Surface Elevation: 0 (ft. NGVD)

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			0.0 (P)	0.12 t=1.0	112	88	87	28	59		12.5		Very soft brown ORGANIC CLAY (OH)
					141	78							
													Boring completed at 2 ft.
	5												
	10												
	15												

Ground Water Level Data	Boring Advancement Method	Notes
	Push Core 0 to 2 ft.	t = Lateral Confining Pressure (psi).
	Boring Abandonment Method	Strata Boundaries May Not Be Exact

Biloxi Marsh Living Shoreline
(P0-0174)
Eloi Bay
St. Bernard Parish, Louisiana

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Austin, TX 78759

LOG OF SOIL BORING P-14

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 17-2828
Date: 8/24/13
Logged by: JP
Driller:
Rig:

Location: Lat. 29° 47' 8.6"
Long. 89° 17' 58.1"
Surface Elevation: 0 (ft. NGVD)

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			0.0 (P)	0.13 t=1.0	142	81	93	28	65		9.9		Very soft brown ORGANIC CLAY (OH)
					129	77							
													Boring completed at 2 ft.
	5												
	10												
	15												

Ground Water Level Data	Boring Advancement Method	Notes
	Push Core 0 to 2 ft.	t = Lateral Confining Pressure (psi).
	Boring Abandonment Method	
		Strata Boundaries May Not Be Exact

ARD LOG01R 17-2828 - 9-4-2018.GPJ LOG01.GDT 12/20/18

Biloxi Marsh Living Shoreline
(P0-0174)
Eloi Bay
St. Bernard Parish, Louisiana

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Austin, TX 78759

LOG OF SOIL BORING P-15

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 17-2828
Date: 8/20/13
Logged by: JP
Driller:
Rig:

Location: Lat. 29° 47' 45.9"
Long. 89° 18' 17.4"
Surface Elevation: 0 (ft. NGVD)

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			0.0 (P)		337	68	107	27	80		9.1		Very soft brown CLAY (CH) with organic
					337	68							
	5												Boring completed at 2 ft.
	10												
	15												

Ground Water Level Data	Boring Advancement Method	Notes
	Push Core 0 to 2 ft.	
	Boring Abandonment Method	

Strata Boundaries May Not Be Exact

ARD LOG01R 17-2828 - 9-4-2018.GPJ LOG01.GDT 12/20/18

Biloxi Marsh Living Shoreline
(P0-0174)
Eloi Bay
St. Bernard Parish, Louisiana

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LOG OF SOIL BORING P-16

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 17-2828
Date: 8/20/13
Logged by: D. Thibodaux
Driller:
Rig:

Location: Lat. 29° 47' 26.8"
Long. 89° 18' 23.4"
Surface Elevation: 0 (ft. NGVD)

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			0.0 (P)	0.10 t=1.0	208 156	81 66	116	28	88		11.6		Very soft brown ORGANIC CLAY (OH)
	5												Boring completed at 2 ft.
	10												
	15												

Ground Water Level Data	Boring Advancement Method	Notes
	Push Core 0 to 2 ft.	t = Lateral Confining Pressure (psi).
	Boring Abandonment Method	

Strata Boundaries May Not Be Exact

Biloxi Marsh Living Shoreline
(P0-0174)
Eloi Bay
St. Bernard Parish, Louisiana

Mott MacDonald
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Austin, TX 78759

LOG OF SOIL BORING P-17

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 17-2828
Date: 8/20/13
Logged by: D. Thibodaux
Driller:
Rig:

Location: Lat. 29° 46' 57.4"
Long. 89° 19' 35.3"
Surface Elevation: 0 (ft. NGVD)

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			0.0 (P)	0.17 t=1.0	92	93	70	28	42		6.8		Very soft gray CLAY (CH) with organic
					128	83							
													Boring completed at 2 ft.
	5												
	10												
	15												

Ground Water Level Data	Boring Advancement Method	Notes
	Push Core 0 to 2 ft.	t = Lateral Confining Pressure (psi).
	Boring Abandonment Method	

Strata Boundaries May Not Be Exact

ARD LOG01R 17-2828 - 9-4-2018.GPJ LOG01.GDT 12/20/18

Biloxi Marsh Living Shoreline
(P0-0174)
Eloi Bay
St. Bernard Parish, Louisiana

Mott MacDonald
10415 Morado Circle, Suite 300
Austin, TX 78759

LOG OF SOIL BORING P-18

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 17-2828
Date: 8/20/13
Logged by: D. Thibodaux
Driller:
Rig:

Location: Lat. 29° 47' 17.6"
Long. 89° 20' 26.1"
Surface Elevation: 0 (ft. NGVD)

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			0.0 (P)	0.19 t=1.0	88	92	119	37	82		15.7		Very soft brown ORGANIC CLAY (OH)
					107	81							
													Boring completed at 2 ft.
	5												
	10												
	15												

Ground Water Level Data	Boring Advancement Method	Notes
	Push Core 0 to 2 ft.	t = Lateral Confining Pressure (psi).
	Boring Abandonment Method	

Strata Boundaries May Not Be Exact

Biloxi Marsh Living Shoreline
(P0-0174)
Eloi Bay
St. Bernard Parish, Louisiana

Mott MacDonald
10415 Morado Circle, Suite 300
Austin, TX 78759

LOG OF SOIL BORING P-19

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 17-2828
Date: 8/20/13
Logged by: D. Thibodaux
Driller:
Rig:

Location: Lat. 29° 47' 51.3"
Long. 89° 20' 56.3"
Surface Elevation: 0 (ft. NGVD)

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			0.0 (P)	0.15 t=1.0	150	77	171	60	111		20.8		Very soft brown ORGANIC CLAY (OH)
					182	67							
													Boring completed at 2 ft.
	5												
	10												
	15												

Ground Water Level Data	Boring Advancement Method	Notes
	Push Core 0 to 2 ft.	t = Lateral Confining Pressure (psi).
	Boring Abandonment Method	

Strata Boundaries May Not Be Exact

ARD LOG01R 17-2828 - 9-4-2018.GPJ LOG01.GDT 12/20/18

Biloxi Marsh Living Shoreline
(P0-0174)
Eloi Bay
St. Bernard Parish, Louisiana

Mott MacDonald
10415 Morado Circle, Suite 300
Austin, TX 78759

LOG OF SOIL BORING P-20

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 17-2828
Date: 8/20/13
Logged by: D. Thibodaux
Driller:
Rig:

Location: Lat. 29° 47' 57.8"
Long. 89° 21' 25.7"
Surface Elevation: 0 (ft. NGVD)

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			0.0 (P)	0.11 t=1.0	176	82	187	46	141		15.2		Very soft brown ORGANIC CLAY (OH)
					191	75							
													Boring completed at 2 ft.
	5												
	10												
	15												

Ground Water Level Data	Boring Advancement Method	Notes
	Push Core 0 to 2 ft.	t = Lateral Confining Pressure (psi).
	Boring Abandonment Method	

Strata Boundaries May Not Be Exact

ARD LOG01R 17-2828 - 9-4-2018.GPJ LOG01.GDT 12/20/18

Biloxi Marsh Living Shoreline
(P0-0174)
Eloi Bay
St. Bernard Parish, Louisiana

Mott MacDonald
10415 Morado Circle, Suite 300
Austin, TX 78759

LOG OF SOIL BORING P-21

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 17-2828
Date: 8/20/13
Logged by: D. Thibodaux
Driller:
Rig:

Location: Lat. 29° 48' 5.27"
Long. 89° 22' 9.09"
Surface Elevation: 0 (ft. NGVD)

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			0.0 (P)	0.14 t=1.0	121	85	136	33	103		14.4		Very soft brown ORGANIC CLAY (OH)
					123	73							
													Boring completed at 2 ft.
	5												
	10												
	15												

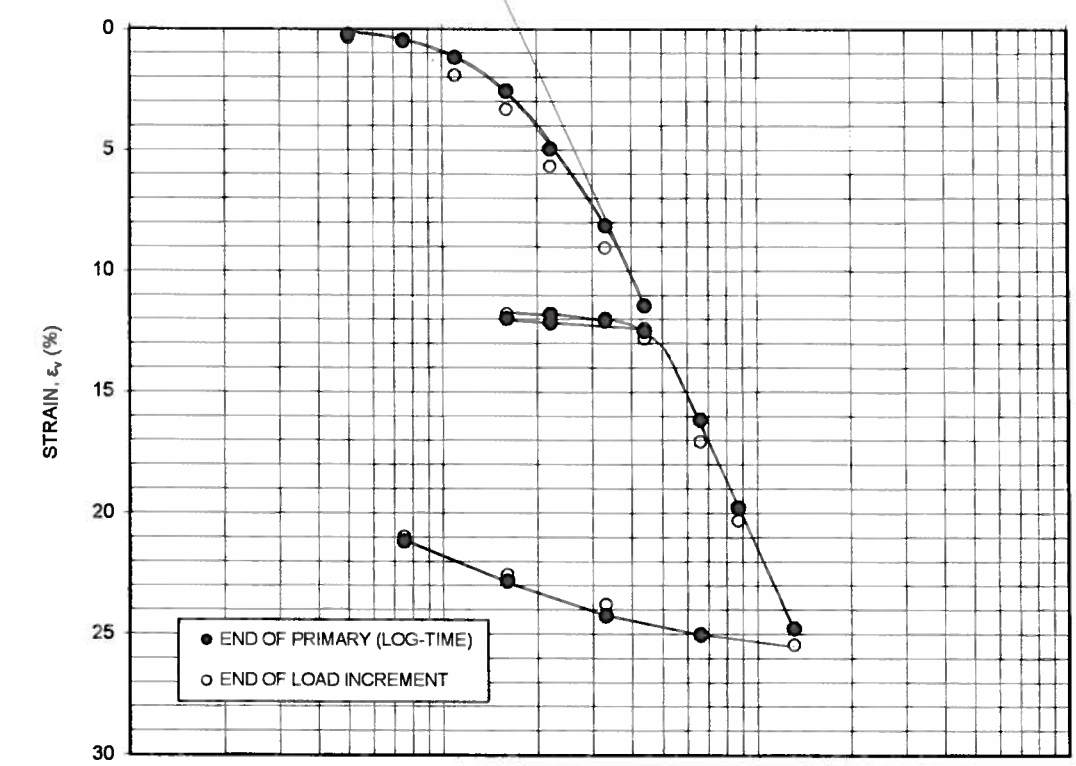
Ground Water Level Data	Boring Advancement Method	Notes
	Push Core 0 to 2 ft.	t = Lateral Confining Pressure (psi).
	Boring Abandonment Method	

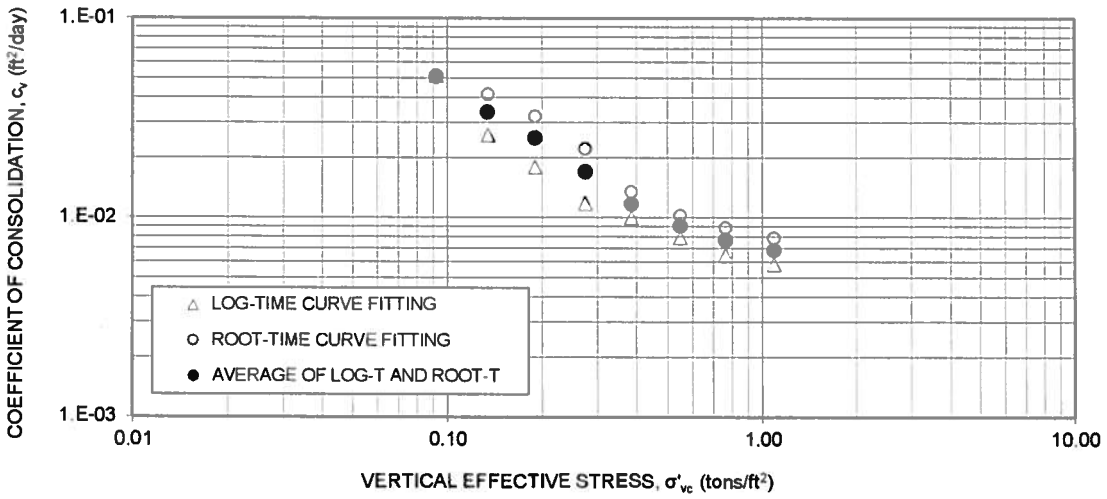
Strata Boundaries May Not Be Exact

ARD LOG01R 17-2828 - 9-4-2018.GPJ LOG01.GDT 12/20/18

12-2909 Biloxi Marsh Demonstration Project (PO-148)
Grab Sample Visual Classification and Moisture Content

SAMPLE NO.	VISUAL CLASSIFICATION	MOISTURE CONTENT (PERCENT)
GB-1	Very soft dark gray organic clay (OH) w/much roots	155
GB-2	Very soft dark gray organic clay (OH)	112
GB-3	Very soft dark gray organic clay (OH) w/sand	122
GB-4	Very soft dark gray organic clay (OH) w/sand	92
GB-5	Very soft dark gray organic clay (OH)	149
GB-6	Very soft dark gray organic clay (OH)	108
GB-7	Very soft gray clay (CH) w/ organic and sand	80
GB-8	Very soft dark gray organic clay (OH)	104
GB-9	Very soft dark gray organic clay (OH)	117
GB-10	Very soft gray clay (CH) w/organic	61
GB-11	Very soft dark gray organic clay (OH) w/much roots	106
GB-12	Very soft dark gray organic clay (OH)	121
GB-13	Very soft dark gray organic clay (OH)	109
GB-14	Very soft gray organic clay (OH)	73
GB-15	Very soft gray clay (CH) w/organic	80
GB-16	Very soft gray clay (CH)	52
GB-17	Very soft gray clay (CH)	65
GB-18	Very soft gray clay (CH)	53
GB-19	Very soft gray clay (CH)	42
GB-20	Very soft gray clay (CH)	54
GB-21	Very soft dark gray organic clay (OH)	135
GB-22	Very soft dark gray organic clay (OH)	103
GB-23	Very soft dark gray organic clay (OH)	135
GB-24	Very soft dark gray organic clay (OH)	95
GB-25	Very soft dark gray organic clay (OH)	127
GB-26	Very soft dark gray peat (PT)	312
GB-27	Very soft dark gray peat (PT)	293
GB-28	Very soft dark gray peat (PT)	300
GB-29	Very soft gray organic clay (OH)	181
GB-30	Very soft gray organic clay (OH)	94
GB-31	Very soft gray clay (CH) w/organic	67
GB-32	Very soft dark gray organic clay (OH)	98
GB-33	Very soft dark gray organic clay (OH)	98
GB-34	Very soft dark gray organic clay (OH)	134
GB-35	Very soft gray clay (CH)	98
GB-36	Very soft dark gray organic clay (OH)	149
GB-37	Very soft dark gray organic clay (OH)	154
GB-38	Very soft dark gray organic clay (OH)	97
GB-39	Very soft gray clay (CH) w/roots	62
GB-40	Very soft gray clay (CH)	81





SAMPLE DATA	
BORING NO.:	B-1
SAMPLE DEPTH (ft):	2 - 4
DESCRIPTION:	Br. Org. Clay (OH)

SPECIMEN CONDITIONS	INITIAL	FINAL
MOISTURE CONTENT (%):	99.2	75.5
DRY DENSITY (lb/ft³):	46.6	60.0
VOID RATIO:	2.454	1.682

INDEX PROPERTIES	
LIQUID LIMIT (%):	247
PLASTIC LIMIT (%):	71
PLASTICITY INDEX (%):	176
SPECIFIC GRAVITY:	2.579
-200 (%):	64

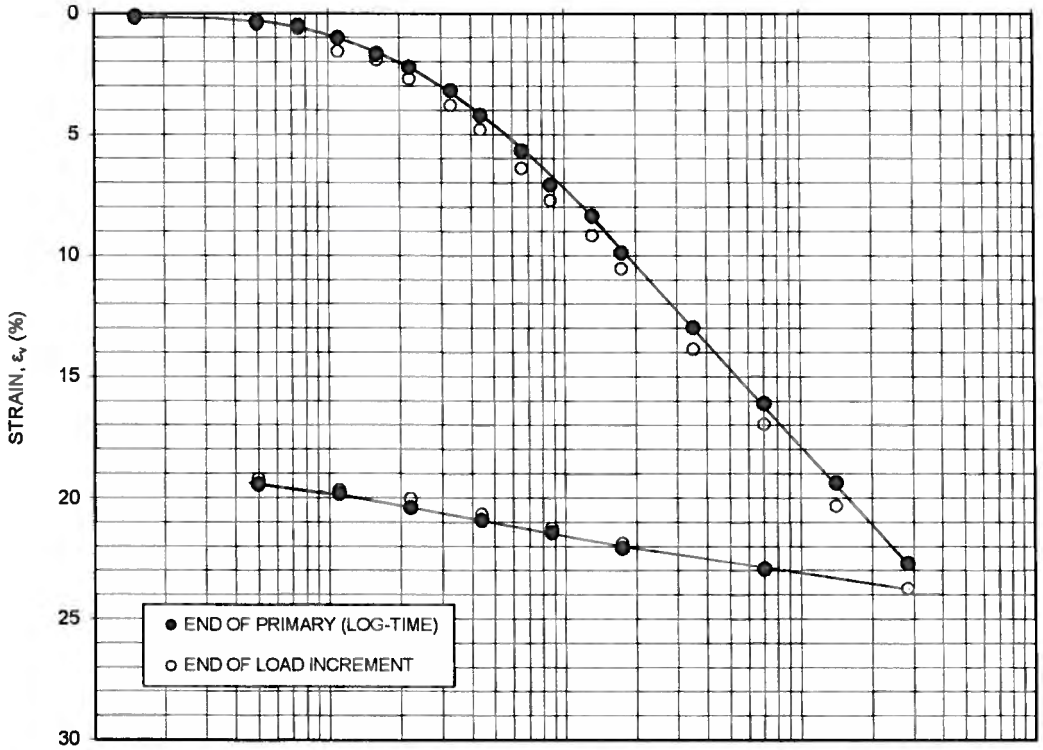
CONSOLIDATION PARAMETERS	
VIRGIN COMPRESSION RATIO, CR:	0.29
RECOMPRESSION RATIO, RR:	0.035
PRECONSOLIDATION PRESSURE, σ'_p:	0.23

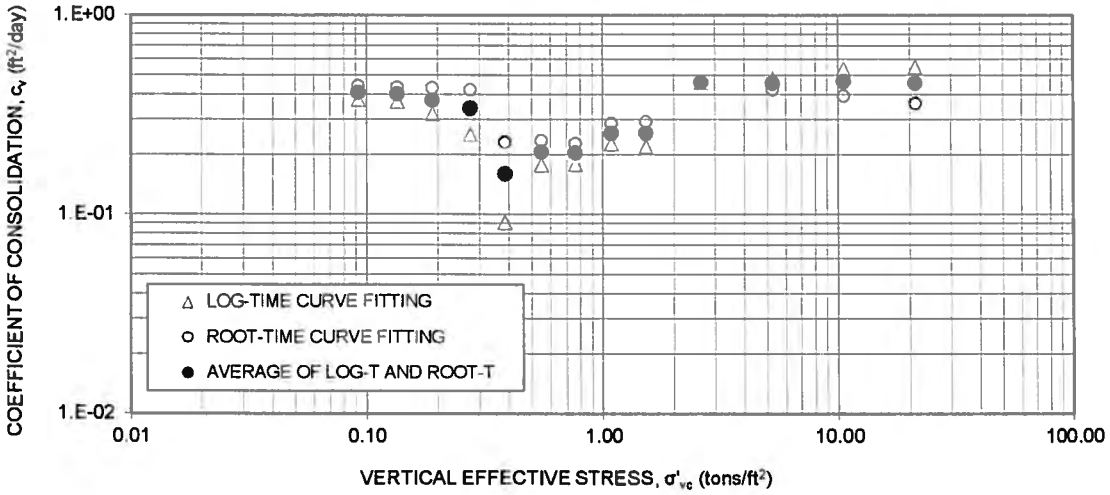
INCREMENTAL CONSOLIDATION TEST RESULTS

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

LIVING SHORELINE DEMONSTRATION PROJECT
COASTAL RESTORATION & PROTECTION AUTHORITY

DRAWN BY	CHECKED BY	DATE
RJW		11-26-13
FILE NO.	APPROVED BY	FIGURE
12-84-2809		D-3





SAMPLE DATA	
BORING NO.:	B-1
SAMPLE DEPTH (ft)	6 - 8
DESCRIPTION:	Gray Silty Clay CL

SPECIMEN CONDITIONS	INITIAL	FINAL
MOISTURE CONTENT (%):	44.6	28.2
DRY DENSITY (lb/ft³)	78.5	97.1
VOID RATIO:	1.109	0.761

INDEX PROPERTIES	
LIQUID LIMIT (%)	41
PLASTIC LIMIT (%)	16
PLASTICITY INDEX (%)	25
SPECIFIC GRAVITY	2.739
-200 (%)	95
ORGANIC CONTENT:	

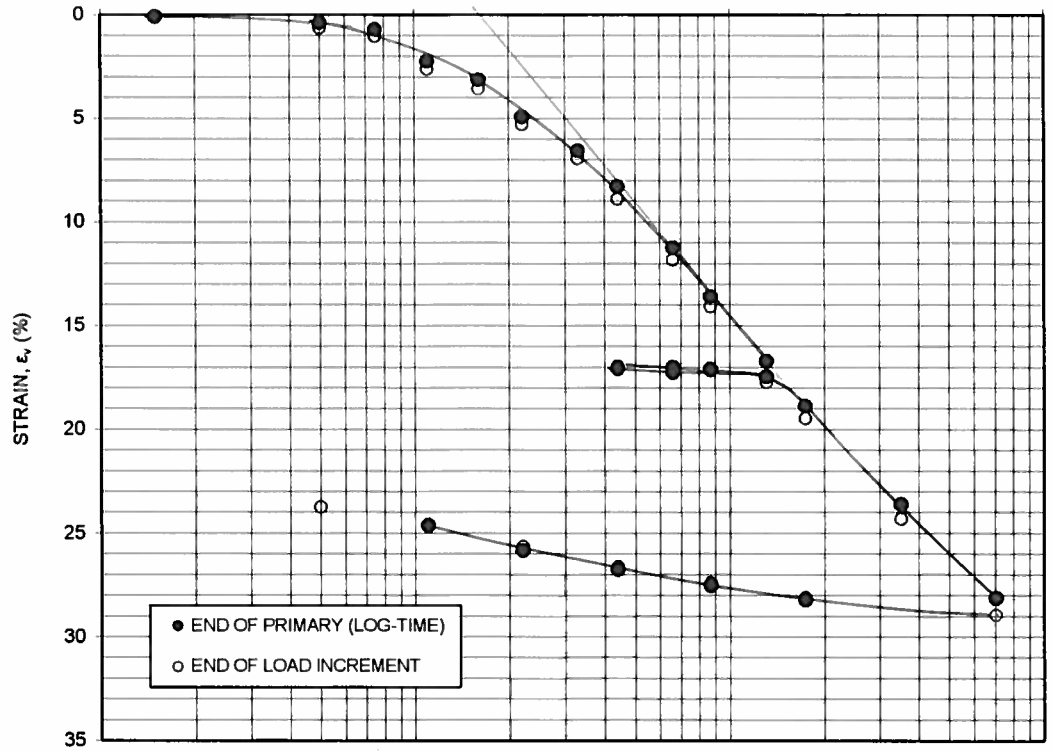
CONSOLIDATION PARAMETERS	
VIRGIN COMPRESSION RATIO, CR:	0.11
RECOMPRESSION RATIO, RR:	
PRECONSOLIDATION PRESSURE, σ'_p:	0.42

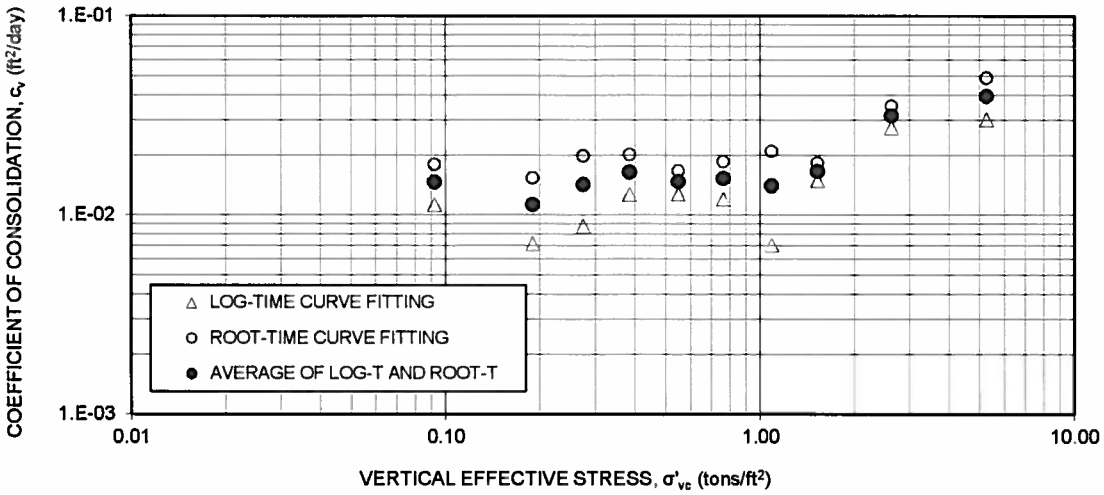
INCREMENTAL CONSOLIDATION TEST RESULTS

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

LIVING SHORELINE DEMONSTRATION PROJECT
COASTAL RESTORATION & PROTECTION AUTHORITY

DRAWN BY	CHECKED BY	DATE
RJW		12-2-13
FILE NO.	APPROVED BY	FIGURE
12-84-2909		D-X





SAMPLE DATA	
BORING NO.:	B-1
SAMPLE DEPTH (ft):	12 - 14
DESCRIPTION:	Gray CH

SPECIMEN CONDITIONS	INITIAL	FINAL
MOISTURE CONTENT (%):	56.6	34.3
DRY DENSITY (lb/ft³):	68.3	89.5
VOID RATIO:	1.544	0.940

INDEX PROPERTIES	
LIQUID LIMIT (%):	67
PLASTIC LIMIT (%):	19
PLASTICITY INDEX (%):	48
SPECIFIC GRAVITY:	2.782
-200 (%):	96

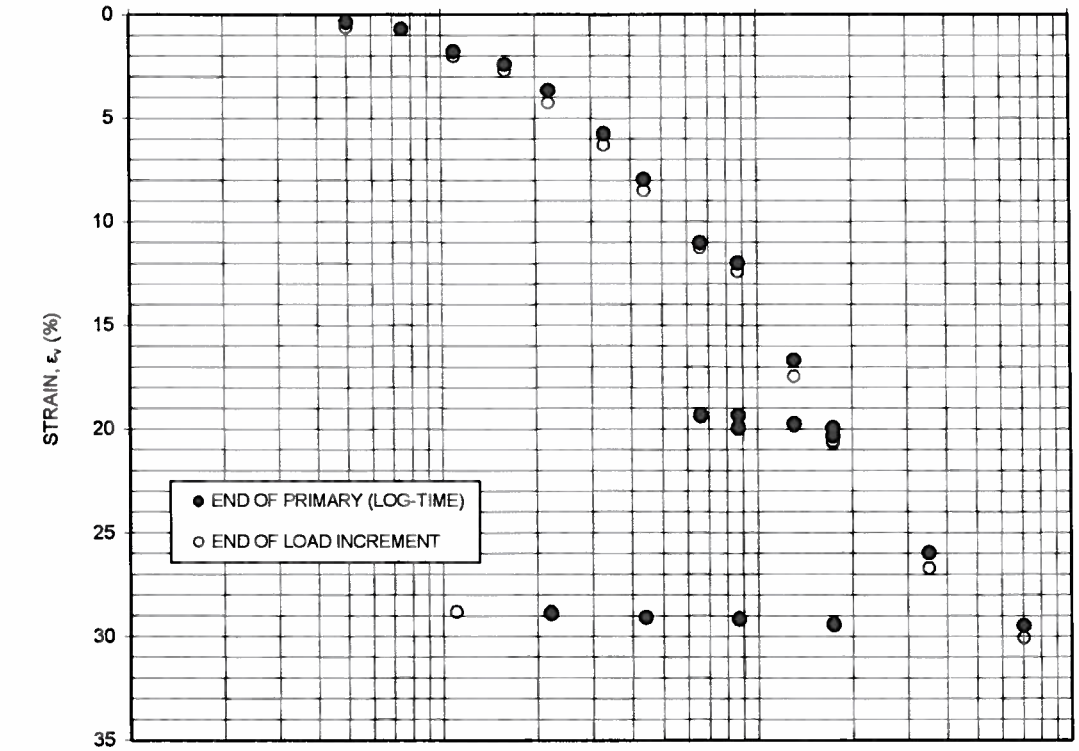
CONSOLIDATION PARAMETERS	
VIRGIN COMPRESSION RATIO, CR:	0.175
RECOMPRESSION RATIO, RR:	0.025
PRECONSOLIDATION PRESSURE, σ'_p:	0.22

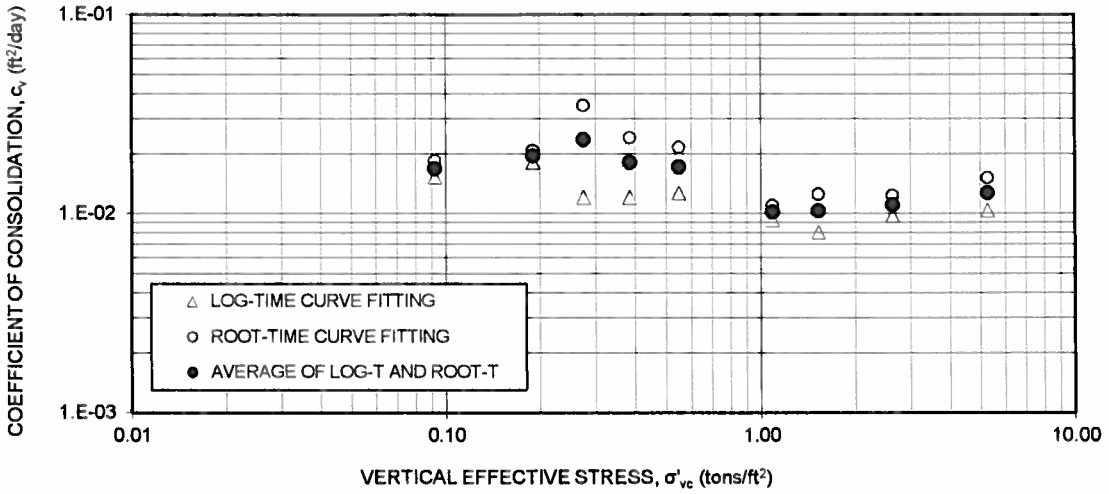
INCREMENTAL CONSOLIDATION TEST RESULTS

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

LIVING SHORELINE DEMONSTRATION PROJECT
COASTAL RESTORATION & PROTECTION AUTHORITY

DRAWN BY: RJW	CHECKED BY:	DATE: 12-2-13
FILE NO.: 12-84-2909	APPROVED BY:	FIGURE: D-X





SAMPLE DATA	
BORING NO.:	B-13
SAMPLE DEPTH (ft):	2 - 4
DESCRIPTION:	Gray CH

SPECIMEN CONDITIONS	INITIAL	FINAL
MOISTURE CONTENT (%):	69.1	40.2
DRY DENSITY (lb/ft³):	60.2	84.5
VOID RATIO:	1.96	1.107

INDEX PROPERTIES	
LIQUID LIMIT (%):	94
PLASTIC LIMIT (%):	24
PLASTICITY INDEX (%):	70
SPECIFIC GRAVITY:	2.852
-200 (%):	100
ORGANIC CONTENT:	

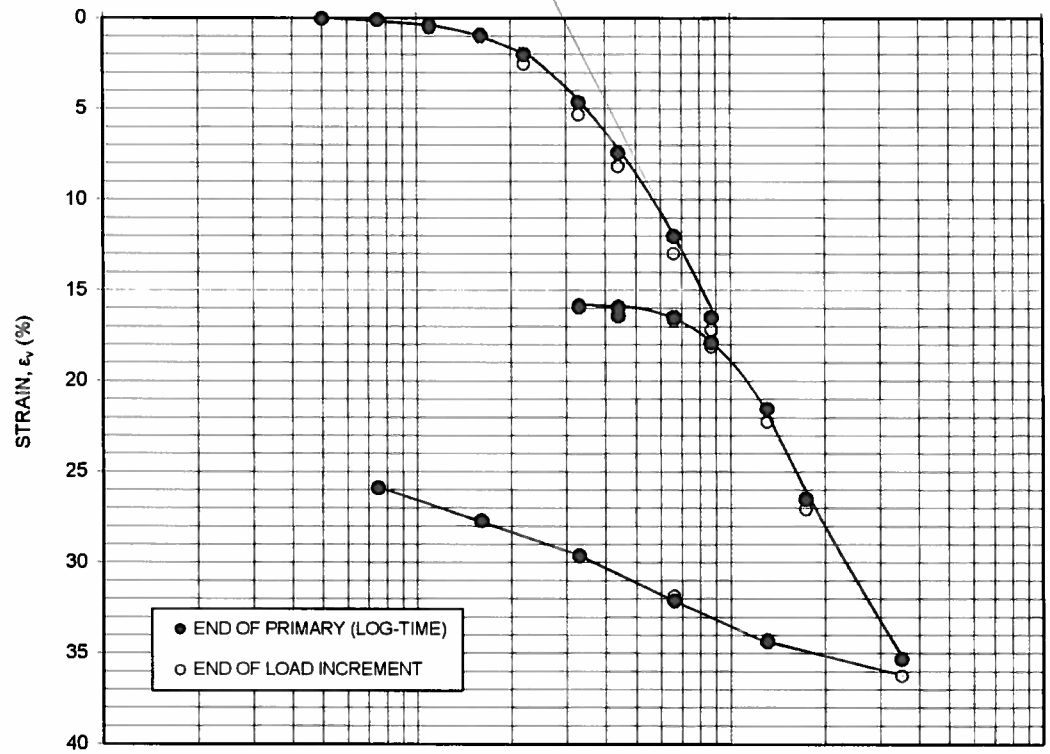
CONSOLIDATION PARAMETERS	
VIRGIN COMPRESSION RATIO, CR:	0.29
RECOMPRESSION RATIO, RR:	0.040
PRECONSOLIDATION PRESSURE, σ'_p:	0.40

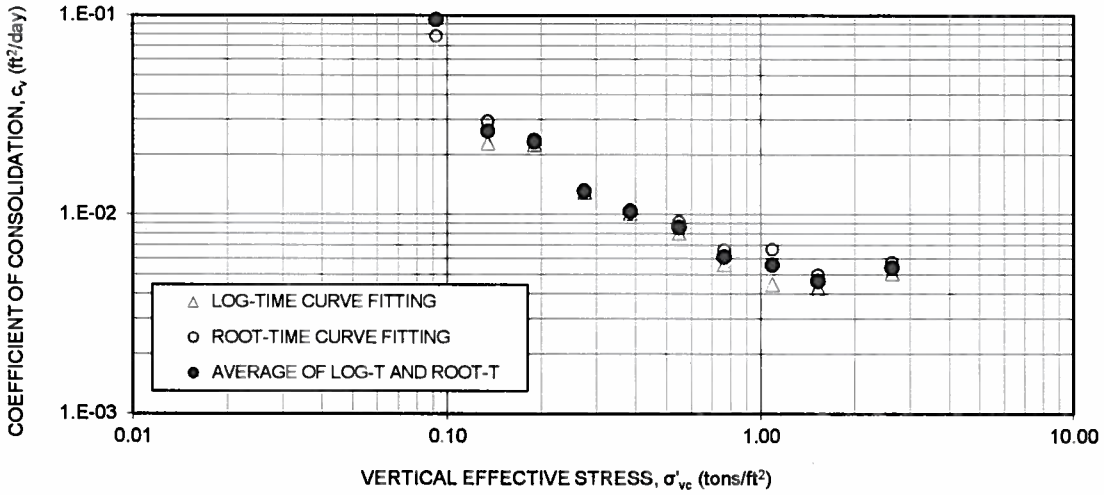
INCREMENTAL CONSOLIDATION TEST RESULTS

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

LIVING SHORELINE DEMONSTRATION PROJECT
COASTAL RESTORATION & PROTECTION AUTHORITY

DRAWN BY: RJW	CHECKED BY:	DATE: 12-2-13
FILE NO: 12-64-2809	APPROVED BY:	FIGURE: D-X





SAMPLE DATA	
BORING NO.:	B-4
SAMPLE DEPTH (ft):	14 - 16
DESCRIPTION:	Gray Clay (CH) w/ Org.

SPECIMEN CONDITIONS	INITIAL	FINAL
MOISTURE CONTENT (%):	118.0	79.4
DRY DENSITY (lb/ft³):	40.8	54.5
VOID RATIO:	3.322	2.235

INDEX PROPERTIES	
LIQUID LIMIT (%):	128
PLASTIC LIMIT (%):	32
PLASTICITY INDEX (%):	96
SPECIFIC GRAVITY:	2.824
-200 (%):	98

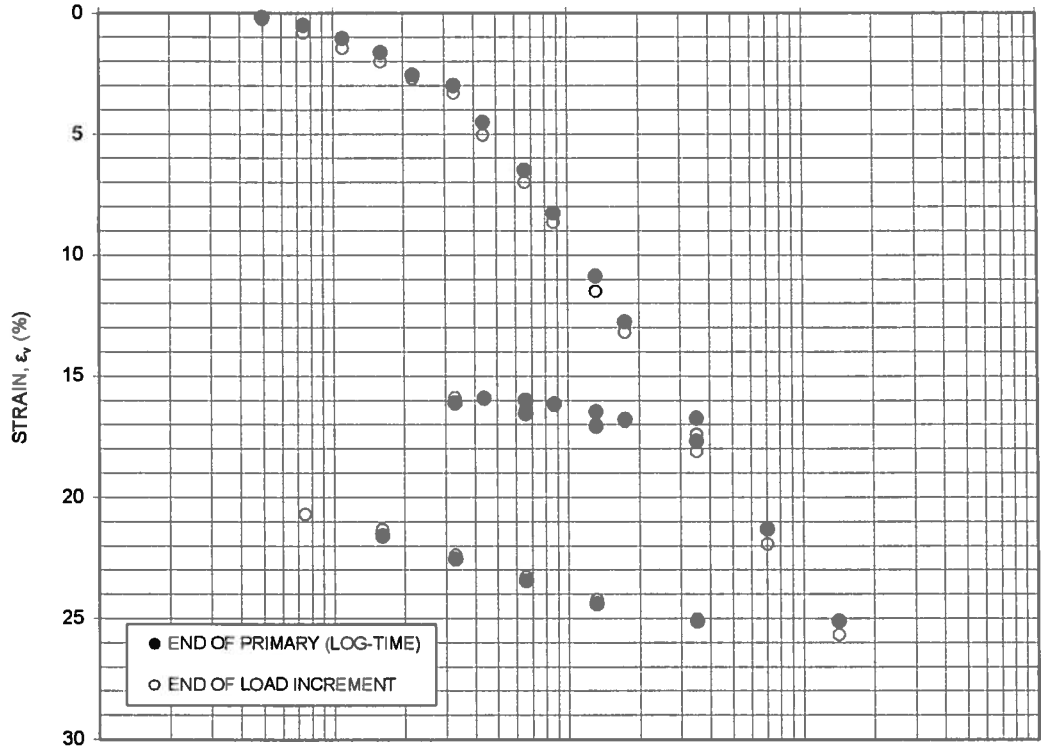
CONSOLIDATION PARAMETERS	
VIRGIN COMPRESSION RATIO, CR:	0.33
RECOMPRESSION RATIO, RR:	0.045
PRECONSOLIDATION PRESSURE, σ'_p:	0.39

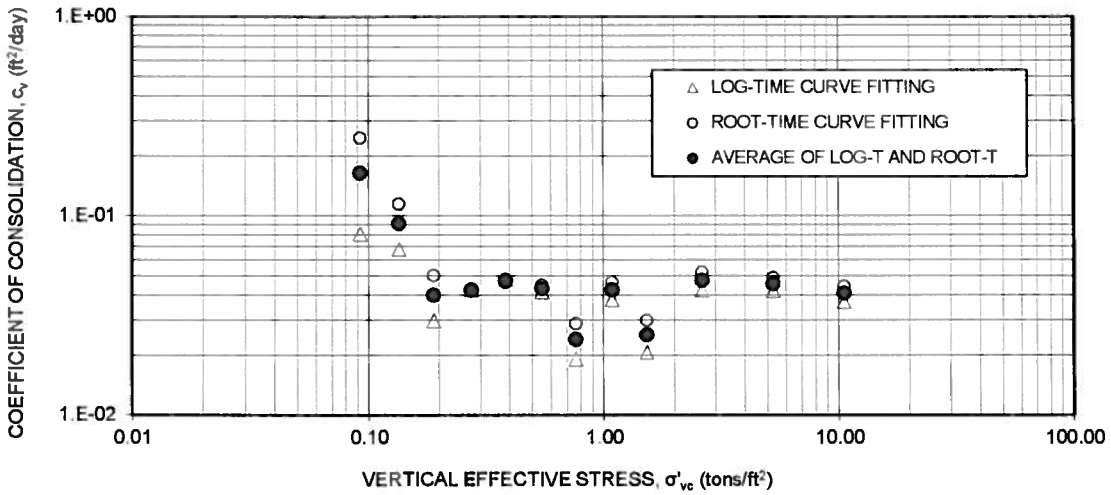
INCREMENTAL CONSOLIDATION TEST RESULTS

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

LIVING SHORELINE DEMONSTRATION PROJECT
COASTAL RESTORATION & PROTECTION AUTHORITY

DRAWN BY: RJW	CHECKED BY:	DATE: 11-26-13
FILE NO.: 12-84-2909	APPROVED BY:	FIGURE: D-x





SAMPLE DATA	
BORING NO.:	B-7
SAMPLE DEPTH (ft):	4 - 6
DESCRIPTION:	Gray Clay CL-CH

SPECIMEN CONDITIONS	INITIAL	FINAL
MOISTURE CONTENT (%):	48.1	30.0
DRY DENSITY (lb/ft³):	75.0	94.7
VOID RATIO:	1.311	0.832

INDEX PROPERTIES	
LIQUID LIMIT (%):	49
PLASTIC LIMIT (%):	16
PLASTICITY INDEX (%):	33
SPECIFIC GRAVITY:	2.775
-200 (%):	100

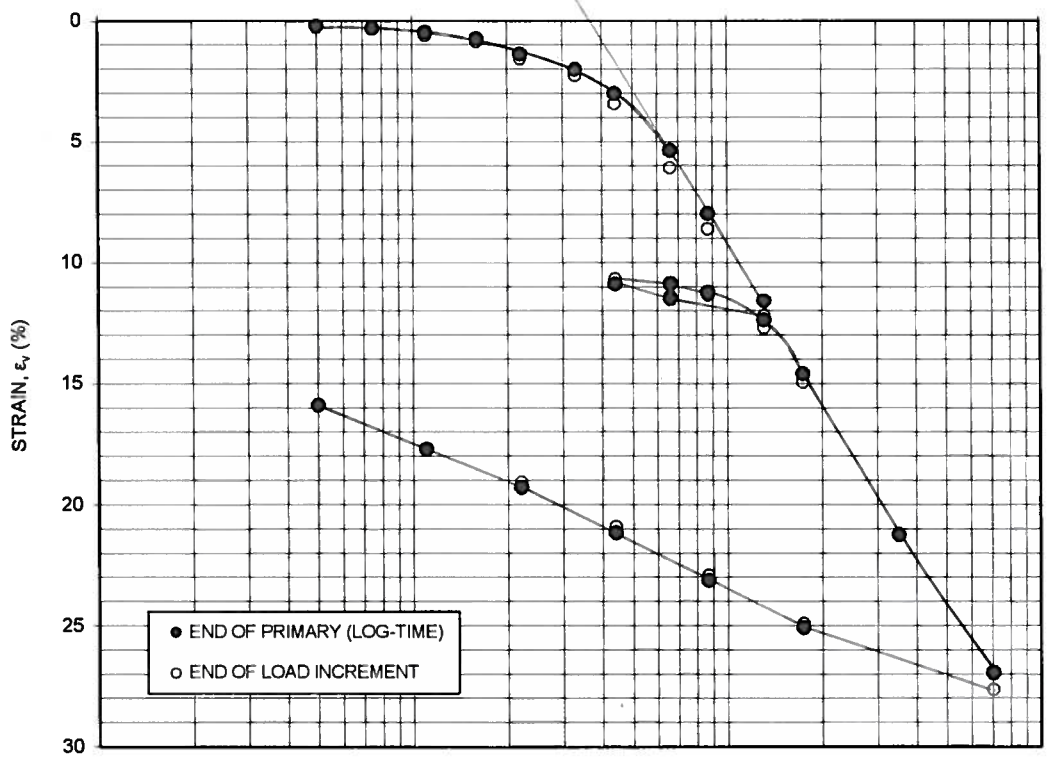
CONSOLIDATION PARAMETERS	
VIRGIN COMPRESSION RATIO, CR:	0.015
RECOMPRESSION RATIO, RR:	0.03
PRECONSOLIDATION PRESSURE, σ'_p:	0.45

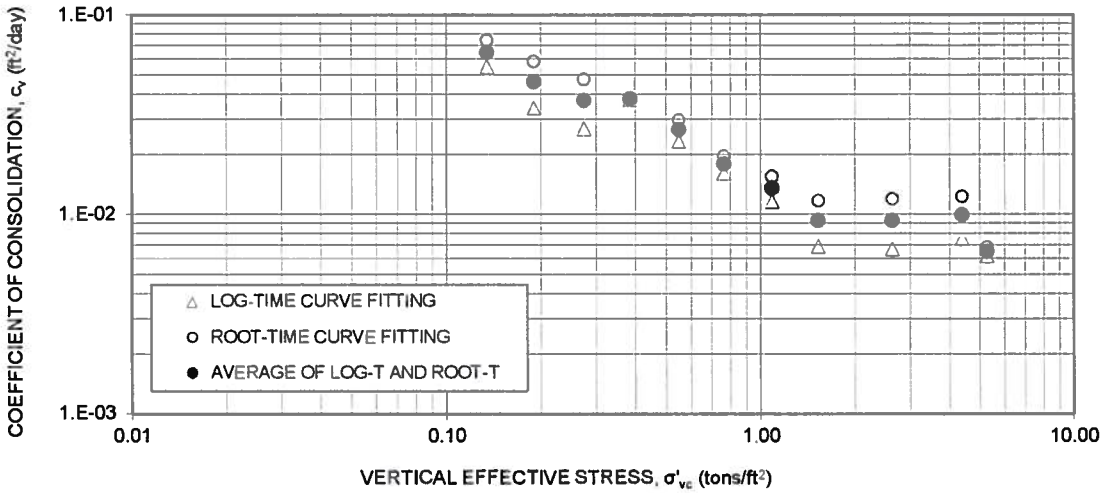
INCREMENTAL CONSOLIDATION TEST RESULTS

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

LIVING SHORELINE DEMONSTRATION PROJECT
COASTAL RESTORATION & PROTECTION AUTHORITY

DRAWN BY	CHECKED BY	DATE
RJW		12-2-13
FILE NO	APPROVED BY	FIGURE
12-84-2909		D-X





SAMPLE DATA	
BORING NO.:	B-10
SAMPLE DEPTH (ft):	4 - 6
DESCRIPTION:	Gray CH w/ Orgs.

SPECIMEN CONDITIONS	INITIAL	FINAL
MOISTURE CONTENT (%):	68.7	52.7
DRY DENSITY (lb/ft³):	59.5	70.5
VOID RATIO:	1.934	1.478

INDEX PROPERTIES	
LIQUID LIMIT (%):	90
PLASTIC LIMIT (%):	22
PLASTICITY INDEX (%):	68
SPECIFIC GRAVITY:	2.798
-200 (%):	99

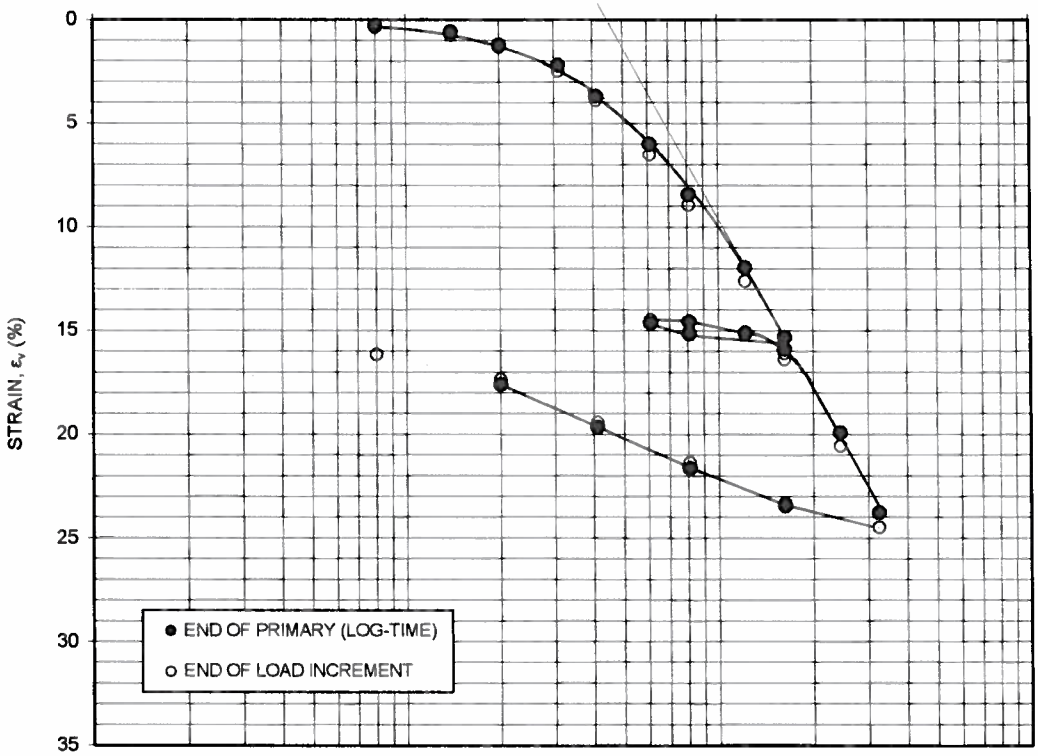
CONSOLIDATION PARAMETERS	
VIRGIN COMPRESSION RATIO, CR:	0.23
RECOMPRESSION RATIO, RR:	0.04
PRECONSOLIDATION PRESSURE, σ'_p:	0.56

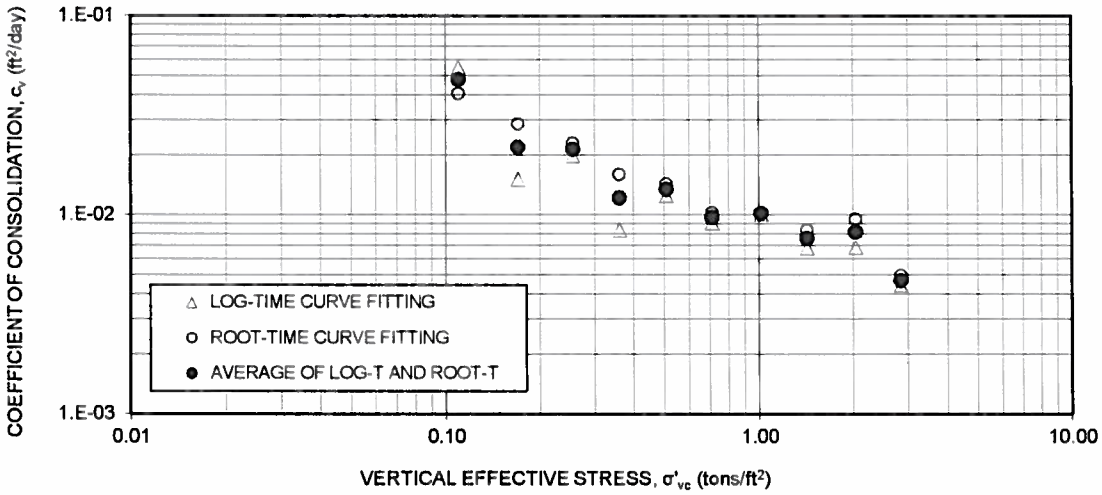
INCREMENTAL CONSOLIDATION TEST RESULTS

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

LIVING SHORELINE DEMONSTRATION PROJECT
COASTAL RESTORATION & PROTECTION AUTHORITY

DRAWN BY	CHECKED BY	DATE
RJW		11-26-13
FILE NO.	APPROVED BY	FIGURE
12-84-2909		D-3





SAMPLE DATA	
BORING NO.:	B-10
SAMPLE DEPTH (ft):	8 - 10
DESCRIPTION:	Gray-Br Clay (CH)

SPECIMEN CONDITIONS	INITIAL	FINAL
MOISTURE CONTENT (%):	102.8	80.6
DRY DENSITY (lb/ft³):	45.2	54.8
VOID RATIO:	2.698	2.052

INDEX PROPERTIES	
LIQUID LIMIT (%):	135
PLASTIC LIMIT (%):	31
PLASTICITY INDEX (%):	104
SPECIFIC GRAVITY:	2.677
-200 (%):	95

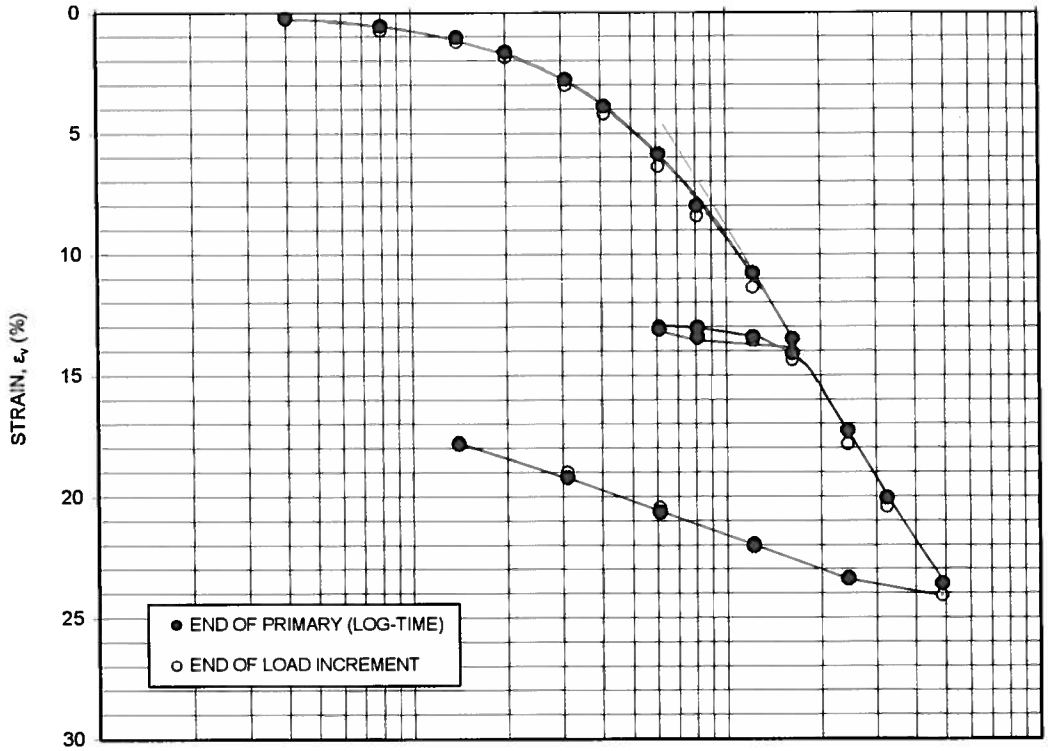
CONSOLIDATION PARAMETERS	
VIRGIN COMPRESSION RATIO, CR:	0.29
RECOMPRESSION RATIO, RR:	0.035
PRECONSOLIDATION PRESSURE, σ'_p:	0.66

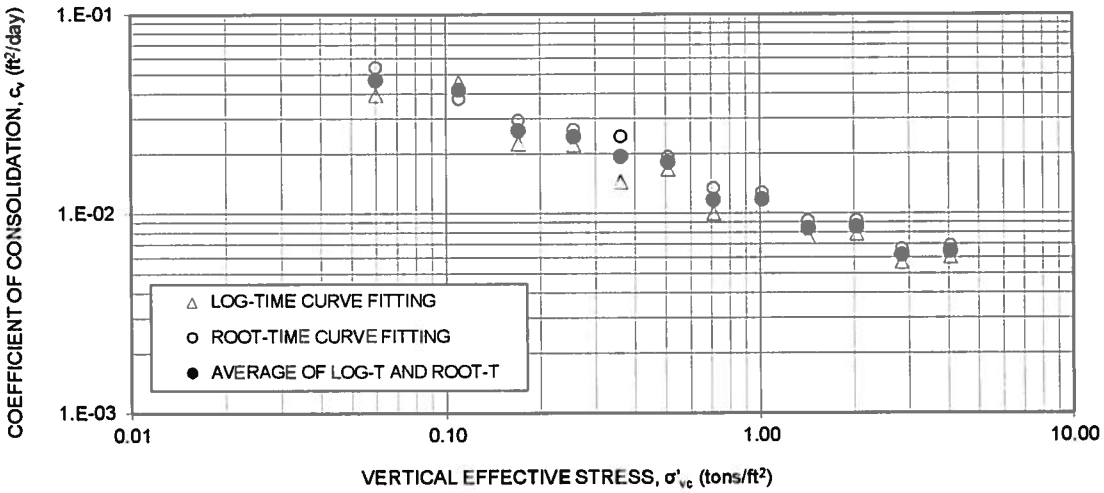
INCREMENTAL CONSOLIDATION TEST RESULTS

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

LIVING SHORELINE DEMONSTRATION PROJECT
COASTAL RESTORATION & PROTECTION AUTHORITY

DRAWN BY: RJW	CHECKED BY:	DATE: 11-26-13
FILE NO.: 12-84-2909	APPROVED BY:	FIGURE: D-x





SAMPLE DATA	
BORING NO.:	B-13
SAMPLE DEPTH (ft):	2 - 4
DESCRIPTION:	Gray CH

SPECIMEN CONDITIONS	INITIAL	FINAL
MOISTURE CONTENT (%):	62.6	44.9
DRY DENSITY (lb/ft³):	63.5	77.3
VOID RATIO:	1.771	1.276

INDEX PROPERTIES	
LIQUID LIMIT (%):	108
PLASTIC LIMIT (%):	18
PLASTICITY INDEX (%):	90
SPECIFIC GRAVITY:	2.818
-200 (%):	99

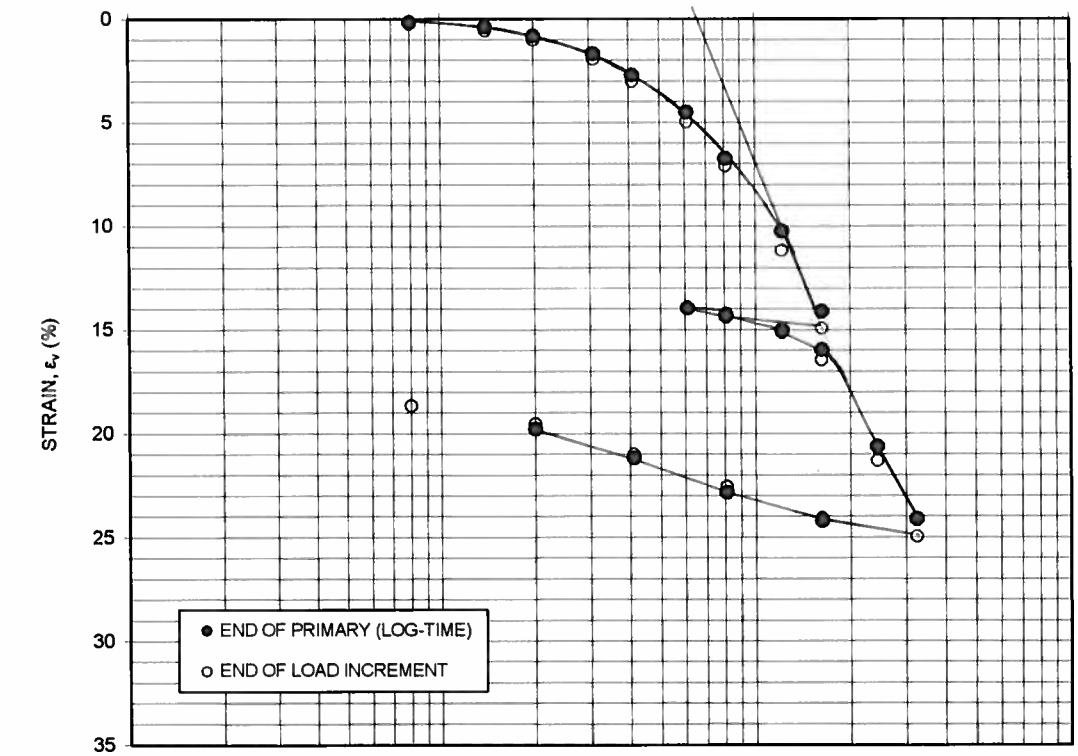
CONSOLIDATION PARAMETERS	
VIRGIN COMPRESSION RATIO, CR:	0.22
RECOMPRESSION RATIO, RR:	0.035
PRECONSOLIDATION PRESSURE, σ'_p:	0.6

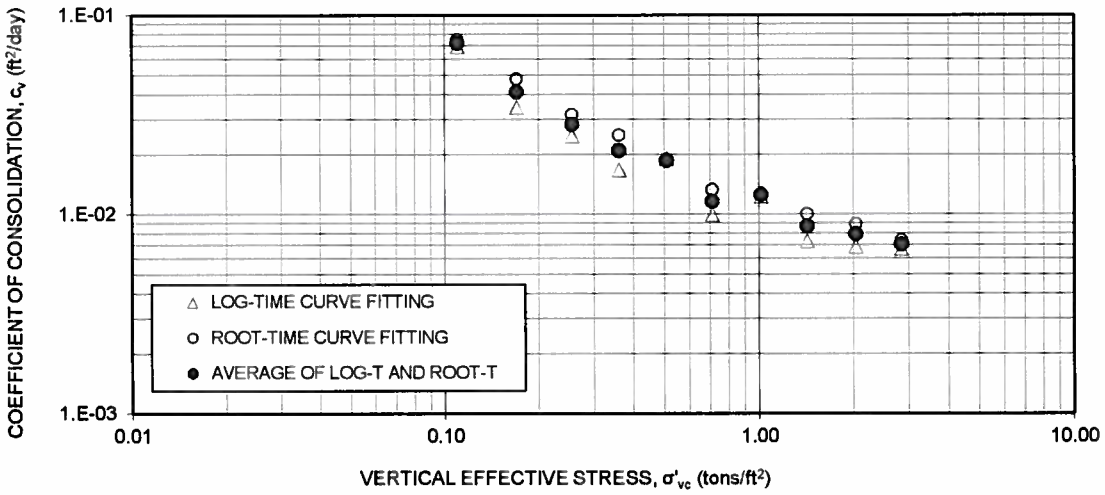
INCREMENTAL CONSOLIDATION TEST RESULTS

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

LIVING SHORELINE DEMONSTRATION PROJECT
COASTAL RESTORATION & PROTECTION AUTHORITY

DRAWN BY	CHECKED BY	DATE
RJW		11-26-13
FILE NO.	APPROVED BY	FIGURE
12-84-2909		D-3





SAMPLE DATA	
BORING NO.:	B-13
SAMPLE DEPTH (ft):	28 - 30
DESCRIPTION:	Gray Clay (CH)

SPECIMEN CONDITIONS	INITIAL	FINAL
MOISTURE CONTENT (%):	97.0	72.7
DRY DENSITY (lb/ft³):	47.0	58.4
VOID RATIO:	2.517	1.835

INDEX PROPERTIES	
LIQUID LIMIT (%):	109
PLASTIC LIMIT (%):	27
PLASTICITY INDEX (%):	82
SPECIFIC GRAVITY:	2.776
-200 (%):	98

CONSOLIDATION PARAMETERS	
VIRGIN COMPRESSION RATIO, CR:	0.34
RECOMPRESSION RATIO, RR:	0.05
PRECONSOLIDATION PRESSURE, σ'_p:	0.84

INCREMENTAL CONSOLIDATION TEST RESULTS

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Geotechnical, Environmental and Materials Consultants

LIVING SHORELINE DEMONSTRATION PROJECT
COASTAL RESTORATION & PROTECTION AUTHORITY

DRAWN BY	CHECKED BY	DATE
RJW		11-26-13
FILE NO.	APPROVED BY:	FIGURE
12-84-2909		D-x

APPENDIX C. PO-0174 BILOXI MARSH LIVING SHORELINE – FIELD AND LABORATORY DATA

This Appendix contains the following:

- Soil Boring Location Plan
- Description of Terms & Symbols Used on Soil Boring Logs
- Soil Borings Logs

NOTES

- Biloxi Marsh Living Shoreline Alignment (PO-0174)
- In-Place Biloxi Marsh Living Shoreline Demonstration Project Alignment (PO-148)
- Alignment Removed from Project

Boring, CPT, Push Core, Grab Bag Location

Biloxi Marsh Living Shoreline Project (PO-0174)
Eloi Bay
St. Bernard Parish, Louisiana

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

ENG	Drawn by:	Checked by:
R.A.N.	R.A.N.	M.W.
File No.:	Date:	FIGURE:
17-2828	12/18/18	No. 5

Title:
PO-0174 Supplemental Investigation Boring Location Plan

Biloxi Marsh Living Shoreline
(P0-0174)
Eloi Bay
St. Bernard Parish, Louisiana

Mott MacDonald
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Austin, TX 78759

LOG OF SOIL BORING NB-02

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 17-2828
Date: 5/15/18
Logged by: E. D'Antoni
Driller: Faucheux
Rig: Airboat

Location: Lat. 29° 47' 28.6"
Long. 89° 23' 2.5"
Surface Elevation: n/a

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			.09 (T)		51								Very Soft gray CLAY (CH)
			.09 (T)										
			.09 (T)	0.08 t=2.8	71	99	93	26	67				
				0.06 t=2.9	82	97	97	24	73				
	5		0.02 (T)		115								Very Soft gray CLAY (CH) with trace organic
			0.04 (T)		99	87							
			0.04 (T)										
			0.05 (T)		108								
			0.05 (T)										
			0.05 (T)	0.07 t=2.9	95	92	108	34	74				
			0.1 (T)		71	102							Very Soft gray CLAY (CH)
			0.13 (T)										
	10		0.11 (T)										
			0.04 (T)		100								Very Soft gray CLAY (CH) with trace organic
			0.09 (T)										
			0.07 (T)	0.11 t=3.1	104	86	114	31	83				
					217						9.6		Very Soft dark gray CLAY (CH) with organic and wood
			0.06 (T)		73	99							Very Soft gray CLAY (CH) with trace organic
			0.05 (T)										
			0.05 (T)										
	15		0.06 (T)		87	93							
			0.09 (T)										
			0.08 (T)										
													Boring completed at 16 ft.

Ground Water Level Data	Boring Advancement Method	Notes
	4" Nom. Dia. Short Flight Auger: 0 to 16 ft.	t = Lateral Confining Pressure (psi).
	Boring Abandonment Method	
	Borehole abandoned upon completion	Strata Boundaries May Not Be Exact

ARD LOG01R 17-2828 - 9-4-2018.GPJ LOG01.GDT 12/18/18

Biloxi Marsh Living Shoreline
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St. Bernard Parish, Louisiana

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LOG OF SOIL BORING NB-03

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 17-2828
Date: 5/15/18
Logged by: E. D'Antoni
Driller: Faucheux
Rig: Airboat

Location: Lat. 29° 47' 29.2"
Long. 89° 22' 46.1"
Surface Elevation: n/a

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			<0.25 (P)		165								Very Soft dark gray ORGANIC CLAY (OH)
			0.05 (T) 0.06 (T) 0.06 (T)	0.17 t=2.6	77	100	97	26	71				Very Soft gray CLAY (CH)
			0.03 (T)		93								
			0.03 (T) 0.04 (T)	0.09 t=2.8	125	88	138	36	102				Very Soft gray CLAY (CH)
					200						14.4		Very Soft dark gray ORGANIC CLAY (OH)
	5		0.05 (T) 0.1 (T) 0.05 (T)	0.15 t=2.6	67 74		102	29	73				Very Soft gray CLAY (CH)
			0.03 (T)		111								Very Soft gray CLAY (CH) with trace organic
			0.06 (T) 0.05 (T)		112	98							
			0.06 (T)		95								Very Soft gray CLAY (CH)
	10		0.06 (T) 0.06 (T)	0.15 t=2.5	99	90	128	28	100				
			0.1 (T)		78								
			0.11 (T) 0.09 (T)		74	99							
			0.06 (T)		81								
			0.04 (T) 0.05 (T)		80	103							
	15		0.06 (T)		81								Very Soft gray CLAY (CH) with silt pockets
			0.04 (T) 0.06 (T)		74	96							
													Boring completed at 16 ft.

Ground Water Level Data	Boring Advancement Method	Notes
	4" Nom. Dia. Short Flight Auger: 0 to 16 ft.	t = Lateral Confining Pressure (psi).
	Boring Abandonment Method Borehole abandoned upon completion	Strata Boundaries May Not Be Exact

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Biloxi Marsh Living Shoreline
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LOG OF SOIL BORING NB-04

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 17-2828
Date: 5/15/18
Logged by: E. D'Antoni
Driller: Faucheux
Rig: Airboat

Location: Lat. 29° 47' 17.8"
Long. 89° 22' 33.2"
Surface Elevation: n/a

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			0.07 (T)		67	115							Soft gray SILTY CLAY (CH) with organic, silt layers, and shell fragments
			0.07 (T) 0.09 (T)	0.34 t=2.7	48								
					639								Very Soft dark gray ORGANIC CLAY (OH)
			0.02 (T)		100								Very Soft gray CLAY (CH) with trace organic
			0.05 (T) 0.05 (T)				103	27	76	99			
	5		0.06 (T)		83								
			0.06 (T) 0.05 (T)	0.21 t=2.7	52	113	66	20	46				Very Soft gray CLAY (CH)
					250								Very Soft dark gray ORGANIC CLAY (OH) with roots
			0.02 (T)		75								Very Soft gray CLAY (CH)
			0.03 (T) 0.02 (T)	0.08 t=2.8	98	95	115	40	75				
			0.06 (T)		87								
			0.1 (T)		80	107							
	10		0.08 (T)										
			0.02 (T)		92								
			0.04 (T) 0.05 (T)		80	96							
					227								Very Soft dark gray ORGANIC CLAY (OH) with peat
			0.02 (T)		95								Very Soft gray CLAY (CH) with trace organic
			0.02 (T) 0.02 (T)	0.16 t=2.8	114	92	131	28	103				
			0.04 (T)		640						33.9		Very Soft dark gray ORGANIC CLAY (OH) with roots
	15		0.04 (T) 0.01 (T)		267	76							
													Boring completed at 16 ft.

Ground Water Level Data	Boring Advancement Method	Notes
	4" Nom. Dia. Short Flight Auger: 0 to 16 ft.	NP = Non-Plastic Consolidation Test: 3.3 to 3.5 ft. Depth
	Boring Abandonment Method Borehole abandoned upon completion	Strata Boundaries May Not Be Exact

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Biloxi Marsh Living Shoreline
(P0-0174)
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St. Bernard Parish, Louisiana

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Austin, TX 78759

LOG OF SOIL BORING NB-05

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 17-2828
Date: 5/15/18
Logged by: E. D'Antoni
Driller: Faucheux
Rig: Airboat

Location: Lat. 29° 47' 3.3"
Long. 89° 22' 27.3"
Surface Elevation: n/a

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			0.01 (T) <0.25 (P)		456	59							Very Soft dark gray PEAT (PT) with shell fragments
			0.03 (T) 0.03 (T)				440	73	367				
			0.03 (T) <0.25 (P)		426	63							
			0.05 (T) 0.05 (T)										
	5		0.01 (T) <0.25 (P)		354								
			0.02 (T) 0.01 (T)	0.09 t=2.1	64	97	60	19	41				Very Soft gray CLAY (CH) with trace organic
			<0.25 (P)		136	90							
			0.06 (T) <0.25 (P)										
			0.06 (T) 0.09 (T)										
			0.03 (T) <0.25 (P)		111								Very Soft gray CLAY (CH) with organic
			0.1 (T) 0.06 (T)	0.10 t=1.8	85	93	102	35	67				
	10		<0.25 (P)		207								Very Soft gray ORGANIC CLAY (OH)
			0.06 (T) <0.25 (P)		71								Very Soft gray CLAY (CH) with trace organic
			0.06 (T) 0.06 (T)		63								
			0.14 (T) <0.25 (P)		70								
			0.16 (T) 0.15 (T)	0.20 t=1.7	73	94	105	28	77				
			0.09 (T) <0.25 (P)		69	100							
	15		0.06 (T) 0.05 (T)										
													Boring completed at 16 ft.

Ground Water Level Data	Boring Advancement Method	Notes
	4" Nom. Dia. Short Flight Auger: 0 to 16 ft.	
	Boring Abandonment Method Borehole abandoned upon completion	Strata Boundaries May Not Be Exact

Biloxi Marsh Living Shoreline
(P0-0174)
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St. Bernard Parish, Louisiana

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LOG OF SOIL BORING NB-07

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 17-2828
Date: 5/15/18
Logged by: E. D'Antoni
Driller: Faucheux
Rig: Airboat

Location: Lat. 29° 46' 57"
Long. 89° 21' 54.8"
Surface Elevation: n/a

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			0.05 (T)		112								Very Soft gray CLAY (CH) with organic
			0.04 (T) 0.09 (T)										
			0.05 (T)		67	95							Very Soft gray SILTY CLAY (CL) with organic
			0.05 (T) 0.05 (T)	0.11 t=2.7	229	77	265	57	208				Very Soft dark gray ORGANIC CLAY (OH)
			<0.25 (P)		426								
	5		0.01 T <0.25 (P)										Very Soft gray CLAY (CH) with trace organic, silt, and sand
			0.01 T 0.02 T	0.16 t=3.3	73	103	96	25	71	100			
			<0.25 (P) 0.04 (T)		77	102							
			0.06 (T) 0.01 (T)										
			<0.25 (P)		77								
			<0.25 (P) 0.06 (T)		71								
			0.12 (T) 0.04 (T)	0.14 t=3.1	127	85	167	27	140				Very Soft gray and CLAY (CH) with organic
	10		<0.25 (P)		106	92							
			<0.25 (P) 0.01 (T)		110								
			0.05 (T) 0.06 (T)										
			0.07 (T)		46								Very Soft gray SILTY CLAY (CL) with organic and sand
			0.09 (T) 0.03 (T)	0.16 t=3.2	74	100	105	26	79				Very Soft gray CLAY (CH) with organic and trace silt and sand
	15		0.01 (T)		124	99							
			0.01 (T) 0.02 (T)										
													Boring completed at 16 ft.

Ground Water Level Data	Boring Advancement Method	Notes
	4" Nom. Dia. Short Flight Auger: 0 to 16 ft.	Consolidation Test: 5.3 to 5.5 ft. Depth
	Boring Abandonment Method Borehole abandoned upon completion	Strata Boundaries May Not Be Exact

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Biloxi Marsh Living Shoreline
(P0-0174)
Eloi Bay
St. Bernard Parish, Louisiana

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Austin, TX 78759

LOG OF SOIL BORING NB-09

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 17-2828
Date: 5/14/18
Logged by: E. D'Antoni
Driller: Faucheux
Rig: Airboat

Location: Lat. 29° 46' 54.5"
Long. 89° 21' 1.9"
Surface Elevation: n/a

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			<0.25 (P)										Very Soft dark gray CLAY (CH) with organic and silt
			<0.25 (P)	0.18 t=2.6	65	100	85	23	62				Very Soft to Soft gray CLAY (CH) with organic
			0.5 (P)		47	109							-with wood
			0.25 (P)										Very Soft gray CLAY (CH) with trace organic and silt
	5		0.15 (T) <0.25 (P) 0.16 (T)		107	89							
			0.06 (T)	0.21 t=1.6	46	105	58	20	38				Very Soft to Soft gray CLAY (CH) with silt
			0.25 (P)		42								
			0.25 (P)										
													Very Soft to Soft gray CLAY (CH) with trace organic
	10			0.22 t=2.6	68	100	89	25	64				
			0.25 (P)		49	110							Very Soft to Soft gray CLAY (CH) with silty clay layers
			0.05 (T) 0.12 (T)										
			0.06 (T) 0.25 (P)		43	111							Soft gray SILTY CLAY (CL) with sand
			0.09 (T) 0.11 (T)	0.39 t=1.6	32	118							
	15		0.09 (T) 0.25 (P)		49	114							Very Soft gray CLAY (CH) with sand layers and trace organic
			0.07 (T) 0.06 (T)										
													Boring completed at 16 ft.

Ground Water Level Data	Boring Advancement Method	Notes
	4" Nom. Dia. Short Flight Auger: 0 to 16 ft.	t = Lateral Confining Pressure (psi). NP = Non-Plastic
	Boring Abandonment Method Borehole abandoned upon completion	Strata Boundaries May Not Be Exact

ARD LOG01R 17-2828 - 9-4-2018.GPJ LOG01.GDT 12/18/18

Biloxi Marsh Living Shoreline
(P0-0174)
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St. Bernard Parish, Louisiana

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LOG OF SOIL BORING NB-11

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 17-2828
Date: 5/16/18
Logged by: E. D'Antoni
Driller: Faucheux
Rig: Airboat

Location: Lat. 29° 46' 40.1"
Long. 89° 19' 38.9"
Surface Elevation: n/a

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			0.15 (T)		66	105							Very Soft gray CLAY (CH) with trace organic
			0.11 (T) 0.05 (T)	0.14 t=2.7	77	93	106	28	78	100			
			0.1 (T)		90	86							
			0.08 (T) 0.09 (T)										
	5		0.1 (T)		80	101							
			0.07 (T) 0.1 (T)	0.16 t=2.3	42	113	47	19	28				Very Soft to Soft gray SILTY CLAY (CL) with clay and silt layers and lenses
					41	117							
			0.15 (T)		55	111							
			0.11 (T) 0.08 (T)	0.47 t=2.7	36	116	35	25	10				
	10		0.04 (T)		42	116							
			0.12 (T) 0.09 (T)										
					59	108							
			0.14 (T)	0.18 t=2.7	40	110	43	24	19				
					58	109							
	15		0.09 (T) 0.1 (T)										
													Boring completed at 16 ft.

Ground Water Level Data	Boring Advancement Method	Notes
	4" Nom. Dia. Short Flight Auger: 0 to 16 ft.	Consolidation Test: 2.3 to 2.5 ft. Depth
	Boring Abandonment Method Borehole abandoned upon completion	Strata Boundaries May Not Be Exact

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Biloxi Marsh Living Shoreline
(P0-0174)
Eloi Bay
St. Bernard Parish, Louisiana

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Austin, TX 78759

LOG OF SOIL BORING NB-12

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 17-2828
Date: 5/16/18
Logged by: E. D'Antoni
Driller: Faucheux
Rig: Airboat

Location: Lat. 29° 45' 50.1"
Long. 89° 18' 51.5"
Surface Elevation: n/a

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
					757								Very Soft dark gray PEAT (PT)
			0.04 (T)		67						8.6		Very Soft to Soft gray CLAY (CH) with silt and trace organic
			0.15 (T) 0.41 (T)	0.34 t=2.8	37	114	54	19	35				
			<0.25 (P) 0.05 (T)		66								
			0.05 (T) 0.21 (T)		43		47	19	28	100			Soft to Medium Stiff gray SILTY CLAY (CL) with trace sand
			0.25 (P)		34					90			
	5		0.23 (T) 0.11 (T)	0.80 t=1.5	30		32	23	9				
			<0.25 (P)		43								
			0.1 (T) 0.15 (T)										
			0.25 (P) 0.02 (T)		36								
			0.04 (T) 0.05 (T)	0.31 t=2.8	30								Soft gray SANDY CLAY (CL) w/ silt and sand lenses
	10		<0.25 (P) .09 (T)		36								
			09 (T) 0.07 (T)										
			0.25 (P) 0.02 (T)		37								
			0.05 (T) 0.05 (T)	0.40 t=2.8	32								
			0.5 (P) .05 (T)		38								
	15		0.1 (T) 0.05 (T)										
													Boring completed at 16 ft.

Ground Water Level Data	Boring Advancement Method	Notes
	4" Nom. Dia. Short Flight Auger: 0 to 16 ft.	t = Lateral Confining Pressure (psi). **Consolidation Test: 3.3 to 3.5 ft. Depth**
	Boring Abandonment Method **Borehole abandoned upon completion**	**Strata Boundaries May Not Be Exact**

ARD LOG01R 17-2828 - 9-4-2018.GPJ LOG01.GDT 12/18/18

Biloxi Marsh Living Shoreline
(P0-0174)
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St. Bernard Parish, Louisiana

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LOG OF SOIL BORING NB-14

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 17-2828
Date: 5/16/18
Logged by: E. D'Antoni
Driller: Faucheux
Rig: Airboat

Location: Lat. 29° 45' 39.8"
Long. 89° 17' 46.5"
Surface Elevation: n/a

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			0.14 T <0.25 (P)		47								Very Soft to Soft gray SILTY CLAY (CL) with trace organic
			0.11 T 0.06 T	0.26 t=1.8	38		45	23	22				
			0.12 T <0.25 (P)		38	109							
			0.06 T 0.1 T										
	5		0.04 T <0.25 (P)		40								Very Soft to Soft gray CLAY (CH) with silt and trace organic
			0.05 T 0.04 T	0.21 t=2.7	48	111	56	21	35				
			0.01 T <0.25 (P)		54								
			0.01 T 0.04 T										
			0.01 T <0.25 (P)		45								Very Soft to Soft gray SILTY CLAY (CL) with sand and layers of clay
			0.01 T 0.01 T	0.23 t=1.7	35		39	21	18				
	10		0.04 T <0.25 (P)		47	117							
			0.01 T 0.02 T										
			0.01 T <0.25 (P)		45								
			0.02 T 0.01 T	0.16 t=3.2	38	116	40	18	22				
			0.01 T <0.25 (P)		42								
	15		0.01 T 0.04 T										
													Boring completed at 16 ft.

Ground Water Level Data	Boring Advancement Method	Notes
	4" Nom. Dia. Short Flight Auger: 0 to 16 ft.	t = Lateral Confining Pressure (psi).
	Boring Abandonment Method Borehole abandoned upon completion	Strata Boundaries May Not Be Exact

ARD LOG01R 17-2828 - 9-4-2018.GPJ LOG01.GDT 12/18/18

Biloxi Marsh Living Shoreline
(P0-0174)
Eloi Bay
St. Bernard Parish, Louisiana

Mott MacDonald
10415 Morado Circle, Suite 300
Austin, TX 78759

LOG OF SOIL BORING NB-15

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 17-2828
Date: 5/16/18
Logged by: E. D'Antoni
Driller: Faucheux
Rig: Airboat

Location: Lat. 29° 46' 7.5"
Long. 89° 17' 36.2"
Surface Elevation: n/a

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			0.01 T <0.25 (P)		165								Very Soft dark gray ORGANIC CLAY (OH)
			0.01 T 0.01 T	0.10	93	93	114	24	90				Very Soft gray CLAY (CH) with organic
			<0.25 (P) 0.01 T		91 308	82							Very Soft dark gray ORGANIC CLAY (OH)
			<0.25 (P) 0.01 T										Very Soft gray CLAY (CH) with organic
			0.01 T 0.01 T <0.25 (P)		117								Very Soft dark gray ORGANIC CLAY (OH)
	5		0.01 T 0.01 T	0.10 t=2.5	101	91	110 125	27 33	83 92	96			Very Soft gray CLAY (CH) with organic
			<0.25 (P) 0.01 T <0.25 (P)		88 304	95					31.9		Very Soft dark gray ORGANIC CLAY (OH)
			0.01 T 0.01 T										Very Soft gray CLAY (CH) with organic
			<0.25 (P) 0.01 T		170								Very Soft dark gray ORGANIC CLAY (OH)
	10		<0.25 (P) 0.01 T 0.01 T 0.01 T <0.25 (P)	0.10 t=2.5	114 172 153	82 86	190	42	148				Very Soft gray CLAY (CH) with organic pockets
			0.01 T 0.01 T										
			0.01 T <0.25 (P)		184								
			0.01 T 0.01 T	0.19 t=2.7	255	72	294	89	205				
	15		0.02 T <0.25 (P)		197	78							
			0.01 T 0.01 T										
													Boring completed at 16 ft.

Ground Water Level Data	Boring Advancement Method	Notes
	4" Nom. Dia. Short Flight Auger: 0 to 16 ft.	t = Lateral Confining Pressure (psi). **Consolidation Test: 5.3 to 5.5 ft. Depth**
	Boring Abandonment Method **Borehole abandoned upon completion**	**Strata Boundaries May Not Be Exact**

ARD LOG01R 17-2828 - 9-4-2018.GPJ LOG01.GDT 12/18/18

Biloxi Marsh Living Shoreline
(P0-0174)
Eloi Bay
St. Bernard Parish, Louisiana

Mott MacDonald
10415 Morado Circle, Suite 300
Austin, TX 78759

LOG OF SOIL BORING NB-16

Ardaman & Associates, Inc.

Sheet 1 of 1

File: 17-2828
Date: 5/16/18
Logged by: E. D'Antoni
Driller: Faucheux
Rig: Airboat

Location: Lat. 29° 46' 41.7"
Long. 89° 17' 36.9"
Surface Elevation: n/a

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			<0.25 (P)		218								Very Soft gray ORGANIC CLAY (OH)
			<0.25 (P) 0.15 T 0.31 T 0.14 T	0.31 t=2.7	69 62	105	108	28	80	100			Soft light gray CLAY (CH) with trace organic
			<0.25 (P)		180								Very Soft gray ORGANIC CLAY (OH)
			<0.25 (P) 0.06 (T) 0.09 (T) 0.11 (T)		72	107							Very Soft gray CLAY (CH)
	5		0.01 (T)		61								
			0.01 (T) 0.14 (T)										
			<0.25 (P) 0.05 T		86								Very Soft dark gray CLAY (CH)
			0.04 T 0.12 T	0.23 t=2.8	79	99	102	24	78				
			<0.25 (P) 0.01 T		68	81							Very Soft gray CLAY (CH) with lenses and layers of silty clay, silt, and organic clay
			0.01 T 0.01 T	0.10 t=2.7	36	119							
	10		0.25 (P) 0.05 T		62								
			0.05 T 0.04 T	0.22 t=2.7	150	85	221	62	159				
			<0.25 (P) 0.05 T		65	92							
			0.06 T 0.16 T										
	15		<0.25 (P) 0.05 T		64	104							
			0.09 T 0.06 T										
													Boring completed at 16 ft.

Ground Water Level Data	Boring Advancement Method	Notes
	4" Nom. Dia. Short Flight Auger: 0 to 16 ft.	t = Lateral Confining Pressure (psi). **Consolidation Test: 1.3 to 1.5 ft. Depth**
	Boring Abandonment Method **Borehole abandoned upon completion**	**Strata Boundaries May Not Be Exact**

ARD LOG01R 17-2828 - 9-4-2018.GPJ LOG01.GDT 12/18/18

Biloxi Marsh Living Shoreline
(P0-0174)
Eloi Bay
St. Bernard Parish, Louisiana

Mott MacDonald
10415 Morado Circle, Suite 300
Austin, TX 78759

LOG OF SOIL BORING NB-18

Ardaman & Associates, Inc.

Sheet 1 of 1

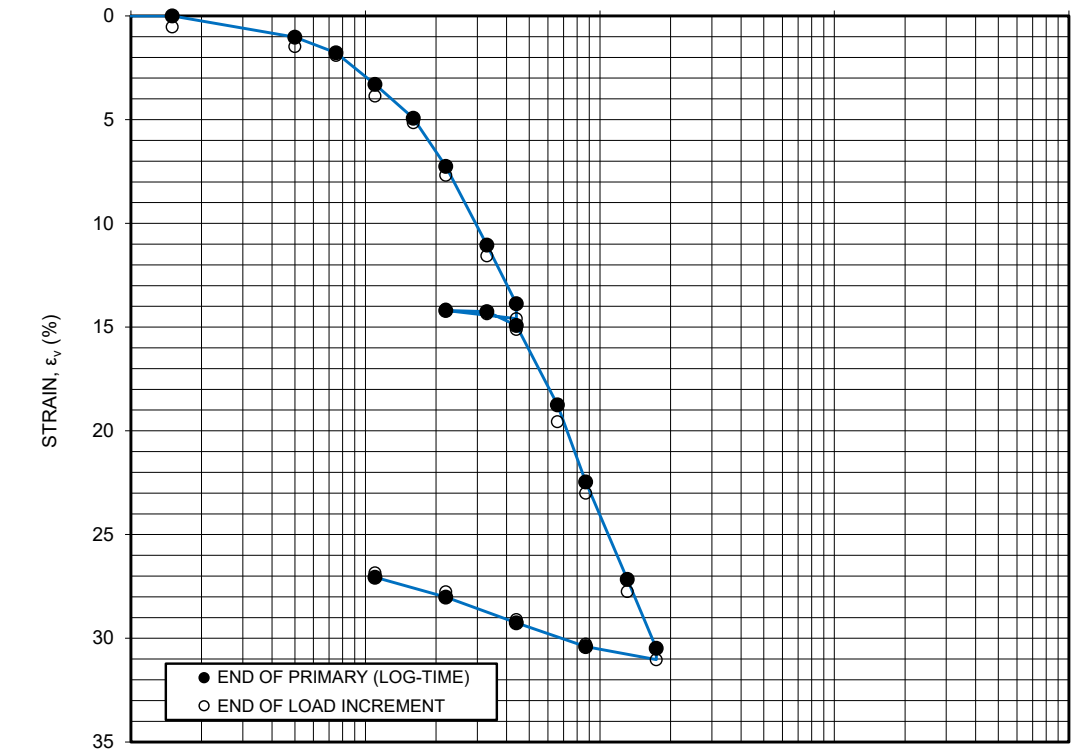
File: 17-2828
Date: 5/16/18
Logged by: E. D'Antoni
Driller: Faucheux
Rig: Airboat

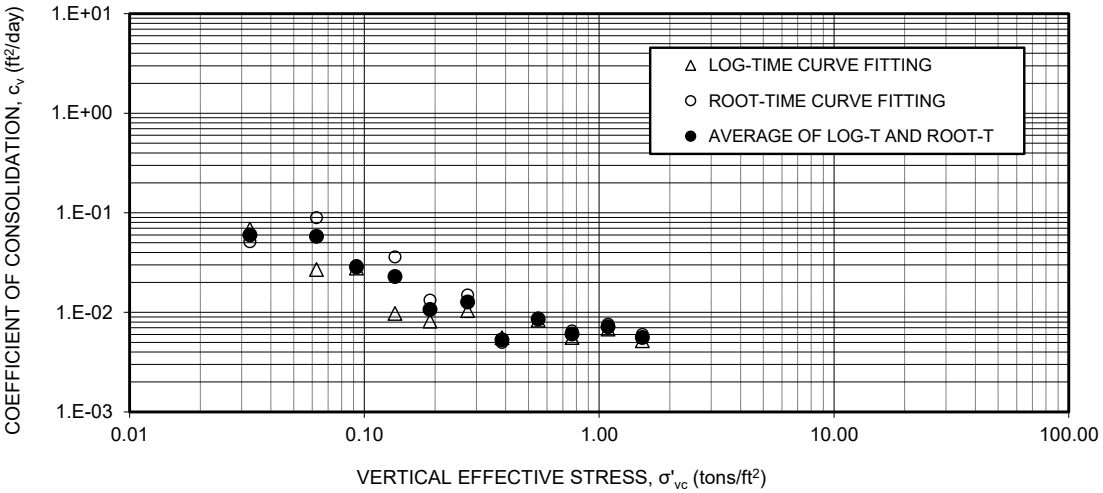
Location: Lat. 29° 47' 41.3"
Long. 89° 17' 48.6"
Surface Elevation: n/a

FIELD DATA				LABORATORY DATA									
Ground Water Level	Depth (feet)	Samples	Field Test Results	Compressive Strength (tsf)	Water Content (%)	Wet Unit Weight (pcf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Percent Passing #200 Sieve	Organic Content (%)	Soil Type	Description
			0.5 (P) 0.11 T		43								Soft gray CLAY (CH) with silt and trace organic
			0.19 T 0.01 T	0.48 t=0.3	34	113	59	18	41				
			0.5 (P) 0.01 T		41								
			0.01 T 0.01 T										
	5		0.01 T 0.5 (P)		42								
			0.01 T 0.09 T	0.38 t=0.3	37	116	52	18	34				
			0.15 T 0.5 (P)		43								
			0.175 T 0.13 T										
			0.5 (P) 0.25 T		67								
			0.12 T 0.1 T	0.37 t=2.6	42	112	60	18	42				
	10		<0.25 (P) 0.1 T		40								
			0.11 T 0.15 T										
			0.5 (P) 0.13 T		35								
			0.09 T 0.19 T	0.37 t=0.3	29	118							Soft gray SILTY CLAY (CL) with sand and clay layers
	15		0.5 (P) 0.12 T		48								
			0.11 T 0.2 T										
													Boring completed at 16 ft.

Ground Water Level Data	Boring Advancement Method	Notes
	4" Nom. Dia. Short Flight Auger: 0 to 16 ft.	t = Lateral Confining Pressure (psi).
	Boring Abandonment Method Borehole abandoned upon completion	Strata Boundaries May Not Be Exact

ARD LOG01R 17-2828 - 9-4-2018.GPJ LOG01.GDT 12/18/18





SAMPLE DATA	
BORING NO.:	B-4
SAMPLE DEPTH (ft):	3.3 - 3.5
DESCRIPTION:	Gray Clay CH

SPECIMEN CONDITIONS	INITIAL	FINAL
MOISTURE CONTENT (%):	98.5	61.8
DRY DENSITY (lb/ft³):	46.7	64.3
VOID RATIO:	2.618	1.629

INDEX PROPERTIES		
LIQUID LIMIT (%):	103	
PLASTIC LIMIT (%):	27	
PLASTICITY INDEX (%):	76	
SPECIFIC GRAVITY:	2.708	(Measured)
-200 (%):	99.45	

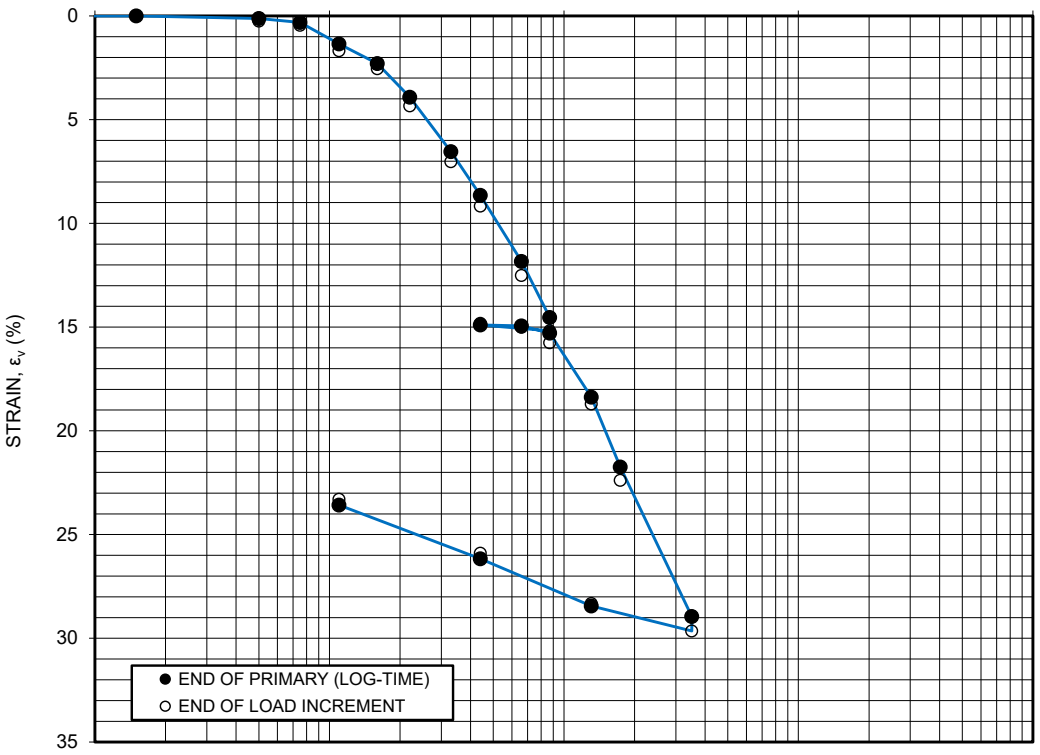
CONSOLIDATION PARAMETERS	
VIRGIN COMPRESSION RATIO, CR:	0.267
RECOMPRESSION RATIO, RR:	0.038
PRECONSOLIDATION PRESSURE, σ'_p:	0.17 tsf

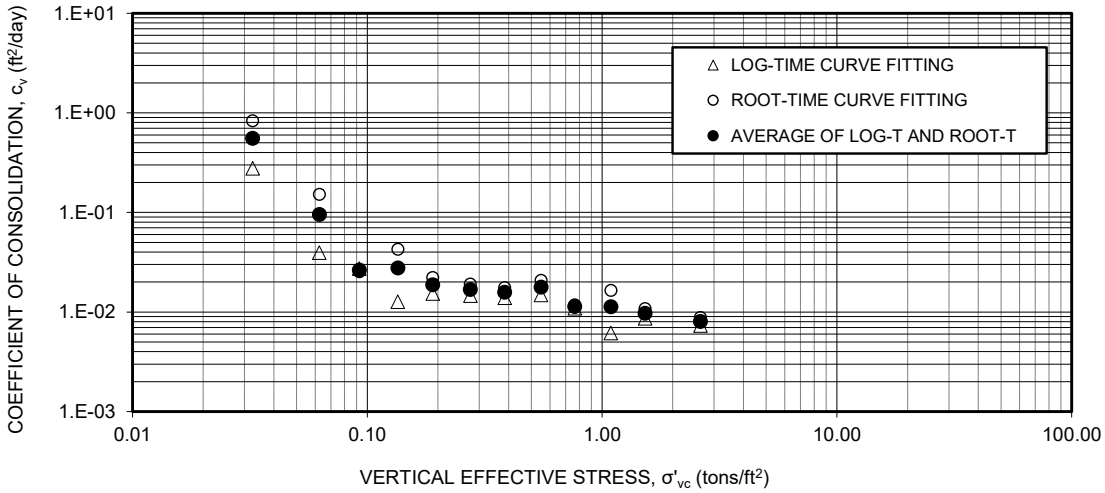
INCREMENTAL CONSOLIDATION TEST RESULTS

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

BILOXI MARSH LIVING SHORELINE

DRAWN BY:	CHECKED BY:	DATE:
RAN	MW	6-18-18
FILE NO.:	APPROVED BY:	FIGURE:
17-2828	MW	--





SAMPLE DATA	
BORING NO.:	B-7
SAMPLE DEPTH (ft):	5.3 - 5.5
DESCRIPTION:	Gray Clay CH

SPECIMEN CONDITIONS	INITIAL	FINAL
MOISTURE CONTENT (%):	82.3	54.8
DRY DENSITY (lb/ft^3):	53.4	70.6
VOID RATIO:	2.164	1.392

INDEX PROPERTIES		
LIQUID LIMIT (%):	0	
PLASTIC LIMIT (%):	0	
PLASTICITY INDEX (%):	0	
SPECIFIC GRAVITY:	2.7054	(Calculated)
-200 (%):	99.64	

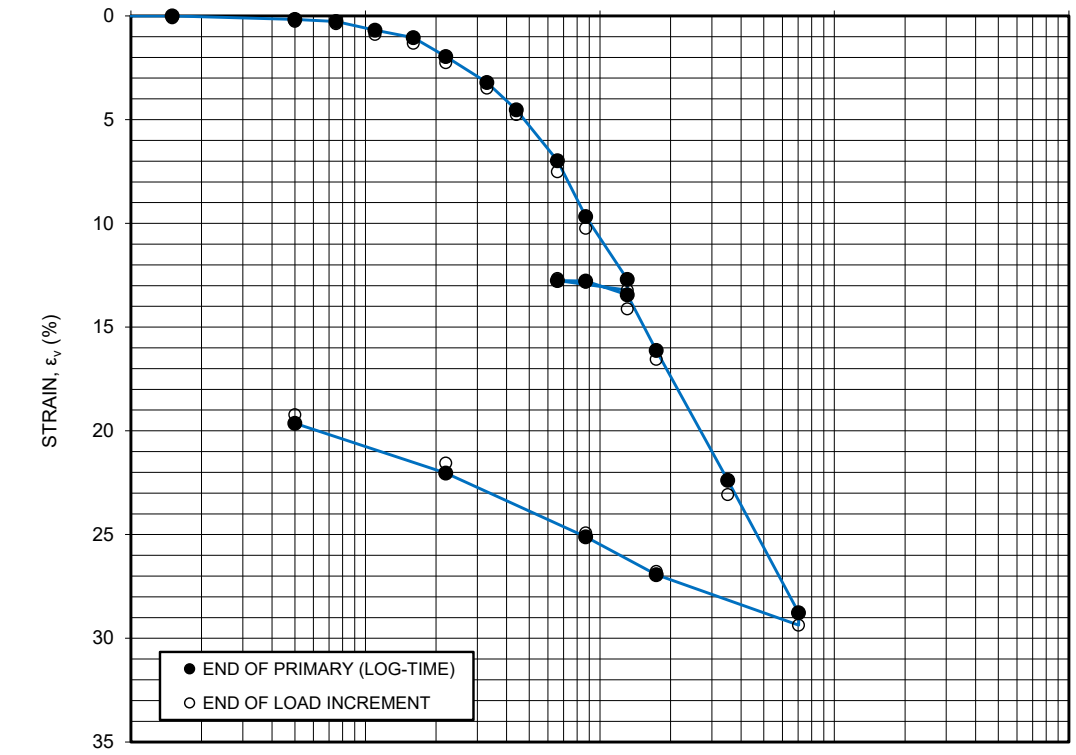
CONSOLIDATION PARAMETERS	
VIRGIN COMPRESSION RATIO, CR:	0.245
RECOMPRESSION RATIO, RR:	0.158
PRECONSOLIDATION PRESSURE, σ'_p:	0.22 tsf

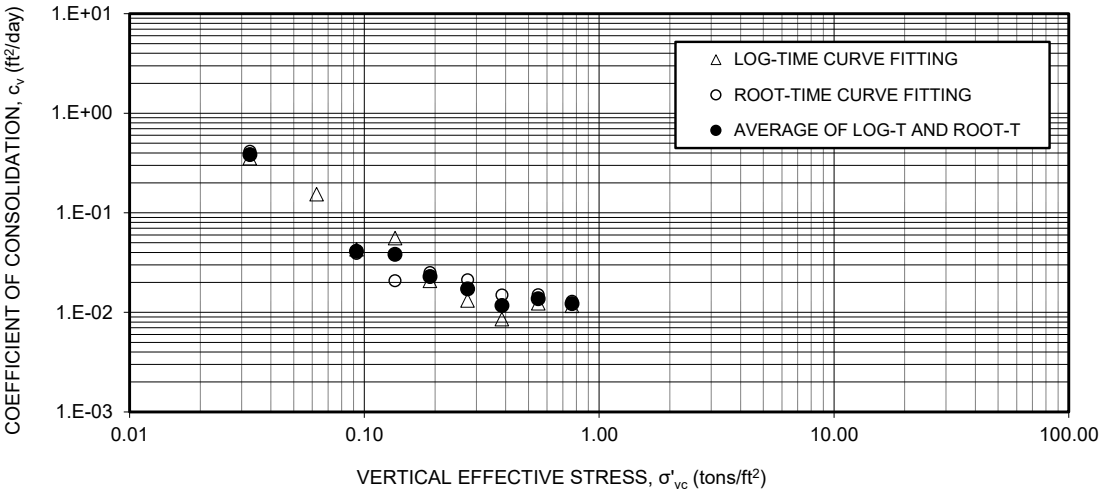
INCREMENTAL CONSOLIDATION TEST RESULTS

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

BILOXI MARSH LIVING SHORELINE

DRAWN BY: RAN	CHECKED BY: MW	DATE: 6-18-18
FILE NO.: 17-2828	APPROVED BY: MW	FIGURE: --





SAMPLE DATA	
BORING NO.:	B-11
SAMPLE DEPTH (ft):	1.3 - 1.5
DESCRIPTION:	Gray Clay CH w/ trace organic

SPECIMEN CONDITIONS	INITIAL	FINAL
MOISTURE CONTENT (%):	70.2	49.3
DRY DENSITY (lb/ft^3):	59.6	74.4
VOID RATIO:	1.800	1.240

INDEX PROPERTIES		
LIQUID LIMIT (%):	106	
PLASTIC LIMIT (%):	28	
PLASTICITY INDEX (%):	78	
SPECIFIC GRAVITY:	2.6711	(Measured)
-200 (%):	99.73	

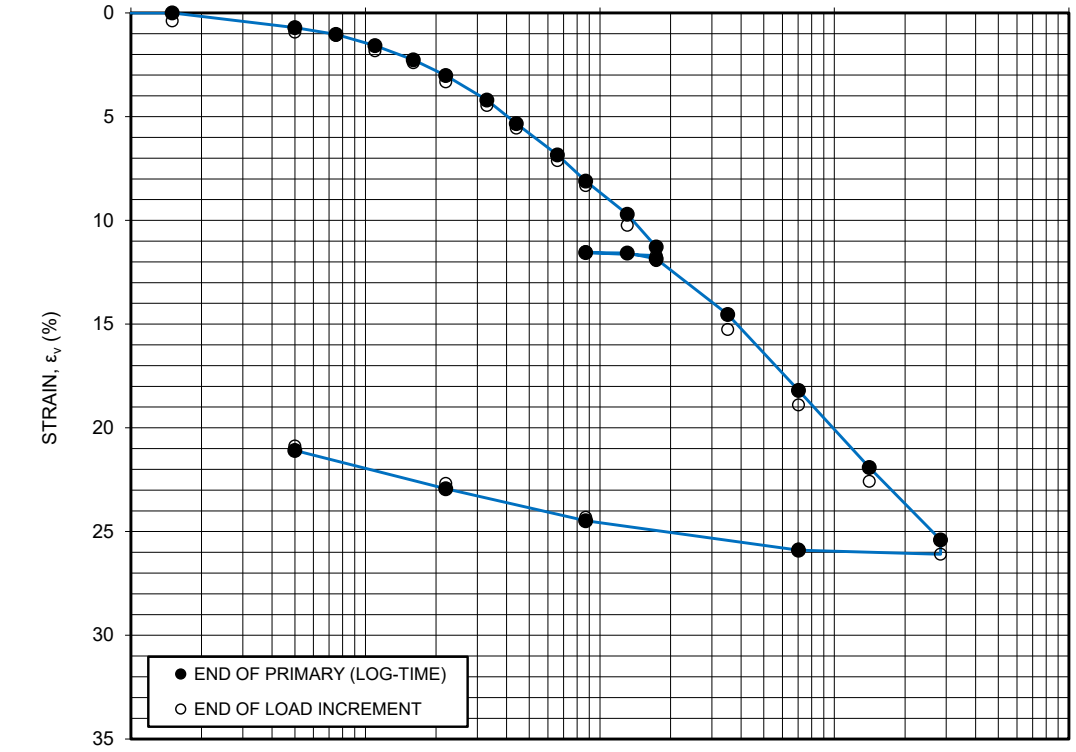
CONSOLIDATION PARAMETERS	
VIRGIN COMPRESSION RATIO, CR:	0.206
RECOMPRESSION RATIO, RR:	0.038
PRECONSOLIDATION PRESSURE, σ'_p:	0.42 tsf

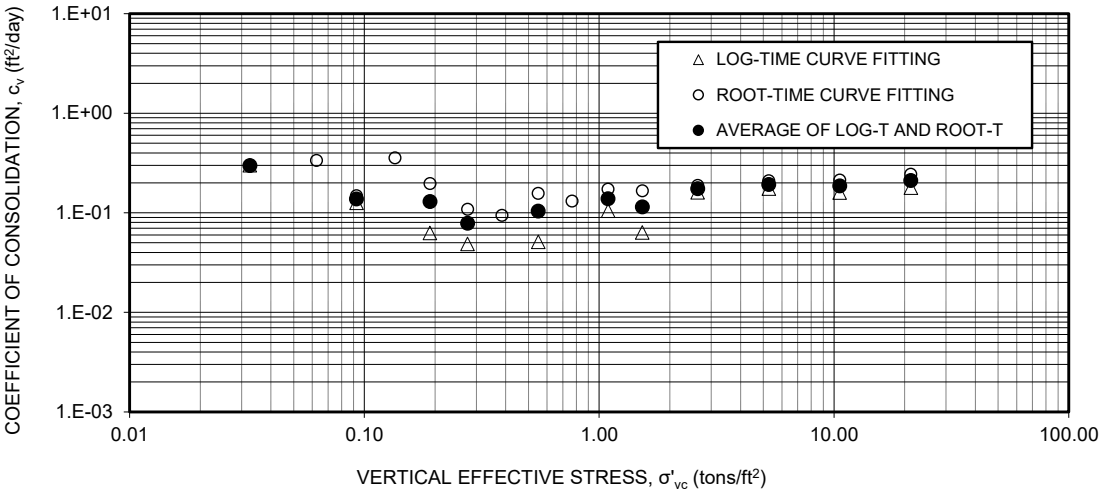
INCREMENTAL CONSOLIDATION TEST RESULTS

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

BILOXI MARSH LIVING SHORELINE

DRAWN BY:	CHECKED BY:	DATE:
RAN	MW	6-18-18
FILE NO.:	APPROVED BY:	FIGURE:
17-2828	MW	--





SAMPLE DATA	
BORING NO.:	B-12
SAMPLE DEPTH (ft):	3.3 - 3.5
DESCRIPTION:	Gray Silty Clay CL

SPECIMEN CONDITIONS	INITIAL	FINAL
MOISTURE CONTENT (%):	42.7	25.9
DRY DENSITY (lb/ft^3):	80.0	103.1
VOID RATIO:	1.123	0.648

INDEX PROPERTIES		
LIQUID LIMIT (%):	47	
PLASTIC LIMIT (%):	19	
PLASTICITY INDEX (%):	28	
SPECIFIC GRAVITY:	2.72	(Measured)
-200 (%):	99.96	

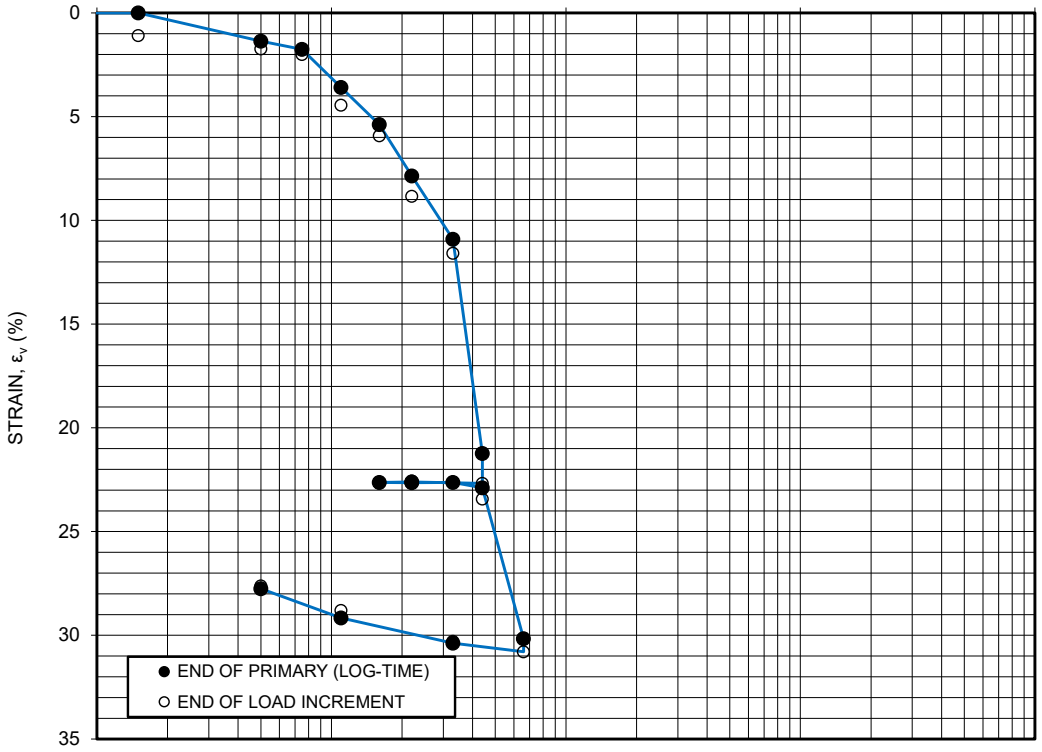
CONSOLIDATION PARAMETERS	
VIRGIN COMPRESSION RATIO, CR:	0.114
RECOMPRESSION RATIO, RR:	0.026
PRECONSOLIDATION PRESSURE, σ'_p:	0.37 tsf

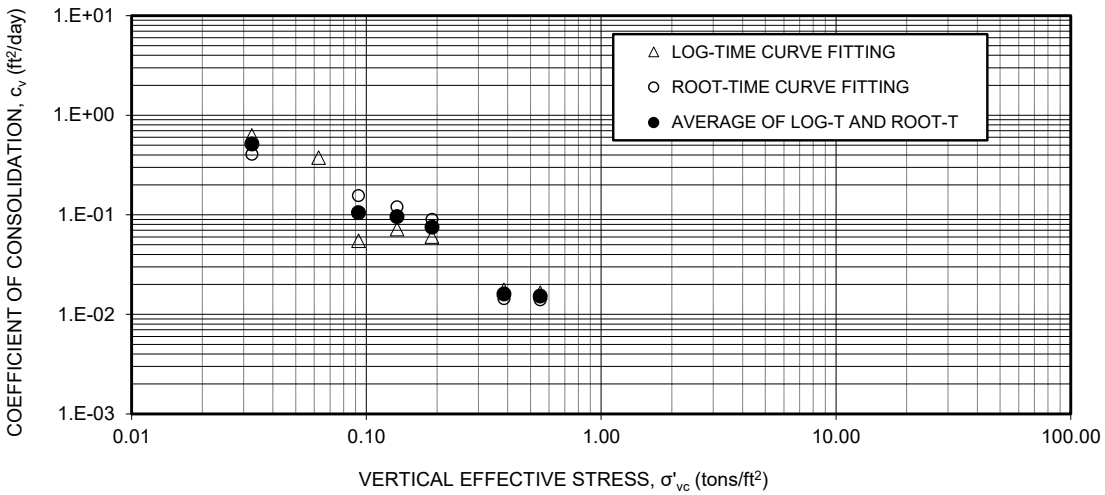
INCREMENTAL CONSOLIDATION TEST RESULTS

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

BILOXI MARSH LIVING SHORELINE

DRAWN BY:	CHECKED BY:	DATE:
RAN	MW	6-18-18
FILE NO.:	APPROVED BY:	FIGURE:
17-2828	MW	--





SAMPLE DATA	
BORING NO.:	B-15
SAMPLE DEPTH (ft):	5.3 - 5.5
DESCRIPTION:	Brown/Gray Organic Clay

SPECIMEN CONDITIONS	INITIAL	FINAL
MOISTURE CONTENT (%):	158.2	101.7
DRY DENSITY (lb/ft^3):	32.5	45.2
VOID RATIO:	4.051	2.637

INDEX PROPERTIES		
LIQUID LIMIT (%):	110	
PLASTIC LIMIT (%):	27	
PLASTICITY INDEX (%):	83	
SPECIFIC GRAVITY:	2.631	(Measured)
-200 (%):	95.77	

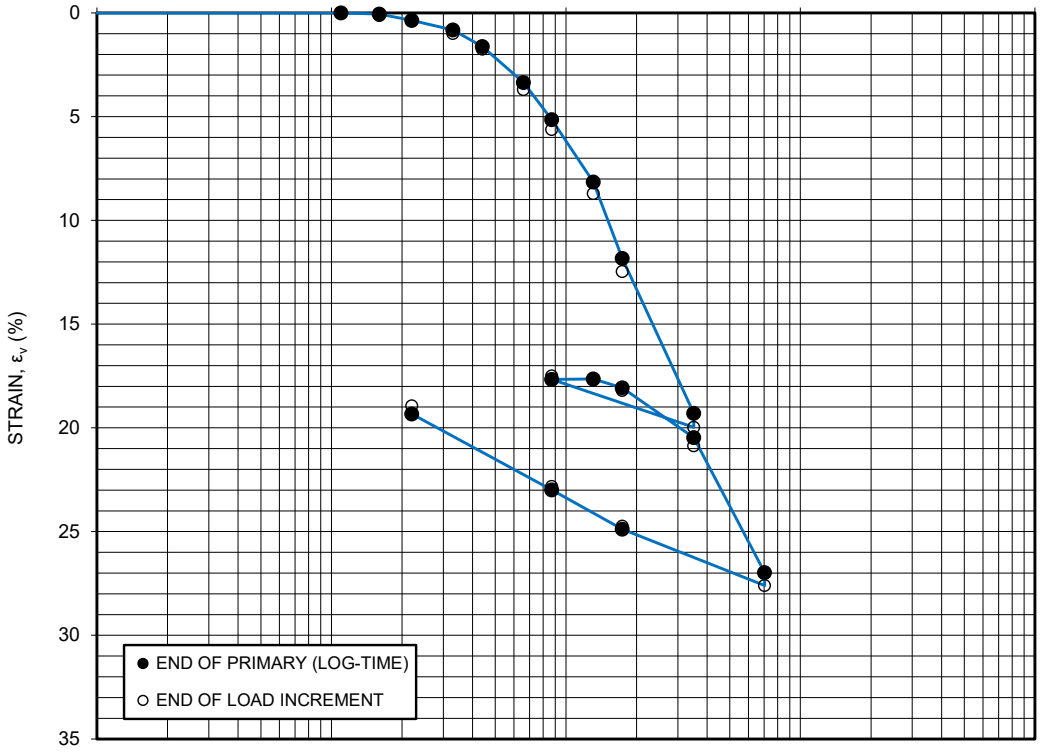
CONSOLIDATION PARAMETERS	
VIRGIN COMPRESSION RATIO, CR:	0.620
RECOMPRESSION RATIO, RR:	0.023
PRECONSOLIDATION PRESSURE, σ'_p:	0.25 tsf

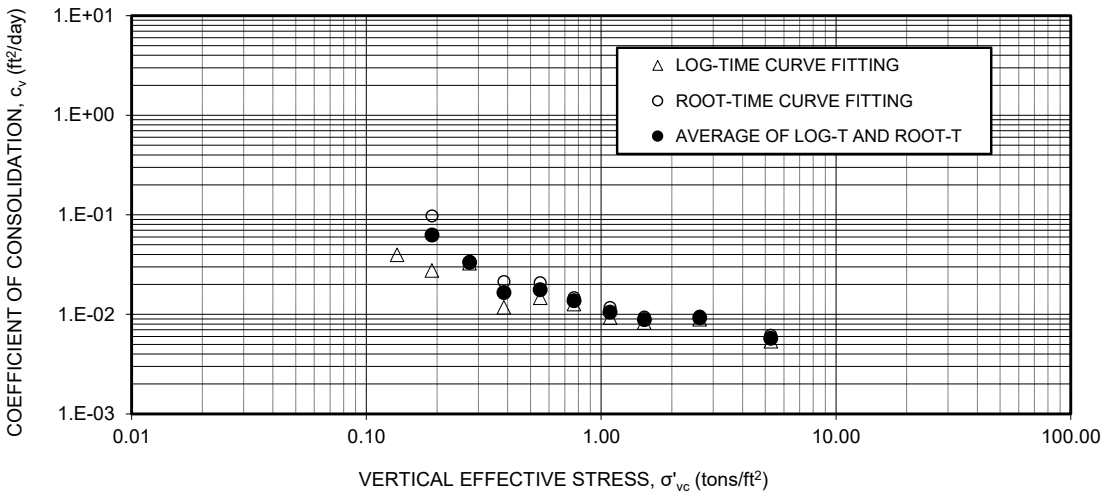
INCREMENTAL CONSOLIDATION TEST RESULTS

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

LIVING SHORELINE
COASTAL RESTORATION & PROTECTION AUTHORITY

DRAWN BY:	CHECKED BY:	DATE:
RAN	MW	6-18-18
FILE NO.:	APPROVED BY:	FIGURE:
17-2828	MW	--





SAMPLE DATA	
BORING NO.:	B-16
SAMPLE DEPTH (ft):	1.3 - 1.5
DESCRIPTION:	Gray Clay CH w/ trace organic

SPECIMEN CONDITIONS	INITIAL	FINAL
MOISTURE CONTENT (%):	67.7	53.1
DRY DENSITY (lb/ft^3):	58.0	71.2
VOID RATIO:	1.936	1.392

INDEX PROPERTIES		
LIQUID LIMIT (%):	108	
PLASTIC LIMIT (%):	28	
PLASTICITY INDEX (%):	80	
SPECIFIC GRAVITY:	2.7288	(Measured)
-200 (%):	99.86	

CONSOLIDATION PARAMETERS	
VIRGIN COMPRESSION RATIO, CR:	0.272
RECOMPRESSION RATIO, RR:	0.045
PRECONSOLIDATION PRESSURE, σ'_p:	0.8 tsf

INCREMENTAL CONSOLIDATION TEST RESULTS

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

BILOXI MARSH LIVING SHORELINE

DRAWN BY:	CHECKED BY:	DATE:
RAN	MW	6-18-18
FILE NO.:	APPROVED BY:	FIGURE:
17-2828	MW	--