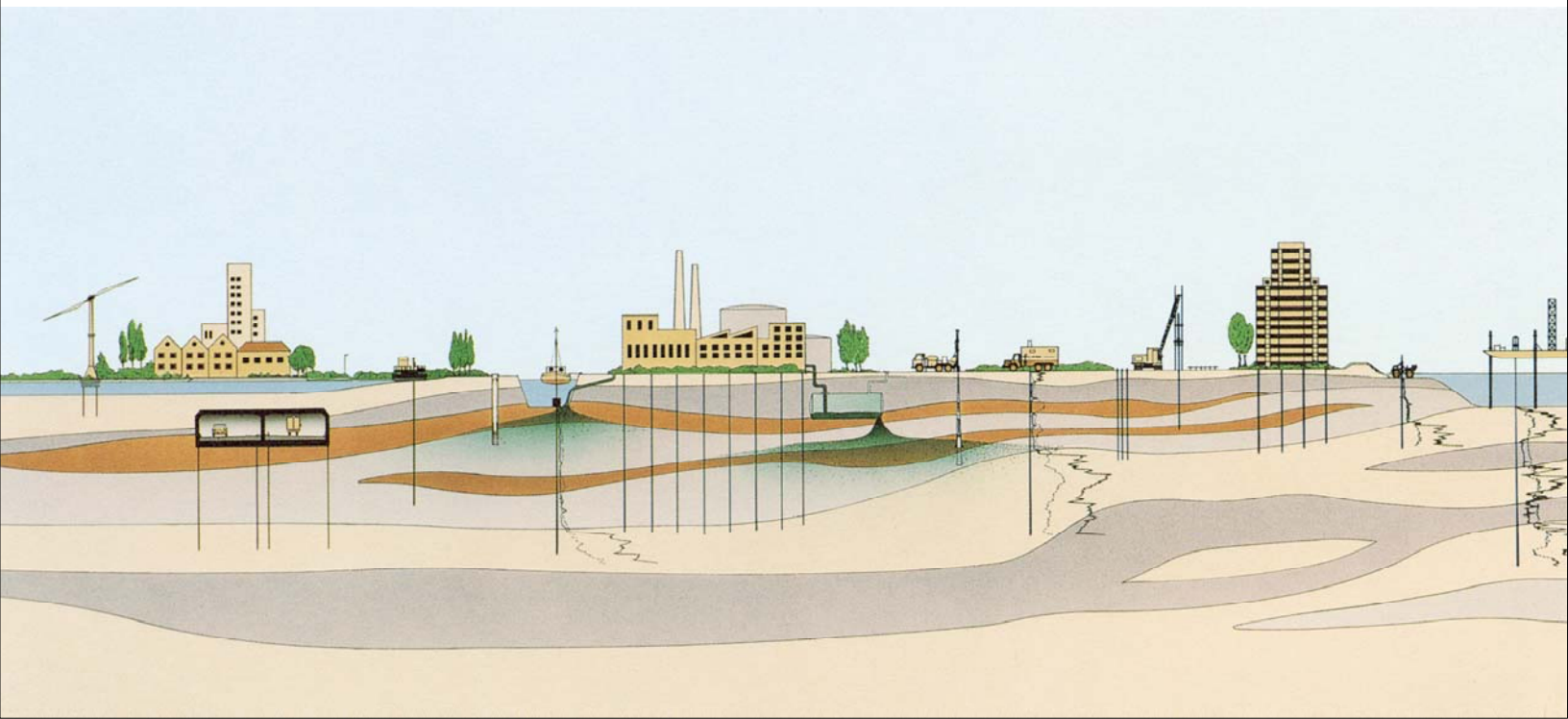
APPENDIX G: DESIGN GEOTECHNICAL DATA

FUGRO CONSULTANTS, INC.

DRAFT GEOTECHNICAL STUDY
MISSISSIPPI RIVER LONG DISTANCE SEDIMENT PIPELINE (BA-43 EB)
MISSISSIPPI RIVER TO BARATARIA WATERWAY
LDNR RSIQ NO. 2503-08-22
JEFFERSON PARISH, LOUISIANA

MOFFATT & NICHOL
BATON ROUGE, LOUISIANA



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Report No. 04.55084005 - DRAFT
November 29, 2011

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Attention: Mr. Jonathan Hird, P.E.

Draft Geotechnical Study
Mississippi River Long Distance Sediment Pipeline (BA-43B)
Mississippi River to Barataria Waterway
LDNR RSIQ No. 25503-08-22
Jefferson Parish, Louisiana

Fugro Consultants, Inc. (Fugro) is pleased to present this draft report of our geotechnical services for the above referenced project. Our services were performed in general accordance with our Proposal No. 5508-4005 dated July 13, 2011. We submitted a data report discussing our field and laboratory operations for the Phase I borings and CPTs on September 23, 2011 and preliminary recommendations based on the borings and CPTs for both Phase I and Phase II on October 28, 2011. Moffatt and Nichol provided comments subsequent to our preliminary recommendations that we have incorporated into this draft report.

This report includes a comprehensive discussion of our field and lab operations as well as a discussion of our engineering analyses and recommendations. We appreciate the opportunity to be of service to Moffatt and Nichol. Please call if you have any questions or comments concerning this draft report, or when we may be of further assistance.

Sincerely,

FUGRO CONSULTANTS, INC.

Jennifer E. Aguettant, P.E.
Engineering Supervisor

Eric R. Marx, P.E.
Branch Manager

Copies Submitted: (1) Addressee
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1.0 INTRODUCTION

1.1 Project Description

Over the last 100 years, the rate of land lost has increased rapidly in the Barataria Basin. One of the major factors has been the construction of levees on the Mississippi River and other natural channels, preventing the yearly deposition of soil as the river flooded and changed courses. Other contributing factors to land loss include manmade pipeline canals, subsidence, sea level rise, shoreline erosion, and saltwater intrusion.

The objective of this project is to obtain renewable sediment sources and provide an adequate corridor that supports equipment mobilization for long-distance conveyance of Mississippi River sediments to wetland creation projects in the Central Barataria Basin in Plaquemines, Jefferson, and Lafourche Parishes. A site vicinity map for the project is included on Plate 1. Our geotechnical study was concentrated on the proposed pipeline corridor alignment between the back levee and Barataria Waterway.

Two options were being considered for the pipeline alignment at the start of our study. The first option, designated the “Option A” alignment, follows a natural ridge immediately south of Chenier Traverse Bayou from the back levee to Bayou DuPont. The second option, designated the “Option B” alignment, follows an existing oil and gas channel that crosses the BA-39 Project area and then turns southwest towards Bayou Dupont. The alignments for Options A and B meet south of Bayou DuPont. After the completion of our field investigation, Option B was removed from consideration.

Moffatt and Nichol, the design engineer for the project, requested that we perform a geotechnical study within the project boundaries to assess subsurface conditions and provide geotechnical recommendations to the project team. Our findings are included herein.

1.2 Scope Of Services

The purposes of our geotechnical study were: 1) to explore and evaluate the subsurface soil conditions at the site, and 2) to provide geotechnical recommendations to assist the design team in developing plans and specifications for the sediment pipeline corridor. The scope of this study included the following:

- reviewing existing topographic and geotechnical information in the vicinity of the project to develop an exploration program
- drilling soil borings and performing Cone Penetration Test (CPT) soundings to evaluate subsurface conditions;

- performing field and laboratory tests on select soil samples to assess pertinent engineering soil properties;
- performing engineering analyses to estimate settlement, factors of safety against slope stability failures and ultimate bearing capacity due to the placement of marsh creation fill and containment dike material;
- preparing a report summarizing our findings and geotechnical recommendations.

Environmental assessments, compliance with state and federal regulatory requirements, and/or environmental analyses including those associated with mold, fungi, and other biologic agents were beyond the scope of this study. A geologic fault study was also beyond the scope of this study.

1.3 Applicability of Report

The explorations and analyses for this study were selected or developed based on our understanding of the project as described previously and in later sections of this report. If there are differences in project location or design features as we understand them, or if the locations or design features change, we should be authorized to review the changes and, if necessary, modify our conclusions and recommendations. The observations, conclusions, and recommendations presented in this report may not apply to locations not explored by our borings and CPTs or areas outside the project boundaries.

We have prepared this report exclusively for Moffatt and Nichol and the Louisiana Office of Coastal Protection and Restoration (OCPR) to guide the geotechnical aspects of the Long Distance Sediment Pipeline Project. We have conducted this study using the standard level of care and diligence normally practiced by recognized engineering firms now performing similar services under similar circumstances. We intend for this report, including all illustrations, to be used in its entirety. This report should be made available for information only and not as a warranty of subsurface conditions.

2.0 REVIEW OF EXISTING INFORMATION

Moffatt and Nichol provided reports of geotechnical studies performed by others in the vicinity of the Long Distance Sediment Pipeline project. In addition, survey data and construction observations from the recently constructed BA-39 marsh creation area was provided. The data was used to develop a field exploration program that would supplement the available subsurface information. In addition, the information was used as a guide to calibrate engineering analyses based on the performance of recently constructed marsh. We have provided a brief discussion of the contents of this available information in the following sections.

2.1 Eustis Engineering Company, Inc. Report (Project No. 19183, dated September 13, 2006)

Eustis Engineering Company, Inc. (Eustis) conducted a geotechnical investigation within the area of BA-39 and also in a potential borrow source area within the Mississippi River. BA-39 is located within the northeast portion of the alignment of the Long Distance Sediment Pipeline project. Eustis performed 3 soil borings along the Mississippi River bank in a potential borrow source area and 5 soil borings within the BA-39 area. The Eustis boring locations within BA-39 are shown on the Plan of Borings and CPTs on Plate 1. The boring logs from the Eustis report along with their plan of borings are presented in Appendix D.

Eustis performed settlement analyses of the containment dikes constructed to contain the marsh fill material as it is placed and the marsh fill material itself, in addition to the settlement of the underlying subsoils.

2.2 URS Corporation Report (Project No. 19228956, dated July 23, 2009)

URS Corporation (URS) conducted a geotechnical investigation within the BA-48 area adjacent to Bayou DuPont. The location of Bayou DuPont is shown on the Plan of Borings and CPTs on Plate 1. URS performed 9 soil borings within the BA-48 area. The URS soil boring locations within BA-48 are shown within the Plan of Borings and CPTS on Plate 1. The boring logs from the URS report are presented in Appendix D.

URS performed settlement analyses of the containment dikes and the marsh fill material. In addition, they also performed slope stability analyses of the containment dikes to evaluate stable side slopes.

2.3 BA-39 Data

The BA-39 marsh creation area was constructed between November 2009 and April 2010. The BA-39 marsh fill area is located in the northeast portion of the project location as shown on the Plan of Borings and CPTs on Plate 1. Sand was pumped from the Mississippi River to the BA-39 area to create the marsh.

Five settlement plates were placed on the natural mudline prior to the placement of the fill material. The locations of the settlement plates are shown on Plate 26. The elevations of the settlement plates were surveyed every one to two weeks during the construction process between November 1, 2009 and April 25, 2010. Moffatt and Nichol also provided information related to the end of construction of each cell within BA-39. Based on the settlement plate survey data and the dates of the end of construction of each cell, the underlying soils appear to have consolidated between 0.2- to 1-ft during the construction of BA-39.

Moffatt and Nichol also provided post-construction topographic survey information of the ground surface after completion of BA-39. The last date of the post-construction survey provided by Moffatt and Nichol was in April 2010. In April 2010, the ground surface within BA-39 appeared to be between El. +2.0 and El. +2.5. John Chance Land Surveys, Inc., a Fugro company, obtained recent topographic information within the BA-39 area on October 10, 2011, for LDNR Contract No. 2503-11-65, Task No. 9. Based on the recent topographic data, the current elevation within BA-39 is on the order of El. +1.6-ft to El. +1.8-ft. Using the topographic data provided by Moffatt and Nichol and John Chance Land Surveys, Inc., total settlement experienced by the sand fill material and the underlying soils is on the order of 0.2-ft to 0.9-ft between April 2010 and October 10, 2011. This information was used to calibrate our settlement analyses discussed later.

3.0 FIELD EXPLORATION

Based on a review of the existing survey and geotechnical information in Section 2.0, we developed a field exploration program to supplement the available data and obtain enough subsurface information suitable for design. Our field activities are discussed in this section. We have included discussions of drilling methods and boring/CPT locations, soil sampling methods, Cone Penetration Testing, water depth observations, and borehole and CPT completion.

3.1 Drilling Methods and Boring/CPT Locations

Our overall field exploration program consisted of a total of 10 soil borings to a depth of approximately 40 ft each below the mudline and 8 soil borings to a depth of approximately 60 ft each below the mudline. In addition, we also performed 10 Cone Penetration Tests (CPT) to a depth of approximately 40 ft each below the mudline, 5 CPTs to a depth of approximately 60 ft each below the mudline and 9 CPTs to a depth of approximately 10 ft each below the mudline.

The borings and CPTs were performed between August 17 and September 14, 2011. The borings and CPTs were performed in a marsh environment west of the Backwater Levee, east of the Barataria Waterway, and south of The Pen. The soil borings were drilled using our skid drilling equipment mounted to a marsh buggy using wet-rotary drilling techniques.

The approximate boring locations are presented in the Plan of Borings and CPTs on Plate 1. The soil boring locations were selected by Fugro and Moffatt and Nichol. Moffatt and Nichol provided proposed coordinates of the boring locations. T. Baker Smith staked the borings in the field prior to our drill crew's mobilization. It should be noted that location boring and CPT location 17 was moved approximately 1,000 ft to the east of its original location due to shallow pipelines in the vicinity that our drilling equipment would have to cross to access the original location. A list of the boring/CPT locations in each Phase and their depths is presented in the following table.

Location	Boring Depth	CPT Depth
1	--	40-ft
2	--	40-ft
3	60-ft	60-ft
4	--	40-ft
5	40-ft	--
6	--	40-ft
7	60-ft	60-ft
8	--	40-ft
9	40-ft	--
10	--	40-ft

Location	Boring	CPT
11	40-ft	--
12	40-ft	--
13	40-ft	--
14	--	40-ft
15	40-ft	--
16	--	40-ft
17	60-ft	60-ft
18	40-ft	--
19	40-ft	--
26	60-ft	60-ft
27	--	40-ft
28	60-ft	60-ft
29	--	40-ft
30	--	10-ft
32	--	10-ft
34	--	10-ft
35	--	10-ft
36	--	10-ft
37	--	10-ft
38	60-ft	--
39	--	10-ft
40	40-ft	--
41	60-ft	--
42	40-ft	--
43	60-ft	--

We have presented the boring logs on Plates 2 through 19. A key to the terms and symbols used on our boring logs is presented on Plates 20a and 20b.

3.2 Soil Sampling Methods

Soil samples were generally taken at about 2-ft intervals to a depth of about 20-ft. Below the depth of continuous sampling, soil samples were taken at 5-ft intervals to the completion depth of the borings as indicated on the boring logs. Undisturbed samples of cohesive soils were obtained by hydraulically pushing a 3-inch-diameter, thin-walled tube a distance of about 24-inches. Our field procedure for cohesive soil sampling was conducted in general accordance with the *Standard Practice for Thin-Walled Tube Sampling of Soils* (ASTM D 1587). The thin-walled tubes were capped and sealed in the field and then transported back to our laboratory in the vertical position.

The samples were extruded in our laboratory and visually classified by one of our senior geotechnical personnel.

Our field procedure for sampling granular soils was conducted in general accordance with the *Standard Method for Penetration Test and Split-Barrel Sampling of Soils* (ASTM D 1586). Granular soil samples were obtained using the Standard Penetration Test (SPT) as described on Plate 20b. A manual hammer was used to obtain the hammer blows for each SPT. Our geotechnical personnel recorded the hammer blows for each sampling interval. The uncorrected SPT N-values are recorded on the boring logs. The soil samples obtained from the split-barrel sampler were visually classified and packaged for transportation to our laboratory.

3.3 Cone Penetration Testing

The CPT soundings were conducted using our skid-mounted CPT unit mounted on a marsh buggy that uses the weight of the marsh buggy to push a cylindrical steel probe into the ground. We obtained CPT data by pushing a series of cylindrical rods with an instrumented probe at the base into the soil at a constant rate[1]. The probe consists of a cone tip element and a side friction sleeve element. Continuous measurements of penetration resistance at the cone tip and friction on the friction sleeve were recorded during the penetration. Continuous measurements of pore pressure were also made and recorded. CPT field data were saved on computer diskettes for further data reduction in the office.

The location of the CPTs can be found on the Plan of Borings and CPTs located on Plate 1. The CPT results will be correlated with the results of our borings.

The CPT logs are presented in Appendix C. A key identifying the terms and symbols used on the CPT logs and the generalized classification chart utilized for data reduction of the test results are also presented at the beginning of Appendix C.

3.4 Water Depth Observations

The soil borings and CPTs were performed in a marsh environment. Most of the boring/CPT locations were performed in the water; however, some were performed above the water level on the marsh. The approximate depth to the mudline for the exploration locations below the water surface at the time of our field operations varied between about 1.1- to 4.0-ft. The approximate depth of water at the boring/CPT locations is presented on the boring/CPT logs.

It should be noted that the water depth measurements are intended for the purpose of the geotechnical investigation only, and are not corrected for tidal or other variations. If utilized for

1 Jean Louis Briaud and Jerome Miran, The Cone Penetrometer Test, Report to the Federal Highway Administration, Report No. FHWA-SA-91-043, February 1992.

other purposes, the water depth measurements should be adjusted to account for meteorological tide and datum corrections.

3.5 Borehole and CPT Completion

The borings and CPTs for this study were backfilled upon completion with cement-bentonite grout. We grouted the boreholes from the bottom up. When grout returned to the surface, we topped off each borehole by pouring grout from the surface.

4.0 LABORATORY TESTING

The laboratory-testing program for this study was directed toward evaluating the classification properties, undrained shear strength, and compressibility characteristics of the subsurface soils. Our laboratory tests were performed in general accordance with the appropriate ASTM standards as tabulated in this section.

4.1 Classification Tests

The classification tests included tests for natural moisture content, liquid and plastic limits (collectively termed Atterberg Limits), particle size distribution, percent passing a single sieve, and organic content. These tests aid in classifying the soils and are used to correlate the results of other tests performed on samples taken from different borings and/or different depths. The results of the classification tests are presented on the boring logs on Plates 2 through 19. The particle size analyses are presented on Plates 21a through 21f.

4.2 Undrained Shear Strength Tests

We measured the undrained shear strength of select undisturbed samples of cohesive soils by performing undisturbed and remolded miniature vane shear tests and undisturbed unconsolidated-undrained triaxial compression tests. Miniature vane shear tests were generally performed on each cohesive sample prior to extrusion. Natural moisture contents and dry unit weights were determined as routine portions of the compression tests. The results of the undisturbed shear strength tests are presented on the boring logs on Plates 2 through 19. The results of the undisturbed and remolded shear strength tests are presented in the Summary of Test Results in Appendix A.

4.3 One-Dimensional Consolidation Testing

We measured the compressibility characteristics of the soils along the proposed ridge alignment by performing 27 incremental one-dimensional consolidation tests. Undisturbed soil samples from various soil borings were selected at depths ranging from 3-ft to 54-ft below existing grade for consolidation testing. Natural moisture contents and dry unit weights were determined as routine portions of the consolidation tests. The consolidation test reports are presented in Appendix B. A summary of the consolidation test results is presented in the table on the following page.

Summary of Consolidation Test Results

Boring No.	Depth (ft)	e_0	Cc	Cr	σ'_v (tsf)	σ'_p (tsf)	OCR
B-3	15.0	1.11	0.30	0.07	0.33	0.44	1.3
B-3	29.0	1.80	0.68	0.12	0.60	0.64	1.1
B-5	7.0	1.77	0.53	0.11	0.18	0.23	1.3
B-5	19.0	0.99	0.14	0.02	0.50	0.68	1.4
B-7	3.0	3.13	1.87	0.23	0.03	0.03	1.0
B-7	29.0	2.14	1.12	0.19	0.51	0.70	1.4
B-9	3.0	6.07	1.95	0.32	0.03	0.03	1.0
B-11	9.0	6.83	2.24	0.43	0.03	0.06	2.0
B-12	7.0	7.07	2.68	0.43	0.03	0.03	1.0
B-13	17.0	2.63	0.66	0.13	0.15	0.15	1.0
B-15	5.0	0.90	0.18	0.02	0.11	0.45	4.1
B-15	24.0	2.59	1.26	0.26	0.60	1.00	1.7
B-17	17.0	1.00	0.22	0.03	0.45	0.95	2.1
B-17	54.0	1.62	0.60	0.11	1.40	1.40	1.0
B-18	7.0	1.73	0.58	0.15	0.05	0.40	8.0
B-19	7.0	1.27	0.26	0.03	0.08	0.14	1.8
B-26	7.0	3.01	0.93	0.29	0.08	0.18	2.3
B-28	7.0	1.74	0.39	0.03	0.09	0.09	1.0
B-28	13.0	2.19	0.70	0.16	0.21	0.17	0.8
B-28	54.0	1.40	0.57	0.12	1.20	1.35	1.1
B-38	3.0	3.23	1.21	0.25	0.03	0.03	1.0
B-38	19.0	1.51	0.35	0.05	0.35	0.40	1.1
B-40	13.0	2.49	0.76	0.12	0.14	0.14	1.0
B-41	24.0	1.71	0.47	0.09	0.25	0.40	1.6
B-42	11.0	5.50	2.60	0.34	0.07	0.07	1.0
B-43	3.0	4.85	1.16	0.25	0.03	0.03	1.0
B-43	19.0	4.15	1.15	0.28	0.20	0.20	1.0

e_0 = initial void ratio

C_c = compression index

C_r = recompression index

σ'_v = effective overburden pressure

σ'_p = effective preconsolidation pressure

OCR = overconsolidation ratio

4.4 Summary of Laboratory Testing

The laboratory tests were conducted in accordance with the procedures described in the table below. The results of our laboratory tests are presented on the boring logs on Plates 2 through 19 and also in the Summary of Test Results in Appendix A.

Type of Test	Test Designation
Moisture Content	ASTM D 2216
Atterberg Limits	ASTM D 4318
Particle Size Distribution	ASTM D 6913
Material Finer than a No. 200 Sieve	ASTM D 1140
Organic Content	ASTM D 2974
Miniature Vane Shear (undisturbed and remolded)	ASTM D 4648
Unconsolidated-Undrained Triaxial Compression	ASTM D 2850
One-Dimensional Consolidation	ASTM D 2435

5.0 GENERALIZED SUBSURFACE CONDITIONS

The generalized subsurface soil conditions based on the results of our soil borings and Cone Penetration Test soundings are discussed in the following sections. Soil borings and CPTs within each soils reach were grouped based on similarities in stratigraphy and undrained shear strength. In summary, three distinct profiles were delineated along the alignment. The three soil profiles were designated Soils Reach 1, 2 and 3. The borings and CPTs included in each soils reach are defined in the table below.

Soils Reach	Borings	CPTs
1	B-3, B-5, B-7, B-38, and B-40	CPT-1, CPT-2, CPT-3, CPT-4, CPT-6, CPT-7, CPT-8, CPT-30, and CPT-39
2	B-9, B-11, B-12, B-13, B-19, B-26, B-28, B-41, and B-42	CPT-10, CPT-26, CPT-27, CPT-28, and CPT-29
3	B-15, B-17, B-18, and B-43	CPT-14, CPT-16, and CPT-17

5.1 Soils Reach 1

Soils Reach 1 includes the portion of the pipeline alignment extending west of the backwater levee and east of Bayou DuPont and south of the Chenier Traverse Bayou as depicted on the Plan of Borings and CPTs. A generalized cross-section of the borings and CPTs included in Soils Reach 1 is presented on Plate 22.

Based on our field observations and the results of our laboratory testing and CPT interpretation, we classified the subsurface soils as mostly cohesive. Sand was found in the upper 3- to 7-ft of Borings B-3 and B-5 and CPT-1, CPT-2, CPT-3, CPT-4, CPT-30, and CPT-39. At CPT-6 and CPT-32, little to no sand fill was detected. We have assumed the sand to be fill material that was placed during the construction of BA-39. Based on grain size distributions performed on samples of the sand material obtained from Borings B-3 and B-5, the fill material is composed of poorly graded sand (SP).

The native soils beneath the sand fill consist primarily of fat and lean clay materials with organic clays and peat within the upper 4- to 5-ft. A layer of silty sand was encountered between El. -30-ft- and -40-ft in Boring B-38.

5.2 Soils Reach 2

Soils Reach 2 was designated to be the portion of the pipeline alignment extending south of Bayou DuPont and a portion of the Option B pipeline alignment as shown on the Plan of Borings and CPTs. The boring and CPT locations included in Soils Reach 2 are B-9, CPT-10, B-11, B-12, B-13, B/CPT-26, CPT-27, B/CPT-28, CPT-29, B-41, B-42, and B-19. Boring B-19 is actually located closer to Soils Reach 3; however, the soil conditions and strength parameters encountered in Boring B-19 are more similar to the borings included in Soils Reach 2. Therefore Boring B-19 was included in our analyses for Soils Reach 2. A generalized cross-section of the borings and CPTs included in Soils Reach 2 is presented on Plates 23 and 24.

Based on our field observations and the results of our laboratory testing and CPT interpretation, we would classify the subsurface soils as mostly cohesive material. The soils consist mostly of fat and lean clays with organic clay and peat found within the upper 4- to 14-ft of our soil borings. Silty sand was encountered in Boring B-9 between El. -26-ft and -41-ft and in Boring B-28 between El. -31-ft and -41-ft. Sand pockets were also observed in Boring B-26 between El. -41-ft and -48-ft. CPT-26, CPT-27, and CPT-28 also indicated sand between El. -29-ft and -50-ft.

5.3 Soils Reach 3

Soils Reach 3 was designated to be the portion of the pipeline alignment extending to the west of Boring B-13, as shown on the Plan of Borings and CPTs. The boring and CPT locations included in Soils Reach 3 are CPT-14, B-15, CPT-16, B/CPT-17, B-18, B-19, and B-43. A generalized cross-section of the borings and CPTs included in Soils Reach 3 is presented on Plate 25.

Based on our field observations and the results of our laboratory testing and CPT interpretation, we would classify the subsurface soils as mostly cohesive material. The soils consist mostly of fat and lean clays. Organic clay and peat were observed within the upper 4- to 7-ft of Borings B-18 and B-43, which were located to the north of the proposed pipeline alignment. The rest of the borings in Soils Reach 3 indicated more lean clay as compared to the borings in Soils Reaches 1 and 2.

5.4 Design Soil Strength Parameters

Design undrained shear strength and unit weight profiles were developed for each soils reach based upon the results of the laboratory tests performed on samples from the soil borings along with cone penetration tests (CPT).

For the CPT data, site correlations have indicated that dividing the CPT tip resistance by a Nc factor of 20 correlates well with unconsolidated undrained triaxial shear tests. Therefore, combined plots of undrained shear strength versus elevation based on a Nc factor of 20 are presented on the design shear strength plots. Results of laboratory shear strength tests and unit

weights from undisturbed borings performed for this study are plotted for the various soils reaches on Plates 28 through 30.

5.5 Design Soil Compressibility Parameters

Soil compressibility parameters for design were developed using the 27 consolidation tests performed for this study. The results of the consolidation tests are discussed in Section 4.3. After reviewing the consolidation data, we determined in our analyses that the soil strata are normally consolidated and will compress along a "virgin" compression line (OCR = 1). Site-specific correlations for the compressibility index, C_c, as it relates to moisture content and liquid limit were generated based on all of the consolidation tests performed. We then plotted moisture content and liquid limit profiles for each Soils Reach and developed compressibility profiles for each soils reach.

In an effort to evaluate the time rate of settlement, we estimated the coefficient of consolidation (c_v) values from the consolidation tests and adjusted these values to match the historical data for BA-39 as discussed in the Settlement Analyses section of this report. Some of our soil borings and CPTs, especially those in Soils Reach 2, encountered layers of silty sand and poorly graded sand below a depth of about 20-ft. These sand layers will not compress as much as clay layers. As such, we neglected the presence of these sand layers in our analyses to provide a conservative estimate of settlement. In addition, these sand layers would behave as a drainage layer beneath the upper cohesive soils. The presence of a sand layer beneath the cohesive material would decrease the drainage path within the cohesive layer above and increase the rate of consolidation within the cohesive material.

As part of our consolidation testing program, some of the tested soil specimens were selected from Borings B-3 and B-5, which were performed within the formerly constructed BA-39 area. As previously mentioned, fill material was placed within the BA-39 area between November 2009 and April 2010. To develop our compressibility design profile within Soils Reach 1, the consolidation data from Borings B-3 and B-5 were considered in addition to the other borings within Soils Reach 1; however, we neglected any effects of consolidation from the application of the fill material.

In addition, we understand that the containment dikes within Soils Reach 1 will be constructed by excavating in-situ material from the interior of the footprint of the pipeline access corridor. The borrow excavation will be backfilled with the same sand fill material used to construct the pipeline access corridor. We anticipate the borrow excavation may extend to a depth of approximately 8-ft assuming a cut-to-fill ratio for the containment dikes of approximately 2.5:1.0. We understand the borrow excavation may extend to within 25-ft of the containment dike toes in the footprint of the pipeline access corridor. Therefore, most of the highly organic materials encountered in the upper 10-ft of our soil borings and CPTs will be removed and replaced with less compressible poorly graded sand. We evaluated the settlement of the pipeline access corridor fill material and foundation soils assuming the sand fill extended to El. -9-ft. We also evaluated the settlement of

the pipeline access corridor fill material and foundation soils outside of the borrow excavation and the containment dikes assuming the in-situ compressible organic material was present.

We encountered a thick layer of organic clay and peat within the upper 20-ft of Borings B-42 and B-43 in the Marsh Creation Area. The Marsh Creation Area lies to the west of Soils Reach 2. The thick layer of organic material within the upper 20-ft of the Marsh Creation Area will compress more than the soils encountered within Soils Reach 2. To evaluate the range in compression that will occur in the March Creation Area, we evaluated the compressibility using both the compressibility profile defined for Soils Reach 2 and the more conservative profile based on Borings B-42 and B-43.

Soils Reach 1: Compressibility Parameters

Bottom of Layer Elevation, ft	Generalized Soil Classification	C_c	C_v, ft^2/day	e_o
-3.0	Peat	1.50	0.06	3.20
-38.0	Fat Clay	0.35	0.20	1.50
-58.0	Fat Clay	0.68	0.20	1.80
C_c = Coefficient of Compression C_v = Coefficient of Consolidation e_o = in situ initial void ratio				

Note: The settlement analyses of the section of the pipeline access corridor in the vicinity of the borrow excavation assumed poorly graded sand was present from the mudline to El. -9-ft. We assumed the poorly graded sand was incompressible in our settlement analyses.

Soils Reach 2: Compressibility Parameters

Bottom of Layer Elevation, ft	Generalized Soil Classification	C_c	C_v, ft^2/day	e_o
-7.0	Peat	2.00	0.06	5.50
-30.0	Fat Clay	0.34	0.20	2.40
-45.0	Fat Clay	0.47	0.20	1.72
-60.0	Fat Clay	0.34	0.20	1.40
C_c = Coefficient of Compression C_v = Coefficient of Consolidation e_o = in situ initial void ratio				

Soils Reach 3: Compressibility Parameters

Bottom of Layer Elevation, ft	Generalized Soil Classification	C_c	C_v, ft^2/day	e_o
-7.5	Peat	0.47	0.003	1.35
-25.0	Fat Clay	0.29	0.03	1.00
-32.5	Fat Clay	0.56	0.03	1.62
-36.0	Fat Clay	0.34	0.03	1.50
-60.0	Fat Clay	0.51	0.03	1.60
C_c = Coefficient of Compression C_v = Coefficient of Consolidation e_o = in situ initial void ratio				

Marsh Creation Area: Compressibility Parameters (Based on B-42 and B-43)

Bottom of Layer Elevation, ft	Generalized Soil Classification	C_c	C_v, ft^2/day	e_o
-15.0	Peat	2.00	0.003	5.5
-22.5	Organic Clay	1.40	0.003	4.5
-60.0	Fat Clay	0.62	0.030	2.0
C_c = Coefficient of Compression C_v = Coefficient of Consolidation e_o = in situ initial void ratio				

6.0 PROJECT FEATURES

Preliminary cross-sections for the design of the sediment pipeline corridor have been provided by Moffatt and Nichol throughout the course of our study. The most recent versions of these drawings at the time of this report are included in Appendix E.

We understand temporary containment dikes will be constructed along the portion of the access corridor between BA-39 and Bayou DuPont to contain the fill material as it is placed (see Cross-section 2 in Appendix E). In addition, a containment dike is also planned along the eastern edge of the access corridor adjacent to the existing canal for the section of the alignment south of the fish camp (see Cross-section 5 in Appendix E). We assumed the crown of the containment dike would be constructed to an elevation 1-ft above the adjacent access corridor fill material at the time of construction. Current plans have the containment dikes constructed of in-situ material excavated from the near-surface materials.

Subsequent to forming the containment dikes, sediment from the Mississippi River will be pumped to create the marsh platform along the pipeline access corridor alignment. In addition, an area adjacent to the pipeline corridor has been targeted for additional marsh creation.

We understand that the containment dikes along the access access corridor between BA-39 and Bayou DuPont will be degraded to an inclination of 20 Horizontal to 1 Vertical after construction of the access corridor (see Cross-section 2 in Appendix E). In addition, the section of the access corridor between Bayou DuPont and the fish camp, the western edge of the corridor south of the fish camp, and the marsh creation fill material will be constructed with a slope of approximately 20 Horizontal to 1 Vertical (see Cross-sections 4, 5, and 6 in Appendix E).

A brief discussion of the scope of engineering for each area of the project is included below.

6.1 Containment Dikes

Containment dikes will be constructed to contain the pipeline corridor fill material as it is placed along segments of the pipeline corridor. The final design of the containment dikes should consider the desired final elevation, side slopes, and crest width, which is based on the properties of the proposed material used for the construction of the containment dikes. The design should account for expected consolidation during construction, and the time needed for settlement to occur. For our analyses, we generated the following for the containment dikes:

- Time-settlement curves during construction;
- Short-term slope stability of the proposed side-slope inclinations;
- Cut to fill ratio for construction; and

- Construction sequence and recommendations

6.2 Pipeline Access Corridor and Adjacent Marsh Apron Fill Area

Hydraulically pumped borrow fill material from the Mississippi River will be placed within the containment dikes to create the pipeline access corridor and adjacent marsh apron. We have assumed that the material will be similar to the sand placed to create the BA-39 area. The following analyses were performed relative to the pipeline access corridor and marsh apron fill area:

- Time-settlement curves over the 20 year project life to meet certain elevation criteria including self-weight compression of the sand fill along with settlement of the underlying soils;
- Slope stability of the side slopes of the pipeline access corridor; and
- Cut to fill ratio for construction.

6.3 Additional Marsh Creation Fill Area

Hydraulically pumped borrow fill material from the Mississippi River will be placed in areas adjacent to the pipeline access corridor to create additional marsh restoration area. At the time of this report, the area to the west of Soils Reach 2 near Boring locations B-42 and B-43 were evaluated for additional marsh creation. The following analyses were performed relative to marsh creation area.

- Time-settlement curves over the 20 year project life to meet the elevation criteria set by Moffatt and Nichol including self-weight compression of the sand fill along with settlement of the underlying soils; and
- Cut to fill ratio for construction.

The analyses associated with the project features are discussed in the following sections. The results of our settlement analyses are discussed in Section 7.0, the results of our slope stability analyses are discussed in Section 8.0 and Construction Considerations are included in Section 9.0.

7.0 SETTLEMENT ANALYSES

Settlement analyses for the site were performed using the computer program Settle^{3D} developed by RocScience. Settle^{3D} uses Boussinesq's theory to compute stresses within the in-situ material under applied loads. The program then uses soil compressibility parameters to evaluate the change in thickness of individual layers and computes the overall movement at select locations. Settle^{3D} was used to compute the settlement of the in-situ material due to the application of the fill material for the containment dikes and the pipeline corridor fill material. We have presented a discussion of our settlement models and results in the following sections.

7.1 Settlement Models

For design purposes, we assigned the elevation of the water in the marsh to be at El. +0.5-ft, which is the mean low water level provided by Moffatt and Nichol. By using the mean low water level in our analyses, loads applied to the native soils by the fill material are more conservative than those computed using the mean sea level and the mean high water level. The current plan is to construct the pipeline corridor and marsh creation areas with the same material used to construct BA-39. Therefore, we assumed the placed fill material for the pipeline corridor will consist of poorly graded sand with an approximate total unit weight of 105 pcf. We understand the perimeter containment dikes will be constructed by excavating material along the centerline of the alignment. Accordingly, the containment dikes will be constructed of the organic clays and peat found in the upper strata of our soil borings. We assumed the containment dike material will have a total unit weight after placement of about 85 pcf. The soil compressibility profiles for each Soils Reach are included in Section 5.5.

Based on our understanding that the access corridors will be constructed of poorly graded sand, the majority of the self-weight compression of the sand material will occur during the construction process. We have estimated the self-weight compression of the fill material to be on the order of 2 to 3% of the fill height at the end of construction.

Moffatt and Nichol provided typical preliminary cross-sections of the pipeline access corridor and containment dikes. We evaluated the various cross-sections using the compressibility profile for the soils reach in which the cross-section is planned to be constructed. Moffatt and Nichol provided a range of mudline elevations within each soils reach. We evaluated the settlement using an upper and lower bound mudline elevation within each soils reach. The assumed mudline elevations evaluated for each soils reach are presented in the following table.

Soils Reach	Assumed Upper-bound Mudline Elevation, ft	Assumed Lower-bound Mudline Elevation, ft
1	+1.0	-1.0
2	+1.0	-2.0
3	+1.0	-2.5

Based on the parameters above, we evaluated various fill thicknesses for the pipeline access corridor to determine the minimum elevation needed to meet the long-term elevation criteria. We made the following assumptions about the construction process in developing our models:

- containment dikes would be constructed to an elevation 1-ft above the top of the pipeline access corridor at the end of construction;
- containment dikes would be constructed approximately two weeks prior to placement of the pipeline access corridor fill material
- pipeline access corridor fill material would be placed in less than or equal to seven days at a specific location;
- process survey would be conducted within approximately 30 days following the completion of fill placement; and
- the period of time between the beginning of placement of the pipeline access corridor fill material and the process survey was considered to be the duration of construction.

7.2 Settlement Analyses of the Pipeline Corridor and Containment Dikes

Moffatt and Nichol provided settlement criteria for the pipeline access corridor fill material as presented in the table below.

Years after Construction	Target Design Elevation of Access Corridor and Marsh Fill Material
5	+1.3-ft
20	+0.5- to +0.9-ft

We evaluated the settlement of the pipeline access corridor and the containment dikes using the upper- and lower-bound mudline elevations presented in the table in Section 7.1. The containment dikes were designed so that the crown of the dike was approximately 1-ft above the top elevation of the pipeline access corridor fill material at the end of construction. The results of our settlement analyses for the access corridor fill material and the containment dikes are presented in the

following tables. Plots of top of fill elevation versus time for the pipeline corridor fill material and the containment dikes are presented on Plates 31 through 35.

Soils Reach 1: Settlement of Access Corridor and Marsh Apron Fill Material (assumed Lower-bound mudline at El. -1.0-ft)

Nominal Fill Thickness	Top of Fill El. at End of Placement	Settlement During Fill Placement	Actual Fill Thickness	Settlement of Fdtn. Soils b/t End of Placement and Process Survey	Self-Weight Compression of Fill	Total Settlement at End of Construction	Design Top of Fill El. At End of Construction	Foundation Settlement after 5 years	Foundation Settlement after 20 years	Top of Fill El. After 5 years	Top of Fill El. After 20 years
feet	feet	feet	feet	feet	feet	feet	feet	feet	feet	feet	feet
3.0	+2.0	0.41	3.41	0.20	0.11	0.72	+1.69	1.09	1.37	+0.60	+0.32
3.5	+2.5	0.44	3.94	0.22	0.12	0.78	+2.14	1.21	1.53	+0.93	+0.61
4.0	+3.0	0.47	4.47	0.22	0.14	0.83	+2.64	1.31	1.69	+1.33	+0.95

Soils Reach 1: Settlement of Access Corridor and Marsh Apron Fill Material (assumed Upper-bound mudline at El. +1.0-ft)

Nominal Fill Thickness	Top of Fill El. at End of Placement	Settlement During Fill Placement	Actual Fill Thickness	Settlement of Fdtn. Soils b/t End of Placement and Process Survey	Self-Weight Compression of Fill	Total Settlement at End of Construction	Design Top of Fill El. At End of Construction	Foundation Settlement after 5 years	Foundation Settlement after 20 years	Top of Fill El. After 5 years	Top of Fill El. After 20 years
feet	feet	feet	feet	feet	feet	feet	feet	feet	feet	feet	feet
1.0	+2.0	0.14	1.14	0.06	0.04	0.24	+1.90	0.60	0.92	+1.30	+0.98
1.5	+2.5	0.18	1.68	0.08	0.05	0.31	+2.37	0.77	1.20	+1.60	+1.17
2.0	+3.0	0.21	2.21	0.10	0.07	0.38	+2.84	0.91	1.41	+1.93	+1.43

Soils Reach 1: Settlement of Access Corridor and Marsh Apron Fill Material (borrow excavation to El. -9.0-ft)

Nominal Fill Thickness	Top of Fill El. at End of Placement	Settlement During Fill Placement	Actual Fill Thickness	Settlement of Fdtn. Soils b/t End of Placement and Process Survey	Self-Weight Compression of Fill	Total Settlement at End of Construction	Design Top of Fill El. At End of Construction	Foundation Settlement after 5 years	Foundation Settlement after 20 years	Top of Fill El. After 5 years	Top of Fill El. After 20 years
feet	feet	feet	feet	feet	feet	feet	feet	feet	feet	feet	feet
3.0	+2.0	0.02	3.02	0.03	0.33	0.38	+1.64	0.20	0.36	+1.44	+1.28
3.5	+2.5	0.02	3.52	0.03	0.35	0.40	+2.12	0.25	0.43	+1.87	+1.69
4.0	+3.0	0.02	4.02	0.04	0.36	0.42	+2.60	0.28	0.50	+2.32	+2.10

Soils Reach 2: Settlement of Access Corridor and Marsh Apron Fill Material (assumed Lower-bound mudline at El. -2.0-ft)

Nominal Fill Thickness	Top of Fill El. at End of Placement	Settlement During Fill Placement	Actual Fill Thickness	Settlement of Fdtn. Soils b/t End of Placement and Process Survey	Self-Weight Compression of Fill	Total Settlement at End of Construction	Design Top of Fill El. At End of Construction	Foundation Settlement after 5 years	Foundation Settlement after 20 years	Top of Fill El. After 5 years	Top of Fill El. After 20 years
feet	feet	feet	feet	feet	feet	feet	feet	feet	feet	feet	feet
4.0	+2.0	0.36	4.36	0.17	0.14	0.67	+1.70	1.28	1.82	+0.42	-0.12
5.0	+3.0	0.43	5.43	0.18	0.17	0.78	+2.64	1.48	2.13	+1.16	+0.51
5.5	+3.5	0.42	5.92	0.20	0.18	0.80	+3.12	1.52	2.18	+1.60	+0.94

Soils Reach 2: Settlement of Access Corridor and Marsh Apron Fill Material (assumed Upper-bound mudline at El. +1.0-ft)

Nominal Fill Thickness	Top of Fill El. at End of Placement	Settlement During Fill Placement	Actual Fill Thickness	Settlement of Fdtn. Soils b/t End of Placement and Process Survey	Self-Weight Compression of Fill	Total Settlement at End of Construction	Design Top of Fill El. At End of Construction	Foundation Settlement after 5 years	Foundation Settlement after 20 years	Top of Fill El. After 5 years	Top of Fill El. After 20 years
feet	feet	feet	feet	feet	feet	feet	feet	feet	feet	feet	feet
1.0	+2.0	0.12	1.12	0.05	0.04	0.21	+1.91	0.52	0.92	+1.39	+0.99
1.5	+2.5	0.16	1.66	0.07	0.05	0.28	+2.38	0.69	1.19	+1.69	+1.19
2.0	+3.0	0.17	2.17	0.07	0.07	0.31	+2.86	0.74	1.32	+2.12	+1.54

Soils Reach 3: Settlement of Access Corridor and Marsh Apron Fill Material (assumed Lower-bound mudline at El. -2.5-ft)

Nominal Fill Thickness	Top of Fill El. at End of Placement	Settlement During Fill Placement	Actual Fill Thickness	Settlement of Fdtn. Soils b/t End of Placement and Process Survey	Self-Weight Compression of Fill	Total Settlement at End of Construction	Design Top of Fill El. At End of Construction	Foundation Settlement after 5 years	Foundation Settlement after 20 years	Top of Fill El. After 5 years	Top of Fill El. After 20 years
feet	feet	feet	feet	feet	feet	feet	feet	feet	feet	feet	feet
4.5	+2.0	0.26	4.76	0.12	0.15	0.53	+1.74	1.00	1.72	+0.74	+0.02
5.0	+2.5	0.27	5.27	0.13	0.16	0.56	+2.22	1.06	1.83	+1.16	+0.39
5.5	+3.0	0.28	5.78	0.13	0.18	0.59	+2.70	1.14	2.02	+1.56	+0.68

Soils Reach 3: Settlement of Access Corridor and Marsh Apron Fill Material (assumed Upper-bound mudline at El. +1.0-ft)

Nominal Fill Thickness	Top of Fill El. at End of Placement	Settlement During Fill Placement	Actual Fill Thickness	Settlement of Fdtn. Soils b/t End of Placement and Process Survey	Self-Weight Compression of Fill	Total Settlement at End of Construction	Design Top of Fill El. At End of Construction	Foundation Settlement after 5 years	Foundation Settlement after 20 years	Top of Fill El. After 5 years	Top of Fill El. After 20 years
feet	feet	feet	feet	feet	feet	feet	feet	feet	feet	feet	feet
1.0	+2.0	0.08	1.08	0.04	0.03	0.15	+1.93	0.35	0.65	+1.58	+1.28
1.5	+2.5	0.11	1.61	0.04	0.05	0.20	+2.41	0.45	0.85	+1.96	+1.56
2.0	+3.0	0.12	2.12	0.05	0.07	0.24	+2.89	0.53	1.03	+2.36	+1.86

Soils Reach 1: Settlement of Containment Dike Fill Material (assumed Lower-bound mudline at El. -1.0-ft)

Nominal Fill Thickness	Top of Fill El. at End of Placement	Settlement During Fill Placement	Actual Fill Thickness	Settlement of Fdtn. Soils b/t End of Placement and Process Survey	Self-Weight Compression of Fill	Total Settlement at End of Construction	Design Top of Fill El. At End of Construction	Foundation Settlement after 5 years	Foundation Settlement after 20 years	Top of Fill El. After 5 years	Top of Fill El. After 20 years
feet	feet	feet	feet	feet	feet	feet	feet	feet	feet	feet	feet
4.5	+3.5	0.44	4.94	0.27	0.52	1.23	+2.71	1.11	1.32	+1.60	+1.39
5.0	+4.0	0.48	5.48	0.26	0.57	1.31	+3.17	1.16	1.40	+2.01	+1.77
5.5	+4.5	0.53	6.03	0.27	0.63	1.43	+3.61	1.29	1.58	+2.32	+2.03

Soils Reach 1: Settlement of Containment Dike Fill Material (assumed Upper-bound mudline at El. +1.0-ft)

Nominal Fill Thickness	Top of Fill El. at End of Placement	Settlement During Fill Placement	Actual Fill Thickness	Settlement of Fdtn. Soils b/t End of Placement and Process Survey	Self-Weight Compression of Fill	Total Settlement at End of Construction	Design Top of Fill El. At End of Construction	Foundation Settlement after 5 years	Foundation Settlement after 20 years	Top of Fill El. After 5 years	Top of Fill El. After 20 years
feet	feet	feet	feet	feet	feet	feet	feet	feet	feet	feet	feet
2.0	+3.0	0.21	3.21	0.09	0.23	0.53	+2.68	0.73	1.08	+1.95	+1.60
2.5	+3.5	0.23	2.73	0.11	0.28	0.62	+3.11	0.84	1.25	+2.27	+1.86
3.0	+4.0	0.25	3.25	0.12	0.34	0.71	+3.54	0.94	1.40	+2.60	+2.14

Soils Reach 2: Settlement of Containment Dike Fill Material (assumed Lower-bound mudline at El. -2.0-ft)

Nominal Fill Thickness	Top of Fill El. at End of Placement	Settlement During Fill Placement	Actual Fill Thickness	Settlement of Fdtn. Soils b/t End of Placement and Process Survey	Self-Weight Compression of Fill	Total Settlement at End of Construction	Design Top of Fill El. At End of Construction	Foundation Settlement after 5 years	Foundation Settlement after 20 years	Top of Fill El. After 5 years	Top of Fill El. After 20 years
feet	feet	feet	feet	feet	feet	feet	feet	feet	feet	feet	feet
6.0	+4.0	0.43	6.43	0.24	0.67	1.34	+3.09	1.41	1.93	+1.68	+1.16
6.5	+4.5	0.45	6.95	0.25	0.72	1.42	+3.53	1.48	2.03	+2.05	+1.50
7.0	+5.0	0.46	7.46	0.24	0.77	1.47	+3.99	1.49	2.05	+2.50	+1.94

Soils Reach 2: Settlement of Containment Dike Fill Material (assumed Upper-bound mudline at El. +1.0-ft)

Nominal Fill Thickness	Top of Fill El. at End of Placement	Settlement During Fill Placement	Actual Fill Thickness	Settlement of Fdtn. Soils b/t End of Placement and Process Survey	Self-Weight Compression of Fill	Total Settlement at End of Construction	Design Top of Fill El. At End of Construction	Foundation Settlement after 5 years	Foundation Settlement after 20 years	Top of Fill El. After 5 years	Top of Fill El. After 20 years
feet	feet	feet	feet	feet	feet	feet	feet	feet	feet	feet	feet
2.0	+3.0	0.18	2.18	0.08	0.23	0.49	+2.69	0.66	1.09	+2.03	+1.60
2.5	+3.5	0.20	2.70	0.09	0.28	0.57	+3.13	0.81	1.28	+2.32	+1.85
3.0	+4.0	0.21	3.21	0.11	0.33	0.65	+3.56	0.88	1.44	+2.68	+2.12

Soils Reach 3: Settlement of Containment Dike Fill Material (assumed Lower-bound mudline at El. -2.5-ft)

Nominal Fill Thickness	Top of Fill El. at End of Placement	Settlement During Fill Placement	Actual Fill Thickness	Settlement of Fdtn. Soils b/t End of Placement and Process Survey	Self-Weight Compression of Fill	Total Settlement at End of Construction	Design Top of Fill El. At End of Construction	Foundation Settlement after 5 years	Foundation Settlement after 20 years	Top of Fill El. After 5 years	Top of Fill El. After 20 years
feet	feet	feet	feet	feet	feet	feet	feet	feet	feet	feet	feet
6.0	+3.5	0.26	6.26	0.15	0.64	1.05	+2.71	0.94	1.48	+1.77	+1.23
6.5	+4.0	0.26	6.76	0.16	0.69	1.11	+3.15	0.97	1.56	+2.18	+1.59
7.0	+4.5	0.28	7.28	0.15	0.74	1.17	+3.61	0.99	1.57	+2.62	+2.04

Soils Reach 3: Settlement of Containment Dike Fill Material (assumed Upper-bound mudline at El. +1.0-ft)

Nominal Fill Thickness	Top of Fill El. at End of Placement	Settlement During Fill Placement	Actual Fill Thickness	Settlement of Fdtn. Soils b/t End of Placement and Process Survey	Self-Weight Compression of Fill	Total Settlement at End of Construction	Design Top of Fill El. At End of Construction	Foundation Settlement after 5 years	Foundation Settlement after 20 years	Top of Fill El. After 5 years	Top of Fill El. After 20 years
feet	feet	feet	feet	feet	feet	feet	feet	feet	feet	feet	feet
2.0	+3.0	0.11	2.11	0.05	0.22	0.38	+2.73	0.40	0.73	+2.33	+2.00
2.5	+3.5	0.12	2.62	0.06	0.27	0.45	+3.17	0.47	0.86	+2.70	+2.31
3.0	+4.0	0.14	3.14	0.06	0.32	0.52	+3.61	0.53	0.96	+3.08	+2.65

7.3 Settlement of Marsh Creation Areas

In addition to the areas of the pipeline access corridor and containment dikes, Moffatt and Nichol also requested that we perform soil borings in an area of potential additional marsh creation, specifically in the area of borings B-42 and B-43. We performed settlement analyses for the marsh creation area using the compressibility profile developed from Soil Borings B-42 and B-43 and the Soils Reach 2 compressibility profile presented in Section 5.5. We believe the settlement computed using these two compressibility profiles will provide a range of anticipated settlement within the marsh creation area due to the varying soil conditions.

The settlement criteria for the marsh creation area are the same as that presented above in Section 7.2 for the pipeline access corridor fill material. The extent of the marsh creation area was unknown at the time of our analysis. We assumed an area 2,000-ft across to model the marsh creation area. The results of our settlement analysis for the marsh creation area are presented in the tables on the following page. Plots of top of fill elevation versus time for the marsh creation fill material are presented on Plate 36.

Marsh Creation Area: Settlement of Additional Marsh Creation Fill Material – Based on B-42 and B-43
(assumed mudline at El. -2.5-ft)

Nominal Fill Thickness	Top of Fill El. at End of Placement	Settlement During Fill Placement	Actual Fill Thickness	Settlement of Fdtn. Soils b/t End of Placement and Process Survey	Self-Weight Compression of Fill	Total Settlement at End of Construction	Design Top of Fill El. At End of Construction	Foundation Settlement after 5 years	Foundation Settlement after 20 years	Top of Fill El. After 5 years	Top of Fill El. After 20 years
feet	feet	feet	feet	feet	feet	feet	feet	feet	feet	feet	feet
6.0	+3.5	0.42	6.42	0.22	0.18	0.82	+3.08	1.76	3.04	+1.32	+0.04
6.5	+4.0	0.43	6.93	0.23	0.21	0.87	+3.55	1.85	3.17	+1.70	+0.38
7.0	+4.5	0.44	7.44	0.24	0.23	0.91	+4.02	1.93	3.32	+2.09	+0.70

Marsh Creation Area: Settlement of Additional Marsh Creation Fill Material – Using Soils Reach 2 Compressibility Profile
(assumed mudline at El. -2.5-ft)

Nominal Fill Thickness	Top of Fill El. at End of Placement	Settlement During Fill Placement	Actual Fill Thickness	Settlement of Fdtn. Soils b/t End of Placement and Process Survey	Self-Weight Compression of Fill	Total Settlement at End of Construction	Design Top of Fill El. At End of Construction	Foundation Settlement after 5 years	Foundation Settlement after 20 years	Top of Fill El. After 5 years	Top of Fill El. After 20 years
feet	feet	feet	feet	feet	feet	feet	feet	feet	feet	feet	feet
5.5	+3.0	0.40	5.90	0.22	0.18	0.80	+2.60	1.54	2.22	+1.06	+0.38
6.0	+3.5	0.42	6.42	0.22	0.20	0.84	+3.08	1.62	2.35	+1.46	+0.73
6.5	+4.0	0.43	6.93	0.23	0.21	0.87	+3.55	1.68	2.47	+1.87	+1.08

8.0 SLOPE STABILITY ANALYSES

Slope stability analyses were performed for the containment dikes and marsh fill areas to determine the factor of safety for the proposed design. Moffatt and Nichol provided typical cross-sections of the pipeline corridor and containment dikes along the pipeline alignment. The provided cross-sections that were used in our slope stability analyses are presented in Appendix E. We have described which cross-section was evaluated within each Soils Reach in the table below.

Cross-Section No. (see Appendix E)	Description of Section of Alignment Corresponding to Cross-Section	Design Parameters used in Analysis
2	Between BA-39 and Bayou DuPont	Soils Reach 1
4	From BA-48 to the Fish Camp (Sta. 470+28.82)	Soils Reach 2
5	From the Fish Camp to Barataria Waterway	Soils Reach 2 and 3
6	Additional Marsh Creation Area	Soils Reach 2

The factor of safety against stability failure is expected to increase with time as the underlying foundation material consolidates and gains strength, and after placing the dredged material. The analyses were performed using Slope/W Version 7.17 (GeoStudio, 2007). The factor of safety was determined using Spencer's (1967) method of slices where force and moment equilibrium is achieved for each slice in this method. We evaluated circular failure surfaces in our analyses.

8.1 Material Properties

We used the undrained shear strength and total unit weight profiles presented on Plates 28, 29, and 30 for our slope stability analyses. We assumed the containment dike material had a total unit weight of 85 pcf and an undrained shear strength of 80 psf. We assumed the pipeline corridor material and the marsh creation fill material consisted of poorly graded sand with a total unit weight of 105 pcf and an internal angle of friction of 30 degrees.

8.2 Stability Models

We understand temporary containment dikes will be constructed along the portion of the pipeline corridor between BA-39 and Bayou DuPont to contain the fill material as it is placed (see Cross-section 2 in Appendix E). In addition, a containment dike is also planned along the eastern edge of the pipeline corridor adjacent to the existing canal for the section of the alignment south of the fish camp (see Cross-section 5 in Appendix E). We evaluated the stability of the containment dikes assuming a 3 Horizontal to 1 Vertical side slope inclination and a crown width of 6-ft. In addition,

we assumed the crown of the containment dike would be constructed to an elevation 1-ft above the adjacent pipeline corridor fill material at the end of construction. Current plans have the containment dikes constructed of in-situ material excavated from the near-surface materials. We assumed a cut-to-fill ratio of approximately 2.5:1 for the containment dike material. Therefore, we assumed the bottom of the containment dike borrow excavation would be between approximately El. -9-ft to -11.5-ft depending on the existing mudline in the vicinity of the borrow area. We performed our stability analyses using the lower-bound mudline elevations evaluated in our settlement analyses for each soils reach. Using the lower-bound mudline elevations is a conservative approach for evaluating the stability of the containment dikes and pipeline corridor marsh apron as this would simulate fill placed at higher elevations than using the upper-bound mudline elevations. We assumed the containment dikes would be constructed to an elevation approximately 1-ft above the elevation of the pipeline access corridor fill material at the end of construction.

We understand that the containment dikes and fill along the pipeline corridor between BA-39 and Bayou DuPont will be degraded to an inclination of 20 Horizontal to 1 Vertical after construction of the pipeline corridor (see Cross-section 2 in Appendix E). In addition, the section of the access corridor and marsh apron between Bayou DuPont and the fish camp, the western edge of the corridor south of the fish camp, and the additional marsh creation fill material will also have side slopes of 20 Horizontal to 1 Vertical (see Cross-sections 4, 5, and 6 in Appendix E). We performed a stability analysis to evaluate the side slopes of the pipeline corridor using the appropriate design soil parameters for each cross-section.

8.3 Slope Stability Analysis Results

The results of our slope stability analyses for the various cross-sections and design soil parameters are summarized in the following table. The failure surfaces corresponding to the factors of safety presented in the following table are presented on Plates 37 through 43.

Soils Reach	Cross-Section (from Appendix E)	Description of Analysis	Side Slope Inclination	Elevation of Top of Fill (ft)	Factor of Safety
1	2	Containment Dike adjacent to Borrow Area	3H:1V	+4.5	1.26
1	2	Pipeline Corridor	20H:1V	+3.0	2.99
2	5	Containment Dike adjacent to Canal	3H:1V	+5.0	1.22
2	4	Pipeline Corridor	20H:1V	+3.5	1.72
3	5	Containment Dike adjacent to Canal	3H:1V	+4.0	1.28
3	5	Pipeline Corridor	20H:1V	+3.0	4.39
2	6	Marsh Creation Area	20H:1V	+3.5	1.74

The reported factors of safety presented in the table above and on Plates 37 through 43, are above 1.2, which we believe is an acceptable factor of safety for the application of these structures. Factors of safety less than 1.2 were observed for shallow surficial slip surfaces. These shallow failure surfaces are more indicative of a localized bearing capacity failure and not a global slope stability failure.

9.0 CONSTRUCTION RECOMMENDATIONS

9.1 Containment Dike

The containment dike will be constructed from borrow material excavated and handled within the restoration area. The borrow material will likely be from the upper 10 feet and will comprise primarily of organic fat clays. Since the moisture content in the upper 10 feet ranged from 60 to over 200 percent, a moisture content of 125 percent was assumed to be a representative average value during dredging. Based on published values in similar material, we estimate the cut-to-fill ratio for dike construction for similar materials is in the range of 2.0 to 3.0:1.

In our stability model, a single-staged construction of the dike was assumed. However if the construction schedule permits, multiple-stage construction is preferred. This will significantly reduce possible displacements and shallow bearing capacity failures.

To reduce the potential of ponding of surface water on the containment dike, it is recommended that positive surface gradients be incorporated into the construction of the dike.

9.2 Access Corridor and Marsh Creation Fill Material

The borrow material for the fill area will be dredged from the Mississippi River. We have assumed that the material will be similar in consistency to that placed for BA-39.

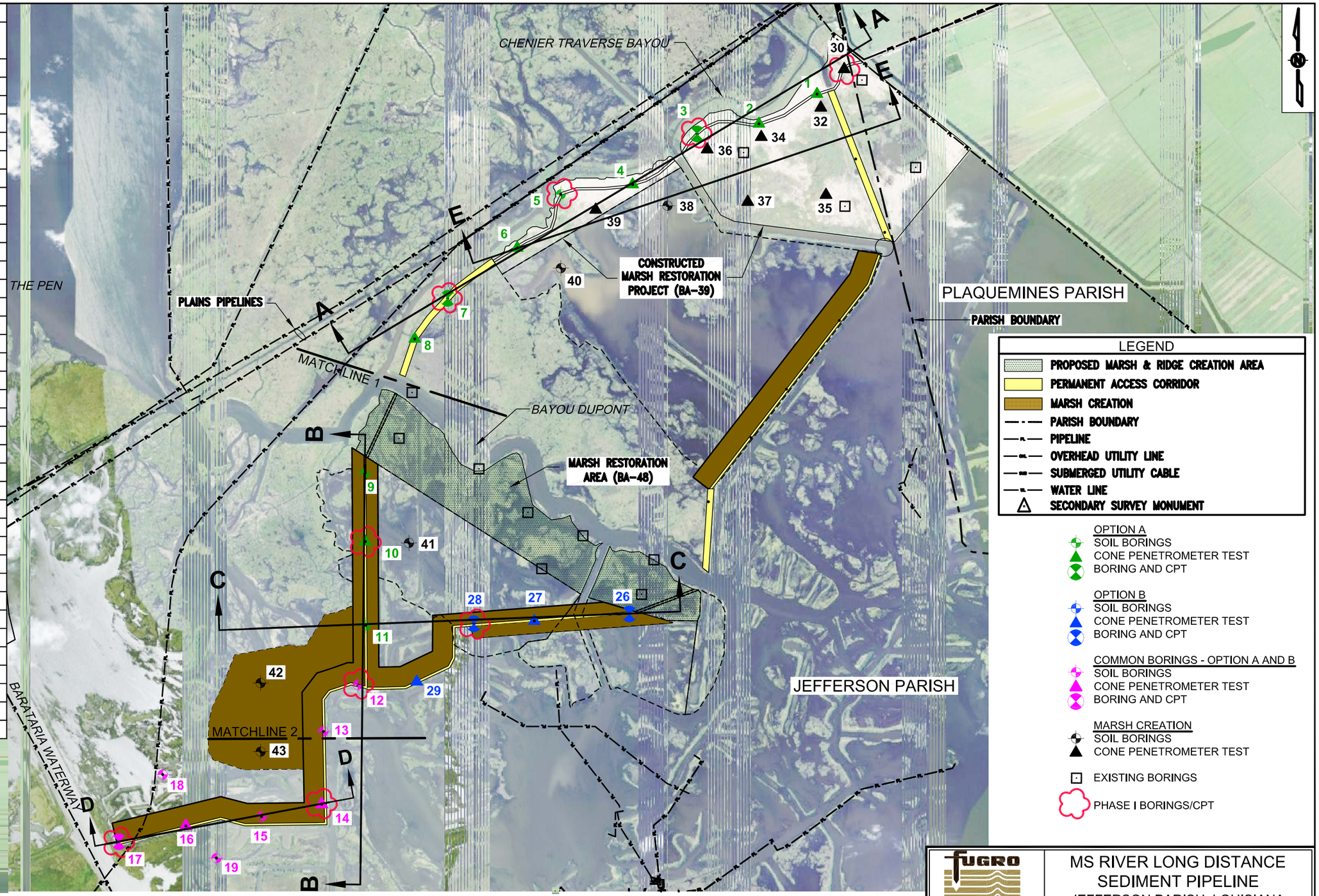
We believe the volume of material required to fill the pipeline access corridor area will be approximately 1.2 to 1.5 times the initial calculated fill volume based on pre-construction survey data. The additional volume of material will need to be placed to accommodate potential shallow “mud waves” and settlement of the underlying native materials during construction prior to the process survey. As such, we recommend a cut to fill ratio between 1.2 to 1.5:1 be assumed for the borrow material.

9.3 Additional Construction Considerations

Due to the very soft sediment located in the top 10-ft, it is likely that placement of material for both the containment dikes and marsh creation fill material will generate mud waves, or shallow bearing capacity failures at the site. The design recommendations considered more significant, deeper seated failures. If shallow mud waves are problematic and will not create a stable base for containment dikes, geotextiles or other methods of confinement may be required.

ILLUSTRATIONS

COORDINATES		
Boring No.	Latitude (d-m-s)	Longitude (d-m-s)
1	29 39 18.8	90 00 50.3
2	29 39 11.4	90 01 07.3
3	29 39 09.1	90 01 25.4
4	29 38 56.3	90 01 44.4
5	29 38 54.0	90 02 05.4
6	29 38 40.5	90 02 18.2
7	29 38 27.9	90 02 38.7
8	29 38 17.6	90 02 48.4
9	29 37 43.6	90 03 03.4
10	29 37 26.1	90 03 03.5
11	29 37 04.8	90 03 03.7
12	29 36 49.6	90 03 06.2
13	29 36 37.9	90 03 16.4
14	29 36 19.3	90 03 17.1
15	29 36 16.4	90 03 34.7
16	29 36 14.2	90 03 56.8
17	29 36 10.4	90 04 16.3
18	29 36 27.4	90 04 03.4
19	29 36 05.9	90 03 48.0
26	29 37 06.9	90 01 46.7
27	29 37 05.4	90 02 14.5
28	29 37 04.9	90 02 32.1
29	29 36 50.3	90 02 49.0
30	29 39 25.1	90 00 42.3
31	29 39 16.1	90 00 29.0
32	29 39 15.4	90 00 49.2
33	29 38 52.8	90 00 20.0
34	29 39 081	90 01 06.7
35	29 38 53.1	90 00 48.0
36	29 39 05.0	90 01 22.5
37	29 38 516	90 01 10.8
38	29 38 50.8	90 01 34.3
39	29 38 50.0	90 01 55.2
40	29 38 35.2	90 02 05.6
41	29 37 25.7	90 02 50.8
42	29 36 50.4	90 03 34.5
43	29 36 32.9	90 03 34.7



LEGEND

- PROPOSED MARSH & RIDGE CREATION AREA
- PERMANENT ACCESS CORRIDOR
- MARSH CREATION
- PARISH BOUNDARY
- PIPELINE
- OVERHEAD UTILITY LINE
- SUBMERGED UTILITY CABLE
- WATER LINE
- SECONDARY SURVEY MONUMENT

OPTION A
SOIL BORINGS
CONE PENETROMETER TEST
BORING AND CPT

OPTION B
SOIL BORINGS
CONE PENETROMETER TEST
BORING AND CPT

COMMON BORINGS - OPTION A AND B
SOIL BORINGS
CONE PENETROMETER TEST
BORING AND CPT

MARSH CREATION
SOIL BORINGS
CONE PENETROMETER TEST

EXISTING BORINGS

PHASE I BORINGS/CPT

2500' 1250' 0' 2500' 5000'

GRAPHIC SCALE

REFERENCE:
Site Plan provided by Moffatt & Nichol.

NOTE:
Soils Reach 1: B-3, B-5, B-7, B-38, and B-40
Soils Reach 2: B-9, B-11, B-12, B-13, B-19, B-26, B-28, B-41, and B-42.
Soils Reach 3: B-15, B-17, B-18, and B-43.

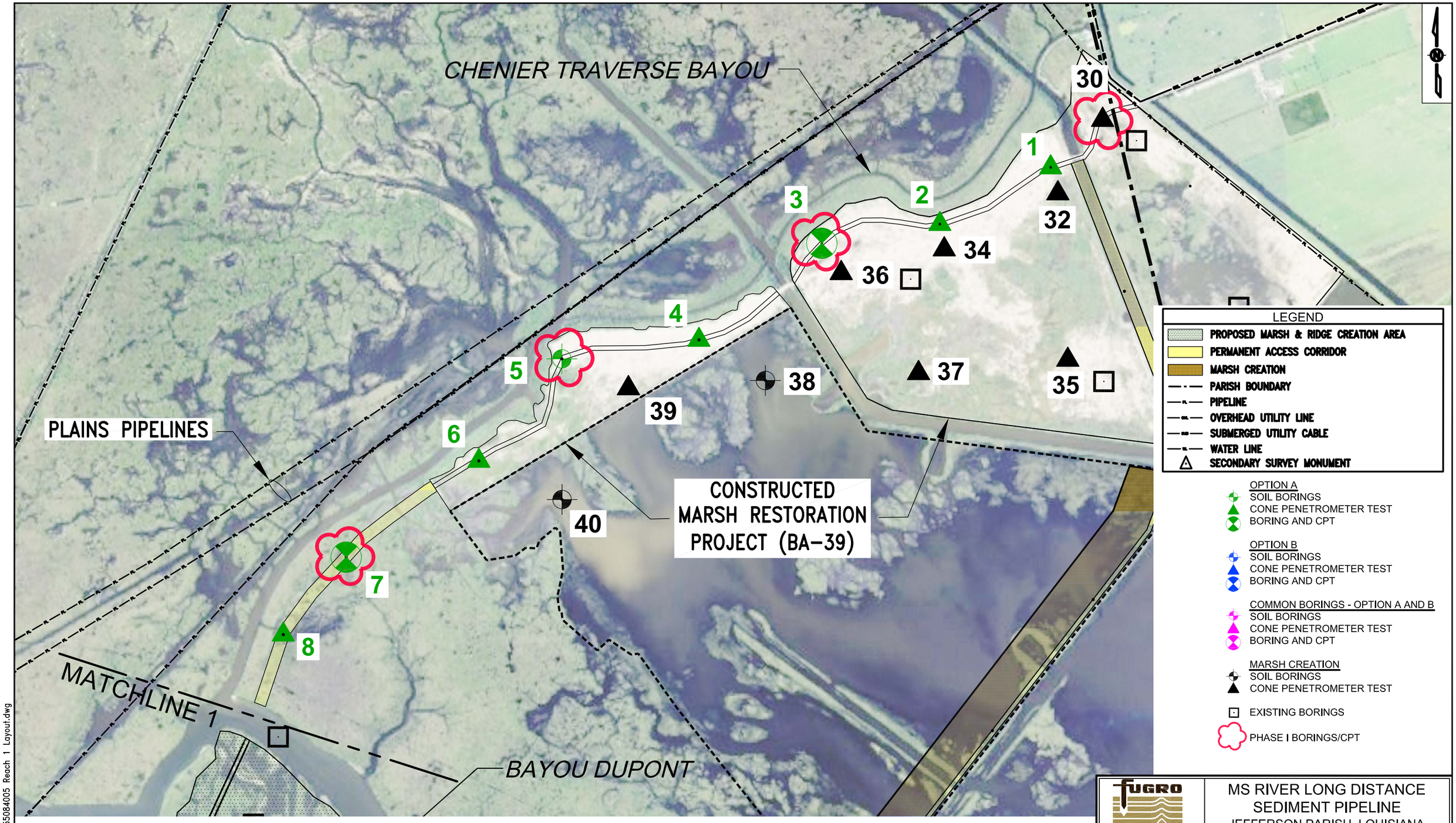
November 16, 2011 04.55084005 Overall Layout as of 11-16-2011.dwg

FUGRO

MS RIVER LONG DISTANCE SEDIMENT PIPELINE
JEFFERSON PARISH, LOUISIANA

PLAN OF BORINGS AND CPTS

SIZE	PROJECT NO.		REV.
B	04.55084005		0
SCALE: AS SHOWN	DRAWN BY: DMS	CHKD BY: JEA	DATE: 11/16/11	Plate No.: 1a



1200' 600' 0' 1200' 2400'

GRAPHIC SCALE

REFERENCE:
Site Plan provided by Moffatt & Nichol.

November 16, 2011 04.55084005 Reach 1 Layout.dwg

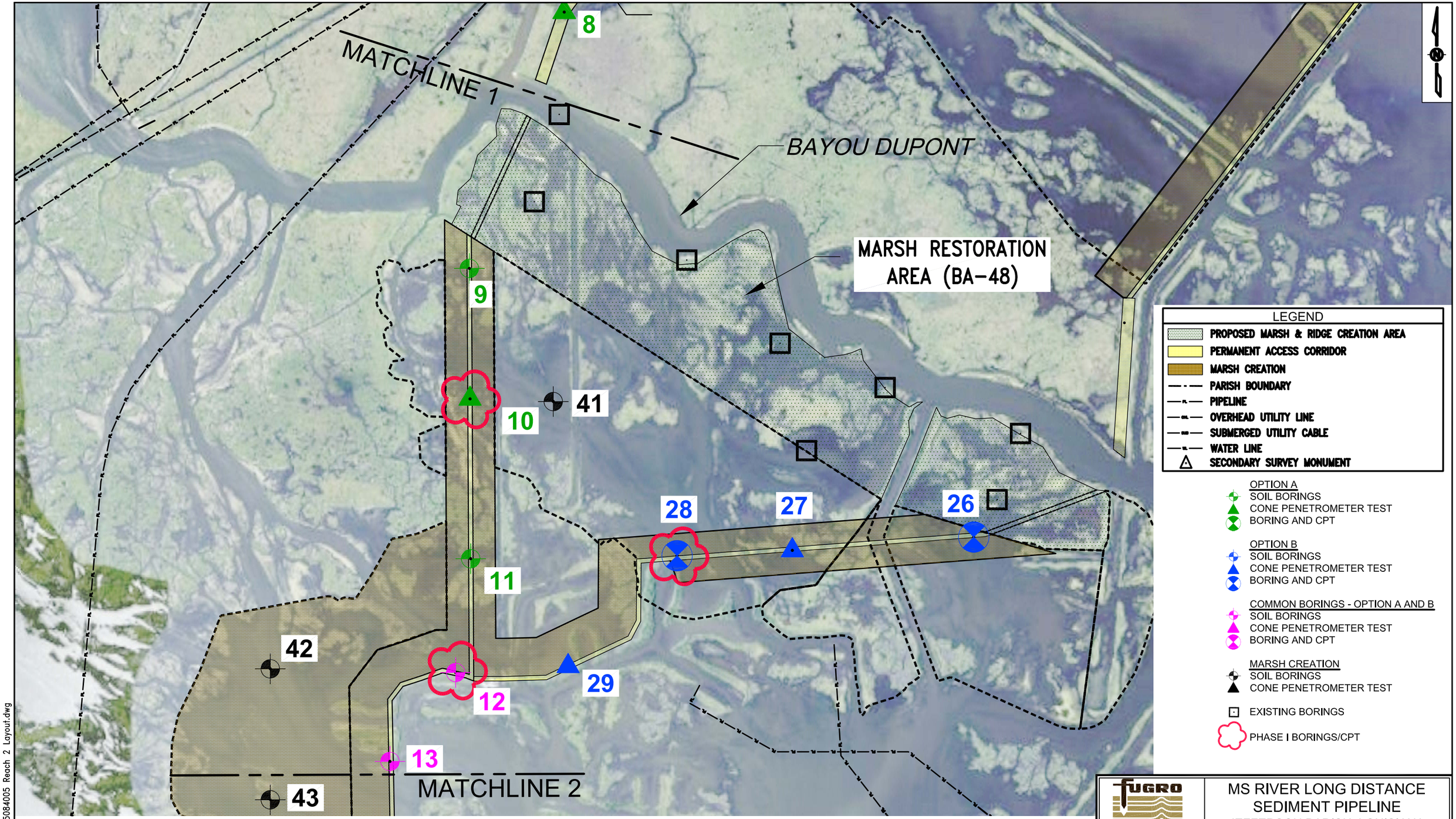
FUGRO

MS RIVER LONG DISTANCE SEDIMENT PIPELINE
JEFFERSON PARISH, LOUISIANA

PLAN OF BORINGS AND CPTS

SIZE	PROJECT NO.		REV.
B	04.55084005		0

SCALE:	DRAWN BY:	CHKD BY:	DATE:	Plate No.:
AS SHOWN	DMS	JEA	11/16/11	1b



1200' 600' 0' 1200' 2400'

GRAPHIC SCALE

REFERENCE:
Site Plan provided by Moffatt & Nichol.

November 16, 2011 04.55084005 Reach 2 Layout.dwg

FUGRO

MS RIVER LONG DISTANCE SEDIMENT PIPELINE
JEFFERSON PARISH, LOUISIANA

PLAN OF BORINGS AND CPTS

SIZE	PROJECT NO.		REV.
B	04.55084005		0

SCALE:	DRAWN BY:	CHKD BY:	DATE:	Plate No.:
AS SHOWN	DMS	JEA	11/16/11	1c

BARATARIA WATERWAY

MATCHLINE 2

11 12 13 14 15 16 17 18 19

26 27 28 29

42 43

LEGEND

- PROPOSED MARSH & RIDGE CREATION AREA
- PERMANENT ACCESS CORRIDOR
- MARSH CREATION
- PARISH BOUNDARY
- PIPELINE
- OVERHEAD UTILITY LINE
- SUBMERGED UTILITY CABLE
- WATER LINE
- SECONDARY SURVEY MONUMENT

OPTION A
- SOIL BORINGS
- CONE PENETROMETER TEST
- BORING AND CPT

OPTION B
- SOIL BORINGS
- CONE PENETROMETER TEST
- BORING AND CPT

COMMON BORINGS - OPTION A AND B
- SOIL BORINGS
- CONE PENETROMETER TEST
- BORING AND CPT

MARSH CREATION
- SOIL BORINGS
- CONE PENETROMETER TEST

- EXISTING BORINGS
- PHASE I BORINGS/CPT

1200' 600' 0' 1200' 2400'

GRAPHIC SCALE

REFERENCE:
Site Plan provided by Moffatt & Nichol.

November 16, 2011 04.55084005 Reach 3 Layout.dwg

FUGRO

MS RIVER LONG DISTANCE SEDIMENT PIPELINE
JEFFERSON PARISH, LOUISIANA

PLAN OF BORINGS AND CPTS

SIZE			REV.
B	PROJECT NO. 04.55084005		0
SCALE: AS SHOWN	DRAWN BY: DMS	CHKD BY: JEA	DATE: 11/16/11	Plate No.: 1d

LOCATION: See Plate 1

COORDINATES: N 29° 39' 09.1"
W 90° 01' 25.4"

SURFACE EL.: 1.5'

DEPTH, FT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
	POORLY GRADED SAND (SP), loose, brown, fine-grained							
	- gray below 1.5'				21			
5	N=Push			5	18			
	N=7							
	FAT CLAY (CH), soft, gray, with silt traces and organics	6.0			53	73	25	48
					52			
					53			
10	- with ferrous nodules below 9'				65			
	- with sand pockets below 11'			55	37	54	19	35
	POORLY GRADED SAND (SP), gray, fine-grained	12.0		3	20			
	LEAN CLAY (CL), very soft, gray	14.0						
15			78	88	37	43	23	20
					68			
	FAT CLAY (CH), soft, dark gray, with organics and shell fragments	18.0						
	LEAN CLAY (CL), very soft, gray	19.0			38			
20								
					83			
	FAT CLAY (CH), soft to firm, gray, with silt layers	24.0	55		78			
25								
30			59	100	68	72	24	48
					80			
35								
			59		69			
40								

SHEAR STRENGTH

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

KIPS PER SQ FT

0.2 0.4 0.6 0.8 1.0

NOTES:

1. Terms and symbols defined on Plates 20a and 20b.
2. Push = Sample recovered with splitspoon due to low recovery with shelby tube.

COMPLETION DATE: August 24, 2011
TOTAL DEPTH: 60'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 60'
BACKFILL: Cement-Bentonite Grout
LOGGER: T. Ferro

Fugro Consultants, Inc.

MS River Long Distance Sediment Pipeline

LOG OF BORING NO. B-3

Jefferson Parish, Louisiana

Project No. 04.55084005

PLATE 2a

FCBR_LOG (FINAL) 0 TO 1 04.55084005.GPJ FUGRO DATA TEMPLATE 042610.GDT 11/16/11

LOCATION: See Plate 1

COORDINATES: N 29° 39' 09.1"
W 90° 01' 25.4"

SURFACE EL.: 1.5'

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLES	BLOWS PER FOOT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	CLASSIFICATION: UNIT DRY WT, PCF	CLASSIFICATION: PASSING NO. 200 SIEVE, %	CLASSIFICATION: WATER CONTENT, %	CLASSIFICATION: LIQUID LIMIT	CLASSIFICATION: PLASTIC LIMIT	CLASSIFICATION: PLASTICITY INDEX (PI)	SHEAR STRENGTH
45					**FAT CLAY (CH)**, soft to firm, gray, with silt layers				61				
50									58				
55							69		56				
60						60.0			60				
65													
70													
75													
80													

SHEAR STRENGTH

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

KIPS PER SQ FT

0.2 0.4 0.6 0.8 1.0

NOTES:

1. Terms and symbols defined on Plates 20a and 20b.
2. Push = Sample recovered with splitspoon due to low recovery with shelby tube.

COMPLETION DATE: August 24, 2011
TOTAL DEPTH: 60'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 60'
BACKFILL: Cement-Bentonite Grout
LOGGER: T. Ferro

Fugro Consultants, Inc.

MS River Long Distance Sediment Pipeline

LOG OF BORING NO. B-3

Jefferson Parish, Louisiana

Project No. 04.55084005

PLATE 2b

FCBR_LOG (FINAL) 0 TO 1 04.55084005.GPJ FUGRO DATA TEMPLATE 042610.GDT 11/16/11

LOCATION: See Plate 1

COORDINATES: N 29° 38' 54.0"
W 90° 02' 05.4"

SURFACE EL.: 1.3'

DEPTH, FT	WATER LEVEL SYMBOL	SAMPLES	BLOWS PER FOOT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	CLASSIFICATION: UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
			N=WOH	**POORLY GRADED SAND (SP)**, very loose, gray and brown, fine-grained			4	21			
			N=27	- medium-dense at 2.5'			5	19			
5											
				FAT CLAY (CH), very soft to soft, gray, with organics	7.0	59	97	68	81	24	57
10								54			
								15			
				- with silt and sand pockets at 13'				29	66	22	44
15				**LEAN CLAY (CL)**, very soft to soft, gray	15.0			39			
				- with shell fragments from 16' to 25'				37			
20						84	97	37	32	25	7
25						55		77			
			N=20					39	46	22	24
30											
			N=20	**LEAN CLAY WITH SAND (CL)**, gray	33.5		84	31			
35											
				FAT CLAY (CH), soft, gray, with silt layers	38.0						
40					40.0	59		71			

SHEAR STRENGTH

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

KIPS PER SQ FT

0.2 0.4 0.6 0.8 1.0

NOTES:

1. Terms and symbols defined on Plates 20a and 20b.
2. WOH = Weight of Hammer

COMPLETION DATE: August 24, 2011
TOTAL DEPTH: 40'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 40'
BACKFILL: Cement-Bentonite Grout
LOGGER: T. Ferro

Fugro Consultants, Inc.

MS River Long Distance Sediment Pipeline

LOG OF BORING NO. B-5

Jefferson Parish, Louisiana

Project No. 04.55084005

PLATE 3

FCBR_LOG (FINAL) 0 TO 1 04.55084005.GPJ FUGRO DATA TEMPLATE 042610.GDT 11/16/11

LOCATION: See Plate 1

COORDINATES: N 29° 38' 27.9"
W 90° 02' 38.7"

SURFACE EL.: -0.8'

DEPTH, FT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
	ORGANIC CLAY (OH), very soft, black				135			
	N=WOH				184			
			39	89	125	133	35	98
5	**LEAN CLAY (CL)**, very soft to soft, gray and dark gray	5.0			33			
					42			
					35			
					37			
10					42	38	22	16
	FAT CLAY (CH), very soft, dark gray	11.0			70			
					73			
	- with shell fragments below 14'							
15	- with organics below 15'				155			
					93	99	32	67
					53			
	LEAN CLAY (CL), very soft, gray, with shell fragments, and sand seams	18.0			36			
20								
	FAT CLAY (CH), soft, gray, with silt seams and lenses	24.0	64		62			
25								
30			54	100	74	85	27	58
			57		75			
35								
40					68			

SHEAR STRENGTH

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

KIPS PER SQ FT

0.2 0.4 0.6 0.8 1.0

NOTES:

1. Terms and symbols defined on Plates 20a and 20b.
2. Depth to mudline below water surface = 1.3'.
3. WOH = Weight of Hammer

COMPLETION DATE: August 23, 2011
TOTAL DEPTH: 60'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 60'
BACKFILL: Cement-Bentonite Grout
LOGGER: T. Ferro

Fugro Consultants, Inc.

MS River Long Distance Sediment Pipeline

LOG OF BORING NO. B-7

Jefferson Parish, Louisiana

Project No. 04.55084005

PLATE 4a

FCBR_LOG (FINAL) 0 TO 1 04.55084005.GPJ FUGRO DATA TEMPLATE 042610.GDT 11/16/11

LOCATION: See Plate 1

COORDINATES: N 29° 38' 27.9"
W 90° 02' 38.7"

SURFACE EL.: -0.8'

DEPTH, FT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	CLASSIFICATION: UNIT DRY WT, PCF	CLASSIFICATION: PASSING NO. 200 SIEVE, %	CLASSIFICATION: WATER CONTENT, %	CLASSIFICATION: LIQUID LIMIT	CLASSIFICATION: PLASTIC LIMIT	CLASSIFICATION: PLASTICITY INDEX (PI)
45	**FAT CLAY (CH)**, soft, gray, with silt seams and lenses				69			
	FAT CLAY (CH), soft to firm, gray, with silt seams and lenses	45.0						
50			69		54			
55					49			
60		60.0	63		61			
65								
70								
75								
80								

SHEAR STRENGTH

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

KIPS PER SQ FT

0.2 0.4 0.6 0.8 1.0

NOTES:

1. Terms and symbols defined on Plates 20a and 20b.
2. Depth to mudline below water surface = 1.3'.
3. WOH = Weight of Hammer

COMPLETION DATE: August 23, 2011
TOTAL DEPTH: 60'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 60'
BACKFILL: Cement-Bentonite Grout
LOGGER: T. Ferro

Fugro Consultants, Inc.

MS River Long Distance Sediment Pipeline

LOG OF BORING NO. B-7

Jefferson Parish, Louisiana

Project No. 04.55084005

PLATE 4b

FCBR_LOG (FINAL) 0 TO 1 04.55084005.GPJ FUGRO DATA TEMPLATE 042610.GDT 11/16/11

LOCATION: See Plate 1

COORDINATES: N 29° 37' 43.6"
W 90° 03' 03.4"

SURFACE EL.: -1.3'

DEPTH, FT	WATER LEVEL SYMBOL	SAMPLES	BLOWS PER FOOT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	CLASSIFICATION: UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	SHEAR STRENGTH
0			N=WOH	**PEAT (PT)**, very soft, black, with roots				214				
								395				
						22	47	264	191	54	137	▲
				FAT CLAY (CH), very soft, gray, with organics	4.0							
5								53				▲
								86				▲
10								49				▲
								40				▲
								68	55	24	31	
								44				▲
15								77				▲
								54				▲
20								35				▲
				SILT (ML), very soft to soft, gray, with clay pockets, and sand lenses	23.0			30	25	24	1	
						74		47				● ▲
25				**SILTY SAND (SM)**, gray, fine-grained	25.0							
			N=Push									
30			N=26	- medium-dense from 30' to 38.5'			44	28				
35												
			N=7	- loose below 38.5'			44	35				
40					40.0							

SHEAR STRENGTH: ☐ Penetrometer ◇ Torvane △ Field Vane; Unconfined ▼ Triaxial ● Miniature Vane ▲; KIPS PER SQ FT: 0.2 0.4 0.6 0.8 1.0

NOTES:

1. Terms and symbols defined on Plates 20a and 20b.
2. Depth to mudline below water surface = 1.7'.
3. WOH = Weight of Hammer
4. Push = Sample recovered with splitspoon due to low recovery with shelby tube.

COMPLETION DATE: August 26, 2011
TOTAL DEPTH: 40'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 40'
BACKFILL: Cement-Bentonite Grout
LOGGER: T. Ferro

Fugro Consultants, Inc.

MS River Long Distance Sediment Pipeline

LOG OF BORING NO. B-9

Jefferson Parish, Louisiana

Project No. 04.55084005

PLATE 5

FCBR_LOG (FINAL) 0 TO 1 04.55084005.GPJ FUGRO DATA TEMPLATE 042610.GDT 11/16/11

LOCATION: See Plate 1

COORDINATES: N 29° 37' 04.8"
W 90° 03' 03.7"

SURFACE EL.: -1.8'

DEPTH, FT	WATER LEVEL SYMBOL	SAMPLES	BLOWS PER FOOT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
			N=WOH	**PEAT (PT)**, very soft, black, with, wood pieces				852			
								913	548	254	294
5			N=Push					447			
				- with clay pockets at 6'				266			
10						13	80	465	312	152	160
				- with clay layers below 10'				275			
								320			
				ORGANIC CLAY (OH), very soft, gray	14.0						
15								128			
				FAT CLAY (CH), very soft, gray	16.0			130	125	35	90
								83			
				- with sand lenses below 18'							
				LEAN CLAY (CL), very soft, gray, with sand lenses	19.0			36			
20				**FAT CLAY (CH)**, very soft, gray, with sand lenses	20.0						
						58		68			
25											
								80			
30								58			
						70		49			
35											
								78			
40					40.0			73			

CLASSIFICATION

SHEAR STRENGTH

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

KIPS PER SQ FT

0.2 0.4 0.6 0.8 1.0

NOTES:

1. Terms and symbols defined on Plates 20a and 20b.
2. Depth to mudline below water surface = 2.4'.
3. WOH = Weight of Hammer
4. Push = Sample recovered with splitspoon due to low recovery with shelby tube.

COMPLETION DATE: August 27, 2011
TOTAL DEPTH: 40'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 40'
BACKFILL: Cement-Bentonite Grout
LOGGER: T. Ferro

Fugro Consultants, Inc.

MS River Long Distance Sediment Pipeline

LOG OF BORING NO. B-11

Jefferson Parish, Louisiana

Project No. 04.55084005

PLATE 6

FCBR_LOG (FINAL) 0 TO 1 04.55084005.GPJ FUGRO DATA TEMPLATE 042610.GDT 11/16/11

LOCATION: See Plate 1

COORDINATES: N 29° 36' 49.6"
W 90° 03' 06.2"

SURFACE EL.: -2.8'

DEPTH, FT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
	PEAT (PT), very soft, black, with roots and grass				533			
					179	175	35	140
					221			
5	- with organic clay lenses below 6'				230			
			18	28	283	287	57	230
					183			
10					243			
					271			
	FAT CLAY (CH), very soft, gray	14.0			77			
15					92	77	23	54
					52			
	LEAN CLAY (CL), very soft, gray	19.0			33			
20	**FAT CLAY (CH)**, soft, gray	20.0						
	N=Push							
25								
30			69		53			
35					57			
40		40.0	68		55			

SHEAR STRENGTH

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

KIPS PER SQ FT

0.2 0.4 0.6 0.8 1.0

NOTES:

1. Terms and symbols defined on Plates 20a and 20b.
2. Depth to mudline below water surface = 3.0'.
3. Push = Sample recovered with splitspoon due to low recovery with shelby tube.

COMPLETION DATE: August 21, 2011
TOTAL DEPTH: 40'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 40'
BACKFILL: Cement-Bentonite Grout
LOGGER: T. Ferro

Fugro Consultants, Inc.

MS River Long Distance Sediment Pipeline

LOG OF BORING NO. B-12

Jefferson Parish, Louisiana

Project No. 04.55084005

PLATE 7

FCBR_LOG (FINAL) 0 TO 1 04.55084005.GPJ FUGRO DATA TEMPLATE 042610.GDT 11/16/11

LOCATION: See Plate 1

COORDINATES: N 29° 36' 37.9"
W 90° 03' 16.4"

SURFACE EL.: -3.5'

DEPTH, FT	WATER LEVEL SYMBOL	SAMPLES	BLOWS PER FOOT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	CLASSIFICATION: UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	SHEAR STRENGTH
0			N=WOR	**ORGANIC CLAY (OH)**, very soft, black				412				
5								205	187	47	140	
								92				▲
								101				
				- with wood pieces at 8'								
10								157				
				- with wood pieces at 11'				151				
								168	125	38	87	
								176				▲
15					15.0							
				FAT CLAY (CH), very soft, gray				138				▲
				- with roots from 16' to 20'								
						45	87	91	76	26	50	▲
20								82				▲
			N=Push					51	58	22	36	
25												
				- very soft to soft, with silt pockets, lenses, and layers below 28'								
30						56		77				▲ ●
								79				
35								77				▲
40					40.0	60		67				▲ ●

SHEAR STRENGTH: ☐ Penetrometer ◇ Torvane △ Field Vane; Unconfined ▼ Triaxial ● Miniature Vane ▲; KIPS PER SQ FT: 0.2 0.4 0.6 0.8 1.0

NOTES:

1. Terms and symbols defined on Plates 20a and 20b.
2. Depth to mudline below water surface = 4.0'.
3. WOR = Weight of Rod
4. Push = Sample recovered with splitspoon due to low recovery with shelby tube.

COMPLETION DATE: August 28, 2011
TOTAL DEPTH: 40'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 40'
BACKFILL: Cement-Bentonite Grout
LOGGER: T. Ferro

Fugro Consultants, Inc.

MS River Long Distance Sediment Pipeline

LOG OF BORING NO. B-13

Jefferson Parish, Louisiana

Project No. 04.55084005

PLATE 8

FCBR_LOG (FINAL) 0 TO 1 04.55084005.GPJ FUGRO DATA TEMPLATE 042610.GDT 11/16/11

LOCATION: See Plate 1

COORDINATES: N 29° 36' 16.4"
W 90° 03' 34.7"

SURFACE EL.: -1.0'

DEPTH, FT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
	FAT CLAY (CH), very soft, black, with roots				61			
		3.0			36			
5	**LEAN CLAY (CL)**, soft to firm, gray - with silt traces at 4'		86	94	34	45	18	27
	- with roots at 6'				39			
10					42			
	- with organics at 12'				36			
					35			
15	**SILTY CLAY (CL-ML)**, very soft to soft, gray	15.0			29			
				92	34	34	24	10
					31			
	FAT CLAY (CH), soft, gray, with organics	19.0			65			
20								
				96	93	142	37	105
25	- with silt layers below 28'							
	- very soft to soft at 29'		64		60			
30								
	- with silt lenses from 33' to 35'				52	52	20	32
					26			
35								
	- soft to firm, with silt layers below 39'		62		64			
40		40.0						

CLASSIFICATION

SHEAR STRENGTH

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

KIPS PER SQ FT
0.2 0.4 0.6 0.8 1.0

NOTES:

1. Terms and symbols defined on Plates 20a and 20b.
2. Depth to mudline below water surface = 2.0'.
3. WOR = Weight of Rod

COMPLETION DATE: August 29, 2011
TOTAL DEPTH: 40'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 40'
BACKFILL: Cement-Bentonite Grout
LOGGER: T. Ferro

Fugro Consultants, Inc.

MS River Long Distance Sediment Pipeline

LOG OF BORING NO. B-15

Jefferson Parish, Louisiana

Project No. 04.55084005

PLATE 9

FCBR_LOG (FINAL) 0 TO 1 04.55084005.GPJ FUGRO DATA TEMPLATE 042610.GDT 11/16/11

LOCATION: See Plate 1

COORDINATES: N 29° 36' 10.4"
W 90° 04' 16.3"

SURFACE EL.: -2.3'

DEPTH, FT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
	FAT CLAY (CH), black				63			
					47	66	21	45
	LEAN CLAY (CL), soft to firm, gray, with organics and roots	3.0			36			
5					40			
					41			
					33			
	- very soft at 9'				32			
10					32	39	21	18
					35			
					43			
15					41			
					37			
			82	89	38	44	21	23
20					39			
	- with organics at 24'		39		127			
25								
	N=WOH							
30								
				98	40			
					58			
35								
					58			
40								

CLASSIFICATION

SHEAR STRENGTH

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

KIPS PER SQ FT

0.2 0.4 0.6 0.8 1.0

NOTES:

1. Terms and symbols defined on Plates 20a and 20b.
2. Depth to mudline below water surface = 2.8'.
3. WOH = Weight of Hammer
4. Push = Sample recovered with splitspoon due to low recovery with shelby tube.

COMPLETION DATE: August 21, 2011
TOTAL DEPTH: 60'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 60'
BACKFILL: Cement-Bentonite Grout
LOGGER: T. Ferro

Fugro Consultants, Inc.

MS River Long Distance Sediment Pipeline

LOG OF BORING NO. B-17

Jefferson Parish, Louisiana

Project No. 04.55084005

PLATE 10a

FCBR_LOG (FINAL) 0 TO 1 04.55084005.GPJ FUGRO DATA TEMPLATE 042610.GDT 11/16/11

LOCATION: See Plate 1

COORDINATES: N 29° 36' 10.4"
W 90° 04' 16.3"

SURFACE EL.: -2.3'

DEPTH, FT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	CLASSIFICATION: UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
	LEAN CLAY (CL), soft to firm, gray, with organics and roots				41			
45	**FAT CLAY (CH)**, soft to firm, gray	45.0						
50			64		60			
55				100	62	85	27	58
60		60.0	69		51			
65								
70								
75								
80								

SHEAR STRENGTH

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

KIPS PER SQ FT

0.2 0.4 0.6 0.8 1.0

NOTES:

1. Terms and symbols defined on Plates 20a and 20b.
2. Depth to mudline below water surface = 2.8'.
3. WOH = Weight of Hammer
4. Push = Sample recovered with splitspoon due to low recovery with shelby tube.

COMPLETION DATE: August 21, 2011
TOTAL DEPTH: 60'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 60'
BACKFILL: Cement-Bentonite Grout
LOGGER: T. Ferro

Fugro Consultants, Inc.

MS River Long Distance Sediment Pipeline

LOG OF BORING NO. B-17

Jefferson Parish, Louisiana

Project No. 04.55084005

PLATE 10b

FCBR_LOG (FINAL) 0 TO 1 04.55084005.GPJ FUGRO DATA TEMPLATE 042610.GDT 11/16/11

LOCATION: See Plate 1

COORDINATES: N 29° 36' 27.4"
W 90° 04' 03.4"

SURFACE EL.: -2.5'

DEPTH, FT	WATER LEVEL SYMBOL	SAMPLES	BLOWS PER FOOT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
			N=WOR	**PEAT (PT)**, very soft, black, with organic clay, shells, roots, and wood				653			
								809			
					3.0						
5			N=Push	**ORGANIC CLAY (OH)**, very soft, gray, with wood and roots				180			
								206			
					7.0						
				FAT CLAY (CH), soft, gray, with silt pockets, organics, and wood		61	99	60	94	30	64
10								54			
								57			
								82			
15								58	83	27	56
								76			
				- very soft from 17' to 20'				93			
20								31			
			N=WOR								
25											
				- with silt layers at 28'							
30						58		73			
			N=Push					66			
35											
				- very soft below 38'							
40					40.0			72			

SHEAR STRENGTH

☐ Penetrometer ▼ Unconfined
◇ Torvane ● Triaxial
△ Field Vane ▲ Miniature Vane

KIPS PER SQ FT

0.2 0.4 0.6 0.8 1.0

NOTES:

1. Terms and symbols defined on Plates 20a and 20b.
2. Depth to mudline below water surface = 3.0'.
3. WOR = Weight of Rod
4. Push = Sample recovered with splitspoon due to low recovery with shelby tube.

COMPLETION DATE: August 28, 2011
TOTAL DEPTH: 40'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 40'
BACKFILL: Cement-Bentonite Grout
LOGGER: T. Ferro

Fugro Consultants, Inc.

MS River Long Distance Sediment Pipeline

LOG OF BORING NO. B-18

Jefferson Parish, Louisiana

Project No. 04.55084005

PLATE 11

FCBR_LOG (FINAL) 0 TO 1 04.55084005.GPJ FUGRO DATA TEMPLATE 042610.GDT 11/16/11

LOCATION: See Plate 1

COORDINATES: N 29° 36' 05.9"
W 90° 03 48.0"

SURFACE EL.: -1.0'

DEPTH, FT	WATER LEVEL SYMBOL	SAMPLES	BLOWS PER FOOT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
			N=WOR	**ORGANIC CLAY (OH)**, very soft, black, with roots, grass, and wood				230			
			N=Push					256	189	43	146
5				**FAT CLAY (CH)**, very soft, gray, with organics and roots	5.0			70			
				- with silt seams and traces from 7' to 10'		73	100	49	70	23	47
10								58			
								56			
								55			
15				**LEAN CLAY (CL)**, very soft, gray, with silt layers	14.0			37			
								40	43	18	25
								78			
20								41			
25				**SILTY SAND (SM)**, gray, fine-grained	24.0			26	NP	NP	NP
							13	24			
30											
			N=5	**POORLY GRADED SAND WITH CLAY (SP-SC)**, loose to medium, gray, fine-grained	33.5						
35											
			N=25				9	24			
40					40.0						

CLASSIFICATION

SHEAR STRENGTH

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

KIPS PER SQ FT

0.2 0.4 0.6 0.8 1.0

NOTES:

1. Terms and symbols defined on Plates 20a and 20b.
2. Depth to mudline below water surface = 1.1'.
3. WOR = Weight of Rod.
4. Push = Sample recovered with splitspoon due to low recovery with shelby tube.

COMPLETION DATE: August 29, 2011
TOTAL DEPTH: 40'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 40'
BACKFILL: Cement-Bentonite Grout
LOGGER: T. Ferro

Fugro Consultants, Inc.

MS River Long Distance Sediment Pipeline

LOG OF BORING NO. B-19

Jefferson Parish, Louisiana

Project No. 04.55084005

PLATE 12

FCBR_LOG (FINAL) 0 TO 1 04.55084005.GPJ FUGRO DATA TEMPLATE 042610.GDT 11/16/11

LOCATION: See Plate 1

COORDINATES: N 29° 37' 06.9"
W 90° 01' 46.7"

SURFACE EL.: -3.5'

DEPTH, FT	WATER LEVEL SYMBOL	SAMPLES	BLOWS PER FOOT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	CLASSIFICATION: UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	SHEAR STRENGTH
0			N=WOH	**ORGANIC CLAY (OH)**, very soft to soft, black				264				
								158	185	39	146	
								145				
5								198				
								357				
					7.0							
				FAT CLAY (CH), very soft, black and gray, - with silt pockets at 7'		42	99	110	115	34	81	
10				- dark gray, with sand pockets and layers from 9' to 13'				29				
								49				
				- gray below 12'			72	54	54	20	34	
				- with organics from 12' to 18'				73				
15								42				
								77				
								78	82	25	57	
20								70				
				LEAN CLAY (CL), gray, with silty sand pockets	20.0							
				- very stiff at 24'		97		26				1.8
25				**FAT CLAY (CH)**, soft, gray	25.0							
			N=2	- with silt pockets below 28.5'				58				
30												
			N=Push					46				
35												
					38.0							
			N=8	**SILTY CLAY (CL-ML)**, firm, gray, with sand pockets			96	38				
40												

SHEAR STRENGTH: ☐ Penetrometer ◇ Torvane △ Field Vane — Unconfined ▼ Triaxial ● Miniature Vane ▲ — KIPS PER SQ FT (0.2, 0.4, 0.6, 0.8, 1.0)

NOTES:

1. Terms and symbols defined on Plates 20a and 20b.
2. Depth to mudline below water surface = 3.4'.
3. WOH = Weight of Hammer.
4. Push = Sample recovered with splitspoon due to low recovery with shelby tube.

COMPLETION DATE: August 27, 2011
TOTAL DEPTH: 60'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 60'
BACKFILL: Cement-Bentonite Grout
LOGGER: T. Ferro

Fugro Consultants, Inc.

MS River Long Distance Sediment Pipeline

LOG OF BORING NO. B-26

Jefferson Parish, Louisiana

Project No. 04.55084005

PLATE 13a

FCBR_LOG (FINAL) 0 TO 1 04.55084005.GPJ FUGRO DATA TEMPLATE 042610.GDT 11/16/11

LOCATION: See Plate 1

COORDINATES: N 29° 37' 06.9"
W 90° 01' 46.7"

SURFACE EL.: -3.5'

DEPTH, FT	WATER LEVEL SYMBOL	SAMPLES	BLOWS PER FOOT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	CLASSIFICATION: UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
				SILTY CLAY WITH SAND (CL-ML), firm, gray	42.0						
			N=14				72	32			
45				**FAT CLAY (CH)**, firm, gray, with silt layers	45.0						
50						73		49			
								41			
55								58			
60					60.0	66		56			
65											
70											
75											
80											

SHEAR STRENGTH

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

KIPS PER SQ FT

0.2 0.4 0.6 0.8 1.0

NOTES:

1. Terms and symbols defined on Plates 20a and 20b.
2. Depth to mudline below water surface = 3.4'.
3. WOH = Weight of Hammer.
4. Push = Sample recovered with splitspoon due to low recovery with shelby tube.

COMPLETION DATE: August 27, 2011
TOTAL DEPTH: 60'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 60'
BACKFILL: Cement-Bentonite Grout
LOGGER: T. Ferro

Fugro Consultants, Inc.

MS River Long Distance Sediment Pipeline

LOG OF BORING NO. B-26

Jefferson Parish, Louisiana

Project No. 04.55084005

PLATE 13b

FCBR_LOG (FINAL) 0 TO 1 04.55084005.GPJ FUGRO DATA TEMPLATE 042610.GDT 11/16/11

LOCATION: See Plate 1

COORDINATES: N 29° 37' 04.9"
W 90° 02' 32.1"

SURFACE EL.: -2.9'

DEPTH, FT	WATER LEVEL SYMBOL	SAMPLES	BLOWS PER FOOT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
			N=WOH	**ORGANIC CLAY (OH)**, very soft, dark gray, with roots, peat, and shells				182 185 208	158	36	122
5				**LEAN CLAY (CL)**, very soft, dark gray, with organics	6.0	60	96	72	44	20	24
				FAT CLAY (CH), very soft to soft, gray, with organics and roots	8.0			81 169	78	24	54
10				- dark gray below 10'				83			
				ORGANIC CLAY (OH), soft, dark gray, with roots	12.0		27	119			
				FAT CLAY (CH), very soft, gray, with organics and roots	13.0	53	98	80	86	28	58
15				**LEAN CLAY (CL)**, gray	15.0			35			
			N=4	- with sand seams at 18.5'			87	31			
20											
			N=2					41			
25											
			N=Push	**SILTY SAND (SM)**, very loose to medium-dense, gray	28.0		27	27			
30											
			N=15				12	22			
35											
			N=WOH	**LEAN CLAY (CL)**, very soft, gray	38.0						
40											

CLASSIFICATION

SHEAR STRENGTH

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

KIPS PER SQ FT

0.2 0.4 0.6 0.8 1.0

NOTES:

1. Terms and symbols defined on Plates 20a and 20b.
2. Depth to mudline below water surface = 3.6'.
3. WOH = Weight of Hammer.
4. Push = Sample recovered with splitspoon due to low recovery with shelby tube.

COMPLETION DATE: August 22, 2011
TOTAL DEPTH: 60'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 60'
BACKFILL: Cement-Bentonite Grout
LOGGER: T. Ferro

Fugro Consultants, Inc.

MS River Long Distance Sediment Pipeline

LOG OF BORING NO. B-28

Jefferson Parish, Louisiana

Project No. 04.55084005

PLATE 14a

FCBR_LOG (FINAL) 0 TO 1 04.55084005.GPJ FUGRO DATA TEMPLATE 042610.GDT 11/16/11

LOCATION: See Plate 1

COORDINATES: N 29° 37' 04.9"
W 90° 02' 32.1"

SURFACE EL.: -2.9'

DEPTH, FT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
	LEAN CLAY (CL), very soft, gray				31	37	19	18
45					26			
	FAT CLAY (CH), firm, gray, with organics and roots	45.0						
50			64		62			
55			70	100	50	69	23	46
			71		49			
60		60.0						
65								
70								
75								
80								

WATER LEVEL SYMBOL SAMPLES BLOWS PER FOOT

CLASSIFICATION

SHEAR STRENGTH

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

KIPS PER SQ FT
0.2 0.4 0.6 0.8 1.0

NOTES:

1. Terms and symbols defined on Plates 20a and 20b.
2. Depth to mudline below water surface = 3.6'.
3. WOH = Weight of Hammer.
4. Push = Sample recovered with splitspoon due to low recovery with shelby tube.

COMPLETION DATE: August 22, 2011
TOTAL DEPTH: 60'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 60'
BACKFILL: Cement-Bentonite Grout
LOGGER: T. Ferro

Fugro Consultants, Inc.

MS River Long Distance Sediment Pipeline

LOG OF BORING NO. B-28

Jefferson Parish, Louisiana

Project No. 04.55084005

PLATE 14b

FCBR_LOG (FINAL) 0 TO 1 04.55084005.GPJ FUGRO DATA TEMPLATE 042610.GDT 11/16/11

LOCATION: See Plate 1

COORDINATES: N 29° 38' 50.8"
W 90° 01' 34.3"

SURFACE EL.: -1.8'

DEPTH, FT	WATER LEVEL SYMBOL	SAMPLES	BLOWS PER FOOT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
			N=WOH	**ORGANIC CLAY (OH)**, very soft, black, with roots				170			
				- with peat at 2'				322			
						39	98	130	152	41	111
5				**LEAN CLAY (CL)**, very soft, gray, with silt seams	4.0			62			
								69			
				FAT CLAY (CH), soft, gray, with peat and organics	8.0			68			
10								97	89	30	59
								103			
				- very soft, with shell fragments at 13'				77			
15								105			
								49			
20						68	100	53	54	21	33
			N=Push					50	52	21	31
25											
				SILTY SAND (SM), gray	28.0						
30							16	21			
35											
				FAT CLAY (CH), very soft to soft, gray	38.0	59		73			
40				- with silt pockets at 39'				32			

SHEAR STRENGTH

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

KIPS PER SQ FT

0.2 0.4 0.6 0.8 1.0

NOTES:

1. Terms and symbols defined on Plates 20a and 20b.
2. Depth to mudline below water surface = 1.9'.
3. WOH = Weight of Hammer.
4. Push = Sample recovered with splitspoon due to low recovery with shelby tube.

COMPLETION DATE: August 25, 2011
TOTAL DEPTH: 60'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 60'
BACKFILL: Cement-Bentonite Grout
LOGGER: T. Ferro

Fugro Consultants, Inc.

MS River Long Distance Sediment Pipeline

LOG OF BORING NO. B-38

Jefferson Parish, Louisiana

Project No. 04.55084005

PLATE 15a

FCBR_LOG (FINAL) 0 TO 1 04.55084005.GPJ FUGRO DATA TEMPLATE 042610.GDT 11/16/11

LOCATION: See Plate 1

COORDINATES: N 29° 38' 50.8"
W 90° 01' 34.3"

SURFACE EL.: -1.8'

DEPTH, FT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
	FAT CLAY (CH), soft, gray	42.0			44			
45	- with organic traces at 43'				64			
50			65		59			
55					52 58			
60	- soft to firm below 59'	60.0	63		64			
65								
70								
75								
80								

SHEAR STRENGTH

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

KIPS PER SQ FT

0.2 0.4 0.6 0.8 1.0

NOTES:

1. Terms and symbols defined on Plates 20a and 20b.
2. Depth to mudline below water surface = 1.9'.
3. WOH = Weight of Hammer.
4. Push = Sample recovered with splitspoon due to low recovery with shelby tube.

COMPLETION DATE: August 25, 2011
TOTAL DEPTH: 60'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 60'
BACKFILL: Cement-Bentonite Grout
LOGGER: T. Ferro

Fugro Consultants, Inc.

MS River Long Distance Sediment Pipeline

LOG OF BORING NO. B-38

Jefferson Parish, Louisiana

Project No. 04.55084005

PLATE 15b

FCBR_LOG (FINAL) 0 TO 1 04.55084005.GPJ FUGRO DATA TEMPLATE 042610.GDT 11/16/11

LOCATION: See Plate 1

COORDINATES: N 29° 38' 35.2"
W 90° 02' 05.6"

SURFACE EL.: -1.5'

DEPTH, FT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	BLOWS PER FOOT
	ORGANIC CLAY (OH), very soft, black, with roots and grass				191				N=WOR
	PEAT (PT), gray, with organics, grass, and roots	2.0			338	232	64	168	
5	**FAT CLAY (CH)**, very soft, gray, with peat	5.0			55				
					50				
10					77				
					80				
	- with silt traces and shells from 12' to 19'								
			48	99	88	82	26	56	
15	- dark gray from 14' to 16'				96				
	- gray below 16'				102				
	- with organics at 18'				94	105	28	77	
20					67				
									N=Push
25					53				
	- soft, with silt layers below 28'								
30			53		82				
					78				
35					61				
40		40.0	60		67				

CLASSIFICATION

SHEAR STRENGTH

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

KIPS PER SQ FT

0.2 0.4 0.6 0.8 1.0

NOTES:

1. Terms and symbols defined on Plates 20a and 20b.
2. Depth to mudline below water surface = 2.1'.
3. WOR = Weight of Rod.
4. Push = Sample recovered with splitspoon due to low recovery with shelby tube.

COMPLETION DATE: August 25, 2011
TOTAL DEPTH: 40'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 40'
BACKFILL: Cement-Bentonite Grout
LOGGER: T. Ferro

Fugro Consultants, Inc.

MS River Long Distance Sediment Pipeline

LOG OF BORING NO. B-40

Jefferson Parish, Louisiana

Project No. 04.55084005

PLATE 16

FCBR_LOG (FINAL) 0 TO 1 04.55084005.GPJ FUGRO DATA TEMPLATE 042610.GDT 11/16/11

LOCATION: See Plate 1

COORDINATES: N 29° 37' 25.7"
W 90° 02' 50.8"

SURFACE EL.: -2.5'

DEPTH, FT	WATER LEVEL SYMBOL	SAMPLES	BLOWS PER FOOT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	CLASSIFICATION: UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	SHEAR STRENGTH
0			N=WOH	**PEAT (PT)**, very soft, black				378				
			N=Push					221				
4			N=Push	**FAT CLAY (CH)**, dark gray	4.0			115	68	20	48	
6				**PEAT (PT)**, very soft, dark gray	6.0							
10								240				▲
								175				▲
								250	295	77	218	
13				**FAT CLAY (PT)**, very soft, gray, with organics	13.0			65				▲
15								97				▲
								89				▲
20								82				▲
23				**LEAN CLAY (CL)**, very soft to soft, gray, with silt layers	23.0	62	99	62	37	17	20	▲
25												
30			N=WOR					65				
34				**FAT CLAY (CH)**, soft to firm, gray	34.0	56		75				▲●
35												
36								36				
40								32				▲

SHEAR STRENGTH: □ Penetrometer ▼ Unconfined; ◇ Torvane ● Triaxial; △ Field Vane ▲ Miniature Vane; KIPS PER SQ FT; 0.2 0.4 0.6 0.8 1.0

NOTES:

1. Terms and symbols defined on Plates 20a and 20b.
2. Depth to mudline below water surface = 3.0'.
3. WOH = Weight of Hammer.
4. WOR = Weight of Rod.
5. Push = Sample recovered with splitspoon due to low recovery with shelby tube.

COMPLETION DATE: August 26, 2011
TOTAL DEPTH: 60'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 60'
BACKFILL: Cement-Bentonite Grout
LOGGER: T. Ferro

Fugro Consultants, Inc.

MS River Long Distance Sediment Pipeline

LOG OF BORING NO. B-41

Jefferson Parish, Louisiana

Project No. 04.55084005

PLATE 17a

FCBR_LOG (FINAL) 0 TO 1 04.55084005.GPJ FUGRO DATA TEMPLATE 042610.GDT 11/16/11

LOCATION: See Plate 1

COORDINATES: N 29° 37' 25.7"
W 90° 02' 50.8"

SURFACE EL.: -2.5'

DEPTH, FT	WATER LEVEL SYMBOL	SAMPLES	BLOWS PER FOOT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	CLASSIFICATION: UNIT DRY WT, PCF	CLASSIFICATION: PASSING NO. 200 SIEVE, %	CLASSIFICATION: WATER CONTENT, %	CLASSIFICATION: LIQUID LIMIT	CLASSIFICATION: PLASTIC LIMIT	CLASSIFICATION: PLASTICITY INDEX (PI)	SHEAR STRENGTH
45				**FAT CLAY (CH)**, soft to firm, gray		85		34				
50								60 51				
55						73		49				
60					60.0			55 67				
65												
70												
75												
80												

SHEAR STRENGTH

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

KIPS PER SQ FT

0.2 0.4 0.6 0.8 1.0

NOTES:

1. Terms and symbols defined on Plates 20a and 20b.
2. Depth to mudline below water surface = 3.0'.
3. WOH = Weight of Hammer.
4. WOR = Weight of Rod.
5. Push = Sample recovered with splitspoon due to low recovery with shelby tube.

COMPLETION DATE: August 26, 2011
TOTAL DEPTH: 60'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 60'
BACKFILL: Cement-Bentonite Grout
LOGGER: T. Ferro

Fugro Consultants, Inc.

MS River Long Distance Sediment Pipeline

LOG OF BORING NO. B-41

Jefferson Parish, Louisiana

Project No. 04.55084005

PLATE 17b

FCBR_LOG (FINAL) 0 TO 1 04.55084005.GPJ FUGRO DATA TEMPLATE 042610.GDT 11/16/11

LOCATION: See Plate 1

COORDINATES: N 29° 36' 50.4"
W 90° 03' 34.5"

SURFACE EL.: -2.8'

DEPTH, FT	WATER LEVEL SYMBOL	SAMPLES	BLOWS PER FOOT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
			N=WOR	**PEAT (PT)**, very soft, black, with roots				748			
								215			
5				- with wood pieces below 4'				276	242	68	174
								177			
				- soft at 7'				319			
				- dark gray below 8'							
10								204			
						24	83	223	159	40	119
				- with sand pockets below 12'							
				LEAN CLAY (CL), very soft, dark gray, with sand pockets	13.0			33			
15								35			
				FAT CLAY (CH), very soft to soft, gray	16.0						
								98			
								77	66	23	43
20								72			
			N=Push					84			
25											
30						54		80			
								73			
35								91			
						57		75			
40					40.0						

CLASSIFICATION

SHEAR STRENGTH

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

KIPS PER SQ FT

0.2 0.4 0.6 0.8 1.0

NOTES:

1. Terms and symbols defined on Plates 20a and 20b.
2. Depth to mudline below water surface = 3.3'.
3. WOR = Weight of Rod.
4. Push = Sample recovered with splitspoon due to low recovery with shelby tube.

COMPLETION DATE: August 27, 2011
TOTAL DEPTH: 40'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 40'
BACKFILL: Cement-Bentonite Grout
LOGGER: T. Ferro

Fugro Consultants, Inc.

MS River Long Distance Sediment Pipeline

LOG OF BORING NO. B-42

Jefferson Parish, Louisiana

Project No. 04.55084005

PLATE 18

FCBR_LOG (FINAL) 0 TO 1 04.55084005.GPJ FUGRO DATA TEMPLATE 042610.GDT 11/16/11

LOCATION: See Plate 1

COORDINATES: N 29° 36' 32.9"
W 90° 03' 34.7"

SURFACE EL.: -2.6'

DEPTH, FT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
0	**PEAT (PT)**, very soft, dark gray and black, with organics and roots (N=Push)				379			
					518			
			25	63	236	203	55	148
5	**LEAN CLAY (CL)**, soft to firm, gray, with organics and wood	4.0			61			
					40			
		8.0						
10	**FAT CLAY (CH)**, soft to firm, gray, with organics and wood				106			
					64	88	36	52
					78			
					94			
15	- with shell fragments at 14'							
	ORGANIC CLAY (OH), very soft, gray, with wood	15.0			153			
					171			
20			31	73	156	200	52	148
	FAT CLAY (CH), very soft to soft, gray	20.0						
25	(N=Push)				67	62	22	40
30	(N=Push)				78			
35			55		77			
40					76			
					72			

SHEAR STRENGTH

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

KIPS PER SQ FT

0.2 0.4 0.6 0.8 1.0

NOTES:

1. Terms and symbols defined on Plates 20a and 20b.
2. Depth to mudline below water surface = 3.0'.
3. Push = Sample recovered with splitspoon due to low recovery with shelby tube.

COMPLETION DATE: August 28, 2011
TOTAL DEPTH: 60'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 60'
BACKFILL: Cement-Bentonite Grout
LOGGER: T. Ferro

Fugro Consultants, Inc.

MS River Long Distance Sediment Pipeline

LOG OF BORING NO. B-43

Jefferson Parish, Louisiana

Project No. 04.55084005

PLATE 19a

FCBR_LOG (FINAL) 0 TO 1 04.55084005.GPJ FUGRO DATA TEMPLATE 042610.GDT 11/16/11

LOCATION: See Plate 1

COORDINATES: N 29° 36' 32.9"
W 90° 03' 34.7"

SURFACE EL.: -2.6'

DEPTH, FT	WATER LEVEL SYMBOL	SAMPLES	BLOWS PER FOOT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	CLASSIFICATION: UNIT DRY WT, PCF	CLASSIFICATION: PASSING NO. 200 SIEVE, %	CLASSIFICATION: WATER CONTENT, %	CLASSIFICATION: LIQUID LIMIT	CLASSIFICATION: PLASTIC LIMIT	CLASSIFICATION: PLASTICITY INDEX (PI)	SHEAR STRENGTH
45				**FAT CLAY (CH)**, very soft to soft, gray		55		74				
50								61 61				
55				- with silt layers below 53'		58		73 72				
60					60.0			63 69				
65												
70												
75												
80												

SHEAR STRENGTH

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

KIPS PER SQ FT

0.2 0.4 0.6 0.8 1.0

NOTES:

1. Terms and symbols defined on Plates 20a and 20b.
2. Depth to mudline below water surface = 3.0'.
3. Push = Sample recovered with splitspoon due to low recovery with shelby tube.

COMPLETION DATE: August 28, 2011
TOTAL DEPTH: 60'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 60'
BACKFILL: Cement-Bentonite Grout
LOGGER: T. Ferro

Fugro Consultants, Inc.

MS River Long Distance Sediment Pipeline

LOG OF BORING NO. B-43

Jefferson Parish, Louisiana

Project No. 04.55084005

PLATE 19b

FCBR_LOG (FINAL) 0 TO 1 04.55084005.GPJ FUGRO DATA TEMPLATE 042610.GDT 11/16/11

SOIL TYPES

Fat clay, high plasticity

Lean clay, low to moderate plasticity

Silty Clay

Silty Sandy Clay

Elastic silt

Low to moderate plasticity silt

Sandy, non-plastic to low plasticity silt

High plasticity, organic soil

USCS Peat

Silty Sand

Clean sand, poorly graded

SAMPLER TYPES

Thin-walled Tube

Partial Recovery w/ Tube

Auger

Split-barrel

No Recovery

Pitcher

Piston

Geoprobe

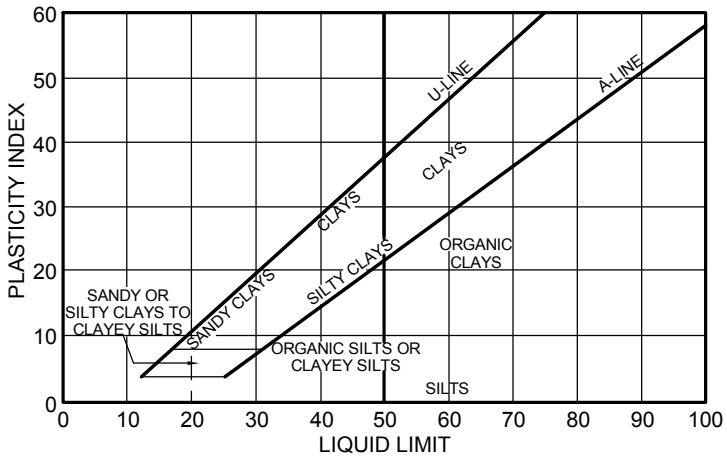
Liner

SOIL GRAIN SIZE

U.S. Standard Sieve

6"	3"	3/4"	4	10	40	200		
Boulders	Cobbles	Gravel		Sand			Silt	Clay
		Coarse	Fine	Coarse	Medium	Fine		
152	75.0	19.0	4.75	2.00	0.425	0.075	0.005	(mm)

PLASTICITY CHART



SOIL STRUCTURE

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

STANDARD PENETRATION TEST (SPT)

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

SPLIT-BARREL SAMPLER DRIVING RECORD

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

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

DENSITY OF GRANULAR SOILS

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

*Estimated from sampler driving record.

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

STRENGTH OF COHESIVE SOILS

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

SHEAR STRENGTH TEST METHOD

U = Unconfined Q = Unconsolidated - Undrained Triaxial

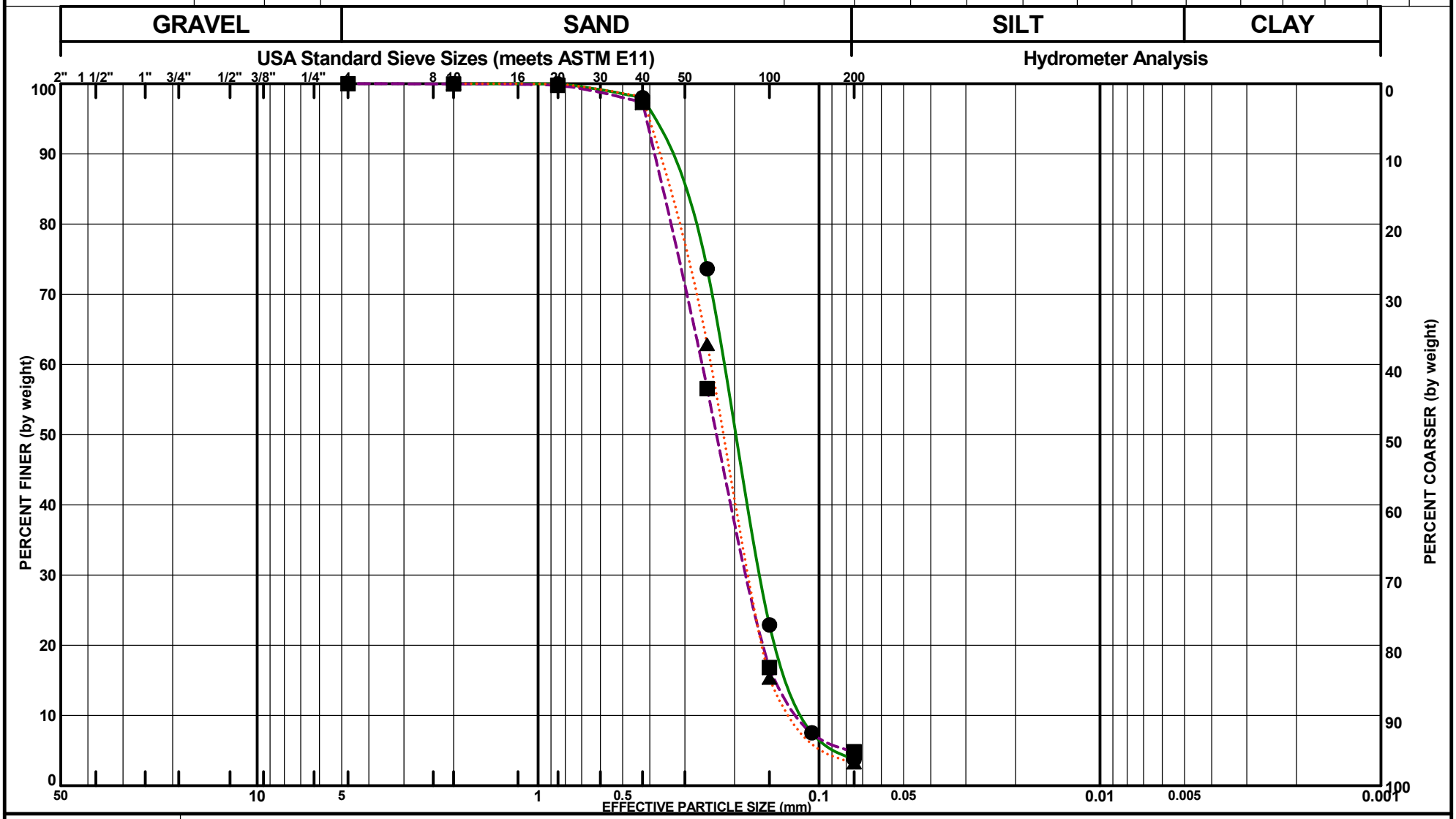
P = Pocket Penetrometer T = Torvane V = Miniature Vane F = Field Vane

HAND PENETROMETER CORRECTION

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

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

Boring Number	Sample Number	Depth (ft.)	Material Description	%Gravel	%Sand	%Silt	%Clay	D100	D60	D30	D10	Cc	Cu	LL	PL	PI
● B-3	1	1-2	POORLY GRADED SAND (SP), brown, fine-grained	0.0	96.2			2	0.218	0.161	0.112	1.06	1.94			
■ B-3	3	4.5-6	POORLY GRADED SAND (SP), gray, fine-grained	0.0	95.2			4.75	0.261	0.178	0.101	1.19	2.59			
▲ B-3	7A	12-14	POORLY GRADED SAND (SP), gray, fine-grained	0.0	96.7			2	0.242	0.176	0.11	1.15	2.19			



FCBR GSA LANDSCAPE 04.55084005.GPJ FUGRO DATA TEMPLATE 042610.GDT 11/16/11

Fugro Consultants, Inc

MS River Long Distance Sediment Pipeline

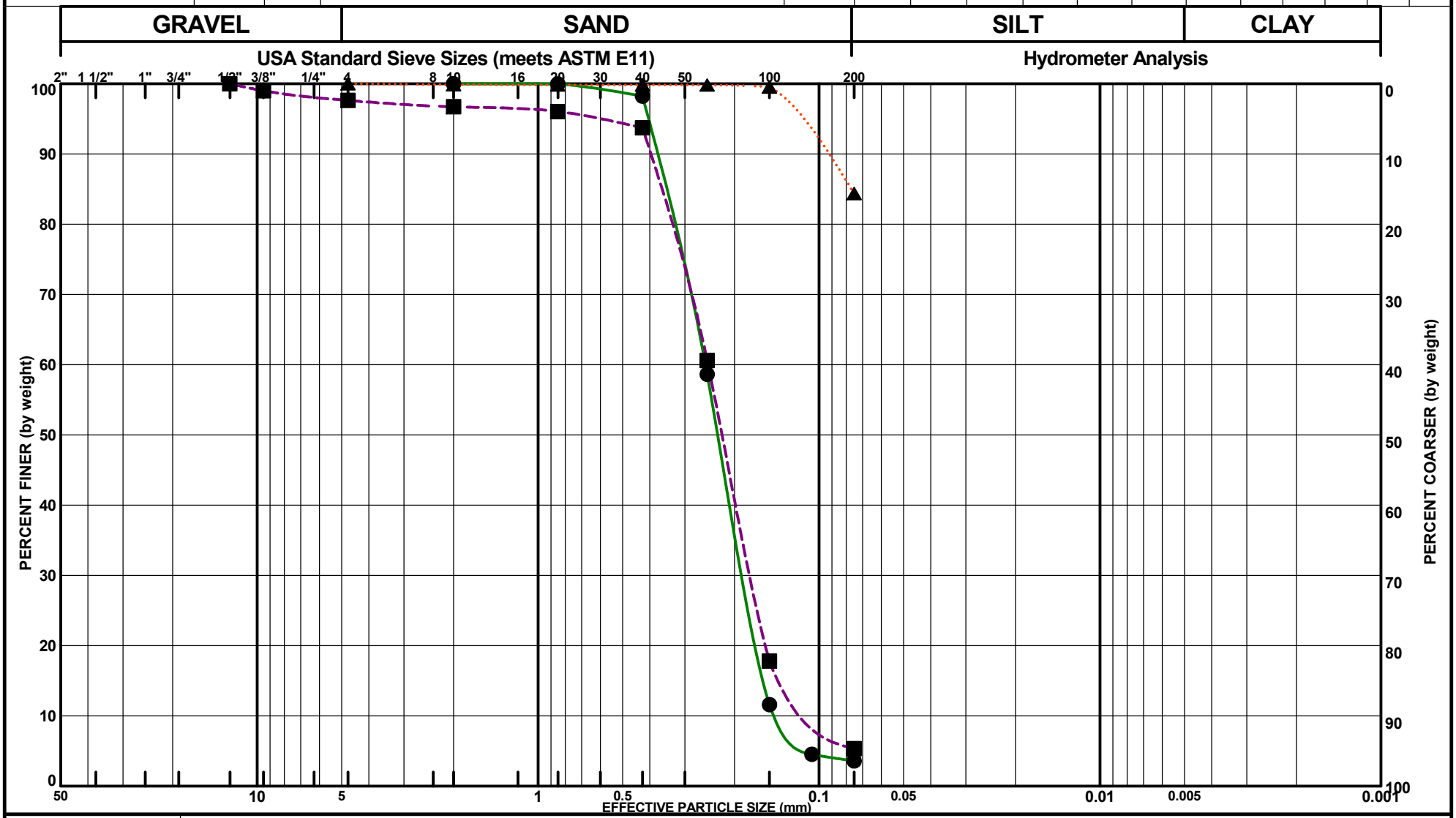
Jefferson Parish , Louisiana

PARTICLE-SIZE ANALYSIS

ASTM D422/D6913/C136

Tested By:	Date Tested:	Reviewed By:	Date Reviewed:	Project No.	
Eddie Lobell	9/1/2011	Jennifer Aguettant	9/23/2011	04.55084005	PLATE 21a

Boring Number	Sample Number	Depth (ft.)	Material Description	%Gravel	%Sand	%Silt	%Clay	D100	D60	D30	D10	Cc	Cu	LL	PL	PI
● B-5	1	0-1.5	POORLY GRADED SAND (SP), gray, fine-grained	0.0	96.4			2	0.255	0.183	0.139	0.95	1.84			
■ B-5	2	2.5-4	POORLY GRADED SAND WITH SILT (SP-SM), gray, fine-grained	2.4	92.3			12.5	0.248	0.174	0.097	1.25	2.55			
▲ B-5	13	33.5-35	LEAN CLAY WITH SAND (CL), gray	0.0	15.6			4.75								



FCBR GSA LANDSCAPE 04.55084005.GPJ FUGRO DATA TEMPLATE 042610.GDT 11/16/11

Fugro Consultants, Inc

MS River Long Distance Sediment Pipeline

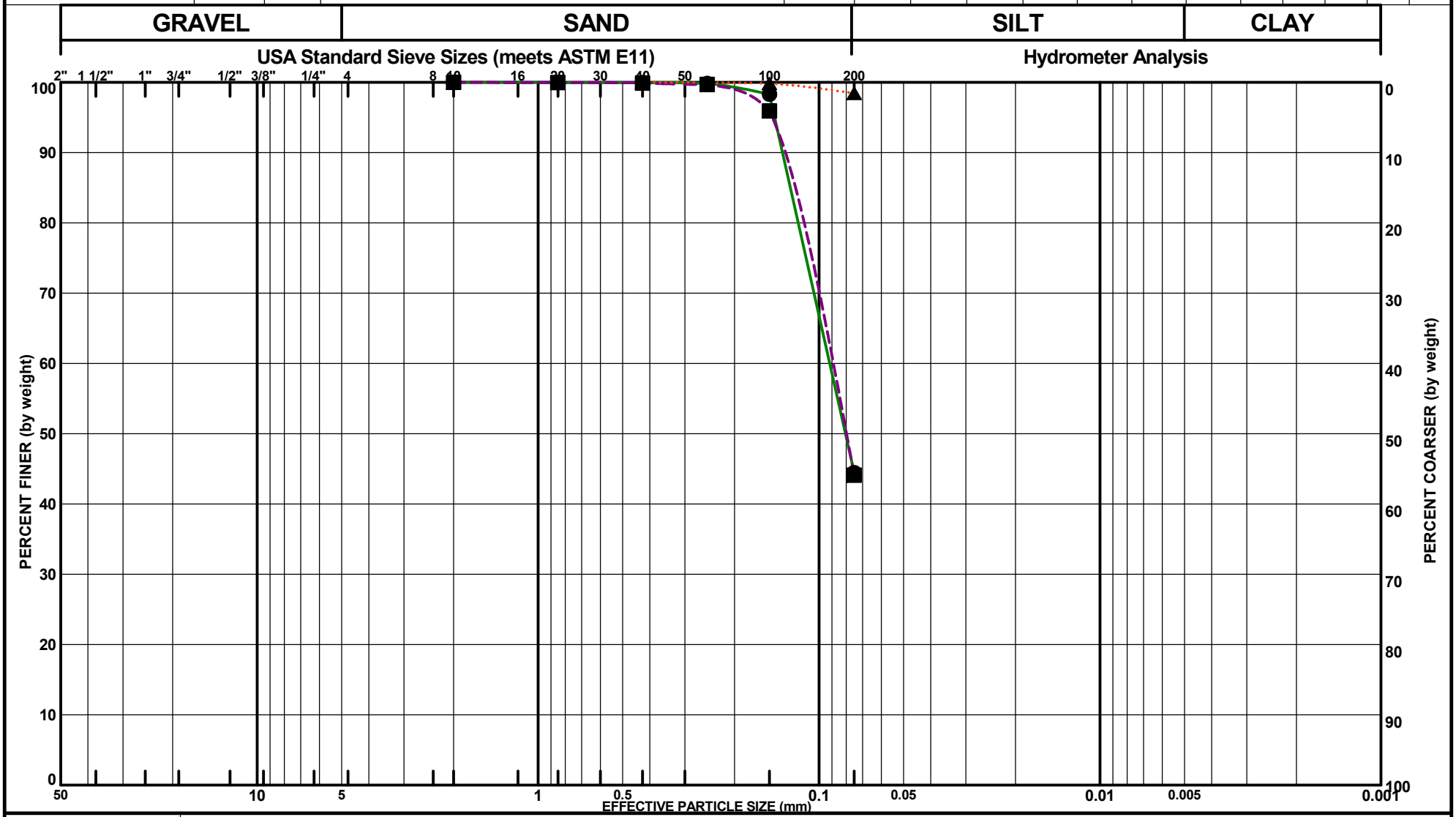
Jefferson Parish , Louisiana

PARTICLE-SIZE ANALYSIS

ASTM D422/D6913/C136

Tested By:	Date Tested:	Reviewed By:	Date Reviewed:	Project No.	PLATE 21b
	9/6/2011	Jennifer Aguettant	9/23/2011	04.55084005	

Boring Number	Sample Number	Depth (ft.)	Material Description	%Gravel	%Sand	%Silt	%Clay	D100	D60	D30	D10	Cc	Cu	LL	PL	PI
● B-9	12A	30-31.5	SILTY SAND (SM), gray	0.0	55.5			2	0.092							
■ B-9	14	38.5-40	SILTY SAND (SM), gray	0.0	55.9			2	0.093							
▲ B-17	13A	33-34	LEAN CLAY (CL), gray, with organics and roots	0.0	1.6			0.425								



FCBR GSA LANDSCAPE 04.55084005.GPJ FUGRO DATA TEMPLATE 042610.GDT 11/16/11

Fugro Consultants, Inc

MS River Long Distance Sediment Pipeline

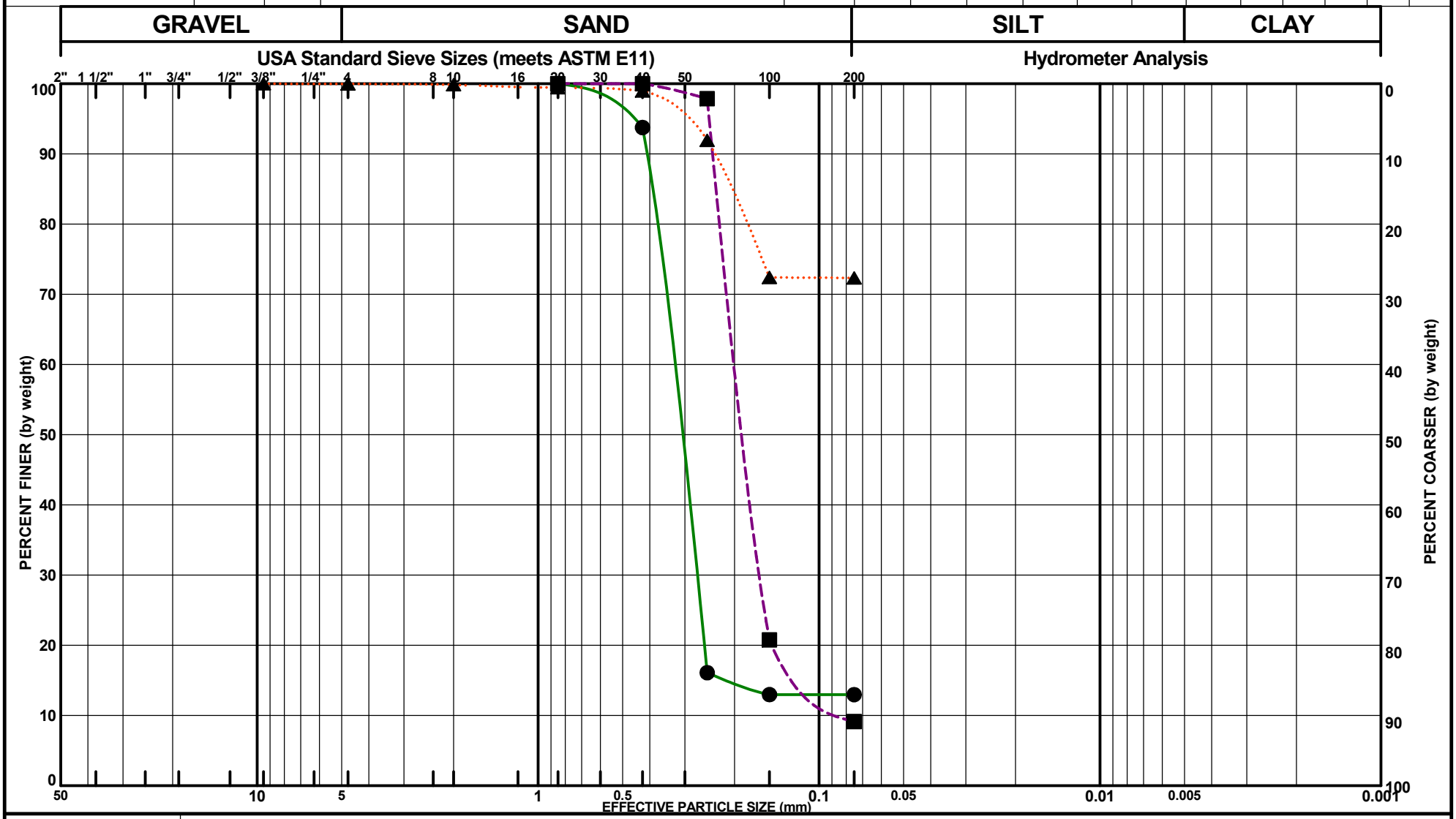
Jefferson Parish , Louisiana

PARTICLE-SIZE ANALYSIS

ASTM D422/D6913/C136

Tested By:	Date Tested:	Reviewed By:	Date Reviewed:	Project No.	
Eddie Lobell	9/1/2011	Jennifer Aguettant	9/23/2011	04.55084005	PLATE 21c

Boring Number	Sample Number	Depth (ft.)	Material Description	%Gravel	%Sand	%Silt	%Clay	D100	D60	D30	D10	Cc	Cu	LL	PL	PI
● B-19	12B	29-30	SILTY SAND (SM), gray, fine-grained	0.0	87.0			0.85	0.337	0.275						
■ B-19	14	38.5-40	POORLY GRADED SAND WITH CLAY (SP-SC), gray, fine-grained	0.0	90.9			0.85	0.195	0.159	0.079	1.66	2.47			
▲ B-26	7A	12-13	FAT CLAY (CH), gray, with sand pockets and organics	0.0	27.6			9.5						54	20	34



FCBR GSA LANDSCAPE 04.55084005.GPJ FUGRO DATA TEMPLATE 042610.GDT 11/16/11

Fugro Consultants, Inc

MS River Long Distance Sediment Pipeline

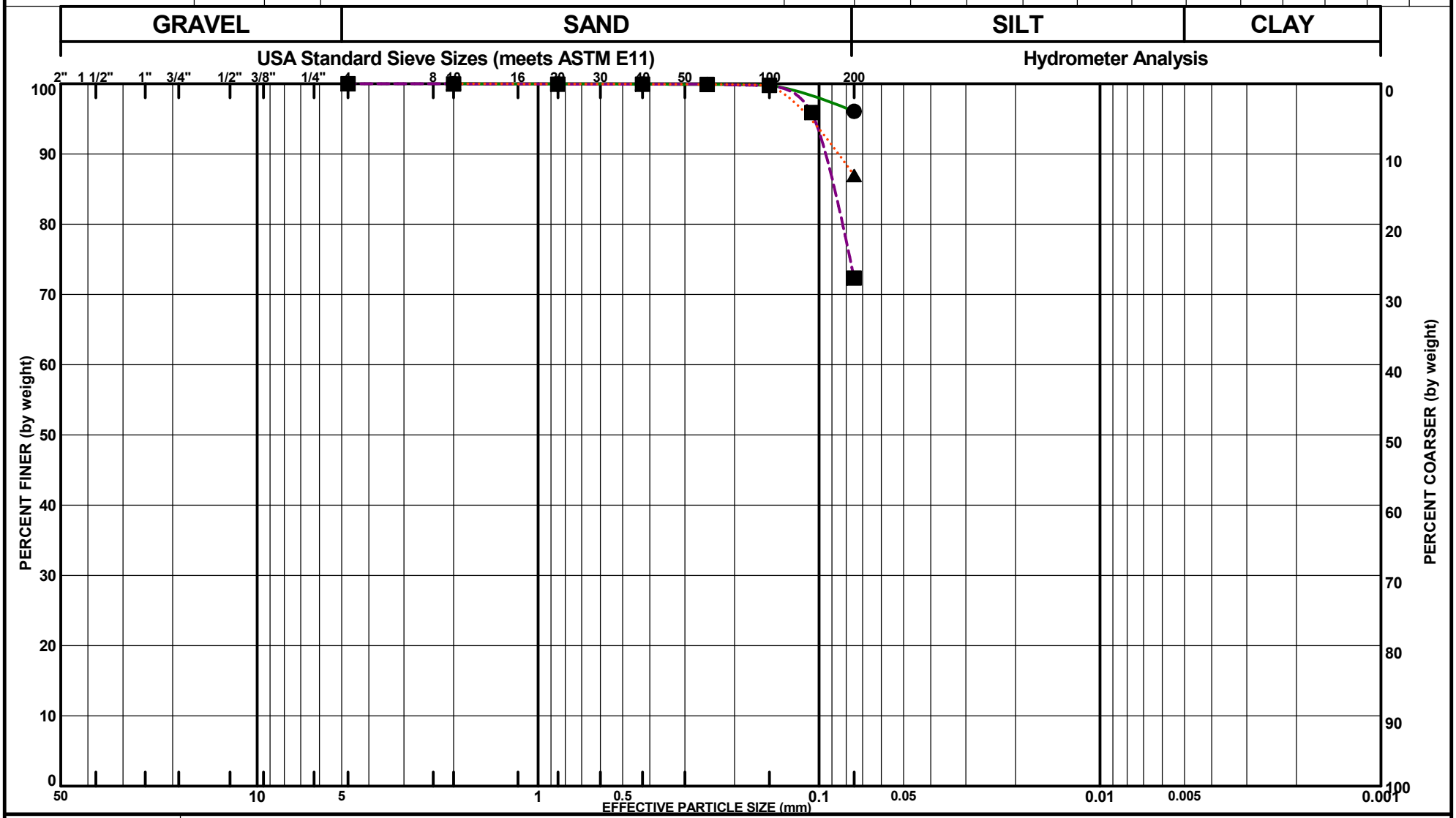
Jefferson Parish , Louisiana

PARTICLE-SIZE ANALYSIS

ASTM D422/D6913/C136

Tested By:	Date Tested:	Reviewed By:	Date Reviewed:	Project No.	PLATE 21d
Eddie Lobell	9/7/2011	Jennifer Aguettant	10/27/2011	04.55084005	

Boring Number	Sample Number	Depth (ft.)	Material Description	%Gravel	%Sand	%Silt	%Clay	D100	D60	D30	D10	Cc	Cu	LL	PL	PI
● B-26	14	38.5-40	SILTY CLAY (CL-ML), gray, with sand pockets	0.0	3.9			2								
■ B-26	15	43.5-45	SILTY CLAY WITH SAND (CL-ML), gray	0.0	27.7			4.75								
▲ B-28	10	18.5-20	LEAN CLAY (CL), gray, with sand seams	0.0	13.1			2								



FCBR GSA LANDSCAPE 04.55084005.GPJ FUGRO DATA TEMPLATE 042610.GDT 11/16/11

Fugro Consultants, Inc

MS River Long Distance Sediment Pipeline

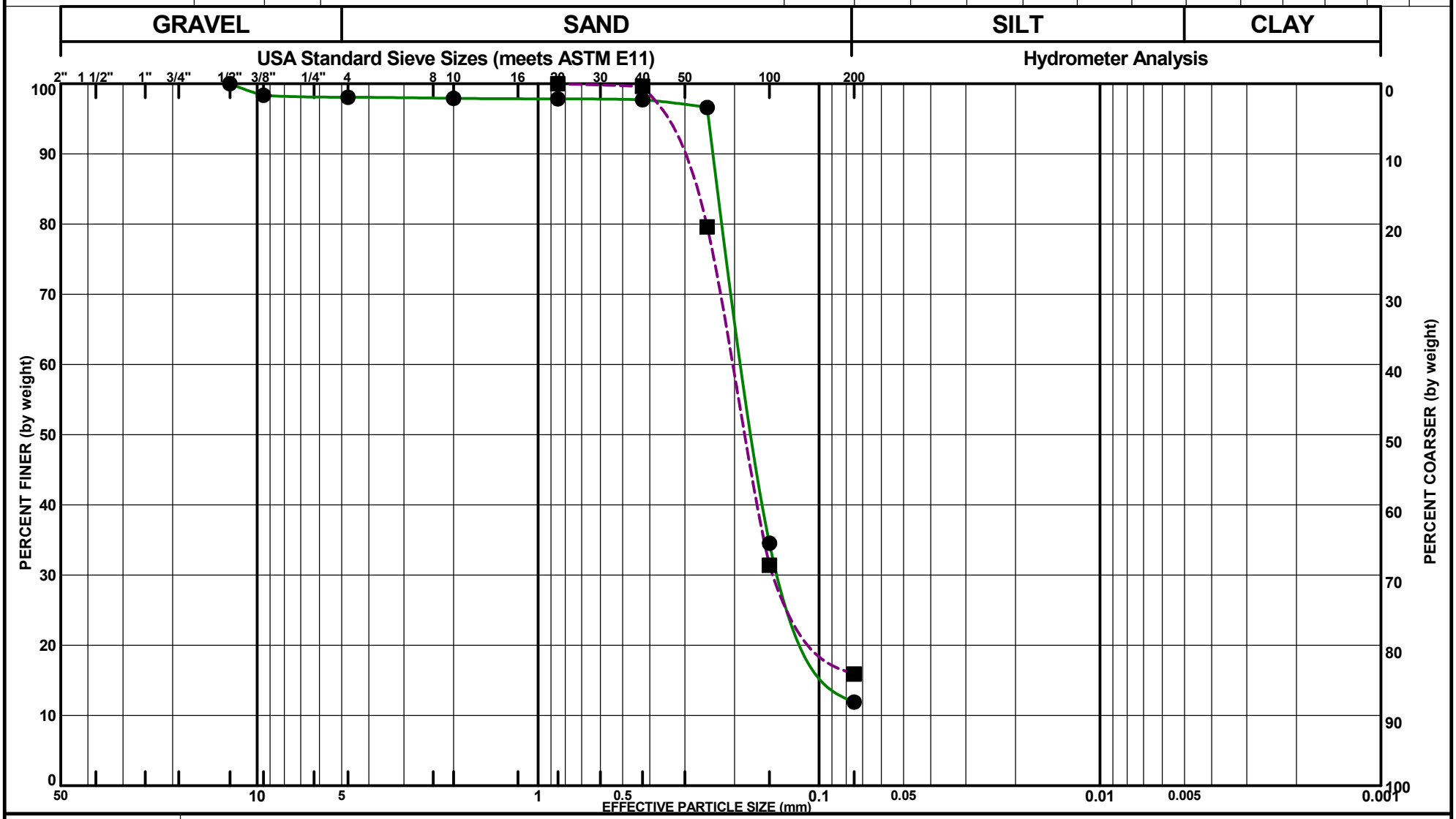
Jefferson Parish , Louisiana

PARTICLE-SIZE ANALYSIS

ASTM D422/D6913/C136

Tested By:	Date Tested:	Reviewed By:	Date Reviewed:	Project No.	
Eddie Lobell	9/1/2011	Jennifer Aguettant	9/23/2011	04.55084005	PLATE 21e

Boring Number	Sample Number	Depth (ft.)	Material Description	%Gravel	%Sand	%Silt	%Clay	D100	D60	D30	D10	Cc	Cu	LL	PL	PI
● B-28	13	33.5-35	SILTY SAND (SM), gray	1.9	86.1			12.5	0.185	0.131						
■ B-38	12B	29-30	SILTY SAND (SM), gray	0.0	84.1			0.85	0.203	0.141						
▲																



FCBR GSA LANDSCAPE 04.55084005.GPJ FUGRO DATA TEMPLATE 042610.GDT 11/16/11

Fugro Consultants, Inc

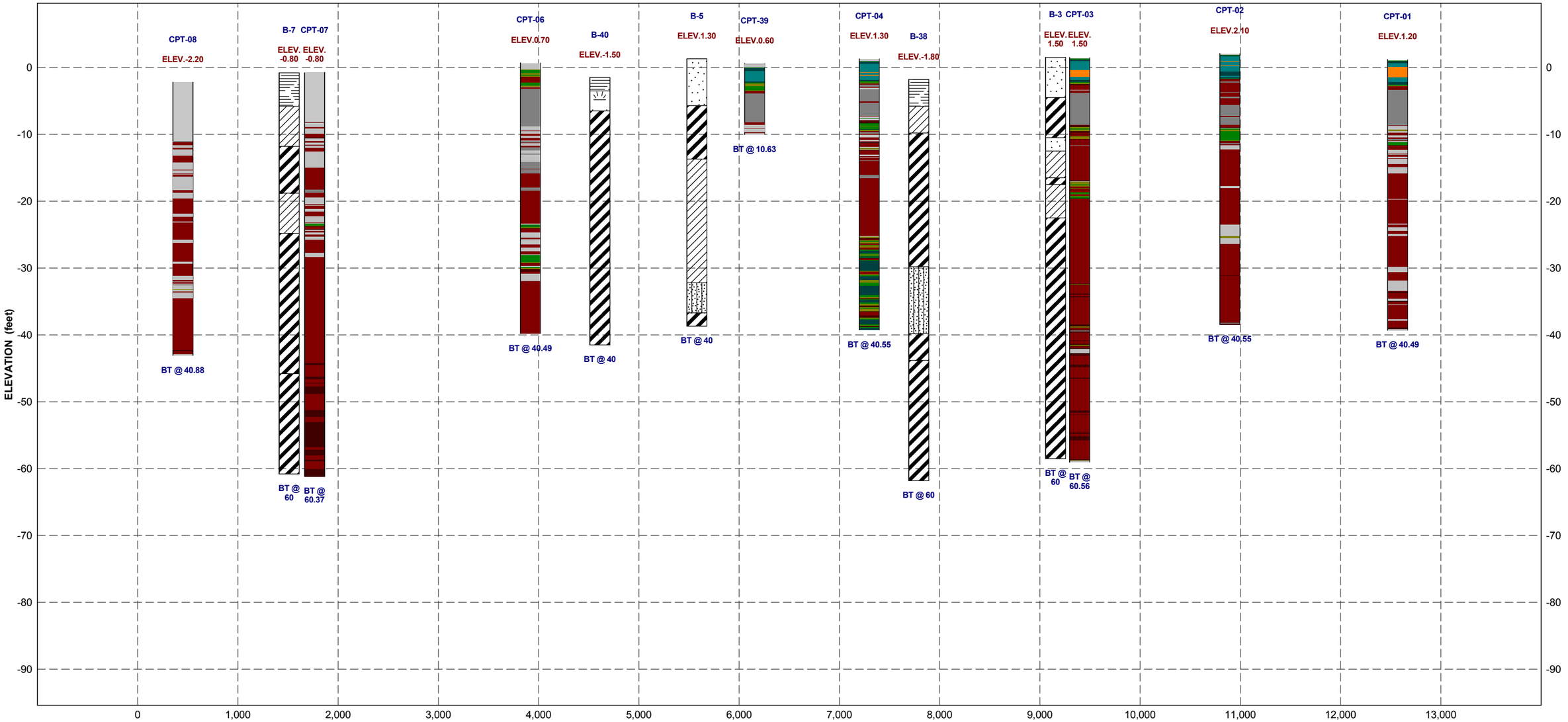
MS River Long Distance Sediment Pipeline

Jefferson Parish , Louisiana

PARTICLE-SIZE ANALYSIS

ASTM D422/D6913/C136

Tested By:	Date Tested:	Reviewed By:	Date Reviewed:	Project No.	PLATE
Eddie Lobell	9/7/2011	Jennifer Aguettant	10/27/2011	04.55084005	21f



CPT MATERIAL GRAPHICS

- sensitive fine grained
- organic material
- clay
- silty clay to clay
- clayey silt to silty clay
- sandy silt to clayey silt
- silty sand to sandy silt
- sand to silty sand
- sand
- gravelly sand to sand
- very stiff fine grained (*)
- sand to clayey sand (*)

Robertson et al (1986)

LITHOLOGY GRAPHICS

- Fat clay, high plasticity
- Lean clay, low to moderate plasticity
- Silty Clay
- Silty Sandy Clay
- Elastic silt
- Low to moderate plasticity silt
- Sandy, non-plastic to low plasticity silt
- High plasticity, organic soil
- USCS Peat
- Silty Sand
- Clean sand, poorly graded

BT = Depth of Boring Termination in feet

FUGRO

MS RIVER LONG DISTANCE SEDIMENT PIPELINE

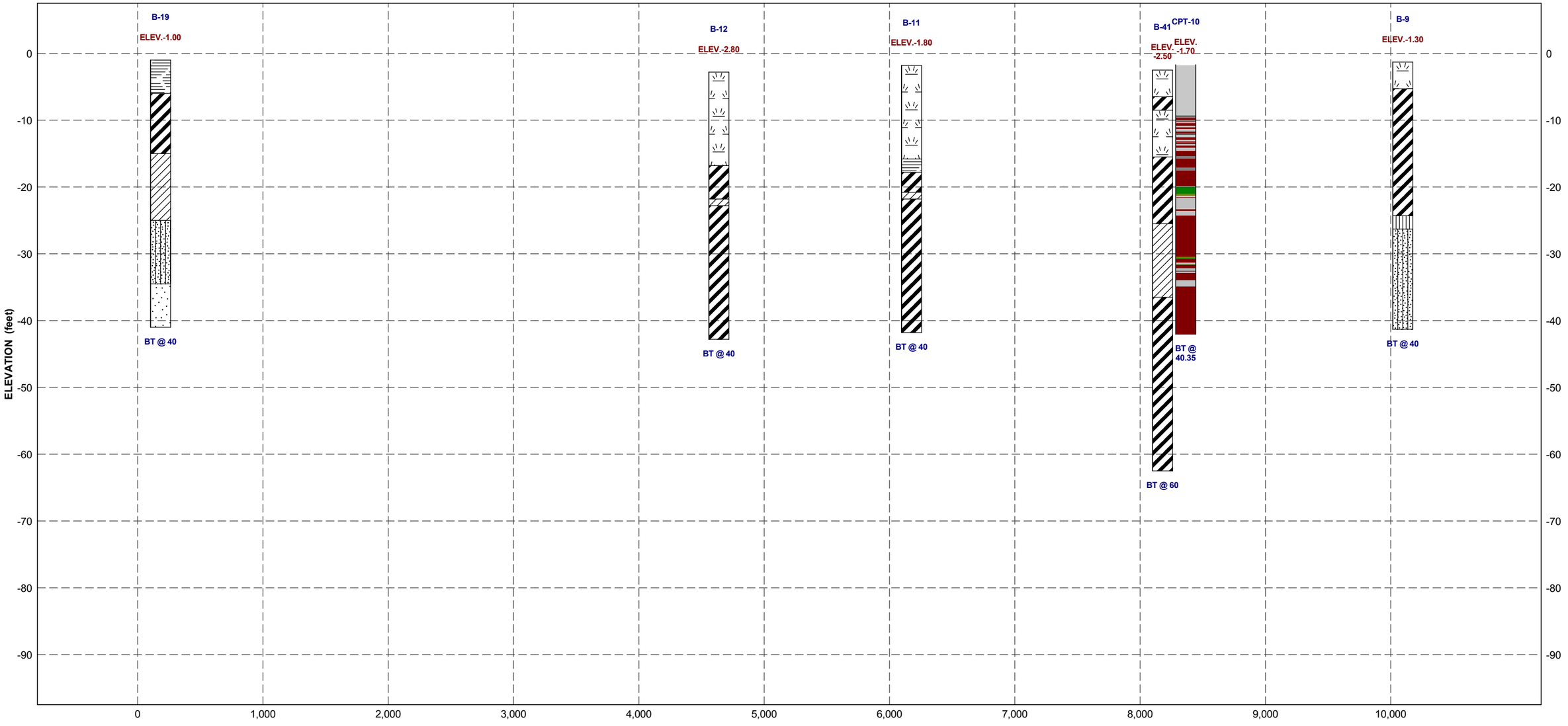
JEFFERSON PARISH, LOUISIANA

GENERALIZED SUBSURFACE PROFILE SOILS REACH 1 - CROSS-SECTION A-A

PROJECT NO. 04.55084005

SCALE	Drawn by:	Checked by:	Date:	
AS SHOWN	dms	JEA	11/16/2011	PLATE 22

FCBR CPT AND BOREHOLE DATA 11X17 04.55084005.GPJ FUGRO DATA TEMPLATE 042610.GDT 11/16/11



CPT MATERIAL GRAPHICS

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- clayey silt to silty clay
- sandy silt to clayey silt
- silty sand to sandy silt
- sand to silty sand
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- gravelly sand to sand
- very stiff fine grained (*)
- sand to clayey sand (*)

Robertson et al (1986)

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- Elastic silt
- Low to moderate plasticity silt
- Sandy, non-plastic to low plasticity silt
- High plasticity, organic soil
- USCS Peat
- Silty Sand
- Clean sand, poorly graded

BT = Depth of Boring Termination in feet

FUGRO

MS RIVER LONG DISTANCE SEDIMENT PIPELINE

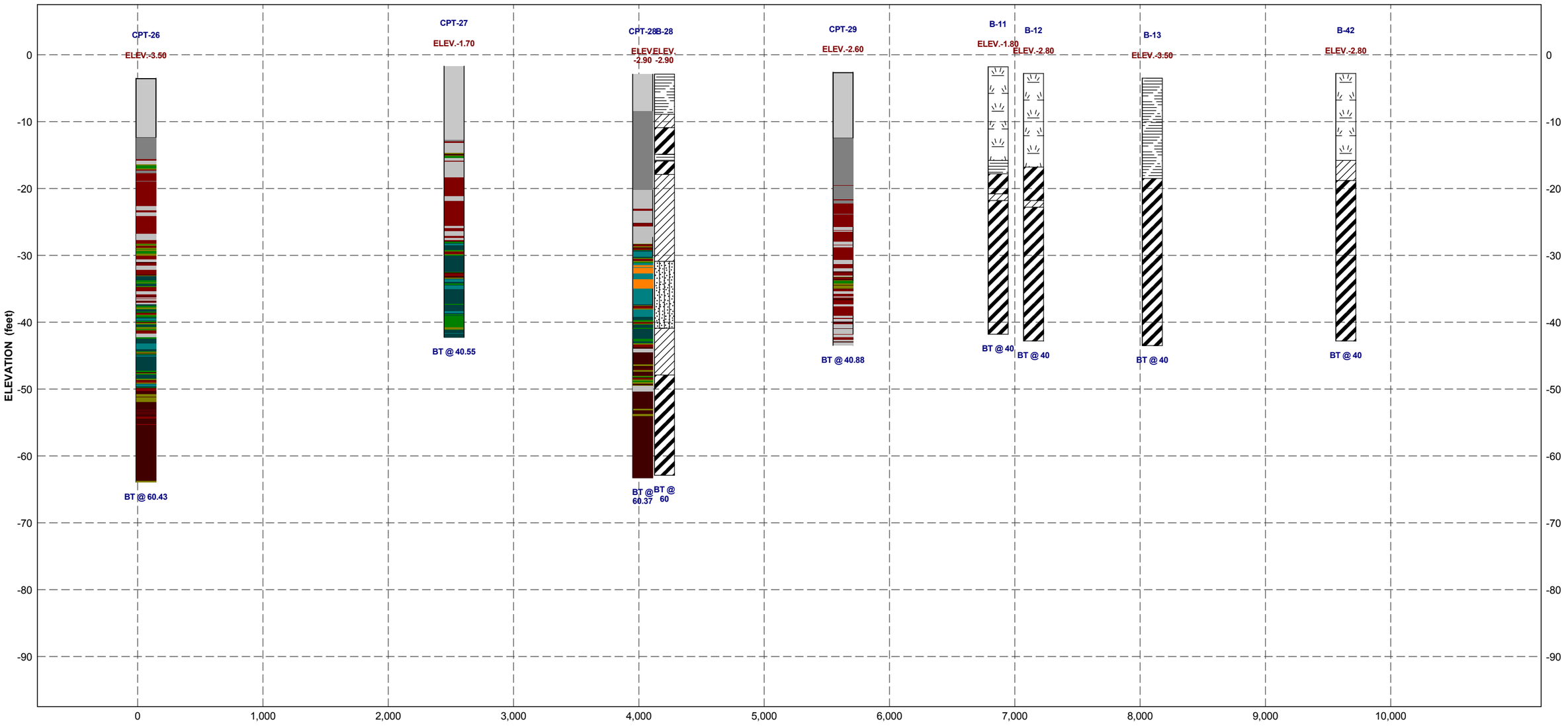
JEFFERSON PARISH, LOUISIANA

GENERALIZED SUBSURFACE PROFILE SOILS REACH 2, NORTH-SOUTH CROSS-SECTION B-B

PROJECT NO. 04.55084005

SCALE	Drawn by:	Checked by:	Date:	
AS SHOWN	dms	JEA	11/16/2011	PLATE 23

FCBR CPT AND BOREHOLE DATA 11X17 04.55084005.GPJ FUGRO DATA TEMPLATE 042610.GDT 11/16/11



CPT MATERIAL GRAPHICS

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- clay
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- clayey silt to silty clay
- sandy silt to clayey silt
- silty sand to sandy silt
- sand to silty sand
- sand
- gravelly sand to sand
- very stiff fine grained (*)
- sand to clayey sand (*)

Robertson et al (1986)

LITHOLOGY GRAPHICS

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- Elastic silt
- Low to moderate plasticity silt
- Sandy, non-plastic to low plasticity silt
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- USCS Peat
- Silty Sand
- Clean sand, poorly graded

BT = Depth of Boring Termination in feet

FUGRO

MS RIVER LONG DISTANCE SEDIMENT PIPELINE

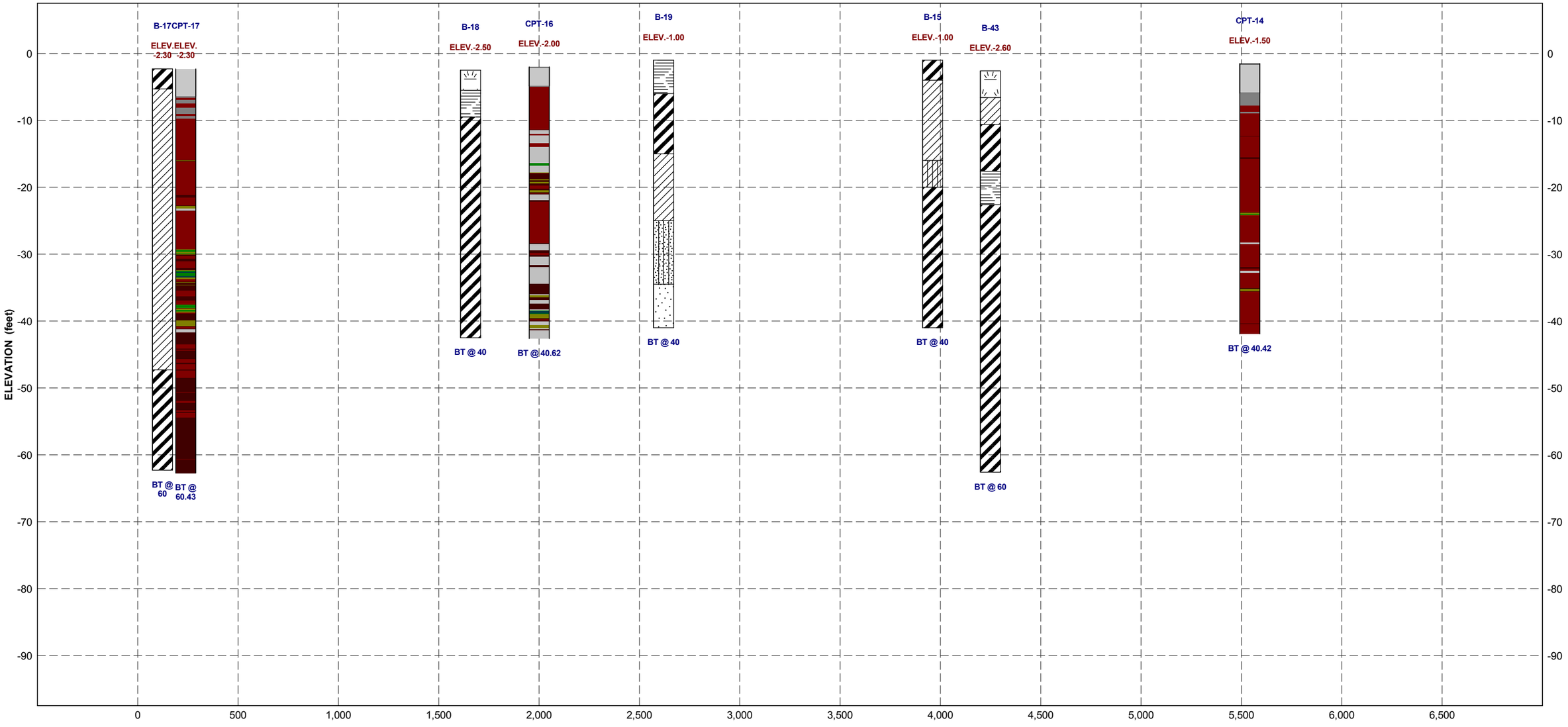
JEFFERSON PARISH, LOUISIANA

GENERALIZED SUBSURFACE PROFILE
SOILS REACH 2, EAST-WEST
CROSS-SECTION C-C

PROJECT NO. 04.55084005

SCALE	Drawn by:	Checked by:	Date:	
AS SHOWN	dms	JEA	11/16/2011	PLATE 24

FCBR CPT AND BOREHOLE DATA 11X17 04.55084005.GPJ FUGRO DATA TEMPLATE 042610.GDT 11/16/11



CPT MATERIAL GRAPHICS

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- silty clay to clay
- clayey silt to silty clay
- sandy silt to clayey silt
- silty sand to sandy silt
- sand to silty sand
- sand
- gravelly sand to sand
- very stiff fine grained (*)
- sand to clayey sand (*)

Robertson et al (1986)

LITHOLOGY GRAPHICS

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- Elastic silt
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- Sandy, non-plastic to low plasticity silt
- High plasticity, organic soil
- USCS Peat
- Silty Sand
- Clean sand, poorly graded

BT = Depth of Boring Termination in feet

FUGRO

MS RIVER LONG DISTANCE SEDIMENT PIPELINE

JEFFERSON PARISH, LOUISIANA

GENERALIZED SUBSURFACE PROFILE SOILS REACH 3 - CROSS-SECTION D-D

PROJECT NO. 04.55084005

SCALE	Drawn by:	Checked by:	Date:	
AS SHOWN	dms	JEA	11/16/2011	PLATE 25

FCBR CPT AND BOREHOLE DATA 11X17 04.55084005.GPJ FUGRO DATA TEMPLATE 042610.GDT 11/16/11

ER TRAVERSE BAYOU

SP-1

SP-4

SP-2

SP-3

SP-1(INC2)

CONSTRUCTED
MARSH RESTORATION
PROJECT (BA-39)

LEGEND

- PROPOSED MARSH & RIDGE CREATION AREA
- MARSH CREATION
- PARISH BOUNDARY
- PIPELINE
- OVERHEAD UTILITY LINE
- WATER LINE

LEGEND:

- SETTLEMENT PLATES

1000' 500' 0' 1000' 2000'

GRAPHIC SCALE

REFERENCE:
Site Plan provided by Moffatt & Nichol.

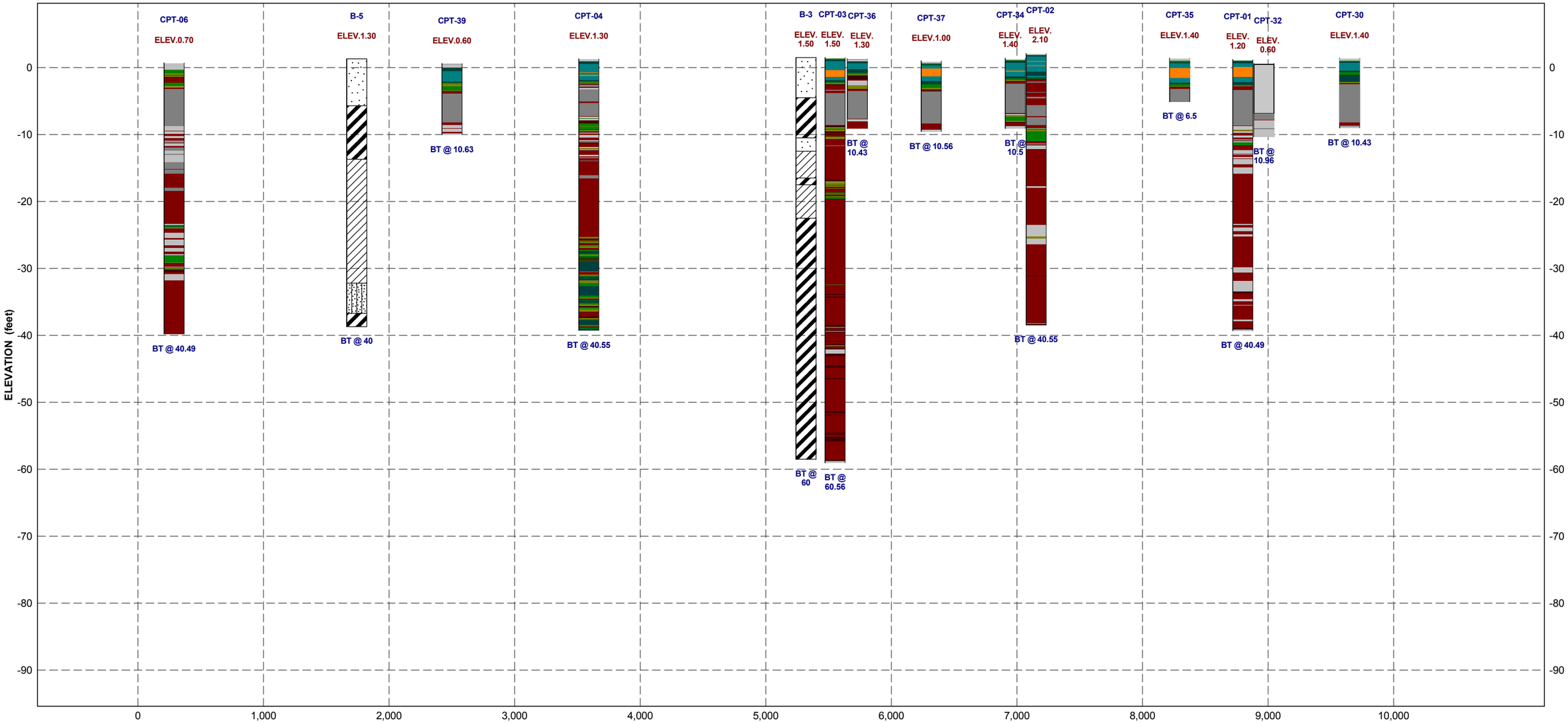
November 16, 2011 04.55084005 Settlement Plate Layout.dwg

FUGRO

MS RIVER LONG DISTANCE
SEDIMENT PIPELINE
JEFFERSON PARISH, LOUISIANA

LOCATIONS OF BA-39 SETTLEMENT PLATES

SIZE	PROJECT NO.		REV.
B	04.55084005		0
SCALE: AS SHOWN	DRAWN BY: DMS	CHKD BY: JEA	DATE: 11/16/11	Plate No.: 26



CPT MATERIAL GRAPHICS

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- clayey silt to silty clay
- sandy silt to clayey silt
- silty sand to sandy silt
- sand to silty sand
- sand
- gravelly sand to sand
- very stiff fine grained (*)
- sand to clayey sand (*)

Robertson et al (1986)

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- Elastic silt
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- Sandy, non-plastic to low plasticity silt
- High plasticity, organic soil
- USCS Peat
- Silty Sand
- Clean sand, poorly graded

BT = Depth of Boring Termination in feet

FUGRO

MS RIVER LONG DISTANCE SEDIMENT PIPELINE

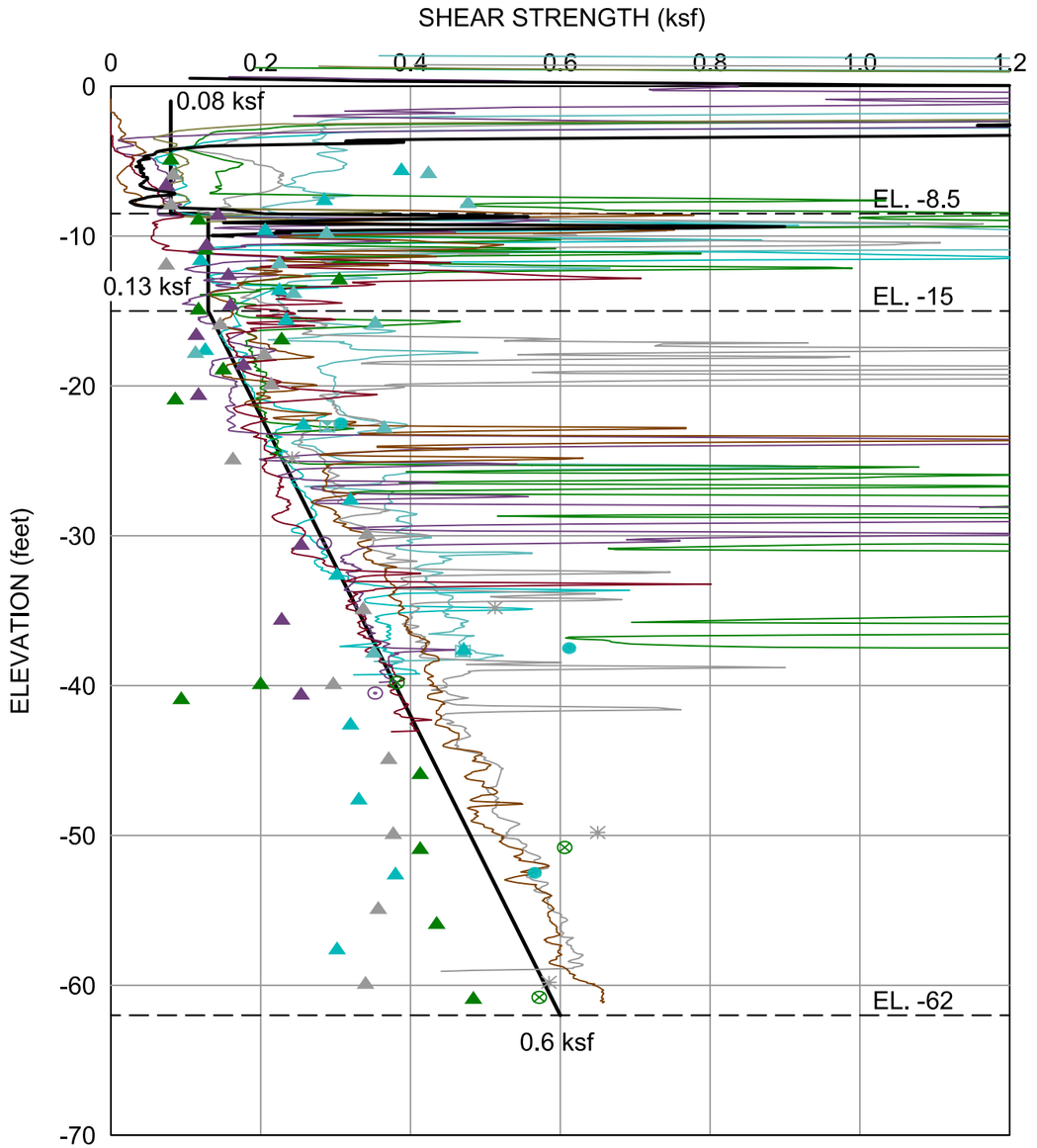
JEFFERSON PARISH, LOUISIANA

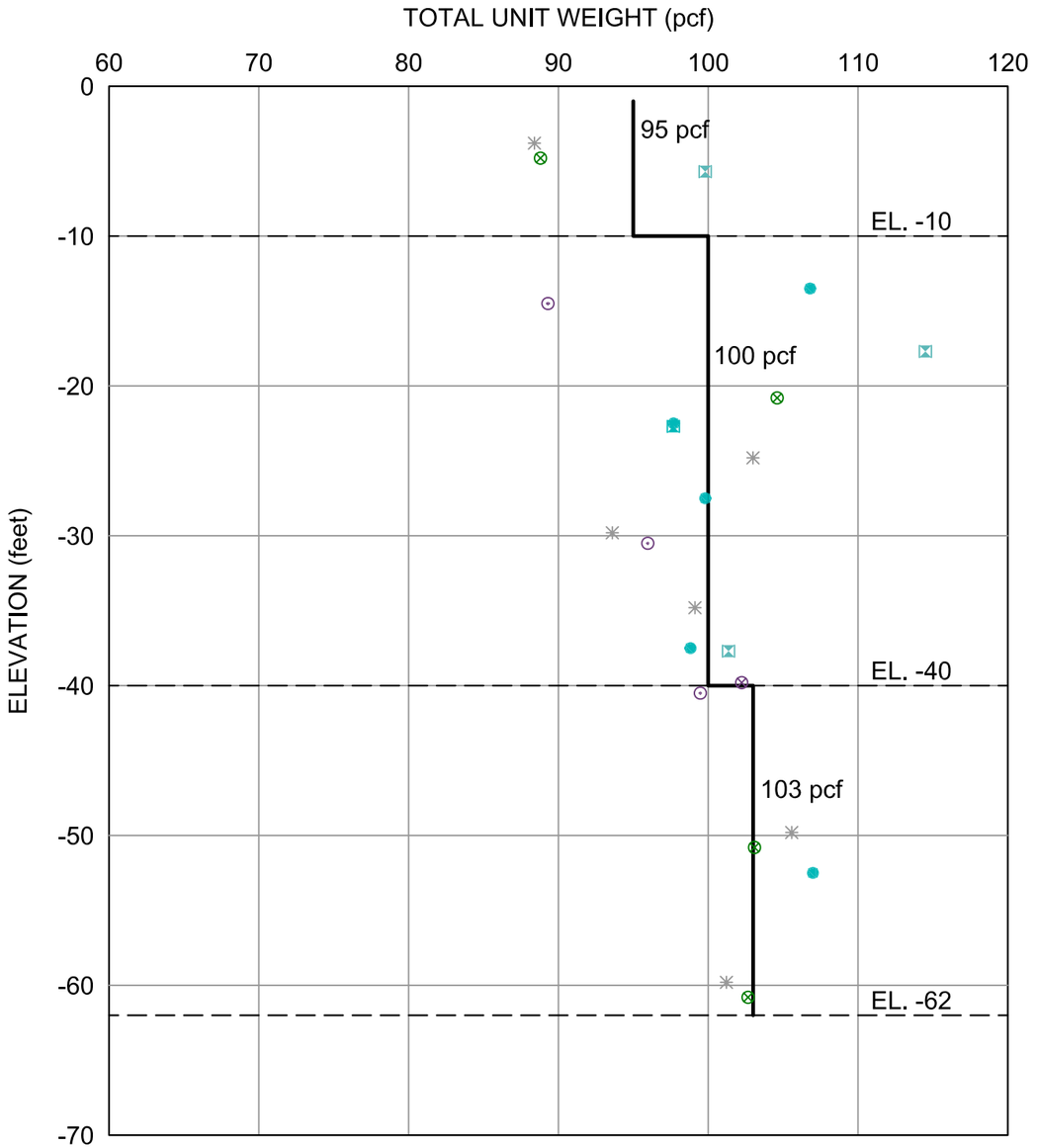
GENERALIZED SUBSURFACE PROFILE
BA-39 - CROSS-SECTION E-E

PROJECT NO. 04.55084005

SCALE	Drawn by:	Checked by:	Date:	
AS SHOWN	dms	JEA	11/16/2011	PLATE 27

FCBR CPT AND BOREHOLE DATA 11X17 04.55084005.GPJ FUGRO DATA TEMPLATE 042610.GDT 11/16/11





LEGEND

- DESIGN PROFILE
- CPT-01
- CPT-02
- CPT-03
- CP-04
- CPT-06
- CPT-07
- CPT-08
- CPT-30
- CPT-39

Borings

- B-3
- B-5
- B-7
- B-38
- B-40

Minivanes

- B-3
- B-5
- B-7
- B-38
- B-40

FUGRO

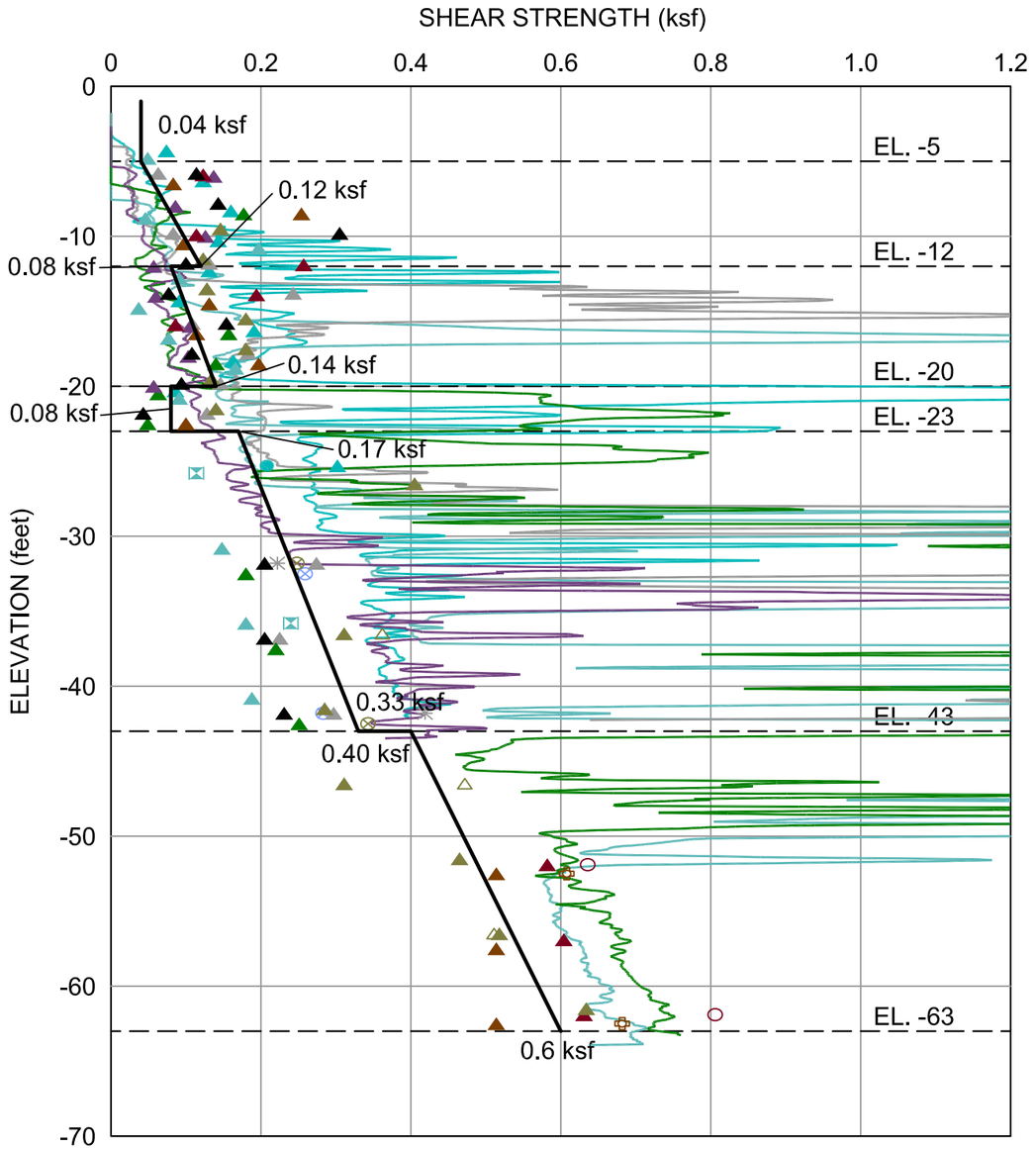
MS RIVER LONG DISTANCE SEDIMENT PIPELINE
JEFFERSON PARISH, LOUISIANA

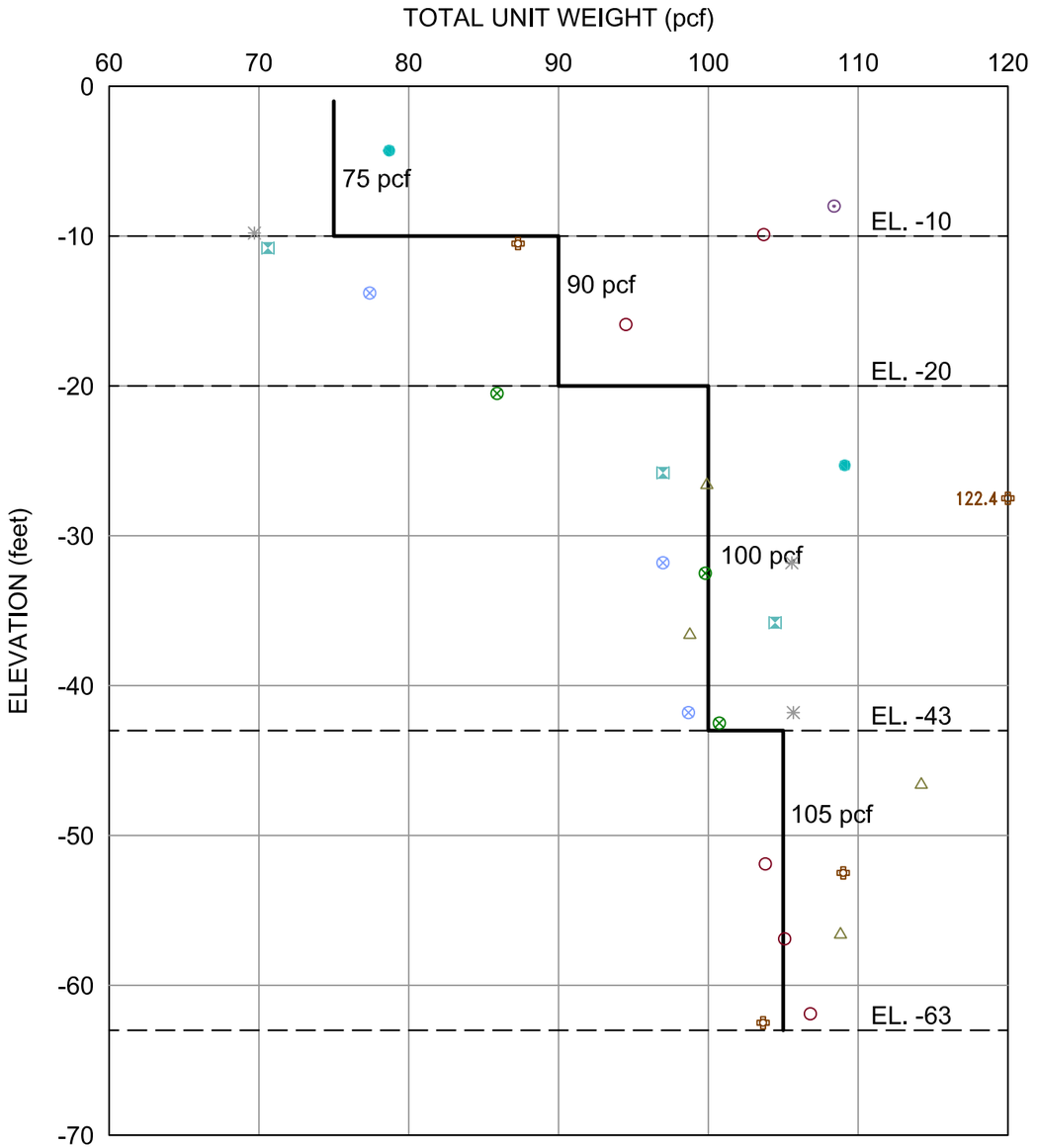
DESIGN STRENGTH AND UNIT WEIGHT PARAMETERS - SOILS REACH 1

SIZE	PROJECT NO.		REV.
B	04.55084005		0

SCALE:	DRAWN BY:	CHKD BY:	DATE:	Plate No.:
AS SHOWN	DMS	JEA	11/26/11	28

November 26, 2011 04.55084005 Soils Reach 1 Strength & Unit Wt.dwg





LEGEND

- DESIGN PROFILE
- CPT-10
- CPT-26
- CPT-27
- CPT-28
- CPT-29

Borings	Minivanes
B-9	B-9
B-11	B-11
B-12	B-12
B-13	B-13
B-19	B-19
B-26	B-26
B-28	B-28
B-41	B-41
B-42	B-42

FUGRO

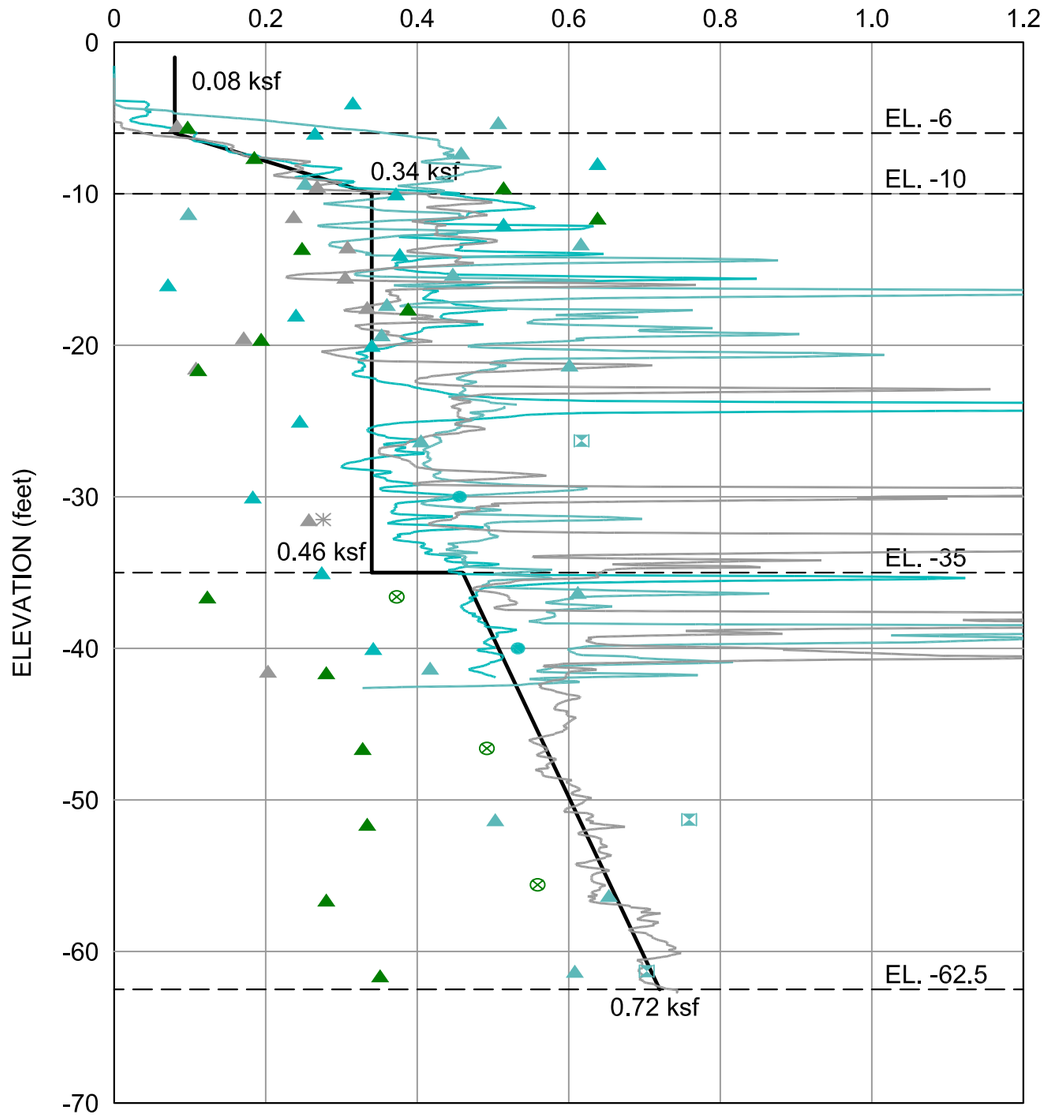
MS RIVER LONG DISTANCE SEDIMENT PIPELINE
JEFFERSON PARISH, LOUISIANA

DESIGN STRENGTH AND UNIT WEIGHT PARAMETERS - SOILS REACH 2

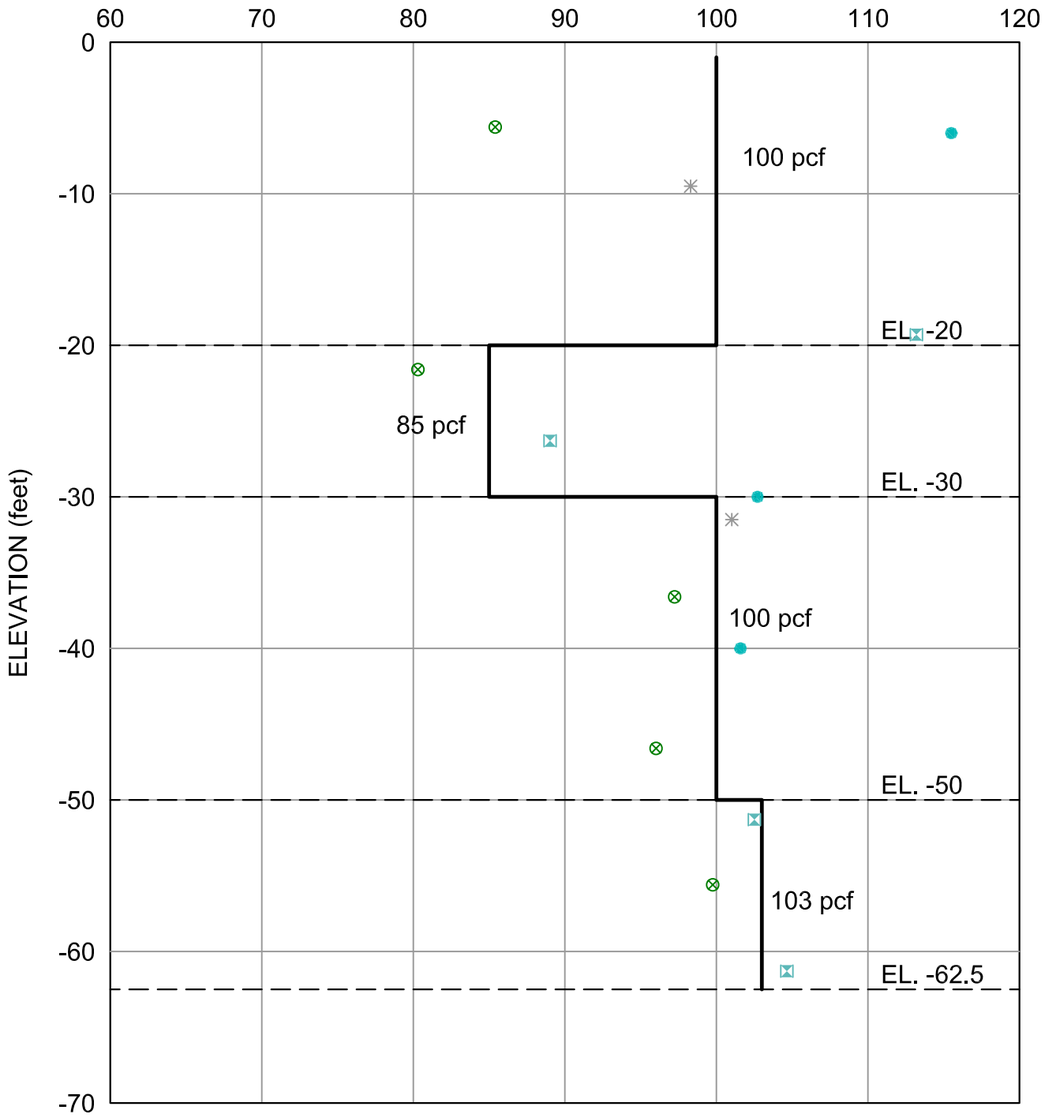
SIZE	PROJECT NO.		REV.
B	04.55084005		0
SCALE: AS SHOWN	DRAWN BY: DMS	CHKD BY: JEA	DATE: 11/26/11	Plate No.: 29

November 26, 2011 04.55084005 Soils Reach 2 Strength & Unit Wt.dwg

SHEAR STRENGTH (ksf)



TOTAL UNIT WEIGHT (pcf)



LEGEND

DESIGN PROFILE
CPT-14
CPT-16
CPT-17

Borings
B-15
B-17
B-18
B-43

Minivanes
B-15
B-17
B-18
B-43

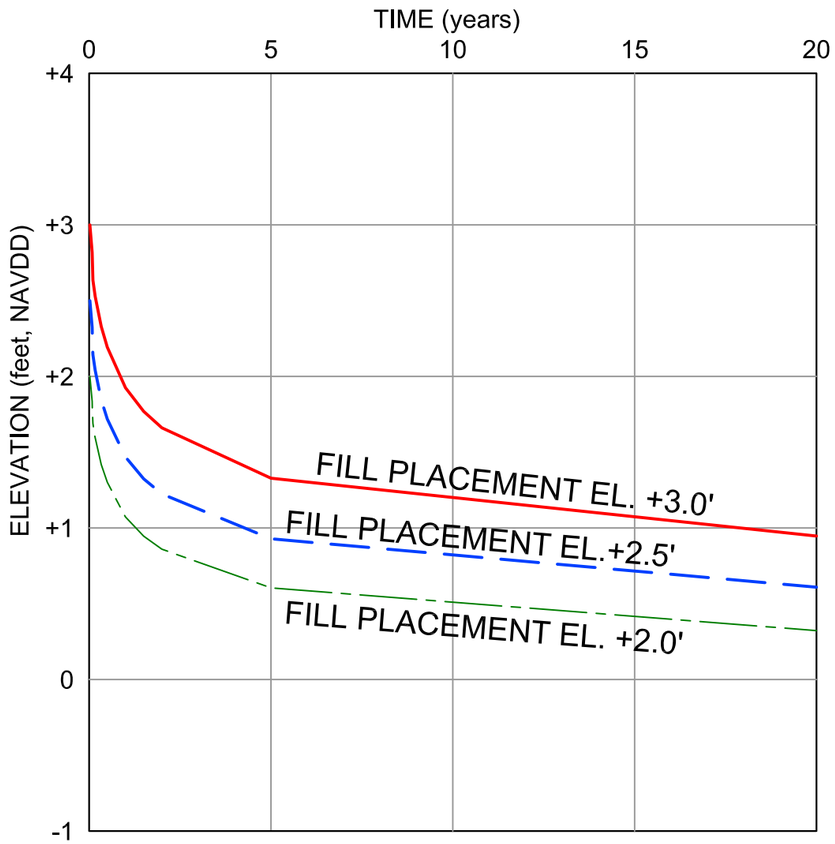
FUGRO

MS RIVER LONG DISTANCE SEDIMENT PIPELINE
JEFFERSON PARISH, LOUISIANA

DESIGN STRENGTH AND UNIT WEIGHT PARAMETERS - SOILS REACH 3

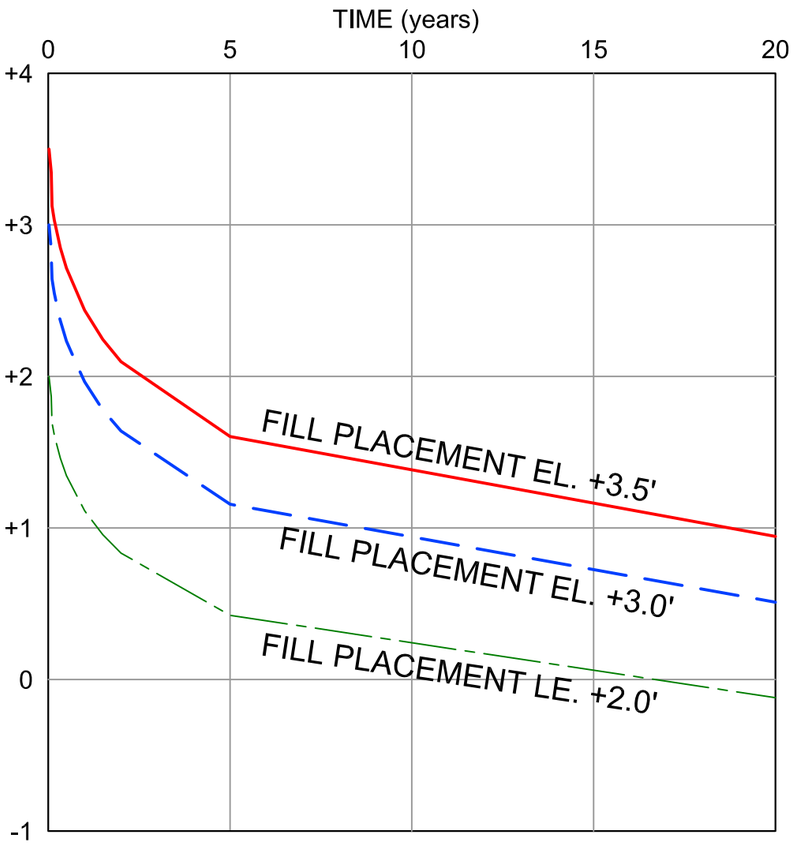
SIZE	PROJECT NO.		REV.
B	04.55084005		0
SCALE: AS SHOWN	DRAWN BY: DMS	CHKD BY: JEA	DATE: 11/26/11	Plate No.: 30

November 26, 2011 04.55084005 Soils Reach 3 Strength & Unit Wt.dwg



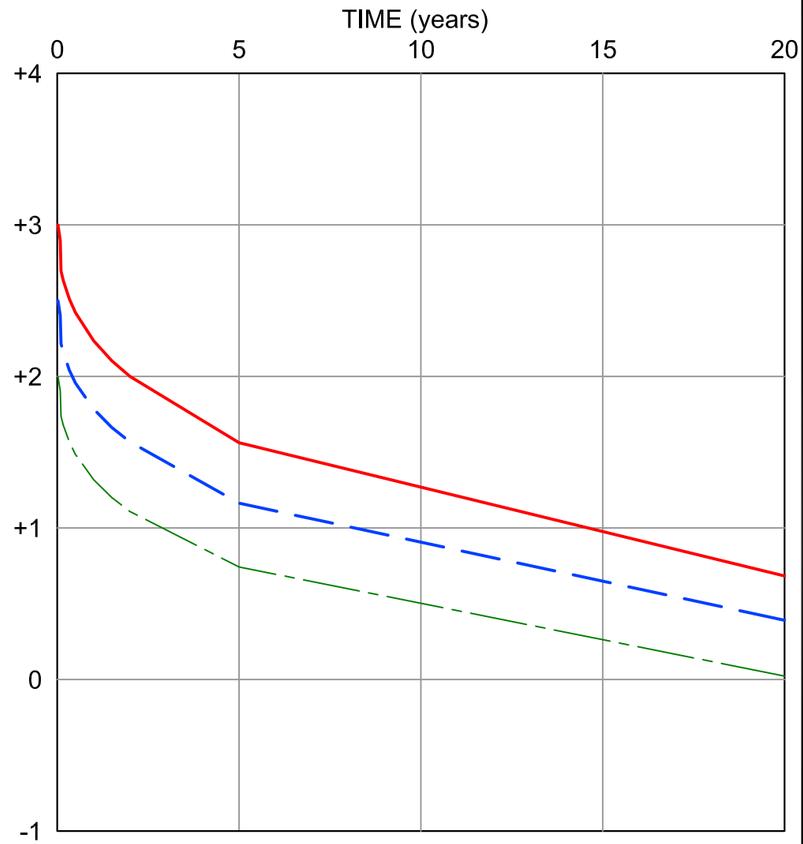
SOILS REACH 1 - MUDLINE EL. -1.0'

Time (months)	Description of Activity	Top of Fill Elevation (feet)		
		EL. +3.0	EL. +2.5	EL. +2.0
0.25	End of Fill Placement	3.00	2.50	2.00
1.25	Process Survey	2.64	2.14	1.69
60	5 yr Post Const.	1.33	0.93	0.60
240	20 yr Post Const.	0.95	0.61	0.32



SOILS REACH 2 - MUDLINE AT EL. -2.0'

Time (months)	Description of Activity	Top of Fill Elevation (feet)		
		EL. +3.5	EL. +3.0	EL. +2.0
0.25	End of Fill Placement	3.50	3.00	2.00
1.25	Process Survey	3.12	2.64	1.70
60	5 yr Post Const.	1.60	1.16	0.42
240	20 yr Post Const.	0.94	0.51	-0.12



SOILS REACH 3 - MUDLINE AT EL. -2.5'

Time (months)	Description of Activity	Top of Fill Elevation (feet)		
		EL. +3.0	EL. +2.5	EL. +2.0
0.25	End of Fill Placement	3.00	2.50	2.00
1.25	Process Survey	2.70	2.22	1.74
60	5 yr Post Const.	1.56	1.16	0.74
240	20 yr Post Const.	0.68	0.39	0.02

FUGRO

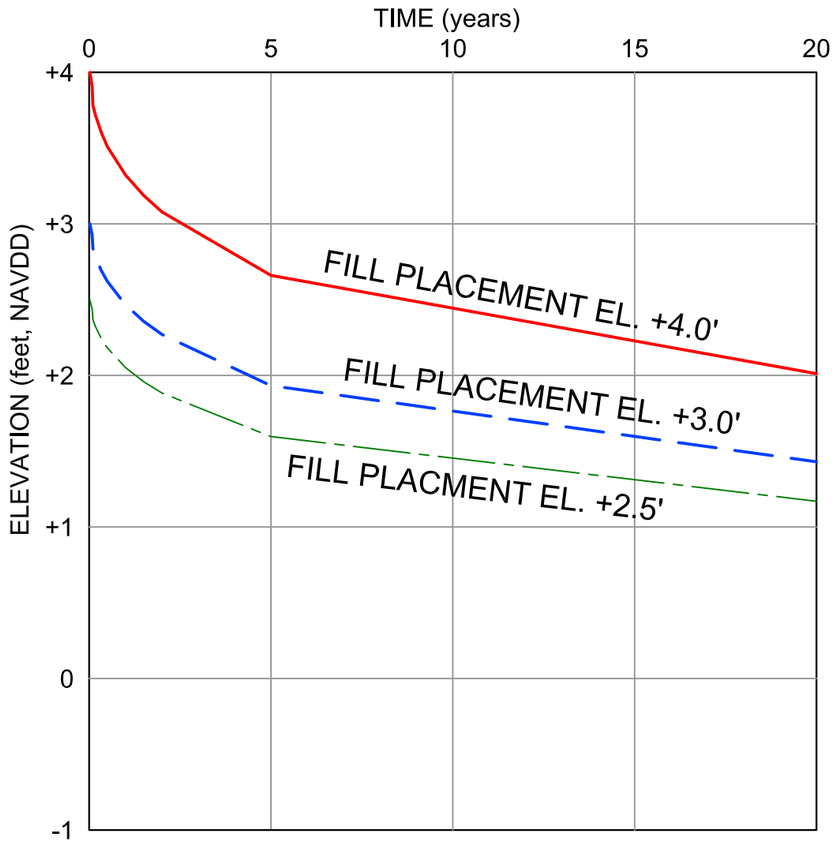
MS RIVER LONG DISTANCE SEDIMENT PIPELINE
JEFFERSON PARISH, LOUISIANA

TIME RATE OF SETTLEMENT - PIPELINE CORRIDOR - LOWER BOUND INTERFACE

SIZE	PROJECT NO.		REV.
B	04.55084005		0

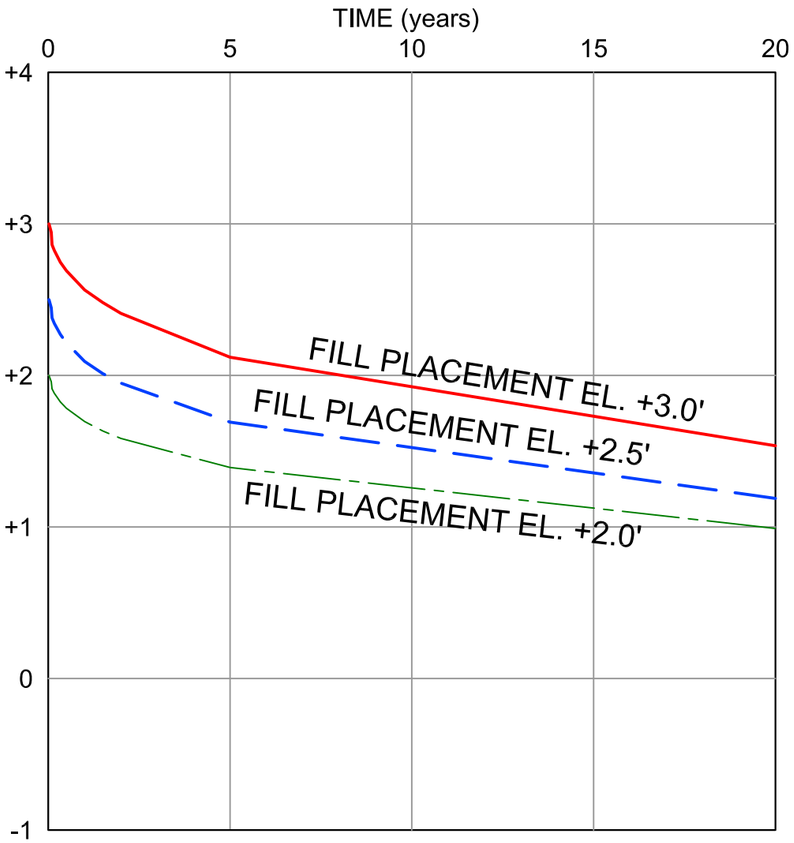
SCALE:	DRAWN BY:	CHKD BY:	DATE:	Plate No.:
AS SHOWN	DMS	JEA	11/26/11	31

November 26, 2011 04.55084005 Settlement Pipeline Corridor Lower.dwg



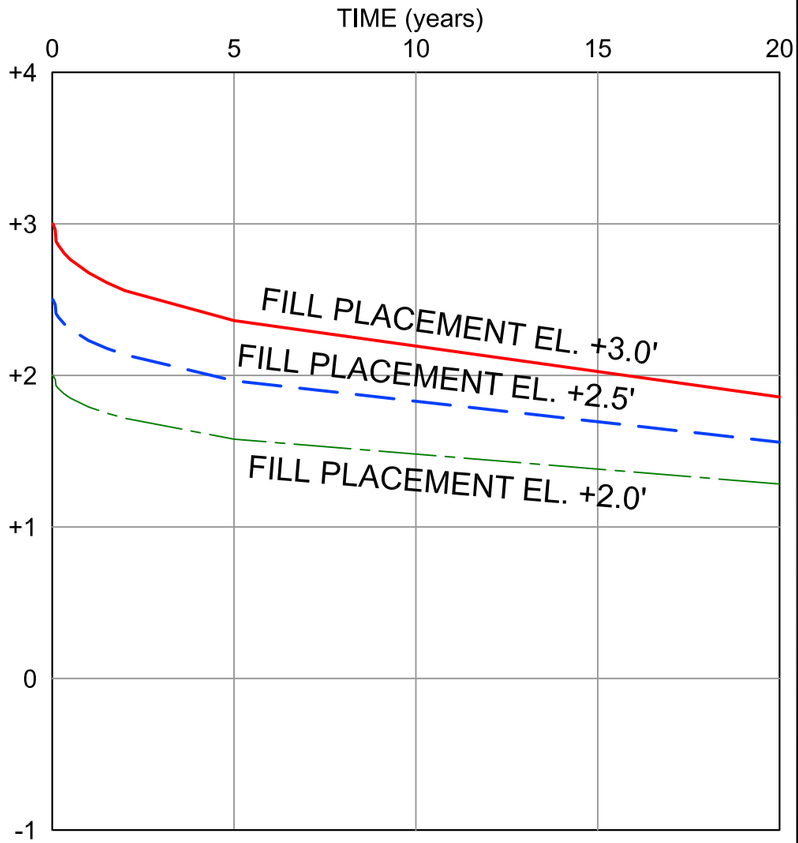
SOILS REACH 1- MUDLINE EL. +1.0'

Time (months)	Description of Activity	Top of Fill Elevation (feet)		
		EL. +4.0	EL. +3.0	EL. +2.5
0.25	End of Fill Placement	4.00	3.00	2.50
1.25	Process Survey	3.78	2.84	2.37
60	5 yr Post Const.	2.66	1.93	1.60
240	20 yr Post Const.	2.01	1.43	1.17



SOILS REACH 2 - MUDLINE EL. +1.0'

Time (months)	Description of Activity	Top of Fill Elevation (feet)		
		EL. +3.0	EL. +2.5	EL. +2.0
0.25	End of Fill Placement	3.00	2.50	2.00
1.25	Process Survey	2.86	2.38	1.91
60	5 yr Post Const.	2.12	1.69	1.39
240	20 yr Post Const.	1.54	1.19	0.99



SOILS REACH 3 - MUDLINE EL. +1.0'

Time (months)	Description of Activity	Top of Fill Elevation (feet)		
		EL. +3.0'	EL. +2.5	EL. +2.0
0.25	End of Fill Placement	3.00	2.50	2.00
1.25	Process Survey	2.89	2.41	1.93
60	5 yr Post Const.	2.36	1.96	1.58
240	20 yr Post Const.	1.86	1.56	1.28

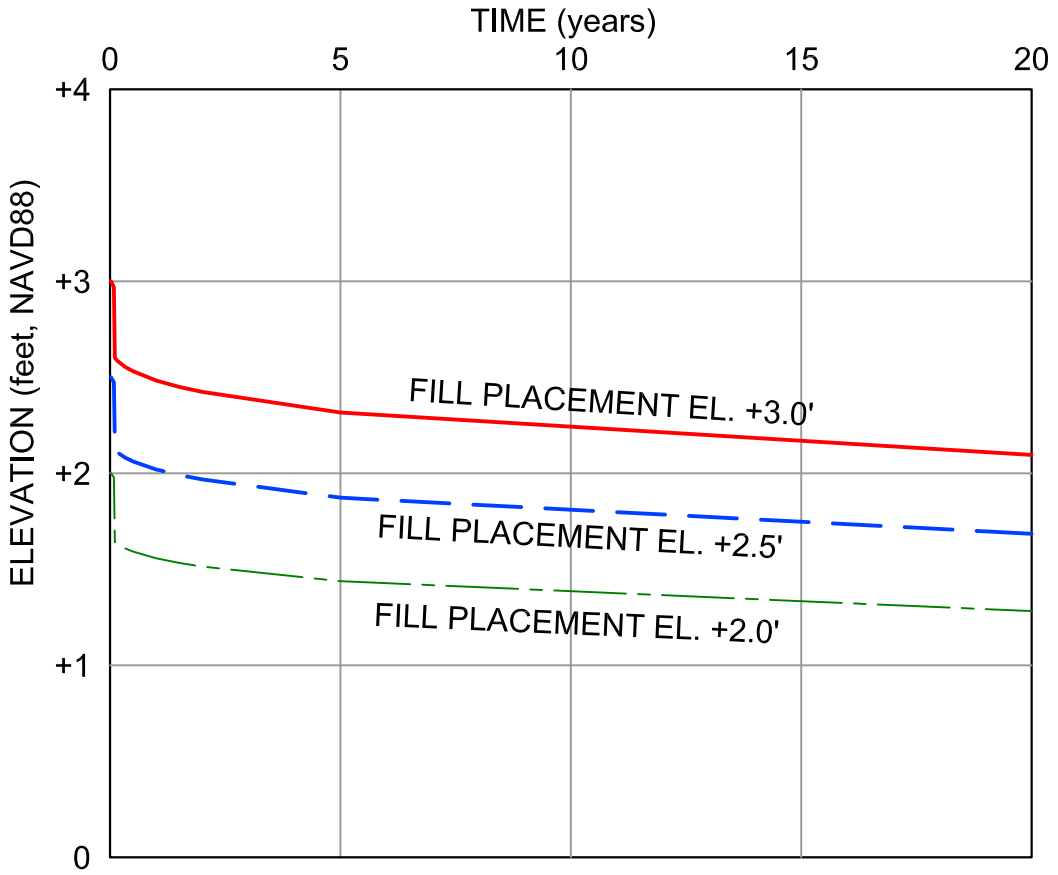
FUGRO

MS RIVER LONG DISTANCE SEDIMENT PIPELINE
JEFFERSON PARISH, LOUISIANA

TIME RATE OF SETTLEMENT - PIPELINE CORRIDOR - UPPER BOUND INTERFACE

SIZE	PROJECT NO.		REV.
B	04.55084005		0
SCALE: AS SHOWN	DRAWN BY: DMS	CHKD BY: JEA	DATE: 11/26/11	Plate No.: 32

November 26, 2011 04.55084005 Settlement Pipeline Corridor Upper.dwg



SOILS REACH 1- MUDLINE EL. -9.0'

Time (months)	Description of Activity	Top of Fill Elevation (feet)		
		EL. +3.0	EL. +2.5	EL. +2.0
0.25	End of Fill Placement	3.00	2.50	2.00
1.25	Process Survey	2.60	2.12	1.64
60	5 yr Post Const.	2.32	1.87	1.44
240	20 yr Post Const.	2.10	1.69	1.28

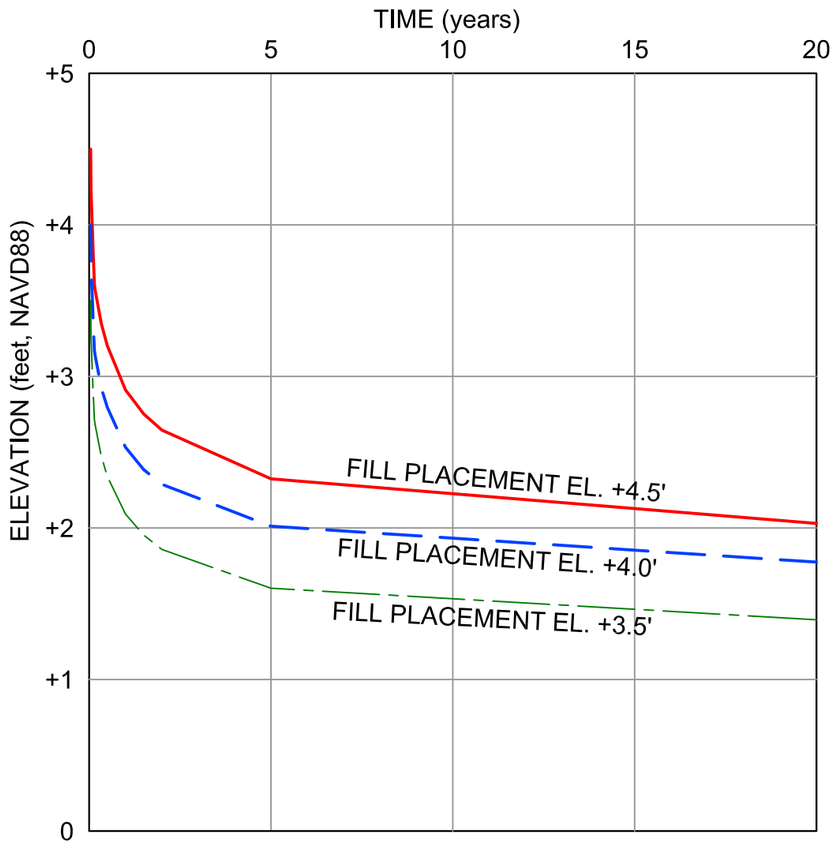
FUGRO

MS RIVER LONG DISTANCE SEDIMENT PIPELINE
JEFFERSON PARISH, LOUISIANA

TIME RATE OF SETTLEMENT - PIPELINE CORRIDOR - SOILS REACH 1 BORROW EXCAVATION

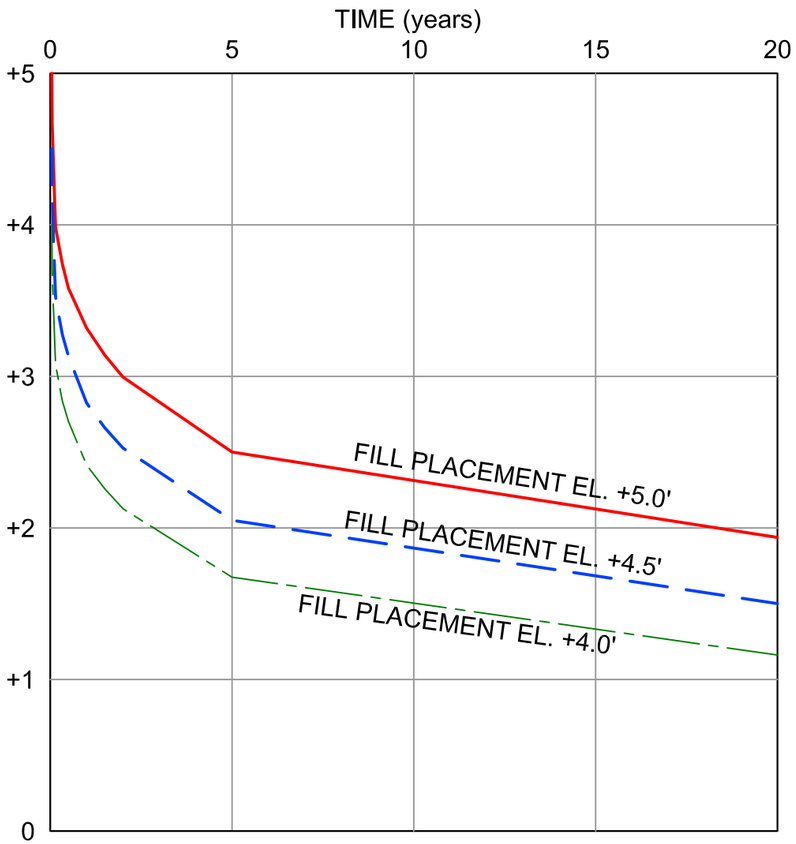
SIZE	PROJECT NO.		REV.
B	04.55084005		0

SCALE:	DRAWN BY:	CHKD BY:	DATE:	Plate No.:
AS SHOWN	DMS	JEA	11/29/11	33



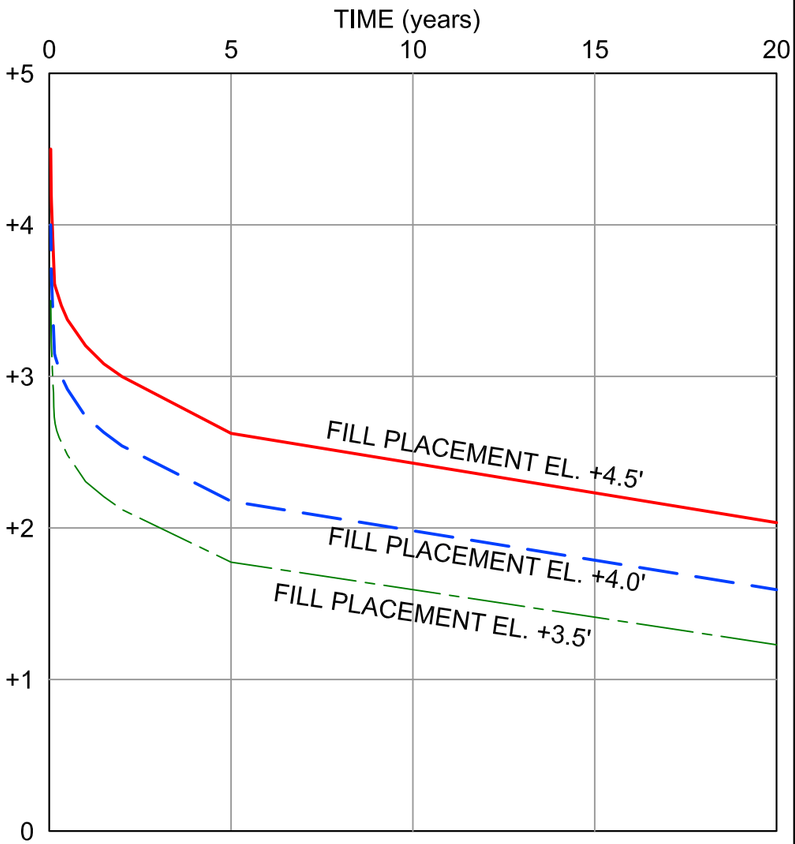
SOILS REACH 1- MUDLINE EL. -1.0'

Time (months)	Description of Activity	Top of Fill Elevation (feet)		
		EL. +4.5	EL. +4.0	EL. +3.5
0.25	End of Fill Placement	4.50	4.00	3.50
1.25	Process Survey	3.61	3.17	2.71
60	5 yr Post Const.	2.32	2.01	1.60
240	20 yr Post Const.	2.03	1.77	1.39



SOILS REACH 2- MUDLINE EL. -2.0'

Time (months)	Description of Activity	Top of Fill Elevation (feet)		
		EL. +5.0	EL. +4.5	EL. +4.0
0.25	End of Fill Placement	5.00	4.50	4.00
1.25	Process Survey	3.99	3.53	3.09
60	5 yr Post Const.	2.50	2.05	1.68
240	20 yr Post Const.	1.94	1.50	1.16



SOILS REACH 3- MUDLINE EL. -2.5'

Time (months)	Description of Activity	Top of Fill Elevation (feet)		
		EL. +4.5	EL. +4.0	EL. +3.5
0.25	End of Fill Placement	4.50	4.00	3.50
1.25	Process Survey	2.61	3.15	2.71
60	5 yr Post Const.	2.62	2.18	1.77
240	20 yr Post Const.	2.04	1.59	1.23

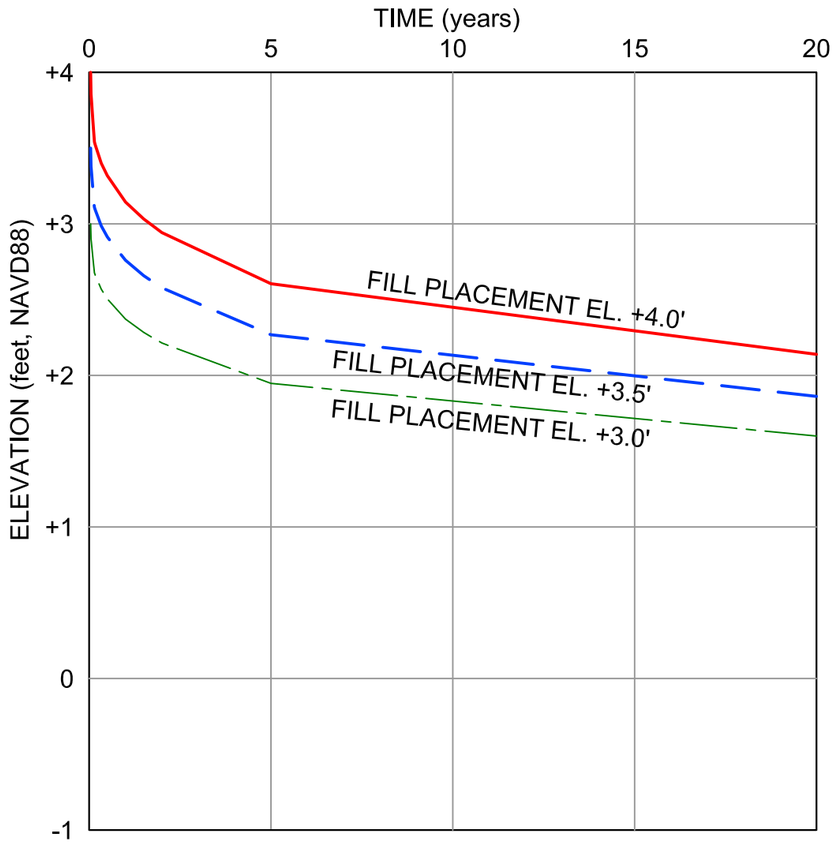
FUGRO

MS RIVER LONG DISTANCE SEDIMENT PIPELINE
JEFFERSON PARISH, LOUISIANA

TIME RATE OF SETTLEMENT - CONTAINMENT DIKE - LOWER BOUND INTERFACE

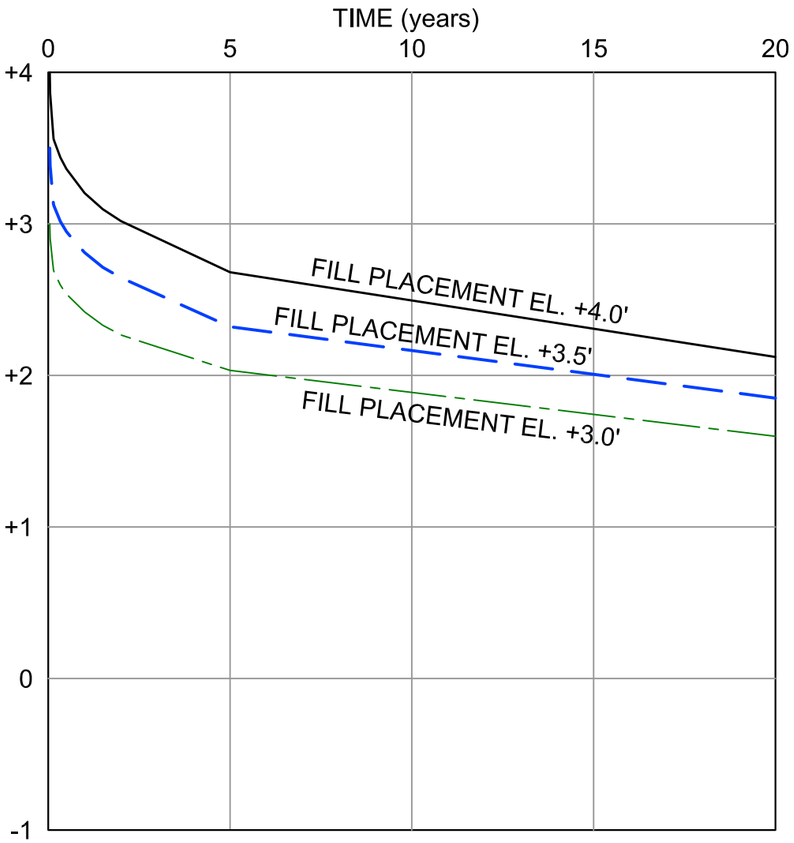
SIZE	PROJECT NO.		REV.
B	04.55084005		0
SCALE: AS SHOWN	DRAWN BY: DMS	CHKD BY: JEA	DATE: 11/29/11	Plate No.: 34

November 29, 2011 04.55084005 Settlement Cont Dike Lower.dwg



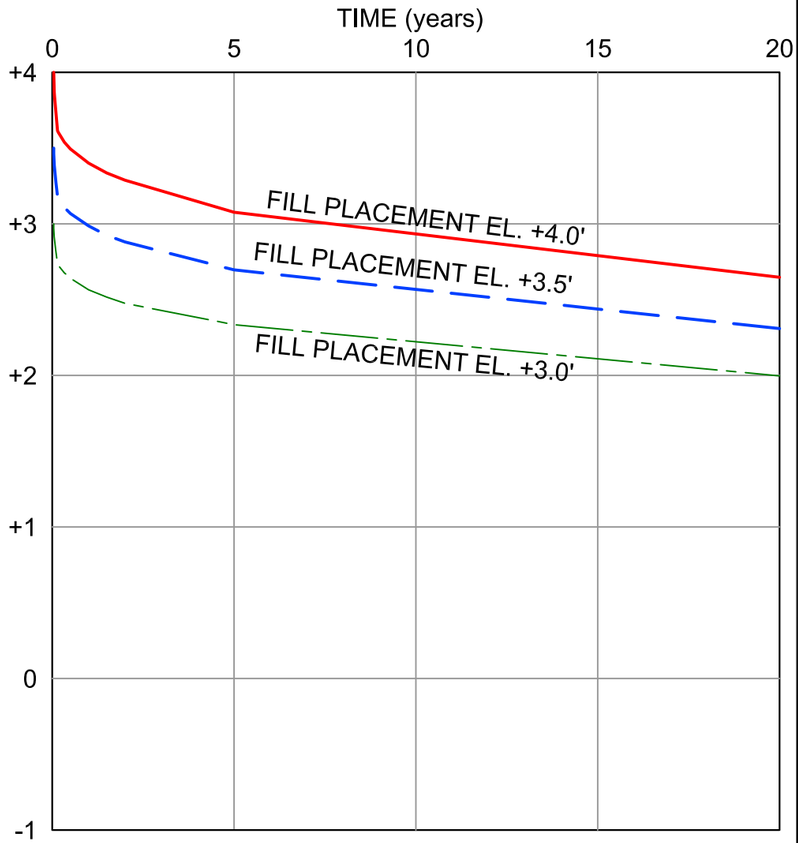
SOILS REACH 1 - MUDLINE AT EL. +1.0'

Time (months)	Description of Activity	Top of Fill Elevation (feet)		
		EL. +4.0	EL. +3.5	EL. +3.0
0.25	End of Fill Placement	4.00	3.50	3.00
1.25	Process Survey	3.54	3.11	2.68
60	5 yr Post Const.	2.60	2.27	1.95
240	20 yr Post Const.	2.14	1.86	1.60



SOILS REACH 2 - MUDLINE AT EL. +1.0'

Time (months)	Description of Activity	Top of Fill Elevation (feet)		
		EL. +4.0	EL. +3.5	EL. +3.0
0.25	End of Fill Placement	4.00	3.50	3.00
1.25	Process Survey	3.56	3.13	2.69
60	5 yr Post Const.	2.68	2.32	2.03
240	20 yr Post Const.	2.12	1.85	1.60



SOILS REACH 3 - MUDLINE AT EL. +1.0'

Time (months)	Description of Activity	Top of Fill Elevation (feet)		
		EL. +4.0	EL. +3.5	EL. +3.0
0.25	End of Fill Placement	4.00	3.50	3.00
1.25	Process Survey	3.61	3.17	2.73
60	5 yr Post Const.	3.08	2.70	2.33
240	20 yr Post Const.	2.65	2.13	2.00

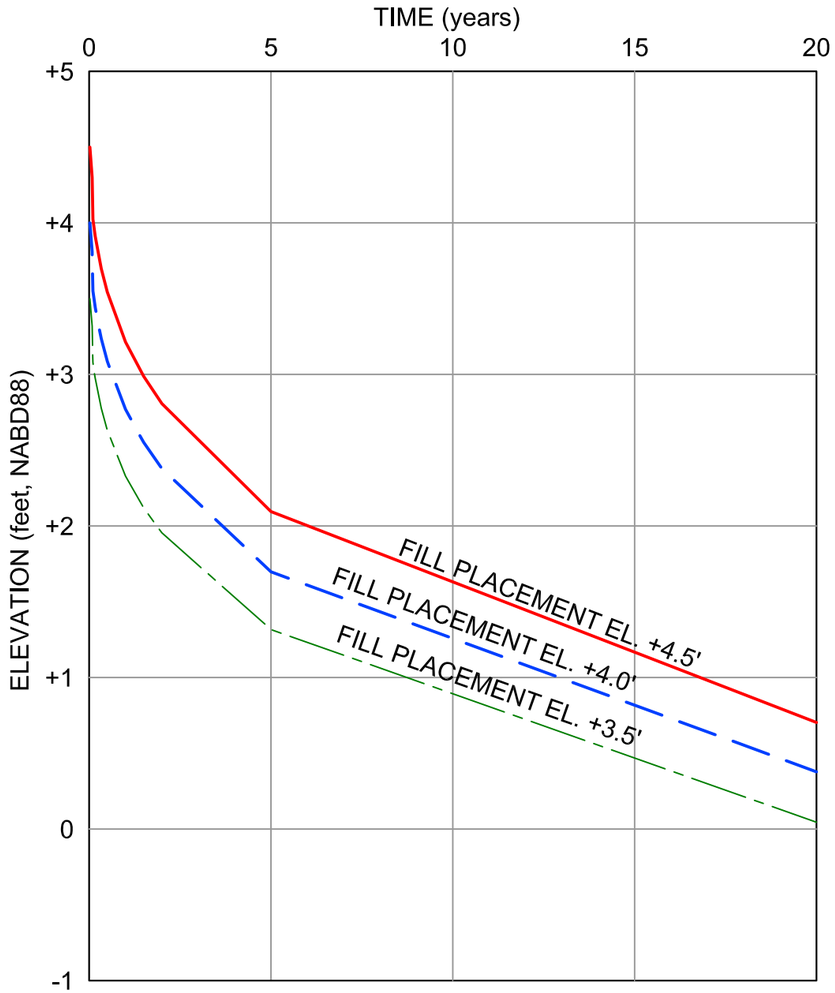
FUGRO

MS RIVER LONG DISTANCE SEDIMENT PIPELINE
JEFFERSON PARISH, LOUISIANA

TIME RATE OF SETTLEMENT - CONTAINMENT DIKE - UPPER BOUND INTERFACE

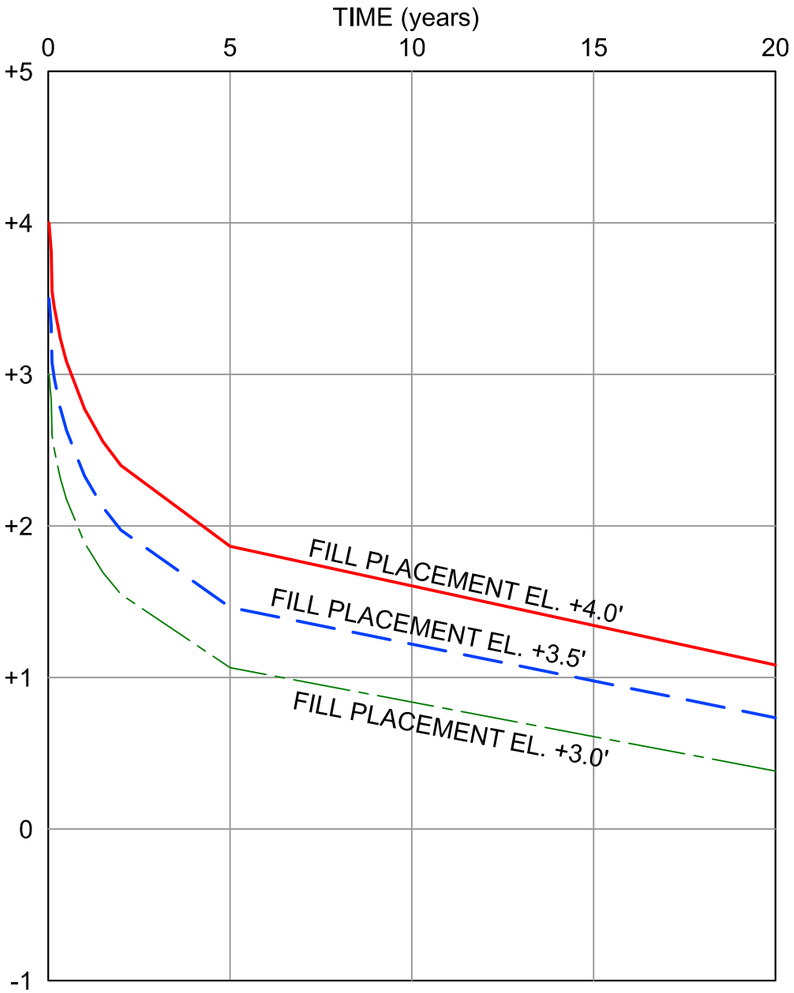
SIZE	PROJECT NO.		REV.
B	04.55084005		0
SCALE: AS SHOWN	DRAWN BY: DMS	CHKD BY: JEA	DATE: 11/29/11	Plate No.: 35

November 29, 2011 04.55084005 Settlement Cont Dike Upper.dwg



B-42 AND B-43 PROFILE

Time (months)	Description of Activity	Top of Fill Elevation (feet)		
		EL. +4.5'	EL. +4.0'	EL. +3.5'
0.25	End of Fill Placement	4.50	4.00	3.50
1.25	Process Survey	4.02	3.55	3.08
60	5 yr Post Const.	2.09	1.70	1.32
240	20 yr Post Const.	0.70	0.38	0.04



SOILS REACH 2 PROFILE

Time (months)	Description of Activity	Top of Fill Elevation (feet)		
		EL. +4.0'	EL. +3.5'	EL. +3.0'
0.25	End of Fill Placement	4.00	3.50	3.00
1.25	Process Survey	3.55	3.08	2.60
60	5 yr Post Const.	1.87	1.46	1.06
240	20 yr Post Const.	1.08	0.73	0.38

FUGRO

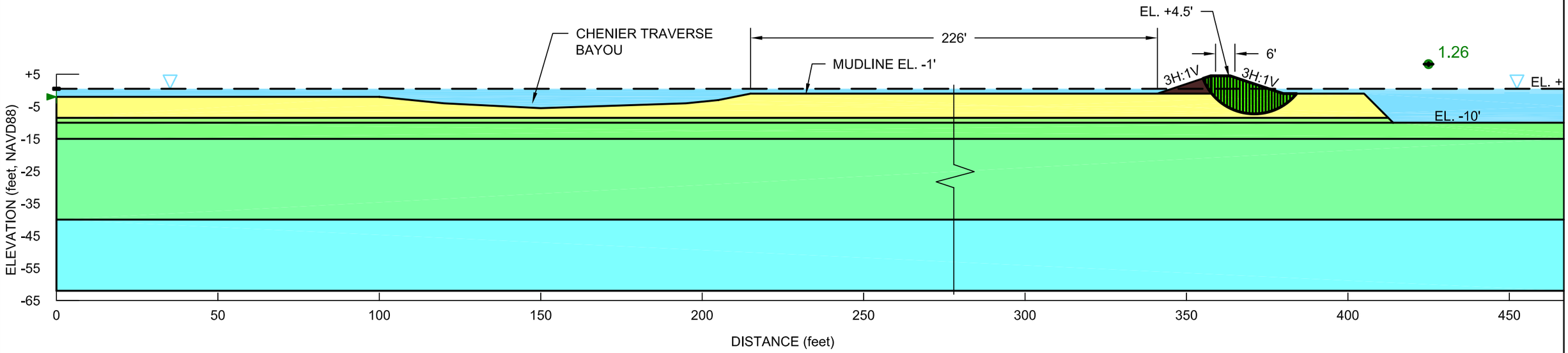
MS RIVER LONG DISTANCE SEDIMENT PIPELINE
JEFFERSON PARISH, LOUISIANA

TIME RATE OF SETTLEMENT
MARSH CREATION AREA

SIZE	PROJECT NO.		REV.
B	04.55084005		0

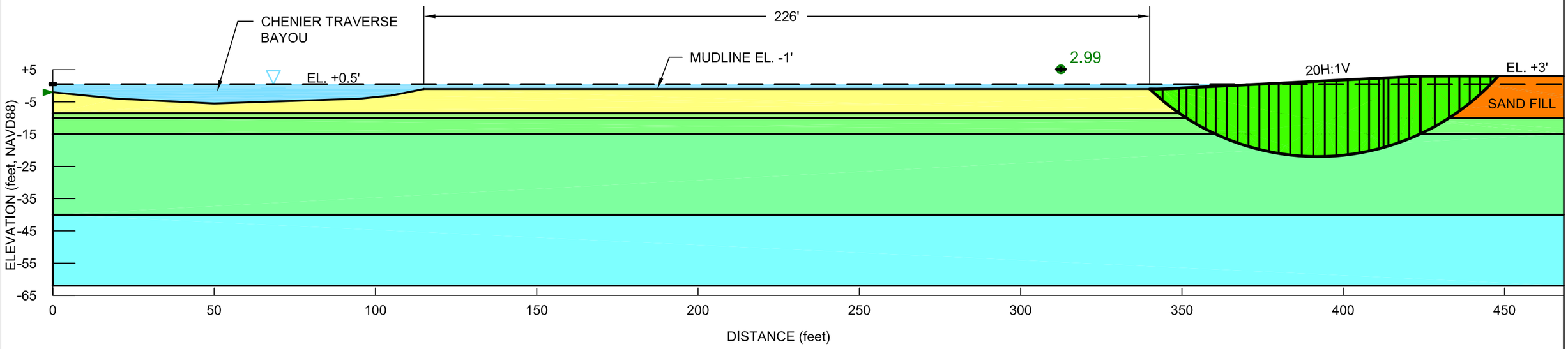
SCALE:	DRAWN BY:	CHKD BY:	DATE:	Plate No.:
AS SHOWN	DMS	JEA	11/29/11	36

November 29, 2011 04.55084005 Settlement Marsh Creation.dwg



FUGRO	MS RIVER LONG DISTANCE SEDIMENT PIPELINE JEFFERSON PARISH, LOUISIANA			
SLOPE STABILITY ANALYSIS SOILS REACH 1 - CONTAINMENT DIKE				
SIZE B	PROJECT NO. 04.55084005			REV. 0
SCALE: AS SHOWN	DRAWN BY: DMS	CHKD BY: JEA	DATE: 11/28/11	Plate No.: 37

November 28, 2011 04.55084005 Soils Reach 1 Stability Cont Dike.dwg



November 28, 2011 04.55084005 Soils Reach 1 Stability Cont Dike Fill.dwg

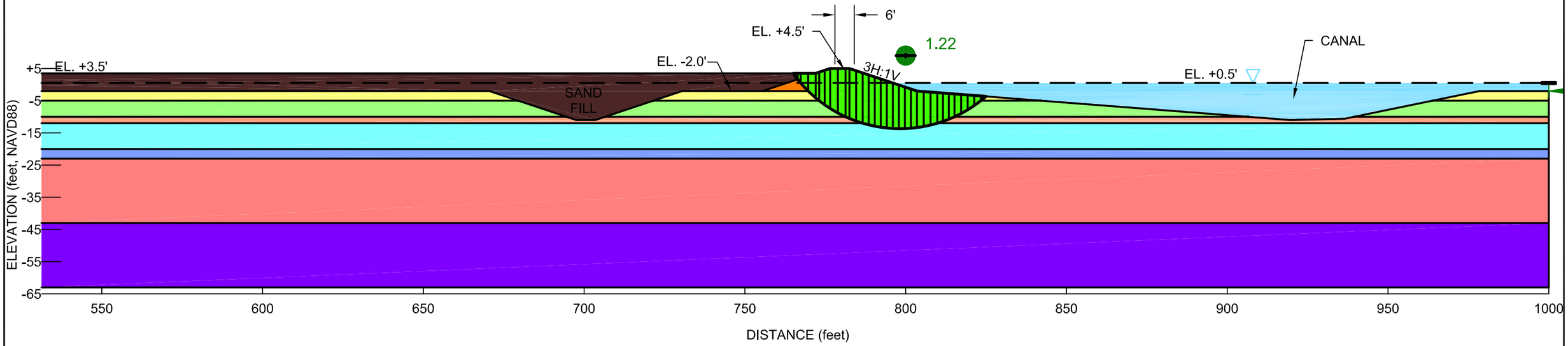
FUGRO

MS RIVER LONG DISTANCE
SEDIMENT PIPELINE
JEFFERSON PARISH, LOUISIANA

SLOPE STABILITY ANALYSIS
SOILS REACH 1 - PIPELINE CORRIDOR

SIZE	PROJECT NO.		REV.
B	04.55084005		0

SCALE:	DRAWN BY:	CHKD BY:	DATE:	Plate No.:
AS SHOWN	DMS	JEA	11/28/11	38



November 28, 2011 04.55084005 Soils Reach 2 Stability Cont Dike.dwg

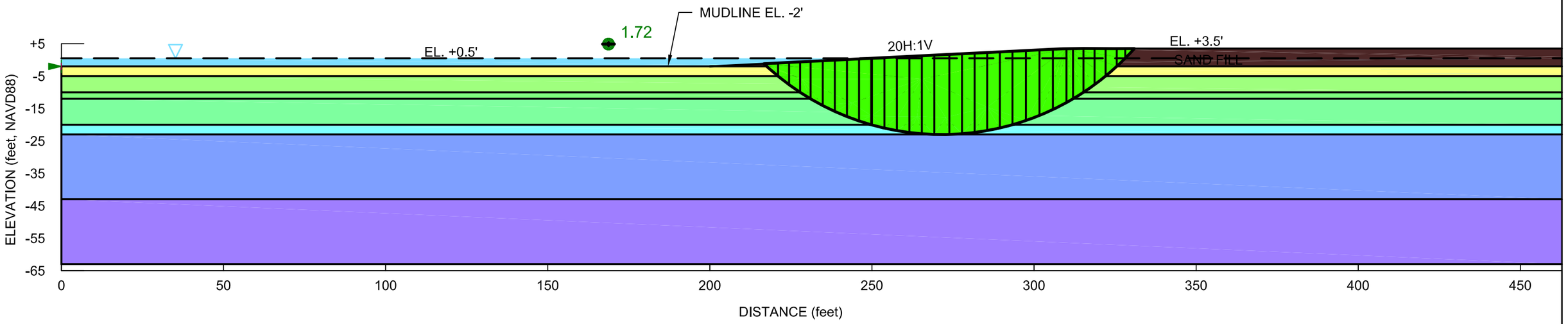
FUGRO

MS RIVER LONG DISTANCE
SEDIMENT PIPELINE
JEFFERSON PARISH, LOUISIANA

SLOPE STABILITY ANALYSIS
SOILS REACH 2 - CONTAINMENT DIKE

SIZE	PROJECT NO.		REV.
B	04.55084005		0

SCALE:	DRAWN BY:	CHKD BY:	DATE:	Plate No.:
AS SHOWN	DMS	JEA	11/28/11	39



November 28, 2011 04.55084005 Soils Reach 2 Stability Cont Dike Fill.dwg

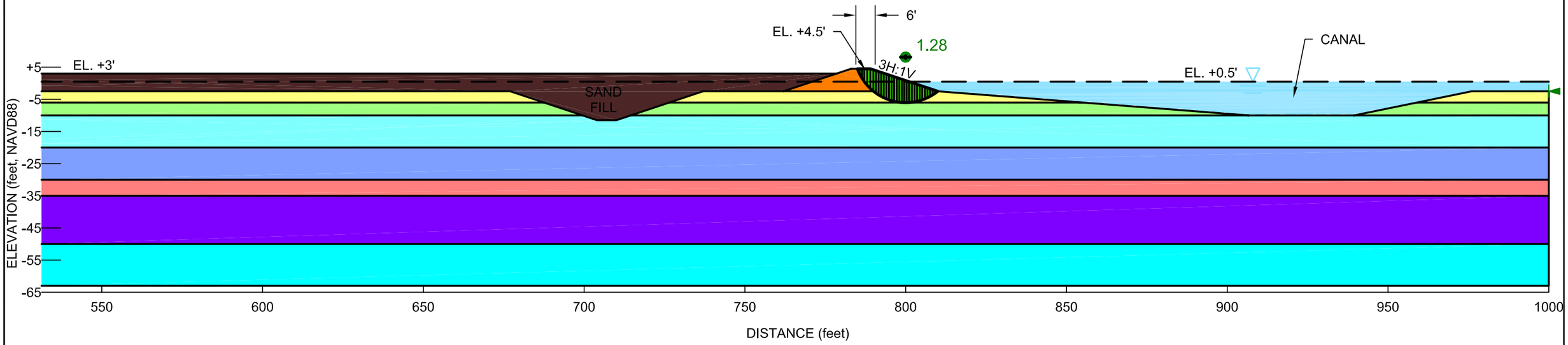
FUGRO

MS RIVER LONG DISTANCE SEDIMENT PIPELINE
JEFFERSON PARISH, LOUISIANA

SLOPE STABILITY ANALYSIS
SOILS REACH 2 - PIPELINE CORRIDOR

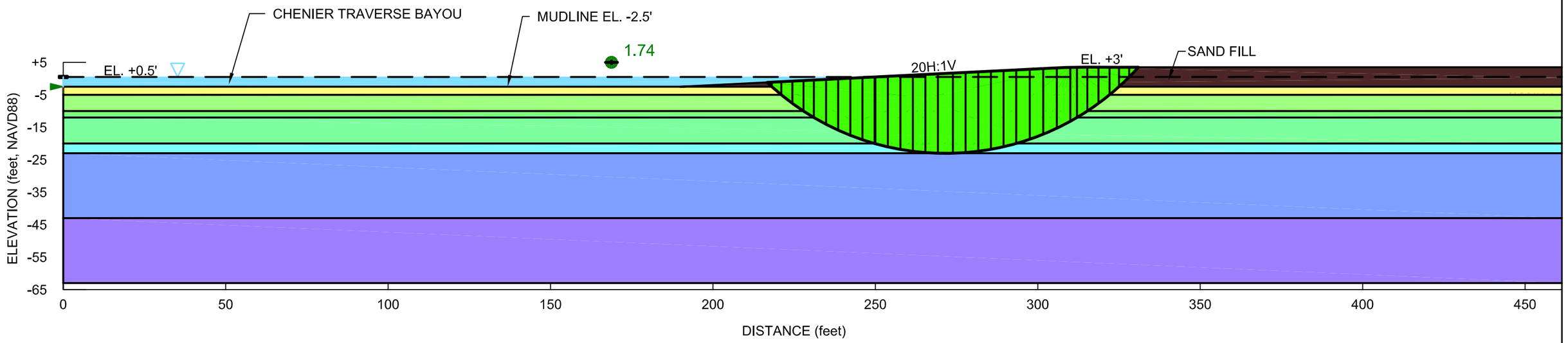
SIZE	PROJECT NO.		REV.
B	04.55084005		0

SCALE:	DRAWN BY:	CHKD BY:	DATE:	Plate No.:
AS SHOWN	DMS	JEA	11/28/11	40



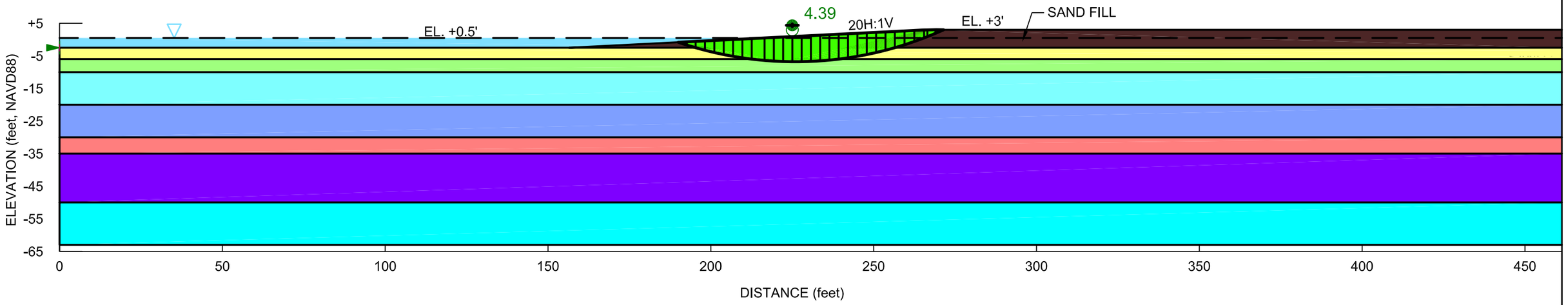
FUGRO	MS RIVER LONG DISTANCE SEDIMENT PIPELINE JEFFERSON PARISH, LOUISIANA			
SLOPE STABILITY ANALYSIS SOILS REACH 3 - CONTAINMENT DIKE				
SIZE B	PROJECT NO. 04.55084005			REV. 0
SCALE: AS SHOWN	DRAWN BY: DMS	CHKD BY: JEA	DATE: 11/28/11	Plate No.: 41

November 28, 2011 04.55084005 Soils Reach 3 Stability Cont Dike.dwg



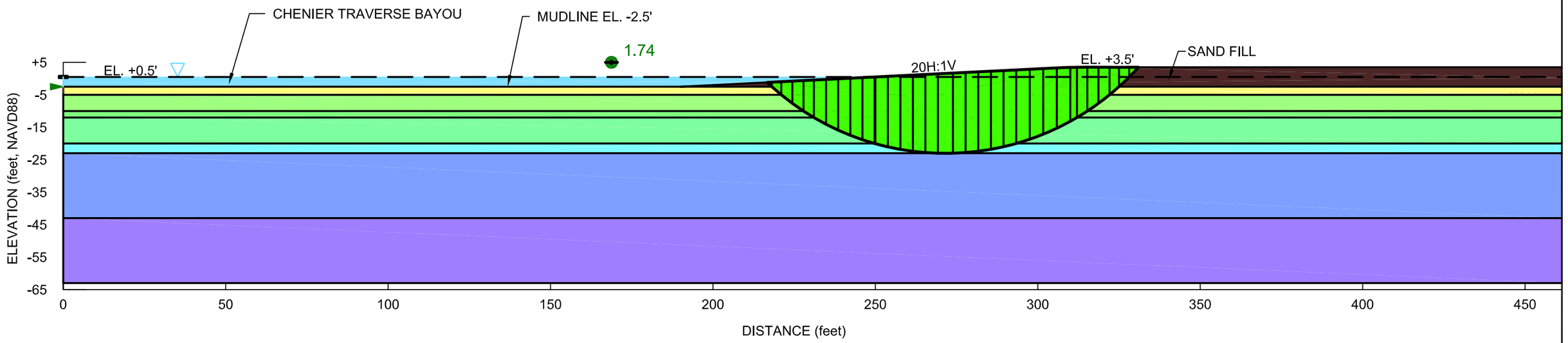
FUGRO	MS RIVER LONG DISTANCE SEDIMENT PIPELINE JEFFERSON PARISH, LOUISIANA			
SLOPE STABILITY ANALYSIS MARSH CREATION AREA				
SIZE B	PROJECT NO. 04.55084005			REV. 0
SCALE: AS SHOWN	DRAWN BY: DMS	CHKD BY: JEA	DATE: 11/28/11	Plate No.: 43

November 28, 2011 04.55084005 Marsh Creation Stability.dwg



FUGRO	MS RIVER LONG DISTANCE SEDIMENT PIPELINE JEFFERSON PARISH, LOUISIANA			
SLOPE STABILITY ANALYSIS SOILS REACH 3 - PIPELINE CORRIDOR				
SIZE B	PROJECT NO. 04.55084005			REV. 0
SCALE: AS SHOWN	DRAWN BY: DMS	CHKD BY: JEA	DATE: 11/28/11	Plate No.: 42

November 28, 2011 04.55084005 Soils Reach 3 Stability Cont Dike Fill.dwg



FUGRO	MS RIVER LONG DISTANCE SEDIMENT PIPELINE JEFFERSON PARISH, LOUISIANA			
SLOPE STABILITY ANALYSIS MARSH CREATION AREA				
SIZE B	PROJECT NO. 04.55084005			REV. 0
SCALE: AS SHOWN	DRAWN BY: DMS	CHKD BY: JEA	DATE: 11/29/11	Plate No.: 43

November 29, 2011 04.55084005 Marsh Creation Stability.dwg

APPENDIX A
SUMMARY OF TEST RESULTS

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquidity Index	Liquid Limit (%)	Plastic Limit (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer* (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
1	1-2				14		4													
2	2-4				21															
3	4.5-6				18		5													
4A	6-7	0.59	73	25	53															
4B	7-8				52					0.39										
5A	8-9				53															
5B	9-10				65					0.29	0.36									
6A	10-11																			
6B	11-12	0.51	54	19	37		55			0.21										
7A	12-14				20		3													
7B	13-14				22					0.12										
8B	15-16	0.69	43	23	37	78	88			0.23										
9B	17-18				68					0.23										
10A	18-19							0.50												
10B	19-20				38					0.13										
11A	23-24				83															
11B	24-25				78	55				0.26		UU	78	17	0.31		0.8	55	6.9	A
12A	28-29																			
12B	29-30	0.92	72	24	68	59	100			0.32										
13A	33-34																			
13B	34-35				80					0.30										
14B	39-40				69	59				0.47		UU	69	22	0.61		0.8	59	2.7	B
15B	44-45				61					0.32										
16A	48-49																			

Notes:

NP = Non-Plastic Material
*Corrected as described on Terms and Symbols Used on Boring Logs.

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

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

Fugro Consultants, Inc

MS River Long Distance Sediment Pipeline

SUMMARY OF TEST RESULTS - BORING B-3

LELAP Lab ID #10001

Jefferson Parish, Louisiana

Project No.
04.55084005

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquidity Index	Liquid Limit (%)	Plastic Limit (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer* (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
16B	49-50				58					0.33										
17B	54-55				56	69				0.38		UU	56	38	0.57		0.8	69	4.7	B
18A	58-59																			
18B	59-60				60					0.30										

Notes:

NP = Non-Plastic Material
*Corrected as described on Terms and Symbols Used on Boring Logs.

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

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

Fugro Consultants, Inc

MS River Long Distance Sediment Pipeline

SUMMARY OF TEST RESULTS - BORING B-3

LELAP Lab ID #10001

Jefferson Parish, Louisiana

Project No.
04.55084005

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquidity Index	Liquid Limit (%)	Plastic Limit (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer* (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
1	0-1.5				21		4													
2	2.5-4				19		5													
4B	7-8	0.78	81	24	68	59	97			0.42										
5	8-9																			
5B	9-10				54					0.48	0.24									
6B	11-12				15					0.29										
7B	13-14	0.15	66	22	29					0.23										
8B	15-16				39					0.24										
9B	17-18				37					0.35	0.24									
10B	19-20	1.69	32	25	37	84	97			0.11										
11B	24-25				77	55				0.37		UU	77	17	0.29		0.9	55	8.4	A
12	28-30	0.70	46	22	39															
12	29-30																			
13	33.5-35				31		84													
14B	39-40				71	59				0.35		UU	71	27	0.47		0.7	59	4.0	B

Notes:

NP = Non-Plastic Material
*Corrected as described on Terms and Symbols Used on Boring Logs.

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

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

Fugro Consultants, Inc

MS River Long Distance Sediment Pipeline

SUMMARY OF TEST RESULTS - BORING B-5

LELAP Lab ID #10001

Jefferson Parish, Louisiana

Project No.
04.55084005

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquidity Index	Liquid Limit (%)	Plastic Limit (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer* (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
1	0.5-2				135															
2A	2-3				184															
2B	3-4	0.92	133	35	125	39	89			0.02										
3A	4-5																			
3B	5-6				33			0.50		0.08										
4A	6-7				42															
4B	7-8				35					0.08	0.10									
5A	8-9																			
5B	9-10				37															
6A	10-11	1.28	38	22	42															
6B	11-12				70					0.07										
7B	13-14				73															
8A	14-15																			
8B	15-16				155					0.15										
9A	16-17	0.91	99	32	93															
9B	17-18				53					0.21										
10A	18-19																			
10B	19-20				36					0.21										
11B	24-25				62	64				0.16		UU	62	17	0.24		1.8	64	11.9	A
12B	29-30	0.81	85	27	74	54	100			0.34										
13B	34-35				75	57				0.34		UU	75	24	0.51		0.9	57	4.3	B
14A	38-39																			
14B	39-40				68					0.30										
15A	43-44																			

Notes:

NP = Non-Plastic Material
*Corrected as described on Terms and Symbols Used on Boring Logs.

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

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

Fugro Consultants, Inc

MS River Long Distance Sediment Pipeline

SUMMARY OF TEST RESULTS - BORING B-7

LELAP Lab ID #10001

Jefferson Parish, Louisiana

Project No.
04.55084005

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquidity Index	Liquid Limit (%)	Plastic Limit (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer* (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
15B	44-45				69			0.50		0.37										
16B	49-50				54	69				0.38		UU	54	34	0.65		0.6	69	1.9	B
17A	53-54																			
17B	54-55				49			0.50		0.36										
18B	59-60				61	63				0.34		UU	61	41	0.59		0.6	63	5.1	B

Notes:

NP = Non-Plastic Material
*Corrected as described on Terms and Symbols Used on Boring Logs.

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

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

Fugro Consultants, Inc

MS River Long Distance Sediment Pipeline

SUMMARY OF TEST RESULTS - BORING B-7

LELAP Lab ID #10001

Jefferson Parish, Louisiana

Project No.
04.55084005

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquidity Index	Liquid Limit (%)	Plastic Limit (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer* (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
1	0-1.5				214															
2A	2-3				395															
2B	3-4	1.54	191	54	264	22	47			0.07										
3B	5-6				53					0.12	0.12									
4B	7-8				86					0.16										
5B	9-10				49					0.14										
6B	11-12				40					0.13										
7A	12-13	1.42	55	24	68															
7B	13-14				44					0.09										
8B	15-16				77					0.19										
9B	17-18				54					0.16										
10B	19-20				35					0.09										
11A	23-24	7.10	25	24	30															
11B	24-25				47	74				0.30		UU	47	18	0.21		2.5	74	13.9	A
12A	30-31.5				28		44													
14	38.5-40				35		44													

Notes:

NP = Non-Plastic Material
*Corrected as described on Terms and Symbols Used on Boring Logs.

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

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

Fugro Consultants, Inc

MS River Long Distance Sediment Pipeline

SUMMARY OF TEST RESULTS - BORING B-9

LELAP Lab ID #10001

Jefferson Parish, Louisiana

Project No.
04.55084005

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquidity Index	Liquid Limit (%)	Plastic Limit (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer* (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
1	0-1.5				852															
2a	2-3																			
2B	3-4	2.24	548	254	913					0.05										
3	4-6				447															
4b	7-8				266					0.05										
5a	8-9																			
5b	9-10	1.95	312	152	465	13	80			0.20										
6b	11-12				275					0.09										
7b	13-14				320					0.04										
8b	15-16				128					0.08										
9b	16-17	1.06	125	35	130															
9b	17-18				83					0.17										
10b	19-20				36					0.09	0.15									
11b	24-25				68	58						UU	68	18	0.11		1.0	58	14.6	A
12a	28-29				80															
12b	29-30				58					0.15										
13b	34-35				49	70				0.18		UU	49	26	0.24		1.2	70	9.3	A
14a	38-39				78															
14b	39-40				73					0.19										

Notes:

NP = Non-Plastic Material
*Corrected as described on Terms and Symbols Used on Boring Logs.

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

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

Fugro Consultants, Inc

MS River Long Distance Sediment Pipeline

SUMMARY OF TEST RESULTS - BORING B-11

LELAP Lab ID #10001

Jefferson Parish, Louisiana

Project No.
04.55084005

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquidity Index	Liquid Limit (%)	Plastic Limit (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer* (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
1	0-2				533															
2	2-3	1.03	175	35	179															
2B	3-4				221					0.06										
3	4-6																			
4A	6-7				230															
4B	7-8	0.98	287	57	283	18	28			0.08										
5A	8-9																			
5B	9-10				183					0.13										
6B	11-12				243					0.24	0.20									
7A	12-13																			
7B	13-14				271					0.11										
8A	14-15																			
8B	15-16				77					0.18										
9A	16-17	1.28	77	23	92															
9B	17-18				52					0.15										
10A	18-19																			
10B	19-20				33					0.13										
11	23-25																			
12B	29-30				53	69				0.27		UU	53	20	0.22		1.1	69	10.4	A
13A	33-34																			
13B	34-35				57					0.23										
14B	39-40				55	68				0.30		UU	55	27	0.42		0.8	68	4.3	A,B

Notes:

NP = Non-Plastic Material
*Corrected as described on Terms and Symbols Used on Boring Logs.

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

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

Fugro Consultants, Inc

MS River Long Distance Sediment Pipeline

SUMMARY OF TEST RESULTS - BORING B-12

LELAP Lab ID #10001

Jefferson Parish, Louisiana

Project No.
04.55084005

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquidity Index	Liquid Limit (%)	Plastic Limit (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer* (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
1	0-1.5				412															
3A	4-5	1.13	187	47	205															
3B	5-6				92					0.18										
4B	7-8				101															
5B	9-10				157						0.24									
6B	11-12				151															
7A	12-13	1.49	125	38	168															
7B	13-14				176					0.16										
8B	15-16				138					0.14										
9B	17-18	1.30	76	26	91	45	87			0.06										
10B	19-20				82					0.05										
11	23-25	0.79	58	22	51															
12B	29-30				77	56				0.18		UU	77	20	0.26		0.8	56	11.1	A
13A	33-34				79															
13B	34-35				77					0.22										
14B	39-40				67	60				0.25		UU	67	27	0.34		0.7	60	6.6	A

Notes:

NP = Non-Plastic Material
*Corrected as described on Terms and Symbols Used on Boring Logs.

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

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

Fugro Consultants, Inc

MS River Long Distance Sediment Pipeline

SUMMARY OF TEST RESULTS - BORING B-13

LELAP Lab ID #10001

Jefferson Parish, Louisiana

Project No.
04.55084005

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquidity Index	Liquid Limit (%)	Plastic Limit (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer* (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
1	0-1.5				61															
2B	3-4				36					0.32	0.25									
3B	5-6	0.60	45	18	34	86	94			0.27										
4B	7-8				39					0.64										
5B	9-10				42					0.37										
6B	11-12				36					0.51										
7B	13-14				35					0.38										
8B	15-16				29					0.07										
9A	16-17	1.10	34	24	34		92													
9B	17-18				31					0.24										
10B	19-20				65					0.34										
11B	24-25	0.53	142	37	93		96			0.25										
12B	29-30				60	64				0.18		UU	60	20	0.46		0.8	64	3.8	C
13A	33-34	0.99	52	20	52															
13B	34-35				26					0.27										
14B	39-40				64	62				0.34		UU	64	27	0.53		0.8	62	5.6	B

Notes:

NP = Non-Plastic Material
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TYPE OF TEST
U - Unconfined Compression
UU - Unconsolidated - Undrained Triaxial
CU - Consolidated - Undrained Triaxial

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

Fugro Consultants, Inc

MS River Long Distance Sediment Pipeline

SUMMARY OF TEST RESULTS - BORING B-15

LELAP Lab ID #10001

Jefferson Parish, Louisiana

Project No.
04.55084005

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquidity Index	Liquid Limit (%)	Plastic Limit (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer* (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
1	0-1				63															
2A	2-3	0.58	66	21	47															
2B	3-4				36					0.51										
3A	4-5																			
3B	5-6				40					0.46										
4A	6-7				41															
4B	7-8				33					0.25	0.53									
5B	9-10				32					0.10										
6A	10-11	0.63	39	21	32															
6B	11-12				35					0.62										
7A	12-13																			
7B	13-14				43					0.45										
8A	14-15				41															
8B	15-16				37					0.36										
9B	17-18	0.73	44	21	38	82	89			0.35										
10B	19-20				39					0.60										
11B	24-25				127	39				0.41		UU	127	17	0.62		0.9	39	2.7	A
12	28.5-30																			
13A	33-34				40		98	0.50												
13B	34-35				58					0.61										
14A	38-39							0.50												
14B	39-40				58					0.42										
15A	43-44																			
15B	44-45				41															

Notes:

NP = Non-Plastic Material
*Corrected as described on Terms and Symbols Used on Boring Logs.

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

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

Fugro Consultants, Inc

MS River Long Distance Sediment Pipeline

SUMMARY OF TEST RESULTS - BORING B-17

LELAP Lab ID #10001

Jefferson Parish, Louisiana

Project No.
04.55084005

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquidity Index	Liquid Limit (%)	Plastic Limit (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer* (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
1	0-1.5				653															
2A	2-3				809															
2B	3-4				180					0.08										
3	4-6				206															
4B	7-8	0.47	94	30	60	61	99			0.27										
5B	9-10				54					0.24										
6B	11-12				57					0.31										
7B	13-14				82					0.31										
8A	14-15	0.55	83	27	58															
8B	15-16				76					0.33										
9B	17-18				93					0.17	0.15									
10B	19-20				31					0.11										
11	23-25				47															
12B	29-30				73	58				0.26		UU	73	20	0.28		1.1	58	8.1	A,B
13	33-35				66															
14B	39-40				72					0.20										

Notes:

NP = Non-Plastic Material
*Corrected as described on Terms and Symbols Used on Boring Logs.

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

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

Fugro Consultants, Inc

MS River Long Distance Sediment Pipeline

SUMMARY OF TEST RESULTS - BORING B-18

LELAP Lab ID #10001

Jefferson Parish, Louisiana

Project No.
04.55084005

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquidity Index	Liquid Limit (%)	Plastic Limit (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer* (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
1	0-1.5				230															
2	2-4	1.46	189	43	256															
3B	5-6				70					0.14										
4B	7-8	0.56	70	23	49	73	100			0.09										
5B	9-10				58					0.13										
6B	11-12				56					0.06										
7B	13-14				55					0.06	0.06									
8B	15-16				37					0.11										
9A	16-17	0.86	43	18	40															
9B	17-18				78					0.10										
10B	19-20				41					0.06										
11B	24-25	-1230.53	NP	NP	26															
12B	29-30				24		13													
13	33-35				38															
14	38.5-40				24		9													

Notes:

NP = Non-Plastic Material
*Corrected as described on Terms and Symbols Used on Boring Logs.

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

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

Fugro Consultants, Inc

MS River Long Distance Sediment Pipeline

SUMMARY OF TEST RESULTS - BORING B-19

LELAP Lab ID #10001

Jefferson Parish, Louisiana

Project No.
04.55084005

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquidity Index	Liquid Limit (%)	Plastic Limit (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer* (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
1	0-1.5				264															
2A	2-3	0.81	185	39	158															
2B	3-4				145					0.08										
3	4-5				198															
3B	5-6				357					0.25	0.11									
4B	7-8	0.94	115	34	110	42	99			0.10										
5B	9-10				29															
6B	11-12				49					0.13										
7A	12-13	1.01	54	20	54		72													
7B	13-14				73					0.11										
8B	15-16				42					0.20										
9B	17-18				77															
10A	18-19	0.94	82	25	78															
10B	19-20				70					0.10										
11B	24-25				26	97						UU	26	17	1.82		6.5	97	15.0	A
12	28.5-30				58															
13	33-35				46															
14	38.5-40				38		96													
15	43.5-45				32		72													
16A	48-49							0.50												
16B	49-50				49	73				0.51		UU	49	34	0.61		0.6	73	7.1	B
17A	53-54				41			0.50												
17B	54-55				58					0.51										
	54.1-				52															

Notes:

NP = Non-Plastic Material
*Corrected as described on Terms and Symbols Used on Boring Logs.

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

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

Fugro Consultants, Inc

MS River Long Distance Sediment Pipeline

SUMMARY OF TEST RESULTS - BORING B-26

LELAP Lab ID #10001

Jefferson Parish, Louisiana

Project No.
04.55084005

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquidity Index	Liquid Limit (%)	Plastic Limit (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer* (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
18b	59-60				56	66				0.51		UU	56	41	0.68		0.7	66	3.8	C

Notes:

NP = Non-Plastic Material
*Corrected as described on Terms and Symbols Used on Boring Logs.

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

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

Fugro Consultants, Inc

MS River Long Distance Sediment Pipeline

SUMMARY OF TEST RESULTS - BORING B-26

LELAP Lab ID #10001

Jefferson Parish, Louisiana

Project No.
04.55084005

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquidity Index	Liquid Limit (%)	Plastic Limit (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer* (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
1	0.5-2				182															
2	2-3	1.22	158	36	185															
2B	3-4				208					0.12										
4A	6-7																			
4B	7-8	2.16	44	20	72	60	96			0.11										
5A	8-9	1.05	78	24	81															
5B	9-10				169					0.26										
6A	10-11																			
6B	11-12				83					0.19										
7A	12-13				119		27													
7B	13-14	0.89	86	28	80	53	98			0.09										
8B	15-16				35						0.20									
10	18.5-20				31		87													
11	23.5-25				41															
12	28-30				27		27													
13	33.5-35				22		12													
14	38.5-40																			
15A	43-44	0.63	37	19	31															
15B	44-45				26															
16A	48-49							0.75												
16B	49-50				62	64				0.58		UU	62	34	0.64		0.6	64	3.3	A,C
17A	53-54							0.50												
17B	54-55	0.58	69	23	50	70	100			0.60										
18B	59-60				49	71				0.63		UU	49	41	0.81		0.8	71	4.2	B

Notes:

NP = Non-Plastic Material
*Corrected as described on Terms and Symbols Used on Boring Logs.

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

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

Fugro Consultants, Inc

MS River Long Distance Sediment Pipeline

SUMMARY OF TEST RESULTS - BORING B-28

LELAP Lab ID #10001

Jefferson Parish, Louisiana

Project No.
04.55084005

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquidity Index	Liquid Limit (%)	Plastic Limit (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer* (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
1	0-1.5				170															
2A	2-3				322															
2B	3-4	0.80	152	41	130	39	98			0.08										
3	4-5				62															
4B	7-8				69					0.12										
5B	9-10				68					0.13										
6A	10-11	1.15	89	30	97															
6B	11-12				103					0.31										
7B	13-14				77					0.12	0.20									
8B	15-16				105					0.23										
9B	17-18				49					0.15										
10B	19-20	0.98	54	21	53	68	100			0.09										
11	23-25	0.95	52	21	50															
12B	29-30				21		16													
14A	38-39				73	59				0.20		UU	73	27	0.38		1.3	59	11.8	A
14B	39-40				32					0.09										
15A	43-44				44															
15B	44-45				64					0.41										
16B	49-50				59	65				0.41		UU	59	34	0.61		0.8	65	6.8	B
17A	53-54				52															
17B	54-55				58					0.44										
18B	59-60				64	63				0.48		UU	64	41	0.57		1.2	63	7.0	C

Notes:

NP = Non-Plastic Material
*Corrected as described on Terms and Symbols Used on Boring Logs.

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

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

Fugro Consultants, Inc

MS River Long Distance Sediment Pipeline

SUMMARY OF TEST RESULTS - BORING B-38

LELAP Lab ID #10001

Jefferson Parish, Louisiana

Project No.
04.55084005

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquidity Index	Liquid Limit (%)	Plastic Limit (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer* (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
1	0-1.5				191															
2	2-4	1.63	232	64	338															
2B	3-4				249															
3B	5-6				55					0.07										
4B	7-8				50					0.14	0.09									
5B	9-10				77					0.13										
6B	11-12				80					0.16										
7B	13-14	1.11	82	26	88	48	99			0.16										
8B	15-16				96					0.11										
9B	17-18				102					0.18										
10A	18-19	0.86	105	28	94															
10B	19-20				67					0.12										
11	23-25				53															
12B	29-30				82	53				0.25		UU	82	20	0.29		1.0	53	9.1	A
13A	33-34				78															
13B	34-35				61					0.23										
14B	39-40				67	60				0.25		UU	67	27	0.35		0.7	60	7.6	A

Notes:

NP = Non-Plastic Material
*Corrected as described on Terms and Symbols Used on Boring Logs.

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

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

Fugro Consultants, Inc

MS River Long Distance Sediment Pipeline

SUMMARY OF TEST RESULTS - BORING B-40

LELAP Lab ID #10001

Jefferson Parish, Louisiana

Project No.
04.55084005

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquidity Index	Liquid Limit (%)	Plastic Limit (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer* (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
1	0-1.5				378															
2	2-4				221															
3	4-6	1.99	68	20	115															
4B	7-8				277					0.15										
5B	9-10				240					0.12	0.31									
6B	11-12				175					0.13										
7A	12-13	0.79	295	77	250															
7B	13-14				65					0.18										
8B	15-16				97					0.18										
9B	17-18				89					0.13										
10B	19-20				82					0.14										
11B	24-25	2.18	37	17	62	62	99			0.41										
12	28.5-30				65															
13B	34-35				75	56				0.31		UU	75	24	0.36		0.7	56	3.0	A
14A	38-39				36															
14B	39-40				32					0.29										
15B	44-45				34	85				0.31		UU	34	31	0.47		1.1	85	8.1	A
16A	48-49				60															
16B	49-50				51					0.47										
17B	54-55				49	73				0.52		UU	49	38	0.51		0.8	73	4.7	B
18A	58-59				55															
18B	59-60				67					0.63										

Notes:

NP = Non-Plastic Material
*Corrected as described on Terms and Symbols Used on Boring Logs.

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

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

Fugro Consultants, Inc

MS River Long Distance Sediment Pipeline

SUMMARY OF TEST RESULTS - BORING B-41

LELAP Lab ID #10001

Jefferson Parish, Louisiana

Project No.
04.55084005

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquidity Index	Liquid Limit (%)	Plastic Limit (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer* (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
1	0-1.5				748															
2B	3-4				215					0.11										
3A	4-5	1.19	242	68	276															
3B	5-6				177					0.14										
4B	7-8				319					0.31	0.15									
5B	9-10				204					0.10										
6B	11-12	1.54	159	40	223	24	83			0.08										
7B	13-14				33					0.15										
8B	15-16				35					0.11										
9B	17-18				98					0.09										
10A	18-19	1.25	66	23	77															
10B	19-20				72					0.04										
11	23-25				84															
12B	29-30				80	54				0.21		UU	80	20	0.25		0.8	54	4.3	B
13A	33-34				73															
13B	34-35				91					0.21										
14B	39-40				75	57				0.23		UU	75	27	0.28		0.9	57	10.3	A

Notes:

NP = Non-Plastic Material
*Corrected as described on Terms and Symbols Used on Boring Logs.

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

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

Fugro Consultants, Inc

MS River Long Distance Sediment Pipeline

SUMMARY OF TEST RESULTS - BORING B-42

LELAP Lab ID #10001

Jefferson Parish, Louisiana

Project No.
04.55084005

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquidity Index	Liquid Limit (%)	Plastic Limit (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer* (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
1	0-1.5				379															
2A	2-3				518															
2B	3-4	1.23	203	55	236	25	63			0.10										
3B	5-6				61					0.19	0.30									
4B	7-8				40					0.51										
5B	9-10				106			0.75		0.64										
6A	10-11	0.54	88	36	64															
6B	11-12				78					0.25										
7B	13-14				94															
8B	15-16				153					0.39										
9B	17-18				171					0.19										
10B	19-20	0.70	200	52	156	31	73			0.11										
11	23-25	1.11	62	22	67															
12	28-30				78															
13B	34-35				77	55				0.12		UU	77	24	0.37		0.6	55	3.2	A
14A	38-39				76															
14B	39-40				72					0.28										
15B	44-45				74	55				0.33		UU	74	31	0.49		0.9	55	4.1	B
16A	48-49				61															
16B	49-50				61					0.33										
17A	53-54				73	58						UU	73	38	0.56		0.7	58	2.5	B
17B	54-55				72					0.28										
18A	58-59				63															
18B	59-60				69					0.35										

Notes:

NP = Non-Plastic Material
*Corrected as described on Terms and Symbols Used on Boring Logs.

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

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

Fugro Consultants, Inc

MS River Long Distance Sediment Pipeline

SUMMARY OF TEST RESULTS - BORING B-43

LELAP Lab ID #10001

Jefferson Parish, Louisiana

Project No.
04.55084005

Sample No.	Depth (ft)	Identification Tests						Field Shear Strength Estimate		Miniature Vane Tests		Compression Tests								
		Liquidity Index	Liquid Limit (%)	Plastic Limit (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer* (ksf)	Torvane (ksf)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	Type Test	Moisture Content (%)	Confining Pressure (psi)	Shear Strength (ksf)	Remolded Shear Strength (ksf)	E50 Strain (%)	Dry Unit Weight (pcf)	Failure Strain (%)	Type of Failure
16A	48-49							0.50												
16B	49-50				60	64				0.50		UU	60	34	0.76		0.8	64	2.5	C
17A	53-54							0.50												
17B	54-55	0.60	85	27	62		100			0.65										
18A	58-59							0.50												
18B	59-60				51	69				0.61		UU	51	41	0.70		1.0	69	5.3	B

Notes:

NP = Non-Plastic Material
*Corrected as described on Terms and Symbols Used on Boring Logs.

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

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

Fugro Consultants, Inc

MS River Long Distance Sediment Pipeline

SUMMARY OF TEST RESULTS - BORING B-17

LELAP Lab ID #10001

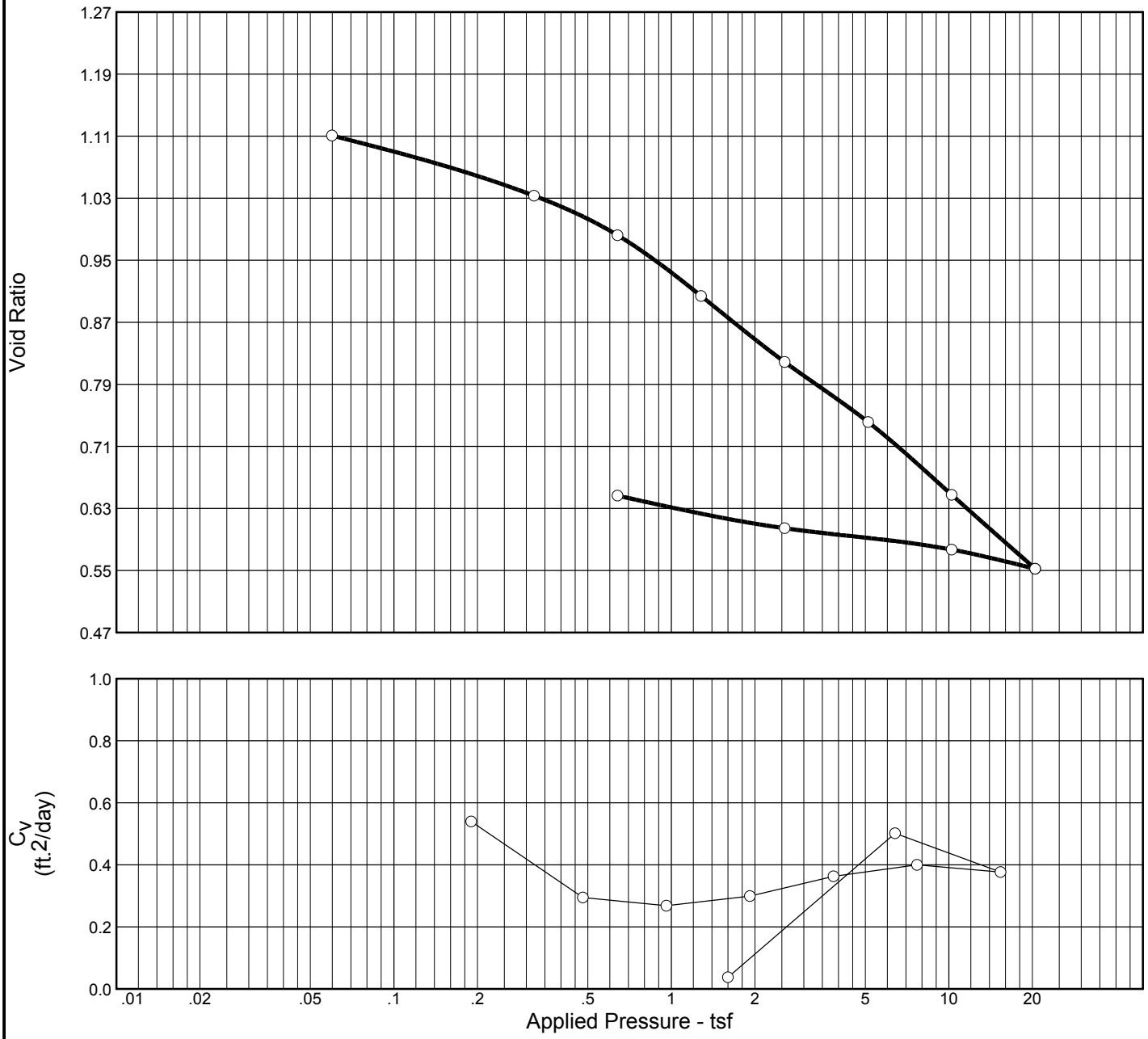
Jefferson Parish, Louisiana

Project No.
04.55084005

APPENDIX B

ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
87.4 %	36.8 %	78.1	41	18	2.643	0.33	0.44	0.30	0.07	1.113

MATERIAL DESCRIPTION	USCS	AASHTO
LEAN CLAY (CL), gray, with sand pockets	CL	

Project No. 04.55084005 **Client:** Moffat & Nichol - LDNR

Project: MS River Long Distance Sediment Pipeline

Source: B-3 **Sample No.:** 8B **Elev./Depth:** 15

Fugro Consultants, Inc.

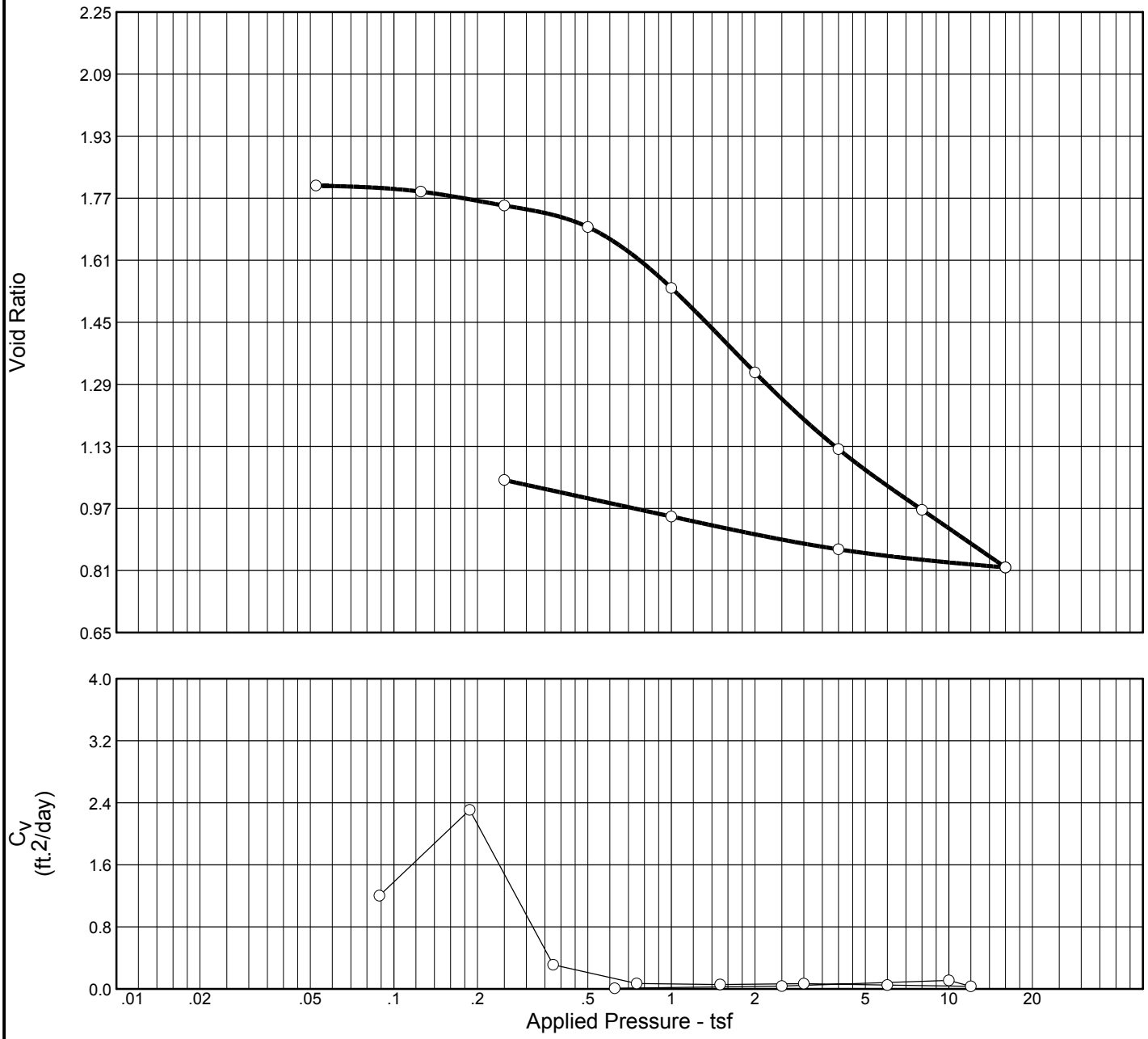
Baton Rouge, LA

Remarks:

Tested by: IK
Calculated by: KA
Checked by: YL

PLATE 1

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
100.5 %	67.8 %	59.5	72	48	2.673	0.60	0.64	0.68	0.12	1.803

MATERIAL DESCRIPTION	USCS	AASHTO
FAT CLAY (CH), gray, with silt seams	CH	

Project No. 04.55084005 **Client:** Moffat & Nichol - LDNR

Project: MS River Long Distance Sediment Pipeline

Source: B-3 **Sample No.:** 12B **Elev./Depth:** 29

Fugro Consultants, Inc.

Baton Rouge, LA

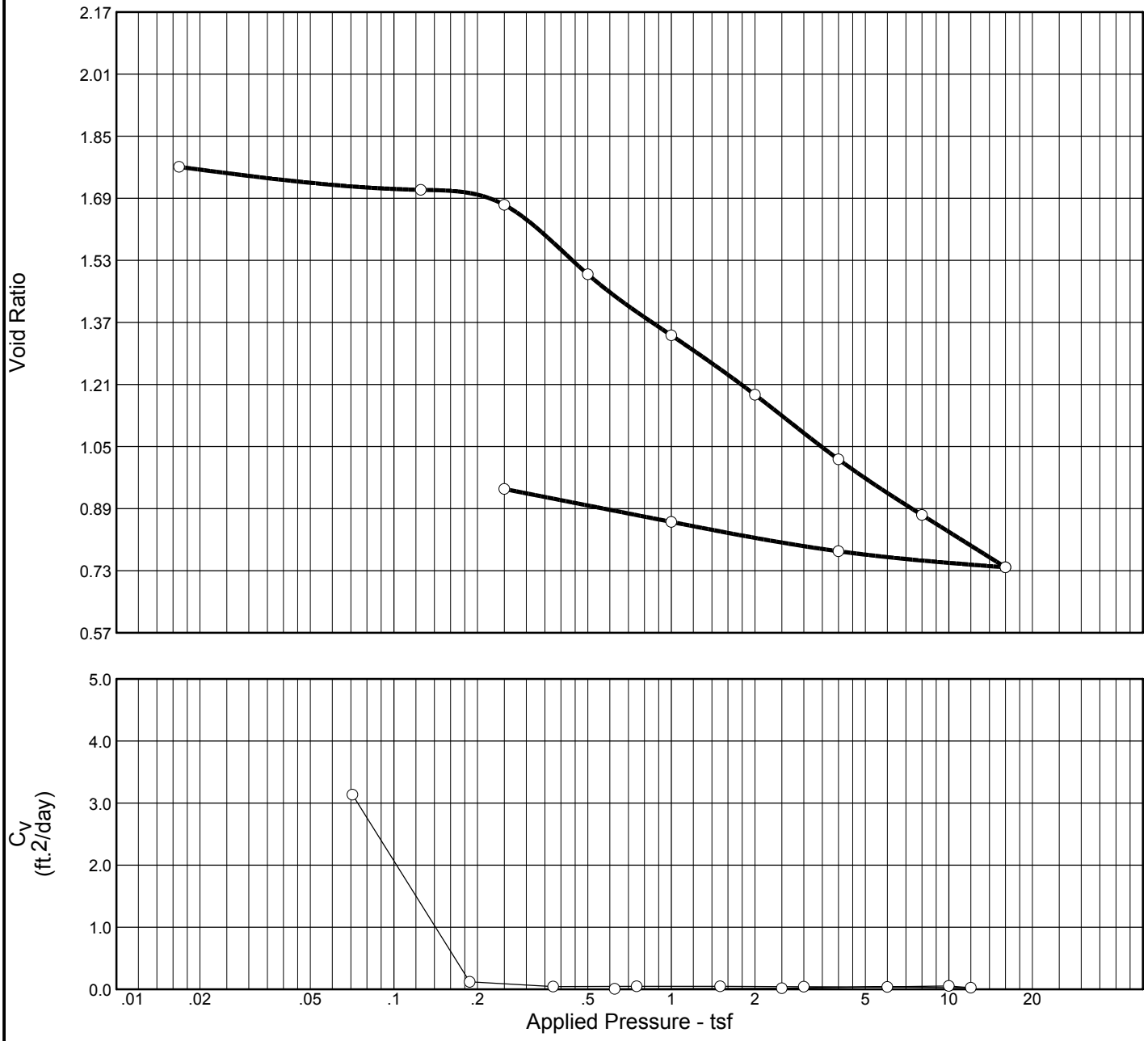
Remarks:

%-200=99.9

Tested by: IK
Calculated by: KA
Checked by: YL

PLATE 2

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
101.2 %	68.0 %	59.4	81	57	2.634	0.18	0.23	0.53	0.11	1.770

MATERIAL DESCRIPTION	USCS	AASHTO
FAT CLAY (CH), gray, with roots	CH	

Project No. 04.55084005 **Client:** Moffat & Nichol - LDNR

Project: MS River Long Distance Sediment Pipeline

Source: B-5 **Sample No.:** 4B **Elev./Depth:** 7

Fugro Consultants, Inc.

Baton Rouge, LA

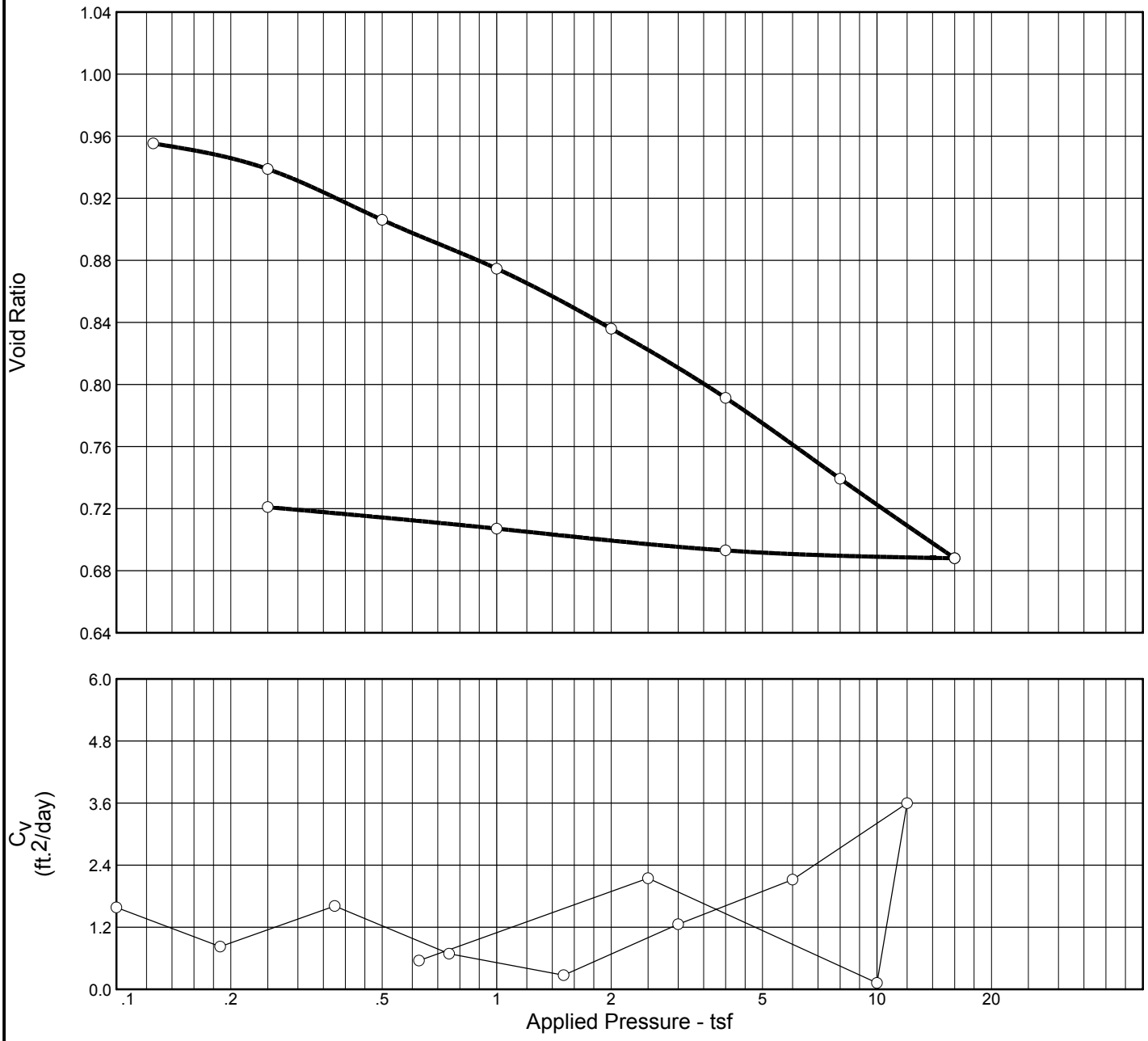
Remarks:

%-200=97.0

Tested by: IK
Calculated by: KA
Checked by: YL

PLATE 3

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
99.5 %	37.0 %	83.6	32	7	2.668	0.5	0.68	0.17	0.02	0.993

MATERIAL DESCRIPTION	USCS	AASHTO
LEAN CLAY (CL), dark gray, with sand pockets	CL	

Project No. 04.55084005 **Client:** Moffat & Nichol - LDNR

Project: MS River Long Distance Sediment Pipeline

Source: B-5 **Sample No.:** 10B **Elev./Depth:** 19

Fugro Consultants, Inc.

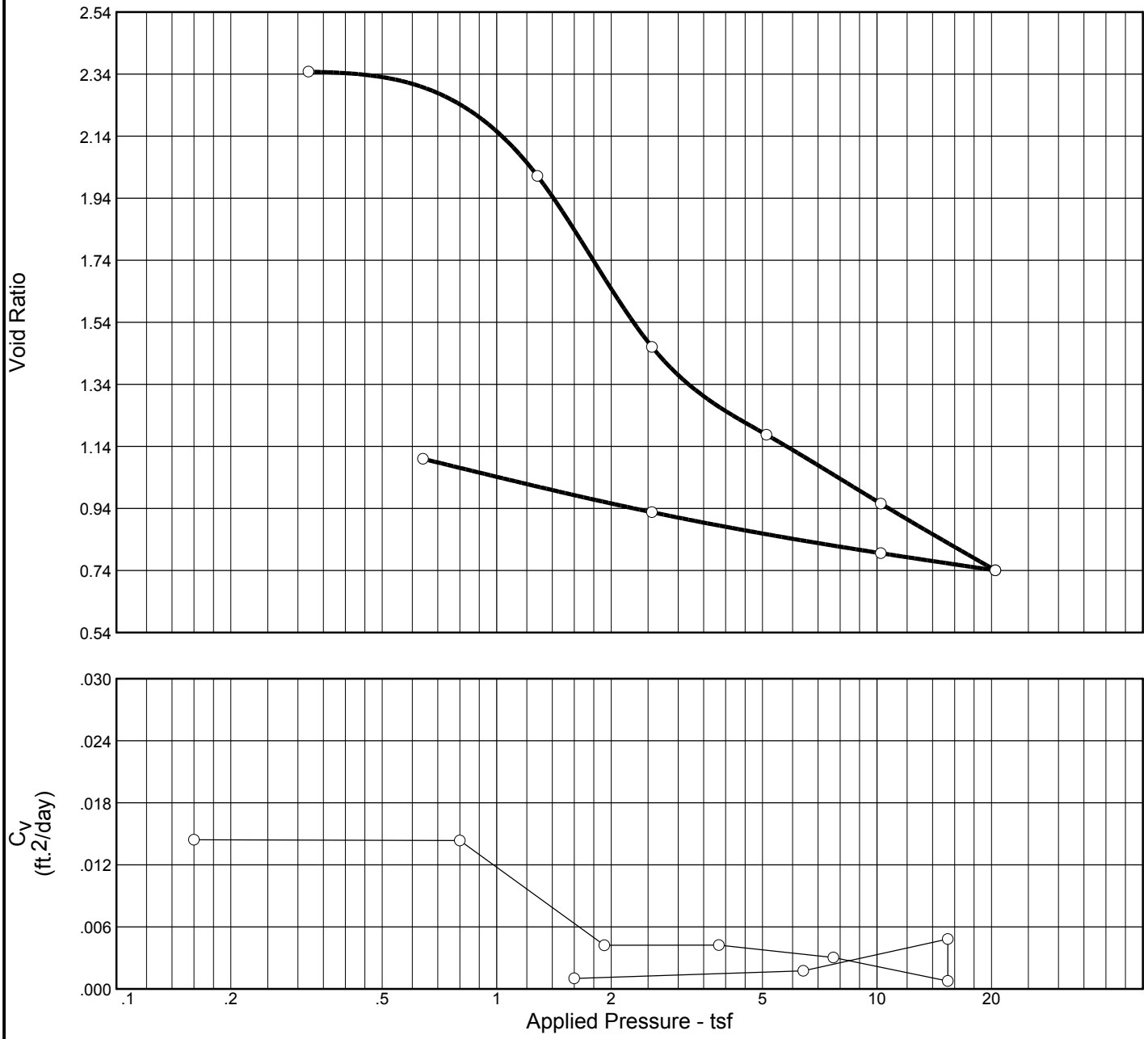
Baton Rouge, LA

Remarks:

%-200=96.5
Tested by: ERM/KA
Calculated by: KA
Checked by: YL

PLATE 4

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
104.0 %	125.4 %	39.2	133	96	2.600	0.03	0.03	1.87	0.23	3.136

MATERIAL DESCRIPTION	USCS	AASHTO
ORGANIC CLAY (OH), gray and black	OH	

Project No. 04.55084005 **Client:** Moffat & Nichol - LDNR

Project: MS River Long Distance Sediment Pipeline

Source: B-7 **Sample No.:** 2B **Elev./Depth:** 3

Fugro Consultants, Inc.

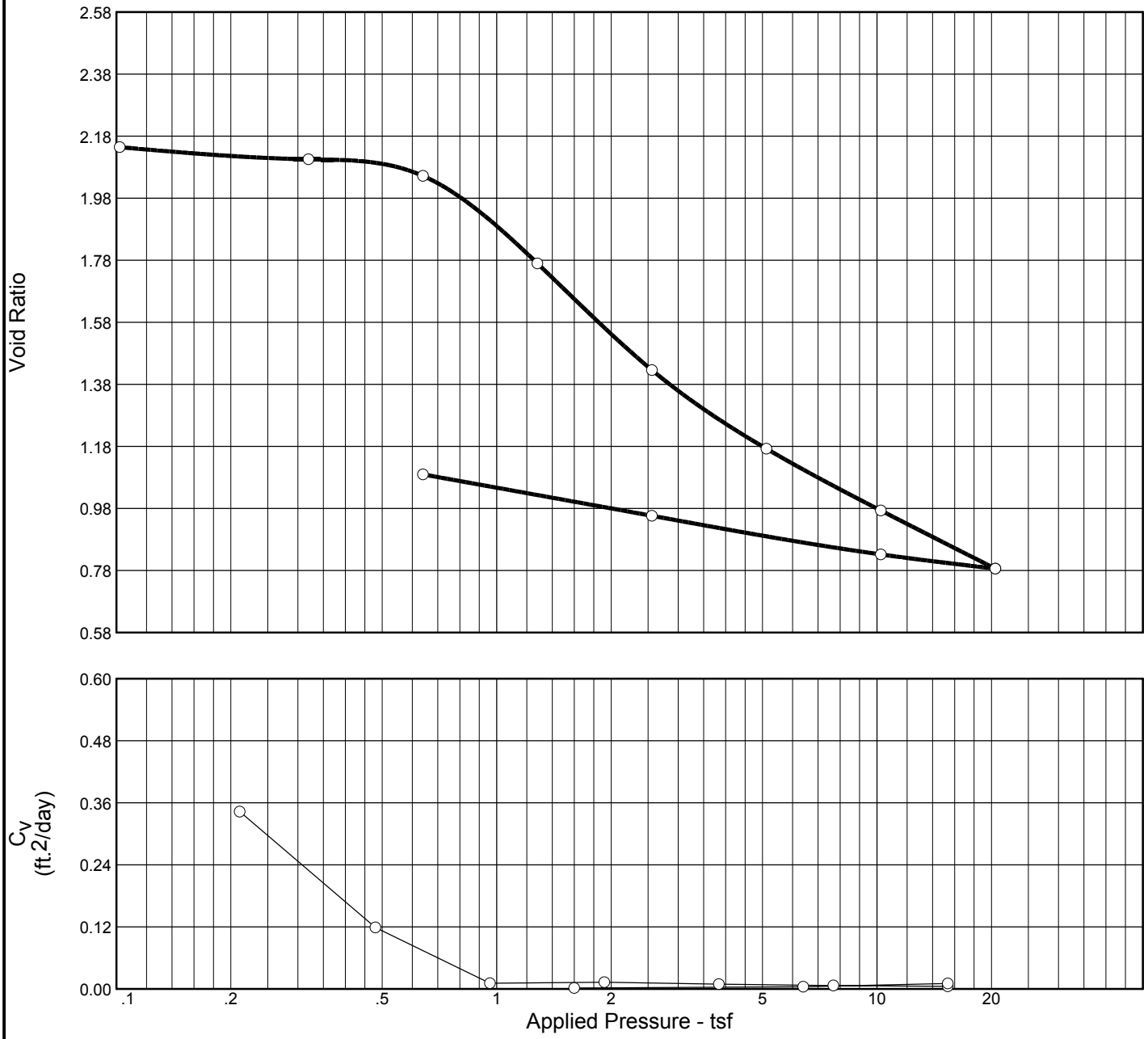
Baton Rouge, LA

Remarks:

Tested by: IK
Calculated by: KA
Checked by: YL

PLATE 5

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
93.5 %	74.0 %	53.8	85	58	2.709	0.51	0.70	1.12	0.19	2.145

MATERIAL DESCRIPTION	USCS	AASHTO
FAT CLAY (CH), gray	CH	

Project No. 04.55084005 **Client:** Moffat & Nichol - LDNR

Project: MS River Long Distance Sediment Pipeline

Source: B-7 **Sample No.:** 12B **Elev./Depth:** 29

Fugro Consultants, Inc.

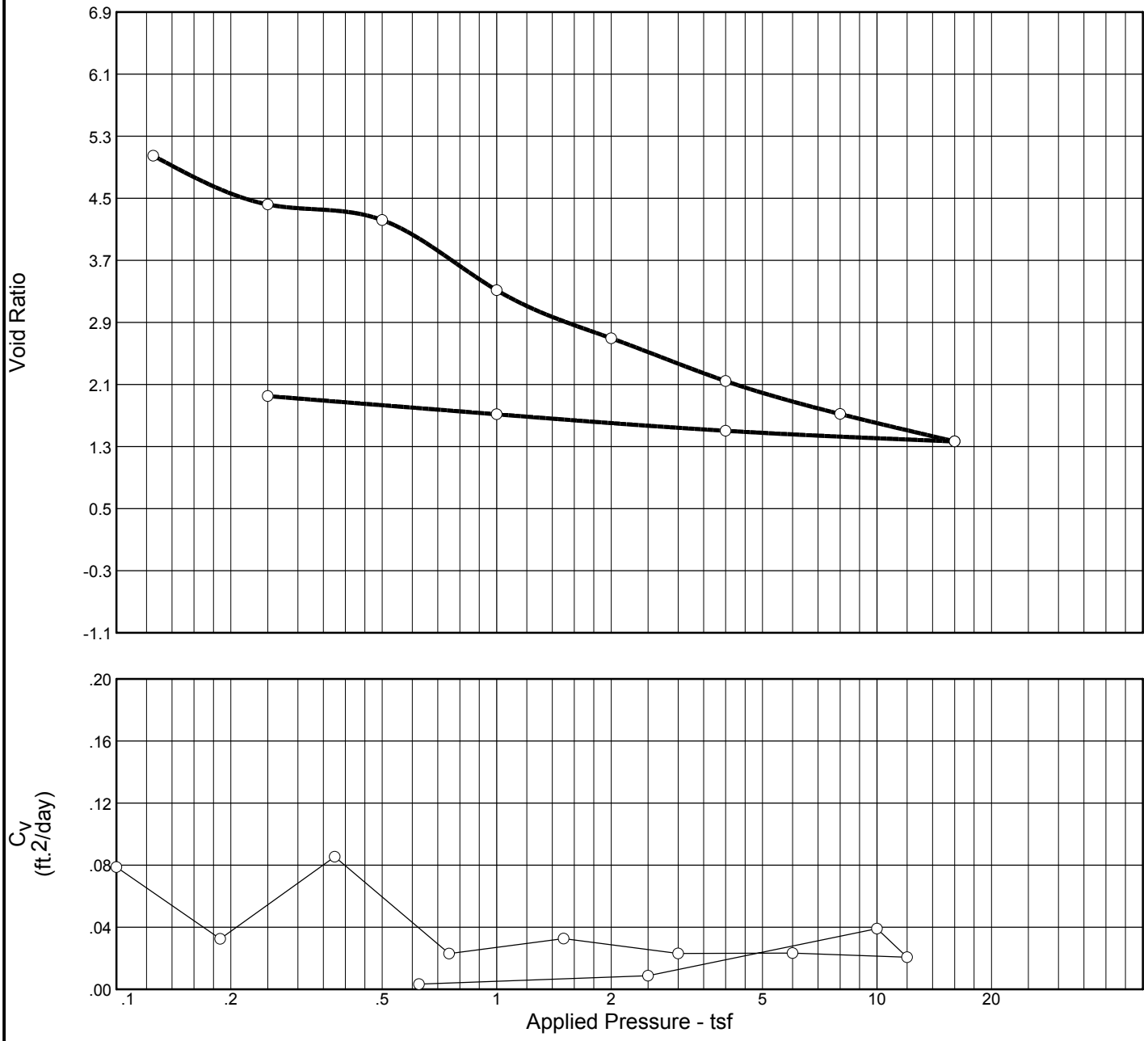
Baton Rouge, LA

Remarks:

Tested by: IK
Calculated by: KA
Checked by: YL

PLATE 6

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
106.5 %	264.3 %	21.6	191	137	2.446	0.025	0.025	1.9	0.32	6.072

MATERIAL DESCRIPTION	USCS	AASHTO
PEAT (PT), black	PT	

Project No. 04.55084005 **Client:** Moffat & Nichol - LDNR

Project: MS River Long Distance Sediment Pipeline

Source: B-9 **Sample No.:** 2B **Elev./Depth:** 3

Fugro Consultants, Inc.

Baton Rouge, LA

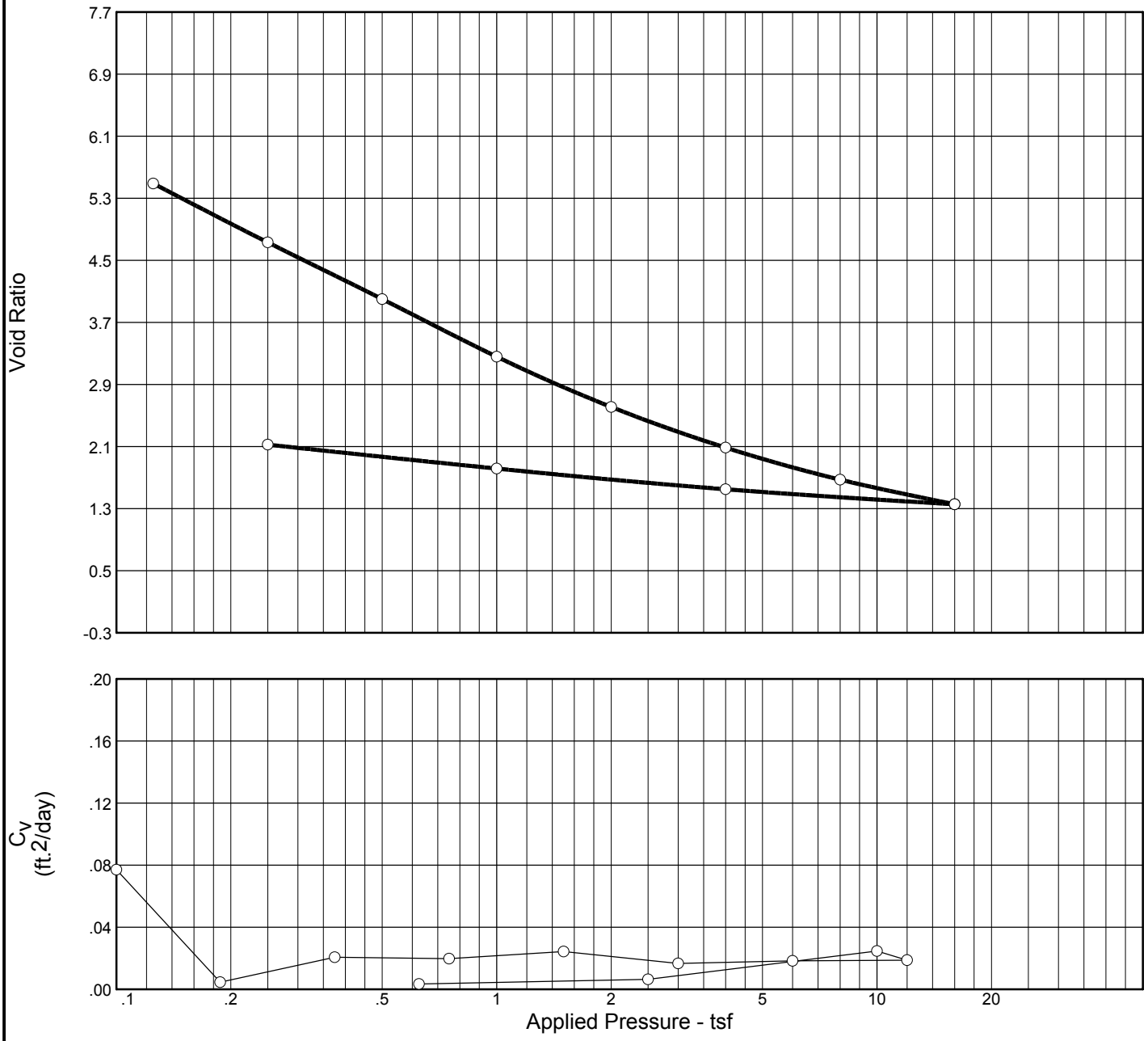
Remarks:

%-200=42.9

Tested by: IK
Calculated by: KA
Checked by: YL

PLATE 7

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
93.1 %	254.8 %	19.9	312	160	2.500	0.03	0.06	2.24	0.43	6.839

MATERIAL DESCRIPTION	USCS	AASHTO
PEAT, black	PT	

Project No. 04.55084005 **Client:** Moffat & Nichol - LDNR

Project: MS River Long Distance Sediment Pipeline

Source: B-11 **Sample No.:** 5 **Elev./Depth:** 9

Fugro Consultants, Inc.

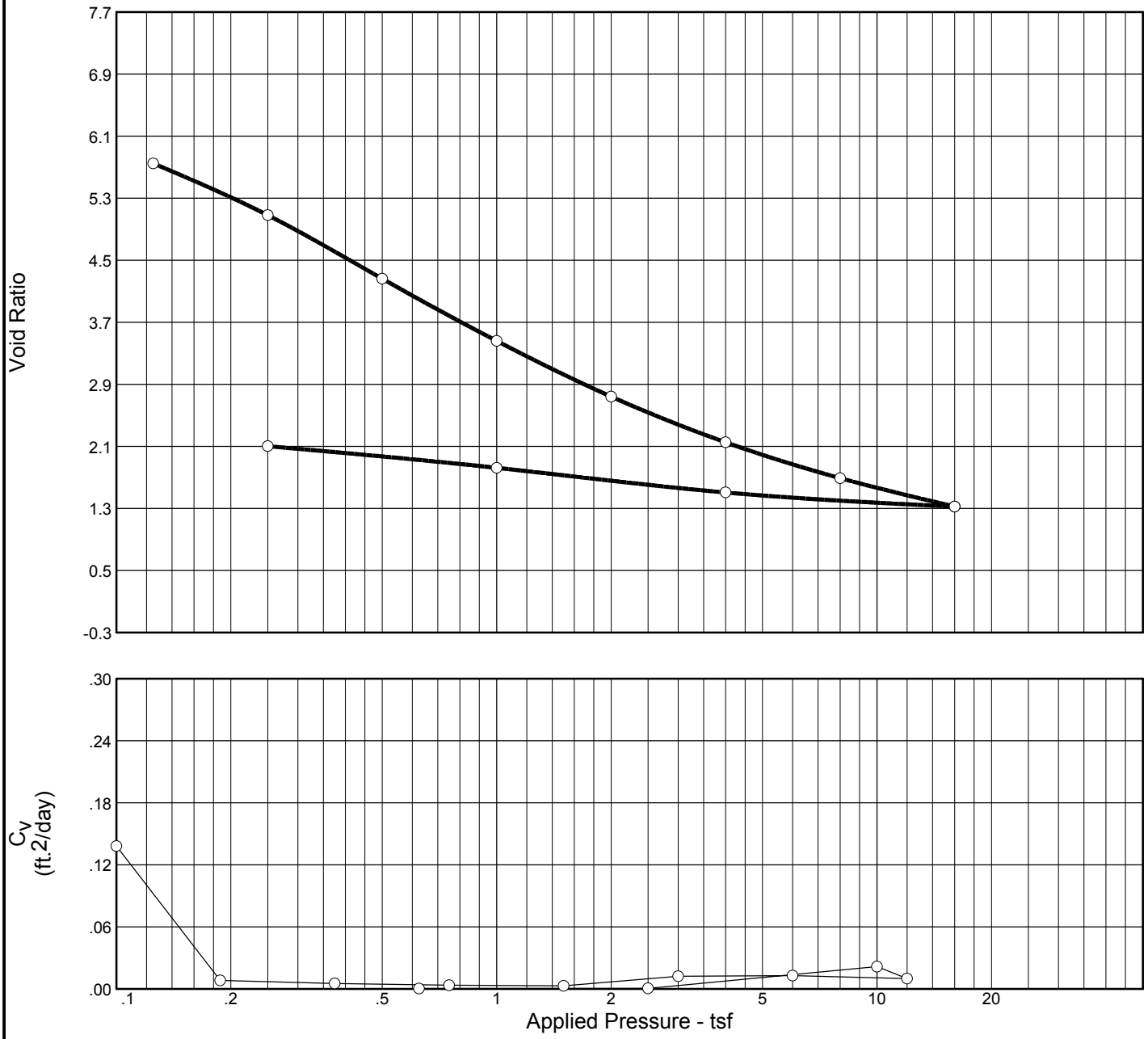
Baton Rouge, LA

Remarks:

%-200=80.2
Tested by: KA
Calculated by: KA
Checked by: YL

PLATE 8

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
94.1 %	283.2 %	18.2	287	230	2.352	0.03	0.03	2.68	0.43	7.076

MATERIAL DESCRIPTION	USCS	AASHTO
PEAT (PT), black	PT	

Project No. 04.55084005 **Client:** Moffat & Nichol - LDNR

Project: MS River Long Distance Sediment Pipeline

Source: B-12 **Sample No.:** 4B **Elev./Depth:** 7

Fugro Consultants, Inc.

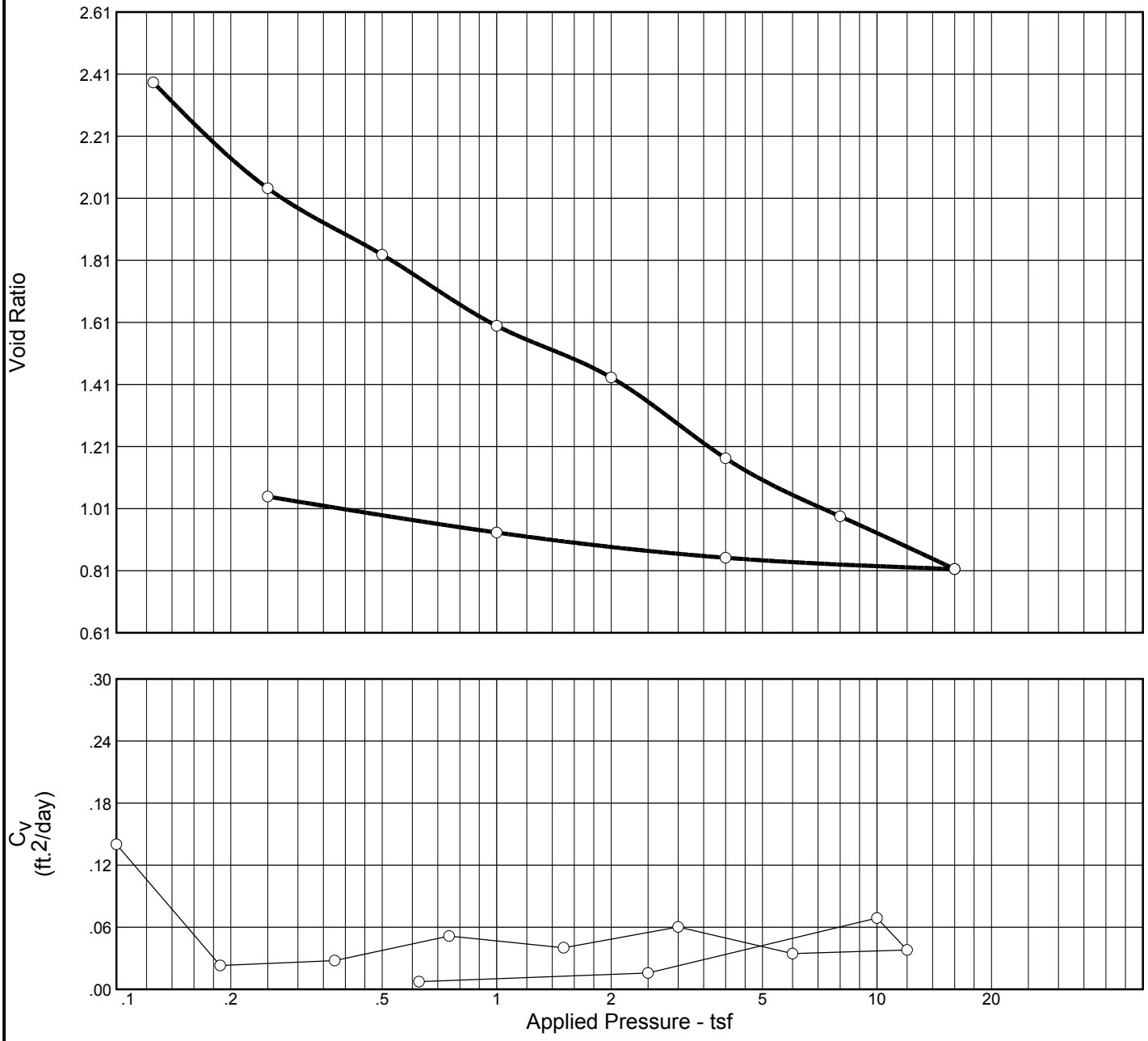
Baton Rouge, LA

Remarks:

Tested by: IK
Calculated by: KA
Checked by: YL

PLATE 9

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
90.4 %	90.9 %	45.0	76	50	2.622	0.15	0.15	0.66	0.13	2.635

MATERIAL DESCRIPTION	USCS	AASHTO
FAT CLAY (CH), gray, with wood and roots	CH	

Project No. 04.55084005 **Client:** Moffat & Nichol - LDNR

Project: MS River Long Distance Sediment Pipeline

Source: B-13 **Sample No.:** 9B **Elev./Depth:** 17

Fugro Consultants, Inc.

Baton Rouge, LA

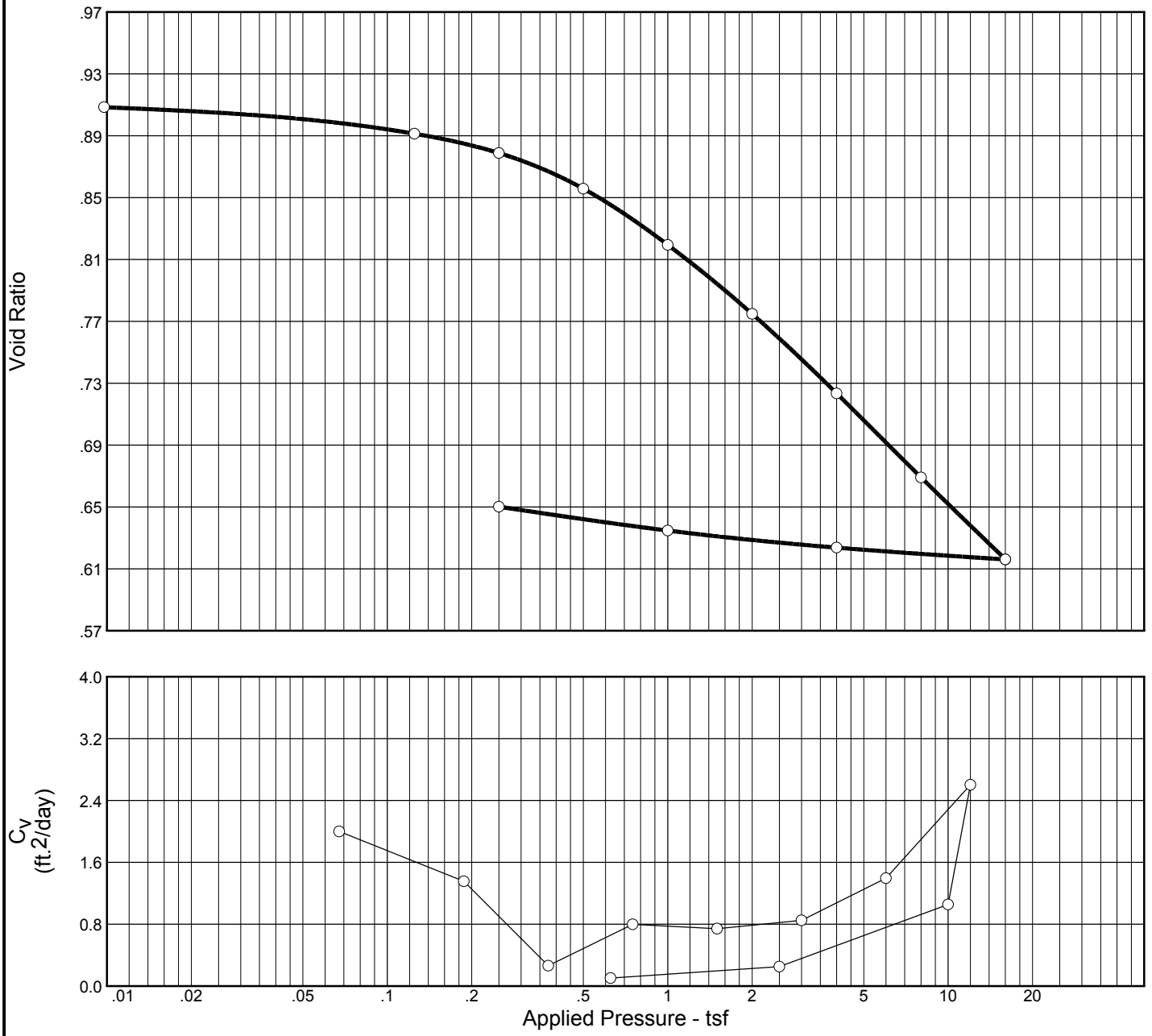
Remarks:

%-200=86.6

Tested by: IK
Calculated by: KA
Checked by: YL

PLATE 10

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
99.2 %	34.3 %	86.0	45	27	2.629	0.11	0.45	0.18	0.02	0.909

MATERIAL DESCRIPTION	USCS	AASHTO
LEAN CLAY (CL), gray, with sand traces	CL	

Project No. 04.55084005 **Client:** Moffat & Nichol - LDNR

Project: MS River Long Distance Sediment Pipeline

Source: B-15 **Sample No.:** 3B **Elev./Depth:** 5

Fugro Consultants, Inc.

Baton Rouge, LA

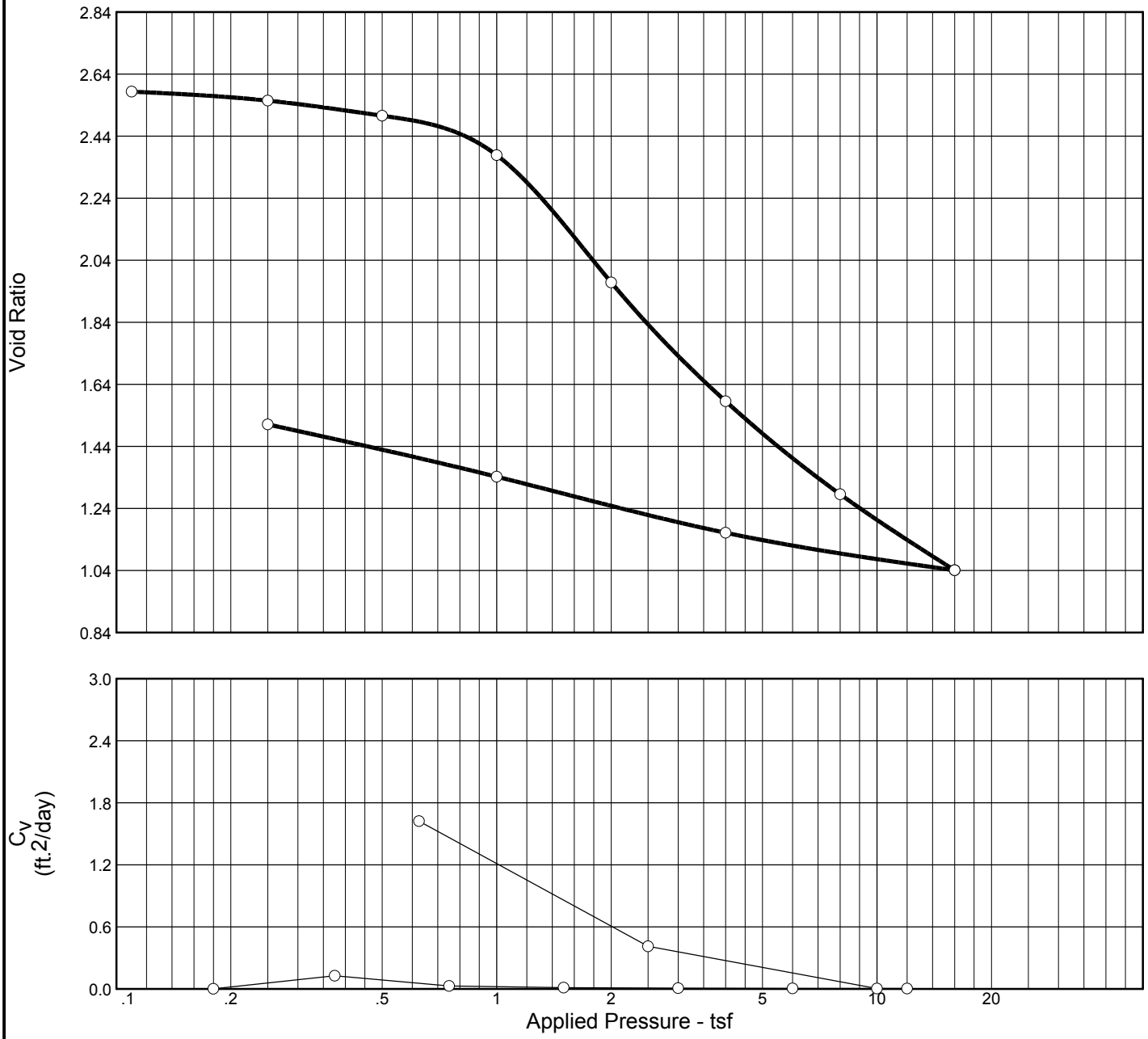
Remarks:

%-200=94.2

Tested by: IK
Calculated by: KA
Checked by: YL

PLATE 11

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
95.4 %	93.3 %	46.1	142	105	2.652	0.6	1.00	1.28	0.26	2.595

MATERIAL DESCRIPTION	USCS	AASHTO
ORGANIC CLAY (OH), gray	OH	

Project No. 04.55084005 **Client:** Moffat & Nichol - LDNR

Project: MS River Long Distance Sediment Pipeline

Source: B-15 **Sample No.:** 11B **Elev./Depth:** 24

Fugro Consultants, Inc.

Baton Rouge, LA

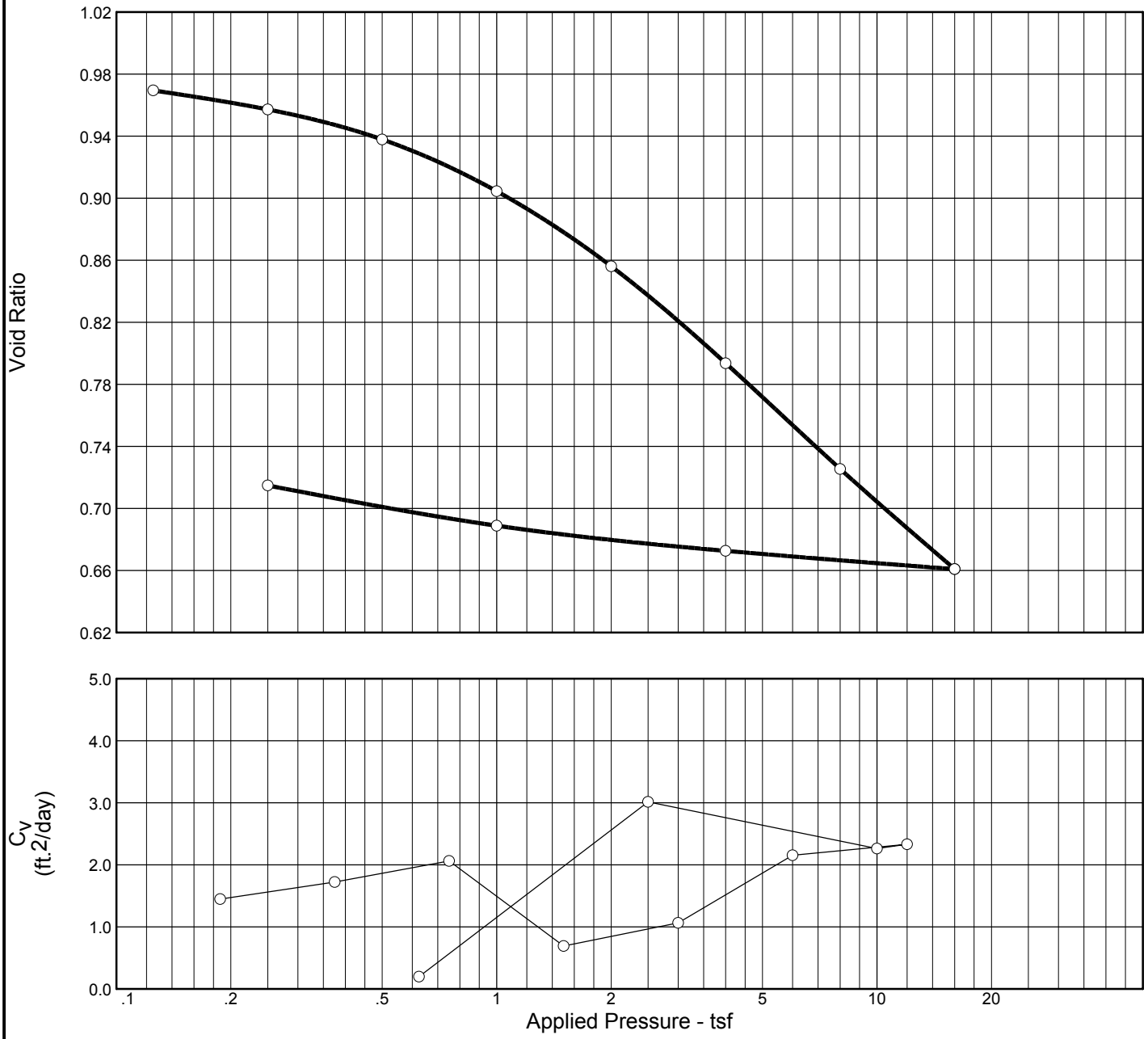
Remarks:

%-200= 96.3

Tested by: IK
Calculated by: KA
Checked by: YL

PLATE 12

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
99.1 %	37.7 %	82.2	44	23	2.640	0.45	0.95	0.22	0.03	1.004

MATERIAL DESCRIPTION	USCS	AASHTO
LEAN CLAY (CL), gray, with sand pockets	CL	

Project No. 04.55084005 **Client:** Moffat & Nichol - LDNR

Project: MS River Long Distance Sediment Pipeline

Source: B-17 **Sample No.:** 9B **Elev./Depth:** 17

Fugro Consultants, Inc.

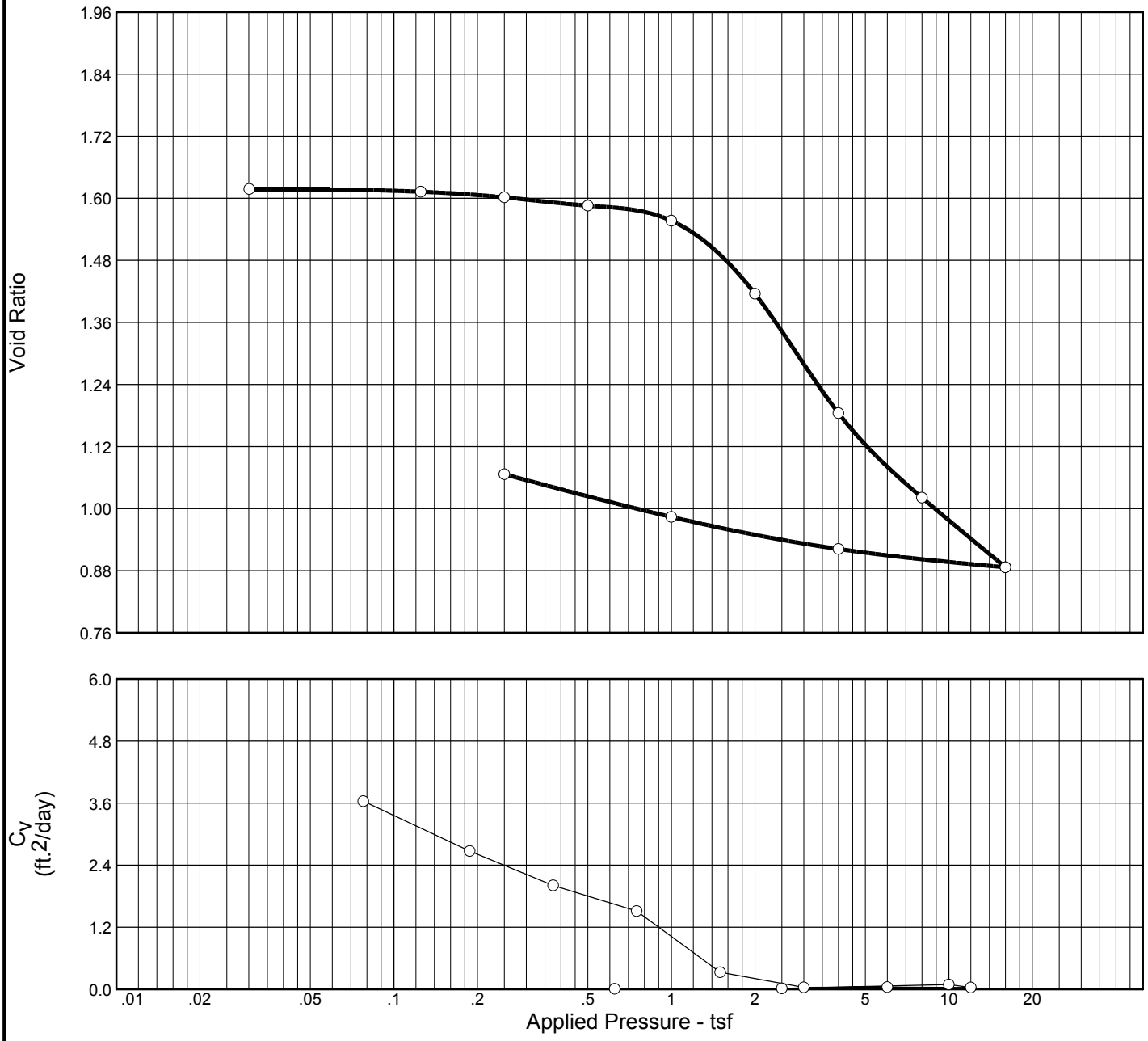
Baton Rouge, LA

Remarks:

Tested by: IK
Calculated by: KA
Checked by: YL

PLATE 13

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
112.2 %	66.3 %	65.3	85	58	2.443	1.40	1.40	0.60	0.11	1.620

MATERIAL DESCRIPTION	USCS	AASHTO
FAT CLAY (CH), dark gray	CH	

Project No. 04.55084005 **Client:** Moffat & Nichol - LDNR

Project: MS River Long Distance Sediment Pipeline

Source: B-17 **Sample No.:** 17B **Elev./Depth:** 54

Fugro Consultants, Inc.

Baton Rouge, LA

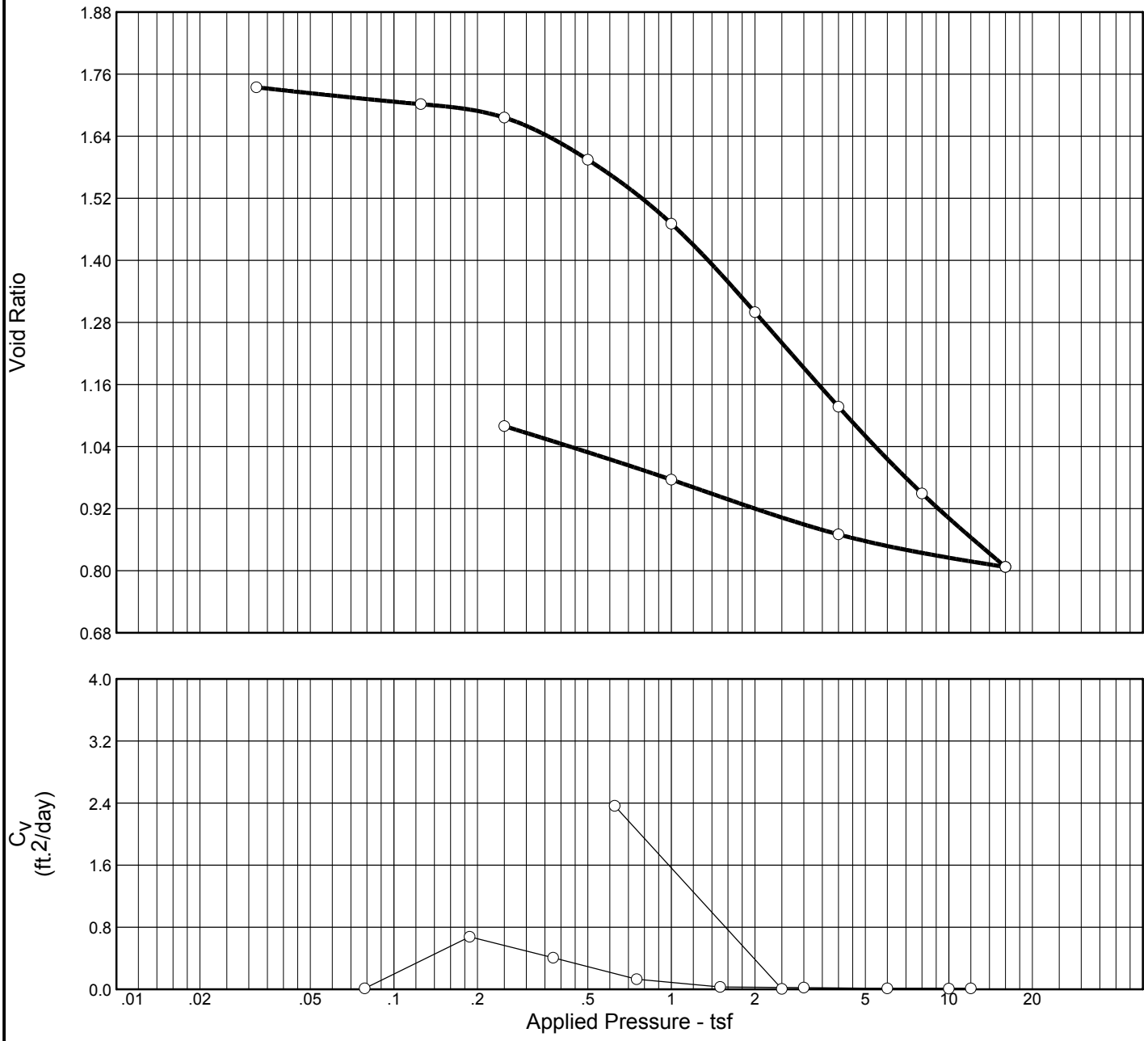
Remarks:

%-200=99.9

Tested by: IK
Calculated by: KA
Checked by: YL

PLATE 14

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
93.3 %	60.3 %	61.3	94	64	2.686	0.05	0.40	0.58	0.15	1.736

MATERIAL DESCRIPTION	USCS	AASHTO
FAT CLAY (CH), gray, with roots	CH	

Project No. 04.55084005 **Client:** Moffat & Nichol - LDNR

Project: MS River Long Distance Sediment Pipeline

Source: B-18 **Sample No.:** 4B **Elev./Depth:** 7

Fugro Consultants, Inc.

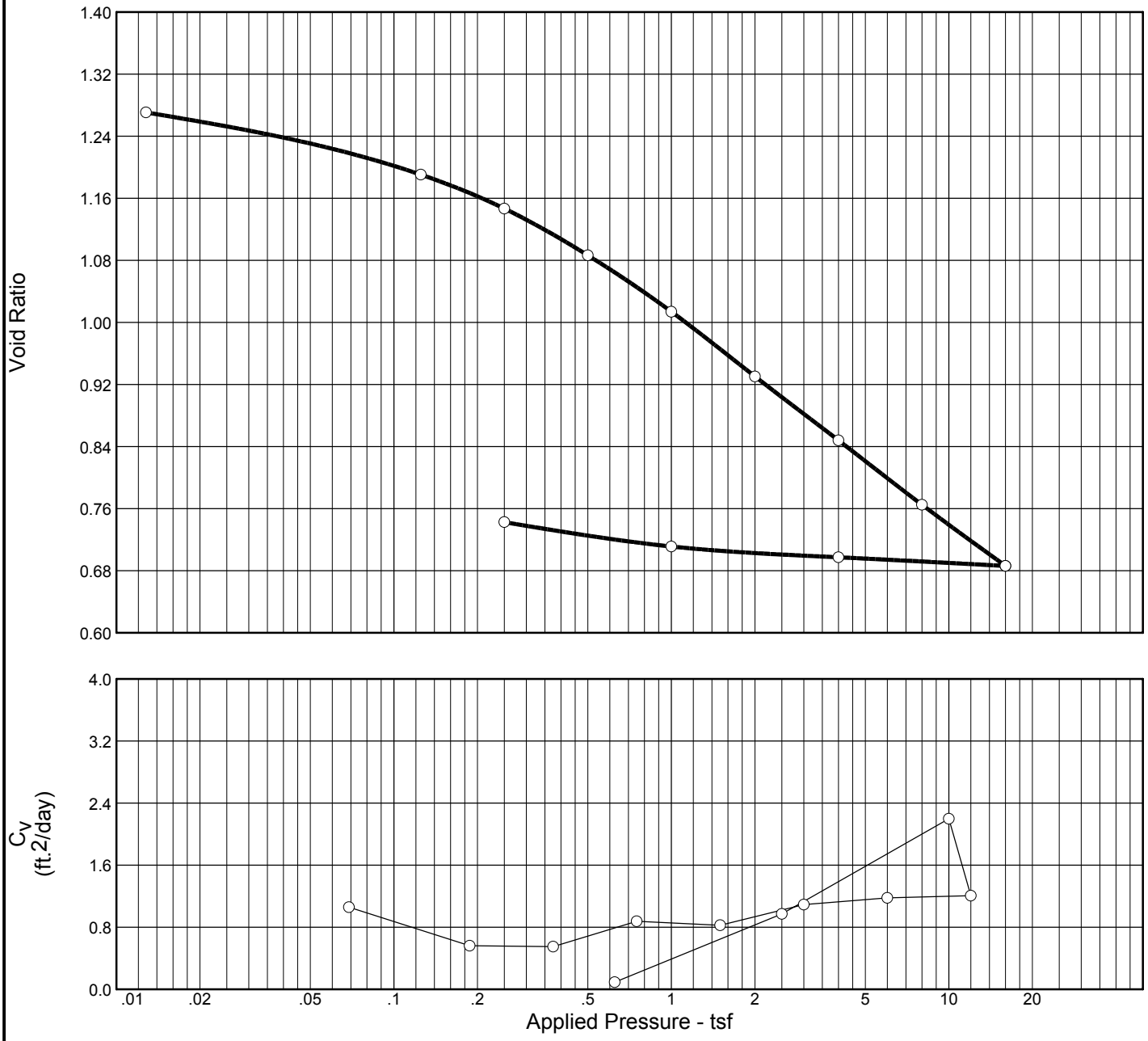
Baton Rouge, LA

Remarks:

%-200=99.0
Tested by: IK
Calculated by: KA
Checked by: YL

PLATE 15

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
102.1 %	49.1 %	72.7	70	47	2.643	0.08	0.14	0.26	0.03	1.271

MATERIAL DESCRIPTION	USCS	AASHTO
FAT CLAY (CH), gray, with organic traces	CH	

Project No. 04.55084005 **Client:** Moffat & Nichol - LDNR

Project: MS River Long Distance Sediment Pipeline

Source: B-19 **Sample No.:** 4B **Elev./Depth:** 7

Fugro Consultants, Inc.

Baton Rouge, LA

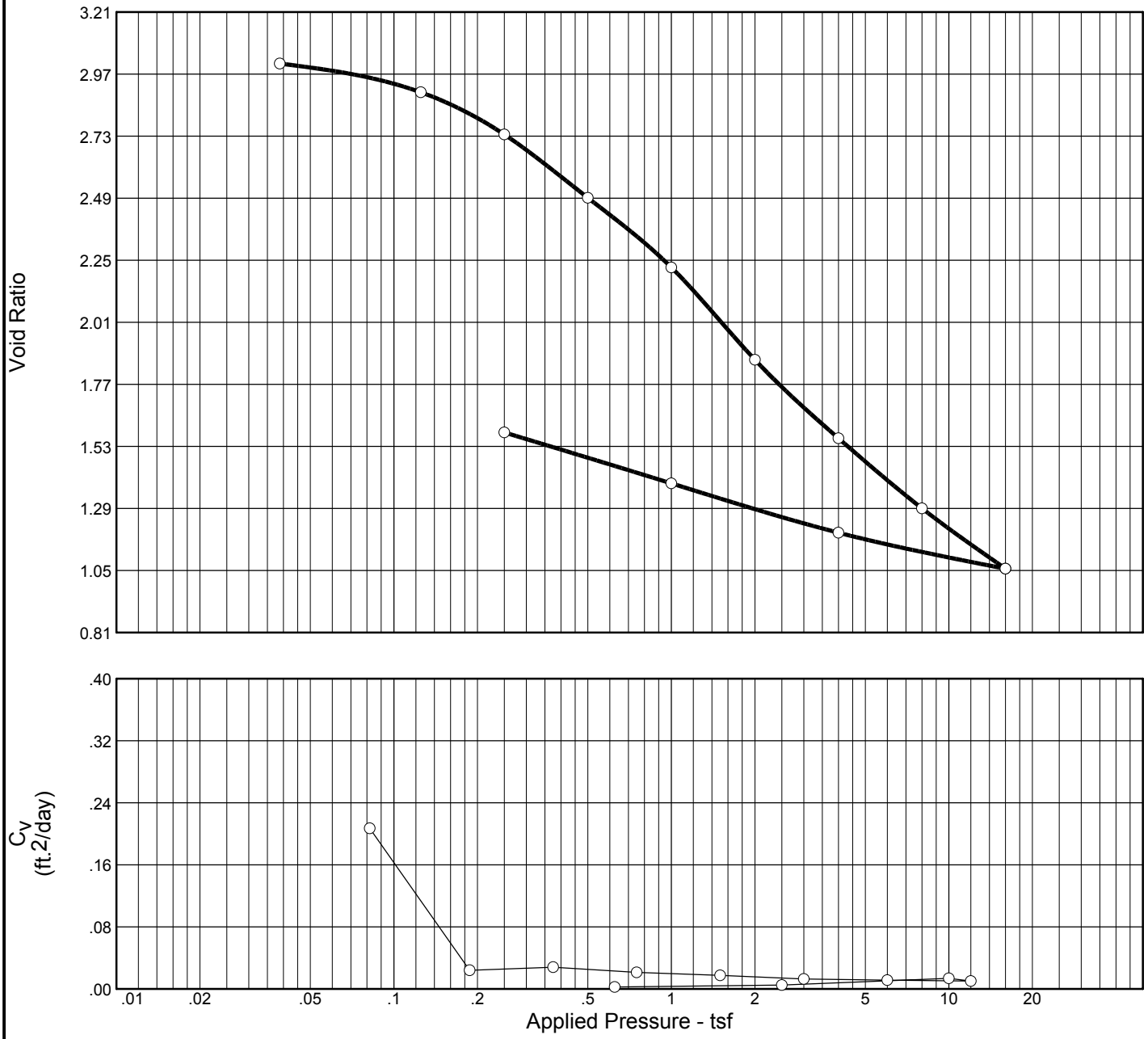
Remarks:

%-200=99.9

Tested by: IK
Calculated by: KA
Checked by: YL

PLATE 16

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
97.8 %	110.3 %	41.5	115	81	2.669	0.08	0.18	0.93	0.29	3.011

MATERIAL DESCRIPTION	USCS	AASHTO
FAT CLAY (CH), gray, with organic seams	CH	

Project No. 04.55084005 **Client:** Moffat & Nichol - LDNR

Project: MS River Long Distance Sediment Pipeline

Source: B-26 **Sample No.:** 4 **Elev./Depth:** 7

Fugro Consultants, Inc.

Baton Rouge, LA

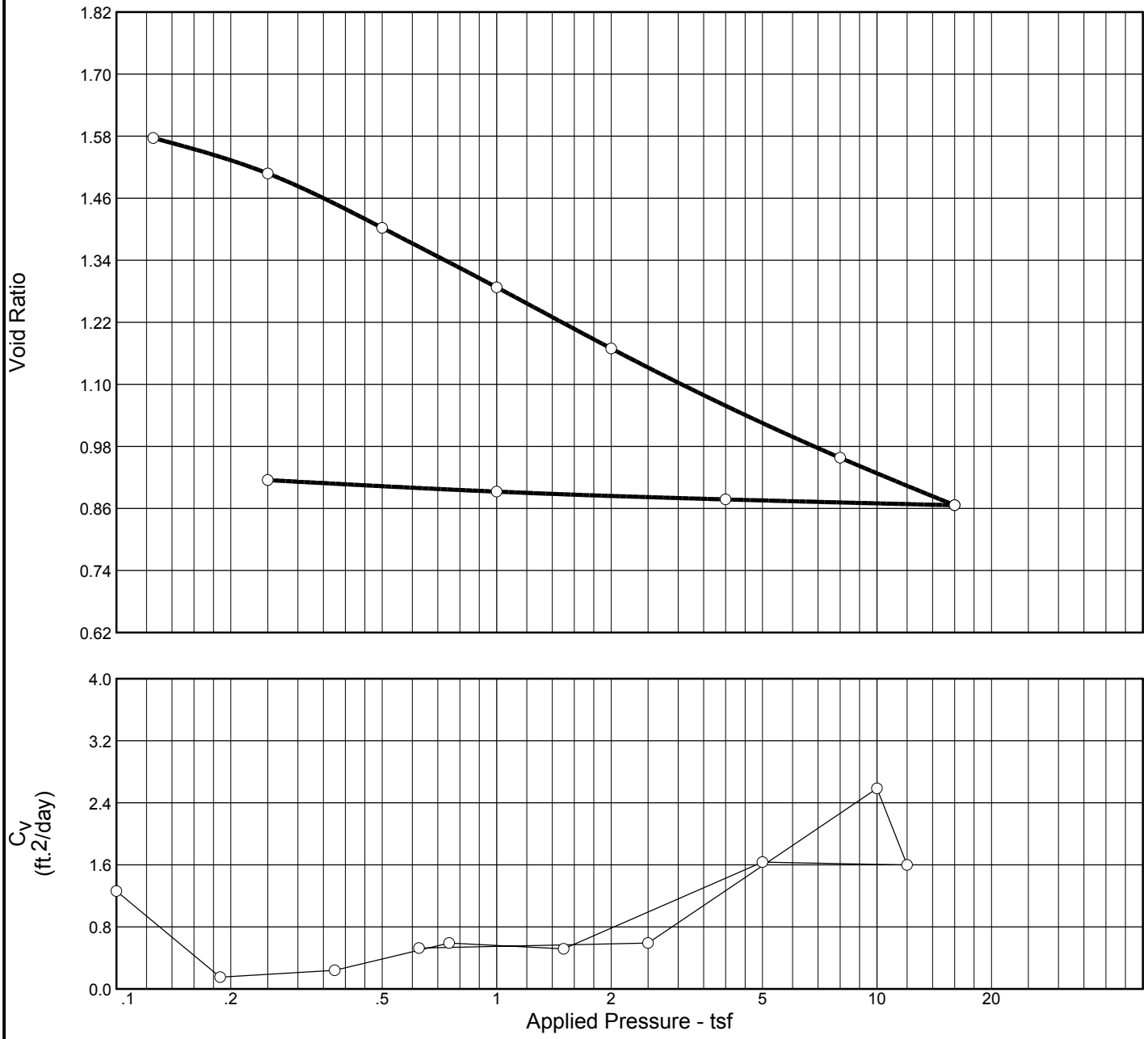
Remarks:

%-200=98.6

Tested by: IK
Calculated by: KA
Checked by: YL

PLATE 17

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
109.8 %	72.3 %	60.2	44	24	2.644	0.09	0.09	0.39	0.03	1.741

MATERIAL DESCRIPTION	USCS	AASHTO
LEAN CLAY (CL), gray, with sand pockets	CL	

Project No. 04.55084005 **Client:** Moffat & Nichol - LDNR

Project: MS River Long Distance Sediment Pipeline

Source: B-28 **Sample No.:** 4B **Elev./Depth:** 7

Fugro Consultants, Inc.

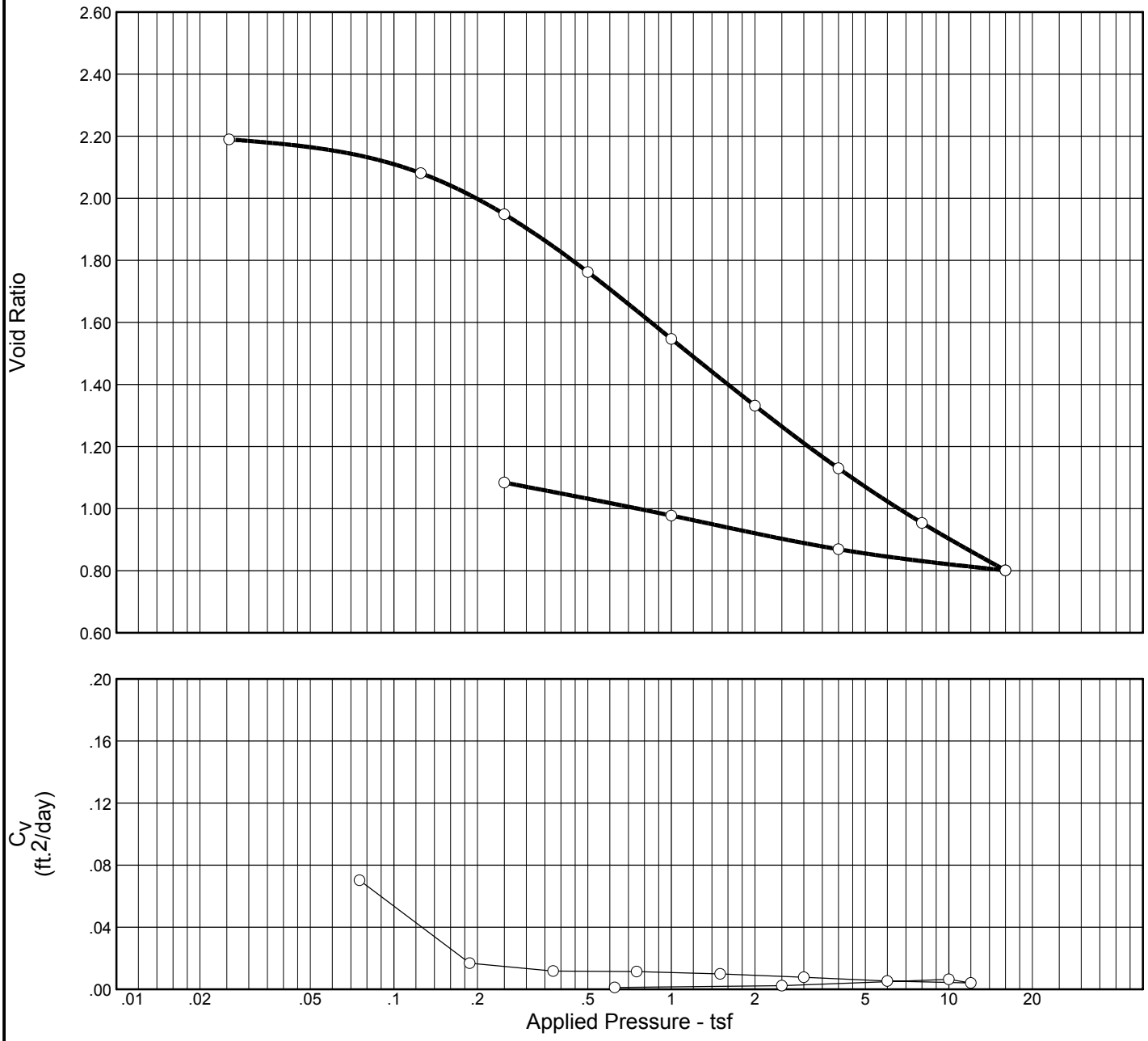
Baton Rouge, LA

Remarks:

Tested by: IK
Calculated by: KA
Checked by: YL

PLATE 18

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
97.7 %	79.6 %	52.6	86	58	2.688	0.21	0.17	0.70	0.16	2.190

MATERIAL DESCRIPTION	USCS	AASHTO
FAT CLAY (CH), gray, with organics	CH	

Project No. 04.55084005 **Client:** Moffat & Nichol - LDNR

Project: MS River Long Distance Sediment Pipeline

Source: B-28 **Sample No.:** 7B **Elev./Depth:** 13

Fugro Consultants, Inc.

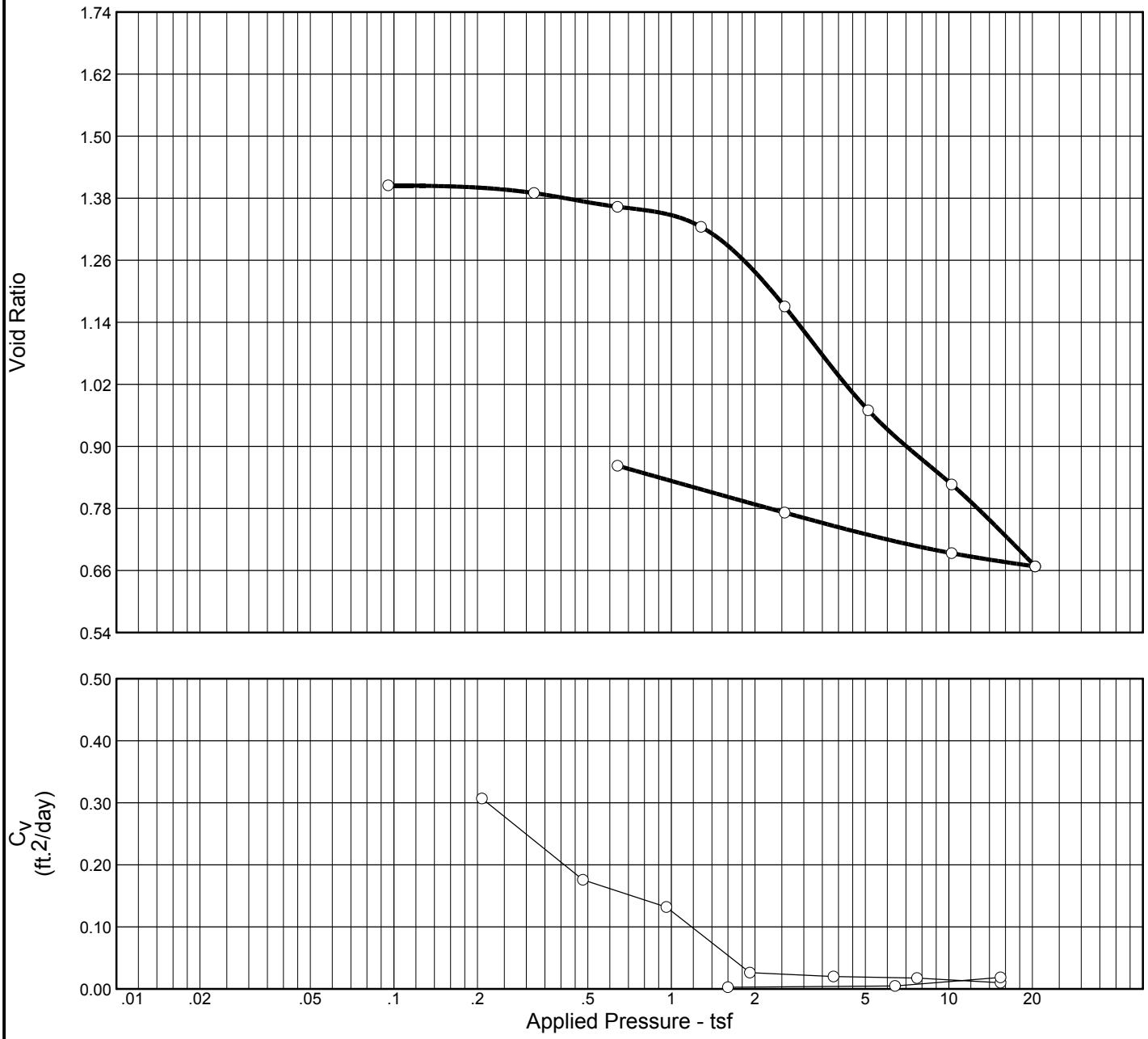
Baton Rouge, LA

Remarks:

Tested by: IK
Calculated by: KA
Checked by: YL

PLATE 19

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
95.7 %	49.7 %	70.2	69	46	2.705	1.20	1.35	0.57	0.12	1.405

MATERIAL DESCRIPTION	USCS	AASHTO
FAT CLAY (CH), gray	CH	

Project No. 04.55084005 **Client:** Moffat & Nichol - LDNR

Project: MS River Long Distance Sediment Pipeline

Source: B-28 **Sample No.:** 17B **Elev./Depth:** 54

Fugro Consultants, Inc.

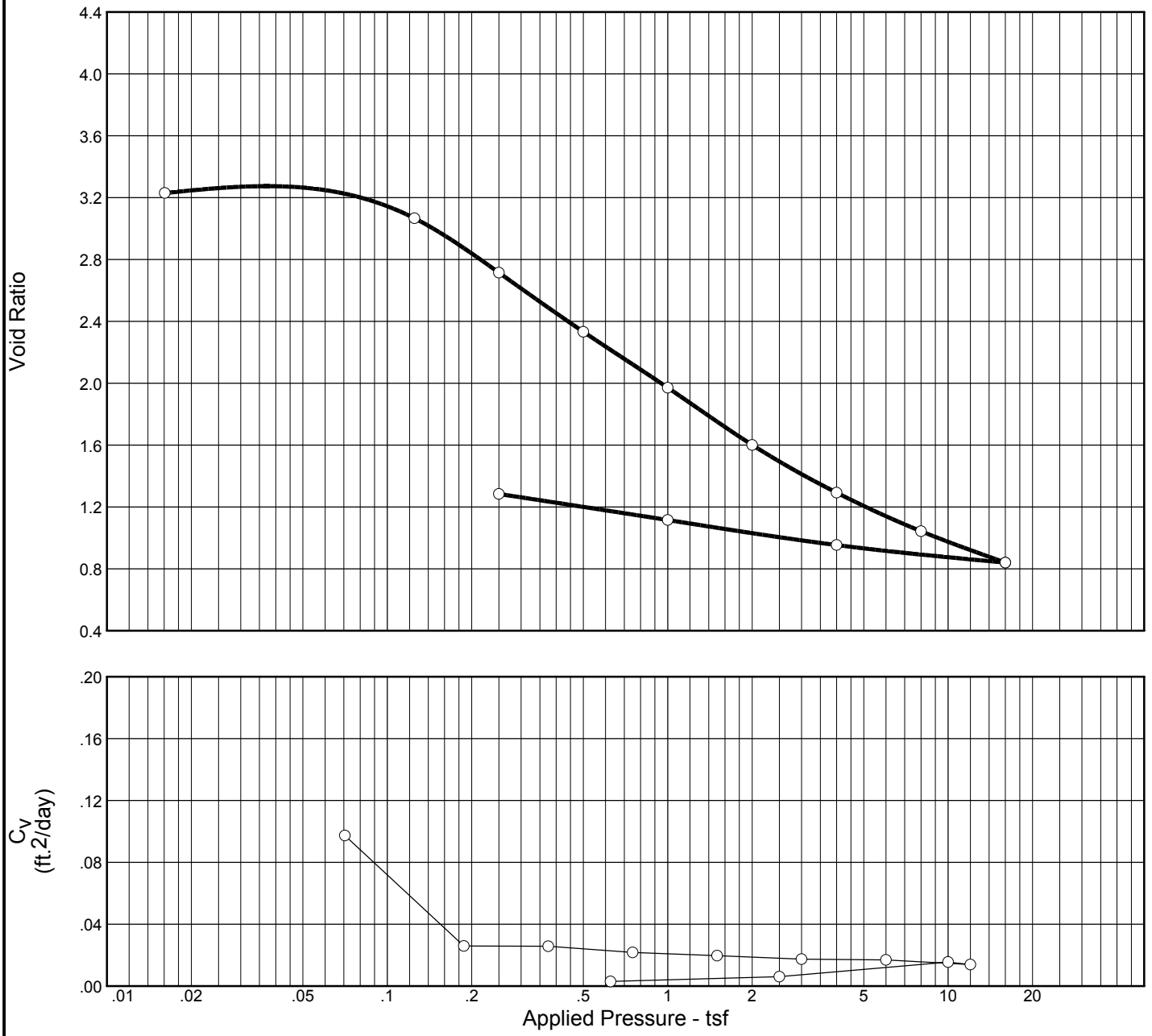
Baton Rouge, LA

Remarks:

Tested by: IK
Calculated by: KA
Checked by: JEA

PLATE 20

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
105.2 %	129.5 %	38.7	152	111	2.625	0.03	0.03	1.21	0.25	3.231

MATERIAL DESCRIPTION	USCS	AASHTO
ORGANIC CLAY (OH), gray	OH	

Project No. 04.55084005 **Client:** Moffat & Nichol - LDNR

Project: MS River Long Distance Sediment Pipeline

Source: B-38 **Sample No.:** 2B **Elev./Depth:** 3

Fugro Consultants, Inc.

Baton Rouge, LA

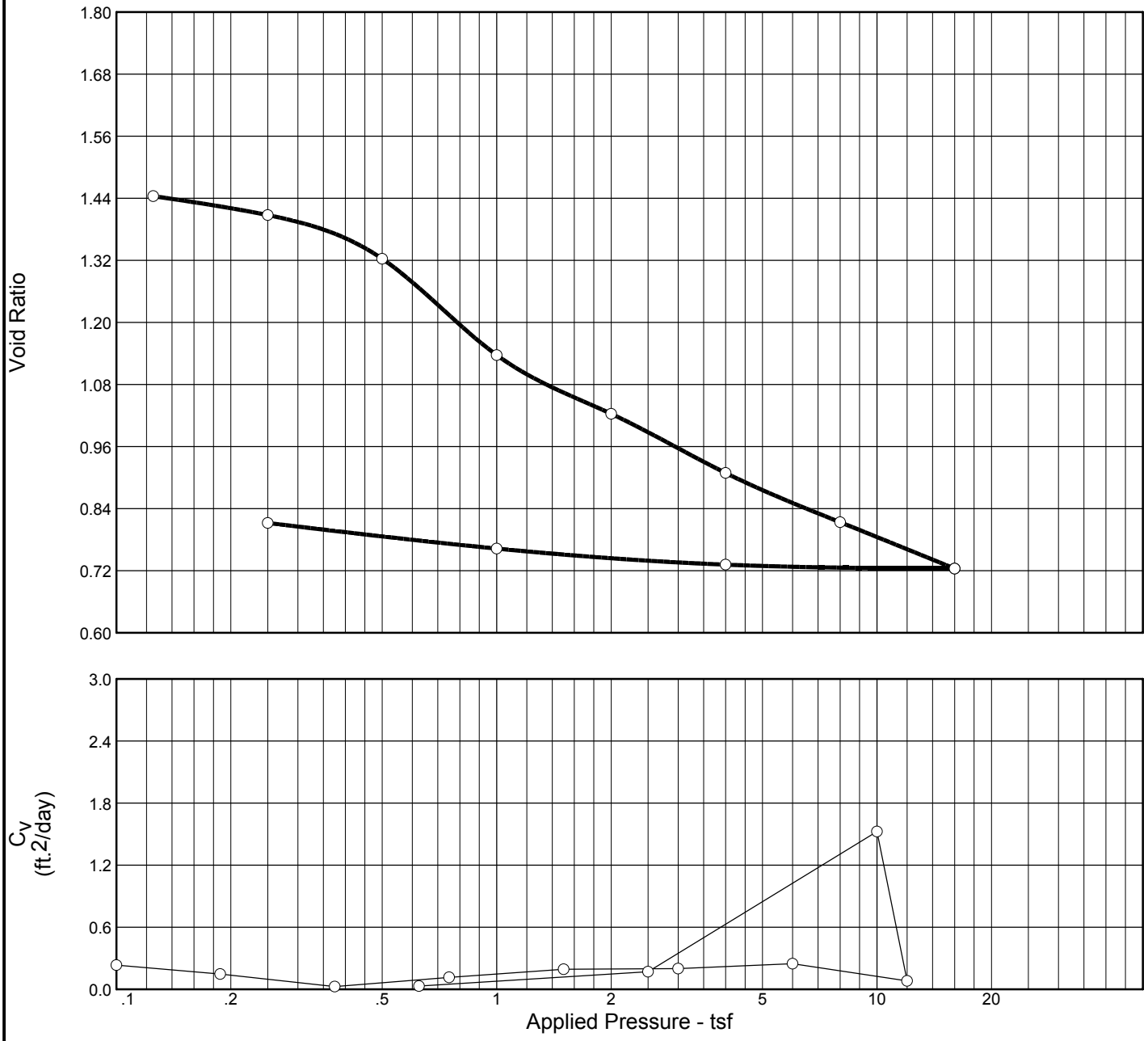
Remarks:

%-200=98.3

Tested by: IK
Calculated by: KA
Checked by: YL

PLATE 21

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
96.1 %	52.9 %	68.4	54	33	2.761	0.35	0.40	0.35	0.05	1.519

MATERIAL DESCRIPTION	USCS	AASHTO
FAT CLAY (CH), gray	CH	

Project No. 04.55084005 **Client:** Moffat & Nichol - LDNR

Project: MS River Long Distance Sediment Pipeline

Source: B-38 **Sample No.:** 10B **Elev./Depth:** 19

Fugro Consultants, Inc.

Baton Rouge, LA

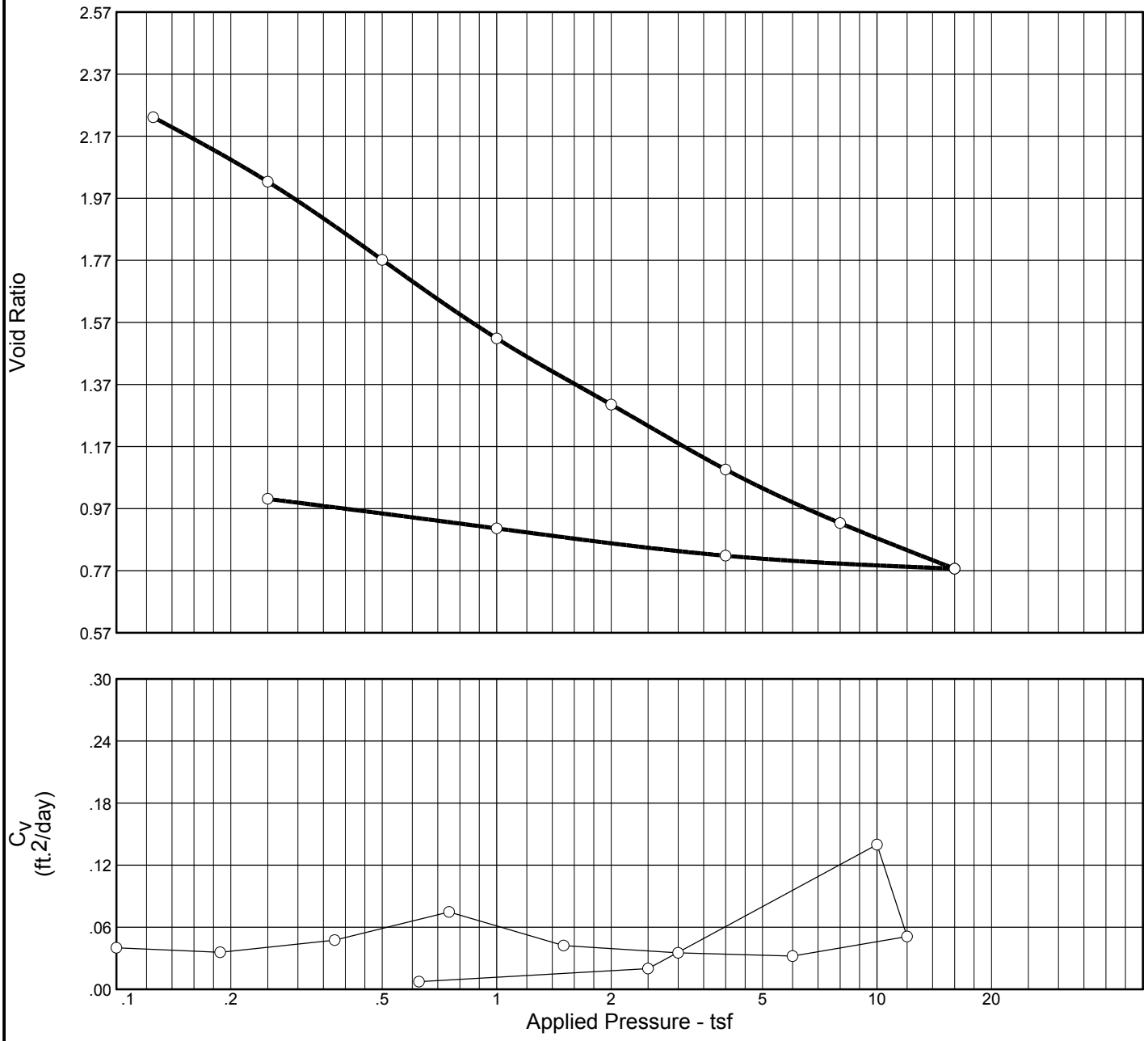
Remarks:

%-200=99.7

Tested by: IK
Calculated by: KA
Checked by: YL

PLATE 22

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
93.8 %	88.0 %	47.5	82	56	2.659	0.14	0.14	0.76	0.12	2.495

MATERIAL DESCRIPTION	USCS	AASHTO
FAT CLAY (CH), dark brown, with organics and shell fragments	CH	

Project No. 04.55084005 **Client:** Moffat & Nichol - LDNR

Project: MS River Long Distance Sediment Pipeline

Source: B-40 **Sample No.:** 7B **Elev./Depth:** 13

Fugro Consultants, Inc.

Baton Rouge, LA

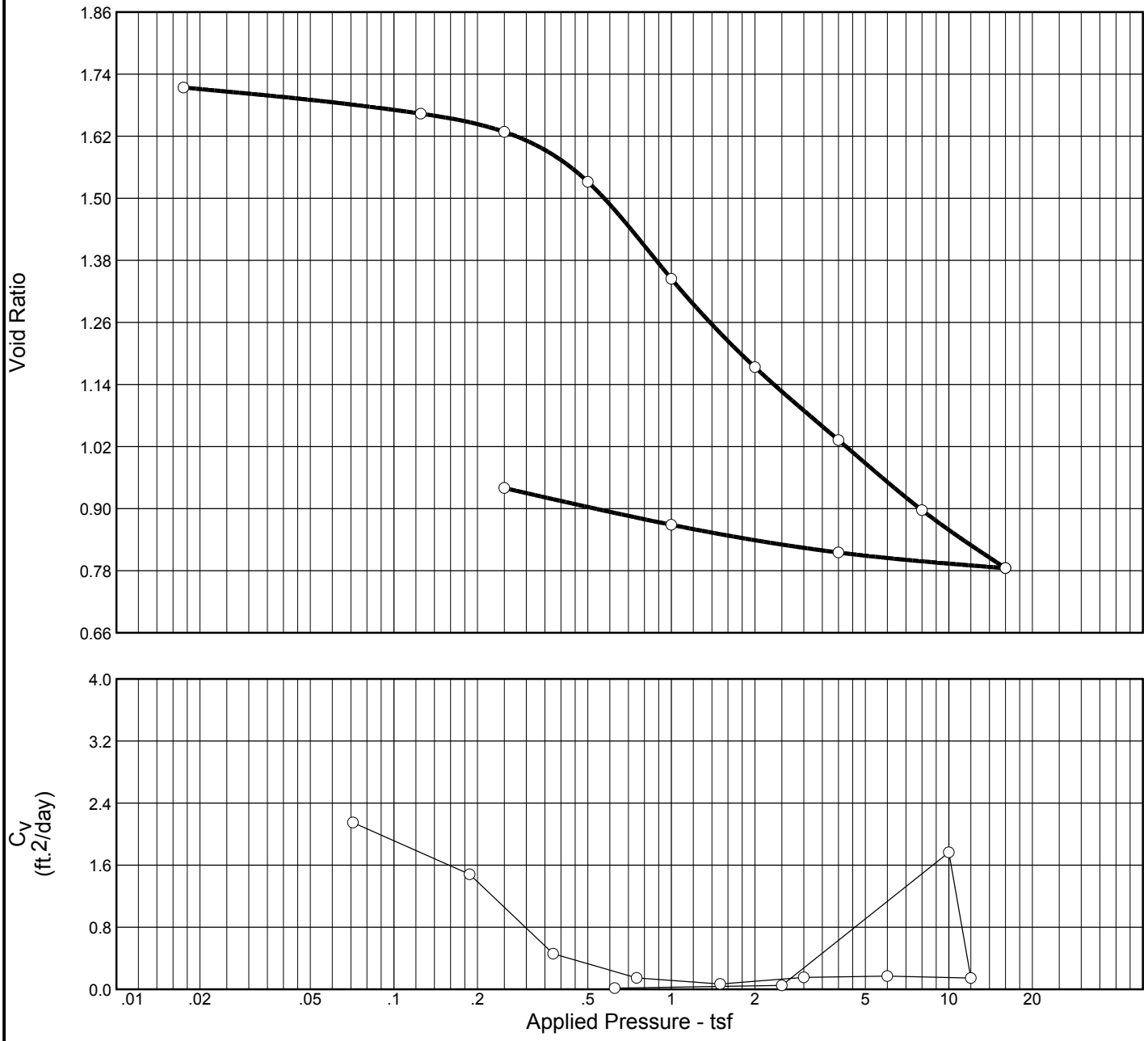
Remarks:

%-200=99.4

Tested by: IK
Calculated by: KA
Checked by: YL

PLATE 23

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
96.7 %	61.7 %	61.8	37	20	2.692	0.25	0.4	0.47	0.09	1.718

MATERIAL DESCRIPTION	USCS	AASHTO
LEAN CLAY (CL), gray, with sand traces	CL	

Project No. 04.55084005 **Client:** Moffat & Nichol - LDNR

Project: MS River Long Distance Sediment Pipeline

Source: B-41 **Sample No.:** 11B **Elev./Depth:** 24

Fugro Consultants, Inc.

Baton Rouge, LA

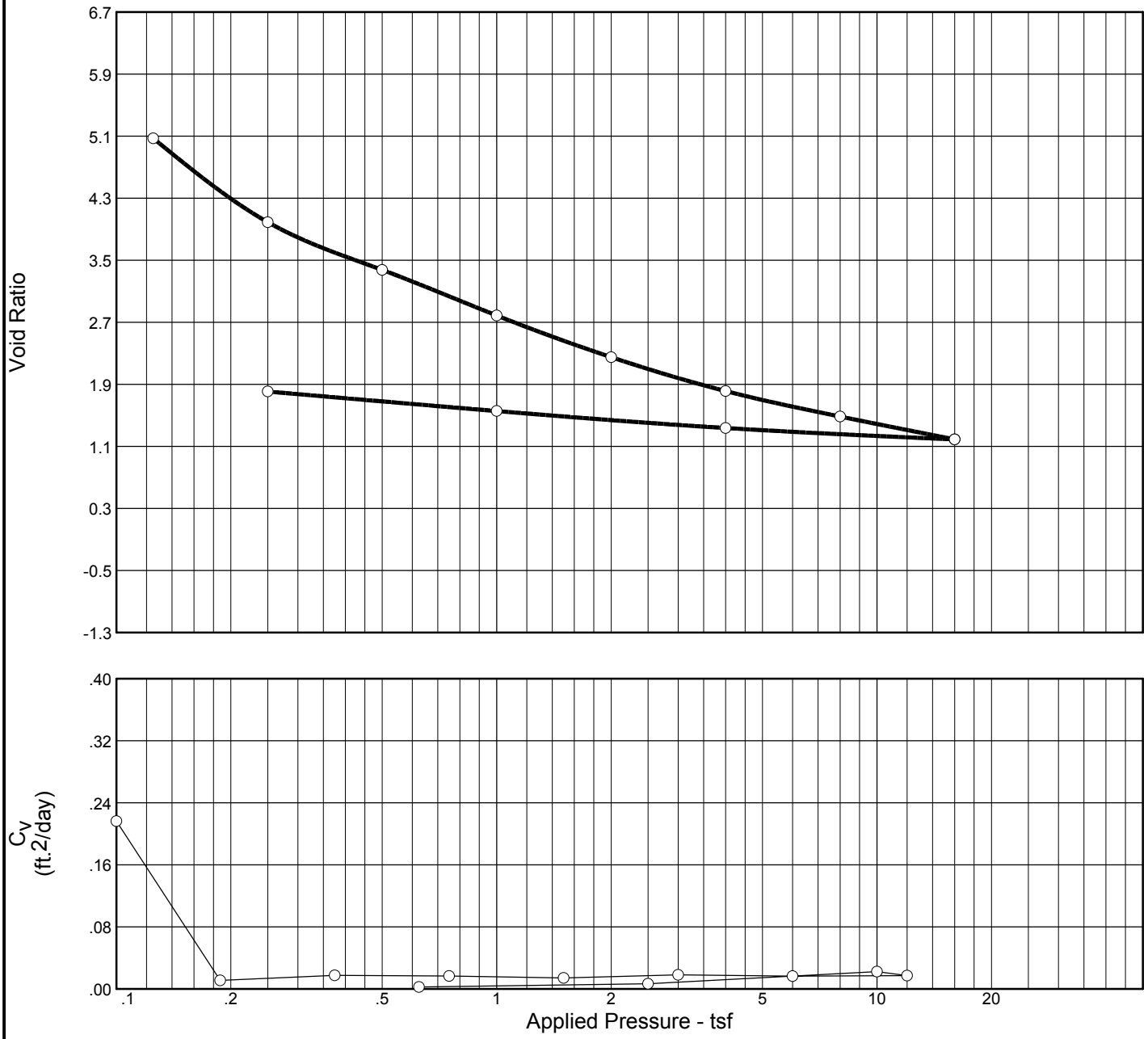
Remarks:

%-200=98.8

Tested by: IK
Calculated by: KA
Checked by: YL

PLATE 24

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
101.2 %	223.2 %	24.0	159	119	2.497	0.07	0.07	2.60	0.34	5.508

MATERIAL DESCRIPTION	USCS	AASHTO
PEAT (PT), gray, with rotten wood and roots	PT	

Project No. 04.55084005 **Client:** Moffat & Nichol - LDNR

Project: MS River Long Distance Sediment Pipeline

Source: B-42 **Sample No.:** 6B **Elev./Depth:** 11

Fugro Consultants, Inc.

Baton Rouge, LA

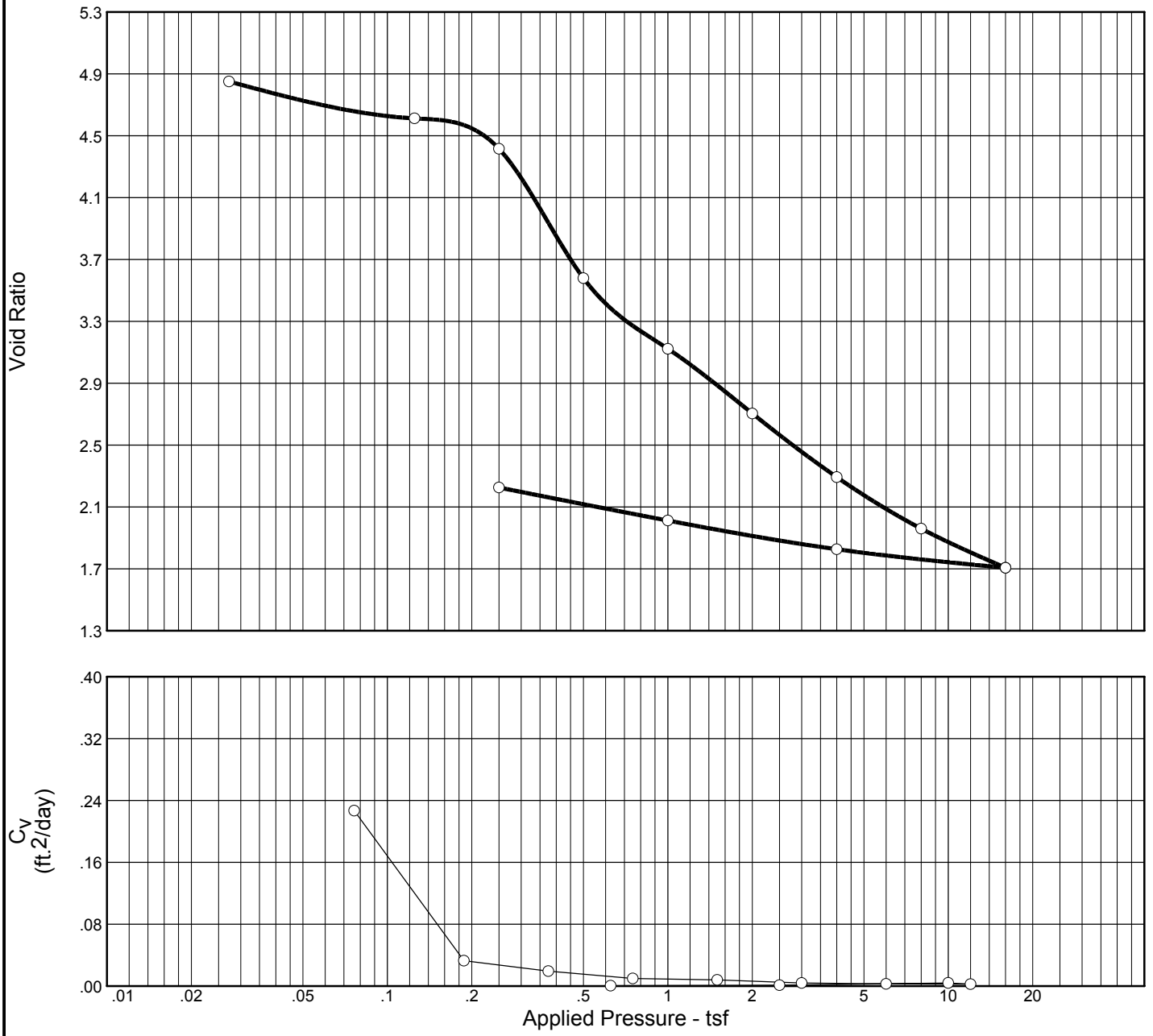
Remarks:

%-200=83.1

Tested by: IK
Calculated by: KA
Checked by: YL

PLATE 25

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
100.0 %	236.1 %	25.4	203	148	2.057	0.03	0.03	1.16	0.25	4.856

MATERIAL DESCRIPTION	USCS	AASHTO
PEAT (PT), dark gray, with roots	PT	

Project No. 04.55084005 **Client:** Moffat & Nichol - LDNR

Project: MS River Long Distance Sediment Pipeline

Source: B-43 **Sample No.:** 2B **Elev./Depth:** 3

Fugro Consultants, Inc.

Baton Rouge, LA

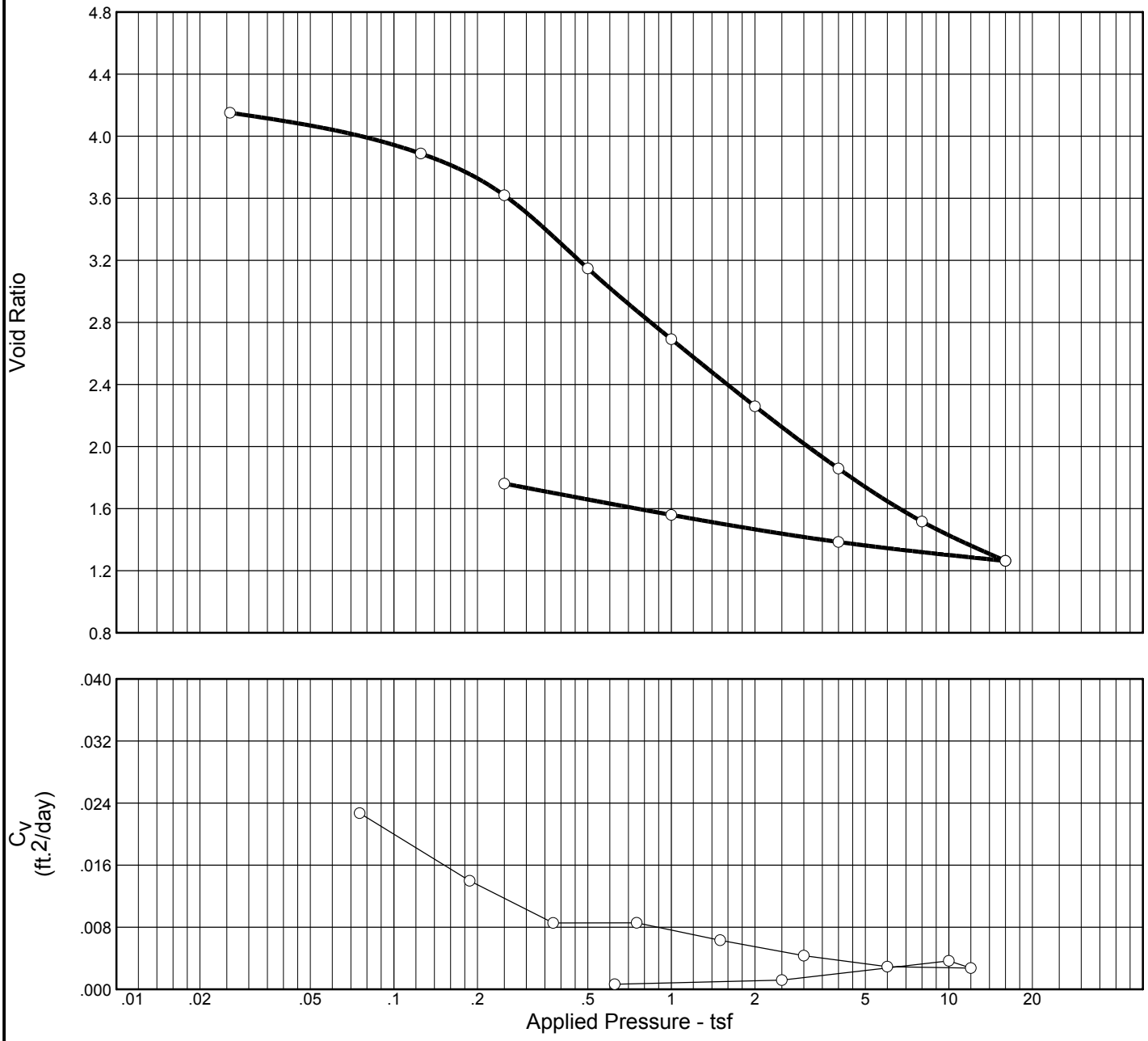
Remarks:

%-200=63.4

Tested by: IK
Calculated by: KA
Checked by: YL

PLATE 26

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
97.2 %	156.0 %	31.3	200	148	2.587	0.2	1.02	1.45	0.28	4.152

MATERIAL DESCRIPTION	USCS	AASHTO
ORGANIC CLAY (OH), gray, with roots	OH	

Project No. 04.55084005 **Client:** Moffat & Nichol - LDNR

Project: MS River Long Distance Sediment Pipeline

Source: B-43 **Sample No.:** 10B **Elev./Depth:** 19

Fugro Consultants, Inc.

Baton Rouge, LA

Remarks:

%-200=73.3

Tested by: IK
Calculated by: KA
Checked by: YL

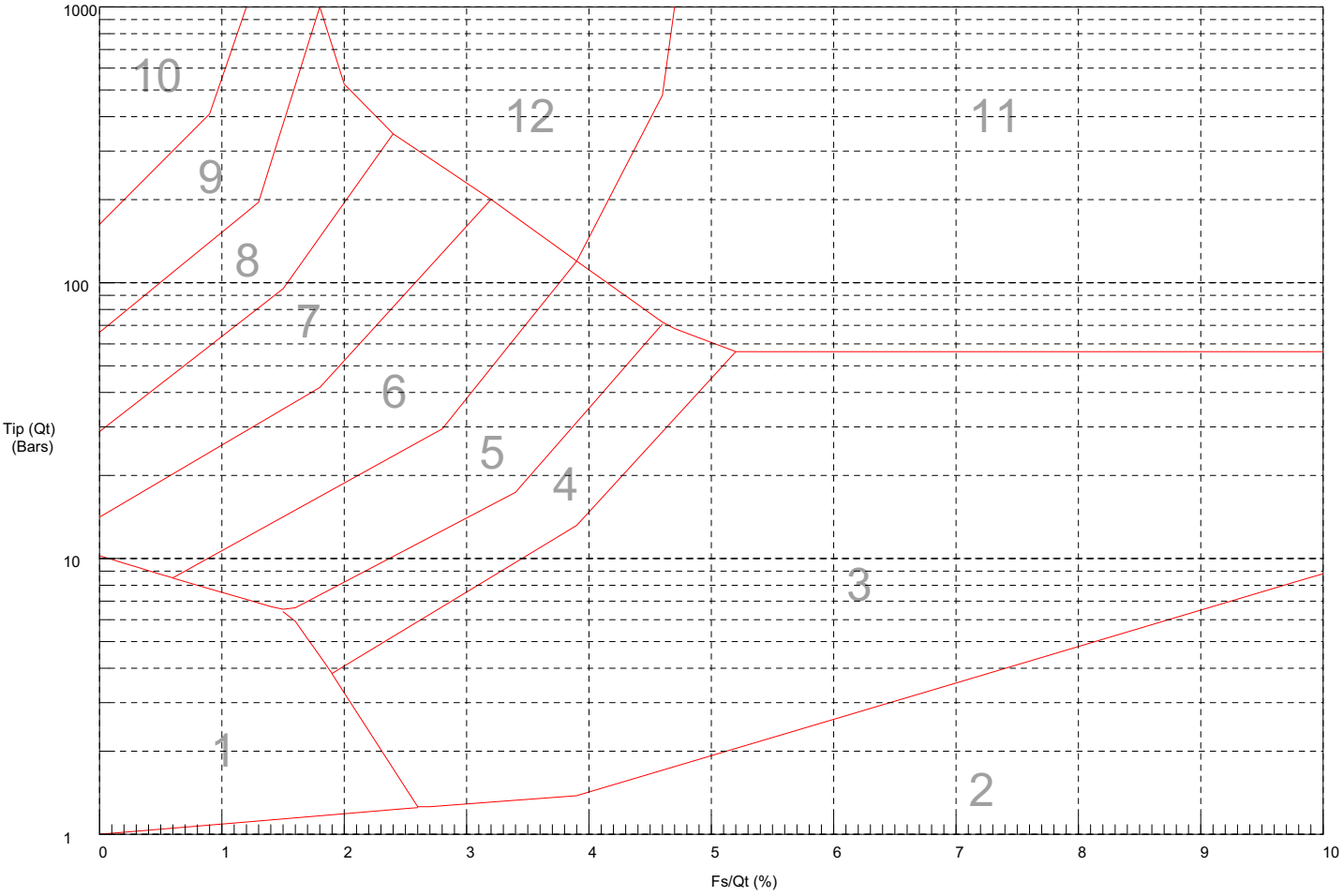
PLATE 27

APPENDIX C

CONE PENETRATION TEST LOGS

12 Zone Soil Behavior Chart

Classification Data:
Robertson and Campanella UBC-1986

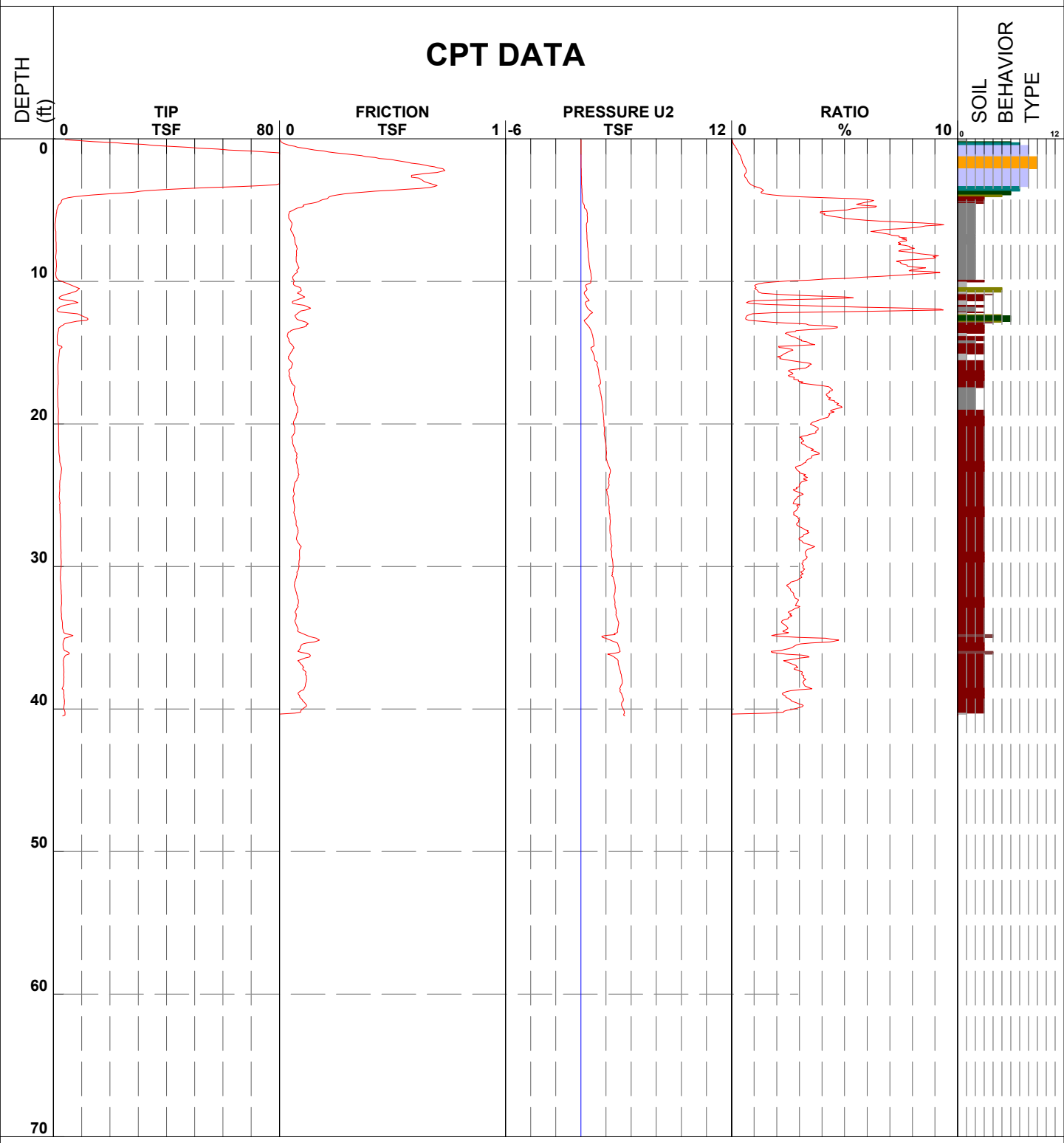


1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

* Overconsolidated or cemented

CPT Data

Job Number	04.5508-4005	CPT Number	CPT-01	Location	Baton Rouge-LA
Operator	David Cline	Date and Tin	24-Aug-2011 14:16:29	Cone Number	A15F2.5CKE2H2403
Client	Fugro Consultants, Inc.	Elevation	1.2'	Coordinates	N 29 39 18.8 W 90 00 50.3

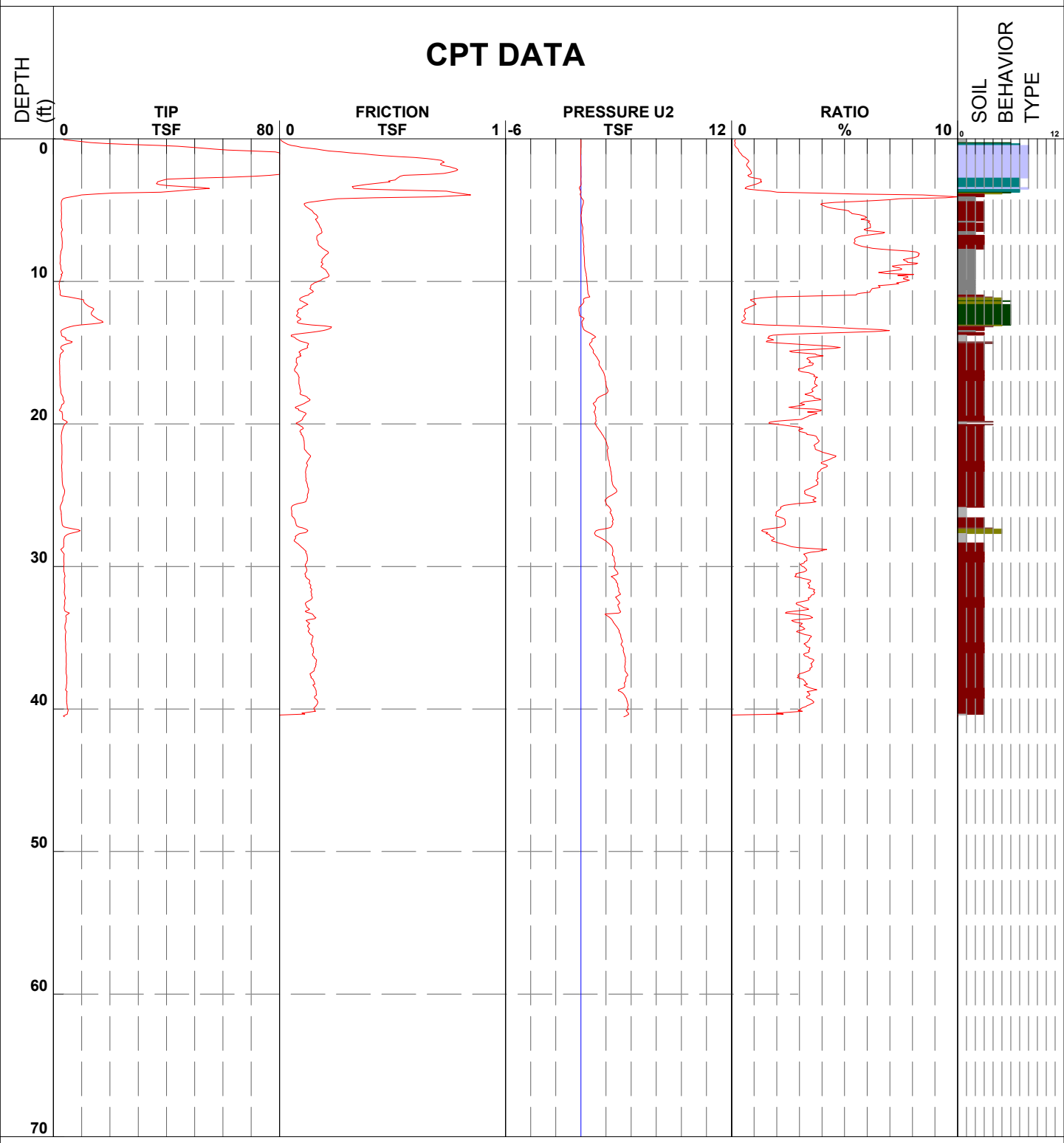


1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Robertson et al. 1986 * Overconsolidated or Cemented

CPT Data

Job Number	04.5508-4005	CPT Number	CPT-02	Location	Baton Rouge-LA
Operator	David Cline	Date and Tin	25-Aug-2011 07:52:39	Cone Number	A15F2.5CKE2H2403
Client	Fugro Consultants, Inc.	Elevation	2.1'	Coordinates	N 29 39 11.4 W 90 01 07.3

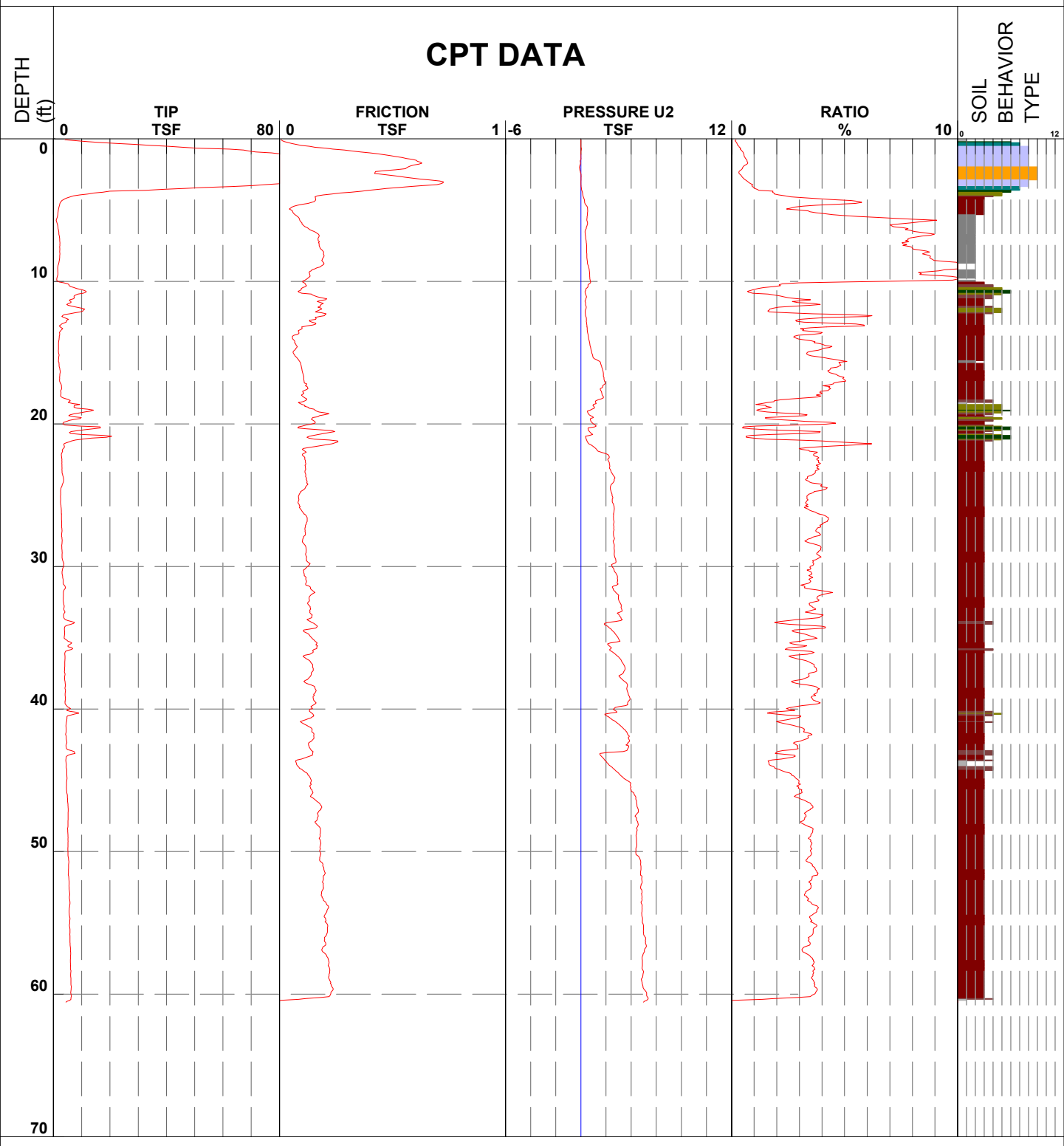


1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Robertson et al. 1986 * Overconsolidated or Cemented

CPT Data

Job Number	04.5508-4005	CPT Number	CPT-03	Location	Baton Rouge-LA
Operator	David Cline	Date and Tir	18-Aug-2011 09:28:47	Cone Number	A15F2.5CKE2H2403
Client	Fugro Consultants, Inc.	Elevation	1.5'	Coordinate	N 29 39 09.1 W 90 01 25.4

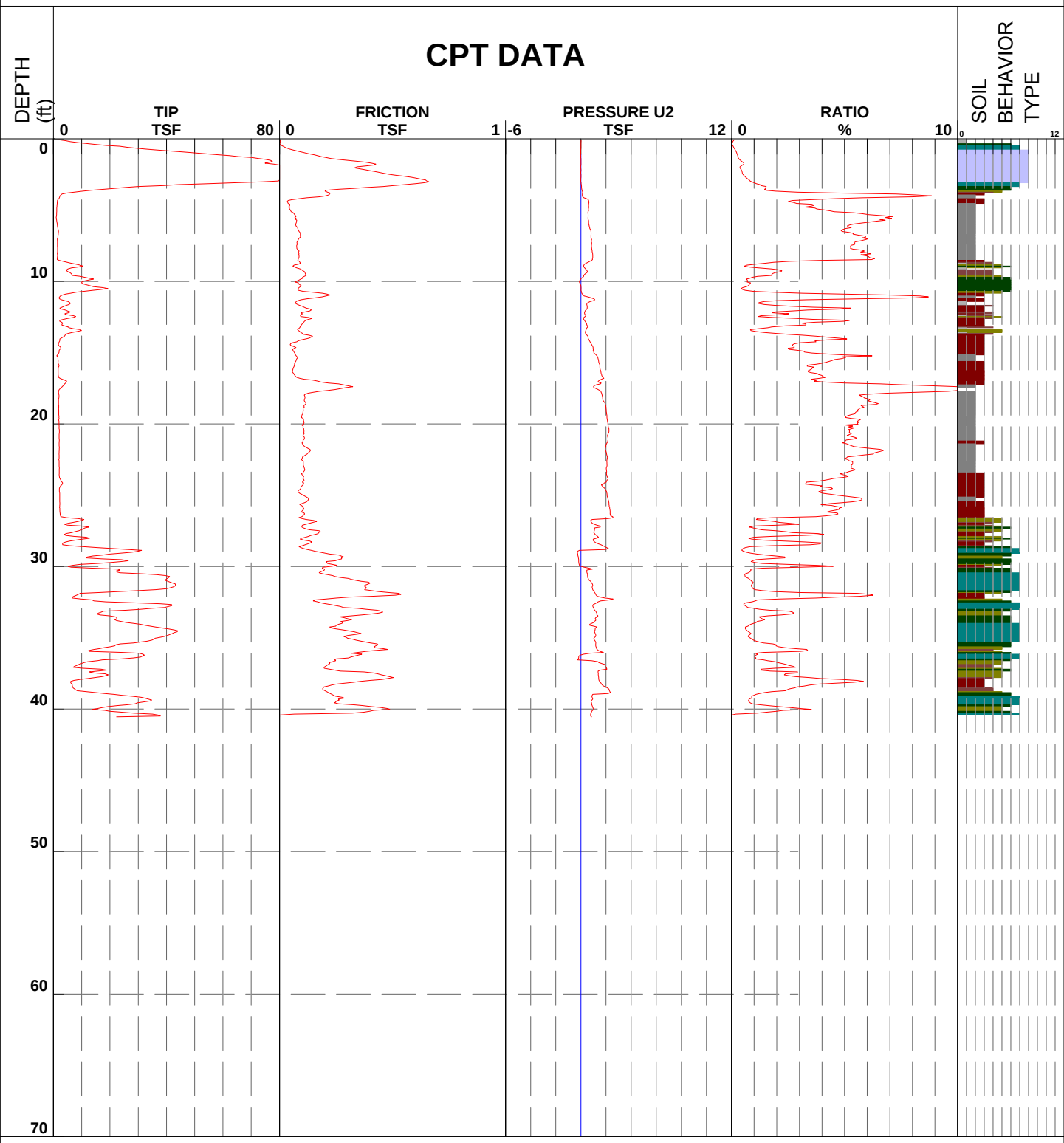


1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Robertson et al. 1986 * Overconsolidated or Cemented

CPT Data

Job Number	04.5508-4005	CPT Number	CPT-04	Location	Baton Rouge-LA
Operator	Herbert Jackson	Date and Tin	13-Sep-2011 15:22:16	Cone Number	A15F2.5CKE2H2403
Client	Fugro Consultants, Inc.	Elevation	1.3'	Coordinates	N 29 38 56.3 W 90 01 44.4

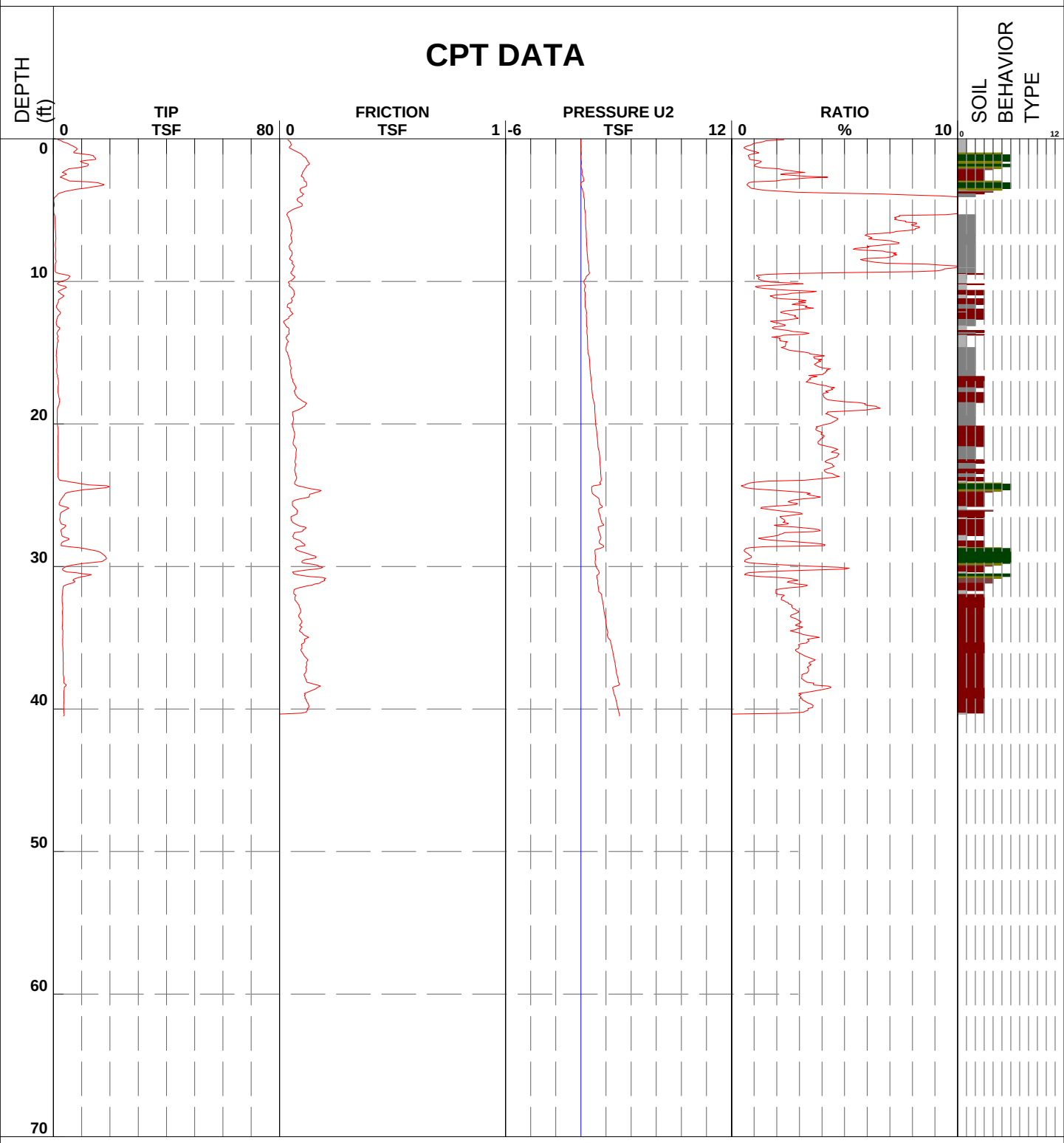


1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

Robertson et al. 1986 * Overconsolidated or Cemented

CPT Data

Job Number	04.5508-4005	CPT Number	CPT-06	Location	Baton Rouge-LA
Operator	Herbert Jackson	Date and Tin	13-Sep-2011 12:47:17	Cone Number	A15F2.5CKE2H2403
Client	Fugro Consultants, Inc.	Elevation	0.7'	Coordinates	N 29 38 40.5 W 90 02 18.2



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 (*)

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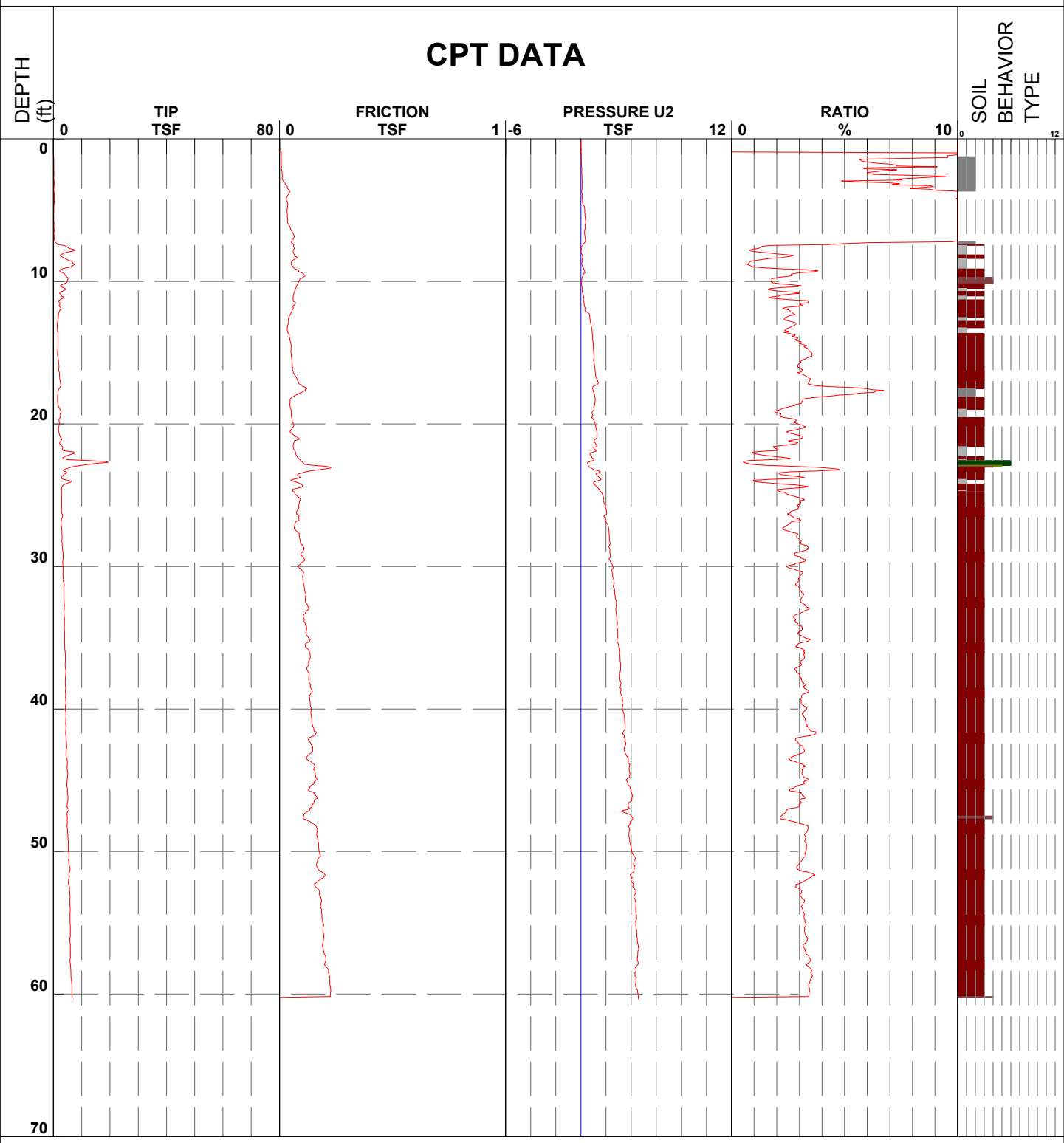
CPT Data

Job Number	04.5508-4005	CPT Number	CPT-7	Location	Baton Rouge-LA
Operator	David Cline	Date and Tin	17-Aug-2011 14:16:21	Cone Number	A15F2.5CKE2H2403
Client	Fugro Consultants, Inc.	Elevation	-0.80'	Coordinates	N 29 38 27.9 W 90 02 38.7



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 (*)

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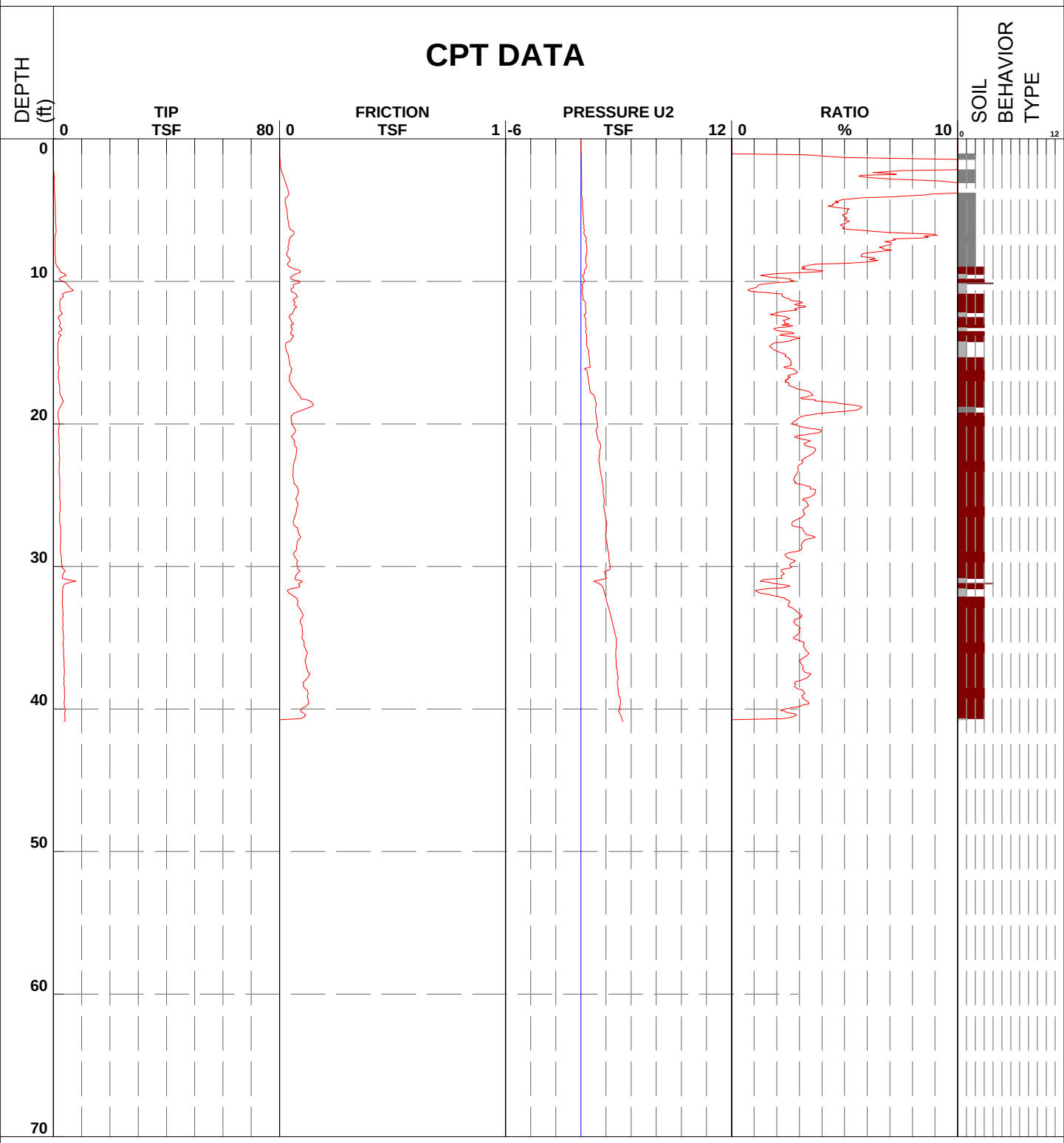
CPT Data

Job Number	04.5508-4005	CPT Number	CPT-08	Location	Baton Rouge-LA
Operator	Herbert Jackson	Date and Tin	13-Sep-2011 10:55:19	Cone Number	A15F2.5CKE2H2403
Client	Fugro Consultants, Inc.	Elevation	-2.2'	Coordinates	N 29 38 17.6 W 90 02 48.4



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 (*)

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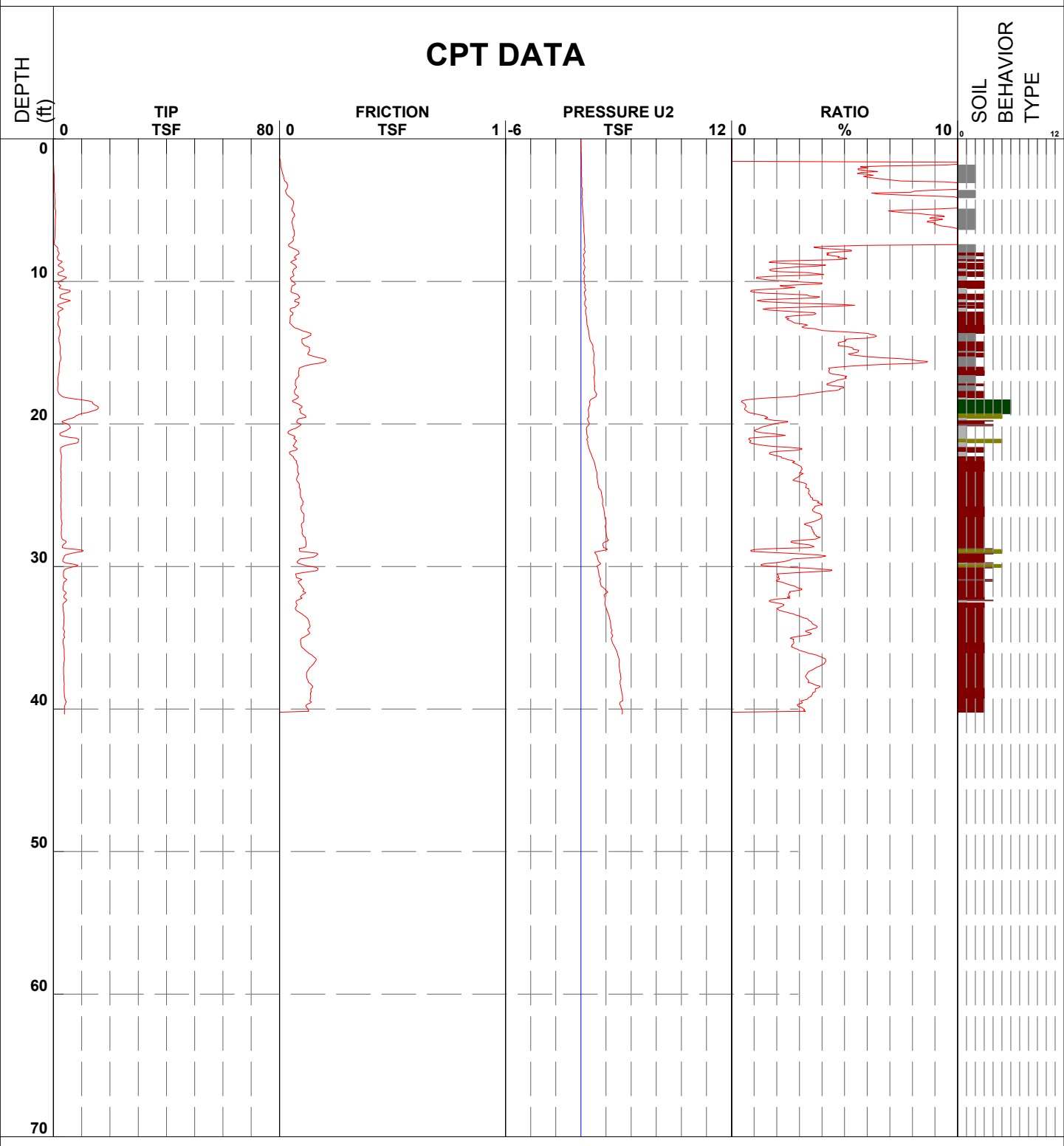
CPT Data

Job Number	04.5508-4005	CPT Number	CPT-10	Location	Baton Rouge-LA
Operator	David Cline	Date and Tin	17-Aug-2011 11:54:25	Cone Number	A15F2.5CKE2H2403
Client	Fugro Consultants, Inc.	Elevation	-1.7'	Coordinates	N 29 37 26.1 W 90 03 03.5



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 (*)

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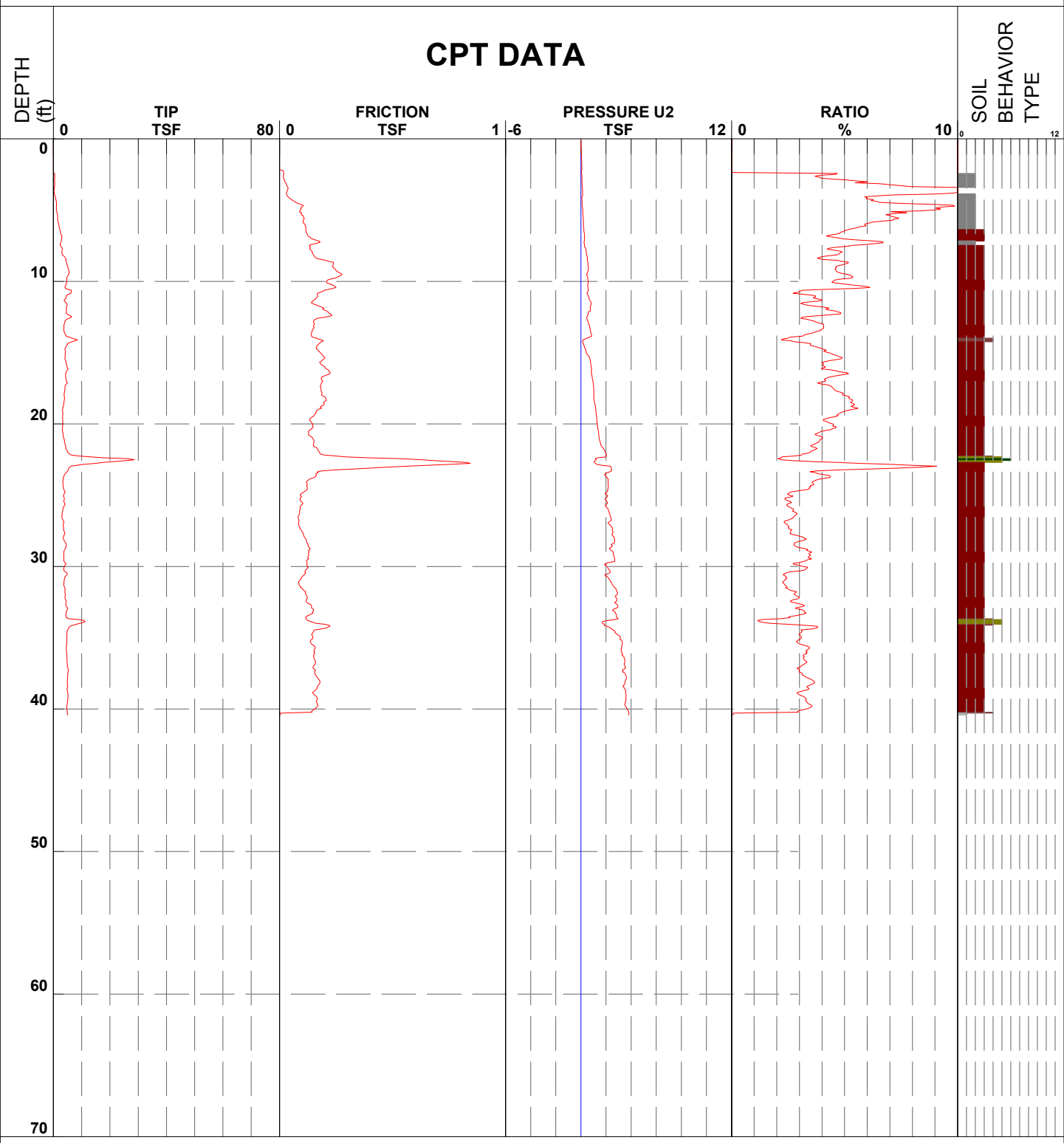
CPT Data

Job Number	04.5508-4005	CPT Number	CPT-14	Location	Baton Rouge-LA
Operator	David Cline	Date and Tin	17-Aug-2011 08:02:21	Cone Number	A15F2.5CKE2H2403
Client	Fugro Consultants, Inc.	Elevation	-1.5'	Coordinates	N 29 36 19.3 W 90 03 17.1



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 (*)

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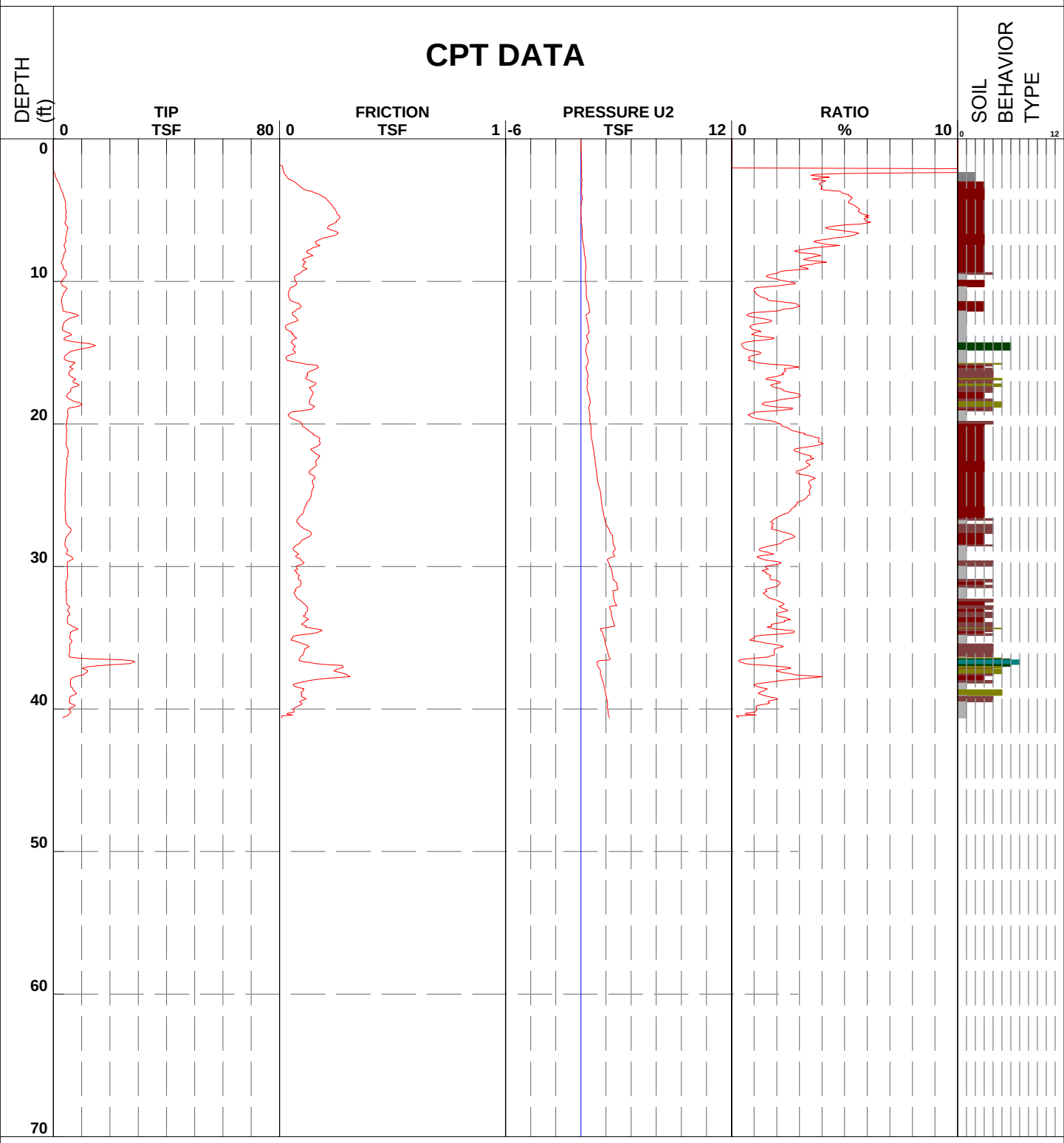
CPT Data

Job Number	04.5508-4005	CPT Number	CPT-16	Location	Baton Rouge-LA
Operator	Herbert Jackson	Date and Tin	12-Sep-2011 09:56:21	Cone Number	A15F2.5CKE2H2053
Client	Fugro Consultants, Inc.	Elevation	-2.0'	Coordinate	N 29 36 14.2 W 90 03 56.8



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 (*)

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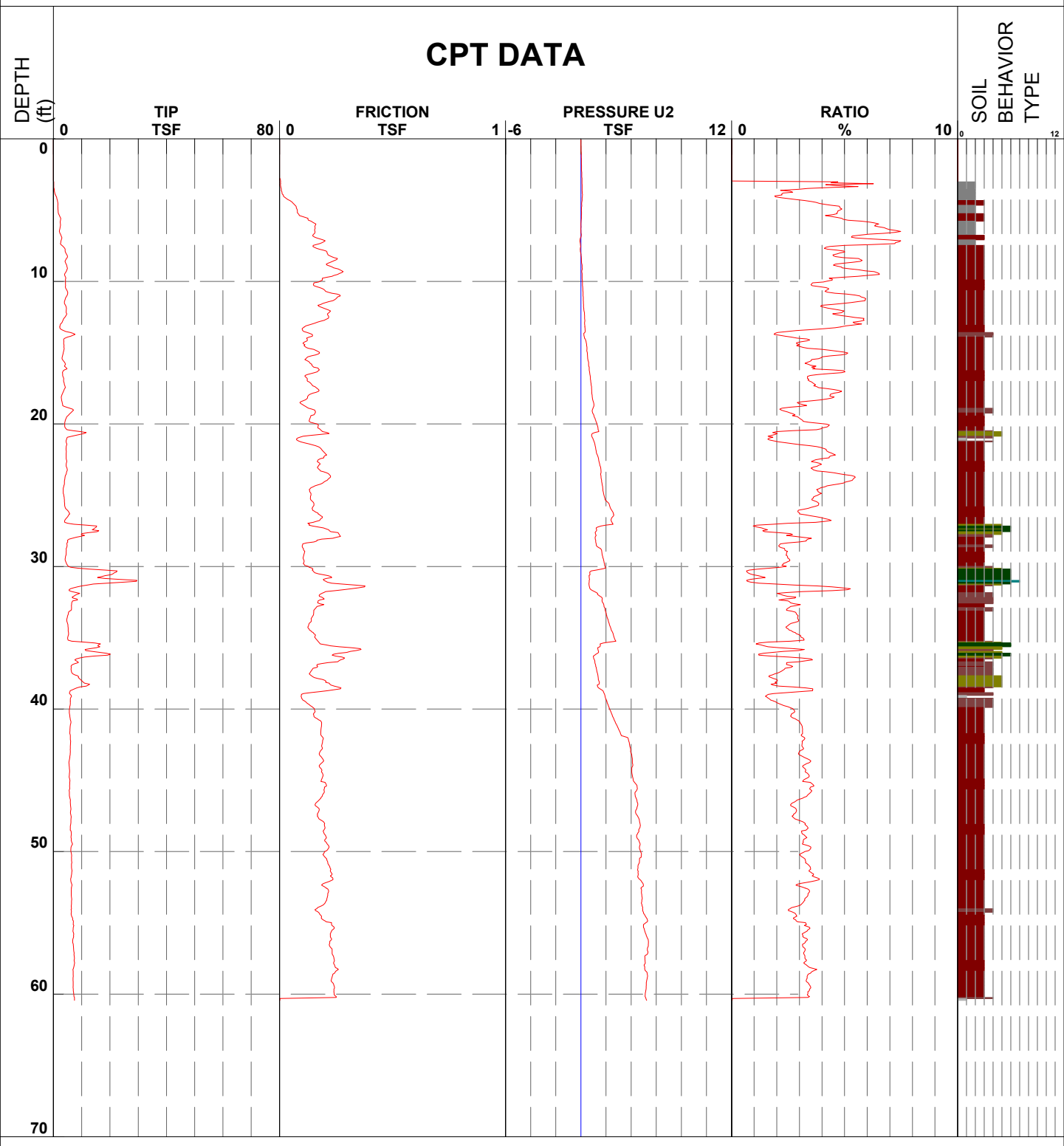
CPT Data

Job Number	04.5508-4005	CPT Number	CPT-17	Location	Baton Rouge-LA
Operator	David Cline	Date and Tin	19-Aug-2011 08:42:08	Cone Number	A15F2.5CKE2H2403
Client	Fugro Consultants, Inc.	Elevation	-2.30'	Coordinates	N 29 36 10.4 W 90 04 16.3



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 (*)

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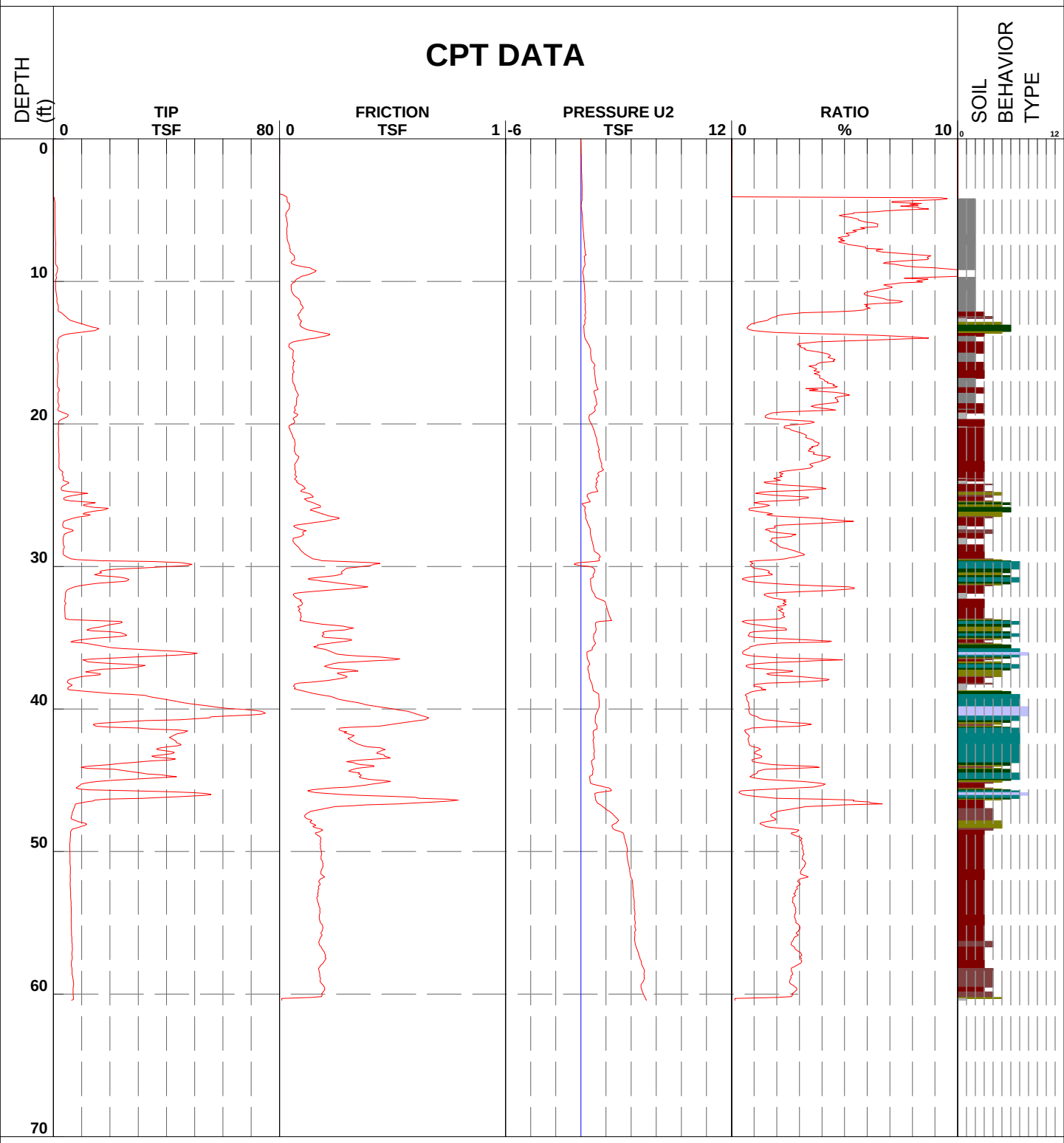
CPT Data

Job Number	04.5508-4005	CPT Number	CPT-26	Location	Baton Rouge-LA
Operator	Herbert Jackson	Date and Tin	13-Sep-2011 08:02:27	Cone Number	A15F2.5CKE2H2403
Client	Fugro Consultants, Inc.	Elevation	-3.5'	Coordinates	N 29 37 06.9 W 90 01 46.7



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 (*)

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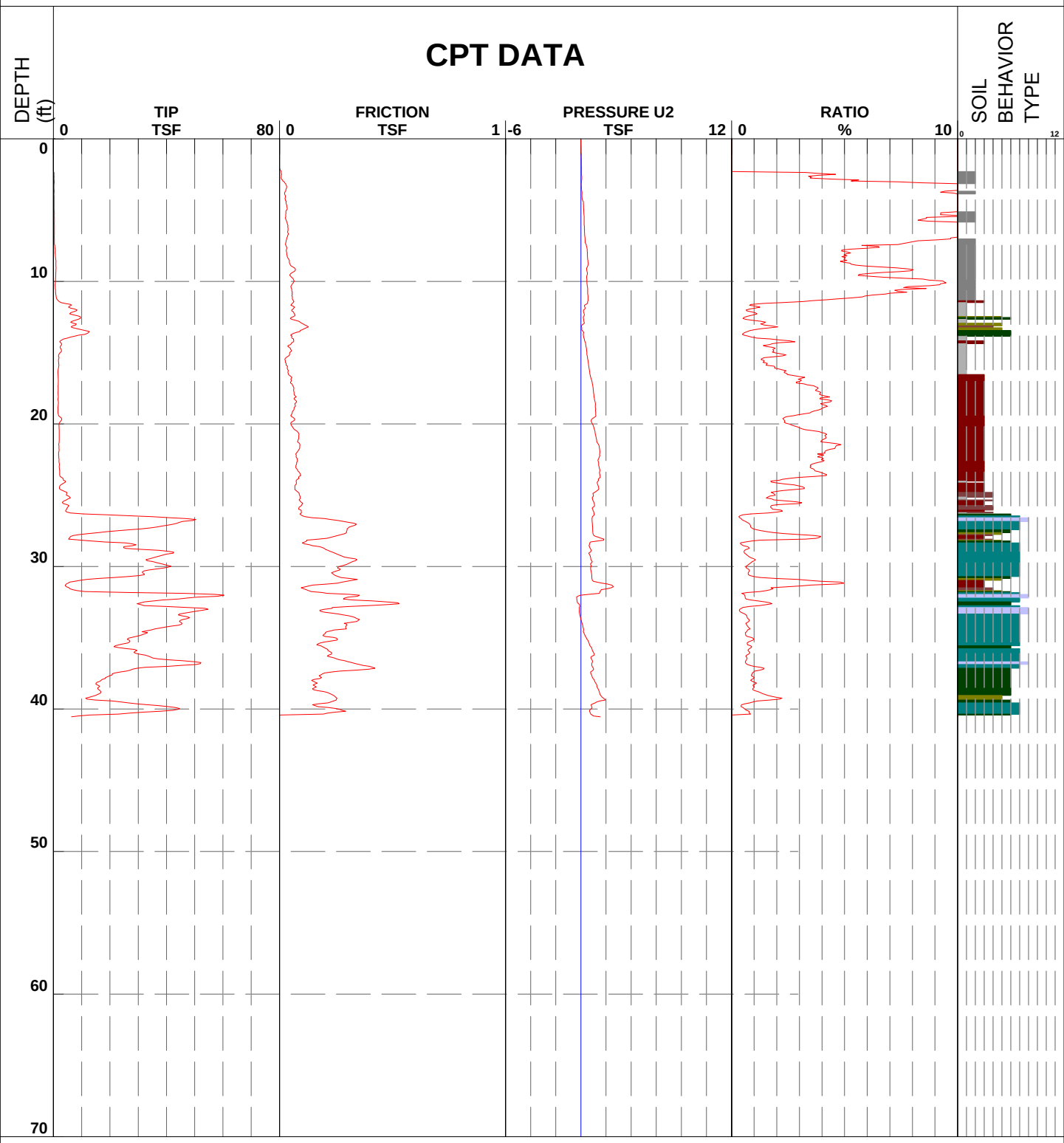
CPT Data

Job Number	04.5508-4005	CPT Number	CPT-27	Location	Baton Rouge-LA
Operator	Herbert Jackson	Date and Tin	12-Sep-2011 15:03:18	Cone Number	A15F2.5CKE2H2403
Client	Fugro Consultants, Inc.	Elevation	-1.7'	Coordinates	N 29 37 05.4 W 90 02 14.5



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 (*)

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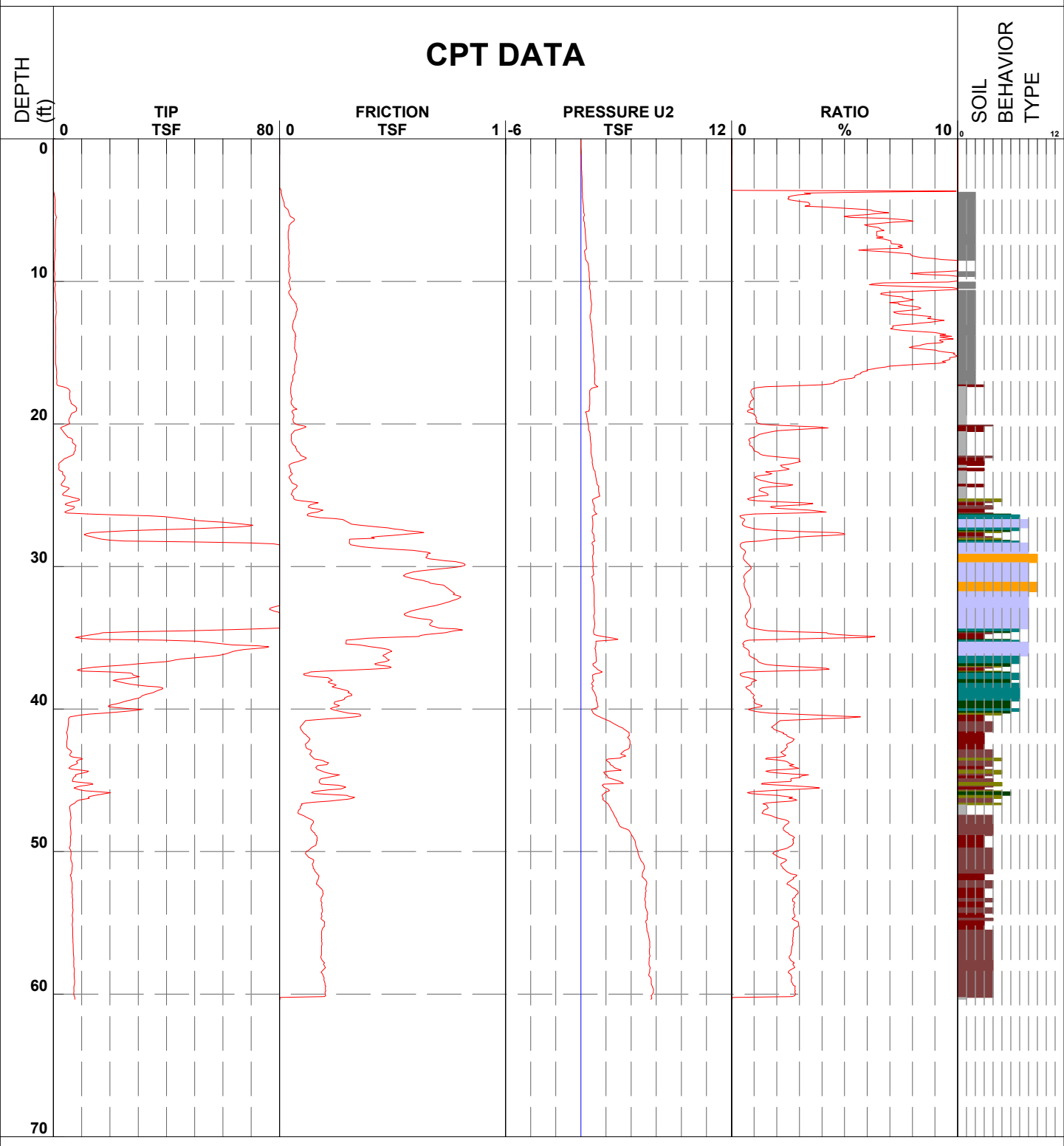
CPT Data

Job Number	04.5508-4005	CPT Number	CPT-28	Location	Baton Rouge-LA
Operator	David Cline	Date and Tin	17-Aug-2011 10:27:31	Cone Number	A15F2.5CKE2H2403
Client	Fugro Consultants, Inc.	Elevation	2.9'	Coordinates	N 29 37 04.9 W 90 02 32.1



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 (*)

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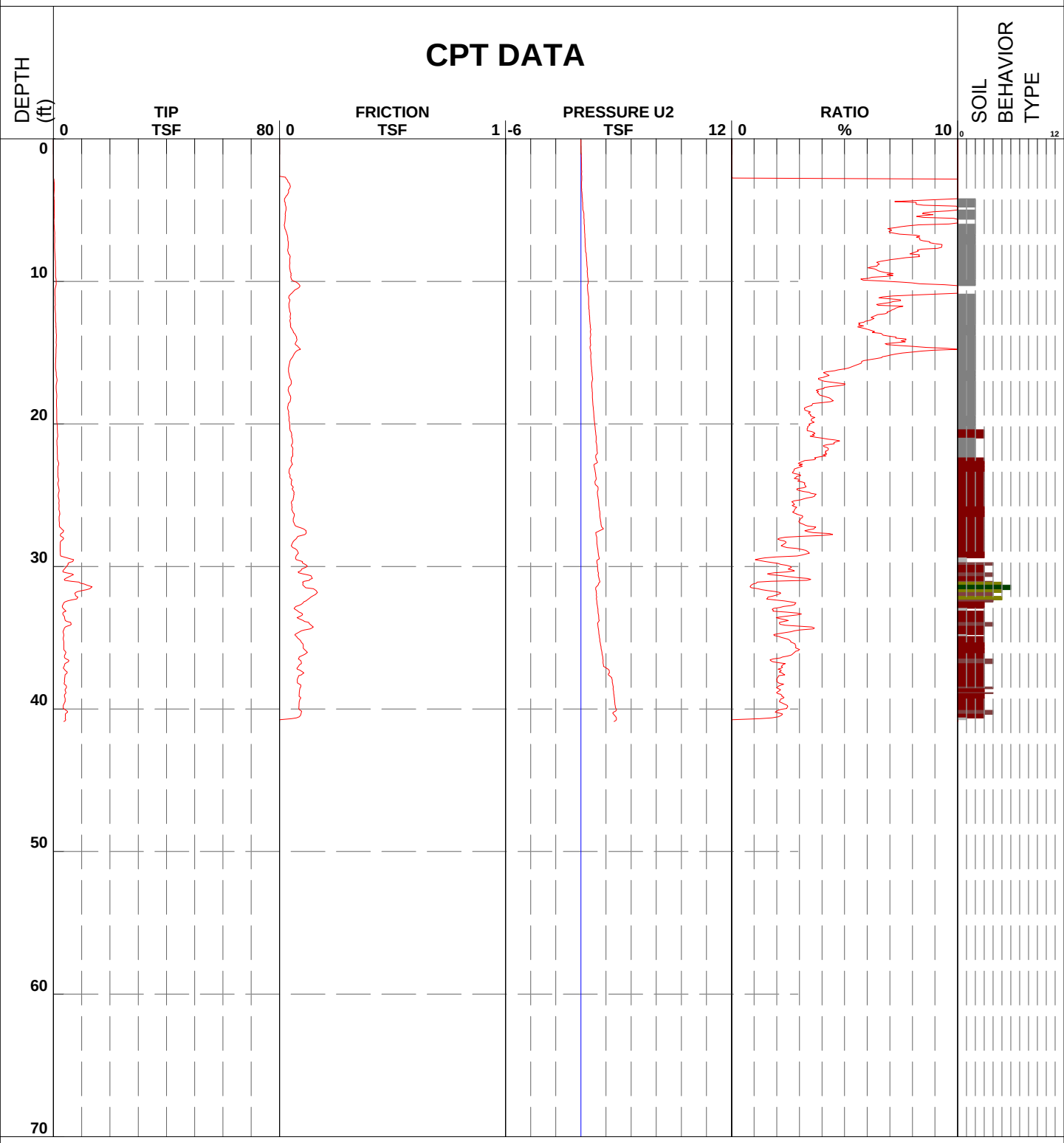
CPT Data

Job Number	04.5508-4005	CPT Number	CPT-29	Location	Baton Rouge-LA
Operator	Herbert Jackson	Date and Tin	12-Sep-2011 13:02:30	Cone Number	A15F2.5CKE2H2403
Client	Fugro Consultants, Inc.	Elevation	-1.8'	Coordinate	N 29 36 50.3 W 90 02 49.0



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 (*)

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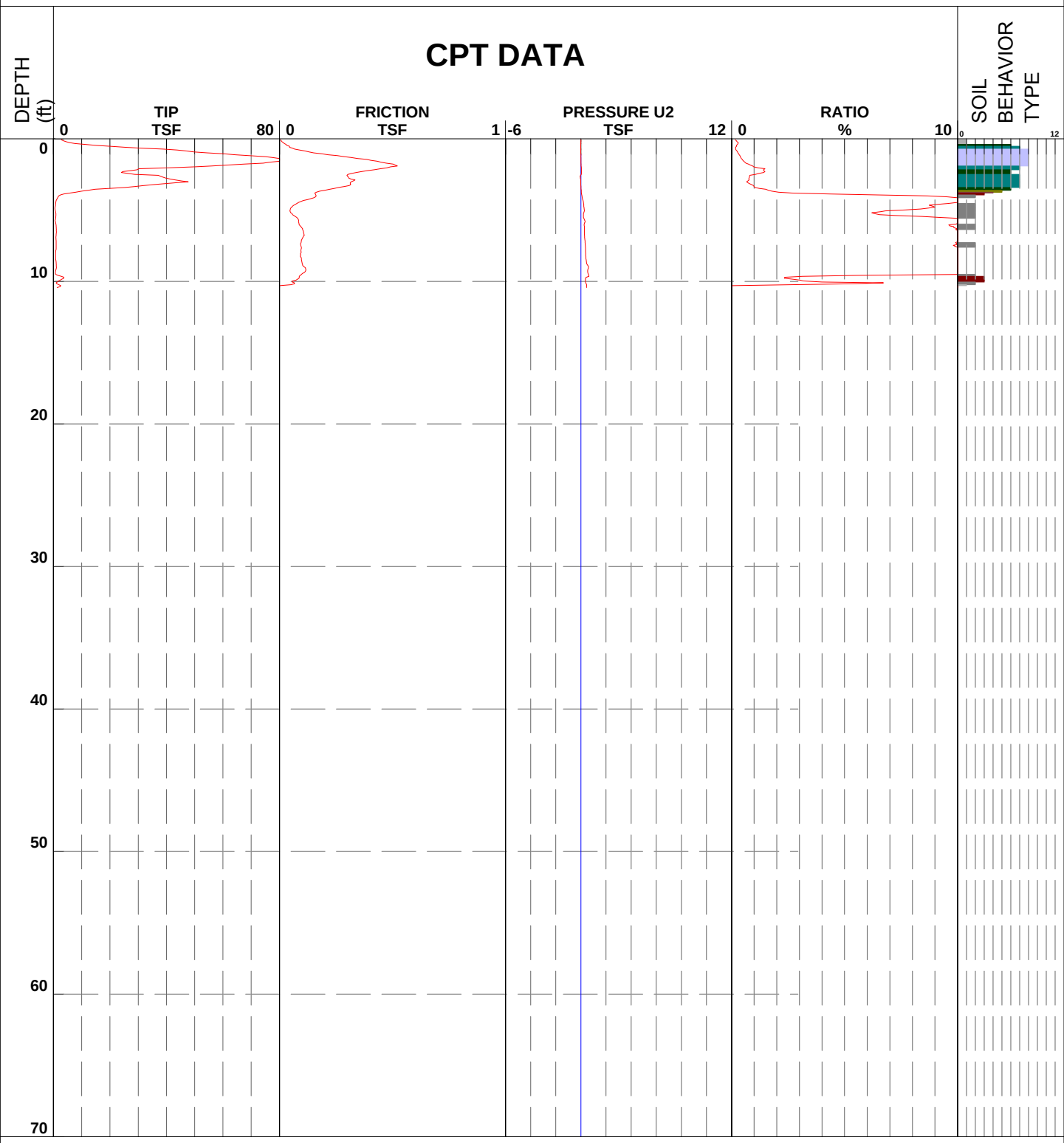
CPT Data

Job Number	04.5508-4005	CPT Number	CPT-30	Location	Baton Rouge-LA
Operator	David Cline	Date and Tin	18-Aug-2011 11:47:12	Cone Number	A15F2.5CKE2H2403
Client	Fugro Consultants, Inc.	Elevation	1.40'	Coordinates	N 29 39 25.1 W 90 00 42.3



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 (*)

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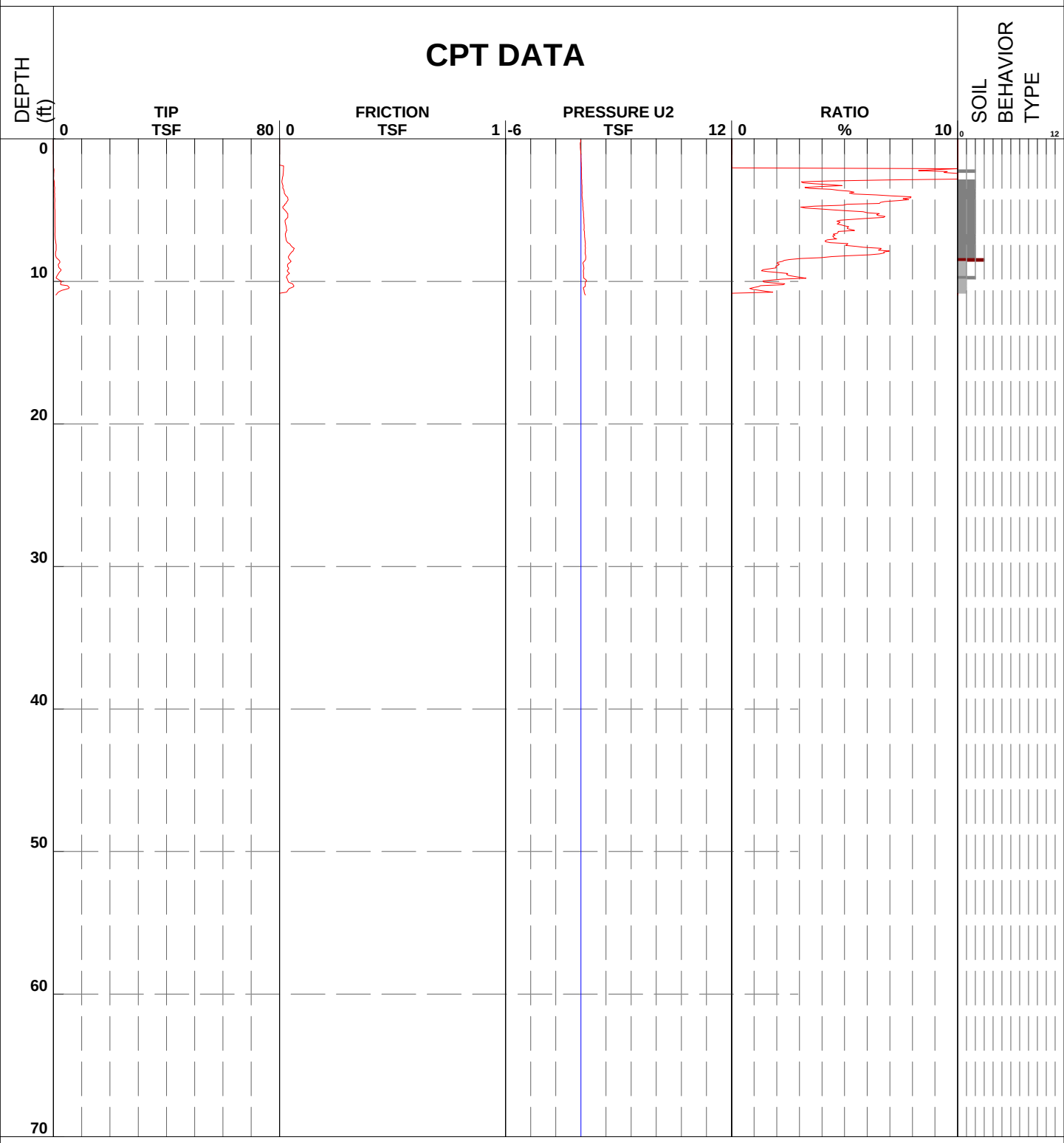
CPT Data

Job Number	04.5508-4005	CPT Number	CPT-32	Location	Baton Rouge-LA
Operator	Herbert Jackson	Date and Tin	14-Sep-2011 10:00:13	Cone Number	A15F2.5CKE2H2403
Client	Fugro Consultants, Inc.	Elevation	0.6'	Coordinates	N29 39 15.4 W 90 00 49.2



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 (*)

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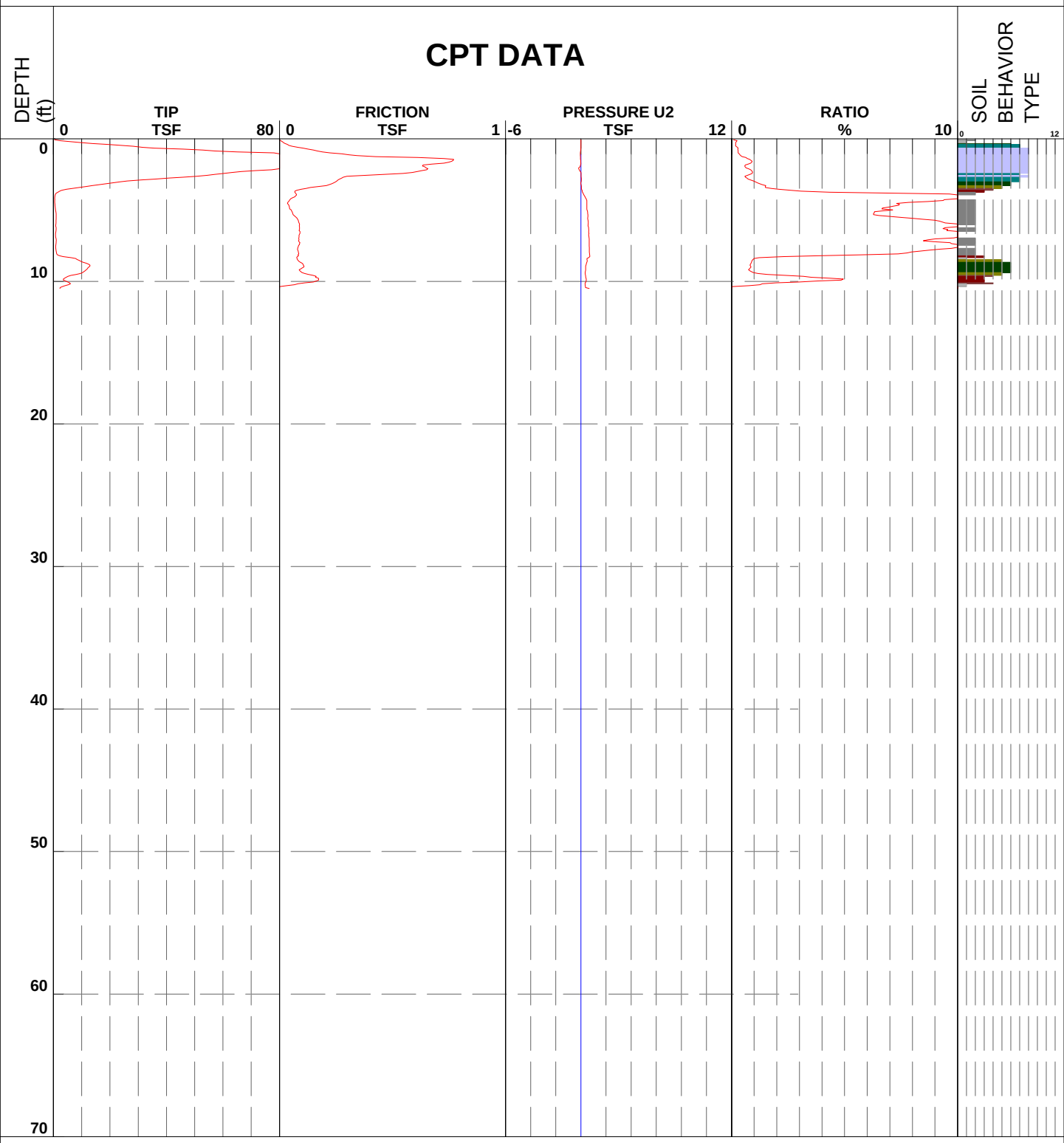
CPT Data

Job Number	04.5508-4005	CPT Number	CPT-34	Location	Baton Rouge-LA
Operator	David Cline	Date and Tin	25-Aug-2011 10:14:22	Cone Number	A15F2.5CKE2H2403
Client	Fugro Consultants, Inc.	Elevation	1.4'	Coordinates	N 29 39 081 W 90 01 06.7

CPT DATA



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 (*)

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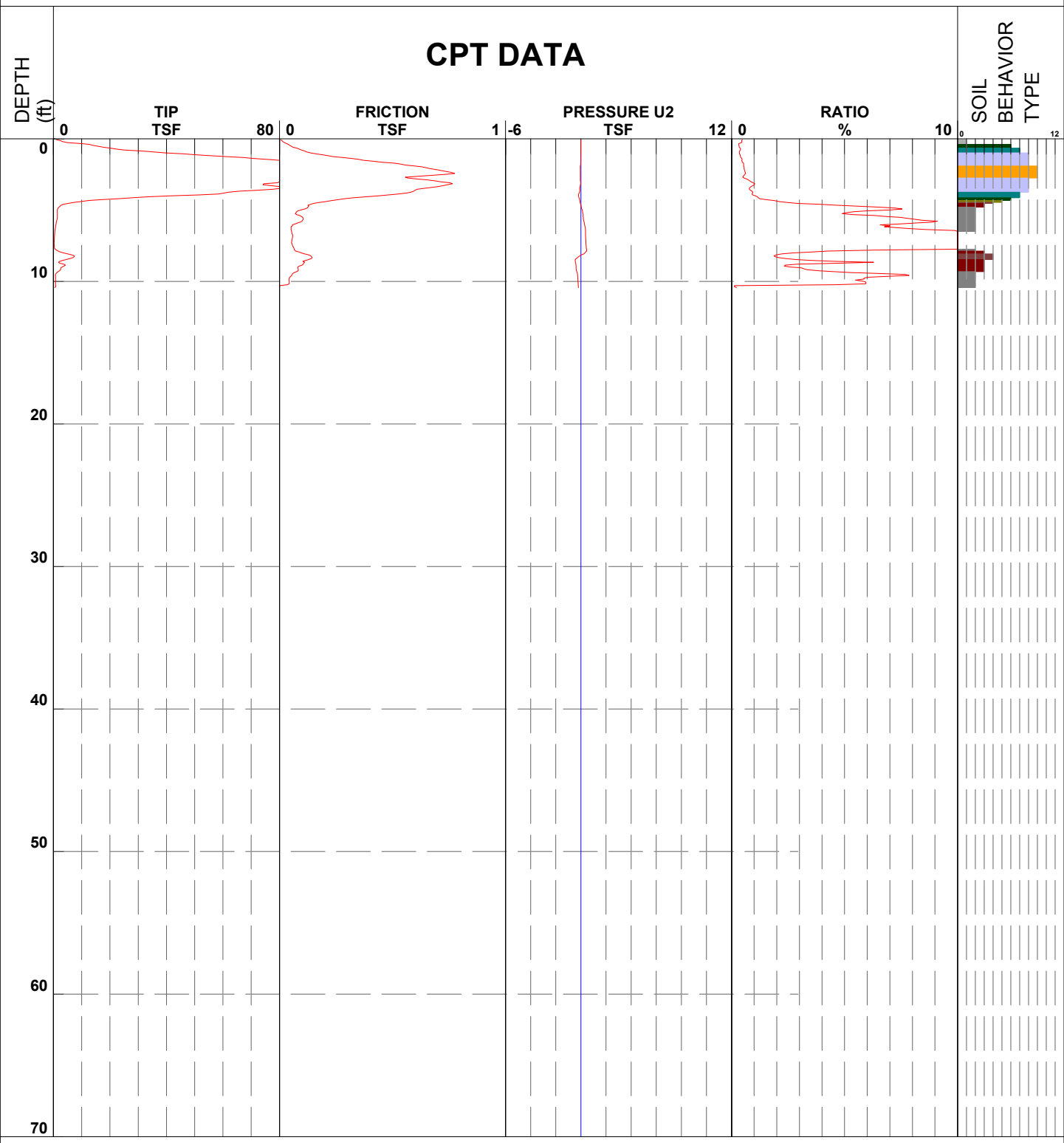
CPT Data

Job Number	04.5508-4005	CPT Number	CPT-35A	Location	Baton Rouge-LA
Operator	David Cline	Date and Tin	25-Aug-2011 11:31:38	Cone Number	A15F2.5CKE2H2403
Client	Fugro Consultants, Inc.	Elevation	1.4'	Coordinates	N 29 38 53.1 W 90 00 48.0



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 (*)

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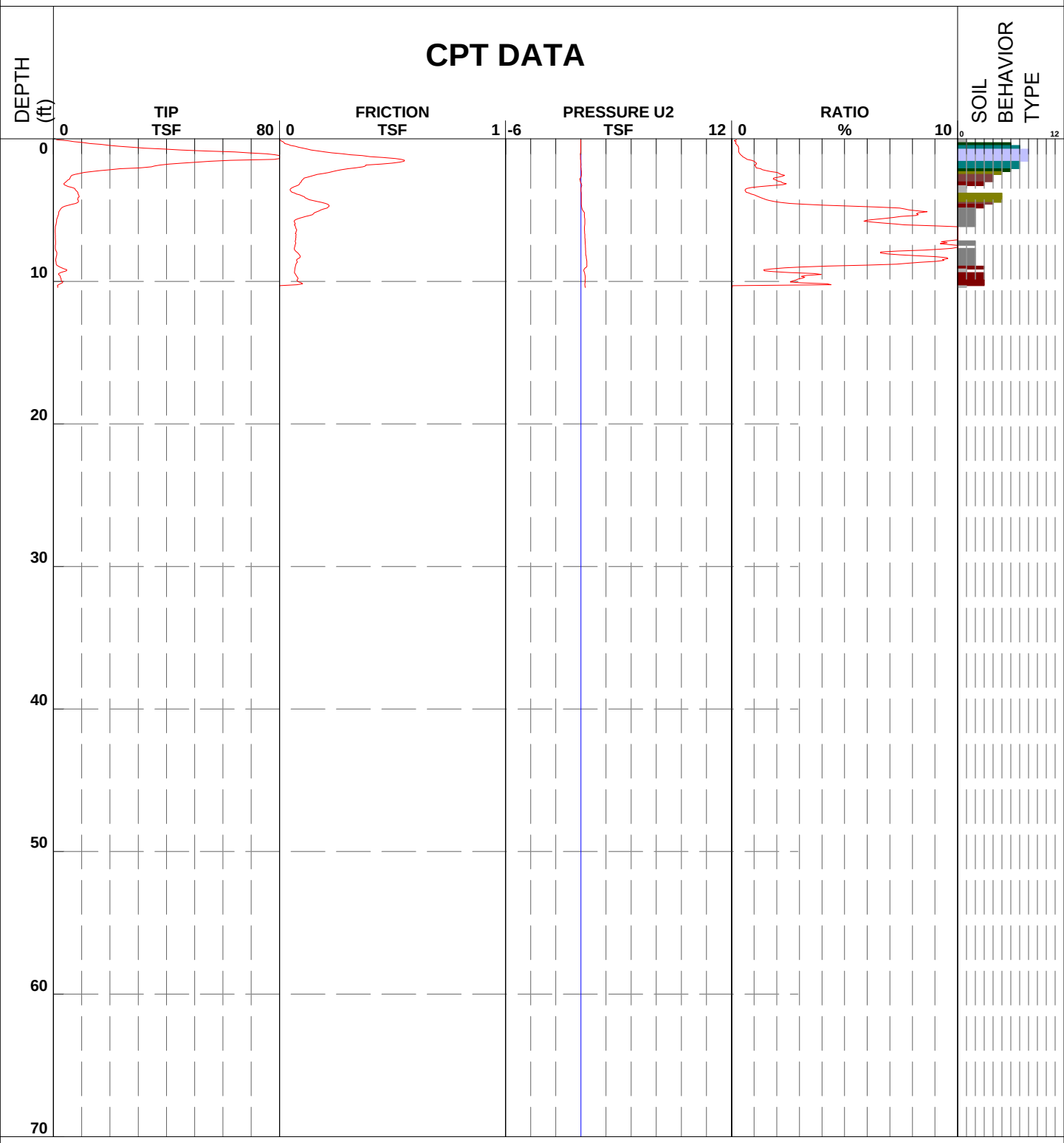
CPT Data

Job Number	04.5508-4005	CPT Number	CPT-36	Location	Baton Rouge-LA
Operator	David Cline	Date and Tin	25-Aug-2011 08:51:51	Cone Number	A15F2.5CKE2H2403
Client	Fugro Consultants, Inc.	Elevation	1.3'	Coordinates	N 29 39 05.0 W 90 01 22.5



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 (*)

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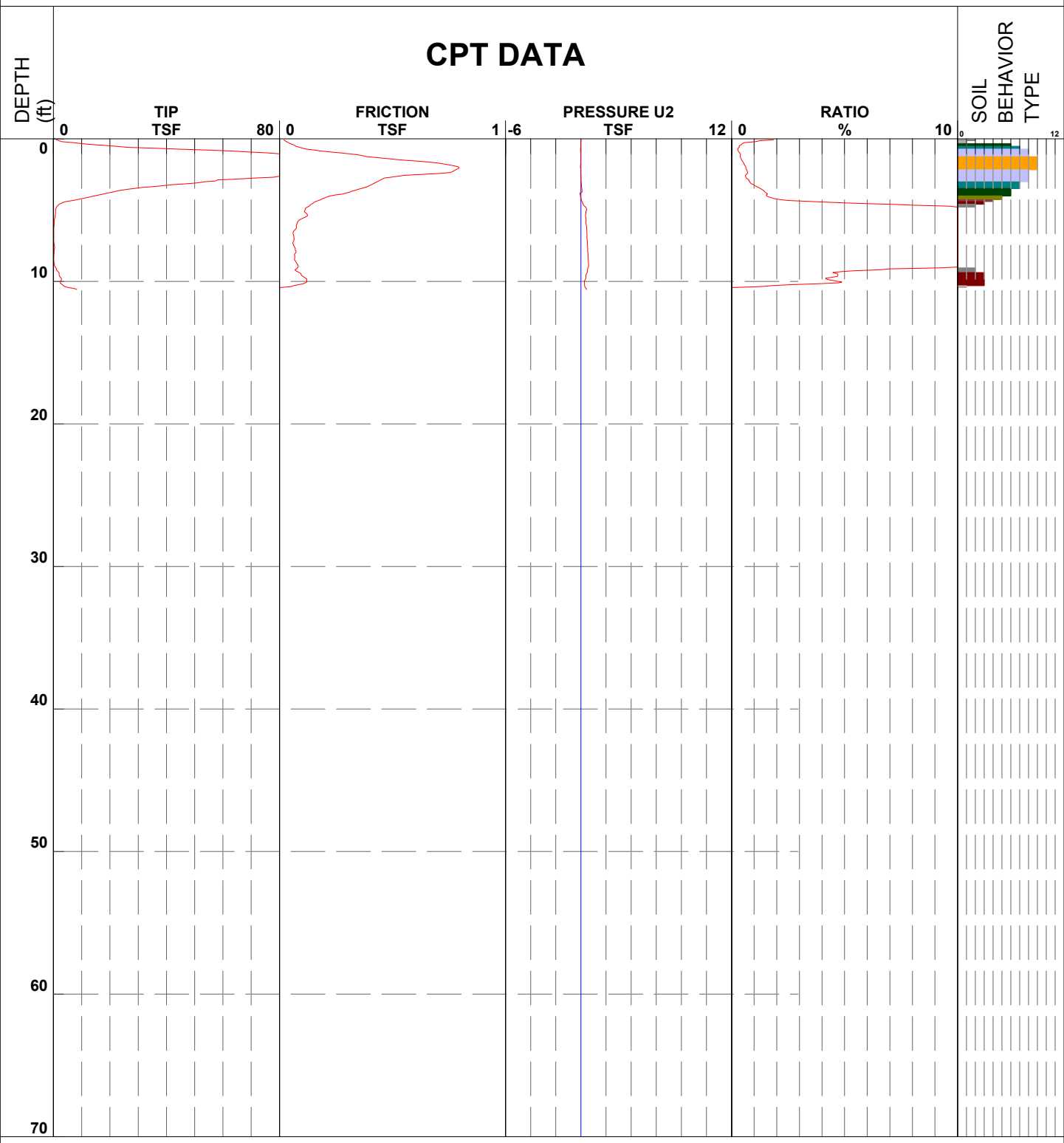
CPT Data

Job Number	04.5508-4005	CPT Number	CPT-37	Location	Baton Rouge-LA
Operator	David Cline	Date and Tin	25-Aug-2011 12:24:30	Cone Number	A15F2.5CKE2H2403
Client	Fugro Consultants, Inc.	Elevation	1.0'	Coordinates	N 29 38 516 W 90 01 10.8



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 (*)

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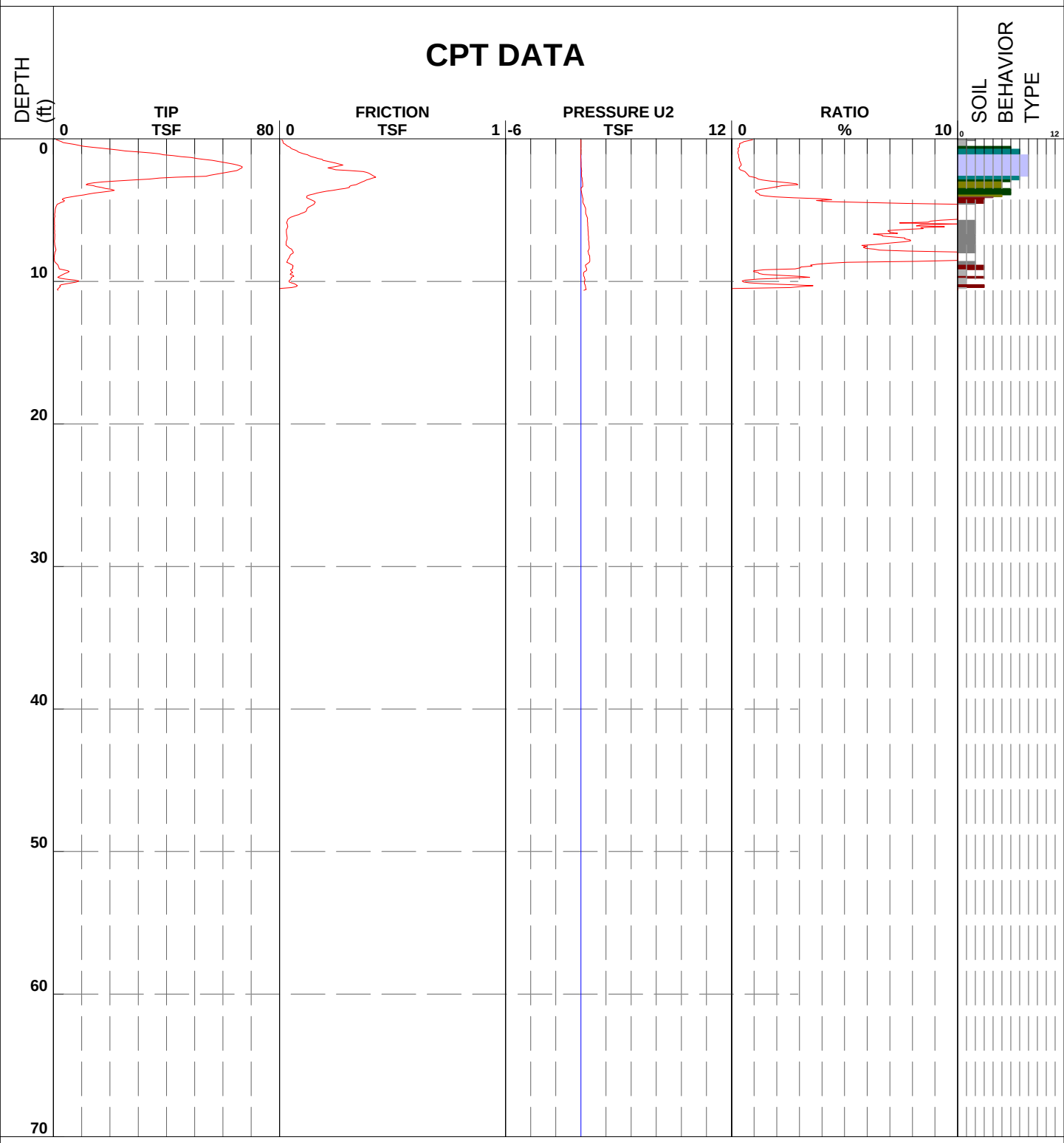
CPT Data

Job Number	04.5508-4005	CPT Number	CPT-39	Location	Baton Rouge-LA
Operator	Herbert Jackson	Date and Tin	13-Sep-2011 14:28:20	Cone Number	A15F2.5CKE2H2403
Client	Fugro Consultants, Inc.	Elevation	0.6'	Coordinates	N 29 38 50.0 W 90 01 55.2



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 (*)

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APPENDIX D

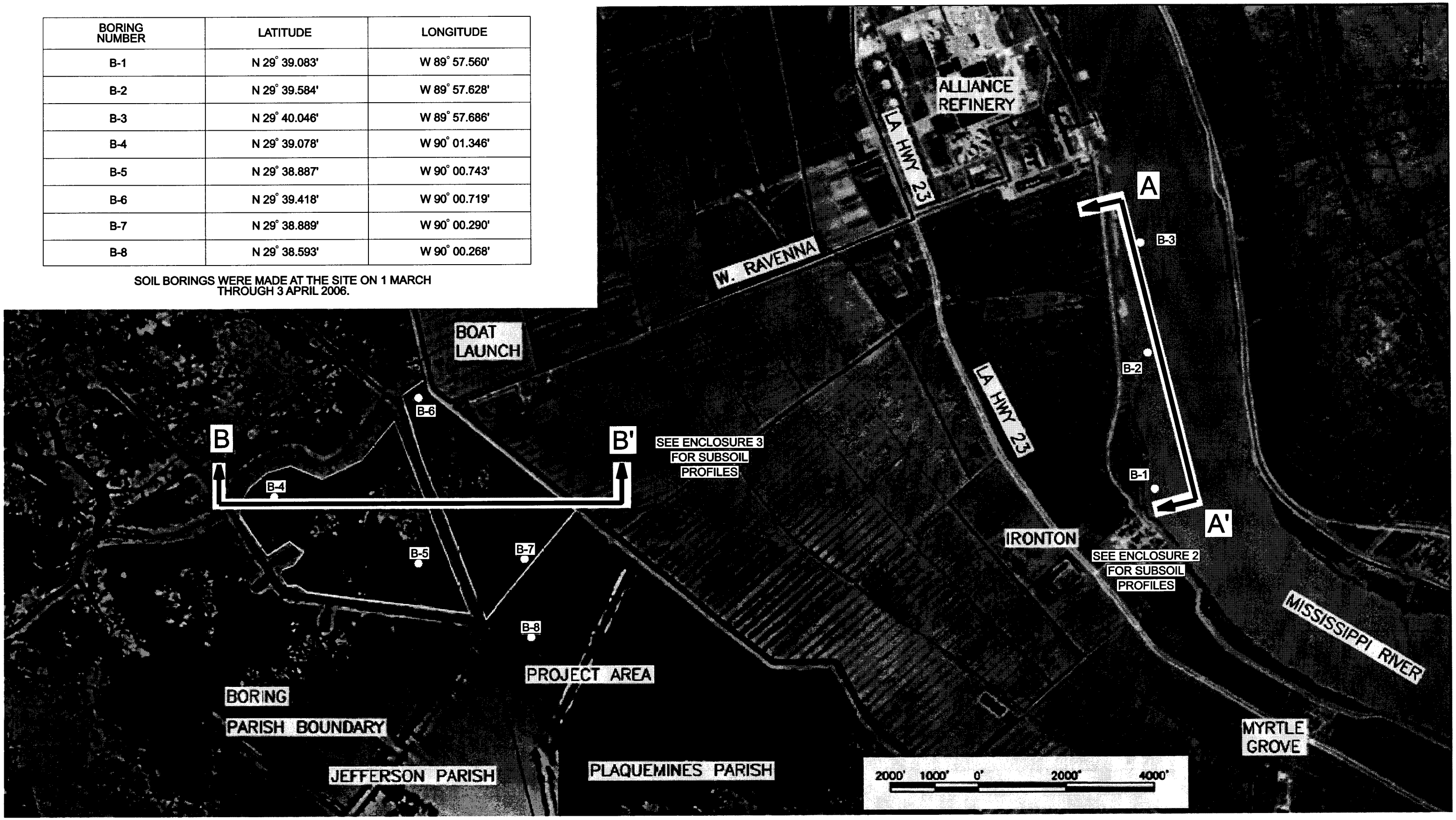
SUBSURFACE INFORMATION OBTAINED BY OTHERS

APPENDIX I

LOGS OF SOIL BORINGS AND LABORATORY TEST RESULTS

BORING NUMBER	LATITUDE	LONGITUDE
B-1	N 29° 39.083'	W 89° 57.560'
B-2	N 29° 39.584'	W 89° 57.628'
B-3	N 29° 40.046'	W 89° 57.686'
B-4	N 29° 39.078'	W 90° 01.346'
B-5	N 29° 38.887'	W 90° 00.743'
B-6	N 29° 39.418'	W 90° 00.719'
B-7	N 29° 38.889'	W 90° 00.290'
B-8	N 29° 38.593'	W 90° 00.268'

SOIL BORINGS WERE MADE AT THE SITE ON 1 MARCH THROUGH 3 APRIL 2006.



EUSTIS ENGINEERING COMPANY, INC.
GEOTECHNICAL ENGINEERING & CQC SERVICES
3011 28TH STREET METAIRIE, LOUISIANA

REV	DATE	DESCRIPTION	REV	DATE	DESCRIPTION

LOCATION OF BORINGS
AND GEOLOGIC SUBSOIL PROFILES
STATE OF LOUISIANA
COASTAL RESTORATION AND MANAGEMENT
MISSISSIPPI RIVER SEDIMENT DELIVERY SYSTEM
BAYOU DUPONT
PLAQUEMINES AND JEFFERSON PARISHES, LOUISIANA

DRAWN BY: J.L.S.	DATE: 10 JULY 06
CHECKED BY: J.J.H.	JOB NO. 19183
SCALE: AS SHOWN	FIGURE 1
FILE: BORINGS.DGN	

LEGEND AND NOTES FOR
LOG OF BORING AND TEST RESULTS

PP Pocket penetrometer: Resistance in tons per square foot

SPT Standard Penetration Test: Number of blows of a 140-lb hammer dropped 30 inches required to drive 2-in. O.D., 1.4-in. I.D. sampler a distance of 1 foot into the soil after first seating it 6 inches

SPLR Type of Sampling  Shelby  SPT  Auger  No sample

SYMBOL Clay  Silt  Sand  Peat/Humus  Shells  Stone/Gravel 

Predominant type shown heavy; Modifying type shown light

USC Unified Soil Classification

DENSITY Unit weight in pounds per cubic foot

SHEAR TESTS

TYPE

- UC Unconfined compression shear
- OB Unconsolidated undrained triaxial compression shear on one specimen confined at the approximate overburden pressure
- UU Unconsolidated undrained triaxial compression shear
- CU Consolidated undrained triaxial compression shear
- DS Direct shear

- Ø Angle of internal friction in degrees
- c Cohesion in pounds per square foot

ATTERBERG LIMITS

- LL Liquid Limit
- PL Plastic Limit
- PI Plasticity Index

OTHER TESTS

- CON Consolidation
- PD Particle size distribution (sieve and/or hydrometer)
- k Coefficient of permeability in centimeters per second
- SP Swelling pressure in pounds per square foot

Other laboratory test results reported on separate figures

GENERAL NOTES

(1) If a ground water depth is shown on the boring log, these observations were made at the time of drilling and were measured below the existing ground surface. These observations are shown on the boring logs. However, ground water levels may vary due to seasonal fluctuations and other factors. If important to construction, the depth to ground water should be determined by those persons responsible for construction immediately prior to beginning work.

(2) While the individual logs of borings are considered to be representative of subsurface conditions at their respective locations on the dates shown, it is not warranted that they are representative of subsurface conditions at other locations and times.

EUSTIS ENGINEERING COMPANY, INC.

LOG OF BORING AND TEST RESULTS

STATE OF LOUISIANA
COASTAL RESTORATION AND MANAGEMENT
MISSISSIPPI RIVER SEDIMENT DELIVERY SYSTEM
BAYOU DUPONT, LOUISIANA

Ground Elev.: -18.3 **Datum:** NAVD 88 **Gr. Water Depth:** N/A **Job No.:** 19183 **Date Drilled:** 3/01/06 **Boring:** 1 **Refer to "Legends & Notes"**

Scale In Feet	PP	SPT	SPLR	Symbol	Visual Classification	USC	Sample Number	Depth In Feet	Water Content Percent	Density Dry	Density Wet	Shear Tests Type	Shear Tests ø	Shear Tests C	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI		Other Tests
0		1			Loose gray clayey silt	ML	1	0-1.5											
		5					2	2-3.5	33										
					Loose gray sandy silt	ML	3	5-6											
							4	6-7											
							5	7-8	25	98	122	OB	--						
10					Very soft gray clay	CH	6	11-12	56	67	104	UC	--	114	65	23	42		
					Loose to medium dense gray silty sand w/clay layers	SM	7	13-14											
							8	15-16											
							9	16-17											PD
					Very soft gray clay w/silty sand lenses & layers	CH	10	19-20	47	74	109	OB	0	75	72	24	48		
20	0.25						11	20-21											
					Loose brown & gray sandy silt w/clay	ML	12	23-24											PD
	0.25				Very soft to soft brown & gray clay w/silt lenses & pockets	CH	13	25-26											
	0.25						14	27-28	43	77	111	UC	--	139	70	27	43		
30	0.25					CH	15	29-30											PD
	0.25						16	31-32											
					Medium compact gray sandy silt	ML	17	32-34											
	0.50				Soft brown & gray clay w/silt lenses & pockets	CH	18	35-36	55	66	102	UC	--	503	64	22	42		
	0.25						19	37-38											
40	0.25						20	39-40											
50																			

Comments: Estimated water surface at el 2.7.
N 29° 39.083'; W 89° 57.560'

EUSTIS ENGINEERING COMPANY, INC.

LOG OF BORING AND TEST RESULTS

STATE OF LOUISIANA
COASTAL RESTORATION AND MANAGEMENT
MISSISSIPPI RIVER SEDIMENT DELIVERY SYSTEM
BAYOU DUPONT, LOUISIANA

Ground Elev.: -33.3 **Datum:** NAVD 88 **Gr. Water Depth:** N/A **Job No.:** 19183 **Date Drilled:** 3/01/06 **Boring:** 2 **Refer to "Legends & Notes"**

Scale In Feet	PP	SPT	S P L R	Symbol	Visual Classification	USC	Sample Number	Depth In Feet	Water Content Percent	Density Dry	Density Wet	Shear Tests Type	Shear Tests ø	Shear Tests C	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI		Other Tests
0					Very soft gray silty clay	CL	1	0-2	30						50	16	34		
							2	3-4	37	85	116	UC	--	75	40	17	23		
					Very soft gray clay w/silt lenses & pockets	CH	3	5-6											
	0.25						4	7-8											
	0.25						5	9-10	53	70	106	OB	0	69	58	22	36		
10	0.25				Loose gray clayey silt	ML	6	11-12	56										
					Very soft gray silty clay	CL	7	13-14	70										
					Loose gray sandy silt	SM	8	15-16											PD
					Loose gray silty fine sand w/clay layers	SM	9	17-18											
							10	19-20											
20					Very soft gray clay w/silt pockets & lenses	CH	11	21-22	43	76	109	UC	--	81					
					Loose gray silty sand w/clay layers	SM	12	22-24											
							13	25-26											PD
							14	26-28											
							15	28-30											
30							16	30-32											
							17	32-34	22	101	122	OB	0	1107					
							18	34-36											
							19	36-38											
					Very soft gray silty clay w/sand layers	CL													
	0.50				Medium stiff gray silty clay w/silt lenses	CL	20	38-40											
40																			
50																			

Comments: Estimated water surface at el 2.7.
N 29° 39.584'; W 89° 57.628'

EUSTIS ENGINEERING COMPANY, INC.

LOG OF BORING AND TEST RESULTS

STATE OF LOUISIANA
COASTAL RESTORATION AND MANAGEMENT
MISSISSIPPI RIVER SEDIMENT DELIVERY SYSTEM
BAYOU DUPONT, LOUISIANA

Ground Elev.: -27.3 **Datum:** NAVD 88 **Gr. Water Depth:** N/A **Job No.:** 19183 **Date Drilled:** 3/05/06 **Boring:** 3 Refer to "Legends & Notes"

Scale In Feet	PP	SPT	S P L R	Symbol	Visual Classification	USC	Sample Number	Depth In Feet	Water Content Percent	Density Dry	Density Wet	Shear Tests Type	Shear Tests ø	Shear Tests C	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI		Other Tests
0	0.25				Extremely soft to very soft gray silty clay	CL	1	0-2											
	0.25						2	2-4	48	74	109	UC	--	28					
	0.25						3	4-6											
					Very loose to loose gray sandy silt	ML	4	6-8											
							5	8-10	30	90	117	OB	0	204					
10					Loose gray silty sand w/clay	SM	6	10-12											
							7	12-14											PD
							8	14-16											
							9	16-18											
							10	18-19											
20		8			Medium dense gray silty sand	SM	11	19-20.5											
		10					12	22-23											
		13					13	25-26											
		25					14	28-29											PD
30		24					15	31-32											
		16					16	34-35											
		18					17	37-38											
		20					18	39-40											
40																			
50																			

Comments: Estimated water surface at el 2.7.
N 29° 40.046'; W 89° 57.686'

EUSTIS ENGINEERING COMPANY, INC.

LOG OF BORING AND TEST RESULTS

STATE OF LOUISIANA
COASTAL RESTORATION AND MANAGEMENT
MISSISSIPPI RIVER SEDIMENT DELIVERY SYSTEM
BAYOU DUPONT, LOUISIANA

Ground Elev.: -1.3 **Datum:** NAVD 88 **Gr. Water Depth:** N/A **Job No.:** 19183 **Date Drilled:** 4/03/06 **Boring:** 4 **Refer to "Legends & Notes"**

Scale In Feet	PP	SPT	S P L R	Symbol	Visual Classification	USC	Sample Number	Depth In Feet	Water Content Percent	Density Dry	Density Wet	Shear Tests Type	Shear Tests ø	Shear Tests C	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI		Other Tests
0	0.00				Very soft gray clay	CH	1	1-2	87	50	93	OB	0	50	109	29	80		
	0.00						2	3-4											
	0.00				Very soft gray organic clay	OH	3	5-6	262	20	74	UC	--	125	267	88	179		
	0.50				Loose gray sandy silt	ML	4	7.0-8							32	25	7		CON
	0.00				Very soft gray clay w/sandy silt lenses & pockets	CH	5	9-10	76	55	98	OB	0	58					
10	0.00				w/sand pockets & shell fragments		6	11-12											
	0.50						7	13-14	63	63	102	UC	--	148					
	0.25						8	15-16											
	0.00						9	17-18											
20	0.25						10	19-20											
	0.50						11	24-25	79	53	95	UC	--	173					
30	0.75						12	29-30											
	0.50						13	34-35											
40	0.50						14	39-40											
50																			

Comments: Estimated water surface at el 0.2.
N 29° 39.078'; 90° 01.346'

EUSTIS ENGINEERING COMPANY, INC.

LOG OF BORING AND TEST RESULTS

STATE OF LOUISIANA
COASTAL RESTORATION AND MANAGEMENT
MISSISSIPPI RIVER SEDIMENT DELIVERY SYSTEM
BAYOU DUPONT, LOUISIANA

Ground Elev.: -1.8 **Datum:** NAVD 88 **Gr. Water Depth:** N/A **Job No.:** 19183 **Date Drilled:** 3/30/06 **Boring:** 5 **Refer to "Legends & Notes"**

Scale In Feet	PP	SPT	S P L R	Symbol	Visual Classification	USC	Sample Number	Depth In Feet	Water Content Percent	Density Dry	Density Wet	Shear Tests Type	Shear Tests ø	Shear Tests C	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI		Other Tests
0	0.00				Very soft black humus	Pt	1	1-2											
	0.00						2	3-4	664	9	66	OB	0	53.2	672	245	427		
	0.00				Very soft gray clay w/silt lenses & pockets	CH	3	5-6											
	0.25						4	7-8	71	56	96	UC	--	65	150	47	103		
10	0.00						5	9-10											
	0.25				Loose to medium compact gray clayey silt w/ clay layers	ML	6	11-12	34	88	117	OB	0	355	48	21	27		
	0.25						7	13-14											
	0.75						8	15-16											
	0.00				Medium compact gray sandy silt w/clay layers	ML	9	17-18	24	98	122	OB	0	1658	35	26	9		CON
20	0.25						10	19-20											
	0.25				Very soft gray clay	CH	11	24-25	82	52	94	UC	--	160					
					w/sandy silt lenses & layers														
30	0.25						12	29-30											
	0.25						13	34-35	63	61	99	UC	--	180					
	0.50						14	39-40											
40					Soft gray clay w/sand lenses	CH													
	0.75						15	44-45	60	63	101	OB	0	392					
50	0.75						16	49-50											

Comments: Estimated water surface at el 0.2.
N 29° 38.887'; W 90° 00.743'

EUSTIS ENGINEERING COMPANY, INC.

LOG OF BORING AND TEST RESULTS

STATE OF LOUISIANA
COASTAL RESTORATION AND MANAGEMENT
MISSISSIPPI RIVER SEDIMENT DELIVERY SYSTEM
BAYOU DUPONT, LOUISIANA

Ground Elev.: -1.8 **Datum:** NAVD 88 **Gr. Water Depth:** N/A **Job No.:** 19183 **Date Drilled:** 3/30/06 **Boring:** 5 **Refer to "Legends & Notes"**

Scale In Feet	PP	SPT	S P L R	Symbol	Visual Classification	USC	Sample Number	Depth In Feet	Water Content Percent	Density Dry	Density Wet	Shear Tests Type	Shear Tests ø	Shear Tests C	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI		Other Tests
50					Soft gray clay	CH													
	0.50						17	54-55	64	63	102	UC	--	395					
					Medium stiff gray clay	CH													
60	0.75						18	59-60											
70																			
80																			
90																			
100																			

Comments: Estimated water surface at el 0.2.
N 29° 38.887'; W 90° 00.743'

EUSTIS ENGINEERING COMPANY, INC.

LOG OF BORING AND TEST RESULTS

STATE OF LOUISIANA
COASTAL RESTORATION AND MANAGEMENT
MISSISSIPPI RIVER SEDIMENT DELIVERY SYSTEM
BAYOU DUPONT, LOUISIANA

Ground Elev.: -0.3 **Datum:** NAVD 88 **Gr. Water Depth:** N/A **Job No.:** 19183 **Date Drilled:** 4/03/06 **Boring:** 6 Refer to "Legends & Notes"

Scale In Feet	PP	SPT	S P L R	Symbol	Visual Classification	USC	Sample Number	Depth In Feet	Water Content Percent	Density Dry	Density Wet	Shear Tests Type	Shear Tests ø	Shear Tests C	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI		Other Tests
0	0.00				Very soft dark brown humus	Pt	1	1-2											
	0.75				Very soft gray clay w/silt pockets	CH	2	3-4	63	61	100	UC	--	145	88	27	61		CON
	1.00						3	5-6											
	0.75						4	7-8	63	62	100	UC	--	215	81	23	58		
10	0.50						5	9-10											
	1.25				Medium compact gray clayey silt w/clay lenses	ML	6	11-12	38	83	115	OB	0	552					
	1.25						7	13-14											
	0.50				Very soft gray clay w/silt lenses & layers	CH	8	15-16	57	65	102	OB	0	150	68	28	40		
	0.50						9	17-18											
20	0.75						10	19-20											
	0.50				w/sandy silt pockets		11	24-25											
30	1.00						12	29-30	64	61	100	UC	--	233					
	0.75						13	34-35											
40	0.75						14	39-40											
50																			

Comments: Estimated water surface at el 0.2.
N 29° 39.418'; W 90° 00.719'

EUSTIS ENGINEERING COMPANY, INC.

LOG OF BORING AND TEST RESULTS

STATE OF LOUISIANA
COASTAL RESTORATION AND MANAGEMENT
MISSISSIPPI RIVER SEDIMENT DELIVERY SYSTEM
BAYOU DUPONT, LOUISIANA

Ground Elev.: -2.7 **Datum:** NAVD 88 **Gr. Water Depth:** N/A **Job No.:** 19183 **Date Drilled:** 4/03/06 **Boring:** 7 **Refer to "Legends & Notes"**

Scale In Feet	PP	SPT	S P L R	Symbol	Visual Classification	USC	Sample Number	Depth In Feet	Water Content Percent	Density Dry	Density Wet	Shear Tests Type	Shear Tests ø	Shear Tests C	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI		Other Tests
0	0.00				Very soft black humus	Pt	1	1-2	700	8	64	OB	0	64					
	0.00						2	3-4											
	1.50				Medium compact gray clayey silt	ML	3	5-6											
	0.75						4	7-8	29	93	120	OB	0	616	36	31	5		
10	0.50						5	9-10											
	0.00						6	11-12											
	0.00				Very soft gray clay w/sand lenses & pockets	CH	7	13-14	79	54	97	OB	0	100	80	25	55		
	0.50						8	15-16											
	0.00				w/sand pockets		9	17-18											
20	0.50						10	19-20	74	57	99	UC	--	95					
	0.25						11	24-25											
30	0.50				w/sand lenses & pockets		12	29-30											
	0.75						13	34-35	69	55	96	UC	--	98	74	22	52		CON
					Medium stiff gray clay	CH													
40	1.00						14	39-40											
50																			

Comments: Estimated water surface at el 0.2.
N 29° 38.889'; W 90° 00.290'

EUSTIS ENGINEERING COMPANY, INC.

LOG OF BORING AND TEST RESULTS

STATE OF LOUISIANA
COASTAL RESTORATION AND MANAGEMENT
MISSISSIPPI RIVER SEDIMENT DELIVERY SYSTEM
BAYOU DUPONT, LOUISIANA

Ground Elev.: -1.8 **Datum:** NAVD 88 **Gr. Water Depth:** N/A **Job No.:** 19183 **Date Drilled:** 3/31/06 **Boring:** 8 **Refer to "Legends & Notes"**

Scale In Feet	PP	SPT	S P L R	Symbol	Visual Classification	USC	Sample Number	Depth In Feet	Water Content Percent	Density Dry	Density Wet	Shear Tests Type	Shear Tests ø	Shear Tests C	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI		Other Tests
0	0.00				Very soft black humus	Pt	1	1-2	528	10	65	UC	--	13					
	0.00						2	3-4											
	0.00						3	5-6											
	0.00				Very soft dark gray humus w/roots and clay layers	Pt	4	7-8	208	25	76	OB	0	57	224	67	157		CON
	0.00						5	9-10											
10	0.50				Very loose gray clayey silt	ML	6	11-12											
	0.00				Very soft gray clay	CH	7	13-14	38	83	115	OB	0	221					
	0.00						8	15-16											
	0.00				w/sand lenses & pockets		9	17-18											
20	0.00						10	19-20	81	52	93	UC	--	155					
	0.00						11	24-25											
30	0.25						12	29-30	57	64	100	UC	--	130					
	0.50						13	34-35											
40	0.50						14	39-40											
50																			

Comments: Estimated water surface at el 0.2.
N 29° 38.593'; W 90° 00.268'

EUSTIS ENGINEERING COMPANY, INC.

LOG OF BORING AND TEST RESULTS

STATE OF LOUISIANA
COASTAL RESTORATION AND MANAGEMENT
MISSISSIPPI RIVER SEDIMENT DELIVERY SYSTEM
BAYOU DUPONT, LOUISIANA

Ground Elev.: -18.3 **Datum:** NAVD 88 **Gr. Water Depth:** N/A **Job No.:** 19183 **Date Drilled:** 3/01/06 **Boring:** 1 **Refer to "Legends & Notes"**

Scale In Feet	PP	SPT	SPLR	Symbol	Visual Classification	USC	Sample Number	Depth In Feet	Water Content Percent	Density Dry	Density Wet	Shear Tests Type	Shear Tests ø	Shear Tests C	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI		Other Tests
0		1			Loose gray clayey silt	ML	1	0-1.5											
		5					2	2-3.5	33										
					Loose gray sandy silt	ML	3	5-6											
							4	6-7											
							5	7-8	25	98	122	OB	--						
10					Very soft gray clay	CH	6	11-12	56	67	104	UC	--	114	65	23	42		
					Loose to medium dense gray silty sand w/clay layers	SM	7	13-14											
							8	15-16											
							9	16-17											PD
					Very soft gray clay w/silty sand lenses & layers	CH	10	19-20	47	74	109	OB	0	75	72	24	48		
20	0.25						11	20-21											
					Loose brown & gray sandy silt w/clay	ML	12	23-24											PD
	0.25				Very soft to soft brown & gray clay w/silt lenses & pockets	CH	13	25-26											
	0.25						14	27-28	43	77	111	UC	--	139	70	27	43		
30	0.25					CH	15	29-30											PD
	0.25						16	31-32											
					Medium compact gray sandy silt	ML	17	32-34											
	0.50				Soft brown & gray clay w/silt lenses & pockets	CH	18	35-36	55	66	102	UC	--	503	64	22	42		
	0.25						19	37-38											
40	0.25						20	39-40											
50																			

Comments: Estimated water surface at el 2.7.
N 29° 39.083'; W 89° 57.560'

EUSTIS ENGINEERING COMPANY, INC.

LOG OF BORING AND TEST RESULTS

STATE OF LOUISIANA
COASTAL RESTORATION AND MANAGEMENT
MISSISSIPPI RIVER SEDIMENT DELIVERY SYSTEM
BAYOU DUPONT, LOUISIANA

Ground Elev.: -33.3 **Datum:** NAVD 88 **Gr. Water Depth:** N/A **Job No.:** 19183 **Date Drilled:** 3/01/06 **Boring:** 2 **Refer to "Legends & Notes"**

Scale In Feet	PP	SPT	S P L R	Symbol	Visual Classification	USC	Sample Number	Depth In Feet	Water Content Percent	Density Dry	Density Wet	Shear Tests Type	Shear Tests ø	Shear Tests C	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI		Other Tests
0					Very soft gray silty clay	CL	1	0-2	30						50	16	34		
							2	3-4	37	85	116	UC	--	75	40	17	23		
					Very soft gray clay w/silt lenses & pockets	CH	3	5-6											
	0.25						4	7-8											
	0.25						5	9-10	53	70	106	OB	0	69	58	22	36		
10	0.25				Loose gray clayey silt	ML	6	11-12	56										
					Very soft gray silty clay	CL	7	13-14	70										
					Loose gray sandy silt	SM	8	15-16											PD
					Loose gray silty fine sand w/clay layers	SM	9	17-18											
							10	19-20											
20					Very soft gray clay w/silt pockets & lenses	CH	11	21-22	43	76	109	UC	--	81					
					Loose gray silty sand w/clay layers	SM	12	22-24											
							13	25-26											PD
							14	26-28											
							15	28-30											
30							16	30-32											
							17	32-34	22	101	122	OB	0	1107					
							18	34-36											
							19	36-38											
					Very soft gray silty clay w/sand layers	CL													
	0.50				Medium stiff gray silty clay w/silt lenses	CL	20	38-40											
40																			
50																			

Comments: Estimated water surface at el 2.7.
N 29° 39.584'; W 89° 57.628'

EUSTIS ENGINEERING COMPANY, INC.

LOG OF BORING AND TEST RESULTS

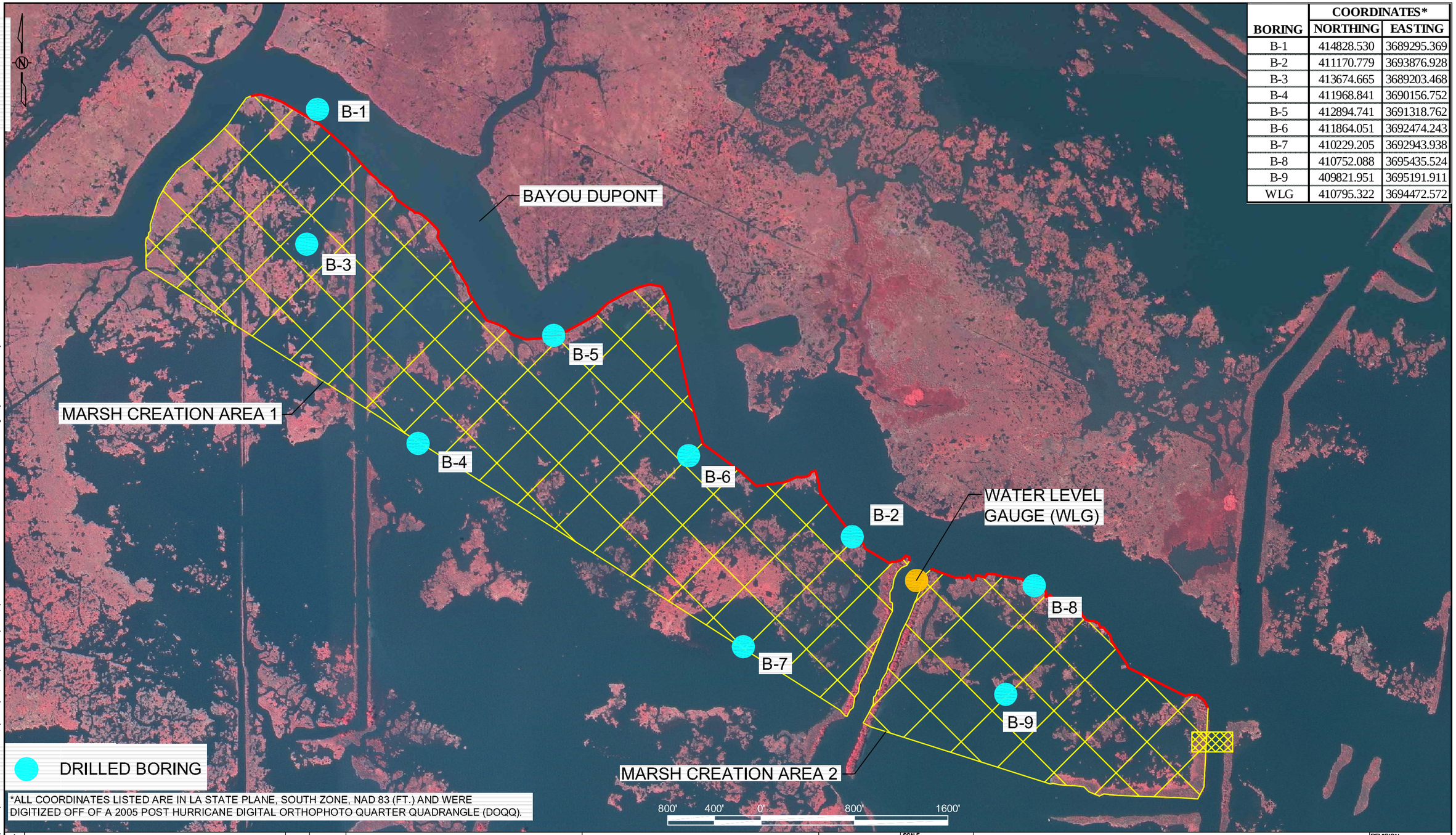
STATE OF LOUISIANA
COASTAL RESTORATION AND MANAGEMENT
MISSISSIPPI RIVER SEDIMENT DELIVERY SYSTEM
BAYOU DUPONT, LOUISIANA

Ground Elev.: -27.3 **Datum:** NAVD 88 **Gr. Water Depth:** N/A **Job No.:** 19183 **Date Drilled:** 3/05/06 **Boring:** 3 Refer to "Legends & Notes"

Scale In Feet	PP	SPT	S P L R	Symbol	Visual Classification	USC	Sample Number	Depth In Feet	Water Content Percent	Density Dry	Density Wet	Shear Tests Type	Shear Tests ø	Shear Tests C	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI		Other Tests
0	0.25				Extremely soft to very soft gray silty clay	CL	1	0-2											
	0.25						2	2-4	48	74	109	UC	--	28					
	0.25						3	4-6											
					Very loose to loose gray sandy silt	ML	4	6-8											
							5	8-10	30	90	117	OB	0	204					
10					Loose gray silty sand w/clay	SM	6	10-12											
							7	12-14											PD
							8	14-16											
							9	16-18											
							10	18-19											
20		8			Medium dense gray silty sand	SM	11	19-20.5											
		10					12	22-23											
		13					13	25-26											
		25					14	28-29											PD
30		24					15	31-32											
		16					16	34-35											
		18					17	37-38											
		20					18	39-40											
40																			
50																			

Comments: Estimated water surface at el 2.7.
N 29° 40.046'; W 89° 57.686'

BORING	COORDINATES*	
	NORTHING	EASTING
B-1	414828.530	3689295.369
B-2	411170.779	3693876.928
B-3	413674.665	3689203.468
B-4	411968.841	3690156.752
B-5	412894.741	3691318.762
B-6	411864.051	3692474.243
B-7	410229.205	3692943.938
B-8	410752.088	3695435.524
B-9	409821.951	3695191.911
WLG	410795.322	3694472.572



DRILLED BORING

*ALL COORDINATES LISTED ARE IN LA STATE PLANE, SOUTH ZONE, NAD 83 (FT.) AND WERE DIGITIZED OFF OF A 2005 POST HURRICANE DIGITAL ORTHOPHOTO QUARTER QUADRANGLE (DOQQ).

REV	DESCRIPTION OF REVISION	BY	DATE
△			
△			
△			
△			
△			
△			

URS
7389 Florida Blvd., Suite 300
Baton Rouge, Louisiana 70806
225/922-5700

REFERENCE DRAWINGS

SCALE	NOTED
DESIGNED	IH
DRAWN	ESL
CHECKED	
PEER REVIEWED	
DATE	

BAYOU DUPONT MARSH CREATION AND RIDGE RESTORATION

TEST LOCATION PLAN

REVISION	△
PROJECT	19228956
FIGURE	2

I:\CADD\DUPONT\19228956\00001\BORING LAYOUT3.DWG I:\CADD\DUPONT\19228956\00001\BORING LAYOUT3.DWGBORING LAYOUT3.DWG — Boring Layout — Thursday, March 19, 2009 1:08:00 PM

Project: Bayou DuPont Marsh Restoration
Project Location: Jefferson Parish, Louisiana
Project Number: 19228956.00001

Log of Boring B-1

Sheet 1 of 2

Date(s) Drilled	**2/20/09 - 2/20/09**	Logged By	**A. Bukkapatnam**	Checked By	**I. Harrouch**
Drilling Method	**Rotary Wash**	Drill Bit Size/Type	**Bottom Discharge 4(5/8)"**	Total Depth Drilled (feet)	**31.8**
Drill Rig Type	**Marsh Buggy**	Drilling Contractor	**SESI**	Sampler Type(s)	**Piston Sampler/ Shelby Tube**
Groundwater Level and Date Measured	**-0.2' 2/20/2009**	Hammer Data	**140 LBS Safety**	Approximate Surface Elevation	**-0.2'**
Location	**N414828.534 E3689295.369**			Borehole Backfill	**Cement Grout**

Elevation feet	Depth, feet	SAMPLES Type	Number	Recovery, in.	Sampling Resistance, blows / ft	Graphic Log	MATERIAL DESCRIPTION	Torvane (tsf)	Hand Penetrometer (tsf)	Water Content, %	Dry Unit Weight, pcf	Cohesion (ksf)	Liquid Limit, %	Plastic Index, %
	0						WATER MUDLINE El. -2.03'							
			ST-1	20			ORGANICS with Clay (OH)			607				
-5	5		ST-2	15			Very Soft, Brown to Black HUMUS with Clay (OH)*		0.10	305	21	0.08	618	395
			ST-3	15			Very Soft, CLAY with Organics (CH - OH)			230	24	0.06	202	150
			ST-4	22			Very Soft, Gray Lean CLAY (CL)*		0.75	64	72	0.15	46	20
-10	10		ST-5	22			Very Soft, Gray SILT with Clay, Organics and trace Fine Sand (CL-ML)*		0.25	54	74	0.17	43	18
-15	15		ST-6	22			Very Soft, Gray CLAY with Silt (CH)		0.25	88	55	0.12		
-20	20		ST-7	15			Very Soft, Gray fat CLAY (CH)*		0.25	87	47	0.20	85	54
-25	25		ST-8	15			Very Soft, Gray CLAY with trace Organic Pockets (CH)*		0.25	79	56	0.08		

Project: Bayou DuPont Marsh Restoration
Project Location: Jefferson Parish, Louisiana
Project Number: 19228956.00001

Log of Boring B-1

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Recovery, in.	SAMPLES Sampling Resistance, blows / ft	Graphic Log	MATERIAL DESCRIPTION	Torvane (tsf)	Hand Penetrometer (tsf)	Water Content, %	Dry Unit Weight, pcf	Cohesion (ksf)	Liquid Limit, %	Plastic Index, %
-30	30	ST-9	20				Soft, Gray fat CLAY (CH)*		0.50	75	61	0.26	92	60
							Bottom of hole @ 30 feet below MUDLINE * - Look at Table: Boring B - 1 for additional Laboratory Results							
-35	35													
-40	40													
-45	45													
-50	50													
-55	55													

Project: Bayou DuPont Marsh Restoration
Project Location: Jefferson Parish, Louisiana
Project Number: 19228956.00001

Log of Boring B-2

Sheet 1 of 2

Date(s) Drilled	**2/19/09 - 2/19/09**	Logged By	**A. Bukkapatnam**	Checked By	**I. Harrouch**
Drilling Method	**Rotary Wash**	Drill Bit Size/Type	**Bottom Discharge 4(5/8)"**	Total Depth Drilled (feet)	**31.5**
Drill Rig Type	**Marsh Buggy**	Drilling Contractor	**SESI**	Sampler Type(s)	**Piston Sampler/ Shelby Tube**
Groundwater Level and Date Measured	**0.2' 2/19/2009**	Hammer Data	**140 LBS Safety**	Approximate Surface Elevation	**0.2'**
Location	**N411170.779 E3693876.982**			Borehole Backfill	**Cement Grout**

Elevation feet	Depth, feet	SAMPLES Type	Number	Recovery, in.	Sampling Resistance, blows / ft	Graphic Log	MATERIAL DESCRIPTION	Torvane (tsf)	Hand Penetrometer (tsf)	Water Content, %	Dry Unit Weight, pcf	Cohesion (ksf)	Liquid Limit, %	Plastic Index, %
0	0						WATER MUDLINE El. -1.3'							
			ST-1	20			ORGANICS with Clay (OH)			915				
-5	5		ST-2	20			Very Soft, Brown ORGANICS with Clay and Peat (OH)*		0.25	475	12	0.12	400	254
			ST-3	20			Very Soft, Gray and Black CLAY with Organics and Silt traces (CH)*		0.25	204	27	0.13		
			ST-4	22			Very Soft, Gray CLAY with Organic pockets (CH)		0.25	95	50	0.06	123	90
-10	10		ST-5	18			Very Soft, Gray CLAY with Organics (CH)*		0.25	88	52	0.07	97	70
-15	15		ST-6	18			Very Soft, Gray CLAY with Organic pockets (CH)		0.25	141	36	0.07	144	104
-20	20		ST-7	20			Very Soft, Gray CLAY with Silt (CH)		0.50	50	75	0.14	58	36
-25	25		ST-8	16			Very Soft, Gray CLAY with Silt pockets and Organics (CH)*		0.25	98	51	0.11		

Project: Bayou DuPont Marsh Restoration
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Project Number: 19228956.00001

Log of Boring B-2

Elevation feet	Depth, feet	SAMPLES Type	Number	Recovery, in.	Sampling Resistance, blows / ft	Graphic Log	MATERIAL DESCRIPTION	Torvane (tsf)	Hand Penetrometer (tsf)	Water Content, %	Dry Unit Weight, pcf	Cohesion (ksf)	Liquid Limit, %	Plastic Index, %
-30	30		ST-9	20			Very Soft, Gray CLAY with Silt and Organics (CH)		1.00	42	69	0.12	78	53
							Bottom of hole @ 30 feet below MUDLINE * - Look at Table: Boring B - 2 for additional Laboratory Results							
-35	35													
-40	40													
-45	45													
-50	50													
-55	55													

Project: Bayou DuPont Marsh Restoration
Project Location: Jefferson Parish, Louisiana
Project Number: 19228956.00001

Log of Boring B-3

Sheet 1 of 2

Date(s) Drilled	**2/20/09 - 2/20/09**	Logged By	**A. Bukkapatnam**	Checked By	**I. Harrouch**
Drilling Method	**Rotary Wash**	Drill Bit Size/Type	**Bottom Discharge 4(5/8)"**	Total Depth Drilled (feet)	**40.7**
Drill Rig Type	**Marsh Buggy**	Drilling Contractor	**SESI**	Sampler Type(s)	**Piston Sampler/ Shelby Tube**
Groundwater Level and Date Measured	**-0.2' 2/20/2009**	Hammer Data	**140 LBS Safety**	Approximate Surface Elevation	**-0.2'**
Location	**N413674.665 E3689203.468**			Borehole Backfill	**Cement Grout**

Elevation feet	Depth, feet	SAMPLES Type	Number	Recovery, in.	Sampling Resistance, blows / ft	Graphic Log	MATERIAL DESCRIPTION	Torvane (tsf)	Hand Penetrometer (tsf)	Water Content, %	Dry Unit Weight, pcf	Cohesion (ksf)	Liquid Limit, %	Plastic Index, %
	0						WATER MUDLINE El. -0.87'							
			ST-1	14			PEAT (PT)*			1171			996	644
			ST-2	12			Very Soft, Black PEAT with Clay (PT)*		0.25	383		0.12		
-5	5		ST-3	18			Very Soft, Gray CLAY with Organic pockets (CL)*			171		0.06	141	102
			ST-4	18			Very Soft, Gray Lean CLAY with trace Organics (CL)*		0.25	43		0.14		
-10	10		ST-5	16			Very Soft, Gray Lean Clay (CL - ML)*		0.50	46		0.07	45	15
-15	15		ST-6	12			Very Soft, Gray CLAY with Silt, Shells and Organics (CH)*		0.50	90		0.08	126	104
-20	20		ST-7	18			Very Soft, Gray Clay becoming Organic Peat and Clay (CH)		0.50	230		0.11		
-25	25		ST-8	18			Very Soft, Gray CLAY with Organics (CH)*			100		0.13	108	81

Project: Bayou DuPont Marsh Restoration
Project Location: Jefferson Parish, Louisiana
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Log of Boring B-3

Elevation feet	Depth, feet	SAMPLES Type	Number	Recovery, in.	Sampling Resistance, blows / ft	Graphic Log	MATERIAL DESCRIPTION	Torvane (tsf)	Hand Penetrometer (tsf)	Water Content, %	Dry Unit Weight, pcf	Cohesion (ksf)	Liquid Limit, %	Plastic Index, %
-30	30		ST-9	20			Loose, Gray Silt with Fine Sand and trace Clay (ML)*			33		0.38		
-35	35		ST-10	18			Gray Sandy Silt with Clay pockets (ML)*			26		5.12	NP	NP
-40	40		ST-11	20			Loose, Gray Sandy Silt with trace Clay (ML)			27		0.26	NP	NP
							Bottom of hole @ 40 feet below MUDLINE * - Look at Table: Boring B - 3 for additional Laboratory Results							
-45	45													
-50	50													
-55	55													

Project: Bayou DuPont Marsh Restoration
Project Location: Jefferson Parish, Louisiana
Project Number: 19228956.00001

Log of Boring B-4

Sheet 1 of 2

Date(s) Drilled	**2/17/09 - 2/17/09**	Logged By	**A. Bukkapatnam**	Checked By	**I. Harrouch**
Drilling Method	**Rotary Wash**	Drill Bit Size/Type	**Bottom Discharge 4(5/8)"**	Total Depth Drilled (feet)	**40.7**
Drill Rig Type	**Marsh Buggy**	Drilling Contractor	**SESI**	Sampler Type(s)	**Piston Sampler/ Shelby Tube**
Groundwater Level and Date Measured	**0.2' 2/17/2009**	Hammer Data	**140 LBS Safety**	Approximate Surface Elevation	**0.2'**
Location	**N411968.841 E3690156.752**			Borehole Backfill	**Cement Grout**

Elevation feet	Depth, feet	SAMPLES Type	Number	Recovery, in.	Sampling Resistance, blows / ft	Graphic Log	MATERIAL DESCRIPTION	Torvane (tsf)	Hand Penetrometer (tsf)	Water Content, %	Dry Unit Weight, pcf	Cohesion (ksf)	Liquid Limit, %	Plastic Index, %
0	0						WATER MUDLINE El. -0.47'							
			ST-1				PEAT with Clay *			860			958	427
			ST-2				Very Soft, Dark Gray CLAY with Organic pockets (OH)*			333	17	0.11	482	386
-5	5		ST-3				Very Soft, Gray CLAY with Organic pockets (CH)			80	56	0.07	122	83
			ST-4				Very Soft, Gray CLAY with Organic pockets and trace Shells (CH)*			72	49	0.06	64	41
-10	10		ST-5				Very Soft CLAY with Silt, Organic pockets and Shells (CH)*			90	50	0.07		
-15	15		ST-6				Very Soft, Gray CLAY with Organic and Silty Clay (CH)*			114	45	0.10	91	58
-20	20		ST-7				Very Soft, Gray CLAY with Silt and Organic pockets (CH)*			91	50	0.09		
-25	25		ST-8				Very Soft, Gray CLAY with Organic pockets, Sandy Silt and Silty Sand layers (CH)*		0.25	97	57	0.10	101	62

Project: Bayou DuPont Marsh Restoration
Project Location: Jefferson Parish, Louisiana
Project Number: 19228956.00001

Log of Boring B-4

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	Recovery, in.	Sampling Resistance, blows / ft	Graphic Log	MATERIAL DESCRIPTION	Torvane (tsf)	Hand Penetrometer (tsf)	Water Content, %	Dry Unit Weight, pcf	Cohesion (ksf)	Liquid Limit, %	Plastic Index, %
-30	30	ST	9				Firm, Gray Clayey SILT (ML)		0.25	30	92	0.87		
-35	35	ST	10				Firm, Gray Sandy SILT with Clay (ML)*		0.25	28	99	1.08	NP	NP
-40	40	ST	11				Soft, Gray CLAY (CH)		0.30	63	66	0.38	63	39
-45	45						Bottom of hole @ 40 feet below MUDLINE * - Look at Table: Boring B - 4 for additional Laboratory Results							
-50	50													
-55	55													

Project: Bayou DuPont Marsh Restoration
Project Location: Jefferson Parish, Louisiana
Project Number: 19228956.00001

Log of Boring B-5

Sheet 1 of 3

Date(s) Drilled	**2/16/09 - 2/17/09**	Logged By	**A. Bukkapatnam**	Checked By	**I. Harrouch**
Drilling Method	**Rotary Wash**	Drill Bit Size/Type	**Bottom Discharge 4(5/8)"**	Total Depth Drilled (feet)	**60.4**
Drill Rig Type	**Marsh Buggy**	Drilling Contractor	**SESI**	Sampler Type(s)	**Piston Sampler/ Shelby Tube**
Groundwater Level and Date Measured	**0.2' 2/17/2009**	Hammer Data	**140 LBS Safety**	Approximate Surface Elevation	**0.2'**
Location	**N412894.741 E3691318.762**			Borehole Backfill	**Cement Grout**

Elevation feet	Depth, feet	SAMPLES Type	Number	Recovery, in.	Sampling Resistance, blows / ft	Graphic Log	MATERIAL DESCRIPTION	Torvane (tsf)	Hand Penetrometer (tsf)	Water Content, %	Dry Unit Weight, pcf	Cohesion (ksf)	Liquid Limit, %	Plastic Index, %
0	0						WATER MUDLINE El. -0.22'							
			ST-1	17			Very Soft PEAT (PT)			428	11	0.05		
			ST-2	24			PEAT with Clay and Organics (PT-OH)*			223			223	165
-5	5		ST-3	13			Very Soft, PEAT with Clay and Organics (PT-OH)*			334	17	0.07		
			ST-4	23			Very Soft Gray CLAY with Organic pockets (CH)			84	55	0.05	68	42
-10	10		ST-5	22			Very Soft Gray CLAY with Organic pockets and trace Silt pockets (CH)			62	64			
-15	15		ST-6	20			Very Soft, Gray Lean CLAY with Organics and Fine Sand (CH)*			117	39	0.08	78	42
-20	20		ST-7	22			Very Soft Gray CLAY with Organic pockets (CH)*			138	40	0.07		
-25	25		ST-8	23			Very Soft, Gray SILTY CLAY (CL)*			168	40	0.09	47	23

Project: Bayou DuPont Marsh Restoration
Project Location: Jefferson Parish, Louisiana
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Log of Boring B-5

Elevation feet	Depth, feet	SAMPLES Type	Number	Recovery, in.	Sampling Resistance, blows / ft	Graphic Log	MATERIAL DESCRIPTION	Torvane (tsf)	Hand Penetrometer (tsf)	Water Content, %	Dry Unit Weight, pcf	Cohesion (ksf)	Liquid Limit, %	Plastic Index, %
-30	30		ST-9	23			Very Soft, Gray CLAYEY Silt with Clay and Sand (CL-ML)			33	81	0.09	34	6
-35	35		ST-10	17			Alternating layers of Very Soft, Gray SILTY CLAY with Sand (CL)			47	72			
-40	40		ST-11	24			Loose Gray SILT with CLAY layers (ML)*			38	89	0.46	NP	NP
-45	45		ST-12	19			Medium, Gray CLAYEY Silt with Clay (CL-ML)*			32	95	0.60		
-50	50		ST-13	18			Very Soft to Soft Gray CLAY (CH)*			68	62	0.24	79	44
-55	55		ST-14	22			Very Soft to Soft, Gray CLAY with Silt pockets and trace Organics (CH)*			56	69	0.22		

Project: Bayou DuPont Marsh Restoration
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Log of Boring B-5

Elevation feet	Depth, feet	SAMPLES Type	Number	Recovery, in.	Sampling Resistance, blows / ft	Graphic Log	MATERIAL DESCRIPTION	Torvane (tsf)	Hand Penetrometer (tsf)	Water Content, %	Dry Unit Weight, pcf	Cohesion (ksf)	Liquid Limit, %	Plastic Index, %
-60	60		ST-15	15			Soft Gray CLAY with trace Organics (CH)*			53	74	0.38	67	42
							Bottom of hole @ 60 feet below MUDLINE * - Look at Table: Boring B - 5 for additional Laboratory Results							
-65	65													
-70	70													
-75	75													
-80	80													
-85	85													

Project: Bayou DuPont Marsh Restoration
Project Location: Jefferson Parish, Louisiana
Project Number: 19228956.00001

Log of Boring B-6

Sheet 1 of 3

Date(s) Drilled	**2/17/09 - 2/17/09**	Logged By	**A. Bukkapatnam**	Checked By	**I. Harrouch**
Drilling Method	**Rotary Wash**	Drill Bit Size/Type	**Bottom Discharge 4(5/8)"**	Total Depth Drilled (feet)	**62.2**
Drill Rig Type	**Marsh Buggy**	Drilling Contractor	**SESI**	Sampler Type(s)	**Piston Sampler/ Shelby Tube**
Groundwater Level and Date Measured	**0.2' 2/17/2009**	Hammer Data	**140 LBS Safety**	Approximate Surface Elevation	**0.2'**
Location	**N411864.051 E3692474.243**			Borehole Backfill	**Cement Grout**

Elevation feet	Depth, feet	SAMPLES Type	Number	Recovery, in.	Sampling Resistance, blows / ft	Graphic Log	MATERIAL DESCRIPTION	Torvane (tsf)	Hand Penetrometer (tsf)	Water Content, %	Dry Unit Weight, pcf	Cohesion (ksf)	Liquid Limit, %	Plastic Index, %
0	0						WATER							
							MUDLINE El. -1.97'							
			ST-1	22			Very Soft, PEAT with Clay (PT)*			194	23		289	145
-5	5		ST-2	23			Very Soft, Brown Organic CLAY with Peat (PT/OH/CH)*			374	18	0.08		
			ST-3	18			Very Soft, Gray CLAY with Organic pockets (CH)*			123	43	0.07	120	76
			ST-4	19			Very Soft, Gray CLAY with Organic pockets (CH)							
-10	10		ST-5	22			Very Soft, Gray CLAY with Organic pockets (CH)*			99	52	0.10	67	33
-15	15		ST-6	22			Very Soft, Gray CLAY with Organic pockets (CH)			124	44			
-20	20		ST-7	12			Very Soft, Gray CLAY becoming Gray SANDY SILT with Clay (CH becoming ML)*			104	47	0.10		
-25	25													

Project: Bayou DuPont Marsh Restoration
Project Location: Jefferson Parish, Louisiana
Project Number: 19228956.00001

Log of Boring B-6

Elevation feet	Depth, feet	SAMPLES Type	Number	Recovery, in.	Sampling Resistance, blows / ft	Graphic Log	MATERIAL DESCRIPTION	Torvane (tsf)	Hand Penetrometer (tsf)	Water Content, %	Dry Unit Weight, pcf	Cohesion (ksf)	Liquid Limit, %	Plastic Index, %
			ST-8	22			Very Soft, Gray CLAY becoming Gray SILT with Clay (CH)			83	63	0.16	130	90
-30	30		ST-9	22			Very Soft, Gray CLAY with Silt (CH)*			71	61	0.18		
-35	35		ST-10	21			Soft, Gray CLAY becoming Gray SILT with Clay (CH)*			46	84	0.36	83	52
-40	40		ST-11	10			Soft, Gray CLAY with trace Silt and Organics (CH)*			62	68			
-45	45		ST-12	23			Loose, Gray SILT with trace Organics, trace silt and silt lenses, with Clay (MH)*			50	76	0.33	55	22
-50	50		ST-13	22			Medium, Gray CLAY with Silt pockets (CH)			50	81	0.34		
-55	55													

Project: Bayou DuPont Marsh Restoration
Project Location: Jefferson Parish, Louisiana
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Log of Boring B-6

Sheet 3 of 3

Elevation feet	Depth, feet	SAMPLES Type	Number	Recovery, in.	Sampling Resistance, blows / ft	Graphic Log	MATERIAL DESCRIPTION	Torvane (tsf)	Hand Penetrometer (tsf)	Water Content, %	Dry Unit Weight, pcf	Cohesion (ksf)	Liquid Limit, %	Plastic Index, %
		ST	ST-14	19			Soft, Gray CLAY with trace Silt (CH)*			63	66	0.60		
-60	60	ST	ST-15	22			Soft, Gray CLAY with trace Silt (CH)*			71	64	0.46		
							Bottom of hole @ 60 feet below MUDLINE * - Look at Table: Boring B - 6 for additional Laboratory Results							
-65	65													
-70	70													
-75	75													
-80	80													
-85	85													

Project: Bayou DuPont Marsh Restoration
Project Location: Jefferson Parish, Louisiana
Project Number: 19228956.00001

Log of Boring B-7

Date(s) Drilled	**2/17/09 - 2/17/09**	Logged By	**A. Bukkapatnam**	Checked By	**I. Harrouch**
Drilling Method	**Rotary Wash**	Drill Bit Size/Type	**Bottom Discharge 4(5/8)"**	Total Depth Drilled (feet)	**41.8**
Drill Rig Type	**Marsh Buggy**	Drilling Contractor	**SESI**	Sampler Type(s)	**Piston Sampler/ Shelby Tube**
Groundwater Level and Date Measured	**0.2' 2/17/2009**	Hammer Data	**140 LBS Safety**	Approximate Surface Elevation	**0.2'**
Location	**N410229.205 E3692943.938**			Borehole Backfill	**Cement Grout**

Elevation feet	Depth, feet	SAMPLES Type	Number	Recovery, in.	Sampling Resistance, blows / ft	Graphic Log	MATERIAL DESCRIPTION	Torvane (tsf)	Hand Penetrometer (tsf)	Water Content, %	Dry Unit Weight, pcf	Cohesion (ksf)	Liquid Limit, %	Plastic Index, %
0	0						WATER MUDLINE El -1.63'							
			ST-1	20			Very Soft, PEAT with Clay pockets (PT)		<0.25	955	6	0.04	925	595
-5	5		ST-2	15			Very Soft, PEAT becoming Clay with Organics (PT)*		<0.25	309	18		384	284
			ST-3	22			Very Soft, Gray CLAY with Organics (CH)		<0.25	112	45	0.05		
			ST-4	18			Very Soft, Gray SILTY CLAY with trace Organics (CL)*		<0.25	90	52	0.06		
-10	10		ST-5	15			Very Soft, Gray CLAY with Humus, Organic layers and pockets (OH)*		<0.25	334	18	0.10	240	178
-15	15		ST-6	16			Very Soft, Intermixed Gray CLAY, SILT and SANDY SILT (CL to ML)		<0.25	55	70	0.08		
-20	20		ST-7	18			Soft, Gray SILTY CLAY with trace Organics (CL)*		0.25	48	83	0.29	43	22
-25	25		ST-8	18			Firm, CLAYEY SILT with trace Sand (ML)*		0.25	29	99	1.06		

Project: Bayou DuPont Marsh Restoration
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Log of Boring B-7

Elevation feet	Depth, feet	SAMPLES Type	Number	Recovery, in.	Sampling Resistance, blows / ft	Graphic Log	MATERIAL DESCRIPTION	Torvane (tsf)	Hand Penetrometer (tsf)	Water Content, %	Dry Unit Weight, pcf	Cohesion (ksf)	Liquid Limit, %	Plastic Index, %
-30	30	ST	9	16			Very Soft, Gray CLAY with Silt streaks and trace Organics (CH)*		0.30	56	71	0.17	90	60
-35	35	ST	10	20			Soft, Gray CLAY becoming Gray SILT with Clay (CH)		0.35	25	99	0.24		
-40	40	ST	11	20			Soft, Gray SILTY CLAY with Sandy Silt (CL)		0.40	47	77	0.34	35	12
							Bottom of hole @ 40 feet below MUDLINE * - Look at Table: Boring B - 7 for additional Laboratory Results							
-45	45													
-50	50													
-55	55													

Project: Bayou DuPont Marsh Restoration
Project Location: Jefferson Parish, Louisiana
Project Number: 19228956.00001

Log of Boring B-8

Sheet 1 of 2

Date(s) Drilled	**2/19/09 - 2/19/09**	Logged By	**A. Bukkapatnam**	Checked By	**I. Harrouch**
Drilling Method	**Rotary Wash**	Drill Bit Size/Type	**Bottom Discharge 4(5/8)"**	Total Depth Drilled (feet)	**41.8**
Drill Rig Type	**Marsh Buggy**	Drilling Contractor	**SESI**	Sampler Type(s)	**Piston Sampler/ Shelby Tube**
Groundwater Level and Date Measured	**0.2' 2/19/2009**	Hammer Data	**140 LBS Safety**	Approximate Surface Elevation	**0.2'**
Location	**N410752.088 E3695435.524**			Borehole Backfill	**Cement Grout**

Elevation feet	Depth, feet	SAMPLES Type	Number	Recovery, in.	Sampling Resistance, blows / ft	Graphic Log	MATERIAL DESCRIPTION	Torvane (tsf)	Hand Penetrometer (tsf)	Water Content, %	Dry Unit Weight, pcf	Cohesion (ksf)	Liquid Limit, %	Plastic Index, %
0	0						WATER MUDLINE El. -1.63'							
			ST-1	20			Very Soft, PEAT (PT)*			766	8	0.07		
-5	5		ST-2	20			Very Soft, PEAT with Clay pockets (PT)*		0.25	383	15	0.13		
			ST-3	22			Very Soft, Gray CLAY with Organic pockets (CH-OH)*		0.25	140	36	0.09	185	137
			ST-4	18			Very Soft, Gray CLAY with Organic pockets (CH)		0.25	117	44	0.06	96	63
-10	10		ST-5	18			Very Loose, Gray SILTY CLAY with Clay and Organic pockets (MH)*		0.25	130	40	0.05	87	36
-15	15		ST-6	16			Loose, Gray SILT with trace Sand and Silty Clay pockets (ML)*		0.25	50	75	0.82	NP	NP
-20	20		ST-7	22			Loose, Gray SILT with trace Fine Sand and Clay and Organic pockets (ML)*		0.75	29	96	0.98	NP	NP
-25	25		ST-8	18			Very Soft, Gray CLAY with Silt and Organics (CH)		0.50	107	46	0.13	107	71

Project: Bayou DuPont Marsh Restoration
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Log of Boring B-8

Elevation feet	Depth, feet	SAMPLES Type	Number	Recovery, in.	Sampling Resistance, blows / ft	Graphic Log	MATERIAL DESCRIPTION	Torvane (tsf)	Hand Penetrometer (tsf)	Water Content, %	Dry Unit Weight, pcf	Cohesion (ksf)	Liquid Limit, %	Plastic Index, %
-30	30	ST	9	22			Very Soft, Gray CLAY with Silt pockets becoming Gray Silt with Clay (CH)*		0.75	60	64	0.09		
-35	35	ST	10	18			Loose, Gray SILT with Clay (CL-ML)*		0.25	62	66	0.40	34	9
-40	40	ST	11	18			Intermixed Gray CLAY and SILT with trace Sand and Organics (CL-ML)*		0.50	32	85	0.14		
							End of hole @ 40 feet below MUDLINE * - Look at Table: Boring B - 8 for additional Laboratory Results							
-45	45													
-50	50													
-55	55													

Project: Bayou DuPont Marsh Restoration
Project Location: Jefferson Parish, Louisiana
Project Number: 19228956.00001

Log of Boring B-9

Sheet 1 of 3

Date(s) Drilled	**2/19/09 - 2/19/09**	Logged By	**A. Bukkapatnam**	Checked By	**I. Harrouch**
Drilling Method	**Rotary Wash**	Drill Bit Size/Type	**Bottom Discharge 4(5/8)"**	Total Depth Drilled (feet)	**62.8**
Drill Rig Type	**Marsh Buggy**	Drilling Contractor	**SESI**	Sampler Type(s)	**Piston Sampler/ Shelby Tube**
Groundwater Level and Date Measured	**0.2' 2/19/2009**	Hammer Data	**140 LBS Safety**	Approximate Surface Elevation	**0.2'**
Location	**N409821.951 E3695191.911**			Borehole Backfill	**Cement Grout**

Elevation feet	Depth, feet	SAMPLES Type	Number	Recovery, in.	Sampling Resistance, blows / ft	Graphic Log	MATERIAL DESCRIPTION	Torvane (tsf)	Hand Penetrometer (tsf)	Water Content, %	Dry Unit Weight, pcf	Cohesion (ksf)	Liquid Limit, %	Plastic Index, %
0	0						WATER MUDLINE El. -2.63'							
			ST-1	20"			PEAT (PT)			894	6			
-5	5		ST-2	12"			Very Soft, PEAT with Clay and Organics (PT)*			255	20	0.06	257	173
			ST-3	18"			Very Soft, Gray CLAY with Organics (CH)*		0.25	135	36	0.11		
-10	10		ST-4	20"			PEAT with Clay pockets and Silt pockets (PT)*		0.25	334	17	0.17	573	427
			ST-5	18"			Very Soft, SILTY CLAY with Organics (CL)*		0.25	205	22	0.05		
			ST-6	18"			Very Soft, Gray CLAY with trace Silt and Organic pockets (CH)*		0.50	60	62	0.08	65	39
-15	15		ST-7	20"			Very Soft, Gray CLAY with trace Organic pockets (CH)		0.25	59	72	0.15		
			ST-8	18"			Very Soft, Gray CLAY with Silt and trace Organic (CH)		0.25	49	81	0.13	54	26
-20	20		ST-9	20"			Loose, Gray SILT with clay pockets and trace Fine Sand (ML)		0.75	34	87	0.53		
			ST-10	22"			Firm, Gray SILT with trace Fine Sand and Clay (ML)*		0.25	25	95	2.94	NP	NP
			ST-11	18"			Very Soft, Gray CLAY with Silt lenses (CH)		0.25	98	51	0.10		
-25	25													

Project: Bayou DuPont Marsh Restoration
Project Location: Jefferson Parish, Louisiana
Project Number: 19228956.00001

Log of Boring B-9

Elevation feet	Depth, feet	SAMPLES Type	Number	Recovery, in.	Sampling Resistance, blows / ft	Graphic Log	MATERIAL DESCRIPTION	Torvane (tsf)	Hand Penetrometer (tsf)	Water Content, %	Dry Unit Weight, pcf	Cohesion (ksf)	Liquid Limit, %	Plastic Index, %
		ST	ST-12	18"			Soft, Gray CLAY with Silt pockets (CH)*		0.25	51	67		66	39
		ST	ST-13	18"			Very Soft, Gray CLAY with Silt (CH)*		0.25	80	58	0.11		
-30	30	ST	ST-14	22"			Soft, Gray CLAY with Silt pockets (CH)		0.25	64	62			
		ST	ST-15	16"			Very Soft, Gray CLAY with trace Silt and trace Organics (CH)*		0.50	71	60	0.14	72	45
		ST	ST-16	20"			Loose, Gray SANDY SILT with Clay pockets (ML)		0.50	30	94			
-35	35	ST	ST-17	16"			Soft, Intermixed CLAY and SANDY SILT (CL-ML)		0.75	39	82	0.48	38	7
		ST	ST-18	20"			Soft, Gray SILT with CLAY pockets (ML)*		0.25	43	78			
-40	40	ST	ST-19	16"			Soft, Gray SILT with CLAY pockets (ML)		0.25	55	66	0.31	86	52
		ST	ST-20	16"			Soft, Gray SILT with CLAY pockets and layers (ML)		0.50	53	68			
		ST	ST-21	16"			Very Soft, Gray CLAY with trace Silt (CH)		0.50	63	64	0.15		
-45	45	ST	ST-22	18"			Very Soft, Gray CLAY with Silt pockets (CH)		0.25	54			60	34
		ST	ST-23	18"			Soft, Gray CLAY with Sandy Silt pockets (CH)*		0.25	58	65			
-50	50	ST	ST-24	22"			Very Soft, Gray CLAY with Silt pockets (CH)		0.25	57	67	0.19	52	31
		ST	ST-25	12"			Sandy Clayey SILT (ML)*		0.25	34				
		ST	ST-26	22"			Medium, Gray CLAY with Silt pockets (CH)		0.50	43	76	0.46	56	30
-55	55	ST	ST-27	22"			Very Soft, Gray CLAY with trace Silt and Organics (CH)		0.75					

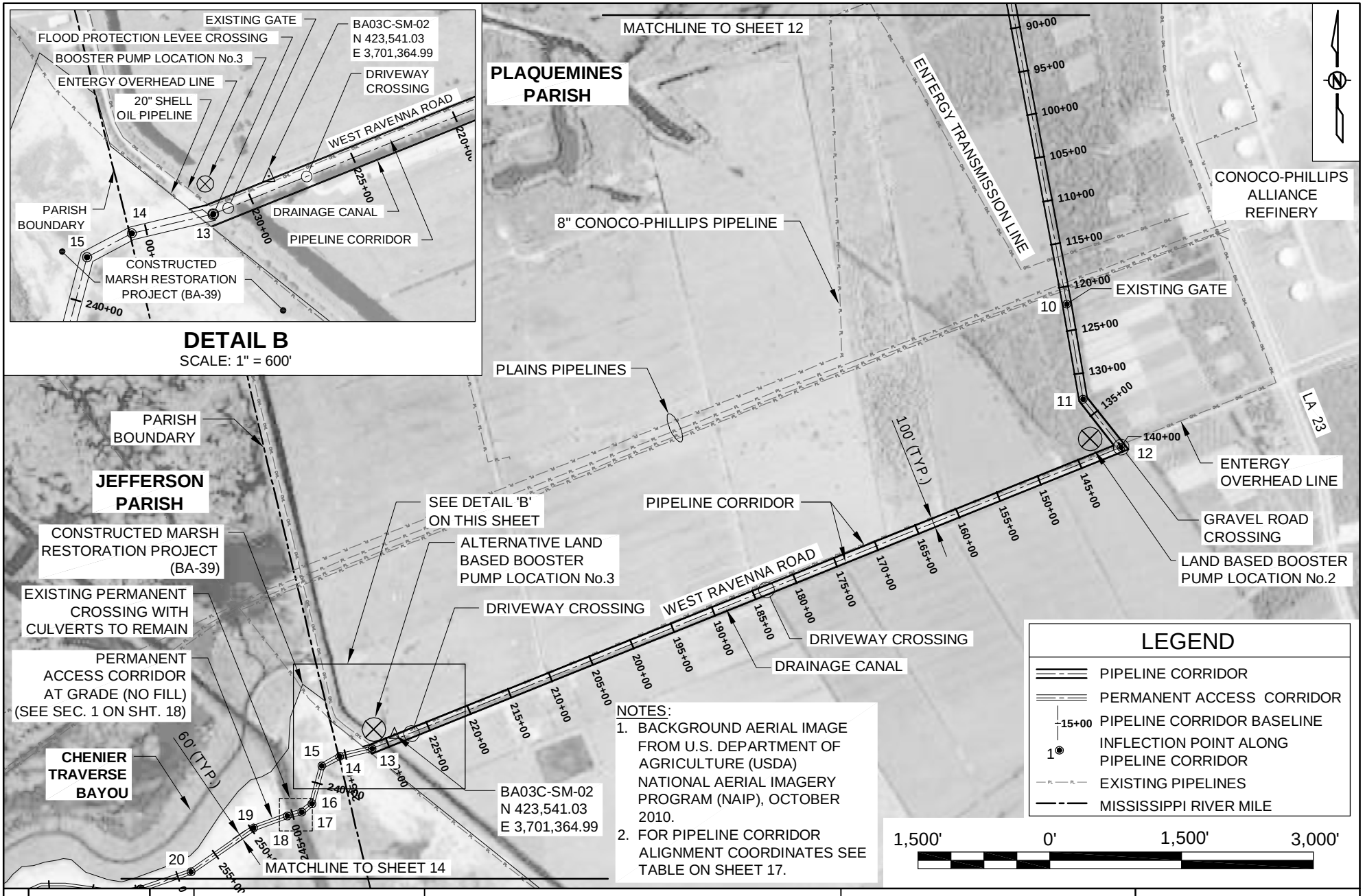
Project: Bayou DuPont Marsh Restoration
Project Location: Jefferson Parish, Louisiana
Project Number: 19228956.00001

Log of Boring B-9

Elevation feet	Depth, feet	SAMPLES Type	Number	Recovery, in.	Sampling Resistance, blows / ft	Graphic Log	MATERIAL DESCRIPTION	Torvane (tsf)	Hand Penetrometer (tsf)	Water Content, %	Dry Unit Weight, pcf	Cohesion (ksf)	Liquid Limit, %	Plastic Index, %
			ST-28	22"			Soft, Gray CLAY with Silt (CH)*		0.50	59	67	0.36	76	49
-60	60		ST-29	20"			Soft to Medium, Gray CLAY (CH)		0.50	58				
			ST-30	18"			Very Soft, CLAY with trace Silt (CH)*		0.50	57	66	0.15	69	43
							Bottom of the hole @ 60 feet below mudline							
							* - Look at Table: Boring B - 9 for additional Laboratory Results							
-65	65													
-70	70													
-75	75													
-80	80													
-85	85													

APPENDIX E

TYPICAL CROSS-SECTIONS PROVIDED BY MOFFATT AND NICHOL



BY	DESCRIPTION	DATE

MOFFATT & NICHOL
ONE AMERICAN PLACE
301 MAIN STREET, SUITE 800
BATON ROUGE, LA 70825
225-927-7793

OFFICE OF COASTAL PROTECTION & RESTORATION
ENGINEERING BRANCH
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

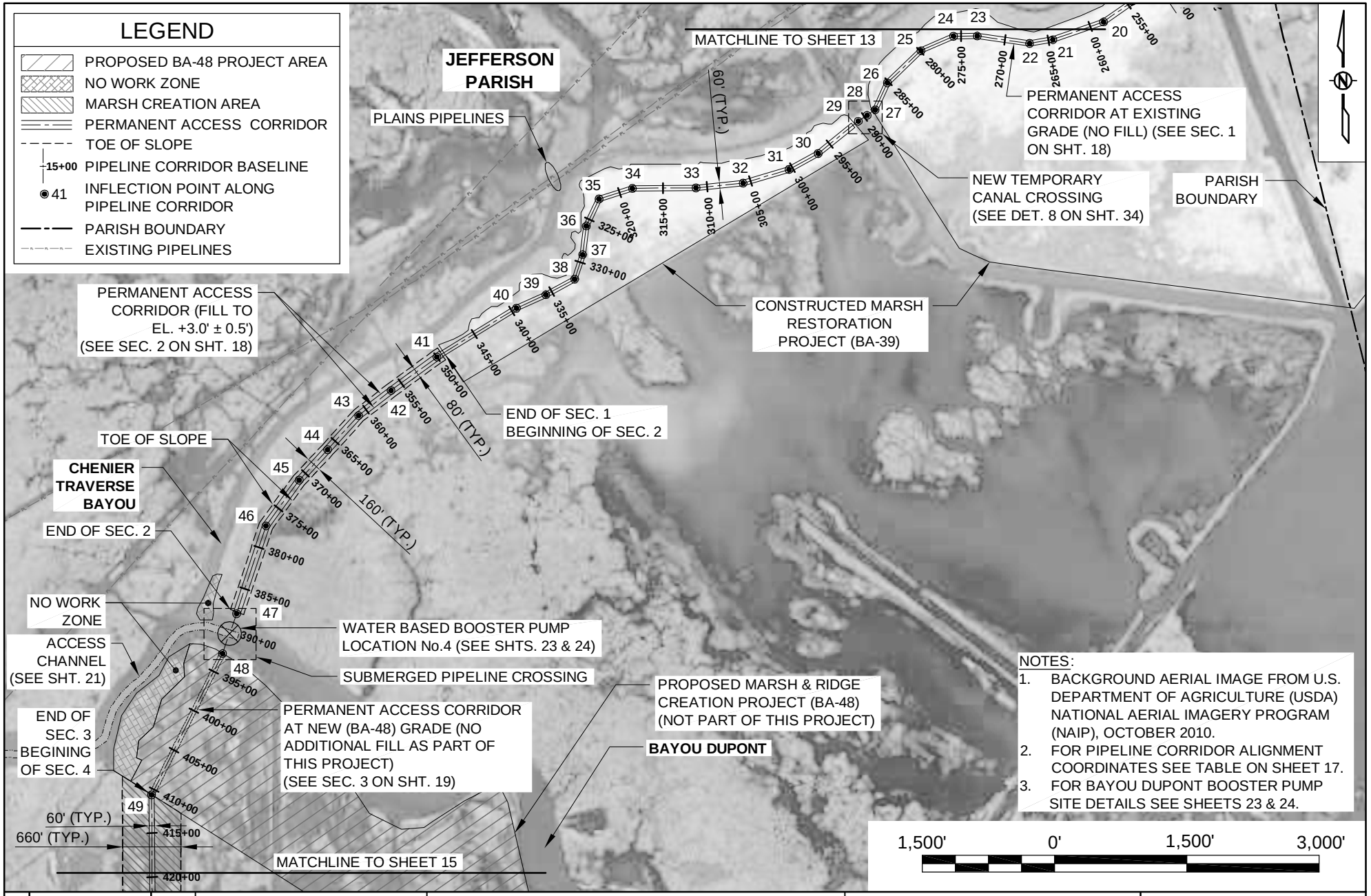
MISSISSIPPI RIVER
LONG DISTANCE SEDIMENT PIPELINE

PIPELINE CORRIDOR
LAYOUT (2 OF 4)

STATE PROJECT NUMBER: BA-43 (EB)

DATE: SEPTEMBER 9, 2011

DRAWN BY: YC | DESIGNED BY: SA | APPROVED BY: | FEDERAL PROJECT NUMBER: N/A | SHEET 13 OF 36



BY	DESCRIPTION	DATE

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225-927-7793

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ENGINEERING BRANCH
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BATON ROUGE, LOUISIANA 70801

MISSISSIPPI RIVER
LONG DISTANCE SEDIMENT PIPELINE

PIPELINE CORRIDOR
LAYOUT (3 OF 4)

STATE PROJECT NUMBER: BA-43 (EB)

DATE: SEPTEMBER 9, 2011

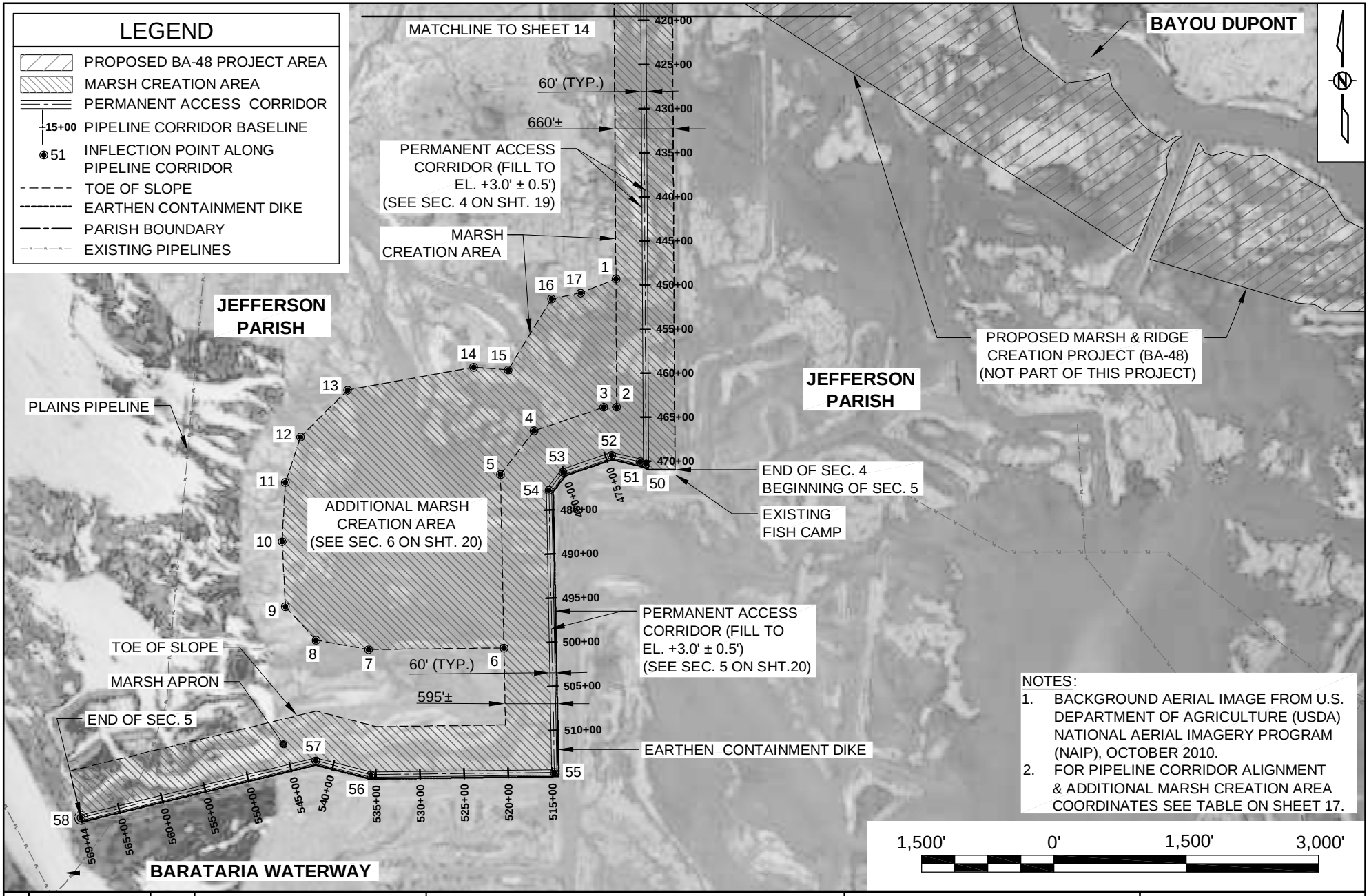
DRAWN BY: YC

DESIGNED BY: SA

APPROVED BY:

FEDERAL PROJECT NUMBER: N/A

SHEET 14 OF 36



NOTES:
1. BACKGROUND AERIAL IMAGE FROM U.S. DEPARTMENT OF AGRICULTURE (USDA) NATIONAL AERIAL IMAGERY PROGRAM (NAIP), OCTOBER 2010.
2. FOR PIPELINE CORRIDOR ALIGNMENT & ADDITIONAL MARSH CREATION AREA COORDINATES SEE TABLE ON SHEET 17.

1,500' 0' 1,500' 3,000'

BY	DESCRIPTION	DATE

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MISSISSIPPI RIVER
LONG DISTANCE SEDIMENT PIPELINE

PIPELINE CORRIDOR
LAYOUT (4 OF 4)

STATE PROJECT NUMBER: BA-43 (EB)

DATE: SEPTEMBER 9, 2011

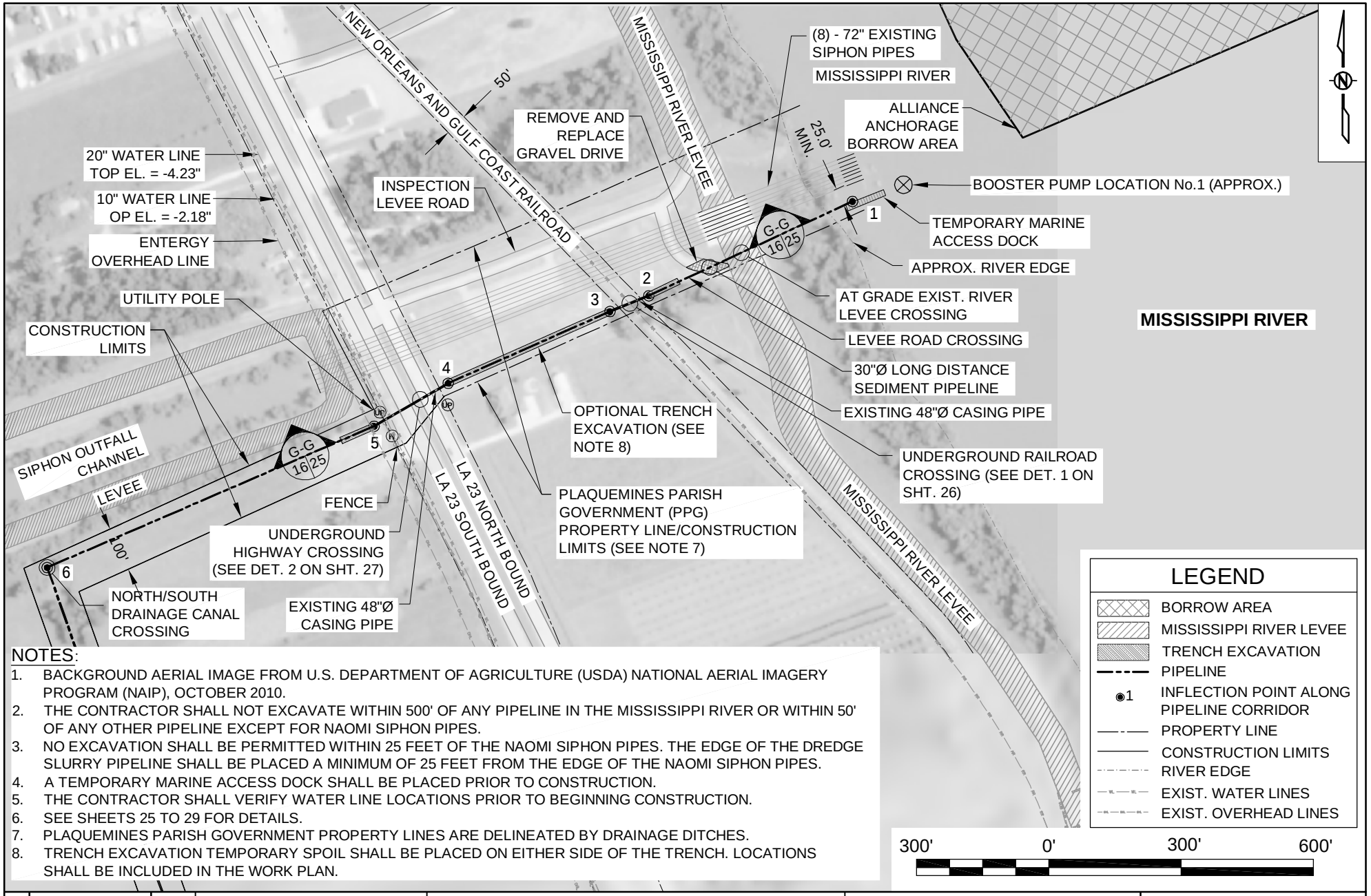
DRAWN BY: YC

DESIGNED BY: SA

APPROVED BY:

FEDERAL PROJECT NUMBER: N/A

SHEET 15 OF 36



NOTES:

1. BACKGROUND AERIAL IMAGE FROM U.S. DEPARTMENT OF AGRICULTURE (USDA) NATIONAL AERIAL IMAGERY PROGRAM (NAIP), OCTOBER 2010.
2. THE CONTRACTOR SHALL NOT EXCAVATE WITHIN 500' OF ANY PIPELINE IN THE MISSISSIPPI RIVER OR WITHIN 50' OF ANY OTHER PIPELINE EXCEPT FOR NAOMI SIPHON PIPES.
3. NO EXCAVATION SHALL BE PERMITTED WITHIN 25 FEET OF THE NAOMI SIPHON PIPES. THE EDGE OF THE DREDGE SLURRY PIPELINE SHALL BE PLACED A MINIMUM OF 25 FEET FROM THE EDGE OF THE NAOMI SIPHON PIPES.
4. A TEMPORARY MARINE ACCESS DOCK SHALL BE PLACED PRIOR TO CONSTRUCTION.
5. THE CONTRACTOR SHALL VERIFY WATER LINE LOCATIONS PRIOR TO BEGINNING CONSTRUCTION.
6. SEE SHEETS 25 TO 29 FOR DETAILS.
7. PLAQUEMINES PARISH GOVERNMENT PROPERTY LINES ARE DELINEATED BY DRAINAGE DITCHES.
8. TRENCH EXCAVATION TEMPORARY SPOIL SHALL BE PLACED ON EITHER SIDE OF THE TRENCH. LOCATIONS SHALL BE INCLUDED IN THE WORK PLAN.

BY	DESCRIPTION	DATE

MOFFATT & NICHOL
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301 MAIN STREET, SUITE 800
BATON ROUGE, LA 70825
225-927-7793

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MISSISSIPPI RIVER
LONG DISTANCE SEDIMENT PIPELINE

PIPELINE CORRIDOR
DETAIL A

STATE PROJECT NUMBER: BA-43 (EB)

DATE: SEPTEMBER 9, 2011

DRAWN BY: YC

DESIGNED BY: SA

APPROVED BY:

FEDERAL PROJECT NUMBER: N/A

SHEET 16 OF 36

PIPELINE CORRIDOR ALIGNMENT

PT.	EASTING	NOTRHING
1	3709295.15	439287.46
2	3708833.00	439073.60
3	3708745.00	439037.80
4	3708378.00	438874.90
5	3708210.00	438777.60
6	3707468.37	438457.08
7	3708010.71	436924.44
8	3708151.13	433271.33
9	3708274.87	432470.08
10	3709020.90	428442.06
11	3709207.34	427358.82
12	3709640.03	426810.80
13	3701112.29	423381.44
14	3700741.69	423294.08
15	3700538.00	423185.19
16	3700424.62	422753.89
17	3700308.53	422659.59
18	3700145.88	422615.52
19	3699761.50	422478.14
20	3699047.76	421979.44
21	3698472.93	421778.59
22	3698209.03	421735.03
23	3697614.62	421819.58
24	3697345.59	421817.02
25	3696976.65	421653.04
26	3696595.44	421288.58
27	3696457.72	420983.63
28	3696365.29	420919.59
29	3696265.66	420853.30
30	3695810.63	420487.43
31	3695480.80	420305.26
32	3694958.57	420150.54
33	3694425.06	420098.06
34	3693702.83	420090.22
35	3693324.98	419970.64
36	3693181.49	419664.54
37	3693138.44	419339.30
38	3693047.57	419061.89
39	3692722.33	418884.92
40	3692387.88	418732.22
41	3691538.38	418212.51
42	3690965.90	417799.60
43	3690596.95	417515.21
44	3690245.94	417128.33
45	3689923.11	416782.44

PT.	EASTING	NOTRHING
46	3689546.48	416264.89
47	3689213.40	415268.22
48	3689054.74	414815.39
49	3688249.91	413214.21
50	3688282.83	407251.28
51	3688214.75	407277.40
52	3687891.71	407348.42
53	3687340.48	407159.87
54	3687180.94	406952.63
55	3687243.43	403753.80
56	3685161.39	403726.37
57	3684537.11	403885.76
58	3681873.45	403237.73

ADDITIONAL MARSH AREA

PT.	EASTING	NOTRHING
1	3687941.24	409350.34
2	3687949.27	407895.61
3	3687802.63	407895.61
4	3687011.95	407626.56
5	3686632.31	407133.37
6	3686670.77	405164.44
7	3685135.17	405145.15
8	3684540.07	405252.97
9	3684192.66	405633.55
10	3684154.49	406370.04
11	3684191.67	407042.44
12	3684363.02	407557.46
13	3684898.65	408089.54
14	3686328.06	408348.46
15	3686719.48	408317.68
16	3687210.41	409124.00
17	3687540.48	409189.26

PROBABLE BOOSTER PUMP LOCATIONS

No.	EASTING	NOTRHING
1	3709411.03	439325.16
2	3709430.00	426505.97
3	3701075.84	423518.50
4	3689132.52	415040.26

ACCESS CHANNEL ALIGNMENT

PT.	EASTING	NOTRHING
1	3674046.30	417690.06
2	3674443.87	417928.38
3	3674549.10	417843.37
4	3674605.34	417650.30
5	3674768.33	417626.30
6	3674891.14	417524.89
7	3675173.97	417404.50
8	3675374.37	417400.08
9	3675899.41	417192.18
10	3676242.80	417171.66
11	3676428.65	417358.88
12	3676548.44	417686.20
13	3676739.59	417811.17
14	3677375.53	417869.55
15	3677870.90	417830.11
16	3678337.82	417708.89
17	3678811.83	417514.80
18	3679772.32	416805.21
19	3679930.74	416596.04
20	3680221.29	416069.93
21	3680593.81	415970.76
22	3680718.25	415816.36
23	3680950.88	415619.43
24	3681378.51	415564.60
25	3681635.27	415496.11
26	3681977.36	415432.46
27	3682205.59	415229.13
28	3682250.83	415129.57
29	3682397.09	414968.27
30	3683138.30	414802.76
31	3683474.36	414513.64
32	3683792.94	414308.27
33	3684035.91	414239.78
34	3684285.57	414253.96
35	3684542.75	414352.05
36	3684764.87	414409.57
37	3685015.36	414387.73
38	3685168.42	414252.81
39	3685281.66	414088.33
40	3685359.42	414002.16
41	3685450.50	413949.56
42	3685898.07	413778.66
43	3686447.21	413686.62
44	3686740.16	413671.24
45	3687188.62	413691.73

PT.	EASTING	NOTRHING
46	3687438.03	413721.65
47	3687616.06	413782.04
48	3687710.79	413852.06
49	3687766.22	414034.24
50	3687811.91	414175.11
51	3687930.02	414339.53
52	3688053.13	414460.19
53	3688138.44	414524.38
54	3688306.59	414717.17
55	3688397.69	414842.33
56	3688450.73	414937.10
57	3688547.73	415047.00
58	3688627.47	415092.91
59	3688728.60	415115.08
60	3688878.22	415127.36
61	3689243.43	415004.47

BY	DESCRIPTION	DATE

MOFFATT & NICHOL
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301 MAIN STREET, SUITE 800
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225-927-7793

OFFICE OF COASTAL PROTECTION & RESTORATION
ENGINEERING BRANCH
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

MISSISSIPPI RIVER
LONG DISTANCE SEDIMENT PIPELINE

PROJECT
ALIGNMENT
TABLES

STATE PROJECT NUMBER: BA-43 (EB)

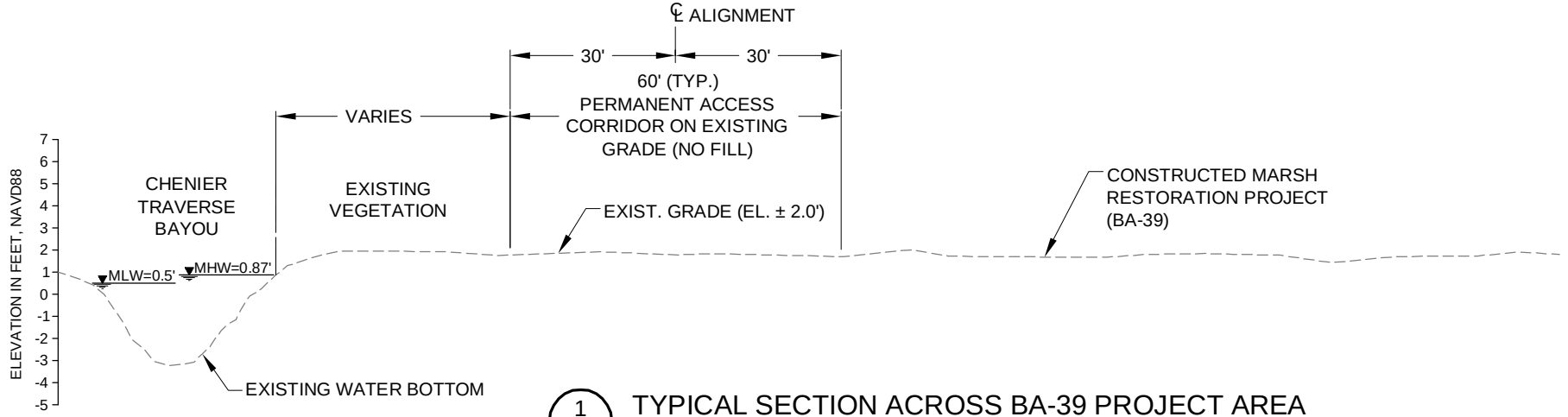
DATE: SEPTEMBER 9, 2011

DRAWN BY: YC

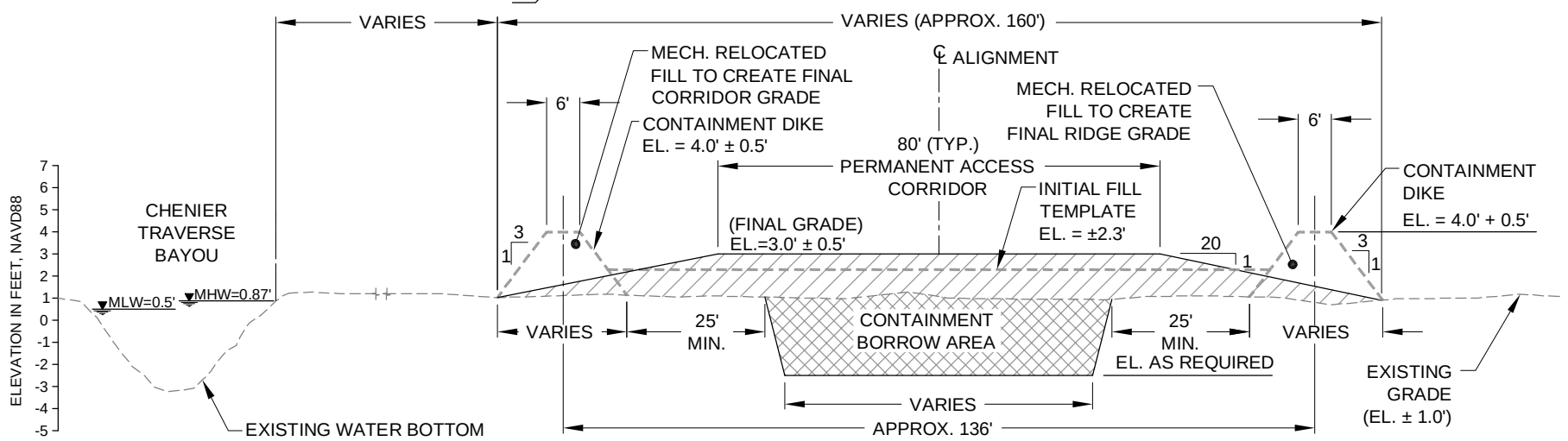
DESIGNED BY: SA

APPROVED BY:

FEDERAL PROJECT NUMBER: N/A



1 / 13 TYPICAL SECTION ACROSS BA-39 PROJECT AREA



2 / 14 TYPICAL SECTION BETWEEN BA-39 AND BAYOU DUPONT

BY	DESCRIPTION	DATE

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BATON ROUGE, LOUISIANA 70801

MISSISSIPPI RIVER
LONG DISTANCE SEDIMENT PIPELINE

TYPICAL
FILL SECTIONS
(SHEET 1 OF 3)

STATE PROJECT NUMBER: BA-43 (EB)

DATE: SEPTEMBER 9, 2011

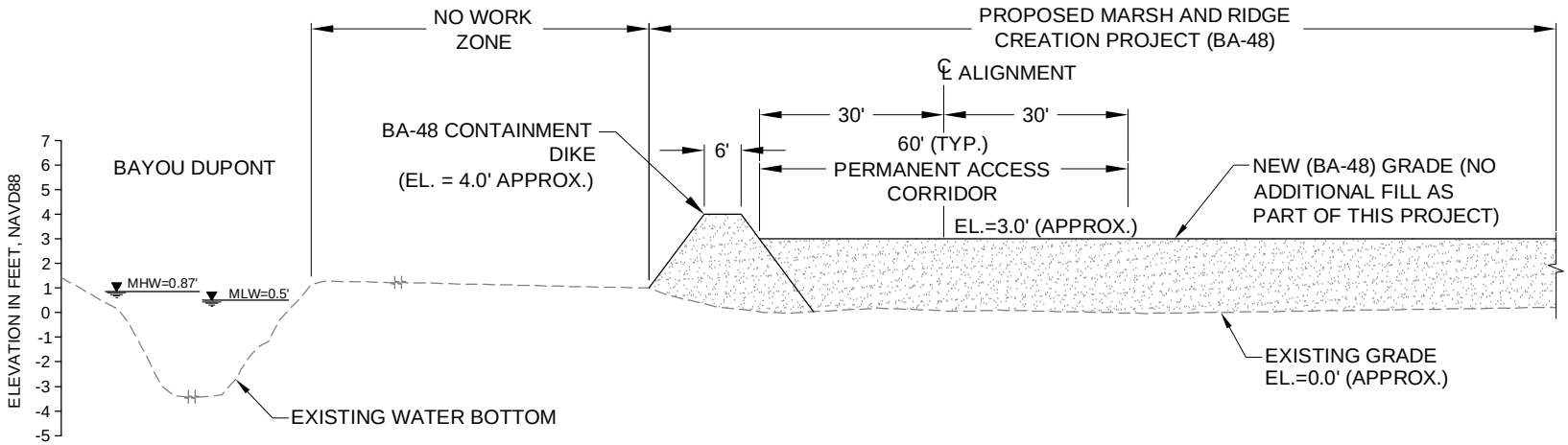
DRAWN BY: YC

DESIGNED BY: SA

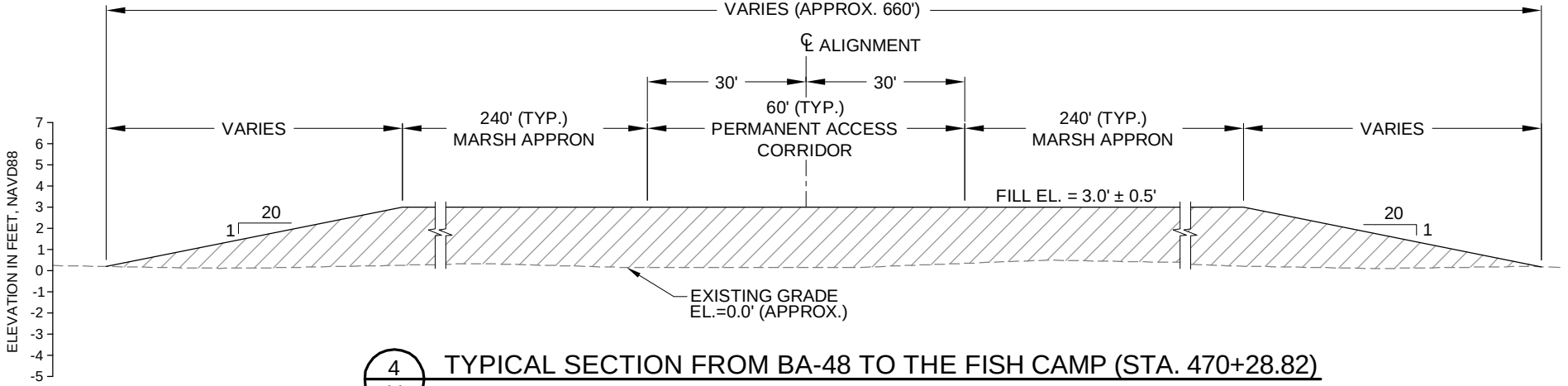
APPROVED BY:

FEDERAL PROJECT NUMBER: N/A

SHEET 18 OF 36



3/14 TYPICAL SECTION ACCROSS PROPOSED BA-48 PROJECT AREA



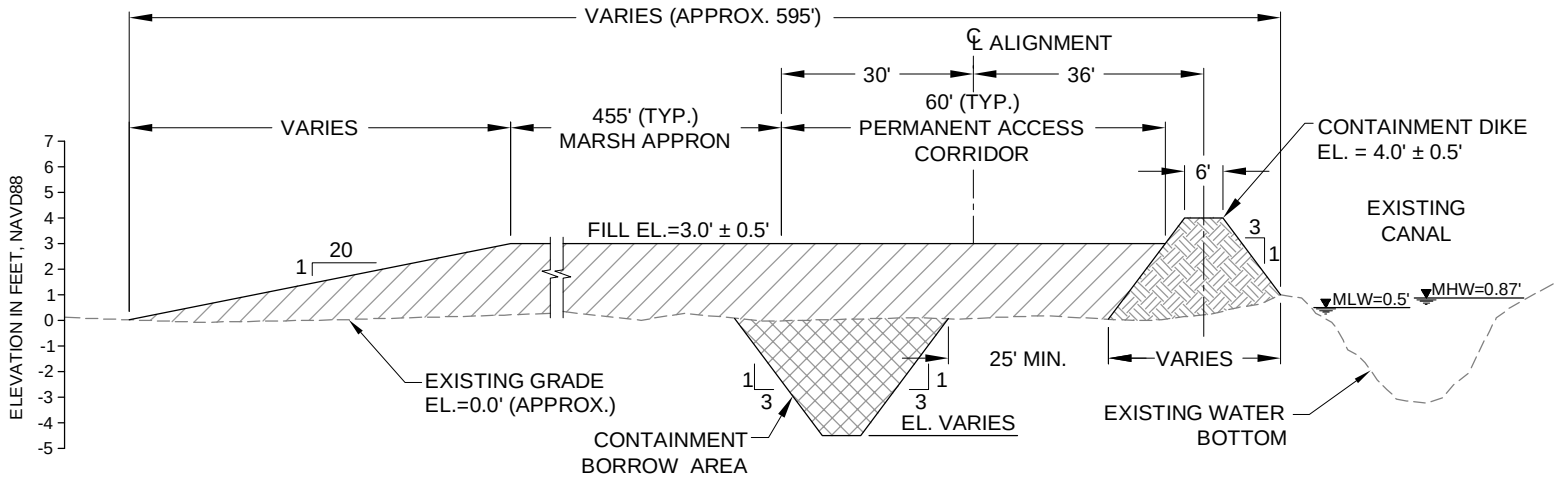
4/14 TYPICAL SECTION FROM BA-48 TO THE FISH CAMP (STA. 470+28.82)

15

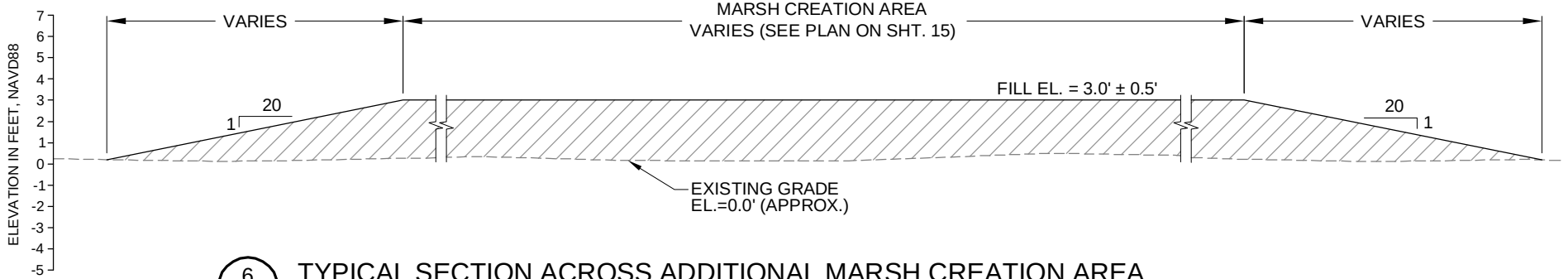
30' 15' 0' 30' 60'

HORIZONTAL SCALE

BY	DESCRIPTION	DATE				
			MOFFATT & NICHOL ONE AMERICAN PLACE 301 MAIN STREET, SUITE 800 BATON ROUGE, LA 70825 225-927-7793	**OFFICE OF COASTAL PROTECTION & RESTORATION** **ENGINEERING BRANCH** 450 LAUREL STREET BATON ROUGE, LOUISIANA 70801	MISSISSIPPI RIVER LONG DISTANCE SEDIMENT PIPELINE	TYPICAL FILL SECTIONS (SHEET 2 OF 3)
					STATE PROJECT NUMBER: BA-43 (EB)	DATE: SEPTEMBER 9, 2011
DRAWN BY: YC			DESIGNED BY: SA	APPROVED BY:	FEDERAL PROJECT NUMBER: N/A	SHEET 19 OF 36



5 / 15 TYPICAL SECTION FROM THE FISH CAMP (STA. 470+28.82) TO BARATARIA WATERWAY



6 / 15 TYPICAL SECTION ACROSS ADDITIONAL MARSH CREATION AREA

30' 15' 0' 30' 60'

HORIZONTAL SCALE

BY	DESCRIPTION	DATE				
			MOFFATT & NICHOL ONE AMERICAN PLACE 301 MAIN STREET, SUITE 800 BATON ROUGE, LA 70825 225-927-7793	**OFFICE OF COASTAL PROTECTION & RESTORATION** **ENGINEERING BRANCH** 450 LAUREL STREET BATON ROUGE, LOUISIANA 70801	MISSISSIPPI RIVER LONG DISTANCE SEDIMENT PIPELINE	TYPICAL FILL SECTIONS (SHEET 3 OF 3)
					STATE PROJECT NUMBER: BA-43 (EB)	DATE: SEPTEMBER 9, 2011
DRAWN BY: YC			DESIGNED BY: SA	APPROVED BY:	FEDERAL PROJECT NUMBER: N/A	SHEET 20 OF 36

MISSISSIPPI RIVER BORROW AREA
BORING LOGS

Following pages contain the boring logs corresponding to F-1, F-3, F-4, and F-5 on Sheets 7 and 8 of 81 of the Plans.

LOCATION: See Plate 1

COORDINATES: N 29° 44' 29.7"
W 90° 00' 13.3"

SURFACE EL.: -38.9' NAVD88

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLES	BLOWS PER FOOT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	SHEAR STRENGTH
					POORLY GRADED SAND WITH SILT (SP-SM), brown and gray, with layers of organics			7	30				
					SILTY SAND (SM), brown and gray	2.0							
5													
								32					
10					- with clay layers below 10'								
						14.0							
15				N=10	**POORLY GRADED SAND WITH SILT (SP-SM)**, medium-dense, brown and gray			9	33				
				N=14									
				N=11				9	27				
20				N=12				11	27				
				N=4	**LEAN CLAY (CL)**, soft, gray, with sand pockets	22.0		91	47	46	22	24	
				N=29	**SILTY SAND (SM)**, medium-dense, gray	24.0		25	19				
25				N=42	- dense from 26' to 27.5'								
				N=19	- with clay pockets at 28'			22	26				
30				N=18									
				N=18				17	28				
35													
				N=14	- with a clay layer at 38.5'			7	29				

CLASSIFICATION

SHEAR STRENGTH

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

KIPS PER SQ FT
0.5 1.0 1.5 2.0 2.5

NOTES:

1. Terms and symbols defined on Plates 8a and 8b.
2. Depth to mudline below water surface = 44 ft at time of drilling.

COMPLETION DATE: April 13, 2012
TOTAL DEPTH: 84.5'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 84.5'
BACKFILL: Cement-Bentonite Grout
LOGGER: L. Meyer

Fugro Consultants, Inc.

LDSP River Borings

LOG OF BORING NO. F-1

Plaquemines, Louisiana

Project No. 04.55124014

PLATE 2a

FCBR_LOG (FINAL) 04.55124014.GPJ FUGRO DATA TEMPLATE 042610.GDT 06/08/12

LOCATION: See Plate 1

COORDINATES: N 29° 44' 29.7"
W 90° 00' 13.3"

SURFACE EL.: -38.9' NAVD88

DEPTH, FT	WATER LEVEL SYMBOL SAMPLES	BLOWS PER FOOT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	CLASSIFICATION: UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
45		N=26	**SILTY SAND (SM)**, medium-dense, gray			13	29			
		N=13								
50		N=23				8	29			
55				56.0						
		N=7	**FAT CLAY (CH)**, firm, light gray and tan, with silt seams				37	56	23	33
60		N=6				95	35			
65										
		N=4					46	64	24	40
70				71.0						
		N=46	**POORLY GRADED SAND WITH SILT (SP-SM)**, dense, gray and tan			11	23			
75		N=50				5	21			

SHEAR STRENGTH

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

KIPS PER SQ FT

0.5 1.0 1.5 2.0 2.5

NOTES:

1. Terms and symbols defined on Plates 8a and 8b.
2. Depth to mudline below water surface = 44 ft at time of drilling.

COMPLETION DATE: April 13, 2012
TOTAL DEPTH: 84.5'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 84.5'
BACKFILL: Cement-Bentonite Grout
LOGGER: L. Meyer

Fugro Consultants, Inc.

LDSP River Borings

LOG OF BORING NO. F-1

Plaquemines, Louisiana

Project No. 04.55124014

PLATE 2b

FCBR_LOG (FINAL) 04.55124014.GPJ FUGRO DATA TEMPLATE 042610.GDT 06/08/12

LOCATION: See Plate 1

COORDINATES: N 29° 44' 29.7"
W 90° 00' 13.3"

SURFACE EL.: -38.9' NAVD88

DEPTH, FT	WATER LEVEL	SYMBOL	SAMPLES	BLOWS PER FOOT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)	SHEAR STRENGTH
					POORLY GRADED SAND WITH SILT (SP-SM), gray and tan	80.0							
						84.5							
85													
90													
95													
100													
105													
110													
115													

CLASSIFICATION

SHEAR STRENGTH

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

KIPS PER SQ FT

0.5 1.0 1.5 2.0 2.5

NOTES:

1. Terms and symbols defined on Plates 8a and 8b.
2. Depth to mudline below water surface = 44 ft at time of drilling.

COMPLETION DATE: April 13, 2012
TOTAL DEPTH: 84.5'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 84.5'
BACKFILL: Cement-Bentonite Grout
LOGGER: L. Meyer

Fugro Consultants, Inc.

LDSP River Borings

LOG OF BORING NO. F-1

Plaquemines, Louisiana

Project No. 04.55124014

PLATE 2c

FCBR_LOG (FINAL) 04.55124014.GPJ FUGRO DATA TEMPLATE 042610.GDT 06/08/12

LOCATION: See Plate 1

COORDINATES: N 29° 44' 13.3"
W 89° 59' 55.3"

SURFACE EL.: -45.2' NAVD88

DEPTH, FT	WATER LEVEL SYMBOL	SAMPLES	BLOWS PER FOOT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	CLASSIFICATION: UNIT DRY WT, PCF	CLASSIFICATION: PASSING NO. 200 SIEVE, %	CLASSIFICATION: WATER CONTENT, %	CLASSIFICATION: LIQUID LIMIT	CLASSIFICATION: PLASTIC LIMIT	CLASSIFICATION: PLASTICITY INDEX (PI)	SHEAR STRENGTH
			N=22	**POORLY GRADED SAND (SP)**, medium-dense, brown			3	25				
			N=12									
5			N=2	- very loose from 4' to 8'			2	31				
			N=2				4	28				
			N=8	- loose below 8'			2	28				
10			N=10									
			N=9				5	27				
				POORLY GRADED SAND WITH SILT (SP-SM), medium-dense, gray	13.0							
15			N=18	- brown at 14'								
				- brown and gray from 15' to 25'								
			N=13				11	25				
			N=4				7	33				
20												
			N=3				13	38				
25				- brown from 25' to 38'								
			N=34				8	29				
30												
			N=26	- medium-dense below 91'			9	31				
35												
			N=17	- brown and gray below 38'								

SHEAR STRENGTH: □ Penetrometer ▼ Unconfined; ◇ Torvane ● Triaxial; △ Field Vane ▲ Miniature Vane

KIPS PER SQ FT: 0.5 1.0 1.5 2.0 2.5

NOTES:

1. Terms and symbols defined on Plates 8a and 8b.
2. Depth to mudline below water surface = 52 ft at time of drilling.

COMPLETION DATE: April 6, 2012
TOTAL DEPTH: 74.5'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 74.5'
BACKFILL: Cement-Bentonite Grout
LOGGER: L. Meyer

Fugro Consultants, Inc.

LDSP River Borings

LOG OF BORING NO. F-3

Plaquemines, Louisiana

Project No. 04.55124014

PLATE 3a

FCBR_LOG (FINAL) 04.55124014.GPJ FUGRO DATA TEMPLATE 042610.GDT 06/08/12

LOCATION: See Plate 1

COORDINATES: N 29° 44' 13.3"
W 89° 59' 55.3"

SURFACE EL.: -45.2' NAVD88

DEPTH, FT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	BLOWS PER FOOT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
	SILTY SAND (SM), medium-dense, gray	40.0							
			N=15		12	32			
45									
	- with clay layers below 48'		N=19		14	29			
50									
	POORLY GRADED SAND WITH SILT (SP-SM), medium-dense, gray	52.0	N=15		5	29			
55									
	- with layers of organics at 57'								
	- with a clay layer at 58'		N=13						
60									
			N=30		11	29			
65	**FAT CLAY (CH)**, very stiff, gray	65.0							
			N=19			54	77	25	52
	SILTY SAND (SM), medium-dense, gray, with organic lenses	69.0							
70									
			N=11		18	28			
75		74.5							

SHEAR STRENGTH

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

KIPS PER SQ FT

0.5 1.0 1.5 2.0 2.5

NOTES:

1. Terms and symbols defined on Plates 8a and 8b.
2. Depth to mudline below water surface = 52 ft at time of drilling.

COMPLETION DATE: April 6, 2012
TOTAL DEPTH: 74.5'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 74.5'
BACKFILL: Cement-Bentonite Grout
LOGGER: L. Meyer

Fugro Consultants, Inc.

LDSP River Borings

LOG OF BORING NO. F-3

Plaquemines, Louisiana

Project No. 04.55124014

PLATE 3b

FCBR_LOG (FINAL) 04.55124014.GPJ FUGRO DATA TEMPLATE 042610.GDT 06/08/12

LOCATION: See Plate 1

COORDINATES: N 29° 43' 06.1"
W 89° 59' 21.6"

SURFACE EL.: -50.1' NAVD88

DEPTH, FT	BLOWS PER FOOT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
		POORLY GRADED SAND (SP), brown - with shell fragments from 0' to 8' - with wood fragments and organics to 10'			3	29			
5					4	20			
	N=13	- medium-dense from 8' to 14'			6	36			
10	N=16								
	N=12	- gray and brown from 12' to 57'			4	23			
	N=6	- loose from 14' to 16'							
15	N=22	- medium-dense from 16' to 22'			5	24			
	N=21								
20	N=26	- with clay pockets at 20'			9	25			
	N=34	- dense from 22' to 24'							
	N=27	- medium-dense from 24' to 32'			7	28			
25	N=20								
30									
	N=34	- dense from 32' to 40'			3	23			
35									
	N=33								

CLASSIFICATION

SHEAR STRENGTH

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

KIPS PER SQ FT

0.5 1.0 1.5 2.0 2.5

NOTES:

1. Terms and symbols defined on Plates 8a and 8b.
2. Depth to mudline below water surface = 57 ft at time of drilling.

COMPLETION DATE: April 3, 2012
TOTAL DEPTH: 68.5'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 68.5'
BACKFILL: Cement-Bentonite Grout
LOGGER: L. Meyer

Fugro Consultants, Inc.

LDSP River Borings

LOG OF BORING NO. F-4

Plaquemines, Louisiana

Project No. 04.55124014

PLATE 4a

FCBR_LOG (FINAL) 04.55124014.GPJ FUGRO DATA TEMPLATE 042610.GDT 06/08/12

LOCATION: See Plate 1

COORDINATES: N 29° 43' 06.1"
W 89° 59' 21.6"

SURFACE EL.: -50.1' NAVD88

DEPTH, FT	WATER LEVEL SYMBOL	SAMPLES	BLOWS PER FOOT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	CLASSIFICATION: UNIT DRY WT, PCF	CLASSIFICATION: PASSING NO. 200 SIEVE, %	CLASSIFICATION: WATER CONTENT, %	CLASSIFICATION: LIQUID LIMIT	CLASSIFICATION: PLASTIC LIMIT	CLASSIFICATION: PLASTICITY INDEX (PI)
				POORLY GRADED SAND (SP), very dense, brown	40.0						
			N=67	- with shell fragments at 42'			5	22			
45			N=37	- medium-dense to dense below 47'							
50			N=25				7	23			
55				- with a clay layer from 56' to 57'							
				- gray below 57'			3	17			
60			N=29								
65			N=31	- with clay pockets at 67'			4	22			
					68.5						
70											
75											

SHEAR STRENGTH

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

KIPS PER SQ FT

0.5 1.0 1.5 2.0 2.5

NOTES:

1. Terms and symbols defined on Plates 8a and 8b.
2. Depth to mudline below water surface = 57 ft at time of drilling.

COMPLETION DATE: April 3, 2012
TOTAL DEPTH: 68.5'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 68.5'
BACKFILL: Cement-Bentonite Grout
LOGGER: L. Meyer

Fugro Consultants, Inc.

LDSP River Borings

LOG OF BORING NO. F-4

Plaquemines, Louisiana

Project No. 04.55124014

PLATE 4b

FCBR_LOG (FINAL) 04.55124014.GPJ FUGRO DATA TEMPLATE 042610.GDT 06/08/12

LOCATION: See Plate 1

COORDINATES: N 29° 42' 39.7"
W 89° 59' 09.9"

SURFACE EL.: -49.8' NAVD88

DEPTH, FT	BLOWS PER FOOT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
		SILTY SAND (SM), brown, with gravel			27	48			
		POORLY GRADED SAND (SP), brown	2.0						
5					2	25			
					2	23			
10	N=13	- medium-dense from 11' to 13'			1	22			
	N=8	- loose from 13' to 21' - with shell fragments at 13'			3	22			
15	N=7	- with wood fragments at 15'			2	25			
	N=7								
	N=9	- with organic layer at 18.5' - with wood fragments at 19'			3	33			
20	N=21	- gray and brown from 21' to 27' - medium-dense from 21' to 32'							
	N=16				2	22			
25	N=18				3	22			
	N=19	- gray below 27'			4	26			
30	N=27								
	N=9	**POORLY GRADED SAND WITH SILT (SP-SM)**, loose to medium-dense, gray	32.0		9	28			
35									
	N=21				5	25			

SHEAR STRENGTH

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

KIPS PER SQ FT

0.5 1.0 1.5 2.0 2.5

NOTES:

1. Terms and symbols defined on Plates 8a and 8b.
2. Depth to mudline below water surface = 48.5 ft at time of drilling.

COMPLETION DATE: April 1, 2012
TOTAL DEPTH: 73.5'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 73.5'
BACKFILL: Cement-Bentonite Grout
LOGGER: L. Meyer

Fugro Consultants, Inc.

LDSP River Borings

LOG OF BORING NO. F-5

Plaquemines, Louisiana

Project No. 04.55124014

PLATE 5a

FCBR_LOG (FINAL) 04.55124014.GPJ FUGRO DATA TEMPLATE 042610.GDT 06/08/12

LOCATION: See Plate 1

COORDINATES: N 29° 42' 39.7"
W 89° 59' 09.9"

SURFACE EL.: -49.8' NAVD88

DEPTH, FT	STRATUM DESCRIPTION	STRATUM DEPTH, FT	BLOWS PER FOOT	UNIT DRY WT, PCF	PASSING NO. 200 SIEVE, %	WATER CONTENT, %	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX (PI)
	POORLY GRADED SAND WITH SILT (SP-SM), dense, brown, with gravel	40.0							
	- with wood fragments at 42'		N=33						
45	**CLAYEY SAND (SC)**, loose, gray, with shell fragments and wood	45.0							
			N=5		32	36	38	15	23
50									
	LEAN CLAY (CL), very stiff, gray and tan, with silt seams	52.0	N=16			22	44	14	30
55	- with silty sand layers at 57'					29	36	16	20
				94		28			
60									
	FAT CLAY (CH), stiff to very stiff, gray and tan	62.0				35	58	21	37
				86		33			
65									
						39	69	24	45
				82		37			
70									
	SILTY SAND (SM), tan and gray	72.0			22	25			
		73.5							
75									

SHEAR STRENGTH

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

KIPS PER SQ FT

0.5 1.0 1.5 2.0 2.5

NOTES:

1. Terms and symbols defined on Plates 8a and 8b.
2. Depth to mudline below water surface = 48.5 ft at time of drilling.

COMPLETION DATE: April 1, 2012
TOTAL DEPTH: 73.5'
CAVED DEPTH: Not Applicable
DRY AUGER: Not Applicable
WET ROTARY: 0' to 73.5'
BACKFILL: Cement-Bentonite Grout
LOGGER: L. Meyer

Fugro Consultants, Inc.

LDSP River Borings

LOG OF BORING NO. F-5

Plaquemines, Louisiana

Project No. 04.55124014

PLATE 5b

FCBR_LOG (FINAL) 04.55124014.GPJ FUGRO DATA TEMPLATE 042610.GDT 06/08/12

SOIL TYPES

Fat clay, high plasticity

Lean clay, low to moderate plasticity

Clayey sand

Silty Sand

Clean sand, poorly graded

SAMPLER TYPES

Thin-walled Tube

Partial Recovery w/ Tube

Auger

Split-barrel

No Recovery

Pitcher

Piston

Geoprobe

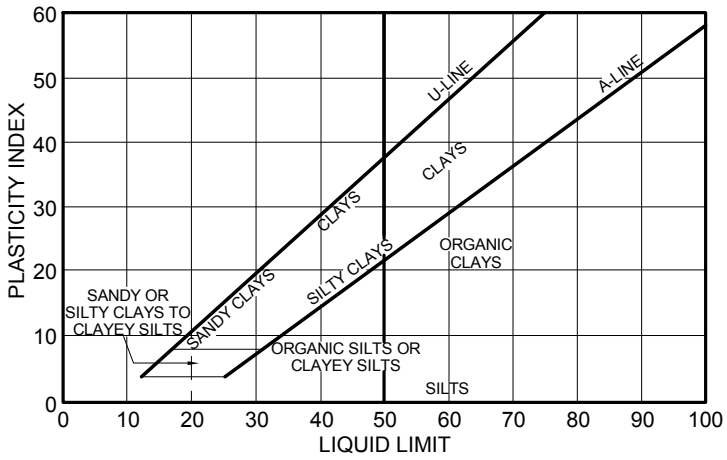
Liner

SOIL GRAIN SIZE

U.S. Standard Sieve

6"	3"	3/4"	4	10	40	200		
Boulders	Cobbles	Gravel		Sand			Silt	Clay
		Coarse	Fine	Coarse	Medium	Fine		
152	75.0	19.0	4.75	2.00	0.425	0.075	0.005	(mm)

PLASTICITY CHART



SOIL STRUCTURE

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

STANDARD PENETRATION TEST (SPT)

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

SPLIT-BARREL SAMPLER DRIVING RECORD

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

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

DENSITY OF GRANULAR SOILS

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

*Estimated from sampler driving record.

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

STRENGTH OF COHESIVE SOILS

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

SHEAR STRENGTH TEST METHOD

U = Unconfined Q = Unconsolidated - Undrained Triaxial

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

HAND PENETROMETER CORRECTION

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

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