VOLUME 2 OF 2

UNRESTRICTEI IFB 'C' CONTRACT

CONTRACT NO: **W9127819C0029**
SOLICITATION NO: **W9127819B0004**
CADD NO: **CHC18001**

MSCIP COMPREHENSIVE BARRIER ISLAND RESTORATION PLAN, SHIP ISLAND PHASES 3 AND 4

HARRISON COUNTY, MISSISSIPPI

THIS IS A CIVIL WORKS PROGRAM PROCUREMENT AND IS NOT FUNDED BY THE DEPARTMENT OF DEFENSE

"GOOD ENGINEERING RESULTS IN A BETTER ENVIRONMENT"

US Army Corps of Engineers
Mobile District

U.S. ARMY ENGINEER DISTRICT, MOBILE
109 St. Joseph St
Mobile, Alabama 36602

LEADERS IN CUSTOMER CARE
WE CARE FOR THOSE WE SERVE
MOBILE DISTRICT

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APPENDIX A

DRILLING LOGS AND LAB DATA

APPENDIX A - DRILLING LOGS AND LAB DATA

Sheets CB-113 through CB-116 of the Phase 3/4 Plans contain vibracore locations within the Petit Bois Pass Outer Continental Shelf (OCS) East 2, Petit Bois Pass Mississippi, Ship Island, and Petit Bois Pass Outer Continental Shelf East 3, 4, and 5 borrow areas. Vibracores are not available for the Ship Island Pass borrow area (Sheet CB-112). Each vibracore shown on the drawings has a corresponding drilling log and associated sample lab data sheet(s), as applicable. The drilling logs and lab data sheets are separated according to their Plan Sheet Reference Number and listed numerically within each subsection.

PLAN SHEET REFERENCE NUMBER	APPENDIX A SUBSECTION	PAGE
SHEET CB-113	PETIT BOIS PASS OUTER CONTINENTAL SHELF EAST 2 BORROW AREA DRILLING LOGS	A-3
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SHEET CB-113: PETIT BOIS PASS OUTER CONTINENTAL SHELF EAST

2 BORROW AREA DRILLING LOGS

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Boring Designation BI-PBS-002-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 2 SHEETS
	South Atlantic	Mobile District	

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-002-12	LOCATION COORDINATES: E = 1,138,053 N = 231,827	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL: / BEARING:	14. WATER DEPTH: 50.9 Ft.	
		15. DATE BORING	STARTED: 11-26-12 / COMPLETED: 11-26-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -50.2 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 20.0 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Mike FitzHarris, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-50.2	0.0				
			SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace silt, shell fragments in interval 0-2.7 ft., greenish gray (SP)	A	Classification: SP Color: 5Y 7/2-light gray D50: 0.22 mm % Fines: 1.6
				B	Classification: SP Color: 5Y 6/2-light olive gray D50: 0.21 mm % Fines: 3.9
-58.0	7.8				
-59.7	9.5		SAND, clayey, mostly fine-grained sand-sized quartz, some clay, trace shell fragments, greenish gray (SC)	NS	
-61.7	11.5		CLAY, lean, mostly clay, some sand, trace shell fragments, greenish gray (CL)		
-66.7	16.5		CLAY, fat, mostly clay, moderately stiff with some clayey sand nodules, greenish gray mottled with brown (CH)		
-68.6	18.4		SAND, silty, mostly fine-grained sand-sized quartz, some silt, trace clay, trace shell fragments, gray (SM)		
-70.2	20.0		CLAY, fat, mostly clay, trace fine-grained sand-sized quartz, trace wood debris, moderately stiff, gray (CH)		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.13658° Long = -88.34678°

DRILLING LOG (Cont. Sheet)	INSTALLATION		SHEET 2 OF 2 SHEETS
	Mobile District		
PROJECT	**COORDINATE SYSTEM/DATUM**	**HORIZONTAL**	**VERTICAL**
MsCIP Barrier Island Restoration	State Plane, MSE (U.S. Ft.)	NAD83	NAVD88
LOCATION COORDINATES	**ELEVATION TOP OF BORING**		
X = 1,138,053 Y = 231,827	-50.2 Ft.		

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
			3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.		

30
35
40
45
50
55
60

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.13658° Long = -88.34678°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
S E R V I C E S

Core Identifier BI-PBS-02-12

Coordinate System
Latitude / Longitude

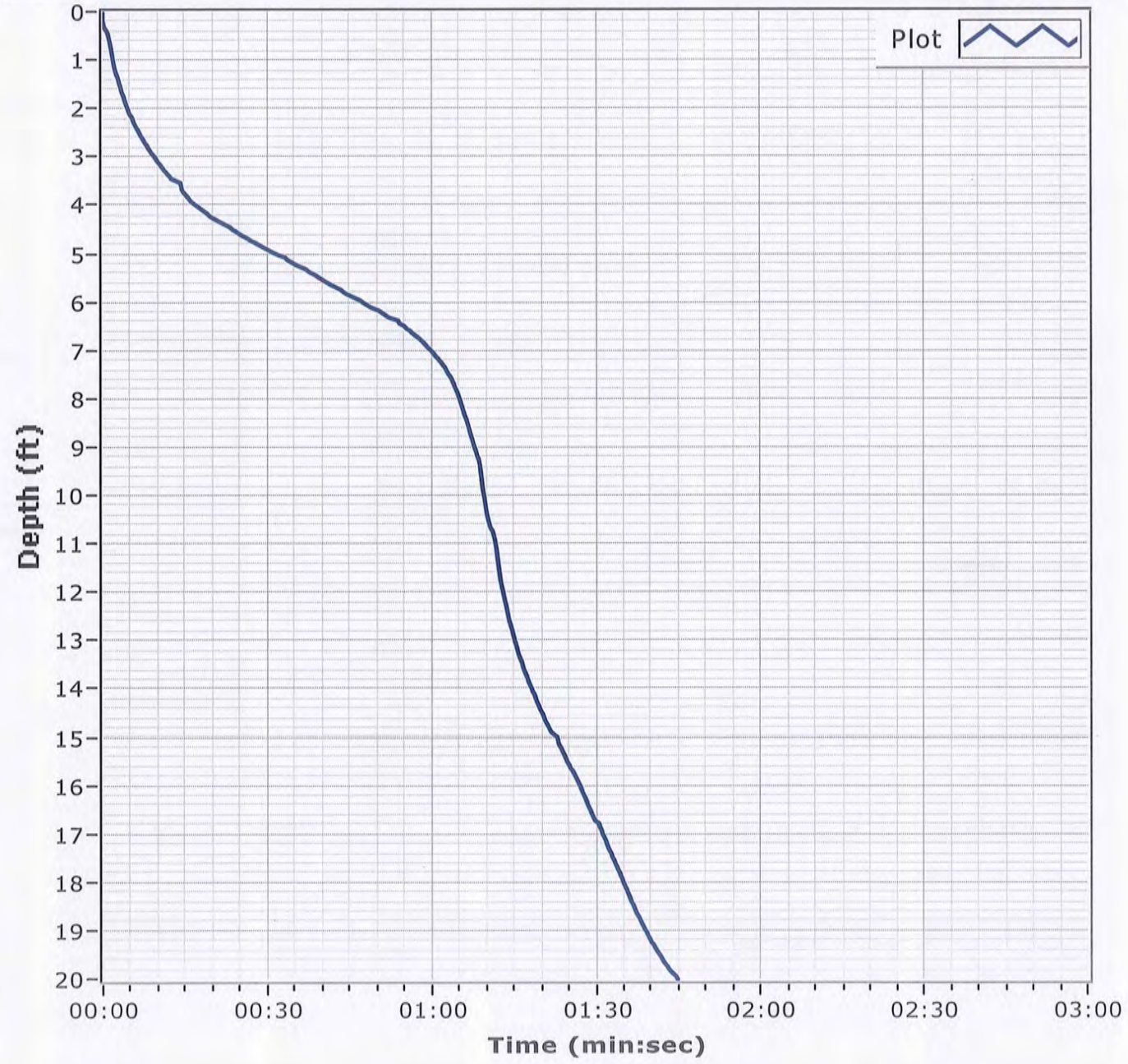
Latitude 30 08.195

Longitude 088 20.807

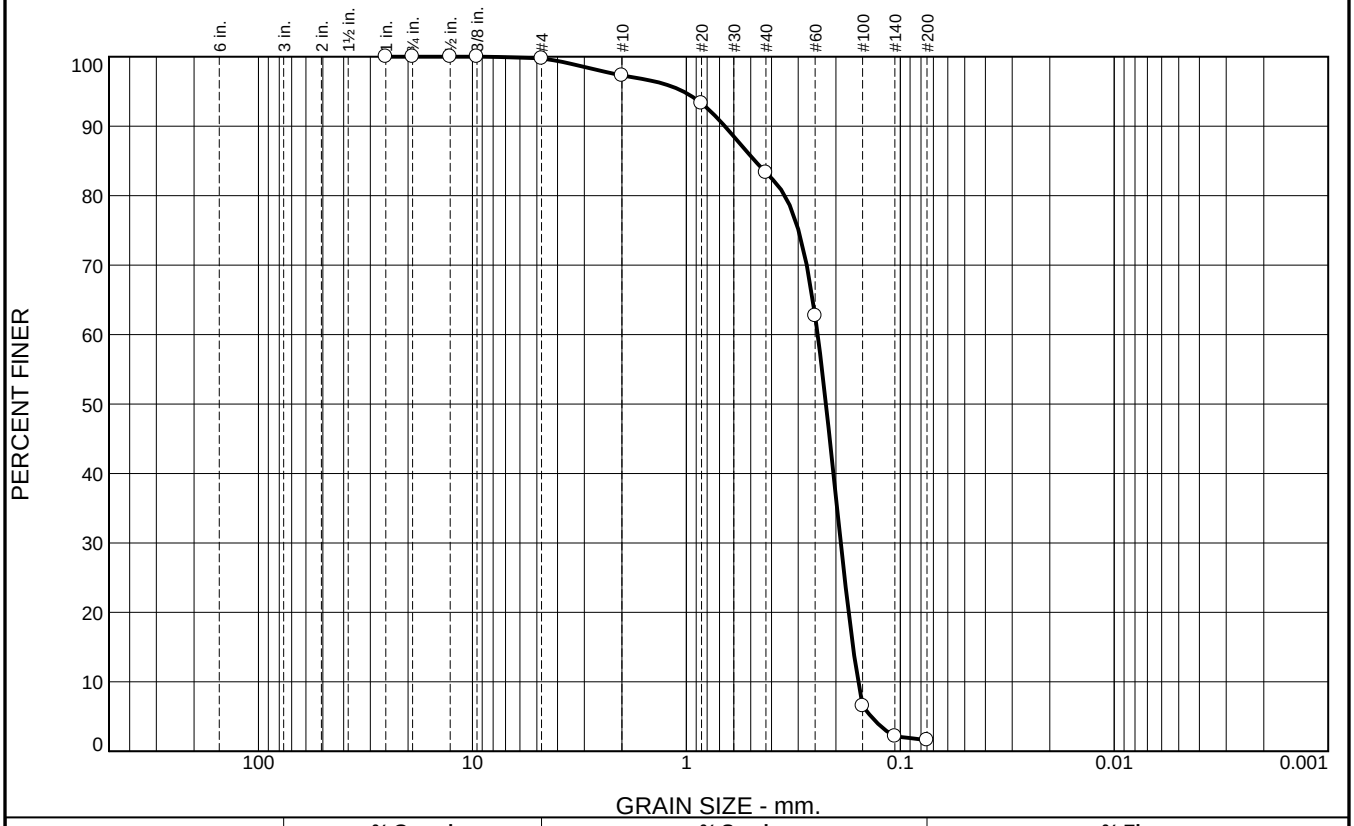
Date 11/26/2012
Start Time 12:43:05
End Time 12:44:50
Total Time 00:01:45

Water Depth 50.9'
Penetration 20.0'
Recovery 19.5'

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.3	2.4	14.0	81.7	1.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.7		
#10	97.3		
#20	93.3		
#40	83.3		
#60	62.7		
#100	6.5		
#140	2.2		
#200	1.6		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6616 D_{85}= 0.4781 D_{60}= 0.2432
D_{50}= 0.2225 D_{30}= 0.1898 D_{15}= 0.1665
D_{10}= 0.1575 C_u= 1.54 C_c= 0.94

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-02-12 A
Sample Number: 6469 (55) **Depth:** 0.0' **Date:** 11/28/12

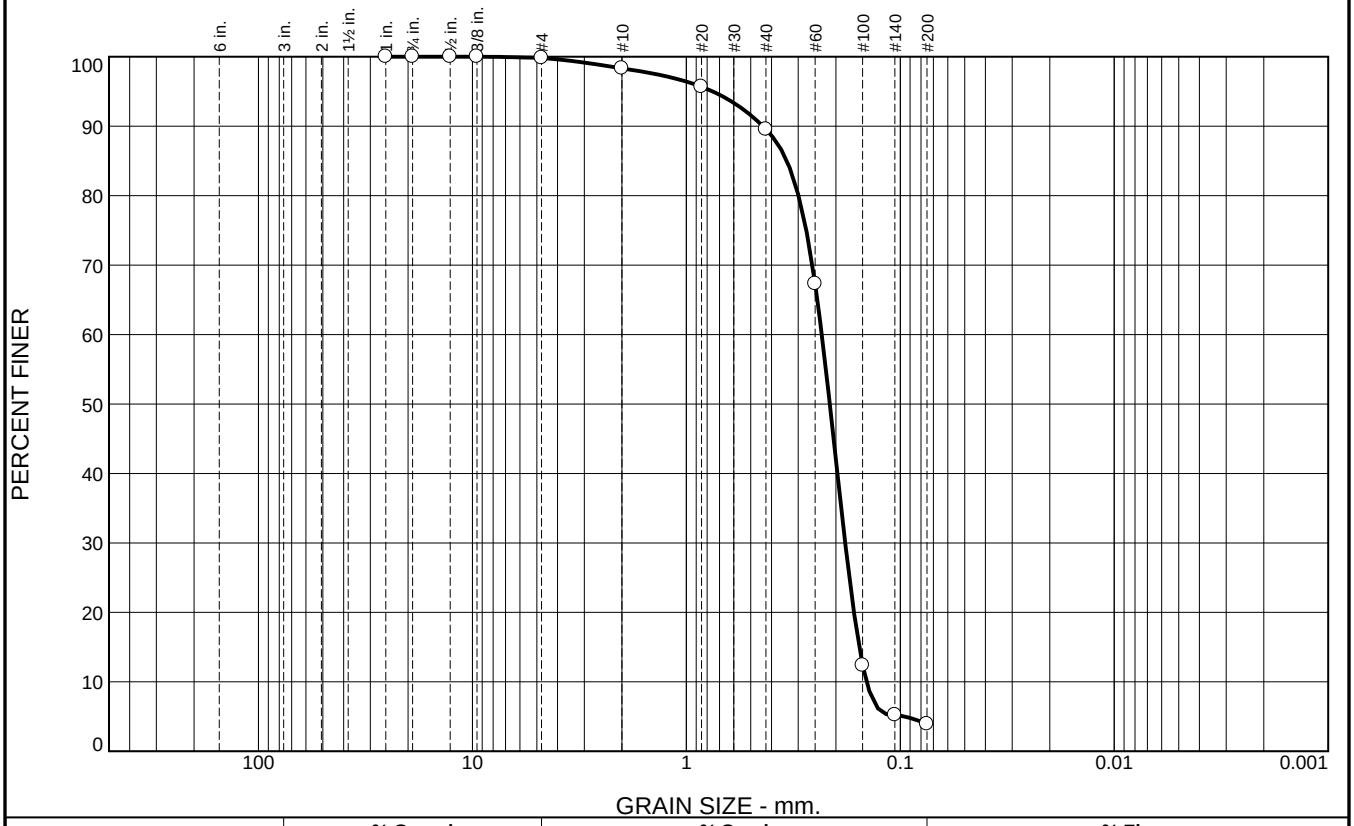
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	1.5	8.8	85.6	3.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.8		
#10	98.3		
#20	95.7		
#40	89.5		
#60	67.3		
#100	12.4		
#140	5.2		
#200	3.9		

* (no specification provided)

Material Description

Fine grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4395 D_{85}= 0.3391 D_{60}= 0.2327
D_{50}= 0.2136 D_{30}= 0.1810 D_{15}= 0.1556
D_{10}= 0.1438 C_u= 1.62 C_c= 0.98

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-02-12 B
Sample Number: 6469 (56) **Depth:** 4.5' **Date:** 11/28/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBS-003-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 2 SHEETS
	South Atlantic	Mobile District	

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-003-12	LOCATION COORDINATES: E = 1,138,716 N = 232,102	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL: / BEARING:	14. WATER DEPTH: 59.7 Ft.	
		15. DATE BORING	STARTED: 11-26-12 / COMPLETED: 11-26-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -59.4 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 19.5 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Mike FitzHarris, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-59.4	0.0				
			SAND, clayey, mostly fine-grained sand-sized quartz, some shell fragments, with sandy clay stringers, gray mottled with brown (SC)		
-61.2	1.8		CLAY, lean, mostly clay, trace shell fragments, pockets of sandy clay, medium plasticity, gray mottled with brown (CL)		
-66.5	7.1		SAND, clayey, mostly fine-grained sand-sized quartz, trace shell fragments, low plasticity, gray (SC) At El. -67.6 Ft., mostly fine-grained sand-sized quartz, some clay, trace shell fragments, trace wood debris, alternating layers of clayey sand and sandy clay, gray	NS	
-78.9	19.5				
			NOTES: 1. Soils are field visually classified in accordance with the Unified Soils Classification System. 2. NS = Sample not submitted for laboratory analysis from this interval. 3. Seafloor elevation calculated using sampling vessel's fathometer water depth reading and		

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.13733° Long = -88.34468°

DRILLING LOG (Cont. Sheet)	INSTALLATION		SHEET 2 OF 2 SHEETS
	Mobile District		
PROJECT	**COORDINATE SYSTEM/DATUM**	**HORIZONTAL**	**VERTICAL**
MsCIP Barrier Island Restoration	State Plane, MSE (U.S. Ft.)	NAD83	NAVD88
LOCATION COORDINATES	**ELEVATION TOP OF BORING**		
X = 1,138,716 Y = 232,102	-59.4 Ft.		

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
			applying NOAA tidal gauge data conversion factor.		

30
35
40
45
50
55
60

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
SERVICES

Core Identifier BI-PBS-03-12

Coordinate System
Latitude / Longitude

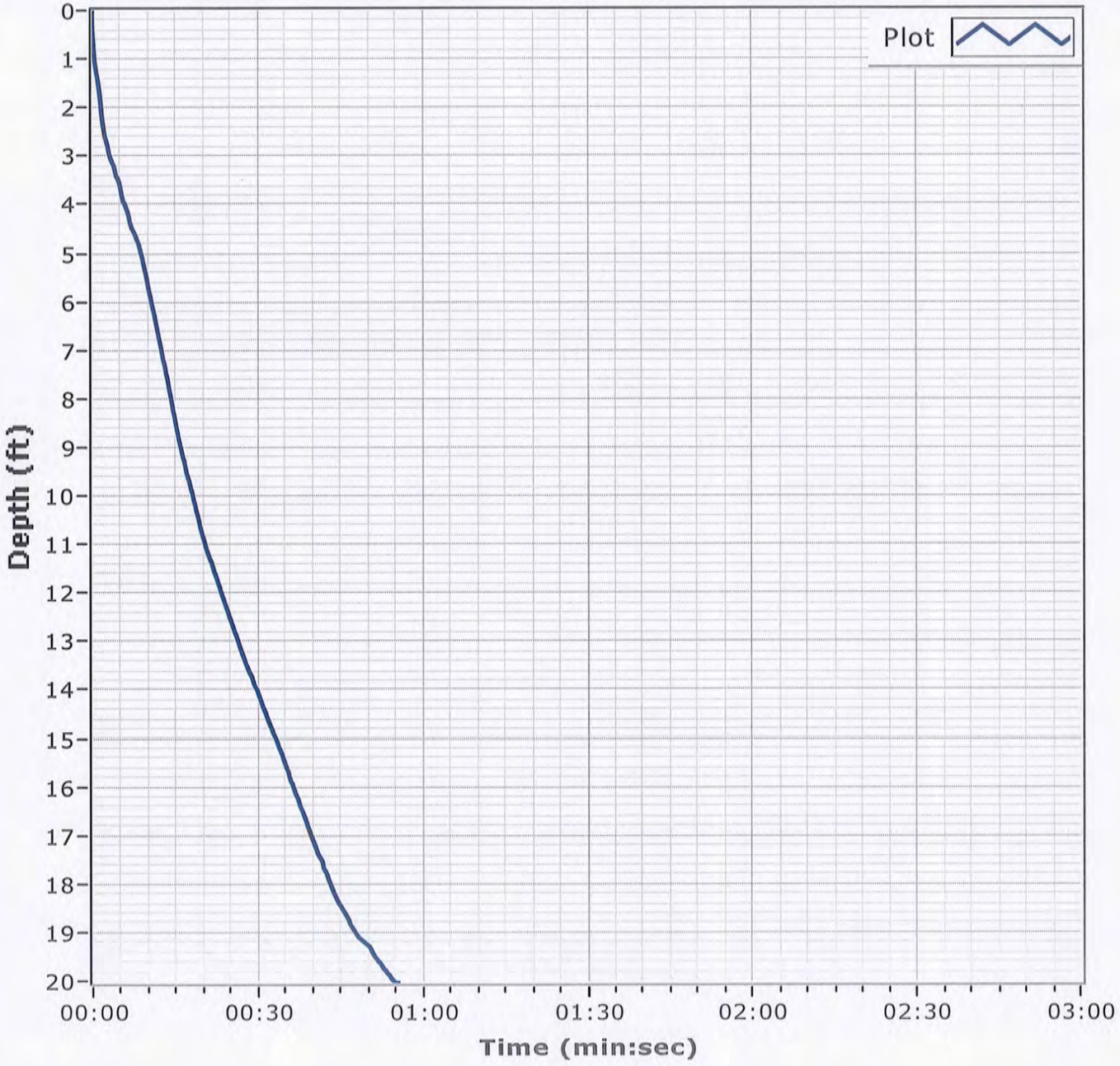
Latitude 30 08.240

Longitude 088 20.681

Date 11/26/2012
Start Time 09:52:42
End Time 09:53:38
Total Time 00:00:55

Water Depth 59.7'
Penetration 20.0'
Recovery 19.5'

Comments



Boring Designation BI-PBS-010-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET / OF
	South Atlantic	Mobile District	SHEET 1 OF 1 SHEETS

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-010-12	LOCATION COORDINATES: E = 1,136,488 N = 232,689	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 48.1 Ft.	
		15. DATE BORING	STARTED: 11-23-12 / COMPLETED: 11-23-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -47.3 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 11.9 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: John Bass, Geotechnical Engineer	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-47.3	0.0				
			SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, little shell fragments, trace fines, gray to light gray (SP)	A	Classification: SP Color: 5Y 7/2-light gray D50: 0.33 mm % Fines: 1.3
-53.2	5.9				
			SAND, poorly-graded, mostly fine-grained sand-sized quartz, trace silt, trace shell fragments, gray to light gray (SP)	B	Classification: SP Color: 5Y 6.5/2- D50: 0.28 mm % Fines: 2.5
-55.7	8.4				
-57.0	9.7		SAND, poorly-graded with silt, mostly fine-grained sand-sized quartz, few silt, trace shell fragments, gray (SP-SM)	NS	
-59.2	11.9		SAND, silty, mostly fine-grained sand-sized quartz, some silt, trace shell fragments, gray (SM)		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.13897° Long = -88.35172°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
SERVICES

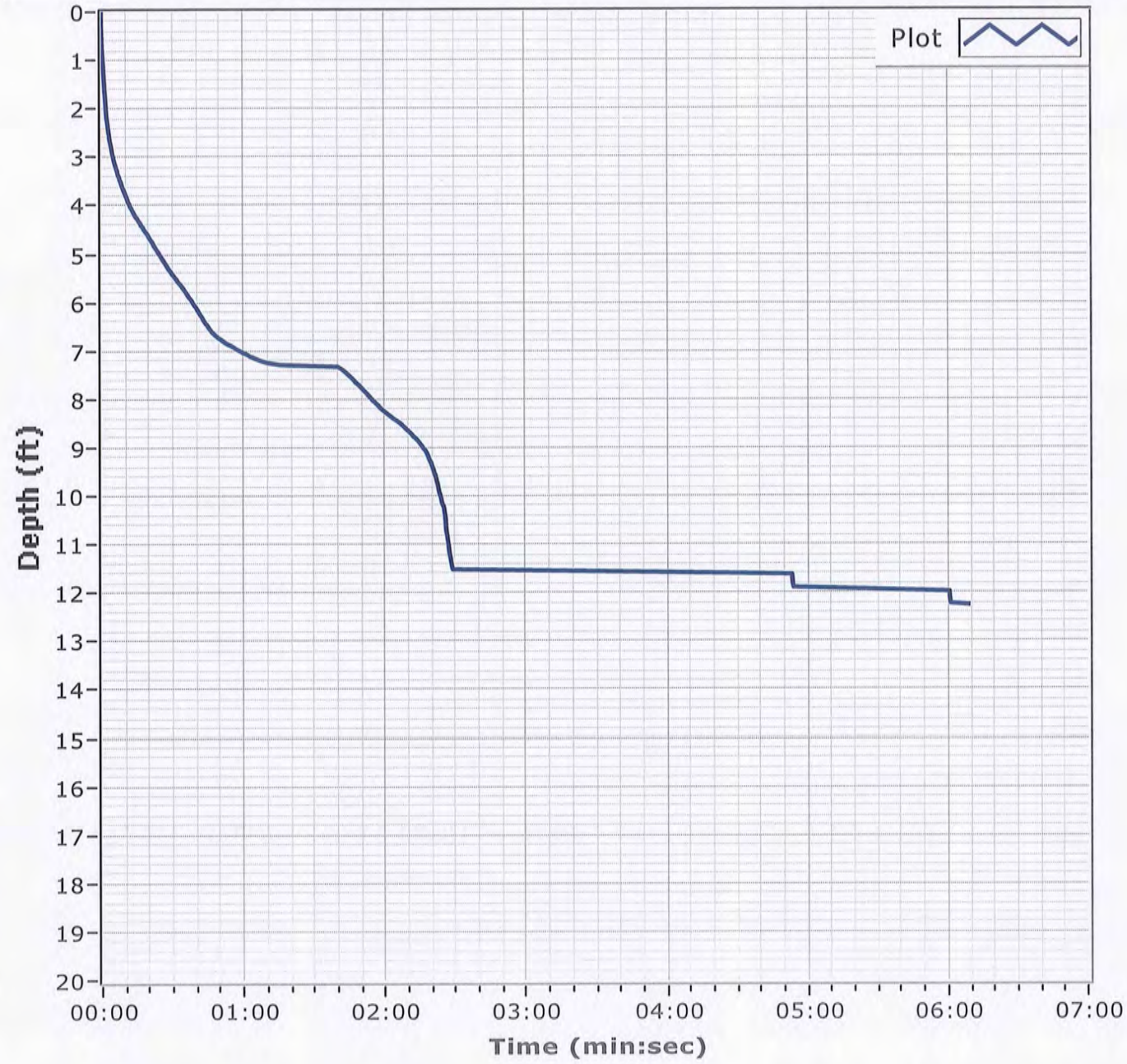
Core Identifier BI-PBS-10-12
Coordinate System
Latitude / Longitude

Latitude 30 08.338
Longitude 088 20.103

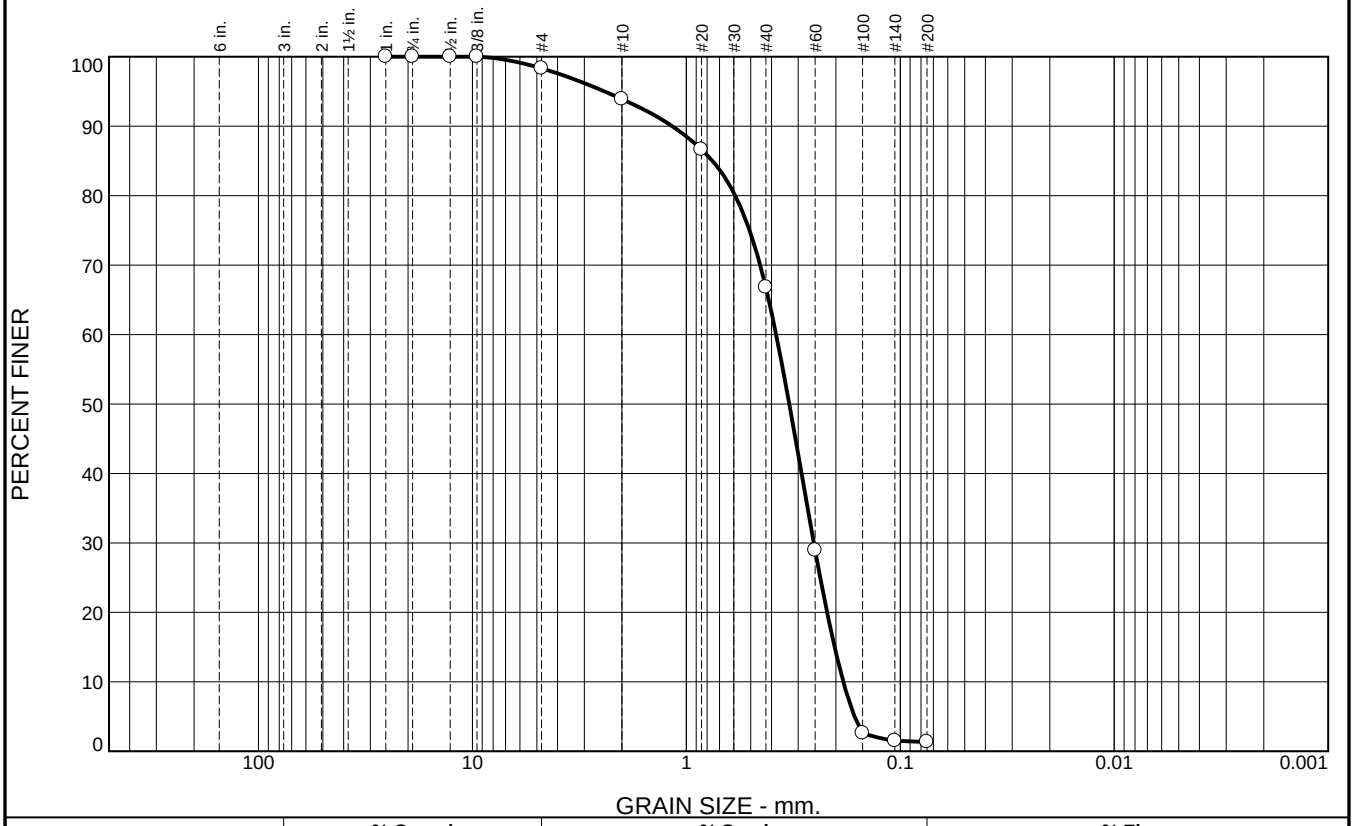
Date 11/23/2012
Start Time 15:44:24
End Time 15:50:33
Total Time 00:06:09

Water Depth 48.1'
Penetration 12.3'
Recovery 11.9'

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.7	4.4	27.1	65.5	1.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	98.3		
#10	93.9		
#20	86.6		
#40	66.8		
#60	28.9		
#100	2.6		
#140	1.5		
#200	1.3		

* (no specification provided)

Material Description

Fine to medium grained, SAND, with SHELL

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.1641 D_{85}= 0.7550 D_{60}= 0.3804
D_{50}= 0.3303 D_{30}= 0.2537 D_{15}= 0.2028
D_{10}= 0.1848 C_u= 2.06 C_c= 0.92

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-10-12 A
Sample Number: 6469 (38) **Depth:** 0.0' **Date:** 11/28/12

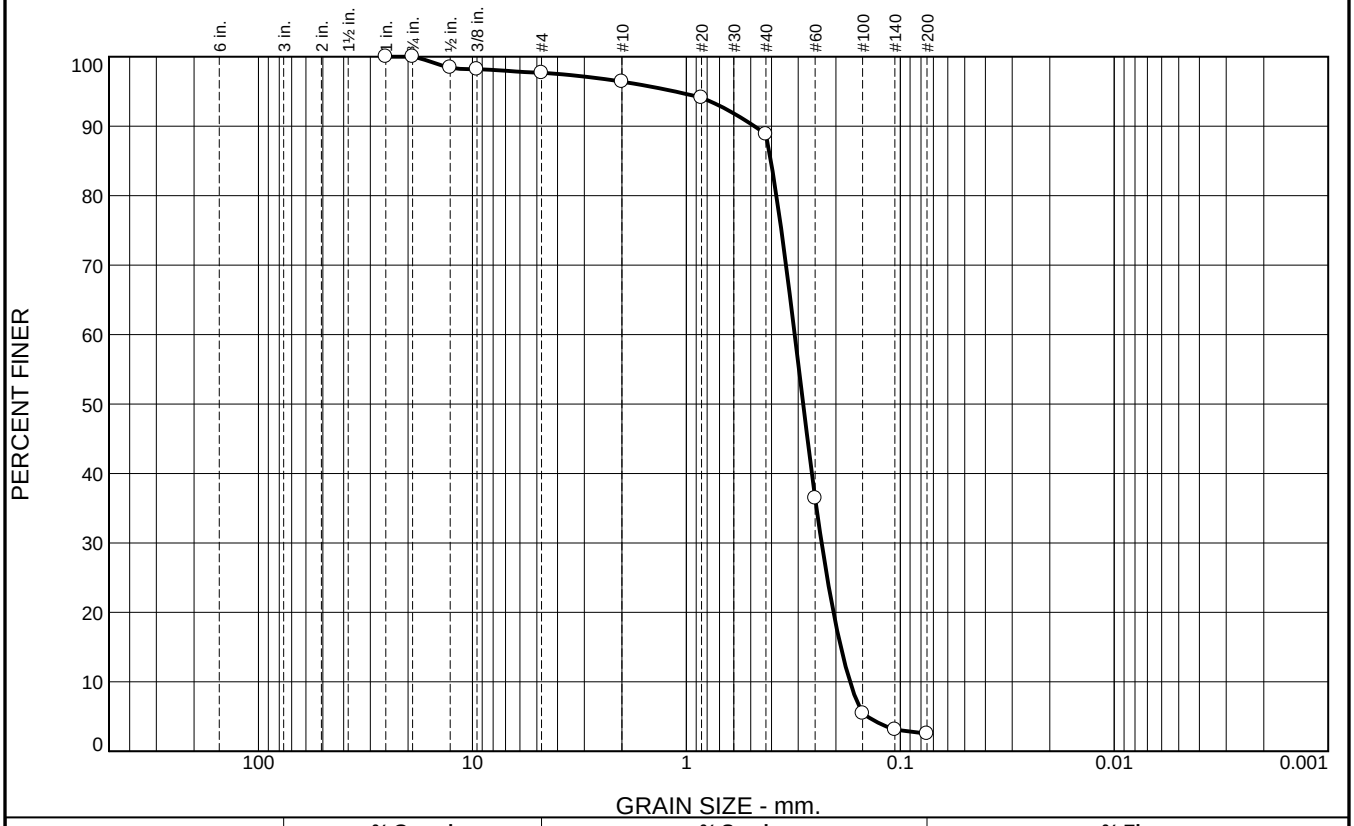
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.3	1.3	7.6	86.3	2.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	98.4		
.375	98.2		
#4	97.7		
#10	96.4		
#20	94.1		
#40	88.8		
#60	36.4		
#100	5.4		
#140	3.1		
#200	2.5		

* (no specification provided)

Material Description

Fine grained, SAND, with trace SHELL

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4813 D_{85}= 0.4025 D_{60}= 0.3117
D_{50}= 0.2846 D_{30}= 0.2332 D_{15}= 0.1898
D_{10}= 0.1720 C_u= 1.81 C_c= 1.01

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-10-12 B
Sample Number: 6469 (39) **Depth:** 5.9' **Date:** 11/28/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBS-011-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET / OF
	South Atlantic	Mobile District	1 of 1 SHEETS

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-011-12	LOCATION COORDINATES: E = 1,136,985 N = 232,368	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL:	BEARING:	14. WATER DEPTH: 46.4 Ft.
		15. DATE BORING	STARTED: 11-23-12 / COMPLETED: 11-23-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -46.2 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 19.3 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: John Bass, Geotechnical Engineer	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-46.2	0.0				
			SAND, poorly-graded, mostly fine-grained sand-sized quartz, little shell fragments, trace fines, lt. gray (SP)	A	Classification: SP Color: 5Y 7/2-light gray D50: 0.28 mm % Fines: 1.6
-54.8	8.6				
			SAND, poorly-graded, mostly fine-grained sand-sized quartz, few fines, trace shell fragments, lt. gray (SP)	B	Classification: SP Color: 5Y 6/2-light olive gray D50: 0.24 mm % Fines: 3.2
-56.6	10.4				
			SAND, silty, mostly fine-grained sand-sized quartz, little shell fragments, gray (SM)	NS	
-60.0	13.8				
-60.7	14.5		CLAY, lean, mostly clay, some fine-grained sand-sized quartz, lt. gray mottled with gray and orange (CL)		
-61.8	15.6				
			SAND, silty, mostly fine-grained sand-sized quartz, some silt, gray (SM)		
			CLAY, lean, mostly clay, with sandy lenses throughout, lt. gray mottled with gray and orange (CL)		
-65.5	19.3				
			NOTES: 1. Soils are field visually classified in accordance with the Unified Soils Classification System. 2. NS = Sample not submitted for laboratory analysis from this interval. 3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.		

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.13808° Long = -88.35015°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
SERVICES

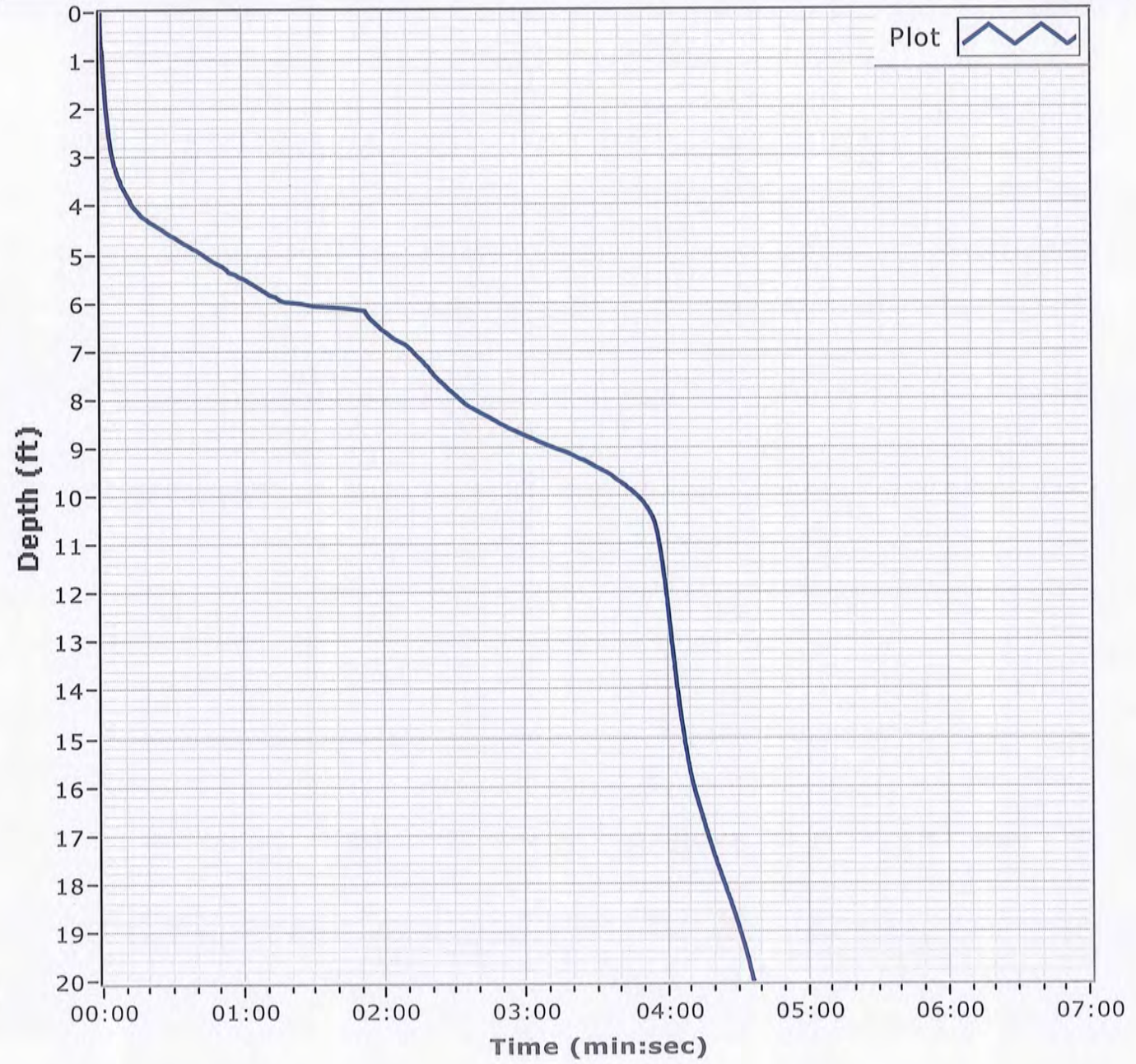
Core Identifier BI-PBS-11-12
Coordinate System
Latitude / Longitude

Date 11/23/2012
Start Time 15:04:48
End Time 15:09:25
Total Time 00:04:36

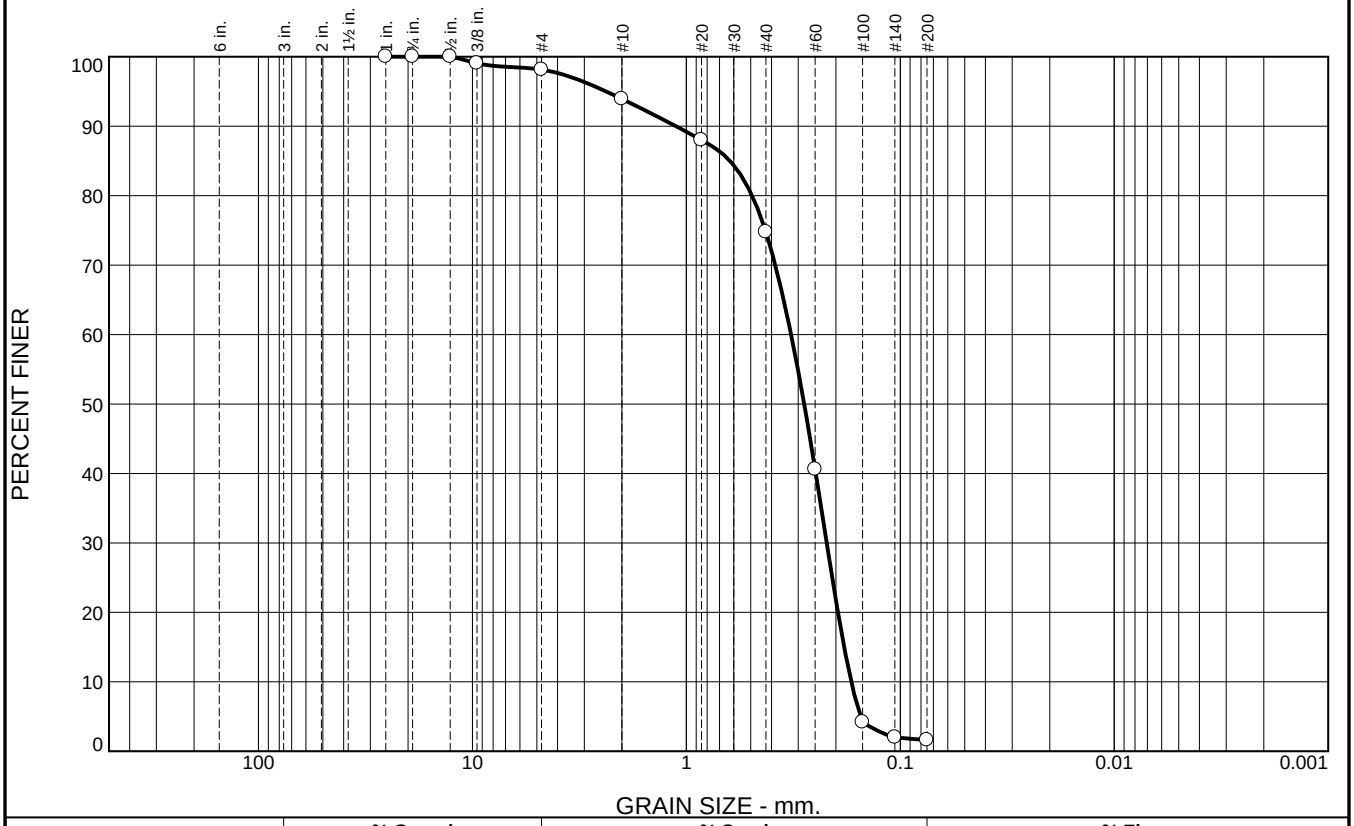
Water Depth 46.4
Penetration 20.0'
Recovery 19.3'

Latitude 30 08.285
Longitude 088 20.009

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.9	4.2	19.1	73.2	1.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	99.1		
#4	98.1		
#10	93.9		
#20	88.0		
#40	74.8		
#60	40.6		
#100	4.2		
#140	2.0		
#200	1.6		

* (no specification provided)

Material Description

Fine to medium grained, SAND, with trace SHELL

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.1206 D_{85}= 0.6257 D_{60}= 0.3240
D_{50}= 0.2814 D_{30}= 0.2208 D_{15}= 0.1831
D_{10}= 0.1697 C_u= 1.91 C_c= 0.89

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-11-12 A
Sample Number: 6469 (36) **Depth:** 0.0' **Date:** 11/28/12

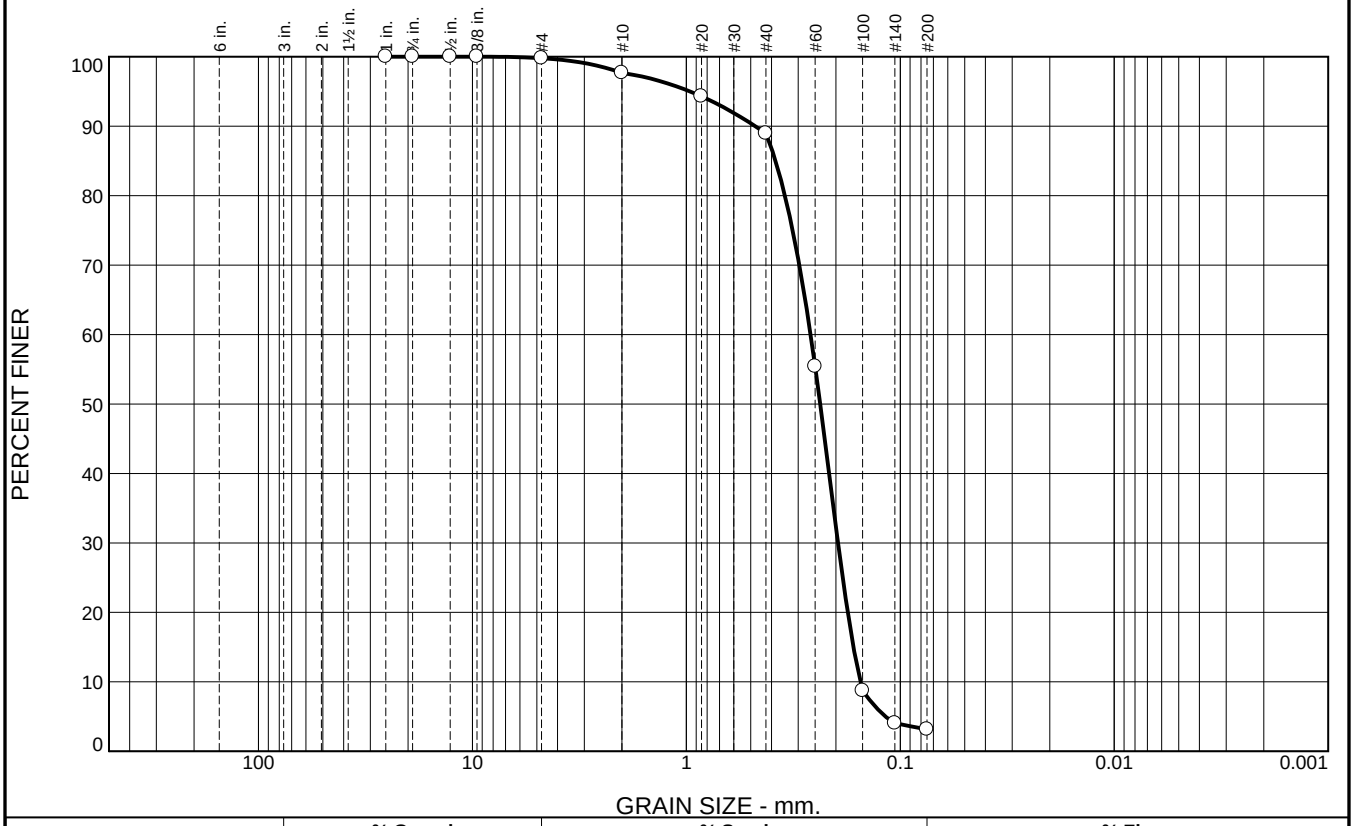
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	2.1	8.8	85.7	3.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.8		
#10	97.7		
#20	94.3		
#40	88.9		
#60	55.4		
#100	8.7		
#140	4.0		
#200	3.2		

* (no specification provided)

Material Description

Fine grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4772 D_{85}= 0.3827 D_{60}= 0.2626
D_{50}= 0.2368 D_{30}= 0.1955 D_{15}= 0.1658
D_{10}= 0.1537 C_u= 1.71 C_c= 0.95

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-11-12 B
Sample Number: 6469 (37) **Depth:** 8.6' **Date:** 11/28/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBS-012-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 2 SHEETS
	South Atlantic	Mobile District	

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-012-12	LOCATION COORDINATES: E = 1,137,391 N = 232,075	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 48.7 Ft.	
		15. DATE BORING	STARTED: 11-23-12 / COMPLETED: 11-23-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -49.2 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 20.0 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: John Bass, Geotechnical Engineer	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-49.2	0.0				
			SAND, poorly-graded, mostly fine to medium-grained quartz, little shell fragments, trace fines, sand and shell debris layer at 3.0-3.8 ft, lt. gray (SP)	A	Classification: SP Color: 5Y 6/2-light olive gray D50: 0.27 mm % Fines: 1.9
-54.2	5.0				
			SAND, poorly-graded, mostly fine-grained sand-sized quartz, little fines, trace shell fragments, lt. gray (SP)	B	Classification: SP Color: 5Y 6/2-light olive gray D50: 0.23 mm % Fines: 2.8
-58.0	8.8				
-59.2	10.0		SAND, poorly-graded, mostly fine-grained sand-sized quartz, little fines, lt. gray (SP)	C	Classification: SP-SM Color: 5Y 5/2-olive gray D50: 0.21 mm % Fines: 9.9
			SAND, silty, mostly fine-grained sand-sized quartz, with clay lenses, gray (SM)	NS	
-62.7	13.5				
			CLAY, silty, mostly clay, trace fine-grained sand-sized quartz, lt. gray mottled with orange (CL-ML)		
-68.0	18.8				
-69.2	20.0		SAND, silty, mostly fine-grained sand-sized quartz, trace wood debris, gray (SM)		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

3. Seafloor elevation determined from USACE

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.13727° Long = -88.34887°

DRILLING LOG (Cont. Sheet)	INSTALLATION	SHEET 2 OF 2 SHEETS
	Mobile District	

PROJECT	COORDINATE SYSTEM/DATUM	HORIZONTAL	VERTICAL
MsCIP Barrier Island Restoration	State Plane, MSE (U.S. Ft.)	NAD83	NAVD88

LOCATION COORDINATES	ELEVATION TOP OF BORING
X = 1,137,391 Y = 232,075	-49.2 Ft.

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
			hydrographic survey completed April 2014.		

30
35
40
45
50
55
60

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.13727° Long = -88.34887°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE SERVICES

Core Identifier BI-PBS-12-12

Coordinate System
Latitude / Longitude

Latitude 30 08.236

Longitude 088 20.932

Date 11/23/2012

Start Time 14:18:11

End Time 14:20:19

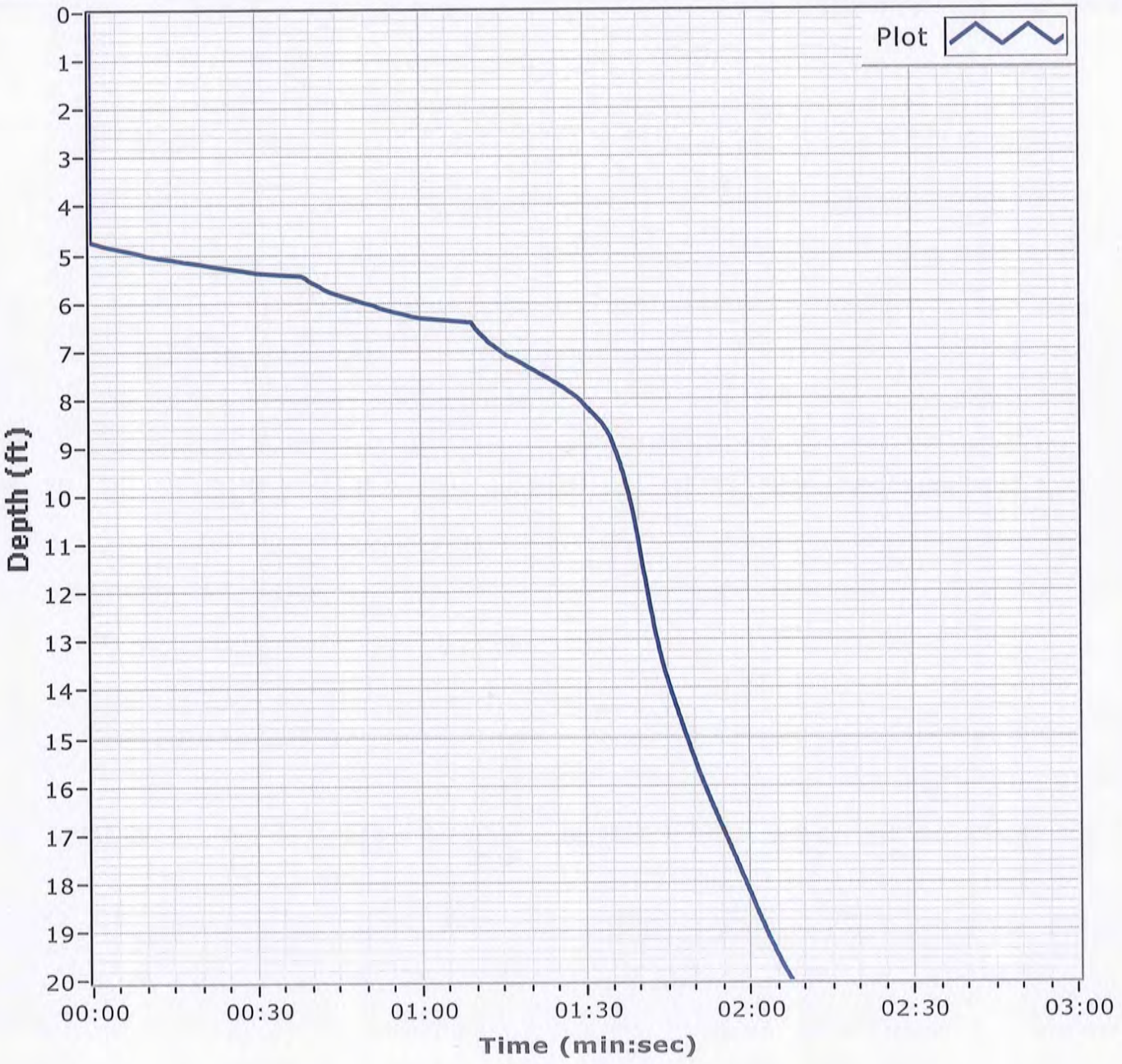
Total Time 00:02:07

Water Depth 48.7'

Penetration 20.0'

Recovery 20.0'

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.4	4.4	20.3	72.0	1.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	99.6		
#4	98.6		
#10	94.2		
#20	87.8		
#40	73.9		
#60	44.1		
#100	5.6		
#140	2.4		
#200	1.9		

* (no specification provided)

Material Description

Fine to medium grained, SAND, with trace SHELL

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.0750 D_{85}= 0.6757 D_{60}= 0.3148
D_{50}= 0.2700 D_{30}= 0.2121 D_{15}= 0.1768
D_{10}= 0.1640 C_u= 1.92 C_c= 0.87

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-12-12 A
Sample Number: 6469 (33) **Depth:** 0.0' **Date:** 11/28/12

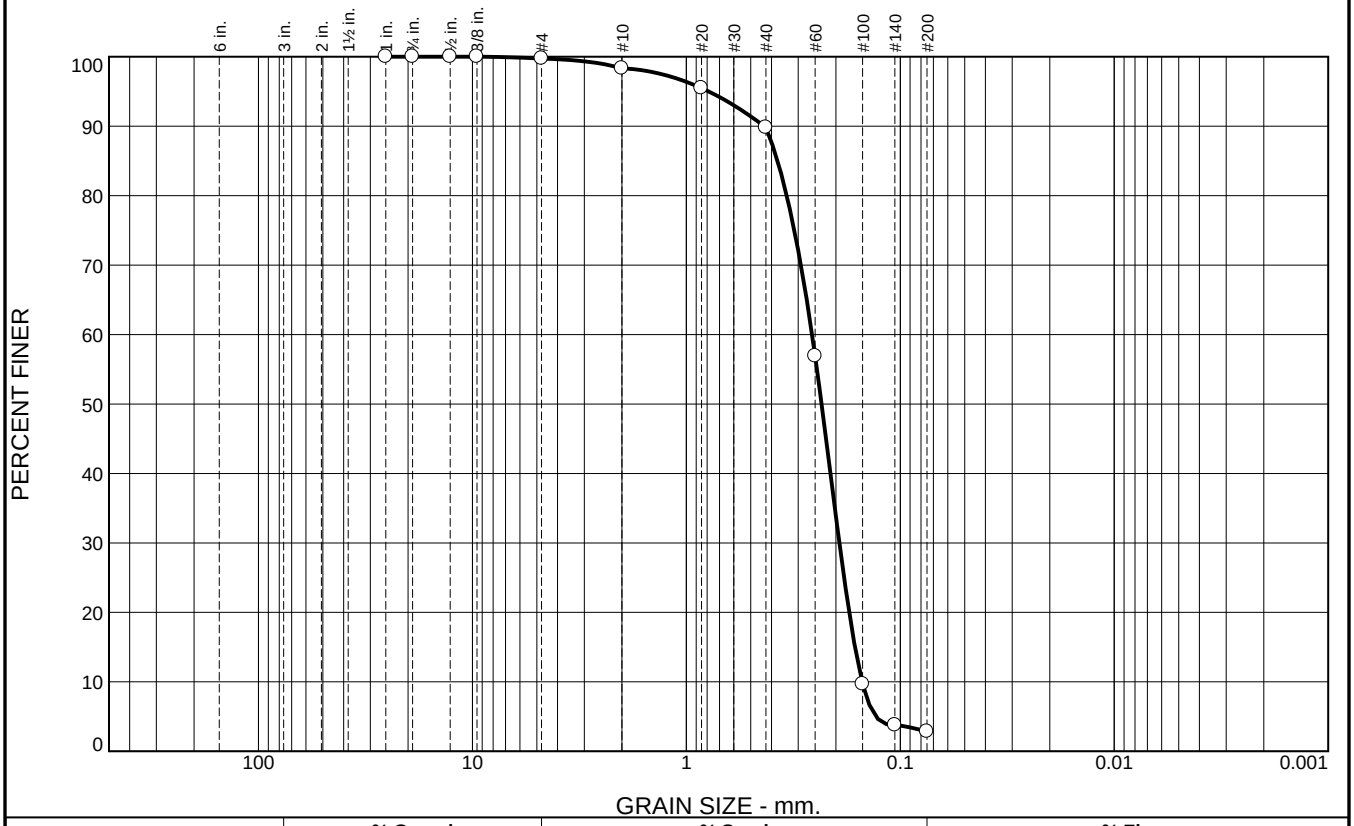
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.3	1.4	8.5	87.0	2.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.7		
#10	98.3		
#20	95.5		
#40	89.8		
#60	56.9		
#100	9.7		
#140	3.8		
#200	2.8		

* (no specification provided)

Material Description

Fine grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4338 D_{85}= 0.3746 D_{60}= 0.2585
D_{50}= 0.2333 D_{30}= 0.1927 D_{15}= 0.1631
D_{10}= 0.1509 C_u= 1.71 C_c= 0.95

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-12-12 B
Sample Number: 6469 (34) **Depth:** 5.0' **Date:** 11/28/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.2	2.6	13.2	73.1	9.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	99.6		
.375	99.3		
#4	98.8		
#10	96.2		
#20	92.0		
#40	83.0		
#60	62.8		
#100	23.6		
#140	12.6		
#200	9.9		

* (no specification provided)

Material Description

Fine to medium grained, SLIGHTLY SILTY SAND, with trace SHELL

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6799 D_{85}= 0.4731 D_{60}= 0.2404
D_{50}= 0.2117 D_{30}= 0.1656 D_{15}= 0.1204
D_{10}= 0.0766 C_u= 3.14 C_c= 1.49

Classification

USCS= SP-SM AASHTO=

Remarks

Location: BI-PBS-12-12 C
Sample Number: 6469 (35) **Depth:** 8.8' **Date:** 11/28/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBS-013-12

DRILLING LOG	DIVISION: South Atlantic	INSTALLATION: Mobile District	SHEET 1 OF 1 SHEETS

1. PROJECT: MsCIP Barrier Island Restoration Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-013-12	LOCATION COORDINATES: E = 1,133,767 N = 233,198	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 46.7 Ft.	
		15. DATE BORING	STARTED: 11-28-12 / COMPLETED: 11-28-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -47.3 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 11.8 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Mike FitzHarris, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-47.3	0.0				
			SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace shell fragments, occasional bands of shelly sand, gray (SP)	A	Classification: SP Color: 2.5Y 7/1-light gray D50: 0.35 mm % Fines: 1.6
				B	Classification: SP Color: 2.5Y 6.5/2- D50: 0.25 mm % Fines: 2.9
-56.5	9.2				
			CLAY, fat, mostly clay, trace silt, trace fine-grained sand-sized quartz, moderately stiff to stiff, medium to high plasticity, gray mottled with brown (CH)	NS	
-59.1	11.8				
			NOTES: 1. Soils are field visually classified in accordance with the Unified Soils Classification System. 2. NS = Sample not submitted for laboratory analysis from this interval. 3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.		

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.14040° Long = -88.36032°

Project Mississippi Barrier Island Restoration Project

AVS AMERICAN VIBRACORE SERVICES

Core Identifier BI-PBS-13-12

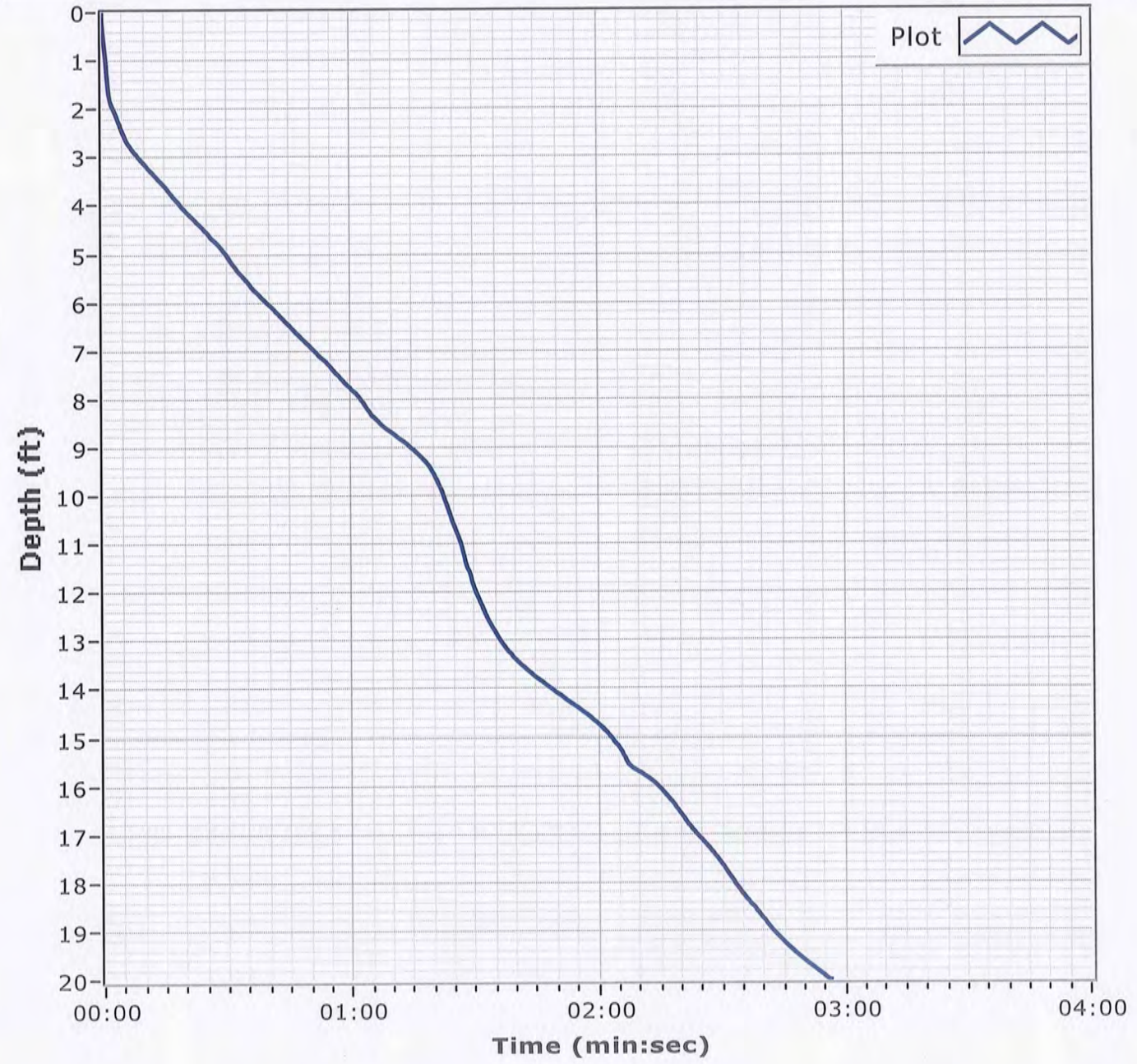
Coordinate System
Latitude / Longitude

Date 11/28/2012
Start Time 13:40:11
End Time 13:43:08
Total Time 00:02:56

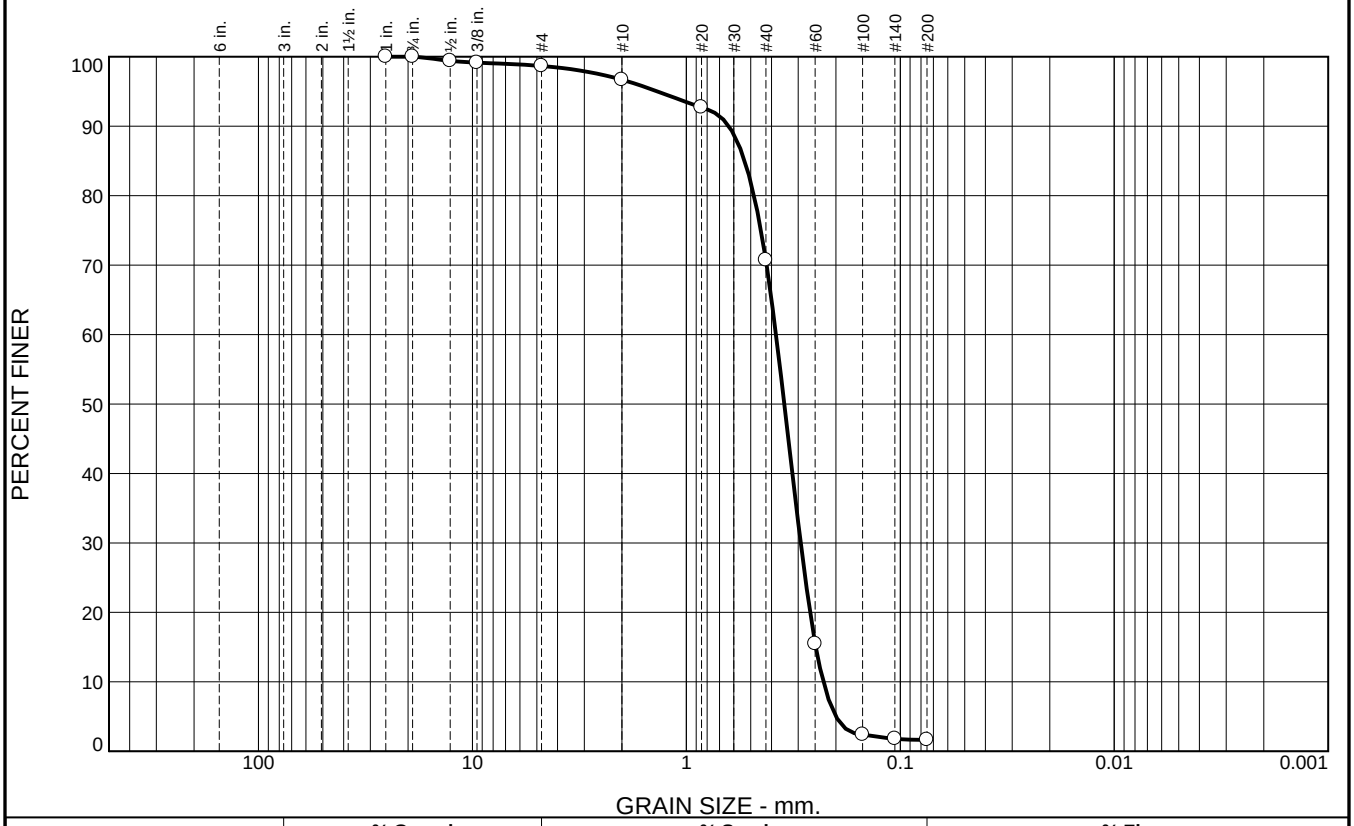
Water Depth 46.7'
Penetration 20.0'
Recovery 12.1'

Latitude 30 08.424
Longitude 088 21.619

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.3	2.0	26.0	69.1	1.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	99.4		
.375	99.1		
#4	98.7		
#10	96.7		
#20	92.7		
#40	70.7		
#60	15.5		
#100	2.4		
#140	1.8		
#200	1.6		

* (no specification provided)

Material Description

Fine to medium grained, SAND, with trace SHELL

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6331 D_{85}= 0.5337 D_{60}= 0.3810
D_{50}= 0.3484 D_{30}= 0.2923 D_{15}= 0.2483
D_{10}= 0.2289 C_u= 1.66 C_c= 0.98

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-13-12 A
Sample Number: 6471 (1) **Depth:** 0.0' **Date:** 12/03/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.8	2.1	12.3	81.9	2.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.2		
#10	97.1		
#20	93.1		
#40	84.8		
#60	50.9		
#100	6.6		
#140	3.4		
#200	2.9		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5218 D_{85}= 0.4275 D_{60}= 0.2775
D_{50}= 0.2477 D_{30}= 0.2028 D_{15}= 0.1718
D_{10}= 0.1600 C_u= 1.73 C_c= 0.93

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-13-12 B
Sample Number: 6471 (2) **Depth:** 5.0' **Date:** 12/03/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBS-014-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 1 SHEETS
	South Atlantic	Mobile District	

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-014-12	LOCATION COORDINATES: E = 1,136,141 N = 231,771	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 53.4 Ft.	
		15. DATE BORING	STARTED: 11-28-12 / COMPLETED: 11-28-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -53.2 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 19.6 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Mike FitzHarris, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-53.2	0.0				
			SAND, poorly-graded, mostly fine to medium-grained quartz, trace silt, trace shell fragments, greenish gray (SP)	A	Classification: SP Color: 5Y 6/2-light olive gray D50: 0.25 mm % Fines: 3.7
-56.4	3.2				
			SAND, silty, mostly fine-grained sand-sized quartz, some silt, trace clay, trace shell fragments, greenish gray (SM)	B	Classification: SP-SM Color: 5Y 5/2-olive gray D50: 0.2 mm % Fines: 11.8
-59.2	6.0				
			SAND, clayey, mostly fine-grained sand-sized quartz, some clay, trace shell fragments, alternating bands of clayey sand and sandy clay, gray mottled with greenish gray and brown (SC)		
-61.4	8.2				
			CLAY, fat, mostly clay, trace fine-grained sand-sized quartz, trace wood debris, trace shell fragments, occasional shelly bands and sandy pockets, moderately stiff, gray (CH)	NS	
-72.8	19.6				
			NOTES: 1. Soils are field visually classified in accordance with the Unified Soils Classification System. 2. NS = Sample not submitted for laboratory analysis from this interval. 3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.		

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.13645° Long = -88.35283°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
SERVICES

Core Identifier BI-PBS-14-12

Coordinate System
Latitude / Longitude

Latitude 30 08.187

Longitude 088 21.170

Date 11/28/2012

Start Time 09:49:38

End Time 09:50:16

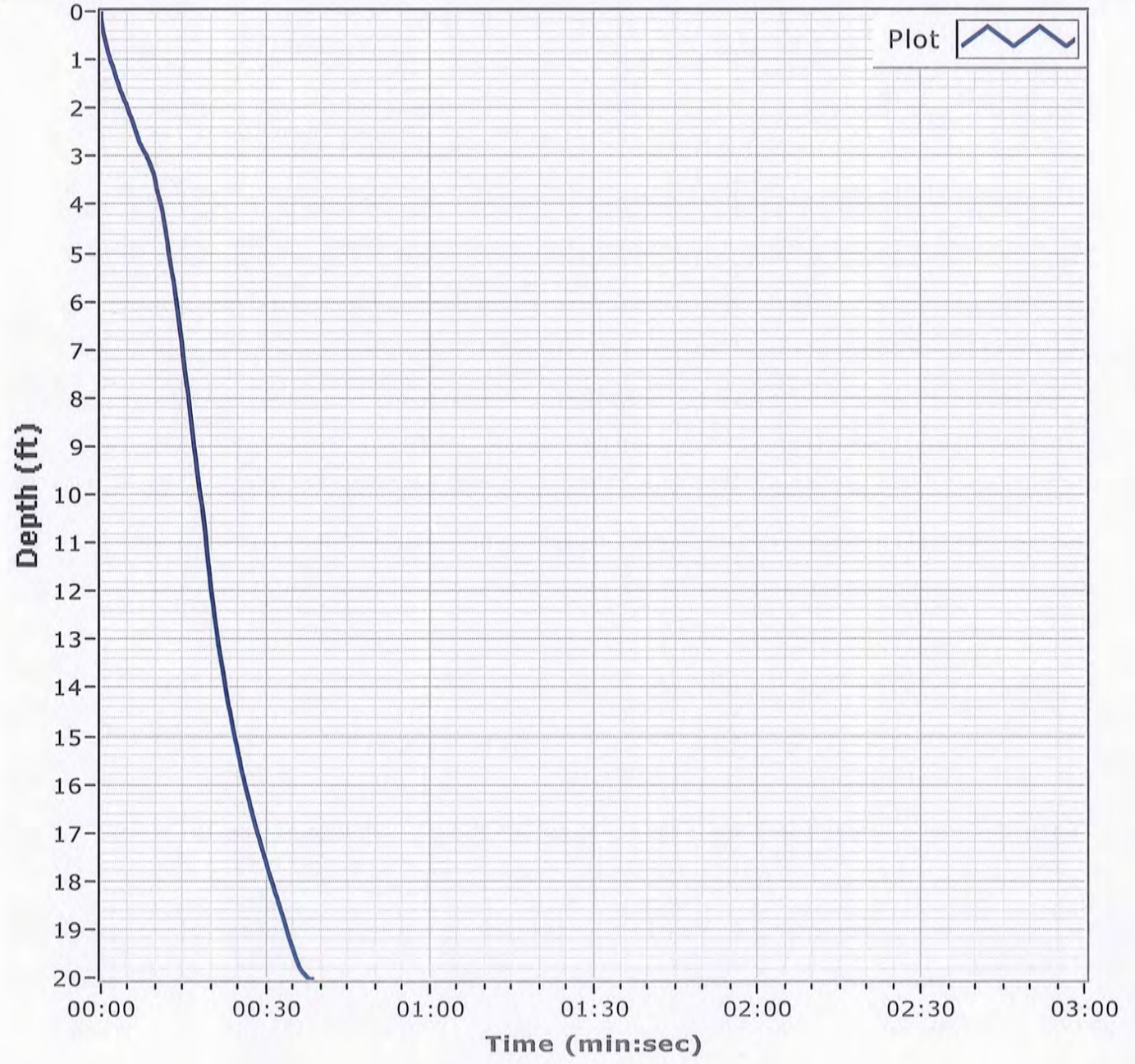
Total Time 00:00:38

Water Depth 53.4'

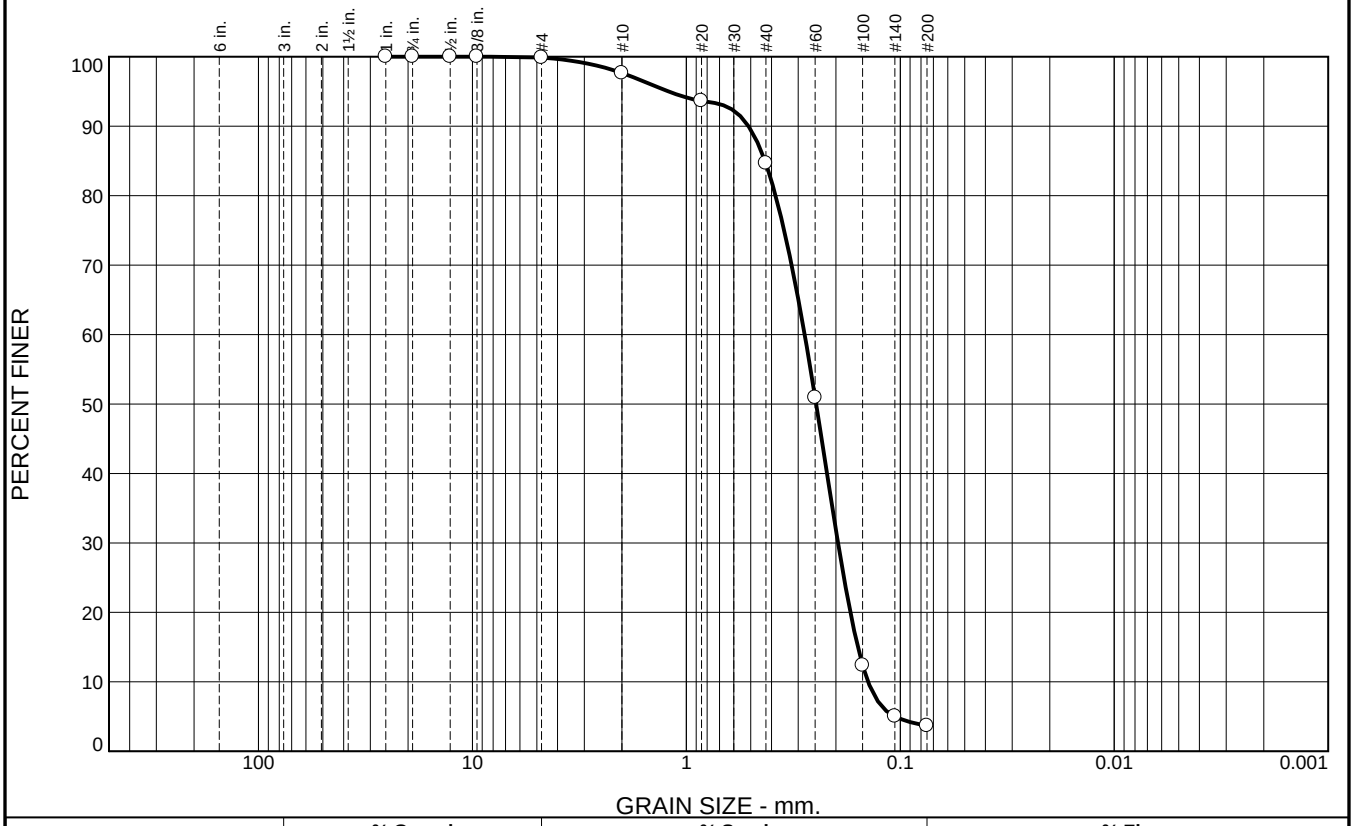
Penetration 20.0'

Recovery 19.6

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	2.3	13.0	80.9	3.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.9		
#10	97.6		
#20	93.6		
#40	84.6		
#60	50.9		
#100	12.4		
#140	5.0		
#200	3.7		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5125 D_{85}= 0.4290 D_{60}= 0.2801
D_{50}= 0.2473 D_{30}= 0.1955 D_{15}= 0.1580
D_{10}= 0.1414 C_u= 1.98 C_c= 0.96

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-14-12 A
Sample Number: 6471 (3) **Depth:** 0.0' **Date:** 12/03/12

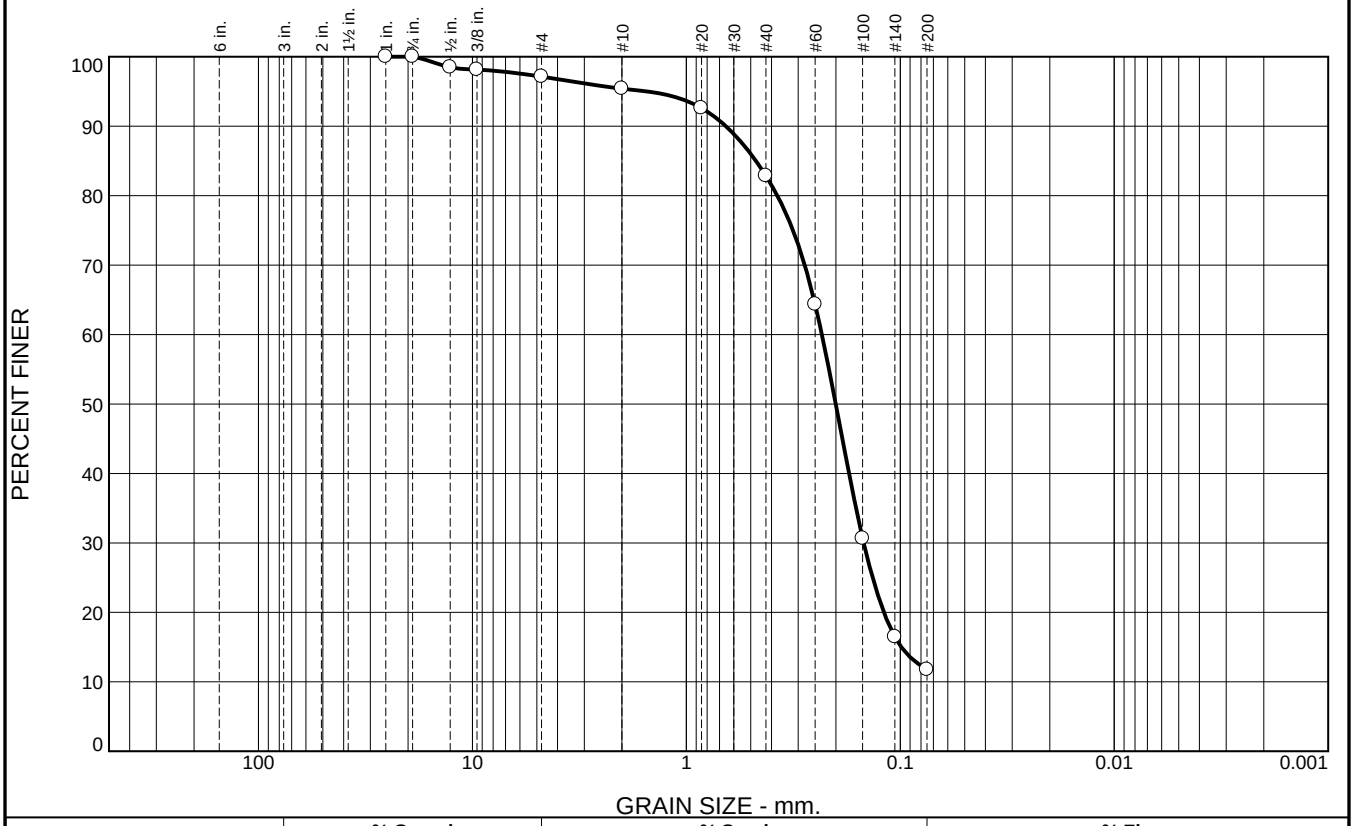
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.9	1.7	12.6	71.0	11.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	98.5		
.375	98.1		
#4	97.1		
#10	95.4		
#20	92.6		
#40	82.8		
#60	64.3		
#100	30.6		
#140	16.5		
#200	11.8		

* (no specification provided)

Material Description

Fine to medium grained, SLIGHTLY SILTY SAND, with trace SHELL

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6538 D_{85}= 0.4732 D_{60}= 0.2325
D_{50}= 0.2004 D_{30}= 0.1484 D_{15}= 0.0989
D_{10}= C_u= C_c=

Classification

USCS= SP-SM AASHTO=

Remarks

Location: BI-PBS-14-12 B
Sample Number: 6471 (4) **Depth:** 3.2' **Date:** 12/03/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBS-015-12

DRILLING LOG	DIVISION: South Atlantic	INSTALLATION: Mobile District	SHEET 1 OF 2 SHEETS

1. PROJECT: MsCIP Barrier Island Restoration Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-015-12	LOCATION COORDINATES: E = 1,135,034 N = 232,632	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 48.9 Ft.	
		15. DATE BORING	STARTED: 11-28-12 / COMPLETED: 11-28-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -49.7 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 19.9 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Mike FitzHarris, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-49.7	0.0				
			SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace silt, trace shell fragments, gray (SP)	A	Classification: SP Color: 5Y 7/2-light gray D50: 0.29 mm % Fines: 2
-55.2	5.5			NS	
			SAND, silty, mostly fine-grained sand-sized quartz, some silt, trace shell fragments, trace clay, gray (SM)	B	Classification: SP-SM Color: 5Y 5/2-olive gray D50: 0.2 mm % Fines: 11.6
-58.4	8.7				
			CLAY, lean, mostly clay, trace wood debris, occasional pockets of clayey sand, gray mottled with greenish gray and brown (CL)	NS	
-64.6	14.9				
			CLAY, fat, mostly clay, trace shell fragments, trace wood debris, moderately stiff, gray (CH)		
-67.8	18.1				
-68.3	18.6				
			SAND, clayey, mostly fine-grained sand-sized quartz, trace silt, trace shell fragments, gray (SC)		
-69.6	19.9				
			SAND, poorly-graded with silt, mostly fine-grained sand-sized quartz, few silt, trace shell fragments, trace clay, gray (SP-SM)		
			NOTES: 1. Soils are field visually classified in accordance with the Unified Soils Classification System.		

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.13883° Long = -88.35632°

DRILLING LOG (Cont. Sheet)	INSTALLATION		SHEET 2 OF 2 SHEETS
	Mobile District		
PROJECT	**COORDINATE SYSTEM/DATUM**	**HORIZONTAL**	**VERTICAL**
MsCIP Barrier Island Restoration	State Plane, MSE (U.S. Ft.)	NAD83	NAVD88
LOCATION COORDINATES	**ELEVATION TOP OF BORING**		
X = 1,135,034 Y = 232,632	-49.7 Ft.		

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
			2. NS = Sample not submitted for laboratory analysis from this interval. 3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.		

30
35
40
45
50
55
60

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.13883° Long = -88.35632°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
S E R V I C E S

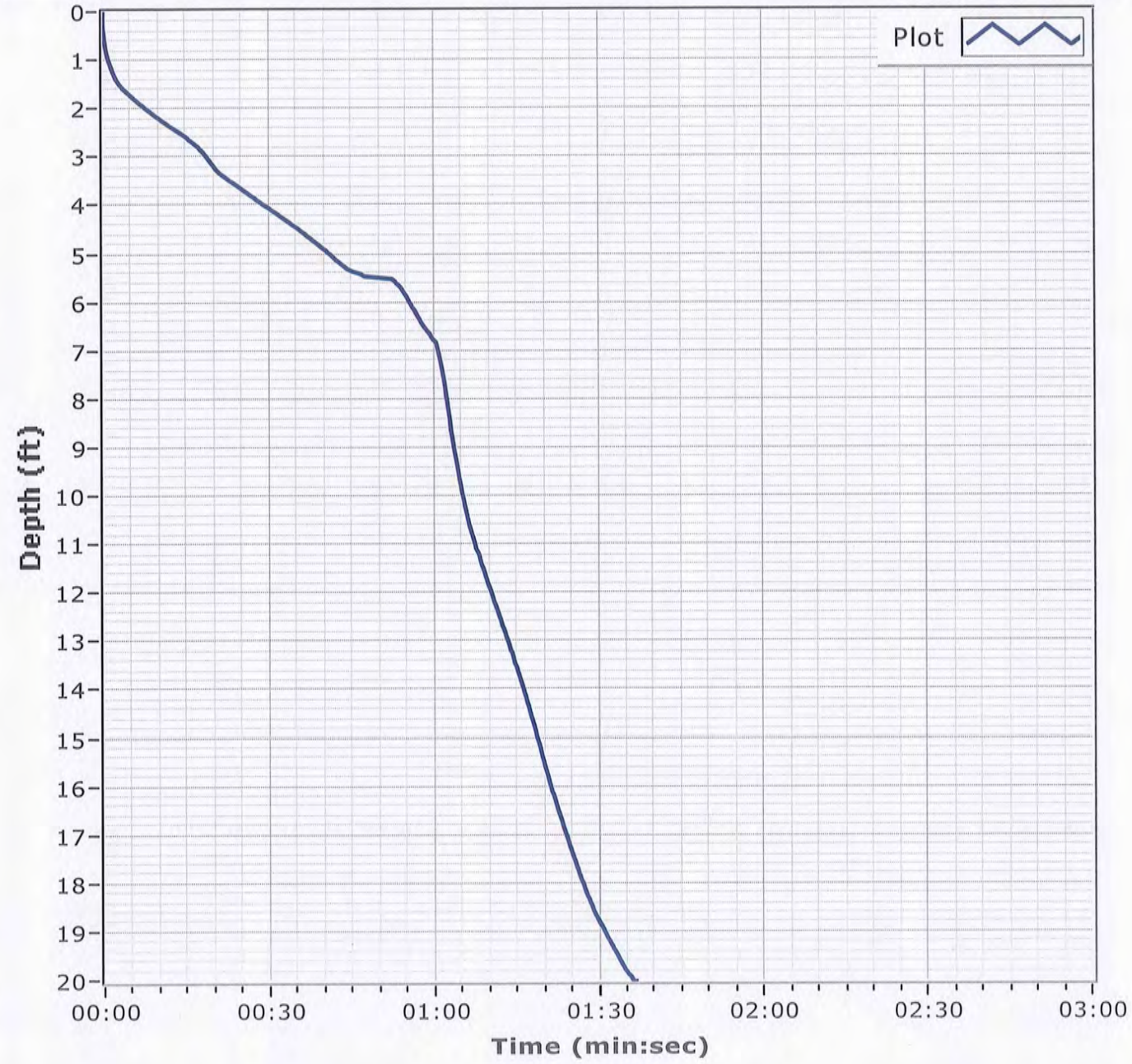
Core Identifier BI-PBS-15-12
Coordinate System
Latitude / Longitude

Latitude 30 08.330
Longitude 088 21.379

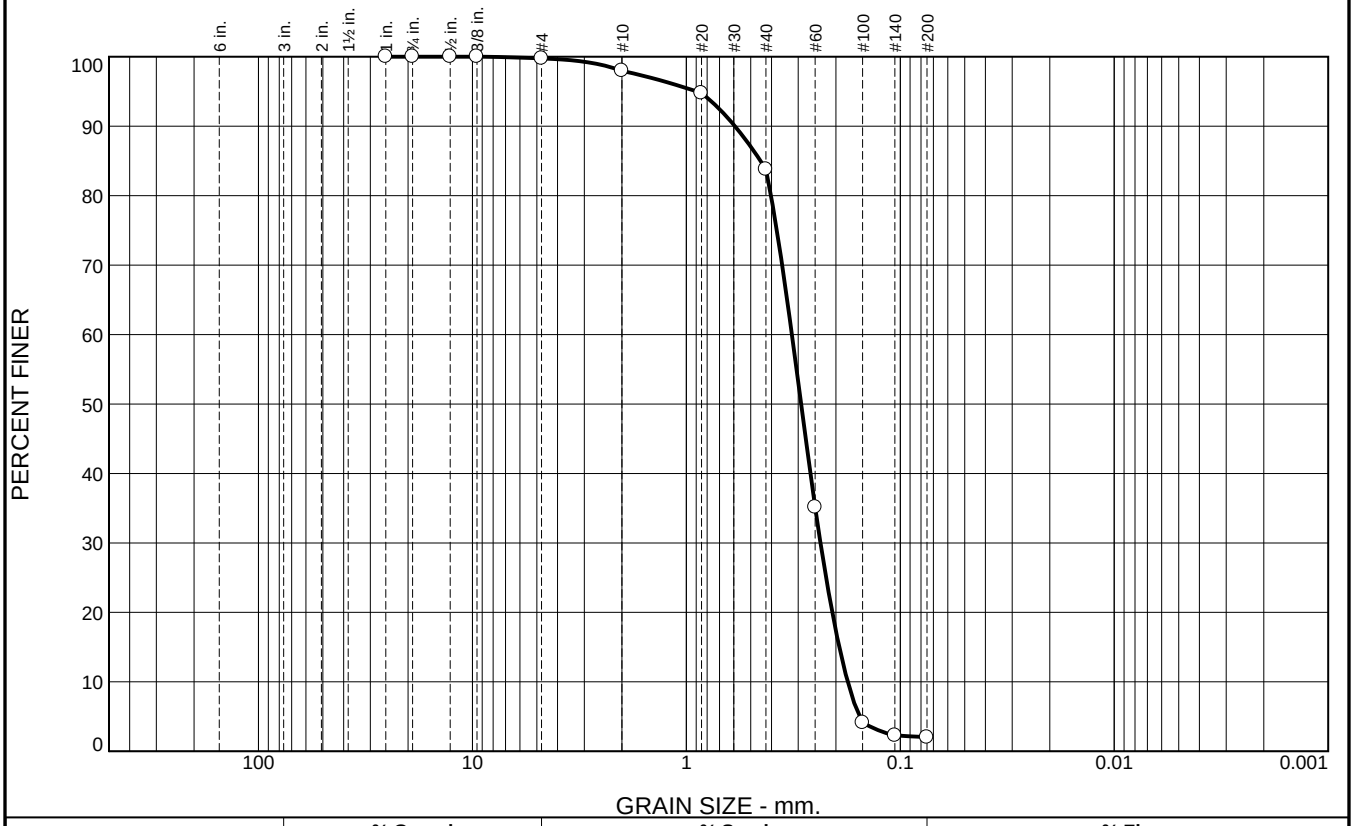
Date 11/28/2012
Start Time 10:32:11
End Time 10:33:48
Total Time 00:01:37

Water Depth 48.9'
Penetration 20.0'
Recovery 19.9'

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.3	1.7	14.2	81.8	2.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.7		
#10	98.0		
#20	94.8		
#40	83.8		
#60	35.1		
#100	4.1		
#140	2.3		
#200	2.0		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5930 D_{85}= 0.4505 D_{60}= 0.3212
D_{50}= 0.2909 D_{30}= 0.2360 D_{15}= 0.1929
D_{10}= 0.1763 C_u= 1.82 C_c= 0.98

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-15-12 A
Sample Number: 6471 (5) **Depth:** 0.0' **Date:** 12/03/12

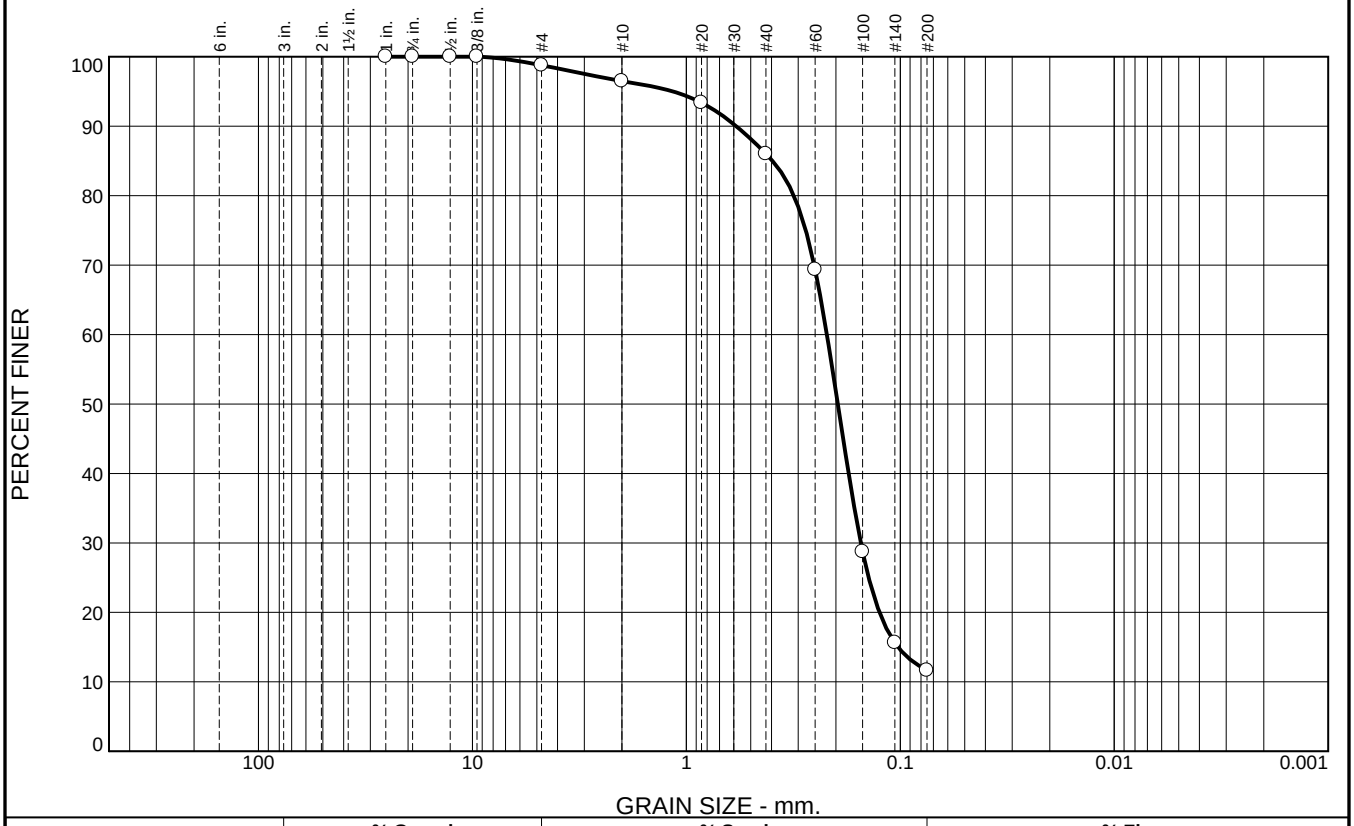
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.2	2.3	10.5	74.4	11.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	98.8		
#10	96.5		
#20	93.4		
#40	86.0		
#60	69.4		
#100	28.7		
#140	15.6		
#200	11.6		

* (no specification provided)

Material Description

Fine to medium grained, SLIGHTLY SILTY SAND, with trace SHELL

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5851 D_{85}= 0.3961 D_{60}= 0.2203
D_{50}= 0.1960 D_{30}= 0.1530 D_{15}= 0.1024
D_{10}= C_u= C_c=

Classification

USCS= SP-SM AASHTO=

Remarks

Location: BI-PBS-15-12 B
Sample Number: 6471 (6) **Depth:** 5.5' **Date:** 12/03/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBS-016-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET / OF
	South Atlantic	Mobile District	SHEET 1 OF 1 SHEETS

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-016-12	LOCATION COORDINATES: E = 1,138,607 N = 231,553	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 52.8 Ft.	
		15. DATE BORING	STARTED: 11-23-12 / COMPLETED: 11-23-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -52.5 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 17.8 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: John Bass, Geotechnical Engineer	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-52.5	0.0				
-55.0	2.5		SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace fines, trace shell fragments, gray (SP)	A	Classification: SP Color: 5Y 6/2-light olive gray D50: 0.29 mm % Fines: 2.4
-56.3	3.8		SAND, poorly-graded, mostly fine-grained sand-sized quartz, little fines, little shell fragments, gray (SP)	B	Classification: SP Color: 5Y 6/2-light olive gray D50: 0.21 mm % Fines: 3.7
-58.1	5.6		SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, little fines, gray (SP)	C	Classification: SP Color: 5Y 6/2-light olive gray D50: 0.24 mm % Fines: 4
-61.3	8.8		SAND, silty, mostly fine-grained sand-sized quartz, little shell fragments, gray (SM)	NS	
-64.6	12.1		CLAY, lean, mostly clay, some sand, lt. gray mottled with orange (CL)		
-65.6	13.1		SAND, clayey, mostly fine-grained sand-sized quartz, lt. gray mottled with orange (SC)		
-66.4	13.9		CLAY, lean, mostly clay, little fine-grained sand-sized quartz, low plasticity, dark gray (CL)		
-68.2	15.7		SAND, silty, mostly fine-grained sand-sized quartz, trace shell fragments, trace wood debris, gray (SM)		
-70.3	17.8		CLAY, lean, mostly clay, trace fine-grained sand-sized quartz, gray (CL)		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.13582° Long = -88.34503°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
SERVICES

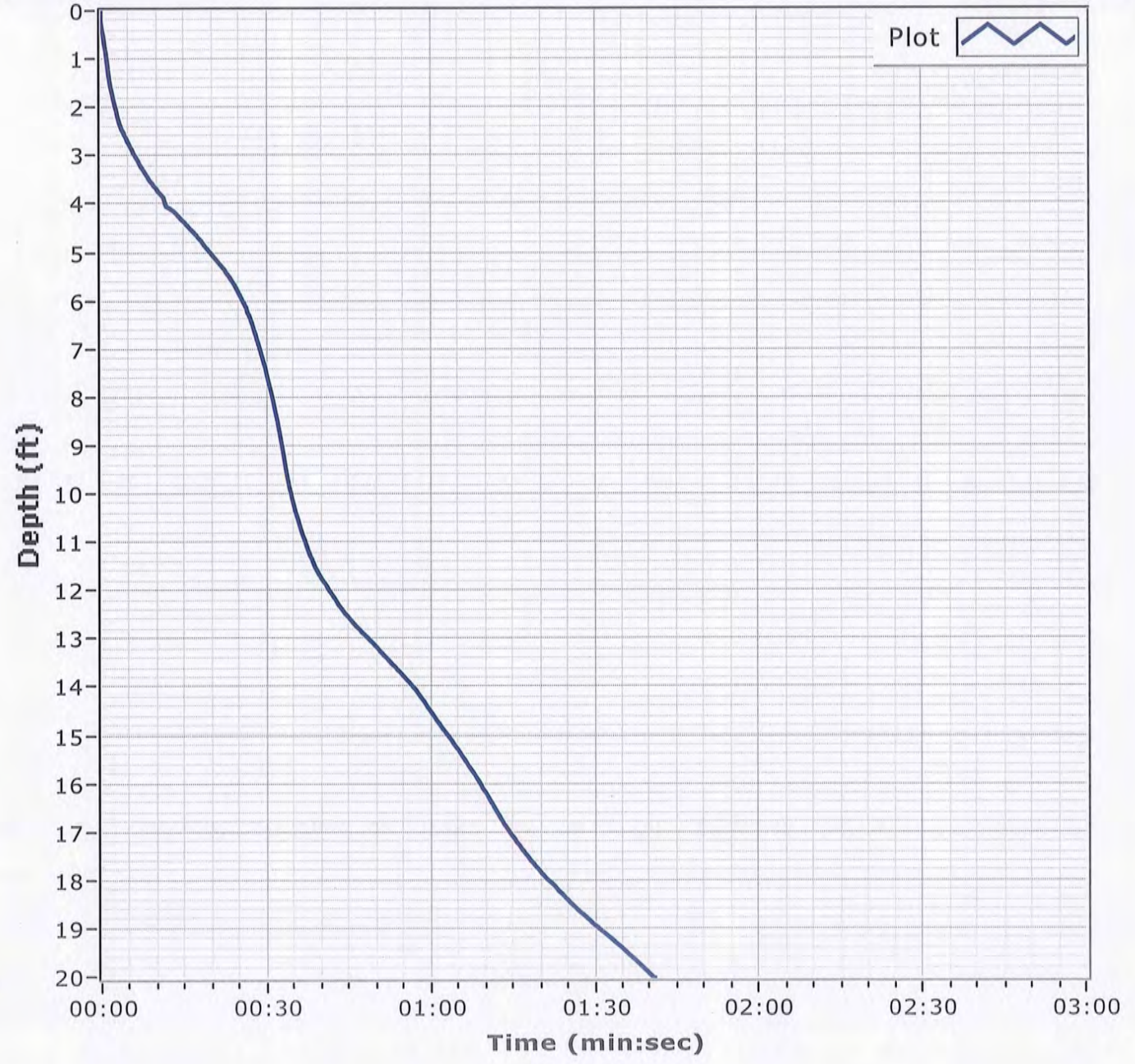
Core Identifier BI-PBS-16-12
Coordinate System
Latitude / Longitude

Date 11/23/2012
Start Time 13:34:56
End Time 13:36:37
Total Time 00:01:41

Water Depth 52.8'
Penetration 20.0'
Recovery 17.8'

Latitude 30 08.149
Longitude 088 20.702

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.9	2.4	15.7	78.6	2.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	99.7		
#4	99.1		
#10	96.7		
#20	92.7		
#40	81.0		
#60	35.8		
#100	6.4		
#140	2.9		
#200	2.4		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6916 D_{85}= 0.5156 D_{60}= 0.3255
D_{50}= 0.2923 D_{30}= 0.2329 D_{15}= 0.1859
D_{10}= 0.1672 C_u= 1.95 C_c= 1.00

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-16-12 A
Sample Number: 6469 (30) **Depth:** 0.0' **Date:** 11/28/12

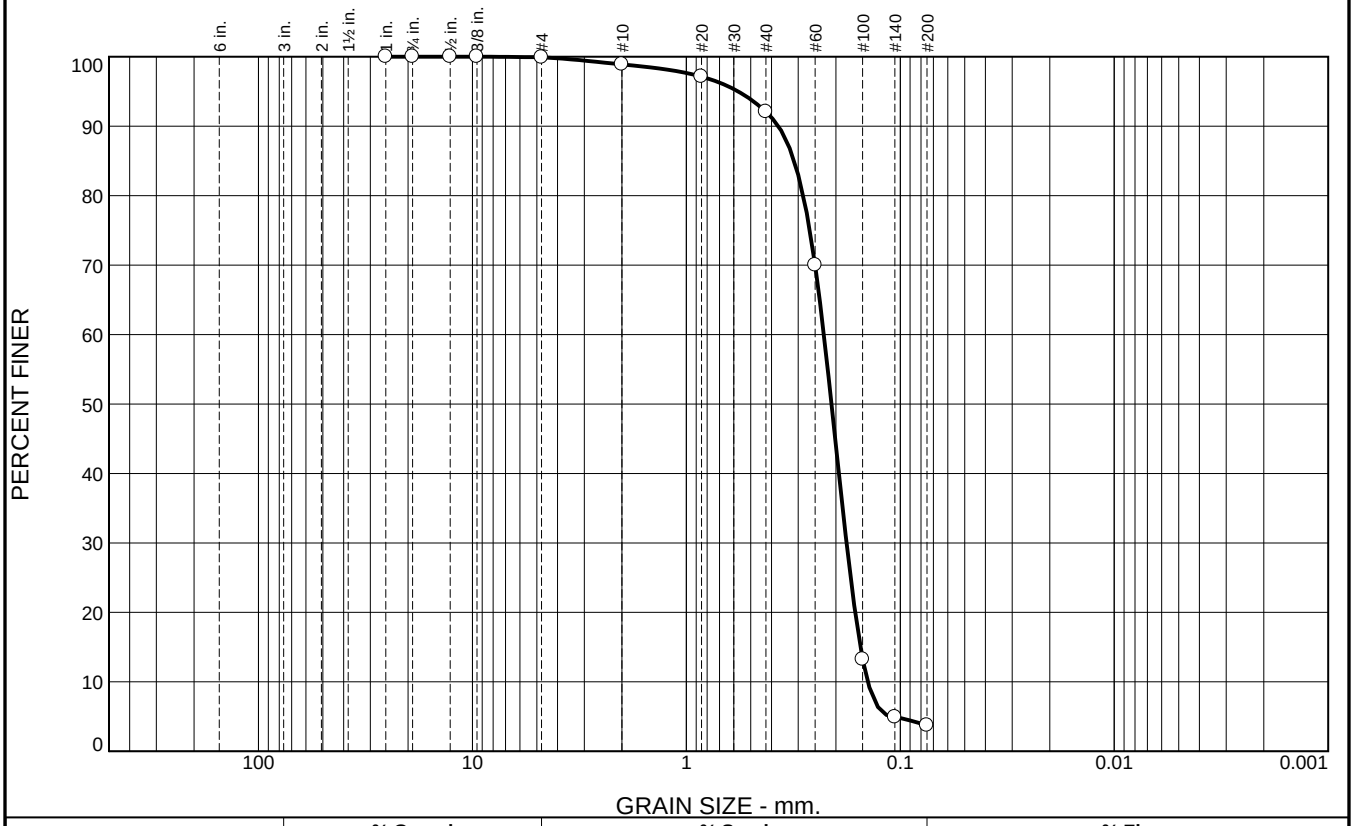
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	1.0	6.8	88.4	3.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.9		
#10	98.9		
#20	97.1		
#40	92.1		
#60	70.0		
#100	13.2		
#140	4.9		
#200	3.7		

* (no specification provided)

Material Description

Fine grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3712 D_{85}= 0.3135 D_{60}= 0.2276
D_{50}= 0.2097 D_{30}= 0.1785 D_{15}= 0.1537
D_{10}= 0.1420 C_u= 1.60 C_c= 0.99

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-16-12 B
Sample Number: 6469 (31) **Depth:** 2.5' **Date:** 11/28/12

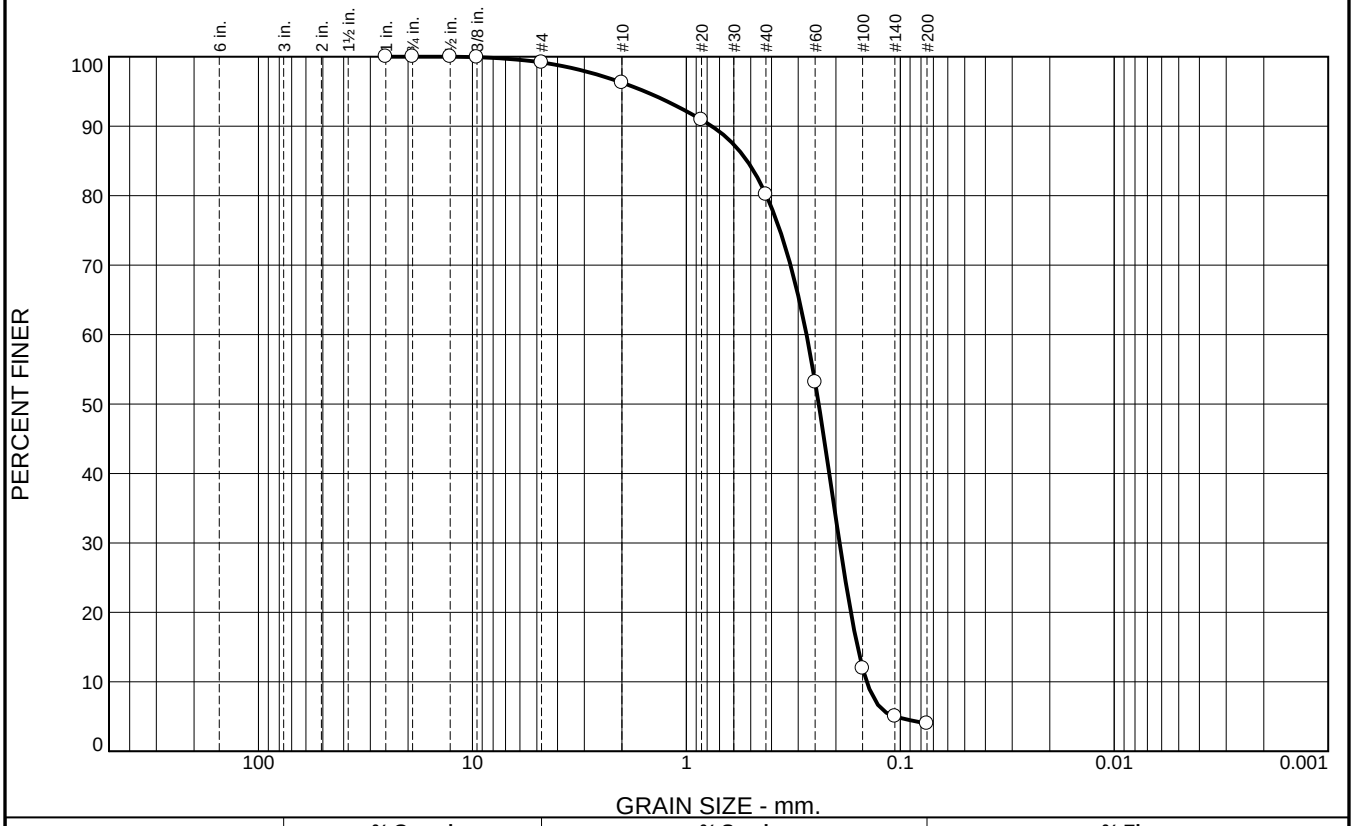
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.8	2.9	16.1	76.2	4.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	99.9		
#4	99.2		
#10	96.3		
#20	90.9		
#40	80.2		
#60	53.1		
#100	11.9		
#140	5.0		
#200	4.0		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.7616 D_{85}= 0.5200 D_{60}= 0.2745
D_{50}= 0.2406 D_{30}= 0.1923 D_{15}= 0.1585
D_{10}= 0.1436 C_u= 1.91 C_c= 0.94

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-16-12 C
Sample Number: 6469 (32) **Depth:** 3.8' **Date:** 11/28/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBS-025-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET / OF
	South Atlantic	Mobile District	SHEET 1 OF 1 SHEETS

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-025-12	LOCATION COORDINATES: E = 1,136,537 N = 233,755	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 49.8 Ft.	
		15. DATE BORING	STARTED: 11-24-12 / COMPLETED: 11-24-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -49.6 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 18.8 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: John Bass, Geotechnical Engineer	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-49.6	0.0				
			SAND, poorly-graded, mostly fine-grained sand-sized quartz, little shell fragments, trace fines, lt. gray (SP)	A	Classification: SP Color: 5Y 7/2-light gray D50: 0.3107 mm % Fines: 1.6
-54.8	5.2				
			SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace fines, trace shell fragments, lt. gray (SP)	B	Classification: SP-SM Color: 5Y 6/1-gray D50: 0.3415 mm % Fines: 5.7
-56.2	6.6				
-58.0	8.4		SAND, silty, mostly fine-grained sand-sized quartz, with clay lenses, gray mottled with lt. gray and orange (SM)		
			CLAY, lean, mostly clay, little fine-grained sand-sized quartz, gray mottled with lt. gray and orange (CL)	NS	
-63.0	13.4				
			SAND, poorly-graded with silt, mostly fine-grained sand-sized quartz, little silt, trace shell fragments, gray to light gray (SP-SM)	C	Classification: SP-SM Color: 2.5Y 6/2-light brownish gray D50: 0.2548 mm % Fines: 12.3
-65.3	15.7				
-66.3	16.7		SAND, silty, mostly fine-grained sand-sized quartz, some silt, trace shell fragments, silt content increases with depth, gray (SM)	NS	
-68.4	18.8		CLAY, silty, mostly silt, some clay, little fine-grained sand-sized quartz, gray (CL-ML)		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.14190° Long = -88.35155°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE SERVICES

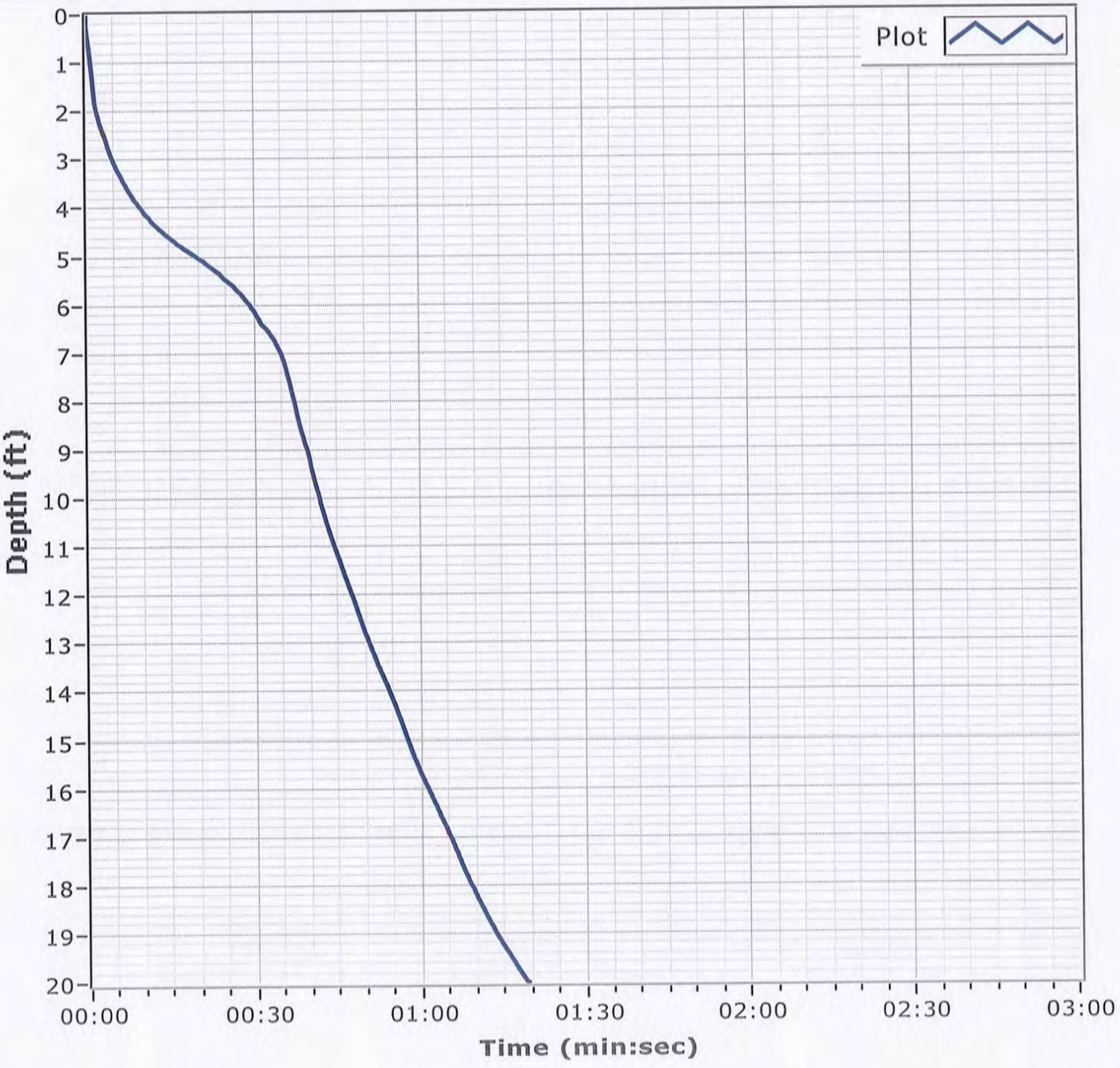
Core Identifier BI-PBS-25-12
Coordinate System
Latitude / Longitude

Date 11/24/2012
Start Time 11:24:42
End Time 11:26:02
Total Time 00:01:19

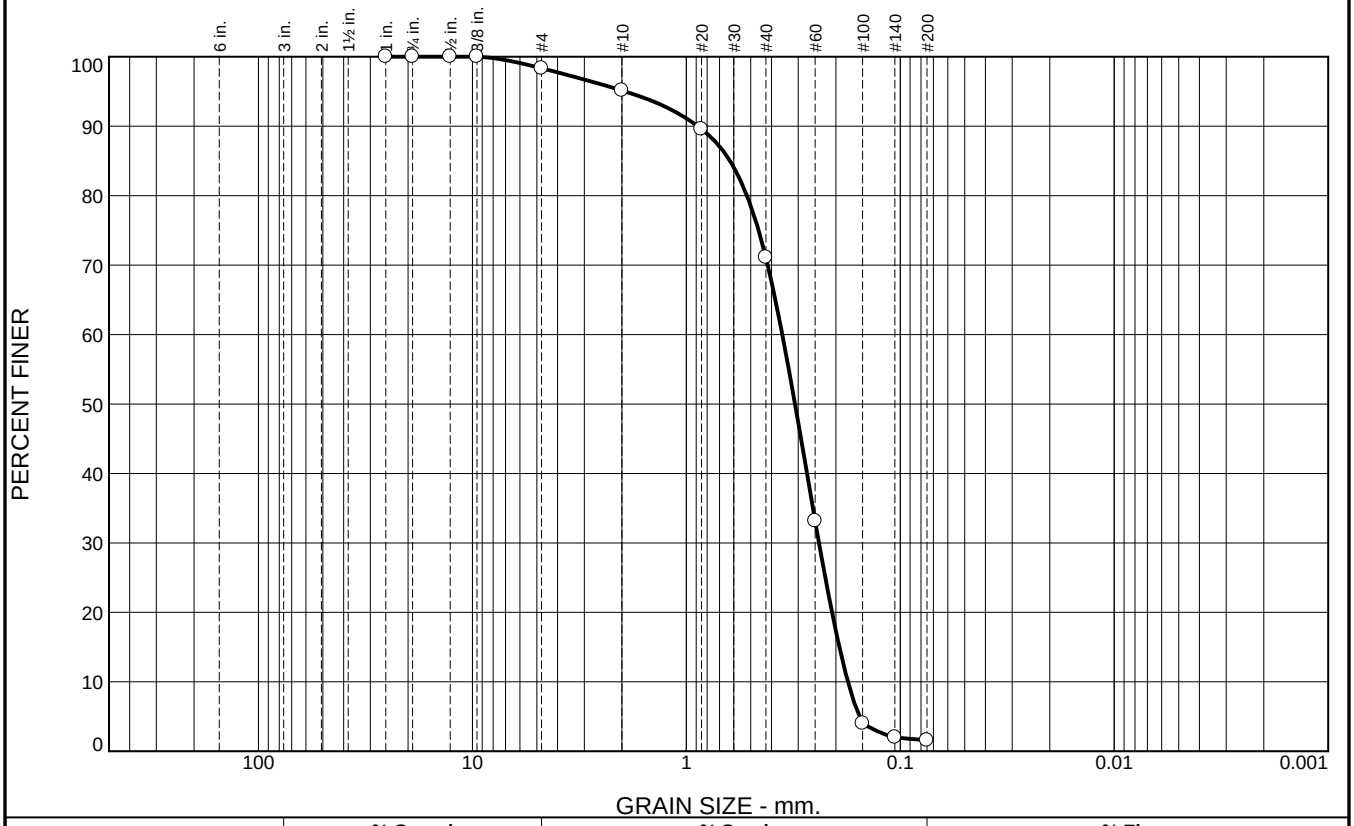
Water Depth 49.8'
Penetration 20.0'
Recovery 18.8'

Latitude 30 08.514
Longitude 088 21.093

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.7	3.2	24.0	69.5	1.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	98.3		
#10	95.1		
#20	89.6		
#40	71.1		
#60	33.2		
#100	4.0		
#140	2.0		
#200	1.6		

* (no specification provided)

Material Description

Fine to medium grained, SAND, with trace SHELL

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.8852 D_{85}= 0.6249 D_{60}= 0.3560
D_{50}= 0.3107 D_{30}= 0.2398 D_{15}= 0.1927
D_{10}= 0.1759 C_u= 2.02 C_c= 0.92

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-25-12 A
Sample Number: 6469 (40) **Depth:** 0.0' **Date:** 11/28/12

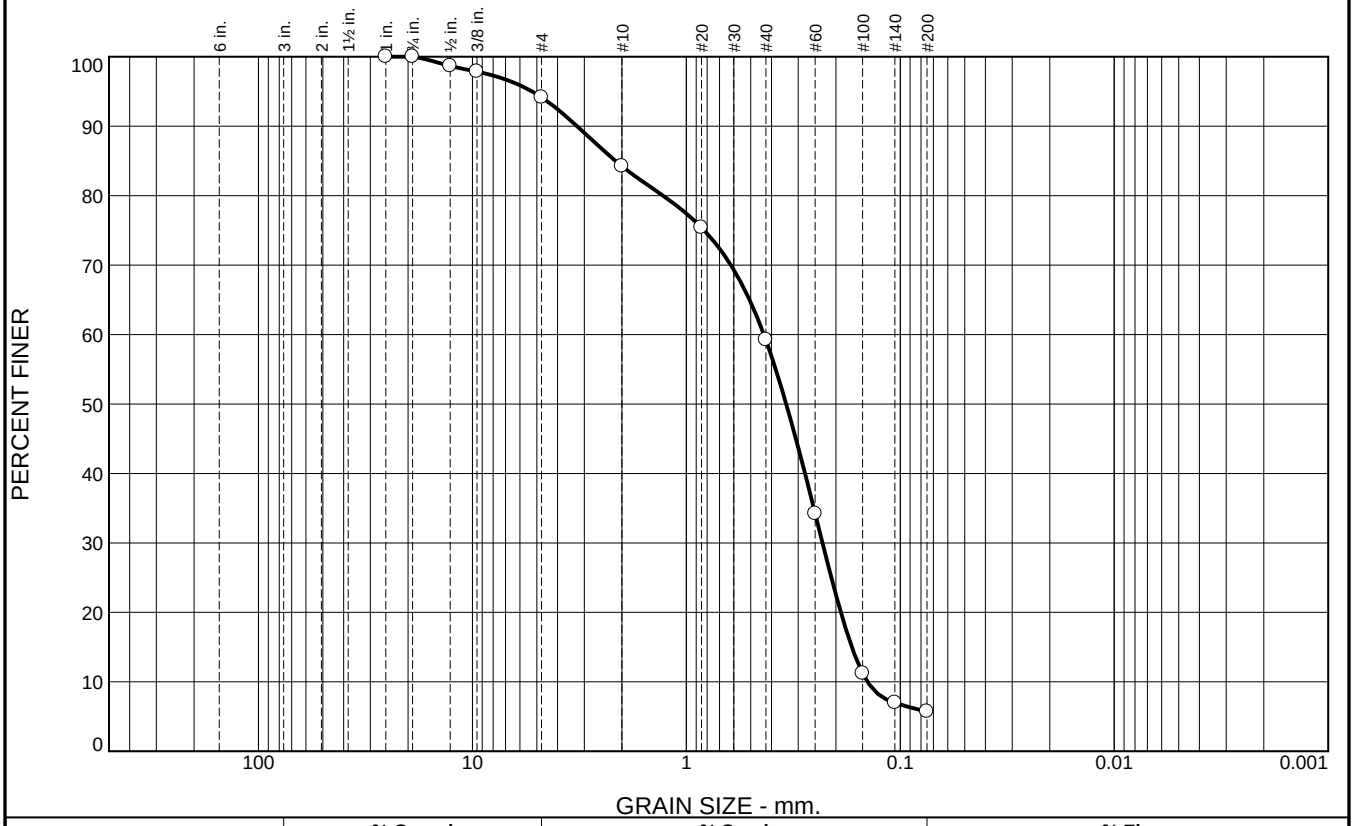
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	5.9	9.9	25.0	53.5	5.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	98.7		
.375	97.9		
#4	94.1		
#10	84.2		
#20	75.4		
#40	59.2		
#60	34.2		
#100	11.2		
#140	7.0		
#200	5.7		

* (no specification provided)

Material Description

Fine to medium grained, SLIGHTLY SILTY SAND, with trace SHELL

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 3.2439 D_{85}= 2.1444 D_{60}= 0.4341
D_{50}= 0.3415 D_{30}= 0.2310 D_{15}= 0.1686
D_{10}= 0.1423 C_u= 3.05 C_c= 0.86

Classification

USCS= SP-SM AASHTO=

Remarks

Location: BI-PBS-25-12 B
Sample Number: 6469 (41) **Depth:** 5.2' **Date:** 11/28/12

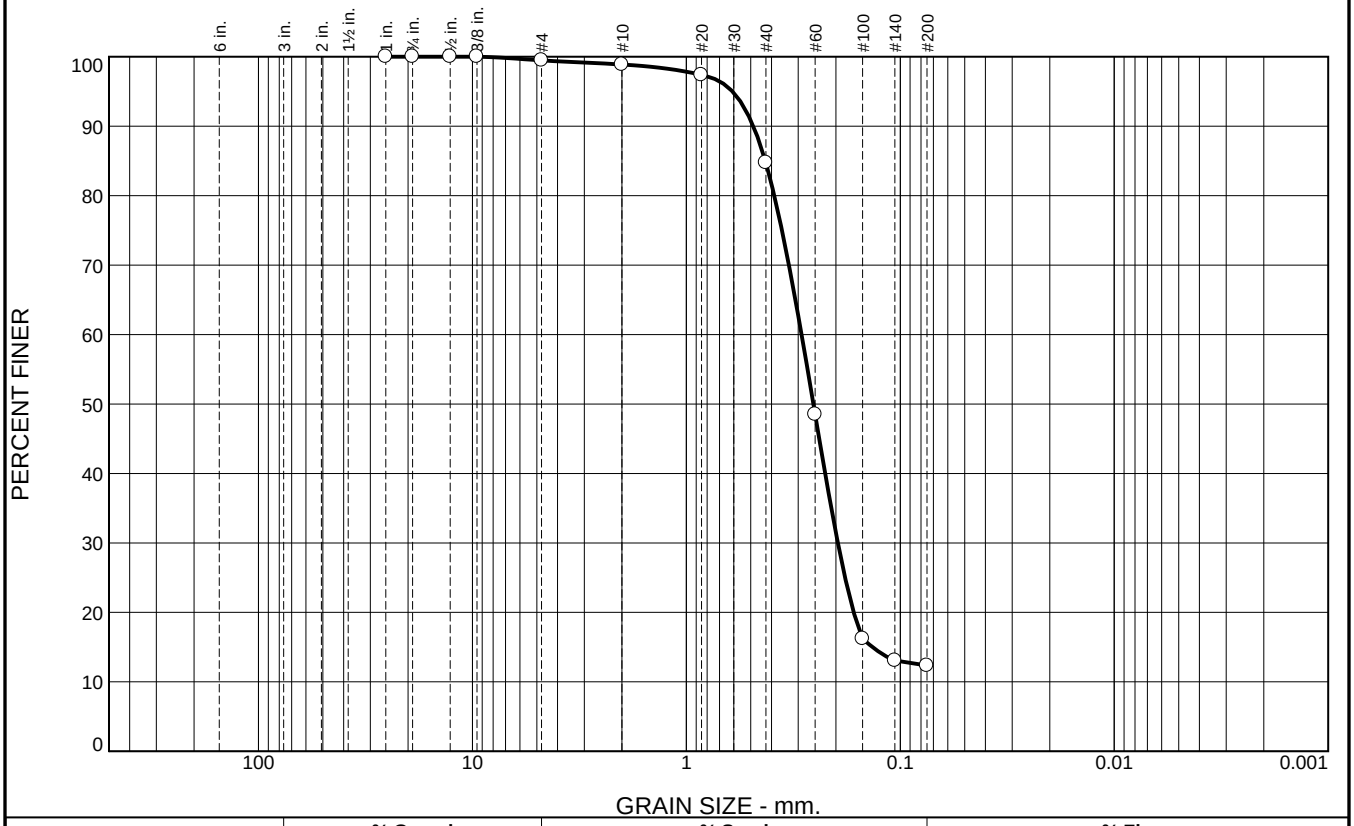
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.5	0.6	14.2	72.4	12.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.5		
#10	98.9		
#20	97.4		
#40	84.7		
#60	48.5		
#100	16.2		
#140	13.1		
#200	12.3		

* (no specification provided)

Material Description

Fine to medium grained, SLIGHTLY SILTY SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4865 D_{85}= 0.4275 D_{60}= 0.2895
D_{50}= 0.2548 D_{30}= 0.1959 D_{15}= 0.1349
D_{10}= C_u= C_c=

Classification

USCS= SP-SM AASHTO=

Remarks

Location: BI-PBS-25-12 C
Sample Number: 6469 (42) **Depth:** 13.4' **Date:** 11/28/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBS-047-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 1 SHEETS
	South Atlantic	Mobile District	

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-047-12	LOCATION COORDINATES: E = 1,133,067 N = 234,413	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 48.4 Ft.	
		15. DATE BORING	STARTED: 11-28-12 / COMPLETED: 11-28-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -49.2 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 16.9 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Mike FitzHarris, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-49.2	0.0				
			SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace shell fragments, gray (SP)	A	Classification: SP Color: 5Y 7/2-light gray D50: 0.2838 mm % Fines: 1.7
-52.9	3.7				
			SAND, poorly-graded with silt, mostly fine-grained sand-sized quartz, few silt, trace clay, trace shell fragments, gray (SP-SM)	B	Classification: SP Color: 5Y 6/2-light olive gray D50: 0.2135 mm % Fines: 0.2
-54.8	5.6				
			SAND, poorly-graded with clay, mostly fine-grained sand-sized quartz, few clay, trace silt, trace shell fragments, gray (SP-SC)	NS	
-57.7	8.5				
			CLAY, fat, mostly clay, trace shell fragments, trace wood debris, trace fine grain sand lenses, soft to moderately hard, med. to high plasticity, gray mottled with brown and greenish gray (CH)		
-62.7	13.5				
			SAND, clayey, mostly fine-grained sand-sized quartz, some clay, trace shell fragments, sandy lense at 15.0', gray (SC)		
-64.7	15.5				
			CLAY, fat, mostly clay, trace wood debris, trace shell fragments, medium to high plasticity, gray (CH)		
-66.1	16.9				

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.14375° Long = -88.36252°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE SERVICES

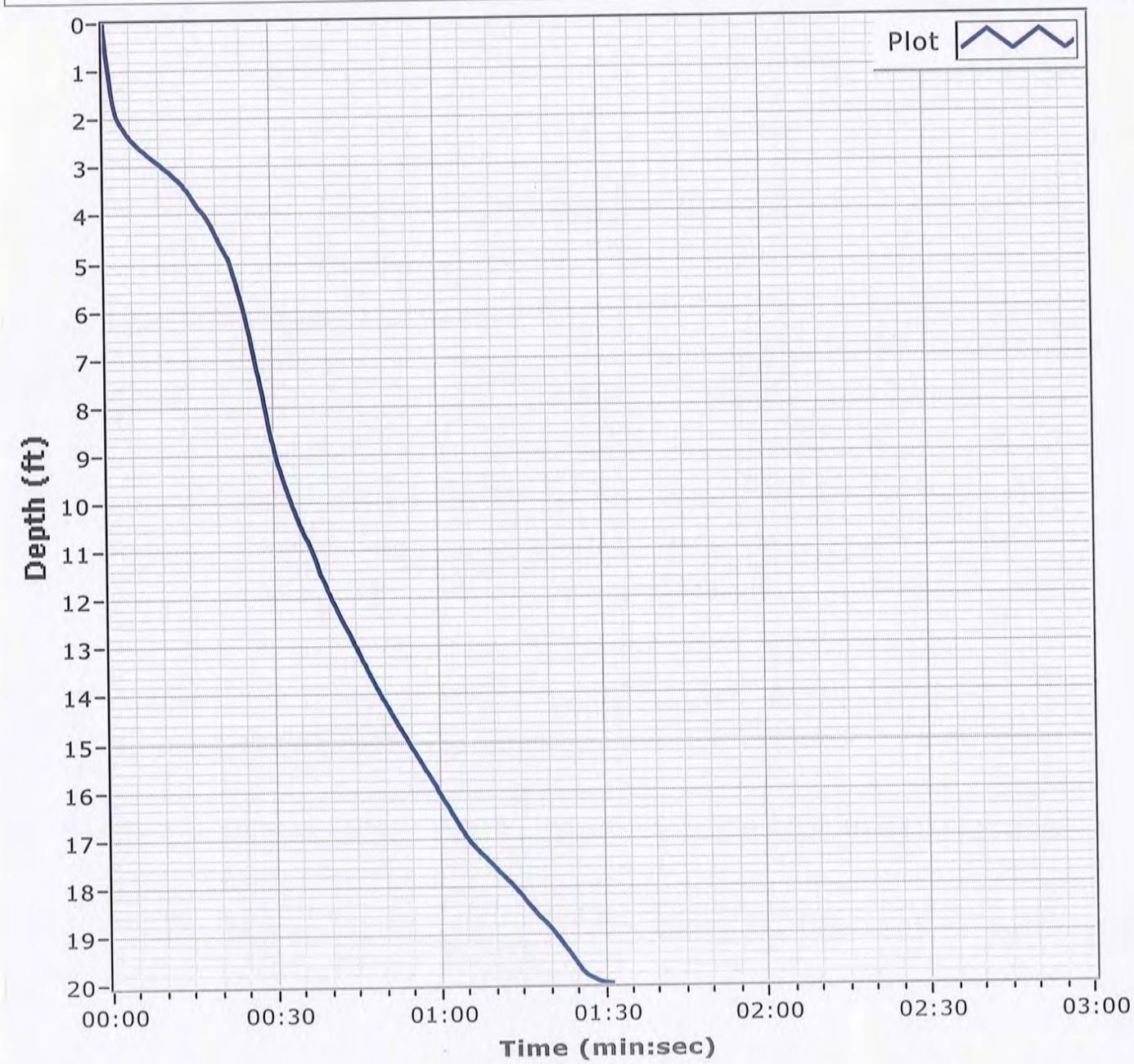
Core Identifier BI-PBS-47-12
Coordinate System Latitude / Longitude

Latitude 30 08.635
Longitude 088 21.751

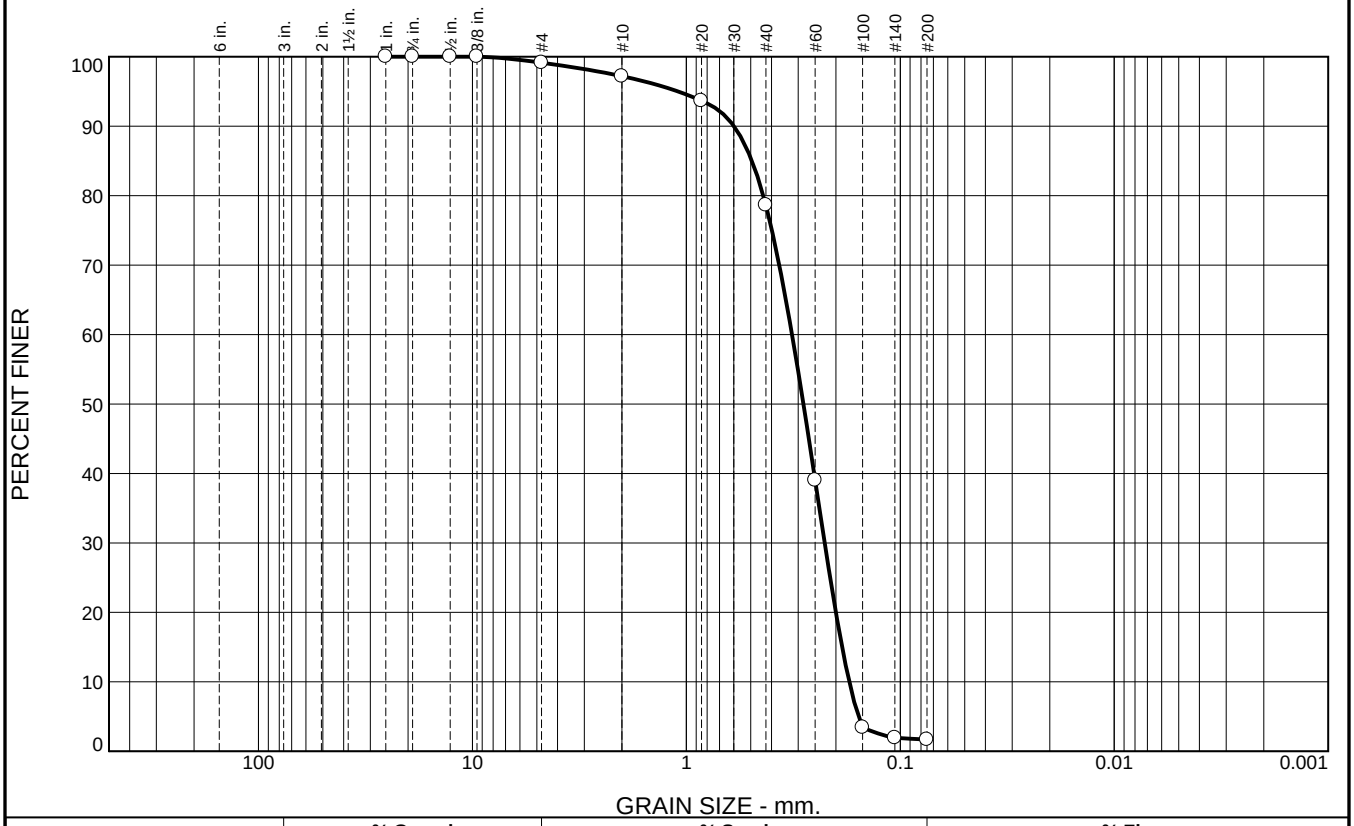
Date 11/28/2012
Start Time 14:21:09
End Time 14:22:41
Total Time 00:01:31

Water Depth 48.4'
Penetration 20.0'
Recovery 16.9'

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.9	1.9	18.6	76.9	1.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.1		
#10	97.2		
#20	93.7		
#40	78.6		
#60	39.0		
#100	3.4		
#140	1.9		
#200	1.7		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5990 D_{85}= 0.4938 D_{60}= 0.3207
D_{50}= 0.2838 D_{30}= 0.2256 D_{15}= 0.1871
D_{10}= 0.1734 C_u= 1.85 C_c= 0.92

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-47-12 A
Sample Number: 6471 (19) **Depth:** 0.0' **Date:** 12/03/12

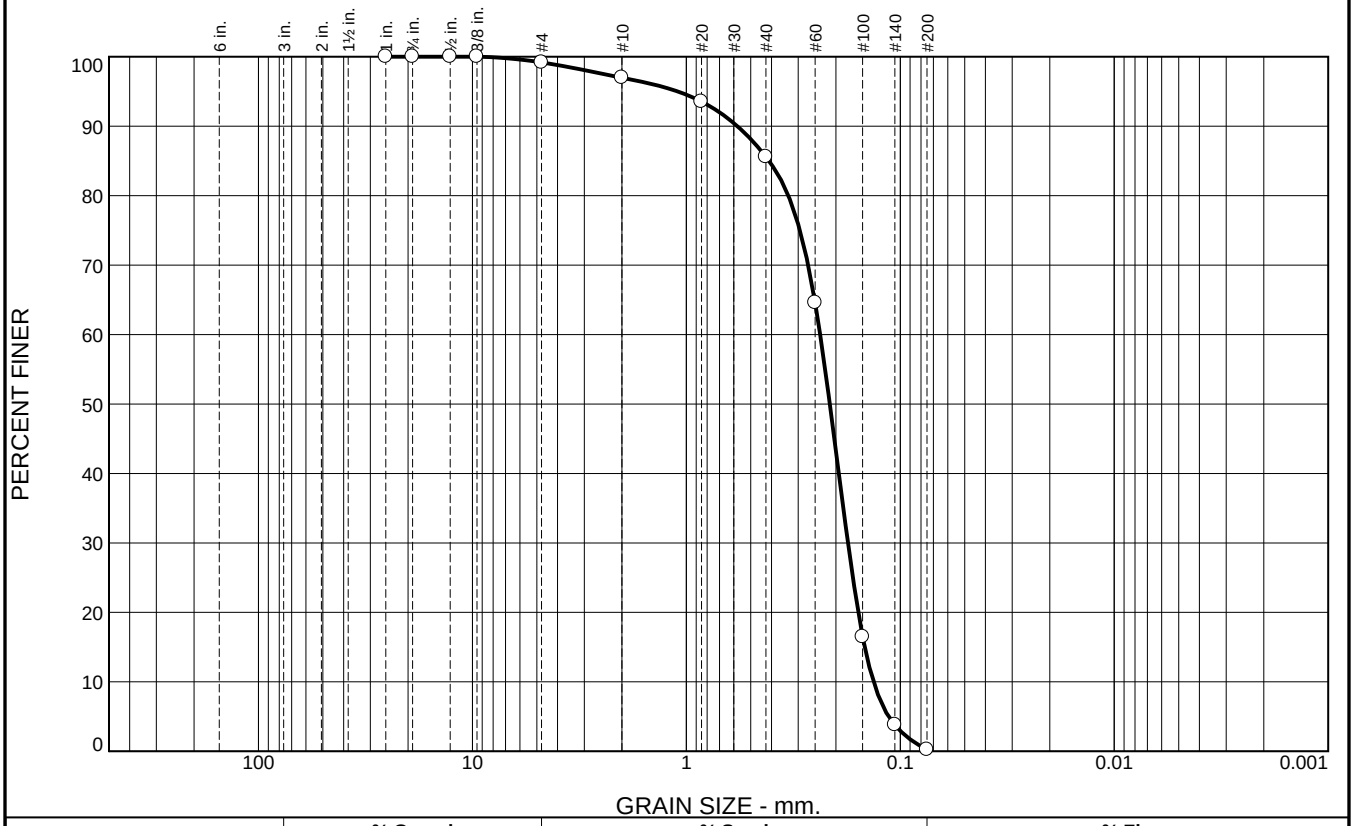
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.8	2.2	11.4	85.4	0.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.2		
#10	97.0		
#20	93.5		
#40	85.6		
#60	64.6		
#100	16.5		
#140	3.8		
#200	0.2		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5779 D_{85}= 0.4111 D_{60}= 0.2368
D_{50}= 0.2135 D_{30}= 0.1757 D_{15}= 0.1467
D_{10}= 0.1334 C_u= 1.77 C_c= 0.98

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-47-12 B
Sample Number: 6471 (20) **Depth:** 3.7' **Date:** 12/03/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBS-048-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET / OF SHEETS
	South Atlantic	Mobile District	SHEET 1 OF 1 SHEETS

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-048-12	LOCATION COORDINATES: E = 1,134,712 N = 233,995	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 48.1 Ft.	
		15. DATE BORING	STARTED: 11-28-12 / COMPLETED: 11-28-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -50.7 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 18.4 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Mike FitzHarris, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-50.7	0.0				
-52.0	1.3		SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, little shell fragments, trace silt, gray (SP)	A	Classification: SP Color: 5Y 7/2-light gray D50: 0.5146 mm % Fines: 1.7
-54.6	3.9		SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace shell fragments, gray (SP)	B	Classification: SP Color: 5Y 6/2-light olive gray D50: 0.2246 mm % Fines: 0.4
-57.0	6.3		SAND, silty, mostly fine-grained sand-sized quartz, some silt, trace clay, trace shell fragments, gray (SM)	C	Classification: SM Color: 5Y 5/2-olive gray D50: 0.1863 mm % Fines: 14.9
-66.0	15.3		SAND, clayey, mostly fine-grained sand-sized quartz, some clay, alternating bands of clayey sand and sandy clay, greenish gray (SC) At El. -61.1 Ft., mostly fine-grained sand-sized quartz, some clay, trace shells, trace wood debris, gray	NS	
-69.1	18.4		CLAY, lean, mostly clay, trace fine-grained sand-sized quartz, trace wood debris, moderately stiff, gray (CL)		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.14258° Long = -88.35732°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
SERVICES

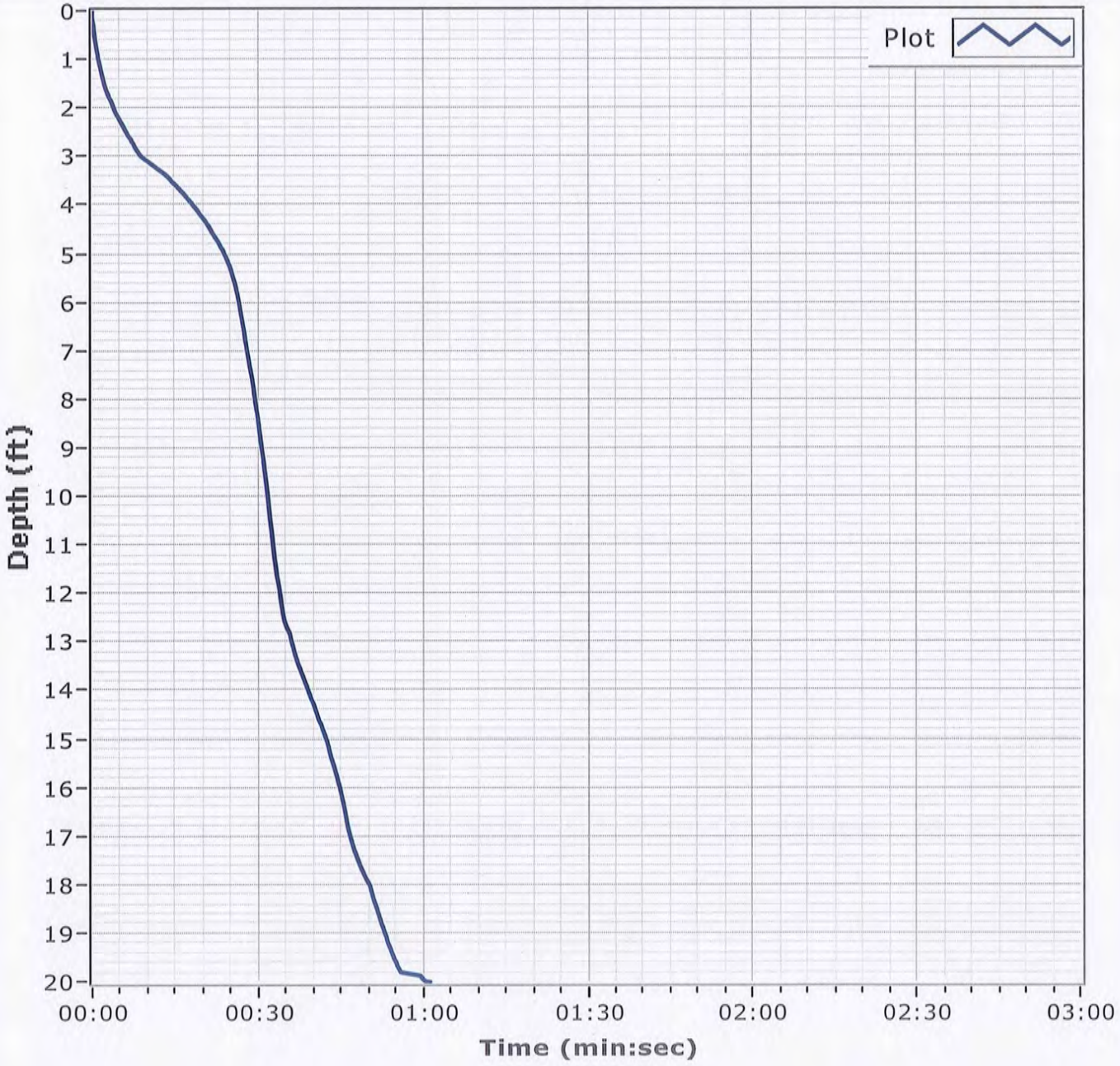
Core Identifier BI-PBS-48-12
Coordinate System
Latitude / Longitude

Latitude 30 08.555
Longitude 088 21.439

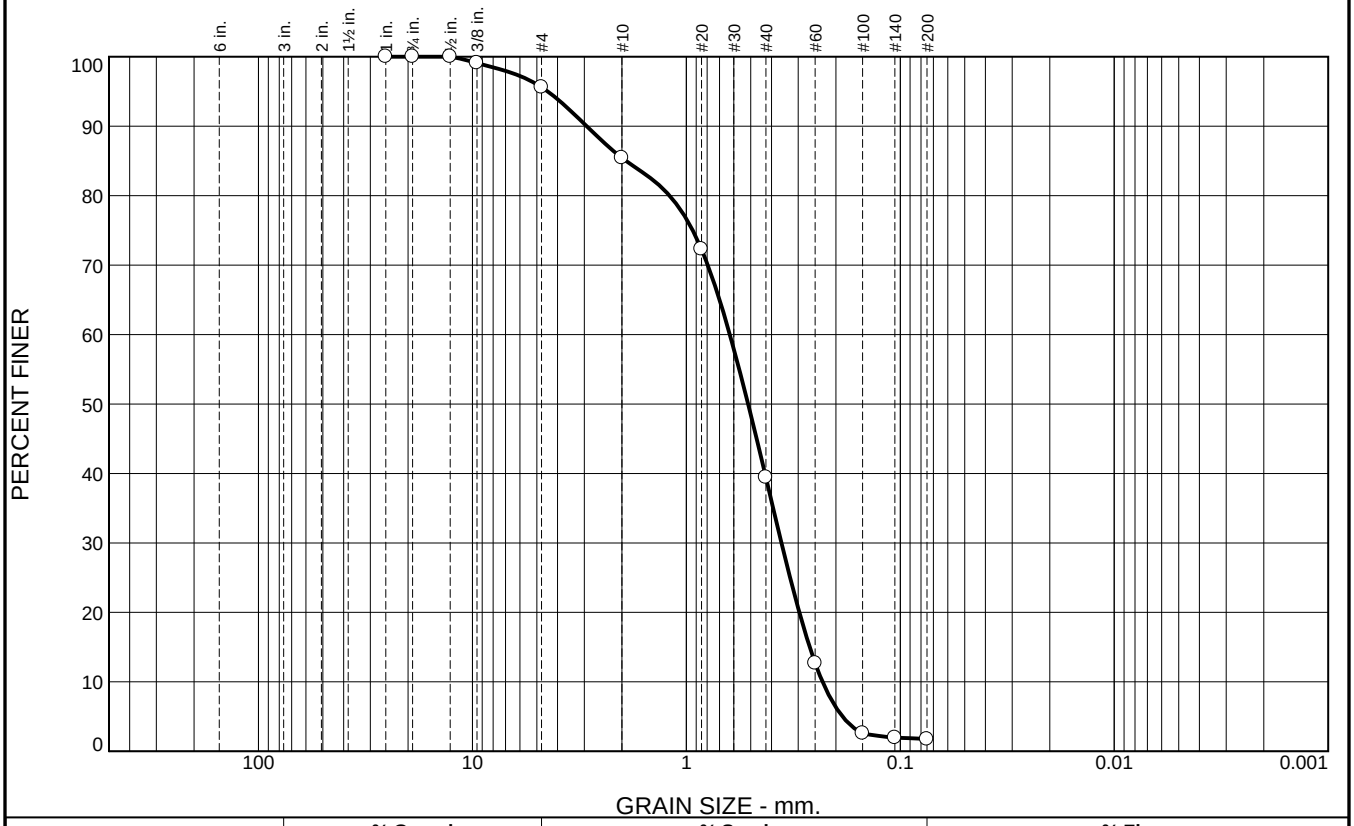
Date 11/28/2012
Start Time 11:20:50
End Time 11:21:52
Total Time 00:01:01

Water Depth 48.1'
Penetration 20.0'
Recovery 18.4'

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.4	10.2	46.0	37.7	1.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	99.1		
#4	95.6		
#10	85.4		
#20	72.3		
#40	39.4		
#60	12.7		
#100	2.6		
#140	1.9		
#200	1.7		

* (no specification provided)

Material Description

Fine to coarse grained, SAND, with trace SHELL

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 2.9235 D_{85}= 1.9142 D_{60}= 0.6265
D_{50}= 0.5146 D_{30}= 0.3592 D_{15}= 0.2653
D_{10}= 0.2309 C_u= 2.71 C_c= 0.89

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-48-12 A
Sample Number: 6471 (21) **Depth:** 0.0' **Date:** 12/03/12

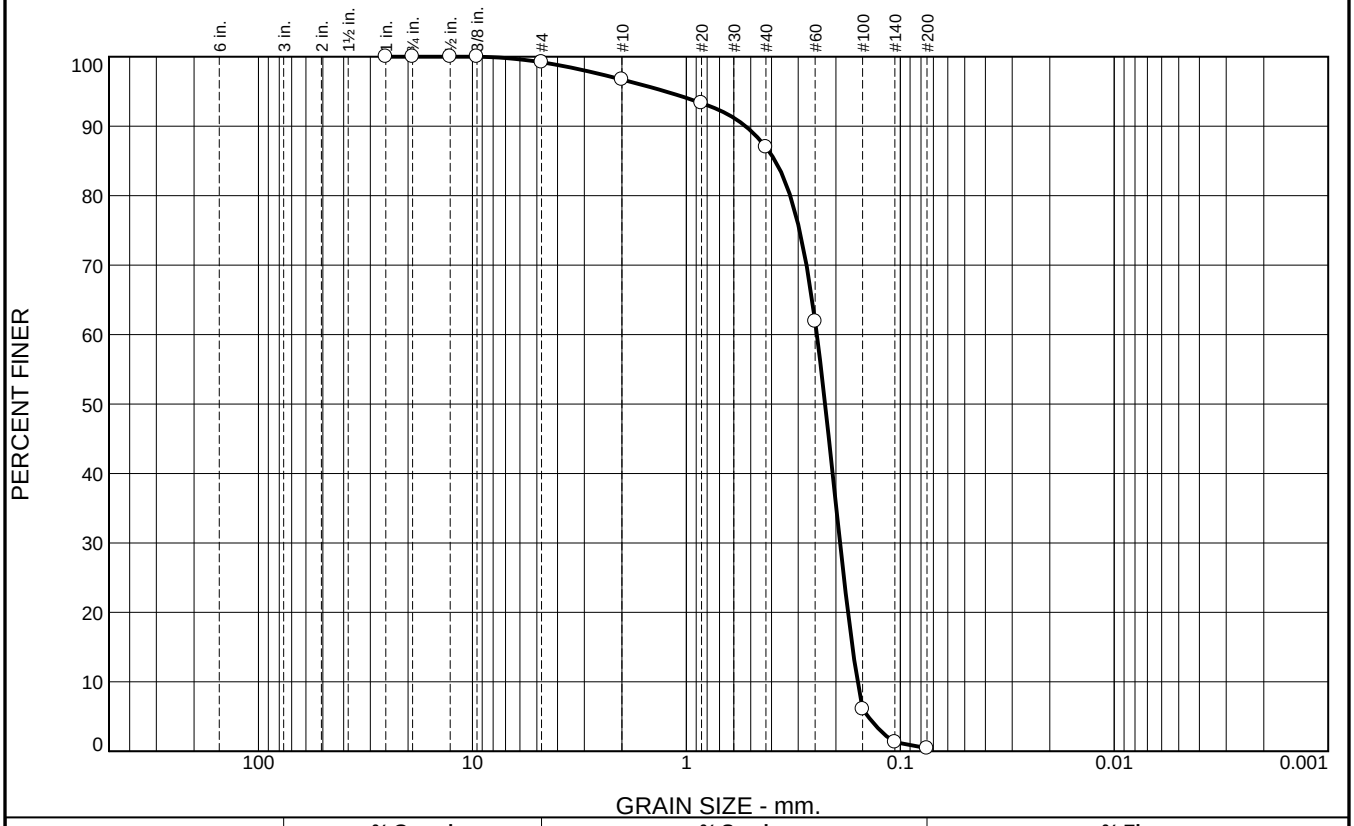
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.8	2.5	9.7	86.6	0.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.2		
#10	96.7		
#20	93.3		
#40	87.0		
#60	61.9		
#100	6.1		
#140	1.3		
#200	0.4		

* (no specification provided)

Material Description

Fine grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5290 D_{85}= 0.3840 D_{60}= 0.2453
D_{50}= 0.2246 D_{30}= 0.1913 D_{15}= 0.1675
D_{10}= 0.1585 C_u= 1.55 C_c= 0.94

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-48-12 B
Sample Number: 6471 (22) **Depth:** 1.3' **Date:** 12/03/12

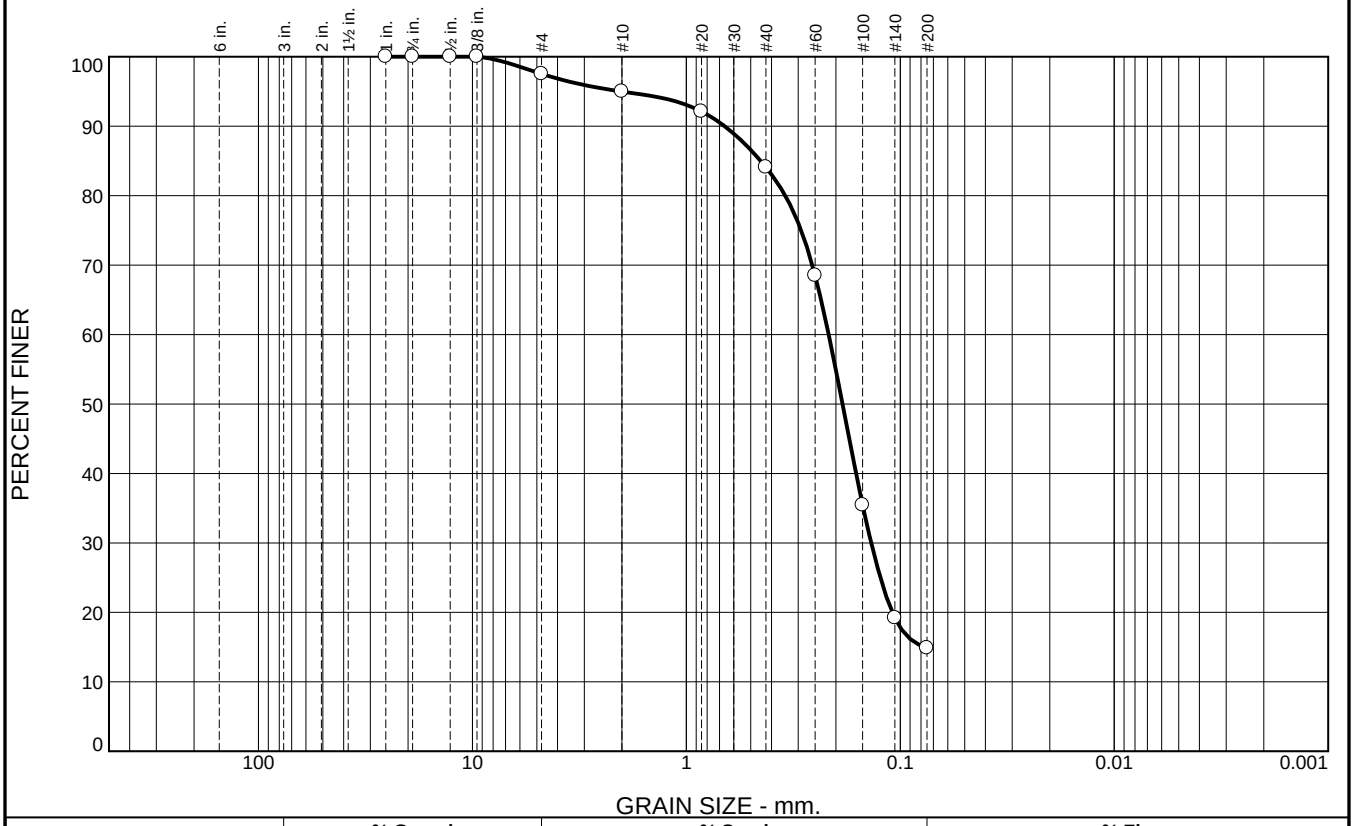
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.5	2.5	10.9	69.2	14.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	97.5		
#10	95.0		
#20	92.1		
#40	84.1		
#60	68.5		
#100	35.4		
#140	19.2		
#200	14.9		

* (no specification provided)

Material Description

Fine to medium grained, SILTY SAND, with trace SHELL

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6631 D_{85}= 0.4502 D_{60}= 0.2161
D_{50}= 0.1863 D_{30}= 0.1368 D_{15}= 0.0769
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

Location: BI-PBS-48-12 C
Sample Number: 6471 (23) **Depth:** 3.9' **Date:** 12/03/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBS-049-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET / OF
	South Atlantic	Mobile District	1 OF 1 SHEETS

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-049-12	LOCATION COORDINATES: E = 1,131,364 N = 236,432	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 50.6 Ft.	
		15. DATE BORING	STARTED: 11-28-12 / COMPLETED: 11-28-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -50.6 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 19.2 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Mike FitzHarris, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-50.6	0.0				
-54.8	4.2		SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace shell fragments, gray (SP)	A	Classification: SP Color: 5Y 7/2-light gray D50: 0.2387 mm % Fines: 3.6
-56.5	5.9		SAND, silty, mostly fine-grained sand-sized quartz, some silt, trace shell fragments, wood fragments at 4.3', gray (SM)		
-59.3	8.7		CLAY, lean, mostly clay, some fine-grained sand-sized quartz, trace wood debris, gray (CL)		
-61.3	10.7		SAND, clayey, mostly fine-grained sand-sized quartz, some clay, trace wood debris, gray (SC)		
-65.8	15.2		CLAY, fat, mostly clay, trace fine-grained sand-sized quartz, trace shell fragments, gray (CH)	NS	
-69.8	19.2		SAND, clayey, mostly fine-grained sand-sized quartz, some clay, trace shell fragments, trace wood debris, gray (SC)		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.14932° Long = -88.36788°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
S E R V I C E S

Core Identifier BI-PBS-49-12

Coordinate System
Latitude / Longitude

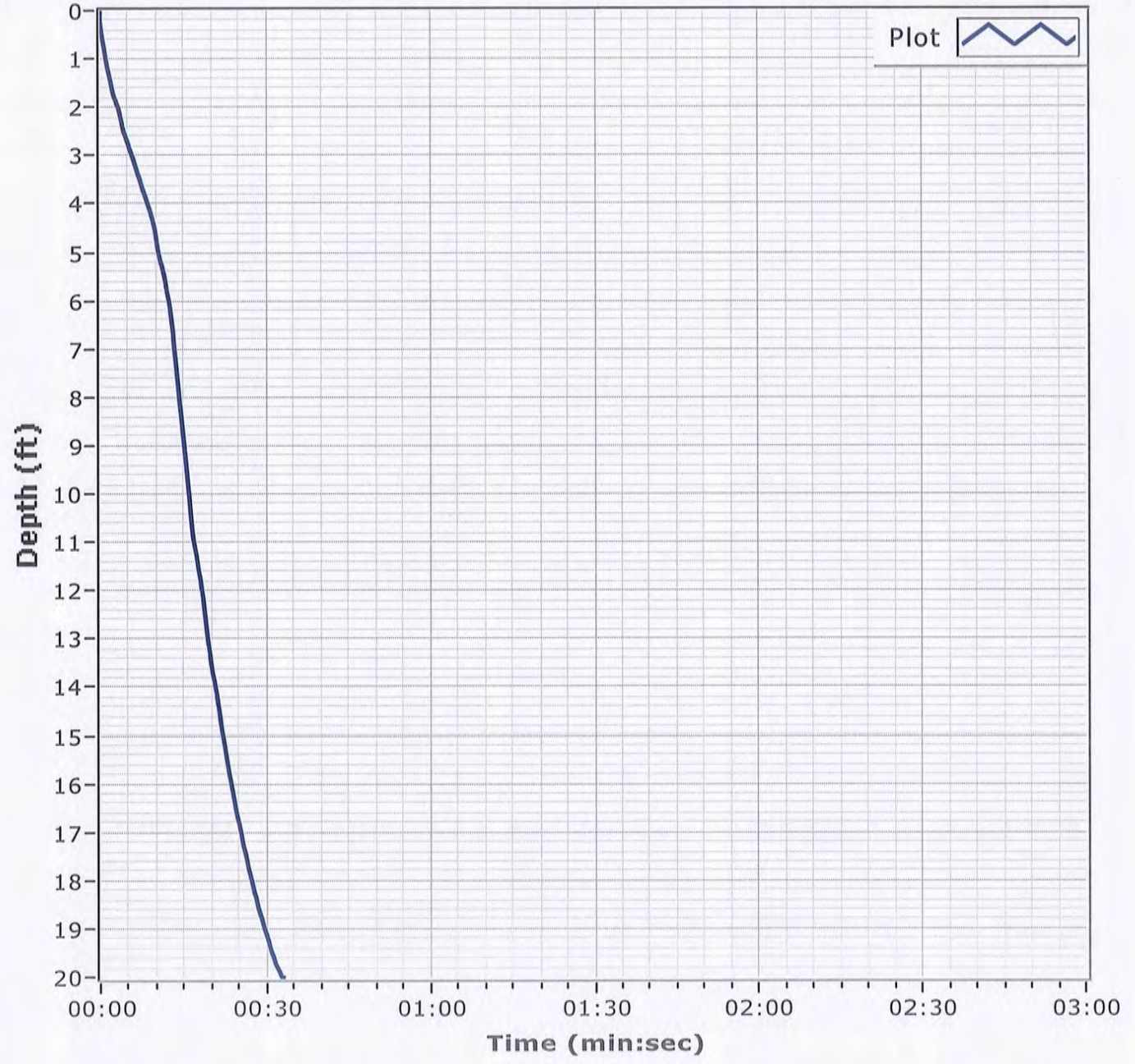
Latitude 30 08.959

Longitude 088 22.073

Date 11/28/2012
Start Time 15:43:56
End Time 15:44:29
Total Time 00:00:33

Water Depth 50.6'
Penetration 20.0'
Recovery 19.2'

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.6	1.8	10.2	83.8	3.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.4		
#10	97.6		
#20	94.9		
#40	87.4		
#60	54.6		
#100	7.1		
#140	4.3		
#200	3.6		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4671 D_{85}= 0.3966 D_{60}= 0.2649
D_{50}= 0.2387 D_{30}= 0.1982 D_{15}= 0.1695
D_{10}= 0.1583 C_u= 1.67 C_c= 0.94

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-49-12 A
Sample Number: 6471 (24) **Depth:** 0.0' **Date:** 12/03/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBS-050-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 1 SHEETS
	South Atlantic	Mobile District	

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-050-12	LOCATION COORDINATES: E = 1,132,205 N = 235,628	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL	BEARING	14. WATER DEPTH: 48.7 Ft.
		15. DATE BORING	STARTED: 11-28-12 / COMPLETED: 11-28-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -48.4 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 18.9 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Mike FitzHarris, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-48.4	0.0				
			SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace shell fragments, gray (SP)	A	Classification: SP Color: 5Y 7/2-light gray D50: 0.2669 mm % Fines: 3.3
-53.4	5.0				
-54.7	6.3		SAND, poorly-graded with clay, mostly fine-grained sand-sized quartz, few clay, trace shell fragments, gray (SP-SC)	B	Classification: SP-SM Color: 5Y 6/2-light olive gray D50: 0.2078 mm % Fines: 11.4
-56.4	8.0		SAND, clayey, mostly fine-grained sand-sized quartz, some clay, trace shell fragments, gray (SC)		
			CLAY, fat, mostly clay, trace shell fragments, trace wood debris, intermittent lenses of sandy clay, gray (CH)	NS	
-67.3	18.9				
			NOTES: 1. Soils are field visually classified in accordance with the Unified Soils Classification System. 2. NS = Sample not submitted for laboratory analysis from this interval. 3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.		

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.14710° Long = -88.36523°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE SERVICES

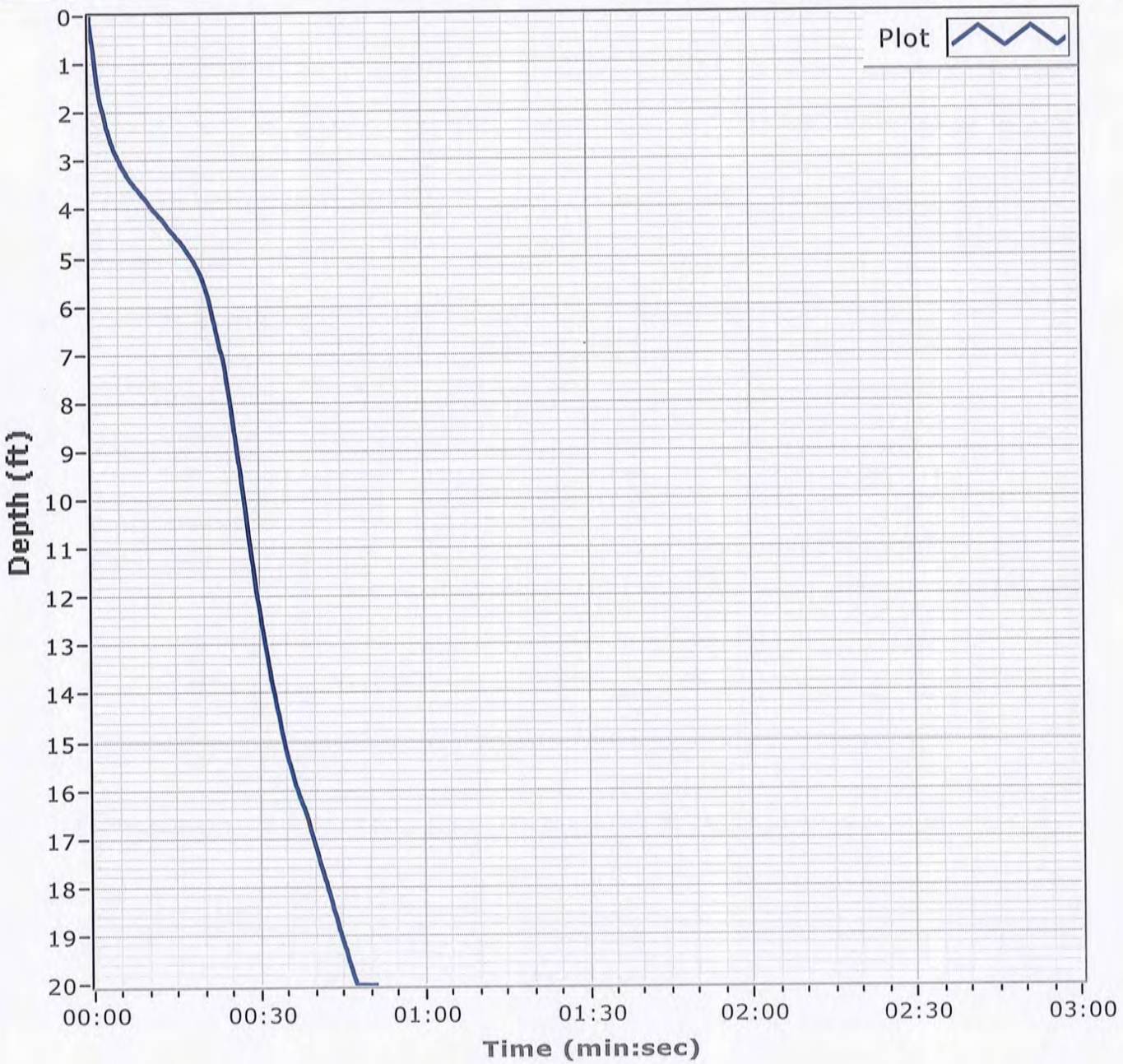
Core Identifier BI-PBS-50-12
Coordinate System Latitude / Longitude

Latitude 30 08.826
Longitude 088 21.914

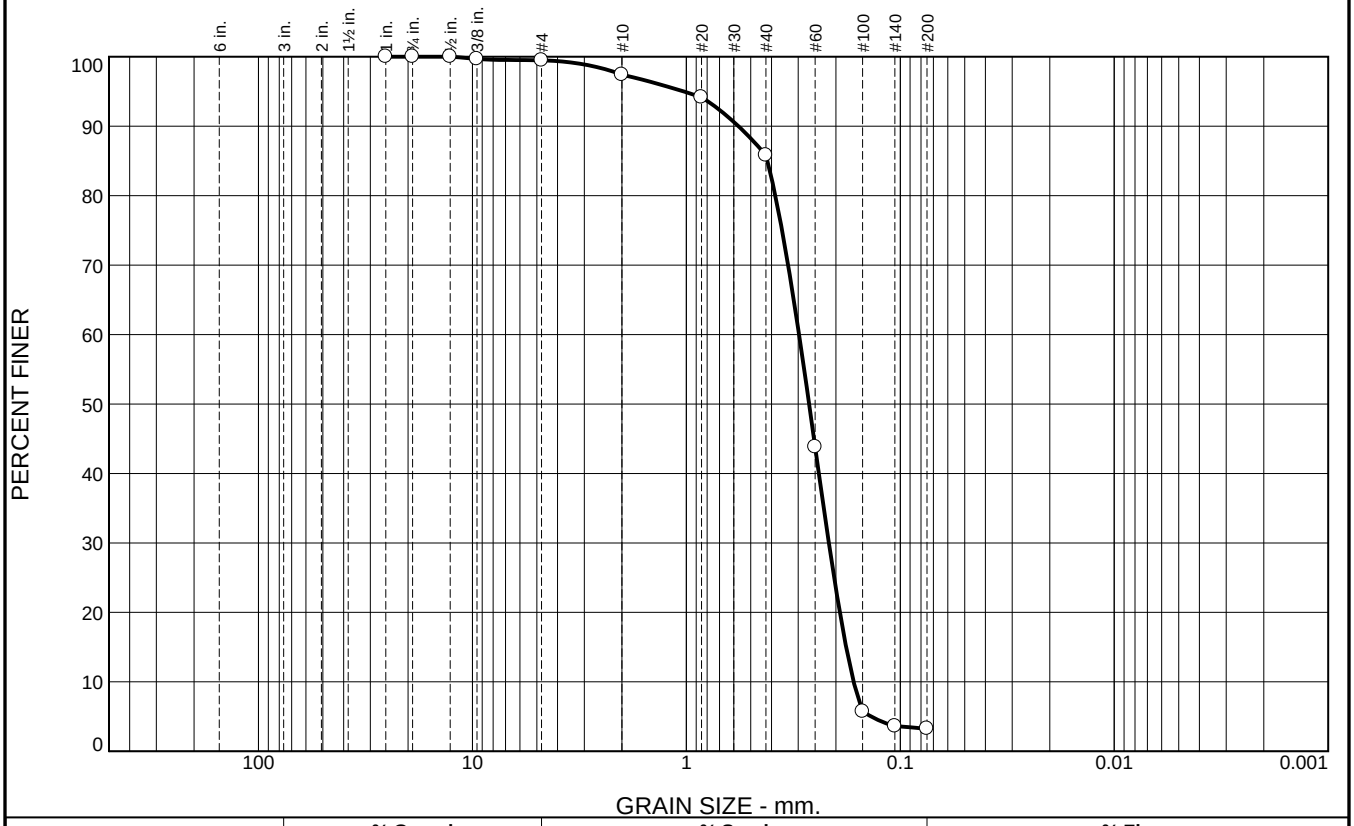
Date 11/28/2012
Start Time 15:02:32
End Time 15:03:23
Total Time 00:00:51

Water Depth 48.7'
Penetration 20.0'
Recovery 18.9'

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.5	2.1	11.6	82.5	3.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	99.7		
#4	99.5		
#10	97.4		
#20	94.2		
#40	85.8		
#60	43.8		
#100	5.7		
#140	3.6		
#200	3.3		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5711 D_{85}= 0.4181 D_{60}= 0.2975
D_{50}= 0.2669 D_{30}= 0.2157 D_{15}= 0.1792
D_{10}= 0.1653 C_u= 1.80 C_c= 0.95

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-50-12 A
Sample Number: 6471 (25) **Depth:** 0.0' **Date:** 12/03/12

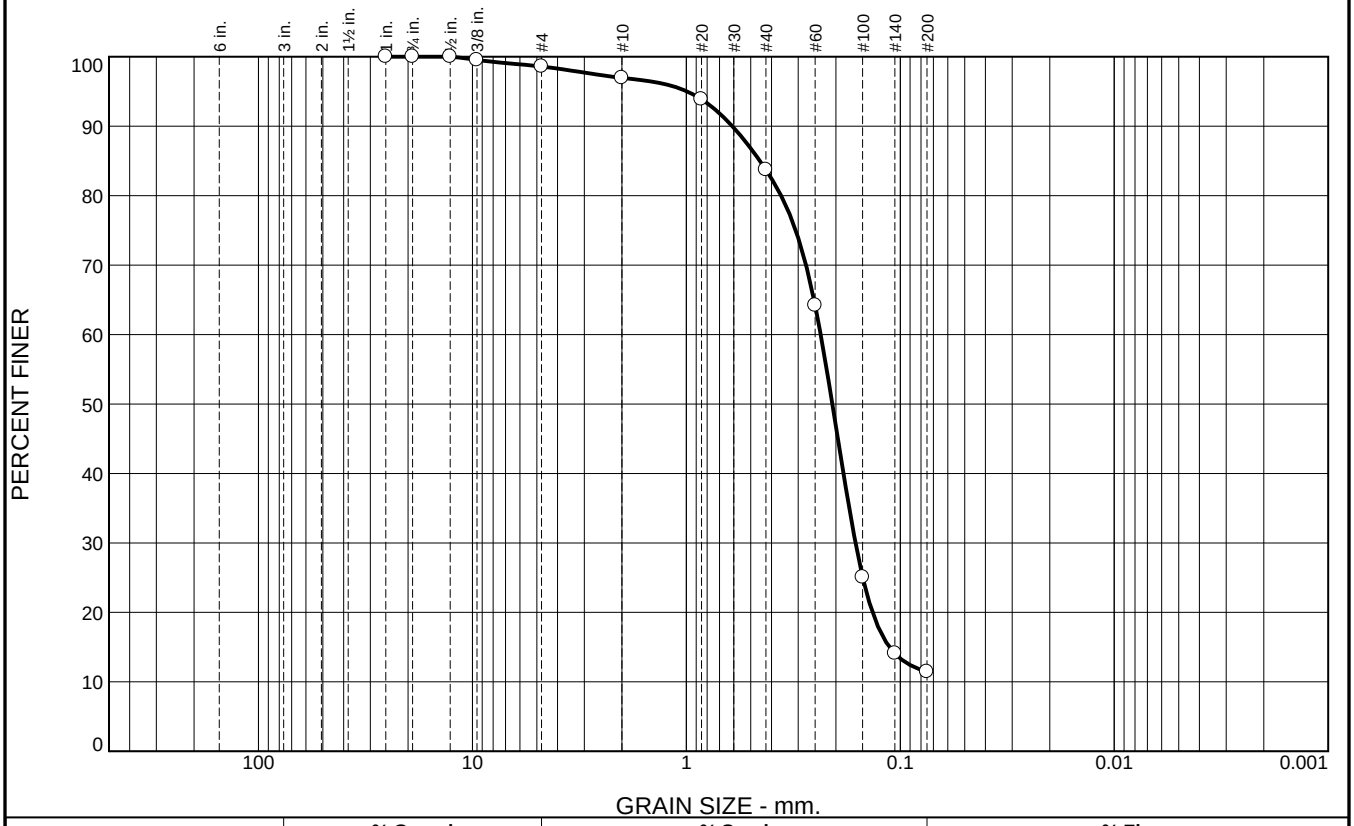
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.4	1.7	13.2	72.3	11.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	99.5		
#4	98.6		
#10	96.9		
#20	93.9		
#40	83.7		
#60	64.2		
#100	25.1		
#140	14.1		
#200	11.4		

* (no specification provided)

Material Description

Fine to medium grained, SLIGHTLY SILTY SAND, with trace SHELL

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6098 D_{85}= 0.4536 D_{60}= 0.2355
D_{50}= 0.2078 D_{30}= 0.1620 D_{15}= 0.1123
D_{10}= C_u= C_c=

Classification

USCS= SP-SM AASHTO=

Remarks

Location: BI-PBS-50-12 B
Sample Number: 6471 (26) **Depth:** 5.0' **Date:** 12/03/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
SERVICES

Core Identifier BI-PBS-65-12

Coordinate System
Latitude / Longitude

Latitude 30 09.133

Longitude 88 18.627

Date 11/16/2012

Start Time 15:46:59

End Time 15:54:01

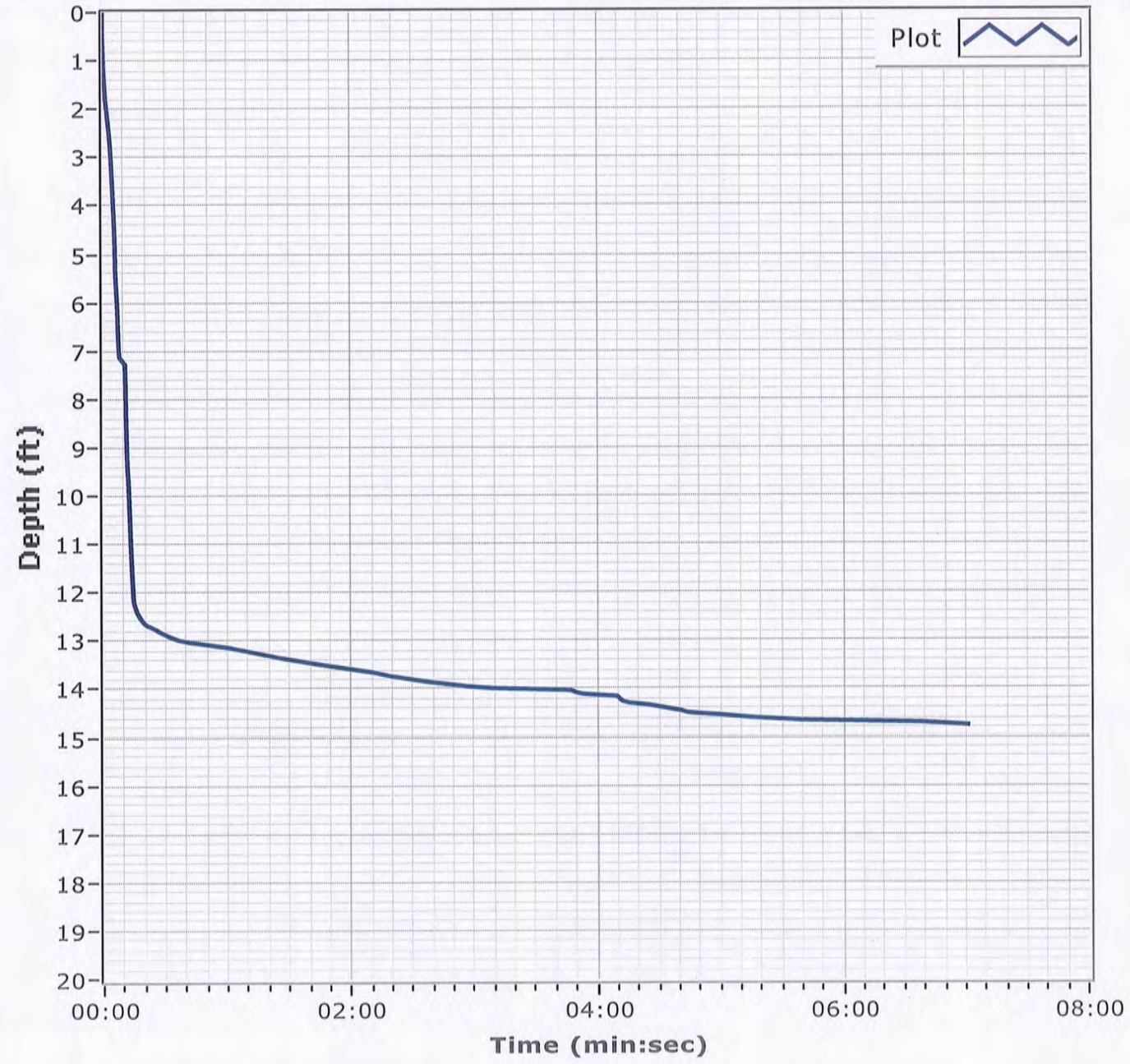
Total Time 00:07:01

Water Depth 54.0'

Penetration 14.8'

Recovery 13.5'

Comments



Boring Designation BI-PBS-120-13

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 1 SHEETS
	South Atlantic	Mobile District	

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-120-13	LOCATION COORDINATES: E = 1,135,247 N = 233,851	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: 3 / UNDISTURBED (UD): 0
4. NAME OF DRILLER: Construction Solutions International, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL	BEARING	14. WATER DEPTH: 49 Ft.
		15. DATE BORING	STARTED: 12-01-13 / COMPLETED: 12-01-13
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -48.1 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 18.4 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Tom Powers, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-48.1	0.0				
			SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, some shell, lt. gray (SP)	A	Classification: SP Color: GLEY1 10Y 7/1- D50: 0.342 mm % Fines: 1.7
				B	Classification: SP Color: GLEY1 10Y 6/1- D50: 0.31 mm % Fines: 1.9
-54.1	6.0				
			SAND, silty, mostly fine-grained sand-sized quartz, few shell, medium gray (SM)	C	Classification: SP-SM Color: GLEY1 10Y 5/1- D50: 0.194 mm % Fines: 11.1
-56.2	8.1				
			CLAY, lean, sandy, medium gray (CL)	NS	
-63.4	15.3				
-64.1	16.0		SAND, clayey, medium gray (SC)		
			CLAY, lean, sandy, medium gray (CL)		
-66.5	18.4				
			NOTES: 1. Soils are field visually classified in accordance with the Unified Soils Classification System. 2. NS = Sample not submitted for laboratory analysis from this interval. 3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.		

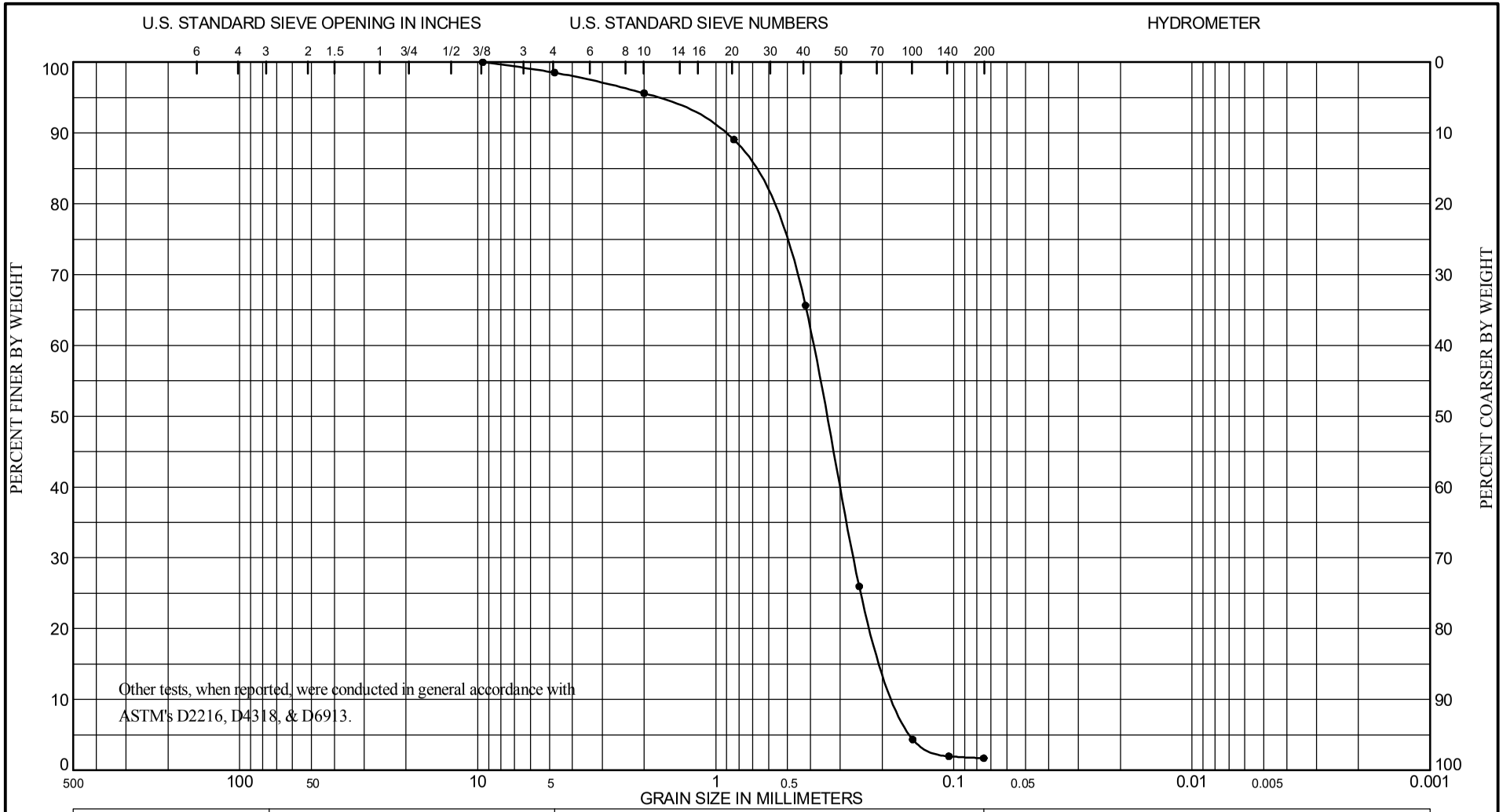
0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.14218° Long = -88.35563°

DEPARTMENT OF THE ARMY, SAVANNAH DISTRICT, ENVIRONMENTAL AND MATERIALS UNIT
CORPS OF ENGINEERS, 200 N. COBB PARKWAY, BLDG 400 SUITE 404, MARIETTA, GA. 30062

WORK ORDER: 848e
REQUISITION: W33SJG32900192



Sample No.	Depth (ft)	ASTM D2487 Classification	Nat w%	LL	PL	PI
A	0.0 to 3.0	Olive Gray, Poorly Graded Sand (SP), with a trace of gravel size				
		shell.				

Project MsCIP Barrier Island Restoration

Vibracore Sampling Pascagoula, MS

Lab No. K5/3902

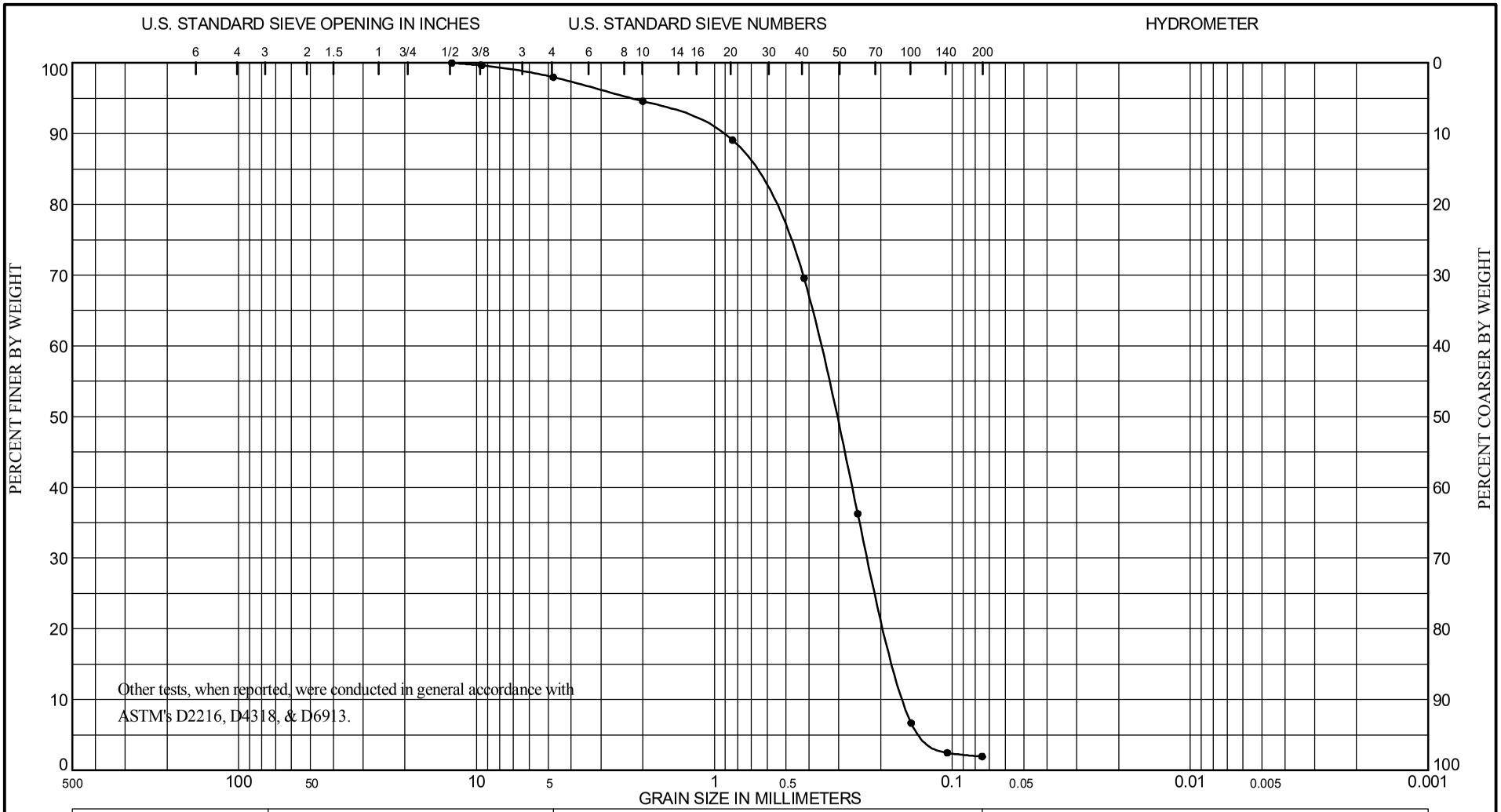
Hole No. BI-PBS-120-13

Date 4/23/14

GRADATION CURVES

DEPARTMENT OF THE ARMY, SAVANNAH DISTRICT, ENVIRONMENTAL AND MATERIALS UNIT
CORPS OF ENGINEERS, 200 N. COBB PARKWAY, BLDG 400 SUITE 404, MARIETTA, GA. 30062

WORK ORDER: 848e
REQUISITION: W33SJG32900192



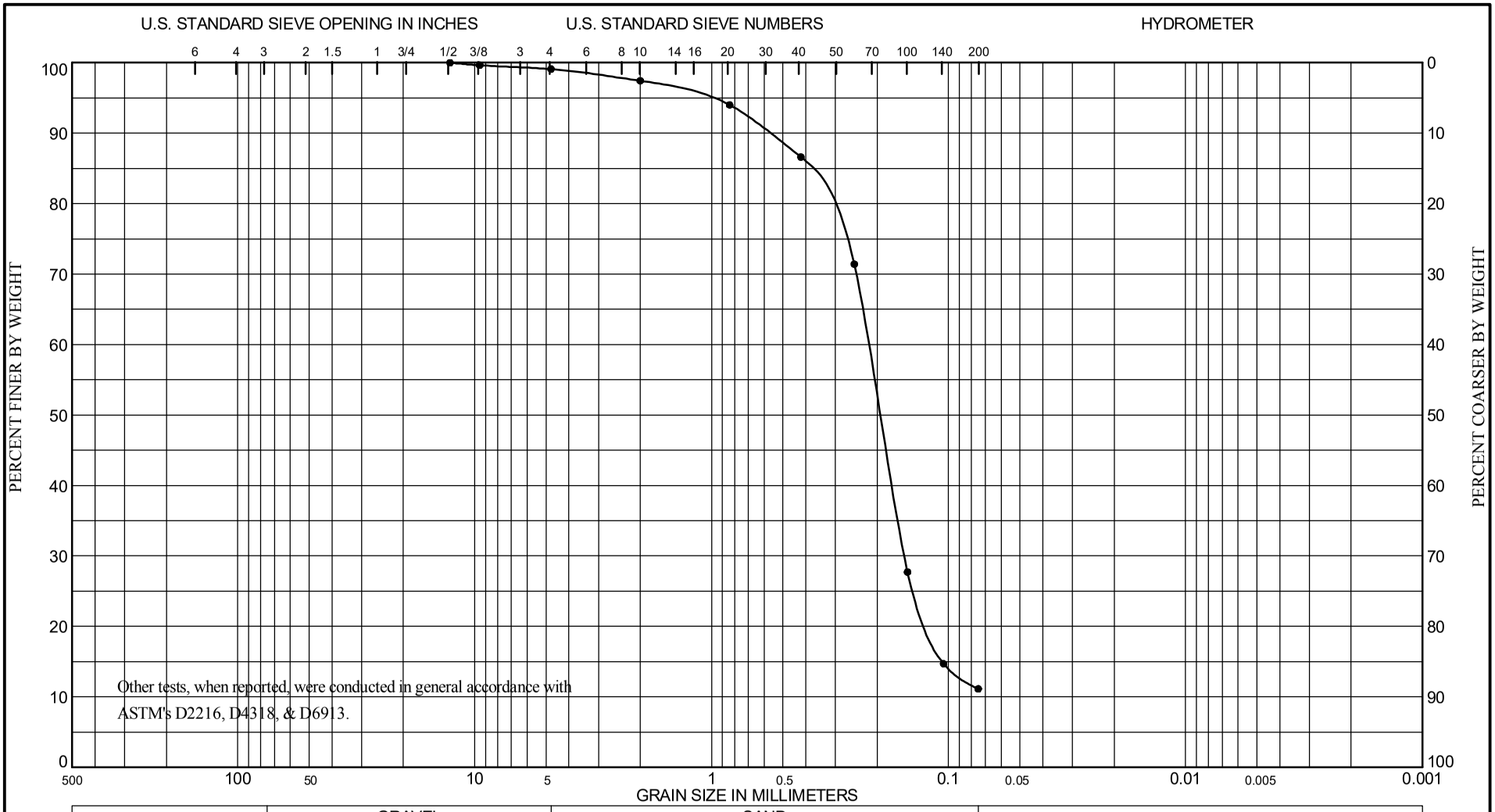
Sample No.	Depth (ft)	ASTM D2487 Classification	Nat w%	LL	PL	PI
B	3.0 to 6.0	Olive Gray, Poorly Graded Sand (SP), with a trace of gravel size				
		shell.				

Project MsCIP Barrier Island Restoration
Vibracore Sampling Pascagoula, MS
Lab No. K5/3903
Hole No. BI-PBS-120-13
Date 4/23/14

GRADATION CURVES

DEPARTMENT OF THE ARMY, SAVANNAH DISTRICT, ENVIRONMENTAL AND MATERIALS UNIT
CORPS OF ENGINEERS, 200 N. COBB PARKWAY, BLDG 400 SUITE 404, MARIETTA, GA. 30062

WORK ORDER: 848e
REQUISITION: W33SJG32900192



Sample No.	Depth (ft)	ASTM D2487 Classification	Nat w%	LL	PL	PI
C	6.0 to 8.1	Dark Greenish Gray, Poorly Graded Silty Sand (SP-SM).				

Project MsCIP Barrier Island Restoration

Vibracore Sampling Pascagoula, MS

Lab No. K5/3904

Hole No. BI-PBS-120-13

Date 4/23/14

GRADATION CURVES

Boring Designation BI-PBS-122-13

DRILLING LOG	DIVISION	INSTALLATION	SHEET / OF
	South Atlantic	Mobile District	SHEET 1 OF 1 SHEETS

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-122-13	LOCATION COORDINATES: E = 1,135,969 N = 232,825	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: 2 / UNDISTURBED (UD): 0
4. NAME OF DRILLER: Construction Solutions International, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 48 Ft.	
		15. DATE BORING	STARTED: 12-01-13 / COMPLETED: 12-01-13
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -48.0 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 17.4 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Tom Powers, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-48.0	0.0				
-53.0	5.0		SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace coarse-grained quartz sand, lt. gray (SP)	A	Classification: SP Color: GLEY1 10Y 6/1- D50: 0.246 mm % Fines: 2.5
-56.4	8.4		SAND, silty, mostly fine-grained sand-sized quartz, little shell, medium gray (SM)	B	Classification: SP-SM Color: GLEY1 10Y 5/1- D50: 0.185 mm % Fines: 11.9
-65.4	17.4		CLAY, fat, little pockets of silty sand, 1-inch thick, upper 4 feet of strata, light greenish gray (CH)	NS	
			NOTES: 1. Soils are field visually classified in accordance with the Unified Soils Classification System. 2. NS = Sample not submitted for laboratory analysis from this interval. 3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.		

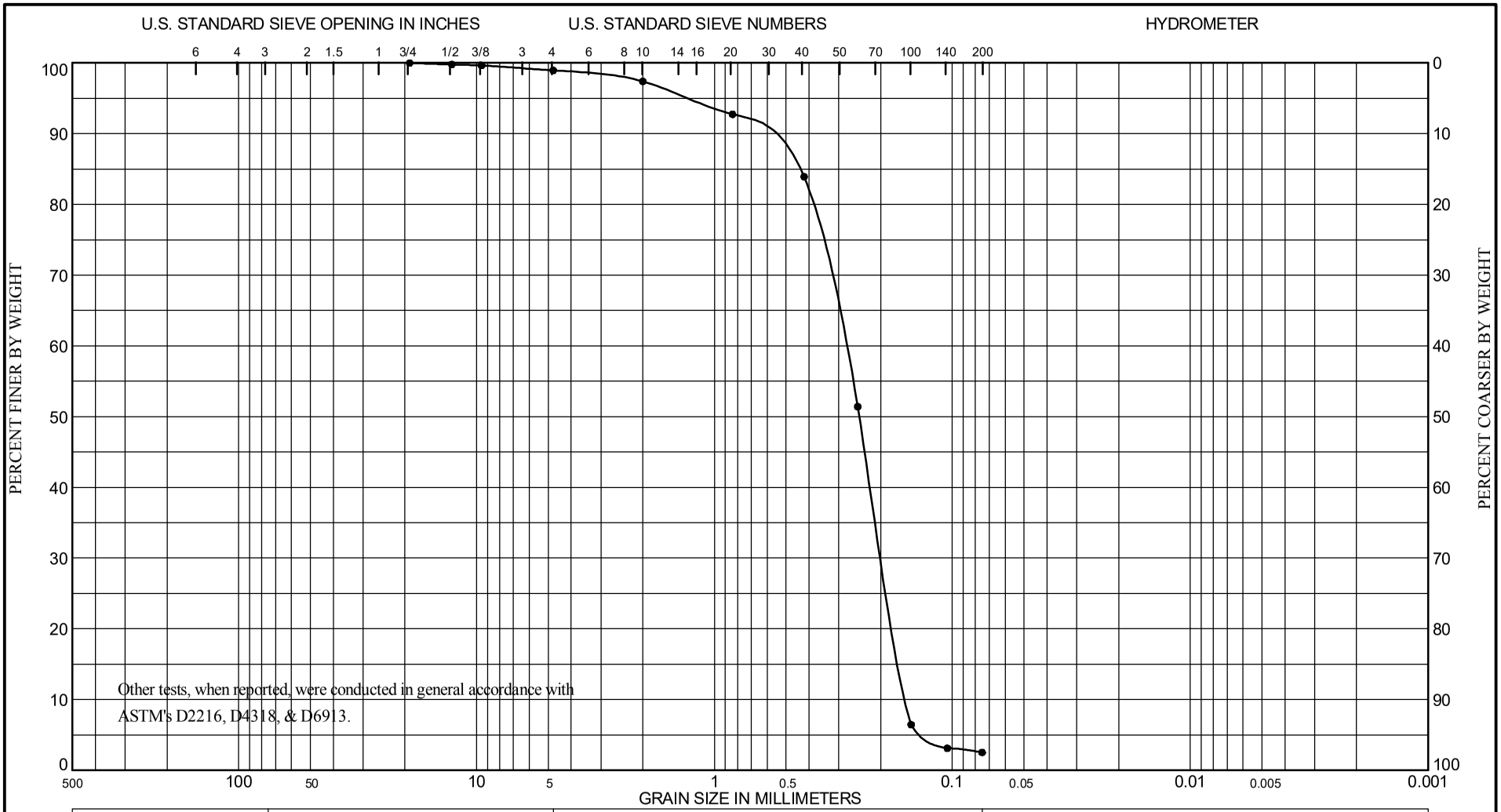
0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.13935° Long = -88.35336°

DEPARTMENT OF THE ARMY, SAVANNAH DISTRICT, ENVIRONMENTAL AND MATERIALS UNIT
CORPS OF ENGINEERS, 200 N. COBB PARKWAY, BLDG 400 SUITE 404, MARIETTA, GA. 30062

WORK ORDER: 848e
REQUISITION: W33SJG32900192



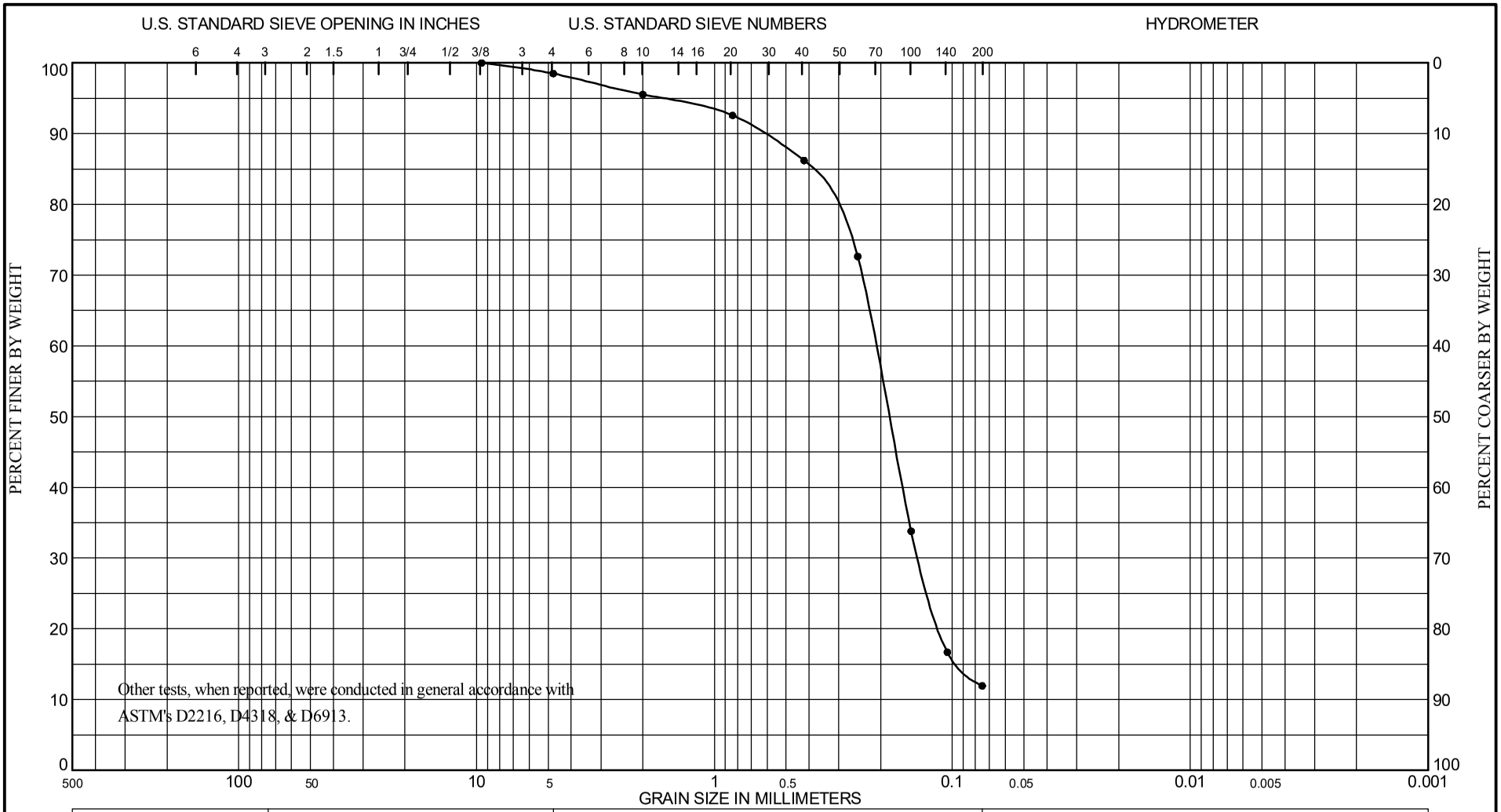
Sample No.	Depth (ft)	ASTM D2487 Classification	Nat w%	LL	PL	PI
A	0.0 to 5.0	Olive Gray, Poorly Graded Sand (SP), with a trace of gravel size				
		shell.				

Project MsCIP Barrier Island Restoration
Vibracore Sampling Pascagoula, MS
Lab No. K5/3900
Hole No. BI-PBS-122-13
Date 4/23/14

GRADATION CURVES

DEPARTMENT OF THE ARMY, SAVANNAH DISTRICT, ENVIRONMENTAL AND MATERIALS UNIT
CORPS OF ENGINEERS, 200 N. COBB PARKWAY, BLDG 400 SUITE 404, MARIETTA, GA. 30062

WORK ORDER: 848e
REQUISITION: W33SJG32900192



Sample No.	Depth (ft)	ASTM D2487 Classification	Nat w%	LL	PL	PI
B	5.0 to 8.4	Very Dark Greenish Gray, Poorly Graded Silty Sand (SP-SM), with				
		a trace of gravel size shell.				

Project MsCIP Barrier Island Restoration
Vibracore Sampling Pascagoula, MS
Lab No. K5/3901
Hole No. BI-PBS-122-13
Date 4/23/14

GRADATION CURVES

Boring Designation BI-PBS-123-13

DRILLING LOG	DIVISION	INSTALLATION	SHEET / OF
	South Atlantic	Mobile District	SHEET 1 OF 2 SHEETS

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-123-13	LOCATION COORDINATES: E = 1,131,230 N = 235,261	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: 2 / UNDISTURBED (UD): 0
4. NAME OF DRILLER: Construction Solutions International, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 50 Ft.	
		15. DATE BORING	STARTED: 12-01-13 / COMPLETED: 12-01-13
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -49.5 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 20.0 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Tom Powers, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-49.5	0.0				
			SAND, silty, mostly fine-grained sand-sized quartz, little shell, medium gray (SM)	A	Classification: SP-SM Color: GLEY1 10Y 6/1- D50: 0.206 mm % Fines: 6.1
				B	Classification: SM Color: 2.5Y 5/1-gray D50: 0.193 mm % Fines: 14.6
-55.2	5.7				
			CLAY, lean, sandy from depth of 5.7 to 14 feet, non-sandy from 14 to depth of 20 feet, medium gray (CL)	NS	
-69.5	20.0				
			NOTES: 1. Soils are field visually classified in accordance with the Unified Soils Classification System. 2. NS = Sample not submitted for laboratory analysis from this interval. 3. Seafloor elevation determined from USACE		

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.14610° Long = -88.36832°

DRILLING LOG (Cont. Sheet)	INSTALLATION	SHEET 2 OF 2 SHEETS
	Mobile District	

PROJECT	COORDINATE SYSTEM/DATUM	HORIZONTAL	VERTICAL
MsCIP Barrier Island Restoration	State Plane, MSE (U.S. Ft.)	NAD83	NAVD88

LOCATION COORDINATES	ELEVATION TOP OF BORING
X = 1,131,230 Y = 235,261	-49.5 Ft.

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
			hydrographic survey completed April 2014.		

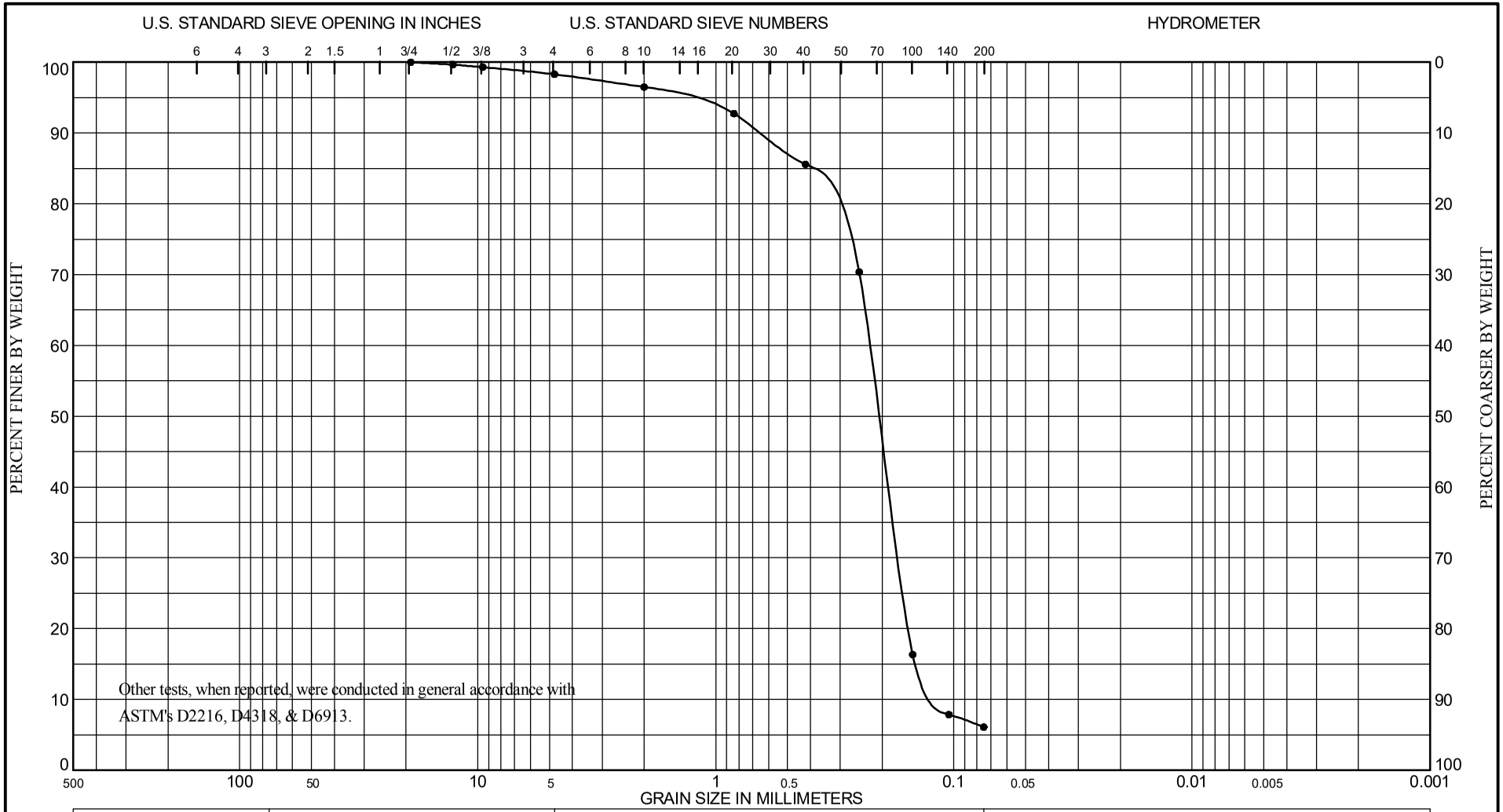
30
35
40
45
50
55
60

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.14610° Long = -88.36832°

DEPARTMENT OF THE ARMY, SAVANNAH DISTRICT, ENVIRONMENTAL AND MATERIALS UNIT
CORPS OF ENGINEERS, 200 N. COBB PARKWAY, BLDG 400 SUITE 404, MARIETTA, GA. 30062

WORK ORDER: 848e
REQUISITION: W33SJG32900192



Sample No.	Depth (ft)	ASTM D2487 Classification	Nat w%	LL	PL	PI
A	0.0 to 2.3	Dark Greenish Gray, Poorly Graded Silty Sand (SP-SM), with a				
		trace of gravel size shell.				

Project MsCIP Barrier Island Restoration
Vibracore Sampling Pascagoula, MS
Lab No. K5/3908
Hole No. BI-PBS-123-13
Date 4/23/14

GRADATION CURVES

DEPARTMENT OF THE ARMY, SAVANNAH DISTRICT, ENVIRONMENTAL AND MATERIALS UNIT
CORPS OF ENGINEERS, 200 N. COBB PARKWAY, BLDG 400 SUITE 404, MARIETTA, GA. 30062

WORK ORDER: 848e
REQUISITION: W33SJG32900192



Sample No.	Depth (ft)	ASTM D2487 Classification	Nat w%	LL	PL	PI
B	2.3 to 5.7	Dark Greenish Gray, Silty Sand (SM), with a trace of gravel size				
		shell.				

Project MsCIP Barrier Island Restoration
Vibracore Sampling Pascagoula, MS
Lab No. K5/3909
Hole No. BI-PBS-123-13
Date 4/23/14

GRADATION CURVES

Boring Designation BI-PBS-124-13

DRILLING LOG	DIVISION	INSTALLATION	SHEET / OF SHEETS
	South Atlantic	Mobile District	SHEET 1 OF 1 SHEETS

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-124-13	LOCATION COORDINATES: E = 1,133,046 N = 234,126	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: 3 / UNDISTURBED (UD): 0
4. NAME OF DRILLER: Construction Solutions International, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 46 Ft.	
		15. DATE BORING	STARTED: 12-01-13 / COMPLETED: 12-01-13
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -45.5 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 18.7 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Tom Powers, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-45.5	0.0				
			SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, some shell, lt. gray (SP)	A	Classification: SP Color: GLEY1 10Y 7/1- D50: 0.306 mm % Fines: 1.8
				B	Classification: SP Color: GLEY1 10Y 7/1- D50: 0.362 mm % Fines: 1.5
-53.3	7.8				
			SAND, silty, mostly fine-grained sand-sized quartz, little shell, medium gray (SM)	C	Classification: SP-SM Color: GLEY1 10Y 5/1- D50: 0.193 mm % Fines: 9.2
-56.0	10.5				
			CLAY, lean, sandy CL-CH, orangish gray down to 13.9 ft. over lt. greenish gray (CL)	NS	
-64.2	18.7				
			NOTES: 1. Soils are field visually classified in accordance with the Unified Soils Classification System. 2. NS = Sample not submitted for laboratory analysis from this interval. 3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.		

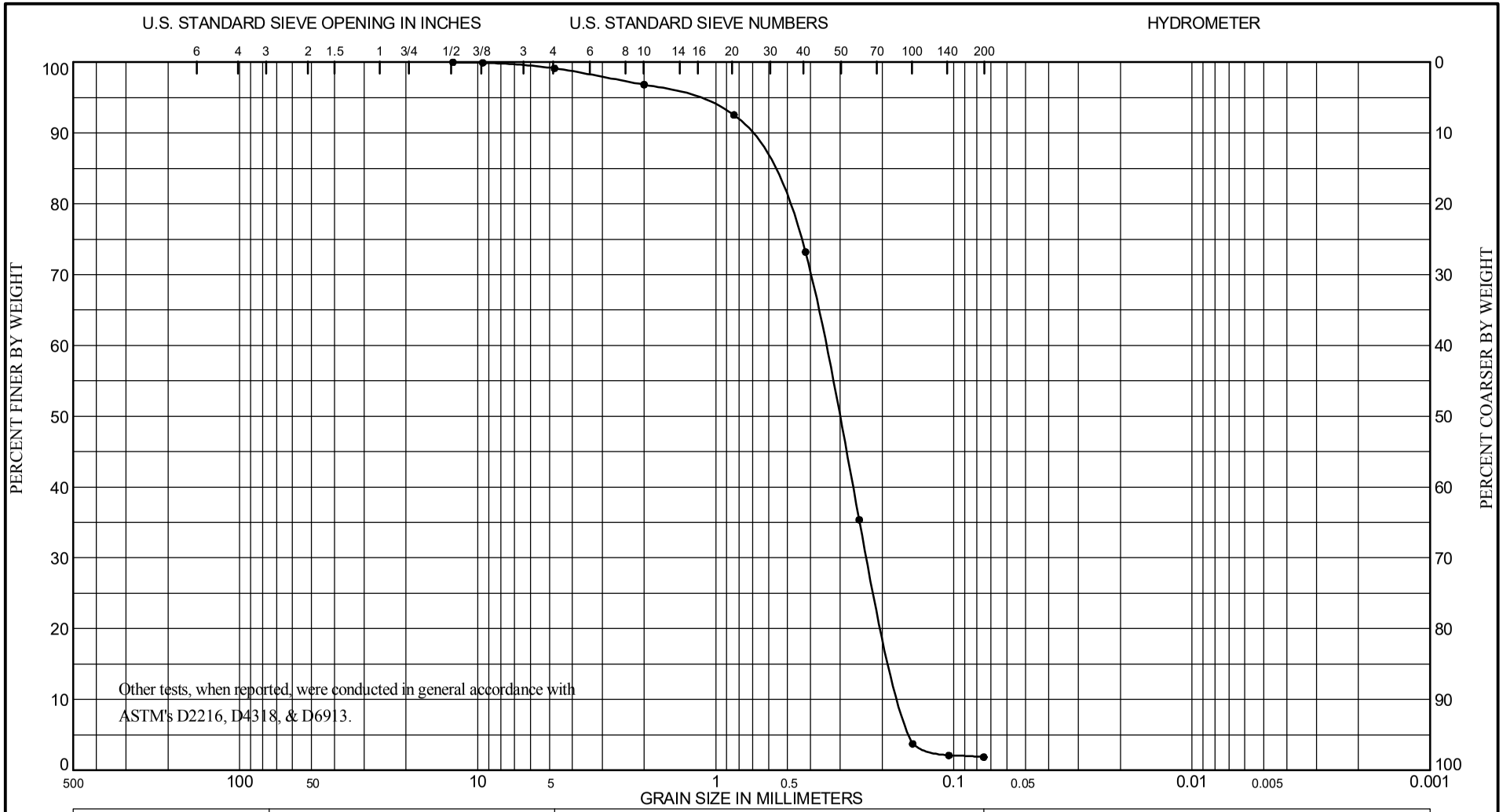
0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.14296° Long = -88.36259°

DEPARTMENT OF THE ARMY, SAVANNAH DISTRICT, ENVIRONMENTAL AND MATERIALS UNIT
CORPS OF ENGINEERS, 200 N. COBB PARKWAY, BLDG 400 SUITE 404, MARIETTA, GA. 30062

WORK ORDER: 848e
REQUISITION: W33SJG32900192



Sample No.	Depth (ft)	ASTM D2487 Classification	Nat w%	LL	PL	PI
A	0.0 to 4.0	Olive Gray, Poorly Graded Sand (SP).				

Project MsCIP Barrier Island Restoration

Vibracore Sampling Pascagoula, MS

Lab No. K5/3905

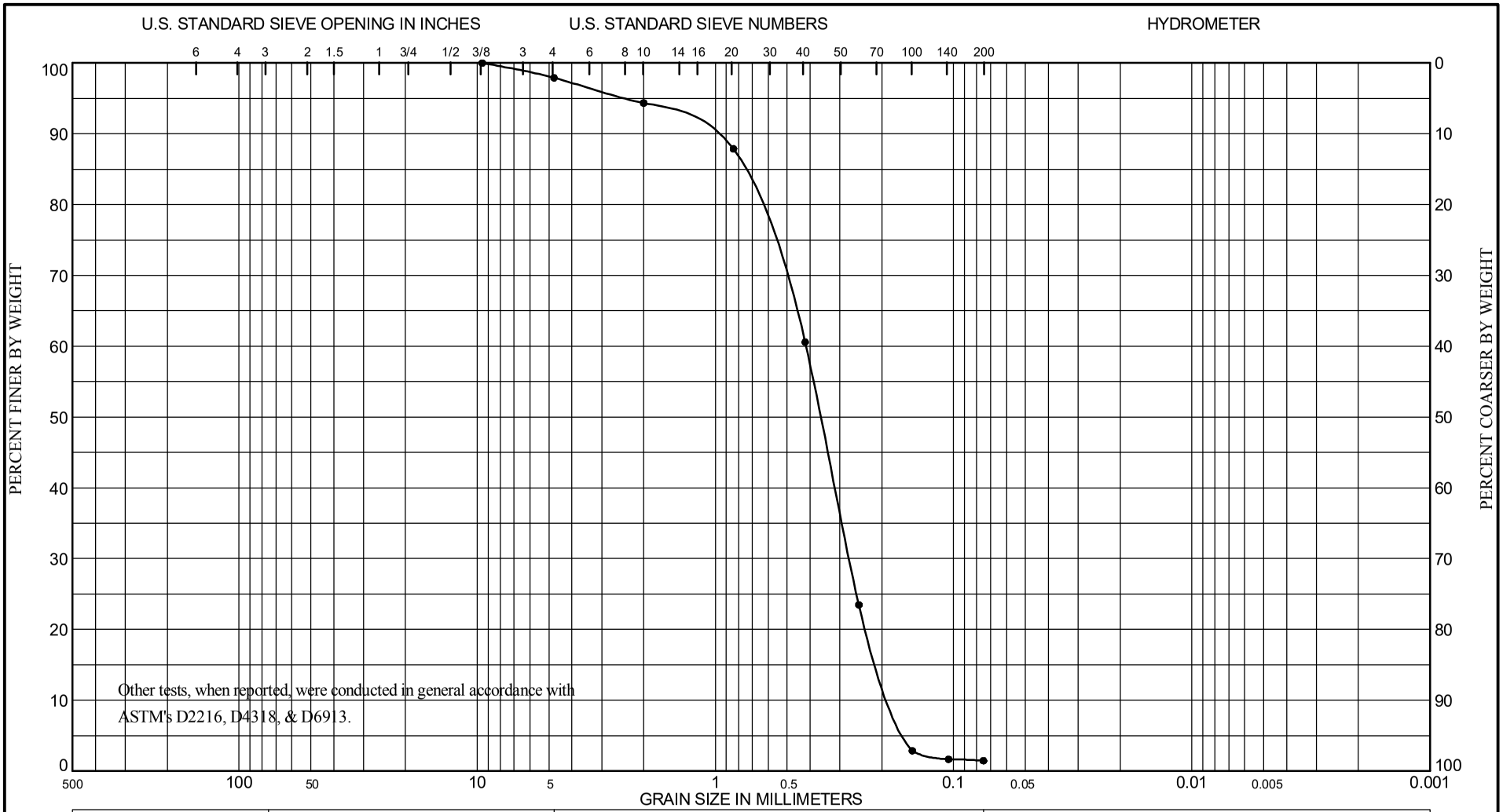
Hole No. BI-PBS-124-13

Date 4/23/14

GRADATION CURVES

DEPARTMENT OF THE ARMY, SAVANNAH DISTRICT, ENVIRONMENTAL AND MATERIALS UNIT
CORPS OF ENGINEERS, 200 N. COBB PARKWAY, BLDG 400 SUITE 404, MARIETTA, GA. 30062

WORK ORDER: 848e
REQUISITION: W33SJG32900192



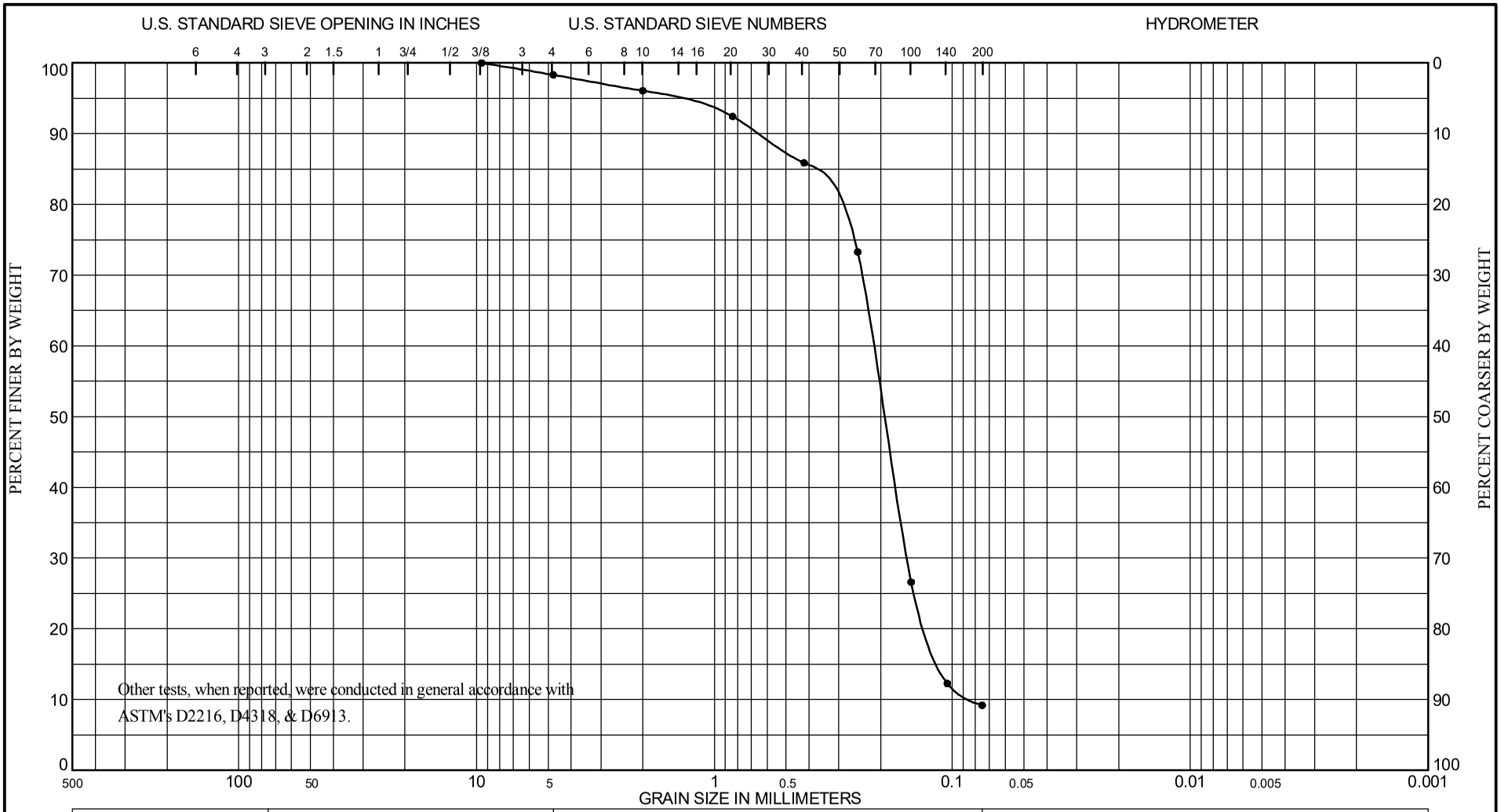
Sample No.	Depth (ft)	ASTM D2487 Classification	Nat w%	LL	PL	PI
B	4.0 to 7.8	Olive Gray, Poorly Graded Sand (SP), with a trace of gravel size				
		shell.				

Project MsCIP Barrier Island Restoration
Vibracore Sampling Pascagoula, MS
Lab No. K5/3906
Hole No. BI-PBS-124-13
Date 4/23/14

GRADATION CURVES

DEPARTMENT OF THE ARMY, SAVANNAH DISTRICT, ENVIRONMENTAL AND MATERIALS UNIT
CORPS OF ENGINEERS, 200 N. COBB PARKWAY, BLDG 400 SUITE 404, MARIETTA, GA. 30062

WORK ORDER: 848e
REQUISITION: W33SJG32900192



Sample No.	Depth (ft)	ASTM D2487 Classification	Nat w%	LL	PL	PI
C	7.8 to 10.5	Dark Greenish Gray, Poorly Graded Silty Sand (SP-SM), with a				
		trace of gravel size shell.				

Project MsCIP Barrier Island Restoration

Vibracore Sampling Pascagoula, MS

Lab No. K5/3907

Hole No. BI-PBS-124-13

Date 4/23/14

GRADATION CURVES

Boring Designation BI-PBS-144-13

DRILLING LOG	DIVISION	INSTALLATION	SHEET / OF SHEETS
	South Atlantic	Mobile District	SHEET 1 OF 1 SHEETS

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-144-13	LOCATION COORDINATES: E = 1,133,323 N = 235,207	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: 1 / UNDISTURBED (UD): 0
4. NAME OF DRILLER: Construction Solutions International, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 50 Ft.	
		15. DATE BORING	STARTED: 11-30-13 / COMPLETED: 11-30-13
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -49.2 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 18.7 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Tom Powers, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-49.2	0.0				
-53.4	4.2		SAND, poorly-graded, mostly fine to coarse-grained sand-sized quartz, trace shell, medium gray (SP)	A	Classification: SP Color: GLEY1 10Y 7/1- D50: 0.334 mm % Fines: 1.4
-58.0	8.8		SAND, clayey, medium gray (SC)		
-60.9	11.7		CLAY, lean, sandy, medium gray (CL)		
-63.9	14.7		SAND, clayey, medium gray (SC)		
-67.9	18.7		CLAY, fat, trace wood fragments, medium gray (CH)		
			NOTES: 1. Soils are field visually classified in accordance with the Unified Soils Classification System. 2. NS = Sample not submitted for laboratory analysis from this interval. 3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.		

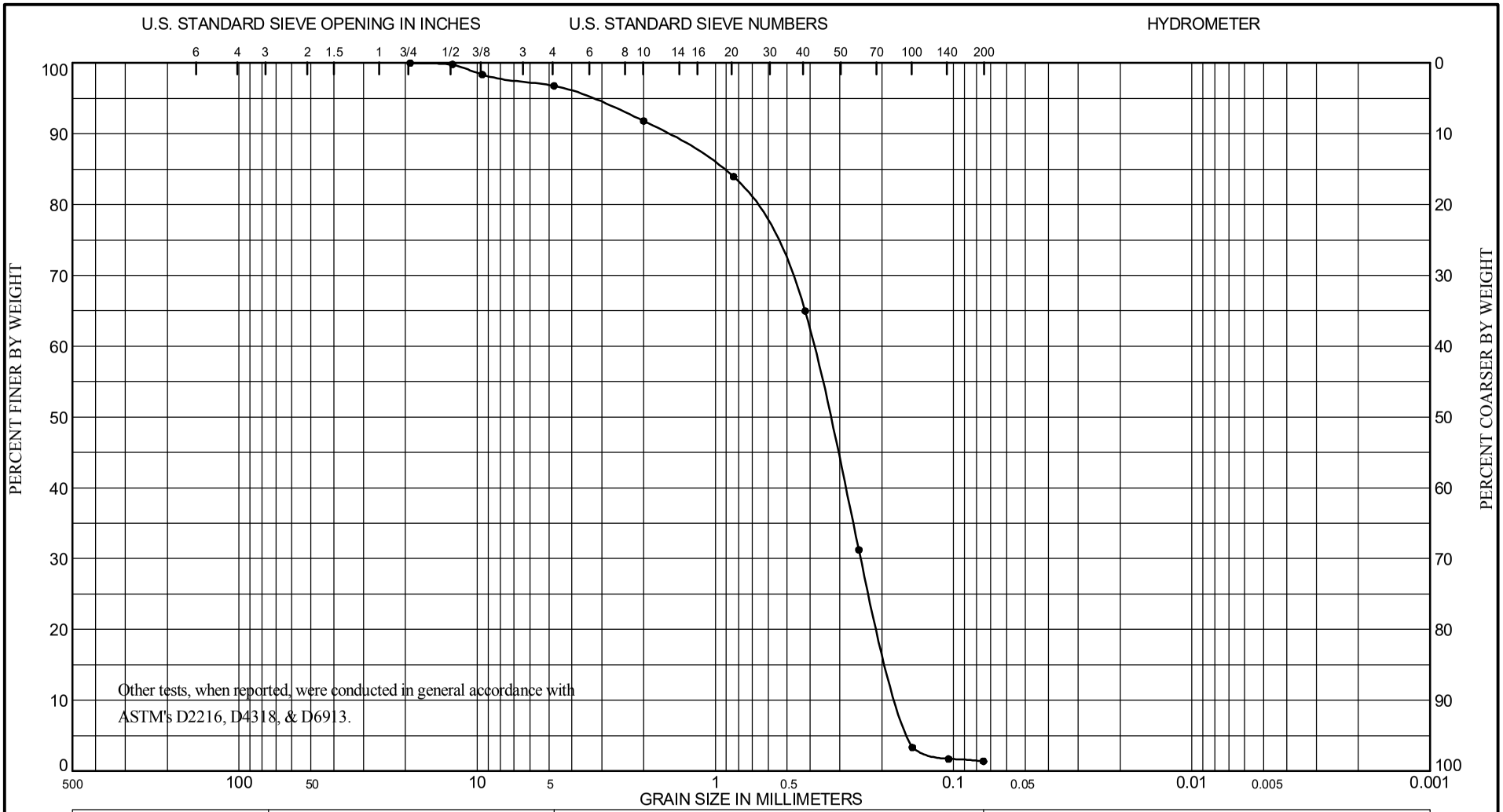
0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.14593° Long = -88.36170°

DEPARTMENT OF THE ARMY, SAVANNAH DISTRICT, ENVIRONMENTAL AND MATERIALS UNIT
CORPS OF ENGINEERS, 200 N. COBB PARKWAY, BLDG 400 SUITE 404, MARIETTA, GA. 30062

WORK ORDER: 848e
REQUISITION: W33SJG32900192



Sample No.	Depth (ft)	ASTM D2487 Classification	Nat w%	LL	PL	PI
A	0.0 to 4.2	Olive Gray, Poorly Graded Sand (SP), with a trace of gravel size				
		shell.				

Project MsCIP Barrier Island Restoration
Vibracore Sampling Pascagoula, MS
Lab No. K5/3899
Hole No. BI-PBS-144-13
Date 4/23/14

GRADATION CURVES

Boring Designation BI-PBS-378-13

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 1 SHEETS
	South Atlantic	Mobile District	

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-378-13	LOCATION COORDINATES: E = 1,132,503 N = 236,193	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: 1 / UNDISTURBED (UD): 0
4. NAME OF DRILLER: Construction Solutions International, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 51.3 Ft.	
		15. DATE BORING	STARTED: 02-22-14 / COMPLETED: 02-22-14
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -49.1 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 18.1 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Tom Powers, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-49.1	0.0				
-52.5	3.4		SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, little shell fragments, lt. gray (SP)	A	Classification: SP Color: 2.5Y 6/1-gray D50: 0.306 mm % Fines: 1.3
-55.1	6.0		SAND, silty, mostly fine-grained sand-sized quartz, few shell fragments, high fines content, medium gray (SM)	NS	
-56.1	7.0		SAND, silty, clayey, mostly fine-grained sand-sized quartz, medium gray (SC-SM)		
-57.6	8.5		CLAY, lean, sandy, firm, medium gray (CL)		
-60.1	11.0		SAND, clayey, mostly fine-grained sand-sized quartz, trace shell fragments, medium gray (SC)		
-67.2	18.1		CLAY, lean, sandy between 11 to 13.4 ft. and 17 to 18.1 ft. with few shell fragments in the sandy zones, medium gray (CL)		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.

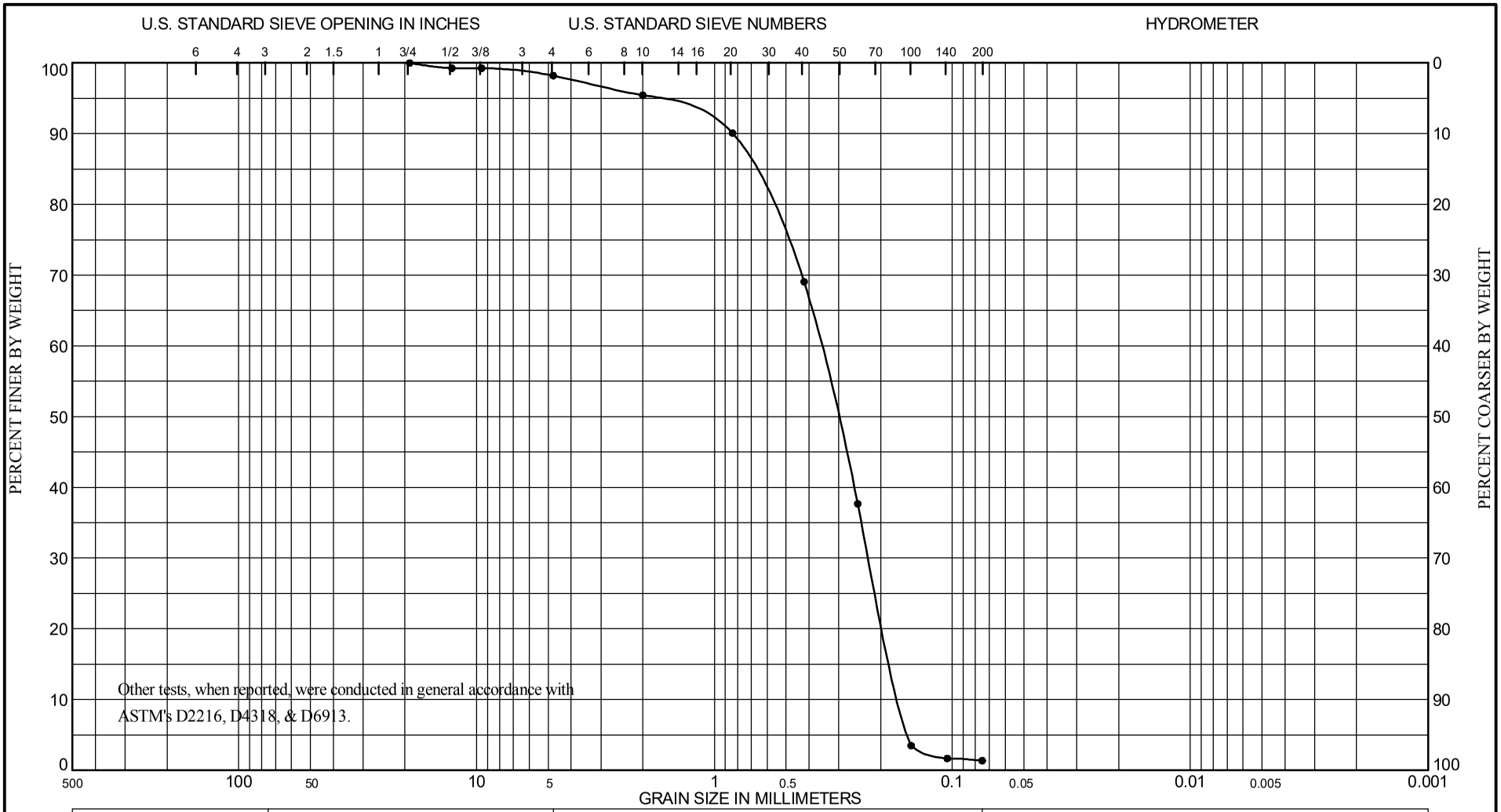
0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.14865° Long = -88.36428°

DEPARTMENT OF THE ARMY, SAVANNAH DISTRICT, ENVIRONMENTAL AND MATERIALS UNIT
CORPS OF ENGINEERS, 200 N. COBB PARKWAY, BLDG 400 SUITE 404, MARIETTA, GA. 30062

WORK ORDER: 848e
REQUISITION: W33SJG32900192



Sample No.	Depth (ft)	ASTM D2487 Classification	Nat w%	LL	PL	PI
A	0.0 to 3.4	Greenish Gray, Poorly Graded Sand (SP), with a trace of gravel size				
		shell.				

Project MsCIP Barrier Island Restoration
Vibracore Sampling Pascagoula, MS
Lab No. K5/4862
Hole No. BI-PBS-378-13
Date 4/23/14

GRADATION CURVES

Boring Designation BI-PBS-379-13

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 1 SHEETS
	South Atlantic	Mobile District	

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-379-13	LOCATION COORDINATES: E = 1,134,184 N = 232,600	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: 1 / UNDISTURBED (UD): 0
4. NAME OF DRILLER: Construction Solutions International, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 55 Ft.	
		15. DATE BORING	STARTED: 02-22-14 / COMPLETED: 02-22-14
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -53.3 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 18.3 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Tom Powers, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-53.3	0.0				
			SAND, silty, mostly fine-grained sand-sized quartz, trace shell fragments, medium gray (SM)	A	Classification: SP Color: 2.5Y 6/1-gray D50: 0.216 mm % Fines: 2.5
			At El. -54.9 Ft., high fines content to base of unit, few shell fragments		
-57.8	4.5				
-58.8	5.5		SILT, inorganic-L, few shell fragments, sandy, medium gray (ML)		
-60.2	6.9		CLAY, silty, few shell fragments, medium gray (CL-ML)		
			CLAY, lean, trace wood fragments, sandy between 13.4 and 14.3 ft. depths, firm to depth of 17.0 ft., soft to depth of 18.3 ft., medium gray (CL)	NS	
-71.6	18.3				

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.

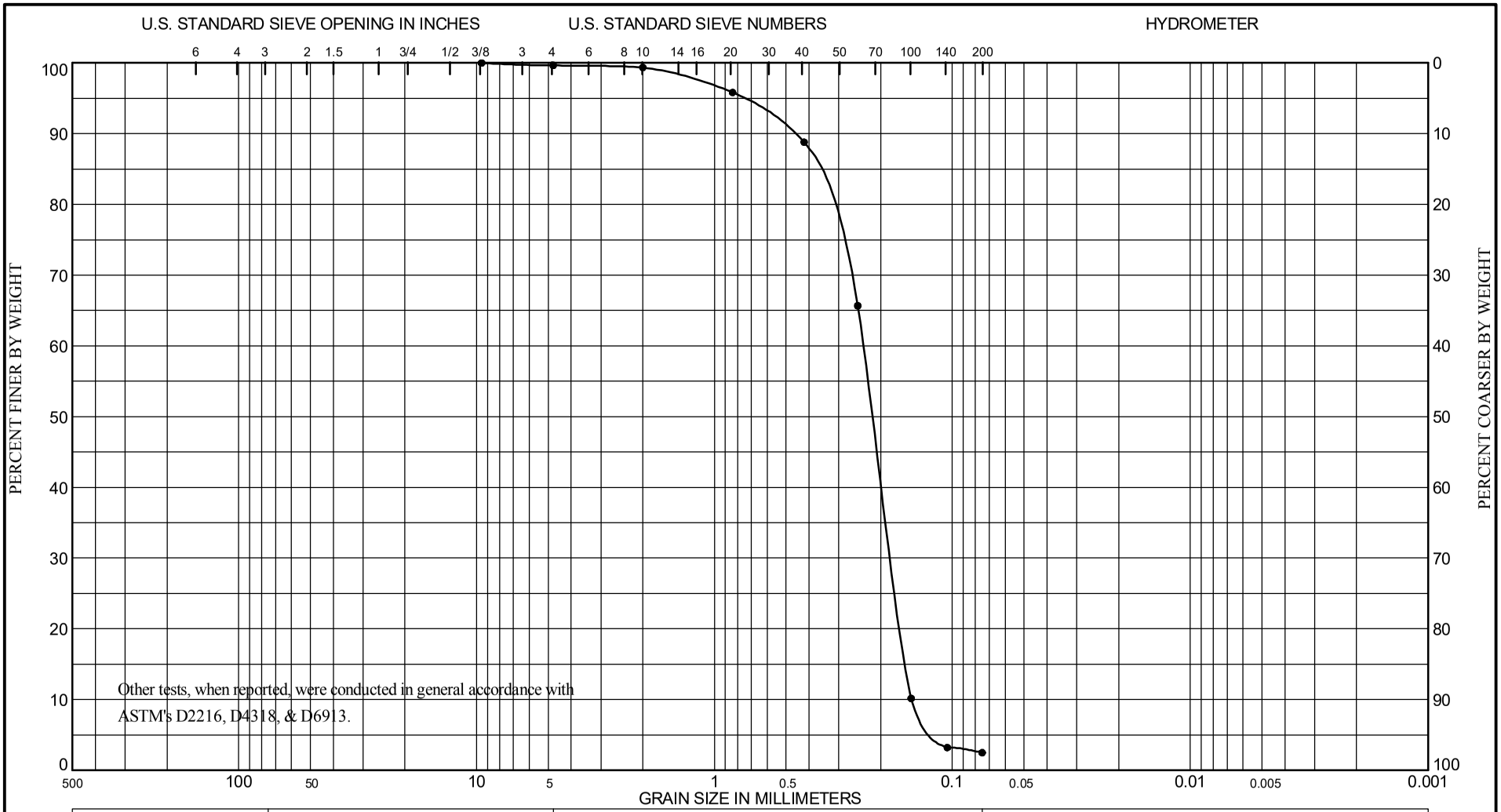
0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.13875° Long = -88.35901°

DEPARTMENT OF THE ARMY, SAVANNAH DISTRICT, ENVIRONMENTAL AND MATERIALS UNIT
CORPS OF ENGINEERS, 200 N. COBB PARKWAY, BLDG 400 SUITE 404, MARIETTA, GA. 30062

WORK ORDER: 848e
REQUISITION: W33SJG32900192



Sample No.	Depth (ft)	ASTM D2487 Classification	Nat w%	LL	PL	PI
A	0.0 to 1.6	Greenish Gray, Poorly Graded Sand (SP).				

Project MsCIP Barrier Island Restoration

Vibracore Sampling Pascagoula, MS

Lab No. K5/4861

Hole No. BI-PBS-379-13

Date 4/23/14

GRADATION CURVES

Boring Designation BI-PBS-380-13

DRILLING LOG	DIVISION	INSTALLATION	SHEET / OF
	South Atlantic	Mobile District	SHEET 1 OF 1 SHEETS

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-380-13	LOCATION COORDINATES: E = 1,137,169 N = 233,049	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: 2 / UNDISTURBED (UD): 0
4. NAME OF DRILLER: Construction Solutions International, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL	BEARING	14. WATER DEPTH: 55.6 Ft.
		15. DATE BORING	STARTED: 02-22-14 / COMPLETED: 02-22-14
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -52.1 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 18.5 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Tom Powers, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-52.1	0.0				
-55.0	2.9		SAND, poorly-graded, mostly fine to coarse-grained sand-sized quartz, little shell fragments, lt. gray (SP)	A	Classification: SP Color: 2.5Y 6/1-gray D50: 0.399 mm % Fines: 1.1
-56.1	4.0		SAND, silty, mostly fine-grained sand-sized quartz, trace shell fragments, high fines content, medium gray (SM)	B	Classification: SP-SM Color: 2.5Y 5/1-gray D50: 0.204 mm % Fines: 9.6
-58.0	5.9		SAND, clayey, mostly fine-grained sand-sized quartz, few shell fragments, medium gray (SC)		
-63.1	11.0		CLAY, fat, discontinue shell fragments, sandy, firm, pale orange, pale green (CH)		
-64.6	12.5		CLAY, lean, trace shell fragments, sandy, medium gray (CL)	NS	
-66.5	14.4		SAND, clayey, mostly fine to medium-grained sand-sized quartz, little shell fragments, medium gray (SC)		
-70.6	18.5		CLAY, fat, hard, medium gray (CH)		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.

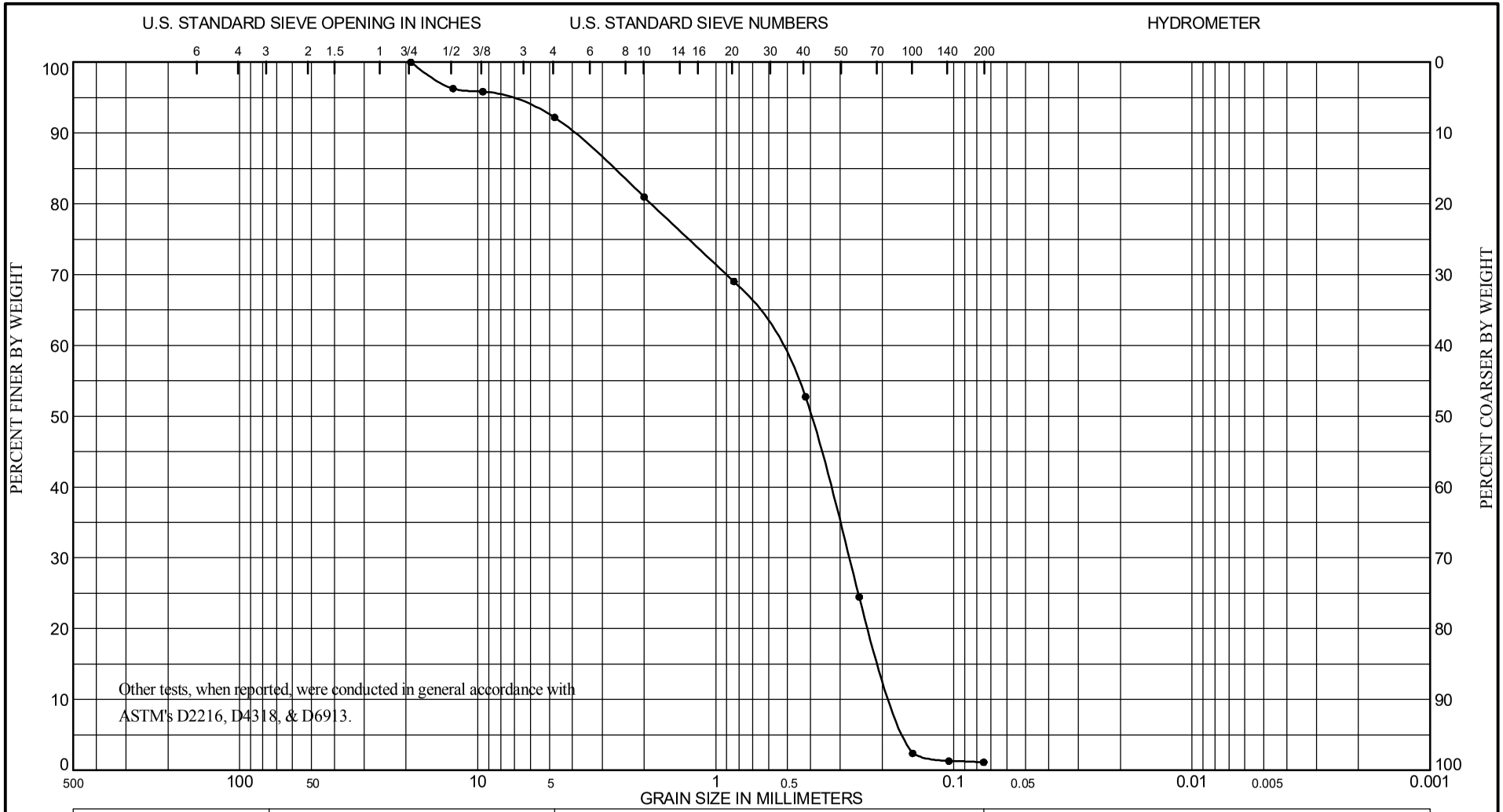
0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.13995° Long = -88.34956°

DEPARTMENT OF THE ARMY, SAVANNAH DISTRICT, ENVIRONMENTAL AND MATERIALS UNIT
CORPS OF ENGINEERS, 200 N. COBB PARKWAY, BLDG 400 SUITE 404, MARIETTA, GA. 30062

WORK ORDER: 848e
REQUISITION: W33SJG32900192



Sample No.	Depth (ft)	ASTM D2487 Classification	Nat w%	LL	PL	PI
A	0.0 to 2.9	Gray, Poorly Graded Sand (SP).				

Project MsCIP Barrier Island Restoration

Vibracore Sampling Pascagoula, MS

Lab No. K5/4859

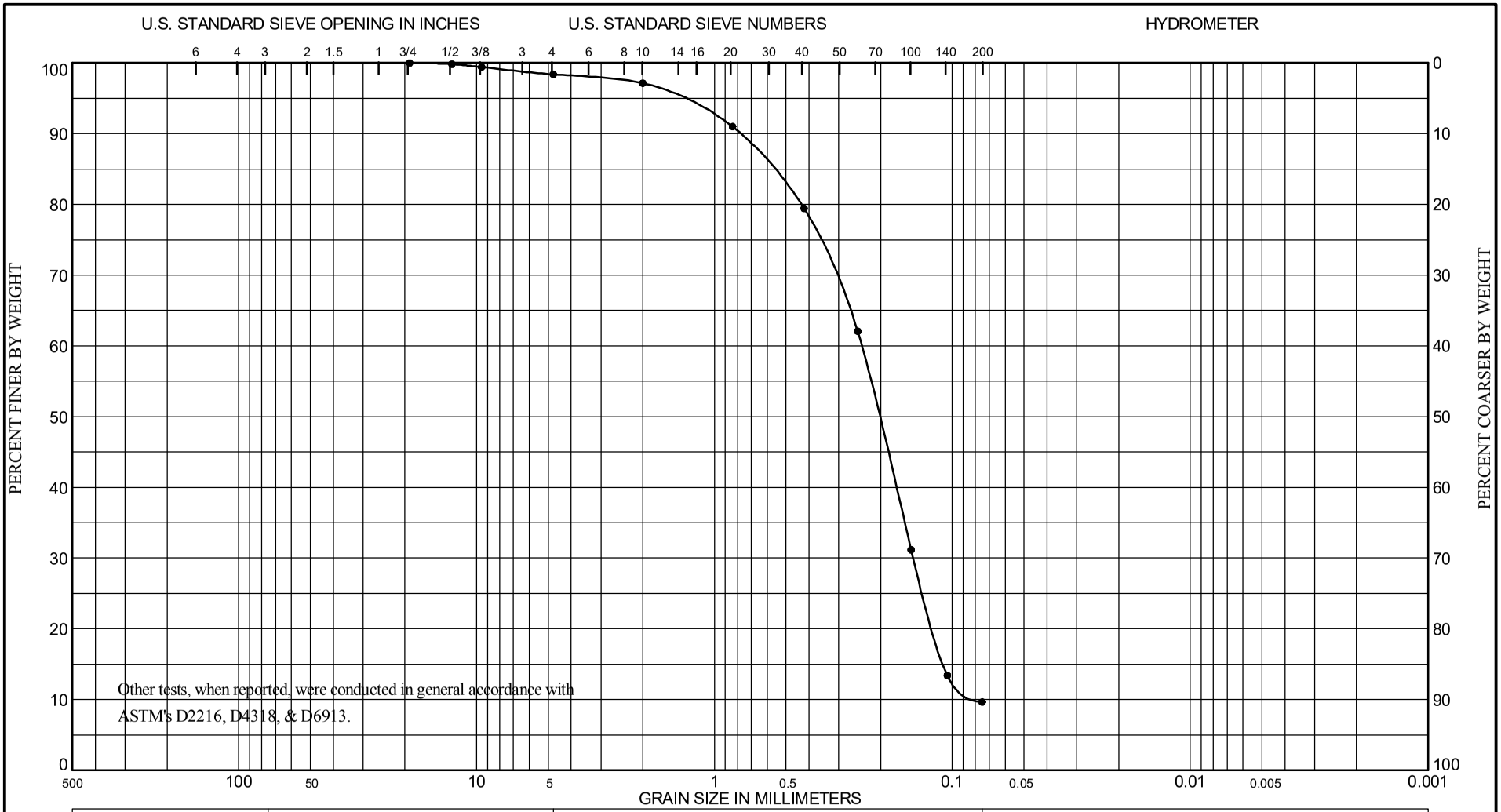
Hole No. BI-PBS-380-13

Date 4/23/14

GRADATION CURVES

DEPARTMENT OF THE ARMY, SAVANNAH DISTRICT, ENVIRONMENTAL AND MATERIALS UNIT
CORPS OF ENGINEERS, 200 N. COBB PARKWAY, BLDG 400 SUITE 404, MARIETTA, GA. 30062

WORK ORDER: 848e
REQUISITION: W33SJG32900192



Sample No.	Depth (ft)	ASTM D2487 Classification	Nat w%	LL	PL	PI
B	2.9 to 4.0	Dark Greenish Gray, Poorly Graded Silty Sand (SP-SM), with a				
		trace of gravel size shell.				

Project MsCIP Barrier Island Restoration

Vibracore Sampling Pascagoula, MS

Lab No. K5/4860

Hole No. BI-PBS-380-13

Date 4/23/14

GRADATION CURVES

SHEET CB-114: PETIT BOIS PASS MISSISSIPPI BORROW AREA BORROW AREA DRILLING LOGS

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Boring Designation BI-PBP-01-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 2 SHEETS
	South Atlantic	Mobile District	

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-MS		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBP-01-12	LOCATION COORDINATES: E = 1,122,455 N = 251,890	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 31.7 Ft.	
		15. DATE BORING	STARTED: 12-08-12 / COMPLETED: 12-08-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -31.1 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 16.3 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Mike FitzHarris, Geologist	

ELEV.	DEPTH	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-31.1	0.0			
-31.7	0.6	SAND, poorly-graded, mostly fine-grained sand-sized quartz, trace silt, brownish gray (SP)	A	Classification: SP Color: 5Y 6/3-pale olive D50: 0.2506 mm % Fines: 2.1
-32.1	1.0		NS	
		CLAY, fat, mostly clay, medium to high plasticity, dark gray (CH)	C	Classification: SP Color: 5Y 7/2-light gray D50: 0.4777 mm % Fines: 1.4
		SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, little shell fragments, trace silt, gray (SP) At El. -32.4 Ft., mostly fine to medium-grained sand-sized quartz, some shell fragments, trace silt, gray	B	Classification: SP Color: 5Y 8/1-white D50: 0.3651 mm % Fines: 1.6
-38.5	7.4	At El. -33.6 Ft., mostly fine-grained sand-sized quartz, trace silt, trace shell fragments, trace clay stringers, lt. gray to white	E	Classification: SP Color: 2.5Y 8.5/1- D50: 0.3686 mm % Fines: 0.9
-40.3	9.2	At El. -37.4 Ft., mostly fine to medium-grained sand-sized quartz, trace silt, lt. gray to white	D	Classification: SP-SM Color: 5Y 5/2-olive gray D50: 0.3369 mm % Fines: 8.2
-42.1	11.0	SAND, poorly-graded with silt, mostly fine-grained sand-sized quartz, few silt, trace shell fragments, dark gray (SP-SM)	NS	
-42.4	11.3			
-42.8	11.7	SAND, silty, mostly fine-grained sand-sized quartz, trace shell fragments, dark gray (SM)	G	Classification: SP Color: 5Y 6/2-light olive gray D50: 0.3452 mm % Fines: 4.1
		CLAY, fat, mostly clay, medium to high plasticity, dark gray (CH)		
		SAND, poorly-graded with silt, mostly fine-grained sand-sized quartz, few silt, clay banding, dark gray (SP-SM)	F	Classification: SP Color: 5Y 6/2-light olive gray D50: 0.3004 mm % Fines: 3.2
-47.4	16.3			
		SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, some shell fragments, trace silt, clay nodules, gray (SP) At El. -44.2 Ft., mostly fine-grained sand-sized quartz, trace silt, trace clay, trace shell fragments, gray to light gray		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

3. Sample intervals do not match up with lithologic intervals because the contractor

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.19192° Long = -88.39588°

DRILLING LOG (Cont. Sheet)	INSTALLATION		SHEET 2 OF 2 SHEETS
	Mobile District		
PROJECT	**COORDINATE SYSTEM/DATUM**	**HORIZONTAL**	**VERTICAL**
MsCIP Barrier Island Restoration	State Plane, MSE (U.S. Ft.)	NAD83	NAVD88
LOCATION COORDINATES	**ELEVATION TOP OF BORING**		
X = 1,122,455 Y = 251,890	-31.1 Ft.		

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
			reversed the tubes on the table during sampling. This caused a disjointed sampling event because there were four five-foot tubes and the tops and bottoms did not match up correctly. The original log was redrawn to correct this situation, but the samples remained from the original, incorrect intervals. Their depths have been adjusted to account for the mix up. The lab sample intervals are incorrect; they match the original sample intervals. 4. Seafloor elevation determined from USACE hydrographic survey completed April 2014.		

30
35
40
45
50
55
60

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.19192° Long = -88.39588°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
SERVICES

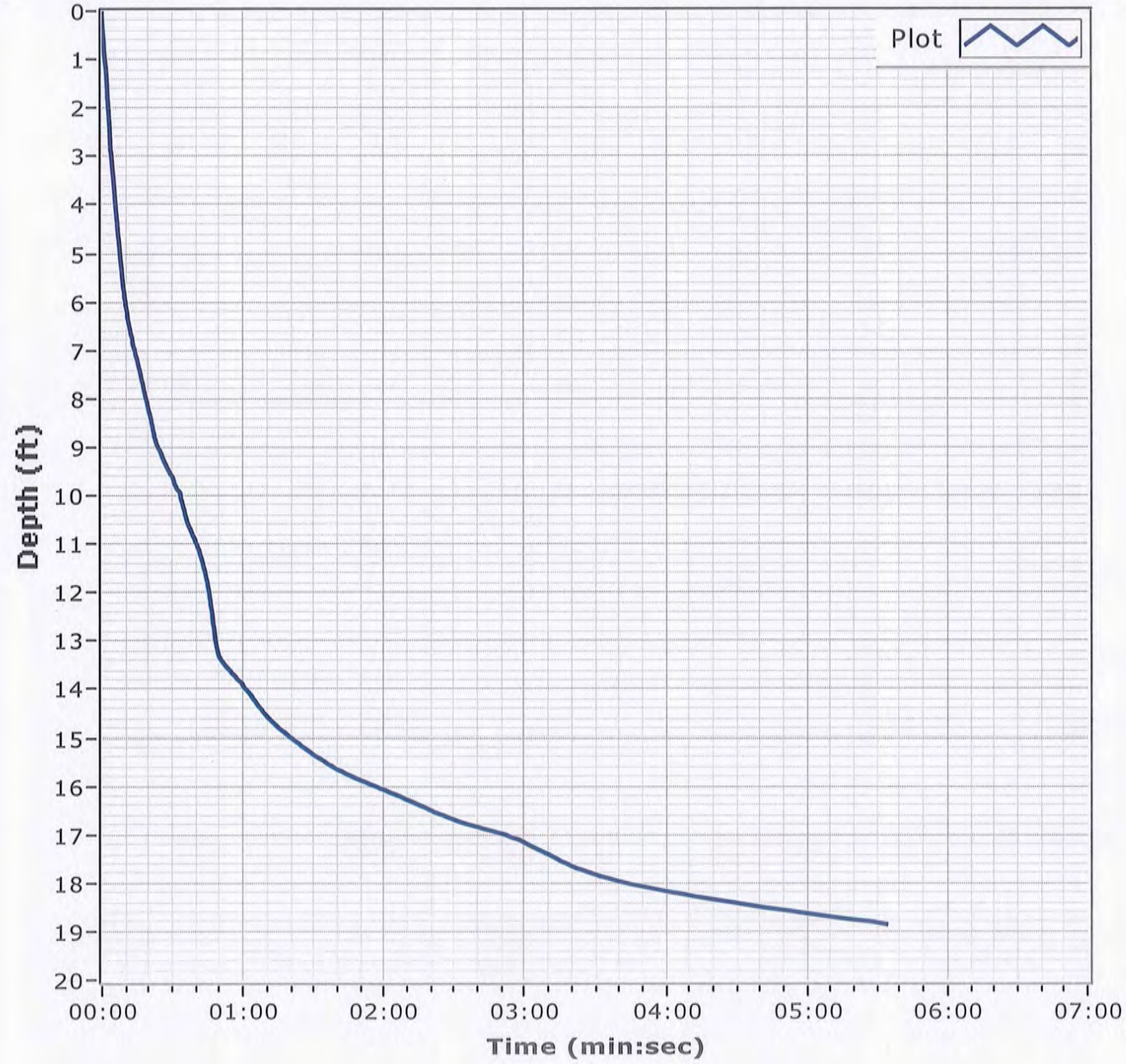
Core Identifier BI-PBP-1-12
Coordinate System
Latitude / Longitude

Date 12/08/2012
Start Time 11:08:23
End Time 11:13:58
Total Time 00:05:34

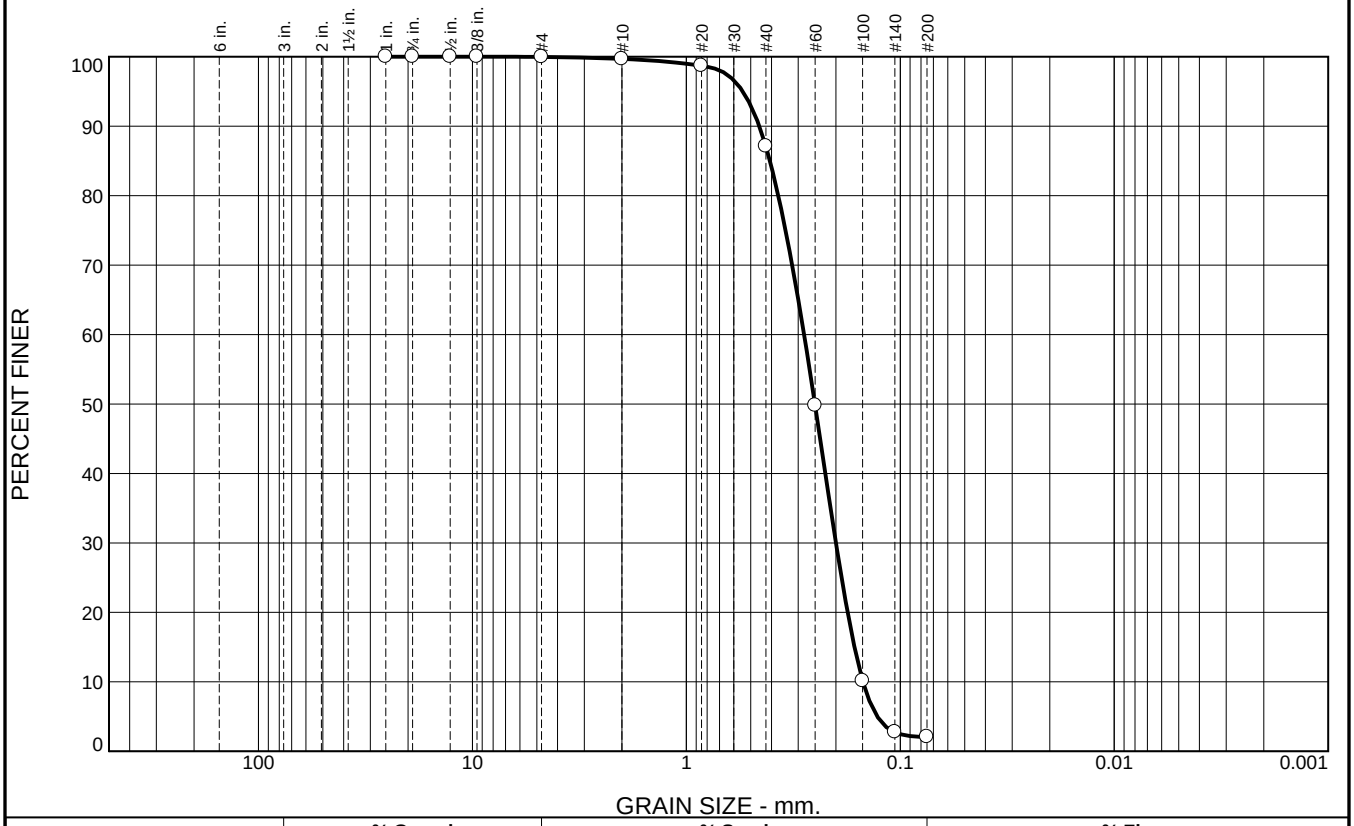
Water Depth 31.7'
Penetration 18.9'
Recovery 16.3'

Latitude 30 11.515
Longitude 088 23.753

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.3	12.6	85.0	2.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	100.0		
#10	99.7		
#20	98.7		
#40	87.1		
#60	49.8		
#100	10.1		
#140	2.8		
#200	2.1		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4561 D_{85}= 0.4068 D_{60}= 0.2818
D_{50}= 0.2506 D_{30}= 0.1999 D_{15}= 0.1639
D_{10}= 0.1495 C_u= 1.88 C_c= 0.95

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-1-12 A
Sample Number: 6482 (20) **Depth:** 0.7' **Date:** 12/12/12

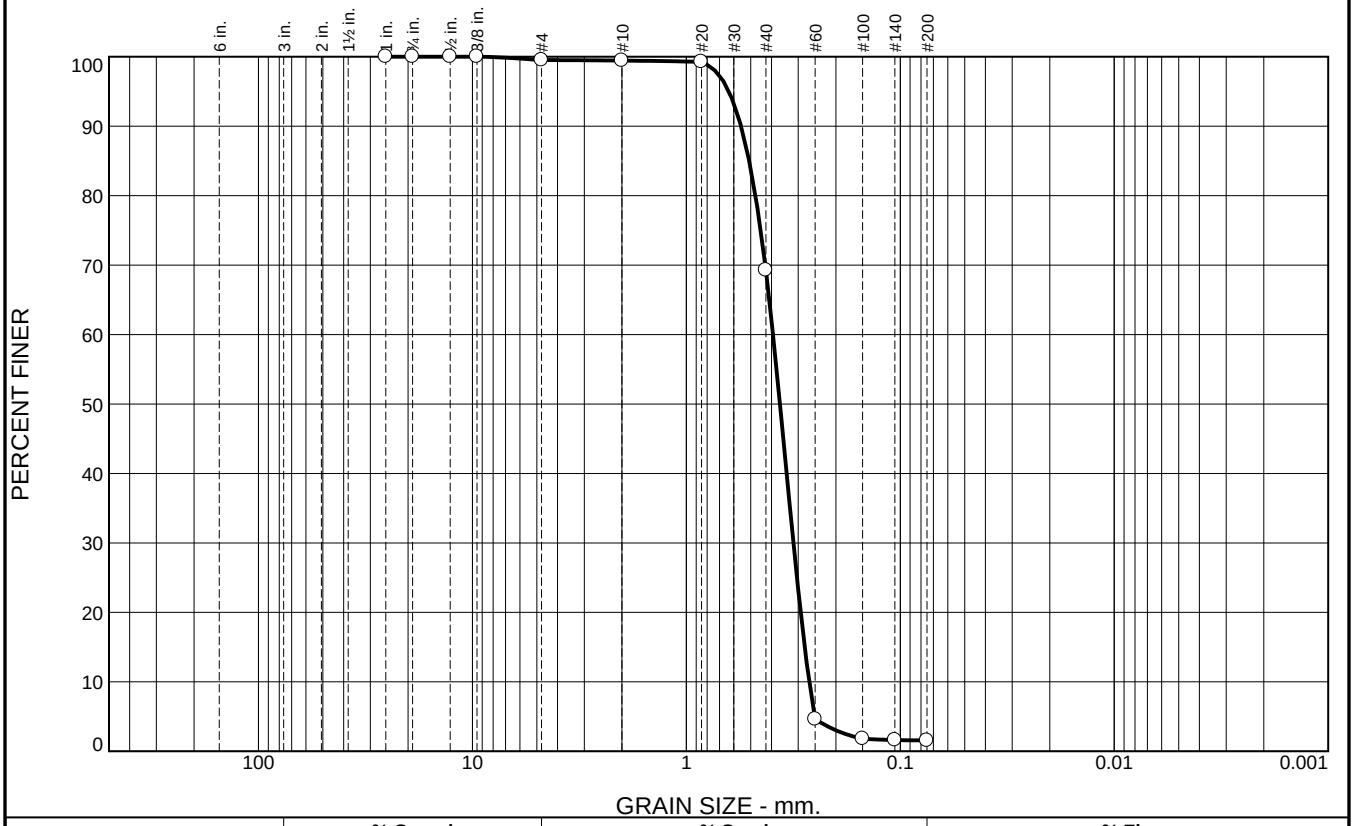
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.5	0.1	30.1	67.7	1.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.5		
#10	99.4		
#20	99.3		
#40	69.3		
#60	4.6		
#100	1.8		
#140	1.6		
#200	1.6		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5551 D_{85}= 0.5088 D_{60}= 0.3935
D_{50}= 0.3651 D_{30}= 0.3160 D_{15}= 0.2801
D_{10}= 0.2668 C_u= 1.47 C_c= 0.95

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-1-12 B
Sample Number: 6482 (21) **Depth:** 1.3' **Date:** 12/12/12

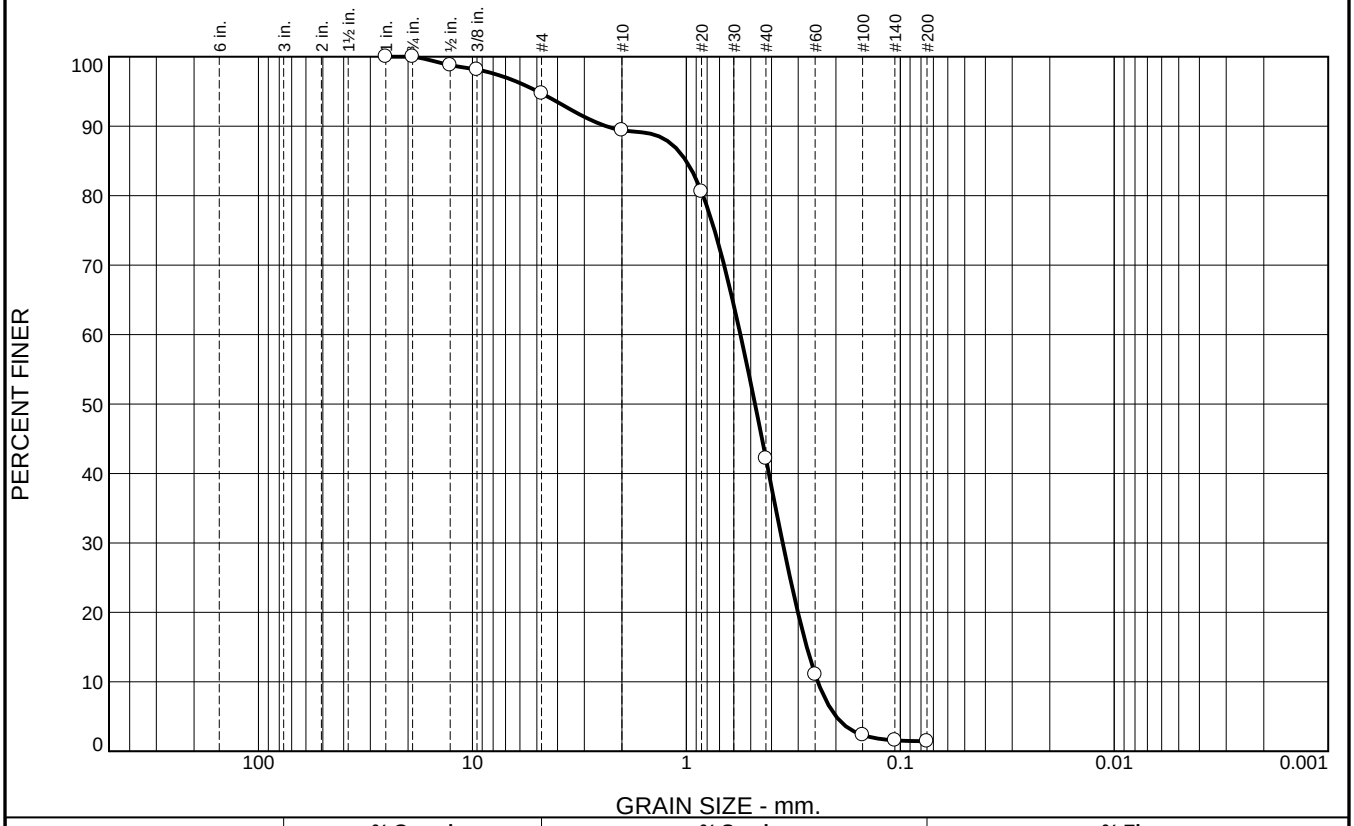
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	5.3	5.3	47.2	40.8	1.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	98.8		
.375	98.1		
#4	94.7		
#10	89.4		
#20	80.6		
#40	42.2		
#60	11.1		
#100	2.4		
#140	1.6		
#200	1.4		

* (no specification provided)

Material Description

Fine to medium grained, SAND, with trace SHELL

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 2.3797 D_{85}= 1.0022 D_{60}= 0.5589
D_{50}= 0.4777 D_{30}= 0.3545 D_{15}= 0.2737
D_{10}= 0.2429 C_u= 2.30 C_c= 0.93

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-1-12 C
Sample Number: 6482 (22) **Depth:** 5.1' **Date:** 12/12/12

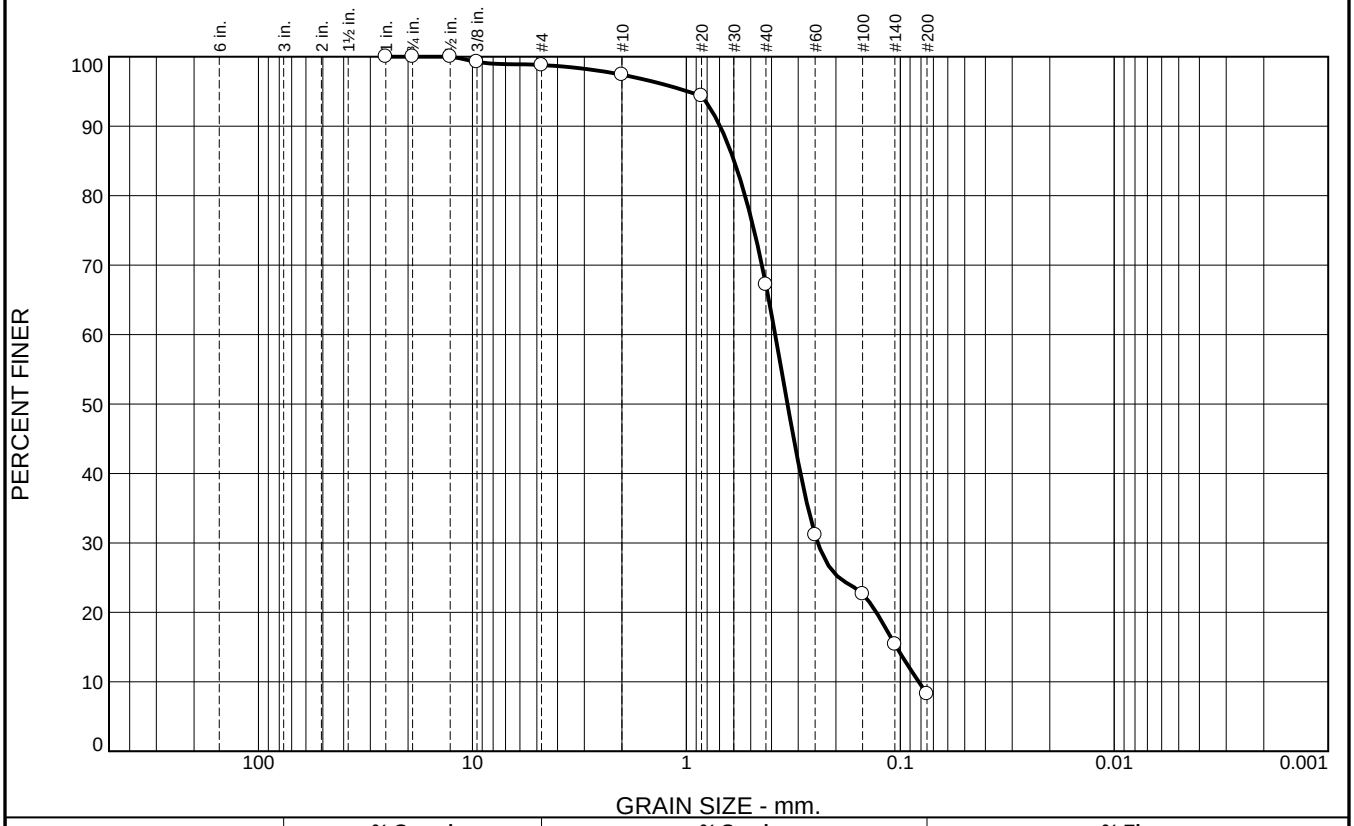
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.2	1.4	30.2	59.0	8.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	99.3		
#4	98.8		
#10	97.4		
#20	94.4		
#40	67.2		
#60	31.2		
#100	22.6		
#140	15.4		
#200	8.2		

* (no specification provided)

Material Description

Fine to medium grained, SLIGHTLY SILTY SAND, with trace SHELL

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6960 D_{85}= 0.5977 D_{60}= 0.3843
D_{50}= 0.3369 D_{30}= 0.2429 D_{15}= 0.1042
D_{10}= 0.0820 C_u= 4.69 C_c= 1.87

Classification

USCS= SP-SM AASHTO=

Remarks

Location: BI-PBP-1-12 D
Sample Number: 6482 (23) **Depth:** 8.4' **Date:** 12/12/12

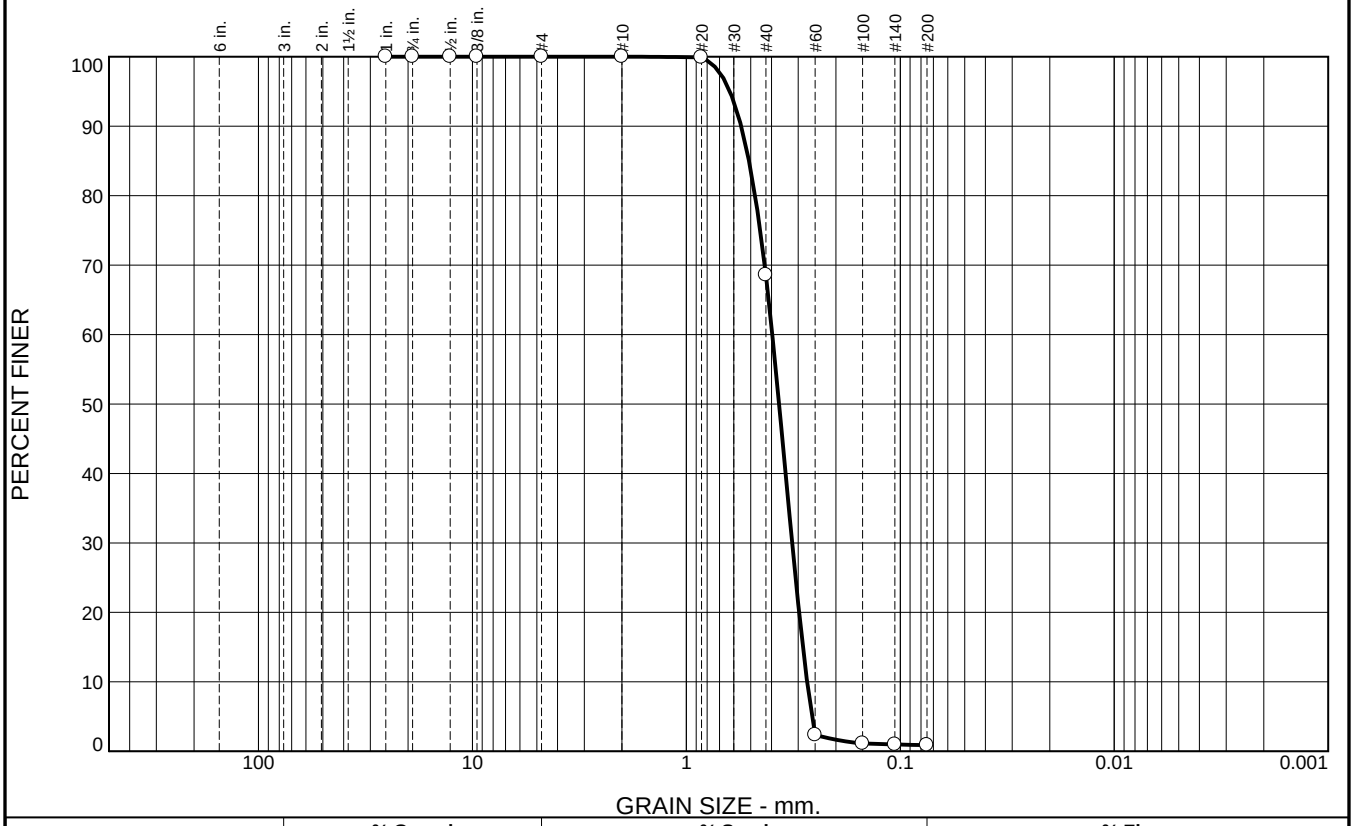
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	31.4	67.7	0.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	100.0		
#10	100.0		
#20	99.9		
#40	68.6		
#60	2.4		
#100	1.1		
#140	1.0		
#200	0.9		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5541 D_{85}= 0.5097 D_{60}= 0.3965
D_{50}= 0.3686 D_{30}= 0.3204 D_{15}= 0.2855
D_{10}= 0.2729 C_u= 1.45 C_c= 0.95

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-1-12 E
Sample Number: 6482 (24) **Depth:** 10.2' **Date:** 12/12/12

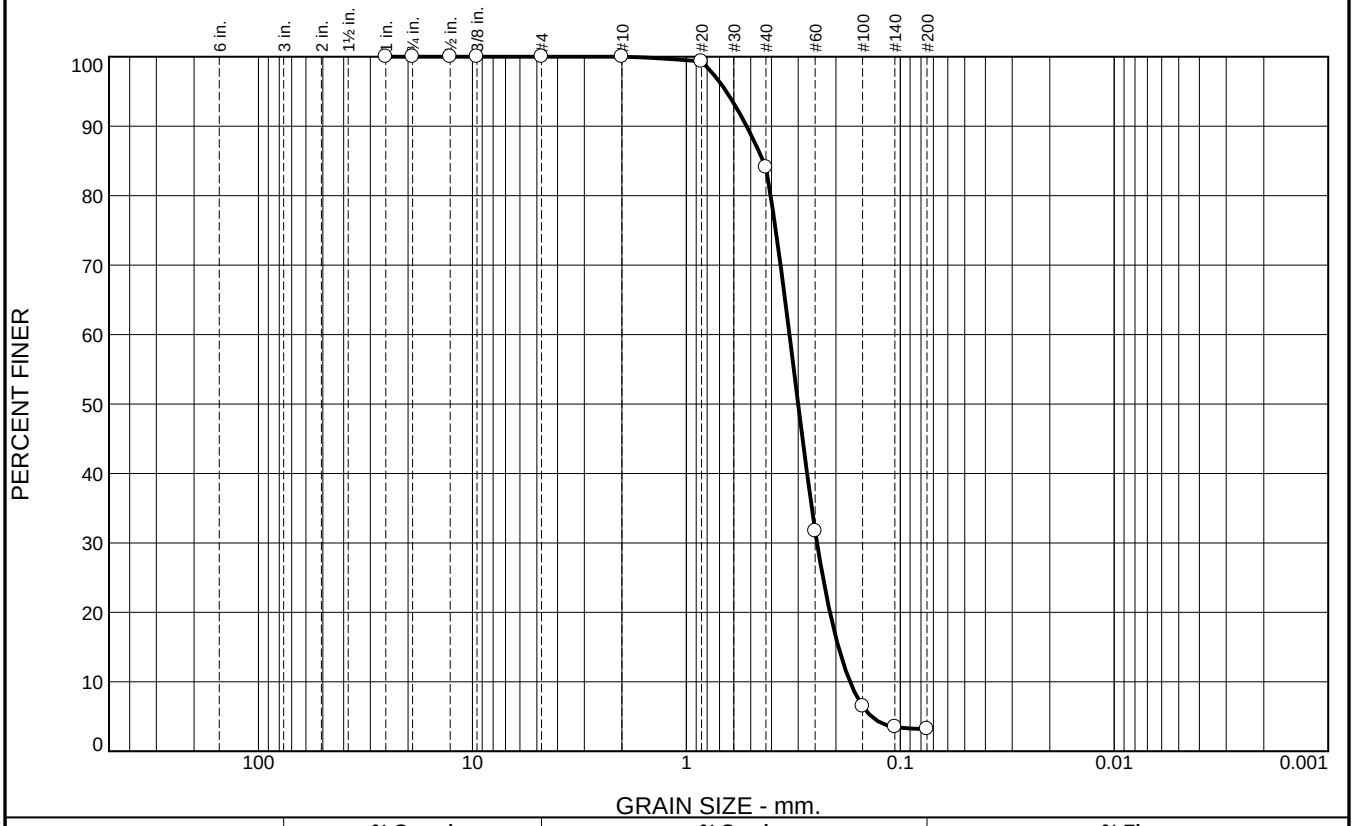
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	15.9	80.9	3.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	100.0		
#10	100.0		
#20	99.3		
#40	84.1		
#60	31.7		
#100	6.5		
#140	3.5		
#200	3.2		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5226 D_{85}= 0.4377 D_{60}= 0.3296
D_{50}= 0.3004 D_{30}= 0.2450 D_{15}= 0.1946
D_{10}= 0.1719 C_u= 1.92 C_c= 1.06

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-1-12 F
Sample Number: 6482 (25) **Depth:** 11.3' **Date:** 12/12/12

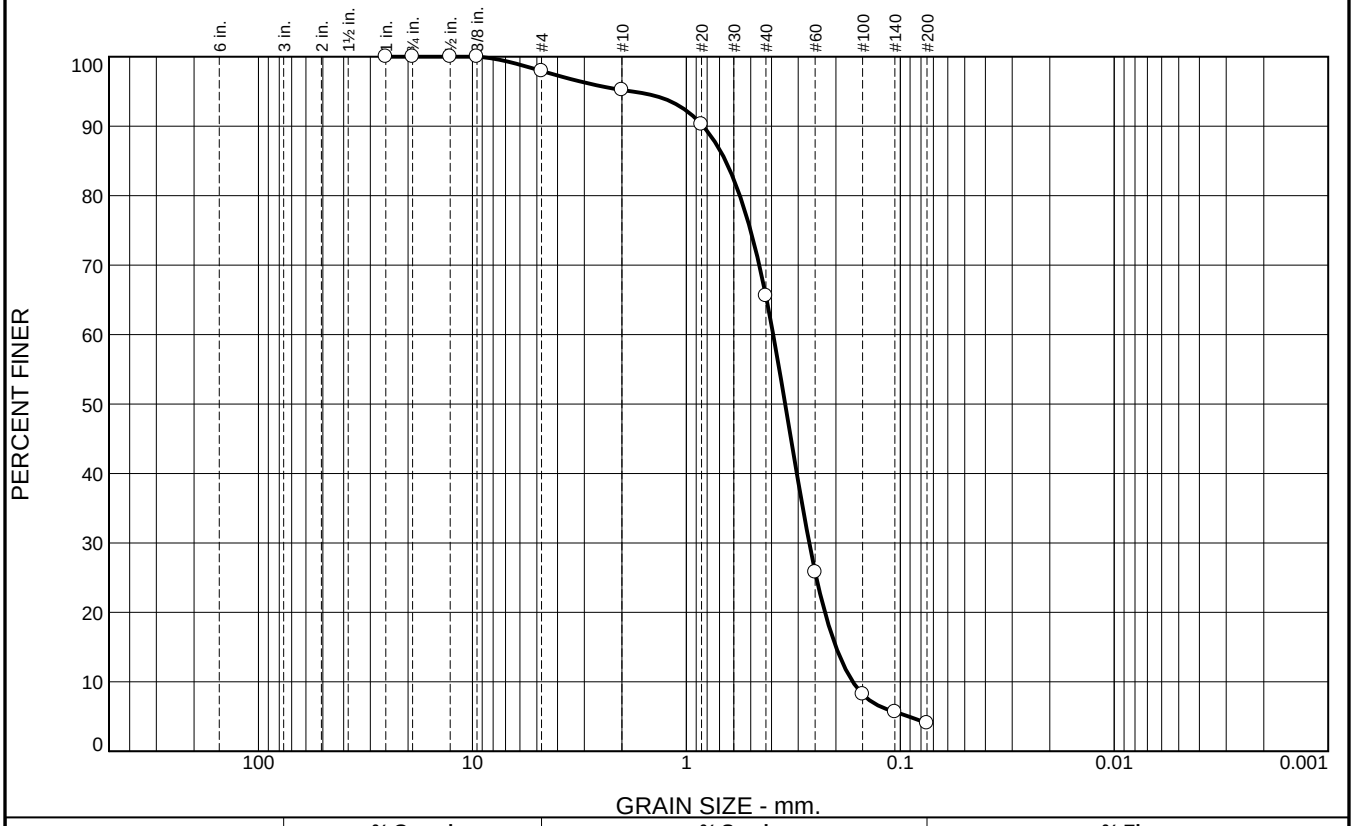
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.1	2.7	29.6	61.5	4.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	97.9		
#10	95.2		
#20	90.3		
#40	65.6		
#60	25.8		
#100	8.2		
#140	5.7		
#200	4.1		

* (no specification provided)

Material Description

Fine to medium grained, SAND, with trace SHELL

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.8355 D_{85}= 0.6555 D_{60}= 0.3926
D_{50}= 0.3452 D_{30}= 0.2666 D_{15}= 0.1998
D_{10}= 0.1668 C_u= 2.35 C_c= 1.08

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-1-12 G
Sample Number: 6482 (26) **Depth:** 14.5' **Date:** 12/12/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBP-02-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET / OF SHEETS
	South Atlantic	Mobile District	SHEET 1 OF 1 SHEETS

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-MS		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBP-02-12	LOCATION COORDINATES: E = 1,123,466 N = 251,916	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 25.8 Ft.	
		15. DATE BORING	STARTED: 12-08-12 / COMPLETED: 12-08-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -24.1 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 15.0 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Mike FitzHarris, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-24.1	0.0				
			SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace fines, trace shell fragments, lt. gray (SP)	A	Classification: SP Color: 5Y 7/2-light gray D50: 0.3198 mm % Fines: 1.1
-29.1	5.0				
-30.1	6.0		SAND, poorly-graded with silt, mostly fine-grained sand-sized quartz, few silt, trace shell fragments, trace clay, lt. gray to gray (SP-SM)	NS	
			SAND, poorly-graded, mostly fine-grained sand-sized quartz, trace shell fragments, silty bands at 7.2 ft. and 7.8 ft., lt. gray (SP)	B	Classification: SP Color: 5Y 6/2-light olive gray D50: 0.2417 mm % Fines: 4.4
			At El. -32.7 Ft., mostly fine to medium-grained sand-sized quartz, little shell fragments, siltier at 10.8 ft. with a clay band at 10.9 ft., lt. gray to gray	C	Classification: SP Color: 5Y 7/2-light gray D50: 0.3588 mm % Fines: 1.7
			At El. -35.1 Ft., mostly fine to medium-grained sand-sized quartz, trace shell fragments, silty band at 12.3 to 12.5 ft., sand grades finer with depth, dense, lt. gray	D	Classification: SP Color: 5Y 7/2-light gray D50: 0.3187 mm % Fines: 2.7
-39.1	15.0				
			NOTES: 1. Soils are field visually classified in accordance with the Unified Soils Classification System. 2. NS = Sample not submitted for laboratory analysis from this interval. 3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.		

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.19198° Long = -88.39268°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
SERVICES

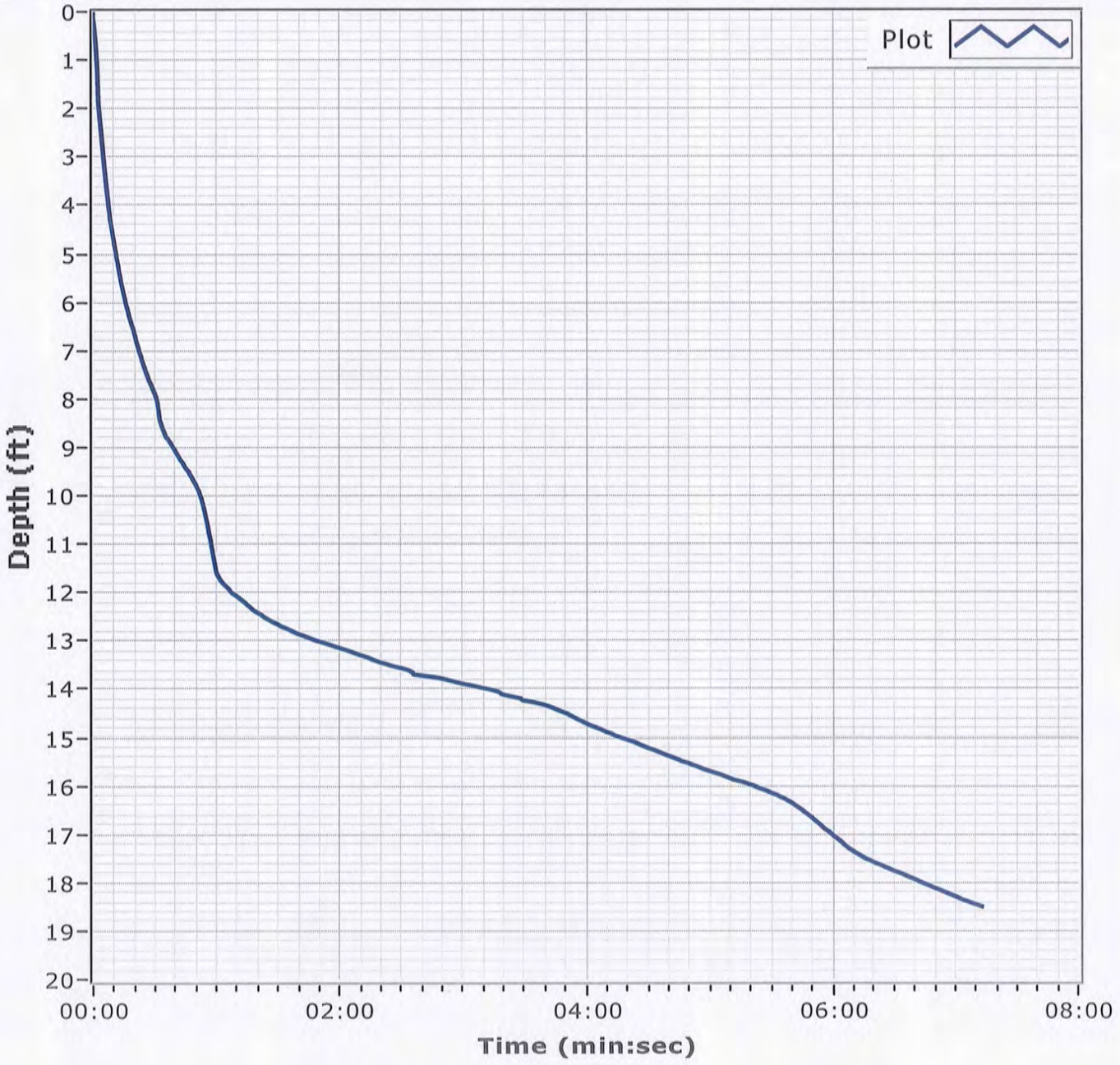
Core Identifier BI-PBP-2-12
Coordinate System
Latitude / Longitude

Date 12/08/2012
Start Time 11:59:54
End Time 12:07:08
Total Time 00:07:13

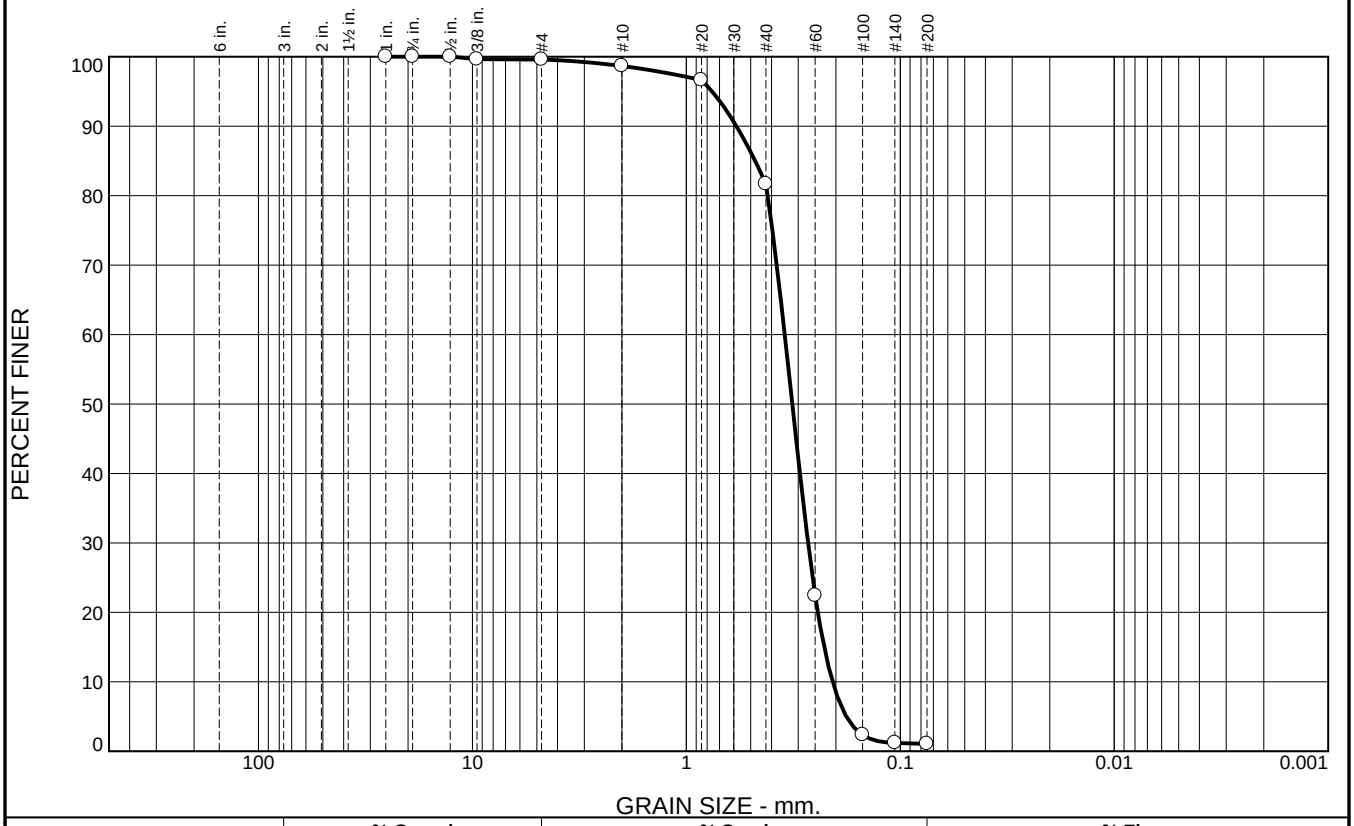
Water Depth 25.8'
Penetration 18.5'
Recovery 15.0'

Latitude 30 11.519
Longitude 088 23.561

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.4	0.9	17.0	80.6	1.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	99.6		
#4	99.6		
#10	98.7		
#20	96.6		
#40	81.7		
#60	22.4		
#100	2.4		
#140	1.2		
#200	1.1		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5836 D_{85}= 0.4771 D_{60}= 0.3468
D_{50}= 0.3198 D_{30}= 0.2699 D_{15}= 0.2269
D_{10}= 0.2073 C_u= 1.67 C_c= 1.01

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-2-12 A
Sample Number: 6482 (27) **Depth:** 0.0' **Date:** 12/12/12

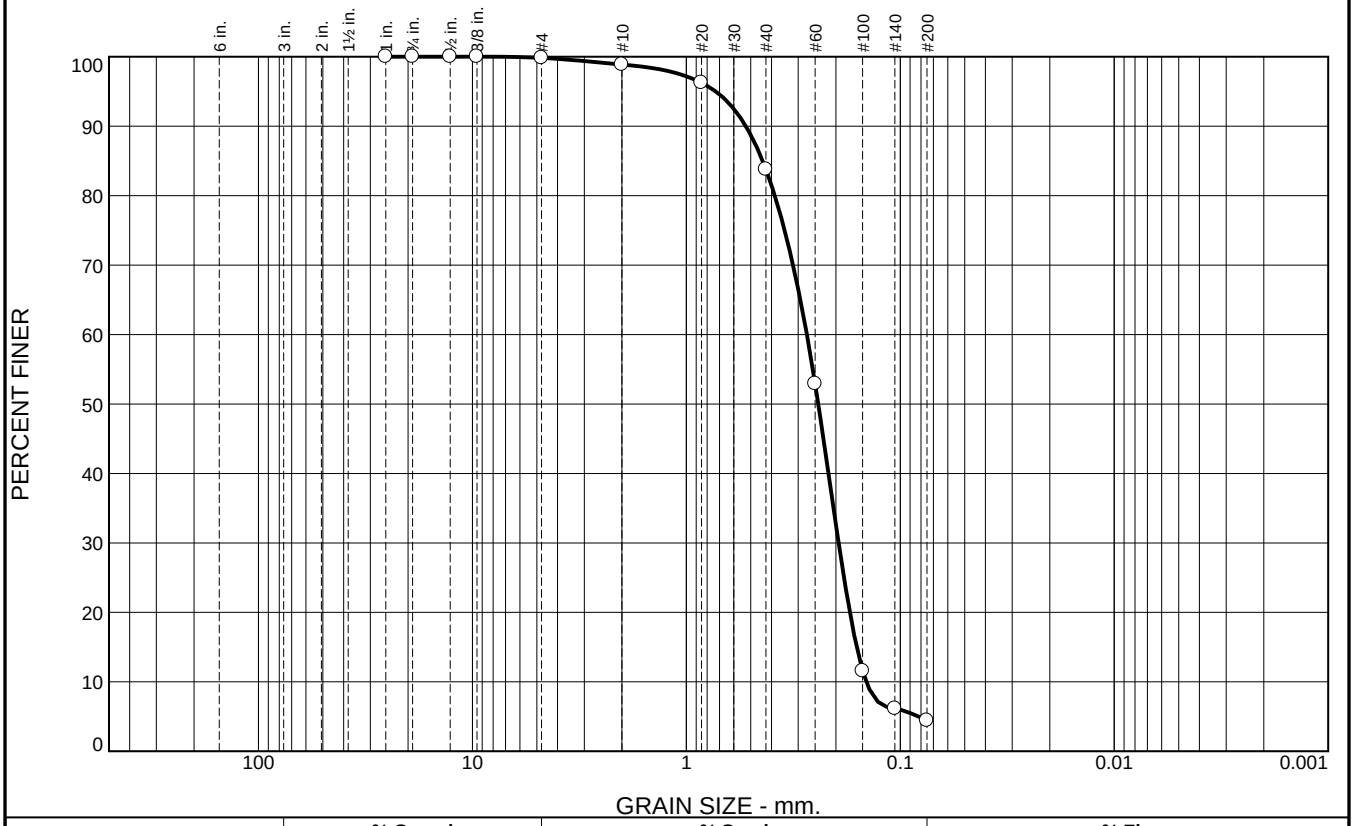
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	0.9	15.1	79.4	4.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.8		
#10	98.9		
#20	96.2		
#40	83.8		
#60	52.9		
#100	11.6		
#140	6.2		
#200	4.4		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5272 D_{85}= 0.4402 D_{60}= 0.2734
D_{50}= 0.2417 D_{30}= 0.1943 D_{15}= 0.1600
D_{10}= 0.1443 C_u= 1.89 C_c= 0.96

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-2-12 B
Sample Number: 6482 (28) **Depth:** 6.0' **Date:** 12/12/12

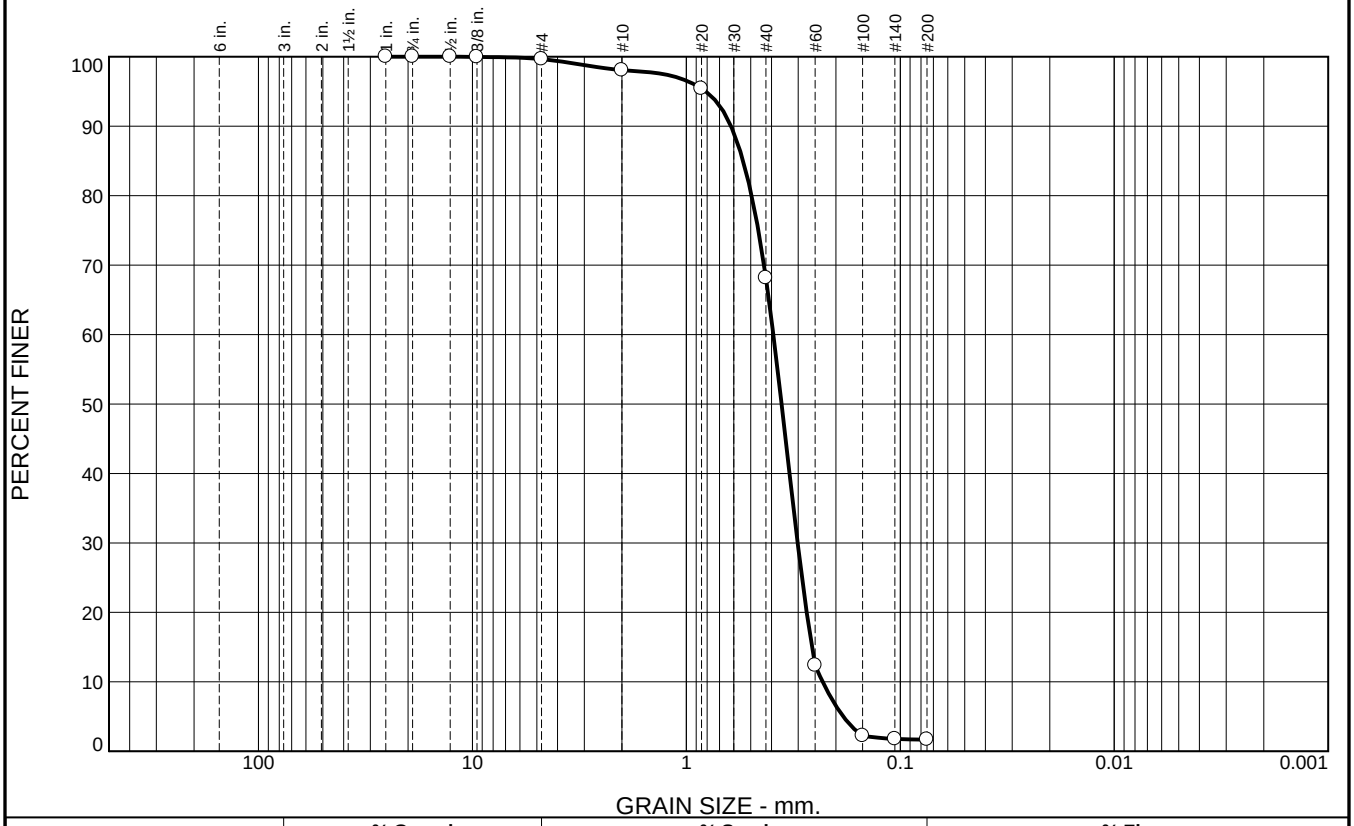
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.4	1.5	29.9	66.5	1.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.6		
#10	98.1		
#20	95.4		
#40	68.2		
#60	12.4		
#100	2.2		
#140	1.8		
#200	1.7		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6180 D_{85}= 0.5426 D_{60}= 0.3920
D_{50}= 0.3588 D_{30}= 0.3020 D_{15}= 0.2589
D_{10}= 0.2305 C_u= 1.70 C_c= 1.01

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-2-12 C
Sample Number: 6482 (29) **Depth:** 8.6' **Date:** 12/12/12

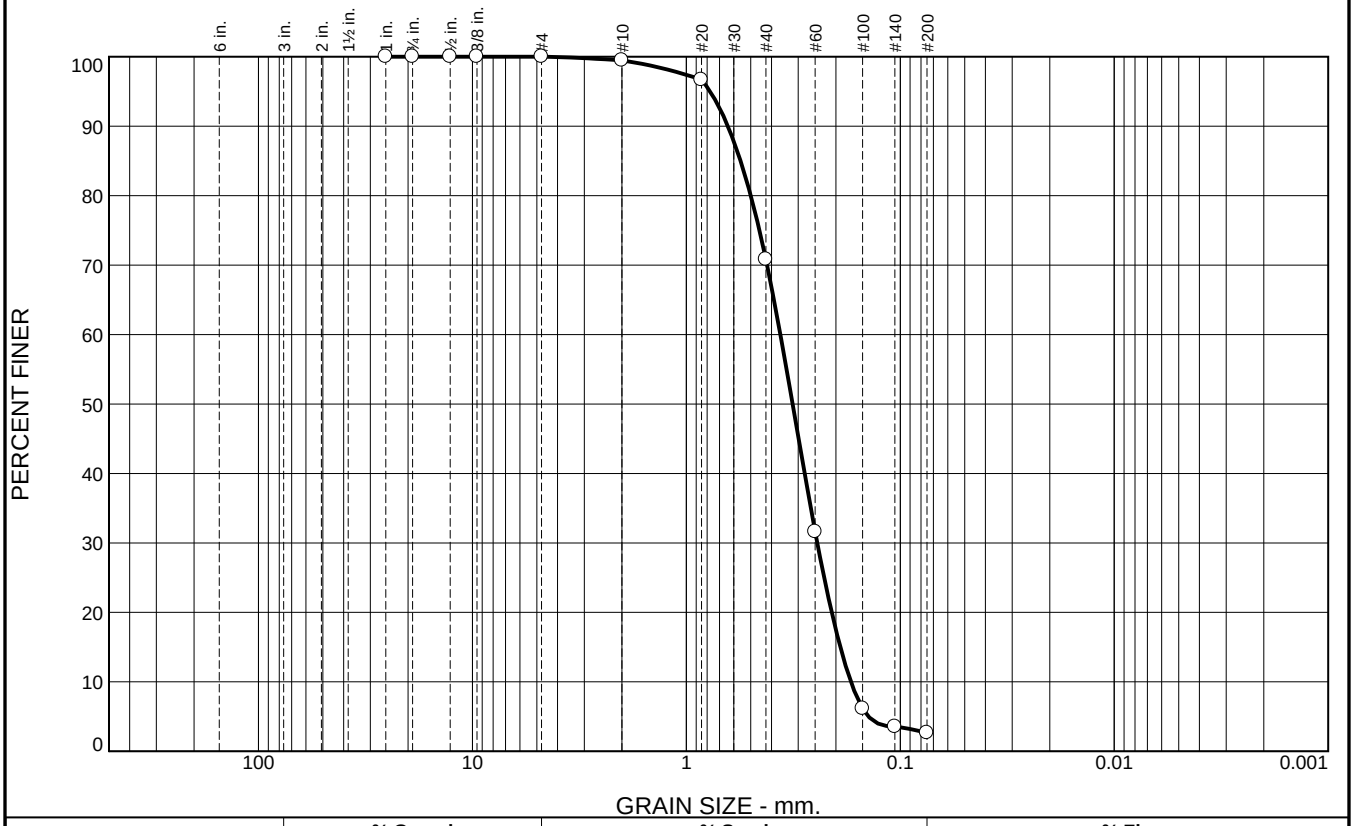
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.5	28.7	68.1	2.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	100.0		
#10	99.5		
#20	96.7		
#40	70.8		
#60	31.6		
#100	6.2		
#140	3.5		
#200	2.7		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6397 D_{85}= 0.5581 D_{60}= 0.3635
D_{50}= 0.3187 D_{30}= 0.2443 D_{15}= 0.1908
D_{10}= 0.1703 C_u= 2.13 C_c= 0.96

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-2-12 D
Sample Number: 6482 (30) **Depth:** 11.0' **Date:** 12/12/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBP-03-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 1 SHEETS
	South Atlantic	Mobile District	

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-MS		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBP-03-12	LOCATION COORDINATES: E = 1,124,344 N = 251,919	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 28.9 Ft.	
		15. DATE BORING	STARTED: 12-08-12 / COMPLETED: 12-08-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -27.4 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 19.0 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Mike FitzHarris, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-27.4	0.0				
-29.2	1.8		SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, little shell fragments, trace fines, gray (SP)	B	Classification: SP Color: 5Y 7/2-light gray D50: 0.3817 mm % Fines: 1
-30.1	2.7		SAND, silty, mostly fine-grained sand-sized quartz, some silt, trace shell fragments, dark gray (SM)	NS	
-30.5	3.1			A	Classification: SP Color: 5Y 7/1-light gray D50: 0.3418 mm % Fines: 1.6
			CLAY, fat, mostly clay, medium to high plasticity, dark gray (CH)	D	Classification: SP Color: 5Y 7/2-light gray D50: 0.3612 mm % Fines: 1.8
-34.5	7.1		SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, few shell fragments, trace silt, lt. gray (SP)	C	Classification: SP Color: 2.5Y 8/1-white D50: 0.2873 mm % Fines: 2.1
-36.0	8.6		At El. -31.4 Ft., mostly fine to medium-grained sand-sized quartz, trace fines, trace shell fragments, lt. gray		
-36.4	9.0		At El. -32.5 Ft., mostly fine-grained sand-sized quartz, trace fines, lt. gray to white		
-38.9	11.5		SAND, silty, mostly fine-grained sand-sized quartz, some silt, trace shell fragments, trace clay stringers, brown (SM)		
-41.4	14.0		SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, little shell fragments, trace fines, lt. brown (SP)	NS	
			SAND, silty, mostly fine-grained sand-sized quartz, some silt, brown (SM)		
			CLAY, lean, mostly clay, some fine-grained sand-sized quartz, trace shell fragments, dark brown to dark gray (CL)		
-46.4	19.0		SAND, clayey, mostly fine-grained sand-sized quartz, some clay, with shelly bands throughout, gray (SC)		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.19198° Long = -88.38990°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
SERVICES

Core Identifier BI-PBP-3-12

Coordinate System
Latitude / Longitude

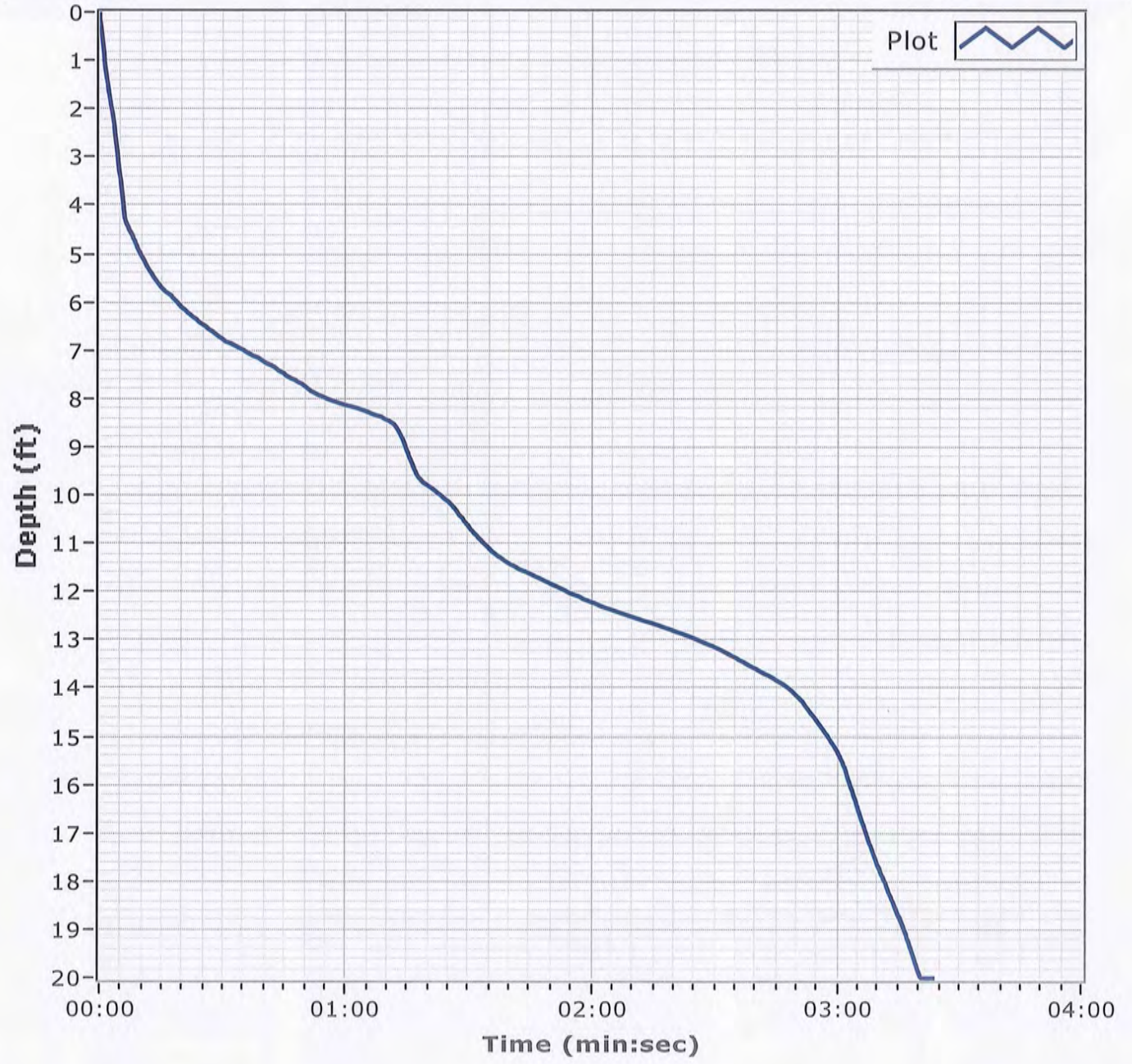
Latitude 30 11.519

Longitude 088 23.396

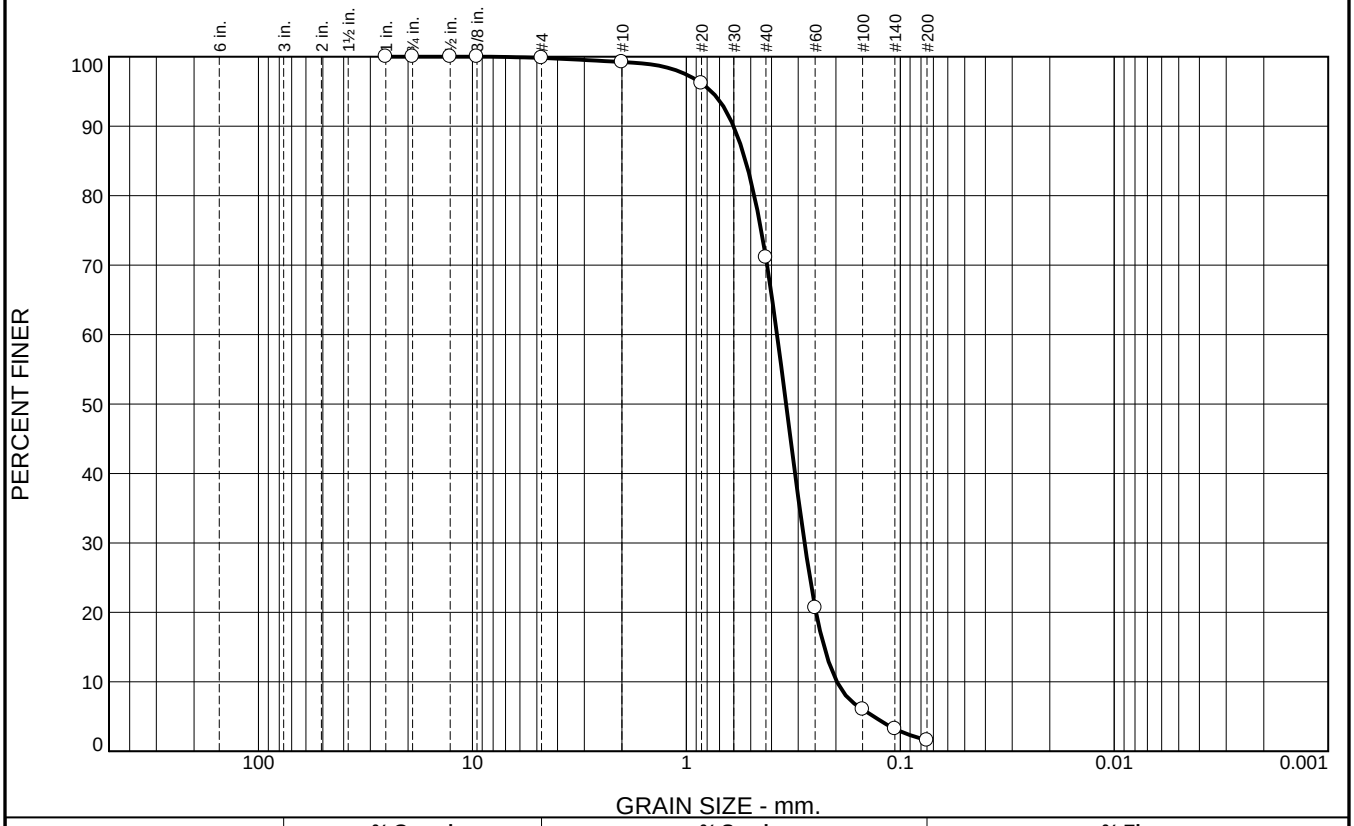
Date 12/08/2012
Start Time 13:05:48
End Time 13:09:12
Total Time 00:03:24

Water Depth 28.9'
Penetration 20.0'
Recovery 19.0'

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	0.6	28.1	69.5	1.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.8		
#10	99.2		
#20	96.2		
#40	71.1		
#60	20.7		
#100	6.0		
#140	3.2		
#200	1.6		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6013 D_{85}= 0.5284 D_{60}= 0.3767
D_{50}= 0.3418 D_{30}= 0.2804 D_{15}= 0.2269
D_{10}= 0.1978 C_u= 1.90 C_c= 1.05

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-3-12 A
Sample Number: 6482 (31) **Depth:** 0.0' **Date:** 12/12/12

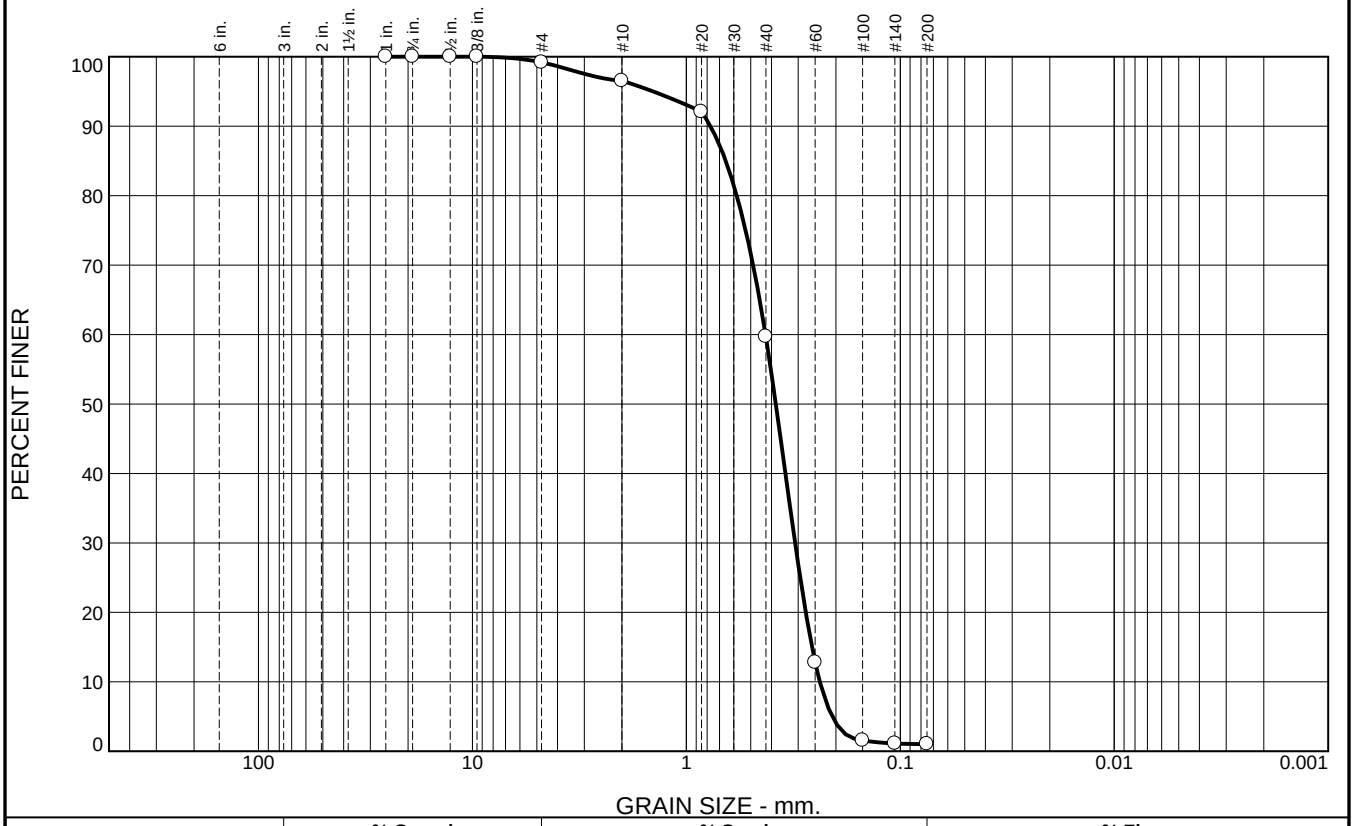
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.8	2.7	36.8	58.7	1.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.2		
#10	96.5		
#20	92.1		
#40	59.7		
#60	12.8		
#100	1.6		
#140	1.1		
#200	1.0		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.7718 D_{85}= 0.6544 D_{60}= 0.4266
D_{50}= 0.3817 D_{30}= 0.3103 D_{15}= 0.2588
D_{10}= 0.2377 C_u= 1.79 C_c= 0.95

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-3-12 B
Sample Number: 6482 (32) **Depth:** 2.2' **Date:** 12/12/12

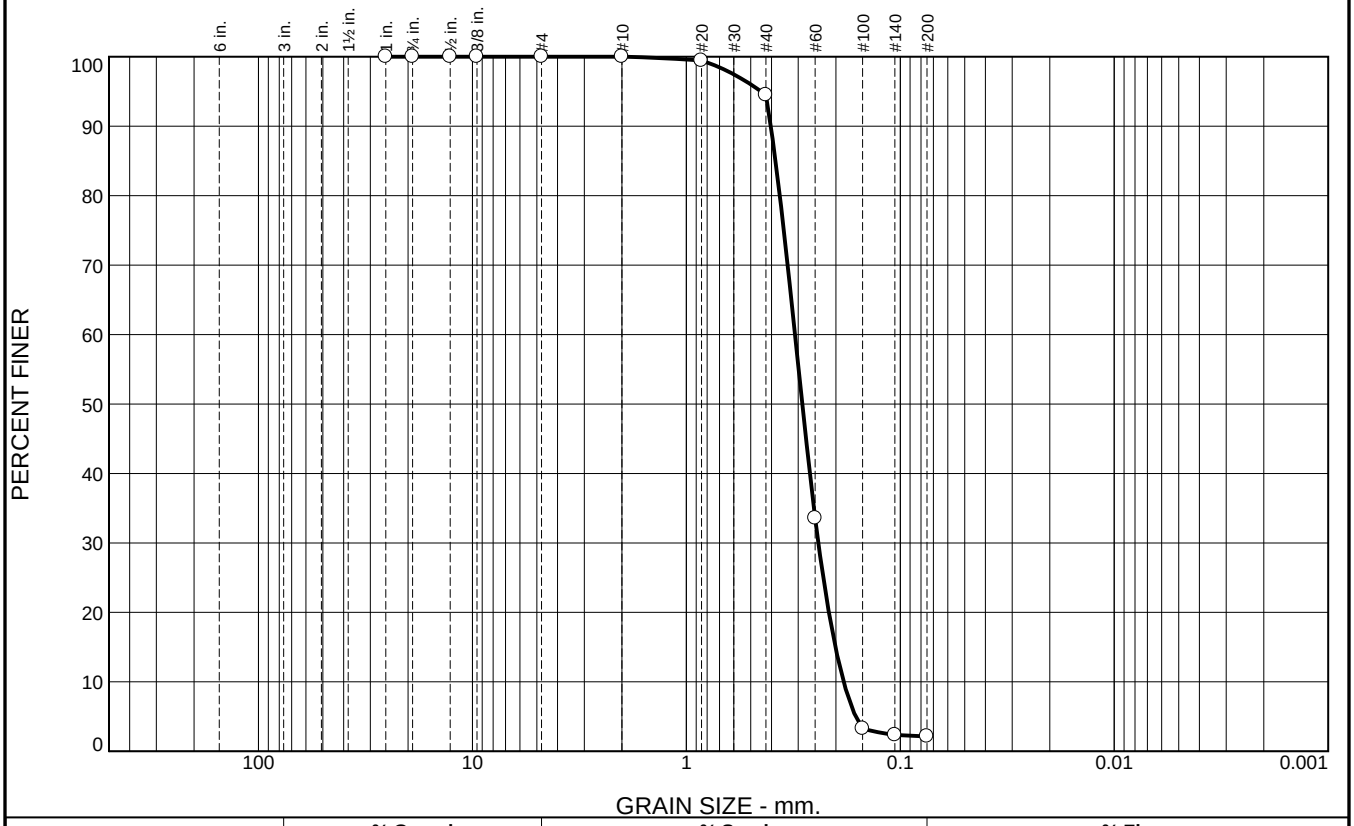
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	5.5	92.4	2.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	100.0		
#10	100.0		
#20	99.4		
#40	94.5		
#60	33.6		
#100	3.3		
#140	2.4		
#200	2.1		

* (no specification provided)

Material Description

Fine grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4028 D_{85}= 0.3828 D_{60}= 0.3107
D_{50}= 0.2873 D_{30}= 0.2415 D_{15}= 0.2011
D_{10}= 0.1841 C_u= 1.69 C_c= 1.02

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-3-12 C
Sample Number: 6482 (33) **Depth:** 5.9' **Date:** 12/12/12

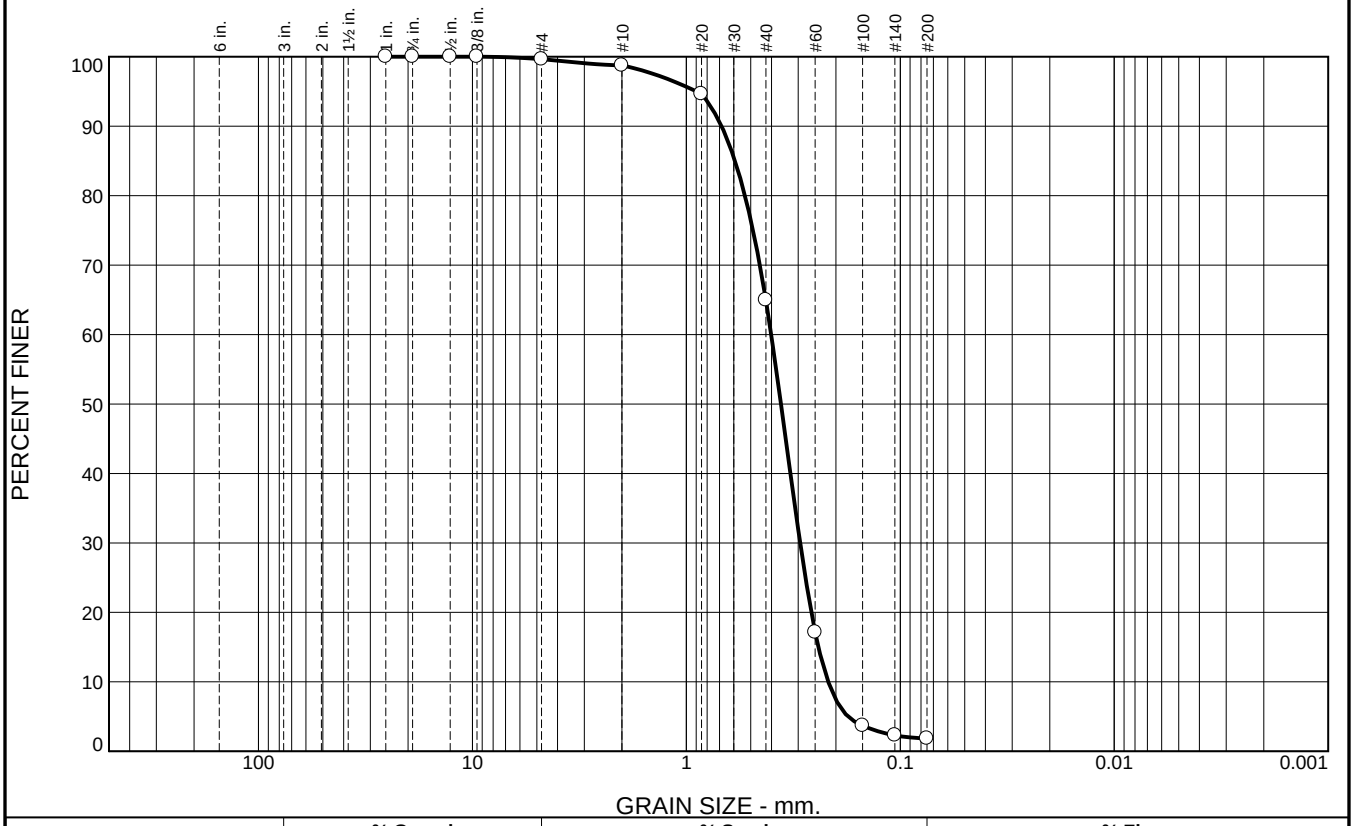
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.4	0.8	33.8	63.2	1.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.6		
#10	98.8		
#20	94.6		
#40	65.0		
#60	17.1		
#100	3.7		
#140	2.3		
#200	1.8		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6848 D_{85}= 0.5922 D_{60}= 0.4013
D_{50}= 0.3612 D_{30}= 0.2940 D_{15}= 0.2414
D_{10}= 0.2171 C_u= 1.85 C_c= 0.99

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-3-12 D
Sample Number: 6482 (34) **Depth:** 7.9' **Date:** 12/12/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBP-04-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET / OF
	South Atlantic	Mobile District	SHEET 1 OF 1 SHEETS

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-MS		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBP-04-12	LOCATION COORDINATES: E = 1,122,984 N = 250,768	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL: / BEARING:	14. WATER DEPTH: 32.3 Ft.	
		15. DATE BORING	STARTED: 12-22-12 / COMPLETED: 12-22-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -31.6 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 15.0 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Mike FitzHarris, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-31.6	0.0				
			SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace fines, trace shell fragments, slightly silty at 3.1 ft., gray (SP)	A	Classification: SP-SM Color: 5Y 6/2-light olive gray D50: 0.2498 mm % Fines: 5.6
-35.9	4.3				
			SAND, clayey, mostly fine-grained sand-sized quartz, some clay, trace shell fragments, clay band at 5.1 ft., gray (SC)	NS	
-38.9	7.3				
			SAND, silty, mostly fine-grained sand-sized quartz, some silt, gray (SM)		
-41.6	10.0				
			SILT, inorganic-L, mostly silt, some fine-grained sand-sized quartz, little clay, brown grading to gray (ML)		
-43.4	11.8				
			SAND, poorly-graded with silt, mostly fine-grained sand-sized quartz, some silt, few clay stringers, gray (SP-SM)		
-46.6	15.0				
			NOTES: 1. Soils are field visually classified in accordance with the Unified Soils Classification System. 2. NS = Sample not submitted for laboratory analysis from this interval. 3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.		

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.18883° Long = -88.39422°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
SERVICES

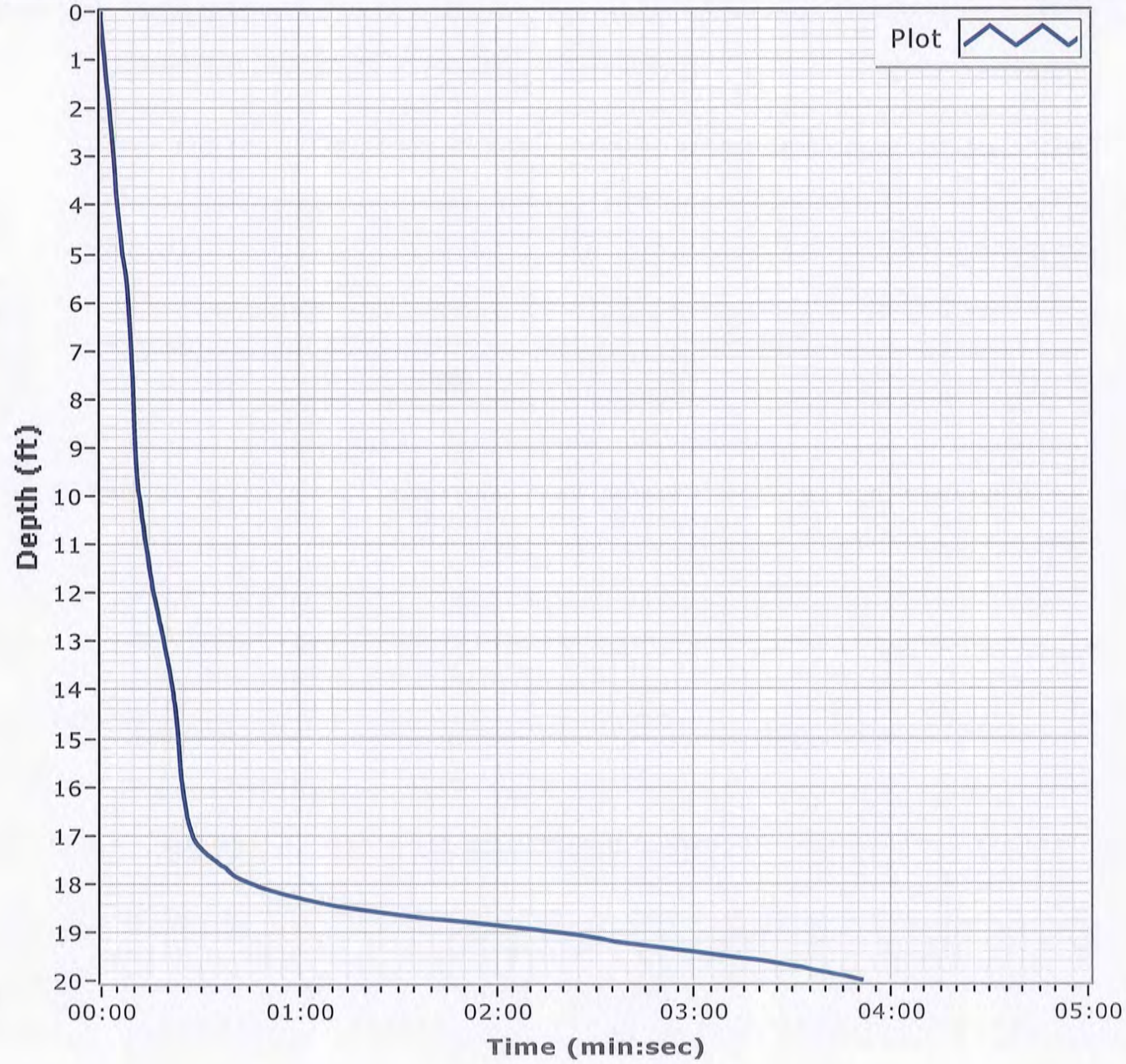
Core Identifier BI-PBP-4-12
Coordinate System
Latitude / Longitude

Latitude 30 11.330
Longitude 088 23.653

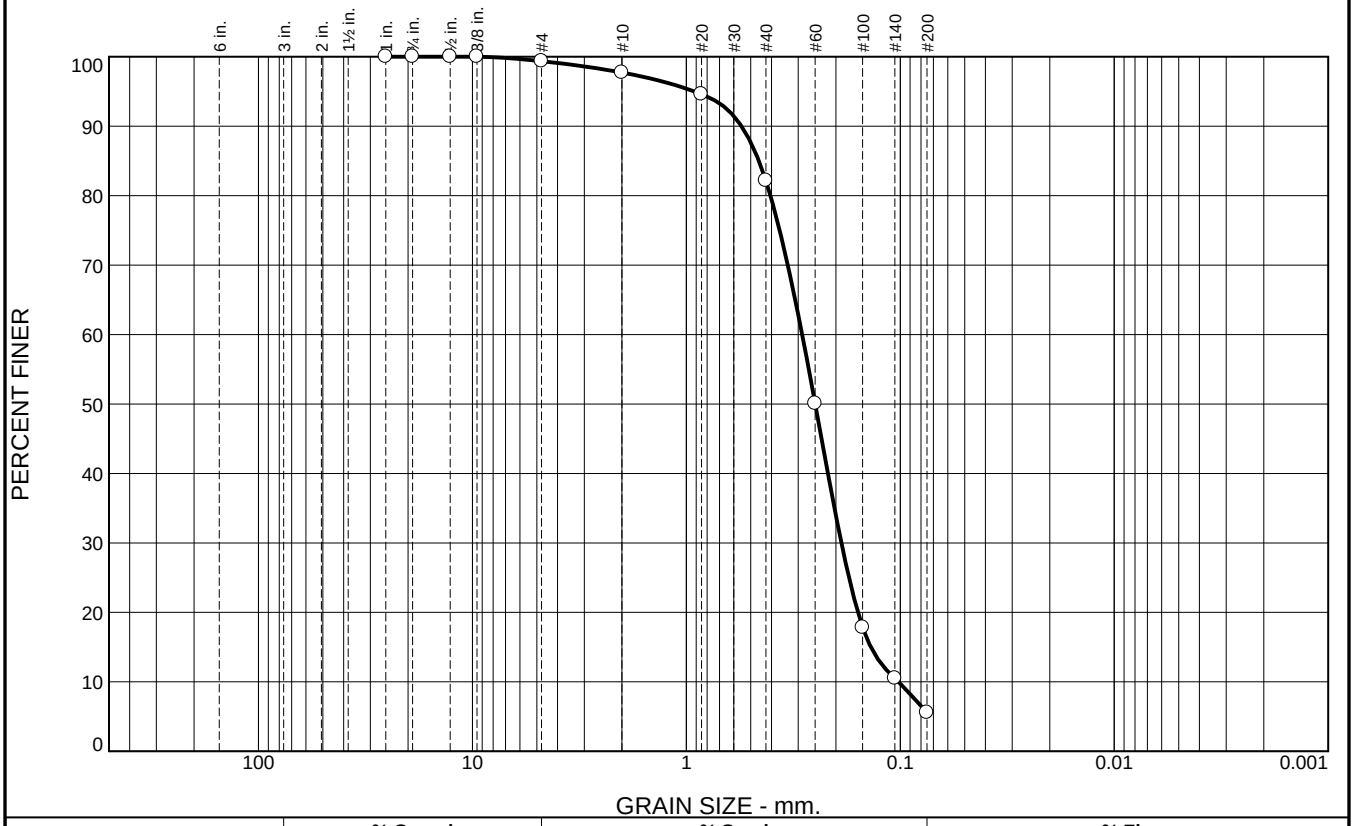
Date 12/22/2012
Start Time 14:55:19
End Time 14:59:11
Total Time 00:03:51

Water Depth 32.3'
Penetration 20.0'
Recovery 15.0'

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.7	1.6	15.5	76.6	5.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.3		
#10	97.7		
#20	94.6		
#40	82.2		
#60	50.1		
#100	17.8		
#140	10.5		
#200	5.6		

* (no specification provided)

Material Description

Fine to medium grained, SLIGHTLY SILTY SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5525 D_{85}= 0.4583 D_{60}= 0.2877
D_{50}= 0.2498 D_{30}= 0.1886 D_{15}= 0.1374
D_{10}= 0.1021 C_u= 2.82 C_c= 1.21

Classification

USCS= SP-SM AASHTO=

Remarks

Location: BI-PBP-4-12 A
Sample Number: 6495 (20) **Depth:** 0.0' **Date:** 12/31/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBP-05-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 1 SHEETS
	South Atlantic	Mobile District	

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-MS		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBP-05-12	LOCATION COORDINATES: E = 1,123,963 N = 250,798	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL: / BEARING:	14. WATER DEPTH: 31.2 Ft.	
		15. DATE BORING	STARTED: 12-08-12 / COMPLETED: 12-08-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -29.5 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 16.8 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Mike FitzHarris, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-29.5	0.0				
-34.0	4.5		SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace shell fragments, lt. gray (SP)	A	Classification: SP Color: 5Y 7/2-light gray D50: 0.2748 mm % Fines: 1.8
-35.7	6.2		SHELL, mostly shell fragments, clay band at 5.2 to 5.4 ft., gray	NS	
-36.7	7.2		SAND, poorly-graded with silt, mostly fine-grained sand-sized quartz, few silt, lt. gray to gray (SP-SM)	B	Classification: SP-SM Color: 5Y 7/2-light gray D50: 0.2448 mm % Fines: 5.4
-39.5	10.0		CLAY, lean, mostly clay, some fine-grained sand-sized quartz, trace shell fragments, gray (CL)		
-42.1	12.6		SAND, silty, mostly fine-grained sand-sized quartz, some silt, lt. brown to gray (SM)	NS	
-42.9	13.4		CLAY, lean, mostly clay, some fine-grained sand-sized quartz, trace shell fragments, low to medium plasticity, dark gray (CL)		
-45.6	16.1		SAND, silty, mostly fine-grained sand-sized quartz, some silt, trace shell fragments, dark gray (SM)		
-46.3	16.8		SAND, poorly-graded, mostly fine-grained sand-sized quartz, trace silt, lt. gray (SP)		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.18890° Long = -88.39112°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
SERVICES

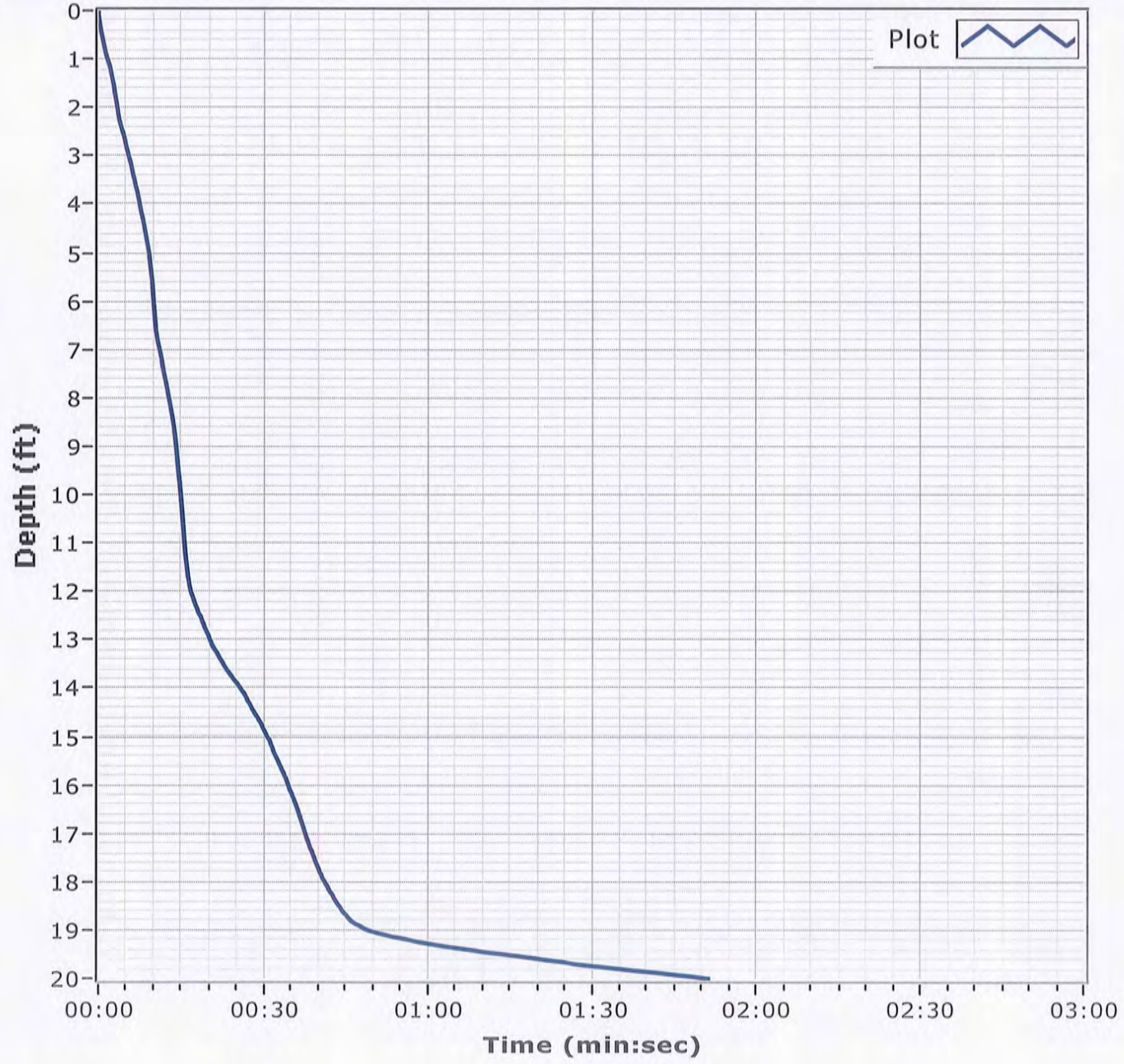
Core Identifier BI-PBP-5-12
Coordinate System
Latitude / Longitude

Date 12/08/2012
Start Time 14:51:14
End Time 14:53:06
Total Time 00:01:51

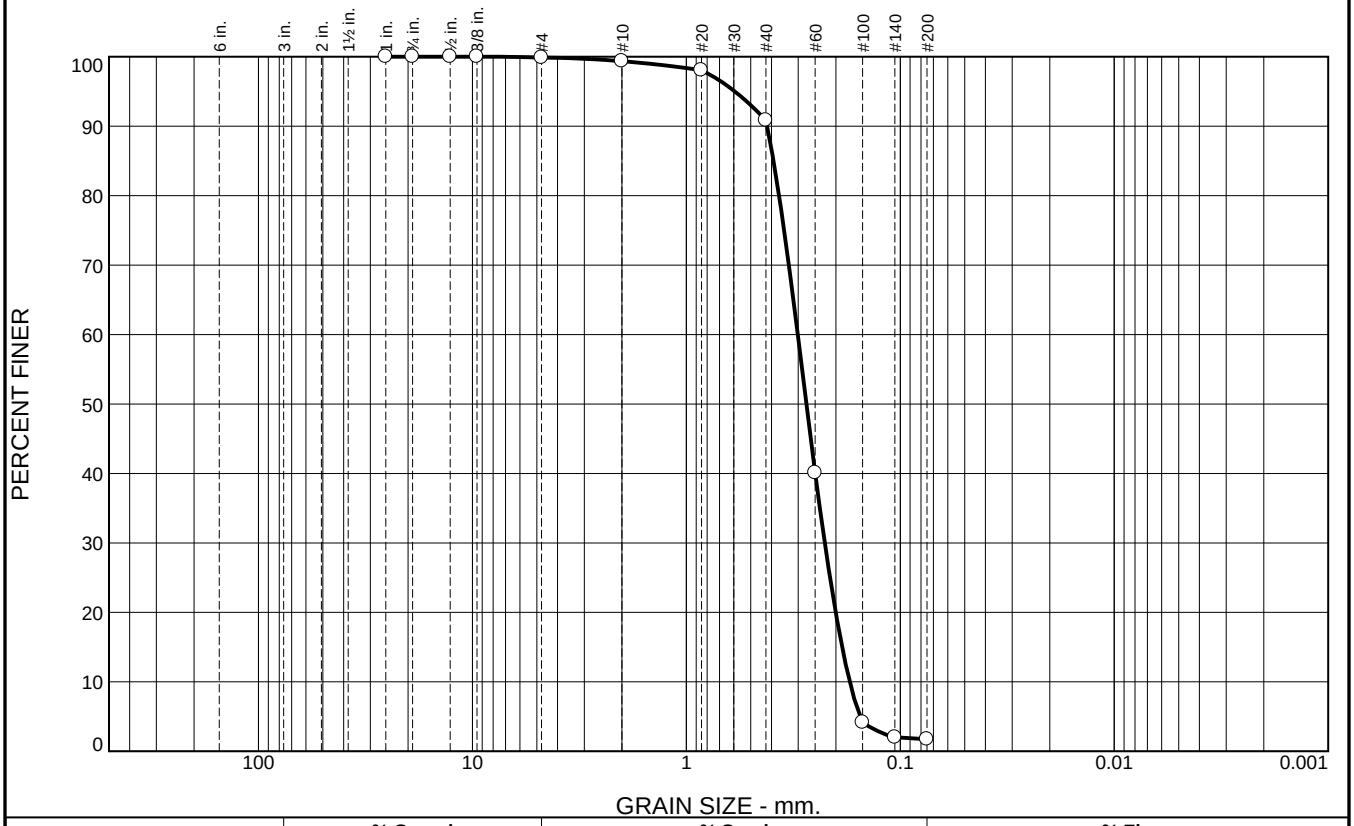
Water Depth 31.2'
Penetration 20.0'
Recovery 16.8'

Latitude 30 11.467
Longitude 088 23.334

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.5	8.6	89.0	1.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.9		
#10	99.4		
#20	98.1		
#40	90.8		
#60	40.1		
#100	4.1		
#140	2.0		
#200	1.8		

* (no specification provided)

Material Description

Fine grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4194 D_{85}= 0.3911 D_{60}= 0.3016
D_{50}= 0.2748 D_{30}= 0.2254 D_{15}= 0.1871
D_{10}= 0.1725 C_u= 1.75 C_c= 0.98

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-5-12 A
Sample Number: 6482 (35) **Depth:** 0.0' **Date:** 12/12/12

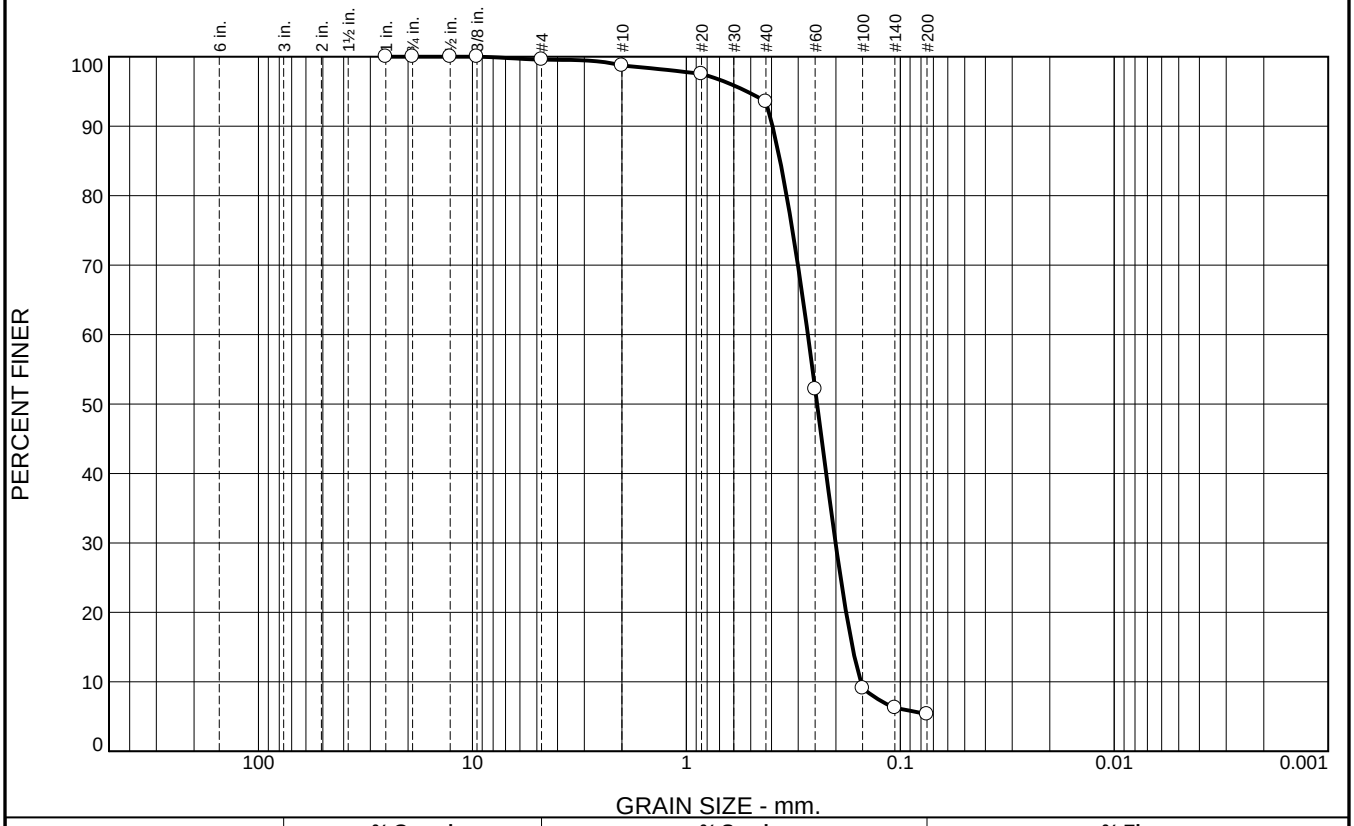
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.4	0.9	5.2	88.1	5.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.6		
#10	98.7		
#20	97.5		
#40	93.5		
#60	52.2		
#100	9.1		
#140	6.3		
#200	5.4		

* (no specification provided)

Material Description

Fine grained, SLIGHTLY SILTY SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3954 D_{85}= 0.3643 D_{60}= 0.2705
D_{50}= 0.2448 D_{30}= 0.2008 D_{15}= 0.1675
D_{10}= 0.1533 C_u= 1.76 C_c= 0.97

Classification

USCS= SP-SM AASHTO=

Remarks

Location: BI-PBP-5-12 B
Sample Number: 6482 (36) **Depth:** 6.2' **Date:** 12/12/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBP-06-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET / OF
	South Atlantic	Mobile District	SHEET 1 OF 1 SHEETS

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-MS		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBP-06-12	LOCATION COORDINATES: E = 1,125,039 N = 251,911	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 33 Ft.	
		15. DATE BORING	STARTED: 12-08-12 / COMPLETED: 12-08-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -31.5 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 6.8 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Mike FitzHarris, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-31.5	0.0				
-34.9	3.4		SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, some shell fragments, trace silt, clay pocket at 0.2, gray to lt. gray (SP)	A	Classification: SP Color: 5Y 7/2-light gray D50: 0.3322 mm % Fines: 2.1
-36.2	4.7		CLAY, fat, mostly clay, some sand, trace shell fragments, medium to high plasticity, greenish gray (CH)	NS	
-38.3	6.8		SAND, silty, mostly fine-grained sand-sized quartz, some silt, dark brown band at 5.3 ft., dense sand, pale brown (SM)	B	Classification: SP Color: 2.5Y 5/2-grayish brown D50: 0.24 mm % Fines: 2.7

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.19195° Long = -88.38770°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
SERVICES

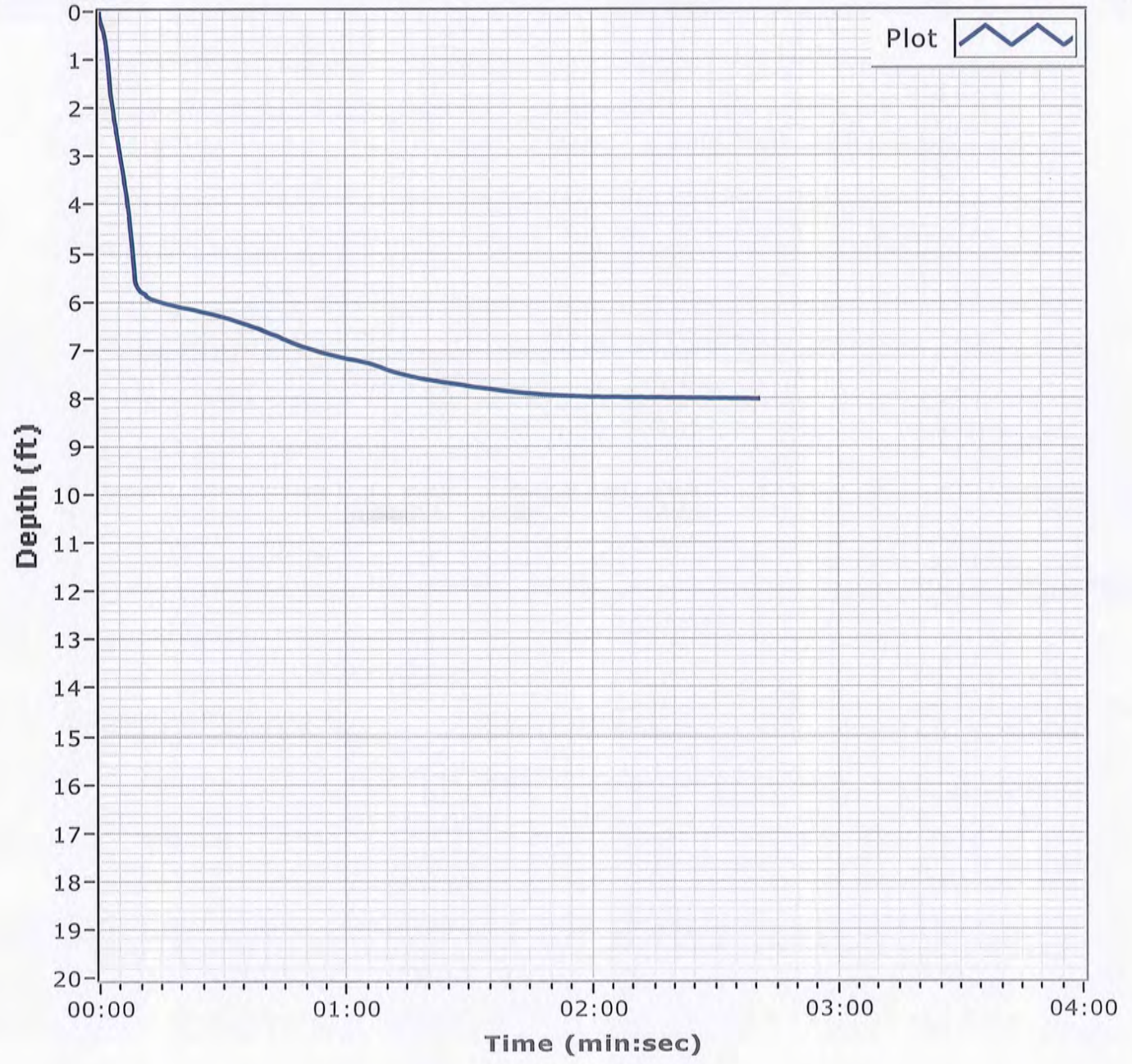
Core Identifier BI-PBP-6-12
Coordinate System
Latitude / Longitude

Date 12/08/2012
Start Time 13:45:51
End Time 13:48:32
Total Time 00:02:41

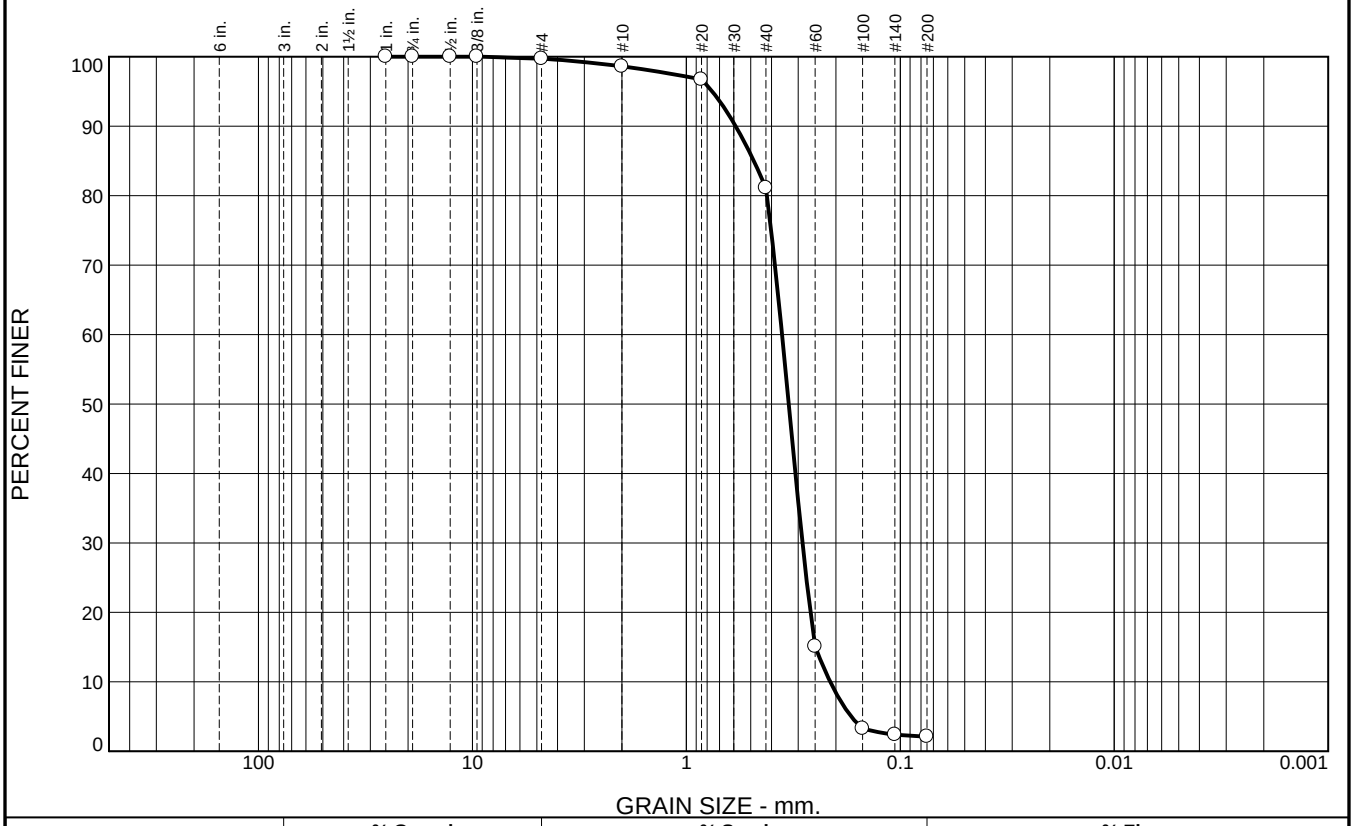
Water Depth 33.0'
Penetration 8.0'
Recovery 6.8'

Latitude 30 11.517
Longitude 088 23.262

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.3	1.1	17.5	79.0	2.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.7		
#10	98.6		
#20	96.7		
#40	81.1		
#60	15.1		
#100	3.3		
#140	2.4		
#200	2.1		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5883 D_{85}= 0.4841 D_{60}= 0.3569
D_{50}= 0.3322 D_{30}= 0.2869 D_{15}= 0.2492
D_{10}= 0.2126 C_u= 1.68 C_c= 1.08

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-6-12 A
Sample Number: 6482 (37) **Depth:** 0.0' **Date:** 12/12/12

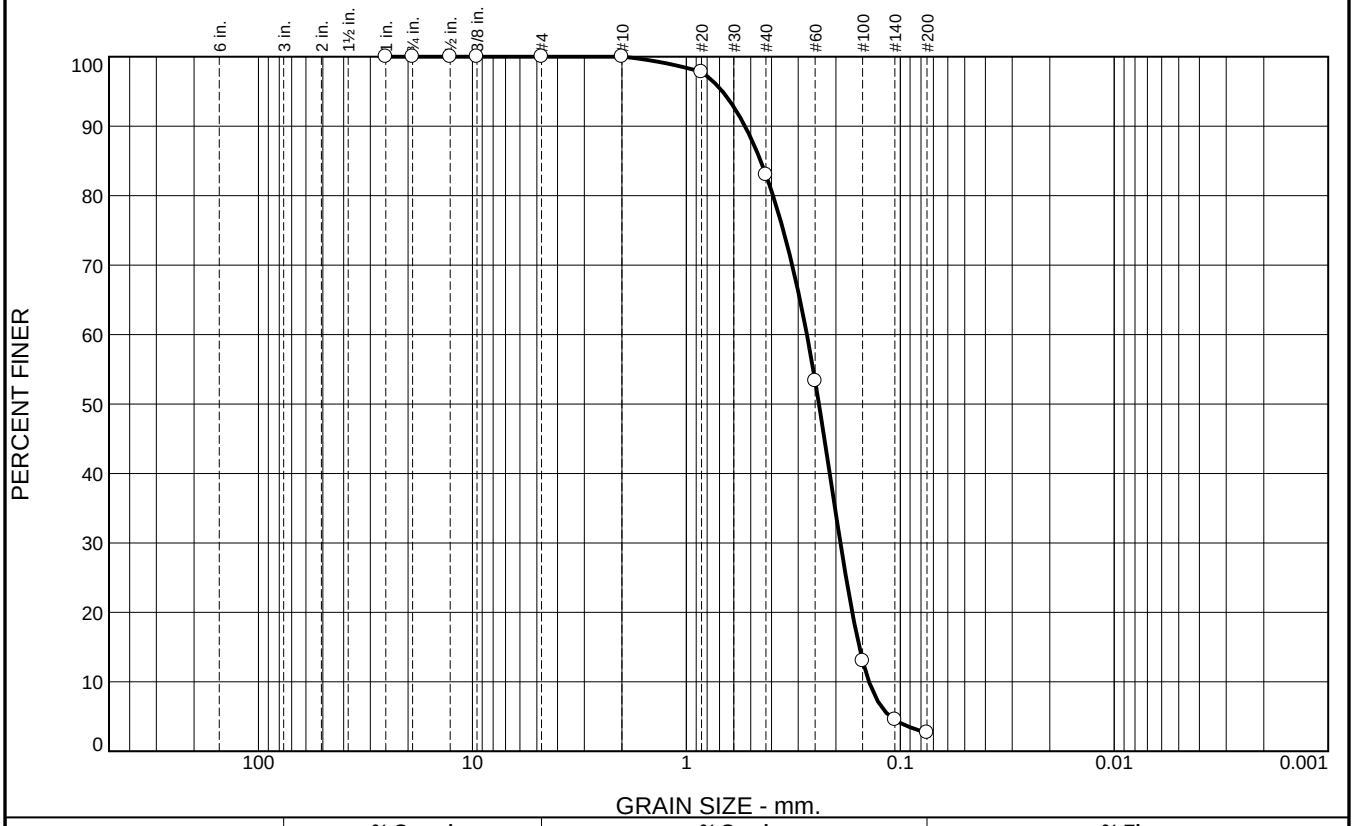
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	17.0	80.3	2.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	100.0		
#10	100.0		
#20	97.8		
#40	83.0		
#60	53.3		
#100	13.0		
#140	4.6		
#200	2.7		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5320 D_{85}= 0.4495 D_{60}= 0.2733
D_{50}= 0.2400 D_{30}= 0.1906 D_{15}= 0.1555
D_{10}= 0.1400 C_u= 1.95 C_c= 0.95

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-6-12 B
Sample Number: 6482 (38) **Depth:** 4.7' **Date:** 12/12/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBP-08-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 1 SHEETS
	South Atlantic	Mobile District	

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-MS		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBP-08-12	LOCATION COORDINATES: E = 1,125,076 N = 250,555	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 27.1 Ft.	
		15. DATE BORING	STARTED: 12-22-12 / COMPLETED: 12-22-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -27.3 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 16.7 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Mike FitzHarris, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-27.3	0.0				
			SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, few shell fragments, trace fines, lt. gray to gray (SP)	A	Classification: SP Color: 5Y 7/2-light gray D50: 0.3643 mm % Fines: 1
-33.6	6.3			B	Classification: SP Color: 5Y 7/2-light gray D50: 0.2361 mm % Fines: 1.7
			SAND, silty, mostly fine-grained sand-sized quartz, some silt, little clay stringers, gray (SM)	NS	
-37.2	9.9				
			SILT, inorganic-L, mostly silt, some clay, little fine-grained sand-sized quartz, dark gray (ML)		
-39.6	12.3				
			SAND, silty, mostly fine-grained sand-sized quartz, some silt, few clay stringers and a clay band at 14.8 ft., brown to gray (SM)		
-43.0	15.7				
-44.0	16.7		SAND, poorly-graded with silt, mostly fine-grained sand-sized quartz, few silt, gray (SP-SM)		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.18822° Long = -88.38760°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
SERVICES

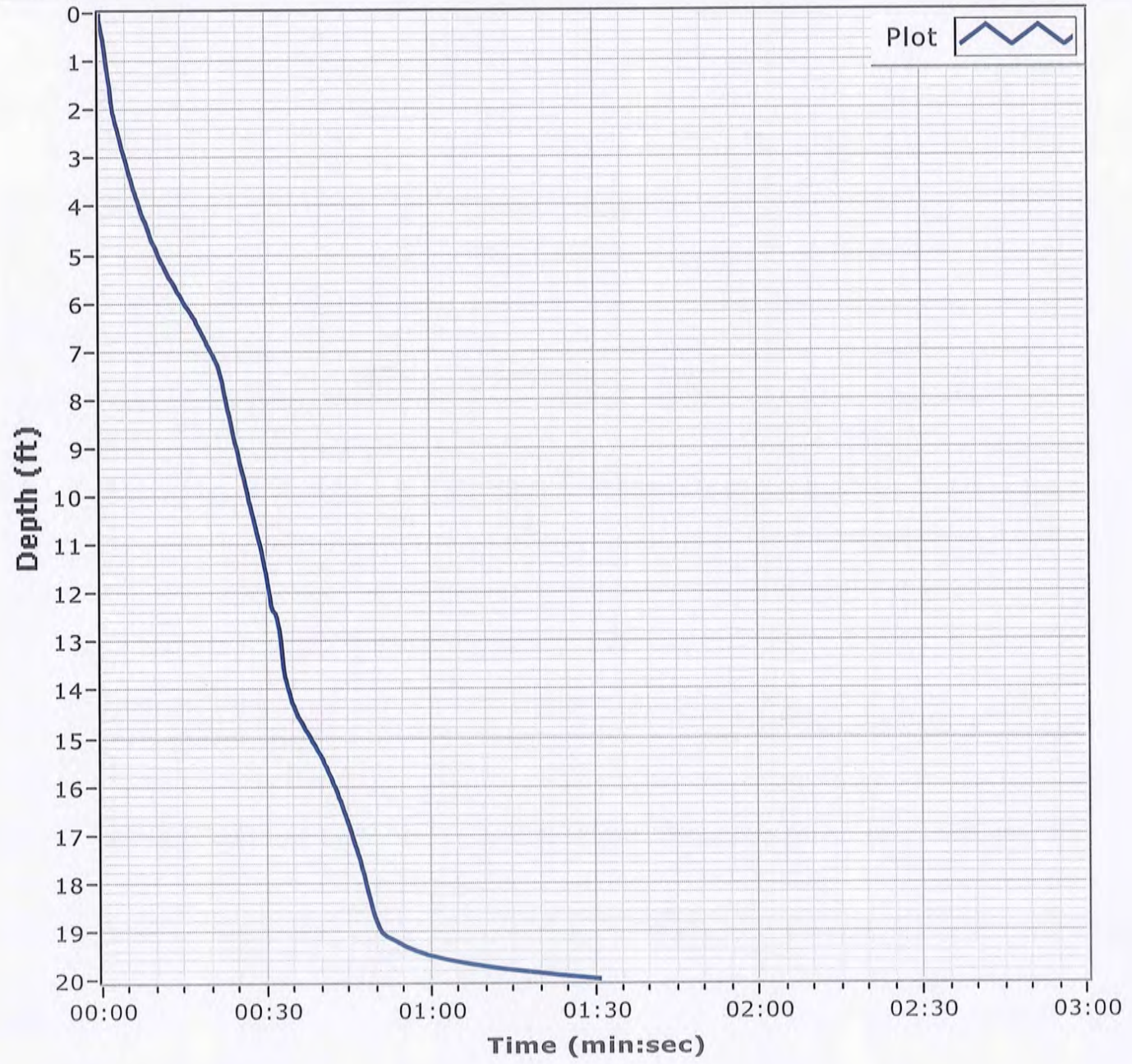
Core Identifier BI-PBP-8-12
Coordinate System
Latitude / Longitude

Date 12/22/2012
Start Time 13:47:50
End Time 13:49:21
Total Time 00:01:31

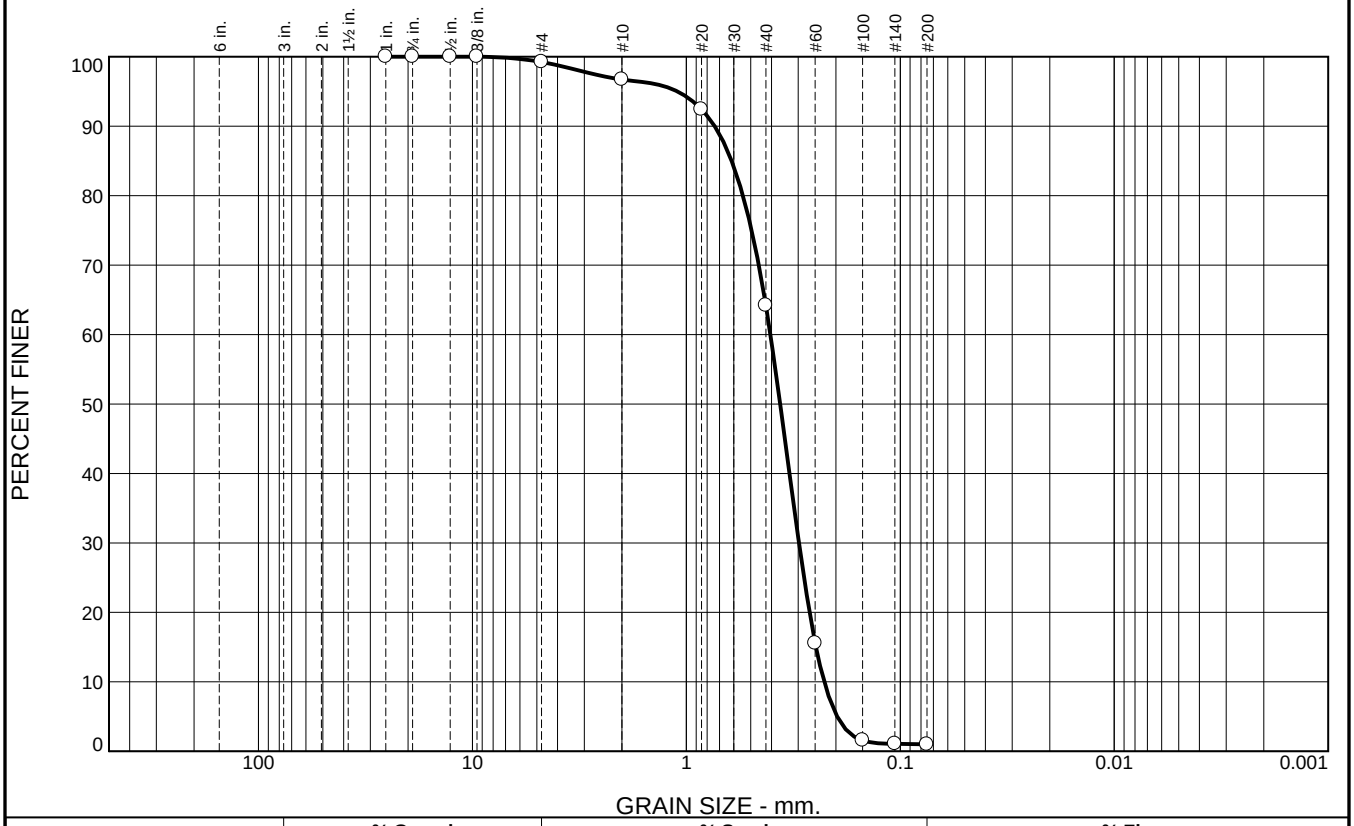
Water Depth 27.1'
Penetration 20.0'
Recovery 16.7'

Latitude 30 11.293
Longitude 088 23.256

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.8	2.5	32.5	63.2	1.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.2		
#10	96.7		
#20	92.4		
#40	64.2		
#60	15.5		
#100	1.6		
#140	1.1		
#200	1.0		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.7379 D_{85}= 0.6142 D_{60}= 0.4048
D_{50}= 0.3643 D_{30}= 0.2977 D_{15}= 0.2479
D_{10}= 0.2268 C_u= 1.78 C_c= 0.97

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-8-12 A
Sample Number: 6495 (21) **Depth:** 0.0' **Date:** 12/31/12

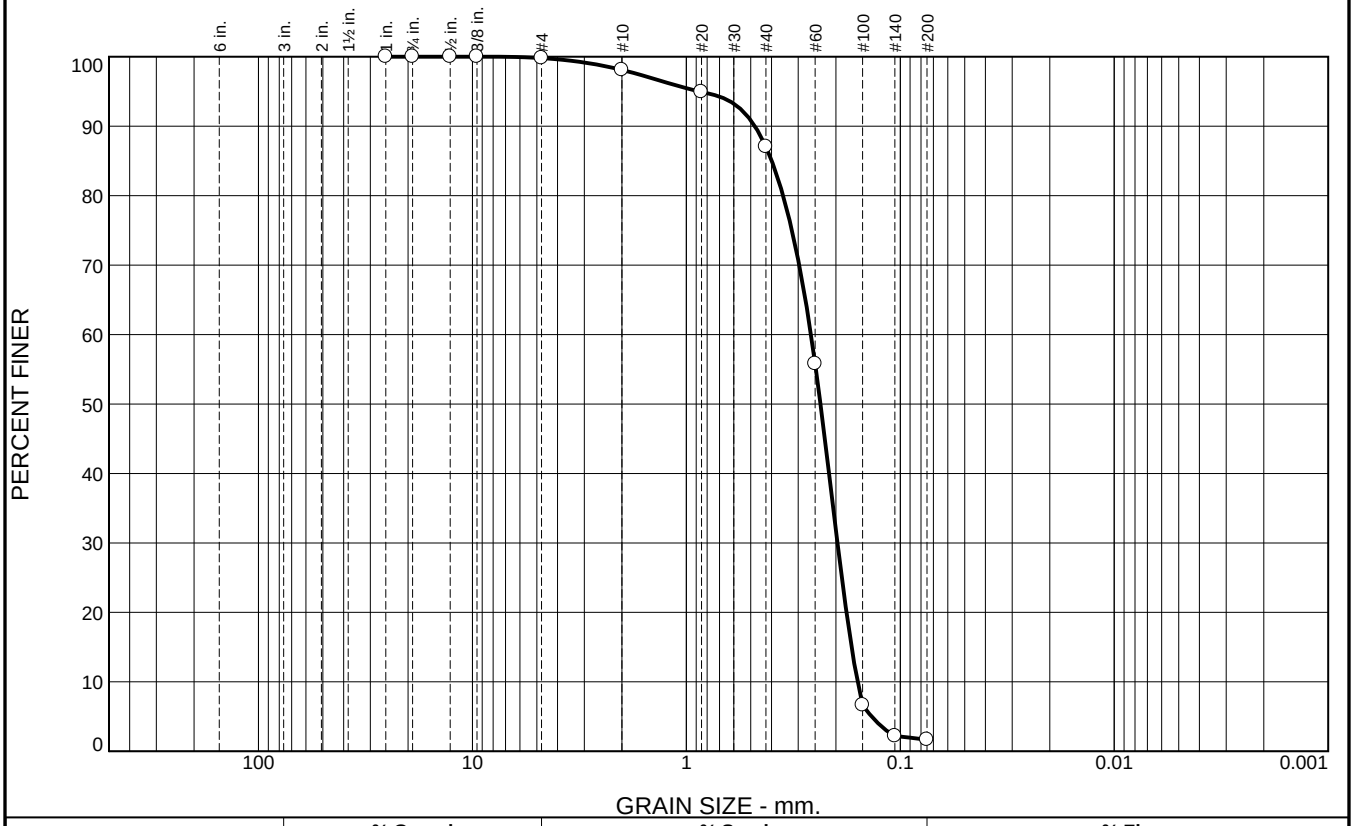
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	1.7	11.1	85.3	1.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.8		
#10	98.1		
#20	94.9		
#40	87.0		
#60	55.8		
#100	6.6		
#140	2.2		
#200	1.7		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4787 D_{85}= 0.3988 D_{60}= 0.2616
D_{50}= 0.2361 D_{30}= 0.1967 D_{15}= 0.1691
D_{10}= 0.1586 C_u= 1.65 C_c= 0.93

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-8-12 B
Sample Number: 6495 (22) **Depth:** 5.0' **Date:** 12/31/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBP-09-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 2 SHEETS
	South Atlantic	Mobile District	

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-MS		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBP-09-12	LOCATION COORDINATES: E = 1,124,933 N = 250,772	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 28.9 Ft.	
		15. DATE BORING	STARTED: 12-08-12 / COMPLETED: 12-08-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -27.4 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 18.0 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Mike FitzHarris, Geologist	

ELEV.	DEPTH	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-27.4	0.0			
		SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace shell fragments, pale lt. brown (SP)	A	Classification: SP Color: 2.5Y 7/2-light gray D50: 0.3314 mm % Fines: 1
-29.6	2.2			
-29.8	2.4		NS	
		SHELL, mostly shell fragments, trace fine-grained sand-sized quartz, gray		
		SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, few shell fragments, trace fines, lt. gray (SP)	B	Classification: SP Color: 5Y 7/2-light gray D50: 0.2559 mm % Fines: 1.7
-33.0	5.6			
-33.9	6.5	SAND, clayey, mostly fine-grained sand-sized quartz, some clay, gray (SC)		
-34.9	7.5			
		CLAY, fat, mostly clay, medium to high plasticity, dark gray (CH)		
-36.5	9.1			
		SAND, poorly-graded, mostly fine-grained sand-sized quartz, trace fines, trace shell fragments, gray (SP)		
		SAND, silty, mostly fine-grained sand-sized quartz, some silt, pale brown (SM)	NS	
		At El. -41.2 Ft., mostly fine-grained sand-sized quartz, some silt, trace clay, brown		
-42.8	15.4			
-43.3	15.9			
		CLAY, lean, mostly clay, trace fine-grained sand-sized quartz, low to medium plasticity, dark gray (CL)		
-45.1	17.7			
-45.4	18.0			
		SAND, silty, mostly fine-grained sand-sized quartz, some silt, gray (SM)		
		SAND, poorly-graded, mostly fine-grained sand-sized quartz, trace fines, lt. gray (SP)		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

3. Seafloor elevation determined from USACE

DRILLING LOG (Cont. Sheet)	INSTALLATION	SHEET 2 OF 2 SHEETS
	Mobile District	

PROJECT	COORDINATE SYSTEM/DATUM	HORIZONTAL	VERTICAL
MsCIP Barrier Island Restoration	State Plane, MSE (U.S. Ft.)	NAD83	NAVD88

LOCATION COORDINATES	ELEVATION TOP OF BORING
X = 1,124,933 Y = 250,772	-27.4 Ft.

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
			hydrographic survey completed April 2014.		

30
35
40
45
50
55
60

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.18882° Long = -88.38805°

Project Mississippi Barrier Island Restoration Project

AVS AMERICAN VIBRACORE SERVICES

Core Identifier BI-PBP-9-12

Coordinate System
Latitude / Longitude

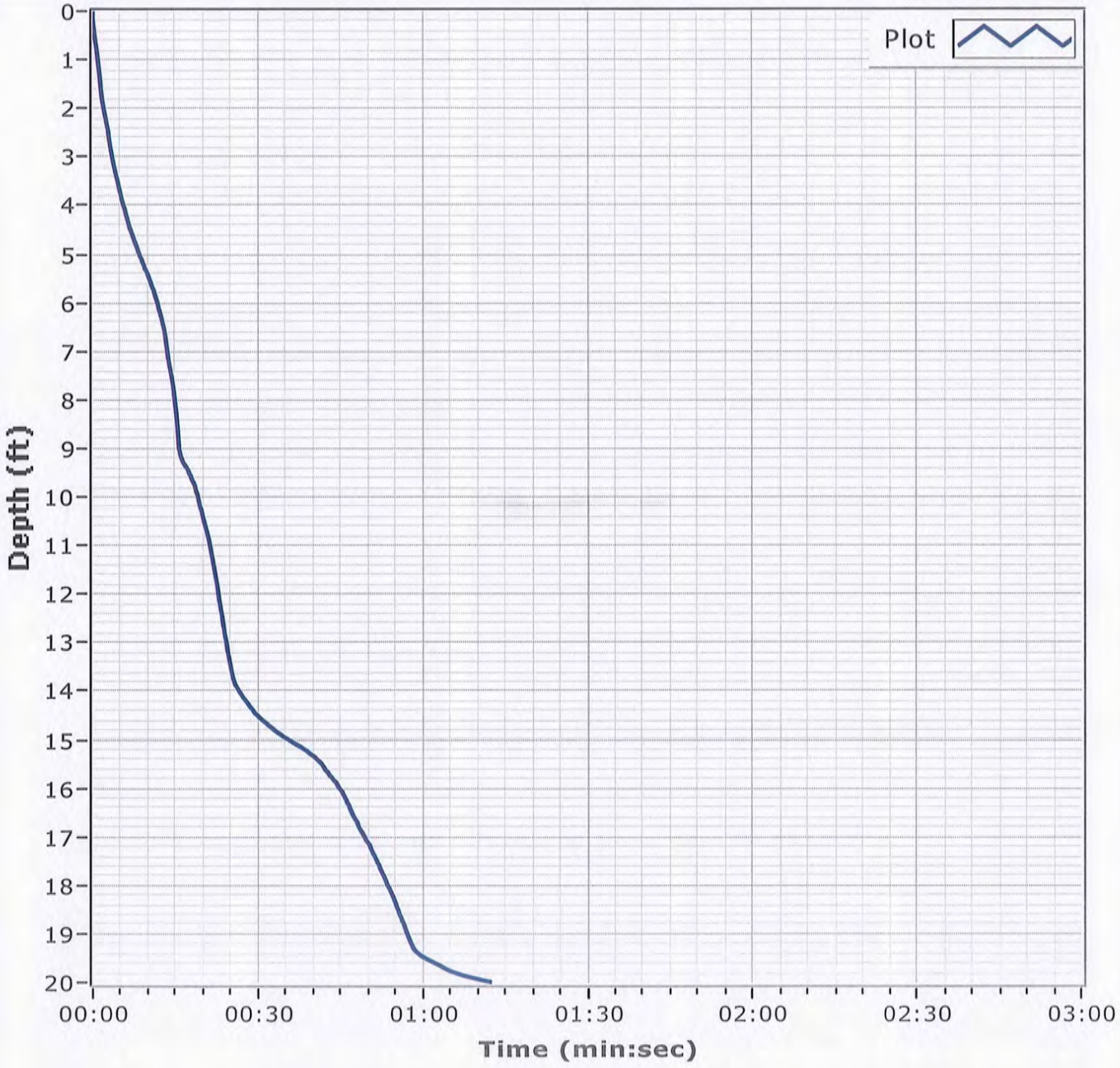
Latitude 30 11.329

Longitude 088 23.283

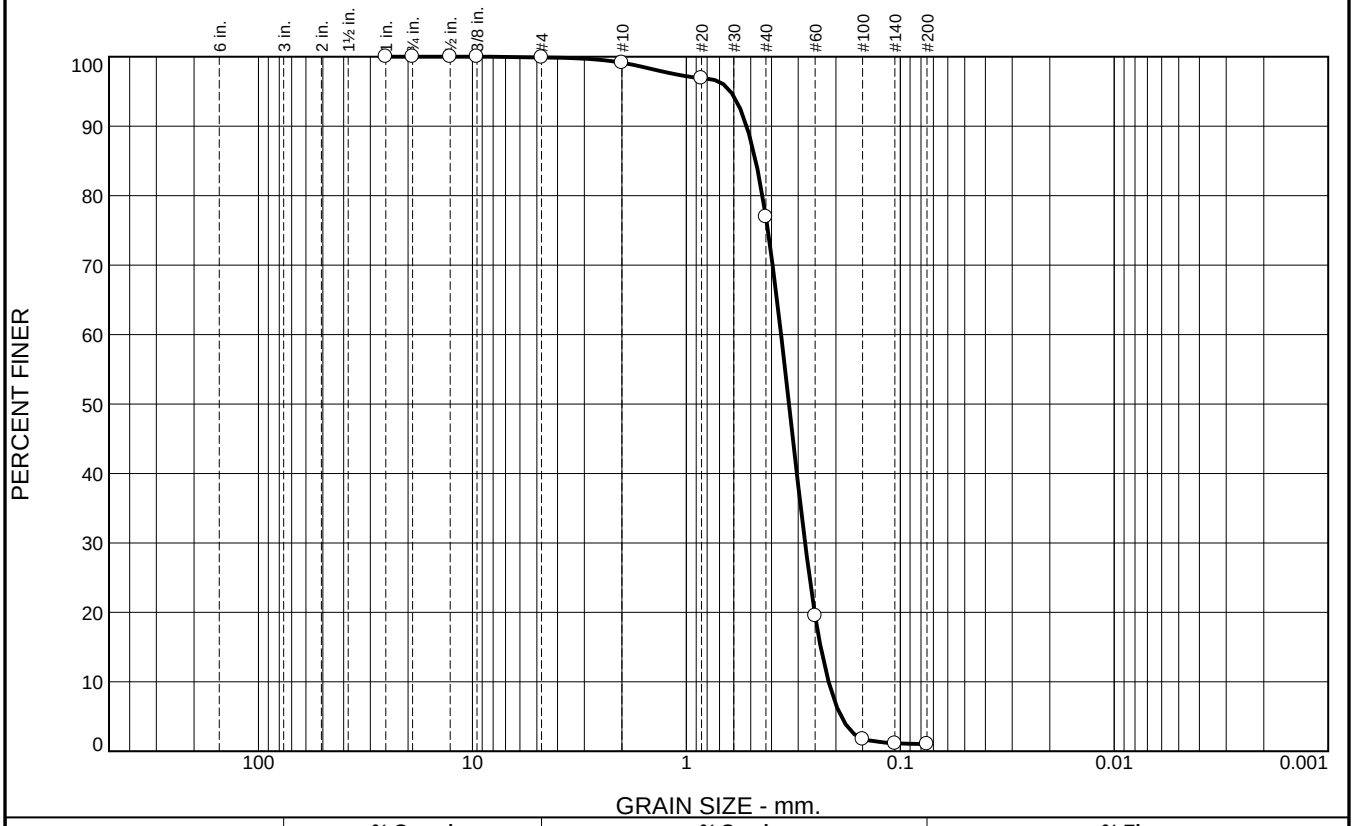
Date 12/08/2012
Start Time 14:17:46
End Time 14:18:59
Total Time 00:01:12

Water Depth 28.9'
Penetration 20.0'
Recovery 18.0'

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.8	22.1	76.0	1.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.9		
#10	99.1		
#20	96.9		
#40	77.0		
#60	19.5		
#100	1.7		
#140	1.1		
#200	1.0		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5225 D_{85}= 0.4741 D_{60}= 0.3607
D_{50}= 0.3314 D_{30}= 0.2788 D_{15}= 0.2355
D_{10}= 0.2163 C_u= 1.67 C_c= 1.00

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-9-12 A
Sample Number: 6482 (39) **Depth:** 0.0' **Date:** 12/12/12

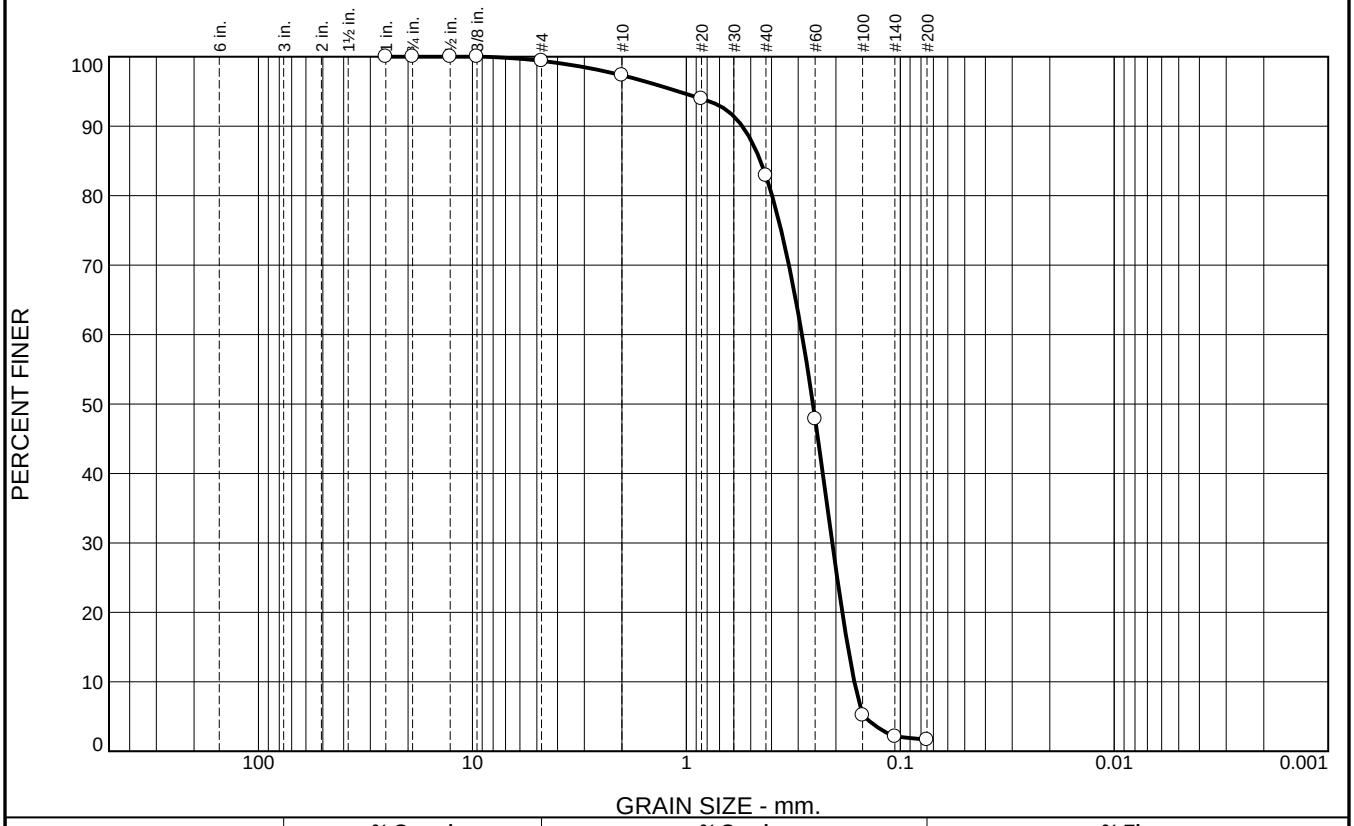
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.6	2.1	14.4	81.2	1.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.4		
#10	97.3		
#20	93.9		
#40	82.9		
#60	47.9		
#100	5.2		
#140	2.1		
#200	1.7		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5473 D_{85}= 0.4503 D_{60}= 0.2882
D_{50}= 0.2559 D_{30}= 0.2079 D_{15}= 0.1759
D_{10}= 0.1641 C_u= 1.76 C_c= 0.91

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-9-12 B
Sample Number: 6482 (40) **Depth:** 2.4' **Date:** 12/12/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBP-12-12

DRILLING LOG	DIVISION: South Atlantic	INSTALLATION: Mobile District	SHEET 1 OF 1 SHEETS

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-MS		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBP-12-12	LOCATION COORDINATES: E = 1,122,682 N = 251,164	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 32.5 Ft.	
		15. DATE BORING	STARTED: 12-22-12 / COMPLETED: 12-22-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -31.0 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 8.6 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Mike FitzHarris, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-31.0	0.0				
-33.1	2.1		SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace fines, trace shell fragments, gray (SP)	A	Classification: SP Color: 5Y 6/2-light olive gray D50: 0.2788 mm % Fines: 2
-34.1	3.1		SAND, poorly-graded with silt, mostly fine to medium-grained sand-sized quartz, some shell fragments, few clay stringers, gray (SP-SM)	NS	
-36.7	5.7		SAND, silty, mostly fine-grained sand-sized quartz, some silt, little shell fragments, gray (SM)	B	Classification: SP-SM Color: 5Y 5/2-olive gray D50: 0.2942 mm % Fines: 7.3
-37.9	6.9		SAND, clayey, mostly fine-grained sand-sized quartz, some clay, clay band at 6.6 ft., dark gray (SC)	NS	
-39.6	8.6		SAND, poorly-graded with silt, mostly fine-grained sand-sized quartz, few silt, grades siltier with depth, gray grading to brown (SP-SM)	C	Classification: SP Color: 2.5Y 6/2-light brownish gray D50: 0.2302 mm % Fines: 3.1
				NS	

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

3. Drilled depth was 16.3 ft. and return was 8.6 ft. Unsure of cause of poor return. Did not appear to be a mechanical issue.

4. Seafloor elevation determined from USACE hydrographic survey completed April 2014.

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.18992° Long = -88.39517°

Project Mississippi Barrier Island Restoration Project

AVS AMERICAN VIBRACORE SERVICES

Core Identifier BI-PBP-12-12

Coordinate System
Latitude / Longitude

Latitude 30 11.395

Longitude 088 23.710

Date 12/22/2012

Start Time 14:20:05

End Time 14:22:54

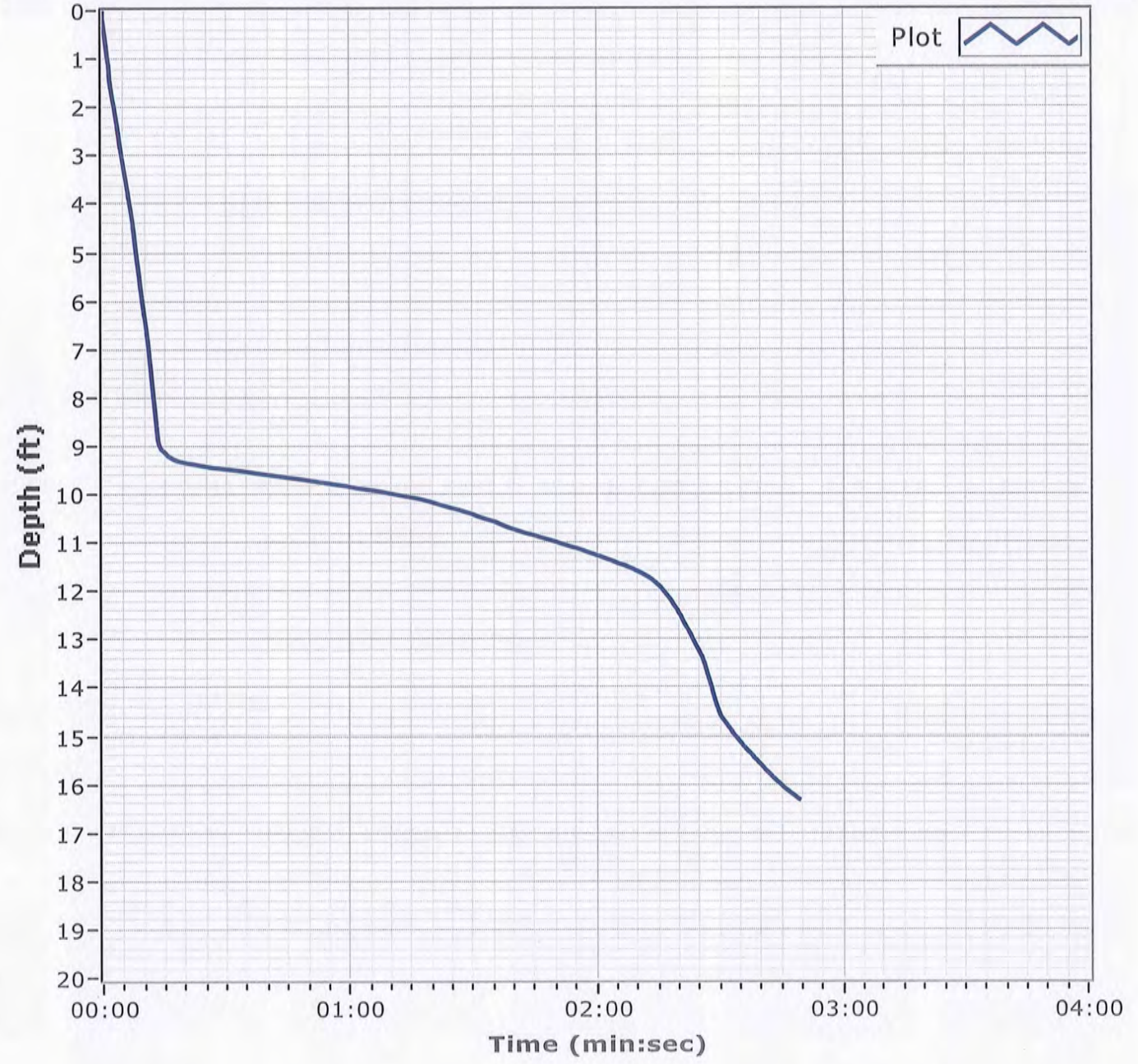
Total Time 00:02:49

Water Depth 32.5'

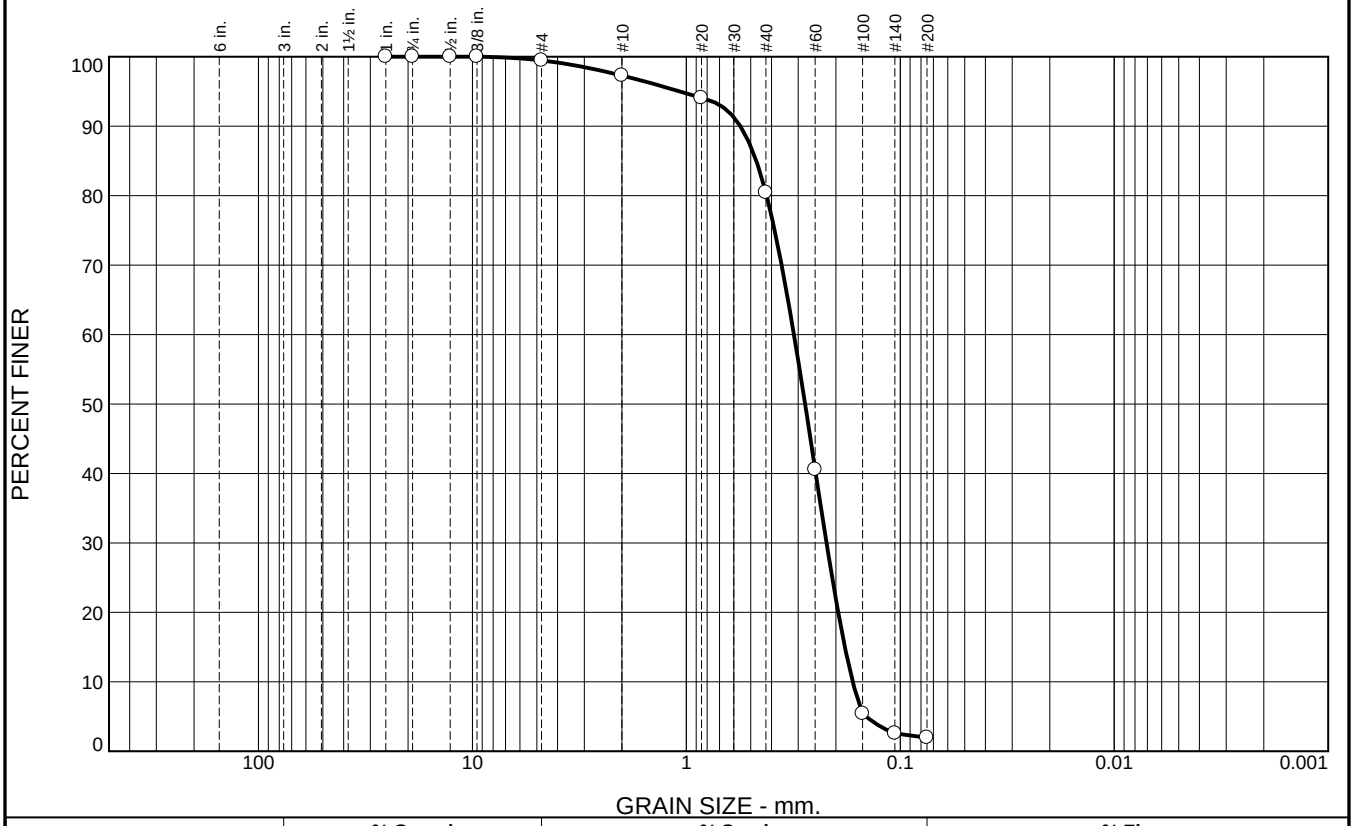
Penetration 16.3'

Recovery 8.6'

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.5	2.2	16.9	78.4	2.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.5		
#10	97.3		
#20	94.1		
#40	80.4		
#60	40.6		
#100	5.4		
#140	2.6		
#200	2.0		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5591 D_{85}= 0.4710 D_{60}= 0.3143
D_{50}= 0.2788 D_{30}= 0.2212 D_{15}= 0.1817
D_{10}= 0.1670 C_u= 1.88 C_c= 0.93

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-12-12 A
Sample Number: 6495 (23) **Depth:** 0.0' **Date:** 12/31/12

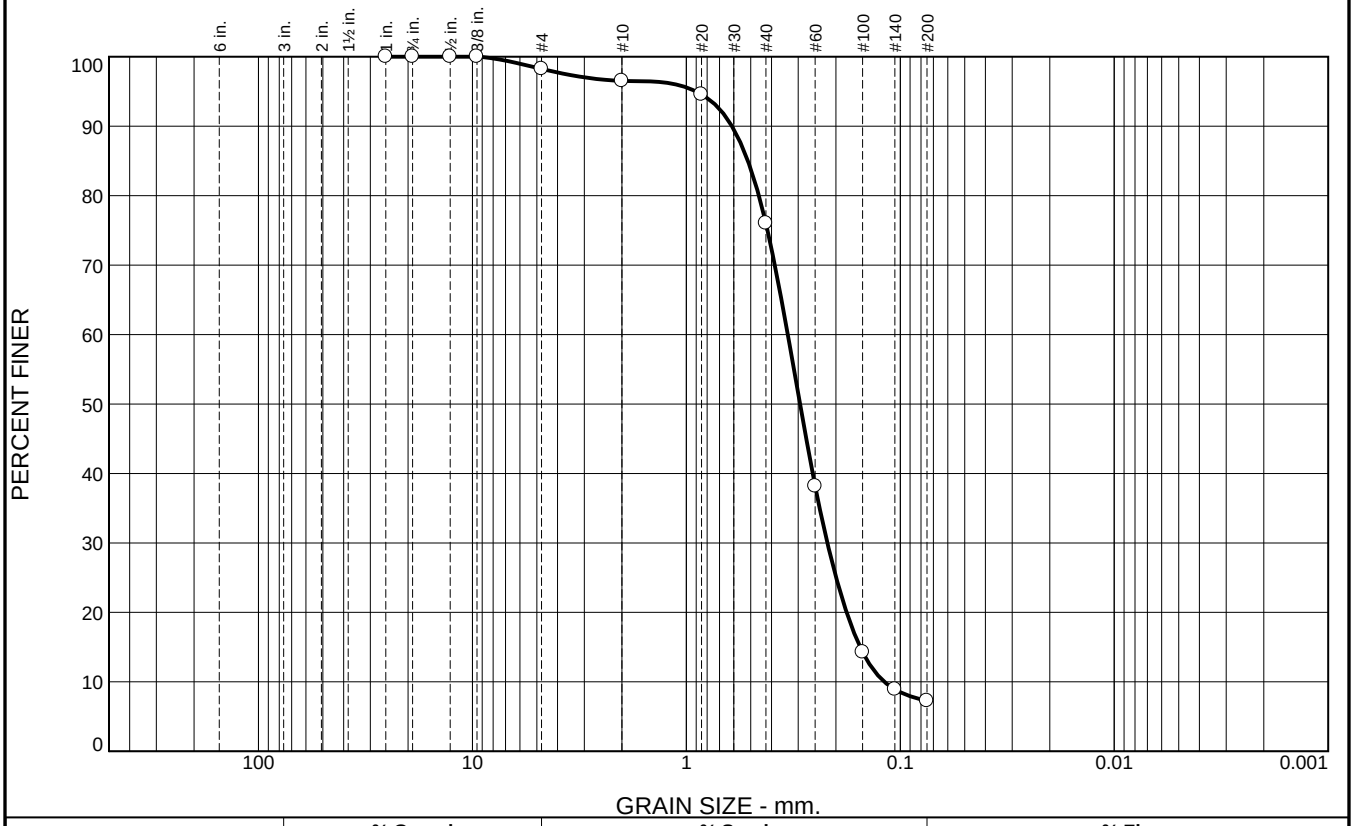
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.8	1.7	20.5	68.7	7.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	98.2		
#10	96.5		
#20	94.6		
#40	76.0		
#60	38.2		
#100	14.3		
#140	8.9		
#200	7.3		

* (no specification provided)

Material Description

Fine to medium grained, SLIGHTLY SILTY SAND, with trace SHELL

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6120 D_{85}= 0.5157 D_{60}= 0.3356
D_{50}= 0.2942 D_{30}= 0.2192 D_{15}= 0.1541
D_{10}= 0.1187 C_u= 2.83 C_c= 1.21

Classification

USCS= SP-SM AASHTO=

Remarks

Location: BI-PBP-12-12 B
Sample Number: 6495 (24) **Depth:** 3.1' **Date:** 12/31/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.9	0.9	14.0	81.1	3.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.1		
#10	98.2		
#20	95.4		
#40	84.2		
#60	55.7		
#100	21.5		
#140	7.4		
#200	3.1		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5218 D_{85}= 0.4348 D_{60}= 0.2669
D_{50}= 0.2302 D_{30}= 0.1723 D_{15}= 0.1319
D_{10}= 0.1162 C_u= 2.30 C_c= 0.96

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-12-12 C
Sample Number: 6495 (25) **Depth:** 6.9' **Date:** 12/31/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBP-13-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 1 SHEETS
	South Atlantic	Mobile District	

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-MS		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBP-13-12	LOCATION COORDINATES: E = 1,124,325 N = 252,847	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL:	BEARING:	14. WATER DEPTH: 29 Ft.
		15. DATE BORING	STARTED: 12-22-12 / COMPLETED: 12-22-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -28.9 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 19.3 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Mike FitzHarris, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-28.9	0.0				
			SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace shell fragments, shelly at 1.2 ft., dense, lt. gray (SP)	A	Classification: SP Color: 2.5Y 7/2-light gray D50: 0.2911 mm % Fines: 1.9
-33.7	4.8				
			SAND, silty, mostly fine-grained sand-sized quartz, some silt, trace shell fragments, thick clay bands, gray (SM) At El. -34.9 Ft., mostly fine-grained sand-sized quartz, some silt, organic staining, trace clay bands, brown	NS	
				B	Classification: SP-SM Color: 2.5Y 4/2-dark grayish brown D50: 0.2371 mm % Fines: 5.3
-38.4	9.5				
			SAND, clayey, mostly fine-grained sand-sized quartz, some clay, little silt, trace shell fragments, gray (SC)		
-42.7	13.8				
			SAND, silty, mostly fine-grained sand-sized quartz, some silt, trace shell fragments, trace clay bands, loose, gray (SM)	NS	
-48.2	19.3				
			NOTES: 1. Soils are field visually classified in accordance with the Unified Soils Classification System. 2. NS = Sample not submitted for laboratory analysis from this interval. 3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.		

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.19453° Long = -88.38995°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
SERVICES

Core Identifier BI-PBP-13-12

Coordinate System
Latitude / Longitude

Latitude 30 11.672 N

Longitude 088 23.397 W

Date 12/22/2012

Start Time 10:47:16

End Time 10:48:41

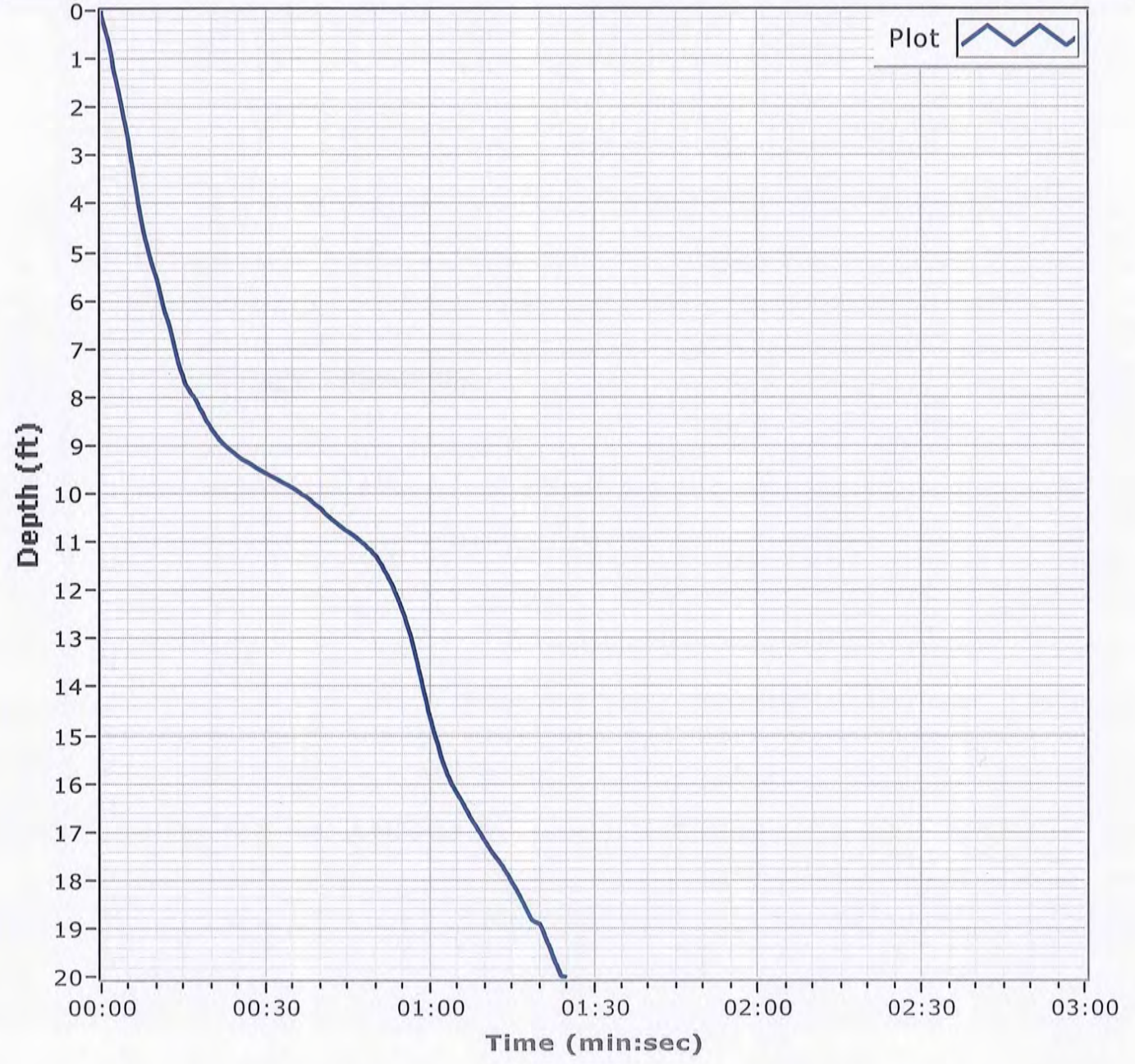
Total Time 00:01:25

Water Depth 29.0'

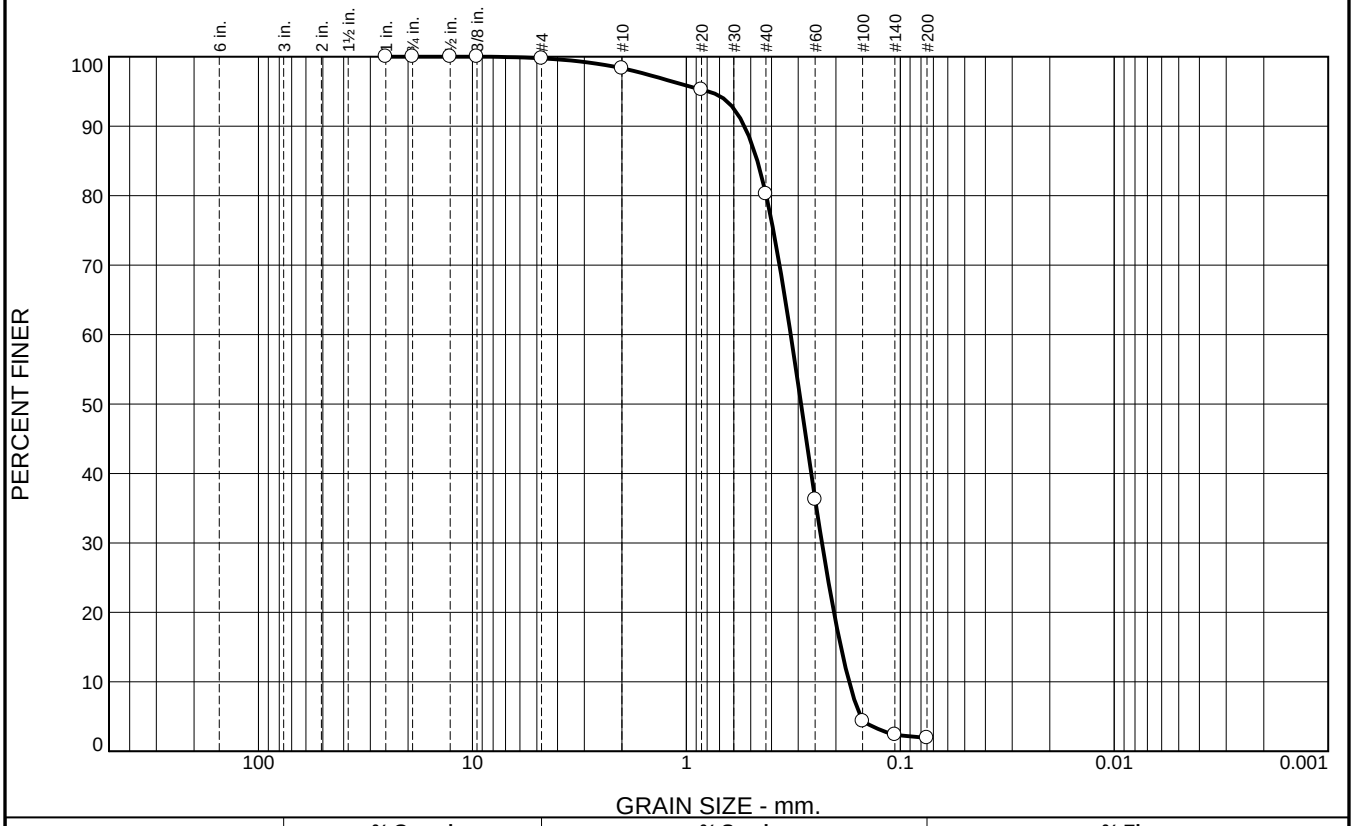
Penetration 20.0'

Recovery 19.3'

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	1.5	18.0	78.4	1.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.8		
#10	98.3		
#20	95.3		
#40	80.3		
#60	36.3		
#100	4.3		
#140	2.4		
#200	1.9		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5350 D_{85}= 0.4657 D_{60}= 0.3253
D_{50}= 0.2911 D_{30}= 0.2323 D_{15}= 0.1896
D_{10}= 0.1736 C_u= 1.87 C_c= 0.96

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-13-12 A
Sample Number: 6495 (26) **Depth:** 0.0' **Date:** 12/31/12

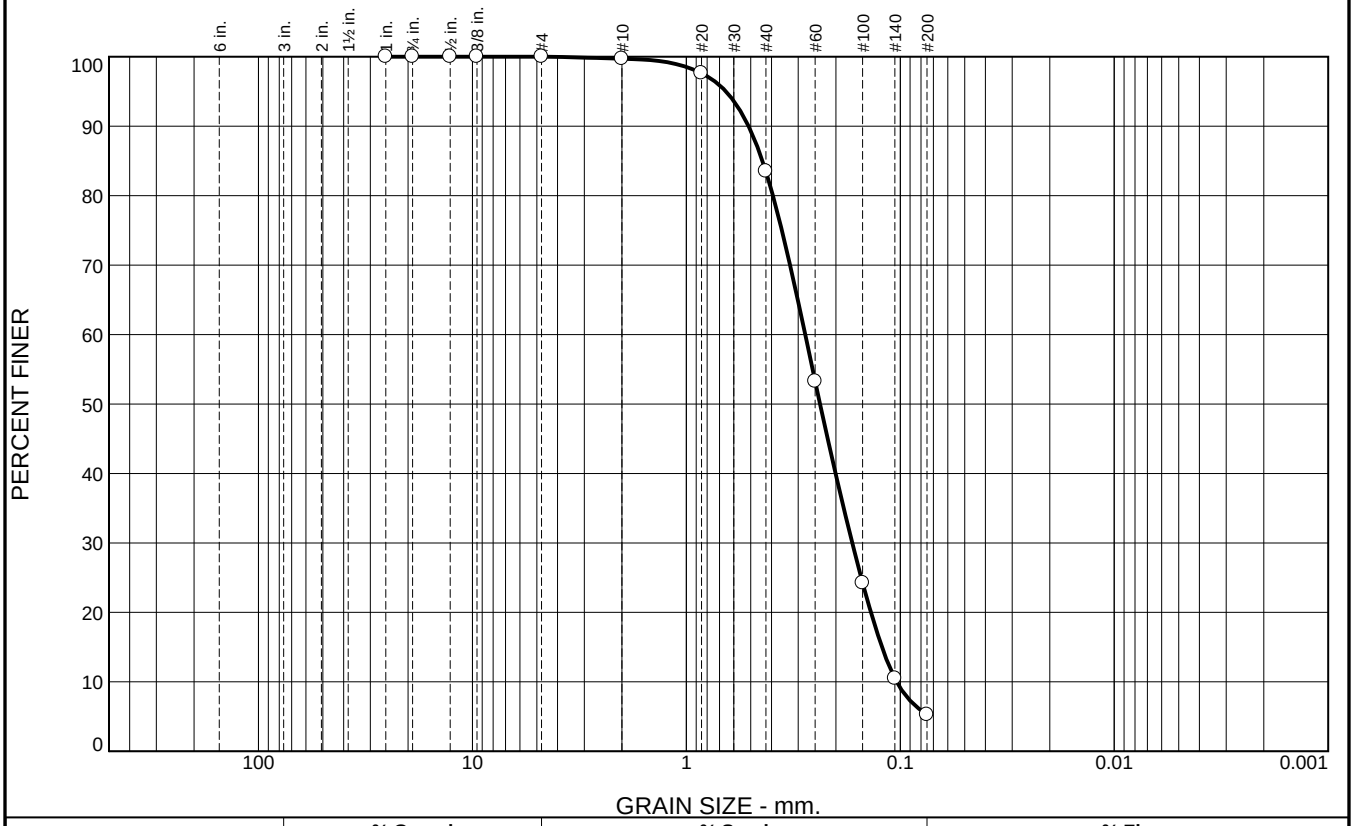
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.3	16.2	78.2	5.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	100.0		
#10	99.7		
#20	97.6		
#40	83.5		
#60	53.3		
#100	24.2		
#140	10.5		
#200	5.3		

* (no specification provided)

Material Description

Fine to medium grained, SLIGHTLY SILTY SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5121 D_{85}= 0.4409 D_{60}= 0.2783
D_{50}= 0.2371 D_{30}= 0.1678 D_{15}= 0.1218
D_{10}= 0.1040 C_u= 2.68 C_c= 0.97

Classification

USCS= SP-SM AASHTO=

Remarks

Location: BI-PBP-13-12 B
Sample Number: 6495 (27) **Depth:** 6.0' **Date:** 12/31/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBP-14-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 1 SHEETS
	South Atlantic	Mobile District	

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-MS		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBP-14-12	LOCATION COORDINATES: E = 1,123,449 N = 252,869	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL: / BEARING:	14. WATER DEPTH: 27.3 Ft.	
		15. DATE BORING	STARTED: 12-22-12 / COMPLETED: 12-22-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -27.8 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 15.5 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Mike FitzHarris, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-27.8	0.0				
-29.8	2.0		SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace fines, trace shell fragments, gray (SP)	A	Classification: SP Color: 5Y 6/2-light olive gray D50: 0.2613 mm % Fines: 2.5
-43.3	15.5		SAND, silty, mostly fine-grained sand-sized quartz, some silt, alternating bands of silty, fine-grained sand and stiff, low to medium plasticity, silty clay up to 1 ft. thick, gray (SM)	NS	

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.19460° Long = -88.39272°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
SERVICES

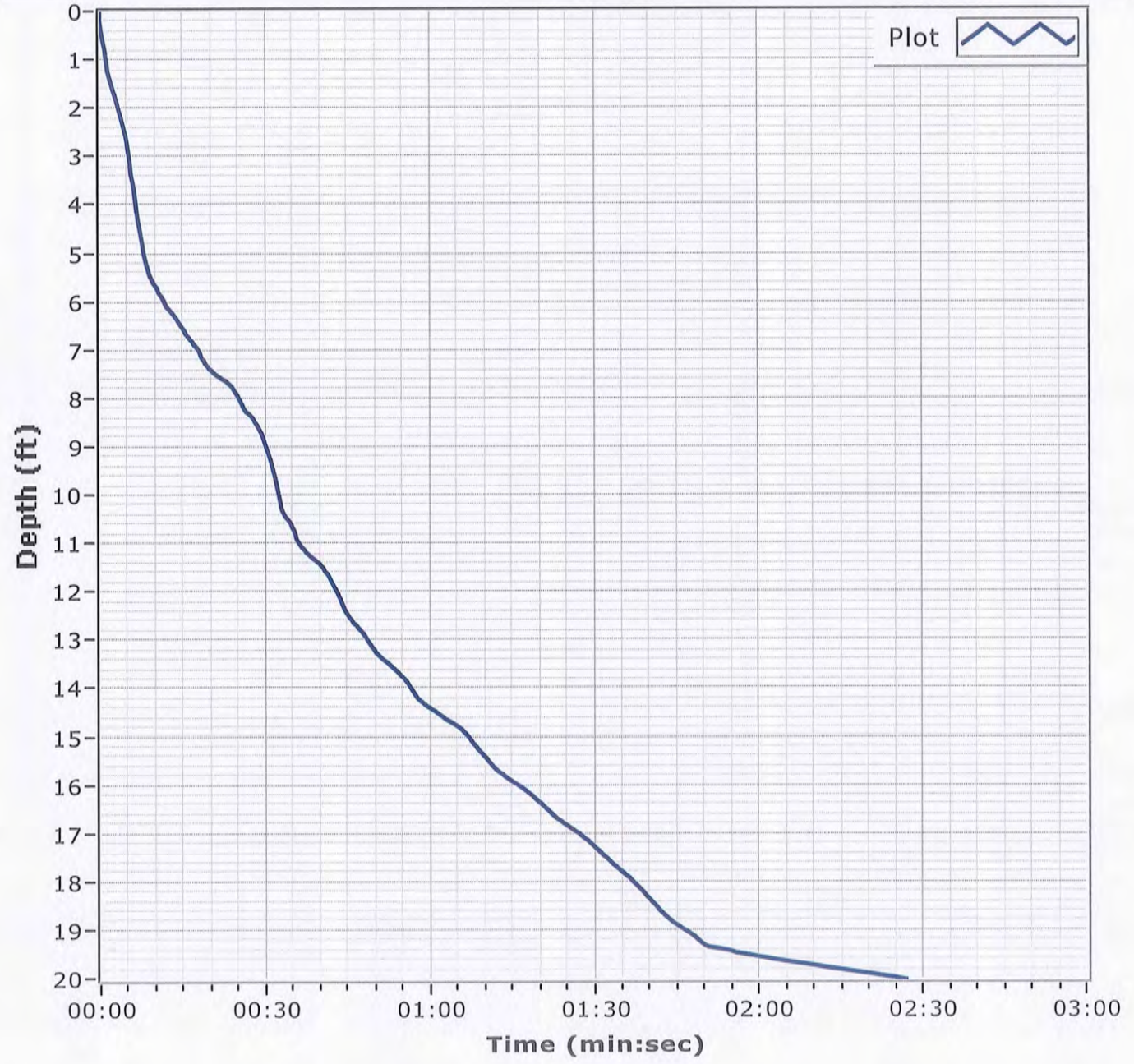
Core Identifier BI-PBP-14-12
Coordinate System
Latitude / Longitude

Date 12/22/2012
Start Time 11:14:48
End Time 11:17:15
Total Time 00:02:27

Water Depth 27.3
Penetration 20.0'
Recovery 15.5'

Latitude 30 11.676 N
Longitude 088 23.563 W

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.6	1.4	17.7	77.8	2.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	99.8		
.375	99.8		
#4	99.4		
#10	98.0		
#20	94.9		
#40	80.3		
#60	46.8		
#100	15.0		
#140	5.1		
#200	2.5		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5732 D_{85}= 0.4779 D_{60}= 0.3012
D_{50}= 0.2613 D_{30}= 0.1962 D_{15}= 0.1501
D_{10}= 0.1315 C_u= 2.29 C_c= 0.97

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-14-12 A
Sample Number: 6495 (28) **Depth:** 0.0' **Date:** 12/31/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBP-18-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 1 SHEETS
	South Atlantic	Mobile District	

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-MS		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBP-18-12	LOCATION COORDINATES: E = 1,123,925 N = 252,361	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL: / BEARING:	14. WATER DEPTH: 27 Ft.	
		15. DATE BORING	STARTED: 12-22-12 / COMPLETED: 12-22-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -27.5 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 19.1 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Mike FitzHarris, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-27.5	0.0				
			SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace fines, trace shell fragments, lt. gray (SP)	A	Classification: SP Color: 5Y 6/2-light olive gray D50: 0.2036 mm % Fines: 3.4
				B	Classification: SP Color: 5Y 7/2-light gray D50: 0.2137 mm % Fines: 3.2
-35.5	8.0				
-36.2	8.7		CLAY, lean, mostly clay, some fine-grained sand-sized quartz, little silt, low to medium plasticity, dark gray (CL)	NS	
			SAND, silty, mostly fine-grained sand-sized quartz, some silt, few organic matter, trace clay, brown (SM)	C	Classification: SP-SM Color: 2.5Y 4/2-dark grayish brown D50: 0.2694 mm % Fines: 5.5
-40.6	13.1				
-41.6	14.1		CLAY, lean, mostly clay, some fine-grained sand-sized quartz, medium plasticity, dark brown (CL)		
			SAND, clayey, mostly fine-grained sand-sized quartz, some clay, trace clay stringers, gray (SC)	NS	
-45.6	18.1				
-46.6	19.1		SAND, poorly-graded, mostly fine-grained sand-sized quartz, trace fines, lt. gray (SP)		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.19320° Long = -88.39122°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
SERVICES

Core Identifier BI-PBP-18-12

Coordinate System
Latitude / Longitude

Latitude 30 11.592 N

Longitude 088 23.473 W

Date 12/22/2012

Start Time 13:16:44

End Time 13:19:25

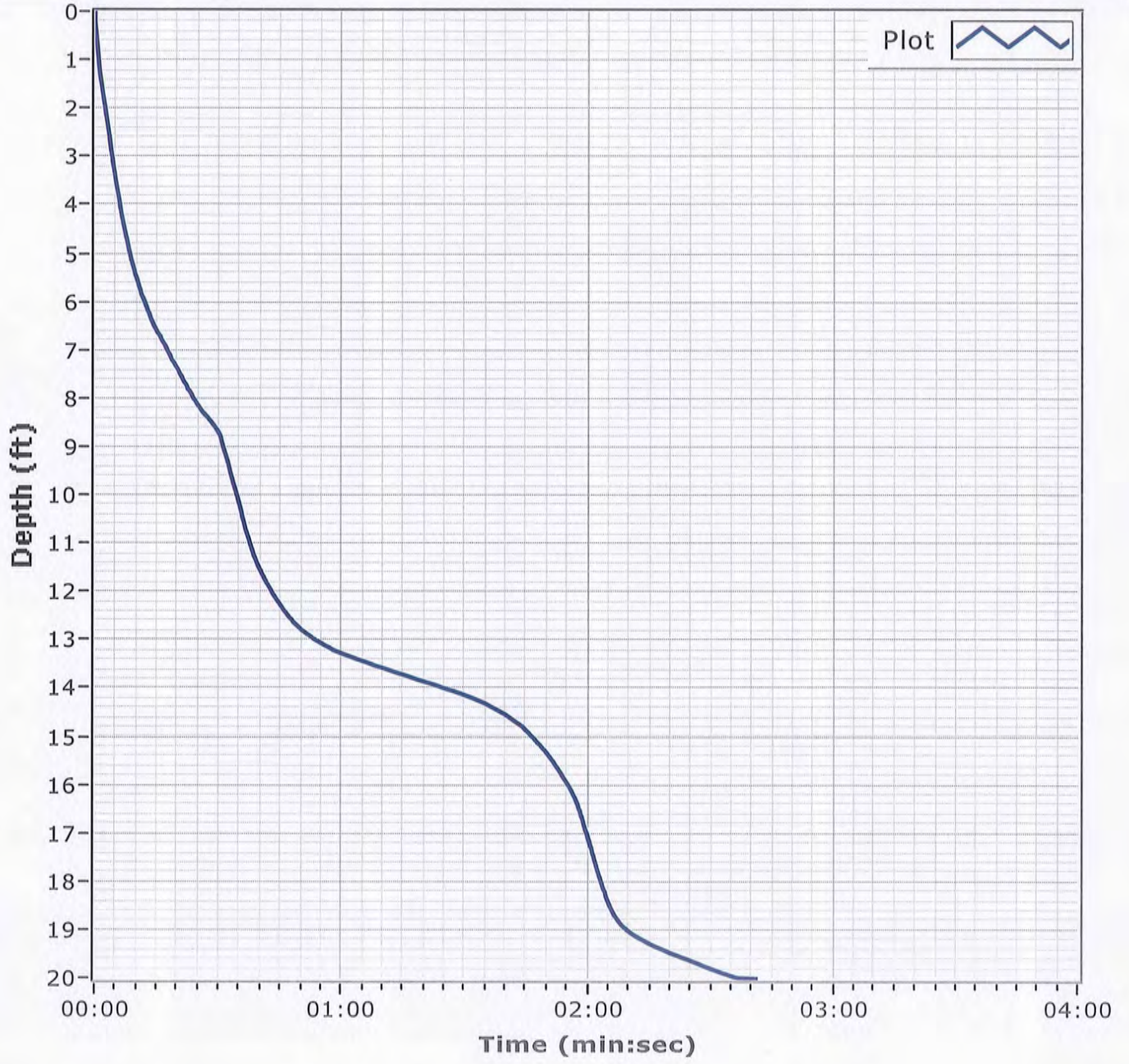
Total Time 00:02:41

Water Depth 27.0'

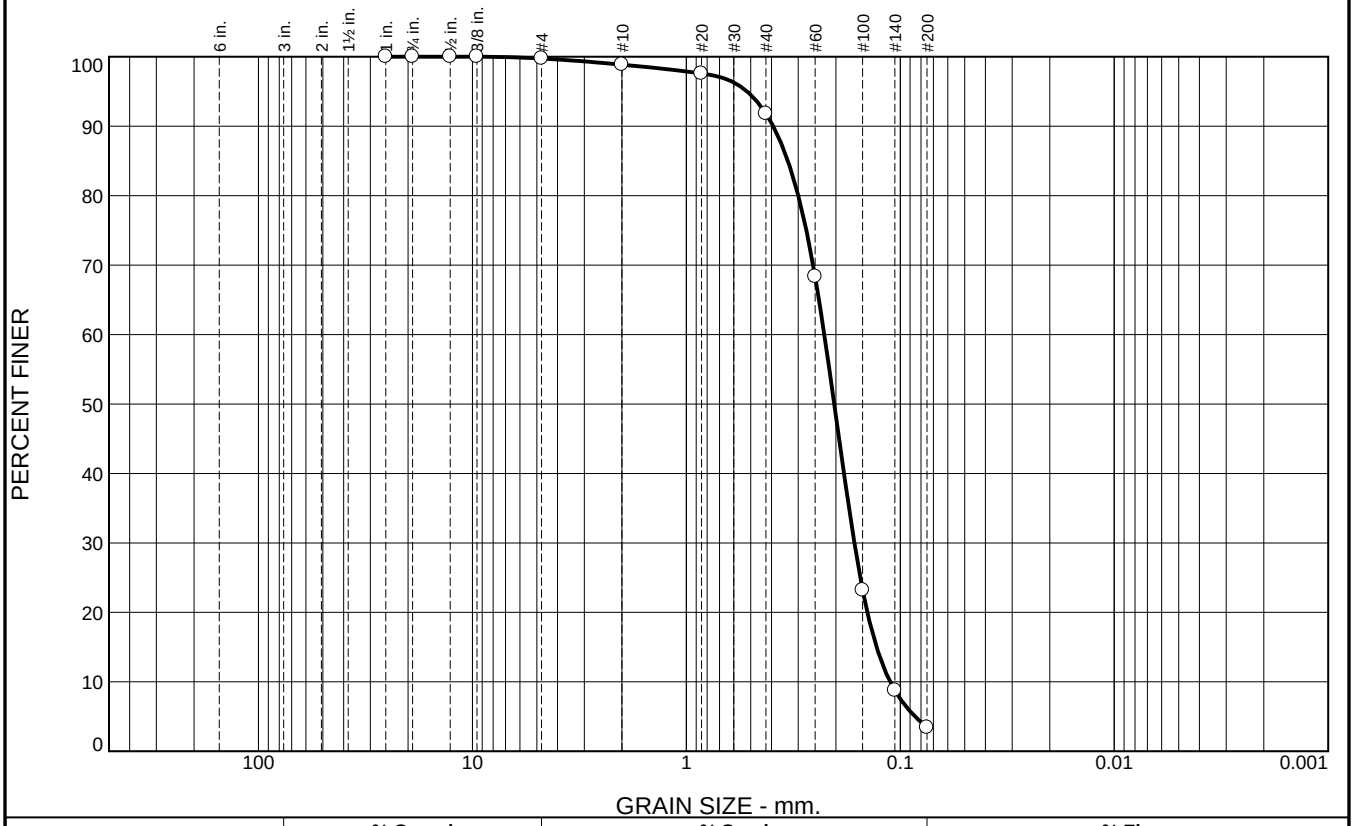
Penetration 20.0'

Recovery 19.1'

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.3	0.9	7.0	88.4	3.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.7		
#10	98.8		
#20	97.6		
#40	91.8		
#60	68.3		
#100	23.2		
#140	8.8		
#200	3.4		

* (no specification provided)

Material Description

Fine grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3927 D_{85}= 0.3353 D_{60}= 0.2265
D_{50}= 0.2036 D_{30}= 0.1640 D_{15}= 0.1292
D_{10}= 0.1115 C_u= 2.03 C_c= 1.06

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-18-12 A
Sample Number: 6495 (31) **Depth:** 0.0' **Date:** 12/31/12

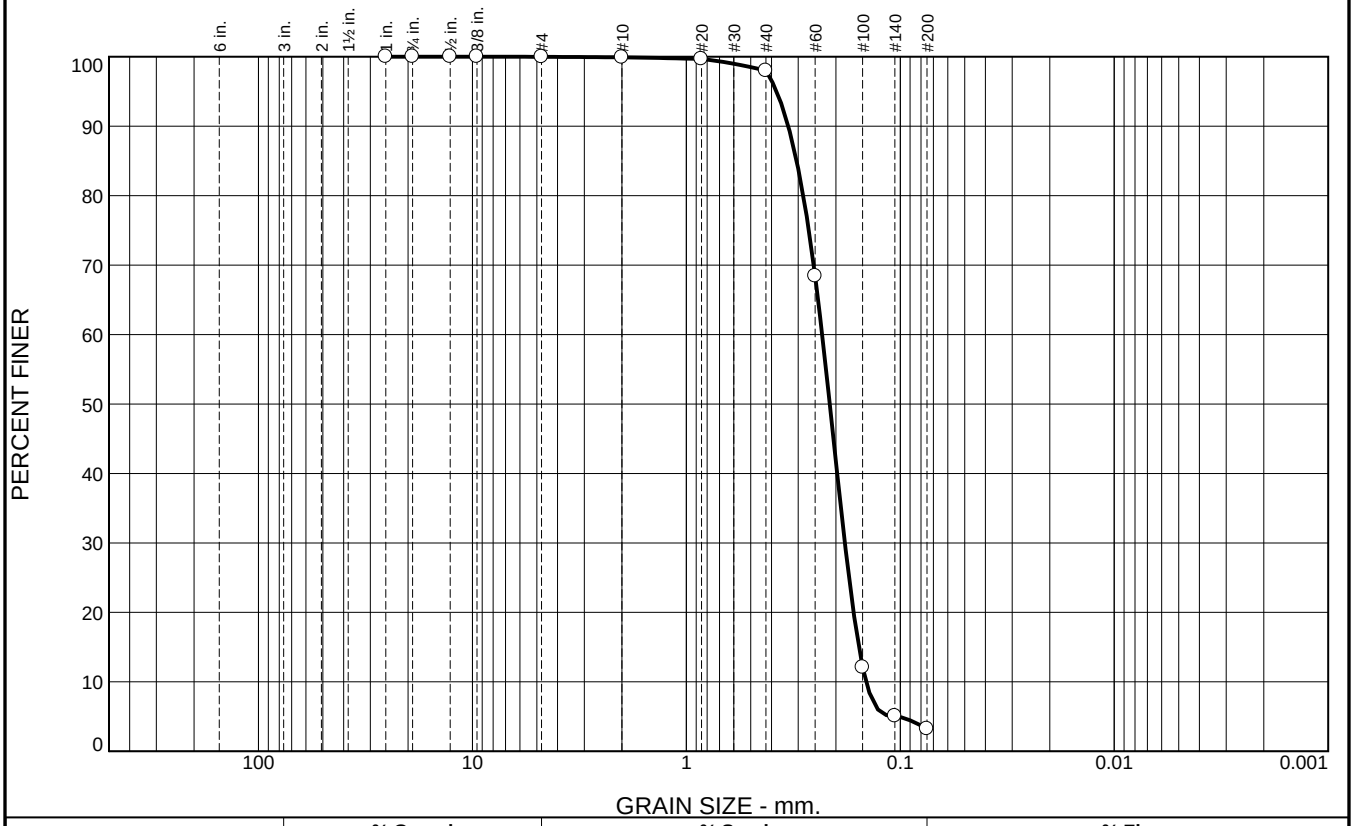
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	1.9	94.8	3.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	100.0		
#10	99.9		
#20	99.7		
#40	98.0		
#60	68.4		
#100	12.1		
#140	5.1		
#200	3.2		

* (no specification provided)

Material Description

Fine grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3339 D_{85}= 0.3053 D_{60}= 0.2318
D_{50}= 0.2137 D_{30}= 0.1817 D_{15}= 0.1563
D_{10}= 0.1446 C_u= 1.60 C_c= 0.98

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-18-12 B
Sample Number: 6495 (32) **Depth:** 4.1' **Date:** 12/31/12

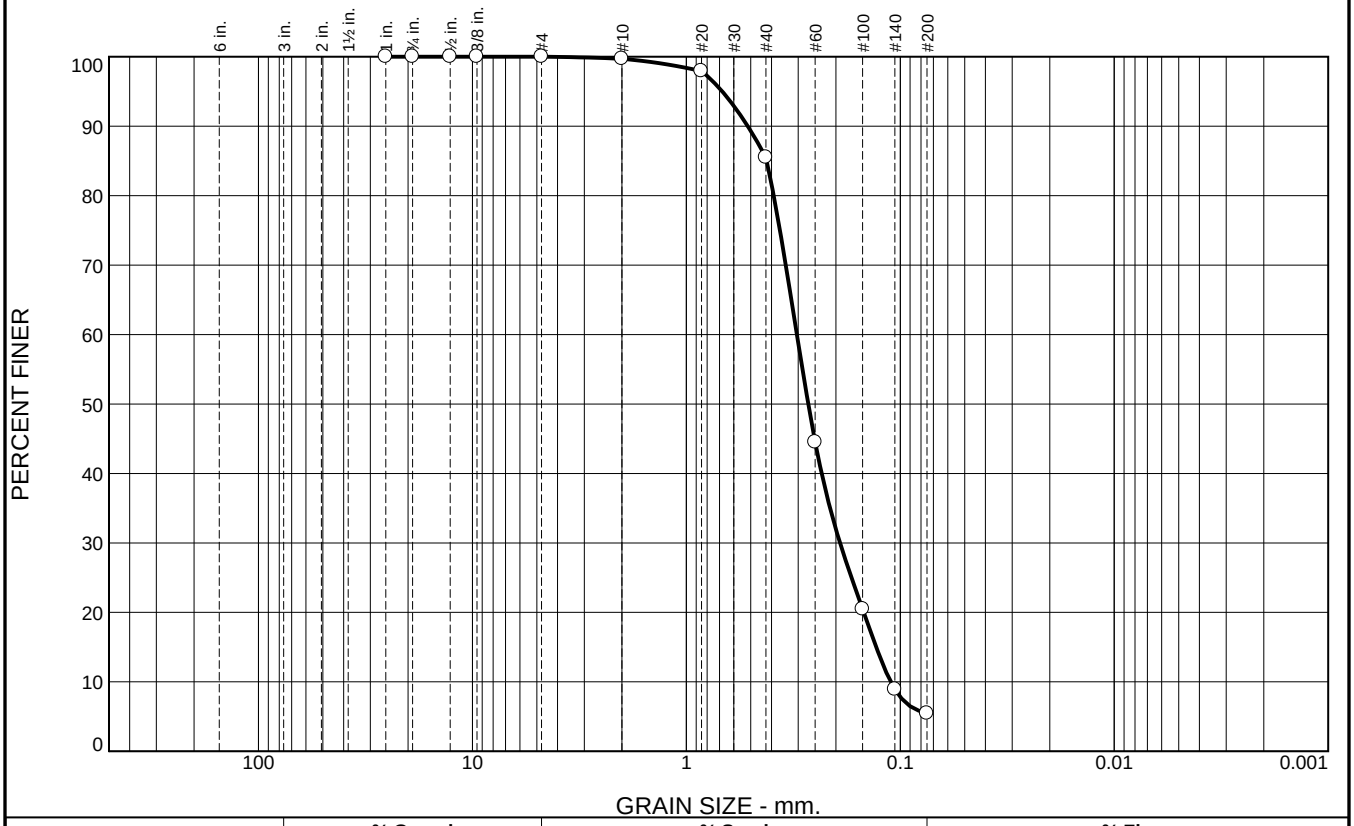
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.3	14.2	80.0	5.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	100.0		
#10	99.7		
#20	97.9		
#40	85.5		
#60	44.5		
#100	20.5		
#140	8.9		
#200	5.5		

* (no specification provided)

Material Description

Fine to medium grained, SLIGHTLY SILTY SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5168 D_{85}= 0.4214 D_{60}= 0.3045
D_{50}= 0.2694 D_{30}= 0.1914 D_{15}= 0.1296
D_{10}= 0.1108 C_u= 2.75 C_c= 1.09

Classification

USCS= SP-SM AASHTO=

Remarks

Location: BI-PBP-18-12 C
Sample Number: 6495 (33) **Depth:** 8.7' **Date:** 12/31/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBP-19-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 1 SHEETS
	South Atlantic	Mobile District	

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-MS		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBP-19-12	LOCATION COORDINATES: E = 1,122,131 N = 252,373	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL: / BEARING:	14. WATER DEPTH: 30.5 Ft.	
		15. DATE BORING	STARTED: 12-22-12 / COMPLETED: 12-22-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -30.3 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 17.7 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Mike FitzHarris, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-30.3	0.0				
-30.7	0.4		SILT, inorganic-L, mostly silt, trace clay, very soft, dark gray (ML)	NS	
			SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace fines, trace shell fragments, gray (SP)	A	Classification: SP Color: 5Y 6/2-light olive gray D50: 0.3295 mm % Fines: 1.7
			At El. -33.3 Ft., mostly fine-grained sand-sized quartz, trace fines, 1-inch clayey band at 3.7 ft., lt. gray to white	B	Classification: SP Color: 2.5Y 7/2-light gray D50: 0.346 mm % Fines: 1.5
-38.2	7.9				
			SAND, poorly-graded with silt, mostly fine to medium-grained sand-sized quartz, few silt, trace shell fragments, siltier at 8.6 and 11.1 ft., shell hash at 12 ft., gray (SP-SM)	C	Classification: SP Color: 5Y 6/2-light olive gray D50: 0.4269 mm % Fines: 3.7
-42.3	12.0				
-43.0	12.7		SAND, silty, mostly fine-grained sand-sized quartz, some silt, dark brown (SM)	NS	
-43.8	13.5				
-44.4	14.1		SAND, clayey, mostly fine-grained sand-sized quartz, some clay, dark brown (SC)		
			CLAY, fat, mostly clay, medium to high plasticity, stiff, dark gray (CH)	D	Classification: SP Color: 2.5Y 6/2-light brownish gray D50: 0.3387 mm % Fines: 3
-48.0	17.7		SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace fines, gets siltier with depth, lt. gray (SP)		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.19325° Long = -88.39690°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
SERVICES

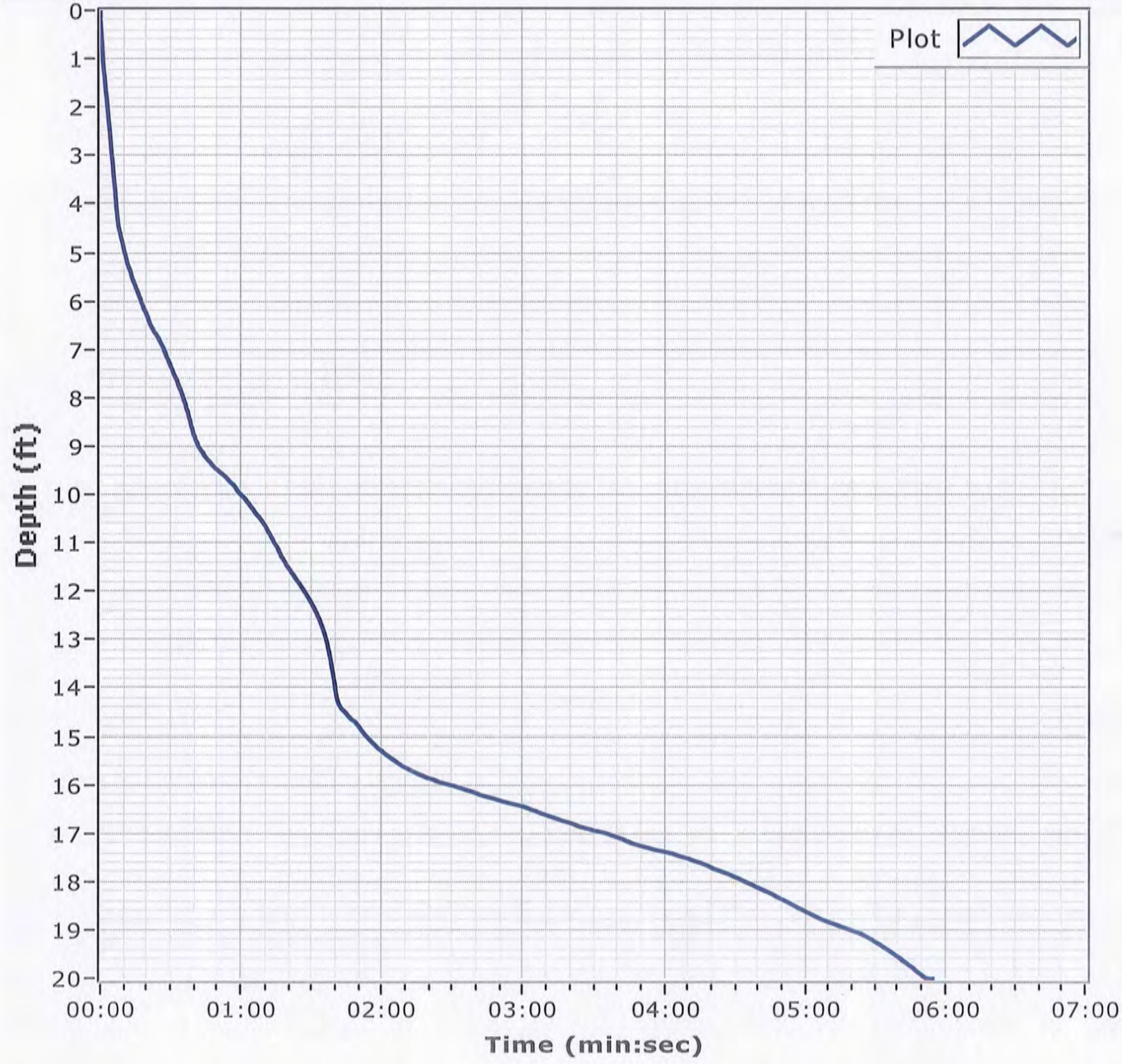
Core Identifier BI-PBP-19-12
Coordinate System
Latitude / Longitude

Latitude 30 11.676 N
Longitude 088 23.814 W

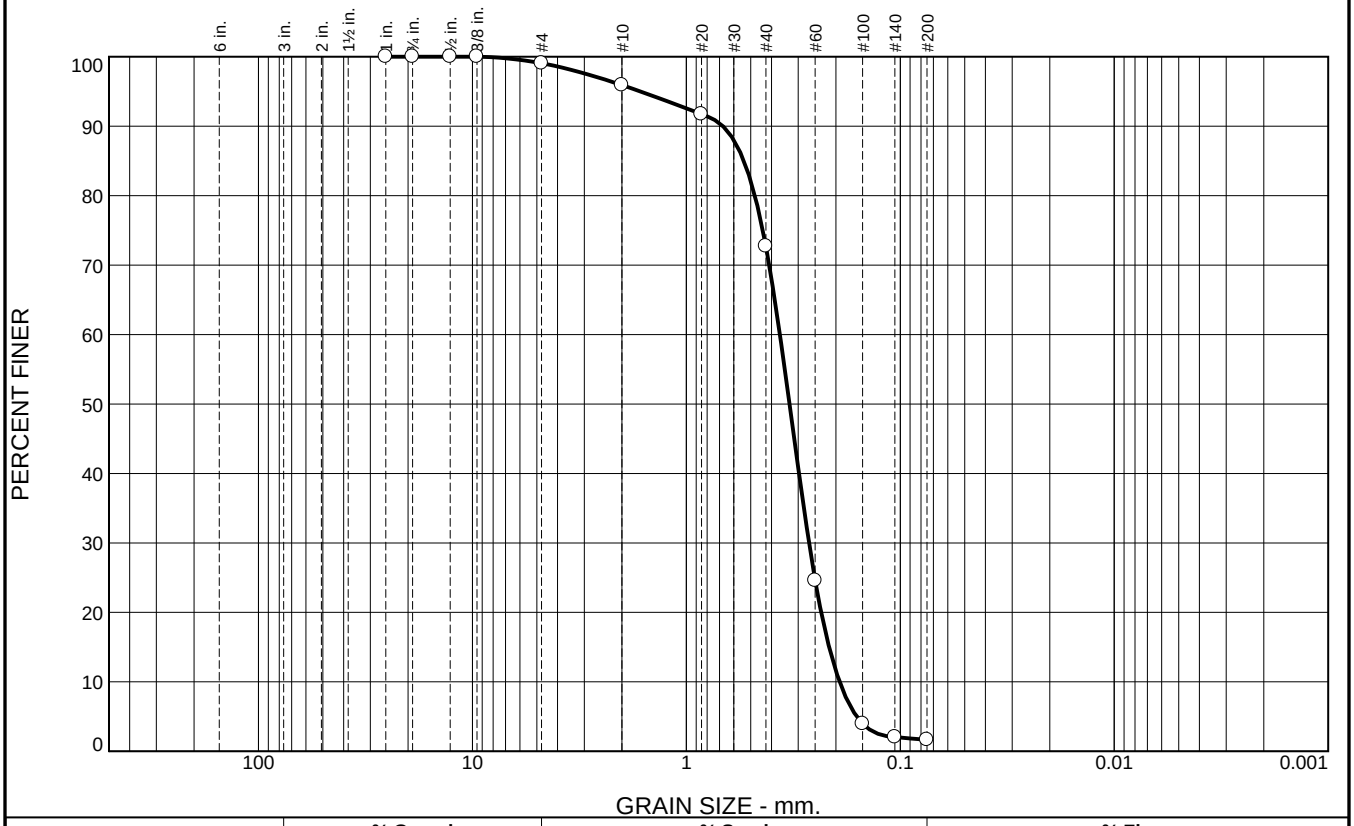
Date 12/22/2012
Start Time 11:42:59
End Time 11:48:55
Total Time 00:05:55

Water Depth 30.5'
Penetration 20.0'
Recovery 17.7'

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.9	3.2	23.2	71.0	1.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.1		
#10	95.9		
#20	91.7		
#40	72.7		
#60	24.6		
#100	4.0		
#140	2.0		
#200	1.7		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6750 D_{85}= 0.5385 D_{60}= 0.3654
D_{50}= 0.3295 D_{30}= 0.2671 D_{15}= 0.2152
D_{10}= 0.1923 C_u= 1.90 C_c= 1.02

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-19-12 A
Sample Number: 6495 (34) **Depth:** 0.4' **Date:** 12/31/12

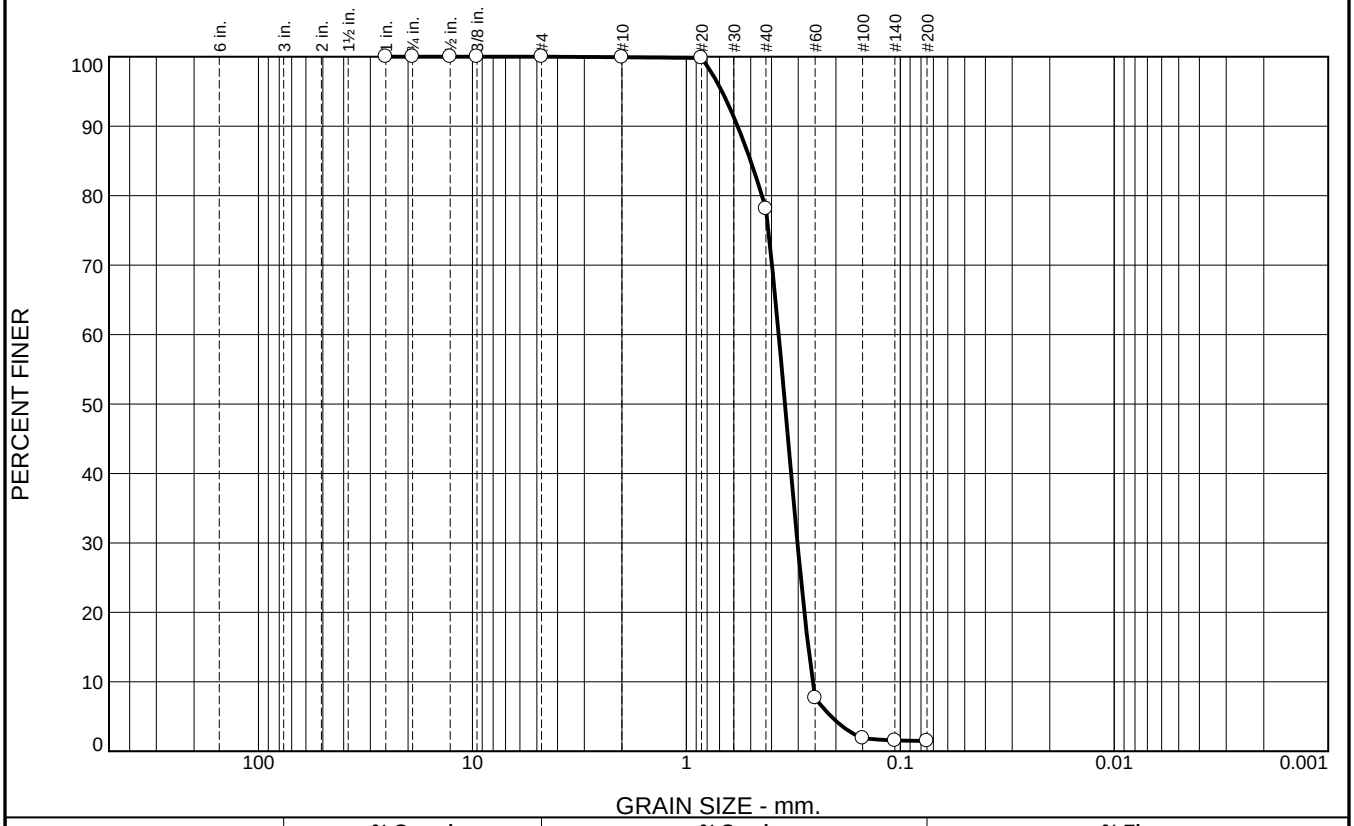
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	21.8	76.6	1.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	100.0		
#10	99.9		
#20	99.8		
#40	78.1		
#60	7.7		
#100	1.9		
#140	1.6		
#200	1.5		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5759 D_{85}= 0.5008 D_{60}= 0.3700
D_{50}= 0.3460 D_{30}= 0.3026 D_{15}= 0.2695
D_{10}= 0.2567 C_u= 1.44 C_c= 0.96

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-19-12 B
Sample Number: 6495 (35) **Depth:** 3.0' **Date:** 12/31/12

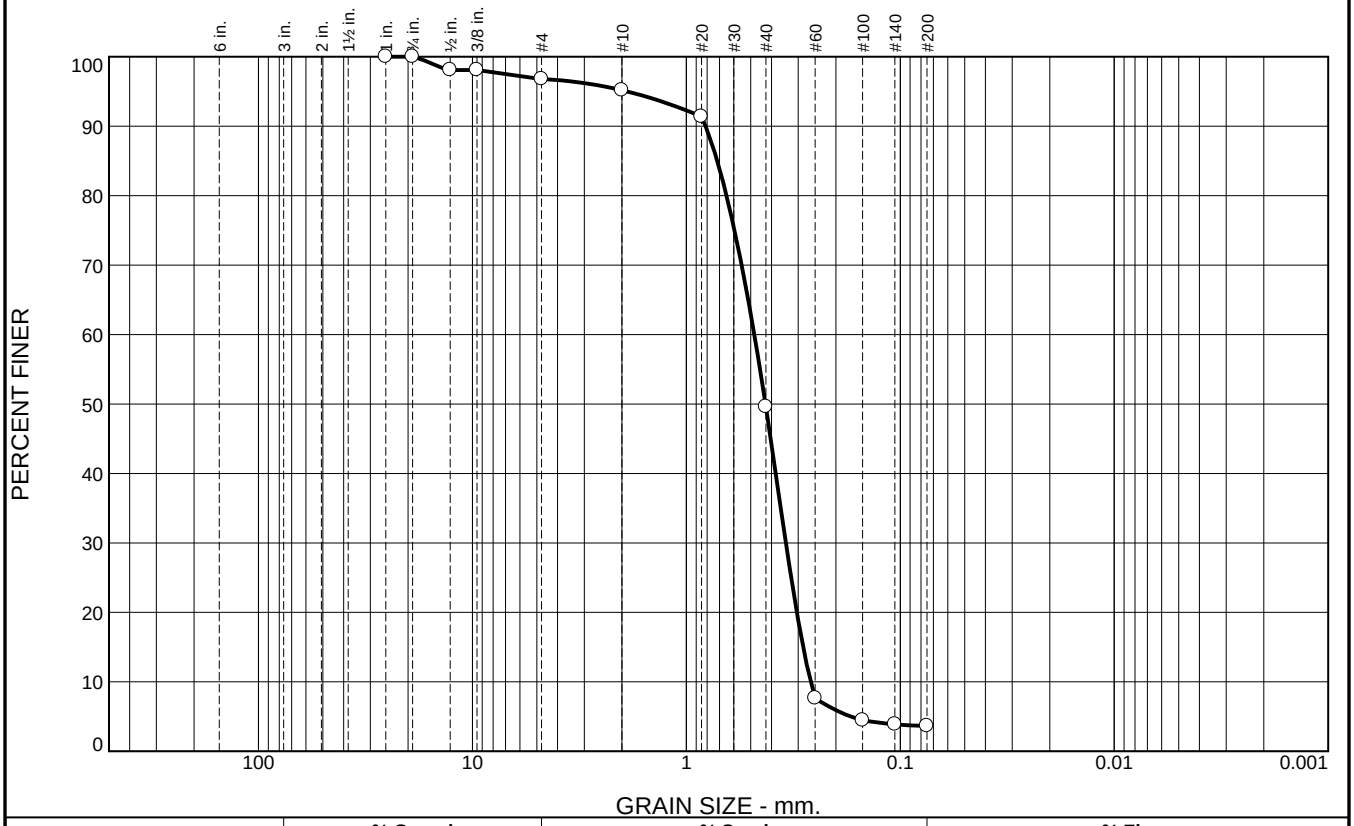
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.2	1.6	45.6	45.9	3.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	98.1		
.375	98.1		
#4	96.8		
#10	95.2		
#20	91.4		
#40	49.6		
#60	7.6		
#100	4.5		
#140	3.9		
#200	3.7		

* (no specification provided)

Material Description

Fine to medium grained, SAND, with trace SHELL

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.8137 D_{85}= 0.7172 D_{60}= 0.4813
D_{50}= 0.4269 D_{30}= 0.3427 D_{15}= 0.2847
D_{10}= 0.2625 C_u= 1.83 C_c= 0.93

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-19-12 C
Sample Number: 6495 (36) **Depth:** 7.9' **Date:** 12/31/12

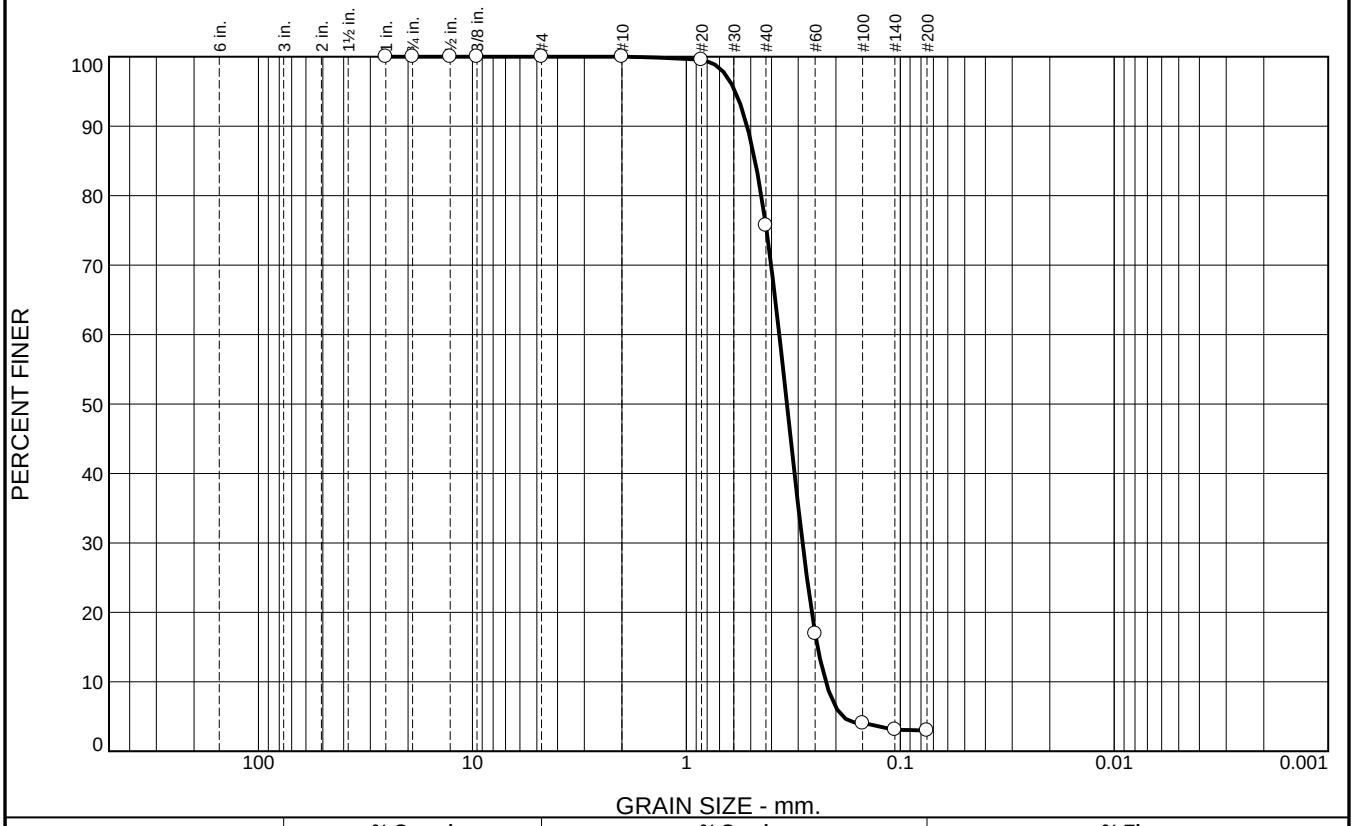
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	24.3	72.7	3.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	100.0		
#10	100.0		
#20	99.6		
#40	75.7		
#60	16.9		
#100	4.0		
#140	3.1		
#200	3.0		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5200 D_{85}= 0.4773 D_{60}= 0.3677
D_{50}= 0.3387 D_{30}= 0.2866 D_{15}= 0.2434
D_{10}= 0.2230 C_u= 1.65 C_c= 1.00

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-19-12 D
Sample Number: 6495 (37) **Depth:** 14.1' **Date:** 12/31/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBP-20-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET / OF SHEETS
	South Atlantic	Mobile District	SHEET 1 OF 1 SHEETS

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-MS		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBP-20-12	LOCATION COORDINATES: E = 1,123,119 N = 252,420	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 24.2 Ft.	
		15. DATE BORING	STARTED: 12-22-12 / COMPLETED: 12-22-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -24.9 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 13.1 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Mike FitzHarris, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-24.9	0.0				
			SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, few shell fragments, trace fines, pale lt. brown (SP)	A	Classification: SP Color: 5Y 7/2-light gray D50: 0.3285 mm % Fines: 0.9
-29.9	5.0		SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace shell fragments, silty zone at 7.2 ft., dense, lt. gray (SP)	B	Classification: SP Color: 5Y 6/2-light olive gray D50: 0.2316 mm % Fines: 4.3
-34.9	10.0		SAND, poorly-graded, mostly fine-grained sand-sized quartz, trace fines, trace shell fragments, very dense, lt. gray (SP)	C	Classification: SP Color: 5Y 7/2-light gray D50: 0.3013 mm % Fines: 3.1
-38.0	13.1				

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

3. Refusal reached at 16 ft.

4. Seafloor elevation determined from USACE hydrographic survey completed April 2014.

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.19337° Long = -88.39377°

Project Mississippi Barrier Island Restoration Project

AVS AMERICAN VIBRACORE SERVICES

Core Identifier BI-PBP-20-12

Coordinate System
Latitude / Longitude

Latitude 30 11.602 N

Longitude 088 23.626 W

Date 12/22/2012

Start Time 12:47:35

End Time 12:53:58

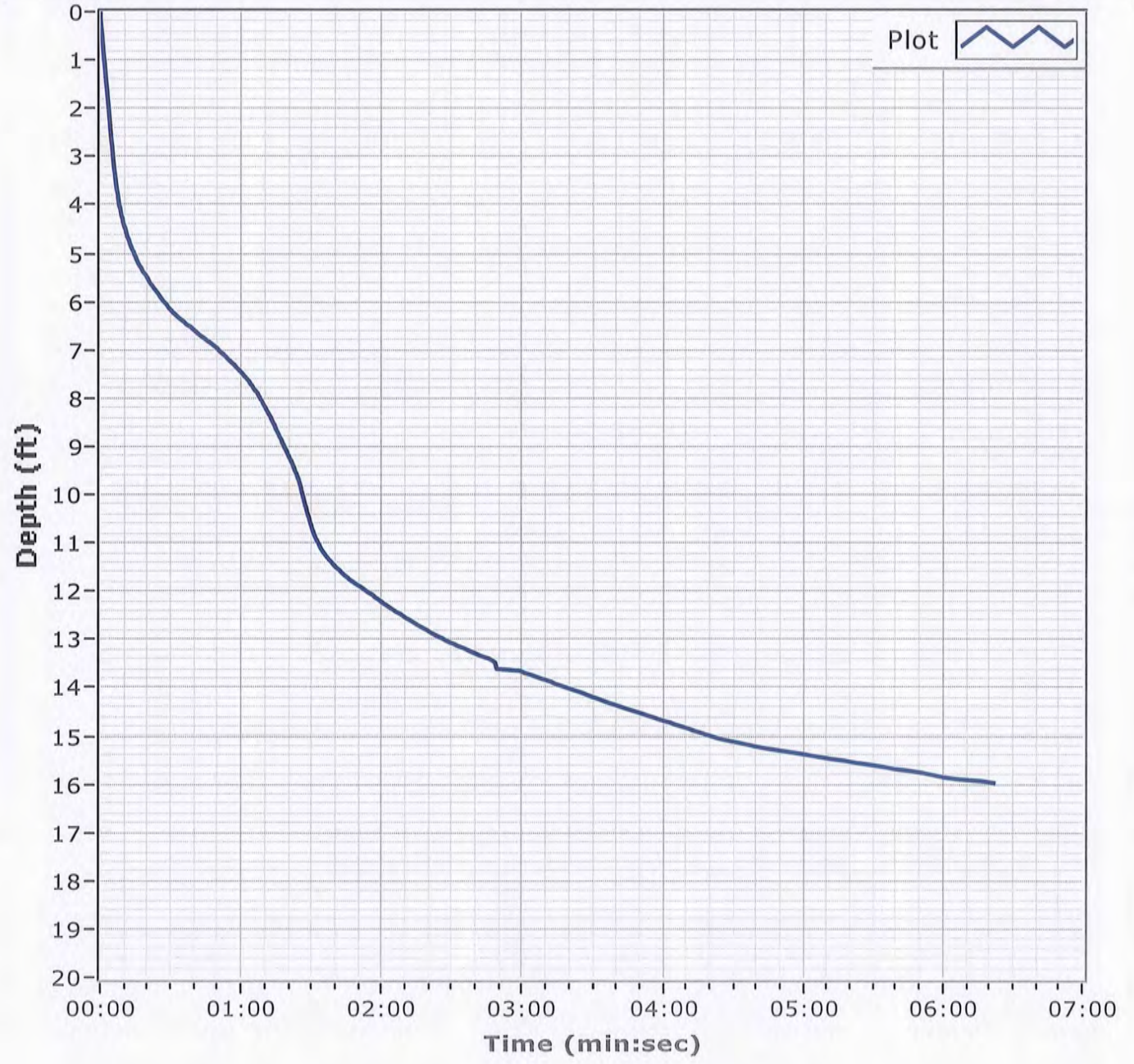
Total Time 00:06:22

Water Depth 24.2'

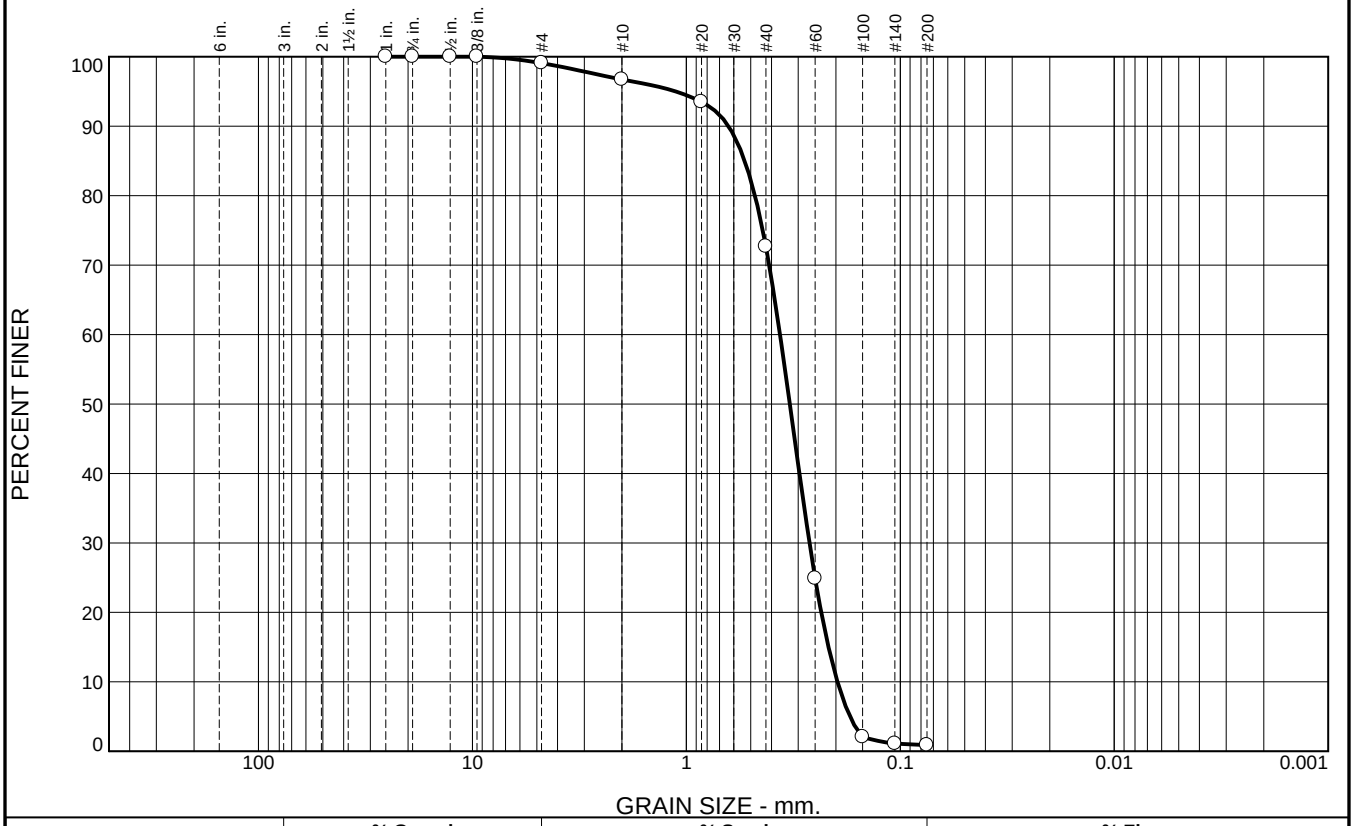
Penetration 16.0'

Recovery 13.1'

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.9	2.4	24.0	71.8	0.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.1		
#10	96.7		
#20	93.5		
#40	72.7		
#60	24.9		
#100	2.1		
#140	1.1		
#200	0.9		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6353 D_{85}= 0.5335 D_{60}= 0.3649
D_{50}= 0.3285 D_{30}= 0.2658 D_{15}= 0.2165
D_{10}= 0.1967 C_u= 1.86 C_c= 0.98

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-20-12 A
Sample Number: 6495 (38) **Depth:** 0.0' **Date:** 12/31/12

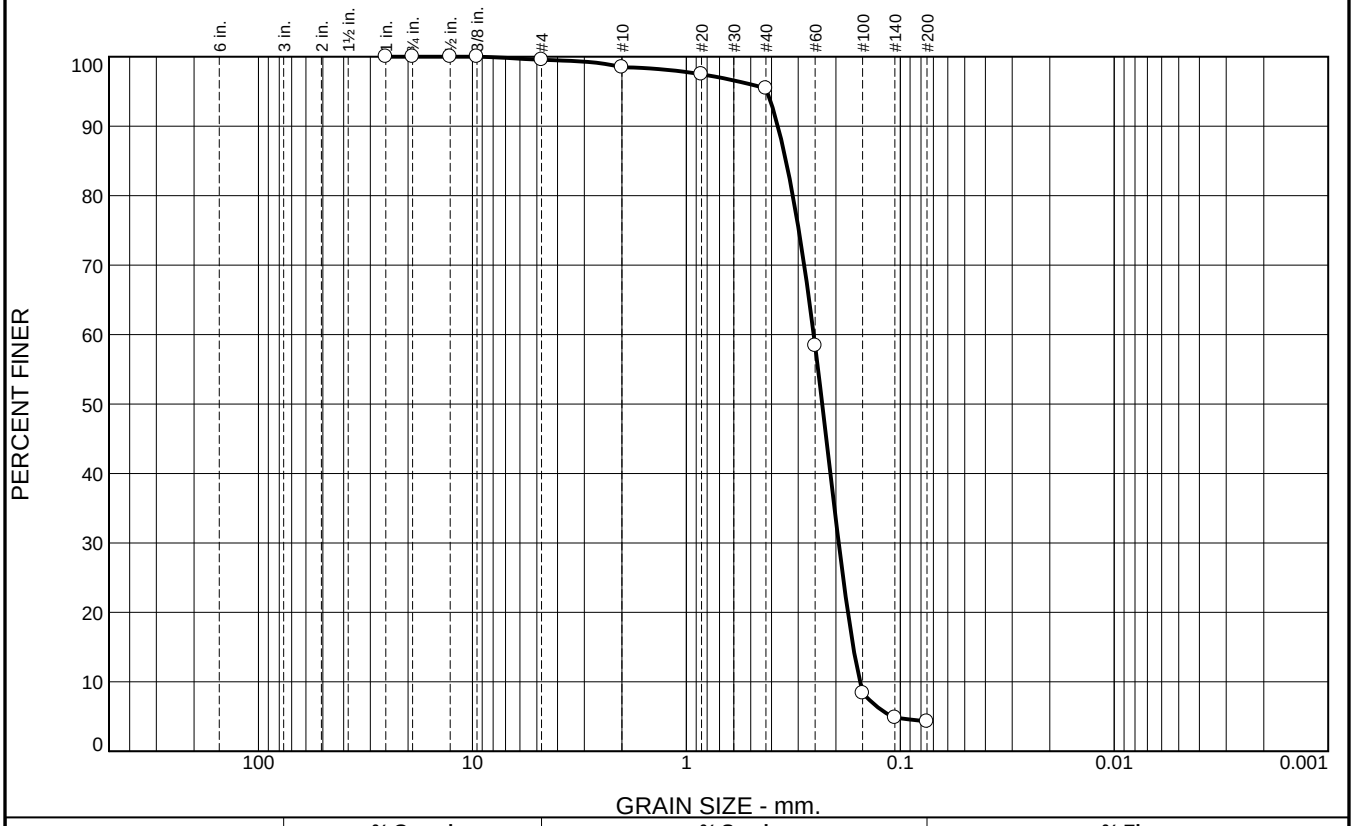
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.4	1.1	3.1	91.1	4.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.6		
#10	98.5		
#20	97.5		
#40	95.4		
#60	58.4		
#100	8.4		
#140	4.8		
#200	4.3		

* (no specification provided)

Material Description

Fine grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3733 D_{85}= 0.3421 D_{60}= 0.2538
D_{50}= 0.2316 D_{30}= 0.1941 D_{15}= 0.1661
D_{10}= 0.1546 C_u= 1.64 C_c= 0.96

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-20-12 B
Sample Number: 6495 (39) **Depth:** 5.0' **Date:** 12/31/12

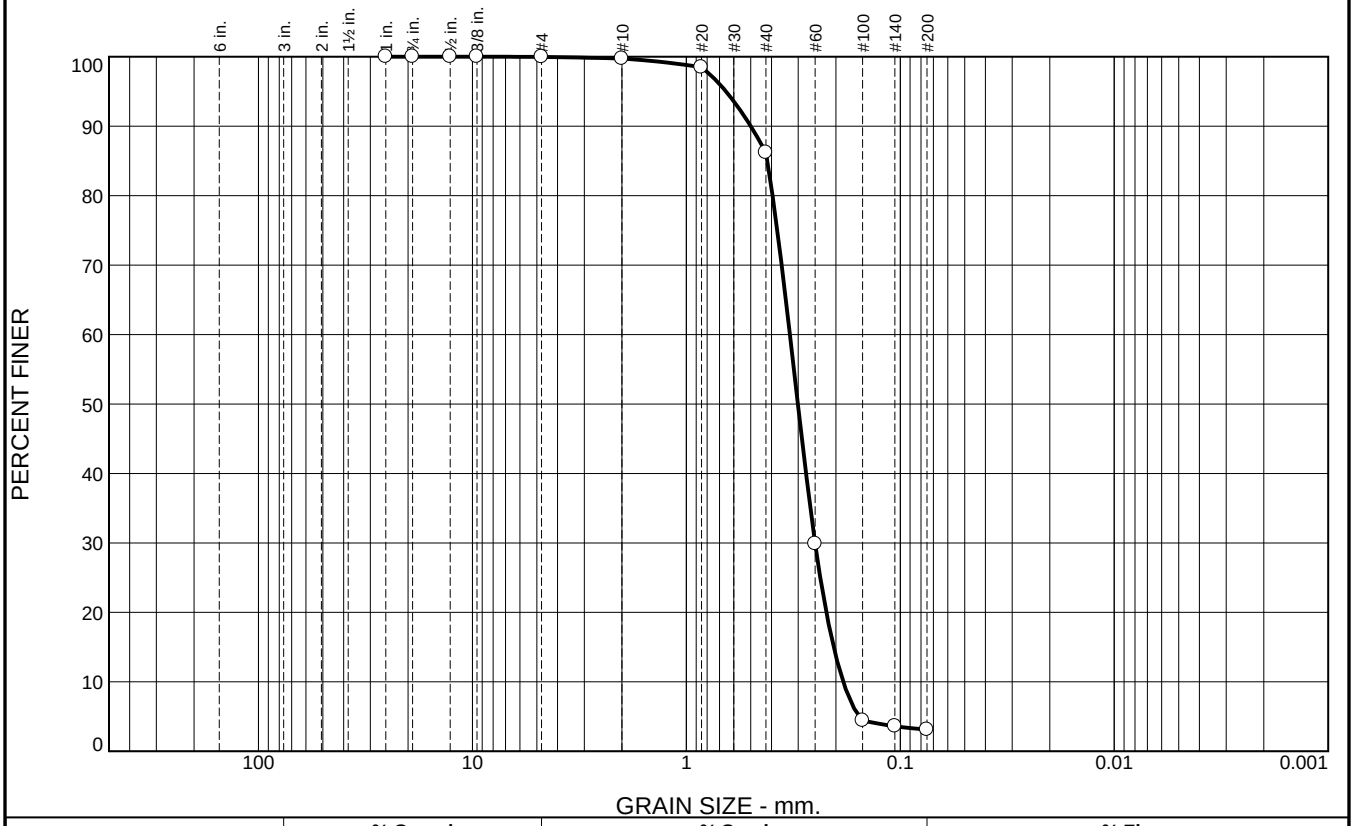
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.3	13.5	83.1	3.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	100.0		
#10	99.7		
#20	98.5		
#40	86.2		
#60	29.9		
#100	4.4		
#140	3.6		
#200	3.1		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5003 D_{85}= 0.4185 D_{60}= 0.3282
D_{50}= 0.3013 D_{30}= 0.2503 D_{15}= 0.2049
D_{10}= 0.1850 C_u= 1.77 C_c= 1.03

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-20-12 C
Sample Number: 6495 (40) **Depth:** 10.0' **Date:** 12/31/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBP-21-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 1 SHEETS
	South Atlantic	Mobile District	

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-MS		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBP-21-12	LOCATION COORDINATES: E = 1,122,925 N = 252,896	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 25.8 Ft.	
		15. DATE BORING	STARTED: 01-04-13 / COMPLETED: 01-04-13
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -25.8 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 13.0 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Mike FitzHarris, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-25.8	0.0				
			SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace fines, trace shell fragments, pale brownish gray (SP)	A	Classification: SP Color: 5Y 7/2-light gray D50: 0.314 mm % Fines: 1.4
-28.3	2.5		SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace fines, trace shell fragments, 0.5-inch clayey band at 9.1 ft., very dense, lt. gray (SP)	B	Classification: SP Color: 5Y 8/1-white D50: 0.3034 mm % Fines: 1.5
				C	Classification: SP Color: 5Y 8/1-white D50: 0.2974 mm % Fines: 1.7
-38.8	13.0				

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.19468° Long = -88.39438°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
SERVICES

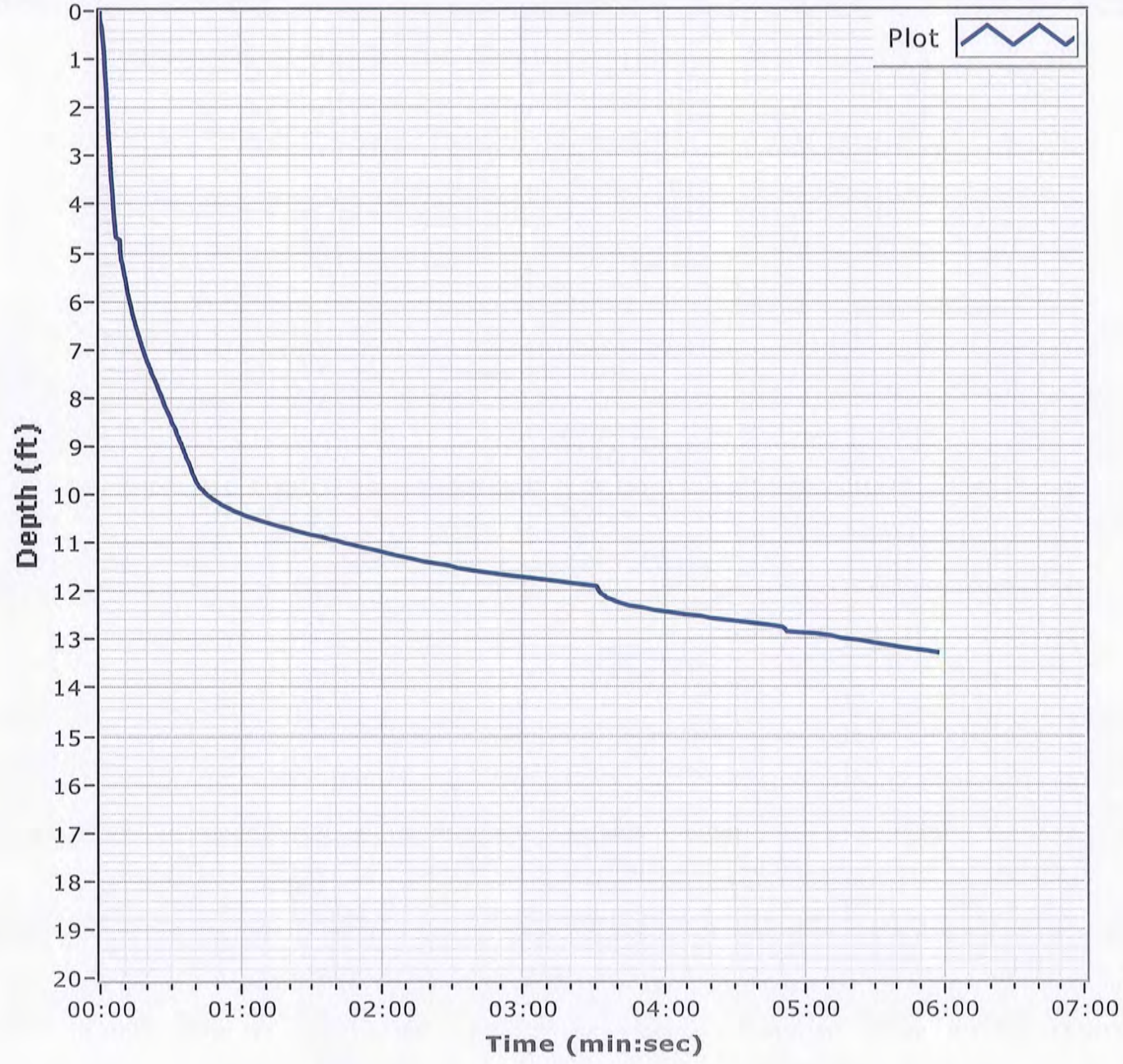
Core Identifier BI-PBP-21-12
Coordinate System
Latitude / Longitude

Date 01/04/2013
Start Time 11:28:15
End Time 11:34:12
Total Time 00:05:57

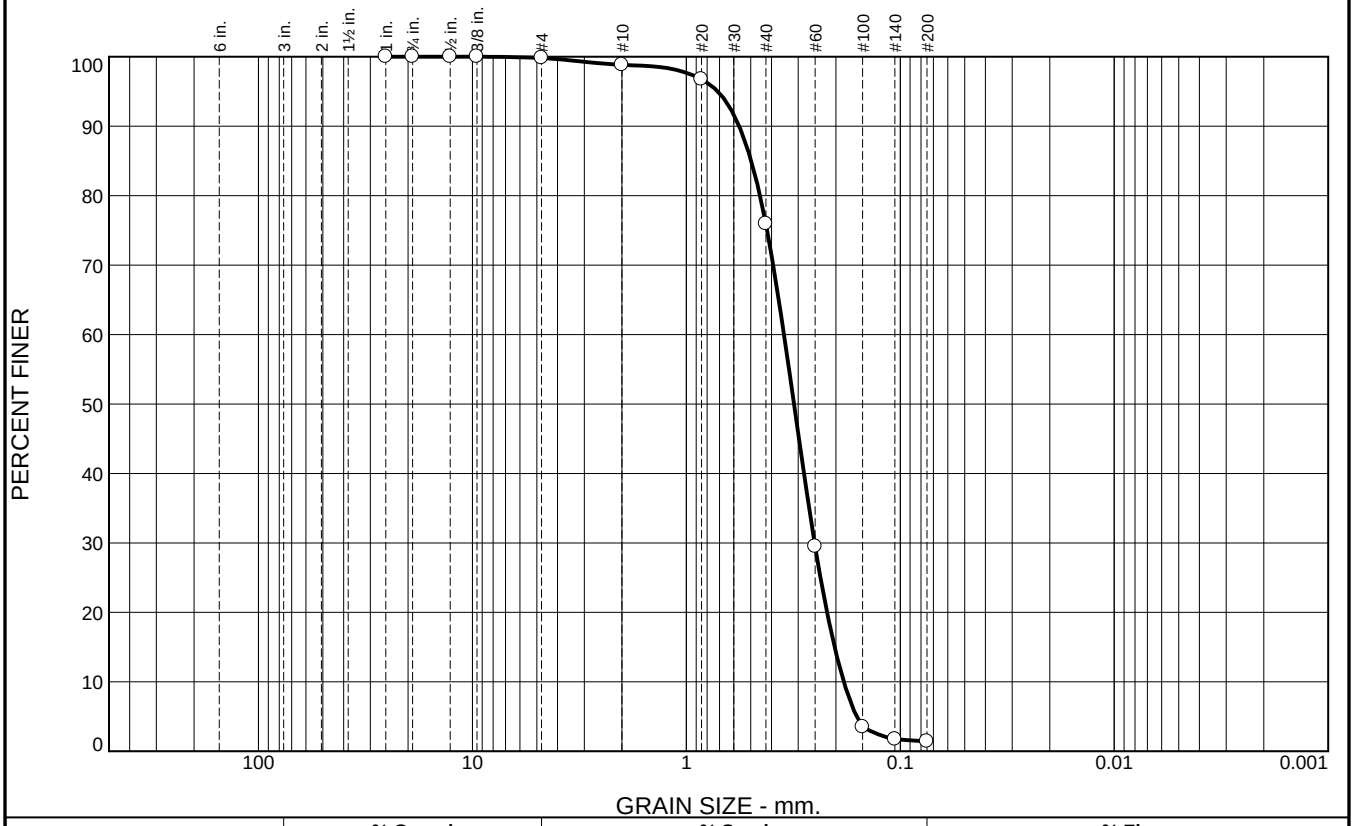
Water Depth 25.8'
Penetration 13.3'
Recovery 13.0'

Latitude 30 11.681 N
Longitude 088 23.663 W

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	1.0	22.9	74.5	1.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.8		
#10	98.8		
#20	96.7		
#40	75.9		
#60	29.5		
#100	3.5		
#140	1.7		
#200	1.4		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5661 D_{85}= 0.4976 D_{60}= 0.3496
D_{50}= 0.3140 D_{30}= 0.2516 D_{15}= 0.2028
D_{10}= 0.1838 C_u= 1.90 C_c= 0.99

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-21-12 A
Sample Number: 6503 (1) **Depth:** 0.0' **Date:** 1/08/13

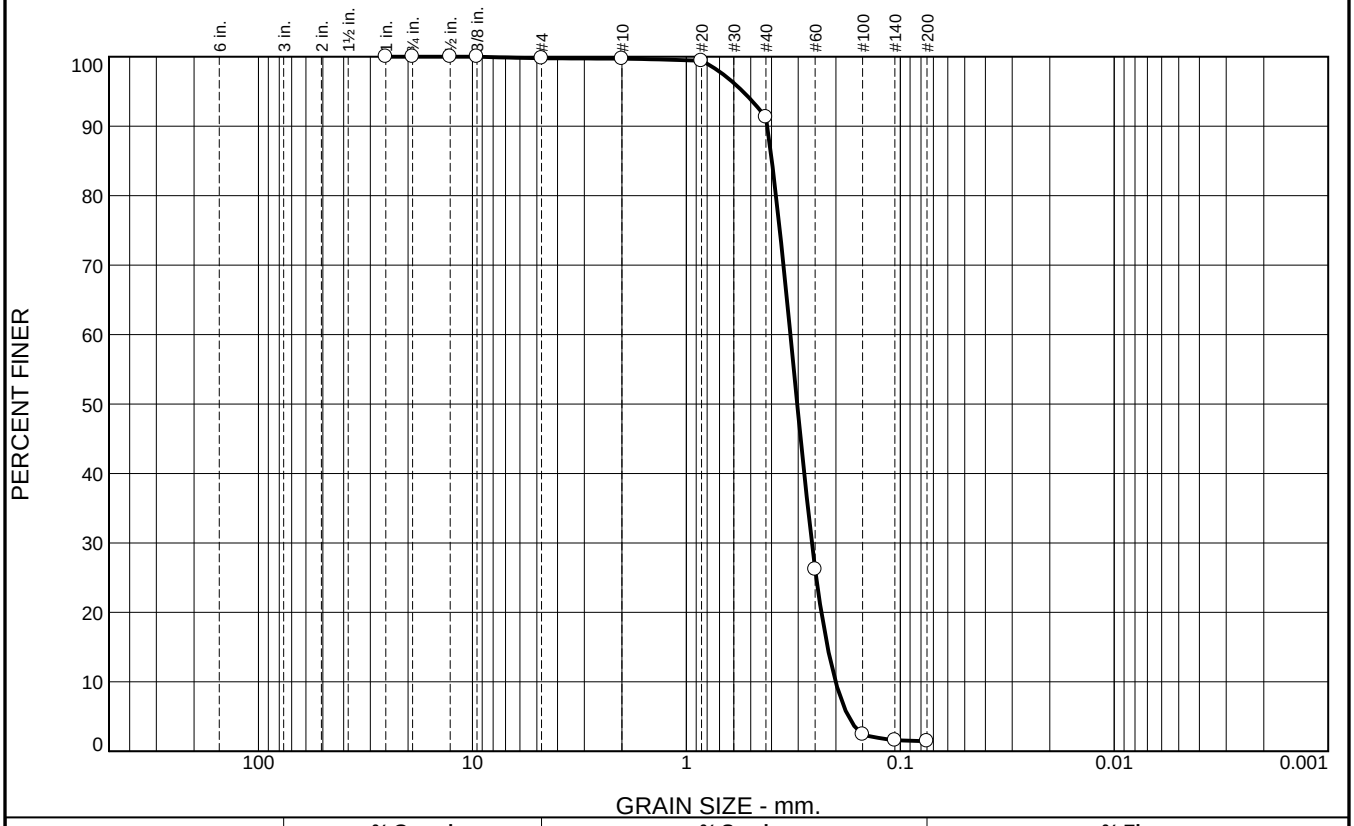
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	0.1	8.4	89.8	1.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.8		
#10	99.7		
#20	99.4		
#40	91.3		
#60	26.2		
#100	2.4		
#140	1.6		
#200	1.5		

* (no specification provided)

Material Description

Fine grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4189 D_{85}= 0.3982 D_{60}= 0.3264
D_{50}= 0.3034 D_{30}= 0.2590 D_{15}= 0.2188
D_{10}= 0.2006 C_u= 1.63 C_c= 1.02

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-21-12 B
Sample Number: 6503 (2) **Depth:** 2.5' **Date:** 1/08/13

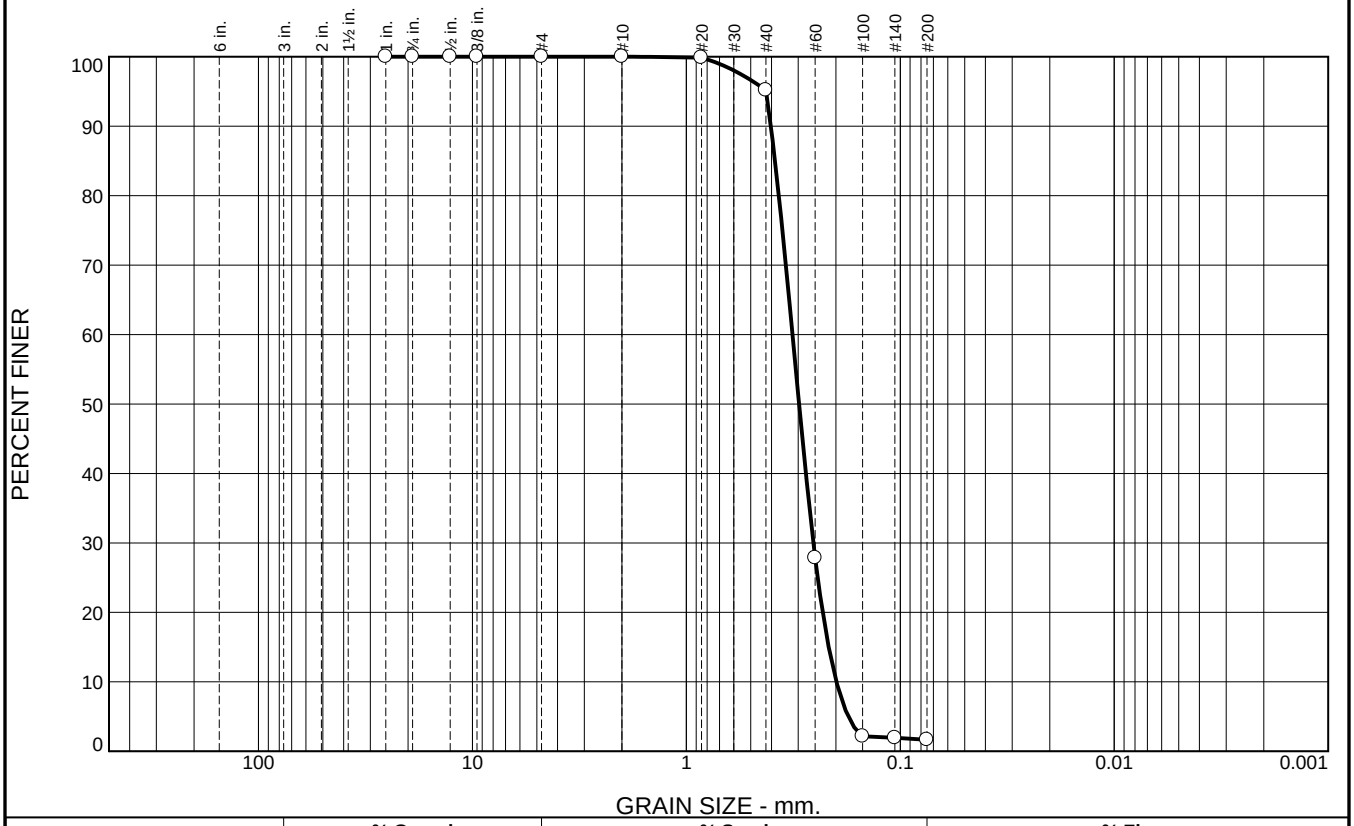
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	4.8	93.5	1.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	100.0		
#10	100.0		
#20	99.9		
#40	95.2		
#60	27.8		
#100	2.1		
#140	1.9		
#200	1.7		

* (no specification provided)

Material Description

Fine grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4026 D_{85}= 0.3848 D_{60}= 0.3191
D_{50}= 0.2974 D_{30}= 0.2549 D_{15}= 0.2161
D_{10}= 0.1989 C_u= 1.60 C_c= 1.02

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-21-12 C
Sample Number: 6503 (3) **Depth:** 7.5' **Date:** 1/08/13

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBP-22-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 2 SHEETS
	South Atlantic	Mobile District	

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-MS		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBP-22-12	LOCATION COORDINATES: E = 1,123,657 N = 251,567	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL:	BEARING:	14. WATER DEPTH: 24.2 Ft.
		15. DATE BORING	STARTED: 01-04-13 / COMPLETED: 01-04-13
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -23.7 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 18.8 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Mike FitzHarris, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-23.7	0.0				
			SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace fines, trace shell fragments, lt. gray (SP)	A	Classification: SP Color: 5Y 7/2-light gray D50: 0.3069 mm % Fines: 1.3
				B	Classification: SP Color: 5Y 7/2-light gray D50: 0.2872 mm % Fines: 2.2
-33.7	10.0				
-34.0	10.3		CLAY, fat, mostly clay, medium to high plasticity, gray (CH)	NS	
			SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace fines, trace clay stringers, gray to lt. gray (SP)	C	Classification: SP Color: 5Y 6/2-light olive gray D50: 0.2354 mm % Fines: 4.5
-37.9	14.2				
			CLAY, lean, mostly clay, some silt, trace shell fragments, sandy zone between 14.2 to 14.7 ft., low to medium plasticity, gray (CL)	NS	
-40.4	16.7				
-42.2	18.5		SAND, poorly-graded with silt, mostly fine-grained sand-sized quartz, few silt, trace shell fragments, gray (SP-SM)		
-42.5	18.8		SAND, poorly-graded with clay, mostly fine-grained sand-sized quartz, few clay, clay band at 18.6 ft., gray (SP-SC)		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.19102° Long = -88.39208°

DRILLING LOG (Cont. Sheet)	INSTALLATION	SHEET 2 OF 2 SHEETS
	Mobile District	

PROJECT	COORDINATE SYSTEM/DATUM	HORIZONTAL	VERTICAL
MsCIP Barrier Island Restoration	State Plane, MSE (U.S. Ft.)	NAD83	NAVD88

LOCATION COORDINATES	ELEVATION TOP OF BORING
X = 1,123,657 Y = 251,567	-23.7 Ft.

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
			3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.		

30
35
40
45
50
55
60

Project Mississippi Barrier Island Restoration Project

AVS AMERICAN VIBRACORE SERVICES

Core Identifier BI-PBP-22-12

Coordinate System
Latitude / Longitude

Latitude 30 11.461 N

Longitude 088 23.525 W

Date 01/04/2013

Start Time 10:52:09

End Time 10:54:10

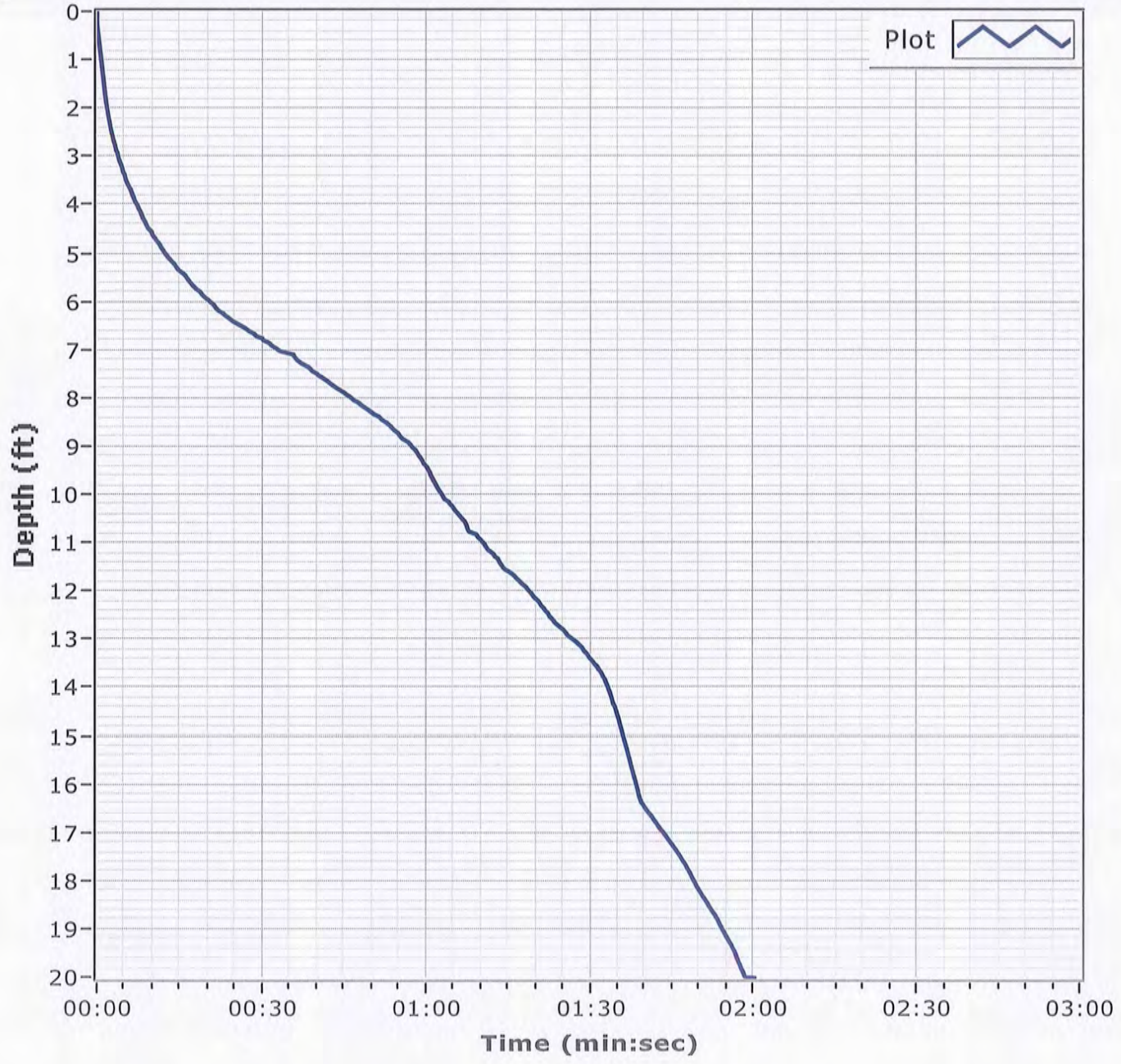
Total Time 00:02:00

Water Depth 24.2'

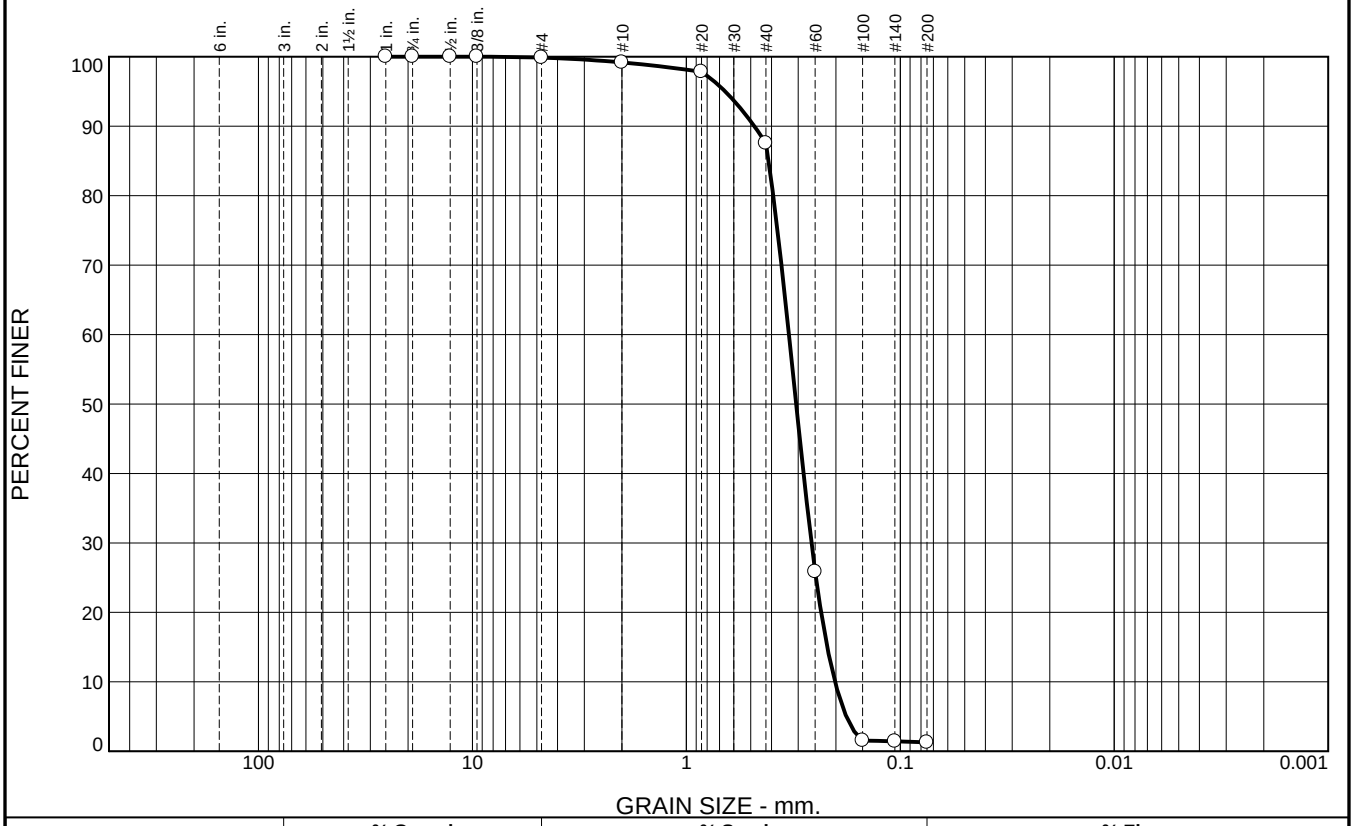
Penetration 20.0'

Recovery 18.8'

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.7	11.7	86.2	1.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.9		
#10	99.2		
#20	97.8		
#40	87.5		
#60	25.9		
#100	1.5		
#140	1.4		
#200	1.3		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4815 D_{85}= 0.4128 D_{60}= 0.3316
D_{50}= 0.3069 D_{30}= 0.2602 D_{15}= 0.2195
D_{10}= 0.2019 C_u= 1.64 C_c= 1.01

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-22-12 A
Sample Number: 6503 (4) **Depth:** 0.0' **Date:** 1/08/13

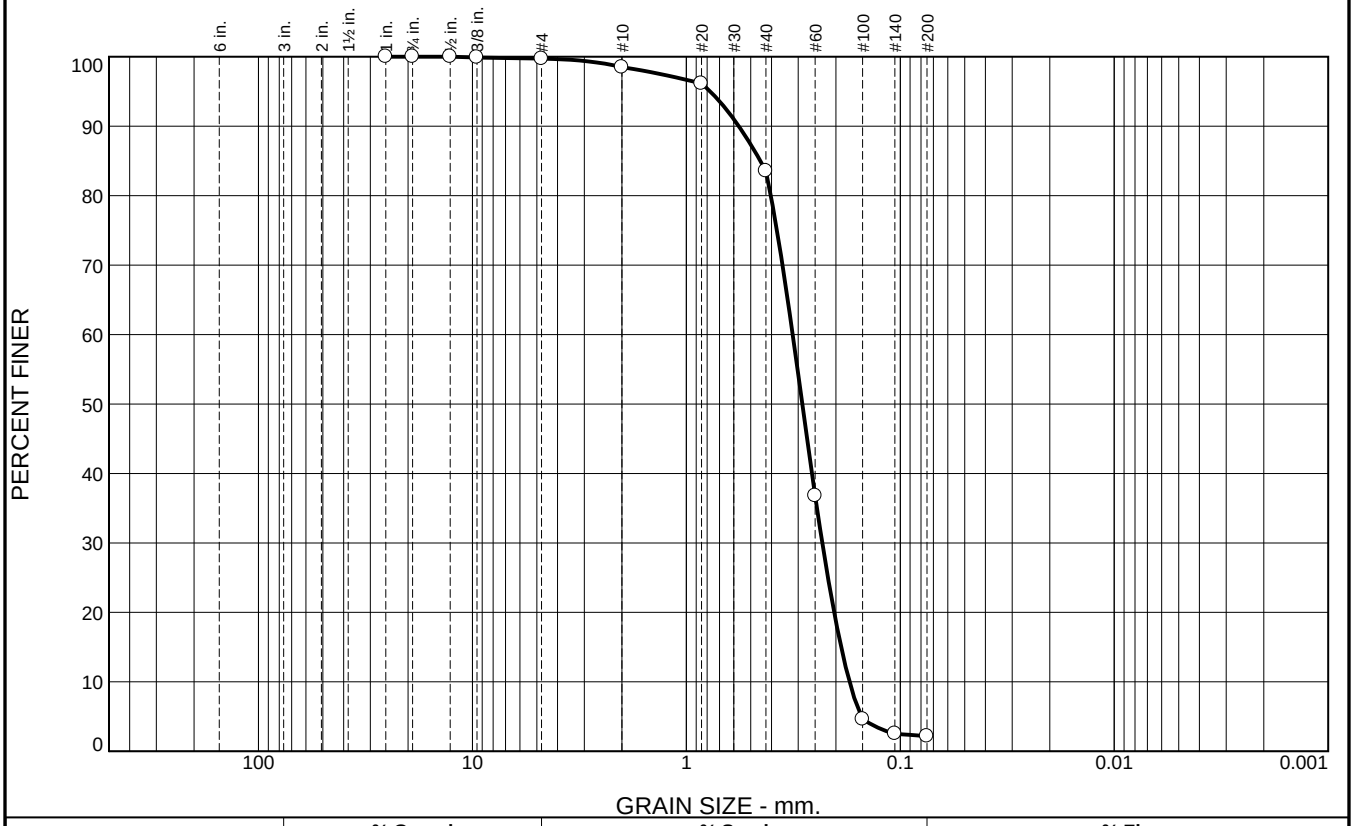
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.3	1.2	15.0	81.3	2.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	99.9		
#4	99.7		
#10	98.5		
#20	96.1		
#40	83.5		
#60	36.8		
#100	4.6		
#140	2.5		
#200	2.2		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5688 D_{85}= 0.4513 D_{60}= 0.3185
D_{50}= 0.2872 D_{30}= 0.2315 D_{15}= 0.1891
D_{10}= 0.1729 C_u= 1.84 C_c= 0.97

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-22-12 B
Sample Number: 6503 (5) **Depth:** 5.0' **Date:** 1/08/12

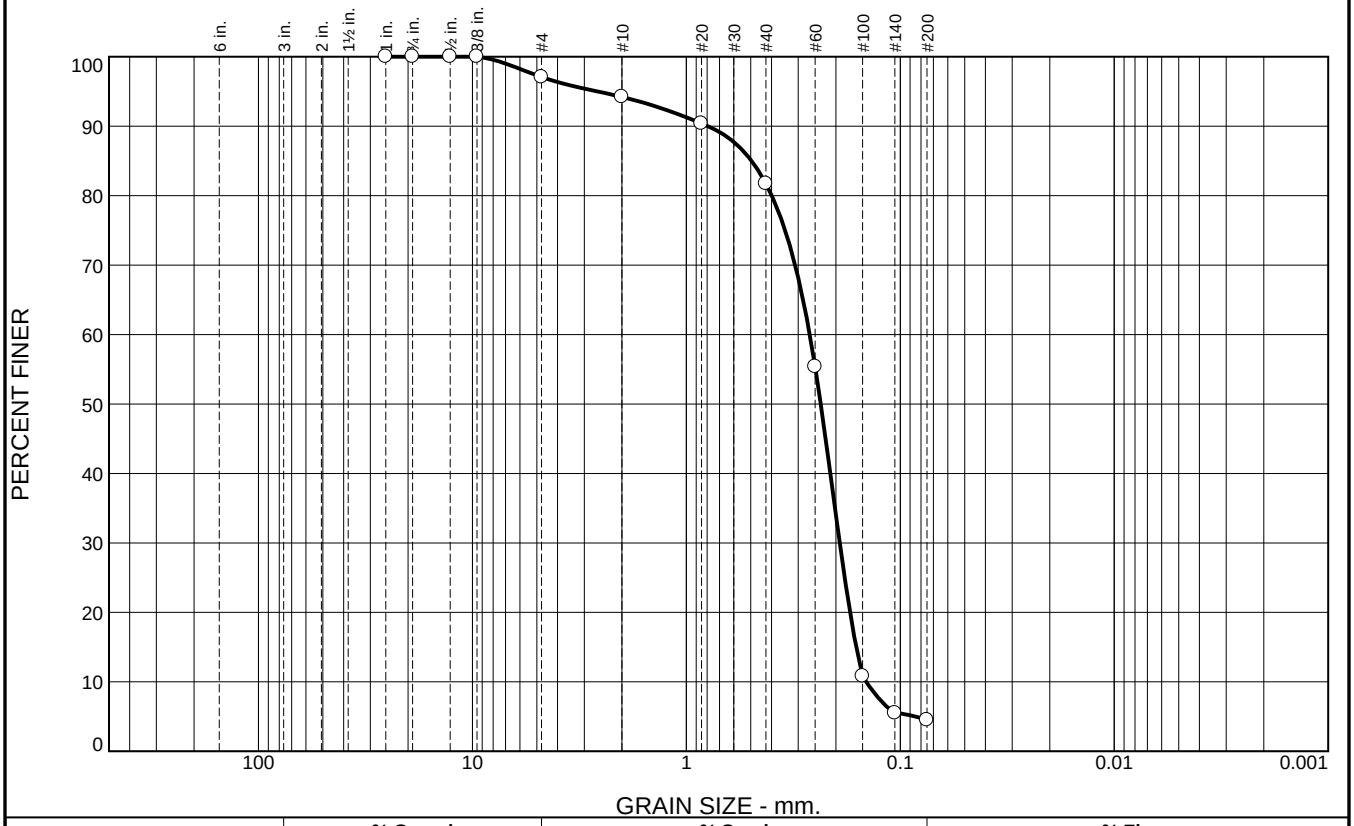
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.9	2.9	12.5	77.2	4.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	97.1		
#10	94.2		
#20	90.4		
#40	81.7		
#60	55.4		
#100	10.8		
#140	5.5		
#200	4.5		

* (no specification provided)

Material Description

Fine to medium grained, SAND, with trace SHELL

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.7955 D_{85}= 0.4955 D_{60}= 0.2650
D_{50}= 0.2354 D_{30}= 0.1919 D_{15}= 0.1609
D_{10}= 0.1443 C_u= 1.84 C_c= 0.96

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-22-12 C
Sample Number: 6503 (6) **Depth:** 10.3' **Date:** 1/08/13

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBP-24-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 2 SHEETS
	South Atlantic	Mobile District	

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-MS		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBP-24-12	LOCATION COORDINATES: E = 1,124,585 N = 250,847	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 27.1 Ft.	
		15. DATE BORING	STARTED: 01-04-13 / COMPLETED: 01-04-13
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -26.3 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 19.9 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Mike FitzHarris, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-26.3	0.0				
			SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace fines, trace shell fragments, lt. pale brown to light gray (SP)	A	Classification: SP-SM Color: 5Y 7/2-light gray D50: 0.3327 mm % Fines: 5.1
				B	Classification: SP Color: 5Y 7/2-light gray D50: 0.2546 mm % Fines: 2
-34.9	8.6				
			SAND, poorly-graded with silt, mostly fine-grained sand-sized quartz, few silt, trace shell fragments, gray (SP-SM)	C	Classification: SP-SM Color: 5Y 6/2-light olive gray D50: 0.2973 mm % Fines: 6.2
-37.5	11.2				
			SAND, clayey, mostly fine-grained sand-sized quartz, some clay, little silt, trace shell fragments, gray (SC)	NS	
-39.9	13.6				
			SAND, silty, mostly fine-grained sand-sized quartz, some silt, trace shell fragments, brown (SM)	D	Classification: SM Color: 2.5Y 4/2-dark grayish brown D50: 0.1227 mm % Fines: 13.6
-44.4	18.1				
-44.7	18.4		SAND, clayey, mostly fine-grained sand-sized quartz, some clay, trace shell fragments, gray (SC)	NS	
-45.9	19.6				
-46.2	19.9		CLAY, lean, mostly clay, some fine-grained sand-sized quartz, gray (CL)		
			SAND, clayey, mostly fine-grained sand-sized quartz, some clay, gray (SC)		
			NOTES: 1. Soils are field visually classified in accordance with the Unified Soils Classification		

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.18903° Long = -88.38915°

DRILLING LOG (Cont. Sheet)	INSTALLATION		SHEET 2 OF 2 SHEETS
	Mobile District		
PROJECT	**COORDINATE SYSTEM/DATUM**	**HORIZONTAL**	**VERTICAL**
MsCIP Barrier Island Restoration	State Plane, MSE (U.S. Ft.)	NAD83	NAVD88
LOCATION COORDINATES	**ELEVATION TOP OF BORING**		
X = 1,124,585 Y = 250,847	-26.3 Ft.		

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
			System. 2. NS = Sample not submitted for laboratory analysis from this interval. 3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.		

30
35
40
45
50
55
60

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.18903° Long = -88.38915°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
SERVICES

Core Identifier BI-PBP-24-12

Coordinate System
Latitude / Longitude

Latitude 30 11.342 N

Longitude 088 23.349 W

Date 01/04/2013

Start Time 09:25:47

End Time 09:28:44

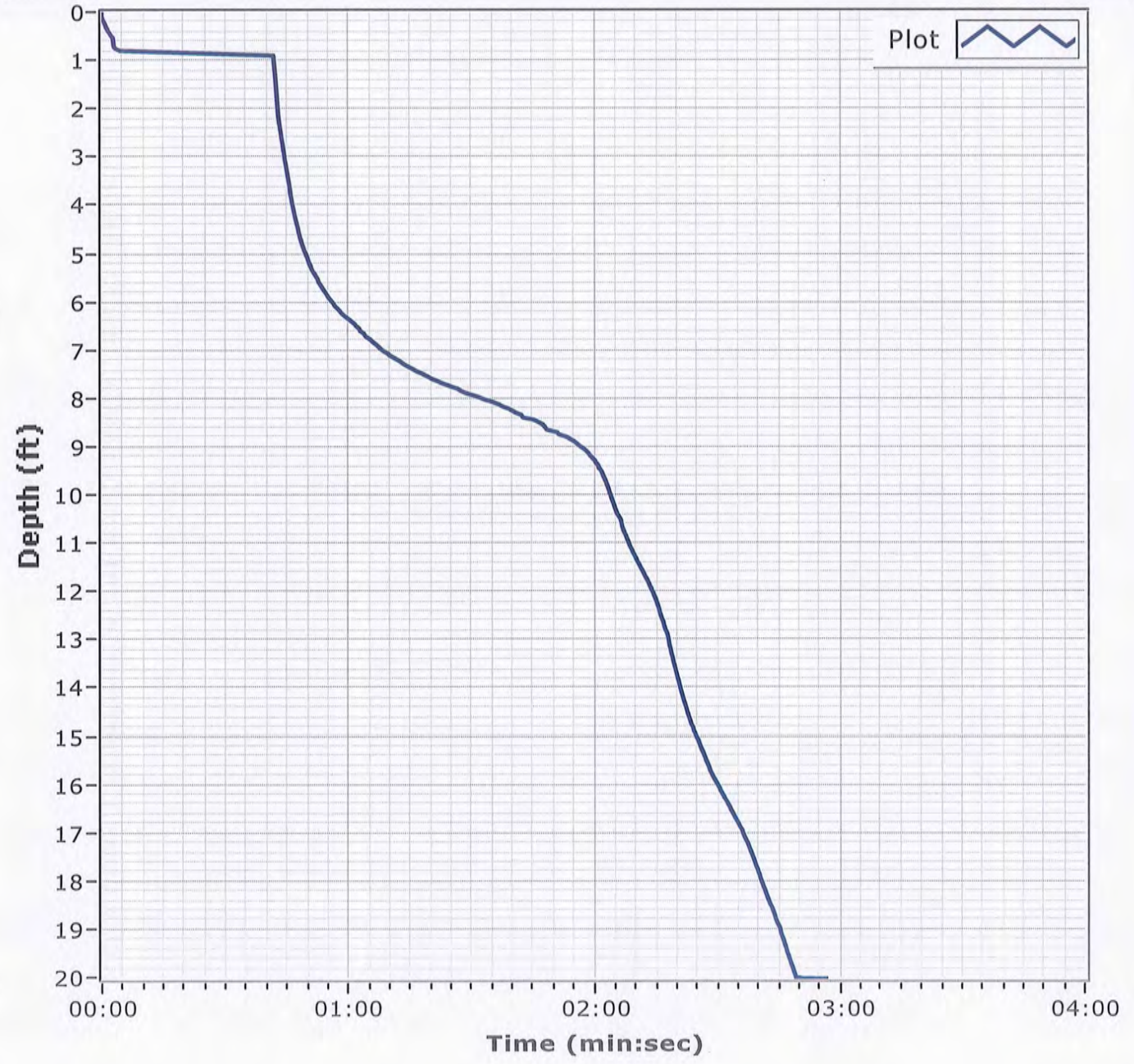
Total Time 00:02:57

Water Depth 27.1'

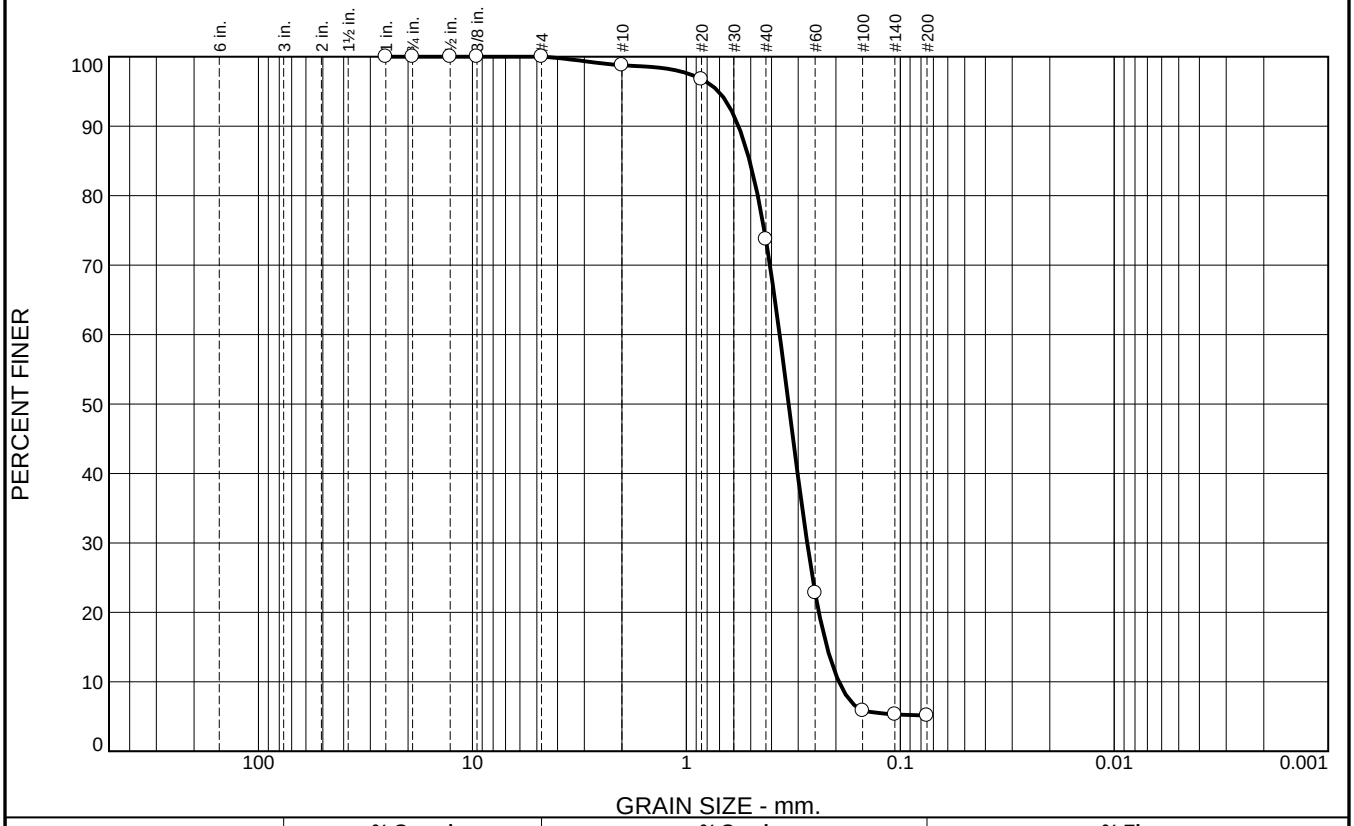
Penetration 20.0'

Recovery 19.9'

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	1.2	25.1	68.6	5.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	100.0		
#10	98.8		
#20	96.8		
#40	73.7		
#60	22.8		
#100	5.8		
#140	5.3		
#200	5.1		

* (no specification provided)

Material Description

Fine to medium grained, SLIGHTLY SILTY SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5703 D_{85}= 0.5061 D_{60}= 0.3663
D_{50}= 0.3327 D_{30}= 0.2726 D_{15}= 0.2202
D_{10}= 0.1937 C_u= 1.89 C_c= 1.05

Classification

USCS= SP-SM AASHTO=

Remarks

Location: BI-PBP-24-12 A
Sample Number: 6503 (11) **Depth:** 0.0' **Date:** 1/08/13

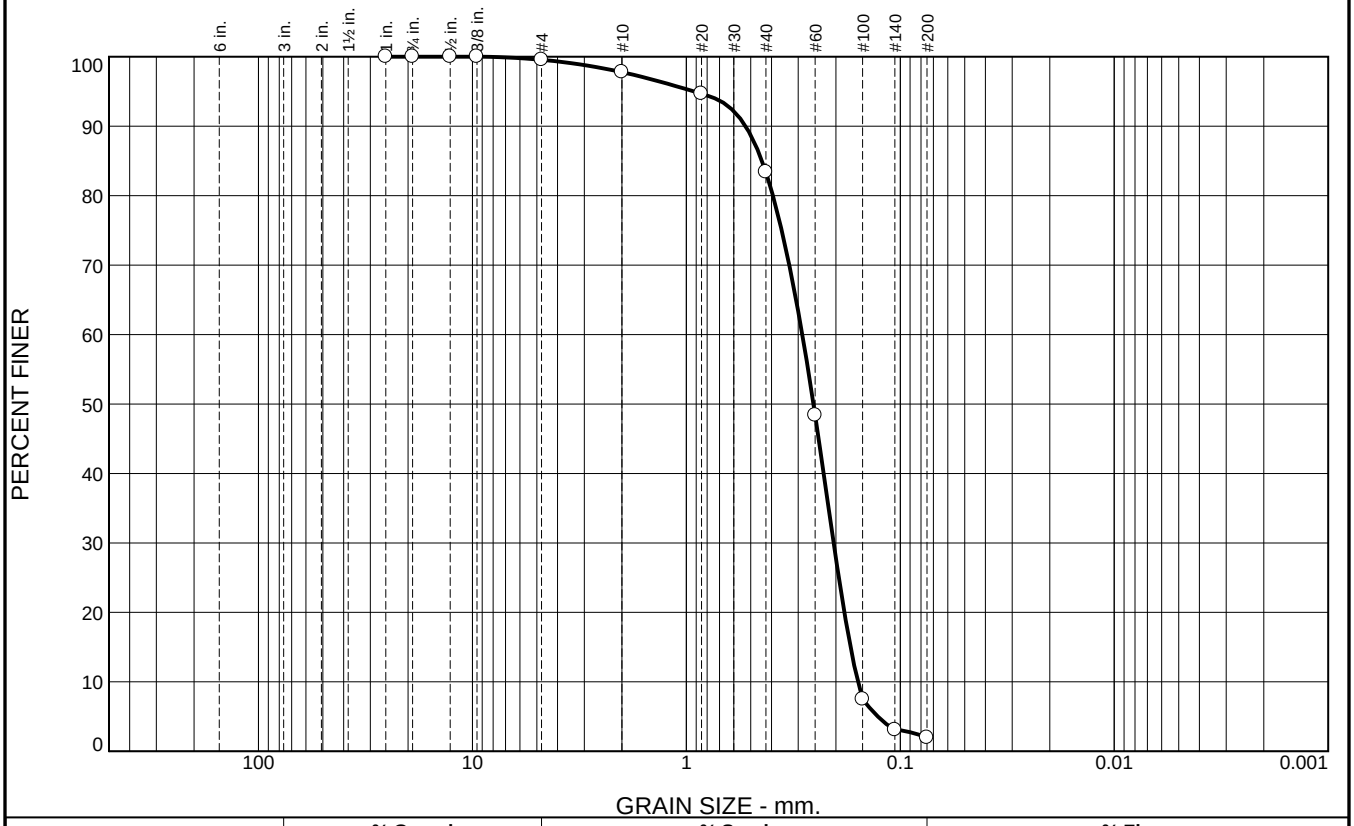
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.4	1.8	14.4	81.4	2.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.6		
#10	97.8		
#20	94.7		
#40	83.4		
#60	48.4		
#100	7.5		
#140	3.1		
#200	2.0		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5288 D_{85}= 0.4432 D_{60}= 0.2873
D_{50}= 0.2546 D_{30}= 0.2049 D_{15}= 0.1710
D_{10}= 0.1580 C_u= 1.82 C_c= 0.93

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBP-24-12 B
Sample Number: 6503 (12) **Depth:** 5.0' **Date:** 1/08/13

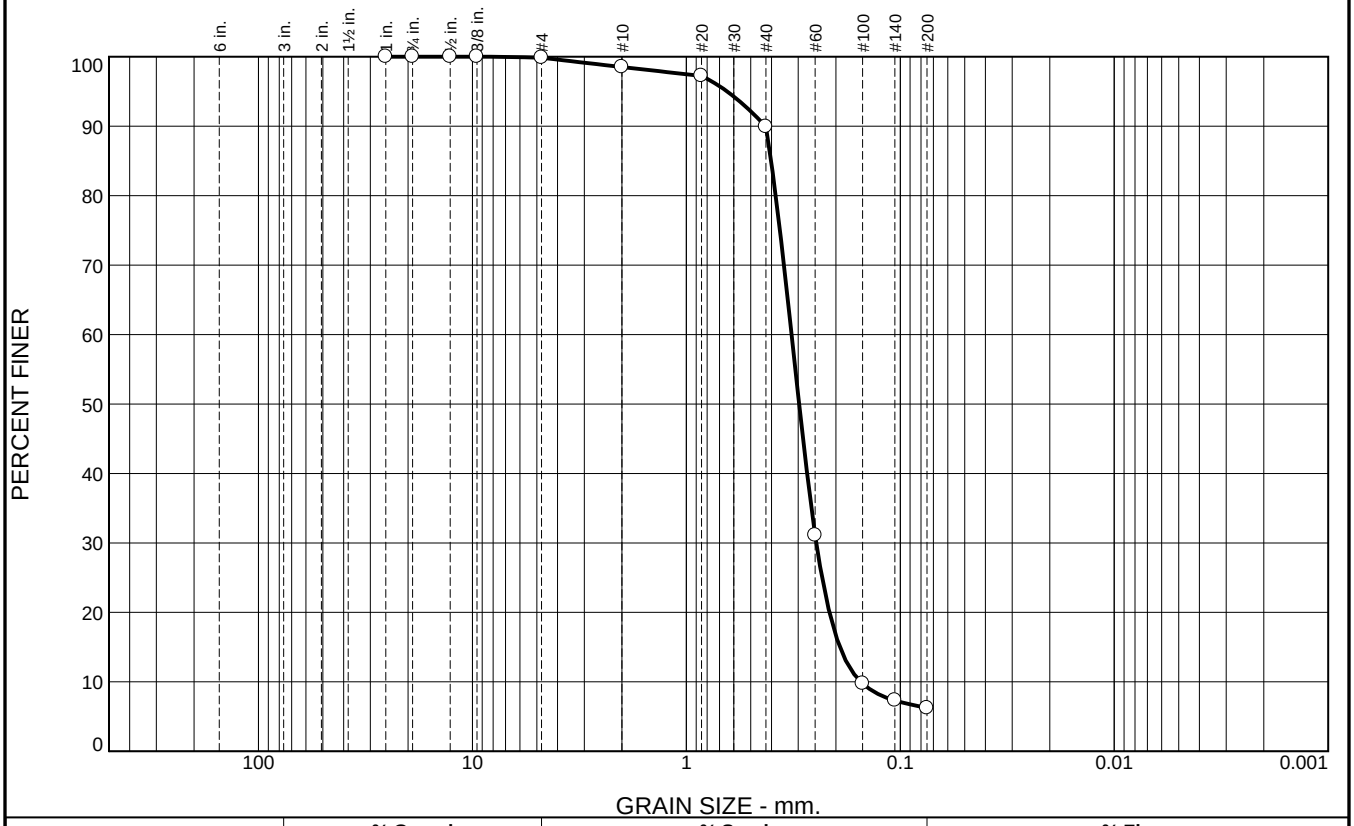
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	1.3	8.6	83.7	6.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.8		
#10	98.5		
#20	97.2		
#40	89.9		
#60	31.1		
#100	9.8		
#140	7.3		
#200	6.2		

* (no specification provided)

Material Description

Fine grained, SLIGHTLY SILTY SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4275 D_{85}= 0.4015 D_{60}= 0.3223
D_{50}= 0.2973 D_{30}= 0.2470 D_{15}= 0.1917
D_{10}= 0.1529 C_u= 2.11 C_c= 1.24

Classification

USCS= SP-SM AASHTO=

Remarks

Location: BI-PBP-24-12 C
Sample Number: 6503 (13) **Depth:** 8.6' **Date:** 1/08/13

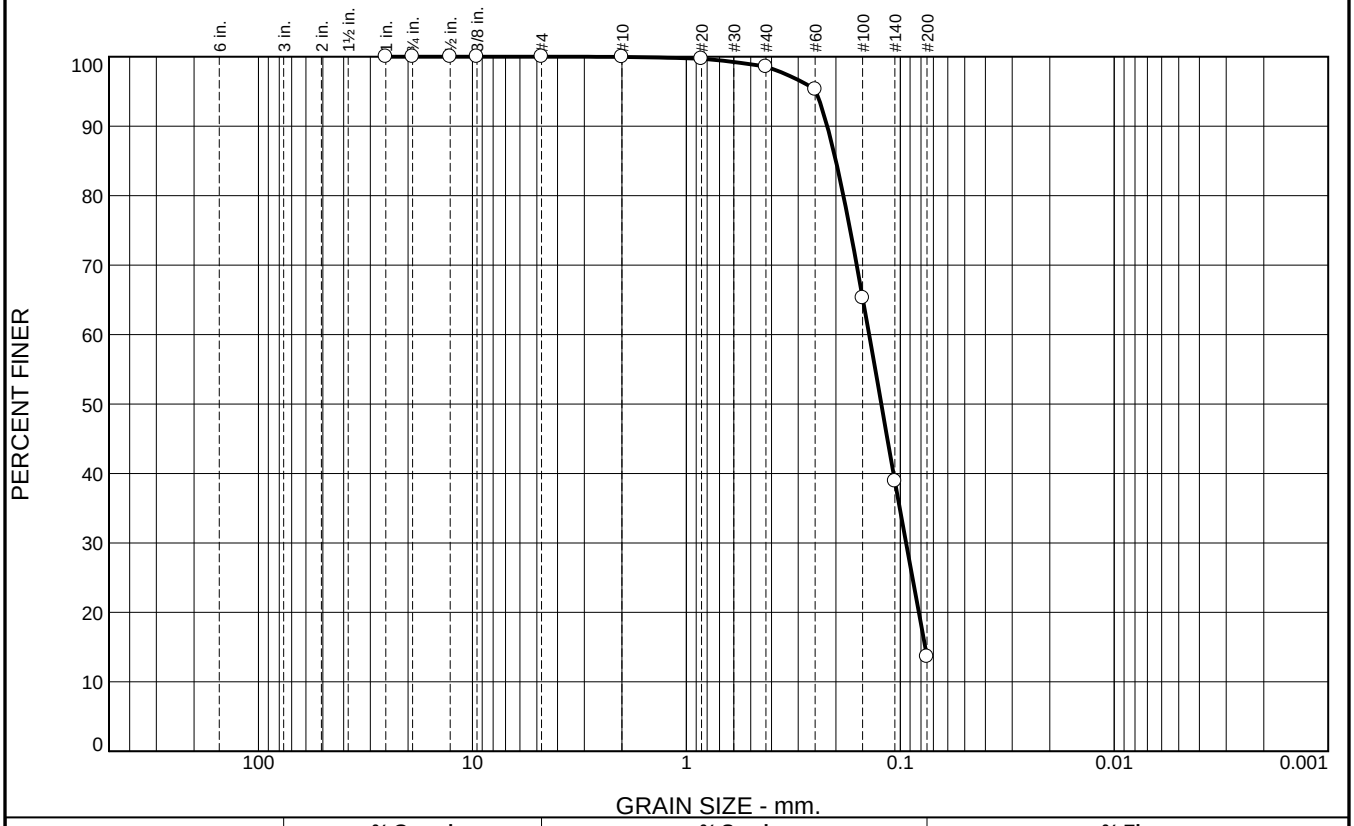
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	1.4	85.0	13.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	100.0		
#10	100.0		
#20	99.7		
#40	98.6		
#60	95.3		
#100	65.3		
#140	38.9		
#200	13.6		

* (no specification provided)

Material Description

Fine grained, SILTY SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2194 D_{85}= 0.2000 D_{60}= 0.1399
D_{50}= 0.1227 D_{30}= 0.0940 D_{15}= 0.0764
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

Location: BI-PBP-24-12 D
Sample Number: 6503 (14) **Depth:** 13.6' **Date:** 1/08/13

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

SHEET CB-115: SHIP ISLAND BORROW AREA DRILLING LOGS

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Boring Designation BI-SI-13-10

DRILLING LOG	DIVISION	INSTALLATION	SHEET / OF SHEETS
	South Atlantic	Mobile District	SHEET 1 OF 1 SHEETS

1. PROJECT: MsCIP Barrier Island Restoration, Ship Island		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-SI-13-10	LOCATION COORDINATES: E = 970,966 N = 258,821	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: 3 / UNDISTURBED (UD): 0
4. NAME OF DRILLER: Construction Solutions International, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 31 Ft.	
		15. DATE BORING	STARTED: 06-01-10 / COMPLETED: 06-01-10
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -28.5 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 18.9 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Marty Gates, Geologist	

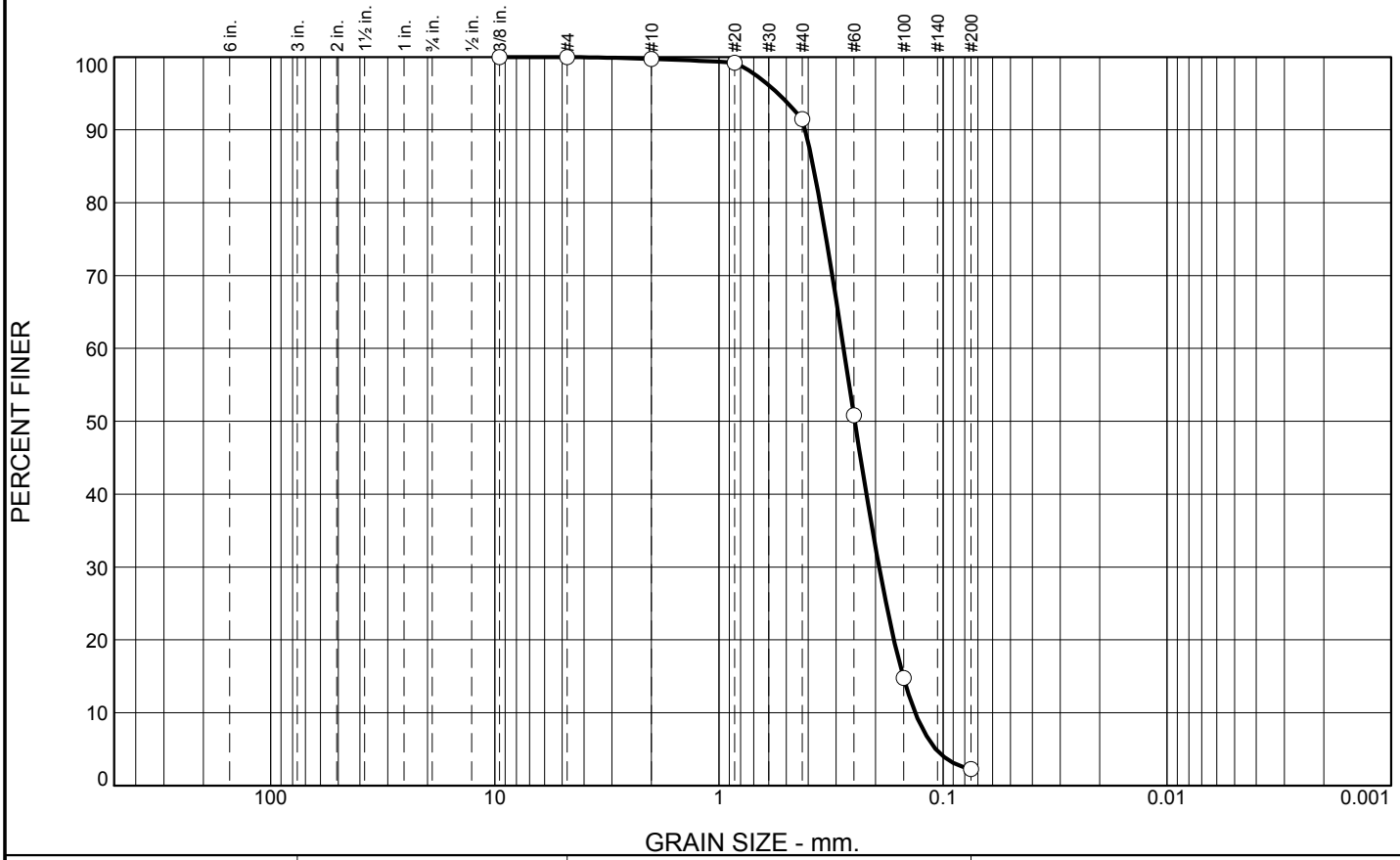
ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-28.5	0.0				
			SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, little silt, trace shell fragments, lt. gray (SP)	A	Classification: SP Color: 2.5Y 7/1-light gray D50: 0.2476 mm % Fines: 2.3
				B	Classification: SP Color: 2.5Y 7/1-light gray D50: 0.2046 mm % Fines: 2.3
				C	Classification: SP-SM Color: 5Y 7/2-light gray D50: 0.165 mm % Fines: 5.9
-41.7	13.2				
			CLAY, lean, dark gray (CL)	NS	
-47.4	18.9				
			NOTES: 1. Soils are field visually classified in accordance with the Unified Soils Classification System. 2. NS = Sample not submitted for laboratory analysis from this interval. 3. Seafloor elevation determined from USACE hydrographic survey completed 2010.		

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.21170° Long = -88.87539°

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.3	8.2	89.2	2.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	100.0		
#10	99.7		
#20	99.2		
#40	91.5		
#60	50.8		
#100	14.8		
#200	2.3		

* (no specification provided)

Material Description

SAND, (SP), fine grained

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4131 D_{85}= 0.3799 D_{60}= 0.2777
D_{50}= 0.2476 D_{30}= 0.1929 D_{15}= 0.1507
D_{10}= 0.1330 C_u= 2.09 C_c= 1.01

Classification

USCS= SP AASHTO=

Remarks

CADD CODE = CH10D965

Location: USACE Sample # BI-SI-13-10A
Sample Number: TE Lab ID: 4519.10 **Depth:** 0.0 - 5.0 (ft.) **Date:** 6/12/10

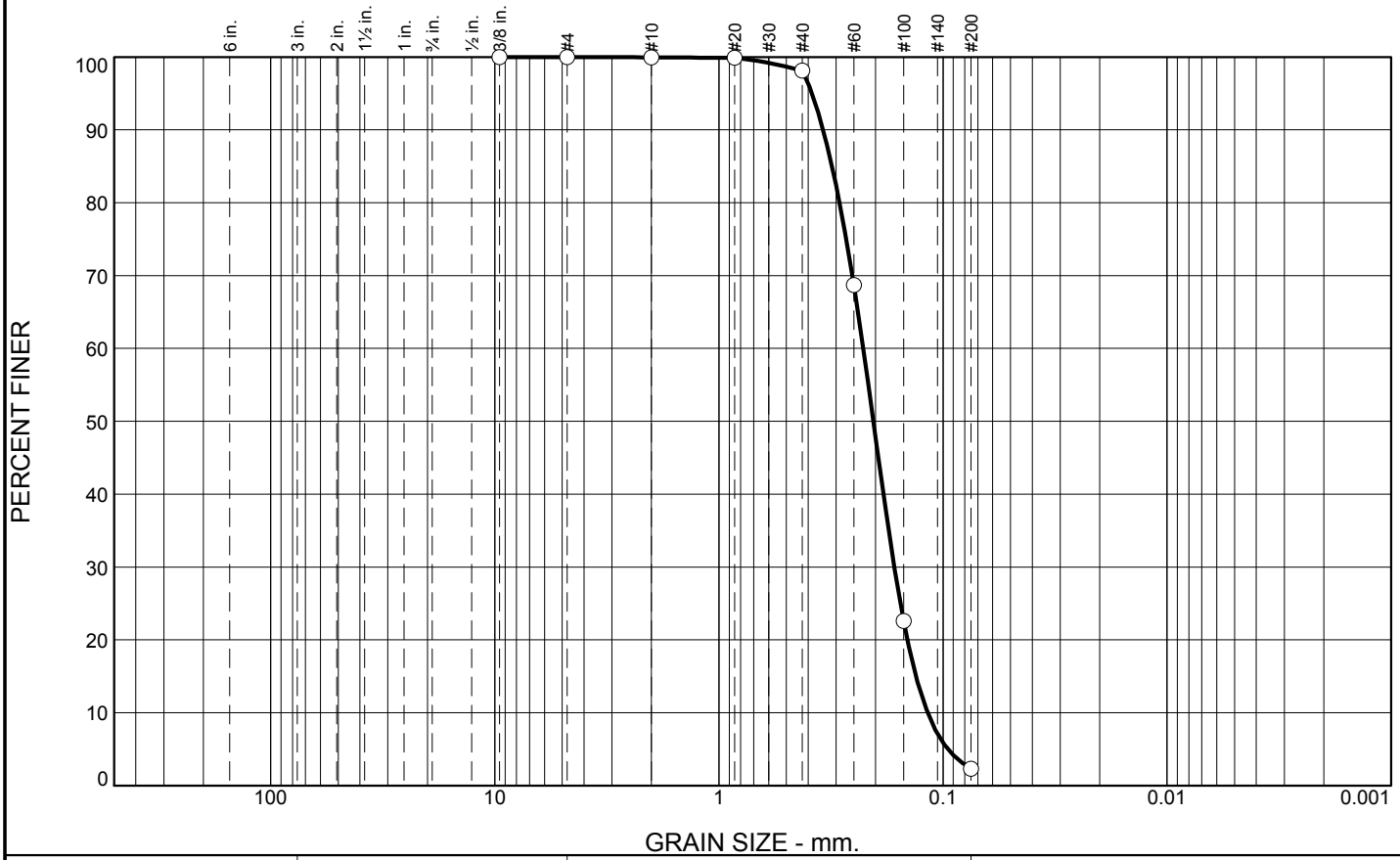
Thompson Engineering

Mobile, Alabama

Client: US Army Corps of Engineers
Project: Contract No. W91278-10-D-0026 - Task 03
Mississippi Barrier Island Restoration Project
Project No: 10-2123-0009 **Figure**

Tested By: R.Martin **Checked By:** R.Byrd

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	1.8	95.8	2.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	100.0		
#10	99.9		
#20	99.9		
#40	98.1		
#60	68.7		
#100	22.6		
#200	2.3		

* (no specification provided)

Material Description

SAND, (SP), fine grained

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3426 D_{85}= 0.3127 D_{60}= 0.2270
D_{50}= 0.2046 D_{30}= 0.1650 D_{15}= 0.1320
D_{10}= 0.1170 C_u= 1.94 C_c= 1.02

Classification

USCS= SP AASHTO=

Remarks

CADD CODE = CH10D965

Location: USACE Sample # BI-SI-13-10B
Sample Number: TE Lab ID: 4519.11 **Depth:** 5.0 - 10.0 (ft.) **Date:** 6/12/10

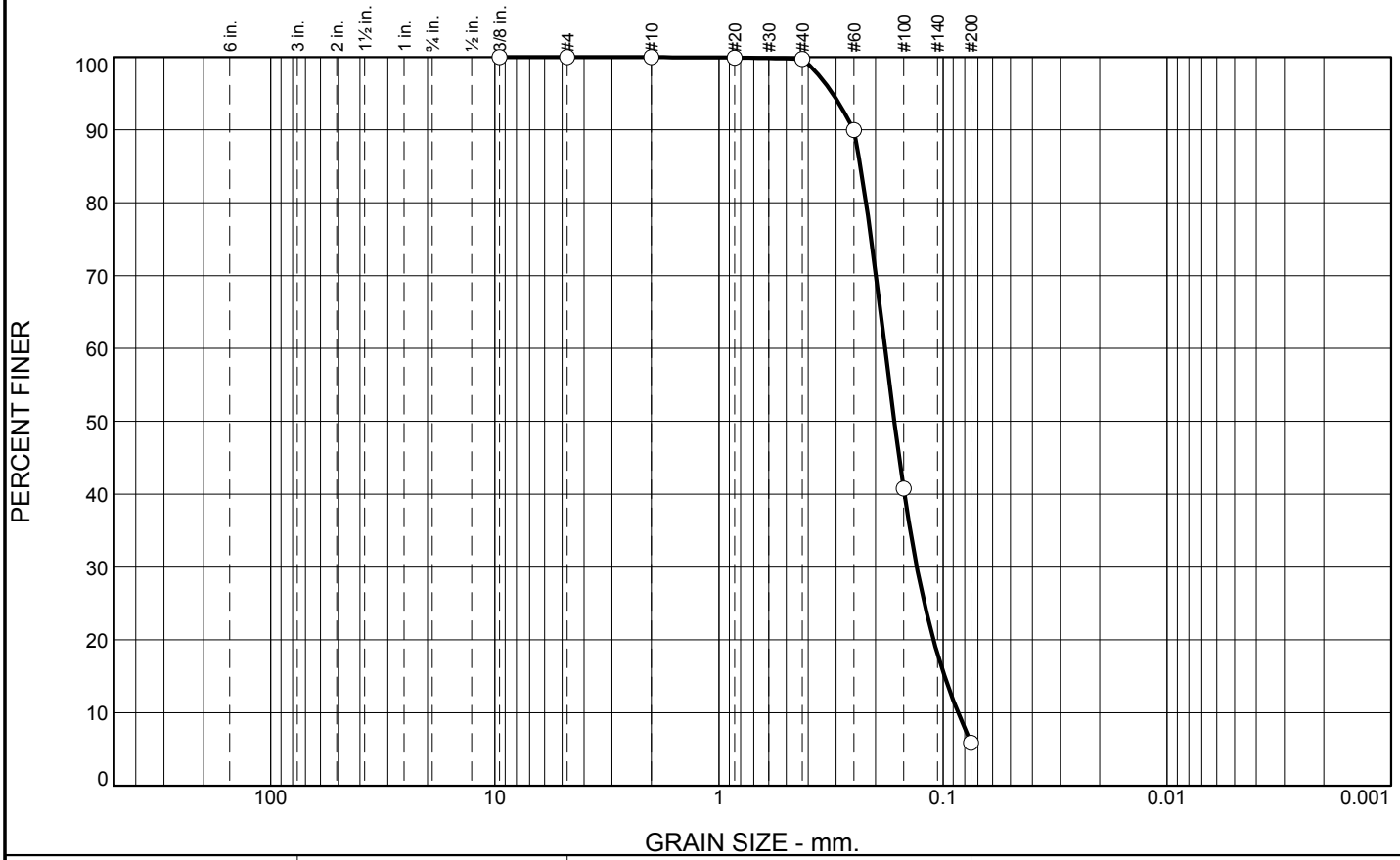
Thompson Engineering

Mobile, Alabama

Client: US Army Corps of Engineers
Project: Contract No. W91278-10-D-0026 - Task 03
Mississippi Barrier Island Restoration Project
Project No: 10-2123-0009 **Figure**

Tested By: R.Martin **Checked By:** R.Byrd

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.3	93.8	5.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	100.0		
#10	100.0		
#20	99.9		
#40	99.7		
#60	90.0		
#100	40.8		
#200	5.9		

* (no specification provided)

Material Description

SAND, (SP-SM), fine grained

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2503 D_{85}= 0.2336 D_{60}= 0.1814
D_{50}= 0.1650 D_{30}= 0.1309 D_{15}= 0.0984
D_{10}= 0.0856 C_u= 2.12 C_c= 1.10

Classification

USCS= SP-SM AASHTO=

Remarks

CADD CODE = CH10D965

Location: USACE Sample # BI-SI-13-10C
Sample Number: TE Lab ID: 4519.12 **Depth:** 10.0 - 13.2 (ft.) **Date:** 6/12/10

Thompson Engineering

Mobile, Alabama

Client: US Army Corps of Engineers
Project: Contract No. W91278-10-D-0026 - Task 03
Mississippi Barrier Island Restoration Project
Project No: 10-2123-0009 **Figure**

Tested By: R.Martin **Checked By:** R.Byrd

Boring Designation BI-SI-40-10

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 1 SHEETS
	South Atlantic	Mobile District	

1. PROJECT: MsCIP Barrier Island Restoration, Ship Island		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-SI-40-10	LOCATION COORDINATES: E = 989,473 N = 257,390	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: 3 / UNDISTURBED (UD): 0
4. NAME OF DRILLER: Construction Solutions International, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL	BEARING	14. WATER DEPTH: 30 Ft.
		15. DATE BORING	STARTED: 06-14-10 / COMPLETED: 06-14-10
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -28.2 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 17.1 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Marty Gates, Geologist	

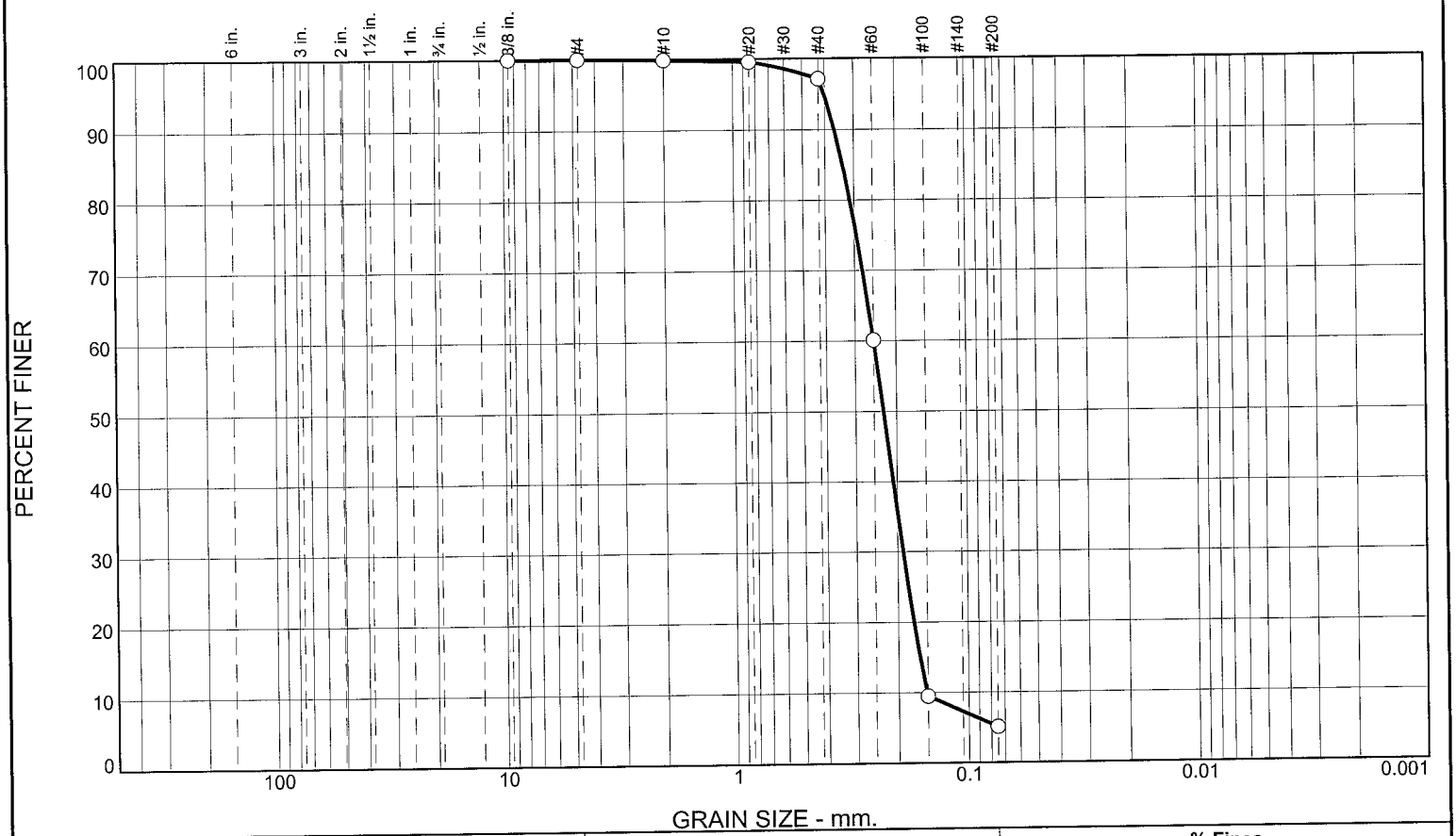
ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-28.2	0.0				
			SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace silt, trace shell fragments, lt. gray (SP)	A	Classification: SP-SM Color: 2.5Y 7/2-light gray D50: 0.2273 mm % Fines: 5.1
				B	Classification: SP-SM Color: 2.5Y 7/2-light gray D50: 0.1872 mm % Fines: 6.8
-41.4	13.2				
			SAND, silty, mostly fine to medium-grained sand-sized quartz, some silt, trace shell fragments, gray (SM)	C	Classification: SP-SM Color: 2.5Y 5/2- D50: 0.2159 mm % Fines: 10.5
-45.3	17.1				
			NOTES: 1. Soils are field visually classified in accordance with the Unified Soils Classification System. 2. NS = Sample not submitted for laboratory analysis from this interval. 3. Seafloor elevation determined from USACE hydrographic survey completed 2010.		

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.20777° Long = -88.8168°

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	2.8	92.0	5.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	100.0		
#10	99.9		
#20	99.5		
#40	97.1		
#60	60.1		
#100	9.5		
#200	5.1		

* (no specification provided)

Material Description

SAND, (SP-SM), fine grained

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3633 D_{85}= 0.3350 D_{60}= 0.2498
D_{50}= 0.2273 D_{30}= 0.1893 D_{15}= 0.1616
D_{10}= 0.1512 C_u= 1.65 C_c= 0.95

Classification

USCS= SP-SM AASHTO=

Remarks

CADD CODE = CH10D965

Location: USACE Sample # BI-SI-40-10A **Depth:** 0.0 - 6.5 (ft.) **Date:** 6/26/10
Sample Number: TE Lab ID: 4549.09

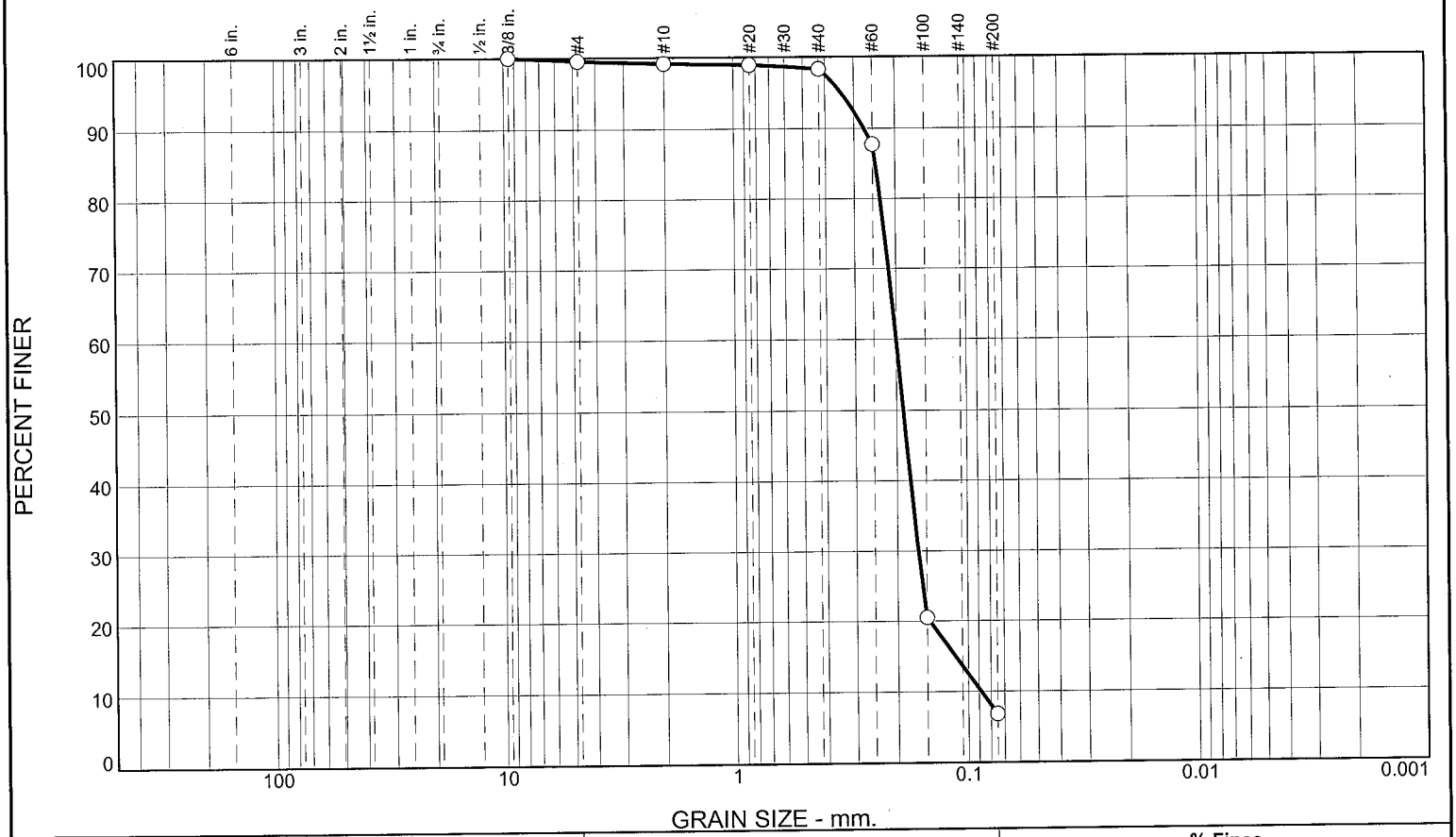
Thompson Engineering

Mobile, Alabama

Client: US Army Corps of Engineers
Project: Contract No. W91278-10-D-0026 - Task 03
Mississippi Barrier Island Restoration Project
Project No: 10-2123-0009 **Figure**

Tested By: G.Fancher **Checked By:** R.Byrd

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.5	0.3	0.9	91.5	6.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.5		
#10	99.2		
#20	98.9		
#40	98.3		
#60	87.8		
#100	20.5		
#200	6.8		

* (no specification provided)

Material Description

SAND, (SP-SM), fine grained

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2718 D_{85}= 0.2430 D_{60}= 0.2003
D_{50}= 0.1872 D_{30}= 0.1626 D_{15}= 0.1136
D_{10}= 0.0881 C_u= 2.27 C_c= 1.50

Classification

USCS= SP-SM AASHTO=

Remarks

CADD CODE = CH10D965

Location: USACE Sample # BI-SI-40-10B
Sample Number: TE Lab ID: 4549.10 **Depth:** 6.5 - 13.2 (ft.) **Date:** 6/26/10

Thompson Engineering

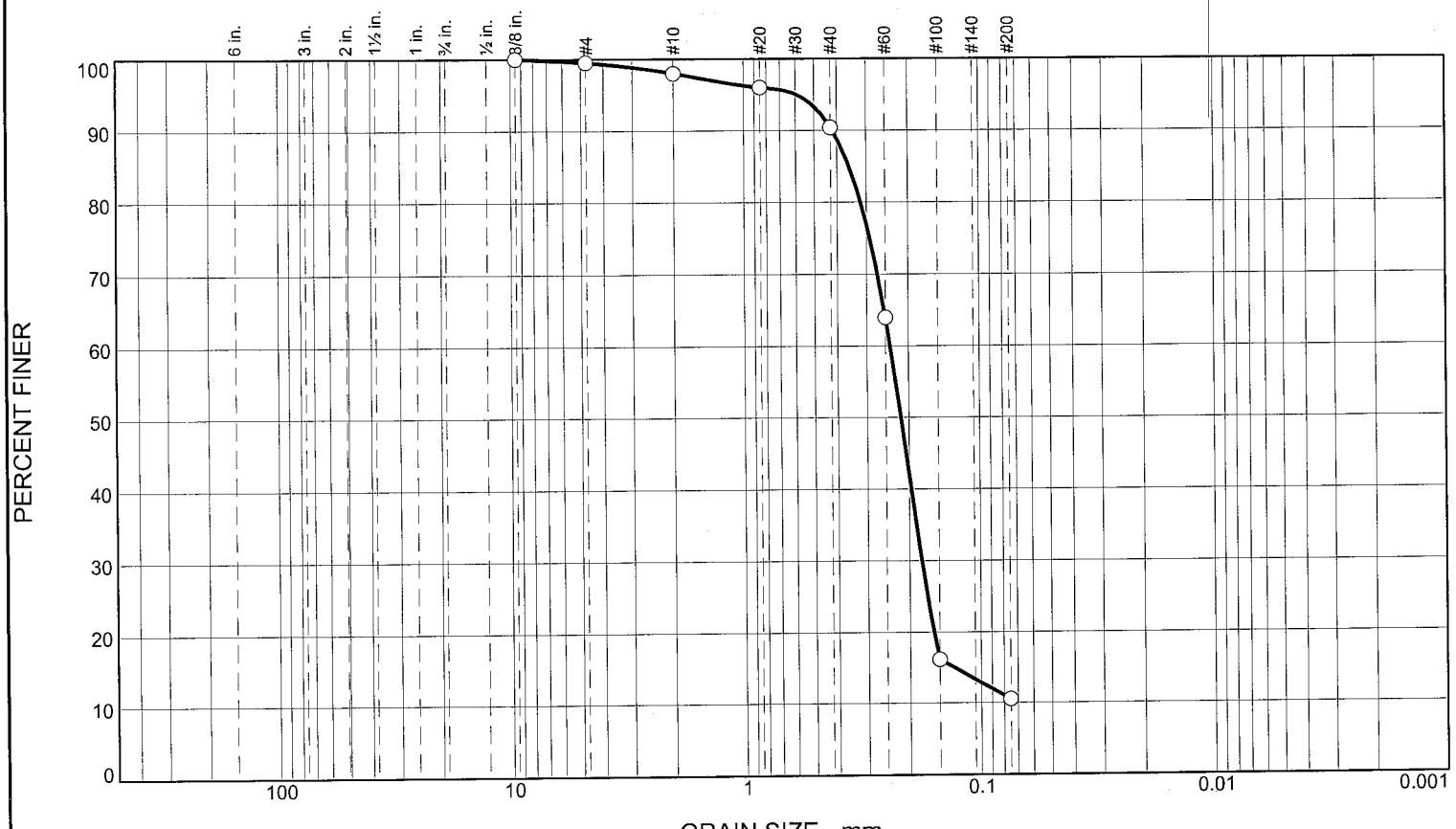
Mobile, Alabama

Client: US Army Corps of Engineers
Project: Contract No. W91278-10-D-0026 - Task 03
Mississippi Barrier Island Restoration Project
Project No: 10-2123-0009

Figure

Tested By: G.Fancher **Checked By:** R.Byrd

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.5	1.5	7.6	79.9	10.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.5		
#10	98.0		
#20	96.0		
#40	90.4		
#60	64.0		
#100	16.2		
#200	10.5		

* (no specification provided)

Material Description

SAND, (SP-SM), medium to fine grained

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4179 D_{85}= 0.3550 D_{60}= 0.2391
D_{50}= 0.2159 D_{30}= 0.1773 D_{15}= 0.1301
D_{10}= C_u= C_c=

Classification

USCS= SP-SM AASHTO=

Remarks

CADD CODE = CH10D965

Location: USACE Sample # BI-SI-40-10C
Sample Number: TE Lab ID: 4549.11 **Depth:** 13.2 - 17.1 (ft.) **Date:** 6/26/10

Thompson Engineering

Mobile, Alabama

Client: US Army Corps of Engineers
Project: Contract No. W91278-10-D-0026 - Task 03
Mississippi Barrier Island Restoration Project
Project No: 10-2123-0009 **Figure**

Tested By: G.Fancher **Checked By:** R.Byrd

Boring Designation BI-SI-39-10

DRILLING LOG	DIVISION	INSTALLATION	SHEET / OF
	South Atlantic	Mobile District	SHEET 1 OF 1 SHEETS

1. PROJECT: MsCIP Barrier Island Restoration, Ship Island		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-SI-39-10	LOCATION COORDINATES: E = 966,533 N = 256,277	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: 3 / UNDISTURBED (UD): 0
4. NAME OF DRILLER: Construction Solutions International, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL	BEARING	14. WATER DEPTH: 28 Ft.
		15. DATE BORING	STARTED: 06-14-10 / COMPLETED: 06-14-10
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -27.2 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 15.6 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Marty Gates, Geologist	

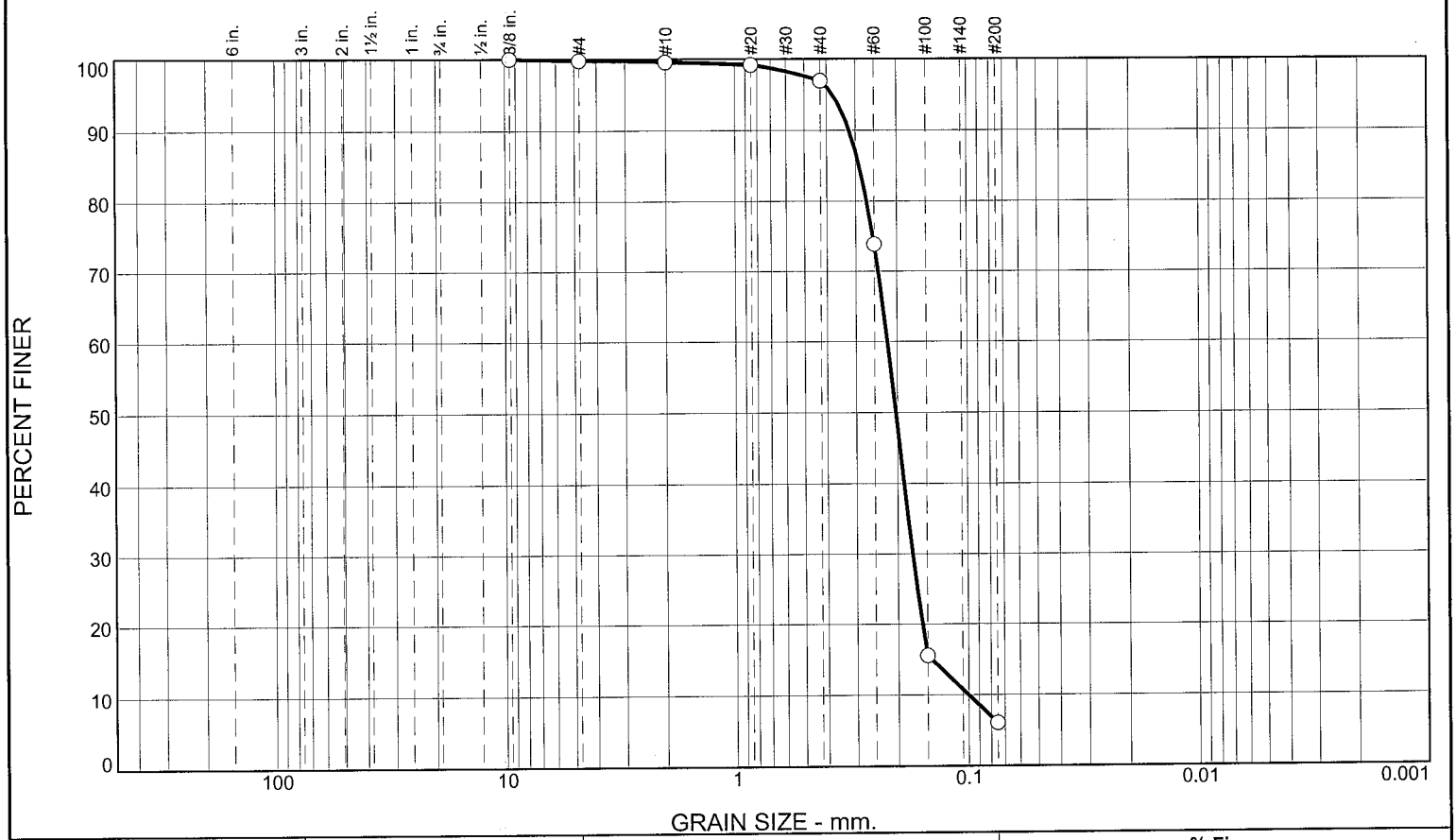
ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-27.2	0.0				
			SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace silt, trace shell fragments, lt. gray (SP)	A	Classification: SP-SM Color: 2.5Y 7/1-light gray D50: 0.203 mm % Fines: 6
				B	Classification: SP-SM Color: 2.5Y 6/2-light brownish gray D50: 0.1798 mm % Fines: 8.9
-39.2	12.0				
			SAND, silty, mostly fine to medium-grained sand-sized quartz, some silt, trace shell fragments, gray (SM)	C	Classification: SP-SM Color: 2.5Y 6/2-light brownish gray D50: 0.1994 mm % Fines: 11.4
-42.8	15.6				
			NOTES: 1. Soils are field visually classified in accordance with the Unified Soils Classification System. 2. NS = Sample not submitted for laboratory analysis from this interval. 3. Seafloor elevation determined from USACE hydrographic survey completed 2010.		

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.20470° Long = -88.88942°

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	0.2	2.6	91.0	6.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.8		
#10	99.6		
#20	99.2		
#40	97.0		
#60	73.8		
#100	15.5		
#200	6.0		

* (no specification provided)

Material Description

SAND, (SP-SM), fine grained

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3190 D_{85}= 0.2891 D_{60}= 0.2201
D_{50}= 0.2030 D_{30}= 0.1727 D_{15}= 0.1444
D_{10}= 0.1003 C_u= 2.19 C_c= 1.35

Classification

USCS= SP-SM AASHTO=

Remarks

CADD CODE = CH10D965

Location: USACE Sample # BI-SI-39-10A
Sample Number: TE Lab ID: 4549.06 **Depth:** 0.0 - 6.0 (ft.) **Date:** 6/26/10

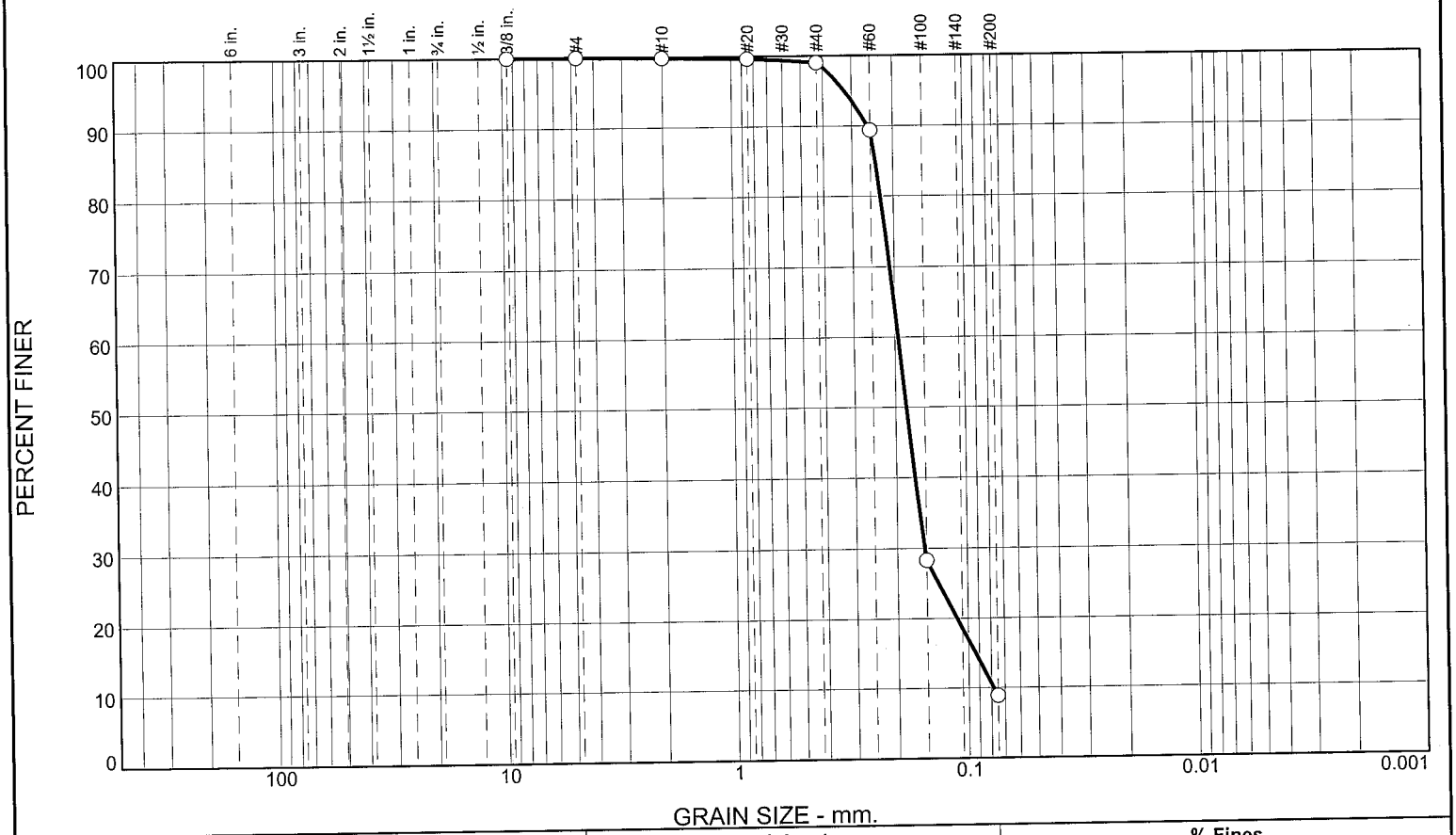
Thompson Engineering

Mobile, Alabama

Client: US Army Corps of Engineers
Project: Contract No. W91278-10-D-0026 - Task 03
Mississippi Barrier Island Restoration Project
Project No: 10-2123-0009 **Figure**

Tested By: G.Fancher **Checked By:** R.Byrd

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.2	0.8	90.1	8.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	100.0		
#10	99.8		
#20	99.6		
#40	99.0		
#60	89.4		
#100	28.3		
#200	8.9		

* (no specification provided)

Material Description

SAND, (SP-SM), fine grained

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2563 D_{85}= 0.2382 D_{60}= 0.1937
D_{50}= 0.1798 D_{30}= 0.1525 D_{15}= 0.0934
D_{10}= 0.0781 C_u= 2.48 C_c= 1.54

Classification

USCS= SP-SM AASHTO=

Remarks

CADD CODE = CH10D965

Location: USACE Sample # BI-SI-39-10B **Depth:** 6.0 - 12.0 (ft.) **Date:** 6/26/10
Sample Number: TE Lab ID: 4549.07

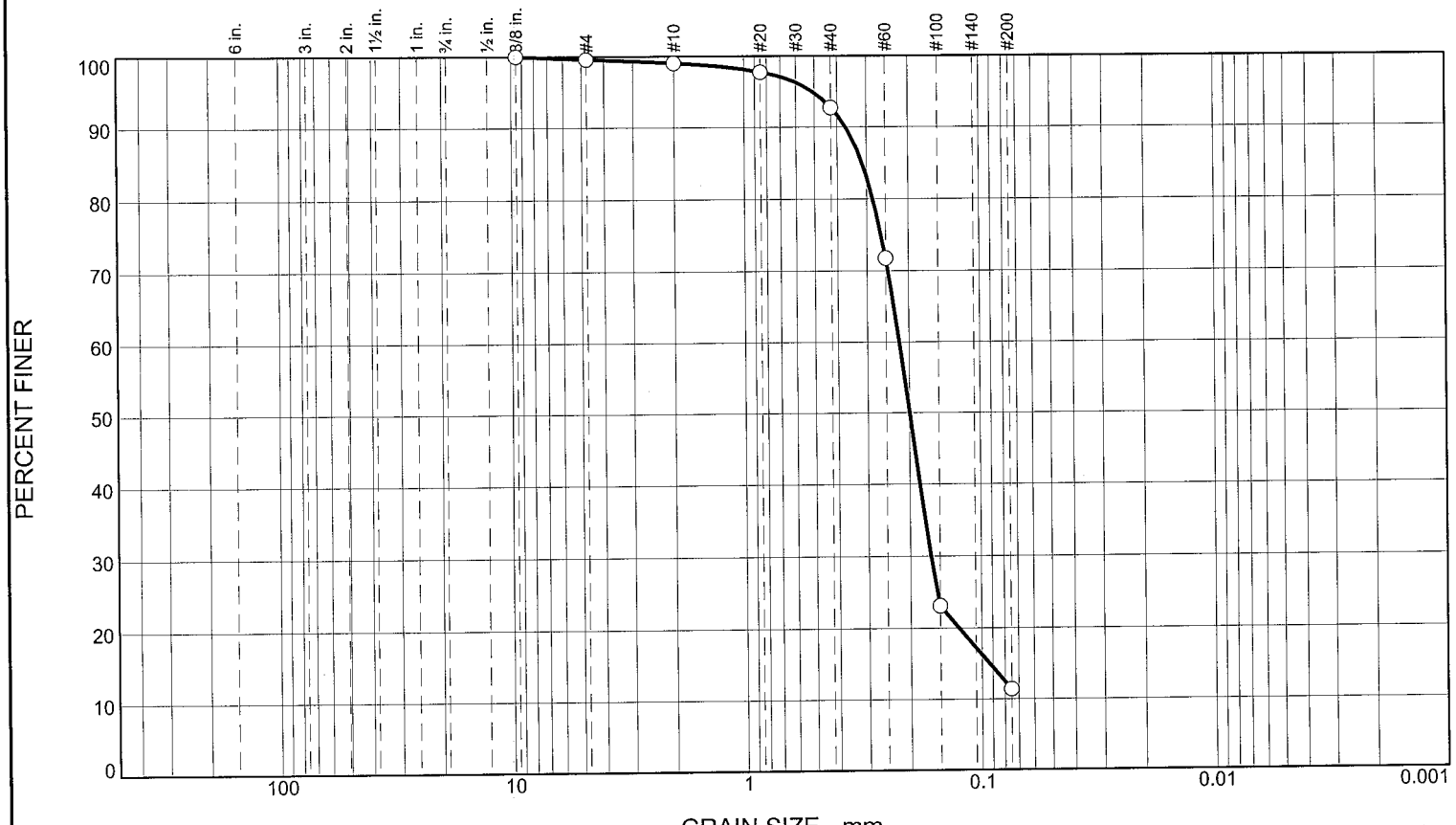
Thompson Engineering

Mobile, Alabama

Client: US Army Corps of Engineers
Project: Contract No. W91278-10-D-0026 - Task 03
Mississippi Barrier Island Restoration Project
Project No: 10-2123-0009 **Figure**

Tested By: G.Fancher **Checked By:** R.Byrd

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.4	0.6	6.3	81.3	11.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.6		
#10	99.0		
#20	97.7		
#40	92.7		
#60	71.7		
#100	23.1		
#200	11.4		

* (no specification provided)

Material Description

SAND, (SP-SM), fine grained

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3677 D_{85}= 0.3133 D_{60}= 0.2197
D_{50}= 0.1994 D_{30}= 0.1633 D_{15}= 0.0928
D_{10}= C_u= C_c=

Classification

USCS= SP-SM AASHTO=

Remarks

CADD CODE = CH10D965

Location: USACE Sample # BI-SI-39-10C
Sample Number: TE Lab ID: 4549.08 **Depth:** 12.0 - 15.6 (ft.) **Date:** 6/26/10

Thompson Engineering

Mobile, Alabama

Client: US Army Corps of Engineers
Project: Contract No. W91278-10-D-0026 - Task 03
Mississippi Barrier Island Restoration Project
Project No: 10-2123-0009 **Figure**

Tested By: G.Fancher **Checked By:** R.Byrd

Boring Designation BI-SI-41-10

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 1 SHEETS
	South Atlantic	Mobile District	

1. PROJECT: MsCIP Barrier Island Restoration, Ship Island		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-SI-41-10	LOCATION COORDINATES: E = 972,059 N = 258,893	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: 2 / UNDISTURBED (UD): 0
4. NAME OF DRILLER: Construction Solutions International, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL	BEARING	14. WATER DEPTH: 30 Ft.
		15. DATE BORING	STARTED: 06-14-10 / COMPLETED: 06-14-10
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -28.9 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 16.7 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Marty Gates, Geologist	

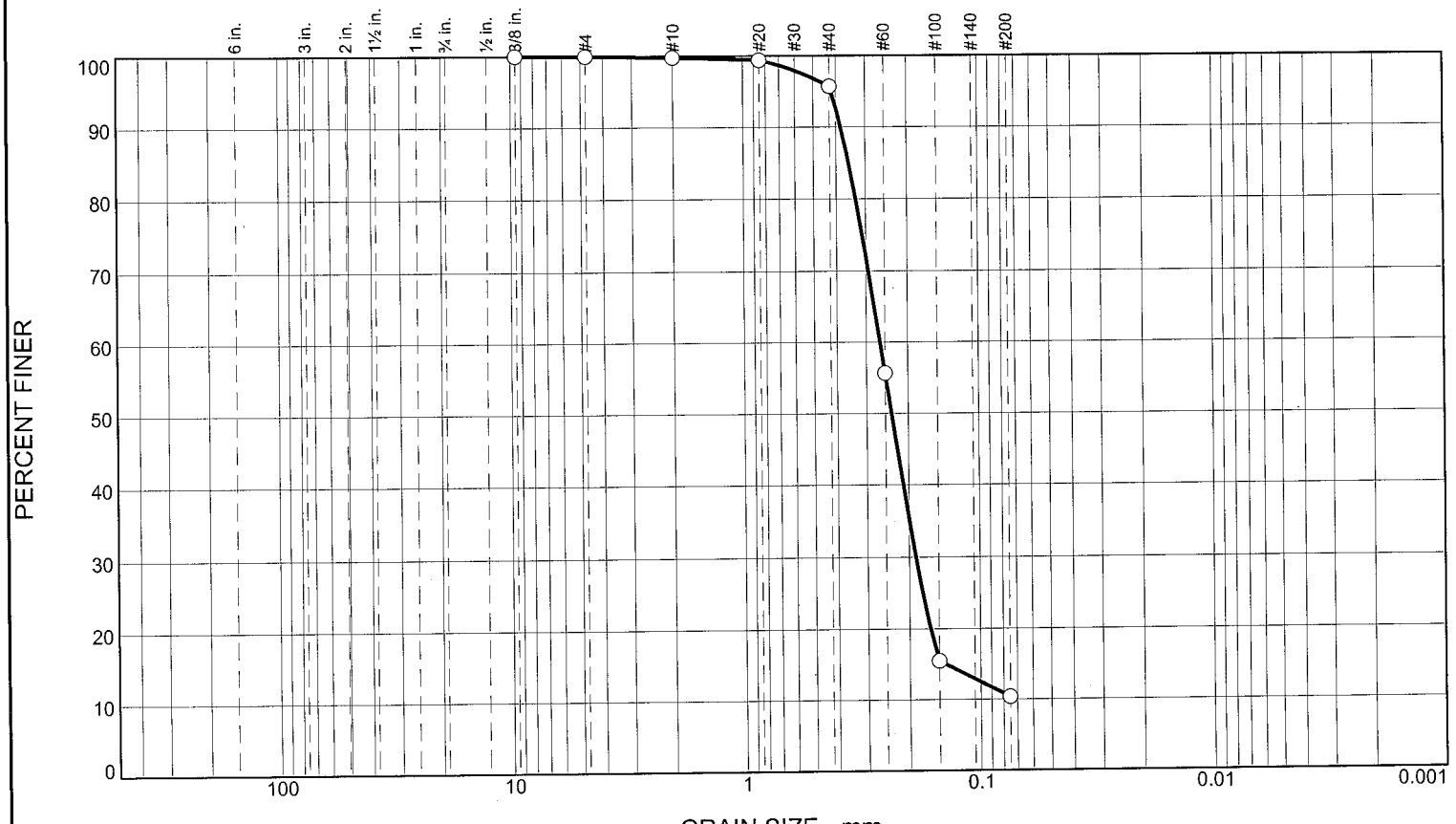
ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-28.9	0.0				
			SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace silt, trace shell fragments, lt. gray (SP)	A	Classification: SP-SM Color: 2.5Y 7/1-light gray D50: 0.2353 mm % Fines: 10.4
				B	Classification: SP-SM Color: 2.5Y 7/1-light gray D50: 0.2164 mm % Fines: 6
-40.3	11.4				
			CLAY, lean, dark gray (CL)	NS	
-45.6	16.7				
			NOTES: 1. Soils are field visually classified in accordance with the Unified Soils Classification System. 2. NS = Sample not submitted for laboratory analysis from this interval. 3. Seafloor elevation determined from USACE hydrographic survey completed 2010.		

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.21190° Long = -88.87193°

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.2	4.1	85.3	10.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	100.0		
#10	99.8		
#20	99.4		
#40	95.7		
#60	55.6		
#100	15.4		
#200	10.4		

* (no specification provided)

Material Description

SAND, (SP-SM), fine grained

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3810 D_{85}= 0.3532 D_{60}= 0.2621
D_{50}= 0.2353 D_{30}= 0.1873 D_{15}= 0.1413
D_{10}= C_u= C_c=

Classification

USCS= SP-SM AASHTO=

Remarks

CADD CODE = CH10D965

Location: USACE Sample # BI-SI-41-10A
Sample Number: TE Lab ID: 4549.12 **Depth:** 0.0 - 5.0 (ft.) **Date:** 6/26/10

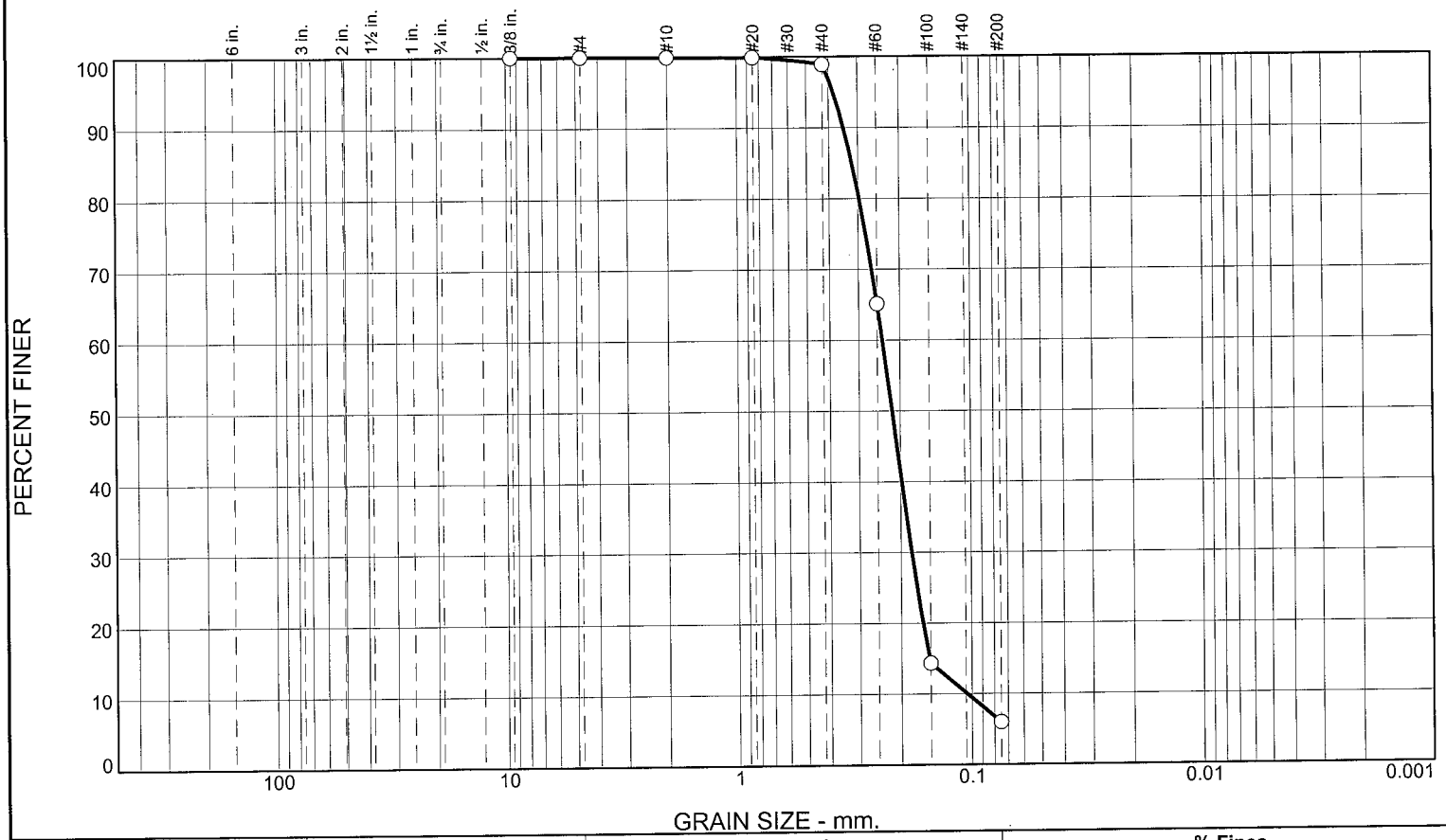
Thompson Engineering

Mobile, Alabama

Client: US Army Corps of Engineers
Project: Contract No. W91278-10-D-0026 - Task 03
Mississippi Barrier Island Restoration Project
Project No: 10-2123-0009 **Figure**

Tested By: G.Fancher **Checked By:** R.Byrd

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	1.0	92.9	6.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	100.0		
#10	99.9		
#20	99.9		
#40	98.9		
#60	65.1		
#100	14.4		
#200	6.0		

* (no specification provided)

Material Description

SAND, (SP-SM), fine grained

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3449 D_{85}= 0.3180 D_{60}= 0.2376
D_{50}= 0.2164 D_{30}= 0.1796 D_{15}= 0.1514
D_{10}= 0.1047 C_u= 2.27 C_c= 1.30

Classification

USCS= SP-SM AASHTO=

Remarks

CADD CODE = CH10D965

Location: USACE Sample # BI-SI-41-10B
Sample Number: TE Lab ID: 4549.13 **Depth:** 5.0 - 11.4 (ft.) **Date:** 6/26/10

Thompson Engineering

Mobile, Alabama

Client: US Army Corps of Engineers
Project: Contract No. W91278-10-D-0026 - Task 03
Mississippi Barrier Island Restoration Project
Project No: 10-2123-0009 **Figure**

Tested By: G.Fancher **Checked By:** R.Byrd

Boring Designation BI-SI-45-10

DRILLING LOG	DIVISION	INSTALLATION	SHEET / OF
	South Atlantic	Mobile District	SHEET 1 OF 1 SHEETS

1. PROJECT: MsCIP Barrier Island Restoration, Ship Island		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-SI-45-10	LOCATION COORDINATES: E = 967,524 N = 254,174	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: 3 / UNDISTURBED (UD): 0
4. NAME OF DRILLER: Construction Solutions International, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 30 Ft.	
		15. DATE BORING	STARTED: 06-14-10 / COMPLETED: 06-14-10
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -28.9 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 15.9 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Marty Gates, Geologist	

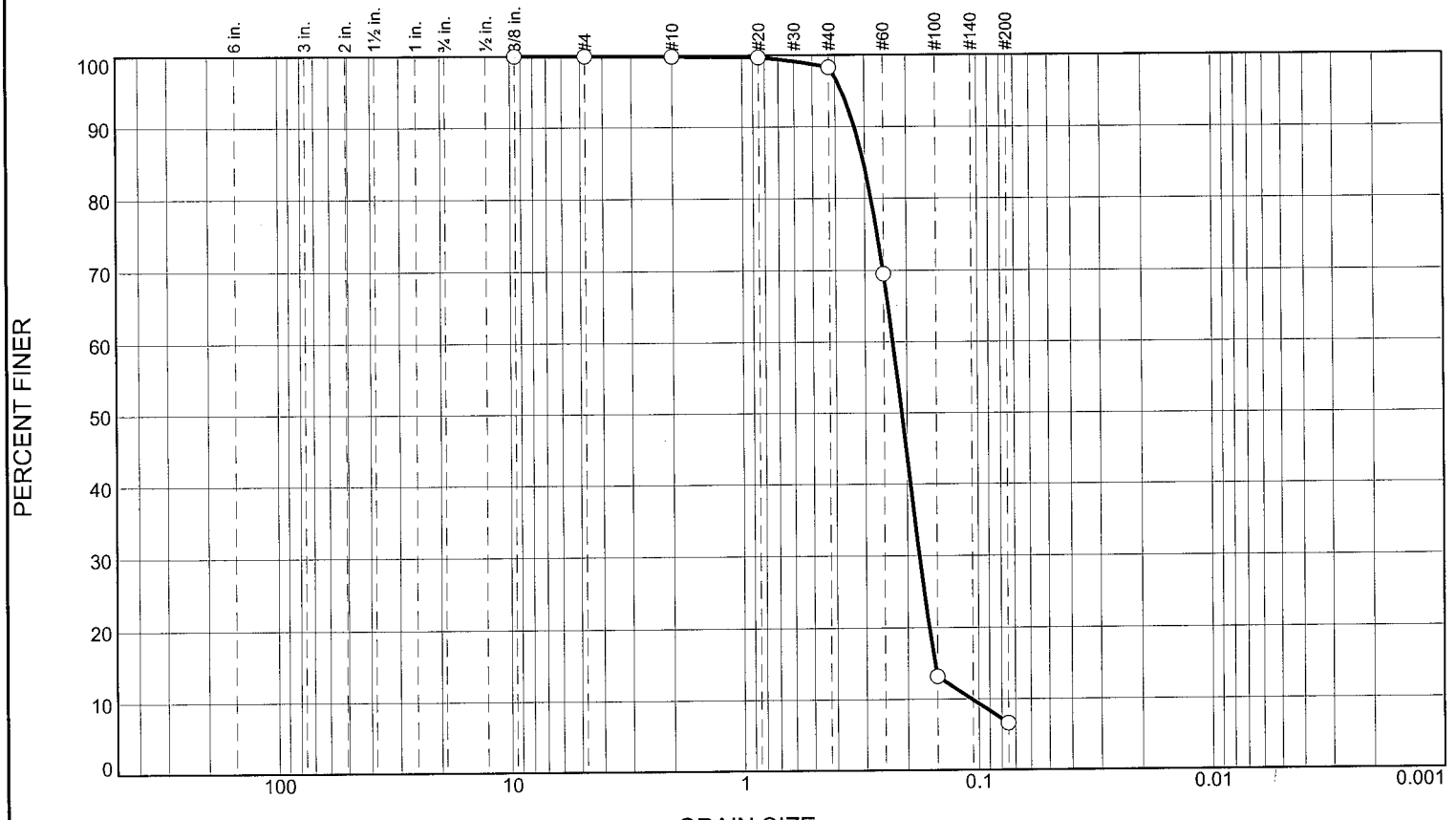
ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-28.9	0.0				
			SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace silt, trace shell fragments, lt. gray (SP)	A	Classification: SP-SM Color: 2.5Y 7/1-light gray D50: 0.2102 mm % Fines: 6.6
				B	Classification: SP-SM Color: 2.5Y 5/2-grayish brown D50: 0.1895 mm % Fines: 7.5
-38.3	9.4				
			CLAY, lean, dark gray (CL)	NS	
-40.4	11.5				
			SAND, silty, mostly fine to medium-grained sand-sized quartz, some silt, trace shell fragments, gray (SM)	C	Classification: SM Color: 2.5Y 5/2-grayish brown D50: 0.1884 mm % Fines: 15.7
-44.8	15.9				
			NOTES: 1. Soils are field visually classified in accordance with the Unified Soils Classification System. 2. NS = Sample not submitted for laboratory analysis from this interval. 3. Seafloor elevation determined from USACE hydrographic survey completed 2010.		

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.19892° Long = -88.88628°

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	1.6	91.7	6.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	100.0		
#10	99.9		
#20	99.7		
#40	98.3		
#60	69.5		
#100	13.2		
#200	6.6		

* (no specification provided)

Material Description

SAND, (SP-SM), fine grained

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3314 D_{85}= 0.3030 D_{60}= 0.2288
D_{50}= 0.2102 D_{30}= 0.1779 D_{15}= 0.1533
D_{10}= 0.1072 C_u= 2.13 C_c= 1.29

Classification

USCS= SP-SM AASHTO=

Remarks

CADD CODE = CH10D965

Location: USACE Sample # BI-SI-45-10A
Sample Number: TE Lab ID: 4549.19 **Depth:** 0.0 - 5.0 (ft.) **Date:** 6/26/10

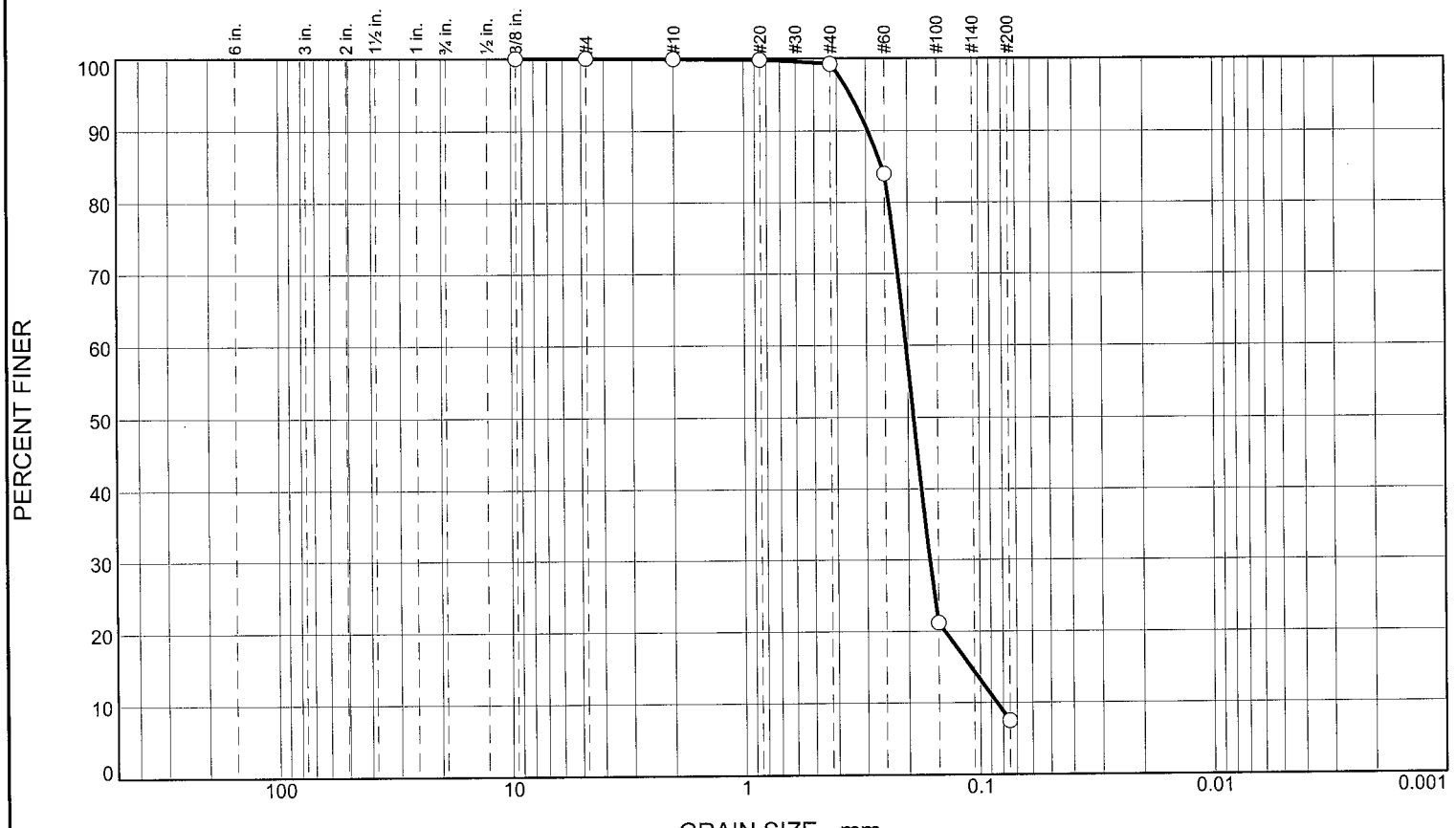
Thompson Engineering

Mobile, Alabama

Client: US Army Corps of Engineers
Project: Contract No. W91278-10-D-0026 - Task 03
Mississippi Barrier Island Restoration Project
Project No: 10-2123-0009 **Figure**

Tested By: G.Fancher **Checked By:** R.Byrd

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	0.7	91.7	7.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	100.0		
#10	99.9		
#20	99.8		
#40	99.2		
#60	84.0		
#100	21.2		
#200	7.5		

* (no specification provided)

Material Description

SAND, (SP-SM), medium to fine grained

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2937 D_{85}= 0.2561 D_{60}= 0.2038
D_{50}= 0.1895 D_{30}= 0.1627 D_{15}= 0.1096
D_{10}= 0.0851 C_u= 2.40 C_c= 1.53

Classification

USCS= SP-SM AASHTO=

Remarks

CADD CODE = CH10D965

Location: USACE Sample # BI-SI-45-10B
Sample Number: TE Lab ID: 4549.20 **Depth:** 5.0 - 9.4 (ft.) **Date:** 6/26/10

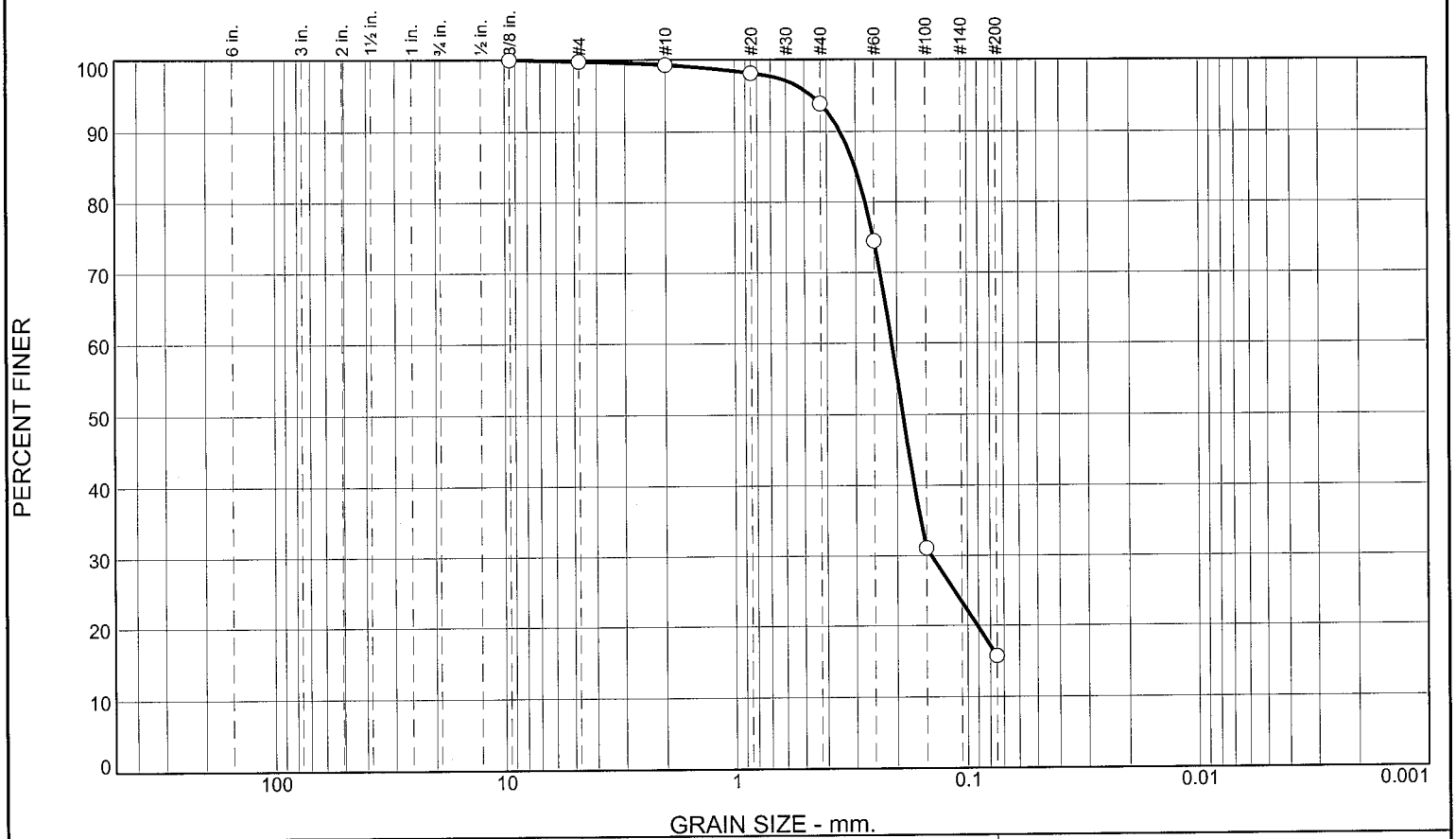
Thompson Engineering

Mobile, Alabama

Client: US Army Corps of Engineers
Project: Contract No. W91278-10-D-0026 - Task 03
Mississippi Barrier Island Restoration Project
Project No: 10-2123-0009 **Figure**

Tested By: G.Fancher **Checked By:** R.Byrd

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	0.5	5.5	78.1	15.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.8		
#10	99.3		
#20	98.1		
#40	93.8		
#60	74.5		
#100	31.1		
#200	15.7		

* (no specification provided)

Material Description

SILTY SAND, (SM), medium to fine grained

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3494 D_{85}= 0.3016 D_{60}= 0.2099
D_{50}= 0.1884 D_{30}= 0.1427 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

CADD CODE = CH10D965

Location: USACE Sample # BI-SI-45-10C
Sample Number: TE Lab ID: 4549.21 **Depth:** 11.5 - 15.9 (ft.) **Date:** 6/26/10

Thompson Engineering

Mobile, Alabama

Client: US Army Corps of Engineers
Project: Contract No. W91278-10-D-0026 - Task 03
Mississippi Barrier Island Restoration Project
Project No: 10-2123-0009 **Figure**

Tested By: G.Fancher **Checked By:** R.Byrd

Boring Designation BI-SI-46-10

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 1 SHEETS
	South Atlantic	Mobile District	

1. PROJECT: MsCIP Barrier Island Restoration, Ship Island		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-SI-46-10	LOCATION COORDINATES: E = 969,755 N = 255,414	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: 3 / UNDISTURBED (UD): 0
4. NAME OF DRILLER: Construction Solutions International, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 31 Ft.	
		15. DATE BORING	STARTED: 06-14-10 / COMPLETED: 06-14-10
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -29.7 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 15.4 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Marty Gates, Geologist	

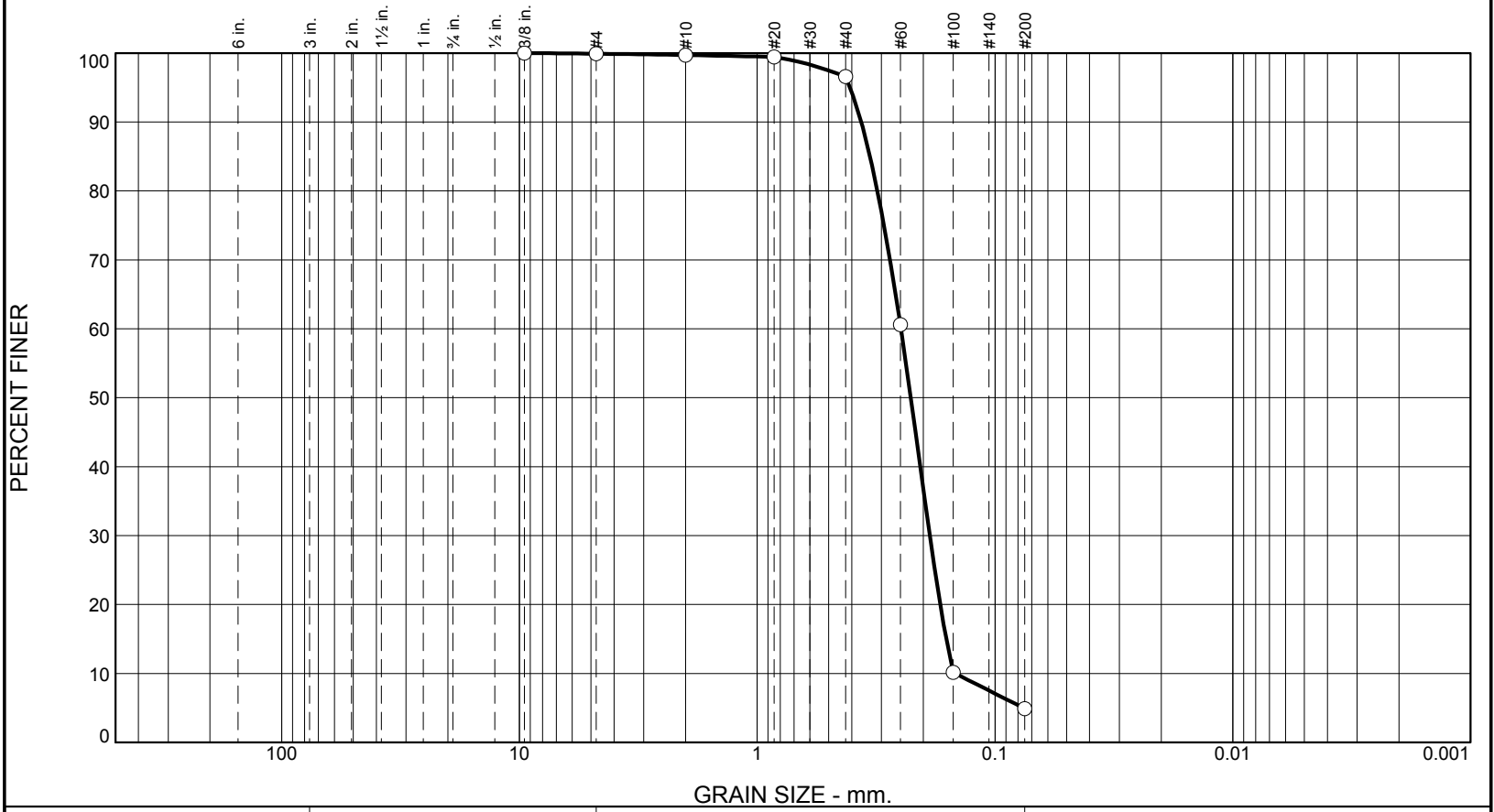
ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-29.7	0.0				
			SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace silt, trace shell fragments, lt. gray (SP)	A	Classification: SP Color: 2.5Y 7/1-light gray D50: 0.226 mm % Fines: 4.9
				B	Classification: SP-SM Color: 2.5Y 7/1-light gray D50: 0.1903 mm % Fines: 8.1
-41.1	11.4				
			SAND, silty, mostly fine to medium-grained sand-sized quartz, some silt, trace shell fragments, gray (SM)	C	Classification: SM Color: 2.5Y 5/2-grayish brown D50: 0.1904 mm % Fines: 16
-45.1	15.4				
			NOTES: 1. Soils are field visually classified in accordance with the Unified Soils Classification System. 2. NS = Sample not submitted for laboratory analysis from this interval. 3. Seafloor elevation determined from USACE hydrographic survey completed 2010.		

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.20233° Long = -88.87922°

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.2	3.1	91.7	4.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.9		
#10	99.7		
#20	99.4		
#40	96.6		
#60	60.6		
#100	10.2		
#200	4.9		

* (no specification provided)

Material Description

SAND, (SP), fine grained

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3651 D_{85}= 0.3355 D_{60}= 0.2485
D_{50}= 0.2260 D_{30}= 0.1879 D_{15}= 0.1602
D_{10}= 0.1470 C_u= 1.69 C_c= 0.97

Classification

USCS= SP AASHTO=

Remarks

CADD CODE = CH10D965

Location: USACE Sample # BI-SI-46-10A
Sample Number: TE Lab ID: 4549.16 **Depth:** 0.0 - 5.0 (FT.) **Date:** 6/26/10

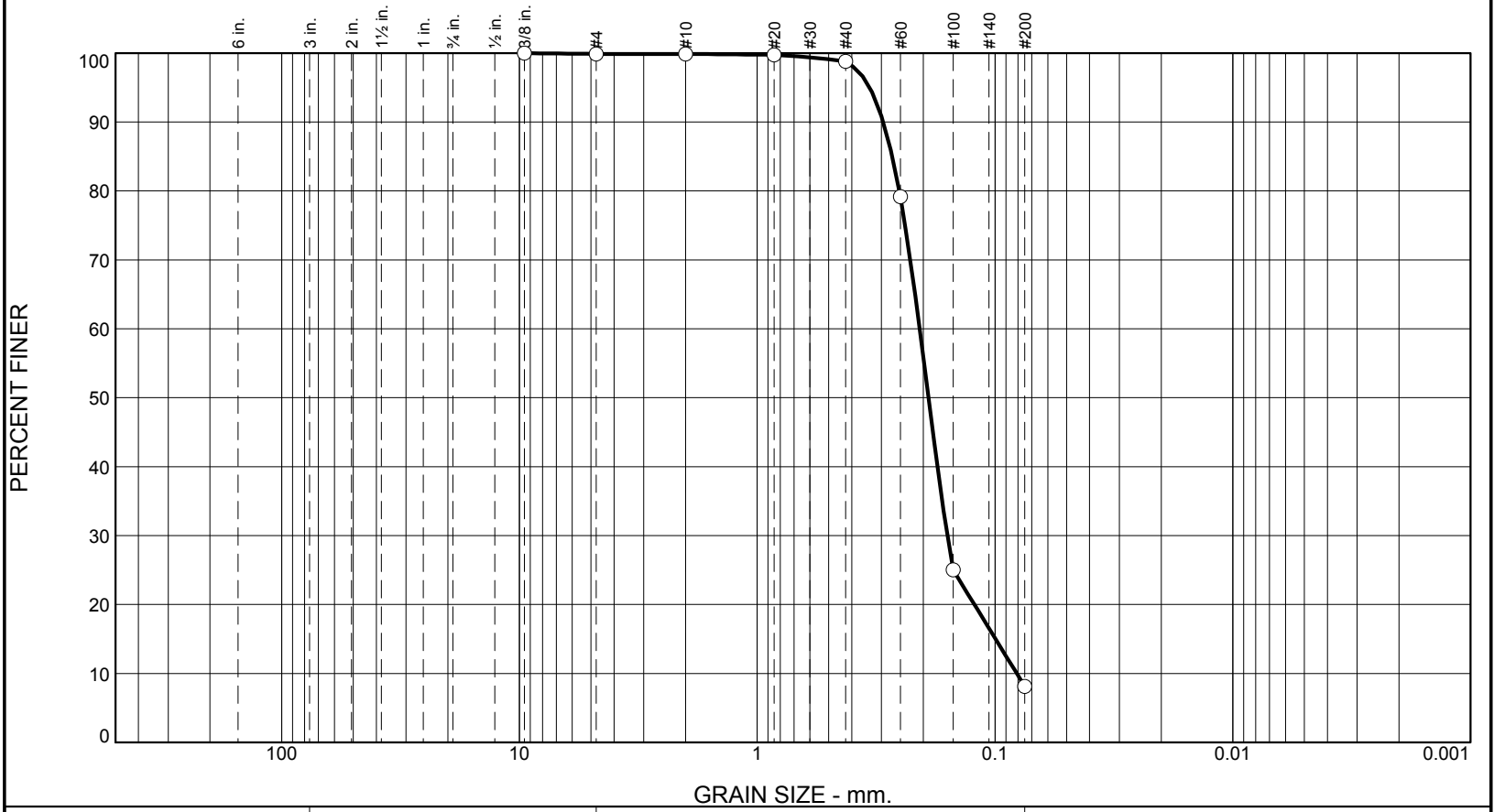
Thompson Engineering

Mobile, Alabama

Client: US Army Corps of Engineers
Project: Contract No. W91278-10-D-0026 - Task 03
Mississippi Barrier Island Restoration Project
Project No: 10-2123-0009 **Figure**

Tested By: G.Fancher **Checked By:** R.Byrd

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.0	1.1	90.7	8.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.9		
#10	99.9		
#20	99.7		
#40	98.8		
#60	79.2		
#100	25.0		
#200	8.1		

* (no specification provided)

Material Description

SAND, (SP-SM), medium to fine grained

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2947 D_{85}= 0.2701 D_{60}= 0.2074
D_{50}= 0.1903 D_{30}= 0.1585 D_{15}= 0.0995
D_{10}= 0.0810 C_u= 2.56 C_c= 1.50

Classification

USCS= SP-SM AASHTO=

Remarks

CADD CODE = CH10D965

Location: USACE Sample # BI-SI-46-10B
Sample Number: TE Lab ID: 4549.17 **Depth:** 5.0 - 11.4 (ft.) **Date:** 6/26/10

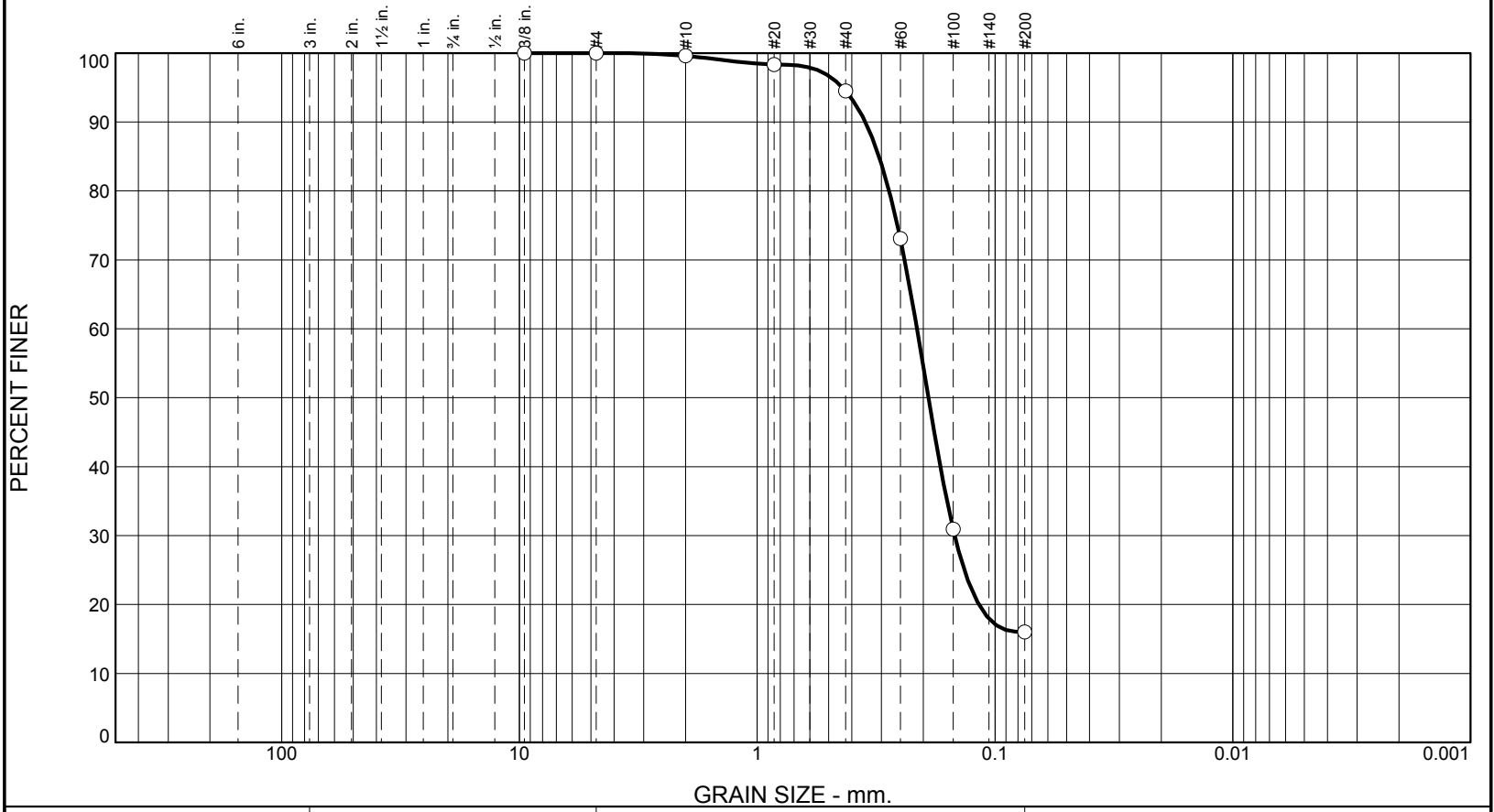
Thompson Engineering

Mobile, Alabama

Client: US Army Corps of Engineers
Project: Contract No. W91278-10-D-0026 - Task 03
Mississippi Barrier Island Restoration Project
Project No: 10-2123-0009 **Figure**

Tested By: G.Fancher **Checked By:** R.Byrd

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.4	5.1	78.5	16.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	100.0		
#10	99.6		
#20	98.4		
#40	94.5		
#60	73.1		
#100	30.9		
#200	16.0		

* (no specification provided)

Material Description

SILTY SAND, (SM), medium to fine grained

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3509 D_{85}= 0.3072 D_{60}= 0.2129
D_{50}= 0.1904 D_{30}= 0.1478 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

CADD CODE = CH10D965

Location: USACE Sample # BI-SI-46-10C
Sample Number: TE Lab ID: 4549.18 **Depth:** 11.4 - 15.4 (ft.) **Date:** 6/26/10

Thompson Engineering

Mobile, Alabama

Client: US Army Corps of Engineers
Project: Contract No. W91278-10-D-0026 - Task 03
Mississippi Barrier Island Restoration Project
Project No: 10-2123-0009 **Figure**

Tested By: G.Fancher **Checked By:** R.Byrd

Boring Designation BI-SI-47-10

DRILLING LOG	DIVISION	INSTALLATION	SHEET / OF
	South Atlantic	Mobile District	SHEET 1 OF 1 SHEETS

1. PROJECT: MsCIP Barrier Island Restoration, Ship Island		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-SI-47-10	LOCATION COORDINATES: E = 971,919 N = 256,598	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: 2 / UNDISTURBED (UD): 0
4. NAME OF DRILLER: Construction Solutions International, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL	BEARING	14. WATER DEPTH: 31 Ft.
		15. DATE BORING	STARTED: 06-14-10 / COMPLETED: 06-14-10
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -30.3 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 15.6 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Marty Gates, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-30.3	0.0				
-31.0	0.7		CLAY, lean, dark gray (CL)	NS	
			SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace silt, trace shell fragments, lt. gray (SP)	A	Classification: SP-SM Color: 2.5Y 7/1-light gray D50: 0.2676 mm % Fines: 6.4
				B	Classification: SP-SM Color: 2.5Y 7/1-light gray D50: 0.1967 mm % Fines: 6.8
-40.0	9.7				
			CLAY, lean, dark gray (CL)	NS	
-45.9	15.6				

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

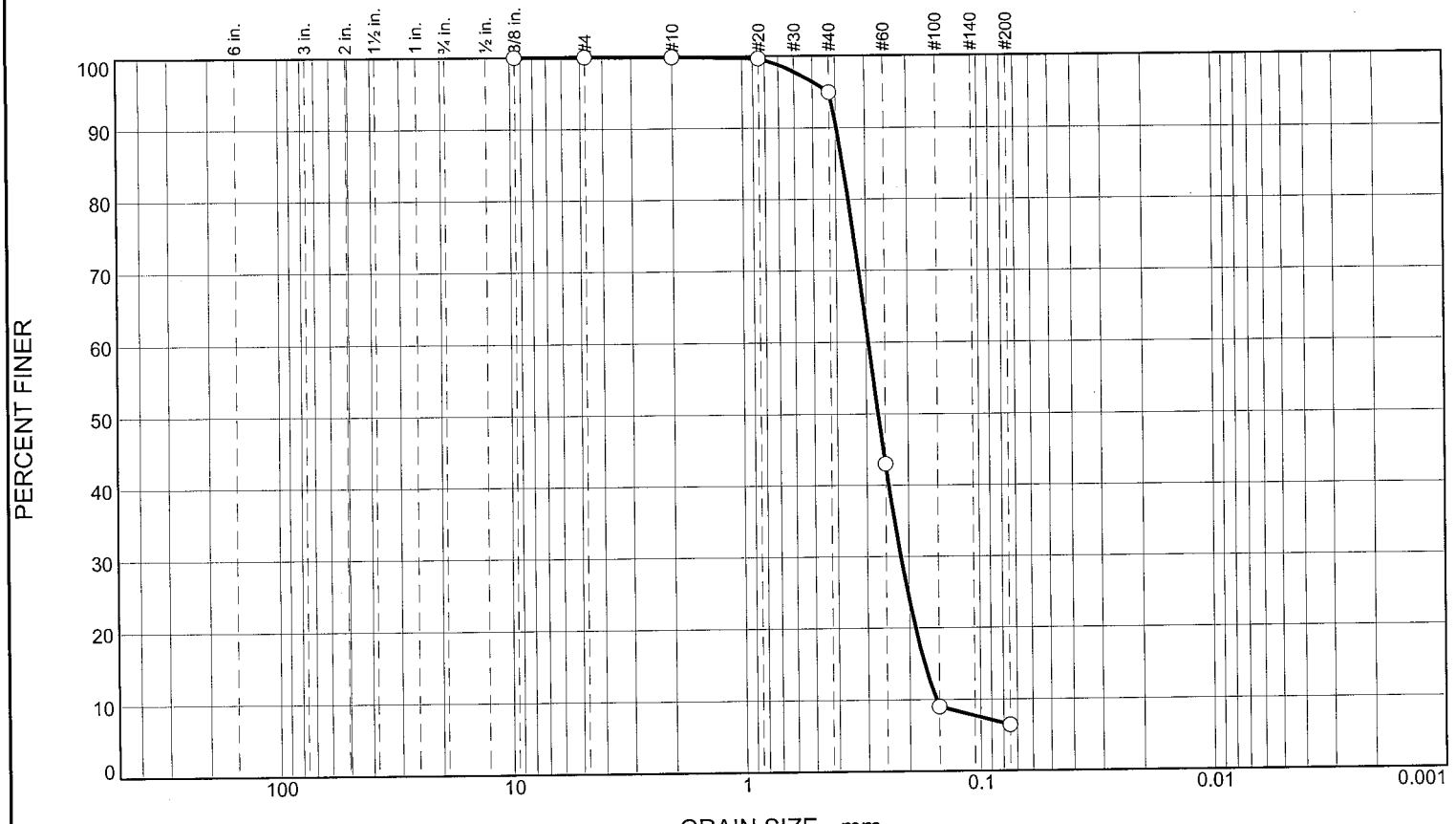
3. Seafloor elevation determined from USACE hydrographic survey completed 2010.

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.20559° Long = -88.87237°

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	5.0	88.5	6.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	100.0		
#10	99.9		
#20	99.7		
#40	94.9		
#60	43.0		
#100	9.0		
#200	6.4		

* (no specification provided)

Material Description

SAND, (SP-SM), fine grained

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3963 D_{85}= 0.3736 D_{60}= 0.2935
D_{50}= 0.2676 D_{30}= 0.2163 D_{15}= 0.1725
D_{10}= 0.1542 C_u= 1.90 C_c= 1.03

Classification

USCS= SP-SM AASHTO=

Remarks

CADD CODE = CH10D965

Location: USACE Sample # BI-SI-47-10A
Sample Number: TE Lab ID: 4549.14 **Depth:** 0.7 - 5.0 (ft.) **Date:** 6/26/10

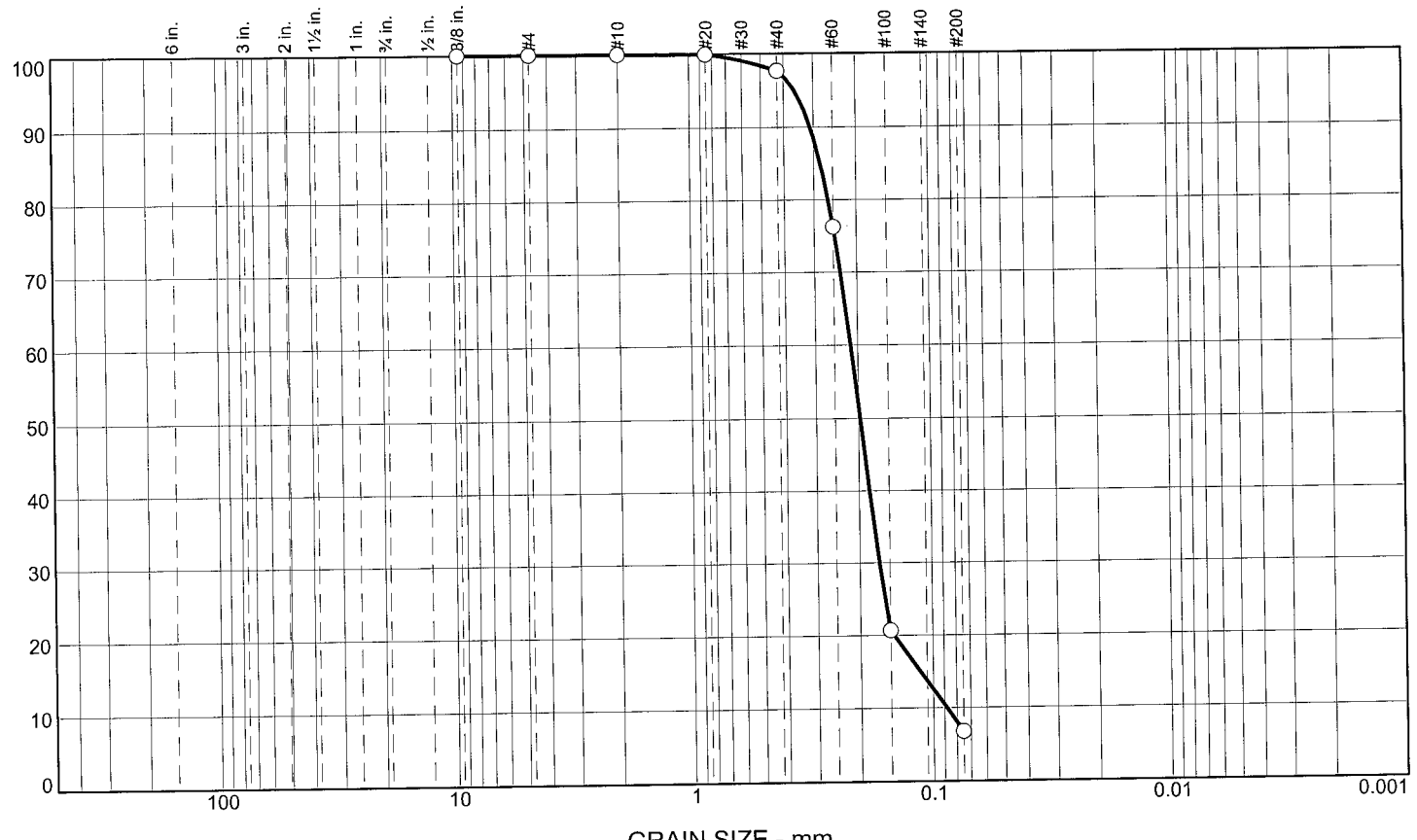
Thompson Engineering

Mobile, Alabama

Client: US Army Corps of Engineers
Project: Contract No. W91278-10-D-0026 - Task 03
Mississippi Barrier Island Restoration Project
Project No: 10-2123-0009 **Figure**

Tested By: G.Fancher **Checked By:** R.Byrd

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	2.4	90.8	6.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	100.0		
#10	100.0		
#20	99.9		
#40	97.6		
#60	76.3		
#100	20.7		
#200	6.8		

* (no specification provided)

Material Description

SAND, (SP-SM), fine grained

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3093 D_{85}= 0.2811 D_{60}= 0.2140
D_{50}= 0.1967 D_{30}= 0.1654 D_{15}= 0.1129
D_{10}= 0.0880 C_u= 2.43 C_c= 1.45

Classification

USCS= SP-SM AASHTO=

Remarks

CADD CODE = CH10D965

Location: USACE Sample # BI-SI-47-10B **Depth:** 5.0 - 9.7 (ft.) **Date:** 6/26/10
Sample Number: TE Lab ID: 4549.15

Thompson Engineering

Mobile, Alabama

Client: US Army Corps of Engineers
Project: Contract No. W91278-10-D-0026 - Task 03
Mississippi Barrier Island Restoration Project
Project No: 10-2123-0009 **Figure**

Tested By: G.Fancher **Checked By:** R.Byrd

Boring Designation BI-SI-73-10

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 1 SHEETS
	South Atlantic	Mobile District	

1. PROJECT: MsCIP Barrier Island Restoration, Ship Island		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-SI-73-10	LOCATION COORDINATES: E = 970,779 N = 257,363	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: 3 / UNDISTURBED (UD): 0
4. NAME OF DRILLER: Construction Solutions International, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL	BEARING	14. WATER DEPTH: 27 Ft.
		15. DATE BORING	STARTED: 06-21-10 / COMPLETED: 06-21-10
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -29.3 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 17.4 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Marty Gates, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-29.3	0.0				
-29.6	0.3		CLAY, lean, dark gray (CL)	NS	
			SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace silt, trace shell fragments, lt. gray (SP)	A	Classification: SP Color: 2.5Y 7/2-light gray D50: 0.192 mm % Fines: 4.9
				B	Classification: SP Color: 2.5Y 7/1-light gray D50: 0.1835 mm % Fines: 4.4
-40.6	11.3		SAND, silty, mostly fine to medium-grained sand-sized quartz, some silt, gray (SM)	C	Classification: SM Color: 2.5Y 4/3-olive brown D50: 0.1636 mm % Fines: 19.1
-44.2	14.9		CLAY, lean, trace wood debris, dark gray (CL)	NS	
-46.7	17.4				

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

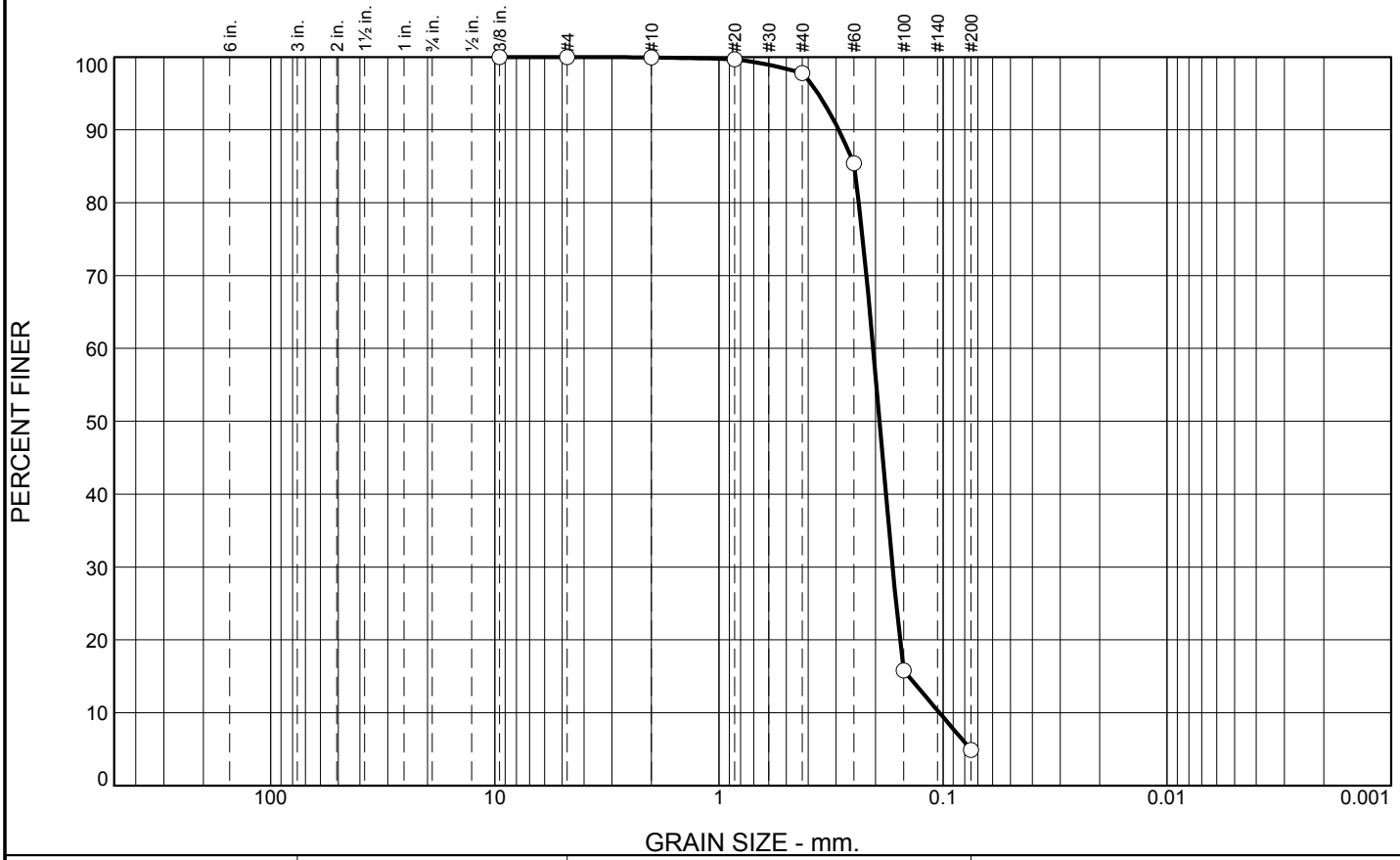
3. Seafloor elevation determined from USACE hydrographic survey completed 2010.

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.20769° Long = -88.87598°

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	2.1	92.9	4.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	100.0		
#10	99.9		
#20	99.7		
#40	97.8		
#60	85.4		
#100	15.8		
#200	4.9		

* (no specification provided)

Material Description

SAND, (SP), fine grained

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2918 D_{85}= 0.2489 D_{60}= 0.2050
D_{50}= 0.1920 D_{30}= 0.1680 D_{15}= 0.1424
D_{10}= 0.1037 C_u= 1.98 C_c= 1.33

Classification

USCS= SP AASHTO=

Remarks

CADD CODE = CH10D965

Location: USACE Sample # BI-SI-73-10A
Sample Number: TE Lab ID: 4557.01 **Depth:** 0.3 - 5.3 (ft.) **Date:** 7/3/10

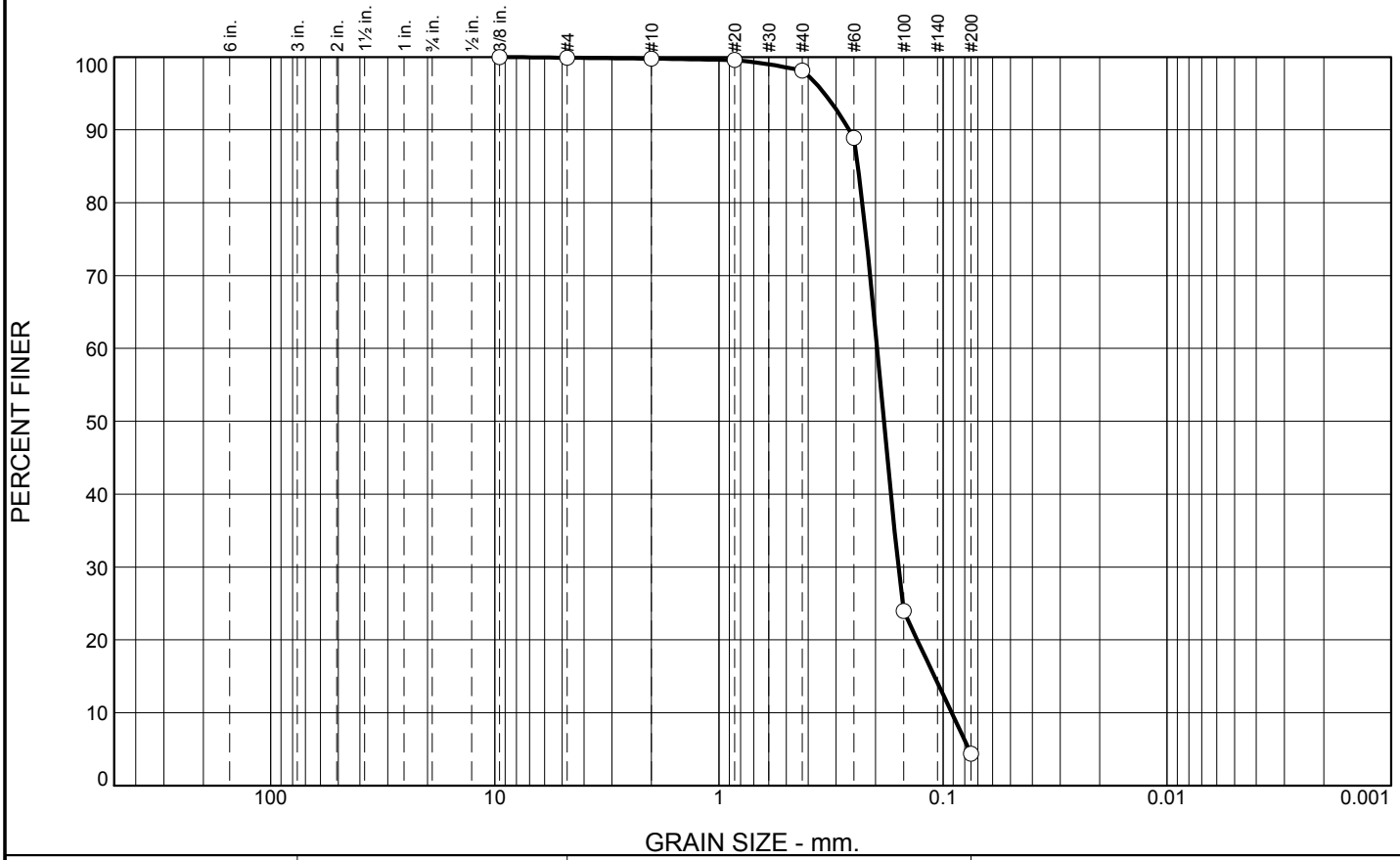
Thompson Engineering

Mobile, Alabama

Client: US Army Corps of Engineers
Project: Contract No. W91278-10-D-0026 - Task 03
Mississippi Barrier Island Restoration Project
Project No: 10-2123-0009 **Figure**

Tested By: G.Fancher **Checked By:** R.Byrd

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.1	1.7	93.7	4.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.9		
#10	99.8		
#20	99.6		
#40	98.1		
#60	88.9		
#100	24.0		
#200	4.4		

* (no specification provided)

Material Description

SAND, (SP), fine grained

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2623 D_{85}= 0.2398 D_{60}= 0.1968
D_{50}= 0.1835 D_{30}= 0.1582 D_{15}= 0.1092
D_{10}= 0.0915 C_u= 2.15 C_c= 1.39

Classification

USCS= SP AASHTO=

Remarks

CADD CODE = CH10D965

Location: USACE Sample # BI-SI-73-10B
Sample Number: TE Lab ID: 4557.02 **Depth:** 5.3 - 11.3 (ft.) **Date:** 7/3/10

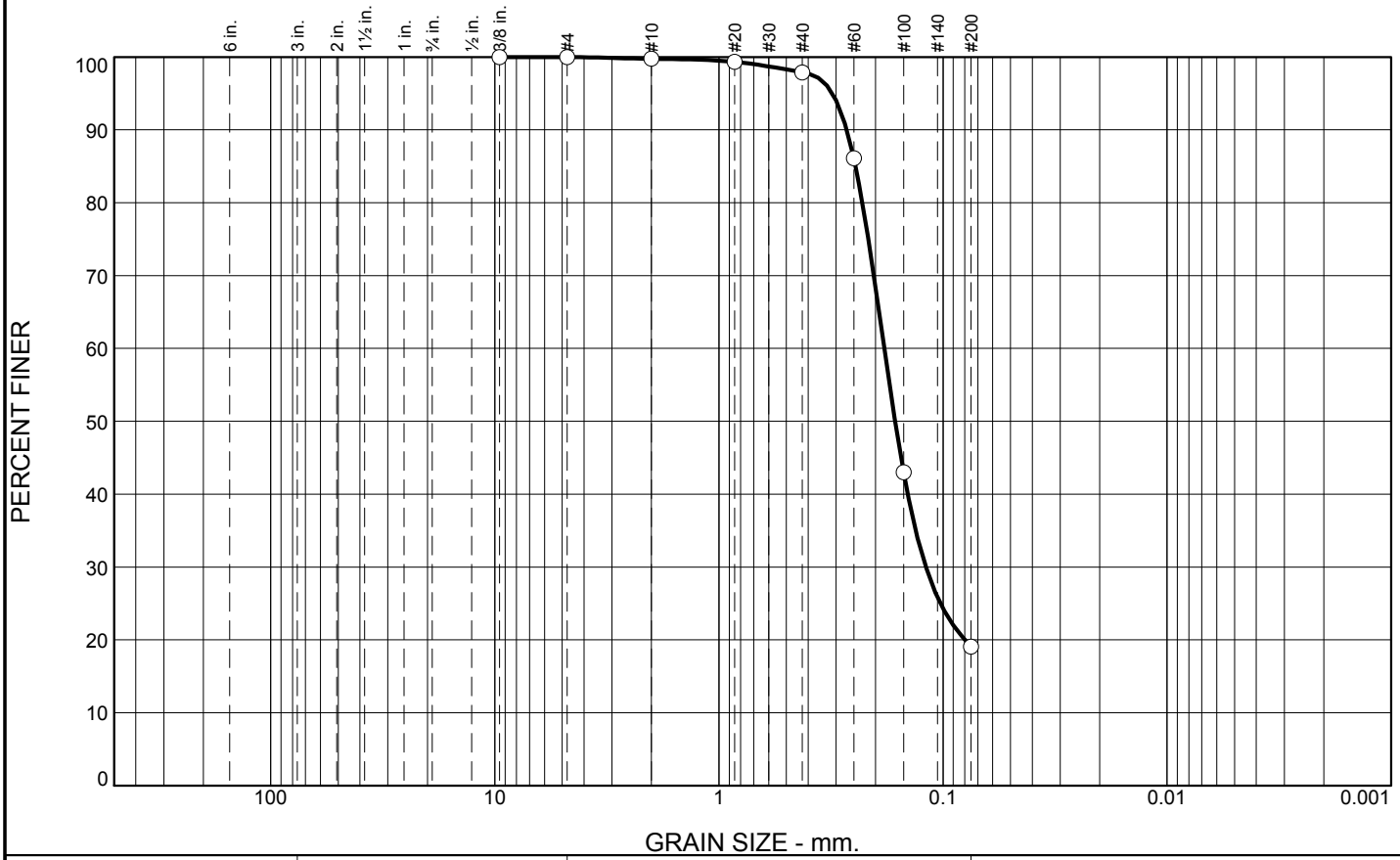
Thompson Engineering

Mobile, Alabama

Client: US Army Corps of Engineers
Project: Contract No. W91278-10-D-0026 - Task 03
Mississippi Barrier Island Restoration Project
Project No: 10-2123-0009 **Figure**

Tested By: G.Fancher **Checked By:** R.Byrd

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.2	1.9	78.8	19.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	100.0		
#10	99.8		
#20	99.3		
#40	97.9		
#60	86.1		
#100	43.0		
#200	19.1		

* (no specification provided)

Material Description

SILTY SAND, (SM), fine grained, with clay pockets

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2687 D_{85}= 0.2456 D_{60}= 0.1828
D_{50}= 0.1636 D_{30}= 0.1192 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

CADD CODE = CH10D965

Location: USACE Sample # BI-SI-73-10C
Sample Number: TE Lab ID: 4557.03 **Depth:** 11.3 - 14.9 (ft.) **Date:** 7/3/10

Thompson Engineering

Mobile, Alabama

Client: US Army Corps of Engineers
Project: Contract No. W91278-10-D-0026 - Task 03
Mississippi Barrier Island Restoration Project
Project No: 10-2123-0009 **Figure**

Tested By: G.Fancher **Checked By:** R.Byrd

Boring Designation BI-SI-89-10

DRILLING LOG	DIVISION	INSTALLATION	SHEET / OF SHEETS
	South Atlantic	Mobile District	SHEET 1 OF 1 SHEETS

1. PROJECT: MsCIP Barrier Island Restoration, Ship Island		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-SI-89-10	LOCATION COORDINATES: E = 972,320 N = 257,500	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: 4 / UNDISTURBED (UD): 0
4. NAME OF DRILLER: Construction Solutions International, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 27 Ft.	
		15. DATE BORING	STARTED: 06-21-10 / COMPLETED: 06-21-10
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -30.0 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 19.3 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Marty Gates, Geologist	

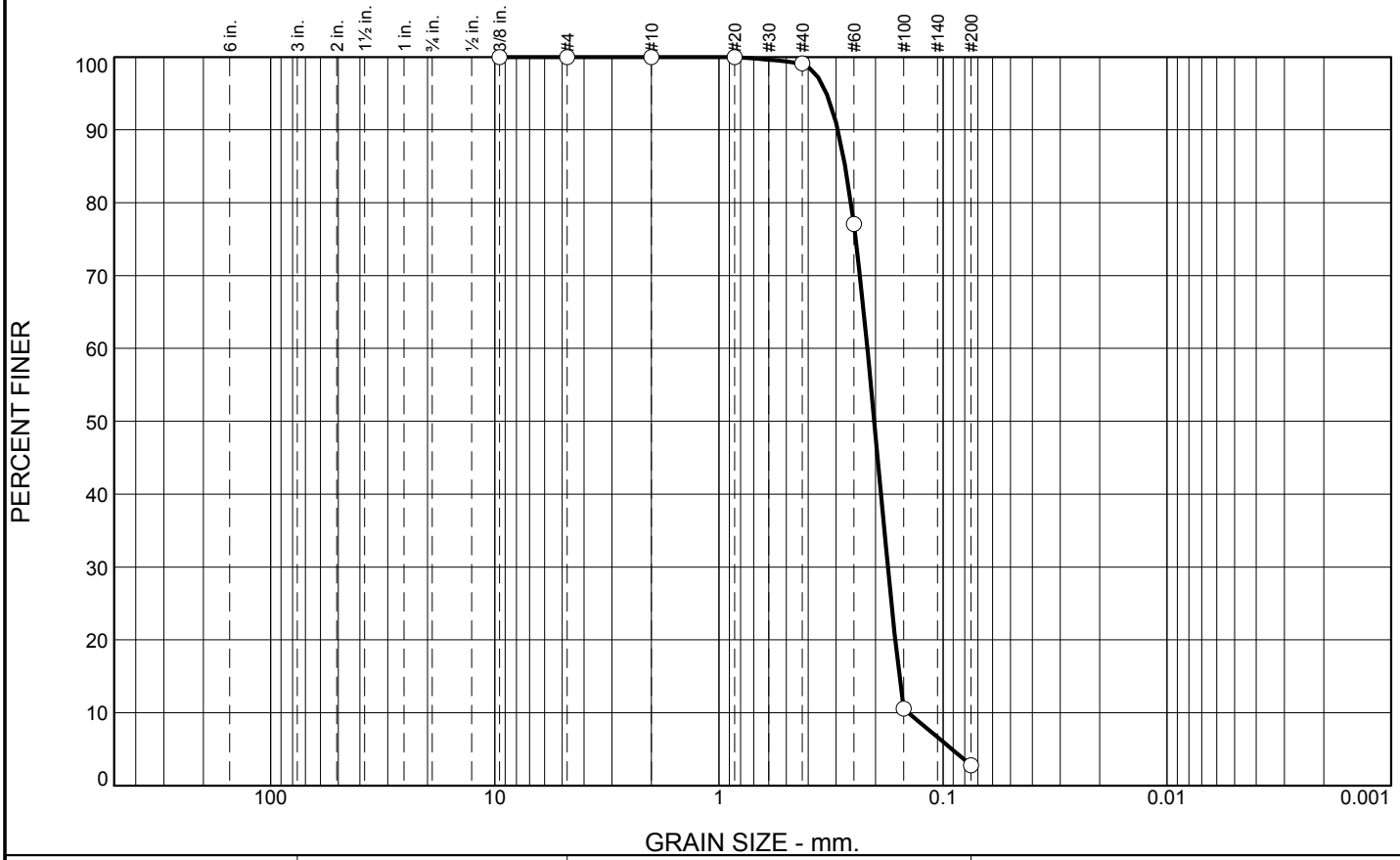
ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-30.0	0.0				
			SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace silt, trace wood debris, trace silt, lt. gray (SP)	A	Classification: SP Color: 2.5Y 7/1-light gray D50: 0.2027 mm % Fines: 2.8
				B	Classification: SP Color: 2.5Y 7/1-light gray D50: 0.1924 mm % Fines: 3.7
				C	Classification: SP Color: 2.5Y 6/2-light brownish gray D50: 0.1844 mm % Fines: 4.7
-43.5	13.5				
			SAND, silty, mostly fine to medium-grained sand-sized quartz, some silt, trace shell fragments, gray (SM)	D	Classification: SM Color: 2.5Y 4/3-olive brown D50: 0.1732 mm % Fines: 20.3
-48.3	18.3				
-49.3	19.3		CLAY, lean, dark gray (CL)	NS	
			NOTES: 1. Soils are field visually classified in accordance with the Unified Soils Classification System. 2. NS = Sample not submitted for laboratory analysis from this interval. 3. Seafloor elevation determined from USACE hydrographic survey completed 2010.		

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.20807° Long = -88.8711°

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.9	96.3	2.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	100.0		
#10	100.0		
#20	100.0		
#40	99.1		
#60	77.1		
#100	10.6		
#200	2.8		

* (no specification provided)

Material Description

SAND, (SP), fine grained

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2947 D_{85}= 0.2731 D_{60}= 0.2176
D_{50}= 0.2027 D_{30}= 0.1764 D_{15}= 0.1566
D_{10}= 0.1427 C_u= 1.52 C_c= 1.00

Classification

USCS= SP AASHTO=

Remarks

CADD CODE = CH10D965

Location: USACE Sample # BI-SI-89-10A
Sample Number: TE Lab ID: 4557.04 **Depth:** 0.0 - 5.0 (ft.) **Date:** 7/3/10

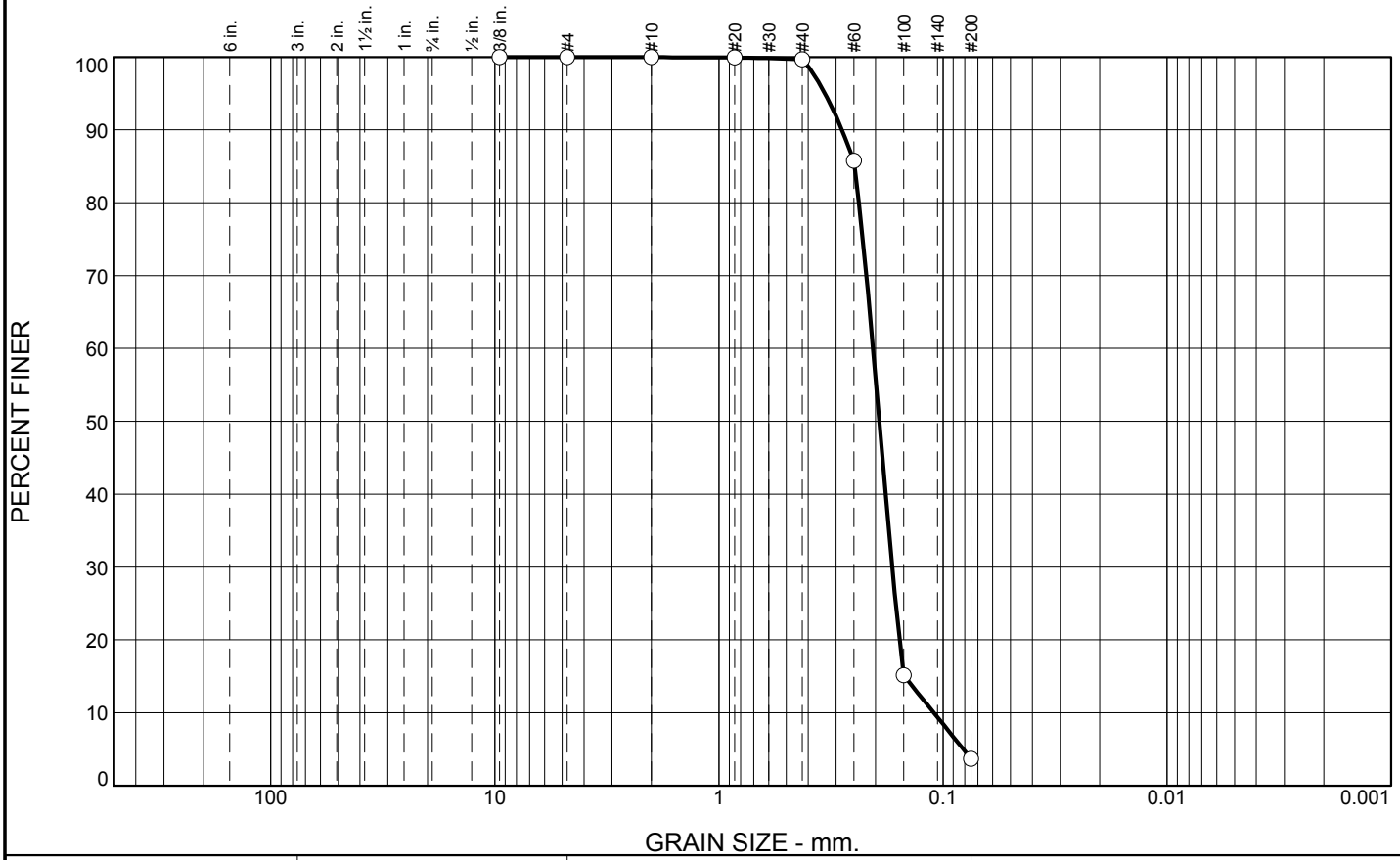
Thompson Engineering

Mobile, Alabama

Client: US Army Corps of Engineers
Project: Contract No. W91278-10-D-0026 - Task 03
Mississippi Barrier Island Restoration Project
Project No: 10-2123-0009 **Figure**

Tested By: G.Fancher **Checked By:** R.Byrd

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.3	96.0	3.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	100.0		
#10	100.0		
#20	99.9		
#40	99.7		
#60	85.7		
#100	15.2		
#200	3.7		

* (no specification provided)

Material Description

SAND, (SP), fine grained

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2824 D_{85}= 0.2482 D_{60}= 0.2053
D_{50}= 0.1924 D_{30}= 0.1686 D_{15}= 0.1486
D_{10}= 0.1099 C_u= 1.87 C_c= 1.26

Classification

USCS= SP AASHTO=

Remarks

CADD CODE = CH10D965

Location: USACE Sample # BI-SI-89-10B
Sample Number: TE Lab ID: 4557.05 **Depth:** 5.0 - 10.0 (ft.) **Date:** 7/3/10

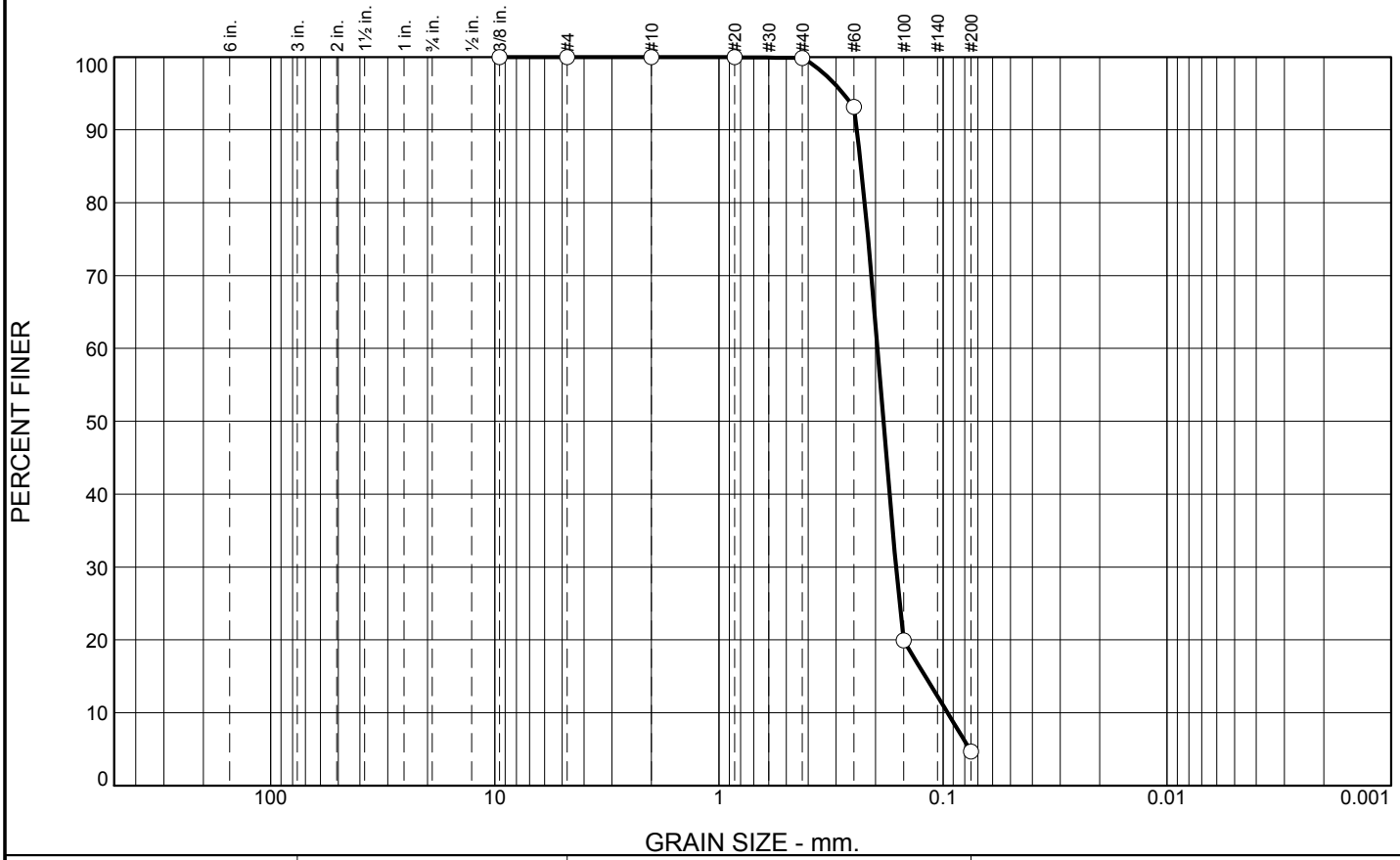
Thompson Engineering

Mobile, Alabama

Client: US Army Corps of Engineers
Project: Contract No. W91278-10-D-0026 - Task 03
Mississippi Barrier Island Restoration Project
Project No: 10-2123-0009 **Figure**

Tested By: G.Fancher **Checked By:** R.Byrd

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.1	95.2	4.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	100.0		
#10	100.0		
#20	100.0		
#40	99.9		
#60	93.1		
#100	19.9		
#200	4.7		

* (no specification provided)

Material Description

SAND, (SP), fine grained

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2423 D_{85}= 0.2322 D_{60}= 0.1961
D_{50}= 0.1844 D_{30}= 0.1621 D_{15}= 0.1199
D_{10}= 0.0955 C_u= 2.05 C_c= 1.40

Classification

USCS= SP AASHTO=

Remarks

CADD CODE = CH10D965

Location: USACE Sample # BI-SI-89-10C
Sample Number: TE Lab ID: 4557.06 **Depth:** 10.0 - 13.5 (ft.) **Date:** 7/3/10

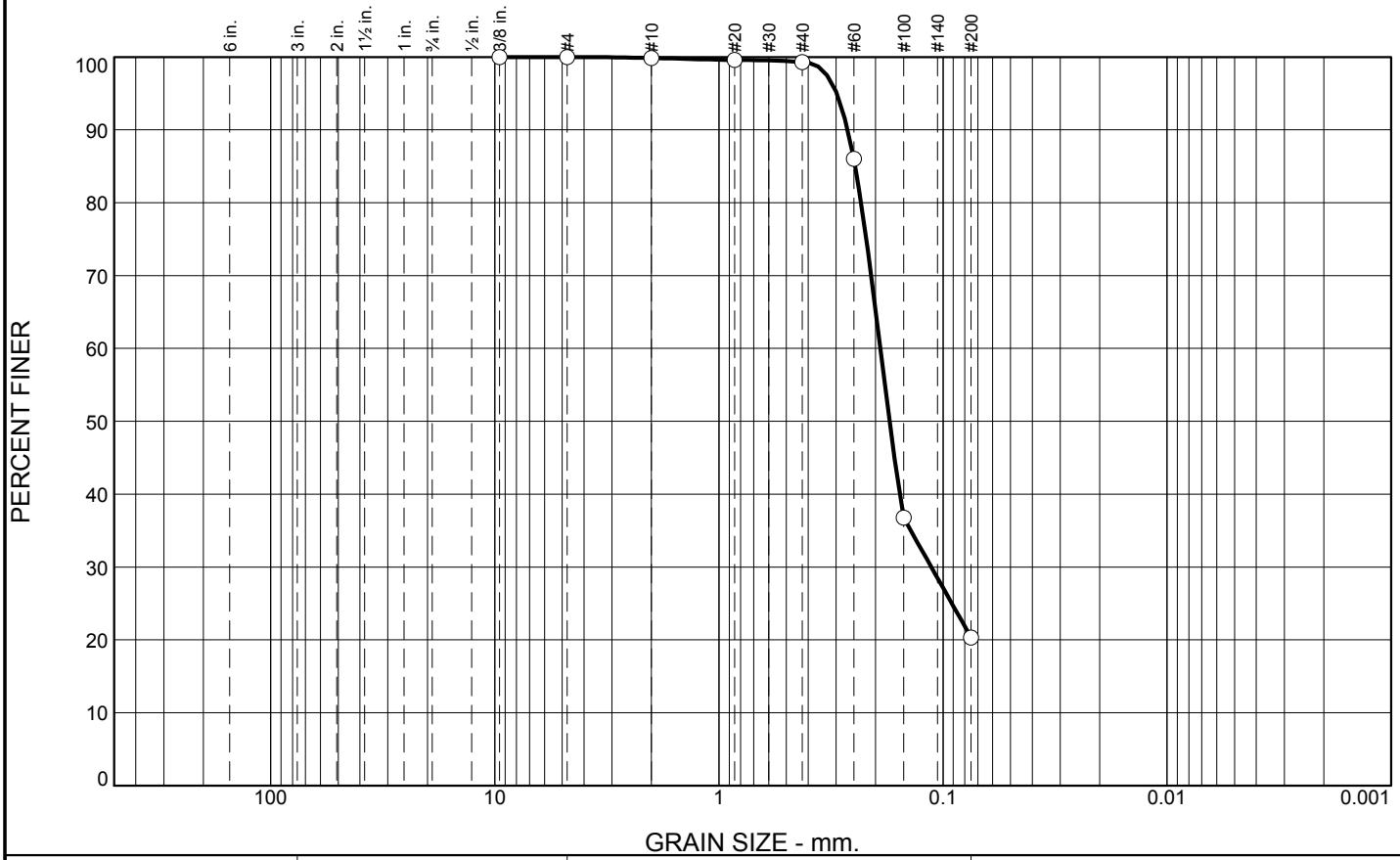
Thompson Engineering

Mobile, Alabama

Client: US Army Corps of Engineers
Project: Contract No. W91278-10-D-0026 - Task 03
Mississippi Barrier Island Restoration Project
Project No: 10-2123-0009 **Figure**

Tested By: G.Fancher **Checked By:** R.Byrd

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	0.6	79.0	20.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	100.0		
#10	99.9		
#20	99.6		
#40	99.3		
#60	86.0		
#100	36.8		
#200	20.3		

* (no specification provided)

Material Description

SILTY SAND, (SM), fine grained, with clay pockets

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2661 D_{85}= 0.2466 D_{60}= 0.1904
D_{50}= 0.1732 D_{30}= 0.1128 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

CADD CODE = CH10D965

Location: USACE Sample # BI-SI-89-10D
Sample Number: TE Lab ID: 4557.07 **Depth:** 13.5 - 18.3 (ft.) **Date:** 7/3/10

Thompson Engineering

Mobile, Alabama

Client: US Army Corps of Engineers
Project: Contract No. W91278-10-D-0026 - Task 03
Mississippi Barrier Island Restoration Project
Project No: 10-2123-0009 **Figure**

Tested By: G.Fancher **Checked By:** R.Byrd

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SHEET CB-116: PETIT BOIS PASS-OUTER CONTINENTAL SHELF EAST 3, 4, & 5 BORROW AREA DRILLING LOGS

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Boring Designation BI-PBS-002-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET / OF
	South Atlantic	Mobile District	SHEET 1 OF 2 SHEETS

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-002-12	LOCATION COORDINATES: E = 1,138,053 N = 231,827	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 50.9 Ft.	
		15. DATE BORING	STARTED: 11-26-12 / COMPLETED: 11-26-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -50.2 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 20.0 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Mike FitzHarris, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-50.2	0.0				
			SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace silt, shell fragments in interval 0-2.7 ft., greenish gray (SP)	A	Classification: SP Color: 5Y 7/2-light gray D50: 0.22 mm % Fines: 1.6
				B	Classification: SP Color: 5Y 6/2-light olive gray D50: 0.21 mm % Fines: 3.9
-58.0	7.8				
-59.7	9.5		SAND, clayey, mostly fine-grained sand-sized quartz, some clay, trace shell fragments, greenish gray (SC)	NS	
-61.7	11.5		CLAY, lean, mostly clay, some sand, trace shell fragments, greenish gray (CL)		
-66.7	16.5		CLAY, fat, mostly clay, moderately stiff with some clayey sand nodules, greenish gray mottled with brown (CH)		
-68.6	18.4		SAND, silty, mostly fine-grained sand-sized quartz, some silt, trace clay, trace shell fragments, gray (SM)		
-70.2	20.0		CLAY, fat, mostly clay, trace fine-grained sand-sized quartz, trace wood debris, moderately stiff, gray (CH)		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.13658° Long = -88.34678°

DRILLING LOG (Cont. Sheet)	INSTALLATION	SHEET 2 OF 2 SHEETS
	Mobile District	

PROJECT	COORDINATE SYSTEM/DATUM	HORIZONTAL	VERTICAL
MsCIP Barrier Island Restoration	State Plane, MSE (U.S. Ft.)	NAD83	NAVD88

LOCATION COORDINATES	ELEVATION TOP OF BORING
X = 1,138,053 Y = 231,827	-50.2 Ft.

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
			3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.		

30
35
40
45
50
55
60

Project Mississippi Barrier Island Restoration Project

AVS AMERICAN VIBRACORE SERVICES

Core Identifier BI-PBS-02-12

Coordinate System
Latitude / Longitude

Latitude 30 08.195

Longitude 088 20.807

Date 11/26/2012

Start Time 12:43:05

End Time 12:44:50

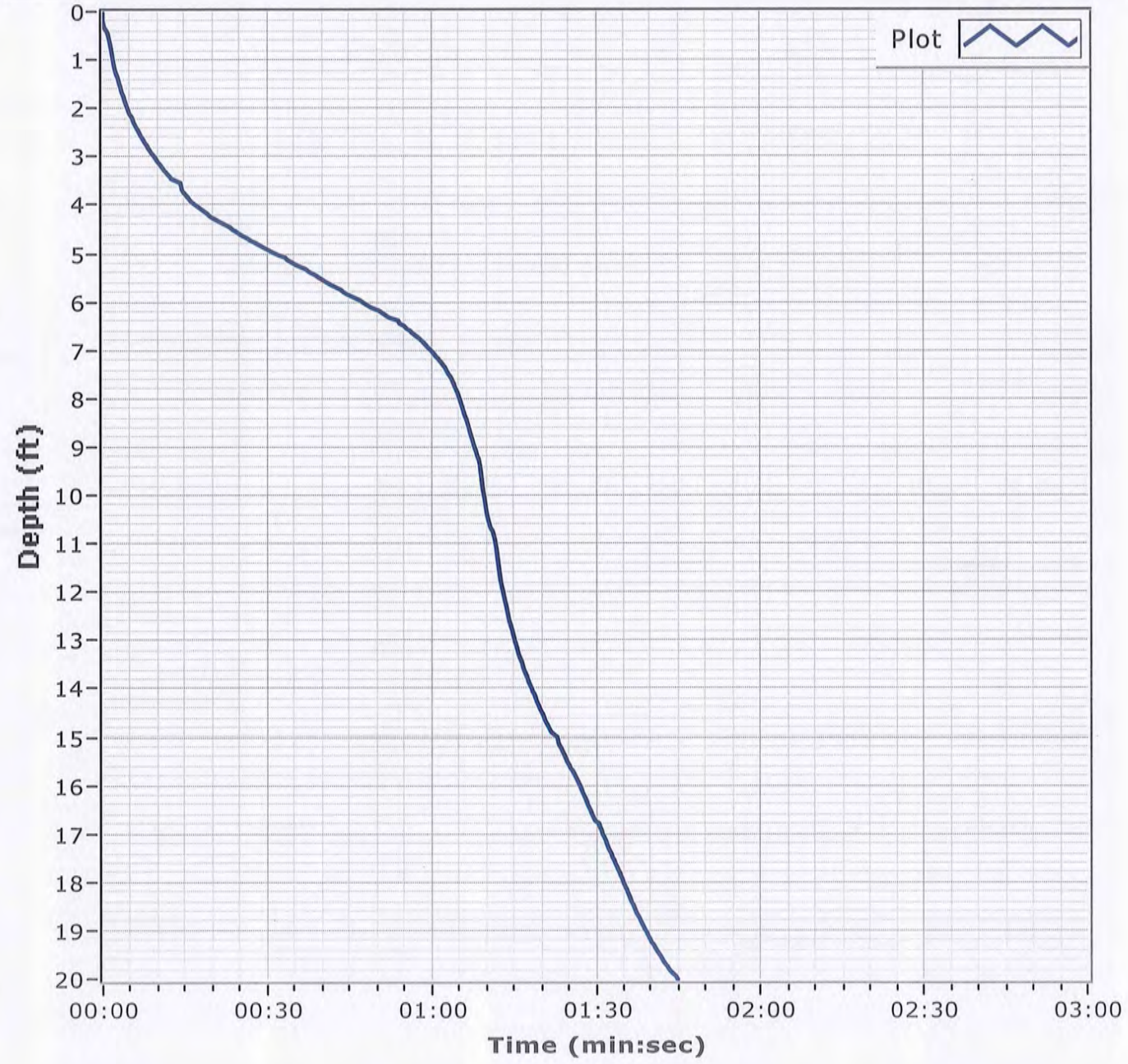
Total Time 00:01:45

Water Depth 50.9'

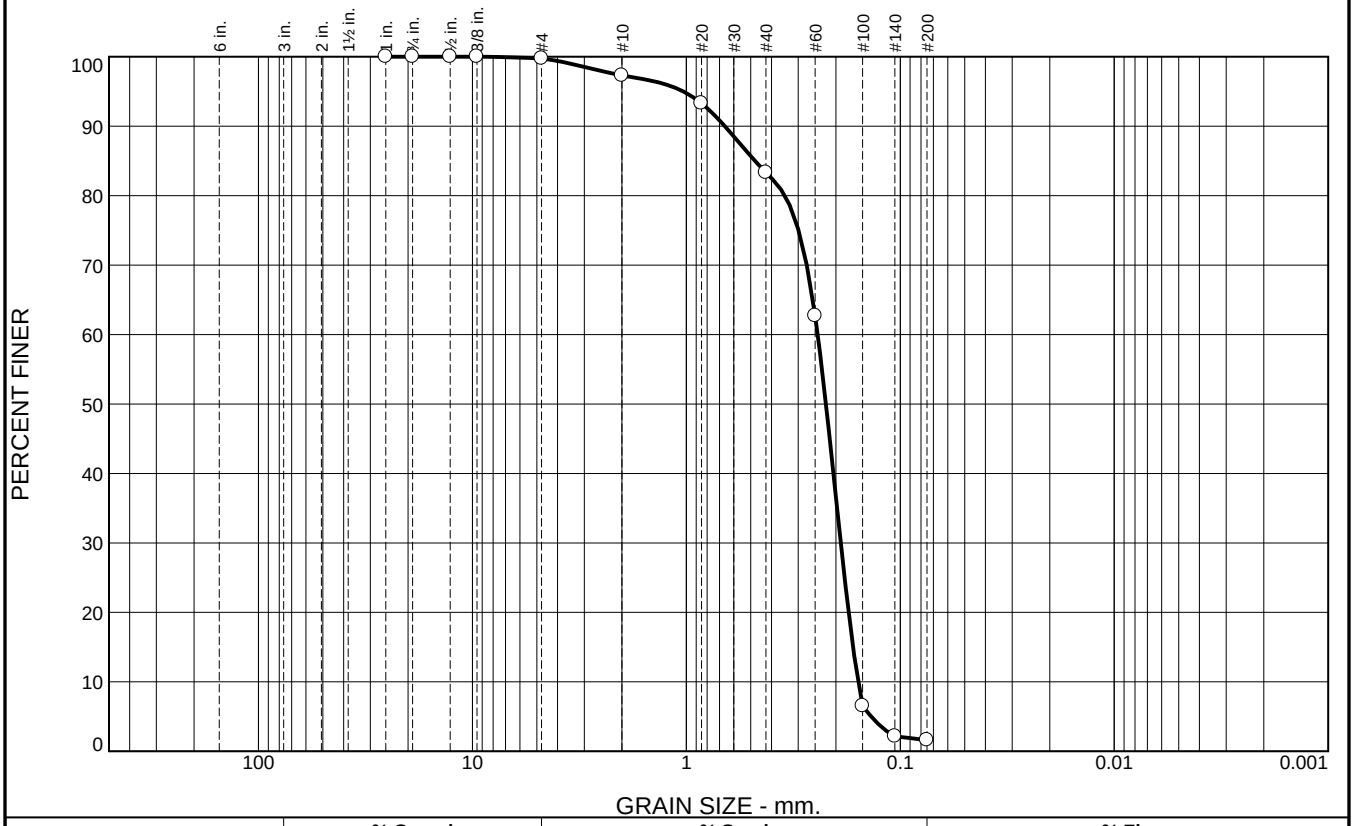
Penetration 20.0'

Recovery 19.5'

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.3	2.4	14.0	81.7	1.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.7		
#10	97.3		
#20	93.3		
#40	83.3		
#60	62.7		
#100	6.5		
#140	2.2		
#200	1.6		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6616 D_{85}= 0.4781 D_{60}= 0.2432
D_{50}= 0.2225 D_{30}= 0.1898 D_{15}= 0.1665
D_{10}= 0.1575 C_u= 1.54 C_c= 0.94

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-02-12 A
Sample Number: 6469 (55) **Depth:** 0.0' **Date:** 11/28/12

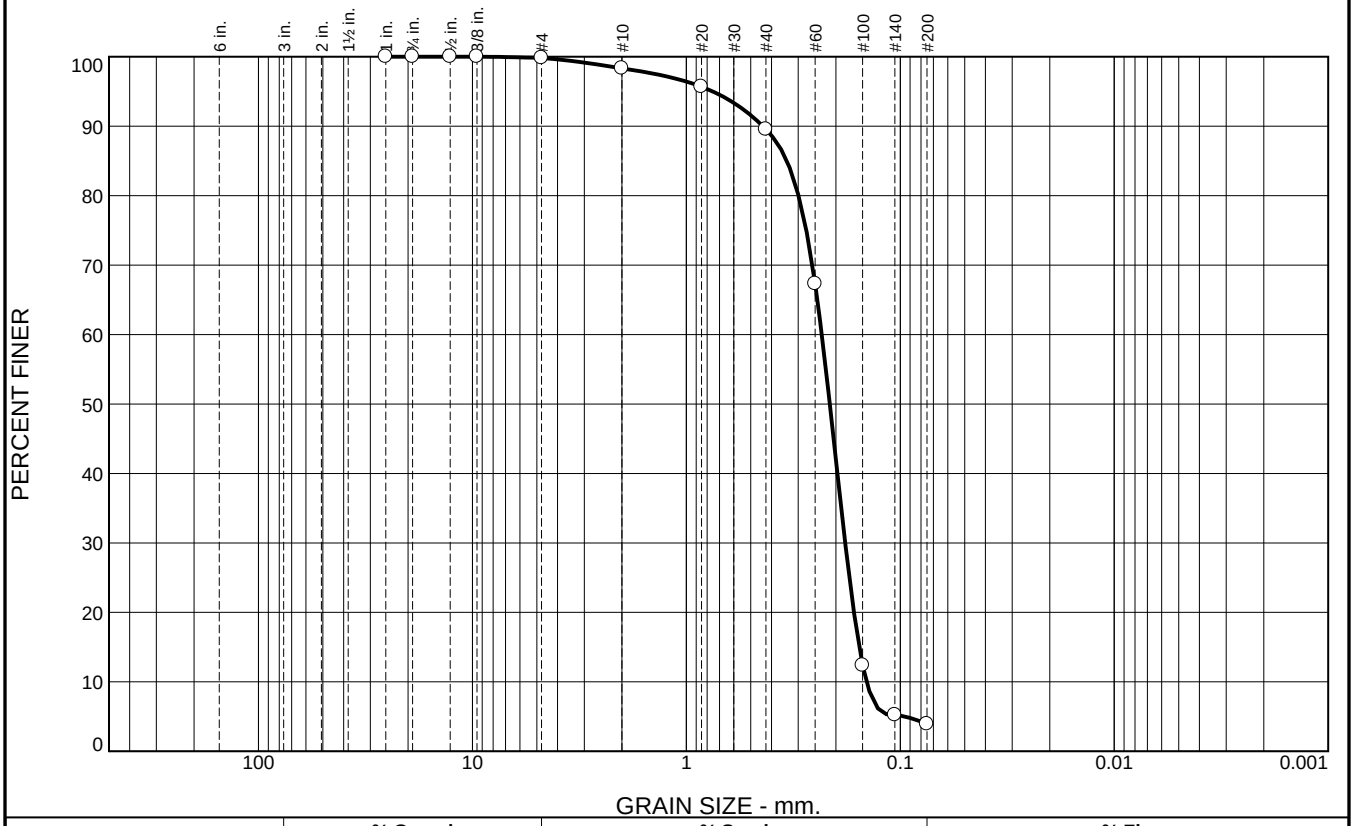
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	1.5	8.8	85.6	3.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.8		
#10	98.3		
#20	95.7		
#40	89.5		
#60	67.3		
#100	12.4		
#140	5.2		
#200	3.9		

* (no specification provided)

Material Description

Fine grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4395 D_{85}= 0.3391 D_{60}= 0.2327
D_{50}= 0.2136 D_{30}= 0.1810 D_{15}= 0.1556
D_{10}= 0.1438 C_u= 1.62 C_c= 0.98

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-02-12 B
Sample Number: 6469 (56) **Depth:** 4.5' **Date:** 11/28/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBS-003-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 2 SHEETS
	South Atlantic	Mobile District	

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-003-12	LOCATION COORDINATES: E = 1,138,716 N = 232,102	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL: / BEARING:	14. WATER DEPTH: 59.7 Ft.	
		15. DATE BORING	STARTED: 11-26-12 / COMPLETED: 11-26-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -59.4 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 19.5 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Mike FitzHarris, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-59.4	0.0				
			SAND, clayey, mostly fine-grained sand-sized quartz, some shell fragments, with sandy clay stringers, gray mottled with brown (SC)		
-61.2	1.8		CLAY, lean, mostly clay, trace shell fragments, pockets of sandy clay, medium plasticity, gray mottled with brown (CL)		
-66.5	7.1		SAND, clayey, mostly fine-grained sand-sized quartz, trace shell fragments, low plasticity, gray (SC) At El. -67.6 Ft., mostly fine-grained sand-sized quartz, some clay, trace shell fragments, trace wood debris, alternating layers of clayey sand and sandy clay, gray	NS	
-78.9	19.5				
			NOTES: 1. Soils are field visually classified in accordance with the Unified Soils Classification System. 2. NS = Sample not submitted for laboratory analysis from this interval. 3. Seafloor elevation calculated using sampling vessel's fathometer water depth reading and		

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.13733° Long = -88.34468°

DRILLING LOG (Cont. Sheet)	INSTALLATION	SHEET 2 OF 2 SHEETS
	Mobile District	

PROJECT	COORDINATE SYSTEM/DATUM	HORIZONTAL	VERTICAL
MsCIP Barrier Island Restoration	State Plane, MSE (U.S. Ft.)	NAD83	NAVD88

LOCATION COORDINATES	ELEVATION TOP OF BORING
X = 1,138,716 Y = 232,102	-59.4 Ft.

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
			applying NOAA tidal gauge data conversion factor.		

30
35
40
45
50
55
60

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.13733° Long = -88.34468°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE SERVICES

Core Identifier BI-PBS-03-12

Coordinate System
Latitude / Longitude

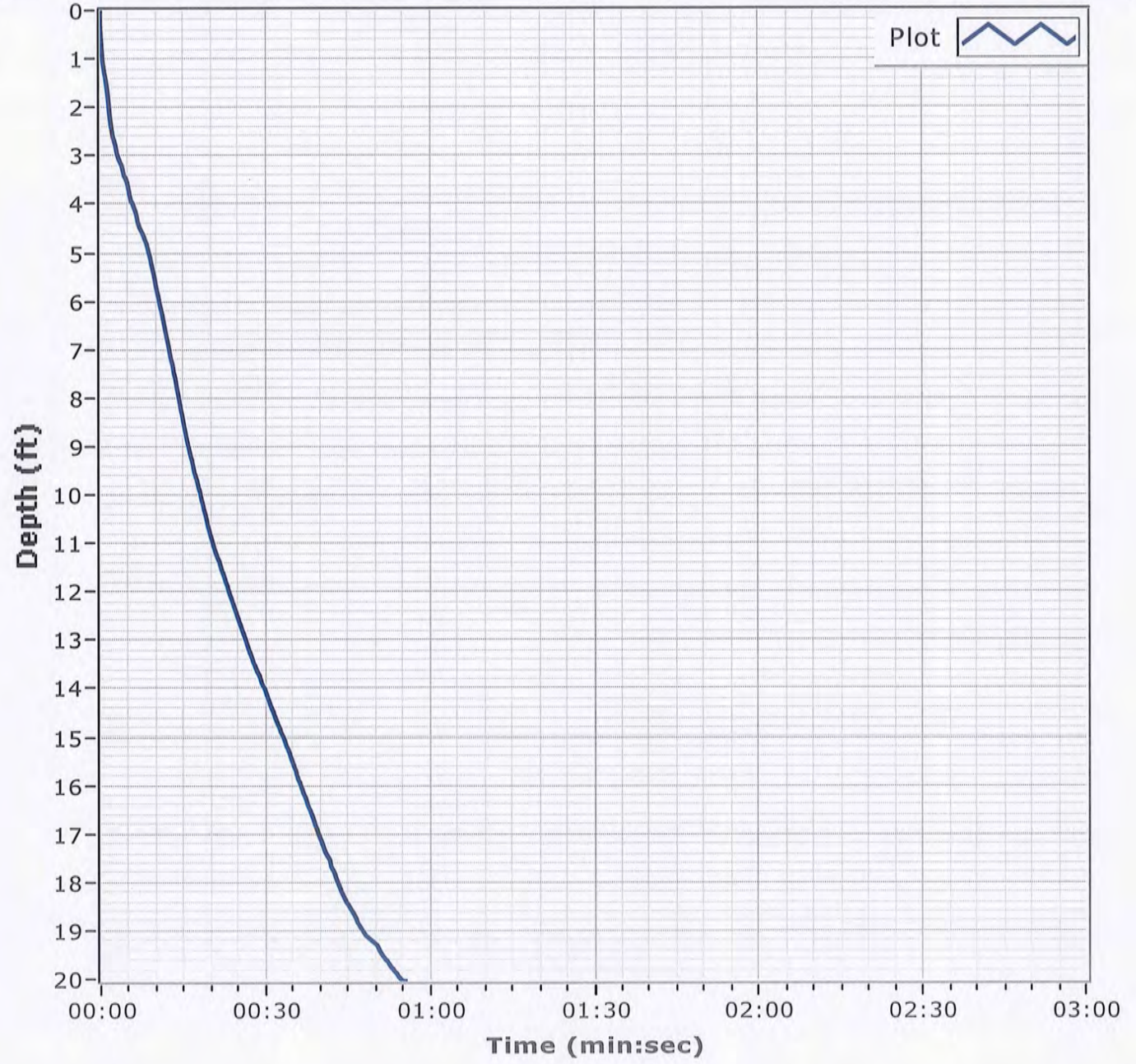
Latitude 30 08.240

Longitude 088 20.681

Date 11/26/2012
Start Time 09:52:42
End Time 09:53:38
Total Time 00:00:55

Water Depth 59.7'
Penetration 20.0'
Recovery 19.5'

Comments



Boring Designation BI-PBS-004-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 2 SHEETS
	South Atlantic	Mobile District	

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-004-12	LOCATION COORDINATES: E = 1,139,523 N = 232,429	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 49.8 Ft.	
		15. DATE BORING	STARTED: 11-26-12 / COMPLETED: 11-26-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -50.1 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 20.0 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Mike FitzHarris, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-50.1	0.0				
			SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace silt, trace wood debris, greenish gray (SP)	A	Classification: SP Color: 5Y 7/2-light gray D50: 0.26 mm % Fines: 1.2
				B	Classification: SP Color: 5Y 7/2-light gray D50: 0.23 mm % Fines: 2.4
-58.7	8.6				
-59.8	9.7		SAND, silty, mostly fine to medium-grained sand-sized quartz, some shell fragments, greenish gray (SM)	NS	
			CLAY, lean, mostly clay, some fine-grained sand-sized quartz, trace shell fragments, medium stiffness, brown mottled with gray (CL) At El. -60.6 Ft., mostly clay, some fine-grained sand-sized quartz, medium stiffness, some bands of fat clay throughout interval, greenish gray mottled with brown		
-65.6	15.5				
			SAND, clayey, mostly fine-grained sand-sized quartz, trace shell fragments, gray (SC)		
-69.6	19.5				
-70.1	20.0		CLAY, fat, mostly clay, trace shell fragments, medium stiffness, gray (CH)		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.13822° Long = -88.34212°

DRILLING LOG (Cont. Sheet)	INSTALLATION	SHEET 2 OF 2 SHEETS
	Mobile District	

PROJECT	COORDINATE SYSTEM/DATUM	HORIZONTAL	VERTICAL
MsCIP Barrier Island Restoration	State Plane, MSE (U.S. Ft.)	NAD83	NAVD88

LOCATION COORDINATES	ELEVATION TOP OF BORING
X = 1,139,523 Y = 232,429	-50.1 Ft.

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
			3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.		

30
35
40
45
50
55
60

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.13822° Long = -88.34212°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
SERVICES

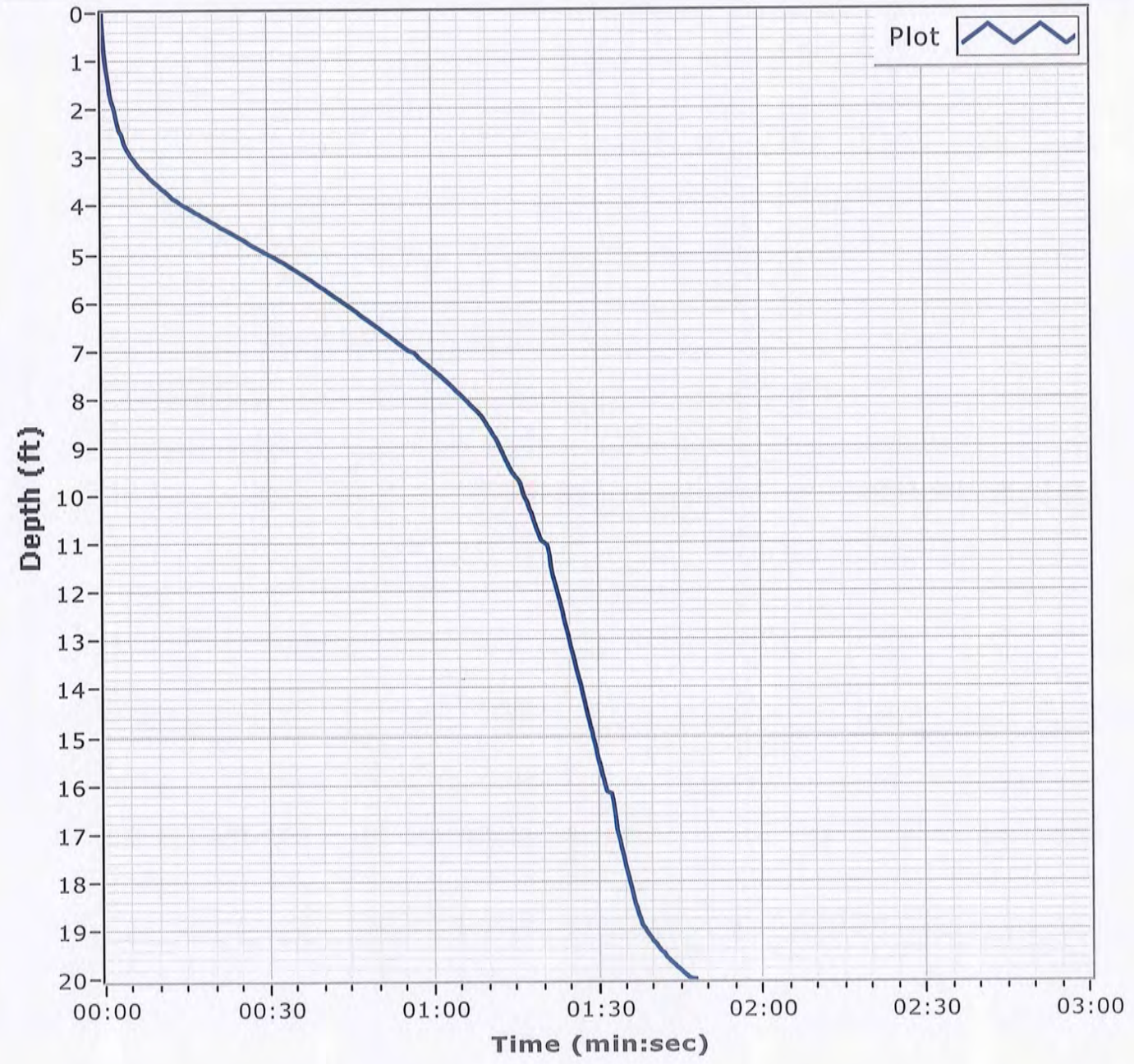
Core Identifier BI-PBS-04-12
Coordinate System
Latitude / Longitude

Date 11/26/2012
Start Time 10:36:10
End Time 10:37:58
Total Time 00:01:48

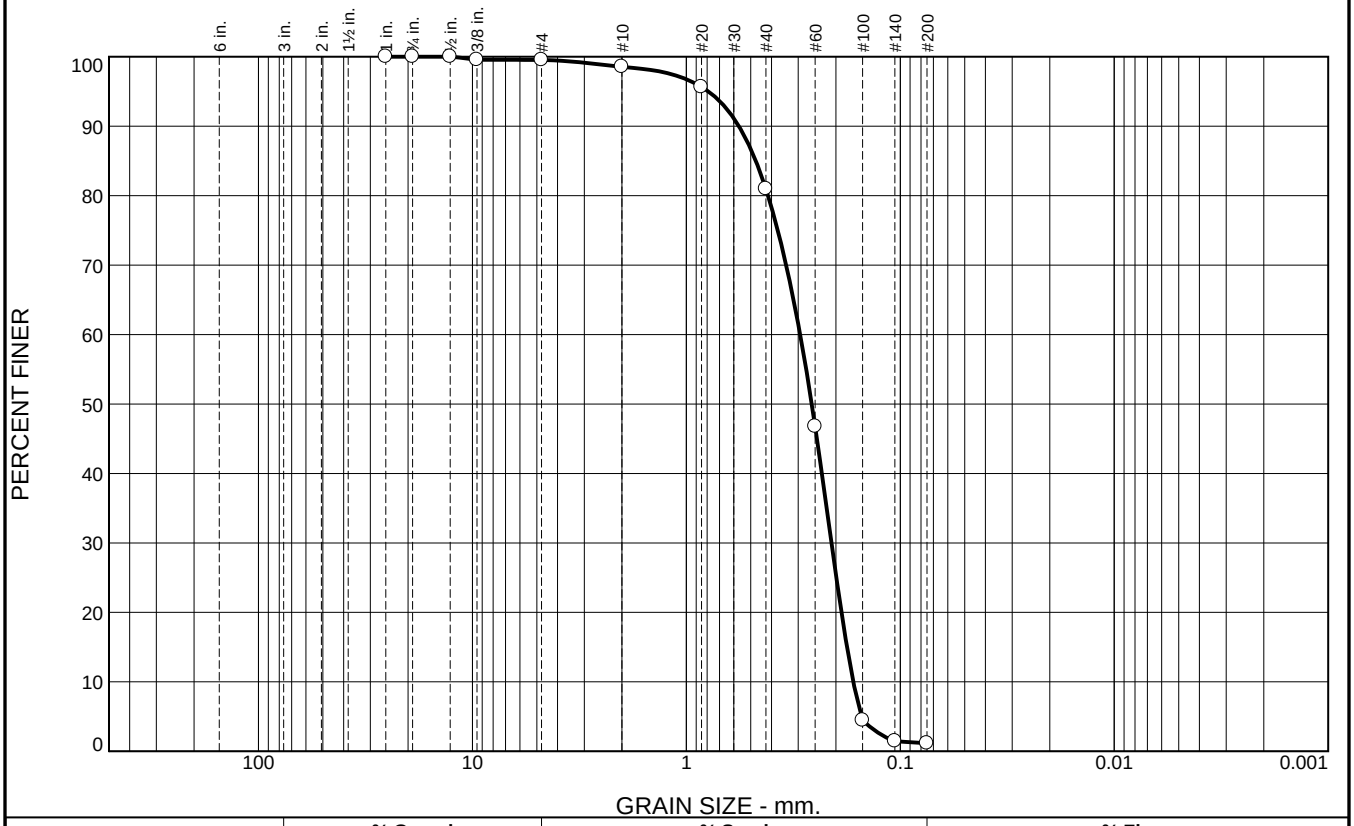
Water Depth 59.3'
Penetration 20.0'
Recovery 20.0'

Latitude 30 08.293
Longitude 088 20.527

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.5	1.0	17.5	79.8	1.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	99.6		
#4	99.5		
#10	98.5		
#20	95.6		
#40	81.0		
#60	46.8		
#100	4.5		
#140	1.5		
#200	1.2		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5681 D_{85}= 0.4736 D_{60}= 0.2939
D_{50}= 0.2594 D_{30}= 0.2097 D_{15}= 0.1776
D_{10}= 0.1660 C_u= 1.77 C_c= 0.90

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-04-12 A
Sample Number: 6469 (57) **Depth:** 0.0' **Date:** 11/28/12

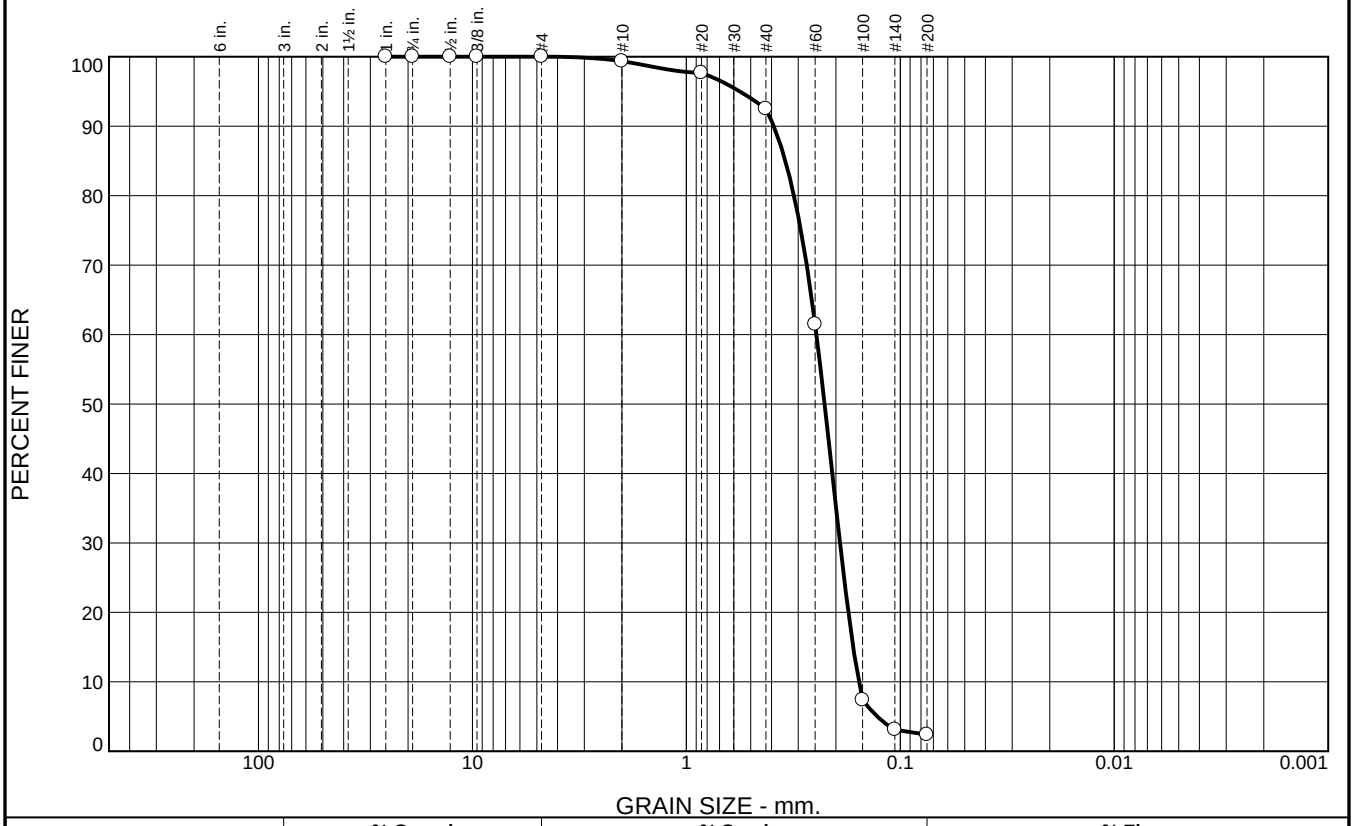
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.7	6.8	90.1	2.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	100.0		
#10	99.3		
#20	97.7		
#40	92.5		
#60	61.5		
#100	7.4		
#140	3.1		
#200	2.4		

* (no specification provided)

Material Description

Fine grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3901 D_{85}= 0.3443 D_{60}= 0.2465
D_{50}= 0.2258 D_{30}= 0.1914 D_{15}= 0.1662
D_{10}= 0.1563 C_u= 1.58 C_c= 0.95

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-04-12 B
Sample Number: 6469 (58) **Depth:** 5.0' **Date:** 11/28/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBS-006-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 2 SHEETS
	South Atlantic	Mobile District	

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-006-12	LOCATION COORDINATES: E = 1,141,764 N = 233,356	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 55 Ft.	
		15. DATE BORING	STARTED: 11-24-12 / COMPLETED: 11-24-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -55.1 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 19.7 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: John Bass, Geotechnical Engineer	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-55.1	0.0				
-60.1	5.0		SAND, poorly-graded, mostly fine-grained sand-sized quartz, trace fines, lt. gray (SP)	A	Classification: SP Color: 5Y 7/2-light gray D50: 0.27 mm % Fines: 2.8
-62.0	6.9		SAND, silty, mostly fine-grained sand-sized quartz, clay lenses throughout, gray (SM)	NS	
-71.5	16.4		SAND, poorly-graded with silt, mostly fine-grained sand-sized quartz, trace shells, clay lenses throughout, gray (SP-SM)	B	Classification: SM Color: 5Y 6/2-light olive gray D50: 0.1672 mm % Fines: 18
-74.1	19.0		SAND, silty, mostly fine-grained sand-sized quartz, some shells, gray (SM)	NS	
-74.8	19.7		CLAY, lean, mostly clay, little fine-grained sand-sized quartz, little shell fragments, gray (CL)		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.14072° Long = -88.33502°

DRILLING LOG (Cont. Sheet)	INSTALLATION		SHEET 2 OF 2 SHEETS
	Mobile District		
PROJECT	**COORDINATE SYSTEM/DATUM**	**HORIZONTAL**	**VERTICAL**
MsCIP Barrier Island Restoration	State Plane, MSE (U.S. Ft.)	NAD83	NAVD88
LOCATION COORDINATES	**ELEVATION TOP OF BORING**		
X = 1,141,764 Y = 233,356	-55.1 Ft.		

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
			3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.		

30
35
40
45
50
55
60

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.14072° Long = -88.33502°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
SERVICES

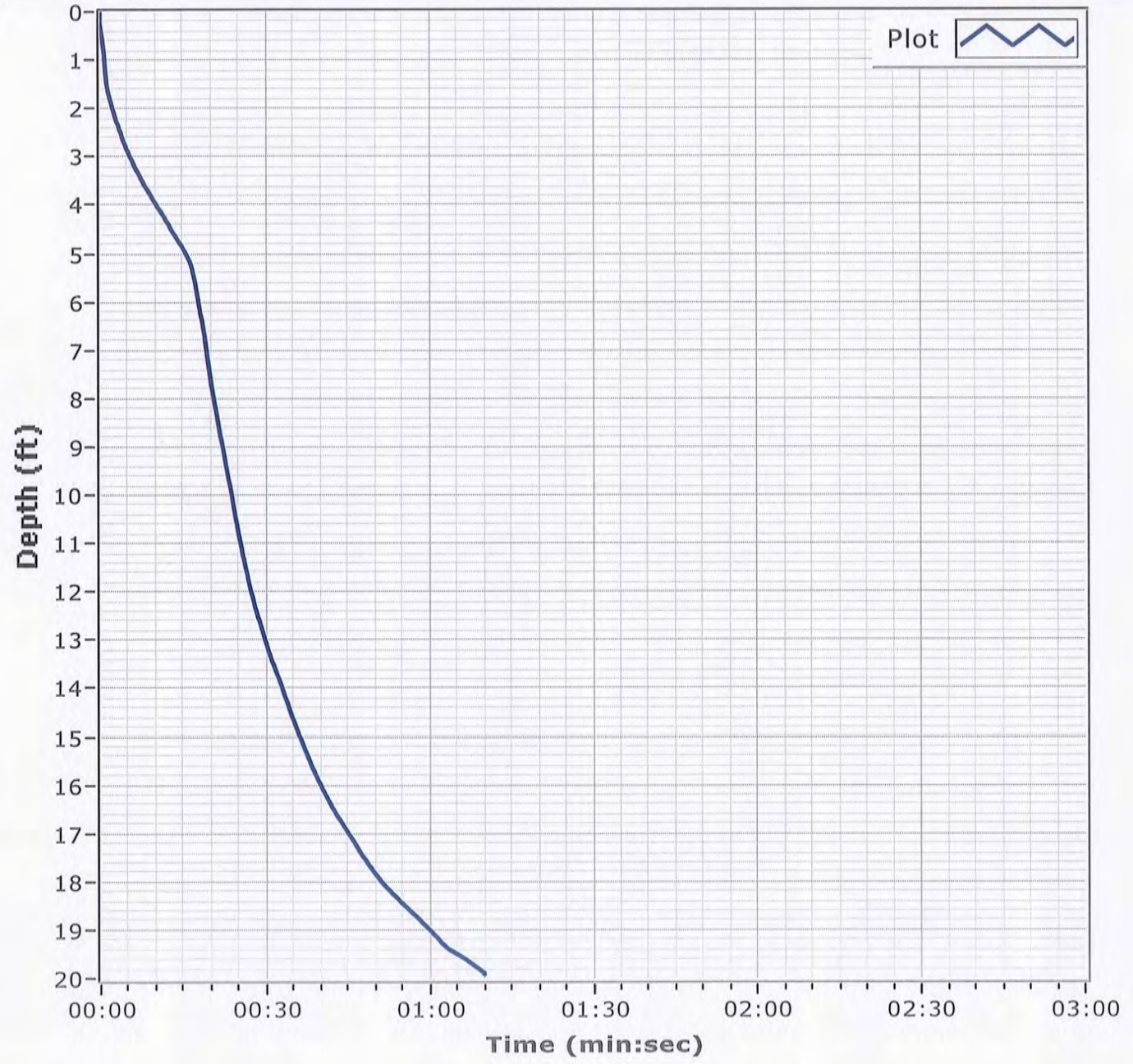
Core Identifier BI-PBS-06-12-a
Coordinate System
Latitude / Longitude

Date 11/24/2012
Start Time 14:29:00
End Time 14:30:10
Total Time 00:01:10

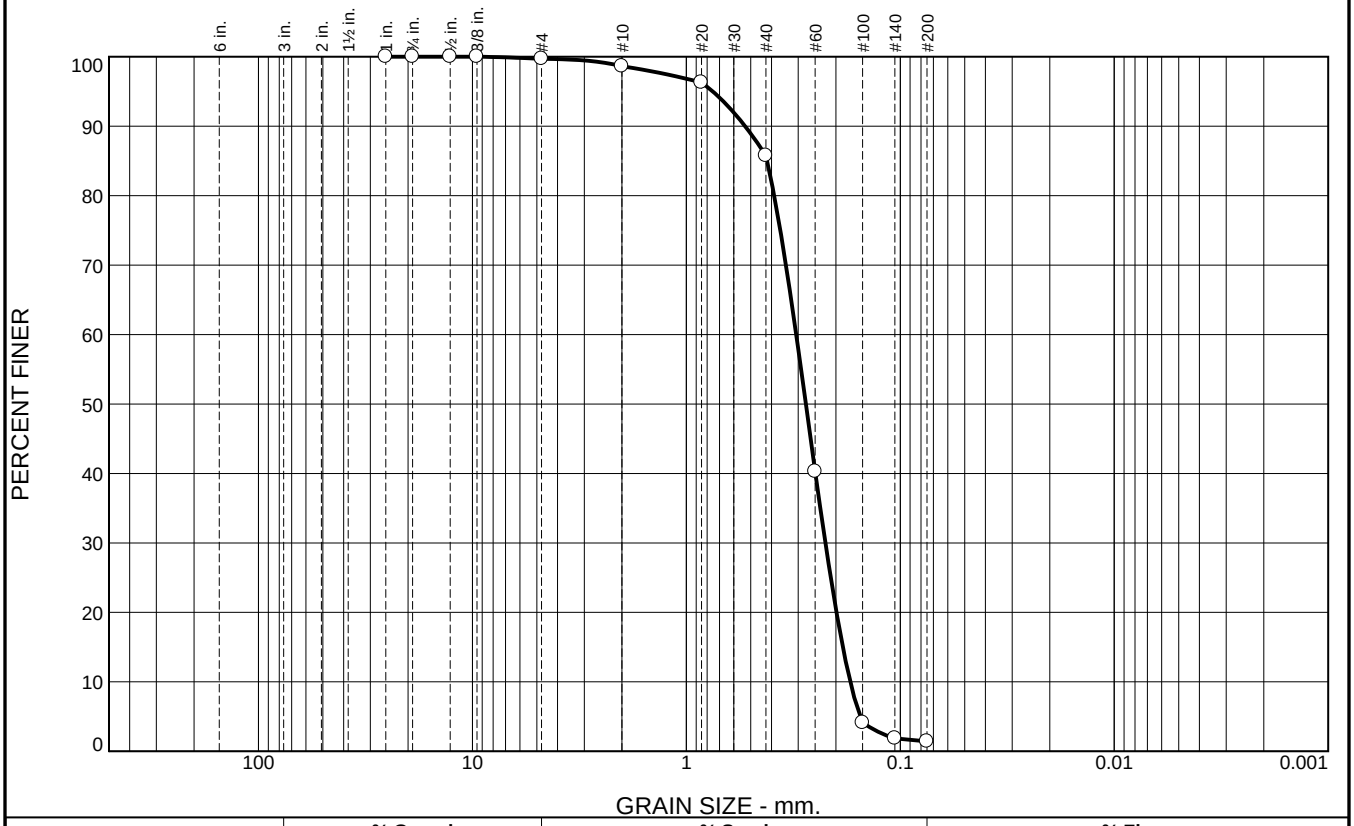
Water Depth 55.0'
Penetration 20.0'
Recovery 19.7'

Latitude 30 08.443
Longitude 088 20.105

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.3	1.1	12.8	84.4	1.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.7		
#10	98.6		
#20	96.3		
#40	85.8		
#60	40.3		
#100	4.1		
#140	1.9		
#200	1.4		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5317 D_{85}= 0.4195 D_{60}= 0.3067
D_{50}= 0.2764 D_{30}= 0.2238 D_{15}= 0.1857
D_{10}= 0.1715 C_u= 1.79 C_c= 0.95

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-06-12a A
Sample Number: 6469 (47) **Depth:** 0.0' **Date:** 11/28/12

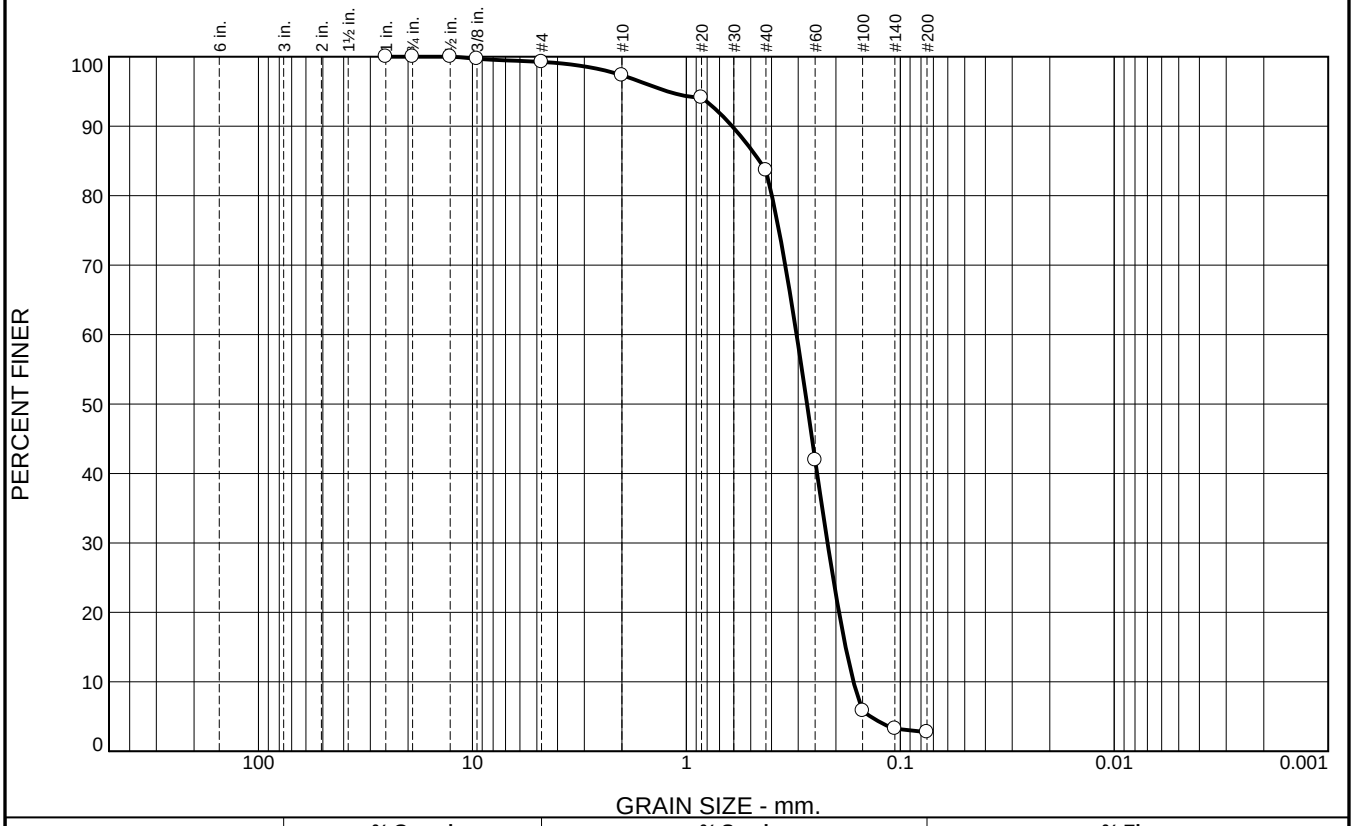
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.8	1.9	13.7	80.8	2.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	99.7		
#4	99.2		
#10	97.3		
#20	94.1		
#40	83.6		
#60	41.9		
#100	5.8		
#140	3.3		
#200	2.8		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6106 D_{85}= 0.4553 D_{60}= 0.3055
D_{50}= 0.2731 D_{30}= 0.2188 D_{15}= 0.1802
D_{10}= 0.1656 C_u= 1.84 C_c= 0.95

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-06-12b A
Sample Number: 6469 (48) **Depth:** 0.0' **Date:** 11/28/12

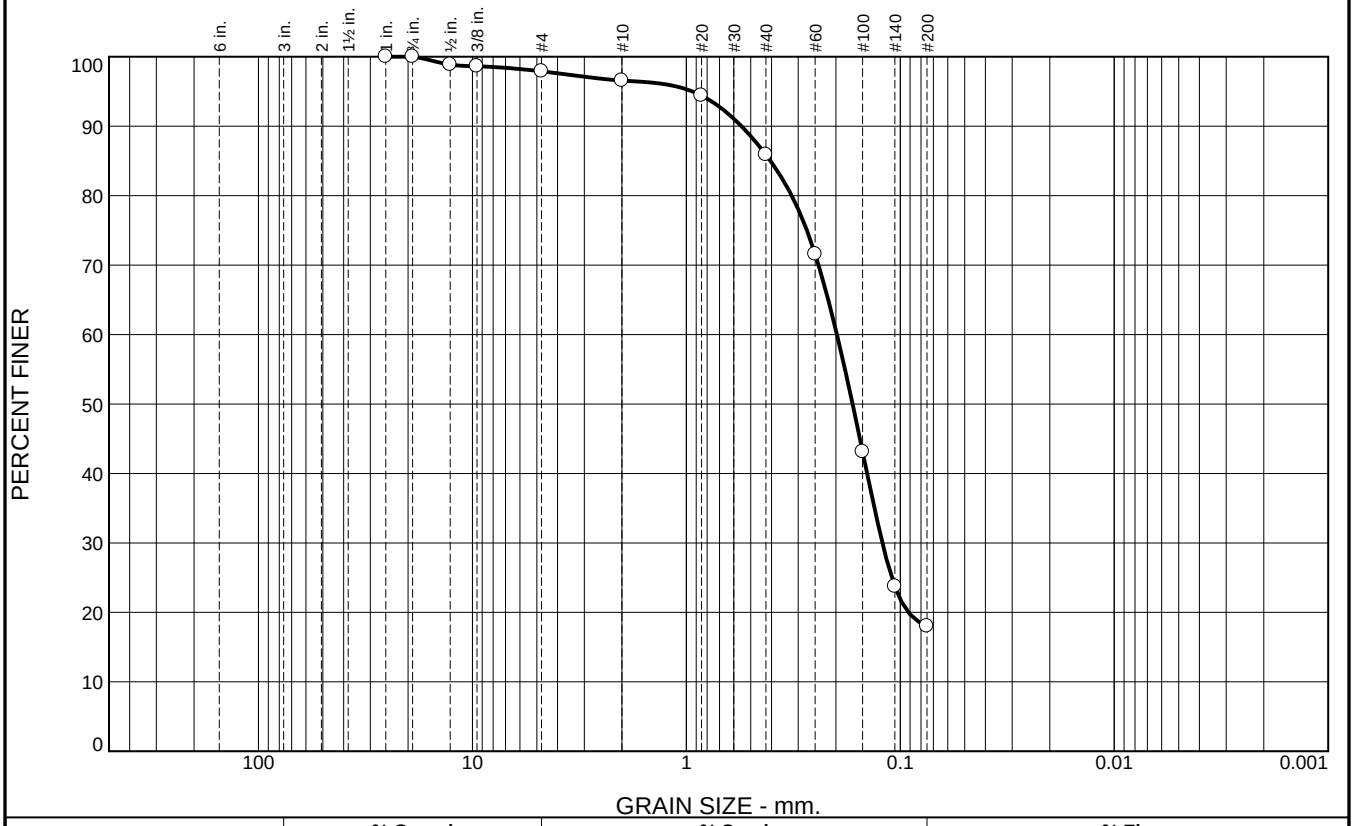
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.1	1.3	10.7	67.9	18.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	98.9		
.375	98.6		
#4	97.9		
#10	96.6		
#20	94.4		
#40	85.9		
#60	71.6		
#100	43.1		
#140	23.7		
#200	18.0		

* (no specification provided)

Material Description

Fine to medium grained, SILTY SAND, with trace SHELL

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5527 D_{85}= 0.4046 D_{60}= 0.1978
D_{50}= 0.1672 D_{30}= 0.1213 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

Location: BI-PBS-06-12b B
Sample Number: 6469 (49) **Depth:** 6.9' **Date:** 11/28/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBS-012-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 2 SHEETS
	South Atlantic	Mobile District	

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-012-12	LOCATION COORDINATES: E = 1,137,391 N = 232,075	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 48.7 Ft.	
		15. DATE BORING	STARTED: 11-23-12 / COMPLETED: 11-23-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -49.2 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 20.0 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: John Bass, Geotechnical Engineer	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-49.2	0.0				
-54.2	5.0		SAND, poorly-graded, mostly fine to medium-grained quartz, little shell fragments, trace fines, sand and shell debris layer at 3.0-3.8 ft, lt. gray (SP)	A	Classification: SP Color: 5Y 6/2-light olive gray D50: 0.27 mm % Fines: 1.9
-58.0	8.8		SAND, poorly-graded, mostly fine-grained sand-sized quartz, little fines, trace shell fragments, lt. gray (SP)	B	Classification: SP Color: 5Y 6/2-light olive gray D50: 0.23 mm % Fines: 2.8
-59.2	10.0		SAND, poorly-graded, mostly fine-grained sand-sized quartz, little fines, lt. gray (SP)	C	Classification: SP-SM Color: 5Y 5/2-olive gray D50: 0.21 mm % Fines: 9.9
-62.7	13.5		SAND, silty, mostly fine-grained sand-sized quartz, with clay lenses, gray (SM)	NS	
-68.0	18.8		CLAY, silty, mostly clay, trace fine-grained sand-sized quartz, lt. gray mottled with orange (CL-ML)		
-69.2	20.0		SAND, silty, mostly fine-grained sand-sized quartz, trace wood debris, gray (SM)		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

3. Seafloor elevation determined from USACE

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.13727° Long = -88.34887°

DRILLING LOG (Cont. Sheet)	INSTALLATION		SHEET 2 OF 2 SHEETS
	Mobile District		
PROJECT	**COORDINATE SYSTEM/DATUM**	**HORIZONTAL**	**VERTICAL**
MsCIP Barrier Island Restoration	State Plane, MSE (U.S. Ft.)	NAD83	NAVD88
LOCATION COORDINATES	**ELEVATION TOP OF BORING**		
X = 1,137,391 Y = 232,075	-49.2 Ft.		

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
			hydrographic survey completed April 2014.		

30
35
40
45
50
55
60

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.13727° Long = -88.34887°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE SERVICES

Core Identifier BI-PBS-12-12

Coordinate System
Latitude / Longitude

Latitude 30 08.236

Longitude 088 20.932

Date 11/23/2012

Start Time 14:18:11

End Time 14:20:19

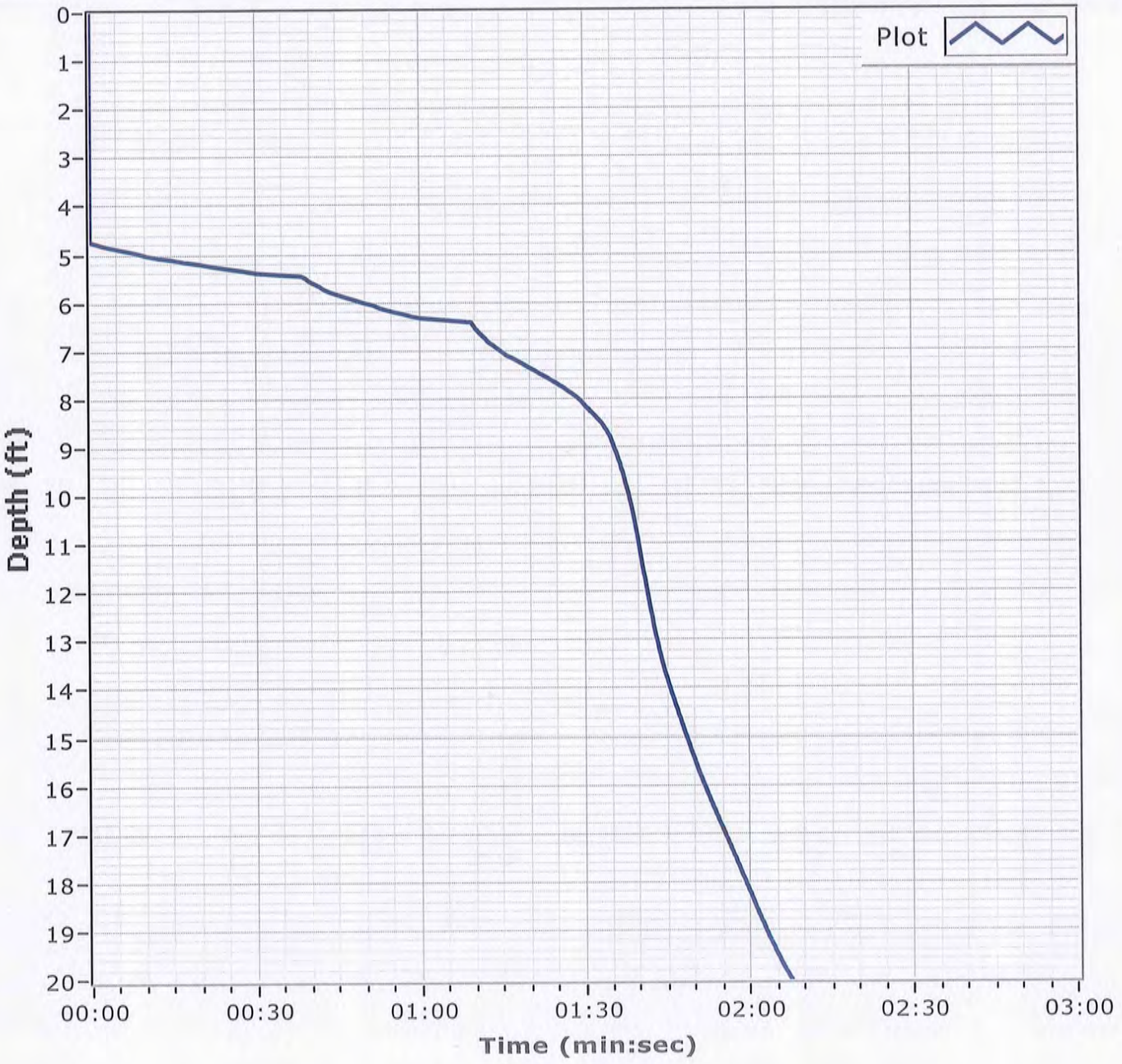
Total Time 00:02:07

Water Depth 48.7'

Penetration 20.0'

Recovery 20.0'

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.4	4.4	20.3	72.0	1.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	99.6		
#4	98.6		
#10	94.2		
#20	87.8		
#40	73.9		
#60	44.1		
#100	5.6		
#140	2.4		
#200	1.9		

* (no specification provided)

Material Description

Fine to medium grained, SAND, with trace SHELL

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.0750 D_{85}= 0.6757 D_{60}= 0.3148
D_{50}= 0.2700 D_{30}= 0.2121 D_{15}= 0.1768
D_{10}= 0.1640 C_u= 1.92 C_c= 0.87

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-12-12 A
Sample Number: 6469 (33) **Depth:** 0.0' **Date:** 11/28/12

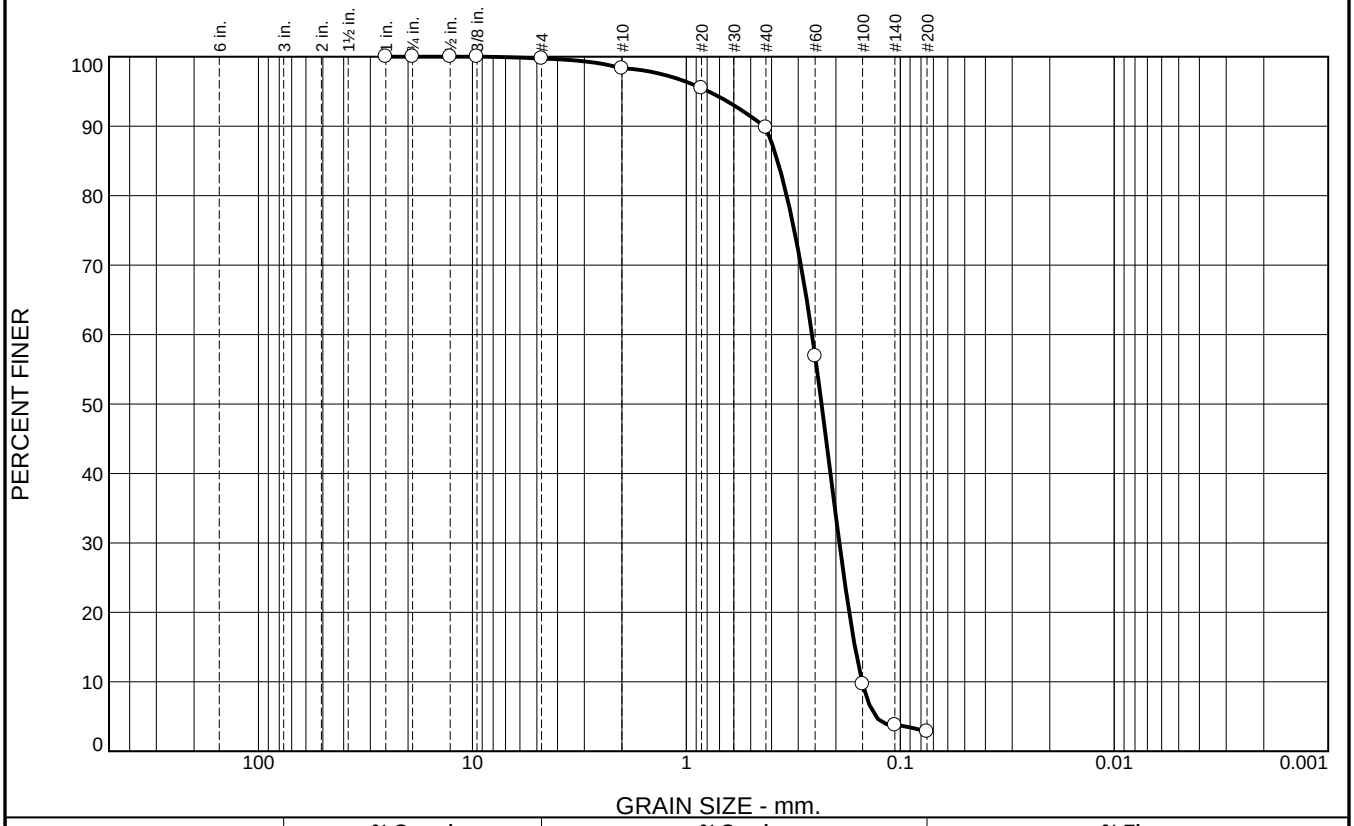
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.3	1.4	8.5	87.0	2.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.7		
#10	98.3		
#20	95.5		
#40	89.8		
#60	56.9		
#100	9.7		
#140	3.8		
#200	2.8		

* (no specification provided)

Material Description

Fine grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4338 D_{85}= 0.3746 D_{60}= 0.2585
D_{50}= 0.2333 D_{30}= 0.1927 D_{15}= 0.1631
D_{10}= 0.1509 C_u= 1.71 C_c= 0.95

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-12-12 B
Sample Number: 6469 (34) **Depth:** 5.0' **Date:** 11/28/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.2	2.6	13.2	73.1	9.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	99.6		
.375	99.3		
#4	98.8		
#10	96.2		
#20	92.0		
#40	83.0		
#60	62.8		
#100	23.6		
#140	12.6		
#200	9.9		

* (no specification provided)

Material Description

Fine to medium grained, SLIGHTLY SILTY SAND, with trace SHELL

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6799 D_{85}= 0.4731 D_{60}= 0.2404
D_{50}= 0.2117 D_{30}= 0.1656 D_{15}= 0.1204
D_{10}= 0.0766 C_u= 3.14 C_c= 1.49

Classification

USCS= SP-SM AASHTO=

Remarks

Location: BI-PBS-12-12 C
Sample Number: 6469 (35) **Depth:** 8.8' **Date:** 11/28/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBS-016-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET / OF SHEETS
	South Atlantic	Mobile District	SHEET 1 OF 1 SHEETS

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-016-12	LOCATION COORDINATES: E = 1,138,607 N = 231,553	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 52.8 Ft.	
		15. DATE BORING	STARTED: 11-23-12 / COMPLETED: 11-23-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -52.5 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 17.8 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: John Bass, Geotechnical Engineer	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-52.5	0.0				
-55.0	2.5		SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace fines, trace shell fragments, gray (SP)	A	Classification: SP Color: 5Y 6/2-light olive gray D50: 0.29 mm % Fines: 2.4
-56.3	3.8		SAND, poorly-graded, mostly fine-grained sand-sized quartz, little fines, little shell fragments, gray (SP)	B	Classification: SP Color: 5Y 6/2-light olive gray D50: 0.21 mm % Fines: 3.7
-58.1	5.6		SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, little fines, gray (SP)	C	Classification: SP Color: 5Y 6/2-light olive gray D50: 0.24 mm % Fines: 4
-61.3	8.8		SAND, silty, mostly fine-grained sand-sized quartz, little shell fragments, gray (SM)	NS	
-64.6	12.1		CLAY, lean, mostly clay, some sand, lt. gray mottled with orange (CL)		
-65.6	13.1		SAND, clayey, mostly fine-grained sand-sized quartz, lt. gray mottled with orange (SC)		
-66.4	13.9		CLAY, lean, mostly clay, little fine-grained sand-sized quartz, low plasticity, dark gray (CL)		
-68.2	15.7		SAND, silty, mostly fine-grained sand-sized quartz, trace shell fragments, trace wood debris, gray (SM)		
-70.3	17.8		CLAY, lean, mostly clay, trace fine-grained sand-sized quartz, gray (CL)		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.13582° Long = -88.34503°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
SERVICES

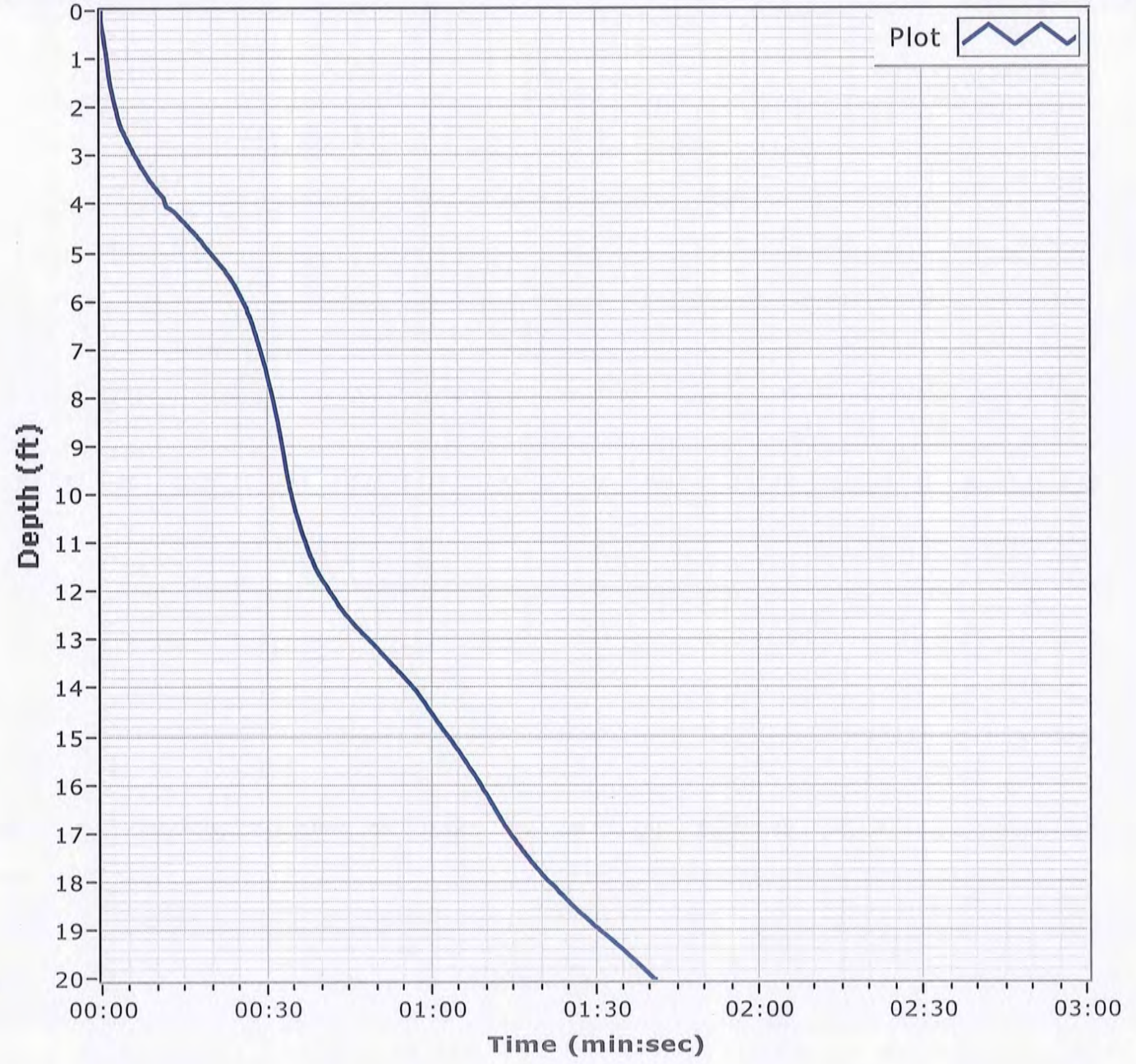
Core Identifier BI-PBS-16-12
Coordinate System
Latitude / Longitude

Latitude 30 08.149
Longitude 088 20.702

Date 11/23/2012
Start Time 13:34:56
End Time 13:36:37
Total Time 00:01:41

Water Depth 52.8'
Penetration 20.0'
Recovery 17.8'

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.9	2.4	15.7	78.6	2.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	99.7		
#4	99.1		
#10	96.7		
#20	92.7		
#40	81.0		
#60	35.8		
#100	6.4		
#140	2.9		
#200	2.4		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6916 D_{85}= 0.5156 D_{60}= 0.3255
D_{50}= 0.2923 D_{30}= 0.2329 D_{15}= 0.1859
D_{10}= 0.1672 C_u= 1.95 C_c= 1.00

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-16-12 A
Sample Number: 6469 (30) **Depth:** 0.0' **Date:** 11/28/12

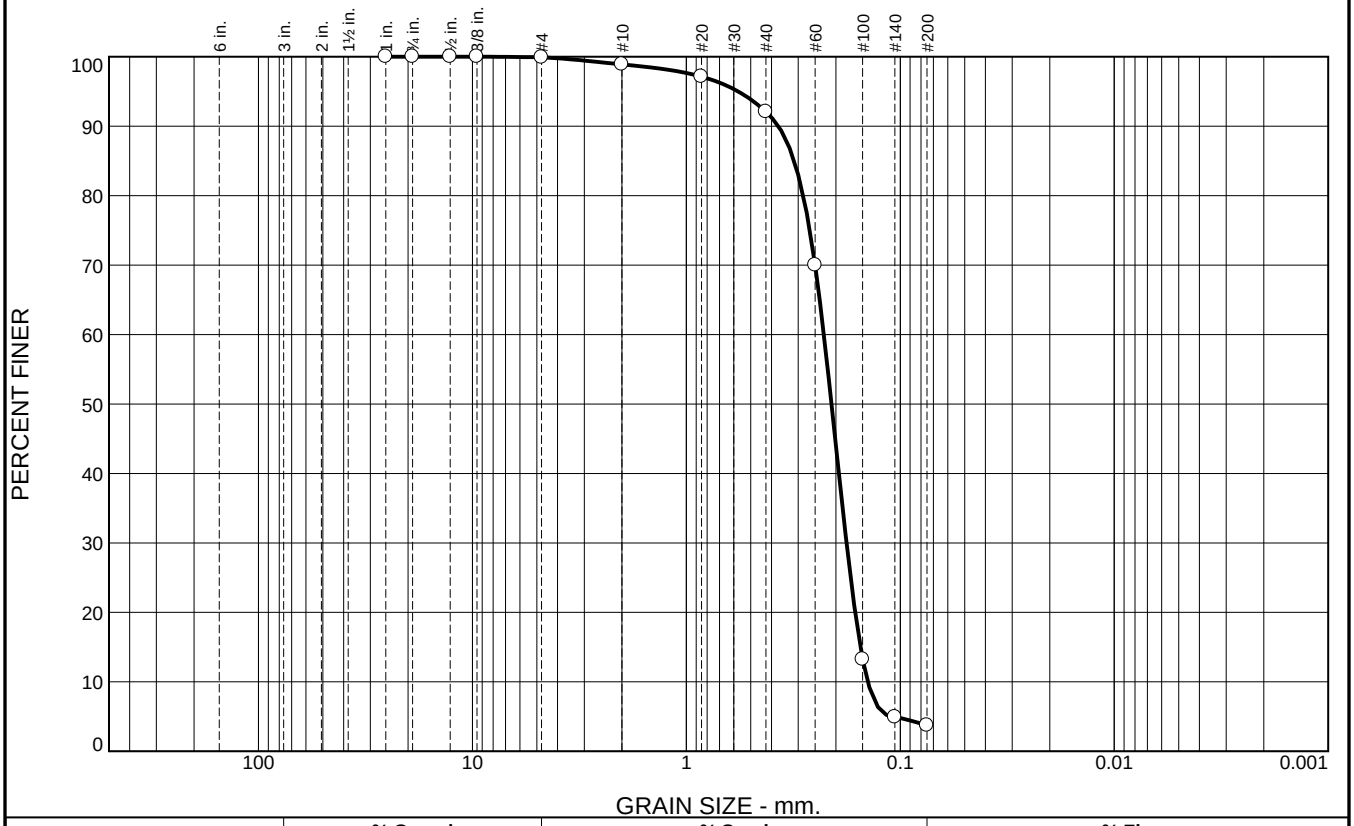
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	1.0	6.8	88.4	3.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.9		
#10	98.9		
#20	97.1		
#40	92.1		
#60	70.0		
#100	13.2		
#140	4.9		
#200	3.7		

* (no specification provided)

Material Description

Fine grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3712 D_{85}= 0.3135 D_{60}= 0.2276
D_{50}= 0.2097 D_{30}= 0.1785 D_{15}= 0.1537
D_{10}= 0.1420 C_u= 1.60 C_c= 0.99

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-16-12 B
Sample Number: 6469 (31) **Depth:** 2.5' **Date:** 11/28/12

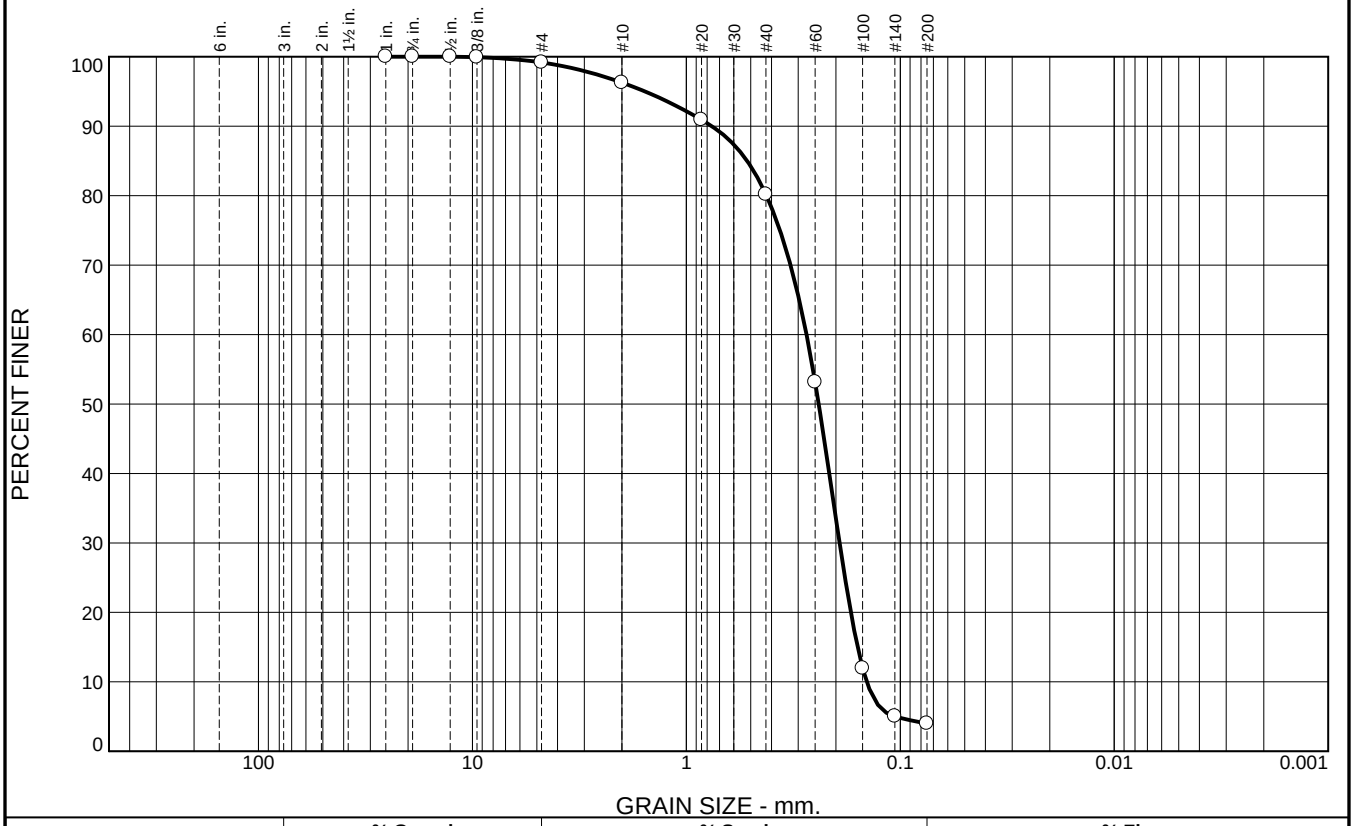
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.8	2.9	16.1	76.2	4.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	99.9		
#4	99.2		
#10	96.3		
#20	90.9		
#40	80.2		
#60	53.1		
#100	11.9		
#140	5.0		
#200	4.0		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.7616 D_{85}= 0.5200 D_{60}= 0.2745
D_{50}= 0.2406 D_{30}= 0.1923 D_{15}= 0.1585
D_{10}= 0.1436 C_u= 1.91 C_c= 0.94

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-16-12 C
Sample Number: 6469 (32) **Depth:** 3.8' **Date:** 11/28/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBS-017-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET / OF
	South Atlantic	Mobile District	SHEET 1 OF 1 SHEETS

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-017-12	LOCATION COORDINATES: E = 1,139,765 N = 231,412	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL:	BEARING:	14. WATER DEPTH: 55.4 Ft.
		15. DATE BORING	STARTED: 11-23-12 / COMPLETED: 11-23-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -58.5 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 19.5 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: John Bass, Geotechnical Engineer	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-58.5	0.0				
-59.5	1.0		SAND, poorly-graded, mostly fine-grained sand-sized quartz, little fines, gray (SP)	A	Classification: SP Color: 2.5Y 6/2-light brownish gray D50: 0.21 mm % Fines: 2.7
-59.7	1.2				
-60.5	2.0		SAND, silty, mostly fine-grained sand-sized quartz, gray (SM)		
			SAND, poorly-graded with silt, mostly fine to medium-grained sand-sized quartz, few shell fragments, trace wood debris, gray (SP-SM)		
			SILT, inorganic-L, little sand, sand lense at 4.5 ft, lt. gray mottled with orange (ML)		
-66.0	7.5				
			SAND, silty, mostly fine-grained sand-sized quartz, trace wood debris, trace shell fragments, gray (SM)	NS	
-70.5	12.0				
			SILT, inorganic-L, trace sand, trace wood debris, gray (ML)		
-74.9	16.4				
-76.0	17.5		SAND, silty, mostly fine-grained sand-sized quartz, trace shell fragments, gray (SM)		
			CLAY, lean, stiff, sand lense at 18.7 ft, lt. gray to gray (CL)		
-78.0	19.5				

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.13542° Long = -88.34137°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
SERVICES

Core Identifier BI-PBS-17-12

Coordinate System
Latitude / Longitude

Latitude 30 08.125

Longitude 088 20.482

Date 11/23/2012

Start Time 10:21:34

End Time 10:22:18

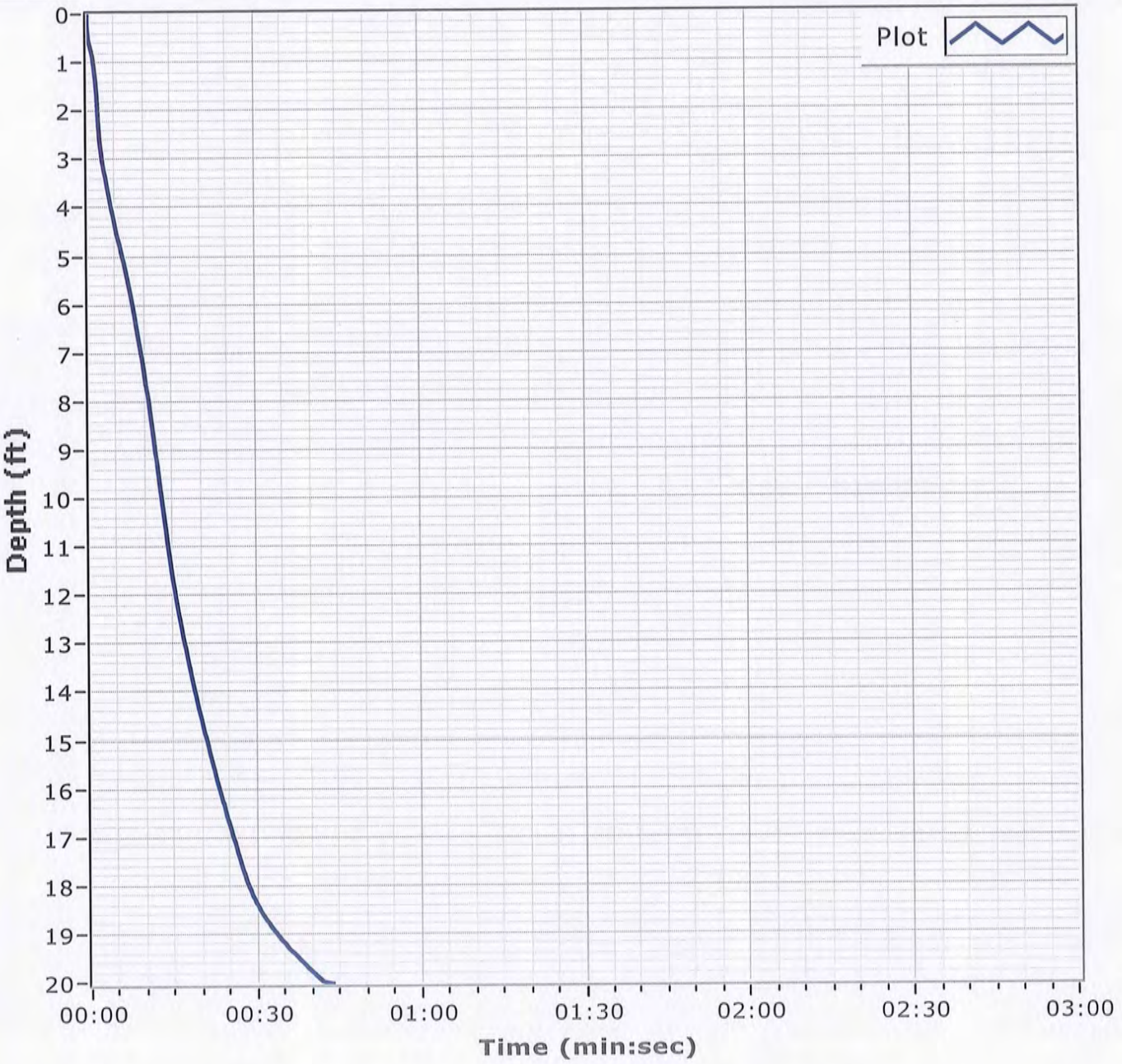
Total Time 00:00:44

Water Depth 58.7'

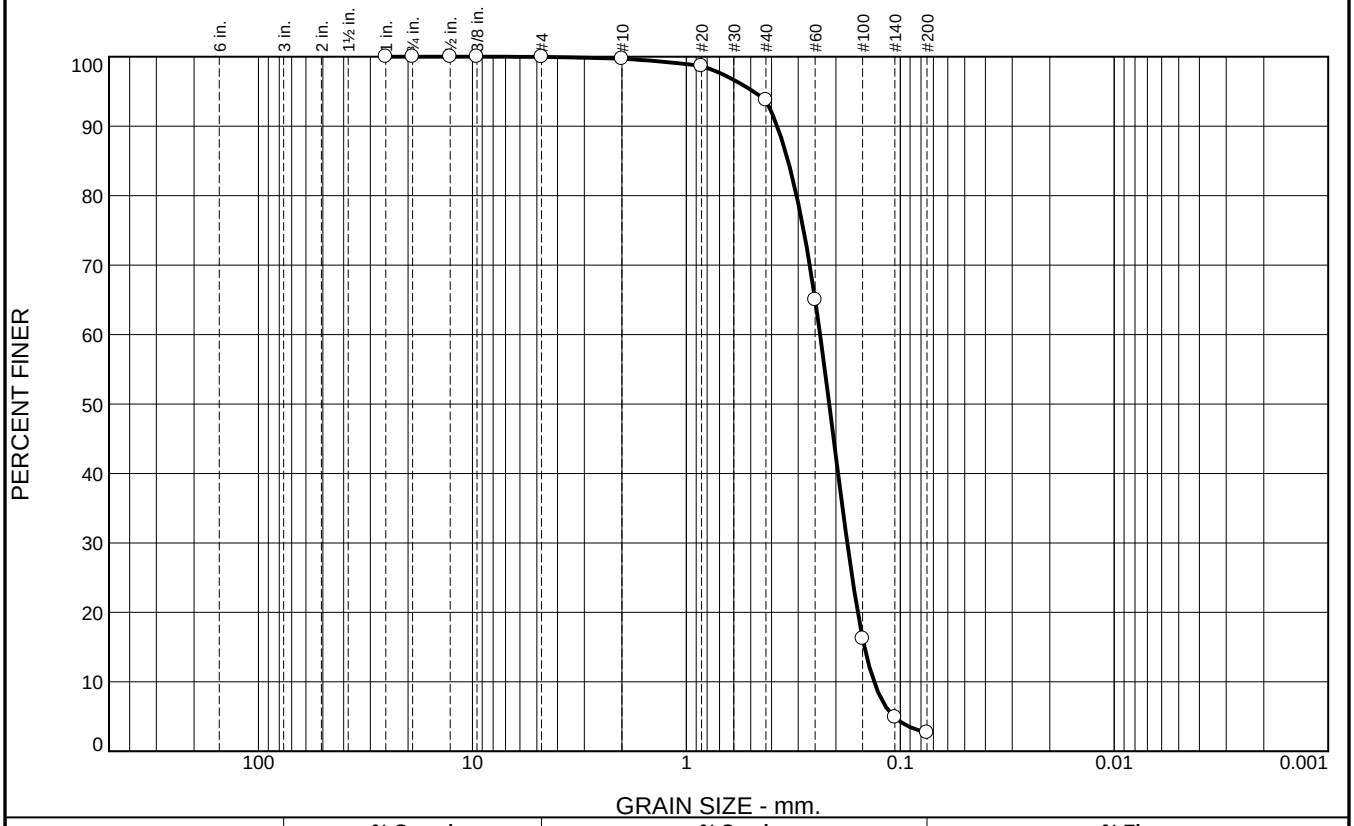
Penetration 20.0'

Recovery 19.5'

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.3	6.0	91.0	2.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	100.0		
#10	99.7		
#20	98.7		
#40	93.7		
#60	65.0		
#100	16.2		
#140	4.9		
#200	2.7		

* (no specification provided)

Material Description

Fine grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3762 D_{85}= 0.3346 D_{60}= 0.2370
D_{50}= 0.2148 D_{30}= 0.1771 D_{15}= 0.1471
D_{10}= 0.1328 C_u= 1.78 C_c= 1.00

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-17-12 A
Sample Number: 6469 (24) **Depth:** 0.0' **Date:** 11/28/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBS-018-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET / OF
	South Atlantic	Mobile District	1 OF 1 SHEETS

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-018-12	LOCATION COORDINATES: E = 1,139,854 N = 232,104	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 50.2 Ft.	
		15. DATE BORING	STARTED: 11-23-12 / COMPLETED: 11-23-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -51.1 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 19.0 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: John Bass, Geotechnical Engineer	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-51.1	0.0				
			SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, little shell fragments, trace fines, lt. gray (SP)	A	Classification: SP Color: 5Y 7/2-light gray D50: 0.3756 mm % Fines: 1.7
-53.5	2.4				
			SAND, poorly-graded, mostly fine-grained sand-sized quartz, few fines, fines increase with depth, lt. gray to gray (SP)	B	Classification: SP Color: 5Y 7/2-light gray D50: 0.2358 mm % Fines: 2.6
-59.3	8.2				
-59.7	8.6		SAND, poorly-graded with silt, mostly fine-grained sand-sized quartz, little shell fragments, gray (SP-SM)	NS	
-61.9	10.8		SAND, silty, mostly fine-grained sand-sized quartz, trace shell fragments, gray mottled with lt. gray and reddish brown (SM)		
-63.9	12.8		CLAY, silty, some fine-grained sand-sized quartz, trace shell fragments, trace wood debris, gray (CL-ML)		
			SAND, silty, mostly fine-grained sand-sized quartz, trace shell fragments, trace wood debris, gray (SM)		
-68.1	17.0				
-70.1	19.0		CLAY, lean, little fine-grained sand-sized quartz, trace wood debris, gray (CL)		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.13732° Long = -88.34108°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
SERVICES

Core Identifier BI-PBS-18-12

Coordinate System
Latitude / Longitude

Latitude 30 08.239

Longitude 088 20.465

Date 11/23/2012

Start Time 10:57:35

End Time 11:00:41

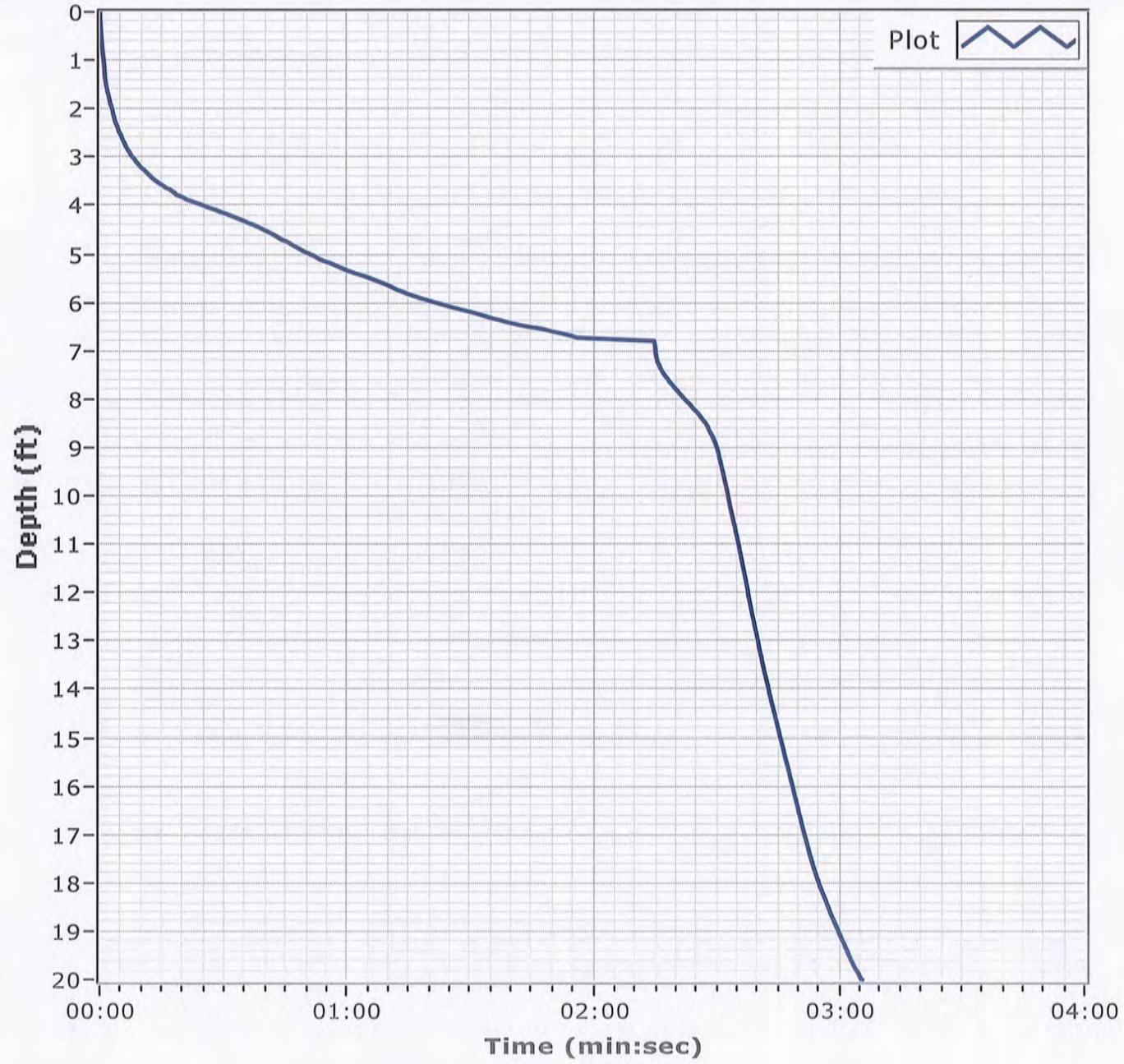
Total Time 00:03:06

Water Depth 50.2'

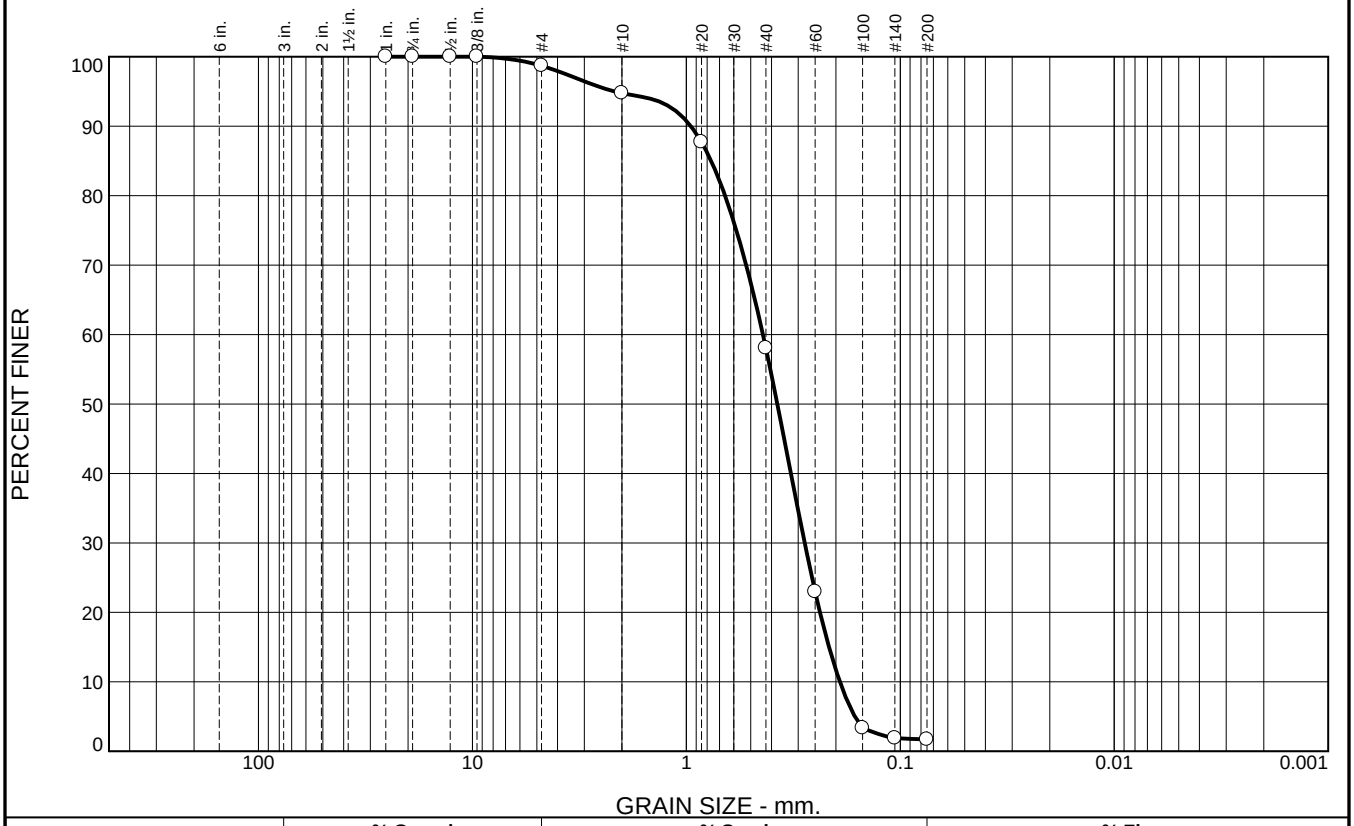
Penetration 20.0'

Recovery 19.0'

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.3	4.0	36.6	56.4	1.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	98.7		
#10	94.7		
#20	87.7		
#40	58.1		
#60	23.0		
#100	3.4		
#140	1.9		
#200	1.7		

* (no specification provided)

Material Description

Fine to medium grained, SAND, with trace SHELL

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.9531 D_{85}= 0.7661 D_{60}= 0.4386
D_{50}= 0.3756 D_{30}= 0.2799 D_{15}= 0.2153
D_{10}= 0.1917 C_u= 2.29 C_c= 0.93

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-18-12 A
Sample Number: 6469 (25) **Depth:** 0.0' **Date:** 11/28/12

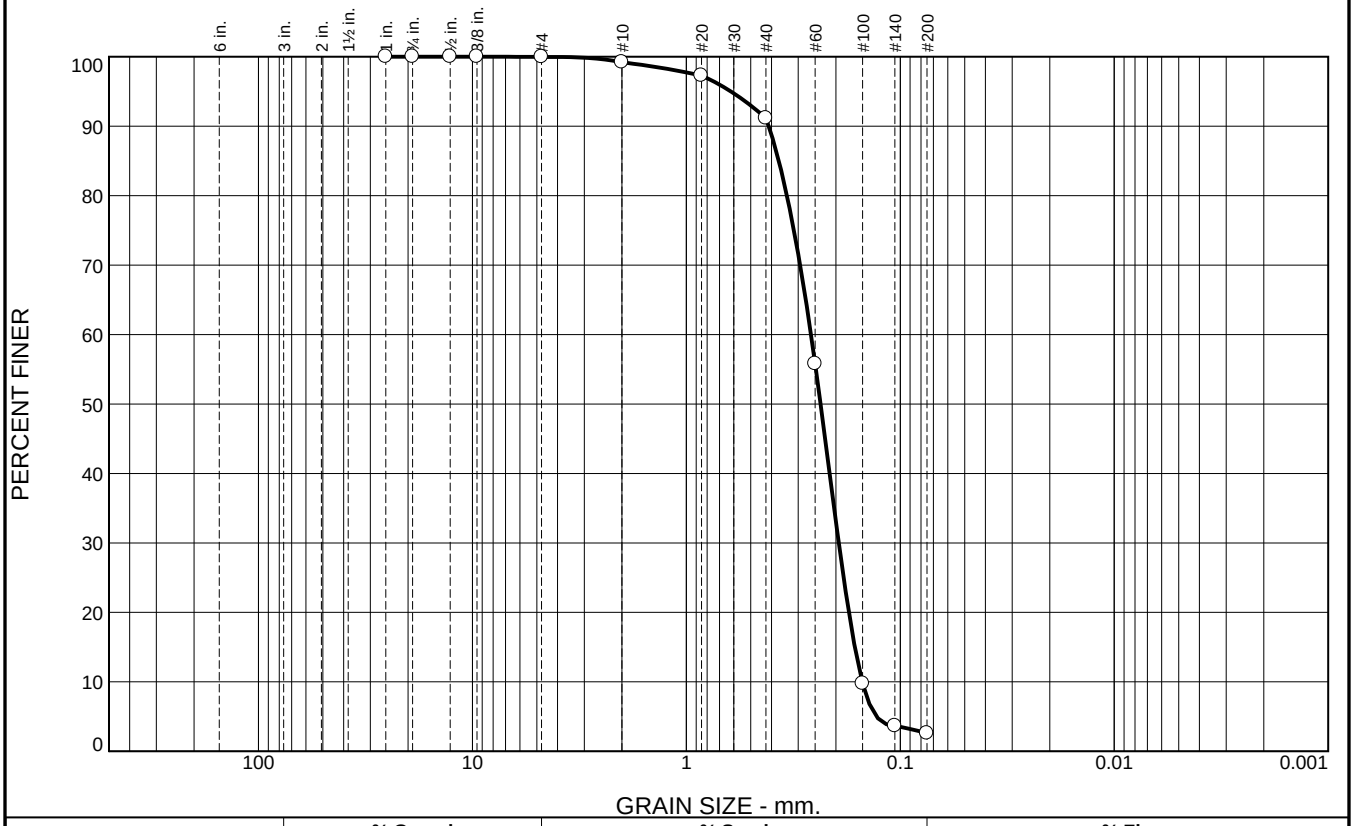
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.8	8.0	88.6	2.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	100.0		
#10	99.2		
#20	97.3		
#40	91.2		
#60	55.8		
#100	9.8		
#140	3.6		
#200	2.6		

* (no specification provided)

Material Description

Fine grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4120 D_{85}= 0.3695 D_{60}= 0.2615
D_{50}= 0.2358 D_{30}= 0.1940 D_{15}= 0.1633
D_{10}= 0.1507 C_u= 1.74 C_c= 0.96

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-18-12 B
Sample Number: 6469 (26) **Depth:** 2.4' **Date:** 11/28/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBS-019-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET / OF
	South Atlantic	Mobile District	1 OF 1 SHEETS

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-019-12	LOCATION COORDINATES: E = 1,139,322 N = 232,876	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 50.6 Ft.	
		15. DATE BORING	STARTED: 11-23-12 / COMPLETED: 11-23-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -51.2 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 18.6 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: John Bass, Geotechnical Engineer	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-51.2	0.0				
			SAND, poorly-graded, mostly fine-grained sand-sized quartz, little shell fragments, trace fines, gray to light gray (SP)	A	Classification: SP Color: 5Y 6/2-light olive gray D50: 0.2978 mm % Fines: 1.8
-55.8	4.6				
-56.2	5.0		SAND, poorly-graded, mostly fine-grained sand-sized quartz, some shell fragments, few fines, gray (SP)	NS	
-57.4	6.2		SAND, poorly-graded with silt, mostly fine-grained sand-sized quartz, little shell fragments, gray (SP-SM)		
-60.1	8.9		SAND, silty, mostly fine-grained sand-sized quartz, trace shell fragments, gray mottled with lt. gray and orange (SM)		
-60.9	9.7		CLAY, silty, little fine-grained sand-sized quartz, lt. gray mottled with orange (CL-ML)		
-61.2	10.0		SAND, silty, mostly fine-grained sand-sized quartz, gray (SM)		
-63.1	11.9		CLAY, lean, little fine-grained sand-sized quartz, lt. gray mottled with orange (CL)		
-67.2	16.0		SAND, silty, mostly fine-grained sand-sized quartz, gray to tan (SM)		
-69.8	18.6		SILT, inorganic-L, mostly silt, trace fine-grained sand-sized quartz, trace wood debris, trace shell fragments, gray (ML)		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.13945° Long = -88.34275°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
SERVICES

Core Identifier BI-PBS-19-12

Coordinate System
Latitude / Longitude

Latitude 30 08.367

Longitude 088 20.565

Date 11/23/2012

Start Time 11:42:08

End Time 11:43:20

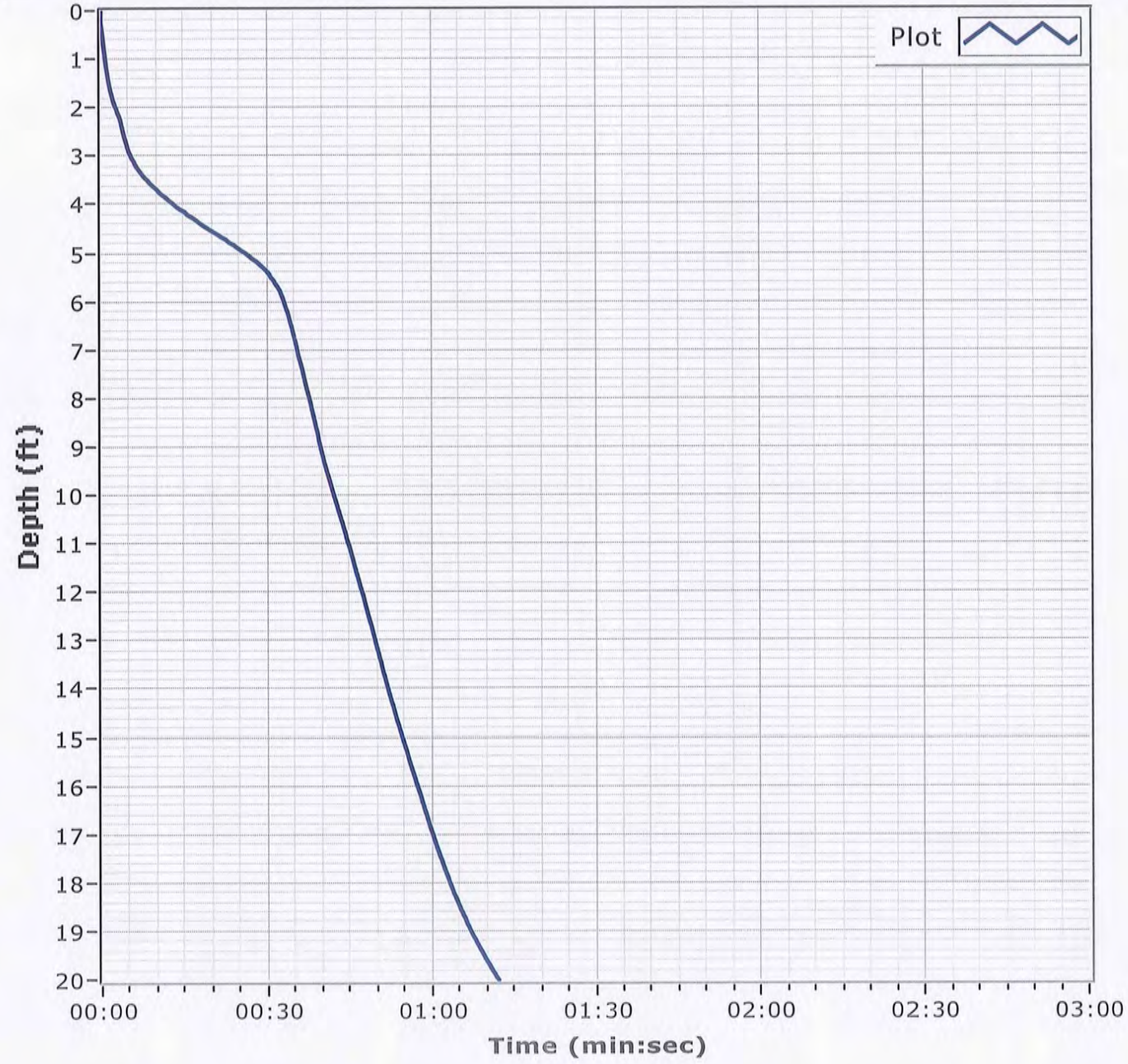
Total Time 00:01:12

Water Depth 50.6'

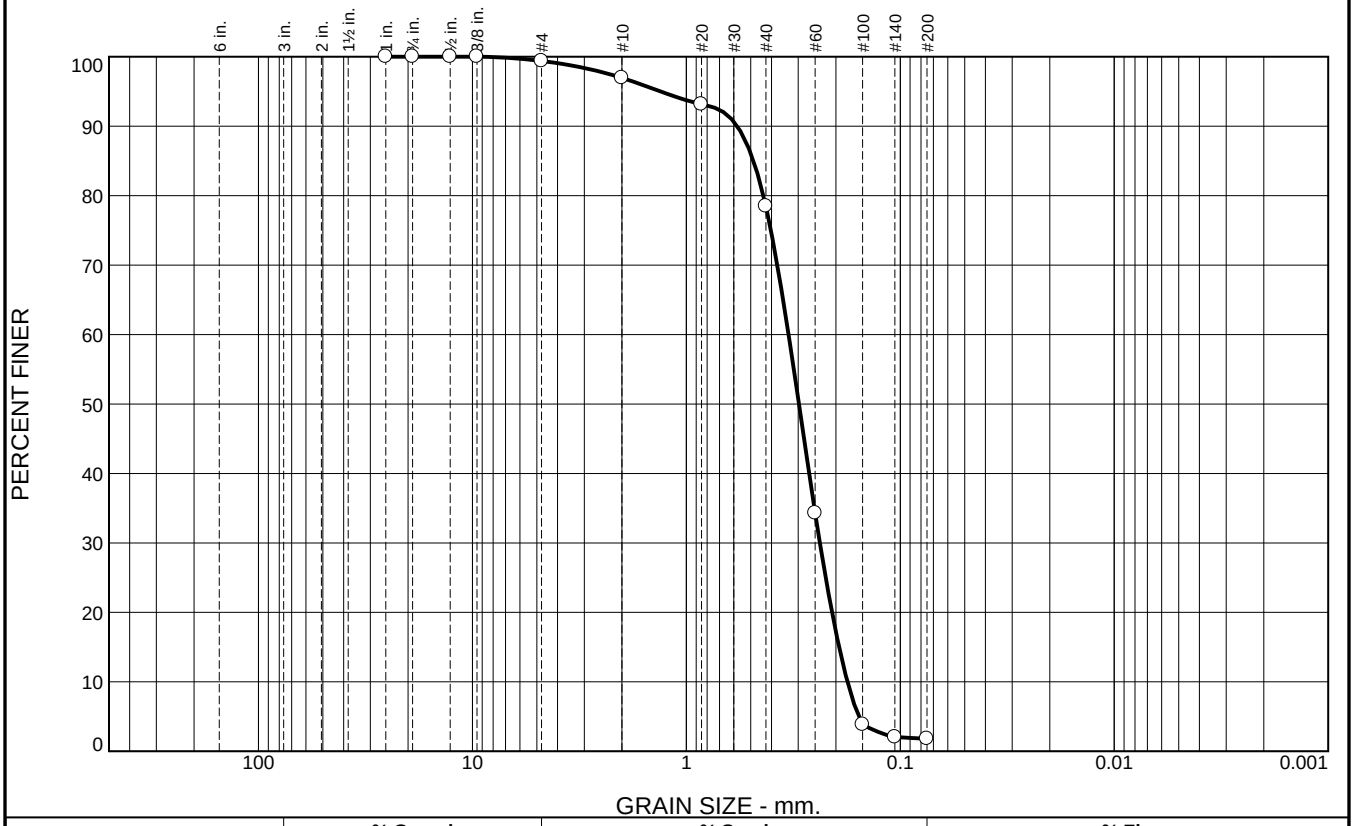
Penetration 20.0'

Recovery 18.6'

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.6	2.5	18.4	76.7	1.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.4		
#10	96.9		
#20	93.1		
#40	78.5		
#60	34.3		
#100	3.9		
#140	2.0		
#200	1.8		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5783 D_{85}= 0.4857 D_{60}= 0.3329
D_{50}= 0.2978 D_{30}= 0.2376 D_{15}= 0.1933
D_{10}= 0.1768 C_u= 1.88 C_c= 0.96

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-19-12 A
Sample Number: 6469 (27) **Depth:** 0.0' **Date:** 11/28/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBS-021-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 2 SHEETS
	South Atlantic	Mobile District	

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-021-12	LOCATION COORDINATES: E = 1,142,638 N = 232,156	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 52 Ft.	
		15. DATE BORING	STARTED: 11-21-12 / COMPLETED: 11-21-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -52.9 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 20.0 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: John Bass, Geotechnical Engineer	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-52.9	0.0				
			SAND, poorly-graded, mostly fine to medium-grained quartz, little shell fragments, trace fines, lt. gray (SP)	A	Classification: SP Color: 2.5Y 7/2-light gray D50: 0.3757 mm % Fines: 1.3
-56.4	3.5				
			SAND, poorly-graded, mostly fine-grained sand-sized quartz, few fines, trace shell fragments, lt. gray (SP)	B	Classification: SP Color: 5Y 6.5/2- D50: 0.2445 mm % Fines: 3
-60.1	7.2				
-60.9	8.0		SAND, clayey, mostly fine-grained sand-sized quartz, some clay, trace wood debris, gray (SC)	NS	
-61.4	8.5		CLAY, lean, mostly fine-grained sand-sized quartz, some fine-grained sand-sized quartz, light gray mottled with brown (CL)		
-65.9	13.0		SAND, clayey, mostly fine-grained sand-sized quartz, some clay, trace shell fragments, trace wood debris, gray to dark gray (SC)		
-69.4	16.5		SAND, silty, mostly fine-grained sand-sized quartz, some silt, trace shell fragments, trace wood debris, gray (SM)		
-72.4	19.5		SILT, inorganic-L, mostly silt, some fine-grained sand-sized quartz, trace wood debris, gray (ML)		
-72.9	20.0		SAND, silty, mostly fine-grained sand-sized quartz, some silt, gray (SM)		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.13743° Long = -88.33227°

DRILLING LOG (Cont. Sheet)	INSTALLATION	SHEET 2 OF 2 SHEETS
	Mobile District	

PROJECT	COORDINATE SYSTEM/DATUM	HORIZONTAL	VERTICAL
MsCIP Barrier Island Restoration	State Plane, MSE (U.S. Ft.)	NAD83	NAVD88

LOCATION COORDINATES	ELEVATION TOP OF BORING
X = 1,142,638 Y = 232,156	-52.9 Ft.

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
			3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.		

30
35
40
45
50
55
60

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
SERVICES

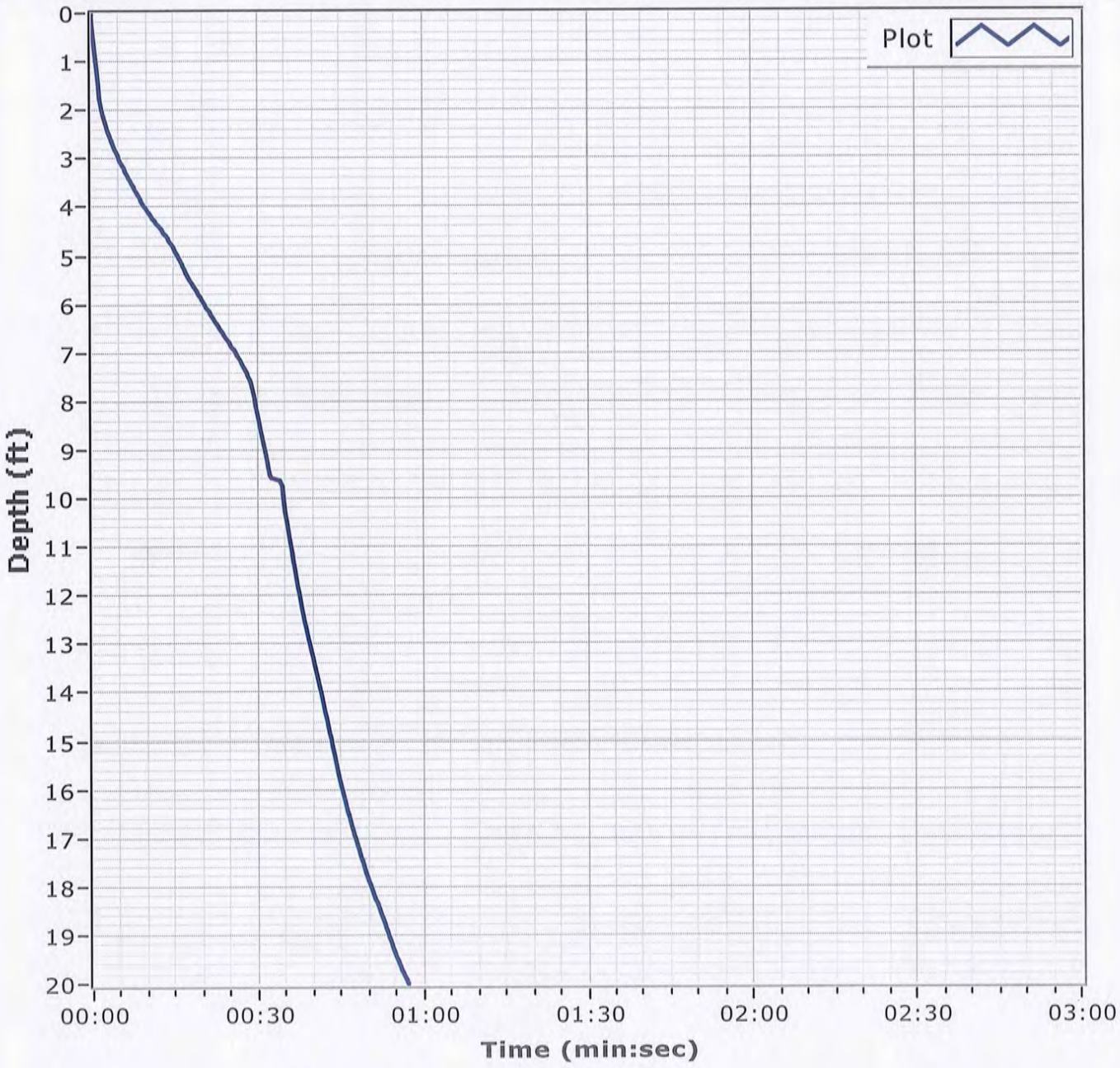
Core Identifier BI-PBS-21-12
Coordinate System
Latitude / Longitude

Latitude 30 08.246
Longitude 088 19.936

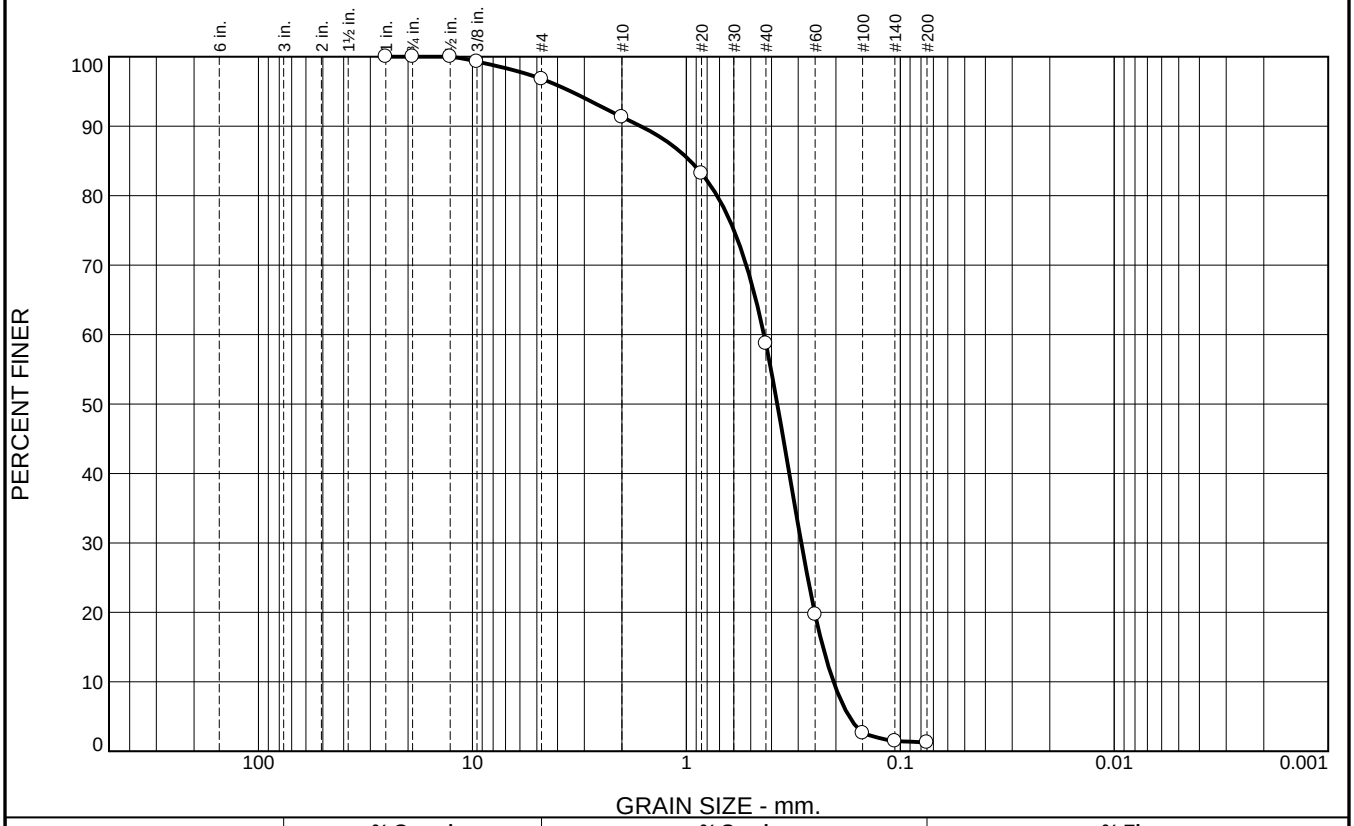
Date 11/21/2012
Start Time 12:57:37
End Time 12:58:34
Total Time 00:00:57

Water Depth 52.0'
Penetration 20.0'
Recovery 20.0'

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.2	5.5	32.6	57.4	1.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	99.3		
#4	96.8		
#10	91.3		
#20	83.2		
#40	58.7		
#60	19.7		
#100	2.6		
#140	1.5		
#200	1.3		

* (no specification provided)

Material Description

Fine to medium grained, SAND, with trace SHELL

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.6366 D_{85}= 0.9602 D_{60}= 0.4338
D_{50}= 0.3757 D_{30}= 0.2904 D_{15}= 0.2298
D_{10}= 0.2052 C_u= 2.11 C_c= 0.95

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-21-12 A
Sample Number: 6469 (10) **Depth:** 0.0' **Date:** 11/28/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.1	2.0	16.3	77.6	3.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	99.5		
.375	99.4		
#4	98.9		
#10	96.9		
#20	93.2		
#40	80.6		
#60	51.9		
#100	8.2		
#140	3.7		
#200	3.0		

* (no specification provided)

Material Description

Fine to medium grained, SAND, with trace SHELL

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6431 D_{85}= 0.4973 D_{60}= 0.2772
D_{50}= 0.2445 D_{30}= 0.1986 D_{15}= 0.1676
D_{10}= 0.1554 C_u= 1.78 C_c= 0.92

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-21-12 B
Sample Number: 6469 (11) **Depth:** 3.5' **Date:** 11/28/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBS-022-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET / OF
	South Atlantic	Mobile District	SHEET 1 OF 2 SHEETS

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-022-12	LOCATION COORDINATES: E = 1,142,318 N = 233,125	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL: / BEARING:	14. WATER DEPTH: 56 Ft.	
		15. DATE BORING	STARTED: 11-21-12 / COMPLETED: 11-21-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -53.1 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 20.0 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: John Bass, Geotechnical Engineer	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-53.1	0.0				
			SAND, poorly-graded, mostly fine to medium-grained quartz, little shell fragments, trace fines, gray (SP)	A	Classification: SP Color: 5Y 7/1-light gray D50: 0.291 mm % Fines: 2.3
-59.0	5.9				
-59.8	6.7		SAND, silty, mostly fine-grained sand-sized quartz, trace shell fragments, trace wood debris, gray (SM)		
-61.1	8.0		CLAY, lean, mostly clay, some fine-grained sand-sized quartz, trace wood debris, gray (CL)		
			SAND, silty, mostly fine-grained sand-sized quartz, little shell fragments, gray (SM)	NS	
-73.1	20.0				
			NOTES: 1. Soils are field visually classified in accordance with the Unified Soils Classification System. 2. NS = Sample not submitted for laboratory analysis from this interval. 3. Seafloor elevation determined from USACE		

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.14010° Long = -88.33327°

DRILLING LOG (Cont. Sheet)	INSTALLATION	SHEET 2 OF 2 SHEETS
	Mobile District	

PROJECT	COORDINATE SYSTEM/DATUM	HORIZONTAL	VERTICAL
MsCIP Barrier Island Restoration	State Plane, MSE (U.S. Ft.)	NAD83	NAVD88

LOCATION COORDINATES	ELEVATION TOP OF BORING
X = 1,142,318 Y = 233,125	-53.1 Ft.

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
			hydrographic survey completed April 2014.		

30
35
40
45
50
55
60

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.14010° Long = -88.33327°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE SERVICES

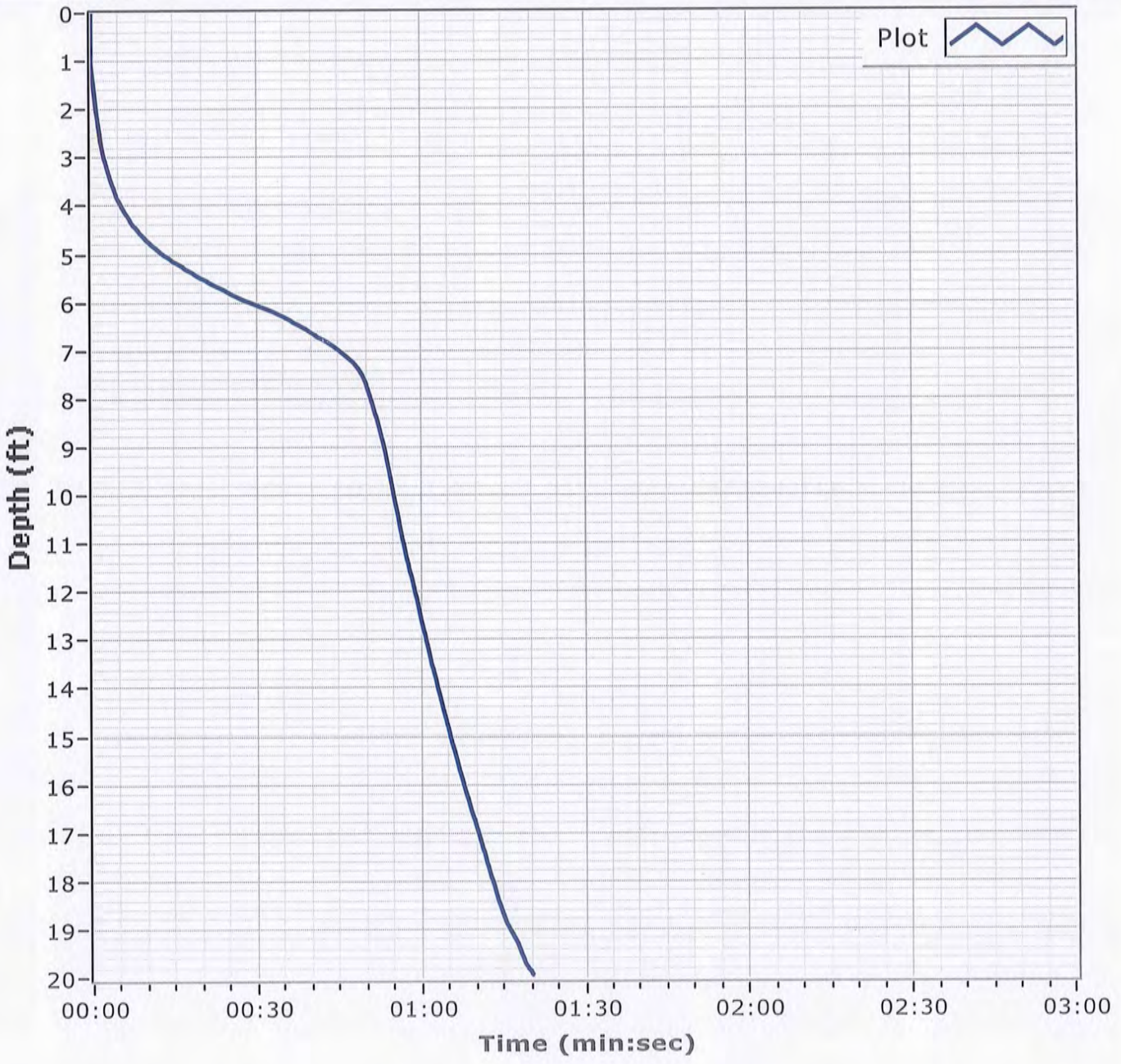
Core Identifier BI-PBS-22-12
Coordinate System
Latitude / Longitude

Latitude 30 08.406
Longitude 088 19.996

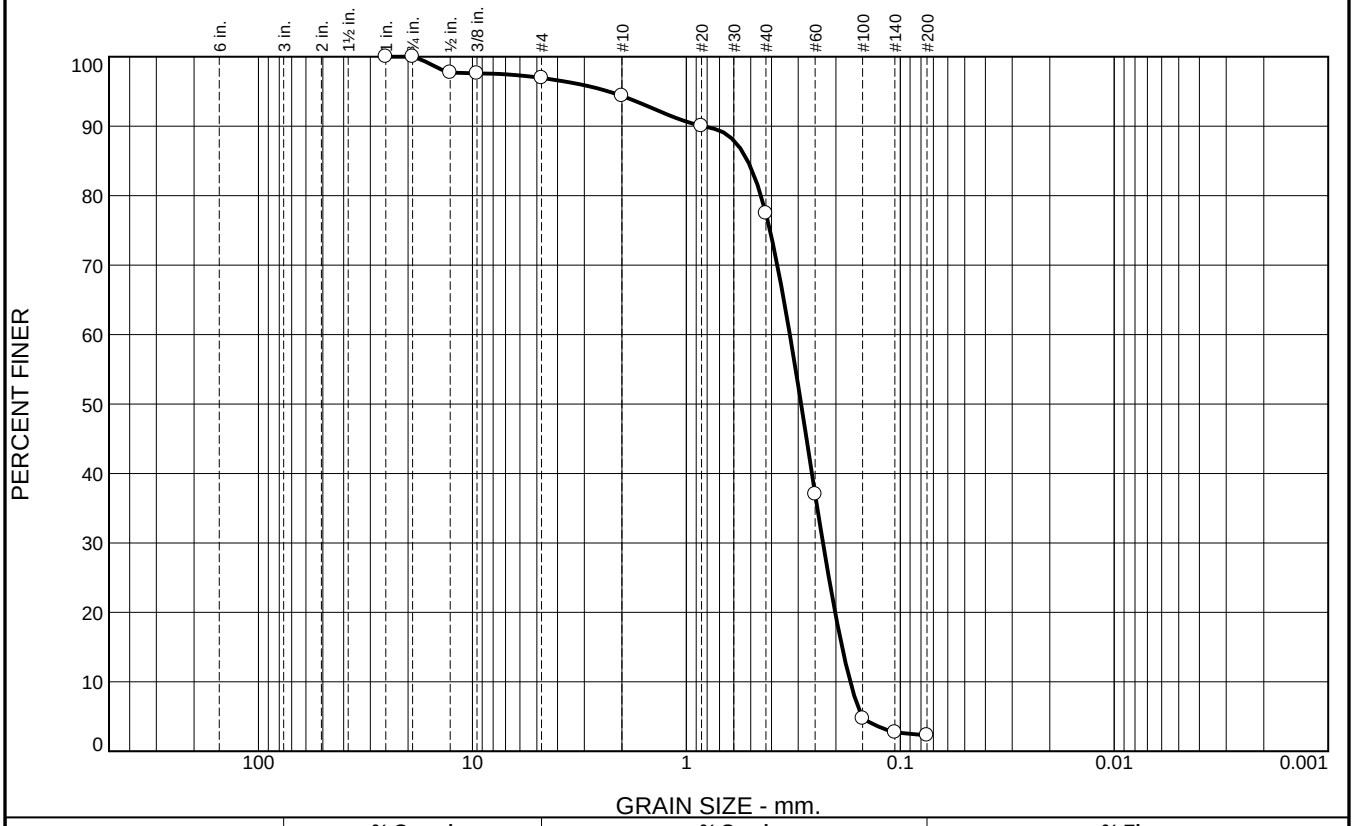
Date 11/21/2012
Start Time 15:33:14
End Time 15:34:34
Total Time 00:01:20

Water Depth 56.0'
Penetration 20.0'
Recovery 20.0'

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.1	2.5	16.9	75.2	2.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	97.7		
.375	97.6		
#4	96.9		
#10	94.4		
#20	90.0		
#40	77.5		
#60	37.0		
#100	4.7		
#140	2.7		
#200	2.3		

* (no specification provided)

Material Description

Fine to medium grained, SAND, with trace SHELL

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.8388 D_{85}= 0.5167 D_{60}= 0.3283
D_{50}= 0.2910 D_{30}= 0.2298 D_{15}= 0.1872
D_{10}= 0.1715 C_u= 1.92 C_c= 0.94

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-22-12 A
Sample Number: 6469 (18) **Depth:** 0.0' **Date:** 11/28/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBS-023-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET / OF
	South Atlantic	Mobile District	SHEET 1 OF 2 SHEETS

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-023-12	LOCATION COORDINATES: E = 1,141,367 N = 233,678	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 55.7 Ft.	
		15. DATE BORING	STARTED: 11-23-12 / COMPLETED: 11-23-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -55.9 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 19.7 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: John Bass, Geotechnical Engineer	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-55.9	0.0				
-59.5	3.6		SAND, poorly-graded, mostly fine-grained sand-sized quartz, trace fines, trace shell fragments, lt. gray (SP)	A	Classification: SP Color: 2.5Y 7/2-light gray D50: 0.3131 mm % Fines: 2.6
-60.2	4.3		SAND, poorly-graded with silt, mostly fine-grained sand-sized quartz, stringers of brown clay, lt. gray mottled with reddish brown (SP-SM)	NS	
-60.9	5.0				
-63.8	7.9		SILT, inorganic-L, mostly silt, some fine-grained sand-sized quartz, trace shell fragments, lt. gray (ML)		
-65.6	9.7		SAND, silty, mostly fine-grained sand-sized quartz, little shell fragments, trace wood debris, lt. gray (SM)	B	Classification: SP-SM Color: 2.5Y 6/2-light brownish gray D50: 0.2021 mm % Fines: 9
-72.9	17.0		SAND, poorly-graded with silt, mostly fine-grained sand-sized quartz, little silt, trace shell fragments, gray (SP-SM) SAND, silty, mostly fine-grained sand-sized quartz, little shell fragments, gray (SM)	NS	
-74.6	18.7		CLAY, lean, mostly clay, lt. gray mottled with orange (CL)		
-75.6	19.7		SAND, poorly-graded, mostly fine-grained sand-sized quartz, trace fines, lt. gray mottled with reddish brown (SP)	C	Classification: SP-SM Color: 2.5Y 7/2-light gray D50: 0.3065 mm % Fines: 8.2

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.14163° Long = -88.33627°

DRILLING LOG (Cont. Sheet)	INSTALLATION	SHEET 2 OF 2 SHEETS
	Mobile District	

PROJECT	COORDINATE SYSTEM/DATUM	HORIZONTAL	VERTICAL
MsCIP Barrier Island Restoration	State Plane, MSE (U.S. Ft.)	NAD83	NAVD88

LOCATION COORDINATES	ELEVATION TOP OF BORING
X = 1,141,367 Y = 233,678	-55.9 Ft.

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
			3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.		

30
35
40
45
50
55
60

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
SERVICES

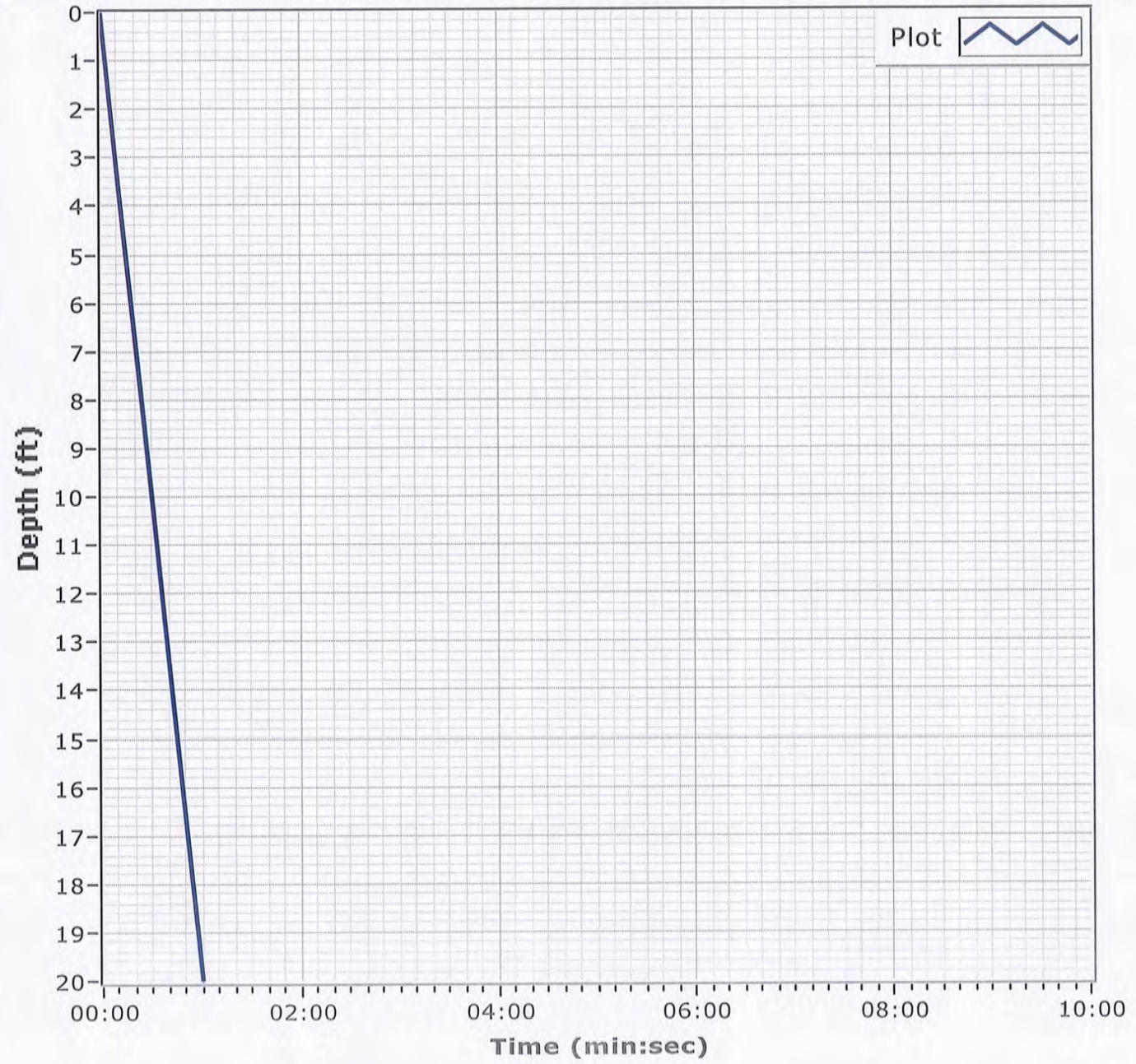
Core Identifier BI-PBS-23-12
Coordinate System
Latitude / Longitude

Latitude 30 08.498
Longitude 088 20.176

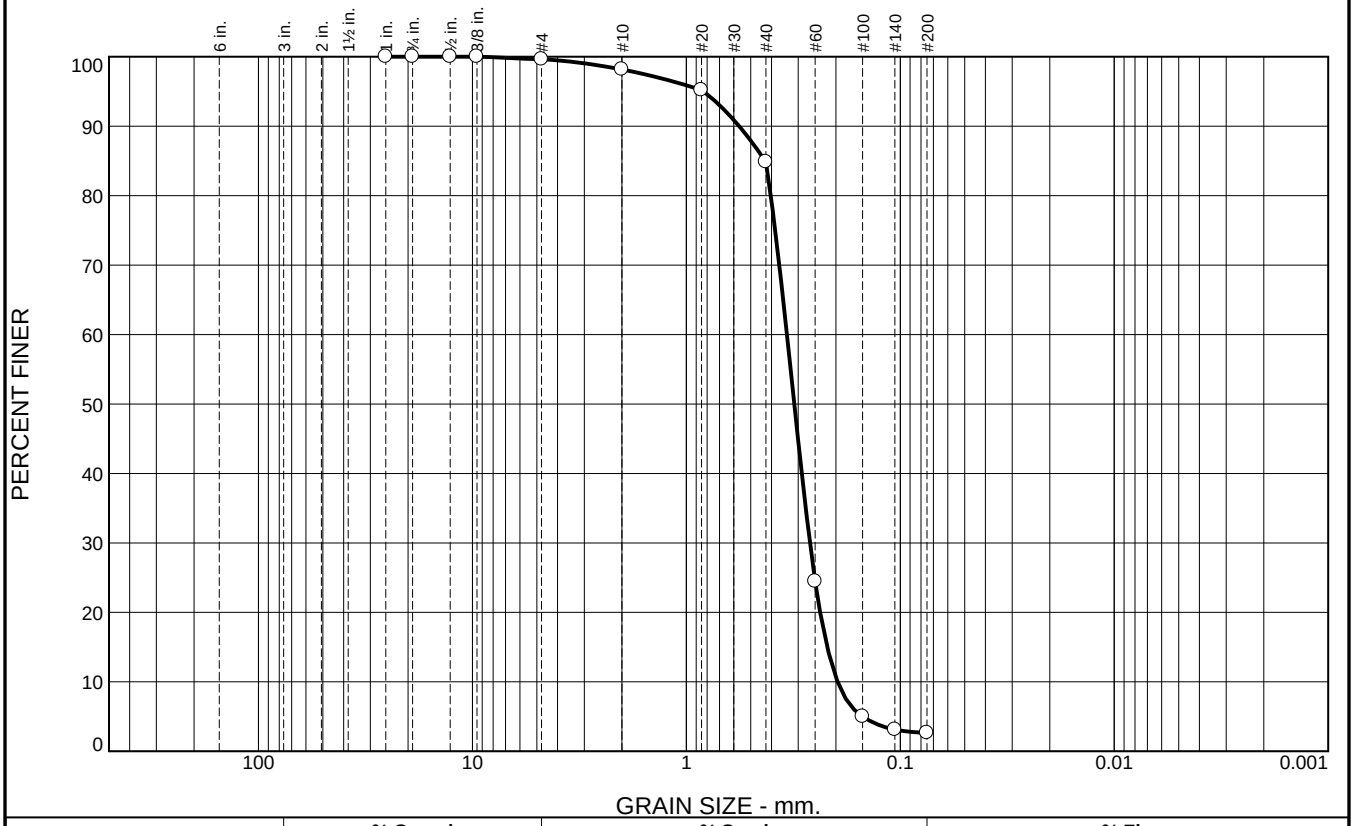
Date 11/23/2012
Start Time 09:00:03
End Time 09:01:03
Total Time 00:01:00

Water Depth 55.7'
Penetration 20.0'
Recovery 19.7'

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.4	1.4	13.4	82.2	2.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.6		
#10	98.2		
#20	95.2		
#40	84.8		
#60	24.5		
#100	5.0		
#140	3.1		
#200	2.6		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5666 D_{85}= 0.4285 D_{60}= 0.3387
D_{50}= 0.3131 D_{30}= 0.2646 D_{15}= 0.2195
D_{10}= 0.1963 C_u= 1.73 C_c= 1.05

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-23-12 A
Sample Number: 6469 (19) **Depth:** 0.0' **Date:** 11/28/12

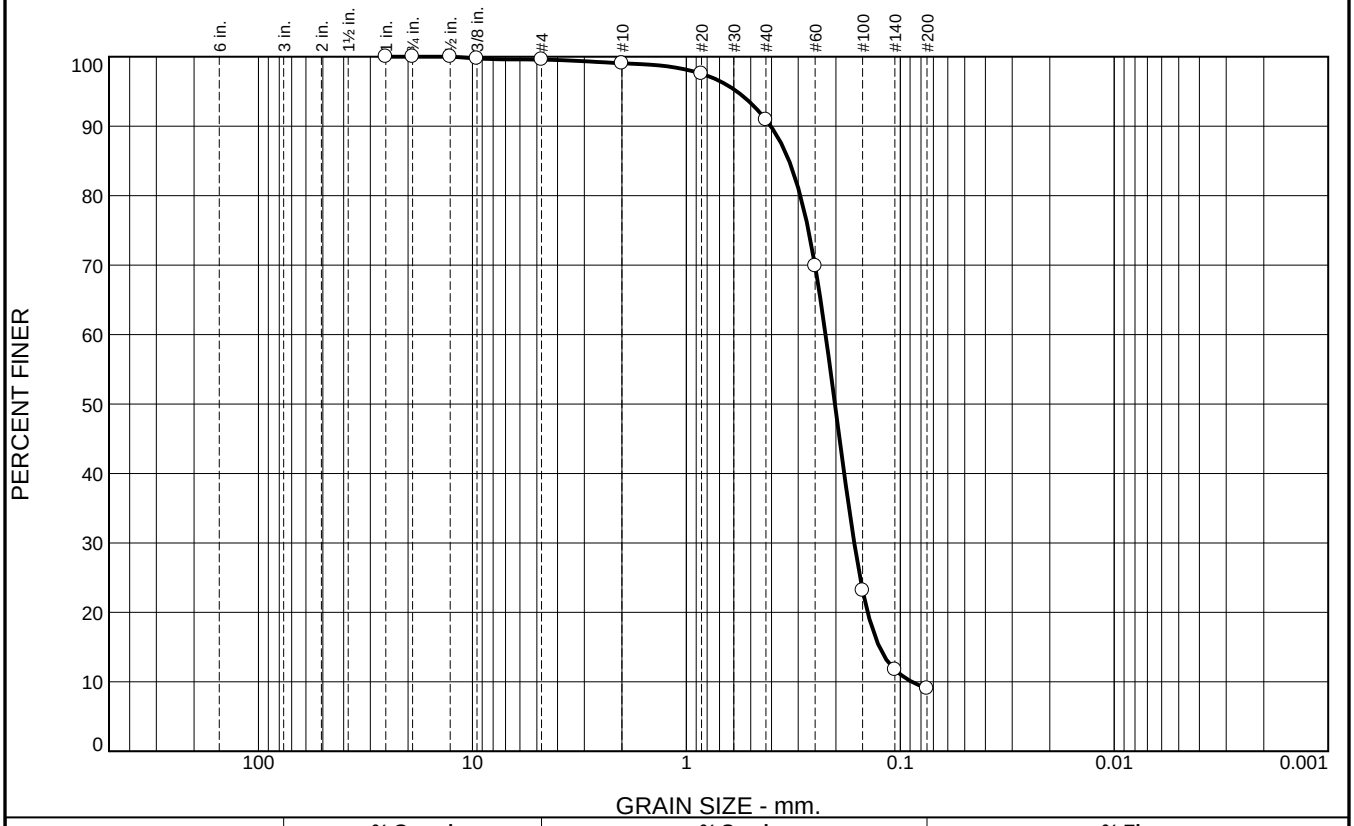
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.4	0.5	8.2	81.9	9.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	99.7		
#4	99.6		
#10	99.1		
#20	97.5		
#40	90.9		
#60	69.9		
#100	23.1		
#140	11.8		
#200	9.0		

* (no specification provided)

Material Description

Fine grained, SLIGHTLY SILTY SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4032 D_{85}= 0.3308 D_{60}= 0.2235
D_{50}= 0.2021 D_{30}= 0.1642 D_{15}= 0.1253
D_{10}= 0.0882 C_u= 2.53 C_c= 1.37

Classification

USCS= SP-SM AASHTO=

Remarks

Location: BI-PBS-23-12 B
Sample Number: 6469 (20) **Depth:** 7.9' **Date:** 11/28/12

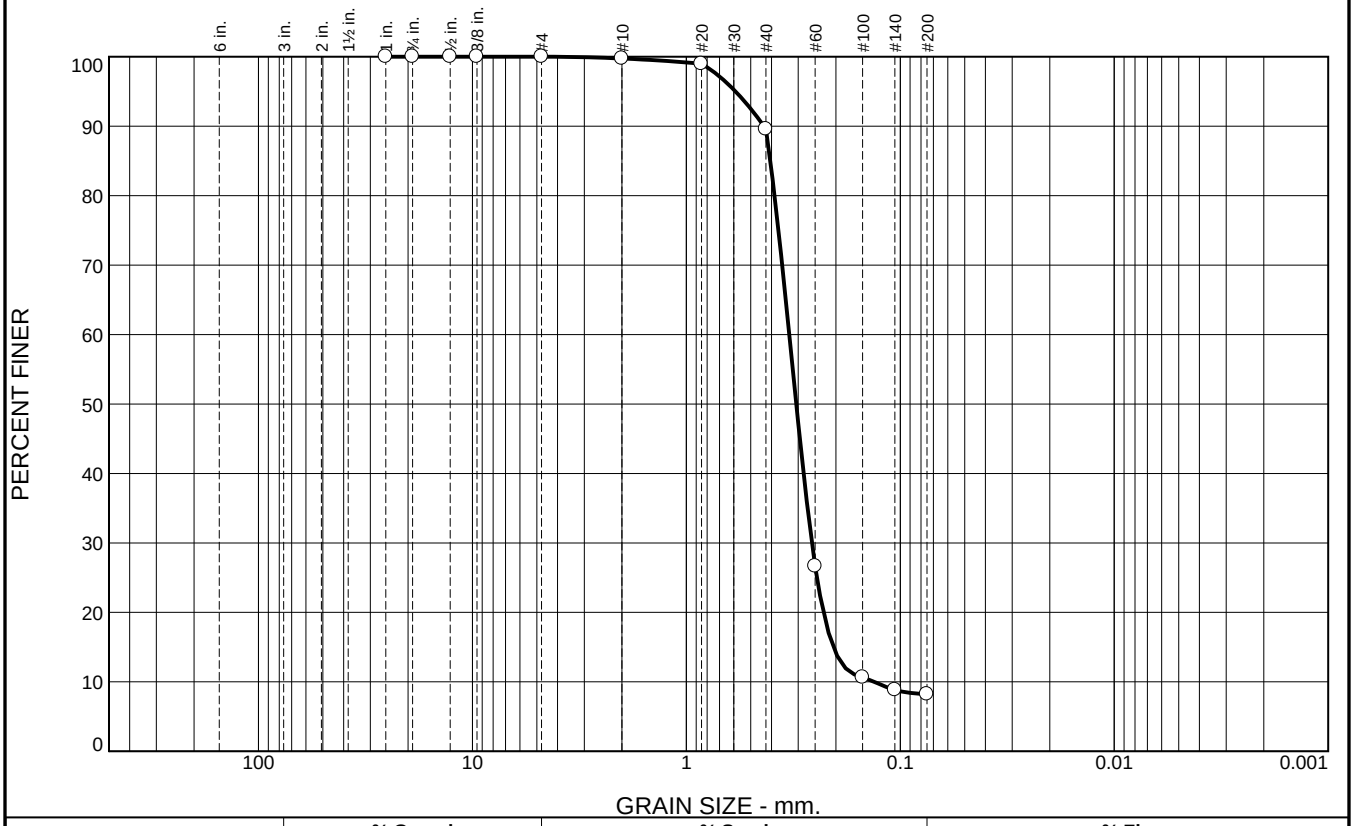
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.3	10.1	81.4	8.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	100.0		
#10	99.7		
#20	99.0		
#40	89.6		
#60	26.6		
#100	10.6		
#140	8.8		
#200	8.2		

* (no specification provided)

Material Description

Fine to medium grained, SLIGHTLY SILTY SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4344 D_{85}= 0.4050 D_{60}= 0.3304
D_{50}= 0.3065 D_{30}= 0.2591 D_{15}= 0.2056
D_{10}= 0.1326 C_u= 2.49 C_c= 1.53

Classification

USCS= SP-SM AASHTO=

Remarks

Location: BI-PBS-23-12 C
Sample Number: 6469 (21) **Depth:** 18.7' **Date:** 11/28/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBS-024-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET / OF
	South Atlantic	Mobile District	1 of 1 SHEETS

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-024-12	LOCATION COORDINATES: E = 1,141,846 N = 232,632	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL: / BEARING:	14. WATER DEPTH: 55.6 Ft.	
		15. DATE BORING	STARTED: 11-21-12 / COMPLETED: 11-21-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -56.0 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 18.8 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: John Bass, Geotechnical Engineer	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-56.0	0.0				
-59.6	3.6		SAND, poorly-graded, mostly fine-grained sand-sized quartz, trace fines, trace shell fragments, lt. gray (SP)	A	Classification: SP Color: 5Y 7/2-light gray D50: 0.2906 mm % Fines: 3.4
-63.5	7.5		SAND, clayey, mostly fine-grained sand-sized quartz, some clay, clay lenses through interval, lt. gray mottled with gray and orange (SC)	NS	
-64.4	8.4		CLAY, silty, mostly clay, trace sand, gray mottled with brown and orange (CL-ML)		
-68.5	12.5		SAND, silty, mostly fine-grained sand-sized quartz, some silt, trace shell fragments, trace wood debris, gray (SM)		
-69.8	13.8		CLAY, lean, mostly clay, little fine-grained sand-sized quartz, trace wood debris, gray (CL)		
-74.8	18.8		SAND, silty, mostly fine-grained sand-sized quartz, trace wood debris, gray (SM)		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.13875° Long = -88.33477°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE SERVICES

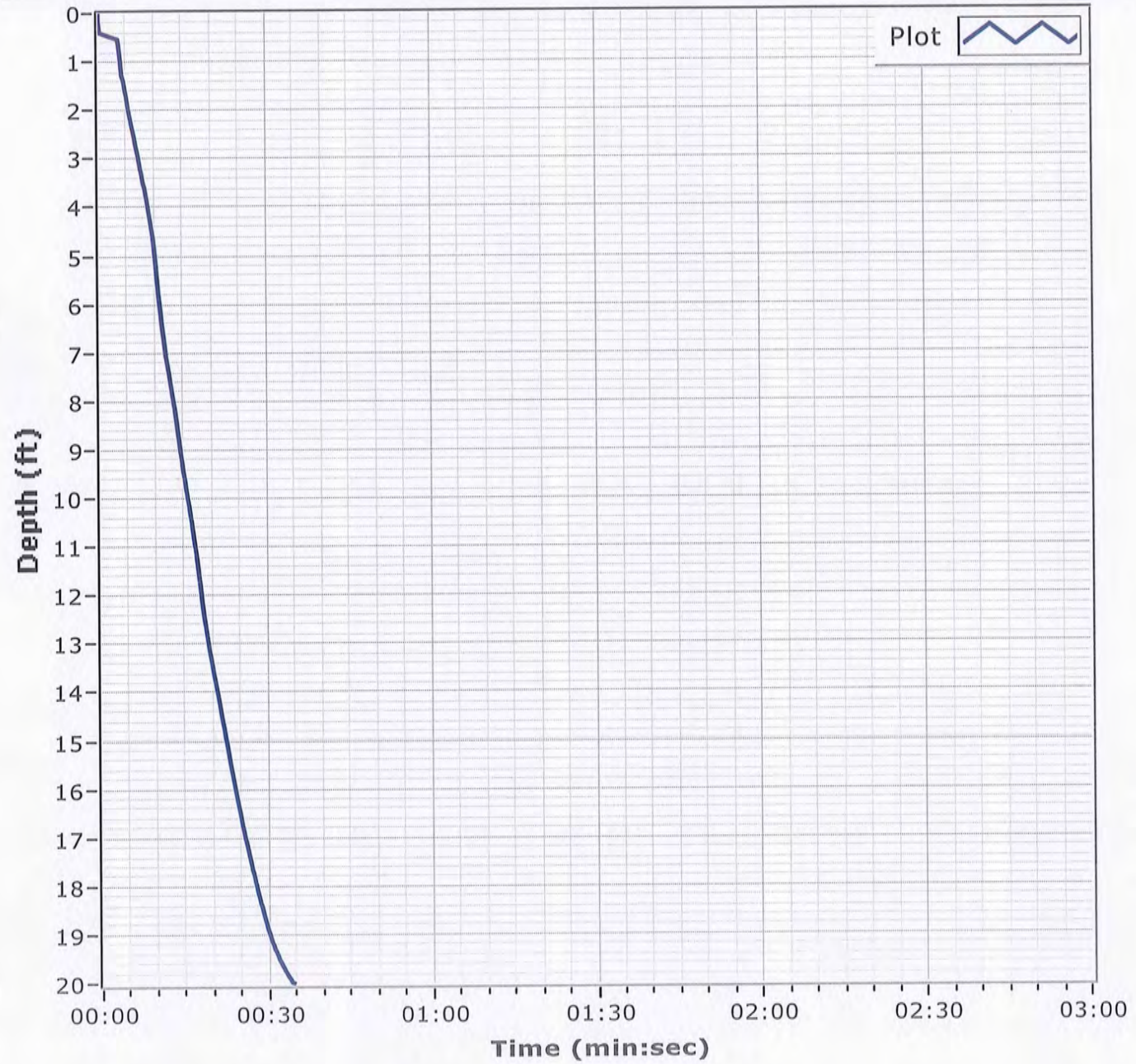
Core Identifier BI-PBS-24-12
Coordinate System Latitude / Longitude

Date 11/21/2012
Start Time 14:55:23
End Time 14:55:57
Total Time 00:00:34

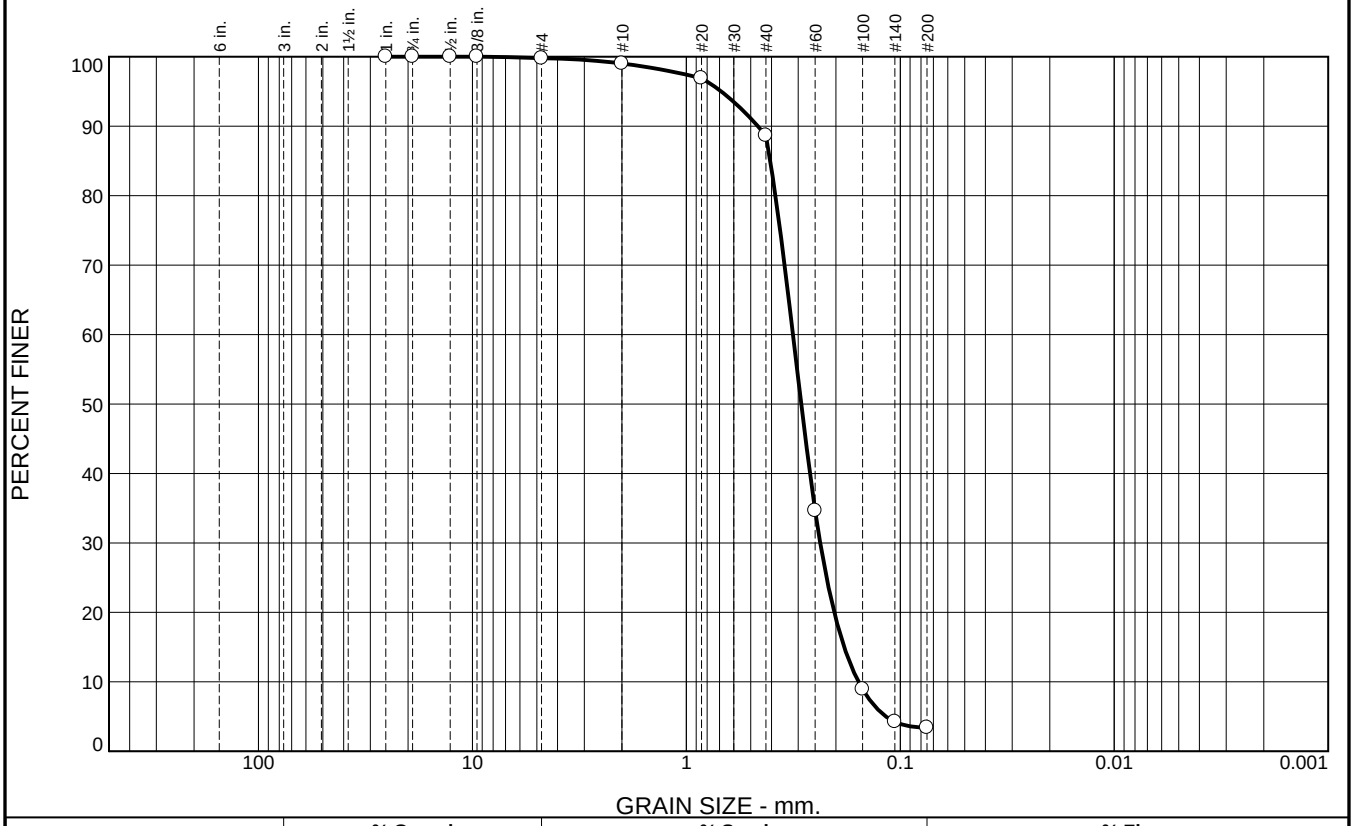
Water Depth 55.6
Penetration 20.0'
Recovery 18.8

Latitude 30 08.325
Longitude 088 20.086

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	0.8	10.4	85.2	3.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.8		
#10	99.0		
#20	96.9		
#40	88.6		
#60	34.6		
#100	8.9		
#140	4.3		
#200	3.4		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4637 D_{85}= 0.4054 D_{60}= 0.3176
D_{50}= 0.2906 D_{30}= 0.2367 D_{15}= 0.1831
D_{10}= 0.1568 C_u= 2.02 C_c= 1.13

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-24-12 A
Sample Number: 6469 (17) **Depth:** 0.0' **Date:** 11/28/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBS-026-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET / OF
	South Atlantic	Mobile District	1 OF 1 SHEETS

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-026-12	LOCATION COORDINATES: E = 1,140,508 N = 231,310	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 54.8 Ft.	
		15. DATE BORING	STARTED: 11-23-12 / COMPLETED: 11-23-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -55.3 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 17.6 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: John Bass, Geotechnical Engineer	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-55.3	0.0				
			SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace fines, trace shell fragments, lt. gray (SP)	A	Classification: SP Color: 2.5Y 7/2-light gray D50: 0.3129 mm % Fines: 2.1
-58.9	3.6				
-59.6	4.3		SAND, poorly-graded, mostly fine-grained sand-sized quartz, little fines, lt. gray to gray (SP)	B	Classification: SP-SM Color: 5Y 6/2-light olive gray D50: 0.1923 mm % Fines: 6.2
-61.4	6.1		SAND, silty, mostly fine-grained sand-sized quartz, little shell fragments, lt. gray mottled with gray and orange (SM)		
-64.2	8.9		CLAY, lean, mostly clay, little sand, low to medium plasticity, lt. gray mottled with orange (CL)		
-66.8	11.5		SAND, silty, mostly fine-grained sand-sized quartz, trace shell fragments, gray (SM)	NS	
-72.3	17.0		CLAY, lean, mostly clay, little sand, trace shell fragments, trace wood debris, low plasticity, gray (CL)		
-72.9	17.6		SAND, silty, mostly fine-grained sand-sized quartz, gray (SM)		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.13513° Long = -88.33902°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
SERVICES

Core Identifier BI-PBS-26-12

Coordinate System
Latitude / Longitude

Latitude 30 08.108

Longitude 088 20.341

Date 11/23/2012

Start Time 09:45:40

End Time 09:47:06

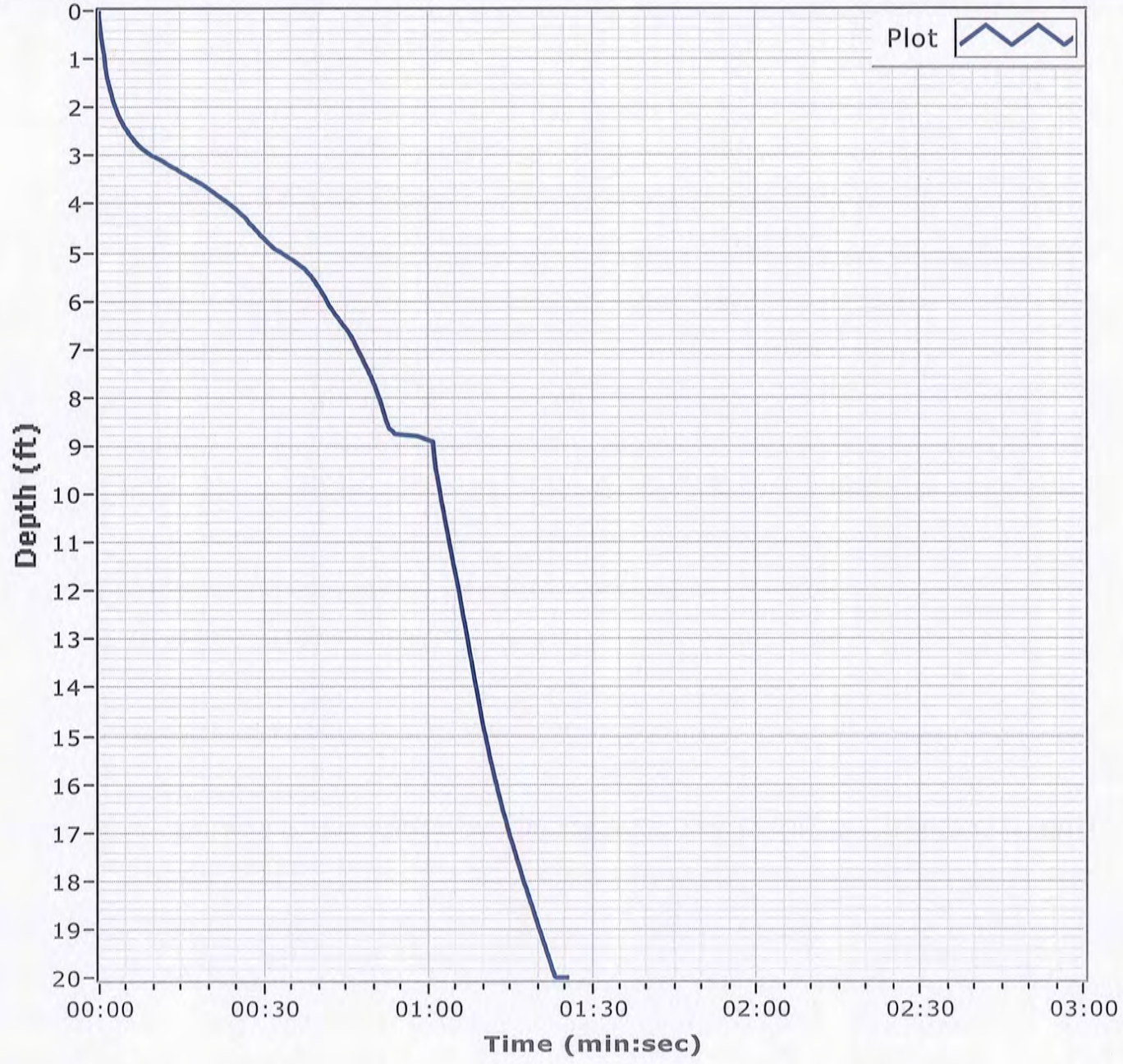
Total Time 00:01:25

Water Depth 54.8'

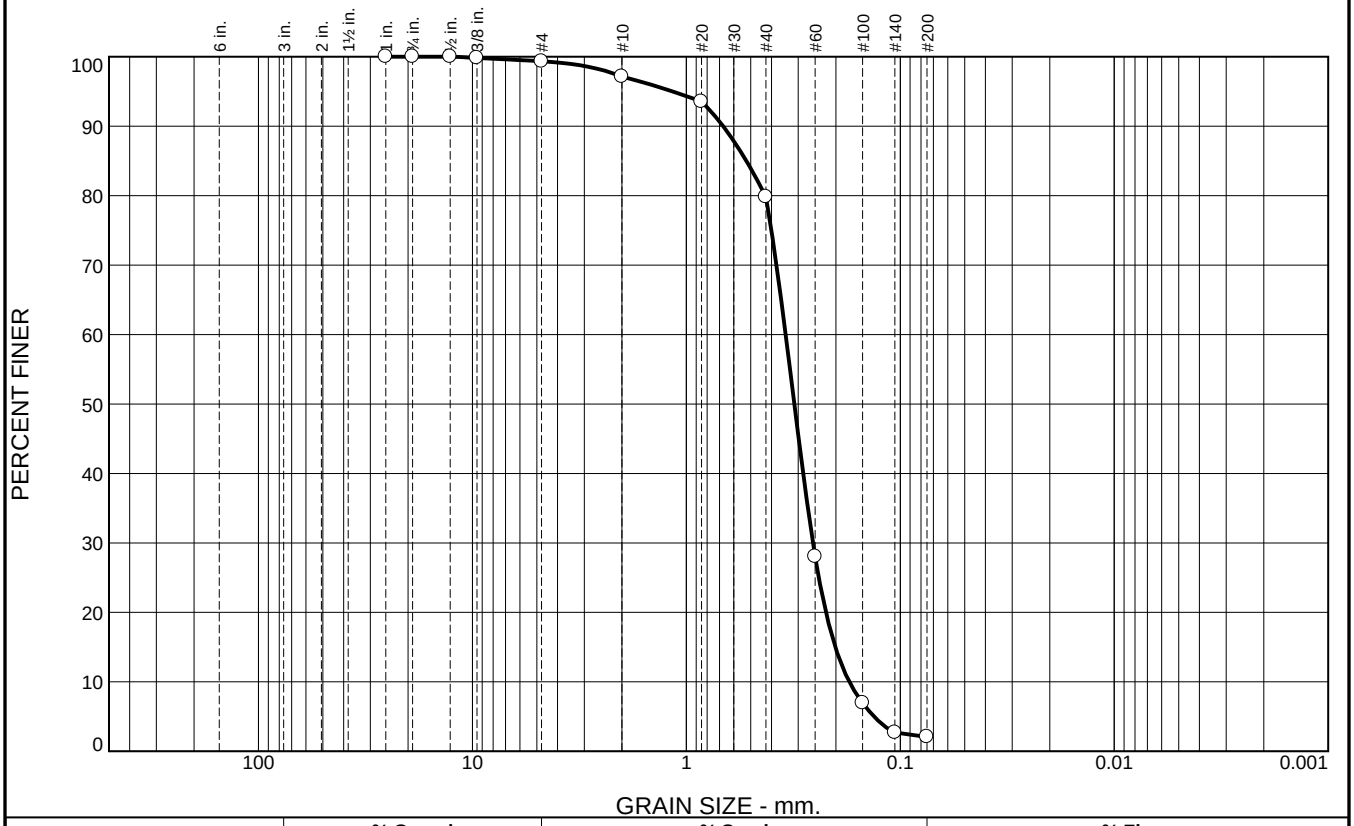
Penetration 20.0'

Recovery 17.6'

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.7	2.2	17.3	77.7	2.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	99.8		
#4	99.3		
#10	97.1		
#20	93.5		
#40	79.8		
#60	28.0		
#100	6.9		
#140	2.7		
#200	2.1		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6733 D_{85}= 0.5244 D_{60}= 0.3434
D_{50}= 0.3129 D_{30}= 0.2560 D_{15}= 0.2013
D_{10}= 0.1733 C_u= 1.98 C_c= 1.10

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-26-12 A
Sample Number: 6469 (22) **Depth:** 0.0' **Date:** 11/28/12

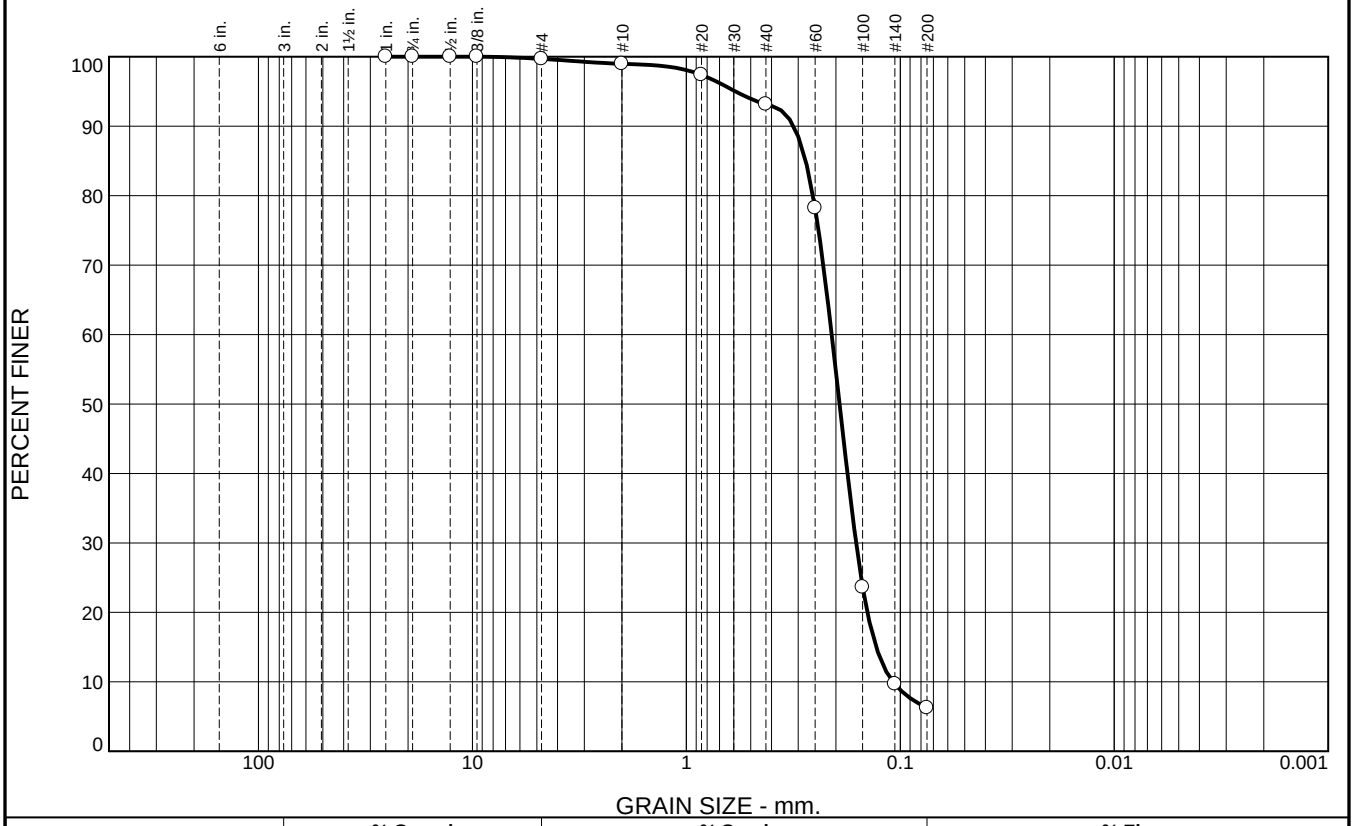
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.3	0.7	5.9	86.9	6.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.7		
#10	99.0		
#20	97.4		
#40	93.1		
#60	78.2		
#100	23.6		
#140	9.7		
#200	6.2		

* (no specification provided)

Material Description

Fine grained, SLIGHTLY SILTY SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3152 D_{85}= 0.2770 D_{60}= 0.2092
D_{50}= 0.1923 D_{30}= 0.1610 D_{15}= 0.1297
D_{10}= 0.1081 C_u= 1.94 C_c= 1.15

Classification

USCS= SP-SM AASHTO=

Remarks

Location: BI-PBS-26-12 B
Sample Number: 6469 (23) **Depth:** 3.6' **Date:** 11/28/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBS-027-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 1 SHEETS
	South Atlantic	Mobile District	

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-027-12	LOCATION COORDINATES: E = 1,142,169 N = 231,132	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 55.1 Ft.	
		15. DATE BORING	STARTED: 11-21-12 / COMPLETED: 11-21-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -56.4 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 19.7 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: John Bass, Geotechnical Engineer	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-56.4	0.0				
			SAND, poorly-graded, mostly fine to medium-grained quartz, some shell fragments, trace fines, light gray (SP)	A	Classification: SP Color: 5Y 7/1-light gray D50: 0.3658 mm % Fines: 1.5
-62.4	6.0				
-63.7	7.3		SAND, poorly-graded, mostly fine-grained sand-sized quartz, some shell fragments, trace fines, lt. gray (SP)	B	Classification: SP-SM Color: 5Y 7/2-light gray D50: 0.2594 mm % Fines: 5.2
			SAND, silty, mostly fine-grained sand-sized quartz, some silt, some shell fragments, gray (SM)	NS	
-67.0	10.6		At El. -64.4 Ft., mostly fine-grained sand-sized quartz, little shell fragments, gray		
-69.0	12.6		SAND, poorly-graded, mostly fine-grained sand-sized quartz, little fines, trace shell fragments, clayey lenses at 11.0' and 12.0', lt. gray (SP)	C	Classification: SP-SM Color: 5Y 7/2-light gray D50: 0.2972 mm % Fines: 9.2
-69.9	13.5		SAND, silty, mostly fine-grained sand-sized quartz, some silt, little shell fragments, gray (SM)	NS	
			CLAY, silty, some silt, some clay, trace fine-grained sand-sized quartz, gray (CL-ML)		
-76.1	19.7		At El. -74.2 Ft., some silt, some clay, some fine-grained sand-sized quartz, little shell fragments, gray		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.13462° Long = -88.33377°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE SERVICES

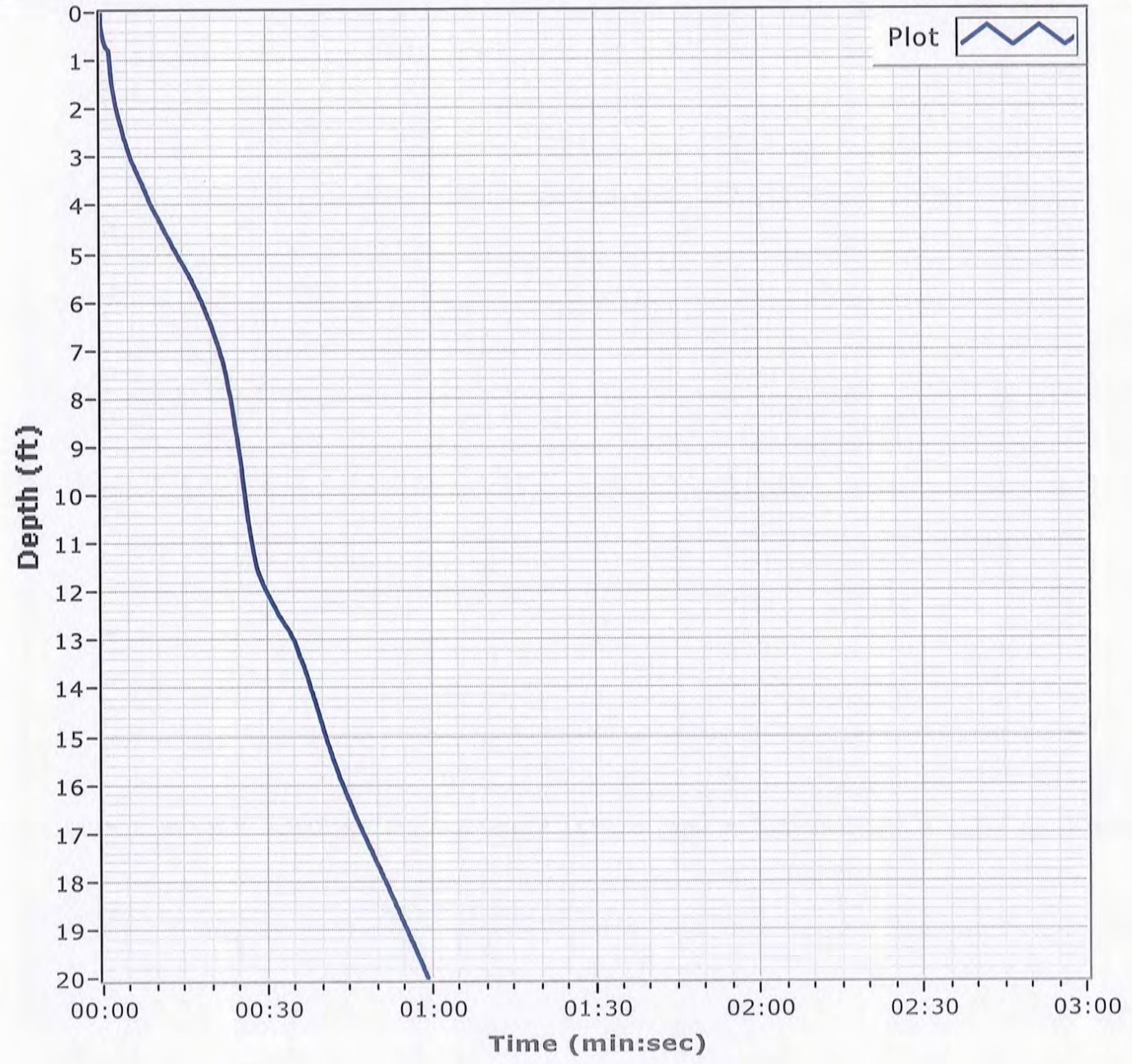
Core Identifier BI-PBS-27-12
Coordinate System
Latitude / Longitude

Latitude 30 08.077
Longitude 088 20.026

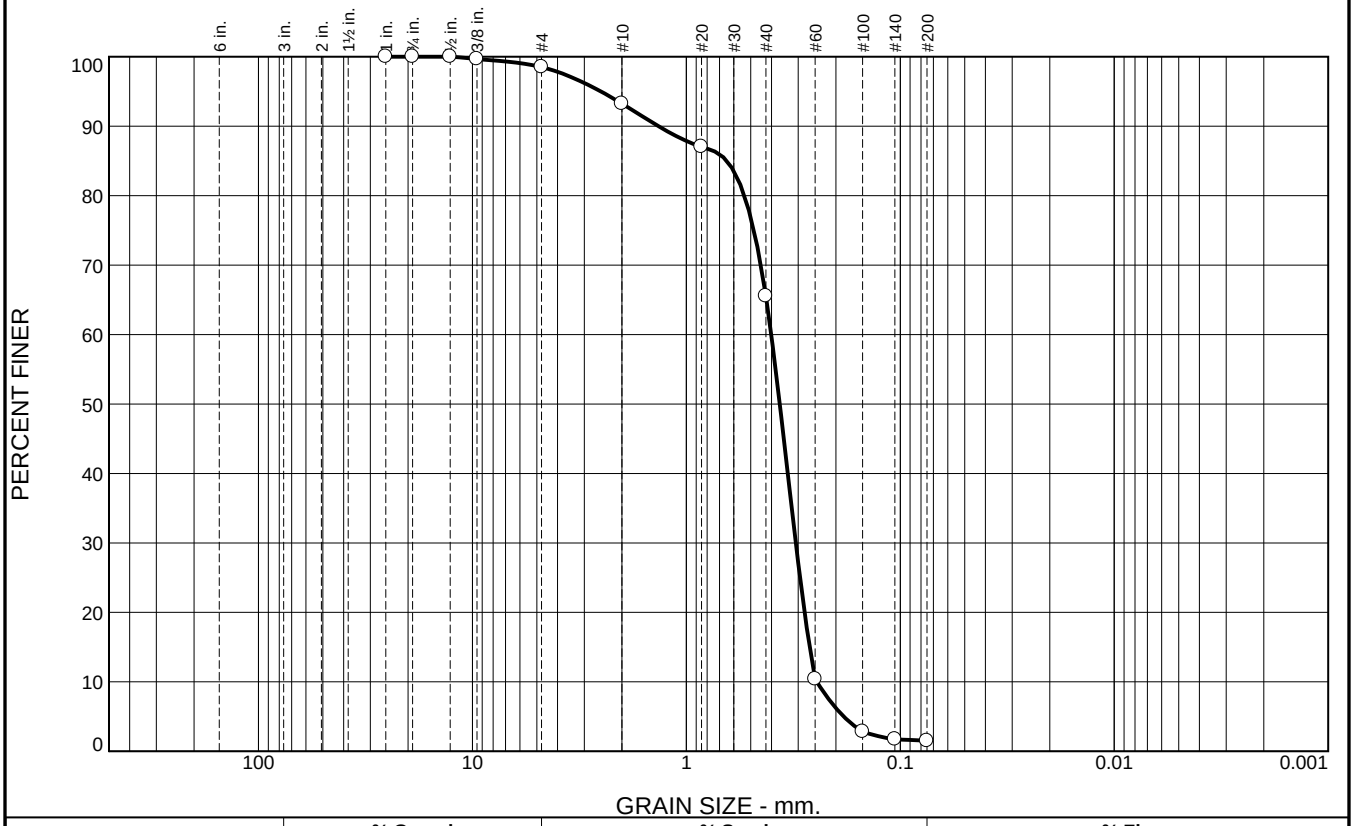
Date 11/21/2012
Start Time 14:11:22
End Time 14:12:22
Total Time 00:00:59

Water Depth 55.1'
Penetration 20.0'
Recovery 19.7'

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.5	5.3	27.7	64.0	1.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	99.7		
#4	98.5		
#10	93.2		
#20	87.0		
#40	65.5		
#60	10.4		
#100	2.8		
#140	1.7		
#200	1.5		

* (no specification provided)

Material Description

Fine to medium grained, SAND, with trace SHELL

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.3510 D_{85}= 0.6468 D_{60}= 0.4010
D_{50}= 0.3658 D_{30}= 0.3080 D_{15}= 0.2656
D_{10}= 0.2455 C_u= 1.63 C_c= 0.96

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-27-12 A
Sample Number: 6469 (14) **Depth:** 0.0' **Date:** 11/28/12

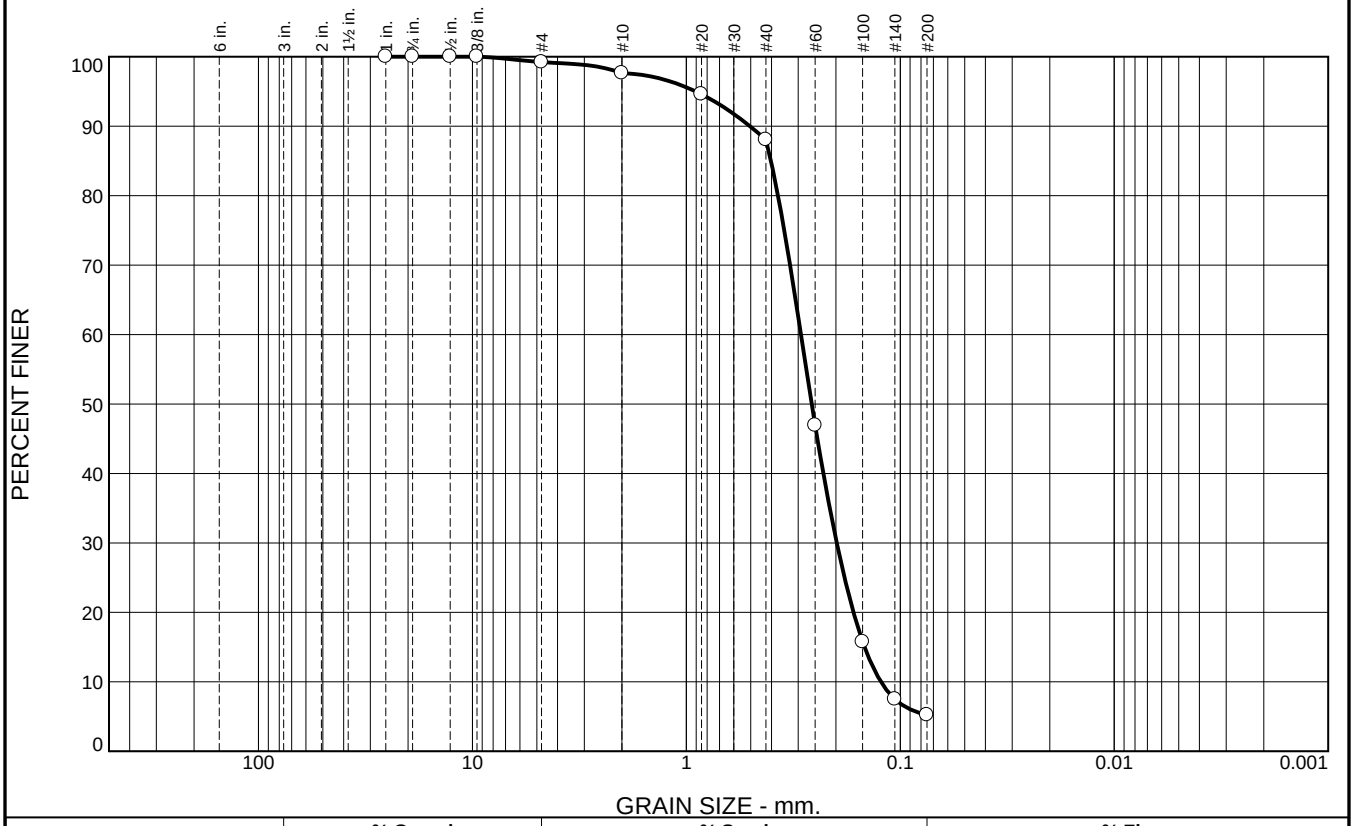
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.8	1.6	9.6	82.8	5.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.2		
#10	97.6		
#20	94.6		
#40	88.0		
#60	46.9		
#100	15.8		
#140	7.5		
#200	5.2		

* (no specification provided)

Material Description

Fine grained, SLIGHTLY SILTY SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5050 D_{85}= 0.4022 D_{60}= 0.2914
D_{50}= 0.2594 D_{30}= 0.1982 D_{15}= 0.1470
D_{10}= 0.1232 C_u= 2.37 C_c= 1.09

Classification

USCS= SP-SM AASHTO=

Remarks

Location: BI-PBS-27-12 B
Sample Number: 6469 (15) **Depth:** 6.0' **Date:** 11/28/12

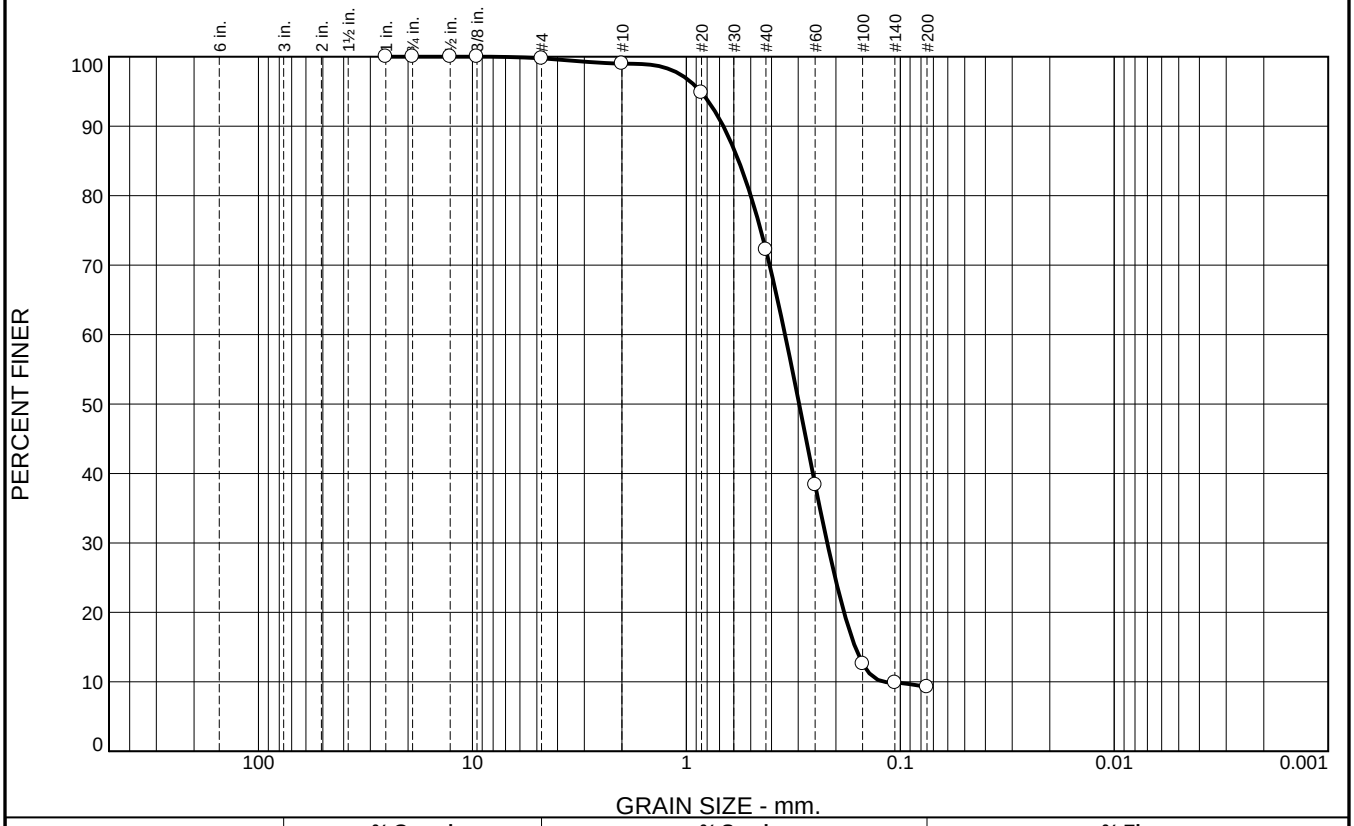
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	0.8	26.8	63.0	9.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.8		
#10	99.0		
#20	94.8		
#40	72.2		
#60	38.4		
#100	12.6		
#140	9.9		
#200	9.2		

* (no specification provided)

Material Description

Fine to medium grained, SLIGHTLY SILTY SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6718 D_{85}= 0.5694 D_{60}= 0.3458
D_{50}= 0.2972 D_{30}= 0.2195 D_{15}= 0.1626
D_{10}= 0.1188 C_u= 2.91 C_c= 1.17

Classification

USCS= SP-SM AASHTO=

Remarks

Location: BI-PBS-27-12 C
Sample Number: 6469 (16) **Depth:** 10.6' **Date:** 11/28/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBS-028-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET / OF
	South Atlantic	Mobile District	SHEET 1 OF 1 SHEETS

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-028-12	LOCATION COORDINATES: E = 1,143,084 N = 230,830	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL: / BEARING:	14. WATER DEPTH: 56.4 Ft.	
		15. DATE BORING	STARTED: 11-21-12 / COMPLETED: 11-21-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -56.8 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 12.4 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: John Bass, Geotechnical Engineer	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-56.8	0.0				
			SAND, poorly-graded, mostly fine-grained sand-sized quartz, trace fines, trace shell fragments, trace wood debris, lt. gray (SP)	A	Classification: SP Color: 5Y 7/2-light gray D50: 0.2984 mm % Fines: 2.9
-63.3	6.5				
			SAND, silty, mostly fine-grained sand-sized quartz, little shell fragments, trace wood debris, gray (SM)	NS	
-65.3	8.5				
			CLAY, silty, some clay, some silt, little fine-grained sand-sized quartz, trace wood debris, gray (CL-ML)		
-66.8	10.0				
-67.8	11.0		SAND, silty, mostly fine-grained sand-sized quartz, some silt, some shell fragments, little wood debris, gray (SM)	B	Classification: SP-SM Color: 5Y 7/2-light gray D50: 0.2837 mm % Fines: 8.5
-69.2	12.4				
			SAND, poorly-graded, mostly fine-grained sand-sized quartz, little fines, trace shell fragments, trace wood debris, lt. gray (SP)		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.13378° Long = -88.33088°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
SERVICES

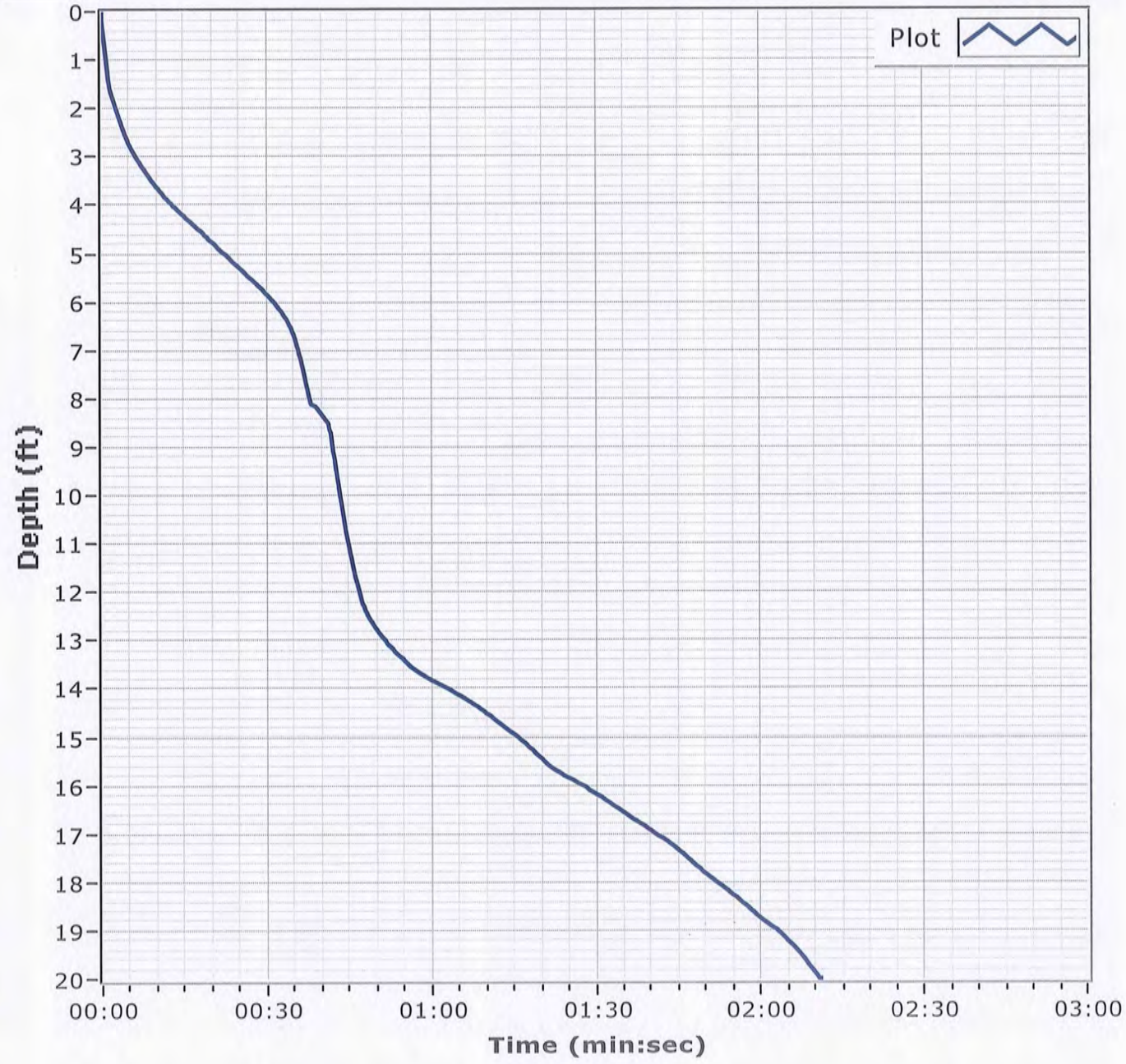
Core Identifier BI-PBS-28-12
Coordinate System
Latitude / Longitude

Latitude 30 08.027
Longitude 088 19.853

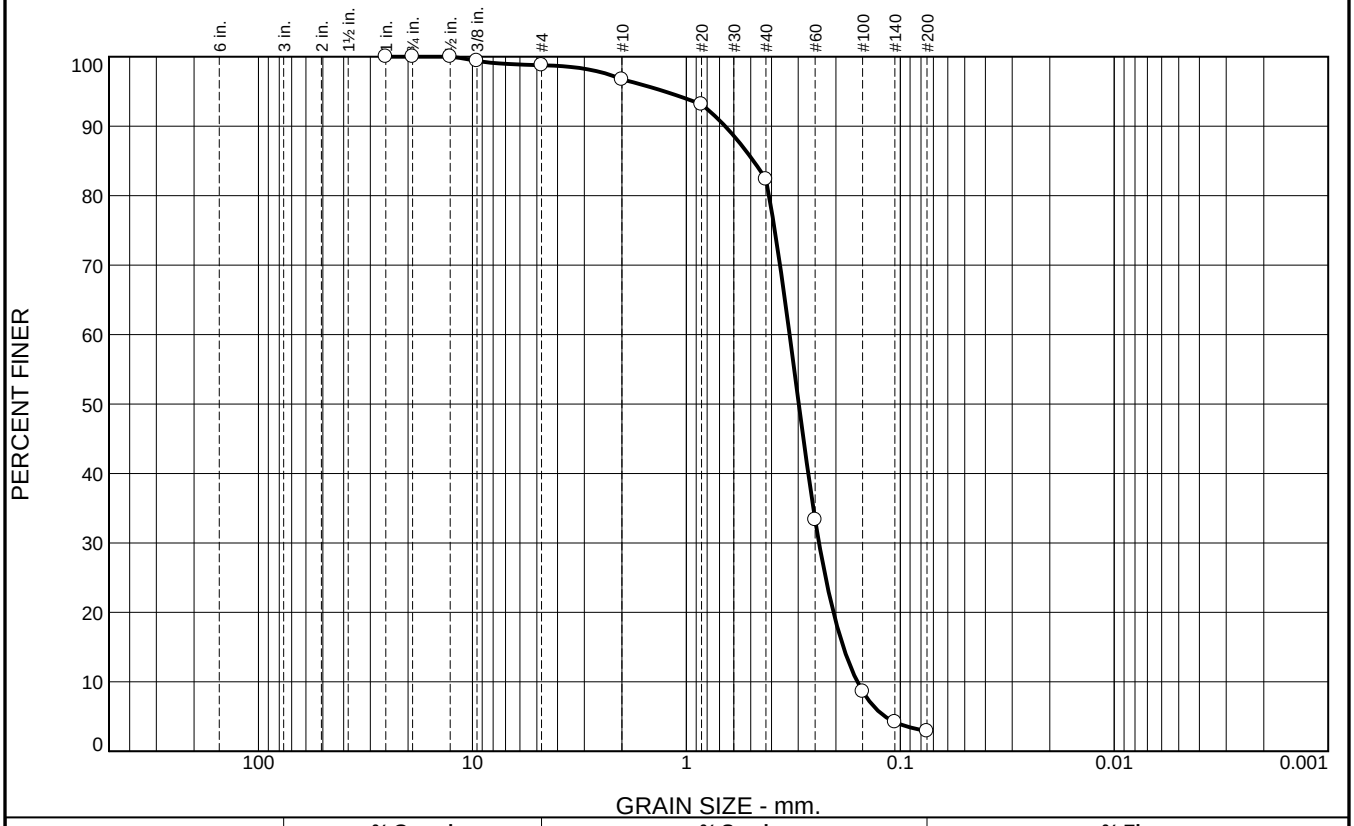
Date 11/21/2012
Start Time 13:36:59
End Time 13:39:10
Total Time 00:02:11

Water Depth 56.4'
Penetration 20.0'
Recovery 12.4'

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.2	2.1	14.3	79.5	2.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	99.4		
#4	98.8		
#10	96.7		
#20	93.1		
#40	82.4		
#60	33.3		
#100	8.6		
#140	4.2		
#200	2.9		

* (no specification provided)

Material Description

Fine to medium grained, SAND, with trace SHELL

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6592 D_{85}= 0.4861 D_{60}= 0.3292
D_{50}= 0.2984 D_{30}= 0.2398 D_{15}= 0.1847
D_{10}= 0.1588 C_u= 2.07 C_c= 1.10

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-28-12 A
Sample Number: 6469 (12) **Depth:** 0.0' **Date:** 11/28/12

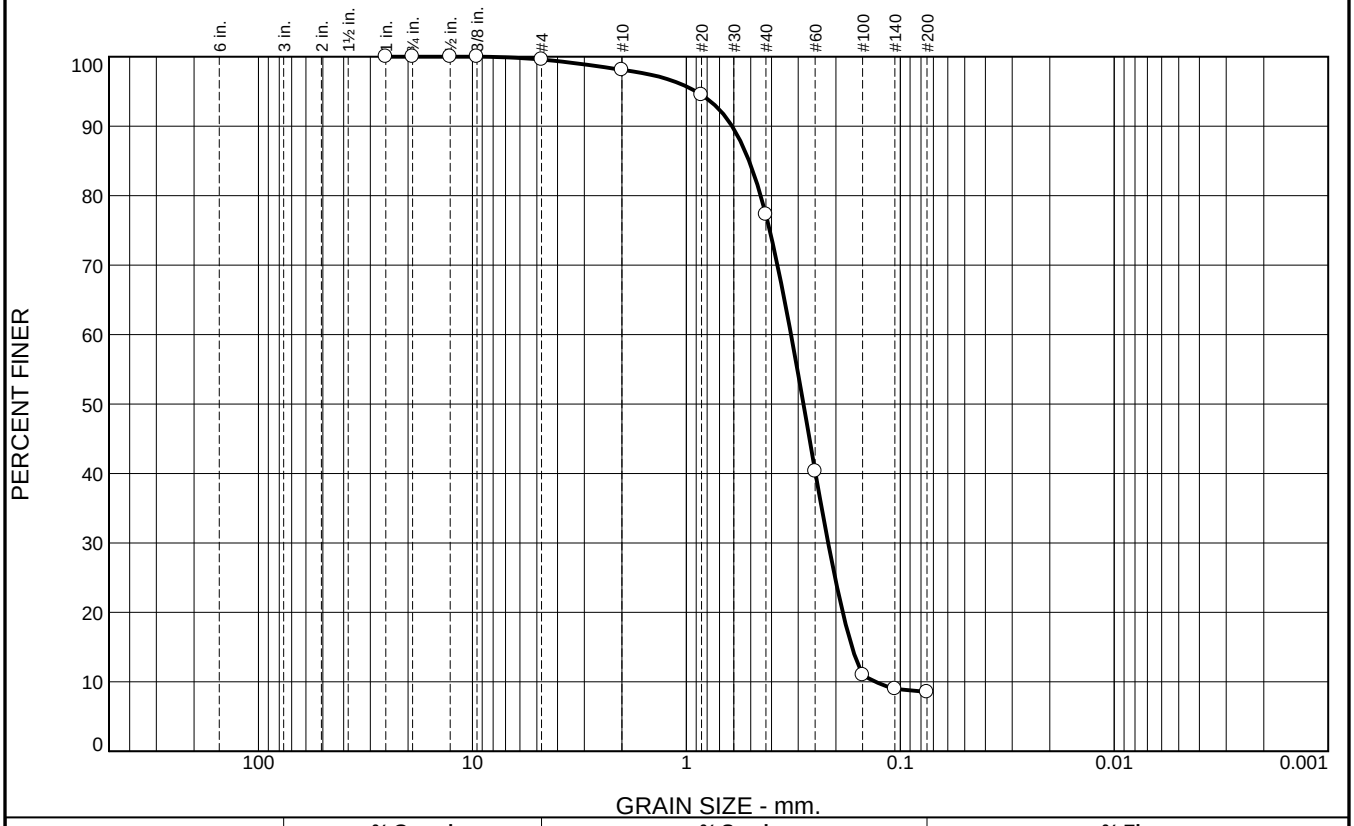
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.4	1.5	20.8	68.8	8.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.6		
#10	98.1		
#20	94.5		
#40	77.3		
#60	40.3		
#100	11.0		
#140	9.0		
#200	8.5		

* (no specification provided)

Material Description

Fine to medium grained, SLIGHTLY SILTY SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6111 D_{85}= 0.5091 D_{60}= 0.3242
D_{50}= 0.2837 D_{30}= 0.2173 D_{15}= 0.1683
D_{10}= 0.1305 C_u= 2.49 C_c= 1.12

Classification

USCS= SP-SM AASHTO=

Remarks

Location: BI-PBS-28-12 B
Sample Number: 6469 (13) **Depth:** 11.0' **Date:** 11/28/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBS-029-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET / OF
	South Atlantic	Mobile District	1 OF 1 SHEETS

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-029-12	LOCATION COORDINATES: E = 1,143,592 N = 230,305	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 62 Ft.	
		15. DATE BORING	STARTED: 11-24-12 / COMPLETED: 11-24-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -55.2 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 7.2 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: John Bass, Geotechnical Engineer	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-55.2	0.0				
			SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace fines, trace shell fragments, lt. gray (SP)	A	Classification: SP Color: 5Y 7/2-light gray D50: 0.2483 mm % Fines: 2.1
-61.2	6.0				
-61.8	6.6			B	Classification: SP-SM Color: 5Y 6/2-light olive gray D50: 0.1892 mm % Fines: 10.9
-62.4	7.2		SAND, poorly-graded, mostly fine-grained sand-sized quartz, trace silt, gray (SP)	NS	
			CLAY, lean, mostly clay, little fine-grained sand-sized quartz, gray (CL)		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.13233° Long = -88.32928°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
SERVICES

Core Identifier BI-PBS-29-12

Coordinate System
Latitude / Longitude

Latitude 30 07.940

Longitude 088 19.757

Date 11/24/2012

Start Time 12:53:28

End Time 12:54:59

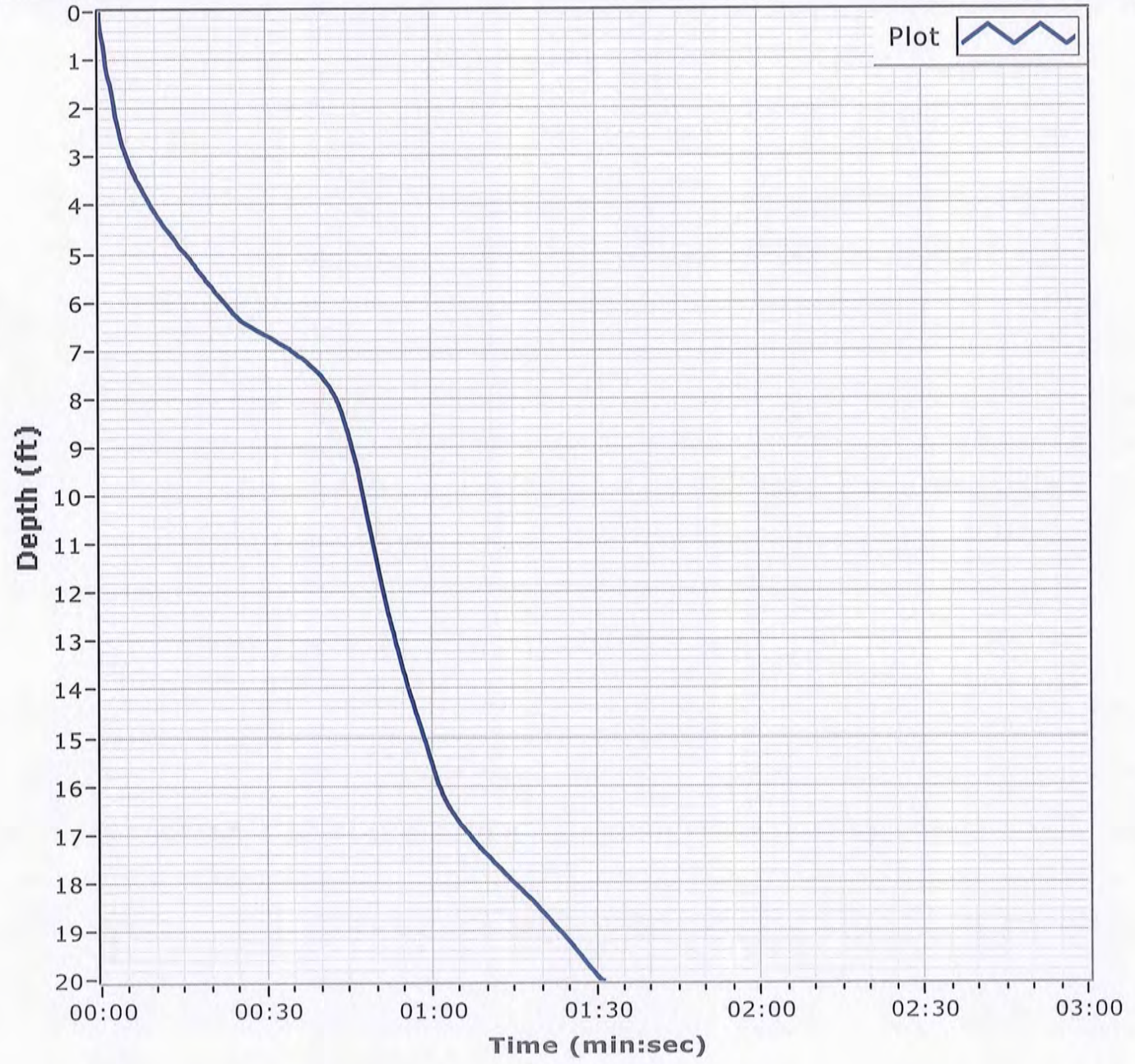
Total Time 00:01:31

Water Depth 62.0'

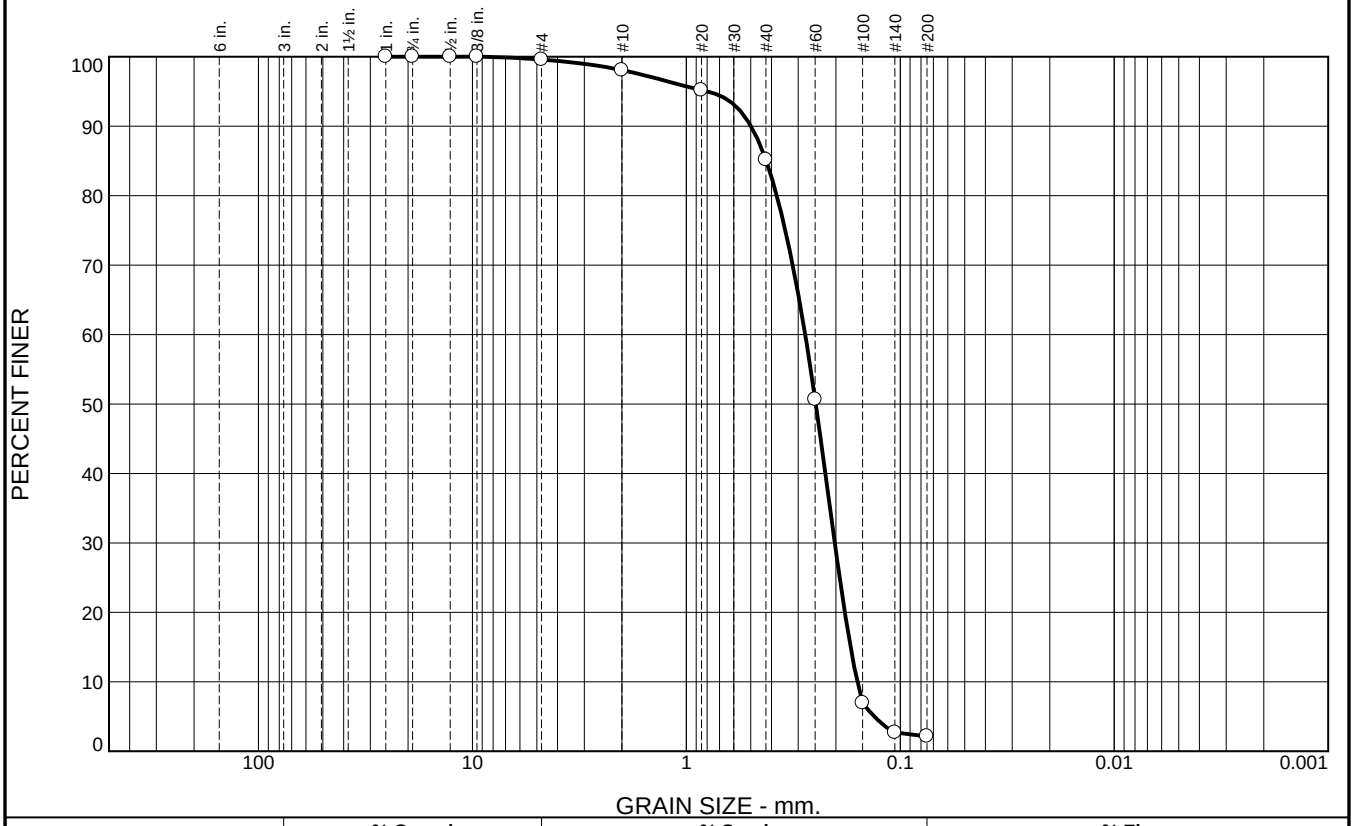
Penetration 20.0'

Recovery 7.2'

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.4	1.5	12.9	83.1	2.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.6		
#10	98.1		
#20	95.2		
#40	85.2		
#60	50.6		
#100	7.0		
#140	2.7		
#200	2.1		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4988 D_{85}= 0.4232 D_{60}= 0.2784
D_{50}= 0.2483 D_{30}= 0.2025 D_{15}= 0.1710
D_{10}= 0.1589 C_u= 1.75 C_c= 0.93

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-29-12 A
Sample Number: 6469 (45) **Depth:** 0.0' **Date:** 11/28/12

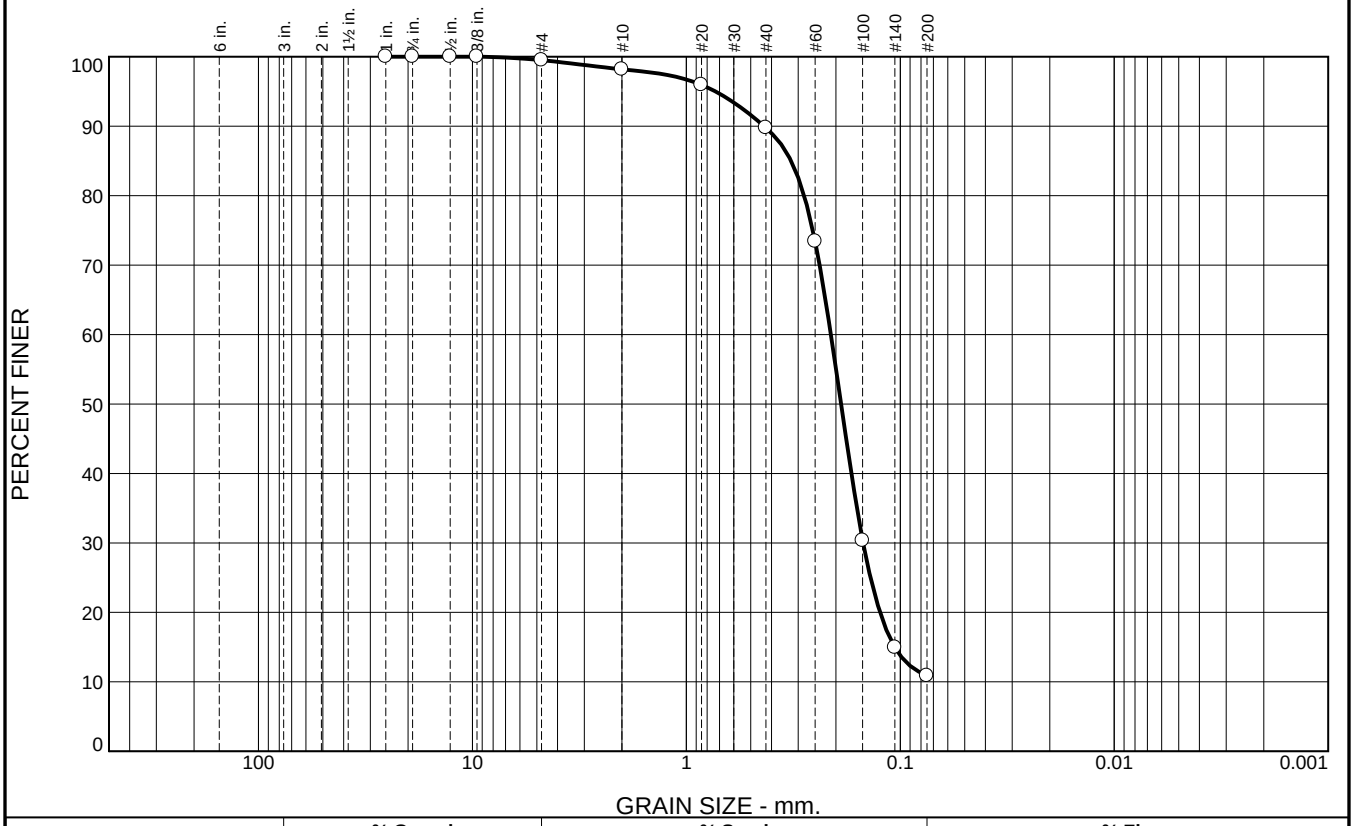
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.5	1.3	8.5	78.8	10.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.5		
#10	98.2		
#20	95.9		
#40	89.7		
#60	73.4		
#100	30.3		
#140	15.0		
#200	10.9		

* (no specification provided)

Material Description

Fine grained, SLIGHTLY SILTY SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4341 D_{85}= 0.3239 D_{60}= 0.2111
D_{50}= 0.1892 D_{30}= 0.1493 D_{15}= 0.1062
D_{10}= C_u= C_c=

Classification

USCS= SP-SM AASHTO=

Remarks

Location: BI-PBS-29-12 B
Sample Number: 6469 (46) **Depth:** 6.0' **Date:** 11/28/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBS-030-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET / OF
	South Atlantic	Mobile District	SHEET 1 OF 1 SHEETS

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-030-12	LOCATION COORDINATES: E = 1,143,904 N = 229,830	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL: / BEARING:	14. WATER DEPTH: 62.7 Ft.	
		15. DATE BORING	STARTED: 11-24-12 / COMPLETED: 11-24-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -60.4 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 15.6 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: John Bass, Geotechnical Engineer	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-60.4	0.0				
-63.5	3.1		SAND, poorly-graded, mostly fine-grained sand-sized quartz, little shell fragments, trace fines, lt. gray (SP)	A	Classification: SP Color: 2.5Y 6/2-light brownish gray D50: 0.2933 mm % Fines: 3
-67.0	6.6		SAND, silty, mostly fine-grained sand-sized quartz, some shell fragments, gray (SM)		
-68.0	7.6		CLAY, lean, mostly clay, little fine-grained sand-sized quartz, trace shell fragments, gray (CL)		
-69.5	9.1		SAND, clayey, mostly fine-grained sand-sized quartz, trace shell fragments, borderline CL, gray (SC)	NS	
-74.7	14.3		CLAY, lean, mostly clay, trace fine-grained sand-sized quartz, trace shell fragments, gray (CL)		
-76.0	15.6		SAND, poorly-graded with silt, mostly fine-grained sand-sized quartz, few silt, trace shell fragments, lt. gray to gray (SP-SM)	B	Classification: SM Color: 2.5Y 6/2-light brownish gray D50: 0.3355 mm % Fines: 22.5

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.13102° Long = -88.32830°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
SERVICES

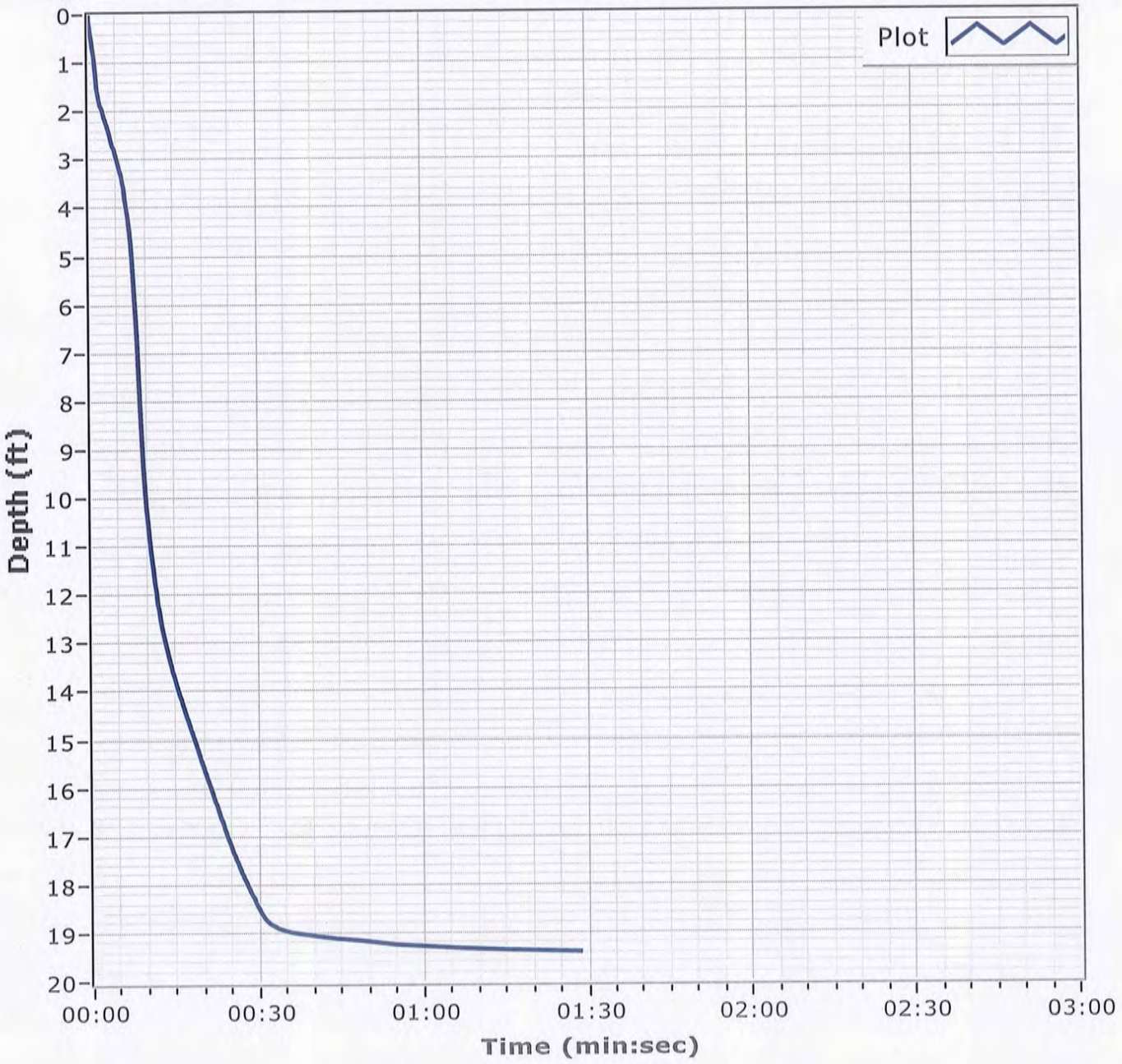
Core Identifier BI-PBS-30-12
Coordinate System
Latitude / Longitude

Latitude 30 07.861
Longitude 088 19.698

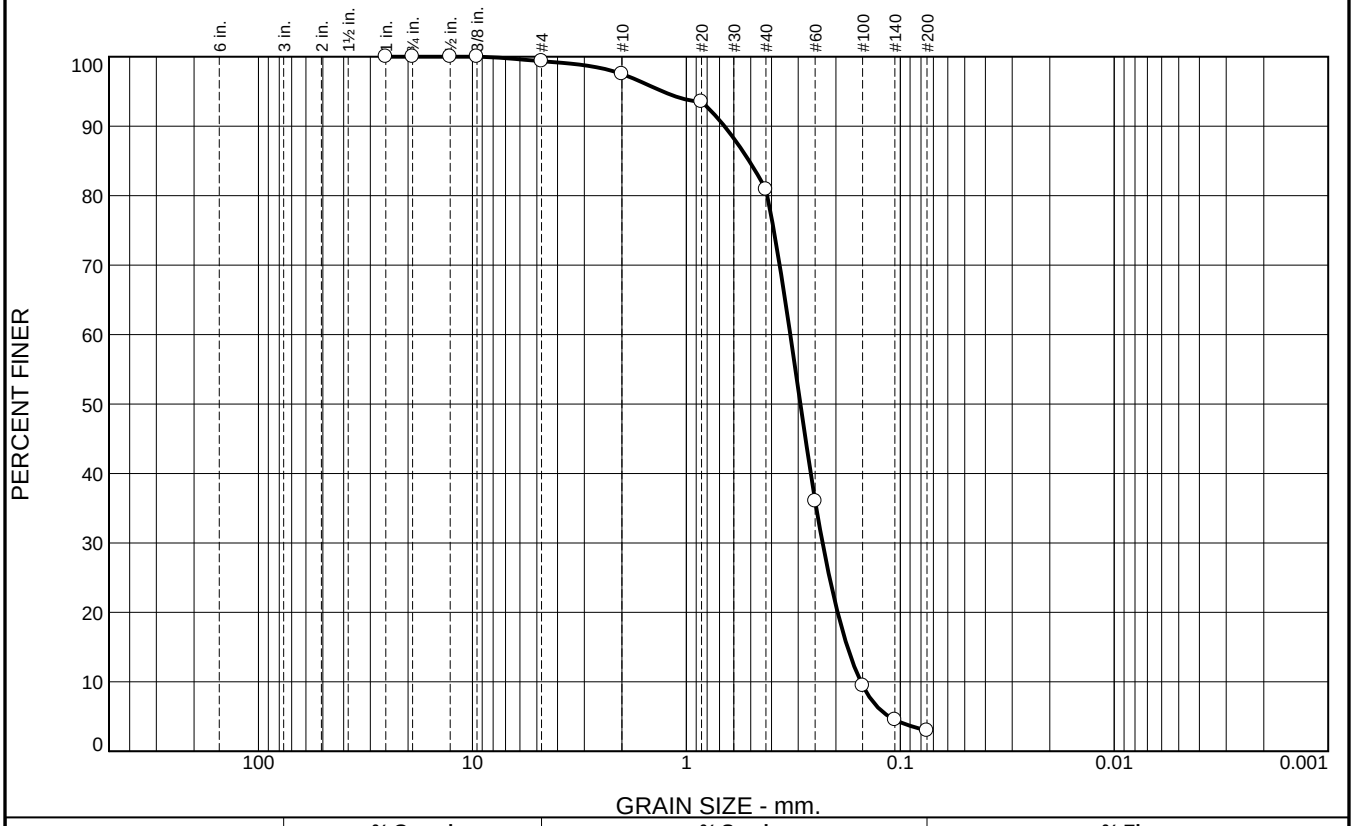
Date 11/24/2012
Start Time 12:11:23
End Time 12:12:52
Total Time 00:01:28

Water Depth 62.7'
Penetration 19.4'
Recovery 15.6'

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.7	1.8	16.6	77.9	3.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.3		
#10	97.5		
#20	93.5		
#40	80.9		
#60	36.0		
#100	9.5		
#140	4.6		
#200	3.0		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6638 D_{85}= 0.5089 D_{60}= 0.3268
D_{50}= 0.2933 D_{30}= 0.2309 D_{15}= 0.1767
D_{10}= 0.1530 C_u= 2.14 C_c= 1.07

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-30-12 A
Sample Number: 6469 (43) **Depth:** 0.0' **Date:** 11/28/12

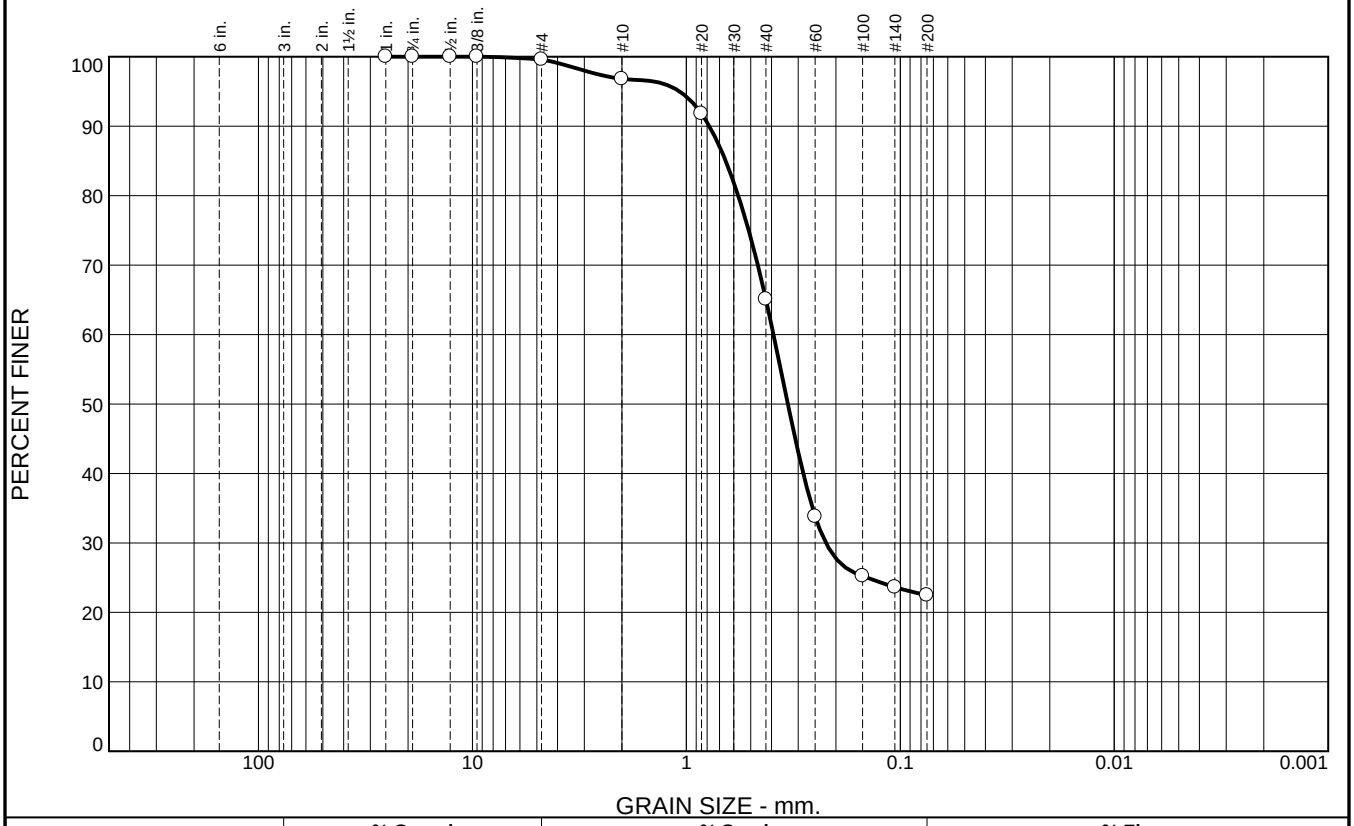
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.4	2.8	31.7	42.6	22.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.6		
#10	96.8		
#20	91.8		
#40	65.1		
#60	33.8		
#100	25.2		
#140	23.6		
#200	22.5		

* (no specification provided)

Material Description

Fine to medium grained, SILTY SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.7814 D_{85}= 0.6548 D_{60}= 0.3915
D_{50}= 0.3355 D_{30}= 0.2227 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

Location: BI-PBS-30-12 B
Sample Number: 6469 (44) **Depth:** 14.3' **Date:** 11/28/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBS-059-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET / OF
	South Atlantic	Mobile District	SHEET 1 OF 1 SHEETS

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-059-12	LOCATION COORDINATES: E = 1,138,239 N = 233,424	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 53.4 Ft.	
		15. DATE BORING	STARTED: 11-26-12 / COMPLETED: 11-26-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -53.1 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 19.5 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Mike FitzHarris, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-53.1	0.0				
-54.9	1.8		SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace shell fragments, gray (SP)	A	Classification: SP Color: 5Y 7/1-light gray D50: 0.3203 mm % Fines: 1.1
-55.7	2.6		SAND, silty, mostly fine-grained sand-sized quartz, trace shell fragments, gray (SM)	B	Classification: SP-SM Color: 5Y 5/2-olive gray D50: 0.206 mm % Fines: 11.4
-61.2	8.1		CLAY, silty, mostly silt, some sand, trace shells, sandy silt with alternating clayey bands, greenish gray mottled with brown (CL-ML)		
-66.4	13.3		SAND, silty, mostly fine-grained sand-sized quartz, some silt, few clay, trace shell fragments, gray (SM)	NS	
-72.6	19.5		CLAY, fat, mostly clay, trace fine-grained sand-sized quartz, trace wood debris, medium stiffness, gray (CH)		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.14097° Long = -88.34617°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
SERVICES

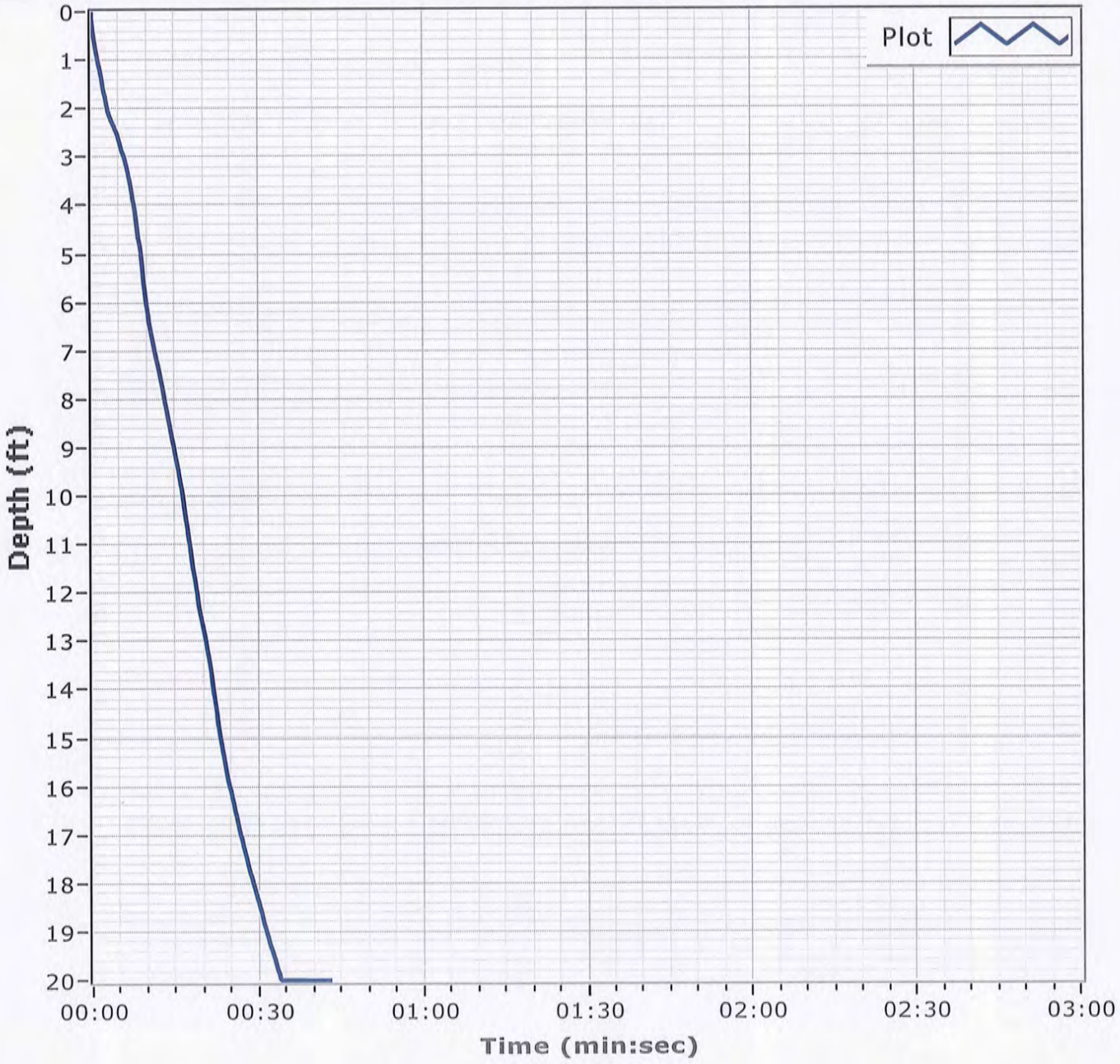
Core Identifier BI-PBS-59-12
Coordinate System
Latitude / Longitude

Date 11/26/2012
Start Time 11:20:29
End Time 11:21:12
Total Time 00:00:43

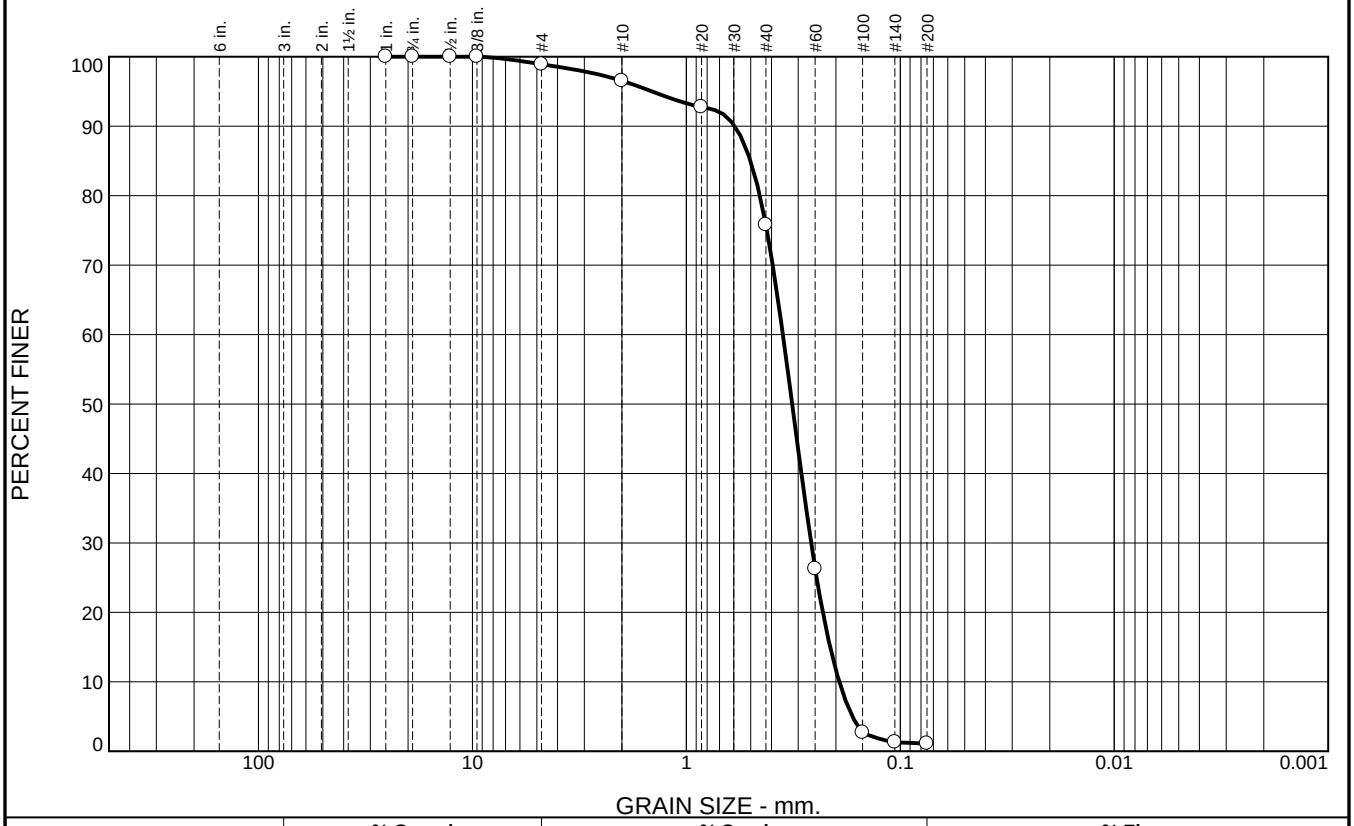
Water Depth 53.4'
Penetration 20.0'
Recovery 19.5'

Latitude 30 08.458
Longitude 088 20.770

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.1	2.4	20.7	74.7	1.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	98.9		
#10	96.5		
#20	92.8		
#40	75.8		
#60	26.3		
#100	2.7		
#140	1.3		
#200	1.1		

* (no specification provided)

Material Description

Fine to medium grained, SAND, with trace SHELL

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5938 D_{85}= 0.5015 D_{60}= 0.3539
D_{50}= 0.3203 D_{30}= 0.2611 D_{15}= 0.2128
D_{10}= 0.1930 C_u= 1.83 C_c= 1.00

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-59-12 A
Sample Number: 6469 (60) **Depth:** 0.0' **Date:** 11/28/12

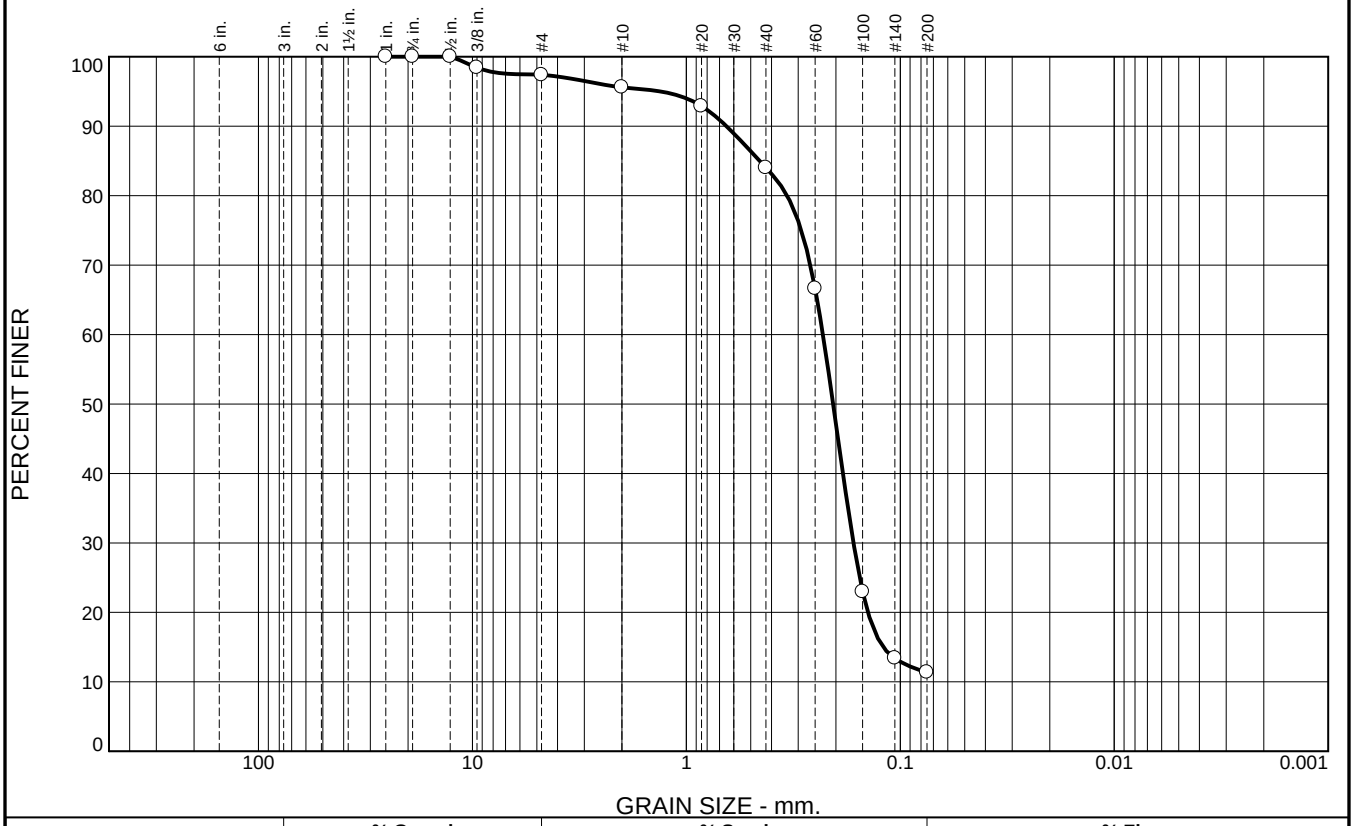
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.6	1.8	11.6	72.6	11.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	98.4		
#4	97.4		
#10	95.6		
#20	92.9		
#40	84.0		
#60	66.6		
#100	23.0		
#140	13.4		
#200	11.4		

* (no specification provided)

Material Description

Fine to medium grained, SLIGHTLY SILTY SAND, with trace SHELL

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6502 D_{85}= 0.4550 D_{60}= 0.2299
D_{50}= 0.2060 D_{30}= 0.1656 D_{15}= 0.1202
D_{10}= C_u= C_c=

Classification

USCS= SP-SM AASHTO=

Remarks

Location: BI-PBS-59-12 B
Sample Number: 6469 (61) **Depth:** 1.8' **Date:** 11/28/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBS-083-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET / OF
	South Atlantic	Mobile District	1 OF 1 SHEETS

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-083-12	LOCATION COORDINATES: E = 1,142,384 N = 232,518	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL:	BEARING:	14. WATER DEPTH: 52.4 Ft.
		15. DATE BORING	STARTED: 12-18-12 / COMPLETED: 12-18-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -52.1 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 19.6 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Mike FitzHarris, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-52.1	0.0				
			SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, little shell fragments, trace clay, trace silt, gray (SP)	A	Classification: SP Color: 5Y 6/2-light olive gray D50: 0.3509 mm % Fines: 1
				B	Classification: SP-SM Color: 5Y 5/2-olive gray D50: 0.2416 mm % Fines: 5.2
-59.8	7.7				
			CLAY, lean, mostly clay, some silt, trace fine-grained sand-sized quartz, trace shell fragments, gray, orangy brown (CL)	NS	
-63.4	11.3				
			SAND, clayey, mostly fine-grained sand-sized quartz, some clay, little silt, trace shell fragments, gray (SC)		
-67.1	15.0				
			CLAY, lean, mostly clay, some silt, some fine-grained sand-sized quartz, trace shell fragments, trace wood debris, gray (CL)		
-71.7	19.6				
			NOTES: 1. Soils are field visually classified in accordance with the Unified Soils Classification System. 2. NS = Sample not submitted for laboratory analysis from this interval. 3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.		

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.13843° Long = -88.33307°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
SERVICES

Core Identifier BI-PBS-83-12

Coordinate System
Latitude / Longitude

Latitude 30 8.306

Longitude 88 19.984

Date 12/18/2012

Start Time 12:21:37

End Time 12:23:12

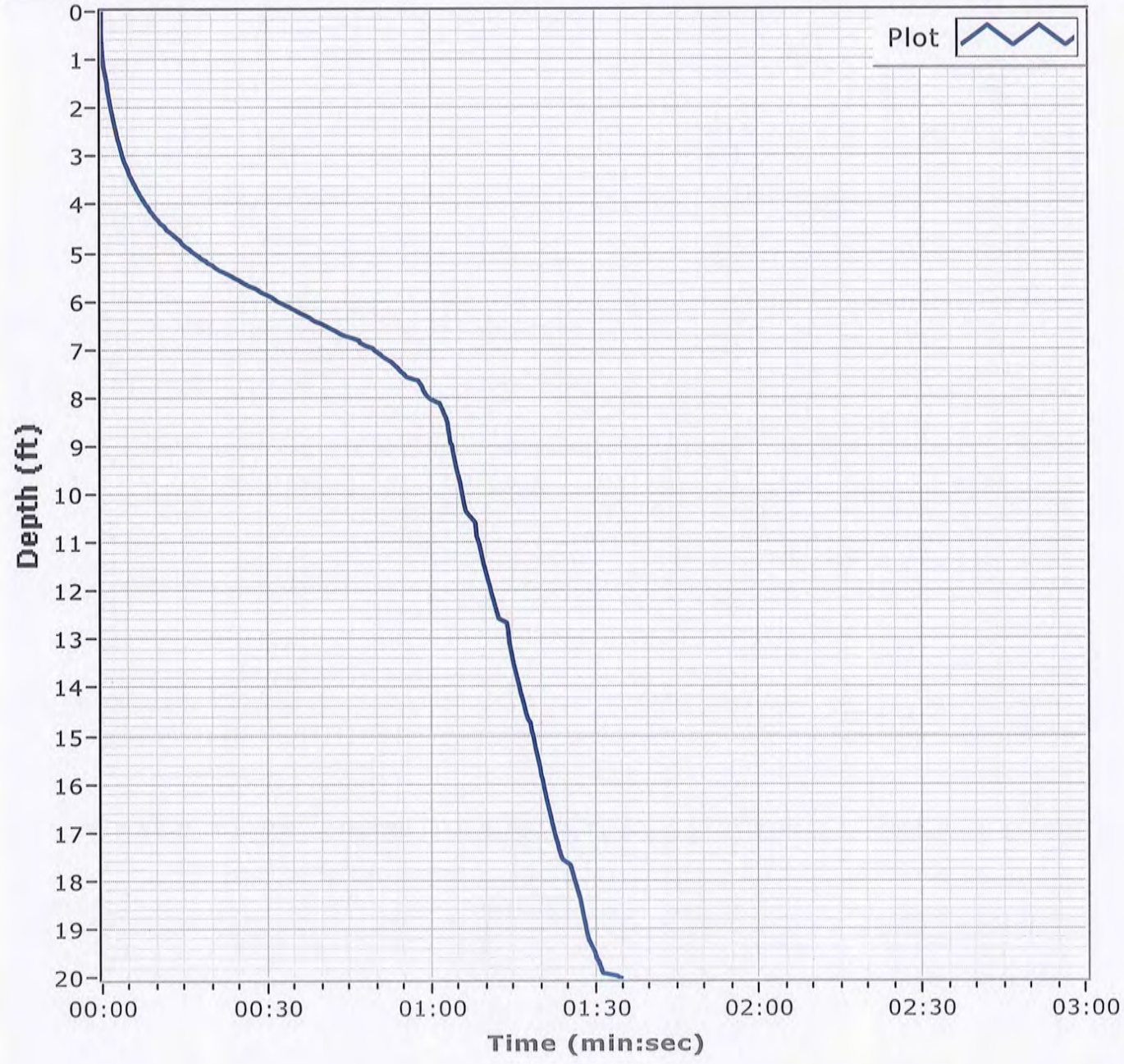
Total Time 00:01:35

Water Depth 52.4'

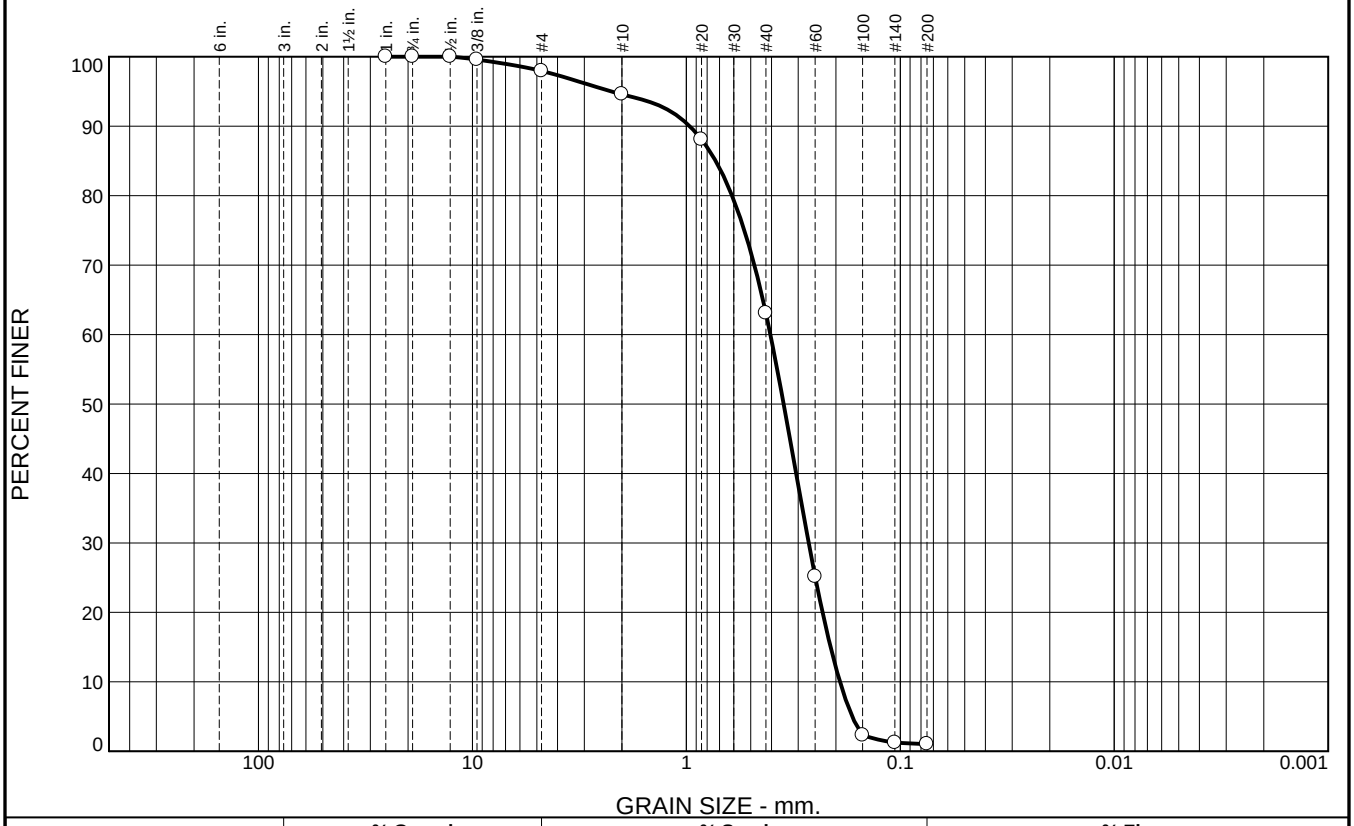
Penetration 20.0'

Recovery 19.6'

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.1	3.3	31.5	62.1	1.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	99.6		
#4	97.9		
#10	94.6		
#20	88.1		
#40	63.1		
#60	25.1		
#100	2.3		
#140	1.2		
#200	1.0		

* (no specification provided)

Material Description

Fine to medium grained, SAND, with trace SHELL

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.9650 D_{85}= 0.7300 D_{60}= 0.4048
D_{50}= 0.3509 D_{30}= 0.2681 D_{15}= 0.2118
D_{10}= 0.1916 C_u= 2.11 C_c= 0.93

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-83-12 A
Sample Number: 6494 (52) **Depth:** 0.0' **Date:** 12/26/12

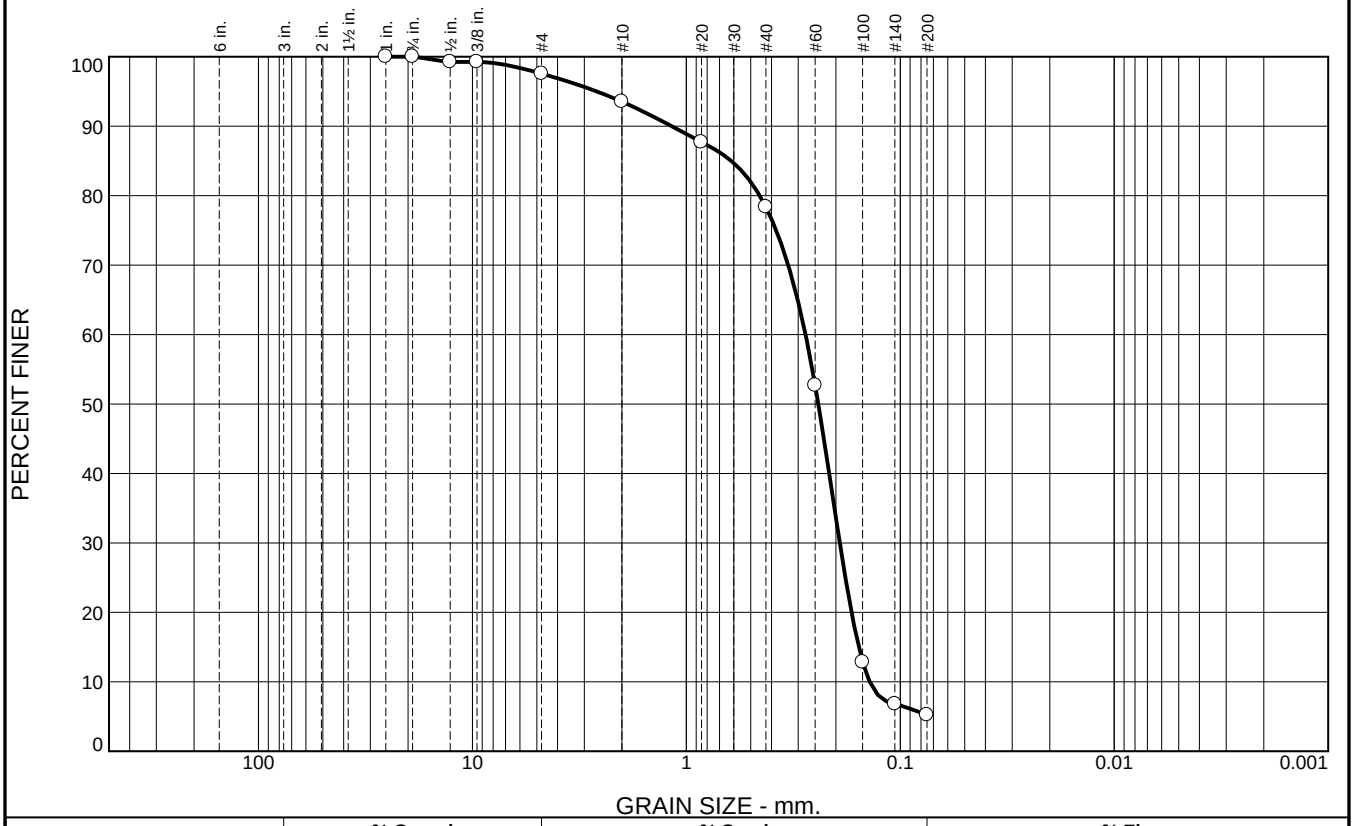
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.4	4.1	15.2	73.1	5.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	99.2		
.375	99.2		
#4	97.6		
#10	93.5		
#20	87.7		
#40	78.3		
#60	52.7		
#100	12.8		
#140	6.8		
#200	5.2		

* (no specification provided)

Material Description

Fine to medium grained, SLIGHTLY SILTY SAND, with trace SHELL

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.1728 D_{85}= 0.6166 D_{60}= 0.2774
D_{50}= 0.2416 D_{30}= 0.1918 D_{15}= 0.1564
D_{10}= 0.1390 C_u= 2.00 C_c= 0.95

Classification

USCS= SP-SM AASHTO=

Remarks

Location: BI-PBS-83-12 B
Sample Number: 6494 (53) **Depth:** 5.0' **Date:** 12/26/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBS-086-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET / OF
	South Atlantic	Mobile District	1 OF 1 SHEETS

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-086-12	LOCATION COORDINATES: E = 1,138,944 N = 231,129	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 54.7 Ft.	
		15. DATE BORING	STARTED: 12-18-12 / COMPLETED: 12-18-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -54.7 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 17.8 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Mike FitzHarris, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-54.7	0.0				
			SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace fines, trace shell fragments, gray (SP)	A	Classification: SP Color: 5Y 6/2-light olive gray D50: 0.204 mm % Fines: 3.1
-58.3	3.6				
			SAND, silty, mostly fine-grained sand-sized quartz, some silt, little shell fragments, trace clay, gray (SM)	B	Classification: SM Color: 5Y 5/2-olive gray D50: 0.1926 mm % Fines: 13.2
-60.6	5.9				
			CLAY, lean, mostly clay, some silt, few fine-grained sand-sized quartz, trace shell fragments, gray with some orange mottle (CL)		
-62.5	7.8				
			CLAY, fat, mostly clay, few silt, trace fine-grained sand-sized quartz, low to medium plasticity, gray, orange mottle (CH)		
-63.7	9.0				
-64.5	9.8		SAND, silty, mostly fine-grained sand-sized quartz, some silt, gray (SM)		
-66.0	11.3				
			CLAY, lean, mostly clay, some silt, little fine-grained sand-sized quartz, stiff, gray (CL)	NS	
			CLAY, fat, mostly clay, trace wood debris, trace shell fragments, stiff, medium to high plasticity, trace fine-grained sandy pockets, gray (CH)		
-72.5	17.8				
			NOTES: 1. Soils are field visually classified in accordance with the Unified Soils Classification System. 2. NS = Sample not submitted for laboratory analysis from this interval. 3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.		

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.13465° Long = -88.34397°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
SERVICES

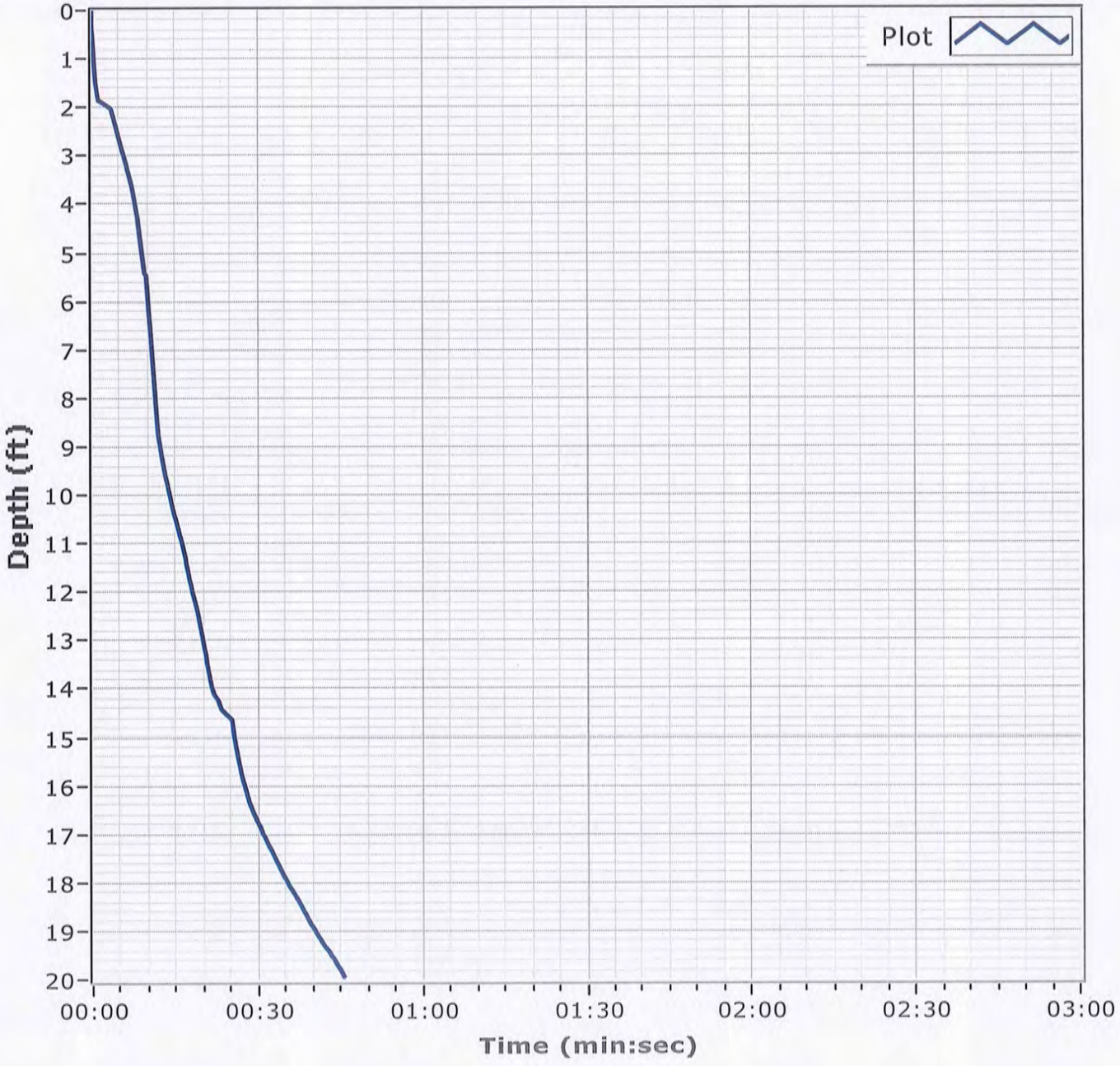
Core Identifier BI-PBS-86-12
Coordinate System
Latitude / Longitude

Latitude 30 8.079
Longitude 88 20.638

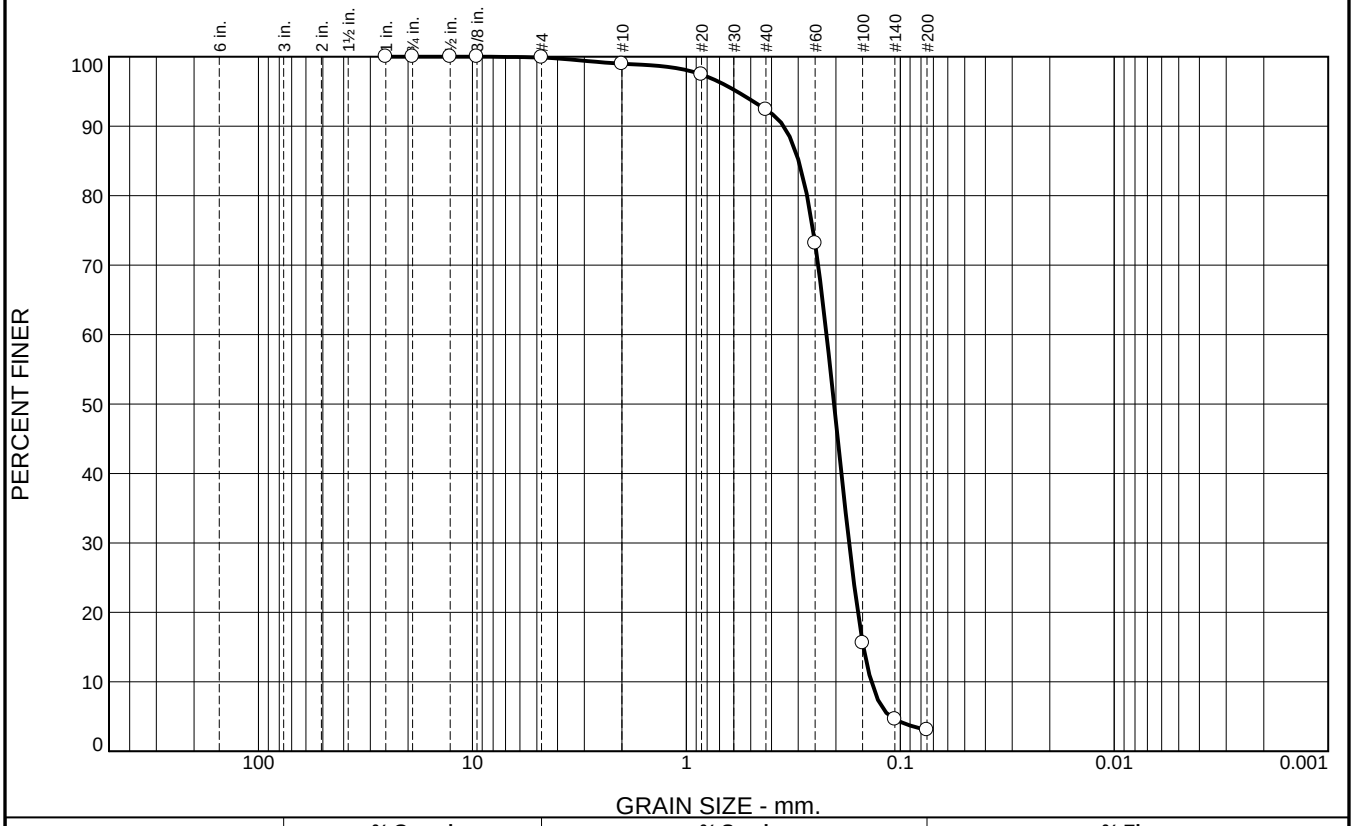
Date 12/18/2012
Start Time 14:23:55
End Time 14:24:41
Total Time 00:00:45

Water Depth 54.7'
Penetration 20.0'
Recovery 17.5'

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.9	6.6	89.3	3.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
3/4"	100.0		
1/2"	100.0		
.375	100.0		
#4	99.9		
#10	99.0		
#20	97.4		
#40	92.4		
#60	73.1		
#100	15.6		
#140	4.6		
#200	3.1		

* (no specification provided)

Material Description

Fine grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3506 D_{85}= 0.2987 D_{60}= 0.2211
D_{50}= 0.2040 D_{30}= 0.1736 D_{15}= 0.1488
D_{10}= 0.1366 C_u= 1.62 C_c= 1.00

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-86-12 A
Sample Number: 6494 (57) **Depth:** 0.0' **Date:** 12/26/12

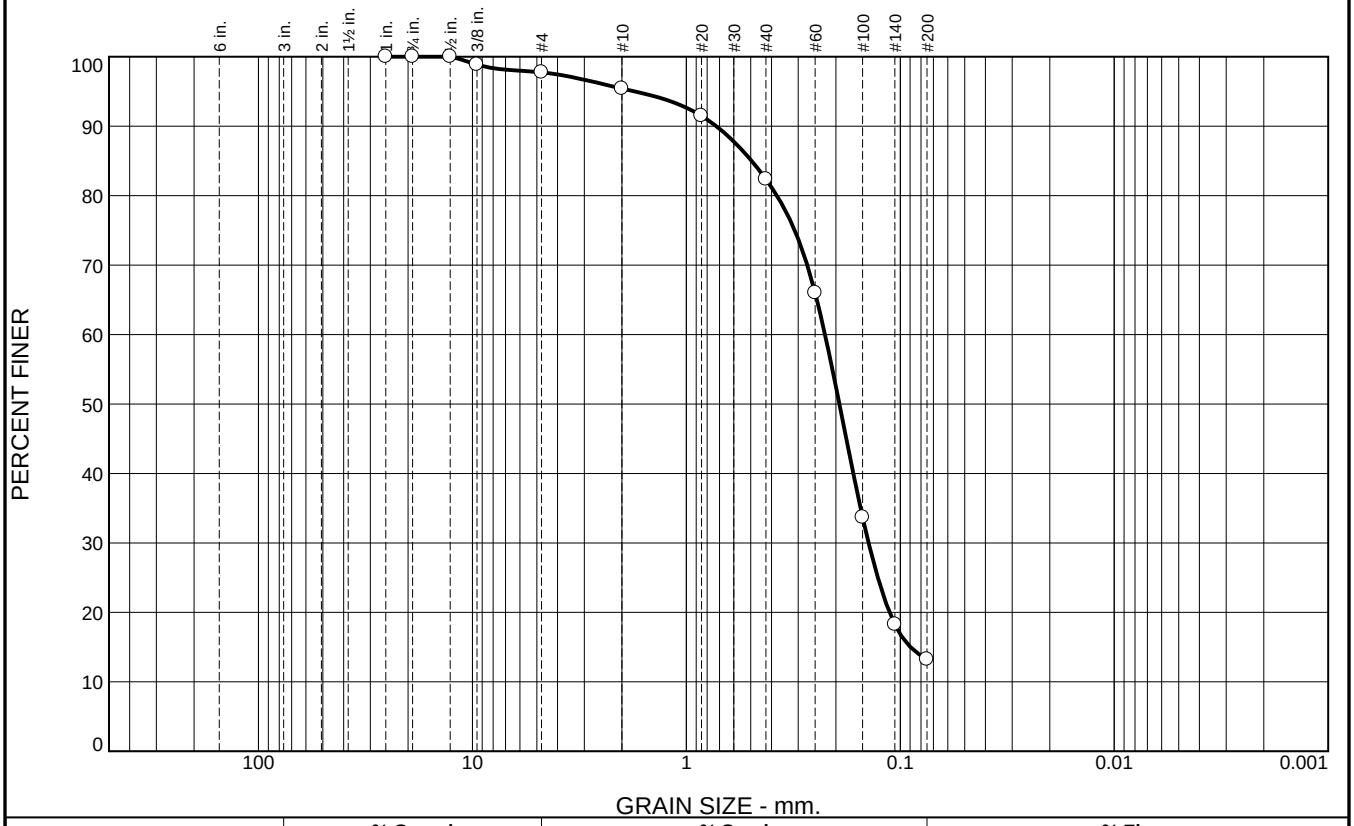
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.3	2.3	13.0	69.2	13.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	98.9		
#4	97.7		
#10	95.4		
#20	91.5		
#40	82.4		
#60	66.0		
#100	33.7		
#140	18.3		
#200	13.2		

* (no specification provided)

Material Description

Fine to medium grained, SILTY SAND, with trace SHELL

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.7251 D_{85}= 0.4956 D_{60}= 0.2248
D_{50}= 0.1926 D_{30}= 0.1407 D_{15}= 0.0897
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

Location: BI-PBS-86-12 B
Sample Number: 6494 (58) **Depth:** 3.6' **Date:** 12/26/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBS-087-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 1 SHEETS
	South Atlantic	Mobile District	

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-087-12	LOCATION COORDINATES: E = 1,140,125 N = 231,570	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 53.1 Ft.	
		15. DATE BORING	STARTED: 12-18-12 / COMPLETED: 12-18-12
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -53.2 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 18.8 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Mike FitzHarris, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-53.2	0.0				
			SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace fines, trace shell fragments, gray (SP)	A	Classification: SP Color: 5Y 6/2-light olive gray D50: 0.258 mm % Fines: 1.5
-58.2	5.0				
			SAND, poorly-graded, mostly fine-grained sand-sized quartz, trace fines, trace shell fragments, gray (SP)	B	Classification: SP Color: 5Y 6/2-light olive gray D50: 0.2058 mm % Fines: 4.5
-59.6	6.4				
			CLAY, lean, mostly clay, some silt, some fine-grained sand-sized quartz, low to medium plasticity, stiff, gray, orangy brown mottle (CL)	NS	
-66.0	12.8				
			SAND, clayey, mostly fine-grained sand-sized quartz, some clay, some silt, borderline silty clay with fine-grained sand, gray (SC)		
-68.2	15.0				
			CLAY, lean, mostly clay, some silt, some fine-grained sand-sized quartz, trace shell fragments, gray (CL)		
-72.0	18.8				
			NOTES: 1. Soils are field visually classified in accordance with the Unified Soils Classification System. 2. NS = Sample not submitted for laboratory analysis from this interval. 3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.		

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.13585° Long = -88.34023°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
S E R V I C E S

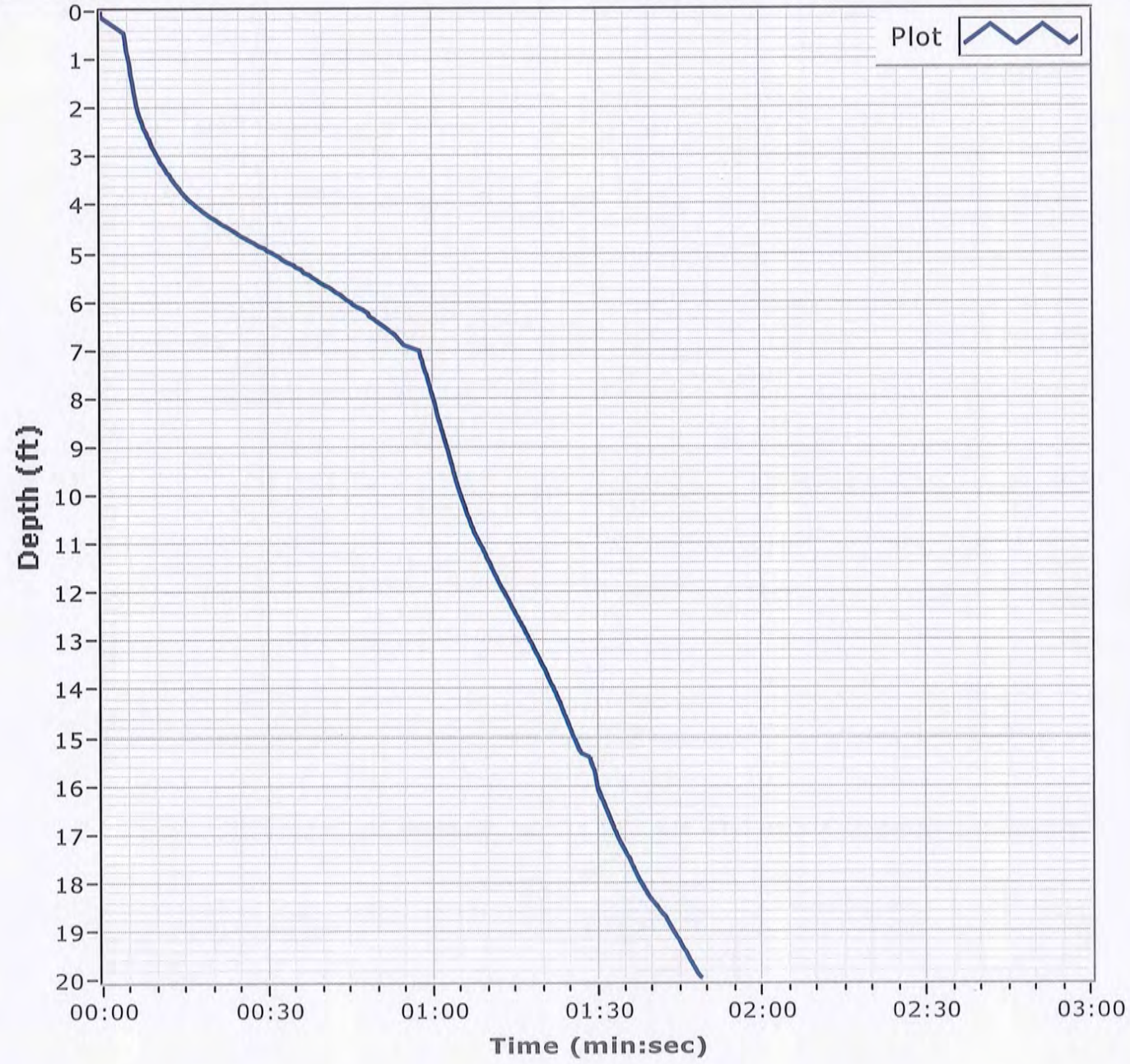
Core Identifier BI-PBS-87-12
Coordinate System
Latitude / Longitude

Latitude 30 8.151
Longitude 88 20.414

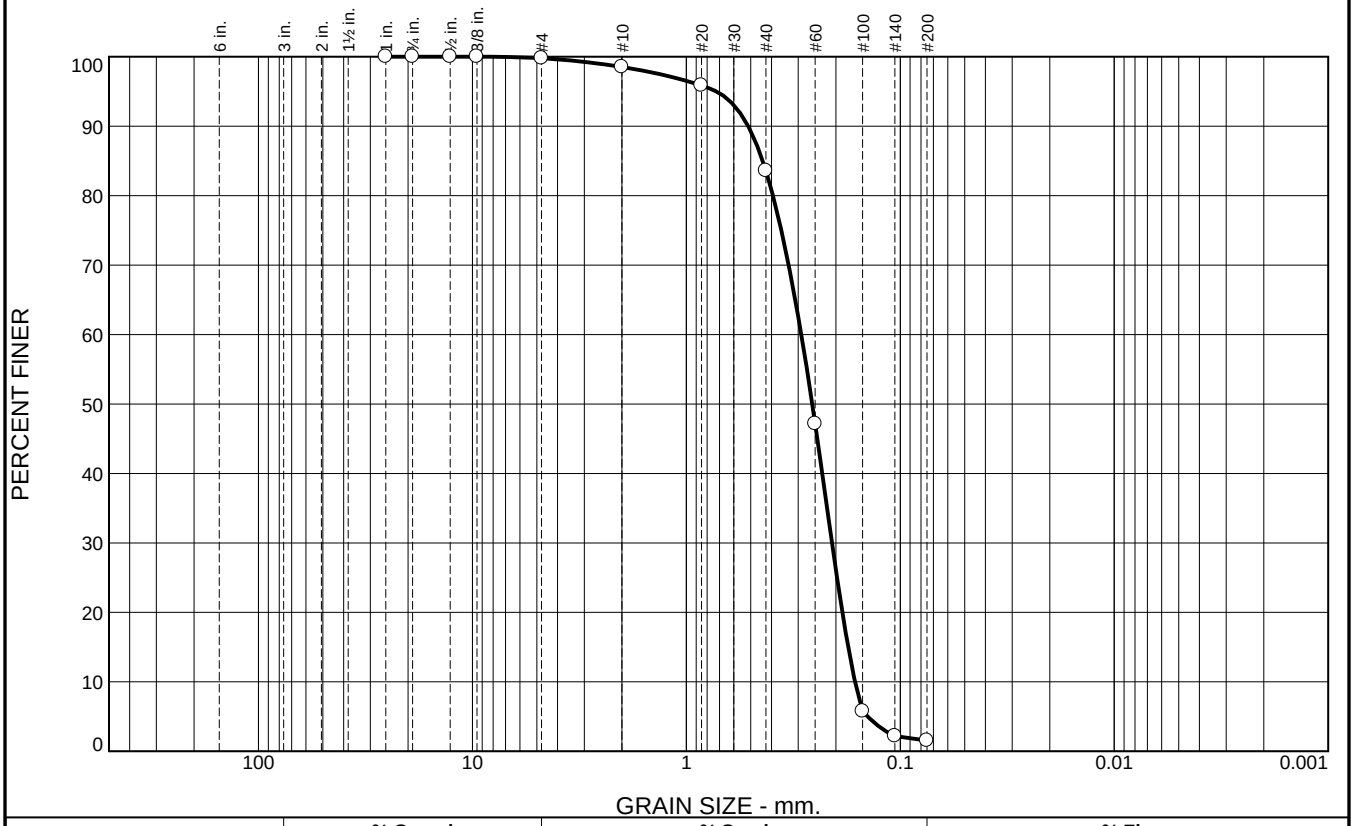
Date 12/18/2012
Start Time 14:54:33
End Time 14:56:22
Total Time 00:01:49

Water Depth 53.1'
Penetration 20.0'
Recovery 17.5'

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	1.3	14.9	82.1	1.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.8		
#10	98.5		
#20	95.9		
#40	83.6		
#60	47.2		
#100	5.8		
#140	2.2		
#200	1.5		

* (no specification provided)

Material Description

Fine to medium grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5142 D_{85}= 0.4397 D_{60}= 0.2904
D_{50}= 0.2580 D_{30}= 0.2086 D_{15}= 0.1753
D_{10}= 0.1630 C_u= 1.78 C_c= 0.92

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-87-12 A
Sample Number: 6494 (59) **Depth:** 0.0' **Date:** 12/26/12

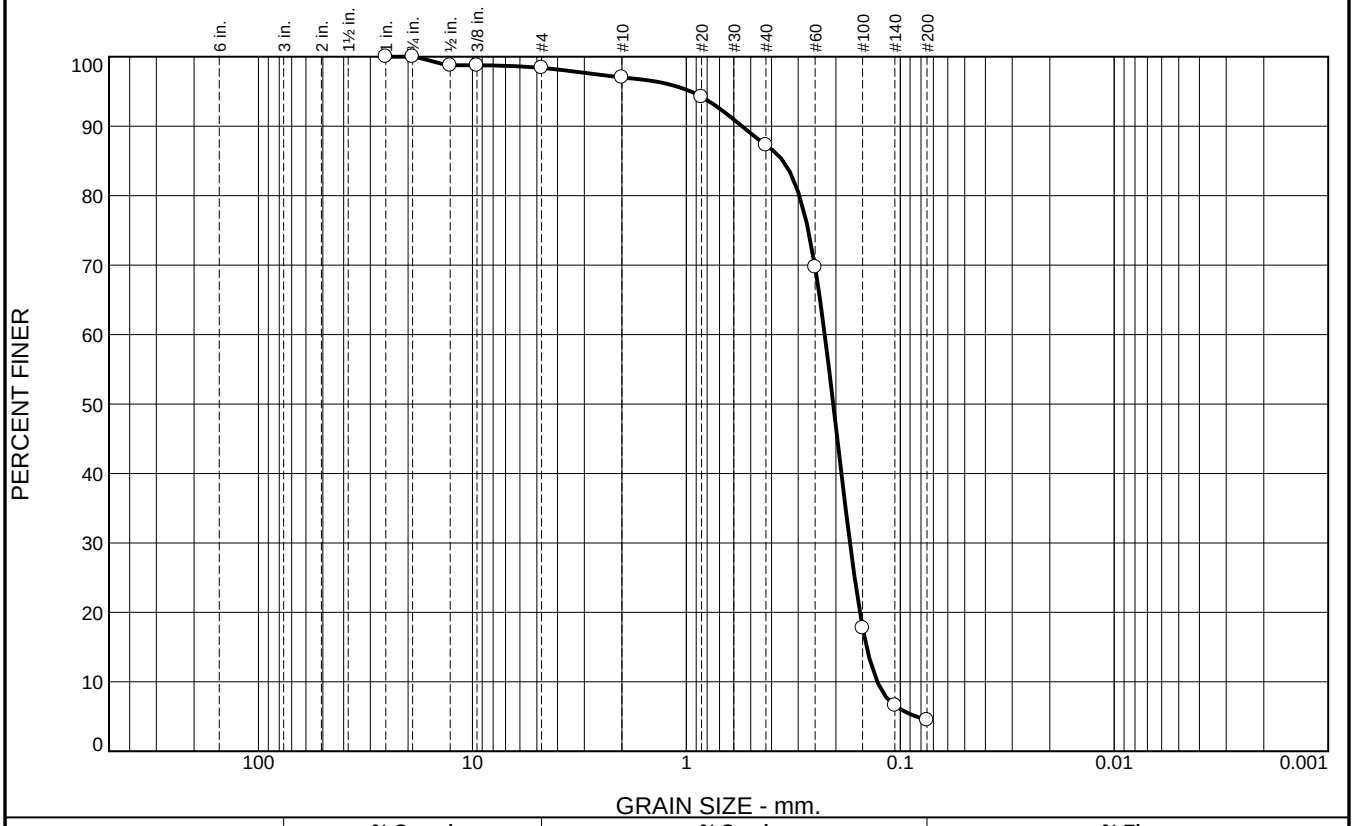
Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.6	1.4	9.7	82.8	4.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	98.8		
.375	98.8		
#4	98.4		
#10	97.0		
#20	94.2		
#40	87.3		
#60	69.7		
#100	17.8		
#140	6.6		
#200	4.5		

* (no specification provided)

Material Description

Fine grained, SAND, with trace SHELL

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5497 D_{85}= 0.3532 D_{60}= 0.2254
D_{50}= 0.2058 D_{30}= 0.1721 D_{15}= 0.1437
D_{10}= 0.1281 C_u= 1.76 C_c= 1.02

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-87-12 B
Sample Number: 6494 (60) **Depth:** 5.0' **Date:** 12/26/12

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBS-105-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET / OF
	South Atlantic	Mobile District	1 OF 1 SHEETS

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-105-12	LOCATION COORDINATES: E = 1,141,273 N = 231,419	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL:	BEARING:	14. WATER DEPTH: 59.8 Ft.
		15. DATE BORING	STARTED: 01-04-13 / COMPLETED: 01-04-13
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -59.3 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 18.5 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Mike FitzHarris, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-59.3	0.0				
-60.8	1.5		SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, trace fines, trace shells, gray (SP)	A	Classification: SP Color: 5Y 6/2-light olive gray D50: 0.2602 mm % Fines: 2.1
-65.7	6.4		CLAY, lean, mostly clay, some fine-grained sand-sized quartz, some silt, few shell fragments, greenish gray, orangy brown, gray mottle (CL) At El. -62.8 Ft., mostly clay, trace fine-grained sand-sized quartz, trace shell fragments, greenish gray, orangy brown, gray mottle At El. -64.4 Ft., mostly clay, some fine-grained sand-sized quartz, trace shell fragments, some clay bands, gray		
-68.5	9.2		SAND, clayey, mostly fine-grained sand-sized quartz, some clay, few shell fragments, gray (SC)		
-75.0	15.7		CLAY, lean, mostly clay, trace shell fragments, trace wood debris, some fine-grained sand between 13.7 and 15.7 ft., gray (CL)	NS	
-77.8	18.5		CLAY, fat, mostly clay, very stiff, medium to high plasticity, lt. gray, orangy brown mottle (CH)		

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.13542° Long = -88.33660°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
S E R V I C E S

Core Identifier BI-PBS-105-12

Coordinate System
Latitude / Longitude

Latitude 30 008.125 N

Longitude 088 20.196 W

Date 01/04/2013

Start Time 15:40:32

End Time 15:41:19

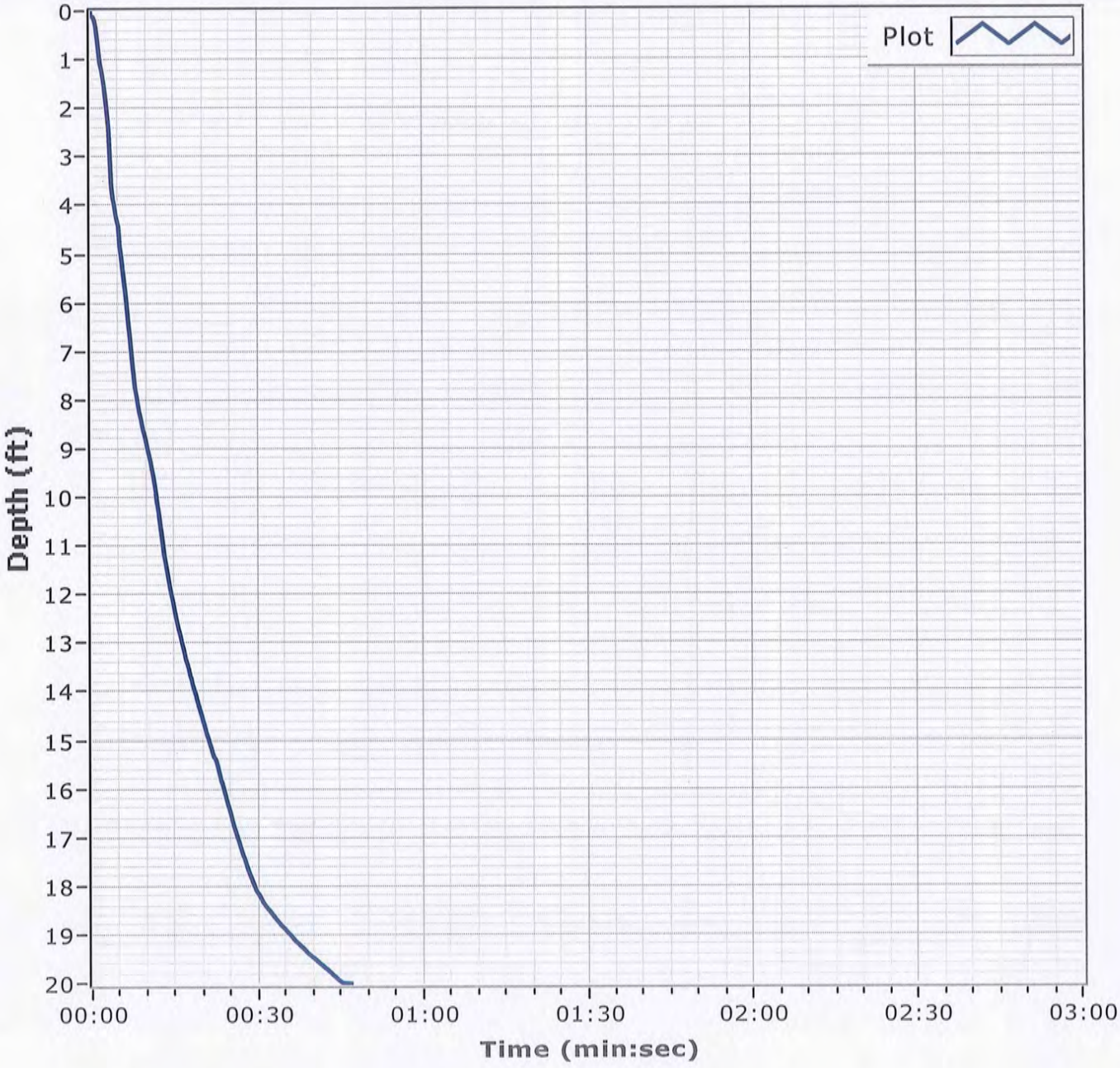
Total Time 00:00:47

Water Depth 59.8'

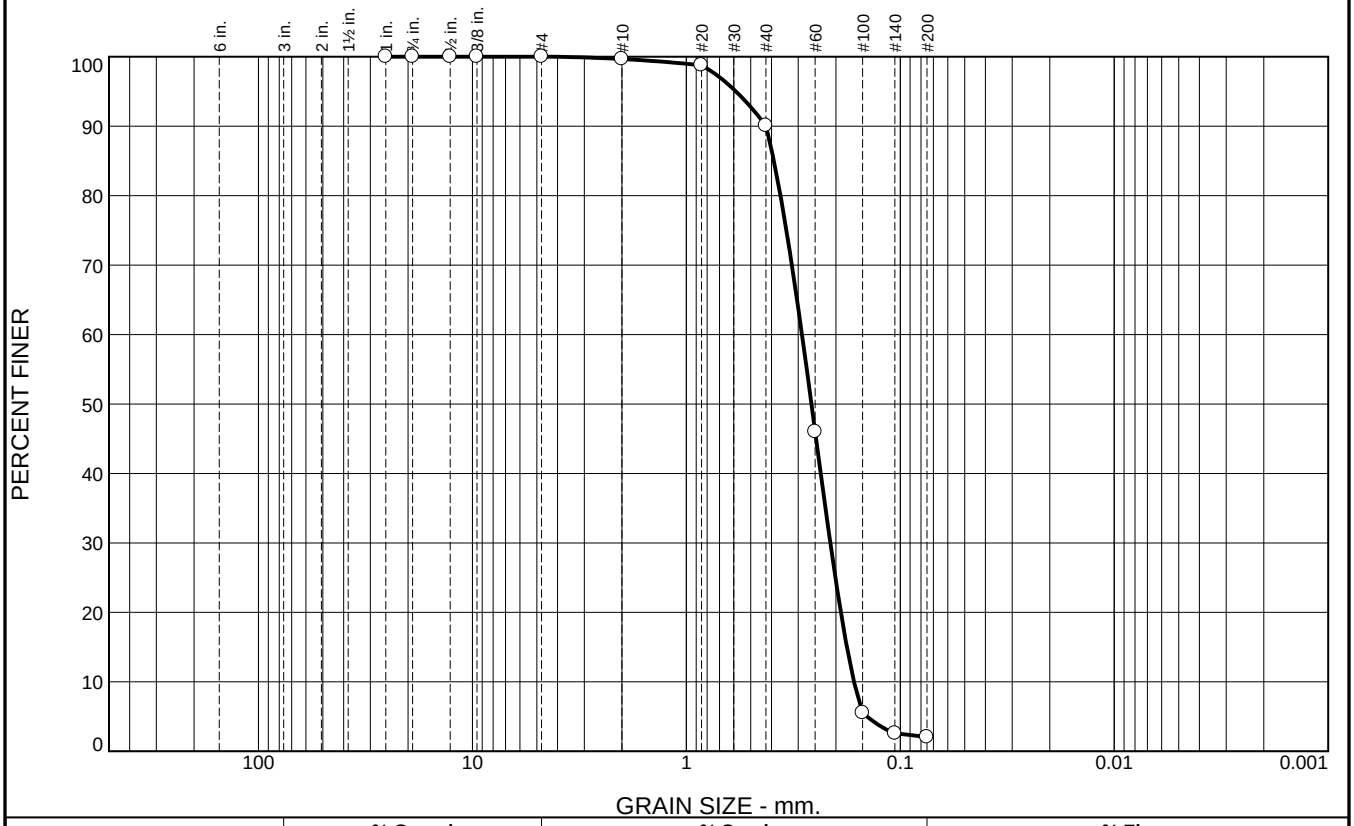
Penetration 20.0'

Recovery 18.5'

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.3	9.6	88.0	2.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	100.0		
#10	99.7		
#20	98.8		
#40	90.1		
#60	46.0		
#100	5.5		
#140	2.6		
#200	2.1		

* (no specification provided)

Material Description

Fine grained, SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4244 D_{85}= 0.3897 D_{60}= 0.2882
D_{50}= 0.2602 D_{30}= 0.2124 D_{15}= 0.1778
D_{10}= 0.1648 C_u= 1.75 C_c= 0.95

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-105-12 A
Sample Number: 6503 (23) **Depth:** 0.0' **Date:** 1/08/13

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBS-106A-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 2 SHEETS
	South Atlantic	Mobile District	

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-106A-12	LOCATION COORDINATES: E = 1,140,300 N = 231,982	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED: / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL:	BEARING:	14. WATER DEPTH: 58.4 Ft.
		15. DATE BORING	STARTED: 01-12-13 / COMPLETED: 01-12-13
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -58.9 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 20.2 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Mike FitzHarris, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-58.9	0.0				
-60.0	1.1		SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, some shell fragments, trace fines, gray (SP)	A	Classification: SP Color: 5Y 6/3-pale olive D50: 0.5035 mm % Fines: 2.5
-65.6	6.7		CLAY, lean, mostly clay, trace shell fragments, pockets of clayey sand, low to medium plasticity, stiff, orangy brown, greenish gray, and gray mottle (CL)		
-68.1	9.2		SAND, clayey, mostly fine-grained sand-sized quartz, some clay, little shell fragments, gray (SC)		
-79.1	20.2		CLAY, fat, mostly clay, trace shell fragments, trace wood debris, medium to high plasticity, stiff, trace fine-grained sandy zones throughout, gray (CH) At El. -76.5 Ft., mostly clay, trace wood debris, medium to high plasticity, very stiff, some silty pockets within zone, lt. gray	NS	

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. NS = Sample not submitted for laboratory analysis from this interval.

3. Seafloor elevation determined from USACE

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.13698° Long = -88.33967°

DRILLING LOG (Cont. Sheet)	INSTALLATION	SHEET 2 OF 2 SHEETS
	Mobile District	

PROJECT	COORDINATE SYSTEM/DATUM	HORIZONTAL	VERTICAL
MsCIP Barrier Island Restoration	State Plane, MSE (U.S. Ft.)	NAD83	NAVD88

LOCATION COORDINATES	ELEVATION TOP OF BORING
X = 1,140,300 Y = 231,982	-58.9 Ft.

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
			hydrographic survey completed April 2014.		

30
35
40
45
50
55
60

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.13698° Long = -88.33967°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
SERVICES

Core Identifier BI-PBS-106A-12

Coordinate System
Latitude / Longitude

Latitude 30 08.219

Longitude 088 20.380

Date 01/12/2013

Start Time 14:55:56

End Time 14:57:02

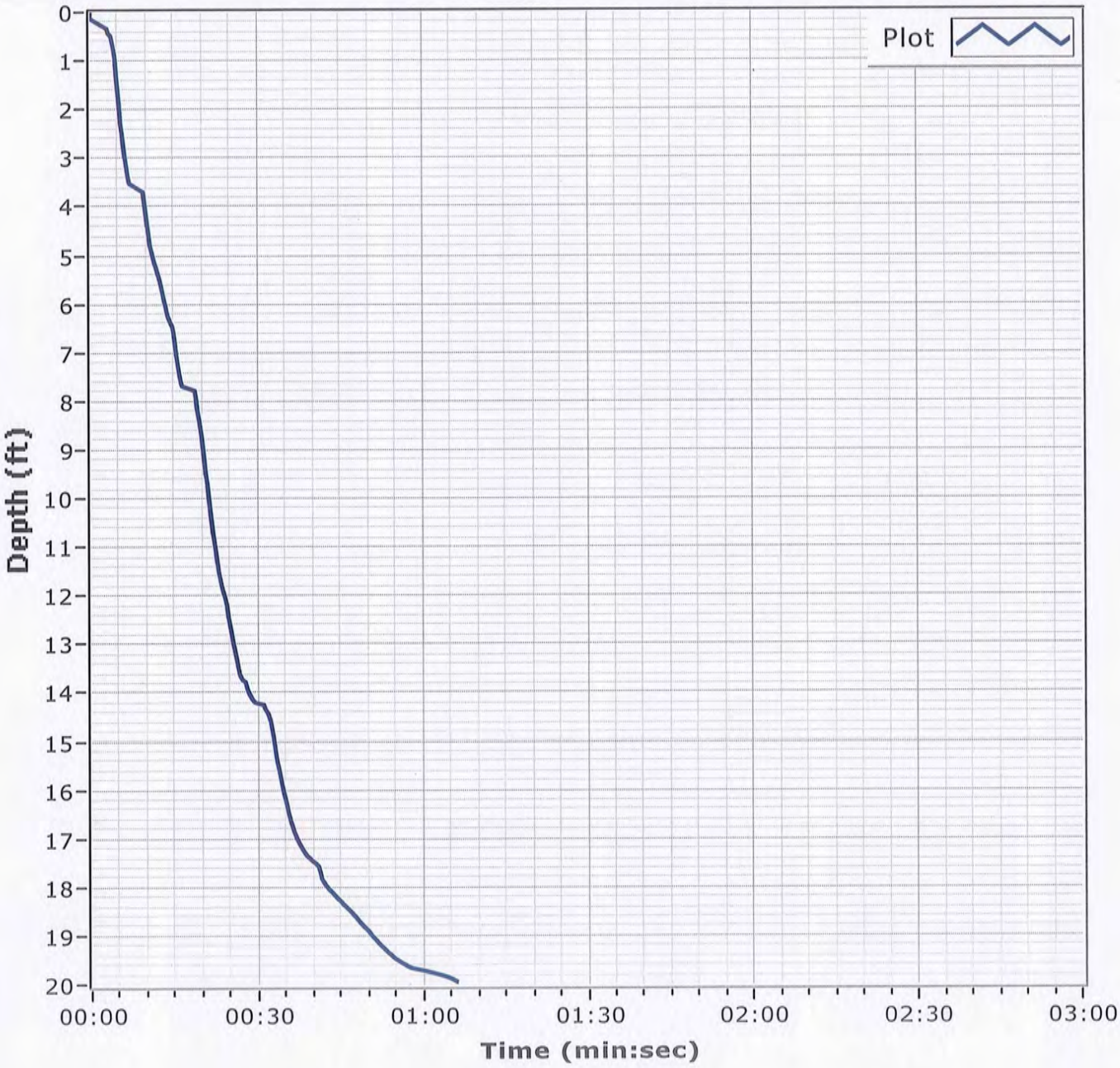
Total Time 00:01:06

Water Depth 58.4'

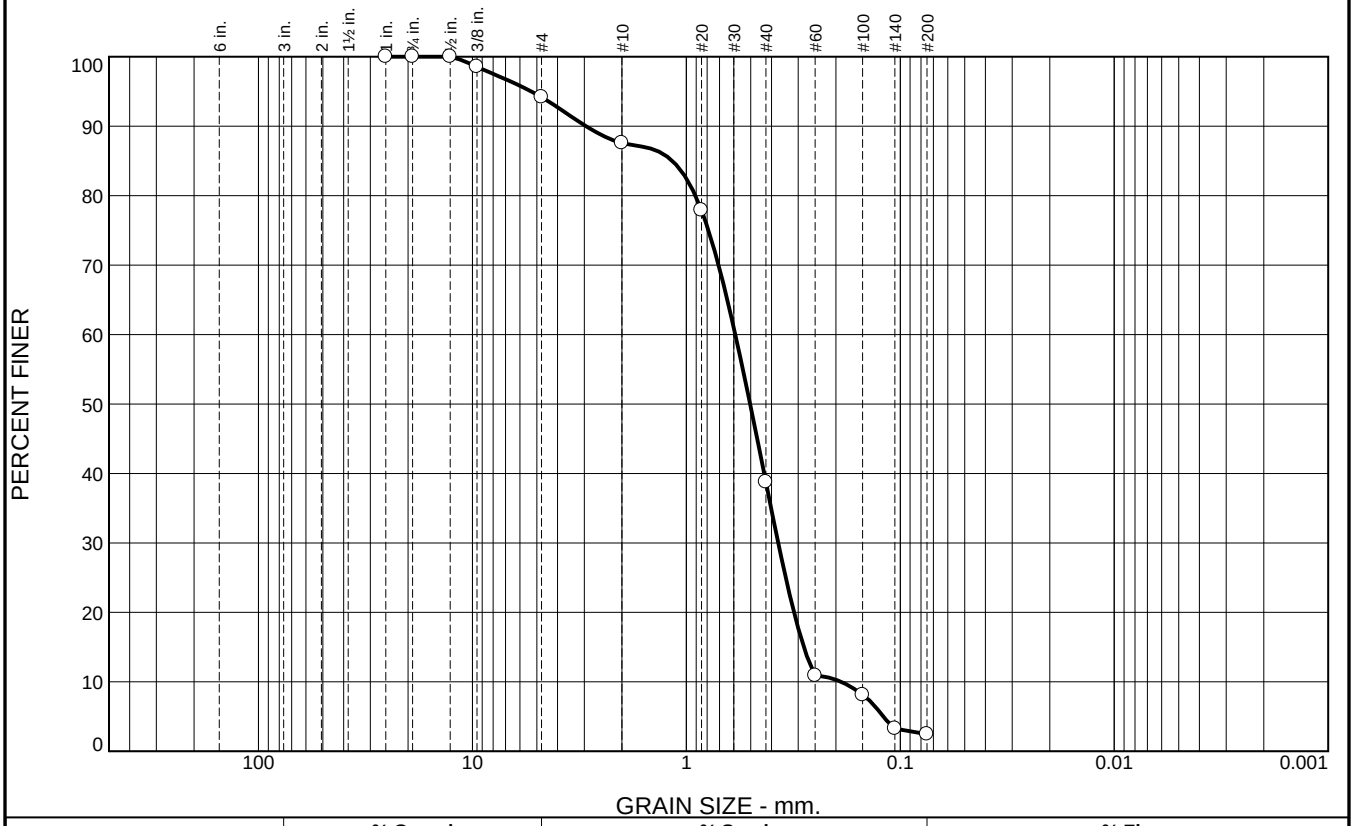
Penetration 20.0'

Recovery 20.0'

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	5.8	6.6	48.8	36.3	2.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	100.0		
.375	98.5		
#4	94.2		
#10	87.6		
#20	77.9		
#40	38.8		
#60	10.9		
#100	8.1		
#140	3.3		
#200	2.5		

* (no specification provided)

Material Description

Fine to medium grained, SAND, with trace SHELL

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 2.9447 D_{85}= 1.1613 D_{60}= 0.5904
D_{50}= 0.5035 D_{30}= 0.3720 D_{15}= 0.2827
D_{10}= 0.1888 C_u= 3.13 C_c= 1.24

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-106A-12 A
Sample Number: 6507 (6) **Depth:** 0.0' **Date:** 1/14/13

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

Boring Designation BI-PBS-114-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET / OF SHEETS
	South Atlantic	Mobile District	SHEET 1 OF 1 SHEETS

1. PROJECT: MsCIP Barrier Island Restoration, Petit Bois Pass-OCS East		9. SIZE AND TYPE OF BIT: N/A	
		10. COORDINATE SYSTEM/DATUM: State Plane, MSE (U.S. Ft.)	HORIZONTAL: NAD83 / VERTICAL: NAVD88
2. BORING DESIGNATION: BI-PBS-114-12	LOCATION COORDINATES: E = 1,142,473 N = 231,598	11. MANUFACTURER'S DESIGNATION OF DRILL: Vibracore	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY: Corps of Engineers - CESAM	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED / UNDISTURBED (UD): 0
4. NAME OF DRILLER: American Vibracore Systems, Inc.		13. TOTAL NUMBER CORE BOXES	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. WATER DEPTH: 57.3 Ft.	
		15. DATE BORING	STARTED: 01-12-13 / COMPLETED: 01-12-13
6. THICKNESS OF OVERBURDEN: N/A		16. ELEVATION TOP OF BORING: -57.9 Ft.	
7. DEPTH DRILLED INTO ROCK: N/A		17. TOTAL RECOVERY FOR BORING: 100%	
8. TOTAL DEPTH OF BORING: 18.4 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Mike FitzHarris, Geologist	

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	SAMPLE	LABORATORY RESULTS
-57.9	0.0				
-60.9	3.0		SAND, poorly-graded, mostly medium-grained sand-sized quartz, some shell fragments, gray (SP)	A	Classification: SP Color: 5Y 6/2-light olive gray D50: 0.6627 mm % Fines: 3.5
-65.1	7.2		CLAY, lean, mostly clay, some fine-grained sand-sized quartz, trace shell fragments, brownish orange, greenish gray, and gray mottle (CL) At El. -61.5 Ft., mostly clay, some fine-grained sand-sized quartz, trace shell fragments, trace wood debris, gray	NS	
-66.7	8.8		SAND, poorly-graded with silt, mostly fine-grained sand-sized quartz, few silt, alternating layers of clay within this zone, gray (SP-SM)		
-67.6	9.7		SAND, clayey, mostly fine-grained sand-sized quartz, some clay, trace shell fragments, gray (SC)		
-72.3	14.4		CLAY, fat, mostly clay, trace fine-grained sand-sized quartz, trace wood debris, medium to high plasticity, stiff, gray (CH)		
-76.3	18.4		CLAY, lean, mostly clay, some fine-grained sand-sized quartz, trace shell fragments, gray (CL)		
			NOTES: 1. Soils are field visually classified in accordance with the Unified Soils Classification System. 2. NS = Sample not submitted for laboratory analysis from this interval. 3. Seafloor elevation determined from USACE hydrographic survey completed April 2014.		

0 5 10 15 20 25

SAM FORM 1836 - MsCIP
MAY 2010

Lat = 30.1359° Long = -88.3328°

Project Mississippi Barrier Island Restoration Project

AVS
AMERICAN VIBRACORE
SERVICES

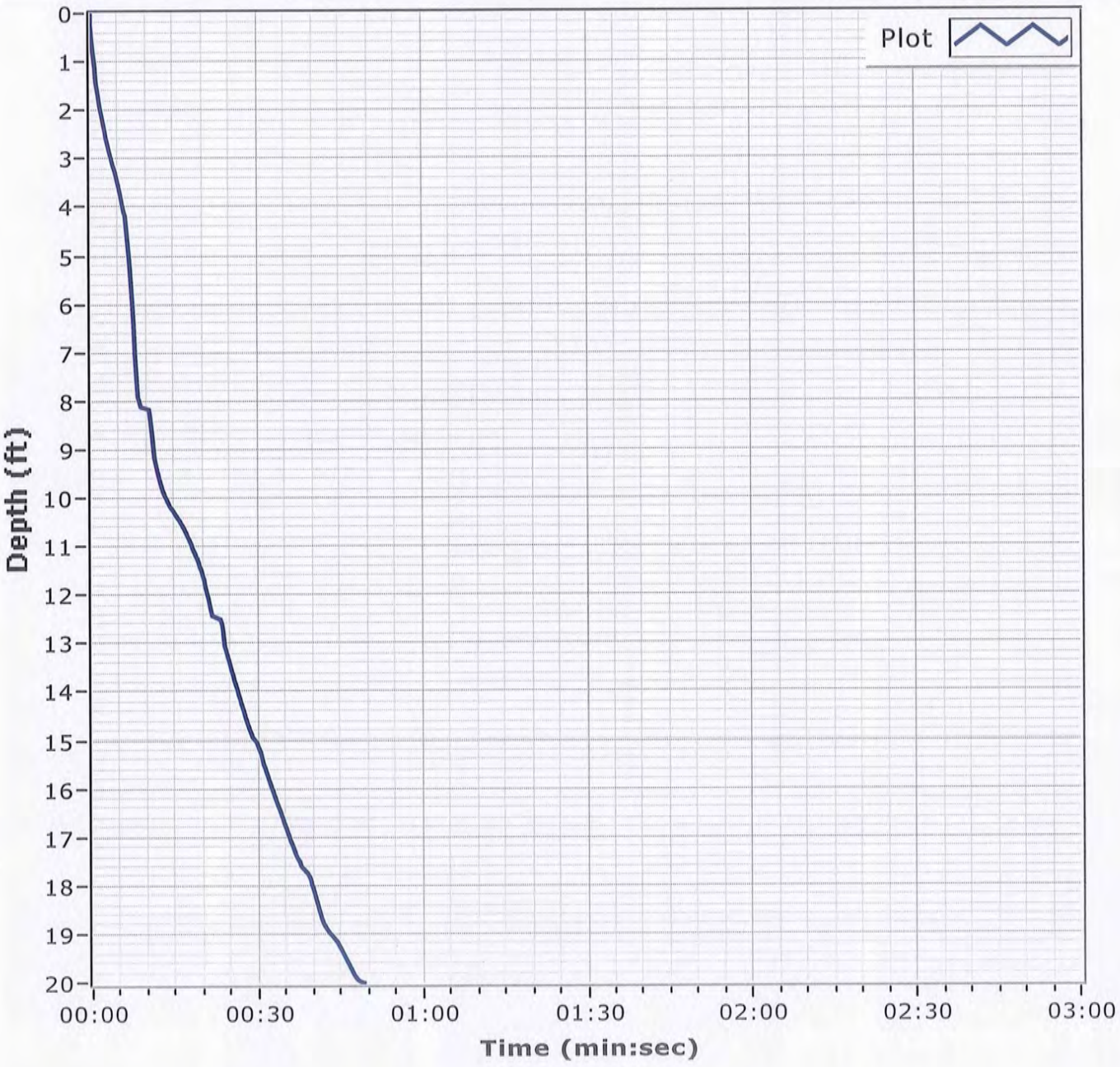
Core Identifier BI-PBS-114-12
Coordinate System
Latitude / Longitude

Date 01/12/2013
Start Time 15:36:18
End Time 15:37:08
Total Time 00:00:49

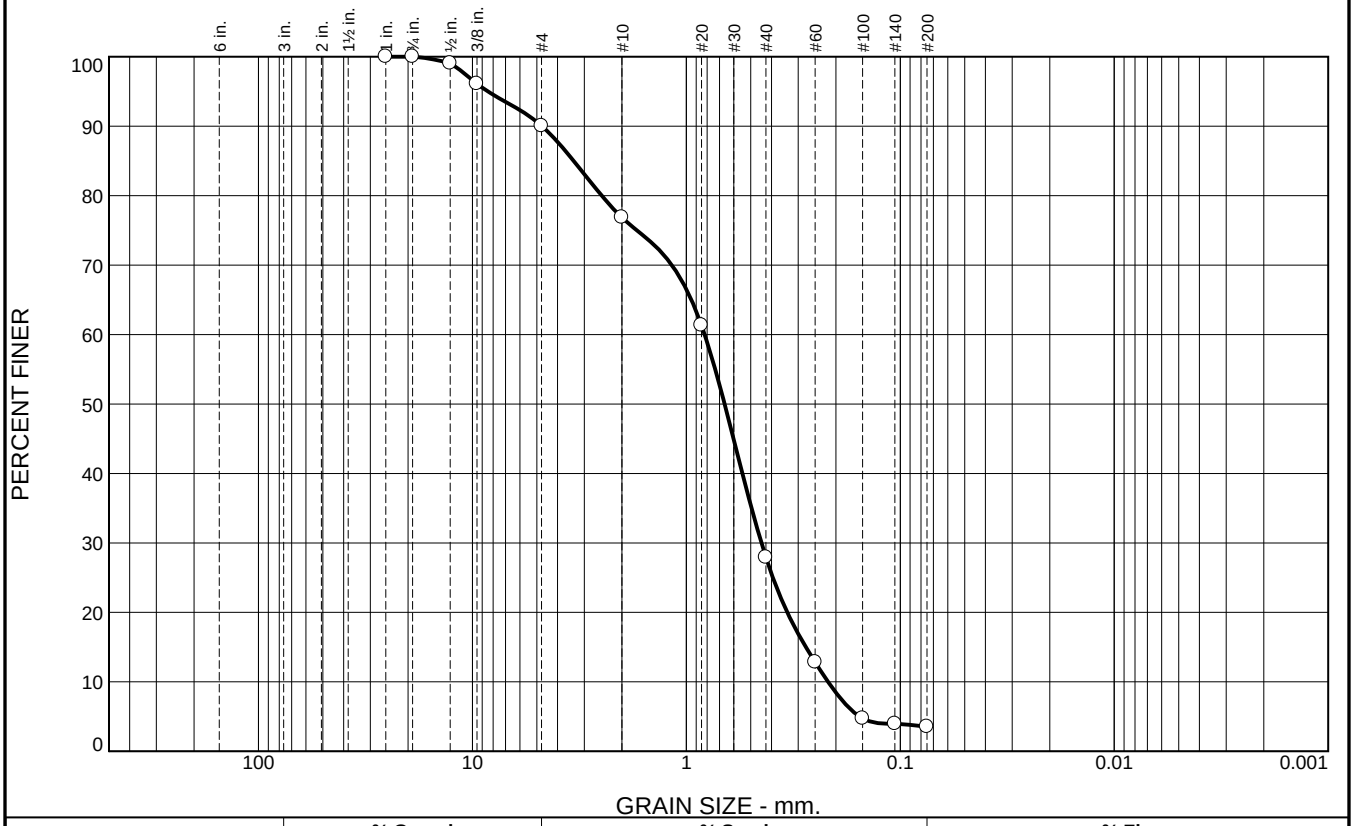
Water Depth 57.3'
Penetration 20.0'
Recovery 18.4'

Latitude 30 08.154
Longitude 088 19.968

Comments



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	10.0	13.2	48.9	24.4	3.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	100.0		
.5	99.1		
.375	96.1		
#4	90.0		
#10	76.8		
#20	61.3		
#40	27.9		
#60	12.8		
#100	4.7		
#140	3.9		
#200	3.5		

* (no specification provided)

Material Description

Fine, medium and coarse grained, SAND, with some SHELL

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 4.7311 D_{85}= 3.3642 D_{60}= 0.8215
D_{50}= 0.6627 D_{30}= 0.4460 D_{15}= 0.2764
D_{10}= 0.2175 C_u= 3.78 C_c= 1.11

Classification

USCS= SP AASHTO=

Remarks

Location: BI-PBS-114-12 A
Sample Number: 6507 (18) **Depth:** 0.0' **Date:** 1/14/13

Thompson Engineering

Mobile, Alabama

Client: CDM/Thompson Engineering JV
Project: MsCIP Barrier Island Restoration GT

Project No: 1221110095 **Figure**

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APPENDIX B

ENVIRONMENTAL

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National Park Service Special Use Permit

NPS Form 10-930
OMB No. 1024-0026
NEW 10/00
Expires 6/30/2013

National Park Service
Gulf Islands National Seashore
1801 Gulf Breeze Parkway
Gulf Breeze, FL 32561
850-934-2620

Application **for Special Use Permit**

Please supply the information requested below. **Attach additional sheets, if necessary, to provide required information**. Allow **AT LEAST** 4 business days for processing (2 business days for First Amendment requests). A non-refundable processing fee should accompany this application unless the requested use is an exercise of a First Amendment right. You will be notified of the disposition of the application and the necessary steps to secure your final permit. Your permit may require the payment of cost recovery charges and proof of liability insurance naming the United States of America as also insured.

Applicant Name:	Organization Name:
Social Security #:	Tax ID #
Street/Address:	Street/Address:
City/State/Zip Code:	City/State/Zip Code:
Telephone #:	Telephone #:
Cell phone #:	Cell phone #:
Fax #:	Fax#:
E-mail:	E-mail:

Description of Proposed Activity (attach diagram, attach additional pages if necessary):

Requested Location: _____

Date(s): _____

Event set up will begin: (date and time)	Event will begin: (date and time)	Event will end: (date and time)	Removal will be done: (date and time)

Maximum Number of Participants _____ (Please provide best estimate)

Maximum Number of Vehicles 0 _____ (attach parking plan)

Support Equipment (list all equipment; attach additional pages if necessary)

List support personnel (contractors, etc. including addresses and telephones attach additional pages if necessary)

Individual in charge of event on site (include address, telephone and cell phone numbers):

Is this an exercise of First Amendment Rights?	☐Y	☒N
Are you familiar with/ have you visited the requested area?	☒Y	☐N
Have your obtained a permit from the National Park Service in the past? (If yes, provide a list of permit dates and locations on a separate page.)	☒Y	☐N
Do you plan to advertise or issue a press release before the event?	☐Y	☒N
Will you distribute printed material?	☐Y	☒N
Is there any reason to believe there will be attempts to disrupt, protest or prevent your event?(If yes, please explain on a separate page.)	☐Y	☒N
Do you intend to solicit donations or offer items for sale? (These activities may require an additional permit.)	☐Y	☒N

The applicant by his or her signature certifies that all the information given is complete and correct, and that no false or misleading information or false statements have been given.

Signature _____ Date _____

****

Information provided will be used to determine whether a permit will be issued. Completed application must be accompanied by an application fee in the form of a cashiers check or money order in the amount of $___.00 made payable to **National Park Service**. Credit card payments may be accepted at some parks. Application and administrative charges are non-refundable.

T*his completed application should be mailed to the Park address found on the first page of this application, Attn: Bob DeLaune.*

Note that this is an application only, and does not serve as permission to conduct any use of the park. If your request is approved, a permit containing applicable terms and conditions will be sent to the person designated on the application. The permit must be signed by the responsible person and returned to the park prior to the event for final approval by the Park Superintendent.

NOTICES

Privacy Act Statement: The Privacy Act of 1974 (5 U.S.C. 552a) provides that you be furnished with the following information in connection with information required by this application. This information is being collected to allow the park manager to make a value judgment on whether or not to allow the requested use. Applicants are required to provide their social security or taxpayer identification number or activities subject to collection of fees by the National Park Service (31 U.S.C. 7701) Information from the application may be transferred to appropriate Federal, State, local agencies, when relevant to civil, criminal or regulatory investigations or prosecutions.

Paperwork Reduction Act Statement): This information is being collected subject to the Paperwork Reduction Act (44 U.S.C. 3501) to allow the park manager to make a value judgment on whether or not to allow the requested use. All applicable parts of the form must be completed. A Federal agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

Estimated Burden Statement: Public reporting burden for this form is estimated to average 30 minutes per response including the time it takes to read, gather and maintain data, review instructions and complete the form. Direct comments regarding this burden estimate or any aspects of this form to the National Park Service, Special Park Uses Program Manager, 1849 C Street NW (2460), Washington, D.C. 20240

Directions for How to Apply for a NPS Scientific Research and Collecting Permit

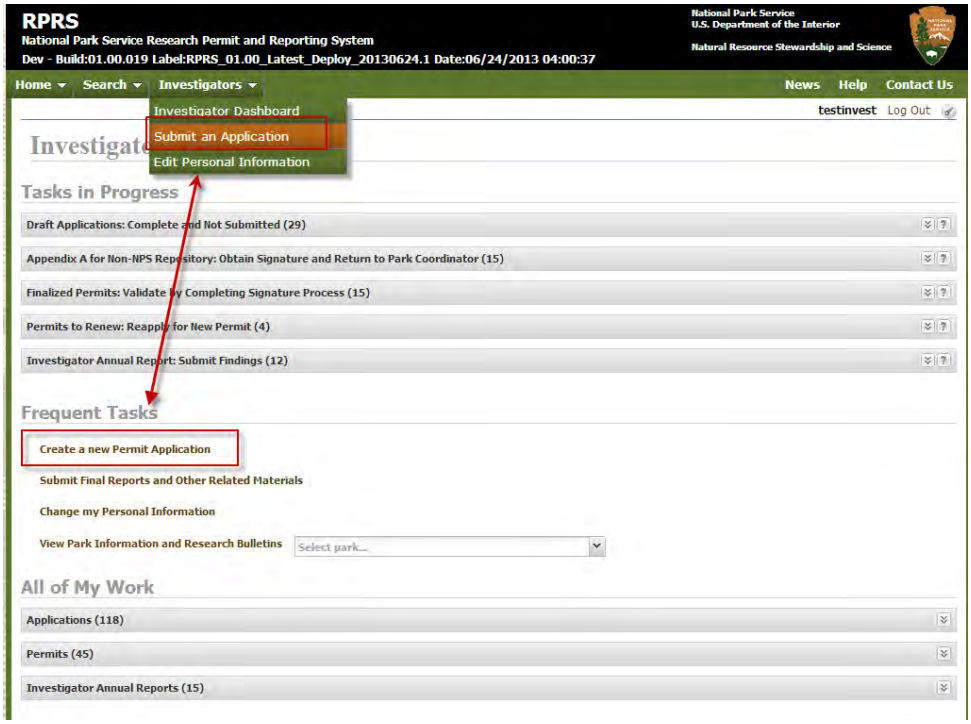
Title: Apply for a Research Permit

Summary: Summarizes the process of applying for a research permit within a National Park

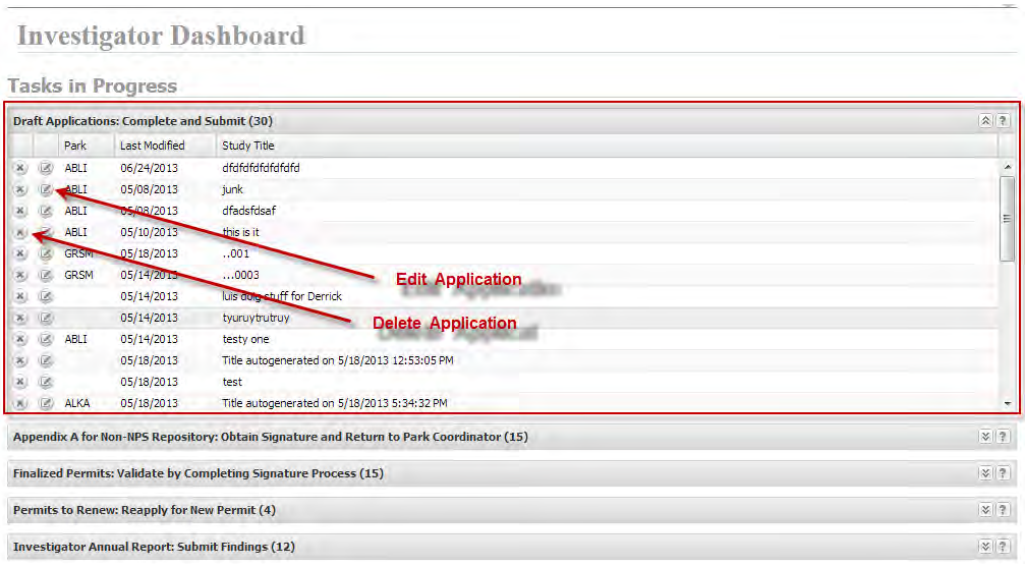
Prerequisite: You must be logged on as an Investigator

Step 1.Select Option to Create a New Research Application

From the Investigator Dashboard, you can select either link to begin the application process.

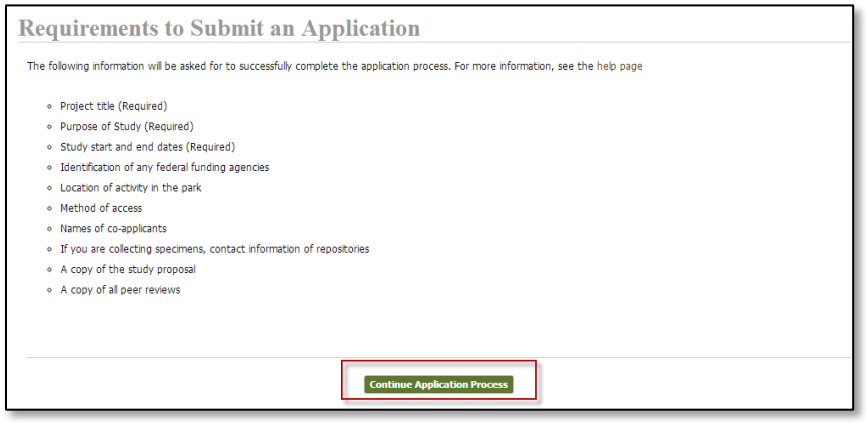


Of course, if you already have an application in process (i.e., Draft), you can continue the application process under the Draft Applications panel:



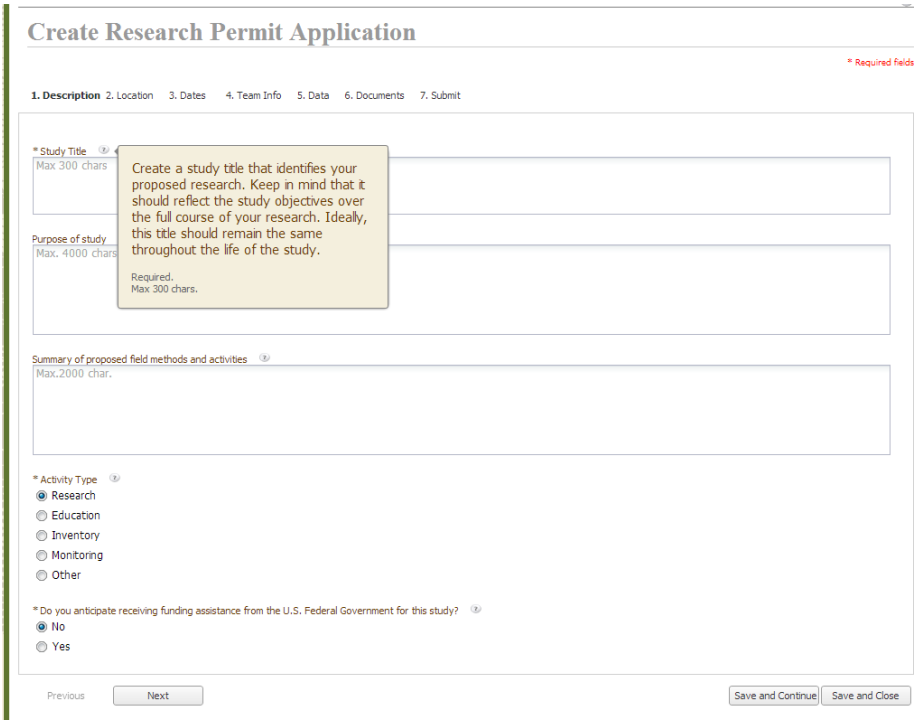
Step 2.Read the General Requirements and Select Continue

This first step gives you a heads-up of some of the information that is required or optional.



Step 3.Complete Required and Option Fields Across All Forms

There are six tabs containing fields where you can enter information. Once completed, the last tab verifies information is complete and submits your application when you are ready.

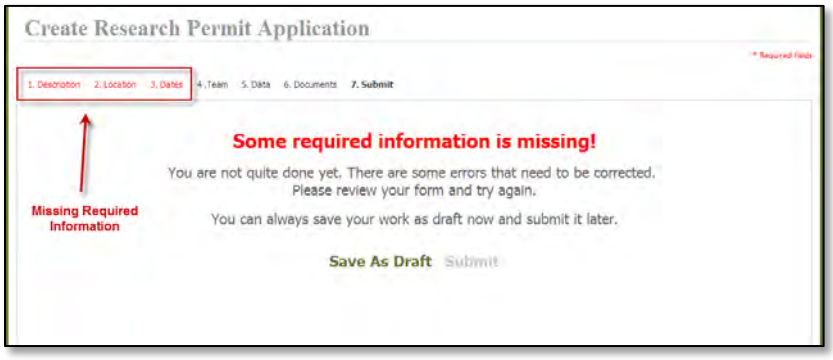


Please note the following:

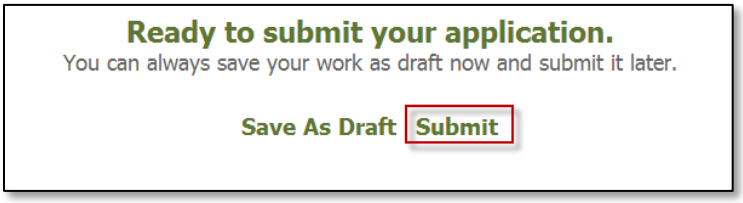
- Clicking on a question mark will give you a more detailed field description. If you still need more help, please refer to the Technical Document [LINK]
- You can optionally complete the tabs and fields in any order.
- Required fields will have an asterisk* next to them.
- You will be unable to submit your application unless required fields have been completed. However, you can save your application as 'Draft' even if required fields are not completed.

Step 4.Complete Application and Submit

Once you are ready to submit your Application, select the Submit tab. RPRS will validate whether all required fields have been completed and will indicate which tabs need review.

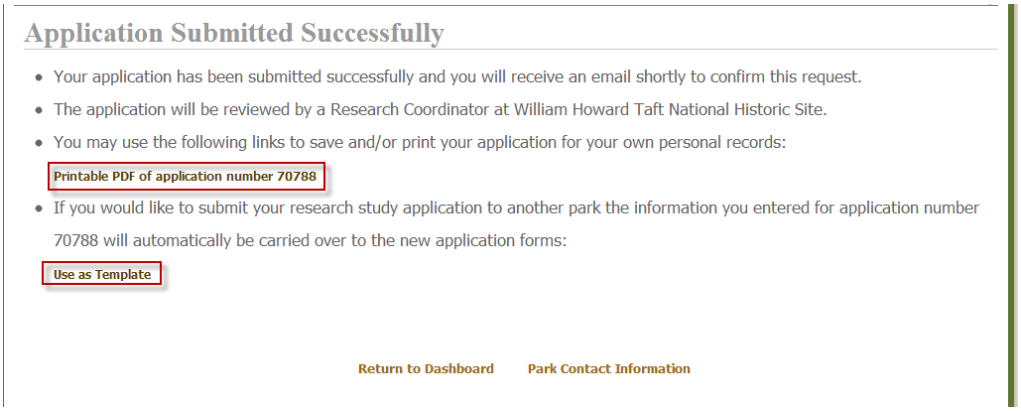


Once all required fields are completed, you will have the option to submit your application. Of course, you can still refine your application even after required fields are completed. Once the application is submitted, however, you will not be able to make further edits.



Step 5.Confirm Submission of Application

Be sure you see the screen indicating the application was successfully submitted. You should see that your application has been given a unique ID. If your study is multi-park in scope, you can now use this application as a template for another permit application. Note however, that acceptance of an application by one park has no bearing on the decision by another.



Recommended Modules to Read Next

Obtain and Appendix A Signature

Use An Existing Application as a Template for Another

Sign a Permit

Mississippi Department of Environmental Quality and Mississippi Department of Marine Resources Certifications

STATE OF MISSISSIPPI
PHIL BRYANT
GOVERNOR
MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
GARY C. RIKARD, EXECUTIVE DIRECTOR

April 8, 2016

Certified Mail No. 7010 1870 0003 4946 8855

Dr. Susan I. Rees, Program Manager
Mississippi Coastal Improvements Program
Department of the Army
Mobile District, Corps of Engineers
P. O. Box 2288
Mobile, Alabama 36628-0001

Dear Dr. Rees:

Re: US Army Corps of Engineers,
Mobile District,
Mississippi Coastal
Improvements Program
Barrier Island Restoration
Jackson, Harrison, and Hancock
Counties
COE No. FP16-MsCIP01-10
WQC No. WQC2016005

Pursuant to Section 401 of the Federal Water Pollution Control Act (33 U. S. C. 1251, 1341), the Office of Pollution Control (OPC) issues this Certification, after public notice and opportunity for public hearing for, US Army Corps of Engineers, Mobile District, Mississippi Coastal Improvements Program, an applicant for a Federal License or permit to conduct the following activity:

> US Army Corps of Engineers, Mobile District, Mississippi Coastal Improvements Program (MsCIP): proposes to enhance the Mississippi Barrier Islands by the following projects. Ship Island Restoration project includes filling of the 3.5 mile-long Camille Cut with approximately 13.5 million cubic yards of sand and replenishment of the southern shoreline of East Ship Island by placement of approximately 5.5 million cubic yards of sand. The combined Camille Cut and East Ship Island equilibrated fill would encompass approximately 1,500 acres. The Cat Island project includes the placement of approximately 2 million cubic yards of sand along the eastern side of Cat Island to restore it to 1998 conditions. Following

OFFICE OF POLLUTION CONTROL
POST OFFICE BOX 2261 • JACKSON, MISSISSIPPI 39225-2261• TEL: (601) 961-5171 • FAX: (601) 354-6612 • www.deq.state.ms.us
AN EQUAL OPPORTUNITY EMPLOYER

the placement of sand, the area would be revegetated with native grasses. For both restoration projects the borrowed material will be dredged either a cutter-head pipeline or a hopper dredge. MsCIP also included a modification to the management of future dredged material placement within Horn Island Pass of the Pascagoula Federal Navigation Channel. The intent is to ensure placement of future dredged material with in the littoral zone replicates natural sediment pathways. The total area for potential direct placement would encompass approximately 1,600 acres, including existing DA-10 site, and the Littoral Zone placement site, with existing depths generally between 5 and 30 feet.
[FP16-MsCIP01-10, WQC2016005].

The Office of Pollution Control certifies that the above-described activity will be in compliance with the applicable provisions of Sections 301, 302, 303, 306, and 307 of the Federal Water Pollution Control Act and Section 49-17-29 of the Mississippi Code of 1972, if the applicant complies with the following conditions:

1. The dredging activities shall be conducted in such a manner that no sumps are created within the dredge areas.

2. All fill material and excavated areas shall have side slopes of at least 3:1 (horizontal:vertiacal) and shall be immediately seeded, stabilized, and maintained.

3. Best management practices should be used at all times during construction to minimize turbidity at both the dredge and restoration sites. The restoration sites shall be constructed and maintained in a manner that minimizes the discharge of turbid waters into waters of the Mississippi Sound. Best management practices should include, but not limited to, the use of staked hay bales; staked filter cloth; sodding, seeding and mulching; staged construction; and the installation of turbidity screens around the immediate project site.

4. The applicant shall submit detailed monitoring plans documenting water quality monitoring activities to confirm compliance with existing water quality criteria, prior to the beginning of construction. The plan shall establish baseline conditions and monitor conditions. If the monitoring identifies problems with water quality, corrective actions shall be described. The plan shall be approved by the Department prior to implementation of any monitoring and will be in compliance with methods as outlined in the Mississippi Water Quality Certification regulations including an approved Quality Assurance Project Plan (QAPP).

5. Turbidity outside the limits of a 750-foot mixing zone shall not exceed the ambient turbidity by more than 50 Nephelometric Turbidity Units. The turbidity within the Ship Island and Cat Island project areas may reasonably exceed this turbidity standard for temporary periods of time but shall not result in permanent environmental harm.

6. No sewage, oil, refuse, or other pollutants shall be discharged into the watercourse.

The Office of Pollution Control also certifies that there are no limitations under Section 302 nor standards under Sections 306 and 307 of the Federal Water Pollution Control Act which are applicable to the applicant's above-described activity.

This certification is valid for the project as proposed. Any deviations without proper modifications and/or approvals may result in a violation of the 401 Water Quality Certification. If we can be of further assistance, please contact us.

Sincerely,

Harry M. Wilson, P.E., DEE
Chief, Environmental Permits Division

HMW: ld

cc: Ms. LeKesha Reynolds, U.S. Army Corps of Engineers, Mobile District
Ms. Willa Brantley, Department of Marine Resources
Mr. Paul Necaise, U.S. Fish and Wildlife Service
Ms. Callista Mills, Environmental Protection Agency

STATE OF MISSISSIPPI

PHIL BRYANT

GOVERNOR

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY

GARY C. RIKARD, EXECUTIVE DIRECTOR

June 10, 2019

Certified Mail No. 7010 0780 0001 9993 2651

Mr. Curtis M. Flakes
US Army Corps of Engineers, Mobile District
109 St. Joseph Street
Mobile, AL 36602

Dear Mr. Flakes:

Re: US Army COE, Mobile District, Mississippi Coastal Improvements Program, Barrier Island Restoration
Harrison County
COE No. FP16-MsCIP01-10
WQC No. WQC2016005

The Department of Environmental Quality understands the need for a Section 401 Water Quality Certification - Modification to the above referenced project. This modification would include obtaining fill for the project differently than originally proposed. The description has been modified to include obtaining fill as follows:

1. Ship Island Borrow Area Option 2: Expand the currently authorized area from 183 acres and 2.7 mcy to 634 acres and 7.8 mcy
2. Petit Bois Pass- OCS West (1-6) Expand authorized dredging boundaries to include a 150-foot "anchorage only" area, as well as an additional 3 feet of maximum allowable overdepth on top of the current 2 feet of allowable overdepth, for a total maximum allowable dredge volume of 13.6 mcy.
3. Petit Bois Pass - OCS East (1-5): Expand authorized dredging boundaries to include a 150-foot "anchorage only" area, as well as an additional 3 feet of maximum allowable overdepth on top of the current 2 feet of allowable overdepth, for a total maximum allowable dredge volume of 3.8 mcy.
4. Ship Island Pass (Old Gulfport Harbor Channel): Utilize 22 acres and .5 mcy of material as an additional borrow area option.

OFFICE OF POLLUTION CONTROL
POST OFFICE BOX 2261 • JACKSON, MISSISSIPPI 39225-2261• TEL: (601) 961-5171 • FAX: (601) 354-6612 • www.deq.state.ms.us
AN EQUAL OPPORTUNITY EMPLOYER

Please be advised all conditions of the Section 401 Water Quality Certification are unchanged. If we can be of further assistance, please contact Paul Devine of my staff at (601) 961-5336.

Sincerely,

Krystal Rudolph

Krystal Rudolph, P.E., BCEE
Chief, Environmental Permits Division

STATE OF MISSISSIPPI
Phil Bryant
Governor

MISSISSIPPI DEPARTMENT OF MARINE RESOURCES
Jamie M. Miller, Executive Director

April 6, 2016

Mr. Curtis M. Flakes
Chief, Planning and Environmental Division
U.S. Army Corps of Engineers
Mobile District
P.O. Box 2288
Mobile, Al 36628

Re: DMR-160200; FP16-MsCIP01-10

Dear Mr. Flakes:

The Department of Marine Resources (DMR) in cooperation with other state agencies is responsible under the Mississippi Coastal Program (MCP) for managing the coastal resources of Mississippi. Proposed activities in the coastal area are reviewed to ensure that the activities are in compliance with the MCP.

The Department has completed review of the proposed the Mississippi Coastal Improvements Program, Comprehensive Barrier Island Restoration plan to place 1,500 acres of fill within the Ship Island portion of the National Park Service's Gulf Islands National Seashore, MS unit to close Camille Cut between East and West Ship Islands and to ameliorate erosion of the southern shoreline of East Ship Island. Of these 1,500 acres, 800 acres will be placed above the Mean High Water Line and 700 acres of sand will be placed below the Mean High Water Line in state water bottoms. In addition, the plan includes the filling of 305 acres for the restoration of the eastern shoreface of Cat Island, Mississippi including revegetation as outlined in your letter dated January 27, 2016, under the Coastal Zone Management Act of 1972 and the Coastal Zone Reauthorization Amendments of 1990 and as the lead Coastal Program Agency for the State of Mississippi pursuant to 16 U.S.C. Section 1456(c) and Mississippi Code § 57-15-5, concurs with the U.S. Corps of Engineers' consistency certification for this project.

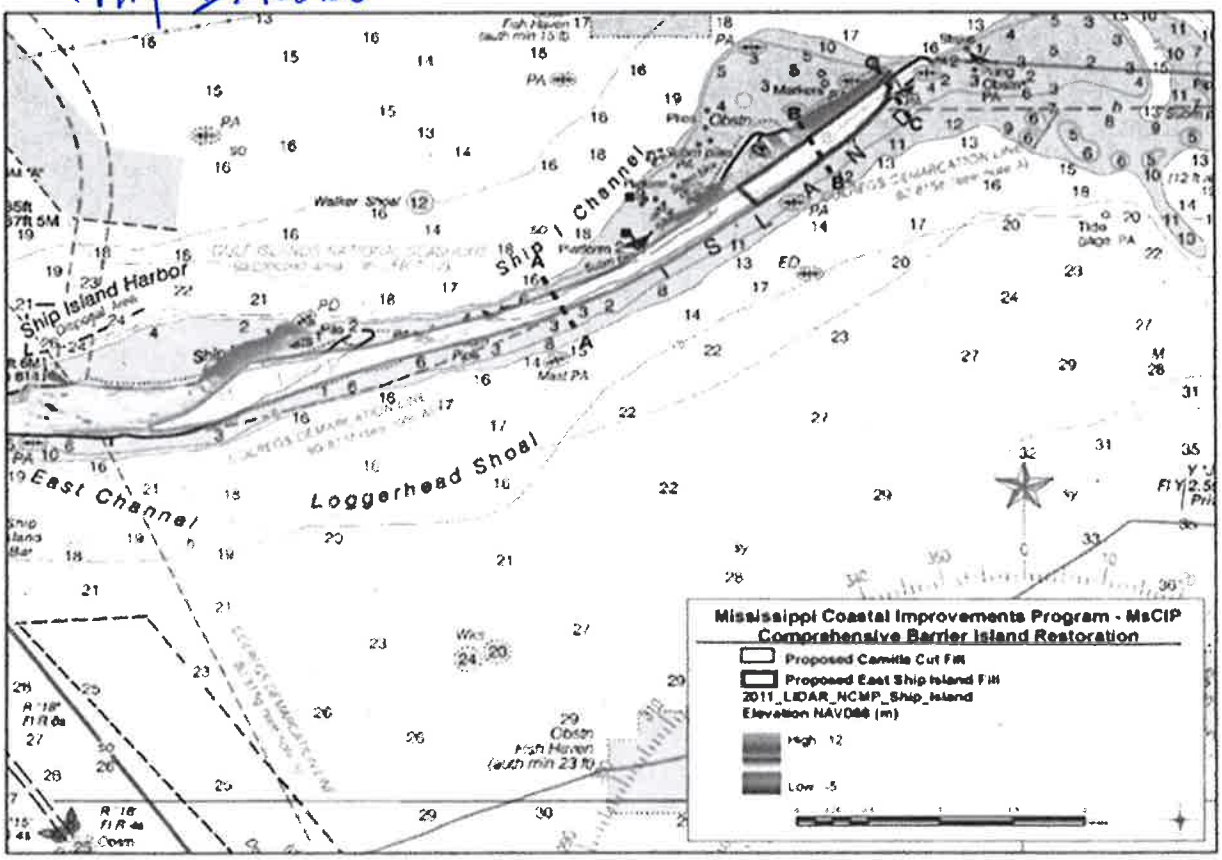
The above granted consistency certification was based upon the plan presented. If you have any questions regarding this letter, please contact Jennifer Wilder with the Bureau of Wetlands Permitting at 228-523-4121 or Jennifer.wilder@dmr.ms.gov

Sincerely,

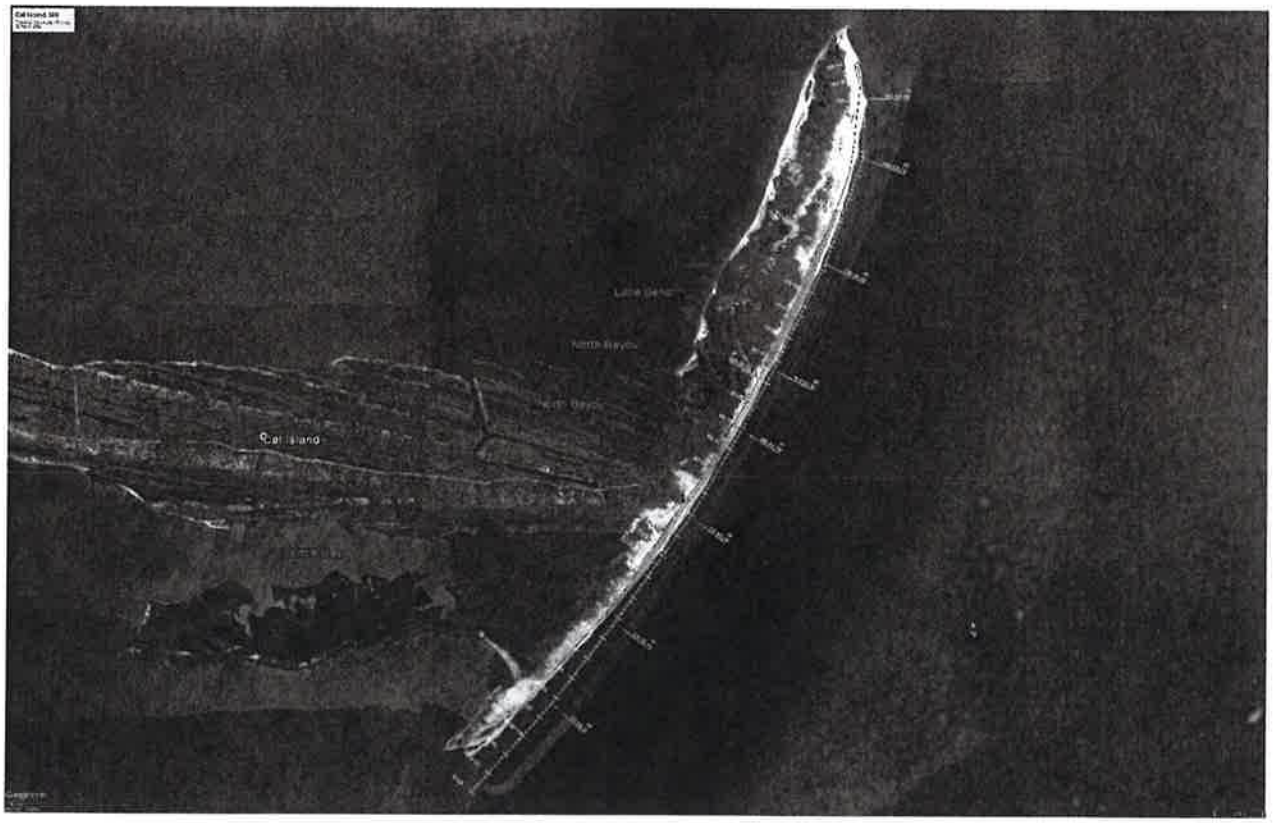
Jamie M. Miller
Executive Director
Mississippi Department of Marine Resources

JMM/jjw

Ship Island



Cat Island



STATE OF MISSISSIPPI
Phil Bryant
Governor

MISSISSIPPI DEPARTMENT OF MARINE RESOURCES
Joe Spraggins, Executive Director

May 31, 2019

Mr. Curtis M. Flakes
Chief, Planning and Environmental Division
U.S. Army Corps of Engineers
Mobile District
P.O. Box 2288
Mobile, Al 36628

Re: DMR-160200; FP19-MsCIP01-13

Dear Mr. Flakes:

The Department of Marine Resources (DMR) in cooperation with other state agencies is responsible under the Mississippi Coastal Program (MCP) for managing the coastal resources of Mississippi. Proposed activities in the coastal area are reviewed to ensure that the activities are in compliance with the MCP.

The Department has completed review of the proposed the Mississippi Coastal Improvements Program, Comprehensive Barrier Island Restoration plan to place 1,500 acres of fill within the Ship Island portion of the National Park Service's Gulf Islands National Seashore, MS unit to close Camille Cut between East and West Ship Islands and to ameliorate erosion of the southern shoreline of East Ship Island. Of these 1,500 acres, 800 acres will be placed above the Mean High Water Line and 700 acres of sand will be placed below the Mean High Water Line in state water bottoms. In addition, the plan includes the filling of 305 acres for the restoration of the eastern shoreface of Cat Island, Mississippi including revegetation as outlined in your letter dated January 27, 2016. In lieu of purchasing the necessary sandy material from Alabama, the Mobile District proposes to do the following:

- Expand the currently authorized Ship Island Borrow Area Option 3 from approximately 183 acres and 2.7 mcy to approximately 634 acres and 7.8 mcy
- Expand PBP-OCS West authorized dredging boundaries to include 150-foot "anchorage only" area, as well as an additional 3 feet of maximum allowable overdepth on top of the current 2 feet of allowable overdepth. Therefore, increasing the currently authorized 5.1 mcy to 13.6 mcy.
- Expand PBP-OCS East authorized dredging boundaries to include 150-foot "anchorage only" area, as well as an additional 3 feet of maximum allowable

overdepth on top of the current 2 feet of allowable overdepth. Therefore, increasing the currently authorized 1.2 mcy to 3.8 mcy.

- Utilize 22 acre area called Ship Island Pass for approximately 0.5 mcy of material

Under the Coastal Zone Management Act of 1972 and the Coastal Zone Reauthorization Amendments of 1990 and as the lead Coastal Program Agency for the State of Mississippi pursuant to 16 U.S.C. Section 1456(c) and Mississippi Code § 57-15-5, concurs with the U.S. Corps of Engineers' consistency certification for this project.

The above granted consistency certification was based upon the plan presented. If you have any questions regarding this letter, please contact Jennifer Wilder with the Bureau of Wetlands Permitting at 228-523-4121 or Jennifer.wilder@dmr.ms.gov

Sincerely,

Joe Spraggins
Executive Director
Mississippi Department of Marine Resources

JS/jjw

Unanticipated Discoveries

SEE APPENDIX E
ENVIRONMENTAL
MONITORING
REQUIREMENTS

ODESS System Requirements and Forms

End of the Project

At the completion of project, the dredging Contractor shall coordinate with a designated USACE district QA/QC point of contact (POC) to determine whether electronic or paper copies of all applicable Observer paper forms will be submitted for the project. Information previously entered on the Post Hopper Dredging Checklist will be available on the ODESS public website (http://dqm.usace.army.mil/odess) for the dredging project.

HARDWARE REQUIREMENTS

The dredge shall be equipped and the Contractor is responsible for an ODESS hardware system consisting of a tablet computer, wireless keyboard, wireless mouse and data modem (or equivalent onboard internet connection) along with a proper tote bag and setup location for the afore mentioned hardware components. If a hardware problem occurs, or if a part of the system is physically damaged, the Contractor shall be responsible for repairing it within 48 hours of determination of the condition. The Contractor shall also keep ODESS personnel updated on the status of the onboard ODESS system and the progress of any repairs.

Computer

The Contractor shall provide a dedicated onboard tablet computer for use by the observers and shall have ODESS software installed on it prior to project initiation. This computer shall be located and oriented to allow data entry and data viewing. It must meet or exceed the following specifications:

Tablet Hardware Component	Specification
CPU	Intel or AMD processor with a (non-overclocked) clock speed of at least 2.4 gigahertz (GHz)
Hard Disk	128 gigabytes (GB); solid state internal storage
RAM	4 gigabytes (GB)
Network Adapter	Internal wired or wireless network hardware to match internet connection
Video Adapter	Support for 1024x768 resolution at 16-bit color depth
Display	>= 10.8 in.
Integrated Camera	2MP HD webcam (front); 8MP (back)
Ports	1 free USB port

Internet Access

The Contractor shall maintain an Internet connection capable of transmitting data to the ODESS database. The telemetry system shall always be available and have connectivity in the contract area. If connectivity is lost, unsent data shall be stored locally within the FC tool and transmitted upon restoration of connectivity. The Contractor shall acquire and install all necessary hardware and software to make the Internet connection available for data

transmission to the ODESS database. The hardware and software must be configured to allow remote access to the computer by USACE ODESS personnel. Coordination between the dredging company's IT and ODESS Support may be required in order to configure remote access though any security, firewall, router, and telemetry systems. Telemetry systems must be capable of meeting these minimum reporting requirements in all operating conditions.

SOFTWARE REQUIREMENTS

ODESS personnel shall be responsible for installing and testing all ODESS software tools on the dedicated onboard ODESS tablet computer. No other software which conflicts with the ODESS function of recording and transmitting data shall be installed on the tablet computer. The Contractor shall be responsible for installing and/or maintaining any necessary manufacturer-provided software for the installed hardware. If any software problem occurs, the Contractor shall contact ODESS Support at ODESS@usace.army.mil or 1.877.840.8024.

The ODESS tablet computer shall have the following minimum software installed in support of the ODESS system.

Software Component	**Specification**
Operating System	Windows 10, Contractor-installed
Browser**	Chrome, Internet Explorer, Contractor-installed
ODESS Software	Field Collector (FC) tool, USACE ODESS Support-installed
Remote Access Software	Team Viewer, USACE ODESS Support-installed
**Latest version recommended, Chrome is preferred.	

Operations and Dredging Endangered Species System (ODESS)
USACE Sea Turtle Deflector Checklist for Hopper Dredges for USACE and USACE/Army-Permitted Projects

1. Read the contract plans and specs and/or all applicable permits (Dept. of the Army Permit, State Permits) to determine the contract or permit requirements for the protection of endangered sea turtles. (Each District spec or permit may be different.)
2. Read the Biological Opinion and any USACE Protocol, if available.
3. Develop a list of inspection requirements:
    a. Deflector leading edge angle (90° or less).
    b. Approach angle or leading edge plowing depth (6" or more).
    c. Aft rigid attachment of the deflector to the draghead (hinged or trunnion).
    d. Forward deflector attachment point (adjustable pinned or cable/chain with stop).
    e. Opening between draghead and deflector (4" x 4" max).
    f. Dredged material screening requirement (yes/no).
    g. Screen type requirement (inflow, overflow, or both).
    h. Inflow basket screen openings (4" x 4" max) and dredged material screening (100%).
    i. Lighting of the inflow and overflow screens and proper access for cleaning (must meet EM 385-1-1).
    j. UXO (Unexploded Ordnance) screening in use (yes/no).
    k. Structural design of the deflector (per the approved deflector submittal).
    l. Dredge operational requirements (starting/stopping the dredge pump, draghead plugging, raising the draghead, turning the dredge).

m. Dredging Quality Management (DQM) dredging data recording requirement. Is dredging data recording (drag elevation, slurry density, and velocity) required by specs or permit? If so, is it being collected, is DQM turned on, and is data being submitted?

n. Turtle trawling requirement. Is turtle trawling required by specs or permit? If so, is it being performed?

o. Turtle observer requirements (12 or 24 hours).

p. A copy of the approved turtle deflector submittal is on board the vessel.

q. Copies of the contract plans and specs or the Dept. of the Army permit are on board the vessel.

4. Review the turtle deflector submittal. (Do not allow dredging to start until the submittal is approved.)

   a. Structural soundness.

   b. Deflector leading edge angle (90° or less).

   c. Approach angles submitted for the project's dredging depths.

   d. 4" x 4" opening between the deflector and the draghead.

   e. Aft rigid deflector attachment to draghead (hinged or trunnion).

   f. Forward deflector attachment point (adjustable pinned or cable/chain with stop).

5. Ensure that the Contractor Quality Control (CQC) performs a pre-dredging inspection. The CQC is required to review and inspect all items in section 3.

6. Ensure that the CQC performs a startup-dredging inspection:

   a. The CQC is required to check the turtle deflector to see if the deflector is installed and adjusted for the required dredge depth of the project in accordance with the approved deflector submittal.

   b. The CQC is required to ensure that the drag tenders are operating the dredge pump and draghead in accordance with the specs/permit.

   c. The CQC should perform a paint test to ensure that the deflector is plowing at least 6" into the dredge material while the dragtender is consistently maintaining the submitted and approved approach angle to a tolerance of +0 to -4°.

   d. The CQC should note the inspection results in the Quality Control (QC) Daily Report.

7. Quality Assurance (QA) should perform a dredging operation inspection soon after the dredge starts dredging:

   a. Review and inspect all items in section 3.

b. Inspect the turtle deflector to ensure that the deflector is installed and adjusted for the required dredge depth of the project in accordance with the approved deflector submittal.

c. Require the contractor to perform a paint test to ensure that the deflector is plowing at least 6" into the dredge material while the dragtender is consistently maintaining the submitted and approved approach angle to a tolerance of +0 to -4°. (While over-penetration of the deflector may reduce production and increase fuel consumption of the dredge, it is allowed.)

d. Ride the dredge through at least one dredging cycle (from dredging to the dump and then back to the dredge site).

e. Watch the dragtender to ensure that he/she is operating the dredging equipment in accordance with the plans and specs:

    i Starting the dredge pump only when the draghead is firmly on the bottom by watching the slurry specific gravity and swell compensator.

    ii Reducing the slurry velocity to the dredge pump idle speed velocity before raising the draghead off the bottom.

    iii Consistently maintaining the approach angle to a tolerance of +0 to -4° whenever the draghead is on the bottom and the dredge pump is operating

    iv Raising the draghead off the bottom due to draghead plugging or ship crabbing.

f. Ensure that the lockout tagout procedure for cleaning the inflow and overflow screens meets EM 385-1-1.

g. Talk to the turtle observers to ensure that they are aware of contract and permit requirements and that they are inspecting the screens and deflectors and reporting any required maintenance to the dredge personnel. Also ensure that correct turtle observer forms are being used and filled out properly.

h. Talk to the dredge Captain about maintaining the screens and deflectors.

i. Ensure that DQM data is being sent to the National Dredging Quality Management Program.

j. Note all pre-dredge/post-dredge and followup inspections in the QA and the QC Daily Reports.

Project Name: _____

Project Location: _____

Contract No.: _____

Dept. of the Army Permit No.: _____

Dredging Company Name: _____

Dredge Name: _____

Contractor CQC Inspector's Name: _____

USACE Inspector Name: _____

Office Symbol: _____ Date of Inspection: _____

Comments: _____

Operations & Dredging Endangered Species System (ODESS)

Dredge Load

US Army Corps of Engineers®

District

Project

Contract

Dredge

Dredging Company

Load Number (*Required*)/Date

Start Date (*Required*)

Start Time (*24 hours*) (*Required*)

Stop Date (*Required*)

Stop Time (*24 hours*) (*Required*)

Port Screen Condition
- ☐ Excellent
- ☐ Good
- ☐ Fair
- ☐ Bad

Starboard Screen Condition
- ☐ Excellent
- ☐ Good
- ☐ Fair
- ☐ Bad

Overflow Screen Condition
- ☐ Excellent
- ☐ Good
- ☐ Fair
- ☐ Bad

Inflow Screen Percent
- ☐ 25%
- ☐ 50%
- ☐ 75%
- ☐ 100%

Overflow Screen Percent
- ☐ 25%
- ☐ 50%
- ☐ 75%
- ☐ 100%

Other Screen Percent
- ☐ 25%
- ☐ 50%
- ☐ 75%
- ☐ 100%

Dragheads Used

Draghead Length (*ft*)

Draghead Width (*ft*)

Draghead Type
- ☐ California Style
- ☐ IHC
- ☐ IHC + Water Injection
- ☐ Wild Dragon
- ☐ Other (Specify)

Deflector Condition
- ☐ Good
- ☐ Fair
- ☐ Poor
- ☐ None

UXO Screening in Use?
- ☐ Yes
- ☐ No

Material Type
- ☐ Clay
- ☐ Consolidated Material
- ☐ Mud
- ☐ Other
- ☐ Rock
- ☐ Sand - Course
- ☐ Sand - Fine
- ☐ Sand - Medium
- ☐ Sand - Mixed
- ☐ Shell
- ☐ Silt
- ☐ Unknown

Weather Conditions
- ☐ Sunny
- ☐ Cloudy
- ☐ Partly Cloudy

Beaufort Sea Scale
- ☐ 0 (0-1 kn, 0-0 ft)
- ☐ 1 (1-3 kn, 0-1 ft)
- ☐ 2 (4-6 kn, 1-2 ft)
- ☐ 3 (6-10 kn, 2-3.5 ft)
- ☐ 4 (10-16 kn, 3.5-6 ft)
- ☐ 5 (16-21 kn, 6-9 ft)
- ☐ 6 (21-27 kn, 9-13 ft)
- ☐ 7 (27-33 kn, 13-19 ft)
- ☐ 8 (33-40 kn, 19-25 ft)
- ☐ 9 (40-47 kn, 25-32 ft)
- ☐ 10 (47-55 kn, 32-41 ft)
- ☐ 11 (55-63 kn, 41-52 ft)
- ☐ 12 (>63 kn, >52 ft)

Wave Height (*ft*)

Wind Speed (*K*)

Wind Direction (°)

Tide
- ☐ High
- ☐ Low
- ☐ Slack
- ☐ Rising
- ☐ Falling
- ☐ Unknown

Air Temp (℃)

Surface Water Temp (℃)

Mid-Depth Water Temp (℃)

Bottom Water Temp (℃)

Trawling Being Conducted?
- ☐ Yes
- ☐ No

Any Incidents Involving Endangered or Protected Species?
- ☐ Yes
- ☐ No

If Yes, Which Species? (*Complete a Turtle or Sturgeon Incident form*)
- ☐ Marine Mammal
- ☐ Sea Turtle
- ☐ Sturgeon
- ☐ Other
- ☐ Unknown

Whale Sighting Notification Received?
- ☐ Yes
- ☐ No

Alert Sent to District?
- ☐ Yes
- ☐ No

Screen Contents

1 Port Screen Contents (*incl. # of each item*)

2 Starboard Screen Contents (*incl. # of each item*)

3 Overflow Screens Contents (*incl. # of each item*)

4 Other Screen or Location (*Specify*) Contents (*incl. # of each item*)

5 Port Draghead Contents (*incl. # of each item*)

6 Starboard Draghead Contents (*incl. # of each item*)

Comments

Observers Used/24 Hours

% Monitoring/Project
- ☐ None
- ☐ 25%
- ☐ 50%
- ☐ 75%
- ☐ 100%

Observer(s) Name(s) (*Req; Print*)

Observer(s) Signature(s)

Observer(s) Company

Notes:
- Screen Contents—Examples include sea turtle (sp.), sturgeon (sp.), shark (sp.), ray (sp.), other fish of note (sp.), horseshoe crab, blue crab, other crab species, coral, jellyballs, other species of note, environmental debris, and trash.

Operations & Dredging Endangered Species System (ODESS)

Marine Mammal Observation

US Army Corps of Engineers®

District

Project

Contract

Dredge

Dredging Company

Load Number (*Required*)/Date

Start Date (*Required*)

Start Time (*24 hours*) (*Required*)

End Date (*Required*)

End Time (*24 hours*) (*Required*)

Beaufort Sea State

- ☐ 0 (0-1 kn, 0-0 ft)
- ☐ 1 (1-3 kn, 0-1 ft)
- ☐ 2 (4-6 kn, 1-2 ft)
- ☐ 3 (6-10 kn, 2-3.5 ft)
- ☐ 4 (10-16 kn, 3.5-6 ft)
- ☐ 5 (16-21 kn, 6-9 ft)
- ☐ 6 (21-27 kn, 9-13 ft)
- ☐ 7 (27-33 kn, 13-19 ft)
- ☐ 8 (33-40 kn, 19-25 ft)
- ☐ 9 (40-47 kn, 25-32 ft)
- ☐ 10 (47-55 kn, 32-41 ft)
- ☐ 11 (55-63 kn, 41-52 ft)
- ☐ 12 (>63 kn, >52 ft)

Species Observed (*Required*)

- ☐ Bryde's/Sei Whale #____ Est. Length (*ft.*) ____
- ☐ Fin Whale #____ Est. Length (*ft.*) ____
- ☐ Humpback Whale #____ Est. Length (*ft.*) ____
- ☐ Manatee #____ Est. Length (*ft.*) ____
- ☐ Minke Whale #____ Est. Length (*ft.*) ____
- ☐ Pilot Whale #____ Est. Length (*ft.*) ____
- ☐ Right Whale #____ Est. Length (*ft.*) ____
- ☐ Unknown #____ Est. Length (*ft.*) ____

Air Temp (℃)

Water Temp (℃)

Winds (*K*)

Seas (*ft*)

Cloud Cover (%)

Magnetic Bearing to Sighting

Estimated Distance

Vessel's Heading

Heading of Animal(s)

Coloration

Fins or Flippers Observed

Behaviors Observed

Surfacing Intervals Time

Surfacing Intervals Distance

Comments (*Was the behavior of the animal(s) affected by the vessel? How far did the animal(s) move? Who was notified?*)

Observer(s) Name(s) (*Required; Print*)

Observer(s) Signature(s)

Observer(s) Company

Operations & Dredging Endangered Species System (ODESS)

Sturgeon Incident

US Army Corps of Engineers®

District

Project

Contract

Dredge

Dredging Company

Species (*Required*)
☐ Atlantic ☐ Gulf ☐ Unknown
☐ Green ☐ Shortnose

Load Number (*Required*)/Date

Recovery Date (*Required*)

Recovery Time (*24 hours*) (*Required*)

Is this a Take? (*Required*)
☐ Yes
☐ No

Incident/Take Description

Location Specimen Recovered
☐ Deck
☐ Draghead
☐ Inflow Cage (*Circle one*) Starboard/Port/Other
☐ Hopper
☐ Overflow Screen (*Circle one*) Starboard/Port/Other
☐ Pipe

Specimen Condition
☐ Alive
☐ Dead
☐ Fresh Dead
☐ Moderately Decomposed
☐ Severely Decomposed
☐ Skeleton
☐ Skeleton Old Bone
☐ Undetermined

Rows of Preanal Shields (*SSN = 1/ATL = 2*)

Location Comment

Dorsal Scutes (*SSN = 8-13/ATL = 7-16*)

Lateral Scutes (*SSN = 22-33/ATL = 24-35*)

Ventral Scutes (*SSN = 7-11/ATL = 6-9*)

Fork Length (*cm/in*)

Standard Length (*cm/in*)

Total Length (*cm/in*)

Mouth Width (*cm/in*)

Head Width at Eyes (*cm/in*)

Other (*cm/in*)

Genetic Samples Taken?
☐ Yes ☐ No

Samples Frozen/Preserved?
☐ Yes ☐ No

Photo Attached?
(*If Yes, label the species, date, geographic site, and dredge name on the photo*)
☐ Yes ☐ No

Comments

Use these diagrams to illustrate the specimen/part that was recovered.





Observer(s) Name(s) (*Required; Print*)

Observer(s) Signature(s)

Observer(s) Company

Operations & Dredging Endangered Species System (ODESS)

Turtle Incident

US Army Corps of Engineers®

District

Project

Contract

Dredge

Dredging Company

Species (*Required*)
- ☐ Green
- ☐ Hawksbill
- ☐ Kemp's Ridley
- ☐ Leatherback
- ☐ Loggerhead
- ☐ Unknown

Load Number (*Required*)/Date

Is this a Take? (*Required*)
- ☐ Yes
- ☐ No

Project Incident # (*Required*)

Recovery Date (*Required*)

Recovery Time (*24 hours*) (*Required*)

Incident/Take Description

Air Temp (℃)

Surface Water Temperature (℃)

Mid-Depth Water Temperature (℃)

Bottom Water Temperature (℃)

Location Specimen Recovered
- ☐ Deck
- ☐ Draghead
- ☐ Inflow Cage (*Circle one*) Starboard/Port/Other
- ☐ Hopper
- ☐ Overflow Screen (*Circle one*) Starboard/Port/Other
- ☐ Pipe

Location Comment

Age Class
- ☐ Juvenile (*10.1-80 cm*)
- ☐ Sub-Adult (*80.1-87 cm*)
- ☐ Adult (*>87 cm*)
- ☐ Unknown

Gender
- ☐ Female
- ☐ Male
- ☐ Unknown

Specimen Condition
- ☐ Alive
- ☐ Dead
- ☐ Fresh Dead
- ☐ Moderately Decomposed
- ☐ Severely Decomposed
- ☐ Skeleton
- ☐ Skeleton Old Bone
- ☐ Undetermined

How Gender Determined
- ☐ Tail Length
- ☐ Eggs Observed
- ☐ Other

Photo Attached? (*If Yes, label the species, date, geographic site, and dredge name on the photo*)
- ☐ Yes
- ☐ No

Tag Type
- ☐ Flipper
- ☐ Pit
- ☐ Other (*Specify*)

Head Width (*cm/in*)

Tag Number

Plastron Length (*cm/in*)

Carapace Straight Length (*cm/in*)

Carapace Curved Length (*cm/in*)

Tag Date

Plastron Width (*cm/in*)

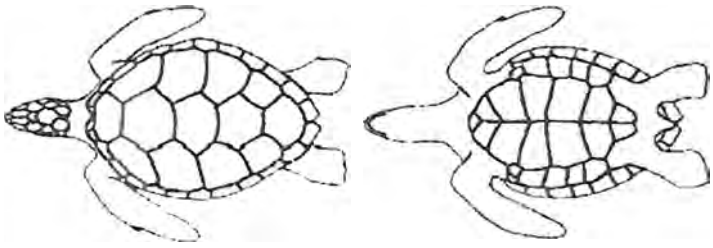
Carapace Straight Width (*cm/in*)

Carapace Curved Width (*cm/in*)

Genetic Samples Taken?
- ☐ Yes
- ☐ No

Final Disposition of Specimen

Use these diagrams to illustrate the specimen/part that was recovered.



Comments

Observer(s) Name(s) (*Required; Print*)

Observer(s) Signature(s)

Observer(s) Company

Operations & Dredging Endangered Species System (ODESS)

US Army Corps of Engineers®

Relocation Trawl Daily Report

Project Name: _____

Trawler Name: _____

Trawling for Dredge(s): _____

Date (*mm*/dd/*yyyy*): _____ Tow Numbers: _____ Total Tows: _____

Project Captures: _____ By Species: Cc _____ Lk _____ Cm _____ Dc _____

Start Time First Tow (*24 hrs*): _____ End Time Last Tow (*24 hrs*): _____

Ops Area: _____

Ops Borrow Area Designation

Ops Area Lat/Long (Shoreward): N _____ ° _____ . _____ BA - _____

W _____ ° _____ . _____

Ops Area Lat/Long (Seaward): N _____ ° _____ . _____ BA - _____

W _____ ° _____ . _____

Beaufort Sea State: 0 1 2 3 4 5 6 7 Air Temperature: _____ °C/°F

Wind Direction: _____ Wind Speed: _____ Wave Height: _____

Water Temperature (*1 fathom*): _____°C/°F Bottom Type: _____

ENDANGERED SPECIES CAPTURED, Total for the Day: _____

Species: _____ Tow #: _____ End Time: _____

Species: _____ Tow #: _____ End Time: _____

Species: _____ Tow #: _____ End Time: _____

General Release Location Lat/Long: N _____ ° _____. _____

W _____ ° _____. _____

Bycatch and Other Comments (including dredge presence/absence from the job site:

_____

_____

_____

_____

_____

Biologist: _____

FIBROPAPILLOMA DOCUMENTATION FORM

Please complete for every turtle exhibiting fibropapillomas and submit with the STSSN report form.

Observer:_____ Stranding Date:_____

Stranding Number by Day:_____ Species:_____

1. **Please select sites where tumors are present:**

☐ Left Eye ☐ Right Eye ☐ Inside Mouth ☐ Neck

☐ Base Front Flippers ☐ Base Rear Flippers ☐ Along Front Flippers ☐ Along Rear Flippers

☐ Around Tail ☐ On Carapace ☐ On Plastron Other_____

2. **How many fibropapillomas are less than 1 cm in diameter? (select one)**

◯ 0 ◯ 1 - 5 ◯ greater than 5

3. **How many fibropapillomas are between 1 cm and 4 cm in diameter? (select one)**

◯ 0 ◯ 1 - 5 ◯ greater than 5

4. **How many fibropapillomas are between 4 cm and 10 cm in diameter? (select one)**

◯ 0 ◯ 1 - 3 ◯ greater than 3

5. **How many fibropapillomas are greater than 10 cm? (select one)**

◯ 0 ◯ 1 - 3 ◯ greater than 3

6. **Do you believe that vision was blocked by fibropapillomas? (select all that apply)**

☐ No ☐ Yes, in Left Eye ☐ Yes, in Right Eye ☐ Yes, in Both Eyes

7. **Please describe the size and exact location of any fibropapillomas inside the mouth.**

_____

_____

_____

Please be sure to take photographs showing all ventral and dorsal surfaces. Please also take one "head-on" photograph of the turtle. If there is a fibropapilloma inside the mouth, please take a photograph of it. Make sure to note Fibropapilloma present in the Comments section on the STSSN form. For dead turtles, *If the turtle is not a green turtle, or if it has a fibropapilloma inside the mouth, please salvage the carcass and contact your local Sea Turtle Stranding Salvage Network Coordinator.*

National Marine Fisheries Service Biological Opinion Incidental Take Statement and Terms and Conditions

INCIDENTAL TAKE STATEMENT (ITS)

Section 9 of the ESA and protective regulations issued pursuant to Section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. Harm is further defined by NMFS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of Section 7(b)(4) and Section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the RPMs and terms and conditions of the ITS.

Anticipated Amount or Extent of Incidental Take

Based on historical distribution data, hopper dredge observer reports, observations of past strandings, and increasing turtle populations of loggerhead, Kemp's ridley, and green sea turtles in the action area, we estimate that these 3 species may occur in the action area and may be taken by the hopper dredging operations of this project, by crushing and/or entrainment in suction dragheads. NMFS anticipates incidental take in both state and OCS waters will consist of up to 14 sea turtles observed (9 Kemp's ridleys and 5 loggerheads; or a combination of 8 Kemp's ridley and 4 loggerhead and 2 green turtle) or 28 total (observed and unobserved - 18 Kemp's ridley and 10 loggerheads; or a combination of 16 Kemp's ridley and 8 loggerhead and 4 green turtle) and 8 (observed and unobserved) Gulf sturgeon killed during dredging, which will be detected and documented by onboard protected species observers (Table 23). NMFS also anticipates that capture trawling may result in up to 400 non-injurious captures and relocations of an estimated (up to) 169 loggerhead, 216 Kemp's ridley, 10 green, and 5 leatherback sea turtles and 30 Gulf sturgeon in both state and OCS waters. Trawl capture will also result in 2 lethal captures of Kemp's ridleys sea turtles (but it may also consist of either a loggerhead or green) and 1 lethal capture of Gulf sturgeon both state and OCS waters.

Amount of Authorized Observed Take During the MsCIP Project and Associated Relocation Trawling

During Dredging	**Loggerhead**	**Kemp's ridley**	**Green**	**Leatherback**	**Gulf sturgeon**
Total Species Observed Lethally Taken	**5 or 4**	**9 or 8**	**2**	**0**	**4**
<u>During Relocation Trawling</u>					
Total Species Nonlethally Taken	**169**	**216**	**10**	**5**	**30**
Total Species Lethally Taken	**1**	**2**	**1**	**0**	**1**

Reasonable and Prudent Measures

Section 7(b)(4) of the ESA requires NMFS to issue a statement specifying the impact of any incidental take on listed species, which results from an agency action otherwise found to comply with Section 7(a)(2) of the ESA. It also states the RPMs necessary to minimize the impacts of take and the terms and conditions to implement those measures, must be provided and must be followed to minimize those impacts. Only incidental taking by the federal agency that complies with the specified terms and conditions is authorized.

The RPMs and terms and conditions are specified as required, by 50 CFR 402.14(i), to document the incidental take of ESA-listed species by the proposed action, to minimize the impact of that take, and to specify the procedures to be used to handle any individuals taken. These measures and terms and conditions are non-discretionary and must be implemented by the USACE, BOEM, and NPS in order for the protection of Section 7(o)(2) to apply. The USACE, as the lead agency, in cooperation with BOEM and NPS has a continuing duty to regulate the activity covered by this incidental take statement. If the USACE fails to adhere to the terms and conditions through enforceable terms, and/or fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of Section 7(o)(2) may lapse.

Current Regional Opinions for hopper dredging require observers to document takes, deflector dragheads, and conditions and guidelines for relocation trawling, which NMFS believes are necessary to minimize effects dredging activities on listed sea turtle species that occur in the action area. NMFS has determined that the following RPMs, patterned after long-standing hopper dredging requirements, are necessary and appropriate to minimize impacts of the incidental take of sea turtles during the proposed action. The RPMs that NMFS believes are necessary to minimize and monitor the impacts of the proposed hopper dredging have been discussed with the USACE, BOEM, and NPS in the past and are standard operating procedures, including use of sea turtle deflector dragheads, use of dredged material inflow and overflow screening, observer and reporting requirements, and relocation trawling. The following RPMs and associated terms and conditions are established to implement these measures, to document incidental takes, and to specify procedures for handling individuals taken. Only incidental takes that occur while these measures are in full implementation are authorized.

1. The USACE as the lead agency, in cooperation with BOEM and NPS shall implement best management measures, including use of temperature- and date-based dredging windows, sea turtle deflector dragheads, disengagement of dredging pumps when they are not on the bottom, limiting dredge lights seasonally, and relocation trawling to reduce the risk of injury or mortality of listed species and lessen the number of sea turtles killed by the proposed action.

Rationale: Temperature- and date-based dredging windows appear to be very effective in reducing sea turtle entrainments, by avoiding times and places either where turtle densities are high or their behaviors may make them less susceptible to entrainment. Draghead deflectors provide a last line of defense, by acting as physical barriers,

reducing the likelihood that turtles that are close to the draghead are actually entrained. When the suction dragheads are not firmly placed on the bottom during dredging operations, sea turtles encountered by the dragheads can be crushed underneath them and/or impinged or sucked into the suction pipes by the powerful suction, almost always resulting in death. Seasonally limiting dredge lights will help reduce potential disorientation effects on female sea turtles approaching the nesting beaches and sea turtle hatchlings making their way seaward from their natal beaches. Relocation (i.e., capture) trawling reduces the risk of turtle entrainment even when turtle densities are high, possibly by either temporarily reducing the local density of turtles in the channel where the dredge is working or by modifying the turtles' behavior temporarily and making them less susceptible to entrainment. In addition, the use of relocation trawling provides the USACE, BOEM, and NPS with valuable real-time estimates of sea turtle abundance, takes, and distribution which have been helpful to USACE, BOEM, and NPS project planning efforts to reduce sea turtle impacts, for example by delaying or changing the location of hopper dredge deployment in response to sea turtle density information in the channel.

2. The USACE, as the lead agency, in cooperation with BOEM and NPS shall have measures in place to detect and report all interactions with any protected species (ESA or Marine Mammal Protection Act) resulting from the proposed action. These measures include endangered species observers aboard the hopper dredge and relocation trawlers, screening of dredged material to allow discovery of any entrained turtles and sturgeon, and handling procedures for incidentally taken animals.

Rationale: NMFS-approved observers monitor dredged material inflow and overflow screening baskets and relocation trawling efforts to monitor and report incidental take. Gathering basic biological information (e.g., size which will help determine the age class) will enable monitoring of the impact of the take on the species taken. PIT tagging, external flipper tagging, and tissue sampling of turtles and Gulf sturgeon captured pursuant to relocation trawling, including genetic analysis of tissue samples taken from dredge- and trawl-captured turtles, will provide important monitoring information about the animals taken during relocation trawling. Tagging will inform about the fate of the turtles and Gulf sturgeon relocated should they be recaptured or strand subsequent to being relocated. Tissue sampling will identify which sea turtle and Gulf sturgeon stocks are being impacted and their geographic origin.

3. The USACE as the lead agency, in cooperation with BOEM and NPS will continue Gulf sturgeon monitoring efforts at Ship Island which are being conducted by the USACE's Engineer Research and Development Center (ERDC) and others. The objective is to characterize the seasonal occurrences and movements of the sturgeon around Ship Island and within Camille Cut and adjacent passes. In particular, the telemetry monitoring during construction on Ship Island and after construction has been finalized (post-construction). This monitoring will refine the benthos assessment applied to the 2011-2012 deployment period (e.g., re-evaluate metrics for defining high/low

categories), refine and finalize description of “important” prey items, and apply this new approach to current benthos dataset.

The USACE will provide more detailed evaluation of detection history of individual fish to identify movement patterns (i.e., corridors) in comparison to long duration residency areas (i.e., feeding). The USACE will follow a detailed outline of the proposed monitoring plan to be implemented as discussed in Section 3.1.7 and detailed in the T&C’s below.

Terms and Conditions

In order to be exempt from the prohibitions of Section 9 of the ESA, the USACE must comply with the following terms and conditions, which implement the reasonable and prudent measures (RPMs) described above and outline required reporting and monitoring requirements. These terms and conditions are non-discretionary.

1) Hopper Dredging (RPM 1): Hopper dredging activities shall be completed, whenever possible, between December 1 and March 31, when sea turtle abundance is lowest throughout Gulf coastal waters.

2) Non-hopper Type Dredging (RPM 1): Pipeline or hydraulic dredges, because they are not known to take healthy sea turtles and have not taken Gulf sturgeon, must be used whenever possible between April 1 and November 30.

3) Operational Procedures (RPM 1): During periods in which hopper dredges are operating and NMFS-approved protected species observers are *not* required, (December 1 through March 31, if water temperatures are under 11°C), the USACE must:

a) Advise inspectors, operators, and vessel captains about the prohibitions on taking, harming, or harassing sea turtles

b) Instruct the captain of the hopper dredge to avoid any turtles encountered while traveling between the dredge site and offshore disposal area, and to immediately contact the

USACE if sea turtles are seen in the vicinity

c) Notify NMFS immediately by email (takereport.nmfsser@noaa.gov) if a sea turtle or other threatened or endangered species is taken by the dredge, and reference this Biological Opinion (SER-2012-09304)

4) Dredging Pumps (RPM 1): Standard operating procedure shall be that dredging pumps shall be disengaged by the operator when the dragheads are not firmly on the bottom, to prevent impingement or entrainment of sea turtles within the water column. This precaution is especially important during the cleanup phase of dredging operations when the draghead frequently comes off the bottom and can suck in turtles resting in the shallow depressions between the high spots the draghead is trimming off.

5) Dredge Lighting (RPM 1): From May 1 through October 31, sea turtle nesting and emergence season, all lighting aboard hopper dredges and hopper dredge pumpout barges operating within 3 nmi of sea turtle nesting beaches shall be limited to the minimal lighting necessary to comply with U.S. Coast Guard and/or Occupational Safety and Health Administration requirements. All non-essential lighting on the dredge and pumpout barge shall be minimized through reduction, shielding, lowering, and appropriate placement of lights to minimize illumination of the water to reduce potential disorientation effects on female sea turtles approaching the nesting beaches and sea turtle hatchlings making their way seaward from their natal beaches.

6) Sea Turtle Deflecting Draghead (RPM 1): State-of-the-art, solid, plow-type rigid deflector dragheads must be used on all hopper dredges at all times. The use of alternative, experimental dragheads is not

authorized without prior written approval from NMFS, in consultation with USACE. Slotted draghead deflectors or chain-type deflectors are currently not authorized.

7) Training – Personnel on Hopper Dredges (RPM 1): The USACE must ensure that all contracted personnel involved in operating hopper dredges receive thorough training on measures of dredge operation that will minimize takes of sea turtles. It shall be the goal of the hopper dredging operation to establish operating procedures that are consistent with those that have been used successfully during hopper dredging in other regions of the coastal United States, and which have proven effective in reducing turtle/dredge interactions. Therefore, USACE's experts or other persons with expertise in this matter shall be involved both in dredge operation training, and installation, adjustment, and monitoring of the rigid deflector draghead assembly.

8) Observers (RPM 2): The USACE shall arrange for NMFS-approved protected species observers to be aboard the hopper dredges to monitor the hopper bin, screening, and dragheads for sea turtles and their remains. Observer coverage sufficient for 100% monitoring (i.e., 2 observers) of hopper dredging operations is required aboard the hopper dredges between April 1 and November 30, or whenever surface water temperatures are 11°C or greater.

9) Screening (RPM 2): When sea turtle observers are required on hopper dredges, 100% inflow screening of dredged material is required and 100% overflow screening is recommended. If conditions prevent 100% inflow screening, inflow screening may be reduced gradually, as further detailed in the following, but 100% overflow screening is then required.

> a) Screen Size: The hopper's inflow screens should have 4-inch by 4-inch screening. If the USACE, in consultation with observers and the draghead operator, determines that the draghead is clogging and reducing production substantially, other than in sand borrow areas the screens may be modified sequentially. Mesh size may be increased to 8-in by 8-in; if that fails to solve the clogging problem, then 16-in by 16-in openings may be used. Clogging should be greatly reduced or eliminated with these options; however, further clogging may compel removal of the screening altogether, in which case effective 100% overflow monitoring and screening is mandatory. The USACE shall notify NMFS beforehand if inflow screening is going to be reduced or eliminated, what attempts were made to reduce the clogging problem, and provide details of how effective overflow screening will be achieved.
>
> b) Need for Flexible, Graduated Screens: NMFS believes that this flexible, graduated-screen option is necessary, since the need to constantly clear the inflow screens will increase the time it takes to complete the project and therefore increase the exposure of sea turtles to the risk of impingement or entrainment. Additionally, there are increased risks to sea turtles in the water column when the inflow is halted to clear screens, since this results in clogged intake pipes, which may have to be lifted from the bottom to discharge the clay by applying suction.

10) Dredge Take Reporting and Final Report (RPM 2): Observer reports of incidental take by hopper dredges must be emailed to the Southeast Regional Office (takereport.nmfsser@noaa.gov) with reference to this Biological Opinion (SER-2012-9304) by onboard NMFS-approved protected species observers, the dredging company, or the USACE within 24-hours of any sea turtle, Gulf sturgeon, or other listed species take observed. A final report summarizing the results of the hopper dredging and any documented sea turtle, Gulf sturgeon, or other listed species takes must be submitted to NMFS

(takereport.nmfsser@noaa.gov) with reference to this Biological Opinion (SER-2012-9304) within 60 working days of completion of the dredging project. The reports shall contain information on project location (specific channel/area dredged), start-up and completion dates, cubic yards of material dredged, problems encountered, incidental takes and sightings of protected species, mitigative actions taken (if relocation trawling, the number and species of turtles relocated), screening type (inflow, overflow) utilized, daily water temperatures, name of dredge, names of endangered species observers, percent observer coverage, and any other information the USACE deems relevant.

11) Sea Turtle Strandings (RPM 2): The USACE Project Manager or designated representative shall notify the STSSN state representative (contact information available at: http://www.sefsc.noaa.gov/seaturtleSTSSN.jsp) of the start-up and completion of hopper dredging operations and bed-leveler dredging operations and ask to be notified of any sea turtle strandings in the project area that, in the estimation of STSSN personnel, bear signs of potential draghead impingement or entrainment, or interaction with a bed-leveling type dredge.

a) Information on any such strandings shall be reported in writing within 30 days of project end to NMFS's Southeast Regional Office (takereport.nmfsser@noaa.gov) with reference to this Biological Opinion (SER-2012-09304) with a report detailing incidents, with photographs when available, of stranded sea turtles that bear indications of draghead impingement or entrainment. Because the deaths of these turtles, if hopper dredge related, have already been accounted for in NMFS's jeopardy analysis as turtles not observed being taken during hopper dredging operations, these strandings will not be counted against the USACE's take limit if they do not exceed the take limits set forth in this consultation.

12) Conditions Requiring Relocation Trawling (RPM 1): The USACE shall require trawling to start as soon as possible within 72 hours of either:

a) Two or more turtles are taken by hopper dredges in a 24-hour period, or

b) Total dredge takes in the project approach 75% (rounded-down) of any of the incidental take limits (Table 23); i.e., 6 Kemp's ridleys, 4 loggerheads, or 1 green taken. Relocation trawling may be suspended if no relocation or dredge takes occur within 14 days.

13) Relocation Trawling (RPM 1): Any relocation trawling conducted or contracted by the USACE to temporarily reduce abundance of these listed species during hopper dredging in order to reduce the possibility of lethal hopper dredge interactions, is subject to the following conditions:

a) Trawl Time: Trawl tow-time duration shall not exceed 42 minutes (measured from the time the trawl doors enter the water until the time the trawl doors are out of the water) and trawl speeds shall not exceed 3.5 knots.

b) Protected Species Handling During Trawling: Handling of sea turtles and Gulf sturgeon captured during relocation trawling in association with the dredging project shall be conducted by NMFS-approved protected species observers. Sea turtles and Gulf sturgeon captured pursuant to relocation trawling shall be handled in a manner designed to ensure their safety and viability, and shall be released over the side of the vessel, away from the propeller, and only after ensuring that the vessel's propeller is in the neutral, or disengaged, position (i.e., not rotating). Sea turtle resuscitation guidelines are attached (Appendix B). Any handling of Gulf

sturgeon captured in the relocation trawling will comply with the NMFS's *Protocol for Use of Shortnose, Atlantic, Gulf, and Green Sturgeons* (Attachment A)

http://www.nmfs.noaa.gov/pr/pdfs/species/kahn_mohead_2010.pdf.

c) Captured Sea Turtle Holding Conditions: Sea turtles may be held briefly for the collection of important biological information, prior to their release. Captured sea turtles shall be kept moist, and shaded whenever possible, until they are released, according to the requirements of Term and Condition No. 13-e, below.

d) Biological Data Collection: When safely possible, all sea turtles and Gulf sturgeon shall be measured, tagged, weighed, and a tissue sample taken prior to release. When handling Gulf sturgeon, NMFS's *Protocol for Use of Shortnose, Atlantic, Gulf, and Green Sturgeons* (Attachment A) will be used. Any external tags shall be noted and data recorded into the observers' log. Gulf sturgeon data will also be recorded on the Gulf Sturgeon Catch Datasheet & Gulf Sturgeon Survey Effort Datasheet (Attachment B). Only NMFS-approved protected species observers or observer candidates in training under the direct supervision of a NMFS-approved protected species observer shall conduct the tagging/measuring/weighing/tissues sampling operations. All Gulf sturgeon data will be submitted to Dr. Brian Kreiser, Department of Biological Sciences, 118 College Drive Ste.5018, University of Southern Mississippi, Hattiesburg, MS 39406, Phone: (601) 266-6556.

e) Take and Release Time During Trawling – Turtles: Turtles shall be kept no longer than 12 hours prior to release and shall be released not less than 3 nmi from the dredge site. Turtles to which satellite tags will be affixed may be held up to 24 hours before release. If 2 or more released turtles are later recaptured, subsequent turtle captures shall be released not less than 5 nmi away. If it can be done safely, turtles may be transferred onto another vessel for transport to the release area to enable the relocation trawler to keep sweeping the dredge site without interruption.

f) Injuries: Injured sea turtles shall be immediately transported to the nearest sea turtlerehabilitation facility. Minor skin abrasions resulting from trawl capture are considered non-injurious. The USACE shall ensure that logistical arrangements and support to accomplish this are pre-planned and ready. The USACE shall bear the financial cost of all sea turtle transport, treatment, rehabilitation, and release.

g) Flipper Tagging: All sea turtles captured by relocation trawling shall be flipper-tagged prior to release with external tags which shall be obtained prior to the project from the University of Florida's Archie Carr Center for Sea Turtle Research. This Opinion serves as the permitting authority for any NMFS-approved protected species observer aboard these relocation trawlers to flipper-tag with external tags (e.g., Inconel tags) captured sea turtles. Columbus crabs or other organisms living on external sea turtle surfaces may also be sampled and removed under this Opinion's authority.

h) PIT-Tag: This Opinion serves as the permitting authority for any NMFS-approved protected species observer aboard a relocation trawler to PIT-tag captured sea turtles and Gulf sturgeon. Tagging of sea turtles and Gulf sturgeon is not required to be done if the NMFS-approved

protected species observer does not have prior training or experience in said activity; however, if the observer has received prior training in PIT tagging procedures, then the observer shall tag the animal prior to release (in addition to the standard external tagging):

i) Sea turtle PIT tagging must then be performed in accordance with the protocol detailed at NMFS's Southeast Fisheries Science Center's webpage: http://www.sefsc.noaa.gov/seaturtlefisheriesobservers.jsp. (See Appendix C on SEFSC's "Fisheries Observers" webpage);

ii) PIT tags used must be sterile, individually-wrapped tags to prevent disease transmission. PIT tags should be 125-kHz, glass-encapsulated tags–the smallest ones made. Note: If scanning reveals a PIT tag and it was not difficult to find, then do not insert another PIT tag; simply record the tag number and location, and frequency, if known. If for some reason the tag is difficult to detect (e.g., tag is embedded deep in muscle, or is a 400-kHz tag), then insert one in the other shoulder.

iii) All Gulf sturgeon handled shall be scanned for a PIT tag; codes shall be included in the take report submitted to NMFS. The PIT tag reader shall be able to read both 125 kHz and 134 kHz tags. Sturgeon without PIT tags will have one installed per guidance in Attachment A. Previously PIT-tagged fish must not be re-tagged.

iv) All unmarked Gulf sturgeon less than 300 mm in total length would be tagged using 11.9 mm x 2.1 mm PIT tags injected using a 12-gauge needle at an angle of 60º to 80º in the dorsal musculature (left and just anterior to the dorsal fin) with the copper antenna oriented up for maximum signal strength. No fish would be double-tagged with PIT tags. The last step after injecting PIT tags would be to verify and record the PIT tag code with a tag reader. PIT tags may also be inserted under scutes after discussing with NMFS.

i) Sea Turtle PIT-Tag Scanning and Data Submission Requirements: All sea turtles captured by relocation trawling or dredges shall be thoroughly scanned for the presence of PIT tags prior to release using a multi-frequency scanner powerful enough to read multiple frequencies (including 125-, 128-, 134-, and 400-kHz tags) and read tags deeply embedded in muscle tissue (e.g., manufactured by Trovan, Biomark, or Avid). Turtles whose scans show they have been previously PIT tagged shall nevertheless be externally flipper tagged. Sea turtle data collected (PIT tag scan data and external tagging data) shall be submitted to NOAA, National Marine Fisheries Service, Southeast Fisheries Science Center, Attn: Lisa Belskis, 75 Virginia Beach Drive, Miami, Florida 33149. All sea turtle data collected shall be submitted in electronic format within 60 days of project completion to Lisa.Belskis@noaa.gov. Sea turtle external flipper tag and PIT tag data generated and collected by relocation trawlers shall also be submitted to the Cooperative Marine Turtle Tagging Program (CMTTP), on the appropriate CMTTP form, at the University of Florida's Archie Carr Center for Sea Turtle Research.

j) Handling Fibropapillomatose Turtles: NMFS-approved protected species observers are not required to handle viral fibropapilloma tumors if they believe there is a health hazard to themselves and choose not to. When handling sea turtles infected with fibropapilloma tumors, observers must maintain a separate set of sampling equipment for handling animals displaying fibropapilloma tumors or lesions.

k) Additional Data Collection Allowed During the Handling of Sea Turtles, Gulf sturgeon, and Other Incidentally-caught ESA-listed species: The USACE shall allow NMFSapproved protected species observers to conduct additional investigations that may include more invasive procedures (e.g., blood-letting, laparoscopies, external tumor removals, anal and gastric lavages, mounting satellite or radio transmitters, etc.) and partake in or assist in research projects but only if 1) the additional work does not interfere with any project operations (dredging activities, relocation trawling, etc.), 2) the observer holds a valid federal research permit (and any required state permits) authorizing the activities, either as the permit holder, or as designated agent of the permit holder, 3) the additional work does not incur any additional expenses to the USACE or the USACE approves of the expense, and 4) the observer has first coordinated with USACE Mobile District and notified NMFS's Southeast Regional Office, Protected Resources Division (takereport.nmfsser@noaa.gov) with reference to this Biological Opinion (SER-2012-09304).

14) Relocation Trawling Report (RPM 2): The USACE shall provide NMFS's Southeast Regional Office (takereport.nmfsser@noaa.gov) with reference to this Biological Opinion (SER-2012-09304) with an end-of-project report within 30 days of completion of any relocation trawling. This report may be incorporated into the final report summarizing the results of the hopper dredging project.

15) Requirement and Authority to Conduct Tissue Sampling for Genetic Analyses (RPM 2): All live or dead sea turtles and/or Gulf sturgeon captured by relocation trawling and hopper dredging shall be tissue-sampled by a NMFS-approved protected species observer prior to release. This Opinion serves as the permitting authority for any NMFS-approved protected species observer aboard a relocation trawler or hopper dredge to tissue-sample live or dead captured sea turtles and/or Gulf sturgeon without the need for an ESA Section 10 permit.

a) Sea turtle tissue samples shall be taken in accordance with NMFS SEFSC's procedures for sea turtle genetic analyses (Appendix II of this Opinion). The USACE shall ensure that tissue samples taken during the dredging project are collected, stored properly, and mailed no later than 60 days of completion of the dredging project to: NOAA, National Marine Fisheries Service, Southeast Fisheries Science Center, Attn: Lisa Belskis, 75 Virginia Beach Drive, Miami, Florida 33149.

b) Gulf sturgeon tissue samples shall be taken in accordance with NMFS's *Protocol for Use of Shortnose, Atlantic, Gulf, and Green Sturgeons* (Attachment A). Care must be used when collecting genetic tissue samples (soft fin clips). Instruments should be changed or disinfected and gloves changed between each fish sampled to avoid possible disease transmission or cross contamination of genetic material.

i) Submission and of genetic tissue samples must be coordinated with Dr. Brian Kreiser, Department of Biological Sciences, 118 College Drive Ste.5018, University of Southern Mississippi, Hattiesburg, MS 39406, Phone: (601) 266-6556. Additional questions will be directed to Jason Rueter, the NMFS PRD species coordinator for Gulf sturgeon, (727) 824-5312. Samples must be submitted within 6 months after collection.

16) Construction Period Monitoring (RPM 3) (Years 5 - 10) will consist of deploying and retrieving a series of VEMCO20 receivers in various telemetry zones (Figure 32), benthic sampling, and yearly in-river netting and tagging (Pearl and Pascagoula Rivers). The USACE and/or its authorized agents will provide

yearly reports on information gathered from long term monitoring plan detailed in Section 3.1.7. Reports may be submitted to NMFS at the following email address: (takereport.nmfsser@noaa.gov) or by hard copy mailed or faxed to the NOAA Southeast Regional Office, Assistant Regional Administrator, Protected Resources Division, National Marine Fisheries Service, 263 13th Avenue South, St. Petersburg, Florida 33701, phone (727) 824-5312; fax (727) 824-5309. This Opinion's issuance date, title, and identifier number (SER-2012-09304) shall be referenced in the correspondence.

12 CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authority to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species, to help implement recovery plans, or to develop information. NMFS believes that USACE should implement the following conservation recommendations:

1. Gather data describing recovery rates of specific Gulf sturgeon prey impacted by the cyclical deposition of material into the adjacent disposal areas that would assist in future assessments of impacts to Gulf sturgeon prey items.

2. Gather additional data describing presence and movement of juvenile Gulf sturgeon within Mississippi Sound and the inland rivers and bays.

3. Gather data on Gulf sturgeon responses to dredging and construction noise.

4. Gather data describing Gulf sturgeon movement within the Pearl River, Pascagoula River, and Mississippi Sound. In order for NMFS to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, we request notification of the implementation of any conservation recommendations.

13 REINITIATION OF CONSULTATION

This concludes formal consultation on the MsCIP Barrier Island Restoration, Mississippi Sound, Hancock, Harrison, and Jackson Counties, Mississippi, and Mobile County, Alabama. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if:

1. The amount or extent of taking specified in the incidental take statement is exceeded;

2. New information reveals effects of the action may affect listed species or critical habitat in a manner or to an extent not previously considered;

3. The identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the Biological Opinion; or

4. A new species is listed or critical habitat designated that may be affected by the identified action. In instances where the amount or extent of take is exceeded, USACE must immediately request reinitiation of formal consultation.

Dredging/Trawling Operations During Reinitiation of Consultation:

To ensure that the specified levels of take are not exceeded early in the project the appropriate action agency (the USACE in cooperation with NPS and BOEM) should immediately reinitiate consultation with NMFS's Southeast Regional Office, Protected Resources Division, if any of the following conditions are met: when more than one turtle is taken by a dredge in any 24-hour period; once 4 turtles are taken by a dredge during a single project; if the dredge take reaches 75% of the take level established for any one species; a turtle species dredge take limit is close to being met; if 2 Gulf sturgeon are taken by a dredge; a hawksbill turtle is taken by a dredge; if more than 2 turtles or 1 Gulf sturgeon is injuriously or lethally taken by a relocation trawler; or the relocation trawling incidental take limit for non-lethally taken turtles or sturgeon is reached. The NMFS's Southeast Regional Office will work with the action agencies to quickly review such incidents to determine the need to implement further mitigating measures or to terminate the remaining dredging activity. However, the affected action agency is not required to suspend dredging or relocation trawling operations during the notification or consultation process, as long as NMFS concurs with the affected action agencies determination that continuation of operations during the reinitiated consultation will not violate Section 7(d) of the ESA.

U.S. Fish and Wildlife Service Biological Opinion
Terms and Conditions

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the COE shall execute the following terms and conditions, which implement the RPM's described above and outline required reporting/monitoring requirements. These terms and conditions are nondiscretionary.

I. *Marking Project Boundaries*

1. The COE should carefully survey and mark the boundaries of the entire project footprint on East and West Ship Islands and Cat Island.

2. Boundary markers should be semi-permanent such that they should be maintained throughout the active work areas and should persist until all construction-related activities are completed.

3. The Service's **Jackson MS Field Office** at **(601)965-4900** should be notified immediately if any work or project-related actions exceed the boundary markers on the islands throughout the various sand placement areas of the project**, so that reinitiation** of **section 7 consultation** can proceed as quickly and efficiently as possible to avoid delay in the project schedule.

II. *Monitoring protocols for Manatees Shall be Implemented as Outlined in Appendix A.*

III. *Monitoring for sea turtles should be conducted within sea turtle nesting and hatching season as outlined in Appendix B (Sea Turtle Monitoring Plan). Additional measures for sea turtles include:*

1. Beach quality sand suitable for sea turtle nesting, successful incubation, and hatchling emergence must be used on the project site.

2. The beach profile template for the sand placement project should be designed to mimic, native beach berm elevation and beach slopes landward and seaward of the equilibrated berm crest to the maximum extent possible.

3. If nests are constructed in the area of sand placement, the eggs must be relocated as outlined in Appendix B. Nest relocation will be on a pre-selected area of beach through coordination among FWS, NPS, and COE that is not expected to experience daily inundation by high tides or known to routinely experience severe erosion and egg loss, predation, or subject to artificial lighting to the maximum extent possible.

4. During the nesting season, construction equipment and materials must be stored in a manner that will minimize impacts to sea turtles to the maximum extent practicable.

5. During the nesting season, lighting associated with the project must be minimized to the maximum extent possible but still comply with OSHA safety requirements to reduce the possibility of disrupting and misdirecting nesting and/or hatchling sea turtles.

6. Prior to the commencement of work, the COE shall submit a lighting plan for the dredge that will be used in the project. The plan shall include a description of each light source that will be

visible from the beach and the measures implemented to minimize this lighting. Direct lighting of the beach and nearshore waters must be limited to the immediate construction area during peak nesting season (May 1 through September 30) and must comply with safety requirements. Lighting on all equipment must be minimized through reduction, shielding, lowering, and appropriate placement to avoid excessive illumination of the water's surface and nesting beach while meeting all Coast Guard, Corps EM 385-1-1, and OSHA requirements. Light intensity of lighting equipment must be reduced to the minimum standard required by OSHA for General Construction areas, in order to not misdirect sea turtles. Shields must be affixed to the light housing and be large enough to block light from all on-beach lamps from being transmitted outside the construction area or to the adjacent sea turtle nesting beach (Figure 14).

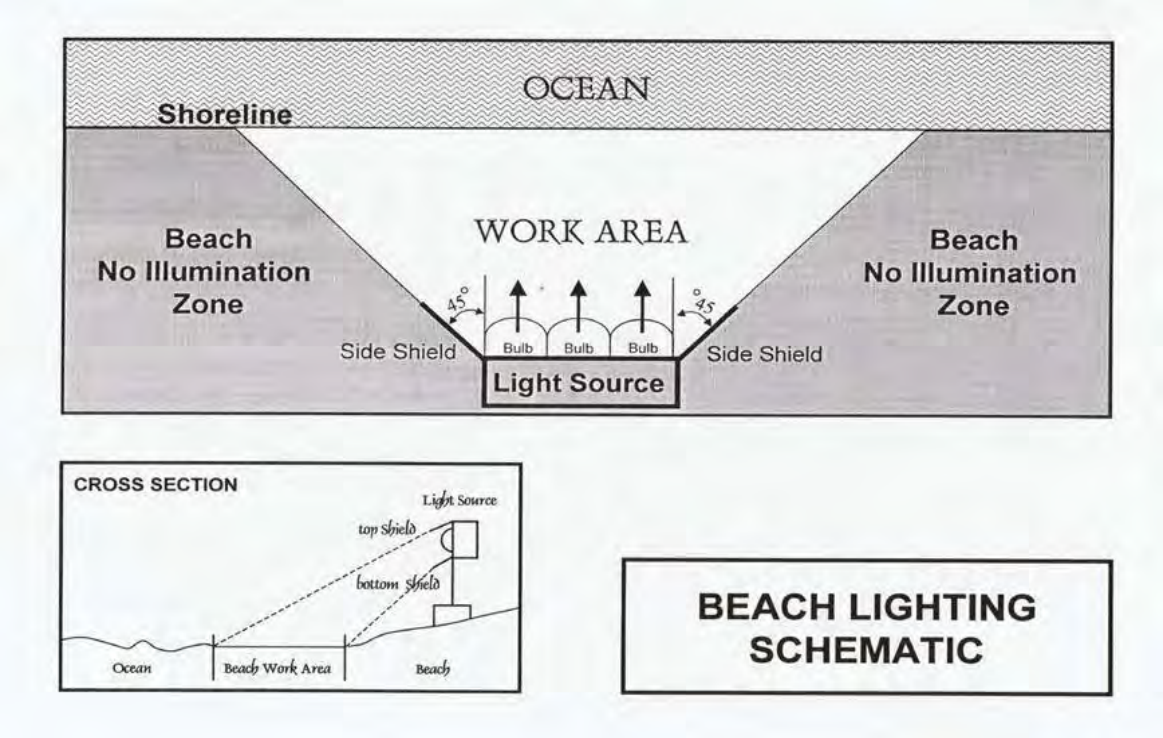


Figure 14 - Beach lighting schematic.

7. The placement and design of the dune must emulate the natural dune system to the maximum extent possible, including the dune configuration and shape.

8. No trash or food should be left on the island, utilize trash receptacles, leave no trace, and pack it in pack it out. All other construction debris should be confined to the staging area and consist of construction debris during the construction period only, which will be removed when the construction period is over and demobilized.

9. For sea turtle nesting surveys during construction, a meeting between representatives of the contractor, the COE, the Service, the NPS, the Service permitted sea turtle surveyor, and other species surveyors, as appropriate, must be held prior to the commencement of work. At least 10 business days advance notice must be provided prior to conducting this meeting. The meeting will provide an opportunity for explanation and/or clarification of the sea turtle protection

measures, as well as additional guidelines when construction occurs during the sea turtle nesting season, such as storing equipment, minimizing driving, and reporting within the work area, as well as follow-up meetings during construction. At that meeting the **COE** must provide the Service and the NPS with specific information on the actual project that is going to proceed (form on the following web link: http://www.fws.gov/northflorida/SeaTurtles/Docs/Corp%20of%20Engineers%20Sea%20Turtle%20Permit%20Information.pdf) and emailed to the Service at seaturtle@fws.gov.

10. Sand compaction [*sic* the shear strength of the beach sand] must be monitored in the area of sand placement during the post construction period, for up to 3 subsequent years. This should occur after the project is completed and outside of the turtle nesting season and prior to May 1 in subsequent years. The Service and NPS shall be notified when Post Construction monitoring starts.

a. The dynamic cone penetrometer (DCP) test method will be used to collect the shear strength ("compaction") data for the preconstruction in situ beach conditions of the islands and the post-construction template fill. This data will be analyzed and compared using an appropriate statistical analysis to determine if tilling is necessary.

b. Shear strength testing stations must be located on shore-normal transects. Transects shall extend from the seaward base of the dune to the high water line (normal wrack line) at intervals separated no more than 500-feet within the sand placement template. One station must be at the seaward edge of the dune line (when material is placed in this area), and one station must be midway between the dune line and the high water line (normal wrack line) = 1 transect. There will be two test stations located on each of the transect lines.

c. For establishment of a pre-construction in situ shear strength baseline DCP measurements should be conducted on no less than thirty (30) transects per island (East Ship, West Ship and Cat Island). The testing station intervals should be no greater than five-hundred (500) feet apart. The purpose of the thirty (30) station minimum is to collect enough data to perform a statistical analysis of the results obtained from the DCP testing (n >/= 30).

d. Each testing station will include a cluster of three spatially-independent DCP sites tested to a minimum depth of eighteen inches (18"), logged at 6-inch deep intervals. Replicates must be located as close to each other as possible, without interacting with the previous hole or disturbed sediments. The three replicate compaction values for each six (6) inch depth interval must be averaged to produce the final values for each station.

e. The statistical significance of the difference between the shear strength of the in situ pre and post construction conditions should be determined through the application of the appropriate statistical analysis. The statistical methods of data analysis will be determined through the joint efforts of the Mobile District COE and the Service. The final DCP testing and statistical analysis procedures are also to be jointly agreed upon by the Mobile District COE and the Service.

f. The in situ shear strength of the pre-construction stations and post construction stations will be compared according to the depth at which the measurements were taken, e.g., the DCP measurements at a depth of six (6) inches from station X will be compared to the DCP measurements at a depth of six inches at station Y. If the average value for any six (6) inch depth interval exceeds the pre-construction value as established by the methods described in this document for any two or more adjacent stations, further coordination with the Service should occur to determine if tilling shall be required. If only a small area of the constructed project is found to be statistically different from the pre project conditions then tilling will not be required. A report on the pre and post construction results of the in situ shear strength condition of the beach sediments will be submitted to the Service.

g. An electronic copy of the results of the shear strength (compaction) monitoring must be submitted to the Service and the NPS prior to any tilling actions being taken or if a request not to till is made based on shear strength (compaction) results. Report should include size of areas failing the compaction test and compare percentage of those sites that were compacted (failed the compaction test) to percent non-compacted area (those that passed the compaction test). The variance between the pre and post project conditions will be reported to the Service and the NPS. The Service and the NPS will review the Compaction Sampling Report and determine whether tilling is needed to decrease the compaction. Allow two weeks for the Service and the NPS to make a determination whether tilling is needed.

h. If the project site fails to meet the mean threshold value of the reference site(s), a decision will made via coordination with the Service and NPS whether tilling is necessary. If tilling is necessary, the COE will submit a plan of equipment to use and method of island access for Service and NPS approval. If tilling is needed, the area must be tilled to a depth of 24 inches. Each pass of the tilling activity must be overlapped to allow more thorough and even tilling. All tilling activity must be completed at least once outside of turtle nesting season and prior to the beginning of sea turtle nesting season (prior to May 1).

i. If required, tilling must occur landward of the wrack line and avoid all vegetated areas 3 square feet or greater with a 3 foot buffer around the vegetated areas and at least 10 feet from the toe of the vegetated dune line. (NOTE: If tilling occurs during shorebird nesting season (March 1-September 15), shorebird surveys prior to tilling are required per the Migratory Bird Treaty Act; see http://myfwc.com/media/1393838/BeachNestingBirdsBrochure.pdf)

12. Visual surveys for escarpments along the project area must be made during the post construction period outside of turtle nesting season and prior to May 1 for 3 subsequent years post construction. Escarpment surveys should include the height and length of escarpments observed must be shared with the Service and NPS.

Escarpments that interfere with sea turtle nesting or that exceed 18 inches in height for a distance of 100 feet or more must be leveled and the beach profile must be reconfigured to mimic native beach slopes to minimize scarp formation during the post construction period but

outside of turtle nesting season. If the post construction period ends during turtle nesting season, coordination with the USFWS and NPS will be conducted no later than the following January and a decision will be made whether escarpment removals are necessary. All escarpment removal activities must be completed before the following sea turtle nesting season begins, which is prior to May 1. Any escarpment removal must be reported by location. Escarpments must be reconfigured to mimic native beach slopes while protecting nests that have been relocated or left in place. The Service and the NPS will be notified and provided a report from the escarpment surveys if subsequent reformation of escarpments that interfere with sea turtle nesting or that exceed 18 inches in height for a distance of 100 feet occurs during the nesting and hatching season (May 1 through November 30), to determine the appropriate action to be taken. If it is determined that escarpment leveling is required during the nesting or hatching season, the Service, after coordination with the NPS, will provide a brief written authorization within 30 days that describes methods to be used to reduce the likelihood of impacting existing nests. An annual summary of escarpment surveys and actions taken must be submitted to the Service with a copy to the NPS**.** This condition must be coordinated with the Service and the NPS post construction to verify whether or not this condition will be required. Factors considered when determining whether escarpment removal will be necessary will be determined within the year that the project is completed and prior to May 1 and continue annually for the duration of the project and up to 3 years post construction.

13. Meetings: Annually, no later than each January during construction and for 3 years post construction, the Service, the COE, and the NPS will meet to review escarpment formation, beach compaction, and other beach conditions to determine actions necessary to insure that the project beaches contain viable sea turtle nesting habitat. Some of the parameters to consider in determining the feasibility of tilling are: percent of beach face compacted, island access points and travel routes, timing with bird nesting seasons, control of windblown sand, and identification of the minimum sized equipment that can effectively accomplish the task. Some of the parameters to consider in determining the feasibility of escarpment removal are: evaluating mechanical escarpment removal, and the length and height of escarpments compared to the length of beach with a natural slope.

14. Memorandum of Understanding:

The Memorandum of Understanding in place will serve as an agreement between the COE, the NPS and the USFWS, that all parties will work together to achieve compliance with the terms and conditions of the BO while minimizing environmental impacts. Moreover that all parties agree that they will implement all reasonable measures to resolve any issues to comply with the terms and conditions of the BO for the MsCIP Barrier Island Restoration Project such as the post-construction monitoring activities, including the logistics of escarpment removals, compaction tilling, associated surveys, turtle nests relocations, access routes to Ship or Cat Island and travel corridors necessary to move equipment to the work site and post-construction monitoring activities. If the listed agencies are unable to agree to resolve any of these issues such that it affects the COE's ability to be in compliance with the BO's terms and conditions; the USFWS agrees to re-consult with COE to insure ESA compliance.

IV. *Monitoring for piping plovers and red knots should be conducted within sea turtle nesting and hatching season as outlined in Appendix C. Additional measures for piping plovers and red knots include:*

1. A survey schedule (with dates) is listed in Appendix C. The Service recognizes that given the remoteness of the project area and the potential for inclement weather conditions during the piping plover and red knot migration and wintering season, surveys may be difficult to achieve. If conditions require a deviation from the survey schedule outlined in Appendix C, such information should be carefully documented in a detailed monitoring plan, including an explanation why any deviation from the recommended schedule was deemed necessary.

2. Piping plover and red knot identification, especially when in non-breeding plumage, can be difficult. Qualified personnel with shorebird/habitat survey experience must conduct the required survey work. Piping plover and red knot monitors must be capable of detecting and recording locations of roosting and foraging birds, and documenting observations in legible, complete field notes. Aptitude for monitoring includes keen powers of observation, familiarity with avian biology and behavior, experience observing birds or other wildlife for sustained periods, tolerance for adverse weather, experience in data collection and management, and patience.

3. At a minimum, binoculars, a global positioning system (GPS) unit, a 10-60x spotting scope with a tripod, and datasheet used in preconstruction surveys thus far should be used to conduct the surveys.

4. Negative (i.e., no plovers or knots seen) and positive survey data shall be recorded and reported.

5. Piping plover and red knot locations shall be recorded with a GPS unit set to record in decimal degrees in universal transverse mercator (UTM) North American Datum 1983 (NAD83).

6. Habitat, landscape, and substrate features used by piping plovers and red knots when seen shall be recorded.

7. Behavior of piping plovers and red knots (e.g., foraging, roosting, preening, bathing, flying, aggression, walking) shall be documented.

8. Any bands/flags seen on piping plovers and red knots shall also be carefully documented, and should also be reported according to the information found at the following websites. Information regarding piping plover band/flag observations can be found at: http://www.fishwild.vt.edu/piping_plover/Protocols_final_draft.pdf, http://www.waterbirds.umn.edu/Piping_Plovers/piping2.htm, and http://www.fws.gov/northeast/pipingplover/pdf/BahamasBandReporting2010.pdf. Information regarding red knot band/flag observations can be found at: http://www.bandedbirds.org/Reporting.html, http://www.flshorebirdalliance.org/resources-pages/bands.html, and http://www.pwrc.usgs.gov/bbl/.

V. *Requirements for surveying benthic prey species*

1. Qualified personnel with sediment/macroinvertebrate sampling experience must conduct the benthic prey species surveys.

2. A baseline macroinvertebrate survey is required to be conducted during the December/January timeframe of the wintering season. Additional surveys will be conducted during the same time of year between **3 to 5 years** post-construction during normal conditions (ie. not following a significant hurricane event) to determine benthic prey species recovery. Depending on the degree of recovery, a second post construction sampling event may be warranted (see success criteria defined in the Long Term Monitoring and Adaptive Management Plan developed through an interagency effort for this project.

3. Sampling will be conducted using a basic before and after control and impact design method. Sampling will be coordinated with piping plover and red knots foraging observations based on low tide surveys.

4. In addition to recording benthic species abundance and diversity, a qualitative measure of sediment characteristics (sand, shell, mud) should also be recorded.

5. An appropriate detailed sampling methodology and schedule should be developed in coordination with the Service prior to initiating pre-construction and post-construction surveys.

6. A report, including all data, should be submitted to the USFWS and the NPS upon completion of each benthic survey.

VI. *Reporting Requirements*

1. Due to the duration between receiving construction funds and letting out contracts, the remoteness of the project area, weather conditions, potential logistical constraints, and the need to closely coordinate with Service and NPS staff. Periodic monitoring reports should be submitted to the Service as outlined in the attached appendices containing monitoring guidelines.

2. Incorporate all data collected into an appropriate database.

3. In addition to routine monitoring reports as outlined in the attached appendices containing monitoring guidelines a comprehensive report describing the actions taken to implement the RPMs and terms and conditions associated with this incidental take statement shall be submitted to the Service's MS Field Office by June 30 of the year following completion of all required bird surveys, and December 31 of the year following completion of all required sea turtle surveys.

4. If the COE foresees any problematic issues that would require a change in the recommended survey schedule due to work conditions or project delays, the COE should immediately notify the Service's **Jackson MS Field Office** at **(601)965-4900** so that we can resolve/correct any such issues.

5. At least two months prior to mobilization of construction equipment, the COE should notify the Service in writing. That notification should include whether there are any changes in the anticipated project footprint or design.

COORDINATION OF INCIDENTAL TAKE STATEMENT WITH OTHER LAWS, REGULATIONS, AND POLICIES

Migratory Bird Treaty Act (MBTA)

The MBTA implements various treaties and conventions between the U.S., Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Under the provisions of the MBTA it is unlawful "by any means or manner to pursue, hunt, take, capture or kill any migratory bird except as permitted by regulations issued by the Service. The term "take" is not defined in the MBTA, but the Service has defined it by regulation to mean to pursue, hunt, shoot, wound, kill, trap, capture or collect any migratory bird, or any part, nest or egg or any migratory bird covered by the conventions or to attempt those activities.

In order to comply with the MBTA and potential for this project to impact nesting shorebirds, the COE should follow the Service and NPS's guidelines (Appendix C) to protect against impacts to nesting shorebirds during implementation of this project. Please note that a bird abatement plan may be necessary to avoid disturbance to nesting water birds and shorebirds.

The Service will not refer the incidental take of piping plovers or red knots associated with this project for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C.703-712), if such take is in compliance with the terms and conditions specified here.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

Conservation Recommendations for Red Knot and Piping Plover

1. We encourage the COE to continue to coordinate with the Service during the pre-planning phases of future Deepwater Horizon NRDAR Early Restoration and any other restoration projects that include sand placement projects within piping plover designated critical habitat.

2. We encourage the COE to incorporate winter and migratory season surveys for piping plovers and red knots for one additional year beyond the required two years post construction outlined in the attached monitoring guidelines (see Appendix C). The one additional year of surveys should be the same year as the post construction benthic sampling, which is projected to take place between 3 and 5 years post construction as outlined in Appendix C. Such data would facilitate our knowledge of the biology of those species and their wintering habitats within the Mississippi barrier islands which may facilitate decision making options on future projects.

Conservation Recommendations for Sea Turtles

1. Construction activities for this project and similar future projects should be planned to take place outside of sea turtle nesting and hatching season to the maximum extent practicable.

2. Appropriate native salt-resistant dune vegetation should be established on the restored dunes.

3. Surveys for nesting success of sea turtles should be continued for a minimum of 3 years post construction to determine whether sea turtle nesting success has been adversely impacted.

4. Educational signs should be placed where appropriate at beach access points explaining the importance of the area to sea turtles and/or the life history of sea turtle species that nest in the area.

In order for the Service to be kept informed of actions that minimize or avoid adverse effects or that benefit listed and proposed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes consultation for the piping plover and red knot as well as the loggerhead, green, and Kemp's ridley sea turtles.

As provided in 50 CFR §402.16, reinitiation of formal consultation for the piping plover (and its critical habitat), red knot, loggerhead sea turtle, green sea turtle, and Kemp's ridley sea turtle is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take (i.e., the 238 acres of bare sand, mud flat, and intertidal habitats described herein) is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this biological opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take shall cease pending reinitiation.

Sea Turtle Monitoring Plan

NESTING SEA TURTLE MONITORING PROCEDURES FOR MSCIP BARRIER ISLAND SHIP ISLAND CONSTRUCTION ACTIVITIES

BIOLOGICAL

Sea Turtles

Threatened and endangered species, sea turtles must be monitored for this project to determine impacts pursuant to the Endangered Species Act. This project is located within the boundaries of Gulf Islands National Seashore, whose barrier island beaches are used by nesting endangered and threatened sea turtles. The U.S. Army Corps of Engineers (USACE), to also include its Contractor/Subcontractor, shall keep construction activities under surveillance, management, and control to prevent impacts to sea turtles, their nests and hatchling sea turtles. The USACE and the contractor may be held responsible for harming or harassing sea turtles, their eggs or their nests as a result of the construction.

Sea turtle monitoring includes documenting defined parameters of sea turtle nesting activity including species, abundance, locating crawls, marking nests and relocating vulnerable nests (see U.S. Fish and Wildlife Service (USFWS)/National Park Service (NPS) monitoring protocol). Monitoring will be conducted on the beach areas of West Ship Island and East Ship Island identified in the Plans and Specs. In order to prevent disturbance to nesting shorebirds, monitoring of sea turtles should be done in the morning prior to the required shorebird monitoring.

There are 5 species of sea turtles: loggerhead (*Caretta caretta*), green (*Chelonia mydas*), leatherback (*Dermochelys coriacea*), hawksbill (*Eretmochelys imbricata*), Kemp's Ridley (*Lepidochelys kempii*), that may be found in the Gulf of Mexico. Green, Loggerhead and Kemp's Ridley sea turtles are regularly documented in the waters surrounding the barrier islands of Gulf Islands National Seashore. Of these, loggerhead and green sea turtles have been documented nesting on the barrier islands in the northern Gulf of Mexico. Though never documented, Kemp's Ridley sea turtles are likely to nest on the Mississippi islands.

Sea turtle nesting and hatching season for Mississippi starts around April 15 and ends around November 30. Incubation for the loggerhead sea turtle ranges from about 45 to 95 days and incubation for the green sea turtle ranges from about 45 to 75 days. Potential hatching dates will be determined for each crawl documented and monitored for nesting success 95 days beyond the crawl date (species dependent) or until construction ends.

MONITORING PERIODS:

An NPS Biologist will be available for assistance if needed during the monitoring.

Pre-Construction:

If project activities are initiated between November 30 and April 15, then no pre-project surveys will be required for nesting sea turtles. If the project will be initiated between April 15 and

November 30, daily pre-project surveys should begin at least 100 days prior to commencement of work in the immediate vicinity of construction.

During Construction:

Nesting surveys, marking, and potential relocation activities must be conducted daily, weather permitting, while construction activities are on-going during nesting and hatching season, April 15 - Nov. 30 in work areas. Surveys will take place where construction activities will be occurring until the end of construction or Nov 30th, whichever comes first.

MONITORING PROTOCOLS:

SURVEY METHODS:

1. On native and newly constructed beaches, surveys will be conducted first thing in the morning by All-Terrain Vehicles (ATV/UTV), foot or boat. The ATV will be operated at <6 mph, to provide adequate opportunity to view the beach, to avoid obstacles and hazards, and to visually investigate all possible turtle crawls. The ATV will be operated low on the beach, on the un-vegetated dune face, at or below the last high tide line. This will allow even the shortest turtle crawls to be located and minimize impacts to bird nests. Be careful not to drive through a bird nesting area or bird closure areas. Back track on foot if necessary to survey the area not accessible by ATV. If it is high tide during your survey, do not attempt to drive the ATV through water. Also, do not drive the vehicle over dunes and vegetation. If there is a path wide enough for the ATV to drive through without impacting vegetation, use the path to circumvent the area where there is no beach. Back track on foot if necessary to survey the area that was missed.
2. During the survey, be alert for tracks, stranded turtles, nests uncovered by predators, hatchlings, etc., or any evidence of a sea turtle incident. Check any marked nests found during previous surveys.

Investigating Nesting Activities:

1. If a turtle crawl is discovered, stop and evaluate the incident as thoroughly as possible. A completed Mississippi Sea Turtle Crawl Datasheet form is required for all incidents, false crawl or nest. Identify the species of the turtle crawl. Record the GPS location. Take photos of the turtle crawl.

2. Mark the turtle crawl to prevent double-counting and/or a nest associated with the crawl. Look for evidence of a body pit. A body pit will look like a roughly circular area of disturbed sand which may or may not be slightly lower than surrounding areas. If there is not a body pit discovered, the crawl will be assumed to be a false crawl. False crawls will be recorded on a report form. If a conspicuous area of disturbed sand is found (body pit), assume that a nesting event has occurred. Look for signs of animal depredation or human tampering.

3. Measure the crawl at three different locations and taking an average of the three. Straight-line measurements should be taken from the tip of the flipper mark on one side to the tip of

the flipper mark on the other. With loggerheads, since the flipper marks alternate, the measurements should be from flipper mark on one side to an extended straight line from the flipper mark on the other side.

4. If the incident was a nest, record the distance from the water to the nest site. This does not need to be exact (water level fluctuates with each wave) but it should be fairly accurate. Also, note if the nest is above or below the rack line (highest debris line on the beach).

5. Estimating egg cavity location: Determine the direction of travel along the crawl, locate a body pit, and locate an escarpment in the shape of an arc at the front of the pit. Typically the female faces away from the water during nesting, although this is not always the case. The escarpment is the result of the turtle using her front flippers to cover the nest with sand when she is done laying. The egg cavity is usually centered behind this escarpment, approximately 3-5 feet back. It may be further back, if the turtle was moving forward while covering the nest site.

6. Occasionally, a nest may be uncovered by predators or beach erosion. If you find a nest where eggs or the remains of eggs are visible, the incident will be reported as a nest. If the nest was predated, the nest must be checked for viable eggs. Do not assume the nest has been totally predated.

   If a nest is partially depredated, the remaining eggs can be reburied with the necessary precautions. Eggs must be rinsed off with freshwater to remove all albumen and other fluids that came from the damaged eggs. Rough handling and turning of the eggs should be avoided. The nest cavity, if still intact, should be emptied out down to clean sand before the eggs are replaced. Do not dig too deep. Occasionally, most eggs can be left in place and only the top few need to be removed, cleaned and returned to the nest. The nest should then be filled with moist sand. Compress the sand with your hands using slight to moderate pressure. Damaged eggs and shells should be removed from the area.

   If the nest was totally depredated, fill in the hole and clean up the area. If you find an area where eggs are strewn about and there is a hole in the sand, but no crawl, this is an old nest that has been depredated. Fill in a nest report (photo and GPS).

MARKING NESTS DURING CONSTRUCTION:

Equipment for nest perimeter buffer zone marking:

1. 4 wooden perimeter buffer zone stakes. Dimensions 1" x 2", 4 feet long.
2. 1 roll of 3/16" fluorescent orange flagging tape

Marking Nest Sites to Protect Buried Eggs from Hazardous Activities

The goal of this marking method is to clearly identify the nest area and protect it from human activities such as vehicular traffic or other disturbances.

A series of stakes and highly visible survey ribbon or string shall be installed to establish a 10-foot radius around the nest (see Nest Buffer Marking Attachment in Appendix B). No activity

shall occur within this area nor will any activity occur that could result in impacts to the nest. Nest sites shall be inspected daily to assure nest markers remain in place and that the nest has not been disturbed by the project activity. The stakes should extend more than 36" above the sand. To further identify the nest site, surveyor's ribbon can be tied from the top of one stake to another to create a perimeter around the nest site. Additionally, a nest sign can be attached to one of the stakes used to create the perimeter. A nest-identifying number and the date the eggs were laid should be placed on at least one of the nest perimeter stakes. At least one additional stake should be placed a measured distance from the clutch location at the base of the dune or seawall to ensure that future location of the nest is possible should the nest perimeter stakes be lost.

Signs should have the following information:

SEA TURTLE NEST - DO NOT REMOVE

VIOLATORS SUBJECT TO FINES AND IMPRISONMENT

U.S. Endangered Species Act of 1973: No person may take, harass, harm, pursue, hunt, shoot, wound, kill, trap, or capture any sea turtle, turtle nest, and/or eggs, or attempt to engage in any such conduct. Any person who knowingly violates any provision of this Act may be assessed a civil penalty up to $25,000 or a criminal penalty up to $100,000 and up to one year imprisonment.

SHOULD YOU WITNESS A VIOLATION OR OBSERVE AN INJURED OR STRANDED TURTLE OR DISORIENTED HATCHLINGS, PLEASE CONTACT:

US Fish and Wildlife Service at (601) 965-4900

Nests Relocation Protocol:

After a nest is identified, three circumstances would warrant nest relocation:

(1) If eggs have been exposed as a result of erosion,
(2) If you observe a nest, due to its location on the beach, is in danger of being inundated by daily tides or lost through erosion, or
(3) The nest is within active construction zone or any zone that will be active within 95 days from the date of discovery.

Do not move the nest unless you are completely confident the nest will be lost.

If the nest requires relocation, then call the designated person(s) permitted to relocate nest and contact USFWS, Mr. Paul Necaise, 228-493-6631, as soon as possible.

A turtle relocation plan is included in the plans and specifications. See Plan Drawing Sheet CB 108.1 Environmentally Sensitive Areas.

Nests requiring relocation must be completely moved no later than 9 a.m. the morning following deposition to a designated relocation area shown on Plan Drawing Sheet CB-108.1 Environmentally Sensitive Areas. Additional sites for nest relocation can be determined in coordination with USFWS and NPS. Relocated nests must not be placed in

organized groupings. Relocated nests must be randomly staggered along the length and width of the beach in settings that are not expected to experience daily inundation by high tides or known to routinely experience severe erosion and egg loss, or subject to artificial lighting. Relocated nests should have a predator proof screen/cage as outlined in the Nest Marking protocol (See Appendix B) where raccoons are a problem. Nest relocations in association with construction activities must cease when construction activities no longer threaten nests.

A new nest location can be excavated above the high tide line and within the areas identified in the turtle relocation plan. The top of the new nest, or egg cavity should be located approximately 10-12 inches below the level of the sand. The bottom of the new cavity should be about 22 inches deep. The nest cavity should be in the shape of a vase with a round bottom and long neck. Dig the new nest cavity before you begin to move the eggs. Move the eggs with care but in a timely manner. Move them one by one to the container. Handle the eggs with care. Use the supply container to store the eggs, or a cooler if one is available. Fill the bottom with some sand from the nest area to prevent the eggs from rolling in the container. The sand will also cushion the eggs. Use the lid to shade the eggs. Large temperature changes need to be avoided. After all the eggs have been deposited (not dropped) carefully in the new nest cavity one at a time, fill cavity with moist sand using the sand from the original nest site. Then use surrounding sand as needed. Compress the sand with your hands with slight to moderate pressure. Mark these nests in accordance with the general guidelines for a positive nest.

Recording Data:

Completely fill in the Mississippi Sea Turtle Crawl Datasheet form provided for all nests and false crawls. Be as accurate as possible. Pay particular attention to describing the location of the nest and how the nest was marked. Use the back of the sheets for additional information or maps/diagrams. Use a separate data sheet for each nest.

Beach Profile Survey at Turtle Nesting/False Crawl Locations:

An elevation profile shall be obtained through an identified sea turtle nesting site or false crawl with a bearing perpendicular to the average shoreline orientation. The seaward limit of the profile should begin at the -2.0 foot contour and continue landward a minimum of 150 feet but no less than 75 feet landward of the nesting site or landward extent of the false crawl track; however, the transect shall terminate at any substantial standing water or at the dense vegetation line landward of the nest. Points along the profile should be spaced such than there is no more than 0.5 foot difference in elevation but no more than 15 feet between points along the profile. Additionally, a point shall be located at the centroid of the nesting site or the false crawl track. Points should be collected by using a high-precision real-time kinematic (RTK) global positioning system (GPS). Positioning data shall be referenced to Mississippi State Plane East, NAD83 HARN, U.S. Survey feet and NAVD88 (Geoid 12A), U.S. Survey feet. Survey control, accuracy, and procedure shall be in accordance with EM 1110-1-1005. Survey information shall

be emailed to the following USACE staff, Mr. Nathan Lovelace at Nathan.D.Lovelace@usace.army.mil, Mr. Stephen Reid at Stephen.H.Reid@usace.army.mil, and Ms. Lekesha Reynolds at Lekesha.W.Reynolds@usace.army.mil.

Sediment Sample at Turtle Nesting/False Crawl Locations:

A sediment sample shall be obtained at the centroid of the nesting site or the false crawl track. Care should be taken to not harm the eggs at the nesting site during the collection. Each sample will include approximately one pint of material and will be labeled with the date and site reference. Samples will be turned in to the Mobile District Office, Mr. Nathan Lovelace, Nathan.D.Lovelace@usace.army.mil for analysis. No lab work is required.

Routine Monitoring of all existing Nest Sites:

1. All sea turtle nests will be monitored throughout the incubation period. This monitoring is for the purpose of determining the duration of incubation, and identifying the incidence of depredation, damage from beach erosion, or disturbance by human activities.

2. Make sure all the stakes are readable and in good condition. If a stake or sign is missing, replace it and note the replacement in the log book and on the nest sheet. Sites will be evaluated for evidence of disturbance including tracks, digging, ghost crab holes, tire tracks, beach erosion or wash-overs, or any other indication of nest disturbance. Photographs and observations of any disturbance should be recorded and provided in the report.

Monitoring at Expected Time of Hatching

1. Beginning at the 50th day from initial discovery, each nest will be monitored more closely. This intensive regime of monitoring will be conducted to determine the precise duration of incubation, and to gather data on hatchling emergence, depredation, and disorientation.

2. Nest sites will be evaluated to determine if hatching has occurred by looking for tracks of hatched turtles which have left the nest. In general, the majority of hatchlings will leave the nest as a group during the night. Their tracks will appear as a clutter of small, approximately 2" wide tracks which radiate out from the nest. The area where the eggs are located will usually appear collapsed.

3. Look for evidence of depredation such as ghost crab or bird and any indication of turtle remains. Look for evidence of hatchling disorientation. Note any tracks which deviate from a straight course to the water and attempt to follow any tracks which have headed in the wrong direction. If disoriented hatchlings have been located, contact Mobile District, PD-EC, Coastal Environment Chief, Ms. Lekesha Reynolds, 251-690-3260, USACE, Ms. Angelia Lewis, 251-694-4105, USFWS, Mr. Paul Necaise 228-493-6631, and NPS, Ms. Caitlynn Brig 30-747-2632, as soon as possible.

4. Record all observations made at the site on the specific FWS form developed for that nest. Please be as complete as possible. Any information which can be learned about the fate of the hatchlings after they emerged from the nest is of value.

Final Nest Assessment and Excavation:

1. All nests will be assessed at the conclusion of the nesting process to gather data on overall nesting success.

2. In general, the final assessment will be conducted 3 days after hatchlings have been documented as emerging from the nest or 80 days after initial discovery of a nest if no evidence of hatching has been recorded.

3. When excavated, the sites are evaluated to determine the fate of the nest. The data collected includes, at minimum, the total number of eggs found (both hatched and unhatched), the presence of any hatchlings inside the nest, the number of unhatched eggs with embryonic development, the number of eggs without embryonic development, and any evidence regarding factors which may have affected the nest, such as ghost crab burrows, vegetation roots, etc.

4. Results will be recorded on the Mississippi Sea Turtle Crawl Datasheet form (in Appendix B) and all protective material including screens and stakes will be removed from the nest location.

Construction protection measures to be monitored (compliance/noncompliance observations should be included in weekly report):

1. During turtle nesting and hatching season, staging areas for construction equipment must not be located in the natural dunes and vegetation on the island. In project areas on natural beaches, construction pipes will be as short in length as possible to allow nesting sea turtles use of the natural beach and limit trapping of nesting sea turtles behind the construction/dredge pipes. In addition, all construction pipes placed on the beach must be located as far landward as possible without compromising the integrity of the dune system. Pipes placed parallel to the dune must be 5 to 10 feet away from the toe of the dune if the width of the beach allows. Temporary storage of pipes must be off the beach to the maximum extent possible. If the pipes are stored on the beach, they must be placed in a manner that will minimize the impact to nesting habitat and must not compromise the integrity of the dune systems.

2. To minimize possible boat impact to nesting sea turtles feeding and loafing in the surf off the outer bar of the south beach support vessels should observe a no wake zone 300 yards from the south shoreline.

3. Direct lighting of the beach and nearshore waters must be limited to the immediate construction area during the nest laying season through end of hatching season (April 15 – November 30) and must comply with safety requirements. Lighting on all equipment must be minimized through reduction, shielding, lowering, and appropriate placement to avoid

excessive illumination of the water's surface and nesting beach while meeting all Coast Guard, Corps EM 385-1-1, and OSHA requirements. Light intensity of lighting equipment must be reduced to the minimum standard required by OSHA for General Construction areas, in order to not misdirect sea turtles.

4. Sea Turtle Signs: If nesting occurs within the construction area, the nest should be relocated, and the construction contractor shall place and maintain a bulletin board in the contracting shed with the location map of the construction site showing the sea turtle nesting areas and a warning, clearly visible, stating that "SEA TURTLE NESTING AREAS ARE PROTECTED BY THE THREATENED AND ENDANGERED SPECIES ACT".

5. Beach Rutting: Ruts created by heavy equipment located along the beach face between the nest and the water will be smoothed to avoid trapping of hatchlings as they move down the beach face to feed.

Reporting:

1. Report any activity daily, including nesting and false crawls via email to USACE POCs in the contact list below. The logs shall summarize sea turtle species observed (adults and hatchlings), the location of turtle crawls and/or nests (GPS coordinates), and construction compliance/noncompliance observations. In addition logs shall summarize upon locating a dead or injured sea turtle that may have resulted from direct or indirect results of the project. Nests with estimated hatch dates should be supplied with the submitted logs. If an injured or dead sea turtle is discovered, contact Mr. Paul Necaise (FWS), and Ms. Kelly Irick (NPS) immediately to ensure treatment or disposition of the dead sea turtle. A NOAA Sea Turtle Stranding and Salvage Network – Stranding Report form should be completed and filed with NOAA. A copy of the form can be found at the MS Sea turtle stranding and salvage network website at https://www.nrc.gov/docs/ML1434/ML14345A279.pdf. Dr. Melissa Cook, Melissa.Cook@noaa.gov, 228-549-1628, is the POC for stranded or dead sea turtles. Ms. Lauren Noble is the POC for stranded or dead mammals, her phone number is 228-549-1612 and her email is Lauren.Noble@noaa.gov, and the hotline number is 877-942-5343 or IMMS 888-767-3657. Please also provide a copy to Mobile District, PD-EC, Coastal Environment Chief, Ms. Lekesha Reynolds, Ms. Angelia Lewis (USACE), and Ms. Kelly Irick (NPS).

2. Report Submission: A summary monitoring report should be submitted weekly to USACE, FWS and NPS POCs listed in the contact list below (including logs, photographs, and all data forms/sheets).

3. Following completion of the project, a summary report of the monitoring and nesting activities shall be forwarded within 30 days to Mobile District, PD-EC, Coastal Environment Chief, Ms. Lekesha Reynolds, USFWS, and NPS.

Requirements for monitor:

Monitoring will be conducted by trained individuals with proven sea turtle experience and identification skills. Credentials of the Sea Turtle Monitor will be submitted to the USFWS,

USACE, and NPS Biologists for review and approval. Not every monitor will require relocation experience and permits, however at least two individuals approved for relocation should be available to allow one person to monitor the construction site every day during the nesting season when there are active construction activities occurring. An NPS Biologist will be available if needed during the monitoring.

MDWFP, USFWS, NPS, and anyone permitted by MDWFP or USFWS shall be allowed on work site during construction as needed to assist with sea turtle monitoring and nest search or to post nest buffers when needed with the approval of the USACE on-site inspector in order to comply with safety regulations.

CONTACT LIST:

USFWS: Mr. Paul Necaise, 228-493-6631, Paul.Necaise@fws.gov, 6578 Dogwood View Pkwy, Jackson, MS 39213
NPS: Ms. Kelly Irick, 850-916-3011, Kelly_Irick@nps.gov, Gulf Islands National Seashore 3500 Park Road, Ocean Springs, MS 39564
NPS: Ms. Caitlynn Brig, 303-747-2632, Caitlynn_Brig@nps.gov. Gulf Islands National Seashore, 3500 Park Road, Ocean Springs, MS 39564
NPS: Ms. Jolene Williams, 228-323-3176, Jolene_Williams@nps.gov, Gulf Islands National Seashore, 3500 Park Road, Ocean Springs, MS 39564
USACE: Ms. Lekesha Reynolds, 251-690-3260, Lekesha.W.Reynolds@usace.army.mil, 109 St. Joseph St., Mobile, AL 36602
USACE: Ms. Angelia Lewis, 251-694-4105, Angelia.V.Lewis@usace.army.mil, 109 St. Joseph St., Mobile, AL 36602
USACE COR: Mr. Stephen Reid, Contracting Officer Representative, 251-957-6019, Cell 251-802-2009, Stephen.H.Reid@usace.army.mil
USACE DMPM: Mr. Nathan Lovelace, Dredge Material Project Manager, 251-694-3713, Cell 251-802-2010, Nathan.D.Lovelace@usace.army.mil

Mississippi Sea Turtle Crawl Datasheet

For nesting and non-nesting emergences

Survey Date (mm/dd/yyyy): Weather:

Surveyor(s): Time Discovered:

Species: **CC CM LK UNK Other** Crawl Type: **NA NB FA FB**

Species Key:		**Crawl Type Key:**	
CC=Caretta caretta	LK=Lepidochelys kempii	NA=Nest above recent high tide	FA=False crawl above recent high tide
CM=Chelonia mydas	UNK=Unknown	NB=Nest below recent high tide	FB=False crawl below recent high tide

Original Crawl/Nest Information

GPS wpt #

Latitude: Longitude:

Abandoned Body Pit: # Abandoned Egg Chamber:

Distance from clutch/apex to:

Toe of Dune (ft): High Water Line (ft):

Clutch Deposited ? **YES NO Unknown** Clutch: **MOVED MARKED**

Nest above Wrack Line? **YES NO** **Nest ID:**

Crawl Width Measurements: Nest Screened: **YES NO**

1 _____ cm Buffer Stakes: **YES NO**

2 _____ cm Nest Relocated: **YES NO**

3 _____ cm Reason:

Hidden Stake (ft): Main 4' Stake Location:

Toe of Dune Stake (ft): Main 4' Stake Height (cm):

Total Clutch Size: # of Broken Eggs:

Depth to Top of Clutch (cm): Depth to Bottom of Clutch (cm):

Photos Taken? **YES NO** (At least 3 photos should be taken. Photos should include an overhead view of the nest/false crawl location with marking stake visible so that the location of the nest site relative to the dune, wrack line, and water can be seen in the image.)

Obstructions Encountered? **YES NO**

If yes, please describe:

Disturbances? (humans, predators) **YES NO**

If yes, please describe (including # of eggs predated):

Notes:

Site Description:

Crawl Sketch (Must show dune, apex or nest location, obstacles, HWL)

Relocated Nest Information

New GPS wpt #: Inventory Date:

Latitude: Longitude:

Total Clutch Size: # of Broken Eggs:

Depth to Top of Clutch (cm): Depth to Bottom of Clutch (cm):

Notes:

Site Description:

Reproductive Success	
Key: H = Hatched HNO = Hatch Not Observed DNH = Did Not Hatch B = Broken	
Nest ID:	**Observer:**
Fate: **H HNO DNH B Other** (if Other, describe)	
First Emergence Date:	Other Emergence Dates:
75 Day Date:	Excavation Date:
4' Stake Height (cm):	
Depth to Top of Clutch (cm):	Depth to Bottom of Clutch (cm):
Hatched:	**Unhatched:**
Live Hatchlings:	Dead Hatchlings:
Yolkless Eggs:	Total Clutch Size:
Development Arrested At:	
Early Stage Mortality:	Addled:
Late Stage Mortality:	Infertile:
Pipped Live:	Pipped Dead:
Eggs Affected By: (describe if nest was affected by predators or inundation)	
Roots (circle all that apply): **Inside Clutch Invade Eggs Hatchlings Trapped**	
Crab Holes (within 60 cm of clutch): **YES NO**	Ants: **YES NO**
HATCHING SUCCESS % (number of hatched shells/total clutch size x 100):	
EMERGING SUCCESS % (number of hatched shells - (live + dead hatchlings)/total clutch size) x 100:	
Comments:	

RTK Survey Summary (summary measurements recorded on this sheet may be rounded to whole numbers)	
Surveyor(s):	Survey Date:
Equipment Make and Model #:	Equipment Serial #:
ASCII file name (if known):	Weather:
Total Length of RTK Profile (ft):	Highest Elevation (ft):
Lowest Elevation (ft):	Nest Elevation(ft):
Profile Sketch (include location of gulf or soutnd water's edge, nest/false crawl loation, dune, berm, vegetation, wrack line, obstructions, as applicable)	

NEST BUFFER MARKING

Equipment for nest perimeter buffer zone marking:

1. 4 wooden perimeter buffer zone stakes. Dimensions 1" x 2", 4 feet long.
2. 1 roll of 3/16" fluorescent orange flagging tape

Marking Nest Sites to Protect Buried Eggs from Hazardous Activities

The goal of this marking method is to clearly identify the nest area and protect it from human activities such as vehicular traffic or other disturbances.

A series of stakes and highly visible survey ribbon or string shall be installed to establish a 10-foot radius around the nest (see photo below). No activity shall occur within this area nor will any activity occur that could result in impacts to the nest. Nest sites shall be inspected daily to assure nest markers remain in place and that the nest has not been disturbed by the project activity. The stakes should extend more than 36" above the sand. To further identify the nest site, surveyor's ribbon can be tied from the top of one stake to another to create a perimeter around the nest site. Additionally, a nest sign can be attached to one of the stakes used to create the perimeter. A nest-identifying number and the date the eggs were laid should be placed on at least one of the nest perimeter stakes. At least one additional stake should be placed a measured distance from the clutch location at the base of the dune or seawall to ensure that future location of the nest is possible should the nest perimeter stakes be lost.

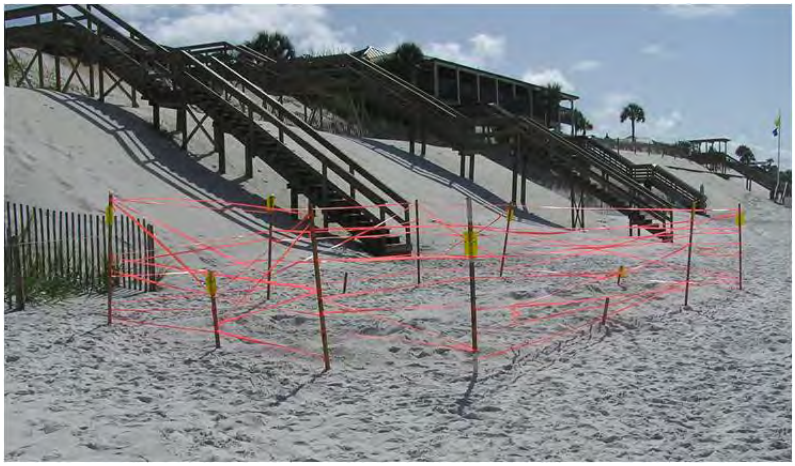
Signs should have the following information:

SEA TURTLE NEST - DO NOT REMOVE

VIOLATORS SUBJECT TO FINES AND IMPRISONMENT

U.S. Endangered Species Act of 1973: No person may take, harass, harm, pursue, hunt, shoot, wound, kill, trap, or capture any sea turtle, turtle nest, and/or eggs, or attempt to engage in any such conduct. Any person who knowingly violates any provision of this Act may be assessed a civil penalty up to $25,000 or a criminal penalty up to $100,000 and up to one year imprisonment.

Example of Nest Marking



TURTLE NEST RELOCATION SITING AND PREPARATION GUIDELINES

General turtle nest relocation area siting and preparation guidelines are described below.

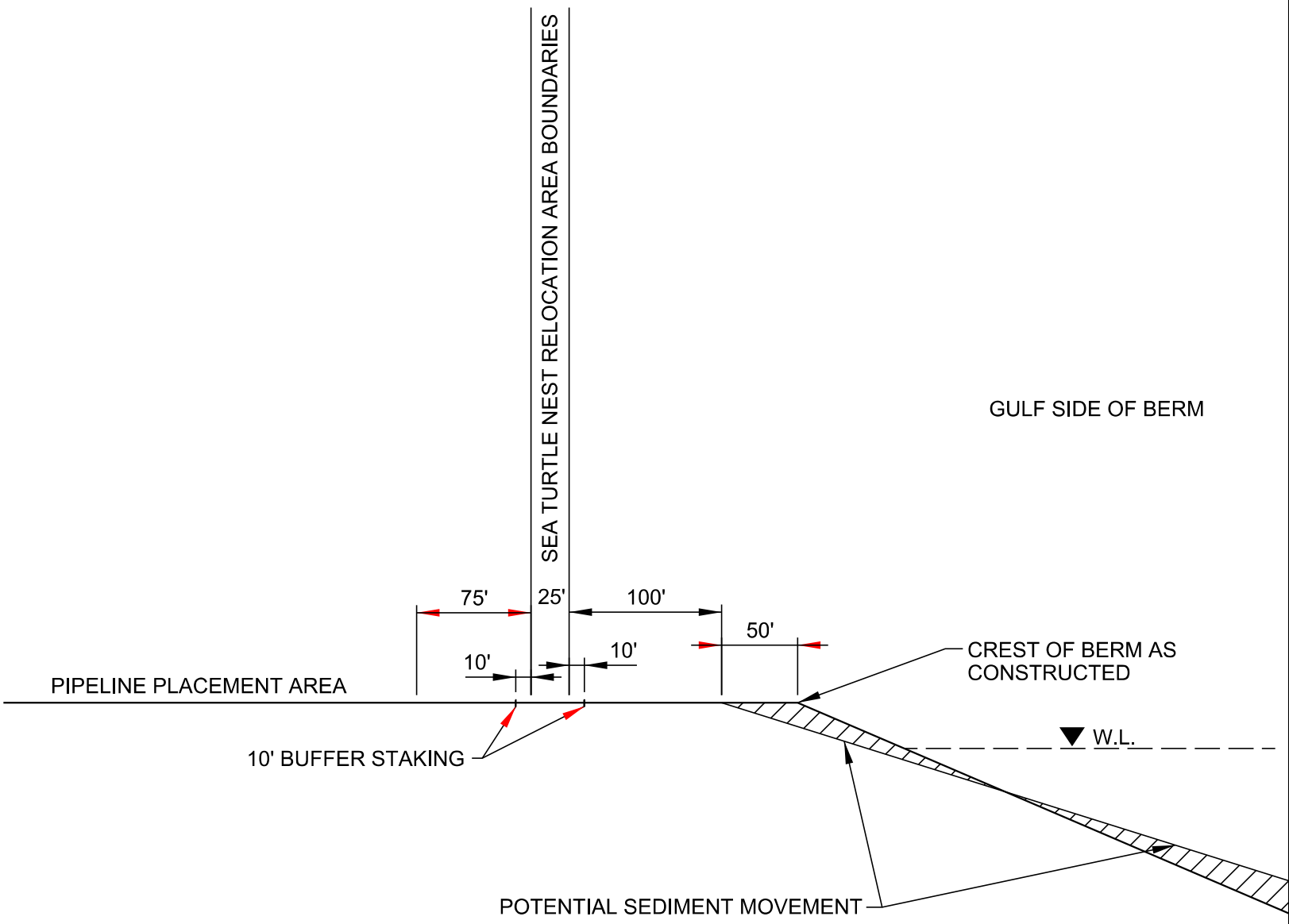
Additional information for turtle monitoring and relocation requirements can be found in the Turtle Monitoring Plan, see Appendix B.

1) Sea Turtle Nest Relocation Area Siting Guidelines:

    a) Relocation areas shall be at least 2 acceptance sections (400 ft) away from an active work zone.
    b) Relocation areas shall be outside of a 120 day window of any Contractor work zones assuming a 30,000 cy per day pumping rate.
    c) Relocation areas shall be located approximately 150 ft back from the construction berm crest on the Gulf of Mexico side of the fill template.
    d) Pipe that is laid parallel to the shoreline shall be set at least 75 ft back from the rear limit of the relocation area (see Pipeline Placement Detail in Appendix B).
    e) Relocation areas shall be actively managed and coordinated by the COR.

2) Relocation Area Preparation Guidelines:

    a) Relocation areas will be tilled to a depth of 18” prior to receiving eggs.
    b) Specialized equipment is not required for tilling the relocation areas.
    c) A ten (10) foot buffer shall be staked out around all active relocation areas.
    d) Relocation areas within the newly constructed fill template shall be tilled and staked a minimum of twenty-four (24) hours prior to nest relocations in that area.



PIPELINE PLACEMENT DETAIL

NOT TO SCALE

Monitoring and Adaptive Management
Turtle Monitoring Data

17 APPENDIX H: TURTLE DATA

17.1 TURTLE DATA ATTRIBUTES

The table below outlines the turtle monitoring attributes.

Attribute	Data Type	Size/format	Description
turtlePermitNo	String	50	Turtle Permit Holder (TP#)
contractNo	String	50	Contract Number
prinPermitHolder	String	50	Principal permit holder
organization	String	50	Data Collector Organization
address	String	150	Data Collector Address
telephoneDay	String	20	Data Collector daytime telephone #
telephoneNight	String	20	Data Collector evening telephone #

TABLE 19 DATA COLLECTOR ATTRIBUTES

Attribute	Data Type	Size/format	Description
beach	String	20	Beach name
obsStartDate	Date	mm/dd/yyyy	Initial observation date
obsStartTime	String	20	Initial observation time (00:00:00)
weather	String	25	Weather conditions
species	String		Species type (Loggerhead, Green, Leatherback, Kemp's Ridley, Unknown)
incidentType	String	25	Incident Type (nest/false crawl)
incidentID	String	25	Turtle Nest/Crawl ID ([IslandID_mmddyy] Island IDS: Cat Island = 1; Ship Island = 2; Horn Island = 3; Petit Bois Island = 4)
crawlMeasurement	Decimal		Crawl Measurement (width)
crawlDescription	Text	20	Crawl Description (alternating, symmetrical)
latitudeGPS	Decimal		Latitude in decimal degrees of nest/crawl location
longitudeGPS	Decimal		Longitude in decimal degrees of

			nest/crawl location
markers	Text	20	Markers around nest (signs, stakes)
nestPhotoID	String	150	File path/name of nest photo
siteDescription	String	150	Site Description
relocated	String	20	Is this a relocated nest? (yes, no)
relocatedReason	String	150	Reason why the nest was relocated. Value required if “relocated” attribute is yes.
previousNestID	String	20	Nest ID (incidentID) before relocation to track movement of nest. Relocated nest gets a new Nest ID.
clutchMeasurements	Decimal		Measurements from center of body pit/egg cavity to marker signs/stakes
clutchDeposited	String	20	Clutch deposited (yes, no, unknown)
totalClutchSize	String		(number of eggs)
clutchPhotoID	String	150	File path/name of clutch photo
inventoryDate	DateTime		Inventory date of hatchling data
emerged	String	20	Hatchlings emerged? (yes, no)
broken	Integer		How many broken?
stakes	String	20	Stakes? (yes, no)
hatched	Integer		Number of hatchlings
bufferStakes	String	20	Buffer stakes? (yes, no)
liveHatchlings	Integer		Number of live hatchings
deadHatchlings	Integer		Number of dead hatchlings
earlyStageMortality	String	20	Early stage mortality? (yes, no)
addled	String	20	Addled? (yes, no)
lateStageMortality	String	20	Late stage mortality (yes, no)
infertile	String	20	Infertile? (yes, no)
pippedDead	Integer		Number of pipped dead
pippedLive	Integer		Number of pipped live
hatchlingSuccess%	Decimal		Hatchling Success % (number of hatched shells/total clutch size X

			100)
emergingSuccess%	Decimal		Emerging Success % (no. hatched shells – {live + dead hatchlings}/total clutch size) X 100)
eggsAffectedBy	String	150	Describe if nest was affected by predators or inundation
Notes	String	250	Additional notes

TABLE 20 TURTLE MONITORING DATA ATTRIBUTES

17.2 TURTLE DATA DELIVERY PROCESS

The data collector will deliver turtle monitoring data to the MsCIP data management team by electronic data files in Excel file format. The data is to be attributed based on the information given in the table above.

17.3 TURTLE DATA STORAGE

The turtle monitoring data will be replicated to USACE Enterprise database by the Spatial Data Branch once received. The location data and attributes will be hosted through ArcGIS rest services for consumption.

17.4 TURTLE DATA VISUALIZATION/DESSIMINATION

The turtle monitoring given in the table above will be available through the MsCIP web mapping interface. Access restrictions to the data will be determined by the MsCIP program management team.

Sea Turtle Handling and Resuscitation Guidelines

Appendix IV: SEA TURTLE HANDLING AND RESUSCITATION GUIDELINES

Any sea turtles taken incidentally during the course of fishing or scientific research activities must be handled with due care to prevent injury to live specimens, observed for activity, and returned to the water according to the following procedures:

A) Sea turtles that are actively moving or determined to be dead (as described in paragraph (B)(4) below) must be released over the stern of the boat. In addition, they must be released only when fishing or scientific collection gear is not in use, when the engine gears are in neutral position, and in areas where they are unlikely to be recaptured or injured by vessels.

B) Resuscitation must be attempted on sea turtles that are comatose or inactive by:

1. Placing the turtle on its bottom shell (plastron) so that the turtle is right side up and elevating its hindquarters at least 6 inches (15.2 cm) for a period of 4 to 24 hours. The amount of elevation depends on the size of the turtle; greater elevations are needed for larger turtles. Periodically, rock the turtle gently left to right and right to left by holding the outer edge of the shell (carapace) and lifting one side about 3 inches (7.6 cm) then alternate to the other side. Gently touch the eye and pinch the tail (reflex test) periodically to see if there is a response.

2. Sea turtles being resuscitated must be shaded and kept damp or moist but under no circumstance be placed into a container holding water. A water-soaked towel placed over the head, carapace, and flippers is the most effective method in keeping a turtle moist.

3. Sea turtles that revive and become active must be released over the stern of the boat only when fishing or scientific collection gear is not in use, when the engine gears are in neutral position, and in areas where they are unlikely to be recaptured or injured by vessels. Sea turtles that fail to respond to the reflex test or fail to move within 4 hours (up to 24, if possible) must be returned to the water in the same manner as that for actively moving turtles.

4. A turtle is determined to be dead if the muscles are stiff (rigor mortis) and/or the flesh has begun to rot; otherwise, the turtle is determined to be comatose or inactive and resuscitation attempts are necessary.

Any sea turtle so taken must not be consumed, sold, landed, offloaded, transshipped, or kept below deck.

These guidelines are adapted from 50 CFR § 223.206(d)(1). Failure to follow these procedures is therefore a punishable offense under the Endangered Species Act.

Cooperative Marine Turtle Tagging Program (CMTTP) Tagging Data Form

COOPERATIVE MARINE TURTLE TAGGING PROGRAM (CMTTP)
TAGGING DATA FORM

SPECIES:_____	**DATE CAPTURED:**	DAY__	MO____	YR____	**DATE RELEASED:**	DAY____	MO____	YR____

TAG NUMBERS (LIST ALL NUMBERS AND LETTER PREFIXES; CIRCLE TAG NUMBERS ALREADY ON THE TURTLE [="OLD TAGS"]):

LEFT FRONT: _____	**RIGHT FRONT:**_____	**LEFT REAR:**_____	**RIGHT REAR:**_____

PIT TAG#:_____ **LOCATION OF PIT TAG:**_____

WAS TURTLE CARRYING TAGS WHEN ENCOUNTERED?:	YES	NO	IF YES, THEN CIRCLE CORRECT STATEMENT:

1. RECAPTURE OF SAME PROJECT TURTLE (EITHER WITHIN SEASON OR BETWEEN SEASONS)
2. RECAPTURE OF DIFFERENT PROJECT TURTLE (NOT A TAG YOUR GROUP APPLIED)

TAG RETURN ADDRESS:

ORGANIZATION TAGGING AND/OR RELEASING TURTLE (INCLUDE AREA CODE/PHONE NUMBER; AND EMAIL):

PROJECT TYPE (CIRCLE ONE):

[NESTING BEACH]	[TANGLE NET]	[POUND NET]	[HAND CATCH]	[STRANDING]	[OTHER, DESCRIBE]

IF NESTING BEACH: DID TURTLE NEST?	YES	NO	UNDETERMINED

FACILITY WHERE TURTLE WAS BEING HELD:

DESCRIBE CAPTURE LOCATION. BE SPECIFIC, INCLUDE COUNTY AND LAT/LONG IF AVAILABLE

DESCRIBE RELEASE LOCATION. BE SPECIFIC, INCLUDE COUNTY AND LAT/LONG IF AVAILABLE.

TURTLE MEASUREMENTS:

STRAIGHT CARAPACE LENGTH (SCL MINIMUM):	_____ CM	_____ INCHES
STRAIGHT CARAPACE LENGTH (SCL NOTCH-TIP):	_____ CM	_____ INCHES
STRAIGHT CARAPACE WIDTH (SCW):	_____ CM	_____ INCHES
CURVED CARAPACE LENGTH (CCL MINIMUM):	_____ CM	_____ INCHES
CURVED CARAPACE LENGTH (CCL NOTCH-TIP)	_____ CM	_____ INCHES
CURVED CARAPACE WIDTH (CCW):	_____ CM	_____ INCHES
WEIGHT:	_____ KG	_____ LBS

TURTLE WAS INSPECTED AND/OR SCANNED FOR:

TAG SCARS:	YES	NO	WHERE LOCATED?
PIT TAGS:	YES	NO	WHAT FREQUENCY?
MAGNETIC WIRES:	YES	NO	WHERE LOCATED?
LIVING TAGS:	YES	NO	WHERE LOCATED?

ADDITIONAL REMARKS OR DATA ON BACK OF FORM:	YES	NO

MAIL COMPLETED FORM TO:

ARCHIE CARR CENTER FOR SEA TURTLE RESEARCH, DEPARTMENT OF ZOOLOGY, PO BOX 118525
UNIVERSITY OF FLORIDA, GAINESVILLE, FL 32611 USA
and
SCDNR Marine Turtle Program, PO Box 12559, Charleston, SC 29422

Protocol for Collection Tissue From Live and Dead Turtles for Genetic Analysis

Appendix II:

PROTOCOL FOR COLLECTING TISSUE FROM DEAD TURTLES FOR GENETIC ANALYSIS

Method for Dead Turtles

<<<IT IS CRITICAL TO USE A NEW SCALPEL BLADE AND GLOVES FOR EACH TURTLE TO AVOID CROSS-CONTAMINATION OF SAMPLES>>>

1. Put on a new pair of latex gloves.
2. Use a new disposable scalpel to cut out an approx. 1 cm (½ in) cube (bigger is NOT better) piece of muscle. Easy access to muscle tissue is in the neck region or on the ventral side where the front flippers "insert" near the plastron. It does not matter what stage of decomposition the carcass is in.
3. Place the muscle sample on a hard uncontaminated surface (plastron will do) and make slices through the sample so the buffer solution will penetrate the tissue.
4. Put the sample into the plastic vial containing saturated NaCl with 20% DMSO *(SEE BELOW)
5. Use the pencil to write the stranding ID number (observer initials, year, month, day, turtle number by day), species, state and carapace length on the waterproof paper label and place it in the vial with the sample. EXAMPLE: For a 35.8 cm curved carapace length green turtle documented by Jane M. Doe on July 15, 2001 in Georgia, the label should read "JMD20010715-01, C. mydas, Georgia, CCL=35.8 cm". If this had been the third turtle Jane Doe responded to on July 15, 2001, it would be JMD20010715-03.
6. Label the outside of the vial with the same information (stranding ID number, species, state and carapace length) using the permanent marker.
7. Place clear scotch tape over the writing on the vial to protect it from being smeared or erased.
8. Wrap parafilm around the cap of the vial by stretching it as you wrap.
9. Place vial within whirlpak and close.
10. Dispose of the scalpel.
11. Note on the stranding form that a part was salvaged, indicating that a genetic sample was taken and specify the location on the turtle where the sample was obtained.
12. Submit the vial with the stranding report to your state coordinator. State coordinators will forward the reports and vials to NMFS for processing and archiving.

*The 20% DMSO buffer in the plastic vials is nontoxic and nonflammable. Handling the buffer without gloves may result in exposure to DMSO. This substance soaks into skin very rapidly and is commonly used to alleviate muscle aches. DMSO will produce a garlic/oyster taste in the mouth along with breath odor. The protocol requires that you WEAR gloves each time you collect a sample and handle the buffer vials.

The vials (both before and after samples are taken) should be stored at room temperature or cooler. If you don't mind the vials in the refrigerator, this will prolong the life of the sample. DO NOT store the vials where they will experience extreme heat (like in your car!) as this could cause the buffer to break down and not preserve the sample properly.

Questions:

Sea Turtle Program
NOAA/NMFS/SEFSC
75 Virginia Beach Drive
Miami, FL 33149
305-361-4207

THANK YOU FOR COLLECTING SAMPLES FOR SEA TURTLE GENETIC RESEARCH!!

Genetic Sample Kit Materials – DEAD turtles

latex gloves
single-use scalpel blades (Fisher Scientific 1-800-766-7000, cat. # 08-927-5A)
plastic screw-cap vial containing saturated NaCl with 20% DMSO, wrapped in parafilm
waterproof paper label, ¼" x 4"
pencil to write on waterproof paper label
permanent marker to label the plastic vials
scotch tape to protect writing on the vials
piece of parafilm to wrap the cap of the vial

- whirl-pak to return/store sample vial

Appendix III:

PROTOCOL FOR COLLECTING TISSUE FROM LIVE TURTLES FOR GENETIC ANALYSIS

Method for Live Turtles

<<<IT IS CRITICAL TO USE A NEW BIOPSY PUNCH AND GLOVES FOR EACH TURTLE TO AVOID CROSS-CONTAMINATION OF SAMPLES>>>

1. Turn the turtle over on its back.
2. Put on a new pair of latex gloves.
3. Swab the entire cap of the sample vial with alcohol.
4. Wipe the ventral and dorsal surfaces of the rear flipper 5-10 cm from the posterior edge with the Betadine/iodine swab.
5. Place the vial under the flipper edge to use the cleaned cap as a hard surface for the punch.
6. Press a new biopsy punch firmly into the flesh as close to the posterior edge as possible and rotate one complete turn. Cut all the way through the flipper to the cap of the vial.
7. Wipe the punched area with Betadine/iodine swab; rarely you may need to apply pressure to stop bleeding.
8. Use a wooden skewer to transfer the sample from the biopsy punch into the plastic vial containing saturated NaCl with 20% DMSO *(SEE BELOW)
9. Use the pencil to write the stranding ID number (observer initials, year, month, day, turtle number by day), species, state and carapace length on the waterproof paper label and place it in the vial with the sample. EXAMPLE: For a 35.8 cm curved carapace length green turtle documented by Jane M. Doe on July 15, 2001 in Georgia, the label should read "JMD20010715-01, C. mydas, Georgia, CCL=35.8 cm". If this had been the third turtle Jane Doe responded to on July 15, 2001, it would be JMD20010715-03.
10. Label the outside of the vial with the same information (stranding ID number, species, state and carapace length) using the permanent marker.
11. Place clear scotch tape over the writing on the vial to protect it from being smeared or erased.
12. Wrap parafilm around the cap of the vial by stretching it as you wrap.
13. Place vial within whirlpak and close.
14. Dispose of the biopsy punch.
15. Note on the stranding form that a part was salvaged, indicating that a genetic sample was taken and specify the location on the turtle where the sample was obtained.
16. Submit the vial with the stranding report to your state coordinator. State coordinators will forward the reports and vials to NMFS for processing and archiving.

*The 20% DMSO buffer in the plastic vials is nontoxic and nonflammable. Handling the buffer without gloves may result in exposure to DMSO. This substance soaks into skin very rapidly and is commonly used to alleviate muscle aches. DMSO will produce a garlic/oyster taste in the mouth along with breath odor. The protocol requires that you WEAR gloves each time you collect a sample and handle the buffer vials.

The vials (both before and after samples are taken) should be stored at room temperature or cooler. If you don't mind the vials in the refrigerator, this will prolong the life of the sample. DO NOT store the vials where they will experience extreme heat (like in your car!) as this could cause the buffer to break down and not preserve the sample properly.

Questions:

Sea Turtle Program
NOAA/NMFS/SEFSC
75 Virginia Beach Drive
Miami, FL 33149
305-361-4207

THANK YOU FOR COLLECTING SAMPLES FOR SEA TURTLE GENETIC RESEARCH!!

Genetic Sample Kit Materials – LIVE turtles

- latex gloves
  alcohol swabs
  Betadine/iodine swabs
  4-6 mm biopsy punch – sterile, disposable (Moore Medical Supply 1-800-678-8678, part #0052442)
  plastic screw-cap vial containing saturated NaCl with 20% DMSO, wrapped in parafilm
  wooden skewer
  waterproof paper label, ¼" x 4"
- pencil to write on waterproof paper label
  permanent marker to label the plastic vials
  scotch tape to protect writing on the vials
  piece if parafilm to wrap the cap of the vial
  whirl-pak to return/store sample vial



Shorebird Monitoring Procedures

SHOREBIRD MONITORING PROCEDURES FOR MSCIP BARRIER ISLAND SHIP ISLAND CONSTRUCTION ACTIVITIES

Threatened and endangered species, critical habitat, and nesting shorebirds must be monitored for this project to determine impacts pursuant to the Endangered Species Act and the Migratory Bird Treaty Act. This project is located within the boundaries of Gulf Islands National Seashore, whose barrier island beaches are listed as critical habitat for the Threatened Piping Plover and contains suitable habitat for the Threatened Red Knot. The U.S. Army Corps of Engineers (USACE) (and its Contractor and/or subcontractor) shall keep construction activities under surveillance, management, and control to prevent impacts to shorebirds and/or their nests. The USACE and its Contractor may be held responsible for harming or harassing the birds, their eggs or their nests as a result of the construction. Eggs and chicks of beach-nesting birds blend in with their surroundings and are nearly invisible on the ground, making it easy for people and equipment to accidentally crush the eggs or kill young chicks; young chicks can get stuck in deep tire ruts, etc.

Monitoring includes bird identification, counts, habitat use, behavior observed, and GPS locations of the main groups of birds using the beach areas on West Ship Island and East Ship Island. The three main groups of birds are solitary nesters, colonial nesters, and winter migrants (including threatened Piping Plover and the threatened Red Knot, as well as Bald eagles and osprey). Species identification information will be provided by the U.S. Fish and Wildlife Service (USFWS), Jackson, Mississippi. A National Park Service Biologist will be available for assistance if needed during all periods of the monitoring.

Specific time frames for monitoring will vary with the avian season, weather, and actual construction logistics. As the project moves from place to place, the Bird Monitor will also have to be able to move with the project and/or with the birds.

There are two monitoring periods:

(1) Fall, Spring Migration/Mid-Winter from July 15 to May 30: During this time, the Bird Monitor will focus on migratory shorebirds including Piping Plover and Red Knot, but should also report on other birds like osprey and eagle.

(2) Nesting from March 1 to September 30: Monitoring for nesting birds is only required during construction, with the exception of the 2 week pre-construction monitoring to identify nests. Monitoring for nesting shorebirds (during construction) will focus on colonial and solitary shorebird species but will also report on other birds like osprey and eagle. Species documented to nest on the Mississippi barrier islands include solitary nesting species such as: Wilson's Plover, Snowy Plover, Semi-palmated Plover, Willet and American Oystercatcher. Documented colonial species include: Least Tern, Gullbilled Tern, Royal Tern, Sandwich Tern, Common Tern and Black Skimmer.

1. Monitoring Periods:

a. Pre and During Construction:

(1) Migration/Mid-Winter Shorebirds: Monitoring frequency a minimum of weekly throughout entire project area where sand will be placed on East and West Ship Islands, except in the event of

adverse weather conditions. A site survey should be conducted before the resumption of any break in activity.

(2) Nesting Shorebirds: The Contractor shall start this frequency of monitoring activity for a period of 2 weeks prior to work. Monitoring frequency daily during active construction except in the event of adverse weather conditions. However, nesting surveys only need to take place within the project area where activities are ongoing or will be within 90 days prior to moving to a different part of the beach in order to prevent impacts to nests/nesting activities. If a nest is found to impede construction work, the USACE must contact USFWS as soon as possible. A site survey should be conducted before the resumption of any break in activity.

2. Visual Surveys and Survey Protocols:

Surveys shall be conducted during the dawn or dusk time frames by a trained or experienced Bird Monitor contractor, approved by the USACE/FWS. Bird monitoring should not take place immediately following turtle monitoring where birds have been disturbed by the use of ATVs. Surveys should be conducted by traversing the length of the project/construction area and visually inspecting, using binoculars or spotting scope, for the presence of shorebirds exhibiting courtship or nesting behavior. The preferred method for monitoring is by foot patrol. During the construction phase, if an ATV or other vehicle is needed to cover large project areas, the vehicle must be operated at a speed <6 mph, shall be run at or below the high-tide line, and the Bird Monitor will stop at no greater than 200 meter intervals to visually inspect for nesting activity. Even with the use of an ATV, the Bird Monitor will use a drive and walk technique coupled with scanning ahead to detect secretive solitary nesting species.

Surveys shall be conducted using survey protocols outlined here:

(1) Pre and During Construction (Nesting): A daily report of nesting shorebird monitoring and nest activity shall be kept by the contractor's Bird Monitor. Daily logs shall summarize each shorebird species observed (adults and chicks/fledglings) and provide a rough estimate of numbers of each species, the location of species (GPS coordinates preferred), leg bands (if applicable), and their activity (e.g. foraging, resting, nesting, courtship behavior, feeding chicks). In addition, daily logs shall summarize findings for locating a dead or injured bird that may have resulted from direct or indirect results of the project, the contractor shall notify USACE and USFWS as soon as possible (see contact list below). Care shall be taken in handling an injured bird, contact a local permitted wildlife rehabilitation center to ensure treatment or disposition of the dead bird. Banded birds should also be noted and recorded (color of bands and location on bird, i.e. one red band on lower right leg and one green band on upper right leg). All activity will be submitted in a report format, and provided within one week of data collection during construction.

Nesting season surveys for detecting new nesting activity will be completed prior to movement of equipment, operation of vehicles, or other activities that could potentially disrupt nesting behavior or cause harm to the birds or their eggs or young (see aforementioned 90 day requirement). Once nesting activity is confirmed by the presence of a scrape, eggs, or young, the USACE will notify the USFWS as soon as possible. This is only required when there is “new” nesting activity (this is defined as a new species seen and/or new area). Bird Monitor will install red wire flags in area identifying location until buffer zone is established (see number 3 below).

(2) During Construction (Migration/Mid-Winter): Monitoring will be done on a weekly basis during construction. The areas to be monitored should include the east tip of West Ship Island, specifically from the vegetation line to the water's edge and East Ship Island, specifically from the edge of the vegetated area to the water's edge and covering the east tip, the south shore, and west tip. Reports shall be submitted weekly during the construction time frames.

The following data shall be included in the surveys:

a) Negative and positive survey data;
b) Piping Plover and Red Knot locations with a Global Position System (GPS-decimal degrees, preferred);
c) Habitat features used by Piping Plovers and Red Knots when seen (i.e. intertidal, fresh wrack, old wrack, dune, mid-beach, vegetation, other);
d) Landscape features where Piping Plovers or Red Knots are located (i.e. Gulf of Mexico shoreline, bayside shorelines, inlet spit, tidal creek, shoals, lagoon shoreline, lakeside sand flats, ephemeral pools, etc.);
e) Substrate used by Piping Plovers and Red Knots (i.e. sand, mud/sand, mud, algal mat, etc.);
f) Behavior of Piping Plovers or Red Knots (i.e. foraging, roosting, preening, bathing, flying, aggression, walking);
g) Color-bands seen on Piping Plovers or Red Knots;
h) All other shorebirds/waterbirds seen within the survey area.

3. Buffer Zones: A temporary, 300-foot buffer zone, or less as only approved via the Contracting Officer Representative in coordination with Mobile District, PD-EC, Coastal Environmental Chief, Ms. Lekesha Reynolds 251-690-3260, Lekesha.W.Reynolds@usace.army.mil, and USFWS, Mr. Paul Necaise: 228-493-6631, or paul_necaise@fws.gov, and NPS, Ms. Kelly Irick, at 850-916-3011, or email at Kelly_Irick@nps/gove and Ms. Jolene Williams, at 228-323-3176, or email Jolene_Williams@nps.gov.. A buffer zone, as approved, shall be created around any nesting or courtship behavior, or around areas where Piping Plovers, Red Knots, or winter migrants congregate in significant numbers. Designated buffer zones must be posted with clearly marked "Area Closed" signs around the perimeter and left undisturbed until nesting is completed or terminated, and the chicks fledge. No access to the nesting sites by humans, equipment under control of the Contractor (except limited access when approved by the Contracting Officer Representative, and accompanied by the Bird Monitor, in coordination with the persons listed in the contact list below. Construction activities, movement of vehicles, or stockpiling of equipment are prohibited in the buffer zone. Buffer zones shall be increased if birds appear agitated or disturbed by construction or other activities in the adjacent area. Disturbed adult birds will attempt to drive a predator away by calling out, dive bombing, or dropping feces on the predators. Other times adult birds will pretend to have a broken wing to lure a predator away from their young.

4. Equipment: Travel corridors and staging areas outside of buffer zones near nesting sites shall be coordinated with the Corps of Engineers, Contracting Officer Representative and these areas shall be designated and marked outside the buffer areas. Heavy equipment, other vehicles or pedestrians may transit past nesting areas in the corridors.

5. Shorebird Signs: If nesting occurs within the construction area, the Contractor shall place and maintain a bulletin board in the contracting shed with the location map of the construction site showing the bird nesting areas and a warning, clearly visible, stating that "BIRD NESTING AREAS ARE PROTECTED BY THE MIGRATORY BIRD TREATY ACT."

Report Submission: The results of the daily shorebird monitoring and nest activities report shall be forwarded weekly to the Contracting Officer Representative and the Mobile District, PD-EC, Chief Coastal Environment, Ms. Lekesha Reynolds, Lekesha.W.Reynolds@usace.army.mil, 251-690-3260.

CONTACT LIST:
FWS: Mr. Paul Necaise at 228-493-6631, email Paul_Necaise@fws.gov
NPS: Ms. Kelly Irick at 850-916-3011, email Kelly_Irick@nps.gov
NPS: Ms. Jolene Williams, at 228-323-3176, email Jolene_Williams@nps.gov
USACE PD-EC: Ms. Lekesha Reynolds, Chief Coastal Environmental, at 251-690-3260, Lekesha.W.Reynolds@usace.army.mil
USACE PD-EC: Ms. Angelia Lewis, at 251-694-4105, Angelia.V.Lewis@usace.army.mil
USACE COR: Mr. Stephen Reid, Contracting Officer Representative, at 251-957-6019, Stephen.H.Reid@usace.army.mil

Monitoring and Adaptive Management
Shorebird Monitoring Data

18 APPENDIX I: BIRD MONITORING DATA (2015)

18.1 BIRD MONITORING ATTRIBUTES (2015)

The MsCIP Data Management Team re-defined the required bird monitoring attributes to document more thoroughly the birds seen on the island and to comply with the required USACE data standard. The table within this section gives the attributes expected to be recorded by any data collector.

Attribute	Data Type	Size/format	Description
birdSpeciesIDPK	Text	20	Primary Key. A unique, user defined identifier for each record or instance of an entity.
birdSpeciesXID	Integer		Unique ID used for indexing and linking purposes.
sdsFeatureName	Text	150	Name of the observed bird species
sdsFeatureDescription	Text	Max	A narrative describing the feature
mediaIDFK	Text	20	Used to link the record to associated multimedia records the reference data such as imagery, video, audio, scanned documents, drawings, and other digital media. See you service implementation guidance for details as to the target of this foreign key.
projectID	Text	Max	A foreign key reference to a project identifier used by an external business system.
sdsID	GUID		A unique identifier for all features and objects in the SDSFIE
sdsMetadataID	Text	80	The foreign key to a metadata record
species	Text	80	Species of the observed bird
location	Text	150	Descriptive location (i.e. West Ship Island)
observationDate	Date		Observation date
observationCount	Double		Number of birds observed
tide	Text	50	Low, mid, or high tide
weather	Text	100	General weather description
temperature	Text	50	General temperature description (i.e. cool)
wind	Text	50	General wind description (i.e. Low, Moderate, High)

habitat	Text	150	General habitat description (i.e. Sand Beach, Lagoon)
side	Text	50	Side of Island (i.e. Gulf Side, Bay Side)
vegetation	Text	50	General vegetation density description (i.e. Sparse)
substrate	Text	50	Substrate (i.e. Mud, Sand)
behavior	Text	200	General Bird behavior (i.e. Walking, Foraging, Roosting)
nests	Double		Number of observed nests
disturbances	Text	250	Activities occurring nearby (i.e. BP Survey, planting…)
speciesRange_Comments	Text	255	Species name when type "Other" is observed
observers	Text	200	First and last name of observer
obsTransportation	Text	50	Transportation being used when observing (i.e. foot, boat,…)
hyperlinks	Text	250	Hyperlinks to pictures taken with GPS at time of data capture or additional documentation
notableCharacteristics	Text	250	Description of any bands on bird if present

TABLE 21 **BIRD MONITORING DATA (2015) ATTRIBUTES**

18.2 BIRD MONITORING DATA DELIVERY PROCESS

The Data is to be collected using an iPad app that will be discussed with the data collector. Data will be collected in the field using an iPad and synced with a master database once connectivity is regained. All attributes seen in Table 21 will be included in submitted data.

18.3 BIRD MONITORING DATA STORAGE

When a data collector syncs the observation data, the data will be ingested into an interim protected online GIS database. The data will be regularly transferred to the USACE Spatial Data Branch where it will be uploaded into an SDE geodatabase. From there the data will be replicated up to USACE Enterprise database for visualization. The location data and attributes will be hosted through ArcGIS rest services for consumption.

18.4 BIRD MONITORING DATA VISUALIZATION/DESSIMINATION

All bird data including locations and attributes will be available through the password-protected private interface. Locations will be viewable within the web map along with the attributes from that particular data observation. Due to the threatened and endangered nature of the particular bird species being monitored, obfuscated bird data may be

available within the public interface giving total number of birds seen during a time range but not bird siting locations.

ArcGIS Collector Application Walk-Through

Collector App Walk-through for MSCIP Bird Data Collection



iPad 9:16 AM 31%

Collector

nwrc-aa.maps.arcg

Con

Try it | Learn

Cancel Sign In

Collector for ArcGIS (iOS) wants to access your account information

Sign in to NWRC Advanced Applications esri

Username

mscipUser

Password

••••••••••

SIGN IN

Forgot username or password?

Collector for ArcGIS (iOS) developed by:



Esri

Esri publishes a set of ready-to-use maps and apps that are available as part of ArcGIS. ArcGIS is a mapping platform that enables you to create interactive maps and apps to share within your

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All Maps

Search maps

All | On Device

1 map



MSCIP Bird Monitoring

3/3/15 | Craig Conzelmann

Download map to device.

iPad 12:59 PM 42%

All Maps

Cancel Download

1 map



1/2/15 | MSCIP

Choose your work area

NCBC Gulfport

Gulfport

Biloxi

Mississippi Sound

- Set Maximum Extent

Work Area Map Detail

Cancel

Download

Choose the map detail you require



- Zoom into necessary detail.
- Click Download

Estimated size: 716 MB

Work Area | Map Detail

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Search maps

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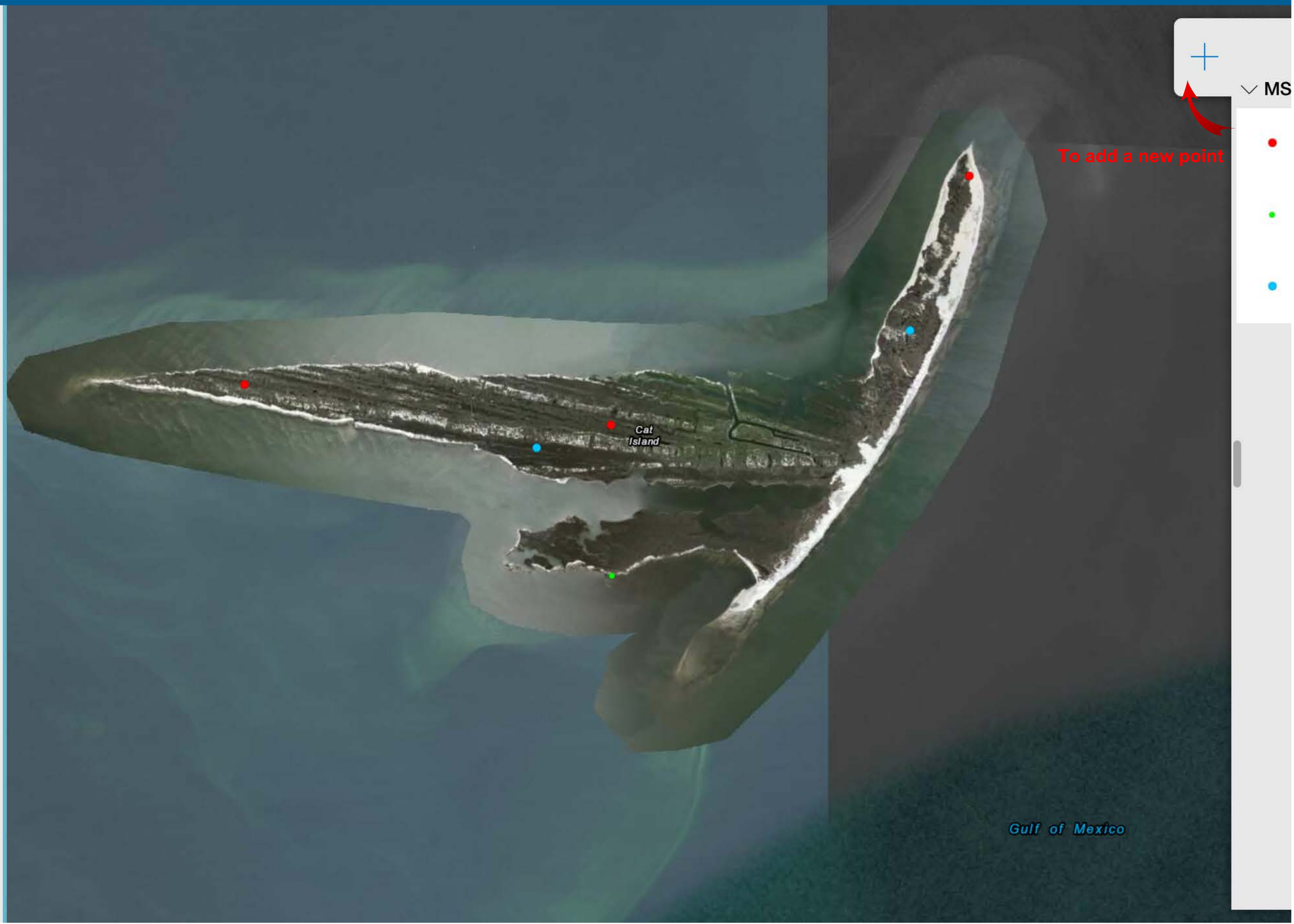
1 map



MSCIP Bird Monitoring

Cancel Download


To add a new point
MS
Cat Island
Gulf of Mexico

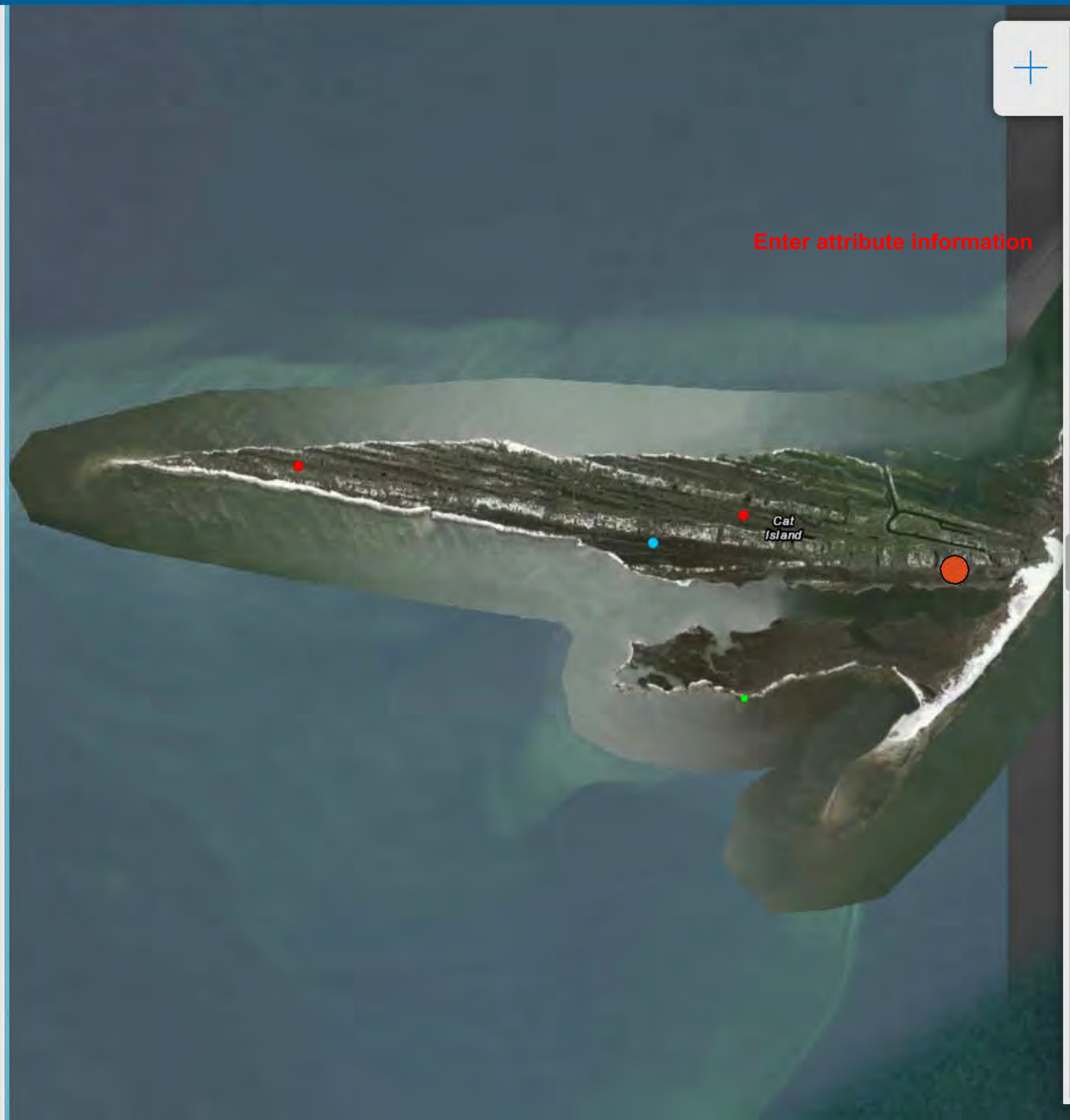
Cat Island

Collect a new feature

Select point type

MsCIP Bird Species

- Ruddy Turn Stone
- Wilsons Plover
- Great Blue Heron
- Least Sandpiper
- Black Belly Plover
- Dunlin
- Other
- Snowy Plover
- Semi-Plamated Plover
- Dowitcher
- Bald Eagle



Enter attribute information

Location
Lat: 30.222499° Long: -89.084594°

MSCIP Birds: Piping Plover

SPECIES
Piping Plover

LOCATION

DATE

BIRDS
0.00

TIDE

WEATHER

TEMPERATURE

WIND

HABITAT

SIDE

VEGETATION

SUBSTRATE

BEHAVIOR

- Click the point to see attributes.
- If need to edit the attributes, click the box/arrow icon the red arrow is pointing to.

Cat Island

Piping Plover
Piping Plover

Location
Lat: 30.222499° Long: -89.084594°

MSCIP Birds: Piping Plover

SPECIES
Piping Plover

LOCATION

DATE
January 9, 2015

BIRDS
0.00

TIDE

WEATHER

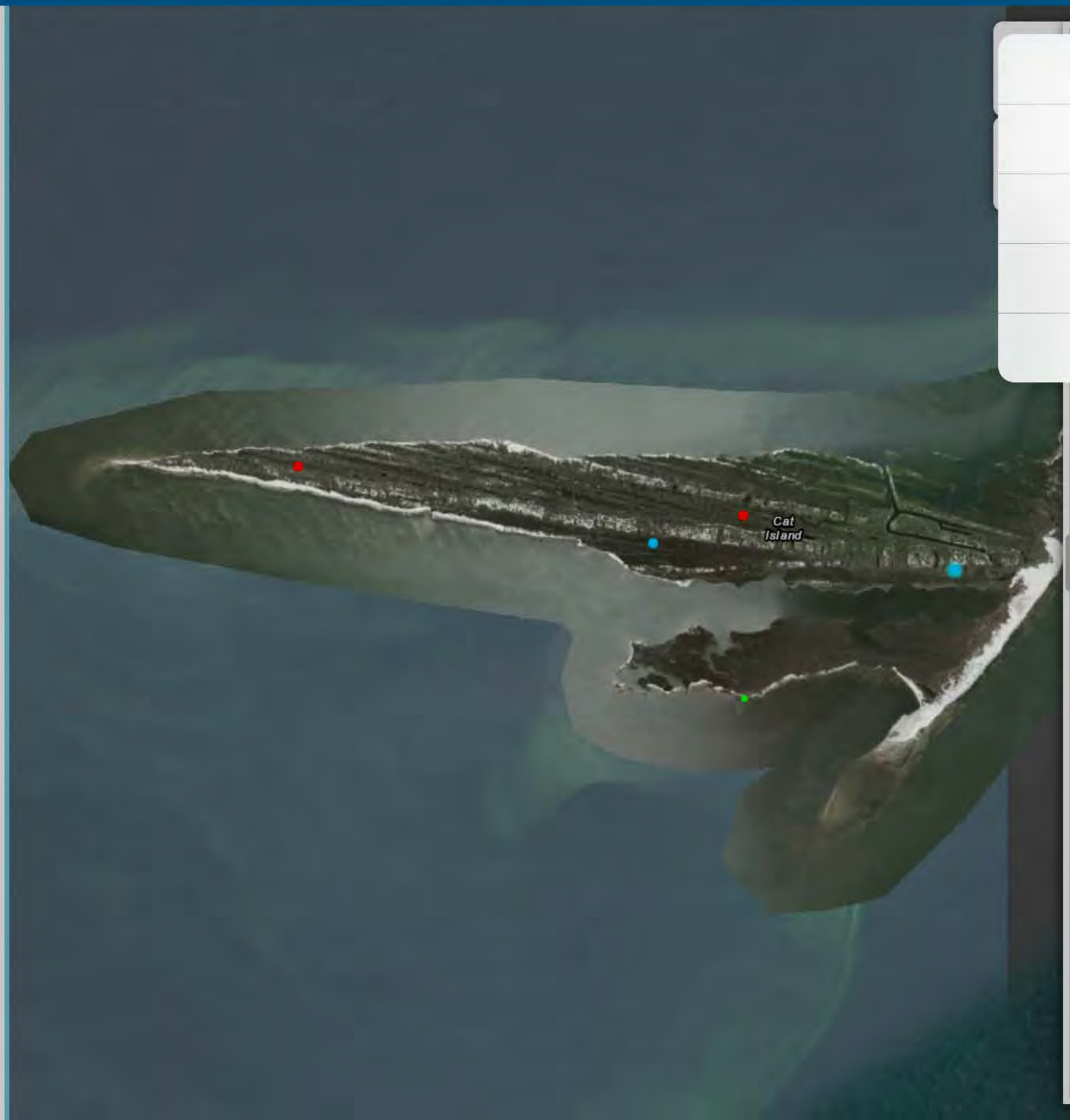
TEMPERATURE

WIND

HABITAT

SIDE

VEGETATION



Copy
Edit
Delete
Zoom to
Directions to here

er

LOCATION

DATE
January 9, 2015

BIRDS
0.00

TIDE

WEATHER

TEMPERATURE

WIND

HABITAT

SIDE

VEGETATION

Cancel Done

Location

<No value>

East Ship Island - East

East Ship Island - West

West Ship Island - East

West Ship Island - West

Cat Island - North ✓

Cat Island - South

Cat Island - Eastern Shoreline

Click the attribute to edit, enter information and click Done when finished.

cation
30.232998° Long: -89.071546°
sCIPSpecies: Red Knot
lame
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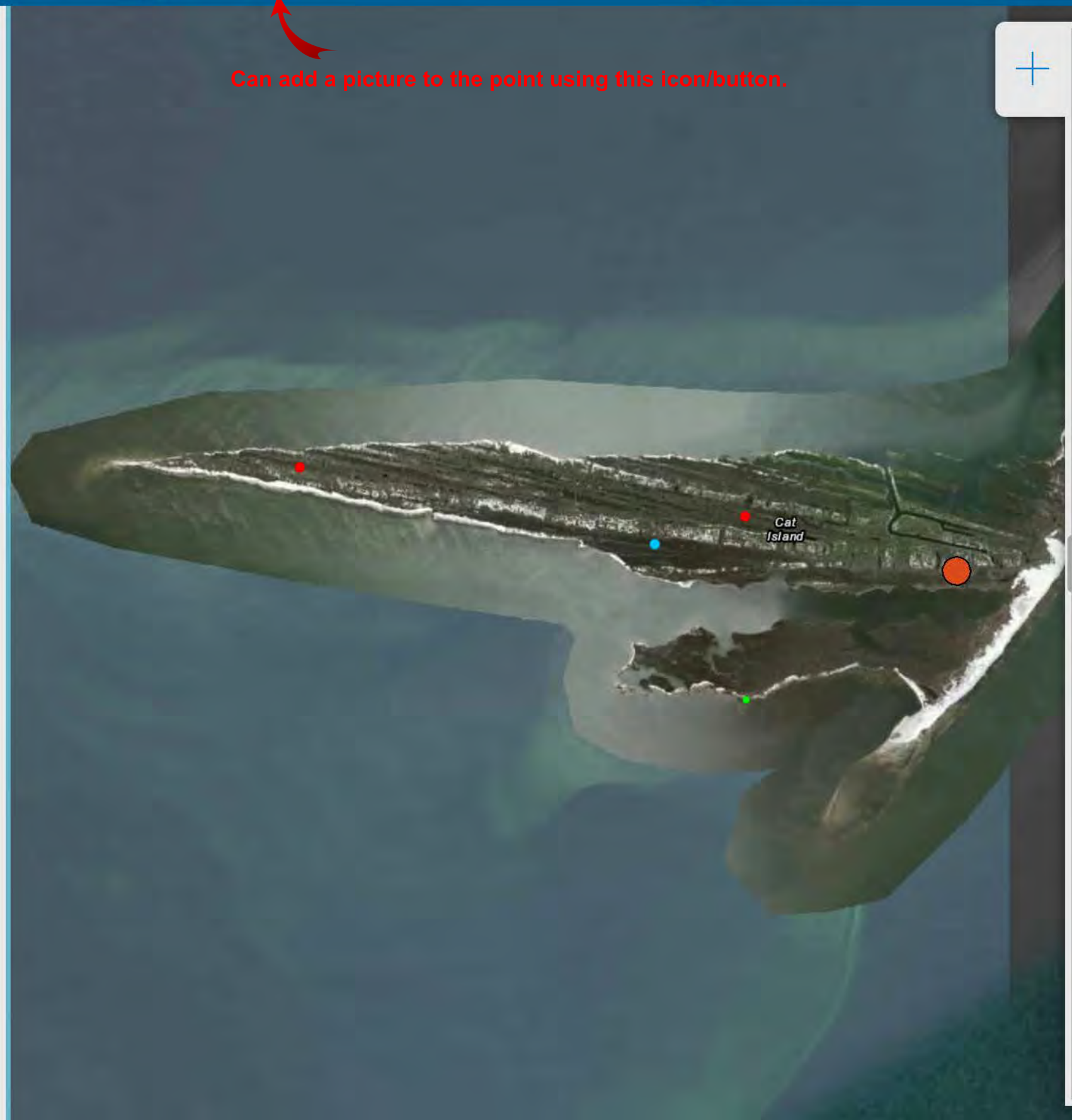
Side
Gulf Side

Cancel Update

Can add a picture to the point using this icon/button.



Location
Lat: 30.222499° Long: -89.084594°

MSCIP Birds: Piping Plover

SPECIES
Piping Plover

LOCATION

DATE
January 9, 2015

BIRDS
0.00

TIDE

WEATHER
rain

TEMPERATURE

WIND

HABITAT

SIDE

VEGETATION

SUBSTRATE

BEHAVIOR

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Cancel Update

Done **Attachments**



Add

Take Photo or Video

Choose From Library

Can select a photo from your iPad photo library or can take a picture.

After editing attributes, click Update. This updates the information on your device only.

cation
30.242233° Long: -89.066476°
MsCIP Birds: Red Knot
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Moderate

Cat Island

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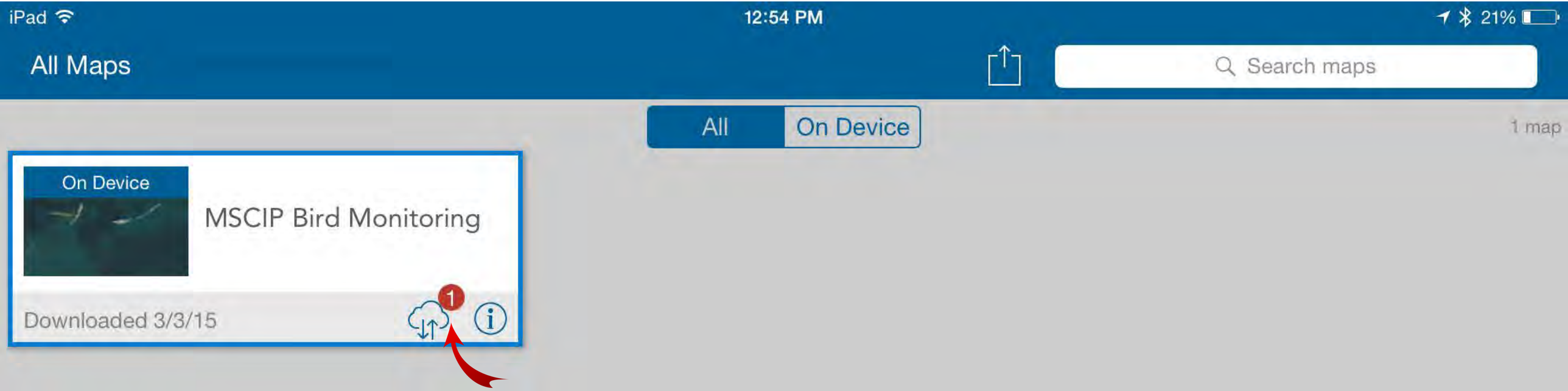
Maps

When ready to sync the data back online (database), click Maps.

MS

Cat Island

Gulf of Mexico



The red "1" shows there is a change saved on your iPad that needs to be synced back to the online database. Click the cloud once you regain connectivity and are ready to sync.

All Maps

Search maps

All | On Device

1 of 2 maps



MSCIP Bird Monitoring

Cancel Sync

Guidelines for Activities in Proximity to Manatees and Their Habitat

Guidelines for Activities in Proximity to Manatees and Their Habitat

A. All personnel associated with the project should be informed of the potential presence of manatees, manatee speed zones, and the need to avoid collisions with and injury to manatees. Such personnel instruction should also include a discussion of the civil and criminal penalties for harming, harassing, or killing manatees, which are protected under the Marine Mammal Protection Act of 1972 and the Endangered Species Act of 1973.

B. All contract and/or construction personnel are responsible for observing water-related activities for the presence of manatee(s).

C. Temporary signs should be posted prior to and during all construction/dredging activities to remind personnel to be observant for manatees during active construction/dredging operations or within vessel movement zones (i.e., work area), and at least one sign should be placed where it is visible to the vessel operator.

D. Siltation barriers, if used, should be made of material in which manatees could not become entangled, and should be properly secured and regularly monitored. Barriers should not impede manatee movement.

E. If a manatee is sighted within 100 yards of the active work zone, special operating conditions should be implemented, including: no operation of moving equipment within 50 ft of a manatee; all vessels should operate at no wake/idle speeds within 100 yards of the work area; and siltation barriers, if used, should be re-secured and monitored. Once the manatee has left the 100-yard buffer zone around the work area on its own accord, special operating conditions are no longer necessary, but careful observations would be resumed.

F. Any manatee sighting should be immediately reported to the Dauphin Island Sea Lab's Manatee Sighting Network Hotline at (866-493-5803) or at manatee.disl.org and the U.S. Fish and Wildlife Service's Jackson MS Field Office (228-493-6631).

Turbidity Monitoring Report

TURBIDITY MONITORING REPORT
IRVINGTON SITE OFFICE
CONTRACT NUMBER:

==========

DATE: REPORT NO. #

TIME OF DAY SAMPLE TAKEN:_____hrs

WEATHER CONDITIONS:

DIRECTION OF WATER FLOW:_____TIDAL STAGE: _____

WATER TEMP:_____° WIND SPEED _____ (MPH)

WAVE CONDITIONS (CALM, CHOPPY, ROUGH): _____

==========

TURBIDITY MEASUREMENT TAKEN APPROX. _____ FT. FROM DREDGE

TURBIDITY MEASUREMENT TAKEN APPROX._____FT. FROM DISCHARGE

DISCHARGE IS APPROX._____FT FROM DREDGE WITH AZIMUTH_____°

DEPTH AT DREDGE: _____ FT. DEPTH AT DISCHARGE:_____FT.

SURFACE TURBIDITY AT DREDGE:_____NTU

MID-DEPTH TURBITY AT DREDGE:_____NTU

SURFACE TURBIDITY AT DISCHARGE:_____NTU D/A #: 11, SECTION 1a

MID-DEPTH TURBITY AT DISCHARGE:_____NTU

==========

BACKGROUND TURBIDITY TAKEN APPROX._____FT FROM DREDGE

AZIMUTH FROM DREDGE:_____°

WATER DEPTH:_____FT

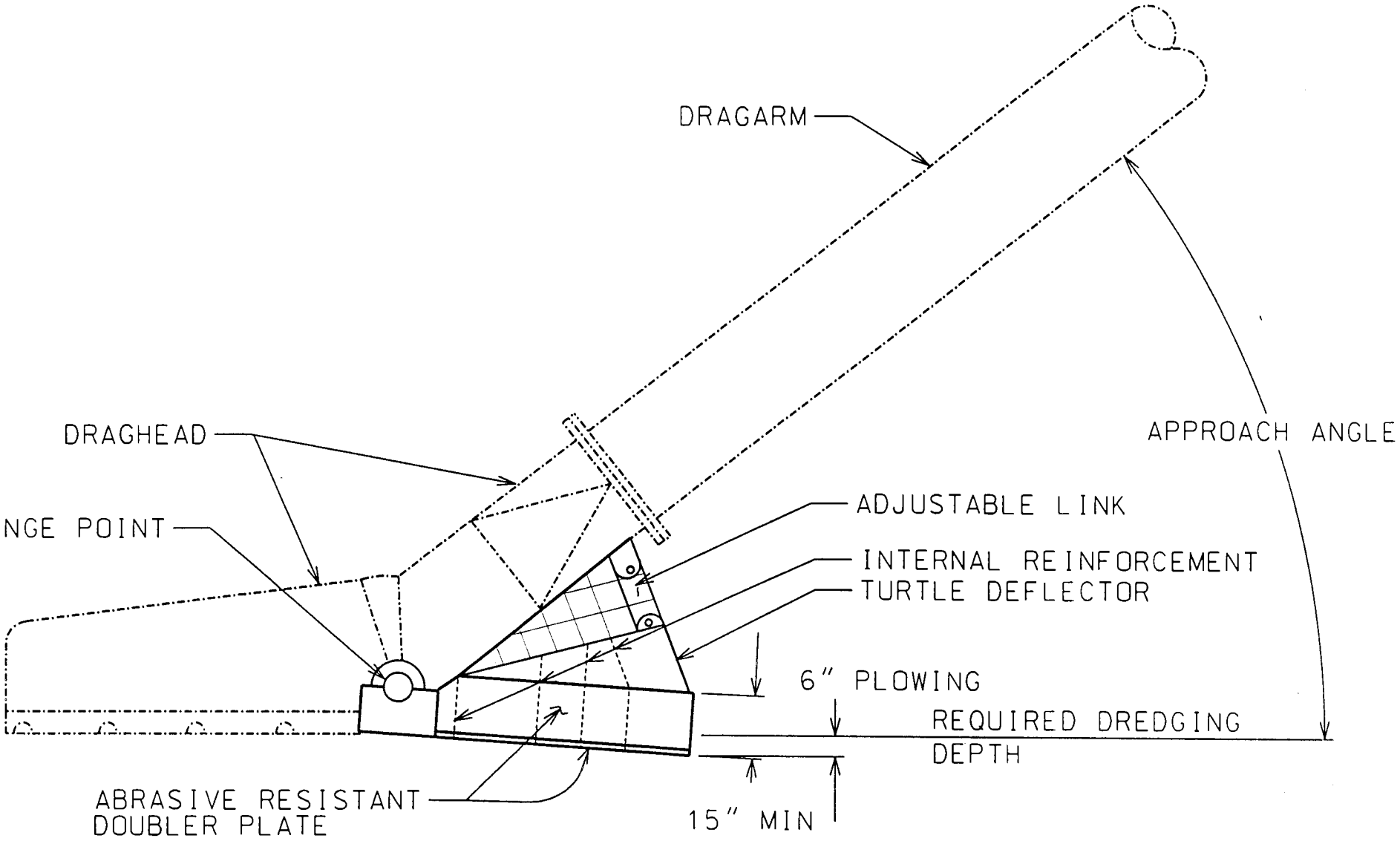
SURFACE TURBIDITY:_____NTU MID-DEPTH TURBIDITY:_____NTU

==========

REMARKS (VISIBLE PLUME, ETC.): Sea too rough for samples_____

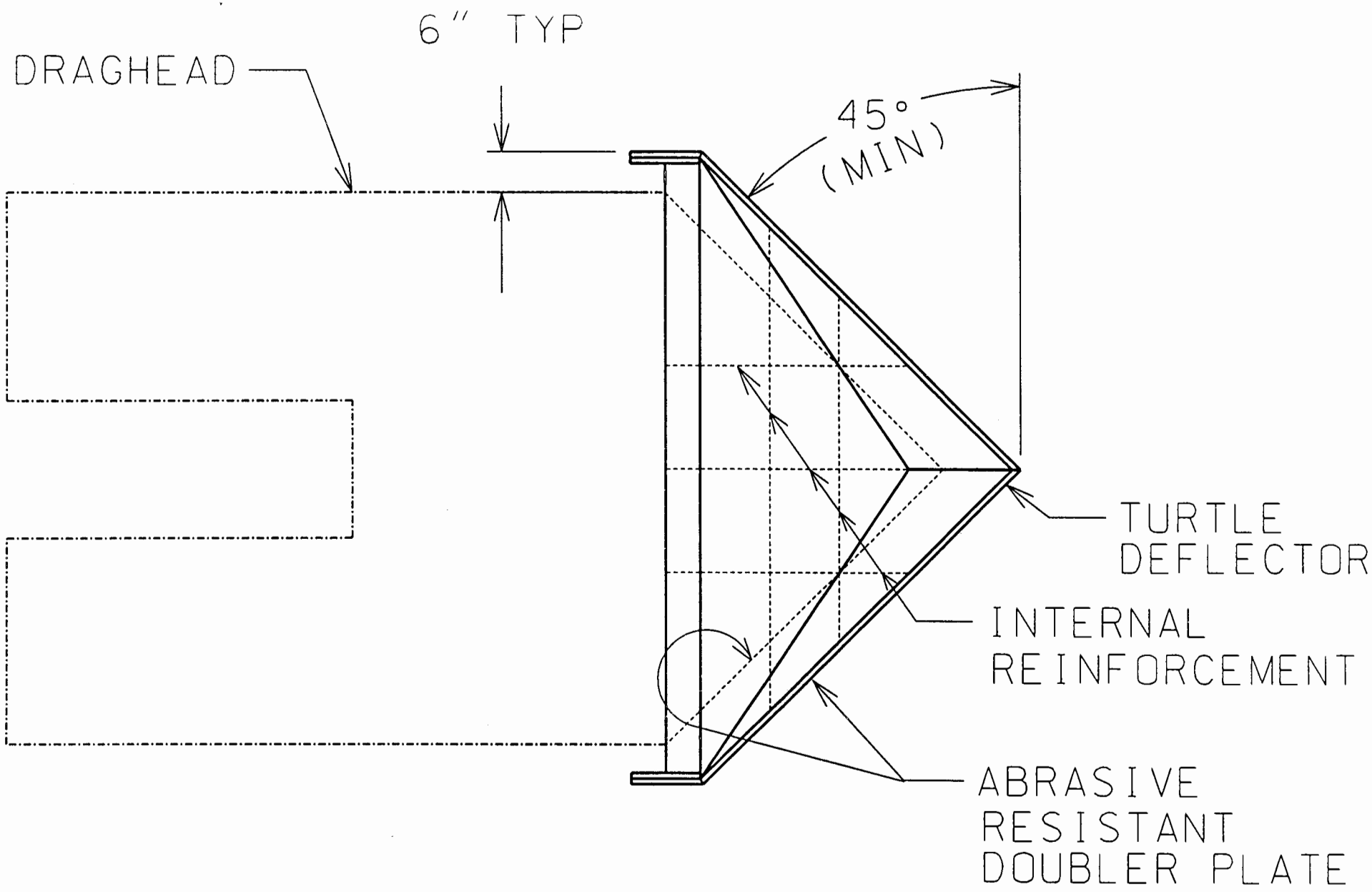
INSPECTOR: _____

Sea Turtle Deflector Specifications



ELEVATION

RIGID ADJUSTABLE TURTLE DEFLECTOR
SCALE: NONE



01355-2

PLAN VIEW

RIGID TURTLE DEFLECTOR

SCALE: NONE

Pipeline Bouy Specification

The wire that secures the buoy to a submerged pipeline can have enough slack to cause a loop in the line and entangle sea turtles causing accidental drownings. In order to prevent sea turtle drowning due to entanglement in the wire that secures the buoy to submerged pipelines, one of three options must be implemented:

1. Light weight chain
2. Non-looping wire rope
3. Plastic sheathing around nylon rope to prevent looping

The option identified must be included in the Environmental Protection Plan.

Bureau of Ocean Energy Management
Memorandum of Agreement

MEMORANDUM OF AGREEMENT
BETWEEN
THE BUREAU OF OCEAN ENERGY MANAGEMENT
OF THE DEPARTMENT OF THE INTERIOR
AND THE
U.S. ARMY CORPS OF ENGINEERS

REGARDING THE USE OF OUTER CONTINENTAL SHELF SAND RESOURCES FOR THE MISSISSIPPI COASTAL IMPROVEMENTS PROGRAM COMPREHENSIVE BARRIER ISLAND RESTORATION PROJECT, GULF ISLANDS NATIONAL SEASHORE, MISSISSIPPI

BOEM Negotiated Agreement No. OCS-G 35929

Title I. Explanatory Recitals

A. The United States Department of the Interior (DOI), acting through the Bureau of Ocean Energy Management (BOEM; or collectively with DOI, as the "Lessor"), enters into this Memorandum of Agreement (MOA) with the U.S. Army Corps of Engineers (USACE; as the "Lessee"), providing for the use of up to 19.6 million cubic yards of Outer Continental Shelf sand resources ("OCS sand resources") to complete the Mississippi Coastal Improvements Program Comprehensive Barrier Island Restoration Project ("the Project"), under the authority of Section 8(k)(2) of the Outer Continental Shelf Lands Act (OCSLA) (43 U.S.C. § 1337(k)(2)).

B. The term "OCS sand resources" means sand, gravel, and shell resources found on or below the surface of the seabed on the Outer Continental Shelf (OCS), as defined in Section 2(a) of the OCSLA (43 U.S.C. § 1331(a)).

C. Prior to the notice-to-proceed with construction, USACE will procure lands, easements, and rights-of-way (collectively, "Land Rights") as necessary from upland landowners, other property rights holders, and other persons and entities of appropriate scope and duration to facilitate the Project.

Title II. Purpose and Authority

A. This MOA authorizes USACE to use up to 19.6 million cubic yards of OCS sand resources from Petit Bois Pass OCS West 1 and 3-6, and Petit Bois Pass OCS East 1-5 (also referred to as the "Borrow Areas"), as designated and delineated in Tables 1-10 and on the attached maps, (Attachment 1) and to transport those sand resources to shore, in accordance with the terms of this MOA. After removal of the sand resources from the OCS and placement of those resources as specified in this MOA, BOEM has no jurisdiction over those sand resources unless they return to the OCS.

Table 1. Petit Bois Pass OCS East 1 Borrow Area Coordinates

PT.	NORTHING	EASTING
1	240620.40	1130436.97
2	241337.99	1130766.36
3	240579.22	1132003.89
4	240587.87	1132031.25
5	240346.85	1132526.09
6	240321.60	1132525.37
7	239610.67	1133019.21
8	239080.04	1132975.35
9	239333.41	1132176.59
10	240037.76	1132213.31
11	240327.14	1131861.24
12	240348.33	1131863.77
13	240207.62	1131280.01

Note: Coordinates are relative to the State Plane Coordinate System, Mississippi East Zone, NAD83, in U.S. Survey feet.

Table 2. Petit Bois Pass OCS East 2 Borrow Area Coordinates

PT.	NORTHING	EASTING
1	235816.31	1131548.90
2	236615.96	1132321.74
3	234426.82	1134285.25
4	234945.03	1134919.83
5	233348.53	1137400.69
6	232913.41	1137153.91
7	232596.85	1137463.73
8	231767.81	1138850.70
9	231106.70	1138623.70
10	231905.14	1136970.99
11	232230.63	1136497.79
12	232166.95	1136156.07
13	232338.44	1135252.97
14	232258.20	1134985.78
15	233326.50	1132944.38
16	233367.12	1132983.50

Note: Coordinates are relative to the State Plane Coordinate System, Mississippi East Zone, NAD83, in U.S. Survey feet.

Table 3. Petit Bois Pass OCS East 3 Borrow Area Coordinates

PT.	NORTHING	EASTING
1	233560.29	1141213.61
2	233821.47	1141438.63
3	233524.67	1142090.05
4	233129.13	1142563.27
5	232848.89	1142713.05
6	232084.54	1142808.33
7	231892.10	1142508.45
8	232395.40	1141946.49

Note: Coordinates are relative to the State Plane Coordinate System, Mississippi East Zone, NAD83, in U.S. Survey feet.

Table 4. Petit Bois Pass OCS East 4 Borrow Area Coordinates

PT.	NORTHING	EASTING
1	231059.31	1141636.19
2	231556.69	1141792.15
3	231402.65	1142138.23
4	231536.67	1142241.98
5	230958.81	1143514.28
6	230146.62	1144051.61
7	229962.34	1143741.03
8	230416.26	1143219.53

Note: Coordinates are relative to the State Plane Coordinate System, Mississippi East Zone, NAD83, in U.S. Survey feet.

Table 5. Petit Bois Pass OCS East 5 Borrow Area Coordinates

PT.	NORTHING	EASTING
1	232824.81	1138600.03
2	233273.73	1138978.08
3	232759.27	1139641.97
4	231984.05	1140157.33
5	231445.34	1140508.62
6	231224.00	1140286.81
7	231709.23	1139765.19
8	232470.61	1139046.23

Note: Coordinates are relative to the State Plane Coordinate System, Mississippi East Zone, NAD83, in U.S. Survey feet.

Table 6. Petit Bois Pass OCS West 1 Borrow Area Coordinates

PT.	NORTHING	EASTING
1	235548.45	1096673.62
2	236485.89	1097571.71
3	235981.75	1099731.60
4	232656.93	1103831.33
5	231724.08	1104974.34
6	230458.95	1103957.18
7	231084.65	1102538.62
8	234138.14	1098503.74

Note: Coordinates are relative to the State Plane Coordinate System, Mississippi East Zone, NAD83, in U.S. Survey feet.

Table 7. Petit Bois Pass OCS West 3 Borrow Area Coordinates

PT.	NORTHING	EASTING
1	236606.42	1113721.28
2	237093.63	1116141.41
3	236353.50	1116603.33
4	235882.87	1116509.03
5	235660.50	1116265.04
6	234942.27	1115166.66
7	236447.38	1113860.83

Note: Coordinates are relative to the State Plane Coordinate System, Mississippi East Zone, NAD83, in U.S. Survey feet.

Table 8. Petit Bois Pass OCS West 4 Borrow Area Coordinates

PT.	NORTHING	EASTING
1	233997.95	1110853.25
2	235019.89	1111176.25
3	235101.44	1111145.20
4	235690.99	1111339.37
5	234337.02	1115241.72
6	233727.20	1115058.78
7	232998.34	1116327.06
8	232205.97	1116107.90

Note: Coordinates are relative to the State Plane Coordinate System, Mississippi East Zone, NAD83, in U.S. Survey feet.

Table 9. Petit Bois Pass OCS West 5 Borrow Area Coordinates

PT.	NORTHING	EASTING
1	230328.20	1119315.92
2	231052.66	1119658.65
3	230537.73	1120794.70
4	231003.40	1121012.59
5	229775.62	1123653.84
6	229369.77	1124558.29
7	227853.55	1124066.10
8	228344.32	1123094.69
9	229788.36	1120470.95

Note: Coordinates are relative to the State Plane Coordinate System, Mississippi East Zone, NAD83, in U.S. Survey feet.

Table 10. Petit Bois Pass OCS West 6 Borrow Area Coordinates

PT.	NORTHING	EASTING
1	225158.59	1128932.17
2	227759.12	1128934.76
3	225094.90	1132244.24
4	223787.23	1131937.61

Note: Coordinates are relative to the State Plane Coordinate System, Mississippi East Zone, NAD83, in U.S. Survey feet.

B. BOEM, under the authority delegated by the Secretary of the Interior, is authorized, pursuant to Section 8(k)(2) of the OCSLA (43 U.S.C. § 1337(k)(2)), to enter into this MOA concerning the potential use of OCS sand resources. BOEM has determined that the Project meets the requirements of Section 8(k)(2)(A)(i) of the OCSLA. Therefore, in accordance with Section 8(k)(2), and subject to the terms and conditions contained herein, BOEM hereby authorizes the use of OCS sand resources from the Petit Bois Pass OCS Borrow Areas located in Mobile Area Blocks 819, 861, 862, 863 and 864, as identified in Tables 1-10, for the construction undertaken in furtherance of the Project. The parties acknowledge that, under the terms of Section 8(k)(2)(B), BOEM will not assess any fee against USACE for the use of the OCS sand resources described herein. In consideration of the provision of OCS sand resources for the Project, USACE will provide to BOEM survey results and other data as provided herein, which will, among other things, give BOEM valuable information on the Borrow Areas and use of Federal OCS mineral resources. Nothing in this MOA is intended to abrogate or diminish the Secretary of the Interior's authority under the OCSLA to oversee and regulate the removal of OCS sand resources.

C. The USACE is undertaking this Project pursuant to authority granted to it in accordance with the MsCIP Congressional authorization and enters into this MOA in compliance with the requirements of Sections 8(k)(2)(A)(i) and 8(k)(2)(D) of the OCSLA. Nothing in this MOA is intended to impede or hinder USACE's ability to complete the Project or abrogate or diminish either Party's authority or responsibilities under applicable law, including, but not limited to, the

National Environmental Policy Act (NEPA), Endangered Species Act (ESA), Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), Marine Mammal Protection Act (MMPA), National Historic Preservation Act (NHPA), Migratory Bird Treaty Act (MBTA), or the Coastal Zone Management Act (CZMA).

Title III. Project Description

Following Hurricane Katrina, USACE's Mobile District prepared the Mississippi Coastal Improvements Program (MsCIP) Comprehensive Plan and Integrated Programmatic Environmental Impact Statement (Programmatic EIS) in 2009. The plan was developed to support the long-term recovery of Hancock, Harrison, and Jackson Counties from the devastation caused by Hurricane Katrina and other storm events. Additionally, the plan seeks to make the coast more resilient against damage from future storms and to mitigate the effects of past navigational dredging and disposal activities that have altered sediment availability and transport along the barrier islands.

The selected plan outlined within the MsCIP Programmatic EIS represented the USACE's initial plan for barrier island restoration. It served as the basis for development of the final design for implementing the authorized construction project as determined through additional detailed studies conducted under the Mississippi Barrier Island Restoration component of the MsCIP Comprehensive Plan. At the programmatic level, the initial analysis of alternatives assumed that borrow areas would be available within the immediate project area; however, later cost and environmental evaluations concluded that OCS sand resources would be needed to provide sufficient quantities to achieve project requirements. The USACE's 2016 Supplemental Environmental Impact Statement (Supplemental EIS) addresses site-specific restoration project components and specific borrow source locations in State and Federal waters.

The project area includes the mainland coast of Mississippi (i.e., Hancock, Harrison, and Jackson Counties), the Mississippi Sound, the Mississippi-Alabama barrier islands, and the northern Gulf of Mexico to about 8 miles (13 kilometers) seaward of the barrier islands. A chain of sandy barrier islands located from 6 to 12 miles (10 to 19 kilometers) offshore separates the Mississippi Sound from the northern Gulf of Mexico. From east to west, the islands are Dauphin Island in Alabama and Petit Bois, Sand, Horn, East Ship, West Ship, and Cat Islands in Mississippi. With the exception of portions of Cat Island, all of the Mississippi islands are part of the Gulf Islands National Seashore, which is under jurisdiction of the National Park Service.

The project area offshore of the islands includes portions of the OCS, which are under BOEM's jurisdiction for leasing and regulating the recovery of minerals. Borrow Site Option 4 in the Supplemental EIS is the selected USACE alternative involving the use of sand from 18 specific borrow locations within 5 geographic areas located in the State waters of Mississippi and Alabama, 10 of which are located on the OCS. The borrow sites on the OCS include Petit Bois Pass OCS West 1 and 3-6, and Petit Bois Pass OCS East 1-5 from which USACE is requesting to utilize a total of 19.6 million cubic yards of sand.

Transportation of OCS sand resources from the OCS to the Restoration Area may involve establishing temporary staging or "pumpout" areas on the OCS or in State waters offshore of the Restoration Area. If utilized, hopper dredges or scow barges used to transport sand from the Borrow Areas will anchor and/or spud and unload at these sites. A temporary facility with pumpout capability, which is anchored or spudded within the pumpout area, might also be used during construction. Sand will be transported through a temporary dredge pipeline (floating and/or submerged) that will extend from the pumpout area to the Restoration Area along an established conveyance corridor. No dredging will occur within the pumpout areas on the OCS or along the corridors.

Sand from these borrow sites on the OCS will be used for the restoration of Ship Island, which includes the closure of Camille Cut and restoration of the shoreline of the current East Ship Island. This restoration would be accomplished in five phases over an approximately 2.5-year period.

To restore East Ship Island and West Ship Island to a single elongated barrier island, the approximately 3.5-mile-long Camille Cut would be filled with approximately 13.5 million cubic yards of sand. The newly formed island segment would be constructed as a low-level dune system connecting existing West Ship Island and East Ship Island. Under the proposed design template, the constructed Camille Cut closure would be approximately 1,100 feet (305 meters) wide. The fill would tie into the existing island shoreline just below the frontal dune line at an elevation of approximately +7 feet (2 meters) North American Vertical Datum of 1988 (NAVD88) with a 1V:12H (vertical:horizontal) slope to the mean high water line (MHWL) and an approximate 1V:20H slope below the MHWL. The fill at its western and eastern ends would tie into the existing berm along the eastern end of West Ship Island and transition into the proposed East Ship Island placement.

As sand placement in Camille Cut progresses, sand fencing will be constructed and native dune vegetative species, including sea oats and/or other grasses and forbs, will be planted along the newly created island segment to enhance dune formation and restore dune habitat.

The restoration of East Ship Island would consist of the placement of approximately 5.5 million cubic yards of sand along the southern shoreline. In addition to restoring the southern shoreline, placement of sand in this area would add material to the newly restored Camille Cut fill and therefore support the overall replenishment of the littoral sand budget as identified in the sediment budget analysis and sediment transport modeling. The construction template for the restored southern shoreline would consist of an average berm crest width of approximately 1,200 feet (366 meters) at an elevation of +6 feet (2 meters) NAVD88 with a 1V:12H to 1:20 slope from the seaward edge of the berm to the toe of the fill (intersection with the existing water bottom).

Title IV. Provisions

A. BOEM authorizes the use of up to 19.6 million cubic yards of OCS sand resources from the Borrow Areas delineated in Tables 1-10 in Petit Bois Pass OCS West 1 and 3-6 and Petit Bois

Pass OCS East 1, 2, 3, 4 and 5, and the transportation of the sand resources off the OCS to the Restoration Area. The USACE or its contractor(s) may only extract, transport, and place such OCS sand resources from the Borrow Areas in accordance with the terms and conditions set forth below and in accordance with applicable regulations and permits. Except as provided above, the parties agree that all other aspects of the Project's execution and completion must be carried out as described in the USACE's Supplemental SEIS.

B. All written notifications, requests, submissions, and deliverables, unless otherwise stated, should be sent to BOEM at the address below:

Michael Miner (MS 623E)
Marine Minerals Program
Bureau of Ocean Energy Management
Gulf of Mexico OCS Region
1201 Elmwood Park Blvd.
New Orleans, LA 70123-2394

All electronic notifications, submissions, and deliverables to BOEM should be sent to dredgeinfo@boem.gov and michael.miner@boem.gov.

All written notifications, requests, submissions, and deliverables to the USACE should be sent to the address below:

Susan Ivester Rees, Ph.D.
Program Manager
Coastal Resiliency Program
U.S. Army Corps of Engineers, Mobile District
PO Box 2288
Mobile, AL 36628

If a new point of contact (POC) is assigned during the term of this MOA, the Parties agree to send written notification within 7 working days.

C. This MOA applies only to the extraction, transportation, and placement of OCS sand resources as described above. This MOA will terminate or expire (a) upon USACE sending written notice that it has obtained sufficient OCS sand resources to complete the Project, up to 19.6 million cubic yards; (b) the expiration, termination, or revocation of the National Park Service's Gulf Islands National Seashore Special Use permit; or (c) five (5) years from the date of execution of this MOA, whichever occurs first. Upon request by USACE, the Parties may agree to extend the terms of this MOA as necessary to provide USACE and its contractor(s) with additional time to complete the Project. The Parties acknowledge that there may be a need for future OCS sand resources for periodic maintenance, augmentation, or construction purposes. BOEM and

USACE may enter into subsequent agreements, for the use of additional OCS sand resources for the Project, consistent with each Party's responsibilities under applicable law.

D. BOEM and USACE recognize that planning and coordination will ensure that responsibilities under the OCSLA, other applicable Federal laws, and this Congressionally authorized Project are carried out and accommodated in an efficient and timely manner so that the Project schedule will not be unnecessarily delayed or compromised. The USACE recognizes that BOEM, as a Bureau in the DOI, has certain responsibilities for the orderly, timely, and efficient recovery of OCS minerals using the best available technology while ensuring environmental stewardship and compliance. Moreover, BOEM recognizes that USACE has certain stewardship and environmental compliance responsibilities that are separate and distinct from the responsibilities of BOEM. To these ends, and with respect to the Project, BOEM and USACE agree to the following terms:

1. Plans and Performance Requirements

The USACE will include this MOA as a reference document in the advertised "Construction Solicitation and Specifications Plan" (hereinafter referred to as the "Plan") or as an advertised amendment. The USACE will ensure that all operations at the Borrow Areas, pumpout areas, and along the temporary conveyance corridors are conducted in accordance with the final approved Plan and all terms and conditions in this MOA, as well as all applicable statutes, regulations, orders, guidelines, and directives are upheld. The USACE will send BOEM a copy of the plans and any modifications prior to construction.

The dredging method for removing and transporting sand from the OCS will be consistent with those methods evaluated in the NEPA documents prepared in conjunction with the Project and approved in any authorizing documents or project permits. The USACE will allow BOEM to review and comment on modifications to the Plan that may affect the Borrow Areas, pumpout areas, or pipeline corridors on the OCS, including the use of submerged or floated pipelines to directly convey sediment from the Borrow Areas or offshore pumpout areas to the placement site. Said comments will be delivered in a timely fashion so as to not unnecessarily delay USACE's construction contract or schedule.

If dredging and/or conveyance methods are not wholly consistent with those evaluated in relevant NEPA documents, environmental, and cultural resource consultations additional environmental review may be necessary. If the additional NEPA analysis, consultations, or permit modifications would impact or otherwise require modification to the provisions of this MOA, an amendment may be required.

Any areas where bottom disturbing (e.g., spudding, anchoring, submerged pipeline installation, etc.) might occur that have not already been cleared by cultural resource surveys and coordination with the State Historic Preservation Officer and BOEM will require clearance from those parties before work can be conducted. This may include requiring

additional surveys where bottom disturbing is anticipated. Clearance surveys and associated reports for areas where bottom disturbing will occur but has yet to be cleared must be submitted to BOEM's POC for review and concurrence before any bottom disturbing can occur. BOEM will require 10 working days for review.

Prior to the commencement of construction, USACE must electronically provide BOEM with a summary of the construction schedule. The USACE, at the reasonable request of BOEM, must allow access, at the site of any operation subject to safety regulations, to any authorized Federal inspector and will provide BOEM any documents and records that are pertinent to occupational or public health, safety, environmental protection, conservation of natural resources, or other use of the OCS, as BOEM requests. The USACE agrees to facilitate access to the site of any operation, including, but not limited to, dredges and support equipment, fill areas, turtle relocation trawlers, etc., for scientists conducting sampling or observations associated with research conducted or funded by BOEM.

2. Environmental Responsibilities and Environmental Compliance

The USACE is the lead Federal agency on behalf of the Federal Government to ensure that activities comply with applicable environmental laws, including, but not limited to, the Endangered Species Act, Magnuson-Stevens Fishery Management and Conservation Act, Migratory Bird Treaty Act, National Historic Preservation Act, and Coastal Zone Management Act. The USACE has assumed the role of lead Federal agency for Endangered Species Act Section 7 compliance concerning threatened and endangered species under the purview of Fish and Wildlife Service (FWS) and National Marine Fisheries Service (NMFS). Likewise, USACE has assumed the role of lead Federal agency for complying with Section 305 of the Magnuson-Stevens Fishery Management and Conservation Act, Section 106 of the National Historic Preservation Act, and Section 307 of the Coastal Zone Management Act. The USACE will instruct the contractor(s) to implement the mitigation terms, conditions, and measures required by FWS and NMFS, pursuant to applicable Federal and State laws and regulations. The required mitigation terms, conditions, and measures are reflected in the Biological Opinions, Conservation Recommendations, and State Coastal Permits/Coastal Zone Management requirements. Electronic copies of all relevant correspondence, monitoring data, and reports related to the activities covered by this MOA, will be provided electronically to BOEM within 14 days of issuance (including observer,, and dredging reports).

Specific mitigation, monitoring, and reporting required by BOEM are incorporated into this MOA, as described in the USACE's SEIS. Mitigating measures were identified to reduce potential effects to habitat and sand resources in reference to construction areas, borrow areas, water quality, and cultural resources. In addition to BOEM's requirements, all of the FWS, NMFS, and State requirements are incorporated into the MsCIP Monitoring and Adaptive Management Plan.

3. Pre-Construction Notification of Activity in or near the Borrow Areas, Dredge Pumpout Areas, and Conveyance Areas

The USACE will invite BOEM to attend a pre-construction meeting that describes the USACE's and/or its contractors' or agents' plan and schedule to construct the Project.

The USACE will notify the designated BOEM, Gulf of Mexico OCS Region, Marine Minerals Program POC at least 72 hours prior to the commencement, and within 24 hours after termination, of operations on the OCS. This requirement includes any temporary demobilization from the OCS that exceeds 14 days in duration. BOEM will electronically notify USACE in a timely manner of any OCS activity within the jurisdiction of the DOI that may adversely affect USACE's ability to use OCS sand for the Project.

4. Dredge Positioning

During all phases of the Project, USACE will ensure that the dredge and any bottom-disturbing equipment are outfitted with an onboard global positioning system (GPS) capable of maintaining and recording location within a horizontal accuracy range of no more than plus or minus 10 feet (3 meters). The GPS must be installed as close to the excavator ("cutter head" or drag head) as is practicable or must use appropriate instrumentation to accurately represent the position of the excavator. Whenever dredging operations are underway, the location of the dredge will be continuously monitored and its position within the borrow area will be recorded in real time, in North American Datum of 1983 (NAD83), at intervals not to exceed 2 minutes. During dredging operations, USACE will immediately notify BOEM electronically if dredging occurs outside of the approved Borrow Area. Such notification will be made as soon as possible after the time USACE becomes aware of dredging outside of the approved Borrow Area.

Anchoring, spudding, or other bottom-disturbing activities on the OCS are not authorized outside of the approved Borrow Area with the exception of cutterhead dredge swing anchors within the approved anchor area zones as shown in the maps in Attachment 1, in areas that have been cleared and approved by BOEM to conduct activities associated with transportation of sand resources from the OCS, or when there are immediate concerns of safety, navigation risks, or emergency situations. Anchoring, spudding, temporary dredge pipeline installations, or other bottom-disturbing activities on the OCS associated with dredge pumpout areas and conveyance corridors is authorized on the condition that BOEM must approve compliance submittals from USACE as discussed in Term No. 1 above.

The USACE will electronically provide BOEM all dredge positioning and production data acquired during the Project using procedures agreed upon in writing by BOEM and USACE prior to dredging. This would include, but is not limited to, dredging quality management (DQM) data using procedures jointly developed by USACE's National DQM Data Program Support Center and BOEM. The USACE will submit the DQM data to BOEM at dredgeinfo@boem.gov and the designated BOEM, Gulf of Mexico OCS Region, Marine

Minerals Program POC on a biweekly basis. These biweekly dredge reports will also include a summary of dredge excavator (cutterhead and/or drag head) track lines, outlining any deviations from the original Plan. A color-coded plot of the excavator locations will be submitted, showing any horizontal or vertical dredge violations. A plot will also be used to show dredge status as described in Term No. 6 below. Map(s) will be provided in Adobe PDF format. A complete dataset (dredge position and status) will be submitted within 45 days of completion of the Project. If available, USACE will also submit Automatic Identification System (AIS) data for vessels qualifying under the International Maritime Organization's (IMO) International Convention for the Safety of Life at Sea.

5. Dredge Operation

Dredging will be performed so that the dredge excavates OCS sand resources to an overall cut depth not to exceed that approved in the Project borrow design plan (the "overdredge" limit as shown in Attachment 1).

6. Submittal of Production and Volume Information

The USACE, in cooperation with the dredge operator, must submit to BOEM every 2 weeks a summary report of dredge activity including the dredge track lines, outlining any deviations from the original Plan. A color-coded plot of the dragheads (port and starboard), cutterhead, or other hydraulic or mechanical dredging device will be submitted for all dredging and transport activity on the OCS, showing any horizontal or vertical dredge violations. Transiting/unloading tracks will also be shown for hopper dredges and scow barges. The dredge track lines must show dredge status, i.e., hoteling, dredging (pump on/off), transiting, or unloading. This map will be provided in PDF format.

The USACE will provide at least a biweekly update of the construction progress, including estimated volumetric production rates from the OCS Borrow Areas (both cumulative and for the reporting period) to BOEM. The biweekly deliverables will be provided electronically to BOEM at dredgeinfo@boem.gov and the designated BOEM, Gulf of Mexico OCS Region, Marine Minerals Program POC. The Project completion report, as described below, will also include production and volume information, including Daily Operational Reports.

7. Local Notice to Mariners

The USACE will require its contractor(s) for the Project to place a notice in the U.S. Coast Guard's Local Notice to Mariners regarding the timeframe and location of dredging, pumpout areas, pipeline conveyance corridor, and construction operations in advance of commencement of dredging.

8. Marine Pollution Control and Contingency Plan

The USACE will require its contractor(s) and subcontractor(s) to prepare for and take all necessary precautions to prevent discharges of oil and releases of waste and hazardous

materials that may impair water quality. In the event of a discharge, notification and response will be in accordance with applicable requirements of 40 CFR part 300. All dredging and support operations must be compliant with the U.S. Coast Guard's regulations and the U.S. Environmental Protection Agency's Vessel General Permit, as applicable. The USACE will notify BOEM of any occurrences and remedial actions and provide copies of reports of the incident and resultant actions at dredgeinfo@boem.gov and the designated BOEM, Gulf of Mexico OCS Region, Marine Minerals Program POC.

9. Encounter of Ordnance

If any ordnance is encountered while conducting dredging activities, the USACE will report the discovery within 24 hours to dredgeinfo@boem.gov and the designated BOEM, Gulf of Mexico OCS Region, Marine Minerals Program POC.

10. Bathymetric Surveys

The USACE will provide BOEM with pre- and post-dredging bathymetric surveys of the borrow area. BOEM recommends that the pre-dredging survey of the Borrow Area be conducted within 90 days prior to dredging for each Borrow Area. However, the surveys will not be conducted before a notice to proceed is issued by USACE to the dredge contract for work in each Borrow Area. The post-dredging survey of each borrow area will be conducted within 30 days after the completion of dredging. BOEM recommends that USACE conduct additional bathymetric surveys of the Borrow Area as part of the MsCIP Monitoring and Adaptive Management Program five (5) and ten (10) years after the completion of dredging to document borrow area evolution and provide information to inform future decisions and consultations regarding the use of OCS sand resources. Surveys, error analysis, and reporting will be performed in accordance with the most recent edition of USACE's Hydrographic Surveying Manual EM 1110-2-1003 unless specified otherwise. For bathymetric surveys, 100 percent coverage using interferometric swath or multibeam bathymetric survey methods is required. All bathymetric data will be roll, pitch, heave, and tide corrected using best practices. Sound velocity corrections will be applied based on measurements made during and throughout the duration of the survey using a profiling sound velocity meter to obtain water column sound velocities with casts that log the entire water column to the seafloor. Survey lines of the specific dredge area will be established at intervals necessary to provide 100 percent coverage. All survey lines will extend at least 100 meters (328 feet) beyond the edge of the Borrow Area's limits (including Allowable Anchorage Area; Attachment 1) as defined in this MOA. All data will be collected in such a manner that post-dredging bathymetric surveys are compatible with the pre-dredging bathymetric survey data to enable the latter to be subtracted from the former to calculate the volume of material removed, shape of the excavation, and nature of post-dredging bathymetric change. Pre-dredge bathymetric survey transects will be reoccupied during the post-dredging surveys.

Surveys will be conducted using kinematic GPS referenced to a GPS base station occupying an established (NAVD 88 vertical control) monument within 15 kilometers (9 miles) of the survey area, a National Geodetic Survey real-time network, or a water-level gauge deployed within the vicinity of the Borrow Area and referenced to an established monument (NAVD 88 vertical control), unless alternative methods are approved by BOEM. Pre- and post-dredging surveys will be referenced to the same water-level gauge, tide gauge, real-time network, benchmark, or BOEM-approved method. An uncertainty or error analysis will be conducted on the bathymetric dataset. This analysis will quantify (vertical) uncertainty for each survey based on best management practices. This is typically based on the calculated differences of measured elevations (depths) at all transect crossings or overlap data coverage between adjacent transects (also note that other best practices typically employed to identify potential error or quantify uncertainty, such as daily bar-checks, will be conducted and documented). Alternative methods for quantifying uncertainty must be approved by BOEM. A methods and uncertainty analysis report, field notes, and metadata must be submitted to BOEM with the processed bathymetric data products.

BOEM reserves the right to require additional surveys if a hurricane passes within 100 miles (161 kilometers) of the borrow areas or in the case of extended demobilizations (in excess of 180 days) from the borrow area.

Copies of processed pre-dredging and post-dredging bathymetric data will be submitted to BOEM via dredgeinfo@boem.gov and the designated BOEM, Gulf of Mexico OCS Region, Marine Minerals Program POC within 30 days after each survey is completed. Pre-dredging bathymetric survey results and attendant products must be provided to BOEM for approval, and BOEM must review and deem them acceptable prior to commencement of dredging activity. If data accuracy, coverage, quality, or other parameters for either pre- or post-dredging surveys are not sufficient to provide for accurate comparisons between the pre-dredge and post-dredge surveys (e.g., do not meet specifications and standards discussed or referenced above), BOEM may require that a new survey (at the pre-dredge and/or post-dredge phase) be conducted.

The delivery format for bathymetry data submission is an ASCII file containing x, y, z data and a digital elevation model in a format agreed upon between BOEM and USACE in writing. The horizontal data will be provided in the NAD83 Mississippi State Plane East, U.S. survey feet. Vertical data will be provided in the NAVD 88, U.S. survey feet unless otherwise specified. A plan view plot of the pre- and post-construction data will be provided showing the survey vessel navigation tracks, as well as contour lines at appropriate elevation intervals. A plot of the digital elevation model will also be provided. These plots will be provided in Adobe PDF format.

11. Oil and Gas Infrastructure

Along and within the dredge pipeline conveyance corridor, the Project Technical Specifications will require best management practices for temporary dredge pipeline installation, maintenance, and removal to avoid impacts when the OCS sand resource pipeline crosses oil and gas pipelines. BOEM has provided USACE with information delineating the locations of oil and gas pipelines based on the survey documentation provided to the Bureau of Safety and Environmental Enforcement by pipeline operators at the time of pipeline installation. The USACE or their contractor(s) will conduct a pre-dredging hazards survey using a marine magnetometer within 90 days prior to mobilization of equipment to the OCS. This survey can be conducted simultaneously with the pre-dredge bathymetry survey and must be submitted to BOEM for approval prior to commencement of bottom-disturbing activities.

It is incumbent upon USACE to request a current list of all owners of oil and gas infrastructure including, but not limited to, rights-of-way (ROW) holders from BOEM at the above contact in order to comply with the MOA no sooner than 120 days before dredging begins. The USACE will notify the current oil and gas pipeline ROW permit holder(s) four (4) weeks prior to the commencement of dredging operations so that the ROW permit holder(s) may take precautions to mark its pipeline segment if they choose to do so. Documentation and the outcome of communication between pipeline companies and/or current ROW holders and the USACE must be provided to BOEM at dredgeinfo@boem.gov and to the designated BOEM, Gulf of Mexico OCS Region, Marine Minerals Program POC. BOEM must reply with concurrence before the commencement of dredging on the OCS.

During all dredging and OCS sand resource conveyance operations, USACE will require its contractor to observe a minimum “no dredge” and no bottom-disturbing activity (including anchoring and spudding) setback distance of 1,000 feet (305 meters) from existing pipelines and all other oil- and gas-related infrastructure. The USACE will immediately notify the Regional Supervisor, Office of Environment, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region at 504-736-2963 and the designated BOEM, Gulf of Mexico OCS Region, Marine Minerals Program POC if any oil and gas infrastructure on the OCS is disturbed during the course of the Project.

BOEM reserves the right to require additional shallow hazards surveys to locate the position of existing pipelines and other seabed infrastructure in the wake of a severe storm event, horizontal or vertical dredge violations, or other bottom-disturbing activity by USACE or their contractors outside of approved bottom-disturbing areas in this MOA, or availability of new information suggesting that there may be hazards in the area.

12. Archaeological Resources

Onshore Prehistoric or Historic Resources

If the USACE discovers any previously unknown historic or archaeological resources while accomplishing the activities related to the Project onshore, USACE will notify BOEM of any finding. The USACE will initiate the Federal and State coordination required to determine if the discovered resources warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places. All Parties will follow NHPA Section 106 guidelines to determine and implement future actions that may include data recovery or resource avoidance.

Offshore Prehistoric or Historic Resources

Areas on the OCS where bottom disturbing (e.g., anchoring, spudding, temporary pipeline installations, etc.) is anticipated must be surveyed using a marine magnetometer towed at 30 meters (98 feet) maximum survey transect spacing and side-scan sonar with 100-percent bottom coverage, analyzed by a Registered Professional Archeologist, and submitted for review and concurrence by BOEM before any bottom-disturbing activities can occur.

In the event that USACE and/or their contractors discover any archaeological resource while conducting operations on the OCS or along dredge pipeline corridors, or in the vicinity of pump-out operations, USACE must require that dredge and/or pump-out operations be halted immediately within 305 meters (1,000 feet) of the area of discovery. The USACE must then immediately report the discovery to the Regional Supervisor, Office of Environment, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region at 504-736-2963 and the designated BOEM, Gulf of Mexico OCS Region, Marine Minerals Program POC. If investigations determine that the resource is significant, the Parties will together determine how best to protect it.

13. Post-Construction Site Clearance

All construction equipment and material related to the Project, including, but not limited to, all temporary dredge pipe sections, or fittings, or other related obstructions, and debris, shall be promptly removed within 30 days following culmination of OCS borrow activities (confirmed by acceptance at the project fill site by USACE). The USACE will, within the same 30-day time period, conduct a site-clearance verification survey with their contractor that covers all OCS project areas. Survey techniques are described in Term No. 10 above. A report documenting the site-clearance inspection survey results will be provided to BOEM for review and concurrence at dredgeinfo@boem.gov and the designated BOEM, Gulf of Mexico OCS Region, Marine Minerals Program POC and included in the Project Completion Report (Term No. 15 below).

14. Disclaimers; Contingencies

BOEM does not warrant that the OCS sand resources used in this Project are suitable for the purpose for which they are intended by USACE. BOEM's responsibility under this Project is limited to the authorization of use of OCS sand resources from the Borrow Areas delineated in Tables 1-10, as described in this MOA, and therefore, BOEM disclaims any and all responsibility for the physical and financial activities undertaken by other Parties in pursuit of the Project.

15. Project Completion Report

A project completion report will be submitted by USACE to BOEM within 120 days following completion of the activities authorized under this MOA. This report and supporting materials must be sent to the designated BOEM, Gulf of Mexico OCS Region, Marine Minerals Program POC and to dredgeinfo@boem.gov. The report must contain, at a minimum, the following information:

- the names and titles of the project managers overseeing the effort (for USACE, the engineering firm [if applicable] and the contractor), including contact information (i.e., telephone numbers, mailing addresses, and email addresses);
- the location and description of the project, including the final total volume of OCS sand resources extracted from the Borrow Area and the volume of OCS sand resources actually placed on the beach or shoreline (including a description of the volume calculation method used to determine these volumes);
- ASCII files containing the x, y, z and time stamp of the cutterhead locations;
- a narrative describing the final, as-built features, boundaries, and acreage, including the restored beach/marsh width and length;
- a table, an example of which is illustrated below, showing the various key project cost elements;

Project Cost Element	Cost Incurred as of Construction Completion ($)
Construction	
Engineering and Design	
Inspections/Contract Administration	
Total	

- a table, an example of which is illustrated below, showing the various items of work construction, final quantities, and monetary amounts;

Item No.	Item	Estimated Quantity	Final Quantity
1	Mobilization and Demobilization		
2	Beach Fill		
3	Any Beach or Offshore Hard Structure Placed or Removed		

- a listing of construction and construction oversight information, including the prime and subcontractor(s), contract costs, etc.;
- a list of all major equipment used to construct the project;
- a narrative discussing the construction sequences and activities, and, if applicable, any problems encountered and solutions;
- a list and description of any construction change orders issued, if applicable;
- a list and description of any safety-related issues or accidents reported during the life of the project;
- a narrative and any appropriate tables describing any environmental or compliance surveys or efforts associated with the project and costs associated with these surveys or efforts;
- a table listing significant construction dates beginning with bid opening and ending with final acceptance of the project by USACE;
- digital appendices containing the as-built drawings, beach-fill cross-sections, and survey data; and
- any additional pertinent comments.

16. Sharing of Information

Consistent with the purpose stipulated by the Parties in Title II, and to the extent allowed by law, policy, and regulation, USACE and BOEM agree to (1) share all information needed for or generated from the Project, including the sharing of implementation and other applicable schedules; (2) provide such information to the requesting agency as expeditiously as possible; and (3) work to ensure that all required completion report information is received.

The Parties to this MOA acknowledge that information and reports required by and/or exchanged pursuant to the Project that is the subject of this MOA may include confidential business information, trade secrets, or other sensitive information that is entitled to protection from disclosure by the Freedom of Information Act.

Any Party, contractor, or agent of one of the Parties requesting that information or reports provided pursuant to this MOA be treated as confidential will, at the time the information is submitted, prominently mark the information and report as “Confidential,” along with the bases for the claim of confidentiality. Any covering correspondence submitted with the

information or report will likewise note the claim of confidentiality being asserted. To the extent practicable, a Party to this MOA may only request information that has been marked as "Confidential" and is in the possession of another Party to this MOA if the information is needed by the requesting Party to carry out its obligations under this MOA or if the information is necessary for the requesting Party to fulfill its obligations under the law. The Party in possession of the information requested may work with the requesting Party to determine if the information can be shared without waiving the confidential nature of the material.

The Parties further agree that they will immediately and timely notify the other Parties in writing of any request by any person seeking the release or disclosure of information marked "Confidential" in whole or in part, including, but not limited to, requests pursuant to Court orders, discovery, subpoenas, or other compulsory process, or public access request under applicable Federal or State law. Notification will be considered timely if it provides the Parties or individuals claiming the information or report is confidential a reasonable opportunity to seek a Court order to prevent release or disclosure. Any disputes regarding requests for information or the confidential nature of the information requested will be resolved according to applicable law. If the Party or individual claiming the information or report is confidential fails timely to obtain a Court order preventing the release or disclosure of the information, the Party in possession of the information will release it as and to the extend required by applicable law.

17. Resolution of Disputes

The Parties agree to make every attempt to settle any disputes regarding this MOA at the lowest operational level. In the case of (1) a substantial disagreement between BOEM and USACE with respect to any aspect of BOEM's authorization of the use of OCS sand resources in accordance with the terms and conditions as specified or (2) any alleged breach by a Party of the terms and conditions as specified herein, the undersigned will designate a senior management official in their respective agencies to state the area(s) of disagreement or alleged breach in writing and present such statement to the other Party for consideration. If resolution is not reached within 60 days, the undersigned may request the active participation of the USACE District Commander, Mobile District and BOEM's Regional Supervisor, Office of Environment, Gulf of Mexico OCS Region.

18. Notices

Except as otherwise provided herein, all notices relating to this MOA or activities authorized hereunder by or among the Parties must be provided to the following addresses:

To BOEM
Michael Miner (MS 623E)
Marine Minerals Coordinator
Bureau of Ocean Energy Management

Gulf of Mexico OCS Region
1201 Elmwood Park Blvd.
New Orleans, LA 70123-2394
michael.miner@boem.gov
504-736-2700

All electronic notifications, submissions, and deliverables to BOEM should be sent to dredgeinfo@boem.gov and michael.miner@boem.gov.

To USACE
Susan Ivester Rees, Ph.D.
Program Manager
Coastal Resiliency Program
U.S. Army Corps of Engineers, Mobile District
P.O. Box 2288
Mobile, AL 36628

19. Miscellaneous

This MOA will not affect any pre-existing or independent relationships or obligations among DOI, BOEM, and USACE, including any other relationships or obligations between BOEM and USACE, or any other units of such Parties.

All rights in the Borrow Area not expressly granted to USACE are hereby reserved to BOEM. BOEM reserves the right to authorize other uses in the Borrow Area that will not unreasonably interfere with activities authorized under this MOA. BOEM will allow USACE to review and comment on any proposed authorizations for the use of OCS sand resources in the Borrow Area while this MOA is in effect.

Nothing herein is intended to conflict with current State or Federal laws, rules, regulations, or local ordinances. If the terms of this MOA are inconsistent with existing laws, rules, or regulations of or applicable to any of the Parties entering into this MOA, then those portions of this MOA that are determined to be inconsistent will be invalid, but the remaining terms and conditions not affected by the inconsistency will remain in full force and effect. At the first opportunity for review of the MOA once such inconsistency is identified, all necessary changes will be accomplished either by an amendment to this MOA or by entering into a new MOA, whichever is deemed expedient to the interest of the Parties.

***

This agreement may be executed in two (2) or more counterparts, each of which will be deemed an original. The signatures to this agreement may be executed on separate pages, and when attached to this MOA will constitute one complete document.

MEMORANDUM OF AGREEMENT
BETWEEN
THE BUREAU OF OCEAN ENERGY MANAGEMENT
OF THE DEPARTMENT OF THE INTERIOR
AND THE
U.S. ARMY CORPS OF ENGINEERS

REGARDING THE USE OF OUTER CONTINENTAL SHELF SAND RESOURCES FOR THE MISSISSIPPI COASTAL IMPROVEMENTS PROGRAM COMPREHENSIVE BARRIER ISLAND RESTORATION PROJECT, GULF ISLANDS NATIONAL SEASHORE, MISSISSIPPI

BOEM Negotiated Agreement No. OCS-G 35929

Signatory Page

DELAPP.JAMES.ANDREW.1087484218

Digitally signed by DELAPP.JAMES.ANDREW.1087484218
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=DELAPP.JAMES.ANDREW.1087484218
Date: 2016.11.28 15:44:18 -06'00'

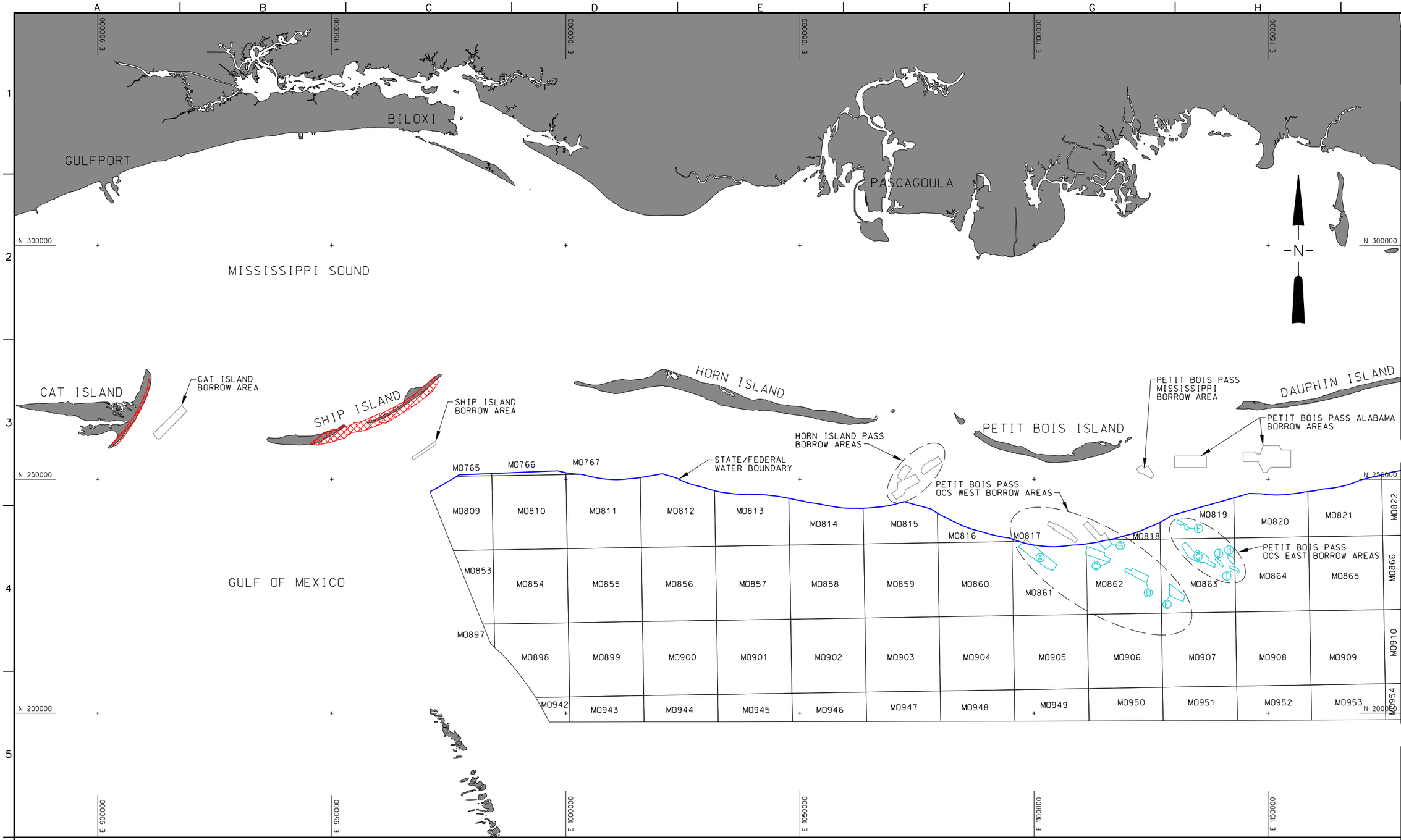
James A. DeLapp
Colonel, U.S. Army
District Commander

Date: 28 November 2016

Michael A. Celata
Regional Director
Bureau of Ocean Energy Management
Gulf of Mexico OCS Region

Date: 01 December 2016

ATTACHMENT 1



US Army Corps of Engineers
Mobile District

Symbol	Description	Date	Approved

Designed By: E. GODSEY	Date: SEPTEMBER 2016
Drawn By: J. GIBSON	File No.
Checked By: -	I.S.O. Sheet File Name: BOEMCB101.DGN
Reviewed By: -	Solicitation Number:

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
MOBILE, ALABAMA

MsCIP COMPREHENSIVE BARRIER ISLAND RESTORATION

PROJECT OVERVIEW MAP

Sheet Reference Number:
CB-101

LEGEND

- RESTORATION AREA LIMITS
- MO943 — OCS LEASE BLOCKS
- STATE/FEDERAL WATER BOUNDARY
- BORROW AREA LOCATED IN STATE WATERS
- BORROW AREA LOCATED IN FEDERAL WATERS

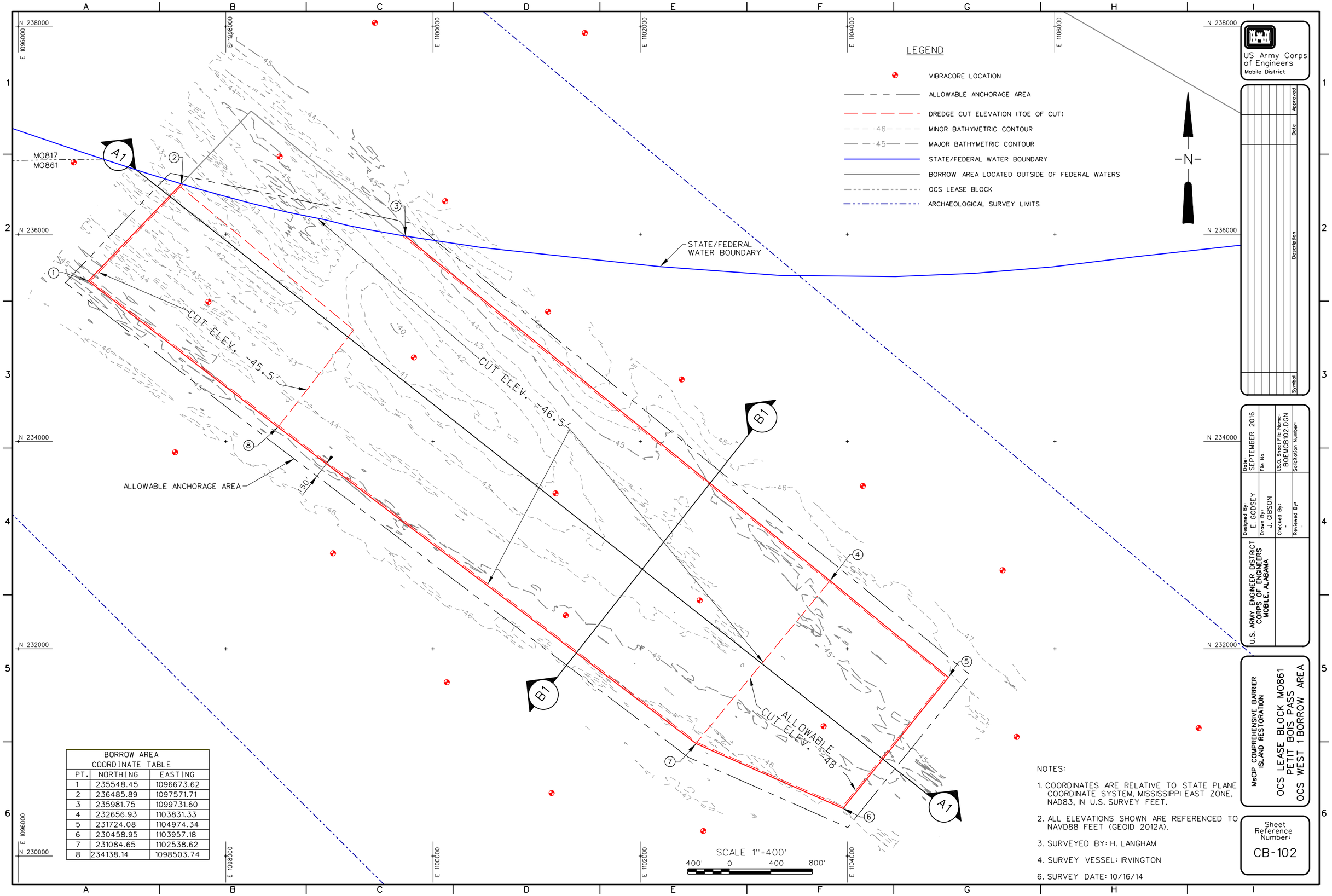
BORROW AREA LEGEND

- Ⓐ OCS WEST 1
- Ⓑ OCS WEST 3
- Ⓒ OCS WEST 4
- Ⓓ OCS WEST 5
- Ⓔ OCS WEST 6
- Ⓕ OCS EAST 1
- Ⓖ OCS EAST 2
- Ⓗ OCS EAST 3
- Ⓘ OCS EAST 4
- Ⓙ OCS EAST 5

SCALE 1"=10,000'
10,000' 0 10,000' 20,000'

NOTES:

1. COORDINATES ARE REFERENCED TO MISSISSIPPI STATE PLANE COORDINATE SYSTEM 83 DATUM EAST ZONE.



BORROW AREA COORDINATE TABLE		
PT.	NORTHING	EASTING
1	235548.45	1096673.62
2	236485.89	1097571.71
3	235981.75	1099731.60
4	232656.93	1103831.33
5	231724.08	1104974.34
6	230458.95	1103957.18
7	231084.65	1102538.62
8	234138.14	1098503.74

NOTES:

1. COORDINATES ARE RELATIVE TO STATE PLANE COORDINATE SYSTEM, MISSISSIPPI EAST ZONE, NAD83, IN U.S. SURVEY FEET.
2. ALL ELEVATIONS SHOWN ARE REFERENCED TO NAVD88 FEET (GEOID 2012A).
3. SURVEYED BY: H. LANGHAM
4. SURVEY VESSEL: IRVINGTON
6. SURVEY DATE: 10/16/14

US Army Corps of Engineers
Mobile District

Symbol	Description	Date	Approved

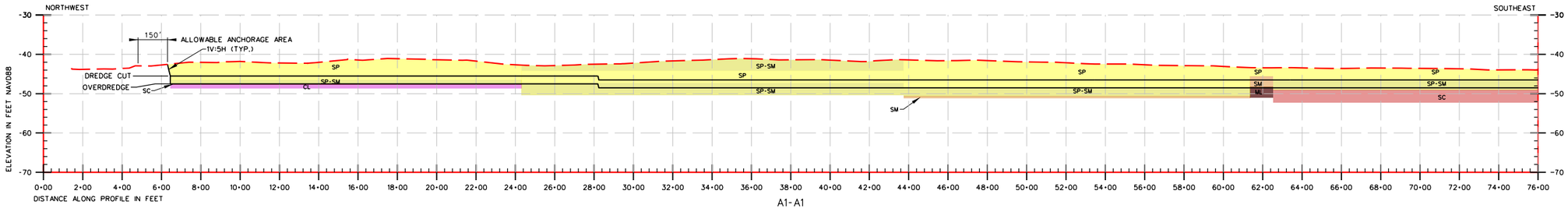
Designed By: E. GODSEY	Date: SEPTEMBER 2016		
Drawn By: J. GIBSON	File No.	I.S.O. Sheet File Name: BOEMCB102.DGN	Solicitation Number:
		Checked By: -	Reviewed By: -

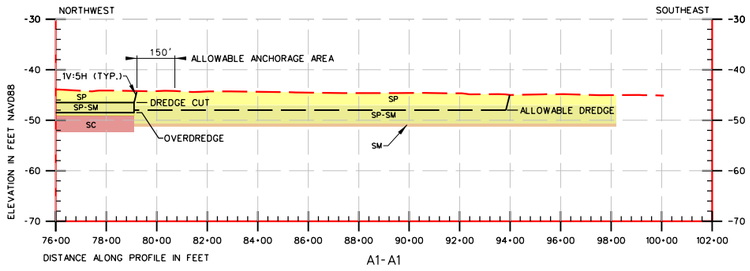
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
MOBILE, ALABAMA

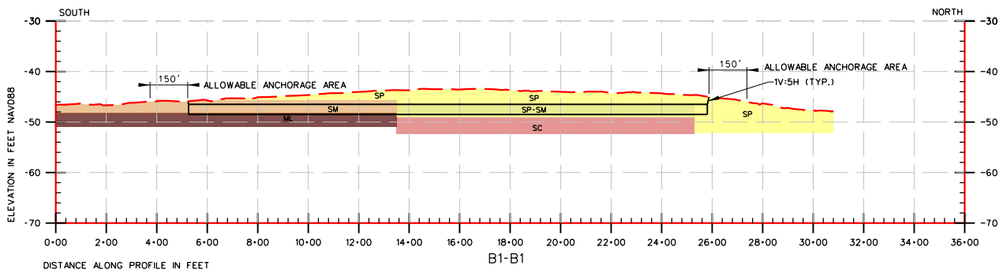
MsCIP COMPREHENSIVE BARRIER ISLAND RESTORATION

OCS LEASE BLOCK MO861
PETIT BOIS PASS
OCS WEST 1 BORROW AREA

Sheet Reference Number:
CB-102







LEGEND

- EXISTING GRADE (APRIL 2014)
- SP: POORLY GRADED SAND
- SP-SM: POORLY GRADE SAND WITH SILT
- SP-SC: POORLY GRADED SAND WITH CLAY
- SM: SILTY SAND
- SC: CLAYEY SAND
- SC-SM: CLAYEY SAND/SILTY SAND
- CL: LOW PLASTICITY CLAY
- CL-ML: LOW PLASTICITY CLAY WITH SILT
- CH: HIGH PLASTICITY CLAY
- ML: SILT

H: SCALE 1"=200'
200' 0 200 400'

V: SCALE 1"=10'
10' 0 10' 20'

US Army Corps of Engineers
Mobile District

Symbol	Description	Date	Approved

Date: SEPTEMBER 2016
File No.:
I.S.O. Sheet File Name: BOEMCB301.DGN
Solicitation Number:

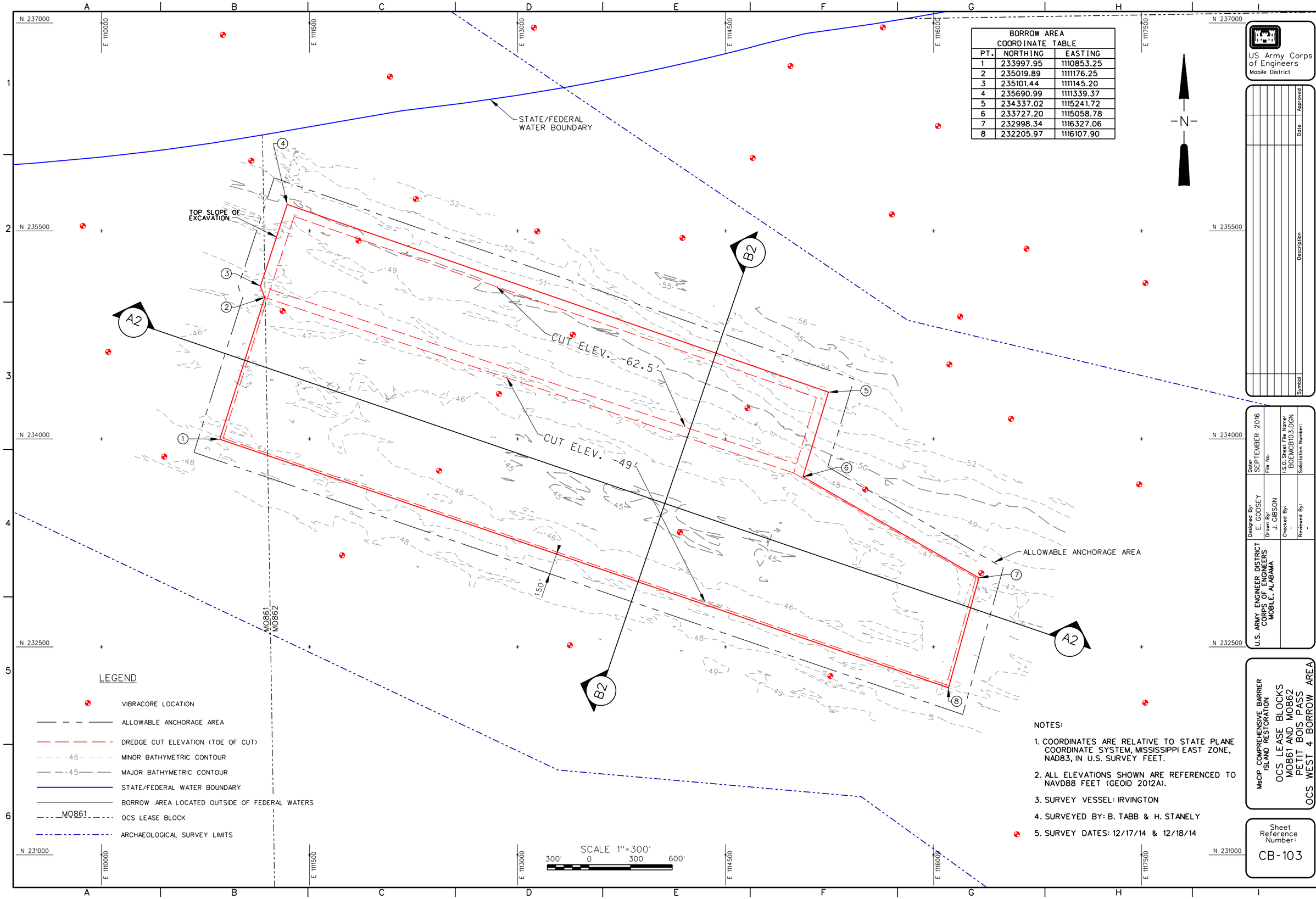
Designed By: E. GODSEY
Drawn By: J. GIBSON
Checked By: -
Reviewed By: -

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
MOBILE, ALABAMA

MsCIP COMPREHENSIVE BARRIER ISLAND RESTORATION

OCS LEASE BLOCK MO861
OCS WEST 1
TYPICAL SECTIONS

Sheet Reference Number:
CB-301



BORROW AREA COORDINATE TABLE

PT.	NORTHING	EASTING
1	233997.95	1110853.25
2	235019.89	1111176.25
3	235101.44	1111145.20
4	235690.99	1111339.37
5	234337.02	1115241.72
6	233727.20	1115058.78
7	232998.34	1116327.06
8	232205.97	1116107.90

NOTES:

1. COORDINATES ARE RELATIVE TO STATE PLANE COORDINATE SYSTEM, MISSISSIPPI EAST ZONE, NAD83, IN U.S. SURVEY FEET.
2. ALL ELEVATIONS SHOWN ARE REFERENCED TO NAVD88 FEET (GEOID 2012A).
3. SURVEY VESSEL: IRVINGTON
4. SURVEYED BY: B. TABB & H. STANELY
5. SURVEY DATES: 12/17/14 & 12/18/14

US Army Corps of Engineers
Mobile District

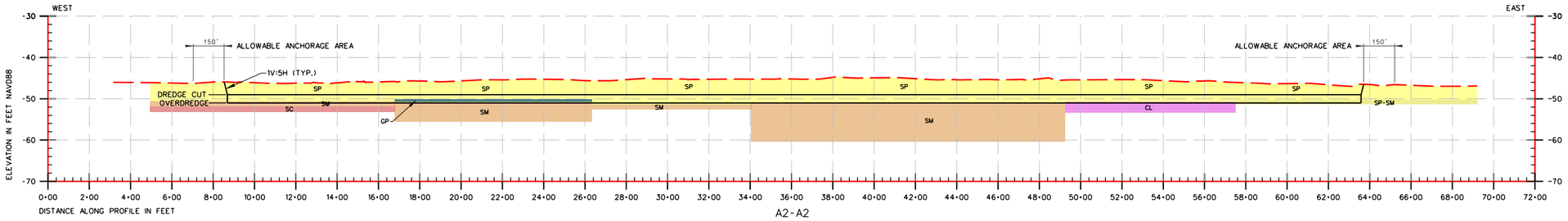
Symbol	Description	Date	Approved

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
MOBILE, ALABAMA

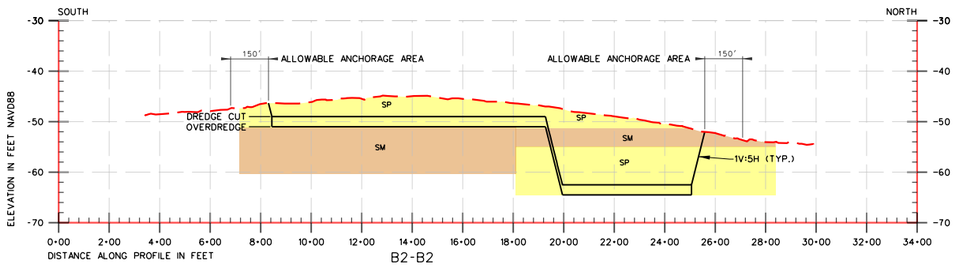
Designed By: E. GODSEY
Drawn By: J. GIBSON
Checked By: -
Reviewed By: -
Date: SEPTEMBER 2016
File No.
I.S.O. Sheet File Name: BOEMCB103.DGN
Solicitation Number:

MsCIP COMPREHENSIVE BARRIER ISLAND RESTORATION
OCS LEASE BLOCKS
MO861 AND MO862
PETIT BOIS PASS
OCS WEST 4 BORROW AREA

Sheet Reference Number:
CB-103



A2-A2



B2-B2

LEGEND

- EXISTING GRADE (APRIL 2014)
- SP: POORLY GRADED SAND
- SP-SM: POORLY GRADE SAND WITH SILT
- SP-SC: POORLY GRADED SAND WITH CLAY
- SM: SILTY SAND
- SC: CLAYEY SAND
- SC-SM: CLAYEY SAND/SILTY SAND
- CL: LOW PLASTICITY CLAY
- CL-ML: LOW PLASTICITY CLAY WITH SILT
- CH: HIGH PLASTICITY CLAY
- ML: SILT
- GP: GRAVEL

H: SCALE 1"=200'
200' 0 200 400'

V: SCALE 1"=10'
10' 0 10' 20'

US Army Corps of Engineers
Mobile District

Symbol	Description	Date	Approved

Date: SEPTEMBER 2016
File No.:
I.S.O. Sheet File Name: BOEMCB302.DGN
Solicitation Number:

Designed By: E. GODSEY
Drawn By: J. GIBSON
Checked By: -
Reviewed By: -

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
MOBILE, ALABAMA

MsCIP COMPREHENSIVE BARRIER ISLAND RESTORATION

OCS LEASE BLOCKS M0861 AND M0862, OCS WEST 4 TYPICAL SECTIONS

Sheet Reference Number:
CB-302

BORROW AREA COORDINATE TABLE		
PT.	NORTHING	EASTING
1	236606.42	1113721.28
2	237093.63	1116141.41
3	236353.50	1116603.33
4	235882.87	1116509.03
5	235660.50	1116265.04
6	234942.27	1115166.66
7	236447.38	1113860.83

LEGEND

- VIBRACORE LOCATION
- ALLOWABLE ANCHORAGE AREA
- DREDGE CUT ELEVATION (TOE OF CUT)
- -46- MINOR BATHYMETRIC CONTOUR
- -45- MAJOR BATHYMETRIC CONTOUR
- STATE/FEDERAL WATER BOUNDARY
- BORROW AREA LOCATED OUTSIDE OF FEDERAL WATERS
- MO818 OCS LEASE BLOCK
- ARCHAEOLOGICAL SURVEY LIMITS

OCS WEST 2

OCS WEST 3

OCS WEST 4

STATE/FEDERAL WATER BOUNDARY

MO861 MO862

MO818 MO862

CUT ELEV. -64.0

CUT ELEV. -65.5

ALLOWABLE ANCHORAGE AREA

150'

NOTES:

1. COORDINATES ARE RELATIVE TO STATE PLANE COORDINATE SYSTEM, MISSISSIPPI EAST ZONE, NAD83, IN U.S. SURVEY FEET.
2. ALL ELEVATIONS SHOWN ARE REFERENCED TO NAVD88 FEET (GEOID 2012A).
3. SURVEYED BY: H. LANGHAM
4. SURVEY VESSEL: IRVINGTON
6. SURVEY DATE: 10/29/14

SCALE 1"=400'

400' 0 400 800'

US Army Corps of Engineers
Mobile District

Symbol	Description	Date	Approved

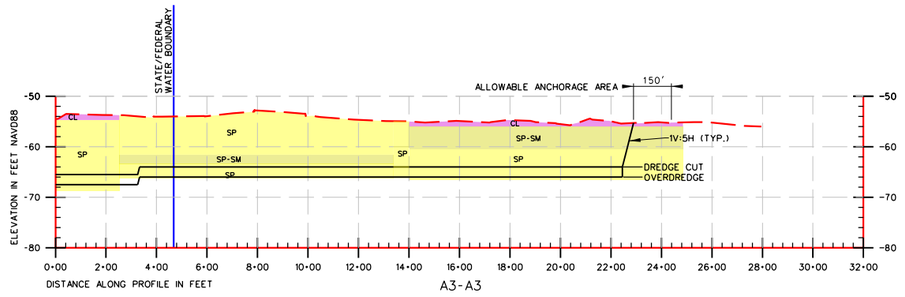
Designed By: E. GODSEY		Date: SEPTEMBER 2016	
Drawn By: J. GIBSON		File No.	
Checked By: -		I.S.O. Sheet File Name: BOEMCB104.DGN	
Reviewed By: -		Solicitation Number:	

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
MOBILE, ALABAMA

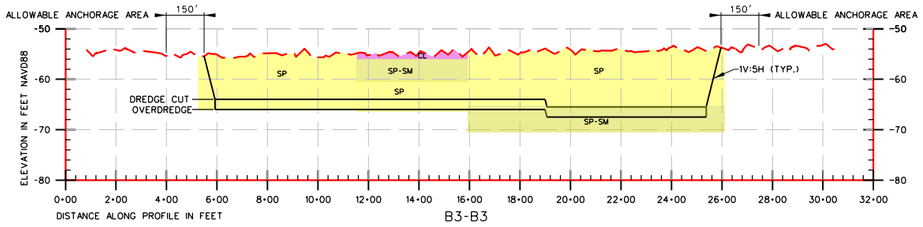
MsCIP COMPREHENSIVE BARRIER ISLAND RESTORATION

OCS LEASE BLOCK MO862
PETIT BOIS PASS
OCS WEST 3 BORROW AREA

Sheet Reference Number:
CB-104



A3-A3



B3-B3

LEGEND

- EXISTING GRADE (APRIL 2014)
- SP: POORLY GRADED SAND
- SP-SM: POORLY GRADE SAND WITH SILT
- SP-SC: POORLY GRADED SAND WITH CLAY
- SM: SILTY SAND
- SC: CLAYEY SAND
- SC-SM: CLAYEY SAND/SILTY SAND
- CL: LOW PLASTICITY CLAY
- CL-ML: LOW PLASTICITY CLAY WITH SILT
- CH: HIGH PLASTICITY CLAY
- ML: SILT
- GP: GRAVEL

H: SCALE 1"=200'
200' 0 200 400'

V: SCALE 1"=10'
10' 0 10' 20'

US Army Corps of Engineers
Mobile District

Symbol	Description	Date	Approved

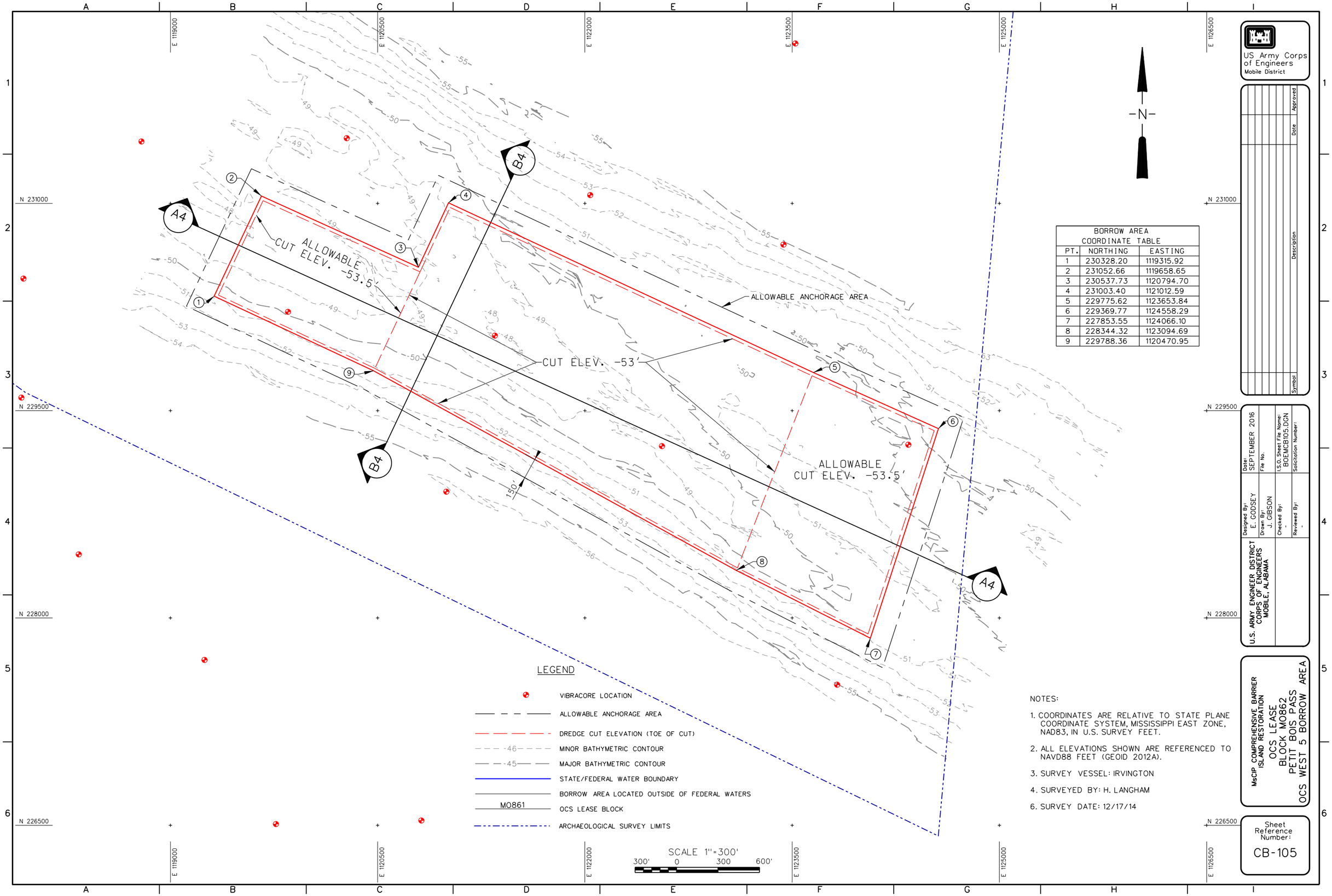
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS MOBILE, ALABAMA	Designed By: E. GODSEY	Date: SEPTEMBER 2016	
	Drawn By: J. GIBSON	File No.	
	Checked By: -	I.S.O. Sheet File Name: BOEMCB303.DGN	
	Reviewed By: -	Solicitation Number:	

MsCIP COMPREHENSIVE BARRIER ISLAND RESTORATION

OCS LEASE BLOCK MO862 OCS WEST 3 TYPICAL SECTIONS

Sheet Reference Number:

CB-303



BORROW AREA
COORDINATE TABLE

PT.	NORTHING	EASTING
1	230328.20	1119315.92
2	231052.66	1119658.65
3	230537.73	1120794.70
4	231003.40	1121012.59
5	229775.62	1123653.84
6	229369.77	1124558.29
7	227853.55	1124066.10
8	228344.32	1123094.69
9	229788.36	1120470.95

NOTES:

1. COORDINATES ARE RELATIVE TO STATE PLANE COORDINATE SYSTEM, MISSISSIPPI EAST ZONE, NAD83, IN U.S. SURVEY FEET.
2. ALL ELEVATIONS SHOWN ARE REFERENCED TO NAVD88 FEET (GEOID 2012A).
3. SURVEY VESSEL: IRVINGTON
4. SURVEYED BY: H. LANGHAM
6. SURVEY DATE: 12/17/14

US Army Corps of Engineers
Mobile District

Symbol	Description	Date	Approved

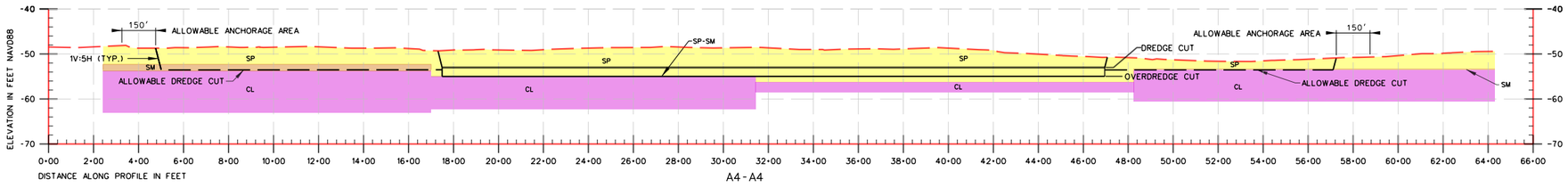
Designed By: E. GODSEY	Date: SEPTEMBER 2016	I.S.O. Sheet File Name: BOEMCB105.DGN	
Drawn By: J. GIBSON	File No.		Solicitation Number:
Checked By: -			
Reviewed By: -			

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
MOBILE, ALABAMA

MsCIP COMPREHENSIVE BARRIER ISLAND RESTORATION

OCS LEASE
BLOCK M0862
PETIT BOIS PASS
OCS WEST 5 BORROW AREA

Sheet Reference Number:
CB-105



A4 - A4

B4-B4

LEGEND

- EXISTING GRADE (APRIL 2014)
- SP: POORLY GRADED SAND
- SP-SM: POORLY GRADE SAND WITH SILT
- SP-SC: POORLY GRADED SAND WITH CLAY
- SM: SILTY SAND
- SC: CLAYEY SAND
- SC-SM: CLAYEY SAND/SILTY SAND
- CL: LOW PLASTICITY CLAY
- CL-ML: LOW PLASTICITY CLAY WITH SILT
- CH: HIGH PLASTICITY CLAY
- ML: SILT
- GP: GRAVEL

H: SCALE 1"=200'
200' 0 200 400'

V: SCALE 1"=10'
10' 0 10' 20'

US Army Corps of Engineers
Mobile District

Symbol	Description	Date	Approved

Date: SEPTEMBER 2016
File No.:
I.S.O. Sheet File Name: BOEMCB304.DGN
Solicitation Number:

Designed By: E. GODSEY
Drawn By: J. GIBSON
Checked By: -
Reviewed By: -

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
MOBILE, ALABAMA

MsCIP COMPREHENSIVE BARRIER ISLAND RESTORATION

OCS LEASE BLOCK MO862 OCS WEST 5 TYPICAL SECTIONS

Sheet Reference Number:
CB-304

BORROW AREA COORDINATE TABLE		
PT.	NORTHING	EASTING
1	225158.59	1128932.17
2	227759.12	1128934.76
3	225094.90	1132244.24
4	223787.23	1131937.61

CUT ELEV. -56.5'

150'

LEGEND

- VIBRACORE LOCATION
- ALLOWABLE ANCHORAGE AREA
- DREDGE CUT ELEVATION (TOE OF CUT)
- -46- MINOR BATHYMETRIC CONTOUR
- -45- MAJOR BATHYMETRIC CONTOUR
- STATE/FEDERAL WATER BOUNDARY
- BORROW AREA LOCATED OUTSIDE OF FEDERAL WATERS
- MO861 OCS LEASE BLOCK
- ARCHAEOLOGICAL SURVEY LIMITS

SCALE 1"=300'
300' 0 300 600'

NOTES:

1. COORDINATES ARE RELATIVE TO STATE PLANE COORDINATE SYSTEM, MISSISSIPPI EAST ZONE, NAD83, IN U.S. SURVEY FEET.
2. ALL ELEVATIONS SHOWN ARE REFERENCED TO NAVD88 FEET (GEOID 2012A).
3. SURVEYED BY: H. LANGHAM
4. SURVEY VESSEL: IRVINGTON
6. SURVEY DATE: 12/17/14

US Army Corps of Engineers
Mobile District

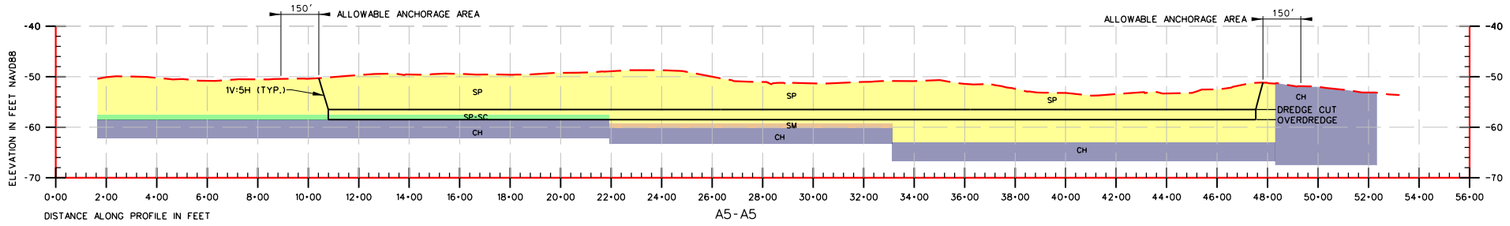
Symbol	Description	Date	Approved

Designed By: E. GODSEY	Date: SEPTEMBER 2016	I.S.O. Sheet File Name: BOEMCB106.DGN	
Drawn By: J. GIBSON	File No.		
Checked By: -			
Reviewed By: -		Solicitation Number:	

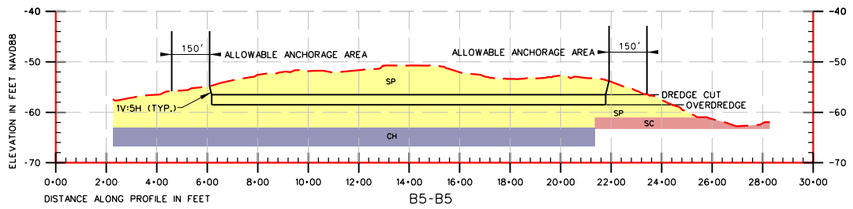
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
MOBILE, ALABAMA

MsCIP COMPREHENSIVE BARRIER ISLAND RESTORATION
OCS LEASE
BLOCK MO863
PETIT BOIS PASS
OCS WEST 6 BORROW AREA

Sheet Reference Number:
CB-106



A5-A5



B5-B5

LEGEND

- EXISTING GRADE (APRIL 2014)
- SP: POORLY GRADED SAND
- SP-SM: POORLY GRADE SAND WITH SILT
- SP-SC: POORLY GRADED SAND WITH CLAY
- SM: SILTY SAND
- SC: CLAYEY SAND
- SC-SM: CLAYEY SAND/SILTY SAND
- CL: LOW PLASTICITY CLAY
- CL-ML: LOW PLASTICITY CLAY WITH SILT
- CH: HIGH PLASTICITY CLAY
- ML: SILT
- GP: GRAVEL

H: SCALE 1"=200'
200' 0 200 400'

V: SCALE 1"=10'
10' 0 10' 20'

US Army Corps of Engineers
Mobile District

Symbol	Description	Date	Approved

U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS MOBILE, ALABAMA	Designed By: E. GODSEY	Date: SEPTEMBER 2016	
	Drawn By: J. GIBSON	File No.	
	Checked By: -	I.S.O. Sheet File Name: BOEMCB305.DGN	
	Reviewed By: -	Solicitation Number:	

MsCIP COMPREHENSIVE BARRIER ISLAND RESTORATION

OCS LEASE BLOCK MO863 OCS WEST 6 TYPICAL SECTIONS

Sheet Reference Number:

CB-305

STATE/FEDERAL WATER BOUNDARY

BORROW AREA COORDINATE TABLE		
PT.	NORTHING	EASTING
1	240620.40	1130436.97
2	241337.99	1130766.36
3	240579.22	1132003.89
4	240587.87	1132031.25
5	240346.85	1132526.09
6	240321.60	1132525.37
7	239610.67	1133019.21
8	239080.04	1132975.35
9	239333.41	1132176.59
10	240037.76	1132213.31
11	240327.14	1131861.24
12	240348.33	1131863.77
13	240207.62	1131280.01

LEGEND

- VIBRACORE LOCATION
- ALLOWABLE ANCHORAGE AREA
- DREDGE CUT ELEVATION (TOE OF CUT)
- -46- MINOR BATHYMETRIC CONTOUR
- -45- MAJOR BATHYMETRIC CONTOUR
- STATE/FEDERAL WATER BOUNDARY
- BORROW AREA LOCATED OUTSIDE OF FEDERAL WATERS
- MO818 OCS LEASE BLOCK
- ARCHAEOLOGICAL SURVEY LIMITS

-N-

A6 B6 B6 A6

CUT ELEV. -49.5'

CUT ELEV. -54'

150'

ALLOWABLE ANCHORAGE AREA

SCALE 1"=200'
200' 0 200 400'

NOTES:

1. COORDINATES ARE RELATIVE TO STATE PLANE COORDINATE SYSTEM, MISSISSIPPI EAST ZONE, NAD83, IN U.S. SURVEY FEET.
2. ALL ELEVATIONS SHOWN ARE REFERENCED TO NAVD88 FEET (GEOID 2012A).
3. SURVEYED APRIL 23, 24, & 26, 2014.

US Army Corps of Engineers
Mobile District

Symbol	Description	Date	Approved

Date: SEPTEMBER 2016
File No.:
I.S.O. Sheet File Name: BOEMCB107.DGN
Solicitation Number:

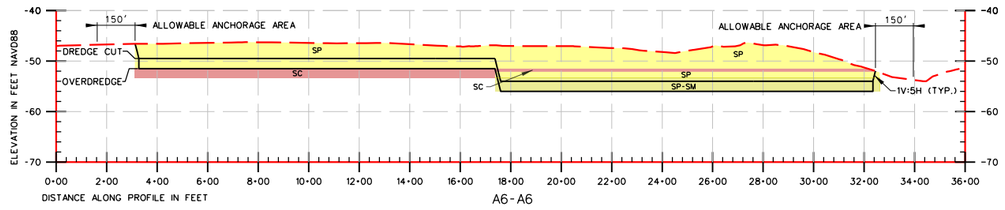
Designed By: E. CODSEY
Drawn By: J. GIBSON
Checked By: -
Reviewed By: -

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
MOBILE, ALABAMA

MsCIP COMPREHENSIVE BARRIER ISLAND RESTORATION

OCS LEASE BLOCK MO819
PETIT BOIS PASS
OCS EAST 1 BORROW AREA

Sheet Reference Number:
CB-107



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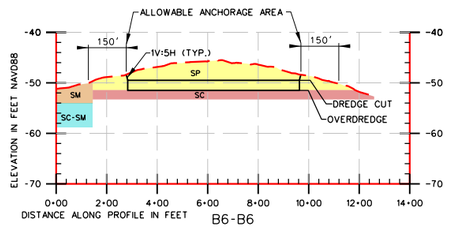


B6-B6

LEGEND

- EXISTING GRADE (APRIL 2014)
- SP: POORLY GRADED SAND
- SP-SM: POORLY GRADE SAND WITH SILT
- SP-SC: POORLY GRADED SAND WITH CLAY
- SM: SILTY SAND
- SC: CLAYEY SAND
- SC-SM: CLAYEY SAND/SILTY SAND
- CL: LOW PLASTICITY CLAY
- CL-ML: LOW PLASTICITY CLAY WITH SILT
- CH: HIGH PLASTICITY CLAY
- ML: SILT
- GP: GRAVEL

H: SCALE 1"=200'
200' 0 200 400'

V: SCALE 1"=10'
10' 0 10' 20'

US Army Corps of Engineers
Mobile District

Symbol	Description	Date	Approved

Designed By: E. CODSEY	Date: SEPTEMBER 2016
Drawn By: J. GIBSON	File No.
Checked By: -	I.S.O. Sheet File Name: BOEMCB306.DGN
Reviewed By: -	Solicitation Number:

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
MOBILE, ALABAMA

MsCIP COMPREHENSIVE BARRIER ISLAND RESTORATION

OCS LEASE BLOCK MO819
OCS EAST 1
TYPICAL SECTIONS

Sheet Reference Number:
CB-306

BORROW AREA COORDINATE TABLE		
PT.	NORTHING	EASTING
1	235816.31	1131548.90
2	236615.96	1132321.74
3	234426.82	1134285.25
4	234945.03	1134919.83
5	233348.53	1137400.69
6	232913.41	1137153.91
7	232596.85	1137463.73
8	231767.81	1138850.70
9	231106.70	1138623.70
10	231905.14	1136970.99
11	232230.63	1136497.79
12	232166.95	1136156.07
13	232338.44	1135252.97
14	232258.20	1134985.78
15	233326.50	1132944.38
16	233367.12	1132983.50

CUT ELEV. -53'

CUT ELEV. -54'

CUT ELEV. -56'

OCS EAST 5
CUT EL. -56.5'

150'

ALLOWABLE ANCHORAGE AREA

A7

B7

NOTES:

1. COORDINATES ARE RELATIVE TO STATE PLANE COORDINATE SYSTEM, MISSISSIPPI EAST ZONE, NAD83, IN U.S. SURVEY FEET.
2. ALL ELEVATIONS SHOWN ARE REFERENCED TO NAVD88 FEET (GEOID 2012A).
3. SURVEYED APRIL 23, 24, & 26, 2014.

LEGEND

- VIBRACORE LOCATION
- ALLOWABLE ANCHORAGE AREA
- DREDGE CUT ELEVATION (TOE OF CUT)
- ARCHAEOLOGICAL SURVEY LIMITS

SCALE 1"=300'
300' 0 300 600'

US Army Corps of Engineers
Mobile District

Symbol	Description	Date	Approved

Date: SEPTEMBER 2016
File No.:
I.S.O. Sheet File Name: BOEMCB108.DGN
Solicitation Number:

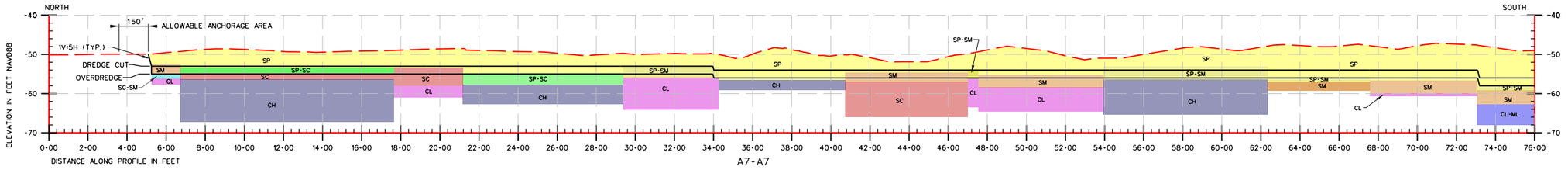
Designed By: E. GODSEY
Drawn By: J. GIBSON
Checked By: -
Reviewed By: -

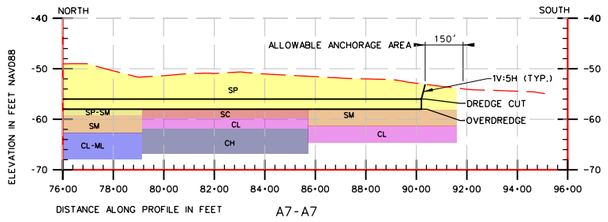
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
MOBILE, ALABAMA

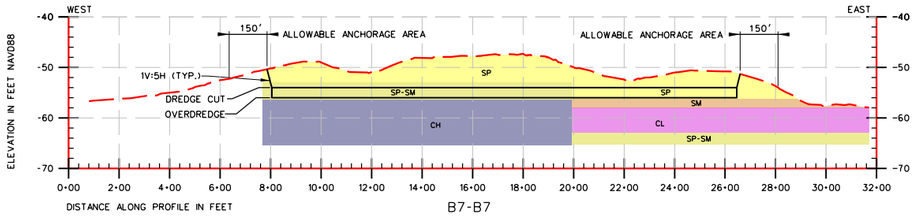
MsCIP COMPREHENSIVE BARRIER ISLAND RESTORATION

OCS LEASE BLOCK MO863
PETIT BOIS PASS
OCS EAST 2 BORROW AREA

Sheet Reference Number:
CB-108







LEGEND

- EXISTING GRADE (APRIL 2014)
- SP: POORLY GRADED SAND
- SP-SM: POORLY GRADE SAND WITH SILT
- SP-SC: POORLY GRADED SAND WITH CLAY
- SM: SILTY SAND
- SC: CLAYEY SAND
- SC-SM: CLAYEY SAND/SILTY SAND
- CL: LOW PLASTICITY CLAY
- CL-ML: LOW PLASTICITY CLAY WITH SILT
- CH: HIGH PLASTICITY CLAY

H: SCALE 1"=200'
200' 0 200 400'

V: SCALE 1"=10'
10' 0 10' 20'

US Army Corps of Engineers
Mobile District

Symbol	Description	Date	Approved

Date: SEPTEMBER 2016
File No.:
I.S.O. Sheet File Name: BOEMCB307.DGN
Solicitation Number:

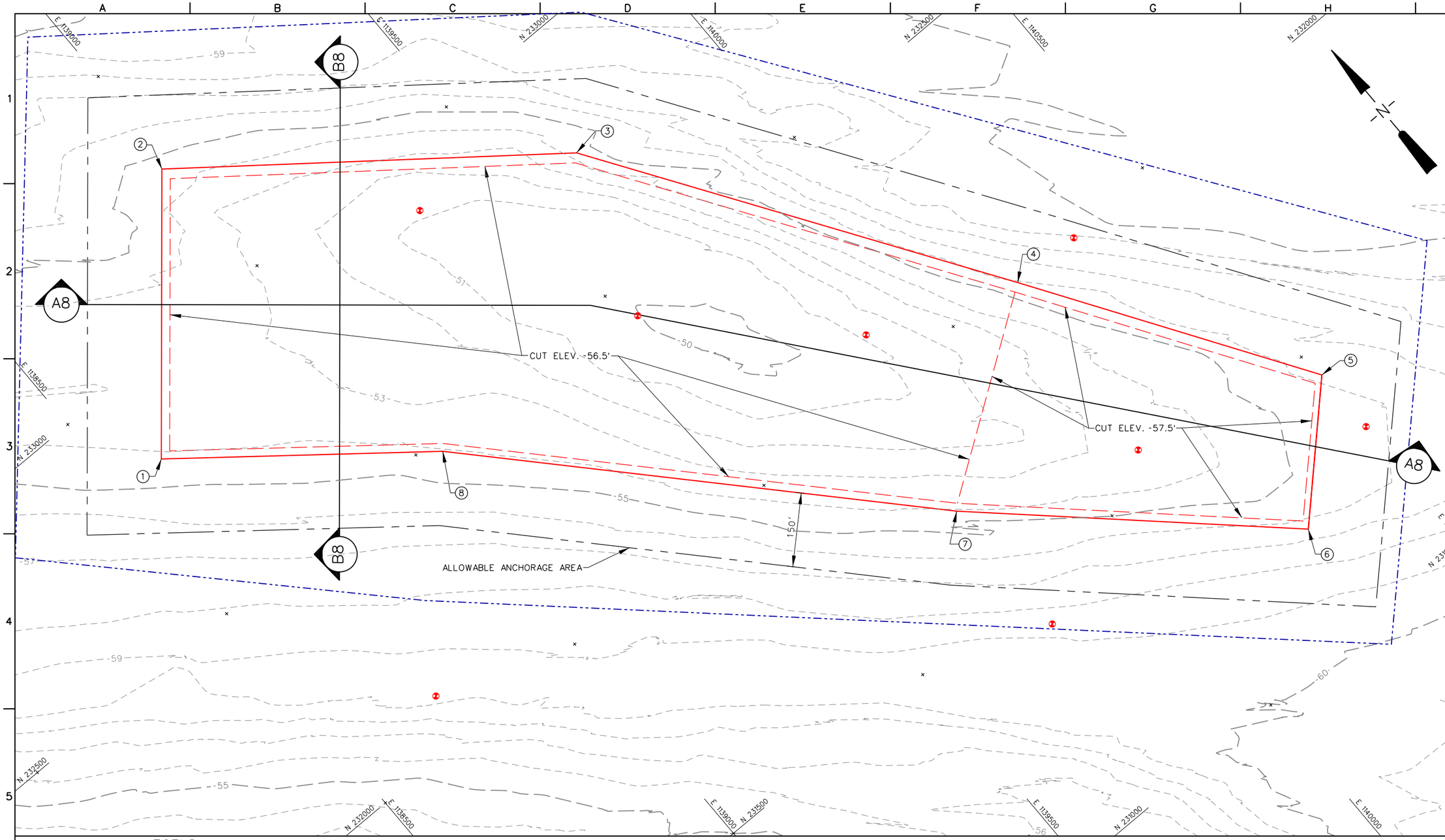
Designed By: E. GODSEY
Drawn By: J. GIBSON
Checked By: -
Reviewed By: -

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
MOBILE, ALABAMA

MsCIP COMPREHENSIVE BARRIER ISLAND RESTORATION

OCS LEASE BLOCK MO863 OCS EAST 2 TYPICAL SECTIONS

Sheet Reference Number:
CB-307



LEGEND

- VIBRACORE LOCATION
- ALLOWABLE ANCHORAGE AREA
- DREDGE CUT ELEVATION (TOE OF CUT)
- -46- MINOR BATHYMETRIC CONTOUR
- -45- MAJOR BATHYMETRIC CONTOUR
- STATE/FEDERAL WATER BOUNDARY
- BORROW AREA LOCATED OUTSIDE OF FEDERAL WATERS
- M0818 OCS LEASE BLOCK
- ARCHAEOLOGICAL SURVEY LIMITS

BORROW AREA COORDINATE TABLE		
PT.	NORTHING	EASTING
1	232824.81	1138600.03
2	233273.73	1138978.08
3	232759.27	1139641.97
4	231984.05	1140157.33
5	231445.34	1140508.62
6	231224.00	1140286.81
7	231709.23	1139765.19
8	232470.61	1139046.23

SCALE 1"=100'

100' 0 100 200'

NOTES:

1. COORDINATES ARE RELATIVE TO STATE PLANE COORDINATE SYSTEM, MISSISSIPPI EAST ZONE, NAD83, IN U.S. SURVEY FEET.
2. ALL ELEVATIONS SHOWN ARE REFERENCED TO NAVD88 FEET (GEOID 2012A).
3. SURVEYED APRIL 23, 24, & 26, 2014.

US Army Corps of Engineers
Mobile District

Symbol	Description	Date	Approved

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
MOBILE, ALABAMA

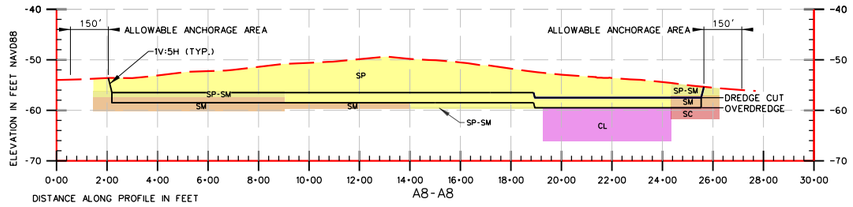
Designed By: E. GODSEY
Drawn By: J. GIBSON
Checked By: -
Reviewed By: -

Date: SEPTEMBER 2016
File No.
I.S.O. Sheet File Name: BOEMCB109.DGN
Solicitation Number:

MsCIP COMPREHENSIVE BARRIER ISLAND RESTORATION

OCS LEASE BLOCK M0863
PETIT BOIS PASS
OCS EAST 5 BORROW AREA

Sheet Reference Number:
CB-109



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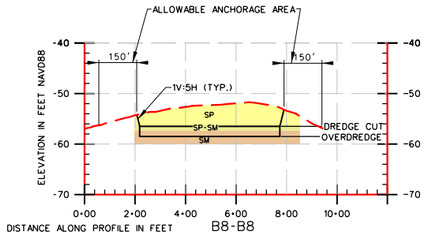


B8-B8

LEGEND

- EXISTING GRADE (APRIL 2014)
- SP: POORLY GRADED SAND
- SP-SM: POORLY GRADE SAND WITH SILT
- SP-SC: POORLY GRADED SAND WITH CLAY
- SM: SILTY SAND
- SC: CLAYEY SAND
- SC-SM: CLAYEY SAND/SILTY SAND
- CL: LOW PLASTICITY CLAY
- CL-ML: LOW PLASTICITY CLAY WITH SILT
- CH: HIGH PLASTICITY CLAY
- ML: SILT
- GP: GRAVEL

H: SCALE 1"=200'

200' 0 200 400'

V: SCALE 1"=10'

10' 0 10' 20'

US Army Corps of Engineers
Mobile District

Symbol	Description	Date	Approved

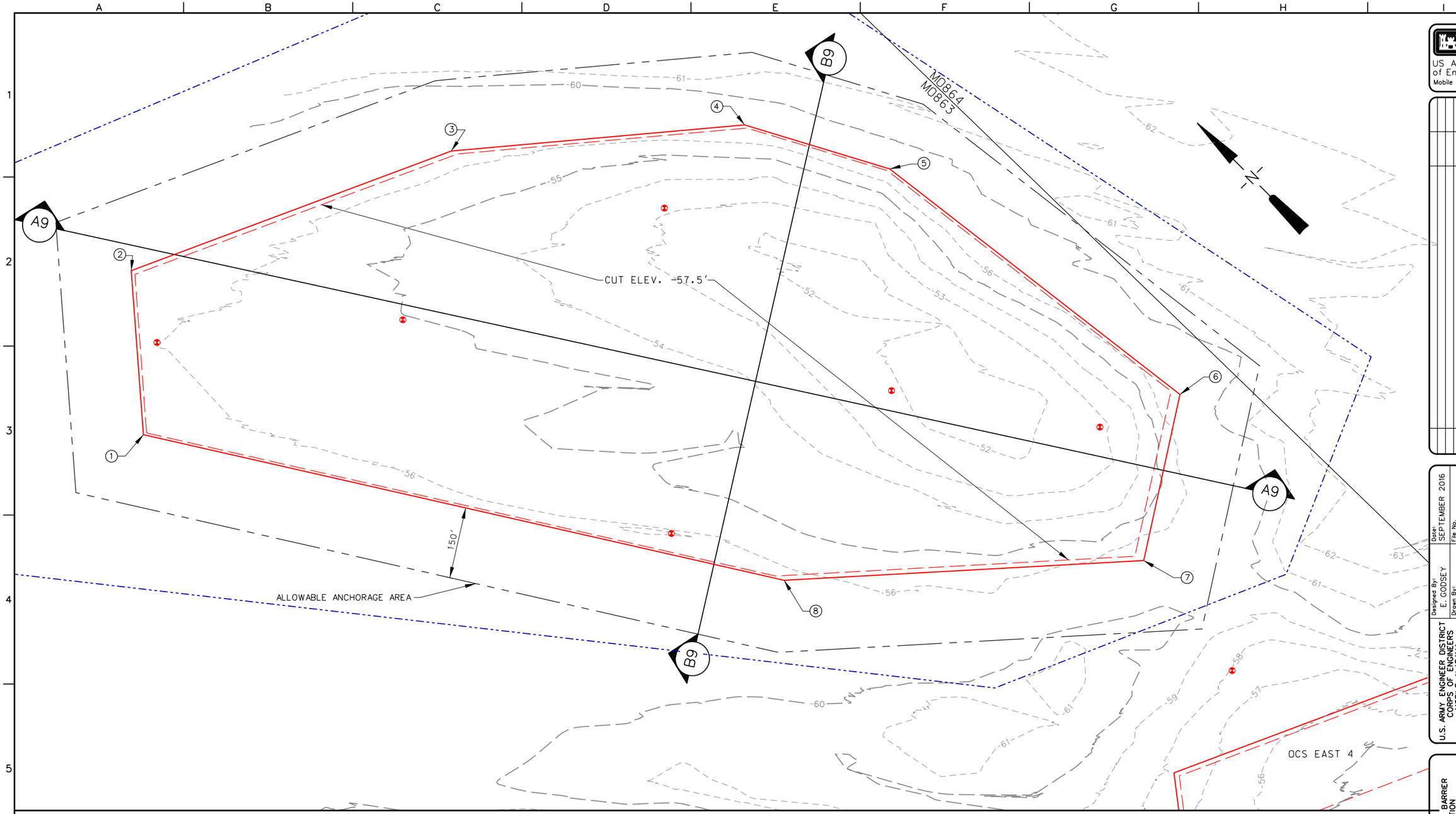
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS MOBILE, ALABAMA	Designed By: E. GODSEY	Date: SEPTEMBER 2016	
	Drawn By: J. GIBSON	File No.	
	Checked By: -	I.S.O. Sheet File Name: BOEMCB308.DGN	
	Reviewed By: -	Solicitation Number:	

MsCIP COMPREHENSIVE BARRIER ISLAND RESTORATION

OCS LEASE BLOCK MO863 OCS EAST 5 TYPICAL SECTIONS

Sheet Reference Number:

CB-308



LEGEND

- VIBRACORE LOCATION
- ALLOWABLE ANCHORAGE AREA
- DREDGE CUT ELEVATION (TOE OF CUT)
- -46- MINOR BATHYMETRIC CONTOUR
- -45- MAJOR BATHYMETRIC CONTOUR
- STATE/FEDERAL WATER BOUNDARY
- BORROW AREA LOCATED OUTSIDE OF FEDERAL WATERS
- MO818 OCS LEASE BLOCK
- ARCHAEOLOGICAL SURVEY LIMITS

SCALE 1"=100'

100' 0 100 200'

BORROW AREA COORDINATE TABLE		
PT.	NORTHING	EASTING
1	233560.29	1141213.61
2	233821.47	1141438.63
3	233524.67	1142090.05
4	233129.13	1142563.27
5	232848.89	1142713.05
6	232084.54	1142808.33
7	231892.10	1142508.45
8	232395.40	1141946.49

NOTES:

1. COORDINATES ARE RELATIVE TO STATE PLANE COORDINATE SYSTEM, MISSISSIPPI EAST ZONE, NAD83, IN U.S. SURVEY FEET.
2. ALL ELEVATIONS SHOWN ARE REFERENCED TO NAVD88 FEET (GEOID 2012A).
3. SURVEYED APRIL 23, 24, & 26, 2014.

US Army Corps of Engineers
Mobile District

Symbol	Description	Date	Approved

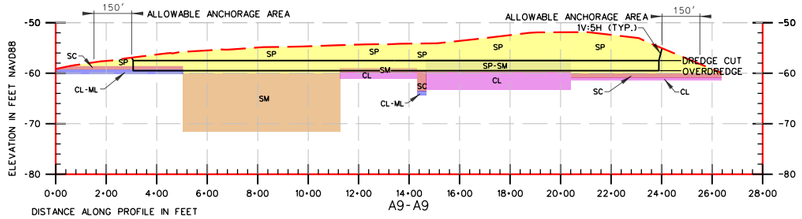
Designed By: E. GODSEY
Drawn By: J. GIBSON
Checked By: -
Reviewed By: -
Date: SEPTEMBER 2016
File No.:
I.S.O. Sheet File Name: BOEMCB110.DGN
Solicitation Number:

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
MOBILE, ALABAMA

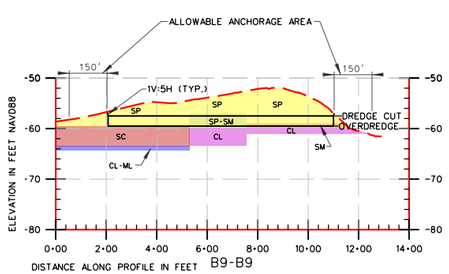
MsCIP COMPREHENSIVE BARRIER ISLAND RESTORATION

OCS LEASE BLOCK MO863
PETIT BOIS PASS
OCS EAST 3 BORROW AREA

Sheet Reference Number:
CB-110



A9-A9



B9-B9

LEGEND

- EXISTING GRADE (APRIL 2014)
- SP: POORLY GRADED SAND
- SP-SM: POORLY GRADE SAND WITH SILT
- SP-SC: POORLY GRADED SAND WITH CLAY
- SM: SILTY SAND
- SC: CLAYEY SAND
- SC-SM: CLAYEY SAND/SILTY SAND
- CL: LOW PLASTICITY CLAY
- CL-ML: LOW PLASTICITY CLAY WITH SILT
- CH: HIGH PLASTICITY CLAY
- ML: SILT
- GP: GRAVEL

H: SCALE 1"=200'

200' 0 200 400'

V: SCALE 1"=10'

10' 0 10' 20'

US Army Corps of Engineers
Mobile District

Symbol	Description	Date	Approved

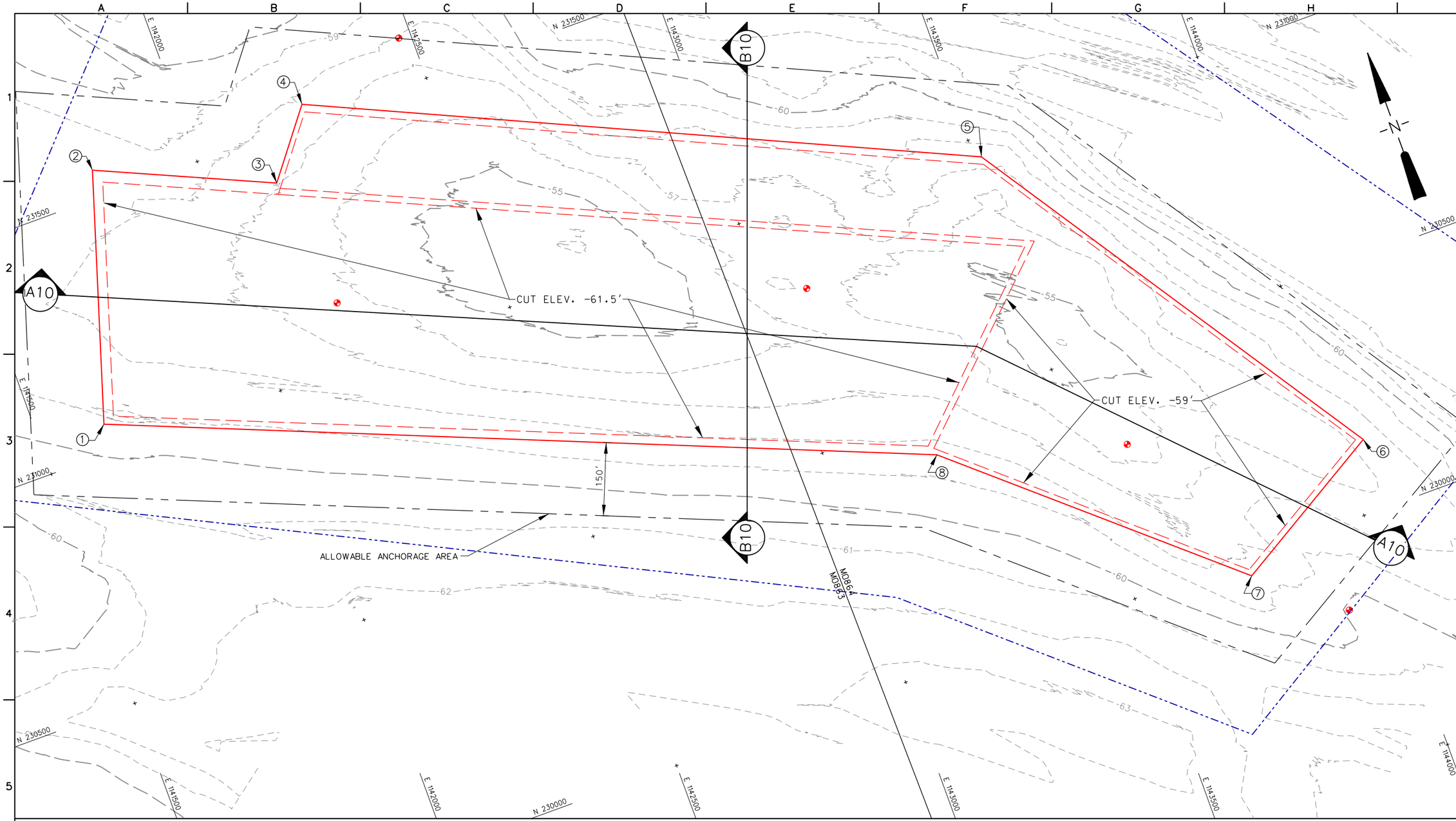
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS MOBILE, ALABAMA	Designed By: E. GODSEY	Date: SEPTEMBER 2016	
	Drawn By: J. GIBSON	File No.	
	Checked By: -	I.S.O. Sheet File Name: BOEMCB309.DGN	
	Reviewed By: -	Solicitation Number:	

MsCIP COMPREHENSIVE BARRIER ISLAND RESTORATION

OCS LEASE BLOCK MO863 OCS EAST 3 TYPICAL SECTIONS

Sheet Reference Number:

CB-309



LEGEND

- VIBRACORE LOCATION
- ARCHAEOLOGICAL SURVEY LIMITS
- ALLOWABLE ANCHORAGE AREA
- DREDGE CUT ELEVATION (TOE OF CUT)
- -46- MINOR BATHYMETRIC CONTOUR
- -45- MAJOR BATHYMETRIC CONTOUR
- STATE/FEDERAL WATER BOUNDARY
- BORROW AREA LOCATED OUTSIDE OF FEDERAL WATERS
- MO818 OCS LEASE BLOCK

BORROW AREA COORDINATE TABLE

PT.	NORTHING	EASTING
1	231059.31	1141636.19
2	231556.69	1141792.15
3	231402.65	1142138.23
4	231536.67	1142241.98
5	230958.81	1143514.28
6	230146.62	1144051.61
7	229962.34	1143741.03
8	230416.26	1143219.53

SCALE 1"=100'
100' 0 100 200'

NOTES:

1. COORDINATES ARE RELATIVE TO STATE PLANE COORDINATE SYSTEM, MISSISSIPPI EAST ZONE, NAD83, IN U.S. SURVEY FEET.
2. ALL ELEVATIONS SHOWN ARE REFERENCED TO NAVD88 FEET (GEOID 2012A).
3. SURVEYED APRIL 23, 24, & 26, 2014.

US Army Corps of Engineers
Mobile District

Symbol	Description	Date	Approved

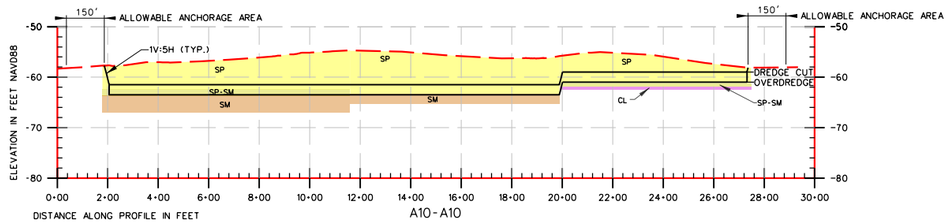
Designed By: E. CODSEY
Drawn By: J. GIBSON
Checked By: -
Reviewed By: -
Date: SEPTEMBER 2016
File No.
I.S.O. Sheet File Name: BOEMCB111.DGN
Solicitation Number:

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
MOBILE, ALABAMA

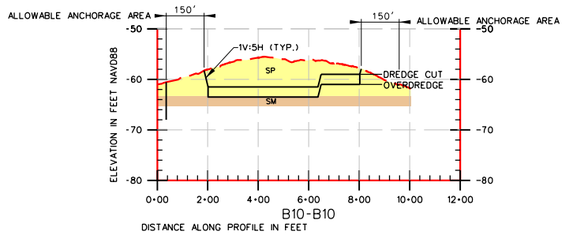
MsCIP COMPREHENSIVE BARRIER ISLAND RESTORATION

OCS LEASE BLOCKS MO863 AND MO864, PETIT BOIS PASS OCS EAST 4 BORROW AREA

Sheet Reference Number:
CB-111



A10-A10



B10-B10

LEGEND

- EXISTING GRADE (APRIL 2014)
- SP: POORLY GRADED SAND
- SP-SM: POORLY GRADE SAND WITH SILT
- SP-SC: POORLY GRADED SAND WITH CLAY
- SM: SILTY SAND
- SC: CLAYEY SAND
- SC-SM: CLAYEY SAND/SILTY SAND
- CL: LOW PLASTICITY CLAY
- CL-ML: LOW PLASTICITY CLAY WITH SILT
- CH: HIGH PLASTICITY CLAY
- ML: SILT
- GP: GRAVEL

H: SCALE 1"=200'

200' 0 200 400'

V: SCALE 1"=10'

10' 0 10' 20'

US Army Corps of Engineers
Mobile District

Symbol	Description	Date	Approved

U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS MOBILE, ALABAMA	Designed By: E. GODSEY	Date: SEPTEMBER 2016	
	Drawn By: J. GIBSON	File No.	
	Checked By: -	I.S.O. Sheet File Name: BOEMCB310.DGN	
	Reviewed By: -	Solicitation Number:	

MsCIP COMPREHENSIVE BARRIER ISLAND RESTORATION

OCS LEASE BLOCKS MO863 AND MO864, OCS EAST 4 TYPICAL SECTIONS

Sheet Reference Number:

CB-310

APPENDIX C

BORROW AREA VOLUME REPORT
AND
BEACH FILL AVERAGE END AREA REPORT

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APPENDIX C, TEMPLATE FILL AVERAGE END AREA VOLUME REPORT
MSCIP COMPREHENSIVE BARRIER ISLAND RESTORATION PLAN, SHIP ISLAND PHASE III & IV

PHASE 3 VOLUMES

Baseline Station	Station Fill Area (S.F.)	Station Fill Volume (C.Y.)	Cummulative Fill Volume (C.Y.)
2+50	0	0	0
3+86	2315	5843	5843
5+00	2283	9681	15524
10+00	5590	72897	88420
15+00	9856	143016	231437
20+00	14519	225693	457129
25+00	15739	280167	737296
30+00	16155	295315	1032611
35+00	16420	301618	1334229
39+48	16523	272995	1607224
39+98	16403	30487	1637711
40+00	16403	1519	1639229
45+00	16249	302331	1941561
50+00	8189	226274	2167834
55+00	605	81420	2249254
56+00	4	1127	2250381

PHASE 4 VOLUMES

Baseline Station	Station Fill Area (S.F.)	Station Fill Volume (C.Y.)	Cummulative Fill Volume (C.Y.)
12500	0	0	0
13000	340	3152	3152
13500	715	9775	12927
14000	1728	22621	35548
14500	1861	33231	68779
15000	2313	38650	107429
15500	2706	46476	153905
16000	2783	50829	204734
16500	2680	50582	255317
17000	2634	49201	304517
17500	2722	49595	354112
18000	2644	49689	403801
18500	2702	49503	453304
19000	2604	49133	502437
19500	2628	48444	550881
20000	2642	48798	599679
20500	2637	48880	648559
21000	2398	46615	695173
21500	2061	41281	736454
22000	2052	38080	774534

22500	2019	37690	812224
23000	2011	37308	849532
23500	2130	38337	887868
24000	2010	38325	926194
24500	1896	36163	962357
25000	1864	34818	997175
25500	2089	36604	1033779
26000	2268	40342	1074121
26500	2067	40136	1114257
27000	1603	33981	1148238
27500	1681	30411	1178649
28000	1133	26053	1204701
28365.86	533	11284	1215985
28500	171	1749	1217734

BORROW AREA VOLUME REPORT

MSCIP COMPREHENSIVE BARRIER ISLAND RESTORATION PLAN, SHIP ISLAND PHASE III & IV

	Required Dredge Volume (CY)	Allowable Dredge Volume (CY)
Borrow Areas		
SHIP ISLAND PASS	536,953	71,717
OCS EAST 2		
OCS EAST 2A	335,561	281,621
OCS EAST 2B	888,416	524,494
OCS EAST 2C	163,797	89,735
Borrow Area Total	**1,387,774**	**895,850**
OCS-EAST 3		
OCS-EAST 3	169,108	109,892
Borrow Area Total	**169,108**	**109,892**
OCS-EAST 4		
OCS EAST 4A	152,285	64,007
OCS EAST 4B	50,358	42,818
Borrow Area Total	**202,643**	**106,825**
OCS-EAST 5		
OCS EAST 5A	32,007	19,104
OCS EAST 5B	148,919	69,985
Borrow Area Total	**180,926**	**89,089**
PETIT POIS MS		
PBPMSA	385,345	55,056
PBPMSB	273,254	51,355
PBPMSC	282,050	63,543
PBPMSD	593,906	210,076
PBPMSE	76,960	49,854
Borrow Area Total	**1,611,515**	**429,884**
SHIP ISLAND	2,157,185	592,530

APPENDIX D

BORROW AREA OBSTRUCTION REPORT

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Magnetic Avoidance Anomalies

Anomaly	Centroid Easting (NAD83 SP MS-E)	Centroid Northing (NAD83 SP MS-E)	Potentially Significant	Composition	Survey Lines Crossed	Declination	Size Pole-to-Pole (feet)	Size Max Across Poles (feet)	Size Max Across Midline (feet)	Amplitude Raw Positive (gammas)	Amplitude Raw Negative (gammas)	Amplitude Relative Positive (gammas)	Amplitude Relative Negative (gammas)	Amplitude Ratio (Neg:Pos)	Amplitude Gradient (gammas/foot)	SSS Contact	Source
C.015M	1,118,268.77	229,466.89	N	DP	1	76	29	78	72	47,549	47,515	17	-16	01:01.1	1.1	NA	UNK
C.016M	1,120,431.55	228,754.22	N	DP	1	-59	31	97	94	47,564	47,496	32	-36	01:00.9	2.2	NA	UNK
D.013M	1,098,869.01	235,064.58	N	MP	1	NA	NA	103	61	NA	47,543	NA	-40	NA	NA	NA	UNK
D.014M	1,100,375.50	234,212.15	N	MP	1	NA	NA	100	56	47,583	NA	24	NA	NA	NA	NA	UNK
D.015M	1,104,943.87	231,686.66	N	MP	1	NA	NA	100	62	NA	47,534	NA	-22	NA	NA	NA	UNK
D.016M	1,105,606.74	230,764.40	N	MP	1	NA	NA	101	56	NA	47,523	NA	-30	NA	NA	NA	UNK
D.017M	1,106,899.64	229,821.17	N	MP	1	NA	NA	97	77	47,592	NA	34	NA	NA	NA	NA	UNK
E.001M	1,110,430.78	239,049.28	N	MP	1	NA	NA	NA	33	47,590	NA	10	NA	NA	NA	NA	UNK
E.002M	1,118,186.10	235,897.92	N	MP	1	NA	NA	NA	121	NA	47,495	NA	-67	NA	NA	E.019S	UNK
E.003M	1,118,168.91	235,692.39	N	MP	1	NA	NA	NA	93	47,601	NA	42	NA	NA	NA	NA	UNK
E.004M	1,118,094.67	235,501.29	N	MP	1	NA	NA	NA	83	47,596	NA	21	NA	NA	NA	NA	UNK

Acoustic Contacts

C.001S	5/20/2014 3:53:18 PM	30.1492145427	-88.4557932924
C.002S.1	6/29/2014 4:54:24 PM	30.1450608034	-88.4343473484
C.002S.2	6/29/2014 4:19:12 PM	30.1450968088	-88.4343468448
C.004S	6/30/2014 9:45:52 PM	30.1559668797	-88.4488118564
C.005S	7/1/2014 2:06:50 PM	30.1258491744	-88.3972954878
C.006S	7/1/2014 7:56:43 PM	30.1250504522	-88.3934269109
C.007S	7/1/2014 8:00:50 PM	30.1263724686	-88.3964896568
C.008S.1	7/1/2014 7:10:42 PM	30.1478497359	-88.4310892545
C.008S.2	7/2/2014 1:58:41 PM	30.1478757686	-88.4310771387
C.009S.1	7/1/2014 9:58:37 PM	30.1429760806	-88.4225744883
C.009S.2	7/2/2014 2:06:58 PM	30.1429951010	-88.4225543282
C.010S	7/2/2014 3:17:02 PM	30.1410521830	-88.4180537431
C.012S	7/2/2014 10:06:34 PM	30.1449092512	-88.4231017770
C.013S	7/2/2014 8:53:52 PM	30.1518433480	-88.4334243067
C.014S.1	7/16/2014 9:31:35 PM	30.1327618606	-88.3954849985
C.014S.2	7/16/2014 10:18:26 PM	30.1327877629	-88.3955499532
D.008S	4/24/2014 7:20:05 PM	30.1389111918	-88.4776820180
D.009S	4/24/2014 6:05:32 PM	30.1391916258	-88.4778095837
D.010S.1	4/24/2014 2:18:26 PM	30.1381322261	-88.4725748302
D.010S.2	4/23/2014 10:09:16 PM	30.1380332414	-88.4725497187
D.011S	4/24/2014 2:24:38 PM	30.1339895394	-88.4669608668
D.013S	4/23/2014 6:37:44 PM	30.1452628302	-88.4775654380
D.017S	3/23/2014 6:15:52 PM	30.1454642306	-88.4729369462
D.018S	4/25/2014 1:49:00 PM	30.1410526135	-88.4634208773
D.020S	4/25/2014 8:48:05 PM	30.1365177212	-88.4542706502
D.021S	4/26/2014 6:06:37 PM	30.1400475234	-88.4573619779

D.023S	4/26/2014 7:33:32 PM	30.1348699122	-88.4480634460
D.024S	4/26/2014 9:29:54 PM	30.1521362791	-88.4685467655
D.026S	5/24/2014 7:49:15 PM	30.1389830073	-88.4471074188
D.027S	5/24/2014 8:02:23 PM	30.1460159492	-88.4572471322
D.029S	5/25/2014 1:50:54 PM	30.1501292675	-88.4597912603
E.001S	2/10/2014 4:18:26 PM	30.1607114719	-88.4251974006
E.002S	2/10/2014 2:54:26 PM	30.1563835997	-88.4155020082
E.003S	2/8/2014 9:40:55 PM	30.1569860741	-88.4191986895
E.004S	2/8/2014 8:14:40 PM	30.1549702652	-88.4175578764
E.005S	2/10/2014 9:33:46 PM	30.1567963705	-88.4264677369
E.006S	2/10/2014 7:42:05 PM	30.1516288547	-88.4151383590
E.007S	2/10/2014 7:46:34 PM	30.1528424710	-88.4193072488
E.008S	2/10/2014 7:47:10 PM	30.1533636302	-88.4195693608
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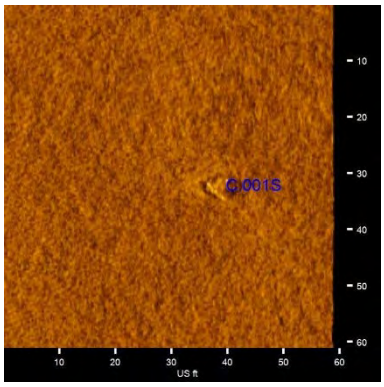
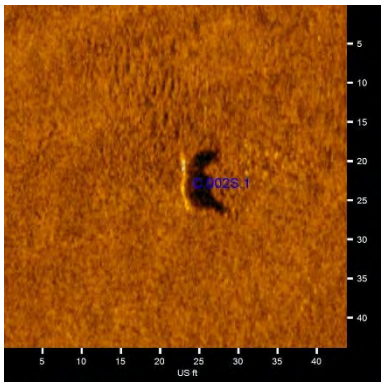
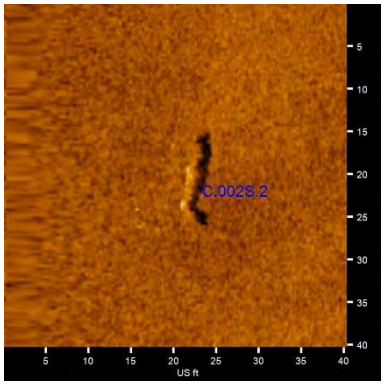
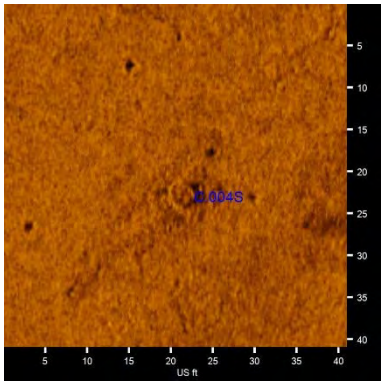
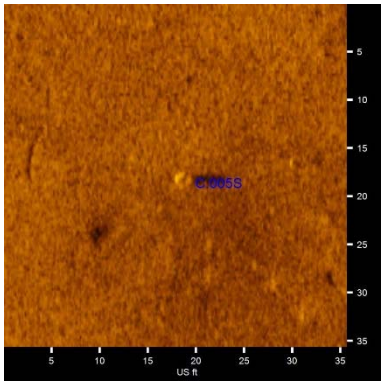
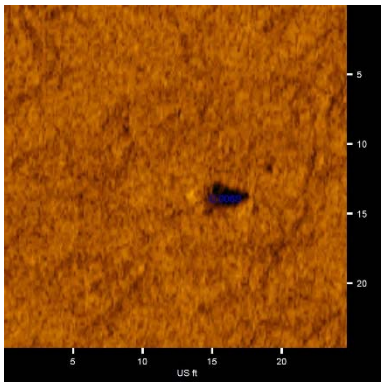
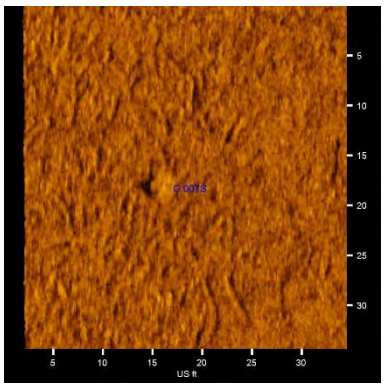
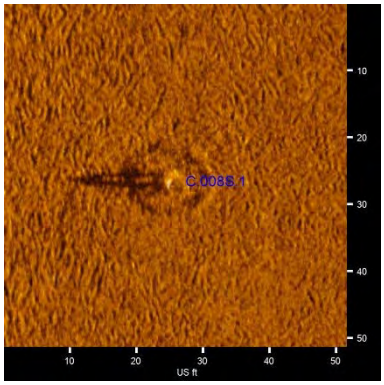
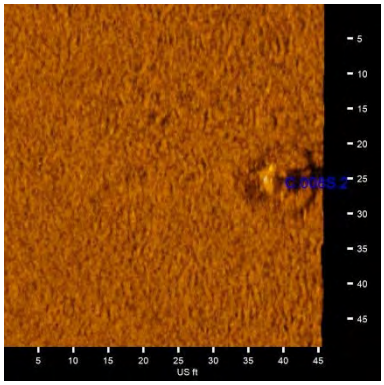
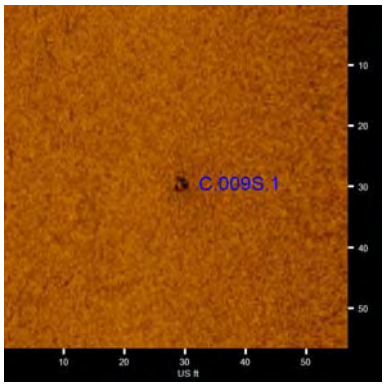
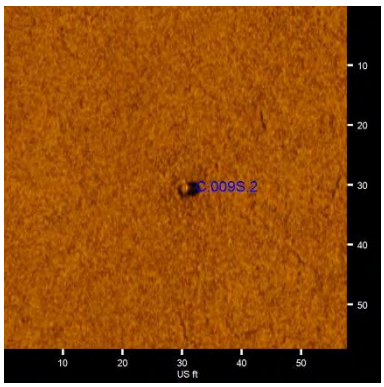
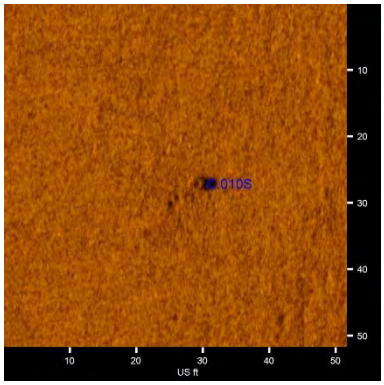
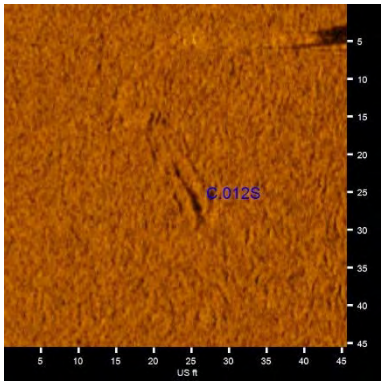
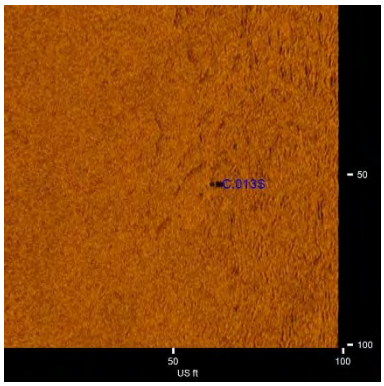
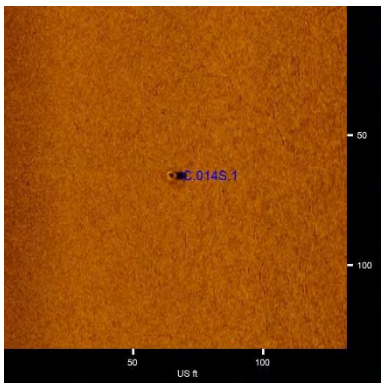
E.010S	2/10/2014 6:55:37 PM	30.1494511469	-88.4101275579
E.011S	2/10/2014 6:55:21 PM	30.1495612624	-88.4103776258
E.012S	2/10/2014 6:42:14 PM	30.1535798248	-88.4230754658
E.013S	2/23/2014 6:22:52 PM	30.1606989658	-88.4237771626
E.014S	2/23/2014 6:09:25 PM	30.1611249755	-88.4270383974
E.015S	2/19/2014 8:06:56 PM	30.1580243599	-88.4228592122
E.016S	2/19/2014 8:10:21 PM	30.1570349767	-88.4191501110
E.017S	2/19/2014 6:26:40 PM	30.1603474934	-88.4335597843
E.018S	2/17/2014 8:36:17 PM	30.1550628751	-88.4205652356
E.019S	2/24/2014 6:20:57 PM	30.1479516557	-88.4095684302
E.020S	2/24/2014 5:42:53 PM	30.1542405297	-88.4293181149
E.021S	2/17/2014 5:51:16 PM	30.1550911795	-88.4329187129
E.023S	2/24/2014 8:35:32 PM	30.1464534886	-88.4105806918

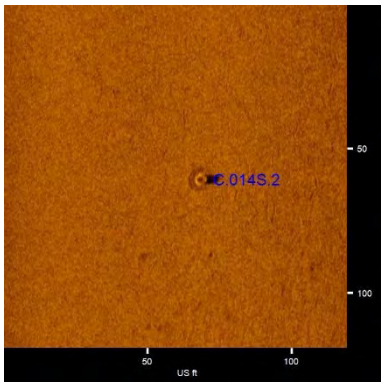
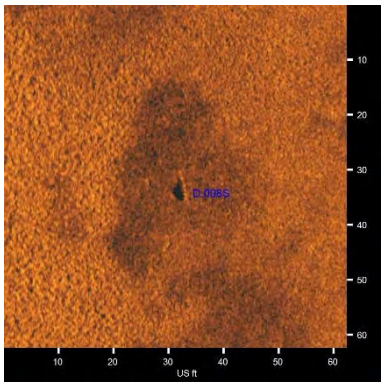
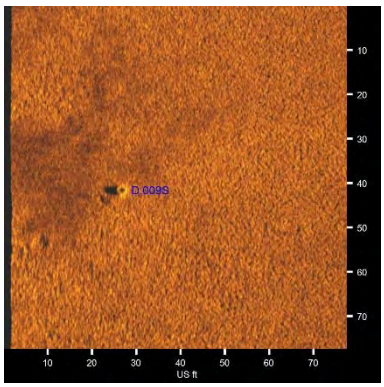
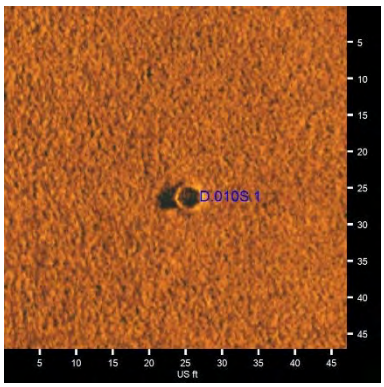
E.024S	2/25/2014 4:14:58 PM	30.1447441382	-88.4074486294
H.001S.1	5/25/2014 2:56:17 PM	30.1233098984	-88.3993267269
H.001S.2	5/25/2014 5:30:03 PM	30.1233011877	-88.3993463725
H.003S	5/25/2014 4:48:56 PM	30.1256340439	-88.4049982050
H.004S.1	5/25/2014 8:34:30 PM	30.1232092914	-88.4047299931
H.004S.2	5/25/2014 10:37:33 PM	30.1232173145	-88.4048296696
H.008S	6/26/2014 1:56:16 PM	30.1223837766	-88.4098094499

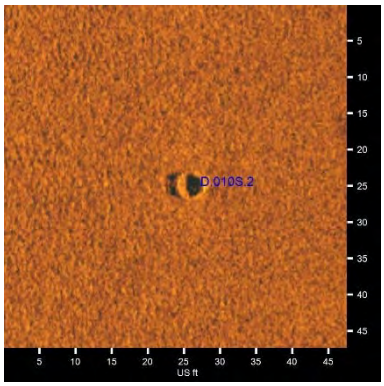
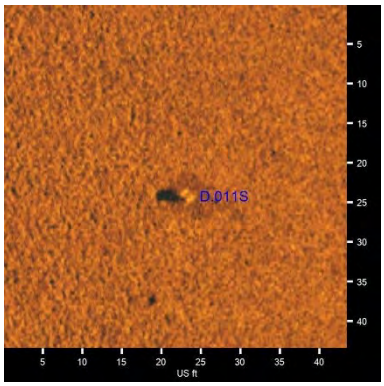
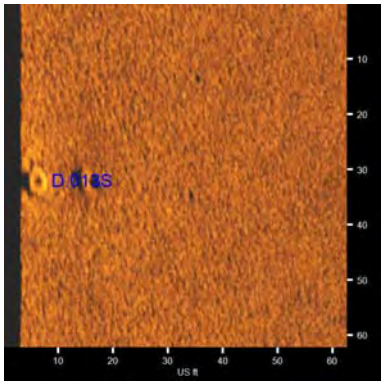
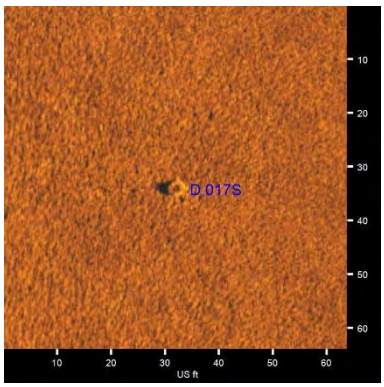
Target Image	Target Info	User Entered Info
	**C.001S** • Sonar Time at Target: 5/20/2014 3:53:18 PM • Click Position 30.1492145427 -88.4557932924 (WGS84) (X) 1103577.61 (Y) 236291.17 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 124679 • Range to target: 107.22 US ft • Fish Height: 24.06 US ft • Heading: 120.000 Degrees • Line Name: C-06	**Dimensions and attributes** • Target Width: 3.96 US ft • Target Height: 0.76 US ft • Target Length: 3.77 US ft • Target Shadow: 3.57 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Unknown • Area: MSCIP • Block: C • Description:
	**C.002S.1** • Sonar Time at Target: 6/29/2014 4:54:24 PM • Click Position 30.1450608034 -88.4343473484 (WGS84) (X) 1110361.28 (Y) 234803.60 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 235027 • Range to target: 80.13 US ft • Fish Height: 23.72 US ft • Heading: 321.390 Degrees • Line Name: C.30	**Dimensions and attributes** • Target Width: 1.16 US ft • Target Height: 1.20 US ft • Target Length: 7.23 US ft • Target Shadow: 4.46 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Unknown • Area: MSCIP • Block: C • Description:
	**C.002S.2** • Sonar Time at Target: 6/29/2014 4:19:12 PM • Click Position 30.1450968088 -88.4343468448 (WGS84) (X) 1110361.39 (Y) 234816.70 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 191364 • Range to target: 21.49 US ft • Fish Height: 23.28 US ft • Heading: 118.500 Degrees • Line Name: C.32.001	**Dimensions and attributes** • Target Width: 0.99 US ft • Target Height: 1.58 US ft • Target Length: 6.26 US ft • Target Shadow: 2.31 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Unknown • Area: MSCIP • Block: C • Description:

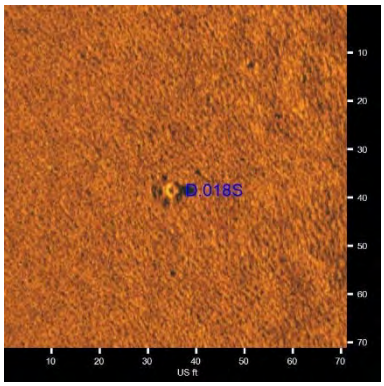
	**C.004S** • Sonar Time at Target: 6/30/2014 9:45:52 PM • Click Position 30.1559668797 -88.4488118564 (WGS84) (X) 1105775.94 (Y) 238754.25 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 616198 • Range to target: 75.43 US ft • Fish Height: 22.27 US ft • Heading: 309.600 Degrees • Line Name: C.38.002	**Dimensions and attributes** • Target Width: 3.25 US ft • Target Height: 0.22 US ft • Target Length: 3.55 US ft • Target Shadow: 0.77 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Unknown • Area: MSCIP • Block: C • Description:
	**C.005S** • Sonar Time at Target: 7/1/2014 2:06:50 PM • Click Position 30.1258491744 -88.3972954878 (WGS84) (X) 1122099.42 (Y) 227859.52 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 23809 • Range to target: 88.86 US ft • Fish Height: 26.07 US ft • Heading: 121.400 Degrees • Line Name: C41	**Dimensions and attributes** • Target Width: 1.62 US ft • Target Height: 0.95 US ft • Target Length: 1.76 US ft • Target Shadow: 3.52 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Tire • Area: MSCIP • Block: C • Description:
	**C.006S** • Sonar Time at Target: 7/1/2014 7:56:43 PM • Click Position 30.1250504522 -88.3934269109 (WGS84) (X) 1123323.56 (Y) 227573.73 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 328965 • Range to target: 52.15 US ft • Fish Height: 21.04 US ft • Heading: 316.000 Degrees • Line Name: C44	**Dimensions and attributes** • Target Width: 1.42 US ft • Target Height: 1.08 US ft • Target Length: 2.14 US ft • Target Shadow: 3.04 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Unknown • Area: MSCIP • Block: C • Description:
	**C.007S** • Sonar Time at Target: 7/1/2014 8:00:50 PM • Click Position 30.1263724686 -88.3964896568 (WGS84) (X) 1122353.45 (Y) 228050.80 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 334070 • Range to target: 98.26 US ft • Fish Height: 21.60 US ft • Heading: 315.500 Degrees • Line Name: C44	**Dimensions and attributes** • Target Width: 2.40 US ft • Target Height: 0.22 US ft • Target Length: 3.02 US ft • Target Shadow: 1.04 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Unknown • Area: MSCIP • Block: C • Description:

	**C.008S.1** • Sonar Time at Target: 7/1/2014 7:10:42 PM • Click Position 30.1478497359 -88.4310892545 (WGS84) (X) 1111387.53 (Y) 235821.50 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 271881 • Range to target: 76.32 US ft • Fish Height: 18.91 US ft • Heading: 115.800 Degrees • Line Name: C45.001	**Dimensions and attributes** • Target Width: 11.89 US ft • Target Height: 2.84 US ft • Target Length: 10.65 US ft • Target Shadow: 13.87 US ft • Mag Anomaly: N • Avoidance Area: Y • Classification1: Unknown • Area: MSCIP • Block: C • Description: Possible geotechnical or hydrological equipment.
	**C.008S.2** • Sonar Time at Target: 7/2/2014 1:58:41 PM • Click Position 30.1478757686 -88.4310771387 (WGS84) (X) 1111391.32 (Y) 235830.98 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 37159 • Range to target: 104.08 US ft • Fish Height: 27.87 US ft • Heading: 117.590 Degrees • Line Name: C.47.001	**Dimensions and attributes** • Target Width: 3.85 US ft • Target Height: 1.11 US ft • Target Length: 5.00 US ft • Target Shadow: 4.48 US ft • Mag Anomaly: N • Avoidance Area: Y • Classification1: Unknown • Area: MSCIP • Block: C • Description: Possible geotechnical or hydrological equipment.
	**C.009S.1** • Sonar Time at Target: 7/1/2014 9:58:37 PM • Click Position 30.1429760806 -88.4225744883 (WGS84) (X) 1114085.20 (Y) 234058.63 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 480206 • Range to target: 34.92 US ft • Fish Height: 26.41 US ft • Heading: 110.590 Degrees • Line Name: C46.001	**Dimensions and attributes** • Target Width: 2.65 US ft • Target Height: 1.06 US ft • Target Length: 2.65 US ft • Target Shadow: 1.84 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Unknown • Area: MSCIP • Block: C • Description:
	**C.009S.2** • Sonar Time at Target: 7/2/2014 2:06:58 PM • Click Position 30.1429951010 -88.4225543282 (WGS84) (X) 1114091.55 (Y) 234065.57 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 47423 • Range to target: 53.72 US ft • Fish Height: 21.37 US ft • Heading: 120.900 Degrees • Line Name: C.47.001	**Dimensions and attributes** • Target Width: 2.33 US ft • Target Height: 0.72 US ft • Target Length: 2.64 US ft • Target Shadow: 2.02 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Unknown • Area: MSCIP • Block: C • Description:

	**C.010S** • Sonar Time at Target: 7/2/2014 3:17:02 PM • Click Position 30.1410521830 -88.4180537431 (WGS84) (X) 1115516.70 (Y) 233364.11 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 134354 • Range to target: 74.57 US ft • Fish Height: 22.05 US ft • Heading: 315.390 Degrees • Line Name: C.48.001	**Dimensions and attributes** • Target Width: 2.42 US ft • Target Height: 0.55 US ft • Target Length: 2.14 US ft • Target Shadow: 2.00 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Tire • Area: MSCIP • Block: C • Description:
	**C.012S** • Sonar Time at Target: 7/2/2014 10:06:34 PM • Click Position 30.1449092512 -88.4231017770 (WGS84) (X) 1113916.00 (Y) 234761.09 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 642467 • Range to target: 76.10 US ft • Fish Height: 24.40 US ft • Heading: 115.300 Degrees • Line Name: C.52.001	**Dimensions and attributes** • Target Width: 4.83 US ft • Target Height: 0.36 US ft • Target Length: 15.35 US ft • Target Shadow: 1.19 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Unknown • Area: MSCIP • Block: C • Description:
	**C.013S** • Sonar Time at Target: 7/2/2014 8:53:52 PM • Click Position 30.1518433480 -88.4334243067 (WGS84) (X) 1110644.39 (Y) 237271.32 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 552259 • Range to target: 74.76 US ft • Fish Height: 23.05 US ft • Heading: 313.890 Degrees • Line Name: C.53.002	**Dimensions and attributes** • Target Width: 2.44 US ft • Target Height: 0.70 US ft • Target Length: 1.62 US ft • Target Shadow: 2.43 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Tire • Area: MSCIP • Block: C • Description:
	**C.014S.1** • Sonar Time at Target: 7/16/2014 9:31:35 PM • Click Position 30.1327618606 -88.3954849985 (WGS84) (X) 1122662.15 (Y) 230375.73 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 459536 • Range to target: 90.53 US ft • Fish Height: 31.19 US ft • Heading: 314.890 Degrees • Line Name: C.63	**Dimensions and attributes** • Target Width: 3.36 US ft • Target Height: 1.12 US ft • Target Length: 3.77 US ft • Target Shadow: 3.57 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Tire • Area: MSCIP • Block: C • Description:

	**C.014S.2** • Sonar Time at Target: 7/16/2014 10:18:26 PM • Click Position 30.1327877629 -88.3955499532 (WGS84) (X) 1122641.58 (Y) 230385.07 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 499879 • Range to target: 107.80 US ft • Fish Height: 36.31 US ft • Heading: 105.590 Degrees • Line Name: C.65	**Dimensions and attributes** • Target Width: 4.29 US ft • Target Height: 1.18 US ft • Target Length: 3.58 US ft • Target Shadow: 3.82 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Tire • Area: MSCIP • Block: C • Description:
	**D.008S** • Sonar Time at Target: 4/24/2014 7:20:05 PM • Click Position 30.1389111918 -88.4776820180 (WGS84) (X) 1096670.96 (Y) 232521.80 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 344108 • Range to target: 56.04 US ft • Fish Height: 17.53 US ft • Heading: 315.700 Degrees • Line Name: D.08.001	**Dimensions and attributes** • Target Width: 0.42 US ft • Target Height: 0.58 US ft • Target Length: 4.45 US ft • Target Shadow: 1.99 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Unknown • Area: MSCIP • Block: D • Description:
	**D.009S** • Sonar Time at Target: 4/24/2014 6:05:32 PM • Click Position 30.1391916258 -88.4778095837 (WGS84) (X) 1096630.32 (Y) 232623.66 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 263792 • Range to target: 104.15 US ft • Fish Height: 19.70 US ft • Heading: 318.500 Degrees • Line Name: D.09.001	**Dimensions and attributes** • Target Width: 2.70 US ft • Target Height: 0.61 US ft • Target Length: 3.10 US ft • Target Shadow: 3.38 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Tire • Area: MSCIP • Block: D • Description:
	**D.010S.1** • Sonar Time at Target: 4/24/2014 2:18:26 PM • Click Position 30.1381322261 -88.4725748302 (WGS84) (X) 1098286.24 (Y) 232243.57 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 19108 • Range to target: 57.07 US ft • Fish Height: 21.24 US ft • Heading: 123.400 Degrees • Line Name: D.15	**Dimensions and attributes** • Target Width: 4.44 US ft • Target Height: 0.66 US ft • Target Length: 4.25 US ft • Target Shadow: 1.95 US ft • Mag Anomaly: N • Avoidance Area: • Classification1: Unknown • Area: MSCIP • Block: D • Description:

	**D.010S.2** • Sonar Time at Target: 4/23/2014 10:09:16 PM • Click Position 30.1380332414 -88.4725497187 (WGS84) (X) 1098294.29 (Y) 232207.60 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 493520 • Range to target: 60.65 US ft • Fish Height: 29.43 US ft • Heading: 321.500 Degrees • Line Name: D.16.001	**Dimensions and attributes** • Target Width: 4.43 US ft • Target Height: 0.65 US ft • Target Length: 3.96 US ft • Target Shadow: 1.53 US ft • Mag Anomaly: N • Avoidance Area: • Classification1: Unknown • Area: MSCIP • Block: D • Description:
	**D.011S** • Sonar Time at Target: 4/24/2014 2:24:38 PM • Click Position 30.1339895394 -88.4669608668 (WGS84) (X) 1100065.67 (Y) 230742.61 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 25791 • Range to target: 35.06 US ft • Fish Height: 20.86 US ft • Heading: 125.000 Degrees • Line Name: D.15	**Dimensions and attributes** • Target Width: 1.48 US ft • Target Height: 1.33 US ft • Target Length: 1.72 US ft • Target Shadow: 2.79 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Unknown • Area: MSCIP • Block: D • Description: Probable crab trap.
	**D.013S** • Sonar Time at Target: 4/23/2014 6:37:44 PM • Click Position 30.1452628302 -88.4775654380 (WGS84) (X) 1096700.61 (Y) 234831.89 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 265627 • Range to target: 124.88 US ft • Fish Height: 28.28 US ft • Heading: 126.500 Degrees • Line Name: D.24	**Dimensions and attributes** • Target Width: 3.48 US ft • Target Height: 0.43 US ft • Target Length: 5.64 US ft • Target Shadow: 1.96 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Tire • Area: MSCIP • Block: D • Description:
	**D.017S** • Sonar Time at Target: 3/23/2014 6:15:52 PM • Click Position 30.1454642306 -88.4729369462 (WGS84) (X) 1098163.35 (Y) 234909.73 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 293107 • Range to target: 72.93 US ft • Fish Height: 26.23 US ft • Heading: 320.600 Degrees • Line Name: D.36.001	**Dimensions and attributes** • Target Width: 3.71 US ft • Target Height: 0.61 US ft • Target Length: 3.51 US ft • Target Shadow: 1.85 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Tire • Area: MSCIP • Block: D • Description:

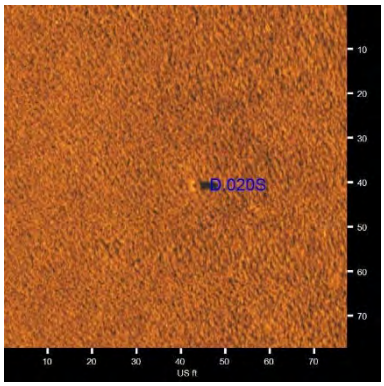


D.018S

- Sonar Time at Target: 4/25/2014 1:49:00 PM
- Click Position
  30.1410526135 -88.4634208773 (WGS84)
  (X) 1101176.39 (Y) 233314.93 (Projected Coordinates)
- Map Projection: MS83-EF
- Ping Number: 38467
- Range to target: 78.31 US ft
- Fish Height: 22.65 US ft
- Heading: 129.100 Degrees
- Line Name: D.43.001

Dimensions and attributes

- Target Width: 2.68 US ft
- Target Height: 0.88 US ft
- Target Length: 3.30 US ft
- Target Shadow: 3.30 US ft
- Mag Anomaly: N
- Avoidance Area: N
- Classification1: Tire
- Area: MSCIP
- Block: D
- Description:

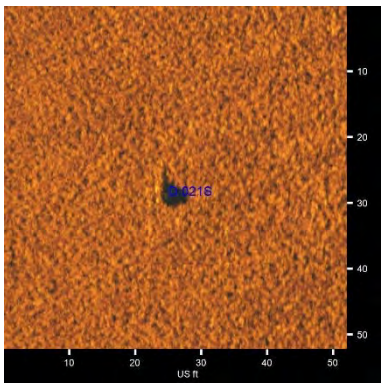


D.020S

- Sonar Time at Target: 4/25/2014 8:48:05 PM
- Click Position
  30.1365177212 -88.4542706502 (WGS84)
  (X) 1104074.21 (Y) 231675.16 (Projected Coordinates)
- Map Projection: MS83-EF
- Ping Number: 490000
- Range to target: 87.52 US ft
- Fish Height: 22.65 US ft
- Heading: 128.690 Degrees
- Line Name: D.49.001

Dimensions and attributes

- Target Width: 2.43 US ft
- Target Height: 0.97 US ft
- Target Length: 2.63 US ft
- Target Shadow: 4.04 US ft
- Mag Anomaly: N
- Avoidance Area: N
- Classification1: Tire
- Area: MSCIP
- Block: D
- Description:

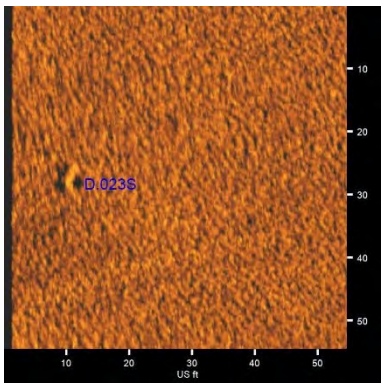


D.021S

- Sonar Time at Target: 4/26/2014 6:06:37 PM
- Click Position
  30.1400475234 -88.4573619779 (WGS84)
  (X) 1103092.78 (Y) 232955.65 (Projected Coordinates)
- Map Projection: MS83-EF
- Ping Number: 273065
- Range to target: 78.05 US ft
- Fish Height: 18.17 US ft
- Heading: 317.890 Degrees
- Line Name: D.51.001

Dimensions and attributes

- Target Width: 1.09 US ft
- Target Height: 0.87 US ft
- Target Length: 3.42 US ft
- Target Shadow: 4.04 US ft
- Mag Anomaly: N
- Avoidance Area: N
- Classification1: Unknown
- Area: MSCIP
- Block: D
- Description:

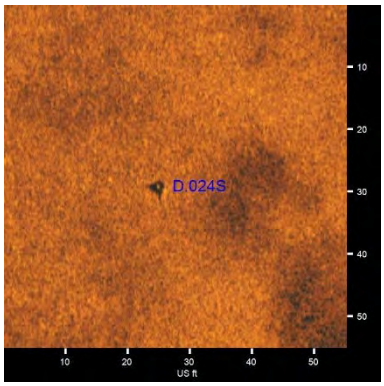


D.023S

- Sonar Time at Target: 4/26/2014 7:33:32 PM
- Click Position
  30.1348699122 -88.4480634460 (WGS84)
  (X) 1106038.38 (Y) 231082.46 (Projected Coordinates)
- Map Projection: MS83-EF
- Ping Number: 366708
- Range to target: 120.02 US ft
- Fish Height: 18.04 US ft
- Heading: 127.590 Degrees
- Line Name: D.55.001

Dimensions and attributes

- Target Width: 1.76 US ft
- Target Height: 0.25 US ft
- Target Length: 3.73 US ft
- Target Shadow: 1.68 US ft
- Mag Anomaly: N
- Avoidance Area: N
- Classification1: Unknown
- Area: MSCIP
- Block: D
- Description:

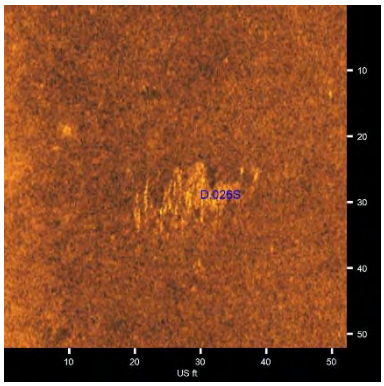


D.024S

- Sonar Time at Target: 4/26/2014 9:29:54 PM
- Click Position
  30.1521362791 -88.4685467655 (WGS84)
  (X) 1099543.24 (Y) 237340.64 (Projected Coordinates)
- Map Projection: MS83-EF
- Ping Number: 492077
- Range to target: 69.86 US ft
- Fish Height: 21.24 US ft
- Heading: 121.190 Degrees
- Line Name: D.62

Dimensions and attributes

- Target Width: 1.12 US ft
- Target Height: 0.65 US ft
- Target Length: 2.36 US ft
- Target Shadow: 2.30 US ft
- Mag Anomaly: N
- Avoidance Area: N
- Classification1: Unknown
- Area: MSCIP
- Block: D
- Description:

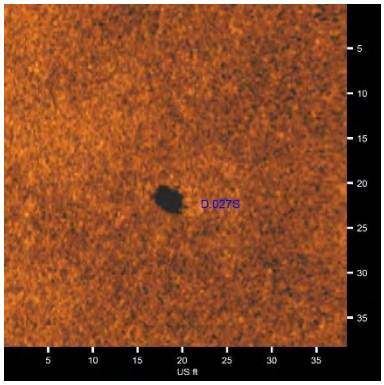


D.026S

- Sonar Time at Target: 5/24/2014 7:49:15 PM
- Click Position
  30.1389830073 -88.4471074188 (WGS84)
  (X) 1106335.53 (Y) 232579.34 (Projected Coordinates)
- Map Projection: MS83-EF
- Ping Number: 411135
- Range to target: 64.74 US ft
- Fish Height: 22.52 US ft
- Heading: 315.000 Degrees
- Line Name: D.69.001

Dimensions and attributes

- Target Width: 9.98 US ft
- Target Height: 0.37 US ft
- Target Length: 20.21 US ft
- Target Shadow: 1.16 US ft
- Mag Anomaly: N
- Avoidance Area: N
- Classification1: Unknown
- Area: MSCIP
- Block: D
- Description:

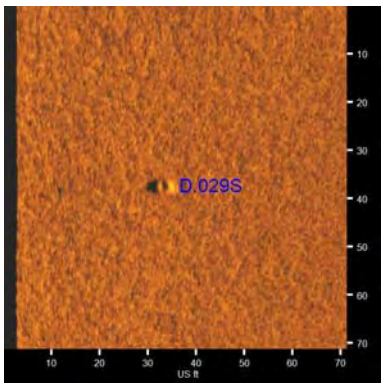


D.027S

- Sonar Time at Target: 5/24/2014 8:02:23 PM
- Click Position
  30.1460159492 -88.4572471322 (WGS84)
  (X) 1103121.93 (Y) 235126.38 (Projected Coordinates)
- Map Projection: MS83-EF
- Ping Number: 425291
- Range to target: 26.87 US ft
- Fish Height: 18.68 US ft
- Heading: 316.790 Degrees
- Line Name: D.69.001

Dimensions and attributes

- Target Width: 2.27 US ft
- Target Height: 1.76 US ft
- Target Length: 2.55 US ft
- Target Shadow: 3.40 US ft
- Mag Anomaly: N
- Avoidance Area: N
- Classification1: Unknown
- Area: MSCIP
- Block: D
- Description: Probable crab trap.

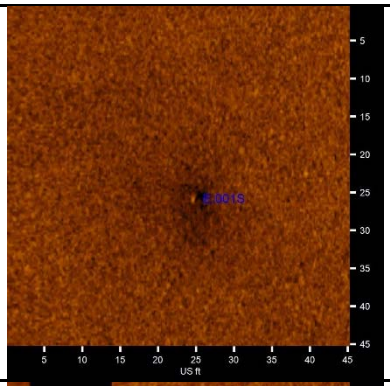
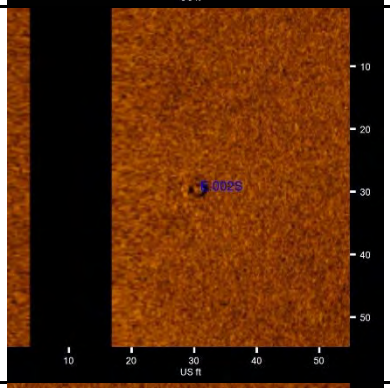
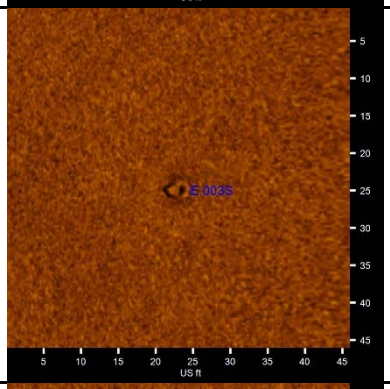
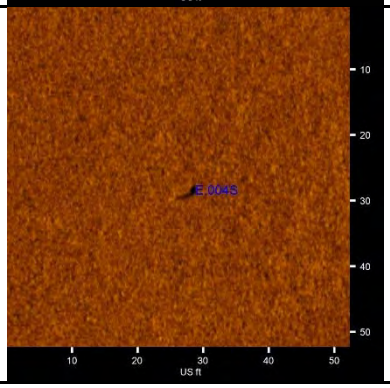


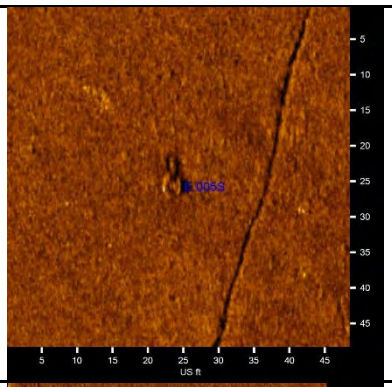
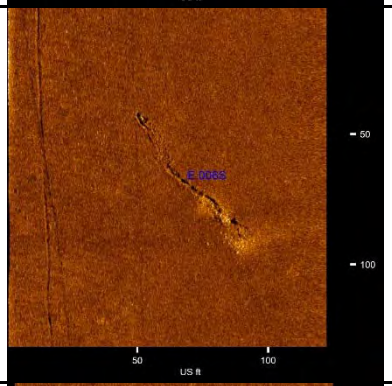
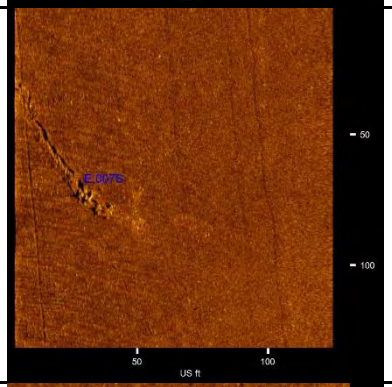
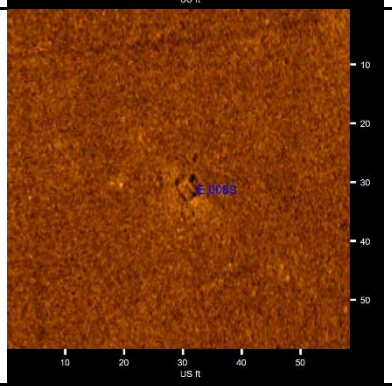
D.029S

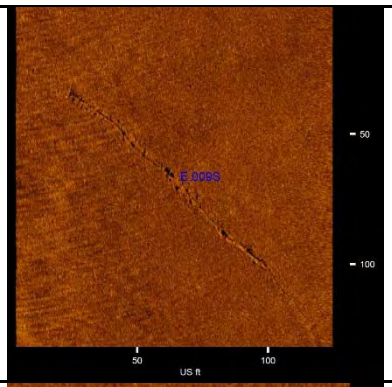
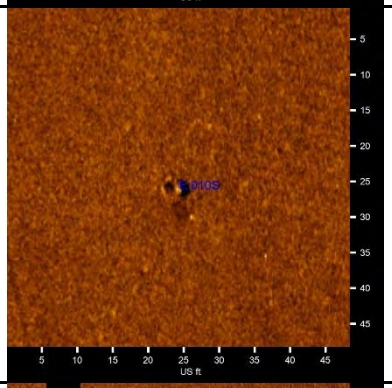
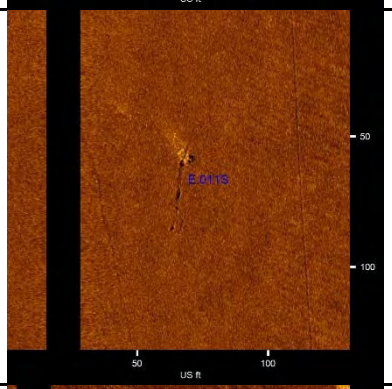
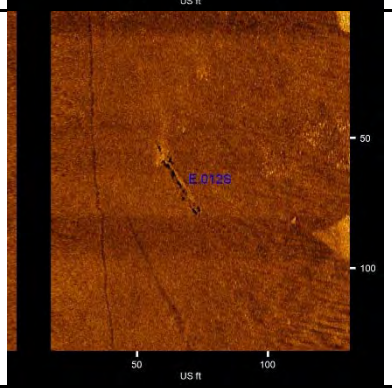
- Sonar Time at Target: 5/25/2014 1:50:54 PM
- Click Position
  30.1501292675 -88.4597912603 (WGS84)
  (X) 1102312.89 (Y) 236619.68 (Projected Coordinates)
- Map Projection: MS83-EF
- Ping Number: 28740
- Range to target: 97.50 US ft
- Fish Height: 26.49 US ft
- Heading: 120.800 Degrees
- Line Name: D.74.001

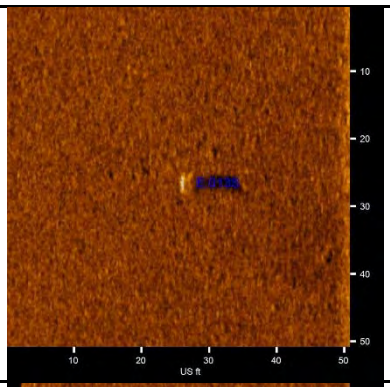
Dimensions and attributes

- Target Width: 3.15 US ft
- Target Height: 0.58 US ft
- Target Length: 4.51 US ft
- Target Shadow: 2.25 US ft
- Mag Anomaly: N
- Avoidance Area: N
- Classification1: Unknown
- Area: MSCIP
- Block: D
- Description:

	**E.001S** • Sonar Time at Target: 2/10/2014 4:18:26 PM • Click Position 30.1607114719 -88.4251974006 (WGS84) (X) 1113233.05 (Y) 240505.72 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 149720 • Range to target: 40.18 US ft • Fish Height: 25.03 US ft • Heading: 304.390 Degrees • Line Name: E.44.001	**Dimensions and attributes** • Target Width: 0.61 US ft • Target Height: 0.00 US ft • Target Length: 1.22 US ft • Target Shadow: 0.00 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Unknown • Area: MSCIP • Block: E • Description:
	**E.002S** • Sonar Time at Target: 2/10/2014 2:54:26 PM • Click Position 30.1563835997 -88.4155020082 (WGS84) (X) 1116302.87 (Y) 238942.84 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 59231 • Range to target: 19.19 US ft • Fish Height: 29.00 US ft • Heading: 300.500 Degrees • Line Name: E.40	**Dimensions and attributes** • Target Width: 2.81 US ft • Target Height: 0.76 US ft • Target Length: 3.58 US ft • Target Shadow: 0.93 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Tire • Area: MSCIP • Block: E • Description:
	**E.003S** • Sonar Time at Target: 2/8/2014 9:40:55 PM • Click Position 30.1569860741 -88.4191986895 (WGS84) (X) 1115133.75 (Y) 239157.69 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 461995 • Range to target: 31.73 US ft • Fish Height: 31.43 US ft • Heading: 104.590 Degrees • Line Name: E.38	**Dimensions and attributes** • Target Width: 2.49 US ft • Target Height: 0.33 US ft • Target Length: 2.33 US ft • Target Shadow: 0.47 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Tire • Area: MSCIP • Block: E • Description:
	**E.004S** • Sonar Time at Target: 2/8/2014 8:14:40 PM • Click Position 30.1549702652 -88.4175578764 (WGS84) (X) 1115655.00 (Y) 238426.46 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 369082 • Range to target: 77.28 US ft • Fish Height: 32.33 US ft • Heading: 99.500 Degrees • Line Name: E.34	**Dimensions and attributes** • Target Width: 1.74 US ft • Target Height: 0.30 US ft • Target Length: 3.07 US ft • Target Shadow: 0.78 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Unknown • Area: MSCIP • Block: E • Description:

	**E.005S** • Sonar Time at Target: 2/10/2014 9:33:46 PM • Click Position 30.1567963705 -88.4264677369 (WGS84) (X) 1112836.66 (Y) 239080.42 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 489456 • Range to target: 80.10 US ft • Fish Height: 26.70 US ft • Heading: 308.200 Degrees • Line Name: E.29.001	**Dimensions and attributes** • Target Width: 2.67 US ft • Target Height: 0.46 US ft • Target Length: 5.77 US ft • Target Shadow: 1.48 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Unknown • Area: MSCIP • Block: E • Description:
	**E.006S** • Sonar Time at Target: 2/10/2014 7:42:05 PM • Click Position 30.1516288547 -88.4151383590 (WGS84) (X) 1116424.14 (Y) 237214.04 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 369128 • Range to target: 63.21 US ft • Fish Height: 27.85 US ft • Heading: 302.890 Degrees • Line Name: E.25.001	**Dimensions and attributes** • Target Width: 2.01 US ft • Target Height: 0.00 US ft • Target Length: 53.89 US ft • Target Shadow: 0.00 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Anchor Scar • Area: MSCIP • Block: E • Description:
	**E.007S** • Sonar Time at Target: 2/10/2014 7:46:34 PM • Click Position 30.1528424710 -88.4193072488 (WGS84) (X) 1115104.91 (Y) 237650.60 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 373974 • Range to target: 105.18 US ft • Fish Height: 27.34 US ft • Heading: 305.200 Degrees • Line Name: E.25.001	**Dimensions and attributes** • Target Width: 5.30 US ft • Target Height: 0.00 US ft • Target Length: 61.53 US ft • Target Shadow: 0.00 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Anchor Scar • Area: MSCIP • Block: E • Description:
	**E.008S** • Sonar Time at Target: 2/10/2014 7:47:10 PM • Click Position 30.1533636302 -88.4195693608 (WGS84) (X) 1115021.38 (Y) 237839.84 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 374612 • Range to target: 50.67 US ft • Fish Height: 27.21 US ft • Heading: 305.500 Degrees • Line Name: E.25.001	**Dimensions and attributes** • Target Width: 2.16 US ft • Target Height: 0.00 US ft • Target Length: 3.20 US ft • Target Shadow: 0.00 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Unknown • Area: MSCIP • Block: E • Description:

	**E.009S** • Sonar Time at Target: 2/10/2014 6:57:15 PM • Click Position 30.1492870819 -88.4084829360 (WGS84) (X) 1118530.84 (Y) 236370.14 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 320836 • Range to target: 68.58 US ft • Fish Height: 29.26 US ft • Heading: 108.900 Degrees • Line Name: E.23.001	**Dimensions and attributes** • Target Width: 1.98 US ft • Target Height: 0.00 US ft • Target Length: 129.62 US ft • Target Shadow: 0.00 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Anchor Scar • Area: MSCIP • Block: E • Description:
	**E.010S** • Sonar Time at Target: 2/10/2014 6:55:37 PM • Click Position 30.1494511469 -88.4101275579 (WGS84) (X) 1118010.80 (Y) 236427.88 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 319074 • Range to target: 55.02 US ft • Fish Height: 28.62 US ft • Heading: 104.000 Degrees • Line Name: E.23.001	**Dimensions and attributes** • Target Width: 2.96 US ft • Target Height: 0.47 US ft • Target Length: 2.97 US ft • Target Shadow: 1.04 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Tire • Area: MSCIP • Block: E • Description:
	**E.011S** • Sonar Time at Target: 2/10/2014 6:55:21 PM • Click Position 30.1495612624 -88.4103776258 (WGS84) (X) 1117931.61 (Y) 236467.63 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 318788 • Range to target: 44.02 US ft • Fish Height: 28.62 US ft • Heading: 106.090 Degrees • Line Name: E.23.001	**Dimensions and attributes** • Target Width: 2.41 US ft • Target Height: 0.00 US ft • Target Length: 37.07 US ft • Target Shadow: 0.00 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Anchor Scar • Area: MSCIP • Block: E • Description:
	**E.012S** • Sonar Time at Target: 2/10/2014 6:42:14 PM • Click Position 30.1535798248 -88.4230754658 (WGS84) (X) 1113912.98 (Y) 237914.46 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 304648 • Range to target: 55.28 US ft • Fish Height: 30.28 US ft • Heading: 99.400 Degrees • Line Name: E.23	**Dimensions and attributes** • Target Width: 2.32 US ft • Target Height: 0.00 US ft • Target Length: 30.20 US ft • Target Shadow: 0.00 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Anchor Scar • Area: MSCIP • Block: E • Description:

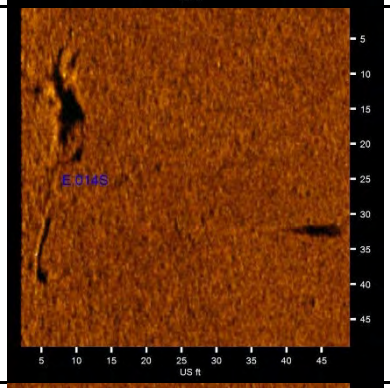


E.013S

- Sonar Time at Target: 2/23/2014 6:22:52 PM
- Click Position
  30.1606989658 -88.4237771626 (WGS84)
  (X) 1113681.90 (Y) 240502.78 (Projected Coordinates)
- Map Projection: MS83-EF
- Ping Number: 94671
- Range to target: 102.87 US ft
- Fish Height: 27.48 US ft
- Heading: 97.000 Degrees
- Line Name: E.47

Dimensions and attributes

- Target Width: 2.38 US ft
- Target Height: 1.58 US ft
- Target Length: 3.02 US ft
- Target Shadow: 6.50 US ft
- Mag Anomaly: N
- Avoidance Area: N
- Classification1: Crap Pot
- Area: MSCIP
- Block: E
- Description:

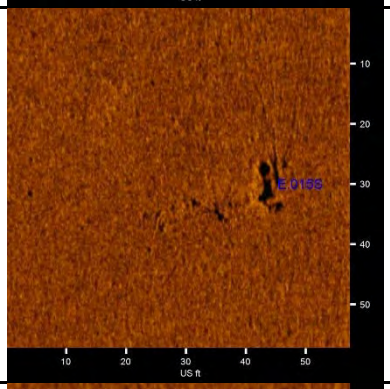


E.014S

- Sonar Time at Target: 2/23/2014 6:09:25 PM
- Click Position
  30.1611249755 -88.4270383974 (WGS84)
  (X) 1112650.70 (Y) 240654.02 (Projected Coordinates)
- Map Projection: MS83-EF
- Ping Number: 80177
- Range to target: 124.63 US ft
- Fish Height: 22.52 US ft
- Heading: 304.600 Degrees
- Line Name: E.0046

Dimensions and attributes

- Target Width: 1.39 US ft
- Target Height: 0.15 US ft
- Target Length: 33.19 US ft
- Target Shadow: 0.84 US ft
- Mag Anomaly: N
- Avoidance Area: N
- Classification1: Unknown
- Area: MSCIP
- Block: E
- Description: Possible anchor scar

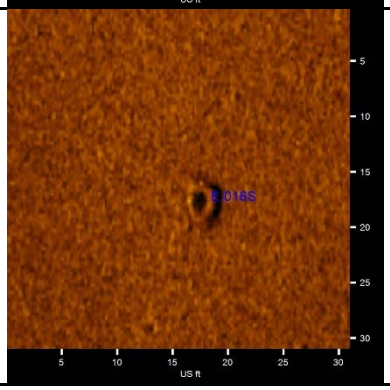


E.015S

- Sonar Time at Target: 2/19/2014 8:06:56 PM
- Click Position
  30.1580243599 -88.4228592122 (WGS84)
  (X) 1113975.51 (Y) 239531.11 (Projected Coordinates)
- Map Projection: MS83-EF
- Ping Number: 112453
- Range to target: 112.60 US ft
- Fish Height: 24.57 US ft
- Heading: 106.090 Degrees
- Line Name: E.39

Dimensions and attributes

- Target Width: 5.12 US ft
- Target Height: 0.00 US ft
- Target Length: 7.59 US ft
- Target Shadow: 0.00 US ft
- Mag Anomaly: N
- Avoidance Area: N
- Classification1: Bottom Depression
- Area: MSCIP
- Block: E
- Description:

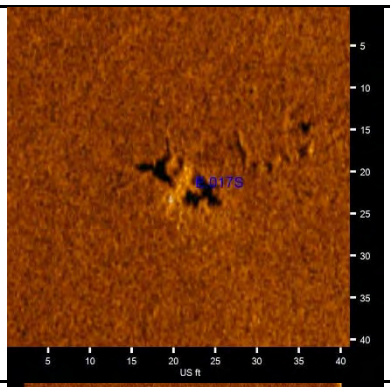
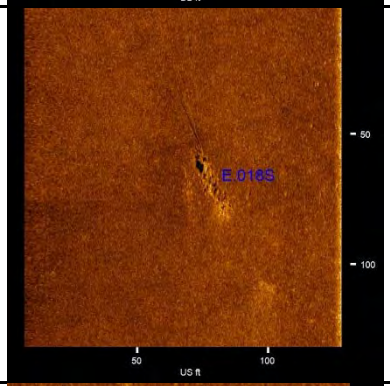
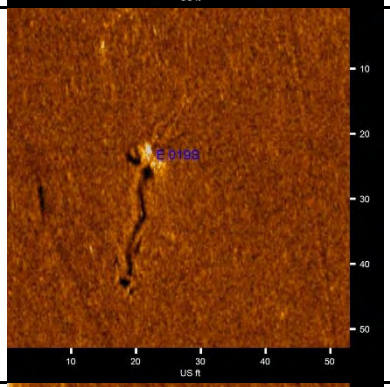
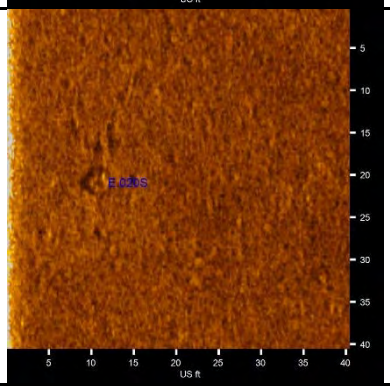


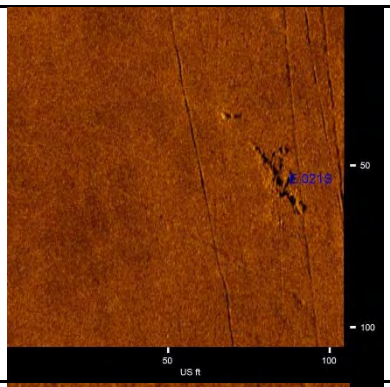
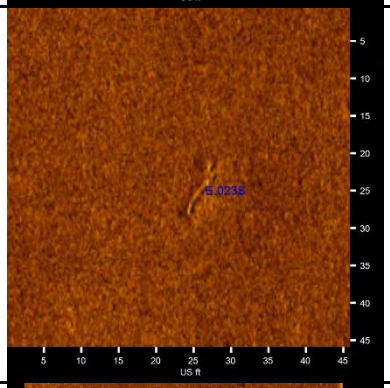
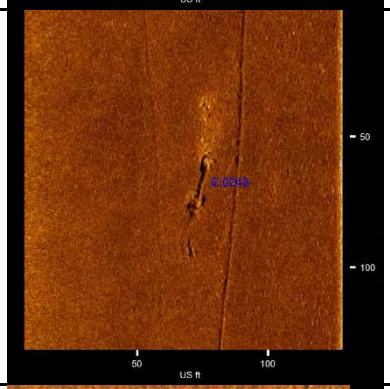
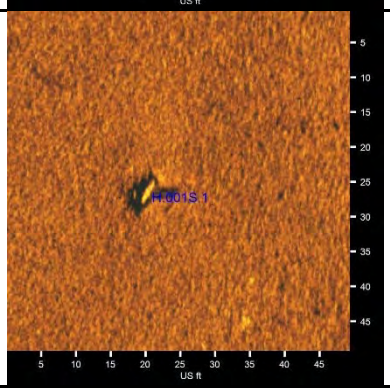
E.016S

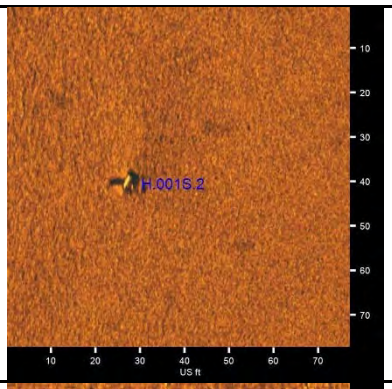
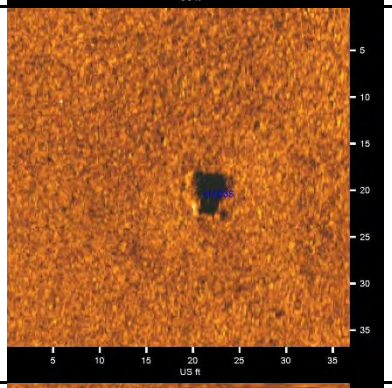
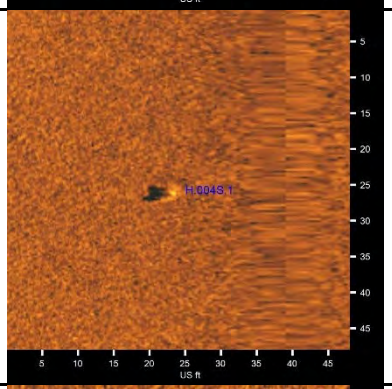
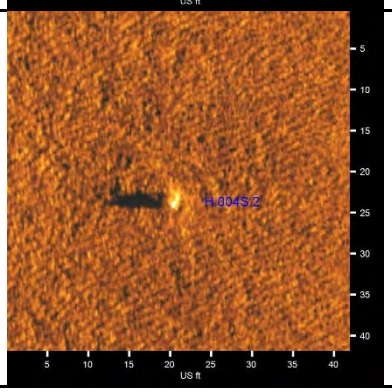
- Sonar Time at Target: 2/19/2014 8:10:21 PM
- Click Position
  30.1570349767 -88.4191501110 (WGS84)
  (X) 1115149.04 (Y) 239175.53 (Projected Coordinates)
- Map Projection: MS83-EF
- Ping Number: 116128
- Range to target: 49.39 US ft
- Fish Height: 25.33 US ft
- Heading: 106.900 Degrees
- Line Name: E.39

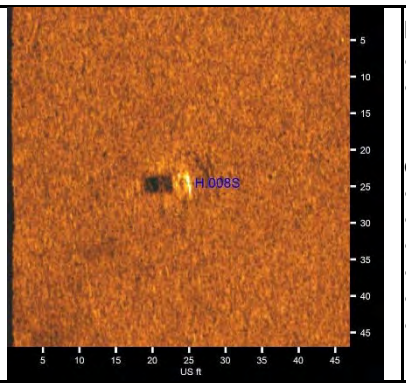
Dimensions and attributes

- Target Width: 2.47 US ft
- Target Height: 0.30 US ft
- Target Length: 3.29 US ft
- Target Shadow: 0.66 US ft
- Mag Anomaly: N
- Avoidance Area: N
- Classification1: Tire
- Area: MSCIP
- Block: E
- Description:

	**E.017S** • Sonar Time at Target: 2/19/2014 6:26:40 PM • Click Position 30.1603474934 -88.4335597843 (WGS84) (X) 1110590.73 (Y) 240363.98 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 4421 • Range to target: 85.98 US ft • Fish Height: 25.58 US ft • Heading: 111.400 Degrees • Line Name: E.35	**Dimensions and attributes** • Target Width: 2.45 US ft • Target Height: 0.00 US ft • Target Length: 6.78 US ft • Target Shadow: 0.00 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Unknown • Area: MSCIP • Block: E • Description: Possible bottom depression
	**E.018S** • Sonar Time at Target: 2/17/2014 8:36:17 PM • Click Position 30.1550628751 -88.4205652356 (WGS84) (X) 1114704.40 (Y) 238456.68 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 185135 • Range to target: 77.03 US ft • Fish Height: 28.66 US ft • Heading: 101.000 Degrees • Line Name: E.31	**Dimensions and attributes** • Target Width: 5.36 US ft • Target Height: 0.00 US ft • Target Length: 27.87 US ft • Target Shadow: 0.00 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Anchor Scar • Area: MSCIP • Block: E • Description:
	**E.019S** • Sonar Time at Target: 2/24/2014 6:20:57 PM • Click Position 30.1479516557 -88.4095684302 (WGS84) (X) 1118189.55 (Y) 235883.20 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 133075 • Range to target: 83.43 US ft • Fish Height: 28.69 US ft • Heading: 108.500 Degrees • Line Name: E.17.001	**Dimensions and attributes** • Target Width: 4.33 US ft • Target Height: 0.65 US ft • Target Length: 3.32 US ft • Target Shadow: 2.05 US ft • Mag Anomaly: E.002M • Avoidance Area: N • Classification1: Unknown • Area: MSCIP • Block: E • Description: Associated bottom scar / Possible anchor
	**E.020S** • Sonar Time at Target: 2/24/2014 5:42:53 PM • Click Position 30.1542405297 -88.4293181149 (WGS84) (X) 1111939.11 (Y) 238147.71 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 92064 • Range to target: 117.72 US ft • Fish Height: 23.80 US ft • Heading: 308.200 Degrees • Line Name: E.19.1.001	**Dimensions and attributes** • Target Width: 2.76 US ft • Target Height: 0.00 US ft • Target Length: 3.05 US ft • Target Shadow: 0.00 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Tire • Area: MSCIP • Block: E • Description:

	**E.021S** • Sonar Time at Target: 2/17/2014 5:51:16 PM • Click Position 30.1550911795 -88.4329187129 (WGS84) (X) 1110800.04 (Y) 238453.06 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 7360 • Range to target: 109.02 US ft • Fish Height: 21.58 US ft • Heading: 100.800 Degrees • Line Name: E.18	**Dimensions and attributes** • Target Width: 2.80 US ft • Target Height: 0.00 US ft • Target Length: 26.01 US ft • Target Shadow: 0.00 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Anchor Scar • Area: MSCIP • Block: E • Description:
	**E.023S** • Sonar Time at Target: 2/24/2014 8:35:32 PM • Click Position 30.1464534886 -88.4105806918 (WGS84) (X) 1117871.62 (Y) 235337.15 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 278087 • Range to target: 66.02 US ft • Fish Height: 25.85 US ft • Heading: 306.100 Degrees • Line Name: E.11	**Dimensions and attributes** • Target Width: 0.85 US ft • Target Height: 0.00 US ft • Target Length: 7.33 US ft • Target Shadow: 0.00 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Unknown • Area: MSCIP • Block: E • Description:
	**E.024S** • Sonar Time at Target: 2/25/2014 4:14:58 PM • Click Position 30.1447441382 -88.4074486294 (WGS84) (X) 1118863.92 (Y) 234719.17 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 128596 • Range to target: 74.47 US ft • Fish Height: 26.04 US ft • Heading: 99.590 Degrees • Line Name: E.10	**Dimensions and attributes** • Target Width: 2.54 US ft • Target Height: 0.00 US ft • Target Length: 59.92 US ft • Target Shadow: 0.00 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Anchor Scar • Area: MSCIP • Block: E • Description:
	**H.001S.1** • Sonar Time at Target: 5/25/2014 2:56:17 PM • Click Position 30.1233098984 -88.3993267269 (WGS84) (X) 1121460.76 (Y) 226933.58 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 99182 • Range to target: 87.26 US ft • Fish Height: 23.42 US ft • Heading: 119.590 Degrees • Line Name: H.37	**Dimensions and attributes** • Target Width: 0.87 US ft • Target Height: 0.73 US ft • Target Length: 3.64 US ft • Target Shadow: 2.92 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Unknown • Area: MSCIP • Block: H • Description:

	**H.001S.2** • Sonar Time at Target: 5/25/2014 5:30:03 PM • Click Position 30.1233011877 -88.3993463725 (WGS84) (X) 1121454.56 (Y) 226930.39 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 264839 • Range to target: 96.22 US ft • Fish Height: 28.89 US ft • Heading: 115.900 Degrees • Line Name: H.02	**Dimensions and attributes** • Target Width: 0.00 US ft • Target Height: 0.00 US ft • Target Length: 0.00 US ft • Target Shadow: 0.00 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Unknown • Area: MSCIP • Block: H • Description:
	**H.003S** • Sonar Time at Target: 5/25/2014 4:48:56 PM • Click Position 30.1256340439 -88.4049982050 (WGS84) (X) 1119664.54 (Y) 227772.06 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 220544 • Range to target: 50.93 US ft • Fish Height: 20.47 US ft • Heading: 318.890 Degrees • Line Name: H.05.001	**Dimensions and attributes** • Target Width: 1.27 US ft • Target Height: 1.19 US ft • Target Length: 4.97 US ft • Target Shadow: 3.37 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Unknown • Area: MSCIP • Block: H • Description:
	**H.004S.1** • Sonar Time at Target: 5/25/2014 8:34:30 PM • Click Position 30.1232092914 -88.4047299931 (WGS84) (X) 1119752.65 (Y) 226890.54 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 463581 • Range to target: 15.35 US ft • Fish Height: 28.28 US ft • Heading: 312.700 Degrees • Line Name: H.11	**Dimensions and attributes** • Target Width: 1.71 US ft • Target Height: 1.92 US ft • Target Length: 3.34 US ft • Target Shadow: 2.35 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Unknown • Area: MSCIP • Block: H • Description:
	**H.004S.2** • Sonar Time at Target: 5/25/2014 10:37:33 PM • Click Position 30.1232173145 -88.4048296696 (WGS84) (X) 1119721.12 (Y) 226893.34 (Projected Coordinates) • Map Projection: MS83-EF • Ping Number: 596146 • Range to target: 54.25 US ft • Fish Height: 16.25 US ft • Heading: 125.690 Degrees • Line Name: H.12.1	**Dimensions and attributes** • Target Width: 1.59 US ft • Target Height: 1.71 US ft • Target Length: 3.49 US ft • Target Shadow: 6.66 US ft • Mag Anomaly: N • Avoidance Area: N • Classification1: Unknown • Area: MSCIP • Block: H • Description:



H.008S

- Sonar Time at Target: 6/26/2014 1:56:16 PM
- Click Position
  30.1223837766 -88.4098094499 (WGS84)
  (X) 1118147.88 (Y) 226584.32 (Projected Coordinates)
- Map Projection: MS83-EF
- Ping Number: 29686
- Range to target: 87.51 US ft
- Fish Height: 27.87 US ft
- Heading: 122.000 Degrees
- Line Name: H.24

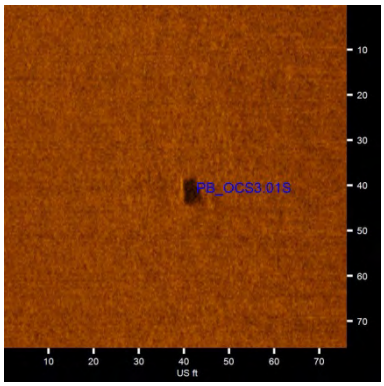
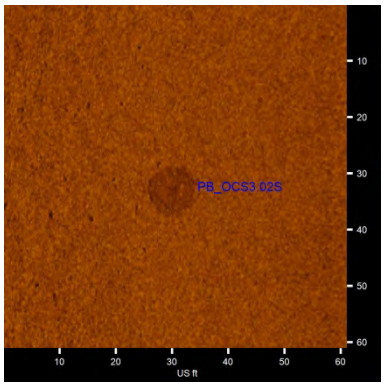
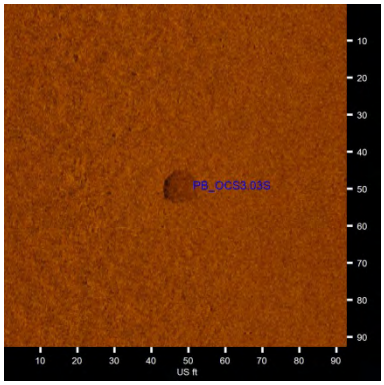
Dimensions and attributes

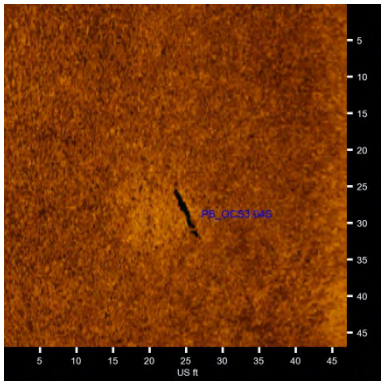
- Target Width: 3.29 US ft
- Target Height: 1.15 US ft
- Target Length: 3.41 US ft
- Target Shadow: 3.97 US ft
- Mag Anomaly: N
- Avoidance Area: N
- Classification1: Unknown
- Area: MSCIP
- Block: H
- Description:

OCS3 Contact Report

Contacts in the report:

PB_OCS3.01S	7/30/2013 7:07:22 PM	30.1385218202	-88.3335082673
PB_OCS3.02S	7/30/2013 7:28:57 PM	30.1394944147	-88.3335615544
PB_OCS3.03S	7/30/2013 7:38:04 PM	30.1397542600	-88.3341388011
PB_OCS3.04S	7/30/2013 8:37:22 PM	30.1426948659	-88.3354163340

Target Image	Target Info	User Entered Info
	**PB_OCS3.01S** • Sonar Time at Target: 7/30/2013 7:07:22 PM • Click Position 30.1385218202 -88.3335082673 (WGS84) 30.1383180869 -88.3335032366 (NAD27LL) 30.1385218202 -88.3335082673 (LocalLL) (X) 1142245.22 (Y) 232551.02 (Projected Coordinates) • Map Projection: MS83-EF • Acoustic Source File: S:\2849_12116F_MSCIP\Raw\Mod 1\PBB-OCS_3.8.jsf • Ping Number: 5344 • Range to target: 73.50 US ft • Fish Height: 19.35 US ft • Heading: 120.190 Degrees • Event Number: 0 • Line Name: PBB-OCS_3.8 • Water Depth: 34.47 US ft	**Dimensions and attributes** • Target Width: 2.26 US ft • Target Height: 0.79 US ft • Target Length: 6.06 US ft • Target Shadow: 3.23 US ft • Mag Anomaly: • Avoidance Area: • Classification1: Unknown • Classification2: • Area: Petit Bois • Block: OCS3 • Description: Unidentified object
	**PB_OCS3.02S** • Sonar Time at Target: 7/30/2013 7:28:57 PM • Click Position 30.1394944147 -88.3335615544 (WGS84) 30.1392906927 -88.3335565168 (NAD27LL) 30.1394944147 -88.3335615544 (LocalLL) (X) 1142226.83 (Y) 232904.67 (Projected Coordinates) • Map Projection: MS83-EF • Acoustic Source File: S:\2849_12116F_MSCIP\Raw\Mod 1\PBB-OCS_3.10.jsf • Ping Number: 24109 • Range to target: 39.49 US ft • Fish Height: 15.84 US ft • Heading: 121.800 Degrees • Event Number: 0 • Line Name: PBB-OCS_3.10 • Water Depth: 37.67 US ft	**Dimensions and attributes** • Target Width: 0.00 US ft • Target Height: 0.00 US ft • Target Length: 0.00 US ft • Target Shadow: 0.00 US ft • Mag Anomaly: • Avoidance Area: • Classification1: Unknown • Classification2: • Area: Petit Bois • Block: OCS3 • Description: Unidentified object
	**PB_OCS3.03S** • Sonar Time at Target: 7/30/2013 7:38:04 PM • Click Position 30.1397542600 -88.3341388011 (WGS84) 30.1395505470 -88.3341337421 (NAD27LL) 30.1397542600 -88.3341388011 (LocalLL) (X) 1142043.95 (Y) 232998.37 (Projected Coordinates) • Map Projection: MS83-EF • Acoustic Source File: S:\2849_12116F_MSCIP\Raw\Mod 1\PBB-OCS_3.11.jsf • Ping Number: 32042 • Range to target: 60.75 US ft • Fish Height: 18.58 US ft • Heading: 296.290 Degrees • Event Number: 0 • Line Name: PBB-OCS_3.11 • Water Depth: 34.69 US ft	**Dimensions and attributes** • Target Width: 0.00 US ft • Target Height: 0.00 US ft • Target Length: 0.00 US ft • Target Shadow: 0.00 US ft • Mag Anomaly: • Avoidance Area: • Classification1: Unknown • Classification2: • Area: Petit Bois • Block: OCS3 • Description: Unidentified object



PB_OCS3.04S

- Sonar Time at Target: 7/30/2013 8:37:22 PM
- Click Position
  30.1426948659 -88.3354163340 (WGS84)
  30.1424911990 -88.3354112151 (NAD27LL)
  30.1426948659 -88.3354163340 (LocalLL)
  (X) 1141635.45 (Y) 234066.06 (Projected Coordinates)
- Map Projection: MS83-EF
- Acoustic Source File: S:\2849_12116F_MSCIP\Raw\Mod 1\PBB-OCS_3.18.jsf
- Ping Number: 38056
- Range to target: 26.73 US ft
- Fish Height: 12.67 US ft
- Heading: 126.500 Degrees
- Event Number: 0
- Line Name: PBB-OCS_3.18
- Water Depth: 47.91 US ft

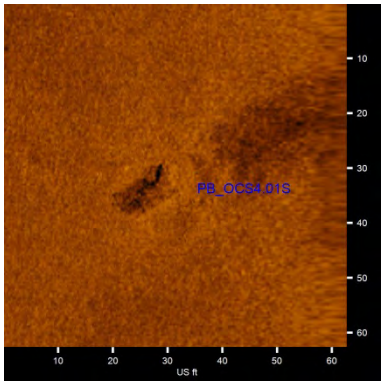
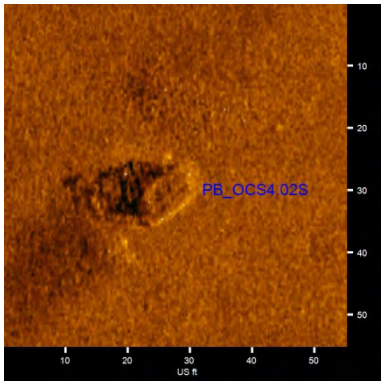
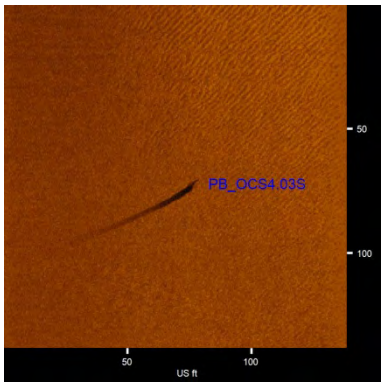
Dimensions and attributes

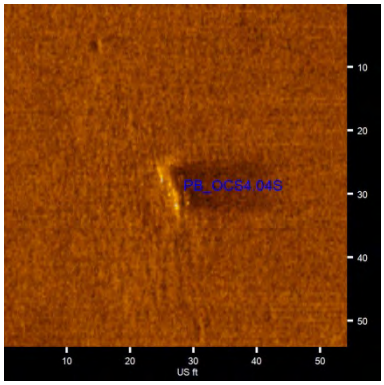
- Target Width: 0.00 US ft
- Target Height: 0.00 US ft
- Target Length: 0.00 US ft
- Target Shadow: 0.00 US ft
- Mag Anomaly:
- Avoidance Area:
- Classification1: Unknown
- Classification2:
- Area: Petit Bois
- Block: OCS3
- Description: Unidentified object

OCS4 Contact Report

Contacts in the report:

PB_OCS4.01S	7/30/2013 4:02:51 PM	30.1336234364	-88.3282726102
PB_OCS4.02S	7/30/2013 4:18:05 PM	30.1333209326	-88.3276853092
PB_OCS4.03S	7/30/2013 4:23:43 PM	30.1330067835	-88.3285423978
PB_OCS4.04S	7/30/2013 5:36:58 PM	30.1338510768	-88.3356522631

Target Image	Target Info	User Entered Info
	**PB_OCS4.01S** • Sonar Time at Target: 7/30/2013 4:02:51 PM • Click Position 30.1336234364 -88.3282726102 (WGS84) 30.1334195925 -88.3282677867 (NAD27LL) 30.1336234364 -88.3282726102 (LocalLL) (X) 1143908.12 (Y) 230776.84 (Projected Coordinates) • Map Projection: MS83-EF • Acoustic Source File: S:\2849_12116F_MSCIP\Raw\Mod 1\ocs4.13.jsf • Ping Number: 59827 • Range to target: 30.98 US ft • Fish Height: 36.05 US ft • Heading: 301.890 Degrees • Event Number: 0 • Line Name: ocs4.13 • Water Depth: 27.43 US ft	**Dimensions and attributes** • Target Width: 2.47 US ft • Target Height: 0.89 US ft • Target Length: 5.98 US ft • Target Shadow: 1.20 US ft • Mag Anomaly: • Avoidance Area: • Classification1: Unknown • Classification2: • Area: Petit Bois • Block: OCS4 • Description: Unidentified object
	**PB_OCS4.02S** • Sonar Time at Target: 7/30/2013 4:18:05 PM • Click Position 30.1333209326 -88.3276853092 (WGS84) 30.1331170791 -88.3276805075 (NAD27LL) 30.1333209326 -88.3276853092 (LocalLL) (X) 1144094.27 (Y) 230667.65 (Projected Coordinates) • Map Projection: MS83-EF • Acoustic Source File: S:\2849_12116F_MSCIP\Raw\Mod 1\ocs4.12.jsf • Ping Number: 73067 • Range to target: 57.10 US ft • Fish Height: 32.56 US ft • Heading: 125.500 Degrees • Event Number: 0 • Line Name: ocs4.12 • Water Depth: 31.81 US ft	**Dimensions and attributes** • Target Width: 5.96 US ft • Target Height: 4.19 US ft • Target Length: 9.53 US ft • Target Shadow: 9.72 US ft • Mag Anomaly: • Avoidance Area: • Classification1: Unknown • Classification2: • Area: Petit Bois • Block: OCS4 • Description: Unidentified object
	**PB_OCS4.03S** • Sonar Time at Target: 7/30/2013 4:23:43 PM • Click Position 30.1330067835 -88.3285423978 (WGS84) 30.1328029358 -88.3285375680 (NAD27LL) 30.1330067835 -88.3285423978 (LocalLL) (X) 1143823.83 (Y) 230552.20 (Projected Coordinates) • Map Projection: MS83-EF • Acoustic Source File: S:\2849_12116F_MSCIP\Raw\Mod 1\ocs4.11.jsf • Ping Number: 77973 • Range to target: 73.20 US ft • Fish Height: 34.53 US ft • Heading: 296.200 Degrees • Event Number: 0 • Line Name: ocs4.11 • Water Depth: 26.84 US ft	**Dimensions and attributes** • Target Width: 2.70 US ft • Target Height: 6.18 US ft • Target Length: 5.29 US ft • Target Shadow: 17.62 US ft • Mag Anomaly: • Avoidance Area: • Classification1: Unknown • Classification2: • Area: Petit Bois • Block: OCS4 • Description: Unidentified object



PB_OCS4.04S

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  30.1336473155 -88.3356471823 (NAD27LL)
  30.1338510768 -88.3356522631 (LocalLL)
  (X) 1141574.90 (Y) 230849.38 (Projected Coordinates)
- Map Projection: MS83-EF
- Acoustic Source File: S:\2849_12116F_MSCIP\Raw\Mod 1\ocs4.4.jsf
- Ping Number: 141671
- Range to target: 84.13 US ft
- Fish Height: 26.93 US ft
- Heading: 119.190 Degrees
- Event Number: 0
- Line Name: ocs4.4
- Water Depth: 33.77 US ft

Dimensions and attributes

- Target Width: 2.32 US ft
- Target Height: 3.95 US ft
- Target Length: 8.38 US ft
- Target Shadow: 15.17 US ft
- Mag Anomaly:
- Avoidance Area:
- Classification1: Unknown
- Classification2:
- Area: Petit Bois
- Block: OCS4
- Description: Unidentified object

Unanticipated Discoveries

SEE APPENDIX E
ENVIRONMENTAL
MONITORING
REQUIREMENTS

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APPENDIX E

ARCHAEOLOGICAL MONITORING REQUIREMENTS

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UNANTICIPATED DISCOVERIES

UNANTICIPATED DISCOVERIES OF ARCHAEOLOGICAL SITES, HISTORIC SITES, AND SUBMERGED CULTURAL RESOURCES INCLUDING HUMAN REMAINS COVERED UNDER THE NATIVE AMERICAN GRAVES REPATRIATION ACT (NAGPRA)

Although a project area may receive a complete cultural resource assessment survey, it is impossible to ensure that all cultural resources will be discovered. Even at sites that have been previously identified and assessed, there is a potential for the discovery of previously unidentified archaeological components, features, or human remains that may require investigation and assessment. Therefore, a procedure has been developed for the treatment of any unexpected discoveries that may occur during site development.

DISCOVERIES ON FOOT

If unexpected cultural resources are discovered on, or near, the project template or the archaeological monitoring area between Stations 0+00 and 59+00, the following steps shall be taken:

1. ALL work shall be stopped in the immediate vicinity of the discovery and the QAR shall be notified (within 30 minutes) with a description of the object and its GPS coordinates.
2. The discovery shall immediately be protected from disturbance or further viewing until the archaeological monitor can examine the discovery and clear the area.
3. The project archaeological monitor shall clear the site according to their scope of work and provide notification to the QAR when work may continue in the location where the artifact was discovered. ONLY the QAR (or COR) have the authority to provide notification to the Contractor when work shall be continued in the “discovery” area and they shall do so in writing after they have verified that the area has been cleared by the archaeological monitor. The QAR shall coordinate the discovery with the USACE, Mobile District, Archaeologist, Mr. Patrick O’Day, for further coordination with Agency and Tribal Partners.

DISCOVERIES ON BOAT

In the event that unrecorded shipwreck sites and/or other underwater archaeological resources are discovered (adapted from The Commonwealth of Massachusetts, Board of Underwater Archaeological Resources, Office of Coastal Zone Management):

1. In the event that a suspected shipwreck or other site is uncovered during construction activity, that activity shall immediately be halted in the area of the find until it can be determined whether the object is a shipwreck or other underwater archaeological resource and if it represents a potentially significant feature or site.
2. The project field staff will immediately notify the USACE District Archaeologist

upon the suspension of work activities in the area of the find. Notification will include the specific location in which the potential feature or site is located.

3. The USACE will immediately ensure a qualified Maritime Archaeologist reviews the information. On-site personnel will provide information on the location and any discernible characteristics of the potential cultural resource (the target), and any survey data depicting the find. This information will be forwarded for review by the USACE for the qualified Maritime Archaeologist.
4. If the project archaeologist determines that the site, feature, or target is not potentially cultural, the project field staff through the USACE will be notified by the project archaeologist that work may resume. The project archaeologist will also notify the USACE of this recommendation.
5. If, based upon both previously acquired and current remote sensing survey data, or other indications (e.g., timbers, etc.), it is determined that the new target is possibly a shipwreck or other potential submerged cultural resource, the project archaeologist will inform the USACE, who will inform the project field staff that work may not resume at the given location until notified in writing by the USACE. The cognizant review agencies, SHPO, Advisory Council (if applicable), and other agencies as applicable will be notified of this determination within 2 working days.
6. A visual inspection by archaeological divers or remotely operated vehicle (ROV) will be conducted to determine if the site is potentially eligible for listing in the National Register. The results of the survey will be formally submitted to cognizant review agencies, SHPO, and the Advisory Council (if applicable) for final review and comment. The SHPO and USACE will endeavor to respond within 2 working days of receiving the inspection results and recommendations.
7. If it is determined that the target, feature, or site does not represent a potentially significant resource, and USACE is in receipt of written comment from the review agency(s), work may resume in that area.
8. If a National Register determination cannot be made in accordance with Step 6, the USACE may either undertake additional research to satisfy Step 6 or exercise Step 9 (avoidance).
9. If agency review concurs or concludes that the site may be important and is potentially National Register eligible, the USACE will develop avoidance measures to eliminate the site from the Area of Potential Effects. Any proposed avoidance measures will be made available to the cognizant review agencies for review and comment.
10. If avoidance measures cannot be developed and executed, the resource may be excavated and/or removed only under a memorandum of agreement with all interested parties including the State Archaeologist, SHPO, USACE, and, if applicable, the Advisory Council subject to appropriate state permits and appropriate federal jurisdictions. This memorandum will outline an adequate data recovery plan that specifies a qualified research team and an appropriate research design.

Areas that have been previously cleared for spudding and anchoring are shown on Sheet CB-111 of the Contract Plans.

ARCHAEOLOGICAL MONITORING AREAS AND CONSULTATION CONDITIONS

The project area shall be monitored and cleared every day that work is being performed by the Contractor between Stations 0+00 and 59+00 AS WELL AS any, and all, travel corridors that adjoin portions of the native beach or are located along the shoreline(s) adjacent to the Phase III template. These areas are referred to as the "archaeological monitoring area" within these Contract Documents.

The archaeological monitor shall coordinate with the QAR to ensure compliance with the Contract Documents related to special construction requirements and the terms specified in this Appendix. The project archaeological monitor shall coordinate activities and route communications through the QAR and the Project Archaeologist, Mr. Patrick O'Day.

Conditions for work on or near Stations 0+00 and 59+00 as well as travel corridors or Gulf facing shorelines adjacent to, or adjoining, the Phase III template (archaeological monitoring area), are as follows:

- The archaeological monitor shall conduct a preconstruction survey of the archaeological monitoring area and re-bury any encountered isolated human skeletal remains in accordance with the current NAGPRA Plan of Action for this site (see current plan in enclosures). No work shall start in the archaeological monitoring area until this action is complete. NPS's Southeastern Archaeological Center (SEAC) shall be provided notice of the date when this survey shall be conducted by the project archaeological monitor. The survey shall be coordinated prior to mobilization of the Contractor and shall take place within one (1) week of any construction or preparation activities beginning in the archaeological monitoring area. See project specification sections 35 20 25 Beach and Dune Fill for further information regarding notification of intent to dredge.
- Sand shall be pumped into the Phase III project template from west (Station 59+00) to east (Station 0+00) to allow new sand to be pushed into the current work area from previously filled areas. This means that the East Ship Island Restoration work (Phase III) will start from the previously approved and constructed Camille Cut Fill Area (Ship Island Phases I and II) and work east towards the archaeological monitoring area. This allows for all equipment to originate from the fill material outside of the archaeological monitoring area.
- During construction activities in the archaeological monitoring area, travel corridors, or other active work areas, a daily examination of the archaeological monitoring area shall be conducted by an SOI qualified physical anthropologist or archaeologist with human burial experience to identify and rebury any isolated human remains. This archaeologist shall also accompany the environmental monitor whose task it is to relocate sea turtle nests each day and ensure that any nests encountered in the archaeological monitoring area and that relocation activities do not impact burials or artifacts of cultural significance.
- The archaeological monitor shall coordinate with the QAR and the Contractor

such that clearance and archaeological monitoring occurs in the work areas and travel corridors that are actively being used. The archaeological monitor is only required to clear the entire site once before all work and preparation activities begin, after which they shall only be required to clear ahead of the Contractor's daily work activities, active travel corridors and staging areas, as well as the environmental monitor's sea-turtle nest relocation activities.

- Operation of equipment and dredge pipe placement shall be strictly limited to those areas with a minimum of 30 inches of fill sand (a "lift" in engineering terms) having been placed over the modern day surface in the archaeological monitoring area. No equipment shall be used to move pipe or shape the fill material sand into the template shape without 30-inches of fill material first being placed over the native surface in the archaeological monitoring area.
- All dredged material shall come from previously surveyed and approved borrow areas.
- All supply pipes from the dredges to the island are to be placed within the access corridors and areas previously surveyed and coordinated through the COR.
- Only Low Ground Pressure bulldozers, which have a ground - bearing pressure of six (6) pounds per square inch (psi) or less, shall be used within the archaeological monitoring area for the movement of fill material in advance of articulated wheel loaders that will haul dredge pipe to expand the template.
- The Contractor shall minimize rutting by varying pipe hauling routes and travel corridors as necessary to avoid compression damage to buried artifacts or human remains.
- The staging and storage of equipment on the native beach surface within the archaeological monitoring area is prohibited.
- Excavation or anchoring of equipment for any duration within the archaeological monitoring area by the dredge plant (spudding) or any other vessel is prohibited.
- If a discovery of human remains occurs during on-going work, the 2011 NAGPRA Plan of Action (POA) shall be followed, until superseded by an updated POA for this and future actions. The USACE District Archaeologist, Mr. Patrick O'Day, shall coordinate all activities being conducted in support of the NAGPRA Plan of Action.

ARCHAEOLOGICAL MONITORING SCOPE OF WORK

The Contractor's Archaeological Monitor must be on-site during all ground disturbing activities conducted within Site the archaeological monitoring area and the associated work areas. The Archaeological Monitor must conduct daily inspections of the ground surface before work proceeds within the archaeological monitoring and active work areas to determine if human skeletal remains or related funerary objects are present. If such materials are discovered, the Contractor's Archaeological Monitor shall bury these material at a depth of one (1) meter below the ground surface within the discovery location using hand tools to protect the find from further disturbance.

The contractor shall retain the services of a qualified Archaeological Monitor meeting the qualifications listed in the Archaeological Monitor Qualifications Section of this Appendix who shall complete the following tasks:

Preconstruction survey within the archaeological monitoring area

The Contractor's archaeologist shall conduct a preconstruction survey of the archaeological monitoring area, within one (1) week, or seven (7) days, prior to the start of construction. This survey shall be conducted to identify and bury any isolated human remains, exposed burials, and associated materials within the archaeological monitoring and associated work areas.

During the preconstruction survey the archaeological monitor shall:

- Complete a pedestrian survey of the archaeological monitoring area and associated work areas within one (1) week, or seven (7) days prior to the start of project construction (reference Specification Section 35 20 25, Submittals, SD- 07, Certificates, Notice of Intent to Dredge).
- Coordinate survey activities with the mobilization of the Contractor through the project archaeologist, Mr. Patrick O'Day, and the National Park Service, Gulf Islands National Seashore, which is the property owner and the lead agency for the compliance with the Native Americans Graves Protection and Repatriation Act (NAGPRA).
- Identify all exposed isolated human skeletal remains and associated artifacts and materials and bury all human remains at their identified location at a depth of 1 meter below the ground surface using hand tools.
- All burial locations will be minimally recorded with a GPS and any other documentation required for the NPS NAGPRA and accession file.
- Prepare a standard trip report that will include an overview and description of the work performed during the preconstruction survey, and summary of survey results.

Daily monitoring within the archaeological monitoring area

Archaeological monitoring within the archaeological monitoring area shall be conducted by an archaeologist meeting the qualifications listed in the Archaeological Monitor Qualifications Section of this appendix.

During construction the Archaeological monitor shall:

- Conduct daily site examinations of the archaeological monitoring area and adjacent native beach, staging areas, driving paths, corridors, or any other active work areas throughout the period of performance.
- Identify all exposed isolated human skeletal remains and associated artifacts and materials and bury all human remains at their identified location at a depth of one (1) meter below the ground surface using hand tools.
- Accompany the environmental monitoring biologists tasked with relocating sea turtle nests within the archaeological monitoring area each day and ensure that nest relocation activities do not impact burials or cultural artifacts.
- Prepare a standard trip report that will include an overview and description of the work performed during the preconstruction survey, and summary of survey results.
- All burial locations will be minimally recorded with a GPS and documentation required for the NPS NAGPRA and accession file.

ARCHAEOLOGICAL MONITORING QUALIFICATIONS

The Contractor's Archaeological Monitoring personnel, including all field personnel performing monitoring and clearance activities, shall meet the Secretary of the Interior's Professional Qualifications Standards and Mississippi State's Qualification Standards (http://www.mdah.ms.gov/new/preserve/archaeology/professional-qualifications/) for Archaeology as follows:

A graduate degree in archeology, anthropology, or closely related field plus:

At least one year of full-time professional experience or equivalent specialized training in archeological research, administration or management;

At least four months of supervised field and analytic experience in general North American archeology;

Demonstrated ability to carry research to completion;

Demonstrated ability to complete National Register of Historic Places (NRHP) evaluations for cultural resources; and

Demonstrated ability to identify and assess subsurface and surface archaeological deposits.

In addition to these minimum qualifications, the Archaeological Monitor must have at least one year of regional experience in identifying and the appropriate handling of human remains, burial features, and funerary objects.

Credentials/qualifications of all Archaeological Monitor(s) that will conduct all work under this task shall be submitted for approval as described in Specification Section 01 57 19, Temporary Environmental Controls, Submittals.

DOCUMENTATION PROVIDED TO THE GOVERNMENT

The Contractor's Archaeological Monitor must record and maintain daily Archaeological Monitoring Logs, which include written descriptions of the areas monitored, project activities in those areas, and photographs, as appropriate. Include descriptions of any find(s) and the response to the find(s). Submit the daily Archaeological Monitoring Logs electronically on a weekly basis to the Contracting Officer and USACE Archaeologist, through the Contractor's Archaeological Monitor, no later than the Friday following each work week.
After project construction is complete, the Contractor's Archaeological Monitor must compose an archaeological Summary Monitoring Report that describes the work completed, areas monitored, descriptions of all finds, and response processes within 30-days after the end of on-site construction as described in Specification Section 35 20 25, Beach and Dune Fill, SD-11, Closeout Submittals, Project Completion Report.

TRIBAL MONITORING

The Contractor shall, without expense to the government, provide the opportunity for Tribal Monitors to be present on-site during ground disturbing activities to observe work activities and assist in ensuring that sensitive Tribal resources are not impacted. For the purpose of Tribal Monitoring, ground disturbing activities includes any grading or excavations, including turtle nest relocation activities, or other activities that have the potential to disturb soil beyond preconstruction conditions that are reasonably visible to archaeologists within the archaeological monitoring area.

The Contractor shall, without expense to the government, provide the opportunity for Tribal Monitors to inspect soil and other material within the archaeological monitoring area as work proceeds to assist in determining the presence of resources significant to the Tribes. Tribal Monitors do not have authority to stop work unilaterally. Proceed with all work if the Tribes cannot recommend a Tribal Monitor or if Tribal Monitors cannot be present. Further information related to Tribal monitoring may be found within the Specification Section 01 57 19, Temporary Environmental Controls.

TRIBAL COORDINATION:

Tribal monitoring will be conducted by no more than two representatives at a time and shall be selected by the Federally Recognized Tribes identified in the 2011 NAGPRA POA. Forty-eight (48) hours' notice is required for Tribal visits, which may be coordinated through the Project Archaeologist, Mr. Patrick O'Day, for the length of the project to ensure that resources significant to the Tribes are protected and treated with respect and dignity. The Project Archaeologist, Mr. Patrick O'Day, shall coordinate Tribal visits with the project Team and accompany Tribal monitors during their visit(s). Tribal monitors shall be required to comply with the site safety requirements for Personal Protective Equipment (PPE) and related protocols.

SUPPLEMENT TO
ARCHAEOLOGICAL MONITORING AREA SPECIFICATIONS

EXCERPTS FROM SPECIFICATION SECTIONS 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS, AND 35 20 25, BEACH AND DUNE FILL, THAT CONTAIN LANGUAGE RELATED TO INADVERTENT DISCOVERIES OF CULTURAL RESOURCES AS WELL AS SPECIAL CONSTRUCTION CONDITIONS ARE INCLUDED BELOW. RELATED TEXT FROM EACH SUB-PART IS ALSO INCLUDED TO PROVIDE CONTEXT FOR EACH ITEM.

THIS SUPPLEMENT DOES NOT REPLACE THE CONTRACT PLANS AND SPECIFICATIONS BUT IS BEING PROVIDED IN THIS APPENDIX AS A COURTESY TO THE CONTRACTOR. THIS SUPPLEMENT DOES NOT RELIEVE THE CONTRACTOR OR ITS CONSULTANTS FROM ANY OTHER REQUIREMENTS OF THIS CONTRACT.

SECTION 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS

1.6 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Environmental Protection Plan; G, PD

Prior to commencement of the work, the Contractor shall, after receipt of Notice of Award of the Contract and at least 7 days prior to the Preconstruction Conference, submit in writing the above EPP to the USACE, Mobile District, Chief of Coastal Environmental, PD-EC, Ms. Lekesha Reynolds, 251-690-3260, Lekesha.W.Reynolds@usace.army.mil, and shall meet with representative(s) of the Contracting Office to develop mutual understanding relative to compliance with this provision and administration of the environmental protection program.

Qualifications; G, PD

ARCHEOLOGICAL MONITOR QUALIFICATIONS; G, PD

An archaeological monitor shall be required to inspect and clear work areas and travel corridors every day that work activities are being performed and shall accompany the environmental monitor during all monitoring/relocation activities from Stations 0+00 to 59+00 (Phase III template).

The qualifications of the project archaeological monitor shall comply with the requirements set forth in APPENDIX E, ARCHAEOLOGICAL MONITORING REQUIREMENTS. The archaeological monitors' qualifications shall be submitted for approval at least 7 days prior to the Preconstruction Conference to the USACE, Mobile District, Archaeologist, Mr. Patrick O'Day at 251-690-3214, Patrick.M.O'Day@usace.army.mil.

ARCHAEOLOGICAL MONITORING PLAN; G, PD

An archaeological monitoring and clearance plan shall comply with the requirements set forth in APPENDIX E, ARCHAEOLOGICAL MONITORING REQUIREMENTS, and shall be submitted for approval at least 7 days prior to the Preconstruction Conference to the USACE, Mobile District, Archaeologist, Mr. Patrick O'Day at 251-690-2019, Patrick.M.O'Day@usace.army.mil.

3.3 RECORDING AND PRESERVING HISTORICAL AND ARCHAEOLOGICAL FINDS:

All items over 50 years old having any apparent historical or archeological interest, which are inadvertently discovered in the course of any removing of material and placement activities shall be carefully preserved. With the exception of cultural resources specifically referenced elsewhere in this document, the Contractor shall leave the archaeological find undisturbed and immediately report their findings to the COR and the USACE, Mobile District, Archaeologist, Mr. Patrick O'Day at 251-690-2019, Patrick.M.O'Day@usace.army.mil. Alternate archaeology POCs are Mr. Michael Malsom, 251-690-2023, email Michael.F.Malsom@usace.army.mil, and Lekesha Reynolds, Lekesha.W.Reynolds@usace.army.mil.

SUB-AERIAL SITE CONDITIONS

If construction activities inadvertently discover possible human remains, funerary objects, sacred objects, or objects of cultural patrimony, ALL work shall be stopped in the immediate vicinity of the discovery and the COR shall be notified (within 30 minutes) with a description of the object and its GPS coordinates. The discovery shall immediately be protected from disturbance or further viewing until the archaeological monitor can examine the discovery and clear the area. The archaeological monitor shall proceed according to the protocols described in Appendix E, Archaeological Monitoring Requirements. The COR shall be notified when the archaeological monitor has cleared the area. The Contractor shall not perform work in the

"discovery" area without notification in writing (includes email) from the COR that they are approved to do so.

Cultural resource sites that limit Contractor entry, access, or staging, or that provide special conditions for work (e.g., 24 inches of sand must cover the site prior to equipment traversing it) will be identified to the Contractor, though not necessarily as cultural sites. The District Archeologist will further coordinate with the NPS, the Mississippi Department of Archives and History (MDAH), and Mississippi State Historic Preservation Officer (SHPO), to obtain the precise coordinates for an archeological site. The site(s) shall be identified and the coordinates shall be provided to the Contractor at the pre-construction conference. Tribal monitors shall be provided access to the project site at no additional cost to the Government so long as it does not burden the Contractor or stop work. Tribal monitor site visits shall be coordinated through the COR with Patrick O'Day and the Contractor will be given written notice of the visit. The COR shall determine if project operations are conducive to visitor safety and may recommend an alternate date for the visit if there is a concern for visitor safety due to mechanical operations or severe weather. The COR shall accomodate visits from Tribal monitors as soon as the weather improves or they believe that there is no longer a safety risk to visitors due to heavy equipment or mechanical operations in the immediate vicinity of the project site (Phase III).

3.3.2 Environmentally Sensitive Areas

2) Specific terms and conditions apply to other environmentally sensitive areas within the project boundaries. These terms are described throughout this document and summarized in Appendix E, ARCHAEOLOGICAL MONITORING REQUIREMENTS.

3.5 PROTECTION OF FISH AND WILDLIFE:

4) There are environmentally sensitive areas on the site which are not suitable for staging of equipment. These areas are shown on the Environmental Sensitive Areas plan drawing CB-110 and are identified as the OSPREY/EAGLE BUFFER AREA. Additional restrictions to staging and equipment operation may be found in Contract Specification Section 35 20 25, BEACH AND DUNE FILL.

8) The Contractor shall coordinate any activities that affect federally protected birds, or sea turtle nesting and relocations with the USACE, Mobile District, Chief of Coastal Environmental,

PD-EC, Ms. Lekesha Reynolds, 251-690-3260 or BB 251-327-8650, Lekesha.W.Reynolds@usace.army.mil, Ms. Angelia Lewis, Angelia.V.Lewis@usace.army.mil and the USFWS, Jackson, Mississippi, Mr. Paul Necaise, by phone 228-493-6631 or by email at Paul_Necaise@fws.gov.

UNDER NO CIRCUMSTANCES SHALL THE CONTRACTOR'S ENVIRONMENTAL MONITORING SUB-CONTRACTORS COORDINATE OR COMMUNICATE WITH THE NATIONAL PARK SERVICE, THE FISH AND WILDLIFE SERVICE, OR ANY OTHER AGENCY, WITHOUT THE EXPRESS WRITTEN (INCLUDES EMAIL) CONSENT OF THE COR. COMMUNICATION AND DATA TRANSFER PROTOCOLS SHALL BE STRICTLY ADHERED TO DURING THE ENTIRE PERIOD OF PERFORMANCE. VIOLATIONS OF THESE PROTOCOLS SHALL BE BE REPORTED BY THE CONTRACTOR TO THE CONTRACTING OFFICER, (KO), Ms. Kathleen Achord, email: Kathleen.A.Achord@usace.army.mil, phone#: 251-441-5665.

19) MONITORING AND RELOCATION OF SEA TURTLE NESTS
(Please note that the Contractor is not responsible for conducting any post construction monitoring.)

a) Monitoring Pre- and During Construction: Nesting surveys, marking, and potential relocation activities must be conducted daily in accordance with the Sea Turtle Monitoring Plan in Appendix B, weather permitting, for at least 100 days before the start of work and while construction activities are on-going.

Monitoring is required prior to nesting and hatching season, from April 15th to November 30th in areas where construction activities are on-going. If construction begins within 100 days after April 15th, then monitoring will begin on April 15. Construction beginning anytime outside of 100 days after April 15th will be required to perform 100 days of preconstruction monitoring. The sea turtle monitoring will be conducted first thing in the morning, or by 9:00 am, in the immediate vicinity of work as well as in the area where work will be occurring within the next 100 days. Sea turtle nest relocation shall be performed according to the procedures outlined in Appendix B.

An archaeological monitor shall accompany the environmental monitor during all nest monitoring and relocations along the Phase III template area (STA 0+00.00 to STA 59+00.00). The archaeological monitor shall observe each turtle nest excavation and relocation and intervene as appropriate to protect any resource under their purview according to APPENDIX E, ARCHAEOLOGICAL MONITORING REQUIREMENTS. Under no circumstances shall an environmental monitor work perform monitoring or relocation activities from STA 0+00 to STA 59+00 without being accompanied by the project archaeological monitor.

SECTION 35 20 25, BEACH AND DUNE FILL

SD-01 Preconstruction Submittals

Unless otherwise indicated below, Preconstruction Submittals shall be submitted no later than 20 calendar days after Notice of Award or 5 calendar days after Notice to Proceed, whichever is later.

General Work Plan; G, OP

c. Grade Stake Log:

GRADE STAKES ARE PROHIBITED FROM USE BETWEEN STATION 00+00 AND STATION 59+00 (PHASE III TEMPLATE) AND THE NATIVE BEACH AREA ADJACENT TO THOSE STATIONS.

The Contractor shall provide a sample Grade Stake Log used on the project and indicate how the log is prepared and maintained to inventory the grade stakes used on the project. The log shall include information concerning the location, installation, and recovery of all grade stakes. The Contractor shall make this log available for review by the appropriate Government personnel upon request.

d. Staging and Access Area:

STAGING OF EQUIPMENT IS PROHIBITED BETWEEN STATION 0+00 AND 59+00 (PHASE III TEMPLATE) AND THE NATIVE BEACH AREA ADJACENT TO THOSE STATIONS.

The Contractor shall indicate how they plan on accessing each site for their construction operations. The Contractor shall submit proposed drawings depicting the areas, photo-

documentation of the condition of the access location prior to disrupting the site, dimensions of access channels, location of placement for excavated access channel material, and any support facilities for Contracting Officer approval.

CULTURAL RESOURCE SENSITIVITY BRIEFING SCRIPT AND FORM; G, OP, PD

The Contractor shall be required to give a cultural resource sensitivity briefing to each employee and visitor to the site. The sensitivity briefing shall be given each time that the safety briefing is given. Each employee and visitor shall acknowledge that they have received the sensitivity briefing on the project "sign-in" sheet. This acknowledgement may be simply incorporated into the Contractor's standard sign-in sheet as a "Sensitivity Briefing" check box next to their signature. The sensitivity briefing text shall be placed in any location where safety information is displayed so that employees and visitors may reference it as appropriate. If an employee or visitor refuses to receive/acknowledge the sensitivity briefing, or does not adhere to the level of professionalism expected under the terms of these Contract Specifications, the QAR may restrict their access to the archaeological monitoring area.

A script of the sensitivity briefing that the Contractor intends to deliver throughout the period of performance shall be submitted to the Contracting Officer at least 7 days prior to the pre-construction conference along with the acknowledgement form or sign-in sheet that employees/visitors will sign to acknowledge that they have received the briefing.

Construction and Grade Stakes Recovery Plan; G, OP

GRADE STAKES ARE PROHIBITED FROM USE BETWEEN STATION 00+00 AND STATION 59+00 (PHASE III TEMPLATE) AND THE NATIVE BEACH AREA ADJACENT TO THOSE STATIONS.

If the Contractor intends to use grade stakes in the project work area, they shall submit a Construction and Grade Stakes Recovery Plan. The plan will outline the steps that the Contractor will implement to recover all the stakes used on the project. This plan will include the use of the Grade Stake Log submitted with the General Work Plan above.

SD-07 Certificates

Notice of Intent to Dredge; G, OP, PD

Prior to commencement of work on this contract, the Contractor will be required to notify the Commander, Eighth Coast Guard District of their intent to dredge and request that it be published in the Local Notice to Mariners. This notification must be given in sufficient time so that it appears in the Notice to Mariners at least 30 calendar days prior to project commencement. A copy of the notification shall be provided to the Contracting Officer.

At least ten (10) calendar days before the Contractor mobilizes to the project site to begin work preparations, the project archaeologist, Mr. Patrick O'Day, shall be contacted according to the conditions described in APPENDIX E, ARCHAEOLOGICAL MONITORING REQUIREMENTS of these Contract Documents.

The Contractor shall not be permitted to stage equipment, or make any site preparations east of Station 59+00, if the terms of APPENDIX E, ARCHAEOLOGICAL MONITORING REQUIREMENTS are not satisfied.

Failure to comply with ANY of the APPENDIX E terms shall immediately be reported by the Contractor to the CONTRACTING OFFICER, (KO), Ms. Kathleen Achord, email: Kathleen.A.Achord@usace.army.mil, phone#: 251-441-5665.

Notification of Discovery of Archeological Sites; G, OP, PD

The Contractor shall immediately notify the Project Archaeologist, Mr. Patrick O'Day, if any shipwreck, artifact, or other objects of antiquity that have scientific or historical value, or are of interest to the public, are discovered, located, and/or recovered. Reporting shall meet the requirements of Section 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS, subparagraph "Recording and Preserving Historical and Archeological Finds" and APPENDIX E, ARCHAEOLOGICAL MONITORING REQUIREMENTS.

SD-11 Closeout Submittals

Project Completion Report; G, OP, PD

The Contractor shall submit a Project Completion Report in Adobe PDF format to the Contracting Officer within 30 days following project completion. The Project Completion Report shall include but not be limited to the following:

n. The Contractor shall include all archaeological monitoring reports as an appendix to the Closeout Submittal report and prepare a summary of any noteable observations or findings. A copy of the final archaeological monitoring report shall be sent to the project archaeologist, Mr. Patrick O'Day. Additional reporting requirements and details regarding archaeological Closeout Submittals may be found in APPENDIX E, ARCHAEOLOGICAL MONITORING REQUIREMENTS.

1.4.1 Project Order of Work

The project extends along East Ship Island continuing to West Ship Island, Mississippi along stations 0+00 to 56+00 in the Phase III template and 125+00 to 286+00 in the Phase IV template as shown on the Contract Drawings.

At the Preconstruction Conference, the Contractor shall propose the order in which the work will be performed, including the anticipated progression of satisfactory fill placement throughout the project area and excavation of the borrow areas.

Phase III template: Sand shall be pumped into the Phase III project template from west (Station 56+00) to east (Station 0+00) to allow construction under this Contract to originate from material that has been mechanically placed under a previous contract and work east towards the archaeological monitoring area. All equipment shall originate from the fill material outside of the archaeological monitoring area.

Phase IV template: The Contractor shall place satisfactory fill within the template such that the fill acceptance progresses from east to west along Phase IV or as otherwise directed by the QAR or COR.

The Contractor shall maintain a continuous filling operation, without any intervening gaps, from the initial placement location to the leading edge of the fill.

1.4.2 Project Coordination

Project coordination with the Contracting Officer/Representative (KO/COR) and Quality Assurance Representative (QAR) shall occur during all phases of construction. Coordination also includes but is not limited to publication of the notice of intent to dredge and coordination with local officials including police, Public, NPS, US Coast Guard, and others as agreed during coordination meetings. Submittal of the Notice of Intent to Dredge is described in the SD-07

Certificates requirements of this document. Submittal requirements for Dredge Progress Reports are described in SD-06 Test Reports.

TRIBAL COORDINATION: Federally Recognized Tribes identified in the 2011 NAGPRA Plan of Action shall be provided access to the archaeological monitoring and associated work areas covered under this Contract as described in APPENDIX E, ARCHAEOLOGICAL MONITORING REQUIREMENTS.

Forty-eight (48) hours' notice is required for Tribal visits, which may be coordinated through the Project Archaeologist, Mr. Patrick O'Day, for the length of the project to ensure that resources significant to the Tribes are protected and treated with respect and dignity. Tribal monitoring will be conducted by no more than two representatives at a time and shall be selected by the Federally Recognized Tribes identified in the 2011 NAGPRA POA.

The Project Archaeologist, Mr. Patrick O'Day, shall coordinate Tribal visits with the project Team and accompany Tribal monitors during their visit(s). Tribal monitors shall be required to comply with the site safety requirements for Personal Protective Equipment (PPE) and related protocols.

1.4.4 Protection of Existing Structures from Construction Activity

The Contractor shall be responsible for determining and documenting the pre-construction condition of existing structures within the project area including staging site(s) and work access. The Contractor shall take appropriate measures to prevent damage to any structures during construction, and for performing a post-construction verification inspection of those structures previously inspected.

IN ADDITION TO THE TYPICAL SITE CONDITION DOCUMENTATION AND PROTECTION, ADDITIONAL REQUIREMENTS AND PROCEDURES ARE SPECIFIED IN APPENDIX E, ARCHAEOLOGICAL MONITORING REQUIREMENTS.

1.4.4.1 Damages to Adjacent Property and Structures

Any damage to private or public property within the project boundaries, including staging site(s) and work access areas/roads, shall be repaired promptly by the Contractor. Any damage as a result of the Contractor's operations shall be repaired at no cost to the Government.

DAMAGES TO HISTORICAL OBJECTS OF ARCHAEOLOGICAL OR CULTURAL SIGNIFIGANCE SHALL BE IMMEDIATELY REPORTED BY THE CONTRACTOR TO THE CONTRACTING OFFICER, (KO), Ms. Kathleen Achord, email: Kathleen.A.Achord@usace.army.mil, phone#: 251-441-5665, AND THE PROJECT ARCHAEOLOGIST, MR. PATRICK O'DAY, #251-690-2326.

1.5 ENVIRONMENTAL PROTECTION

The Contractor shall protect the environment during all phases of work. See Section 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS for additional details.

ADDITIONAL REQUIREMENTS FOR ENVIRONMENTAL PROTECTION ARE SET FORTH IN APPENDIX E, ARCHAEOLOGICAL MONITORING REQUIREMENTS.

1.5.5 Cultural Resources Protection

The Contractor shall protect cultural resources during all phases of the project. The location of known cultural resource areas will be provided to the Contractor at the pre-construction conference. There are known culturally sensitive areas located within the construction footprint. Due to the sensitivity of these areas, they shall/must remain buried under a specified lift thickness of satisfactory fill material. An initial partial deposition of material over one of the known sites should have occured during Phase II of the Ship Island beach and dune fill construction. It shall remain the responsibility of the Contractor for Phases III and IV to ensure that the culturally sensitive areas are buried to the depth that has been specified for their locations.

Site specific construction terms and conditions shall be provided to the Contractor at the pre-construction meeting for the archaeological monitoring area referenced within this Specification and APPENDIX E, ARCHAEOLOGICAL MONITORING REQUIREMENTS. THESE SITE-SPECIFIC CONDITIONS SHALL BE STRICTLY ADHERED TO AT ALL TIMES DURING CONSTRUCTION. VIOLATIONS OF THESE SITE CONDITIONS SHALL IMMEDIATELY BE REPORTED BY THE CONTRACTOR TO THE CONTRACTING OFFICER, (KO), Ms. Kathleen Achord, email: Kathleen.A.Achord@usace.army.mil, phone#: 251-441-5665 AND THE PROJECT ARCHAEOLOGIST, MR. PATRICK O'DAY, #251-690-2326.

IF site-specific conditions ARE NOT PROVIDED for any sensitive area within the project footprint, then that area shall be buried with at least thirty (30) inches of satisfactory fill material before any equipment is allowed to pass over the site.

Post-award questions related to these culturally sensitive areas shall be immediately addressed to the COR to ensure a prompt resolution.

Phase III pre-construction condition surveys will be provided to the Contractor for assessing site conditions prior to the start of Phase III construction. No additional penetration may occur within the archaeological monitoring area beyond the fill being placed under this Contract. Spudding and any other type of penetration below the seafloor for access will be limited to areas designated on sheet CB-111 of the Contract Plans, which have been cleared for cultural resources.

A Maritime avoidance area is located in areas of potential anchoring, spudding and pipeline laying. No anchoring, pipeline laying or spudding shall occur within 165 feet (50 m) of this site. The areas identified as "access corridors" have been cleared for cultural resources to -12 feet NAVD 88. Consequently ground disturbance can take place within the corridors to that elevation. This includes dredging, driving of temporary pilings, or any combination thereof. No disturbance in the corridors shall exceed the -12 feet NAVD88 elevation. No other ground disturbance shall be allowed to occur outside of the minimal disturbance of the pipeline within National Park Service (NPS) waters.

All borrow areas have been surveyed and cleared for cultural resources. Anchoring at the borrow areas shall be restricted to within 150 feet of the borrow area limits provided on the Contract Drawings.

In addition to the areas surveyed and cleared for cultural resources, additional surveys may be required outside of NPS submerged bottomlands for necessary spudding, anchoring, or laying pipeline on the seafloor. Since these surveys are likely to cross submerged bottomlands controlled by both the State of Mississippi and the Bureau of Ocean Energy Management, a survey strategy has been devised that satisfies the Phase I maritime cultural resources survey requirements of the State of Mississippi, the Bureau of Ocean Energy Management, and the US Army Corps of Engineers. Specifically, the contractor will be required to conduct Phase I

maritime survey by a qualified maritime archaeologist meeting the Secretary of the Interior's Professional Qualifications Standards at survey transects that do not exceed 30 meters using a side-scan sonar of at least 600 kHz resolution, an Overhauser or cesium-vapor magnetometer, and sub-bottom sonar. All data must be collected and georeferenced using Differential Global Positioning System (DGPS).

Please refer to 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS and APPENDIX E, ARCHAEOLOGICAL MONITORING REQUIREMENTS, for further details on cultural resource protection.

1.5.6 Archaeological Sites

If any shipwreck, artifact, or other objects of antiquity that have scientific or historical value, or are of interest to the public, are discovered, located, and/or recovered, the Contractor acknowledges that:

a. The site(s), articles, or other materials are the property of the State or Federal Government.

b. Shall immediately notify the QAR, the archaeological monitor, and the Project Archaeologist, Mr. Patrick O'Day.

Refer to subparagraph "Recording and Preserving Historical and Archeological Finds" of Section 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS and APPENDIX E, ARCHAEOLOGICAL MONITORING REQUIREMENTS for additional details regarding archaeological sites. Procedures for the Notification of Discovery of Archeological Sites are described in the submittal requirements for SD-07, Certificates, described at the beginning of this Specification.

1.7 WORK AND ACCESS AREA

The Contractor shall comply with work and access area requirements indicated herein and described in paragraphs 3.2 PROTECTION OF WATER RESOURCES and paragraph 3.4 PROTECTION OF LAND RESOURCES of Specification Section 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS.

NO STAGING OF EQUIPMENT SHALL OCCUR BETWEEN STATIONS 00+00 AND 59+00 OR ON THE NATIVE BEACH ADJACENT TO THESE STATIONS.

3.1.2 Staging and Access Areas

g. The Contractor will limit staging and storage of equipment to the portions of the island that were mechanically placed. These activities are prohibited on the native beach surface.

h. The Contractor SHALL NOT ALLOW excavation or anchoring of vessels or equipment in the shallow offshore areas adjacent to the Phase III template (between Stations 0+00 to 59+00). Personnel or equipment on/off-loading in these areas is allowed, however, anchoring for any duration is prohibited (e.g., near Station 0+00).

SEE SUB-PART 1.7, WORK AND ACCESS AREA, OF THIS SPECIFICATION AS WELL AS SPECIFICATION SECTION 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS, SUB-PART 3.2, PROTECTION OF WATER RESOURCES, AND SUB-PART 3.4, PROTECTION OF LAND RESOURCES, FOR ADDITIONAL INFORMATION RELATED TO STAGING AND ACCESS AREAS.

3.1.2.1 Existing Conditions Documentation

At all access sites and staging areas to be used, the Contractor shall:

a. Photo-document the condition of the access location prior to disrupting the site. All photographs shall be GPS tagged.

b. Limit access width through existing vegetation to 20 feet or less.

c. Replace any fencing or signage disturbed by the Contractors' activities.

ADDITIONAL REQUIREMENTS FOR EXISTING CONDITION DOCUMENTATION ARE SET FORTH IN APPENDIX E, ARCHAEOLOGICAL MONITORING REQUIREMENTS.

3.2.2 Obstructions

A magnetometer survey was conducted at the borrow sites, access channels, and satisfactory fill template with construction access shown on sheet CB-111 and survey results shown on sheets CB-117 through CB-119 of the Contract Plans for informational purposes. The contractor shall submit for approval an Obstruction Identification and Removal Plan to the COR

prior to the start of dredging in the designated borrow area as described in the Pre-Construction submittals described in Speciafication Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS. Any obstructions that need to be removed from the borrow or access channels to complete the work shall be approved by the COR and shall be disposed of in areas provided by, and at the expense of, the Contractor. The Contractor should make his own investigation of submerged, surface, and overhead obstructions in the work areas and other locations the Contractor finds necessary to traverse. The exact location, depths, and height of submarine cables, pipes, highlines, docks, piers, bridges, etc. (as applicable) are not known, and it will be necessary for the Contractor to ascertain interference problems and notify the respective owners in advance of dredging operations. The Contractor shall make all arrangements with the respective owners of the structure to assure satisfactory completion of dredging in the vicinity with minimum interruption of service, and shall perform operations in such a manner as will avoid damage to these facilities. Submittal requirements for the Obstruction Identification and Removal Plan are described in SD-01 Preconstruction Submittals.

THE LOCATION OF SURVEY ANOMALIES MAY BE FOUND IN APPENDIX D OF THE CONTRACT DOCUMENTS. ADDITIONAL SURVEY DATA SHALL BE PROVIDED TO THE CONTRACTOR AT THE PRE-CONSTRUCTION CONFERENCE.

3.3.3 Upland Pipeline

The Contractor shall maintain barricades, warning signals, and flagmen to ensure public safety in the vicinity of the pipeline discharge. Any damages to private or public property resulting from the Contractor's operations shall be repaired at no additional expense to the Government and to the satisfaction of the Contracting Officer.

AT LEAST 30 INCHES OF FILL MATERIAL SHALL BE PLACED BETWEEN STATIONS 0+00 AND 59+00 PRIOR TO THE PLACEMENT OF PIPELINE OR ANY OTHER EQUIPMENT OR MACHINERY.

ADDITIONAL PIPELINE REQUIREMENTS ARE SET FORTH IN APPENDIX E, ARCHAEOLOGICAL MONITORING REQUIREMENTS, SPECIFICATION 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS, AND APPENDIX B OF THE CONTRACT DOCUMENTS.

3.5.2 Construction

The fill area is subject to changes and the elevations at the time the work is done may vary from the elevations shown on the drawings. The Contracting Officer reserves the right to vary the width and grade of the berm from the lines and grades shown on the plans in order to establish a uniform fill for the entire length of the project. The fill cross sections shown on the drawings are for the purpose of estimating the theoretical amount of satisfactory fill needed and will be used by the Contracting Officer in making any change in the lines and grades. The Contractor will not be required to dress the fill below the mean high water to the slopes shown but will be required to do the dressing specified in subparagraph "Dressing for Payment" below.

THE CONTRACTOR WILL NOT BE REQUIRED TO GRADE THE 30-INCH LIFT OF FILL MATERIAL AT THE INTERFACE OF THE NATIVE BEACH AND CONSTRUCTION TEMPLATE LOCATED BETWEEN STATIONS 0+00 AND 59+00 AND SHOWN ON SHEET CB-500 OF THE CONTRACT PLANS.

3.5.2.1 Construction Equipment Limitations

Grading and other construction equipment shall not be permitted outside the landward limit of fill at the time of construction except for designated ingress and egress to and from the site. Mobile equipment of any type operating within 50 feet of any structure as determined by the Contracting Officer shall be rubber wheeled. Tracked equipment shall not be permitted to operate within 50 feet of any structure as determined by the Contracting Officer. Hand tools may be required in these areas. A waiver to the 50 feet may be petitioned by the Contractor to the Contracting Officer if the Contractor can provide justification otherwise. A waiver does not relieve the contractor of liability for damages incurred.

ABSOLUTELY NO EQUIPMENT SHALL BE PLACED BETWEEN STATION 0+00 AND 59+00 AND NO MACHINERY SHALL TRAVERSE THE AREA WITHIN, OR SURROUNDING, THE PROJECT TEMPLATE BETWEEN STATIONS 0+00 AND 59+00 WITHOUT 30-INCHES OF FILL MATERIAL FIRST BEING PLACED. SEE SHEET CB-500 OF THE CONTRACT DRAWINGS AND APPENDIX E, ARCHAEOLOGICAL MONITORING REQUIREMENTS, FOR ADDITIONAL INFORMATION AND SPECIAL CONSTRUCTION REQUIREMENTS.

IN ADDITION TO SPECIAL CONSTRUCTION REQUIREMENTS, ALL EQUIPMENT THAT OPERATES BETWEEN STATIONS 0+00 AND 59+00 AND THE SURROUNDING AREA IS REQUIRED TO BE LOW GROUND PRESSURE (LGP) EQUIPMENT WITH A GROUND-BEARING PRESSURE EQUAL TO, OR LESS THAN, SIX (6) POUNDS PER SQUARE INCH (PSI).

FAILURE TO LIMIT CONSTRUCTION EQUIPMENT IN ACCORDANCE WITH THE CONTRACT DOCUMENTS SHALL IMMEDIATELY BE REPORTED BY THE CONTRACTOR TO THE KO, Ms. Kathleen Achord, email: Kathleen.A.Achord@usace.army.mil, phone#: 251-441-5665 AND THE PROJECT ARCHAEOLOGIST, MR. PATRICK O'DAY, #251-690-2326.

3.5.2.2 Grade Stake Installation and Recovery Operations

Grade stakes left in the fill template after construction present a safety hazard to island visitors. It is the Contractor's responsibility to name a designated person whose responsibility is to track, locate, and completely remove all grade stakes in their entirety to the satisfaction of the Contracting Officer. This identified person shall have an alternate in place in the event the designated person is absent. Any grade stakes left in the fill template will be the sole responsibility of the Contractor. The Contractor is to remove all grade stakes immediately after the acceptance section has been completed and ready for public use. This search and removal of all the stakes shall be conducted by the Contractor prior to releasing the construction area to the public. Submittals for the Construction and Grade Stakes Recovery Plan are described in the SD-01 Preconstruction Submittals requirements of this specification section. Submittal procedures to document Grade Stake Recovery are described in the SD-07 Certificates requirements of this specification section. To ensure the safety of the public and that the contractor meets contract guidelines as it pertains to grade staking and removal, the Contractor shall perform, but is not limited to, the following duties:

a. No construction or grade staking shall be allowed between Stations 0+00 and 59+00 (Phase III template). Any construction or grade staking used on Phase IV shall be made of steel pipe or other material that can, and will be, removed intact after filling as verified during final walk-through inspection. All stakes shall have sufficient length above grade so they may not be accidentally covered by fill.

3.5.3 Placement

a. Prior to placement of satisfactory fill, the Contractor shall remove from the site of the work all snags, concrete rubble, reinforcement bars, and similar debris lying within the foundation limits of the fill section. All materials removed shall be disposed of in areas provided by and at the expense of the Contractor and approved by the Contracting Officer.

THE CONTRACTOR SHALL NOT REMOVE RUBBLE, DEBRIS, OR ANY OTHER OBJECT FROM THE WORK AREA BETWEEN STATIONS 0+00 AND 59+00, EXCEPT TO FULFILL THE REQUIREMENTS OF SUB-PART 3.7, QUALITY CONTROL FOR BEACH AND DUNE FILL, OF THIS SPECIFICATION OR UNLESS IT IS MODERN DAY GARBAGE LYING ON THE BEACH SURFACE WHICH SHALL BE REMOVED BY HAND. IF OBJECTS ARE FOUND WITHIN THE PROJECT FOOTPRINT THAT REQUIRE MECHANICAL REMOVAL PRIOR TO FILL PLACEMENT, THE QAR SHALL BE CONSULTED FOR FURTHER COORDINATION WITH THE ENGINEERING TEAM AS APPROPRIATE.

b. The excavated material shall be placed and brought to rest in the fill template to the lines, grades, and cross section indicated on the drawings, unless otherwise provided for herein or directed by the Contracting Officer. The Contractor shall not stockpile pipe or any other equipment or debris within 5 feet seaward of existing dune vegetation. Pipe shall be placed parallel to shore and landward as far as possible without compromising the dune system.

c. Mechanical operations may be needed to place material to the required lines and grades. Stockpiling, additional longitudinal dikes, and/or other special handling may be needed. It is the Contractor's responsibility to place material to the specified lines and grades within the fill cross section.

d. Any material that is rehandled or moved and placed in its final position by methods other than hydraulic shall be placed in horizontal layers not exceeding three (3) feet in thickness. Compaction of the layers will not be required. The Contractor shall schedule their operations to take advantage of the tide so that filling is done in the dry or as directed.

e. Low Ground Pressure bulldozers, which have a ground - bearing pressure of six (6) pounds per square inch (psi) or less, shall be used to move material between Station 0+00 and 59+00 in advance of articulated wheel loaders that will haul dredge pipe to expand the feature.

f. The Contractor will minimize rutting by varying pipe hauling routes as necessary to avoid compression damage to buried artifacts or other objects of cultural significance.

3.5.3.2 Dressing for Final Acceptance

Immediately upon the completion of satisfactory fill placement and removal of equipment and materials from the fill area, the final dressing shall be accomplished by the Contractor for final acceptance. The bank caused by wave forces shall be graded down to slope as shown on the drawings. Grade stakes shall be removed intact and any excavation required to remove the stakes shall be backfilled. The contractor is not required to dress the fill below 0 feet NAVD88 to the 1V:20H slopes shown on the Contract Plans.

THE CONTRACTOR SHALL NOT GRADE THE NATURAL BACKSLOPE OF THE 30-INCH LIFT OF FILL MATERIAL BEING PLACED AT THE INTERFACE OF THE NATIVE BEACH AND THE PROJECT TEMPLATE BETWEEN STATIONS 0+00 AND 59+00 AND SHOWN ON SHEET CB-500 OF THE CONTRACT PLANS.

3.5.4 Tolerances

Final grade (F.G.) shall be within tolerances of plus or minus five-tenths (0.5) of a foot of fill grade line. Tolerance shall extend the entire construction template shown on the Plans which includes everything from the upland intersection with natural grade to termination of the seaward berm slope. If material is placed above the upper or below lower specified tolerance the Contractor shall be required at no cost to the government to perform additional work to achieve the designed alignments, lines, grades, slopes and dimensions within the specified tolerance. Contractor may stockpile satisfactory fill above the tolerance up-slope of the slough zone, to compensate for material expected to be removed by wave action; but smooth slopes shall be maintained. Berm width will vary as directed by the Contracting Officer. Slope shaping shall be accomplished by grading satisfactory fill into water or as directed by the Contracting Officer.

Grade tolerance in excess of 0.5 ft (6-inches) may be provided at the discretion of the QAR for the curve shown on sheet CB-102 of the Contract Drawings, and having a radius defined by points L, M, and N. Grade tolerance flexibility may be exercised as necessary in this area for the purpose of constructability, so long as the pay volume is approximately equal to that which has been estimated for the template as it is shown on the Contract Drawings.

THE CONTRACTOR IS NOT PERMITTED A MINUS (-) 0.5 FOOT TOLERANCE ALONG THE 30-INCH LIFT OF FILL MATERIAL BEING PLACED AT THE INTERFACE OF THE NATIVE BEACH AND THE PROJECT TEMPLATE BETWEEN STATIONS 0+00 AND 59+00. UNDER NO CIRCUMSTANCES SHALL THERE BE LESS THAN 30 INCHES OF FILL MATERIAL BETWEEN THE NATIVE BEACH (SUB-AERIAL AND SUB-AQUEOUS) AND ALL EQUIPMENT AND MACHINERY NECESSARY FOR PROJECT CONSTRUCTION. VIOLATIONS OF THIS REQUIREMENT SHALL IMMEDIATELY BE REPORTED BY THE COR TO THE KO, Ms. Kathleen Achord, email: Kathleen.A.Achord@usace.army.mil, phone#: 251-441-5665 AND THE PROJECT ARCHAEOLOGIST, MR. PATRICK O'DAY.

3.7.2 Fill Observation and Sampling

Fill observation and sampling shall be performed during construction to ensure that the satisfactory fill material meets criteria. A maximum of approximately 70 samples may be tested.

b. The Contractor shall conduct assessments of the sediment as follows: The Contractor shall conduct a visual classification in accordance with ASTM D2488 "Description and Identification of Soils (Visual-Manual Procedure)" of the sediment within each hopper load or scow load, and while it is being placed in the template, to identify obvious disparities with the fill quality specifications. After the fill has been placed in the template, the Contractor shall collect sediment samples, approximately 6-12 inches deep from the surface, along transects spaced every 400 linear feet along the constructed template. Each transect will be perpendicular to the station line of the template. Samples shall be collected between Stations 0+00 through 59+00 and Stations 137+00 through 281+00 at, or near, the locations shown on Sheets CB-106 through CB-109 of the Contract Drawings. Sample locations shall be measured a linear distance landward or seaward of the survey alignment such that any coordinate given may be considered approximate and is being provided for reference only. Questions regarding the location of sample collection shall be coordinated through the QAR prior to the placement of fill material.

For the Phase 3 fill samples as shown on sheet CB-106 of the Contract Plans, the sample(s) shall be taken within 24 hours of fill placement. If the sample is not taken within 24 hours of placement, the archaeological monitor shall be present when the sample is taken to ensure no artifacts from the identified cultural area have been accidentally mixed in with the fill (i.e. if a

significant storm event with storm surge overtops the area after the fill is placed but prior to sampling).

3.8.2 Failure to Comply

In conjunction with the Clause INSPECTION OF CONSTRUCTION of Section 00700 CONTRACT CLAUSES in Volume 1, should the Contractor refuse, neglect, or delay compliance with these requirements, the specific facilities may be furnished and maintained by the Contracting Officer and the cost thereof will be deducted from any amounts due or to become due the Contractor.

FAILURE TO COMPLY WITH SPECIAL CONSTRUCTION REQUIREMENTS RELATED TO ENVIRONMENTALLY SENSITIVE AREAS OR THE TERMS INCLUDED IN APPENDIX E, ARCHAEOLOGICAL MONITORING REQUIREMENTS, SHALL IMMEDIATELY BE REPORTED BY THE CONTRACTOR TO THE KO, Ms. Kathleen Achord, email: Kathleen.A.Achord@usace.army.mil, phone#: 251-441-5665 AND THE PROJECT ARCHAEOLOGIST, MR. PATRICK O'DAY, #251-690-2326.

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