MRGO ECOSYSTEM RESTORATION PLAN FEASIBILITY STUDY

COMMUNICATION

FROM

THE ASSISTANT SECRETARY OF THE ARMY, CIVIL WORKS, THE DEPARTMENT OF DEFENSE

TRANSMITTING

MRGO ECOSYSTEM RESTORATION PLAN FEASIBILITY STUDY

PART 7 OF 7



DECEMBER 19, 2013.—Referred to the Committee on Transportation and Infrastructure and ordered to be printed

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U.S. GOVERNMENT PRINTING OFFICE

87–149 WASHINGTON : 2013

AUTHENTICATED
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INFORMATION
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ANNEX 6

LABORATORY TEST RESULTS

APPENDIX ED-F-3

LABORATORY TEST RESULTS

SUMMARY OF LABORATORY TEST RESULTS

Project: MRGO Ecosystem Restoration Feasibility Study Assigned By: _____

Project Number: 07-022135
Boring: MRGO-1U

Current Date: 11/30/2009

Sample Number	Depth	Visual Classification	USCS	E(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
1A	0.0	VSO DGR CHOB W/ WD	CHOB		152												
1B	0.8	VSO DGR CHOA W/ WD	CHOA		98												
1C	1.7	VSO DGR CHOA W/ WD	CHOA		118												
1D	2.6	VSO DGR CHOA W/ WD	CHOA		108												
2A	4.0	VSO GR CHOA W/ RT, WD	CHOA		112												
2B	4.8	VSO GR CH4 W/ RT, WD	CH4		121	40	88	100					94	27	67		Gs, CON
2C	5.7	SO GR CHOA W/ WD, RT	CHOA		131				UU				117	32	85		NOT TESTABLE
2D	6.6	VSO GR CHOA W/ WD, RT	CHOA		119	40	87	100	UU	0	116		121	30	91	0.10	
3A	8.0	SO GR CH4 W/ LNS & LYS ML, O, WD	CH4		80												
3B	8.8	VSO GR CH2 W/ LNS & LYS ML, O, WD	CH2	8	67	60	100	100	UC	-	143	286	52	23	29	0.10	
3C	9.7	SO GR CH2 W/ LNS & LYS ML, SIF	CH2		67												
4A	12.0	SO GR CHOA W/ WD	CHOA		99												
4B	12.8	SO GR CHOA W/ WD, SIF	CHOA		82												
4C	13.7	VSO GR CH4 W/ ARS SM, WD, O, SIF	CH4		70	59	100	100	UU	0	102		72	22	50	0.07	
4D	14.6	SO GR CH4 W/ WD, O, SIF	CH4		51												
5A	16.0	SO GR CH4 W/ LNS & LYS ML	CH4		79												
5B	16.8	VSO GR CH4 W/ LNS & LYS ML, WD	CH4		80	53	96	100					85	24	61		Gs, CON
5C	17.7	VSO GR CH4 W/ LNS & LYS ML, WD, CC	CH4	15	86	51	95	100	UC	-	140	279	95	26	69	0.16	
6A	20.0	SO GR CH3 W/ LNS & ARS ML	CH3		44												
6B	20.8	SO GR CH3 W/ LNS & LYS ML	CH3		51												
6C	21.7	VSO GR CH3 W/ LNS & LYS ML	CH3		57	67	106	100	UU	0	208		59	23	36	0.17	
7A	24.0	SO GR CH3 W/ LNS & LYS ML	CH3		51												
7B	24.8	SO GR CH4 W/ LNS & LYS ML	CH4		60												
7C	25.7	SO GR CH4 W/ LNS & LYS ML	CH4		59												
7D	26.6	SO GR CH3 W/ LNS & LYS ML	CH3		51												
8A	28.0	SO GR CH4 W/ LNS & LYS ML	CH4		75												
8B	28.8	SO GR CH4 W/ LNS & LYS ML	CH4	4	75	56	98	100	UC	-	361	722	93	27	66	0.21	
8C	29.7	SO GR CH4 W/ LNS & LYS ML	CH4		66												
8D	30.6	SO GR CH4 W/ LNS & LYS ML	CH4		64												
9A	32.0	SO GR CH4 W/ LNS & LYS ML	CH4		78												
9B	32.8	SO GR CH4 W/ LNS & LYS ML	CH4		77	55	97	99	UU	0	310		100	29	71	0.24	
9C	33.7	SO GR CH4 W/ LNS & LYS ML	CH4		74												
9D	34.6	SO GR CH4 W/ LNS & LYS ML	CH4		84												
10A	36.0	SO GR CH4 W/ LNS & LYS ML	CH4		69												
10B	36.8	SO GR CH2 W/ LNS & LYS ML	CH2	4	53	69	106	99	UC	-	436	873	51	22	29	0.25	
10C	37.7	M GR CH4 W/ LNS & LYS ML	CH4		54												

Remarks: _____
FFEB JV, LLC

Checked By: _____
File Name: MRGO-01U.xls

SUMMARY OF LABORATORY TEST RESULTS

Project: MRGO Ecosystem Restoration Feasibility Study Assigned By: _____

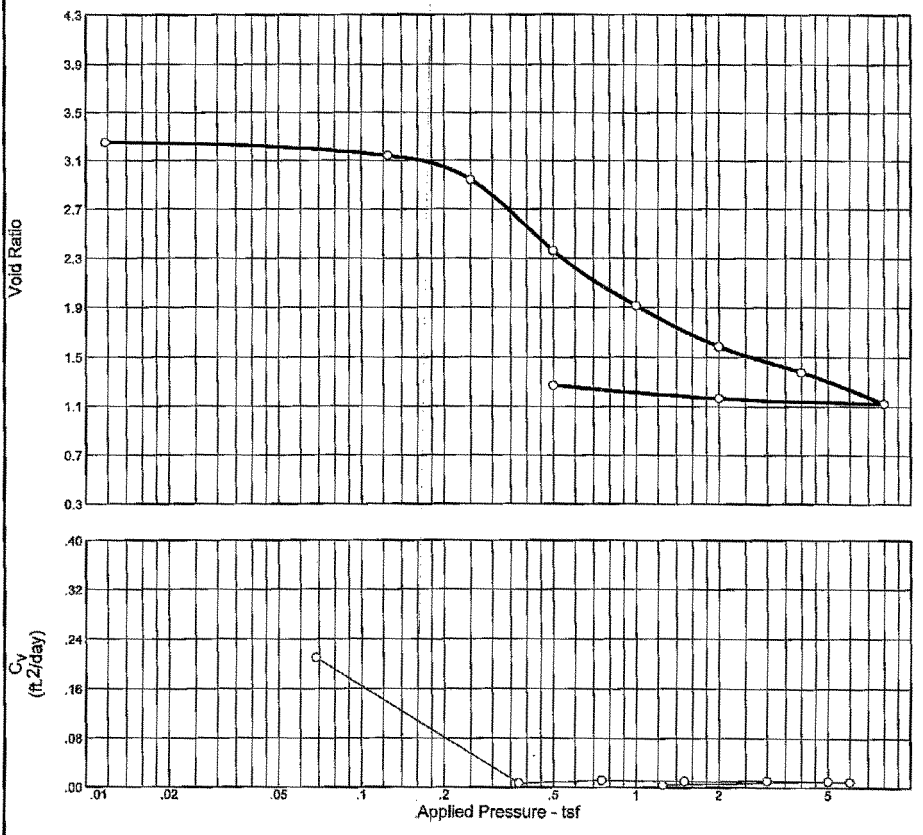
Project Number: 07-022135 Current Date: 11/30/2009
Boring: MRGO-1U

Sample Number	Depth	Visual Classification	USCS	E(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
11A	40.0	M GR CH4	CH4		68												
11B	40.8	M GR CH4 W/ LNS & LYS ML	CH4		67	59	99	98	UU	0	515		90	28	62	0.28	
11C	41.7	M GR CH4 W/ LNS & LYS ML	CH4		68												
11D	42.6	M GR CH4 W/ LNS & LYS ML	CH4		61												
12A	44.0	M GR CH4 W/ ARS ML	CH4		66												
12B	44.8	M GR CH3 W/ LNS ML	CH3	4	50	71	106	97	UC	-	532	1065	66	23	43	0.30	
12C	45.7	M GR CH4 W/ LNS ML	CH4		64												
12D	46.6	M GR CH4	CH4		54												
13A	48.0	M GR CH4	CH4		59												
13B	48.8	M GR CH4	CH4		58												
13C	49.7	M GR CH4 W/ ARS SM	CH4		54	67	104	97	UU	0	653		76	25	51	0.35	
13D	50.6	M GR CH4	CH4		59												
14A	52.0	M GR CH4	CH4		56												
14B	52.8	M GR CH4	CH4		55												
14C	53.7	M GR CH4 W/ LNS & LYS ML	CH4	3	58	66	104	99	UC	-	824	1647	94	28	66	0.36	
14D	54.6	M GR CH4 W/ LNS ML	CH4		52												
15A	56.0	SO GR CH4	CH4		63												
15B	56.8	SO GR CH4 W/ ARS ML	CH4		65												
15C	57.7	SO GR CH4 W/ LNS ML	CH4		64	61	101	98	UU	0	439		98	30	68	0.35	
15D	58.6	SO GR CH4 W/ LNS & LYS ML	CH4		63												

Remarks: _____
FFEB JV, LLC

Checked By: _____
File Name: MRGO-01U.xls

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
100.7 %	120.8 %	39.8	94	67	2.71	0.23	1.86	3.250

MATERIAL DESCRIPTION	USCS	AASHTO
VSO GR CH4 W/ RT, WD	CH4	

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

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

Source: MRGO-01U **Sample No.:** 2B **Elev./Depth:** 4.8

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St Rose, LA

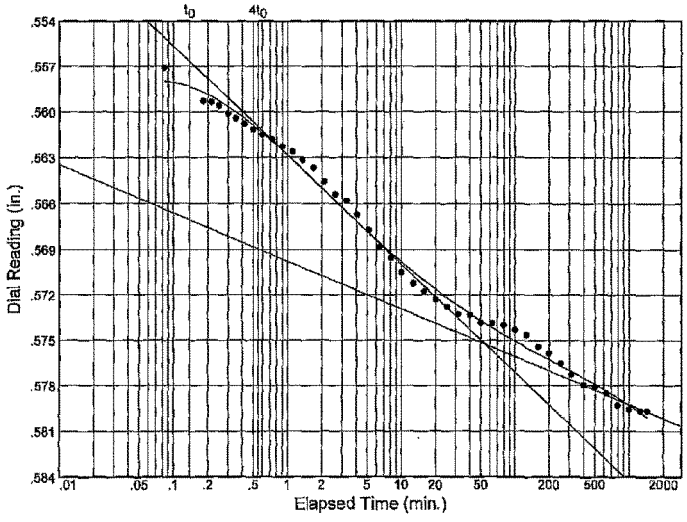
Remarks:
Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

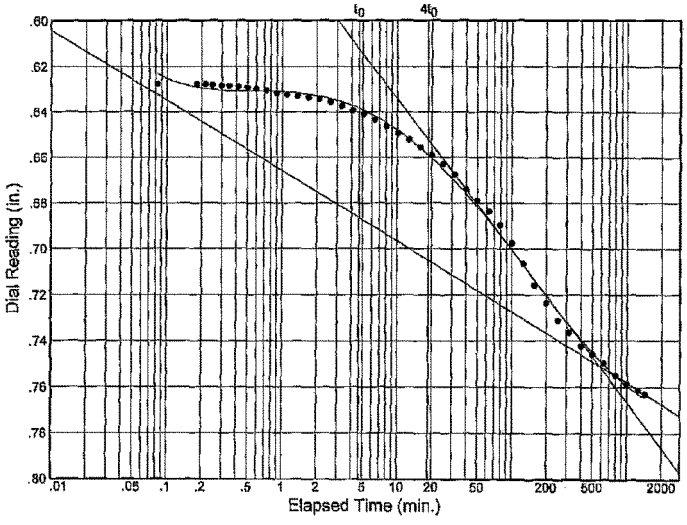
Source: MRGO-01U Sample No.: 2B Elev./Depth: 4.8



Load No.= 2
Load= 0.13 tsf
D_0 = 0.55555
D_{50} = 0.56540
D_{100} = 0.57525
T_{50} = 2.29 min.

C_v @ T_{50}
0.21 ft.2/day

C_α = 0.003



Load No.= 4
Load= 0.50 tsf
D_0 = 0.61816
D_{50} = 0.68454
D_{100} = 0.75092
T_{50} = 55.96 min.

C_v @ T_{50}
0.01 ft.2/day

C_α = 0.033

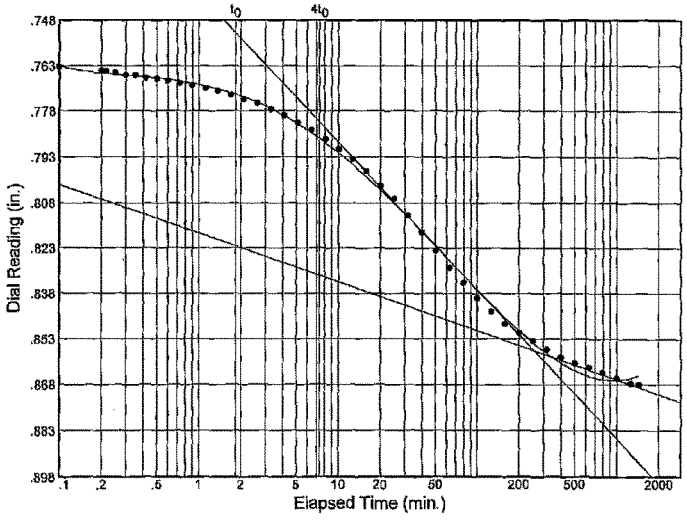
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Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

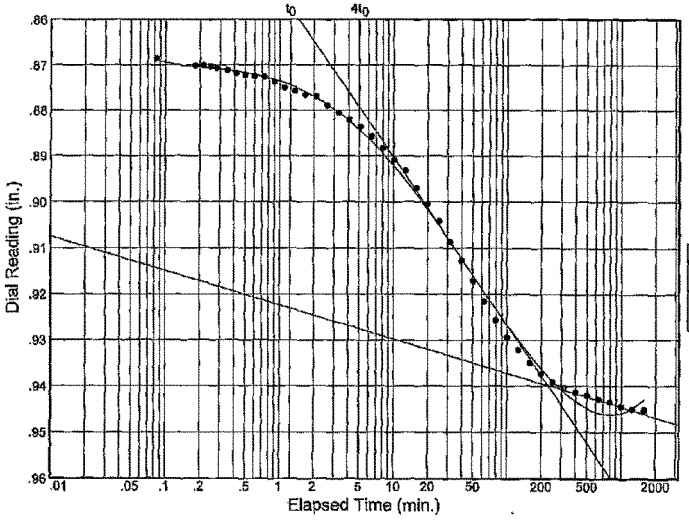
Source: MRGO-01U Sample No.: 2B Elev./Depth: 4.8



Load No.= 5
Load= 1.00 tsf
D_0 = 0.75801
D_{50} = 0.80742
D_{100} = 0.85684
T_{50} = 24.27 min.

C_v @ T_{50}
0.01 ft.^{2}/day

C_α = 0.020



Load No.= 6
Load= 2.00 tsf
D_0 = 0.86458
D_{50} = 0.90222
D_{100} = 0.93986
T_{50} = 20.75 min.

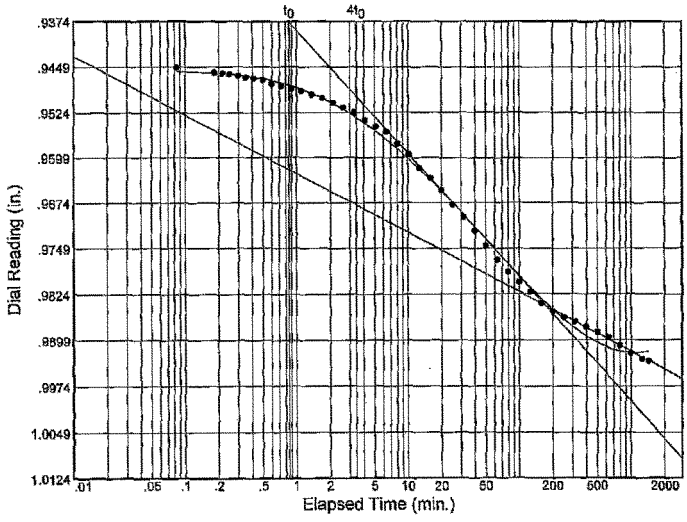
C_v @ T_{50}
0.01 ft.^{2}/day

C_α = 0.011

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

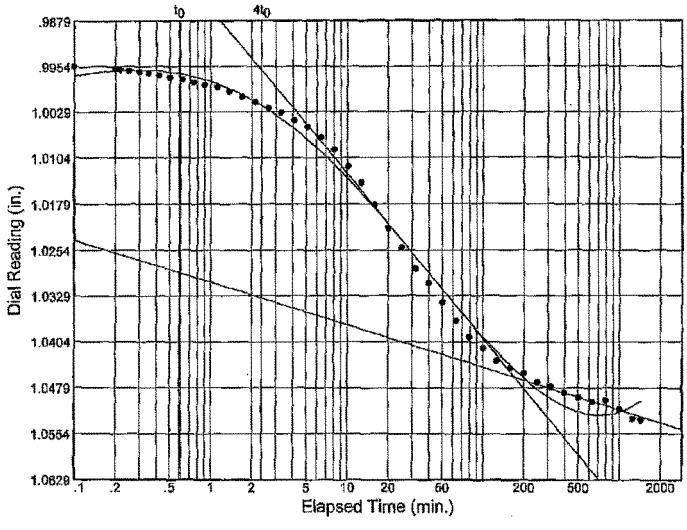
Source: MRGO-01U Sample No.: 2B Elev./Depth: 4.8



Load No.= 7
Load= 4.00 tsf
D_0 = 0.94257
D_{50} = 0.96344
D_{100} = 0.98431
T_{50} = 15.62 min.

C_v @ T_{50}
0.01 ft.^{2}/day

C_α = 0.016



Load No.= 8
Load= 8.00 tsf
D_0 = 0.99124
D_{50} = 1.01870
D_{100} = 1.04616
T_{50} = 16.02 min.

C_v @ T_{50}
0.01 ft.^{2}/day

C_α = 0.012

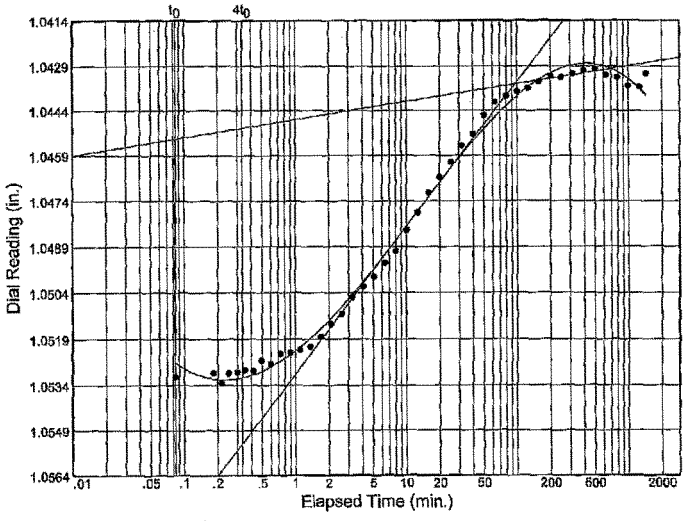
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Figure

Dial Reading vs. Time

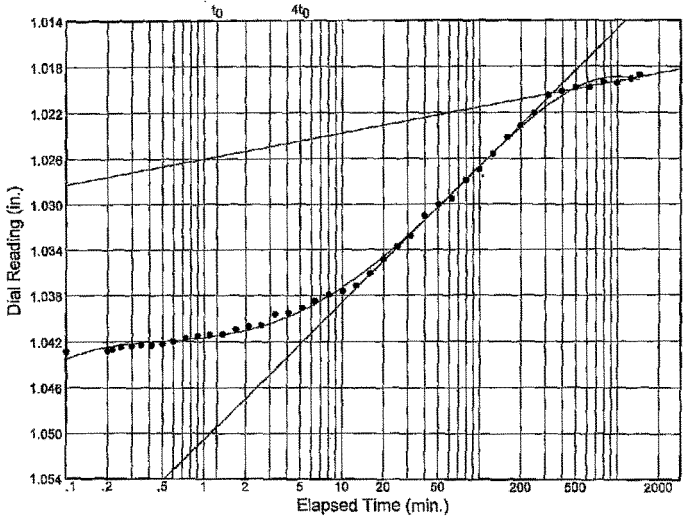
Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-01U Sample No.: 2B Elev./Depth: 4.8



Load No.= 9
Load= 2.00 tsf
D_0 = 1.05220
D_{50} = 1.04785
D_{100} = 1.04350
T_{50} = 12.07 min.

C_v @ T_{50}
0.01 ft.2/day



Load No.= 10
Load= 0.50 tsf
D_0 = 1.04363
D_{50} = 1.03197
D_{100} = 1.02032
T_{50} = 35.66 min.

C_v @ T_{50}
0.00 ft.2/day

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Figure

CONSOLIDATION TEST DATA

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Contract No. W912P8-07-D-0022
Task Order 135
Project Number: 07-022135

Sample Data

Source: MRGO-01U
Sample No.: 2B
Elev. or Depth: 4.8 **Sample Length(in./cm.):**
Location:
Description: VSO GR CH4 W/ RT, WD
Liquid Limit: 94 **Plasticity Index:** 67
USCS: CH4 **AASHTO:** **Figure No.:**
Testing Remarks: Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST		AFTER TEST	
Wet w+t	= 220.80 g.	Consolidometer #	= 10	Wet w+t	= 316.06 g.
Dry w+t	= 100.00 g.			Dry w+t	= 250.15 g.
Tare Wt.	= .00 g.	Spec. Gravity	= 2.71	Tare Wt.	= 112.88 g.
Height	= 1.00 in.	Height	= 1.00 in.		
Diameter	= 4.00 in.	Diameter	= 4.00 in.		
Weight	= 289.26 g.	Defl. Table	= n/a		
Moisture	= 120.8 %	Ht. Solids	= 0.2350 in.	Moisture	= 48.0 %
Wet Den.	= 87.9 pcf	Dry Wt.	= 130.87 g.*	Dry Wt.	= 137.27 g.
Dry Den.	= 39.8 pcf	Void Ratio	= 3.250	Void Ratio	= 1.272
		Saturation	= 100.7 %		

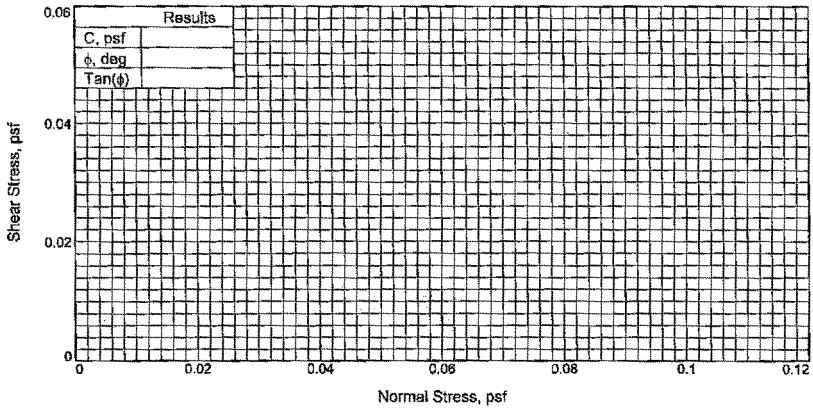
*** Initial dry weight used in calculations**

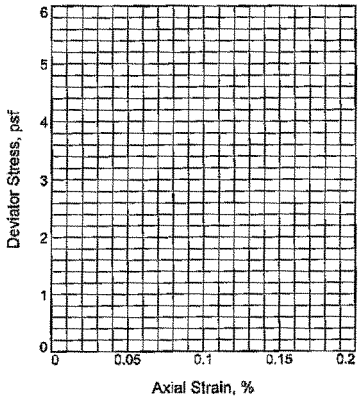
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.55407				3.250	
0.01	0.55427	0.00000			3.249	0.0 Comprs.
0.13	0.57970	0.00000	0.21	0.003	3.141	2.6 Comprs.
0.25	0.62653	0.00000			2.942	7.3 Comprs.
0.50	0.76310	0.00000	0.01	0.033	2.360	20.9 Comprs.
1.00	0.86817	0.00000	0.01	0.020	1.913	31.5 Comprs.
2.00	0.94540	0.00000	0.01	0.011	1.585	39.2 Comprs.
4.00	0.99339	0.00000	0.01	0.016	1.380	44.0 Comprs.
8.00	1.05316	0.00000	0.01	0.012	1.126	50.0 Comprs.

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
2.00	1.04315	0.00000	0.01		1.169	49.0 Comprs.
0.50	1.01874	0.00000	0.00		1.272	46.5 Comprs.

C_c = 1.86 P_c = 0.23 tsf C_r = 0.12





Sample No.	
Initial	Water Content, %
	Dry Density, pcf
	Saturation, %
	Void Ratio
	Diameter, in.
	Height, in.
At Test	Water Content, %
	Dry Density, pcf
	Saturation, %
	Void Ratio
	Diameter, in.
	Height, in.
Strain rate, in./min.	
Back Pressure, psi	
Cell Pressure, psi	
Fail. Stress, psf	
Strain, %	
Ult. Stress, psf	
Strain, %	
σ_1 Failure, psf	
σ_3 Failure, psf	

Type of Test: Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CHOA W/ WD, RT

LL= 117 **PL=** 32 **PI=** 85
Assumed Specific Gravity=
Remarks: SAMPLE DISTURBED BY WOOD. NOT TRIMMABLE.

Figure _____

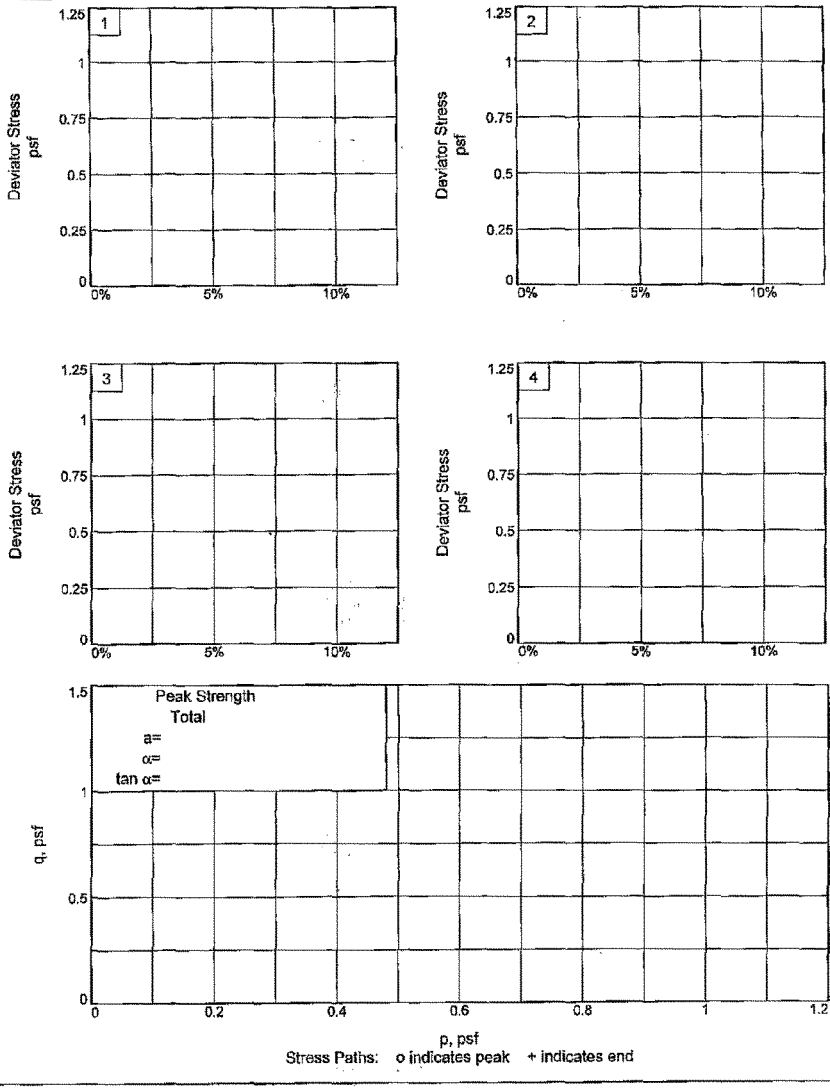
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study St.Bernard Parish, La
Source of Sample: MRGO-1U **Depth:** 5.7
Sample Number: 2C
Proj. No.: 07-022135 **Date Sampled:** 10/7/09

TRIAXIAL SHEAR TEST REPORT

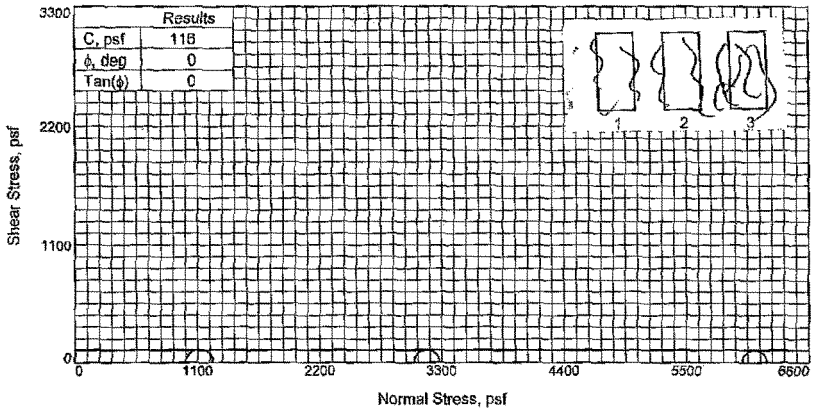
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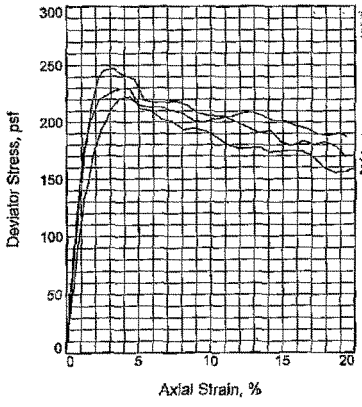
Checked By: MKA



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-1U **Depth:** 5.7 **Sample Number:** 2C
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Checked By: MKA





Sample No.		1	2	3
Initial	Water Content, %	118.2	118.3	120.7
	Dry Density, pcf	39.9	39.6	39.2
	Saturation, %	100.1	99.3	99.8
	Void Ratio	3.0690	3.0974	3.1436
	Diameter, in.	1.389	1.392	1.385
	Height, in.	3.093	3.089	3.090
At Test	Water Content, %	118.2	118.3	120.7
	Dry Density, pcf	39.9	39.6	39.2
	Saturation, %	100.1	99.3	99.8
	Void Ratio	3.0690	3.0974	3.1436
	Diameter, in.	1.389	1.392	1.385
	Height, in.	3.093	3.089	3.090
Strain rate, in./min.		1.000	1.000	1.000
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.89	21.15	41.66
Fail. Stress, psf		247	229	222
Strain, %		3.3	3.7	4.4
Ult. Stress, psf		201	174	182
Strain, %				
σ_1 Failure, psf		1240	3275	6221
σ_3 Failure, psf		993	3046	5999

Type of Test: Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: VSO GR CHOA W/ WD, RT

LL= 121 PL= 30 PI= 91
Assumed Specific Gravity= 2.60
Remarks:

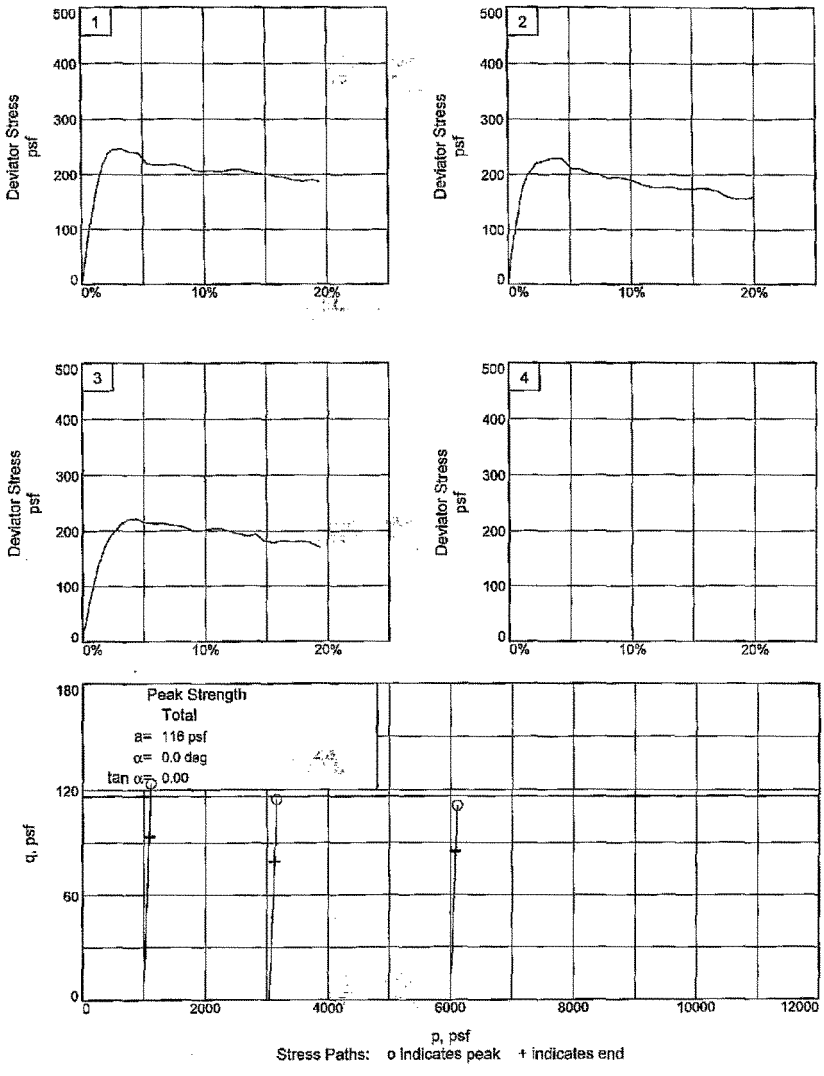
Figure _____

Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-1U **Depth:** 6.6
Sample Number: 2D
Proj. No.: 07-022135 **Date Sampled:** 10/22/09

TRIAXIAL SHEAR TEST REPORT
FFEBJV, LLC

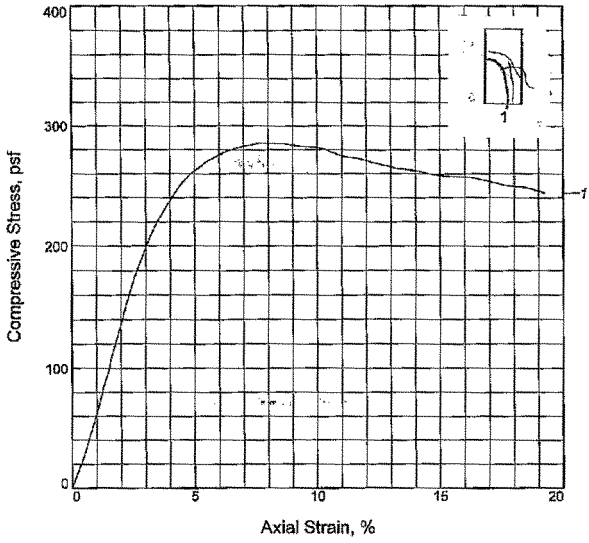
Tested By: ARS/JC **Checked By:** TSL



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-1U **Depth:** 6.6 **Sample Number:** 2D
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: ARS/JC **Checked By:** TSL

UNCONFINED COMPRESSION TEST



Sample No.	1				
Unconfined strength, psf	286				
Undrained shear strength, psf	143				
Failure strain, %	7.8				
Strain rate, in./min.	1.000				
Water content, %	67.4				
Wet density, pcf	100.1				
Dry density, pcf	59.8				
Saturation, %	100.1				
Void ratio	1.8182				
Specimen diameter, in.	1.400				
Specimen height, in.	3.073				
Height/diameter ratio	2.20				

Description: VSO GR CH2 W/ LNS & LYS ML, O, WD

LL = 52	PL = 23	PI = 29	**Assumed GS=** 2.70	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 10/7/09
Remarks:

Figure _____

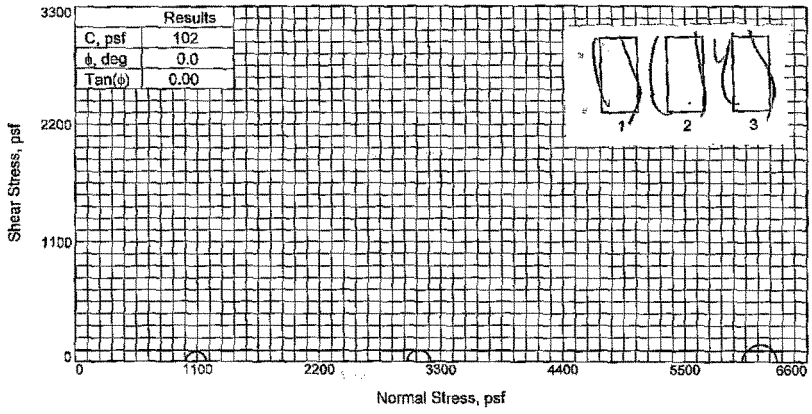
Client: U.S. Army Corps of Engineers

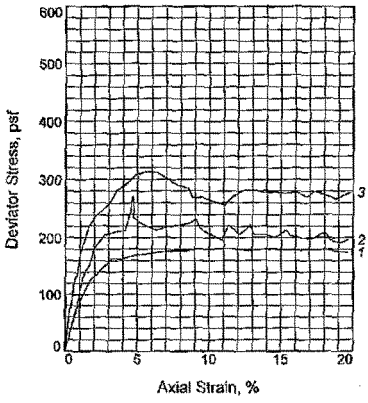
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-1U **Depth:** 8.8
Sample Number: 3B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: JC/NG **Checked By:** TSL





Sample No.		1	2	3
Initial	Water Content, %	71.5	70.1	68.1
	Dry Density, pcf	57.6	58.4	60.6
	Saturation, %	99.5	99.5	102.4
	Void Ratio	1.9704	1.9306	1.8215
	Diameter, in.	1.414	1.410	1.399
	Height, in.	3.093	3.096	3.100
At Test	Water Content, %	71.5	70.1	68.1
	Dry Density, pcf	57.6	58.4	60.6
	Saturation, %	99.5	99.5	102.4
	Void Ratio	1.9704	1.9306	1.8215
	Diameter, in.	1.414	1.410	1.399
	Height, in.	3.093	3.096	3.100
Strain rate, in./min.		1.000	1.000	1.000
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.94	20.82	41.82
Fail. Stress, psf		182	212	314
Strain, %		14.4	4.2	5.6
Ult. Stress, psf		178	196	256
Strain, %				
σ_1 Failure, psf		1181	3211	6336
σ_3 Failure, psf		999	2998	6022

Type of Test: Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: VSO GR CH4 W/ ARS SM, WD, O, SIF
LL= 72 **PL=** 22 **PI=** 50
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

Client: U.S. Army Corps of Engineers

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

Source of Sample: MRGO-1U **Depth:** 13.7

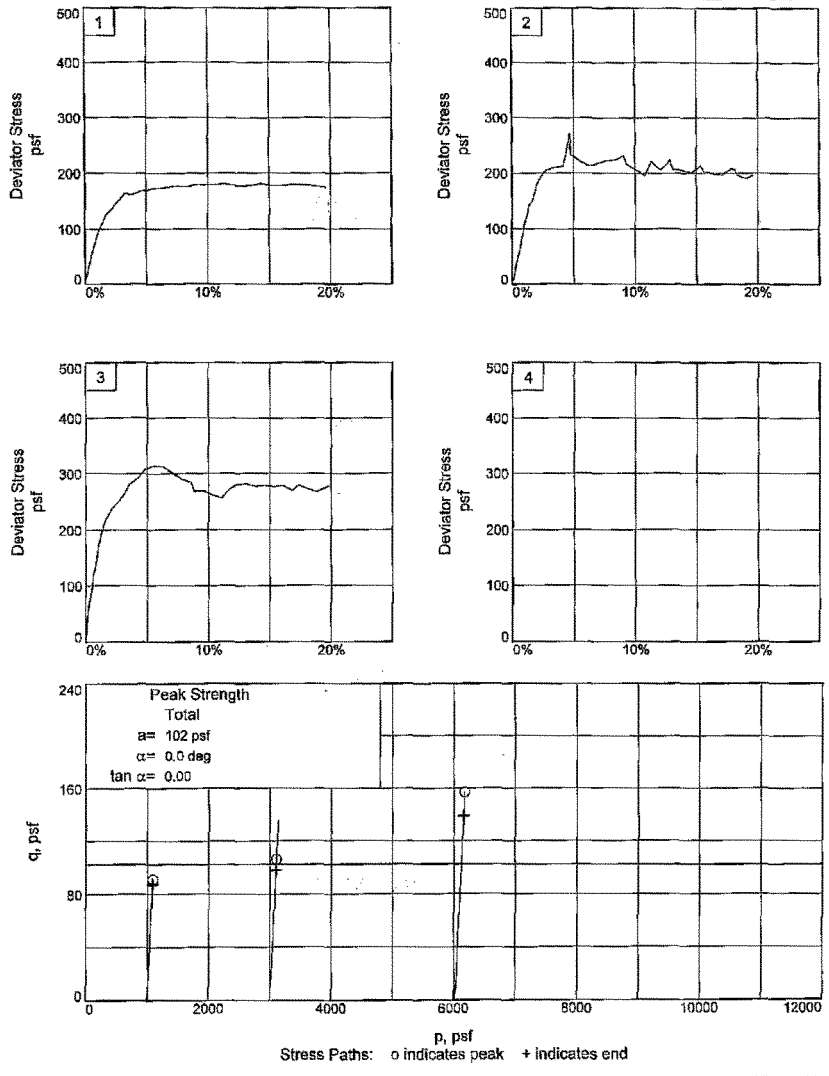
Sample Number: 4C

Proj. No.: 07-022135 **Date Sampled:** 10/7/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

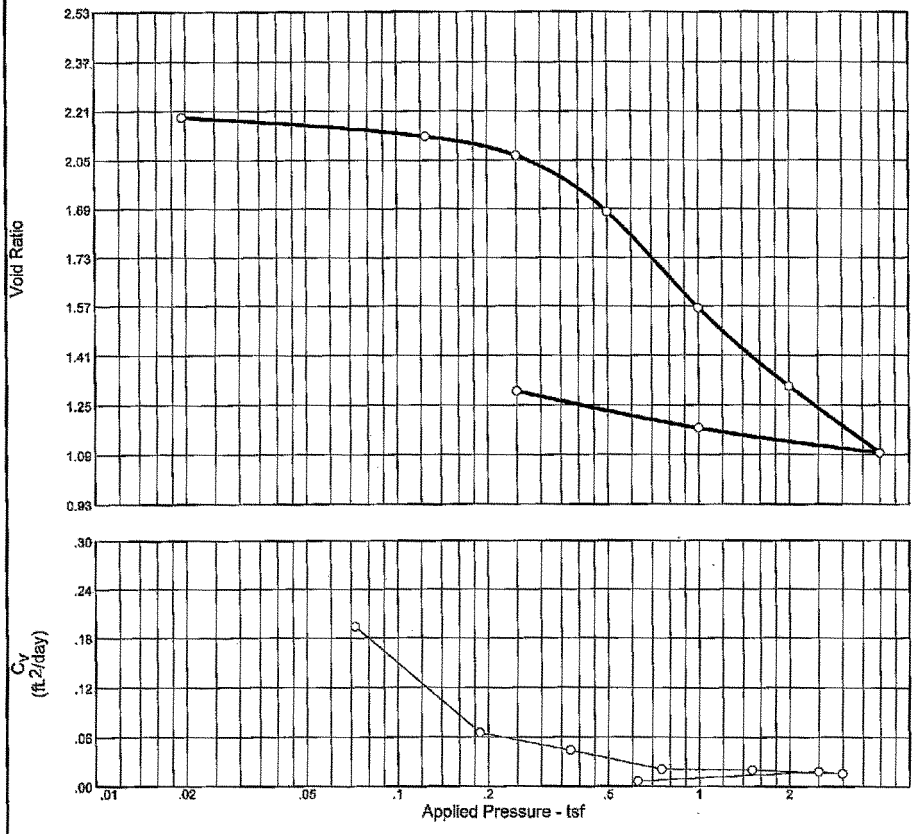
Tested By: JC/ARS **Checked By:** TSL



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-1U **Depth:** 13.7 **Sample Number:** 4C
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: JC/ARS **Checked By:** TSL

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
99.5 %	80.4 %	53.0	85	61	2.71	0.36	1.02	2.190

MATERIAL DESCRIPTION	USCS	AASHTO
VSO GR CH4 W/ LNS & LYS ML, WD	CH4	

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

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

Source: MRGO-01U **Sample No.:** 5B **Elev./Depth:** 16.8

FFEBJV, LLC

St Rose, LA

Remarks:

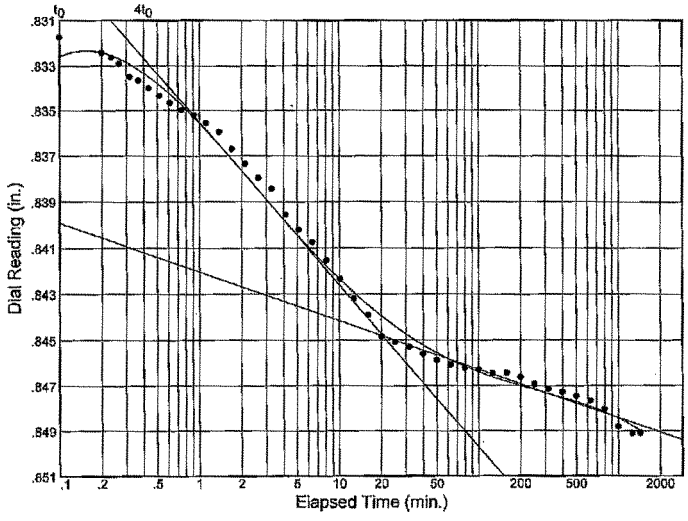
Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

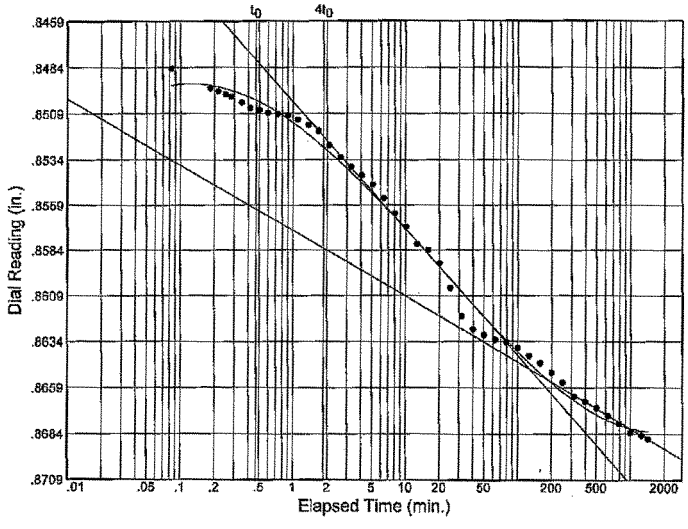
Source: MRGO-01U Sample No.: 5B Elev./Depth: 16.8



Load No.= 2
Load= 0.13 tsf
D_0 = 0.83188
D_{50} = 0.83835
D_{100} = 0.84483
T_{50} = 2.51 min.

C_v @ T_{50}
0.19 ft.2/day

C_α = 0.002



Load No.= 3
Load= 0.25 tsf
D_0 = 0.84762
D_{50} = 0.85626
D_{100} = 0.86490
T_{50} = 7.18 min.

C_v @ T_{50}
0.07 ft.2/day

C_α = 0.004

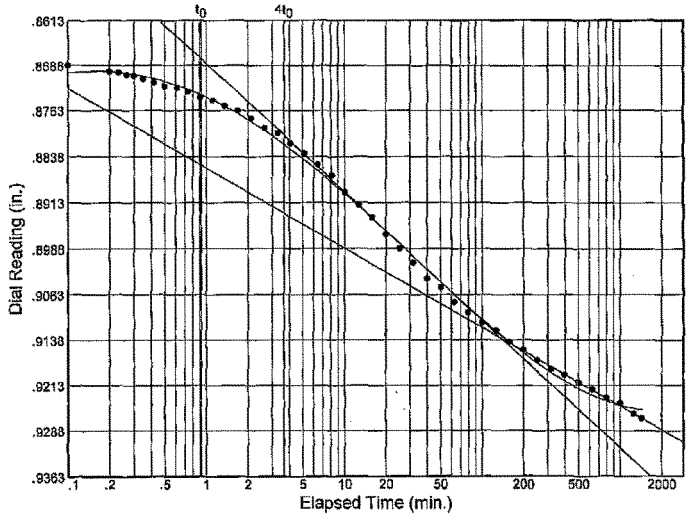
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

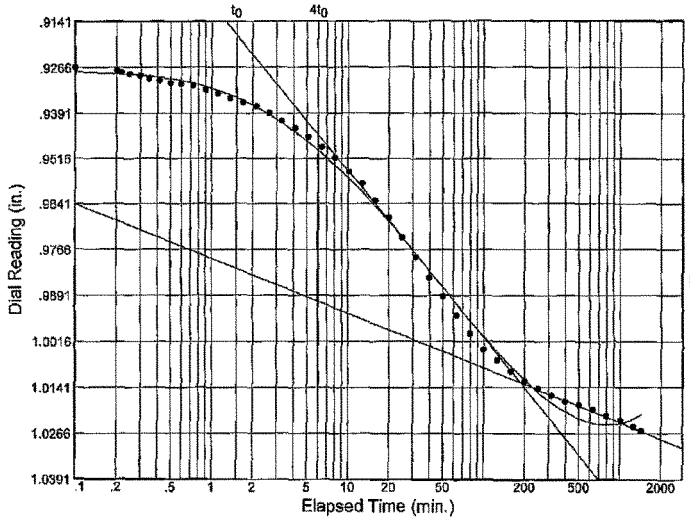
Source: MRGO-01U Sample No.: 5B Elev./Depth: 16.8



Load No.= 4
Load= 0.50 tsf
D_0 = 0.86554
D_{50} = 0.88954
D_{100} = 0.91354
T_{50} = 9.74 min.

C_v @ T_{50}
0.04 ft.2/day

C_α = 0.013



Load No.= 5
Load= 1.00 tsf
D_0 = 0.92017
D_{50} = 0.96651
D_{100} = 1.01284
T_{50} = 17.37 min.

C_v @ T_{50}
0.02 ft.2/day

C_α = 0.016

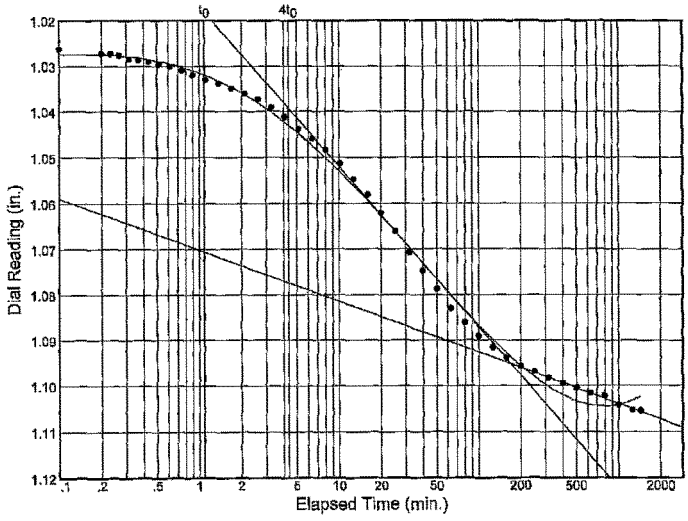
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

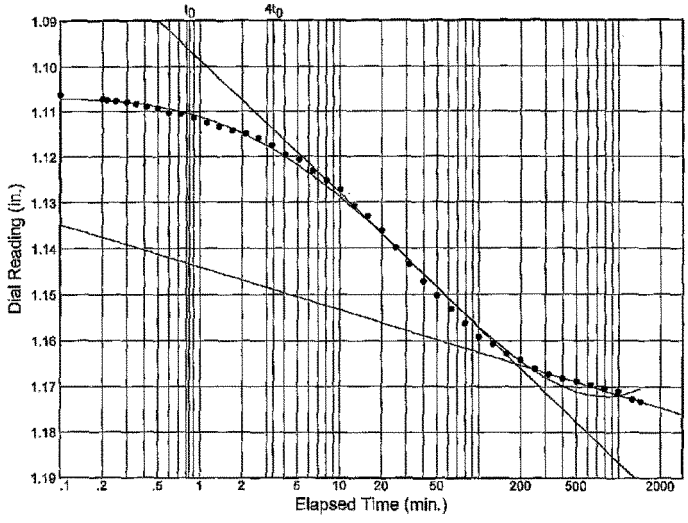
Source: MRGO-01U Sample No.: 5B Elev./Depth: 16.8



Load No.= 6
Load= 2.00 tsf
D_0 = 1.02087
D_{50} = 1.05808
D_{100} = 1.09529
T_{50} = 14.55 min.

C_v @ T_{50}
0.02 ft.^{2}/day

C_α = 0.014



Load No.= 7
Load= 4.00 tsf
D_0 = 1.10248
D_{50} = 1.13374
D_{100} = 1.16501
T_{50} = 15.34 min.

C_v @ T_{50}
0.02 ft.^{2}/day

C_α = 0.013

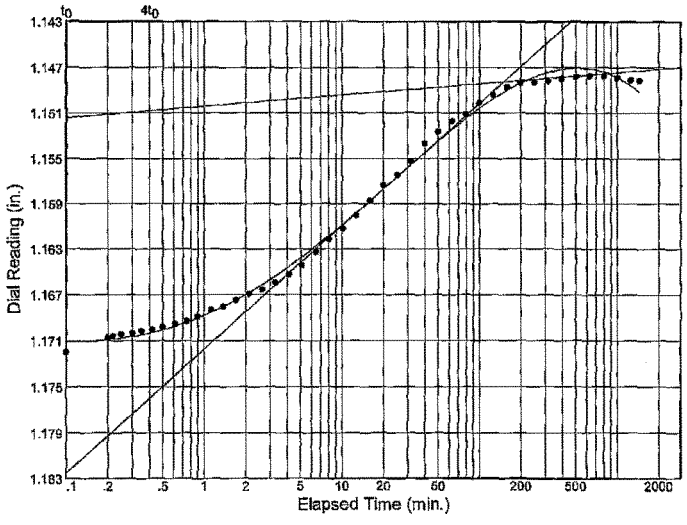
FFEBJV, LLC

Figure

Dial Reading vs. Time

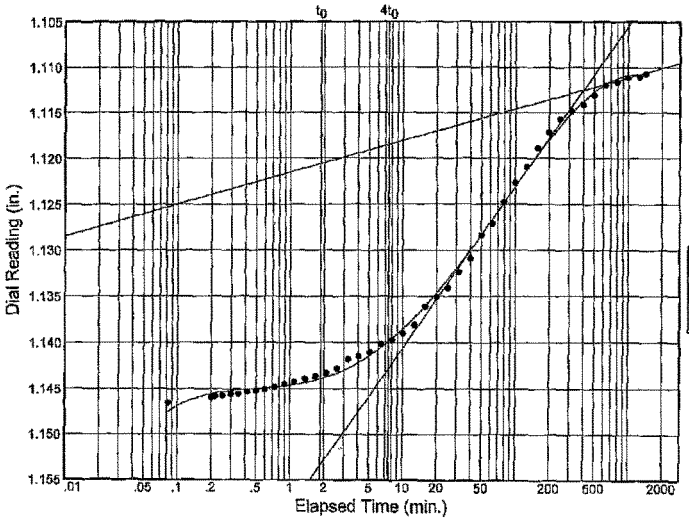
Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-01U Sample No.: 5B Elev./Depth: 16.8



Load No.= 8
Load= 1.00 tsf
D_0 = 1.17181
D_{50} = 1.16003
D_{100} = 1.14824
T_{50} = 12.16 min.

C_v @ T_{50}
0.02 ft.2/day



Load No.= 9
Load= 0.25 tsf
D_0 = 1.14795
D_{50} = 1.13023
D_{100} = 1.11251
T_{50} = 38.76 min.

C_v @ T_{50}
0.01 ft.2/day

FFEBJV, LLC

Figure

SWELL/CONSOLIDATION TEST DATA

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Contract No. W912P8-07-D-0022
Task Order 135
Project Number: 07-022135

Sample Data

Source: MRGO-01U
Sample No.: 5B
Elev. or Depth: 16.8 **Sample Length(in./cm.):**
Location:
Description: VSO GR CH4 W/ LNS & LYS ML, WD
Liquid Limit: 85 **Plasticity Index:** 61
USCS: CH4 **AASHTO:** **Figure No.:**
Testing Remarks: Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST		AFTER TEST	
Wet w+t	= 180.38 g.	Consolidometer #	= 8	Wet w+t	= 378.68 g.
Dry w+t	= 100.00 g.			Dry w+t	= 286.21 g.
Tare Wt.	= .00 g.	Spec. Gravity	= 2.71	Tare Wt.	= 110.82 g.
Height	= 1.00 in.	Height	= 1.00 in.		
Diameter	= 4.00 in.	Diameter	= 4.00 in.		
Weight	= 316.38 g.	Defl. Table	= n/a		
Moisture	= 80.4 %	Ht. Solids	= 0.3144 in.	Moisture	= 52.7 %
Wet Den.	= 95.7 pcf	Dry Wt.	= 175.35 g.*	Dry Wt.	= 175.39 g.
Dry Den.	= 53.0 pcf	Void Ratio	= 2.190	Void Ratio	= 1.295
		Saturation	= 99.5 %		

*** Initial dry weight used in calculations**

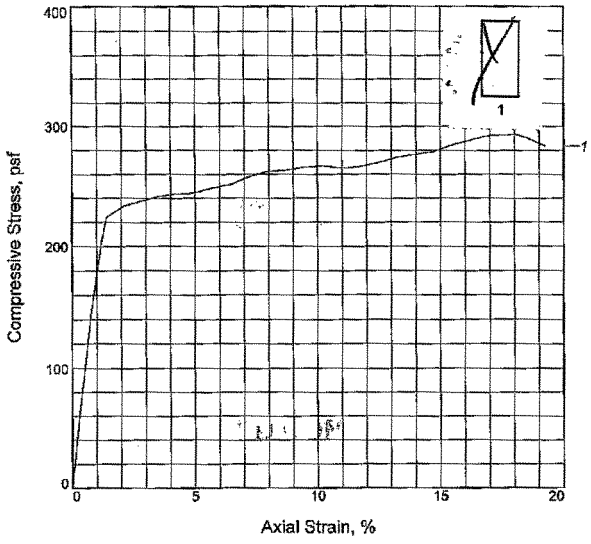
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.82939				2.190	
0.02	0.82936	0.00000			2.190	0.0 Swell
0.13	0.84910	0.00000	0.19	0.002	2.127	2.0 Comprs.
0.25	0.86869	0.00000	0.07	0.004	2.065	3.9 Comprs.
0.50	0.92679	0.00000	0.04	0.013	1.880	9.7 Comprs.
1.00	1.02598	0.00000	0.02	0.016	1.564	19.6 Comprs.
2.00	1.10548	0.00000	0.02	0.014	1.311	27.5 Comprs.
4.00	1.17329	0.00000	0.02	0.013	1.096	34.3 Comprs.
1.00	1.14812	0.00000	0.02		1.176	31.8 Comprs.

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
0.25	1.11070	0.00000	0.01		1.295	28.1 Comprs.

C_c = 1.02 P_c = 0.36 tsf C_r = 0.17

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	279			
Undrained shear strength, psf	139			
Failure strain, %	14.7			
Strain rate, in./min.	1.000			
Water content, %	86.1			
Wet density, pcf	95.4			
Dry density, pcf	51.3			
Saturation, %	101.0			
Void ratio	2.3364			
Specimen diameter, in.	1.407			
Specimen height, in.	3.096			
Height/diameter ratio	2.20			

Description: VSO GR CH4 W/ LNS & LYS ML, WD, CC

LL = 95	**PL** = 26	**PI** = 69	**Assumed GS=** 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 10/7/09
Remarks:

Figure _____

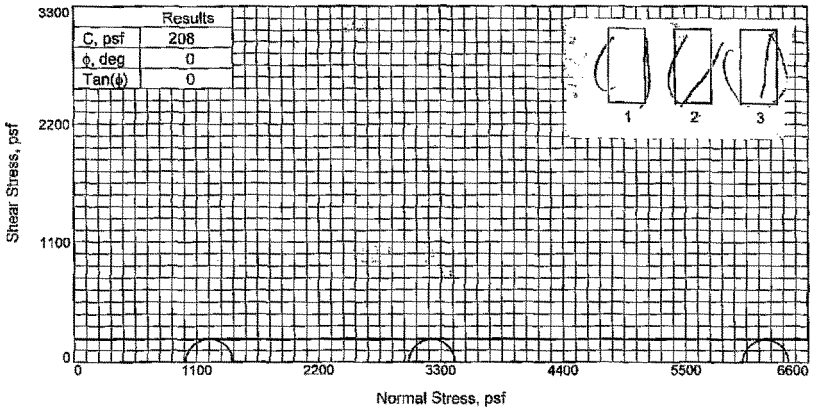
Client: U.S. Army Corps of Engineers

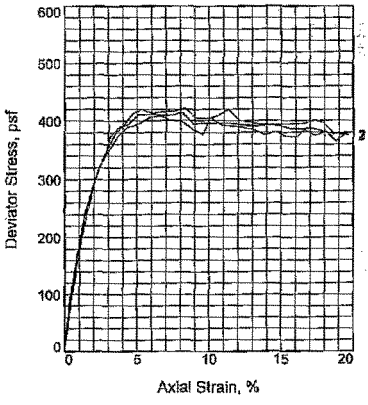
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-1U **Depth:** 17.7
Sample Number: 5C

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: JC/ARS **Checked By:** TSL





Sample No.		1	2	3
Initial	Water Content, %	54.2	54.6	62.0
	Dry Density, pcf	69.0	68.6	64.2
	Saturation, %	100.4	100.3	102.0
	Void Ratio	1.4773	1.4924	1.6654
	Diameter, in.	1.400	1.400	1.400
	Height, in.	3.089	3.091	3.087
At Test	Water Content, %	54.2	54.6	62.0
	Dry Density, pcf	69.0	68.6	64.2
	Saturation, %	100.4	100.3	102.0
	Void Ratio	1.4773	1.4924	1.6654
	Diameter, in.	1.400	1.400	1.400
	Height, in.	3.089	3.091	3.087
Strain rate, in./min.		1.000	1.000	1.000
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.96	20.90	41.76
Fail. Stress, psf		421	414	411
Strain, %		8.3	8.1	5.8
Ult. Stress, psf		392	391	373
Strain, %				
σ_1 Failure, psf		1422	3423	6424
σ_3 Failure, psf		1002	3010	6014

Type of Test: Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: VSO GR CH3 W/ LNS & LYS ML

LL= 59 **PL=** 23 **PI=** 36
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

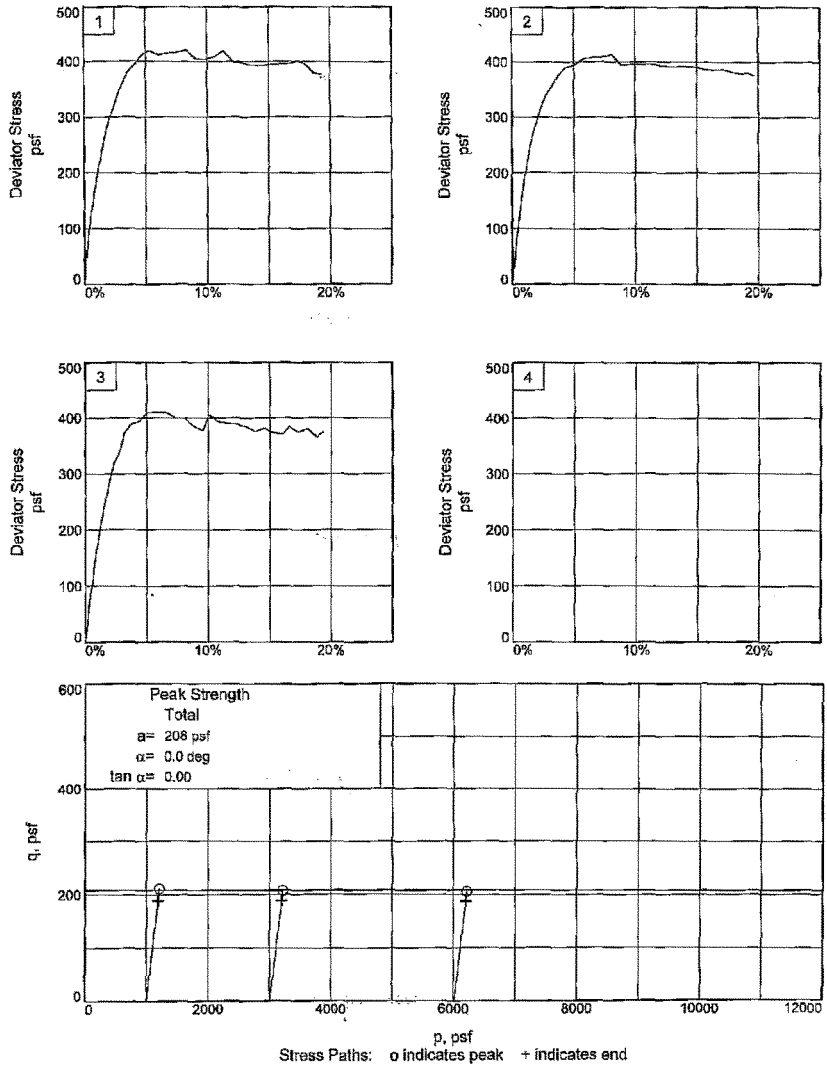
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-1U **Depth:** 21.7
Sample Number: 6C
Proj. No.: 07-022135 **Date Sampled:** 10/7/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

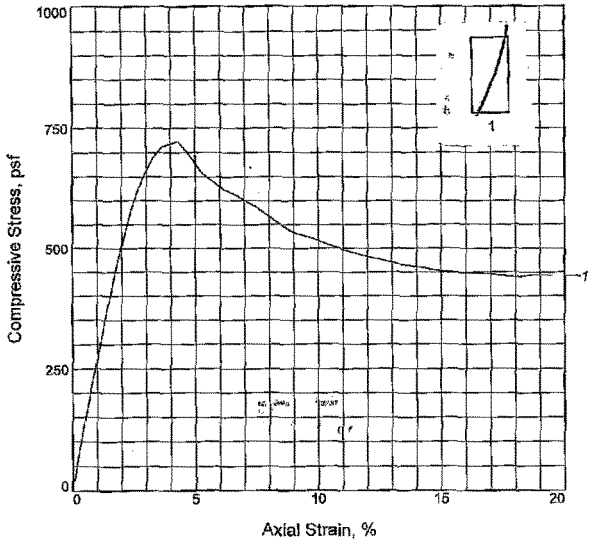
Tested By: JC/ARS **Checked By:** TSL



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-1U **Depth:** 21.7 **Sample Number:** 6C
Project No.: 07-022135 **Figure** _____ FFEBJV, LLC

Tested By: JC/ARS **Checked By:** TSL

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	722			
Undrained shear strength, psf	361			
Failure strain, %	4.3			
Strain rate, in./min.	1.000			
Water content, %	74.6			
Wet density, pcf	97.8			
Dry density, pcf	56.0			
Saturation, %	99.5			
Void ratio	2.0552			
Specimen diameter, in.	1.405			
Specimen height, in.	3.108			
Height/diameter ratio	2.21			

Description: *SO GR CH4 W/ LNS & LYS ML*

LL = 93	PL = 27	PI = 66	**Assumed GS=** 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 10/7/09
Remarks:

Figure _____

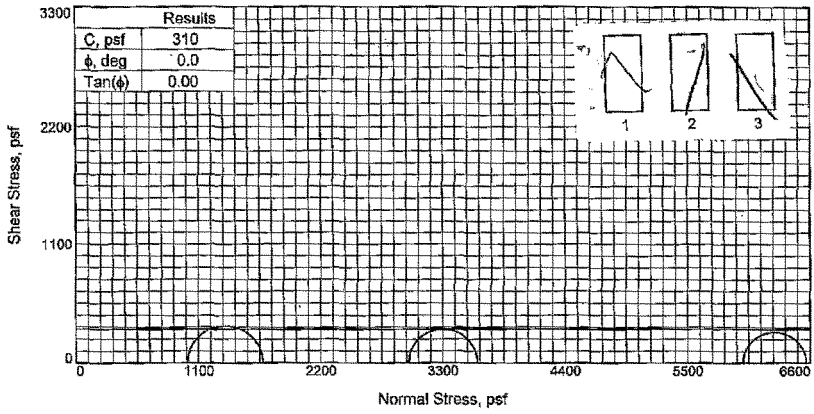
Client: U.S. Army Corps of Engineers

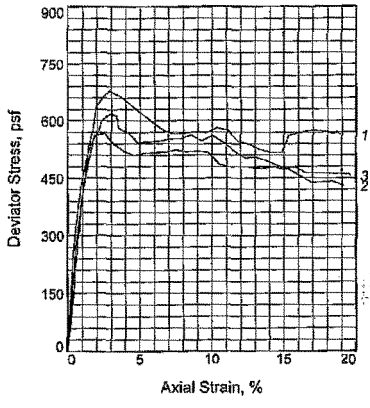
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-1U **Depth:** 28.8
Sample Number: 8B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: JC/ARS **Checked By:** TSL





Sample No.		1	2	3
Initial	Water Content, %	77.0	77.8	75.7
	Dry Density, pcf	54.6	54.3	55.0
	Saturation, %	98.9	99.2	98.3
	Void Ratio	2.1319	2.1492	2.1106
	Diameter, in.	1.414	1.412	1.412
	Height, in.	3.104	3.107	3.109
At Test	Water Content, %	77.0	77.8	75.7
	Dry Density, pcf	54.6	54.3	55.0
	Saturation, %	98.9	99.2	98.3
	Void Ratio	2.1319	2.1492	2.1106
	Diameter, in.	1.414	1.412	1.412
	Height, in.	3.104	3.107	3.109
Strain rate, in./min.		1.000	1.000	1.000
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.95	20.78	41.66
Fail. Stress, psf		678	619	566
Strain, %		2.9	2.9	2.6
Ult. Stress, psf		517	472	472
Strain, %				
σ_1 Failure, psf		1679	3612	6566
σ_3 Failure, psf		1001	2993	5999

Type of Test: Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CH4 W/ LNS & LYS ML

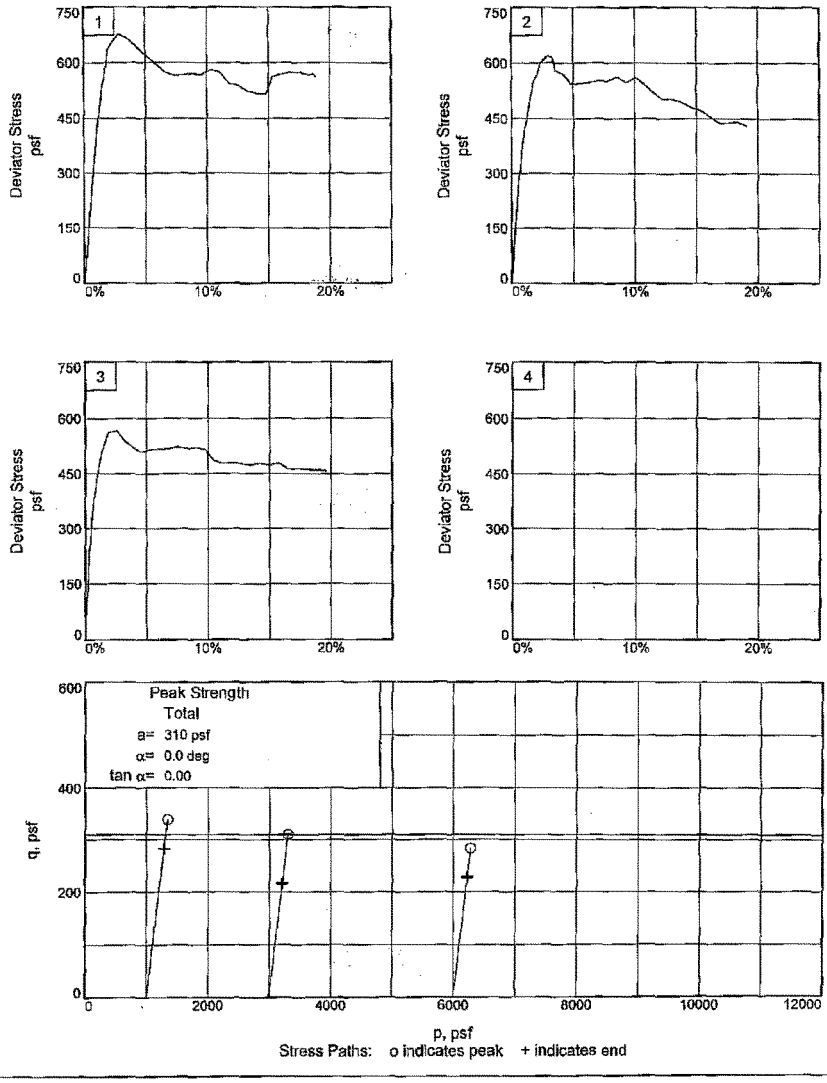
LL= 100 **PL=** 29 **PI=** 71
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-1U **Depth:** 32.8
Sample Number: 9B
Proj. No.: 07-022135 **Date Sampled:** 10/7/09

TRIAXIAL SHEAR TEST REPORT
FFEBJV, LLC

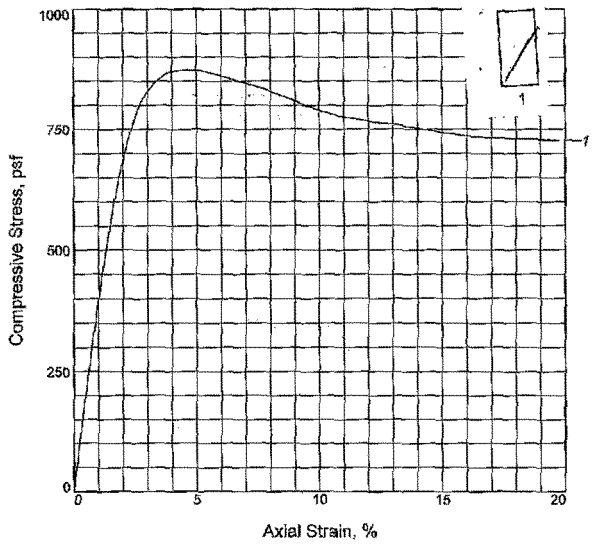
Tested By: JC/ARS **Checked By:** TSL



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-1U **Depth:** 32.8 **Sample Number:** 9B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: JC/ARS **Checked By:** TSL

UNCONFINED COMPRESSION TEST



Sample No.	1				
Unconfined strength, psf	873				
Undrained shear strength, psf	437				
Failure strain, %	4.6				
Strain rate, in./min.	1.000				
Water content, %	53.1				
Wet density, pcf	105.6				
Dry density, pcf	69.0				
Saturation, %	99.3				
Void ratio	1.4436				
Specimen diameter, in.	1.408				
Specimen height, in.	3.106				
Height/diameter ratio	2.21				

Description: SO GR CH2 W/ LNS & LYS ML

LL = 51	PL = 22	PI = 29	Assumed GS= 2.70	Type: UNDISTURBED

Project No.: 07-022135
Date Sampled: 10/7/09
Remarks:

Figure _____

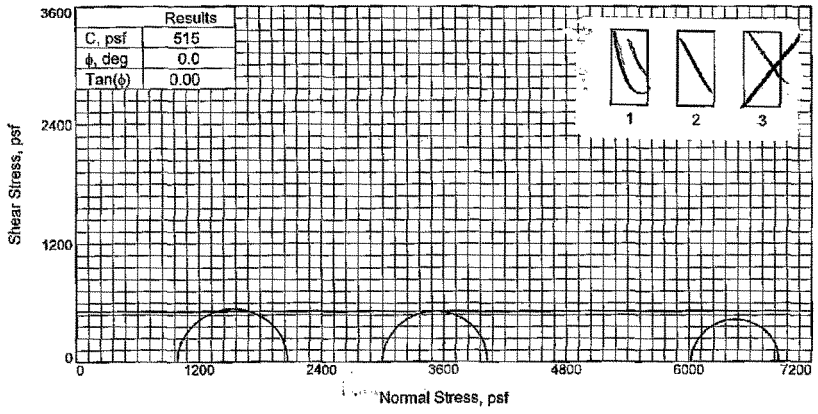
Client: U.S. Army Corps of Engineers

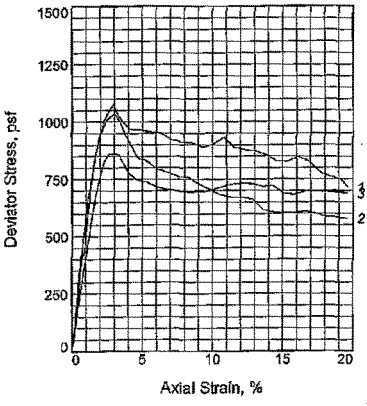
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-1U **Depth:** 36.8
Sample Number: 10B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: JC/ARS **Checked By:** TSL





Sample No.		1	2	3
Initial	Water Content, %	65.9	68.5	67.2
	Dry Density, pcf	60.0	59.0	59.0
	Saturation, %	97.5	98.8	97.0
	Void Ratio	1.8518	1.9015	1.8974
	Diameter, in.	1.411	1.414	1.414
	Height, in.	3.111	3.107	3.112
At Test	Water Content, %	65.9	68.5	67.2
	Dry Density, pcf	60.0	59.0	59.0
	Saturation, %	97.5	98.8	97.0
	Void Ratio	1.8518	1.9015	1.8974
	Diameter, in.	1.411	1.414	1.414
	Height, in.	3.111	3.107	3.112
Strain rate, in./min.		1.000	1.000	1.000
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.88	20.82	41.82
Fail. Stress, psf		1079	1031	861
Strain, %		2.9	3.0	2.6
Ult. Stress, psf		826	605	687
Strain, %				
σ_1 Failure, psf		2069	4030	6883
σ_3 Failure, psf		990	2998	6022

Type of Test: Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: M GR CH4 W/ LNS & LYS ML

LL= 90 **PL=** 28 **PI=** 62
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

Client: U.S. Army Corps of Engineers

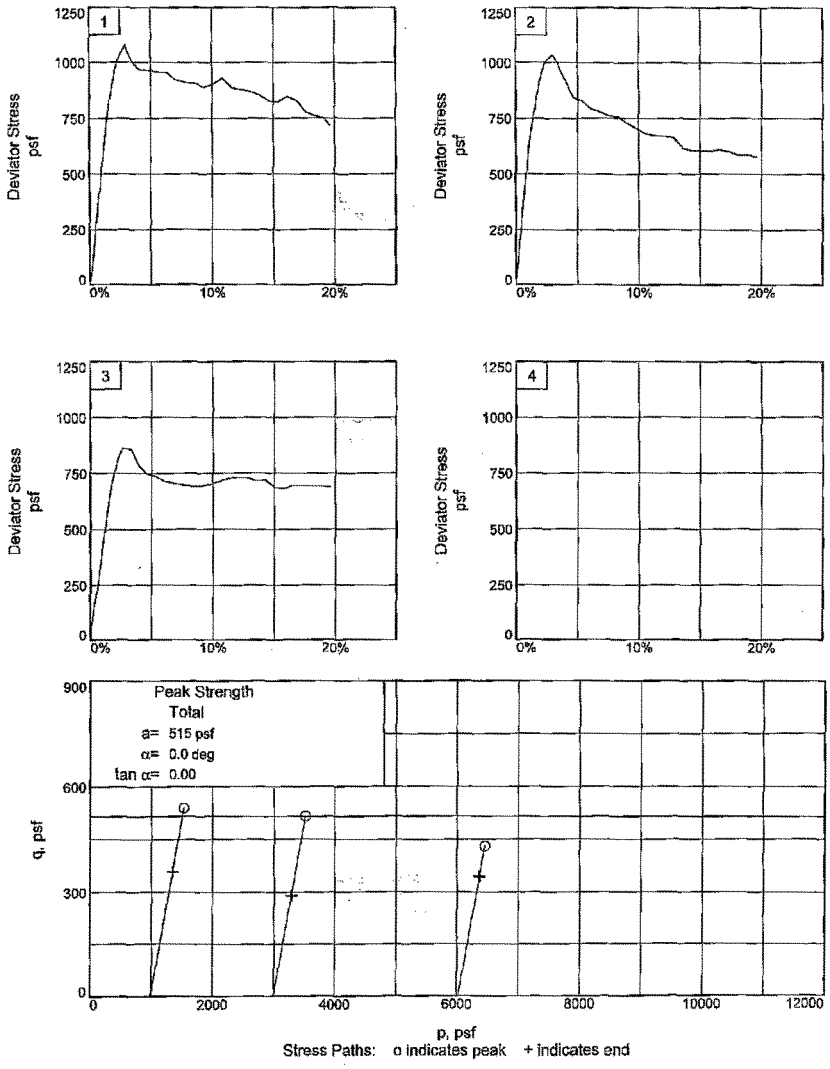
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La

Source of Sample: MRGO-1U **Depth:** 40.8
Sample Number: 11B
Proj. No.: 07-022135 **Date Sampled:** 10/7/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

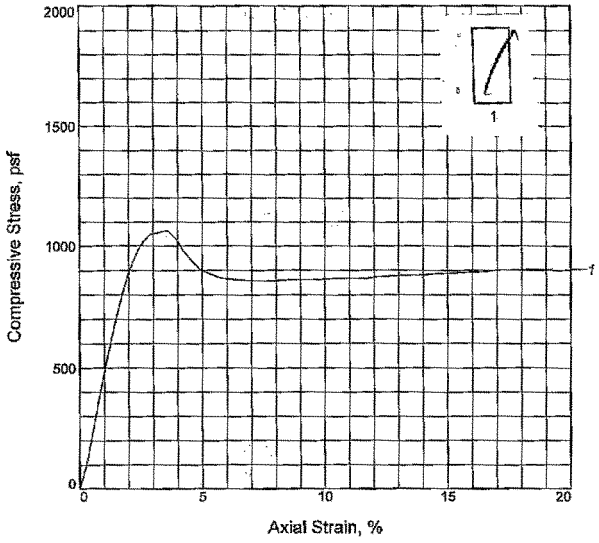
Tested By: JC/ARS **Checked By:** TSL



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-1U **Depth:** 40.8 **Sample Number:** 11B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: JC/ARS **Checked By:** TSL

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	1065			
Undrained shear strength, psf	533			
Failure strain, %	3.6			
Strain rate, in./min.	1.000			
Water content, %	50.4			
Wet density, pcf	106.2			
Dry density, pcf	70.6			
Saturation, %	97.1			
Void ratio	1.4232			
Specimen diameter, in.	1.413			
Specimen height, in.	3.118			
Height/diameter ratio	2.21			

Description: M GR CH3 W/ LNS ML

LL = 66	PL = 23	PI = 43	**Assumed GS=** 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled:
Remarks:

Figure _____

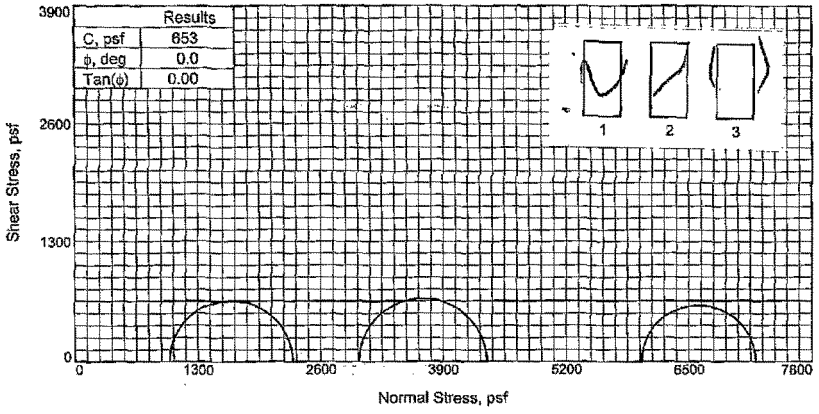
Client: U.S. Army Corps of Engineers

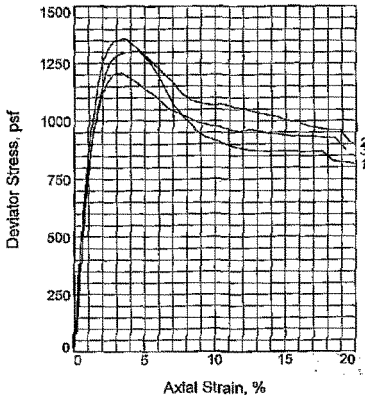
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-1U **Depth:** 44.8
Sample Number: 12B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: ARS/JC **Checked By:** TSL





Sample No.		1	2	3
Initial	Water Content, %	54.7	53.9	54.4
	Dry Density, pcf	67.1	68.0	67.3
	Saturation, %	96.6	97.4	96.8
	Void Ratio	1.5511	1.5154	1.5410
	Diameter, in.	1.419	1.414	1.414
	Height, in.	3.109	3.105	3.111
At Test	Water Content, %	54.7	53.9	54.4
	Dry Density, pcf	67.1	68.0	67.3
	Saturation, %	96.6	97.4	96.8
	Void Ratio	1.5511	1.5154	1.5410
	Diameter, in.	1.419	1.414	1.414
	Height, in.	3.109	3.105	3.111
Strain rate, in./min.		1.000	1.000	1.000
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.94	20.87	41.67
Fail. Stress, psf		1305	1358	1207
Strain, %		4.6	3.5	3.4
Ult. Stress, psf		866	1001	933
Strain, %				
σ_1 Failure, psf		2305	4363	7208
σ_3 Failure, psf		1000	3005	6001

Type of Test: Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: M GR CH4 W/ ARS SM

LL= 76 **PL=** 25 **PI=** 51
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

Client: U.S. Army Corps of Engineers

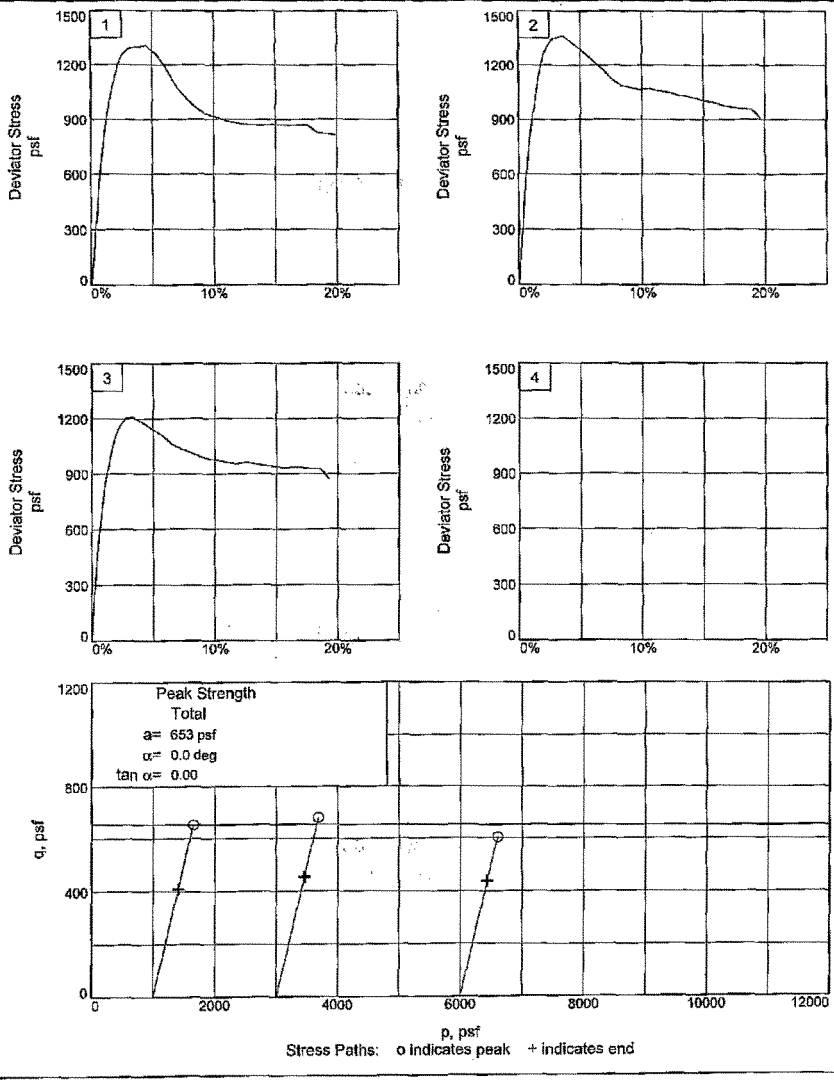
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La

Source of Sample: MRGO-1U **Depth:** 49.7
Sample Number: 13C
Proj. No.: 07-022135 **Date Sampled:** 10/7/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

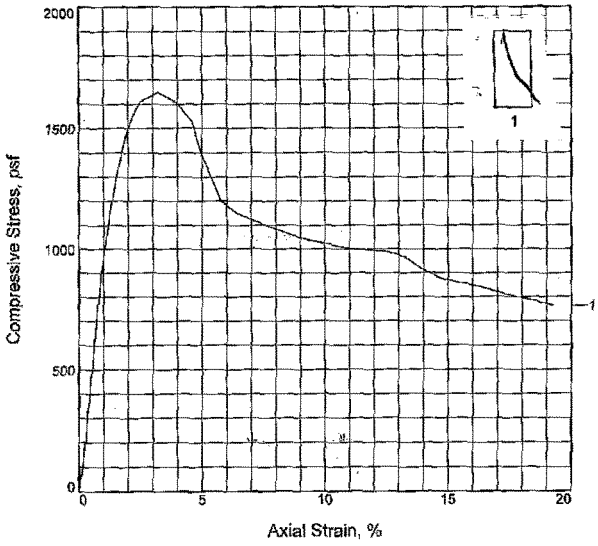
Tested By: JC/ARS **Checked By:** TSL



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-1U **Depth:** 49.7 **Sample Number:** 13C
Project No.: 07-022135 **Figure** _____ FFEBJV, LLC

Tested By: JC/ARS **Checked By:** TSL

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	1647			
Undrained shear strength, psf	824			
Failure strain, %	3.2			
Strain rate, in./min.	1.000			
Water content, %	57.9			
Wet density, pcf	103.5			
Dry density, pcf	65.5			
Saturation, %	98.5			
Void ratio	1.6109			
Specimen diameter, in.	1.413			
Specimen height, in.	3.104			
Height/diameter ratio	2.20			

Description: M GR CH4 W/ LNS & LYS ML

LL = 94	PL = 28	PI = 66	Assumed GS= 2.74	Type: UNDISTURBED

Project No.: 07-022135
Date Sampled: 10/7/09
Remarks:

Client: U.S. Army Corps of Engineers

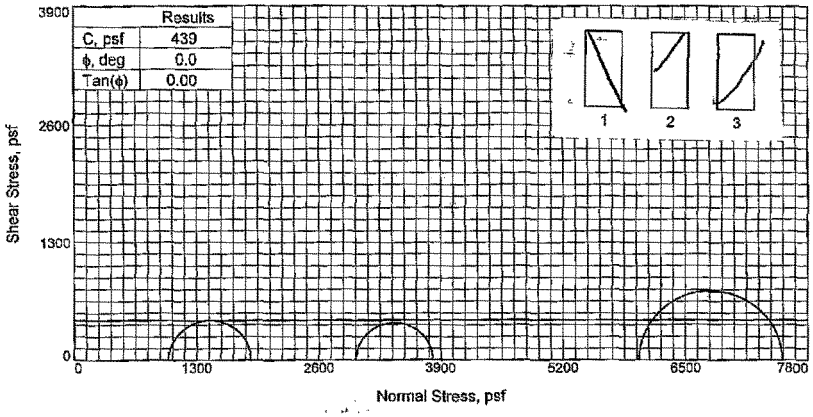
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-1U **Depth:** 53.7
Sample Number: 14C

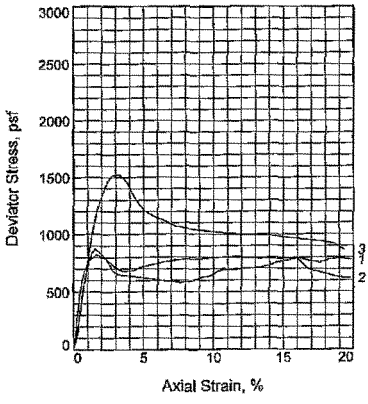
UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Figure _____

Tested By: JC/ARS **Checked By:** TSL





Sample No.		1	2	3
Initial	Water Content, %	63.8	64.8	62.4
	Dry Density, pcf	61.2	61.0	62.2
	Saturation, %	97.4	98.5	97.8
	Void Ratio	1.7958	1.8027	1.7480
	Diameter, in.	1.412	1.412	1.408
	Height, in.	3.110	3.105	3.116
At Test	Water Content, %	63.8	64.8	62.4
	Dry Density, pcf	61.2	61.0	62.2
	Saturation, %	97.4	98.5	97.8
	Void Ratio	1.7958	1.8027	1.7480
	Diameter, in.	1.412	1.412	1.408
	Height, in.	3.110	3.105	3.116
Strain rate, in./min.		1.000	1.000	1.000
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.95	20.78	41.71
Fail. Stress, psf		875	820	1525
Strain, %		1.5	1.7	3.3
Ult. Stress, psf		579	677	980
Strain, %				
σ_1 Failure, psf		1875	3812	7532
σ_3 Failure, psf		1001	2992	6006

Type of Test: Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CH4 W/ LNS ML

LL= 98 PL= 30 PI= 68
Assumed Specific Gravity= 2.74
Remarks:

Client: U.S. Army Corps of Engineers

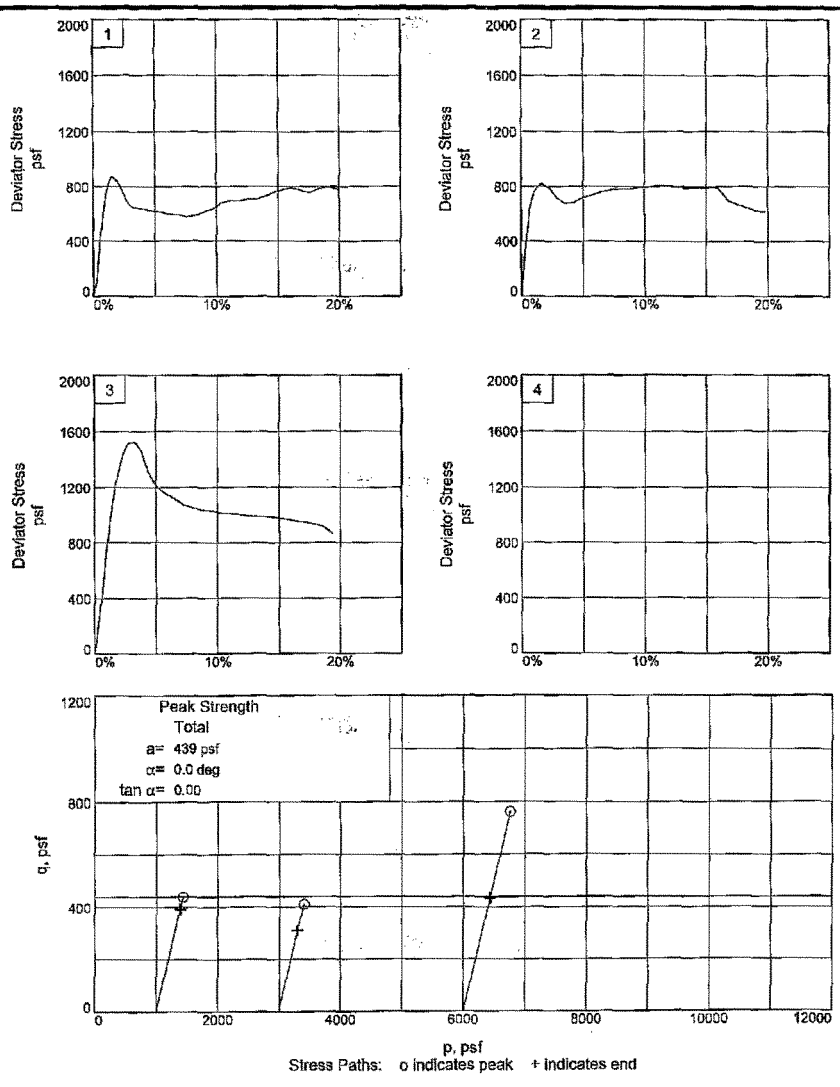
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-1U **Depth:** 57.7
Sample Number: 15C
Proj. No.: 07-022135 **Date Sampled:** 10/7/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

Figure _____

Tested By: JC/ARS **Checked By:** TSL



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-1U **Depth:** 57.7 **Sample Number:** 15C
Project No.: 07-022135 **Figure** _____ FFEBJV, LLC

Tested By: JC/ARS **Checked By:** TSL

SUMMARY OF LABORATORY TEST RESULTS

Project: MRGO Ecosystem Restoration Feasibility Study Assigned By: _____

Project Number: 07-022135 Current Date: 11/30/2009
Boring: MRGO-2U

Sample Number	Depth	Visual Classification	USCS	E(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
1A	0.0	VSO DGR PT W/ RT, WD	PT		213												
1B	0.8	VSO DGR CHOB W/ RT, WD	CHOB		161												
1C	1.7	VSO DGR CHOB W/ RT, WD	CHOB		171												
1D	2.6	VSO DGR CHOC W/ RT, WD	CHOC		199												
2A	4.0	VSO DGR CHOA W/ WD	CHOA		107												
2B	4.8	VSO DGR CHOC W/ WD	CHOC		128								188	46	142		NOT TESTABLE
2C	5.7	VSO DGR CHOA W/ WD	CHOA		138	36	86	100	UU	0	79		148	30	118	0.10	
2D	6.6	VSO DGR PT W/ WD	PT		225												
3A	8.0	VSO DGR PT W/ WD	PT		231												
3B	8.8	VSO DGR CHOA W/ WD, RT	CHOA		164	30	80	98					141	33	108		Gs, CON
3C	9.7	VSO DGR PT W/ WD	PT		209												
3D	10.6	VSO DGR PT W/ WD	PT		241												
4A	12.0	VSO GR CH4 W/ LNS & LYS ML	CH4		76												
4B	12.8	VSO GR CH4 W/ LNS & LYS ML	CH4	15	89	50	95	100	UC	-	100	202	75	26	49	0.11	
4C	13.7	VSO GR CH4 W/ LNS & LYS ML	CH4		77												
5A	16.0	GR ML W/ LNS & LYS CH	ML		41												
5B	16.8	GR ML W/ LNS & LYS CH	ML		38												SV
5C	17.7	GR ML W/ LNS & LYS CH	ML		41												
6A	20.0	GR ML W/ LNS & LYS CH	ML		27												
6B	20.8	GR ML W/ LNS & LYS CH	ML		27												
6C	21.7	GR ML W/ LNS & LYS CH	ML		29												
7A	24.0	GR ML W/ LNS & LYS CH	ML		30												
7B	24.8	VSO GR CL6 W/ LNS & LYS ML	CL6		46	75	109	97	UU	0	219		48	21	27	0.13	
7C	25.7	SO GR CL6 W/ LNS & LYS CH	CL6		45												
7D	26.6	SO GR CL6 W/ LNS & LYS CH	CL6		37												
8A	28.0	SO GR CL4	CL4		36												
8B	28.8	VSO GR CL W/ ARS CH	CL		35	85	115	96					34	25	9		Gs, CON
8C	29.7	SO GR CL4	CL4	14	34	87	117	99	UC	-	367	734	37	22	15	0.22	
8D	30.6	SO GR CL4	CL4		36												
9A	32.0	GR ML	ML		29												
9B	32.8	SO GR CL4 W/ LNS & LYS ML	CL4		40	80	112	99	UU	0	370		41	25	16	0.21	
9C	33.7	SO GR CL6 W/ LNS & LYS CH	CL6		38												
10A	36.0	SO GR CH2	CH2		39												
10B	36.8	SO GR CL6	CL6	15	38	83	114	98	UC	-	355	711	46	19	27	0.23	
10C	37.7	SO GR CH2	CH2		41												
10D	38.6	SO GR CH2	CH2		41												

Remarks: _____
FFEB JV, LLC

Checked By: MS/TB
File Name: MRGO-02U.xls

SUMMARY OF LABORATORY TEST RESULTS

Project: MRGO Ecosystem Restoration Feasibility Study Assigned By: _____

Project Number: 07-022135
Boring: MRGO-2U

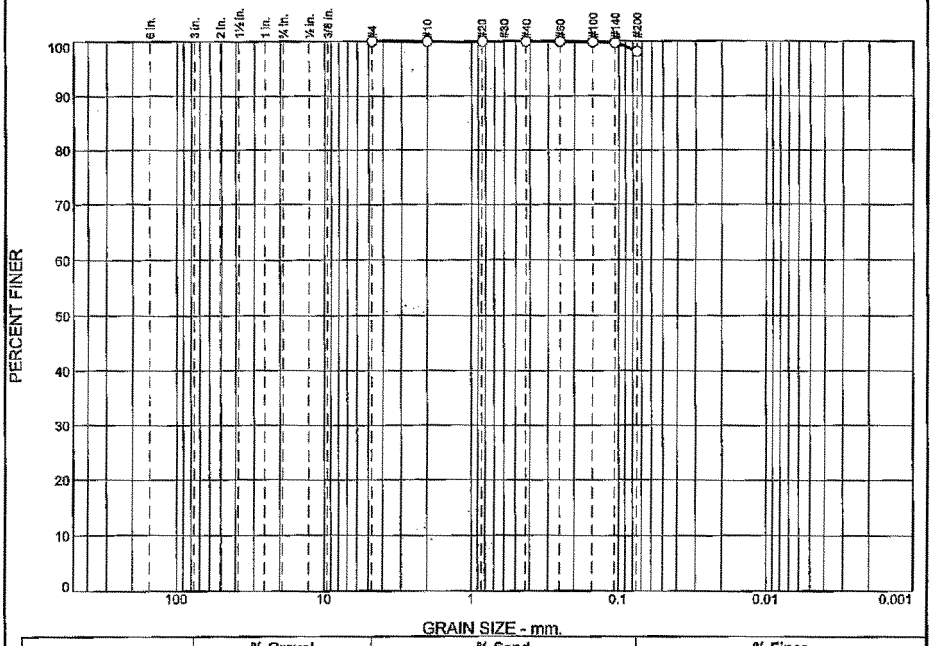
Current Date: 11/30/2009

Sample Number	Depth	Visual Classification	USCS	E(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
11A	40.0	SO GR CH2 W/ LNS & LYS ML	CH2		42												
11B	40.8	SO GR CH2 W/ LNS & LYS ML	CH2		41	80	112	99	UU	0	429		50	21	29	0.28	
11C	41.7	SO GR CH2 W/ LNS & LYS ML	CH2		41												
11D	42.6	SO GR CH2 W/ ARS ML	CH2		40												
12A	44.0	SO GR CH2	CH2		42												
12B	44.8	SO GR CH2	CH2	15	41	79	111	97	UC	-	253	506	55	21	34	0.20	
12C	45.7	SO GR CH2	CH2		42												
12D	46.6	SO GR CH2	CH2		39												
13A	48.0	M GR CH4 W/ LNS & LYS ML	CH4		59												
13B	48.8	M GR CH4 W/ LNS & LYS ML	CH4		57	66	103	97	UU	0	775		86	25	61	0.32	
13C	49.7	M GR CH4 W/ LNS & LYS ML	CH4		60												
13D	50.6	M GR CH4 W/ LNS & LYS ML	CH4		59												
14A	52.0	M GR CH4	CH4		58												
14B	52.8	M GR CH4	CH4		58												
14C	53.7	M GR CH4	CH4		58												
14D	54.6	M GR CH4	CH4		56												
15A	56.0	M GR CH4	CH4		58												
15B	56.8	SO GR CH4	CH4	15	57	64	101	94	UC	-	322	645	87	28	59	0.25	
15C	57.7	M GR CH4	CH4		63												
15D	58.6	M GR CH4	CH4		62												

Remarks: _____
FFEB JV, LLC

Checked By: MS/TB
File Name: MRGO-02U.xls

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
o	0.0	0.0	0.0	0.0	0.1	1.9	98.0	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o										

Material Description	USCS	AASHTO
o GR ML W/ LNS & LYS CH	ML	

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

Project: USACE - MRGO Ecosystem Restoration Feasibility Study

St.Bernard Parish, La

o **Source of Sample:** MRGO-2U **Depth:** 16.8 **Sample Number:** 5B

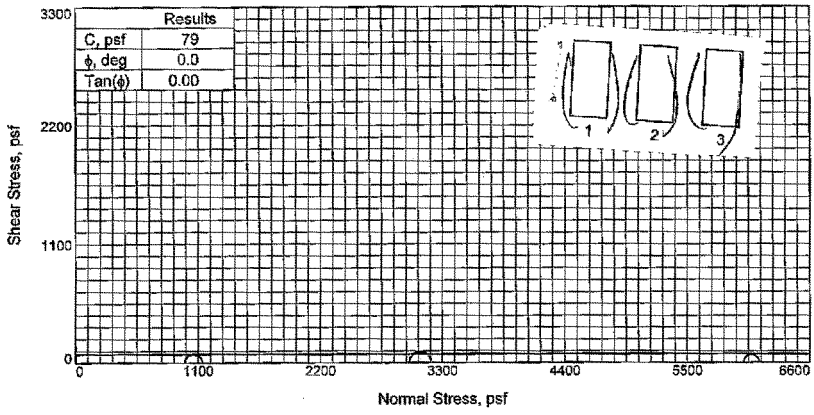
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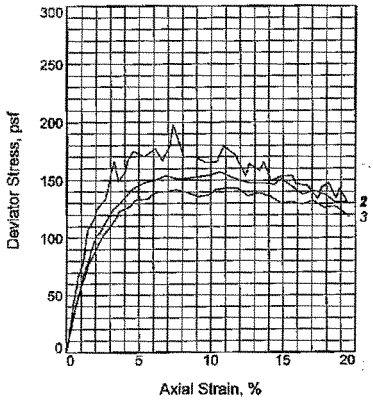
FFEBJV, LLC

St Rose, LA

Figure

Tested By: ACN **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	137.4	148.1	128.0
	Dry Density, pcf	36.1	34.2	38.1
	Saturation, %	102.1	102.7	101.9
	Void Ratio	3.4977	3.7512	3.2643
	Diameter, in.	1.390	1.386	1.384
	Height, in.	3.088	3.084	3.075
At Test	Water Content, %	137.4	148.1	128.0
	Dry Density, pcf	36.1	34.2	38.1
	Saturation, %	102.1	102.7	101.9
	Void Ratio	3.4977	3.7512	3.2643
	Diameter, in.	1.390	1.386	1.384
	Height, in.	3.088	3.084	3.075
Strain rate, in./min.		1.000	1.000	1.000
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.81	20.84	41.71
Fail. Stress, psf		157	198	143
Strain, %		10.6	7.4	11.1
Ult. Stress, psf		146	153	130
Strain, %				
σ_1 Failure, psf		1137	3198	6149
σ_3 Failure, psf		980	3000	6006

Type of Test: Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: VSO DGR CHOA W/ WD

LL= 148 **PL=** 30 **PI=** 118
Assumed Specific Gravity= 2.60
Remarks:

Figure _____

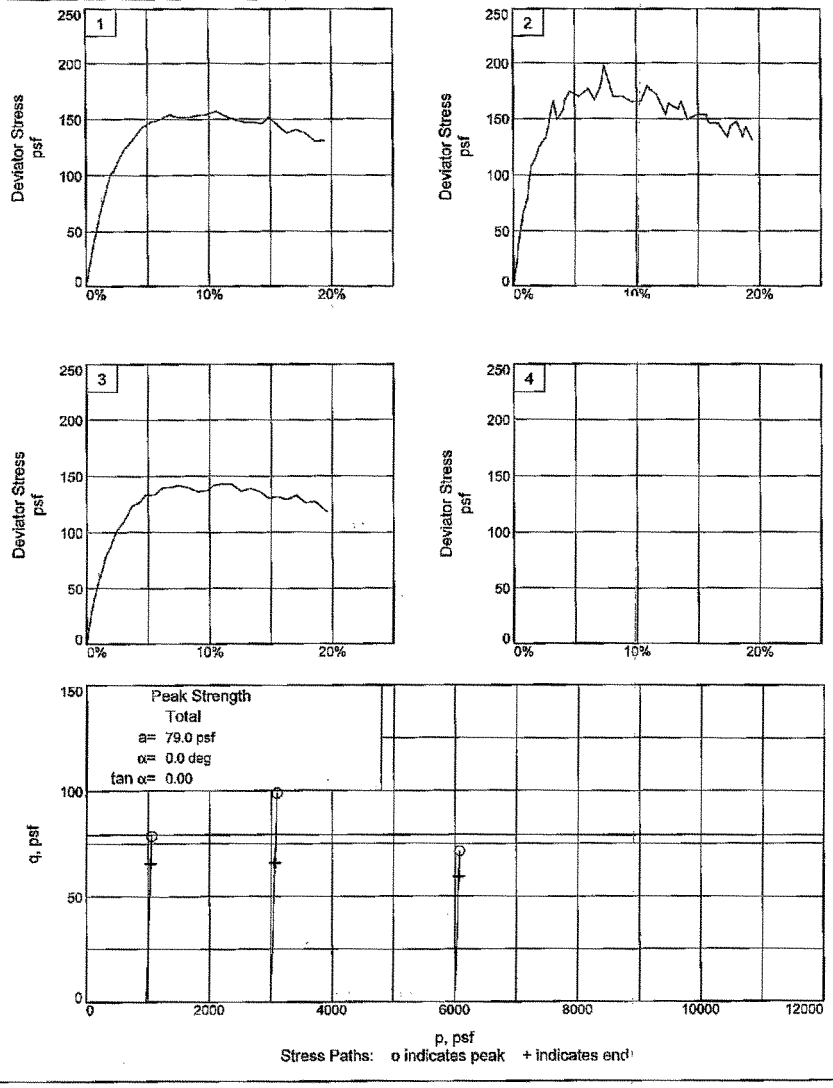
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-2U **Depth:** 5.7
Sample Number: 2C
Proj. No.: 07-022135 **Date Sampled:** 11/10/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

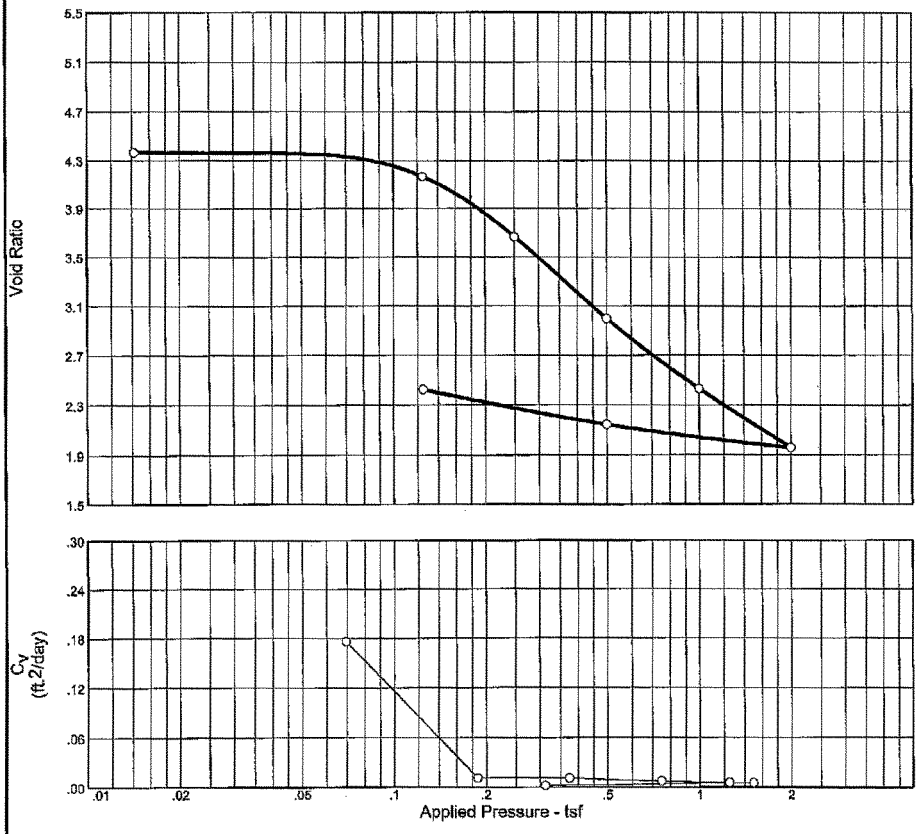
Tested By: ARS/JC **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-2U **Depth:** 5.7 **Sample Number:** 2C
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: ARS/JC **Checked By:** MS

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
98.0 %	163.9 %	30.4	141	108	2.61	0.15	2.17	4.367

MATERIAL DESCRIPTION	USCS	AASHTO
VSO DGR CHOA W/ WD, RT	CHOA	

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

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

Source: MRGO-02U **Sample No.:** 3B **Elev./Depth:** 8.8

FFEBJV, LLC

St Rose, LA

Remarks:

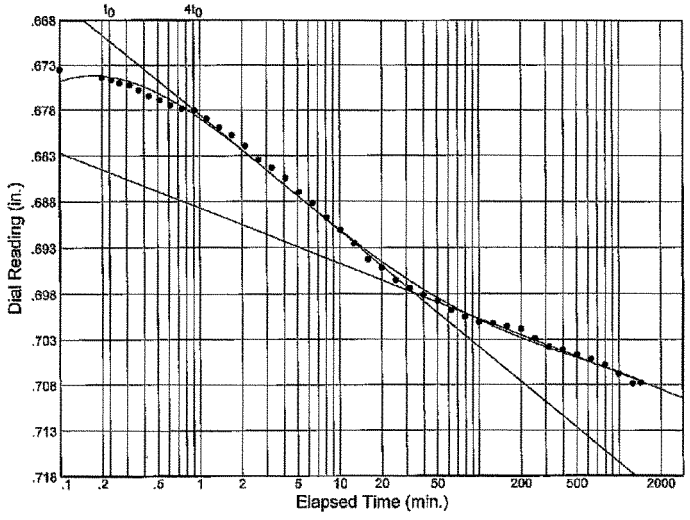
Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

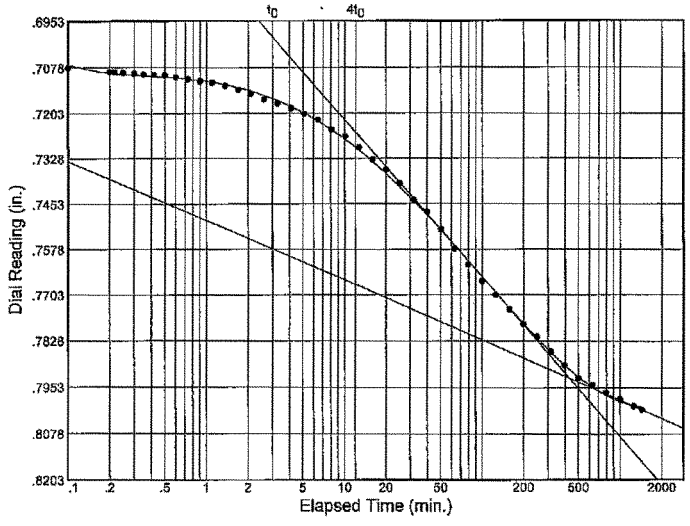
Source: MRGO-02U Sample No.: 3B Elev./Depth: 8.8



Load No.= 2
Load= 0.13 tsf
D_0 = 0.67020
D_{50} = 0.68404
D_{100} = 0.69788
T_{50} = 2.72 min.

C_v @ T_{50}
0.18 ft.2/day

C_α = 0.006



Load No.= 3
Load= 0.25 tsf
D_0 = 0.70267
D_{50} = 0.74769
D_{100} = 0.79271
T_{50} = 38.19 min.

C_v @ T_{50}
0.01 ft.2/day

C_α = 0.017

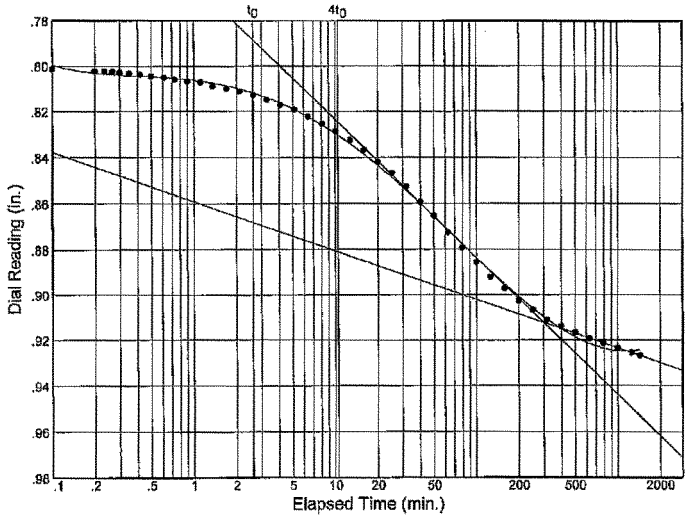
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

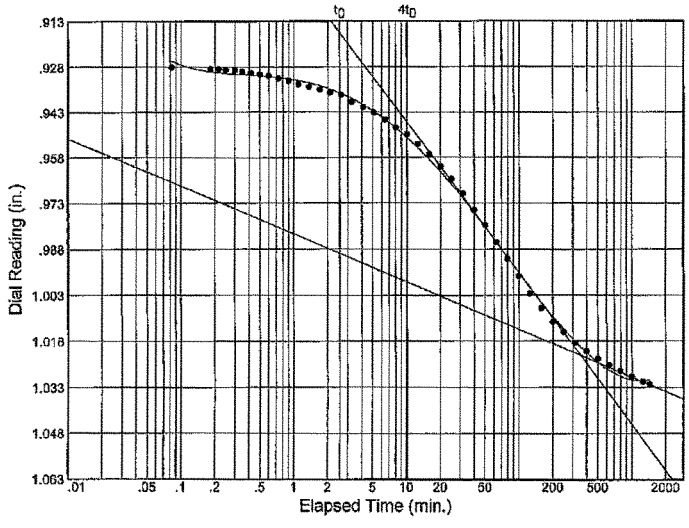
Source: MRGO-02U Sample No.: 3B Elev./Depth: 8.8



Load No.= 4
Load= 0.50 tsf
D_0 = 0.79341
D_{50} = 0.85279
D_{100} = 0.91216
T_{50} = 29.91 min.

C_v @ T_{50}
0.01 ft.^{2}/day

C_α = 0.024



Load No.= 5
Load= 1.00 tsf
D_0 = 0.92168
D_{50} = 0.97217
D_{100} = 1.02267
T_{50} = 32.84 min.

C_v @ T_{50}
0.01 ft.^{2}/day

C_α = 0.021

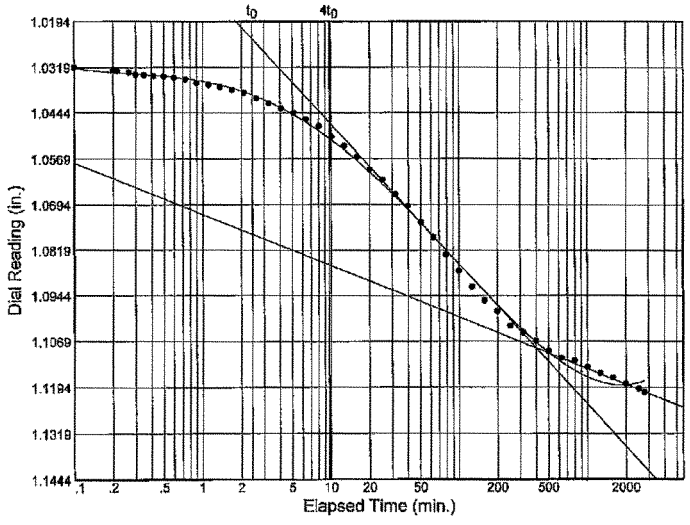
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

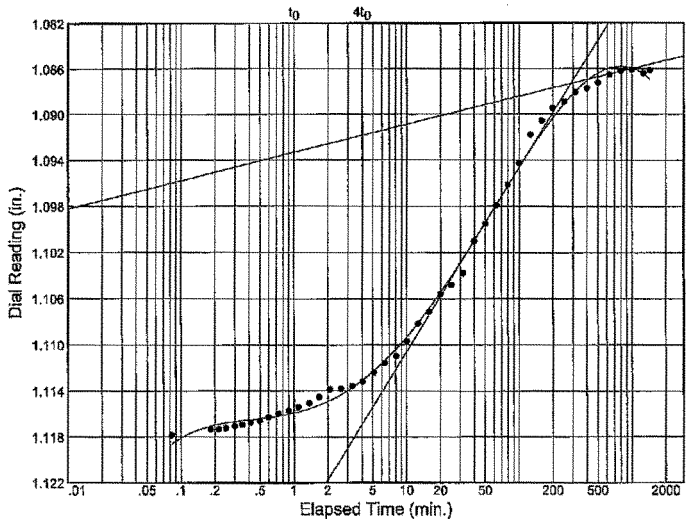
Source: MRGO-02U Sample No.: 3B Elev./Depth: 8.8



Load No.= 6
Load= 2.00 tsf
D_0 = 1.02767
D_{50} = 1.06818
D_{100} = 1.10869
T_{50} = 33.75 min.

C_v @ T_{50}
0.01 ft.^{2}/day

C_α = 0.022



Load No.= 7
Load= 0.50 tsf
D_0 = 1.11876
D_{50} = 1.10304
D_{100} = 1.08731
T_{50} = 29.55 min.

C_v @ T_{50}
0.01 ft.^{2}/day

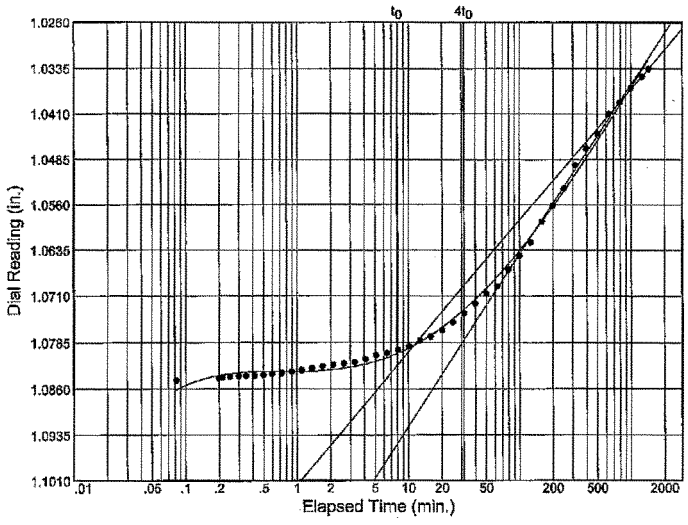
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-02U Sample No.: 3B Elev./Depth: 8.8



Load No.= 8
Load= 0.13 tsf
D_0 = 1.08738
D_{50} = 1.06346
D_{100} = 1.03953
T_{50} = 101.62 min.

C_v @ T_{50}
0.00 $ft.^2/day$

FFEBJV, LLC

Figure

SWELL/CONSOLIDATION TEST DATA

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Contract No. W912P8-07-D-0022
Task Order 135
Project Number: 07-022135

Sample Data

Source: MRGO-02U
Sample No.: 3B
Elev. or Depth: 8.8 **Sample Length(in./cm.):**
Location:
Description: VSO DGR CHOA W/ WD, RT
Liquid Limit: 141 **Plasticity Index:** 108
USCS: CHOA **AASHTO:** **Figure No.:**
Testing Remarks: Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST	AFTER TEST	
Wet w+t =	263.90 g.	Consolidometer # = 18	Wet w+t =	306.14 g.
Dry w+t =	100.00 g.		Dry w+t =	210.05 g.
Tare Wt. =	.00 g.	Spec. Gravity = 2.61	Tare Wt. =	112.17 g.
Height =	1.00 in.	Height = 1.00 in.		
Diameter =	4.00 in.	Diameter = 4.00 in.		
Weight =	264.83 g.	Defl. Table = n/a		
Moisture =	163.9 %	Ht. Solids = 0.1868 in.	Moisture =	98.2 %
Wet Den. =	80.1 pcf	Dry Wt. = 100.15 g.*	Dry Wt. =	97.88 g.
Dry Den. =	30.4 pcf	Void Ratio = 4.367	Void Ratio =	2.423
		Saturation = 98.0 %		

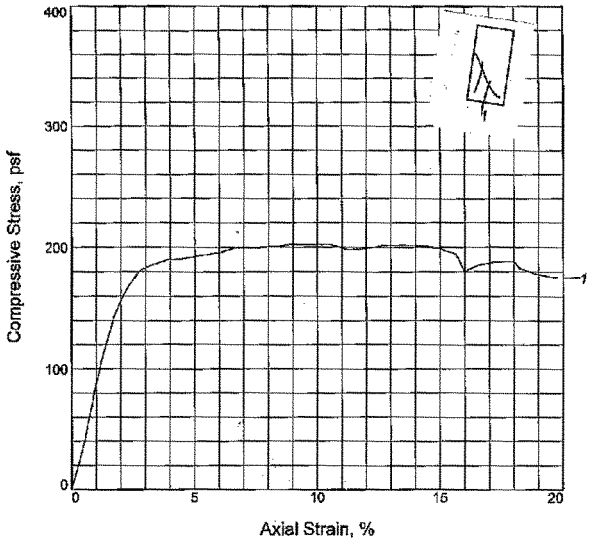
* Initial dry weight used in calculations

End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.67045				4.367	
0.01	0.67042	0.00000			4.367	0.0 Swell
0.13	0.70781	0.00000	0.18	0.006	4.167	3.7 Comprs.
0.25	0.80125	0.00000	0.01	0.017	3.667	13.0 Comprs.
0.50	0.92682	0.00000	0.01	0.024	2.995	25.6 Comprs.
1.00	1.03221	0.00000	0.01	0.021	2.430	36.1 Comprs.
2.00	1.12067	0.00000	0.01	0.022	1.957	44.9 Comprs.
0.50	1.08616	0.00000	0.01		2.142	41.5 Comprs.
0.13	1.03356	0.00000	0.00		2.423	36.2 Comprs.

C_c = 2.17 P_c = 0.15 tsf C_r = 0.39

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	199			
Undrained shear strength, psf	100			
Failure strain, %	15.0			
Strain rate, in./min.	1.000			
Water content, %	89.4			
Wet density, pcf	94.8			
Dry density, pcf	50.1			
Saturation, %	101.4			
Void ratio	2.4169			
Specimen diameter, in.	1.407			
Specimen height, in.	3.099			
Height/diameter ratio	2.20			

Description: VSO GR CH4 W/ LNS & LYS ML

LL = 75	PL = 26	PI = 49	**Assumed GS=** 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 10/6/09
Remarks:

Figure _____

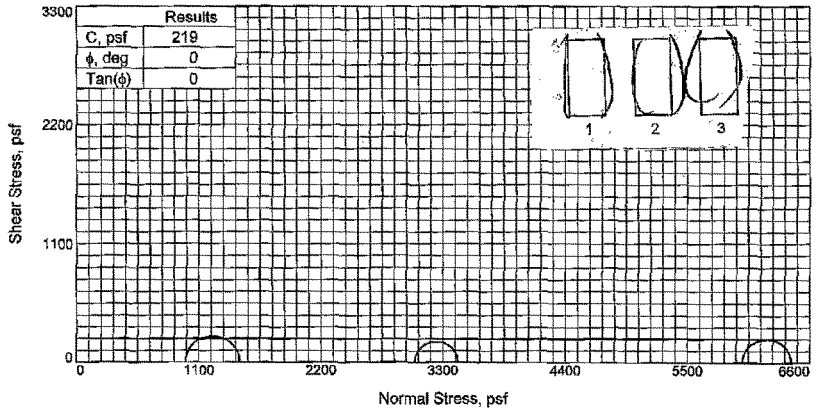
Client: U.S. Army Corps of Engineers

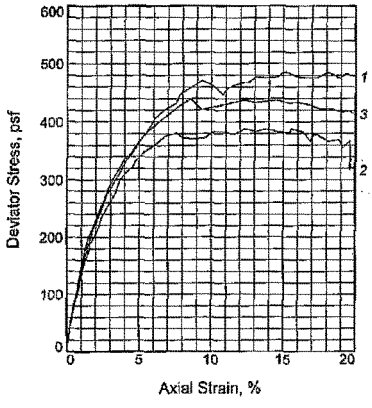
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-2U **Depth:** 12.8
Sample Number: 4B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: JC/ARS **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	44.3	47.5	46.4
	Dry Density, pcf	75.9	73.4	74.2
	Saturation, %	98.1	99.0	98.5
	Void Ratio	1.2196	1.2966	1.2717
	Diameter, in.	1.401	1.406	1.401
	Height, in.	3.099	3.095	3.093
At Test	Water Content, %	44.3	47.5	46.4
	Dry Density, pcf	75.9	73.4	74.2
	Saturation, %	98.1	99.0	98.5
	Void Ratio	1.2196	1.2966	1.2717
	Diameter, in.	1.401	1.406	1.401
	Height, in.	3.099	3.095	3.093
Strain rate, in./min.		1.000	1.000	1.000
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.82	21.17	41.65
Fail. Stress, psf		486	388	439
Strain, %		15.1	13.8	8.6
Ult. Stress, psf		486	381	421
Strain, %				
σ_1 Failure, psf		1468	3436	6437
σ_3 Failure, psf		982	3048	5998

Type of Test: Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: VSO GR CL6 W/ LNS & LYS ML

LL= 48 **PL=** 21 **PI=** 27
Assumed Specific Gravity= 2.70
Remarks:

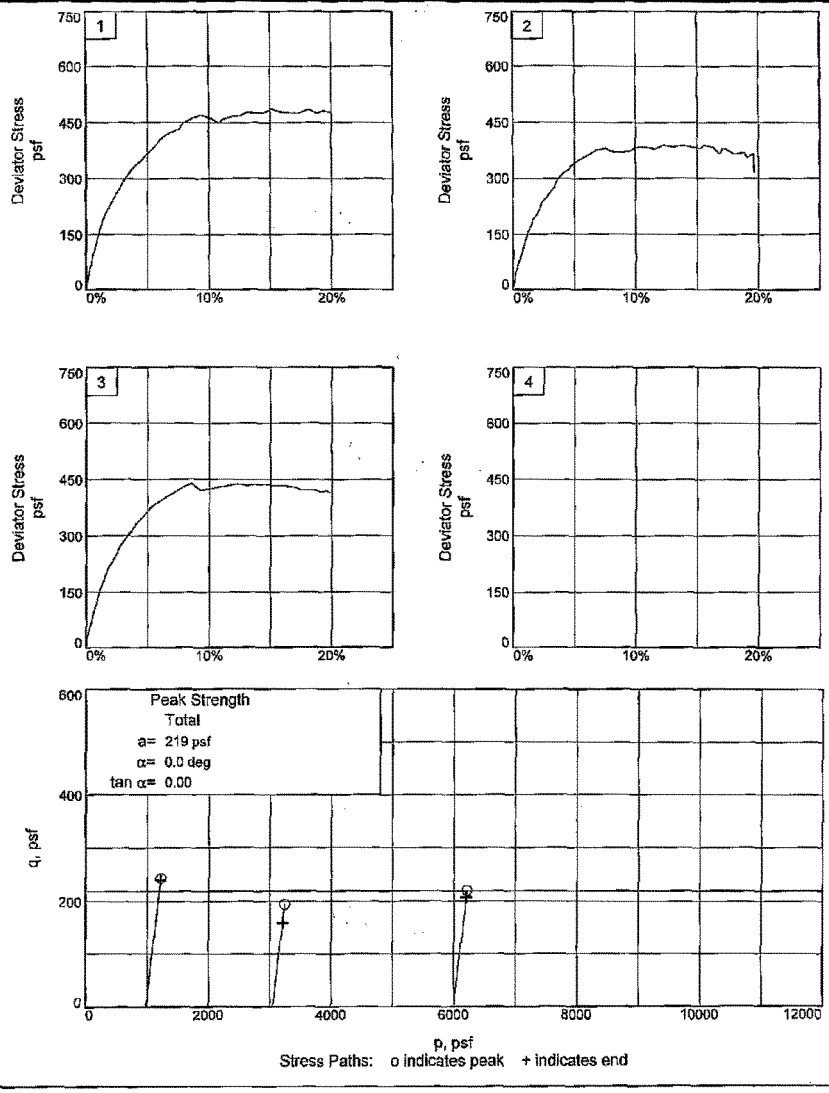
Figure _____

Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-2U **Depth:** 24.8
Sample Number: 7B
Proj. No.: 07-022135 **Date Sampled:** 10/6/09

TRIAXIAL SHEAR TEST REPORT
FFEBJV, LLC

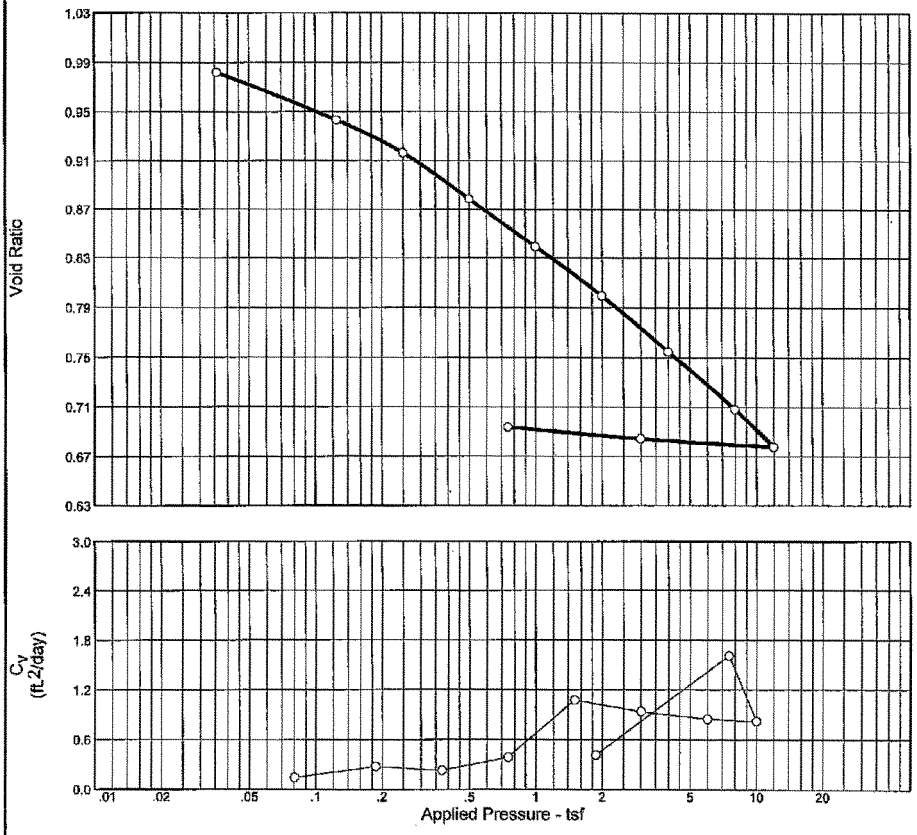
Tested By: JC/ARS **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: *USACE - MRGO Ecosystem Restoration Feasibility Study*
Source of Sample: MRGO-2U **Depth:** 24.8 **Sample Number:** 7B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: JC/ARS **Checked By:** MS

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
96.2 %	35.1 %	84.9	34	9	2.70	0.36	0.15	0.986

MATERIAL DESCRIPTION	USCS	AASHTO
VSO GR CL W/ ARS CH	CL	

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

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

Source: MRGO-02U **Sample No.:** 8B **Elev./Depth:** 28.8

FFEBJV, LLC

St Rose, LA

Remarks:

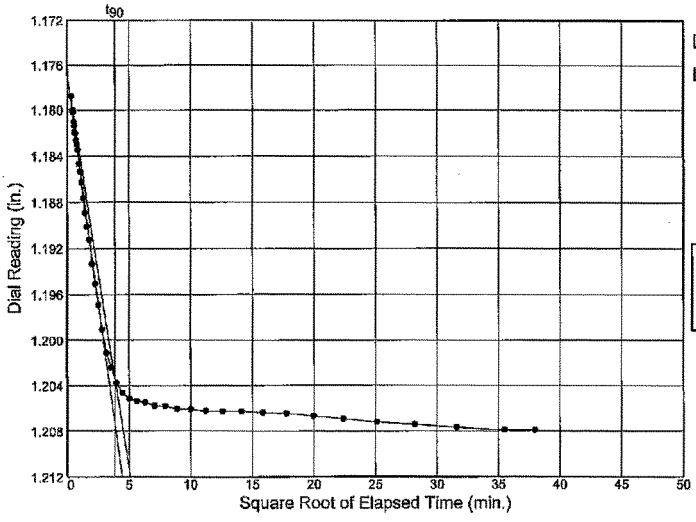
Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

Dial Reading vs. Time

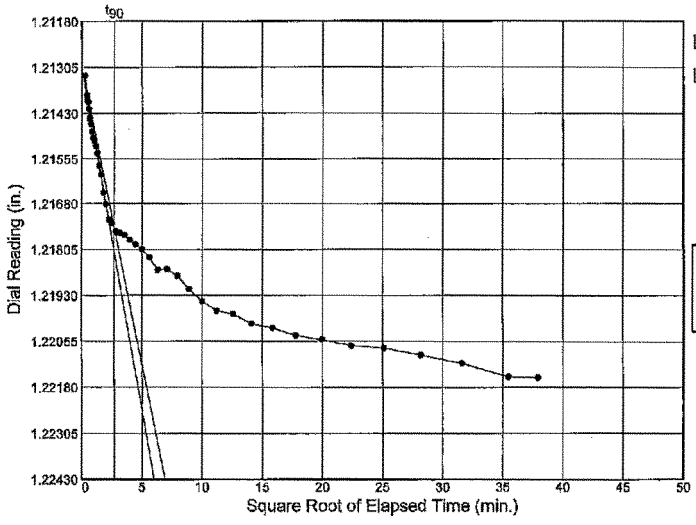
Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-02U Sample No.: 8B Elev./Depth: 28.8



Load No.= 2
Load= 0.13 tsf
D_0 = 1.17698
D_{90} = 1.20334
D_{100} = 1.20627
T_{90} = 14.87 min.

C_v @ T_{90}
0.14 ft.^{2}/day



Load No.= 3
Load= 0.25 tsf
D_0 = 1.21305
D_{90} = 1.21746
D_{100} = 1.21795
T_{90} = 7.34 min.

C_v @ T_{90}
0.28 ft.^{2}/day

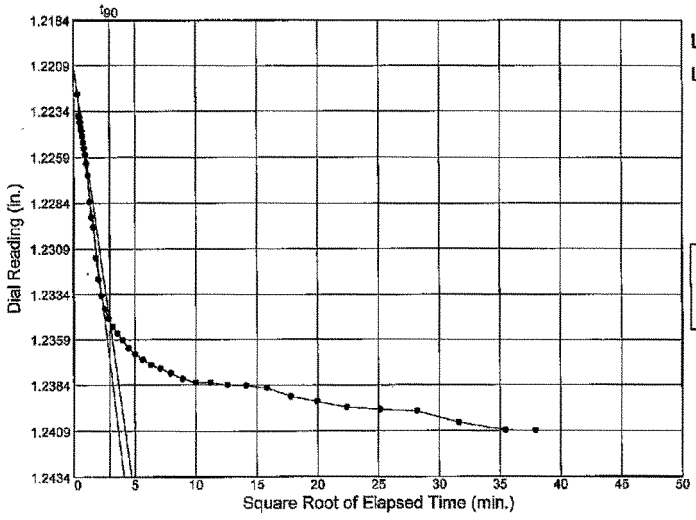
FFEBJV, LLC

Figure

Dial Reading vs. Time

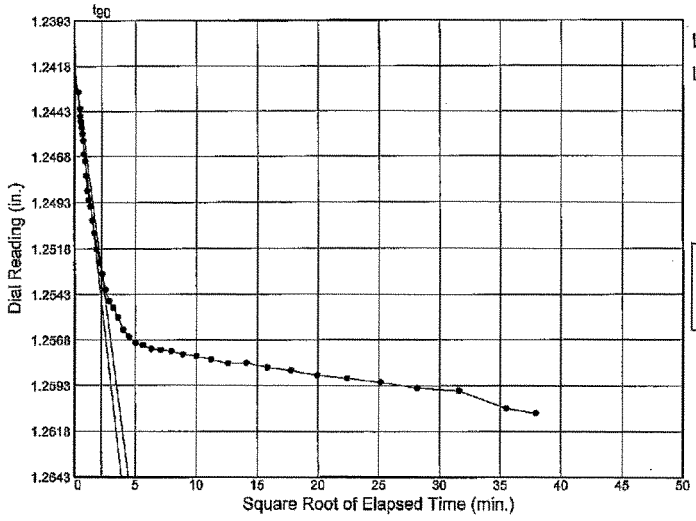
Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-02U Sample No.: 8B Elev./Depth: 28.8



Load No.= 4
Load= 0.50 tsf
D_0 = 1.22091
D_{90} = 1.23488
D_{100} = 1.23643
T_{90} = 8.54 min.

C_v @ T_{90}
0.23 ft.2/day



Load No.= 5
Load= 1.00 tsf
D_0 = 1.24190
D_{90} = 1.25304
D_{100} = 1.25428
T_{90} = 4.87 min.

C_v @ T_{90}
0.39 ft.2/day

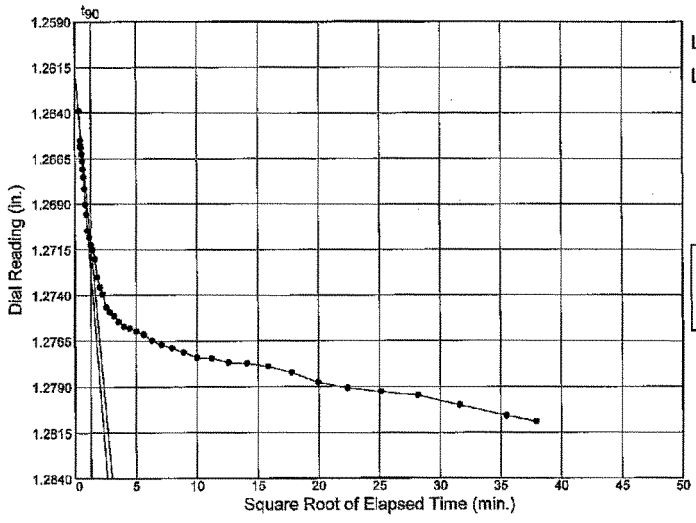
FFEBJV, LLC

Figure

Dial Reading vs. Time

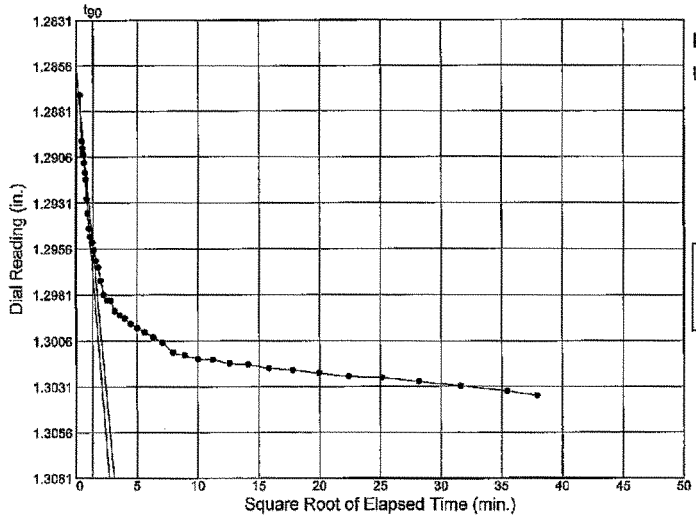
Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-02U Sample No.: 8B Elev./Depth: 28.8



Load No.= 6
Load= 2.00 tsf
D_0 = 1.26156
D_{90} = 1.27123
D_{100} = 1.27231
T_{90} = 1.69 min.

C_v @ T_{90}
1.07 ft.2/day



Load No.= 7
Load= 4.00 tsf
D_0 = 1.28561
D_{90} = 1.29544
D_{100} = 1.29653
T_{90} = 1.84 min.

C_v @ T_{90}
0.94 ft.2/day

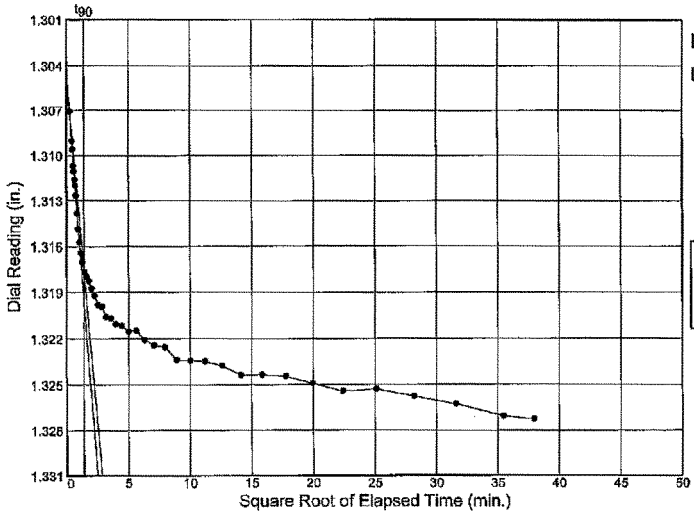
FFEBJV, LLC

Figure

Dial Reading vs. Time

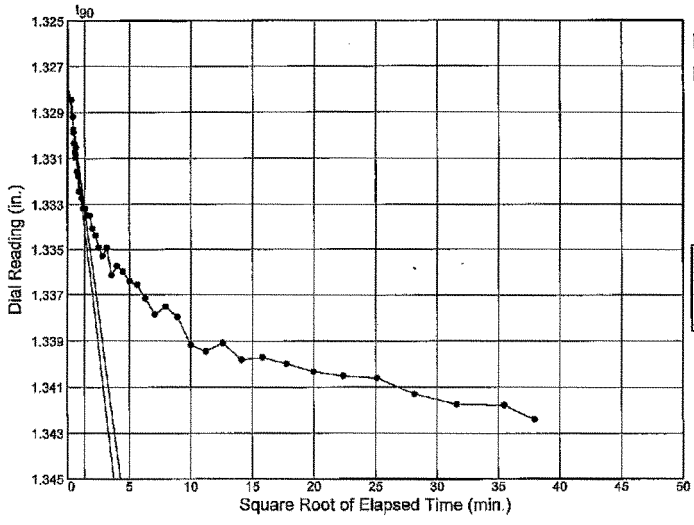
Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-02U Sample No.: 8B Elev./Depth: 28.8



Load No.= 8
Load= 8.00 tsf
D_0 = 1.30452
D_{90} = 1.31745
D_{100} = 1.31889
T_{90} = 1.95 min.

C_v @ T_{90}
0.85 ft.2/day



Load No.= 9
Load= 12.00 tsf
D_0 = 1.32752
D_{90} = 1.33317
D_{100} = 1.33379
T_{90} = 1.92 min.

C_v @ T_{90}
0.82 ft.2/day

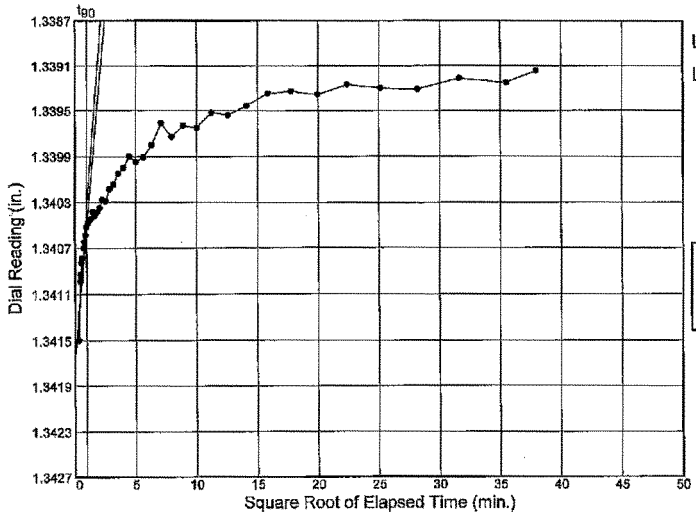
FFEBJV, LLC

Figure

Dial Reading vs. Time

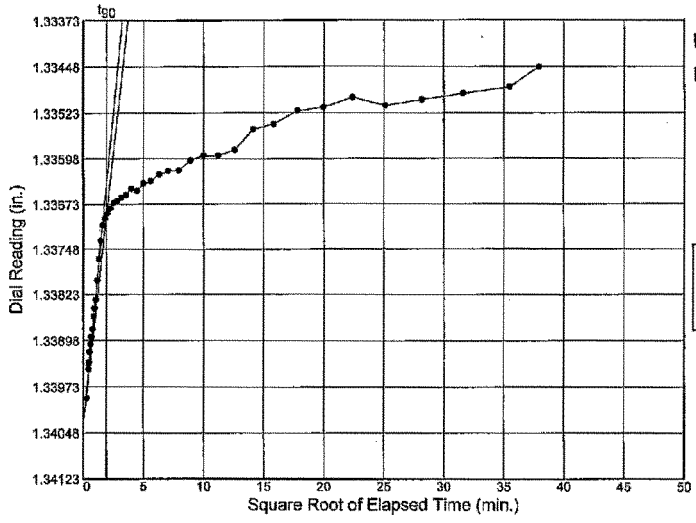
Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-02U Sample No.: 8B Elev./Depth: 28.8



Load No.= 10
Load= 3.00 tsf
D_0 = 1.34170
D_{90} = 1.34052
D_{100} = 1.34038
T_{90} = 0.94 min.

C_v @ T_{90}
1.61 ft.^{2}/day



Load No.= 11
Load= 0.75 tsf
D_0 = 1.34039
D_{90} = 1.33692
D_{100} = 1.33653
T_{90} = 3.74 min.

C_v @ T_{90}
0.41 ft.^{2}/day

FFEBJV, LLC

Figure

CONSOLIDATION TEST DATA

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Contract No. W912P8-07-D-0022
Task Order 135
Project Number: 07-022135

Sample Data

Source: MRGO-02U
Sample No.: 8B
Elev. or Depth: 28.8 **Sample Length(in./cm.):**
Location:
Description: VSO GR CL W/ ARS CH
Liquid Limit: 34 **Plasticity Index:** 9
USCS: CL **AASHTO:** **Figure No.:**
Testing Remarks: Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST		AFTER TEST	
Wet w+t	= 135.15 g.	Consolidometer #	= 11	Wet w+t	= 465.52 g.
Dry w+t	= 100.00 g.			Dry w+t	= 394.67 g.
Tare Wt.	= .00 g.	Spec. Gravity	= 2.70	Tare Wt.	= 112.88 g.
Height	= 1.01 in.	Height	= 1.01 in.		
Diameter	= 4.00 in.	Diameter	= 3.99 in.		
Weight	= 380.80 g.	Defl. Table	= n/a		
Moisture	= 35.1 %	Ht. Solids	= 0.5066 in.	Moisture	= 25.1 %
Wet Den.	= 114.7 pcf	Dry Wt.	= 280.59 g.*	Dry Wt.	= 281.79 g.
Dry Den.	= 84.9 pcf	Void Ratio	= 0.986	Void Ratio	= 0.694
		Saturation	= 96.2 %		

* Initial dry weight used in calculations

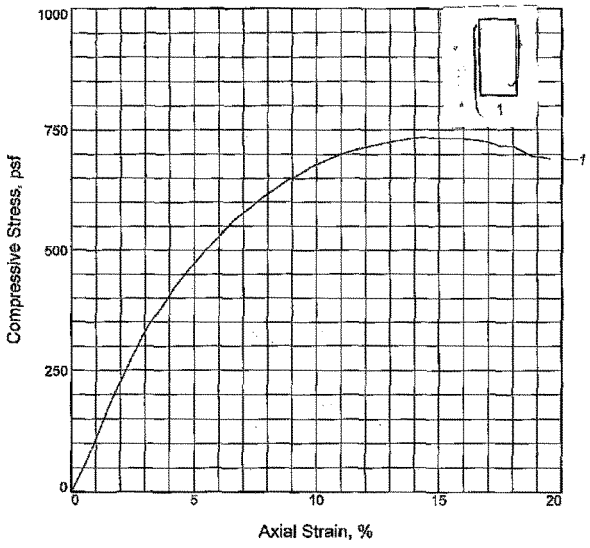
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	1.18616				0.986	
0.04	1.18831	0.00000			0.982	0.2 Comprs.
0.13	1.20795	0.00000	0.14		0.943	2.2 Comprs.
0.25	1.22154	0.00000	0.28		0.916	3.5 Comprs.
0.50	1.24088	0.00000	0.23		0.878	5.4 Comprs.
1.00	1.26080	0.00000	0.39		0.839	7.4 Comprs.
2.00	1.28091	0.00000	1.07		0.799	9.4 Comprs.
4.00	1.30360	0.00000	0.94		0.755	11.7 Comprs.
8.00	1.32726	0.00000	0.85		0.708	14.0 Comprs.

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
12.00	1.34240	0.00000	0.82		0.678	15.5 Comprs.
3.00	1.33914	0.00000	1.61		0.684	15.2 Comprs.
0.75	1.33449	0.00000	0.41		0.694	14.7 Comprs.

C_c = 0.15 P_c = 0.36 tsf C_r = 0.01

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	734			
Undrained shear strength, psf	367			
Failure strain, %	14.3			
Strain rate, in./min.	1.000			
Water content, %	33.7			
Wet density, pcf	116.9			
Dry density, pcf	87.4			
Saturation, %	99.2			
Void ratio	0.9076			
Specimen diameter, in.	1.402			
Specimen height, in.	3.099			
Height/diameter ratio	2.21			

Description: SO GR CL4

LL = 37	PL = 22	PI = 15	Assumed GS= 2.67	Type: UNDISTURBED

Project No.: 07-022135
Date Sampled: 10/6/09
Remarks:

Figure _____

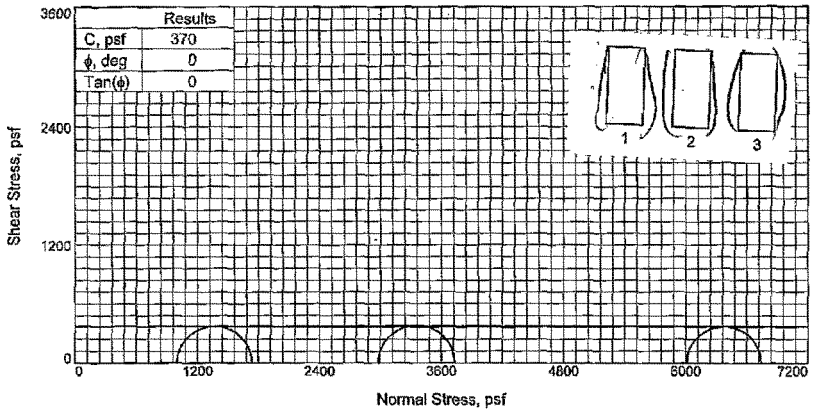
Client: U.S. Army Corps of Engineers

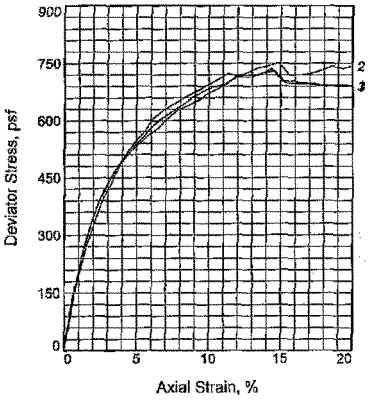
Project: USACE - MRGO Ecosystem Restoration Feasibility Study St.Bernard Parish, La
Source of Sample: MRGO-2U **Depth:** 29.7
Sample Number: 8C

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: JC/ARS **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	40.3	39.6	40.6
	Dry Density, pcf	79.8	80.9	80.0
	Saturation, %	98.8	99.6	100.0
	Void Ratio	1.0881	1.0608	1.0834
	Diameter, in.	1.404	1.402	1.396
	Height, in.	3.102	3.097	3.096
At Test	Water Content, %	40.3	39.6	40.6
	Dry Density, pcf	79.8	80.9	80.0
	Saturation, %	98.8	99.6	100.0
	Void Ratio	1.0881	1.0608	1.0834
	Diameter, in.	1.404	1.402	1.396
	Height, in.	3.102	3.097	3.096
Strain rate, in./min.		1.000	1.000	1.000
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.95	20.69	41.75
Fail. Stress, psf		735	752	731
Strain, %		14.4	14.8	14.6
Ult. Stress, psf		702	752	697
Strain, %				
σ_1 Failure, psf		1736	3731	6742
σ_3 Failure, psf		1001	2980	6011

Type of Test: Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CL4 W/ LNS & LYS ML

LL= 41 **PL=** 25 **PI=** 16
Assumed Specific Gravity= 2.67
Remarks:

Client: U.S. Army Corps of Engineers

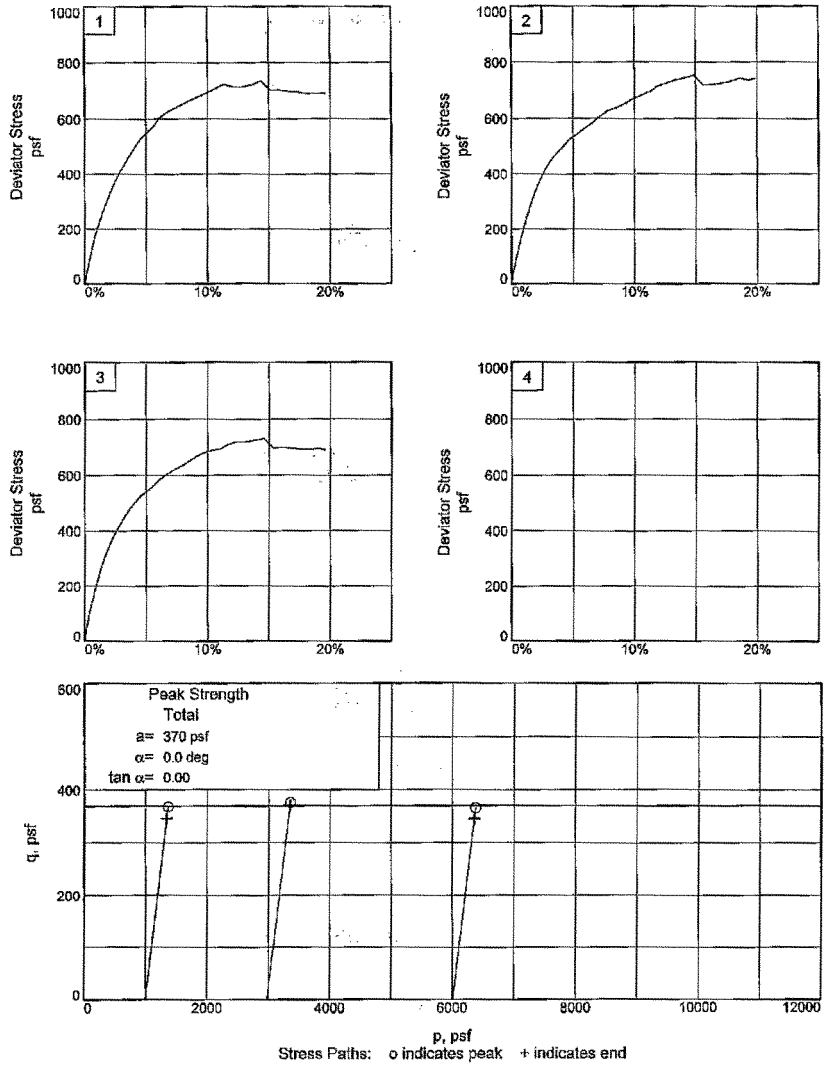
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-2U **Depth:** 32.8
Sample Number: 9B
Proj. No.: 07-022135 **Date Sampled:** 10/6/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

Figure _____

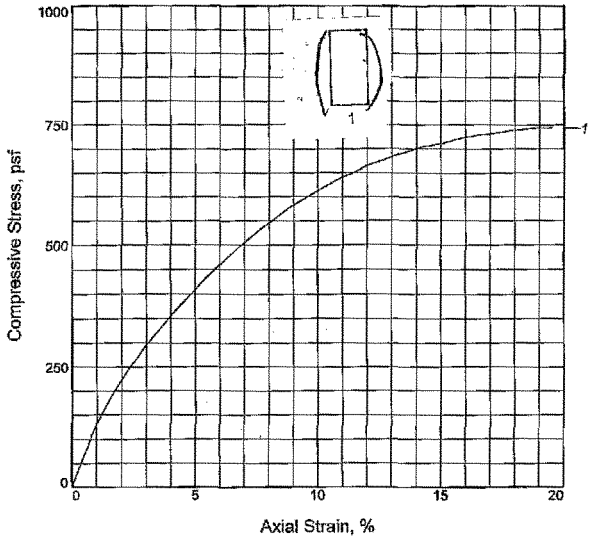
Tested By: JC/ARS **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-2U **Depth:** 32.8 **Sample Number:** 9B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: JC/ARS **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1				
Unconfined strength, psf	711				
Undrained shear strength, psf	355				
Failure strain, %	15.0				
Strain rate, in./min.	1.000				
Water content, %	37.8				
Wet density, pcf	113.7				
Dry density, pcf	82.5				
Saturation, %	97.8				
Void ratio	1.0437				
Specimen diameter, in.	1.410				
Specimen height, in.	3.106				
Height/diameter ratio	2.20				

Description: SO GR CL6

LL = 46	PL = 19	PI = 27	Assumed GS= 2.70	Type: UNDISTURBED

Project No.: 07-022135
Date Sampled: 10/6/09
Remarks:

Figure _____

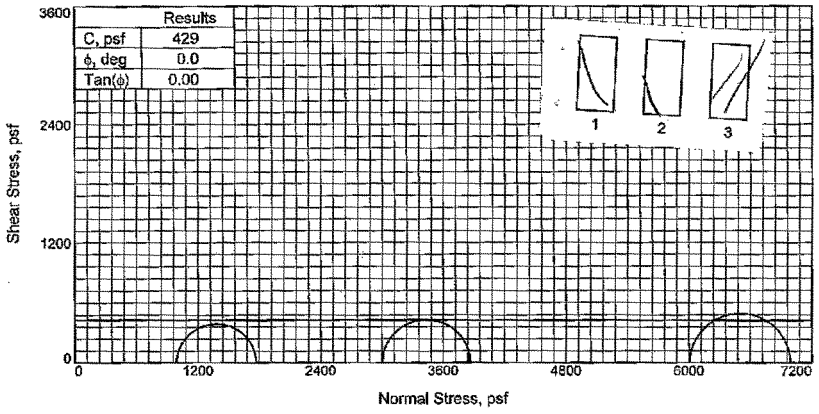
Client: U.S. Army Corps of Engineers

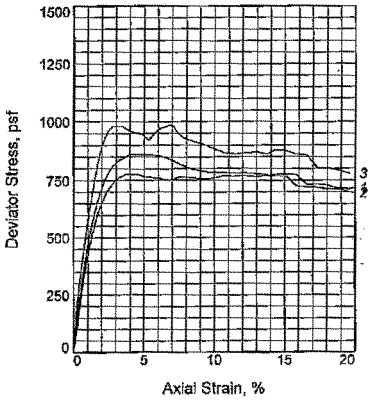
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-2U **Depth:** 36.8
Sample Number: 10B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: JC/ARS **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	40.4	40.3	41.7
	Dry Density, pcf	80.0	80.0	79.1
	Saturation, %	98.6	98.2	99.6
	Void Ratio	1.1074	1.1072	1.1309
	Diameter, in.	1.417	1.422	1.415
	Height, in.	3.105	3.104	3.113
At Test	Water Content, %	40.4	40.3	41.7
	Dry Density, pcf	80.0	80.0	79.1
	Saturation, %	98.6	98.2	99.6
	Void Ratio	1.1074	1.1072	1.1309
	Diameter, in.	1.417	1.422	1.415
	Height, in.	3.105	3.104	3.113
Strain rate, in./min.		1.000	1.000	1.000
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.90	20.87	41.73
Fail. Stress, psf		776	860	984
Strain, %		3.8	4.0	6.8
Ult. Stress, psf		748	773	861
Strain, %				
σ_1 Failure, psf		1770	3865	6994
σ_3 Failure, psf		994	3005	6009

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CH2 W/ LNS & LYS ML

LL= 50 PL= 21 PI= 29
Assumed Specific Gravity= 2.70
Remarks:

Figure _____

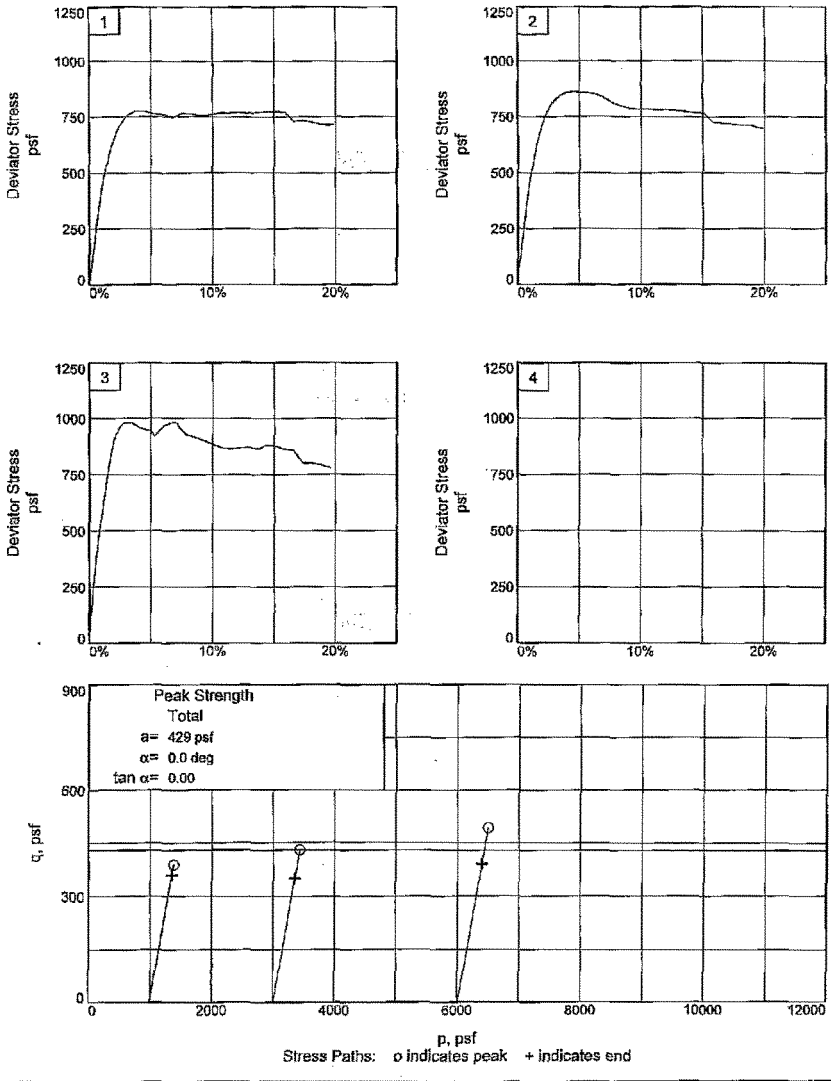
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-2U **Depth:** 40.8
Sample Number: 11B
Proj. No.: 07-022135 **Date Sampled:** 10/6/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

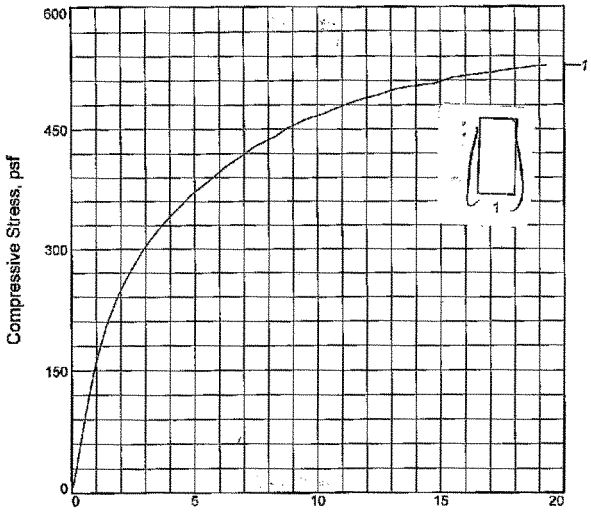
Tested By: VF/ARS **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: *MRGO-2U* **Depth:** 40.8 **Sample Number:** 11B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: VF/ARS **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1				
Unconfined strength, psf	506				
Undrained shear strength, psf	253				
Failure strain, %	14.8				
Strain rate, in./min.	1.000				
Water content, %	40.7				
Wet density, pcf	110.9				
Dry density, pcf	78.8				
Saturation, %	96.6				
Void ratio	1.1382				
Specimen diameter, in.	1.413				
Specimen height, in.	3.095				
Height/diameter ratio	2.19				

Description: SO GR CH2

LL = 55	PL = 21	PI = 34	Assumed GS= 2.70	Type: UNDISTURBED

Project No.: 07-022135
Date Sampled: 10/6/09
Remarks:

Figure _____

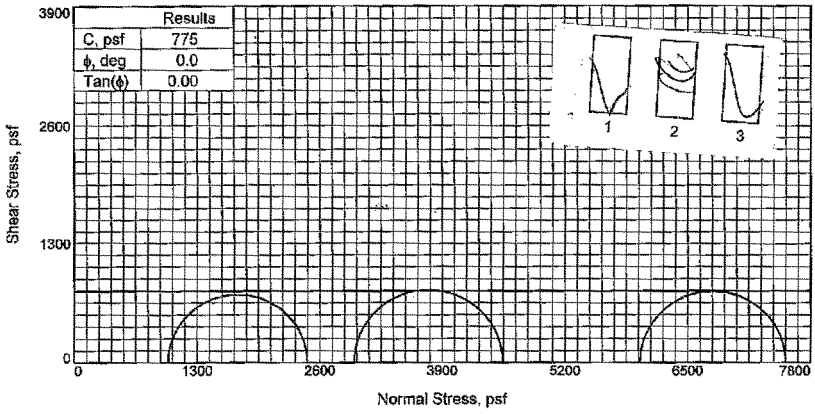
Client: U.S. Army Corps of Engineers

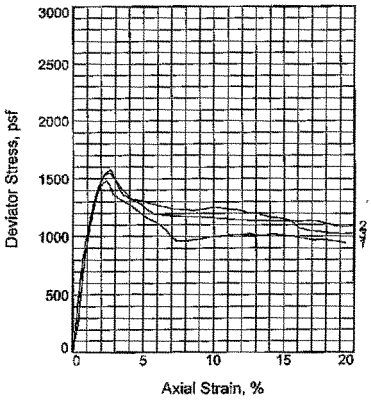
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-2U **Depth:** 44.8
Sample Number: 12B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: JC/ARS **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	57.3	57.1	57.2
	Dry Density, pcf	65.2	65.7	65.7
	Saturation, %	96.7	97.5	97.5
	Void Ratio	1.6226	1.6050	1.6054
	Diameter, in.	1.419	1.419	1.417
	Height, in.	3.108	3.113	3.110
At Test	Water Content, %	57.3	57.1	57.2
	Dry Density, pcf	65.2	65.7	65.7
	Saturation, %	96.7	97.5	97.5
	Void Ratio	1.6226	1.6050	1.6054
	Diameter, in.	1.419	1.419	1.417
	Height, in.	3.108	3.113	3.110
Strain rate, in./min.		1.000	1.000	1.000
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.90	20.60	41.63
Fail. Stress, psf		1475	1577	1546
Strain, %		2.3	2.7	2.5
Ult. Stress, psf		1015	1161	1130
Strain, %				
σ_1 Failure, psf		2468	4543	7541
σ_3 Failure, psf		993	2966	5995

Type of Test: Unconsolidated Undrained

Sample Type: UNDISTURBED

Description: M GR CH4 W/ LNS & LYS ML

LL= 86 **PL=** 25 **PI=** 61

Assumed Specific Gravity= 2.74

Remarks:

Client: U.S. Army Corps of Engineers

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

Source of Sample: MRGO-2U **Depth:** 48.8

Sample Number: 13B

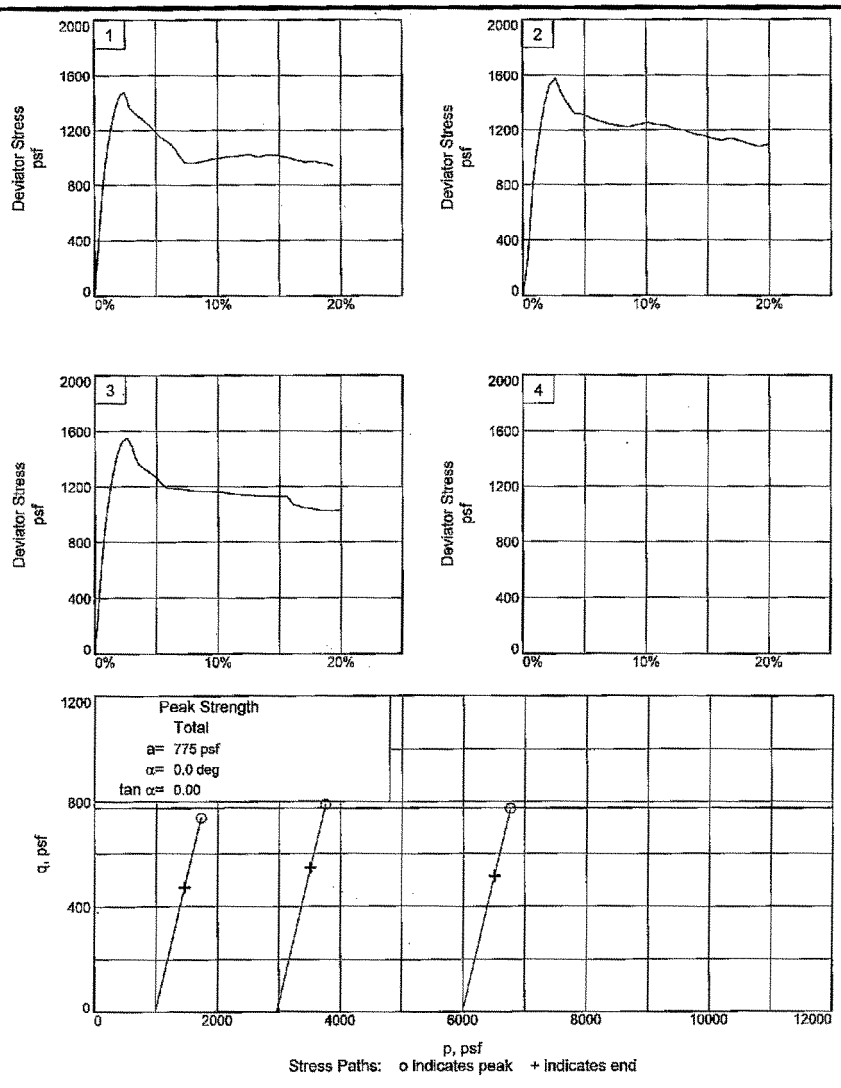
Proj. No.: 07-022135 **Date Sampled:** 10/6/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

Figure _____

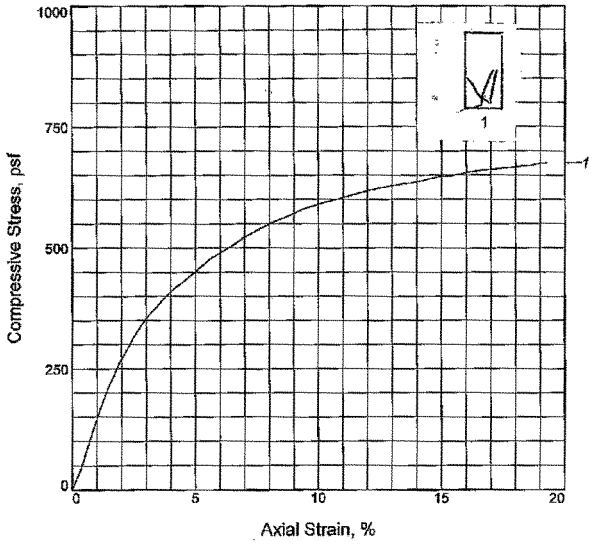
Tested By: VF/ARS **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-2U **Depth:** 48.8 **Sample Number:** 13B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: VF/ARS **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	645			
Undrained shear strength, psf	322			
Failure strain, %	14.8			
Strain rate, in./min.	1.000			
Water content, %	57.1			
Wet density, pcf	101.1			
Dry density, pcf	64.4			
Saturation, %	94.4			
Void ratio	1.6564			
Specimen diameter, in.	1.418			
Specimen height, in.	3.094			
Height/diameter ratio	2.18			

Description: SO GR CH4

LL = 87	PL = 28	PI = 59	Assumed GS= 2.74	Type: UNDISTURBED

Project No.: 07-022135
Date Sampled: 10/6/09
Remarks:

Figure _____

Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-2U **Depth:** 56.8
Sample Number: 15B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: JC/ARS **Checked By:** MS

SUMMARY OF LABORATORY TEST RESULTS

Project: MRGO Ecosystem Restoration Feasibility Study Assigned By: _____

Project Number: 07-022135 Current Date: 12/4/2009
Boring: MRGO-3U

Sample Number	Depth	Visual Classification	USCS	E(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
1A	0.0	VSO GR CH3 W/ ARS SM, WD	CH3		69												
1B	0.8	VSO GR CH3 W/ ARS SM, O, WD	CH3		61	65	104	100	UU	0	44		68	16	52	0.10	
1C	1.7	VSO GR CH2 W/ LNS & LYS SM	CH2		50												
2A	4.0	VSO DGR CHOC W/ WD	CHOC		235												
2B	5.0	VSO DGR CHOC W/ WD	CHOC		285												
2C	6.0	VSO DGR CHOC W/ WD	CHOC		203												
2D	7.0	VSO DGR CHOB	CHOB		163												
3A	8.0	VSO DGR CHOC W/ WD	CHOC		216												
3B	9.0	VSO DGR CHOC	CHOC		232												
3C	10.0	VSO DGR CHOC	CHOC		246												
3D	11.0	VSO DGR CHOC	CHOC		209												
4A	12.0	VSO DGR CHOA W/ RT, WD	CHOA		133												
4B	12.8	VSO DGR CH4 W/ O, WD, RT	CH4		95	47	92	99	UU	0	92		95	22	73	0.15	
4C	13.7	VSO DGR CH4 W/ LNS SM, RT, WD	CH4	.13	74	56	98	99	UC	-	111	222	96	20	76	0.09	
5A	16.0	SO GR CH2	CH2		51												
5B	16.8	SO GR CH2 W/ LNS & LYS ML	CH2		52												
5C	17.7	SO GR CH2 W/ LNS & LYS ML	CH2		44												
6A	20.0	SO GR CH2 W/ LNS & LYS ML	CH2		50												
6B	20.8	VSO GR CL4 W/ LYS CH	CL4		42	79	111	100					41	20	21		Gs, CON
6C	21.7	GR ML W/ LYS CH	ML		30	93	120	99	UU	0	2750		24	21	3	0.10	
7A	24.0	GR ML W/ LYS CH	ML		42												
7B	24.8	SO GR CH2 W/ LYS ML	CH2		47												
7C	25.7	GR SM W/ LYS CH	SM		38												SV
7D	26.6	GR SM W/ LYS CH	SM		33												
8A	28.0	GR SM W/ LYS CH	SM		34												
8B	28.8	SO GR CL W/ LNS CH	CL		35				UU				29	20	9		NOT TESTABLE
8C	29.7	SO GR CH3 W/ LYS ML	CH3		44												
9A	32.0	SO GR CH3 W/ LYS ML	CH3		51												
9B	32.8	M GR CL6 W/ LNS CH	CL6	3	43	78	111	99	UC	-	536	1071	42	16	26	0.19	
9C	33.7	M GR CH4 W/ LYS & LNS ML	CH4		49												
9D	34.6	SO GR CH4 W/ ARS & LNS ML	CH4		64	61	100	97					74	22	52		Gs, CON
10A	36.0	GR ML W/ LYS CH	ML		33												
10B	36.8	GR ML W/ LYS CH	ML		35												
10C	37.7	GR ML W/ LYS CH	ML		37												
11A	40.0	M GR CH4 W/ LNS & LYS ML	CH4		48												
11B	40.8	M GR CH4 W/ LNS & LYS ML	CH4		50												

Remarks: _____
FFEB JV, LLC

Checked By: MKA/MS
File Name: MRGO-03U.xls

SUMMARY OF LABORATORY TEST RESULTS

Project: MRGO Ecosystem Restoration Feasibility Study Assigned By: _____

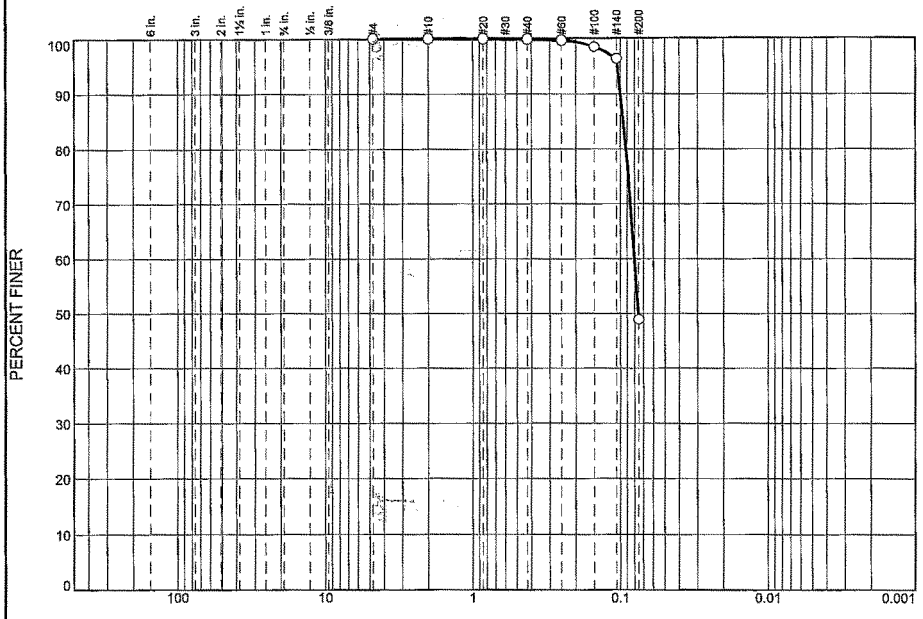
Project Number: 07-022135 Current Date: 12/4/2009
Boring: MRGO-3U

Sample Number	Depth	Visual Classification	USCS	E(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
11C	41.7	SO GR CH4 W/ ARS SM	CH4	4	58	66	103	98	UC	-	448	895	73	18	55	0.27	
12A	44.0	SO GR CH4	CH4		56												
12B	44.8	SO GR CH3 W/ LNS & LYS ML	CH3		49												
12C	45.7	SO GR CL6 W/ LNS SM	CL6		38	82	114	99	UU	0	438		40	16	24	0.25	
13A	48.0	M GR CH4	CH4		62												
13B	48.8	M GR CH4 W/ LNS & LYS ML	CH4		52												
13C	49.7	M GR CH4 W/ LNS & LYS ML	CH4		50												
14A	52.0	M GR CH4 W/ LNS & LYS ML	CH4		44												
14B	52.8	M GR CH4 W/ LNS ML	CH4	2	58	66	104	100	UC	-	753	1505	90	21	69	0.35	
14C	53.7	M GR CH4 W/ LNS & LYS ML	CH4		54												
14D	54.6	M GR CH4 W/ LYS ML	CH4		64												
15A	56.0	M GR CH4	CH4		49												
15B	56.8	M GR CH4	CH4		46												
15C	57.7	M GR CH3 W/ LNS SM	CH3		46	75	110	100	UU	0	750		67	17	50	0.40	
15D	58.6	M GR CH4	CH4		45												

Remarks: _____
FFEB JV, LLC

Checked By: MKA/WS
File Name: MRGO-03U.xls

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	51.0	48.9	

	Colloids	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_C	C_U
○				0.0945	0.0800	0.0755					

Material Description	USCS	AASHTO
○ GR SM W/ LYS CH	SM	

Project No. 07-022135 **Client:** U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
○ **Source of Sample:** MRGO-3U **Depth:** 25.7 **Sample Number:** 7C

Date: ○ 10/13/09

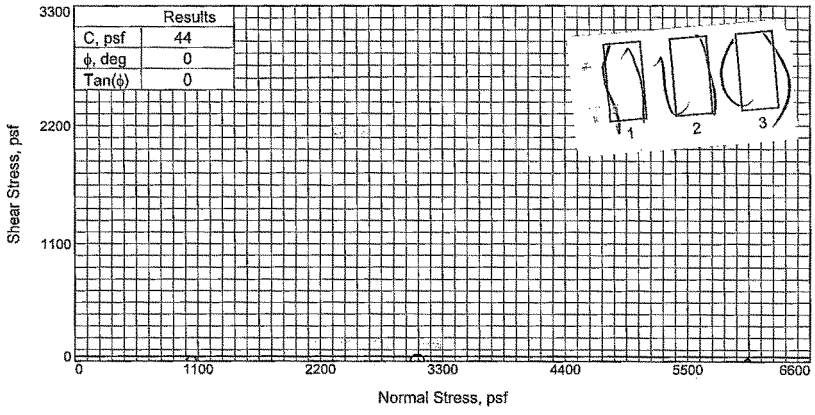
FFEBJV, LLC

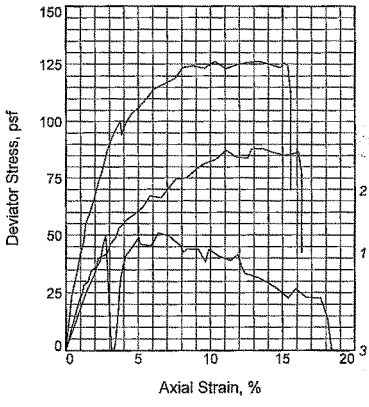
St Rose, LA

Remarks:

Figure

Tested By: JH **Checked By:** MKA





Sample No.		1	2	3
Initial	Water Content, %	59.0	61.2	61.5
	Dry Density, pcf	65.9	64.4	64.0
	Saturation, %	101.5	101.1	100.8
	Void Ratio	1.5947	1.6573	1.6715
	Diameter, in.	1.403	1.402	1.404
	Height, in.	3.083	3.091	3.077
At Test	Water Content, %	59.0	61.2	61.5
	Dry Density, pcf	65.9	64.4	64.0
	Saturation, %	101.5	101.1	100.8
	Void Ratio	1.5947	1.6573	1.6715
	Diameter, in.	1.403	1.402	1.404
	Height, in.	3.083	3.091	3.077
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.94	20.89	41.76
Fail. Stress, psf		88	126	51
Strain, %		13.6	10.3	6.4
Ult. Stress, psf		85	123	43
Strain, %				
σ_1 Failure, psf		1087	3135	6065
σ_3 Failure, psf		999	3009	6014

Type of Test: Unconsolidated Undrained

Sample Type: C

Description: VSO GR CH3 W/ ARS SM, O, WD

LL= 68 **PL=** 16 **PI=** 52

Assumed Specific Gravity= 2.74

Remarks: SCATTER IN TEST RESULTS DUE TO TESTING VSO MATERIAL.

Figure _____

Client: U.S. Army Corps of Engineers

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

Source of Sample: MRGO-3U **Depth:** 0.8

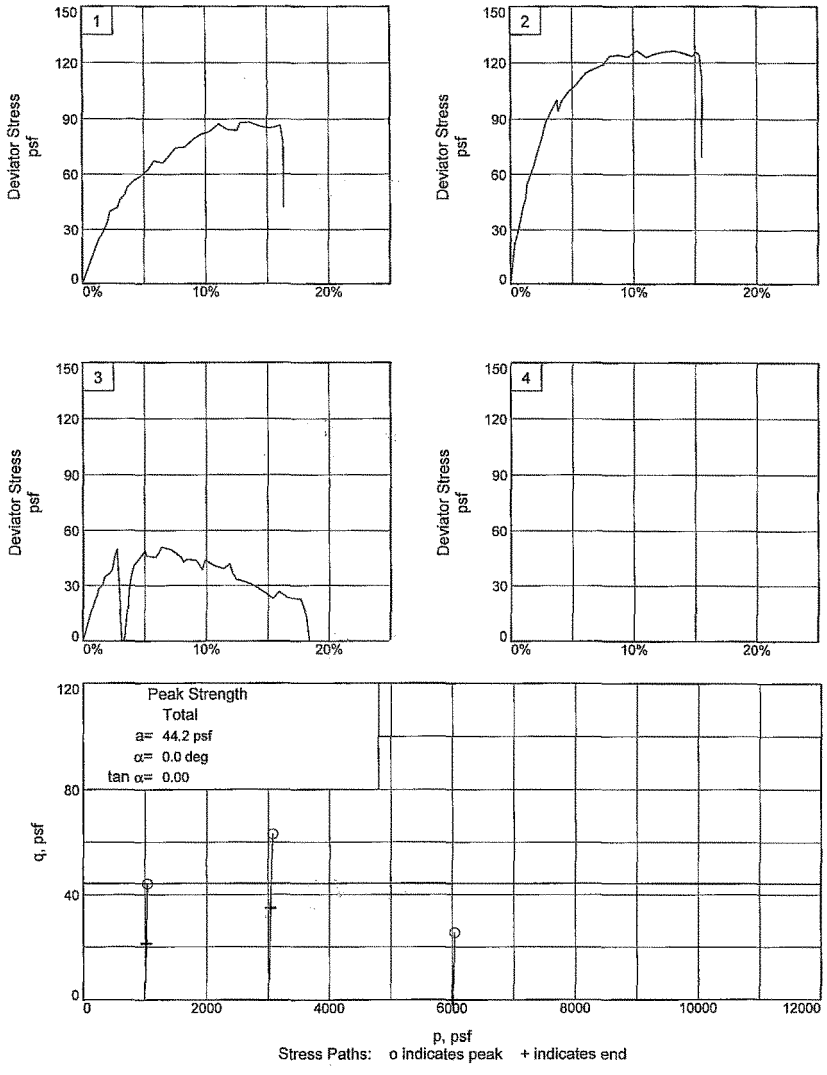
Sample Number: 1B

Proj. No.: 07-022135 **Date Sampled:**

TRIAXIAL SHEAR TEST REPORT

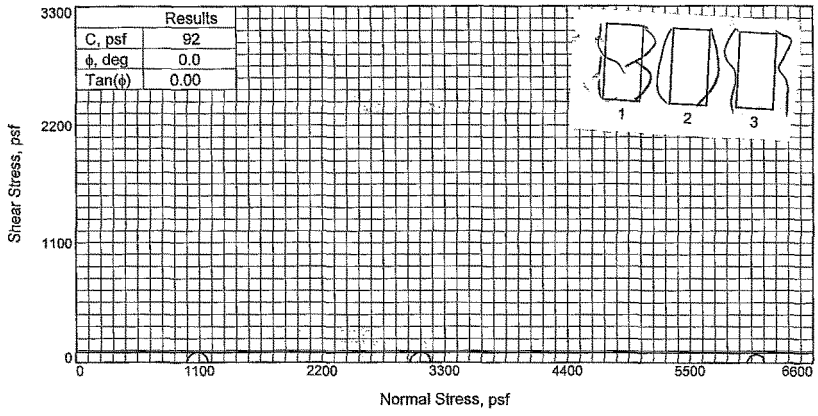
FFEBJV, LLC

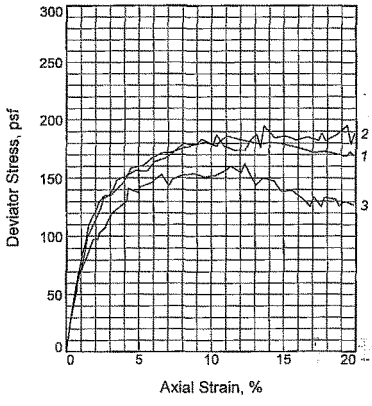
Tested By: ARS **Checked By:** MKA



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-3U **Depth:** 0.8 **Sample Number:** 1B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: ARS **Checked By:** MKA





Sample No.		1	2	3
Initial	Water Content, %	95.0	92.6	97.1
	Dry Density, pcf	47.5	47.7	46.1
	Saturation, %	100.1	98.2	98.2
	Void Ratio	2.6006	2.5839	2.7087
	Diameter, in.	1.394	1.402	1.403
	Height, in.	3.088	3.086	3.094
At Test	Water Content, %	95.0	92.6	97.1
	Dry Density, pcf	47.5	47.7	46.1
	Saturation, %	100.1	98.2	98.2
	Void Ratio	2.6006	2.5839	2.7087
	Diameter, in.	1.394	1.402	1.403
	Height, in.	3.088	3.086	3.094
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.90	20.77	41.77
Fail. Stress, psf		186	186	150
Strain, %		11.1	15.1	13.6
Ult. Stress, psf		179	186	138
Strain, %				
σ_1 Failure, psf		1179	3177	6165
σ_3 Failure, psf		993	2991	6015

Type of Test: Unconsolidated Undrained

Sample Type: C

Description: VSO DGR CH4 W/ O, WD, RT

LL= 95 **PL=** 22 **PI=** 73

Assumed Specific Gravity= 2.74

Remarks:

Figure _____

Client: U.S. Army Corps of Engineers

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

Source of Sample: MRGO-3U **Depth:** 12.8

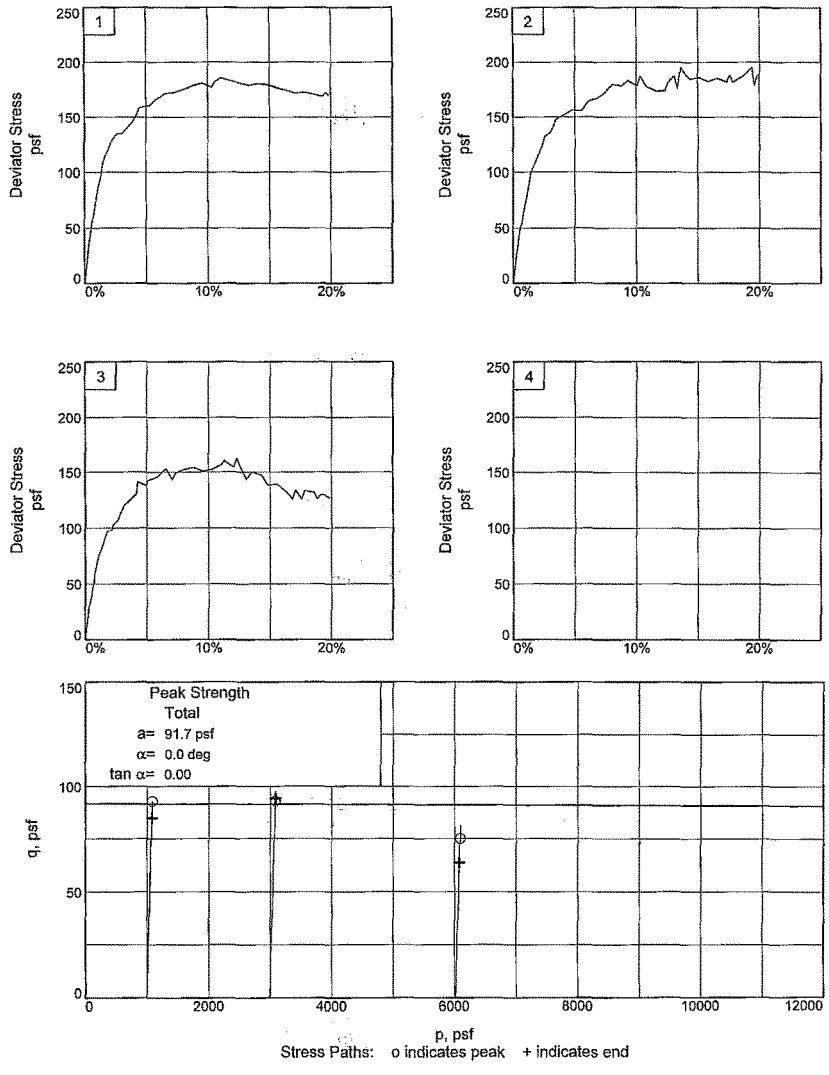
Sample Number: 4B

Proj. No.: 07-022135 **Date Sampled:**

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

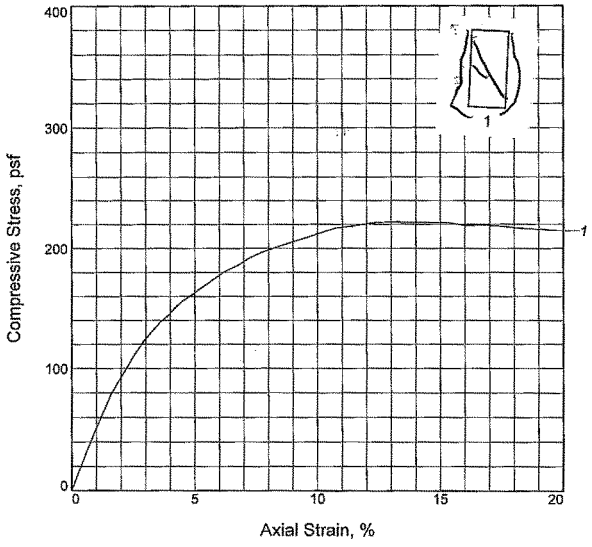
Tested By: ARS **Checked By:** MKA



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-3U **Depth:** 12.8 **Sample Number:** 4B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: ARS **Checked By:** MKA

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	222			
Undrained shear strength, psf	111			
Failure strain, %	13.0			
Strain rate, %/min.	1.00			
Water content, %	74.2			
Wet density, pcf	97.5			
Dry density, pcf	56.0			
Saturation, %	98.8			
Void ratio	2.0572			
Specimen diameter, in.	1.409			
Specimen height, in.	3.088			
Height/diameter ratio	2.19			

Description: VSO DGR CH4 W/ LNS SM, RT, WD

LL = 96	PL = 20	PI = 76	Assumed GS= 2.74	Type: Specimen1

Project No.: 07-022135
Date Sampled:
Remarks:

Figure _____

Client: U.S. Army Corps of Engineers

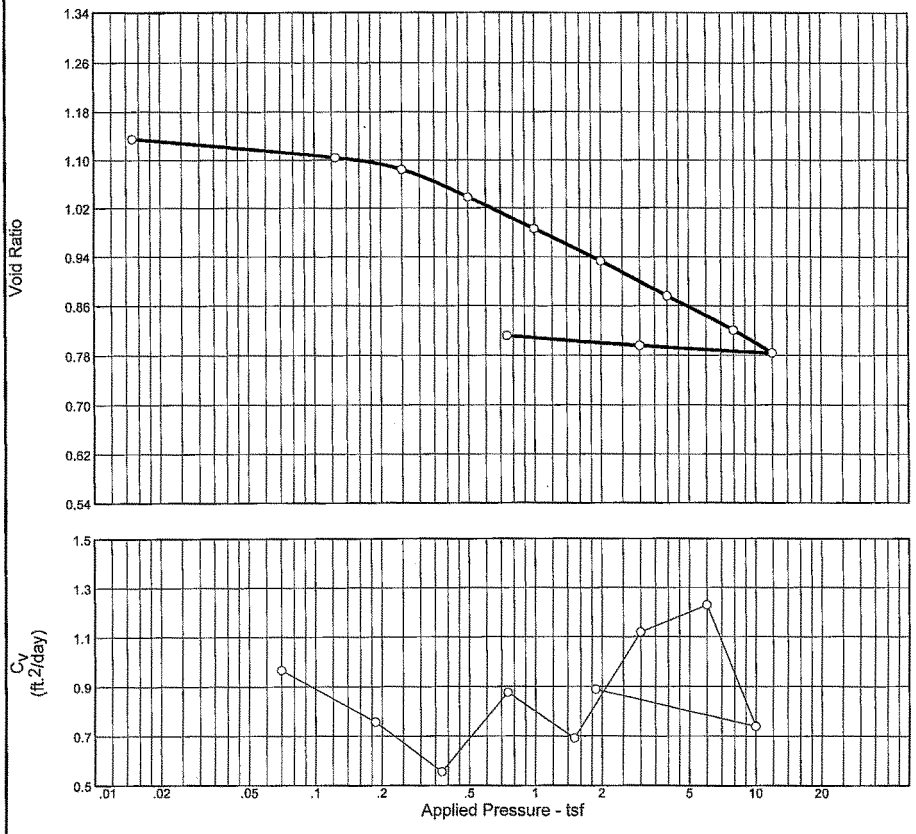
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-3U **Depth:** 13.7
Sample Number: 4C

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: ARS **Checked By:** MKA

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
100.2 %	42.4 %	78.5	41	21	2.69	0.30	0.18	1.138

MATERIAL DESCRIPTION	USCS	AASHTO
VSO GR CL4 W/ LYS CH	CL4	

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

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

Source: MRGO-03U **Sample No.:** 6B **Elev./Depth:** 20.8

FFEBJV, LLC

St Rose, LA

Remarks:

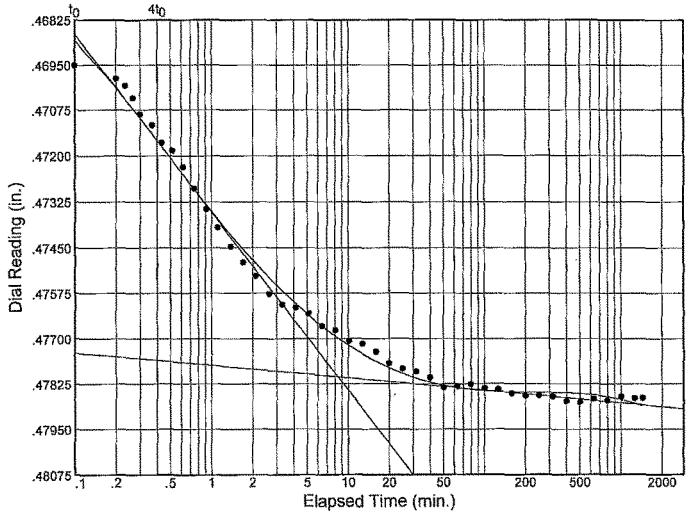
Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

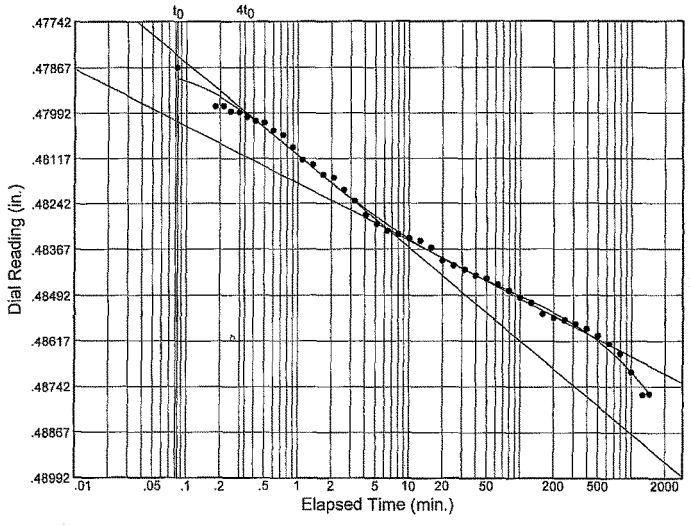
Source: MRGO-03U Sample No.: 6B Elev./Depth: 20.8



Load No.= 2
Load= 0.13 tsf
D_0 = 0.46606
D_{50} = 0.47206
D_{100} = 0.47806
T_{50} = 0.50 min.

C_v @ T_{50}
0.97 ft.2/day

C_α = 0.000



Load No.= 3
Load= 0.25 tsf
D_0 = 0.47802
D_{50} = 0.48058
D_{100} = 0.48313
T_{50} = 0.63 min.

C_v @ T_{50}
0.76 ft.2/day

C_α = 0.002

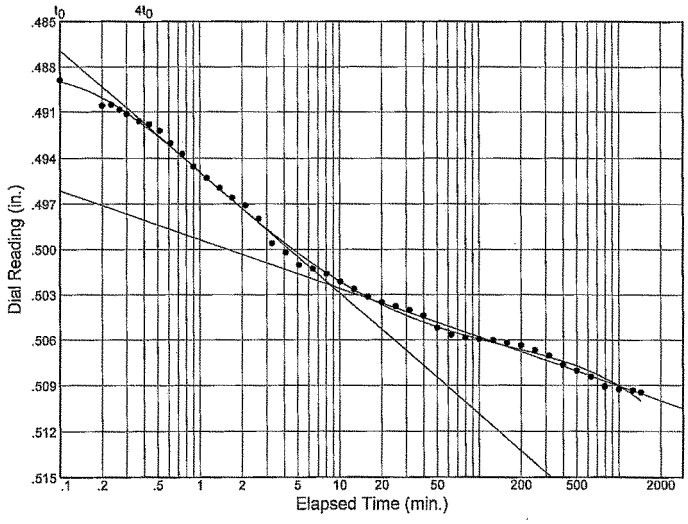
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

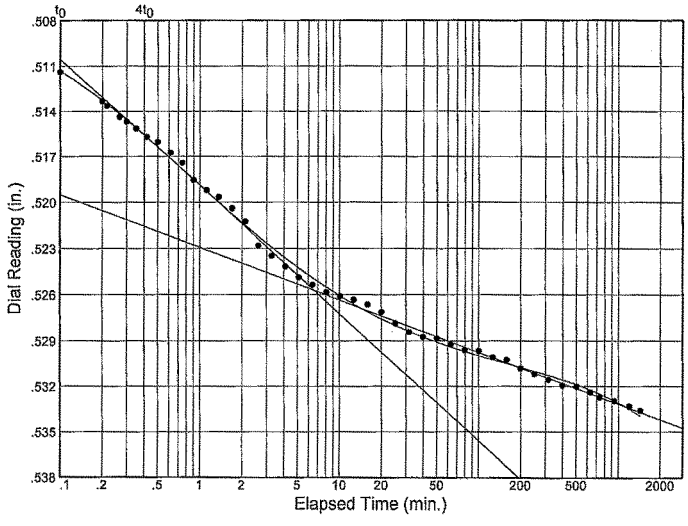
Source: MRGO-03U Sample No.: 6B Elev./Depth: 20.8



Load No.= 4
Load= 0.50 tsf
D_0 = 0.48612
D_{50} = 0.49424
D_{100} = 0.50236
T_{50} = 0.83 min.

C_v @ T_{50}
0.56 ft.^{2}/day

C_α = 0.003



Load No.= 5
Load= 1.00 tsf
D_0 = 0.50706
D_{50} = 0.51639
D_{100} = 0.52571
T_{50} = 0.50 min.

C_v @ T_{50}
0.88 ft.^{2}/day

C_α = 0.004

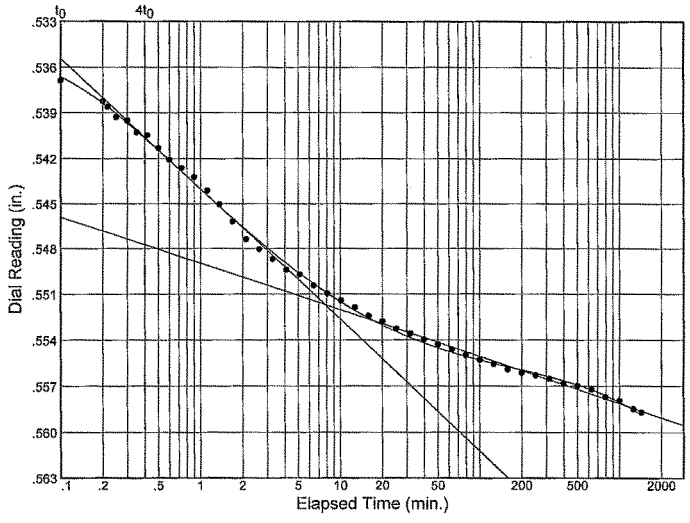
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

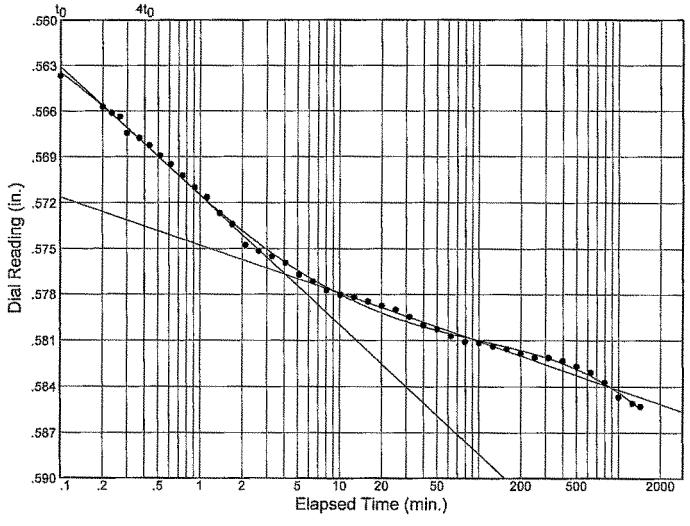
Source: MRGO-03U Sample No.: 6B Elev./Depth: 20.8



Load No.= 6
Load= 2.00 tsf
D_0 = 0.53259
D_{50} = 0.54214
D_{100} = 0.55168
T_{50} = 0.60 min.

C_v @ T_{50}
0.69 ft.^{2}/day

C_α = 0.003



Load No.= 7
Load= 4.00 tsf
D_0 = 0.55873
D_{50} = 0.56770
D_{100} = 0.57667
T_{50} = 0.35 min.

C_v @ T_{50}
1.12 ft.^{2}/day

C_α = 0.003

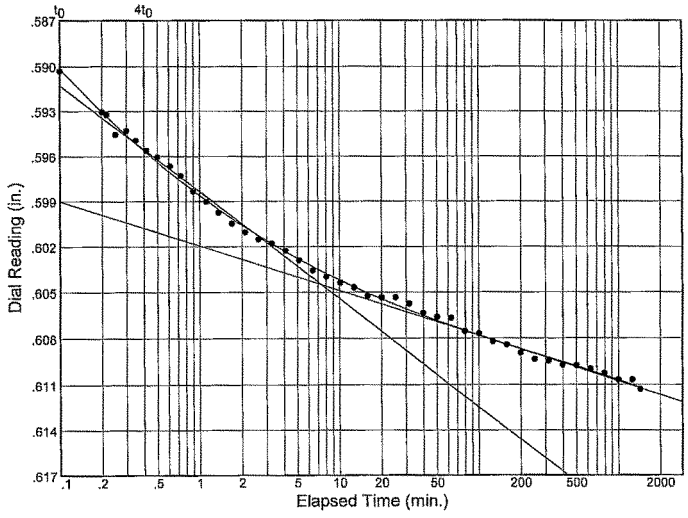
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

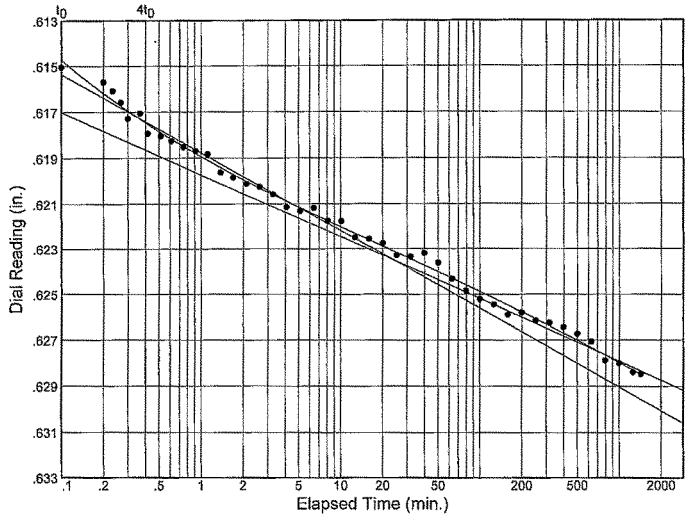
Source: MRGO-03U Sample No.: 6B Elev./Depth: 20.8



Load No.= 8
Load= 8.00 tsf
D_0 = 0.58465
D_{50} = 0.59457
D_{100} = 0.60450
T_{50} = 0.30 min.

C_v @ T_{50}
1.23 ft.^{2}/day

C_α = 0.003



Load No.= 9
Load= 12.00 tsf
D_0 = 0.61200
D_{50} = 0.61774
D_{100} = 0.62349
T_{50} = 0.47 min.

C_v @ T_{50}
0.74 ft.^{2}/day

C_α = 0.003

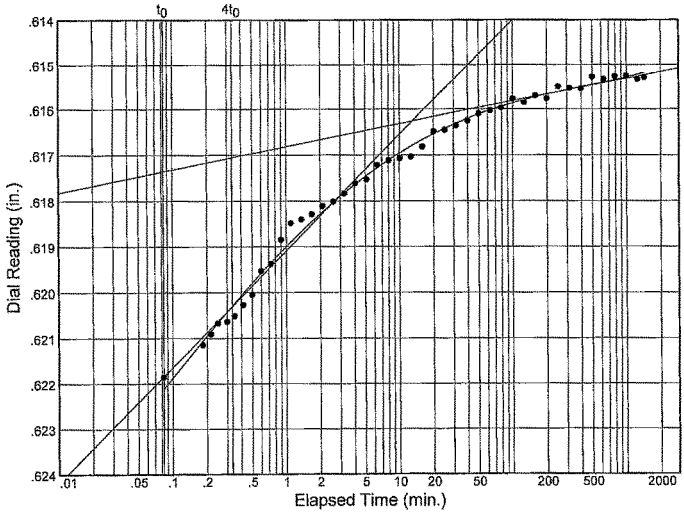
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-03U Sample No.: 6B Elev./Depth: 20.8



Load No.= 11
Load= 0.75 tsf
D_0 = 0.62395
D_{50} = 0.62010
D_{100} = 0.61625
T_{50} = 0.39 min.

C_v @ T_{50}
0.89 $ft.^2/day$

CONSOLIDATION TEST DATA

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Contract No. W912P8-07-D-0022
Task Order 135
Project Number: 07-022135

Sample Data

Source: MRGO-03U
Sample No.: 6B
Elev. or Depth: 20.8 Sample Length(in./cm.):
Location:
Description: VSO GR CL4 W/ LYS CH
Liquid Limit: 41 Plasticity Index: 21
USCS: CL4 AASHTO: Figure No.:
Testing Remarks: Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST		AFTER TEST	
Wet w+t	= 142.40 g.	Consolidometer #	= 9	Wet w+t	= 457.41 g.
Dry w+t	= 100.00 g.			Dry w+t	= 374.09 g.
Tare Wt.	= .00 g.	Spec. Gravity	= 2.69	Tare Wt.	= 111.44 g.
Height	= 1.00 in.	Height	= 1.00 in.		
Diameter	= 4.00 in.	Diameter	= 3.99 in.		
Weight	= 369.11 g.	Defl. Table	= n/a		
Moisture	= 42.4 %	Ht. Solids	= 0.4677 in.	Moisture	= 31.7 %
Wet Den.	= 111.8 pcf	Dry Wt.	= 258.46 g.*	Dry Wt.	= 262.65 g.
Dry Den.	= 78.5 pcf	Void Ratio	= 1.138	Void Ratio	= 0.812
		Saturation	= 100.2 %		

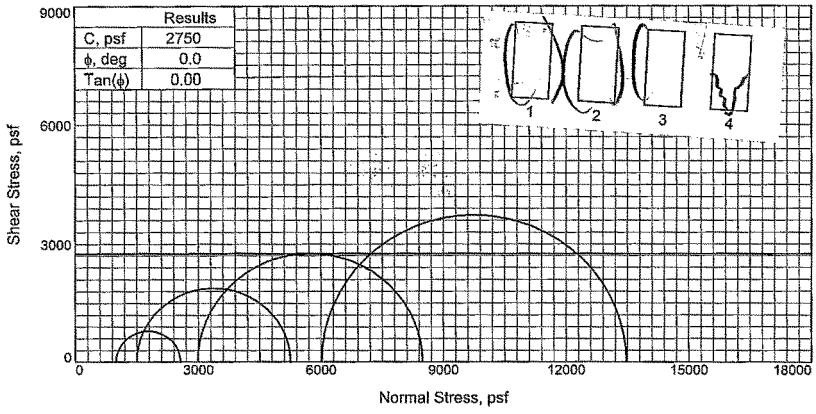
* Initial dry weight used in calculations

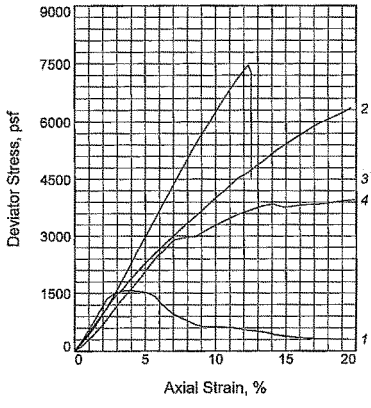
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.46262				1.138	
0.01	0.46440	0.00000			1.135	0.2 Comprs.
0.13	0.47865	0.00000	0.97	0.000	1.104	1.6 Comprs.
0.25	0.48762	0.00000	0.76	0.002	1.085	2.5 Comprs.
0.50	0.50947	0.00000	0.56	0.003	1.038	4.7 Comprs.
1.00	0.53362	0.00000	0.88	0.004	0.987	7.1 Comprs.
2.00	0.55872	0.00000	0.69	0.003	0.933	9.6 Comprs.
4.00	0.58531	0.00000	1.12	0.003	0.876	12.3 Comprs.
8.00	0.61132	0.00000	1.23	0.003	0.820	14.9 Comprs.

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
12.00	0.62847	0.00000	0.74	0.003	0.784	16.6 Comprs.
3.00	0.62280	0.00000			0.796	16.0 Comprs.
0.75	0.61528	0.00000	0.89		0.812	15.3 Comprs.

C_c = 0.18 P_c = 0.30 tsf C_r = 0.02





Sample No.		1	2	3	4
Initial	Water Content, %	28.8	29.8	30.1	30.1
	Dry Density, pcf	93.3	93.0	92.9	91.7
	Saturation, %	97.5	100.0	100.9	97.7
	Void Ratio	0.7931	0.7991	0.8004	0.8246
	Diameter, in.	1.416	1.413	1.422	1.417
	Height, in.	3.062	3.065	3.066	2.999
At Test	Water Content, %	28.8	29.8	30.1	30.1
	Dry Density, pcf	93.3	93.0	92.9	91.7
	Saturation, %	97.5	100.0	100.9	97.7
	Void Ratio	0.7931	0.7991	0.8004	0.8246
	Diameter, in.	1.416	1.413	1.422	1.417
	Height, in.	3.062	3.065	3.066	2.999
Strain rate, %/min.		1.00	1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00	0.00
Cell Pressure, psi		6.89	20.72	41.74	10.36
Fail. Stress, psf		1568	5504	7464	3759
Strain, %		3.6	15.4	12.3	14.8
Ult. Stress, psf		520	5504	6942	3759
Strain, %					
σ_1 Failure, psf		2561	8488	13474	5252
σ_3 Failure, psf		992	2983	6010	1492

Type of Test: Unconsolidated Undrained
Sample Type: D
Description: GR ML W/ LYS CH

LL= 24 **PL=** 21 **PI=** 3
Assumed Specific Gravity= 2.68
Remarks: SCATTER IN TEST RESULTS DUE TO TESTING ML MATERIAL.

Figure _____

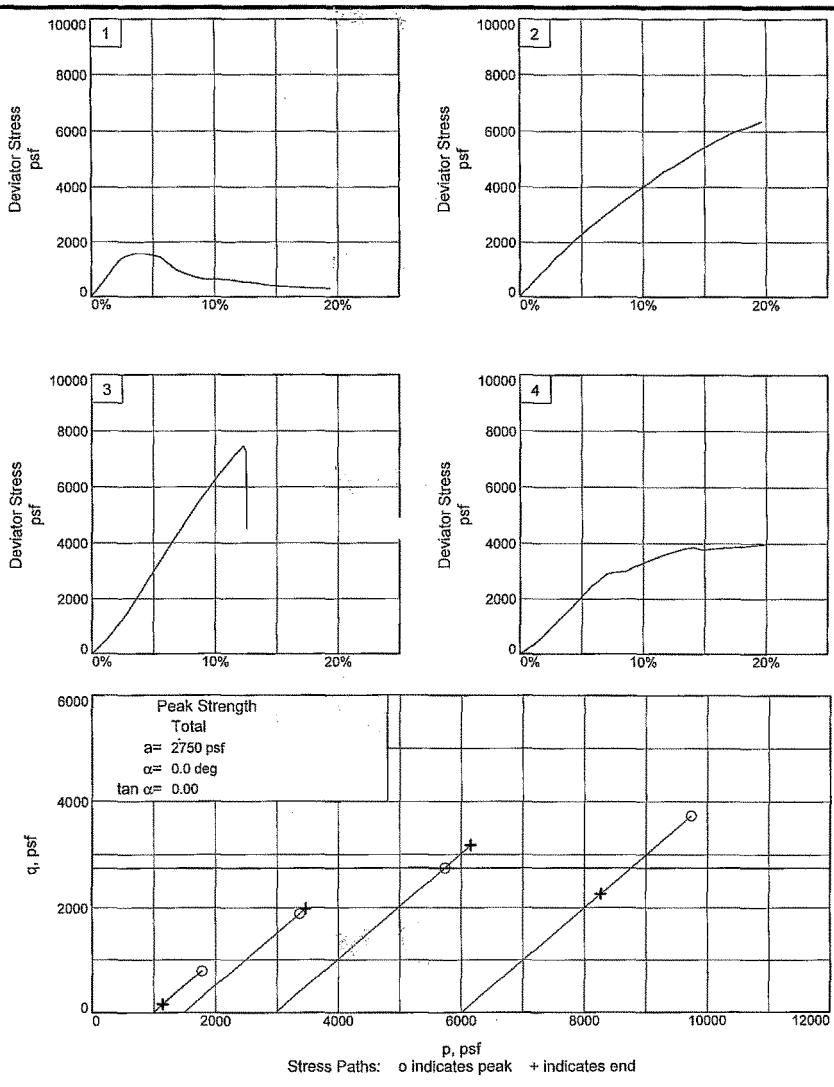
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-3U **Depth:** 21.7
Sample Number: 6C
Proj. No.: 07-022135 **Date Sampled:**

TRIAXIAL SHEAR TEST REPORT

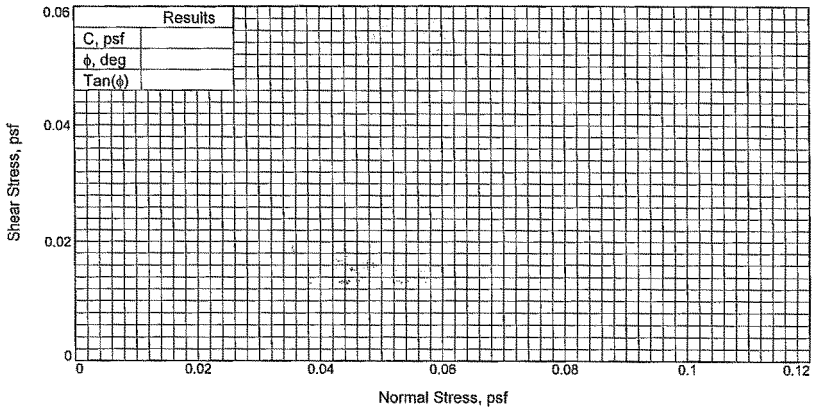
FFEBJV, LLC

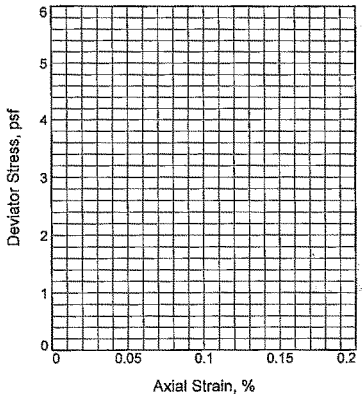
Tested By: ARS **Checked By:** MKA



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-3U **Depth:** 21.7 **Sample Number:** 6C
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: ARS **Checked By:** MKA





Sample No.	
Initial	Water Content, %
	Dry Density, pcf
	Saturation, %
	Void Ratio
	Diameter, in.
	Height, in.
At Test	Water Content, %
	Dry Density, pcf
	Saturation, %
	Void Ratio
	Diameter, in.
	Height, in.
Strain rate, %/min.	
Back Pressure, psi	
Cell Pressure, psi	
Fail. Stress, psf	
Strain, %	
Ult. Stress, psf	
Strain, %	
σ_1 Failure, psf	
σ_3 Failure, psf	

Type of Test: Unconsolidated Undrained
Sample Type:
Description: SO CL W/ LNS CH

LL= 29 **PL=** 20 **PI=** 9
Assumed Specific Gravity=
Remarks: MATERIAL SLUMPING UNDER ITS OWN WEIGHT. NON-TESTABLE. UNABLE TO TEST ALTERNATE SAMPLE (8C).

Figure _____

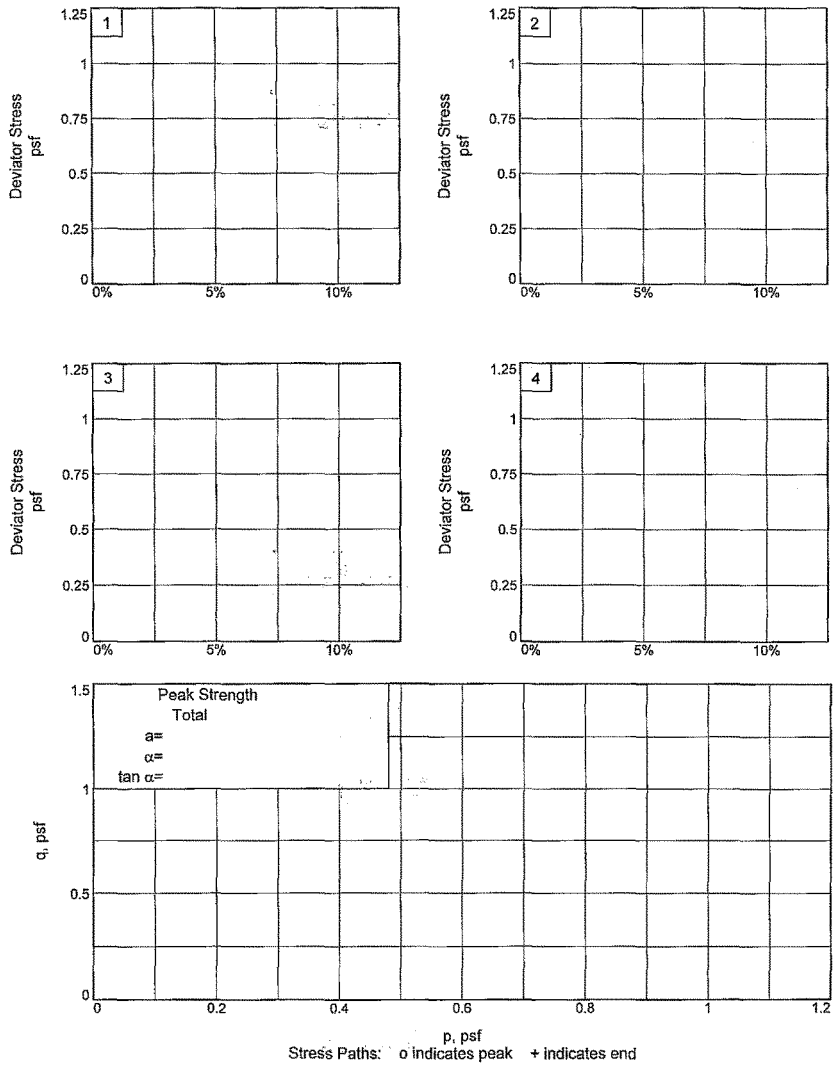
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study St.Bernard Parish, La
Source of Sample: MRGO-3U **Depth:** 28.8
Sample Number: 8B
Proj. No.: 07-022135 **Date Sampled:**

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

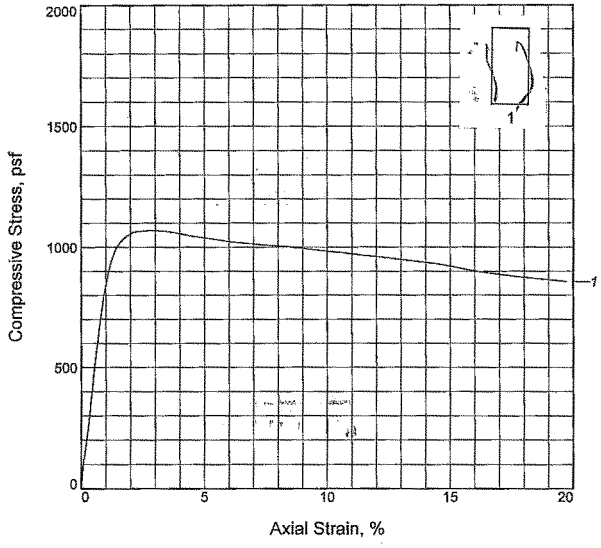
Tested By: ARS **Checked By:** MKA



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-3U **Depth:** 28.8 **Sample Number:** 8B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: ARS **Checked By:** MKA

UNCONFINED COMPRESSION TEST



Sample No.	1				
Unconfined strength, psf	1071				
Undrained shear strength, psf	536				
Failure strain, %	2.8				
Strain rate, %/min.	1.00				
Water content, %	42.7				
Wet density, pcf	111.3				
Dry density, pcf	78.0				
Saturation, %	99.3				
Void ratio	1.1612				
Specimen diameter, in.	1.406				
Specimen height, in.	3.068				
Height/diameter ratio	2.18				

Description: M GR CL6 W/ LNS CH

LL = 42	PL = 16	PI = 26	Assumed GS= 2.70	Type: UNDISTURBED

Project No.: 07-022135
Date Sampled: 10/14/09
Remarks:

Figure _____

Client: U.S. Army Corps of Engineers

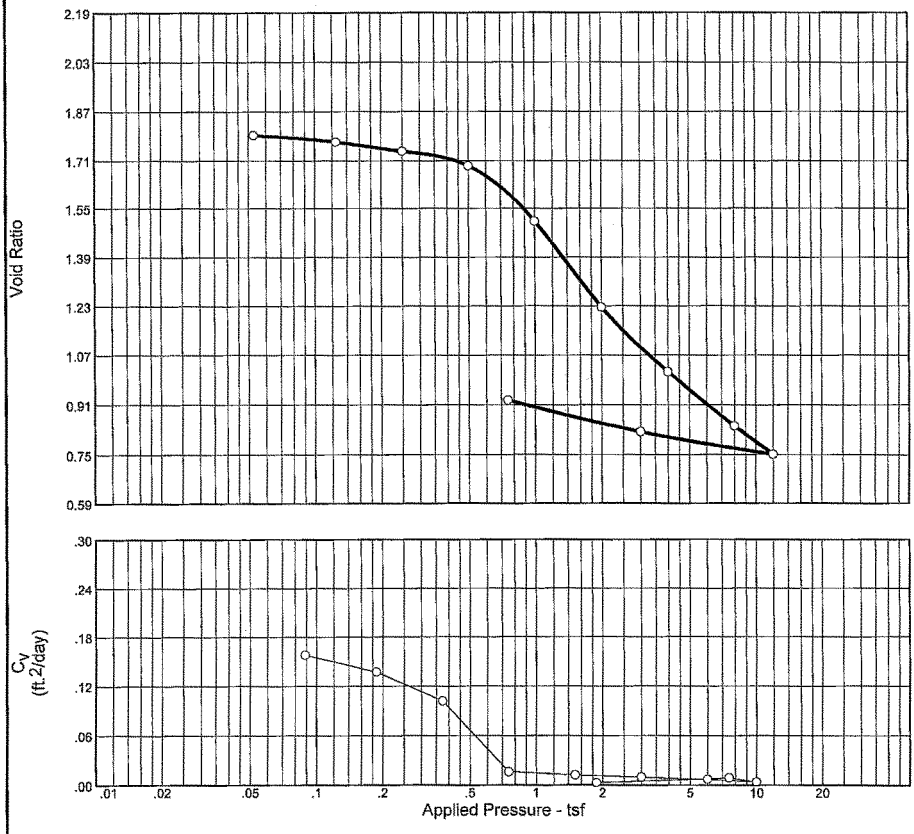
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-3U **Depth:** 32.8
Sample Number: 9B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: JC **Checked By:** MKA

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
97.2 %	63.8 %	61.2	74	52	2.74	0.65	0.92	1.796

MATERIAL DESCRIPTION	USCS	AASHTO
SO GR CH4 W/ ARS & LNS ML	CH4	

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

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

Source: MRGO-03U **Sample No.:** 9D **Elev./Depth:** 34.6

FFEBJV, LLC

St Rose, LA

Remarks:

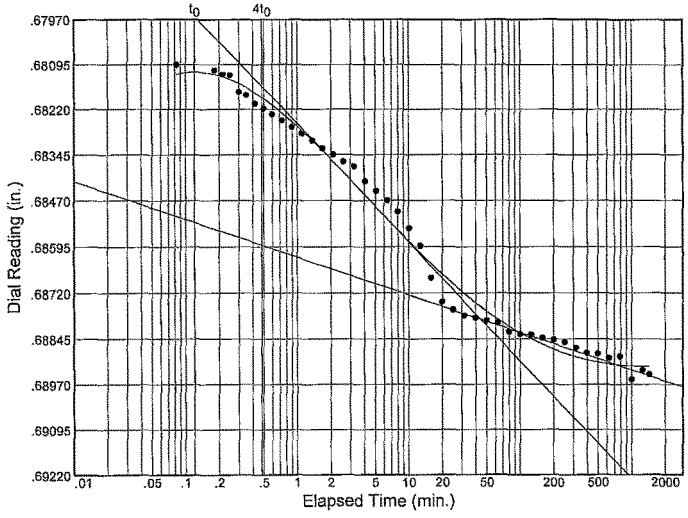
Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

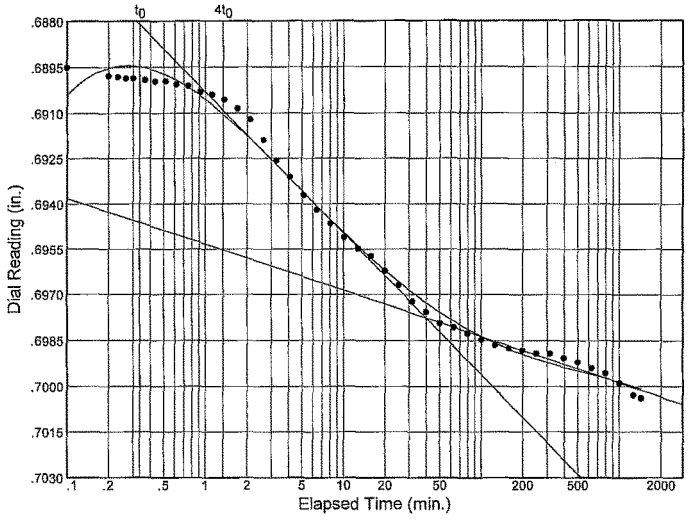
Source: MRGO-03U Sample No.: 9D Elev./Depth: 34.6



Load No.= 2
Load= 0.13 tsf
D_0 = 0.68045
D_{50} = 0.68418
D_{100} = 0.68791
T_{50} = 3.10 min.

C_v @ T_{50}
0.16 ft.^{2}/day

C_α = 0.001



Load No.= 3
Load= 0.25 tsf
D_0 = 0.68794
D_{50} = 0.69285
D_{100} = 0.69776
T_{50} = 3.50 min.

C_v @ T_{50}
0.14 ft.^{2}/day

C_α = 0.002

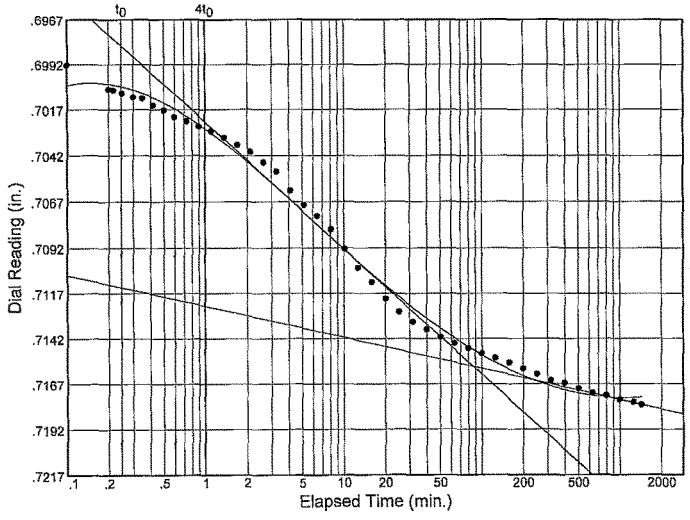
Figure

FFEBJV, LLC

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

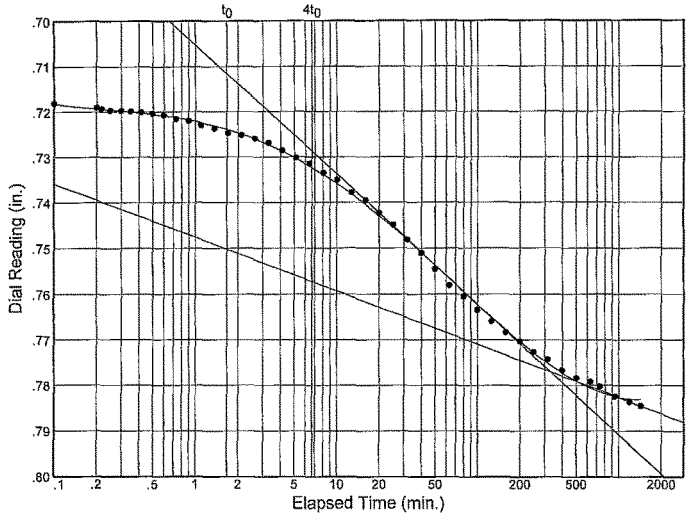
Source: MRGO-03U Sample No.: 9D Elev./Depth: 34.6



Load No.= 4
Load= 0.50 tsf
D_0 = 0.69812
D_{50} = 0.70693
D_{100} = 0.71573
T_{50} = 4.58 min.

C_v @ T_{50}
0.10 ft.2/day

C_α = 0.002



Load No.= 5
Load= 1.00 tsf
D_0 = 0.71537
D_{50} = 0.74617
D_{100} = 0.77697
T_{50} = 26.63 min.

C_v @ T_{50}
0.02 ft.2/day

C_α = 0.012

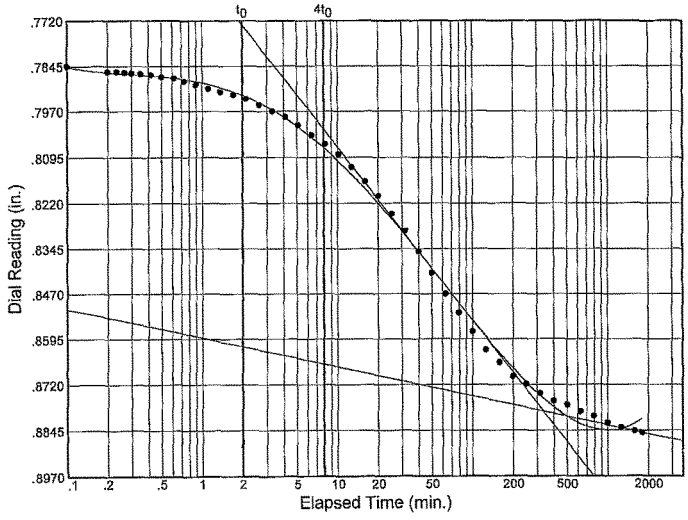
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

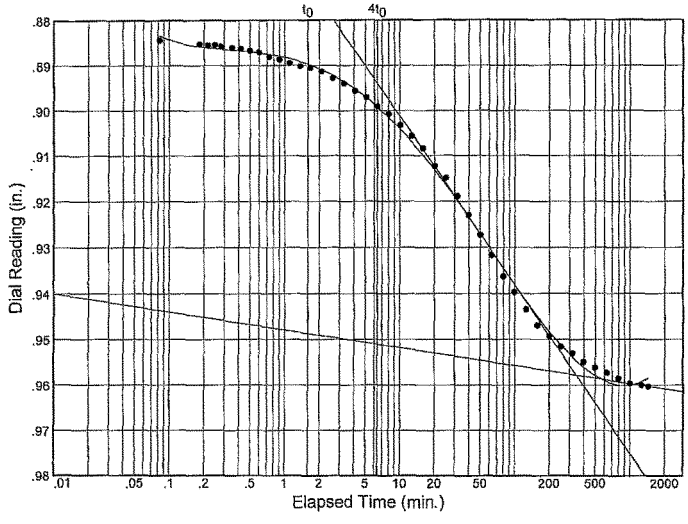
Source: MRGO-03U Sample No.: 9D Elev./Depth: 34.6



Load No.= 6
Load= 2.00 tsf
D_0 = 0.77824
D_{50} = 0.82877
D_{100} = 0.87929
T_{50} = 28.59 min.

C_v @ T_{50}
0.01 ft.2/day

C_α = 0.009



Load No.= 7
Load= 4.00 tsf
D_0 = 0.88018
D_{50} = 0.91903
D_{100} = 0.95787
T_{50} = 29.95 min.

C_v @ T_{50}
0.01 ft.2/day

C_α = 0.005

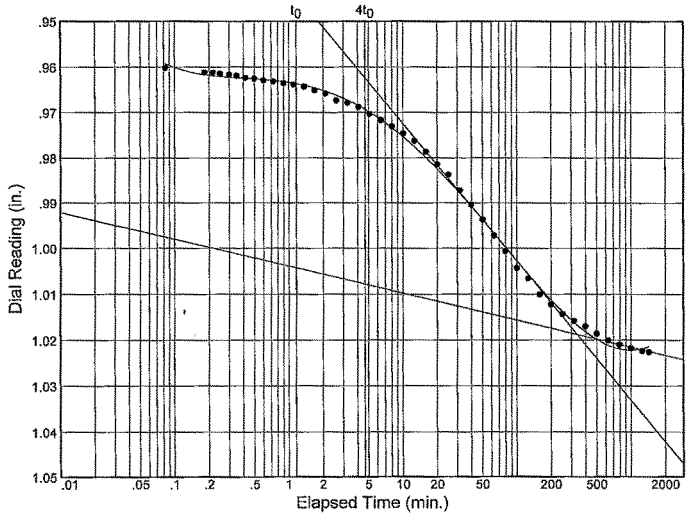
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

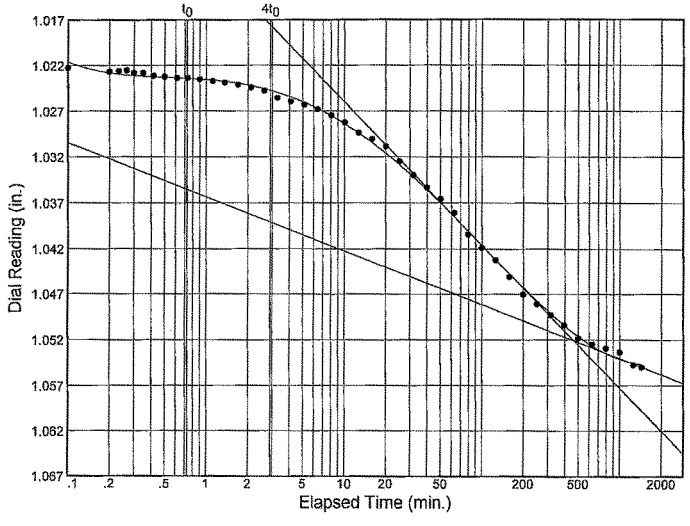
Source: MRGO-03U Sample No.: 9D Elev./Depth: 34.6



Load No.= 8
Load= 8.00 tsf
D_0 = 0.95798
D_{50} = 0.98836
D_{100} = 1.01874
T_{50} = 33.03 min.

C_v @ T_{50}
0.01 ft.2/day

C_α = 0.008



Load No.= 9
Load= 12.00 tsf
D_0 = 1.02206
D_{50} = 1.03707
D_{100} = 1.05209
T_{50} = 50.41 min.

C_v @ T_{50}
0.00 ft.2/day

C_α = 0.009

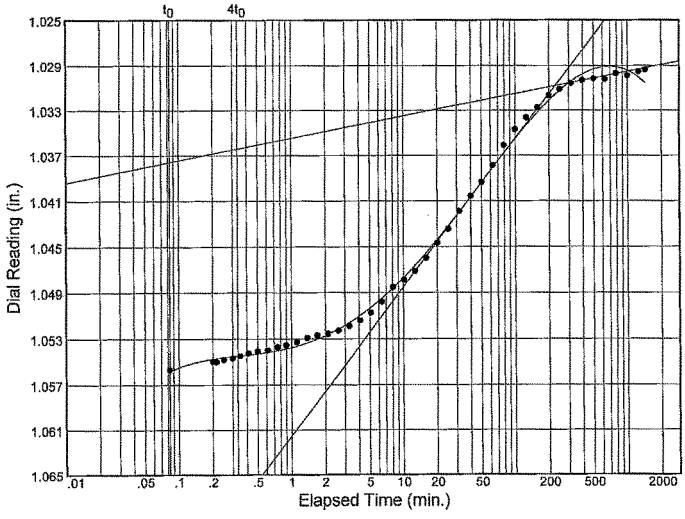
FFEBJV, LLC

Figure

Dial Reading vs. Time

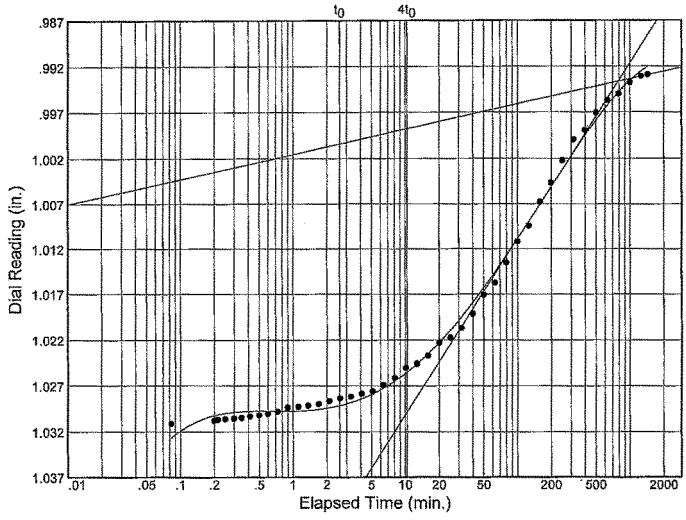
Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-03U Sample No.: 9D Elev./Depth: 34.6



Load No.= 10
Load= 3.00 tsf
D_0 = 1.05717
D_{50} = 1.04397
D_{100} = 1.03077
T_{50} = 21.86 min.

C_v @ T_{50}
0.01 ft.^{2}/day



Load No.= 11
Load= 0.75 tsf
D_0 = 1.03285
D_{50} = 1.01324
D_{100} = 0.99363
T_{50} = 75.01 min.

C_v @ T_{50}
0.00 ft.^{2}/day

FFEBJV, LLC

Figure

CONSOLIDATION TEST DATA

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Contract No. W912P8-07-D-0022
Task Order 135
Project Number: 07-022135

Sample Data

Source: MRGO-03U
Sample No.: 9D
Elev. or Depth: 34.6 Sample Length(in./cm.):
Location:
Description: SO GR CH4 W/ ARS & LNS ML
Liquid Limit: 74 Plasticity Index: 52
USCS: CH4 AASHTO: Figure No.:
Testing Remarks: Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST		AFTER TEST	
Wet w+t =	163.75 g.	Consolidometer # =	7	Wet w+t =	389.61 g.
Dry w+t =	100.00 g.			Dry w+t =	309.02 g.
Tare Wt. =	.00 g.	Spec. Gravity =	2.74	Tare Wt. =	112.34 g.
Height =	1.00 in.	Height =	1.00 in.		
Diameter =	4.00 in.	Diameter =	4.00 in.		
Weight =	330.61 g.	Defl. Table =	n/a		
Moisture =	63.8 %	Ht. Solids =	0.3578 in.	Moisture =	41.0 %
Wet Den. =	100.2 pcf	Dry Wt. =	201.79 g.*	Dry Wt. =	196.68 g.
Dry Den. =	61.2 pcf	Void Ratio =	1.796	Void Ratio =	0.925
		Saturation =	97.2 %		

* Initial dry weight used in calculations

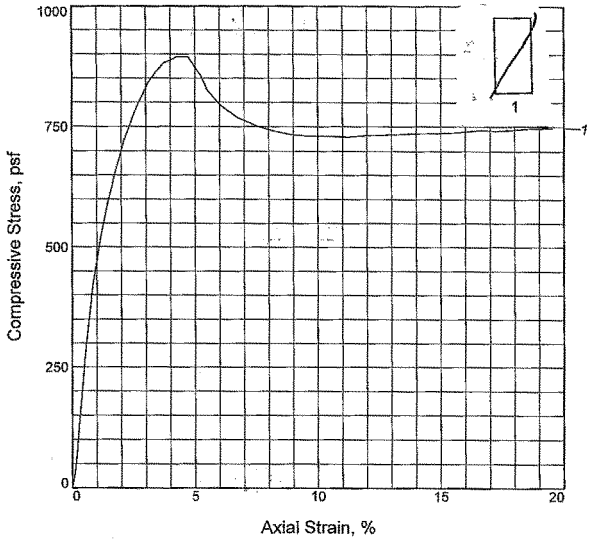
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
start	0.68102				1.796	
0.05	0.68163	0.00000			1.795	0.1 Comprs.
0.13	0.68943	0.00000	0.16	0.001	1.773	0.8 Comprs.
0.25	0.70040	0.00000	0.14	0.002	1.742	1.9 Comprs.
0.50	0.71785	0.00000	0.10	0.002	1.693	3.7 Comprs.
1.00	0.78448	0.00000	0.02	0.012	1.507	10.3 Comprs.
2.00	0.88512	0.00000	0.01	0.009	1.226	20.4 Comprs.
4.00	0.96033	0.00000	0.01	0.005	1.016	27.9 Comprs.
8.00	1.02267	0.00000	0.01	0.008	0.842	34.1 Comprs.

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
12.00	1.05503	0.00000	0.00	0.009	0.751	37.4 Comprs.
3.00	1.02937	0.00000	0.01		0.823	34.8 Comprs.
0.75	0.99292	0.00000	0.00		0.925	31.2 Comprs.

C_c = 0.92 P_c = 0.65 tsf C_r = 0.14

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	895			
Undrained shear strength, psf	448			
Failure strain, %	4.3			
Strain rate, %/min.	1.00			
Water content, %	57.7			
Wet density, pcf	103.3			
Dry density, pcf	65.5			
Saturation, %	98.2			
Void ratio	1.6112			
Specimen diameter, in.	1.406			
Specimen height, in.	3.099			
Height/diameter ratio	2.20			

Description: SO GR CH4 W/ ARS SM

LL = 73	**PL** = 18	**PI** = 55	**Assumed GS**= 2.74	**Type:** Specimen1

Project No.: 07-022135
Date Sampled:
Remarks:

Figure _____

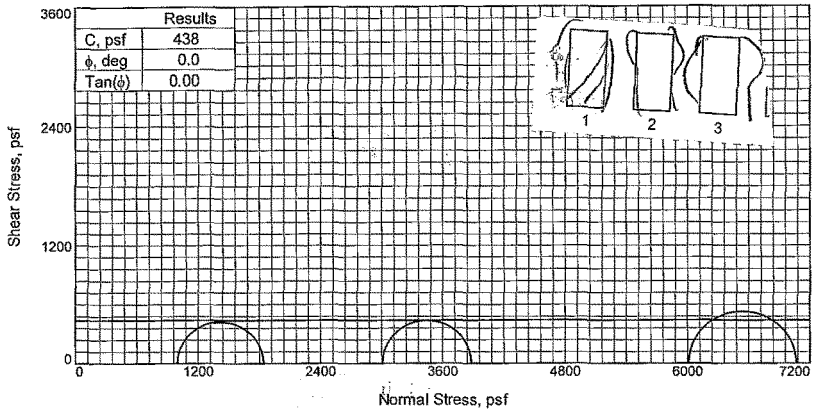
Client: U.S. Army Corps of Engineers

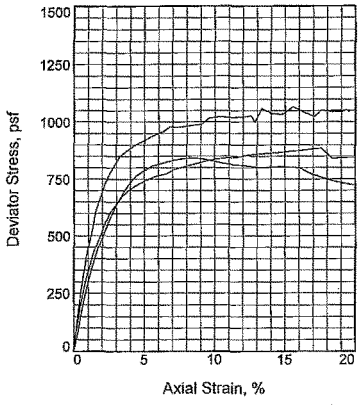
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-3U **Depth:** 41.7
Sample Number: 11C

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: NG **Checked By:** MKA





Sample No.		1	2	3
Initial	Water Content, %	38.9	37.9	38.3
	Dry Density, pcf	81.7	83.6	81.4
	Saturation, %	98.8	100.7	96.7
	Void Ratio	1.0631	1.0170	1.0703
	Diameter, in.	1.406	1.407	1.410
	Height, in.	3.075	3.090	3.088
At Test	Water Content, %	38.9	37.9	38.3
	Dry Density, pcf	81.7	83.6	81.4
	Saturation, %	98.8	100.7	96.7
	Void Ratio	1.0631	1.0170	1.0703
	Diameter, in.	1.406	1.407	1.410
	Height, in.	3.075	3.090	3.088
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.93	20.89	41.74
Fail. Stress, psf		843	872	1057
Strain, %		8.6	15.4	13.3
Ult. Stress, psf		801	872	1034
Strain, %				
σ_1 Failure, psf		1840	3881	7068
σ_3 Failure, psf		997	3009	6011

Type of Test: Unconsolidated Undrained
Sample Type: C
Description: SO GR CL6 W/ LNS SM

LL= 40 **PL=** 16 **PI=** 24
Assumed Specific Gravity= 2.70
Remarks:

Figure _____

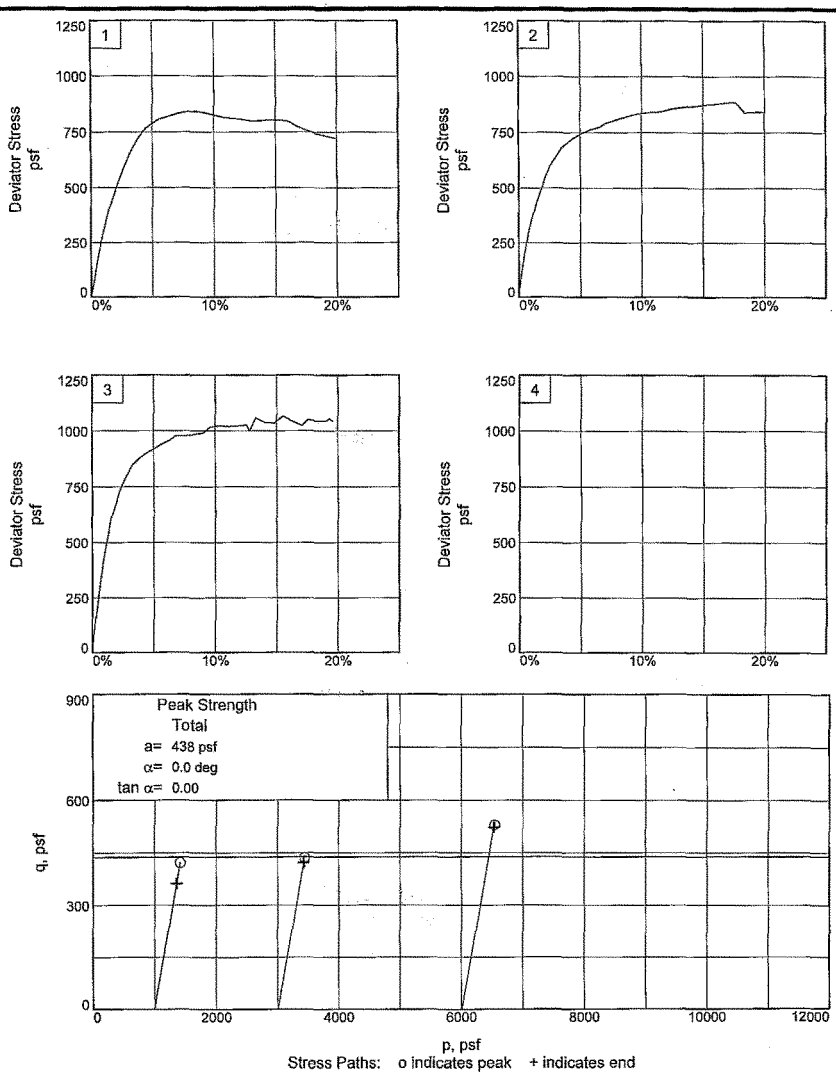
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-3U **Depth:** 45.7
Sample Number: 12C
Proj. No.: 07-022135 **Date Sampled:**

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

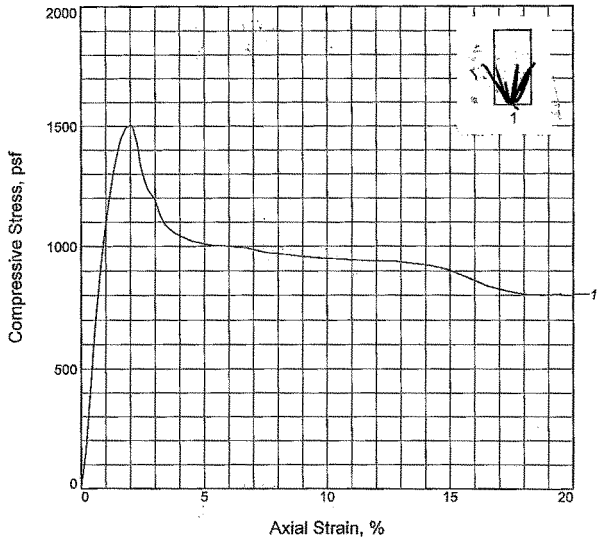
Tested By: ARS **Checked By:** MKA



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-3U **Depth:** 45.7 **Sample Number:** 12C
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: ARS **Checked By:** MKA

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	1505			
Undrained shear strength, psf	753			
Failure strain, %	2.0			
Strain rate, %/min.	1.00			
Water content, %	57.7			
Wet density, pcf	104.2			
Dry density, pcf	66.1			
Saturation, %	99.6			
Void ratio	1.5870			
Specimen diameter, in.	1.406			
Specimen height, in.	3.108			
Height/diameter ratio	2.21			

Description: M GR CH4 W/ LNS ML

LL = 90	PL = 21	PI = 69	Assumed GS= 2.74	Type: Specimen1

Project No.: 07-022135
Date Sampled:
Remarks:

Figure _____

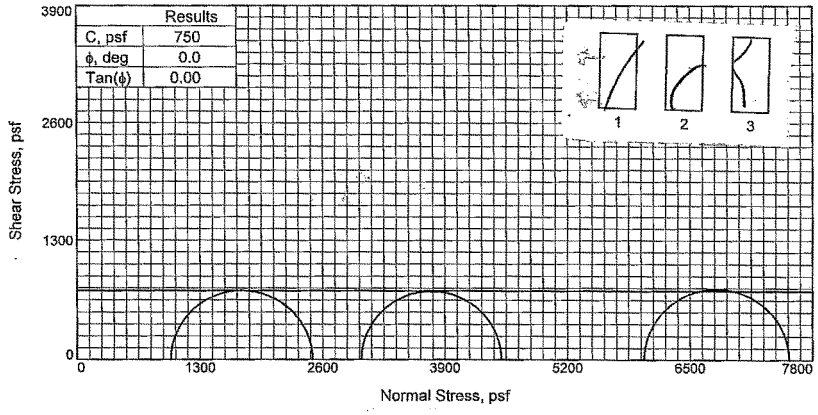
Client: U.S. Army Corps of Engineers

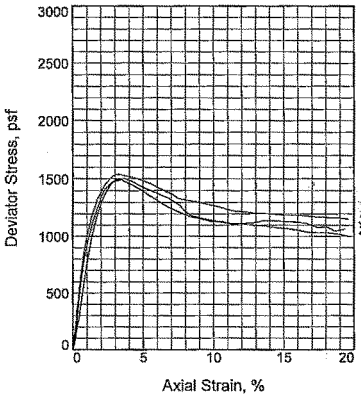
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-3U **Depth:** 52.8
Sample Number: 14B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: ARS **Checked By:** MKA





Sample No.		1	2	3
Initial	Water Content, %	46.4	47.3	45.3
	Dry Density, pcf	75.6	74.7	75.5
	Saturation, %	100.7	100.3	98.1
	Void Ratio	1.2619	1.2908	1.2643
	Diameter, in.	1.405	1.405	1.405
	Height, in.	3.096	3.098	3.105
At Test	Water Content, %	46.4	47.3	45.3
	Dry Density, pcf	75.6	74.7	75.5
	Saturation, %	100.7	100.3	98.1
	Void Ratio	1.2619	1.2908	1.2643
	Diameter, in.	1.405	1.405	1.405
	Height, in.	3.096	3.098	3.105
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.88	20.92	41.76
Fail. Stress, psf		1502	1488	1540
Strain, %		3.7	3.5	3.3
Ult. Stress, psf		1110	1106	1226
Strain, %				
σ_1 Failure, psf		2493	4500	7553
σ_3 Failure, psf		991	3012	6013

Type of Test:
Unconsolidated Undrained
Sample Type: C
Description: M GR CH3 W/ LNS SM

LL= 67 **PL=** 17 **PI=** 50
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

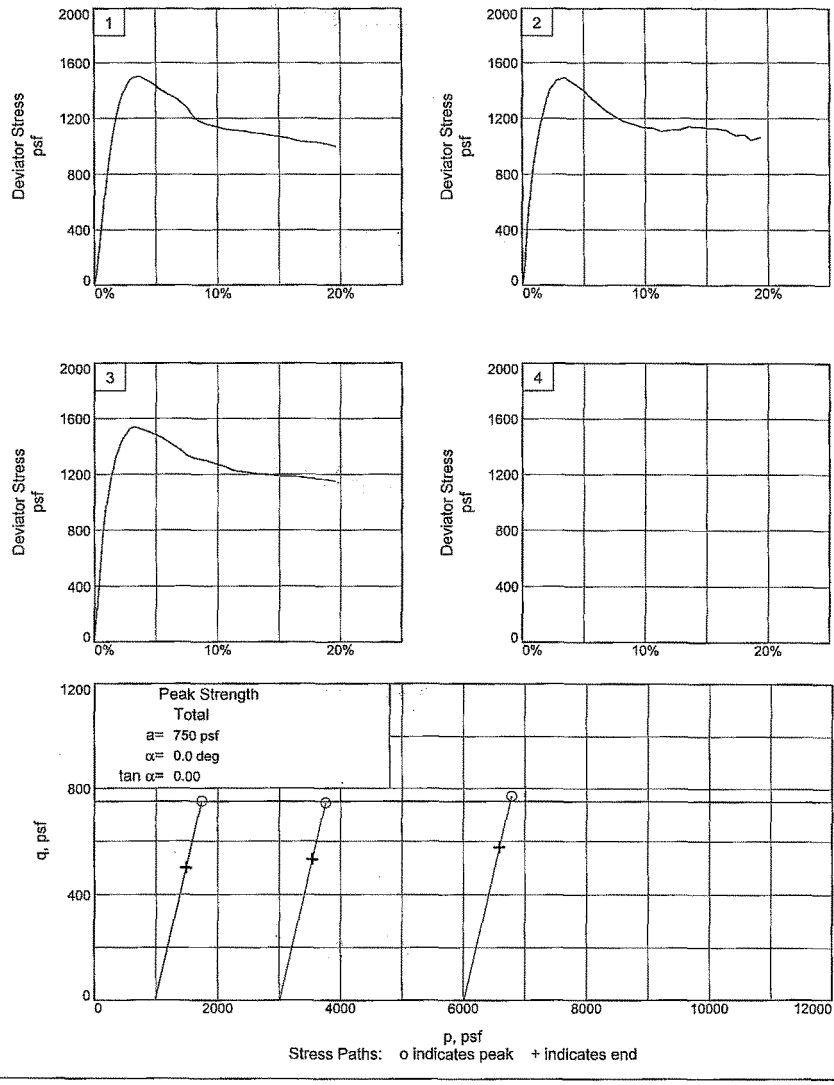
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-3U **Depth:** 57.7
Sample Number: 15C
Proj. No.: 07-022135 **Date Sampled:**

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

Tested By: ARS **Checked By:** MKA



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-3U **Depth:** 57.7 **Sample Number:** 15C
Project No.: 07-022135 **Figure** _____ FFEBJV, LLC

Tested By: ARS **Checked By:** MKA

SUMMARY OF LABORATORY TEST RESULTS

Project: MRGO Ecosystem Restoration Feasibility Study **Assigned By:** _____

Project Number: 07-022135 **Current Date:** 12/2/2009

Boring: MRGO-4U

Sample Number	Depth	Visual Classification	USCS	E(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
1A	0.0	VSO DGR PT W/ WD, RT	PT		342												
1B	0.8	VSO DGR CHOC W/ WD, RT	CHOC		285												
1C	1.7	VSO DGR CHOA W/ WD, RT	CHOA		141												
2A	4.0	VSO BR & DGR PT W/ WD	PT		299												
2B	4.8	VSO BR & DGR PT W/ WD	PT		344												
2C	5.7	VSO BR & DGR CHOC W/ WD	CHOC	6	229	23	76	100	UC	-	89	179	217	36	181	0.10	
2D	6.6	SO GR CHOA W/ WD	CHOA		150												
3A	8.0	VSO GR CHOA	CHOA		125												
3B	8.8	VSO GR CHOA W/ WD	CHOA		141	35	85	100	UU	0	83		138	25	113	0.05	
3C	9.7	SO GR CH4 W/ O, WD, SIF	CH4		59												
3D	10.6	SO GR CH4 W/ O, WD, SIF	CH4		62												
4A	12.0	SO GR CH4 W/ ARS SM, SIF	CH4		59												
4B	12.8	VSO GR CL6 W/ LNS & ARS CH	CL6		66	60	100	98					46	18	28		Gs, CON
4C	13.7	GR ML W/ LYS CH	ML		39												
4D	14.6	GR ML W/ LYS CH	ML		33												
5A	16.0	VSO GR CL6 W/ LYS ML	CL6		40												
5B	16.8	SO GR CH2 W/ LYS ML	CH2		38												
5C	17.7	VSO GR CH3 W/ LNS & LYS ML	CH3	9	59	65	103	98	UC	-	205	409	65	19	46	0.16	
6A	20.0	GR ML W/ CC	ML		32												
6B	20.8	GR ML	ML		32												
7A	24.0	GR ML	ML		29												
7B	24.8	GR ML W/ LYS CH	ML		34												
7C	25.7	SO GR CH3 W/ LNS & LYS ML	CH3		50												
7D	26.6	SO GR CH3 W/ LNS & LYS ML	CH3		53												
8A	28.0	SO GR CH3 W/ LNS & LYS ML	CH3		58												
8B	28.8	SO GR CH3 W/ LNS & LYS ML	CH3		61	64	103	99	UU	0	301		65	19	46	0.23	
8C	29.7	GR ML W/ LYS CH	ML		30												
9A	32.0	SO GR CH4 W/ LNS & LYS ML	CH4		70												
9B	32.8	SO GR CH4 W/ LNS & LYS ML	CH4	2	74	56	98	100	UC	-	480	960	83	22	61	0.21	
9C	33.7	SO GR CH4 W/ LNS & LYS ML	CH4		70												
9D	34.6	SO DGR CH4 W/ LNS & LYS ML	CH4		66												
10A	36.0	SO GR CH4	CH4		57												
10B	36.8	SO GR CH4	CH4		56	67	104	97	UU	0	399		76	20	56	0.28	
10C	37.7	SO GR CH4 W/ LNS ML	CH4	3	60	64	102	97	UC	-	430	860	84	20	64	0.28	
11A	40.0	SO GR CH4 W/ LNS ML	CH4		68												
11B	40.8	M GR CH4 W/ LNS ML	CH4		51	70	106	97					76	23	53		Gs, CON
11C	41.7	M GR CH4 W/ LNS ML	CH4		65												

Remarks: _____

FFEB JV, LLC

Checked By: MS/WH

File Name: MRGO-04U.xls

SUMMARY OF LABORATORY TEST RESULTS

Project: MRGO Ecosystem Restoration Feasibility Study **Assigned By:** _____

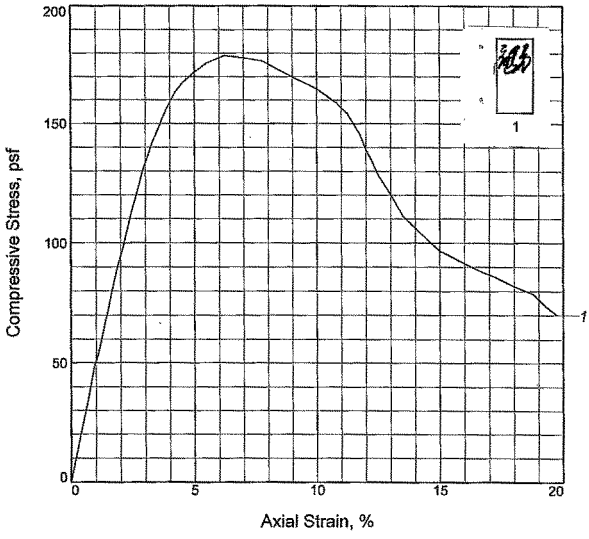
Project Number: 07-022135 **Current Date:** 12/2/2009
Boring: MRGO-4U

Sample Number	Depth	Visual Classification	USCS	E(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
11D	42.6	SO GR CH4 W/ LNS ML	CH4		62	63	102	100	UU	0	378		77	19	58	0.26	
12A	44.0	SO GR CH4 W/ LNS ML	CH4		66												
12B	44.8	SO GR CH4 W/ LNS ML	CH4		66												
12C	45.7	SO GR CH4 W/ LNS ML	CH4	1	65	61	101	100	UC	-	297	595	84	21	63	0.27	
13A	48.0	SO GR CH4	CH4		67												
13B	48.8	M GR CH4 W/ LNS ML	CH4	3	56	67	105	100	UC	-	648	1297	76	19	57	0.34	
13C	49.7	M GR CH4 W/ LNS ML	CH4		61												
13D	50.6	M GR CH4	CH4		63												
14A	52.0	M GR CH4 W/ LNS & LYS ML	CH4		59												
14B	52.8	M GR CH4 W/ LNS & LYS ML, SIF	CH4		70	58	99	99	UU	0	608		92	21	71	0.40	
14C	53.7	M GR CH4 W/ LNS SM	CH4		60												
15A	56.0	ST LGR CH3 W/ ARS & LNS SM, CC	CH3		33												
15B	56.8	M LGR CL6 W/ LNS SM	CL6		30	92	119	96	UU	0	572		42	12	30	0.44	
15C	57.7	ST LGR CH2 W/ LNS SM	CH2		28												
15D	58.6	ST LGR CH2 W/ LNS SM	CH2		29												

Remarks: _____
FFEB JV, LLC

Checked By: MSI WH
File Name: MRGO-04U.xls

UNCONFINED COMPRESSION TEST



Sample No.	1				
Unconfined strength, psf	179				
Undrained shear strength, psf	89				
Failure strain, %	6.2				
Strain rate, %/min.	1.00				
Water content, %	228.7				
Wet density, pcf	76.3				
Dry density, pcf	23.2				
Saturation, %	99.9				
Void ratio	5.7262				
Specimen diameter, in.	1.387				
Specimen height, in.	3.079				
Height/diameter ratio	2.22				

Description: VSO BR & DGR CHOC W/ WD

LL = 217	**PL** = 36	**PI** = 181	**Assumed GS=** 2.50	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 10/14/09
Remarks:

Figure _____

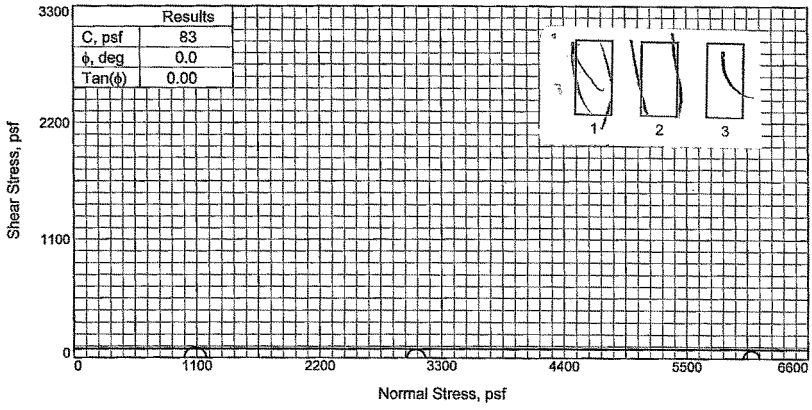
Client: U.S. Army Corps of Engineers

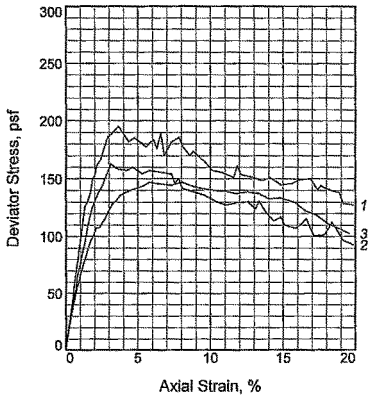
Project: USACE - MRGO Ecosystem Restoration Feasibility Study St.Bernard Parish, La
Source of Sample: MRGO-4U **Depth:** 5.7
Sample Number: 2C

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: ARS/JC **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	147.2	136.9	140.0
	Dry Density, pcf	33.8	36.4	35.0
	Saturation, %	100.5	102.9	100.1
	Void Ratio	3.8080	3.4589	3.6377
	Diameter, in.	1.406	1.400	1.402
	Height, in.	3.078	3.095	3.094
At Test	Water Content, %	147.2	136.9	140.0
	Dry Density, pcf	33.8	36.4	35.0
	Saturation, %	100.5	102.9	100.1
	Void Ratio	3.8080	3.4589	3.6377
	Diameter, in.	1.406	1.400	1.402
	Height, in.	3.078	3.095	3.094
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.86	20.74	41.76
Fail. Stress, psf		195	163	147
Strain, %		3.7	3.1	5.8
Ult. Stress, psf		145	110	133
Strain, %				
σ_1 Failure, psf		1183	3150	6161
σ_3 Failure, psf		988	2987	6014

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: VSO GR CHOA W/ WD

LL= 138 **PL=** 25 **PI=** 113
Assumed Specific Gravity= 2.60
Remarks:

Figure _____

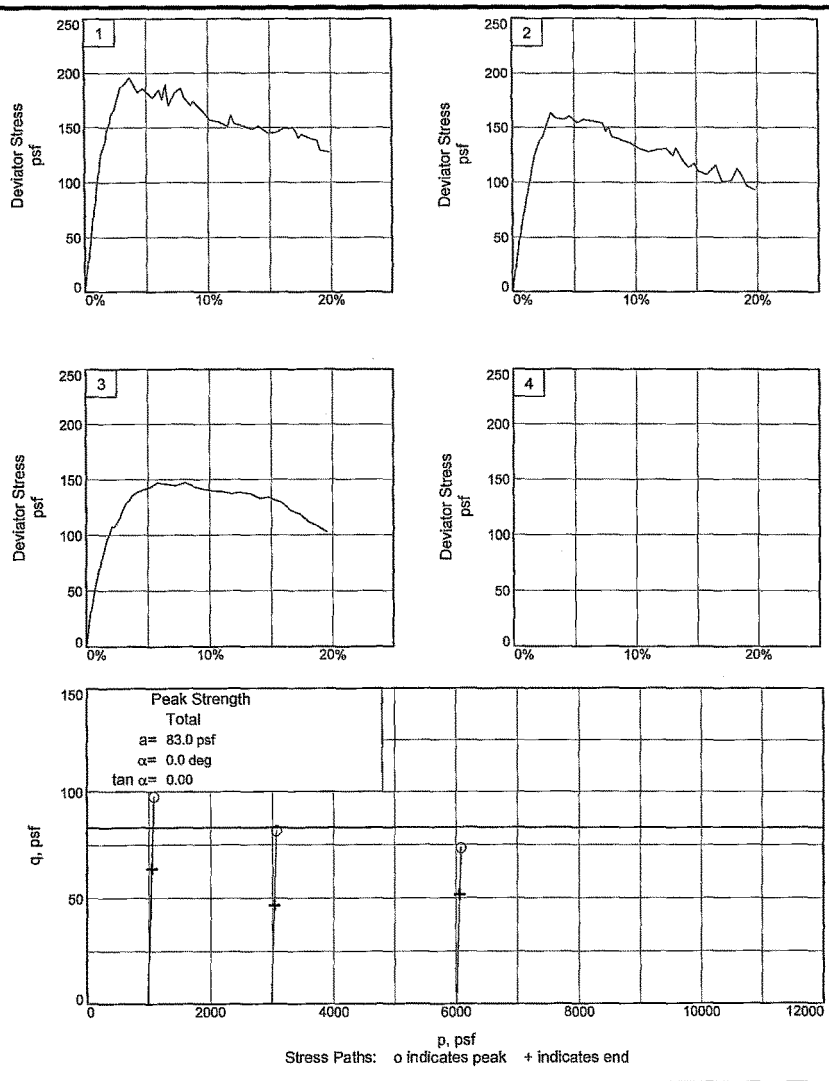
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-4U **Depth:** 8.8
Sample Number: 3B
Proj. No.: 07-022135 **Date Sampled:** 10/14/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

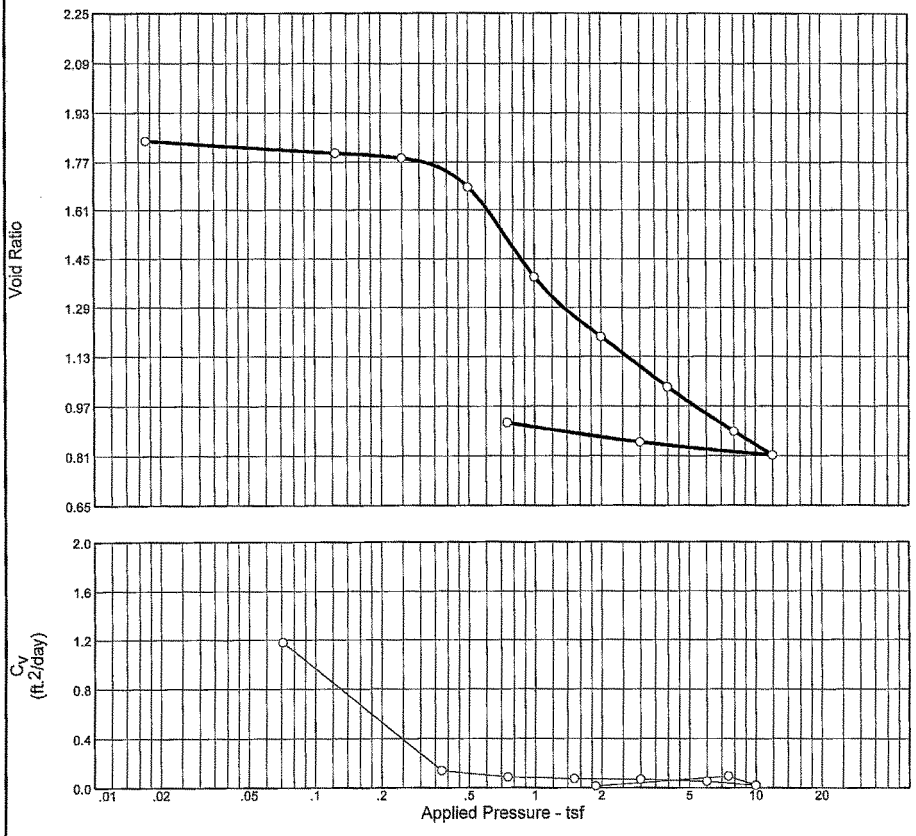
Tested By: ARS/JC **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-4U **Depth:** 8.8 **Sample Number:** 3B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: ARS/JC **Checked By:** MS

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
98.5 %	66.3 %	60.0	46	28	2.73	0.47	0.99	1.839

MATERIAL DESCRIPTION	USCS	AASHTO
VSO GR CL6 W/ LNS & ARS CH	CL6	

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

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

Source: MRGO-04U **Sample No.:** 4B **Elev./Depth:** 12.8

FFEBJV, LLC

St Rose, LA

Remarks:

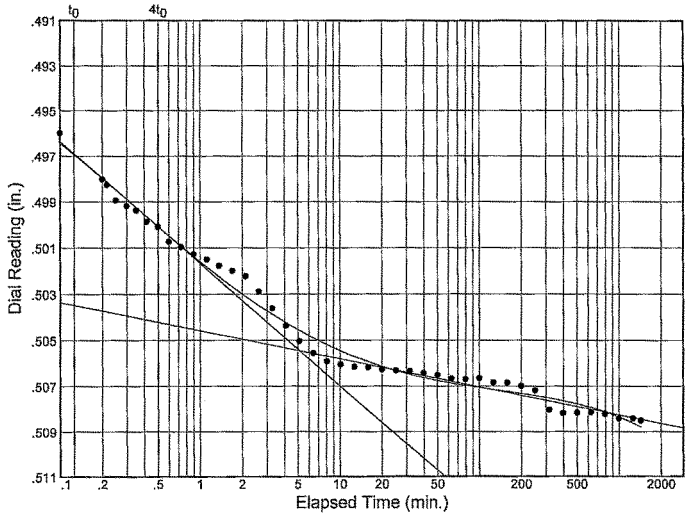
Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

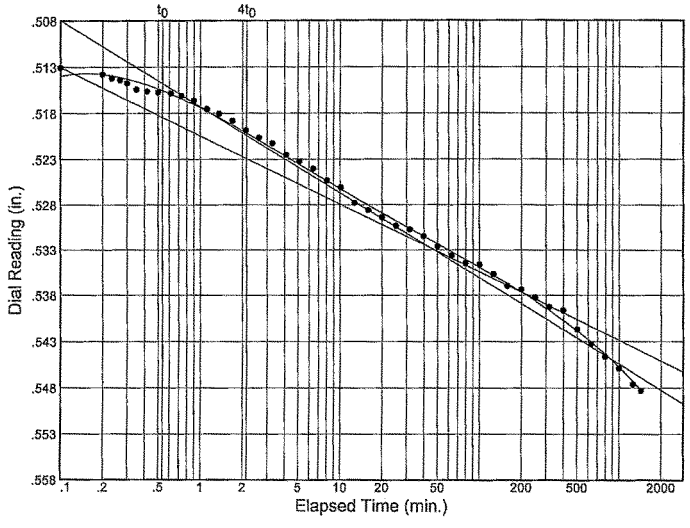
Source: MRGO-04U Sample No.: 4B Elev./Depth: 12.8



Load No.= 2
Load= 0.13 tsf
D_0 = 0.49377
D_{50} = 0.49961
D_{100} = 0.50545
T_{50} = 0.41 min.

C_v @ T_{50}
1.18 ft.2/day

C_α = 0.001



Load No.= 4
Load= 0.50 tsf
D_0 = 0.51090
D_{50} = 0.52182
D_{100} = 0.53274
T_{50} = 3.28 min.

C_v @ T_{50}
0.14 ft.2/day

C_α = 0.008

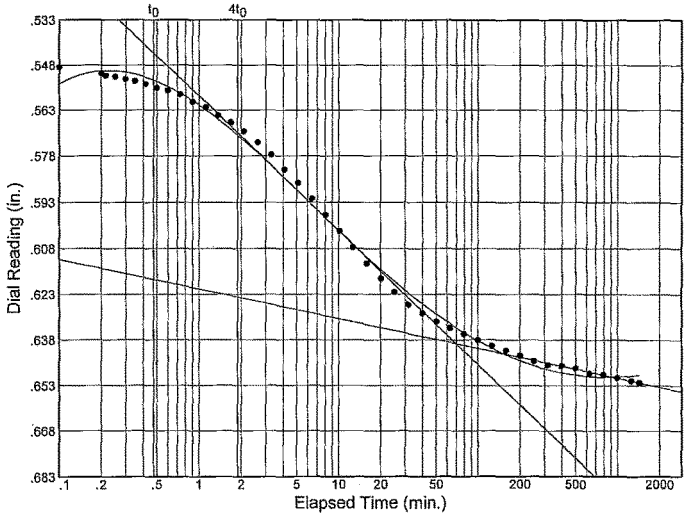
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

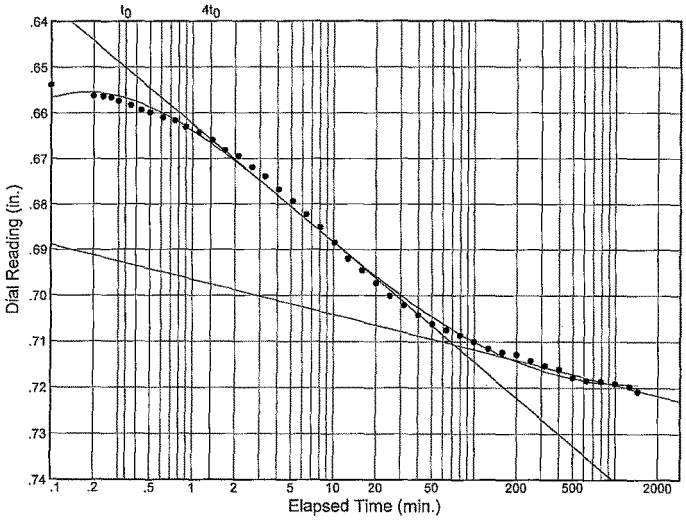
Source: MRGO-04U Sample No.: 4B Elev./Depth: 12.8



Load No.= 5
Load= 1.00 tsf
D_0 = 0.53472
D_{50} = 0.58698
D_{100} = 0.63924
T_{50} = 4.50 min.

C_v @ T_{50}
0.09 ft.^{2}/day

C_α = 0.010



Load No.= 6
Load= 2.00 tsf
D_0 = 0.64685
D_{50} = 0.67878
D_{100} = 0.71071
T_{50} = 4.26 min.

C_v @ T_{50}
0.07 ft.^{2}/day

C_α = 0.009

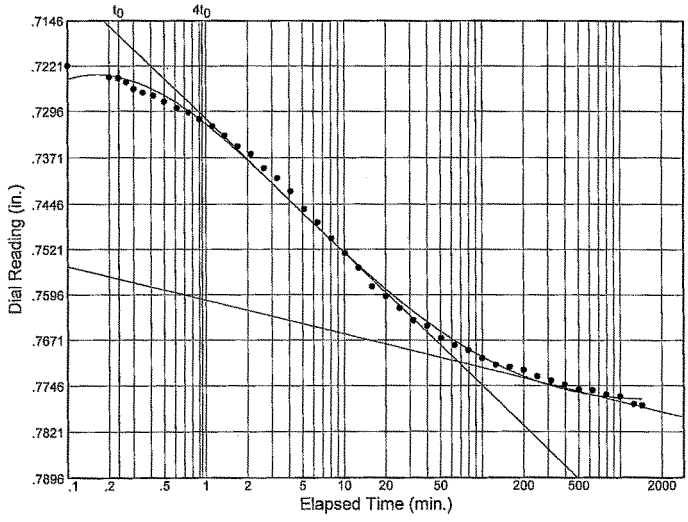
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

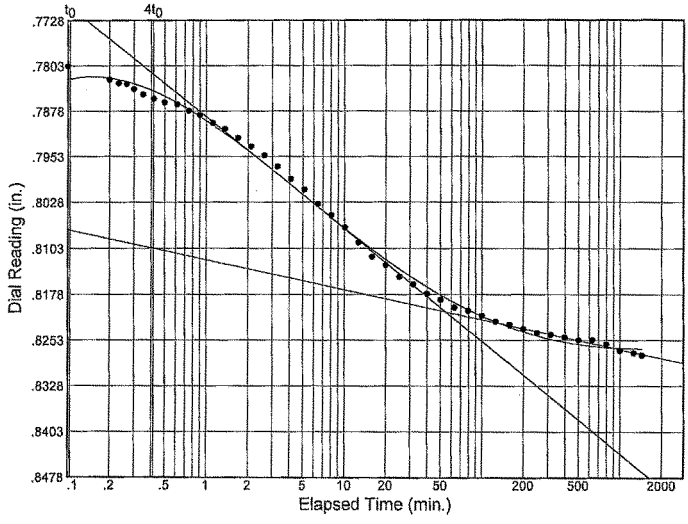
Source: MRGO-04U Sample No.: 4B Elev./Depth: 12.8



Load No.= 7
Load= 4.00 tsf
D_0 = 0.71673
D_{50} = 0.74370
D_{100} = 0.77066
T_{50} = 3.89 min.

C_v @ T_{50}
0.07 ft.^{2}/day

C_α = 0.007



Load No.= 8
Load= 8.00 tsf
D_0 = 0.78051
D_{50} = 0.80057
D_{100} = 0.82063
T_{50} = 4.41 min.

C_v @ T_{50}
0.05 ft.^{2}/day

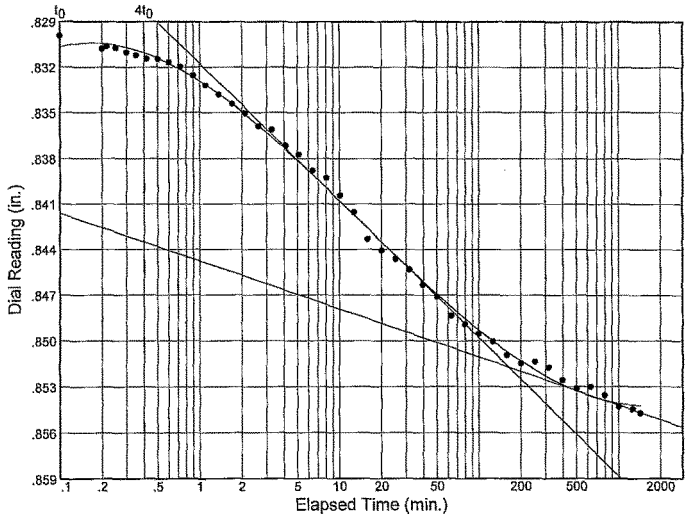
C_α = 0.007

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

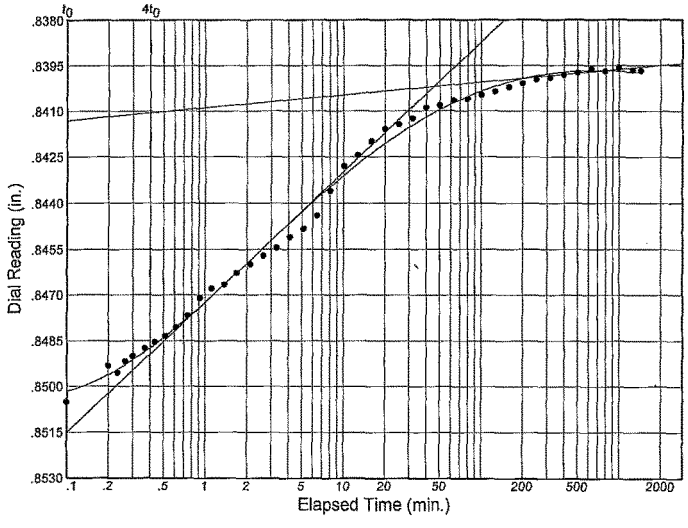
Source: MRGO-04U Sample No.: 4B Elev./Depth: 12.8



Load No.= 9
Load= 12.00 tsf
D_0 = 0.83029
D_{50} = 0.84101
D_{100} = 0.85173
T_{50} = 10.60 min.

C_v @ T_{50}
0.02 ft.^{2}/day

C_α = 0.005



Load No.= 10
Load= 3.00 tsf
D_0 = 0.85157
D_{50} = 0.84588
D_{100} = 0.84019
T_{50} = 2.11 min.

C_v @ T_{50}
0.09 ft.^{2}/day

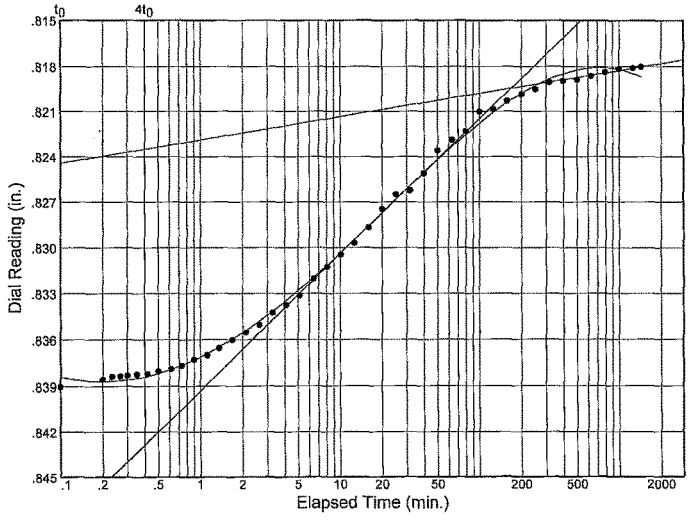
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-04U Sample No.: 4B Elev./Depth: 12.8



Load No.= 11
Load= 0.75 tsf
D_0 = 0.83841
D_{50} = 0.82893
D_{100} = 0.81945
T_{50} = 14.67 min.

C_v @ T_{50}
0.01 ft.^{2}/day

SWELL/CONSOLIDATION TEST DATA

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Contract No. W912P8-07-D-0022
Task Order 135
Project Number: 07-022135

Sample Data

Source: MRGO-04U
Sample No.: 4B
Elev. or Depth: 12.8 Sample Length(in./cm.):
Location:
Description: VSO GR CL6 W/ LNS & ARS CH
Liquid Limit: 46 Plasticity Index: 28
USCS: CL6 AASHTO: Figure No.:
Testing Remarks: Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST		AFTER TEST	
Wet w+t	= 166.33 g.	Consolidometer #	= 13	Wet w+t	= 376.92 g.
Dry w+t	= 100.00 g.			Dry w+t	= 309.95 g.
Tare Wt.	= .00 g.	Spec. Gravity	= 2.73	Tare Wt.	= 112.88 g.
Height	= 1.00 in.	Height	= 1.00 in.		
Diameter	= 4.00 in.	Diameter	= 4.00 in.		
Weight	= 327.79 g.	Defl. Table	= n/a		
Moisture	= 66.3 %	Ht. Solids	= 0.3506 in.	Moisture	= 34.0 %
Wet Den.	= 99.9 pcf	Dry Wt.	= 196.96 g.*	Dry Wt.	= 197.07 g.
Dry Den.	= 60.0 pcf	Void Ratio	= 1.839	Void Ratio	= 0.917
		Saturation	= 98.5 %		

* Initial dry weight used in calculations

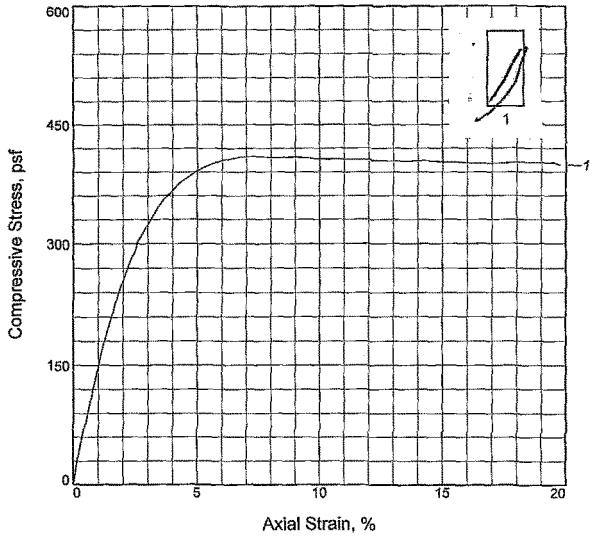
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.49481				1.839	
0.02	0.49474	0.00000			1.839	0.0 Swell
0.13	0.50851	0.00000	1.18	0.001	1.800	1.4 Comprs.
0.25	0.51427	0.00000			1.783	2.0 Comprs.
0.50	0.54829	0.00000	0.14	0.008	1.686	5.4 Comprs.
1.00	0.65211	0.00000	0.09	0.010	1.390	15.8 Comprs.
2.00	0.72088	0.00000	0.07	0.009	1.194	22.7 Comprs.
4.00	0.77784	0.00000	0.07	0.007	1.031	28.4 Comprs.
8.00	0.82780	0.00000	0.05	0.007	0.889	33.5 Comprs.

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
12.00	0.85476	0.00000	0.02	0.005	0.812	36.2 Comprs.
3.00	0.83968	0.00000	0.09		0.855	34.7 Comprs.
0.75	0.81802	0.00000	0.01		0.917	32.5 Comprs.

C_c = 0.99 P_c = 0.47 tsf C_r = 0.09

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	409			
Undrained shear strength, psf	205			
Failure strain, %	9.0			
Strain rate, %/min.	1.00			
Water content, %	59.1			
Wet density, pcf	102.8			
Dry density, pcf	64.6			
Saturation, %	98.2			
Void ratio	1.6484			
Specimen diameter, in.	1.403			
Specimen height, in.	3.101			
Height/diameter ratio	2.21			

Description: VSO GR CH3 W/ LNS & LYS ML

LL = 65	PL = 19	PI = 46	Assumed GS= 2.74	Type: UNDISTURBED

Project No.: 07-022135
Date Sampled: 10/14/09
Remarks:

Figure _____

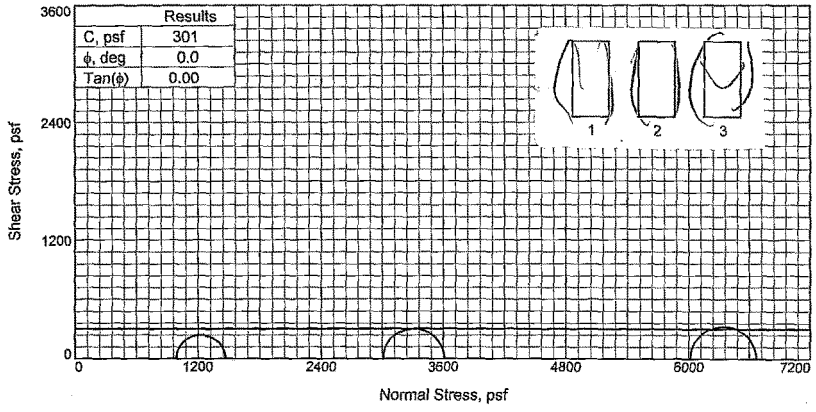
Client: U.S. Army Corps of Engineers

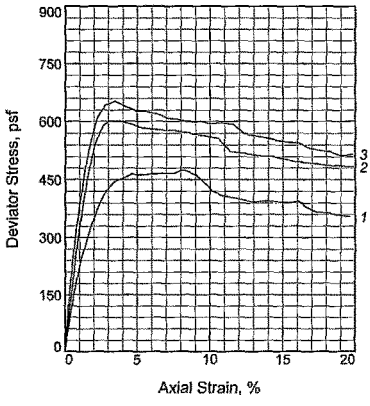
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-4U **Depth:** 17.7
Sample Number: 5C

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: ARS/JC **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	62.3	66.3	54.4
	Dry Density, pcf	63.0	60.4	68.0
	Saturation, %	99.7	99.0	98.3
	Void Ratio	1.7132	1.8339	1.5154
	Diameter, in.	1.407	1.408	1.409
	Height, in.	3.096	3.105	3.099
At Test	Water Content, %	62.3	66.3	54.4
	Dry Density, pcf	63.0	60.4	68.0
	Saturation, %	99.7	99.0	98.3
	Void Ratio	1.7132	1.8339	1.5154
	Diameter, in.	1.407	1.408	1.409
	Height, in.	3.096	3.105	3.099
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.88	20.89	41.78
Fail. Stress, psf		474	602	652
Strain, %		8.1	3.1	3.5
Ult. Stress, psf		391	504	548
Strain, %				
σ_1 Failure, psf		1465	3610	6668
σ_3 Failure, psf		990	3008	6016

Type of Test: Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CH3 W/ LNS & LYS ML

LL= 65 **PL=** 19 **PI=** 46
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

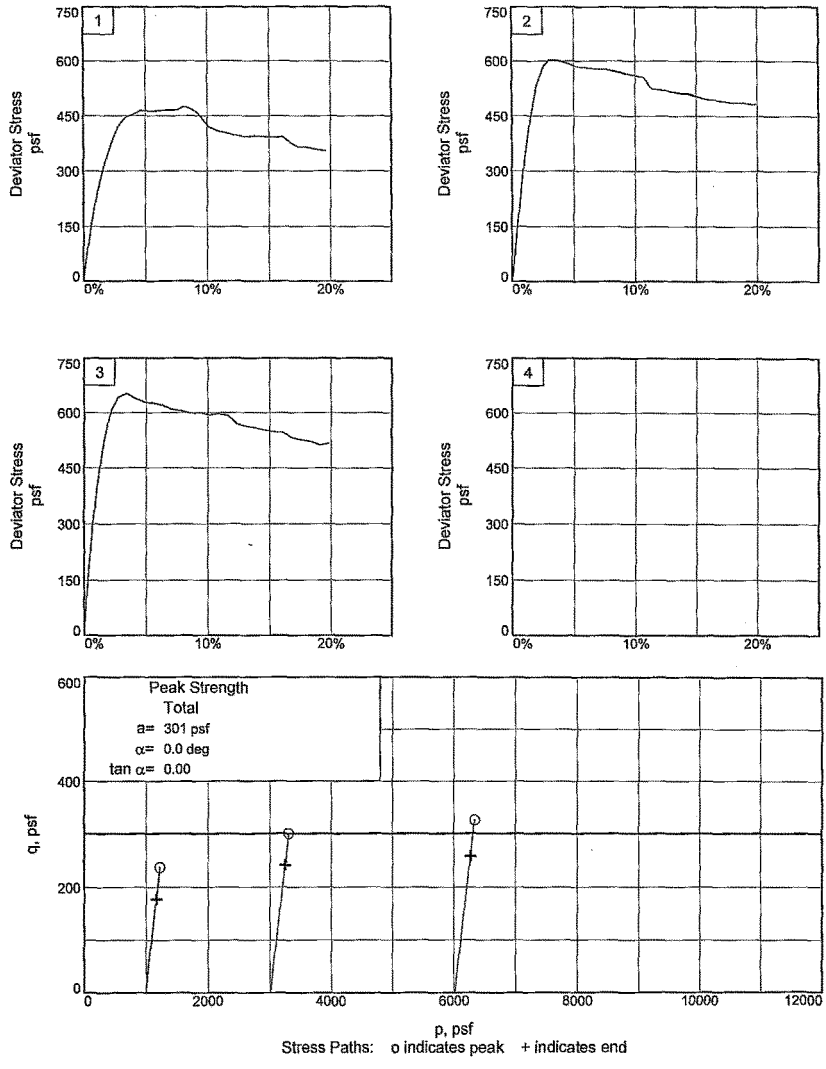
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-4U **Depth:** 28.8
Sample Number: 8B
Proj. No.: 07-022135 **Date Sampled:** 10/14/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

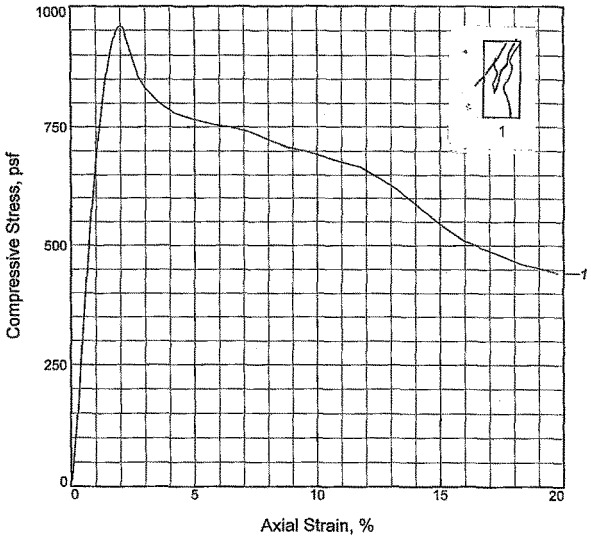
Tested By: ARS/JC **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-4U **Depth:** 28.8 **Sample Number:** 8B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: ARS/JC **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1				
Unconfined strength, psf	960				
Undrained shear strength, psf	480				
Failure strain, %	2.0				
Strain rate, %/min.	1.00				
Water content, %	74.4				
Wet density, pcf	98.1				
Dry density, pcf	56.2				
Saturation, %	99.8				
Void ratio	2.0419				
Specimen diameter, in.	1.406				
Specimen height, in.	3.103				
Height/diameter ratio	2.21				

Description: SO GR CH4 W/ LNS & LYS ML

LL = 83	**PL** = 22	**PI** = 61	**Assumed GS=** 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 10/14/09
Remarks:

Figure _____

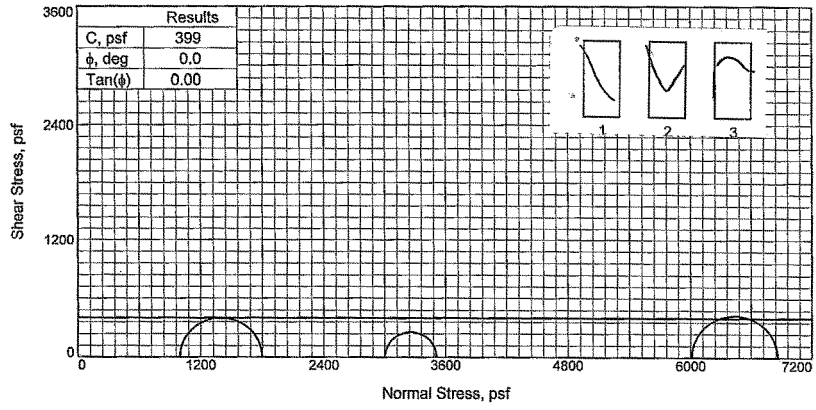
Client: U.S. Army Corps of Engineers

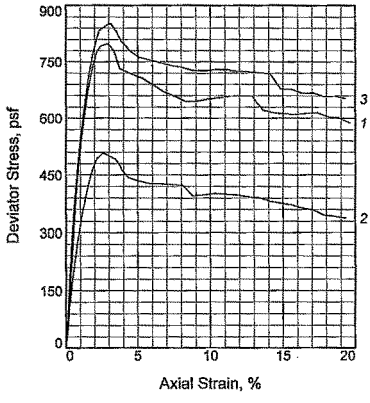
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-4U **Depth:** 32.8
Sample Number: 9B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: ARS/JC **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	55.6	56.3	55.4
	Dry Density, pcf	66.6	66.2	66.9
	Saturation, %	97.2	97.4	97.4
	Void Ratio	1.5687	1.5837	1.5576
	Diameter, in.	1.409	1.405	1.404
	Height, in.	3.105	3.102	3.100
At Test	Water Content, %	55.6	56.3	55.4
	Dry Density, pcf	66.6	66.2	66.9
	Saturation, %	97.2	97.4	97.4
	Void Ratio	1.5687	1.5837	1.5576
	Diameter, in.	1.409	1.405	1.404
	Height, in.	3.105	3.102	3.100
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.93	20.85	41.73
Fail. Stress, psf		798	508	852
Strain, %		2.9	2.6	3.1
Ult. Stress, psf		612	377	677
Strain, %				
σ_1 Failure, psf		1795	3511	6862
σ_3 Failure, psf		997	3002	6010

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CH4

LL= 76 **PL=** 20 **PI=** 56
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

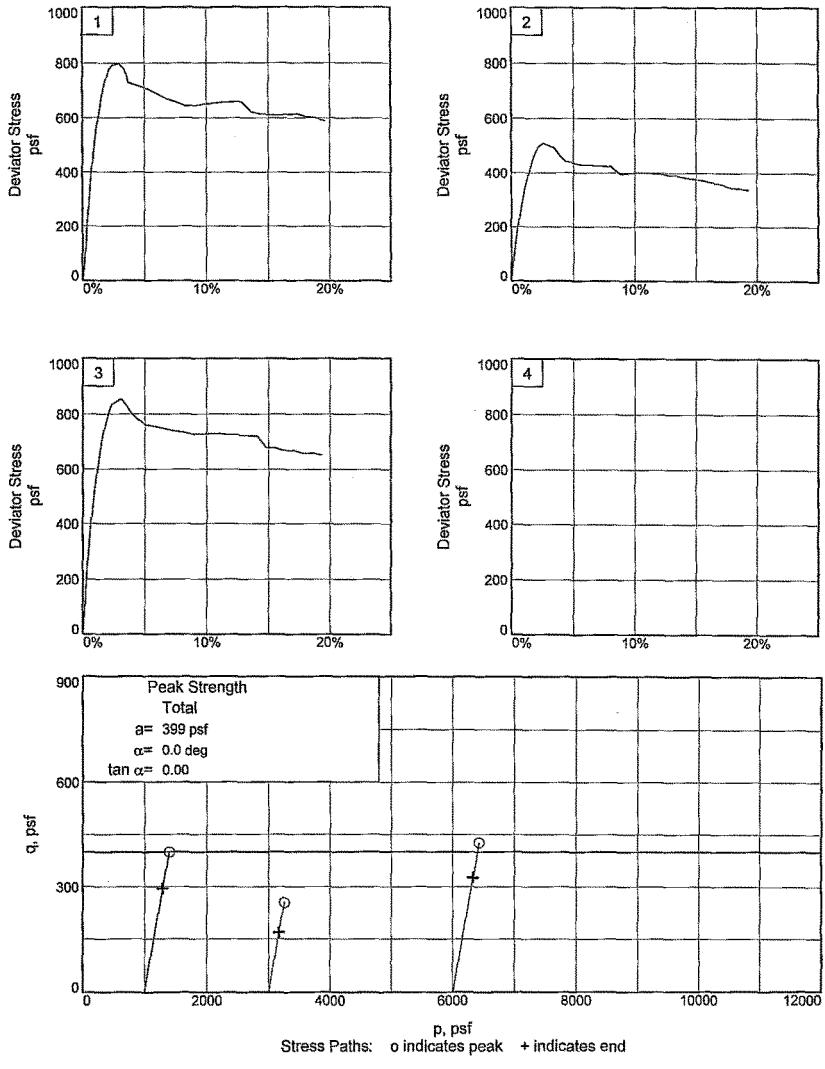
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-4U **Depth:** 36.8
Sample Number: 10B
Proj. No.: 07-022135 **Date Sampled:** 10/14/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

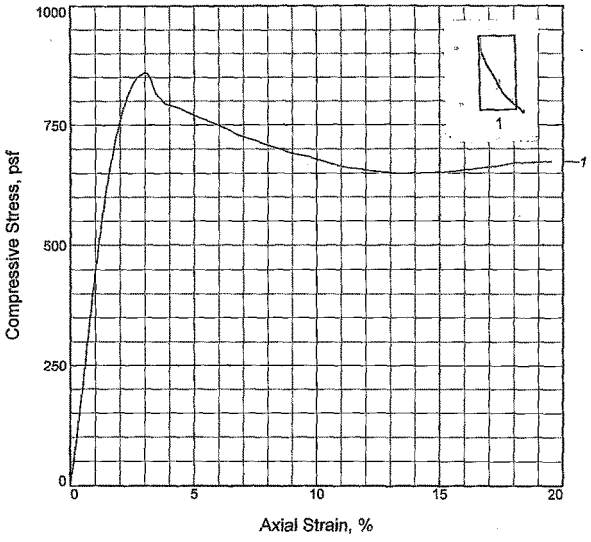
Tested By: ARS/JC **Checked By:** MS/WH



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-4U **Depth:** 36.8 **Sample Number:** 10B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: ARS/JC **Checked By:** MS/WH

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	860			
Undrained shear strength, psf	430			
Failure strain, %	3.0			
Strain rate, %/min.	1.00			
Water content, %	59.6			
Wet density, pcf	101.9			
Dry density, pcf	63.8			
Saturation, %	97.3			
Void ratio	1.6804			
Specimen diameter, in.	1.400			
Specimen height, in.	3.106			
Height/diameter ratio	2.22			

Description: SO GR CH4 W/ LNS ML

LL = 84	PL = 20	PI = 64	Assumed GS= 2.74	Type: UNDISTURBED

Project No.: 07-022135
Date Sampled: 10/14/09
Remarks:

Figure _____

Client: U.S. Army Corps of Engineers

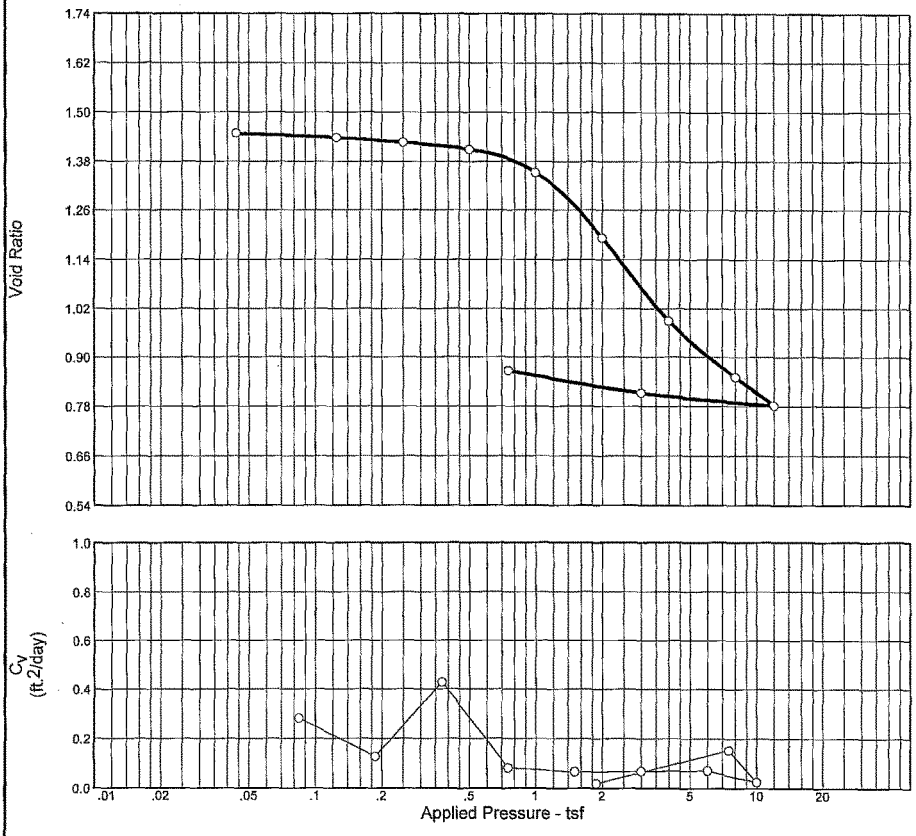
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-4U **Depth:** 37.7
Sample Number: 10C

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: ARS/JC **Checked By:** MS

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
97.3 %	51.3 %	70.1	76	53	2.75	1.14	0.65	1.448

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

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

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

Source: MRGO-04U **Sample No.:** 11B **Elev./Depth:** 40.8

FFEBJV, LLC

St Rose, LA

Remarks:

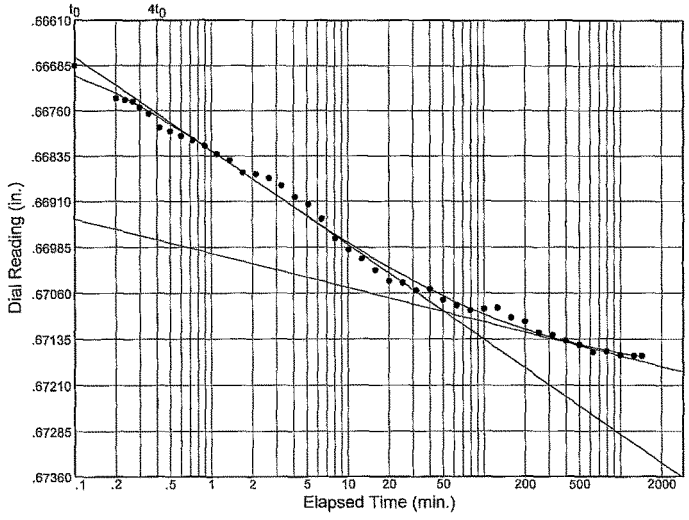
Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

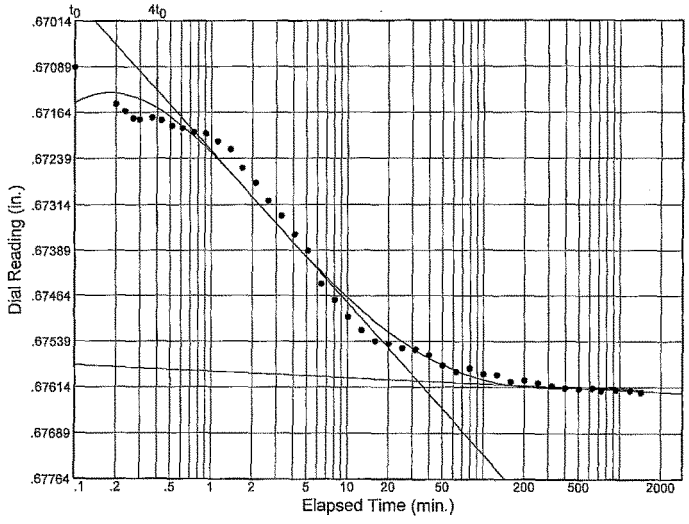
Source: MRGO-04U Sample No.: 11B Elev./Depth: 40.8



Load No.= 2
Load= 0.13 tsf
D_0 = 0.66637
D_{50} = 0.66864
D_{100} = 0.67091
T_{50} = 1.75 min.

C_v @ T_{50}
0.28 ft.^{2}/day

C_α = 0.001



Load No.= 3
Load= 0.25 tsf
D_0 = 0.67141
D_{50} = 0.67372
D_{100} = 0.67604
T_{50} = 3.86 min.

C_v @ T_{50}
0.13 ft.^{2}/day

C_α = 0.000

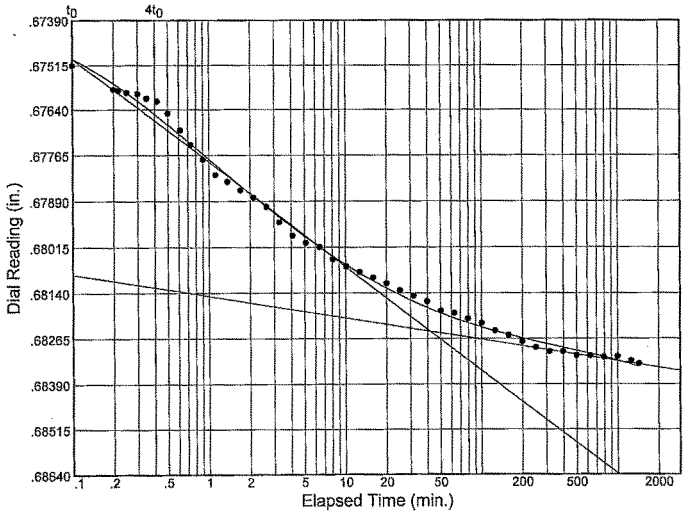
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

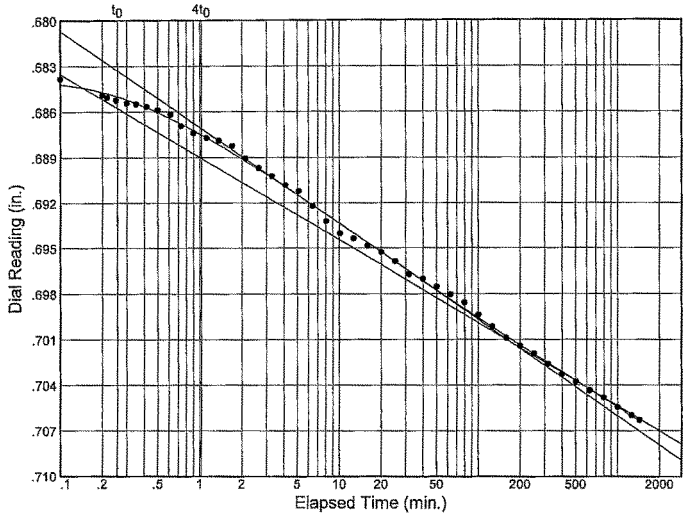
Source: MRGO-04U Sample No.: 11B Elev./Depth: 40.8



Load No.= 4
Load= 0.50 tsf
D_0 = 0.67342
D_{50} = 0.67793
D_{100} = 0.68244
T_{50} = 1.13 min.

C_v @ T_{50}
0.43 ft.2/day

C_α = 0.001



Load No.= 5
Load= 1.00 tsf
D_0 = 0.68249
D_{50} = 0.69186
D_{100} = 0.70124
T_{50} = 5.79 min.

C_v @ T_{50}
0.08 ft.2/day

C_α = 0.006

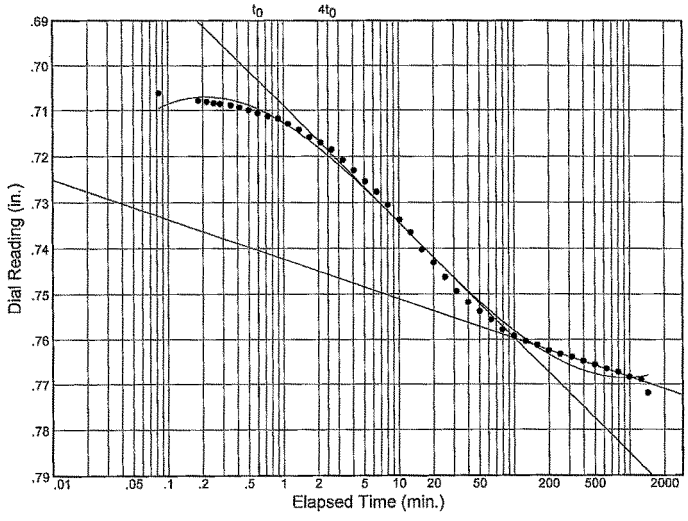
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

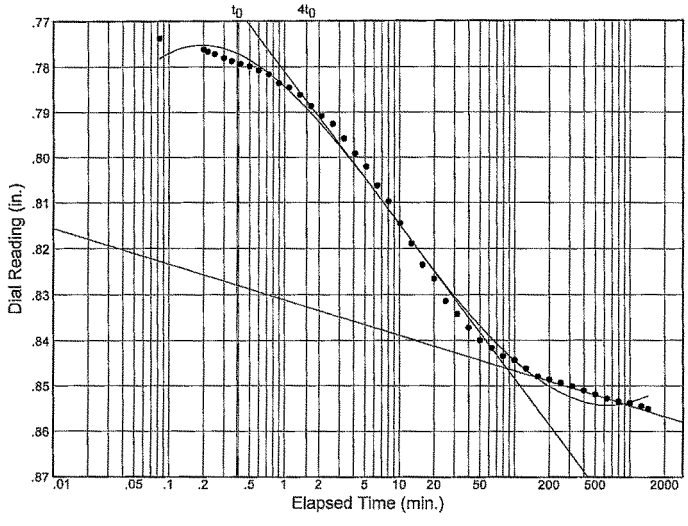
Source: MRGO-04U Sample No.: 11B Elev./Depth: 40.8



Load No.= 6
Load= 2.00 tsf
D_0 = 0.69978
D_{50} = 0.72974
D_{100} = 0.75969
T_{50} = 6.54 min.

C_v @ T_{50}
0.07 ft.^{2}/day

C_α = 0.009



Load No.= 7
Load= 4.00 tsf
D_0 = 0.76488
D_{50} = 0.80551
D_{100} = 0.84614
T_{50} = 5.31 min.

C_v @ T_{50}
0.07 ft.^{2}/day

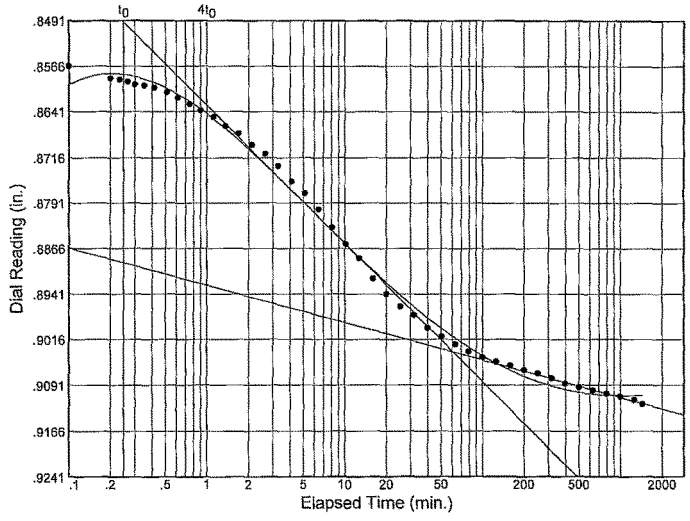
C_α = 0.009

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

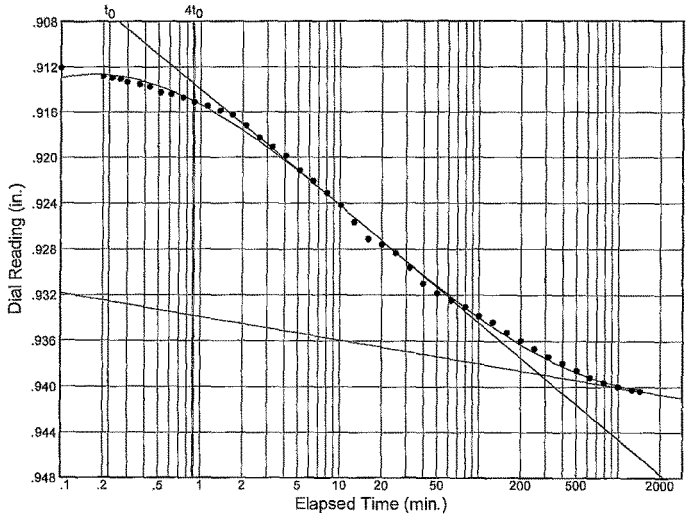
Source: MRGO-04U Sample No.: 11B Elev./Depth: 40.8



Load No.= 8
Load= 8.00 tsf
D_0 = 0.85141
D_{50} = 0.87753
D_{100} = 0.90365
T_{50} = 4.33 min.

C_v @ T_{50}
0.07 ft.2/day

C_α = 0.007



Load No.= 9
Load= 12.00 tsf
D_0 = 0.91036
D_{50} = 0.92463
D_{100} = 0.93890
T_{50} = 10.99 min.

C_v @ T_{50}
0.02 ft.2/day

C_α = 0.003

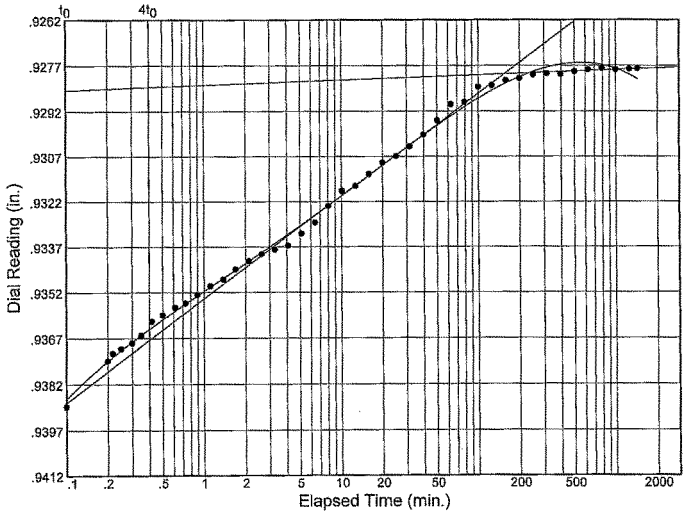
FFEBJV, LLC

Figure

Dial Reading vs. Time

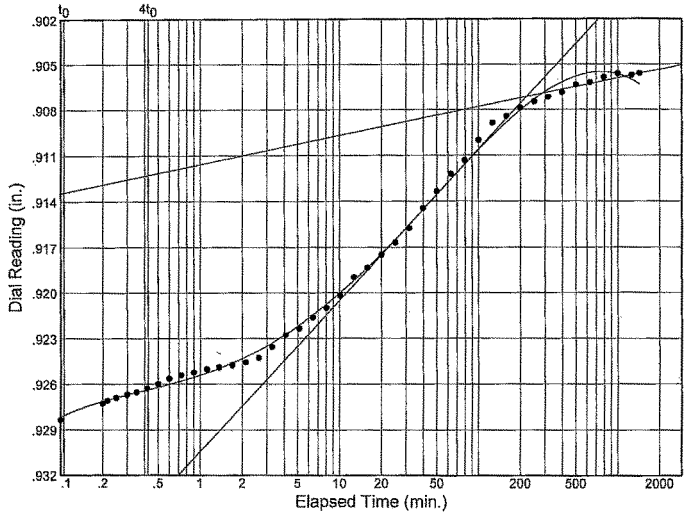
Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-04U Sample No.: 11B Elev./Depth: 40.8



Load No.= 10
Load= 3.00 tsf
D_0 = 0.94095
D_{50} = 0.93446
D_{100} = 0.92797
T_{50} = 1.73 min.

C_v @ T_{50}
0.15 ft.2/day



Load No.= 11
Load= 0.75 tsf
D_0 = 0.92978
D_{50} = 0.91846
D_{100} = 0.90715
T_{50} = 15.44 min.

C_v @ T_{50}
0.02 ft.2/day

FFEBJV, LLC

Figure

SWELL/CONSOLIDATION TEST DATA

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Contract No. W912P8-07-D-0022
Task Order 135
Project Number: 07-022135

Sample Data

Source: MRGO-04U
Sample No.: 11B
Elev. or Depth: 40.8 Sample Length(in./cm.):
Location:
Description: M GR CH4 W/ LNS ML
Liquid Limit: 76 Plasticity Index: 53
USCS: CH4 AASHTO: Figure No.:
Testing Remarks: Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST		AFTER TEST	
Wet w+t	= 151.25 g.	Consolidometer #	= 18	Wet w+t	= 418.63 g.
Dry w+t	= 100.00 g.			Dry w+t	= 344.32 g.
Tare Wt.	= .00 g.	Spec. Gravity	= 2.75	Tare Wt.	= 112.17 g.
Height	= 1.00 in.	Height	= 1.00 in.		
Diameter	= 4.00 in.	Diameter	= 4.00 in.		
Weight	= 350.61 g.	Defl. Table	= n/a		
Moisture	= 51.3 %	Ht. Solids	= 0.4095 in.	Moisture	= 32.0 %
Wet Den.	= 106.1 pcf	Dry Wt.	= 231.34 g.*	Dry Wt.	= 232.15 g.
Dry Den.	= 70.1 pcf	Void Ratio	= 1.448	Void Ratio	= 0.867
		Saturation	= 97.3 %		

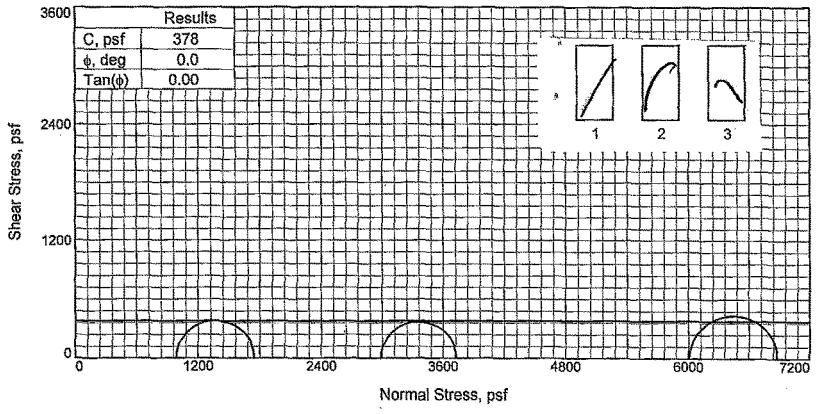
* Initial dry weight used in calculations

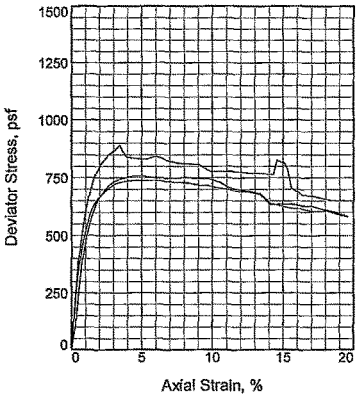
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.66743				1.448	
0.04	0.66739	0.00000			1.448	0.0 Swell
0.13	0.67163	0.00000	0.28	0.001	1.438	0.4 Comprs.
0.25	0.67623	0.00000	0.13	0.000	1.427	0.9 Comprs.
0.50	0.68335	0.00000	0.43	0.001	1.409	1.6 Comprs.
1.00	0.70631	0.00000	0.08	0.006	1.353	3.9 Comprs.
2.00	0.77194	0.00000	0.07	0.009	1.193	10.4 Comprs.
4.00	0.85512	0.00000	0.07	0.009	0.990	18.7 Comprs.
8.00	0.91220	0.00000	0.07	0.007	0.850	24.4 Comprs.

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
12.00	0.94038	0.00000	0.02	0.003	0.782	27.2 Comprs.
3.00	0.92780	0.00000	0.15		0.812	26.0 Comprs.
0.75	0.90562	0.00000	0.02		0.867	23.8 Comprs.

C_c = 0.65 P_c = 1.14 tsf C_r = 0.07





Sample No.		1	2	3
Initial	Water Content, %	65.5	61.3	58.7
	Dry Density, pcf	61.1	63.7	65.2
	Saturation, %	99.8	99.7	99.0
	Void Ratio	1.7988	1.6844	1.6253
	Diameter, in.	1.398	1.399	1.402
	Height, in.	3.104	3.098	3.093
At Test	Water Content, %	65.5	61.3	58.7
	Dry Density, pcf	61.1	63.7	65.2
	Saturation, %	99.8	99.7	99.0
	Void Ratio	1.7988	1.6844	1.6253
	Diameter, in.	1.398	1.399	1.402
	Height, in.	3.104	3.098	3.093
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.86	20.75	41.74
Fail. Stress, psf		758	740	869
Strain, %		5.1	4.6	3.1
Ult. Stress, psf		634	628	765
Strain, %				
σ_1 Failure, psf		1745	3728	6880
σ_3 Failure, psf		987	2988	6010

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CH4 W/ LNS ML

LL= 77 **PL=** 19 **PI=** 58
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

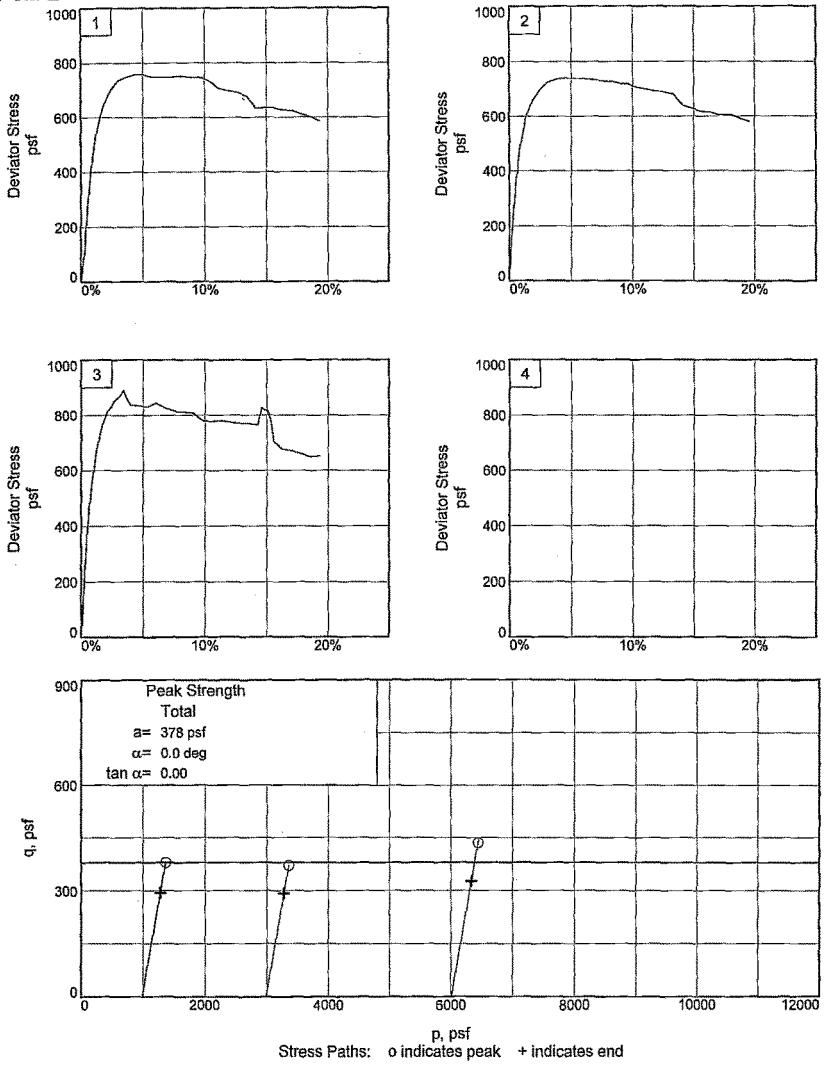
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-4U **Depth:** 42.6
Sample Number: 11D
Proj. No.: 07-022135 **Date Sampled:** 10/14/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

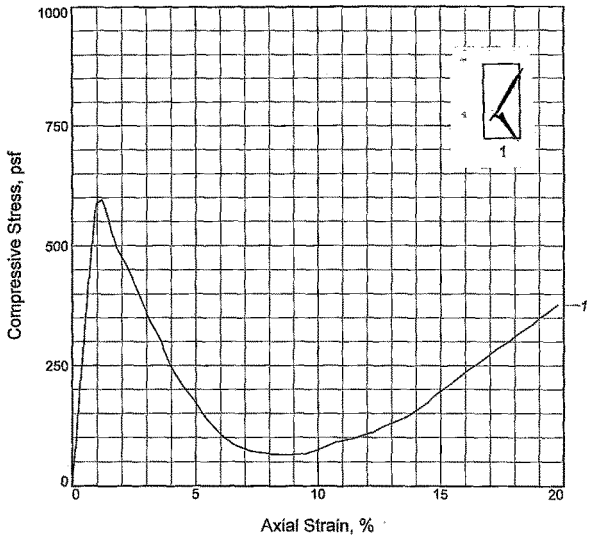
Tested By: ARS/JC **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-4U **Depth:** 42.6 **Sample Number:** 11D
Project No.: 07-022135 **Figure** _____ FFEBJV, LLC

Tested By: ARS/JC **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	595			
Undrained shear strength, psf	297			
Failure strain, %	1.2			
Strain rate, %/min.	1.00			
Water content, %	65.1			
Wet density, pcf	101.3			
Dry density, pcf	61.4			
Saturation, %	99.8			
Void ratio	1.7869			
Specimen diameter, in.	1.400			
Specimen height, in.	3.100			
Height/diameter ratio	2.21			

Description: SO GR CH4 W/ LNS ML

LL = 84	PL = 21	PI = 63	**Assumed GS=** 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 10/14/09
Remarks:

Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-4U **Depth:** 45.7
Sample Number: 12C

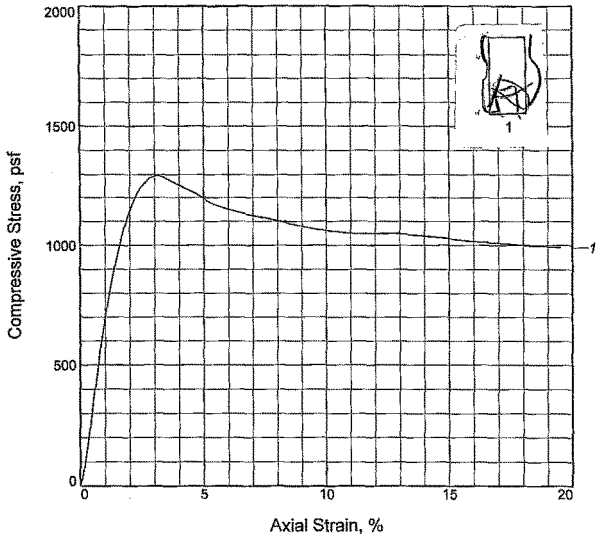
UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Figure _____

Tested By: ARS/JC **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	1297			
Undrained shear strength, psf	648			
Failure strain, %	3.1			
Strain rate, %/min.	1.00			
Water content, %	56.2			
Wet density, pcf	105.0			
Dry density, pcf	67.2			
Saturation, %	99.7			
Void ratio	1.5456			
Specimen diameter, in.	1.404			
Specimen height, in.	3.102			
Height/diameter ratio	2.21			

Description: M GR CH4 W/ LNS ML

LL = 76	**PL** = 19	**PI** = 57	**Assumed GS**= 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 10/14/09
Remarks:

Figure _____

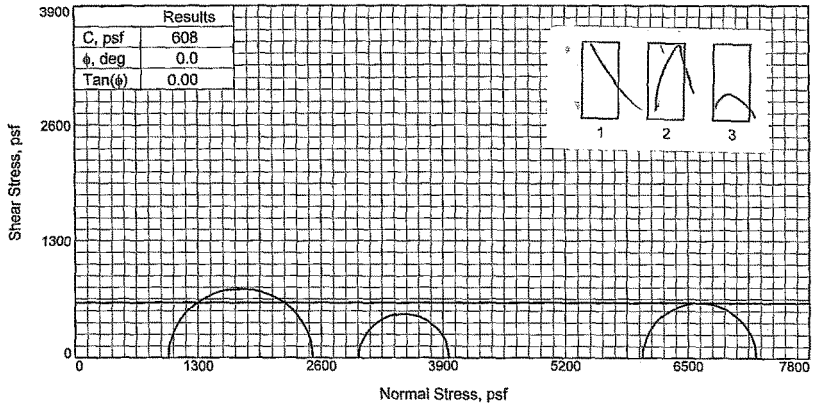
Client: U.S. Army Corps of Engineers

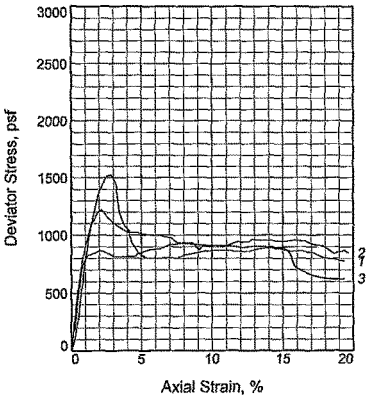
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-4U **Depth:** 48.8
Sample Number: 13B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: ALJ/JC **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	70.5	67.9	71.2
	Dry Density, pcf	57.7	59.1	57.9
	Saturation, %	98.3	98.1	99.9
	Void Ratio	1.9648	1.8959	1.9545
	Diameter, in.	1.410	1.395	1.396
	Height, in.	3.110	3.106	3.105
At Test	Water Content, %	70.5	67.9	71.2
	Dry Density, pcf	57.7	59.1	57.9
	Saturation, %	98.3	98.1	99.9
	Void Ratio	1.9648	1.8959	1.9545
	Diameter, in.	1.410	1.395	1.396
	Height, in.	3.110	3.106	3.105
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.86	20.83	41.77
Fail. Stress, psf		1523	962	1215
Strain, %		2.8	12.9	2.2
Ult. Stress, psf		800	943	863
Strain, %				
σ_1 Failure, psf		2511	3962	7230
σ_3 Failure, psf		988	3000	6015

Type of Test: Unconsolidated Undrained

Sample Type: UNDISTURBED

Description: M GR CH4 W/ LNS & LYS ML, SIF

LL= 92 **PL=** 21 **PI=** 71

Assumed Specific Gravity= 2.74

Remarks:

Figure _____

Client: U.S. Army Corps of Engineers

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

Source of Sample: MRGO-4U **Depth:** 52.8

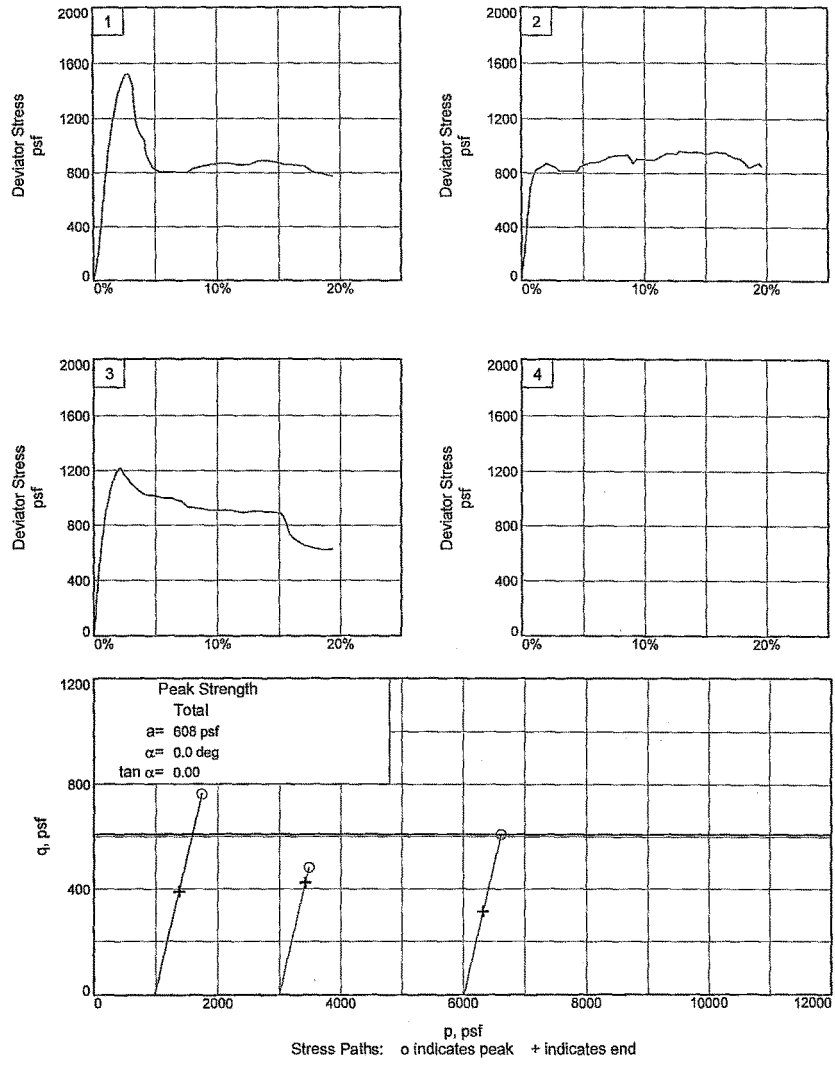
Sample Number: 14B

Proj. No.: 07-022135 **Date Sampled:** 10/14/09

TRIAXIAL SHEAR TEST REPORT

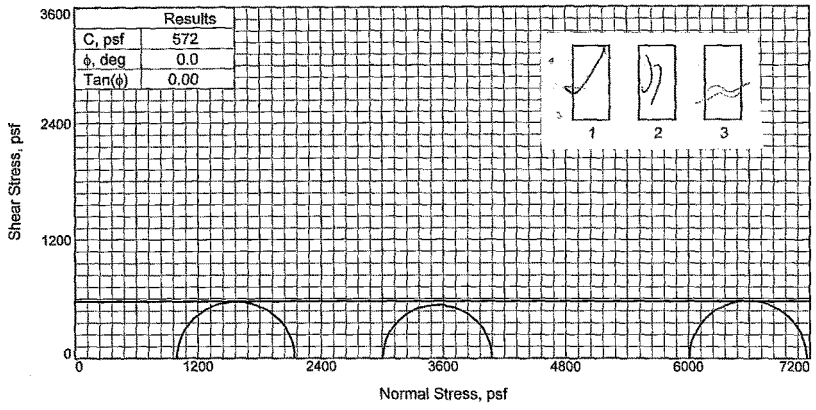
FFEBJV, LLC

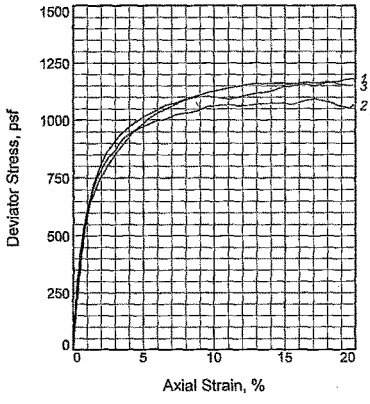
Tested By: JC/ARS **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-4U **Depth:** 52.8 **Sample Number:** 14B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: JC/ARS **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	25.9	33.1	29.7
	Dry Density, pcf	98.4	88.1	90.4
	Saturation, %	98.1	97.7	92.6
	Void Ratio	0.7132	0.9133	0.8650
	Diameter, in.	1.399	1.398	1.409
	Height, in.	3.100	3.103	3.100
At Test	Water Content, %	25.9	33.1	29.7
	Dry Density, pcf	98.4	88.1	90.4
	Saturation, %	98.1	97.7	92.6
	Void Ratio	0.7132	0.9133	0.8650
	Diameter, in.	1.399	1.398	1.409
	Height, in.	3.100	3.103	3.100
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.91	20.87	41.72
Fail. Stress, psf		1144	1073	1161
Strain, %		14.9	14.1	14.3
Ult. Stress, psf		1144	1072	1160
Strain, %				
σ_1 Failure, psf		2139	4078	7169
σ_3 Failure, psf		995	3005	6008

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: M LGR CL6 W/ LNS SM

LL= 42 **PL=** 12 **PI=** 30
Assumed Specific Gravity= 2.70
Remarks:

Figure _____

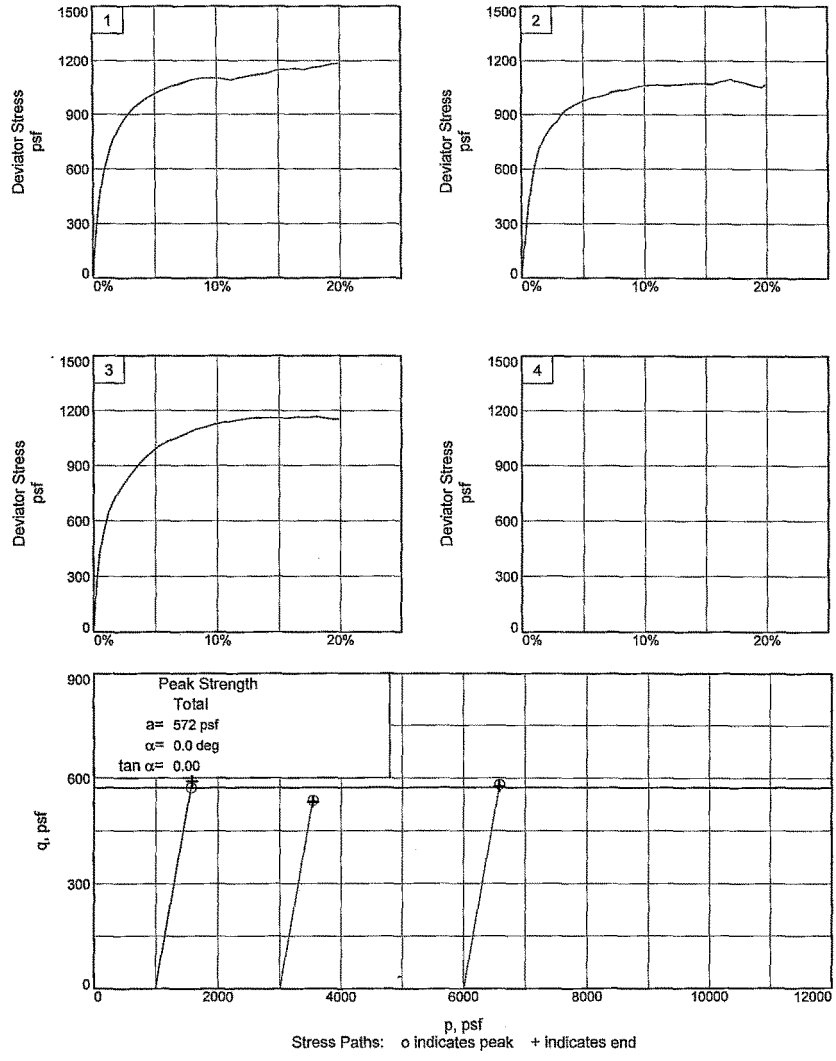
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-4U **Depth:** 56.8
Sample Number: 15B
Proj. No.: 07-022135 **Date Sampled:** 10/14/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

Tested By: ARS/JC **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-4U **Depth:** 56.8 **Sample Number:** 15B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: ARS/JC **Checked By:** MS

SUMMARY OF LABORATORY TEST RESULTS

Project: MRGO Ecosystem Restoration Feasibility Study Assigned By: _____

Project Number: 07-022135 Current Date: 12/30/2009
Boring: MRGO-5U

Sample Number	Depth	Visual Classification	USCS	E(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
1A	0.0	VSO DGR CHOA W/ WD	CHOA		139												
1B	0.8	VSO DGR CHOA W/ WD	CHOA		116												
1C	1.7	VSO DGR CHOA W/ WD	CHOA		118												
1D	2.6	VSO DGR CHOB W/ WD	CHOB		179												
2A	4.0	VSO GR CHOA W/ LNS ML, WD	CHOA		113												
2B	4.8	VSO GR CHOA W/ LNS ML, WD	CHOA		102												
2C	5.7	VSO GR CHOA W/ LNS ML, WD	CHOA		103												
2D	6.6	VSO GR CHOA W/ LNS & LYS ML, WD	CHOA		92												
3A	8.0	GR SM	SM		28												
3B	8.8	GR SM W/ LYS CH	SM		28												-200
3C	9.7	GR SM	SM		25												
4A	12.0	GR SM	SM		26												
4B	14.0	GR SM	SM		27												
5A	16.0	GR SM	SM		29												
5B	16.8	GR SM	SM		28												
5C	18.0	GR SM	SM		29												
6A	20.0	SO GR CH3 W/ LNS & LYS SM	CH3		48												
6B	20.8	GR SM W/ LYS CH	SM		42												
6C	21.7	GR SM W/ LYS CH	SM		34												
6D	22.6	SO GR CL4	CL4	15	41	83	117	100	UC	-	297	593	38	24	14	0.10	
7A	24.0	GR SM W/ LYS CH	SM		38												
7B	24.8	GR SM W/ LYS CH	SM		42												
7C	25.7	SO GR CH2 W/ LNS & LYS SM	CH2		51	72	109	100	UU	0	340		53	24	29	0.24	
7D	26.6	SO GR CH2 W/ ARS & LNS ML	CH2		50	70	105	95					51	18	33		CON, GS
8A	28.0	SO GR CL4 W/ LYS CH	CL4		36												
8B	28.8	SO GR CL4 W/ LYS CH	CL4		37												
8C	29.7	GR SM W/ LYS CH	SM		34												
8D	30.6	M GR CH2 W/ LYS ML	CH2		38												
9A	32.0	M GR CH3 W/ LNS ML	CH3		49												
9B	32.8	SO GR CL6 W/ LNS ML	CL6	9	39	83	115	100	UC	-	459	917	44	21	23	0.28	
9C	33.7	M GR CH2	CH2		34												
9D	34.6	M GR CH2	CH2		38												
10A	36.0	SO GR CH3 W/ LNS ML	CH3		51												
10B	36.8	M GR CH2 W/ LNS ML	CH2		43	78	112	100	UU	0	526		52	22	30	0.35	
10C	37.7	M GR CH2 W/ ARS ML	CH2		41	80	112	98					50	18	32		CON, GS
11A	40.0	M GR CH3 W/ LNS ML	CH3		54												
11B	40.4	M GR CH2 W/ LNS ML	CH2	5	41	79	112	99	UC	-	554	1108	52	23	29	0.31	

Remarks:
FFEB JV, LLC

Checked By: MS/MKB
File Name: MRGO-05U.xls

SUMMARY OF LABORATORY TEST RESULTS

Project: MRGO Ecosystem Restoration Feasibility Study Assigned By: _____

Project Number: 07-022135
Boring: MRGO-5U

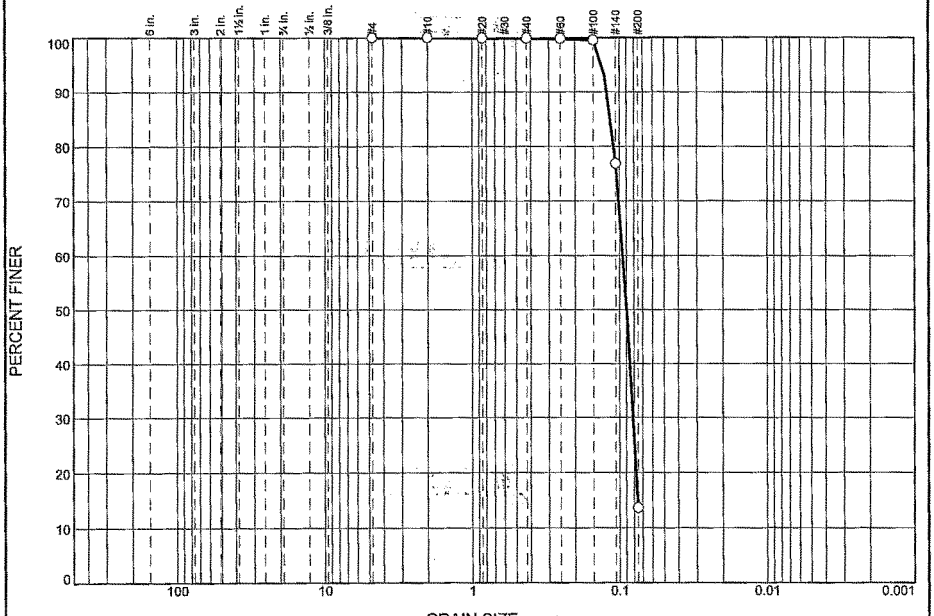
Current Date: 12/30/2009

Sample Number	Depth	Visual Classification	USCS	E(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
11C	41.3	M GR CH2 W/ LNS ML	CH2		39												
11D	42.2	M GR CH2 W/ LNS ML	CH2		39												
12A	44.0	M GR CH2 W/ LNS ML	CH2		39												
12B	44.8	M GR CL6 W/ LNS ML	CL6		37	85	116	100	UU	0	591		46	21	25	0.35	
12C	45.7	M GR CH3 W/ LNS ML	CH3		48												
12D	46.6	M GR CH4	CH4		56												
13A	48.0	M GR CH4 W/ LNS ML	CH4		64												
13B	48.8	M GR CH4 W/ LNS ML	CH4	4	58	65	103	98	UC	-	749	1497	87	32	55	0.36	
13C	49.7	M GR CH4	CH4		58												
13D	50.6	M GR CH4	CH4		58												
14A	52.0	M GR CH4	CH4		58												
14B	52.8	M GR CH4	CH4		57	66	104	99	UU	0	753		84	30	54	0.40	
14C	53.7	M GR CH4	CH4		56												
15A	56.0	M GR CH4 W/ LNS ML	CH4		63												
15B	56.8	M GR CH4 W/ LNS ML	CH4	2	65	62	102	100	UC	-	812	1623	81	31	50	0.45	
15C	57.7	M GR CH4 W/ LNS ML	CH4		66												
15D	58.6	M GR CH4 W/ LNS ML	CH4		62												

Remarks: _____
FFEB JV, LLC

Checked By: MS/MKA
File Name: MRGO-05U.xls

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	86.3	13.6	

	Colloids	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○				0.1140	0.0948	0.0897	0.0811	0.0755			

Material Description	USCS	AASHTO
○ GR SM W/ LYS CH	SM	

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

Project: USACE - MRGO Ecosystem Restoration Feasibility Study

○ **Source of Sample:** MRGO-5U **Depth:** 8.8 **Sample Number:** 3B

Date: ○ 10/13/09

Remarks:

○ -200

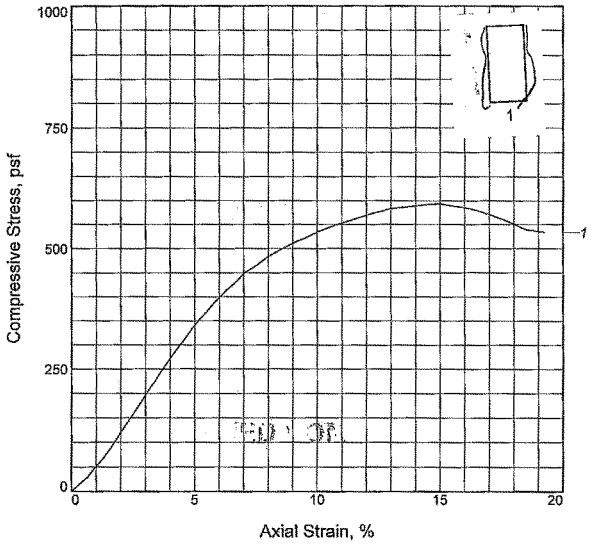
FFEBJV, LLC

St Rose, LA

Figure

Tested By: JH **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	593			
Undrained shear strength, psf	297			
Failure strain, %	15.0			
Strain rate, %/min.	1.00			
Water content, %	40.5			
Wet density, pcf	116.6			
Dry density, pcf	83.0			
Saturation, %	105.4			
Void ratio	1.0457			
Specimen diameter, in.	1.386			
Specimen height, in.	2.985			
Height/diameter ratio	2.15			

Description: SO GR CL4

LL = 38	PL = 24	PI = 14	Assumed GS= 2.72	Type: UNDISTURBED

Project No.: 07-022135
Date Sampled: 10/14/09
Remarks:

Figure _____

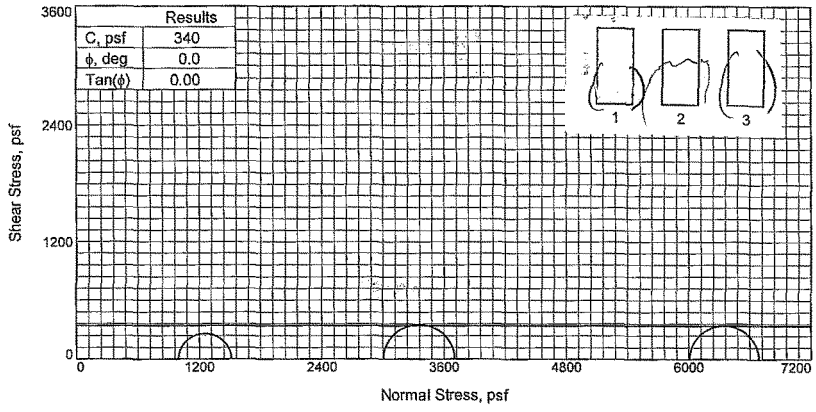
Client: U.S. Army Corps of Engineers

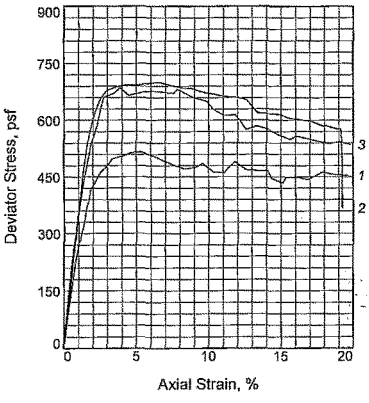
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-5U **Depth:** 22.6
Sample Number: 6D

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: ARS/JC **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	53.0	49.6	49.9
	Dry Density, pcf	70.6	73.0	73.0
	Saturation, %	102.1	101.2	101.8
	Void Ratio	1.4227	1.3436	1.3426
	Diameter, in.	1.397	1.397	1.397
	Height, in.	3.095	3.089	3.095
At Test	Water Content, %	53.0	49.6	49.9
	Dry Density, pcf	70.6	73.0	73.0
	Saturation, %	102.1	101.2	101.8
	Void Ratio	1.4227	1.3436	1.3426
	Diameter, in.	1.397	1.397	1.397
	Height, in.	3.095	3.089	3.095
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.92	20.86	41.72
Fail. Stress, psf		516	700	681
Strain, %		5.3	6.6	7.8
Ult. Stress, psf		434	615	561
Strain, %				
σ_1 Failure, psf		1513	3703	6689
σ_3 Failure, psf		996	3003	6008

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CH2 W/ LNS & LYS SM

LL= 53 **PL=** 24 **PI=** 29
Assumed Specific Gravity= 2.74
Remarks:

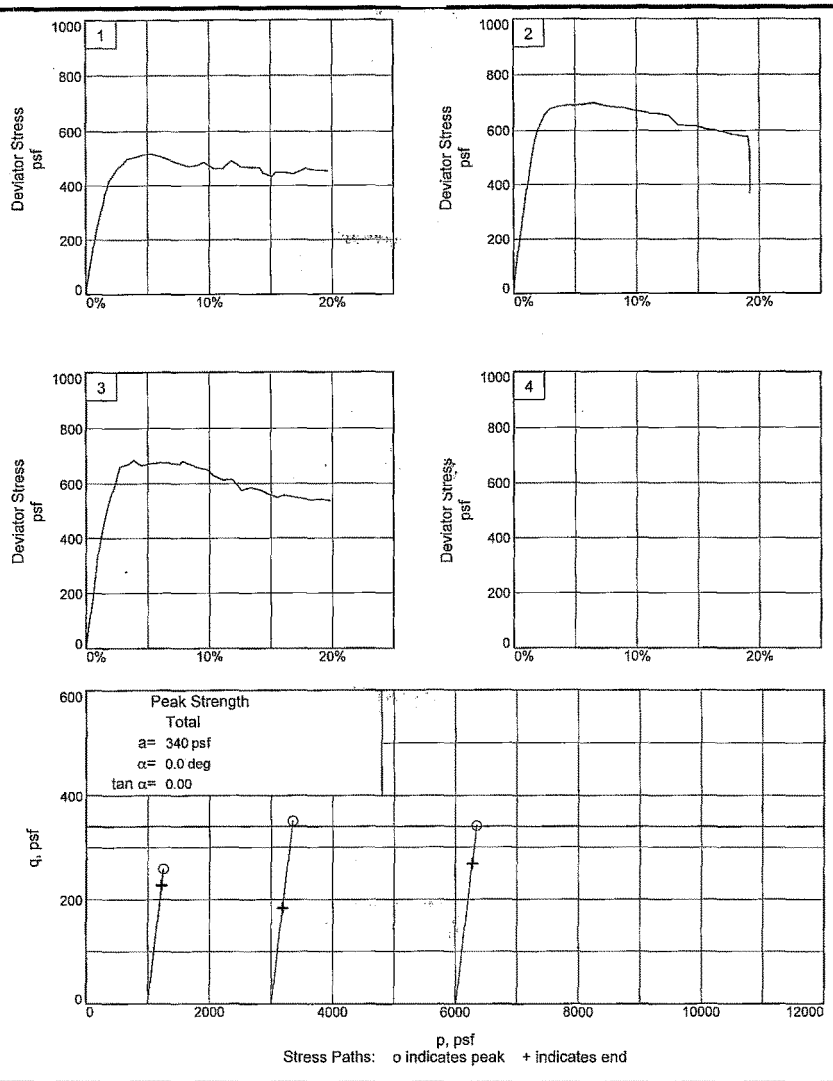
Figure _____

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-5U **Depth:** 25.7
Sample Number: 7C
Proj. No.: 07-022135 **Date Sampled:** 10/14/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

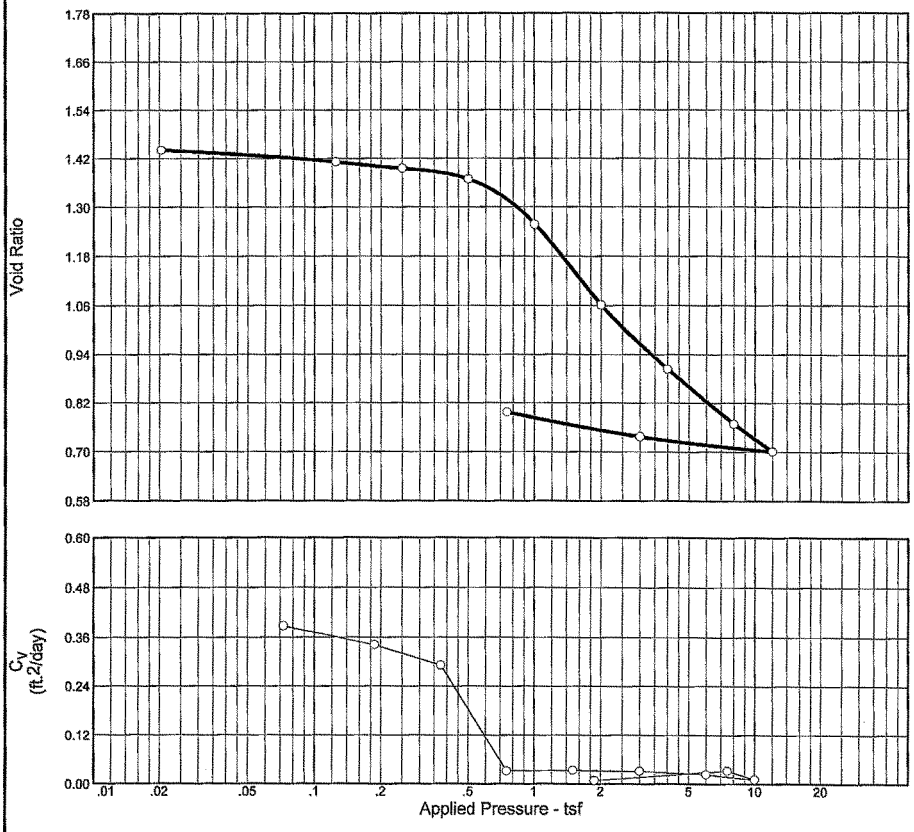
Tested By: ARS/JC **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-5U **Depth:** 25.7 **Sample Number:** 7C
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: ARS/JC **Checked By:** MS

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
95.3 %	50.2 %	70.1	51	33	2.74	0.72	0.67	1.442

MATERIAL DESCRIPTION	USCS	AASHTO
SO GR CH2 W/ ARS & LNS ML	CH2	

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

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

Source: MRGO-05U **Sample No.:** 7D **Elev./Depth:** 26.6

FFEBJV, LLC

St Rose, LA

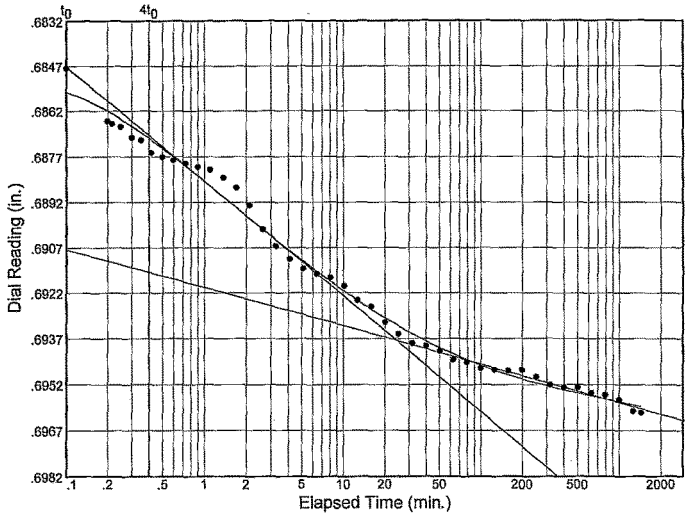
Remarks:
Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

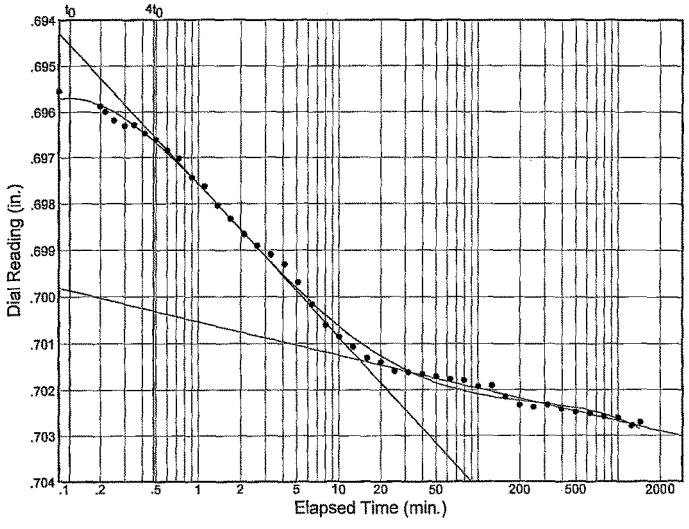
Source: MRGO-05U Sample No.: 7D Elev./Depth: 26.6



Load No.= 2
Load= 0.13 tsf
D_0 = 0.68403
D_{50} = 0.68889
D_{100} = 0.69376
T_{50} = 1.26 min.

C_v @ T_{50}
0.39 ft.2/day

C_α = 0.001



Load No.= 3
Load= 0.25 tsf
D_0 = 0.69476
D_{50} = 0.69806
D_{100} = 0.70135
T_{50} = 1.40 min.

C_v @ T_{50}
0.34 ft.2/day

C_α = 0.001

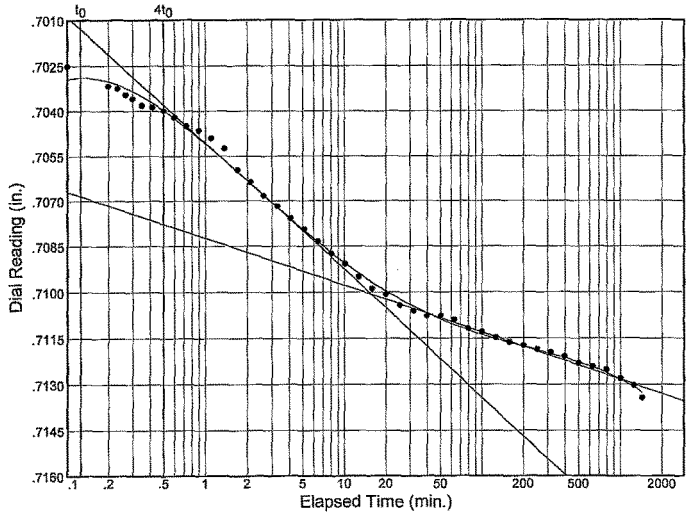
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

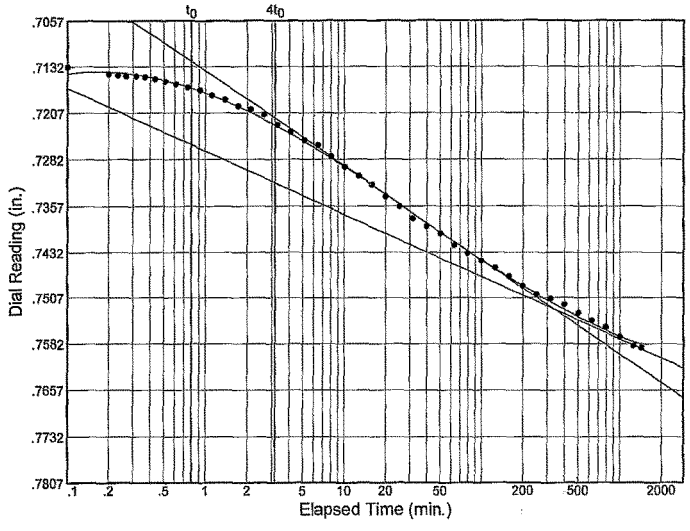
Source: MRGO-05U Sample No.: 7D Elev./Depth: 26.6



Load No.= 4
Load= 0.50 tsf
D_0 = 0.70179
D_{50} = 0.70593
D_{100} = 0.71007
T_{50} = 1.61 min.

C_v @ T_{50}
0.29 ft.2/day

C_α = 0.002



Load No.= 5
Load= 1.00 tsf
D_0 = 0.71067
D_{50} = 0.73157
D_{100} = 0.75247
T_{50} = 14.11 min.

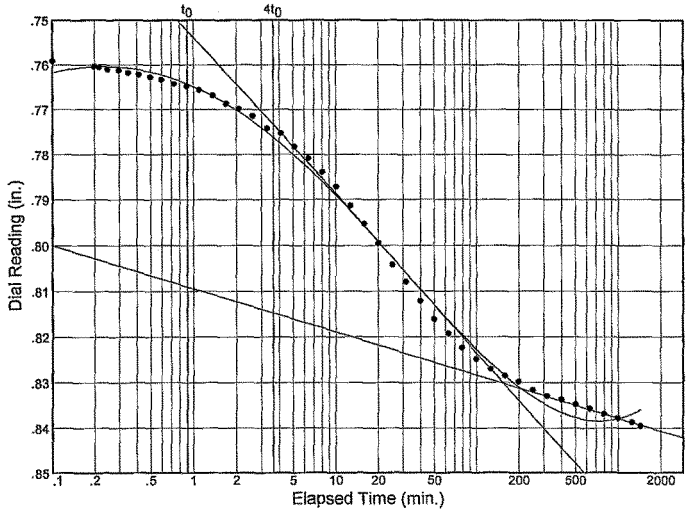
C_v @ T_{50}
0.03 ft.2/day

C_α = 0.010

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

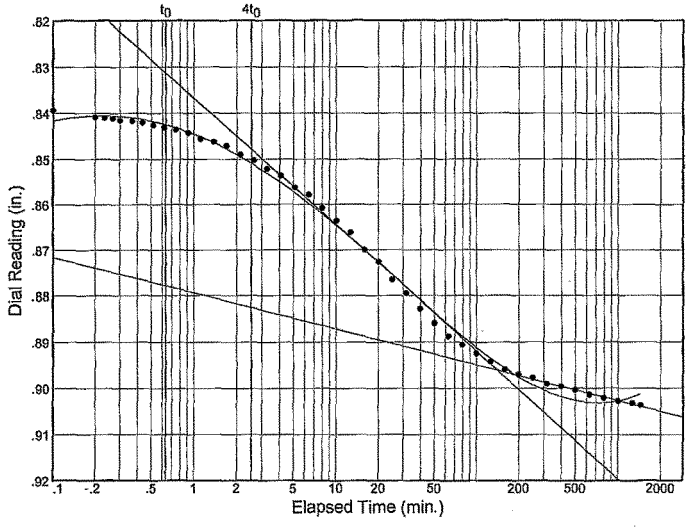
Source: MRGO-05U Sample No.: 7D Elev./Depth: 26.6



Load No.= 6
Load= 2.00 tsf
D_0 = 0.75234
D_{50} = 0.79124
D_{100} = 0.83014
T_{50} = 11.64 min.

C_v @ T_{50}
0.03 ft.2/day

C_α = 0.010



Load No.= 7
Load= 4.00 tsf
D_0 = 0.83406
D_{50} = 0.86505
D_{100} = 0.89603
T_{50} = 10.41 min.

C_v @ T_{50}
0.03 ft.2/day

C_α = 0.009

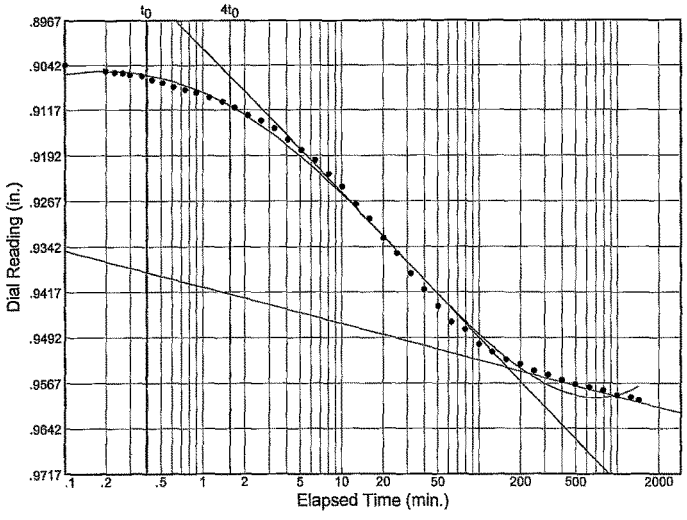
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

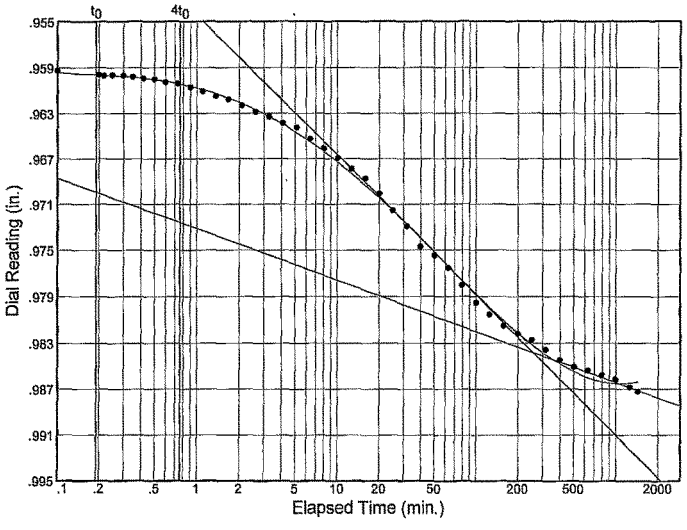
Source: MRGO-05U Sample No.: 7D Elev./Depth: 26.6



Load No.= 8
Load= 8.00 tsf
D_0 = 0.90065
D_{50} = 0.92740
D_{100} = 0.95414
T_{50} = 12.03 min.

C_v @ T_{50}
0.02 ft.2/day

C_α = 0.008



Load No.= 9
Load= 12.00 tsf
D_0 = 0.95878
D_{50} = 0.97129
D_{100} = 0.98380
T_{50} = 23.67 min.

C_v @ T_{50}
0.01 ft.2/day

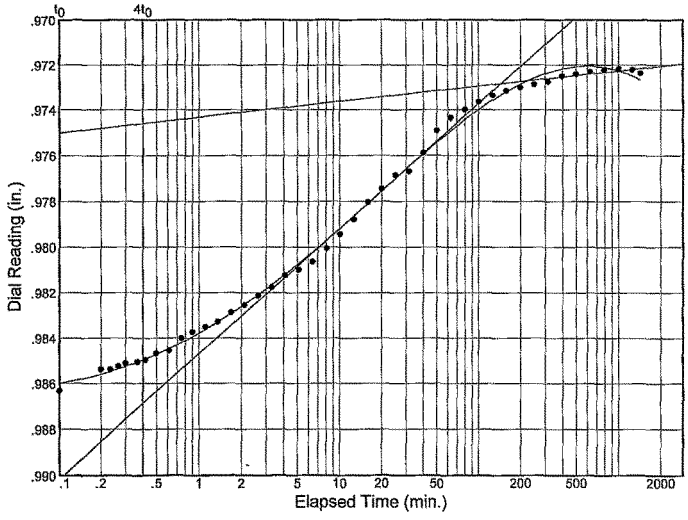
C_α = 0.006

Figure

Dial Reading vs. Time

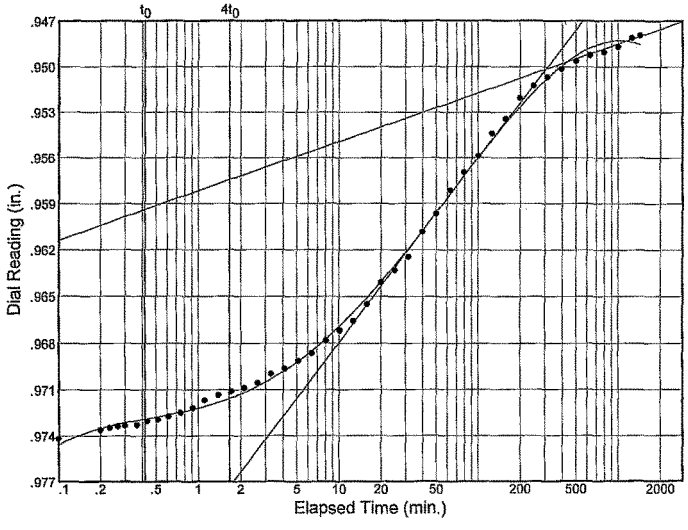
Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-05U Sample No.: 7D Elev./Depth: 26.6



Load No.= 10
Load= 3.00 tsf
D_0 = 0.98703
D_{50} = 0.97993
D_{100} = 0.97283
T_{50} = 7.34 min.

C_v @ T_{50}
0.03 ft.^{2}/day



Load No.= 11
Load= 0.75 tsf
D_0 = 0.97425
D_{50} = 0.96219
D_{100} = 0.95013
T_{50} = 30.08 min.

C_v @ T_{50}
0.01 ft.^{2}/day

FFEBJV, LLC

Figure

CONSOLIDATION TEST DATA

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Contract No. W912P8-07-D-0022
Task Order 135
Project Number: 07-022135

Sample Data

Source: MRGO-05U
Sample No.: 7D
Elev. or Depth: 26.6 **Sample Length(in./cm.):**
Location:
Description: SO GR CH2 W/ ARS & LNS ML
Liquid Limit: 51 **Plasticity Index:** 33
USCS: CH2 **AASHTO:** **Figure No.:**
Testing Remarks: Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Test Specimen Data

TOTAL SAMPLE	BEFORE TEST	AFTER TEST
Wet w+t = 150.16 g.	Consolidometer # = 7	Wet w+t = 415.70 g.
Dry w+t = 100.00 g.		Dry w+t = 337.08 g.
Tare Wt. = .00 g.	Spec. Gravity = 2.74	Tare Wt. = 113.13 g.
Height = 1.00 in.	Height = 1.00 in.	
Diameter = 4.00 in.	Diameter = 4.00 in.	
Weight = 347.22 g.	Defl. Table = n/a	
Moisture = 50.2 %	Ht. Solids = 0.4098 in.	Moisture = 35.1 %
Wet Den. = 105.2 pcf	Dry Wt. = 231.11 g.*	Dry Wt. = 223.95 g.
Dry Den. = 70.1 pcf	Void Ratio = 1.442	Void Ratio = 0.797
	Saturation = 95.3 %	

*** Initial dry weight used in calculations**

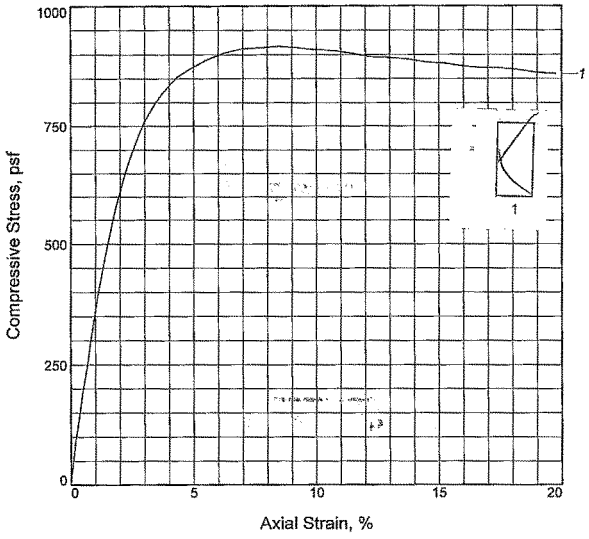
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
start	0.68377				1.442	
0.02	0.68391	0.00000			1.441	0.0 Comprs.
0.13	0.69613	0.00000	0.39	0.001	1.411	1.2 Comprs.
0.25	0.70272	0.00000	0.34	0.001	1.395	1.9 Comprs.
0.50	0.71344	0.00000	0.29	0.002	1.369	3.0 Comprs.
1.00	0.75887	0.00000	0.03	0.010	1.258	7.5 Comprs.
2.00	0.83963	0.00000	0.03	0.010	1.061	15.6 Comprs.
4.00	0.90376	0.00000	0.03	0.009	0.905	22.0 Comprs.
8.00	0.95953	0.00000	0.02	0.008	0.769	27.6 Comprs.
12.00	0.98726	0.00000	0.01	0.006	0.701	30.3 Comprs.

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
3.00	0.97237	0.00000	0.03		0.737	28.8 Comprs.
0.75	0.94795	0.00000	0.01		0.797	26.4 Comprs.

C_c = 0.67 P_c = 0.72 tsf C_r = 0.08

UNCONFINED COMPRESSION TEST



Sample No.	1				
Unconfined strength, psf	917				
Undrained shear strength, psf	459				
Failure strain, %	8.5				
Strain rate, %/min.	1.00				
Water content, %	39.1				
Wet density, pcf	115.4				
Dry density, pcf	83.0				
Saturation, %	102.3				
Void ratio	1.0310				
Specimen diameter, in.	1.386				
Specimen height, in.	3.092				
Height/diameter ratio	2.23				

Description: SO GR CL6 W/ LNS ML

LL = 44	**PL** = 21	**PI** = 23	**Assumed GS**= 2.70	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 10/22/09
Remarks:

Figure _____

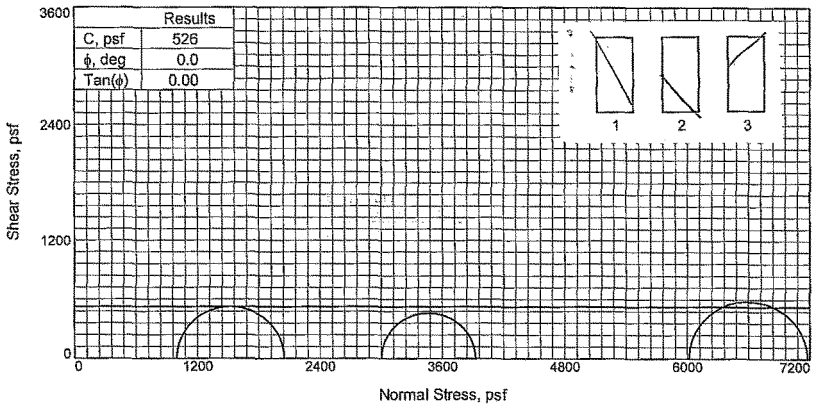
Client: U.S. Army Corps of Engineers

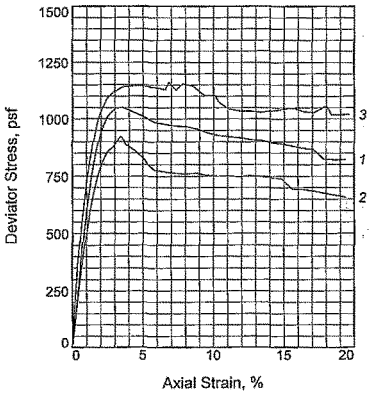
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-5U **Depth:** 32.8
Sample Number: 9B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: JC/ARS **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	43.2	44.2	42.9
	Dry Density, pcf	77.9	77.5	78.2
	Saturation, %	100.3	101.5	100.2
	Void Ratio	1.1640	1.1745	1.1565
	Diameter, in.	1.400	1.403	1.405
	Height, in.	3.102	3.113	3.105
At Test	Water Content, %	43.2	44.2	42.9
	Dry Density, pcf	77.9	77.5	78.2
	Saturation, %	100.3	101.5	100.2
	Void Ratio	1.1640	1.1745	1.1565
	Diameter, in.	1.400	1.403	1.405
	Height, in.	3.102	3.113	3.105
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.92	20.84	41.78
Fail. Stress, psf		1051	922	1161
Strain, %		3.6	3.4	6.8
Ult. Stress, psf		891	738	1028
Strain, %				
σ_1 Failure, psf		2048	3923	7177
σ_3 Failure, psf		997	3001	6016

Type of Test: Unconsolidated Undrained
Sample Type: C
Description: M GR CH2 W/ LNS ML

LL= 52 **PL=** 22 **PI=** 30
Assumed Specific Gravity= 2.70
Remarks:

Figure _____

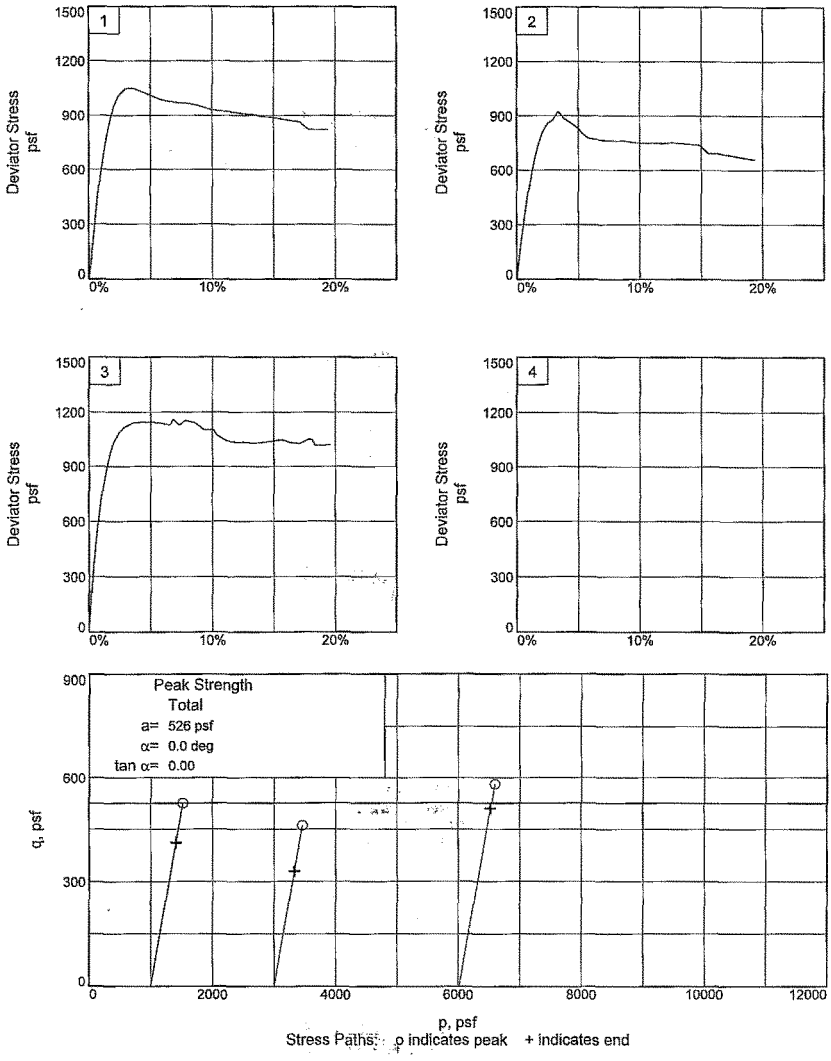
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-5U **Depth:** 36.8
Sample Number: 10B
Proj. No.: 07-022135 **Date Sampled:** 10/14/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

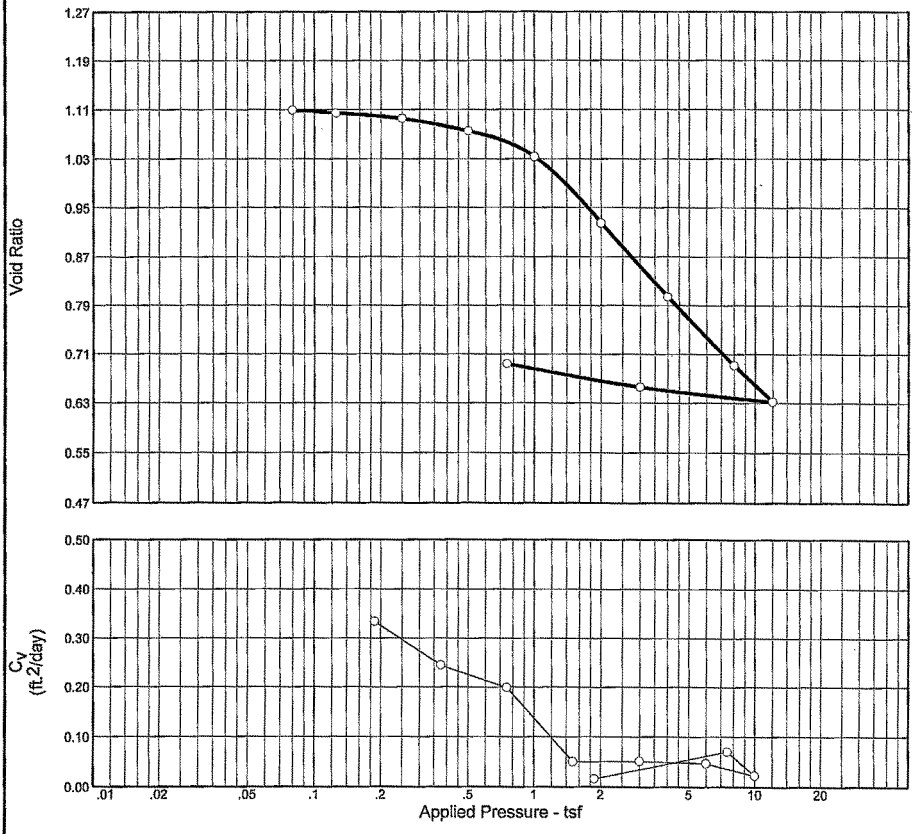
Tested By: ARS/JC **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-5U **Depth:** 36.8 **Sample Number:** 10B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: ARS/JC **Checked By:** MS

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
98.5 %	40.7 %	79.5	50	32	2.69	1.13	0.40	1.113

MATERIAL DESCRIPTION	USCS	AASHTO
M GR CH2 W/ ARS ML	CH2	

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

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

Source: MRGO-05U **Sample No.:** 10C **Elev./Depth:** 37.7

FFEBJV, LLC

St Rose, LA

Remarks:

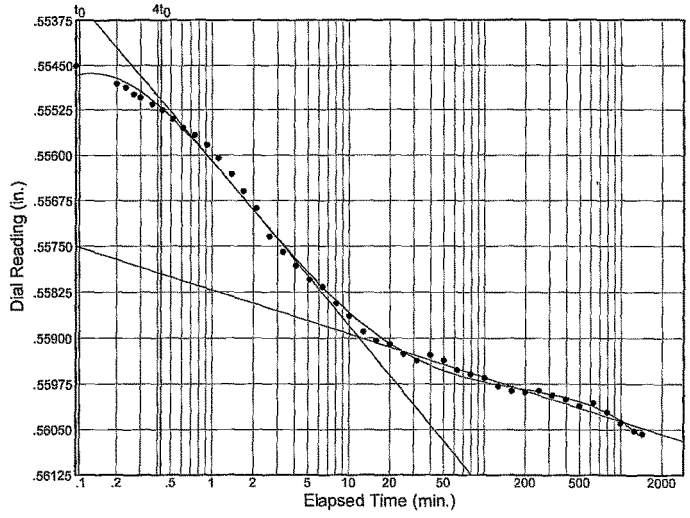
Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

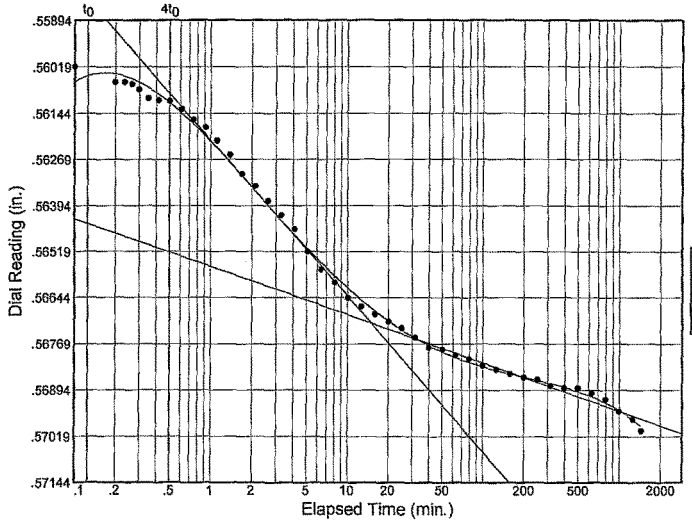
Source: MRGO-05U Sample No.: 10C Elev./Depth: 37.7



Load No.= 3
Load= 0.25 tsf
D_0 = 0.55410
D_{50} = 0.55654
D_{100} = 0.55898
T_{50} = 1.46 min.

C_v @ T_{50}
0.33 ft.2/day

C_α = 0.001



Load No.= 4
Load= 0.50 tsf
D_0 = 0.55970
D_{50} = 0.56341
D_{100} = 0.56712
T_{50} = 1.96 min.

C_v @ T_{50}
0.24 ft.2/day

C_α = 0.001

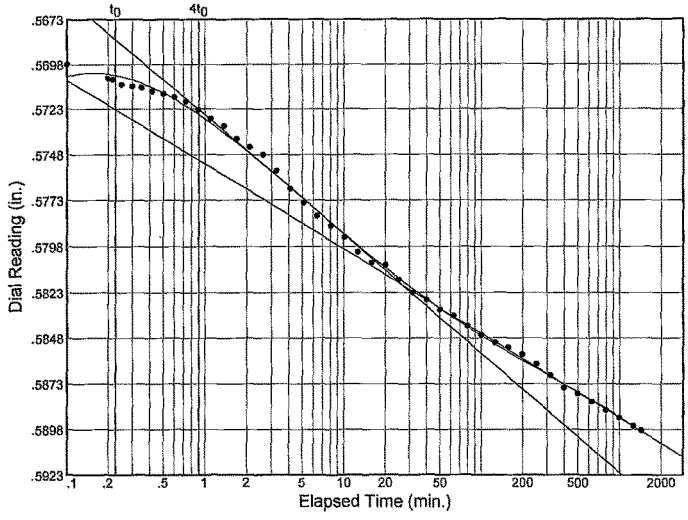
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

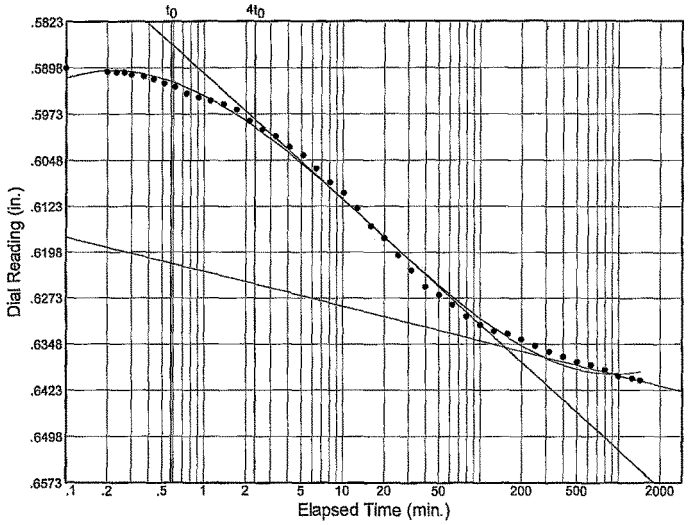
Source: MRGO-05U Sample No.: 10C Elev./Depth: 37.7



Load No.= 5
Load= 1.00 tsf
D_0 = 0.56820
D_{50} = 0.57505
D_{100} = 0.58189
T_{50} = 2.34 min.

C_v @ T_{50}
0.20 ft.2/day

C_α = 0.005



Load No.= 6
Load= 2.00 tsf
D_0 = 0.58458
D_{50} = 0.60992
D_{100} = 0.63525
T_{50} = 8.62 min.

C_v @ T_{50}
0.05 ft.2/day

C_α = 0.006

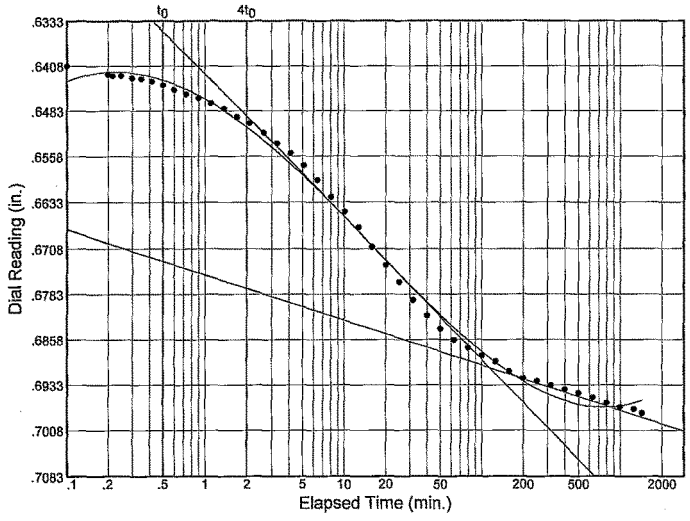
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

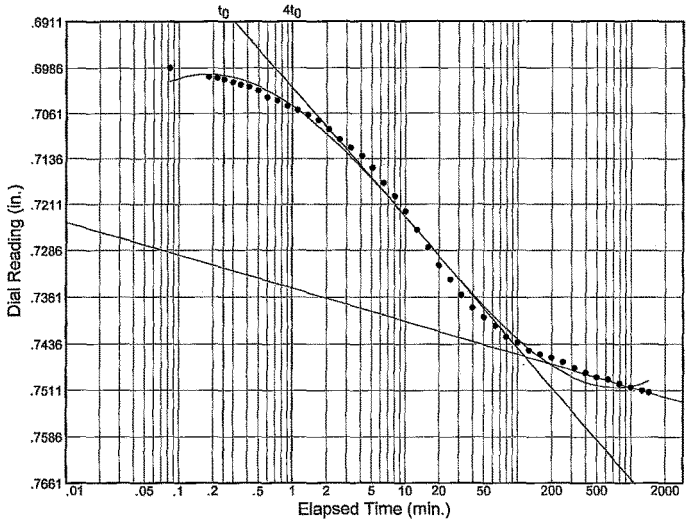
Source: MRGO-05U Sample No.: 10C Elev./Depth: 37.7



Load No.= 7
Load= 4.00 tsf
D_0 = 0.63532
D_{50} = 0.66287
D_{100} = 0.69043
T_{50} = 7.56 min.

C_v @ T_{50}
0.05 ft.2/day

C_α = 0.008



Load No.= 8
Load= 8.00 tsf
D_0 = 0.69476
D_{50} = 0.72018
D_{100} = 0.74559
T_{50} = 7.21 min.

C_v @ T_{50}
0.05 ft.2/day

C_α = 0.006

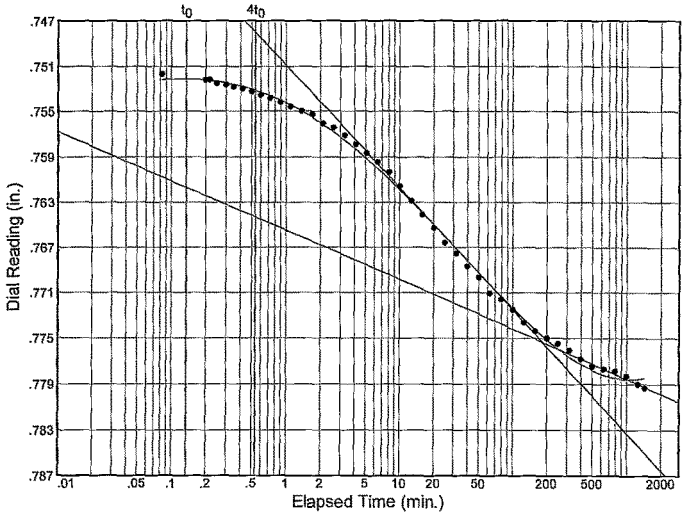
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

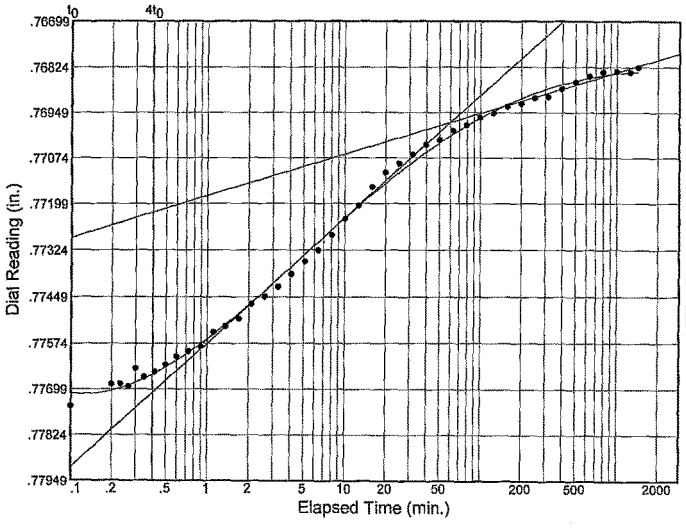
Source: MRGO-05U Sample No.: 10C Elev./Depth: 37.7



Load No.= 9
Load= 12.00 tsf
D_0 = 0.75111
D_{50} = 0.76321
D_{100} = 0.77531
T_{50} = 13.56 min.

C_v @ T_{50}
0.02 ft.2/day

C_α = 0.005



Load No.= 10
Load= 3.00 tsf
D_0 = 0.77761
D_{50} = 0.77368
D_{100} = 0.76976
T_{50} = 4.14 min.

C_v @ T_{50}
0.07 ft.2/day

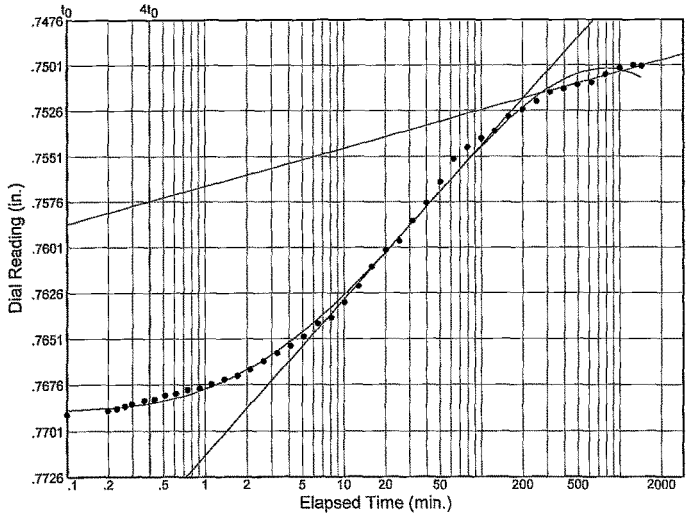
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-05U Sample No.: 10C Elev./Depth: 37.7



Load No.= 11
Load= 0.75 tsf
D_0 = 0.76933
D_{50} = 0.76062
D_{100} = 0.75190
T_{50} = 18.80 min.

C_v @ T_{50}
0.02 ft.2/day

CONSOLIDATION TEST DATA

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Contract No. W912P8-07-D-0022
Task Order 135
Project Number: 07-022135

Sample Data

Source: MRGO-05U
Sample No.: 10C
Elev. or Depth: 37.7 **Sample Length(in./cm.):**
Location:
Description: M GR CH2 W/ ARS ML
Liquid Limit: 50 **Plasticity Index:** 32
USCS: CH2 **AASHTO:** **Figure No.:**
Testing Remarks: Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST	AFTER TEST
Wet w+t =	140.74 g.	**Consolidometer #** = 10	**Wet w+t** = 449.98 g.
Dry w+t =	100.00 g.		**Dry w+t** = 371.97 g.
Tare Wt. =	.00 g.	**Spec. Gravity** = 2.69	**Tare Wt.** = 113.35 g.
Height =	1.00 in.	**Height** = 1.00 in.	
Diameter =	4.00 in.	**Diameter** = 4.00 in.	
Weight =	368.13 g.	**Defl. Table** = n/a	
Moisture =	40.7 %	**Ht. Solids** = 0.4726 in.	**Moisture** = 30.2 %
Wet Den. =	111.9 pcf	**Dry Wt.** = 261.31 g.*	**Dry Wt.** = 258.62 g.
Dry Den. =	79.5 pcf	**Void Ratio** = 1.113	**Void Ratio** = 0.694
		Saturation = 98.5 %	

*** Initial dry weight used in calculations**

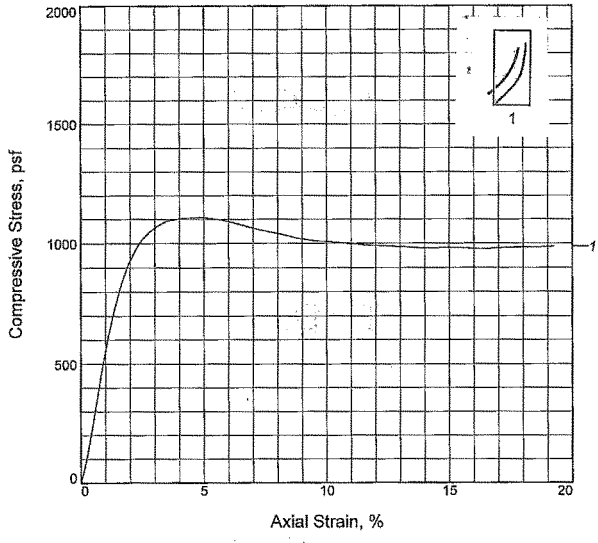
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.55225				1.113	
0.08	0.55400	0.00000			1.109	0.2 Comprs.
0.13	0.55621	0.00000			1.105	0.4 Comprs.
0.25	0.56058	0.00000	0.33	0.001	1.095	0.8 Comprs.
0.50	0.57005	0.00000	0.24	0.001	1.075	1.8 Comprs.
1.00	0.58986	0.00000	0.20	0.005	1.033	3.8 Comprs.
2.00	0.64080	0.00000	0.05	0.006	0.926	8.9 Comprs.
4.00	0.69804	0.00000	0.05	0.008	0.804	14.6 Comprs.
8.00	0.75143	0.00000	0.05	0.006	0.691	19.9 Comprs.
12.00	0.77934	0.00000	0.02	0.005	0.632	22.7 Comprs.

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
3.00	0.76825	0.00000	0.07		0.656	21.6 Comprs.
0.75	0.75018	0.00000	0.02		0.694	19.8 Comprs.

C_c = 0.40 P_c = 1.13 tsf C_r = 0.05

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	1108			
Undrained shear strength, psf	554			
Failure strain, %	4.9			
Strain rate, %/min.	1.00			
Water content, %	41.4			
Wet density, pcf	111.7			
Dry density, pcf	79.0			
Saturation, %	99.2			
Void ratio	1.1176			
Specimen diameter, in.	1.402			
Specimen height, in.	3.092			
Height/diameter ratio	2.21			

Description: M GR CH2 W/ LNS ML

LL = 52	**PL** = 23	**PI** = 29	**Assumed GS**= 2.68	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 10/14/09
Remarks:

Figure _____

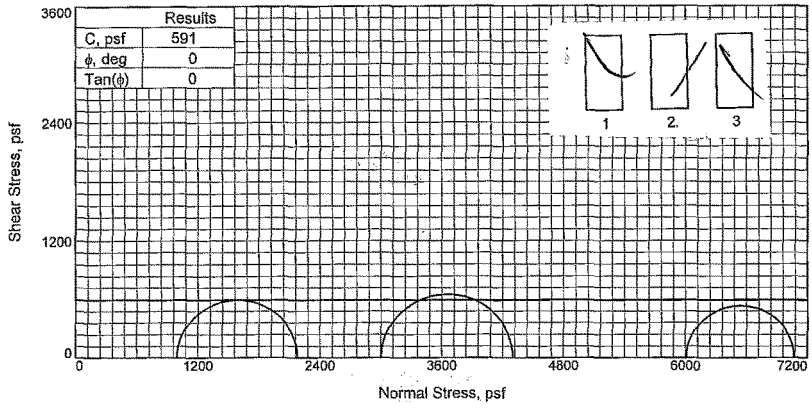
Client: U.S. Army Corps of Engineers

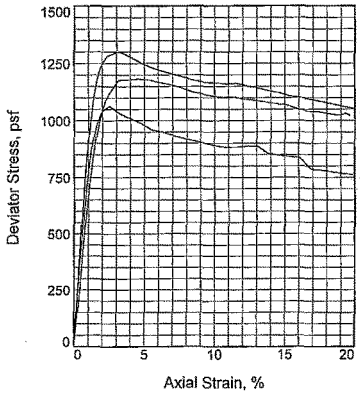
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-5U **Depth:** 40.4
Sample Number: 11B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: ALJ/JC **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	36.4	36.7	36.8
	Dry Density, pcf	84.7	84.6	84.8
	Saturation, %	99.3	99.9	100.7
	Void Ratio	0.9894	0.9917	0.9865
	Diameter, in.	1.408	1.405	1.398
	Height, in.	3.102	3.102	3.105
At Test	Water Content, %	36.4	36.7	36.8
	Dry Density, pcf	84.7	84.6	84.8
	Saturation, %	99.3	99.9	100.7
	Void Ratio	0.9894	0.9917	0.9865
	Diameter, in.	1.408	1.405	1.398
	Height, in.	3.102	3.102	3.105
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.91	20.85	41.73
Fail. Stress, psf		1182	1299	1062
Strain, %		4.6	3.2	2.6
Ult. Stress, psf		1068	1107	842
Strain, %				
σ_1 Failure, psf		2178	4302	7071
σ_3 Failure, psf		996	3003	6009

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: M GR CL6 W/ LNS ML

LL= 46 **PL=** 21 **PI=** 25
Assumed Specific Gravity= 2.70
Remarks:

Figure _____

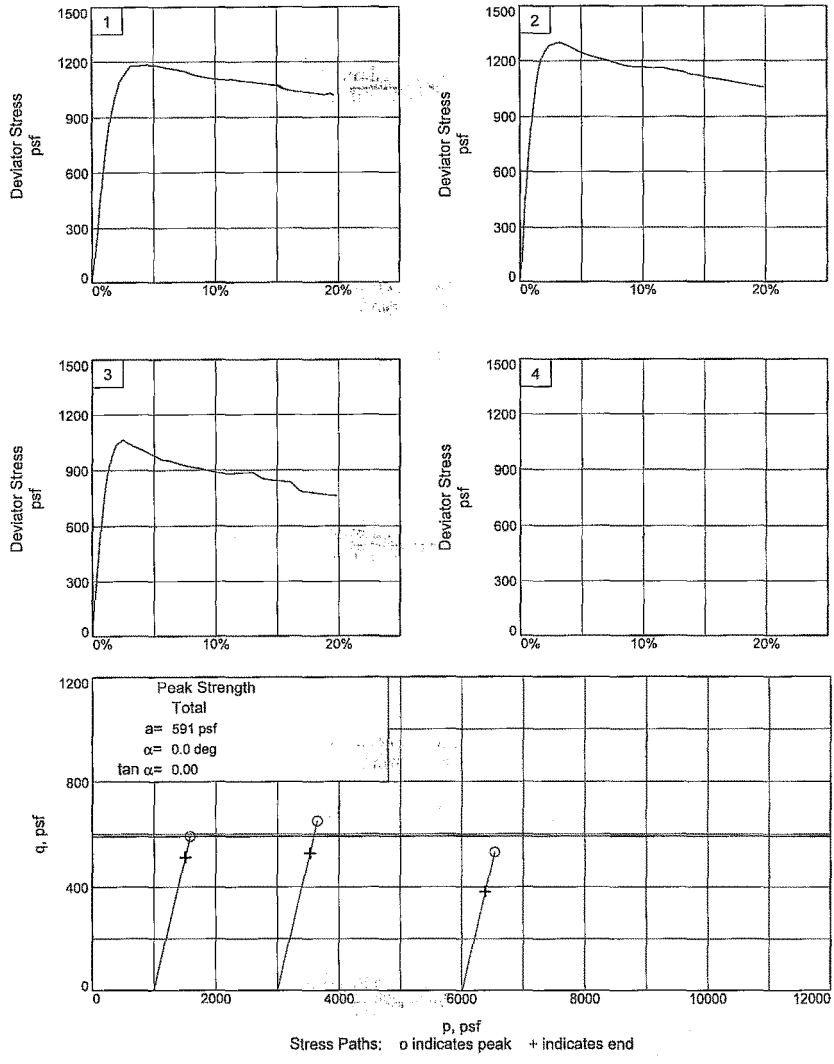
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-5U **Depth:** 44.8
Sample Number: 12B
Proj. No.: 07-022135 **Date Sampled:** 10/14/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

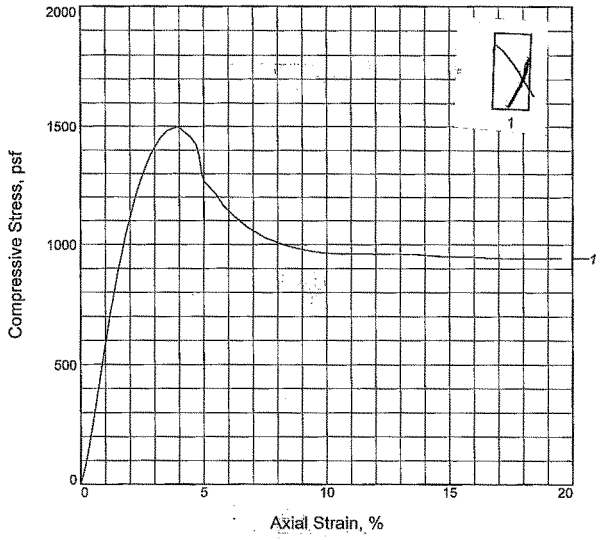
Tested By: ARS/JC **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-5U **Depth:** 44.8 **Sample Number:** 12B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: ARS/JC **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1				
Unconfined strength, psf	1497				
Undrained shear strength, psf	749				
Failure strain, %	3.9				
Strain rate, %/min.	1.00				
Water content, %	57.9				
Wet density, pcf	103.3				
Dry density, pcf	65.4				
Saturation, %	98.2				
Void ratio	1.6152				
Specimen diameter, in.	1.397				
Specimen height, in.	3.107				
Height/diameter ratio	2.22				

Description: M GR CH4 W/ LNS ML

LL = 87	**PL** = 32	**PI** = 55	**Assumed GS**= 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 10/14/09
Remarks:

Figure _____

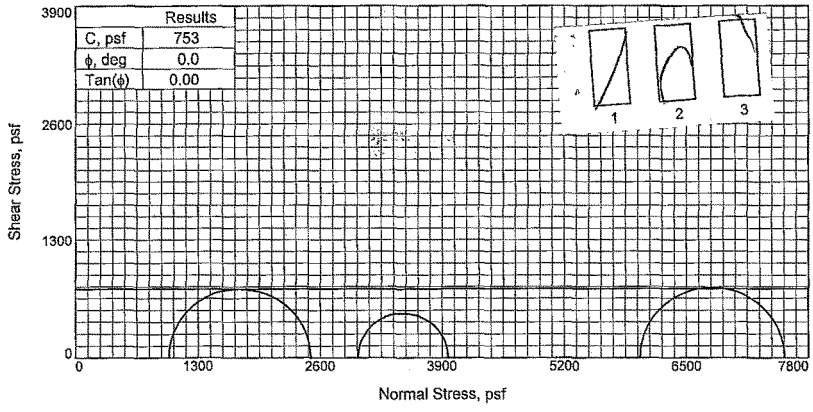
Client: U.S. Army Corps of Engineers

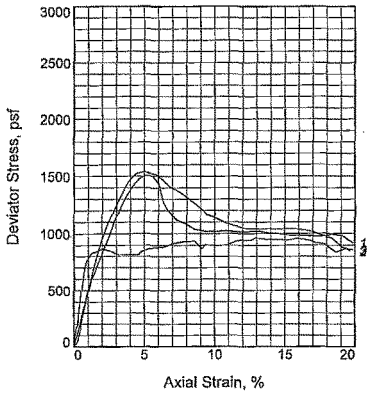
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-5U **Depth:** 48.8
Sample Number: 13B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: ARS/VF **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	57.1	56.6	57.9
	Dry Density, pcf	65.9	66.4	65.7
	Saturation, %	98.1	98.5	99.1
	Void Ratio	1.5960	1.5746	1.6025
	Diameter, in.	1.400	1.395	1.398
	Height, in.	3.099	3.102	3.099
At Test	Water Content, %	57.1	56.6	57.9
	Dry Density, pcf	65.9	66.4	65.7
	Saturation, %	98.1	98.5	99.1
	Void Ratio	1.5960	1.5746	1.6025
	Diameter, in.	1.400	1.395	1.398
	Height, in.	3.099	3.102	3.099
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.87	20.83	41.72
Fail. Stress, psf		1506	962	1539
Strain, %		5.1	12.9	5.0
Ult. Stress, psf		985	943	1036
Strain, %				
σ_1 Failure, psf		2495	3962	7547
σ_3 Failure, psf		989	3000	6008

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: M GR CH4

LL= 84 **PL=** 30 **PI=** 54
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

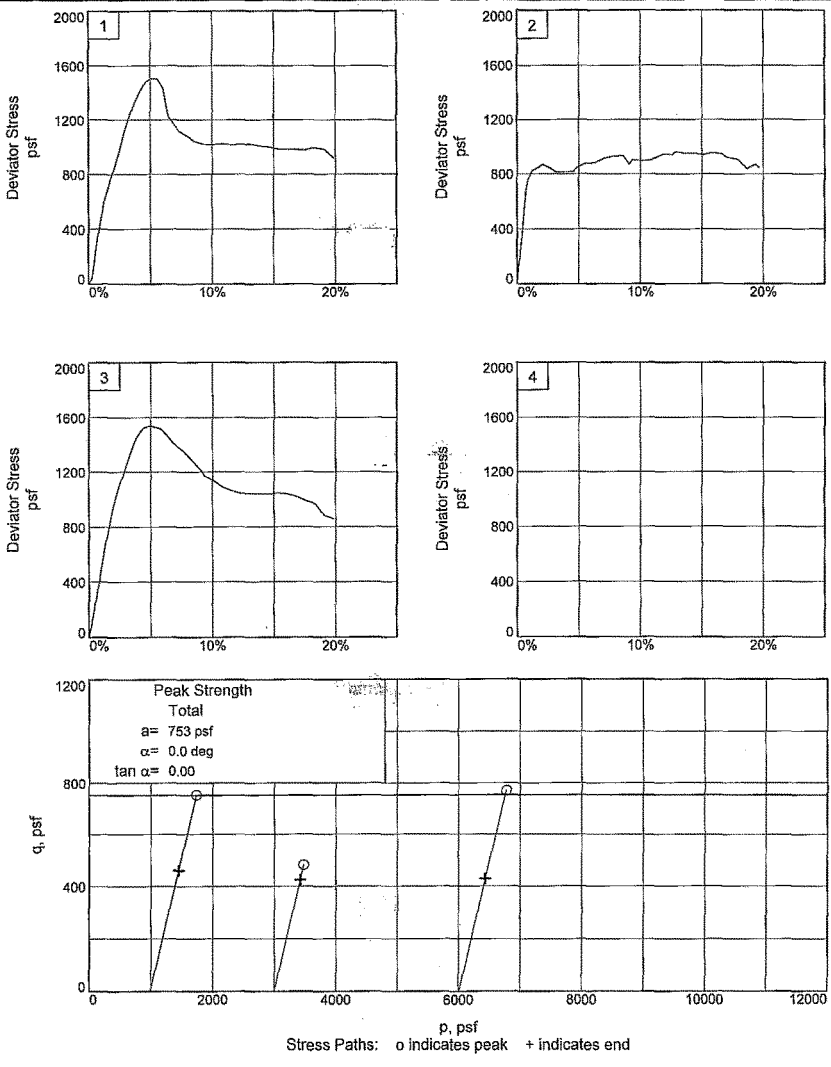
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-5U **Depth:** 52.8
Sample Number: 14B
Proj. No.: 07-022135 **Date Sampled:** 10/14/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

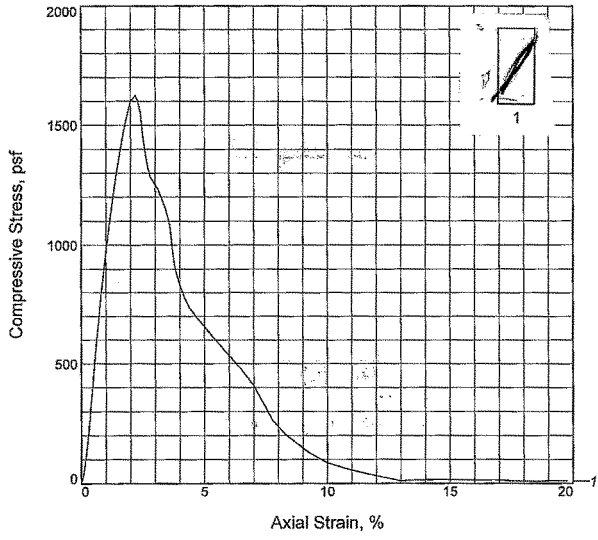
Tested By: ARS/JC **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-5U **Depth:** 52.8 **Sample Number:** 14B
Project No.: 07-022135 **Figure** FFEBJV, LLC

Tested By: ARS/JC **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.		1			
Unconfined strength, psf		1623			
Undrained shear strength, psf		812			
Failure strain, %		2.2			
Strain rate, %/min.		1.00			
Water content, %		65.0			
Wet density, pcf		101.6			
Dry density, pcf		61.6			
Saturation, %		100.2			
Void ratio		1.7772			
Specimen diameter, in.		1.389			
Specimen height, in.		3.103			
Height/diameter ratio		2.23			

Description: M GR CH4 W/ LNS ML

LL = 81	**PL** = 31	**PI** = 50	**Assumed GS=** 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 10/14/09
Remarks:

Figure _____

Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-5U **Depth:** 56.8
Sample Number: 15B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: ARS/JC **Checked By:** MS

SUMMARY OF LABORATORY TEST RESULTS

Project: MRGO Ecosystem Restoration Feasibility Study Assigned By: _____

Project Number: 07-022135 Current Date: 12/29/2009
Boring: MRGO-6U

Sample Number	Depth	Visual Classification	USCS	E(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
1A	0.0	VSO DGR CHOA W/ LNS ML, WD	CHOA		145												
1B	0.8	VSO DGR CH3 W/ LNS ML, O, WD	CH3		101												
1C	1.7	VSO DGR CH3 W/ LNS ML, O, WD	CH3		98												
1D	2.6	VSO DGR CH3 W/ LNS ML, O, WD	CH3		69												
2A	4.0	VSO GR CH2 W/ LNS & LYS ML	CH2		48												
2B	4.8	VSO GR CL6	CL6		45												
2C	5.7	GR SM W/ LYS CH	SM		33												
2D	6.6	GR SM W/ LYS CH	SM		32												
3A	8.0	VSO DGR CL6 W/ LYS SM	CL6		50												
3B	8.8	SO DGR CHOA W/ ARS & LNS SM, WD	CHOA	6	94	48	92	100	UC	-	327	655	148	35	113	0.26	
3C	9.7	VSO DGR CH3 W/ ARS & LNS SM, O, WD	CH3		71												
3D	10.6	SO GR CL4 W/ ARS, CH, O	CL4		36	85	115	98					32	20	12		CON, GS
4A	12.0	GR SM W/ LYS CH	SM		37												
4B	12.8	GR SM W/ LYS CH	SM		29												
4C	13.7	GR SM W/ LYS CH	SM		31												
5A	16.0	GR SM	SM		30												
5B	16.8	GR SM	SM		28												
6A	20.0	GR SM W/ LYS CH	SM		34												
6B	20.8	GR SM W/ LYS CH	SM		31												SV
6C	21.7	GR SM W/ LYS CH	SM		28												
7A	24.0	GR SM W/ LYS CH	SM		31												
7B	24.8	GR SM W/ LYS CH	SM		30												
7C	25.7	GR SM W/ LYS CH	SM		34												
7D	26.6	SO GR CH3 W/ LNS & LYS SM	CH3		50												
8A	28.0	SO GR CH3 W/ LNS & LYS SM	CH3		47												
8B	28.8	SO GR CH2 W/ LNS & LYS SM	CH2		44	77	112	100	UU	0	438		50	17	33	0.26	
8C	29.7	M GR CH4 W/ LNS & LYS ML	CH4		53												
8D	30.6	M GR CH4 W/ LNS & LYS ML	CH4		51												
9A	32.0	M GR CH4 W/ LNS & LYS SM	CH4		57												
9B	32.8	SO GR CH3 W/ ARS SM	CH3	5	51	71	107	100	UC	-	457	913	68	21	47	0.25	
9C	33.7	M GR CH3 W/ LNS & LYS SM	CH3		55												
9D	34.6	M GR CH4 W/ LNS & LYS SM	CH4		61												
10A	36.0	M GR CH4	CH4		61												
10B	36.8	M GR CH4	CH4		64	62	102	100	UU	0	538		95	24	71	0.30	
10C	37.7	M GR CH4	CH4		55												
11A	40.0	M GR CH4 W/ LNS & LYS SM	CH4		54												
11B	40.8	M GR CH4 W/ LNS & LYS SM	CH4	3	50	73	109	100	UC	-	692	1385	82	20	62	0.32	

Remarks: _____
FFEB JV, LLC

Checked By: MS/MKG
File Name: MRGO-6U.xls

SUMMARY OF LABORATORY TEST RESULTS

Project: MRGO Ecosystem Restoration Feasibility Study Assigned By: _____

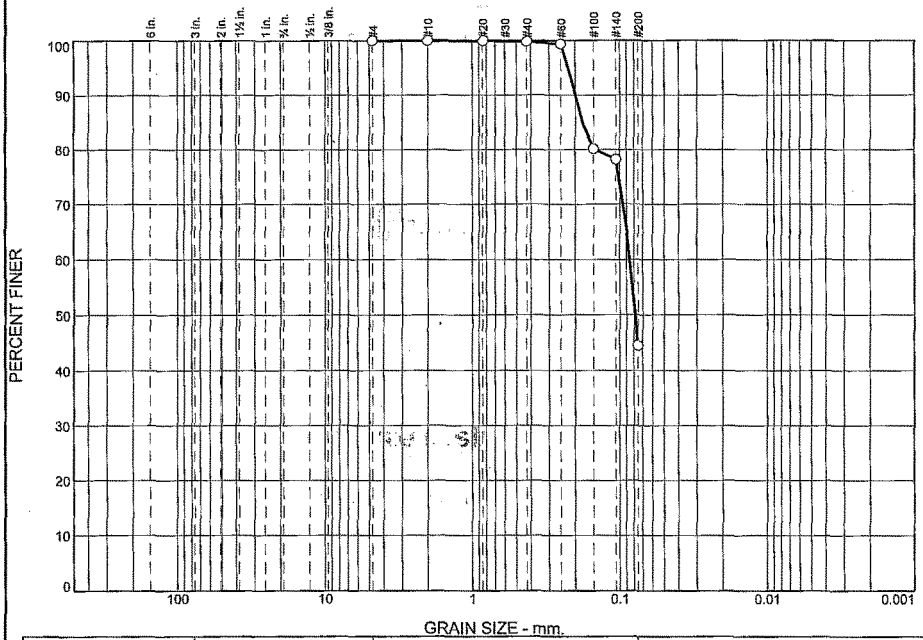
Project Number: 07-022135 Current Date: 12/29/2009
Boring: MRGO-6U

Sample Number	Depth	Visual Classification	USCS	E(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
11C	41.7	M GR CH4 W/ LNS & LYS SM	CH4		50												
11D	42.6	M GR CH2 W/ ARS & LNS ML	CH2		48	73	108	99					53	20	33		CON, GS
12A	44.0	M GR CH4 W/ LNS & LYS ML	CH4		58												
12B	44.8	M GR CH3 W/ LNS & LYS ML	CH3		52												
12C	45.7	M GR CH4 W/ LNS & LYS ML	CH4		58	66	104	100	UU	0	724		92	25	67	0.36	
12D	46.6	M GR CH3 W/ LNS & LYS ML	CH3		55												
13A	48.0	M GR CH4 W/ LNS & LYS ML	CH4		43												
13B	48.8	M GR CH3 W/ LNS & LYS ML	CH3	8	42	80	113	99	UC	-	625	1250	63	18	45	0.40	
13C	49.7	M GR CH4 W/ LNS & LYS ML	CH4		43												
13D	50.6	M GR CH4 W/ LNS & LYS ML	CH4		44												
14A	52.0	SO GR CH4 W/ LNS & LYS ML	CH4		56												
14B	52.8	SO GR CH4 W/ LNS & LYS ML	CH4		45	76	108	99	UU	0	400		70	18	52	0.30	
14C	53.7	SO GR CH4	CH4		53												
14D	54.6	SO GR CH4	CH4		54												
15A	56.9	GR SM W/ ARS CH, SIF	SM		30												
15B	58.0	GR SM W/ ARS CH, SIF	SM		31												

Remarks: _____
FFEB JV, LLC

Checked By: MS/MWG
File Name: MRGO-6U.xls

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.0	0.2	55.3	44.5	

	Colloids	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○				0.1793	0.0853	0.0784					

	Material Description	USCS	AASHTO
○	GR SM W/ LYS CH	SM	

Project No. 07-022135 **Client:** U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
○ **Source of Sample:** MRGO-6U **Depth:** 20.8 **Sample Number:** 6B

Date: ○

FFEBJV, LLC

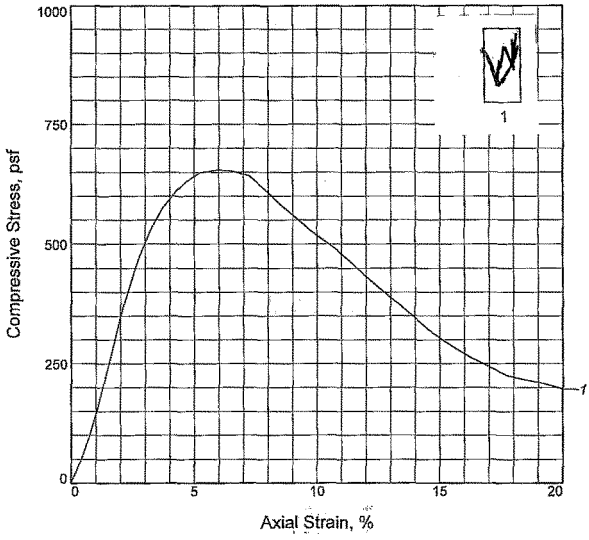
St Rose, LA

Remarks:

Figure

Tested By: JH **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1				
Unconfined strength, psf	655				
Undrained shear strength, psf	327				
Failure strain, %	6.0				
Strain rate, %/min.	1.00				
Water content, %	93.6				
Wet density, pcf	92.0				
Dry density, pcf	47.5				
Saturation, %	100.8				
Void ratio	2.4152				
Specimen diameter, in.	1.392				
Specimen height, in.	3.096				
Height/diameter ratio	2.22				

Description: SO DGR CHOA W/ ARS & LNS SM, WD

LL = 148	**PL** = 35	**PI** = 113	**Assumed GS**= 2.60	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 10/28/09
Remarks:

Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-6U **Depth:** 8.8
Sample Number: 3B

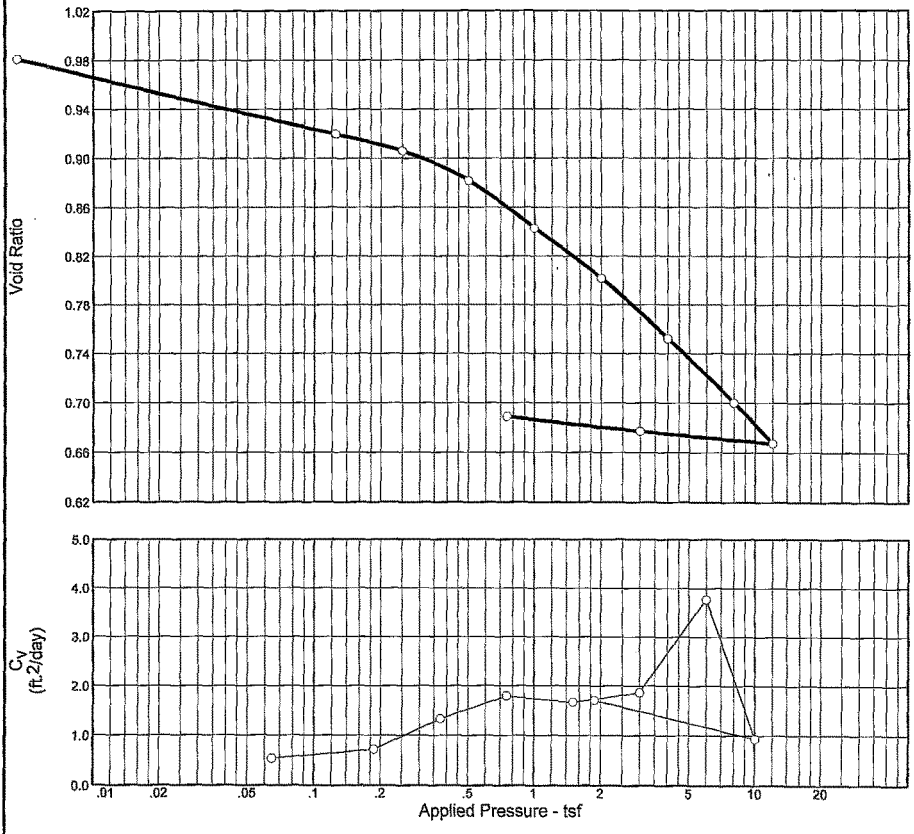
UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Figure _____

Tested By: JC/ARS **Checked By:** MS

CONSOLIDATION TEST REPORT



Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
98.2 %	35.7 %	85.1	32	12	2.70	0.71	0.17	0.981

MATERIAL DESCRIPTION	USCS	AASHTO
SO GR CL4 W/ ARS CH, O	CL4	

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

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

Source: MRGO-06U **Sample No.:** 3D **Elev./Depth:** 10.6

FFEBJV, LLC

St Rose, LA

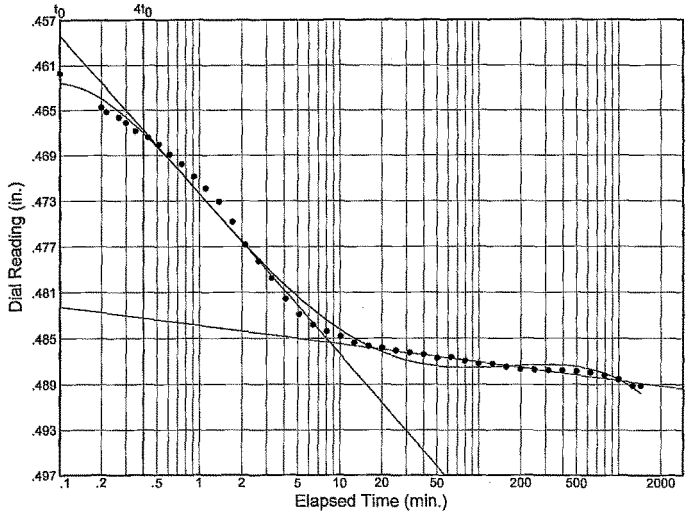
Remarks:
Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

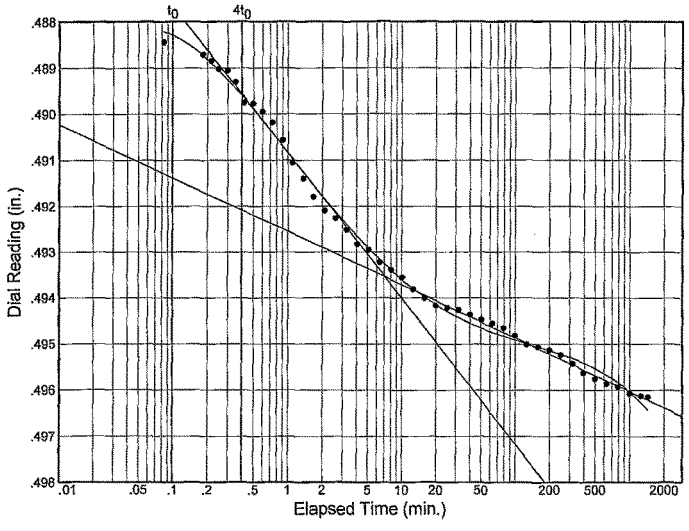
Source: MRGO-06U Sample No.: 3D Elev./Depth: 10.6



Load No.= 2
Load= 0.13 tsf
D_0 = 0.45810
D_{50} = 0.47172
D_{100} = 0.48534
T_{50} = 0.90 min.

C_v @ T_{50}
0.54 ft.2/day

C_α = 0.002



Load No.= 3
Load= 0.25 tsf
D_0 = 0.48696
D_{50} = 0.49025
D_{100} = 0.49353
T_{50} = 0.65 min.

C_v @ T_{50}
0.71 ft.2/day

C_α = 0.001

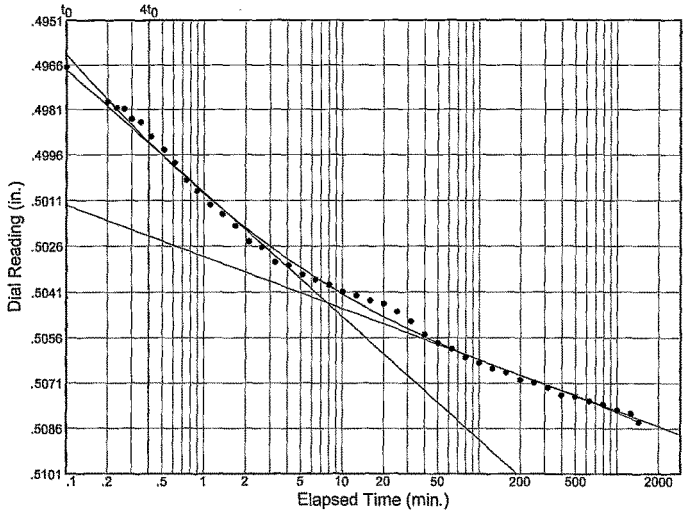
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

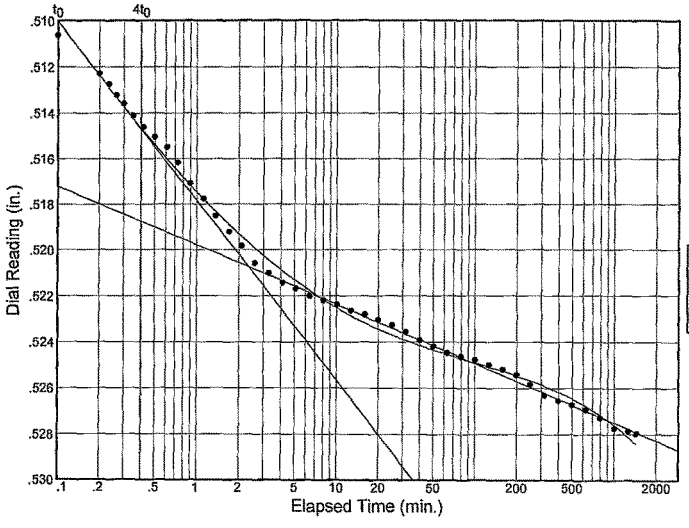
Source: MRGO-06U Sample No.: 3D Elev./Depth: 10.6



Load No.= 4
Load= 0.50 tsf
D_0 = 0.49331
D_{50} = 0.49888
D_{100} = 0.50444
T_{50} = 0.34 min.

C_v @ T_{50}
1.33 ft.2/day

C_α = 0.002



Load No.= 5
Load= 1.00 tsf
D_0 = 0.50540
D_{50} = 0.51306
D_{100} = 0.52073
T_{50} = 0.24 min.

C_v @ T_{50}
1.79 ft.2/day

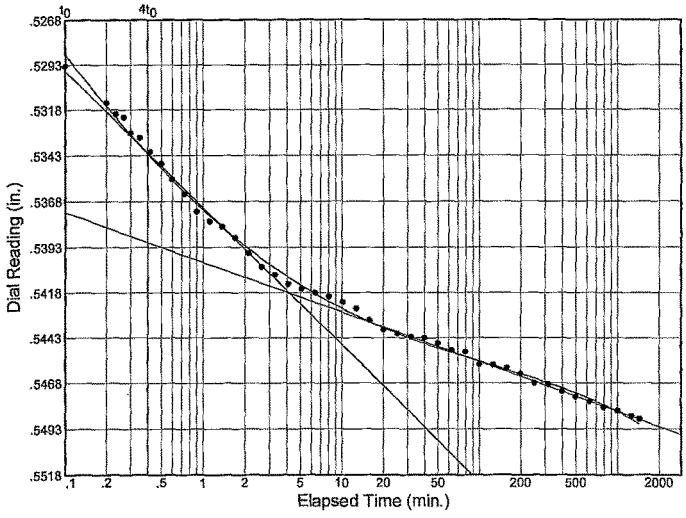
C_α = 0.003

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

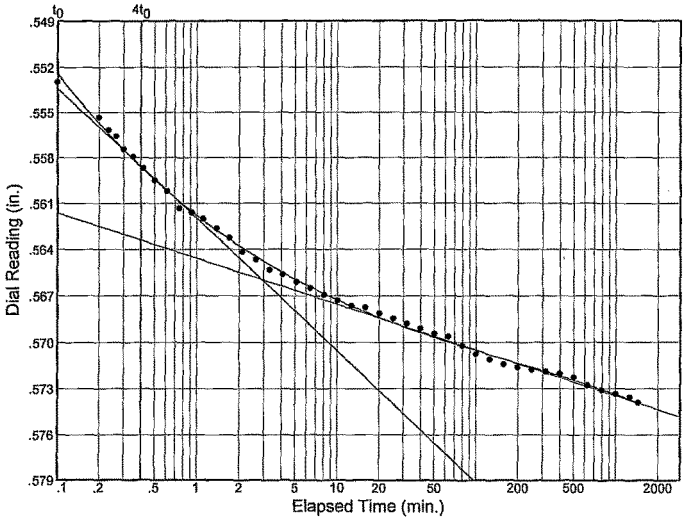
Source: MRGO-06U Sample No.: 3D Elev./Depth: 10.6



Load No.= 6
Load= 2.00 tsf
D_0 = 0.52321
D_{50} = 0.53252
D_{100} = 0.54182
T_{50} = 0.25 min.

C_v @ T_{50}
1.67 ft.2/day

C_α = 0.003



Load No.= 7
Load= 4.00 tsf
D_0 = 0.54621
D_{50} = 0.55608
D_{100} = 0.56595
T_{50} = 0.22 min.

C_v @ T_{50}
1.87 ft.2/day

C_α = 0.003

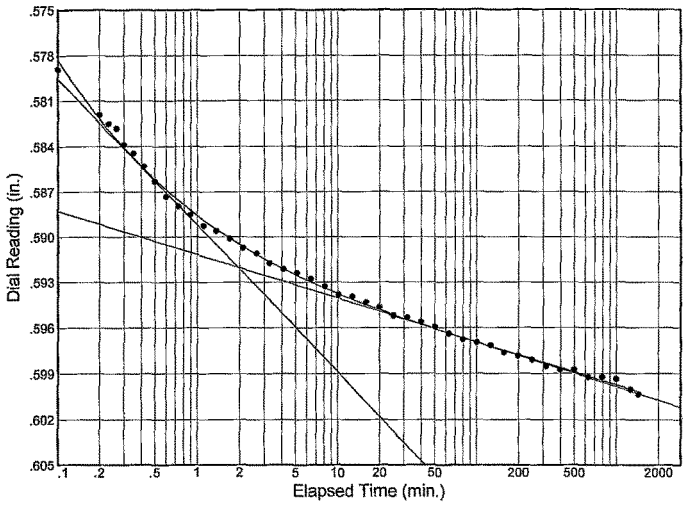
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

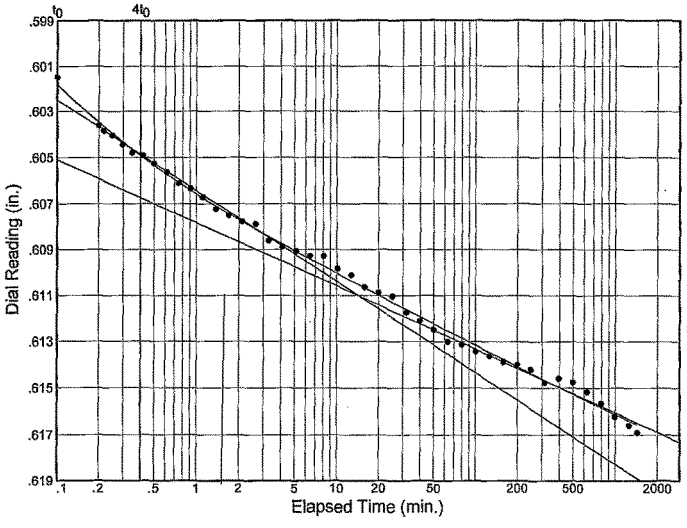
Source: MRGO-06U Sample No.: 3D Elev./Depth: 10.6



Load No.= 8
Load= 8.00 tsf
D_0 = 0.56472
D_{50} = 0.57835
D_{100} = 0.59199
T_{50} = 0.10 min.

C_v @ T_{50}
3.77 ft.^{2}/day

C_α = 0.003



Load No.= 9
Load= 12.00 tsf
D_0 = 0.59873
D_{50} = 0.60486
D_{100} = 0.61099
T_{50} = 0.39 min.

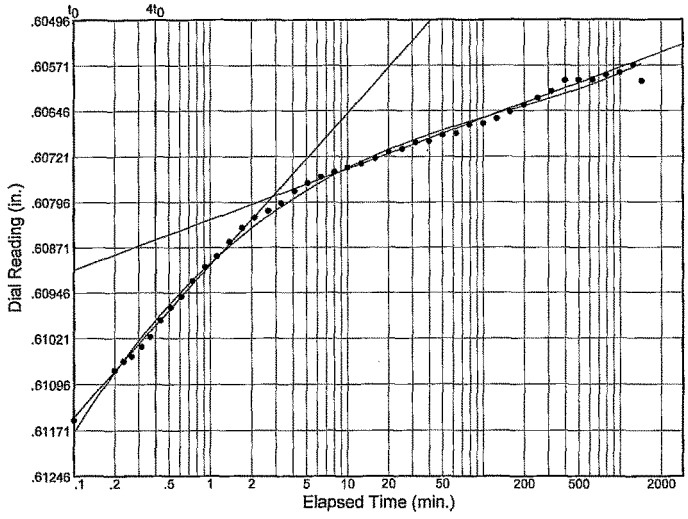
C_v @ T_{50}
0.93 ft.^{2}/day

C_α = 0.003

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-06U Sample No.: 3D Elev./Depth: 10.6



Load No.= 11
Load= 0.75 tsf
D_0 = 0.61358
D_{50} = 0.61073
D_{100} = 0.60787
T_{50} = 0.21 min.

C_v @ T_{50}
1.71 $ft.^2/day$

SWELL/CONSOLIDATION TEST DATA

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Contract No. W912P8-07-D-0022
Task Order 135
Project Number: 07-022135

Sample Data

Source: MRGO-06U
Sample No.: 3D
Elev. or Depth: 10.6 **Sample Length(in./cm.):**
Location:
Description: SO GR CL4 W/ ARS CH, O
Liquid Limit: 32 **Plasticity Index:** 12
USCS: CL4 **AASHTO:** **Figure No.:**
Testing Remarks: Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Test Specimen Data

TOTAL SAMPLE	BEFORE TEST	AFTER TEST
Wet w+t = 135.69 g.	Consolidometer # = 9	Wet w+t = 470.82 g.
Dry w+t = 100.00 g.		Dry w+t = 393.46 g.
Tare Wt. = .00 g.	Spec. Gravity = 2.70	Tare Wt. = 113.07 g.
Height = 1.00 in.	Height = 1.00 in.	
Diameter = 4.00 in.	Diameter = 3.99 in.	
Weight = 382.35 g.	Defl. Table = n/a	
Moisture = 35.7 %	Ht. Solids = 0.5065 in.	Moisture = 27.6 %
Wet Den. = 115.4 pcf	Dry Wt. = 280.92 g.*	Dry Wt. = 280.39 g.
Dry Den. = 85.1 pcf	Void Ratio = 0.981	Void Ratio = 0.689
	Saturation = 98.2 %	

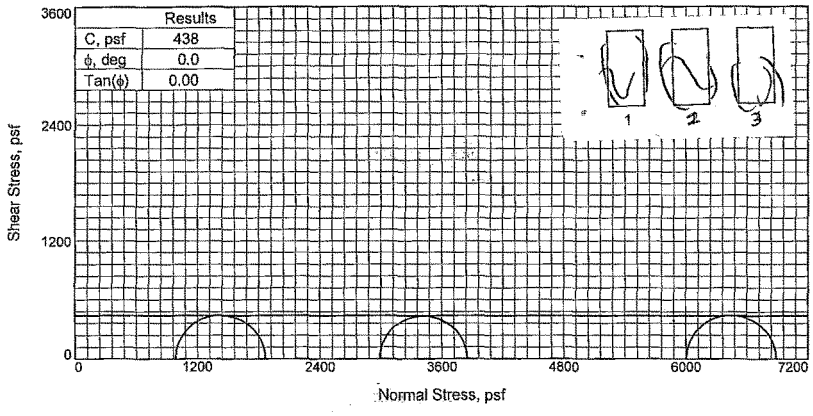
*** Initial dry weight used in calculations**

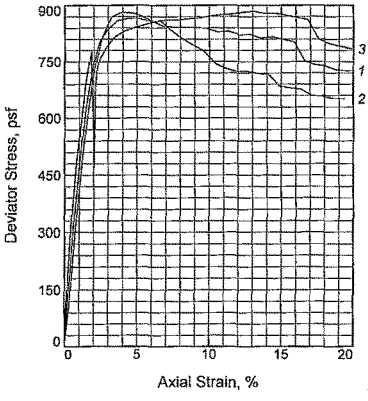
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
start	0.45786				0.981	
0.00	0.45777	0.00000			0.982	0.0 Swell
0.13	0.48915	0.00000	0.54	0.002	0.920	3.1 Comprs.
0.25	0.49616	0.00000	0.71	0.001	0.906	3.8 Comprs.
0.50	0.50840	0.00000	1.33	0.002	0.882	5.0 Comprs.
1.00	0.52797	0.00000	1.79	0.003	0.843	7.0 Comprs.
2.00	0.54878	0.00000	1.67	0.003	0.802	9.1 Comprs.
4.00	0.57393	0.00000	1.87	0.003	0.752	11.6 Comprs.
8.00	0.60037	0.00000	3.77	0.003	0.700	14.2 Comprs.
12.00	0.61692	0.00000	0.93	0.003	0.667	15.8 Comprs.

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
3.00	0.61192	0.00000			0.677	15.4 Comprs.
0.75	0.60597	0.00000	1.71		0.689	14.8 Comprs.

C_c = 0.17 P_c = 0.71 tsf C_r = 0.02





Sample No.		1	2	3
Initial	Water Content, %	42.3	45.6	45.2
	Dry Density, pcf	79.2	75.9	76.6
	Saturation, %	100.0	99.8	100.4
	Void Ratio	1.1597	1.2526	1.2324
	Diameter, in.	1.385	1.388	1.389
	Height, in.	3.093	3.092	3.097
At Test	Water Content, %	42.3	45.6	45.2
	Dry Density, pcf	79.2	75.9	76.6
	Saturation, %	100.0	99.8	100.4
	Void Ratio	1.1597	1.2526	1.2324
	Diameter, in.	1.385	1.388	1.389
	Height, in.	3.093	3.092	3.097
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.83	20.75	41.69
Fail. Stress, psf		881	861	884
Strain, %		4.0	6.6	13.1
Ult. Stress, psf		829	685	879
Strain, %				
σ_1 Failure, psf		1865	3849	6888
σ_3 Failure, psf		983	2988	6004

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CH2 W/ LNS & LYS SM

LL= 50 **PL=** 17 **PI=** 33
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

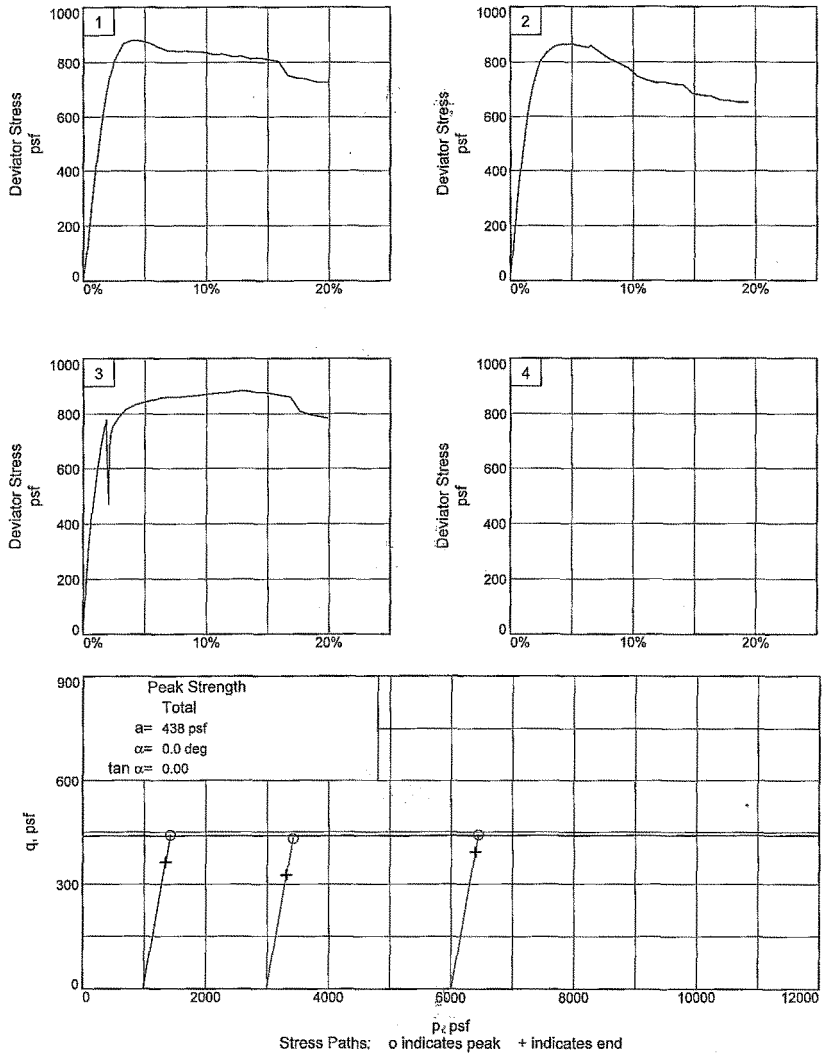
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-6U **Depth:** 28.8
Sample Number: 8B
Proj. No.: 07-022135 **Date Sampled:** 10/28/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

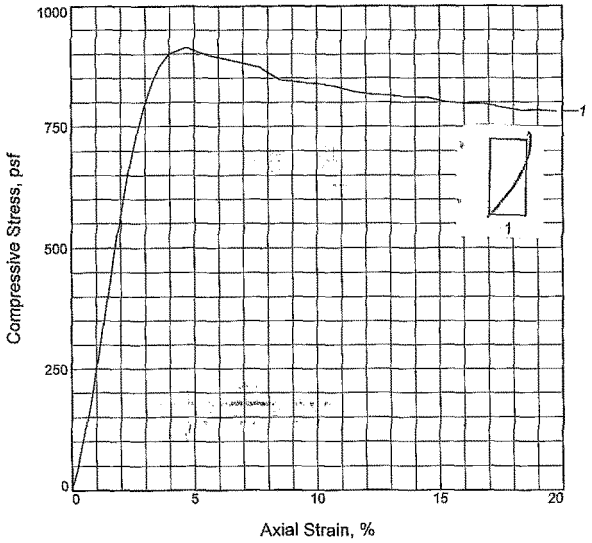
Tested By: JC/ARS **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-6U **Depth:** 28.8 **Sample Number:** 8B
Project No.: 07-022135 **Figure** _____ FFEBJV, LLC

Tested By: JC/ARS **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	913			
Undrained shear strength, psf	457			
Failure strain, %	4.7			
Strain rate, %/min.	1.00			
Water content, %	51.0			
Wet density, pcf	107.4			
Dry density, pcf	71.1			
Saturation, %	99.9			
Void ratio	1.3881			
Specimen diameter, in.	1.386			
Specimen height, in.	3.090			
Height/diameter ratio	2.23			

Description: SO GR CH3 W/ ARS SM

LL = 68	PL = 21	PI = 47	Assumed GS= 2.72	Type: UNDISTURBED

Project No.: 07-022135
Date Sampled: 10/28/09
Remarks:

Figure _____

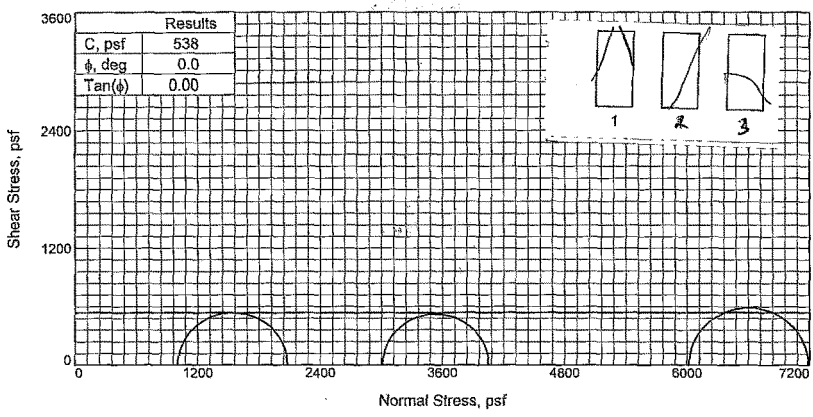
Client: U.S. Army Corps of Engineers

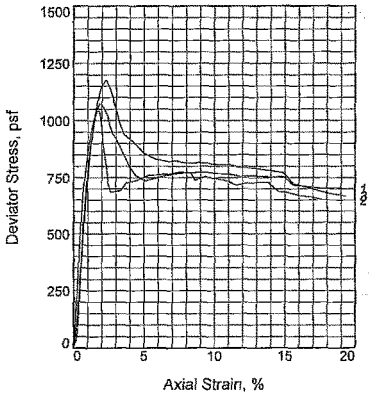
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-6U **Depth:** 32.8
Sample Number: 9B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: JC/ARS **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	64.4	65.2	63.5
	Dry Density, pcf	61.6	61.4	62.4
	Saturation, %	99.2	100.0	99.9
	Void Ratio	1.7775	1.7857	1.7413
	Diameter, in.	1.385	1.387	1.386
	Height, in.	3.098	3.093	3.097
At Test	Water Content, %	64.4	65.2	63.5
	Dry Density, pcf	61.6	61.4	62.4
	Saturation, %	99.2	100.0	99.9
	Void Ratio	1.7775	1.7857	1.7413
	Diameter, in.	1.385	1.387	1.386
	Height, in.	3.098	3.093	3.097
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.98	20.91	41.78
Fail. Stress, psf		1073	1042	1174
Strain, %		1.8	1.7	2.3
Ult. Stress, psf		736	685	858
Strain, %				
σ_1 Failure, psf		2079	4053	7190
σ_3 Failure, psf		1005	3011	6016

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: M GR CH4

LL= 95 **PL=** 24 **PI=** 71
Assumed Specific Gravity= 2.74
Remarks:

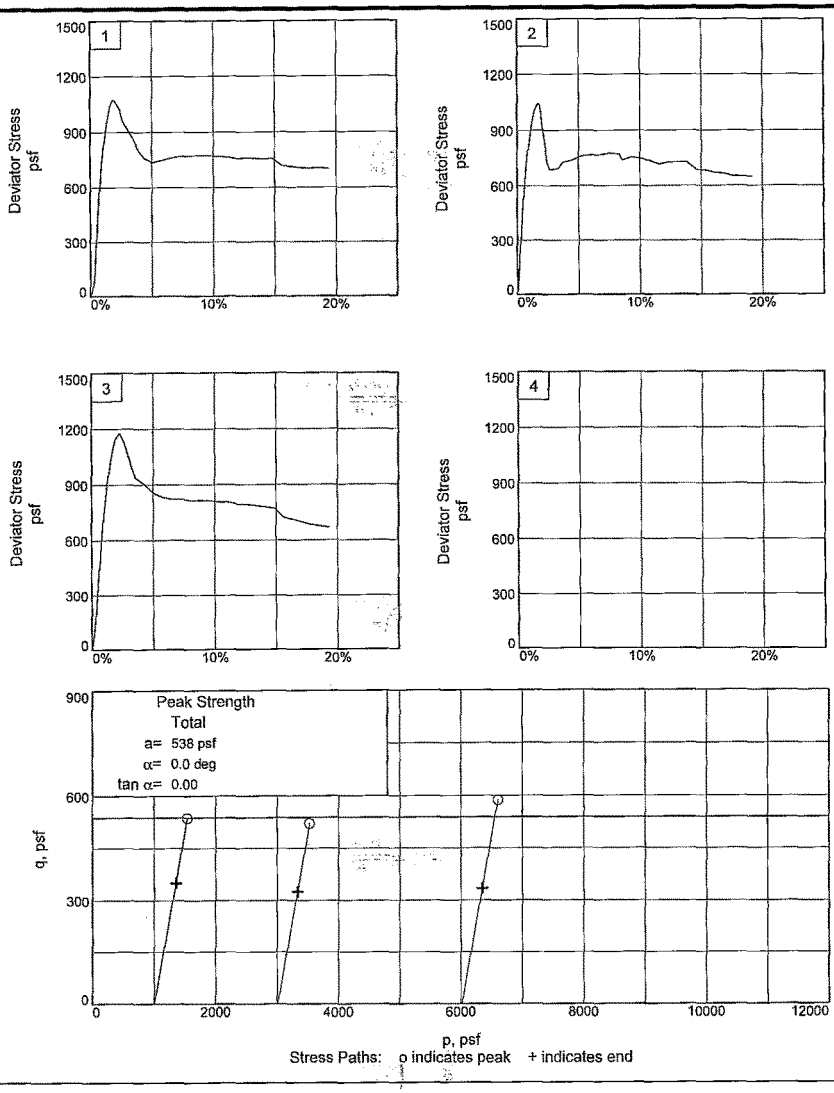
Figure _____

Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-6U **Depth:** 36.8
Sample Number: 10B
Proj. No.: 07-022135 **Date Sampled:** 10/28/09

TRIAXIAL SHEAR TEST REPORT
FFEBJV, LLC

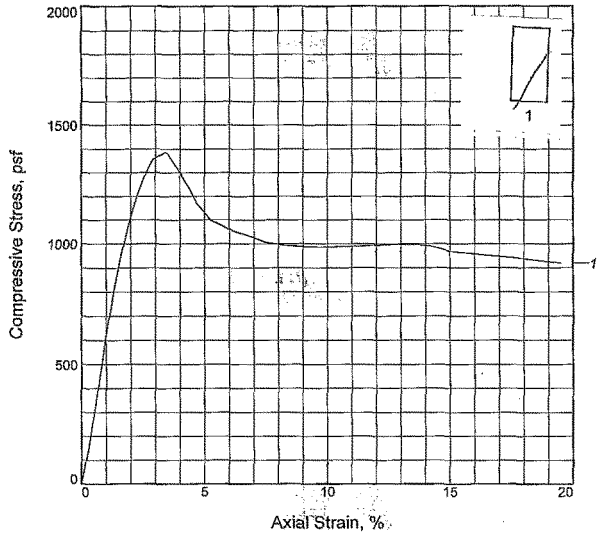
Tested By: JC/ARS **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-6U **Depth:** 36.8 **Sample Number:** 10B
Project No.: 07-022135 **Figure** _____ FFEBJV, LLC

Tested By: JC/ARS **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	1385			
Undrained shear strength, psf	692			
Failure strain, %	3.4			
Strain rate, %/min.	1.00			
Water content, %	50.0			
Wet density, pcf	108.9			
Dry density, pcf	72.6			
Saturation, %	101.0			
Void ratio	1.3575			
Specimen diameter, in.	1.385			
Specimen height, in.	3.087			
Height/diameter ratio	2.23			

Description: M GR CH4 W/ LNS & LYS SM

LL = 82 | **PL** = 20 | **PI** = 62 | **Assumed GS=** 2.74 | **Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 10/28/09
Remarks:

Figure _____

Client: U.S. Army Corps of Engineers

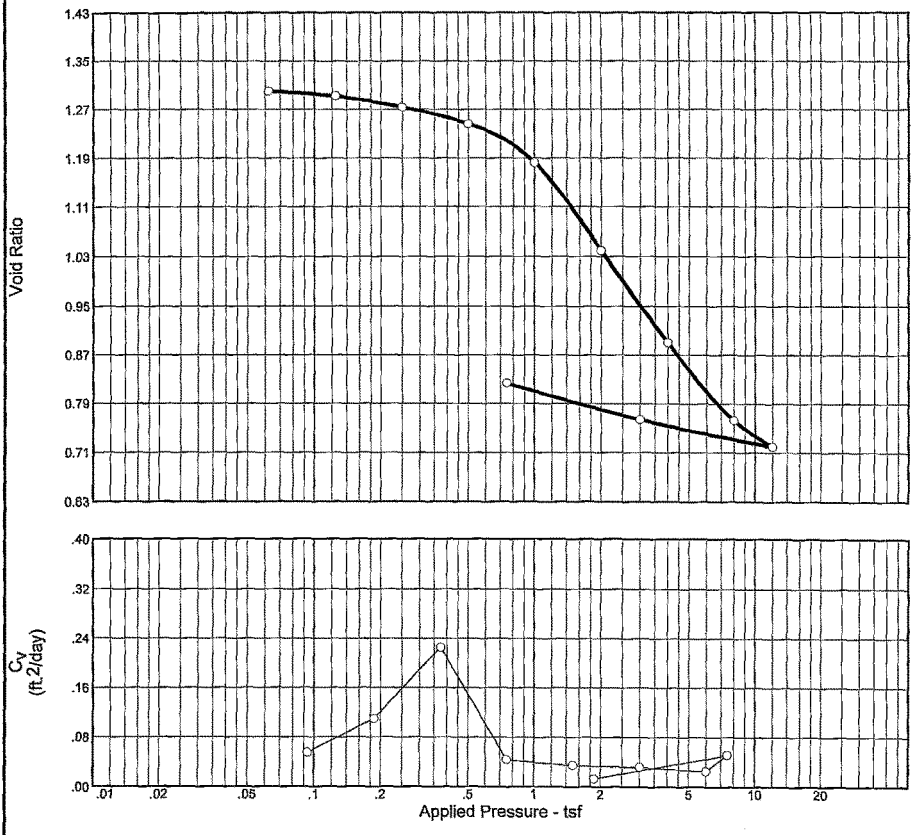
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-6U **Depth:** 40.8
Sample Number: 11B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: JC/ARS **Checked By:** MS

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
99.2 %	47.7 %	73.4	53	33	2.71	1.00	0.49	1.304

MATERIAL DESCRIPTION	USCS	AASHTO
M GR CH2 W/ ARS & LNS ML	CH2	

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

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

Source: MRGO-06U **Sample No.:** 11D **Elev./Depth:** 42.6

FFEBJV, LLC

St Rose, LA

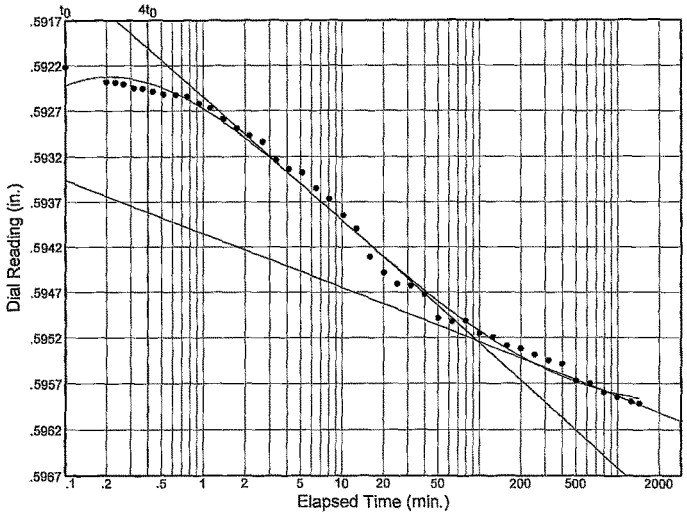
Remarks:
Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

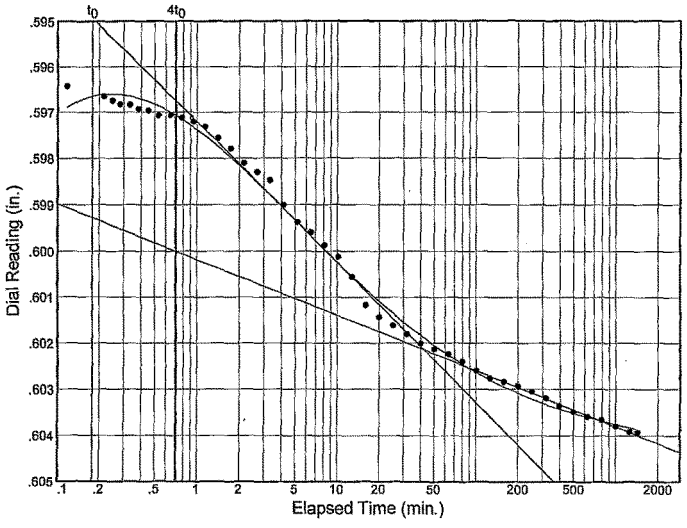
Source: MRGO-06U Sample No.: 11D Elev./Depth: 42.6



Load No.= 2
Load= 0.13 tsf
D_0 = 0.59246
D_{50} = 0.59385
D_{100} = 0.59523
T_{50} = 9.07 min.

C_v @ T_{50}
0.05 ft.2/day

C_α = 0.001



Load No.= 3
Load= 0.25 tsf
D_0 = 0.59622
D_{50} = 0.59918
D_{100} = 0.60214
T_{50} = 4.47 min.

C_v @ T_{50}
0.11 ft.2/day

C_α = 0.001

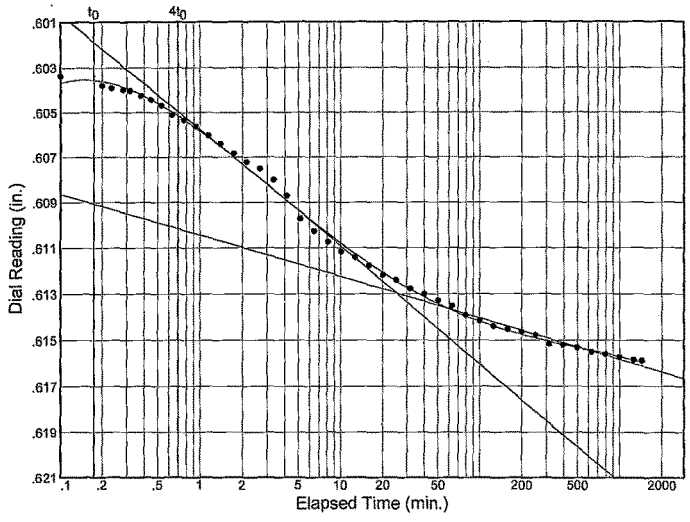
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

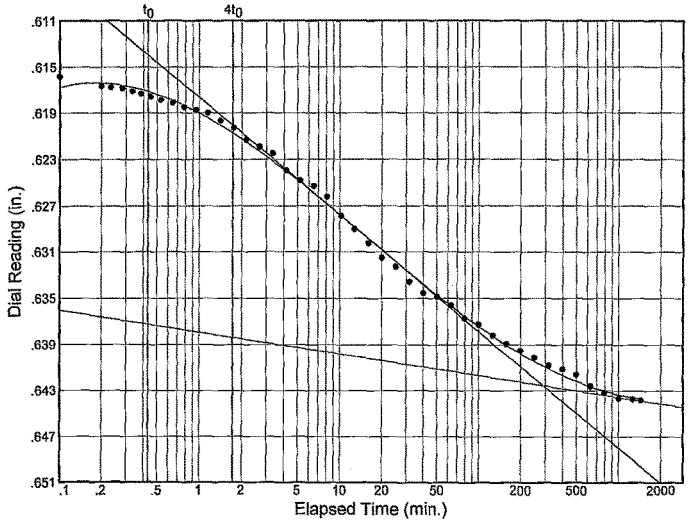
Source: MRGO-06U Sample No.: 11D Elev./Depth: 42.6



Load No.= 4
Load= 0.50 tsf
D_0 = 0.60198
D_{50} = 0.60746
D_{100} = 0.61295
T_{50} = 2.14 min.

C_v @ T_{50}
0.22 ft.2/day

C_α = 0.002



Load No.= 5
Load= 1.00 tsf
D_0 = 0.61351
D_{50} = 0.62803
D_{100} = 0.64256
T_{50} = 10.60 min.

C_v @ T_{50}
0.04 ft.2/day

C_α = 0.002

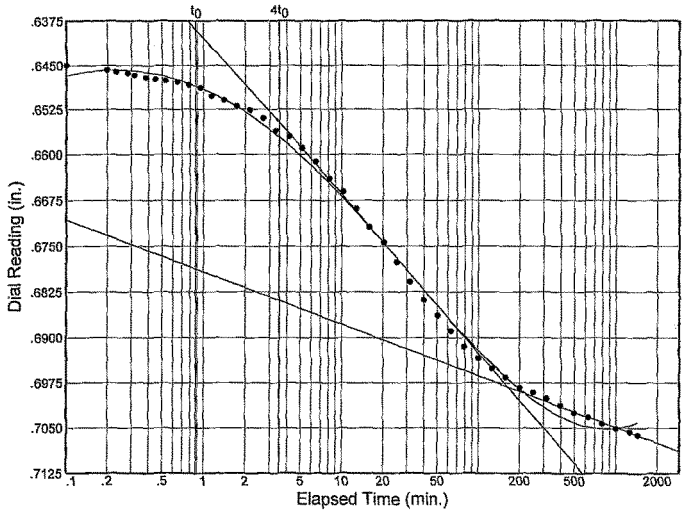
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

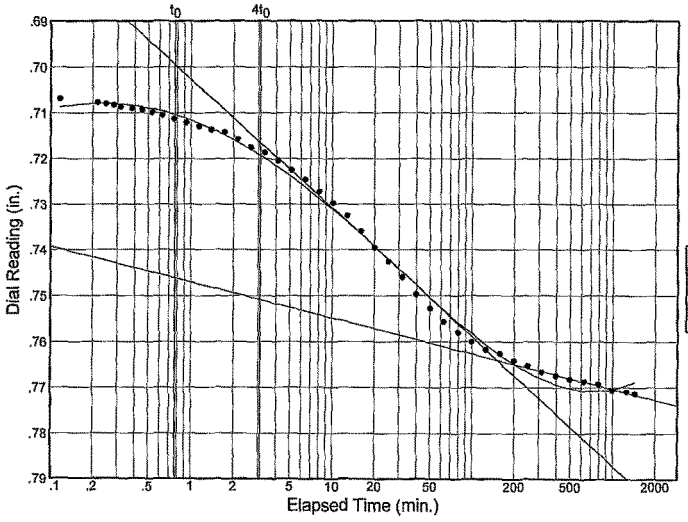
Source: MRGO-06U Sample No.: 11D Elev./Depth: 42.6



Load No.= 6
Load= 2.00 tsf
D_0 = 0.63994
D_{50} = 0.66904
D_{100} = 0.69814
T_{50} = 12.26 min.

C_v @ T_{50}
0.03 ft.2/day

C_α = 0.009



Load No.= 7
Load= 4.00 tsf
D_0 = 0.70145
D_{50} = 0.73270
D_{100} = 0.76396
T_{50} = 11.50 min.

C_v @ T_{50}
0.03 ft.2/day

C_α = 0.009

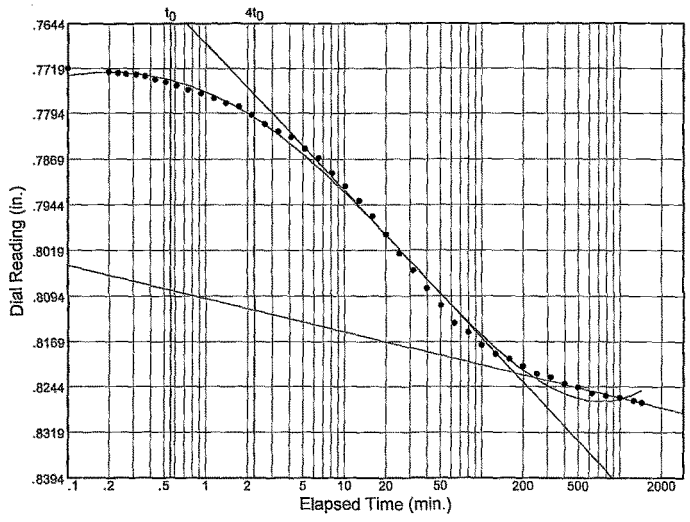
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

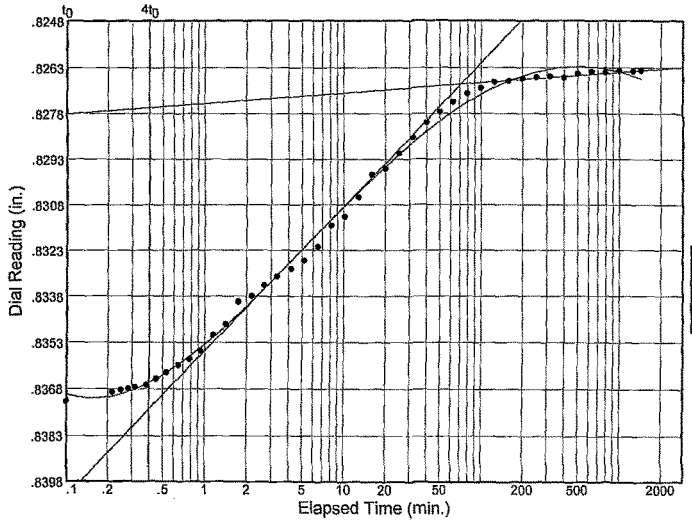
Source: MRGO-06U Sample No.: 11D Elev./Depth: 42.6



Load No.= 8
Load= 8.00 tsf
D_0 = 0.76752
D_{50} = 0.79477
D_{100} = 0.82203
T_{50} = 12.72 min.

C_v @ T_{50}
0.02 ft.2/day

C_α = 0.007



Load No.= 10
Load= 3.00 tsf
D_0 = 0.83733
D_{50} = 0.83208
D_{100} = 0.82683
T_{50} = 5.57 min.

C_v @ T_{50}
0.05 ft.2/day

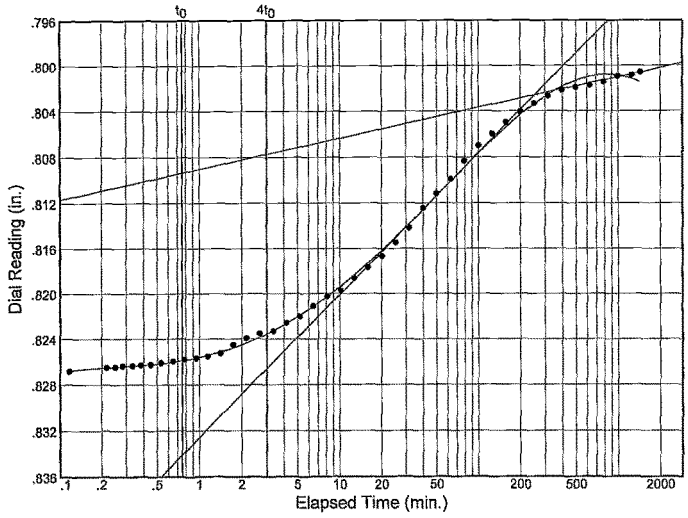
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-06U Sample No.: 11D Elev./Depth: 42.6



Load No.= 11
Load= 0.75 tsf
D_0 = 0.82826
D_{50} = 0.81542
D_{100} = 0.80257
T_{50} = 23.56 min.

C_v @ T_{50}
0.01 ft.2/day

FFEBJV, LLC

Figure

CONSOLIDATION TEST DATA

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Contract No. W912P8-07-D-0022
Task Order 135
Project Number: 07-022135

Sample Data

Source: MRGO-06U
Sample No.: 11D
Elev. or Depth: 42.6 **Sample Length(in./cm.):**
Location:
Description: M GR CH2 W/ ARS & LNS ML
Liquid Limit: 53 **Plasticity Index:** 33
USCS: CH2 **AASHTO:** **Figure No.:**
Testing Remarks: Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Test Specimen Data

TOTAL SAMPLE	BEFORE TEST	AFTER TEST
Wet w+t = 147.74 g.	Consolidometer # = 1	Wet w+t = 442.99 g.
Dry w+t = 100.00 g.		Dry w+t = 356.75 g.
Tare Wt. = .00 g.	Spec. Gravity = 2.71	Tare Wt. = 113.27 g.
Height = 1.01 in.	Height = 1.01 in.	
Diameter = 4.00 in.	Diameter = 4.00 in.	
Weight = 359.54 g.	Defl. Table = n/a	
Moisture = 47.7 %	Ht. Solids = 0.4367 in.	Moisture = 35.4 %
Wet Den. = 108.5 pcf	Dry Wt. = 243.51 g.*	Dry Wt. = 243.48 g.
Dry Den. = 73.4 pcf	Void Ratio = 1.304	Void Ratio = 0.823
	Saturation = 99.2 %	

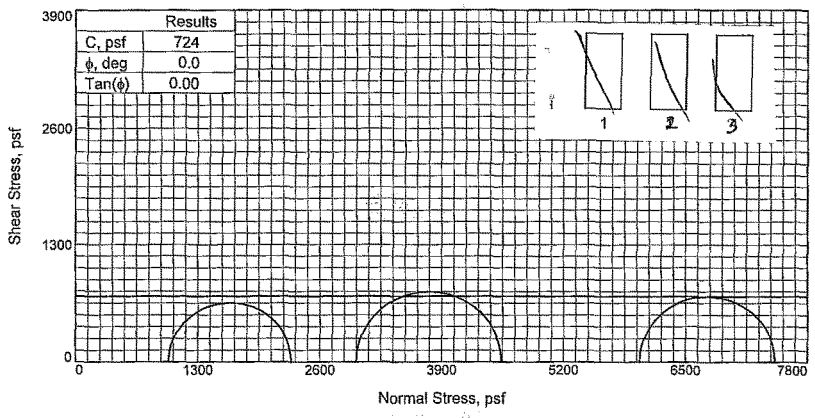
*** Initial dry weight used in calculations**

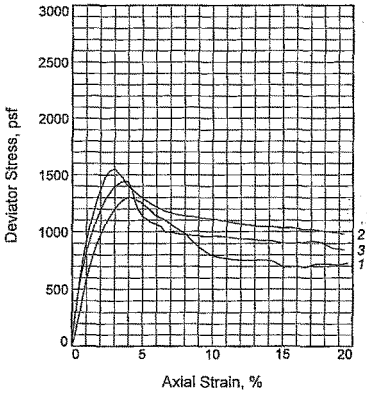
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
start	0.59074				1.304	
0.06	0.59223	0.00000			1.300	0.1 Comprs.
0.13	0.59592	0.00000	0.05	0.001	1.292	0.5 Comprs.
0.25	0.60394	0.00000	0.11	0.001	1.274	1.3 Comprs.
0.50	0.61591	0.00000	0.22	0.002	1.246	2.5 Comprs.
1.00	0.64387	0.00000	0.04	0.002	1.182	5.3 Comprs.
2.00	0.70623	0.00000	0.03	0.009	1.039	11.5 Comprs.
4.00	0.77131	0.00000	0.03	0.009	0.890	17.9 Comprs.
8.00	0.82710	0.00000	0.02	0.007	0.763	23.5 Comprs.
12.00	0.84569	0.00000			0.720	25.3 Comprs.

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
3.00	0.82639	0.00000	0.05		0.764	23.4 Comprs.
0.75	0.80060	0.00000	0.01		0.823	20.9 Comprs.

C_c = 0.49 P_c = 1.00 tsf C_r = 0.09





Sample No.		1	2	3
Initial	Water Content, %	59.2	60.0	53.4
	Dry Density, pcf	66.1	64.6	68.3
	Saturation, %	102.1	99.9	97.3
	Void Ratio	1.5891	1.6465	1.5047
	Diameter, in.	1.386	1.384	1.388
	Height, in.	3.088	3.090	3.025
At Test	Water Content, %	59.2	60.0	53.4
	Dry Density, pcf	66.1	64.6	68.3
	Saturation, %	102.1	99.9	97.3
	Void Ratio	1.5891	1.6465	1.5047
	Diameter, in.	1.386	1.384	1.388
	Height, in.	3.088	3.090	3.025
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.87	20.75	41.75
Fail. Stress, psf		1303	1550	1443
Strain, %		4.0	3.0	3.9
Ult. Stress, psf		749	1137	959
Strain, %				
σ_1 Failure, psf		2293	4538	7455
σ_3 Failure, psf		990	2988	6011

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: M GR CH4 W/ LNS & LYS ML

LL= 92 **PL=** 25 **PI=** 67
Assumed Specific Gravity= 2.74
Remarks:

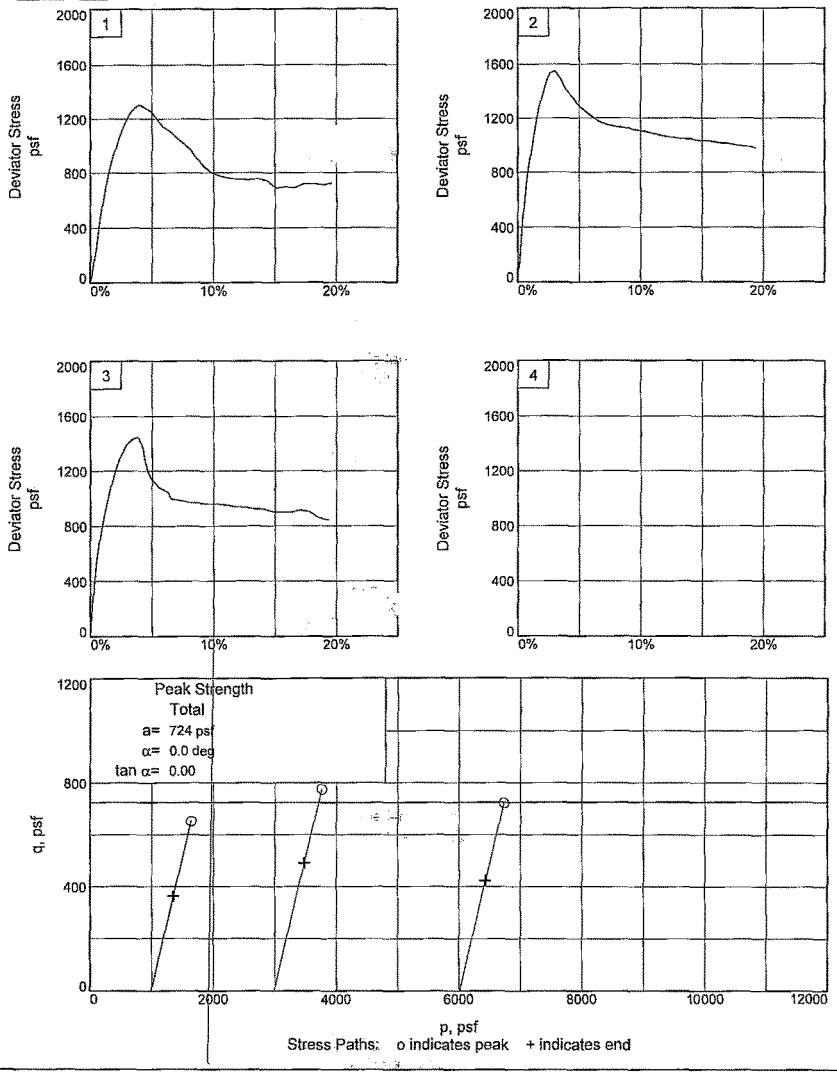
Figure _____

Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-6U **Depth:** 45.7
Sample Number: 12C
Proj. No.: 07-022135 **Date Sampled:** 10/28/09

TRIAXIAL SHEAR TEST REPORT
FFEBJV, LLC

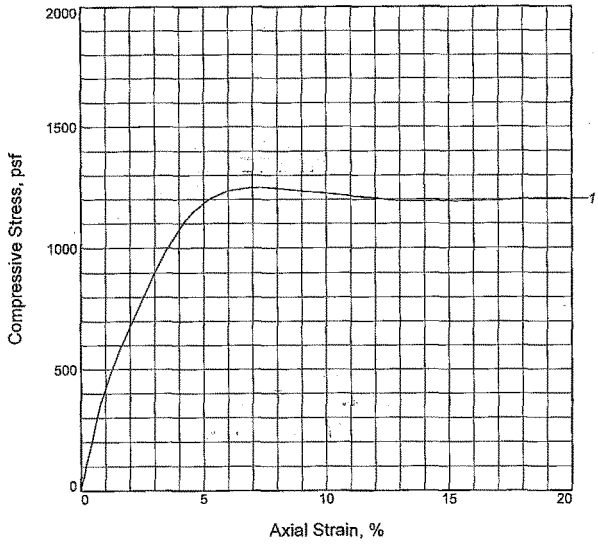
Tested By: JC/ARS **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-6U **Depth:** 45.7 **Sample Number:** 12C
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: JC/ARS **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	1250			
Undrained shear strength, psf	625			
Failure strain, %	7.5			
Strain rate, %/min.	1.00			
Water content, %	41.5			
Wet density, pcf	112.6			
Dry density, pcf	79.6			
Saturation, %	98.9			
Void ratio	1.1501			
Specimen diameter, in.	1.389			
Specimen height, in.	3.025			
Height/diameter ratio	2.18			

Description: M GR CH3 W/ LNS & LYS ML

LL = 63	**PL** = 18	**PI** = 45	**Assumed GS=** 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 10/28/09
Remarks:

Client: U.S. Army Corps of Engineers

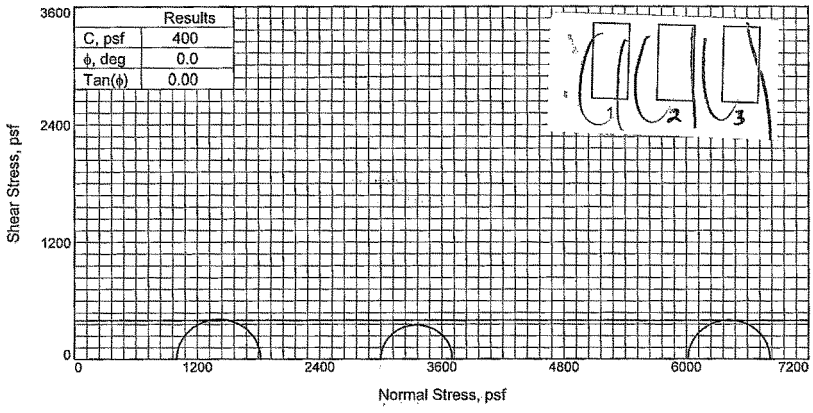
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-6U **Depth:** 48.8
Sample Number: 13B

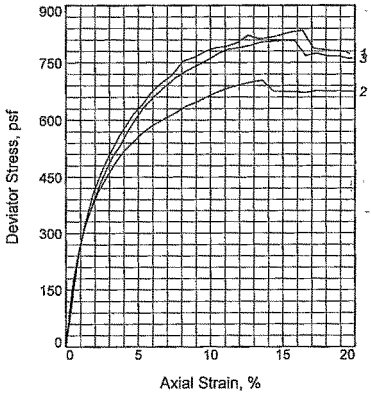
UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Figure _____

Tested By: JC/ARS **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	44.6	44.3	45.7
	Dry Density, pcf	76.0	76.6	76.0
	Saturation, %	97.8	98.3	100.1
	Void Ratio	1.2499	1.2340	1.2516
	Diameter, in.	1.385	1.389	1.389
	Height, in.	3.091	3.090	3.084
At Test	Water Content, %	44.6	44.3	45.7
	Dry Density, pcf	76.0	76.6	76.0
	Saturation, %	97.8	98.3	100.1
	Void Ratio	1.2499	1.2340	1.2516
	Diameter, in.	1.385	1.389	1.389
	Height, in.	3.091	3.090	3.084
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.94	20.84	41.78
Fail. Stress, psf		822	703	807
Strain, %		14.9	13.6	15.1
Ult. Stress, psf		822	674	807
Strain, %				
σ_1 Failure, psf		1821	3703	6823
σ_3 Failure, psf		999	3000	6016

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CH4 W/ LNS & LYS ML

LL= 70 **PL=** 18 **PI=** 52
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

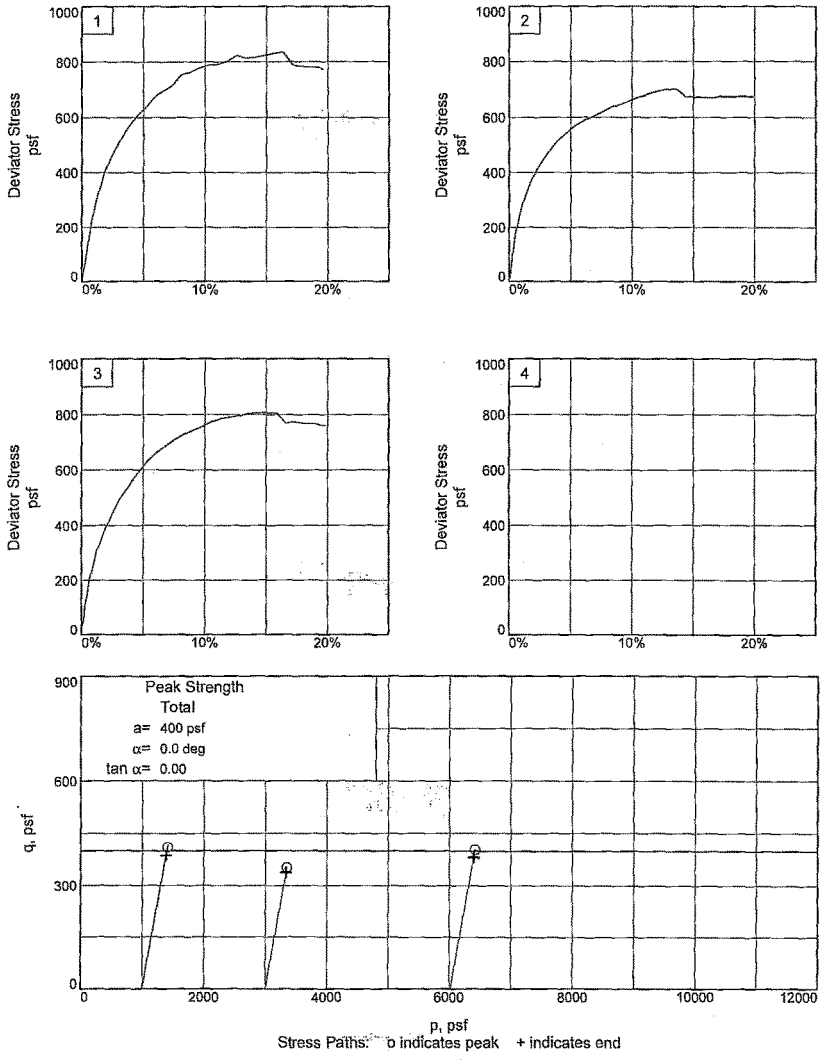
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-6U **Depth:** 52.8
Sample Number: 14B
Proj, No.: 07-022135 **Date Sampled:** 10/28/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

Tested By: JC/ARS **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-6U **Depth:** 52.8 **Sample Number:** 14B
Project No.: 07-022135 **Figure** _____ FFEBJV, LLC

Tested By: JC/ARS **Checked By:** MS

SUMMARY OF LABORATORY TEST RESULTS

Project: MRGO Ecosystem Restoration Feasibility Study Assigned By: _____

Project Number: 07-022135 Current Date: 1/8/2010
Boring: MRGO-7U

Sample Number	Depth	Visual Classification	USCS	E(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
1A	0.0	VSO DGR CHOC W/ RT, WD	CHOC		236												
1B	0.8	VSO DGR CHOC W/ RT, WD	CHOC		222												
1C	1.7	VSO DGR CHOB W/ RT, WD	CHOB		166												
1D	2.6	VSO GR CH3 W/ LNS ML	CH3		96												
2A	4.0	VSO GR CL4 W/ LNS CH	CL4		35												
2B	4.8	VSO GR CL4 W/ LYS CH	CL4	15	40	82	114	100	UC	-	104	208	30	20	10	0.18	
2C	5.7	VSO GR CL4 W/ LYS CH	CL4		43												
2D	6.6	VSO GR CL4 W/ ARS CH, SM	CL4		32	90	119	100					28	17	11		Gs, CON
3A	8.0	GR SM W/ LYS CH	SM		28												
3B	8.8	GR SM W/ LYS CH	SM		31												
3C	9.7	VSO GR CL4 W/ LYS SM	CL4		41	79	112	100	UU	0	249		38	16	22	0.10	
3D	10.6	VSO GR CL4	CL4		38												
4A	12.0	VSO GR CL4 W/ LYS CH	CL4		32												
4B	12.8	VSO GR CL6 W/ LYS CH	CL6		42												
4C	13.7	VSO GR CL4 W/ LYS CH	CL4		38												
4D	14.6	VSO GR CL4 W/ LYS CH	CL4		39												
5A	16.0	VSO GR CH3 W/ ARS ML	CH3		59												
5B	16.8	VSO GR CL4	CL4		35												
5C	17.7	VSO GR CH4 W/ LYS ML	CH4		64	63	103	100	UU	0	194		74	19	55	0.20	
5D	18.6	VSO GR CH3 W/ ARS & LNS ML, ARS SM	CH3		59	64	102	97					64	18	46		Gs, CON
6A	20.0	GR SM W/ ARS CH	SM		33												
6B	20.8	SO GR CL6	CL6		38												
6C	21.7	GR ML W/ LYS CH	ML		32												
7A	24.0	SO GR CL4	CL4		34												
7B	24.8	SO GR CL4	CL4		32	91	120	100	UU	0	332		37	13	24	0.20	
7C	25.7	SO GR CL4	CL4		31												
8A	28.0	SO GR CL4	CL4		31												
8B	28.8	SO GR CL4	CL4	15	32	90	118	100	UC	-	390	780	34	14	20	0.22	
8C	29.7	SO GR CL4	CL4		32												
9A	32.0	SO GR CH3 W/ LNS ML	CH3		40												
9B	32.8	SO GR CH3 W/ LNS ML	CH3		36												
9C	33.7	SO GR CL6 W/ LNS & LYS ML	CL6		36	86	117	100	UU	0	455		44	16	28	0.30	
9D	34.6	SO GR CH3 W/ LNS & LYS ML	CH3		40												
10A	36.0	SO GR CH3 W/ LNS & LYS ML	CH3		39												
10B	36.8	SO GR CL6	CL6		30												
10C	37.7	SO GR CH3 W/ LNS & LYS ML	CH3		37												
10D	38.6	SO GR CH4	CH4	7	63	63	102	100	UC	-	333	667	96	23	73	0.28	

Remarks: _____
FFEB JV, LLC

Checked By: MS | MRG
File Name: MRGO-7U.xls

SUMMARY OF LABORATORY TEST RESULTS

Project: MRGO Ecosystem Restoration Feasibility Study Assigned By: _____

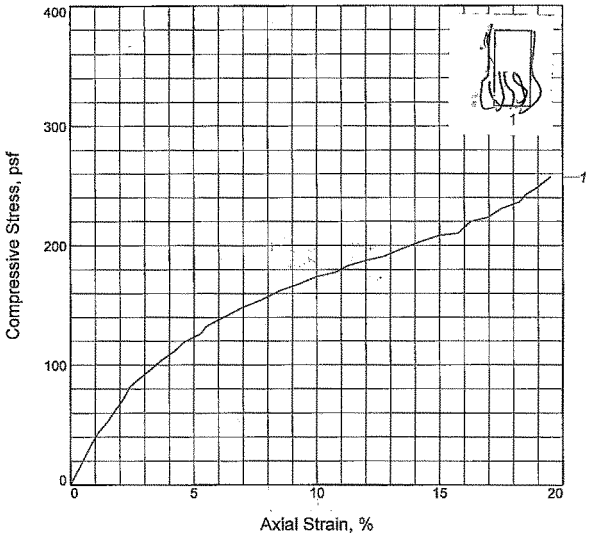
Project Number: 07-022135 Current Date: 1/8/2010
Boring: MRGO-7U

Sample Number	Depth	Visual Classification	USCS	E(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
11A	40.0	SO GR CH3 W/ LNS ML	CH3		50												
11B	40.8	SO GR CL6	CL6		37												
11C	41.7	SO GR CL6	CL6		37	84	115	100	UU	0	483		47	16	31	0.30	
12A	44.0	SO GR CH2 W/ LNS & LYS ML	CH2		33												
12B	44.8	SO GR CH2	CH2	15	42	78	111	99	UC	-	355	710	53	16	37	0.28	
13A	48.0	M GR CH3 W/ LNS ML	CH3		47												
13B	48.8	M GR CH3 W/ LNS ML	CH3		44	78	112	100	UU	0	702		60	18	42	0.35	
13C	49.7	M GR CH4	CH4		51												
13D	50.6	M GR CH4	CH4		51												
14A	52.0	M GR CH4	CH4		60												
14B	52.8	M GR CH4 W/ LNS ML	CH4	3	62	64	103	100	UC		807	1674	92	21	71	0.36	
14C	53.7	GR SM W/ LYS CH, SIF	SM		26												
15A	56.0	GR SM W/ SIF	SM		27												
15B	56.8	GR SM W/ ARS CH, SIF	SM		20												
15C	57.7	M GR CH2 W/ ARS SM, SIF	CH2		32												

Remarks:
FFEB JV, LLC

Checked By: MS/MKG
File Name: MRGO-7U.xls

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	209			
Undrained shear strength, psf	104			
Failure strain, %	15.0			
Strain rate, %/min.	1.00			
Water content, %	39.6			
Wet density, pcf	113.8			
Dry density, pcf	81.5			
Saturation, %	100.2			
Void ratio	1.0682			
Specimen diameter, in.	1.384			
Specimen height, in.	3.057			
Height/diameter ratio	2.21			

Description: VSO GR CL4 W/ LYS CH

LL = 30	**PL** = 20	**PI** = 10	**Assumed GS=** 2.70	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 11/3/09
Remarks:

Figure _____

Client: U.S. Army Corps of Engineers

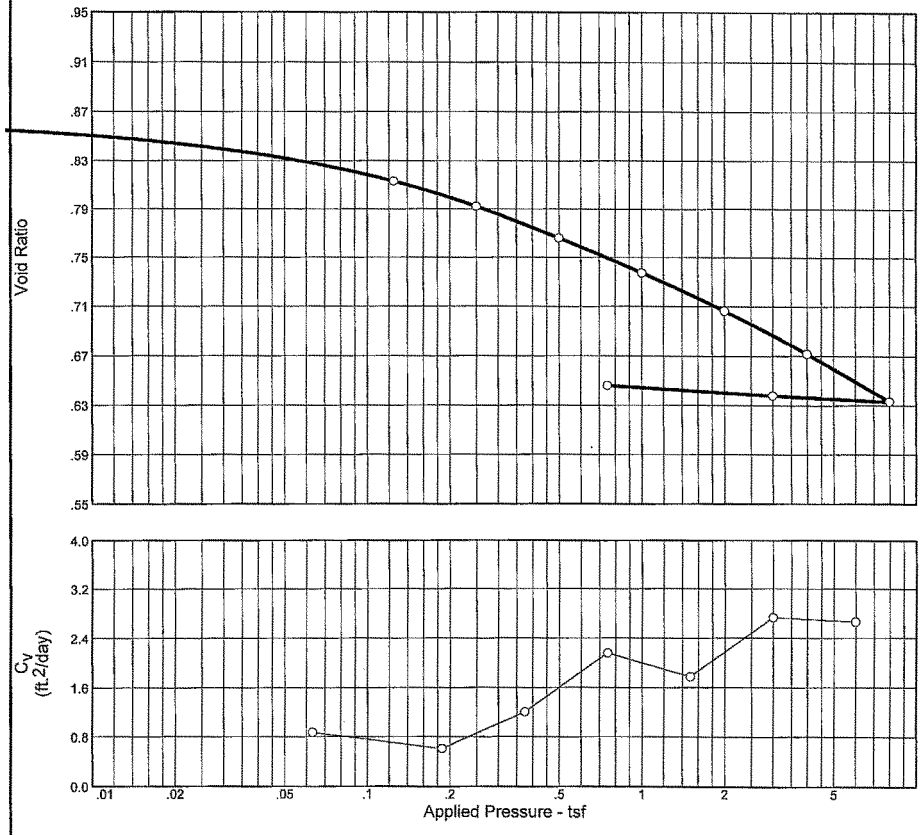
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-7U **Depth:** 4.8
Sample Number: 2B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: JC **Checked By:** MS

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
99.6 %	31.9 %	90.3	28	11	2.69	0.34	0.12	0.861

MATERIAL DESCRIPTION	USCS	AASHTO
VSO GR CL4 W/ ARS CH & SM	CL4	

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

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

Source: MRGO-07U **Sample No.:** 2D **Elev./Depth:** 6.6

FFEBJV, LLC

St Rose, LA

Remarks:

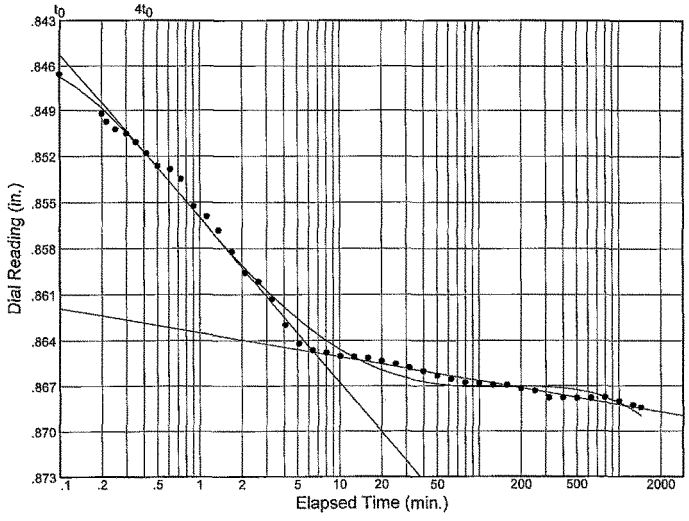
Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

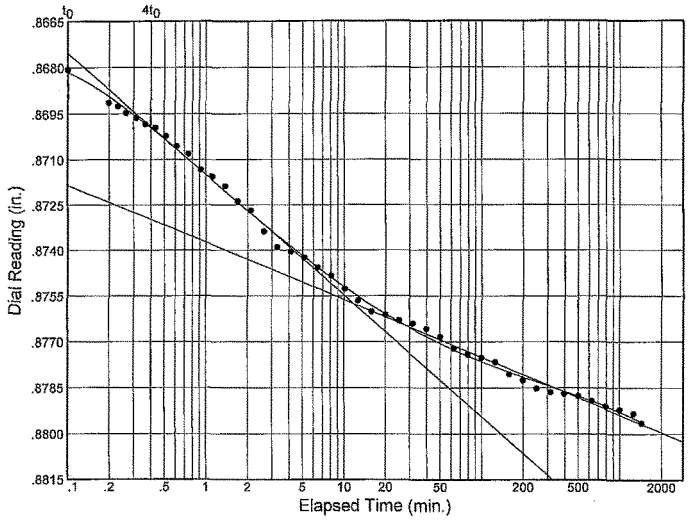
Source: MRGO-07U Sample No.: 2D Elev./Depth: 6.6



Load No.= 2
Load= 0.13 tsf
D_0 = 0.84169
D_{50} = 0.85323
D_{100} = 0.86478
T_{50} = 0.56 min.

C_v @ T_{50}
0.87 ft.^{2}/day

C_α = 0.002



Load No.= 3
Load= 0.25 tsf
D_0 = 0.86634
D_{50} = 0.87104
D_{100} = 0.87575
T_{50} = 0.77 min.

C_v @ T_{50}
0.61 ft.^{2}/day

C_α = 0.002

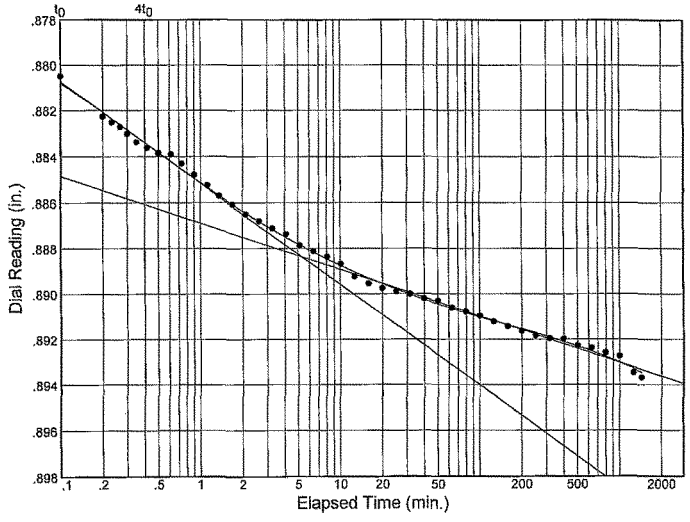
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

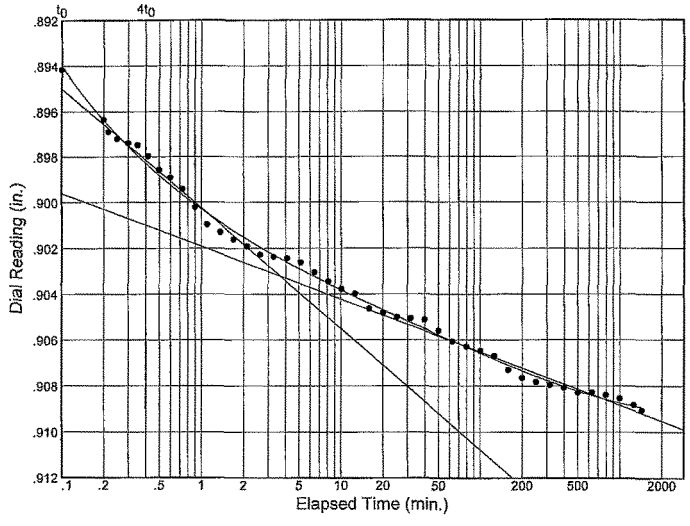
Source: MRGO-07U Sample No.: 2D Elev./Depth: 6.6



Load No.= 4
Load= 0.50 tsf
D_0 = 0.87822
D_{50} = 0.88329
D_{100} = 0.88836
T_{50} = 0.38 min.

C_v @ T_{50}
1.20 ft.^{2}/day

C_α = 0.002



Load No.= 5
Load= 1.00 tsf
D_0 = 0.88968
D_{50} = 0.89645
D_{100} = 0.90321
T_{50} = 0.20 min.

C_v @ T_{50}
2.16 ft.^{2}/day

C_α = 0.002

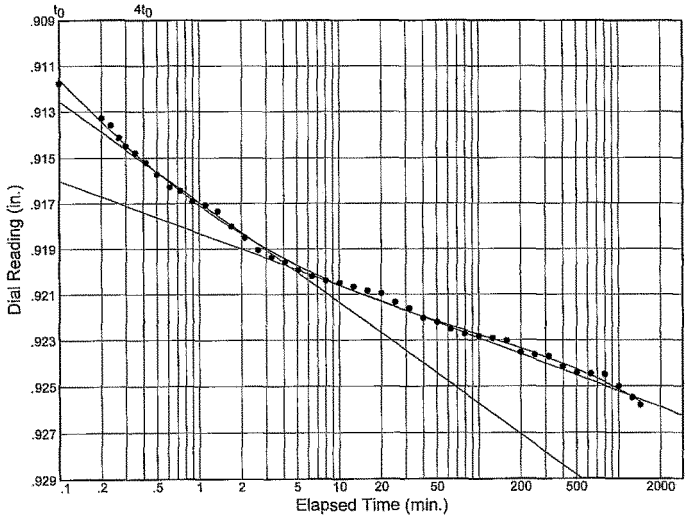
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

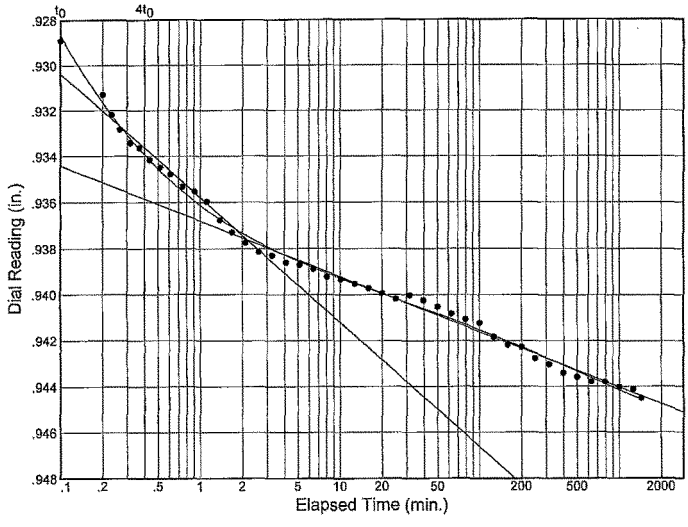
Source: MRGO-07U Sample No.: 2D Elev./Depth: 6.6



Load No.= 6
Load= 2.00 tsf
D_0 = 0.90803
D_{50} = 0.91391
D_{100} = 0.91979
T_{50} = 0.24 min.

C_v @ T_{50}
1.77 ft.^{2}/day

C_α = 0.002



Load No.= 7
Load= 4.00 tsf
D_0 = 0.92333
D_{50} = 0.93047
D_{100} = 0.93761
T_{50} = 0.15 min.

C_v @ T_{50}
2.73 ft.^{2}/day

C_α = 0.003

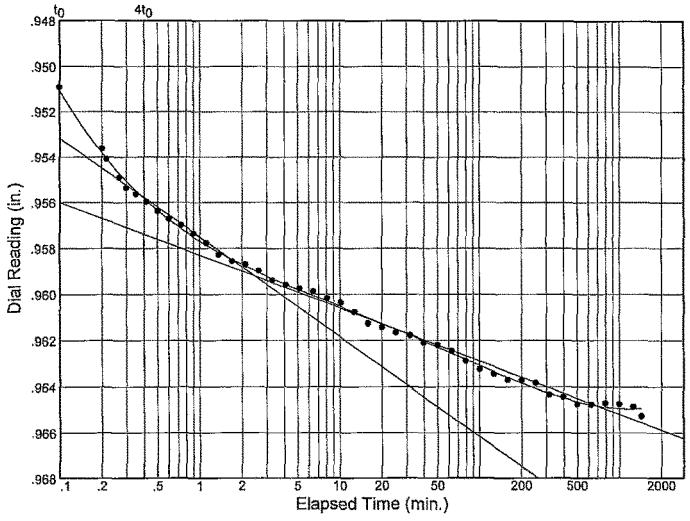
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-07U Sample No.: 2D Elev./Depth: 6.6



Load No.= 8
Load= 8.00 tsf
D_0 = 0.94625
D_{50} = 0.95272
D_{100} = 0.95919
T_{50} = 0.15 min.

C_v @ T_{50}
2.66 ft.^{2}/day

C_α = 0.003

CONSOLIDATION TEST DATA

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Contract No. W912P8-07-D-0022
Task Order 135
Project Number: 07-022135

Sample Data

Source: MRGO-07U
Sample No.: 2D
Elev. or Depth: 6.6 Sample Length(in./cm.):
Location:
Description: VSO GR CL4 W/ ARS CH & SM
Liquid Limit: 28 Plasticity Index: 11
USCS: CL4 AASHTO: Figure No.:
Testing Remarks: Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST		AFTER TEST	
Wet w+t	= 131.85 g.	Consolidometer #	= 8	Wet w+t	= 486.73 g.
Dry w+t	= 100.00 g.			Dry w+t	= 411.75 g.
Tare Wt.	= .00 g.	Spec. Gravity	= 2.69	Tare Wt.	= 112.16 g.
Height	= 1.00 in.	Height	= 1.00 in.		
Diameter	= 4.00 in.	Diameter	= 4.00 in.		
Weight	= 393.52 g.	Defl. Table	= n/a		
Moisture	= 31.9 %	Ht. Solids	= 0.5390 in.	Moisture	= 25.0 %
Wet Den.	= 119.0 pcf	Dry Wt.	= 298.39 g.*	Dry Wt.	= 299.59 g.
Dry Den.	= 90.3 pcf	Void Ratio	= 0.861	Void Ratio	= 0.646
		Saturation	= 99.6 %		

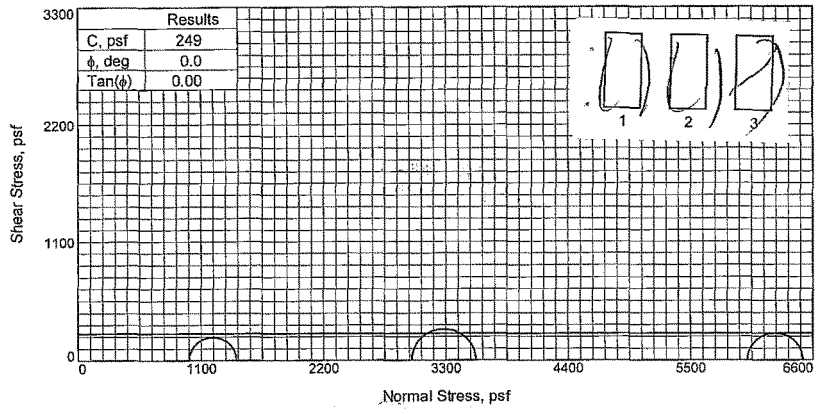
* Initial dry weight used in calculations

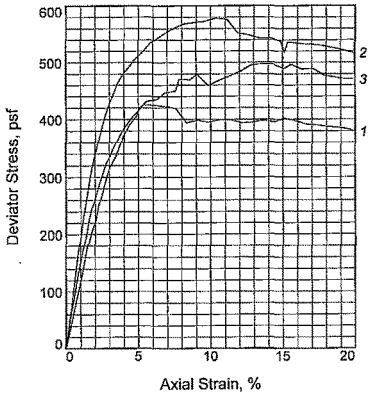
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.84267				0.861	
0.00	0.84297	0.00000		0.009	0.860	0.0 Comprs.
0.13	0.86845	0.00000	0.87	0.002	0.813	2.6 Comprs.
0.25	0.87966	0.00000	0.61	0.002	0.792	3.7 Comprs.
0.50	0.89369	0.00000	1.20	0.002	0.766	5.1 Comprs.
1.00	0.90908	0.00000	2.16	0.002	0.737	6.6 Comprs.
2.00	0.92582	0.00000	1.77	0.002	0.706	8.3 Comprs.
4.00	0.94451	0.00000	2.73	0.003	0.672	10.2 Comprs.
8.00	0.96528	0.00000	2.66	0.003	0.633	12.2 Comprs.

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
3.00	0.96271	0.00000			0.638	12.0 Comprs.
0.75	0.95822	0.00000			0.646	11.5 Comprs.

C_c = 0.12 P_c = 0.34 tsf C_r = 0.01





Sample No.		1	2	3
Initial	Water Content, %	42.8	42.8	38.8
	Dry Density, pcf	77.4	78.1	82.0
	Saturation, %	99.2	100.6	100.2
	Void Ratio	1.1535	1.1351	1.0332
	Diameter, in.	1.382	1.382	1.383
	Height, in.	3.029	3.087	3.080
At Test	Water Content, %	42.8	42.8	38.8
	Dry Density, pcf	77.4	78.1	82.0
	Saturation, %	99.2	100.6	100.2
	Void Ratio	1.1535	1.1351	1.0332
	Diameter, in.	1.382	1.382	1.383
	Height, in.	3.029	3.087	3.080
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.89	20.78	41.74
Fail. Stress, psf		425	578	497
Strain, %		6.1	10.3	13.6
Ult. Stress, psf		394	517	489
Strain, %				
σ_1 Failure, psf		1418	3570	6508
σ_3 Failure, psf		992	2992	6011

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: VSO GR CL4 W/ LYS SM

LL= 38 **PL=** 16 **PI=** 22
Assumed Specific Gravity= 2.67
Remarks:

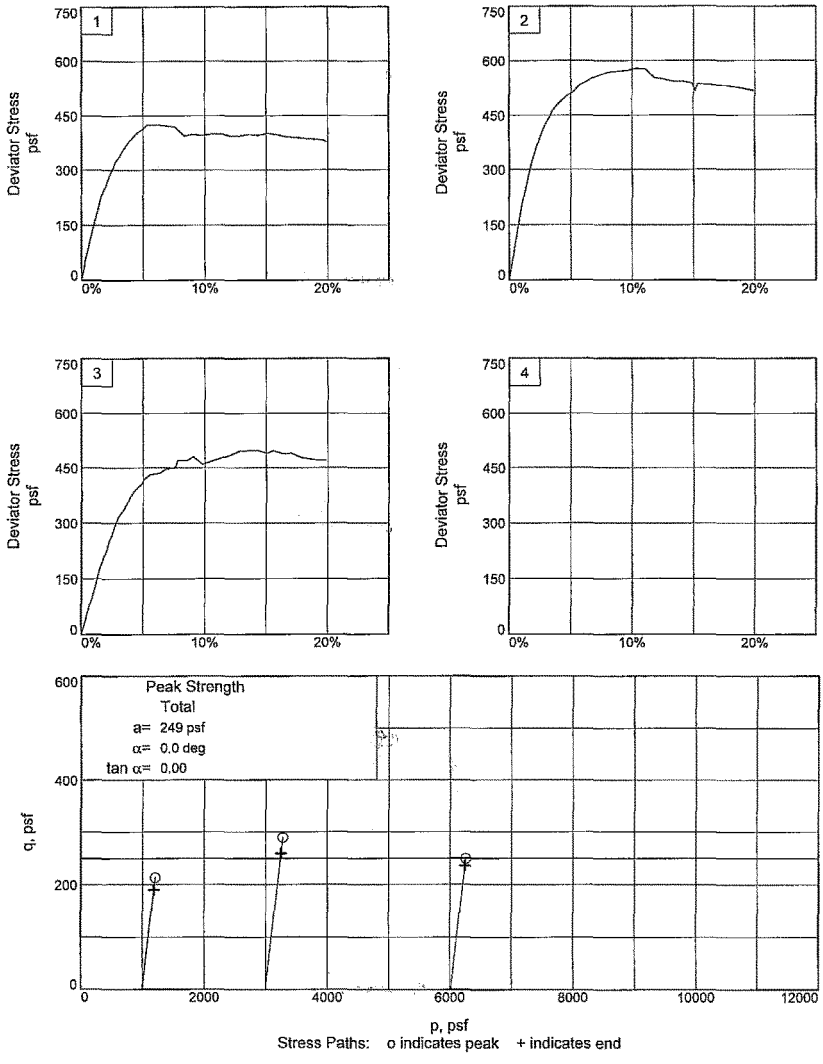
Figure _____

Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-7U **Depth:** 9.7
Sample Number: 3C
Proj. No.: 07-022135 **Date Sampled:** 11/3/09

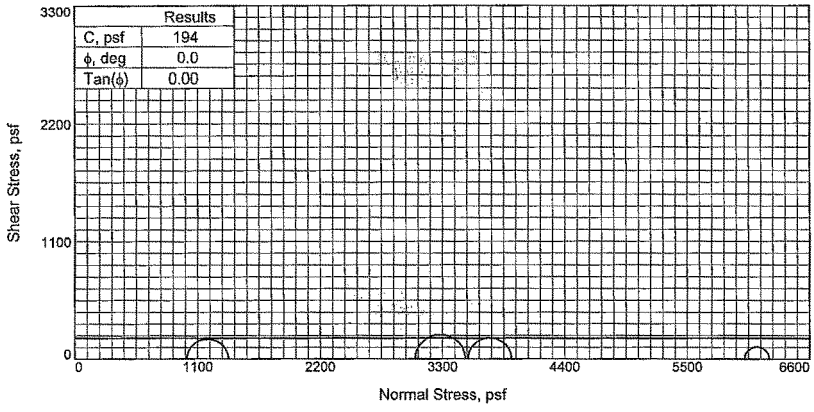
TRIAXIAL SHEAR TEST REPORT
FFEBJV, LLC

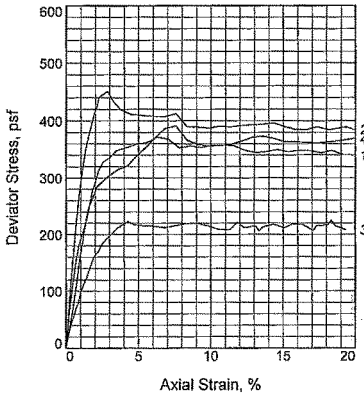
Tested By: JC/ARS **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-7U **Depth:** 9.7 **Sample Number:** 3C
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: JC/ARS **Checked By:** MS





Sample No.		1	2	3	4
Initial	Water Content, %	65.7	68.6	71.1	51.6
	Dry Density, pcf	60.8	59.6	58.7	72.0
	Saturation, %	99.2	100.7	101.8	102.8
	Void Ratio	1.8139	1.8682	1.9129	1.3755
	Diameter, in.	1.384	1.383	1.383	1.383
	Height, in.	3.102	3.092	3.096	3.098
At Test	Water Content, %	65.7	68.6	71.1	51.6
	Dry Density, pcf	60.8	59.6	58.7	72.0
	Saturation, %	99.2	100.7	101.8	102.8
	Void Ratio	1.8139	1.8682	1.9129	1.3755
	Diameter, in.	1.384	1.383	1.383	1.383
	Height, in.	3.102	3.092	3.096	3.098
Strain rate, %/min.		1.00	1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00	0.00
Cell Pressure, psi		6.97	21.21	41.78	24.52
Fail. Stress, psf		371	451	222	391
Strain, %		6.3	2.9	4.3	7.6
Ult. Stress, psf		344	388	206	356
Strain, %					
σ_1 Failure, psf		1375	3506	6238	3921
σ_3 Failure, psf		1004	3055	6016	3530

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: VSO GR CH4 W/ LYS ML

LL= 74 **PL=** 19 **PI=** 55
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

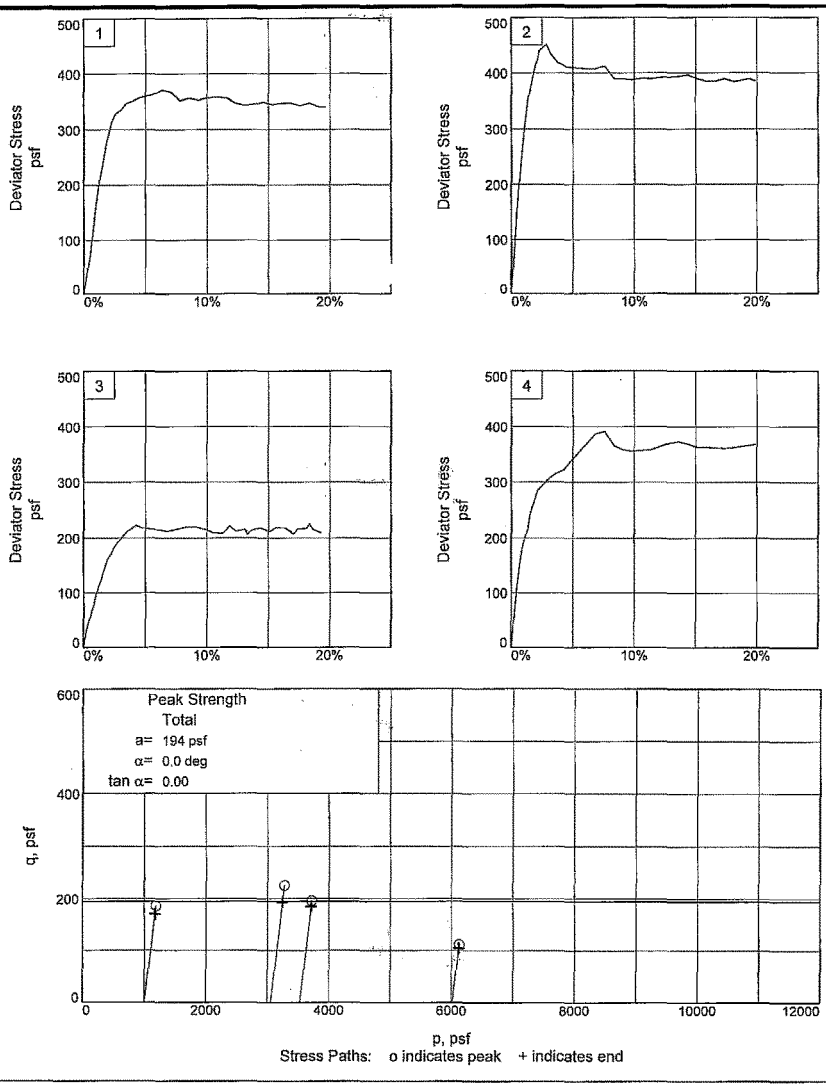
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-7U **Depth:** 17.7
Sample Number: 5C
Proj. No.: 07-022135 **Date Sampled:** 11/3/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

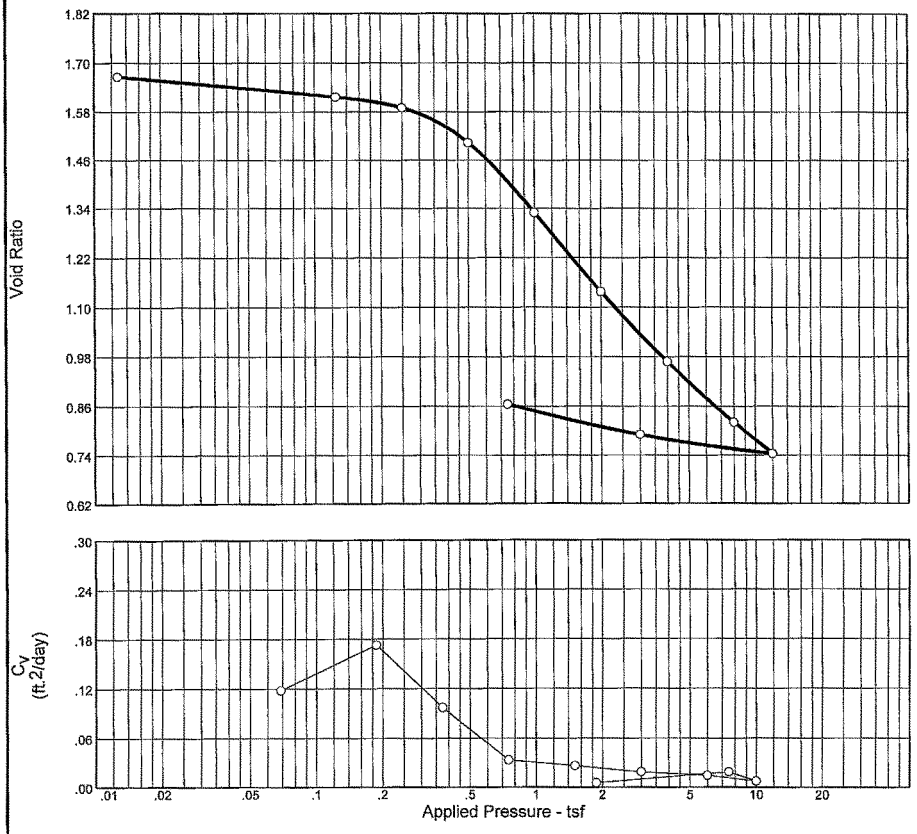
Tested By: JC/ARS **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-7U **Depth:** 17.7 **Sample Number:** 5C
Project No.: 07-022135 **Figure** _____ FFEBJV, LLC

Tested By: JC/ARS **Checked By:** MS

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
97.4 %	59.2 %	64.2	64	46	2.74	0.55	0.64	1.666

MATERIAL DESCRIPTION	USCS	AASHTO
VSO GR CH3 W/ ARS & LNS ML, ARS SM	CH3	

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

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

Source: MRGO-07U **Sample No.:** 5D **Elev./Depth:** 18.6

FFEBJV, LLC

St Rose, LA

Remarks:

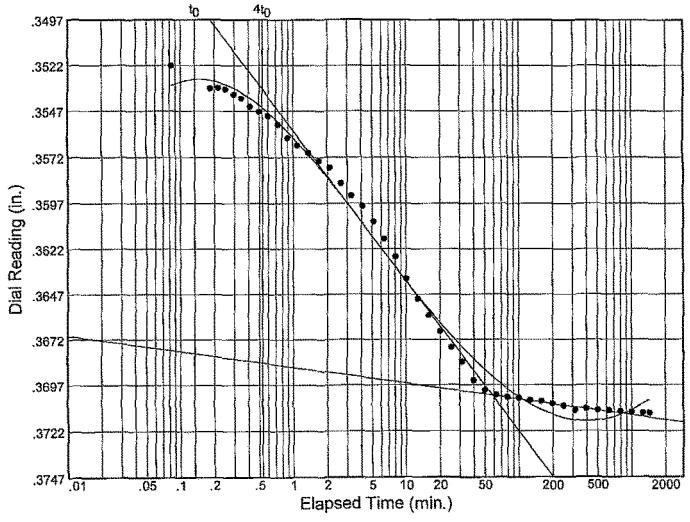
Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

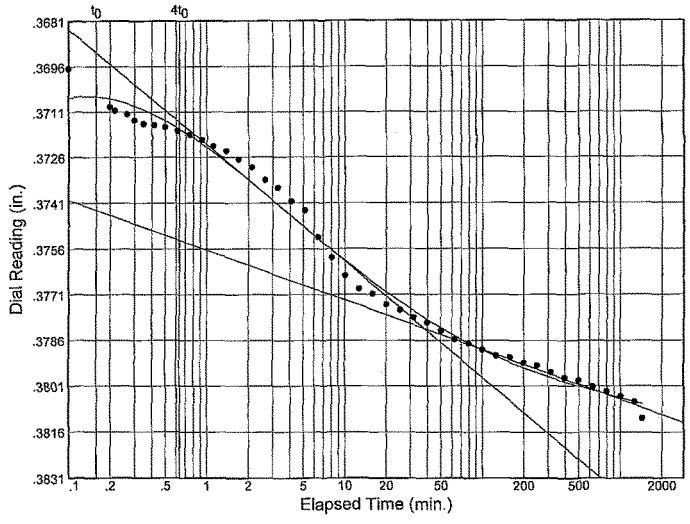
Source: MRGO-07U Sample No.: 5D Elev./Depth: 18.6



Load No.= 2
Load= 0.13 tsf
D_0 = 0.35141
D_{50} = 0.36084
D_{100} = 0.37028
T_{50} = 4.16 min.

C_v @ T_{50}
0.12 ft.2/day

C_α = 0.001



Load No.= 3
Load= 0.25 tsf
D_0 = 0.36952
D_{50} = 0.37387
D_{100} = 0.37822
T_{50} = 2.75 min.

C_v @ T_{50}
0.17 ft.2/day

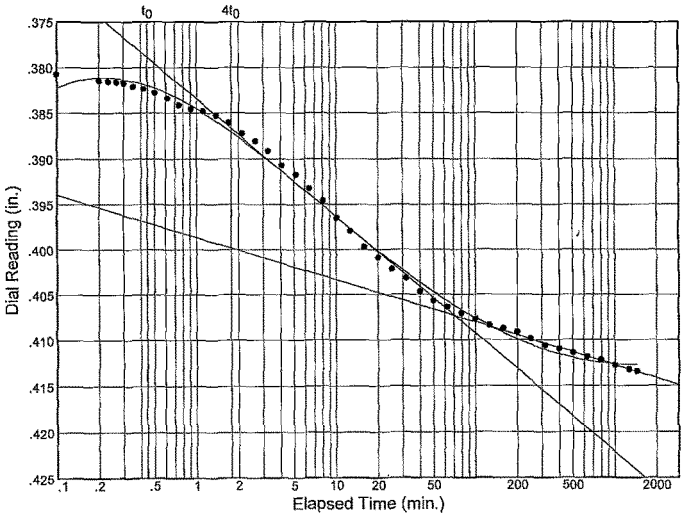
C_α = 0.002

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

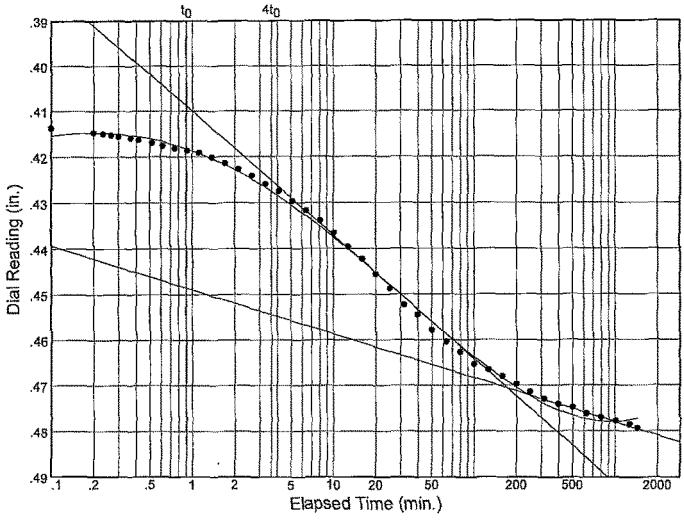
Source: MRGO-07U Sample No.: 5D Elev./Depth: 18.6



Load No.= 4
Load= 0.50 tsf
D_0 = 0.37690
D_{50} = 0.39213
D_{100} = 0.40737
T_{50} = 4.69 min.

C_v @ T_{50}
0.10 ft.^{2}/day

C_α = 0.005



Load No.= 5
Load= 1.00 tsf
D_0 = 0.40890
D_{50} = 0.43979
D_{100} = 0.47067
T_{50} = 12.33 min.

C_v @ T_{50}
0.03 ft.^{2}/day

C_α = 0.010

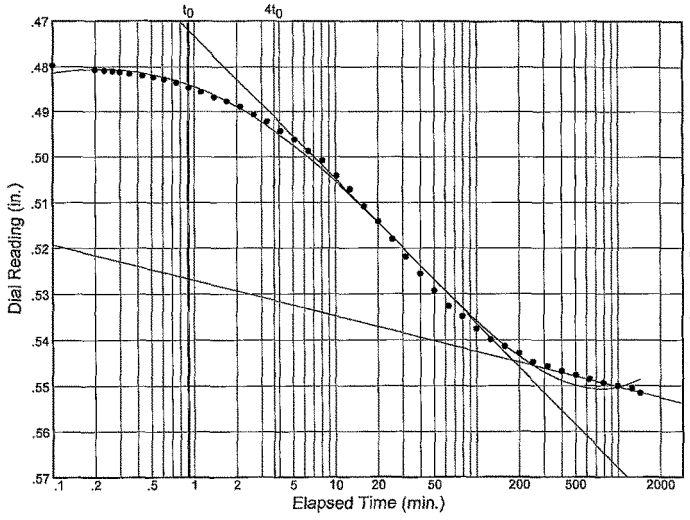
Figure

FFEBJV, LLC

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

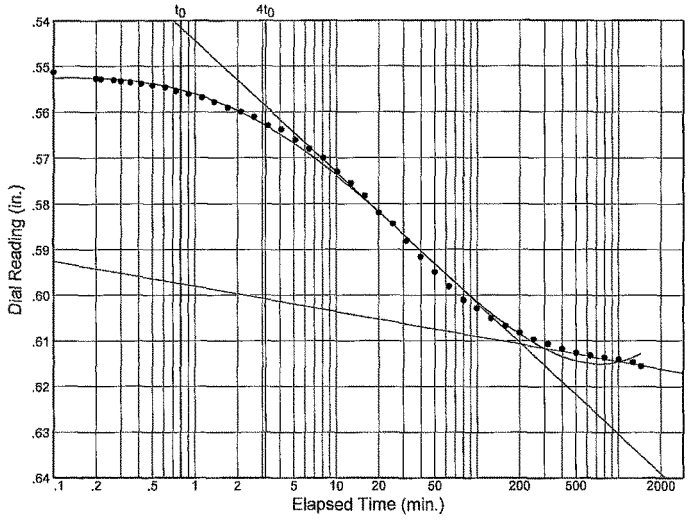
Source: MRGO-07U Sample No.: 5D Elev./Depth: 18.6



Load No.= 6
Load= 2.00 tsf
D_0 = 0.47374
D_{50} = 0.50908
D_{100} = 0.54441
T_{50} = 13.39 min.

C_v @ T_{50}
0.03 ft.2/day

C_α = 0.009



Load No.= 7
Load= 4.00 tsf
D_0 = 0.54731
D_{50} = 0.57903
D_{100} = 0.61075
T_{50} = 15.85 min.

C_v @ T_{50}
0.02 ft.2/day

C_α = 0.007

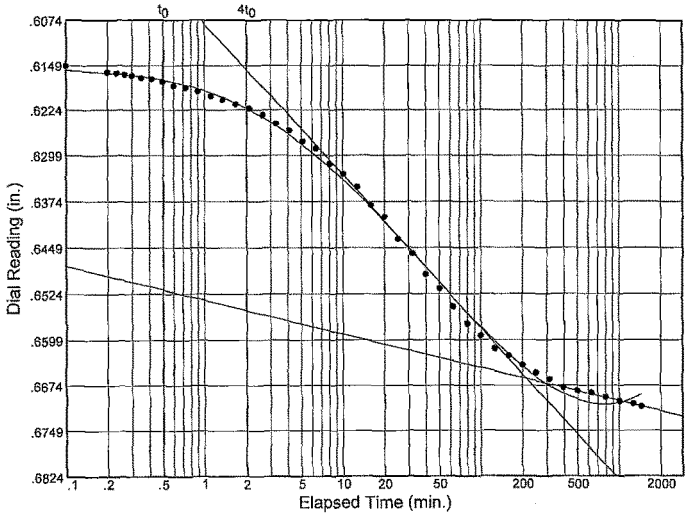
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Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

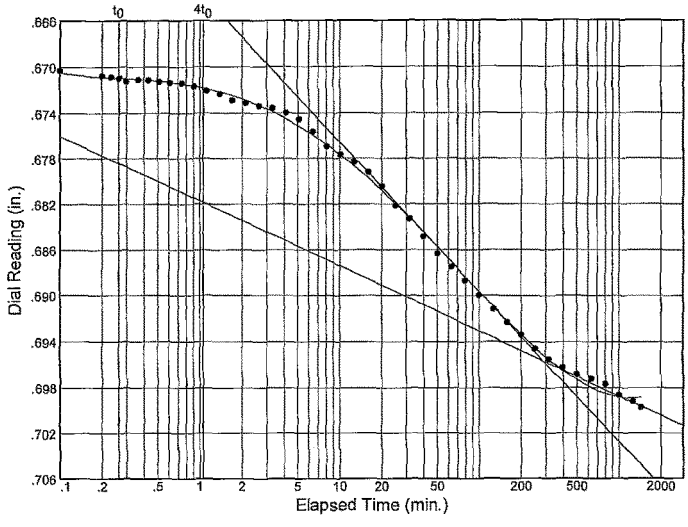
Source: MRGO-07U Sample No.: 5D Elev./Depth: 18.6



Load No.= 8
Load= 8.00 tsf
D_0 = 0.61253
D_{50} = 0.63941
D_{100} = 0.66628
T_{50} = 17.68 min.

C_v @ T_{50}
0.01 ft.2/day

C_α = 0.007



Load No.= 9
Load= 12.00 tsf
D_0 = 0.67013
D_{50} = 0.68290
D_{100} = 0.69567
T_{50} = 29.89 min.

C_v @ T_{50}
0.01 ft.2/day

C_α = 0.008

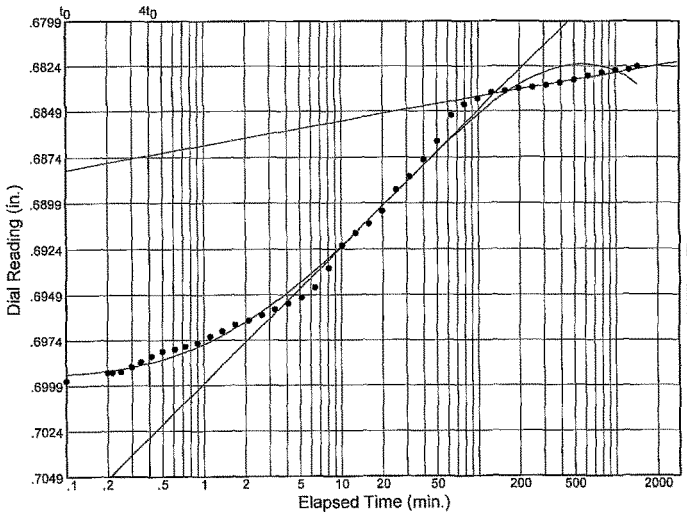
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Figure

Dial Reading vs. Time

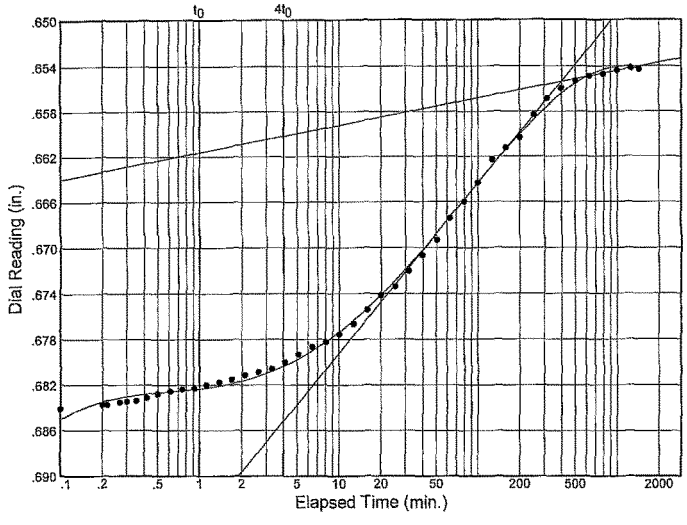
Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-07U Sample No.: 5D Elev./Depth: 18.6



Load No.= 10
Load= 3.00 tsf
D_0 = 0.69985
D_{50} = 0.69189
D_{100} = 0.68393
T_{50} = 11.31 min.

C_V @ T_{50}
0.02 ft.^{2}/day



Load No.= 11
Load= 0.75 tsf
D_0 = 0.68430
D_{50} = 0.66984
D_{100} = 0.65537
T_{50} = 42.41 min.

C_V @ T_{50}
0.01 ft.^{2}/day

FFEBJV, LLC

Figure

SWELL/CONSOLIDATION TEST DATA

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Contract No. W912P8-07-D-0022
Task Order 135
Project Number: 07-022135

Sample Data

Source: MRGO-07U
Sample No.: 5D
Elev. or Depth: 18.6 Sample Length(in./cm.):
Location:
Description: VSO GR CH3 W/ ARS & LNS ML, ARS SM
Liquid Limit: 64 Plasticity Index: 46
USCS: CH3 AASHTO: Figure No.:
Testing Remarks: Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST		AFTER TEST	
Wet w+t	= 159.21 g.	Consolidometer #	= 6	Wet w+t	= 388.52 g.
Dry w+t	= 100.00 g.			Dry w+t	= 318.47 g.
Tare Wt.	= .00 g.	Spec. Gravity	= 2.74	Tare Wt.	= 112.19 g.
Height	= 1.00 in.	Height	= 1.00 in.		
Diameter	= 4.00 in.	Diameter	= 4.00 in.		
Weight	= 338.27 g.	Defl. Table	= n/a		
Moisture	= 59.2 %	Ht. Solids	= 0.3766 in.	Moisture	= 34.0 %
Wet Den.	= 102.2 pcf	Dry Wt.	= 212.37 g.*	Dry Wt.	= 206.28 g.
Dry Den.	= 64.2 pcf	Void Ratio	= 1.666	Void Ratio	= 0.865
		Saturation	= 97.4 %		

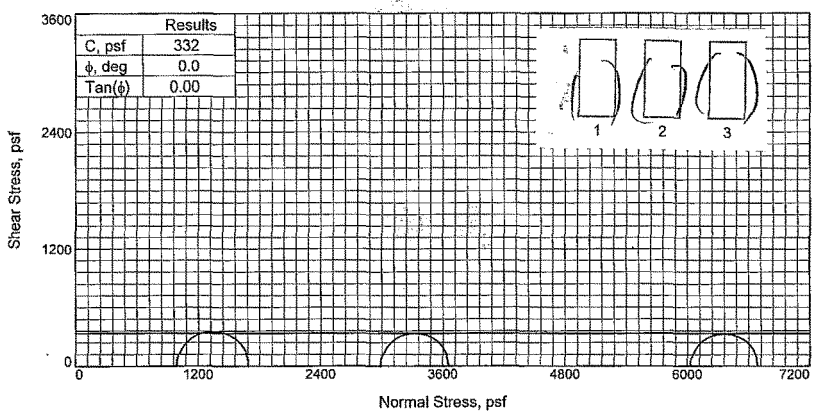
* Initial dry weight used in calculations

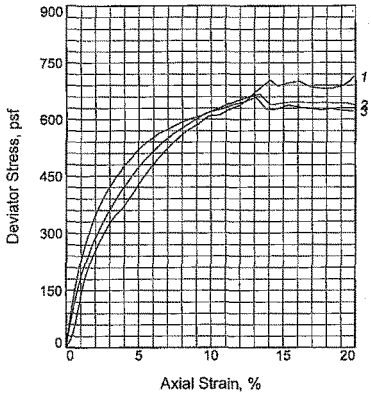
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.35252				1.666	
0.01	0.35247	0.00000			1.666	0.0 Swell
0.13	0.37125	0.00000	0.12	0.001	1.616	1.9 Comprs.
0.25	0.38115	0.00000	0.17	0.002	1.590	2.9 Comprs.
0.50	0.41348	0.00000	0.10	0.005	1.504	6.1 Comprs.
1.00	0.47934	0.00000	0.03	0.010	1.329	12.6 Comprs.
2.00	0.55157	0.00000	0.03	0.009	1.137	19.8 Comprs.
4.00	0.61556	0.00000	0.02	0.007	0.967	26.2 Comprs.
8.00	0.67096	0.00000	0.01	0.007	0.820	31.7 Comprs.

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
12.00	0.69977	0.00000	0.01	0.008	0.744	34.6 Comprs.
3.00	0.68242	0.00000	0.02		0.790	32.9 Comprs.
0.75	0.65430	0.00000	0.01		0.865	30.1 Comprs.

C_c = 0.64 P_c = 0.55 tsf C_r = 0.10





Sample No.		1	2	3
Initial	Water Content, %	31.6	31.9	33.0
	Dry Density, pcf	91.3	91.2	89.5
	Saturation, %	102.2	103.1	102.2
	Void Ratio	0.8252	0.8271	0.8625
	Diameter, in.	1.383	1.385	1.382
	Height, in.	3.089	3.088	3.095
At Test	Water Content, %	31.6	31.9	33.0
	Dry Density, pcf	91.3	91.2	89.5
	Saturation, %	102.2	103.1	102.2
	Void Ratio	0.8252	0.8271	0.8625
	Diameter, in.	1.383	1.385	1.382
	Height, in.	3.089	3.088	3.095
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.88	20.76	41.88
Fail. Stress, psf		704	666	658
Strain, %		14.1	13.4	13.1
Ult. Stress, psf		687	638	626
Strain, %				
σ_1 Failure, psf		1694	3655	6688
σ_3 Failure, psf		991	2989	6030

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CL4

LL= 37 **PL=** 13 **PI=** 24
Assumed Specific Gravity= 2.67
Remarks:

Figure _____

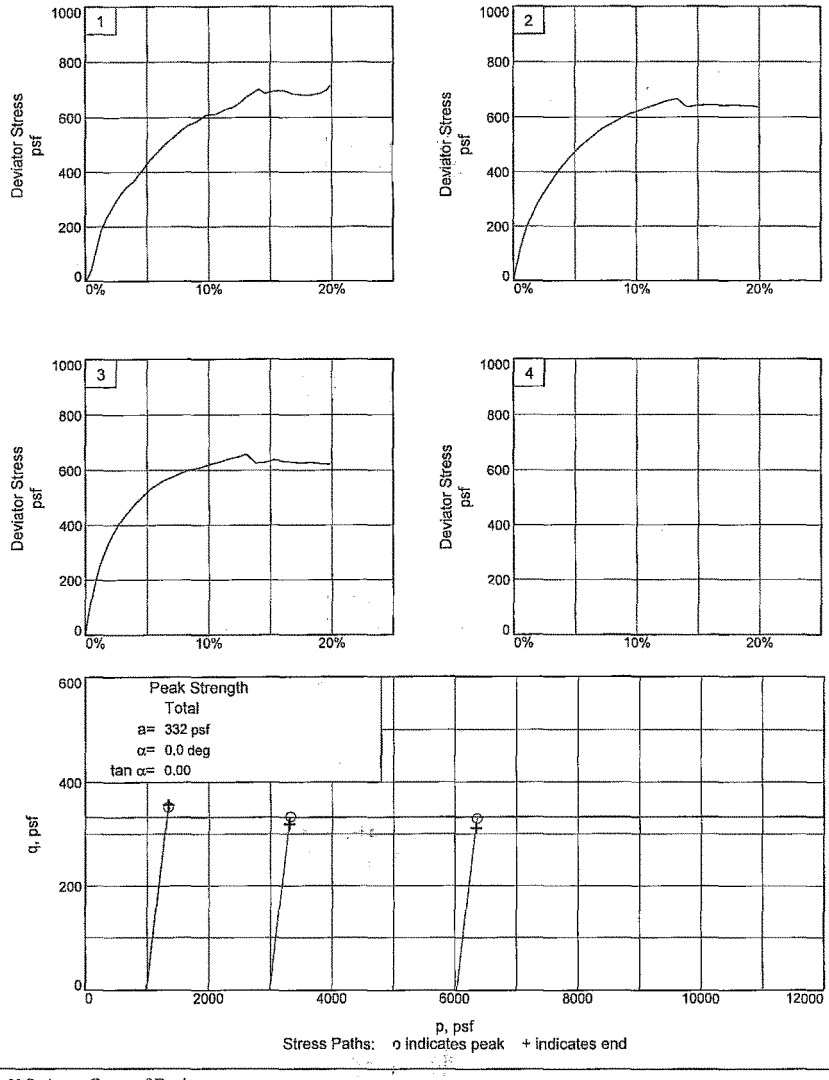
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-7U **Depth:** 24.8
Sample Number: 7B
Proj. No.: 07-022135 **Date Sampled:** 11/3/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

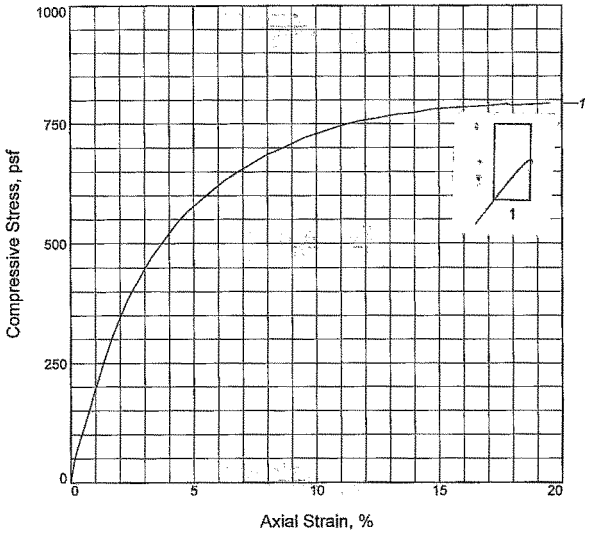
Tested By: JC/ARS **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-7U **Depth:** 24.8 **Sample Number:** 7B
Project No.: 07-022135 **Figure** _____ FFEBJV, LLC

Tested By: JC/ARS _____ **Checked By:** MS _____

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	780			
Undrained shear strength, psf	390			
Failure strain, %	14.8			
Strain rate, %/min.	1.00			
Water content, %	32.1			
Wet density, pcf	118.4			
Dry density, pcf	89.7			
Saturation, %	99.7			
Void ratio	0.8588			
Specimen diameter, in.	1.382			
Specimen height, in.	3.098			
Height/diameter ratio	2.24			

Description: SO GR CL4

LL = 34	**PL** = 14	**PI** = 20	**Assumed GS=** 2.67	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 11/3/09
Remarks:

Figure _____

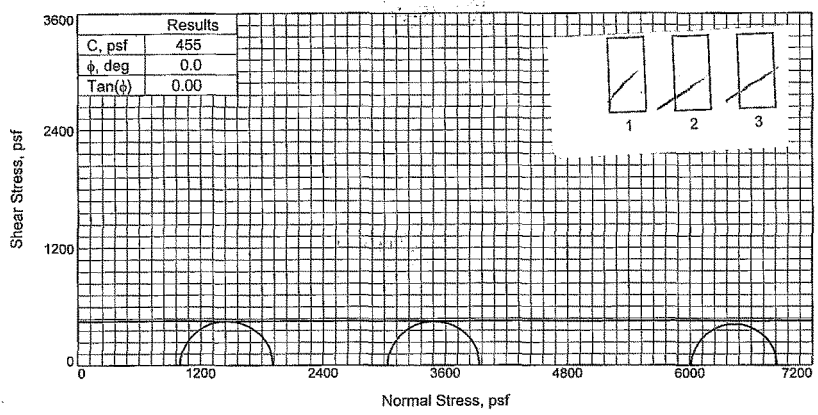
Client: U.S. Army Corps of Engineers

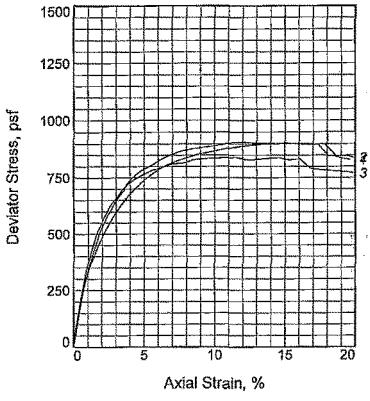
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-7U **Depth:** 28.8
Sample Number: 8B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: JC **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	35.4	35.1	36.1
	Dry Density, pcf	86.6	86.1	85.4
	Saturation, %	101.2	99.1	99.9
	Void Ratio	0.9455	0.9574	0.9745
	Diameter, in.	1.383	1.383	1.383
	Height, in.	3.088	3.095	3.097
At Test	Water Content, %	35.4	35.1	36.1
	Dry Density, pcf	86.6	86.1	85.4
	Saturation, %	101.2	99.1	99.9
	Void Ratio	0.9455	0.9574	0.9745
	Diameter, in.	1.383	1.383	1.383
	Height, in.	3.088	3.095	3.097
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.95	21.06	41.76
Fail. Stress, psf		907	902	839
Strain, %		12.1	14.8	11.6
Ult. Stress, psf		899	902	829
Strain, %				
σ_1 Failure, psf		1908	3935	6853
σ_3 Failure, psf		1000	3033	6013

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CL6 W/ LNS & LYS ML

LL= 44 **PL=** 16 **PI=** 28
Assumed Specific Gravity= 2.70
Remarks:

Figure _____

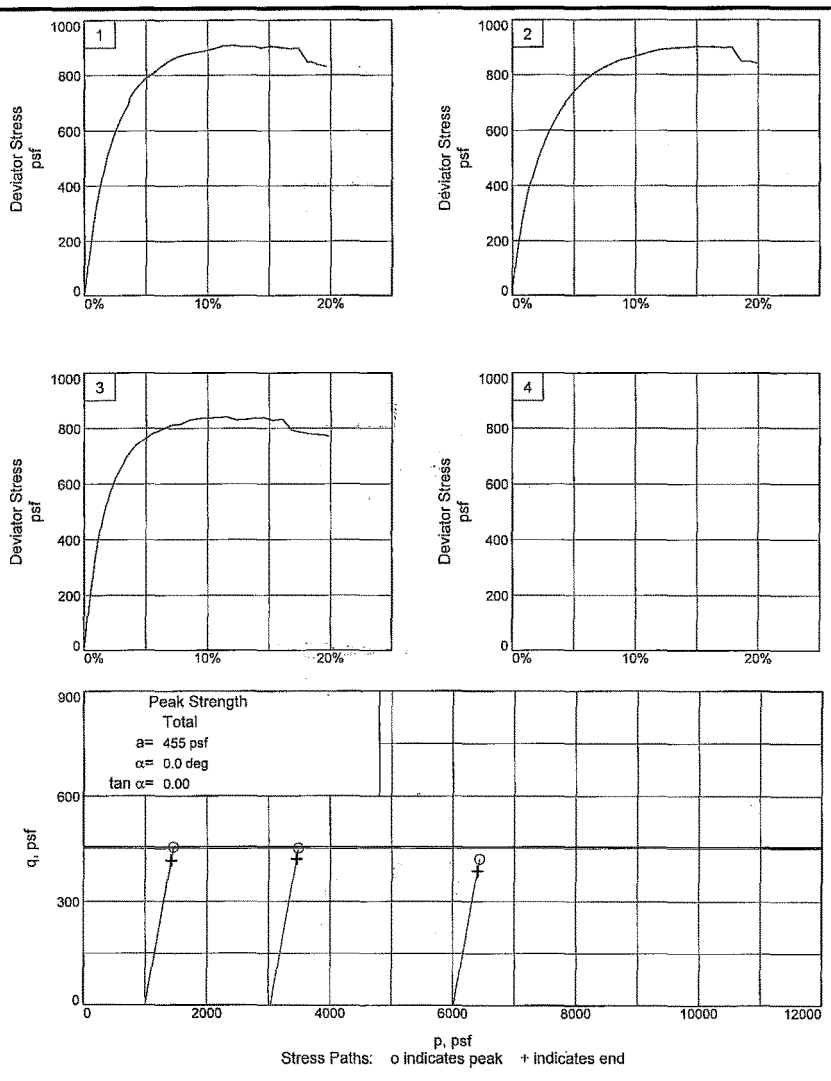
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-7U **Depth:** 33.7
Sample Number: 9C
Proj. No.: 07-022135 **Date Sampled:** 11/3/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

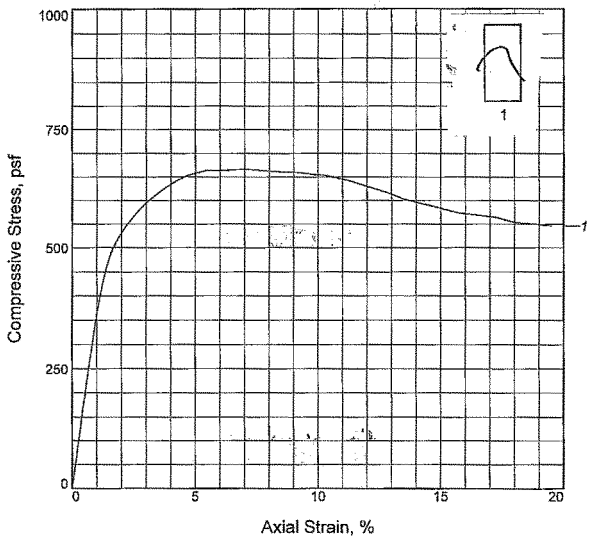
Tested By: JC/ARS **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-7U **Depth:** 33.7 **Sample Number:** 9C
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: JC/ARS **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.		1			
Unconfined strength, psf		667			
Undrained shear strength, psf		333			
Failure strain, %		7.0			
Strain rate, %/min.		1.00			
Water content, %		62.5			
Wet density, pcf		102.2			
Dry density, pcf		62.9			
Saturation, %		99.5			
Void ratio		1.7215			
Specimen diameter, in.		1.385			
Specimen height, in.		3.097			
Height/diameter ratio		2.24			

Description: SO GR CH4

LL = 96	PL = 23	PI = 73	Assumed GS= 2.74	Type: UNDISTURBED

Project No.: 07-022135
Date Sampled: 11/4/09
Remarks:

Figure _____

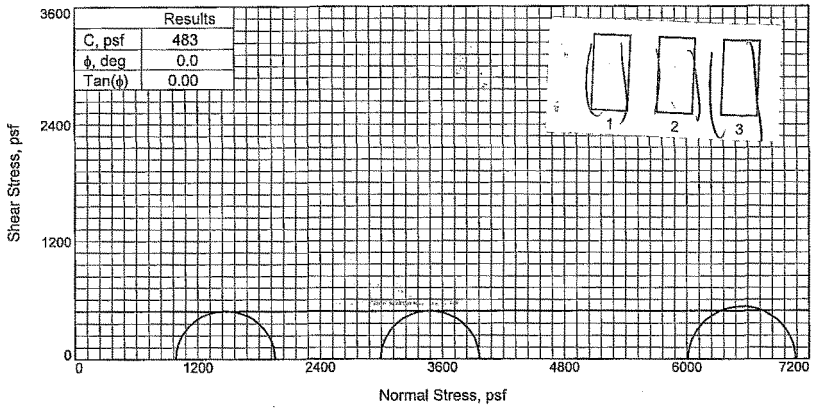
Client: U.S. Army Corps of Engineers

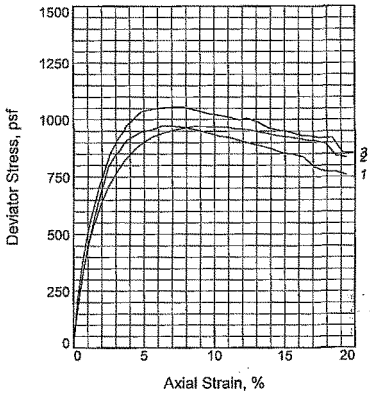
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-7U **Depth:** 38.6
Sample Number: 10D

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: JC/ARS **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	37.1	36.6	36.8
	Dry Density, pcf	83.7	84.8	84.6
	Saturation, %	98.7	100.1	100.1
	Void Ratio	1.0142	0.9880	0.9924
	Diameter, in.	1.382	1.383	1.382
	Height, in.	3.093	3.092	3.093
At Test	Water Content, %	37.1	36.6	36.8
	Dry Density, pcf	83.7	84.8	84.6
	Saturation, %	98.7	100.1	100.1
	Void Ratio	1.0142	0.9880	0.9924
	Diameter, in.	1.382	1.383	1.382
	Height, in.	3.093	3.092	3.093
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.84	20.79	41.75
Fail. Stress, psf		971	970	1054
Strain, %		6.3	8.6	7.1
Ult. Stress, psf		853	928	946
Strain, %				
σ_1 Failure, psf		1956	3964	7066
σ_3 Failure, psf		985	2994	6012

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CL6

LL= 47 **PL=** 16 **PI=** 31
Assumed Specific Gravity= 2.70
Remarks:

Figure _____

Client: U.S. Army Corps of Engineers

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

Source of Sample: MRGO-7U **Depth:** 41.7

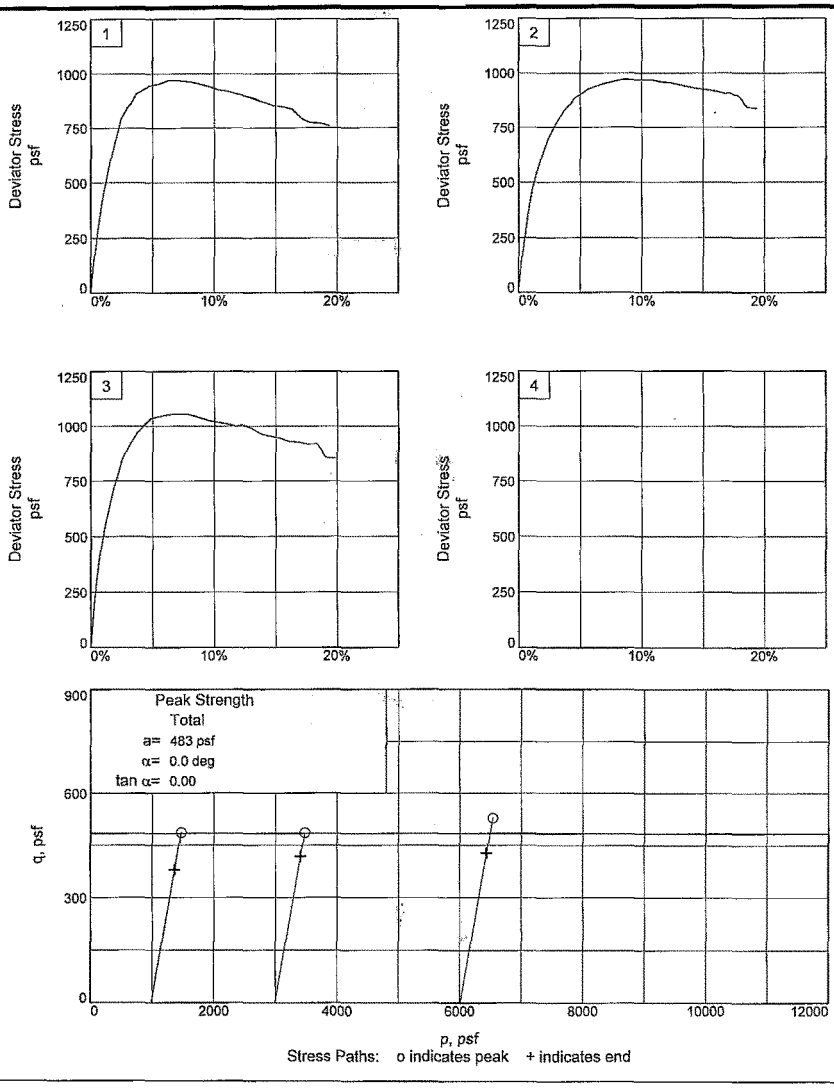
Sample Number: 11C

Proj. No.: 07-022135 **Date Sampled:** 11/3/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

Tested By: JC/ARS **Checked By:** MS

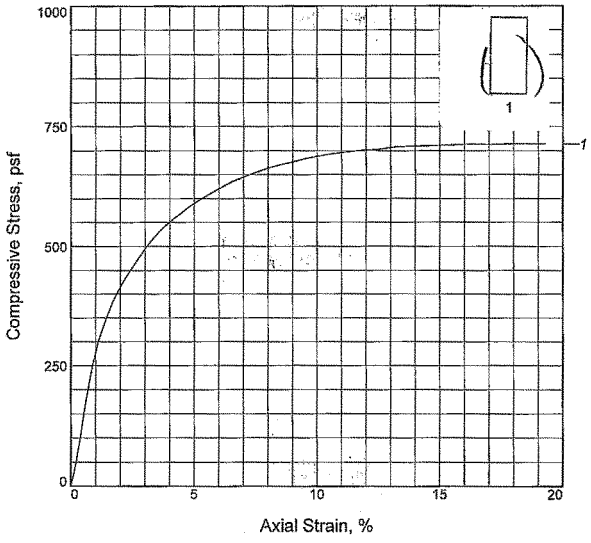


Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-7U **Depth:** 41.7 **Sample Number:** 11C
Project No.: 07-022135 **Figure**

FFEBJV, LLC

Tested By: JC/ARS **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	710			
Undrained shear strength, psf	355			
Failure strain, %	14.8			
Strain rate, %/min.	1.00			
Water content, %	42.3			
Wet density, pcf	111.1			
Dry density, pcf	78.0			
Saturation, %	99.1			
Void ratio	1.1437			
Specimen diameter, in.	1.383			
Specimen height, in.	3.097			
Height/diameter ratio	2.24			

Description: SO GR CH2

LL = 53	PL = 16	PI = 37	**Assumed GS=** 2.68	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 11/4/09
Remarks:

Client: U.S. Army Corps of Engineers

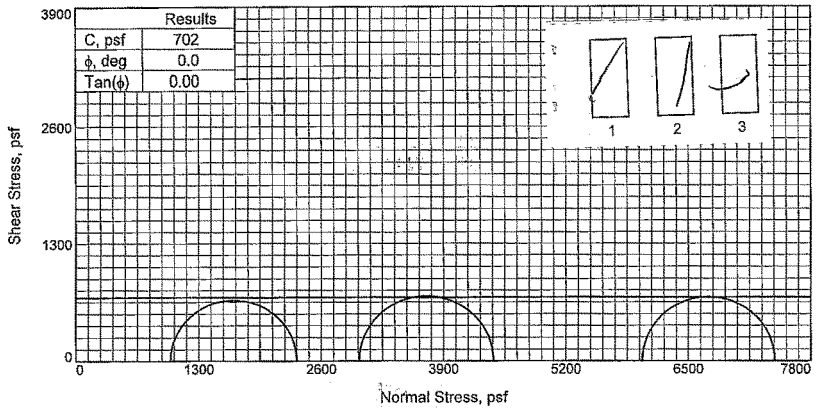
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-7U **Depth:** 44.8
Sample Number: 12B

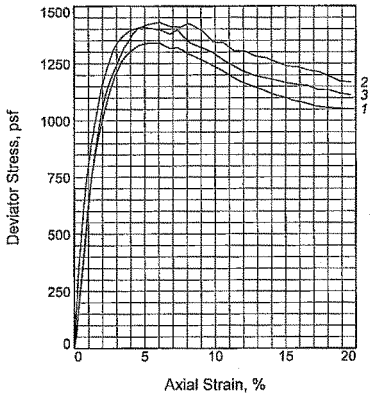
UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Figure _____

Tested By: JC/ARS **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	43.4	43.2	45.9
	Dry Density, pcf	77.8	78.0	77.0
	Saturation, %	99.0	99.3	103.0
	Void Ratio	1.1998	1.1920	1.2217
	Diameter, in.	1.382	1.389	1.388
	Height, in.	3.102	3.102	3.099
At Test	Water Content, %	43.4	43.2	45.9
	Dry Density, pcf	77.8	78.0	77.0
	Saturation, %	99.0	99.3	103.0
	Void Ratio	1.1998	1.1920	1.2217
	Diameter, in.	1.382	1.389	1.388
	Height, in.	3.102	3.102	3.099
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.95	20.85	41.74
Fail. Stress, psf		1339	1429	1408
Strain, %		6.1	6.1	4.7
Ult. Stress, psf		1103	1237	1165
Strain, %				
σ_1 Failure, psf		2339	4431	7419
σ_3 Failure, psf		1001	3002	6011

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: M GR CH3 W/ LNS ML

LL= 60 **PL=** 18 **PI=** 42
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

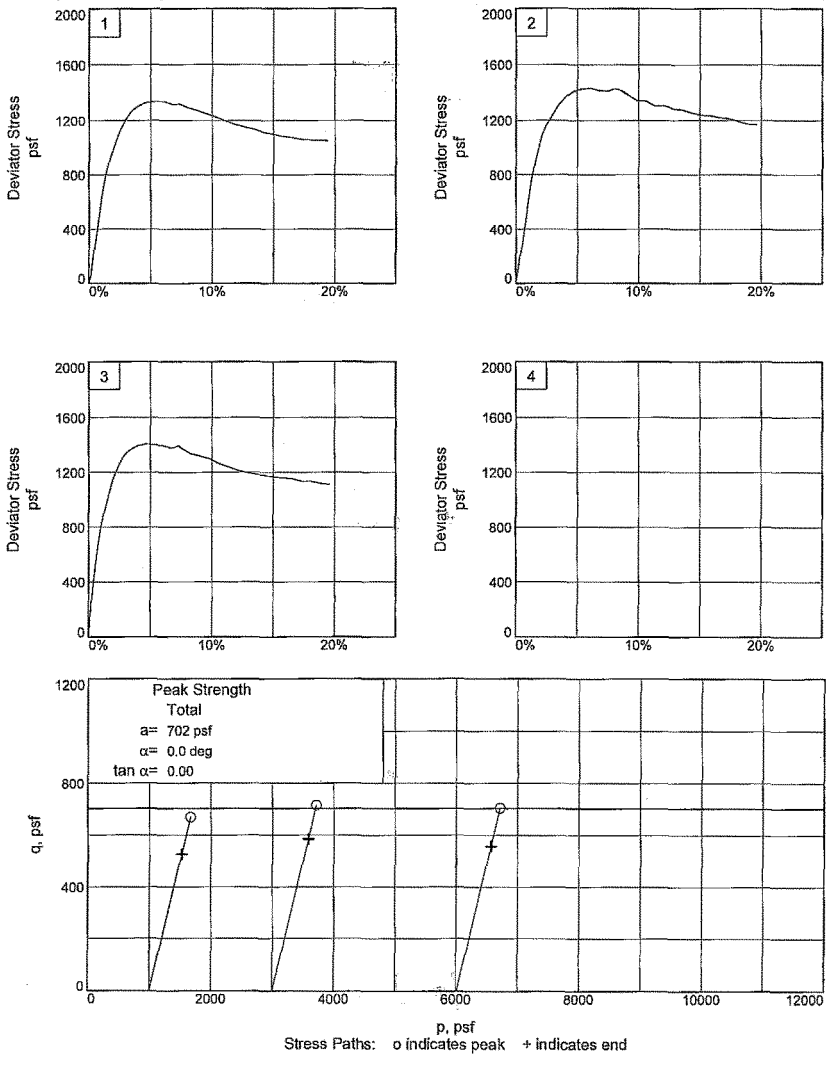
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-7U **Depth:** 48.8
Sample Number: 13B
Proj. No.: 07-022135 **Date Sampled:** 11/4/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

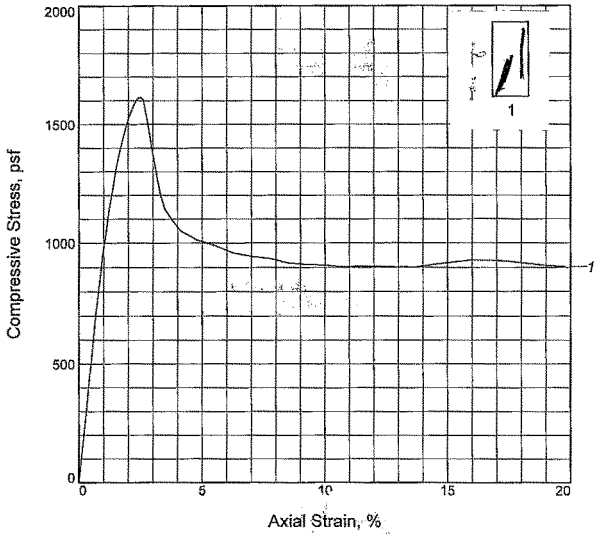
Tested By: JC/ARS **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-7U **Depth:** 48.8 **Sample Number:** 13B
Project No.: 07-022135 **Figure** _____ FFEBJV, LLC

Tested By: JC/ARS **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1				
Unconfined strength, psf	1614				
Undrained shear strength, psf	807				
Failure strain, %	2.5				
Strain rate, %/min.	1.00				
Water content, %	62.3				
Wet density, pcf	103.1				
Dry density, pcf	63.5				
Saturation, %	100.8				
Void ratio	1.6924				
Specimen diameter, in.	1.388				
Specimen height, in.	3.100				
Height/diameter ratio	2.23				

Description: M GR CH4 W/ LNS ML

LL = 92	**PL** = 21	**PI** = 71	**Assumed GS**= 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 11/4/09
Remarks:

Figure _____

Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study St.Bernard Parish, La
Source of Sample: MRGO-7U **Depth:** 52.8
Sample Number: 14B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: JCARS

SUMMARY OF LABORATORY TEST RESULTS

Project: MRGO Ecosystem Restoration Feasibility Study Assigned By: _____

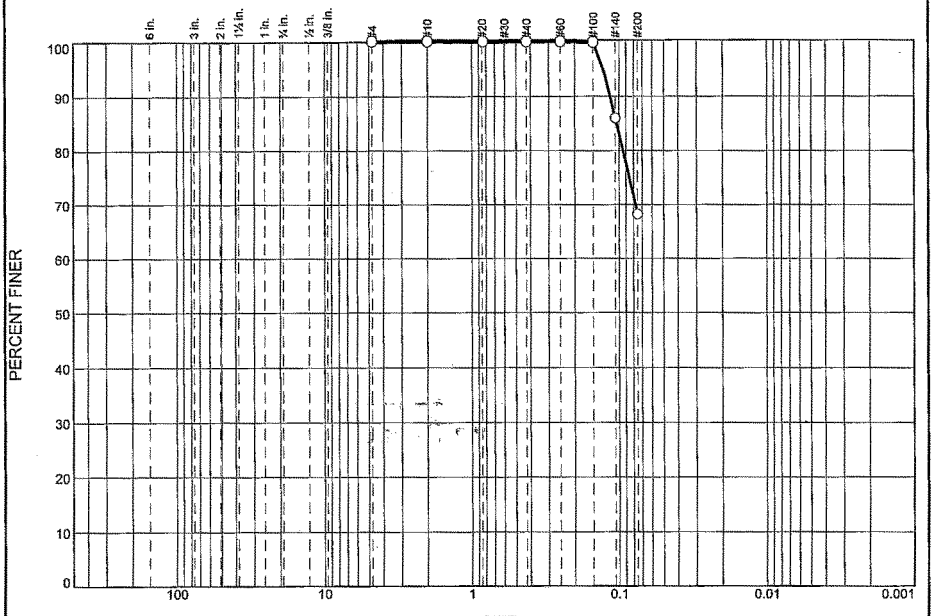
Project Number: 07-022135 Current Date: 12/29/2009
Boring: MRGO-9U

Sample Number	Depth	Visual Classification	USCS	E(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
1A	0.0	VSO GR CHOB W/ WD	CHOB		153												
1B	0.8	VSO GR CHOB W/ WD	CHOB		171												
1C	1.7	VSO GR CHOA W/ WD	CHOA		129												
1D	2.6	VSO GR CHOA W/ WD	CHOA		82												
2A	4.0	VSO GR CHOA	CHOA		149												
2B	4.8	VSO GR CHOA W/ SIF	CHOA		100												
2C	5.7	VSO GR CHOA W/ SIF	CHOA		96												
2D	6.6	VSO GR CHOA W/ LNS ML, WD	CHOA		84												
3A	8.0	VSO GR CH2 W/ ARS ML	CH2		79												
3B	8.8	VSO GR CH4 W/ LNS ML, O	CH4		94	47	91	99	UU	0	145		99	24	75	0.20	
3C	9.7	VSO GR CHOA W/ LNS ML	CHOA		87												
3D	10.6	VSO GR CH4 W/ ARS ML, WD, RT, O	CH4		82	52	93	98					87	22	65		Gs, CON
4A	12.0	VSO GR CL6	CL6		52												
4B	12.8	GR SM W/ LNS & LYS CH	SM		42												
4C	13.7	VSO GR CL6 W/ LNS SM	CL6		48												
5A	16.0	GR ML W/ LYS CH	ML		37												
5B	16.8	GR ML W/ LYS CH	ML		43												SV
5C	17.7	GR ML W/ LNS CH	ML		30												
5D	18.6	GR ML W/ LNS CH	ML		32												
6A	20.0	GR ML	ML		25												
6B	20.8	GR ML	ML		26												
6C	21.7	GR ML	ML		27												
7A	24.0	SO GR CH3 W/ LNS & LYS ML	CH3		49												
7B	24.8	VSO GR CH3 W/ LNS ML	CH3	4	58	66	104	100	UC	-	206	412	69	20	49	0.20	
7C	25.7	SO GR CL6 W/ LYS & ARS CH	CL6		41	80	113	100					45	16	29		Gs, CON
8A	28.0	SO GR CH3 W/ LNS & LYS ML	CH3		65												
8B	28.8	SO GR CH3 W/ LNS & LYS ML	CH3		62												
8C	29.7	SO GR CH4 W/ LNS ML	CH4		63	62	102	99	UU	0	327		79	22	57	0.22	
9A	32.0	M GR CH4 W/ LNS ML	CH4		67												
9B	32.8	M GR CH4 W/ LNS ML	CH4	3	64	62	102	99	UC	-	507	1013	82	23	59	0.25	
9C	33.7	M GR CH4 W/ LNS ML	CH4		55												
9D	34.6	M GR CH4 W/ LNS ML	CH4		67												
10A	36.0	M GR CH4 W/ LNS ML	CH4		60												
10B	36.8	M GR CH4 W/ LNS ML	CH4		68	60	100	100	UU	0	525		91	24	67	0.27	
10C	37.7	M GR CH4 W/ LNS ML	CH4		65												
10D	38.6	M GR CH4 W/ LNS ML	CH4		66												
11A	40.0	M GR CH4 W/ LNS ML	CH4		64												

Remarks: _____
FFEB JV, LLC

Checked By: MS/MRG
File Name: MRGO-9U.xls

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.0	0.0	31.8	68.2	

	Colloids	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○				0.1039							

Material Description	USCS	AASHTO
○ GR ML W/ LYS CH	ML	

Project No. 07-022135 **Client:** U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
○ **Source of Sample:** MRGO-9U **Depth:** 16.8 **Sample Number:** 5B

Date: ○

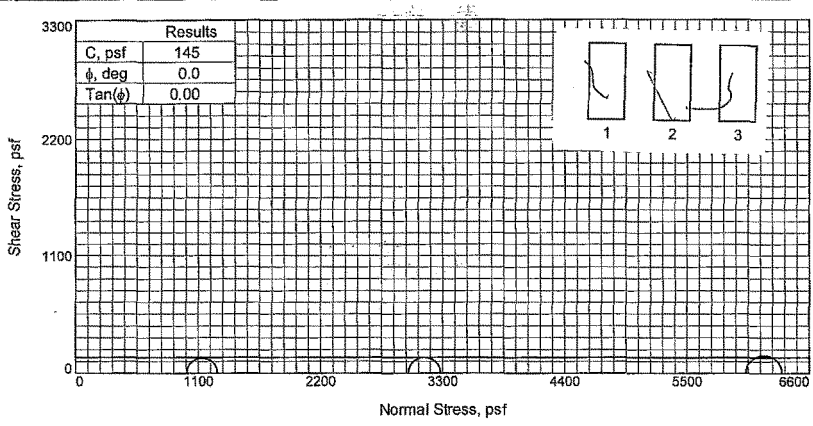
FFEBJV, LLC

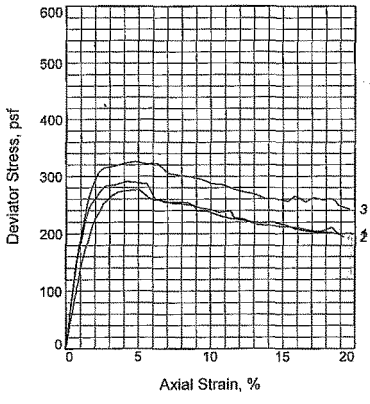
St Rose, LA

Remarks:

Figure

Tested By: JH **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	97.4	90.4	94.1
	Dry Density, pcf	45.7	48.9	46.6
	Saturation, %	99.0	101.0	98.2
	Void Ratio	2.5783	2.3443	2.5114
	Diameter, in.	1.384	1.382	1.384
	Height, in.	3.087	3.089	3.090
At Test	Water Content, %	97.4	90.4	94.1
	Dry Density, pcf	45.7	48.9	46.6
	Saturation, %	99.0	101.0	98.2
	Void Ratio	2.5783	2.3443	2.5114
	Diameter, in.	1.384	1.382	1.384
	Height, in.	3.087	3.089	3.090
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.92	20.76	41.87
Fail. Stress, psf		276	290	325
Strain, %		5.1	4.2	4.8
Ult. Stress, psf		216	212	256
Strain, %				
σ_1 Failure, psf		1273	3280	6355
σ_3 Failure, psf		996	2990	6030

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: VSO GR CH4 W/ LNS ML, O

LL= 99 **PL=** 24 **PI=** 75
Assumed Specific Gravity= 2.62
Remarks:

Figure _____

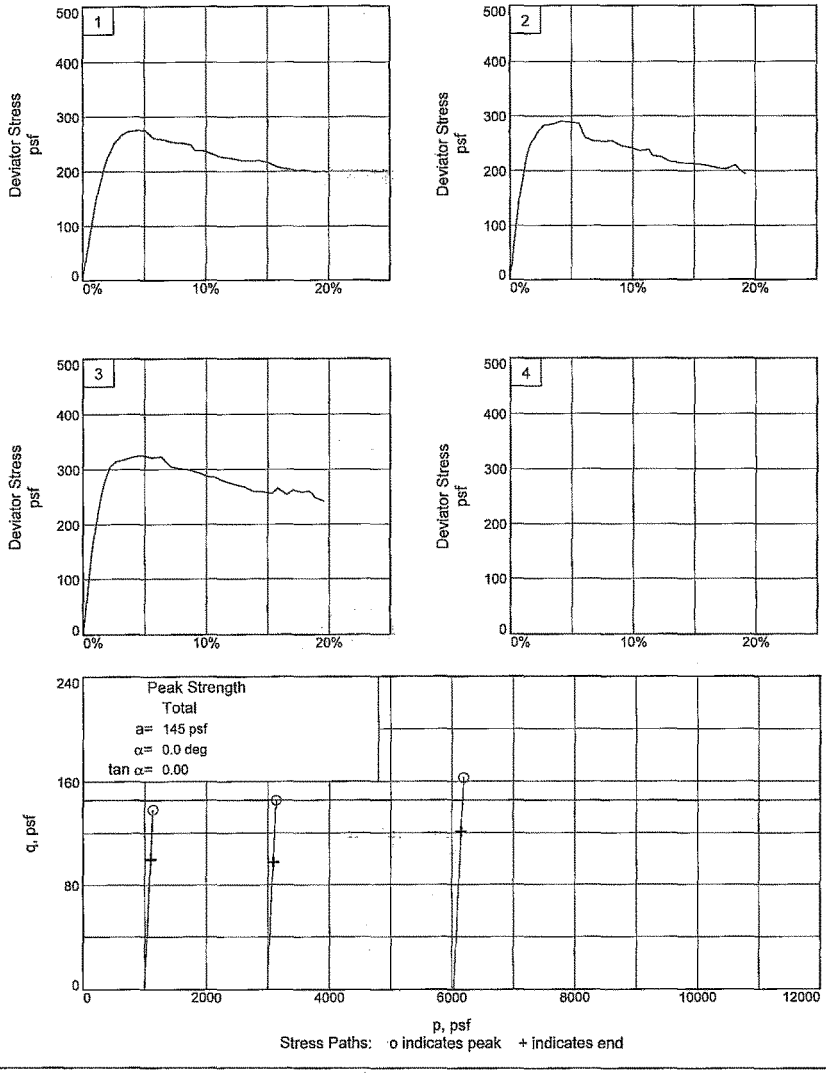
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-9U **Depth:** 8.8
Sample Number: 3B
Proj. No.: 07-022135 **Date Sampled:** 11/3/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

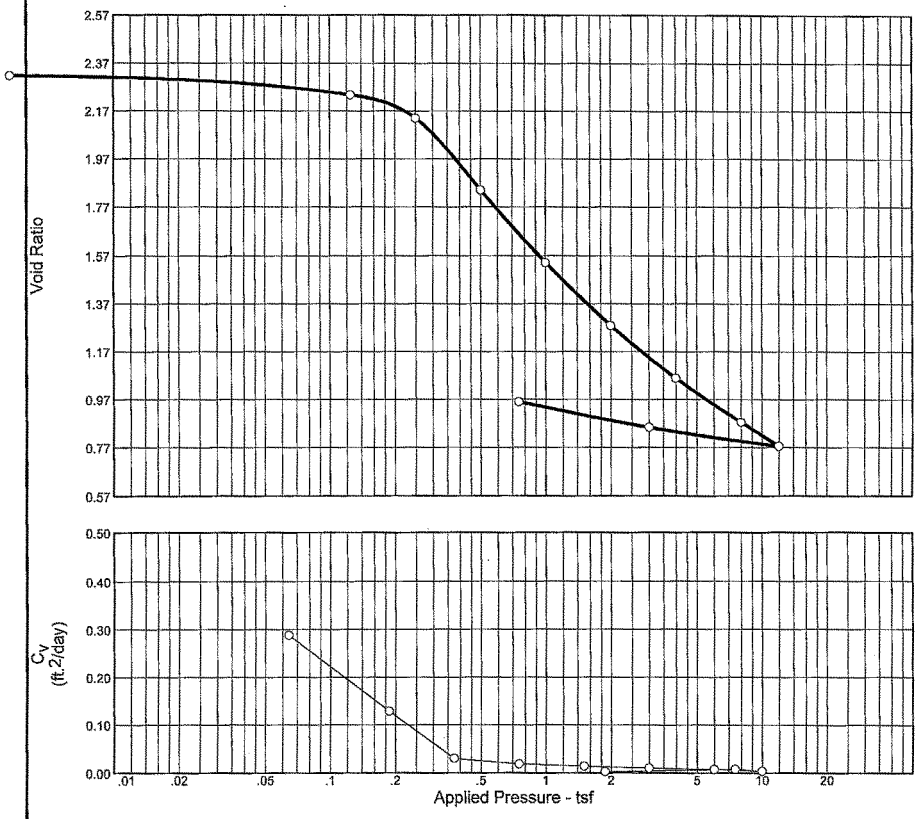
Tested By: JC/ARS **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-9U **Depth:** 8.8 **Sample Number:** 3B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: JC/ARS **Checked By:** MS

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
97.9 %	82.4 %	51.8	87	65	2.75	0.27	1.04	2.317

MATERIAL DESCRIPTION	USCS	AASHTO
VSO GR CH4 W/ ARS ML , WD, RT, O	CH4	

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

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

Source: MRGO-09U **Sample No.:** 3D **Elev./Depth:** 10.6

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St Rose, LA

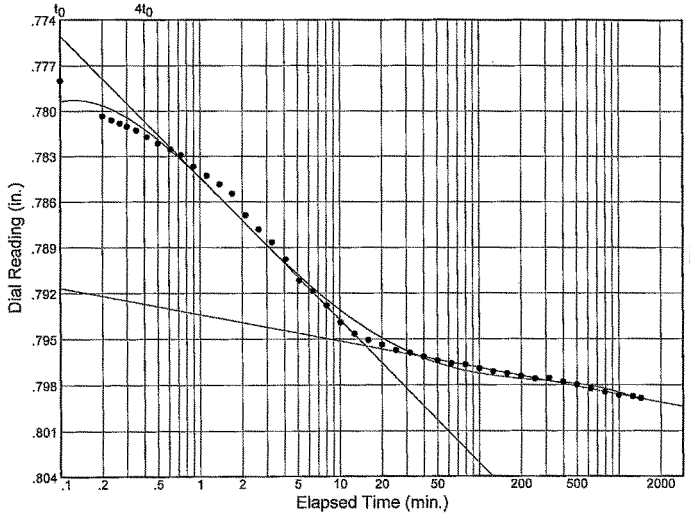
Remarks:
Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

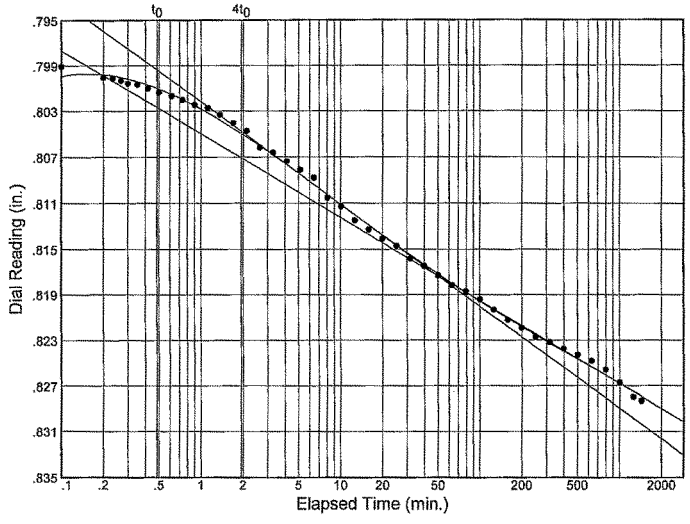
Source: MRGO-09U Sample No.: 3D Elev./Depth: 10.6



Load No.= 2
Load= 0.13 tsf
D_0 = 0.77756
D_{50} = 0.78651
D_{100} = 0.79545
T_{50} = 1.68 min.

C_v @ T_{50}
0.29 ft.2/day

C_α = 0.002



Load No.= 3
Load= 0.25 tsf
D_0 = 0.79703
D_{50} = 0.80716
D_{100} = 0.81729
T_{50} = 3.57 min.

C_v @ T_{50}
0.13 ft.2/day

C_α = 0.007

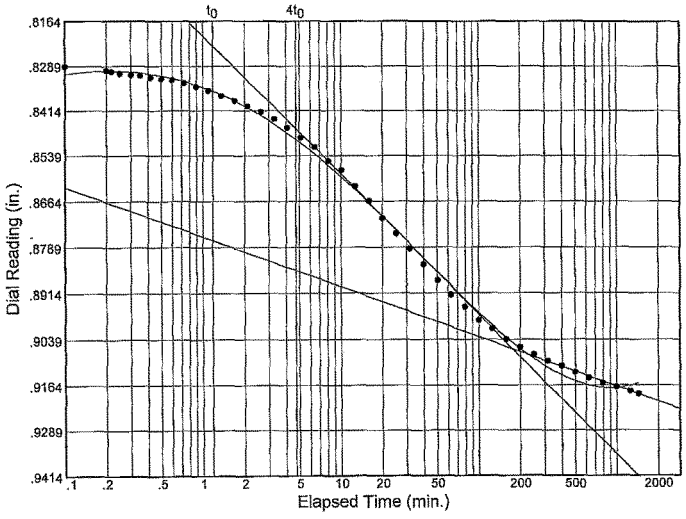
Figure

FFEBJV, LLC

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

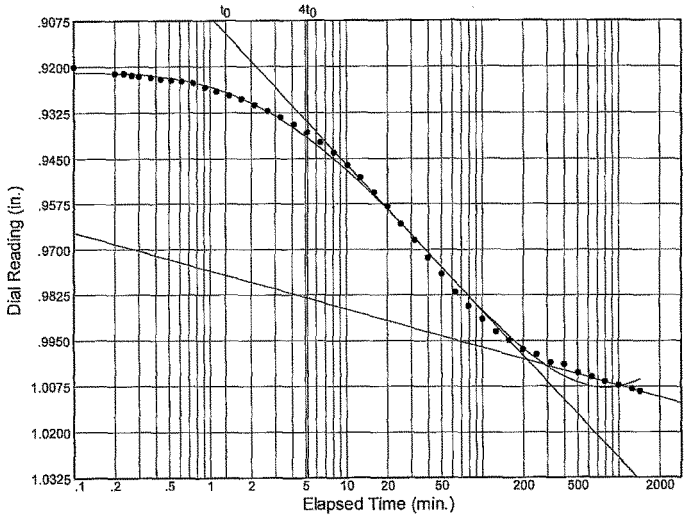
Source: MRGO-09U Sample No.: 3D Elev./Depth: 10.6



Load No.= 4
Load= 0.50 tsf
D_0 = 0.82241
D_{50} = 0.86442
D_{100} = 0.90643
T_{50} = 13.67 min.

C_v @ T_{50}
0.03 ft.^{2}/day

C_α = 0.014



Load No.= 5
Load= 1.00 tsf
D_0 = 0.91443
D_{50} = 0.95732
D_{100} = 1.00021
T_{50} = 18.02 min.

C_v @ T_{50}
0.02 ft.^{2}/day

C_α = 0.012

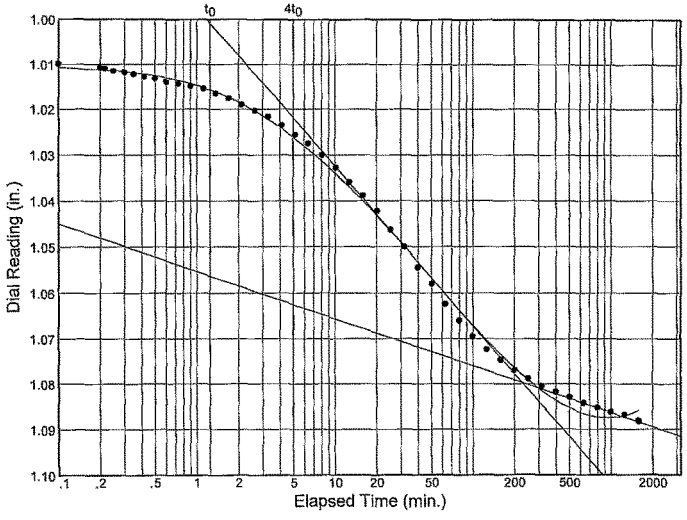
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

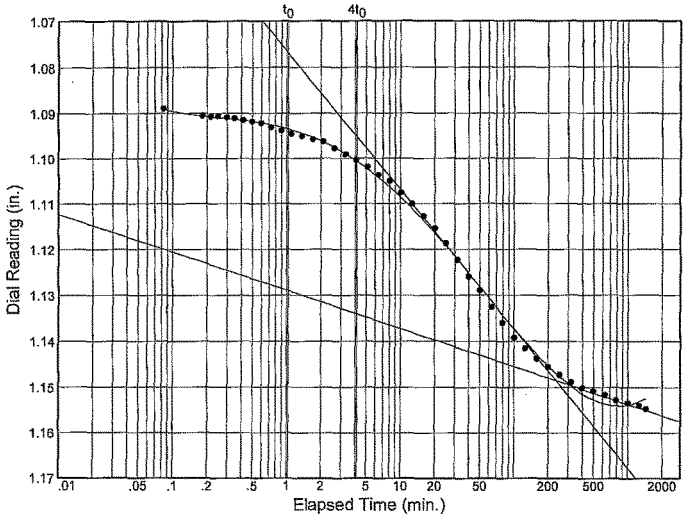
Source: MRGO-09U Sample No.: 3D Elev./Depth: 10.6



Load No.= 6
Load= 2.00 tsf
D_0 = 1.00535
D_{50} = 1.04252
D_{100} = 1.07969
T_{50} = 19.08 min.

C_v @ T_{50}
0.01 ft.^{2}/day

C_α = 0.013



Load No.= 7
Load= 4.00 tsf
D_0 = 1.08624
D_{50} = 1.11739
D_{100} = 1.14854
T_{50} = 21.67 min.

C_v @ T_{50}
0.01 ft.^{2}/day

C_α = 0.012

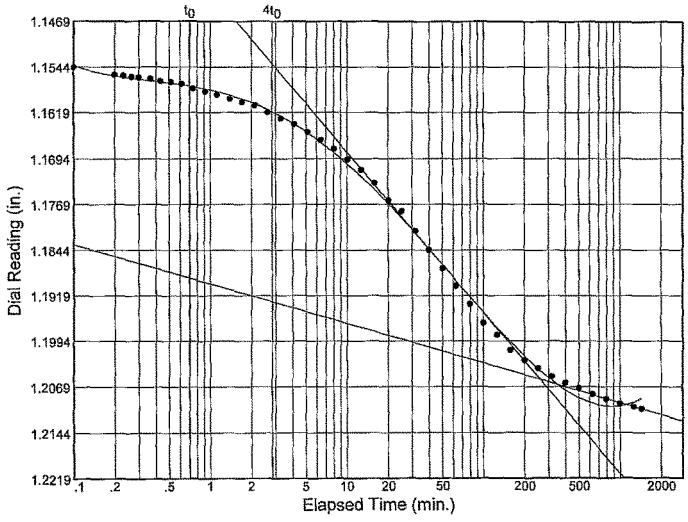
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

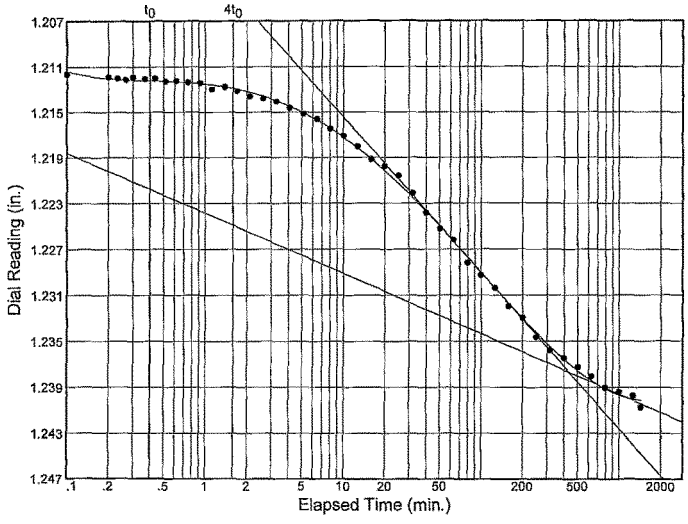
Source: MRGO-09U Sample No.: 3D Elev./Depth: 10.6



Load No.= 8
Load= 8.00 tsf
D_0 = 1.15327
D_{50} = 1.17949
D_{100} = 1.20570
T_{50} = 25.94 min.

C_v @ T_{50}
0.01 ft.2/day

C_α = 0.010



Load No.= 9
Load= 12.00 tsf
D_0 = 1.21156
D_{50} = 1.22463
D_{100} = 1.23769
T_{50} = 46.90 min.

C_v @ T_{50}
0.00 ft.2/day

C_α = 0.009

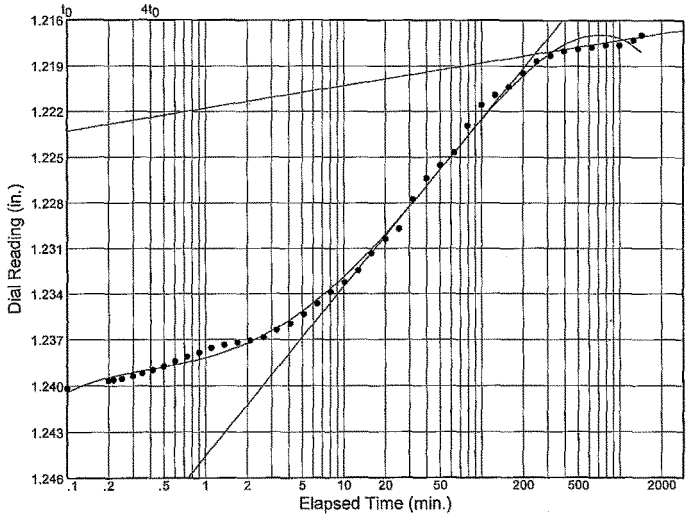
FFEBJV, LLC

Figure

Dial Reading vs. Time

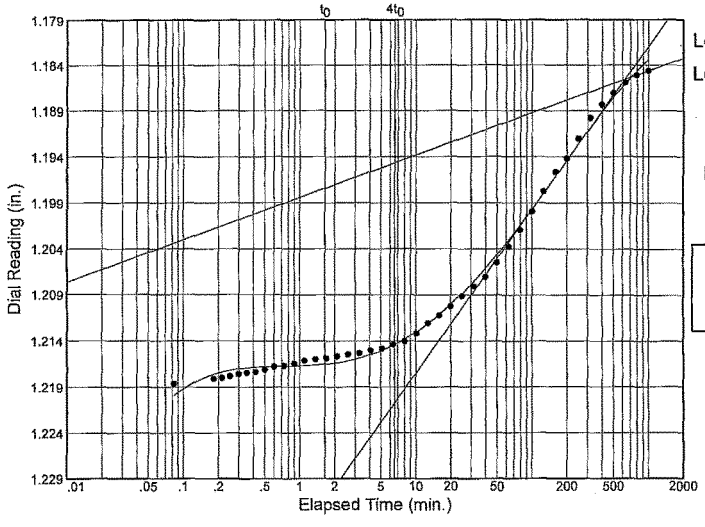
Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-09U Sample No.: 3D Elev./Depth: 10.6



Load No.= 10
Load= 3.00 tsf
D_0 = 1.24192
D_{50} = 1.23007
D_{100} = 1.21822
T_{50} = 20.08 min.

C_v @ T_{50}
0.01 ft.^{2}/day



Load No.= 11
Load= 0.75 tsf
D_0 = 1.21872
D_{50} = 1.20213
D_{100} = 1.18555
T_{50} = 71.98 min.

C_v @ T_{50}
0.00 ft.^{2}/day

FFEBJV, LLC

Figure

SWELL/CONSOLIDATION TEST DATA

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Contract No. W912P8-07-D-0022
Task Order 135
Project Number: 07-022135

Sample Data

Source: MRGO-09U
Sample No.: 3D
Elev. or Depth: 10.6 Sample Length(in./cm.):
Location:
Description: VSO GR CH4 W/ ARS ML , WD, RT, O
Liquid Limit: 87 Plasticity Index: 65
USCS: CH4 AASHTO: Figure No.:
Testing Remarks: Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST		AFTER TEST	
Wet w+t	= 182.45 g.	Consolidometer #	= 16	Wet w+t	= 345.78 g.
Dry w+t	= 100.00 g.			Dry w+t	= 281.21 g.
Tare Wt.	= .00 g.	Spec. Gravity	= 2.75	Tare Wt.	= 113.42 g.
Height	= 1.00 in.	Height	= 1.00 in.		
Diameter	= 4.00 in.	Diameter	= 4.00 in.		
Weight	= 312.02 g.	Defl. Table	= n/a		
Moisture	= 82.5 %	Ht. Solids	= 0.3022 in.	Moisture	= 38.5 %
Wet Den.	= 94.4 pcf	Dry Wt.	= 170.83 g.*	Dry Wt.	= 167.79 g.
Dry Den.	= 51.8 pcf	Void Ratio	= 2.317	Void Ratio	= 0.960
		Saturation	= 97.9 %		

* Initial dry weight used in calculations

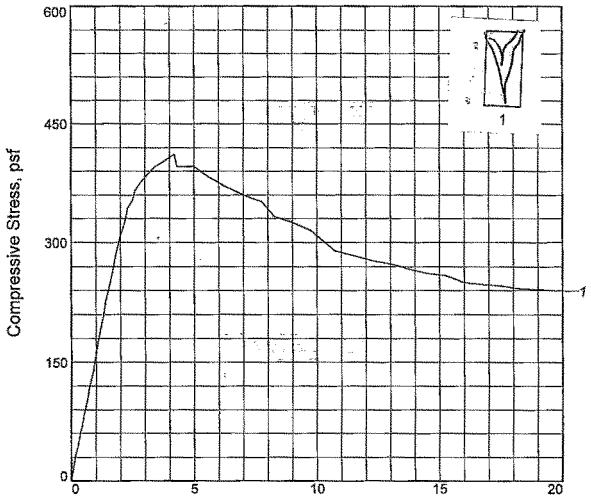
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.77479				2.317	
0.00	0.77447	0.00000			2.318	0.0 Swell
0.13	0.79888	0.00000	0.29	0.002	2.237	2.4 Comprs.
0.25	0.82833	0.00000	0.13	0.007	2.139	5.3 Comprs.
0.50	0.91885	0.00000	0.03	0.014	1.840	14.4 Comprs.
1.00	1.00887	0.00000	0.02	0.012	1.542	23.4 Comprs.
2.00	1.08829	0.00000	0.01	0.013	1.279	31.3 Comprs.
4.00	1.15482	0.00000	0.01	0.012	1.059	37.9 Comprs.
8.00	1.21054	0.00000	0.01	0.010	0.875	43.5 Comprs.

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
12.00	1.24074	0.00000	0.00	0.009	0.775	46.5 Comprs.
3.00	1.21697	0.00000	0.01		0.853	44.1 Comprs.
0.75	1.18463	0.00000	0.00		0.960	40.9 Comprs.

C_c = 1.04 P_c = 0.27 tsf C_r = 0.15

UNCONFINED COMPRESSION TEST



Sample No.	1				
Unconfined strength, psf	412				
Undrained shear strength, psf	206				
Failure strain, %	4.2				
Strain rate, %/min.	1.00				
Water content, %	58.2				
Wet density, pcf	103.9				
Dry density, pcf	65.7				
Saturation, %	99.9				
Void ratio	1.5862				
Specimen diameter, in.	1.382				
Specimen height, in.	3.094				
Height/diameter ratio	2.24				

Description: VSO GR CH3 W/ LNS ML

LL = 69	PL = 20	PI = 49	Assumed GS= 2.72	Type: UNDISTURBED

Project No.: 07-022135
Date Sampled: 11/3/09
Remarks:

Figure _____

Client: U.S. Army Corps of Engineers

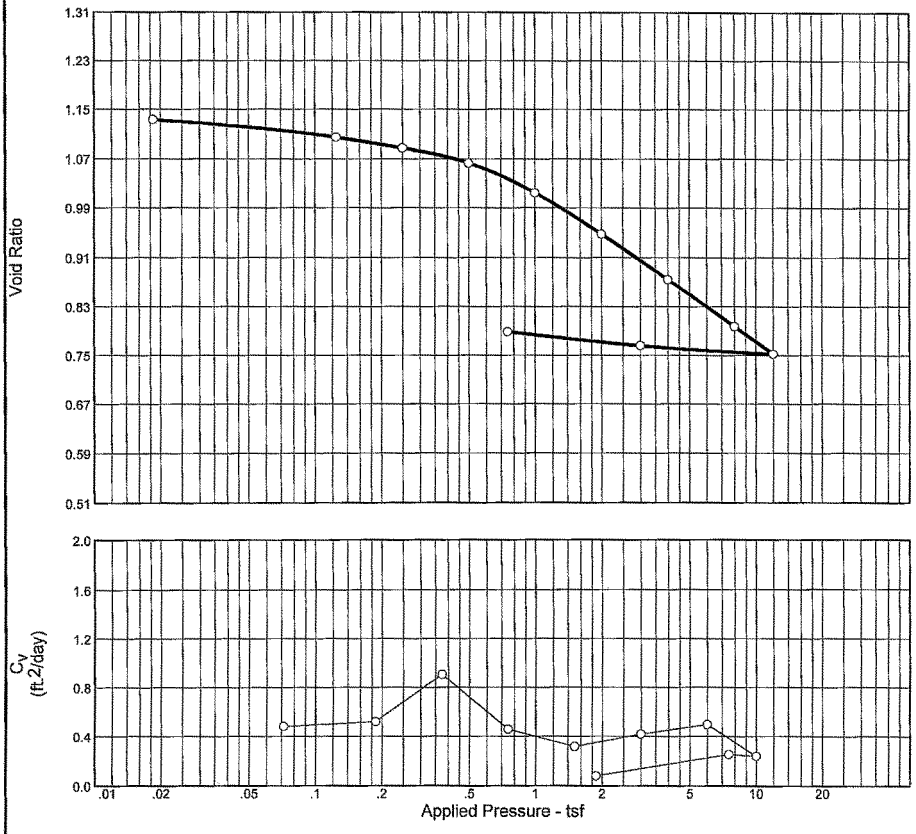
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-9U **Depth:** 24.8
Sample Number: 7B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: JC/AJL **Checked By:** MS

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
99.6 %	41.2 %	80.2	45	29	2.74	0.79	0.25	1.134

MATERIAL DESCRIPTION	USCS	AASHTO
SO GR CL6 W/ LYS & ARS CH	CL6	

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

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

Source: MRGO-09U **Sample No.:** 7C **Elev./Depth:** 25.7

FFEBJV, LLC

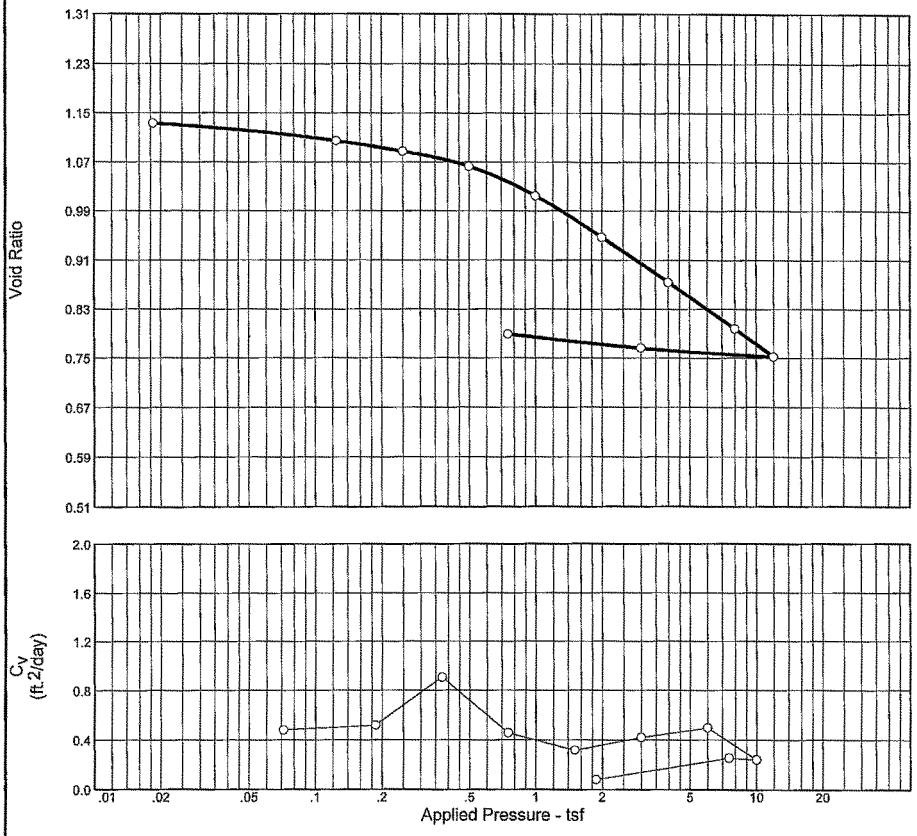
St Rose, LA

Remarks:

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

Figure

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
99.6 %	41.2 %	80.2	45	29	2.74	0.79	0.25	1.134

MATERIAL DESCRIPTION	USCS	AASHTO
SO GR CL6 W/ LYS & ARS CH	CL6	

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

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

Source: MRGO-09U **Sample No.:** 7C **Elev./Depth:** 25.7

FFEBJV, LLC

St Rose, LA

Remarks:

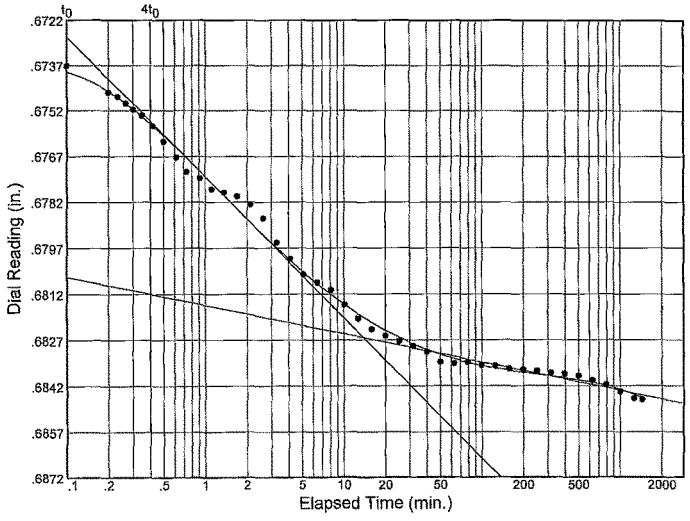
Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

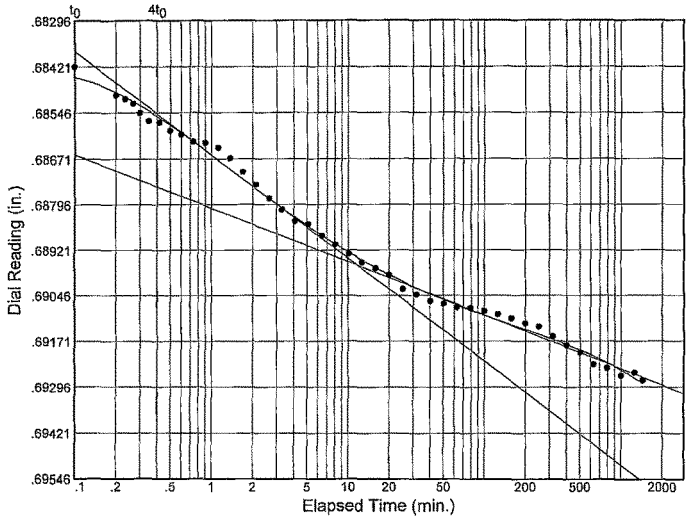
Source: MRGO-09U Sample No.: 7C Elev./Depth: 25.7



Load No.= 2
Load= 0.13 tsf
D_0 = 0.67220
D_{50} = 0.67741
D_{100} = 0.68263
T_{50} = 1.02 min.

C_v @ T_{50}
0.48 ft.2/day

C_α = 0.001



Load No.= 3
Load= 0.25 tsf
D_0 = 0.68342
D_{50} = 0.68652
D_{100} = 0.68962
T_{50} = 0.93 min.

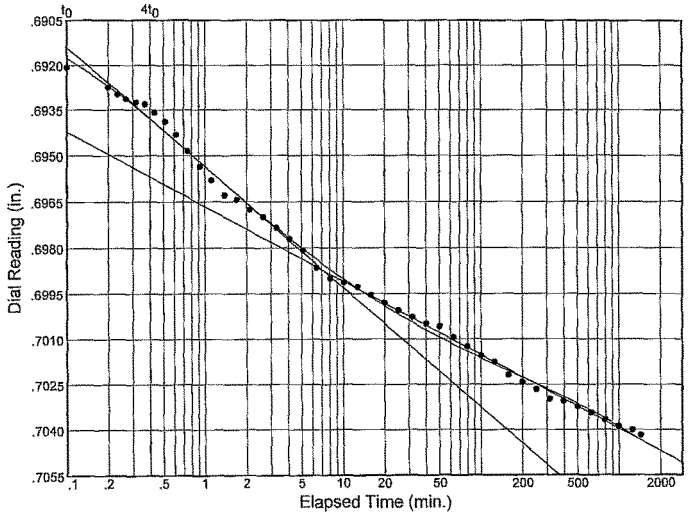
C_v @ T_{50}
0.52 ft.2/day

C_α = 0.001

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

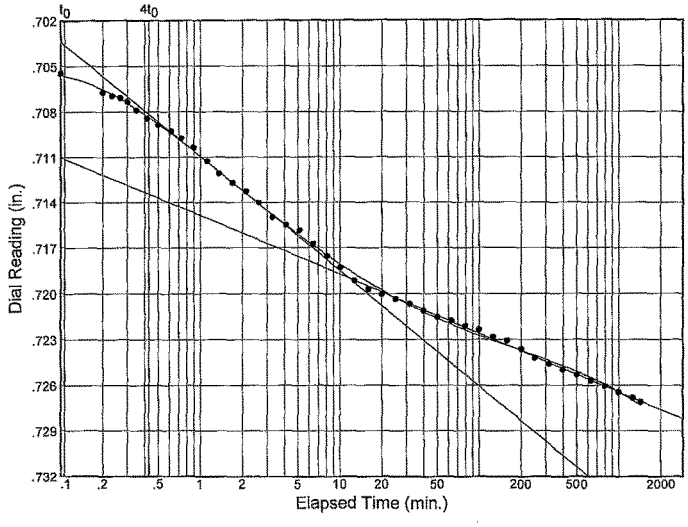
Source: MRGO-09U Sample No.: 7C Elev./Depth: 25.7



Load No.= 4
Load= 0.50 tsf
D_0 = 0.68973
D_{50} = 0.69424
D_{100} = 0.69874
T_{50} = 0.52 min.

C_v @ T_{50}
0.90 ft.2/day

C_α = 0.002



Load No.= 5
Load= 1.00 tsf
D_0 = 0.70290
D_{50} = 0.71093
D_{100} = 0.71895
T_{50} = 0.99 min.

C_v @ T_{50}
0.46 ft.2/day

C_α = 0.004

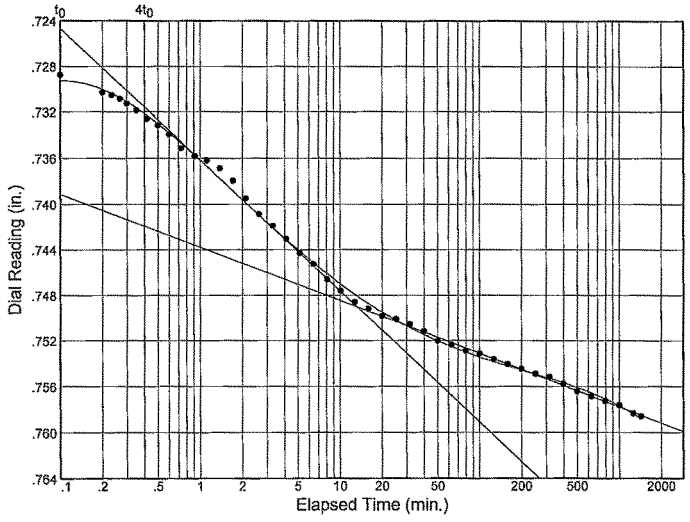
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

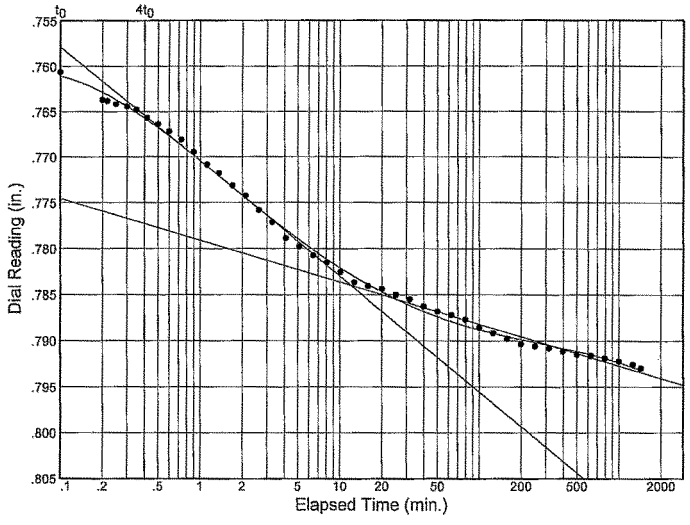
Source: MRGO-09U Sample No.: 7C Elev./Depth: 25.7



Load No.= 6
Load= 2.00 tsf
D_0 = 0.72632
D_{50} = 0.73767
D_{100} = 0.74901
T_{50} = 1.36 min.

C_v @ T_{50}
0.32 ft.2/day

C_α = 0.005



Load No.= 7
Load= 4.00 tsf
D_0 = 0.75640
D_{50} = 0.77020
D_{100} = 0.78399
T_{50} = 0.96 min.

C_v @ T_{50}
0.42 ft.2/day

C_α = 0.005

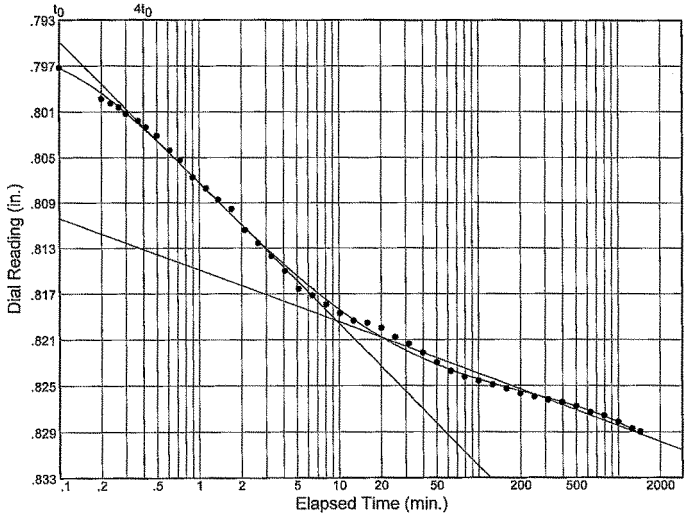
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

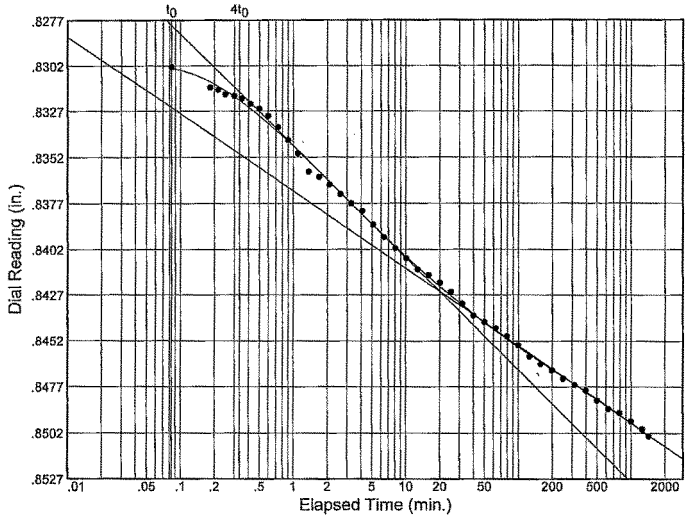
Source: MRGO-09U Sample No.: 7C Elev./Depth: 25.7



Load No.= 8
Load= 8.00 tsf
D_0 = 0.79197
D_{50} = 0.80566
D_{100} = 0.81934
T_{50} = 0.75 min.

C_v @ T_{50}
0.50 ft.^{2}/day

C_α = 0.005



Load No.= 9
Load= 12.00 tsf
D_0 = 0.82857
D_{50} = 0.83555
D_{100} = 0.84253
T_{50} = 1.44 min.

C_v @ T_{50}
0.24 ft.^{2}/day

C_α = 0.005

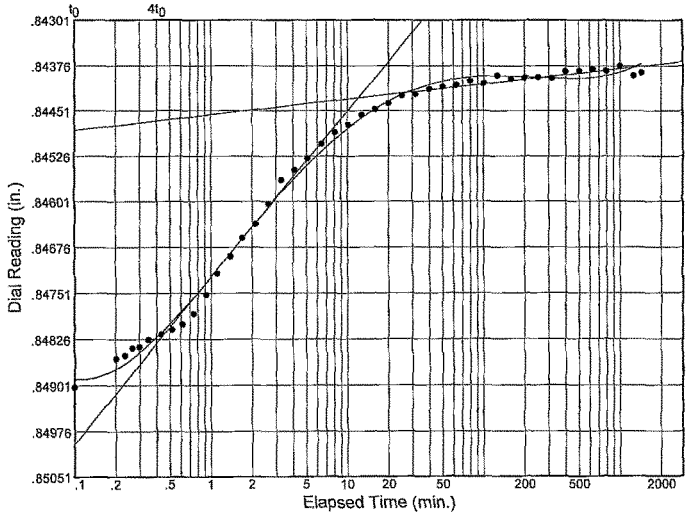
Figure

FFEBJV, LLC

Dial Reading vs. Time

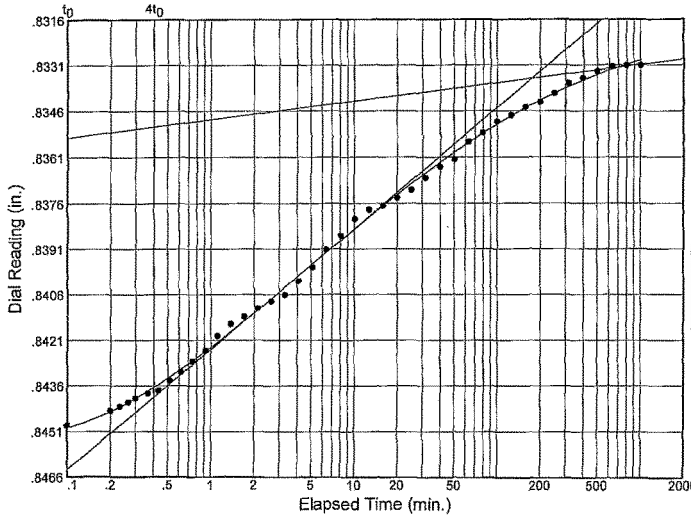
Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-09U Sample No.: 7C Elev./Depth: 25.7



Load No.= 10
Load= 3.00 tsf
D_0 = 0.84957
D_{50} = 0.84694
D_{100} = 0.84430
T_{50} = 1.30 min.

C_v @ T_{50}
0.25 ft.^{2}/day



Load No.= 11
Load= 0.75 tsf
D_0 = 0.84632
D_{50} = 0.83992
D_{100} = 0.83353
T_{50} = 4.26 min.

C_v @ T_{50}
0.08 ft.^{2}/day

Figure

CONSOLIDATION TEST DATA

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Contract No. W912P8-07-D-0022
Task Order 135
Project Number: 07-022135

Sample Data

Source: MRGO-09U
Sample No.: 7C
Elev. or Depth: 25.7 Sample Length(in./cm.):
Location:
Description: SO GR CL6 W/ LYS & ARS CH
Liquid Limit: 45 Plasticity Index: 29
USCS: CL6 AASHTO: Figure No.:
Testing Remarks: Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST		AFTER TEST	
Wet w+t	= 141.20 g.	Consolidometer #	= 18	Wet w+t	= 456.40 g.
Dry w+t	= 100.00 g.			Dry w+t	= 382.64 g.
Tare Wt.	= .00 g.	Spec. Gravity	= 2.74	Tare Wt.	= 110.87 g.
Height	= 1.00 in.	Height	= 1.00 in.		
Diameter	= 4.00 in.	Diameter	= 4.00 in.		
Weight	= 374.22 g.	Defl. Table	= n/a		
Moisture	= 41.2 %	Ht. Solids	= 0.4699 in.	Moisture	= 27.1 %
Wet Den.	= 113.2 pcf	Dry Wt.	= 264.50 g.*	Dry Wt.	= 271.77 g.
Dry Den.	= 80.2 pcf	Void Ratio	= 1.134	Void Ratio	= 0.789
		Saturation	= 99.6 %		

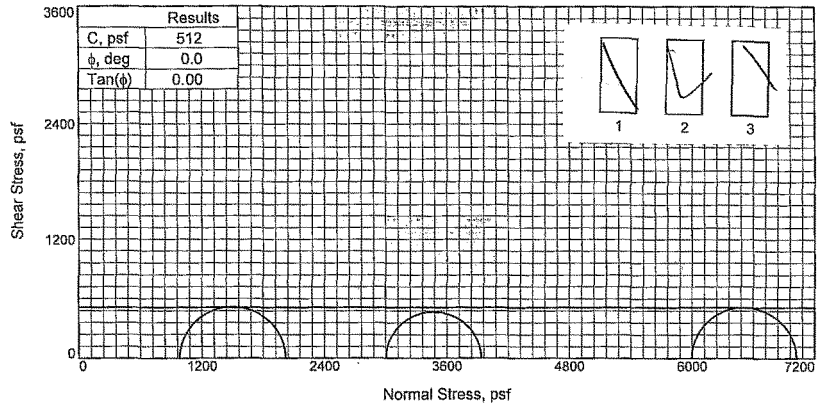
* Initial dry weight used in calculations

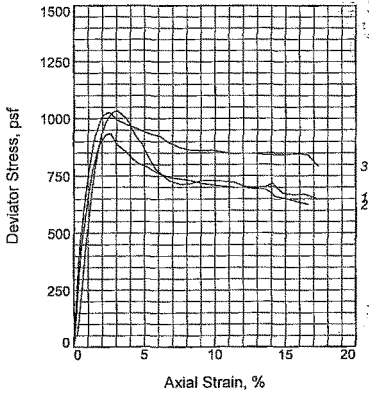
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.67115				1.134	
0.02	0.67117	0.00000			1.134	0.0 Comprs.
0.13	0.68465	0.00000	0.48	0.001	1.105	1.3 Comprs.
0.25	0.69279	0.00000	0.52	0.001	1.087	2.2 Comprs.
0.50	0.70419	0.00000	0.90	0.002	1.063	3.3 Comprs.
1.00	0.72712	0.00000	0.46	0.004	1.014	5.6 Comprs.
2.00	0.75863	0.00000	0.32	0.005	0.947	8.7 Comprs.
4.00	0.79300	0.00000	0.42	0.005	0.874	12.2 Comprs.
8.00	0.82900	0.00000	0.50	0.005	0.798	15.7 Comprs.

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
12.00	0.85037	0.00000	0.24	0.005	0.752	17.9 Comprs.
3.00	0.84386	0.00000	0.25		0.766	17.2 Comprs.
0.75	0.83311	0.00000	0.08		0.789	16.2 Comprs.

C_c = 0.25 P_c = 0.79 tsf C_r = 0.03





Sample No.		1	2	3
Initial	Water Content, %	59.3	59.2	54.0
	Dry Density, pcf	65.9	66.0	70.0
	Saturation, %	101.9	102.0	102.6
	Void Ratio	1.5945	1.5899	1.4420
	Diameter, in.	1.404	1.405	1.404
	Height, in.	3.098	3.099	3.094
At Test	Water Content, %	59.3	59.2	54.0
	Dry Density, pcf	65.9	66.0	70.0
	Saturation, %	101.9	102.0	102.6
	Void Ratio	1.5945	1.5899	1.4420
	Diameter, in.	1.404	1.405	1.404
	Height, in.	3.098	3.099	3.094
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.83	20.85	41.64
Fail. Stress, psf		1035	933	1027
Strain, %		3.0	2.6	2.4
Ult. Stress, psf		674	650	841
Strain, %				
σ_1 Failure, psf		2019	3935	7023
σ_3 Failure, psf		984	3002	5996

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: M GR CH3 W/ LNS & LYS ML, CC

LL= 66 PL= 21 PI= 45
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

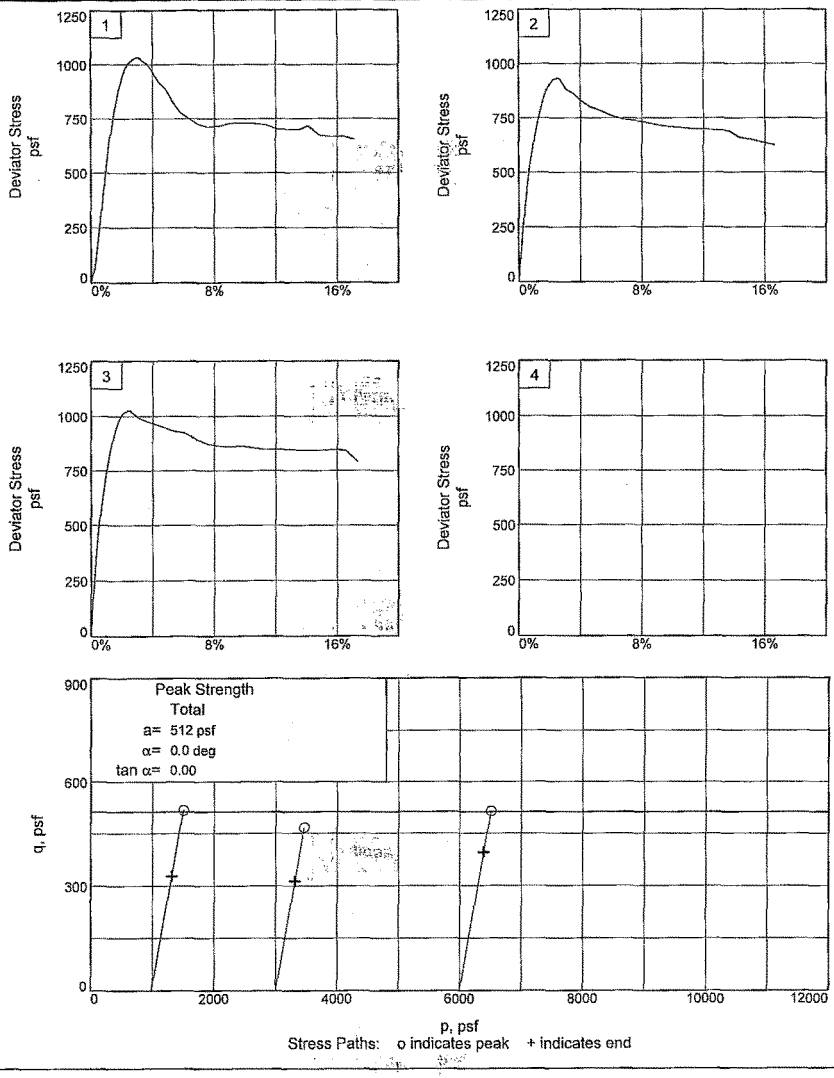
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-10U **Depth:** 32.8
Sample Number: 9B
Proj. No.: 07-022135 **Date Sampled:** 12/11/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

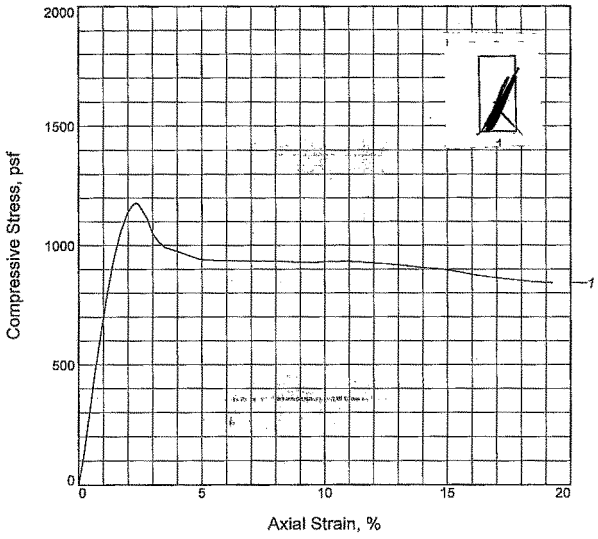
Tested By: VF/ARS **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-10U **Depth:** 32.8 **Sample Number:** 9B
Project No.: 07-022135 **Figure** _____ FFEBJV, LLC

Tested By: VF/ARS **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	1177			
Undrained shear strength, psf	588			
Failure strain, %	2.3			
Strain rate, %/min.	1.00			
Water content, %	63.6			
Wet density, pcf	102.0			
Dry density, pcf	62.3			
Saturation, %	99.9			
Void ratio	1.7443			
Specimen diameter, in.	1.410			
Specimen height, in.	3.105			
Height/diameter ratio	2.20			

Description: M GR CH4 W/ LNS ML

LL = 92	**PL** = 27	**PI** = 65	**Assumed GS**= 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/11/09
Remarks:

Figure _____

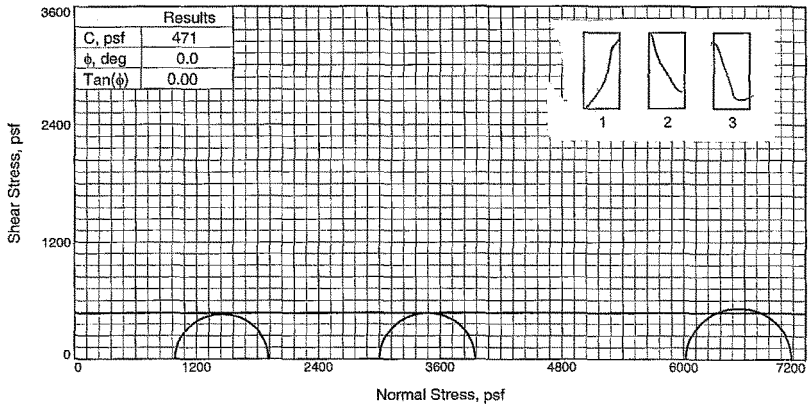
Client: U.S. Army Corps of Engineers

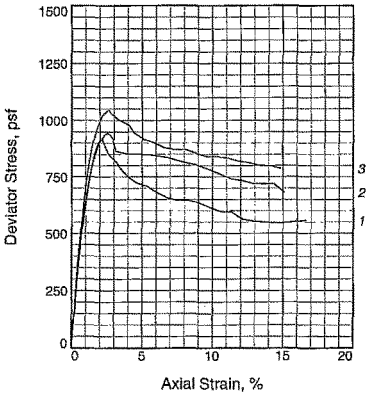
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-10U **Depth:** 36.8
Sample Number: 10B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: VF/ARS **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	65.4	65.3	65.3
	Dry Density, pcf	62.5	62.2	62.1
	Saturation, %	103.2	102.3	102.0
	Void Ratio	1.7359	1.7499	1.7534
	Diameter, in.	1.404	1.408	1.407
	Height, in.	3.096	3.101	3.103
At Test	Water Content, %	65.4	65.3	65.3
	Dry Density, pcf	62.5	62.2	62.1
	Saturation, %	103.2	102.3	102.0
	Void Ratio	1.7359	1.7499	1.7534
	Diameter, in.	1.404	1.408	1.407
	Height, in.	3.096	3.101	3.103
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.87	20.85	41.81
Fail. Stress, psf		918	944	1042
Strain, %		2.1	2.5	2.6
Ult. Stress, psf		545	682	787
Strain, %				
σ_1 Failure, psf		1907	3947	7062
σ_3 Failure, psf		989	3002	6020

Type of Test: Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CH4 W/ LNS ML, SL

LL= 88 **PL=** 27 **PI=** 61
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

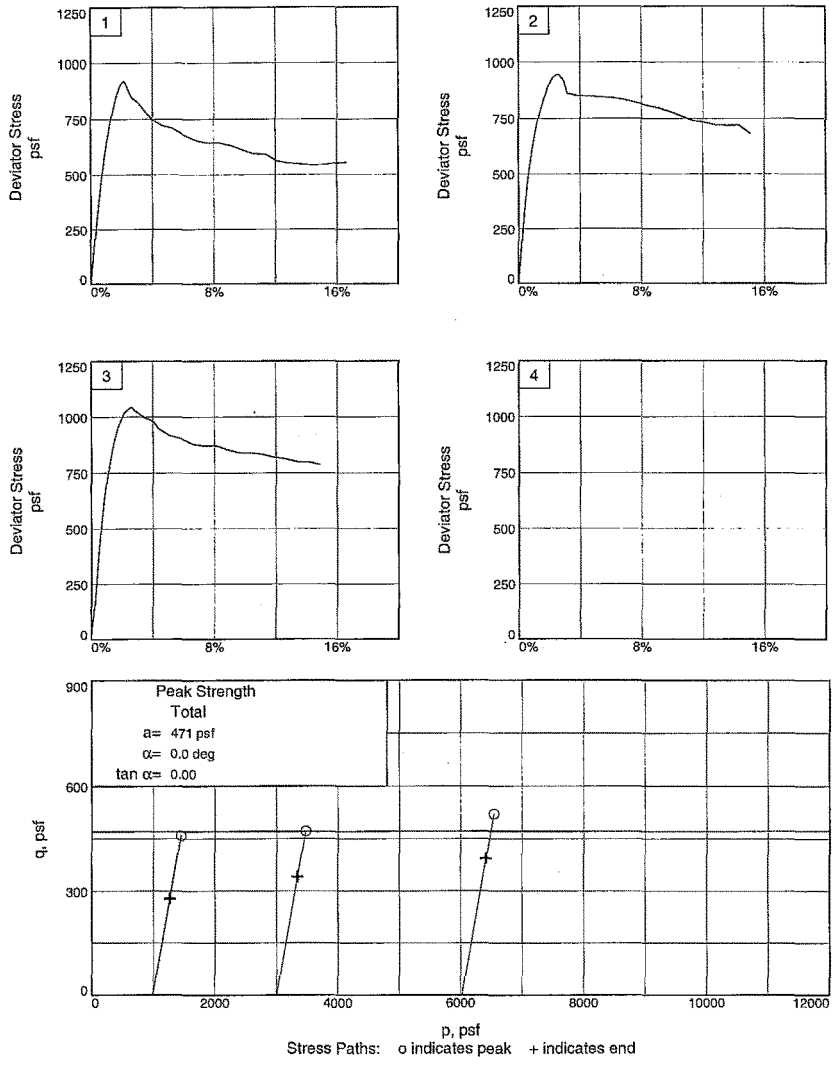
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-10U **Depth:** 40.8
Sample Number: 11B
Proj. No.: 07-022135 **Date Sampled:** 12/11/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

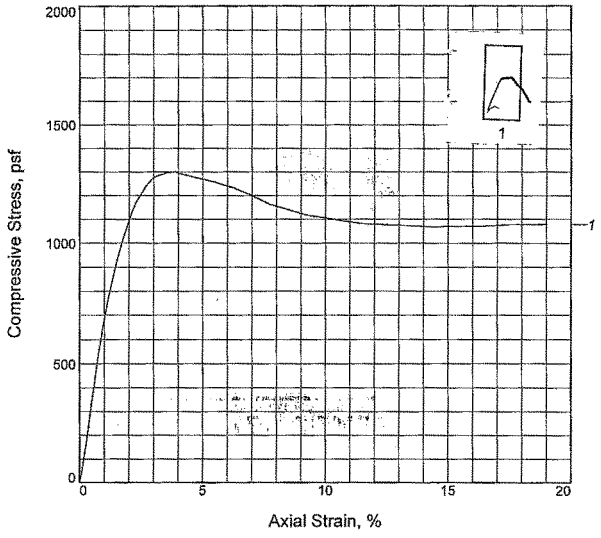
Tested By: VF/ARS ***Checked By:*** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-10U **Depth:** 40.8 **Sample Number:** 11B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: VF/ARS **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1				
Unconfined strength, psf	1301				
Undrained shear strength, psf	650				
Failure strain, %	3.9				
Strain rate, %/min.	1.00				
Water content, %	50.7				
Wet density, pcf	107.9				
Dry density, pcf	71.6				
Saturation, %	100.1				
Void ratio	1.3878				
Specimen diameter, in.	1.409				
Specimen height, in.	3.099				
Height/diameter ratio	2.20				

Description: M GR CH3 W/ LNS & LYS ML

LL = 65	PL = 25	PI = 40	**Assumed GS=** 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/11/09
Remarks:

Client: U.S. Army Corps of Engineers

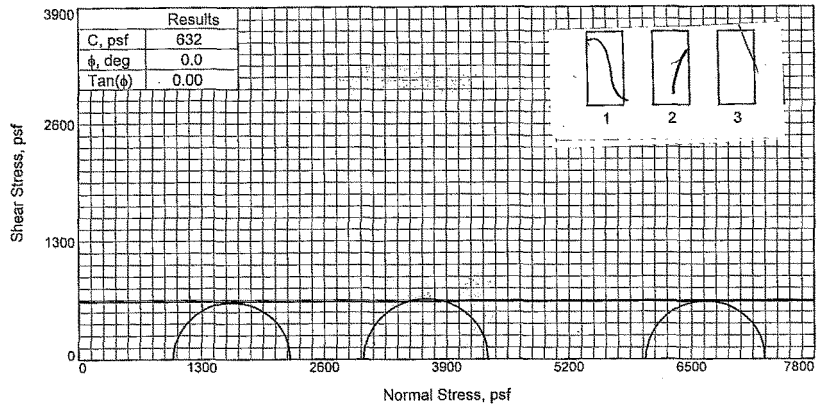
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-10U **Depth:** 46.6
Sample Number: 12C

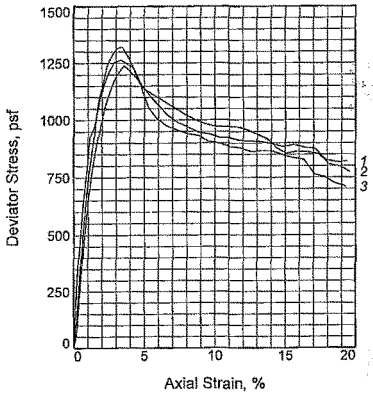
UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Figure _____

Tested By: VF/ARS **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	58.9	59.1	61.4
	Dry Density, pcf	65.6	66.0	64.4
	Saturation, %	100.4	101.7	101.5
	Void Ratio	1.6072	1.5907	1.6577
	Diameter, in.	1.410	1.404	1.405
	Height, in.	3.102	3.098	3.104
At Test	Water Content, %	58.9	59.1	61.4
	Dry Density, pcf	65.6	66.0	64.4
	Saturation, %	100.4	101.7	101.5
	Void Ratio	1.6072	1.5907	1.6577
	Diameter, in.	1.410	1.404	1.405
	Height, in.	3.102	3.098	3.104
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.94	20.96	41.77
Fail. Stress, psf		1238	1321	1264
Strain, %		3.6	3.4	3.4
Ult. Stress, psf		882	855	848
Strain, %				
σ_1 Failure, psf		2237	4340	7278
σ_3 Failure, psf		999	3019	6014

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: M GR CH4 W/ LNS & LYS ML, SL

LL= 76 **PL=** 23 **PI=** 53
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

Client: U.S. Army Corps of Engineers

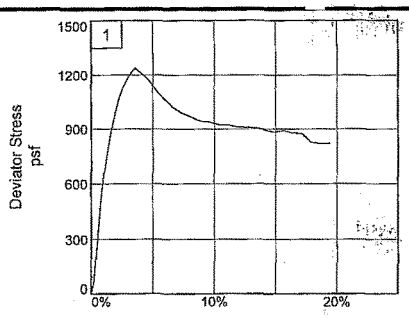
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La

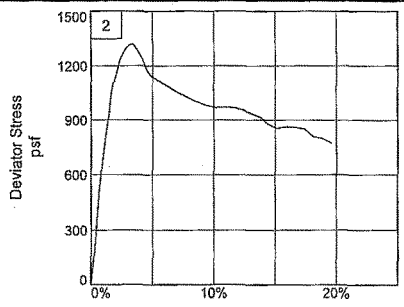
Source of Sample: MRGO-10U **Depth:** 49.7
Sample Number: 13C
Proj. No.: 07-022135 **Date Sampled:** 12/11/09

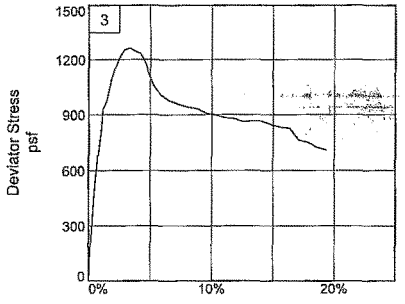
TRIAXIAL SHEAR TEST REPORT

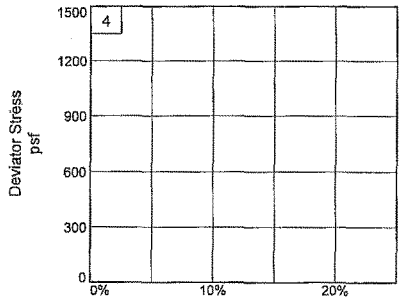
FFEBJV, LLC

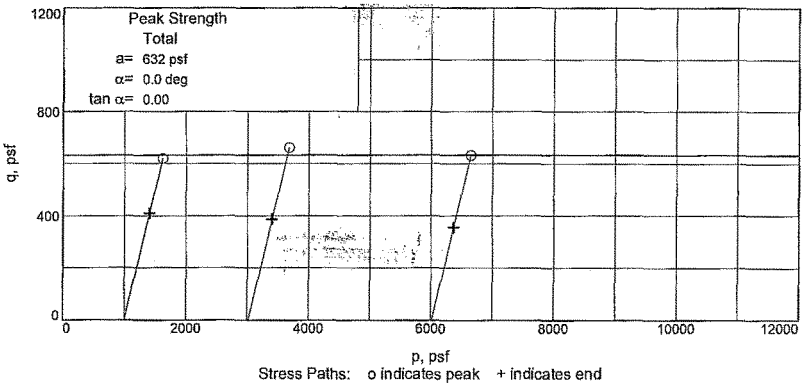
Tested By: VF/ARS **Checked By:** MS









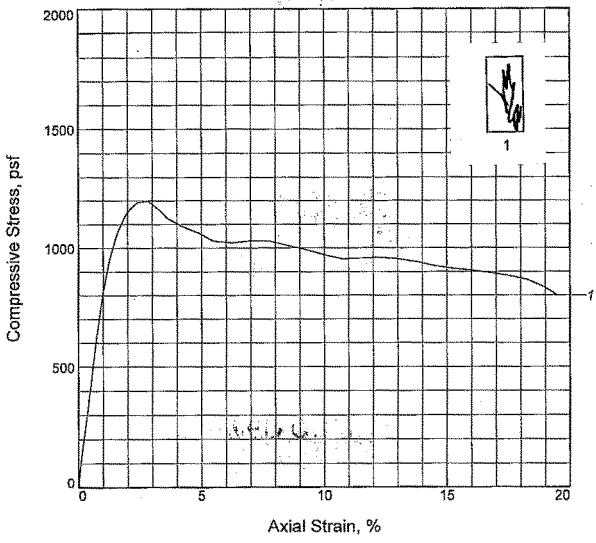


Stress Paths: o indicates peak + indicates end

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-10U **Depth:** 49.7 **Sample Number:** 13C
Project No.: 07-022135 **Figure** _____ FFEBJV, LLC

Tested By: VF/ARS **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	1198			
Undrained shear strength, psf	599			
Failure strain, %	2.8			
Strain rate, %/min.	1.00			
Water content, %	60.7			
Wet density, pcf	103.2			
Dry density, pcf	64.2			
Saturation, %	100.1			
Void ratio	1.6634			
Specimen diameter, in.	1.405			
Specimen height, in.	3.101			
Height/diameter ratio	2.21			

Description: M GR CH4 W/ LNS ML

LL = 93	**PL** = 26	**PI** = 67	**Assumed GS**= 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/11/09
Remarks:

Figure _____

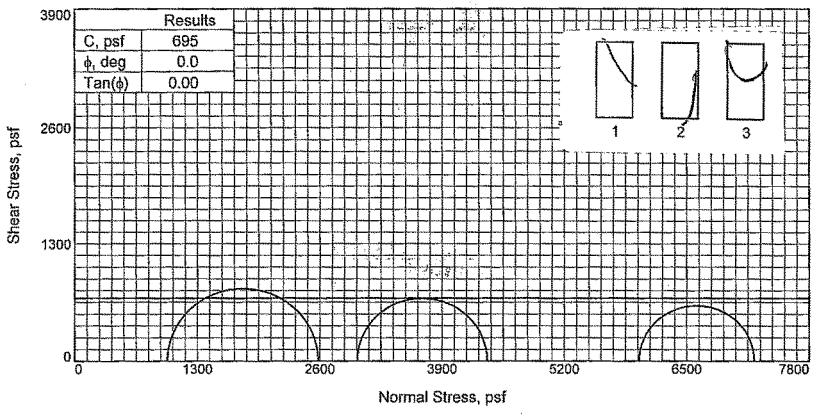
Client: U.S. Army Corps of Engineers

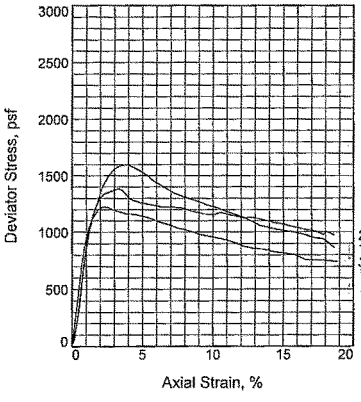
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-10U **Depth:** 53.7
Sample Number: 14C

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: VF/ALJ **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	63.6	63.4	65.4
	Dry Density, pcf	63.1	63.0	62.2
	Saturation, %	101.9	101.3	102.2
	Void Ratio	1.7106	1.7141	1.7520
	Diameter, in.	1.407	1.410	1.408
	Height, in.	3.103	3.100	3.100
At Test	Water Content, %	63.6	63.4	65.4
	Dry Density, pcf	63.1	63.0	62.2
	Saturation, %	101.9	101.3	102.2
	Void Ratio	1.7106	1.7141	1.7520
	Diameter, in.	1.407	1.410	1.408
	Height, in.	3.103	3.100	3.100
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.82	20.81	41.63
Fail. Stress, psf		1600	1385	1223
Strain, %		3.9	3.3	2.2
Ult. Stress, psf		1018	1068	813
Strain, %				
σ_1 Failure, psf		2582	4381	7218
σ_3 Failure, psf		982	2997	5994

Type of Test: Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: M GR CH4 W/ LNS ML, SL

LL= 90 **PL=** 28 **PI=** 62
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

Client: U.S. Army Corps of Engineers

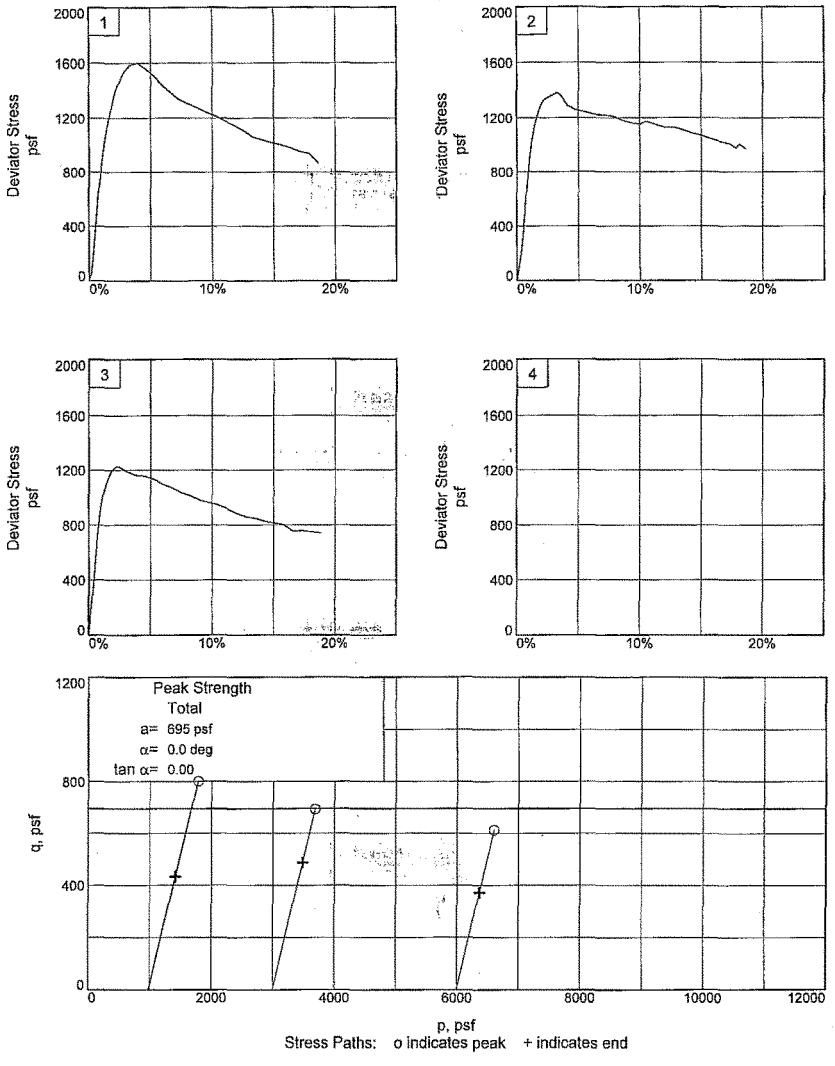
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La

Source of Sample: MRGO-10U **Depth:** 57.7
Sample Number: 15C
Proj. No.: 07-022135 **Date Sampled:** 12/11/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

Tested By: VF/ARS **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-10U **Depth:** 57.7 **Sample Number:** 15C
Project No.: 07-022135 **Figure** _____ FFEBJV, LLC

Tested By: VF/ARS **Checked By:** MS

SUMMARY OF LABORATORY TEST RESULTS

Project: MRGO Ecosystem Restoration Feasibility Study Assigned By: _____

Project Number: 07-022135 Current Date: 1/19/2010
Boring: MRGO-11U

Sample Number	Depth	Visual Classification	USCS	E(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
1A	0.0	VSO DGR CHOC W/ WD, RT	CHOC		230												
1B	0.8	VSO DGR CHOC W/ WD, RT	CHOC		330												
1C	1.7	VSO DGR CHOC W/ WD, RT	CHOC		329												
2A	4.0	VSO GR CHOC W/ RT, WD	CHOC		214												
2B	4.8	VSO GR CHOC W/ RT, WD	CHOC		265												
2C	5.7	SO GR CL4 W/ LNS & LYS ML	CL4		34	91	122	100	UU	0	333		33	25	8	0.13	
2D	6.6	SO GR CL4 W/ WD	CL4		31												
3A	8.0	SO GR CL4	CL4		43												
3B	8.8	GR ML	ML		32												
3C	9.7	GR ML W/ LNS & LYS CH	ML		31												
3D	10.6	GR ML W/ LNS & LYS CH	ML		32												
4A	12.0	VSO GR CH2 W/ LNS & LYS ML, SIF	CH2		54												
4B	12.8	VSO GR CH2 W/ LNS & LYS ML, SIF	CH2	15	61	65	104	100	UC	-	128	255	53	20	33	0.14	
4C	13.7	VSO GR CH2 W/ SIF, WD	CH2		66												
4D	14.6	VSO GR CH2 W/ LNS ML, SIF, WD	CH2		51												
5A	16.0	VSO GR CH4 W/ ARS ML, SIF	CH4		70												
5B	16.8	VSO GR CH4 W/ ARS ML, SIF, WD	CH4		96												
5C	17.7	VSO GR CH2 W/ ARS ML	CH2		49	74	111	100	UU	0	217		51	21	30	0.14	
5D	18.6	SO GR CH2 W/ ARS & LNS ML, SIF, WD	CH2		60	64	102	98					52	18	34		Gs, CON
6A	20.0	SO GR CH4 W/ LNS & LYS ML	CH4		77												
6B	20.8	VSO GR CH3 W/ LNS & LYS ML	CH3	4	61	66	107	100	UC	-	234	469	69	22	47	0.17	
6C	21.7	VSO GR CH3 W/ LNS & LYS ML	CH3		65												
6D	22.6	SO GR CH4	CH4		53												
7A	24.0	SO GR CH4 W/ LNS & LYS ML	CH4		52												
7B	24.8	SO GR CH4 W/ LNS & LYS ML	CH4		58												
7C	25.7	SO GR CH4 W/ LNS ML	CH4		74	57	100	100	UU	0	358		94	25	69	0.20	
7D	26.6	SO GR CH4 W/ LNS ML	CH4		51												
8A	28.0	SO GR CH4	CH4		58												
8B	28.8	SO GR CH4 W/ ARS ML	CH4	4	58	67	106	100	UC	-	382	764	76	22	54	0.19	
8C	29.7	SO GR CH4 W/ LNS & LYS ML	CH4		53												
8D	30.6	SO GR CH4 W/ LNS & LYS ML	CH4		59												
9A	32.0	SO GR CH4 W/ LNS & LYS ML, SIF	CH4		65												
9B	32.8	SO GR CL6 W/ ARS & LNS ML, O, SIF	CL6		55	66	102	95					44	19	25		Gs, CON
9C	33.7	SO GR CH2 W/ LNS & LYS ML, SIF	CH2		52	72	108	100	UU	0	407		56	20	36	0.27	
9D	34.6	SO GR CH4 W/ LNS & LYS ML, SIF	CH4		54												
10A	36.0	SO GR CH4 W/ LNS & LYS ML	CH4		55												
10B	36.8	SO GR CH4 W/ LNS & LYS ML	CH4	3	57	68	106	100	UC	-	479	958	84	26	58	0.22	

Remarks: _____
FFEB JV, LLC

Checked By: MS/WM
File Name: MRGO-11U.xls

SUMMARY OF LABORATORY TEST RESULTS

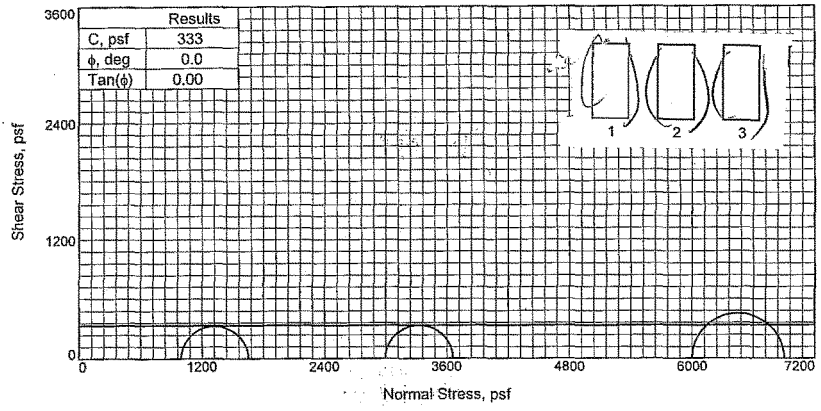
Project: MRGO Ecosystem Restoration Feasibility Study Assigned By: _____

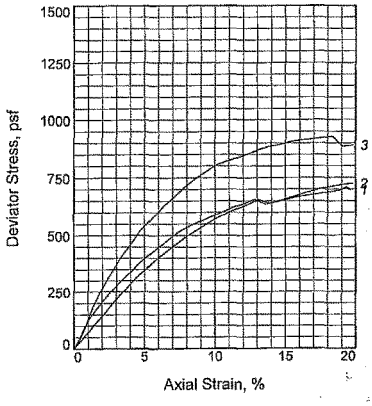
Project Number: 07-022135 Current Date: 1/19/2010
Boring: MRGO-11U

Sample Number	Depth	Visual Classification	USCS	E(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
10C	37.7	M GR CH4 W/ LNS & LYS ML	CH4		49												
11A	40.0	SO GR CH3 W/ LNS & LYS SM	CH3		65												
11B	40.8	VSO GR CH4 W/ LNS & LYS SM	CH4		63	63	103	100	UU	0	227		70	24	46	0.20	
11C	41.7	SO GR CH4 W/ LNS & LYS SM	CH4		57												
12A	44.0	SO GR CH4 W/ LNS & LYS ML	CH4		60												
12B	44.8	SO GR CH4 W/ LNS & LYS ML	CH4	4	59	66	105	100	UC	-	452	904	76	25	51	0.22	
12C	45.7	SO GR CH4 W/ LNS & LYS ML	CH4		57												
12D	46.6	SO GR CH4 W/ LNS & LYS ML	CH4		60												
13A	48.0	SO GR CH4 W/ LNS ML	CH4		69												
13B	48.8	M GR CH4 W/ LNS ML, SIF	CH4		67	62	102	100	UU	0	525		91	27	64	0.27	
13C	49.7	M GR CH4 W/ LNS ML, SIF	CH4		65												
13D	50.6	M GR CH4 W/ LNS ML, SIF	CH4		66												
14A	52.0	M GR CH4 W/ LNS ML, O	CH4		70												
14B	52.8	M GR CH4 W/ LNS ML, O	CH4	4	64	63	103	100	UC	-	568	1136	90	27	63	0.25	
14C	53.7	M GR CH4 W/ LNS ML, O	CH4		63												
15A	56.0	M GR CH4 W/ LNS ML	CH4		54												
15B	56.8	M GR CH4 W/ LNS ML, SL	CH4		66	62	103	100	UU	0	627		87	28	59	0.30	
15C	57.7	M GR CH4 W/ LNS ML	CH4		60												
15D	58.6	M GR CH4 W/ LNS ML	CH4		60												

Remarks: _____
FFEB JV, LLC

Checked By: _____
File Name: MRGO-11U.xls





Sample No.		1	2	3
Initial	Water Content, %	34.4	33.4	33.3
	Dry Density, pcf	89.4	92.5	91.9
	Saturation, %	104.9	109.9	107.7
	Void Ratio	0.8849	0.8213	0.8351
	Diameter, in.	1.376	1.378	1.376
	Height, in.	3.093	3.069	3.085
At Test	Water Content, %	34.4	33.4	33.3
	Dry Density, pcf	89.4	92.5	91.9
	Saturation, %	104.9	109.9	107.7
	Void Ratio	0.8849	0.8213	0.8351
	Diameter, in.	1.376	1.378	1.376
	Height, in.	3.093	3.069	3.085
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.92	20.80	41.66
Fail. Stress, psf		656	664	904
Strain, %		12.8	15.4	15.3
Ult. Stress, psf		634	664	904
Strain, %				
σ_1 Failure, psf		1652	3659	6903
σ_3 Failure, psf		996	2995	5999

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CL4 W/ LNS & LYS ML

LL= 33 **PL=** 25 **PI=** 8
Assumed Specific Gravity= 2.70
Remarks:

Figure _____

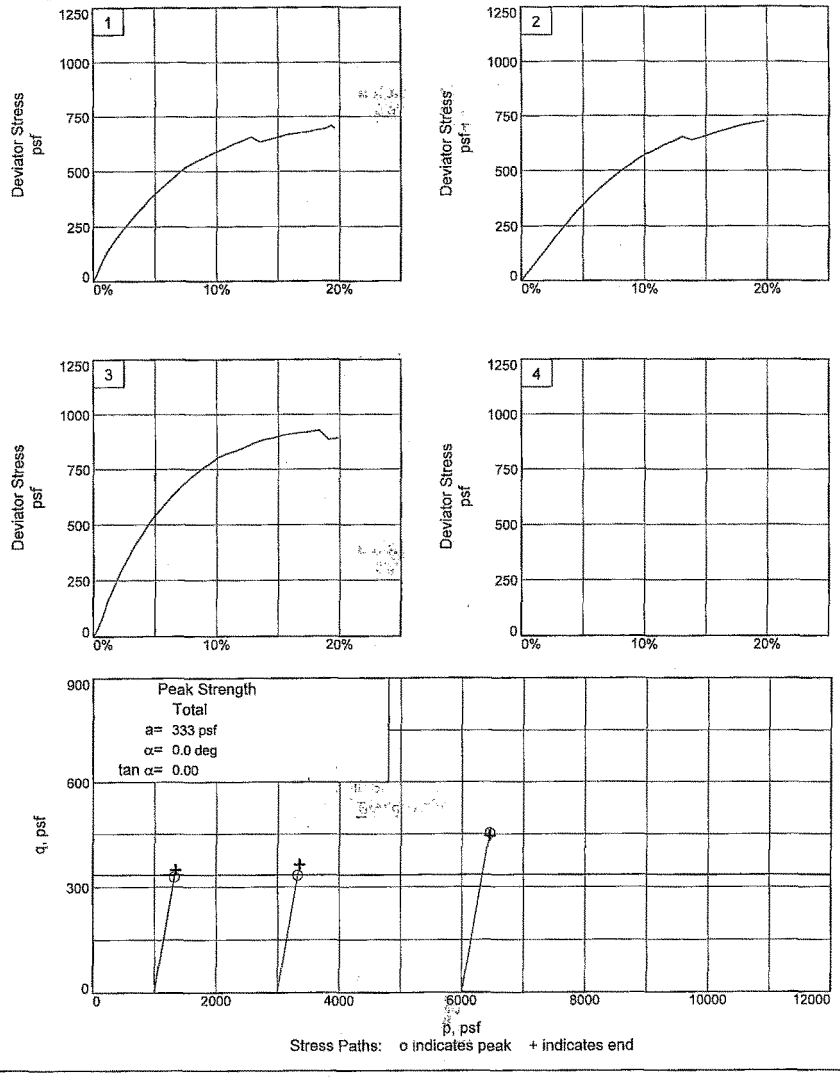
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-11U **Depth:** 5.7
Sample Number: 2C
Proj. No.: 07-022135 **Date Sampled:** 12/4/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

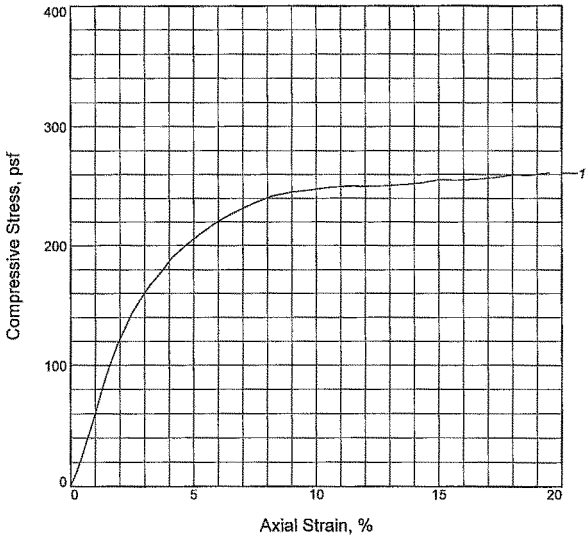
Tested By: ARS/VF **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-11U **Depth:** 5.7 **Sample Number:** 2C
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: ARS/VF **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1				
Unconfined strength, psf	255				
Undrained shear strength, psf	128				
Failure strain, %	15.0				
Strain rate, %/min.	1.00				
Water content, %	61.4				
Wet density, pcf	104.4				
Dry density, pcf	64.7				
Saturation, %	102.8				
Void ratio	1.6251				
Specimen diameter, in.	1.377				
Specimen height, in.	3.102				
Height/diameter ratio	2.25				

Description: VSO GR CH2 W/ LNS & LYS ML, SIF

LL = 53	**PL** = 20	**PI** = 33	**Assumed GS=** 2.72	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/4/09
Remarks:

Figure _____

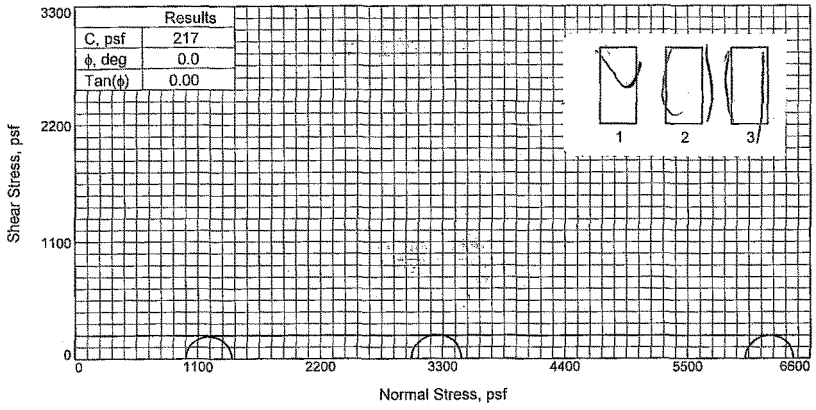
Client: U.S. Army Corps of Engineers

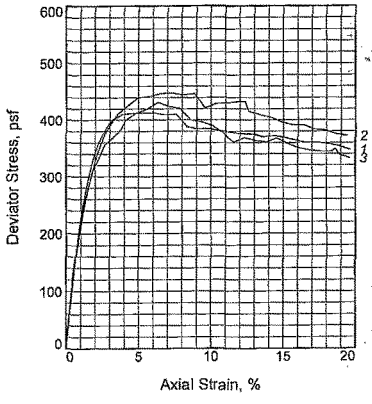
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-11U **Depth:** 12.8
Sample Number: 4B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: TSL/VF **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	49.6	48.8	49.5
	Dry Density, pcf	74.1	74.9	74.0
	Saturation, %	104.3	104.7	104.0
	Void Ratio	1.2925	1.2660	1.2953
	Diameter, in.	1.378	1.377	1.382
	Height, in.	3.091	3.091	3.087
At Test	Water Content, %	49.6	48.8	49.5
	Dry Density, pcf	74.1	74.9	74.0
	Saturation, %	104.3	104.7	104.0
	Void Ratio	1.2925	1.2660	1.2953
	Diameter, in.	1.378	1.377	1.382
	Height, in.	3.091	3.091	3.087
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.90	20.97	41.80
Fail. Stress, psf		413	448	431
Strain, %		5.3	7.3	6.3
Ult. Stress, psf		369	396	358
Strain, %				
σ_1 Failure, psf		1406	3468	6451
σ_3 Failure, psf		993	3020	6020

Type of Test: Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: VSO GR CH2 W/ ARS ML

LL= 51 **PL=** 21 **PI=** 30
Assumed Specific Gravity= 2.72
Remarks:

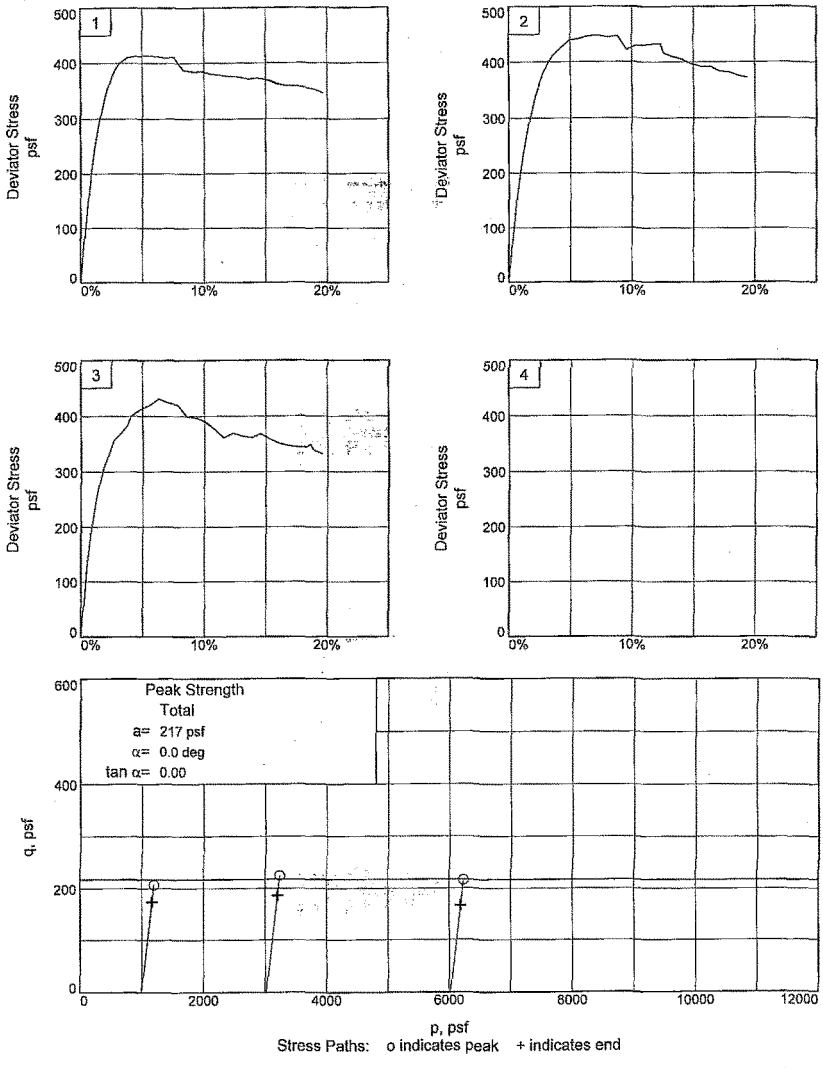
Figure _____

Client: U.S. Army Corps of Engineers
Wate...
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-11U **Depth:** 17.7
Sample Number: 5C
Proj. No.: 07-022135 **Date Sampled:** 12/4/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

Tested By: ARS/VF **Checked By:** MS

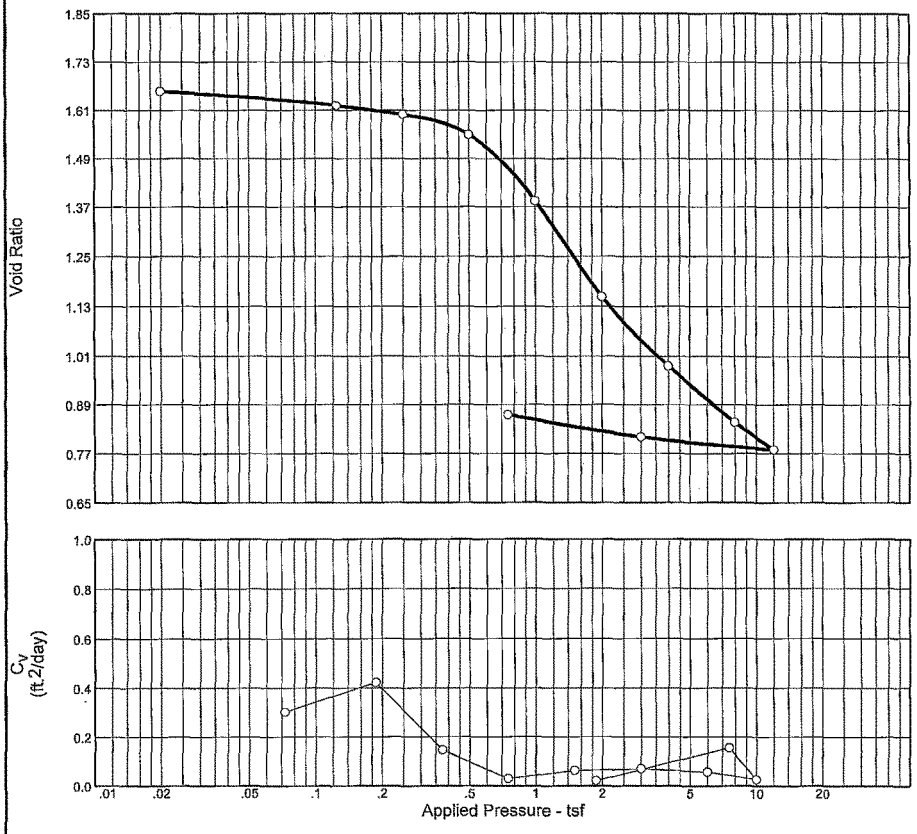


Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-11U **Depth:** 17.7 **Sample Number:** 5C
Project No.: 07-022135 **Figure** _____

FFEBJV, LLC

Tested By: ARS/VF **Checked By:** MS

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
98.4 %	60.0 %	63.9	52	34	2.72	0.62	0.75	1.658

MATERIAL DESCRIPTION	USCS	AASHTO
SO GR CH2 W/ ARS & LNS ML, SIF, WD	CH2	

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

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

Source: MRGO-11U **Sample No.:** 5D **Elev./Depth:** 18.6

FFEBJV, LLC

St Rose, LA

Remarks:

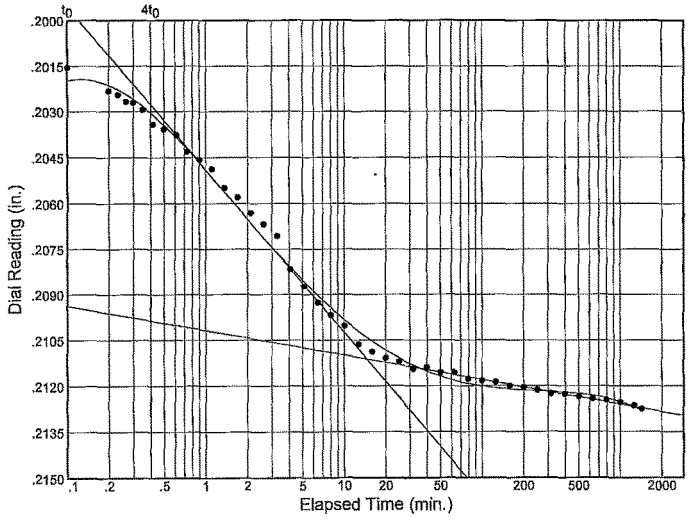
Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

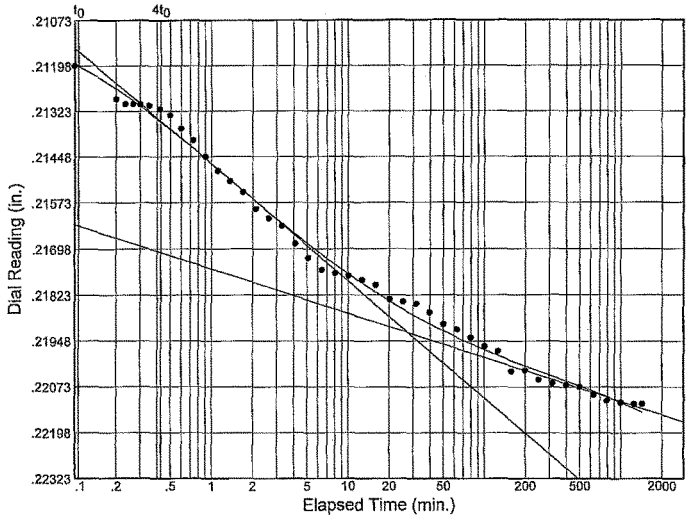
Source: MRGO-11U Sample No.: 5D Elev./Depth: 18.6



Load No.= 2
Load= 0.13 tsf
D_0 = 0.20092
D_{50} = 0.20602
D_{100} = 0.21112
T_{50} = 1.62 min.

C_v @ T_{50}
0.30 ft.^{2}/day

C_α = 0.001



Load No.= 3
Load= 0.25 tsf
D_0 = 0.21044
D_{50} = 0.21485
D_{100} = 0.21925
T_{50} = 1.13 min.

C_v @ T_{50}
0.42 ft.^{2}/day

C_α = 0.001

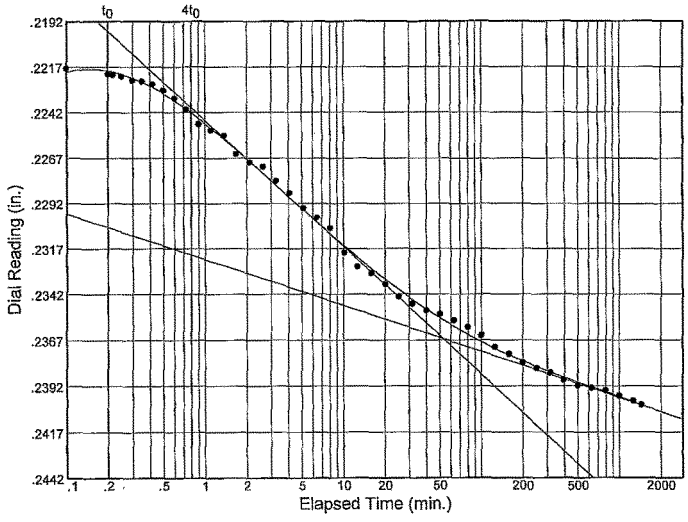
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

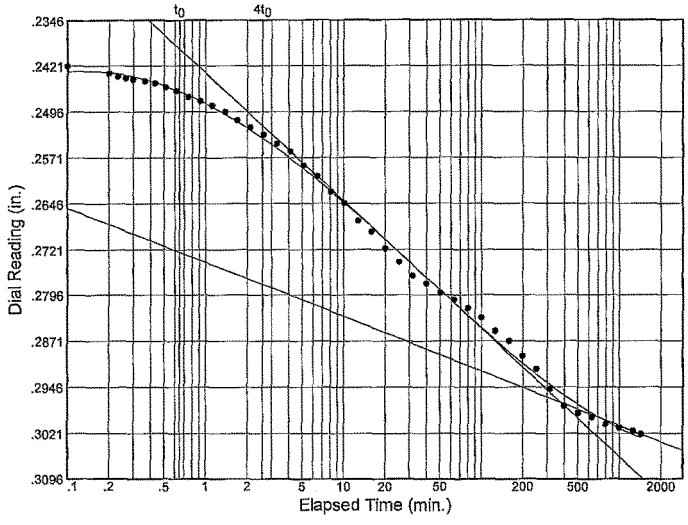
Source: MRGO-11U Sample No.: 5D Elev./Depth: 18.6



Load No.= 4
Load= 0.50 tsf
D_0 = 0.21962
D_{50} = 0.22812
D_{100} = 0.23662
T_{50} = 3.18 min.

C_v @ T_{50}
0.15 ft.^{2}/day

C_α = 0.003



Load No.= 5
Load= 1.00 tsf
D_0 = 0.23864
D_{50} = 0.26785
D_{100} = 0.29706
T_{50} = 14.86 min.

C_v @ T_{50}
0.03 ft.^{2}/day

C_α = 0.009

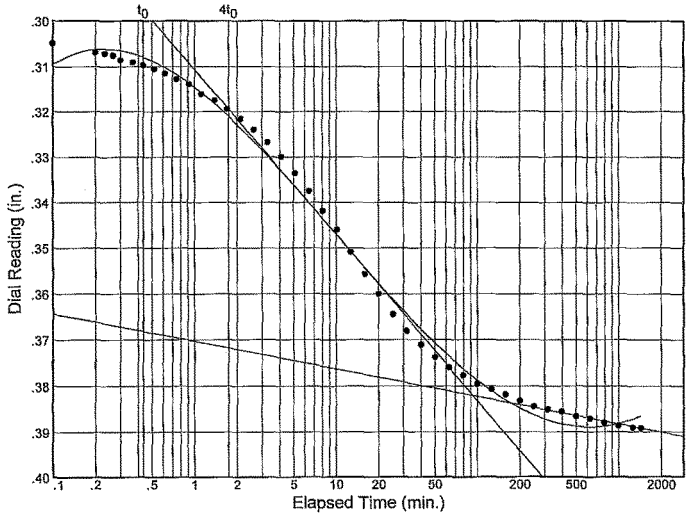
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

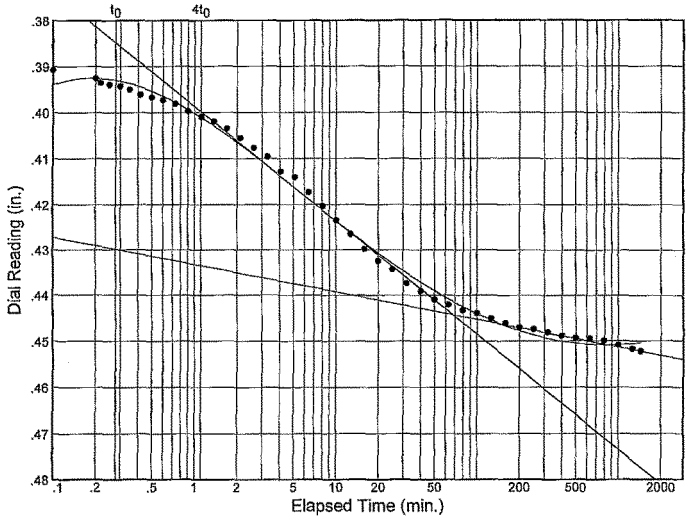
Source: MRGO-11U Sample No.: 5D Elev./Depth: 18.6



Load No.= 6
Load= 2.00 tsf
D_0 = 0.29480
D_{50} = 0.33843
D_{100} = 0.38206
T_{50} = 5.79 min.

C_v @ T_{50}
0.06 ft.^{2}/day

C_α = 0.007



Load No.= 7
Load= 4.00 tsf
D_0 = 0.38490
D_{50} = 0.41457
D_{100} = 0.44425
T_{50} = 4.32 min.

C_v @ T_{50}
0.07 ft.^{2}/day

C_α = 0.007

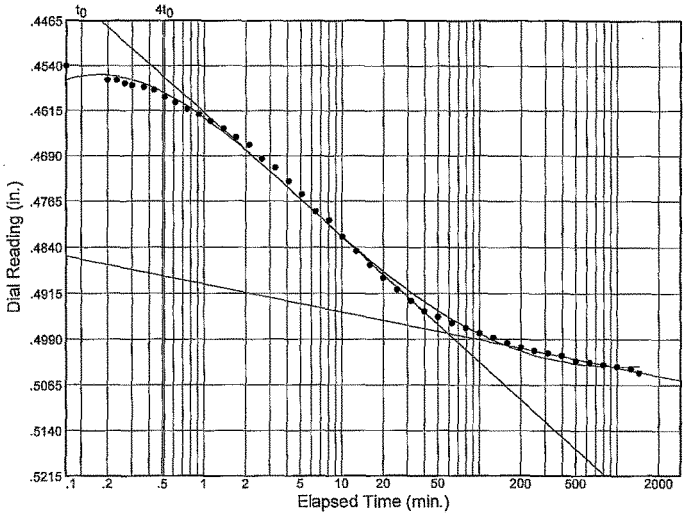
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

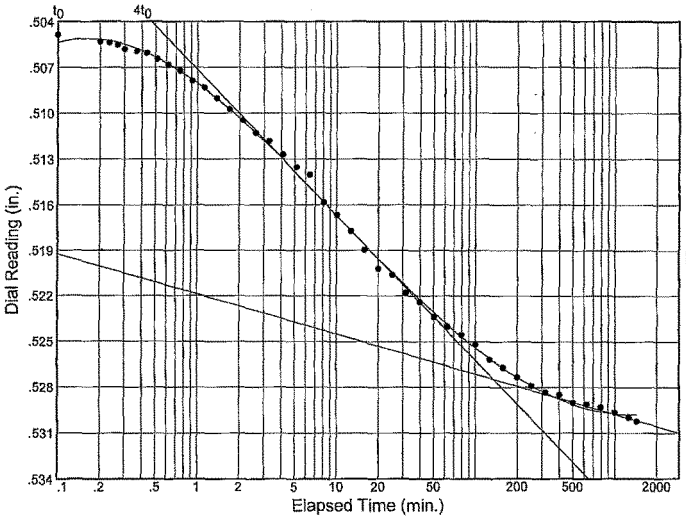
Source: MRGO-11U Sample No.: 5D Elev./Depth: 18.6



Load No.= 8
Load= 8.00 tsf
D_0 = 0.45288
D_{50} = 0.47546
D_{100} = 0.49804
T_{50} = 4.62 min.

C_v @ T_{50}
0.06 ft.2/day

C_α = 0.006



Load No.= 9
Load= 12.00 tsf
D_0 = 0.50484
D_{50} = 0.51616
D_{100} = 0.52748
T_{50} = 8.78 min.

C_v @ T_{50}
0.03 ft.2/day

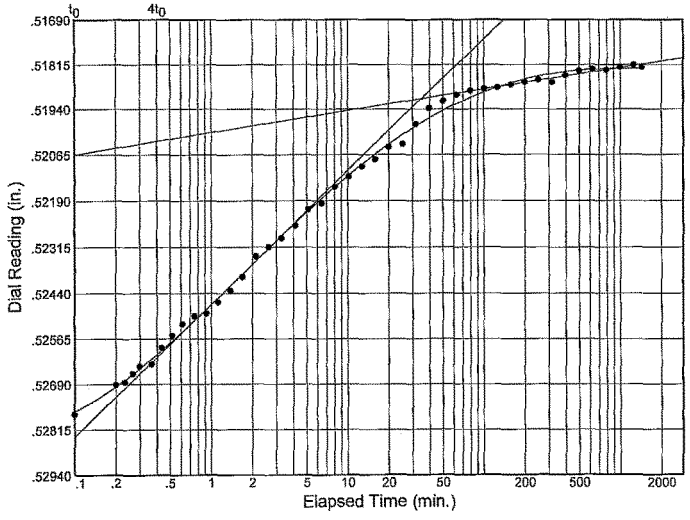
C_α = 0.004

Figure

Dial Reading vs. Time

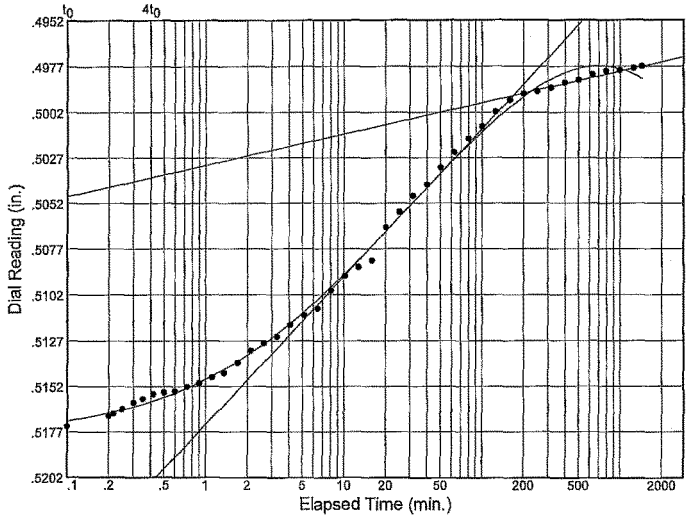
Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-11U Sample No.: 5D Elev./Depth: 18.6



Load No.= 10
Load= 3.00 tsf
D_0 = 0.52922
D_{50} = 0.52417
D_{100} = 0.51911
T_{50} = 1.41 min.

C_v @ T_{50}
0.16 ft.^{2}/day



Load No.= 11
Load= 0.75 tsf
D_0 = 0.51819
D_{50} = 0.50874
D_{100} = 0.49929
T_{50} = 11.22 min.

C_v @ T_{50}
0.02 ft.^{2}/day

FFEBJV, LLC

Figure

CONSOLIDATION TEST DATA

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Contract No. W912P8-07-D-0022
Task Order 135
Project Number: 07-022135

Sample Data

Source: MRGO-11U
Sample No.: 5D
Elev. or Depth: 18.6 Sample Length(in./cm.):
Location:
Description: SO GR CH2 W/ ARS & LNS ML, SIF, WD
Liquid Limit: 52 Plasticity Index: 34
USCS: CH2 AASHTO: Figure No.:
Testing Remarks: Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST		AFTER TEST	
Wet w+t =	159.98 g.	Consolidometer # =	1	Wet w+t =	399.25 g.
Dry w+t =	100.00 g.			Dry w+t =	323.45 g.
Tare Wt. =	.00 g.	Spec. Gravity =	2.72	Tare Wt. =	112.56 g.
Height =	1.00 in.	Height =	1.00 in.		
Diameter =	4.00 in.	Diameter =	4.00 in.		
Weight =	337.38 g.	Defl. Table =	n/a		
Moisture =	60.0 %	Ht. Solids =	0.3767 in.	Moisture =	35.9 %
Wet Den. =	102.2 pcf	Dry Wt. =	210.84 g.*	Dry Wt. =	210.89 g.
Dry Den. =	63.9 pcf	Void Ratio =	1.658	Void Ratio =	0.865
		Saturation =	98.4 %		

* Initial dry weight used in calculations

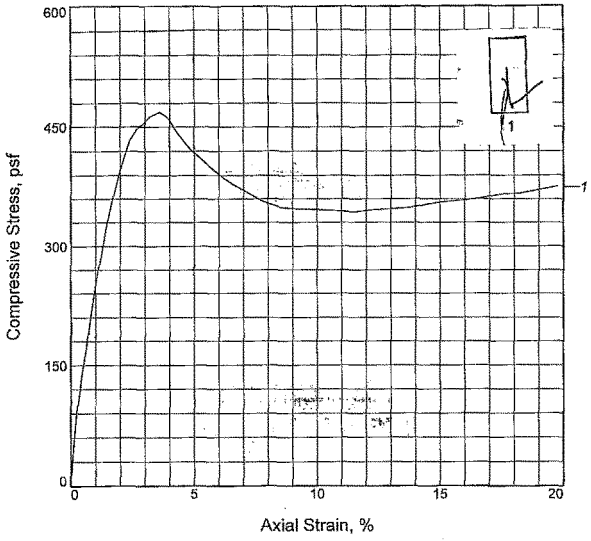
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.19904				1.658	
0.02	0.19923	0.00000			1.658	0.0 Comprs.
0.13	0.21276	0.00000	0.30	0.001	1.622	1.4 Comprs.
0.25	0.22119	0.00000	0.42	0.001	1.599	2.2 Comprs.
0.50	0.24022	0.00000	0.15	0.003	1.549	4.1 Comprs.
1.00	0.30226	0.00000	0.03	0.009	1.384	10.3 Comprs.
2.00	0.38927	0.00000	0.06	0.007	1.153	19.0 Comprs.
4.00	0.45231	0.00000	0.07	0.007	0.986	25.3 Comprs.
8.00	0.50454	0.00000	0.06	0.006	0.847	30.5 Comprs.

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
12.00	0.53024	0.00000	0.03	0.004	0.779	33.1 Comprs.
3.00	0.51822	0.00000	0.16		0.811	31.9 Comprs.
0.75	0.49770	0.00000	0.02		0.865	29.8 Comprs.

C_c = 0.75 P_c = 0.62 tsf C_r = 0.07

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	469			
Undrained shear strength, psf	234			
Failure strain, %	3.6			
Strain rate, %/min.	1.00			
Water content, %	61.1			
Wet density, pcf	106.5			
Dry density, pcf	66.1			
Saturation, %	105.5			
Void ratio	1.5868			
Specimen diameter, in.	1.388			
Specimen height, in.	3.101			
Height/diameter ratio	2.23			

Description: VSO GR CH3 W/ LNS & LYS ML

LL = 69	PL = 22	PI = 47	**Assumed GS=** 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/4/09
Remarks:

Figure _____

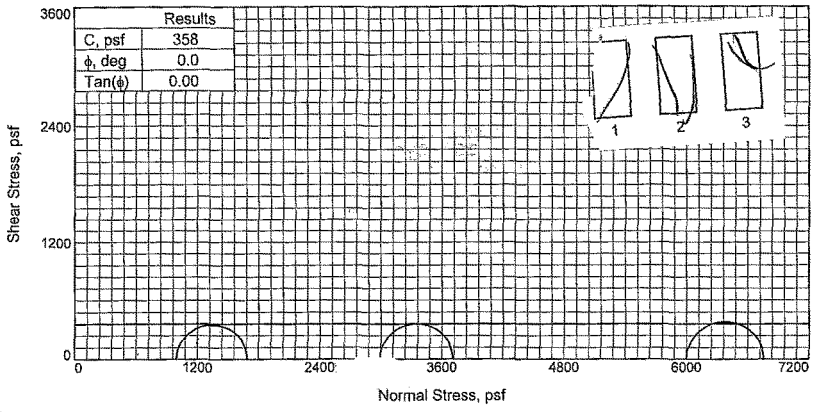
Client: U.S. Army Corps of Engineers

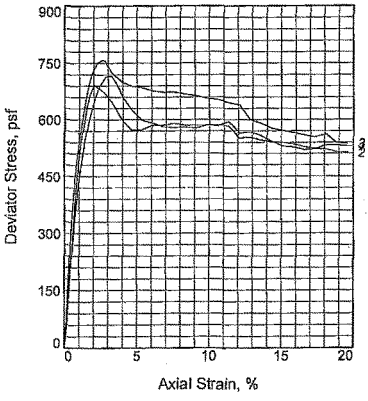
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-11U **Depth:** 20.8
Sample Number: 6B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: ARS/VF **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	74.6	72.4	74.6
	Dry Density, pcf	57.2	58.2	56.9
	Saturation, %	102.6	102.4	101.9
	Void Ratio	1.9905	1.9379	2.0054
	Diameter, in.	1.393	1.394	1.395
	Height, in.	3.103	3.106	3.104
At Test	Water Content, %	74.6	72.4	74.6
	Dry Density, pcf	57.2	58.2	56.9
	Saturation, %	102.6	102.4	101.9
	Void Ratio	1.9905	1.9379	2.0054
	Diameter, in.	1.393	1.394	1.395
	Height, in.	3.103	3.106	3.104
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.93	20.78	41.66
Fail. Stress, psf		692	716	758
Strain, %		2.0	3.1	2.7
Ult. Stress, psf		530	540	571
Strain, %				
σ_1 Failure, psf		1690	3708	6756
σ_3 Failure, psf		998	2992	5999

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CH4 W/ LNS ML

LL= 94 **PL=** 25 **PI=** 69
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

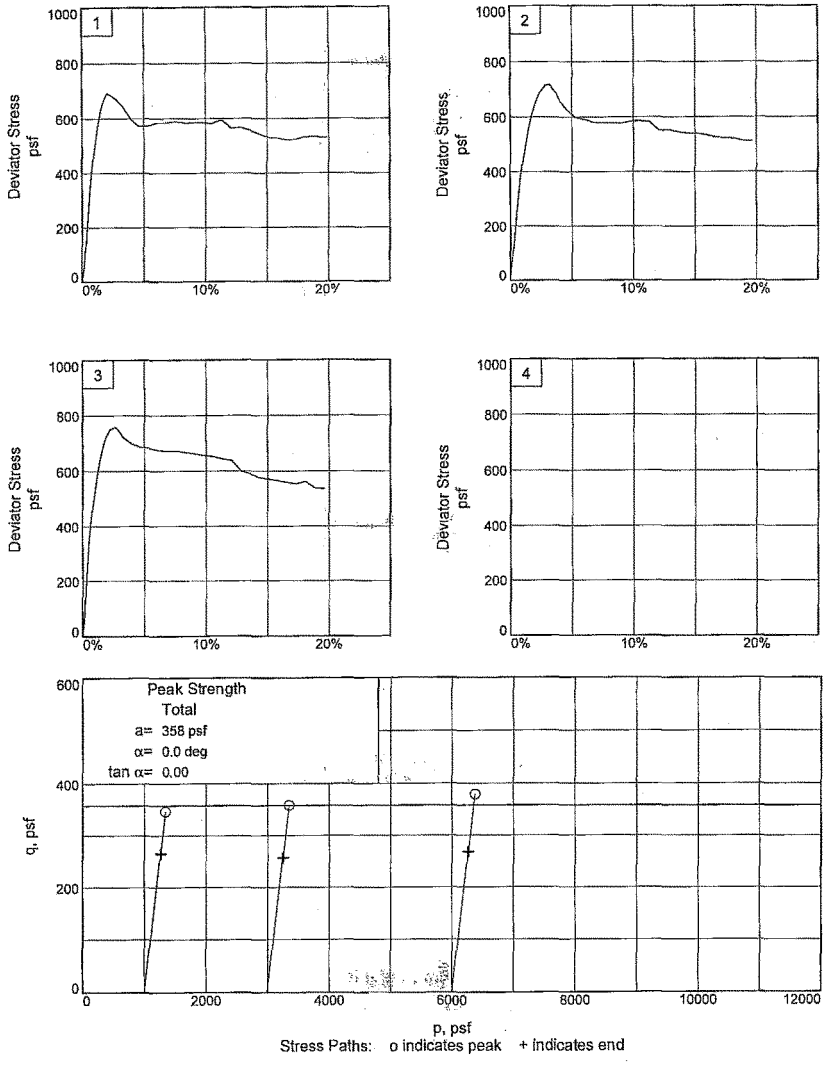
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-11U **Depth:** 25.7
Sample Number: 7C
Proj. No.: 07-022135 **Date Sampled:** 12/4/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

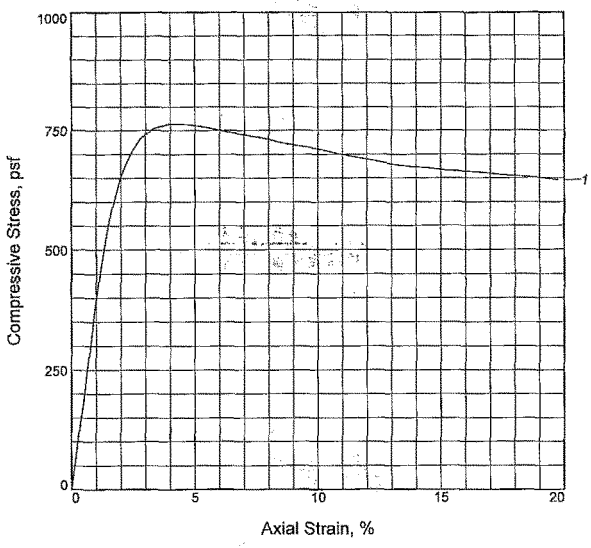
Tested By: ARS/VF **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-11U **Depth:** 25.7 **Sample Number:** 7C
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: ARS/VF **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1				
Unconfined strength, psf	764				
Undrained shear strength, psf	382				
Failure strain, %	4.0				
Strain rate, %/min.	1.00				
Water content, %	57.8				
Wet density, pcf	105.5				
Dry density, pcf	66.8				
Saturation, %	101.7				
Void ratio	1.5592				
Specimen diameter, in.	1.392				
Specimen height, in.	3.103				
Height/diameter ratio	2.23				

Description: SO GR CH4 W/ ARS ML

LL = 76	**PL** = 22	**PI** = 54	**Assumed GS=** 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/4/09
Remarks:

Figure _____

Client: U.S. Army Corps of Engineers

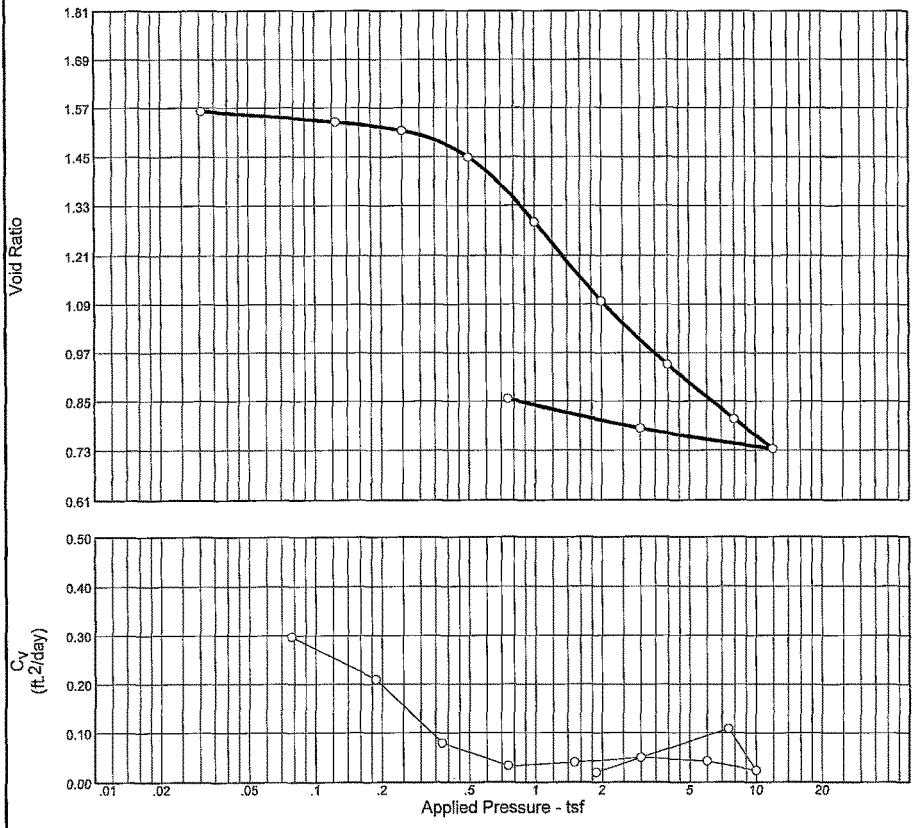
Project: USACE - MRGO Ecosystem Restoration Feasibility Study St.Bernard Parish, La
Source of Sample: MRGO-11U **Depth:** 28.8
Sample Number: 8B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: ARS/VF **Checked By:** MS

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
95.3 %	55.0 %	66.0	44	25	2.71	0.58	0.62	1.564

MATERIAL DESCRIPTION	USCS	AASHTO
SO GR CL6 W/ ARS & LNS ML, O, SIF	CL6	

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

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

Source: MRGO-11U **Sample No.:** 9B **Elev./Depth:** 32.8

FFEBJV, LLC

St Rose, LA

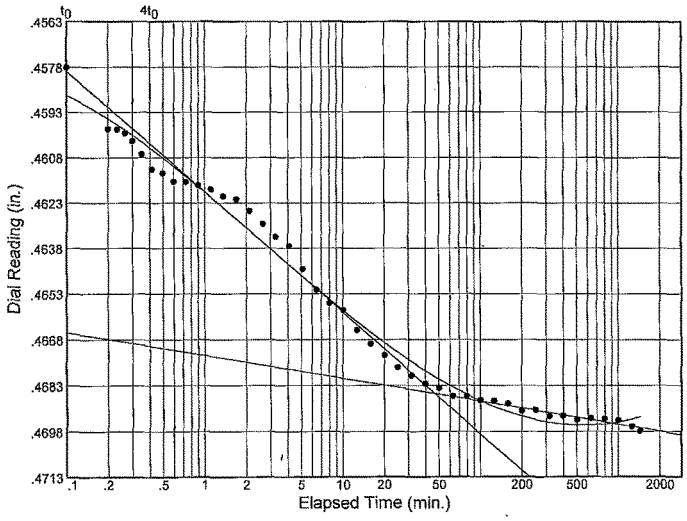
Remarks:
Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

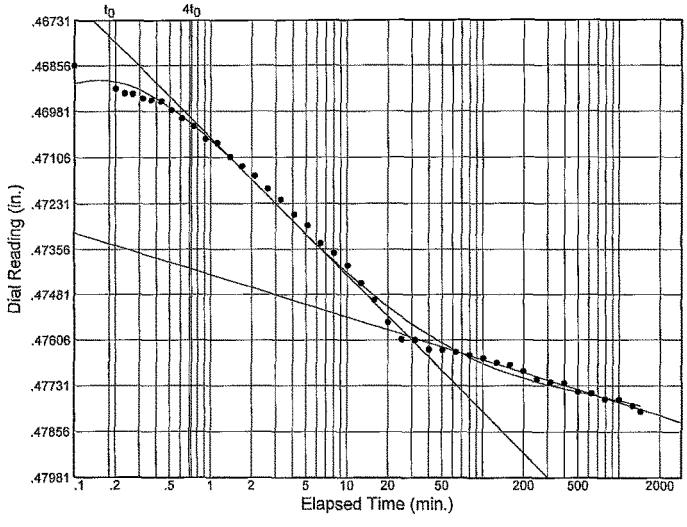
Source: MRGO-11U Sample No.: 9B Elev./Depth: 32.8



Load No.= 2
Load= 0.13 tsf
D_0 = 0.45700
D_{50} = 0.46278
D_{100} = 0.46856
T_{50} = 1.64 min.

C_v @ T_{50}
0.30 ft.^{2}/day

C_α = 0.001



Load No.= 3
Load= 0.25 tsf
D_0 = 0.46780
D_{50} = 0.47188
D_{100} = 0.47596
T_{50} = 2.29 min.

C_v @ T_{50}
0.21 ft.^{2}/day

C_α = 0.001

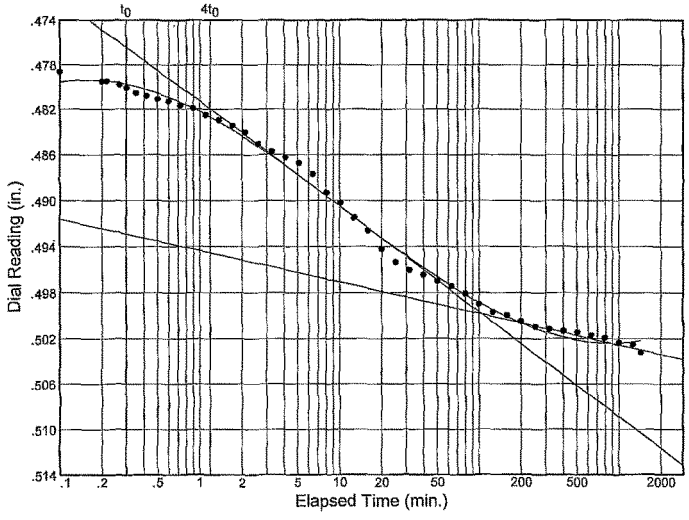
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

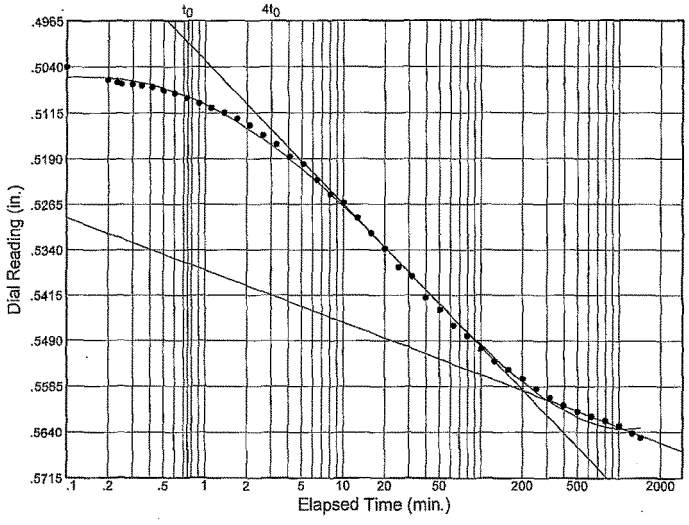
Source: MRGO-11U Sample No.: 9B Elev./Depth: 32.8



Load No.= 4
Load= 0.50 tsf
D_0 = 0.47679
D_{50} = 0.48833
D_{100} = 0.49987
T_{50} = 5.81 min.

C_v @ T_{50}
0.08 ft.2/day

C_α = 0.003



Load No.= 5
Load= 1.00 tsf
D_0 = 0.50107
D_{50} = 0.52914
D_{100} = 0.55721
T_{50} = 12.71 min.

C_v @ T_{50}
0.03 ft.2/day

C_α = 0.009

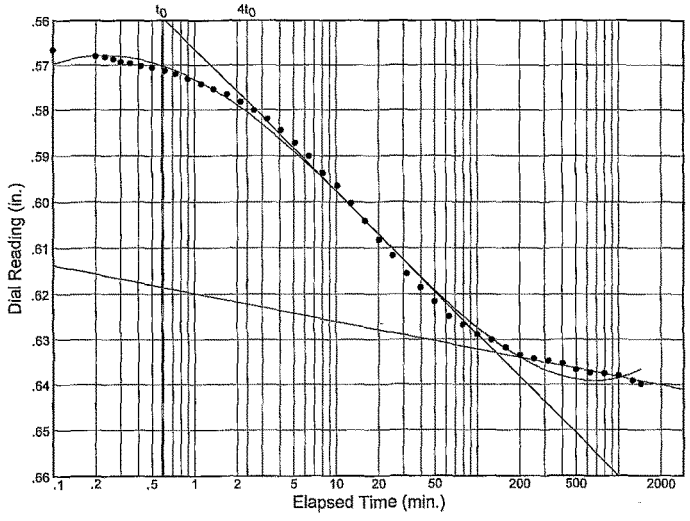
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

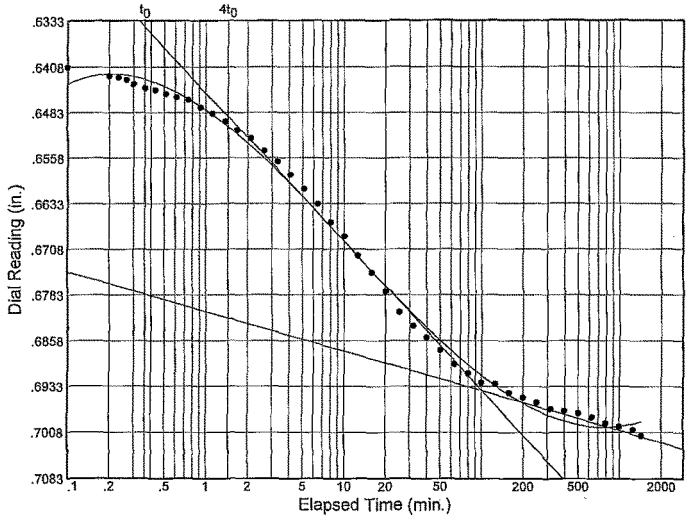
Source: MRGO-11U Sample No.: 9B Elev./Depth: 32.8



Load No.= 6
Load= 2.00 tsf
D_0 = 0.55969
D_{50} = 0.59631
D_{100} = 0.63293
T_{50} = 8.96 min.

C_v @ T_{50}
0.04 ft.^{2}/day

C_α = 0.007



Load No.= 7
Load= 4.00 tsf
D_0 = 0.63484
D_{50} = 0.66443
D_{100} = 0.69402
T_{50} = 6.18 min.

C_v @ T_{50}
0.05 ft.^{2}/day

C_α = 0.008

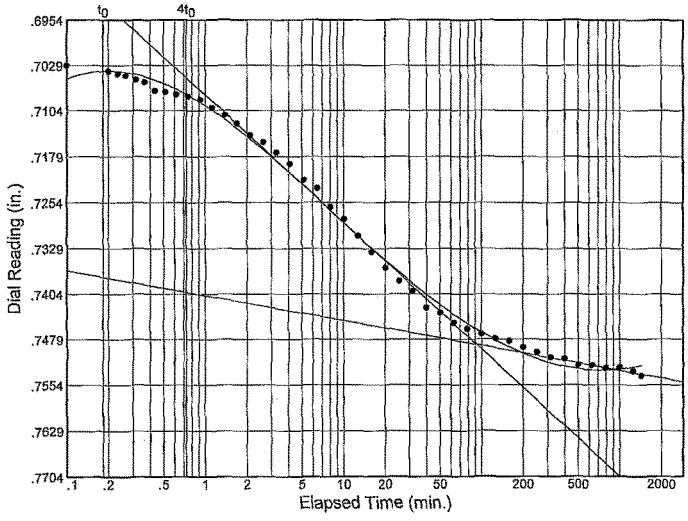
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

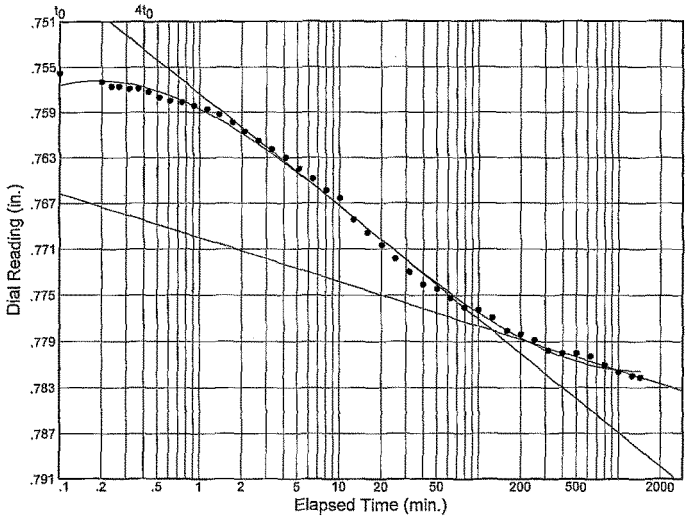
Source: MRGO-11U Sample No.: 9B Elev./Depth: 32.8



Load No.= 8
Load= 8.00 tsf
D_0 = 0.69995
D_{50} = 0.72434
D_{100} = 0.74873
T_{50} = 6.20 min.

C_v @ T_{50}
0.04 ft.^{2}/day

C_α = 0.005



Load No.= 9
Load= 12.00 tsf
D_0 = 0.75647
D_{50} = 0.76724
D_{100} = 0.77802
T_{50} = 10.04 min.

C_v @ T_{50}
0.02 ft.^{2}/day

C_α = 0.005

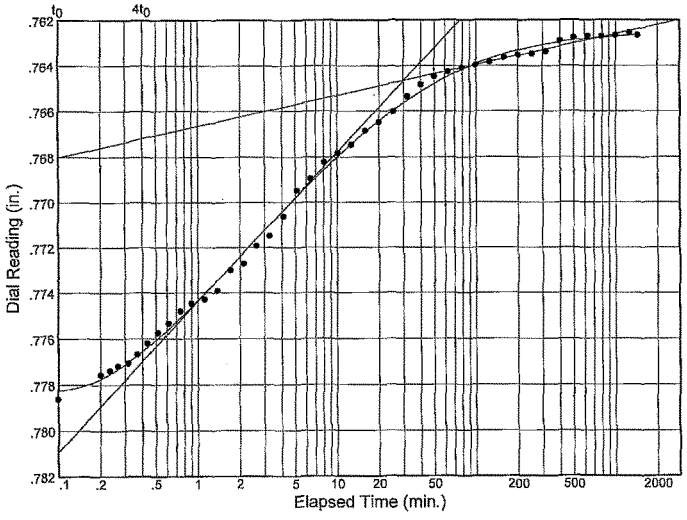
FFEBJV, LLC

Figure

Dial Reading vs. Time

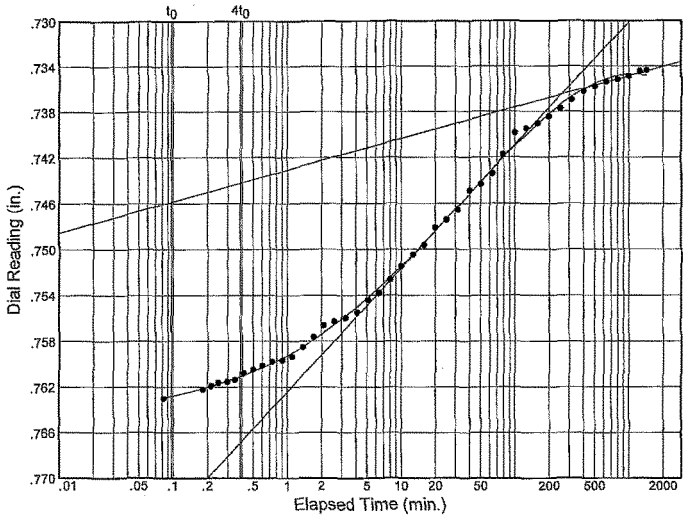
Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-11U Sample No.: 9B Elev./Depth: 32.8



Load No.= 10
Load= 3.00 tsf
D_0 = 0.77990
D_{50} = 0.77228
D_{100} = 0.76466
T_{50} = 2.09 min.

C_v @ T_{50}
0.11 ft.2/day



Load No.= 11
Load= 0.75 tsf
D_0 = 0.76449
D_{50} = 0.75048
D_{100} = 0.73648
T_{50} = 12.70 min.

C_v @ T_{50}
0.02 ft.2/day

FFEBJV, LLC

Figure

CONSOLIDATION TEST DATA

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Contract No. W912P8-07-D-0022
Task Order 135
Project Number: 07-022135

Sample Data

Source: MRGO-11U
Sample No.: 9B
Elev. or Depth: 32.8 Sample Length(in./cm.):
Location:
Description: SO GR CL6 W/ ARS & LNS ML, O, SIF
Liquid Limit: 44 Plasticity Index: 25
USCS: CL6 AASHTO: Figure No.:
Testing Remarks: Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST	AFTER TEST	
Wet w+t	= 155.01 g.	Consolidometer # = 4	Wet w+t	= 400.71 g.
Dry w+t	= 100.00 g.		Dry w+t	= 321.13 g.
Tare Wt.	= .00 g.	Spec. Gravity = 2.71	Tare Wt.	= 110.66 g.
Height	= 1.00 in.	Height = 1.00 in.		
Diameter	= 4.00 in.	Diameter = 4.00 in.		
Weight	= 337.57 g.	Defl. Table = n/a		
Moisture	= 55.0 %	Ht. Solids = 0.3901 in.	Moisture	= 37.8 %
Wet Den.	= 102.3 pcf	Dry Wt. = 217.68 g.*	Dry Wt.	= 210.47 g.
Dry Den.	= 66.0 pcf	Void Ratio = 1.564	Void Ratio	= 0.856
		Saturation = 95.3 %		

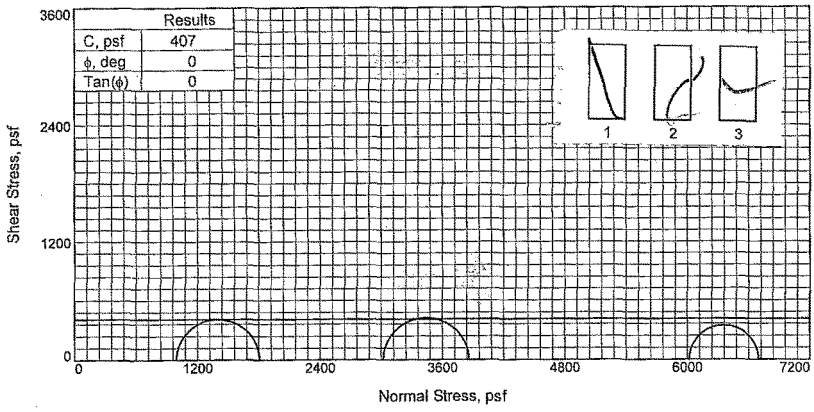
* Initial dry weight used in calculations

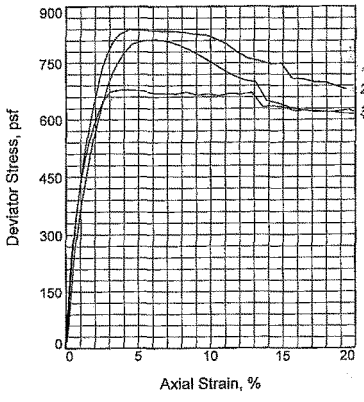
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.45824				1.564	
0.03	0.45924	0.00000			1.562	0.1 Comprs.
0.13	0.46978	0.00000	0.30	0.001	1.535	1.2 Comprs.
0.25	0.47802	0.00000	0.21	0.001	1.513	2.0 Comprs.
0.50	0.50325	0.00000	0.08	0.003	1.449	4.5 Comprs.
1.00	0.56495	0.00000	0.03	0.009	1.291	10.7 Comprs.
2.00	0.64001	0.00000	0.04	0.007	1.098	18.2 Comprs.
4.00	0.70135	0.00000	0.05	0.008	0.941	24.3 Comprs.
8.00	0.75392	0.00000	0.04	0.005	0.806	29.6 Comprs.

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
12.00	0.78213	0.00000	0.02	0.005	0.734	32.4 Comprs.
3.00	0.76267	0.00000	0.11		0.784	30.4 Comprs.
0.75	0.73437	0.00000	0.02		0.856	27.6 Comprs.

C_c = 0.62 P_c = 0.58 tsf C_r = 0.10





Sample No.		1	2	3
Initial	Water Content, %	52.0	52.2	50.3
	Dry Density, pcf	71.3	70.9	72.6
	Saturation, %	103.0	102.3	102.7
	Void Ratio	1.3634	1.3779	1.3223
	Diameter, in.	1.389	1.391	1.391
	Height, in.	3.098	3.090	3.105
At Test	Water Content, %	52.0	52.2	50.3
	Dry Density, pcf	71.3	70.9	72.6
	Saturation, %	103.0	102.3	102.7
	Void Ratio	1.3634	1.3779	1.3223
	Diameter, in.	1.389	1.391	1.391
	Height, in.	3.098	3.090	3.105
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.90	20.97	41.79
Fail. Stress, psf		813	839	679
Strain, %		6.1	4.4	4.5
Ult. Stress, psf		633	747	633
Strain, %				
σ_1 Failure, psf		1806	3859	6697
σ_3 Failure, psf		993	3020	6018

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CH2 W/ LNS & LYS ML, SIF

LL= 56 **PL=** 20 **PI=** 36
Assumed Specific Gravity= 2.70
Remarks:

Figure _____

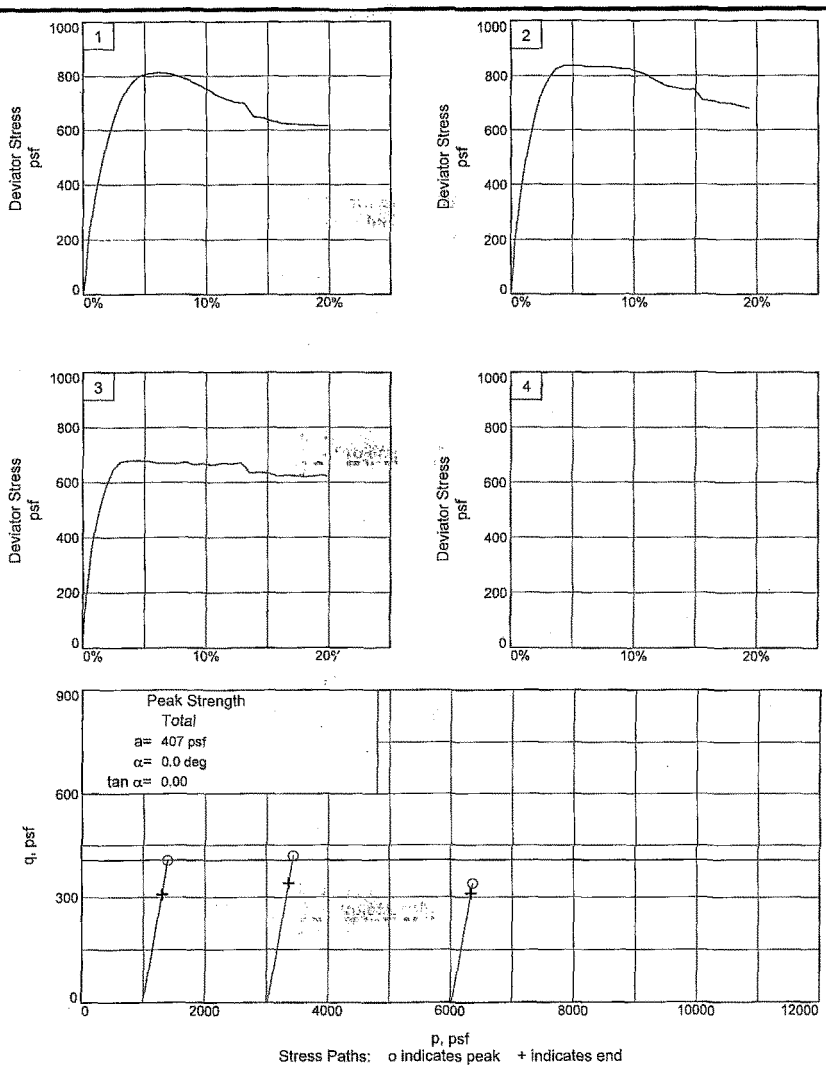
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-11U **Depth:** 33.7
Sample Number: 9C
Proj. No.: 07-022135 **Date Sampled:** 12/4/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

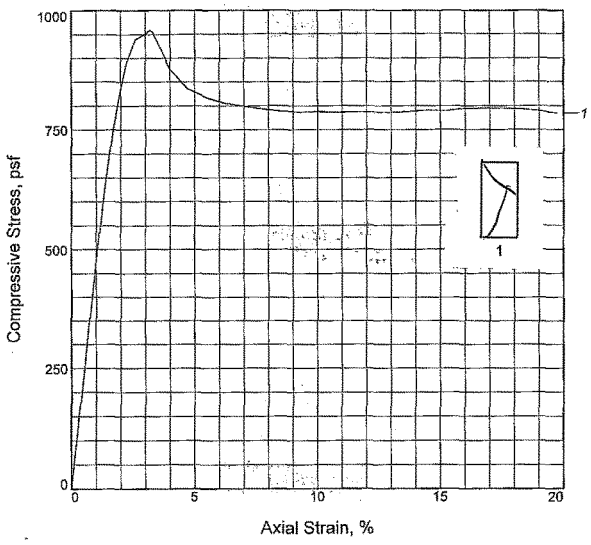
Tested By: ARS/VF **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-11U **Depth:** 33.7 **Sample Number:** 9C
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: ARS/VF **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1				
Unconfined strength, psf	958				
Undrained shear strength, psf	479				
Failure strain, %	3.2				
Strain rate, %/min.	1.00				
Water content, %	56.7				
Wet density, pcf	105.8				
Dry density, pcf	67.5				
Saturation, %	101.3				
Void ratio	1.5333				
Specimen diameter, in.	1.393				
Specimen height, in.	3.109				
Height/diameter ratio	2.23				

Description: SO GR CH4 W/ LNS & LYS ML

LL = 84	PL = 26	PI = 58	**Assumed GS=** 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/4/09
Remarks:

Figure _____

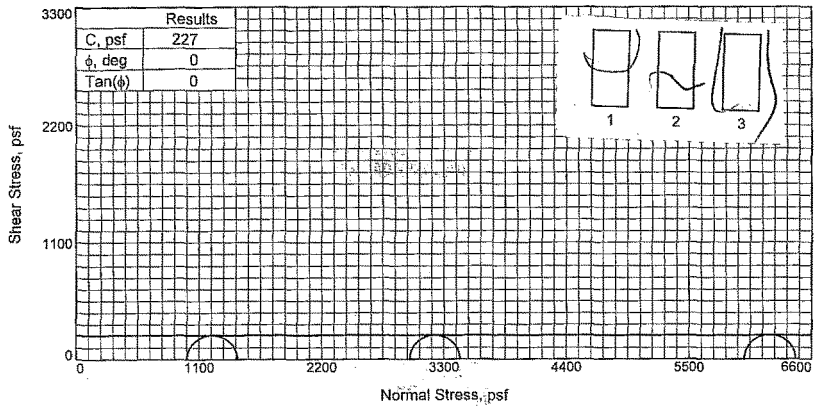
Client: U.S. Army Corps of Engineers

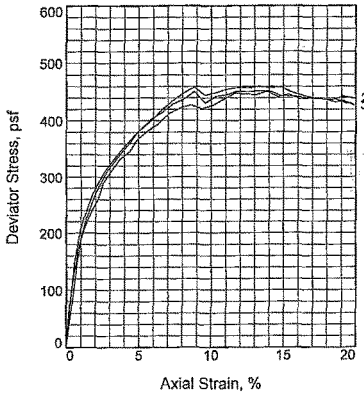
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-11U **Depth:** 36.8
Sample Number: 10B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: ARS/VF **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	62.0	63.7	63.9
	Dry Density, pcf	64.3	62.8	63.2
	Saturation, %	102.3	101.3	102.4
	Void Ratio	1.6615	1.7245	1.7086
	Diameter, in.	1.391	1.396	1.398
	Height, in.	3.087	3.097	3.083
At Test	Water Content, %	62.0	63.7	63.9
	Dry Density, pcf	64.3	62.8	63.2
	Saturation, %	102.3	101.3	102.4
	Void Ratio	1.6615	1.7245	1.7086
	Diameter, in.	1.391	1.396	1.398
	Height, in.	3.087	3.097	3.083
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.89	20.79	41.65
Fail. Stress, psf		452	451	460
Strain, %		13.3	13.9	13.3
Ult. Stress, psf		443	442	458
Strain, %				
σ_1 Failure, psf		1444	3444	6458
σ_3 Failure, psf		992	2993	5997

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: VSO GR CH4 W/ LNS & LYS SM

LL= 70 **PL=** 24 **PI=** 46
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

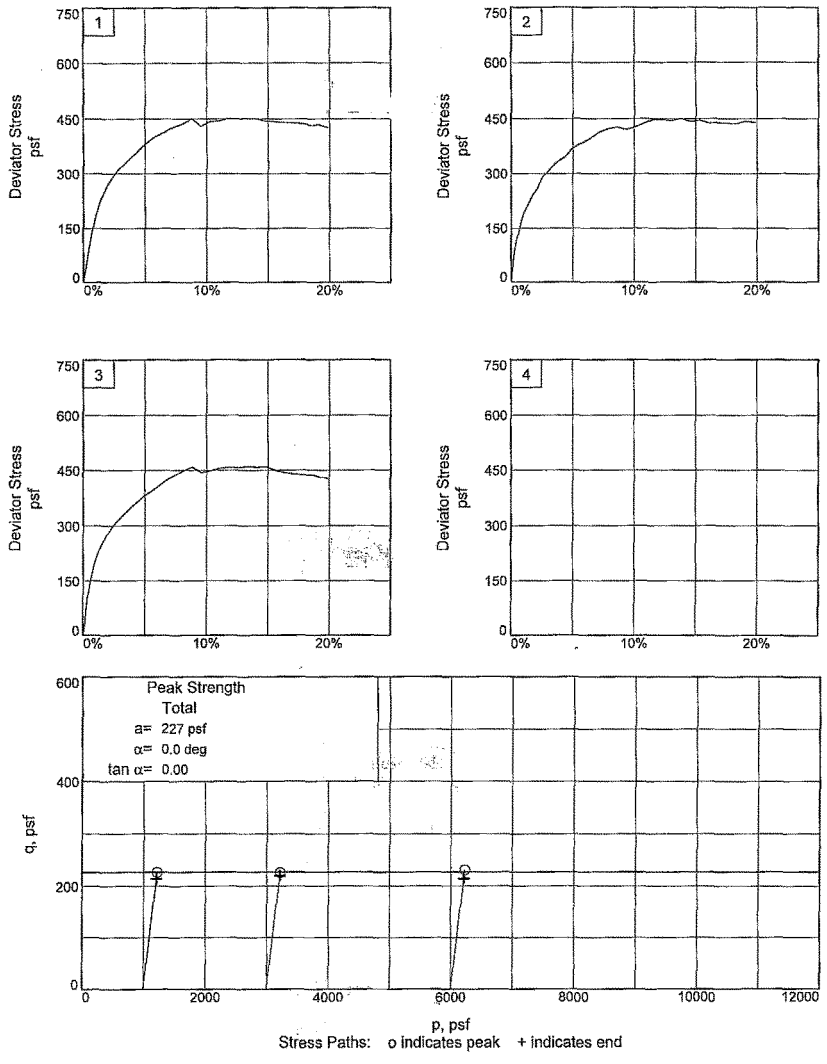
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-11U **Depth:** 40.8
Sample Number: 11B
Proj. No.: 07-022135 **Date Sampled:** 12/4/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

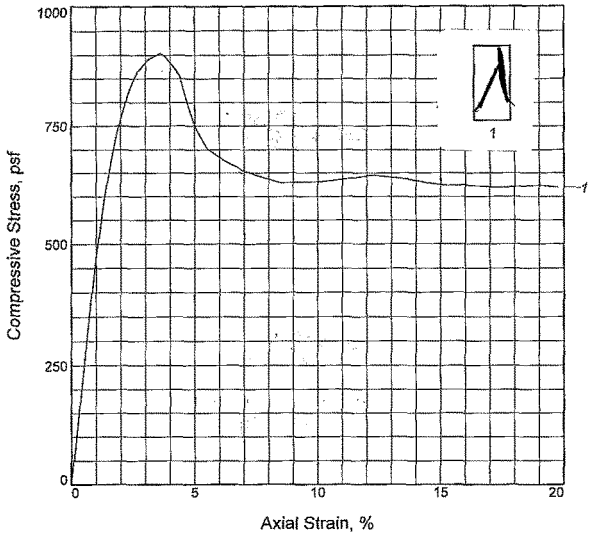
Tested By: ARS/VF **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-11U **Depth:** 40.8 **Sample Number:** 11B
Project No.: 07-022135 **Figure** _____ FFEBJV, LLC

Tested By: ARS/VF **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1				
Unconfined strength, psf	904				
Undrained shear strength, psf	452				
Failure strain, %	3.6				
Strain rate, %/min.	1.00				
Water content, %	59.1				
Wet density, pcf	104.9				
Dry density, pcf	66.0				
Saturation, %	101.6				
Void ratio	1.5934				
Specimen diameter, in.	1.390				
Specimen height, in.	3.104				
Height/diameter ratio	2.23				

Description: SO GR CH4 W/ LNS & LYS ML

LL = 76	**PL** = 25	**PI** = 51	**Assumed GS=** 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/4/09
Remarks:

Figure _____

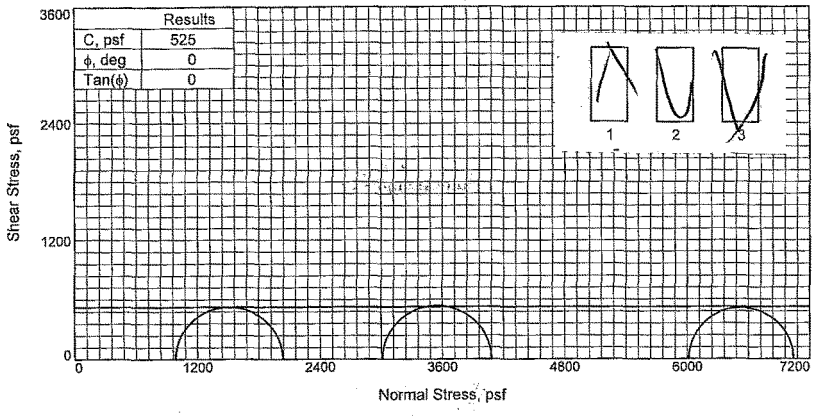
Client: U.S. Army Corps of Engineers

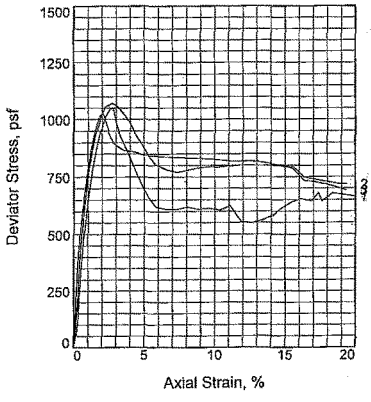
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-11U **Depth:** 44.8
Sample Number: 12B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: TSL/VF **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	66.5	65.5	67.7
	Dry Density, pcf	61.7	61.8	61.0
	Saturation, %	102.8	101.5	102.8
	Void Ratio	1.7734	1.7673	1.8041
	Diameter, in.	1.390	1.395	1.394
	Height, in.	3.108	3.111	3.106
At Test	Water Content, %	66.5	65.5	67.7
	Dry Density, pcf	61.7	61.8	61.0
	Saturation, %	102.8	101.5	102.8
	Void Ratio	1.7734	1.7673	1.8041
	Diameter, in.	1.390	1.395	1.394
	Height, in.	3.108	3.111	3.106
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.84	20.91	41.77
Fail. Stress, psf		1050	1071	1026
Strain, %		2.7	2.7	2.0
Ult. Stress, psf		548	769	800
Strain, %				
σ_1 Failure, psf		2035	4082	7041
σ_3 Failure, psf		985	3011	6015

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: M GR CH4 W/ LNS ML, SIF

LL= 91 **PL=** 27 **PI=** 64
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

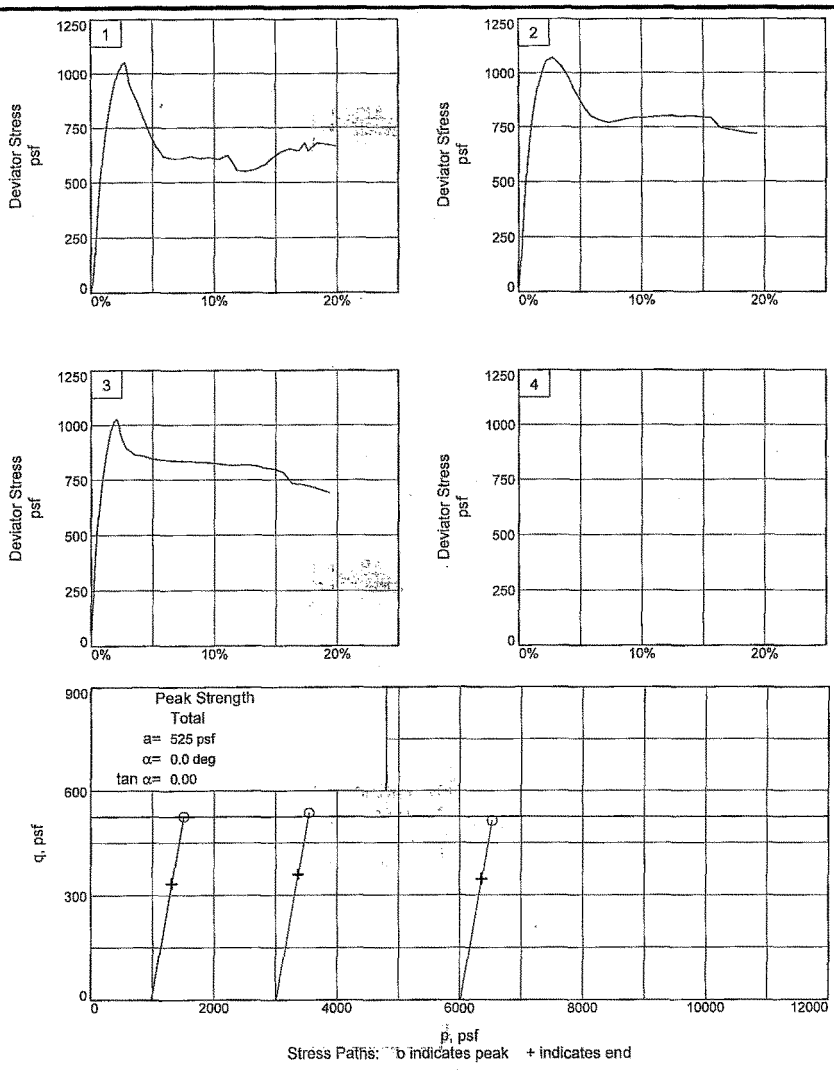
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-11U **Depth:** 48.8
Sample Number: 13B
Proj. No.: 07-022135 **Date Sampled:** 12/4/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

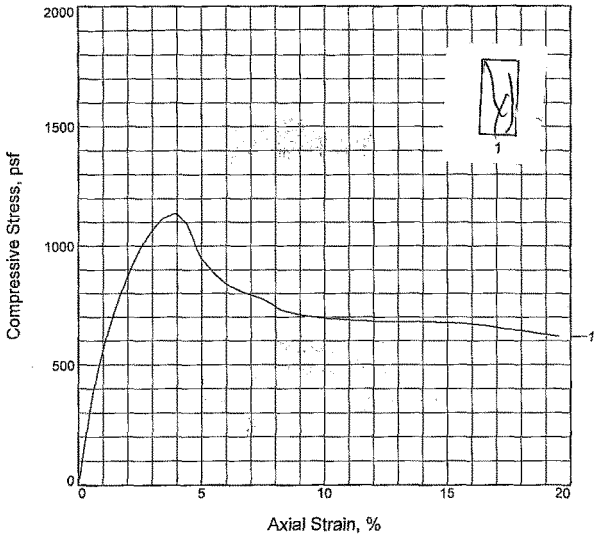
Tested By: ARS/VF **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-11U **Depth:** 48.8 **Sample Number:** 13B
Project No.: 07-022135 **Figure** _____ FFEBJV, LLC

Tested By: ARS/VF **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	1136			
Undrained shear strength, psf	568			
Failure strain, %	3.9			
Strain rate, %/min.	1.00			
Water content, %	63.5			
Wet density, pcf	103.0			
Dry density, pcf	63.0			
Saturation, %	101.4			
Void ratio	1.7166			
Specimen diameter, in.	1.395			
Specimen height, in.	3.107			
Height/diameter ratio	2.23			

Description: M GR CH4 W/ LNS ML, O

LL = 90 | **PL** = 27 | **PI** = 63 | **Assumed GS=** 2.74 | **Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/4/09
Remarks:

Client: U.S. Army Corps of Engineers

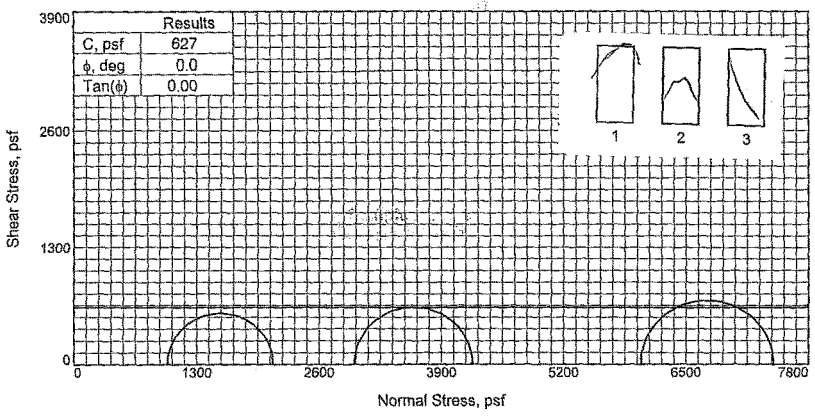
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-11U **Depth:** 52.8
Sample Number: 14B

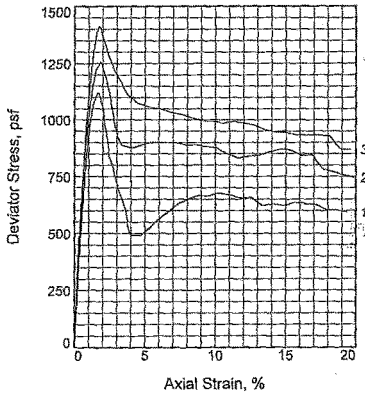
UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Figure _____

Tested By: ARS/VF **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	66.4	64.8	65.9
	Dry Density, pcf	61.9	62.9	62.2
	Saturation, %	103.1	103.4	103.0
	Void Ratio	1.7637	1.7179	1.7521
	Diameter, in.	1.394	1.390	1.389
	Height, in.	3.108	3.104	3.111
At Test	Water Content, %	66.4	64.8	65.9
	Dry Density, pcf	61.9	62.9	62.2
	Saturation, %	103.1	103.4	103.0
	Void Ratio	1.7637	1.7179	1.7521
	Diameter, in.	1.394	1.390	1.389
	Height, in.	3.108	3.104	3.111
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.89	20.66	41.80
Fail. Stress, psf		1119	1256	1411
Strain, %		1.6	1.8	1.7
Ult. Stress, psf		490	831	943
Strain, %				
σ_1 Failure, psf		2111	4231	7430
σ_3 Failure, psf		992	2975	6019

Type of Test: Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: M GR CH4 W/ LNS ML, SL

LL= 87 **PL=** 28 **PI=** 59
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

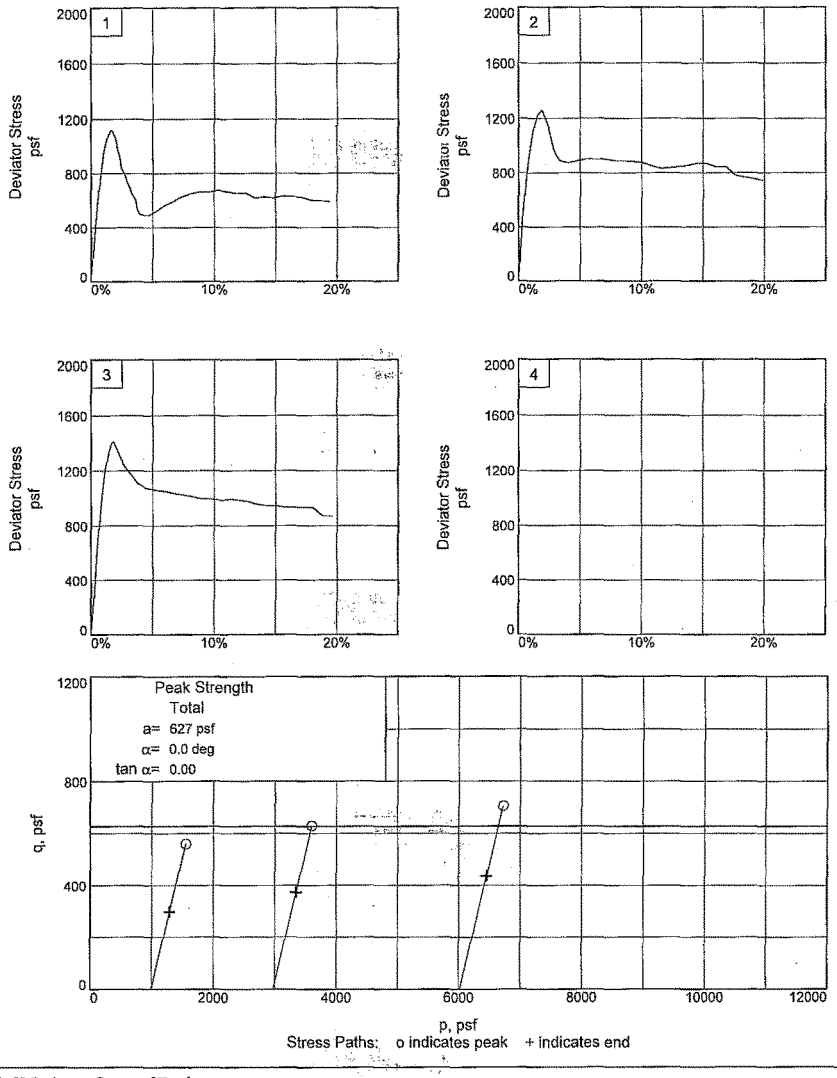
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-11U **Depth:** 56.8
Sample Number: 15B
Proj. No.: 07-022135 **Date Sampled:** 12/4/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

Tested By: ARS/VF **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-11U **Depth:** 56.8 **Sample Number:** 15B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: ARS/VF **Checked By:** MS

SUMMARY OF LABORATORY TEST RESULTS

Project: MRGO Ecosystem Restoration Feasibility Study Assigned By: _____

Project Number: 07-022135 Current Date: 1/25/2010
Boring: MRGO-12U

Sample Number	Depth	Visual Classification	USCS	E(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
1A	0.0	SO DGR CHOC W/ WD, RT	CHOC		238												
1B	0.8	SO DGR CHOB W/ WD, RT	CHOB		163												
1C	1.7	SO GR CH2 W/ O, RT	CH2		44												
2A	4.0	SO GR CL6 W/ LNS & LYS CH, RT	CL6		38												
2B	4.8	SO GR CL4 W/ LNS & ARS CH, RT, WD	CL4		41	80	113	99					36	19	17		Gs, CON SV
2C	5.7	SO GR CL4 W/ LNS & LYS CH, RT	CL4		36												
3A	8.0	SO GR CH2 W/ LNS & LYS ML, RT	CH2		39												
3B	8.8	VSO GR CH2 W/ LNS & LYS ML, RT	CH2	15	49	75	111	100	UC	-	167	334	51	21	30	0.15	
3C	9.7	VSO GR CH2 W/ LNS & LYS ML, RT	CH2		39												
3D	10.6	SO GR CH3 W/ LNS & LYS ML, RT	CH3		52												
4A	12.0	SO GR CL4 W/ LNS & LYS ML	CL4		47												
4B	12.8	SO GR CL4 W/ LNS & LYS ML, RT	CL4		50				UU				41	24	17	0.10	NOT TESTABLE
4C	13.7	SO GR CH3 W/ WD, LNS & LYS ML, RT	CH3		49												
4D	14.6	SO GR CH3 W/ WD, LNS & LYS ML, RT	CH3		60												
5A	16.0	SO GR CL6 W/ LNS ML	CL6		41												
5B	16.8	SO GR CL6 W/ LNS & LYS ML	CL6	15	42	81	115	100	UC	-	374	748	46	20	26	0.20	
5C	17.7	SO GR CL6 W/ LNS & LYS ML	CL6		46												
5D	18.6	SO GR CH2 W/ LNS & LYS ML	CH2		41	81	114	100					52	19	33		Gs, CON
6A	20.0	SO GR CH3 W/ LNS & ARS SM, SIF	CH3		50												
6B	20.8	SO GR CH3 W/ LNS & ARS SM, SIF	CH3		45												
6C	21.7	SO GR CH4 W/ LNS & ARS SM	CH4		68	60	101	100	UU	0	397		94	27	67	0.23	
7A	24.0	SO GR CL4 W/ LNS & LYS CH	CL4		37												
7B	24.8	GR ML W/ LNS SM, LNS CH	ML		35				UC				NP	NP	NP		NOT TESTABLE
7C	25.7	SO GR CL4 W/ LYS SM	CL4	8	39	84	117	100	UC	-	447	894	41	20	21	0.17	
7D	26.6	SO GR CL4 W/ LNS & LYS SM	CL4		35												
8A	28.0	SO GR CH2 W/ LNS & LYS SM	CH2		53												
8B	28.8	M GR CL4 W/ LNS & LYS SM	CL4		40	82	115	100	UU	0	570		40	23	17	0.23	
8C	29.7	M GR CL4 W/ LNS & LYS SM	CL4		45												
8D	30.6	M GR CL4 W/ LNS & LYS SM	CL4		44												
9A	32.0	M GR CH4 W/ LNS & LYS SM	CH4		54												
9B	32.8	M GR CH4 W/ LNS & LYS SM	CH4	3	54	69	107	100	UC	-	542	1084	81	24	57	0.26	
9C	33.7	M GR CH4 W/ LNS & LYS SM	CH4		54												
9D	34.6	M GR CH4 W/ LNS & LYS SM	CH4		54												
10A	36.0	M GR CH4 W/ LNS & LYS ML	CH4		53												
10B	36.8	M GR CH4 W/ LNS & LYS ML	CH4		65	63	103	100	UU	0	520		88	24	64	0.32	

Remarks: _____
FFEB JV, LLC

Checked By: MS/MKG
File Name: MRGO-12U.xls

SUMMARY OF LABORATORY TEST RESULTS

Project: MRGO Ecosystem Restoration Feasibility Study Assigned By: _____

Project Number: 07-022135
Boring: MRGO-12U

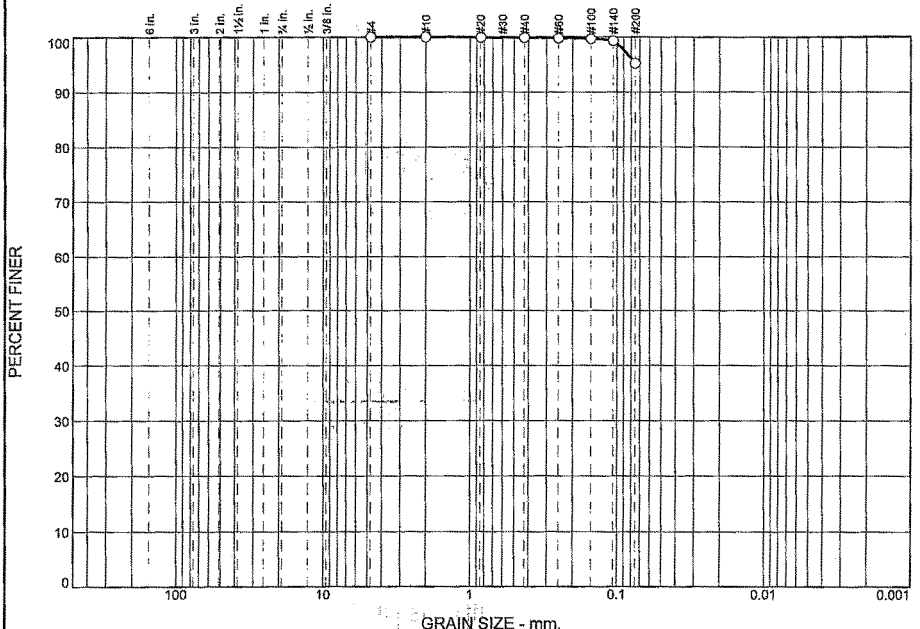
Current Date: 1/25/2010

Sample Number	Depth	Visual Classification	USCS	B(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
10C	37.7	M GR CH4 W/ LNS & LYS ML	CH4		55												
10D	38.6	M GR CH4 W/ LNS & LYS ML	CH4		54												
11A	40.0	M GR CH4 W/ LNS ML, CC	CH4		59												
11B	40.8	M GR CH4 W/ LNS ML, CC	CH4	2	63	64	103	100	UC	-	700	1400	93	27	66	0.30	
11C	41.7	M GR CH4 W/ LNS ML	CH4		59												
11D	42.6	M GR CH4 W/ LNS ML	CH4		57												
12A	44.0	M GR CH4 W/ LNS ML	CH4		60												
12B	44.8	M GR CH4 W/ LNS ML	CH4		64	62	102	100	UU	0	792		94	28	66	0.32	
12C	45.7	M GR CH4 W/ LNS ML	CH4		60												
13A	48.0	M GR CH4 W/ LNS ML	CH4		62												
13B	48.8	M GR CH4 W/ LNS ML	CH4	3	61	64	103	100	UC	-	970	1940	95	27	68	0.33	
13C	49.7	M GR CH4 W/ LNS ML	CH4		57												
13D	50.6	M GR CH4 W/ LNS ML	CH4		57												
14A	52.0	M GR CH4 W/ LNS ML	CH4		56												
14B	52.8	M GR CH4 W/ LNS ML	CH4		56	68	106	100	UU	0	825		83	25	58	0.35	
14C	53.7	M GR CH4 W/ LNS ML	CH4		54												
14D	54.6	M GR CH4 W/ LNS ML	CH4		57												
15A	56.0	M GR CH4 W/ LNS & LYS ML	CH4		56												
15B	56.8	M GR CH4 W/ LNS & LYS ML, SL	CH4	3	59	66	104	100	UC	-	928	1855	92	26	66	0.37	
15C	57.7	M GR CH4 W/ LNS & LYS ML	CH4		55												
15D	58.6	M GR CH4 W/ LNS & LYS ML	CH4		56												

Remarks:
FFEB JV, LLC

Checked By: MS/MGG
File Name: MRGO-12U.xls

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
o	0.0	0.0	0.0	0.0	0.2	4.7	95.1	

	Colloids	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o											

Material Description	USCS	AASHTO
o SO GR CL4 W/ LNS & LYS CH, RT	CL4	

Project No. 07-022135 **Client:** U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
o **Source of Sample:** MRGO-12U **Depth:** 5.7 **Sample Number:** 2C

Date: o

FFEBJV, LLC

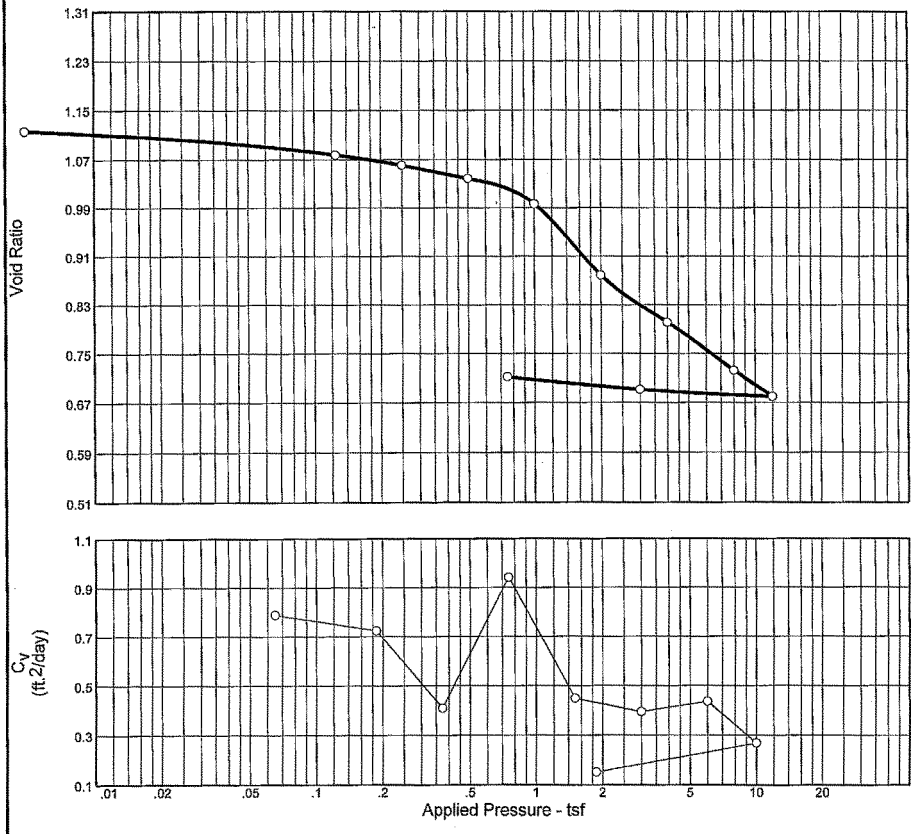
St Rose, LA

Remarks:

Figure

Tested By: NF **Checked By:** MKA

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
98.7 %	40.7 %	79.9	36	17	2.71	0.99	0.40	1.117

MATERIAL DESCRIPTION	USCS	AASHTO
SO GR CL4 W/ LNS & ARS CH, RT, WD	CL4	

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

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

Source: MRGO-12U **Sample No.:** 2B **Elev./Depth:** 4.8

FFEBJV, LLC

St Rose, LA

Remarks:

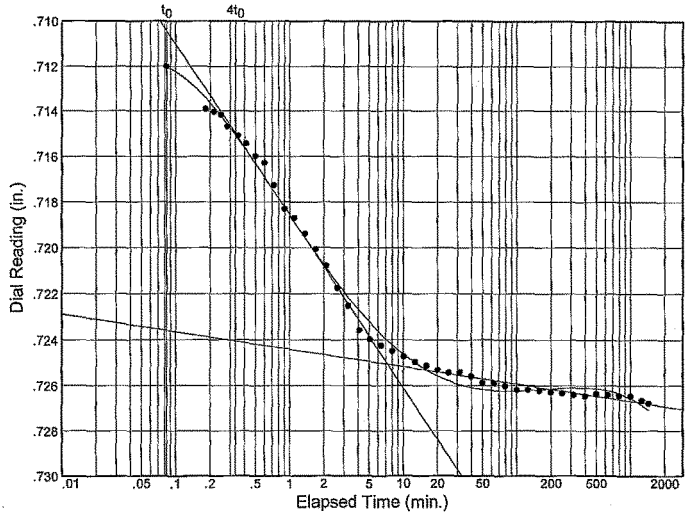
Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

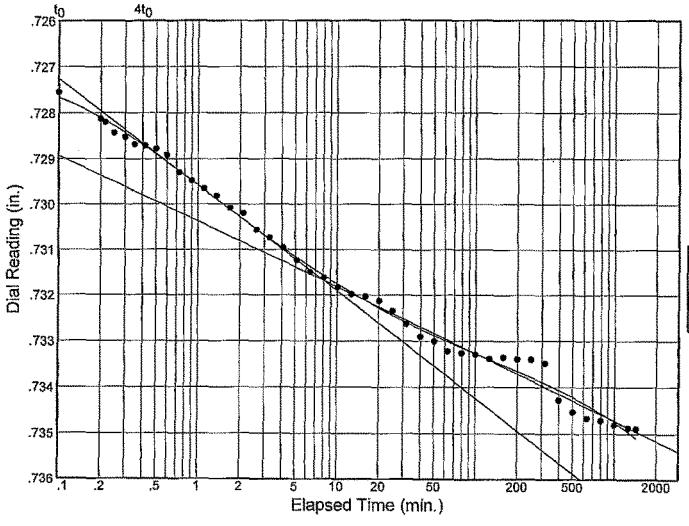
Source: MRGO-12U Sample No.: 2B Elev./Depth: 4.8



Load No.= 2
Load= 0.13 tsf
D_0 = 0.70897
D_{50} = 0.71702
D_{100} = 0.72507
T_{50} = 0.62 min.

C_v @ T_{50}
0.79 ft.2/day

C_α = 0.001



Load No.= 3
Load= 0.25 tsf
D_0 = 0.72665
D_{50} = 0.72916
D_{100} = 0.73168
T_{50} = 0.66 min.

C_v @ T_{50}
0.72 ft.2/day

C_α = 0.001

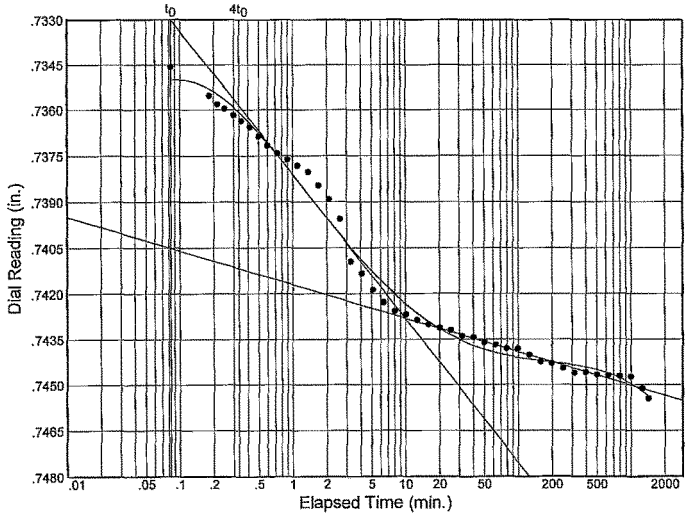
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

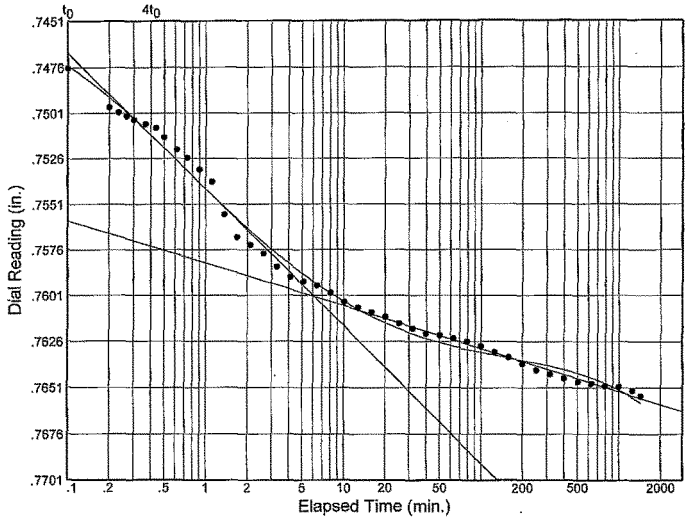
Source: MRGO-12U Sample No.: 2B Elev./Depth: 4.8



Load No.= 4
Load= 0.50 tsf
D_0 = 0.73397
D_{50} = 0.73839
D_{100} = 0.74280
T_{50} = 1.14 min.

C_v @ T_{50}
0.41 ft.2/day

C_α = 0.001



Load No.= 5
Load= 1.00 tsf
D_0 = 0.74367
D_{50} = 0.75191
D_{100} = 0.76015
T_{50} = 0.48 min.

C_v @ T_{50}
0.94 ft.2/day

C_α = 0.002

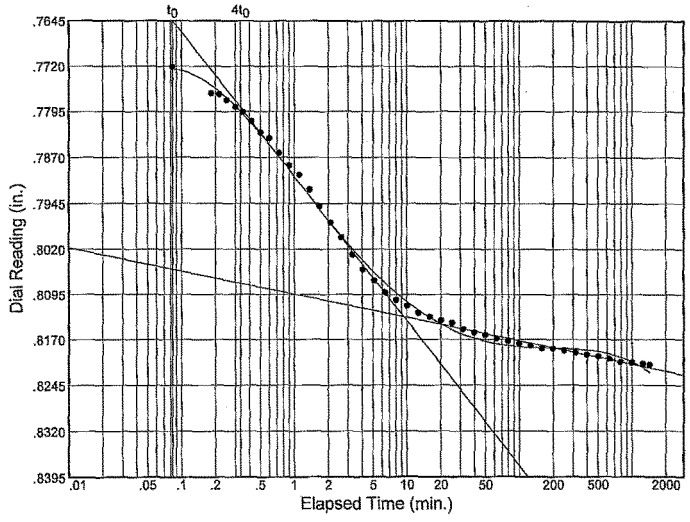
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

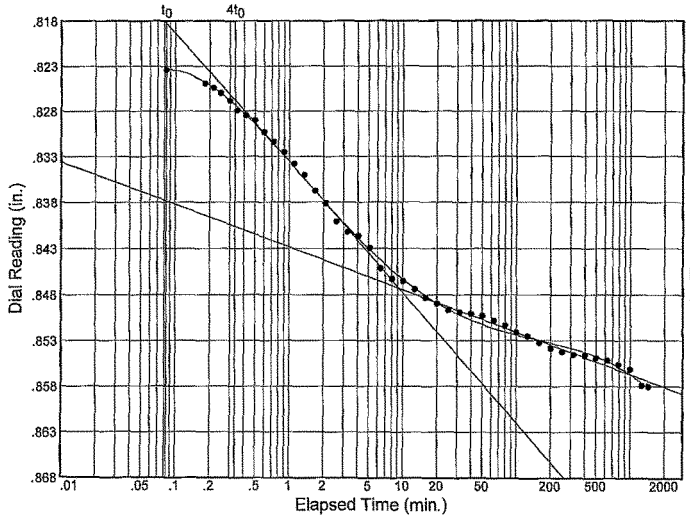
Source: MRGO-12U Sample No.: 2B Elev./Depth: 4.8



Load No.= 6
Load= 2.00 tsf
D_0 = 0.76555
D_{50} = 0.78939
D_{100} = 0.81323
T_{50} = 0.93 min.

C_v @ T_{50}
0.45 ft.2/day

C_α = 0.004



Load No.= 7
Load= 4.00 tsf
D_0 = 0.81938
D_{50} = 0.83333
D_{100} = 0.84728
T_{50} = 0.96 min.

C_v @ T_{50}
0.39 ft.2/day

C_α = 0.005

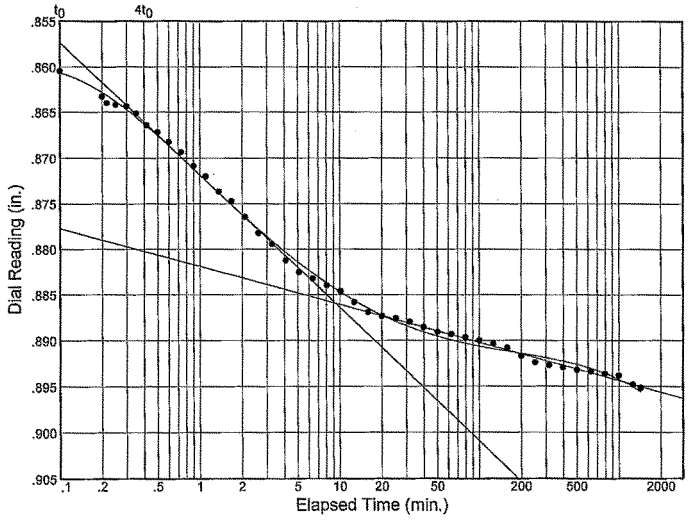
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

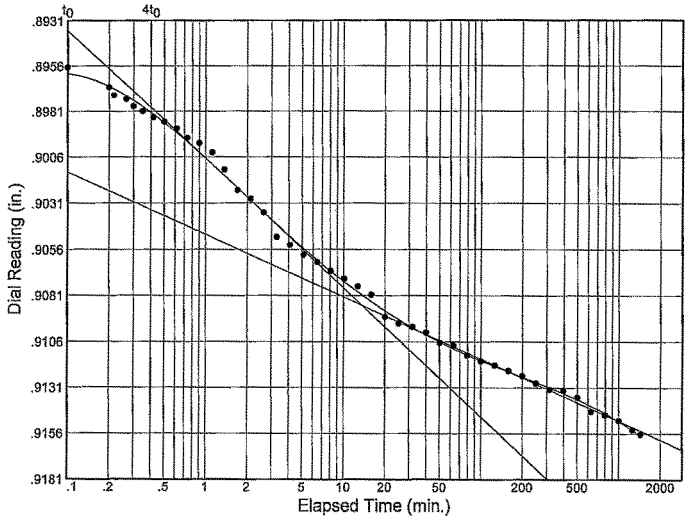
Source: MRGO-12U Sample No.: 2B Elev./Depth: 4.8



Load No.= 8
Load= 8.00 tsf
D_0 = 0.85497
D_{50} = 0.87044
D_{100} = 0.88591
T_{50} = 0.80 min.

C_v @ T_{50}
0.44 ft.2/day

C_α = 0.005



Load No.= 9
Load= 12.00 tsf
D_0 = 0.89389
D_{50} = 0.90126
D_{100} = 0.90862
T_{50} = 1.21 min.

C_v @ T_{50}
0.27 ft.2/day

C_α = 0.004

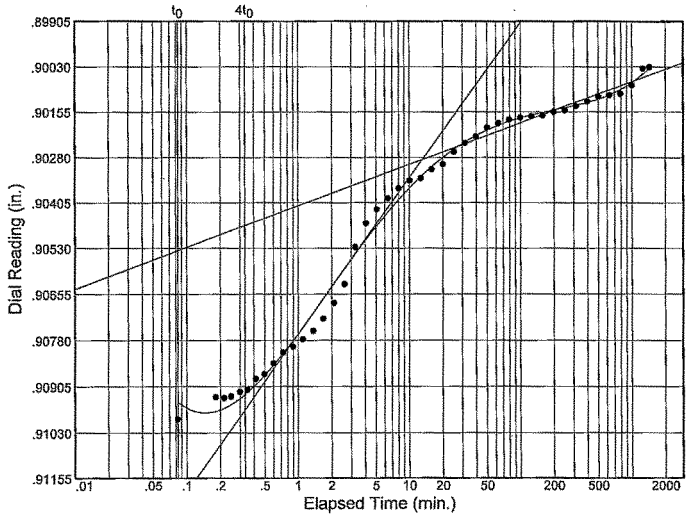
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-12U Sample No.: 2B Elev./Depth: 4.8



Load No.= 11
Load= 0.75 tsf
D_0 = 0.90965
D_{50} = 0.90625
D_{100} = 0.90285
T_{50} = 2.12 min.

C_v @ T_{50}
0.15 ft.^{2}/day

Figure

CONSOLIDATION TEST DATA

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Contract No. W912P8-07-D-0022
Task Order 135
Project Number: 07-022135

Sample Data

Source: MRGO-12U
Sample No.: 2B
Elev. or Depth: 4.8 Sample Length(in./cm.):
Location:
Description: SO GR CL4 W/ LNS & ARS CH, RT, WD
Liquid Limit: 36 Plasticity Index: 17
USCS: CL4 AASHTO: Figure No.:
Testing Remarks: Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST		AFTER TEST	
Wet w+t	= 140.70 g.	Consolidometer #	= 14	Wet w+t	= 450.69 g.
Dry w+t	= 100.00 g.			Dry w+t	= 375.29 g.
Tare Wt.	= .00 g.	Spec. Gravity	= 2.71	Tare Wt.	= 112.18 g.
Height	= 1.00 in.	Height	= 1.00 in.		
Diameter	= 4.00 in.	Diameter	= 4.00 in.		
Weight	= 372.25 g.	Defl. Table	= n/a		
Moisture	= 40.7 %	Ht. Solids	= 0.4744 in.	Moisture	= 28.7 %
Wet Den.	= 112.4 pcf	Dry Wt.	= 264.37 g.*	Dry Wt.	= 263.11 g.
Dry Den.	= 79.9 pcf	Void Ratio	= 1.117	Void Ratio	= 0.712
		Saturation	= 98.7 %		

* Initial dry weight used in calculations

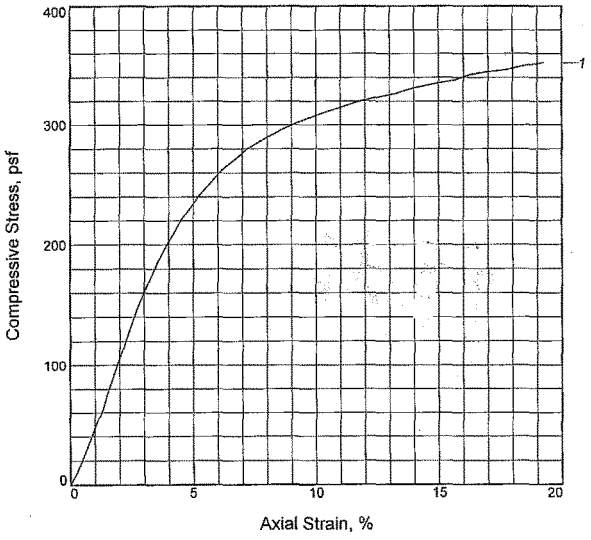
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.70818				1.117	
0.00	0.70831	0.00000			1.117	0.0 Comprs.
0.13	0.72679	0.00000	0.79	0.001	1.078	1.9 Comprs.
0.25	0.73490	0.00000	0.72	0.001	1.061	2.7 Comprs.
0.50	0.74547	0.00000	0.41	0.001	1.038	3.7 Comprs.
1.00	0.76557	0.00000	0.94	0.002	0.996	5.7 Comprs.
2.00	0.82119	0.00000	0.45	0.004	0.879	11.3 Comprs.
4.00	0.85803	0.00000	0.39	0.005	0.801	14.9 Comprs.
8.00	0.89518	0.00000	0.44	0.005	0.723	18.6 Comprs.

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
12.00	0.91565	0.00000	0.27	0.004	0.680	20.7 Comprs.
3.00	0.91009	0.00000			0.691	20.1 Comprs.
0.75	0.90031	0.00000	0.15		0.712	19.1 Comprs.

C_c = 0.40 P_c = 0.99 tsf C_r = 0.03

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	334			
Undrained shear strength, psf	167			
Failure strain, %	14.8			
Strain rate, %/min.	1.00			
Water content, %	48.7			
Wet density, pcf	110.7			
Dry density, pcf	74.4			
Saturation, %	104.1			
Void ratio	1.2643			
Specimen diameter, in.	1.376			
Specimen height, in.	3.079			
Height/diameter ratio	2.24			

Description: VSO GR CH2 W/ LNS & LYS ML, RT

LL = 51	PL = 21	PI = 30	**Assumed GS=** 2.70	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/4/09
Remarks:

Figure _____

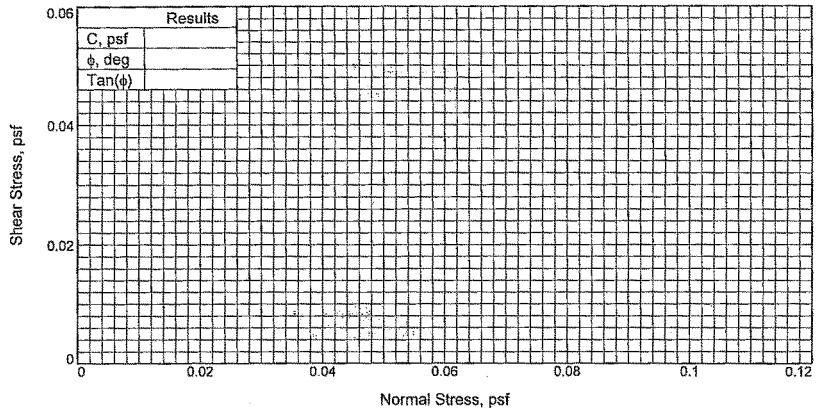
Client: U.S. Army Corps of Engineers

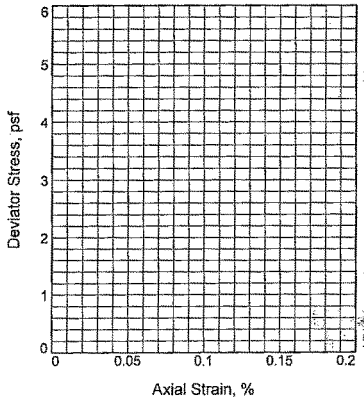
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-12U **Depth:** 8.8
Sample Number: 3B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: VF/ARS ***Checked By:*** MS





Sample No.	
Initial	Water Content, %
	Dry Density, pcf
	Saturation, %
	Void Ratio
	Diameter, in.
	Height, in.
At Test	Water Content, %
	Dry Density, pcf
	Saturation, %
	Void Ratio
	Diameter, in.
	Height, in.
Strain rate, %/min.	
Back Pressure, psi	
Cell Pressure, psi	
Fail. Stress, psf	
Strain, %	
Ult. Stress, psf	
Strain, %	
σ_1 Failure, psf	
σ_3 Failure, psf	

Type of Test: Unconsolidated Undrained

Sample Type:

Description: SO GR CL4 W/ LNS & LYS ML, RT

LL= 41 **PL=** 24 **PI=** 17

Assumed Specific Gravity=

Remarks: SAMPLE SLUMPED UNDER ITS OWN WEIGHT, NON-TESTABLE.

Figure _____

Client: U.S. Army Corps of Engineers

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

Source of Sample: MRGO-12U **Depth:** 12.8

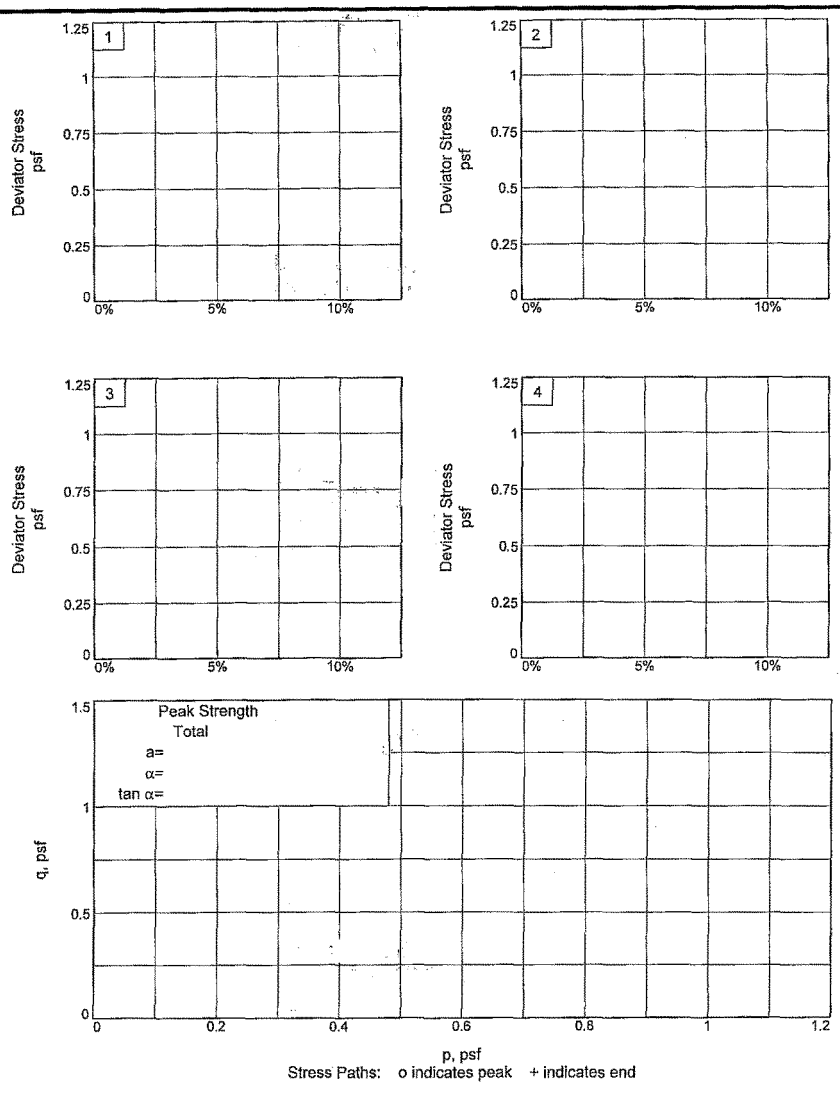
Sample Number: 4B

Proj. No.: 07-022135 **Date Sampled:**

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

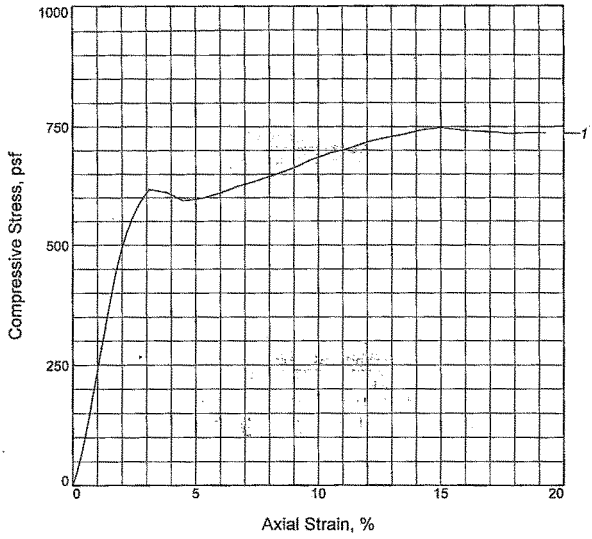
Checked By: MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-12U **Depth:** 12.8 **Sample Number:** 4B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Checked By: MS

UNCONFINED COMPRESSION TEST



Sample No.		1			
Unconfined strength, psf		748			
Undrained shear strength, psf		374			
Failure strain, %		15.0			
Strain rate, %/min.		1.00			
Water content, %		42.3			
Wet density, pcf		114.6			
Dry density, pcf		80.5			
Saturation, %		104.4			
Void ratio		1.0931			
Specimen diameter, in.		1.376			
Specimen height, in.		3.088			
Height/diameter ratio		2.24			

Description: SO GR CL6 W/ LNS & LYS ML

LL = 46	**PL** = 20	**PI** = 26	**Assumed GS=** 2.70	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/4/09
Remarks:

Figure _____

Client: U.S. Army Corps of Engineers

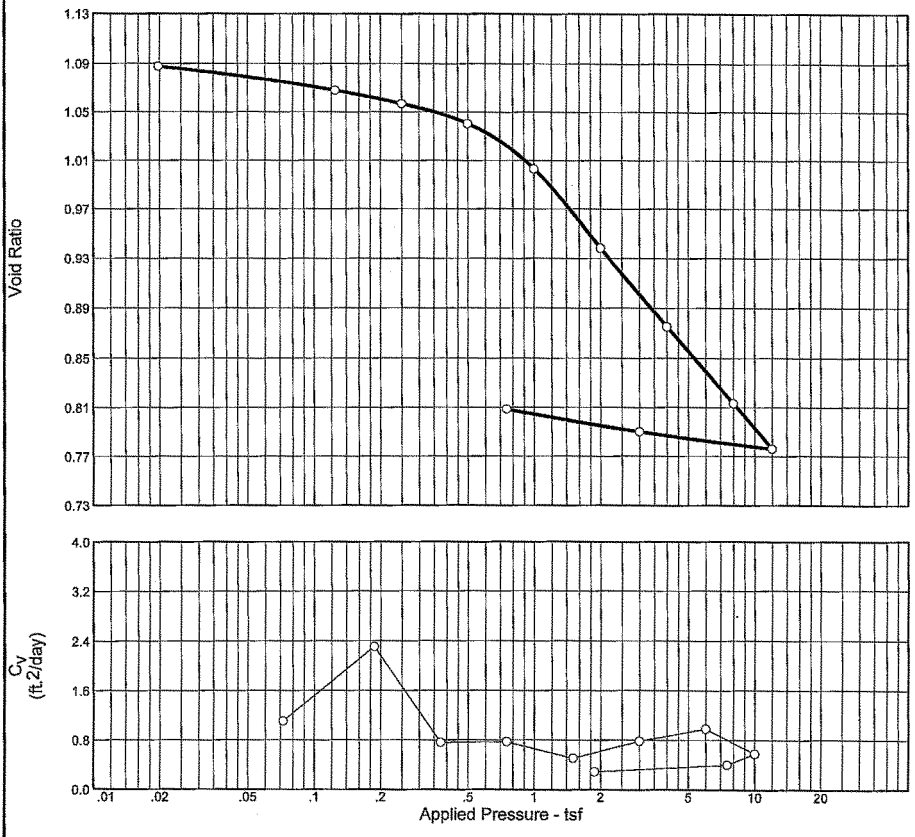
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-12U **Depth:** 16.8
Sample Number: 5B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: VF/ARS **Checked By:** MS

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
102.0 %	40.9 %	81.2	52	33	2.72	0.96	0.21	1.092

MATERIAL DESCRIPTION	USCS	AASHTO
SO GR CH2 W/ LNS & LYS ML	CH2	

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

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

Source: MRGO-12U **Sample No.:** 5D **Elev./Depth:** 18.6

FFEBJV, LLC

St Rose, LA

Remarks:

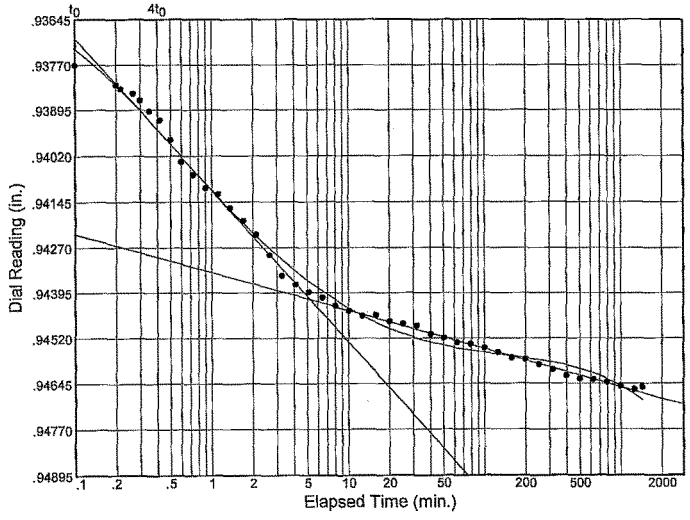
Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

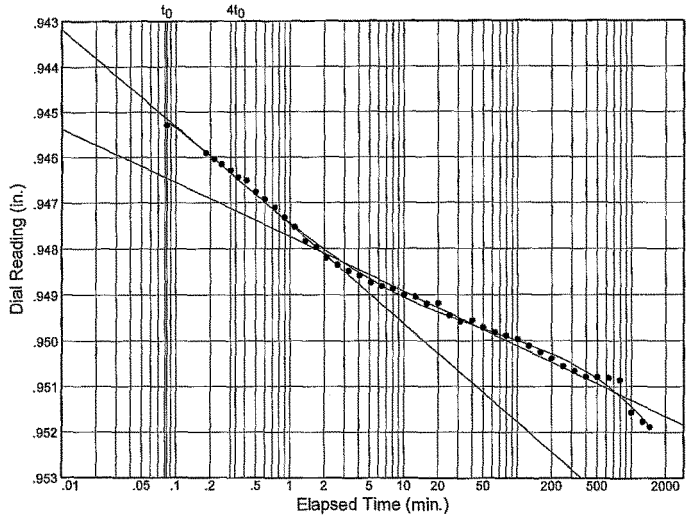
Source: MRGO-12U Sample No.: 5D Elev./Depth: 18.6



Load No.= 2
Load= 0.13 tsf
D_0 = 0.93503
D_{50} = 0.93959
D_{100} = 0.94414
T_{50} = 0.45 min.

C_v @ T_{50}
1.10 ft.2/day

C_α = 0.001



Load No.= 3
Load= 0.25 tsf
D_0 = 0.94397
D_{50} = 0.94602
D_{100} = 0.94806
T_{50} = 0.21 min.

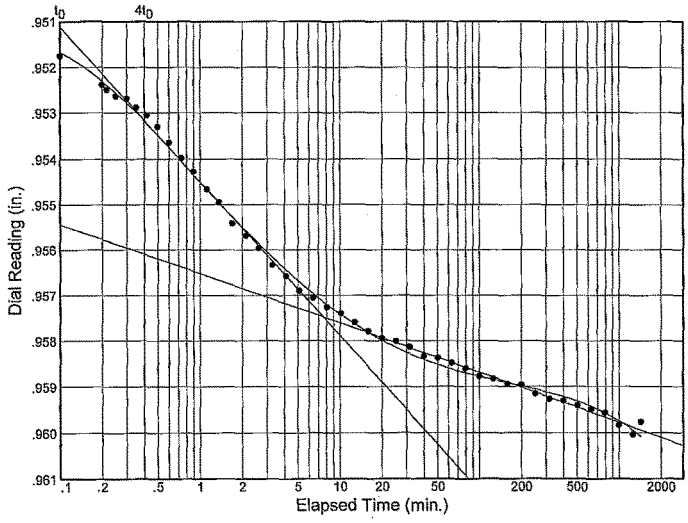
C_v @ T_{50}
2.30 ft.2/day

C_α = 0.001

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

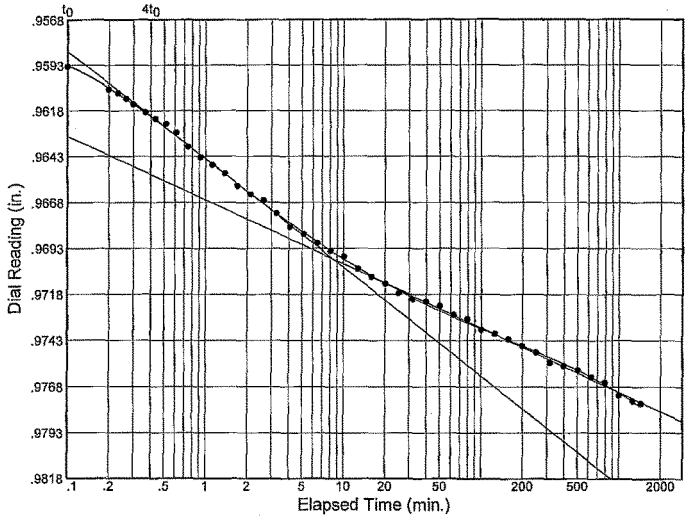
Source: MRGO-12U Sample No.: 5D Elev./Depth: 18.6



Load No.= 4
Load= 0.50 tsf
D_0 = 0.95016
D_{50} = 0.95382
D_{100} = 0.95748
T_{50} = 0.63 min.

C_v @ T_{50}
0.76 ft.2/day

C_α = 0.001



Load No.= 5
Load= 1.00 tsf
D_0 = 0.95645
D_{50} = 0.96316
D_{100} = 0.96986
T_{50} = 0.61 min.

C_v @ T_{50}
0.77 ft.2/day

C_α = 0.004

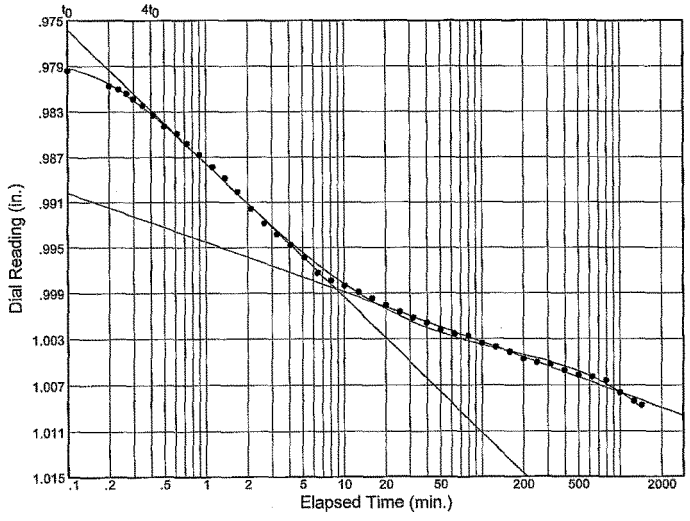
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Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

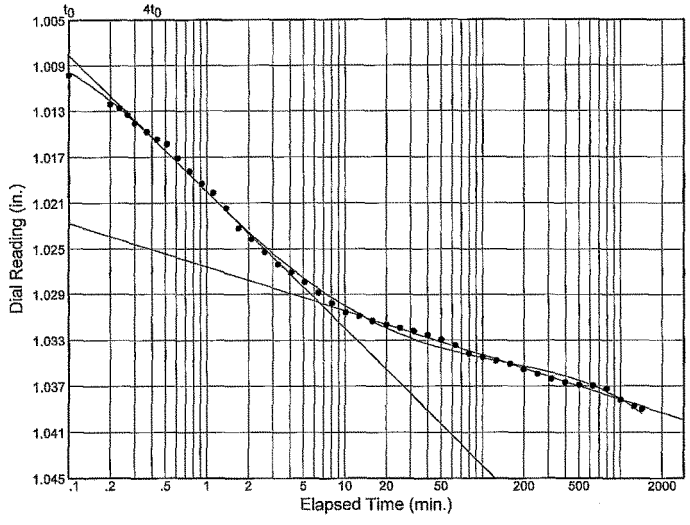
Source: MRGO-12U Sample No.: 5D Elev./Depth: 18.6



Load No.= 6
Load= 2.00 tsf
D_0 = 0.97520
D_{50} = 0.98690
D_{100} = 0.99860
T_{50} = 0.88 min.

C_v @ T_{50}
0.50 ft.2/day

C_α = 0.005



Load No.= 7
Load= 4.00 tsf
D_0 = 1.00380
D_{50} = 1.01677
D_{100} = 1.02973
T_{50} = 0.53 min.

C_v @ T_{50}
0.78 ft.2/day

C_α = 0.004

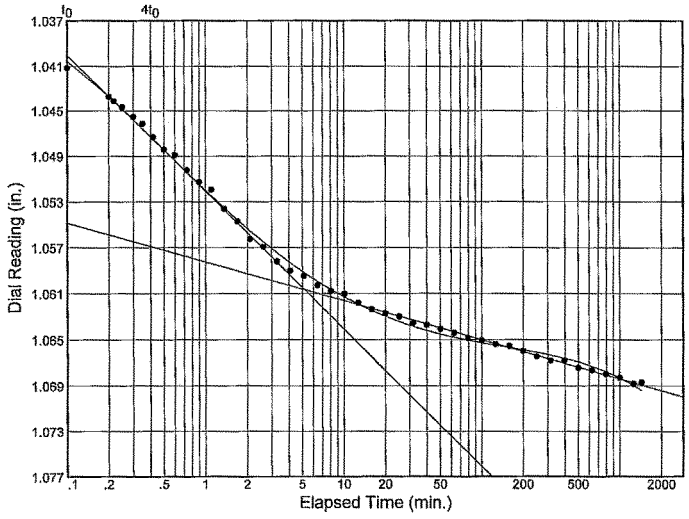
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

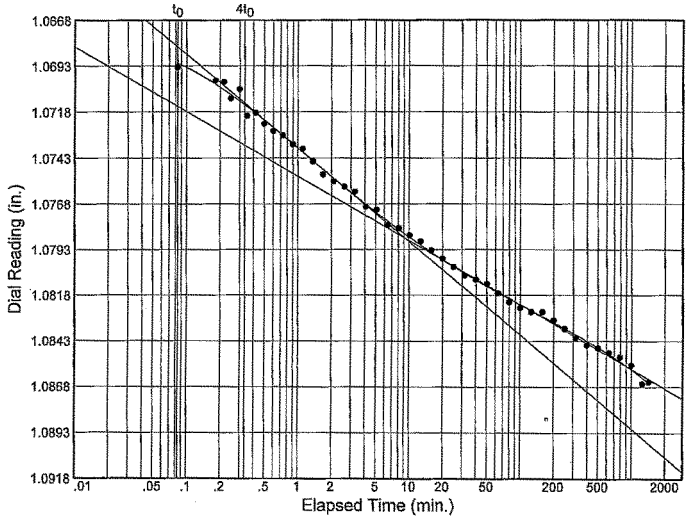
Source: MRGO-12U Sample No.: 5D Elev./Depth: 18.6



Load No.= 8
Load= 8.00 tsf
D_0 = 1.03385
D_{50} = 1.04726
D_{100} = 1.06066
T_{50} = 0.40 min.

C_v @ T_{50}
0.98 ft.2/day

C_α = 0.004



Load No.= 9
Load= 12.00 tsf
D_0 = 1.06689
D_{50} = 1.07278
D_{100} = 1.07866
T_{50} = 0.64 min.

C_v @ T_{50}
0.58 ft.2/day

C_α = 0.004

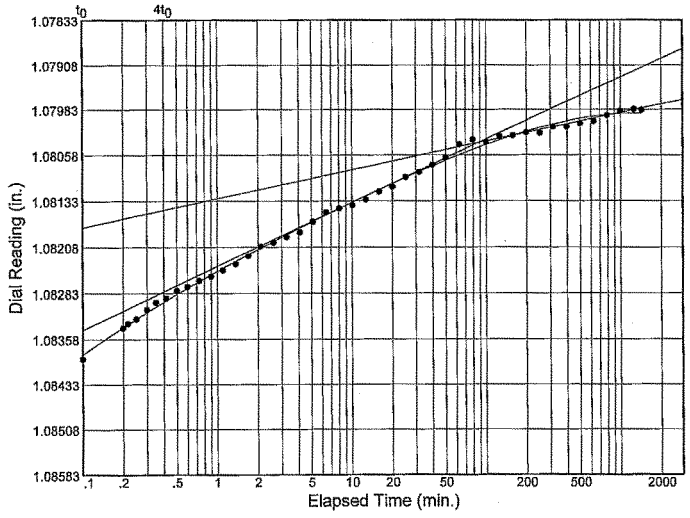
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Figure

Dial Reading vs. Time

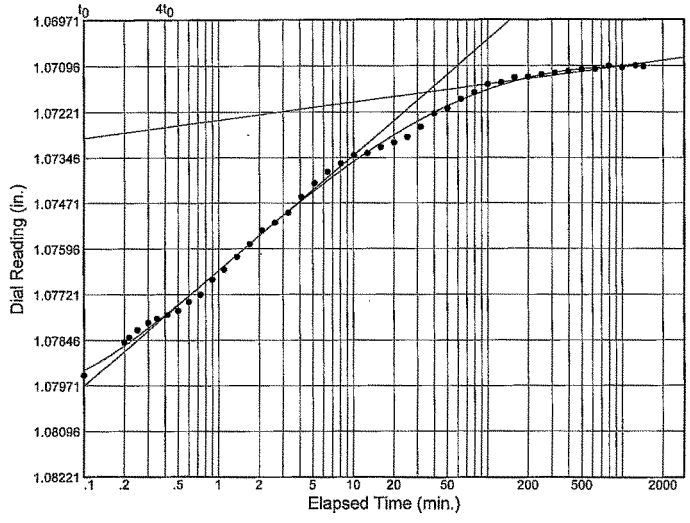
Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-12U Sample No.: 5D Elev./Depth: 18.6



Load No.= 10
Load= 3.00 tsf
D_0 = 1.08470
D_{50} = 1.08254
D_{100} = 1.08038
T_{50} = 0.88 min.

C_V @ T_{50}
0.40 ft.2/day



Load No.= 11
Load= 0.75 tsf
D_0 = 1.08080
D_{50} = 1.07623
D_{100} = 1.07167
T_{50} = 1.28 min.

C_V @ T_{50}
0.29 ft.2/day

FFEBJV, LLC

Figure

CONSOLIDATION TEST DATA

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Contract No. W912P8-07-D-0022
Task Order 135
Project Number: 07-022135

Sample Data

Source: MRGO-12U
Sample No.: 5D
Elev. or Depth: 18.6 Sample Length(in./cm.):
Location:
Description: SO GR CH2 W/ LNS & LYS ML
Liquid Limit: 52 Plasticity Index: 33
USCS: CH2 AASHTO: Figure No.:
Testing Remarks: Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST		AFTER TEST	
Wet w+t =	140.95 g.	Consolidometer # =	15	Wet w+t =	472.44 g.
Dry w+t =	100.00 g.			Dry w+t =	385.44 g.
Tare Wt. =	.00 g.	Spec. Gravity =	2.72	Tare Wt. =	111.05 g.
Height =	1.00 in.	Height =	1.00 in.		
Diameter =	3.99 in.	Diameter =	3.99 in.		
Weight =	377.53 g.	Defl. Table =	n/a		
Moisture =	41.0 %	Ht. Solids =	0.4796 in.	Moisture =	31.7 %
Wet Den. =	114.4 pcf	Dry Wt. =	267.63 g.*	Dry Wt. =	274.39 g.
Dry Den. =	81.2 pcf	Void Ratio =	1.092	Void Ratio =	0.808
		Saturation =	102.0 %		

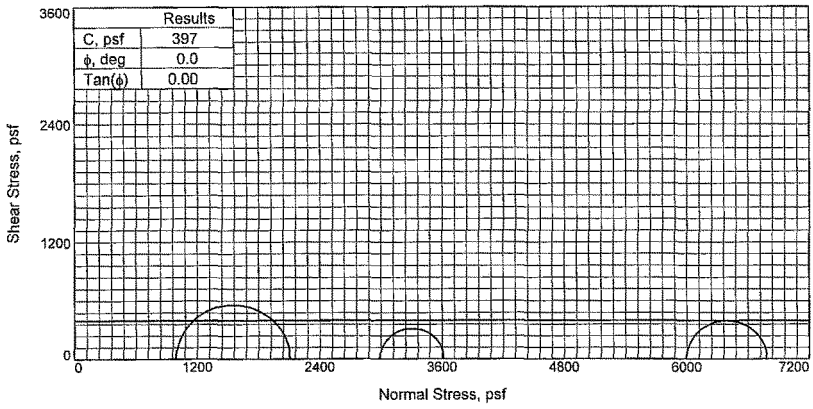
* Initial dry weight used in calculations

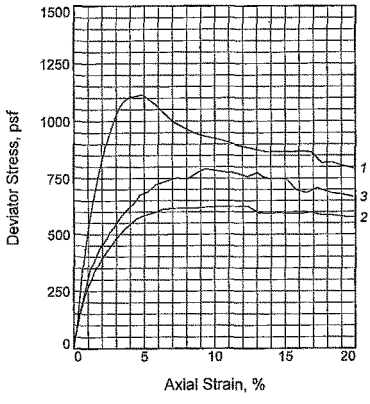
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.93511				1.092	
0.02	0.93706	0.00000			1.088	0.2 Comprs.
0.13	0.94655	0.00000	1.10	0.001	1.068	1.1 Comprs.
0.25	0.95188	0.00000	2.30	0.001	1.057	1.7 Comprs.
0.50	0.95977	0.00000	0.76	0.001	1.040	2.5 Comprs.
1.00	0.97772	0.00000	0.77	0.004	1.003	4.2 Comprs.
2.00	1.00877	0.00000	0.50	0.005	0.938	7.3 Comprs.
4.00	1.03900	0.00000	0.78	0.004	0.875	10.4 Comprs.
8.00	1.06874	0.00000	0.98	0.004	0.813	13.3 Comprs.

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
12.00	1.08653	0.00000	0.58	0.004	0.776	15.1 Comprs.
3.00	1.07984	0.00000	0.40		0.790	14.4 Comprs.
0.75	1.07098	0.00000	0.29		0.808	13.5 Comprs.

C_c = 0.21 P_c = 0.96 tsf C_r = 0.03





Sample No.		1	2	3
Initial	Water Content, %	65.8	68.6	68.8
	Dry Density, pcf	61.1	59.7	59.9
	Saturation, %	100.2	100.9	101.6
	Void Ratio	1.7986	1.8651	1.8557
	Diameter, in.	1.400	1.390	1.391
	Height, in.	3.096	3.092	3.096
At Test	Water Content, %	65.8	68.6	68.8
	Dry Density, pcf	61.1	59.7	59.9
	Saturation, %	100.2	100.9	101.6
	Void Ratio	1.7986	1.8651	1.8557
	Diameter, in.	1.400	1.390	1.391
	Height, in.	3.096	3.092	3.096
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.90	20.76	41.63
Fail. Stress, psf		1113	627	791
Strain, %		4.8	12.3	9.3
Ult. Stress, psf		868	592	757
Strain, %				
σ_1 Failure, psf		2107	3616	6785
σ_3 Failure, psf		994	2989	5994

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CH4 W/ LNS & ARS SM

LL= 94 **PL=** 27 **PI=** 67
Assumed Specific Gravity= 2.74
Remarks:

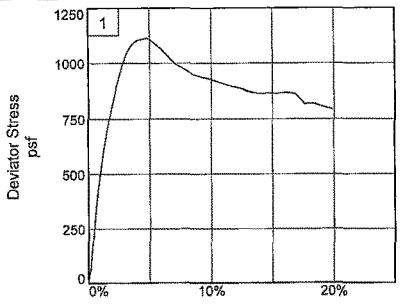
Figure _____

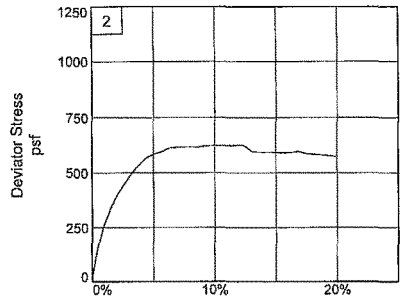
Client: U.S. Army Corps of Engineers

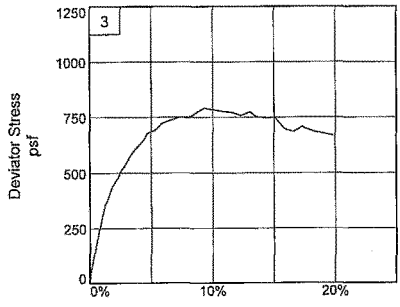
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-12U **Depth:** 21.7
Sample Number: 6C
Proj. No.: 07-022135 **Date Sampled:** 12/4/09

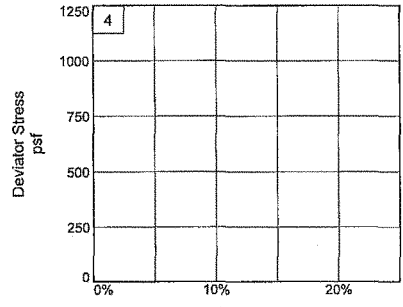
TRIAXIAL SHEAR TEST REPORT
FFEBJV, LLC

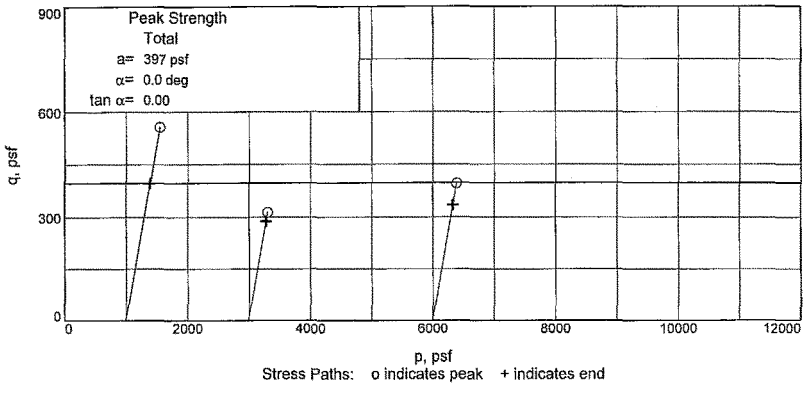
Tested By: VF/ARS **Checked By:** MS







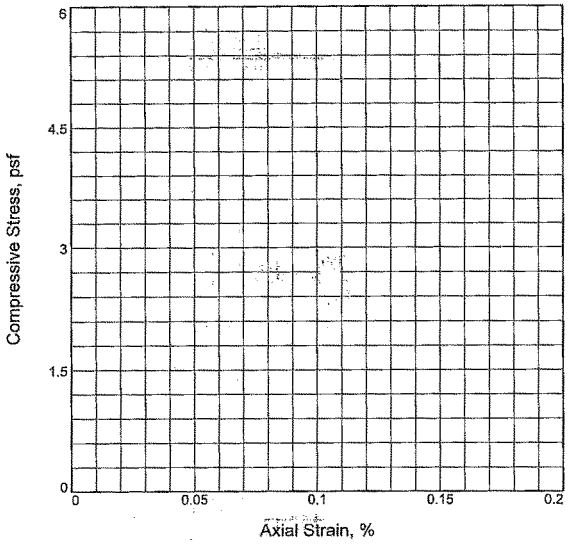




Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-12U **Depth:** 21.7 **Sample Number:** 6C
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: VF/ARS **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.				
Unconfined strength, psf				
Undrained shear strength, psf				
Failure strain, %				
Strain rate, %/min.				
Water content, %				
Wet density, pcf				
Dry density, pcf				
Saturation, %				
Void ratio				
Specimen diameter, in.				
Specimen height, in.				
Height/diameter ratio				

Description: GR ML W/ LNS SM, LNS CH

LL = NP	PL =	PI = NP	Assumed GS=	Type:

Project No.: 07-022135
Date Sampled:
Remarks:
NON-TESTABLE MATERIAL.

Figure _____

Client: U.S. Army Corps of Engineers

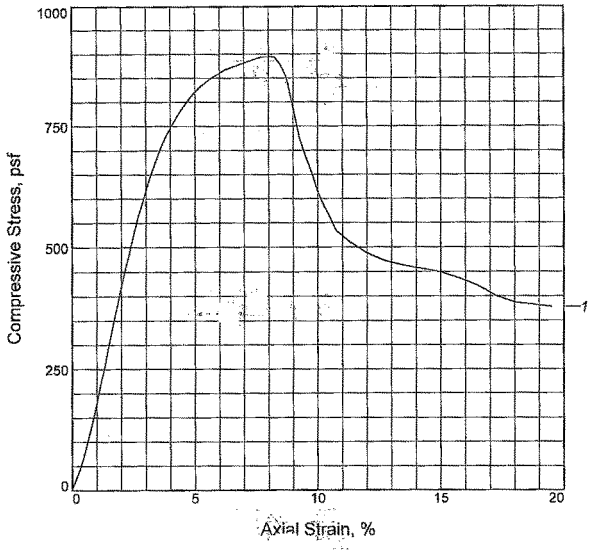
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-12U **Depth:** 24.8
Sample Number: 7B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Checked By: MS

UNCONFINED COMPRESSION TEST



Sample No.	1				
Unconfined strength, psf	894				
Undrained shear strength, psf	447				
Failure strain, %	7.7				
Strain rate, %/min.	1.00				
Water content, %	39.0				
Wet density, pcf	117.1				
Dry density, pcf	84.2				
Saturation, %	105.1				
Void ratio	1.0014				
Specimen diameter, in.	1.392				
Specimen height, in.	3.093				
Height/diameter ratio	2.22				

Description: SO GR CL4 W/ LYS SM

LL = 41	**PL** = 20	**PI** = 21	**Assumed GS=** 2.70	**Type:** Specimen1

Project No.: 07-022135
Date Sampled:
Remarks:
ALTERNATE SAMPLE FOR 7B.

Figure _____

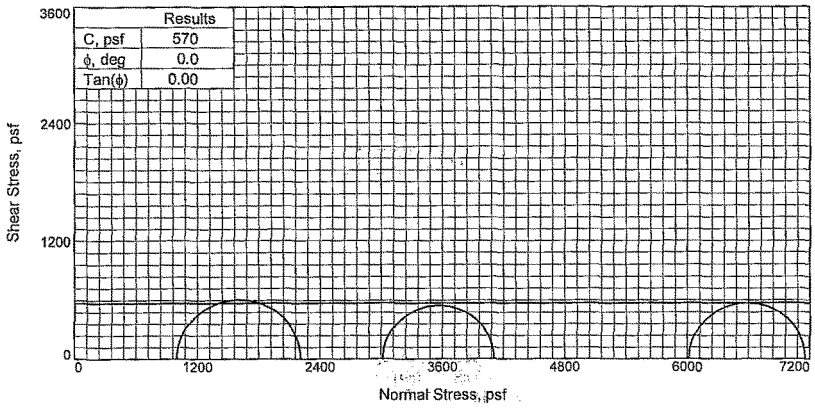
Client: U.S. Army Corps of Engineers

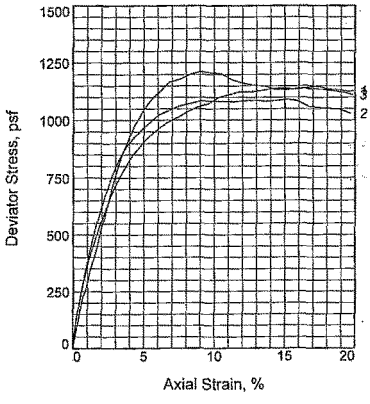
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-12U **Depth:** 25.7
Sample Number: 7C

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Checked By: MS





Sample No.		1	2	3
Initial	Water Content, %	38.4	40.2	41.0
	Dry Density, pcf	83.7	81.7	81.3
	Saturation, %	102.3	102.1	103.2
	Void Ratio	1.0130	1.0643	1.0726
	Diameter, in.	1.390	1.393	1.387
	Height, in.	3.095	3.098	3.087
At Test	Water Content, %	38.4	40.2	41.0
	Dry Density, pcf	83.7	81.7	81.3
	Saturation, %	102.3	102.1	103.2
	Void Ratio	1.0130	1.0643	1.0726
	Diameter, in.	1.390	1.393	1.387
	Height, in.	3.095	3.098	3.087
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.94	20.95	41.78
Fail. Stress, psf		1211	1090	1141
Strain, %		9.1	15.1	14.8
Ult. Stress, psf		1134	1090	1141
Strain, %				
σ_1 Failure, psf		2211	4107	7156
σ_3 Failure, psf		1000	3017	6016

Type of Test: Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: M GR CL4 W/ LNS & LYS SM

LL= 40 **PL=** 23 **PI=** 17
Assumed Specific Gravity= 2.70
Remarks:

Figure _____

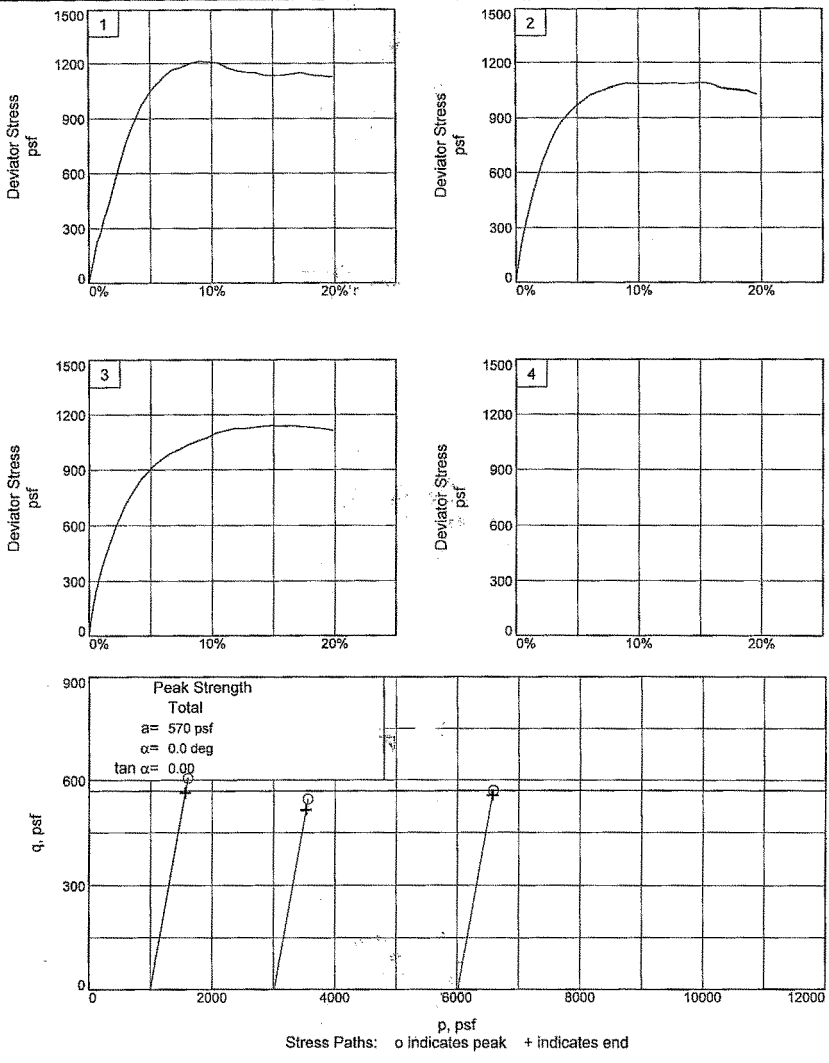
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-12U **Depth:** 28.8
Sample Number: 8B
Proj. No.: 07-022135 **Date Sampled:** 8B

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

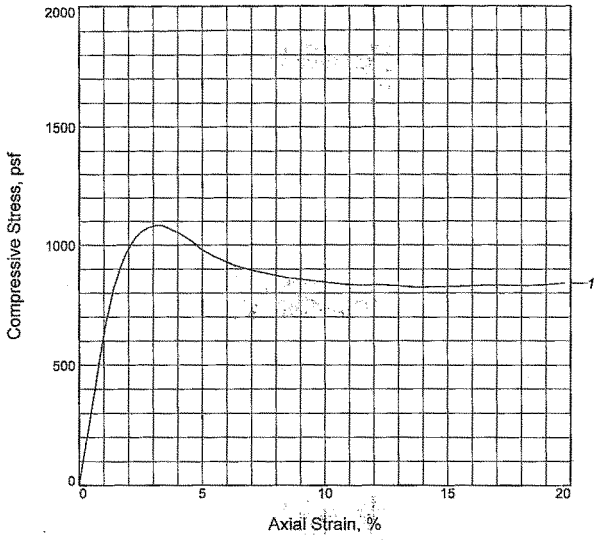
Tested By: 0.23 **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-12U **Depth:** 28.8 **Sample Number:** 8B
Project No.: 07-022135 **Figure** _____ FFEBJV, LLC

Tested By: 0.23 **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	1084			
Undrained shear strength, psf	542			
Failure strain, %	3.2			
Strain rate, %/min.	1.00			
Water content, %	53.9			
Wet density, pcf	106.7			
Dry density, pcf	69.3			
Saturation, %	100.6			
Void ratio	1.4682			
Specimen diameter, in.	1.390			
Specimen height, in.	3.106			
Height/diameter ratio	2.23			

Description: M GR CH4 W/ LNS & LYS SM

LL = 81	**PL** = 24	**PI** = 57	**Assumed GS**= 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/4/09
Remarks:

Figure _____

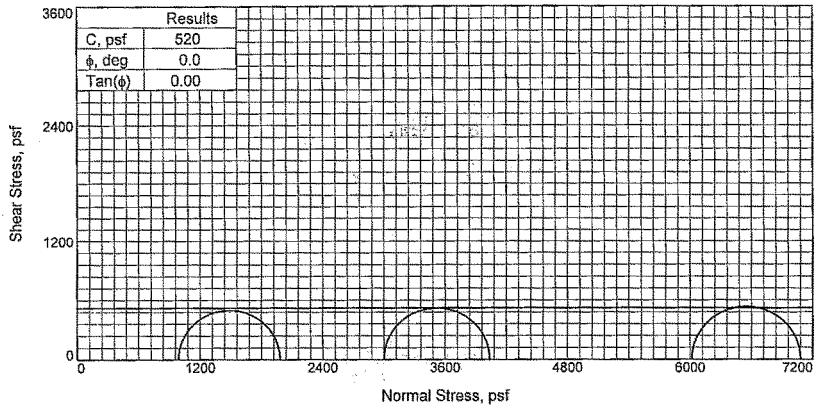
Client: U.S. Army Corps of Engineers

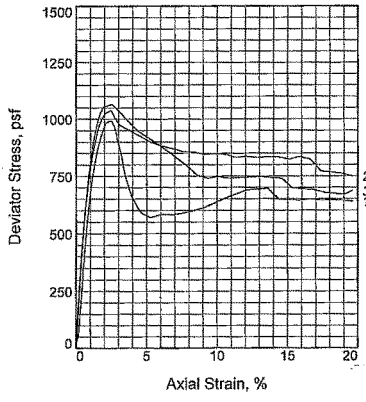
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-12U **Depth:** 32.8
Sample Number: 9B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: VF/ARS **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	65.2	64.0	64.3
	Dry Density, pcf	62.0	63.0	62.9
	Saturation, %	101.5	102.2	102.3
	Void Ratio	1.7610	1.7168	1.7206
	Diameter, in.	1.408	1.400	1.400
	Height, in.	3.096	3.098	3.099
At Test	Water Content, %	65.2	64.0	64.3
	Dry Density, pcf	62.0	63.0	62.9
	Saturation, %	101.5	102.2	102.3
	Void Ratio	1.7610	1.7168	1.7206
	Diameter, in.	1.408	1.400	1.400
	Height, in.	3.096	3.098	3.099
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.87	20.84	41.79
Fail. Stress, psf		993	1037	1065
Strain, %		2.4	2.4	2.5
Ult. Stress, psf		569	845	741
Strain, %				
σ_1 Failure, psf		1982	4038	7083
σ_3 Failure, psf		989	3000	6017

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: M GR CH4 W/ LNS & LYS ML

LL= 88 **PL=** 24 **PI=** 64
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

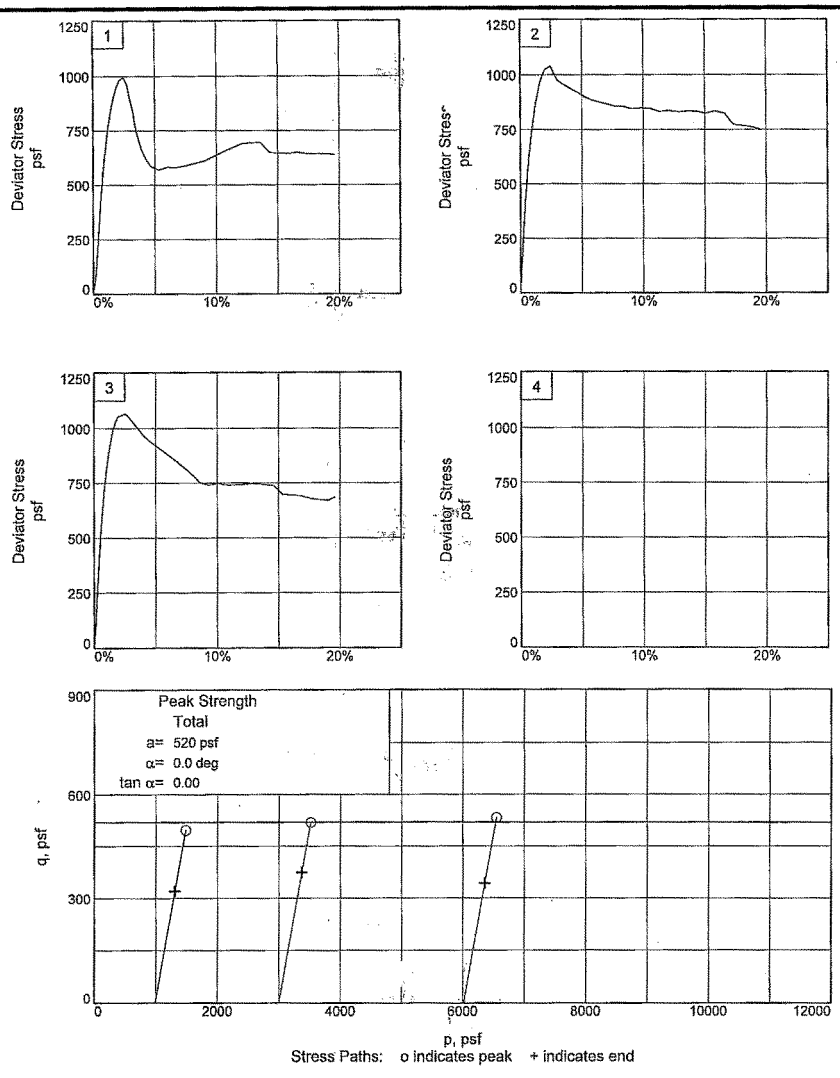
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-12U **Depth:** 36.8
Sample Number: 10B
Proj. No.: 07-022135 **Date Sampled:** 12/4/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

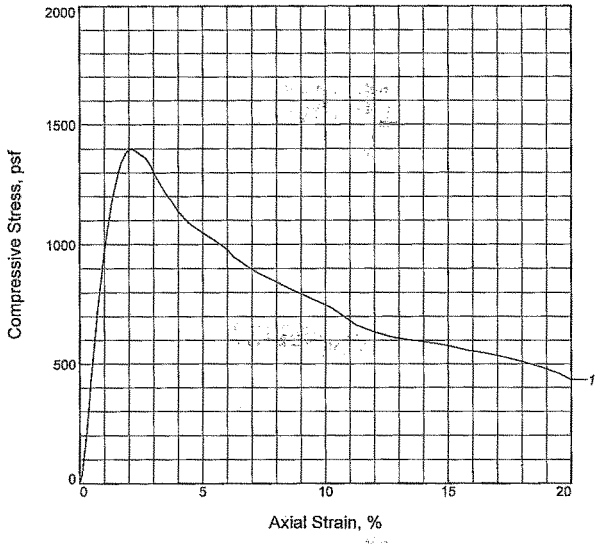
Tested By: VF/ARS **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-12U **Depth:** 36.8 **Sample Number:** 10B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: VF/ARS **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1				
Unconfined strength, psf	1400				
Undrained shear strength, psf	700				
Failure strain, %	2.1				
Strain rate, %/min.	1.00				
Water content, %	62.8				
Wet density, pcf	103.4				
Dry density, pcf	63.5				
Saturation, %	101.6				
Void ratio	1.6924				
Specimen diameter, in.	1.426				
Specimen height, in.	3.091				
Height/diameter ratio	2.17				

Description: M GR CH4 W/ LNS ML, CC

LL = 93	PL = 27	PI = 66	**Assumed GS=** 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/10/09
Remarks:

Figure _____

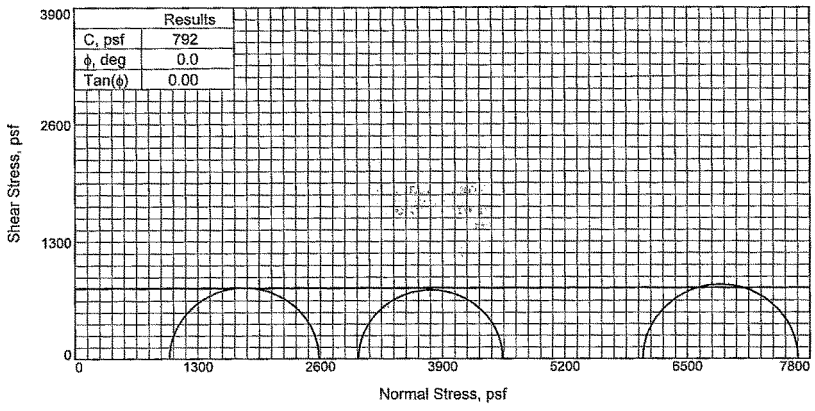
Client: U.S. Army Corps of Engineers

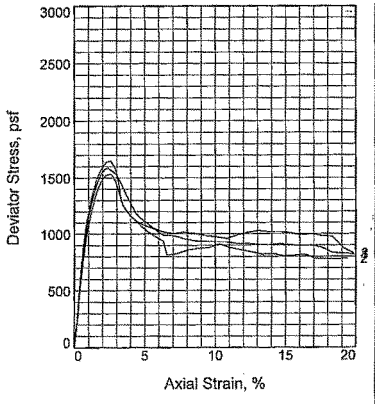
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-12U **Depth:** 40.8
Sample Number: 11B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: VF/ARS **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	65.1	63.1	65.2
	Dry Density, pcf	61.9	62.5	61.8
	Saturation, %	101.3	99.6	101.2
	Void Ratio	1.7612	1.7363	1.7666
	Diameter, in.	1.409	1.411	1.410
	Height, in.	3.105	3.103	3.104
At Test	Water Content, %	65.1	63.1	65.2
	Dry Density, pcf	61.9	62.5	61.8
	Saturation, %	101.3	99.6	101.2
	Void Ratio	1.7612	1.7363	1.7666
	Diameter, in.	1.409	1.411	1.410
	Height, in.	3.105	3.103	3.104
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.93	20.87	41.85
Fail. Stress, psf		1587	1534	1648
Strain, %		2.3	2.5	2.5
Ult. Stress, psf		931	816	1002
Strain, %				
σ_1 Failure, psf		2585	4538	7675
σ_3 Failure, psf		999	3005	6027

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: M GR CH4 W/ LNS ML

LL= 94 **PL=** 28 **PI=** 66
Assumed Specific Gravity= 2.74
Remarks:

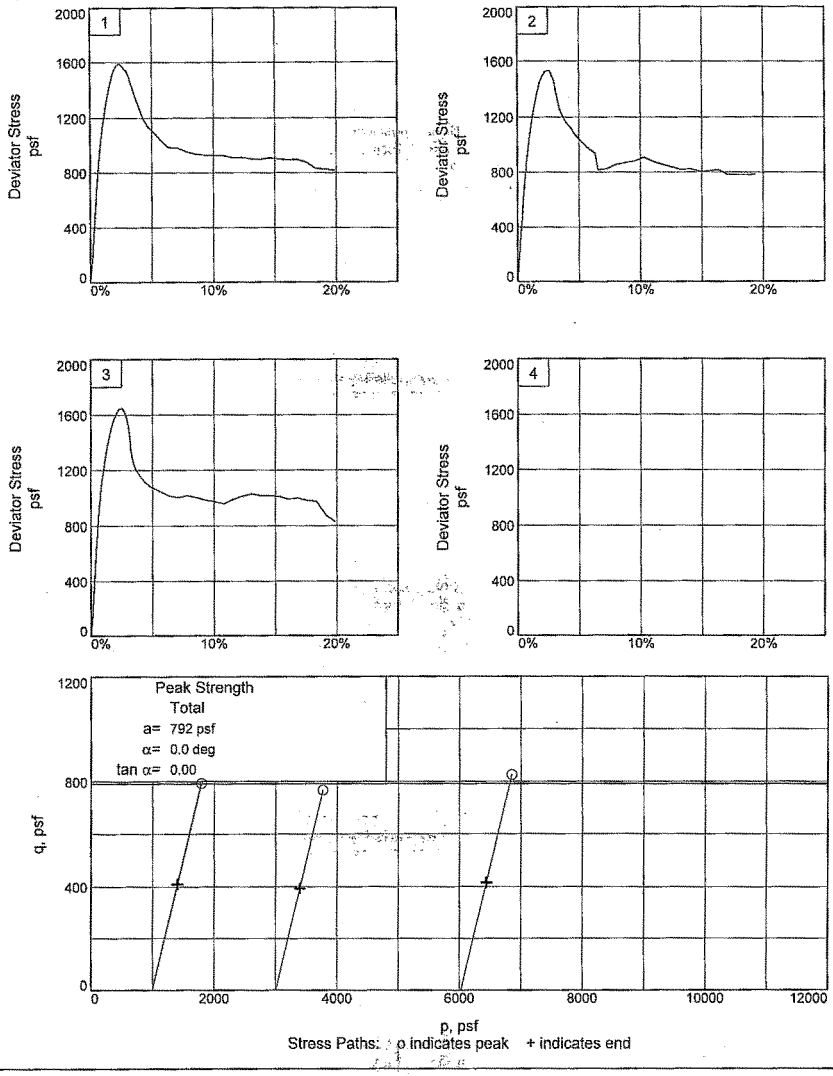
Figure _____

Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-12U **Depth:** 44.8
Sample Number: 12B
Proj. No.: 07-022135 **Date Sampled:** 12/10/09

TRIAXIAL SHEAR TEST REPORT
FFEBJV, LLC

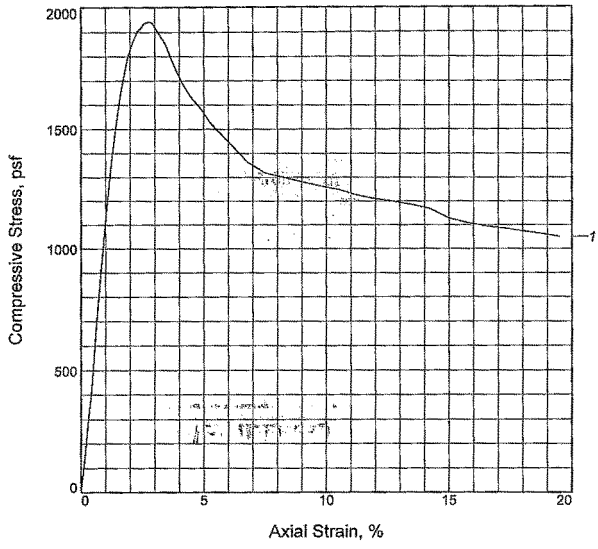
Tested By: VF/ARS **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-12U **Depth:** 44.8 **Sample Number:** 12B
Project No.: 07-022135 **Figure** _____ FFEBJV, LLC

Tested By: VF/ARS **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	1940			
Undrained shear strength, psf	970			
Failure strain, %	2.8			
Strain rate, %/min.	1.00			
Water content, %	60.9			
Wet density, pcf	103.1			
Dry density, pcf	64.1			
Saturation, %	100.0			
Void ratio	1.6682			
Specimen diameter, in.	1.405			
Specimen height, in.	3.109			
Height/diameter ratio	2.21			

Description: M GR CH4 W/ LNS ML

LL = 95	PL = 27	PI = 68	**Assumed GS=** 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/10/09
Remarks:

Figure _____

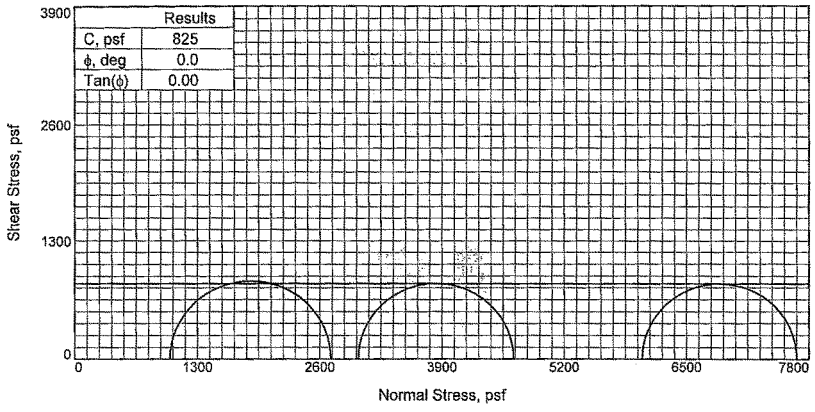
Client: U.S. Army Corps of Engineers

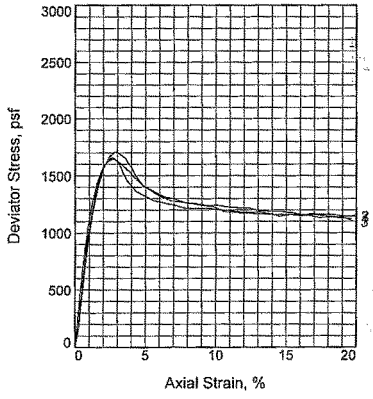
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-12U **Depth:** 48.8
Sample Number: 13B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: VF/JC **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	55.3	54.7	56.5
	Dry Density, pcf	68.5	68.3	67.9
	Saturation, %	101.3	99.8	102.0
	Void Ratio	1.4955	1.5032	1.5173
	Diameter, in.	1.409	1.411	1.406
	Height, in.	3.102	3.105	3.110
At Test	Water Content, %	55.3	54.7	56.5
	Dry Density, pcf	68.5	68.3	67.9
	Saturation, %	101.3	99.8	102.0
	Void Ratio	1.4955	1.5032	1.5173
	Diameter, in.	1.409	1.411	1.406
	Height, in.	3.102	3.105	3.110
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		7.02	20.90	41.86
Fail. Stress, psf		1708	1654	1644
Strain, %		2.9	2.7	2.8
Ult. Stress, psf		1226	1237	1211
Strain, %				
σ_1 Failure, psf		2718	4663	7673
σ_3 Failure, psf		1010	3010	6029

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: M GR CH4 W/ LNS ML

LL= 83 **PL=** 25 **PI=** 58
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

Client: U.S. Army Corps of Engineers

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

Source of Sample: MRGO-12U **Depth:** 52.8

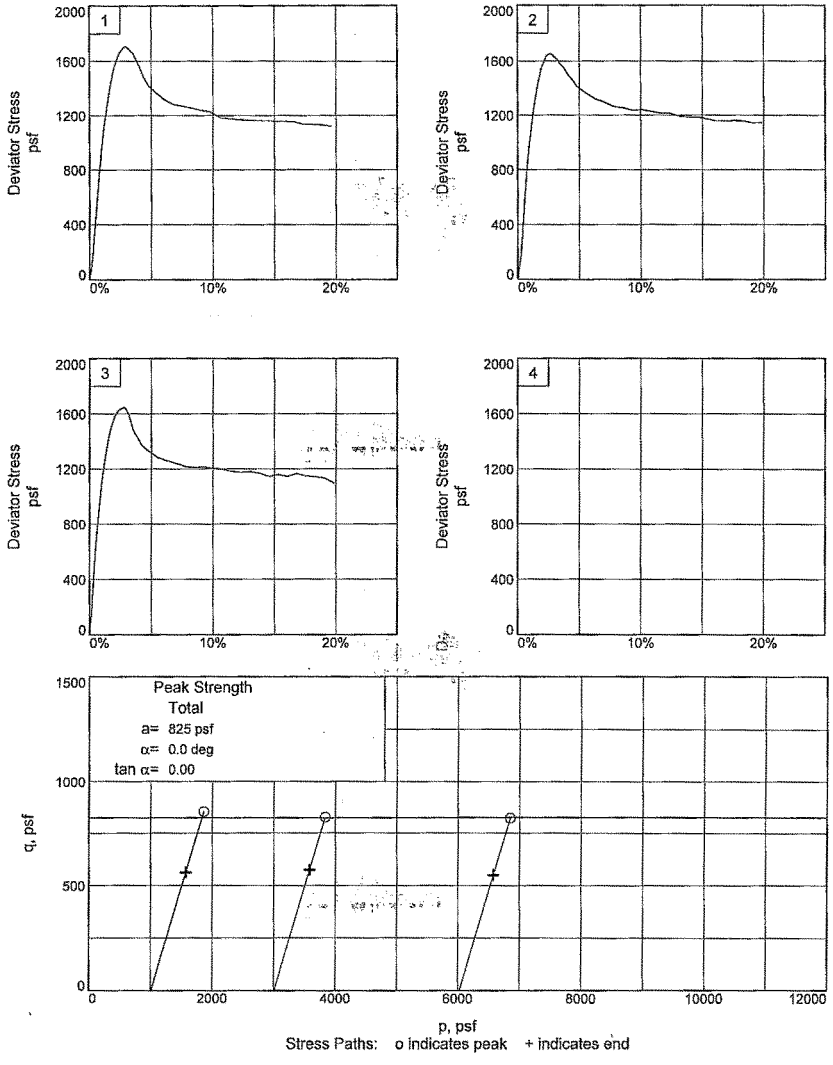
Sample Number: 14B

Proj. No.: 07-022135 **Date Sampled:** 12/10/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

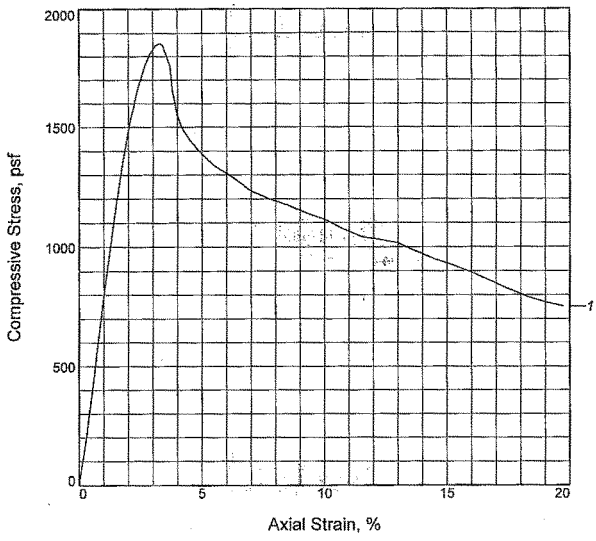
Tested By: VF/ARS **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-12U **Depth:** 52.8 **Sample Number:** 14B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: VF/ARS **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1				
Unconfined strength, psf	1855				
Undrained shear strength, psf	928				
Failure strain, %	3.3				
Strain rate, %/min.	1.00				
Water content, %	59.0				
Wet density, pcf	104.2				
Dry density, pcf	65.6				
Saturation, %	100.4				
Void ratio	1.6092				
Specimen diameter, in.	1.405				
Specimen height, in.	3.104				
Height/diameter ratio	2.21				

Description: M GR CH4 W/ LNS & LYS ML, SL

LL = 92	PL = 26	PI = 66	Assumed GS= 2.74	Type: UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/10/09
Remarks:

Figure _____

Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-12U **Depth:** 56.8
Sample Number: 15B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: VF/ARS **Checked By:** MS

SUMMARY OF LABORATORY TEST RESULTS

Project: MRGO Ecosystem Restoration Feasibility Study Assigned By: _____

Project Number: 07-022135 Current Date: 1/19/2010
Boring: MRGO-17U

Sample Number	Depth	Visual Classification	USCS	E(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
1A	0.0	SO GR CH3 W/ ARS ML, RT	CH3		61												
1B	0.8	M GR CH2 W/ LNS ML, RT	CH2	15	37	86	118	100	UC	-	547	1094	54	21	33	0.20	
2A	4.0	SO GR CH2	CH2		49												
3A	6.0	SO GR CH3	CH3		50												
4A	8.0	SO GR CH3 W/ LNS ML, RT	CH3		50												
4B	8.8	SO GR CH3	CH3		51												
4C	9.7	SO GR CH3 W/ LNS & LYS ML, WD	CH3		45												
4D	10.6	SO GR CH3 W/ LNS & LYS ML, WD	CH3		45												
5A	12.0	GR ML W/ LYS CH	ML		34												
5B	12.8	GR ML W/ LYS CH	ML		35												
5C	13.7	SO GR CL4 W/ LYS CH, RT	CL4		42												
6A	16.0	SO GR CL4 W/ LNS CH	CL4		40												
6B	16.8	SO GR CL4	CL4		37	89	121	100	UU	0	395		35	21	14	0.14	
6C	17.7	VSO GR CL4 W/ LYS ML	CL4		41								*	*	*		CON,GS
6D	18.6	VSO GR CL4 W/ LYS ML	CL4		37												
7A	20.0	SO GR CL4	CL4		40												
7B	20.8	SO GR CL4 W/ LYS ML	CL4	8	38	85	117	100	UC	-	395	790	41	19	22	0.18	
7C	21.7	SO GR CL4 W/ LNS & LYS ML	CL4		38												
7D	22.6	SO GR CL4	CL4		39												
8A	24.0	SO GR CL6 W/ LNS & LYS ML	CL6		46												
8B	24.8	M GR CL4 W/ LYS ML	CL4		34	91	122	100	UU	0	526		33	20	13	0.11	
8C	25.7	SO GR CL6 W/ LYS ML	CL6		42												
8D	26.6	SO GR CL6	CL6		43												
9A	28.0	GR SM W/ LYS CH	SM		37												
9B	28.8	GR SM W/ LYS CH	SM		37												
9C	29.7	GR SM W/ LYS CH	SM		38												
10A	32.0	GR SM W/ LNS & LYS CH	SM		34												
10B	32.8	SO GR CL4 W/ LYS CH	CL4		39												
11A	34.0	SO GR CL6	CL6		45												
12A	36.0	M GR CH3 W/ LNS & LYS ML	CH3		42												
12B	36.4	M GR CH4 W/ LNS & LYS ML	CH4	8	45	77	112	100	UC	-	684	1368	79	23	56	0.23	
12C	37.3	M GR CH3 W/ LNS & LYS ML	CH3		38								*	*	*		CON,GS
12D	38.2	M GR CH3 W/ LNS & LYS ML	CH3		42												
13A	40.0	M GR CH3 W/ LNS ML	CH3		46												
14	42.5	GR ML	ML		25												
15	45.0	M GR CH3 W/ LNS ML	CH3		45												
16	47.5	GR ML	ML		25												

Remarks: _____
FFEB JV, LLC

Checked By: MSLM
File Name: MRGO-17U.xls

SUMMARY OF LABORATORY TEST RESULTS

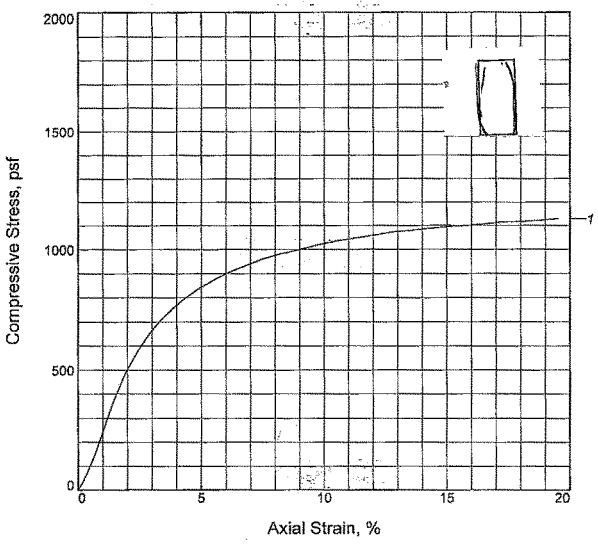
Project: MRGO Ecosystem Restoration Feasibility Study Assigned By: _____

Project Number: 07-022135 Current Date: 1/19/2010
Boring: MRGO-17U

Sample Number	Depth	Visual Classification	USCS	E(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
17	50.0	SO GR CH3 W/ LNS ML	CH3		53												
18A	52.0	GR SM	SM		31												
18B	52.4	SO GR CH2 W/ LNS & LYS SM	CH2		38												
19A	54.0	GR ML	ML		46												
20A	56.0	GR ML	ML		34												
21	58.5	GR ML	ML		28												

Remarks: _____ Checked By: _____
FFEB JV, LLC File Name: MRGO-17U.xls

UNCONFINED COMPRESSION TEST



Sample No.	1				
Unconfined strength, psf	1094				
Undrained shear strength, psf	547				
Failure strain, %	15.0				
Strain rate, %/min.	1.00				
Water content, %	37.3				
Wet density, pcf	117.5				
Dry density, pcf	85.6				
Saturation, %	103.9				
Void ratio	0.9698				
Specimen diameter, in.	1.401				
Specimen height, in.	3.087				
Height/diameter ratio	2.20				

Description: M GR CH2 W/ LNS ML RT

LL = 54	**PL** = 21	**PI** = 33	**Assumed GS**= 2.70	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/10/09
Remarks:

Figure _____

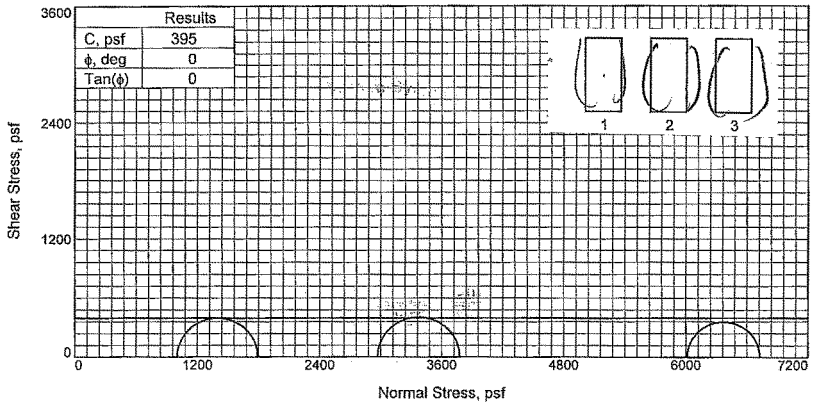
Client: U.S. Army Corps of Engineers

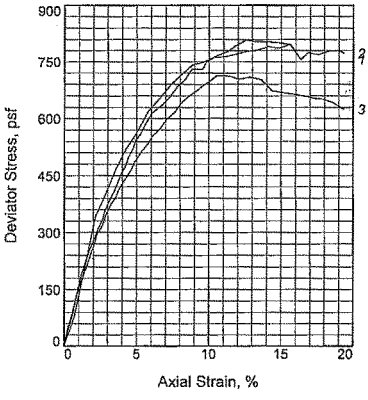
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-17U **Depth:** 0.8
Sample Number: 1B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: VF/ARS **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	36.6	36.1	36.8
	Dry Density, pcf	88.3	89.0	88.5
	Saturation, %	110.0	110.4	111.2
	Void Ratio	0.8874	0.8731	0.8843
	Diameter, in.	1.376	1.383	1.378
	Height, in.	3.034	3.034	3.053
At Test	Water Content, %	36.6	36.1	36.8
	Dry Density, pcf	88.3	89.0	88.5
	Saturation, %	110.0	110.4	111.2
	Void Ratio	0.8874	0.8731	0.8843
	Diameter, in.	1.376	1.383	1.378
	Height, in.	3.034	3.034	3.053
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.96	20.62	41.77
Fail. Stress, psf		790	809	713
Strain, %		14.1	12.6	10.6
Ult. Stress, psf		786	801	669
Strain, %				
σ_1 Failure, psf		1793	3779	6727
σ_3 Failure, psf		1003	2970	6014

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CL*A*

LL= 35 **PL=** 21 **PI=** 14
Assumed Specific Gravity= 2.67
Remarks:

Figure _____

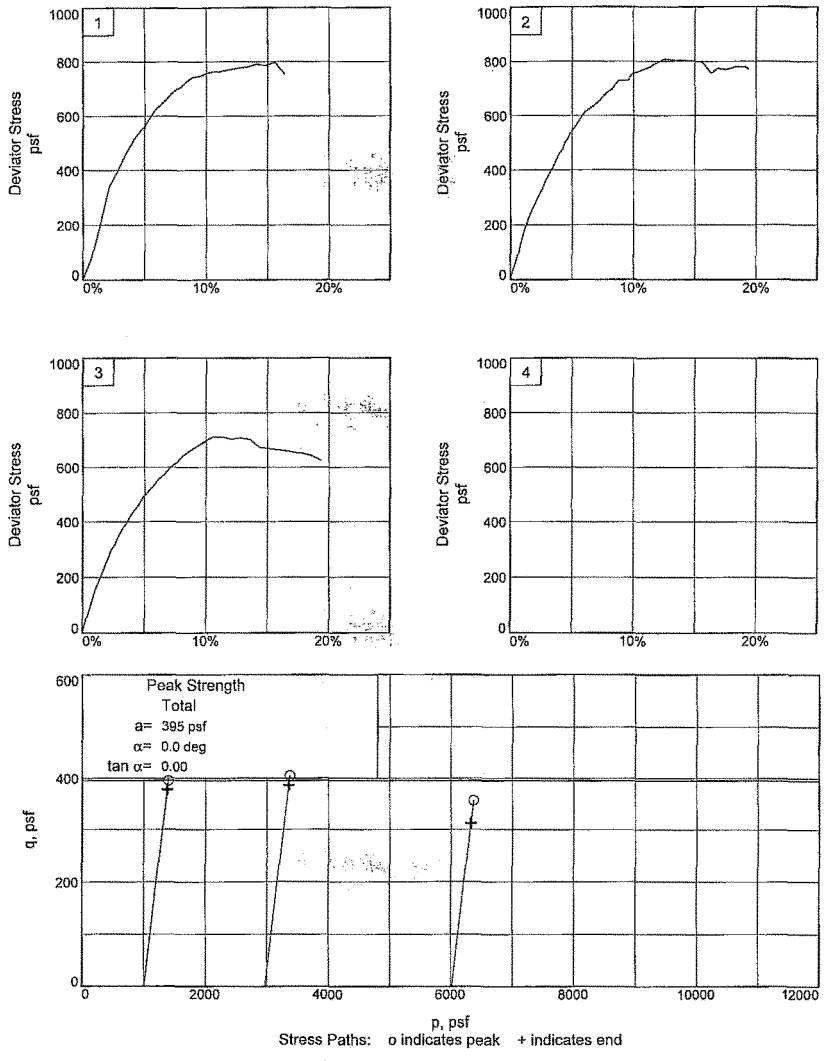
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-17U **Depth:** 16.8
Sample Number: 6B
Proj. No.: 07-022135 **Date Sampled:** 12/10/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

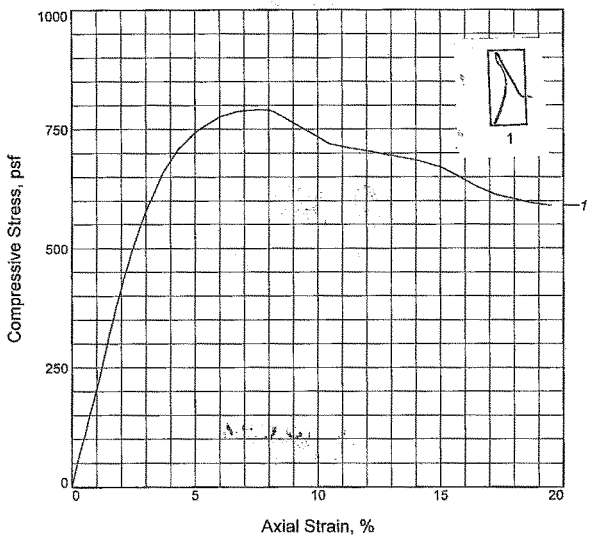
Tested By: ARS/VF **Checked By:** MS _____



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-17U **Depth:** 16.8 **Sample Number:** 6B
Project No.: 07-022135 **Figure** _____ FFEBJV, LLC

Tested By: ARS/VF **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	790			
Undrained shear strength, psf	395			
Failure strain, %	7.5			
Strain rate, %/min.	1.00			
Water content, %	38.1			
Wet density, pcf	117.2			
Dry density, pcf	84.9			
Saturation, %	104.4			
Void ratio	0.9858			
Specimen diameter, in.	1.392			
Specimen height, in.	3.094			
Height/diameter ratio	2.22			

Description: SO GR CL4 W/ LYS ML

LL = 41	PL = 19	PI = 22	Assumed GS= 2.70	Type: UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/10/09
Remarks:

Client: U.S. Army Corps of Engineers

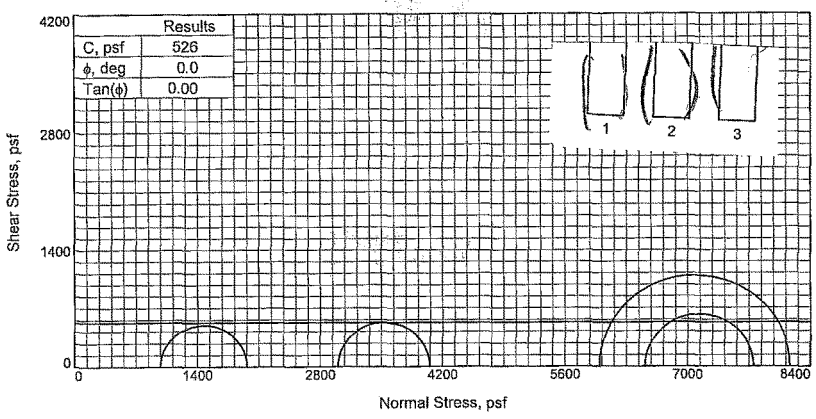
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-17U **Depth:** 20.8
Sample Number: 7B

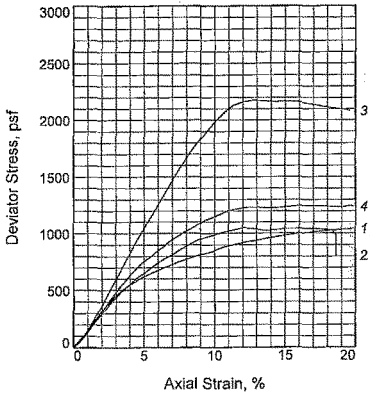
UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Figure _____

Tested By: VF/ARS **Checked By:** MS





Sample No.		1	2	3	4
Initial	Water Content, %	34.4	34.2	32.3	45.2
	Dry Density, pcf	89.8	90.6	92.6	79.0
	Saturation, %	106.0	107.2	106.5	107.7
	Void Ratio	0.8761	0.8612	0.8199	1.1326
	Diameter, in.	1.387	1.389	1.394	1.389
	Height, in.	3.063	3.067	3.074	3.063
At Test	Water Content, %	34.4	34.2	32.3	45.2
	Dry Density, pcf	89.8	90.6	92.6	79.0
	Saturation, %	106.0	107.2	106.5	107.7
	Void Ratio	0.8761	0.8612	0.8199	1.1326
	Diameter, in.	1.387	1.389	1.394	1.389
	Height, in.	3.063	3.067	3.074	3.063
Strain rate, %/min.		1.00	1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00	0.00
Cell Pressure, psi		6.80	20.87	41.61	45.23
Fail. Stress, psf		986	1051	2174	1239
Strain, %		15.4	12.1	12.8	15.3
Ult. Stress, psf		986	1023	2162	1239
Strain, %					
σ_1 Failure, psf		1966	4055	8167	7752
σ_3 Failure, psf		980	3005	5992	6512

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: M GR CL4 W/ LYS ML

LL= 33 **PL=** 20 **PI=** 13
Assumed Specific Gravity= 2.70
Remarks:

Figure _____

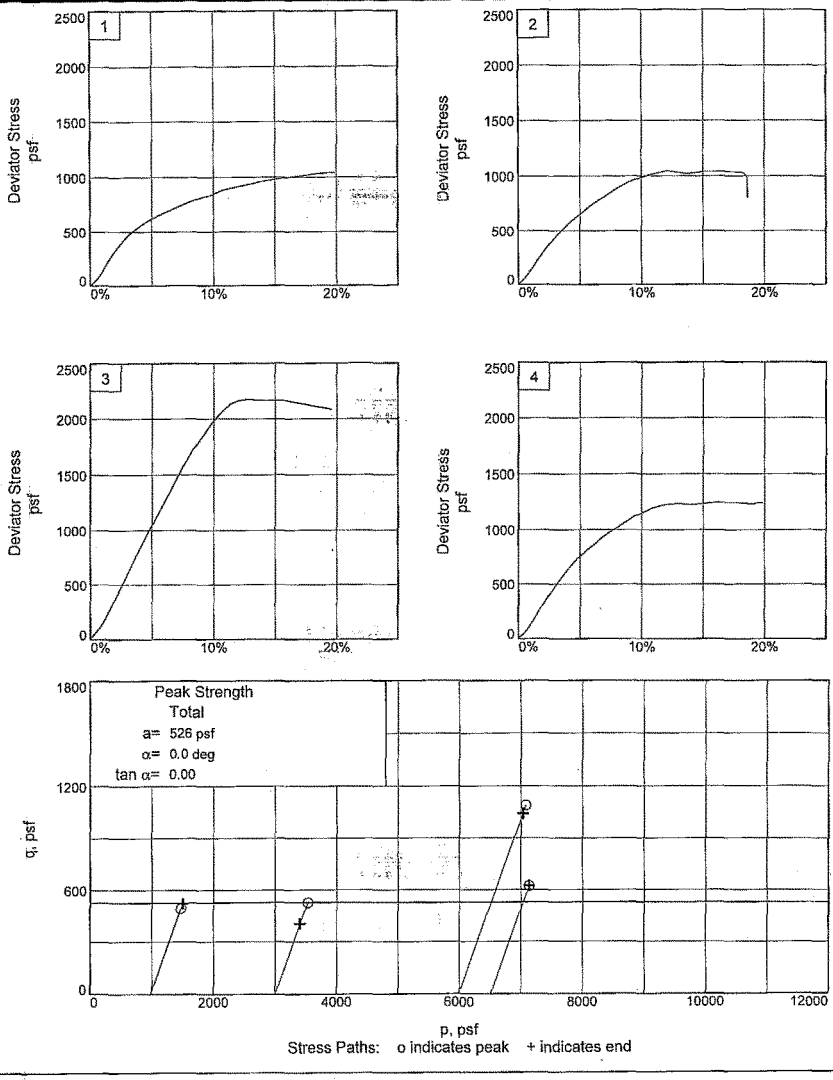
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-17U **Depth:** 24.8
Sample Number: 8B
Proj. No.: 07-022135 **Date Sampled:** 12/10/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

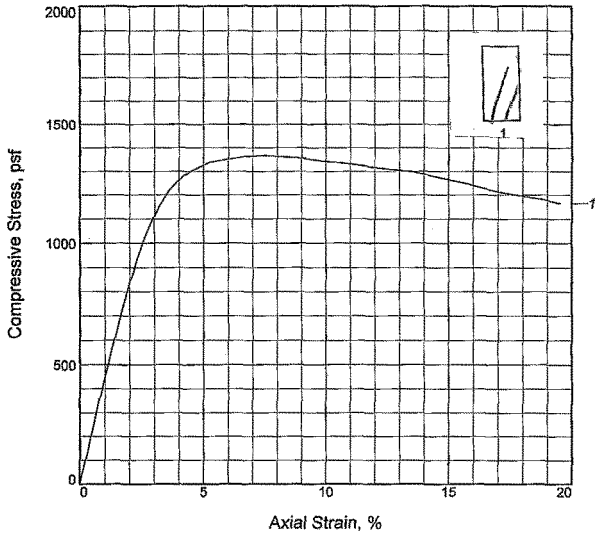
Tested By: VF/ARS **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-17U **Depth:** 24.8 **Sample Number:** 8B
Project No.: 07-022135 **Figure** _____ FFEBJV, LLC

Tested By: VF/ARS **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	1368			
Undrained shear strength, psf	684			
Failure strain, %	7.5			
Strain rate, %/min.	1.00			
Water content, %	45.2			
Wet density, pcf	111.9			
Dry density, pcf	77.1			
Saturation, %	101.5			
Void ratio	1.2195			
Specimen diameter, in.	1.398			
Specimen height, in.	3.101			
Height/diameter ratio	2.22			

Description: M GR CH4 W/ LNS & LYS ML

LL = 79	**PL** = 23	**PI** = 56	**Assumed GS**= 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/10/09
Remarks:

Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-17U **Depth:** 36.4
Sample Number: 12B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Figure _____

Tested By: VF/ARS **Checked By:** MS

SUMMARY OF LABORATORY TEST RESULTS

Project: MRGO Ecosystem Restoration Feasibility Study **Assigned By:** _____

Project Number: 07-022135 **Current Date:** 1/12/2010

Boring: MRGO-18U

Sample Number	Depth	Visual Classification	USCS	E(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
1A	0.0	VSO DGR CHOC W/ RT	CHOC		185												
1B	0.8	VSO DGR PT W/ ARS SM, RT	PT		307												
1C	1.7	VSO GR CHOB W/ RT	CHOB		167												
1D	2.6	VSO GR CHOA W/ RT	CHOA		123												
2A	4.0	VSO GR CL6 W/ LNS & ARS ML, RT	CL6		47												
2B	4.8	VSO GR CL6 W/ LNS ML, RT, WD	CL6	15	52	71	108	100	UC	-	109	218	48	24	24	0.18	
2C	5.7	VSO GR CH3 W/ LNS ML, RT, WD	CH3		64												
2D	6.6	VSO GR CH3 W/ LNS ML, RT, WD	CH3		61												
3A	8.0	VSO GR CH4 W/ LNS ML, RT	CH4		72												
3B	8.8	VSO GR CH4 W/ LNS ML, RT, WD	CH4		72	58	100	100	UU	0	201		95	29	66	0.19	
3C	9.7	VSO GR CH4 W/ LNS ML, WD, RT, CC	CH4		70												CON, GS
3D	10.6	VSO GR CH4 W/ O, WD	CH4		83												
4A	12.0	VSO GR CHOA W/ LNS ML, WD	CHOA		125												
4B	12.8	VSO GR CH4 W/ LNS ML, O, WD	CH4		72												
4C	13.7	VSO GR CHOB W/ LNS ML, WD	CHOB		176												
4D	14.6	VSO GR CH4 W/ WD, O, SIF	CH4	9	104	45	92	100	UC	-	121	241	88	34	54	0.11	
5A	16.0	VSO GR CHOA W/ LNS ML, WD	CHOA		120												
5B	16.8	VSO GR CHOA W/ WD, RT	CHOA		104	45	91	100	UU	0	189		117	31	86	0.13	
5C	17.7	SO GR CHOA W/ WD, SIF	CHOA		91												
5D	18.6	SO GR CH3 W/ LNS ML, O	CH3		61												
6A	20.0	SO GR CL4	CL4		39												
6B	20.8	GR ML W/ LYS CH	ML		34												
6C	21.7	GR ML W/ LYS CH	ML		33												
6D	22.6	GR ML W/ LYS CH	ML		35												
7A	24.0	GR ML	ML		30												
7B	24.8	GR SM W/ ARS CH	SM		22												
7C	25.7	SO GR CL4 W/ ARS & LNS SM, CC	CL4	15	39	84	117	100	UC	-	319	638	39	23	16	0.22	
8A	28.0	GR ML W/ ARS CH	ML		31												
8B	28.8	GR ML W/ LYS CH	ML		36												
8C	29.7	GR ML W/ LYS CH	ML		37				UU				NP	NP	NP		NOT TESTABLE
9A	32.0	SO GR CL4	CL4		37												
9B	32.8	SO GR CH3 W/ LNS & ARS ML	CH3	3	50	73	109	100	UC	-	431	861	61	23	38	0.24	
9C	33.7	SO GR CH3 W/ LNS & ARS ML	CH3		52												CON, GS
9D	34.6	SO GR CH4 W/ LNS & ARS ML	CH4		51												
10A	36.0	SO GR CH3 W/ LNS & LYS ML	CH3		52												
10B	36.8	SO GR CH3 W/ LNS & LYS ML	CH3		58	67	106	100	UU	0	471		69	23	46	0.26	

Remarks: _____

FFEB JV, LLC

Checked By: MKA/WM

File Name: MRGO-18U.xls

SUMMARY OF LABORATORY TEST RESULTS

Project: MRGO Ecosystem Restoration Feasibility Study Assigned By: _____

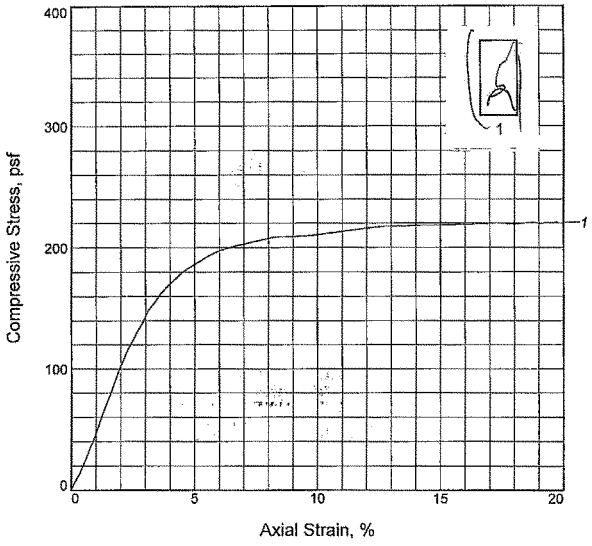
Project Number: 07-022135 Current Date: 1/12/2010
Boring: MRGO-18U

Sample Number	Depth	Visual Classification	USCS	E(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
10C	37.7	SO GR CH3 W/ LNS & LYS ML	CH3		42												
10D	38.6	SO GR CH3 W/ LNS & LYS ML	CH3		51												
11A	40.0	SO GR CH3 W/ LNS & LYS ML	CH3		55												
11B	40.8	SO GR CH3 W/ LNS & LYS ML	CH3	11	52	71	107	99	UC	-	385	770	61	22	39	0.23	
11C	41.7	SO GR CH3 W/ LNS & LYS ML	CH3		50												
12A	44.0	SO GR CH2 W/ LNS & LYS ML	CH2		46												
12B	44.8	SO GR CL6 W/ LNS & LYS ML	CL6		44	78	112	100	UU	0	348		47	25	22	0.30	
12C	45.7	SO GR CL6 W/ LNS & LYS ML	CL6		46												
12D	46.6	SO GR CL6 W/ LNS & LYS ML	CL6		55												
13A	48.0	M GR CL6 W/ LNS & LYS ML	CL6		50												
13B	48.8	M GR CL6 W/ LNS & LYS ML	CL6	6	42	79	112	100	UC	-	614	1229	46	22	24	0.27	
13C	49.7	M GR CL6 W/ LNS & LYS ML	CL6		45												
13D	50.6	M GR CH3 W/ LNS & LYS ML	CH3		57												
14A	52.0	M GR CH3 W/ LYS ML	CH3		46												
14B	52.8	M GR CH3 W/ LNS & LYS ML	CH3		47	75	110	100	UU	0	611		57	23	34	0.30	
14C	53.7	M GR CH3 W/ LNS & LYS ML	CH3		45												
14D	54.6	M GR CH4 W/ LYS ML	CH4		55												
15A	56.0	M GR CH3 W/ LNS & LYS ML	CH3		51												
15B	56.8	VSO GR CH3 W/ LNS & LYS ML	CH3	15	59	66	104	100	UC	-	169	338	69	25	44	0.15	
15C	57.7	M GR CH3 W/ LNS & LYS ML	CH3		49												
15D	58.6	M GR CH3 W/ LNS & LYS ML	CH3		48												

Remarks: _____
FFEB JV, LLC

Checked By: MKB
File Name: MRGO-18U.xls

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	218			
Undrained shear strength, psf	109			
Failure strain, %	15.0			
Strain rate, %/min.	1.00			
Water content, %	52.1			
Wet density, pcf	107.5			
Dry density, pcf	70.7			
Saturation, %	100.4			
Void ratio	1.4206			
Specimen diameter, in.	1.391			
Specimen height, in.	3.075			
Height/diameter ratio	2.21			

Description: VSO GR CL6 W/ LNS ML, RT, WD

LL = 48	PL = 24	PI = 24	**Assumed GS=** 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/11/09
Remarks:

Client: U.S. Army Corps of Engineers

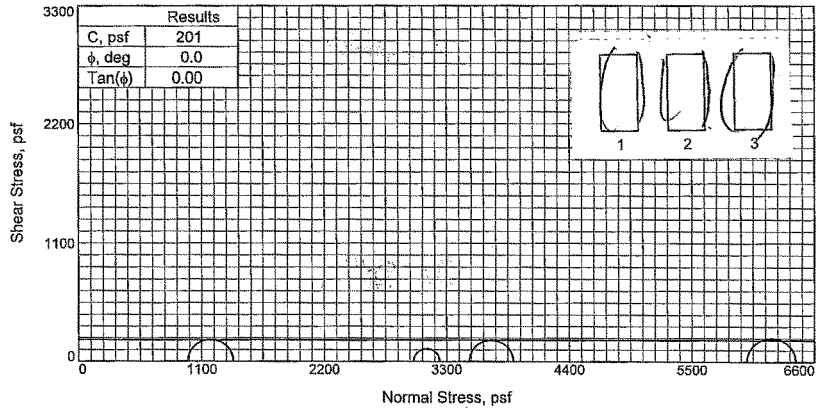
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-18U **Depth:** 4.8
Sample Number: 2B

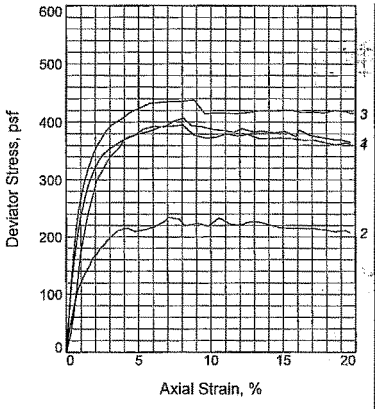
UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Figure _____

Tested By: VF/ARS **Checked By:** MKA





Sample No.		1	2	3	4
Initial	Water Content, %	72.4	76.8	70.6	72.5
	Dry Density, pcf	58.0	56.6	59.2	57.1
	Saturation, %	101.9	104.1	102.4	99.5
	Void Ratio	1.9477	2.0224	1.8884	1.9971
	Diameter, in.	1.401	1.393	1.403	1.431
	Height, in.	3.095	3.085	3.097	3.100
At Test	Water Content, %	72.4	76.8	70.6	72.5
	Dry Density, pcf	58.0	56.6	59.2	57.1
	Saturation, %	101.9	104.1	102.4	99.5
	Void Ratio	1.9477	2.0224	1.8884	1.9971
	Diameter, in.	1.401	1.393	1.403	1.431
	Height, in.	3.095	3.085	3.097	3.100
Strain rate, %/min.		1.00	1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00	0.00
Cell Pressure, psi		6.78	20.85	41.63	24.33
Fail. Stress, psf		407	234	438	395
Strain, %		8.1	7.1	8.8	8.1
Ult. Stress, psf		382	219	414	371
Strain, %					
σ_1 Failure, psf		1382	3237	6432	3898
σ_3 Failure, psf		976	3002	5995	3504

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: VSO GR CH4 W/ LNS ML, RT, WD

LL= 95 **PL=** 29 **PI=** 66
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

Client: U.S. Army Corps of Engineers

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

Source of Sample: MRGO-18U **Depth:** 8.8

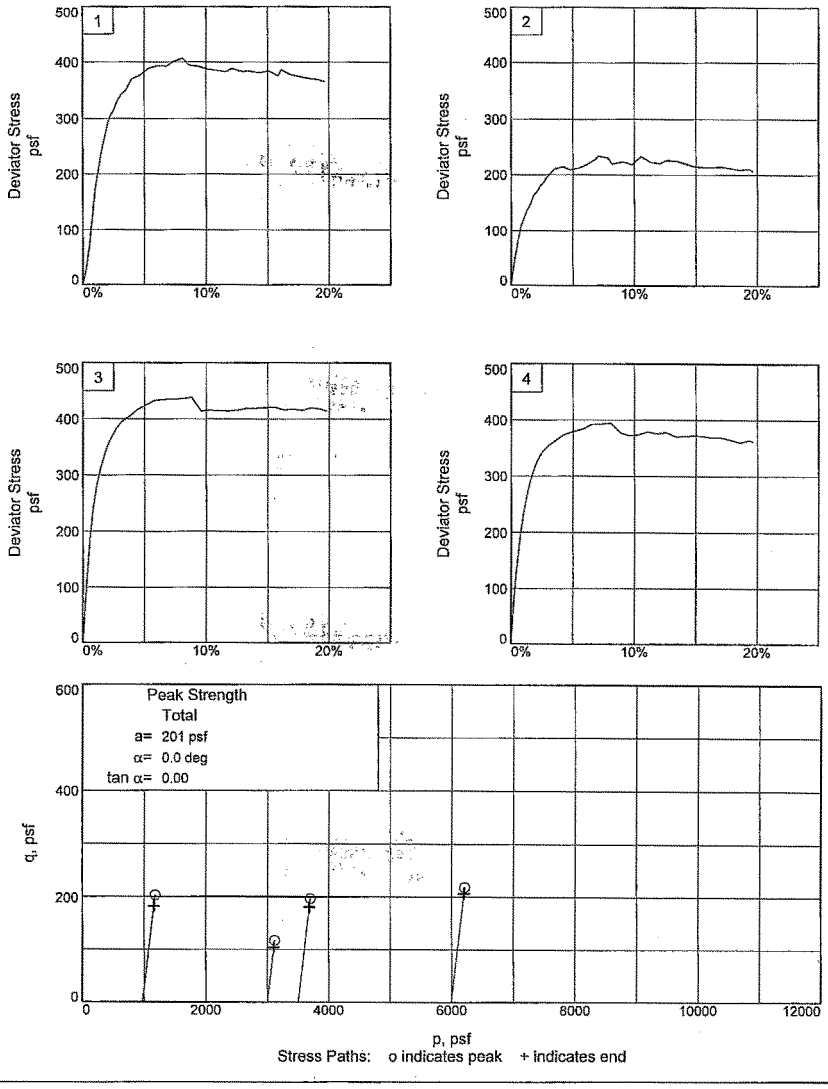
Sample Number: 3B

Proj. No.: 07-022135 **Date Sampled:** 12/11/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

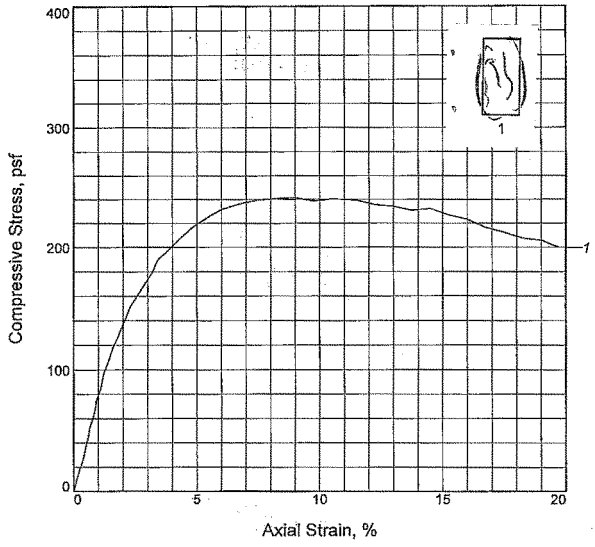
Tested By: VF/ARS **Checked By:** MKA



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-18U **Depth:** 8.8 **Sample Number:** 3B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: VF/ARS **Checked By:** MKA

UNCONFINED COMPRESSION TEST



Sample No.	1				
Unconfined strength, psf	241				
Undrained shear strength, psf	121				
Failure strain, %	9.0				
Strain rate, %/min.	1.00				
Water content, %	103.9				
Wet density, pcf	91.9				
Dry density, pcf	45.1				
Saturation, %	101.9				
Void ratio	2.7946				
Specimen diameter, in.	1.394				
Specimen height, in.	3.103				
Height/diameter ratio	2.23				

Description: VSO GR CH4 W/ WD, O, SIF

LL = 88	**PL** = 34	**PI** = 54	**Assumed GS=** 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/11/09
Remarks:

Figure _____

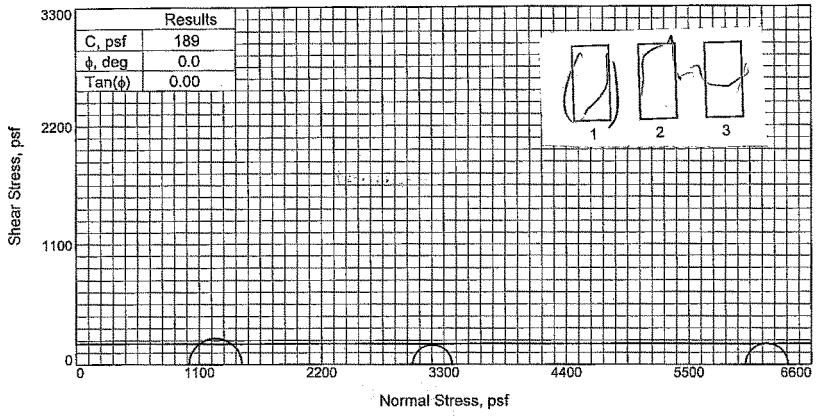
Client: U.S. Army Corps of Engineers

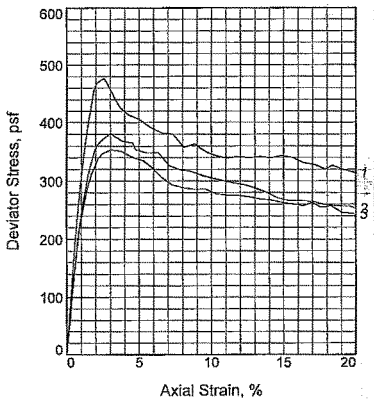
Project: USACE - MRGO Ecosystem Restoration Feasibility Study St.Bernard Parish, La
Source of Sample: MRGO-18U **Depth:** 14.6
Sample Number: 4D

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: VF/JC **Checked By:** MKA





Sample No.		1	2	3
Initial	Water Content, %	103.5	101.1	107.5
	Dry Density, pcf	44.9	45.5	44.1
	Saturation, %	103.0	102.2	104.4
	Void Ratio	2.6129	2.5700	2.6786
	Diameter, in.	1.412	1.402	1.410
	Height, in.	3.098	3.097	3.096
At Test	Water Content, %	103.5	101.1	107.5
	Dry Density, pcf	44.9	45.5	44.1
	Saturation, %	103.0	102.2	104.4
	Void Ratio	2.6129	2.5700	2.6786
	Diameter, in.	1.412	1.402	1.410
	Height, in.	3.098	3.097	3.096
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		7.01	20.97	41.74
Fail. Stress, psf		475	353	381
Strain, %		2.5	3.1	3.0
Ult. Stress, psf		339	285	348
Strain, %				
σ_1 Failure, psf		1485	3372	6391
σ_3 Failure, psf		1010	3019	6010

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: VSO GR CHOA W/ WD, RT

LL= 117 **PL=** 31 **PI=** 86
Assumed Specific Gravity= 2.60
Remarks:

Figure _____

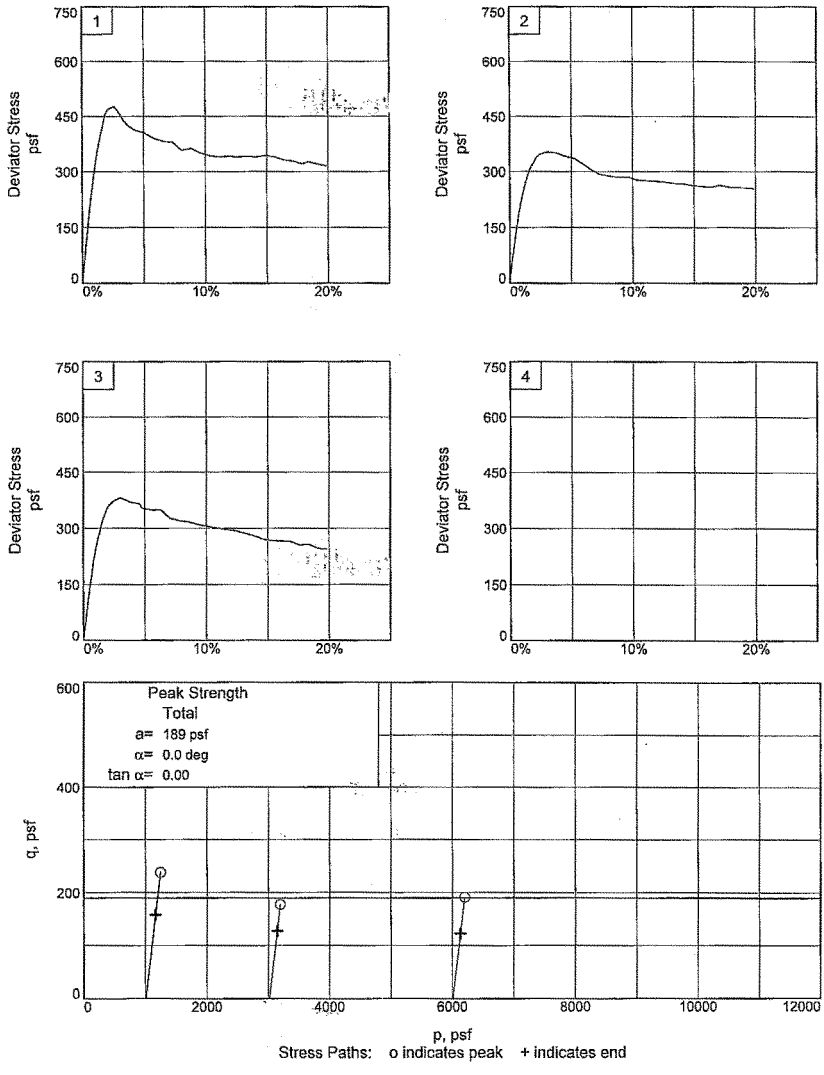
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-18U **Depth:** 16.8
Sample Number: 5B
Proj. No.: 07-022135 **Date Sampled:** 12/11/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

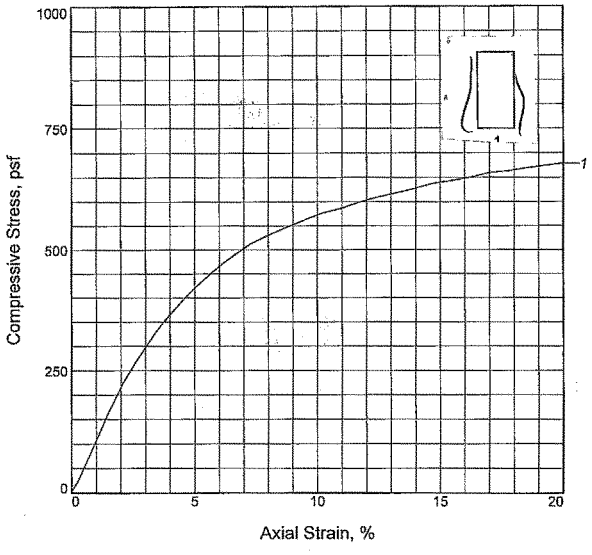
Tested By: VF/ARS **Checked By:** MKA



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-18U **Depth:** 16.8 **Sample Number:** 5B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: VF/ARS **Checked By:** MKA

UNCONFINED COMPRESSION TEST



Sample No.	1				
Unconfined strength, psf	638				
Undrained shear strength, psf	319				
Failure strain, %	14.7				
Strain rate, %/min.	1.00				
Water content, %	39.0				
Wet density, pcf	116.9				
Dry density, pcf	84.1				
Saturation, %	106.2				
Void ratio	0.9814				
Specimen diameter, in.	1.390				
Specimen height, in.	3.079				
Height/diameter ratio	2.22				

Description: SO GR CL4 W/ ARS & LNS SM, CC

LL = 39	PL = 23	PI = 16	Assumed GS= 2.67	Type: UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/11/09
Remarks:

Figure _____

Client: U.S. Army Corps of Engineers

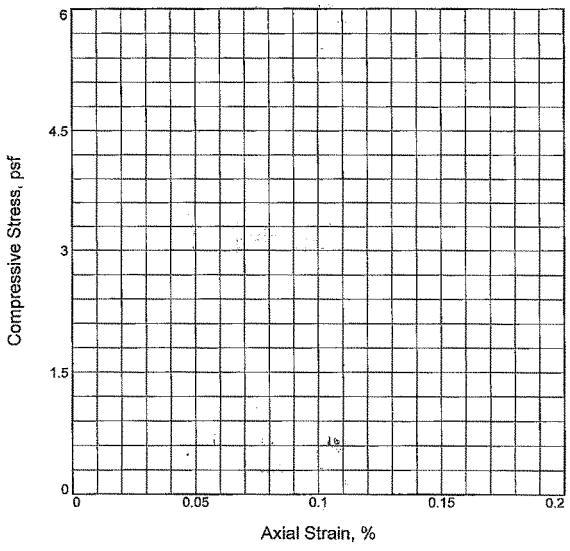
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-18U **Depth:** 25.7
Sample Number: 7C

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: VF/ARS **Checked By:** MKA

UNCONFINED COMPRESSION TEST



Sample No.				
Unconfined strength, psf				
Undrained shear strength, psf				
Failure strain, %				
Strain rate, %/min.				
Water content, %				
Wet density, pcf				
Dry density, pcf				
Saturation, %				
Void ratio				
Specimen diameter, in.				
Specimen height, in.				
Height/diameter ratio				

Description: GR ML W/ LYS CH

LL = NP	**PL =**	**PI =** NP	**Assumed GS=**	**Type:**

Project No.: 07-022135
Date Sampled:
Remarks:
NON-TESTABLE MATERIAL.

Figure _____

Client: U.S. Army Corps of Engineers

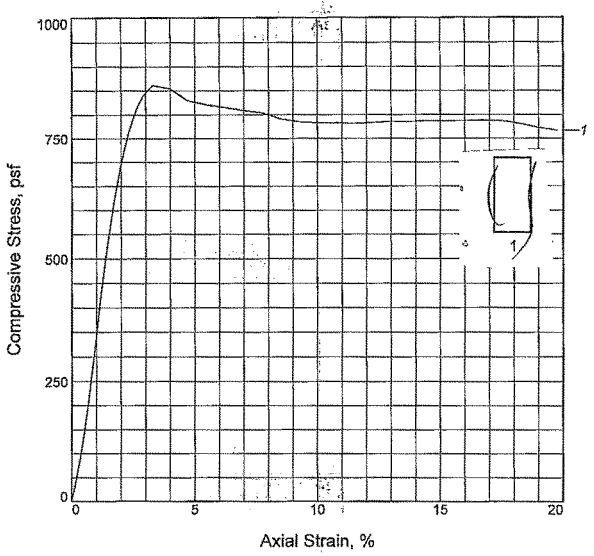
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-18U **Depth:** 29.7
Sample Number: 8C

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Checked By: MKA

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	861			
Undrained shear strength, psf	431			
Failure strain, %	3.3			
Strain rate, %/min.	1.00			
Water content, %	49.8			
Wet density, pcf	109.0			
Dry density, pcf	72.7			
Saturation, %	101.0			
Void ratio	1.3521			
Specimen diameter, in.	1.402			
Specimen height, in.	3.099			
Height/diameter ratio	2.21			

Description: SO GR CH3 W/ LNS & ARS ML

LL = 61	PL = 23	PI = 38	Assumed GS= 2.74	Type: UNDISTURED

Project No.: 07-022135
Date Sampled: 12/11/09
Remarks:

Figure _____

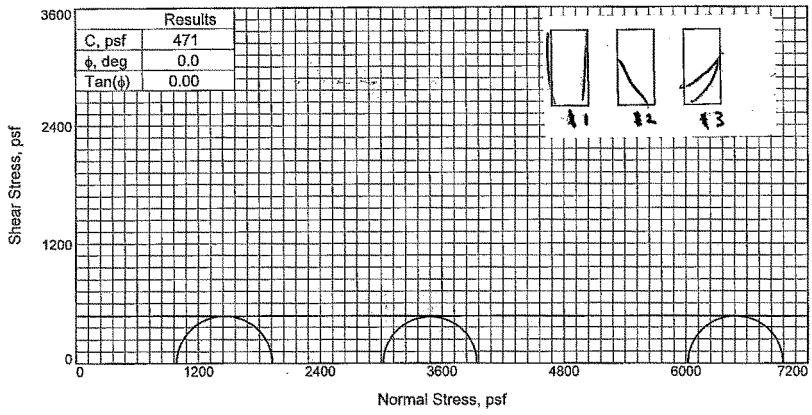
Client: U.S. Army Corps of Engineers

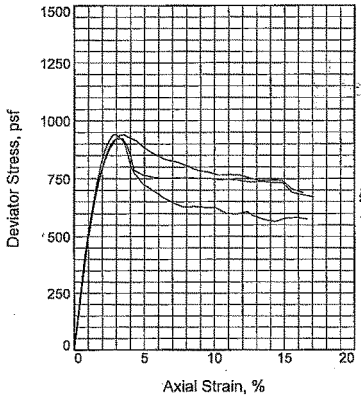
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-18U **Depth:** 32.8
Sample Number: 9B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: VF/ARS **Checked By:** MKA





Sample No.		1	2	3
Initial	Water Content, %	57.8	58.1	57.7
	Dry Density, pcf	67.1	66.7	66.7
	Saturation, %	102.3	101.6	101.0
	Void Ratio	1.5491	1.5664	1.5657
	Diameter, in.	1.402	1.402	1.408
	Height, in.	3.107	3.109	3.101
At Test	Water Content, %	57.8	58.1	57.7
	Dry Density, pcf	67.1	66.7	66.7
	Saturation, %	102.3	101.6	101.0
	Void Ratio	1.5491	1.5664	1.5657
	Diameter, in.	1.402	1.402	1.408
	Height, in.	3.107	3.109	3.101
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.85	20.97	41.80
Fail. Stress, psf		941	923	938
Strain, %		2.9	3.3	3.5
Ult. Stress, psf		628	752	764
Strain, %				
σ_1 Failure, psf		1928	3943	6958
σ_3 Failure, psf		987	3020	6020

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CH3 W/ LNS & LYS ML

LL= 69 **PL=** 23 **PI=** 46
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

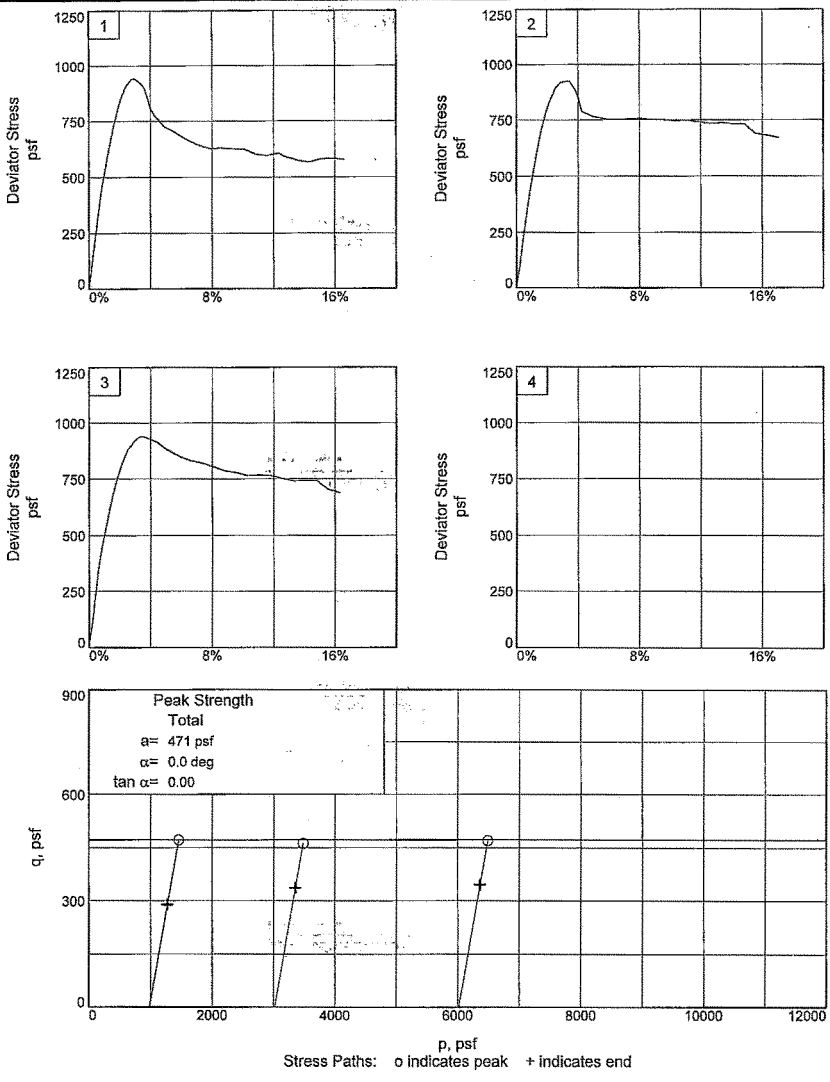
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-18U **Depth:** 36.8
Sample Number: 10B
Proj. No.: 07-022135 **Date Sampled:** 12/11/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

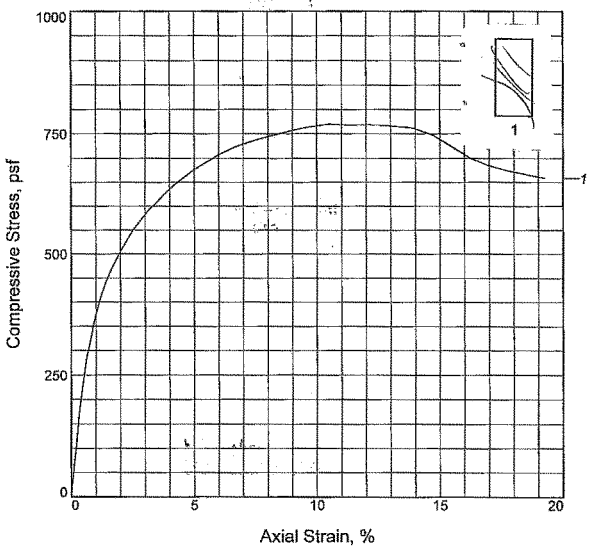
Tested By: VF/ARS **Checked By:** MKA



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-18U **Depth:** 36.8 **Sample Number:** 10B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: VF/ARS **Checked By:** MKA

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	770			
Undrained shear strength, psf	385			
Failure strain, %	10.5			
Strain rate, %/min.	1.00			
Water content, %	51.6			
Wet density, pcf	107.0			
Dry density, pcf	70.5			
Saturation, %	99.3			
Void ratio	1.4249			
Specimen diameter, in.	1.405			
Specimen height, in.	3.100			
Height/diameter ratio	2.21			

Description: SO GR CH3 W/ LNS & LYS ML

LL = 61	PL = 22	PI = 39	**Assumed GS=** 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/11/09
Remarks:

Figure _____

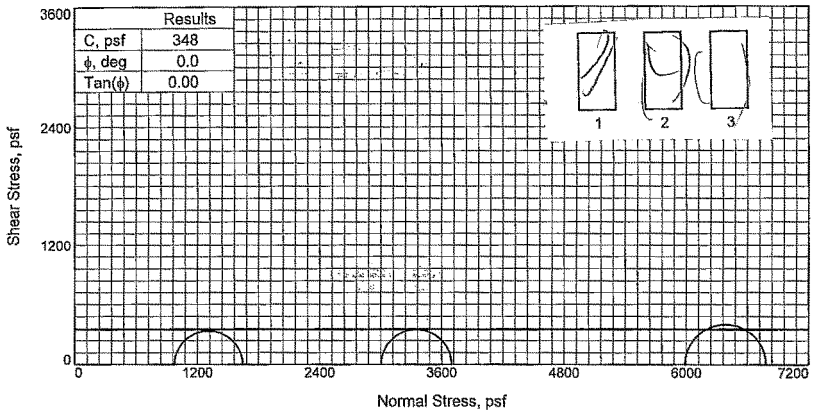
Client: U.S. Army Corps of Engineers

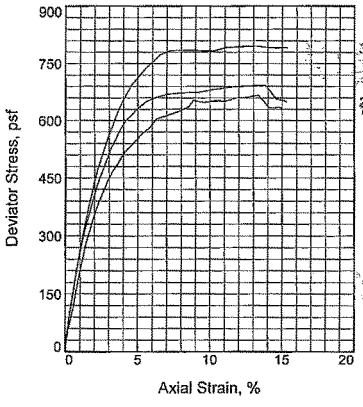
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-18U **Depth:** 40.8
Sample Number: 11B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: VF/ARS **Checked By:** MKA





Sample No.		1	2	3
Initial	Water Content, %	42.7	44.7	43.1
	Dry Density, pcf	78.7	77.1	79.4
	Saturation, %	100.9	101.7	103.6
	Void Ratio	1.1421	1.1874	1.1225
	Diameter, in.	1.395	1.392	1.388
	Height, in.	3.086	3.094	3.090
At Test	Water Content, %	42.7	44.7	43.1
	Dry Density, pcf	78.7	77.1	79.4
	Saturation, %	100.9	101.7	103.6
	Void Ratio	1.1421	1.1874	1.1225
	Diameter, in.	1.395	1.392	1.388
	Height, in.	3.086	3.094	3.090
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.78	20.86	41.58
Fail. Stress, psf		667	692	796
Strain, %		13.3	13.1	13.3
Ult. Stress, psf		629	650	791
Strain, %				
σ_1 Failure, psf		1644	3696	6783
σ_3 Failure, psf		977	3004	5987

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CL6 W/ LNS & LYS MI.

LL= 47 **PL=** 25 **PI=** 22
Assumed Specific Gravity= 2.70
Remarks:

Figure _____

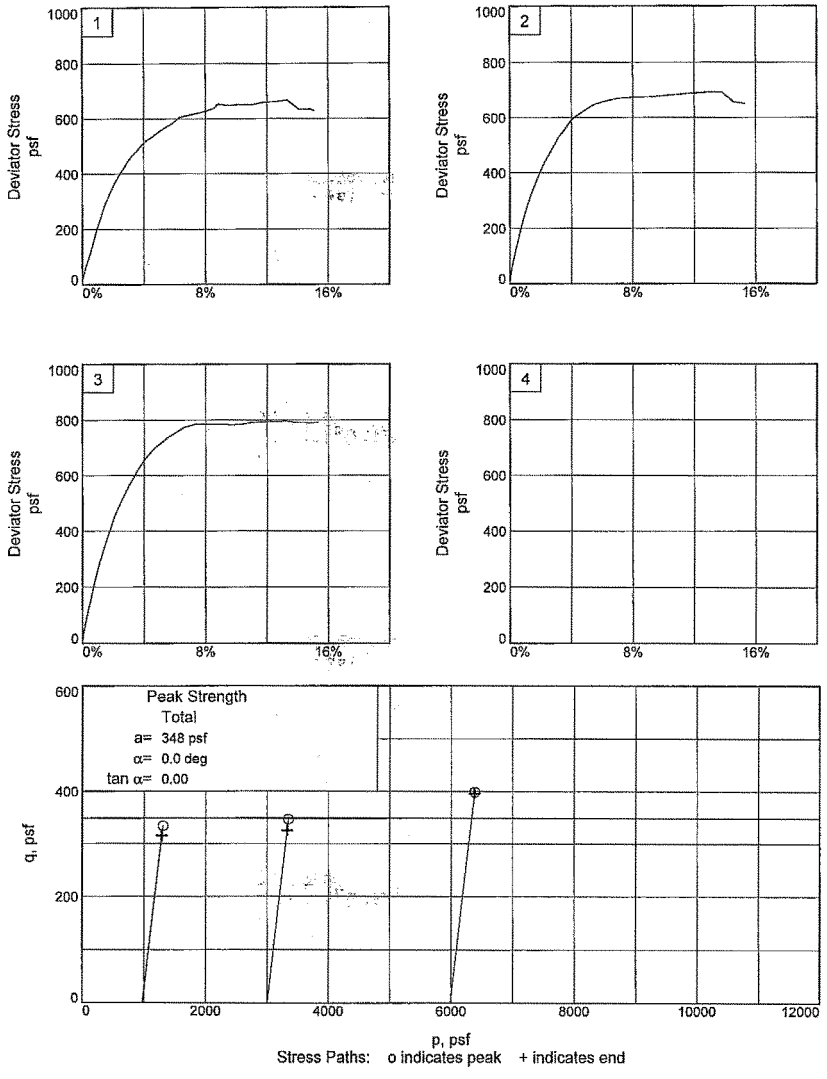
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-18U **Depth:** 44.8
Sample Number: 12B
Proj. No.: 07-022135 **Date Sampled:** 12/11/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

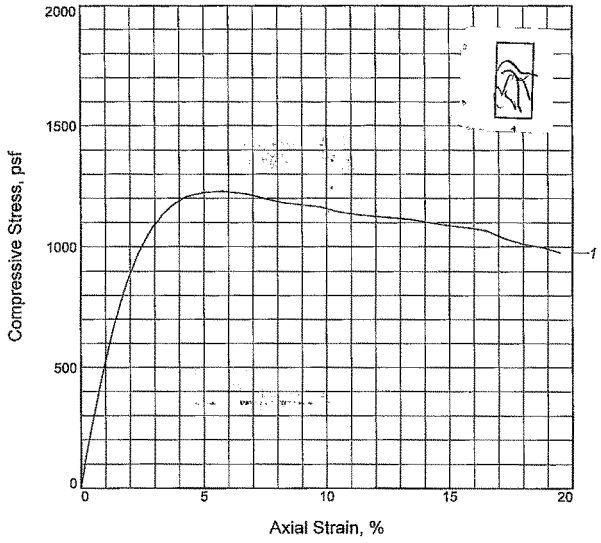
Tested By: VF/ARS **Checked By:** MKA



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-18U **Depth:** 44.8 **Sample Number:** 12B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: VF/ARS **Checked By:** MKA

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	1229			
Undrained shear strength, psf	614			
Failure strain, %	5.8			
Strain rate, %/min.	1.00			
Water content, %	42.1			
Wet density, pcf	112.4			
Dry density, pcf	79.1			
Saturation, %	100.5			
Void ratio	1.1309			
Specimen diameter, in.	1.405			
Specimen height, in.	3.098			
Height/diameter ratio	2.20			

Description: M GR CL6 W/ LNS & LYS ML

LL = 46	PL = 22	PI = 24	Assumed GS= 2.70	Type: UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/11/09
Remarks:

Figure _____

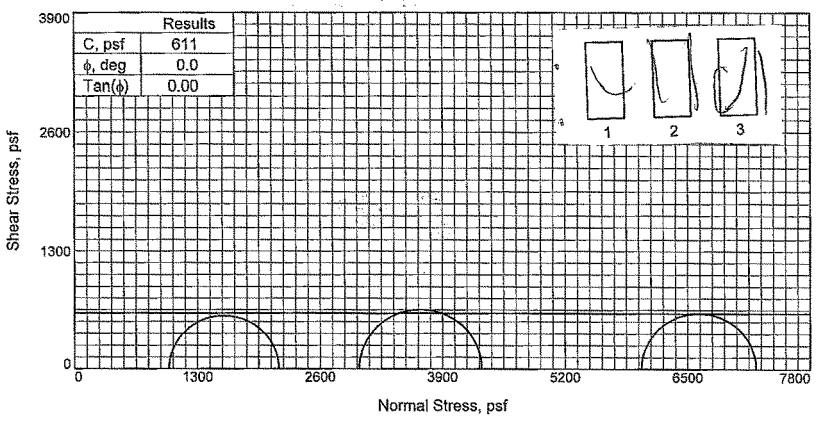
Client: U.S. Army Corps of Engineers

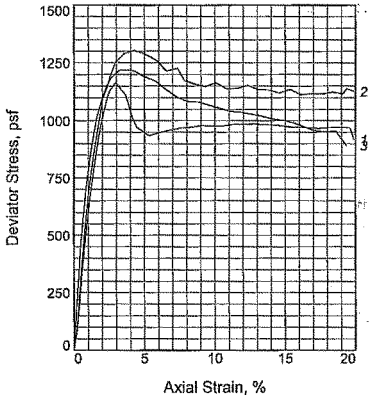
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-18U **Depth:** 48.8
Sample Number: 13B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: VF/ARS **Checked By:** MKA





Sample No.		1	2	3
Initial	Water Content, %	47.1	46.1	47.0
	Dry Density, pcf	74.7	75.5	75.3
	Saturation, %	100.2	99.8	101.2
	Void Ratio	1.2887	1.2645	1.2723
	Diameter, in.	1.406	1.405	1.402
	Height, in.	3.106	3.106	3.107
At Test	Water Content, %	47.1	46.1	47.0
	Dry Density, pcf	74.7	75.5	75.3
	Saturation, %	100.2	99.8	101.2
	Void Ratio	1.2887	1.2645	1.2723
	Diameter, in.	1.406	1.405	1.402
	Height, in.	3.106	3.106	3.107
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.93	20.93	41.73
Fail. Stress, psf		1164	1303	1219
Strain, %		2.9	4.3	3.7
Ult. Stress, psf		934	1119	1002
Strain, %				
σ_1 Failure, psf		2161	4317	7228
σ_3 Failure, psf		997	3014	6009

Type of Test: Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: M GR CH3 W/ LNS & LYS ML

LL= 57 **PL=** 23 **PI=** 34
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

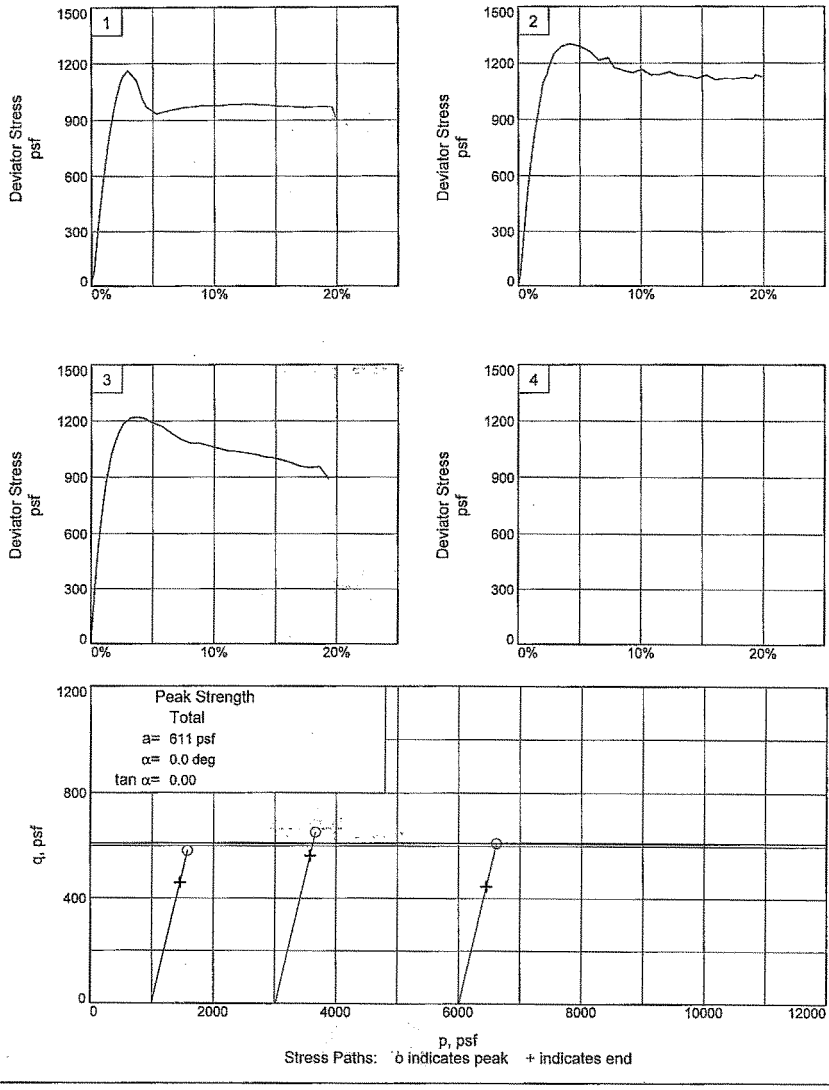
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-18U **Depth:** 52.8
Sample Number: 14B
Proj. No.: 07-022135 **Date Sampled:** 12/11/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

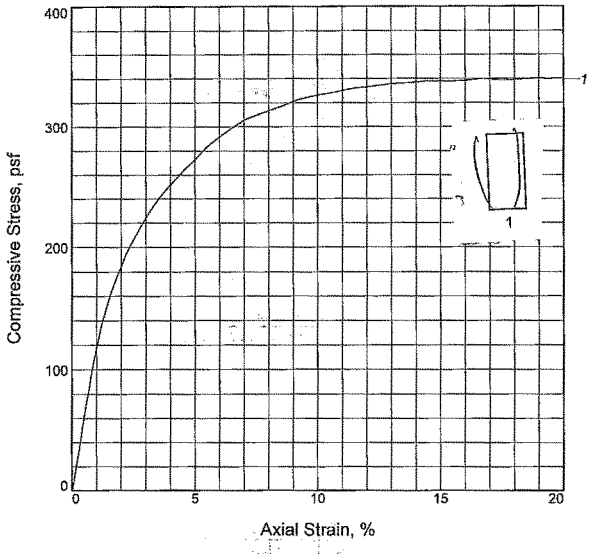
Tested By: ARS/VF **Checked By:** MKA



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-18U **Depth:** 52.8 **Sample Number:** 14B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: ARS/VF **Checked By:** MKA

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	338			
Undrained shear strength, psf	169			
Failure strain, %	15.2			
Strain rate, %/min.	1.00			
Water content, %	59.1			
Wet density, pcf	104.3			
Dry density, pcf	65.6			
Saturation, %	100.7			
Void ratio	1.6092			
Specimen diameter, in.	1.398			
Specimen height, in.	3.078			
Height/diameter ratio	2.20			

Description: VSO GR CH3 W/ LNS & LYS ML

LL = 69	PL = 25	PI = 44	**Assumed GS=** 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/11/09
Remarks:

Figure _____

Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-18U **Depth:** 56.8
Sample Number: 15B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: VF/ARS **Checked By:** MKA

SUMMARY OF LABORATORY TEST RESULTS

Project: MRGO Ecosystem Restoration Feasibility Study Assigned By: _____

Project Number: 07-022135 Current Date: 2/4/2010
Boring: MRGO-19U

Sample Number	Depth	Visual Classification	USCS	E(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
1A	0.0	VSO DGR CHOC W/ WD	CHOC		265												
1B	0.4	VSO DGR PT W/ WD	PT		371												
1C	1.3	VSO DGR PT W/ WD	PT		358												
1D	2.2	VSO GR CHOA W/ ARS ML, WD	CHOA		131												
2A	4.0	VSO GR CHOA W/ ARS ML, WD	CHOA		118												
2B	4.8	VSO GR CHOA W/ ARS ML, WD	CHOA		131												
2C	5.7	VSO GR CHOB W/ ARS ML, WD	CHOB		172												
2D	6.6	VSO GR CHOA W/ ARS ML, WD	CHOA		146												
3A	8.0	VSO GR CHOA W/ ARS ML, WD	CHOA		125												
3B	8.8	VSO GR CH4 W/ ARS ML, O, WD	CH4	4	82	54	99	100	UC	-	84	169	78	26	52	0.11	
3C	9.7	VSO GR CHOA W/ ARS ML, WD, SIF	CHOA		102												
3D	10.6	VSO GR CHOA W/ ARS ML, WD, SIF	CHOA		95												
4A	12.0	VSO GR CH4 W/ LNS & LYS ML, O, WD	CH4		86												
4B	12.8	VSO GR CH4 W/ LNS & LYS ML, O, WD	CH4		89												
5A	16.0	VSO GR CH2 W/ LNS & LYS ML	CH2		53												
5B	16.8	VSO GR CH2 W/ LNS & LYS ML	CH2		56	70	109	100	UU	0	102		50	21	29	0.07	
5C	17.7	VSO GR CH3 W/ ARS ML	CH3		61	65	105	100					59	21	38		CON, GS
5D	18.6	VSO GR CH4 W/ LYS & ARS ML, SIF	CH4		73												
6A	20.0	VSO GR CH4 W/ LNS ML, SIF	CH4		72												
6B	20.8	VSO GR CH4 W/ LNS ML, SIF	CH4		71	59	101	100	UU	0	165		77	26	51	0.10	
6C	21.7	VSO GR CH4 W/ LNS ML, SIF, CC	CH4		82												
7A	24.0	SO GR CH4	CH4		96												
7B	24.8	SO GR CH4 W/ ARS ML, SIF	CH4	2	86	51	95	100	UC	-	282	564	104	27	77	0.12	
7C	25.7	SO GR CH4 W/ O	CH4		91												
7D	26.6	SO GR CH3 W/ LNS & LYS ML, WD	CH3		61												
8A	28.0	SO GR CL6 W/ LNS & LYS CH	CL6		46												
8B	28.8	GR SM W/ LNS & LYS CH	SM		38								NP	NP	NP		SV
8C	29.3	GR SM W/ LNS & LYS CH, CC	SM		26												
8D	30.2	SO GR CH3 W/ LNS & LYS SM	CH3		52												
9A	32.0	GR SM	SM		25												
10	34.0	GR SM	SM		25												
11	37.0	GR SM	SM		28												
12	39.5	GR SM	SM		25												
13A	41.0	SO GR CL6	CL6		44												
13B	41.8	GR ML W/ LYS CH	ML		37												
13C	42.7	GR ML W/ LYS CH	ML		33												
13D	43.6	GR ML	ML		29												

Remarks: _____
FFEB JV, LLC

Checked By: MS/MKA
File Name: MRGO-19U.xls

SUMMARY OF LABORATORY TEST RESULTS

Project: MRGO Ecosystem Restoration Feasibility Study Assigned By: _____

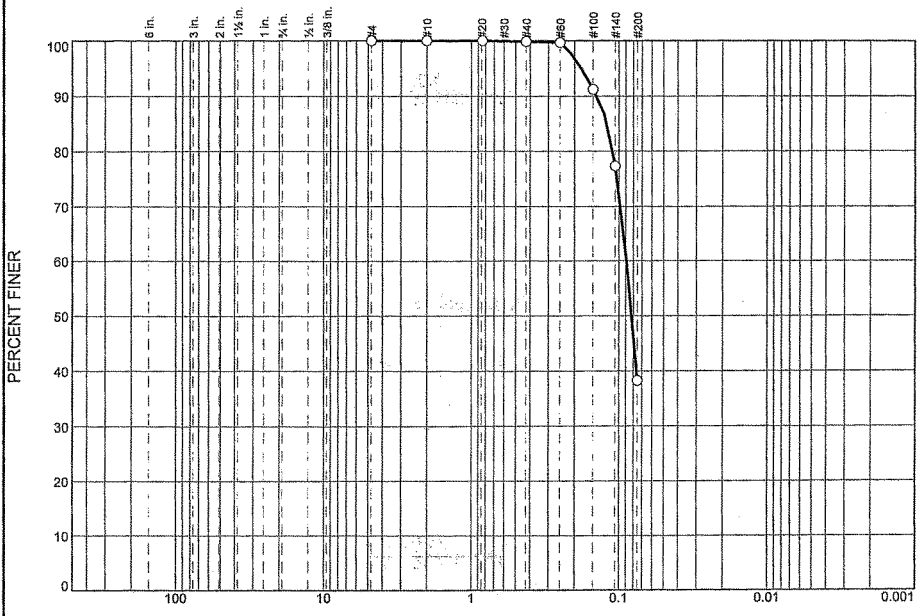
Project Number: 07-02213F Current Date: 2/4/2010
Boring: MRGO-19U

Sample Number	Depth	Visual Classification	USCS	E(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
14A	45.0	M GR CH4 W/ LNS & LYS ML	CH4		48												
14B	45.4	M GR CH4 W/ LNS & LYS ML	CH4		64	62	101	99	UU	0	595		74	25	49	0.24	
14C	46.3	M GR CH2 W/ LNS & LYS ML, SL	CH2		47	74	109	97					51	21	30		CON, GS
14D	47.2	M GR CH4 W/ LNS ML	CH4		55												
15A	49.0	M GR CH4 W/ LNS & LYS ML	CH4		62												
15B	49.8	M GR CH4 W/ LNS & LYS ML	CH4	4	63	62	100	98	UC	-	673	1347	91	29	62	0.24	
15C	50.7	M GR CH4 W/ LNS & LYS ML	CH4		54												
15D	51.6	M GR CH4 W/ LNS & LYS ML	CH4		50												
16A	53.0	M GR CH4 W/ LNS & LYS ML	CH4		58												
16B	53.8	M GR CH4 W/ LNS & LYS ML, SL	CH4		62	63	103	100	UU	0	755		87	25	62	0.25	
16C	54.7	M GR CH4 W/ LNS & LYS ML	CH4		54												
16D	55.6	M GR CH4 W/ LNS & LYS ML	CH4		58												
17A	57.0	M GR CH4 W/ LNS ML	CH4		61												
17B	57.8	M GR CH4 W/ LNS & LYS ML	CH4		53												

Remarks: _____
FFEB JV, LLC

Checked By: ME/MRG
File Name: MRGO-19U.xls

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	61.6	38.3	

	Colloids	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_C	C_U
○		NP	NP	0.1208	0.0890	0.0821					

Material Description	USCS	AASHTO
○ GR SM W/ LNS & LYS CH	SM	

Project No. 07-022135 **Client:** U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
○ **Source of Sample:** MRGO-19U **Depth:** 28.8 **Sample Number:** 8B

Date: ○

FFEBJV, LLC

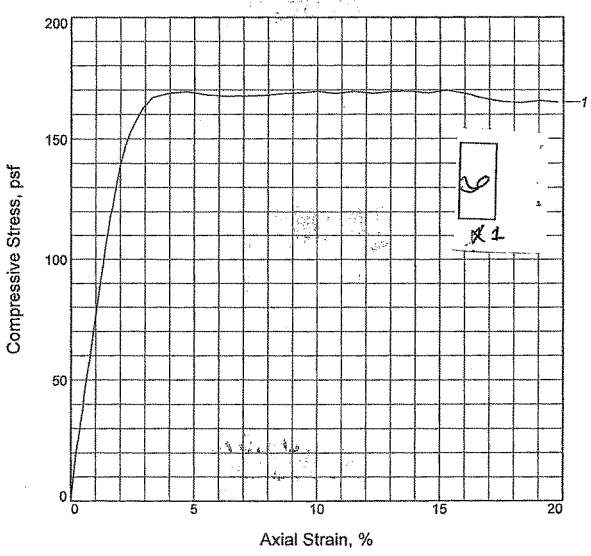
St Rose, LA

Remarks:

Figure

Checked By: MS

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	169			
Undrained shear strength, psf	84			
Failure strain, %	4.0			
Strain rate, %/min.	1.00			
Water content, %	81.5			
Wet density, pcf	98.6			
Dry density, pcf	54.3			
Saturation, %	103.9			
Void ratio	2.1489			
Specimen diameter, in.	1.390			
Specimen height, in.	3.094			
Height/diameter ratio	2.23			

Description: VSO GR CH4 W/ ARS ML, O, WD

LL = 78	PL = 26	PI = 52	Assumed GS= 2.74	Type: UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/10/09
Remarks:

Client: U.S. Army Corps of Engineers

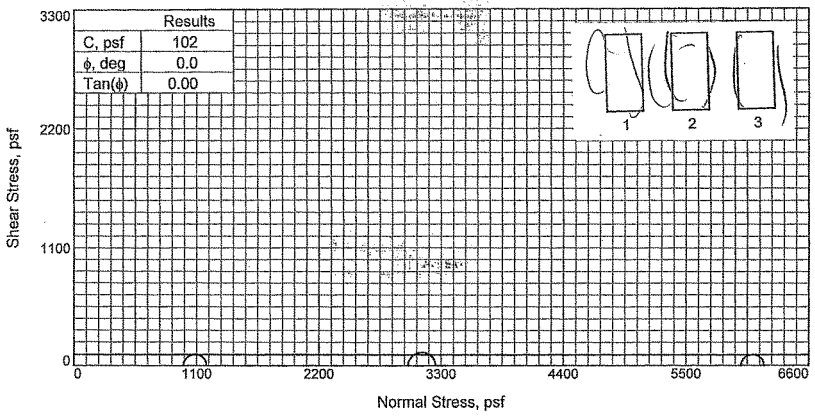
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-19U **Depth:** 8.8
Sample Number: 3B

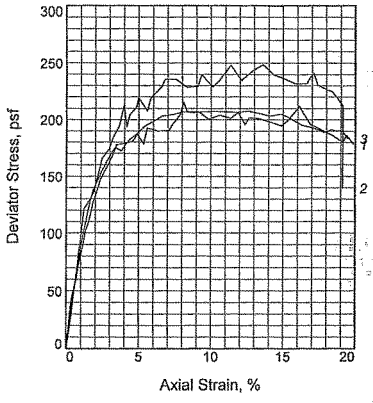
UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Figure _____

Tested By: VF **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	57.9	51.2	58.9
	Dry Density, pcf	68.5	73.2	68.1
	Saturation, %	107.1	106.2	107.8
	Void Ratio	1.4592	1.3017	1.4764
	Diameter, in.	1.380	1.384	1.384
	Height, in.	3.076	3.084	3.067
At Test	Water Content, %	57.9	51.2	58.9
	Dry Density, pcf	68.5	73.2	68.1
	Saturation, %	107.1	106.2	107.8
	Void Ratio	1.4592	1.3017	1.4764
	Diameter, in.	1.380	1.384	1.384
	Height, in.	3.076	3.084	3.067
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.83	20.85	41.63
Fail. Stress, psf		207	249	205
Strain, %		8.3	13.6	14.9
Ult. Stress, psf		195	236	205
Strain, %				
σ_1 Failure, psf		1190	3251	6200
σ_3 Failure, psf		983	3003	5995

Type of Test: Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: VSO GR CH2 W/ LNS & LYS ML

LL= 50 **PL=** 21 **PI=** 29
Assumed Specific Gravity= 2.70
Remarks:

Figure _____

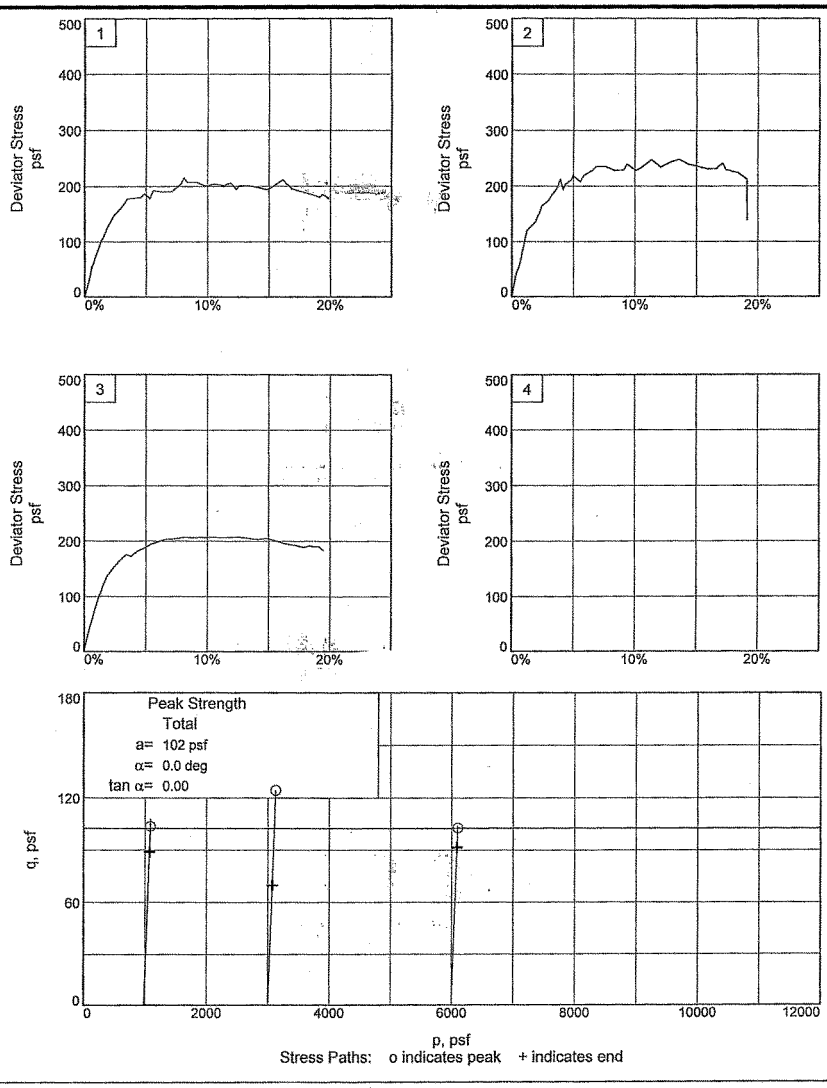
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-19U **Depth:** 16.8
Sample Number: 5B
Proj. No.: 07-022135 **Date Sampled:** 12/10/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

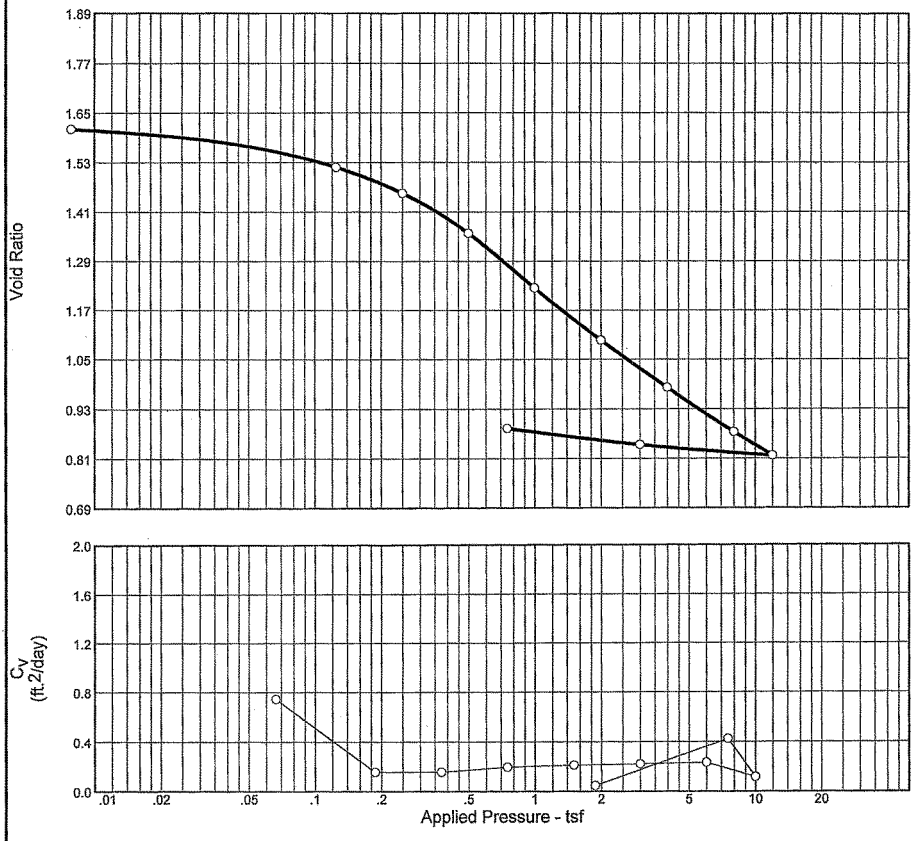
Tested By: VF **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-19U **Depth:** 16.8 **Sample Number:** 5B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: VF **Checked By:** MS

CONSOLIDATION TEST REPORT



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

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

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

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

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

FFEBJV, LLC

St Rose, LA

Remarks:

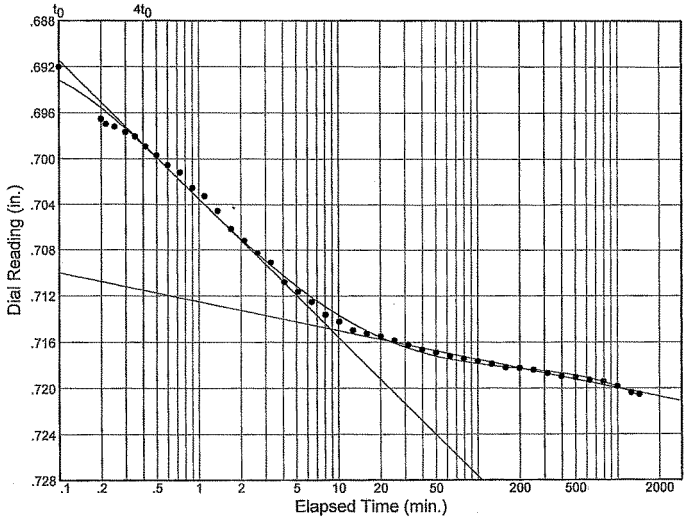
Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

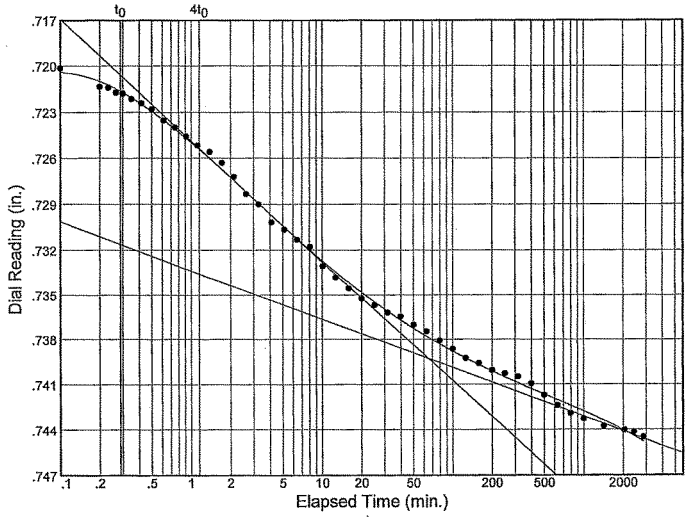
Source: MRGO-19U Sample No.: 5C Elev./Depth: 17.7



Load No.= 2
Load= 0.13 tsf
D_0 = 0.68754
D_{50} = 0.70119
D_{100} = 0.71484
T_{50} = 0.64 min.

C_v @ T_{50}
0.74 ft.2/day

C_α = 0.002



Load No.= 3
Load= 0.25 tsf
D_0 = 0.71784
D_{50} = 0.72855
D_{100} = 0.73927
T_{50} = 2.91 min.

C_v @ T_{50}
0.15 ft.2/day

C_α = 0.003

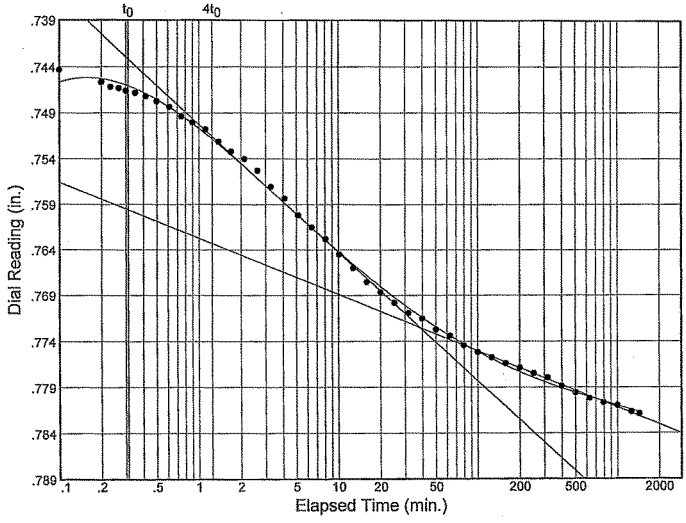
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

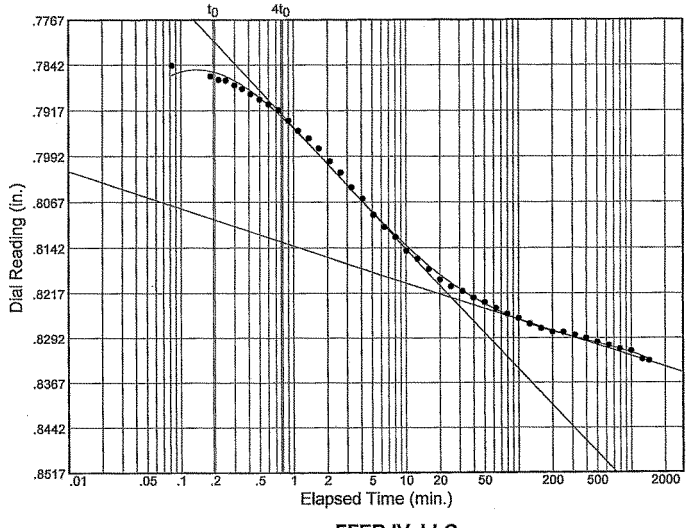
Source: MRGO-19U Sample No.: 5C Elev./Depth: 17.7



Load No.= 4
Load= 0.50 tsf
D_0 = 0.74024
D_{50} = 0.75635
D_{100} = 0.77246
T_{50} = 2.72 min.

C_v @ T_{50}
0.15 ft.2/day

C_α = 0.007



Load No.= 5
Load= 1.00 tsf
D_0 = 0.77803
D_{50} = 0.80024
D_{100} = 0.82246
T_{50} = 1.96 min.

C_v @ T_{50}
0.19 ft.2/day

C_α = 0.007

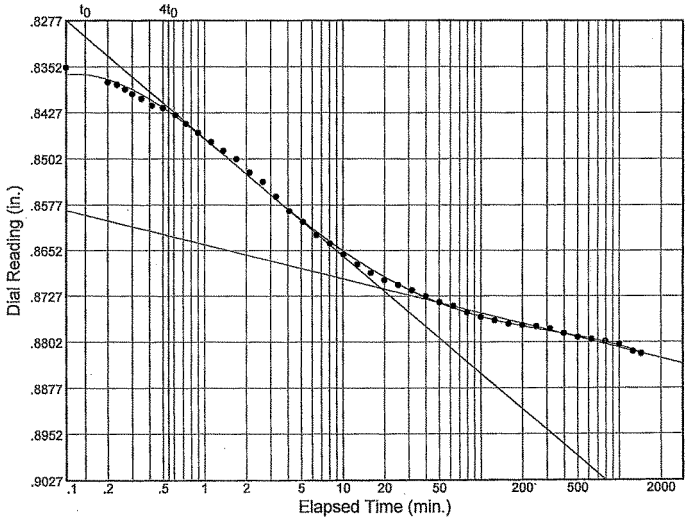
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

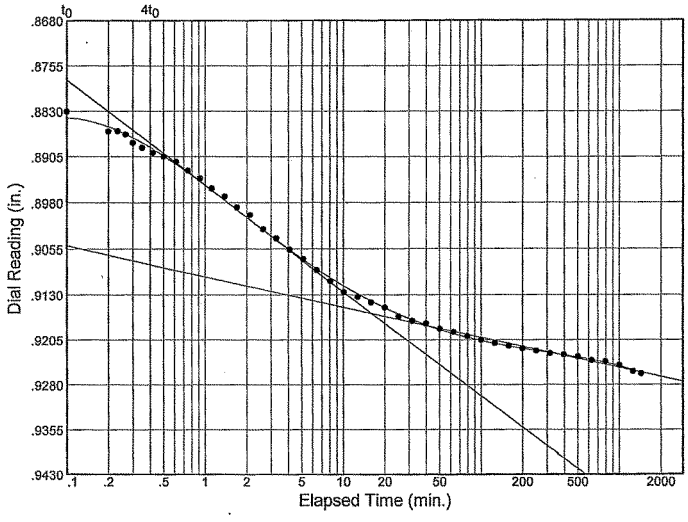
Source: MRGO-19U Sample No.: 5C Elev./Depth: 17.7



Load No.= 6
Load= 2.00 tsf
D_0 = 0.83043
D_{50} = 0.85091
D_{100} = 0.87139
T_{50} = 1.62 min.

C_v @ T_{50}
0.21 ft.^{2}/day

C_α = 0.007



Load No.= 7
Load= 4.00 tsf
D_0 = 0.87911
D_{50} = 0.89760
D_{100} = 0.91610
T_{50} = 1.38 min.

C_v @ T_{50}
0.22 ft.^{2}/day

C_α = 0.006

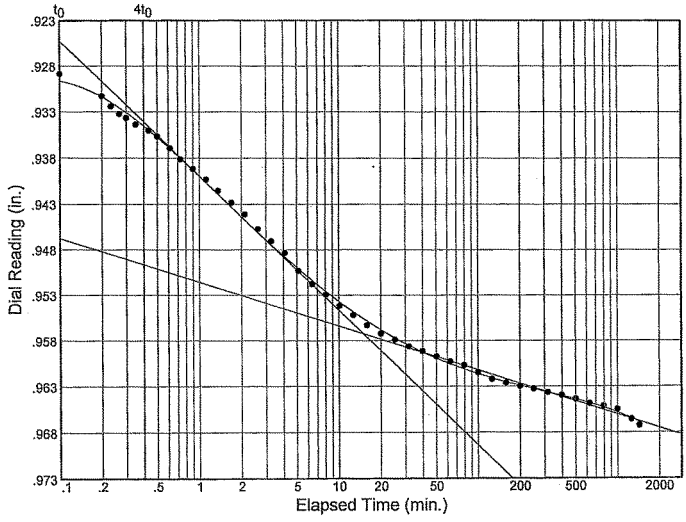
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

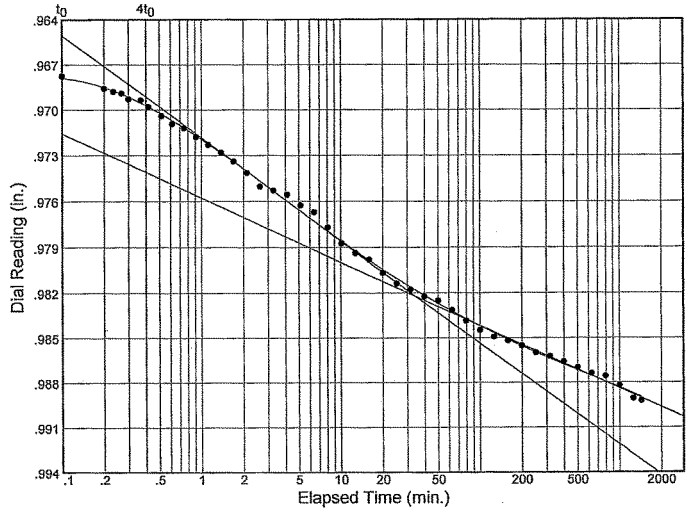
Source: MRGO-19U Sample No.: 5C Elev./Depth: 17.7



Load No.= 8
Load= 8.00 tsf
D_0 = 0.92471
D_{50} = 0.94098
D_{100} = 0.95724
T_{50} = 1.18 min.

C_v @ T_{50}
0.23 ft.2/day

C_α = 0.006



Load No.= 9
Load= 12.00 tsf
D_0 = 0.96607
D_{50} = 0.97414
D_{100} = 0.98222
T_{50} = 2.20 min.

C_v @ T_{50}
0.11 ft.2/day

C_α = 0.006

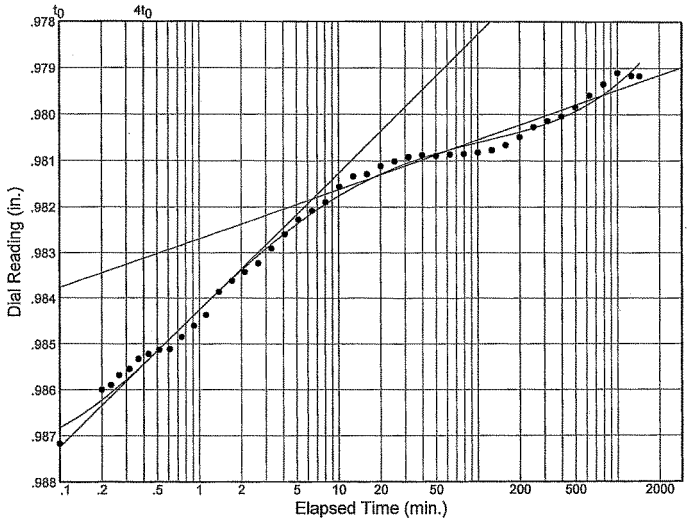
FFEBJV, LLC

Figure

Dial Reading vs. Time

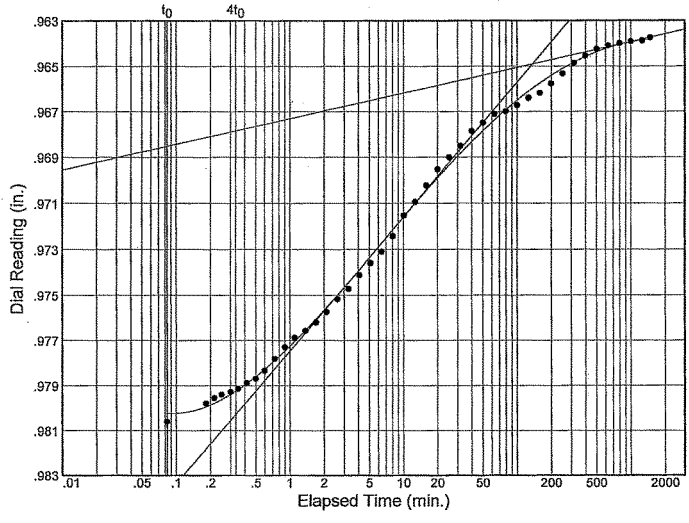
Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

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



Load No.= 10
Load= 3.00 tsf
D_0 = 0.98821
D_{50} = 0.98501
D_{100} = 0.98181
T_{50} = 0.56 min.

C_v @ T_{50}
0.42 ft.^{2}/day



Load No.= 11
Load= 0.75 tsf
D_0 = 0.98122
D_{50} = 0.97305
D_{100} = 0.96489
T_{50} = 5.66 min.

C_v @ T_{50}
0.04 ft.^{2}/day

Figure

FFEBJV, LLC

SWELL/CONSOLIDATION TEST DATA

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Contract No. W912P8-07-D-0022
Task Order 135
Project Number: 07-022135

Sample Data

Source: MRGO-19U
Sample No.: 5C
Elev. or Depth: 17.7 Sample Length(in./cm.):
Location:
Description: VSO GR CH3 W/ ARS ML
Liquid Limit: 59 Plasticity Index: 38
USCS: CH3 AASHTO: Figure No.:
Testing Remarks: Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST	AFTER TEST	
Wet w+t	= 160.82 g.	Consolidometer # = 7	Wet w+t	= 402.02 g.
Dry w+t	= 100.00 g.		Dry w+t	= 334.15 g.
Tare Wt.	= .00 g.	Spec. Gravity = 2.72	Tare Wt.	= 111.81 g.
Height	= 1.00 in.	Height = 1.00 in.		
Diameter	= 4.00 in.	Diameter = 4.00 in.		
Weight	= 345.28 g.	Defl. Table = n/a		
Moisture	= 60.8 %	Ht. Solids = 0.3833 in.	Moisture	= 30.5 %
Wet Den.	= 104.6 pcf	Dry Wt. = 214.58 g.*	Dry Wt.	= 222.34 g.
Dry Den.	= 65.0 pcf	Void Ratio = 1.610	Void Ratio	= 0.884
		Saturation = 102.7 %		

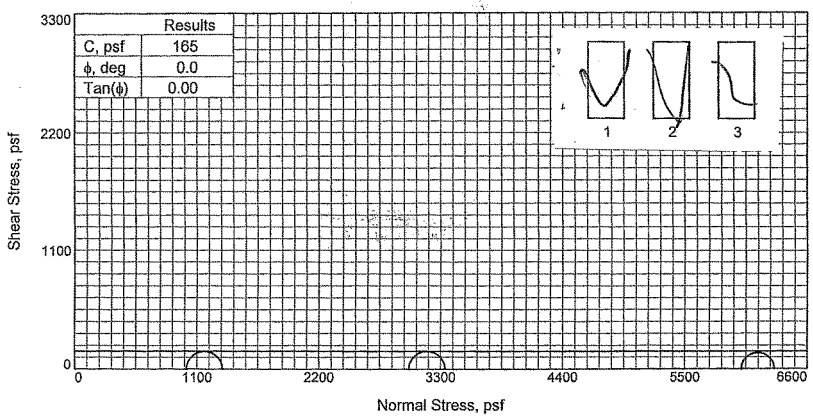
* Initial dry weight used in calculations

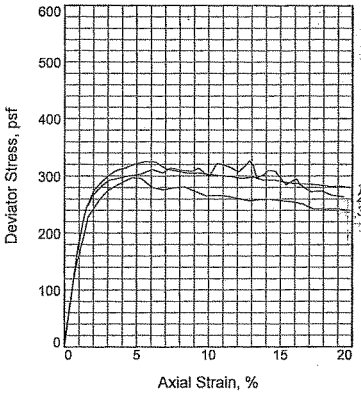
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
start	0.68522				1.610	
0.01	0.68484	0.00000			1.611	0.0 Swell
0.13	0.72052	0.00000	0.74	0.002	1.518	3.5 Comprs.
0.25	0.74450	0.00000	0.15	0.003	1.456	5.9 Comprs.
0.50	0.78192	0.00000	0.15	0.007	1.358	9.7 Comprs.
1.00	0.83306	0.00000	0.19	0.007	1.225	14.8 Comprs.
2.00	0.88211	0.00000	0.21	0.007	1.097	19.7 Comprs.
4.00	0.92612	0.00000	0.22	0.006	0.982	24.1 Comprs.
8.00	0.96725	0.00000	0.23	0.006	0.875	28.2 Comprs.

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
12.00	0.98922	0.00000	0.11	0.006	0.817	30.4 Comprs.
3.00	0.97917	0.00000	0.42		0.844	29.4 Comprs.
0.75	0.96374	0.00000	0.04		0.884	27.8 Comprs.

C_c = 0.44 P_c = 0.36 tsf C_r = 0.06





Sample No.		1	2	3
Initial	Water Content, %	69.9	73.5	70.6
	Dry Density, pcf	60.1	58.0	58.7
	Saturation, %	103.7	103.3	101.1
	Void Ratio	1.8479	1.9494	1.9127
	Diameter, in.	1.401	1.397	1.408
	Height, in.	3.081	3.092	3.096
At Test	Water Content, %	69.9	73.5	70.6
	Dry Density, pcf	60.1	58.0	58.7
	Saturation, %	103.7	103.3	101.1
	Void Ratio	1.8479	1.9494	1.9127
	Diameter, in.	1.401	1.397	1.408
	Height, in.	3.081	3.092	3.096
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.98	20.92	41.73
Fail. Stress, psf		325	326	297
Strain, %		5.6	12.8	4.7
Ult. Stress, psf		289	285	257
Strain, %				
σ_1 Failure, psf		1330	3339	6306
σ_3 Failure, psf		1005	3013	6008

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: VSO GR CH4 W/ LNS ML, SIF

LL= 77 **PL=** 26 **PI=** 51
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

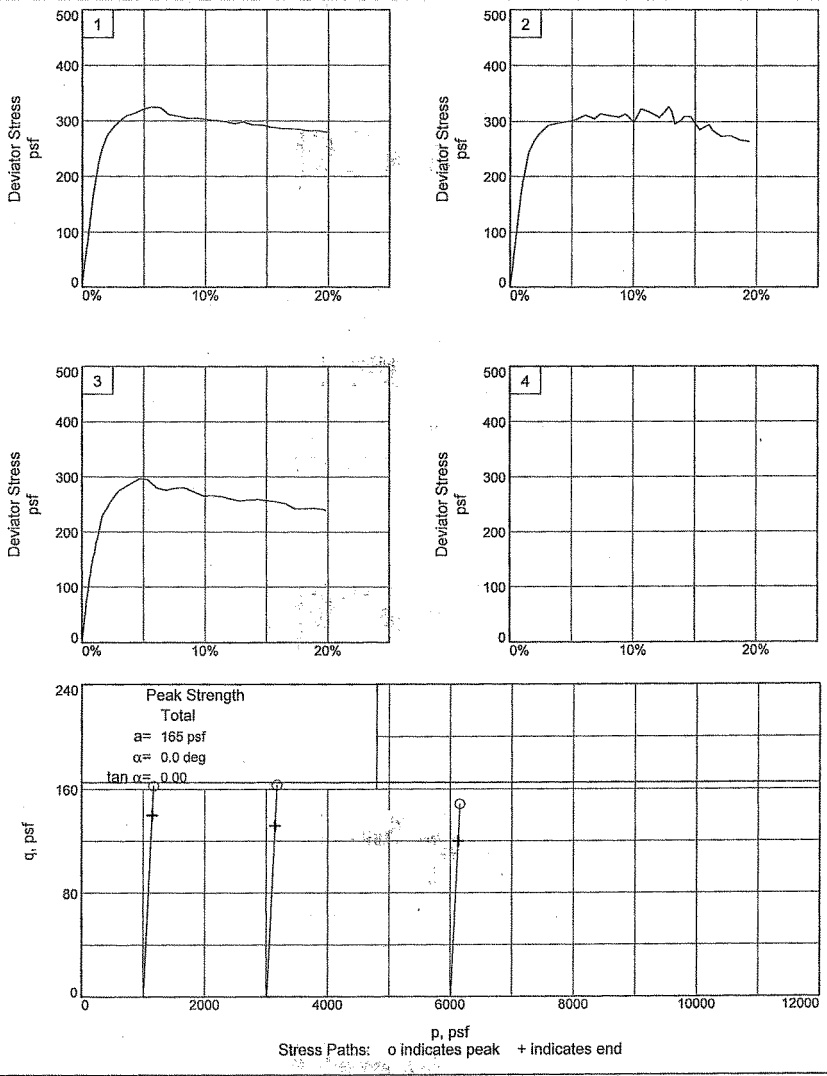
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-19U **Depth:** 20.8
Sample Number: 6B
Proj. No.: 07-022135 **Date Sampled:** 12/10/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

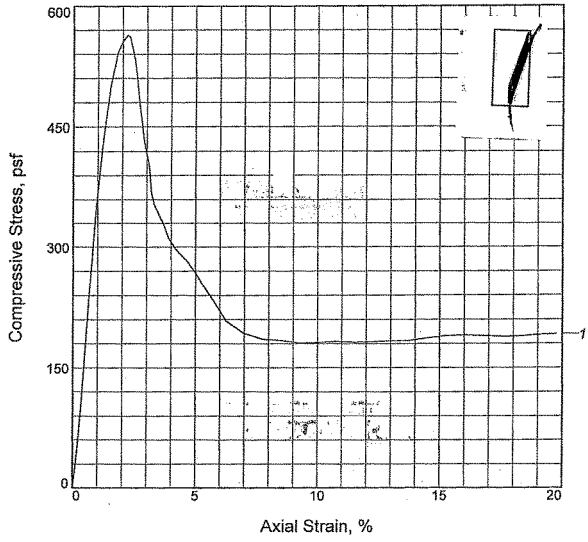
Tested By: VF **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-19U **Depth:** 20.8 **Sample Number:** 6B
Project No.: 07-022135 **Figure** _____ FFEBJV, LLC

Tested By: VF **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	564			
Undrained shear strength, psf	282			
Failure strain, %	2.2			
Strain rate, %/min.	1.00			
Water content, %	86.2			
Wet density, pcf	94.8			
Dry density, pcf	50.9			
Saturation, %	100.0			
Void ratio	2.3619			
Specimen diameter, in.	1.412			
Specimen height, in.	3.098			
Height/diameter ratio	2.19			

Description: SO GR CH4 W/ ARS ML, SIF

LL = 104	PL = 27	PI = 77	**Assumed GS=** 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/10/09
Remarks:

Client: U.S. Army Corps of Engineers

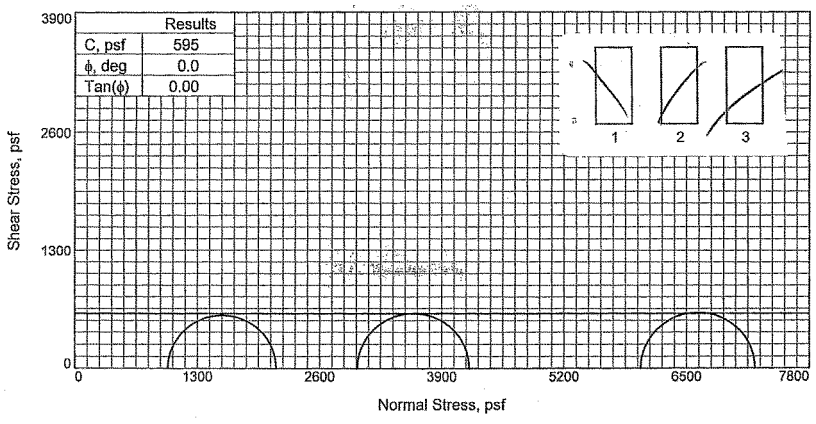
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-19U **Depth:** 24.8
Sample Number: 7B

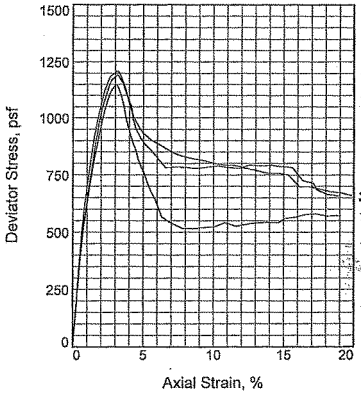
UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Figure _____

Tested By: VF **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	63.2	64.8	64.3
	Dry Density, pcf	61.8	61.6	61.8
	Saturation, %	98.0	99.9	99.7
	Void Ratio	1.7666	1.7784	1.7674
	Diameter, in.	1.410	1.407	1.409
	Height, in.	3.103	3.100	3.100
At Test	Water Content, %	63.2	64.8	64.3
	Dry Density, pcf	61.8	61.6	61.8
	Saturation, %	98.0	99.9	99.7
	Void Ratio	1.7666	1.7784	1.7674
	Diameter, in.	1.410	1.407	1.409
	Height, in.	3.103	3.100	3.100
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.86	20.84	41.76
Fail. Stress, psf		1149	1192	1210
Strain, %		3.0	3.2	3.1
Ult. Stress, psf		516	778	750
Strain, %				
σ_1 Failure, psf		2137	4193	7224
σ_3 Failure, psf		988	3001	6014

Type of Test: Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: M GR CH4 W/ LNS & LYS ML

LL= 74 **PL=** 25 **PI=** 49
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

Client: U.S. Army Corps of Engineers

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

Source of Sample: MRGO-19U **Depth:** 45.4

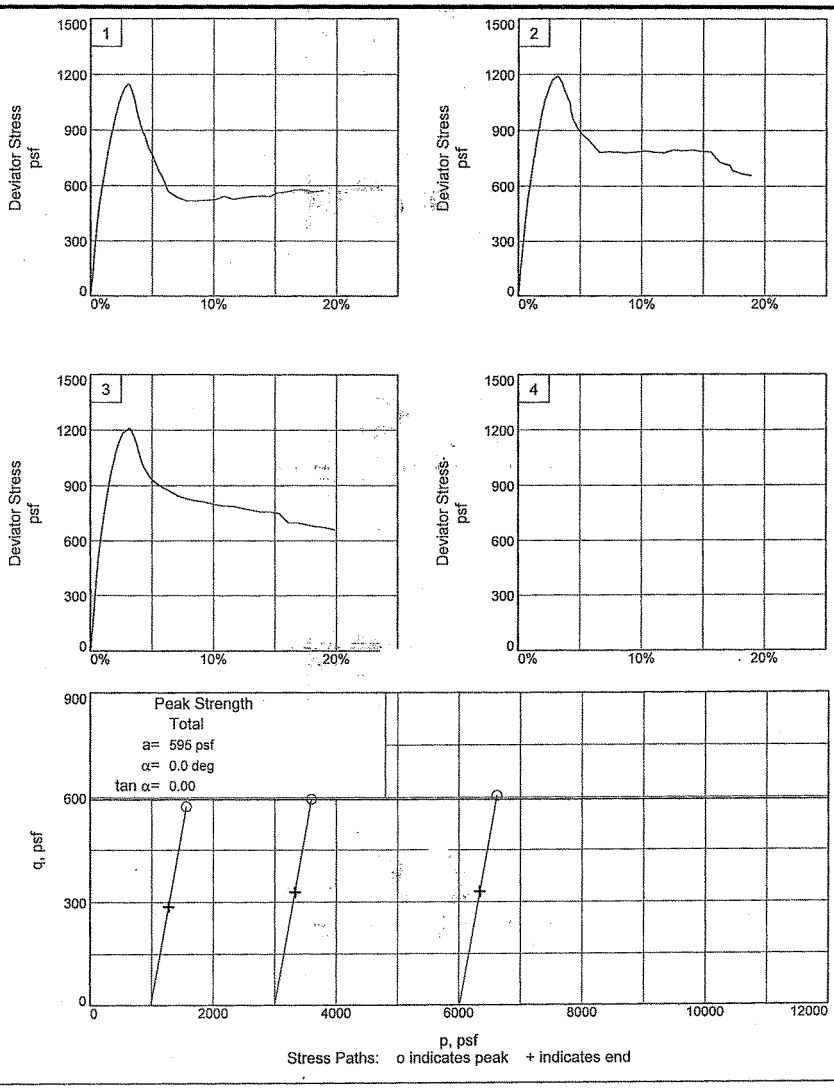
Sample Number: 14B

Proj. No.: 07-022135 **Date Sampled:** 12/10/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

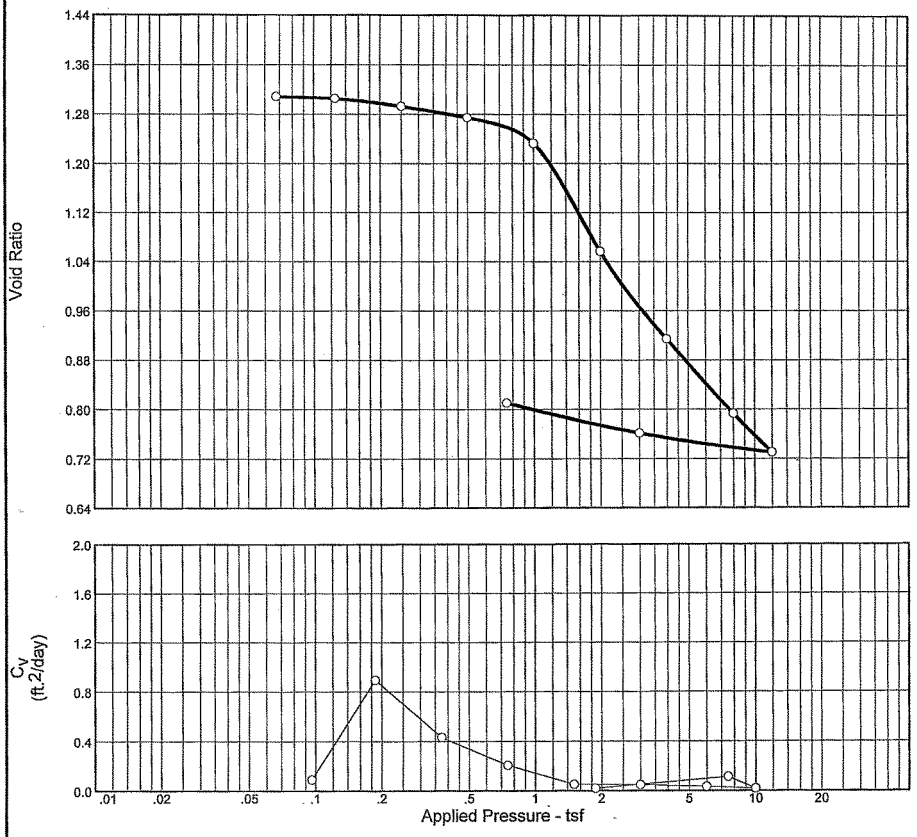
Tested By: VF **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-19U **Depth:** 45.4 **Sample Number:** 14B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: VF **Checked By:** MS

CONSOLIDATION TEST REPORT



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

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

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

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

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

FFEBJV, LLC

St Rose, LA

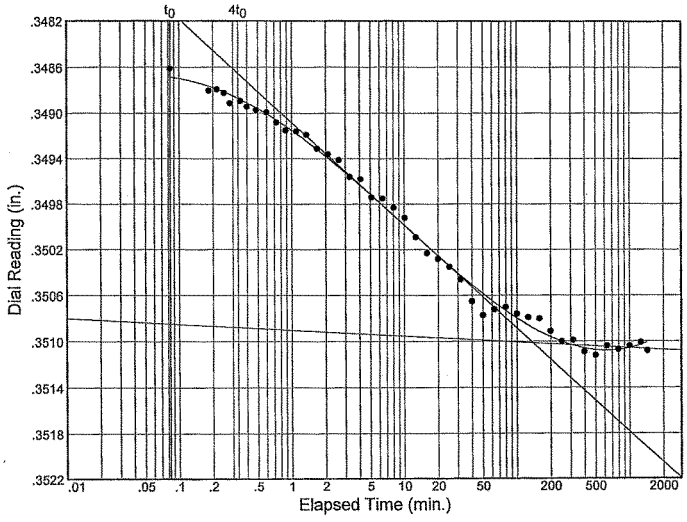
Remarks:
Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

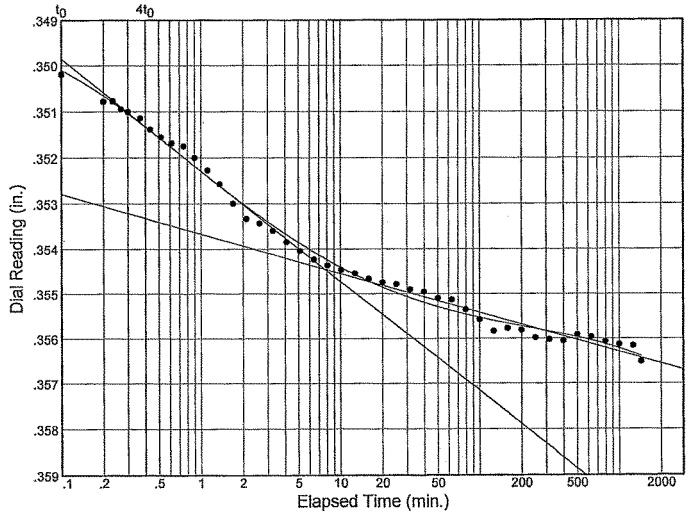
Source: MRGO-19U Sample No.: 14C Elev./Depth: 46.3



Load No.= 2
Load= 0.13 tsf
D_0 = 0.34850
D_{50} = 0.34976
D_{100} = 0.35101
T_{50} = 5.60 min.

C_v @ T_{50}
0.09 ft.2/day

C_α = 0.000



Load No.= 3
Load= 0.25 tsf
D_0 = 0.34887
D_{50} = 0.35166
D_{100} = 0.35444
T_{50} = 0.55 min.

C_v @ T_{50}
0.89 ft.2/day

C_α = 0.001

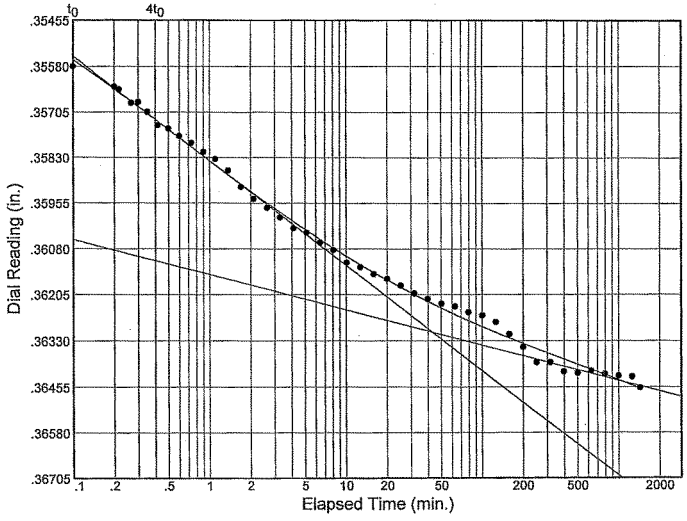
Figure

FFEBJV, LLC

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

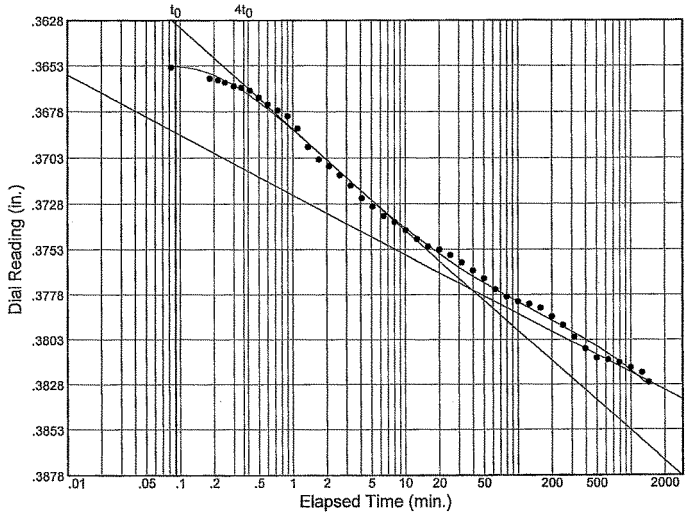
Source: MRGO-19U Sample No.: 14C Elev./Depth: 46.3



Load No.= 4
Load= 0.50 tsf
D_0 = 0.35400
D_{50} = 0.35853
D_{100} = 0.36307
T_{50} = 1.13 min.

C_v @ T_{50}
0.43 ft.^{2}/day

C_α = 0.001



Load No.= 5
Load= 1.00 tsf
D_0 = 0.36399
D_{50} = 0.37075
D_{100} = 0.37751
T_{50} = 2.31 min.

C_v @ T_{50}
0.20 ft.^{2}/day

C_α = 0.003

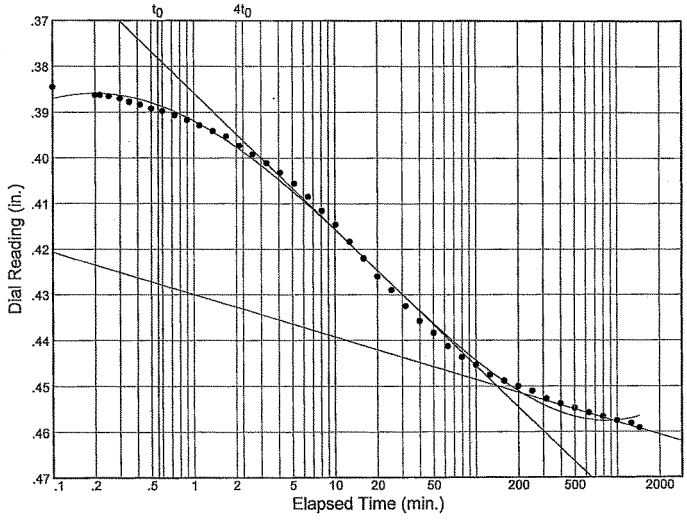
Figure

FFEBJV, LLC

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

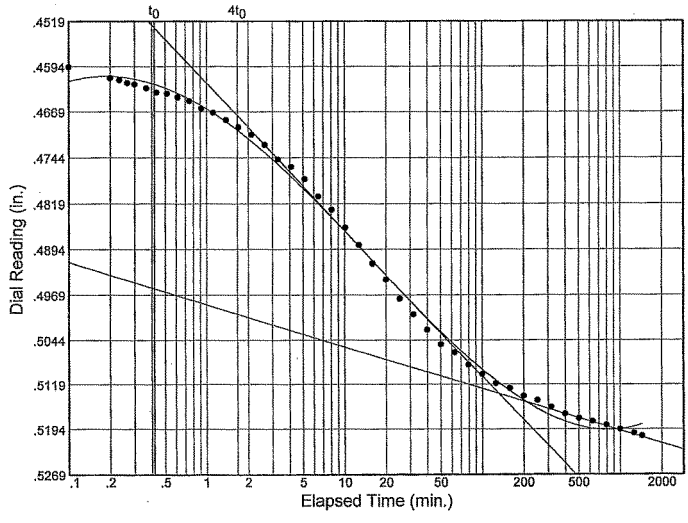
Source: MRGO-19U Sample No.: 14C Elev./Depth: 46.3



Load No.= 6
Load= 2.00 tsf
D_0 = 0.37816
D_{50} = 0.41402
D_{100} = 0.44987
T_{50} = 8.73 min.

C_v @ T_{50}
0.05 ft.2/day

C_α = 0.010



Load No.= 7
Load= 4.00 tsf
D_0 = 0.45472
D_{50} = 0.48407
D_{100} = 0.51343
T_{50} = 8.00 min.

C_v @ T_{50}
0.05 ft.2/day

C_α = 0.008

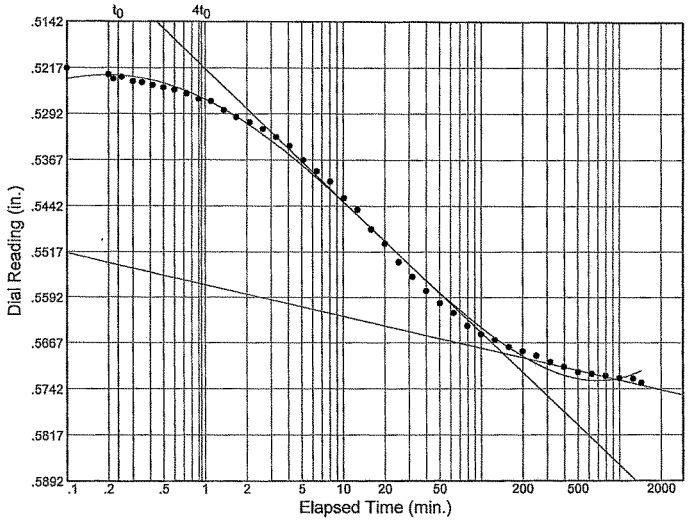
Figure

FFEBJV, LLC

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

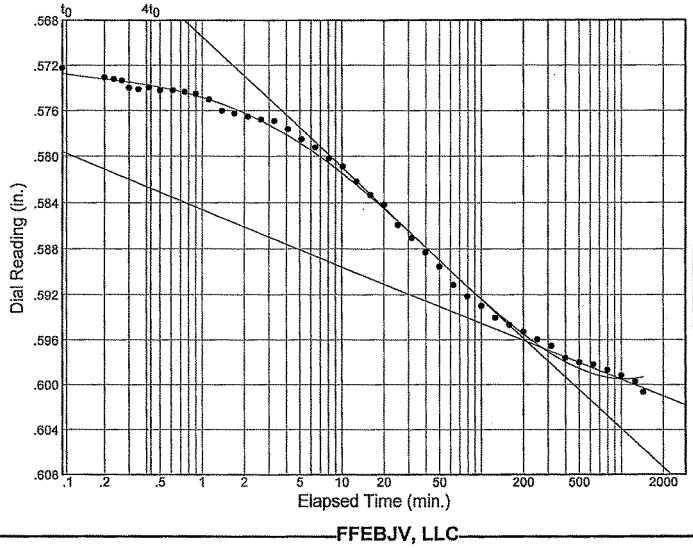
Source: MRGO-19U Sample No.: 14C Elev./Depth: 46.3



Load No.= 8
Load= 8.00 tsf
D_0 = 0.51923
D_{50} = 0.54382
D_{100} = 0.56840
T_{50} = 10.34 min.

C_v @ T_{50}
0.03 ft.^{2}/day

C_α = 0.006



Load No.= 9
Load= 12.00 tsf
D_0 = 0.57173
D_{50} = 0.58395
D_{100} = 0.59617
T_{50} = 17.75 min.

C_v @ T_{50}
0.02 ft.^{2}/day

C_α = 0.006

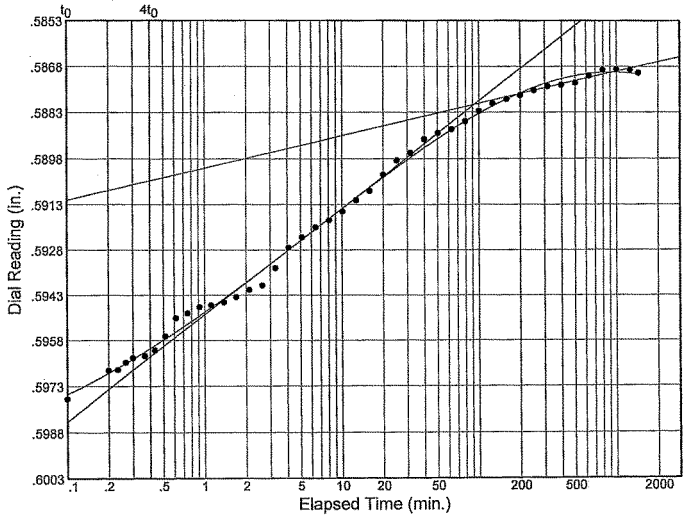
FFEBJV, LLC

Figure

Dial Reading vs. Time

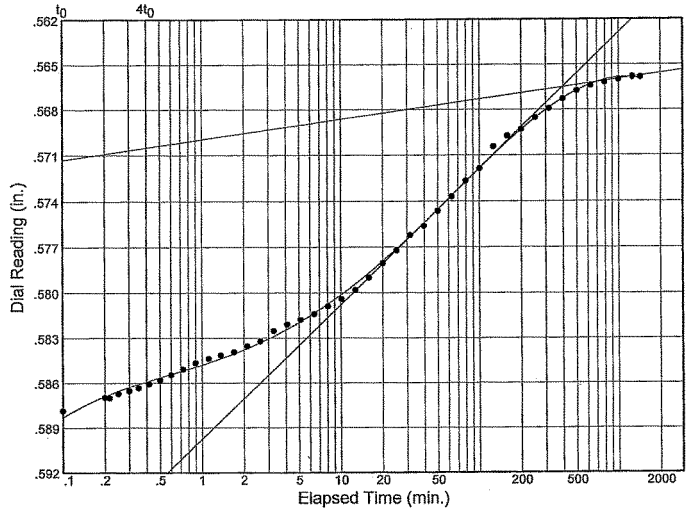
Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

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



Load No.= 10
Load= 3.00 tsf
D_0 = 0.59906
D_{50} = 0.59355
D_{100} = 0.58804
T_{50} = 2.49 min.

C_v @ T_{50}
0.11 ft.^{2}/day



Load No.= 11
Load= 0.75 tsf
D_0 = 0.59076
D_{50} = 0.57863
D_{100} = 0.56649
T_{50} = 16.26 min.

C_v @ T_{50}
0.02 ft.^{2}/day

Figure

CONSOLIDATION TEST DATA

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Contract No. W912P8-07-D-0022
Task Order 135
Project Number: 07-022135

Sample Data

Source: MRGO-19U
Sample No.: 14C
Elev. or Depth: 46.3 Sample Length(in./cm.):
Location:
Description: M GR CH2 W/ LNS & LYS ML, SL
Liquid Limit: 51 Plasticity Index: 30
USCS: CH2 AASHTO: Figure No.:
Testing Remarks: Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST	AFTER TEST	
Wet w+t =	146.67 g.	Consolidometer # = 6	Wet w+t =	428.98 g.
Dry w+t =	100.00 g.		Dry w+t =	355.99 g.
Tare Wt. =	.00 g.	Spec. Gravity = 2.74	Tare Wt. =	112.61 g.
Height =	1.00 in.	Height = 1.00 in.		
Diameter =	4.00 in.	Diameter = 4.00 in.		
Weight =	359.03 g.	Defl. Table = n/a		
Moisture =	46.7 %	Ht. Solids = 0.4338 in.	Moisture =	30.0 %
Wet Den. =	108.4 pcf	Dry Wt. = 244.68 g.*	Dry Wt. =	243.38 g.
Dry Den. =	73.9 pcf	Void Ratio = 1.314	Void Ratio =	0.810
		Saturation = 97.3 %		

* Initial dry weight used in calculations

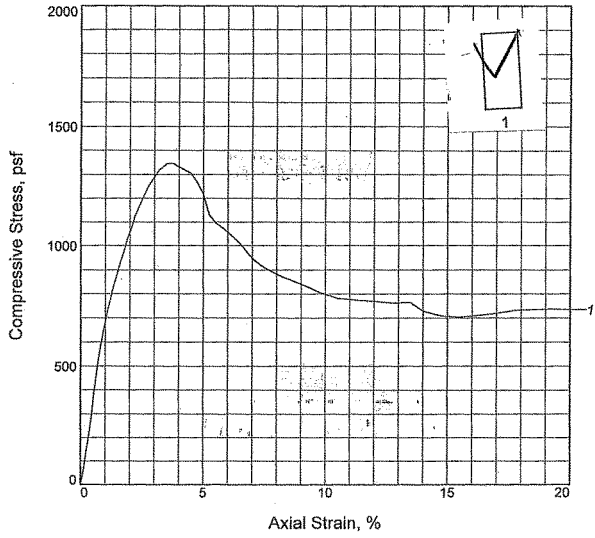
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.34730				1.314	
0.07	0.34979	0.00000			1.308	0.2 Comprs.
0.13	0.35108	0.00000	0.09	0.000	1.305	0.4 Comprs.
0.25	0.35651	0.00000	0.89	0.001	1.293	0.9 Comprs.
0.50	0.36457	0.00000	0.43	0.001	1.274	1.7 Comprs.
1.00	0.38268	0.00000	0.20	0.003	1.232	3.5 Comprs.
2.00	0.45911	0.00000	0.05	0.010	1.056	11.1 Comprs.
4.00	0.52055	0.00000	0.05	0.008	0.915	17.3 Comprs.
8.00	0.57328	0.00000	0.03	0.006	0.793	22.5 Comprs.

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
12.00	0.60066	0.00000	0.02	0.006	0.730	25.2 Comprs.
3.00	0.58701	0.00000	0.11		0.761	23.9 Comprs.
0.75	0.56583	0.00000	0.02		0.810	21.8 Comprs.

C_c = 0.62 P_c = 1.06 tsf C_r = 0.07

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	1347			
Undrained shear strength, psf	673			
Failure strain, %	3.7			
Strain rate, %/min.	1.00			
Water content, %	63.1			
Wet density, pcf	100.9			
Dry density, pcf	61.9			
Saturation, %	97.9			
Void ratio	1.7656			
Specimen diameter, in.	1.409			
Specimen height, in.	3.103			
Height/diameter ratio	2.20			

Description: M GR CH4 W/ LNS & LYS ML.

LL = 91	**PL** = 29	**PI** = 62	**Assumed GS**= 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/20/09
Remarks:

Figure _____

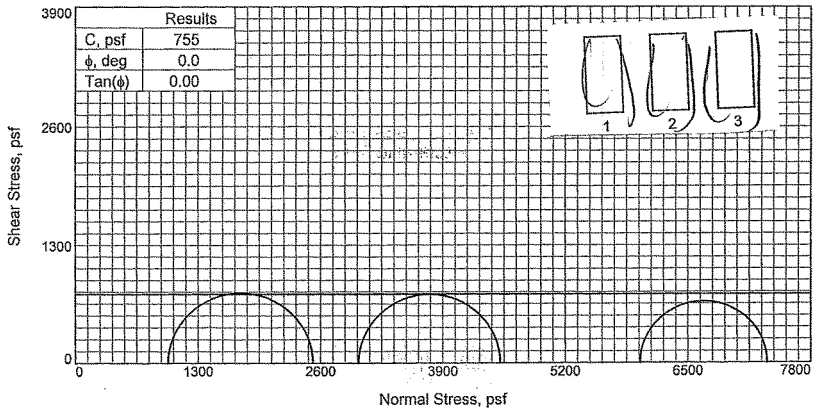
Client: U.S. Army Corps of Engineers

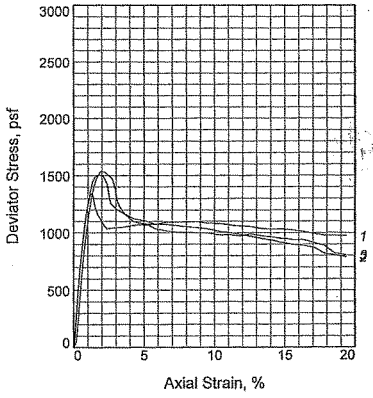
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-19U **Depth:** 49.8
Sample Number: 15B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: VF **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	62.1	62.8	61.5
	Dry Density, pcf	63.1	62.7	64.0
	Saturation, %	99.4	99.7	100.7
	Void Ratio	1.7125	1.7269	1.6720
	Diameter, in.	1.409	1.411	1.407
	Height, in.	3.102	3.099	3.094
At Test	Water Content, %	62.1	62.8	61.5
	Dry Density, pcf	63.1	62.7	64.0
	Saturation, %	99.4	99.7	100.7
	Void Ratio	1.7125	1.7269	1.6720
	Diameter, in.	1.409	1.411	1.407
	Height, in.	3.102	3.099	3.094
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.82	20.86	41.61
Fail. Stress, psf		1537	1508	1347
Strain, %		1.9	1.9	1.3
Ult. Stress, psf		1032	913	949
Strain, %				
σ_1 Failure, psf		2519	4511	7339
σ_3 Failure, psf		982	3004	5992

Type of Test: Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: M GR CH4 W/ LNS & LYS ML, SL

LL= 87 **PL=** 25 **PI=** 62
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

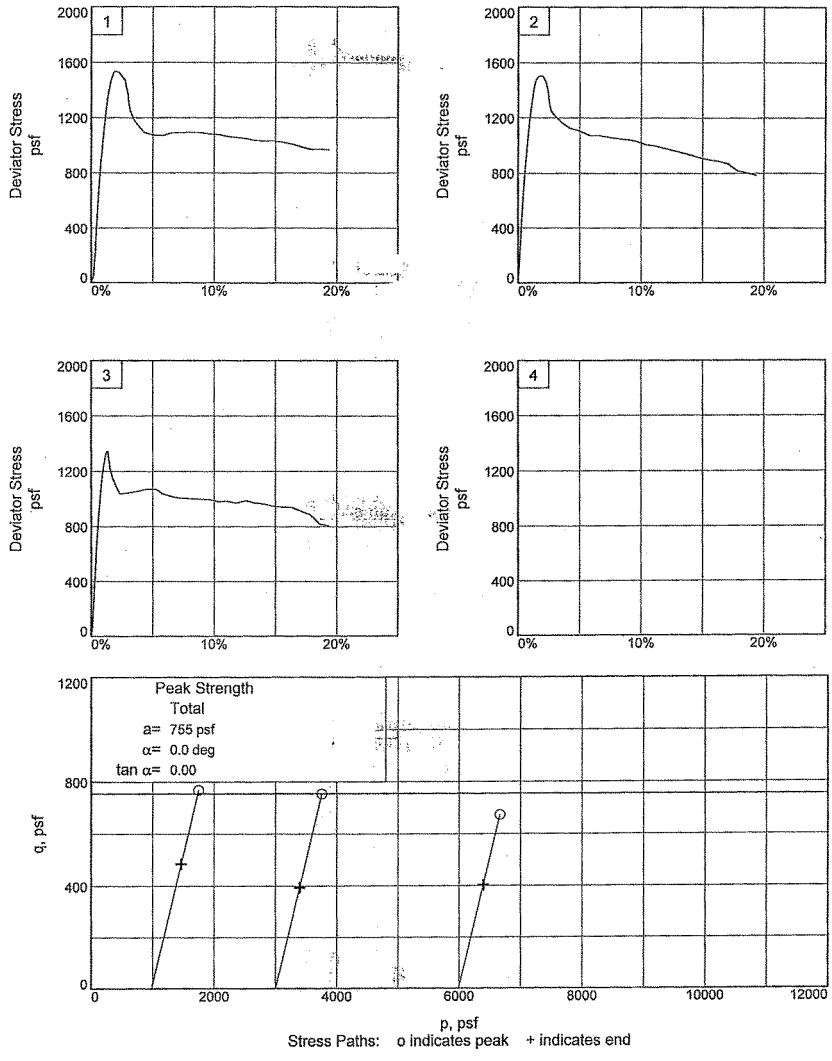
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-19U **Depth:** 53.8
Sample Number: 16B
Proj. No.: 07-022135 **Date Sampled:** 12/20/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

Tested By: VF **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-19U **Depth:** 53.8 **Sample Number:** 16B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: VF **Checked By:** MS

SUMMARY OF LABORATORY TEST RESULTS

Project: MRGO Ecosystem Restoration Feasibility Study Assigned By: _____

Project Number: 07-022135 Current Date: 2/4/2010
Boring: MRGO-20U

Sample Number	Depth	Visual Classification	USCS	E(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
1A	0.0	VSO DGR PT W/ RT, WD	PT		243												
1B	0.8	VSO DGR CHOA W/ RT, WD	CHOA		134												
1C	1.7	VSO DGR CHOA W/ RT, WD	CHOA		109												
2A	4.0	VSO GR CH3 W/ ARS ML, O, RT, WD	CH3		75												
2B	4.8	VSO GR CH3 W/ ARS & LYS ML, O, RT	CH3		67												
2C	5.7	VSO GR CH4 W/ O, RT, WD	CH4		64												
2D	6.6	SO GR CH3 W/ LNS & LYS ML, O, RT	CH3		46												
3A	8.0	SO GR CH3 W/ LNS & LYS ML, WD	CH3		47												
3B	8.8	SO GR CH3 W/ LNS & LYS ML, SIF, O	CH3		56												
3C	9.7	SO GR CHOA W/ LNS & LYS ML, WD, SIF	CHOA		117												
3D	10.6	SO DGR CHOA W/ LNS ML, WD, RT	CHOA		105												
4A	12.0	VSO GR CH4 W/ ARS ML, O, WD, RT	CH4		91												
4B	12.8	SO GR CH4 W/ ARS ML, O, WD, RT	CH4		49												
4C	13.7	SO GR CH4 W/ ARS ML, O, WD, RT	CH4		50												
4D	14.6	SO GR CH4 W/ O, WD, RT	CH4		69												
5A	16.0	VSO GR CH3 W/ ARS ML, O, SIF	CH3		57												
5B	16.8	VSO GR CH3 W/ ARS ML, O, SIF	CH3		63	64	103	100	UU	0	189		64	19	45	0.11	
5C	17.7	VSO GR CH3 W/ ARS ML, O, SIF	CH3		63	62	101	98					69	21	48		CON,GS
6A	20.0	VSO GR CH3 W/ LNS & LYS SM, WD	CH3		50												
6B	20.8	VSO GR CH3 W/ LNS & LYS SM, WD, SIF	CH3		61												
6C	21.7	SO GR CL6 W/ LNS & LYS ML, SIF	CL6	15	40	82	115	100	UC	-	294	588	45	21	24	0.12	
6D	22.6	SO GR CL6 W/ LNS & LYS SM, SIF, WD	CL6		51												
7A	24.0	SO GR CH2 W/ LNS & LYS ML	CH2		61												
7B	24.8	SO GR CH2 W/ LNS & LYS ML	CH2		56	69	107	100	UU	0	312		56	19	37	0.16	
7C	25.7	SO GR CH2 W/ LNS & LYS ML	CH2		52												
8A	28.0	SO GR CH2 W/ LNS & LYS SM	CH2		53												
8B	28.8	SO GR CH2 W/ LNS & LYS SM	CH2	3	52	71	108	100	UC	-	312	624	55	17	38	0.19	
8C	29.7	SO GR CH3 W/ LNS & LYS SM	CH3		56												
8D	30.6	GR SM W/ LYS & ARS CH, WD	SM		30												
9A	32.0	GR SM	SM		30												
9B	32.8	GR SM W/ ARS CH	SM		31												
10A	36.0	GR SM W/ LNS & LYS CH, CC	SM		31												
10B	36.8	GR SM W/ LNS & LYS CH	SM		32												
10C	37.7	GR SM W/ LNS & LYS CH	SM		36												
10D	38.6	GR SM W/ LNS & LYS CH	SM		29												
11A	40.0	GR ML W/ LNS & LYS CH	ML		34												
11B	40.4	GR ML W/ LNS & LYS CH	ML		35												

Remarks: _____
FFEB JV, LLC

Checked By: MS/WH
File Name: MRGO-20U.xls

SUMMARY OF LABORATORY TEST RESULTS

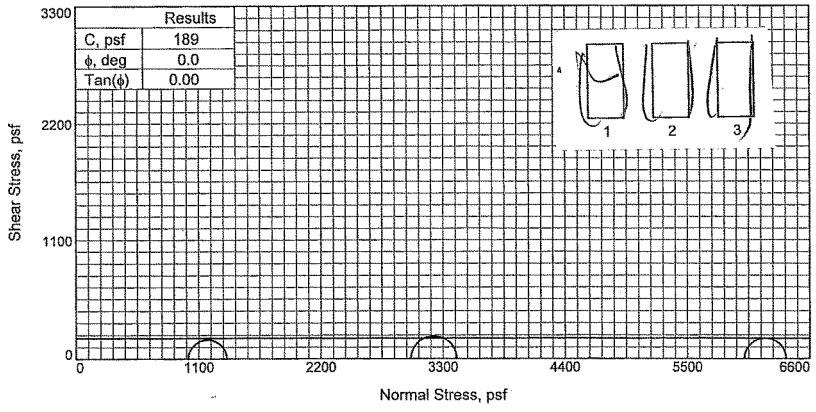
Project: MRGO Ecosystem Restoration Feasibility Study Assigned By: _____

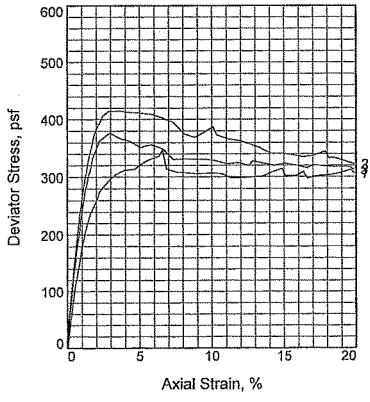
Project Number: 07-022135 Current Date: 2/4/2010
Boring: MRGO-20U

Sample Number	Depth	Visual Classification	USCS	E(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
11C	41.3	GR ML W/ LNS & LYS CH	ML		34												
11D	42.2	SO GR CH2 W/ LNS & LYS ML	CH2		47	75	112	100	UU	0	285		55	18	37	0.21	
12A	44.0	GR ML W/ WD	ML		32												
12B	44.4	GR ML	ML		32												
12C	45.3	M GR CH3 W/ LNS & LYS ML	CH3	5	48	74	109	100	UC	-	591	1182	61	19	42	0.27	
12D	46.2	GR ML W/ LNS & LYS CH	ML		34												
13A	48.0	M GR CH3 W/ LNS & LYS ML, WD	CH3		50												
13B	48.8	M GR CH3 W/ LNS & LYS ML	CH3		50												
13C	49.7	M GR CH4 W/ LNS & LYS ML	CH4		57	68	106	100	UU	0	609		78	24	54	0.28	
14A	52.0	M GR CH4 W/ LNS & LYS ML	CH4		56												
14B	52.8	M GR CH4 W/ LNS & LYS ML	CH4		54	68	104	96					72	23	49		CON,GS
14C	53.7	M GR CH4 W/ LNS & LYS ML	CH4	3	56	68	105	100	UC	-	830	1160	77	21	56	0.34	
14D	54.6	M GR CH4 W/ LNS & LYS ML	CH4		56												
15A	56.0	SO GR CH4 W/ LNS & LYS ML	CH4		59												
15B	56.8	SO GR CH4 W/ LNS & LYS ML	CH4		65	62	103	100	UU	0	434		93	25	68	0.30	
15C	57.7	M GR CH4 W/ LNS & LYS ML	CH4		56												
15D	58.6	M GR CH3 W/ LNS & LYS ML	CH3		41												

Remarks: _____
FFEB JV, LLC

Checked By: MS/WH
File Name: MRGO-20U.xls





Sample No.		1	2	3
Initial	Water Content, %	68.6	61.4	58.7
	Dry Density, pcf	59.5	64.4	66.8
	Saturation, %	100.4	101.5	103.1
	Void Ratio	1.8734	1.6569	1.5592
	Diameter, in.	1.403	1.402	1.390
	Height, in.	3.102	3.098	3.096
At Test	Water Content, %	68.6	61.4	58.7
	Dry Density, pcf	59.5	64.4	66.8
	Saturation, %	100.4	101.5	103.1
	Void Ratio	1.8734	1.6569	1.5592
	Diameter, in.	1.403	1.402	1.390
	Height, in.	3.102	3.098	3.096
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.98	20.90	41.75
Fail. Stress, psf		347	415	376
Strain, %		6.6	3.5	2.9
Ult. Stress, psf		298	369	351
Strain, %				
σ_1 Failure, psf		1353	3424	6388
σ_3 Failure, psf		1006	3009	6011

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: VSO GR CH3 W/ ARS ML, O, SIF

LL= 64 **PL=** 19 **PI=** 45
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

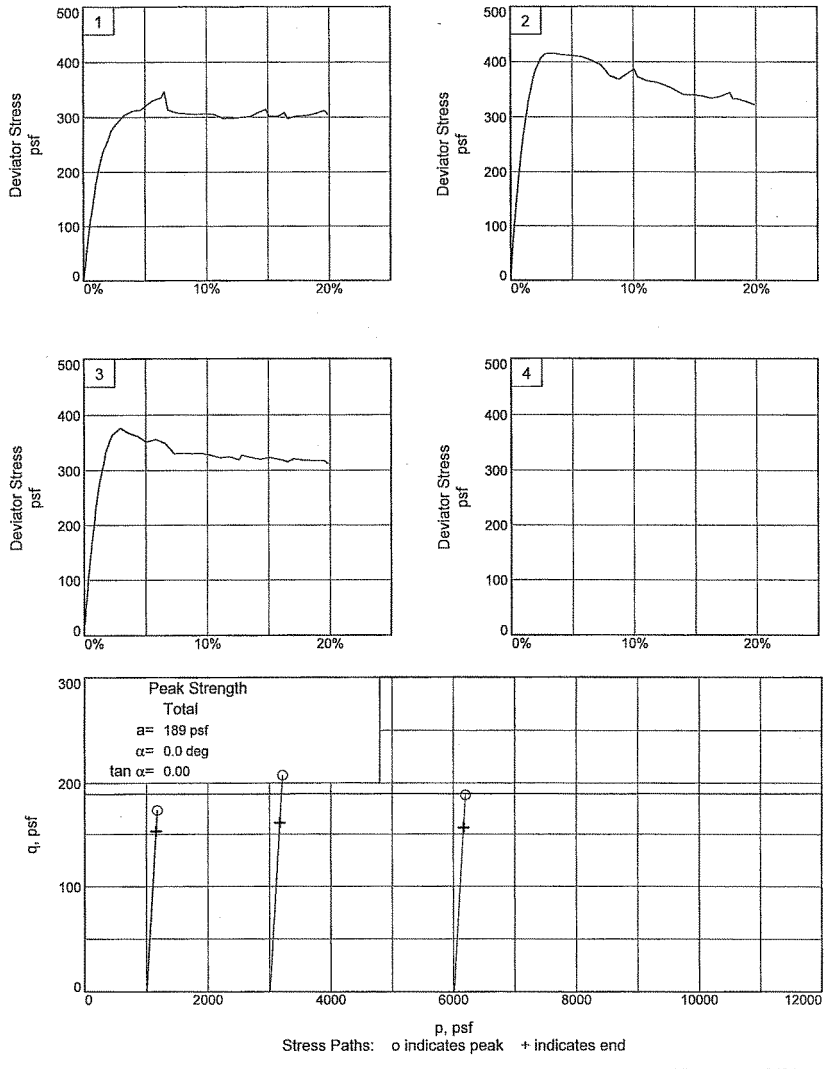
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-20U **Depth:** 16.8
Sample Number: 5B
Proj. No.: 07-022135 **Date Sampled:** 12/11/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

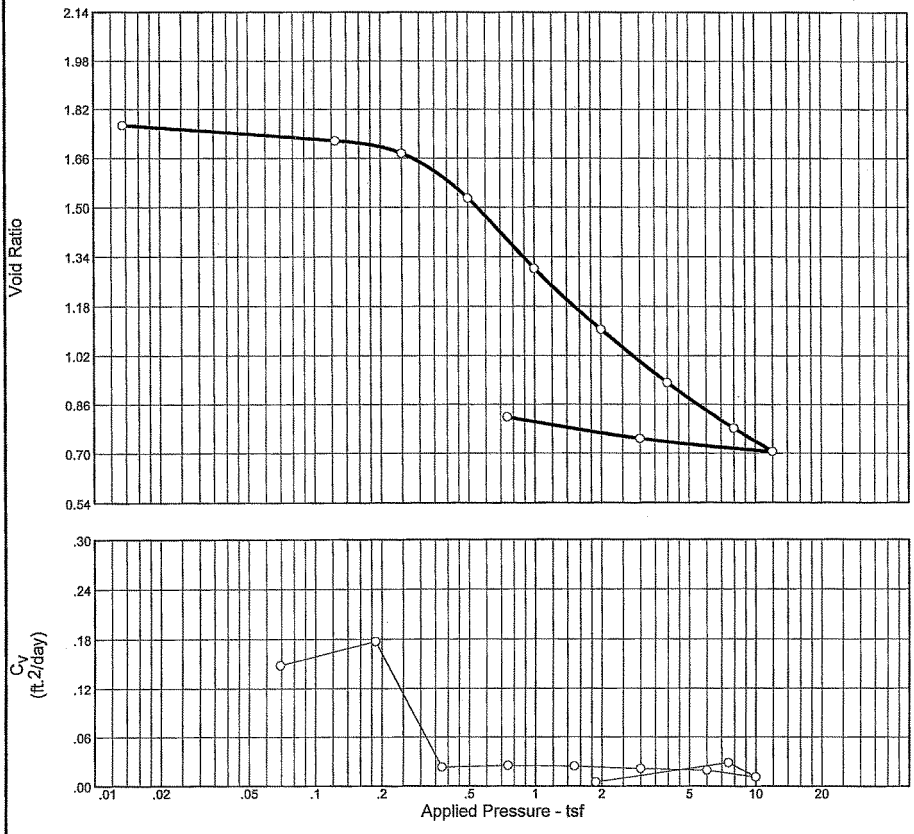
Tested By: VF/ARS **Checked By:** ms



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-20U **Depth:** 16.8 **Sample Number:** 5B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: VF/ARS **Checked By:** ms

CONSOLIDATION TEST REPORT



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

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

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

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

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

FFEBJV, LLC

St Rose, LA

Remarks:

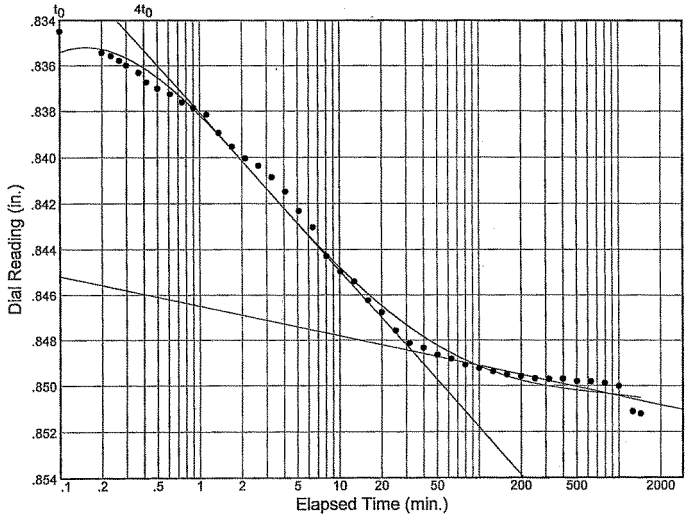
Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

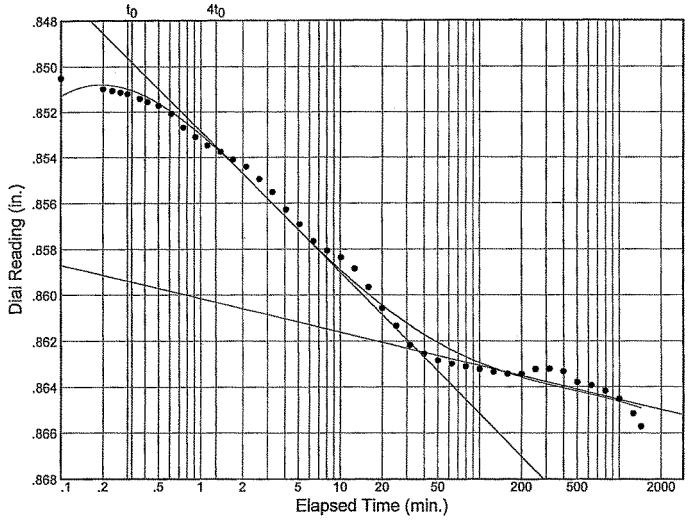
Source: MRGO-20U Sample No.: 5C Elev./Depth: 17.7



Load No.= 2
Load= 0.13 tsf
D_0 = 0.83476
D_{50} = 0.84163
D_{100} = 0.84850
T_{50} = 3.29 min.

C_v @ T_{50}
0.15 ft.2/day

C_α = 0.001



Load No.= 3
Load= 0.25 tsf
D_0 = 0.84850
D_{50} = 0.85547
D_{100} = 0.86243
T_{50} = 2.66 min.

C_v @ T_{50}
0.18 ft.2/day

C_α = 0.001

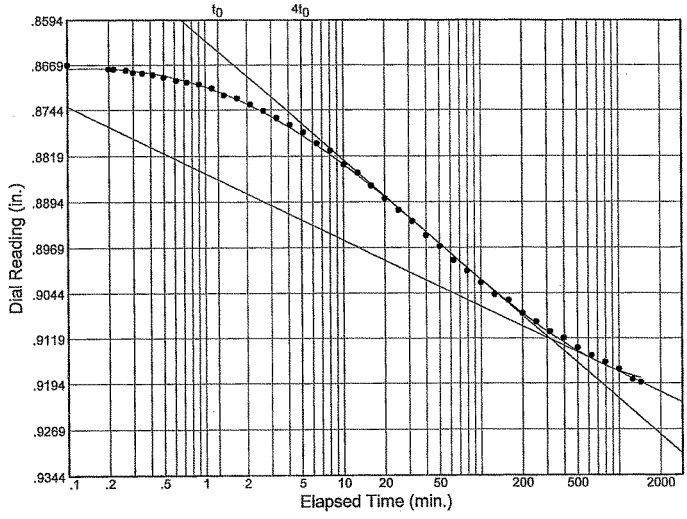
Figure

FFEBJV, LLC

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

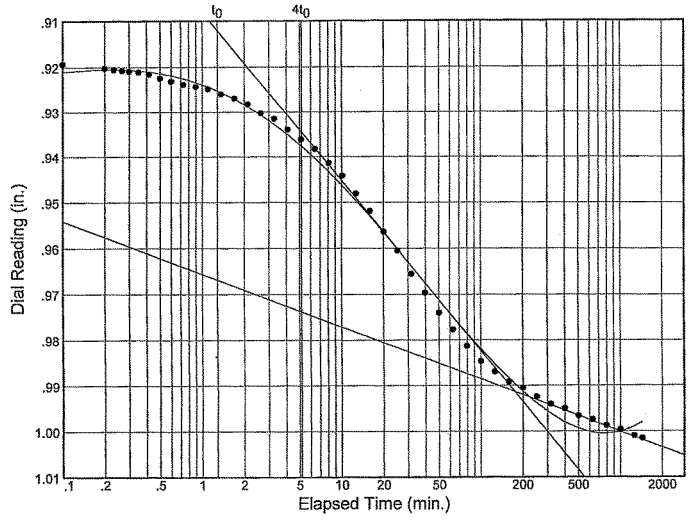
Source: MRGO-20U Sample No.: 5C Elev./Depth: 17.7



Load No.= 4
Load= 0.50 tsf
D_0 = 0.86432
D_{50} = 0.88818
D_{100} = 0.91204
T_{50} = 18.99 min.

C_v @ T_{50}
0.02 ft.^{2}/day

C_α = 0.011



Load No.= 5
Load= 1.00 tsf
D_0 = 0.91294
D_{50} = 0.95215
D_{100} = 0.99136
T_{50} = 15.02 min.

C_v @ T_{50}
0.03 ft.^{2}/day

C_α = 0.013

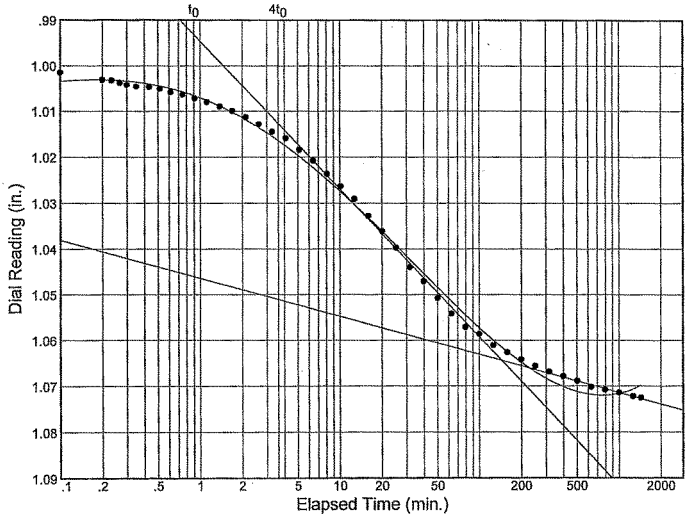
Figure

FFEBJV, LLC

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

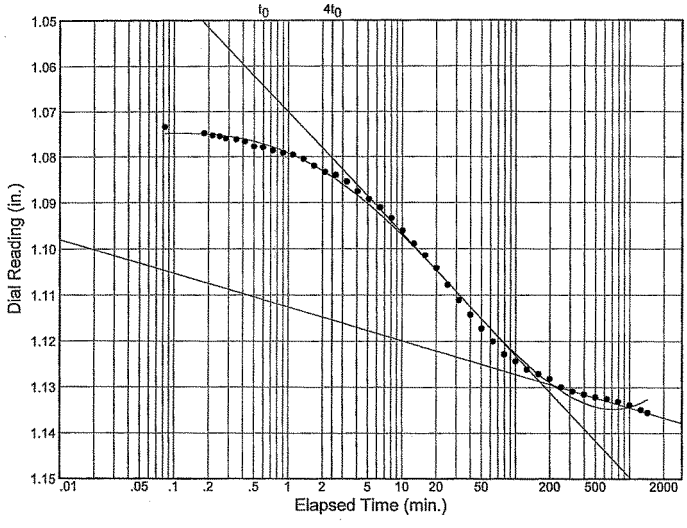
Source: MRGO-20U Sample No.: 5C Elev./Depth: 17.7



Load No.= 6
Load= 2.00 tsf
D_0 = 0.99680
D_{50} = 1.03061
D_{100} = 1.06443
T_{50} = 12.99 min.

C_v @ T_{50}
0.02 ft.2/day

C_α = 0.010



Load No.= 7
Load= 4.00 tsf
D_0 = 1.06994
D_{50} = 1.09933
D_{100} = 1.12872
T_{50} = 12.41 min.

C_v @ T_{50}
0.02 ft.2/day

C_α = 0.009

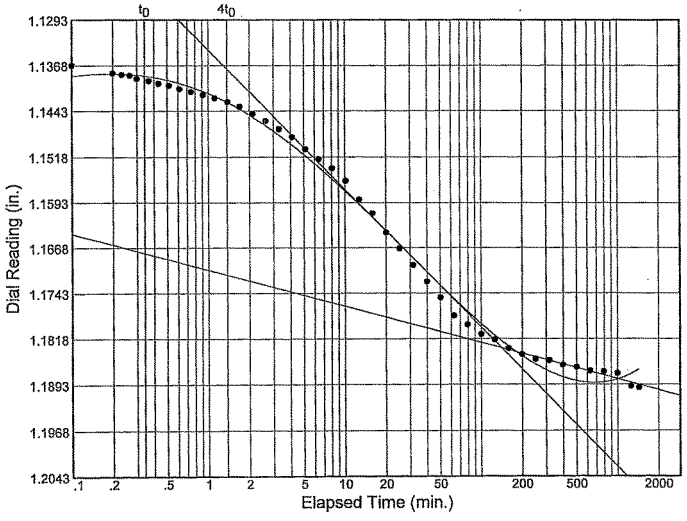
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

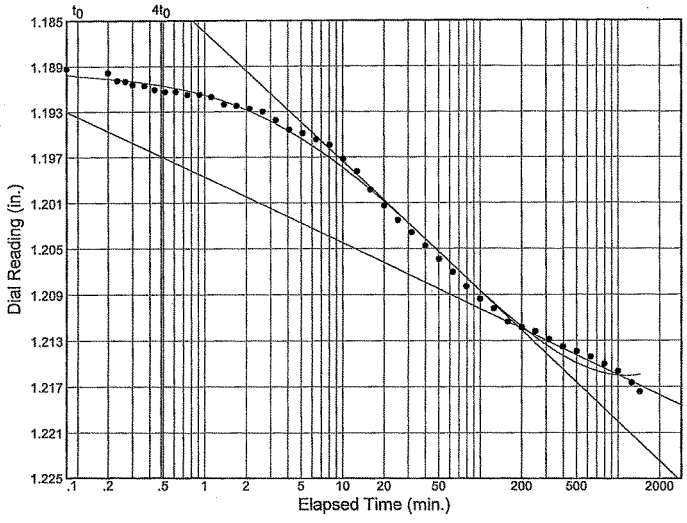
Source: MRGO-20U Sample No.: 5C Elev./Depth: 17.7



Load No.= 8
Load= 8.00 tsf
D_0 = 1.13414
D_{50} = 1.15873
D_{100} = 1.18332
T_{50} = 11.60 min.

C_v @ T_{50}
0.02 ft.^{2}/day

C_α = 0.008



Load No.= 9
Load= 12.00 tsf
D_0 = 1.18901
D_{50} = 1.20041
D_{100} = 1.21182
T_{50} = 18.02 min.

C_v @ T_{50}
0.01 ft.^{2}/day

C_α = 0.009

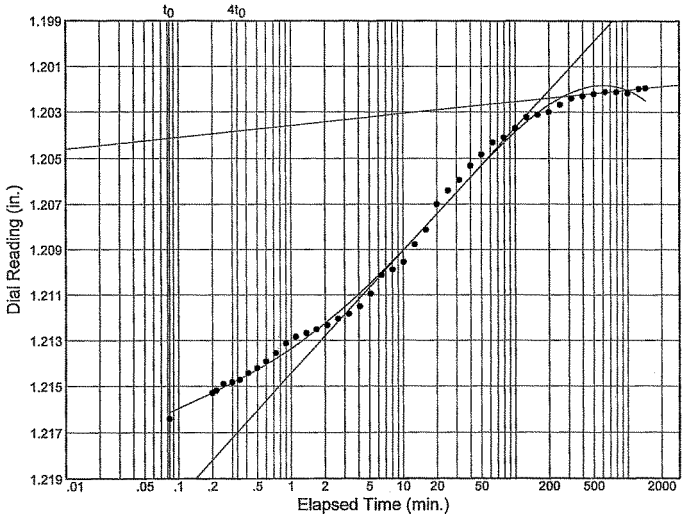
FFEBJV, LLC

Figure

Dial Reading vs. Time

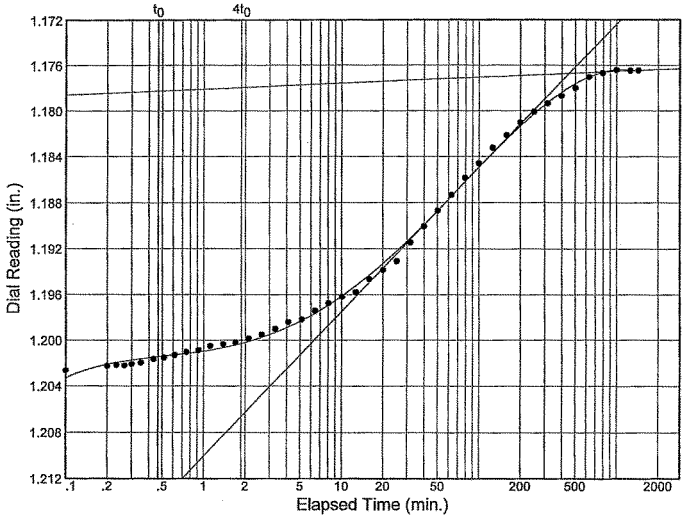
Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

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



Load No.= 10
Load= 3.00 tsf
D_0 = 1.21753
D_{50} = 1.20998
D_{100} = 1.20243
T_{50} = 6.54 min.

C_v @ T_{50}
0.03 ft.2/day



Load No.= 11
Load= 0.75 tsf
D_0 = 1.20257
D_{50} = 1.18965
D_{100} = 1.17673
T_{50} = 42.15 min.

C_v @ T_{50}
0.00 ft.2/day

FFEBJV, LLC

Figure

CONSOLIDATION TEST DATA

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Contract No. W912P8-07-D-0022
Task Order 135
Project Number: 07-022135

Sample Data

Source: MRGO-20U
Sample No.: 5C
Elev. or Depth: 17.7 Sample Length(in./cm.):
Location:
Description: VSO GR CH3 W/ ARS ML, O, SIF
Liquid Limit: 69 Plasticity Index: 48
USCS: CH3 AASHTO: Figure No.:
Testing Remarks: Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Test Specimen Data

TOTAL SAMPLE	BEFORE TEST	AFTER TEST
Wet w+t = 163.15 g.	Consolidometer # = 8	Wet w+t = 381.86 g.
Dry w+t = 100.00 g.		Dry w+t = 317.72 g.
Tare Wt. = .00 g.	Spec. Gravity = 2.75	Tare Wt. = 113.13 g.
Height = 1.00 in.	Height = 1.00 in.	
Diameter = 4.00 in.	Diameter = 4.00 in.	
Weight = 334.63 g.	Defl. Table = n/a	
Moisture = 63.1 %	Ht. Solids = 0.3623 in.	Moisture = 31.4 %
Wet Den. = 101.2 pcf	Dry Wt. = 205.05 g.*	Dry Wt. = 204.59 g.
Dry Den. = 62.0 pcf	Void Ratio = 1.768	Void Ratio = 0.819
	Saturation = 98.2 %	

* Initial dry weight used in calculations

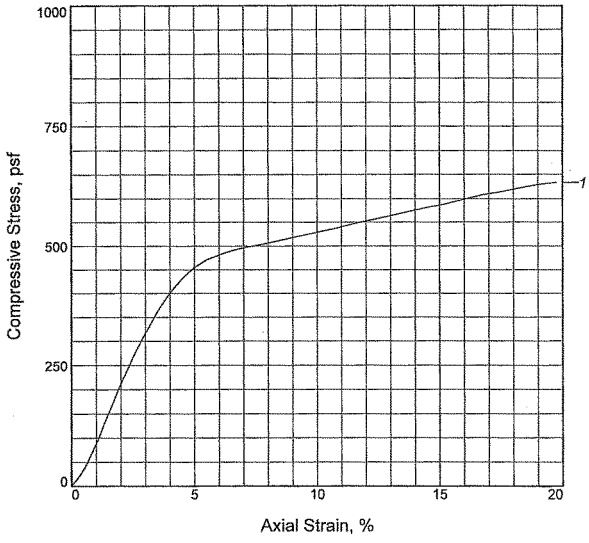
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.83254				1.768	
0.01	0.83304	0.00000			1.767	0.0 Comprs.
0.13	0.85123	0.00000	0.15	0.001	1.716	1.9 Comprs.
0.25	0.86573	0.00000	0.18	0.001	1.676	3.3 Comprs.
0.50	0.91927	0.00000	0.02	0.011	1.529	8.6 Comprs.
1.00	1.00157	0.00000	0.03	0.013	1.301	16.9 Comprs.
2.00	1.07258	0.00000	0.02	0.010	1.105	23.9 Comprs.
4.00	1.13559	0.00000	0.02	0.009	0.931	30.2 Comprs.
8.00	1.18985	0.00000	0.02	0.008	0.782	35.6 Comprs.

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
12.00	1.21745	0.00000	0.01	0.009	0.705	38.4 Comprs.
3.00	1.20195	0.00000	0.03		0.748	36.8 Comprs.
0.75	1.17647	0.00000	0.00		0.819	34.3 Comprs.

C_c = 0.73 P_c = 0.33 tsf C_r = 0.09

UNCONFINED COMPRESSION TEST



Sample No.	1				
Unconfined strength, psf	588				
Undrained shear strength, psf	294				
Failure strain, %	15.2				
Strain rate, %/min.	1.00				
Water content, %	40.2				
Wet density, pcf	115.4				
Dry density, pcf	82.3				
Saturation, %	103.6				
Void ratio	1.0477				
Specimen diameter, in.	1.402				
Specimen height, in.	3.084				
Height/diameter ratio	2.20				

Description: SO GR CL6 W/ LNS & LYS ML, SIF

LL = 45	**PL** = 21	**PI** = 24	**Assumed GS=** 2.70	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/11/09
Remarks:

Figure _____

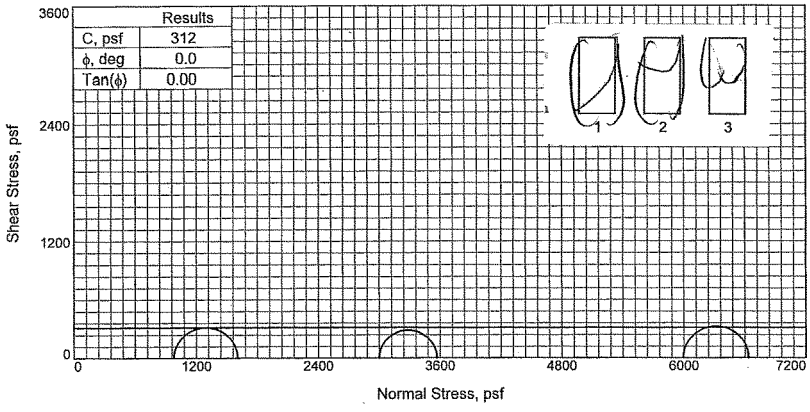
Client: U.S. Army Corps of Engineers

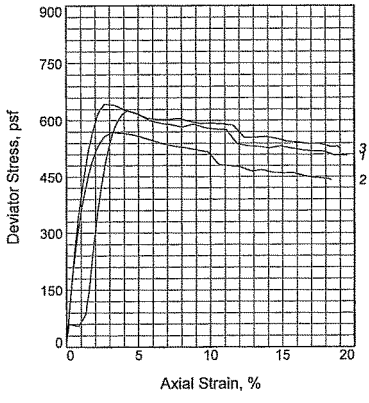
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-20U **Depth:** 21.7
Sample Number: 6C

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: VF **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	56.9	54.2	56.2
	Dry Density, pcf	67.4	69.4	68.7
	Saturation, %	102.3	102.6	104.5
	Void Ratio	1.5008	1.4279	1.4522
	Diameter, in.	1.403	1.403	1.392
	Height, in.	3.103	3.093	3.103
At Test	Water Content, %	56.9	54.2	56.2
	Dry Density, pcf	67.4	69.4	68.7
	Saturation, %	102.3	102.6	104.5
	Void Ratio	1.5008	1.4279	1.4522
	Diameter, in.	1.403	1.403	1.392
	Height, in.	3.103	3.093	3.103
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.81	20.83	41.62
Fail. Stress, psf		627	569	643
Strain, %		4.3	3.2	2.7
Ult. Stress, psf		582	465	602
Strain, %				
σ_1 Failure, psf		1607	3568	6636
σ_3 Failure, psf		980	3000	5993

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CH2 W/ LNS & LYS ML

LL= 56 **PL=** 19 **PI=** 37
Assumed Specific Gravity= 2.70
Remarks:

Figure _____

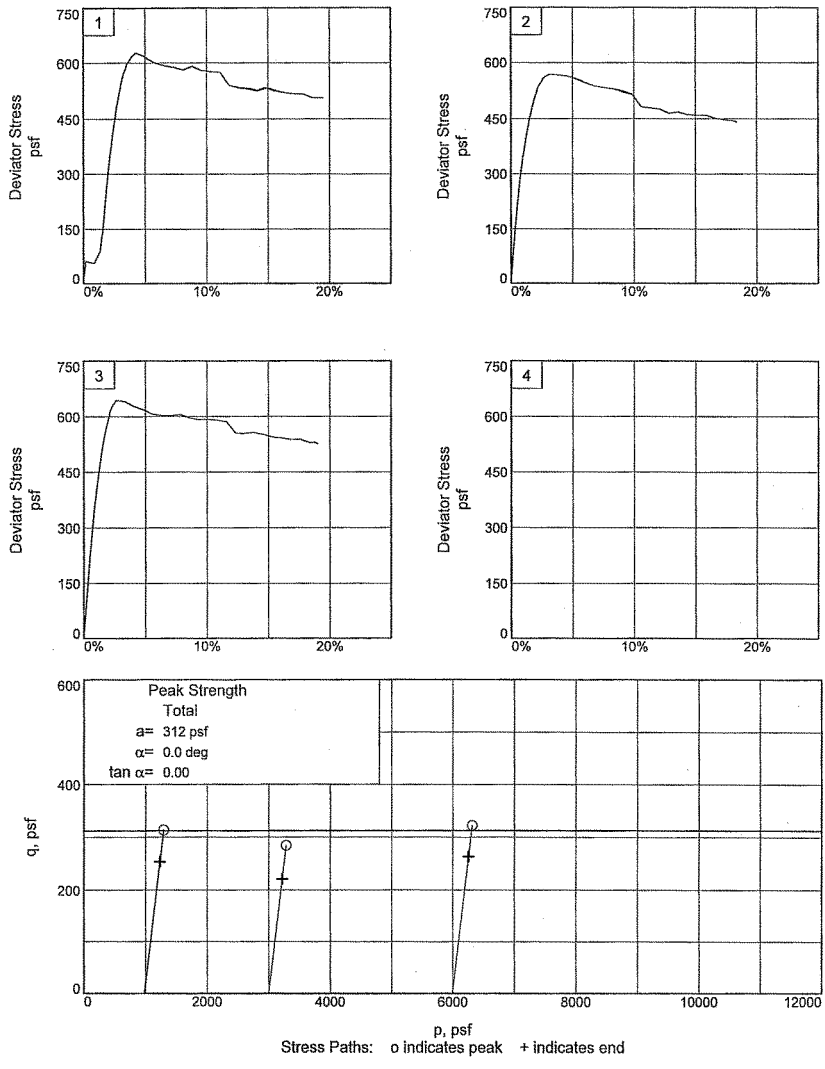
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-20U **Depth:** 24.8
Sample Number: 7B
Proj. No.: 07-022135 **Date Sampled:** 12/11/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

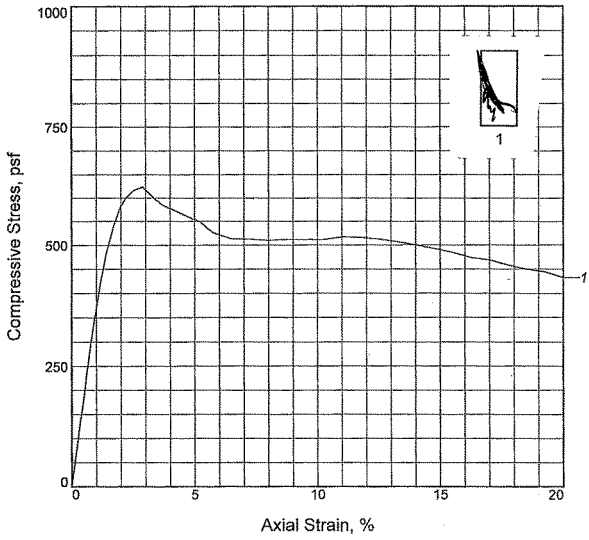
Tested By: VF/ARS **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-20U **Depth:** 24.8 **Sample Number:** 7B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: VF/ARS **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	624			
Undrained shear strength, psf	312			
Failure strain, %	2.9			
Strain rate, %/min.	1.00			
Water content, %	52.0			
Wet density, pcf	108.3			
Dry density, pcf	71.3			
Saturation, %	102.8			
Void ratio	1.3653			
Specimen diameter, in.	1.394			
Specimen height, in.	3.104			
Height/diameter ratio	2.23			

Description: SO GR CH2 W/ LNS & LYS SM

LL = 55	**PL** = 17	**PI** = 38	**Assumed GS=** 2.70	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/11/09
Remarks:

Figure _____

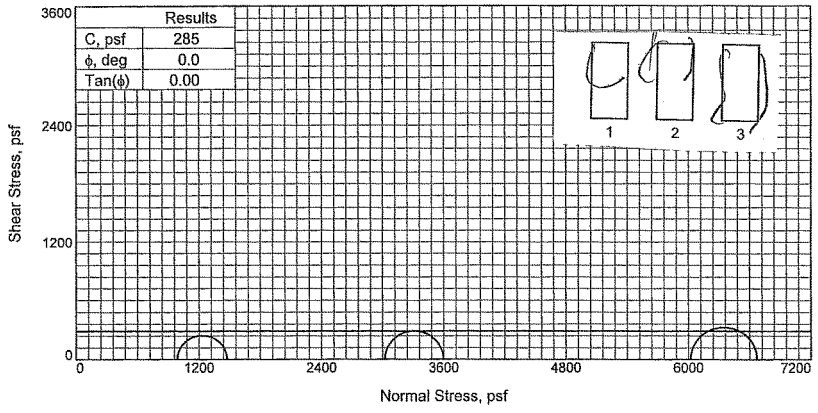
Client: U.S. Army Corps of Engineers

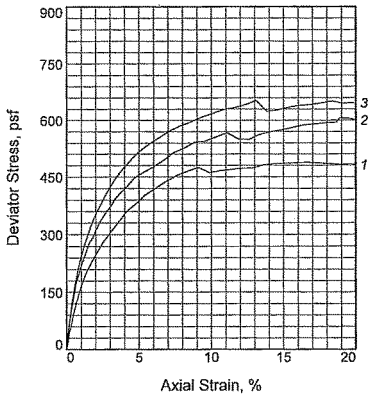
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-20U **Depth:** 28.8
Sample Number: 8B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: VF/ARS **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	48.0	46.3	45.8
	Dry Density, pcf	75.2	76.6	77.4
	Saturation, %	104.2	104.2	105.1
	Void Ratio	1.2427	1.1992	1.1773
	Diameter, in.	1.391	1.390	1.393
	Height, in.	3.095	3.101	3.096
At Test	Water Content, %	48.0	46.3	45.8
	Dry Density, pcf	75.2	76.6	77.4
	Saturation, %	104.2	104.2	105.1
	Void Ratio	1.2427	1.1992	1.1773
	Diameter, in.	1.391	1.390	1.393
	Height, in.	3.095	3.101	3.096
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.87	20.99	41.81
Fail. Stress, psf		485	574	652
Strain, %		15.1	14.9	13.1
Ult. Stress, psf		485	574	623
Strain, %				
σ_1 Failure, psf		1475	3597	6673
σ_3 Failure, psf		990	3022	6021

Type of Test: Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CH2 W/ LNS & LYS ML

LL= 55 **PL=** 18 **PI=** 37
Assumed Specific Gravity= 2.70
Remarks:

Figure _____

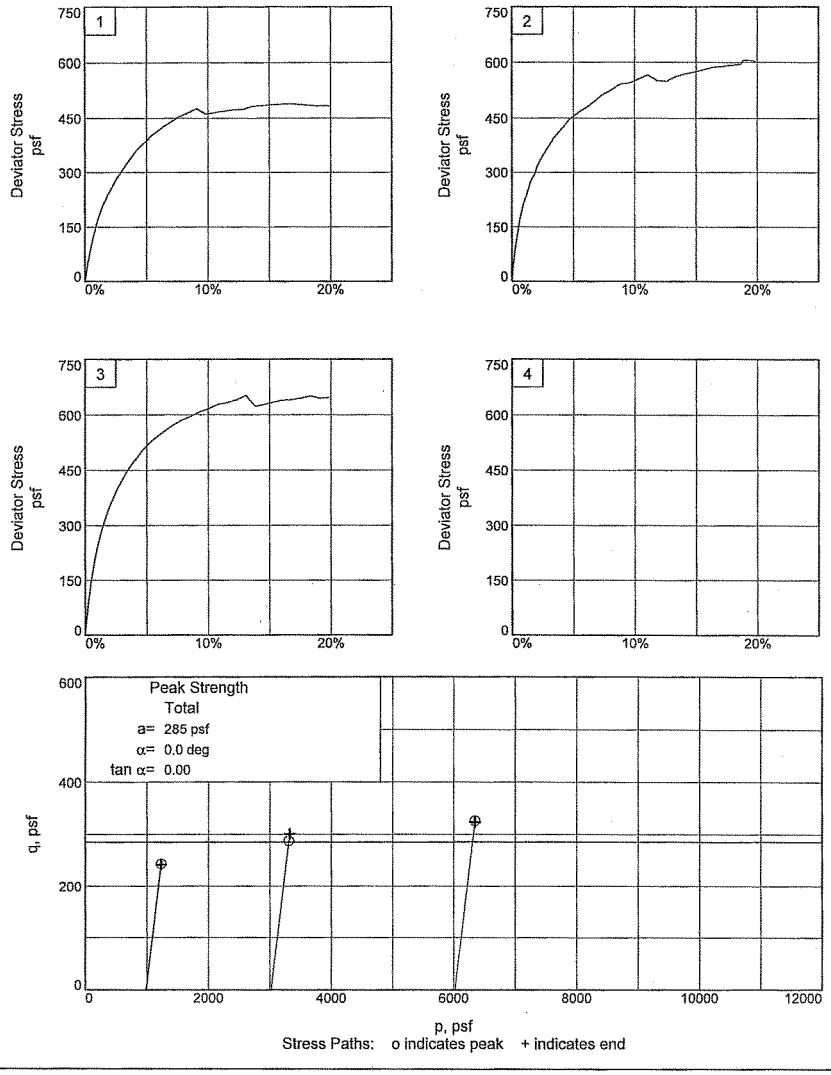
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-20U **Depth:** 42.2
Sample Number: 11D
Proj. No.: 07-022135 **Date Sampled:** 12/11/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

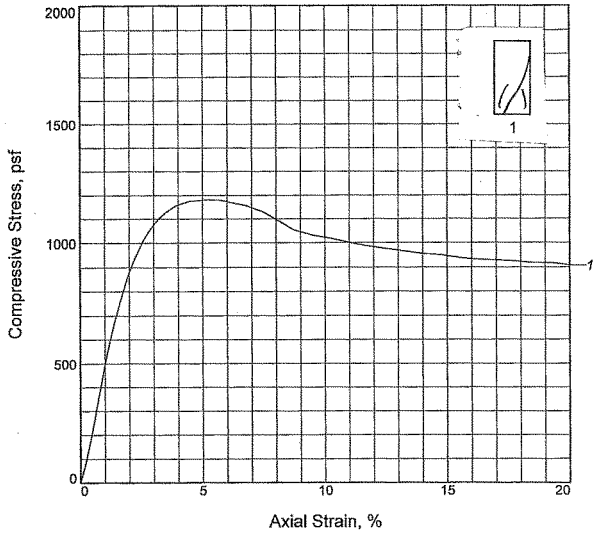
Tested By: VF/ARS **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-20U **Depth:** 42.2 **Sample Number:** 11D
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: VF/ARS **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1				
Unconfined strength, psf	1182				
Undrained shear strength, psf	591				
Failure strain, %	5.2				
Strain rate, %/min.	1.00				
Water content, %	48.2				
Wet density, pcf	109.2				
Dry density, pcf	73.7				
Saturation, %	99.8				
Void ratio	1.3220				
Specimen diameter, in.	1.404				
Specimen height, in.	3.107				
Height/diameter ratio	2.21				

Description: M GR CH3 W/ LNS & LYS ML

LL = 61	**PL** = 19	**PI** = 42	**Assumed GS**= 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/11/09
Remarks:

Figure _____

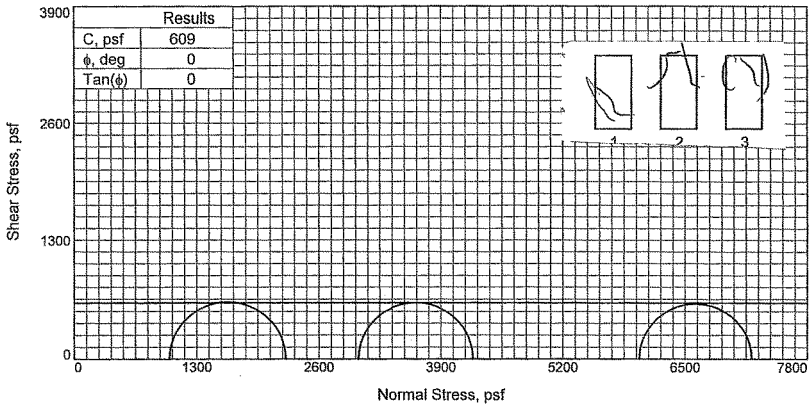
Client: U.S. Army Corps of Engineers

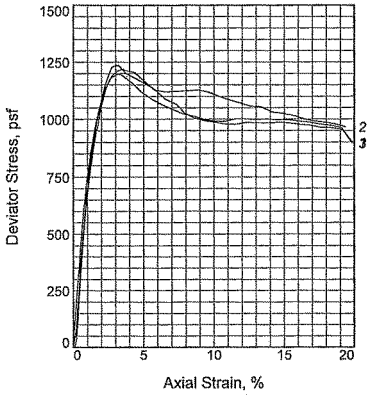
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-20U **Depth:** 45.3
Sample Number: 12C

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: VF/TSL **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	56.6	56.3	57.5
	Dry Density, pcf	67.9	68.3	67.4
	Saturation, %	102.0	102.6	102.5
	Void Ratio	1.5193	1.5027	1.5376
	Diameter, in.	1.406	1.404	1.403
	Height, in.	3.107	3.097	3.100
At Test	Water Content, %	56.6	56.3	57.5
	Dry Density, pcf	67.9	68.3	67.4
	Saturation, %	102.0	102.7	102.5
	Void Ratio	1.5193	1.5027	1.5376
	Diameter, in.	1.406	1.404	1.403
	Height, in.	3.107	3.097	3.100
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		7.02	20.98	41.76
Fail. Stress, psf		1236	1220	1197
Strain, %		3.1	3.5	3.2
Ult. Stress, psf		978	1119	1123
Strain, %				
σ_1 Failure, psf		2246	4242	7210
σ_3 Failure, psf		1011	3022	6013

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: M GR CH4 W/ LNS & LYS ML

LL= 78 **PL=** 24 **PI=** 54
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

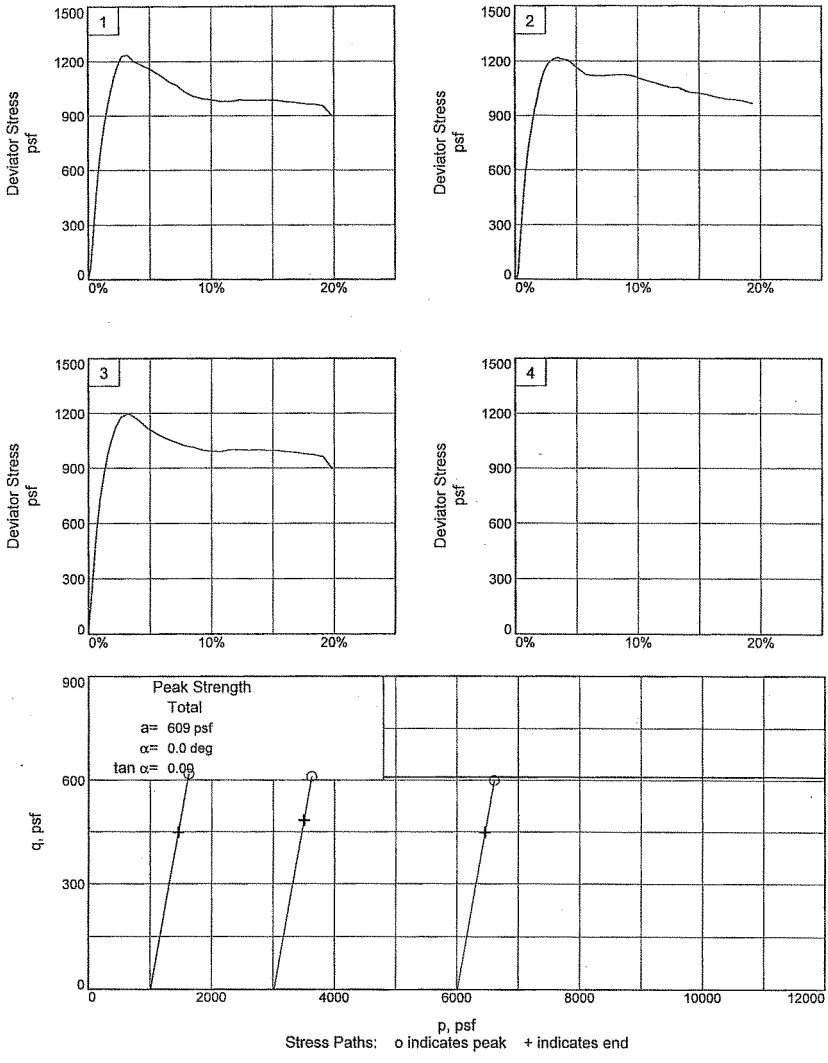
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-20U **Depth:** 49.7
Sample Number: 13C
Proj. No.: 07-022135 **Date Sampled:** 12/11/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

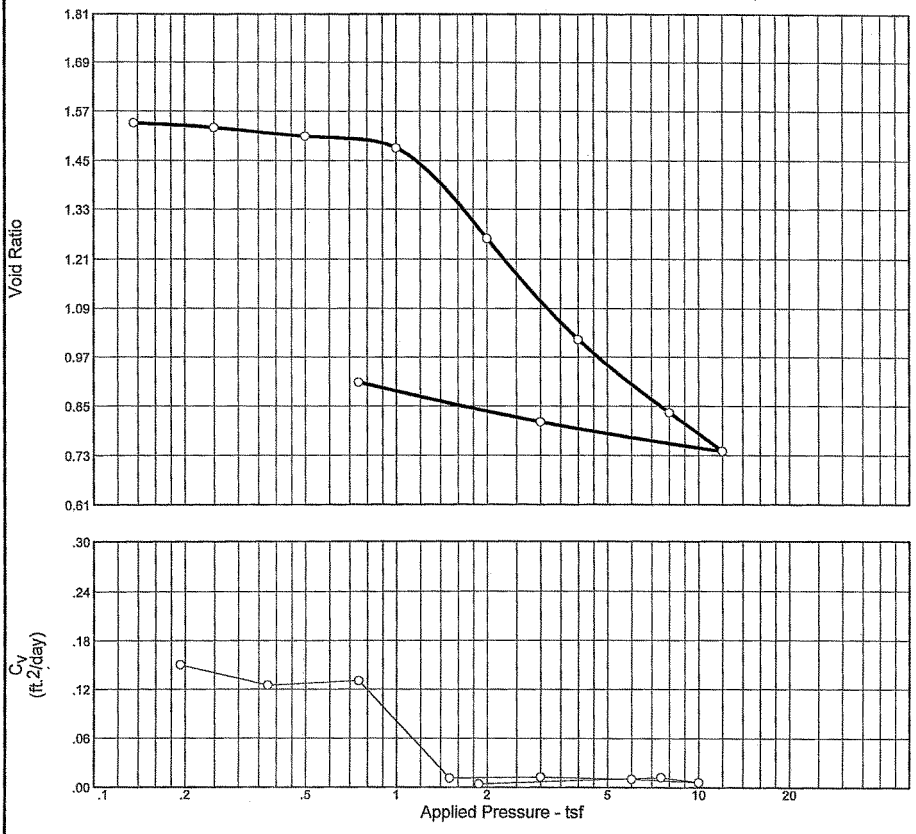
Tested By: VF/ARS **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-20U **Depth:** 49.7 **Sample Number:** 13C
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: VF/ARS **Checked By:** MS

CONSOLIDATION TEST REPORT



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

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

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

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

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

FFEBJV, LLC

St Rose, LA

Remarks:

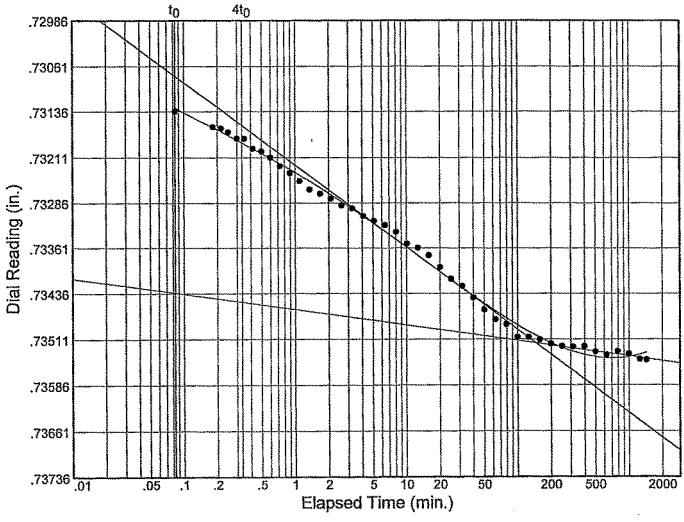
Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

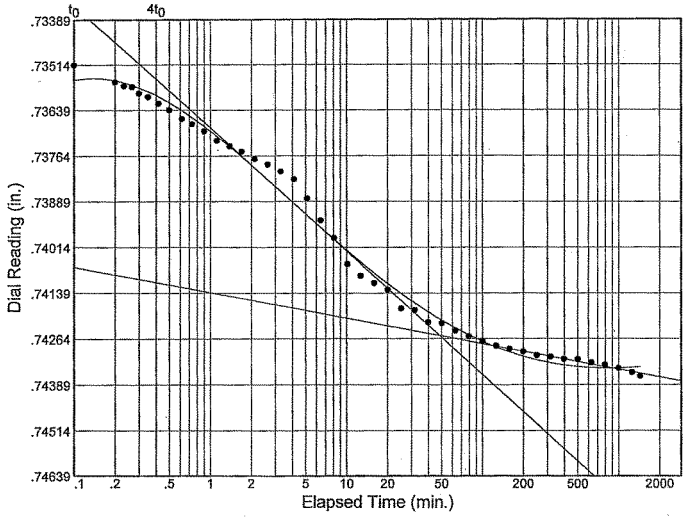
Source: MRGO-20U Sample No.: 14B Elev./Depth: 52.8



Load No.= 2
Load= 0.25 tsf
D_0 = 0.73074
D_{50} = 0.73295
D_{100} = 0.73517
T_{50} = 3.24 min.

C_v @ T_{50}
0.15 ft.2/day

C_α = 0.000



Load No.= 3
Load= 0.50 tsf
D_0 = 0.73515
D_{50} = 0.73885
D_{100} = 0.74256
T_{50} = 3.85 min.

C_v @ T_{50}
0.12 ft.2/day

C_α = 0.001

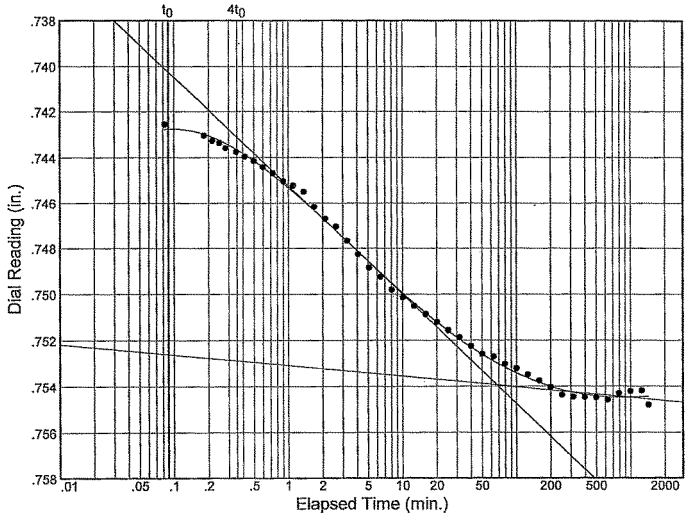
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

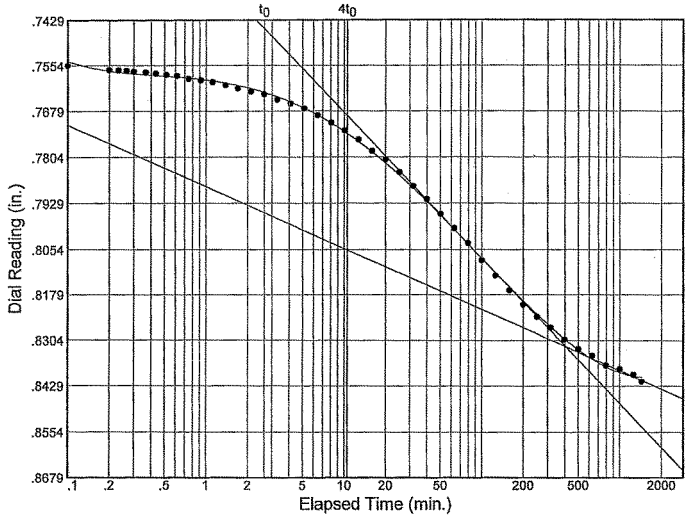
Source: MRGO-20U Sample No.: 14B Elev./Depth: 52.8



Load No.= 4
Load= 1.00 tsf
D_0 = 0.74186
D_{50} = 0.74790
D_{100} = 0.75394
T_{50} = 3.62 min.

C_v @ T_{50}
0.13 ft.2/day

C_α = 0.000



Load No.= 5
Load= 2.00 tsf
D_0 = 0.75144
D_{50} = 0.79176
D_{100} = 0.83208
T_{50} = 38.24 min.

C_v @ T_{50}
0.01 ft.2/day

C_α = 0.017

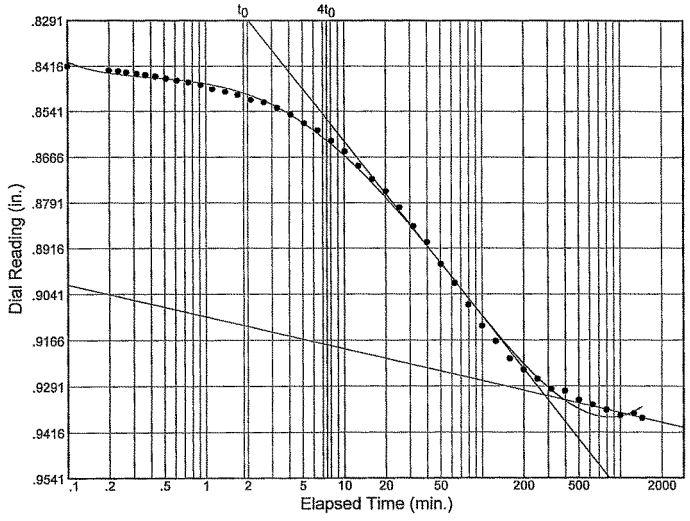
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

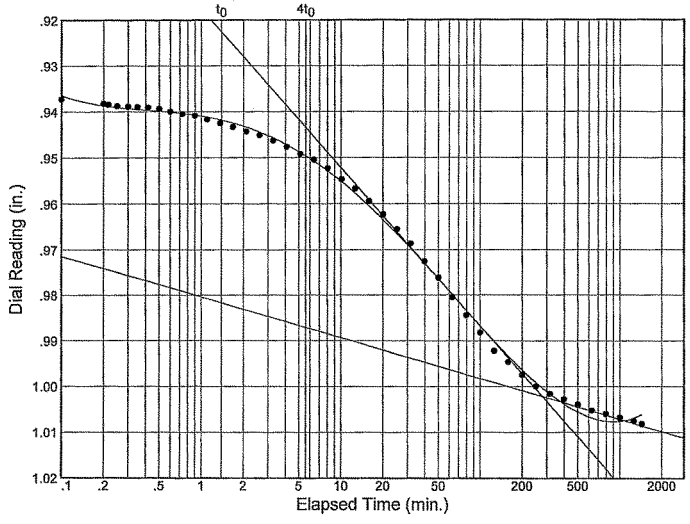
Source: MRGO-20U Sample No.: 14B Elev./Depth: 52.8



Load No.= 6
Load= 4.00 tsf
D_0 = 0.83607
D_{50} = 0.88379
D_{100} = 0.93152
T_{50} = 27.75 min.

C_v @ T_{50}
0.01 ft.2/day

C_α = 0.010



Load No.= 7
Load= 8.00 tsf
D_0 = 0.93408
D_{50} = 0.96814
D_{100} = 1.00220
T_{50} = 28.27 min.

C_v @ T_{50}
0.01 ft.2/day

C_α = 0.011

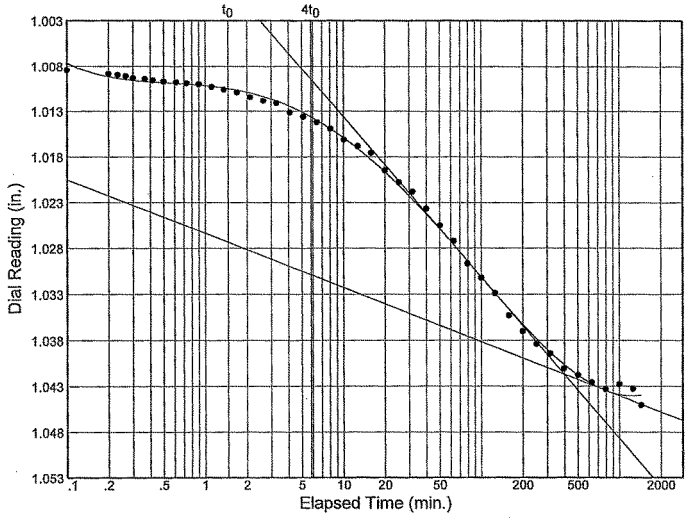
Figure

FFEBJV, LLC

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

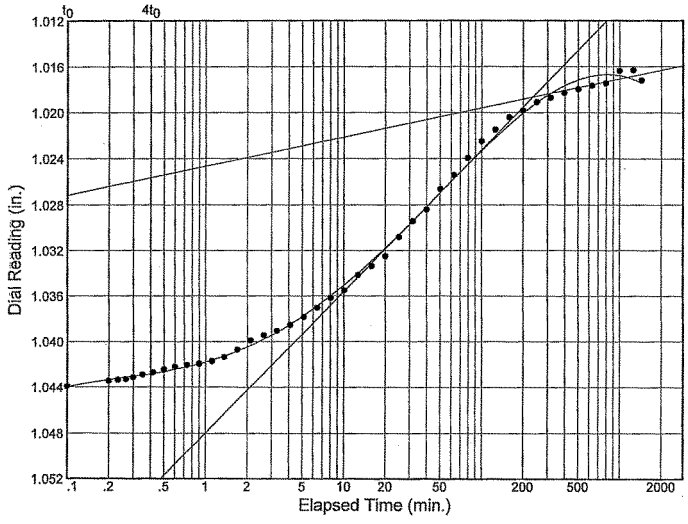
Source: MRGO-20U Sample No.: 14B Elev./Depth: 52.8



Load No.= 8
Load= 12.00 tsf
D_0 = 1.00734
D_{50} = 1.02451
D_{100} = 1.04167
T_{50} = 41.21 min.

C_v @ T_{50}
0.01 ft.2/day

C_α = 0.008



Load No.= 9
Load= 3.00 tsf
D_0 = 1.04520
D_{50} = 1.03193
D_{100} = 1.01866
T_{50} = 19.59 min.

C_v @ T_{50}
0.01 ft.2/day

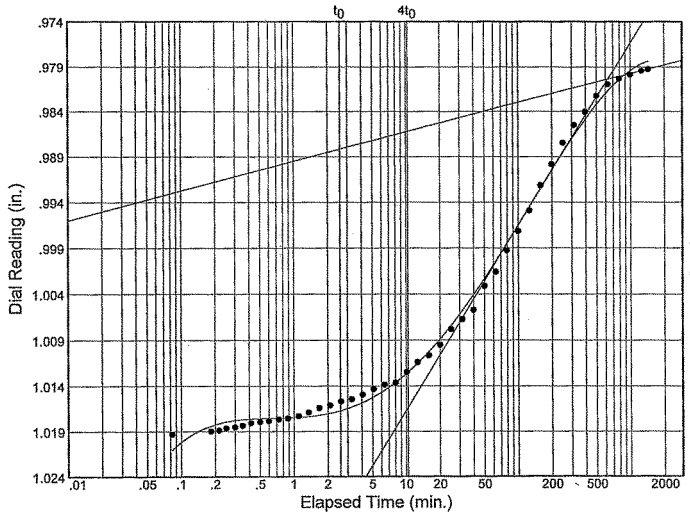
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

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



Load No.= 10
Load= 0.75 tsf
D_0 = 1.02095
D_{50} = 1.00068
D_{100} = 0.98040
T_{50} = 61.58 min.

C_v @ T_{50}
0.00 ft.^{2}/day

CONSOLIDATION TEST DATA

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Contract No. W912P8-07-D-0022
Task Order 135
Project Number: 07-022135

Sample Data

Source: MRGO-20U
Sample No.: 14B
Elev. or Depth: 52.8 **Sample Length(in./cm.):**
Location:
Description: M GR CH4 W/ LNS & LYS ML
Liquid Limit: 72 **Plasticity Index:** 49
USCS: CH4 **AASHTO:** **Figure No.:**
Testing Remarks: Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST		AFTER TEST	
Wet w+t =	153.92 g.	Consolidometer # =	17	Wet w+t =	400.87 g.
Dry w+t =	100.00 g.			Dry w+t =	318.44 g.
Tare Wt. =	.00 g.	Spec. Gravity =	2.77	Tare Wt. =	110.67 g.
Height =	1.00 in.	Height =	1.00 in.		
Diameter =	4.00 in.	Diameter =	4.00 in.		
Weight =	343.44 g.	Defl. Table =	n/a		
Moisture =	53.9 %	Ht. Solids =	0.3918 in.	Moisture =	39.7 %
Wet Den. =	104.2 pcf	Dry Wt. =	223.08 g.*	Dry Wt. =	207.77 g.
Dry Den. =	67.7 pcf	Void Ratio =	1.555	Void Ratio =	0.908
		Saturation =	96.0 %		

* Initial dry weight used in calculations

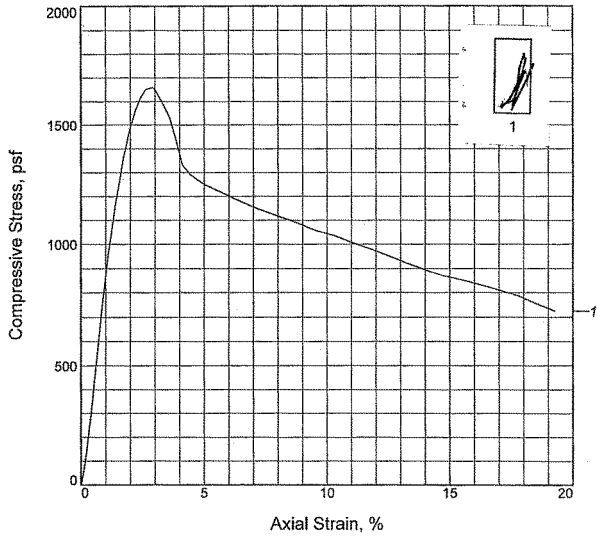
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.72568				1.555	
0.14	0.73097	0.00000			1.542	0.5 Comprs.
0.25	0.73545	0.00000	0.15	0.000	1.530	1.0 Comprs.
0.50	0.74367	0.00000	0.12	0.001	1.509	1.8 Comprs.
1.00	0.75481	0.00000	0.13	0.000	1.481	2.9 Comprs.
2.00	0.84168	0.00000	0.01	0.017	1.259	11.6 Comprs.
4.00	0.93779	0.00000	0.01	0.010	1.014	21.2 Comprs.
8.00	1.00817	0.00000	0.01	0.011	0.834	28.2 Comprs.
12.00	1.04507	0.00000	0.01	0.008	0.740	31.9 Comprs.

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
3.00	1.01722	0.00000	0.01		0.811	29.1 Comprs.
0.75	0.97924	0.00000	0.00		0.908	25.3 Comprs.

C_c = 0.85 P_c = 1.11 tsf C_r = 0.14

UNCONFINED COMPRESSION TEST



Sample No.	1				
Unconfined strength, psf	1660				
Undrained shear strength, psf	830				
Failure strain, %	2.9				
Strain rate, %/min.	1.00				
Water content, %	56.0				
Wet density, pcf	105.3				
Dry density, pcf	67.5				
Saturation, %	100.0				
Void ratio	1.5337				
Specimen diameter, in.	1.407				
Specimen height, in.	3.108				
Height/diameter ratio	2.21				

Description: M GR CH4 W/ LNS & LYS ML

LL = 77	**PL** = 21	**PI** = 56	**Assumed GS=** 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/11/09
Remarks:

Figure _____

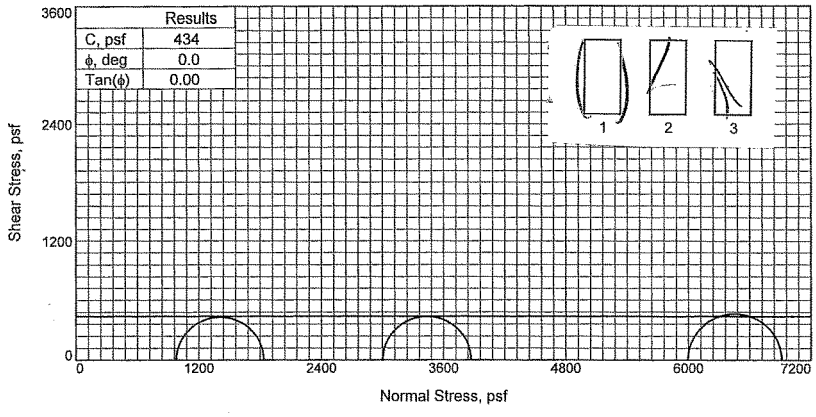
Client: U.S. Army Corps of Engineers

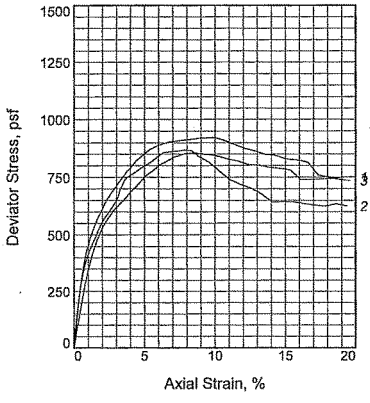
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-20U **Depth:** 53.7
Sample Number: 14C

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: VF/ARS **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	64.9	65.7	65.8
	Dry Density, pcf	62.3	62.2	61.6
	Saturation, %	101.9	102.9	101.4
	Void Ratio	1.7449	1.7491	1.7780
	Diameter, in.	1.406	1.408	1.407
	Height, in.	3.096	3.093	3.100
At Test	Water Content, %	64.9	65.7	65.8
	Dry Density, pcf	62.3	62.2	61.6
	Saturation, %	101.9	102.9	101.4
	Void Ratio	1.7449	1.7491	1.7780
	Diameter, in.	1.406	1.408	1.407
	Height, in.	3.096	3.093	3.100
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.81	20.85	41.63
Fail. Stress, psf		855	867	920
Strain, %		8.6	7.8	9.1
Ult. Stress, psf		781	642	828
Strain, %				
σ_1 Failure, psf		1835	3869	6915
σ_3 Failure, psf		980	3002	5995

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CH4 W/ LNS & LYS ML

LL= 93 **PL=** 25 **PI=** 68
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

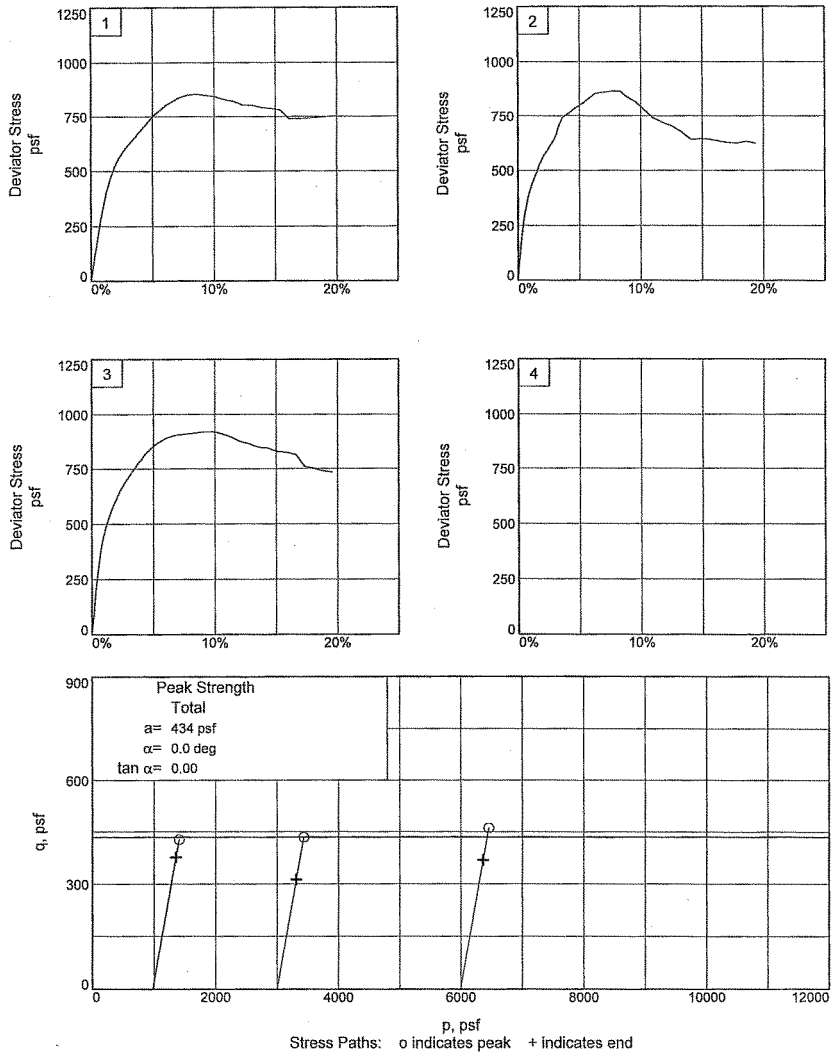
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-20U **Depth:** 56.8
Sample Number: 15B
Proj. No.: 07-022135 **Date Sampled:** 12/11/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

Tested By: VF/ARS **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-20U **Depth:** 56.8 **Sample Number:** 15B
Project No.: 07-022135 **Figure** _____ FFEBJV, LLC

Tested By: VF/ARS **Checked By:** MS

SUMMARY OF LABORATORY TEST RESULTS

Project: MRGO Ecosystem Restoration Feasibility Study Assigned By: _____

Project Number: 07-022135 Current Date: 2/4/2010
Boring: MRGO-21U

Sample Number	Depth	Visual Classification	USCS	F(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
1A	0.0	VSO DGR CHOA W/ WD, RT, SIF	CHOA		121												
1B	0.8	VSO DGR CHOA W/ WD, RT, SIF	CHOA		124												
2A	4.0	VSO DGR CH4 W/ RT, WD, SIF, O	CH4		63												
2B	4.8	SO DGR CH4 W/ SIF, O	CH4		76												
2C	5.7	GR ML W/ O, WD, RT	ML		35												
3A	8.0	GR ML	ML		25												
3B	8.8	GR ML W/ SIF	ML		26												
3C	9.7	GR ML W/ ARS CH	ML		25												
3D	10.6	GR ML	ML		24												
4A	12.0	GR ML W/ RT	ML		31												
4B	12.8	GR ML W/ RT	ML		32												
4C	13.7	GR ML	ML		28												
5A	16.0	SO GR CL6 W/ SIF, ARS SM	CL6		46												
5B	16.8	SO GR CL6 W/ SIF, ARS SM	CL6		49				UU				44	20	24		NON TESTABLE
5C	17.7	SO GR CH2 W/ ARS SM, SIF	CH2		46	75	110	99					52	18	34		CON, GS
5D	18.6	SO GR CH3 W/ ARS SM, SIF	CH3		48												
6A	20.0	SO GR CH3 W/ ARS & LNS SM, SIF	CH3		46												
6B	20.8	SO GR CH3 W/ ARS & LNS ML	CH3		54	70	108	100	UU	0	324		56	19	37	0.19	
6C	21.7	SO GR CH4 W/ ARS & LNS SM, SIF	CH4		59	64	59	97					71	21	50		CON, GS SV
6D	22.6	GR ML W/ LYS CH	ML		34												
7A	24.0	SO GR CH3 W/ LNS & LYS ML	CH3		50												
7B	24.8	SO GR CH4 W/ LNS & LYS ML	CH4	2	77	55	98	100	UC	-	379	759	90	25	65	0.20	
7C	25.7	SO GR CH4 W/ LNS & LYS ML	CH4		57												
7D	26.6	SO GR CH4 W/ LNS & LYS ML	CH4		66												
8A	28.0	SO GR CH4 W/ ARS & LNS SM	CH4		65												
8B	28.8	SO GR CH3 W/ ARS & LNS SM, SIF	CH3		60	66	105	100	UU	0	354		65	23	42	0.19	
8C	29.7	SO GR CH3 W/ ARS & LYS SM, SIF	CH3		42												
8D	30.6	SO GR CH3 W/ ARS & LYS SM, SIF	CH3		53												
9A	32.0	SO GR CH4 W/ LNS ML	CH4		69												
9B	32.8	SO GR CH4 W/ LNS ML	CH4	4	54	69	107	100	UC	-	493	987	99	24	75	0.21	
9C	33.7	SO GR CH3 W/ LNS ML	CH3		51												
10A	36.0	SO GR CL6 W/ LNS & LYS ML	CL6		48												
10B	36.8	SO GR CL6 W/ LNS & LYS ML	CL6		48	75	111	100	UU	0	439		48	19	29	0.24	
10C	37.7	SO GR CL6 W/ LNS & LYS ML	CL6		46												
10D	38.6	SO GR CL6 W/ LNS & LYS ML	CL6		47												
11A	40.0	SO GR CH3 W/ LNS & LYS ML	CH3		57												

Remarks: _____
FFEB JV, LLC

Checked By: MS/WH
File Name: MRGO-21U.xls

SUMMARY OF LABORATORY TEST RESULTS

Project: MRGO Ecosystem Restoration Feasibility Study Assigned By: _____

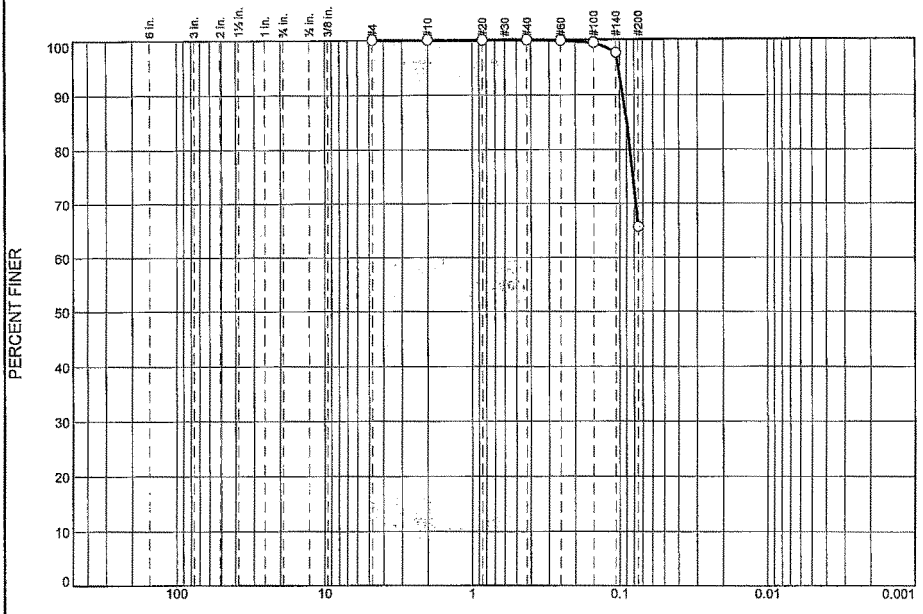
Project Number: 07-022135 Current Date: 2/4/2010
Boring: MRGO-21U

Sample Number	Depth	Visual Classification	USCS	E(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
11B	40.8	SO GR CH3 W/ LNS & LYS ML	CH3		55												
11C	41.7	M GR CH3 W/ LNS & LYS ML	CH3	3	54	70	108	100	UC	-	512	1024	67	24	43	0.25	
11D	42.6	M GR CH3 W/ LNS & LYS ML	CH3		50												
12A	44.0	M GR CH3	CH3		57												
12B	44.8	M GR CH4 W/ LNS & LYS ML	CH4		64	62	102	100	UU	0	655		76	22	54	0.30	
12C	45.7	M GR CH3 W/ LNS & LYS ML	CH3		58												
12D	46.6	M GR CH3 W/ LNS & LYS ML	CH3		58												
13A	48.0	M GR CH3 W/ LNS & LYS ML	CH3		54												
13B	48.8	M GR CH4 W/ LNS & LYS ML	CH4	3	59	65	104	100	UC	-	690	1381	82	26	56	0.29	
13C	49.7	M GR CH3 W/ LNS & LYS ML	CH3		58												
13D	50.6	M GR CH3 W/ LNS & LYS ML	CH3		57												
14A	52.0	M GR CH4 W/ LNS ML	CH4		64												
14B	52.8	M GR CH4 W/ LNS ML	CH4		60	65	105	100	UU	0	657		81	27	54	0.31	
14C	53.7	M GR CH4	CH4		57												
14D	54.6	M GR CH4	CH4		59												
15A	56.0	M GR CH4	CH4		53												
15B	56.8	M GR CH4	CH4	4	51	71	107	98	UC	-	784	1568	78	23	55	0.36	
15C	57.7	M GR CH4	CH4		52												
15D	58.6	M GR CH4 W/ LNS & LYS ML, WD	CH4		50												

Remarks: _____
FFEB JV, LLC

Checked By: WS/WH
File Name: MRGO-21U.xls

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
o	0.0	0.0	0.0	0.0	0.0	34.3	65.7	

	Colloids	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o				0.0895							

Material Description	USCS	AASHTO
o GR ML W/ LYS CH	ML	

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

Project: USACE - MRGO Ecosystem Restoration Feasibility Study

o **Source of Sample:** MRGO-21U **Depth:** 22.6 **Sample Number:** 6D

Date: o 11/9/09

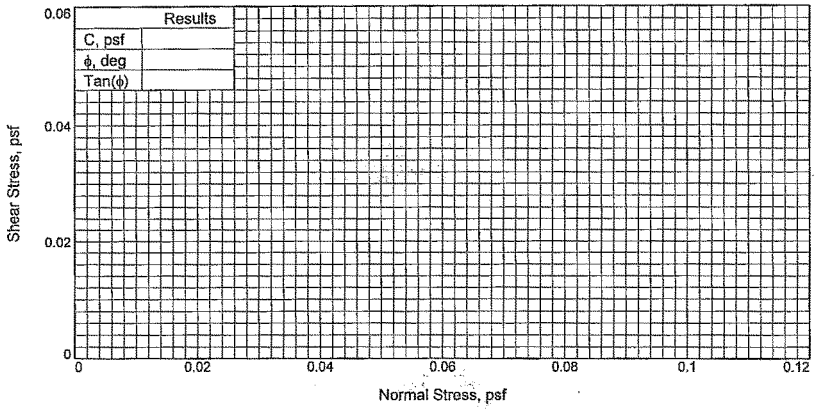
FFEBJV, LLC

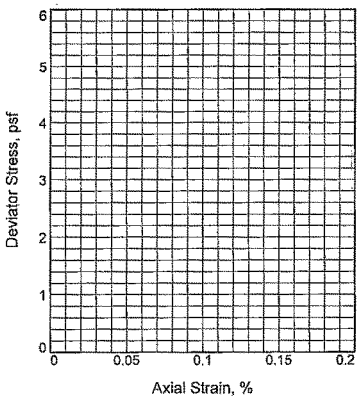
St Rose, LA

Remarks:

Figure

Tested By: JH **Checked By:** MS





Sample No.	
Initial	Water Content, % Dry Density, pcf Saturation, % Void Ratio Diameter, in. Height, in.
At Test	Water Content, % Dry Density, pcf Saturation, % Void Ratio Diameter, in. Height, in.
Strain rate, %/min.	
Back Pressure, psi	
Cell Pressure, psi	
Fail. Stress, psf	
Strain, %	
Ult. Stress, psf	
Strain, %	
σ_1 Failure, psf	
σ_3 Failure, psf	

Type of Test: Unconsolidated Undrained
Sample Type:
Description: SO GR CL6 W/ SIF, ARS SM

LL= 44 **PL=** 20 **PI=** 24
Assumed Specific Gravity=
Remarks: NOT TESTABLE DUE TO SHELLS

Figure _____

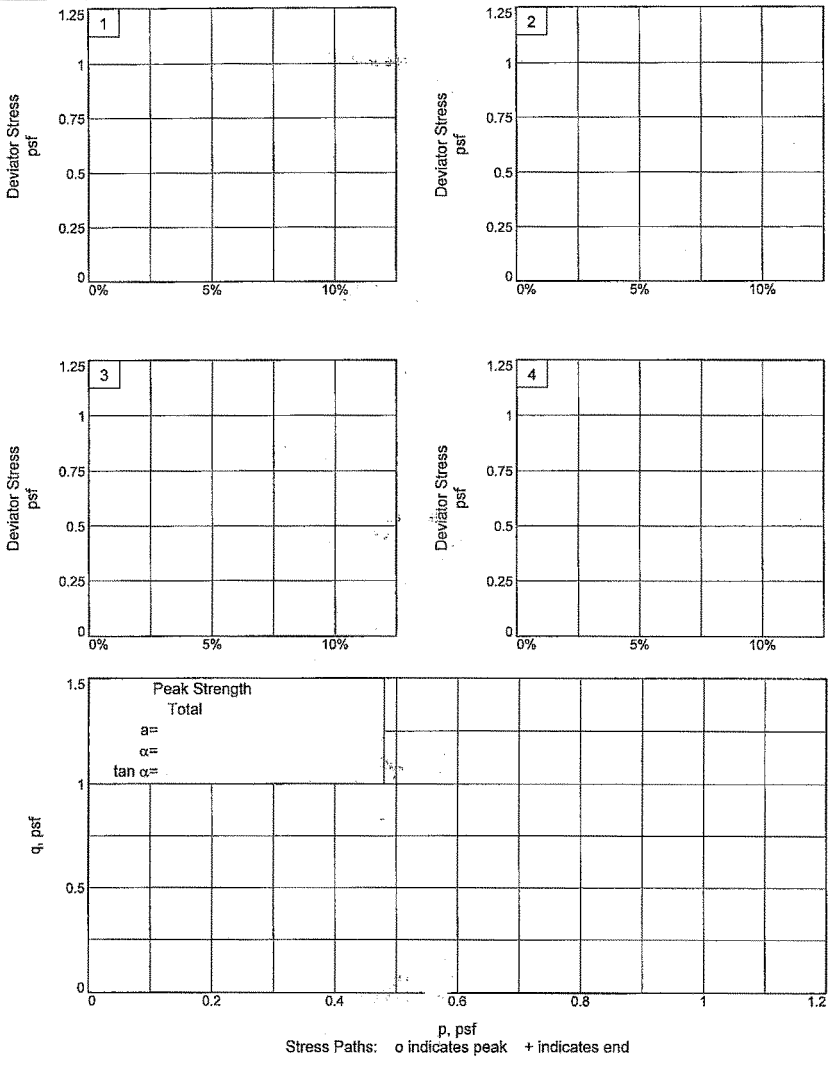
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-21U **Depth:** 16.8
Sample Number: 5B
Proj. No.: 07-022135 **Date Sampled:**

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

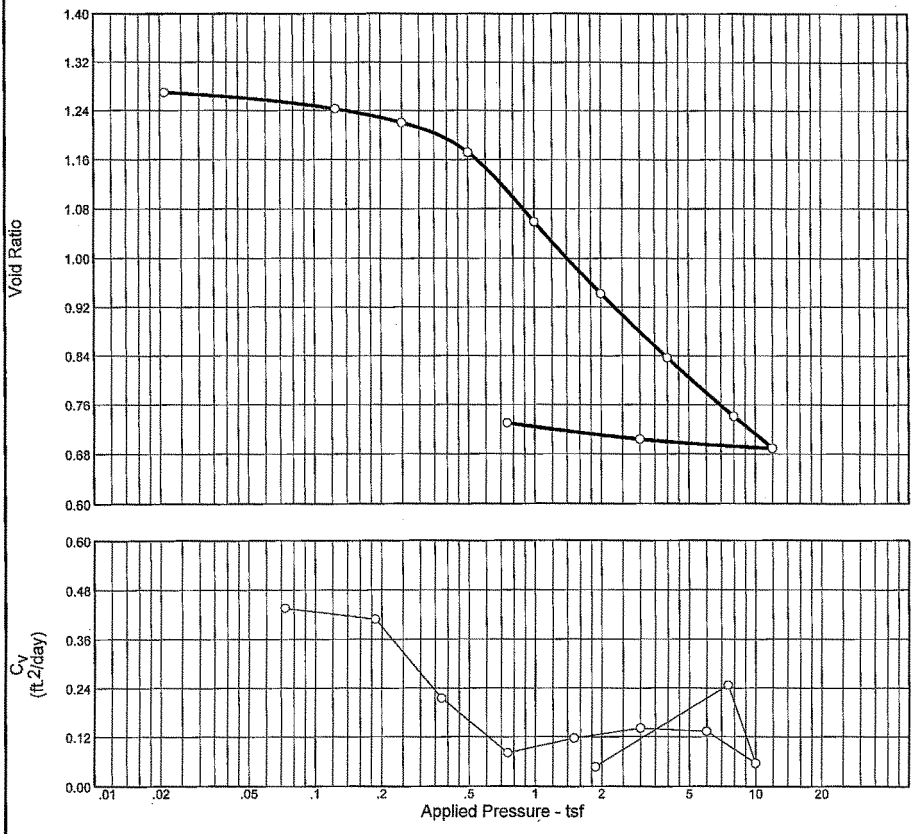
Checked By: MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-21U **Depth:** 16.8 **Sample Number:** 5B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Checked By: MS

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
99.3 %	46.1 %	75.3	52	34	2.74	0.54	0.40	1.270

MATERIAL DESCRIPTION	USCS	AASHTO
SO GR CH2 W/ ARS SM, SIF	CH2	

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

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

Source: MRGO-21U **Sample No.:** 5C **Elev./Depth:** 17.7

FFEBJV, LLC

St Rose, LA

Remarks:

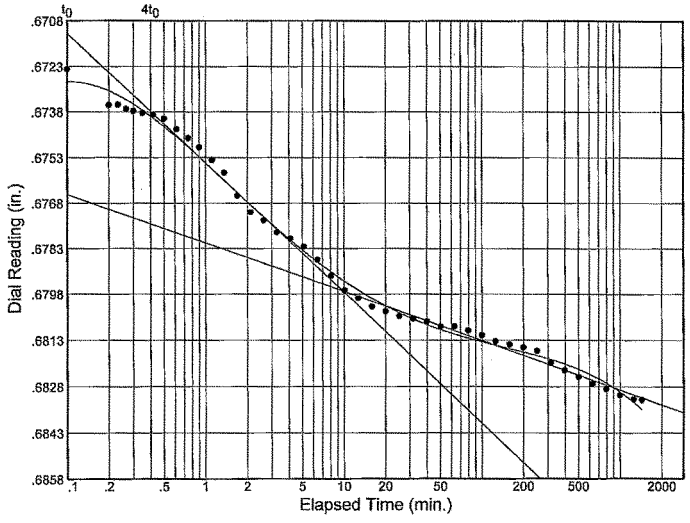
Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

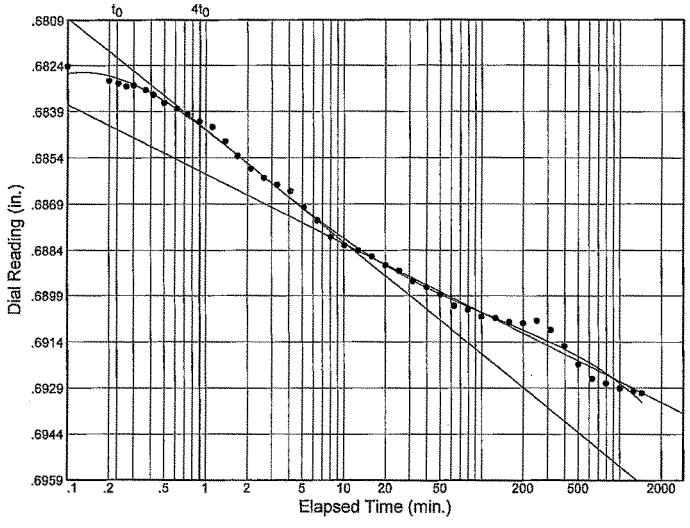
Source: MRGO-21U Sample No.: 5C Elev./Depth: 17.7



Load No.= 2
Load= 0.13 tsf
D_0 = 0.67169
D_{50} = 0.67569
D_{100} = 0.67970
T_{50} = 1.12 min.

C_v @ T_{50}
0.44 ft.2/day

C_α = 0.002



Load No.= 3
Load= 0.25 tsf
D_0 = 0.68125
D_{50} = 0.68475
D_{100} = 0.68826
T_{50} = 1.17 min.

C_v @ T_{50}
0.41 ft.2/day

C_α = 0.002

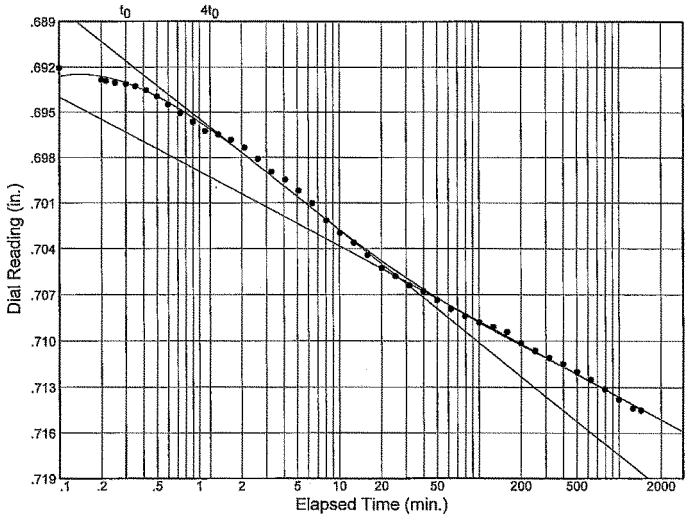
Figure

FFEBJV, LLC

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

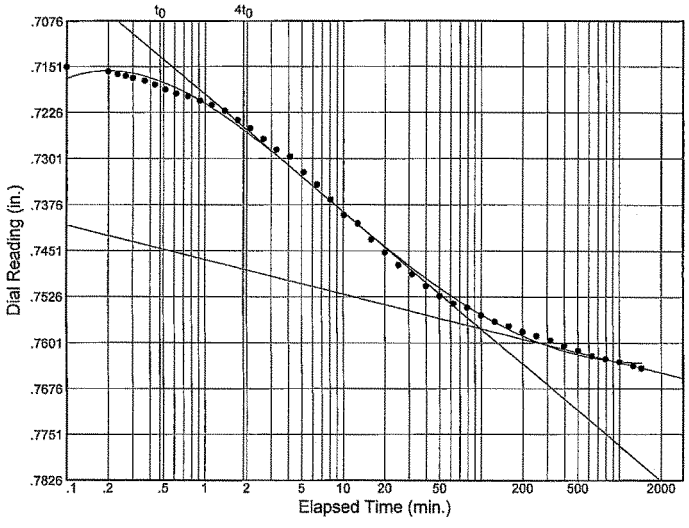
Source: MRGO-21U Sample No.: 5C Elev./Depth: 17.7



Load No.= 4
Load= 0.50 tsf
D_0 = 0.68992
D_{50} = 0.69793
D_{100} = 0.70594
T_{50} = 2.16 min.

C_v @ T_{50}
0.21 ft.2/day

C_α = 0.005



Load No.= 5
Load= 1.00 tsf
D_0 = 0.70956
D_{50} = 0.73365
D_{100} = 0.75773
T_{50} = 5.38 min.

C_v @ T_{50}
0.08 ft.2/day

C_α = 0.006

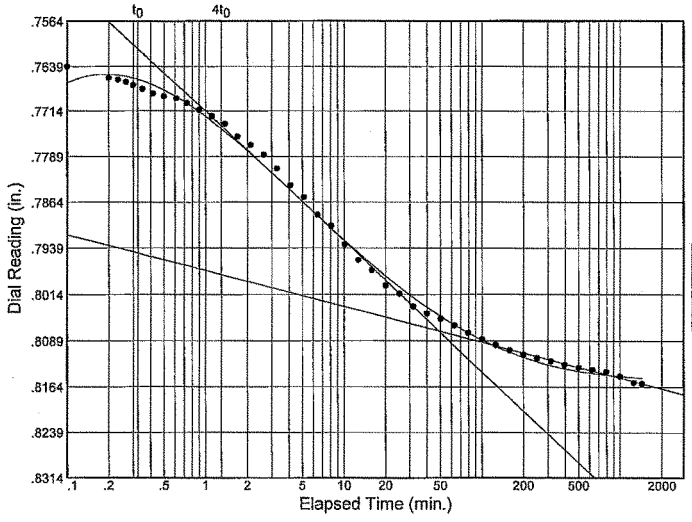
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

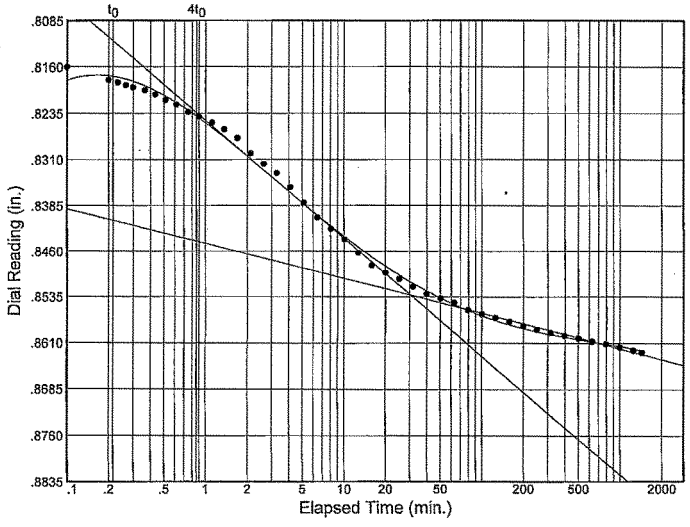
Source: MRGO-21U Sample No.: 5C Elev./Depth: 17.7



Load No.= 6
Load= 2.00 tsf
D_0 = 0.75780
D_{50} = 0.78254
D_{100} = 0.80729
T_{50} = 3.32 min.

C_v @ T_{50}
0.12 ft.2/day

C_α = 0.006



Load No.= 7
Load= 4.00 tsf
D_0 = 0.81106
D_{50} = 0.83215
D_{100} = 0.85324
T_{50} = 2.45 min.

C_v @ T_{50}
0.14 ft.2/day

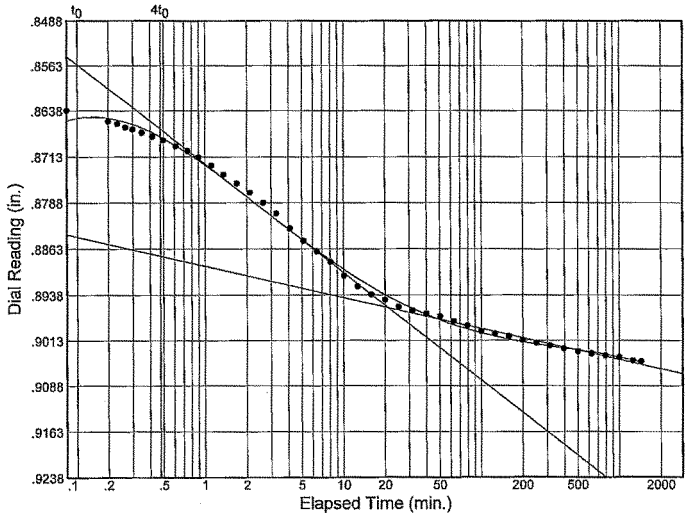
C_α = 0.007

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

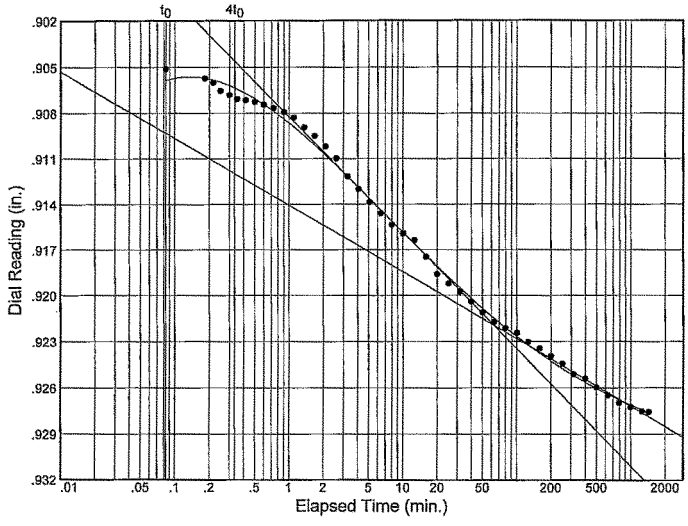
Source: MRGO-21U Sample No.: 5C Elev./Depth: 17.7



Load No.= 8
Load= 8.00 tsf
D_0 = 0.86203
D_{50} = 0.87896
D_{100} = 0.89590
T_{50} = 2.33 min.

C_v @ T_{50}
0.13 ft.2/day

C_α = 0.006



Load No.= 9
Load= 12.00 tsf
D_0 = 0.90540
D_{50} = 0.91368
D_{100} = 0.92195
T_{50} = 5.16 min.

C_v @ T_{50}
0.06 ft.2/day

C_α = 0.006

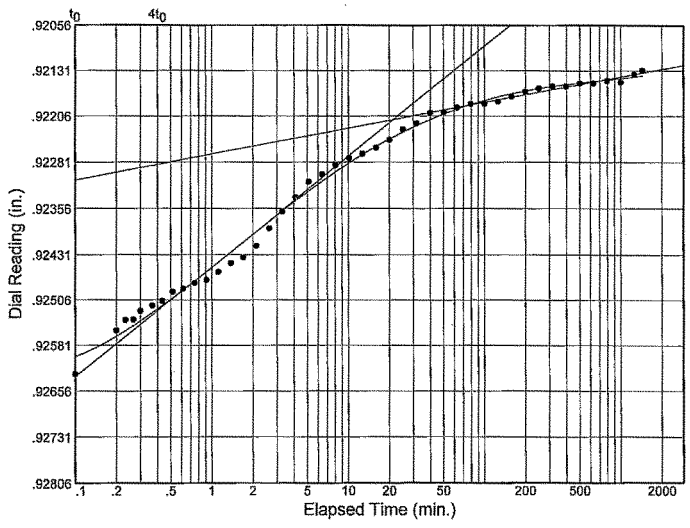
FFEBJV, LLC

Figure

Dial Reading vs. Time

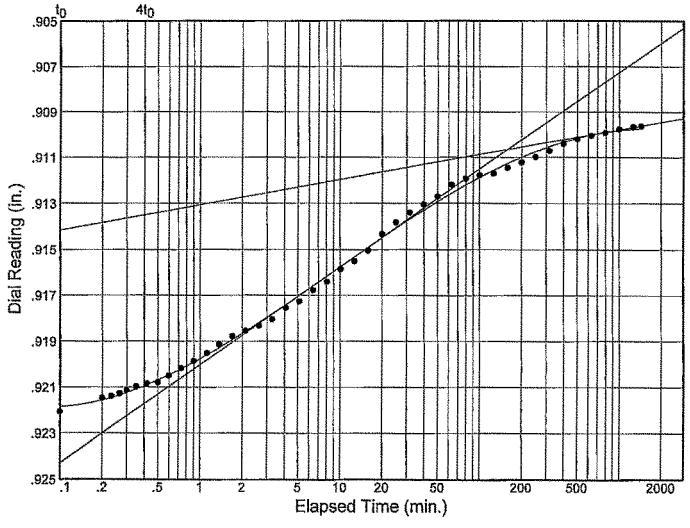
Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-21U Sample No.: 5C Elev./Depth: 17.7



Load No.= 10
Load= 3.00 tsf
D_0 = 0.92678
D_{50} = 0.92445
D_{100} = 0.92212
T_{50} = 1.10 min.

C_v @ T_{50}
0.25 ft.2/day



Load No.= 11
Load= 0.75 tsf
D_0 = 0.92276
D_{50} = 0.91670
D_{100} = 0.91065
T_{50} = 6.06 min.

C_v @ T_{50}
0.05 ft.2/day

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Figure

CONSOLIDATION TEST DATA

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Contract No. W912P8-07-D-0022
Task Order 135
Project Number: 07-022135

Sample Data

Source: MRGO-21U
Sample No.: 5C
Elev. or Depth: 17.7 **Sample Length(in./cm.):**
Location:
Description: SO GR CH2 W/ ARS SM, SIF
Liquid Limit: 52 **Plasticity Index:** 34
USCS: CH2 **AASHTO:** **Figure No.:**
Testing Remarks: Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST		AFTER TEST	
Wet w+t =	146.06 g.	Consolidometer # =	18	Wet w+t =	427.52 g.
Dry w+t =	100.00 g.			Dry w+t =	363.42 g.
Tare Wt. =	.00 g.	Spec. Gravity =	2.74	Tare Wt. =	112.87 g.
Height =	1.00 in.	Height =	1.00 in.		
Diameter =	4.00 in.	Diameter =	4.00 in.		
Weight =	363.78 g.	Defl. Table =	n/a		
Moisture =	46.1 %	Ht. Solids =	0.4416 in.	Moisture =	25.6 %
Wet Den. =	110.0 pcf	Dry Wt. =	248.56 g.*	Dry Wt. =	250.55 g.
Dry Den. =	75.3 pcf	Void Ratio =	1.270	Void Ratio =	0.730
		Saturation =	99.3 %		

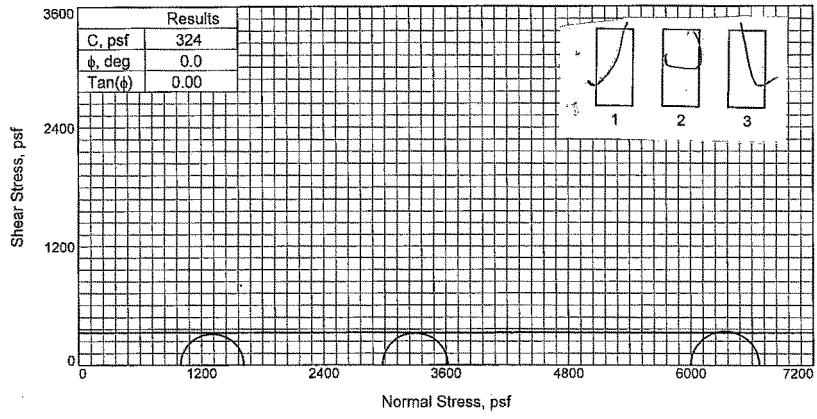
* Initial dry weight used in calculations

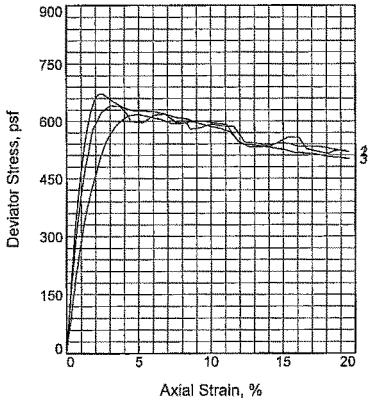
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.67102				1.270	
0.02	0.67121	0.00000			1.270	0.0 Comprs.
0.13	0.68323	0.00000	0.44	0.002	1.243	1.2 Comprs.
0.25	0.69307	0.00000	0.41	0.002	1.220	2.2 Comprs.
0.50	0.71454	0.00000	0.21	0.005	1.172	4.3 Comprs.
1.00	0.76434	0.00000	0.08	0.006	1.059	9.3 Comprs.
2.00	0.81590	0.00000	0.12	0.006	0.942	14.5 Comprs.
4.00	0.86251	0.00000	0.14	0.007	0.837	19.1 Comprs.
8.00	0.90479	0.00000	0.13	0.006	0.741	23.3 Comprs.

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
12.00	0.92761	0.00000	0.06	0.006	0.689	25.6 Comprs.
3.00	0.92131	0.00000	0.25		0.703	25.0 Comprs.
0.75	0.90963	0.00000	0.05		0.730	23.8 Comprs.

C_c = 0.40 P_c = 0.54 tsf C_r = 0.03





Sample No.		1	2	3
Initial	Water Content, %	57.9	48.7	56.6
	Dry Density, pcf	67.4	74.3	68.4
	Saturation, %	103.0	102.3	103.2
	Void Ratio	1.5391	1.3033	1.5024
	Diameter, in.	1.402	1.403	1.398
	Height, in.	3.094	3.096	3.102
At Test	Water Content, %	57.9	48.7	56.6
	Dry Density, pcf	67.4	74.3	68.4
	Saturation, %	103.0	102.3	103.2
	Void Ratio	1.5391	1.3033	1.5024
	Diameter, in.	1.402	1.403	1.398
	Height, in.	3.094	3.096	3.102
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.92	20.67	41.65
Fail. Stress, psf		618	641	673
Strain, %		5.0	3.0	2.3
Ult. Stress, psf		531	536	540
Strain, %				
σ_1 Failure, psf		1614	3617	6671
σ_3 Failure, psf		996	2977	5998

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CH3 W/ ARS & LNS ML

LL= 56 **PL=** 19 **PI=** 37
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

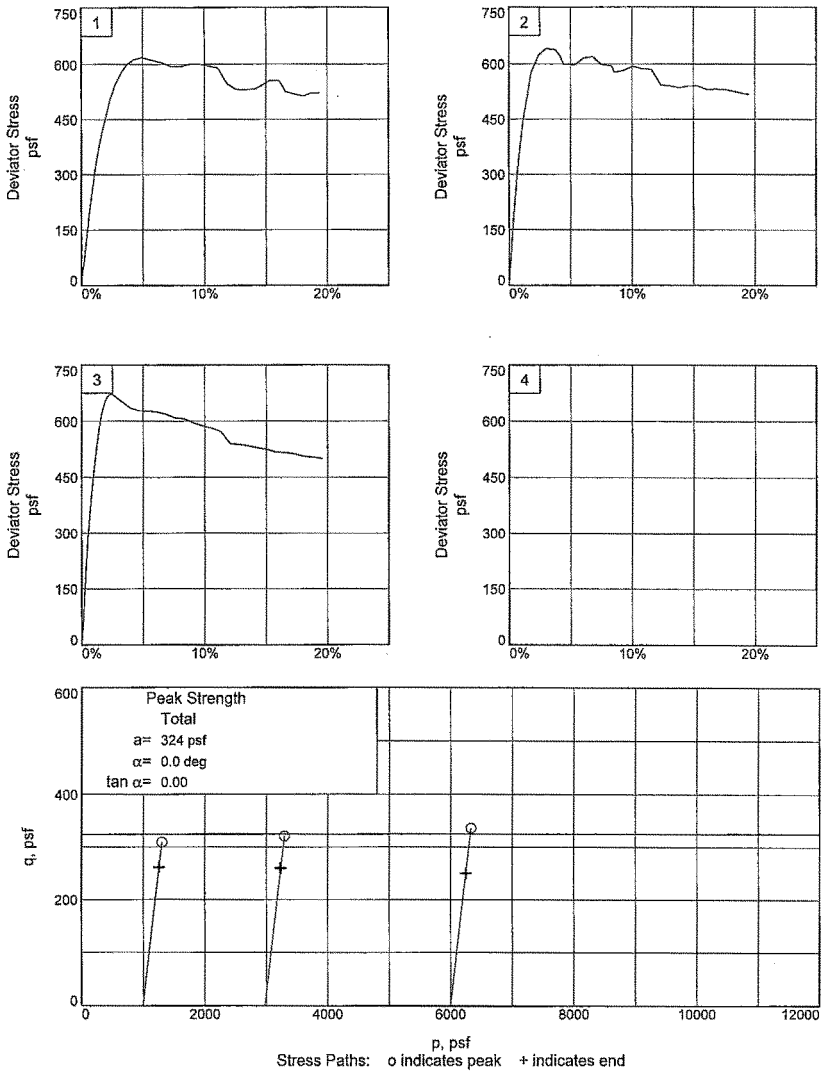
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-21U **Depth:** 20.8
Sample Number: 6B
Proj. No.: 07-022135 **Date Sampled:** 12/10/09

TRIAXIAL SHEAR TEST REPORT

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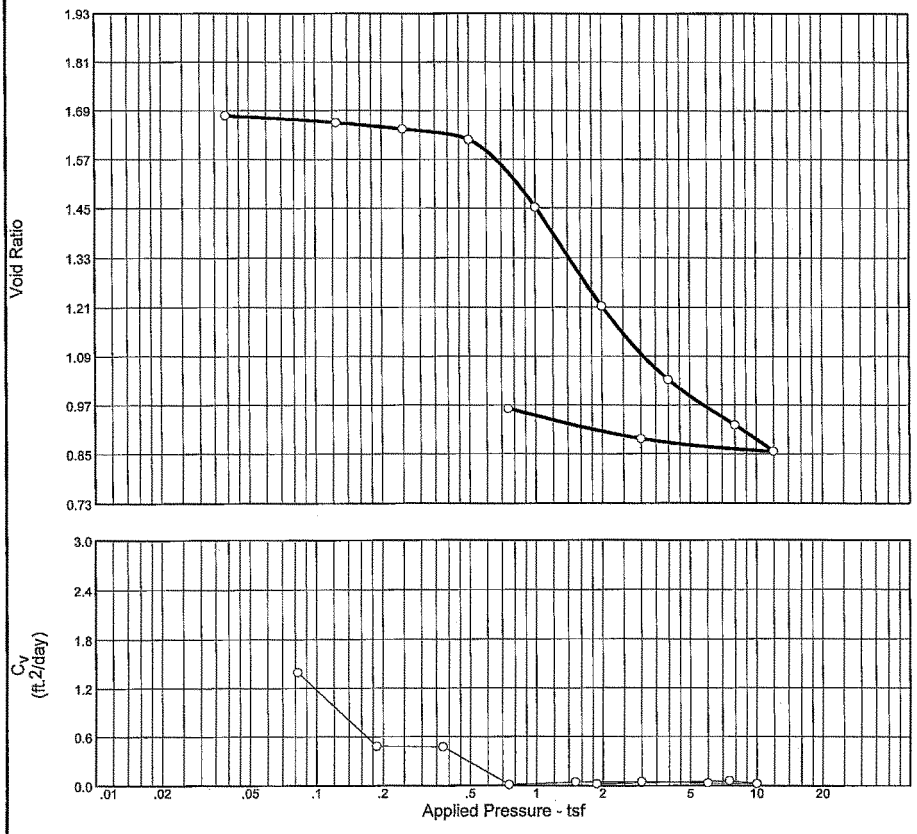
Tested By: VF **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-21U **Depth:** 20.8 **Sample Number:** 6B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: VF **Checked By:** MS

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
96.7 %	59.2 %	63.9	71	50	2.74	0.65	0.80	1.678

MATERIAL DESCRIPTION	USCS	AASHTO
SO GR CH4 W/ ARS & LNS SM, SIF	CH4	

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

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

Source: MRGO-21U **Sample No.:** 6C **Elev./Depth:** 21.7

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St Rose, LA

Remarks:

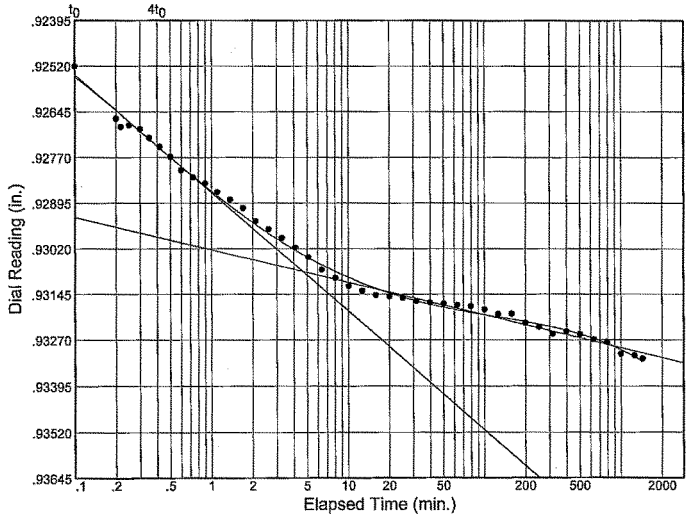
Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

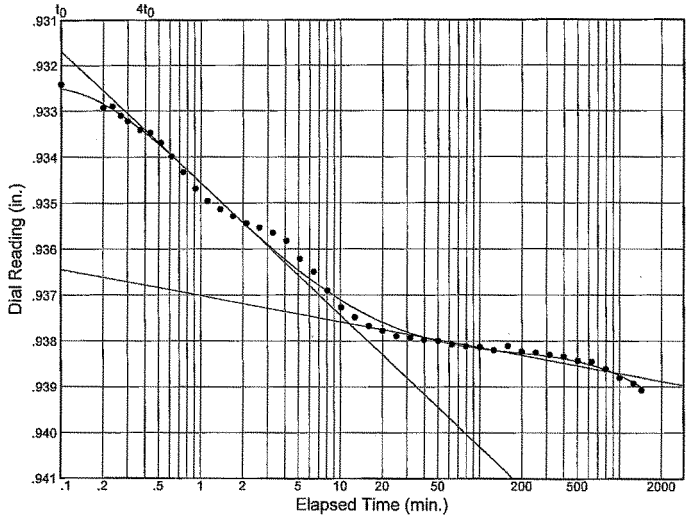
Source: MRGO-21U Sample No.: 6C Elev./Depth: 21.7



Load No.= 2
Load= 0.13 tsf
D_0 = 0.92360
D_{50} = 0.92721
D_{100} = 0.93082
T_{50} = 0.35 min.

C_v @ T_{50}
1.39 ft.2/day

C_α = 0.001



Load No.= 3
Load= 0.25 tsf
D_0 = 0.93155
D_{50} = 0.93458
D_{100} = 0.93761
T_{50} = 1.01 min.

C_v @ T_{50}
0.48 ft.2/day

C_α = 0.001

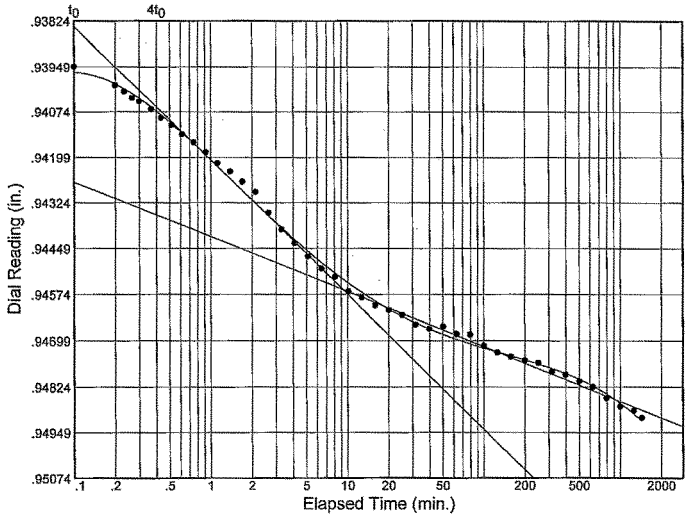
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Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

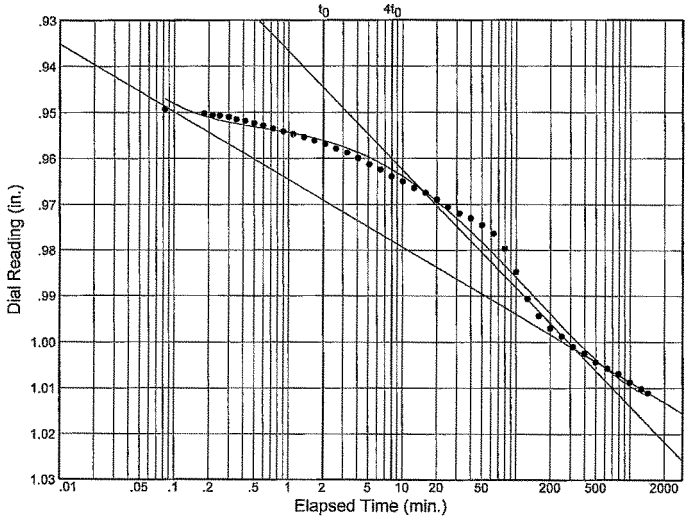
Source: MRGO-21U Sample No.: 6C Elev./Depth: 21.7



Load No.= 4
Load= 0.50 tsf
D_0 = 0.93855
D_{50} = 0.94208
D_{100} = 0.94560
T_{50} = 1.01 min.

C_v @ T_{50}
0.48 ft.^{2}/day

C_α = 0.002



Load No.= 5
Load= 1.00 tsf
D_0 = 0.94976
D_{50} = 0.97575
D_{100} = 1.00174
T_{50} = 39.40 min.

C_v @ T_{50}
0.01 ft.^{2}/day

C_α = 0.015

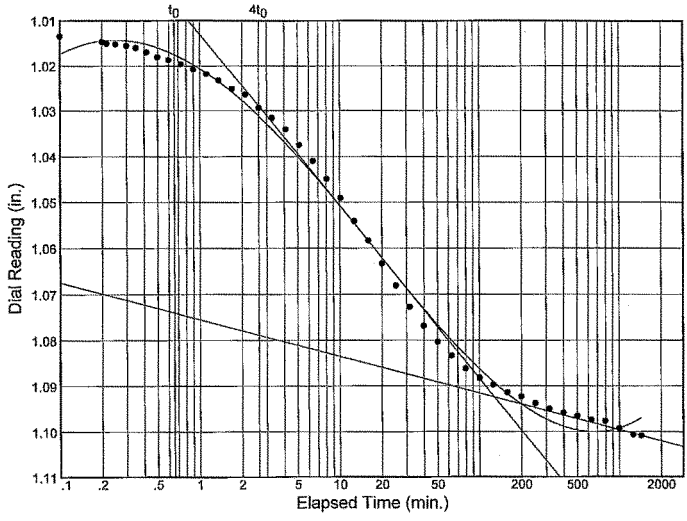
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Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

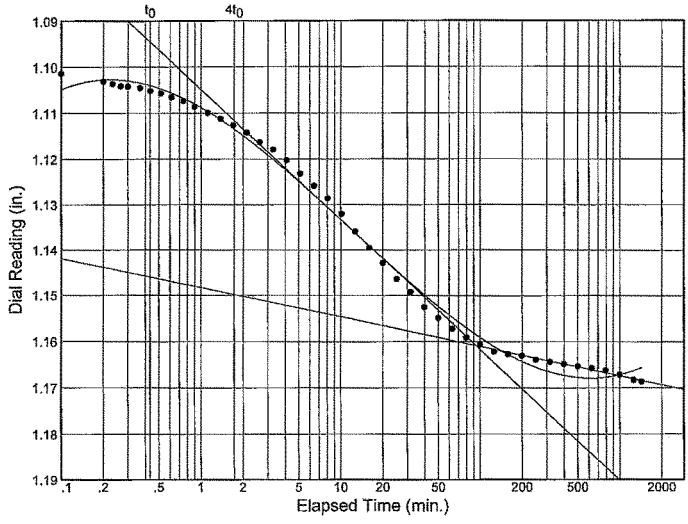
Source: MRGO-21U Sample No.: 6C Elev./Depth: 21.7



Load No.= 6
Load= 2.00 tsf
D_0 = 1.00386
D_{50} = 1.04813
D_{100} = 1.09240
T_{50} = 8.46 min.

C_v @ T_{50}
0.04 ft.^{2}/day

C_α = 0.009



Load No.= 7
Load= 4.00 tsf
D_0 = 1.09447
D_{50} = 1.12764
D_{100} = 1.16082
T_{50} = 6.28 min.

C_v @ T_{50}
0.05 ft.^{2}/day

C_α = 0.008

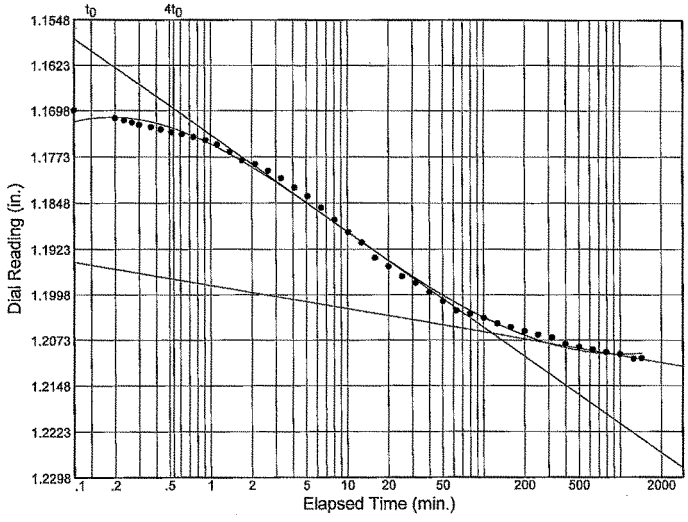
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Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

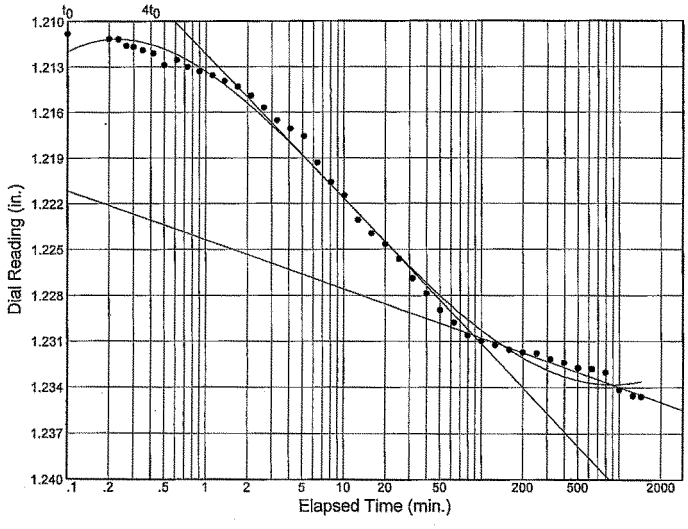
Source: MRGO-21U Sample No.: 6C Elev./Depth: 21.7



Load No.= 8
Load= 8.00 tsf
D_0 = 1.16944
D_{50} = 1.18782
D_{100} = 1.20621
T_{50} = 7.86 min.

C_v @ T_{50}
0.03 ft.^{2}/day

C_α = 0.005



Load No.= 9
Load= 12.00 tsf
D_0 = 1.21249
D_{50} = 1.22154
D_{100} = 1.23059
T_{50} = 9.72 min.

C_v @ T_{50}
0.03 ft.^{2}/day

C_α = 0.004

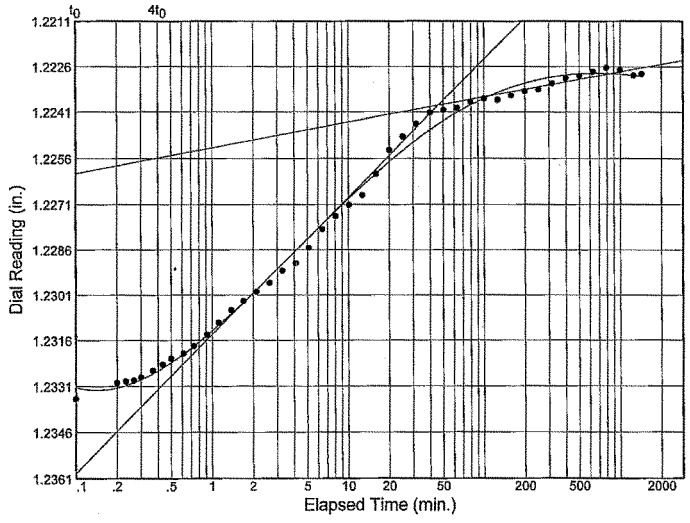
FFEBJV, LLC

Figure

Dial Reading vs. Time

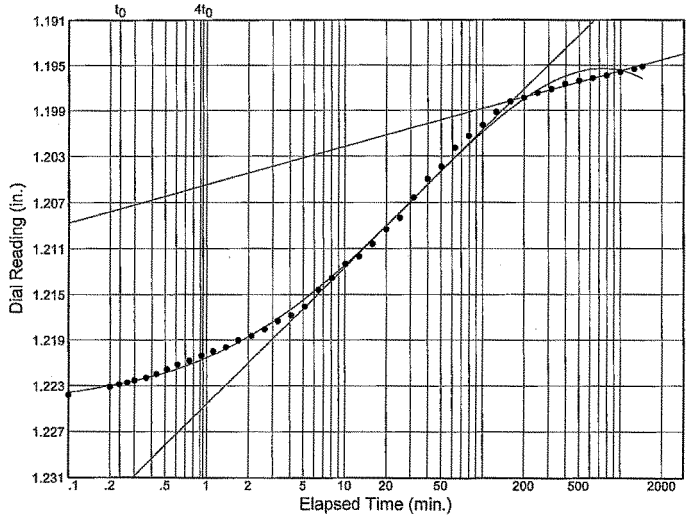
Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-21U Sample No.: 6C Elev./Depth: 21.7



Load No.= 10
Load= 3.00 tsf
D_0 = 1.23367
D_{50} = 1.22877
D_{100} = 1.22388
T_{50} = 3.83 min.

C_v @ T_{50}
0.06 ft.^{2}/day



Load No.= 11
Load= 0.75 tsf
D_0 = 1.22497
D_{50} = 1.21154
D_{100} = 1.19810
T_{50} = 12.16 min.

C_v @ T_{50}
0.02 ft.^{2}/day

FFEBJV, LLC

Figure

CONSOLIDATION TEST DATA

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Contract No. W912P8-07-D-0022
Task Order 135
Project Number: 07-022135

Sample Data

Source: MRGO-21U
Sample No.: 6C
Elev. or Depth: 21.7 Sample Length(in./cm.):
Location:
Description: SO GR CH4 W/ ARS & LNS SM, SIF
Liquid Limit: 71 Plasticity Index: 50
USCS: CH4 AASHTO: Figure No.:
Testing Remarks: Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST		AFTER TEST	
Wet w+t =	159.23 g.	Consolidometer # =	15	Wet w+t =	408.10 g.
Dry w+t =	100.00 g.			Dry w+t =	320.11 g.
Tare Wt. =	.00 g.	Spec. Gravity =	2.74	Tare Wt. =	113.13 g.
Height =	1.00 in.	Height =	1.00 in.		
Diameter =	3.99 in.	Diameter =	3.99 in.		
Weight =	335.61 g.	Defl. Table =	n/a		
Moisture =	59.2 %	Ht. Solids =	0.3746 in.	Moisture =	42.5 %
Wet Den. =	101.7 pcf	Dry Wt. =	210.60 g.*	Dry Wt. =	206.98 g.
Dry Den. =	63.9 pcf	Void Ratio =	1.678	Void Ratio =	0.961
		Saturation =	96.7 %		

* Initial dry weight used in calculations

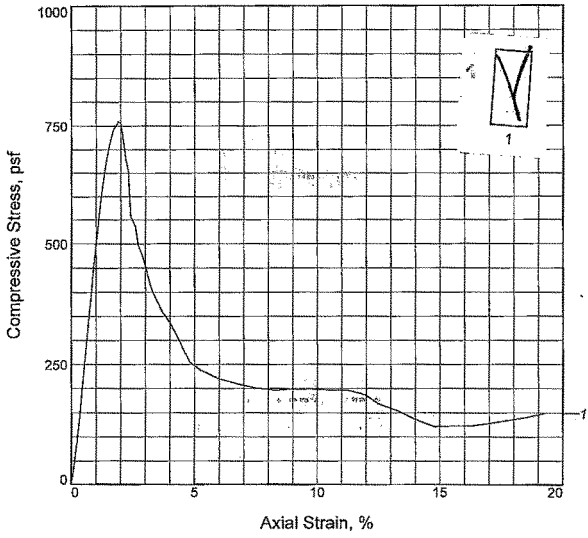
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.92670				1.678	
0.04	0.92686	0.00000			1.677	0.0 Comprs.
0.13	0.93321	0.00000	1.39	0.001	1.660	0.6 Comprs.
0.25	0.93908	0.00000	0.48	0.001	1.645	1.2 Comprs.
0.50	0.94909	0.00000	0.48	0.002	1.618	2.2 Comprs.
1.00	1.01108	0.00000	0.01	0.015	1.453	8.4 Comprs.
2.00	1.10094	0.00000	0.04	0.009	1.213	17.4 Comprs.
4.00	1.16868	0.00000	0.05	0.008	1.032	24.1 Comprs.
8.00	1.21030	0.00000	0.03	0.005	0.921	28.3 Comprs.

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
12.00	1.23461	0.00000	0.03	0.004	0.856	30.7 Comprs.
3.00	1.22284	0.00000	0.06		0.887	29.5 Comprs.
0.75	1.19513	0.00000	0.02		0.961	26.8 Comprs.

C_c = 0.80 P_c = 0.65 tsf C_r = 0.09

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	759			
Undrained shear strength, psf	379			
Failure strain, %	1.9			
Strain rate, %/min.	1.00			
Water content, %	76.6			
Wet density, pcf	97.6			
Dry density, pcf	55.2			
Saturation, %	100.1			
Void ratio	2.0968			
Specimen diameter, in.	1.405			
Specimen height, in.	3.105			
Height/diameter ratio	2.21			

Description: SO GR CH4 W/ LNS & LYS ML

LL = 90	PL = 25	PI = 65	**Assumed GS=** 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/10/09
Remarks:

Client: U.S. Army Corps of Engineers

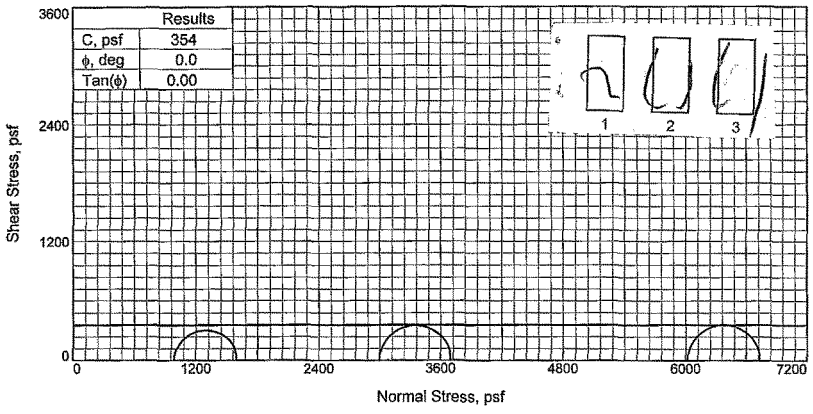
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-21U **Depth:** 24.8
Sample Number: 7B

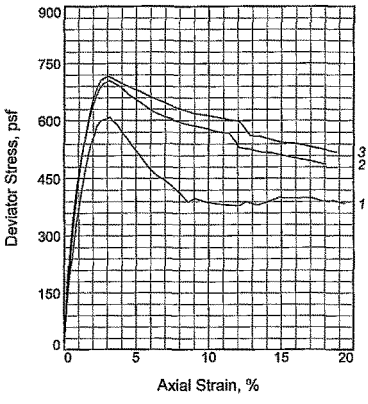
UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Figure _____

Tested By: VF **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	58.9	62.7	58.4
	Dry Density, pcf	66.2	63.9	66.6
	Saturation, %	101.7	102.3	102.1
	Void Ratio	1.5853	1.6779	1.5674
	Diameter, in.	1.401	1.405	1.402
	Height, in.	3.105	3.103	3.093
At Test	Water Content, %	58.9	62.7	58.4
	Dry Density, pcf	66.2	63.9	66.6
	Saturation, %	101.7	102.3	102.1
	Void Ratio	1.5853	1.6779	1.5674
	Diameter, in.	1.401	1.405	1.402
	Height, in.	3.105	3.103	3.093
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.88	20.81	41.79
Fail. Stress, psf		608	704	716
Strain, %		3.2	3.1	3.0
Ult. Stress, psf		380	531	544
Strain, %				
σ_1 Failure, psf		1599	3701	6734
σ_3 Failure, psf		990	2997	6018

Type of Test: Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CH3 W/ ARS & LNS SM, SIF

LL= 65 **PL=** 23 **PI=** 42
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

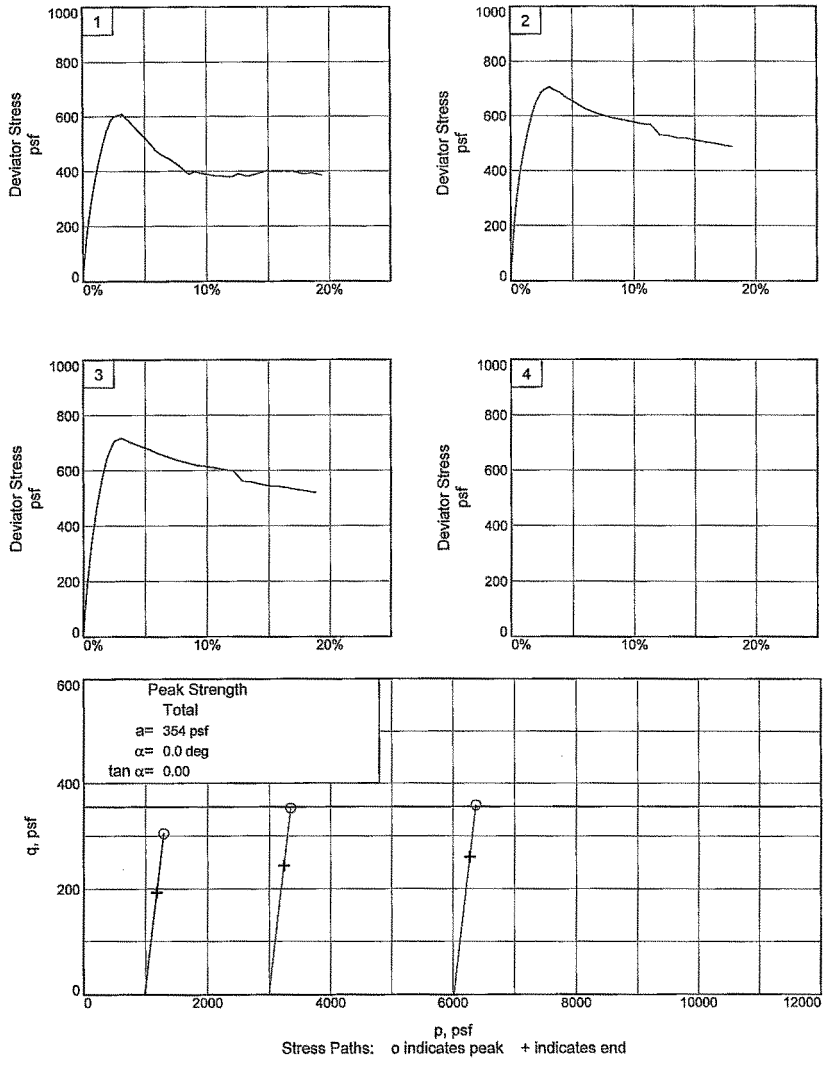
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-21U **Depth:** 28.8
Sample Number: 8B
Proj. No.: 07-022135 **Date Sampled:** 12/10/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

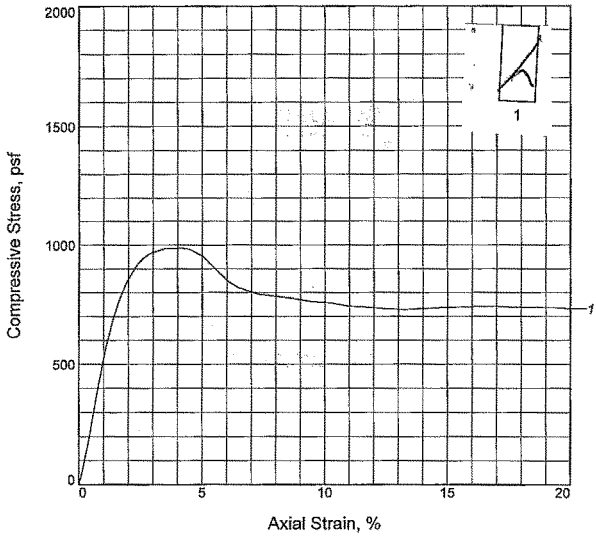
Tested By: VF **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-21U **Depth:** 28.8 **Sample Number:** 8B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: VF **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	987			
Undrained shear strength, psf	493			
Failure strain, %	4.2			
Strain rate, %/min.	1.00			
Water content, %	54.1			
Wet density, pcf	106.8			
Dry density, pcf	69.3			
Saturation, %	101.0			
Void ratio	1.4689			
Specimen diameter, in.	1.404			
Specimen height, in.	3.103			
Height/diameter ratio	2.21			

Description: SO GR CH4 W/ LNS ML

LL = 99	PL = 24	PI = 75	**Assumed GS=** 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/10/09
Remarks:

Figure _____

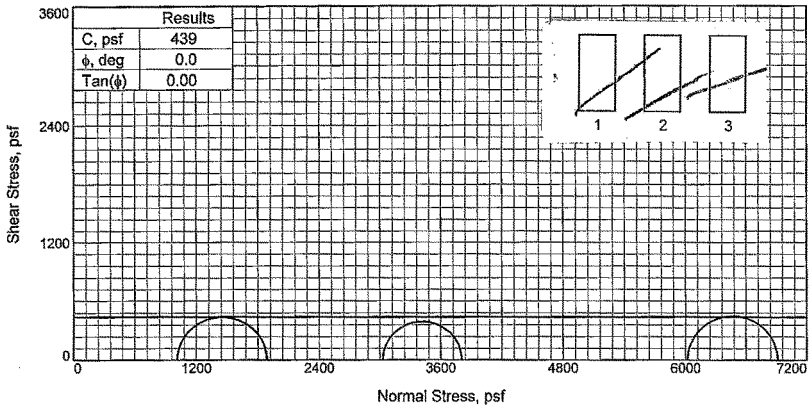
Client: U.S. Army Corps of Engineers

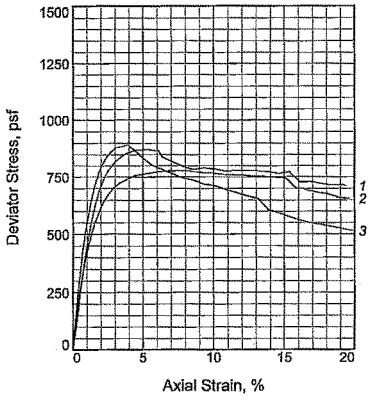
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-21U **Depth:** 32.8
Sample Number: 9B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: VF **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	47.0	49.7	47.9
	Dry Density, pcf	75.6	73.1	75.4
	Saturation, %	103.2	102.6	104.7
	Void Ratio	1.2289	1.3069	1.2341
	Diameter, in.	1.397	1.402	1.398
	Height, in.	3.103	3.095	3.093
At Test	Water Content, %	47.0	49.7	47.9
	Dry Density, pcf	75.6	73.1	75.4
	Saturation, %	103.2	102.6	104.7
	Void Ratio	1.2289	1.3069	1.2341
	Diameter, in.	1.397	1.402	1.398
	Height, in.	3.103	3.095	3.093
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		7.04	21.02	41.81
Fail. Stress, psf		872	779	893
Strain, %		5.3	7.6	3.9
Ult. Stress, psf		773	745	577
Strain, %				
σ_1 Failure, psf		1887	3806	6913
σ_3 Failure, psf		1014	3027	6020

Type of Test: Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CL6 W/ LNS & LYS ML

LL= 48 **PL=** 19 **PI=** 29
Assumed Specific Gravity= 2.70
Remarks:

Figure _____

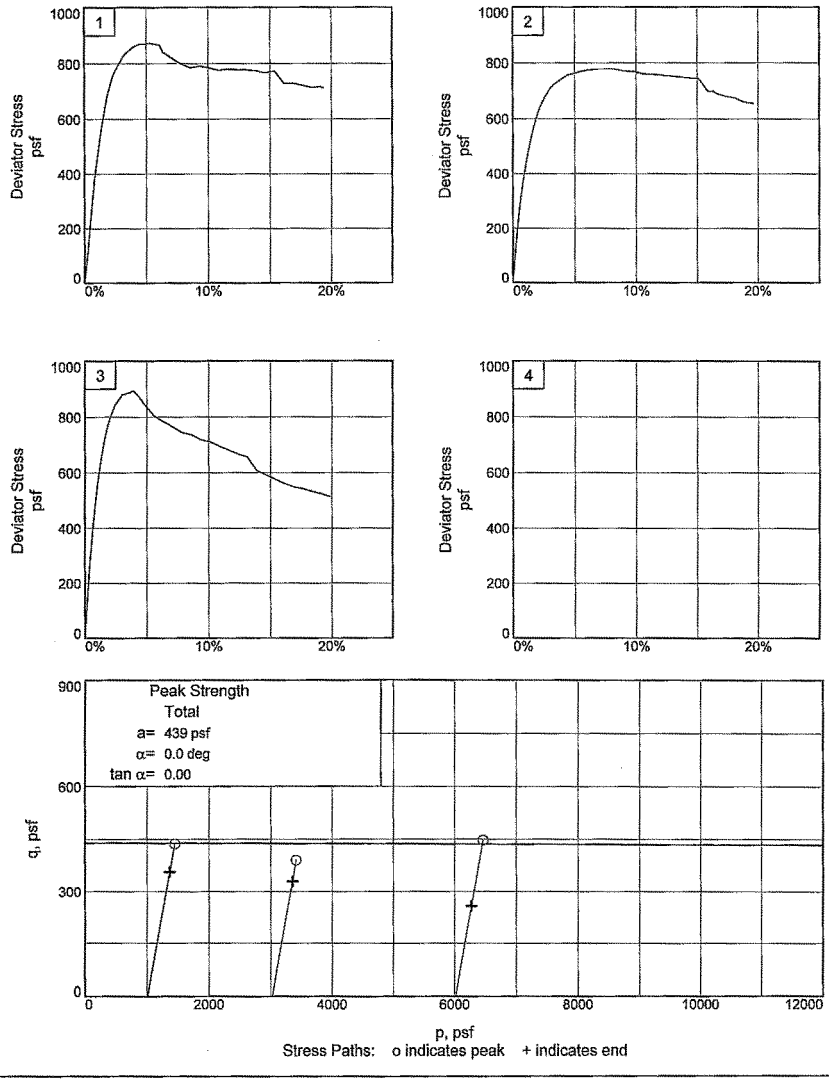
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-21U **Depth:** 36.8
Sample Number: 10B
Proj. No.: 07-022135 **Date Sampled:** 12/10/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

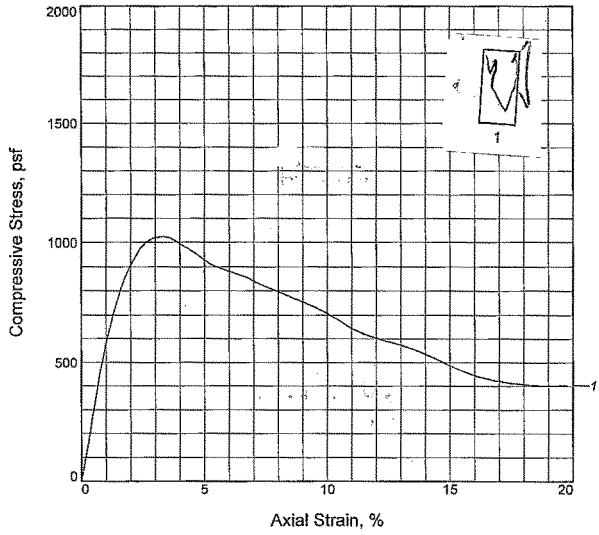
Tested By: VF **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-21U **Depth:** 36.8 **Sample Number:** 10B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: VF **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1				
Unconfined strength, psf	1024				
Undrained shear strength, psf	512				
Failure strain, %	3.3				
Strain rate, %/min.	1.00				
Water content, %	53.8				
Wet density, pcf	107.5				
Dry density, pcf	69.9				
Saturation, %	101.9				
Void ratio	1.4464				
Specimen diameter, in.	1.404				
Specimen height, in.	3.097				
Height/diameter ratio	2.21				

Description: M GR CH3 W/ LNS & LYS ML

LL = 67	**PL** = 24	**PI** = 43	**Assumed GS=** 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/10/09
Remarks:

Figure _____

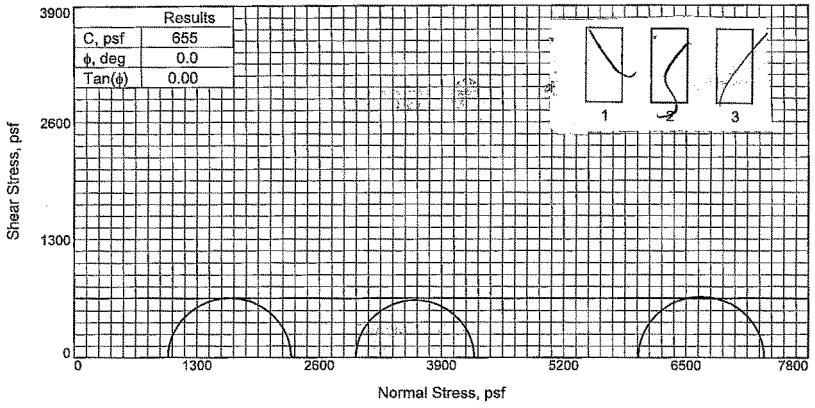
Client: U.S. Army Corps of Engineers

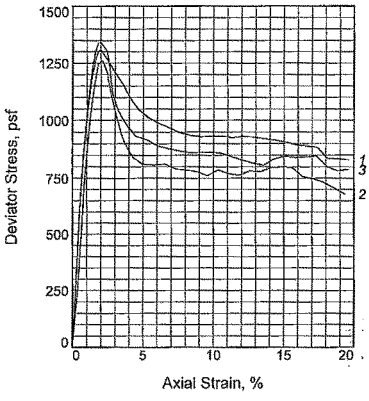
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-21U **Depth:** 41.7
Sample Number: 11C

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: VF **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	64.0	63.9	65.2
	Dry Density, pcf	62.6	62.7	61.5
	Saturation, %	101.3	101.2	100.5
	Void Ratio	1.7315	1.7302	1.7791
	Diameter, in.	1.407	1.408	1.413
	Height, in.	3.093	3.103	3.100
At Test	Water Content, %	64.0	63.9	65.2
	Dry Density, pcf	62.6	62.7	61.5
	Saturation, %	101.3	101.2	100.5
	Void Ratio	1.7315	1.7302	1.7791
	Diameter, in.	1.407	1.408	1.413
	Height, in.	3.093	3.103	3.100
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.91	20.75	41.62
Fail. Stress, psf		1307	1260	1339
Strain, %		1.9	2.0	1.8
Ult. Stress, psf		906	761	828
Strain, %				
σ_1 Failure, psf		2301	4249	7331
σ_3 Failure, psf		994	2989	5993

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: M GR CH4 W/ LNS & LYS ML

LL= 76 **PL=** 22 **PI=** 54
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

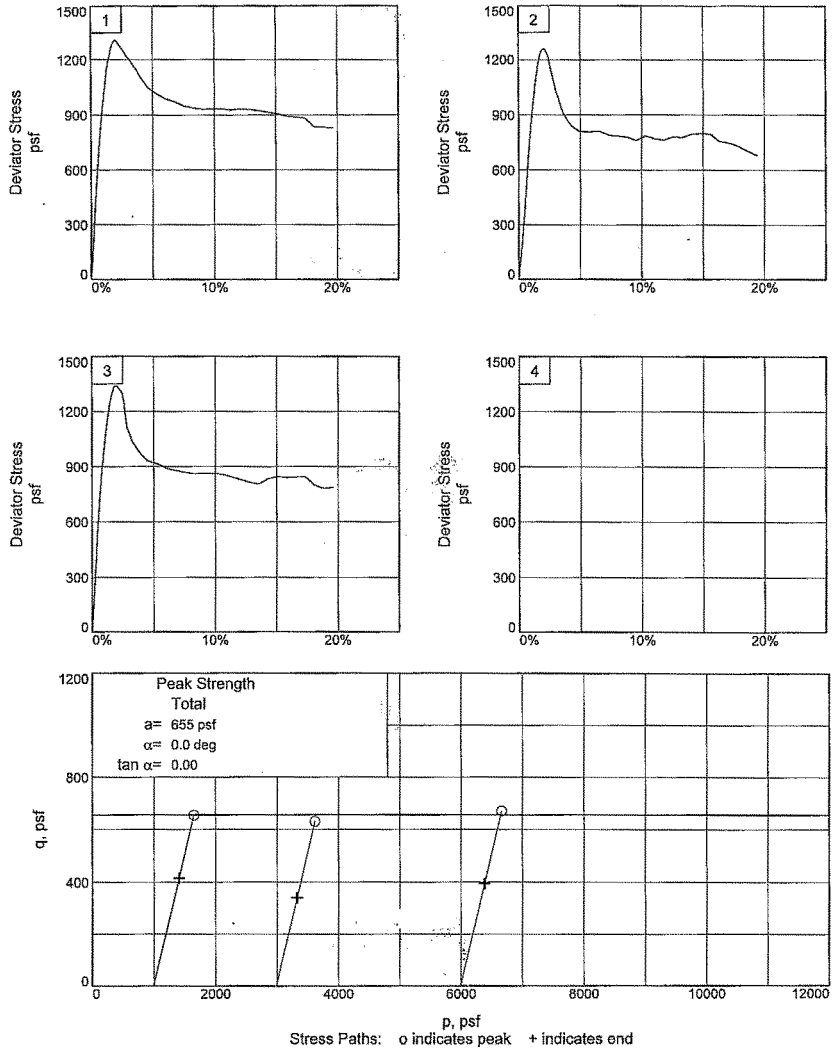
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St Bernard Parish, La
Source of Sample: MRGO-21U **Depth:** 44.8
Sample Number: 12B
Proj. No.: 07-022135 **Date Sampled:** 12/10/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

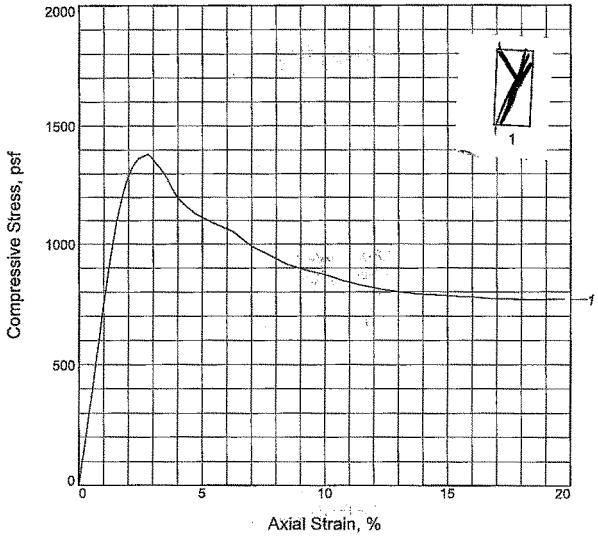
Tested By: VF **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-21U **Depth:** 44.8 **Sample Number:** 12B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: VF **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	1381			
Undrained shear strength, psf	690			
Failure strain, %	2.8			
Strain rate, %/min.	1.00			
Water content, %	59.2			
Wet density, pcf	104.1			
Dry density, pcf	65.4			
Saturation, %	100.4			
Void ratio	1.6143			
Specimen diameter, in.	1.406			
Specimen height, in.	3.100			
Height/diameter ratio	2.20			

Description: M GR CH4 W/ LNS & LYS ML

LL = 82	PL = 26	PI = 56	**Assumed GS=** 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/10/09
Remarks:

Figure _____

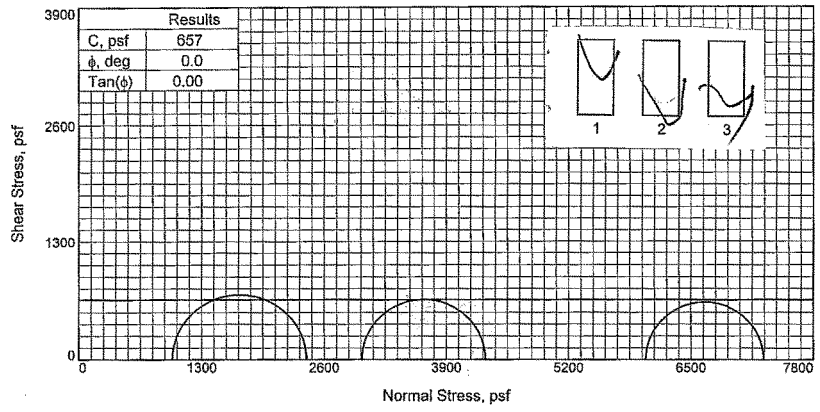
Client: U.S. Army Corps of Engineers

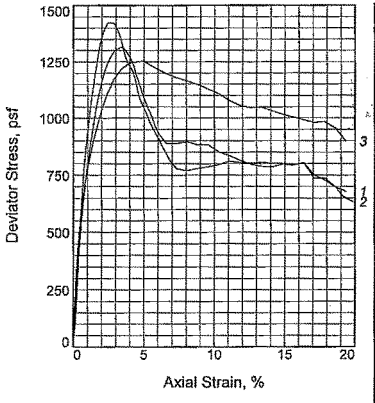
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-21U **Depth:** 48.8
Sample Number: 13B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: VF **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	60.4	60.9	57.6
	Dry Density, pcf	65.0	64.4	67.0
	Saturation, %	101.4	100.9	101.7
	Void Ratio	1.6324	1.6542	1.5520
	Diameter, in.	1.406	1.411	1.404
	Height, in.	3.104	3.105	3.099
At Test	Water Content, %	60.4	60.9	57.6
	Dry Density, pcf	65.0	64.4	67.0
	Saturation, %	101.4	100.9	101.7
	Void Ratio	1.6324	1.6542	1.5520
	Diameter, in.	1.406	1.411	1.404
	Height, in.	3.104	3.105	3.099
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.88	20.84	41.80
Fail. Stress, psf		1422	1315	1254
Strain, %		2.8	3.4	5.0
Ult. Stress, psf		769	785	1015
Strain, %				
σ_1 Failure, psf		2413	4316	7273
σ_3 Failure, psf		991	3001	6019

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: M GR CH4 W/ LNS ML

LL= 81 **PL=** 27 **PI=** 54
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

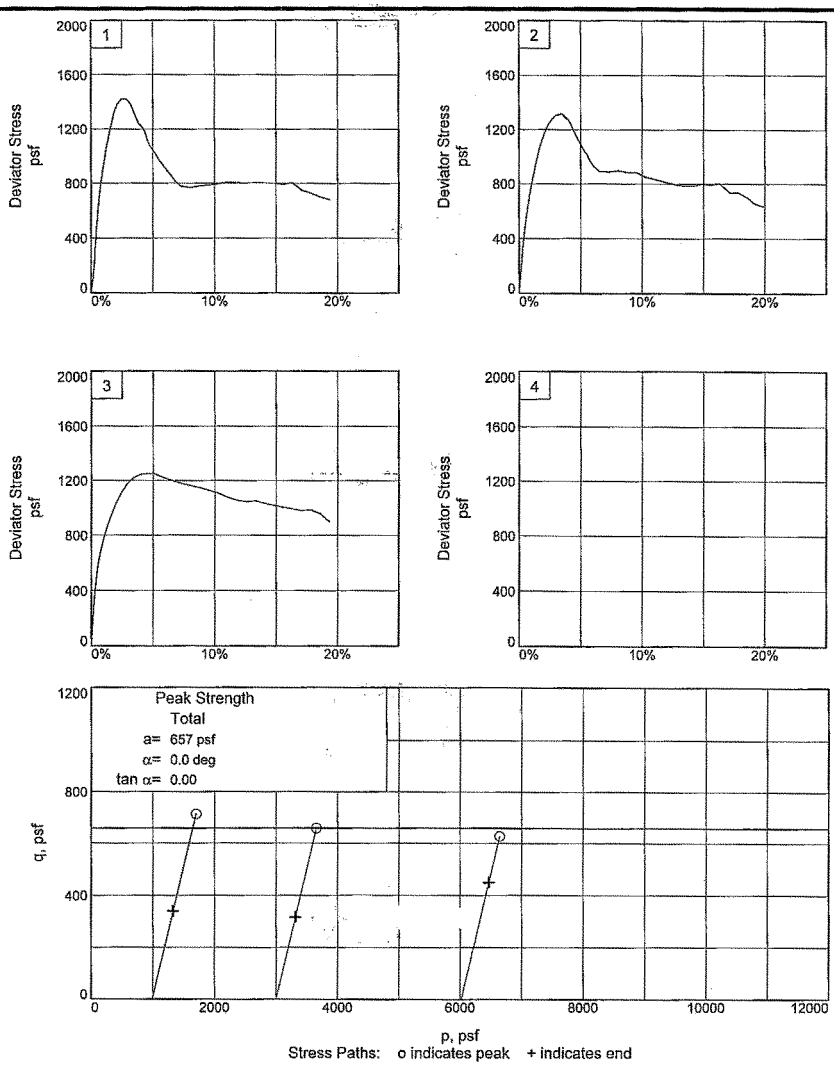
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St Bernard Parish, La
Source of Sample: MRGO-21U **Depth:** 52.8
Sample Number: 14B
Proj. No.: 07-022135 **Date Sampled:** 12/10/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

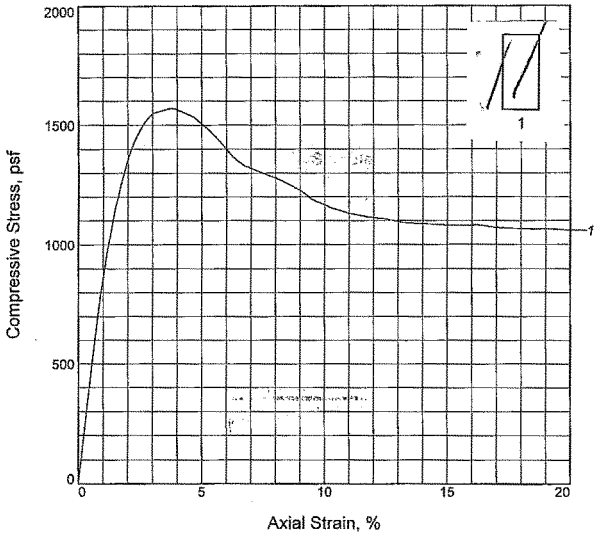
Tested By: VF **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-21U **Depth:** 52.8 **Sample Number:** 14B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: VF **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	1568			
Undrained shear strength, psf	784			
Failure strain, %	3.7			
Strain rate, %/min.	1.00			
Water content, %	50.8			
Wet density, pcf	106.8			
Dry density, pcf	70.8			
Saturation, %	98.3			
Void ratio	1.4158			
Specimen diameter, in.	1.400			
Specimen height, in.	3.101			
Height/diameter ratio	2.22			

Description: M GR CH4

LL = 78	**PL** = 23	**PI** = 55	**Assumed GS=** 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/10/09
Remarks:

Figure _____

Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-21U **Depth:** 56.8
Sample Number: 15B

UNCONFINED COMPRESSION TEST
FFEBJV, LLC

Tested By: VF **Checked By:** MS

SUMMARY OF LABORATORY TEST RESULTS

Project: MRGO Ecosystem Restoration Feasibility Study Assigned By: _____

Project Number: 07-022135 Current Date: 2/3/2010
Boring: MRGO-22U

Sample Number	Depth	Visual Classification	USCS	K(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
1A	0.0	SO DGR CHOB W/ WD	CHOB		146												
1B	0.8	SO DGR CHOB W/ WD	CHOB		145												
1C	1.7	SO DGR CHOA W/ LNS & LYS ML, WD	CHOA		94												
1D	2.6	SO DGR CHOB W/ LNS & LYS ML, WD	CHOB		175												
2A	4.0	SO DGR CHOC W/ WD, RT	CHOC		301												
2B	4.8	SO DGR CHOC W/ WD, RT	CHOC		295												
2C	5.7	SO DGR CHOB W/ LNS & LYS SM, WD, RT	CHOB		137												
2D	6.5	SO DGR CHOA W/ LNS & LYS SM, WD, RT	CHOA		109												
3A	8.0	VSO GR CH4 W/ LYS SM, SIF, WD	CH4		72												
3B	8.8	VSO GR CH3 W/ LYS & LNS ML, SIF, WD	CH3		51												
3C	9.7	VSO GR CH3 W/ LYS & LNS ML, SIF, WD	CH3		54												
3D	10.6	VSO GR CH3 W/ LYS & LNS ML, SIF, WD	CH3		45												
4A	12.0	VSO GR CH3 W/ LNS ML, SIF	CH3		64												
4B	12.8	VSO GR CH3 W/ LNS ML, SIF	CH3		59	65	104	100	UU	0	85		59	19	40	0.09	
4C	13.7	VSO GR CL6 W/ ARS CH, SIF	CL6		50	72	108	99					42	22	20		CON, GS
4D	14.6	VSO GR CH3 W/ LNS ML, SIF	CH3		46												
5A	16.0	VSO GR CH2 W/ LYS & LNS SM, SIF	CH2		37												
5B	16.8	VSO GR CL6 W/ LYS & LNS SM, SIF	CL6	14	44	77	111	100	UC	-	96	192	47	15	32	0.17	
5C	17.7	VSO GR CH3 W/ ARS SM, SIF	CH3		63	63	103	100	UU	0	178		68	18	50	0.09	
5D	18.6	VSO GR CH4 W/ ARS SM, SIF	CH4		63												
6A	20.0	M GR CH3 W/ LYS SM	CH3		48												
6B	20.8	M GR CH4 W/ LYS SM, SIF, WD	CH4		56												
6C	21.7	GR SM W/ LYS CH, WD	SM		35								NP	NP	NP		SV
6D	22.6	GR SM W/ LYS CH, WD	SM		34												
7A	24.0	SO GR CH4 W/ ARS & LNS SM	CH4		68												
7B	24.8	SO GR CH4 W/ ARS & LNS SM	CH4		74	57	98	100	UU	0	252		90	27	63	0.18	
7C	25.7	SO GR CH3 W/ ARS SM, LNS ML, WD	CH3		54	69	106	100					63	43	20		CON, GS
7D	26.6	SO GR CH4 W/ ARS & LNS SM	CH4		63												
8A	28.0	SO GR CH4 W/ LYS & LNS ML	CH4		62												
8B	28.8	SO GR CH4 W/ LNS & LYS ML	CH4	2	69	58	99	98	UC	-	309	619	88	23	65	0.20	
8C	29.7	SO GR CH4 W/ LYS & LNS ML	CH4		65												
8D	30.6	SO GR CH4 W/ LYS & LNS ML	CH4		57												
9A	32.0	SO GR CL6 W/ LYS CH	CL6		45												
9B	32.8	SO GR CL6 W/ LYS CH	CL6		43												
9C	33.7	SO GR CL6 W/ LYS SM	CL6		44												
9D	34.6	SO GR CH2 W/ LYS SM	CH2		45												
10A	36.0	SO GR CH2 W/ LYS SM	CH2		36												

Remarks:
FFEB JV, LLC

Checked By: MS/MKA
File Name: MRGO-22U.xls

SUMMARY OF LABORATORY TEST RESULTS

Project: MRGO Ecosystem Restoration Feasibility Study Assigned By: _____

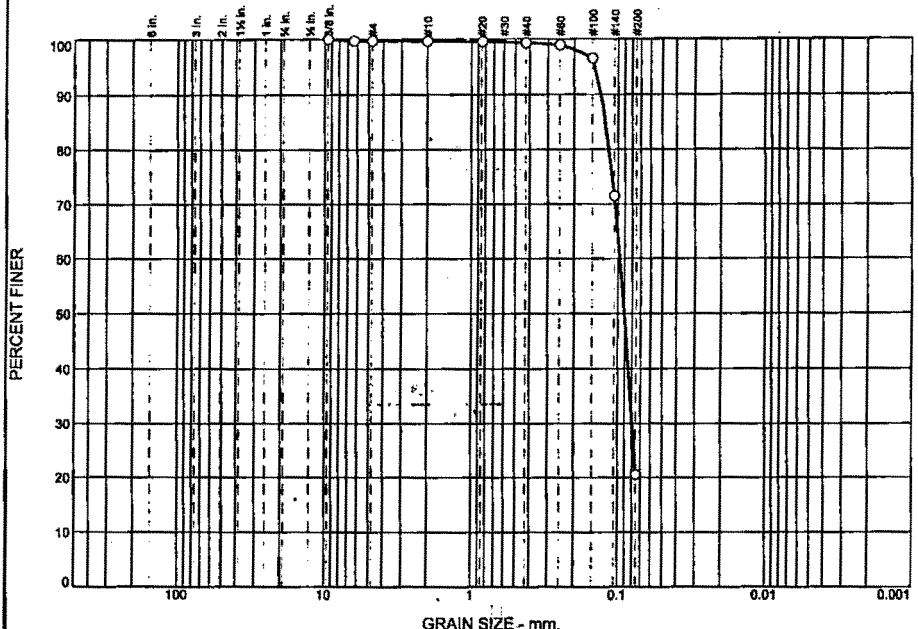
Project Number: 07-022135 Current Date: 2/3/2010
Boring: MRGO-22U

Sample Number	Depth	Visual Classification	USCS	K(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
10B	36.8	SO GR CH2 W/ LYS SM	CH2		51	72	108	100	UU	0	331		55	17	38	0.18	
10C	37.7	SO GR CL6 W/ LYS CH	CL6		41												
11A	40.0	SO GR CL6 W/ LNS ML	CL6		40												
11B	40.8	SO GR CL6 W/ LYS ML	CL6	5	49	72	108	99	UC	-	321	642	46	17	29	0.20	
11C	41.7	SO GR CL6 W/ LYS ML	CL6		47												
11D	42.6	SO GR CL6 W/ LYS ML	CL6		43												
12A	44.0	SO GR CL6 W/ LYS & LNS ML	CL6		44												
12B	44.8	SO GR CL6 W/ LYS & LNS ML	CL6		41	79	112	100	UU	0	317		45	22	23	0.19	
12C	45.7	SO GR CL6 W/ LYS & LNS ML	CL6	10	38	82	113	97	UC	-	372	744	40	20	20	0.20	
12D	46.6	M GR CH3 W/ LYS & LNS ML	CH3		44												
13A	48.0	M GR CH3 W/ LYS ML	CH3		58												
13B	48.8	M GR CH3 W/ LYS ML	CH3	8	46	76	111	100	UC	-	625	1250	58	19	39	0.25	
13C	49.7	M GR CH3 W/ LYS & LNS ML	CH3		44												
13D	50.6	M GR CH3 W/ LYS & LNS ML	CH3		45												
14A	52.0	M GR CH3 W/ LYS & LNS ML	CH3		46												
14B	52.8	M GR CH3 W/ LYS & LNS ML	CH3		40												
14C	53.7	M GR CL6 W/ LYS & LNS ML	CL6		55	68	106	100	UU	0	637		49	19	30	0.32	
14D	54.6	M GR CH3 W/ LYS & LNS ML	CH3		36												
15A	56.0	M GR CH3 W/ LYS & LNS ML	CH3		41												
15B	56.8	SO GR CH4 W/ ARS & LNS ML	CH4	15	39	82	113	97	UC	-	266	532	73	21	52	0.20	
15C	57.7	M GR CH3 W/ ARS & LNS ML	CH3		38												
15D	58.6	M GR CH3 W/ ARS & LNS ML	CH3		40												

Remarks: _____
FFEB JV, LLC

Checked By: WS/MKA
File Name: MRGO-22U.xls

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
o	0.0	0.0	0.3	0.1	0.2	78.8	20.6	

	Colloids	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_C	C_U
o		NP	NP	0.1219	0.0968	0.0903	0.0795				

Material Description	USCS	AASHTO
o GR SM W/ LYS CH, WD	SM	

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

Project: USACE - MRGO Ecosystem Restoration Feasibility Study

o Source of Sample: MRGO-22U Depth: 21.7 Sample Number: 6C

Date: o 11/10/09

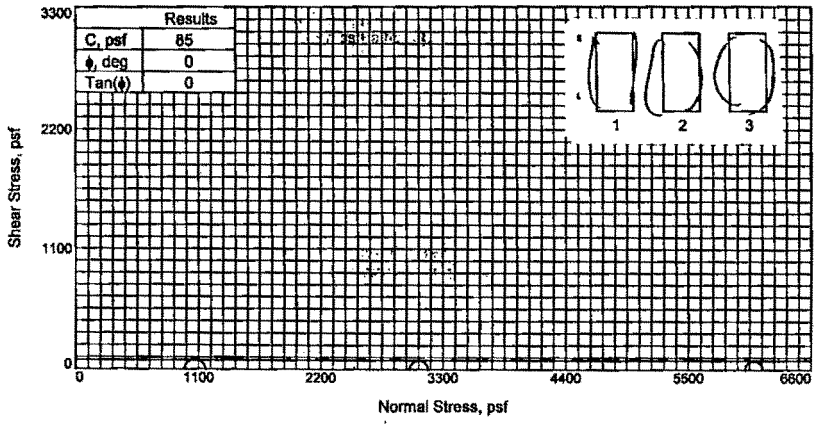
FFEBJV, LLC

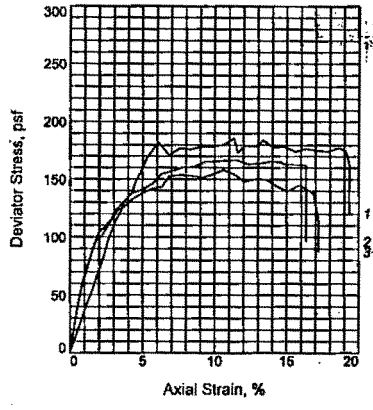
St Rose, LA

Remarks:

Figure

Tested By: JH Checked By: MS





Sample No.		1	2	3
Initial	Water Content, %	58.5	57.2	61.4
	Dry Density, pcf	65.2	66.5	64.6
	Saturation, %	98.7	99.7	102.1
	Void Ratio	1.6253	1.5717	1.6468
	Diameter, in.	1.381	1.379	1.382
	Height, in.	3.057	3.055	3.048
At Test	Water Content, %	58.5	57.2	61.4
	Dry Density, pcf	65.2	66.5	64.6
	Saturation, %	98.7	99.7	102.1
	Void Ratio	1.6253	1.5717	1.6468
	Diameter, in.	1.381	1.379	1.382
	Height, in.	3.057	3.055	3.048
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.77	20.84	41.73
Fail. Stress, psf		186	166	158
Strain, %		11.3	10.8	10.6
Ult. Stress, psf		173	163	140
Strain, %				
σ_1 Failure, psf		1161	3166	6167
σ_3 Failure, psf		975	3000	6009

Type of Test: Unconsolidated Undrained

Sample Type: UNDISTURBED

Description: VSO GR CH3 W/ LNS ML, SIF.

LL= 59 PL= 19 PI= 40

Assumed Specific Gravity= 2.74

Remarks: SAMPLE SLUMPED UNDER ITS OWN WEIGHT.

Figure _____

Client: U.S. Army Corps of Engineers

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

Source of Sample: MRGO-22U **Depth:** 12.8

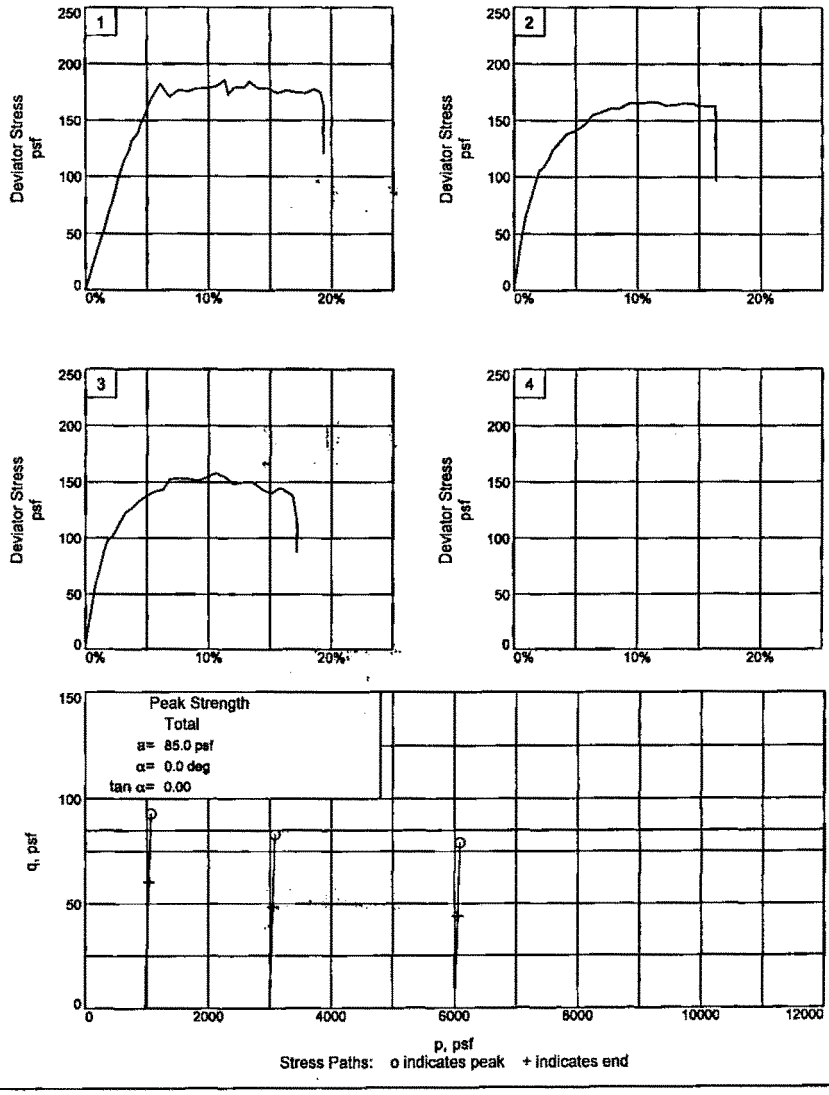
Sample Number: 4B

Proj. No.: 07-022135 **Date Sampled:** 11/10/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

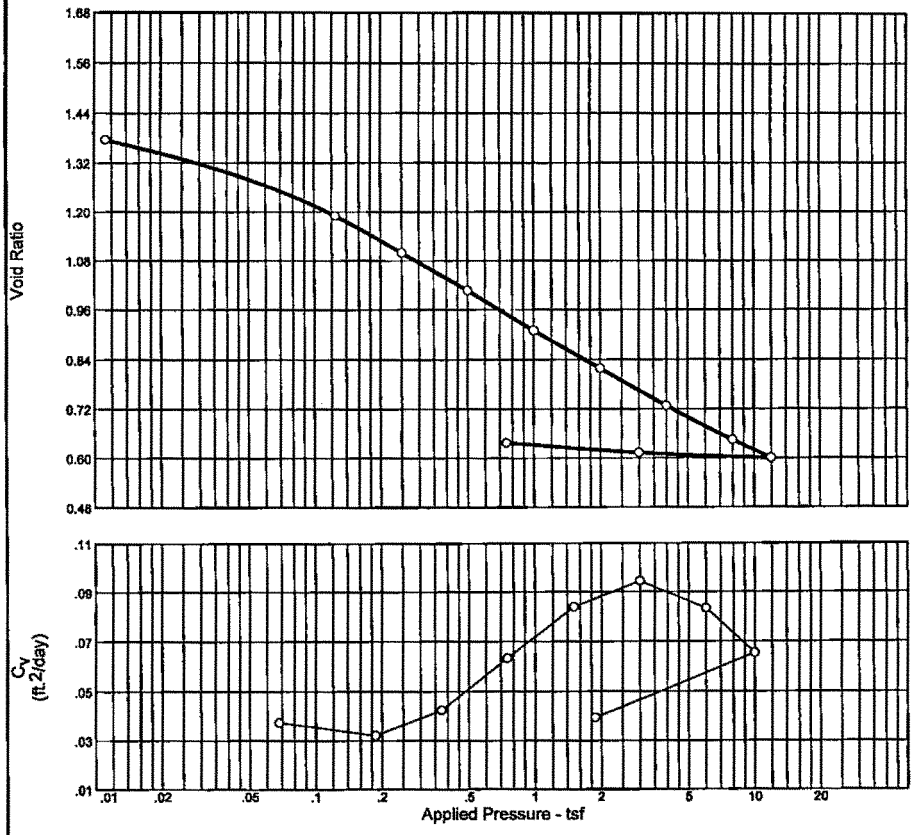
Tested By: ARS/JC **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-22U **Depth:** 12.8 **Sample Number:** 4B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: ARS/JC **Checked By:** MS

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
99.2 %	50.0 %	71.7	42	22	2.73	0.13	0.31	1.377

MATERIAL DESCRIPTION	USCS	AASHTO
VSO GR CL6 W/ ARS CH, SIF	CL6	

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

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

Source: MRGO-22U Sample No.: 4C Elev./Depth: 13.7

FFEBJV, LLC

St Rose, LA

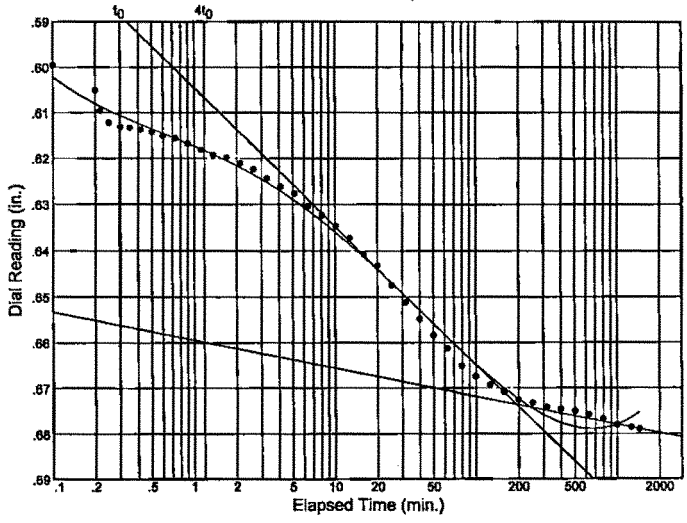
Remarks:
Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

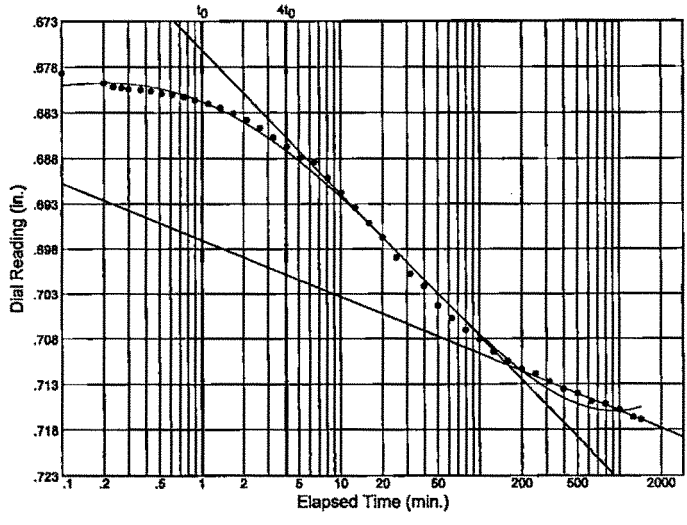
Source: MRGO-22U Sample No.: 4C Elev./Depth: 13.7



Load No.= 2
Load= 0.13 tsf
D_0 = 0.60286
D_{50} = 0.63820
D_{100} = 0.67354
T_{50} = 12.28 min.

C_v @ T_{50}
0.04 ft.2/day

C_α = 0.006



Load No.= 3
Load= 0.25 tsf
D_0 = 0.67647
D_{50} = 0.69368
D_{100} = 0.71089
T_{50} = 12.63 min.

C_v @ T_{50}
0.03 ft.2/day

C_α = 0.007

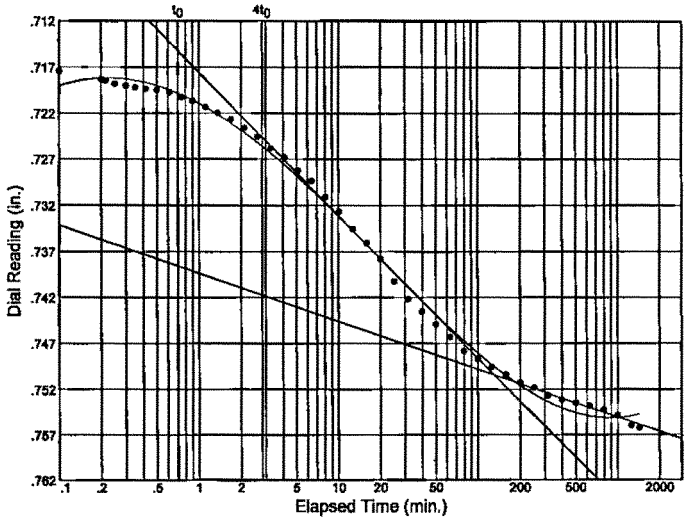
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

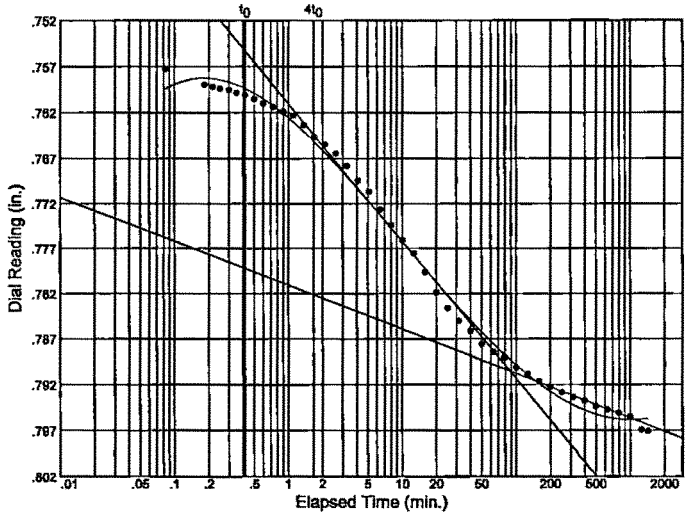
Source: MRGO-22U Sample No.: 4C Elev./Depth: 13.7



Load No.= 4
Load= 0.50 tsf
D_0 = 0.71410
D_{50} = 0.73227
D_{100} = 0.75044
T_{50} = 8.74 min.

C_v @ T_{50}
0.04 ft.2/day

C_α = 0.006



Load No.= 5
Load= 1.00 tsf
D_0 = 0.75365
D_{50} = 0.77207
D_{100} = 0.79050
T_{50} = 5.33 min.

C_v @ T_{50}
0.06 ft.2/day

C_α = 0.006

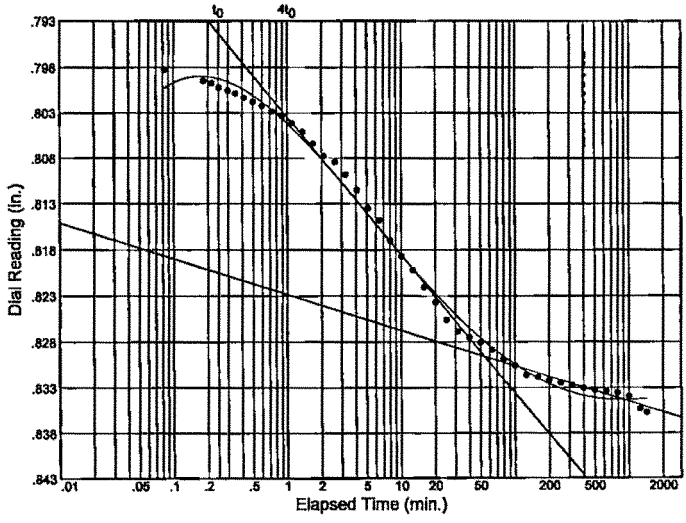
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

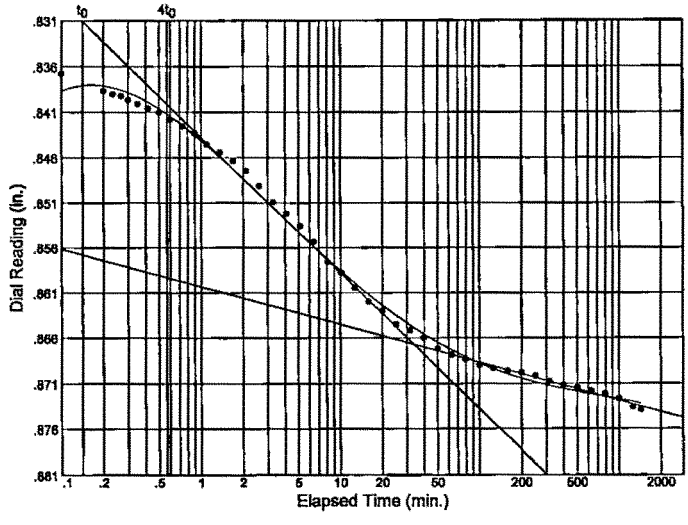
Source: MRGO-22U Sample No.: 4C Elev./Depth: 13.7



Load No.= 6
Load= 2.00 tsf
D_0 = 0.79432
D_{50} = 0.81195
D_{100} = 0.82958
T_{50} = 3.65 min.

C_v @ T_{50}
0.08 ft.2/day

C_α = 0.005



Load No.= 7
Load= 4.00 tsf
D_0 = 0.83493
D_{50} = 0.85082
D_{100} = 0.86671
T_{50} = 2.95 min.

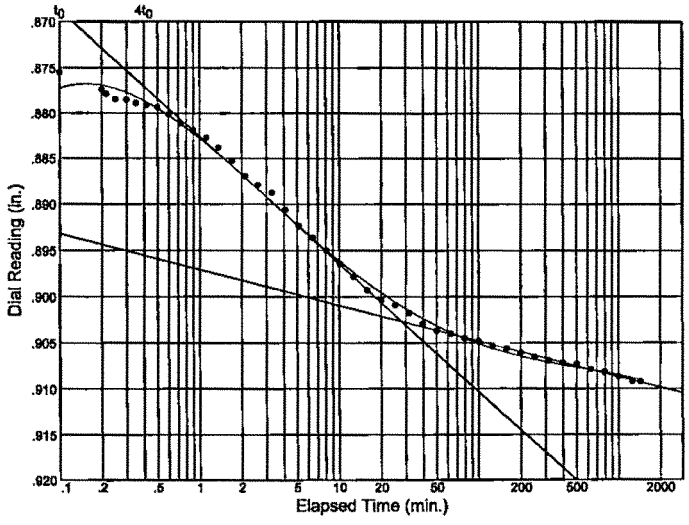
C_v @ T_{50}
0.09 ft.2/day

C_α = 0.005

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

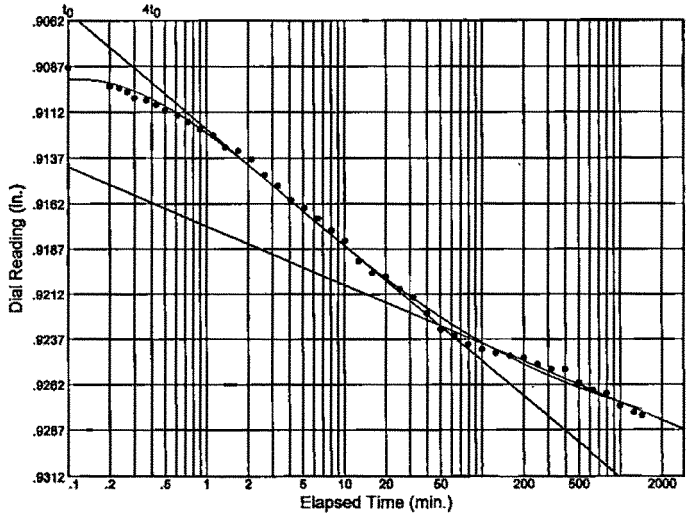
Source: MRGO-22U Sample No.: 4C Elev./Depth: 13.7



Load No.= 8
Load= 8.00 tsf
D_0 = 0.87585
D_{50} = 0.88926
D_{100} = 0.90267
T_{50} = 3.03 min.

C_v @ T_{50}
0.08 ft.2/day

C_α = 0.005



Load No.= 9
Load= 12.00 tsf
D_0 = 0.90839
D_{50} = 0.91566
D_{100} = 0.92293
T_{50} = 3.57 min.

C_v @ T_{50}
0.07 ft.2/day

C_α = 0.005

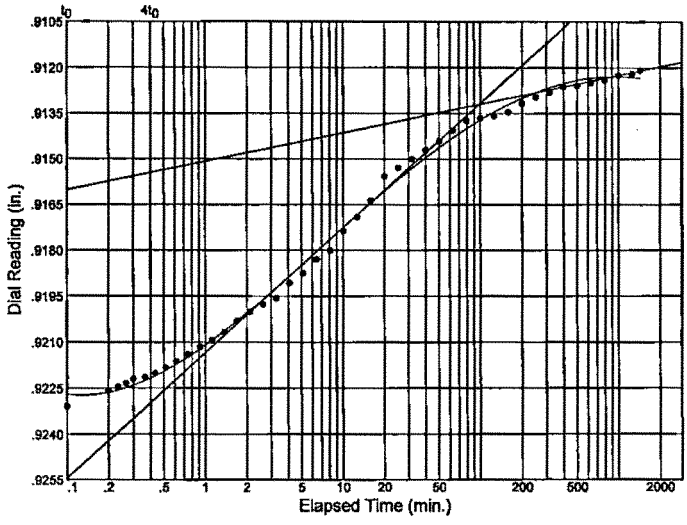
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-22U Sample No.: 4C Elev./Depth: 13.7



Load No.= 11
Load= 0.75 tsf
D_0 = 0.92322
D_{50} = 0.91821
D_{100} = 0.91320
T_{50} = 5.85 min.

C_v @ T_{50}
0.04 ft.^{2}/day

FFEBJV, LLC

Figure

CONSOLIDATION TEST DATA

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Contract No. W912P8-07-D-0022
Task Order 135
Project Number: 07-022135

Sample Data

Source: MRGO-22U
Sample No.: 4C
Elev. or Depth: 13.7 Sample Length(in./cm.):
Location:
Description: VSO GR CL6 W/ ARS CH, SIF
Liquid Limit: 42 Plasticity Index: 22
USCS: CL6 AASHTO: Figure No.:
Testing Remarks: Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST		AFTER TEST	
Wet w+t =	150.04 g.	Consolidometer # =	12	Wet w+t =	405.32 g.
Dry w+t =	100.00 g.			Dry w+t =	344.35 g.
Tare Wt. =	.00 g.	Spec. Gravity =	2.73	Tare Wt. =	113.54 g.
Height =	1.00 in.	Height =	1.00 in.		
Diameter =	4.00 in.	Diameter =	4.00 in.		
Weight =	355.42 g.	Defl. Table =	n/a		
Moisture =	50.0 %	Ht. Solids =	0.4220 in.	Moisture =	26.4 %
Wet Den. =	107.6 pcf	Dry Wt. =	237.05 g.*	Dry Wt. =	230.81 g.
Dry Den. =	71.7 pcf	Void Ratio =	1.377	Void Ratio =	0.638
		Saturation =	99.2 %		

* Initial dry weight used in calculations

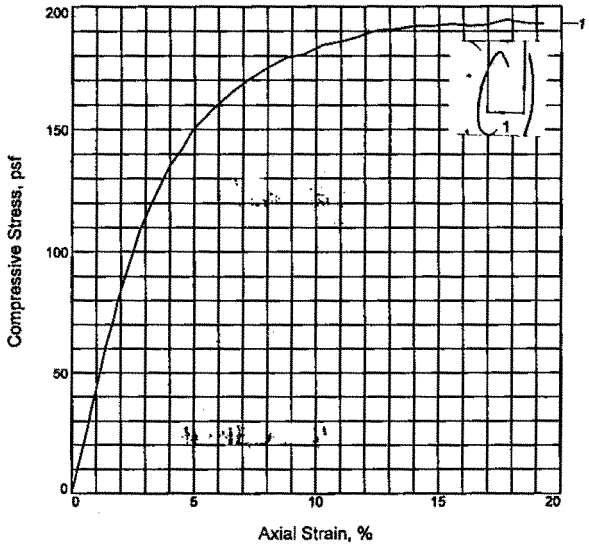
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.59989				1.377	
0.01	0.60031	0.00000			1.376	0.0 Comprs.
0.13	0.67894	0.00000	0.04	0.006	1.190	7.9 Comprs.
0.25	0.71694	0.00000	0.03	0.007	1.100	11.7 Comprs.
0.50	0.75623	0.00000	0.04	0.006	1.007	15.6 Comprs.
1.00	0.79708	0.00000	0.06	0.006	0.910	19.7 Comprs.
2.00	0.83570	0.00000	0.08	0.005	0.819	23.5 Comprs.
4.00	0.87389	0.00000	0.09	0.005	0.728	27.3 Comprs.
8.00	0.90919	0.00000	0.08	0.005	0.644	30.8 Comprs.

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
12.00	0.92791	0.00000	0.07	0.005	0.600	32.7 Comprs.
3.00	0.92225	0.00000			0.614	32.1 Comprs.
0.75	0.91208	0.00000	0.04		0.638	31.1 Comprs.

C_c = 0.31 P_c = 0.13 tsf C_r = 0.03

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	192			
Undrained shear strength, psf	96			
Failure strain, %	14.0			
Strain rate, %/min.	1.00			
Water content, %	44.3			
Wet density, pcf	110.9			
Dry density, pcf	76.9			
Saturation, %	100.3			
Void ratio	1.1928			
Specimen diameter, in.	1.384			
Specimen height, in.	3.057			
Height/diameter ratio	2.21			

Description: VSO GR CL6 W/ LYS & LNS SM SIF

LL = 47	PL = 15	PI = 32	**Assumed GS=** 2.70	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 11/10/09

Remarks:
SAMPLE SLUMPED UNDER ITS OWN WEIGHT.

Figure _____

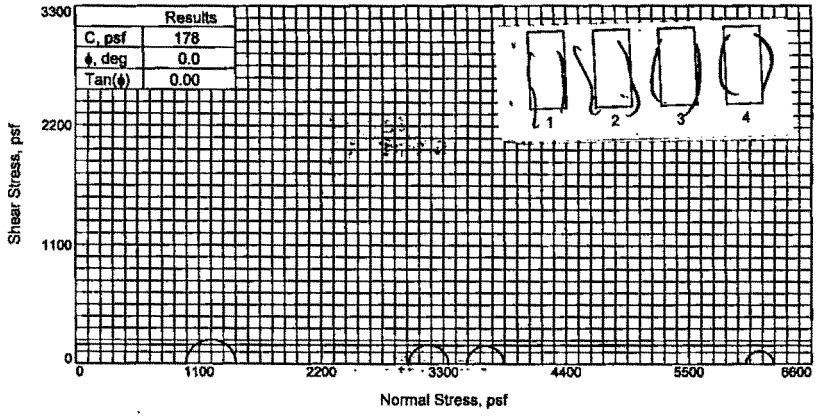
Client: U.S. Army Corps of Engineers

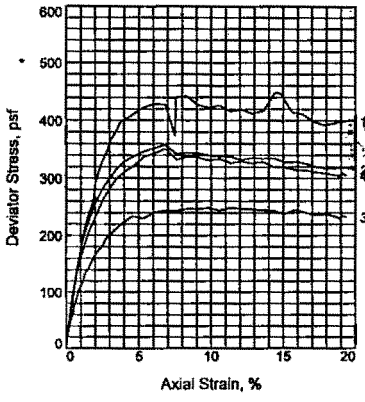
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-22U **Depth:** 16.8
Sample Number: 5B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: ARS/JC **Checked By:** MS





Sample No.		1	2	3	4
Initial	Water Content, %	61.0	61.7	65.0	63.6
	Dry Density, pcf	63.4	63.7	61.3	63.5
	Saturation, %	99.0	100.9	99.9	103.3
	Void Ratio	1.6776	1.6643	1.7697	1.6755
	Diameter, in.	1.389	1.382	1.382	1.382
	Height, in.	3.095	3.094	3.096	3.090
At Test	Water Content, %	61.0	61.7	65.0	63.6
	Dry Density, pcf	63.4	63.7	61.3	63.5
	Saturation, %	99.0	100.9	99.9	103.3
	Void Ratio	1.6776	1.6643	1.7697	1.6755
	Diameter, in.	1.389	1.382	1.382	1.382
	Height, in.	3.095	3.094	3.096	3.090
Strain rate, %/min.		1.00	1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00	0.00
Cell Pressure, psi		6.84	20.74	41.75	24.36
Fail. Stress, psf		449	358	248	338
Strain, %		14.6	6.8	9.8	8.3
Ult. Stress, psf		445	328	238	319
Strain, %					
σ_1 Failure, psf		1434	3345	6260	3845
σ_3 Failure, psf		985	2987	6012	3508

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: VSO GR CH3 W/ ARS SM, SIF

LL= 68 PL= 18 PI= 50
Assumed Specific Gravity= 2.72
Remarks:

Figure _____

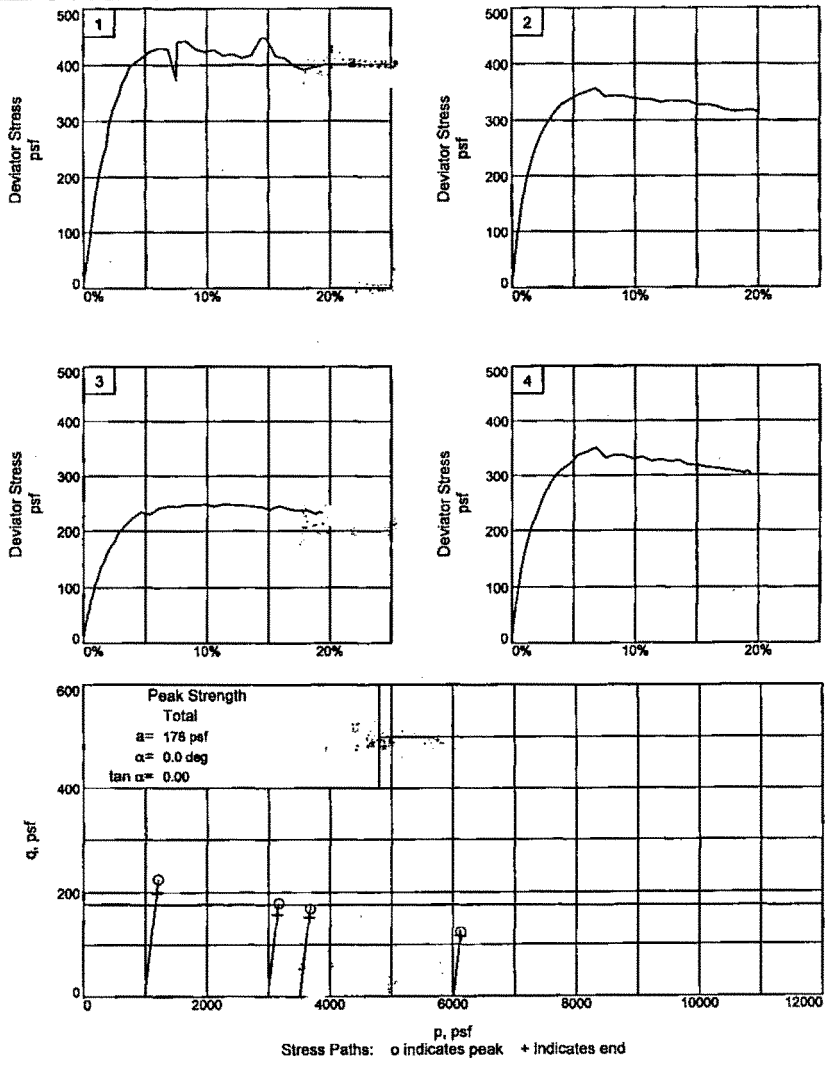
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-22U **Depth:** 17.7
Sample Number: 5C
Proj. No.: 07-022135 **Date Sampled:** 11/10/09

TRIAXIAL SHEAR TEST REPORT

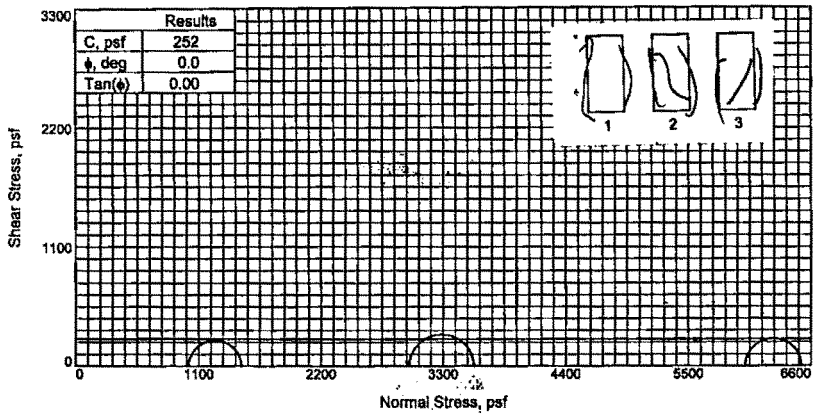
FFEBJV, LLC

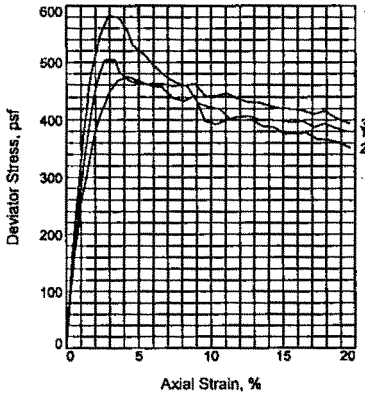
Tested By: ARS/JC **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-22U **Depth:** 17.7 **Sample Number:** 5C
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: ARS/JC **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	66.2	79.5	75.7
	Dry Density, pcf	60.4	54.0	55.1
	Saturation, %	99.3	100.8	98.9
	Void Ratio	1.8118	2.1443	2.0821
	Diameter, in.	1.386	1.383	1.383
	Height, in.	3.102	3.097	3.103
At Test	Water Content, %	66.2	79.5	75.7
	Dry Density, pcf	60.4	54.0	55.1
	Saturation, %	99.3	100.8	98.9
	Void Ratio	1.8118	2.1443	2.0821
	Diameter, in.	1.386	1.383	1.383
	Height, in.	3.102	3.097	3.103
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		7.01	20.79	41.73
Fail. Stress, psf		475	583	504
Strain, %		4.3	3.0	2.7
Ult. Stress, psf		393	376	421
Strain, %				
σ_1 Failure, psf		1485	3577	6513
σ_3 Failure, psf		1010	2994	6009

Type of Test: Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CH4 W/ ARS & LNS SM

LL= 90 PL= 27 PI= 63
Assumed Specific Gravity= 2.72
Remarks:

Figure _____

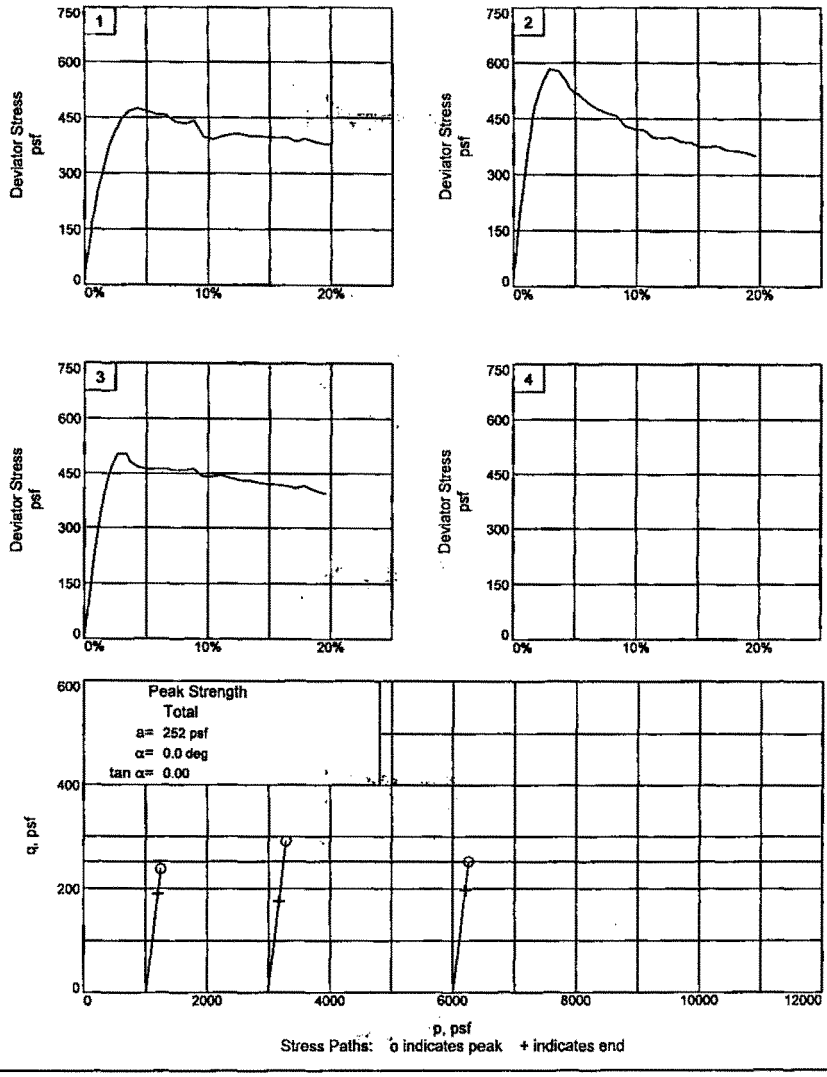
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-22U **Depth:** 24.8
Sample Number: 7B
Proj. No.: 07-022135 **Date Sampled:** 11/10/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

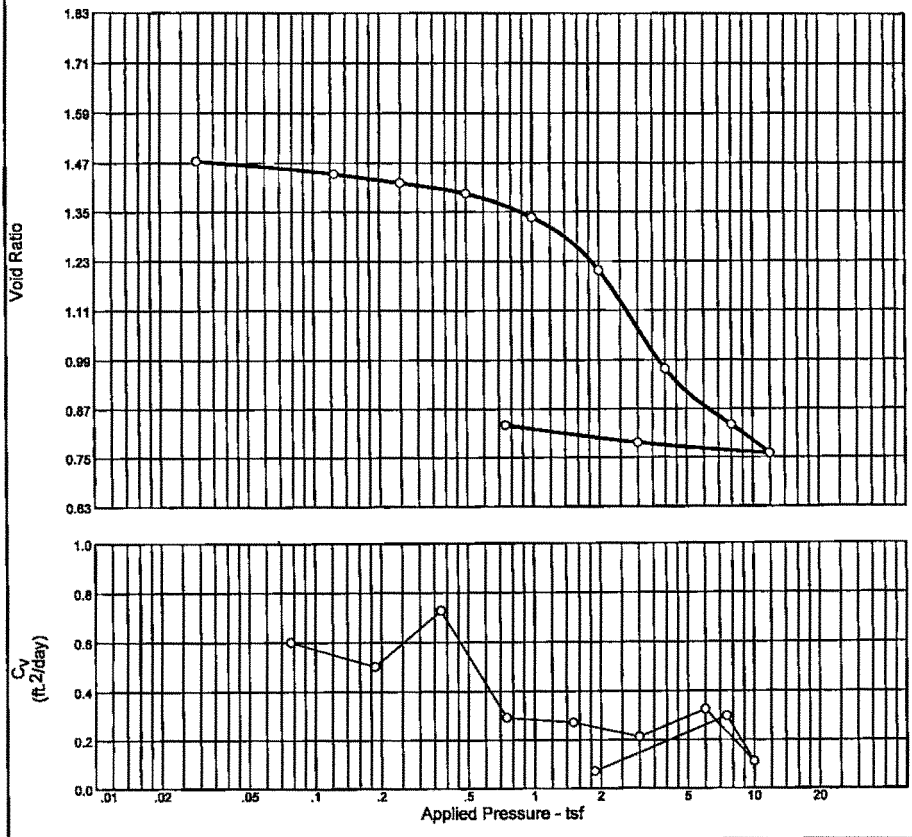
Tested By: ARS/JC **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-22U **Depth:** 24.8 **Sample Number:** 7B
Project No.: 07-022135 **Figure** _____ FFEBJV, LLC

Tested By: ARS/JC **Checked By:** MS

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
99.6 %	54.1 %	68.6	63	43	2.72	1.51	0.85	1.476

MATERIAL DESCRIPTION	USCS	AASHTO
SO GR CH3 W/ ARS SM, LNS ML, WD	CH3	

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

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

Source: MRGO-22U Sample No.: 7C Elev./Depth: 25.7

FFEBJV, LLC

St Rose, LA

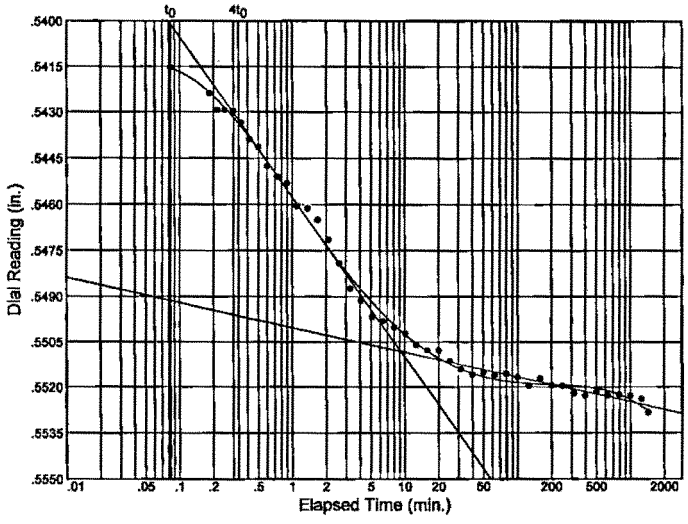
Remarks:
Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

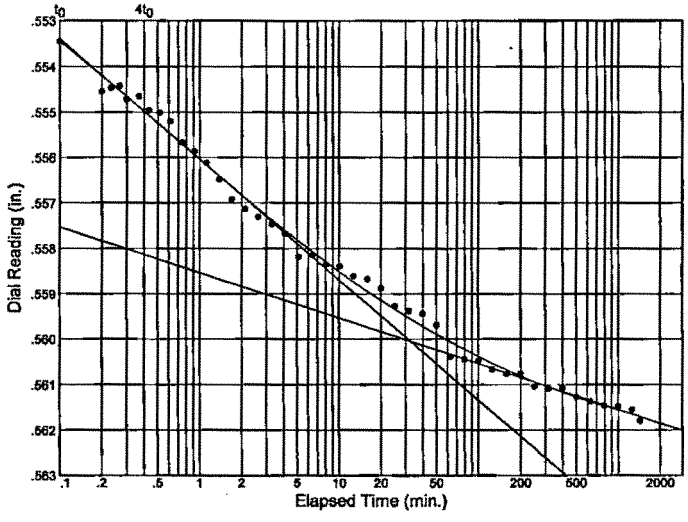
Source: MRGO-22U Sample No.: 7C Elev./Depth: 25.7



Load No.= 2
Load= 0.13 tsf
D_0 = 0.53978
D_{50} = 0.54530
D_{100} = 0.55082
T_{50} = 0.81 min.

C_v @ T_{50}
0.60 ft.^{2}/day

C_α = 0.001



Load No.= 3
Load= 0.25 tsf
D_0 = 0.55191
D_{50} = 0.55598
D_{100} = 0.56005
T_{50} = 0.95 min.

C_v @ T_{50}
0.50 ft.^{2}/day

C_α = 0.001

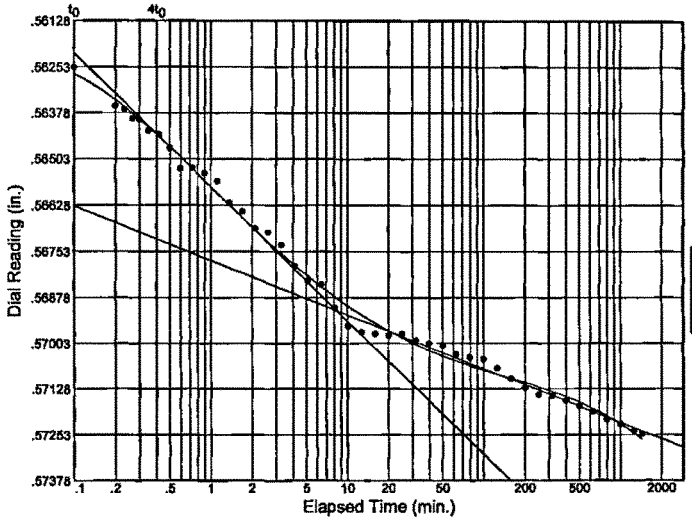
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

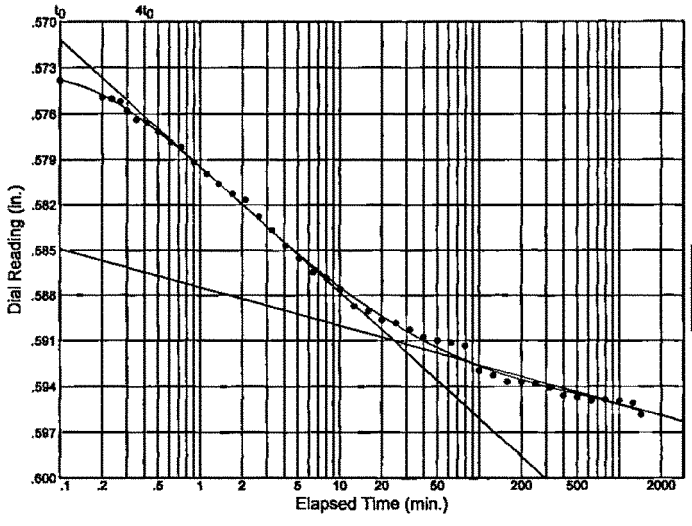
Source: MRGO-22U Sample No.: 7C Elev./Depth: 25.7



Load No.= 4
Load= 0.50 tsf
D_0 = 0.56106
D_{50} = 0.56510
D_{100} = 0.56913
T_{50} = 0.64 min.

C_v @ T_{50}
0.73 ft.2/day

C_α = 0.002



Load No.= 5
Load= 1.00 tsf
D_0 = 0.57109
D_{50} = 0.58105
D_{100} = 0.59102
T_{50} = 1.55 min.

C_v @ T_{50}
0.29 ft.2/day

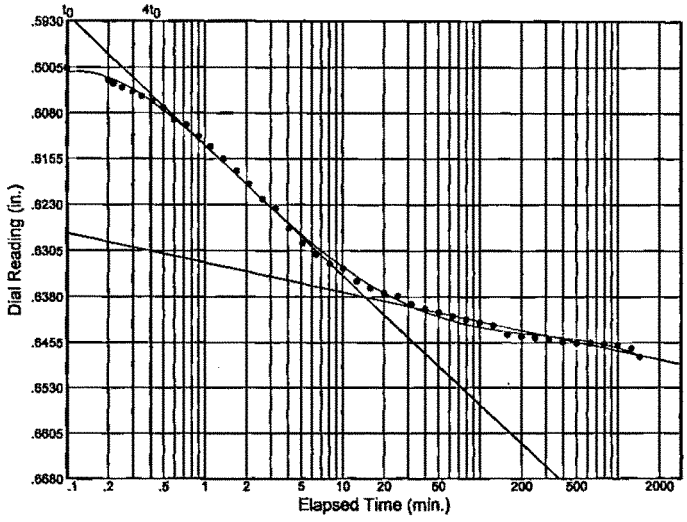
C_α = 0.003

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study .

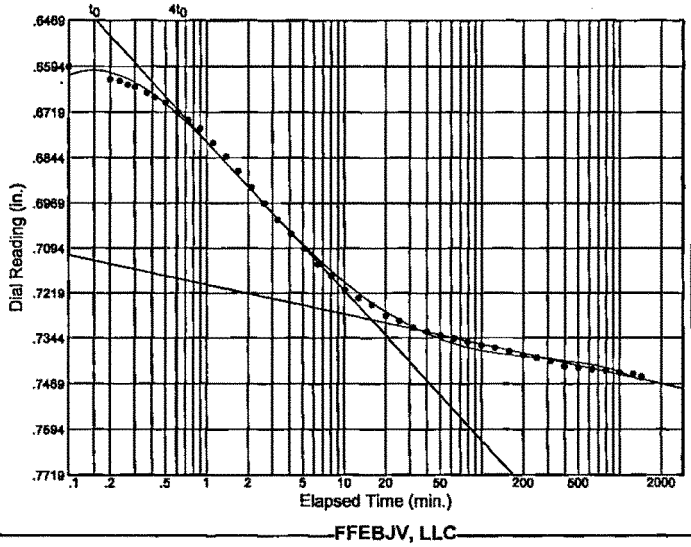
Source: MRGO-22U Sample No.: 7C Elev./Depth: 25.7



Load No.= 6
Load= 2.00 tsf
D_0 = 0.59639
D_{50} = 0.61721
D_{100} = 0.63804
T_{50} = 1.54 min.

C_v @ T_{50}
0.27 ft.2/day

C_α = 0.005



Load No.= 7
Load= 4.00 tsf
D_0 = 0.64843
D_{50} = 0.68895
D_{100} = 0.72948
T_{50} = 1.65 min.

C_v @ T_{50}
0.21 ft.2/day

C_α = 0.009

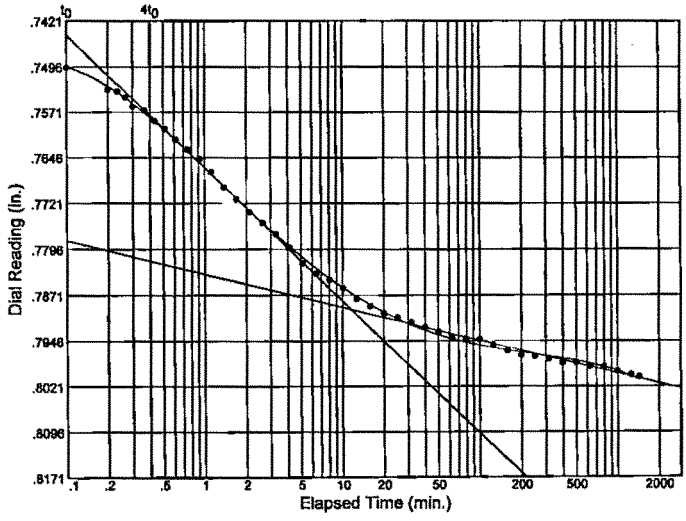
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

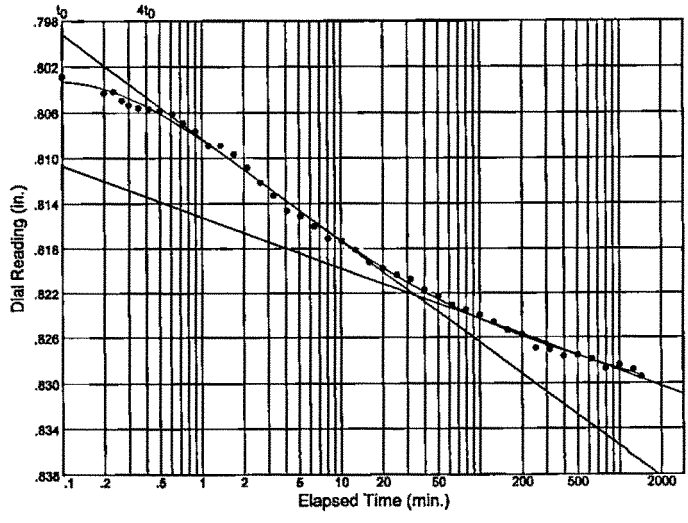
Source: MRGO-22U Sample No.: 7C Elev./Depth: 25.7



Load No.= 8
Load= 8.00 tsf
D_0 = 0.74120
D_{50} = 0.76531
D_{100} = 0.78943
T_{50} = 0.91 min.

C_v @ T_{50}
0.33 ft.^{2}/day

C_α = 0.007



Load No.= 9
Load= 12.00 tsf
D_0 = 0.80115
D_{50} = 0.81168
D_{100} = 0.82220
T_{50} = 2.38 min.

C_v @ T_{50}
0.11 ft.^{2}/day

C_α = 0.006

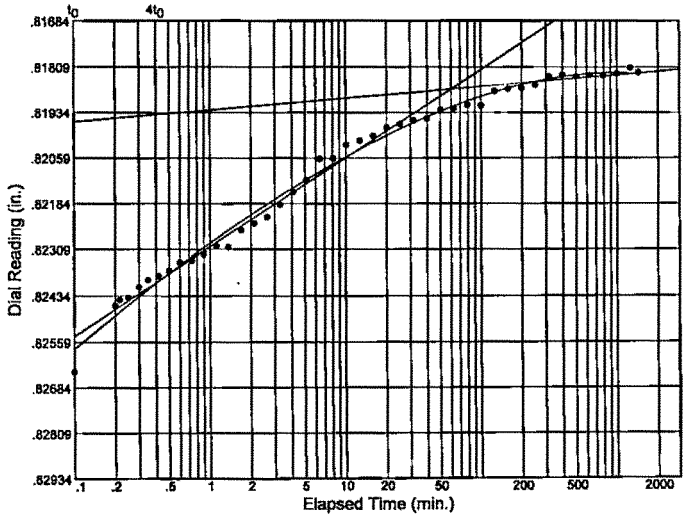
Figure

FFEBJV, LLC

Dial Reading vs. Time

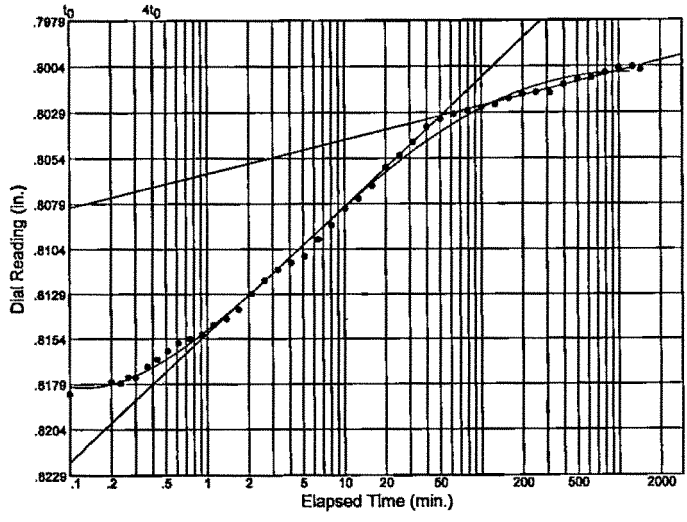
Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-22U Sample No.: 7C Elev./Depth: 25.7



Load No.= 10
Load= 3.00 tsf
D_0 = 0.82758
D_{50} = 0.82314
D_{100} = 0.81869
T_{50} = 0.83 min.

C_v @ T_{50}
0.30 ft.2/day



Load No.= 11
Load= 0.75 tsf
D_0 = 0.81911
D_{50} = 0.81109
D_{100} = 0.80307
T_{50} = 3.72 min.

C_v @ T_{50}
0.07 ft.2/day

FFEBJV, LLC

Figure

CONSOLIDATION TEST DATA

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Contract No. W912P8-07-D-0022
Task Order 135
Project Number: 07-022135

Sample Data

Source: MRGO-22U
Sample No.: 7C
Elev. or Depth: 25.7 Sample Length(in./cm.):
Location:
Description: SO GR CH3 W/ ARS SM, LNS ML, WD
Liquid Limit: 63 Plasticity Index: 43
USCS: CH3 AASHTO: Figure No.:
Testing Remarks: Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST	AFTER TEST
Wet w+t =	154.05 g.	Consolidometer # = 2	Wet w+t = 419.96 g.
Dry w+t =	100.00 g.		Dry w+t = 340.88 g.
Tare Wt. =	.00 g.	Spec. Gravity = 2.72	Tare Wt. = 120.95 g.
Height =	1.00 in.	Height = 1.00 in.	
Diameter =	4.00 in.	Diameter = 4.00 in.	
Weight =	349.08 g.	Defl. Table = n/a	
Moisture =	54.0 %	Ht. Solids = 0.4047 in.	Moisture = 36.0 %
Wet Den. =	105.6 pcf	Dry Wt. = 226.59 g.*	Dry Wt. = 219.93 g.
Dry Den. =	68.6 pcf	Void Ratio = 1.476	Void Ratio = 0.831
		Saturation = 99.6 %	

* Initial dry weight used in calculations

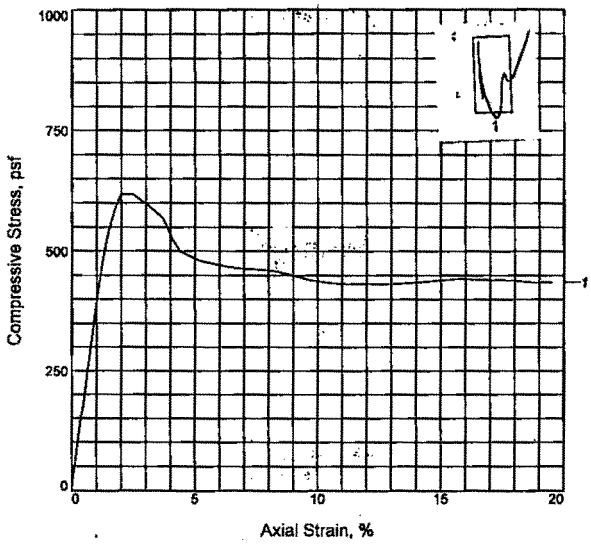
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.53951				1.476	
0.03	0.54016	0.00000			1.474	0.1 Comprs.
0.13	0.55283	0.00000	0.60	0.001	1.443	1.3 Comprs.
0.25	0.56179	0.00000	0.50	0.001	1.421	2.2 Comprs.
0.50	0.57251	0.00000	0.73	0.002	1.394	3.3 Comprs.
1.00	0.59585	0.00000	0.29	0.003	1.337	5.6 Comprs.
2.00	0.64785	0.00000	0.27	0.005	1.208	10.8 Comprs.
4.00	0.74490	0.00000	0.21	0.009	0.969	20.5 Comprs.
8.00	0.80053	0.00000	0.33	0.007	0.831	26.0 Comprs.

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
12.00	0.82944	0.00000	0.11	0.006	0.760	28.9 Comprs.
3.00	0.81823	0.00000	0.30		0.787	27.8 Comprs.
0.75	0.80059	0.00000	0.07		0.831	26.1 Comprs.

C_c = 0.85 P_c = 1.51 tsf C_r = 0.06

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	619			
Undrained shear strength, psf	309			
Failure strain, %	2.0			
Strain rate, %/min.	1.00			
Water content, %	68.8			
Wet density, pcf	98.5			
Dry density, pcf	58.3			
Saturation, %	97.6			
Void ratio	1.9329			
Specimen diameter, in.	1.382			
Specimen height, in.	3.106			
Height/diameter ratio	2.25			

Description: SO GR CH4 W/ LNS & LYS ML

LL = 88	PL = 23	PI = 65	Assumed GS= 2.74	Type: UNDISTURBED

Project No.: 07-022135
Date Sampled: 11/10/09
Remarks:

Client: U.S. Army Corps of Engineers

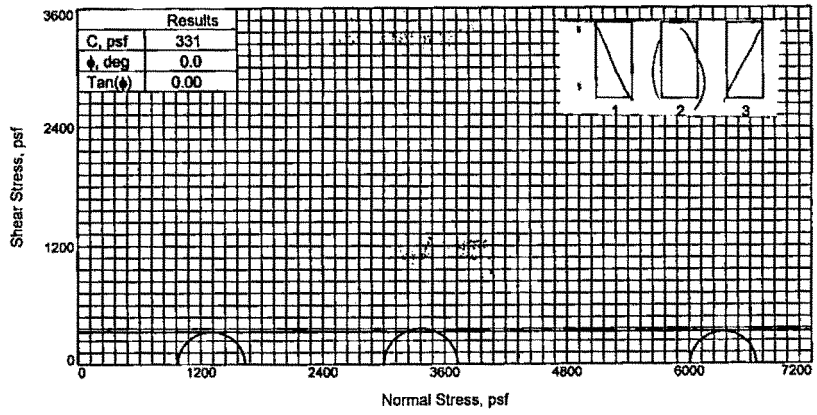
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-22U **Depth:** 28.8
Sample Number: 8B

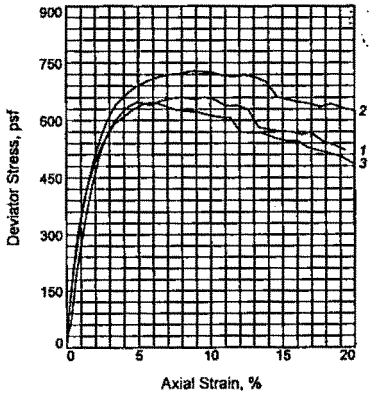
UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Figure _____

Tested By: NG/JC **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	51.1	50.4	52.3
	Dry Density, pcf	71.3	72.9	70.3
	Saturation, %	101.3	103.6	101.1
	Void Ratio	1.3628	1.3125	1.3977
	Diameter, in.	1.379	1.382	1.380
	Height, in.	3.088	3.096	3.094
At Test	Water Content, %	51.1	50.4	52.3
	Dry Density, pcf	71.3	72.9	70.3
	Saturation, %	101.3	103.6	101.1
	Void Ratio	1.3628	1.3125	1.3977
	Diameter, in.	1.379	1.382	1.380
	Height, in.	3.088	3.096	3.094
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.76	20.83	41.73
Fail. Stress, psf		661	728	648
Strain, %		9.6	8.6	6.1
Ult. Stress, psf		572	655	545
Strain, %				
σ_1 Failure, psf		1635	3728	6657
σ_3 Failure, psf		974	3000	6009

Type of Test: Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CH2 W/ LYS SM

LL= 55 PL= 17 PI= 38
Assumed Specific Gravity= 2.70
Remarks:

Figure ____

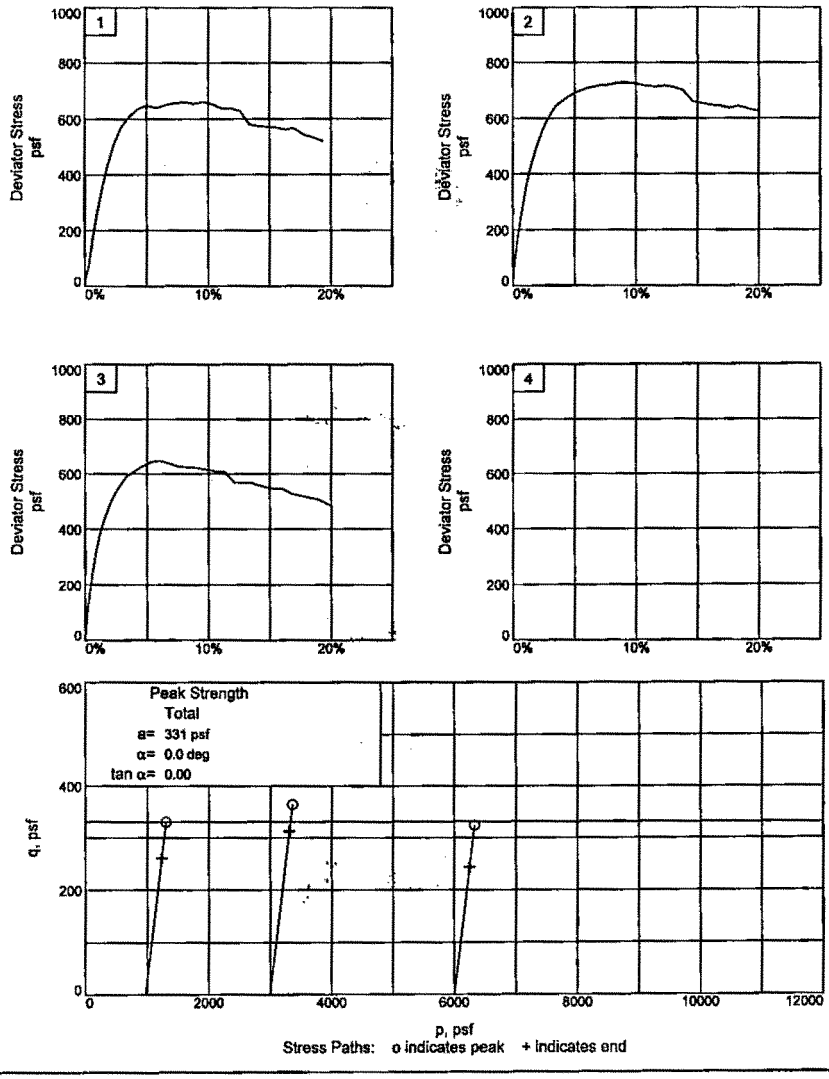
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-22U **Depth:** 36.8
Sample Number: 10B
Proj. No.: 07-022135 **Date Sampled:** 11/10/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

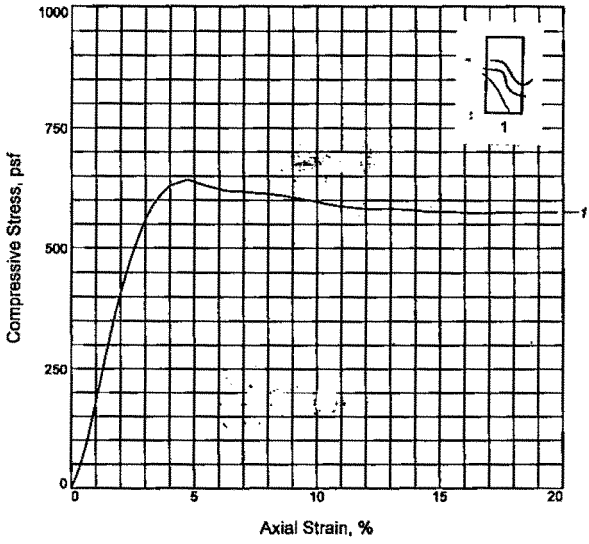
Tested By: ARS/JC **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-22U **Depth:** 36.8 **Sample Number:** 10B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: ARS/JC _____ **Checked By:** MS _____

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	642			
Undrained shear strength, psf	321			
Failure strain, %	4.7			
Strain rate, %/min.	1.00			
Water content, %	49.4			
Wet density, pcf	107.5			
Dry density, pcf	71.9			
Saturation, %	99.3			
Void ratio	1.3429			
Specimen diameter, in.	1.380			
Specimen height, in.	3.088			
Height/diameter ratio	2.24			

Description: SO GR CL6 W/ LYS ML

LL = 46	PL = 17	PI = 29	Assumed GS= 2.70	Type: UNDISTURBED

Project No.: 07-022135
Date Sampled: 11/10/09
Remarks:

Figure _____

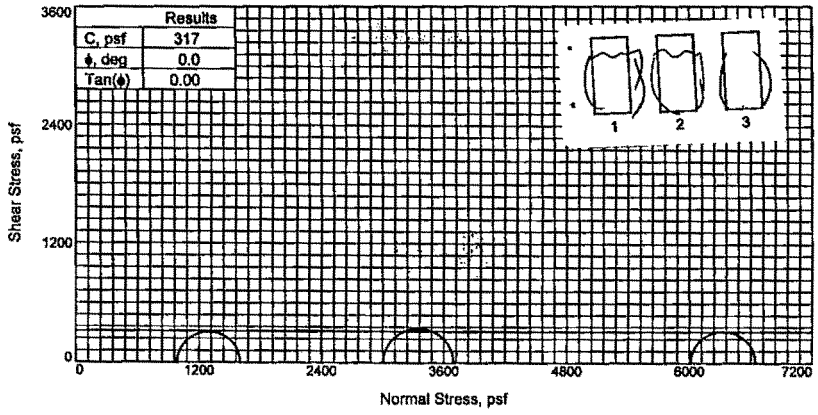
Client: U.S. Army Corps of Engineers

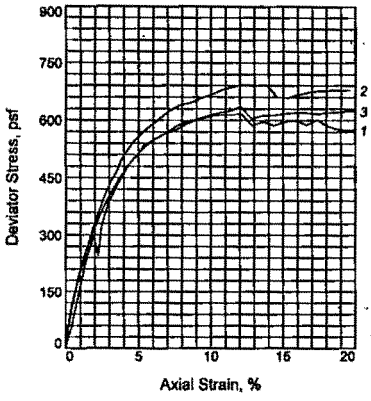
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-22U **Depth:** 40.8
Sample Number: 11B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: ARS/JC **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	42.5	42.2	39.6
	Dry Density, pcf	78.3	78.6	81.3
	Saturation, %	99.5	99.4	99.7
	Void Ratio	1.1531	1.1457	1.0733
	Diameter, in.	1.381	1.380	1.381
	Height, in.	3.066	3.079	3.081
At Test	Water Content, %	42.5	42.2	39.6
	Dry Density, pcf	78.3	78.6	81.3
	Saturation, %	99.5	99.4	99.7
	Void Ratio	1.1531	1.1457	1.0733
	Diameter, in.	1.381	1.380	1.381
	Height, in.	3.066	3.079	3.081
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.85	20.85	41.75
Fail. Stress, psf		616	692	635
Strain, %		12.1	12.3	12.1
Ult. Stress, psf		587	659	604
Strain, %				
σ_1 Failure, psf		1603	3694	6647
σ_3 Failure, psf		986	3002	6011

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CL6 W/ LYS & LNS ML

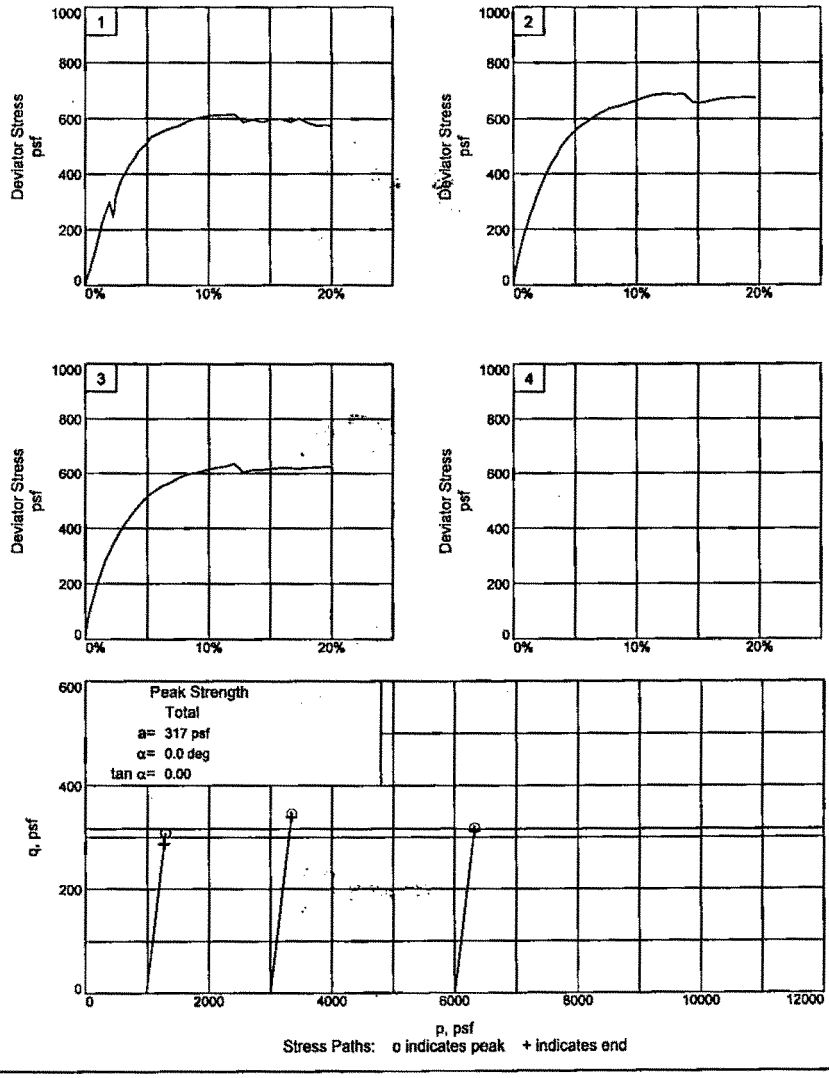
LL= 45 **PL=** 22 **PI=** 23
Assumed Specific Gravity= 2.70
Remarks:

Figure _____

Client: U.S. Army Corps of Engineers
[illegible]
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-22U **Depth:** 44.8
Sample Number: I2B
Proj. No.: 07-022135 **Date Sampled:** 11/10/09

TRIAXIAL SHEAR TEST REPORT
FFEBJV, LLC

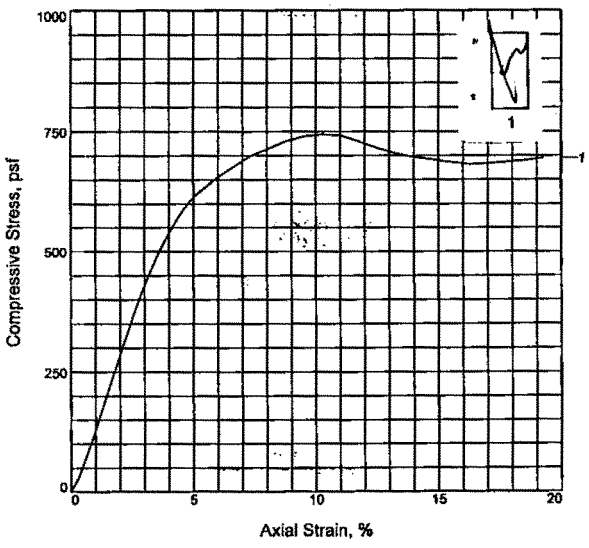
Tested By: ARS/JC **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-22U **Depth:** 44.8 **Sample Number:** 12B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: ARS/JC **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1				
Unconfined strength, psf	744				
Undrained shear strength, psf	372				
Failure strain, %	10.3				
Strain rate, %/min.	1.00				
Water content, %	37.8				
Wet density, pcf	113.1				
Dry density, pcf	82.0				
Saturation, %	96.8				
Void ratio	1.0544				
Specimen diameter, in.	1.381				
Specimen height, in.	3.068				
Height/diameter ratio	2.22				

Description: SO GR CL6 W/ LYS & LNS ML

LL = 40	PL = 20	PI = 20	Assumed GS= 2.70	Type: UNDISTURBED

Project No.: 07-022135
Date Sampled: 11/10/09
Remarks:

Figure _____

Client: U.S. Army Corps of Engineers

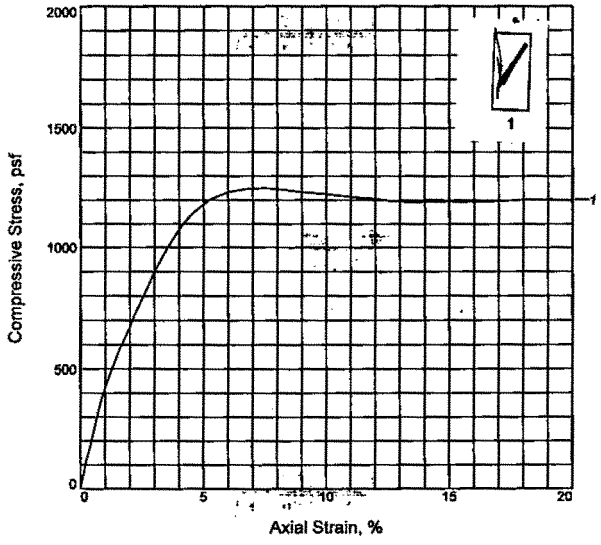
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-22U **Depth:** 45.7
Sample Number: 12C

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: ARS/JC **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	1250			
Undrained shear strength, psf	625			
Failure strain, %	7.5			
Strain rate, %/min.	1.00			
Water content, %	46.0			
Wet density, pcf	110.5			
Dry density, pcf	75.7			
Saturation, %	100.0			
Void ratio	1.2590			
Specimen diameter, in.	1.389			
Specimen height, in.	3.025			
Height/diameter ratio	2.18			

Description: M GR CH3 W/ LYS ML

LL = 58	PL = 19	PI = 39	Assumed GS= 2.74	Type: UNDISTURBED

Project No.: 07-022135
Date Sampled: 11/10/09
Remarks:

Figure _____

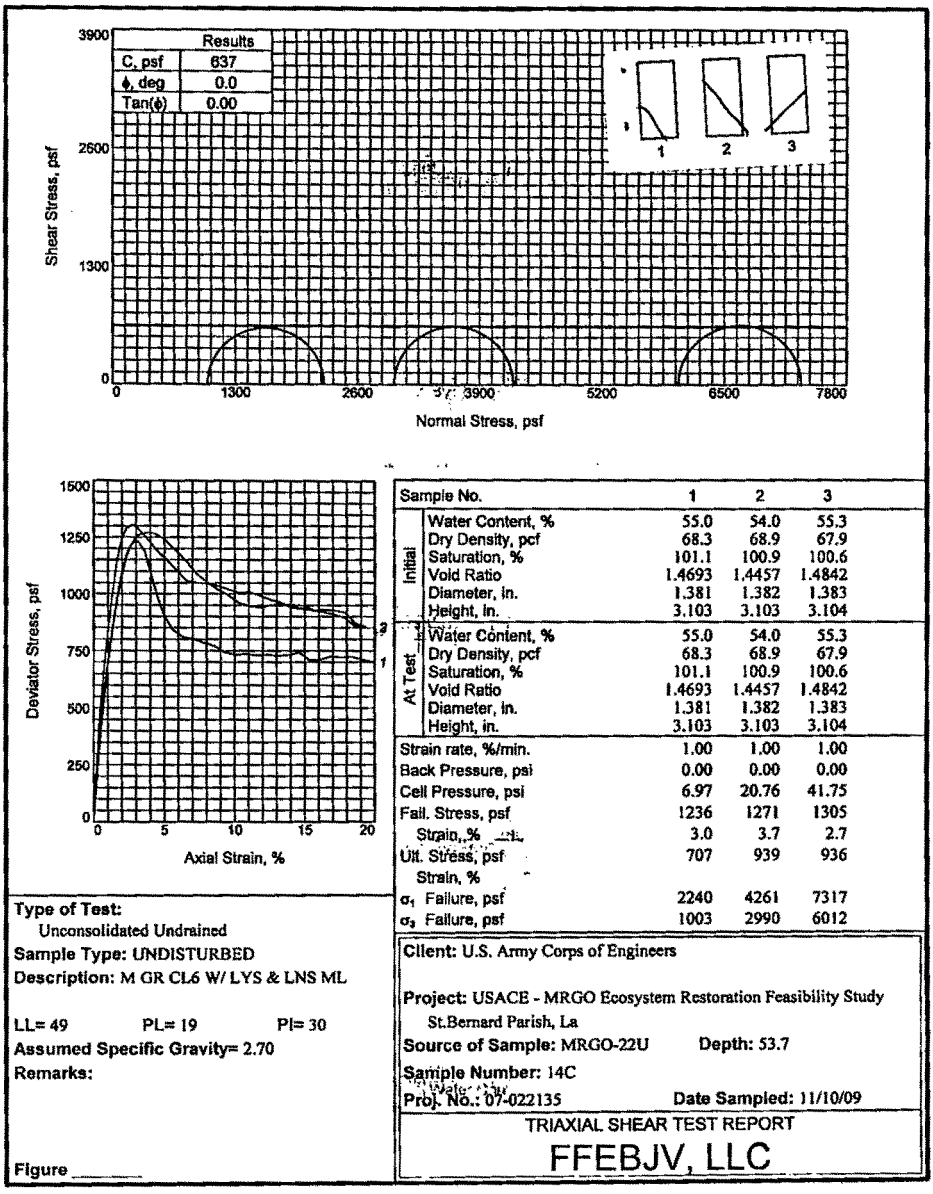
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-22U **Depth:** 48.8
Sample Number: 13B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: ARS/JC **Checked By:** MS



Sample No.		1	2	3
Initial	Water Content, %	55.0	54.0	55.3
	Dry Density, pcf	68.3	68.9	67.9
	Saturation, %	101.1	100.9	100.6
	Void Ratio	1.4693	1.4457	1.4842
	Diameter, in.	1.381	1.382	1.383
	Height, in.	3.103	3.103	3.104
At Test	Water Content, %	55.0	54.0	55.3
	Dry Density, pcf	68.3	68.9	67.9
	Saturation, %	101.1	100.9	100.6
	Void Ratio	1.4693	1.4457	1.4842
	Diameter, in.	1.381	1.382	1.383
	Height, in.	3.103	3.103	3.104
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.97	20.76	41.75
Fail. Stress, psf		1236	1271	1305
Strain, %		3.0	3.7	2.7
Ult. Stress, psf		707	939	936
Strain, %				
σ_1 Failure, psf		2240	4261	7317
σ_3 Failure, psf		1003	2990	6012

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: M GR CL6 W/ LYS & LNS ML

LL= 49 PL= 19 PI= 30
Assumed Specific Gravity= 2.70
Remarks:

Figure _____

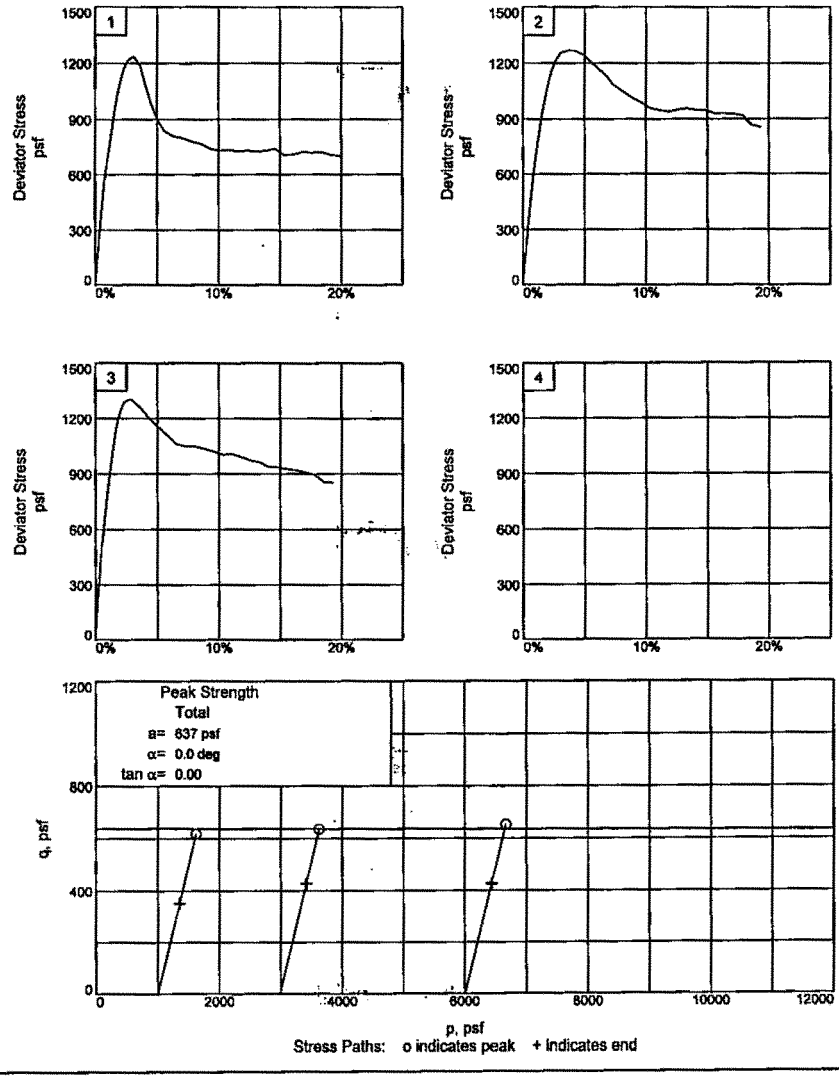
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-22U **Depth:** 53.7
Sample Number: 14C
Proj. No.: 07-022135 **Date Sampled:** 11/10/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

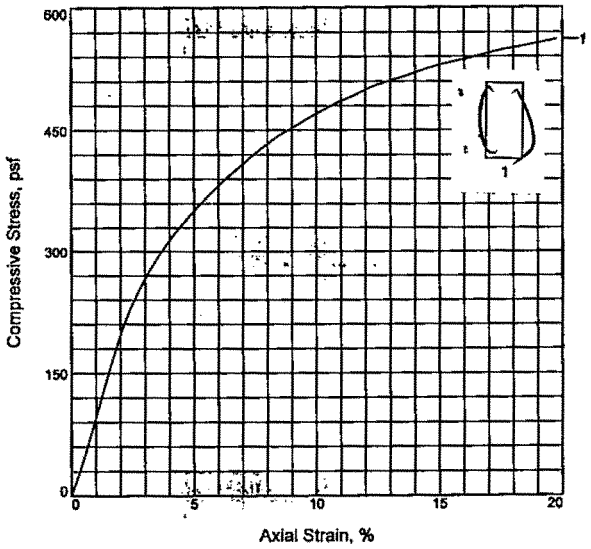
Tested By: ARS/JC **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-22U Depth: 53.7 Sample Number: 14C
Project No.: 07-022135 Figure _____ FFEBJV, LLC

Tested By: ARS/JC Checked By: MS

UNCONFINED COMPRESSION TEST



Sample No.	1				
Unconfined strength, psf	532				
Undrained shear strength, psf	266				
Failure strain, %	15.3				
Strain rate, %/min.	1.00				
Water content, %	38.6				
Wet density, pcf	113.1				
Dry density, pcf	81.6				
Saturation, %	97.2				
Void ratio	1.0808				
Specimen diameter, in.	1.381				
Specimen height, in.	3.083				
Height/diameter ratio	2.23				

Description: SO GR CH4 W/ ARS & LNS ML

LL = 73	PL = 21	PI = 52	Assumed GS= 2.72	Type: 10.0

Project No.: 07-022135
Date Sampled: 11/10/09
Remarks:

Figure _____

Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-22U **Depth:** 56.8
Sample Number: 15B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: ARS/JC **Checked By:** MS

SUMMARY OF LABORATORY TEST RESULTS

Project: MRGO Ecosystem Restoration Feasibility Study Assigned By: _____

Project Number: 07-022135 Current Date: 2/4/2010
Boring: MRGO-23U

Sample Number	Depth	Visual Classification	USCS	E(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
1A	0.0	VSO DGR CH3 W/ ARS SM, SIF	CH3		83												
1B	0.8	VSO DGR CH3 W/ ARS SM, SIF, O	CH3		78												
1C	1.7	VSO GR & DGR CHOB W/ WD, RT	CHOB		180												
1D	2.6	VSO GR & DGR CH4 W/ ARS SM, O, RT	CH4		75												
2A	4.0	VSO GR CL4 W/ ARS ML	CL4		45												
2B	4.8	VSO GR CL4 W/ ARS ML	CL4		49				UU				35	24	11	0.09	NOT TESTABLE
2C	5.7	VSO GR CH4 W/ ARS ML, RT, WD	CH4		83	52	96	100	UU	0	148		91	27	64	0.15	
2D	6.6	VSO GR CH4 W/ ARS ML, RT, SIF, WD	CH4		79												
3A	8.0	VSO GR CH4 W/ ARS ML, WD	CH4		55												
3B	8.8	GR SM W/ LYS CH	SM		41												
3C	9.7	VSO GR CL W/ ARS & LNS CH, RT, O	CL		39	81	112	96					32	23	9		CON, GS
3D	10.6	VSO GR CL4 W/ LYS SM, SIF	CL4		41				UC				36	24	12	0.10	NOT TESTABLE
4A	12.0	VSO GR CH3 W/ ARS SM, SIF	CH3		51												
4B	12.8	VSO GR CH4 W/ ARS SM, SIF	CH4		82	54	99	100	UU	0	150		86	26	60	0.11	
4C	13.7	SO GR CH3 W/ ARS SM	CH3		48												
4D	14.6	SO GR CH3 W/ ARS SM, WD	CH3		47												
5A	16.0	SO GR CH2 W/ ARS SM, SIF	CH2		38												
5B	16.8	VSO GR CL4 W/ ARS CH, ARS SM, WD, SIF	CL4		43												
5C	17.7	SO GR CL4 W/ SIF, WD, ARS SM	CL4		53				UU				38	29	9	0.13	NOT TESTABLE
5D	18.6	GR SM W/ ARS CH, SIF	SM		34												
6A	20.0	GR SM W/ ARS CH, SIF	SM		32												
6B	20.5	GR SP W/ ARS CH	SP		25												
6	21.4	GR SM	SM		29												
7	24.0	GR SM W/ ARS CH, WD	SM		34												
8	26.5	GR SM	SM		24												
9A	28.0	SO GR CL6 W/ ARS ML, SIF	CL6		39												
9B	28.8	SO GR CL6 W/ ARS ML, O, SIF	CL6		46	77	112	100	UU	0	381		46	22	24	0.20	
9C	29.7	SO GR CH4 W/ LNS ML, WD, O	CH4		62	64	103	100					89	24	65		CON, Gs
9D	30.6	M GR CH3 W/ LYS & LNS ML, CC, WD	CH3		47												
10A	32.0	GR ML W/ LYS CH	ML		31												
10B	32.5	VSO GR CL4 W/ LYS SM, LYS ML, CC	CL4	11	44	78	113	100	UC	-	249	498	40	18	22	0.24	
10C	33.4	SO GR CL4 W/ LYS SM, LYS ML, CC	CL4		41												
10D	34.3	SO GR CL4 W/ ARS SM, WD	CL4		37												
11A	36.0	GR ML W/ LYS CH	ML		32												

Remarks: _____
FFEB JV, LLC

Checked By: MS/WH
File Name: MRGO-23U.xls

SUMMARY OF LABORATORY TEST RESULTS

Project: MRGO Ecosystem Restoration Feasibility Study Assigned By: _____

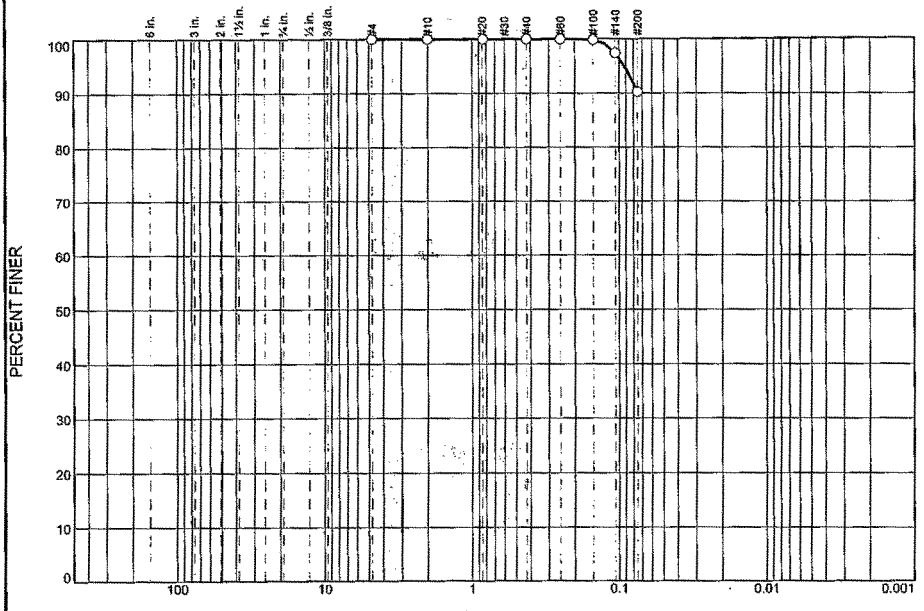
Project Number: 07-022135 Current Date: 2/4/2010
Boring: MRGO-23U

Sample Number	Depth	Visual Classification	USCS	E(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
11B	36.8	GR ML	ML		28								NP	NP	NP		SV
11C	37.7	GR ML W/ LYS CH, WD	ML		28												
12A	40.0	GR ML W/ LYS CH, CC	ML		29												
12B	40.8	GR ML W/ LYS CH, CC	ML		33												
12C	41.7	GR ML W/ ARS CH	ML		30												
13A	44.0	SO GR CL4 W/ LYS CH, WD	CL4		39												
13B	44.8	GR ML W/ LYS CH	ML		36				UC				NP	NP	NP		NOT TESTABLE
13C	45.7	SO GR CL4 W/ LYS CH	CL4	10	38	85	117	100	UC	-	458	916	39	26	13	0.17	
14A	48.0	M GR CH3 W/ LYS ML	CH3		53												
14B	48.8	M GR CH2 W/ LYS SM	CH2		45												
14C	49.7	M GR CH2 W/ LYS SM	CH2		45	77	111	100	UU	0	576		51	23	28	0.30	
14D	50.6	M GR CH3 W/ LYS SM	CH3		41												
15A	52.0	M GR CH3 W/ LYS SM	CH3		41												
15B	52.8	M GR CH3 W/ LYS SM	CH3	9	44	78	113	100	UC	-	615	1230	58	22	36	0.35	
15C	53.7	SO GR CL4 W/ LYS & LNS SM	CL4		36	87	118	100	UU	0	490		34	22	12	0.23	
15D	54.6	M GR CL6 W/ LYS & LNS SM	CL6		35												
16A	56.0	M GR CL6 W/ LNS SM	CL6		36												
16B	56.8	M GR CL6 W/ LNS SM	CL6		34												
16C	57.7	M GR CH4 W/ LYS SM	CH4		43												
16D	58.6	M GR CH3 W/ LYS SM	CH3		36												

Remarks: _____
FFEB JV, LLC

Checked By: MS/WH
File Name: MRGO-23U.xls

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.0	0.0	9.8	90.2	

	Colloids	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○		NP	NP								

Material Description	USCS	AASHTO
○ GR ML	ML	

Project No. 07-022135 **Client:** U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
○ **Source of Sample:** MRGO-23U **Depth:** 36.8 **Sample Number:** 11B

Date: ○

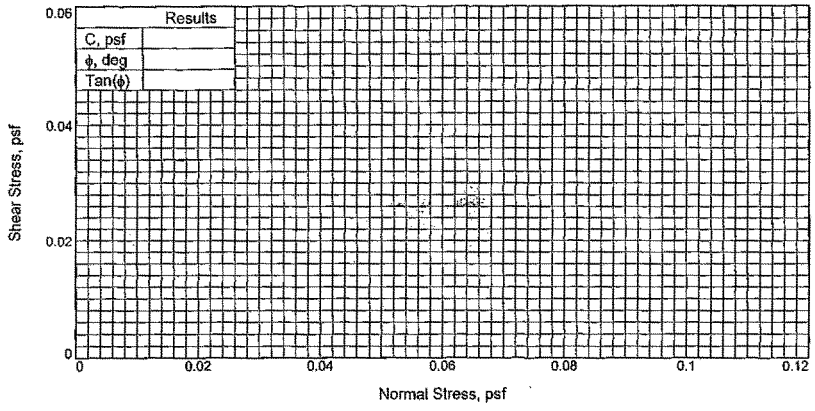
Remarks:

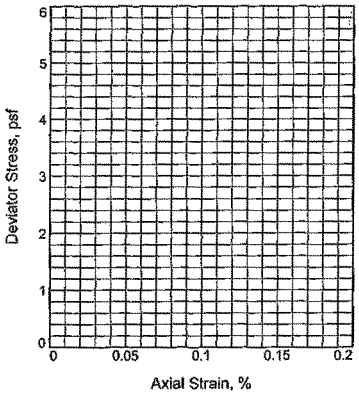
FFEBJV, LLC

St Rose, LA

Figure

Checked By: MS





Sample No.	
Initial	Water Content, % Dry Density, pcf Saturation, % Void Ratio Diameter, in. Height, in.
At Test	Water Content, % Dry Density, pcf Saturation, % Void Ratio Diameter, in. Height, in.
Strain rate, %/min.	
Back Pressure, psi	
Cell Pressure, psi	
Fail. Stress, psf	
Strain, %	
Ult. Stress, psf	
Strain, %	
σ_1 Failure, psf	
σ_3 Failure, psf	

Type of Test:
Unconsolidated Undrained
Sample Type:
Description: VSO GR CL4 W/ ARS ML

LL= 35 **PL=** 24 **PI=** 11
Assumed Specific Gravity=
Remarks: NOT TESTABLE

Figure _____

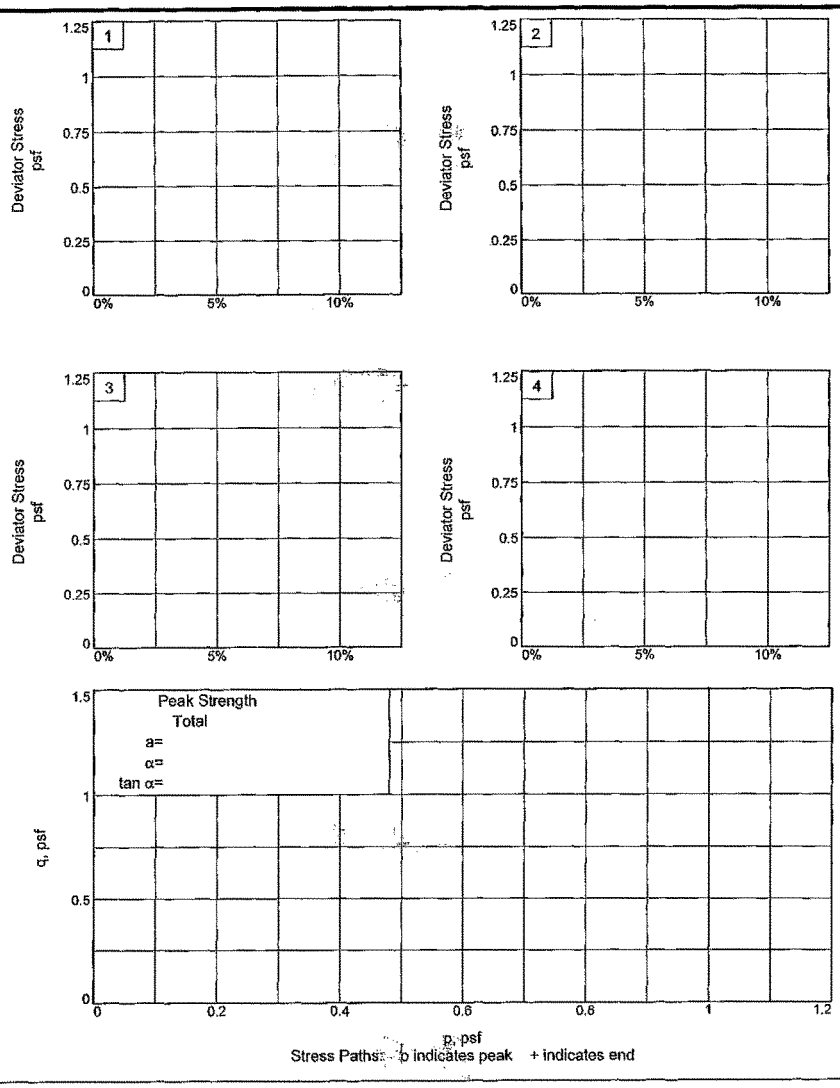
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-23U **Depth:** 4.8
Sample Number: 2B
Proj. No.: 07-022135 **Date Sampled:**

TRIAXIAL SHEAR TEST REPORT

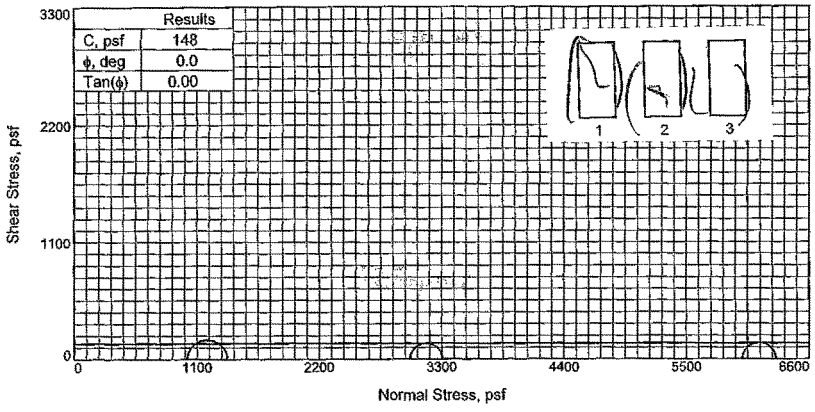
FFEBJV, LLC

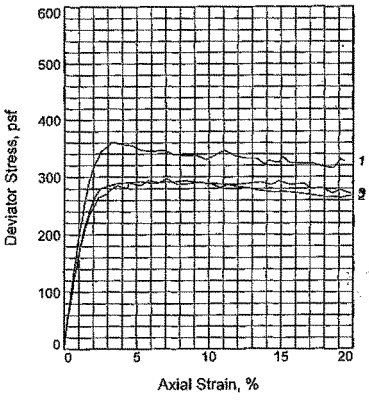
Checked By: MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-23U **Depth:** 4.8 **Sample Number:** 2B
Project No.: 07-022135 **Figure** _____ FFEBJV, LLC

Checked By: MS





Sample No.		1	2	3
Initial	Water Content, %	83.3	78.3	87.4
	Dry Density, pcf	52.6	54.6	49.9
	Saturation, %	101.7	100.9	98.9
	Void Ratio	2.2259	2.1102	2.4037
	Diameter, in.	1.410	1.410	1.413
	Height, in.	3.097	3.089	3.098
At Test	Water Content, %	83.3	78.3	87.4
	Dry Density, pcf	52.6	54.6	49.9
	Saturation, %	101.7	100.9	98.9
	Void Ratio	2.2259	2.1102	2.4037
	Diameter, in.	1.410	1.410	1.413
	Height, in.	3.097	3.089	3.098
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		7.03	20.93	41.70
Fail. Stress, psf		361	292	297
Strain, %		3.3	5.3	7.1
Ult. Stress, psf		326	274	286
Strain, %				
σ_1 Failure, psf		1373	3305	6302
σ_3 Failure, psf		1012	3013	6005

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: VSO GR CH4 W/ ARS ML, RT, WD

LL= 91 **PL=** 27 **PI=** 64
Assumed Specific Gravity= 2.72
Remarks:

Figure _____

Client: U.S. Army Corps of Engineers

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

Source of Sample: MRGO-23U **Depth:** 5.7

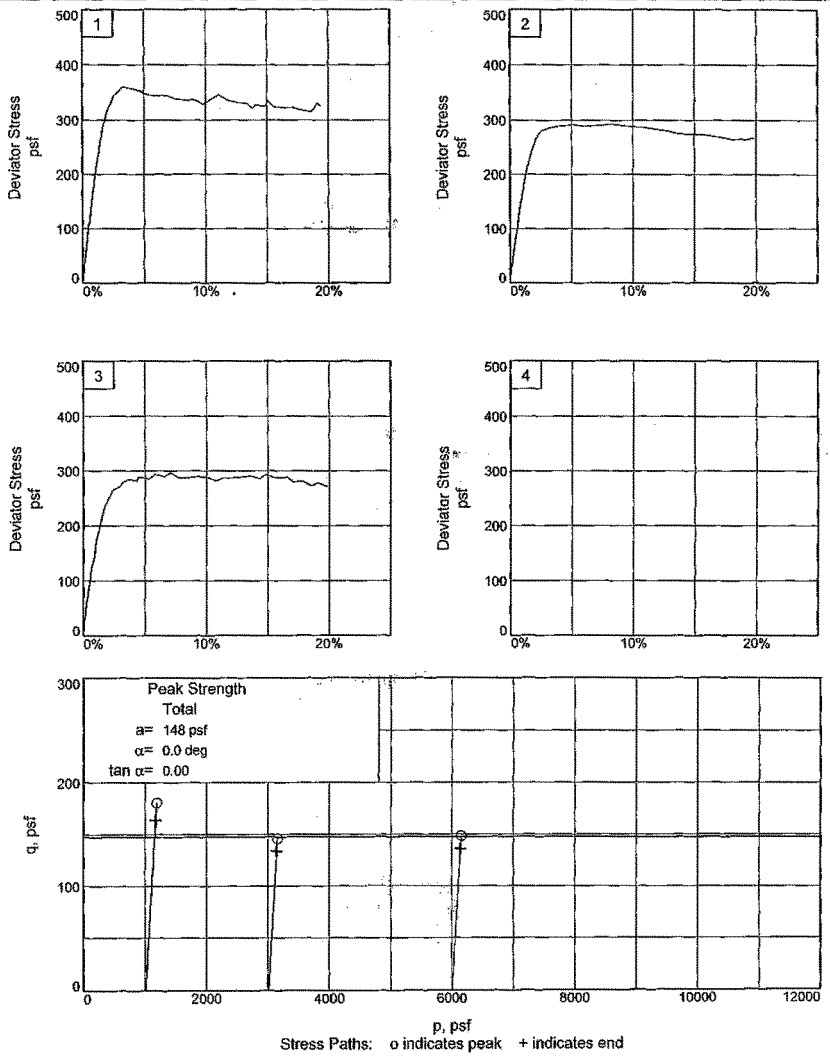
Sample Number: 2C

Proj. No.: 07-022135 **Date Sampled:** 1/7/10

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

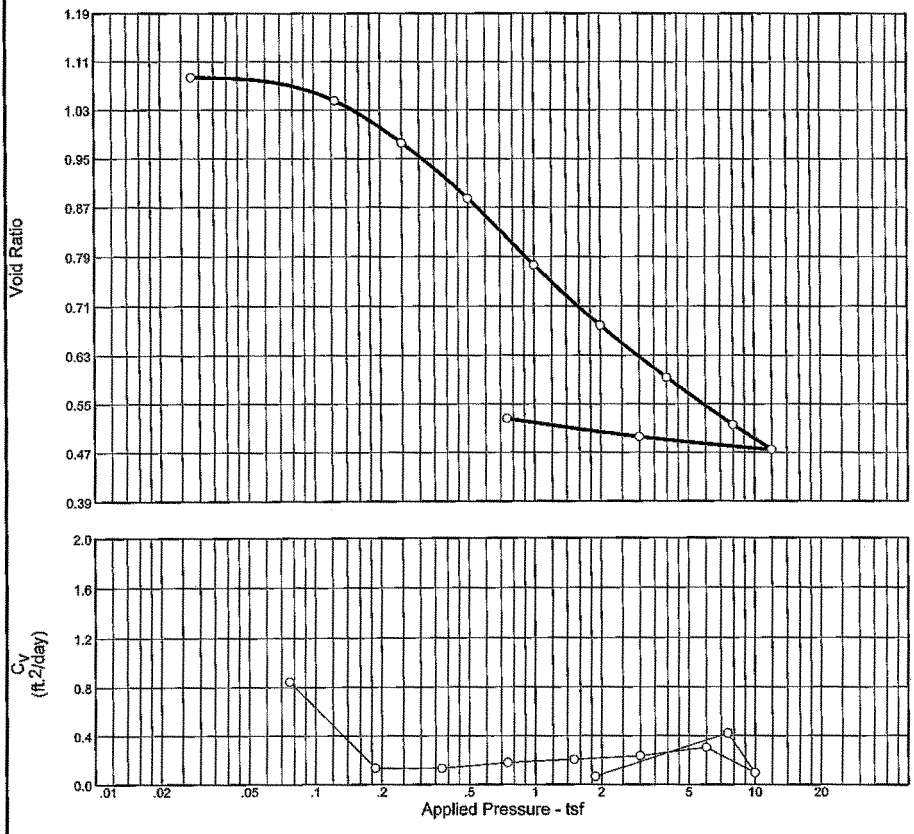
Tested By: ARS **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-23U **Depth:** 5.7 **Sample Number:** 2C
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: ARS **Checked By:** MS

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
96.3 %	39.0 %	80.5	32	9	2.70	0.19	0.35	1.094

MATERIAL DESCRIPTION	USCS	AASHTO
VSO GR CL W/ ARS & LNS CH, RT, O	CL	

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

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

Source: MRGO-23U **Sample No.:** 3C **Elev./Depth:** 9.7

FFEBJV, LLC

St Rose, LA

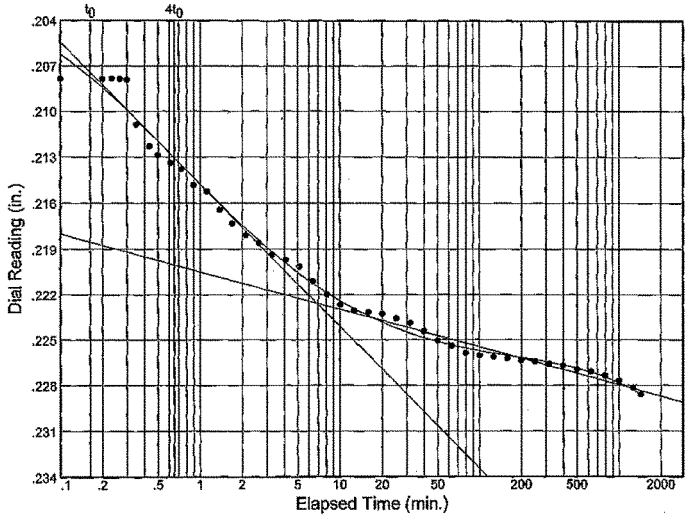
Remarks:
Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

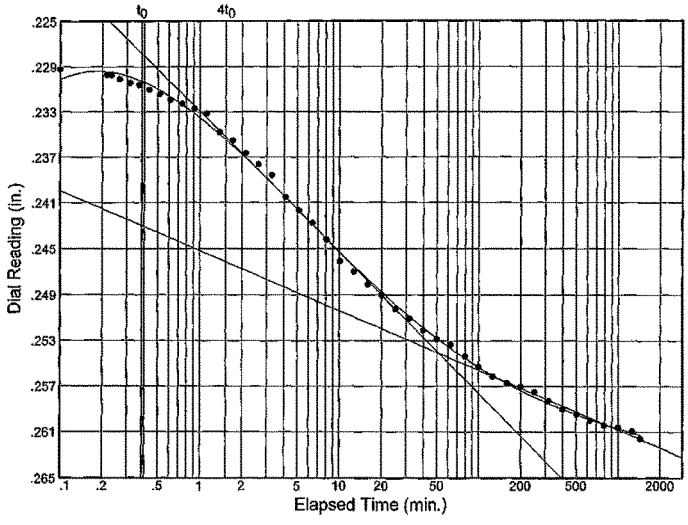
Source: MRGO-23U Sample No.: 3C Elev./Depth: 9.7



Load No.= 2
Load= 0.13 tsf
D_0 = 0.20242
D_{50} = 0.21249
D_{100} = 0.22257
T_{50} = 0.57 min.

C_v @ T_{50}
0.85 ft.2/day

C_α = 0.002



Load No.= 3
Load= 0.25 tsf
D_0 = 0.22510
D_{50} = 0.23959
D_{100} = 0.25408
T_{50} = 3.43 min.

C_v @ T_{50}
0.13 ft.2/day

C_α = 0.005

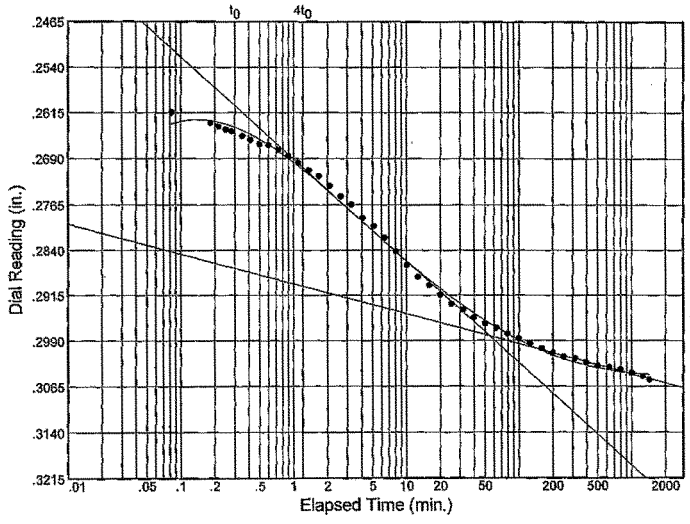
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

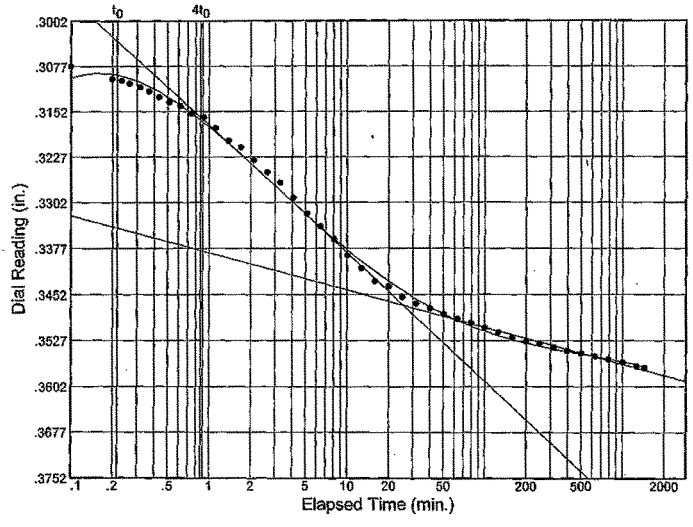
Source: MRGO-23U Sample No.: 3C Elev./Depth: 9.7



Load No.= 4
Load= 0.50 tsf
D_0 = 0.25692
D_{50} = 0.27757
D_{100} = 0.29822
T_{50} = 3.21 min.

C_v @ T_{50}
0.13 ft.2/day

C_α = 0.005



Load No.= 5
Load= 1.00 tsf
D_0 = 0.30172
D_{50} = 0.32431
D_{100} = 0.34690
T_{50} = 2.12 min.

C_v @ T_{50}
0.18 ft.2/day

C_α = 0.007

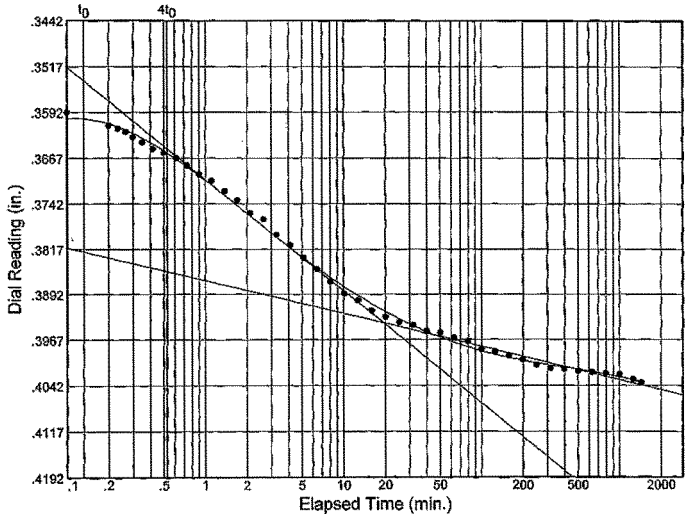
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

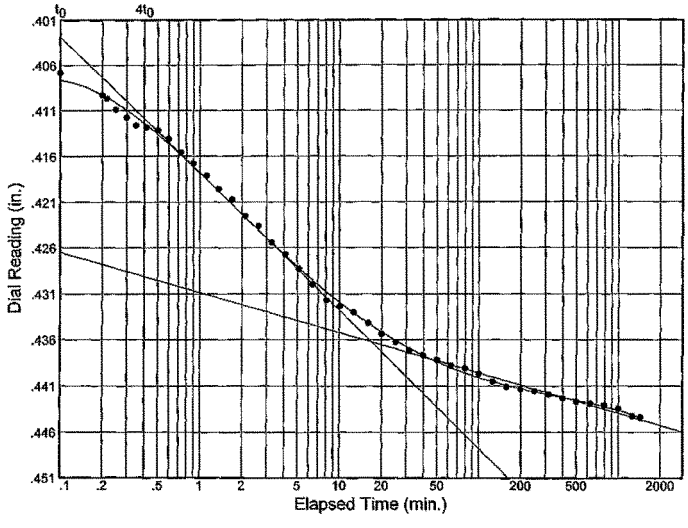
Source: MRGO-23U Sample No.: 3C Elev./Depth: 9.7



Load No.= 6
Load= 2.00 tsf
D_0 = 0.35465
D_{50} = 0.37428
D_{100} = 0.39391
T_{50} = 1.66 min.

C_v @ T_{50}
0.20 $ft.^2$/day

C_α = 0.006



Load No.= 7
Load= 4.00 tsf
D_0 = 0.40288
D_{50} = 0.41955
D_{100} = 0.43622
T_{50} = 1.30 min.

C_v @ T_{50}
0.23 $ft.^2$/day

C_α = 0.005

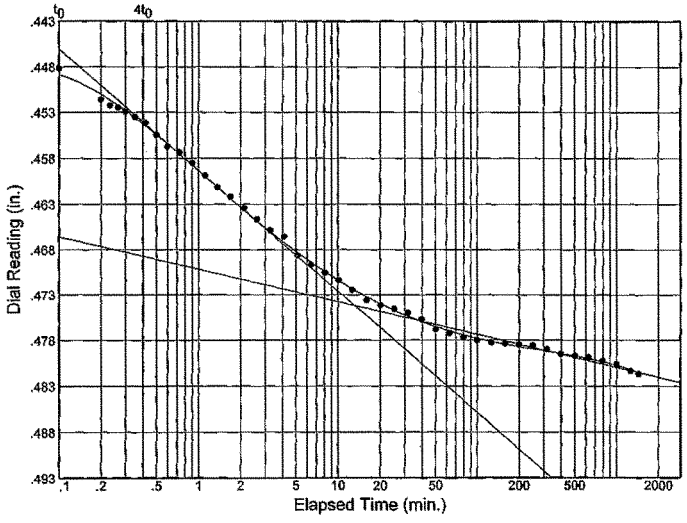
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

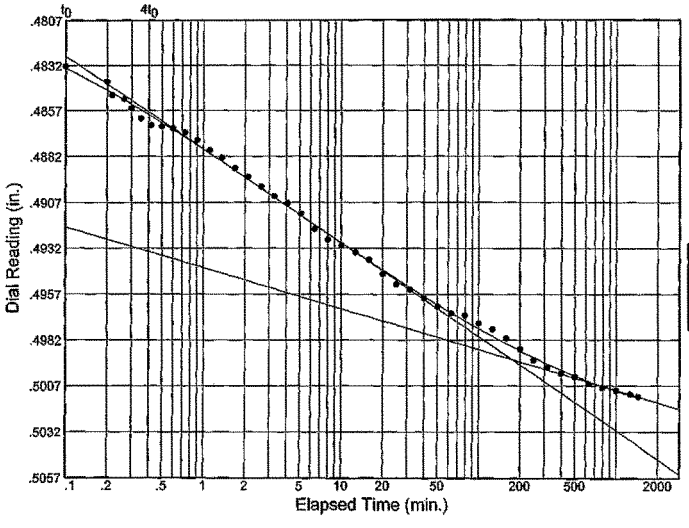
Source: MRGO-23U Sample No.: 3C Elev./Depth: 9.7



Load No.= 8
Load= 8.00 tsf
D_0 = 0.44346
D_{50} = 0.45883
D_{100} = 0.47421
T_{50} = 0.92 min.

C_v @ T_{50}
0.30 ft.^{2}/day

C_α = 0.005



Load No.= 9
Load= 12.00 tsf
D_0 = 0.48077
D_{50} = 0.49001
D_{100} = 0.49926
T_{50} = 2.71 min.

C_v @ T_{50}
0.09 ft.^{2}/day

C_α = 0.003

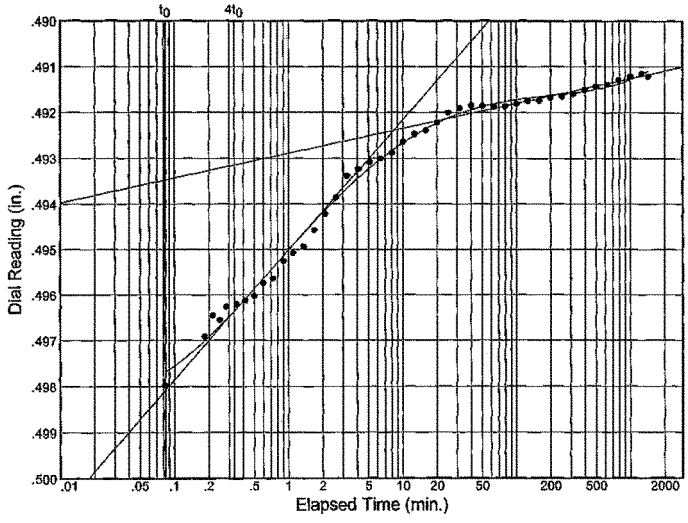
FFEBJV, LLC

Figure

Dial Reading vs. Time

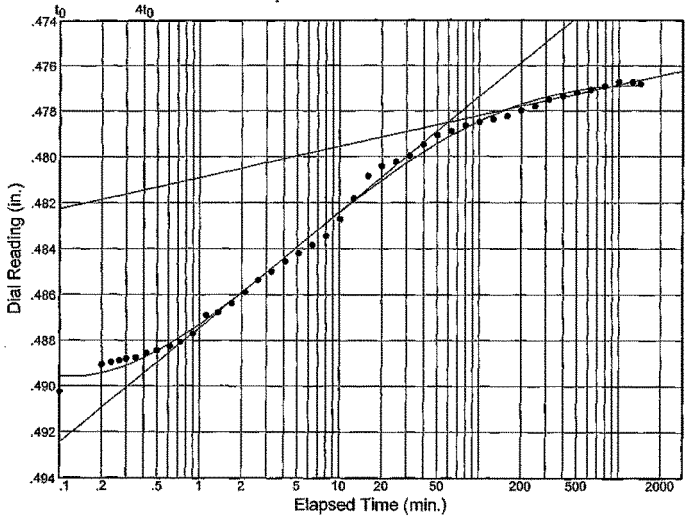
Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-23U Sample No.: 3C Elev./Depth: 9.7



Load No.= 10
Load= 3.00 tsf
D_0 = 0.49901
D_{50} = 0.49570
D_{100} = 0.49239
T_{50} = 0.58 min.

C_v @ T_{50}
0.42 ft.2/day



Load No.= 11
Load= 0.75 tsf
D_0 = 0.49034
D_{50} = 0.48443
D_{100} = 0.47851
T_{50} = 3.99 min.

C_v @ T_{50}
0.06 ft.2/day

FFEBJV, LLC

Figure

CONSOLIDATION TEST DATA

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Contract No. W912P8-07-D-0022
Task Order 135
Project Number: 07-022135

Sample Data

Source: MRGO-23U
Sample No.: 3C
Elev. or Depth: 9.7 Sample Length(in./cm.):
Location:
Description: VSO GR CL W/ ARS & LNS CH, RT, O
Liquid Limit: 32 Plasticity Index: 9
USCS: CL AASHTO: Figure No.:
Testing Remarks: Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST		AFTER TEST	
Wet w+t	= 139.01 g.	Consolidometer #	= 1	Wet w+t	= 403.14 g.
Dry w+t	= 100.00 g.			Dry w+t	= 333.43 g.
Tare Wt.	= .00 g.	Spec. Gravity	= 2.70	Tare Wt.	= 111.83 g.
Height	= 1.00 in.	Height	= 1.00 in.		
Diameter	= 4.00 in.	Diameter	= 4.00 in.		
Weight	= 369.35 g.	Defl. Table	= n/a		
Moisture	= 39.0 %	Ht. Solids	= 0.4781 in.	Moisture	= 31.5 %
Wet Den.	= 111.9 pcf	Dry Wt.	= 265.63 g.*	Dry Wt.	= 221.60 g.
Dry Den.	= 80.5 pcf	Void Ratio	= 1.094	Void Ratio	= 0.526
		Saturation	= 96.3 %		

* Initial dry weight used in calculations

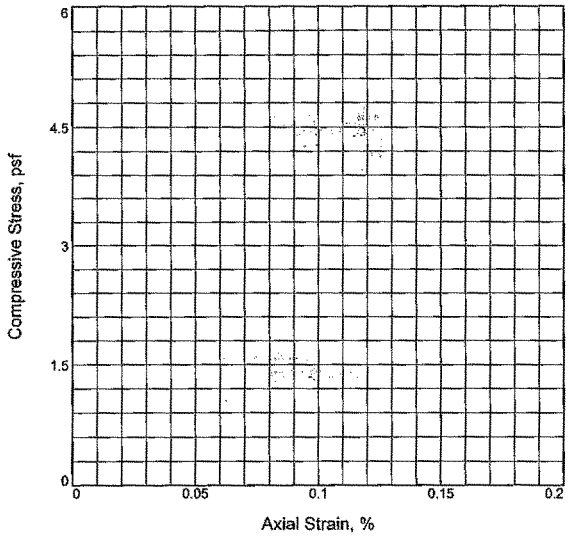
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.20509				1.094	
0.03	0.21008	0.00000			1.084	0.5 Comprs.
0.13	0.22860	0.00000	0.85	0.002	1.045	2.3 Comprs.
0.25	0.26159	0.00000	0.13	0.005	0.976	5.6 Comprs.
0.50	0.30547	0.00000	0.13	0.005	0.884	10.0 Comprs.
1.00	0.35715	0.00000	0.18	0.007	0.776	15.2 Comprs.
2.00	0.40381	0.00000	0.20	0.006	0.679	19.8 Comprs.
4.00	0.44443	0.00000	0.23	0.005	0.594	23.9 Comprs.
8.00	0.48170	0.00000	0.30	0.005	0.516	27.6 Comprs.

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
12.00	0.50130	0.00000	0.09	0.003	0.475	29.6 Comprs.
3.00	0.49121	0.00000	0.42		0.496	28.6 Comprs.
0.75	0.47682	0.00000	0.06		0.526	27.1 Comprs.

C_c = 0.35 P_c = 0.19 tsf C_r = 0.04

UNCONFINED COMPRESSION TEST



Sample No.				
Unconfined strength, psf				
Undrained shear strength, psf				
Failure strain, %				
Strain rate, %/min.				
Water content, %				
Wet density, pcf				
Dry density, pcf				
Saturation, %				
Void ratio				
Specimen diameter, in.				
Specimen height, in.				
Height/diameter ratio				

Description: VSO GR CL4 W/ LYS SM, SIF

LL = 36	**PL** = 24	**PI** = 12	**Assumed GS=**	**Type:**

Project No.: 07-022135
Date Sampled:
Remarks:
NOT TESTABLE, SLUMPING

Figure _____

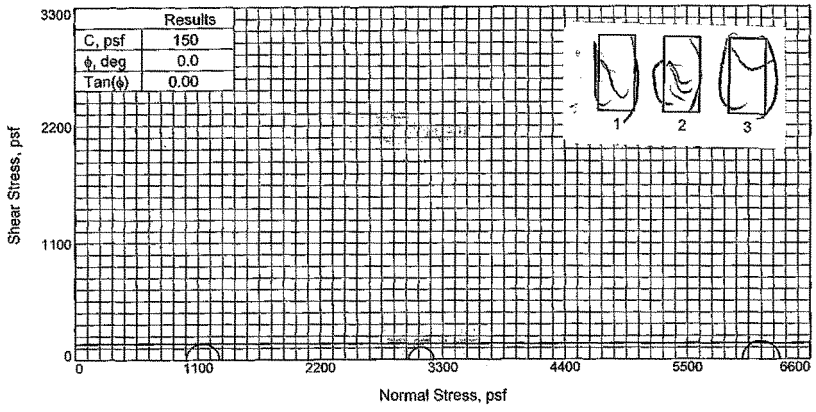
Client: U.S. Army Corps of Engineers

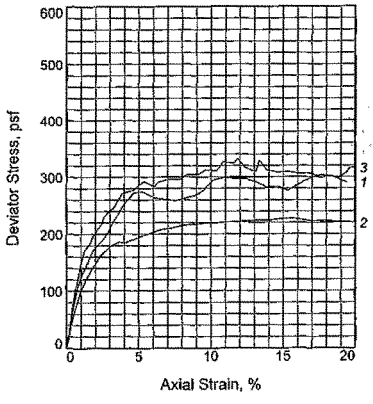
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-23U **Depth:** 10.6
Sample Number: 3D

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Checked By: MS





Sample No.		1	2	3
Initial	Water Content, %	80.2	83.1	83.9
	Dry Density, pcf	55.0	53.7	53.6
	Saturation, %	104.2	104.2	104.8
	Void Ratio	2.1080	2.1871	2.1935
	Diameter, in.	1.385	1.390	1.382
	Height, in.	3.084	3.091	3.089
At Test	Water Content, %	80.2	83.1	83.9
	Dry Density, pcf	55.0	53.7	53.6
	Saturation, %	104.2	104.2	104.8
	Void Ratio	2.1080	2.1871	2.1935
	Diameter, in.	1.385	1.390	1.382
	Height, in.	3.084	3.091	3.089
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.91	20.78	41.64
Fail. Stress, psf		299	227	332
Strain, %		10.9	14.9	11.8
Ult. Stress, psf		276	227	309
Strain, %				
σ_1 Failure, psf		1294	3219	6328
σ_3 Failure, psf		995	2992	5996

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: VSO GR CH4 W/ ARS SM, SIF

LL= 86 **PL=** 26 **PI=** 60
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

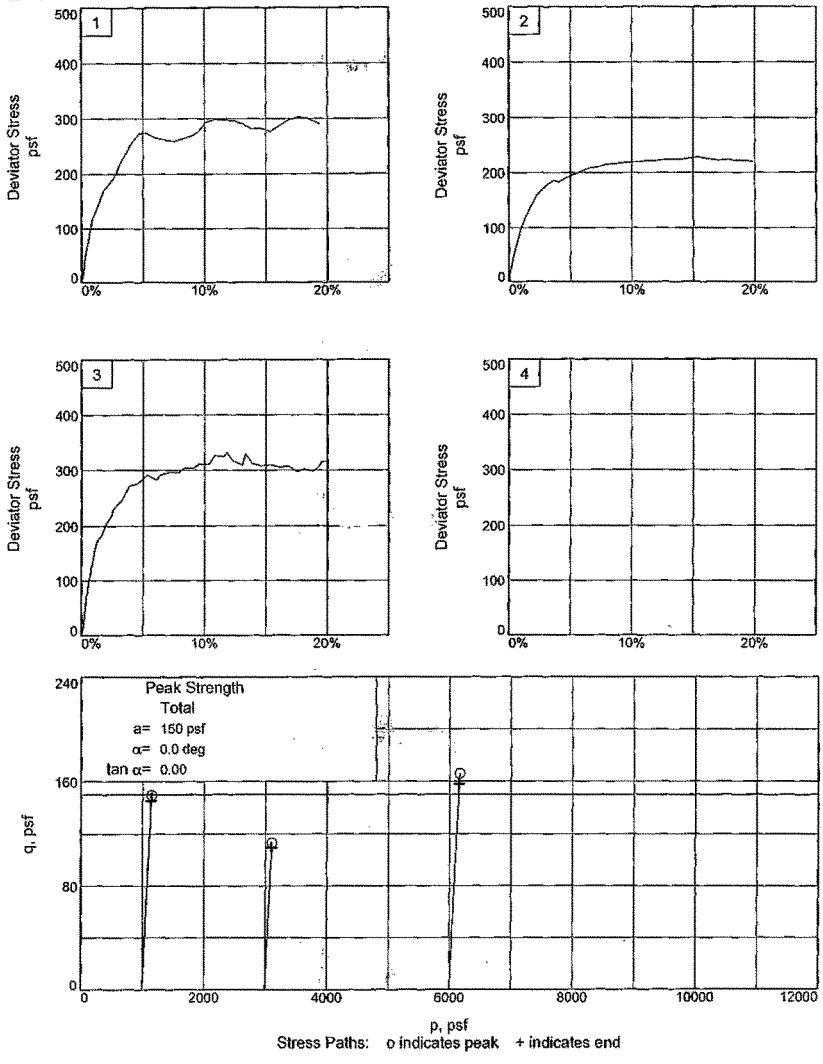
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-23U **Depth:** 12.8
Sample Number: 4B
Proj. No.: 07-022135 **Date Sampled:** 12/4/09

TRIAXIAL SHEAR TEST REPORT

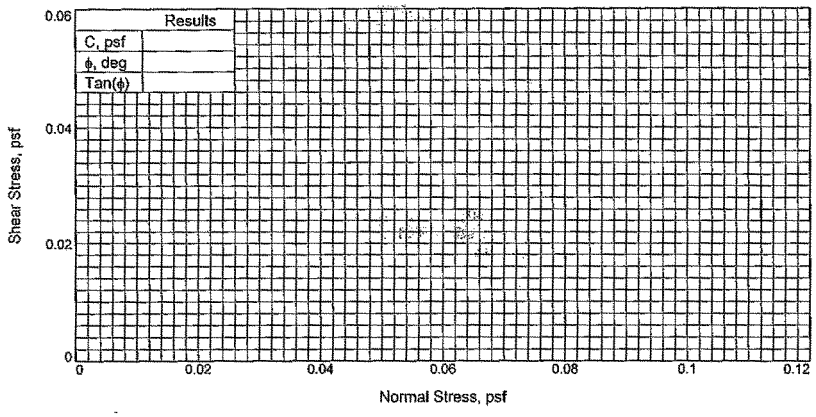
FFEBJV, LLC

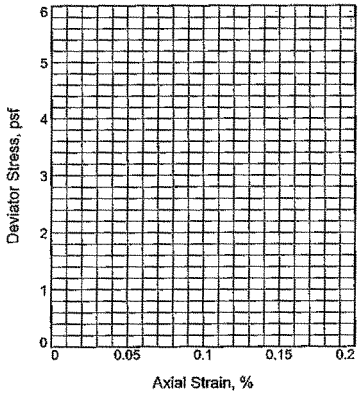
Tested By: JC/ARS **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-23U **Depth:** 12.8 **Sample Number:** 4B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: JC/ARS **Checked By:** MS





Sample No.	
Initial	Water Content, % Dry Density, pcf Saturation, % Void Ratio Diameter, in. Height, in.
At Test	Water Content, % Dry Density, pcf Saturation, % Void Ratio Diameter, in. Height, in.
Strain rate, %/min.	
Back Pressure, psi	
Cell Pressure, psi	
Fail. Stress, psf	
Strain, %	
Ult. Stress, psf	
Strain, %	
σ_1 Failure, psf	
σ_3 Failure, psf	

Type of Test:
Unconsolidated Undrained
Sample Type:
Description: SO GR CL4 W/ SIF, WD, ARS SM

LL= 38 **PL=** 29 **PI=** 9
Assumed Specific Gravity=
Remarks: NOT TESTABLE, SAMPLE DISTURBED BY WOOD

Figure _____

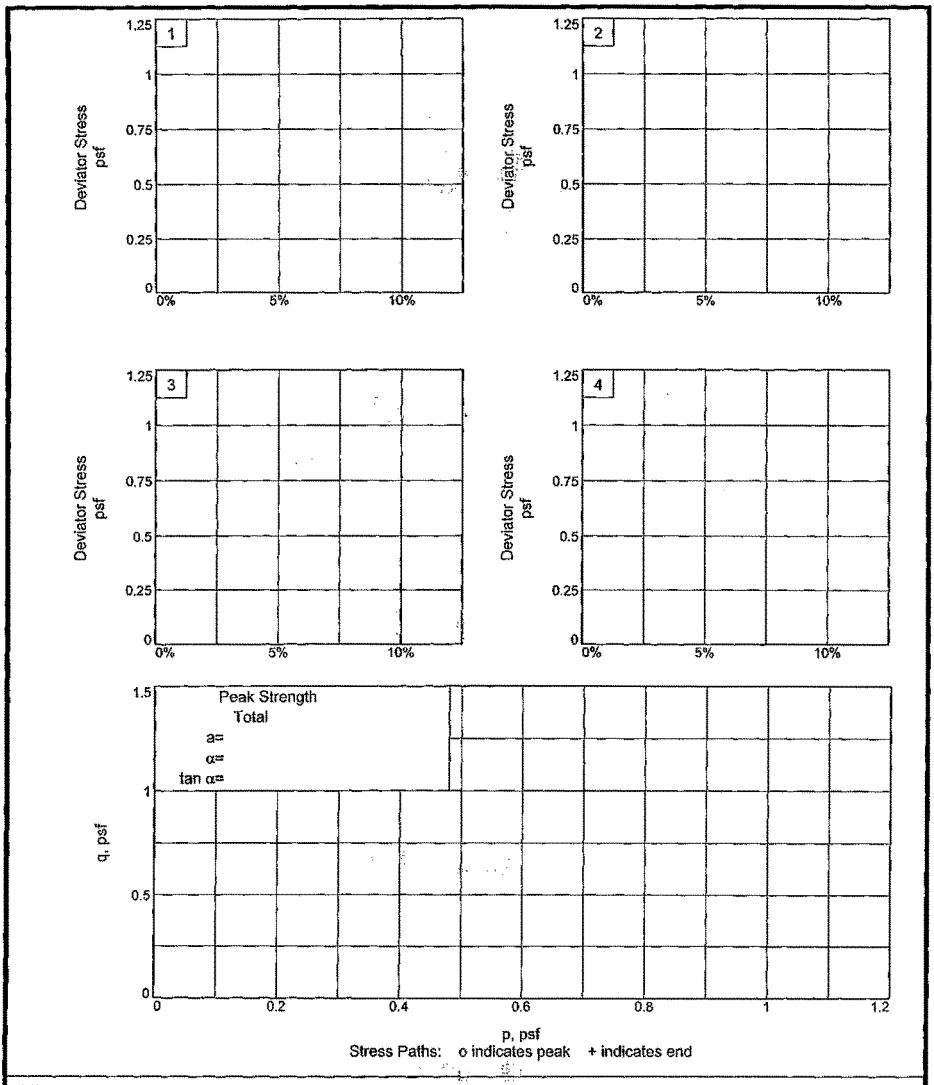
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-23U **Depth:** 17.7
Sample Number: 5C
Proj. No.: 07-022135 **Date Sampled:**

TRIAXIAL SHEAR TEST REPORT

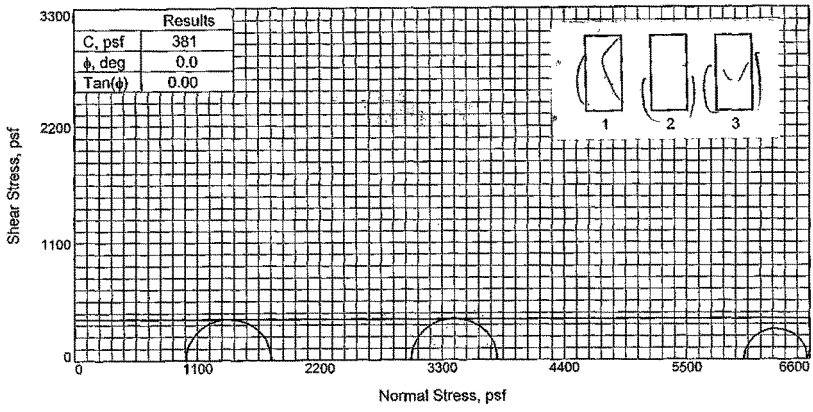
FFEBJV, LLC

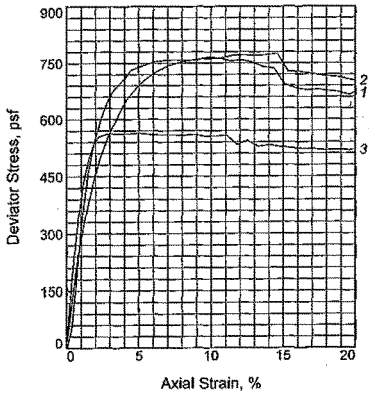
Checked By: MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-23U **Depth:** 17.7 **Sample Number:** 5C
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Checked By: MS





Sample No.		1	2	3
Initial	Water Content, %	43.5	38.8	54.3
	Dry Density, pcf	79.2	84.4	68.8
	Saturation, %	104.2	105.0	101.2
	Void Ratio	1.1271	0.9973	1.4487
	Diameter, in.	1.383	1.380	1.394
	Height, in.	3.087	3.092	3.098
At Test	Water Content, %	43.5	38.8	54.3
	Dry Density, pcf	79.2	84.4	68.8
	Saturation, %	104.2	105.0	101.2
	Void Ratio	1.1271	0.9973	1.4487
	Diameter, in.	1.383	1.380	1.394
	Height, in.	3.087	3.092	3.098
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.93	20.98	41.78
Fail. Stress, psf		766	776	564
Strain, %		9.8	14.6	5.1
Ult. Stress, psf		755	728	557
Strain, %				
σ_1 Failure, psf		1764	3797	6580
σ_3 Failure, psf		998	3022	6016

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CL6 W/ ARS ML, O, SIF

LL= 46 **PL=** 22 **PI=** 24
Assumed Specific Gravity= 2.70
Remarks:

Figure _____

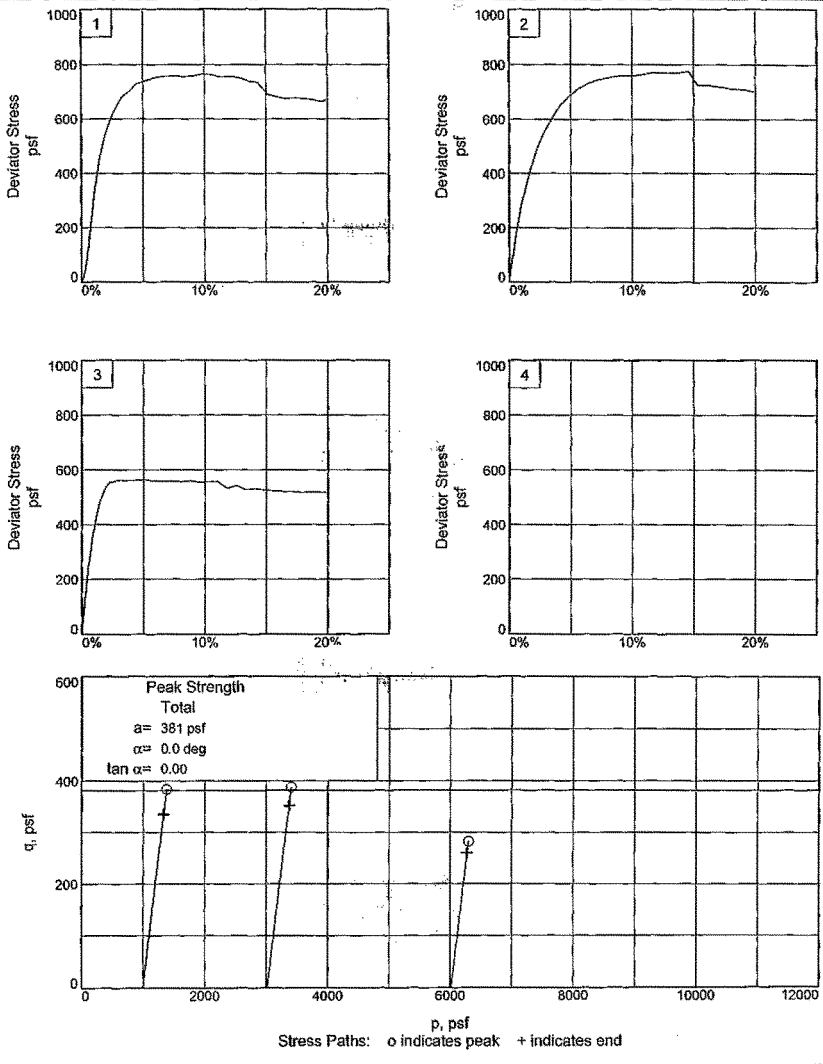
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-23U **Depth:** 28.8
Sample Number: 9B
Proj. No.: 07-022135 **Date Sampled:** 12/4/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

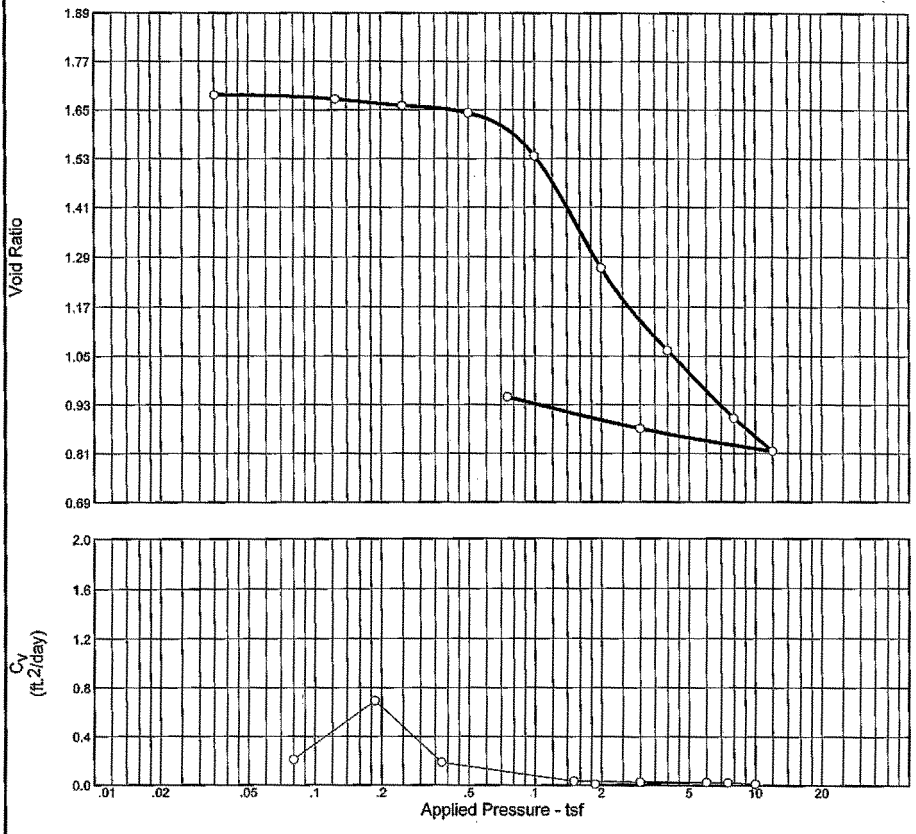
Tested By: JC/ARS **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-23U **Depth:** 28.8 **Sample Number:** 9B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: JC/ARS **Checked By:** MS

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
100.6 %	61.9 %	63.6	89	65	2.74	0.90	0.91	1.688

MATERIAL DESCRIPTION	USCS	AASHTO
SO GR CH4 W/ LNS ML, WD, O	CH4	

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

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

Source: MRGO-23U **Sample No.:** 9C **Elev./Depth:** 29.7

FFEBJV, LLC

St Rose, LA

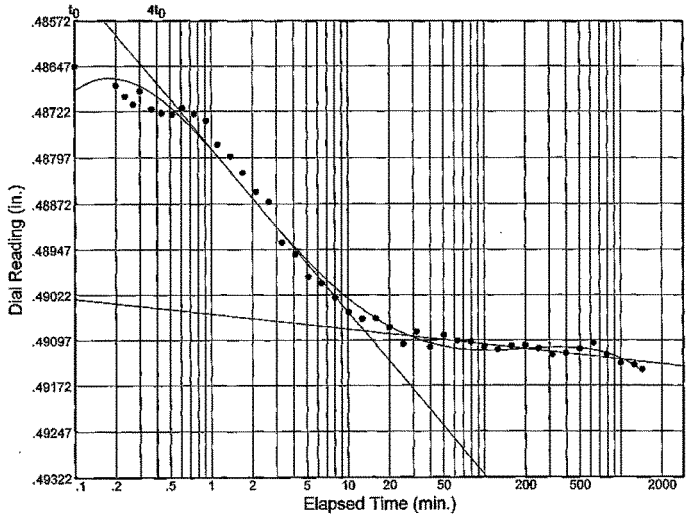
Remarks:
Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

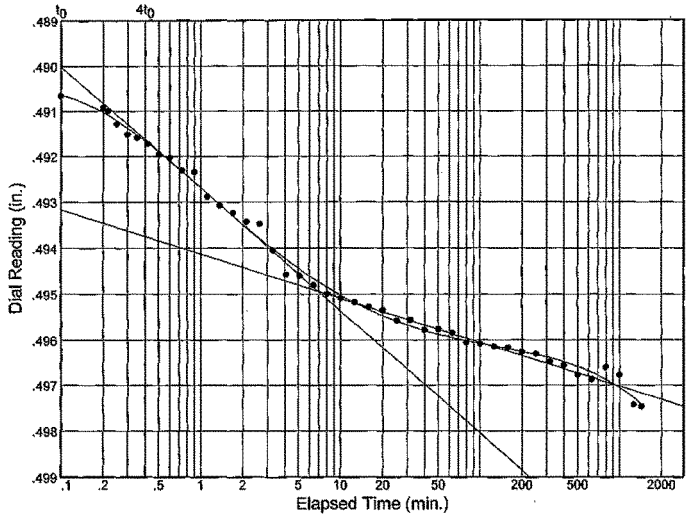
Source: MRGO-23U Sample No.: 9C Elev./Depth: 29.7



Load No.= 2
Load= 0.13 tsf
D_0 = 0.48680
D_{50} = 0.48881
D_{100} = 0.49082
T_{50} = 2.32 min.

C_v @ T_{50}
0.21 ft.2/day

C_α = 0.000



Load No.= 3
Load= 0.25 tsf
D_0 = 0.48962
D_{50} = 0.49228
D_{100} = 0.49494
T_{50} = 0.70 min.

C_v @ T_{50}
0.69 ft.2/day

C_α = 0.001

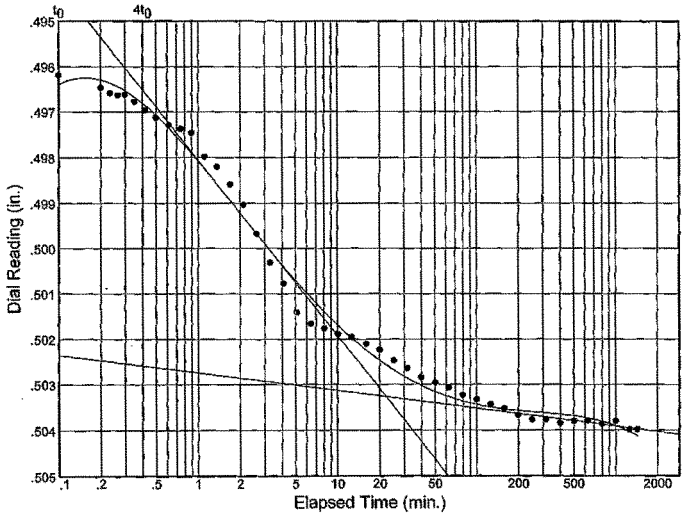
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

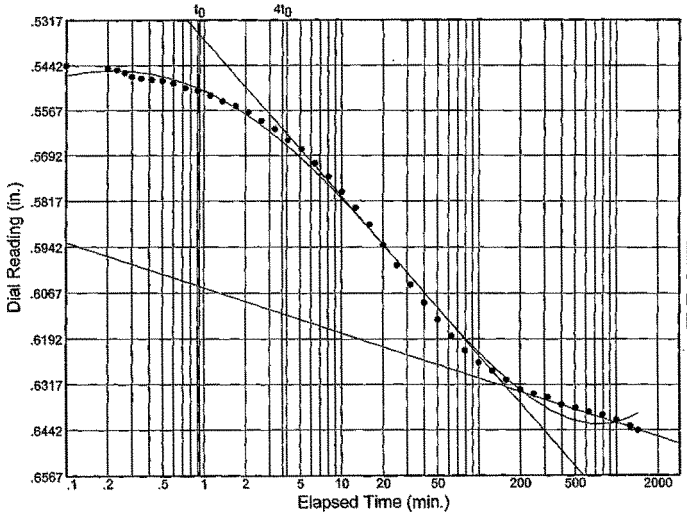
Source: MRGO-23U Sample No.: 9C Elev./Depth: 29.7



Load No.= 4
Load= 0.50 tsf
D_0 = 0.49599
D_{50} = 0.49963
D_{100} = 0.50327
T_{50} = 2.56 min.

C_v @ T_{50}
0.19 ft.2/day

C_α = 0.000



Load No.= 6
Load= 2.00 tsf
D_0 = 0.53600
D_{50} = 0.58417
D_{100} = 0.63234
T_{50} = 11.98 min.

C_v @ T_{50}
0.03 ft.2/day

C_α = 0.013

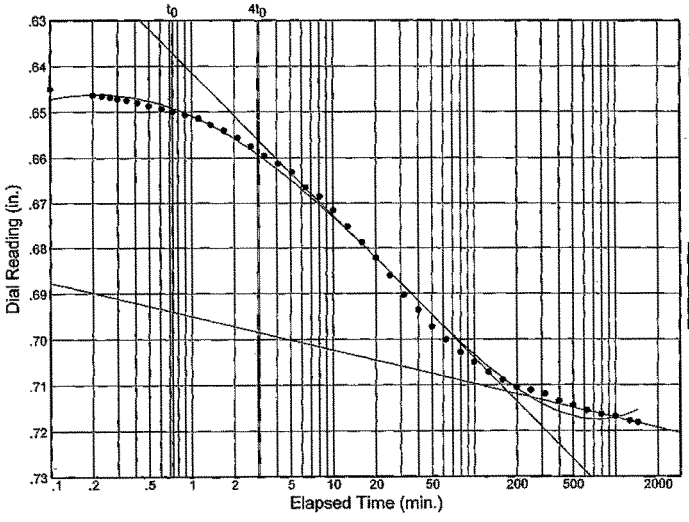
Figure

FFEBJV, LLC

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

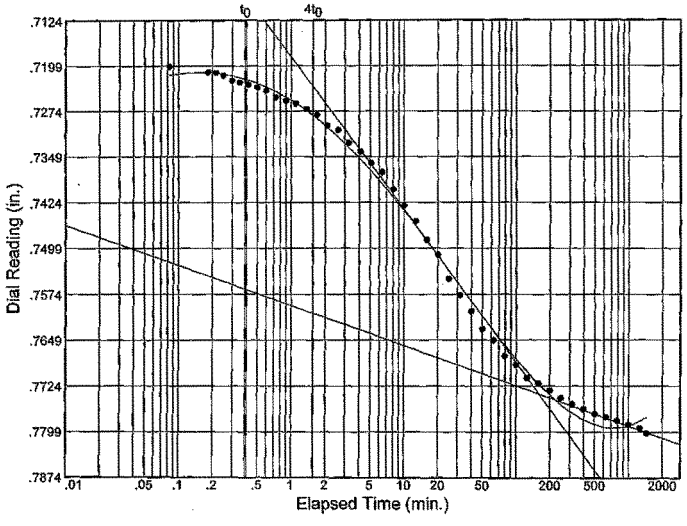
Source: MRGO-23U Sample No.: 9C Elev./Depth: 29.7



Load No.= 7
Load= 4.00 tsf
D_0 = 0.63920
D_{50} = 0.67533
D_{100} = 0.71145
T_{50} = 11.89 min.

C_v @ T_{50}
0.03 ft.2/day

C_α = 0.009



Load No.= 8
Load= 8.00 tsf
D_0 = 0.71607
D_{50} = 0.74489
D_{100} = 0.77371
T_{50} = 11.17 min.

C_v @ T_{50}
0.02 ft.2/day

C_α = 0.008

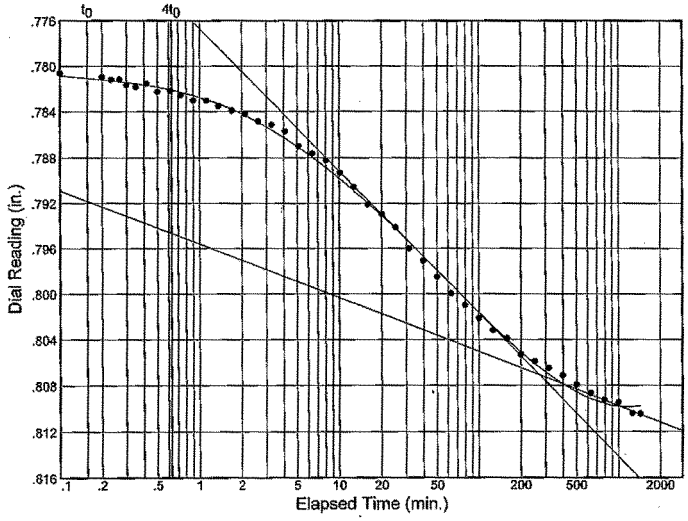
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

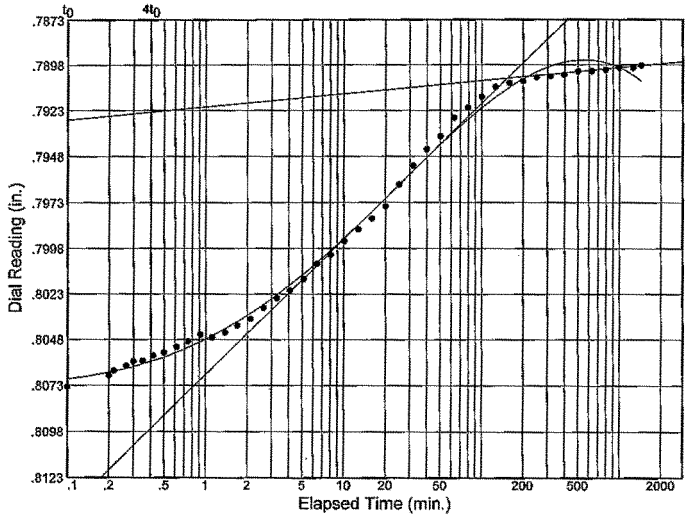
Source: MRGO-23U Sample No.: 9C Elev./Depth: 29.7



Load No.= 9
Load= 12.00 tsf
D_0 = 0.78003
D_{50} = 0.79356
D_{100} = 0.80708
T_{50} = 21.92 min.

C_v @ T_{50}
0.01 ft.^{2}/day

C_α = 0.007



Load No.= 10
Load= 3.00 tsf
D_0 = 0.80792
D_{50} = 0.79923
D_{100} = 0.79054
T_{50} = 10.14 min.

C_v @ T_{50}
0.02 ft.^{2}/day

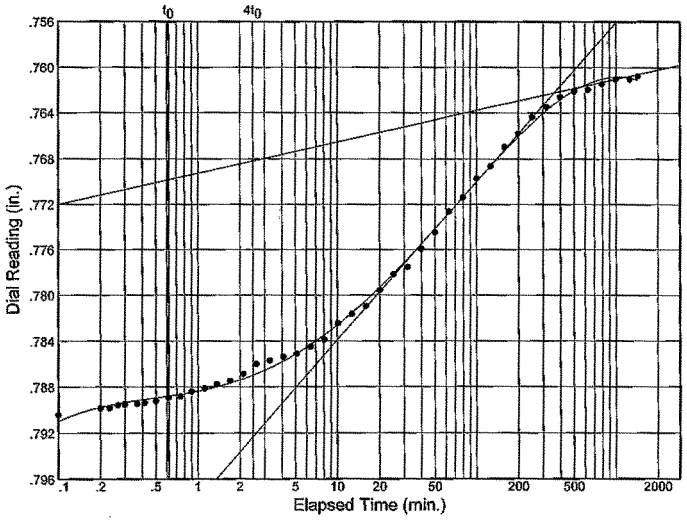
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-23U Sample No.: 9C Elev./Depth: 29.7



Load No.= 11
Load= 0.75 tsf
D_0 = 0.79062
D_{50} = 0.77643
D_{100} = 0.76225
T_{50} = 34.14 min.

C_v @ T_{50}
0.01 ft.2/day

FFEBJV, LLC

Figure

CONSOLIDATION TEST DATA

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Contract No. W912P8-07-D-0022
Task Order 135
Project Number: 07-022135

Sample Data

Source: MRGO-23U
Sample No.: 9C
Elev. or Depth: 29.7 Sample Length(in./cm.):
Location:
Description: SO GR CH4 W/ LNS ML, WD, O
Liquid Limit: 89 Plasticity Index: 65
USCS: CH4 AASHTO: Figure No.:
Testing Remarks: Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST		AFTER TEST	
Wet w+t	= 161.95 g.	Consolidometer #	= 13	Wet w+t	= 393.67 g.
Dry w+t	= 100.00 g.			Dry w+t	= 320.68 g.
Tare Wt.	= .00 g.	Spec. Gravity	= 2.74	Tare Wt.	= 110.66 g.
Height	= 1.00 in.	Height	= 1.00 in.		
Diameter	= 4.00 in.	Diameter	= 4.00 in.		
Weight	= 338.31 g.	Defl. Table	= n/a		
Moisture	= 61.9 %	Ht. Solids	= 0.3702 in.	Moisture	= 34.8 %
Wet Den.	= 103.1 pcf	Dry Wt.	= 208.78 g.*	Dry Wt.	= 210.02 g.
Dry Den.	= 63.6 pcf	Void Ratio	= 1.688	Void Ratio	= 0.949
		Saturation	= 100.6 %		

* Initial dry weight used in calculations

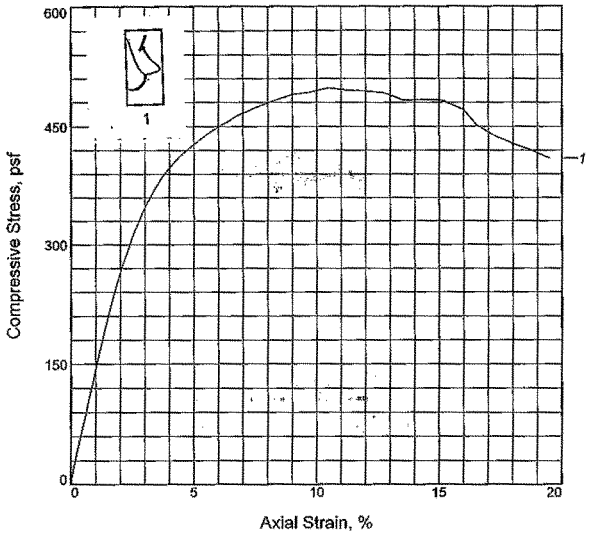
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.48735				1.688	
0.04	0.48758	0.00000			1.687	0.0 Comprs.
0.13	0.49146	0.00000	0.21	0.000	1.677	0.4 Comprs.
0.25	0.49747	0.00000	0.69	0.001	1.661	1.0 Comprs.
0.50	0.50399	0.00000	0.19	0.000	1.643	1.7 Comprs.
1.00	0.54341	0.00000			1.537	5.6 Comprs.
2.00	0.64437	0.00000	0.03	0.013	1.264	15.8 Comprs.
4.00	0.71827	0.00000	0.03	0.009	1.064	23.2 Comprs.
8.00	0.78011	0.00000	0.02	0.008	0.897	29.4 Comprs.

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
12.00	0.81047	0.00000	0.01	0.007	0.815	32.5 Comprs.
3.00	0.78985	0.00000	0.02		0.871	30.4 Comprs.
0.75	0.76077	0.00000	0.01		0.949	27.5 Comprs.

C_c = 0.91 P_c = 0.90 tsf C_r = 0.11

UNCONFINED COMPRESSION TEST



Sample No.	1				
Unconfined strength, psf	498				
Undrained shear strength, psf	249				
Failure strain, %	10.5				
Strain rate, %/min.	1.00				
Water content, %	44.4				
Wet density, pcf	112.8				
Dry density, pcf	78.1				
Saturation, %	103.5				
Void ratio	1.1587				
Specimen diameter, in.	1.383				
Specimen height, in.	3.097				
Height/diameter ratio	2.24				

Description: VSO GR CL4 W/ LYS SM, ML, CC

LL = 40	**PL** = 18	**PI** = 22	**Assumed GS=** 2.70	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/4/09
Remarks:

Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-23U **Depth:** 32.5
Sample Number: 10B

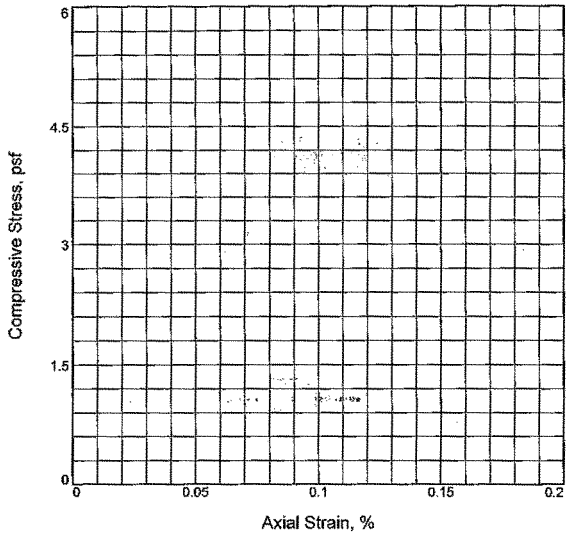
UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Figure _____

Tested By: JC **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.				
Unconfined strength, psf				
Undrained shear strength, psf				
Failure strain, %				
Strain rate, %/min.				
Water content, %				
Wet density, pcf				
Dry density, pcf				
Saturation, %				
Void ratio				
Specimen diameter, in.				
Specimen height, in.				
Height/diameter ratio				

Description: GR ML W/ LYS CH

LL = NP	PL =	PI = NP	Assumed GS=	Type:

Project No.: 07-022135
Date Sampled:
Remarks:
NOT TESTABLE

Figure _____

Client: U.S. Army Corps of Engineers

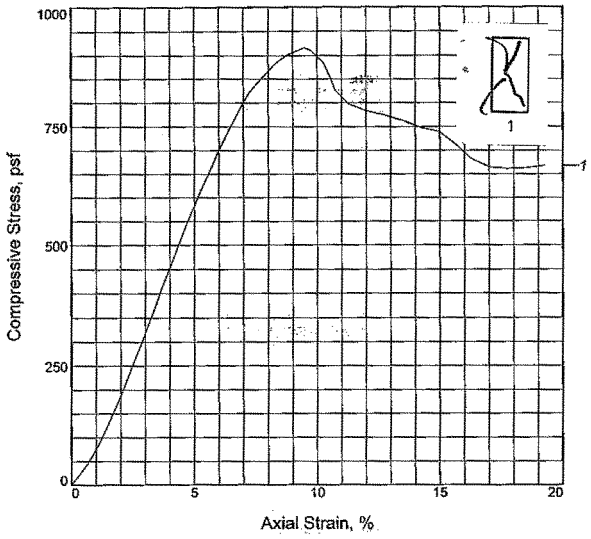
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-23U **Depth:** 44.8
Sample Number: 13B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Checked By: MS

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	916			
Undrained shear strength, psf	458			
Failure strain, %	9.5			
Strain rate, %/min.	1.00			
Water content, %	37.5			
Wet density, pcf	116.7			
Dry density, pcf	84.9			
Saturation, %	102.8			
Void ratio	0.9860			
Specimen diameter, in.	1.387			
Specimen height, in.	3.082			
Height/diameter ratio	2.22			

Description: SO GR CL4 W/ LYS CH

LL = 39	PL = 26	PI = 13	**Assumed GS=** 2.70	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 1/7/10
Remarks:

Figure _____

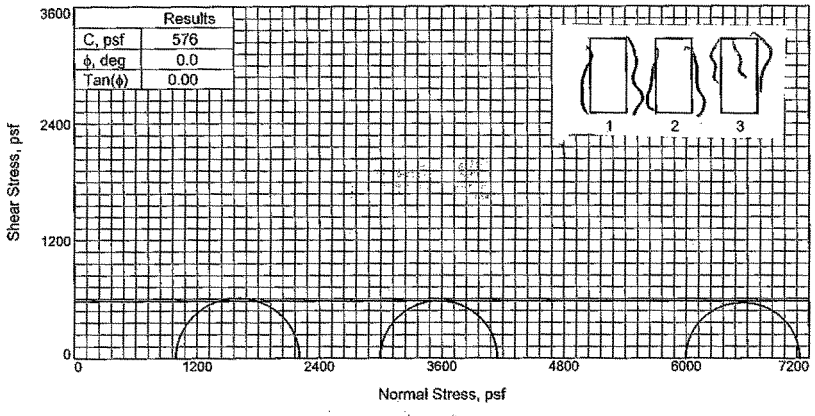
Client: U.S. Army Corps of Engineers

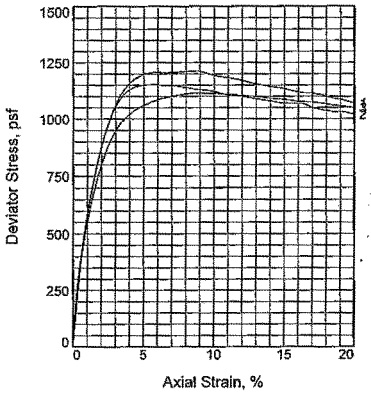
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-23U **Depth:** 45.7
Sample Number: 13C

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: ARS **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	43.7	45.5	44.7
	Dry Density, pcf	78.4	76.2	76.5
	Saturation, %	102.6	101.3	100.4
	Void Ratio	1.1500	1.2114	1.2030
	Diameter, in.	1.389	1.395	1.390
	Height, in.	3.094	3.097	3.099
At Test	Water Content, %	43.7	45.5	44.7
	Dry Density, pcf	78.4	76.2	76.5
	Saturation, %	102.6	101.3	100.4
	Void Ratio	1.1500	1.2114	1.2030
	Diameter, in.	1.389	1.395	1.390
	Height, in.	3.094	3.097	3.099
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.89	20.79	41.63
Fail. Stress, psf		1213	1154	1115
Strain, %		8.8	5.8	8.6
Ult. Stress, psf		1136	1084	1089
Strain, %				
σ_1 Failure, psf		2206	4147	7110
σ_3 Failure, psf		993	2993	5995

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: M GR CH2 W/ LYS SM

LL= 51 PL= 23 PI= 28
Assumed Specific Gravity= 2.70
Remarks:

Figure _____

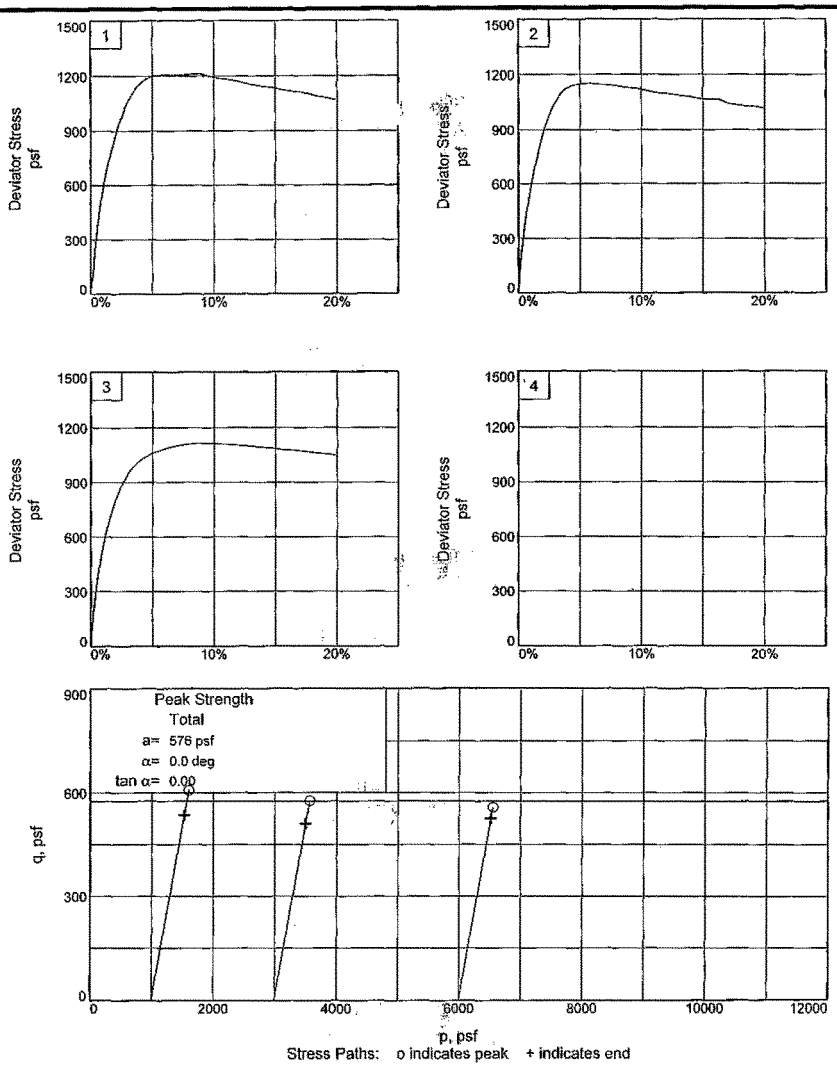
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-23U **Depth:** 49.7
Sample Number: 14C
Proj. No.: 07-022135 **Date Sampled:** 12/4/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

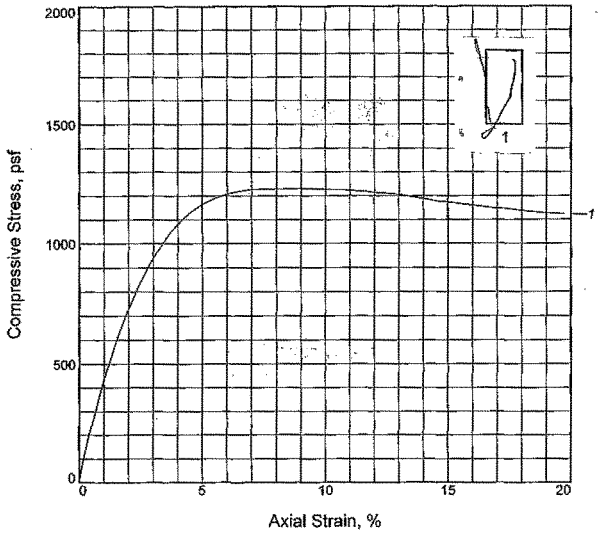
Tested By: JC/ARS **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-23U **Depth:** 49.7 **Sample Number:** 14C
Project No.: 07-022135 **Figure** _____ FFEBJV, LLC

Tested By: JC/ARS **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	1230			
Undrained shear strength, psf	615			
Failure strain, %	8.5			
Strain rate, %/min.	1.00			
Water content, %	43.7			
Wet density, pcf	112.6			
Dry density, pcf	78.4			
Saturation, %	101.2			
Void ratio	1.1822			
Specimen diameter, in.	1.391			
Specimen height, in.	3.097			
Height/diameter ratio	2.23			

Description: M GR CH3 W/ LYS SM

LL = 58 | **PL** = 22 | **PI** = 36 | **Assumed GS**= 2.74 | **Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/4/09
Remarks:

Client: U.S. Army Corps of Engineers

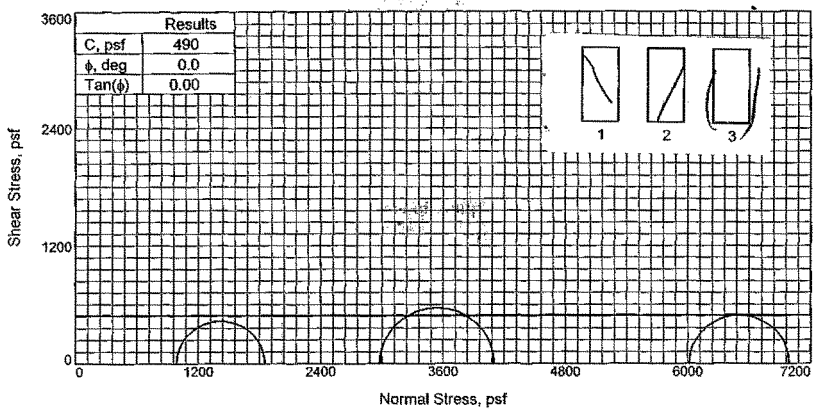
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-23U **Depth:** 52.8
Sample Number: 15B

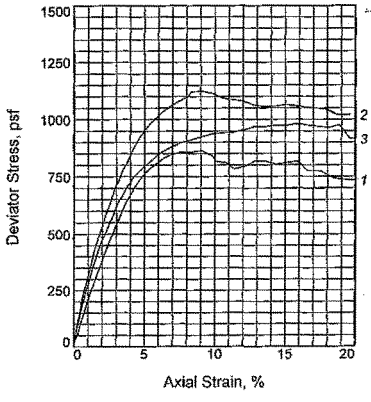
UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Figure _____

Tested By: JC/ARS **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	34.6	35.8	36.9
	Dry Density, pcf	88.2	87.7	85.1
	Saturation, %	102.6	104.9	101.6
	Void Ratio	0.9116	0.9227	0.9804
	Diameter, in.	1.385	1.379	1.376
	Height, in.	3.086	3.071	3.093
At Test	Water Content, %	34.6	35.8	36.9
	Dry Density, pcf	88.2	87.7	85.1
	Saturation, %	102.6	104.9	101.6
	Void Ratio	0.9116	0.9227	0.9804
	Diameter, in.	1.385	1.379	1.376
	Height, in.	3.086	3.071	3.093
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.88	20.68	41.78
Fail. Stress, psf		863	1123	974
Strain, %		9.1	9.1	14.3
Ult. Stress, psf		802	1055	972
Strain, %				
σ_1 Failure, psf		1853	4101	6991
σ_3 Failure, psf		990	2978	6017

Type of Test: Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CL4 W/ LYS & LNS SM

LL= 34 **PL=** 22 **PI=** 12
Assumed Specific Gravity= 2.70
Remarks:

Figure _____

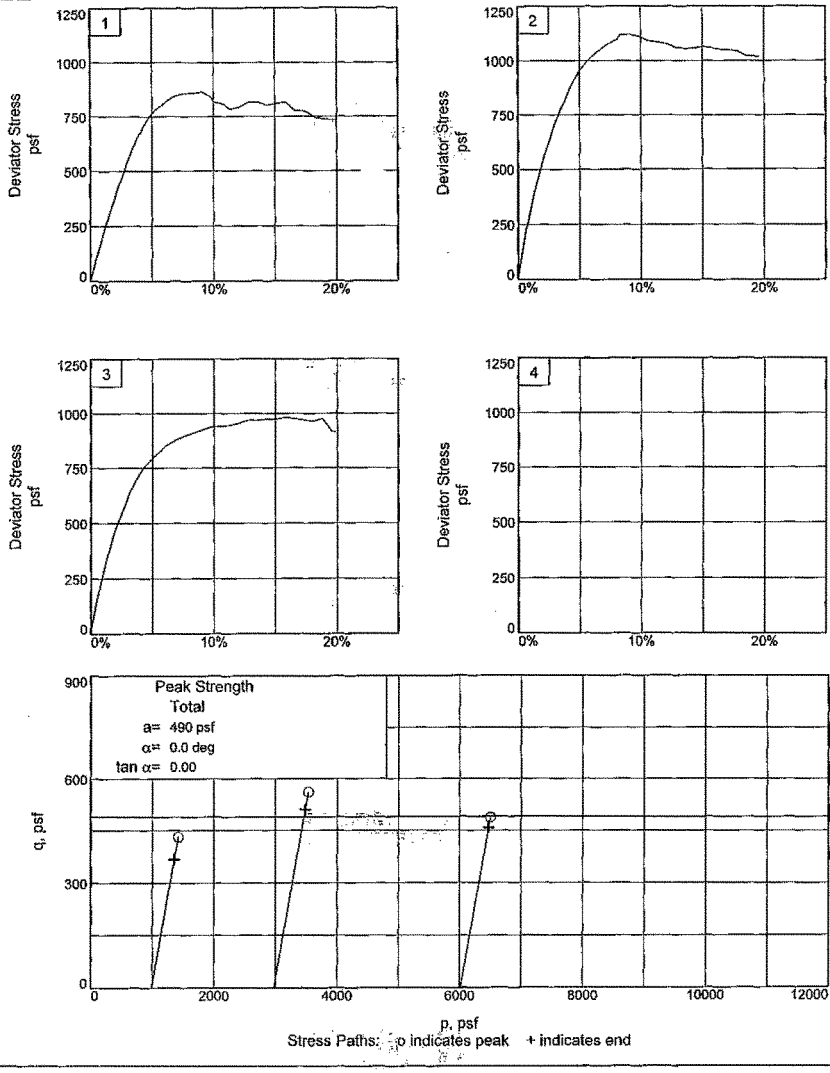
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-23U **Depth:** 53.7
Sample Number: 15C
Proj. No.: 07-022135 **Date Sampled:** 12/4/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

Tested By: VF/ARS **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-23U **Depth:** 53.7 **Sample Number:** 15C
Project No.: 07-022135 **Figure** _____ FFEBJV, LLC

Tested By: VF/ARS **Checked By:** MS

SUMMARY OF LABORATORY TEST RESULTS

Project: MRGO Ecosystem Restoration Feasibility Study Assigned By: _____

Project Number: 07-022135 Current Date: 2/3/2010
Boring: MRGO-24U

Sample Number	Depth	Visual Classification	USCS	E(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
1A	0.0	SO DGR CHOA W/ SIF, RT	CHOA		149												
1B	0.8	SO DGR CHOA W/ WD, RT	CHOA		143												
1C	1.7	SO DGR CHOB W/ WD, RT	CHOB		160												
1D	2.6	SO DGR CHOB W/ ARS ML, WD, RT	CHOB		158												
2A	4.0	SO GR CH4 W/ LYS ML	CH4		61												
2B	4.8	SO GR CHOA W/ LNS ML, WD, RT	CHOA		89												
2C	5.7	SO GR CH3 W/ LNS & LYS ML, WD, RT	CH3		53												
2D	6.6	SO GR CH3 W/ LNS & LYS ML, WD, RT	CH3		62												
3A	8.0	SO GR CH4 W/ LNS ML	CH4		56												
3B	8.8	SO GR CH3 W/ LNS ML, WD, SIF	CH3		54												
3C	9.7	SO GR CH3 W/ LNS ML, WD, SIF	CH3		49												
3D	10.6	SO GR CH2 W/ LNS ML, WD, SIF	CH2		55												
4A	12.0	VSO GR CH4 W/ ARS ML, SIF	CH4		77												
4B	12.8	VSO GR CH4 W/ ARS ML, SIF	CH4	13	74	58	100	100	UC	-	109	219	74	26	48	0.10	
4C	13.7	SO GR CH4 W/ ARS ML, SIF, O	CH4		83												
4D	14.6	VSO GR CH4 W/ ARS ML, SIF	CH4		84	52	95	100	UU	0	106		93	34	59	0.10	
5A	16.0	VSO GR CL4 W/ SIF, ARS SM	CL4		37												
5B	16.8	VSO GR CL4 W/ SIF, ARS SM	CL4		33												
5C	17.7	VSO GR CL4 W/ SIF, ARS SM	CL4	15	34	91	122	100	UC	-	171	342	33	16	17	0.12	
5D	18.6	SO GR CL4 W/ SIF, ARS SM	CL4		36	89	121	100	UU	0	290		32	18	14	0.16	
6A	20.0	GR SM W/ ARS CH	SM		29												
6B	20.8	GR SM W/ ARS CH	SM		28												
6C	21.7	GR SM W/ ARS CH	SM		27												
7A	24.0	GR SM W/ LYS CH, SIF	SM		33												
7B	24.8	M GR CL4 W/ ARS CH	CL4		33	93	123	100	UU	0	823		39	22	17	0.25	
8A	26.0	M GR CH4 W/ LYS ML	CH4		45												
8B	26.8	SO GR CL4 W/ LYS ML	CL4	12	30	96	124	100	UC	-	497	993	33	24	9	0.21	
8C	27.7	M GR CL4 W/ LYS ML	CL4		32												
9A	30.0	GR SM W/ LYS CH, SIF	SM		24												
9B	30.8	GR ML	ML		30												
9C	31.7	GR SM	SM		24												
10A	34.0	M GR CH2 W/ LNS & LYS ML	CH2		46												
10B	34.8	SO GR CH2 W/ LNS & LYS ML	CH2		46	75	110	100	UU	0	401		52	24	28	0.23	
10C	35.7	SO GR CH2 W/ LNS & LYS ML	CH2		40	82	115	100					55	35	20		CON, GS
11A	38.0	SO GR CH3 W/ LNS & LYS SM	CH3		62												
11B	38.8	SO GR CL4 W/ LNS & LYS SM	CL4	2	55	68	106	100	UC	-	449	899	41	22	19	0.25	
11C	39.7	M GR CH3 W/ LNS & LYS SM	CH3		43												

Remarks: _____
FFEB JV, LLC

Checked By: MS MP
File Name: MRGO-24U.xls

SUMMARY OF LABORATORY TEST RESULTS

Project: MRGO Ecosystem Restoration Feasibility Study Assigned By: _____

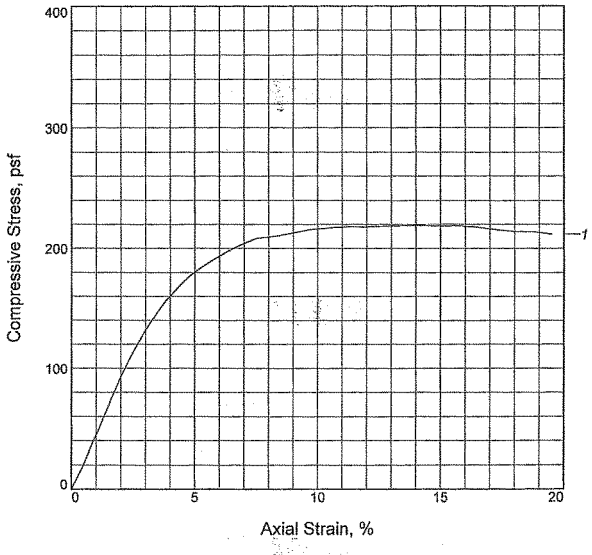
Project Number: 07-022135 Current Date: 2/3/2010
Boring: MRGO-24U

Sample Number	Depth	Visual Classification	USCS	E(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
12A	42.0	M GR CH3 W/ LYS & ARS SM	CH3		38												
12B	42.8	GR ML W/ LYS CH	ML		33												
12C	43.7	GR ML W/ LYS CH	ML		31				UU				30	24	6		NON-TESTABLE
12D	44.6	M GR CL4 W/ LYS SM	CL4		31	93	122	100	UU	0	608		34	23	11	0.25	
13A	46.0	M GR CH2 W/ LYS ML	CH2		38												
13B	46.8	M GR CL4 W/ LYS ML	CL4	6	33	90	120	100	UC	-	613	1226	30	20	10	0.20	
13C	47.7	M GR CL6 W/ LYS ML, WD	CL6		37												
13D	48.6	M GR CL6 W/ LYS ML, WD	CL6		36	85	115	100					40	17	23		CON, GS
14A	50.0	M GR CL6	CL6		36												
14B	50.8	M GR CL4	CL4		34	89	120	100	UU	0	584		39	18	21	0.31	
14C	51.7	M GR CL6 W/ ARS & LNS ML	CL6		39												
14D	52.6	M GR CL6 W/ ARS & LNS ML	CL6		37												
15A	54.0	M GR CL6 W/ LNS & LYS ML	CL6		36												
15B	54.8	M GR CL6 W/ LNS & LYS ML	CL6		37												
15C	55.7	M GR CL6 W/ LNS & LYS ML	CL6	8	33	89	118	99	UC	-	823	1646	46	20	26	0.38	
15D	56.6	ST GR CH4 W/ LNS & LYS ML	CH4		48												
16A	58.0	M GR CH4 W/ LNS & ARS ML	CH4		55												
16B	58.8	SO GR CL6 W/ LNS & ARS ML	CL6		37	86	117	100	UU	0	323		48	20	28	0.29	
16C	59.7	M GR CH2 W/ LNS & ARS ML	CH2		36												

Remarks: _____
FFEB JV, LLC

Checked By: MS/WSL
File Name: MRGO-24U.xls

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	219			
Undrained shear strength, psf	109			
Failure strain, %	12.8			
Strain rate, %/min.	1.00			
Water content, %	74.0			
Wet density, pcf	100.2			
Dry density, pcf	57.6			
Saturation, %	102.9			
Void ratio	1.9698			
Specimen diameter, in.	1.386			
Specimen height, in.	3.086			
Height/diameter ratio	2.23			

Description: VSO GR CH4 W/ ARS ML, SIF

LL = 74	PL = 26	PI = 48	Assumed GS= 2.74	Type: UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/10/09
Remarks:

Client: U.S. Army Corps of Engineers

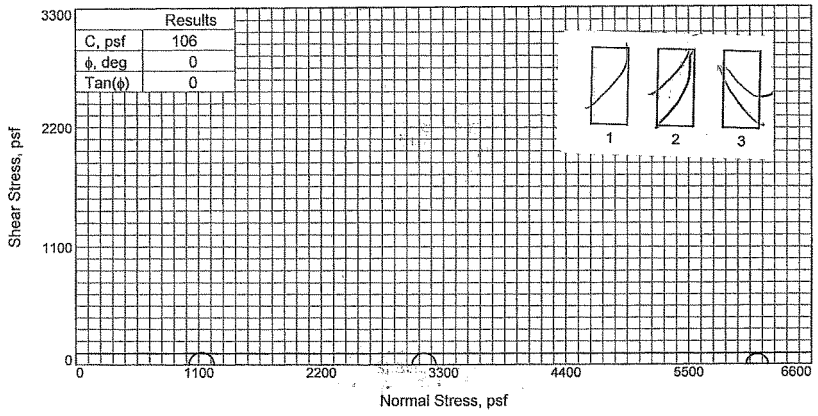
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-24U **Depth:** 12.8
Sample Number: 4B

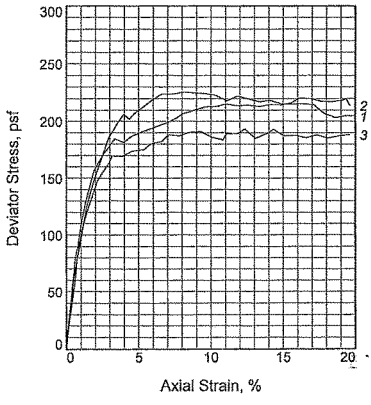
UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Figure _____

Tested By: VF **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	85.0	83.3	84.1
	Dry Density, pcf	51.6	51.9	52.0
	Saturation, %	100.5	99.5	100.8
	Void Ratio	2.3171	2.2928	2.2868
	Diameter, in.	1.391	1.401	1.395
	Height, in.	3.095	3.089	3.092
At Test	Water Content, %	85.0	83.3	84.1
	Dry Density, pcf	51.6	51.9	52.0
	Saturation, %	100.5	99.5	100.8
	Void Ratio	2.3171	2.2928	2.2868
	Diameter, in.	1.391	1.401	1.395
	Height, in.	3.095	3.089	3.092
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		7.03	20.95	41.79
Fail. Stress, psf		226	215	193
Strain, %		8.1	11.1	12.3
Ult. Stress, psf		216	213	185
Strain, %				
σ_1 Failure, psf		1239	3232	6211
σ_3 Failure, psf		1013	3017	6017

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: VSO GR CH4 W/ ARS ML, SIF

LL= 93 **PL=** 34 **PI=** 59
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

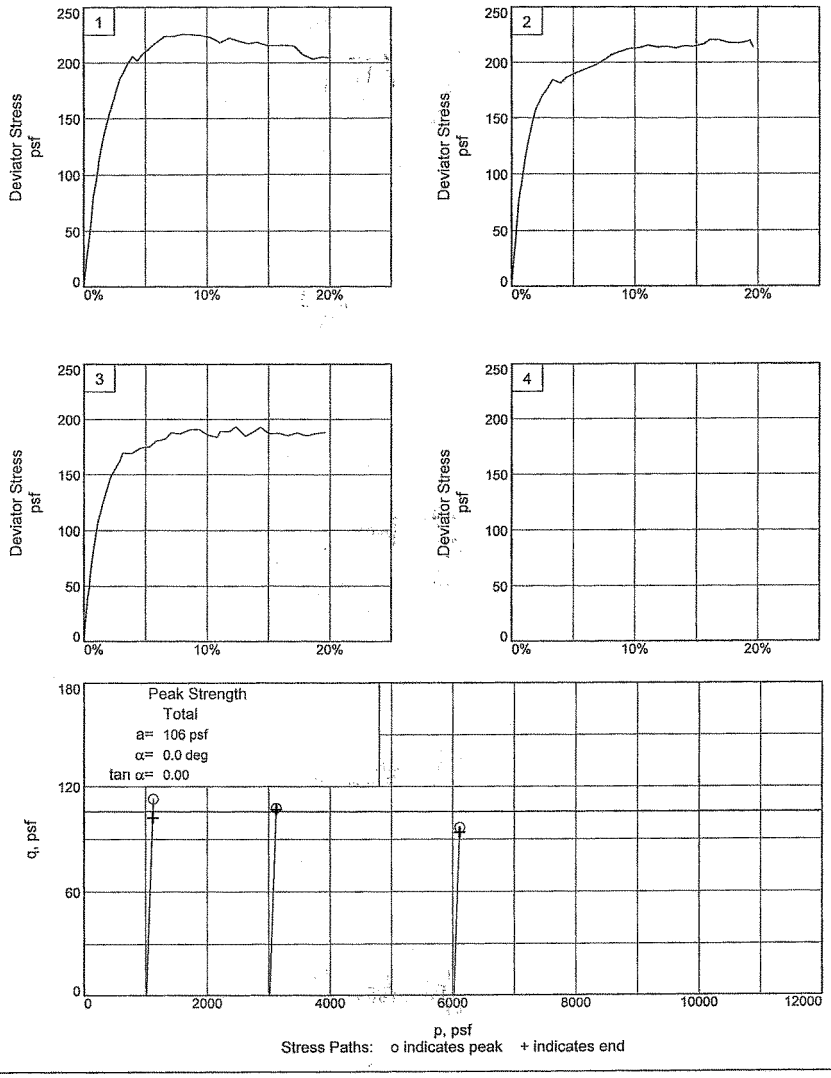
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-24U **Depth:** 14.6
Sample Number: 4D
Proj. No.: 07-022135 **Date Sampled:** 12/20/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

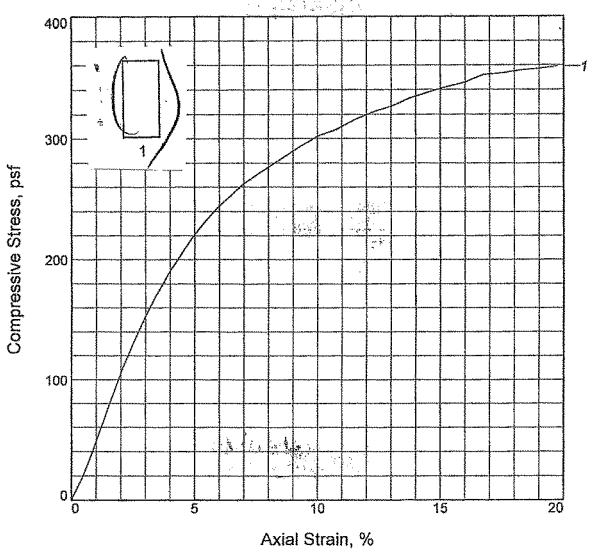
Tested By: VF **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-24U **Depth:** 14.6 **Sample Number:** 4D
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: VF **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	342			
Undrained shear strength, psf	171			
Failure strain, %	15.2			
Strain rate, %/min.	1.00			
Water content, %	34.2			
Wet density, pcf	122.1			
Dry density, pcf	91.0			
Saturation, %	108.3			
Void ratio	0.8524			
Specimen diameter, in.	1.389			
Specimen height, in.	3.076			
Height/diameter ratio	2.21			

Description: VSO GR CL4 W/ SIF, ARS SM

LL = 33	**PL** = 16	**PI** = 17	**Assumed GS**= 2.70	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/10/09
Remarks:

Figure _____

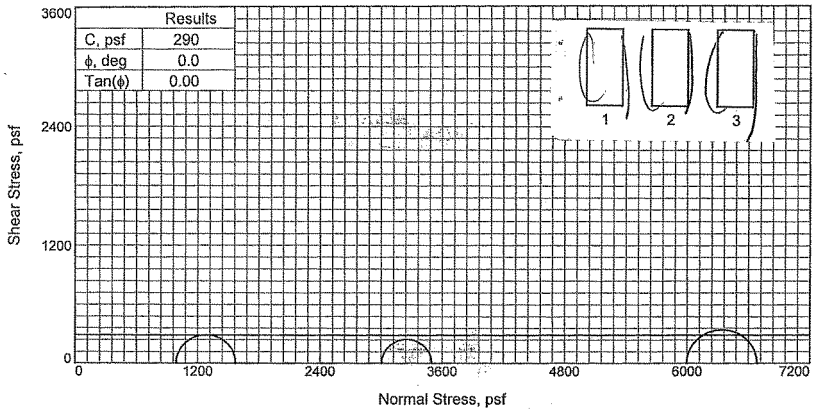
Client: U.S. Army Corps of Engineers

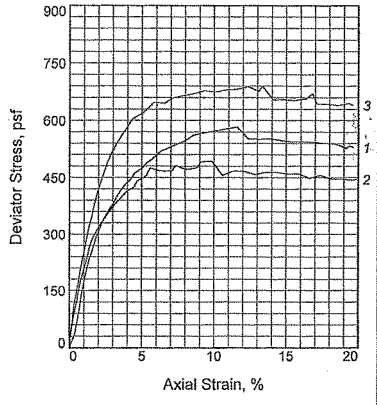
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-24U **Depth:** 17.7
Sample Number: 5C

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: VF **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	32.8	40.3	33.9
	Dry Density, pcf	91.9	84.4	90.8
	Saturation, %	106.1	109.2	106.8
	Void Ratio	0.8335	0.9975	0.8569
	Diameter, in.	1.385	1.378	1.382
	Height, in.	3.087	3.086	3.078
At Test	Water Content, %	32.8	40.3	33.9
	Dry Density, pcf	91.9	84.4	90.8
	Saturation, %	106.1	109.2	106.8
	Void Ratio	0.8335	0.9975	0.8569
	Diameter, in.	1.385	1.378	1.382
	Height, in.	3.087	3.086	3.078
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.87	20.86	41.64
Fail. Stress, psf		583	494	689
Strain, %		11.6	9.8	12.3
Ult. Stress, psf		544	459	654
Strain, %				
σ_1 Failure, psf		1572	3498	6684
σ_3 Failure, psf		989	3004	5996

Type of Test: Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CL4 W/ SIF, ARS SM

LL= 32 **PL=** 18 **PI=** 14
Assumed Specific Gravity= 2.70
Remarks: SAMPLE SLUMPING

Figure _____

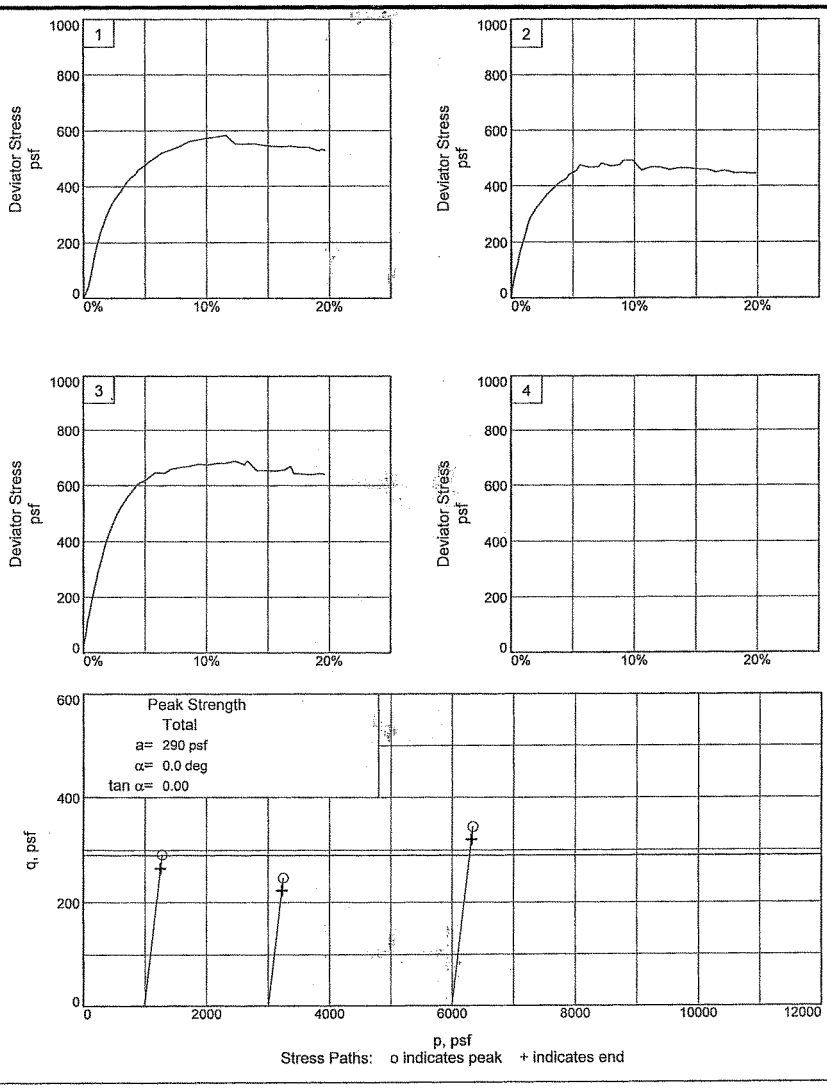
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-24U **Depth:** 18.6
Sample Number: 5D
Proj. No.: 07-022135 **Date Sampled:** 12/10/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

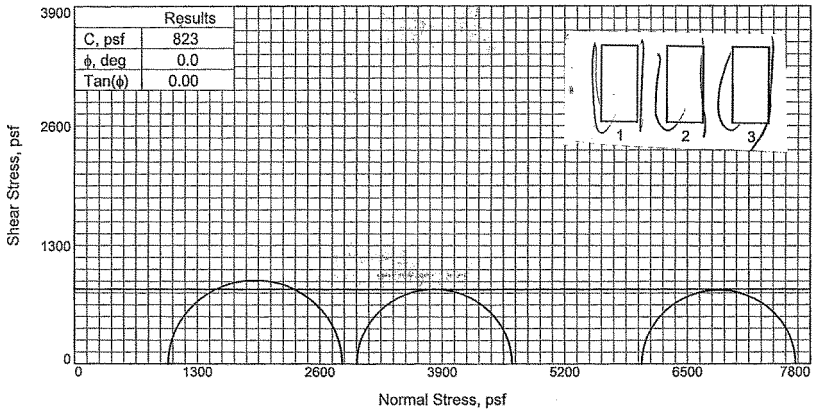
Tested By: VF **Checked By:** MS

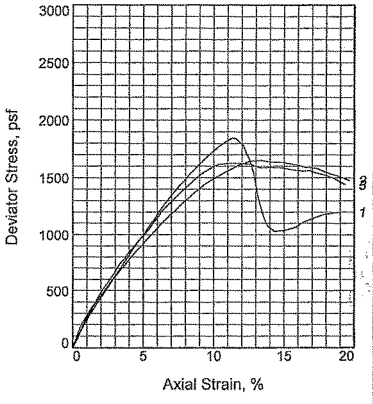


Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-24U **Depth:** 18.6 **Sample Number:** 5D
Project No.: 07-022135 **Figure**

FFEBJV, LLC

Tested By: VF **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	32.3	32.9	32.6
	Dry Density, pcf	92.9	92.5	92.7
	Saturation, %	106.9	108.0	107.5
	Void Ratio	0.8149	0.8217	0.8188
	Diameter, in.	1.386	1.384	1.385
	Height, in.	3.082	3.070	3.086
At Test	Water Content, %	32.3	32.9	32.6
	Dry Density, pcf	92.9	92.5	92.7
	Saturation, %	106.9	108.0	107.5
	Void Ratio	0.8149	0.8217	0.8188
	Diameter, in.	1.386	1.384	1.385
	Height, in.	3.082	3.070	3.086
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.88	20.78	41.79
Fail. Stress, psf		1847	1651	1627
Strain, %		11.3	13.4	11.1
Ult. Stress, psf		1042	1635	1586
Strain, %				
σ_1 Failure, psf		2837	4642	7644
σ_3 Failure, psf		990	2992	6017

Type of Test: Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: M GR CL4 W/ ARS CH

LL= 39 **PL=** 22 **PI=** 17
Assumed Specific Gravity= 2.70
Remarks:

Figure _____

Client: U.S. Army Corps of Engineers

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

Source of Sample: MRGO-24U **Depth:** 24.8

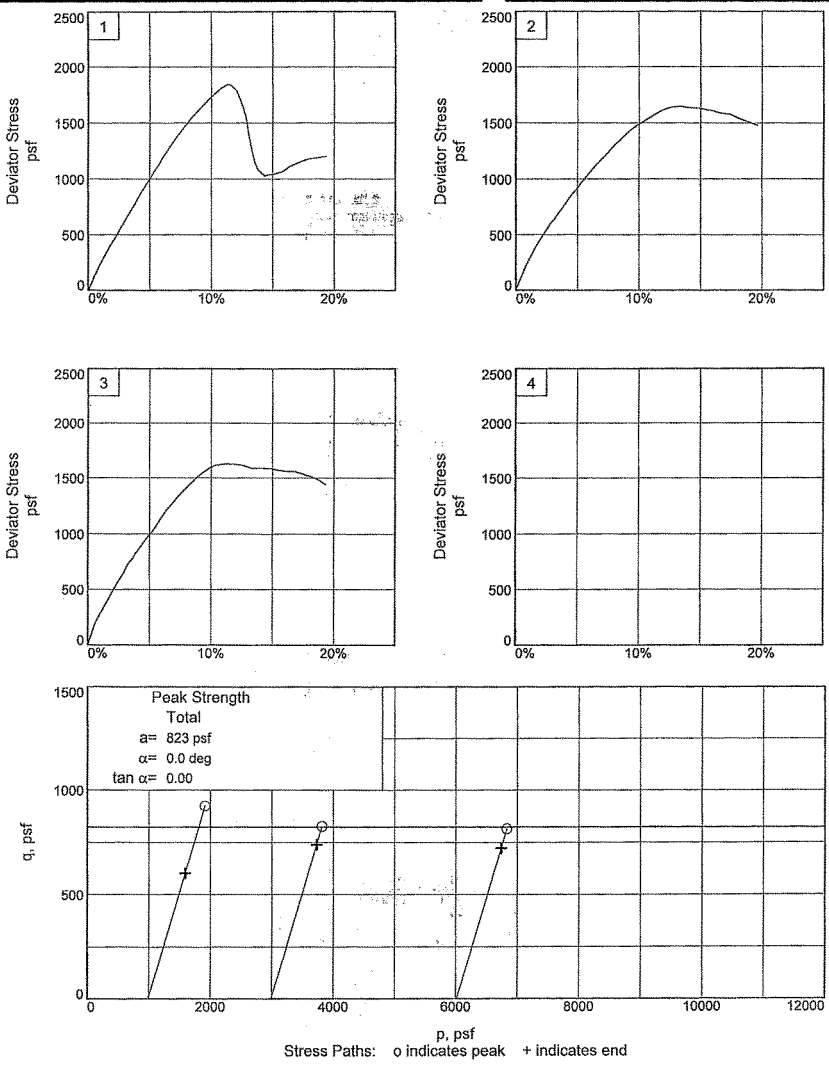
Sample Number: 7B

Proj. No.: 07-022135 **Date Sampled:** 12/10/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

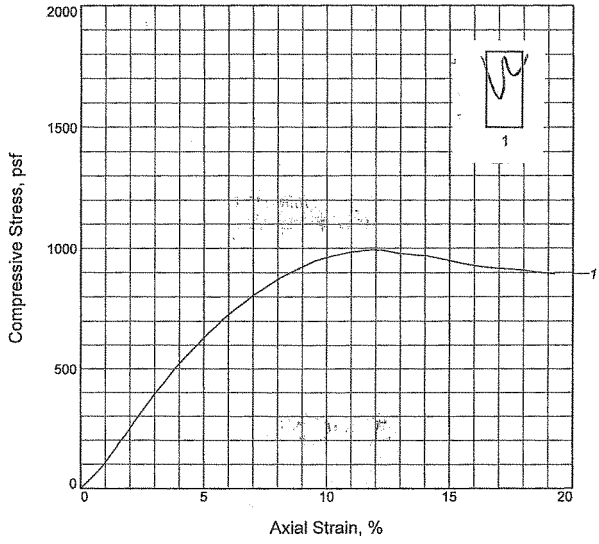
Tested By: VF **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-24U **Depth:** 24.8 **Sample Number:** 7B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: VF **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	993			
Undrained shear strength, psf	497			
Failure strain, %	11.8			
Strain rate, %/min.	1.00			
Water content, %	30.3			
Wet density, pcf	124.4			
Dry density, pcf	95.5			
Saturation, %	106.8			
Void ratio	0.7653			
Specimen diameter, in.	1.388			
Specimen height, in.	3.097			
Height/diameter ratio	2.23			

Description: SO GR CL4 W/ LYS ML

LL = 33	PL = 24	PI = 9	Assumed GS= 2.70	Type: UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/10/09
Remarks:

Client: U.S. Army Corps of Engineers

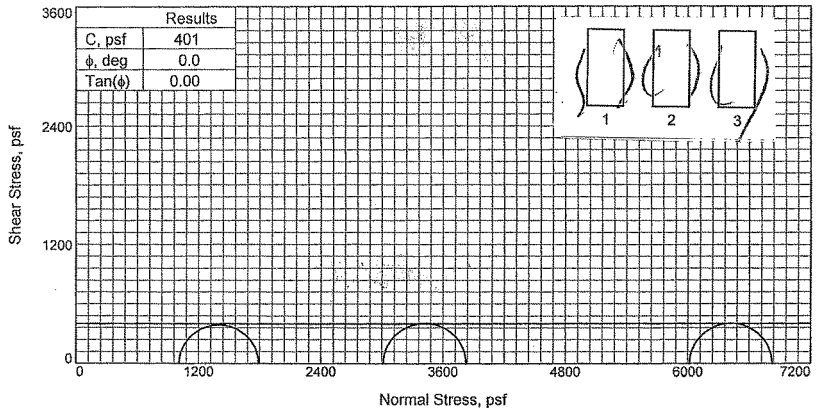
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-24U **Depth:** 26.8
Sample Number: 8B

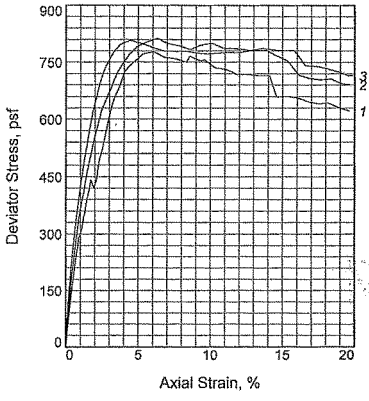
UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Figure _____

Tested By: VF **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	48.5	45.3	45.6
	Dry Density, pcf	71.8	77.2	77.1
	Saturation, %	97.0	103.2	103.8
	Void Ratio	1.3490	1.1837	1.1864
	Diameter, in.	1.405	1.404	1.404
	Height, in.	3.091	3.094	3.105
At Test	Water Content, %	48.5	45.3	45.6
	Dry Density, pcf	71.8	77.2	77.1
	Saturation, %	97.0	103.2	103.8
	Void Ratio	1.3490	1.1837	1.1864
	Diameter, in.	1.405	1.404	1.404
	Height, in.	3.091	3.094	3.105
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		7.01	20.92	41.78
Fail. Stress, psf		778	813	808
Strain, %		6.1	6.3	4.5
Ult. Stress, psf		659	754	772
Strain, %				
σ_1 Failure, psf		1788	3826	6824
σ_3 Failure, psf		1010	3013	6016

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CH2 W/ LNS & LYS ML

LL= 52 **PL=** 24 **PI=** 28
Assumed Specific Gravity= 2.70
Remarks:

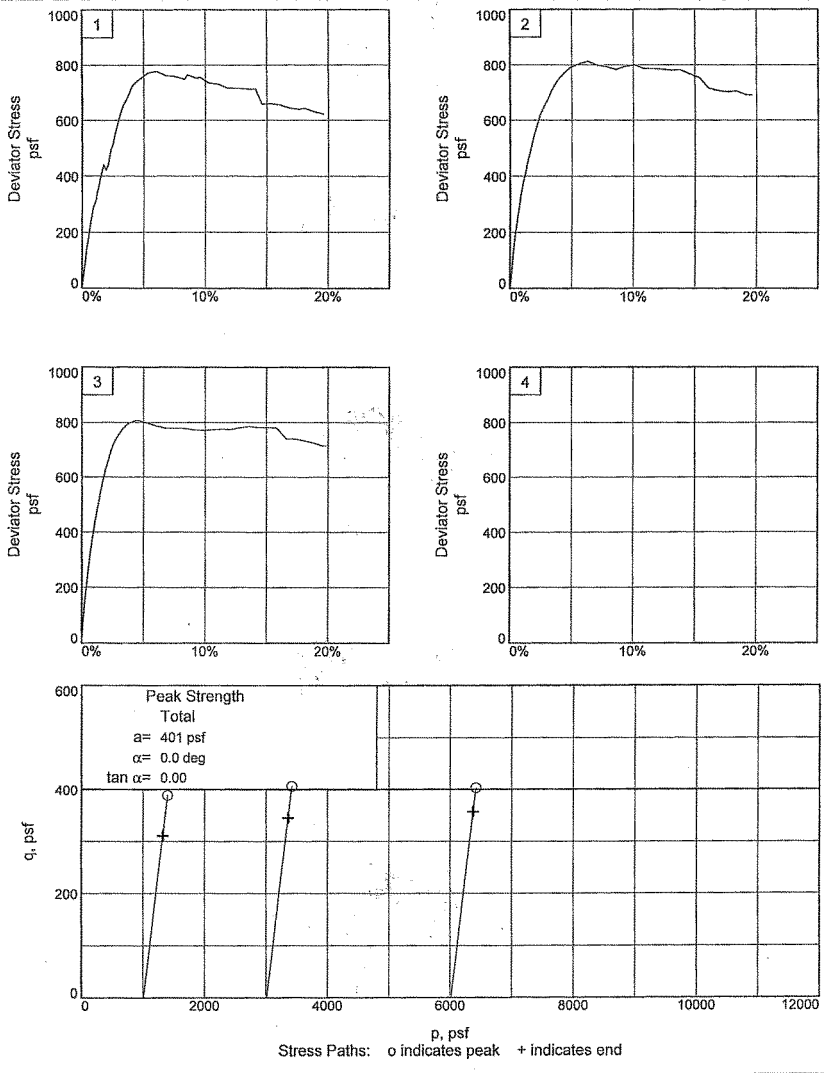
Figure _____

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-24U **Depth:** 34.8
Sample Number: 10B
Proj. No.: 07-022135 **Date Sampled:** 12/10/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

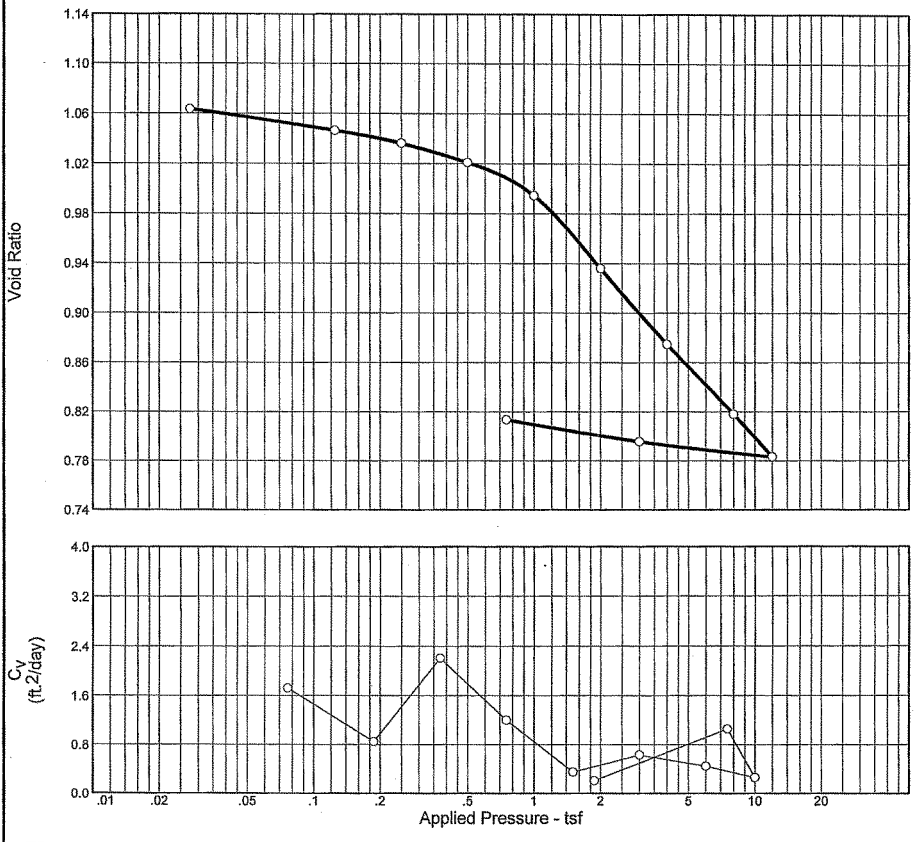
Tested By: VF **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-24U **Depth:** 34.8 **Sample Number:** 10B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: VF **Checked By:** MS

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
101.9 %	39.9 %	82.3	55	35	2.72	1.09	0.20	1.064

MATERIAL DESCRIPTION	USCS	AASHTO
SO GR CH2 W/ LNS & LYS ML	CH2	

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

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

Source: MRGO-24U **Sample No.:** 10C **Elev./Depth:** 35.7

FFEBJV, LLC

St Rose, LA

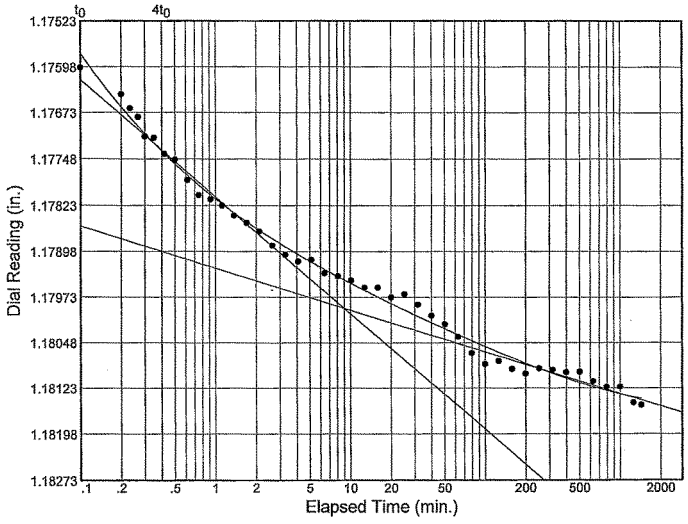
Remarks:
Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

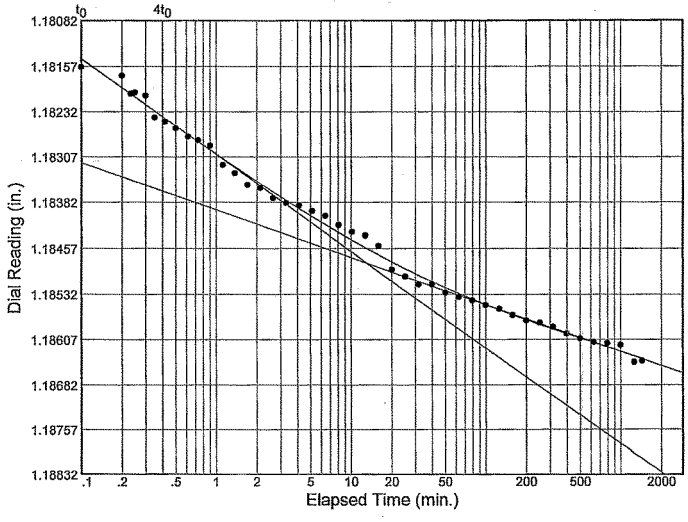
Source: MRGO-24U Sample No.: 10C Elev./Depth: 35.7



Load No.= 2
Load= 0.13 tsf
D_0 = 1.17415
D_{50} = 1.17703
D_{100} = 1.17991
T_{50} = 0.29 min.

C_v @ T_{50}
1.72 ft.2/day

C_α = 0.001



Load No.= 3
Load= 0.25 tsf
D_0 = 1.18050
D_{50} = 1.18265
D_{100} = 1.18481
T_{50} = 0.58 min.

C_v @ T_{50}
0.84 ft.2/day

C_α = 0.001

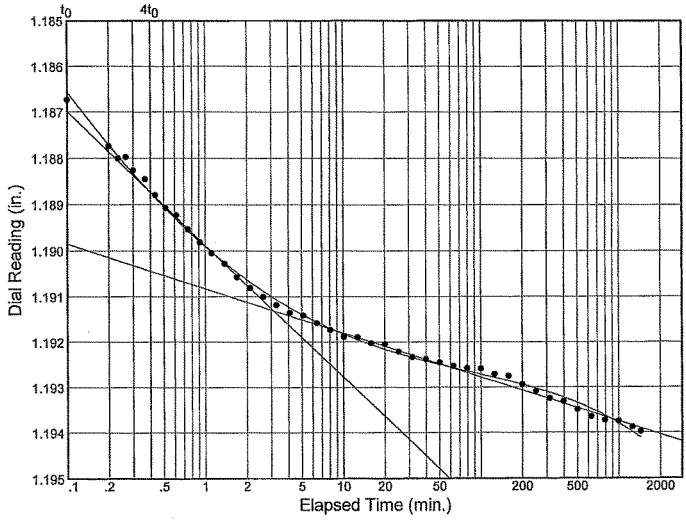
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

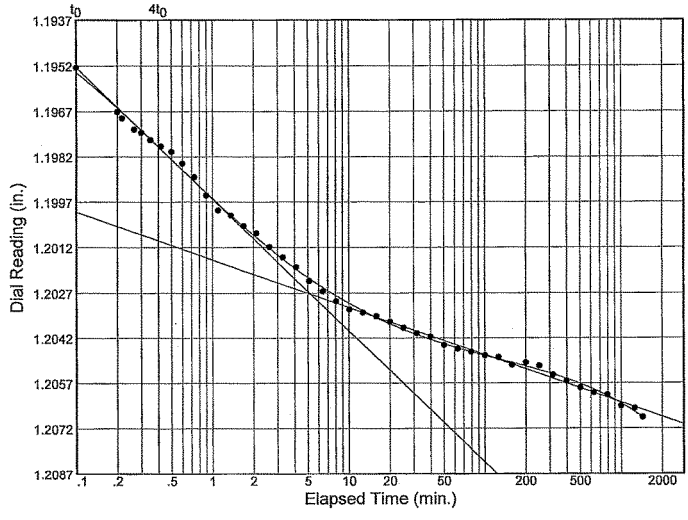
Source: MRGO-24U Sample No.: 10C Elev./Depth: 35.7



Load No.= 4
Load= 0.50 tsf
D_0 = 1.18439
D_{50} = 1.18785
D_{100} = 1.19131
T_{50} = 0.22 min.

C_v @ T_{50}
2.20 ft.2/day

C_α = 0.001



Load No.= 5
Load= 1.00 tsf
D_0 = 1.19295
D_{50} = 1.19784
D_{100} = 1.20274
T_{50} = 0.39 min.

C_v @ T_{50}
1.20 ft.2/day

C_α = 0.002

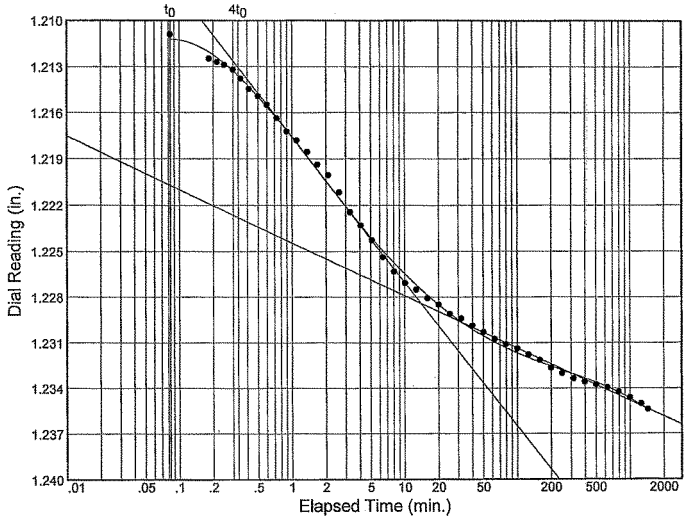
Figure

FFEBJV, LLC

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

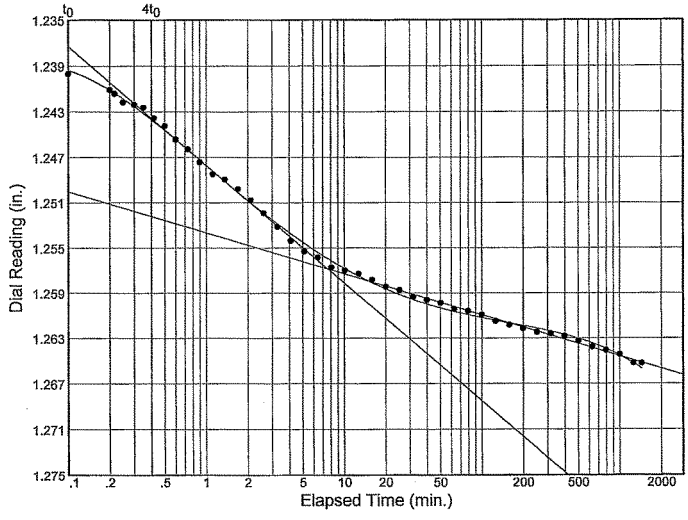
Source: MRGO-24U Sample No.: 10C Elev./Depth: 35.7



Load No.= 6
Load= 2.00 tsf
D_0 = 1.20887
D_{50} = 1.21864
D_{100} = 1.22841
T_{50} = 1.30 min.

C_v @ T_{50}
0.35 ft.2/day

C_α = 0.004



Load No.= 7
Load= 4.00 tsf
D_0 = 1.23507
D_{50} = 1.24596
D_{100} = 1.25686
T_{50} = 0.68 min.

C_v @ T_{50}
0.63 ft.2/day

C_α = 0.004

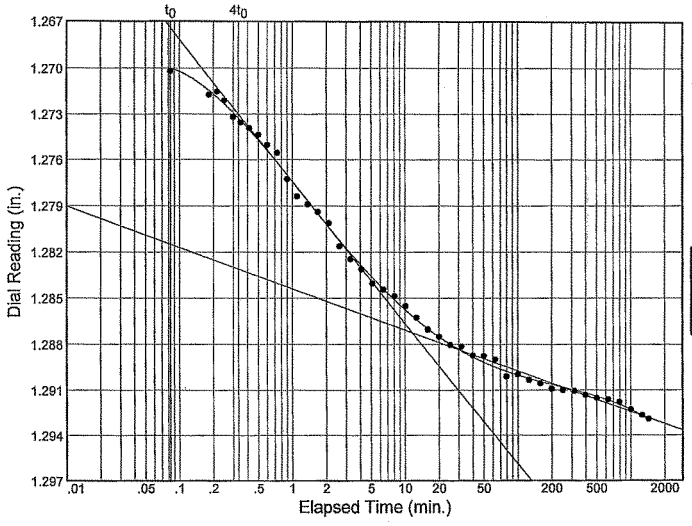
Figure

FFEBJV, LLC

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

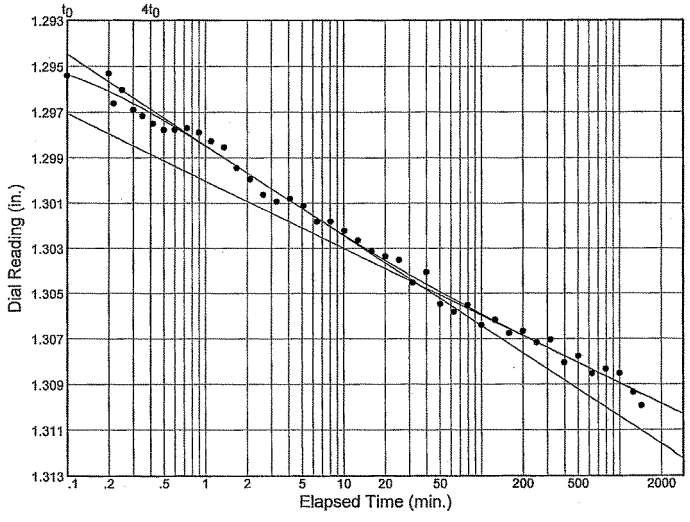
Source: MRGO-24U Sample No.: 10C Elev./Depth: 35.7



Load No.= 8
Load= 8.00 tsf
D_0 = 1.26677
D_{50} = 1.27700
D_{100} = 1.28723
T_{50} = 0.90 min.

C_v @ T_{50}
0.45 ft.^{2}/day

C_α = 0.003



Load No.= 9
Load= 12.00 tsf
D_0 = 1.29368
D_{50} = 1.29915
D_{100} = 1.30462
T_{50} = 1.49 min.

C_v @ T_{50}
0.26 ft.^{2}/day

C_α = 0.003

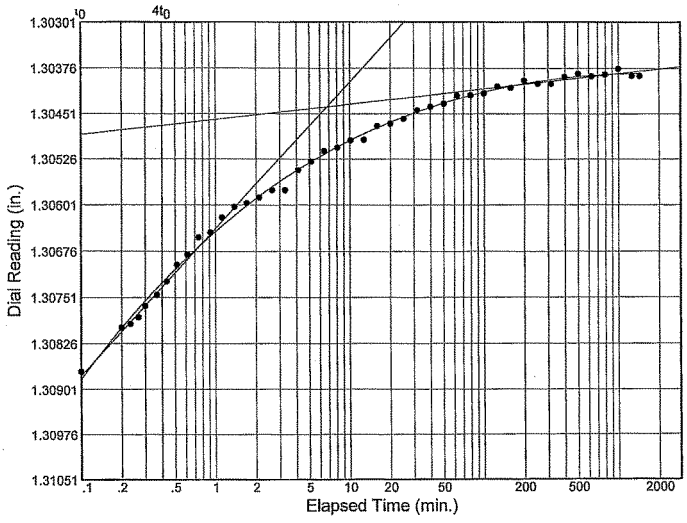
Figure

FFEBJV, LLC

Dial Reading vs. Time

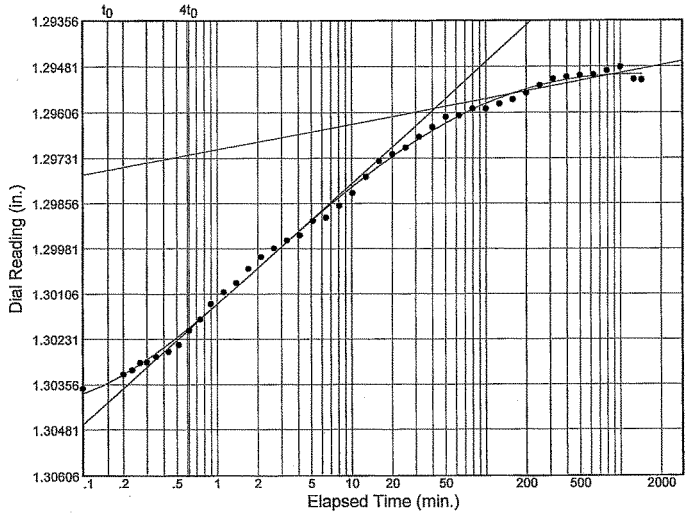
Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-24U Sample No.: 10C Elev./Depth: 35.7



Load No.= 10
Load= 3.00 tsf
D_0 = 1.31043
D_{50} = 1.30741
D_{100} = 1.30439
T_{50} = 0.35 min.

C_v @ T_{50}
1.05 ft.2/day



Load No.= 11
Load= 0.75 tsf
D_0 = 1.30503
D_{50} = 1.30049
D_{100} = 1.29594
T_{50} = 1.82 min.

C_v @ T_{50}
0.21 ft.2/day

Figure

FFEBJV, LLC

CONSOLIDATION TEST DATA

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Contract No. W912P8-07-D-0022
Task Order 135
Project Number: 07-022135

Sample Data

Source: MRGO-24U
Sample No.: 10C
Elev. or Depth: 35.7 Sample Length(in./cm.):
Location:
Description: SO GR CH2 W/ LNS & LYS ML
Liquid Limit: 55 Plasticity Index: 35
USCS: CH2 AASHTO: Figure No.:
Testing Remarks: Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST	AFTER TEST	
Wet w+t	= 139.86 g.	Consolidometer # = 11	Wet w+t	= 472.39 g.
Dry w+t	= 100.00 g.		Dry w+t	= 394.48 g.
Tare Wt.	= .00 g.	Spec. Gravity = 2.72	Tare Wt.	= 111.75 g.
Height	= 1.01 in.	Height = 1.01 in.		
Diameter	= 4.00 in.	Diameter = 3.99 in.		
Weight	= 382.12 g.	Defl. Table = n/a		
Moisture	= 39.9 %	Ht. Solids = 0.4876 in.	Moisture	= 27.6 %
Wet Den.	= 115.1 pcf	Dry Wt. = 272.08 g.*	Dry Wt.	= 282.73 g.
Dry Den.	= 82.3 pcf	Void Ratio = 1.064	Void Ratio	= 0.813
		Saturation = 101.9 %		

* Initial dry weight used in calculations

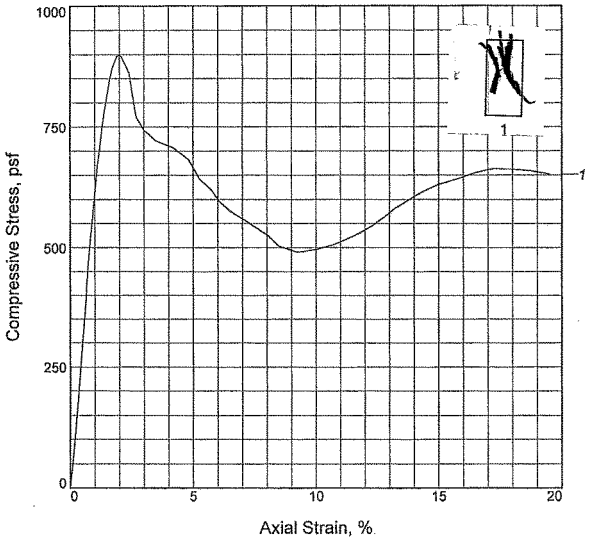
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	1.17318				1.064	
0.03	1.17320	0.00000			1.064	0.0 Comprs.
0.13	1.18151	0.00000	1.72	0.001	1.047	0.8 Comprs.
0.25	1.18642	0.00000	0.84	0.001	1.036	1.3 Comprs.
0.50	1.19398	0.00000	2.20	0.001	1.021	2.1 Comprs.
1.00	1.20683	0.00000	1.20	0.002	0.995	3.3 Comprs.
2.00	1.23539	0.00000	0.35	0.004	0.936	6.2 Comprs.
4.00	1.26521	0.00000	0.63	0.004	0.875	9.1 Comprs.
8.00	1.29291	0.00000	0.45	0.003	0.818	11.9 Comprs.

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
12.00	1.30993	0.00000	0.26	0.003	0.783	13.6 Comprs.
3.00	1.30388	0.00000	1.05		0.796	13.0 Comprs.
0.75	1.29517	0.00000	0.21		0.813	12.1 Comprs.

C_c = 0.20 P_c = 1.09 tsf C_r = 0.03

UNCONFINED COMPRESSION TEST



Sample No.	1				
Unconfined strength, psf	899				
Undrained shear strength, psf	449				
Failure strain, %	2.0				
Strain rate, %/min.	1.00				
Water content, %	55.5				
Wet density, pcf	106.0				
Dry density, pcf	68.1				
Saturation, %	101.7				
Void ratio	1.4742				
Specimen diameter, in.	1.410				
Specimen height, in.	3.096				
Height/diameter ratio	2.20				

Description: SO GR CL4 W/ LNS & LYS SM

LL = 41	**PL** = 22	**PI** = 19	**Assumed GS**= 2.70	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/10/09
Remarks:

Client: U.S. Army Corps of Engineers

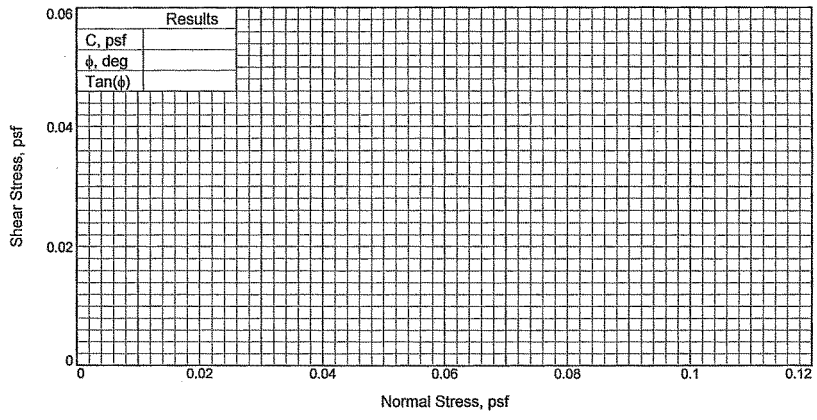
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-24U **Depth:** 38.8
Sample Number: 11B

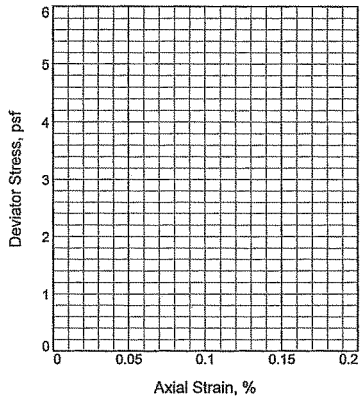
UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Figure _____

Tested By: VF **Checked By:** MS





Sample No.	
Initial	Water Content, %
	Dry Density, pcf
	Saturation, %
	Void Ratio
	Diameter, in.
	Height, in.
At Test	Water Content, %
	Dry Density, pcf
	Saturation, %
	Void Ratio
	Diameter, in.
	Height, in.
Strain rate, %/min.	
Back Pressure, psi	
Cell Pressure, psi	
Fail. Stress, psf	
Strain, %	
Ult. Stress, psf	
Strain, %	
σ_1 Failure, psf	
σ_3 Failure, psf	

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: GR ML W/ LYS CH

LL= 30 **PL=** 24 **PI=** 6
Assumed Specific Gravity=
Remarks: NOT-TESTABLE MATERIAL

Figure _____

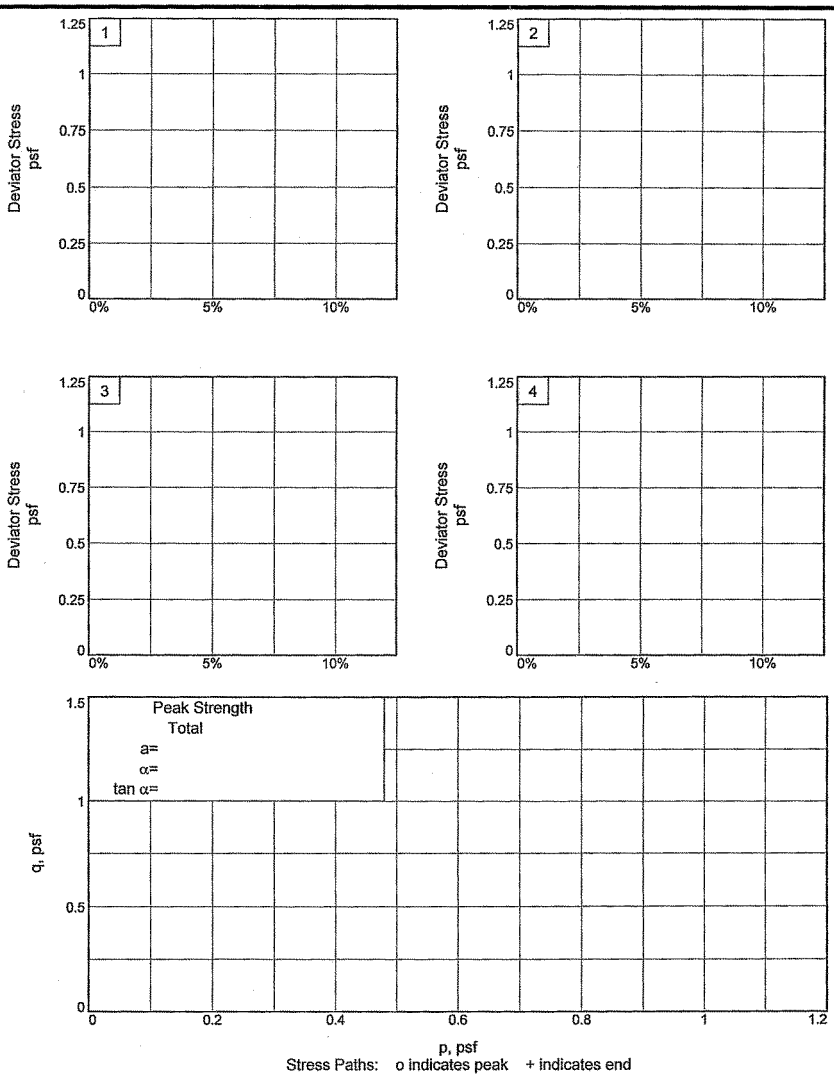
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-24U **Depth:** 43.7
Sample Number: 12C
Proj. No.: 07-022135 **Date Sampled:**

TRIAXIAL SHEAR TEST REPORT

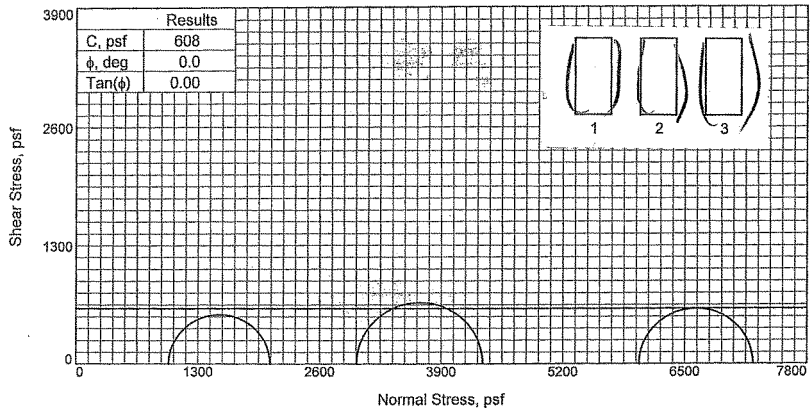
FFEBJV, LLC

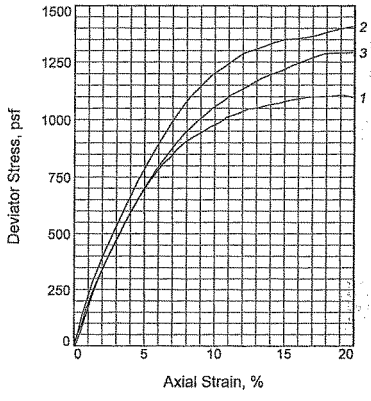
Checked By: MS/WH



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-24U **Depth:** 43.7 **Sample Number:** 12C
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Checked By: MS/WH





Sample No.		1	2	3
Initial	Water Content, %	31.6	30.7	30.8
	Dry Density, pcf	92.1	93.8	94.5
	Saturation, %	102.7	104.0	106.1
	Void Ratio	0.8298	0.7978	0.7832
	Diameter, in.	1.400	1.400	1.391
	Height, in.	3.090	3.092	3.097
At Test	Water Content, %	31.6	30.7	30.8
	Dry Density, pcf	92.1	93.8	94.5
	Saturation, %	102.7	104.0	106.1
	Void Ratio	0.8298	0.7978	0.7832
	Diameter, in.	1.400	1.400	1.391
	Height, in.	3.090	3.092	3.097
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.85	20.79	41.75
Fail. Stress, psf		1085	1351	1214
Strain, %		15.4	15.1	14.8
Ult. Stress, psf		1085	1351	1214
Strain, %				
σ_1 Failure, psf		2071	4345	7226
σ_3 Failure, psf		987	2994	6012

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: M GR CL4 W/ LYS SM

LL= 34 **PL=** 23 **PI=** 11
Assumed Specific Gravity= 2.70
Remarks:

Figure _____

Client: U.S. Army Corps of Engineers

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

Source of Sample: MRGO-24U **Depth:** 44.6

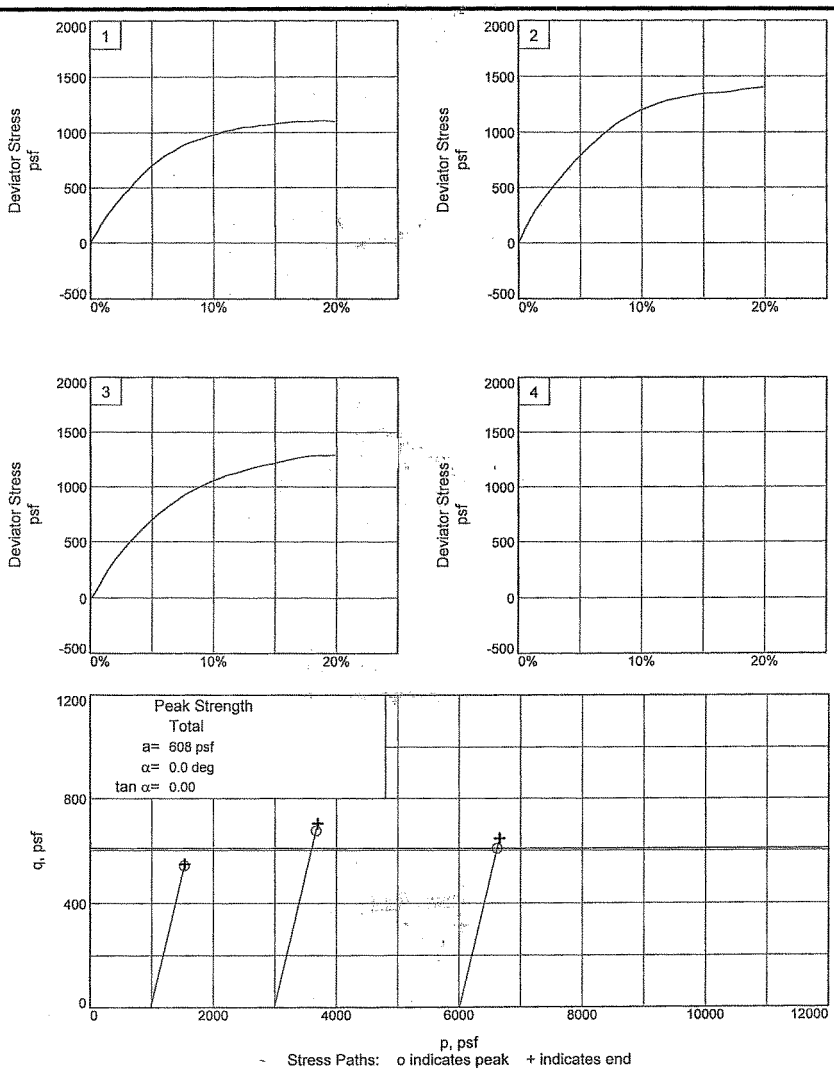
Sample Number: 12D

Proj. No.: 07-022135 **Date Sampled:** 1/7/10

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

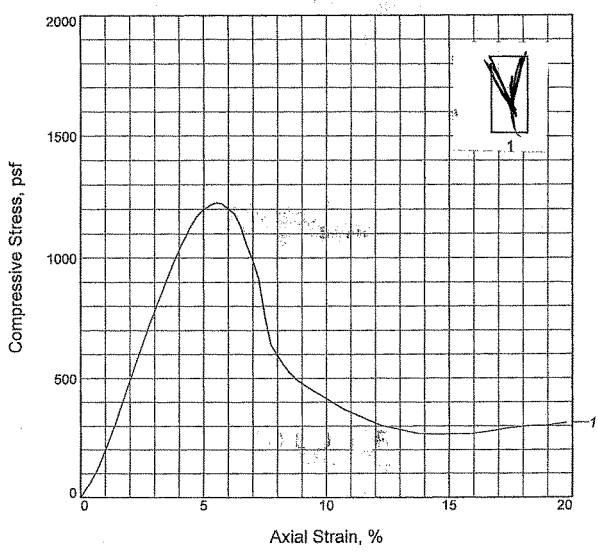
Tested By: ARS **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-24U **Depth:** 44.6 **Sample Number:** 12D
Project No.: 07-022135 **Figure** _____ FFEBJV, LLC

Tested By: ARS **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	1226			
Undrained shear strength, psf	613			
Failure strain, %	5.5			
Strain rate, %/min.	1.00			
Water content, %	33.3			
Wet density, pcf	119.7			
Dry density, pcf	89.8			
Saturation, %	102.6			
Void ratio	0.8768			
Specimen diameter, in.	1.399			
Specimen height, in.	3.077			
Height/diameter ratio	2.20			

Description: M GR CL4 W/ LYS ML

LL = 30	**PL** = 20	**PI** = 10	**Assumed GS=** 2.70	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/10/09
Remarks:

Figure _____

Client: U.S. Army Corps of Engineers

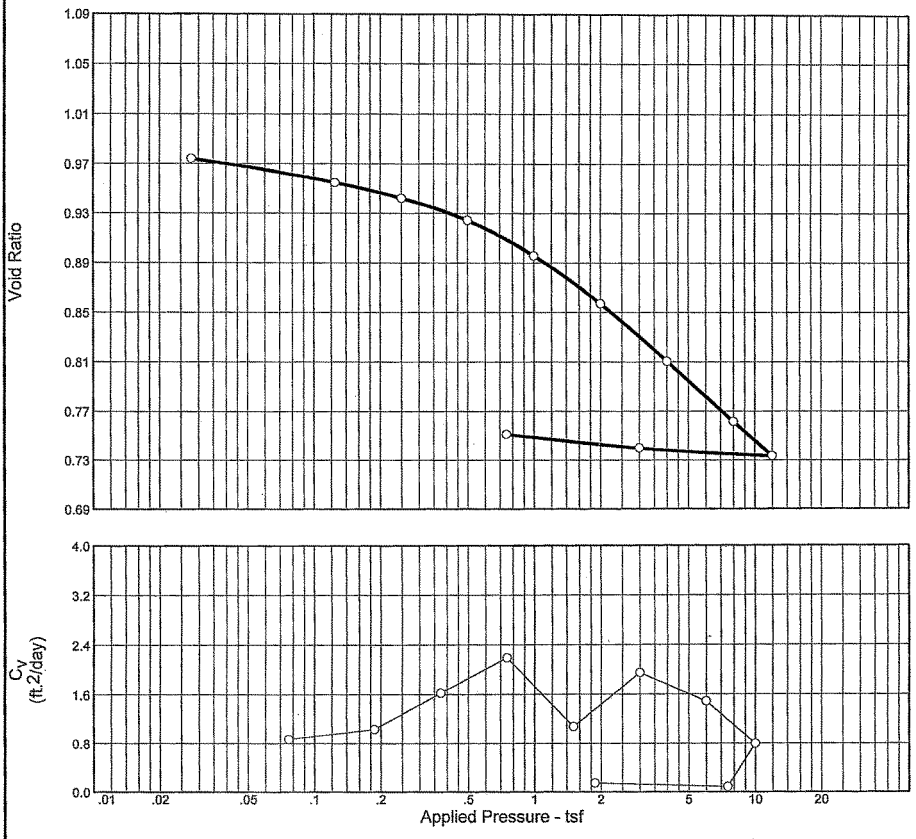
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-24U **Depth:** 46.8
Sample Number: 13B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: VF **Checked By:** MS

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
99.5 %	36.2 %	84.9	40	17	2.69	0.87	0.16	0.978

MATERIAL DESCRIPTION	USCS	AASHTO
M GR CL4 W/ LYS ML, WD	CL4	

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

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

Source: MRGO-24U **Sample No.:** 13D **Elev./Depth:** 48.6

FFEBJV, LLC

St Rose, LA

Remarks:

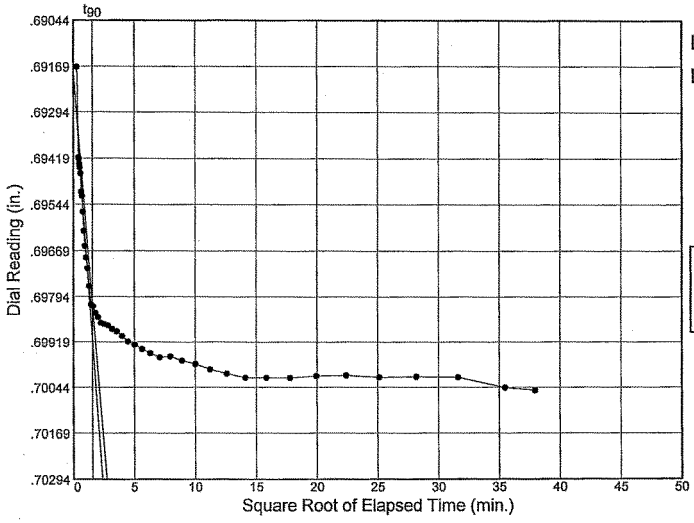
Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

Dial Reading vs. Time

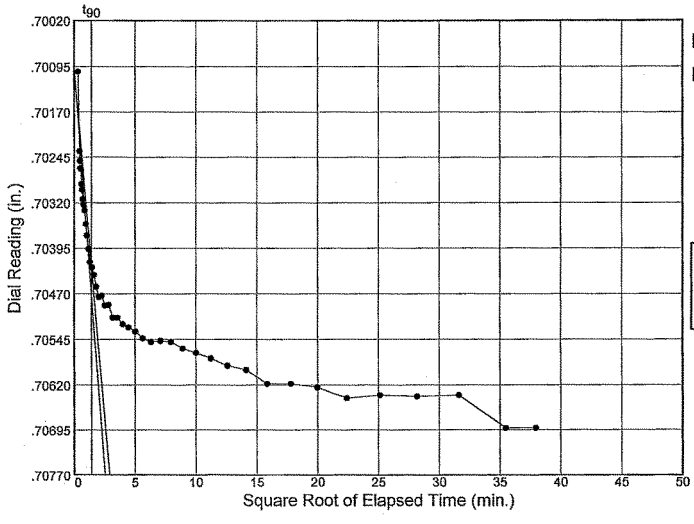
Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-24U Sample No.: 13D Elev./Depth: 48.6



Load No.= 2
Load= 0.13 tsf
D_0 = 0.69179
D_{90} = 0.69818
D_{100} = 0.69889
T_{90} = 2.43 min.

C_v @ T_{90}
0.86 ft.2/day



Load No.= 3
Load= 0.25 tsf
D_0 = 0.70095
D_{90} = 0.70424
D_{100} = 0.70460
T_{90} = 2.01 min.

C_v @ T_{90}
1.03 ft.2/day

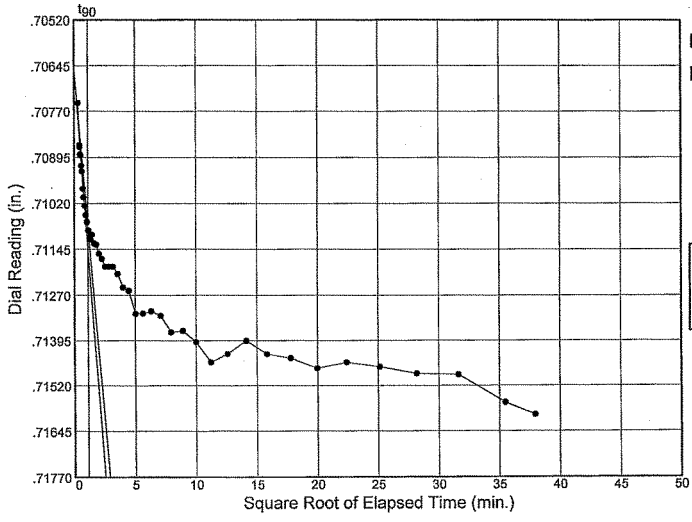
FFEBJV, LLC

Figure

Dial Reading vs. Time

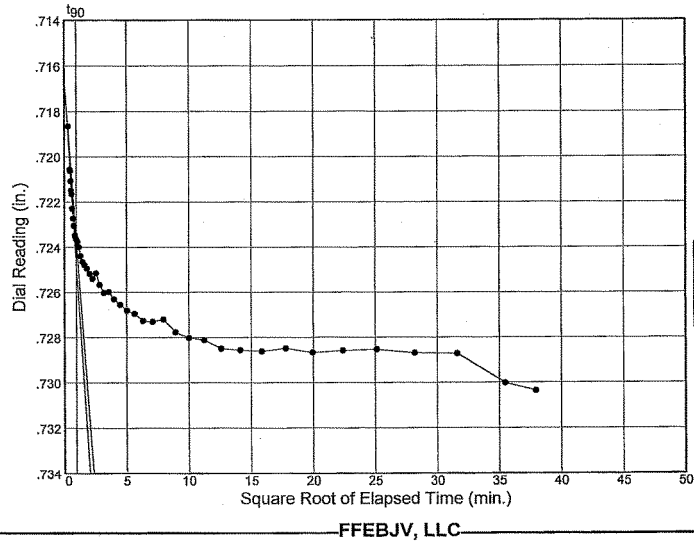
Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-24U Sample No.: 13D Elev./Depth: 48.6



Load No.= 4
Load= 0.50 tsf
D_0 = 0.70645
D_{90} = 0.71084
D_{100} = 0.71133
T_{90} = 1.26 min.

C_v @ T_{90}
1.62 ft.2/day



Load No.= 5
Load= 1.00 tsf
D_0 = 0.71647
D_{90} = 0.72363
D_{100} = 0.72443
T_{90} = 0.91 min.

C_v @ T_{90}
2.19 ft.2/day

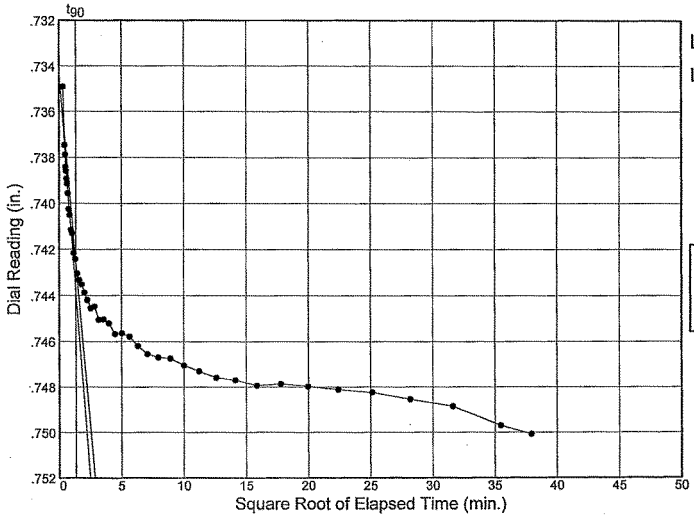
Figure

FFEBJV, LLC

Dial Reading vs. Time

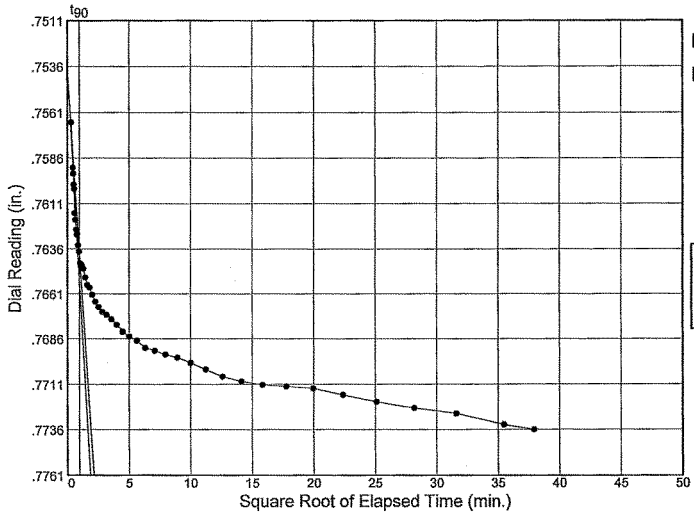
Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-24U Sample No.: 13D Elev./Depth: 48.6



Load No.= 6
Load= 2.00 tsf
D_0 = 0.73423
D_{90} = 0.74256
D_{100} = 0.74349
T_{90} = 1.79 min.

C_v @ T_{90}
1.07 ft.2/day



Load No.= 7
Load= 4.00 tsf
D_0 = 0.75361
D_{90} = 0.76383
D_{100} = 0.76497
T_{90} = 0.94 min.

C_v @ T_{90}
1.95 ft.2/day

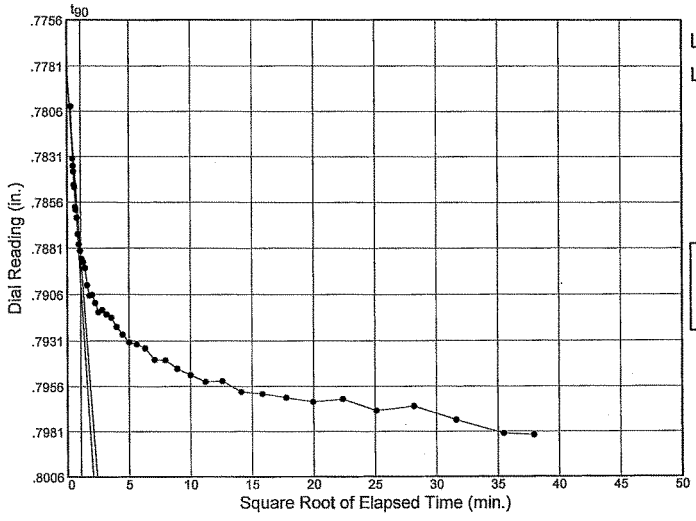
Figure

FFEBJV, LLC

Dial Reading vs. Time

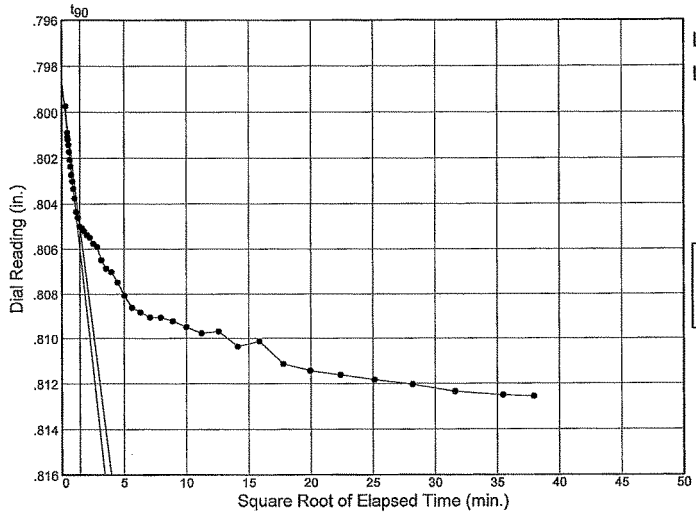
Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-24U Sample No.: 13D Elev./Depth: 48.6



Load No.= 8
Load= 8.00 tsf
D_0 = 0.77813
D_{90} = 0.78835
D_{100} = 0.78949
T_{90} = 1.18 min.

C_v @ T_{90}
1.49 ft.2/day



Load No.= 9
Load= 12.00 tsf
D_0 = 0.79862
D_{90} = 0.80500
D_{100} = 0.80571
T_{90} = 2.11 min.

C_v @ T_{90}
0.79 ft.2/day

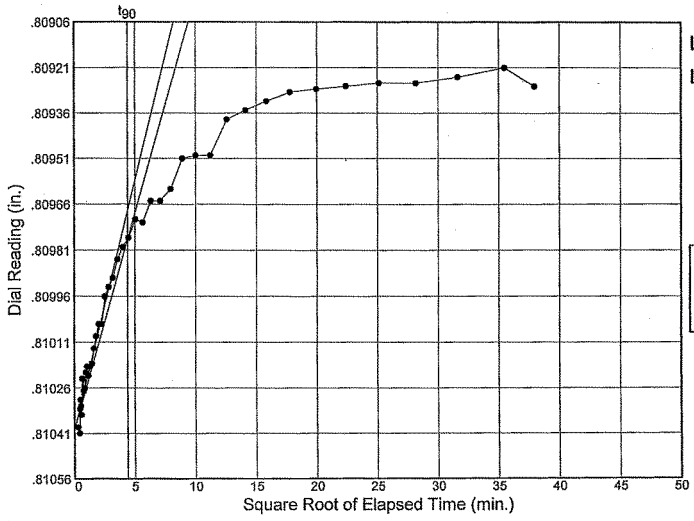
Figure

FFEBJV, LLC

Dial Reading vs. Time

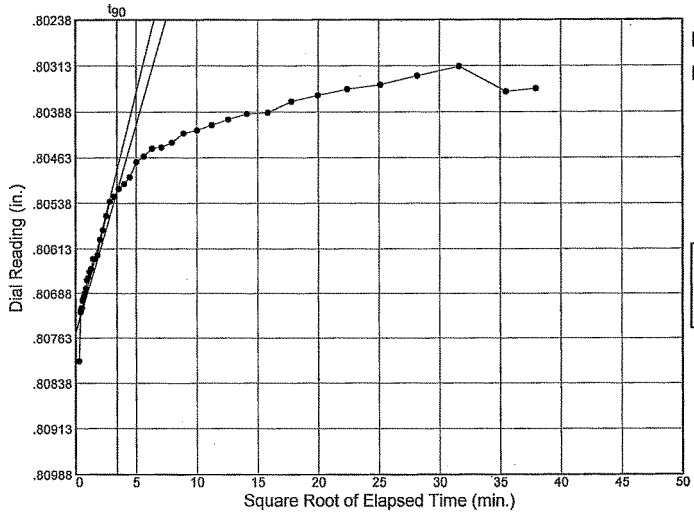
Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-24U Sample No.: 13D Elev./Depth: 48.6



Load No.= 10
Load= 3.00 tsf
D_0 = 0.81040
D_{90} = 0.80978
D_{100} = 0.80971
T_{90} = 19.30 min.

C_v @ T_{90}
0.08 ft.^{2}/day



Load No.= 11
Load= 0.75 tsf
D_0 = 0.80757
D_{90} = 0.80519
D_{100} = 0.80493
T_{90} = 11.68 min.

C_v @ T_{90}
0.14 ft.^{2}/day

FFEBJV, LLC

Figure

CONSOLIDATION TEST DATA

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Contract No. W912P8-07-D-0022
Task Order 135
Project Number: 07-022135

Sample Data

Source: MRGO-24U
Sample No.: 13D
Elev. or Depth: 48.6 Sample Length(in./cm.):
Location:
Description: M GR CL4 W/ LYS ML, WD
Liquid Limit: 40 Plasticity Index: 17
USCS: CL4 AASHTO: Figure No.:
Testing Remarks: Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST		AFTER TEST	
Wet w+t	= 136.16 g.	Consolidometer #	= 5	Wet w+t	= 472.02 g.
Dry w+t	= 100.00 g.			Dry w+t	= 398.14 g.
Tare Wt.	= .00 g.	Spec. Gravity	= 2.69	Tare Wt.	= 112.61 g.
Height	= 1.00 in.	Height	= 1.00 in.		
Diameter	= 4.00 in.	Diameter	= 4.00 in.		
Weight	= 381.56 g.	Defl. Table	= n/a		
Moisture	= 36.2 %	Ht. Solids	= 0.5059 in.	Moisture	= 25.9 %
Wet Den.	= 115.6 pcf	Dry Wt.	= 280.05 g.*	Dry Wt.	= 285.53 g.
Dry Den.	= 84.9 pcf	Void Ratio	= 0.978	Void Ratio	= 0.751
		Saturation	= 99.5 %		

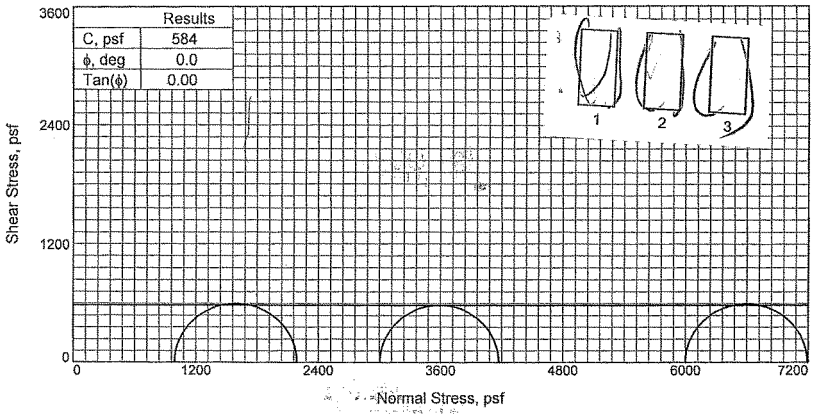
* Initial dry weight used in calculations

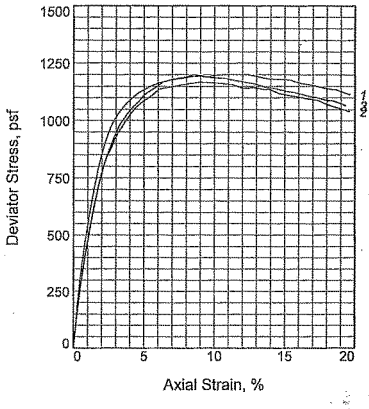
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
start	0.68884				0.978	
0.03	0.69077	0.00000			0.974	0.2 Comprs.
0.13	0.70052	0.00000	0.86		0.955	1.2 Comprs.
0.25	0.70692	0.00000	1.03		0.942	1.8 Comprs.
0.50	0.71600	0.00000	1.62		0.924	2.7 Comprs.
1.00	0.73036	0.00000	2.19		0.896	4.1 Comprs.
2.00	0.75008	0.00000	1.07		0.857	6.1 Comprs.
4.00	0.77361	0.00000	1.95		0.810	8.5 Comprs.
8.00	0.79830	0.00000	1.49		0.762	10.9 Comprs.

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
12.00	0.81255	0.00000	0.79		0.733	12.4 Comprs.
3.00	0.80927	0.00000	0.08		0.740	12.0 Comprs.
0.75	0.80350	0.00000	0.14		0.751	11.5 Comprs.

C_c = 0.16 P_c = 0.87 tsf C_r = 0.01





Sample No.		1	2	3
Initial	Water Content, %	33.9	34.3	34.4
	Dry Density, pcf	89.7	89.4	88.5
	Saturation, %	104.0	104.4	102.7
	Void Ratio	0.8788	0.8862	0.9051
	Diameter, in.	1.407	1.404	1.410
	Height, in.	3.091	3.099	3.095
At Test	Water Content, %	33.9	34.3	34.4
	Dry Density, pcf	89.7	89.4	88.5
	Saturation, %	104.0	104.4	102.7
	Void Ratio	0.8788	0.8862	0.9051
	Diameter, in.	1.407	1.404	1.410
	Height, in.	3.091	3.099	3.095
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.88	20.86	41.65
Fail. Stress, psf		1200	1168	1195
Strain, %		8.6	9.1	9.1
Ult. Stress, psf		1177	1109	1130
Strain, %				
σ_1 Failure, psf		2190	4172	7193
σ_3 Failure, psf		991	3004	5998

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: M GR CL4

LL= 39 **PL=** 18 **PI=** 21
Assumed Specific Gravity= 2.70
Remarks:

Figure _____

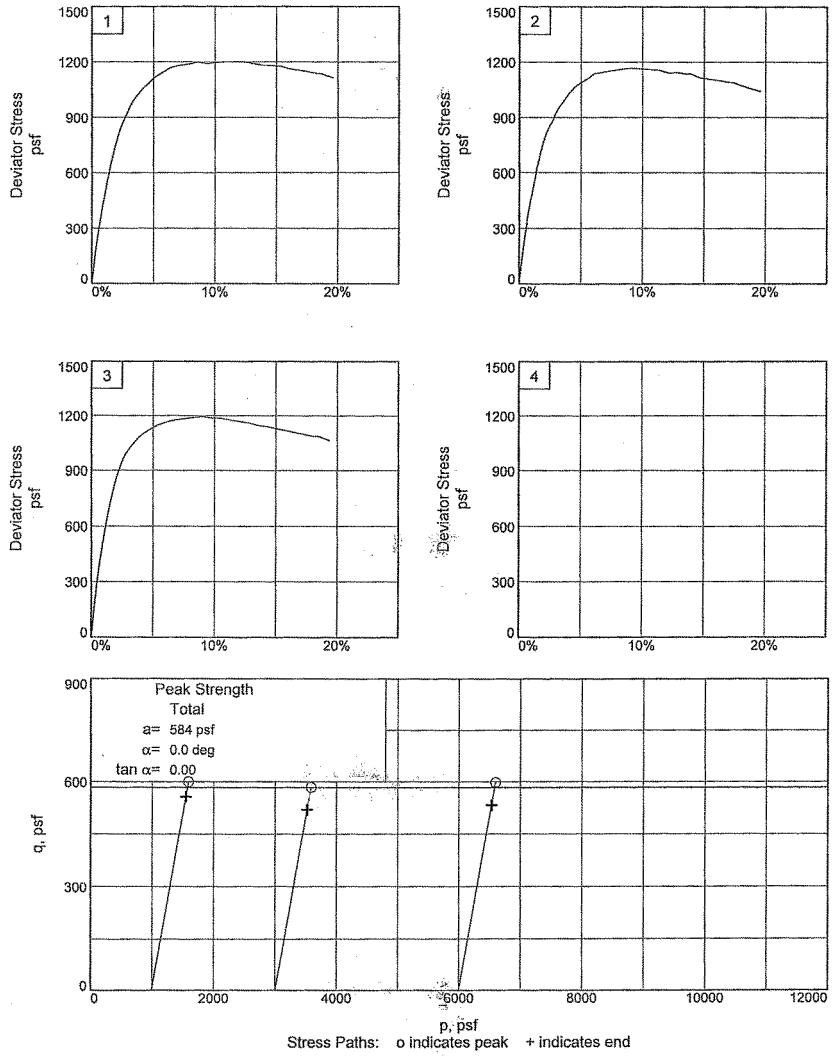
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-24U **Depth:** 50.8
Sample Number: 14B
Proj. No.: 07-022135 **Date Sampled:** 12/10/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

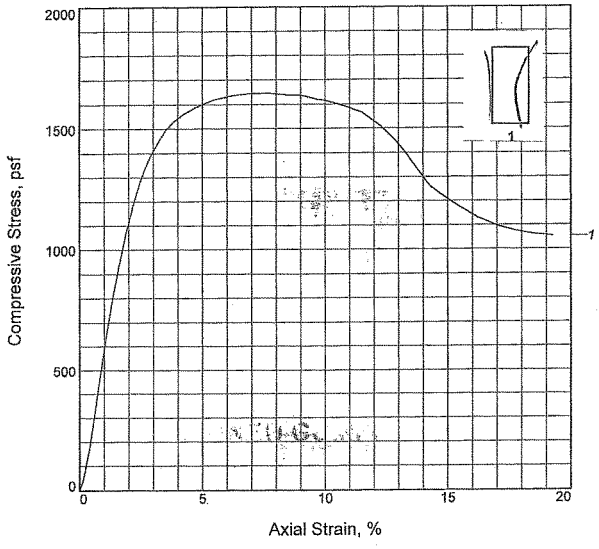
Tested By: VF **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-24U **Depth:** 50.8 **Sample Number:** 14B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: VF **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	1646			
Undrained shear strength, psf	823			
Failure strain, %	7.7			
Strain rate, %/min.	1.00			
Water content, %	33.2			
Wet density, pcf	117.9			
Dry density, pcf	88.5			
Saturation, %	99.1			
Void ratio	0.9040			
Specimen diameter, in.	1.422			
Specimen height, in.	3.102			
Height/diameter ratio	2.18			

Description: M GR CL6 W/ LNS & LYS ML

LL = 46	PL = 20	PI = 26	Assumed GS= 2.70	Type: UNDISTURBED

Project No.: 07-022135
Date Sampled: 12/10/09
Remarks:

Figure _____

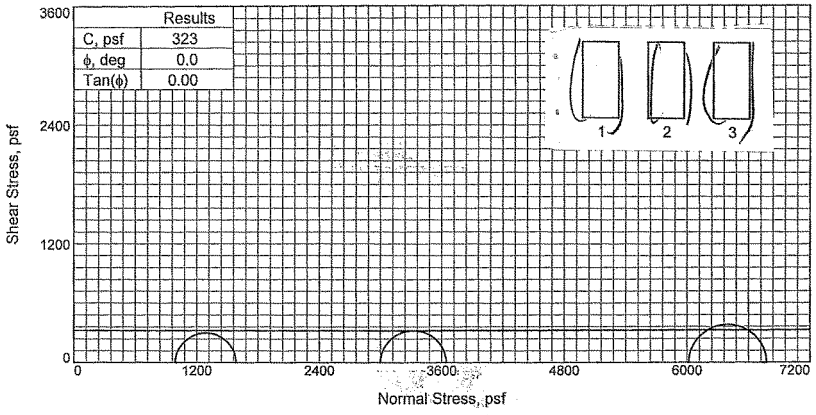
Client: U.S. Army Corps of Engineers

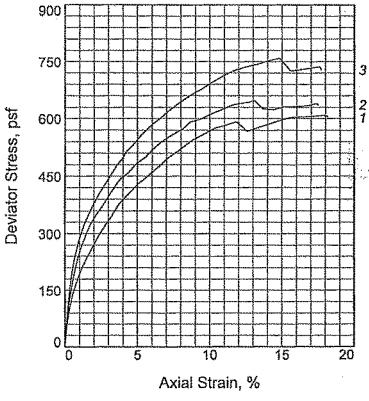
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-24U **Depth:** 55.7
Sample Number: 15C

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: VF **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	36.8	37.2	36.6
	Dry Density, pcf	85.7	85.4	86.2
	Saturation, %	102.7	103.1	103.4
	Void Ratio	0.9674	0.9731	0.9550
	Diameter, in.	1.405	1.404	1.404
	Height, in.	3.093	3.098	3.094
At Test	Water Content, %	36.8	37.2	36.6
	Dry Density, pcf	85.7	85.4	86.2
	Saturation, %	102.7	103.1	103.4
	Void Ratio	0.9674	0.9731	0.9550
	Diameter, in.	1.405	1.404	1.404
	Height, in.	3.093	3.098	3.094
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.87	20.82	41.78
Fail. Stress, psf		596	647	759
Strain, %		14.8	13.1	14.8
Ult. Stress, psf		596	624	759
Strain, %				
σ_1 Failure, psf		1585	3645	6775
σ_3 Failure, psf		989	2998	6016

Type of Test: Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CL6 W/ LNS & ARS ML

LL= 48 **PL=** 20 **PI=** 28
Assumed Specific Gravity= 2.70
Remarks:

Figure _____

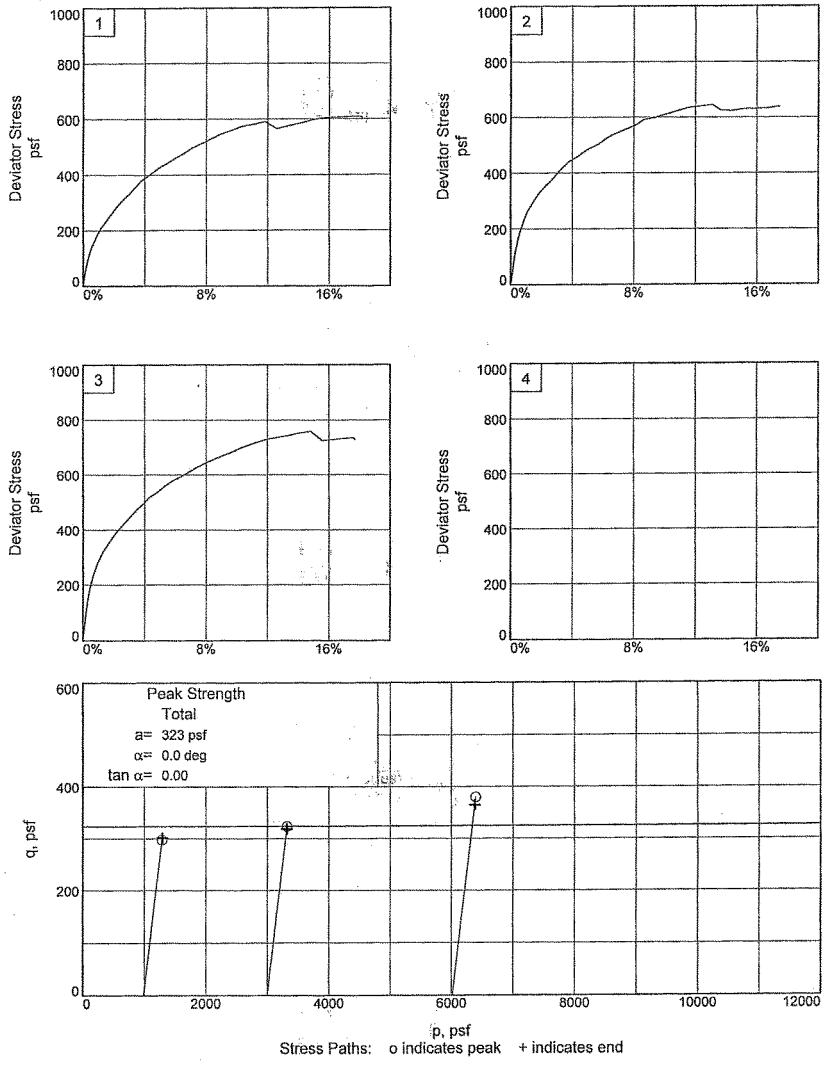
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-24U **Depth:** 58.8
Sample Number: 16B
Proj. No.: 07-022135 **Date Sampled:** 12/10/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

Tested By: VF **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-24U **Depth:** 58.8 **Sample Number:** 16B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: VF **Checked By:** MS

SUMMARY OF LABORATORY TEST RESULTS

Project: MRGO Ecosystem Restoration Feasibility Study Assigned By: _____

Project Number: 07-022135 Current Date: 12/21/2009
Boring: MRGO-29U

Sample Number	Depth	Visual Classification	USCS	E(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
1A	0.0	VSO GR CH4	CH4		104												
2A	2.0	VSO GR CH4	CH4		103												
3A	4.0	VSO GR CH4 W/ ARS ML, WD, O	CH4		83												
3B	4.8	VSO GR CHOA W/ ARS ML, WD, RT	CHOA		91	48	92	100	UU	0	132		117	30	87	0.19	
3C	5.7	SO GR CHOB W/ RT, WD	CHOB		158												
3D	6.6	SO GR CHOB W/ WD, RT	CHOB		160												
4A	8.0	SO GR CL6 W/ LNS & LYS CH	CL6		46												
4B	8.8	GR ML W/ RT	ML		32	90	119	99					NP	NP	NP		Gs, CON, SV
4C	10.0	GR SM	SM		37												
5A	12.0	GR SM	SM		32												
6A	14.0	GR SM	SM		35												
7A	16.0	SO GR CH2 W/ LYS & ARS ML	CH2		41												
7B	16.8	SO GR CH3 W/ LNS & LYS ML	CH3		56												
7C	17.7	SO GR CL6 W/ LNS & LYS ML	CL6		42	79	112	99	UU	0	273		45	22	23	0.20	
7D	18.6	SO GR CH4 W/ LNS & LYS ML	CH4		74												
8A	20.0	SO GR CH4	CH4		80												
8B	20.8	SO GR CH4	CH4		75												
8C	21.7	SO GR CH3 W/ LNS ML	CH3	5	66	61	101	99	UC	-	278	557	66	24	42	0.20	
8D	22.6	SO GR CH4 W/ LNS ML	CH4		70												
9A	24.0	SO GR CH4	CH4		69												
9B	24.8	VSO GR CH4 W/ ARS ML	CH4		63	62	101	99	UU	0	220		73	24	49	0.21	
9C	25.7	SO GR CH4 W/ ARS ML	CH4		67												
9D	26.6	SO GR CH4 W/ ARS ML	CH4		68												
10A	28.0	SO GR CH4 W/ ARS ML	CH4		62												
10B	28.8	SO GR CH4 W/ ARS ML	CH4		61												
10C	29.7	SO GR CH4 W/ LNS & LYS ML	CH4	6	60	64	103	98	UC	-	302	605	75	25	50	0.24	
11A	32.0	SO GR CH4 W/ LNS & LYS ML	CH4		68												
11B	32.8	SO GR CH4 W/ LNS & LYS ML	CH4		60	64	103	99	UU	0	404		74	25	49	0.26	
11C	33.7	SO GR CH4 W/ LNS & LYS ML	CH4		65												
11D	34.6	SO GR CH4 W/ LNS & LYS ML	CH4		61												
12A	36.0	SO GR CH4	CH4		65												
12B	36.8	SO GR CH4 W/ LNS ML	CH4	3	68	59	100	99	UC	-	478	955	92	27	65	0.29	
12C	37.7	SO GR CH4 W/ LNS & LYS ML	CH4		66												
12D	38.6	SO GR CH4 W/ LNS ML	CH4		67												
13A	40.0	M GR CH4 W/ LYS ML	CH4		62												
13B	40.8	M GR CH4 W/ LYS ML	CH4		63	62	101	98					80	25	55		Gs, CON

Remarks: _____
FFEB JV, LLC

Checked By: TB/MS
File Name: MRGO-29U.xls

SUMMARY OF LABORATORY TEST RESULTS

Project: MRGO Ecosystem Restoration Feasibility Study Assigned By: _____

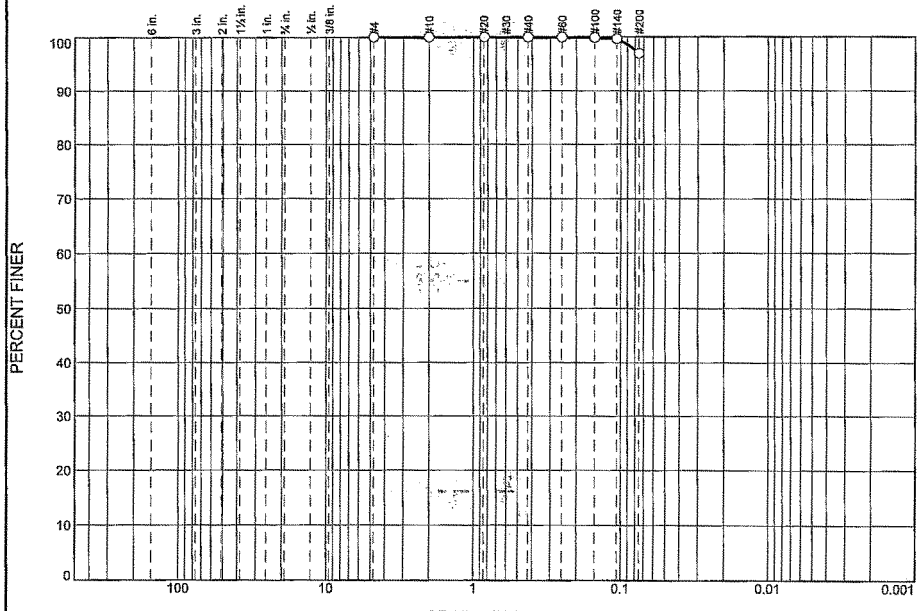
Project Number: 07-022135 Current Date: 12/21/2009
Boring: MRGO-29U

Sample Number	Depth	Visual Classification	USCS	E(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
13C	41.7	M GR CH4 W/ LYS ML	CH4		59												
14A	44.0	ST GR CL4 W/ ARS CH, CC	CL4		24												
14B	44.8	ST LGR & T CH2 W/ ARS ML, CC	CH2		22	104	127	95	UU	0	1365		50	16	34	1.13	
14C	45.7	VST LGR & T CH2 W/ ARS ML	CH2		22												
15A	48.0	ST GNG & T CH2 W/ ARS ML	CH2		32												
15B	48.8	ST GNG & T CH3 W/ ARS ML, CC	CH3	2	31	91	119	97	UC	-	1026	2053	63	19	44	1.63	
15C	49.7	VST LGR CH4 W/ ARS ML	CH4		35												
15D	50.6	VST LGR CH4 W/ ARS ML	CH4		35												
16A	52.0	VST LGR CL4 W/ LYS CH, WD	CL4		19												
16B	52.8	ST LGR CL4 W/ ARS CH, WD	CL4		19	108	129	95	UU	0	1181		33	13	20	0.90	
16C	53.7	ST LGR CL4 W/ ARS CH, WD	CL4		20												
16D	54.6	ST LGR CL4 W/ ARS CH	CL4		22												
17A	56.0	LGR SP W/ ARS CH	SP		16												
17B	56.8	LGR SP	SP		21												

Remarks:
FFEB JV, LLC

Checked By: TB/MS
File Name: MRGO-29U.xls

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.0	0.0	3.0	97.0	

	Colloids	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○		NP	NP								

Material Description	USCS	AASHTO
○ GR ML W/ RT	ML	

Project No. 07-022135 **Client:** U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
○ **Source of Sample:** MRGO-29U **Depth:** 8.8 **Sample Number:** 4B

Date: ○ 10/22/09

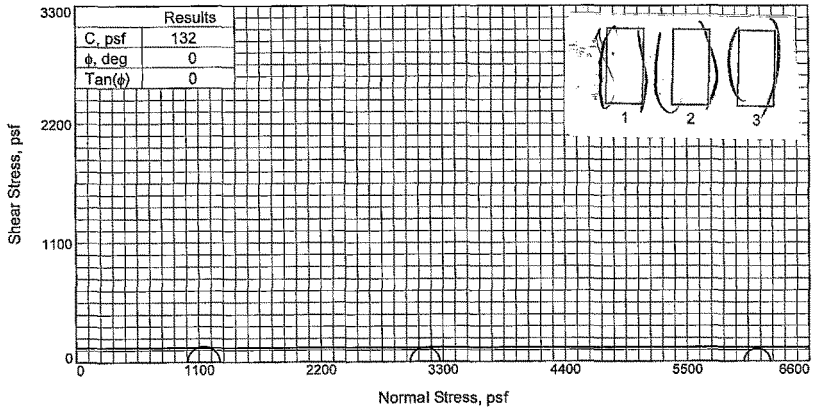
FFEBJV, LLC

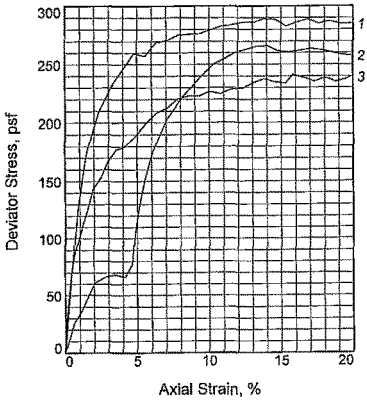
St Rose, LA

Remarks:

Figure

Tested By: JH **Checked By:** TB





Sample No.		1	2	3
Initial	Water Content, %	90.8	88.6	92.8
	Dry Density, pcf	48.2	49.1	47.6
	Saturation, %	99.6	99.9	100.0
	Void Ratio	2.3693	2.3053	2.4125
	Diameter, in.	1.414	1.412	1.413
	Height, in.	3.099	3.107	3.106
At Test	Water Content, %	90.8	88.6	92.8
	Dry Density, pcf	48.2	49.1	47.6
	Saturation, %	99.6	99.9	100.0
	Void Ratio	2.3693	2.3053	2.4125
	Diameter, in.	1.414	1.412	1.413
	Height, in.	3.099	3.107	3.106
Strain rate, in./min.		1.000	1.000	1.000
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.93	20.86	41.74
Fail. Stress, psf		289	266	237
Strain, %		13.9	13.4	13.8
Ult. Stress, psf		283	261	234
Strain, %				
σ_1 Failure, psf		1287	3270	6249
σ_3 Failure, psf		998	3004	6011

Type of Test: Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: VSO GR CHOA W/ ARS ML, WD, RT
LL= 117 **PL=** 30 **PI=** 87
Assumed Specific Gravity= 2.60
Remarks:

Figure _____

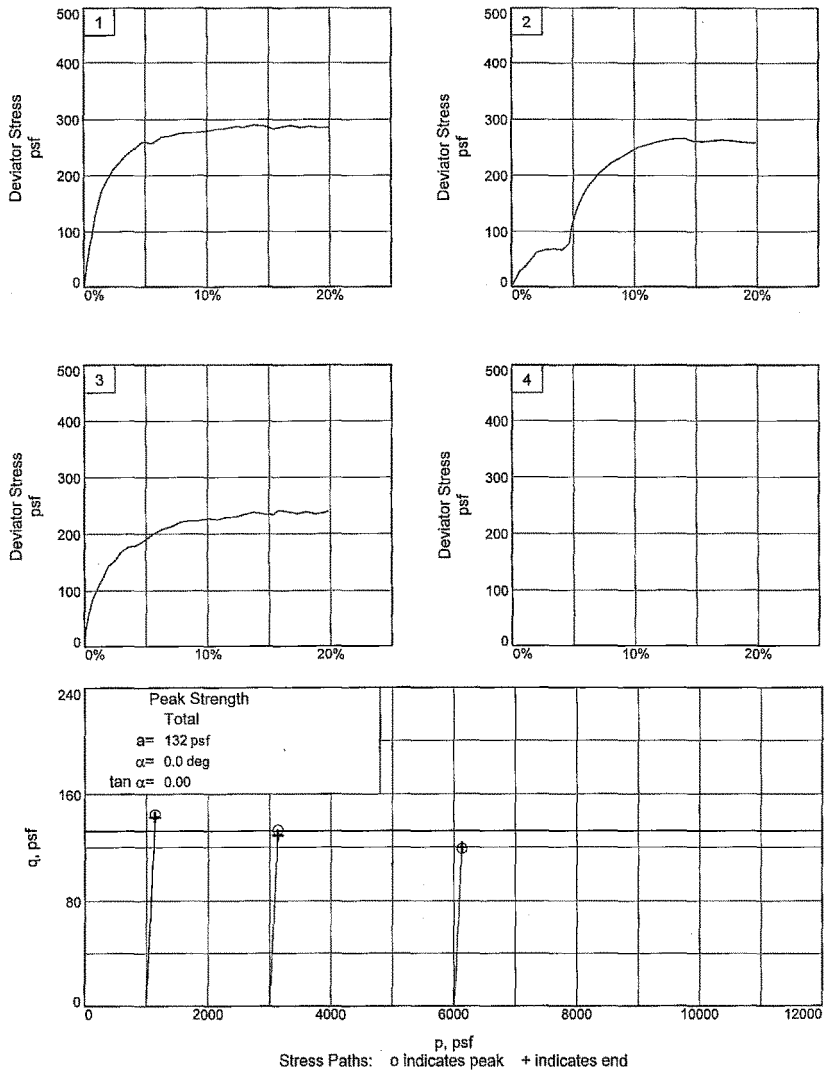
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study St.Bernard Parish, La
Source of Sample: MRGO-29U **Depth:** 4.8
Sample Number: 3B
Proj. No.: 07-022135 **Date Sampled:** 10/6/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

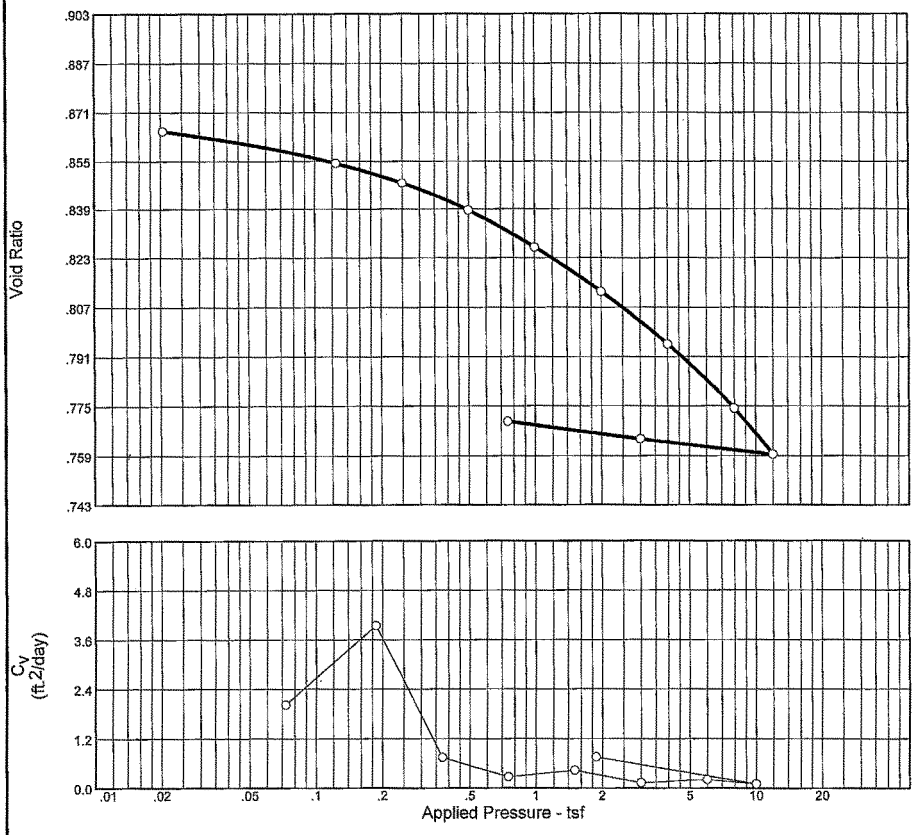
Tested By: ARS/JC **Checked By:** TSL



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-29U **Depth:** 4.8 **Sample Number:** 3B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: ARS/JC **Checked By:** TSL

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
99.3 %	31.9 %	90.1	NP	NP	2.69	1.82	0.08	0.865

MATERIAL DESCRIPTION	USCS	AASHTO
GR ML W/ RT	ML	

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

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

Source: MRGO-29U **Sample No.:** 4B **Elev./Depth:** 8.8

FFEBJV, LLC

St Rose, LA

Remarks:

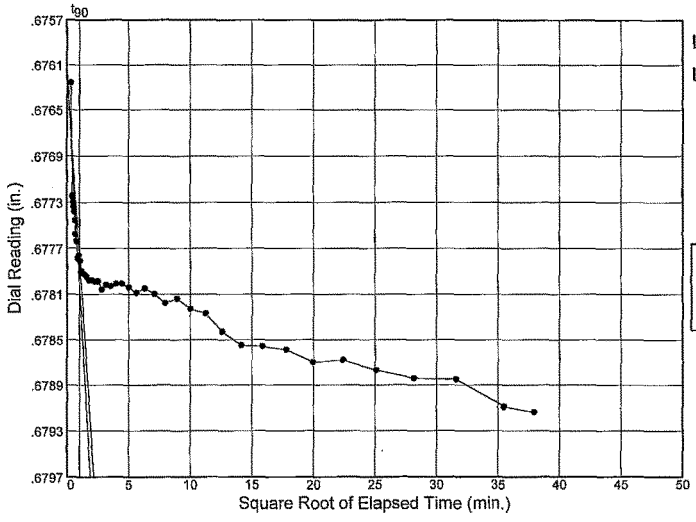
Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

Dial Reading vs. Time

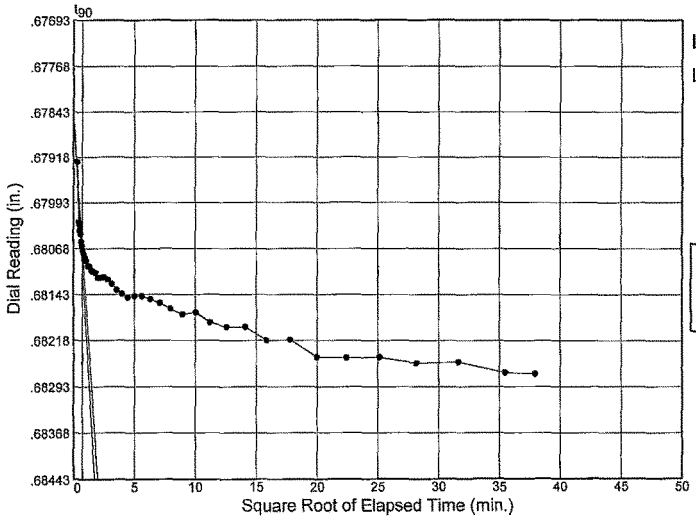
Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-29U Sample No.: 4B Elev./Depth: 8.8



Load No.= 2
Load= 0.13 tsf
D_0 = 0.67612
D_{90} = 0.67779
D_{100} = 0.67798
T_{90} = 1.05 min.

C_v @ T_{90}
2.02 ft.2/day



Load No.= 3
Load= 0.25 tsf
D_0 = 0.67844
D_{90} = 0.68065
D_{100} = 0.68090
T_{90} = 0.53 min.

C_v @ T_{90}
3.94 ft.2/day

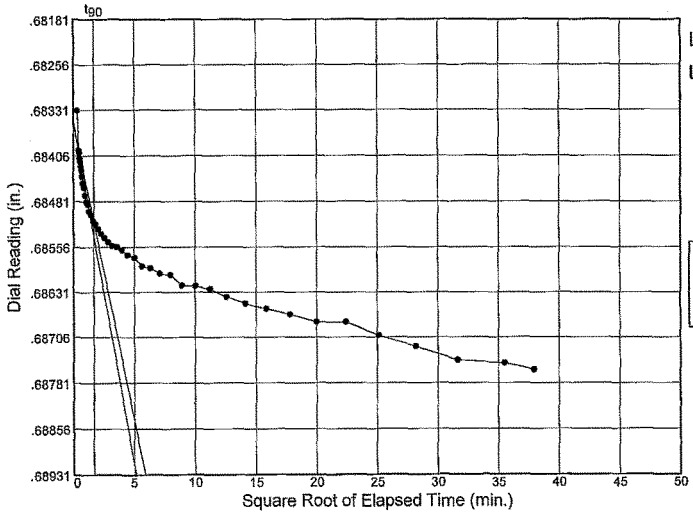
FFEBJV, LLC

Figure

Dial Reading vs. Time

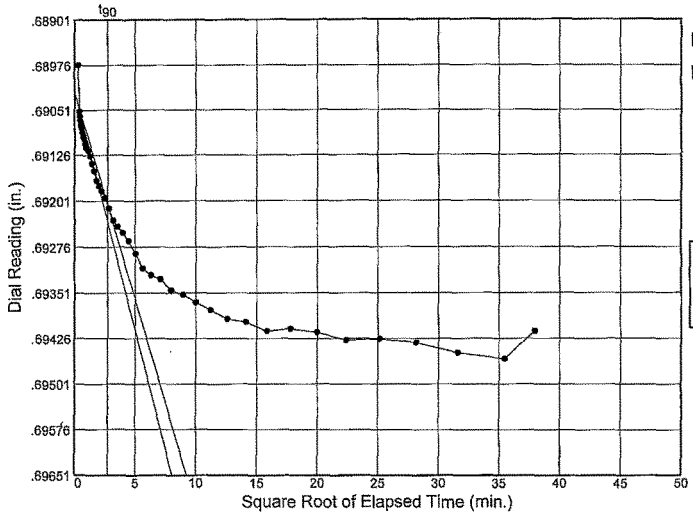
Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-29U Sample No.: 4B Elev./Depth: 8.8



Load No.= 4
Load= 0.50 tsf
D_0 = 0.68350
D_{90} = 0.68514
D_{100} = 0.68533
T_{90} = 2.79 min.

C_v @ T_{90}
0.75 ft.^{2}/day



Load No.= 5
Load= 1.00 tsf
D_0 = 0.69021
D_{90} = 0.69207
D_{100} = 0.69228
T_{90} = 7.49 min.

C_v @ T_{90}
0.28 ft.^{2}/day

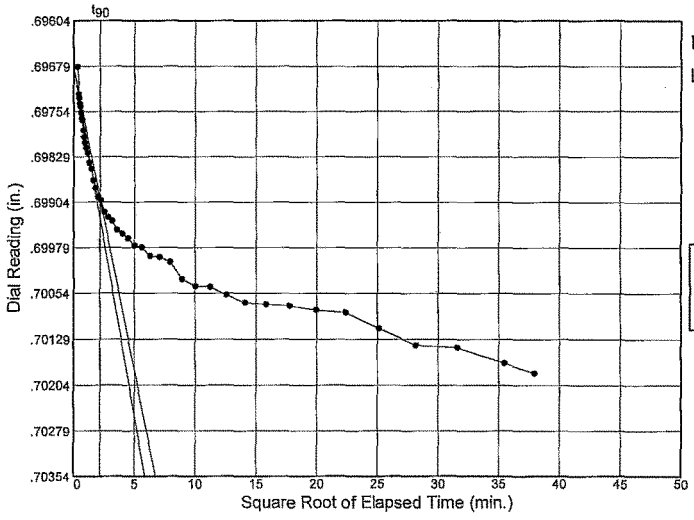
FFEBJV, LLC

Figure

Dial Reading vs. Time

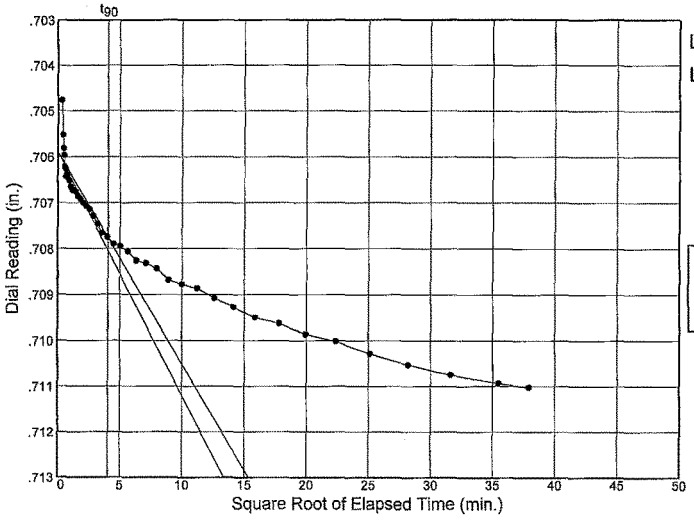
Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-29U Sample No.: 4B Elev./Depth: 8.8



Load No.= 6
Load= 2.00 tsf
D_0 = 0.69682
D_{90} = 0.69899
D_{100} = 0.69923
T_{90} = 4.72 min.

C_v @ T_{90}
0.43 ft.2/day



Load No.= 7
Load= 4.00 tsf
D_0 = 0.70589
D_{90} = 0.70776
D_{100} = 0.70797
T_{90} = 16.35 min.

C_v @ T_{90}
0.12 ft.2/day

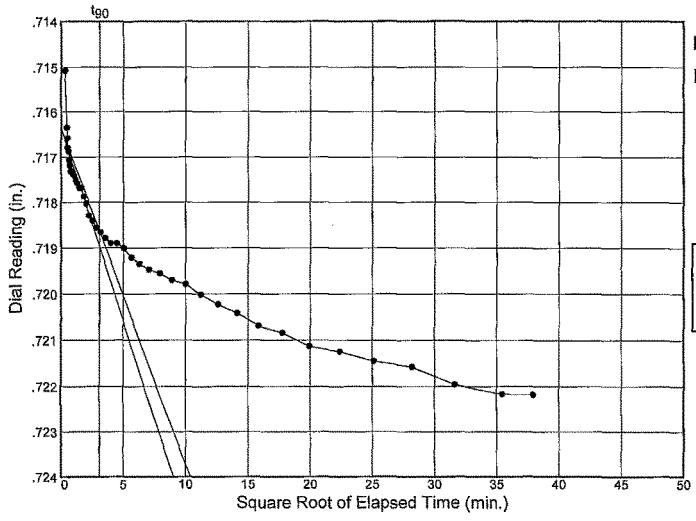
FFEBJV, LLC

Figure

Dial Reading vs. Time

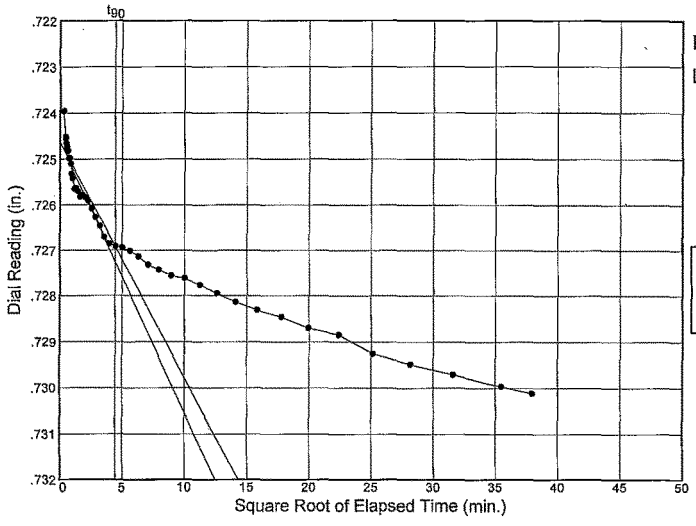
Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-29U Sample No.: 4B Elev./Depth: 8.8



Load No.= 8
Load= 8.00 tsf
D_0 = 0.71636
D_{90} = 0.71863
D_{100} = 0.71888
T_{90} = 9.51 min.

C_v @ T_{90}
0.21 ft.^{2}/day



Load No.= 9
Load= 12.00 tsf
D_0 = 0.72463
D_{90} = 0.72692
D_{100} = 0.72717
T_{90} = 19.75 min.

C_v @ T_{90}
0.10 ft.^{2}/day

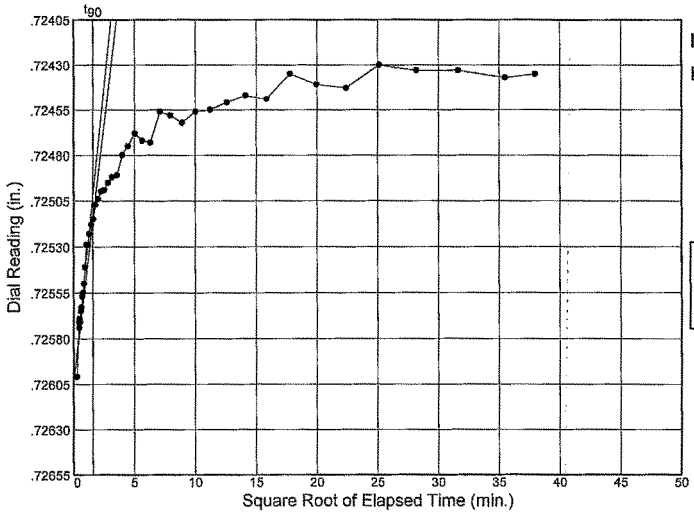
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-29U Sample No.: 4B Elev./Depth: 8.8



Load No.= 11
Load= 0.75 tsf
D_0 = 0.72605
D_{90} = 0.72516
D_{100} = 0.72506
T_{90} = 2.51 min.

C_v @ T_{90}
0.76 $ft.^2$/day

FFEBJV, LLC

Figure

SWELL/CONSOLIDATION TEST DATA

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Contract No. W912P8-07-D-0022
Task Order 135
Project Number: 07-022135

Sample Data

Source: MRGO-29U
Sample No.: 4B
Elev. or Depth: 8.8 Sample Length(in./cm.):
Location:
Description: GR ML W/ RT
Liquid Limit: NP Plasticity Index: NP
USCS: ML AASHTO: Figure No.:
Testing Remarks: Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST		AFTER TEST	
Wet w+t	= 131.91 g.	Consolidometer #	= 18	Wet w+t	= 499.79 g.
Dry w+t	= 100.00 g.			Dry w+t	= 415.45 g.
Tare Wt.	= .00 g.	Spec. Gravity	= 2.69	Tare Wt.	= 112.12 g.
Height	= 1.00 in.	Height	= 1.00 in.		
Diameter	= 4.00 in.	Diameter	= 4.00 in.		
Weight	= 392.70 g.	Defl. Table	= n/a		
Moisture	= 31.9 %	Ht. Solids	= 0.5376 in.	Moisture	= 27.8 %
Wet Den.	= 118.8 pcf	Dry Wt.	= 297.11 g.*	Dry Wt.	= 303.33 g.
Dry Den.	= 90.1 pcf	Void Ratio	= 0.865	Void Ratio	= 0.770
		Saturation	= 99.3 %		

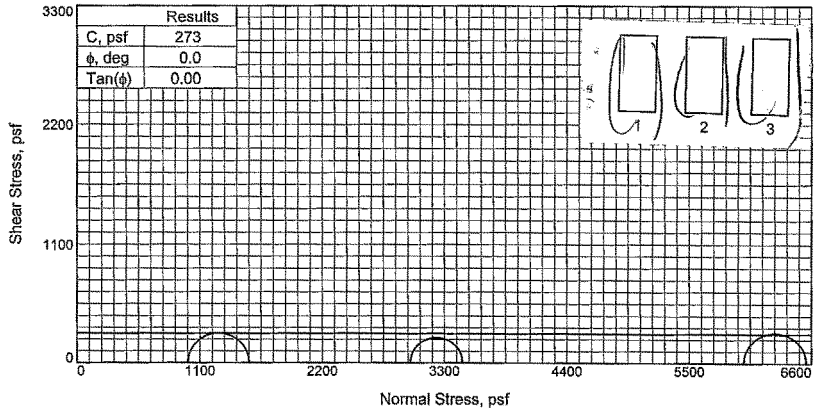
* Initial dry weight used in calculations

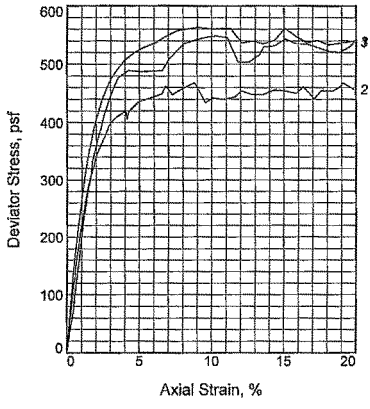
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.67356				0.865	
0.02	0.67350	0.00000			0.865	0.0 Swell
0.13	0.67914	0.00000	2.02		0.854	0.6 Comprs.
0.25	0.68272	0.00000	3.94		0.848	0.9 Comprs.
0.50	0.68760	0.00000	0.75		0.839	1.4 Comprs.
1.00	0.69414	0.00000	0.28		0.826	2.1 Comprs.
2.00	0.70185	0.00000	0.43		0.812	2.8 Comprs.
4.00	0.71103	0.00000	0.12		0.795	3.7 Comprs.
8.00	0.72218	0.00000	0.21		0.774	4.8 Comprs.

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
12.00	0.73012	0.00000	0.10		0.760	5.6 Comprs.
3.00	0.72743	0.00000			0.765	5.4 Comprs.
0.75	0.72435	0.00000	0.76		0.770	5.1 Comprs.

C_c = 0.08 P_c = 1.82 tsf C_r = 0.01





Sample No.		1	2	3
Initial	Water Content, %	41.6	41.6	41.4
	Dry Density, pcf	78.8	79.8	78.1
	Saturation, %	98.6	100.9	96.6
	Void Ratio	1.1395	1.1134	1.1581
	Diameter, in.	1.406	1.400	1.402
	Height, in.	3.094	3.098	3.099
At Test	Water Content, %	41.6	41.6	41.4
	Dry Density, pcf	78.8	79.8	78.1
	Saturation, %	98.6	100.9	96.6
	Void Ratio	1.1395	1.1134	1.1581
	Diameter, in.	1.406	1.400	1.402
	Height, in.	3.094	3.098	3.099
Strain rate, in./min.		1.000	1.000	1.000
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.90	20.79	41.61
Fail. Stress, psf		548	468	563
Strain, %		10.3	8.8	9.1
Ult. Stress, psf		503	433	535
Strain, %				
σ_1 Failure, psf		1542	3462	6555
σ_3 Failure, psf		994	2994	5992

Type of Test: Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CL6 W/ LNS & LYS ML

LL= 45 **PL=** 22 **PI=** 23
Assumed Specific Gravity= 2.70
Remarks:

Figure _____

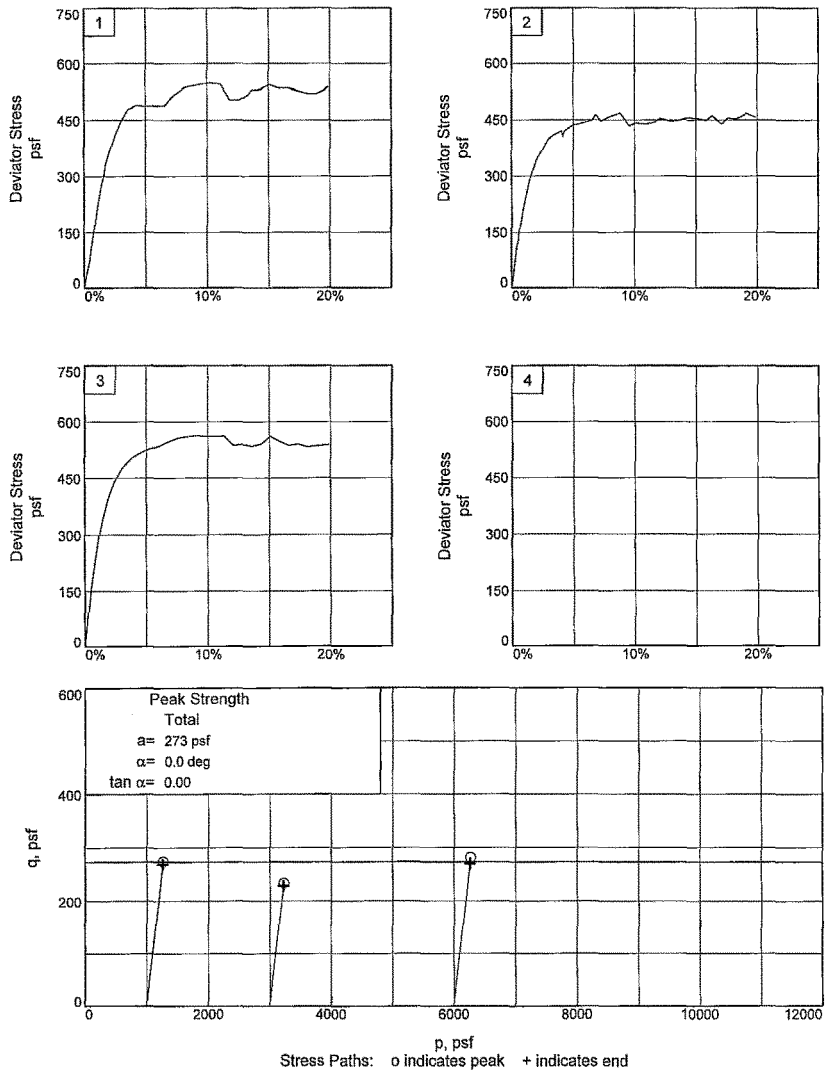
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-29U **Depth:** 17.7
Sample Number: 7C
Proj. No.: 07-022135 **Date Sampled:** 10/6/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

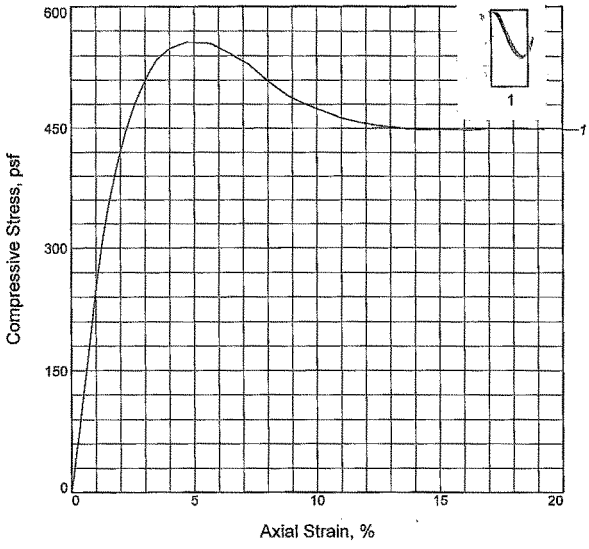
Tested By: JC/ARS **Checked By:** TSL



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-29U **Depth:** 17.7 **Sample Number:** 7C
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: JC/ARS **Checked By:** TSL

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	557			
Undrained shear strength, psf	278			
Failure strain, %	4.7			
Strain rate, in./min.	1.000			
Water content, %	65.7			
Wet density, pcf	100.6			
Dry density, pcf	60.7			
Saturation, %	99.1			
Void ratio	1.8174			
Specimen diameter, in.	1.407			
Specimen height, in.	3.095			
Height/diameter ratio	2.20			

Description: SO GR CH3 W/ LNS ML

LL = 66	**PL** = 24	**PI** = 42	**Assumed GS=** 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 10/6/09
Remarks:

Figure _____

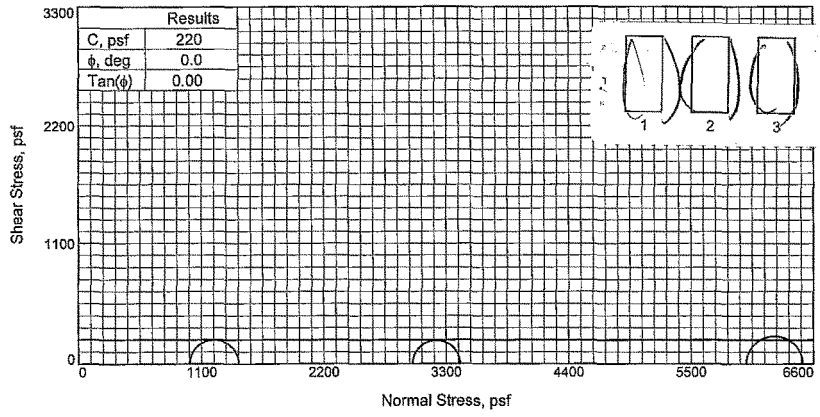
Client: U.S. Army Corps of Engineers

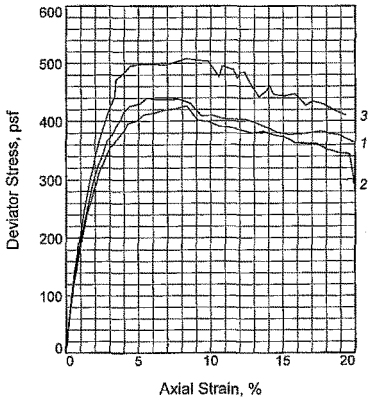
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-29U **Depth:** 21.7
Sample Number: 8C

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: JC/ALJ **Checked By:** TSL





Sample No.		1	2	3
Initial	Water Content, %	63.2	63.0	62.9
	Dry Density, pcf	62.4	61.9	61.8
	Saturation, %	99.7	98.5	97.9
	Void Ratio	1.7228	1.7411	1.7484
	Diameter, in.	1.409	1.408	1.415
	Height, in.	3.093	3.110	3.109
At Test	Water Content, %	63.2	63.0	62.9
	Dry Density, pcf	62.4	61.9	61.8
	Saturation, %	99.7	98.5	97.9
	Void Ratio	1.7228	1.7411	1.7484
	Diameter, in.	1.409	1.408	1.415
	Height, in.	3.093	3.110	3.109
Strain rate, in./min.		1.000	1.000	1.000
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.91	20.82	41.64
Fail. Stress, psf		439	426	508
Strain, %		5.6	8.3	8.3
Ult. Stress, psf		378	373	441
Strain, %				
σ_1 Failure, psf		1435	3425	6505
σ_3 Failure, psf		996	2999	5997

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: VSO GR CH4 W/ ARS ML

LL= 73 **PL=** 24 **PI=** 49
Assumed Specific Gravity= 2.72
Remarks:

Figure _____

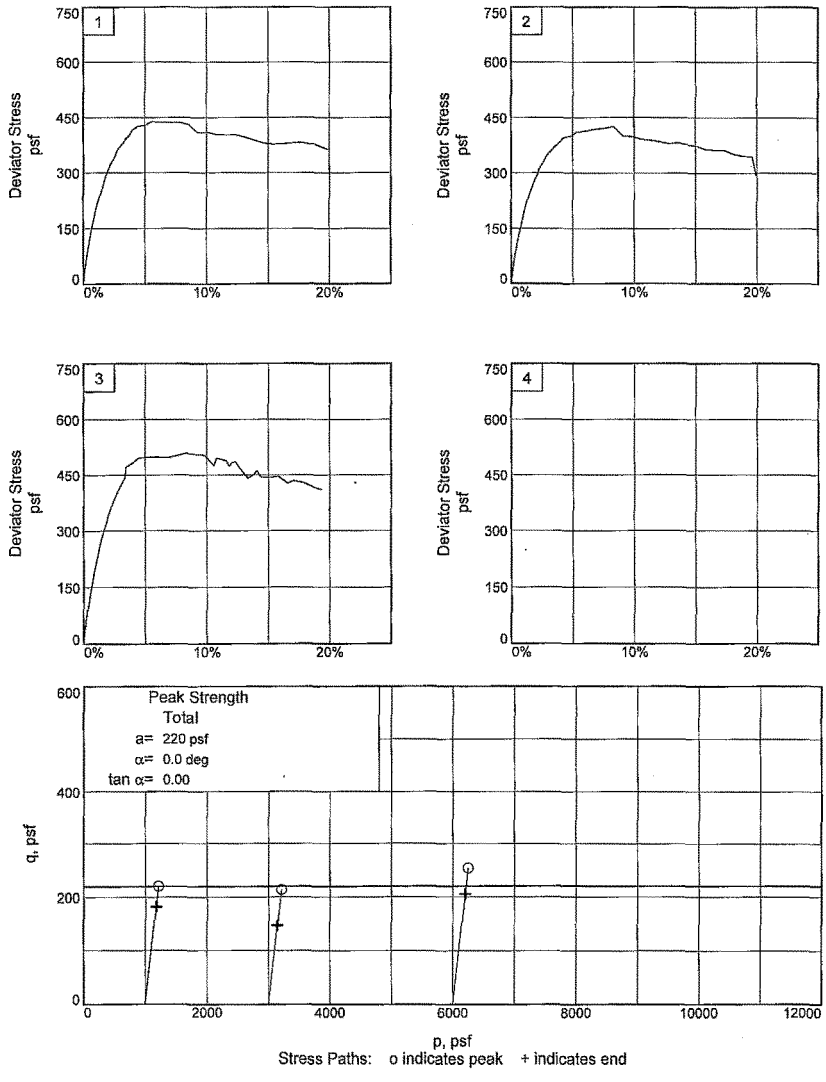
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-29U **Depth:** 24.8
Sample Number: 9B
Proj. No.: 07-022135 **Date Sampled:** 10/6/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

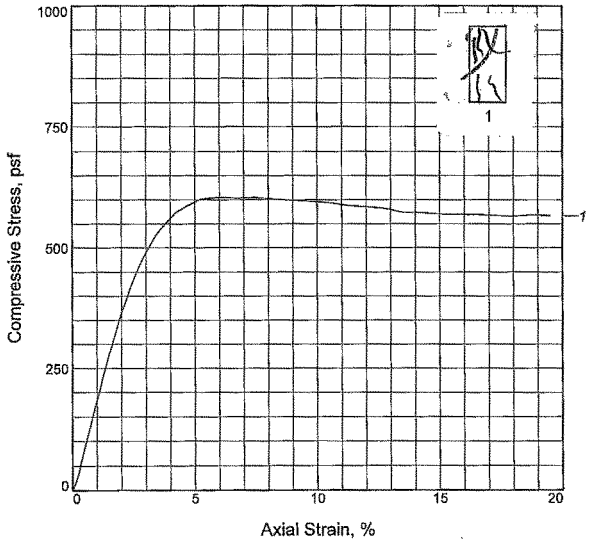
Tested By: JC/ARS **Checked By:** TSL



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-29U **Depth:** 24.8 **Sample Number:** 9B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: JC/ARS ***Checked By:*** TSL

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	605			
Undrained shear strength, psf	302			
Failure strain, %	6.0			
Strain rate, in./min.	1.000			
Water content, %	59.9			
Wet density, pcf	102.5			
Dry density, pcf	64.1			
Saturation, %	98.4			
Void ratio	1.6694			
Specimen diameter, in.	1.402			
Specimen height, in.	3.109			
Height/diameter ratio	2.22			

Description: SO GR CH4 W/ LNS & LYS ML

LL = 75	**PL** = 25	**PI** = 50	**Assumed GS=** 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 10/6/09
Remarks:

Figure _____

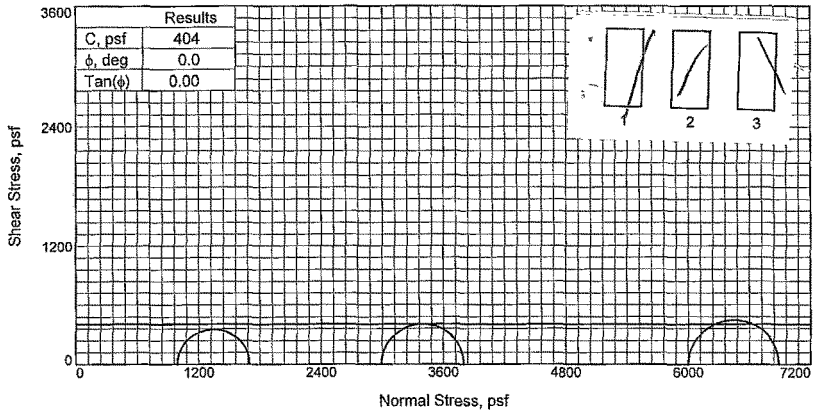
Client: U.S. Army Corps of Engineers

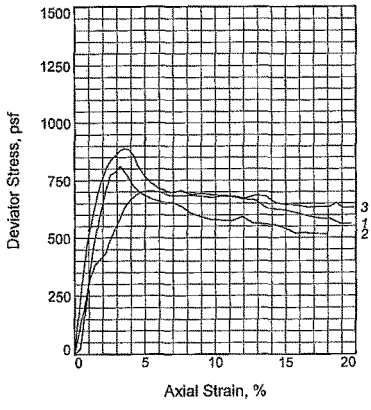
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-29U **Depth:** 29.7
Sample Number: 10C

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: JC/ARS **Checked By:** TSL





Sample No.		1	2	3
Initial	Water Content, %	61.4	64.1	55.2
	Dry Density, pcf	63.3	61.9	66.9
	Saturation, %	98.9	99.6	97.0
	Void Ratio	1.7007	1.7645	1.5587
	Diameter, in.	1.413	1.410	1.414
	Height, in.	3.106	3.105	3.109
At Test	Water Content, %	61.4	64.1	55.2
	Dry Density, pcf	63.3	61.9	66.9
	Saturation, %	98.9	99.6	97.0
	Void Ratio	1.7007	1.7645	1.5587
	Diameter, in.	1.413	1.410	1.414
	Height, in.	3.106	3.105	3.109
Strain rate, in./min.		1.000	1.000	1.000
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.89	20.78	41.68
Fail. Stress, psf		705	809	889
Strain, %		5.3	3.2	3.6
Ult. Stress, psf		618	541	644
Strain, %				
σ_1 Failure, psf		1697	3800	6890
σ_3 Failure, psf		992	2992	6002

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CH4 W/ LNS & LYS ML

LL= 74 **PL=** 25 **PI=** 49
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

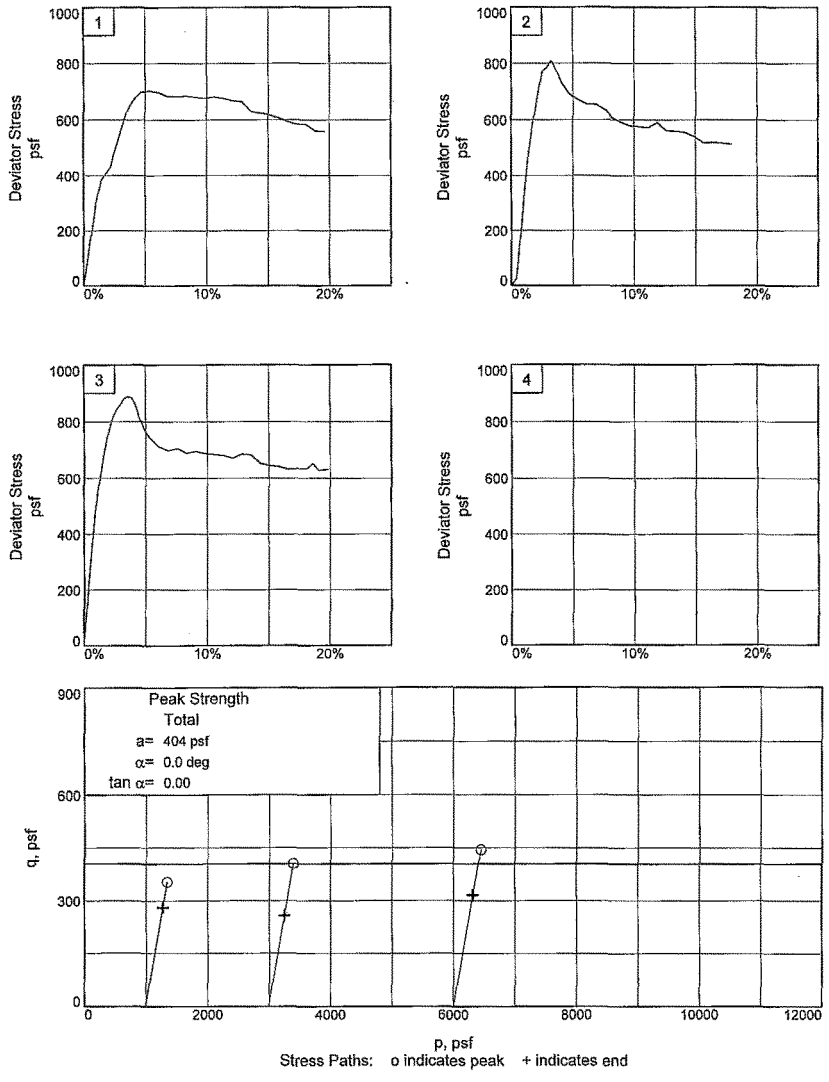
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-29U **Depth:** 32.8
Sample Number: 11B
Proj. No.: 07-022135 **Date Sampled:** 10/6/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

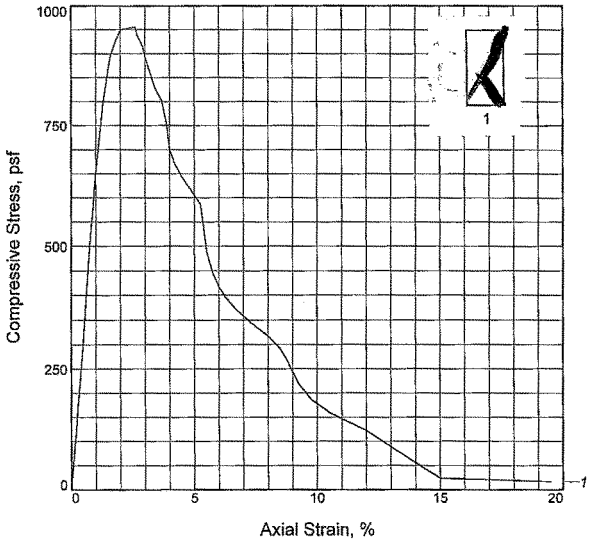
Tested By: JC/ARS **Checked By:** TSL



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-29U **Depth:** 32.8 **Sample Number:** 11B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: JC/ARS _____ ***Checked By:*** TSL _____

UNCONFINED COMPRESSION TEST



Sample No.	1				
Unconfined strength, psf	955				
Undrained shear strength, psf	478				
Failure strain, %	2.6				
Strain rate, in./min.	1.000				
Water content, %	68.2				
Wet density, pcf	99.5				
Dry density, pcf	59.2				
Saturation, %	98.8				
Void ratio	1.8897				
Specimen diameter, in.	1.408				
Specimen height, in.	3.109				
Height/diameter ratio	2.21				

Description: SO GR CH4 W/ LNS ML, SL

LL = 92	**PL** = 27	**PI** = 65	**Assumed GS**= 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 10/6/09
Remarks:

Figure _____

Client: U.S. Army Corps of Engineers

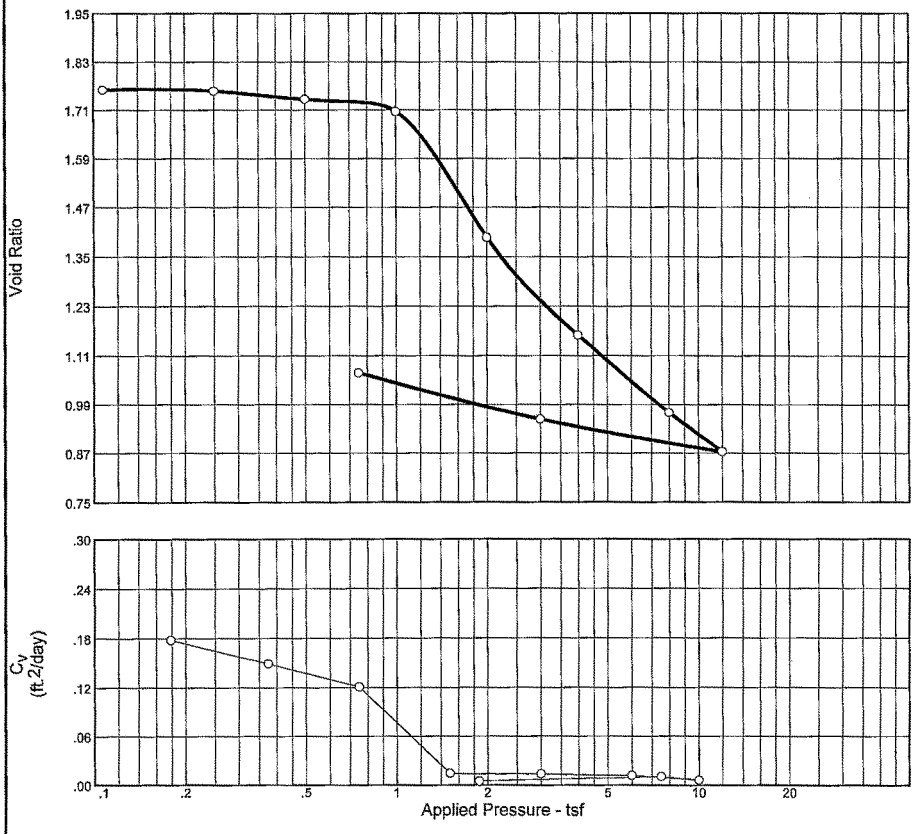
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-29U **Depth:** 36.8
Sample Number: 12B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: JC/ALJ **Checked By:** TSL

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
97.9 %	63.1 %	61.9	80	55	2.75	1.08	1.13	1.772

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

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

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

Source: MRGO-29U **Sample No.:** 13B **Elev./Depth:** 40.8

FFEBJV, LLC

St Rose, LA

Remarks:

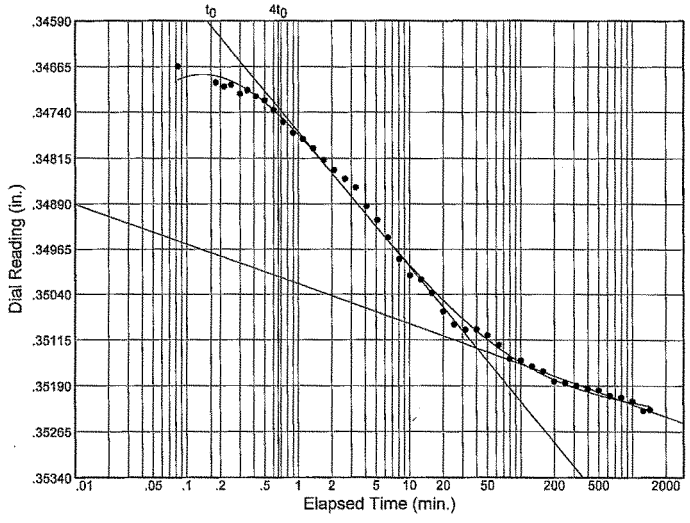
Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

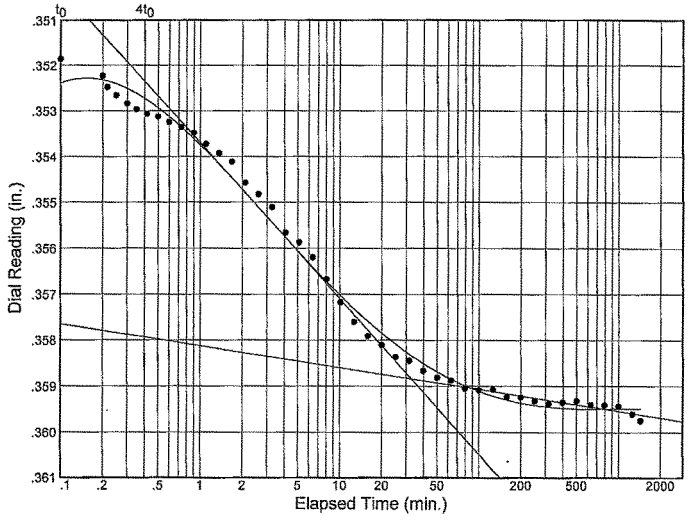
Source: MRGO-29U Sample No.: 13B Elev./Depth: 40.8



Load No.= 2
Load= 0.25 tsf
D_0 = 0.34613
D_{50} = 0.34871
D_{100} = 0.35128
T_{50} = 2.78 min.

C_v @ T_{50}
0.18 ft.^{2}/day

C_α = 0.001



Load No.= 3
Load= 0.50 tsf
D_0 = 0.35205
D_{50} = 0.35544
D_{100} = 0.35884
T_{50} = 3.27 min.

C_v @ T_{50}
0.15 ft.^{2}/day

C_α = 0.000

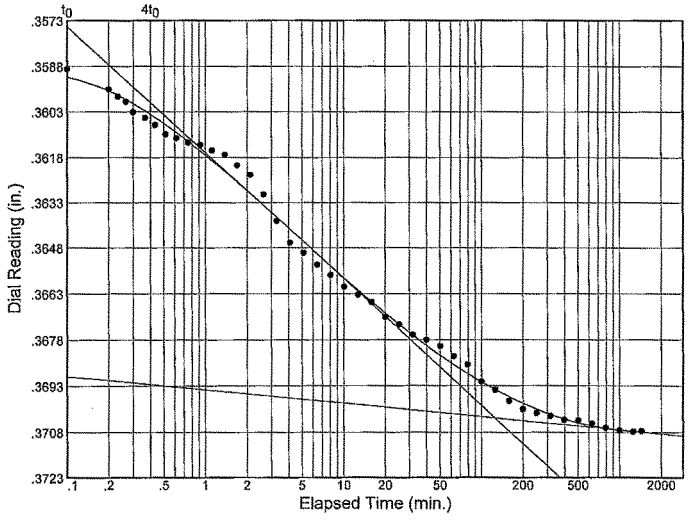
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

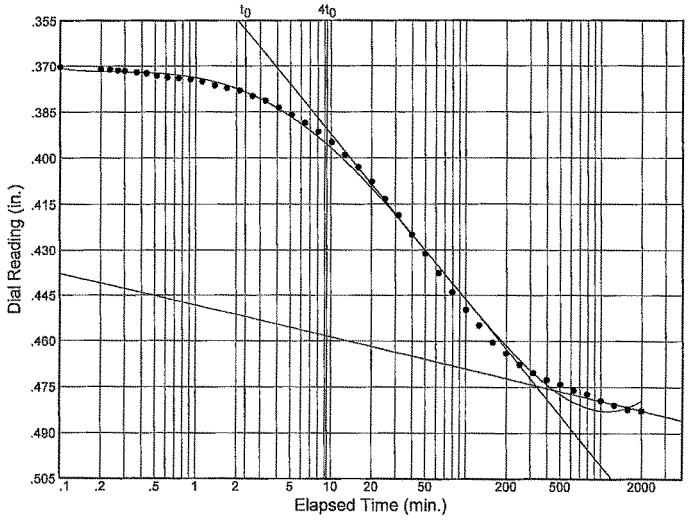
Source: MRGO-29U Sample No.: 13B Elev./Depth: 40.8



Load No.= 4
Load= 1.00 tsf
D_0 = 0.35793
D_{50} = 0.36413
D_{100} = 0.37033
T_{50} = 3.98 min.

C_v @ T_{50}
0.12 ft.^{2}/day

C_α = 0.000



Load No.= 5
Load= 2.00 tsf
D_0 = 0.36153
D_{50} = 0.41804
D_{100} = 0.47454
T_{50} = 29.42 min.

C_v @ T_{50}
0.01 ft.^{2}/day

C_α = 0.011

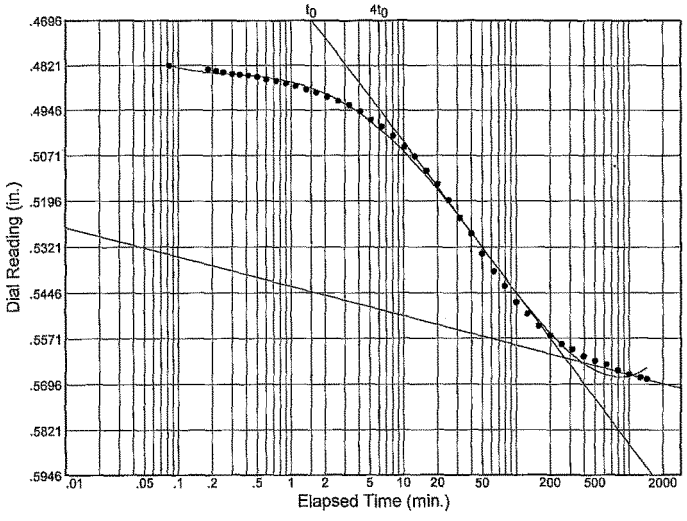
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

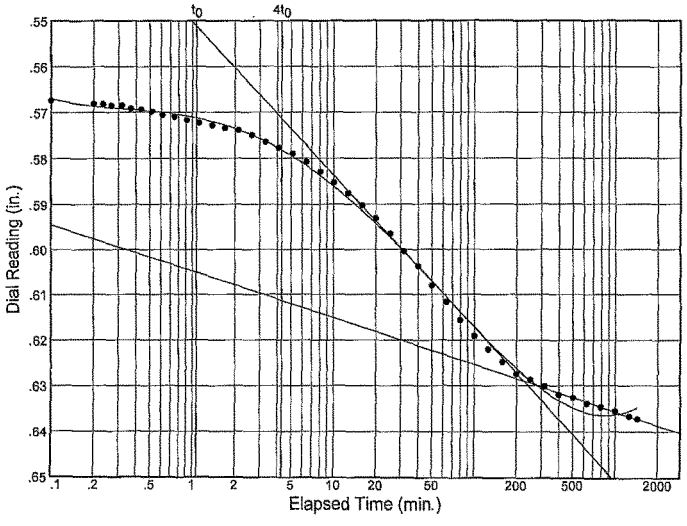
Source: MRGO-29U Sample No.: 13B Elev./Depth: 40.8



Load No.= 6
Load= 4.00 tsf
D_0 = 0.47721
D_{50} = 0.51979
D_{100} = 0.56237
T_{50} = 24.59 min.

C_v @ T_{50}
0.01 ft.^{2}/day

C_α = 0.009



Load No.= 7
Load= 8.00 tsf
D_0 = 0.56417
D_{50} = 0.59655
D_{100} = 0.62894
T_{50} = 23.64 min.

C_v @ T_{50}
0.01 ft.^{2}/day

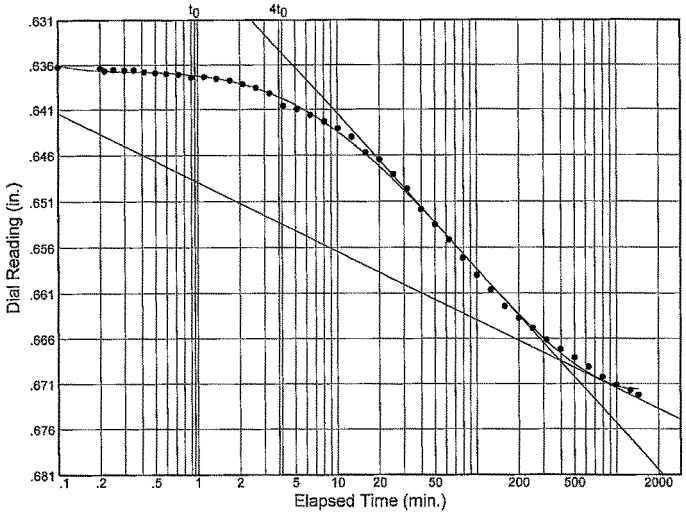
C_α = 0.013

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

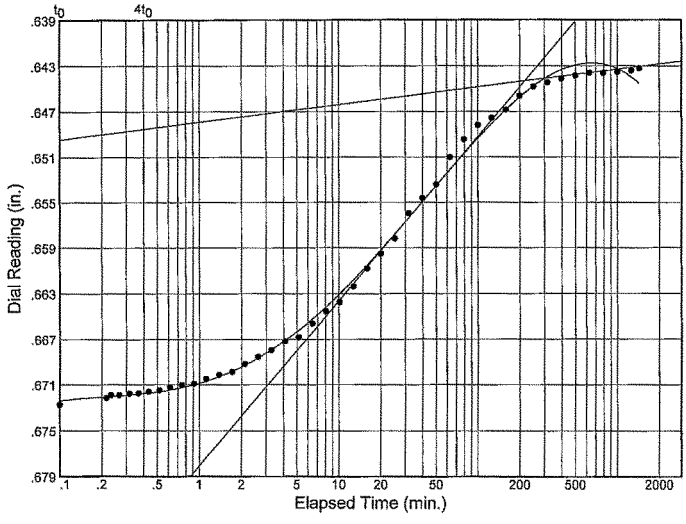
Source: MRGO-29U Sample No.: 13B Elev./Depth: 40.8



Load No.= 8
Load= 12.00 tsf
D_0 = 0.63471
D_{50} = 0.65155
D_{100} = 0.66840
T_{50} = 38.83 min.

C_v @ T_{50}
0.01 ft.2/day

C_α = 0.010



Load No.= 9
Load= 3.00 tsf
D_0 = 0.67304
D_{50} = 0.65867
D_{100} = 0.64431
T_{50} = 21.97 min.

C_v @ T_{50}
0.01 ft.2/day

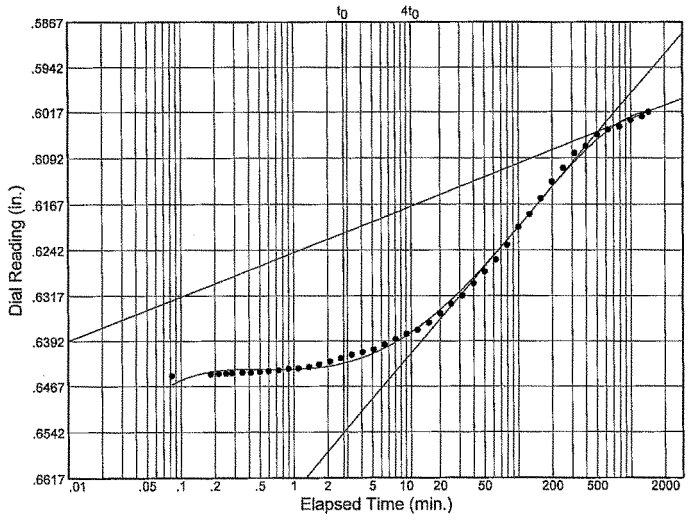
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-29U Sample No.: 13B Elev./Depth: 40.8



Load No.= 10
Load= 0.75 tsf
D_0 = 0.64803
D_{50} = 0.62647
D_{100} = 0.60491
T_{50} = 51.99 min.

C_V @ T_{50}
0.00 ft.^{2}/day

FFEBJV, LLC

Figure

CONSOLIDATION TEST DATA

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Contract No. W912P8-07-D-0022
Task Order 135
Project Number: 07-022135

Sample Data

Source: MRGO-29U
Sample No.: 13B
Elev. or Depth: 40.8 Sample Length(in./cm.):
Location:
Description: M GR CH4 W/ LYS ML
Liquid Limit: 80 Plasticity Index: 55
USCS: CH4 AASHTO: Figure No.:
Testing Remarks: Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST		AFTER TEST	
Wet w+t =	163.12 g.	Consolidometer # =	6	Wet w+t =	398.90 g.
Dry w+t =	100.00 g.			Dry w+t =	315.73 g.
Tare Wt. =	.00 g.	Spec. Gravity =	2.75	Tare Wt. =	112.87 g.
Height =	1.00 in.	Height =	1.00 in.		
Diameter =	4.00 in.	Diameter =	4.00 in.		
Weight =	334.49 g.	Defl. Table =	n/a		
Moisture =	63.1 %	Ht. Solids =	0.3621 in.	Moisture =	41.0 %
Wet Den. =	101.0 pcf	Dry Wt. =	204.97 g.*	Dry Wt. =	202.86 g.
Dry Den. =	61.9 pcf	Void Ratio =	1.772	Void Ratio =	1.068
		Saturation =	97.9 %		

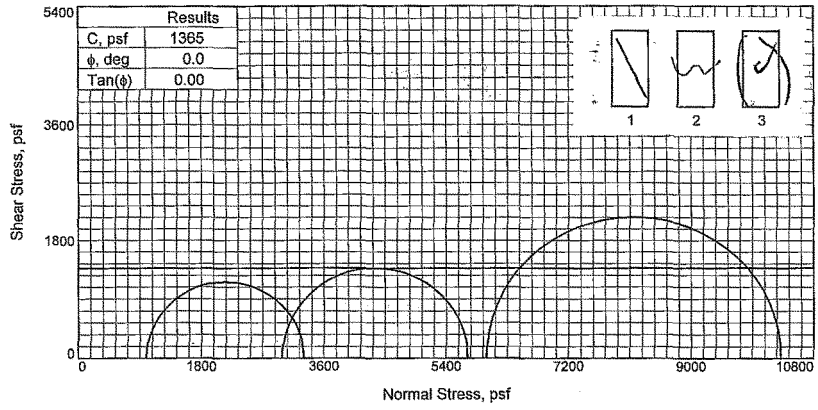
* Initial dry weight used in calculations

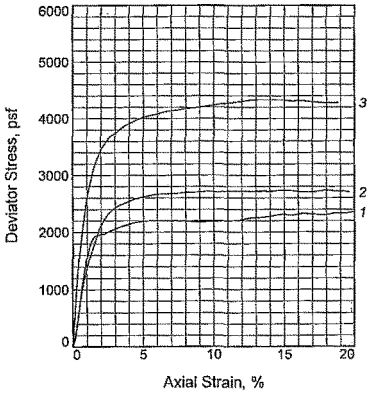
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.34676				1.772	
0.11	0.35114	0.00000			1.760	0.4 Comprs.
0.25	0.35229	0.00000	0.18	0.001	1.757	0.6 Comprs.
0.50	0.35975	0.00000	0.15	0.000	1.737	1.3 Comprs.
1.00	0.37077	0.00000	0.12	0.000	1.706	2.4 Comprs.
2.00	0.48283	0.00000	0.01	0.011	1.397	13.6 Comprs.
4.00	0.56825	0.00000	0.01	0.009	1.161	22.1 Comprs.
8.00	0.63724	0.00000	0.01	0.013	0.970	28.9 Comprs.
12.00	0.67229	0.00000	0.01	0.010	0.873	32.4 Comprs.

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
3.00	0.64322	0.00000	0.01		0.954	29.5 Comprs.
0.75	0.60173	0.00000	0.00		1.068	25.4 Comprs.

C_c = 1.13 P_c = 1.08 tsf C_r = 0.16





Sample No.		1	2	3
Initial	Water Content, %	21.2	23.4	20.0
	Dry Density, pcf	106.1	102.5	104.0
	Saturation, %	98.6	99.1	88.1
	Void Ratio	0.5765	0.6328	0.6090
	Diameter, in.	1.426	1.425	1.413
	Height, in.	3.111	3.113	3.096
At Test	Water Content, %	21.2	23.4	20.0
	Dry Density, pcf	106.1	102.5	104.0
	Saturation, %	98.6	99.1	88.1
	Void Ratio	0.5765	0.6328	0.6090
	Diameter, in.	1.426	1.425	1.413
	Height, in.	3.111	3.113	3.096
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.91	20.73	41.61
Fail. Stress, psf		2309	2732	4329
Strain, %		14.9	14.9	13.3
Ult. Stress, psf		2309	2732	4324
Strain, %				
σ_1 Failure, psf		3305	5718	10321
σ_3 Failure, psf		995	2985	5992

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: ST LGR & T CH2 W/ ARS ML, CC

LL= 50 **PL=** 16 **PI=** 34
Assumed Specific Gravity= 2.68
Remarks:

Figure _____

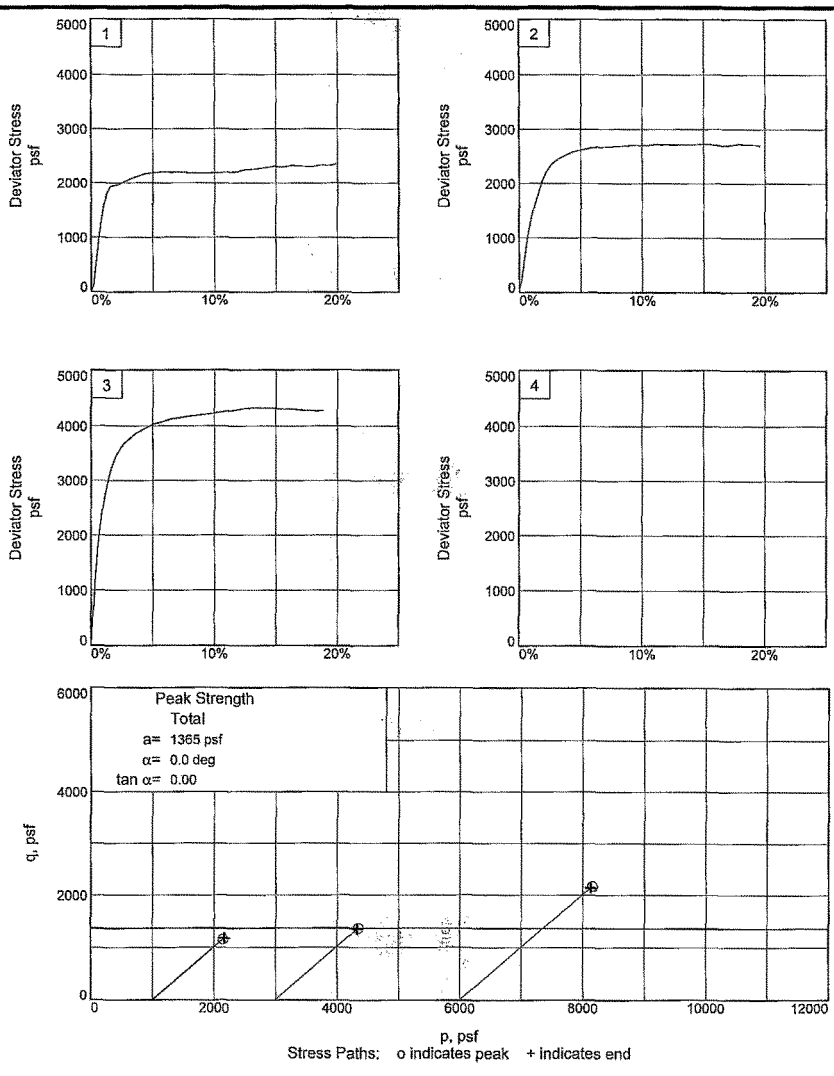
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-29U **Depth:** 44.8
Sample Number: 14B
Proj. No.: 07-022135 **Date Sampled:** 10/6/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

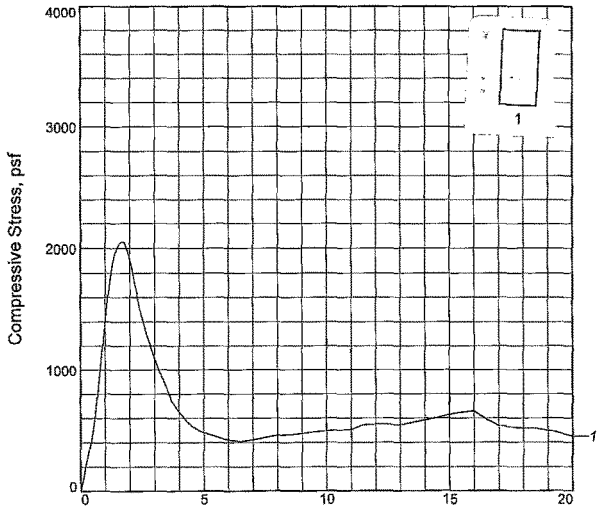
Tested By: JC/ARS **Checked By:** TSL/MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-29U **Depth:** 44.8 **Sample Number:** 14B
Project No.: 07-022135 **Figure** _____ FFEBJV, LLC

Tested By: JC/ARS **Checked By:** TSL/MS

UNCONFINED COMPRESSION TEST



Sample No.	1				
Unconfined strength, psf	2053				
Undrained shear strength, psf	1026				
Failure strain, %	1.7				
Strain rate, in./min.	1.000				
Water content, %	30.8				
Wet density, pcf	119.1				
Dry density, pcf	91.1				
Saturation, %	96.9				
Void ratio	0.8645				
Specimen diameter, in.	1.415				
Specimen height, in.	3.100				
Height/diameter ratio	2.19				

Description: ST GNG & T CH3 W/ ARS ML, CC

LL = 63	**PL** = 19	**PI** = 44	**Assumed GS=** 2.72	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 10/6/09
Remarks:

Figure _____

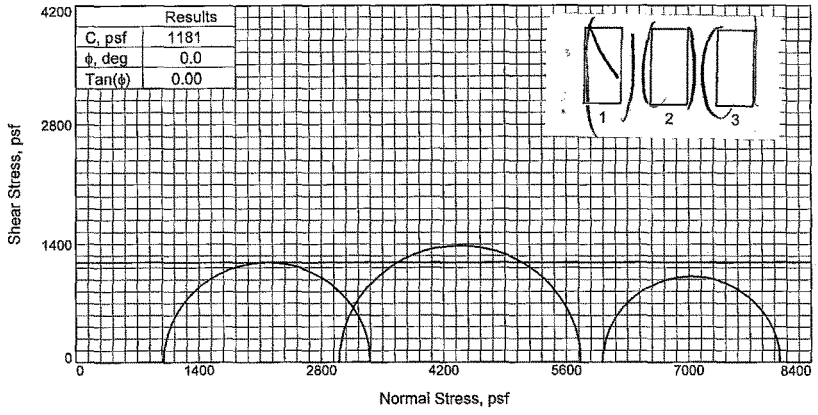
Client: U.S. Army Corps of Engineers

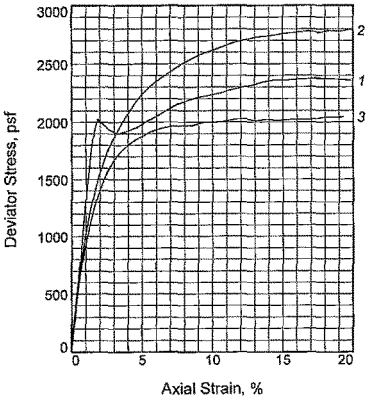
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-29U **Depth:** 48.8
Sample Number: 15B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: JC/ARS **Checked By:** TSL





Sample No.		1	2	3
Initial	Water Content, %	19.1	19.0	20.2
	Dry Density, pcf	106.6	109.6	107.6
	Saturation, %	90.7	97.7	97.9
	Void Ratio	0.5631	0.5204	0.5495
	Diameter, in.	1.419	1.417	1.419
	Height, in.	3.113	3.115	3.108
At Test	Water Content, %	19.1	19.0	20.2
	Dry Density, pcf	106.6	109.6	107.6
	Saturation, %	90.7	97.7	97.9
	Void Ratio	0.5631	0.5204	0.5495
	Diameter, in.	1.419	1.417	1.419
	Height, in.	3.113	3.115	3.108
Strain rate, in./min.		1.000	1.000	1.000
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.93	20.86	41.77
Fail. Stress, psf		2359	2760	2029
Strain, %		15.1	15.4	12.3
Ult. Stress, psf		2359	2760	2012
Strain, %				
σ_1 Failure, psf		3357	5765	8044
σ_3 Failure, psf		998	3005	6015

Type of Test: Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: ST LGR CL4 W/ ARS CH, WD

LL= 33 **PL=** 13 **PI=** 20
Assumed Specific Gravity= 2.67
Remarks:

Figure _____

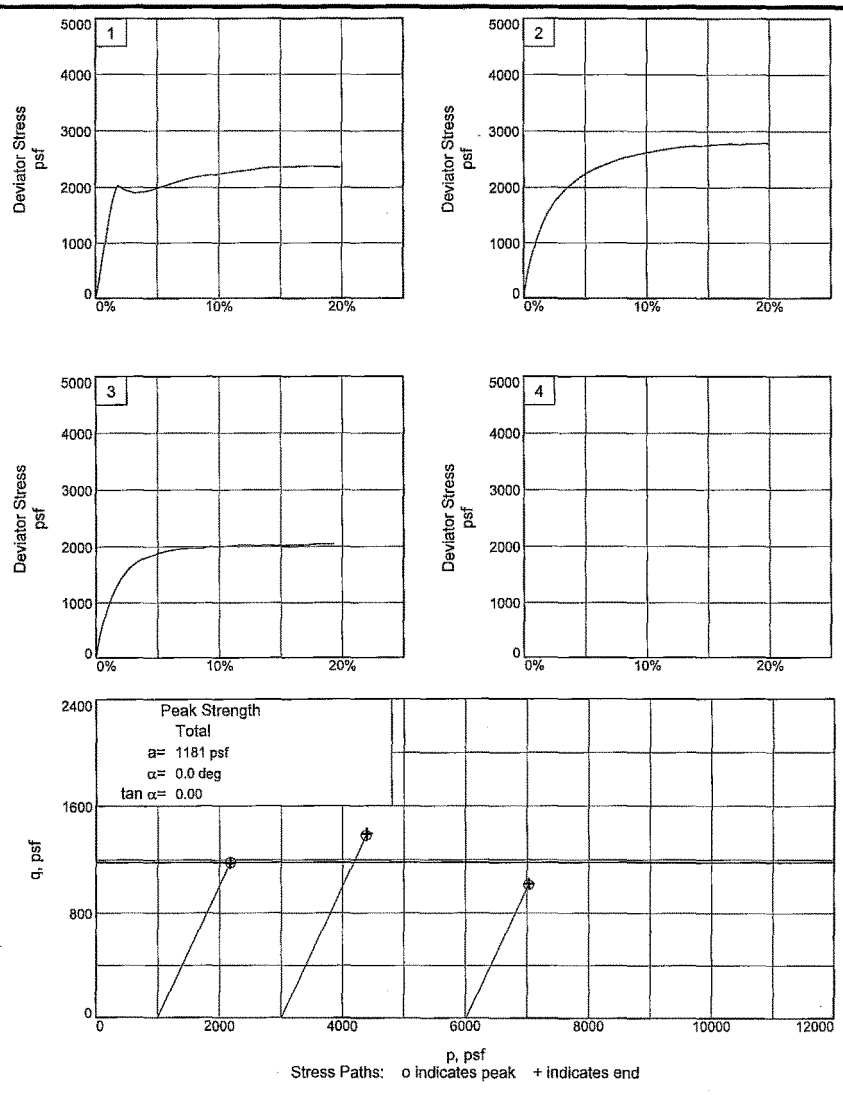
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-29U **Depth:** 52.8
Sample Number: 16B
Proj. No.: 07-022135 **Date Sampled:** 10/6/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

Tested By: JC/ARS **Checked By:** TSL



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-29U **Depth:** 52.8 **Sample Number:** 16B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: JC/ARS **Checked By:** TSL

SUMMARY OF LABORATORY TEST RESULTS

Project: MRGO Ecosystem Restoration Feasibility Study Assigned By: _____

Project Number: 07-022135 Current Date: 12/4/2009
Boring: MRGO-30U

Sample Number	Depth	Visual Classification	USCS	E(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
1A	0.0	GR ML	ML		37												
2A	2.0	GR ML	ML		35												
3A	4.0	VSO DGR CHOA W/ LNS ML, WD	CHOA		99												
3B	4.8	VSO DGR CHOA W/ LNS ML, WD	CHOA		104												
3C	5.7	VSO DGR CHOA W/ LNS ML, WD	CHOA		92	48	91	100	UU	0	238		112	28	84	0.23	
3D	6.6	VSO DGR CHOB W/ LNS ML, WD	CHOB		168												
4A	8.0	SO DGR PT W/ WD	PT		406												
4B	8.8	SO DGR PT W/ WD, RT	PT		338	15	67	95					317	89	228		Gs, CON
4C	9.7	SO GR CHOA W/ LNS ML, WD	CHOA		90												
5A	12.0	VSO GR CHOA W/ RT	CHOA		143												
5B	12.8	VSO GR CHOA W/ LNS ML, RT	CHOA	15	107	44	90	100	UC	-	176	353	115	30	85	0.20	
5C	13.7	VSO GR CH3 W/ LYS SM, O, RT	CH3		64												
5D	14.6	GR SM W/ LYS CH, WD	SM		32												
6A	16.0	GR ML W/ ARS CH	ML		34												
6B	16.8	GR ML W/ ARS & LNS CH	ML		37												
6C	17.7	VSO GR CL6 W/ ARS & LNS ML	CL6		52												
7A	20.0	VSO GR CL6 W/ LNS & LYS ML	CL6		59												
7B	20.8	VSO GR CL6 W/ LNS & LYS ML	CL6	7	52	70	107	100	UC	-	244	488	42	20	22		
7C	21.7	SO GR CH3 W/ LNS & LYS ML	CH3		63	63	102	100					71	23	48		Gs, CON
7D	22.6	SO GR CH3 W/ LNS & LYS ML	CH3		57												
8A	24.0	SO GR CH2 W/ LNS & LYS ML	CH2		50												
8B	24.8	SO GR CH2 W/ LNS & LYS ML	CH2		53	70	106	99	UU	0	272		54	17	37	0.22	
8C	25.7	SO GR CH3 W/ LNS & LYS ML	CH3		61												
8D	26.6	SO GR CH3 W/ LNS & LYS ML	CH3		57												
9A	28.0	SO GR CH4 W/ LNS SM	CH4		69												
9B	28.8	SO GR CH4 W/ LNS ML	CH4		63												
9C	29.7	SO GR CH4 W/ LNS ML	CH4	3	74	57	99	100	UC	-	295	590	83	24	59	0.22	
10A	32.0	SO GR CH4	CH4		73												
10B	32.8	SO GR CH4 W/ LNS & LYS SP, WD	CH4		61												
10C	33.7	SO GR CH4 W/ LNS & LYS SP, WD	CH4		68	60	101	100	UU	0	280		78	23	55	0.22	
11A	36.0	SO GR CH4 W/ LNS SP	CH4		63												
11B	36.8	SO GR CH4 W/ LNS SP	CH4		67												
11C	37.7	SO GR CH4 W/ LYS SP	CH4		64												
11D	38.6	SO GR CH4	CH4		67												
12A	40.0	SO GR CH4	CH4		67												
12B	40.8	SO GR CH4 W/ LNS ML	CH4	7	68	58	98	97	UC	-	423	847	83	25	58	0.25	
12C	41.7	M GR CH4 W/ LNS ML	CH4		54												

Remarks: _____
FFEB JV, LLC

Checked By: TB/MKG
File Name: MRGO-30U.xls

SUMMARY OF LABORATORY TEST RESULTS

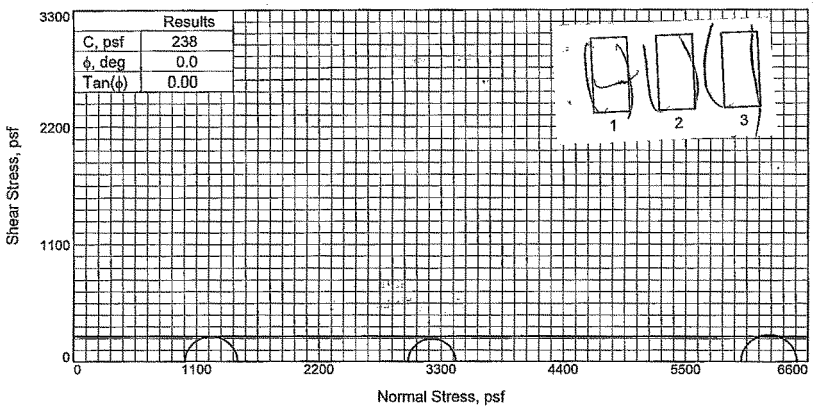
Project: MRGO Ecosystem Restoration Feasibility Study Assigned By: _____

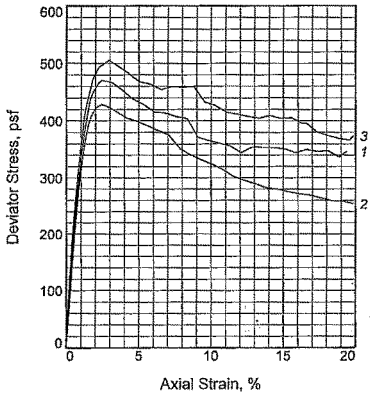
Project Number: 07-022135 Current Date: 12/4/2009
Boring: MRGO-30U

Sample Number	Depth	Visual Classification	USCS	E(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
12D	42.6	M GR CH4 W/ LNS ML	CH4		65												
13A	44.0	M GR CH4 W/ LNS & LYS SM	CH4		64												
13B	44.8	M GR CH4	CH4		73	57	98	99	UU	0	585		89	22	67	0.32	
13C	45.7	M GR CH4	CH4		65												
13D	46.6	SO GR CH4 W/ LYS SP	CH4		69												
14A	48.0	M GR CH3 W/ LNS & ARS SM	CH3		51												
14B	48.8	GR SM W/ ARS CH, SIF	SM		28												
14C	49.7	GR SM W/ ARS CH, SIF	SM		33												
14D	50.6	GR SM W/ ARS CH, SIF	SM		32												
15A	52.0	M GNG CL4 W/ LNS CH	CL4		31												
15B	52.8	M GNG CL4 W/ LNS CH	CL4		28				UU				30	17	13		NOT TESTABLE
15C	53.7	M GNG CL6 W/ LNS CH	CL6		28				UU				49	17	32		NOT TESTABLE
15D	54.6	M GNG CL6 W/ LNS CH	CL6		26												
16A	56.0	GR SM W/ LNS CH, SIF	SM		26												
16B	56.8	GR SM W/ LNS CH, SIF	SM		23												
16C	57.7	GR SM W/ LNS CH, SIF	SM		21												
16D	58.6	WD W/ ARS SM	WD		276												

Remarks: _____
FFEB JV, LLC

Checked By: TB/MBD
File Name: MRGO-30U.xls





Sample No.		1	2	3
Initial	Water Content, %	95.5	98.8	83.1
	Dry Density, pcf	46.3	45.5	50.7
	Saturation, %	99.3	100.1	98.2
	Void Ratio	2.5019	2.5670	2.2010
	Diameter, in.	1.422	1.409	1.412
	Height, in.	3.111	3.104	3.080
At Test	Water Content, %	95.5	98.8	87.9
	Dry Density, pcf	46.3	45.5	50.7
	Saturation, %	99.3	100.1	103.8
	Void Ratio	2.5019	2.5670	2.2010
	Diameter, in.	1.422	1.409	1.412
	Height, in.	3.111	3.104	3.080
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.94	20.86	41.66
Fail. Stress, psf		471	428	505
Strain, %		2.4	2.4	2.9
Ult. Stress, psf		344	315	454
Strain, %				
σ_1 Failure, psf		1469	3433	6504
σ_3 Failure, psf		999	3004	5998

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: VSO DGR CHOA W/ LNS ML, WD

LL= 112 **PL=** 28 **PI=** 84
Assumed Specific Gravity= 2.60
Remarks:

Figure _____

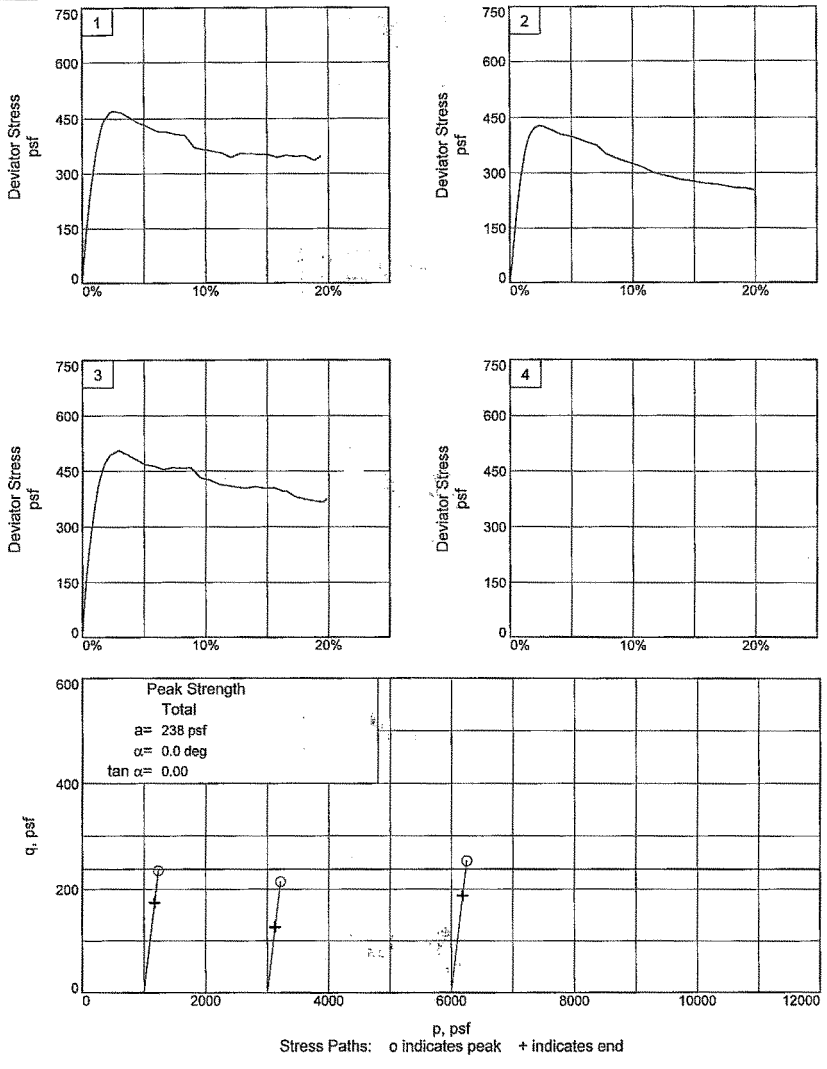
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-30U **Depth:** 5.7
Sample Number: 3C
Proj. No.: 07-022135 **Date Sampled:** 10/7/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

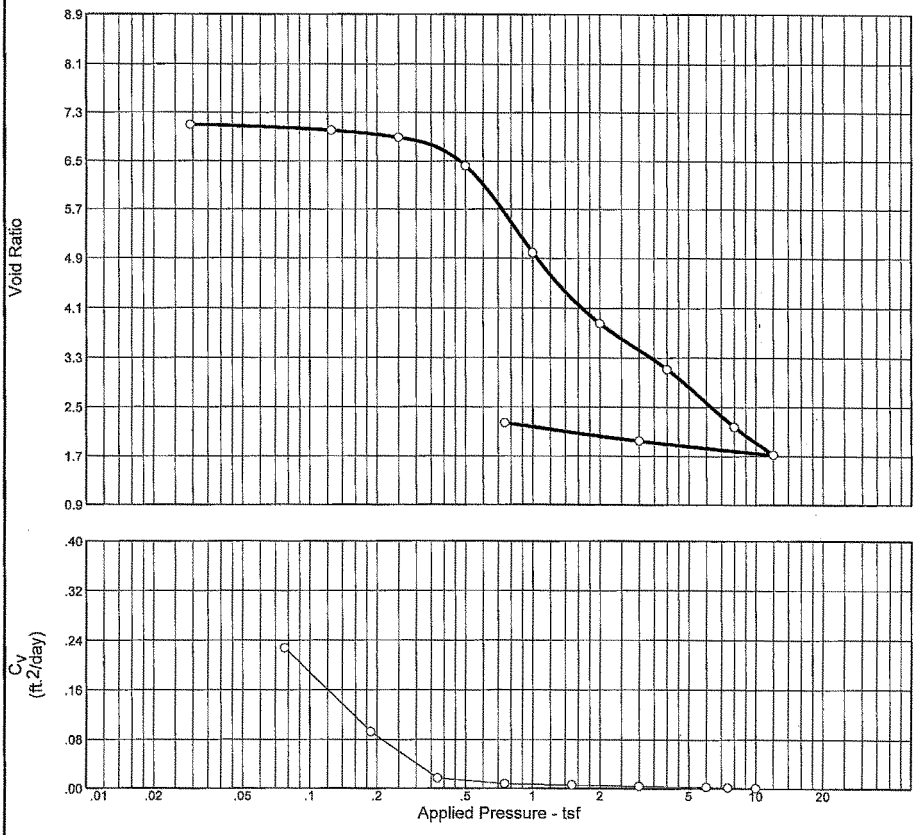
Tested By: JC/ARS **Checked By:** TB



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-30U **Depth:** 5.7 **Sample Number:** 3C
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: JC/ARS **Checked By:** TB

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
95.3 %	338.2 %	15.4	317	228	2.00	0.51	5.03	7.099

MATERIAL DESCRIPTION	USCS	AASHTO
SO DGR PT W/ WD, RT	PT	

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

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

Source: MRGO-30U **Sample No.:** 4B **Elev./Depth:** 8.8

FFEBJV, LLC

St Rose, LA

Remarks:

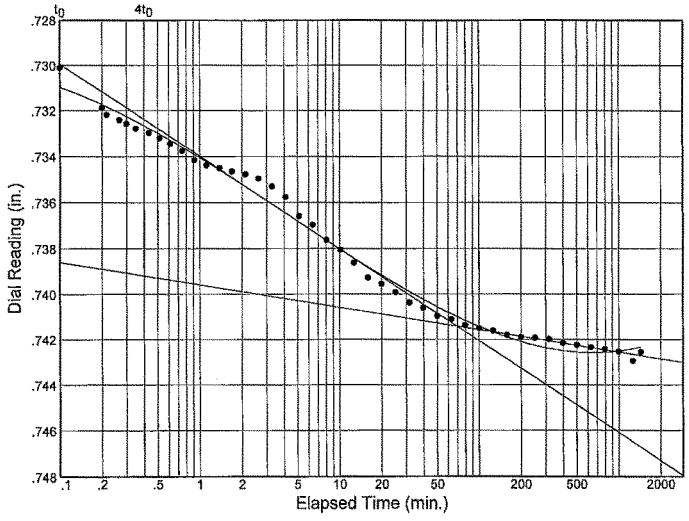
Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

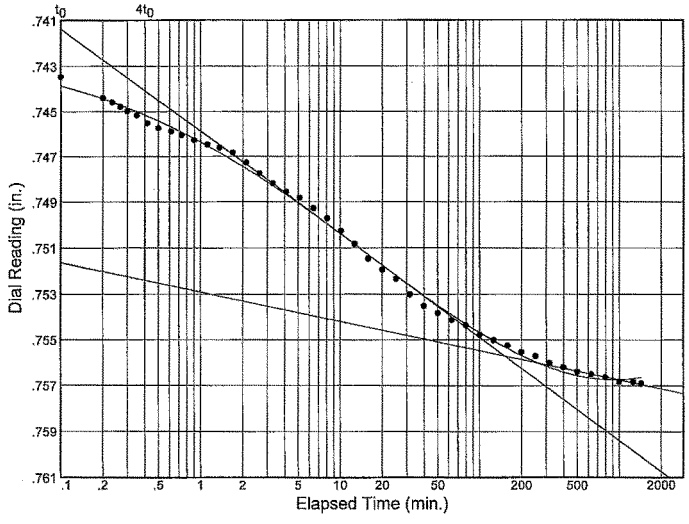
Source: MRGO-30U Sample No.: 4B Elev./Depth: 8.8



Load No.= 2
Load= 0.13 tsf
D_0 = 0.72928
D_{50} = 0.73534
D_{100} = 0.74141
T_{50} = 2.15 min.

C_v @ T_{50}
0.23 ft.2/day

C_α = 0.001



Load No.= 3
Load= 0.25 tsf
D_0 = 0.74256
D_{50} = 0.74912
D_{100} = 0.75569
T_{50} = 5.17 min.

C_v @ T_{50}
0.09 ft.2/day

C_α = 0.001

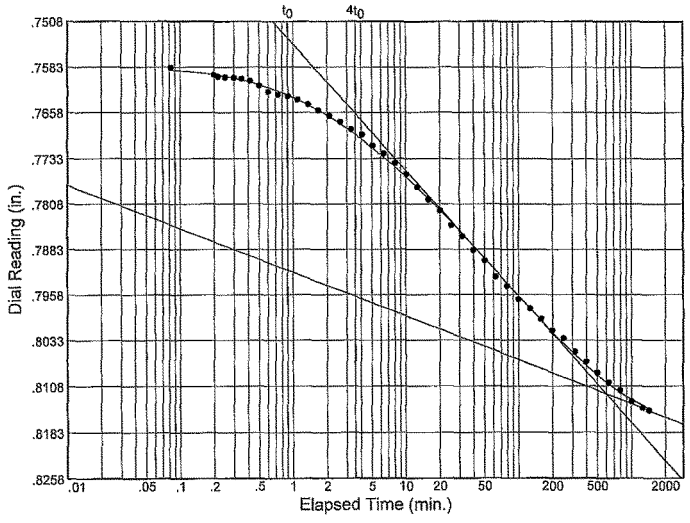
Figure

FFEBJV, LLC

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

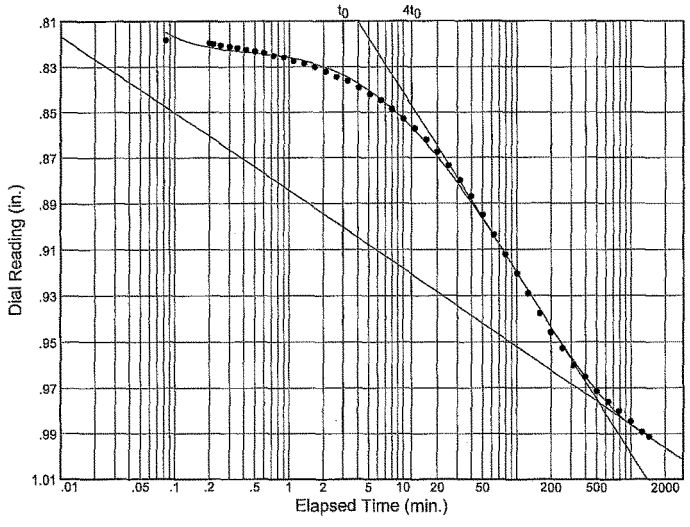
Source: MRGO-30U Sample No.: 4B Elev./Depth: 8.8



Load No.= 4
Load= 0.50 tsf
D_0 = 0.75647
D_{50} = 0.78425
D_{100} = 0.81203
T_{50} = 26.76 min.

C_v @ T_{50}
0.02 ft.2/day

C_α = 0.007



Load No.= 5
Load= 1.00 tsf
D_0 = 0.81047
D_{50} = 0.89342
D_{100} = 0.97638
T_{50} = 45.07 min.

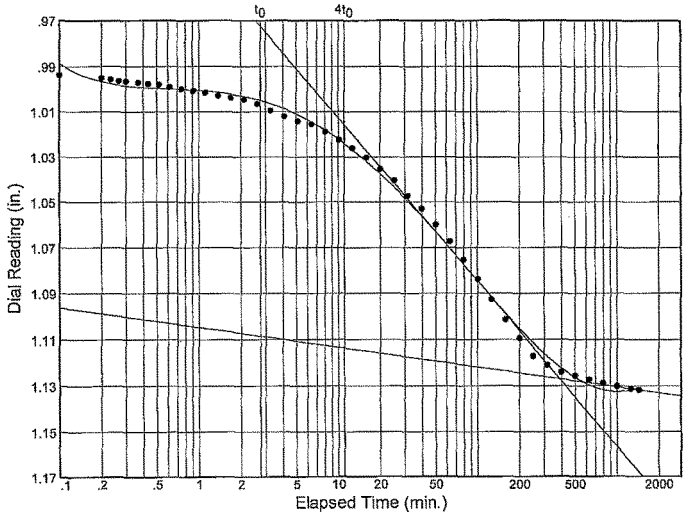
C_v @ T_{50}
0.01 ft.2/day

C_α = 0.037

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

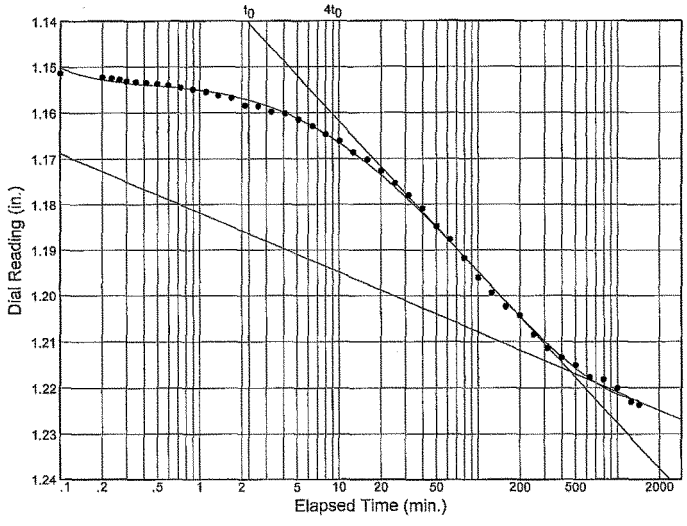
Source: MRGO-30U Sample No.: 4B Elev./Depth: 8.8



Load No.= 6
Load= 2.00 tsf
D_0 = 0.98583
D_{50} = 1.05637
D_{100} = 1.12691
T_{50} = 39.90 min.

C_v @ T_{50}
0.01 ft.2/day

C_α = 0.012



Load No.= 7
Load= 4.00 tsf
D_0 = 1.14889
D_{50} = 1.18271
D_{100} = 1.21652
T_{50} = 42.03 min.

C_v @ T_{50}
0.00 ft.2/day

C_α = 0.022

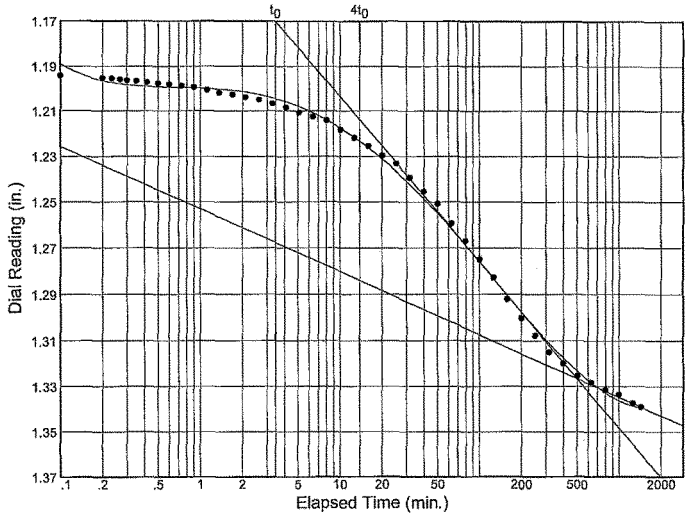
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

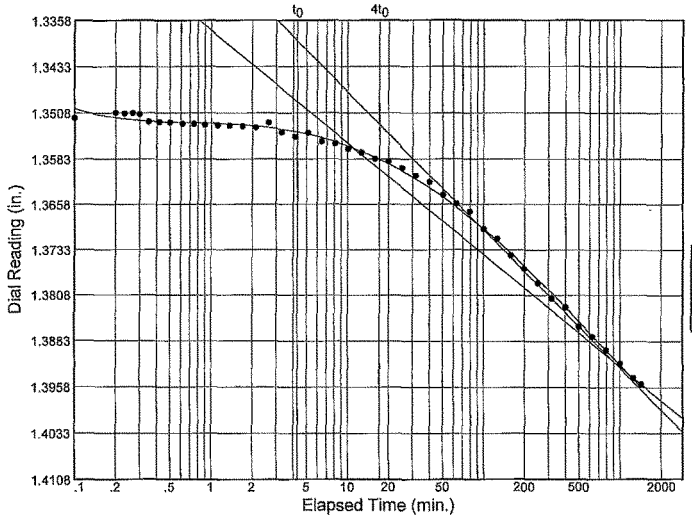
Source: MRGO-30U Sample No.: 4B Elev./Depth: 8.8



Load No.= 8
Load= 8.00 tsf
D_0 = 1.18571
D_{50} = 1.25611
D_{100} = 1.32651
T_{50} = 52.07 min.

C_v @ T_{50}
0.00 ft.2/day

C_α = 0.050



Load No.= 9
Load= 12.00 tsf
D_0 = 1.34942
D_{50} = 1.37041
D_{100} = 1.39140
T_{50} = 106.59 min.

C_v @ T_{50}
0.00 ft.2/day

C_α = 0.047

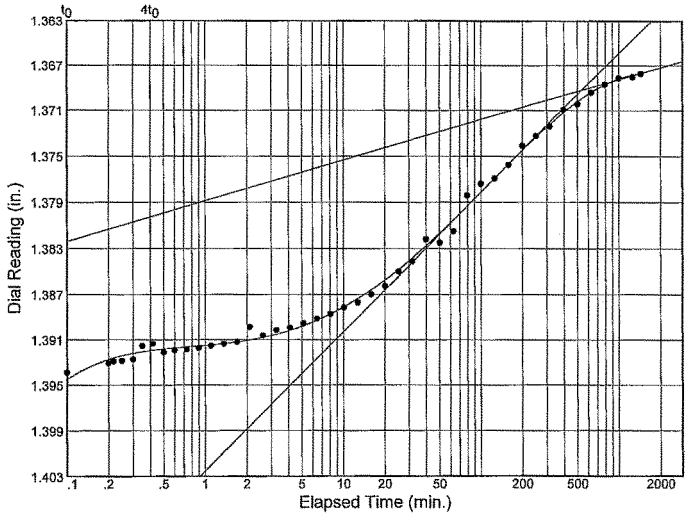
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-30U Sample No.: 4B Elev./Depth: 8.8



Load No.= 10
Load= 3.00 tsf
D_0 = 1.39709
D_{50} = 1.38315
D_{100} = 1.36921
T_{50} = 36.86 min.

C_v @ T_{50}
0.00 ft.2/day

FFEBJV, LLC

Figure

CONSOLIDATION TEST DATA

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Contract No. W912P8-07-D-0022
Task Order 135
Project Number: 07-022135

Sample Data

Source: MRGO-30U
Sample No.: 4B
Elev. or Depth: 8.8 Sample Length(in./cm.):
Location:
Description: SO DGR PT W/ WD, RT
Liquid Limit: 317 Plasticity Index: 228
USCS: PT AASHTO: Figure No.:
Testing Remarks: Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST	AFTER TEST	
Wet w+t	= 438.24 g.	Consolidometer # = 17	Wet w+t	= 224.68 g.
Dry w+t	= 100.00 g.		Dry w+t	= 155.39 g.
Tare Wt.	= .00 g.	Spec. Gravity = 2.00	Tare Wt.	= 112.27 g.
Height	= 1.00 in.	Height = 1.00 in.		
Diameter	= 4.00 in.	Diameter = 4.00 in.		
Weight	= 222.73 g.	Defl. Table = n/a		
Moisture	= 338.2 %	Ht. Solids = 0.1236 in.	Moisture	= 160.7 %
Wet Den.	= 67.6 pcf	Dry Wt. = 50.81 g.*	Dry Wt.	= 43.12 g.
Dry Den.	= 15.4 pcf	Void Ratio = 7.099	Void Ratio	= 2.245
		Saturation = 95.3 %		

* Initial dry weight used in calculations

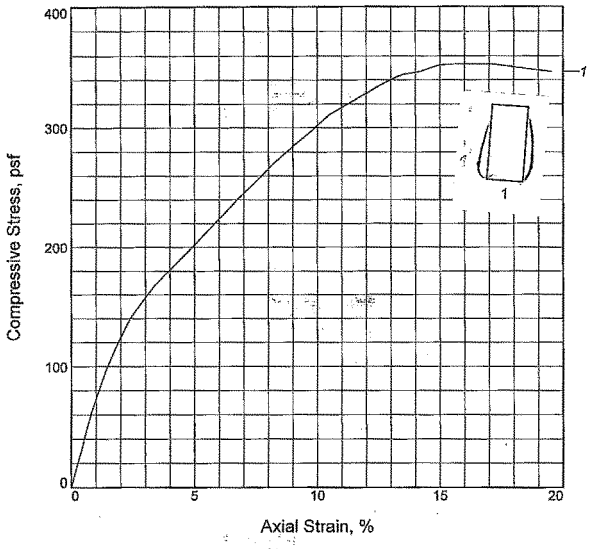
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
start	0.73079				7.099	
0.03	0.73086	0.00000			7.099	0.0 Comprs.
0.13	0.74257	0.00000	0.23	0.001	7.004	1.2 Comprs.
0.25	0.75692	0.00000	0.09	0.001	6.888	2.6 Comprs.
0.50	0.81479	0.00000	0.02	0.007	6.420	8.4 Comprs.
1.00	0.99132	0.00000	0.01	0.037	4.992	26.0 Comprs.
2.00	1.13180	0.00000	0.01	0.012	3.855	40.1 Comprs.
4.00	1.22368	0.00000	0.00	0.022	3.112	49.2 Comprs.
8.00	1.33907	0.00000	0.00	0.050	2.178	60.8 Comprs.

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
12.00	1.39530	0.00000	0.00	0.047	1.723	66.4 Comprs.
3.00	1.36773	0.00000	0.00		1.946	63.6 Comprs.
0.75	1.33075	0.00000			2.245	59.9 Comprs.

C_c = 5.03 P_c = 0.51 tsf C_r = 0.43

UNCONFINED COMPRESSION TEST



Sample No.	1				
Unconfined strength, psf	353				
Undrained shear strength, psf	176				
Failure strain, %	15.0				
Strain rate, %/min.	1.00				
Water content, %	106.9				
Wet density, pcf	90.0				
Dry density, pcf	43.5				
Saturation, %	101.8				
Void ratio	2.7300				
Specimen diameter, in.	1.406				
Specimen height, in.	3.099				
Height/diameter ratio	2.20				

Description: VSO GR CHOA W/ LNS ML, RT

LL = 115	**PL** = 30	**PI** = 85	**Assumed GS**= 2.60	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 10/7/09
Remarks:

Figure _____

Client: U.S. Army Corps of Engineers

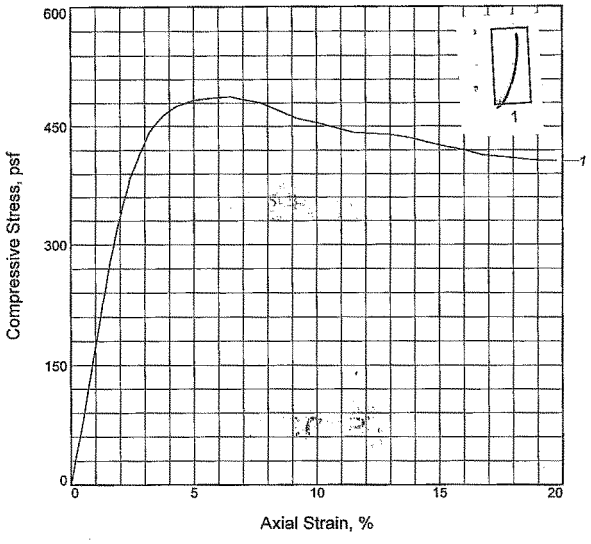
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-30U **Depth:** 12.8
Sample Number: 5B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: JC/ARS **Checked By:** TB

UNCONFINED COMPRESSION TEST



Sample No.		1			
Unconfined strength, psf		488			
Undrained shear strength, psf		244			
Failure strain, %		6.5			
Strain rate, %/min.		1.00			
Water content, %		52.2			
Wet density, pcf		107.0			
Dry density, pcf		70.4			
Saturation, %		100.9			
Void ratio		1.3958			
Specimen diameter, in.		1.407			
Specimen height, in.		3.103			
Height/diameter ratio		2.21			

Description: VSO GR CL6 W/ LNS & LYS ML

LL = 42	**PL** = 20	**PI** = 22	**Assumed GS=** 2.70	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 10-07-09
Remarks:

Figure _____

Client: U.S. Army Corps of Engineers

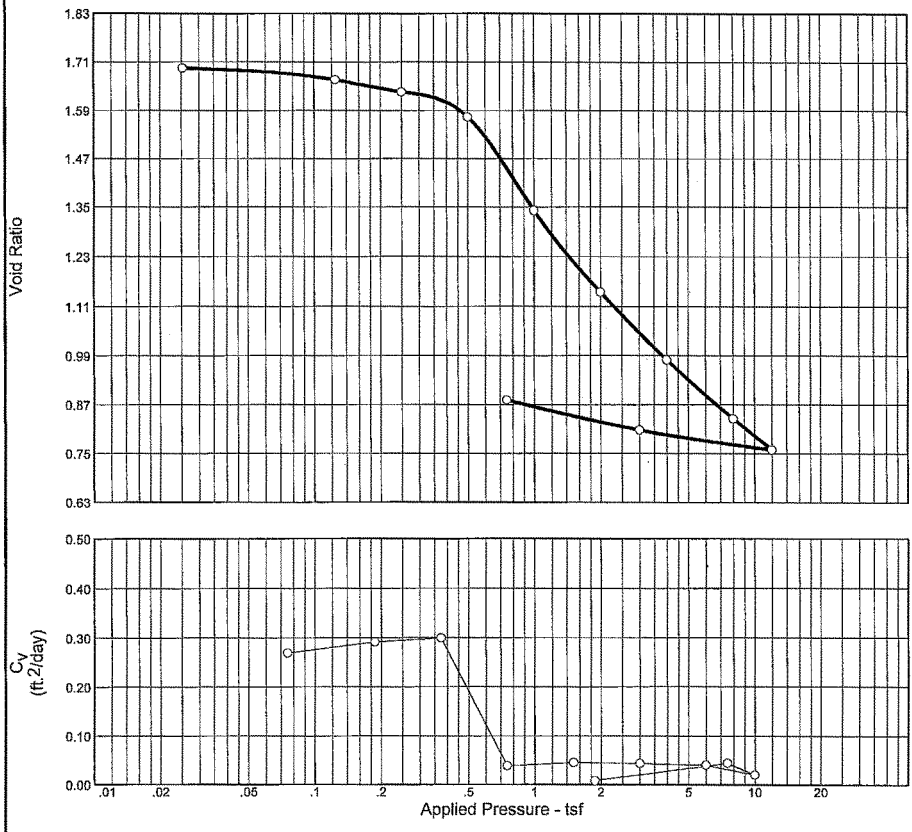
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-30U **Depth:** 20.8
Sample Number: 7B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: ARS **Checked By:** TB

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
99.9 %	62.5 %	62.8	71	48	2.71	0.52	0.82	1.695

MATERIAL DESCRIPTION	USCS	AASHTO
SO GR CH3 W/ LNS & LYS ML	CH3	

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

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

Source: MRGO-30U **Sample No.:** 7C **Elev./Depth:** 21.7

FFEBJV, LLC

St Rose, LA

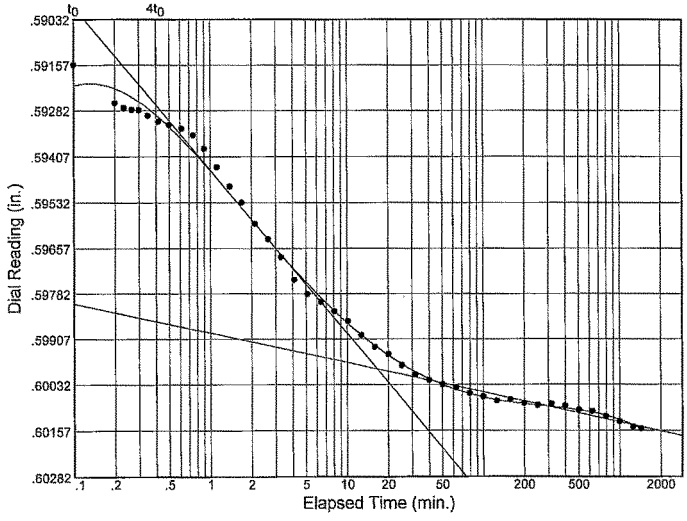
Remarks:
Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

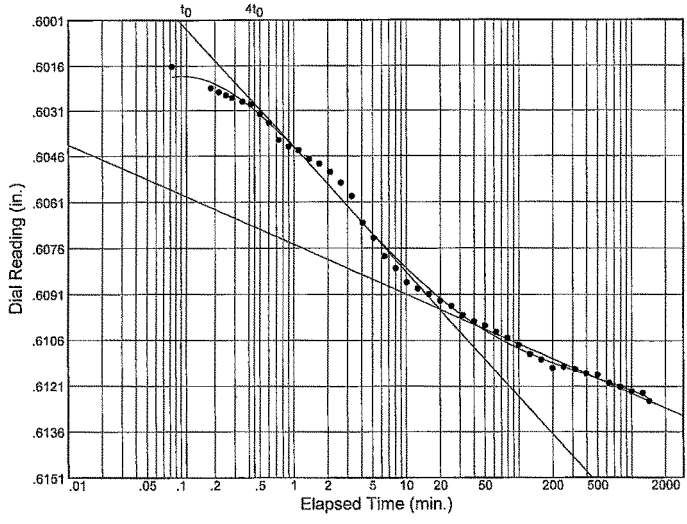
Source: MRGO-30U Sample No.: 7C Elev./Depth: 21.7



Load No.= 2
Load= 0.13 tsf
D_0 = 0.59135
D_{50} = 0.59562
D_{100} = 0.59989
T_{50} = 1.84 min.

C_v @ T_{50}
0.27 ft.2/day

C_α = 0.001



Load No.= 3
Load= 0.25 tsf
D_0 = 0.60082
D_{50} = 0.60519
D_{100} = 0.60957
T_{50} = 1.66 min.

C_v @ T_{50}
0.29 ft.2/day

C_α = 0.002

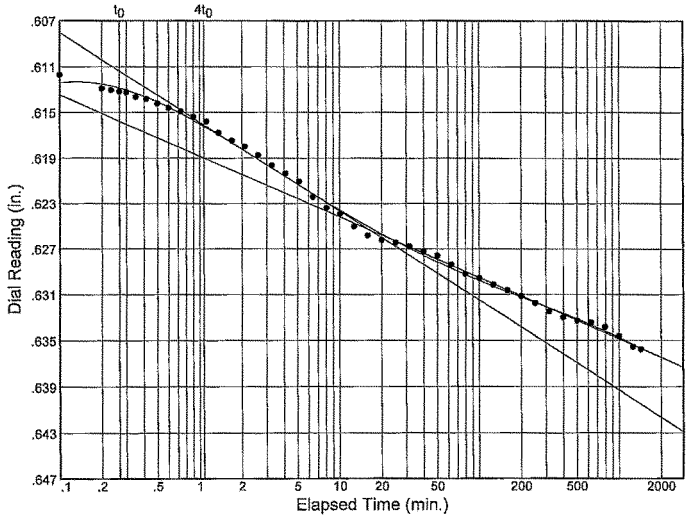
Figure

FFEBJV, LLC

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

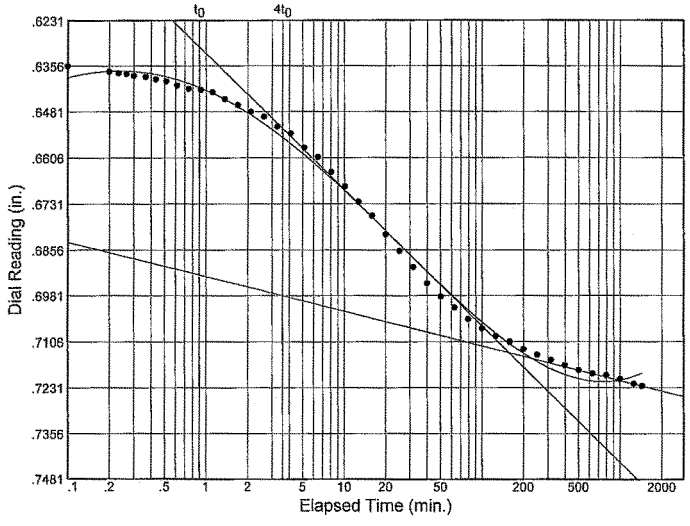
Source: MRGO-30U Sample No.: 7C Elev./Depth: 21.7



Load No.= 4
Load= 0.50 tsf
D_0 = 0.60955
D_{50} = 0.61740
D_{100} = 0.62524
T_{50} = 1.56 min.

C_v @ T_{50}
0.30 ft.2/day

C_α = 0.005



Load No.= 5
Load= 1.00 tsf
D_0 = 0.62793
D_{50} = 0.67076
D_{100} = 0.71358
T_{50} = 10.81 min.

C_v @ T_{50}
0.04 ft.2/day

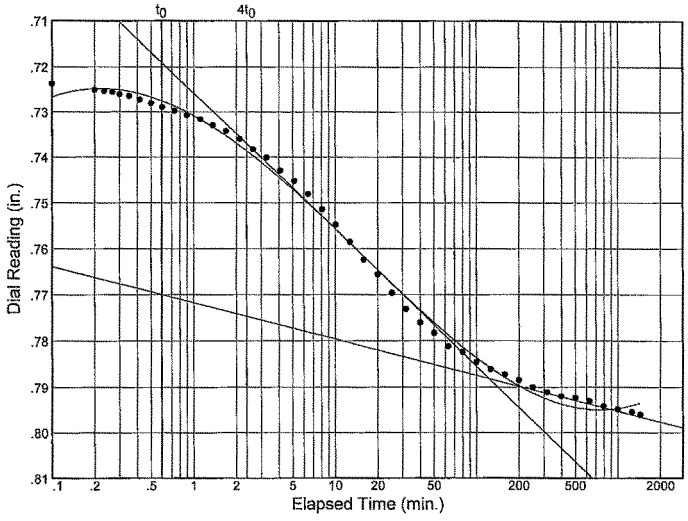
C_α = 0.010

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

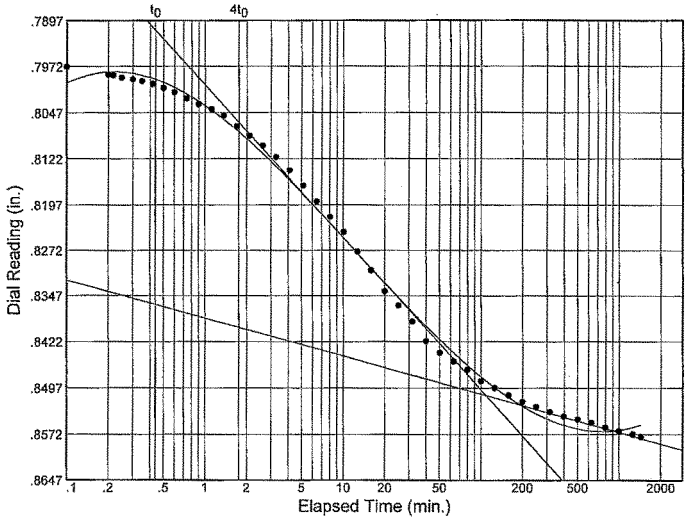
Source: MRGO-30U Sample No.: 7C Elev./Depth: 21.7



Load No.= 6
Load= 2.00 tsf
D_0 = 0.71636
D_{50} = 0.75224
D_{100} = 0.78812
T_{50} = 7.62 min.

C_v @ T_{50}
0.05 ft.2/day

C_α = 0.009



Load No.= 7
Load= 4.00 tsf
D_0 = 0.79081
D_{50} = 0.82088
D_{100} = 0.85096
T_{50} = 6.74 min.

C_v @ T_{50}
0.04 ft.2/day

C_α = 0.008

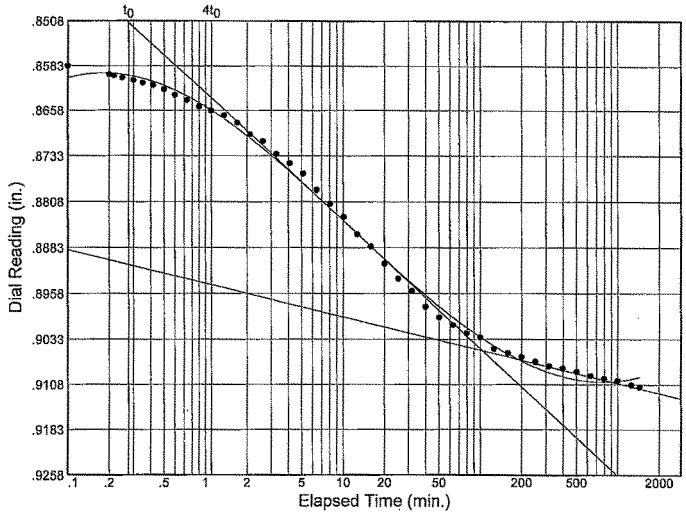
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

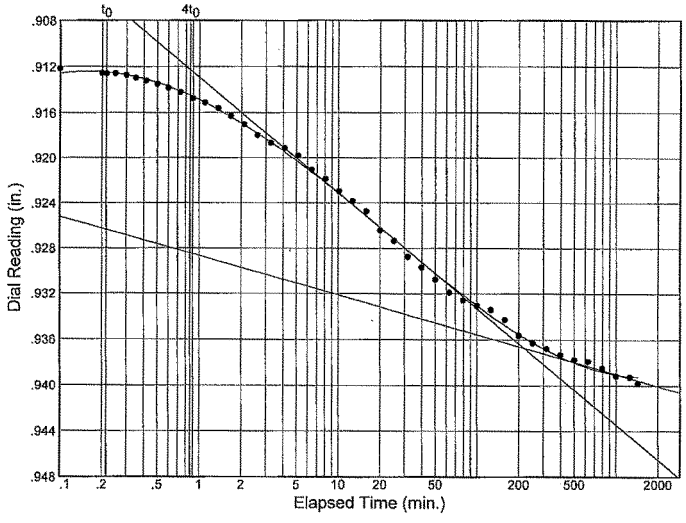
Source: MRGO-30U Sample No.: 7C Elev./Depth: 21.7



Load No.= 8
Load= 8.00 tsf
D_0 = 0.85394
D_{50} = 0.87957
D_{100} = 0.90520
T_{50} = 6.23 min.

C_v @ T_{50}
0.04 ft.2/day

C_α = 0.007



Load No.= 9
Load= 12.00 tsf
D_0 = 0.91042
D_{50} = 0.92357
D_{100} = 0.93672
T_{50} = 11.02 min.

C_v @ T_{50}
0.02 ft.2/day

C_α = 0.005

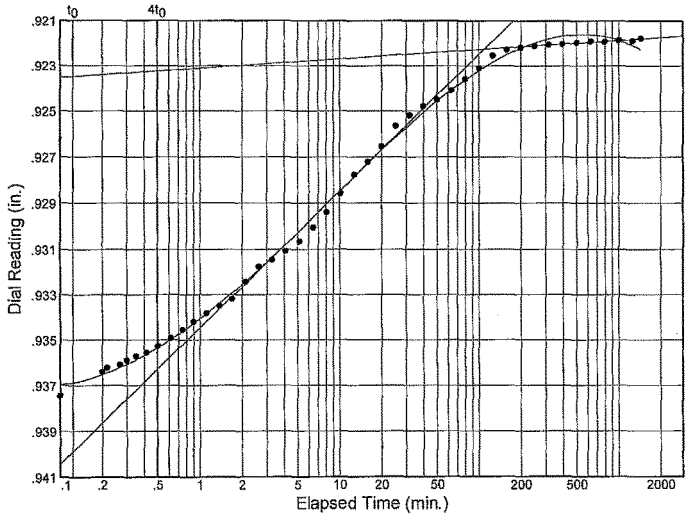
FFEBJV, LLC

Figure

Dial Reading vs. Time

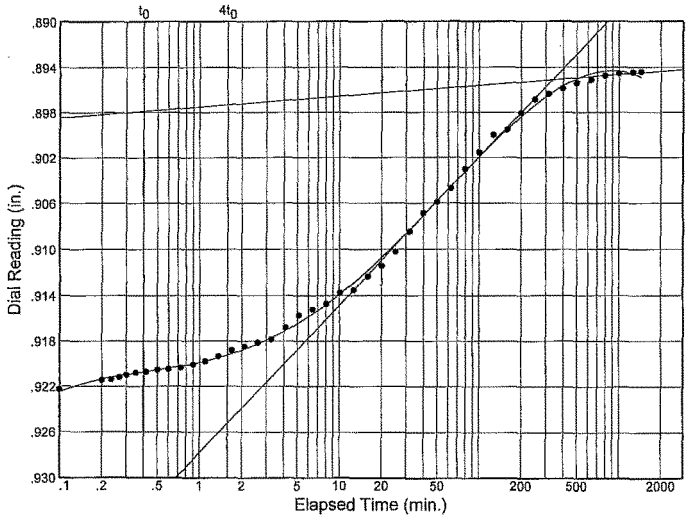
Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-30U Sample No.: 7C Elev./Depth: 21.7



Load No.= 10
Load= 3.00 tsf
D_0 = 0.93839
D_{50} = 0.93033
D_{100} = 0.92226
T_{50} = 4.93 min.

C_v @ T_{50}
0.04 ft.2/day



Load No.= 11
Load= 0.75 tsf
D_0 = 0.92224
D_{50} = 0.90867
D_{100} = 0.89510
T_{50} = 29.90 min.

C_v @ T_{50}
0.01 ft.2/day

FFEBJV, LLC

Figure

CONSOLIDATION TEST DATA

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Contract No. W912P8-07-D-0022
Task Order 135
Project Number: 07-022135

Sample Data

Source: MRGO-30U
Sample No.: 7C
Elev. or Depth: 21.7 Sample Length(in./cm.):
Location:
Description: SO GR CH3 W/ LNS & LYS ML
Liquid Limit: 71 Plasticity Index: 48
USCS: CH3 AASHTO: Figure No.:
Testing Remarks: Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST	AFTER TEST	
Wet w+t =	162.46 g.	Consolidometer # = 1	Wet w+t =	339.56 g.
Dry w+t =	100.00 g.		Dry w+t =	320.26 g.
Tare Wt. =	.00 g.	Spec. Gravity = 2.71	Tare Wt. =	110.83 g.
Height =	1.01 in.	Height = 1.01 in.		
Diameter =	4.00 in.	Diameter = 4.00 in.		
Weight =	337.97 g.	Defl. Table = n/a		
Moisture =	62.5 %	Ht. Solids = 0.3733 in.	Moisture =	9.2 %
Wet Den. =	102.0 pcf	Dry Wt. = 208.16 g.*	Dry Wt. =	209.43 g.
Dry Den. =	62.8 pcf	Void Ratio = 1.695	Void Ratio =	0.881
		Saturation = 99.9 %		

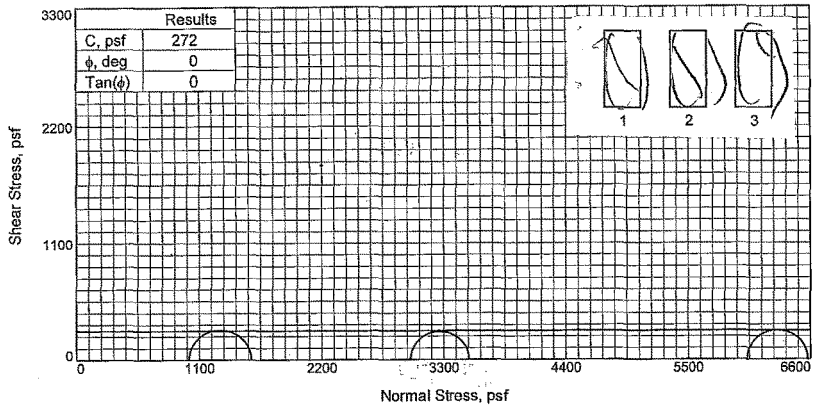
* Initial dry weight used in calculations

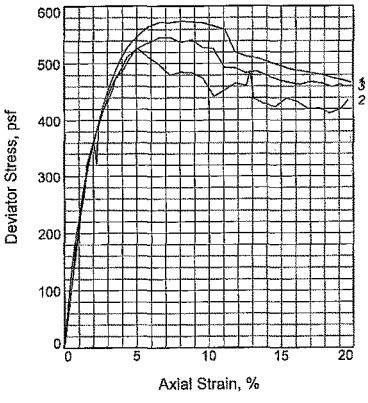
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.59052				1.695	
0.03	0.59060	0.00000			1.695	0.0 Comprs.
0.13	0.60152	0.00000	0.27	0.001	1.666	1.1 Comprs.
0.25	0.61260	0.00000	0.29	0.002	1.636	2.2 Comprs.
0.50	0.63578	0.00000	0.30	0.005	1.574	4.5 Comprs.
1.00	0.72267	0.00000	0.04	0.010	1.341	13.1 Comprs.
2.00	0.79606	0.00000	0.05	0.009	1.144	20.4 Comprs.
4.00	0.85763	0.00000	0.04	0.008	0.979	26.6 Comprs.
8.00	0.91124	0.00000	0.04	0.007	0.836	31.9 Comprs.

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
12.00	0.93981	0.00000	0.02	0.005	0.759	34.7 Comprs.
3.00	0.92179	0.00000	0.04		0.808	32.9 Comprs.
0.75	0.89442	0.00000	0.01		0.881	30.2 Comprs.

C_c = 0.82 P_c = 0.52 tsf C_r = 0.10





Sample No.		1	2	3
Initial	Water Content, %	48.9	55.6	53.9
	Dry Density, pcf	72.0	67.8	69.3
	Saturation, %	98.4	100.9	101.7
	Void Ratio	1.3419	1.4862	1.4318
	Diameter, in.	1.412	1.402	1.408
	Height, in.	3.112	3.096	3.099
At Test	Water Content, %	48.9	55.6	53.9
	Dry Density, pcf	72.0	67.8	69.3
	Saturation, %	98.4	100.9	101.7
	Void Ratio	1.3419	1.4862	1.4318
	Diameter, in.	1.412	1.402	1.408
	Height, in.	3.112	3.096	3.099
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.99	20.83	41.87
Fail. Stress, psf		559	526	546
Strain, %		11.1	5.1	6.6
Ult. Stress, psf		497	480	483
Strain, %				
σ_1 Failure, psf		1566	3526	6576
σ_3 Failure, psf		1007	3000	6030

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CH2 W/ LNS & LYS ML

LL= 54 **PL=** 17 **PI=** 37
Assumed Specific Gravity= 2.70
Remarks:

Figure _____

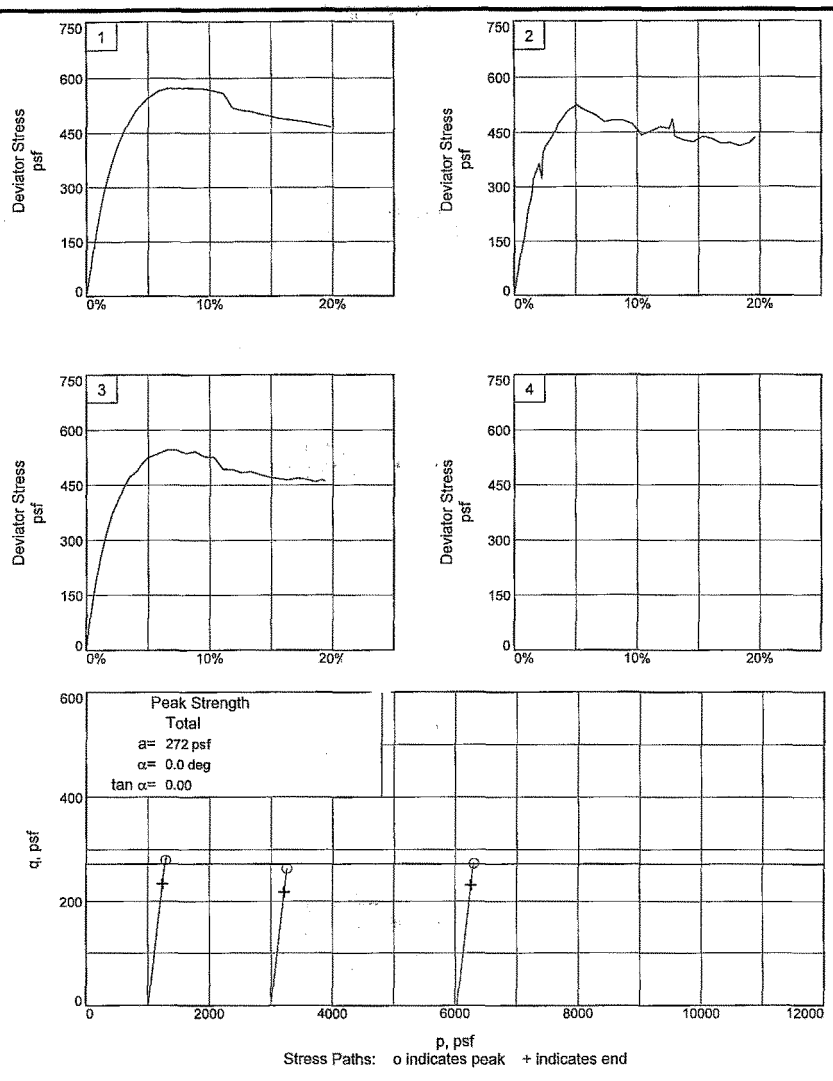
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-30U **Depth:** 24.8
Sample Number: 8B
Proj. No.: 07-022135 **Date Sampled:** 10/7/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

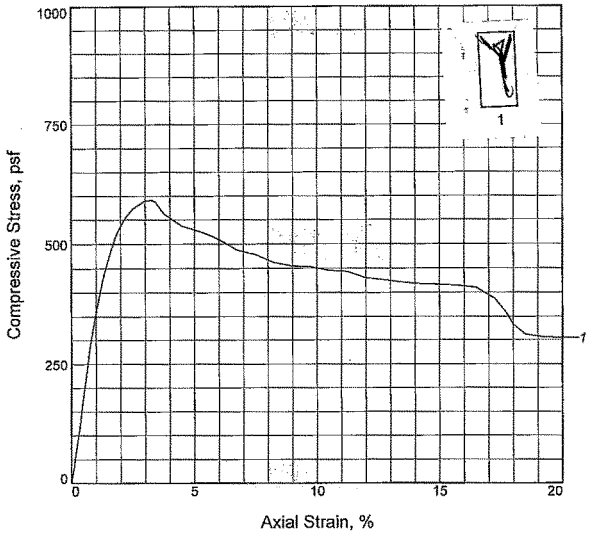
Tested By: JC/ARS **Checked By:** TB



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-30U **Depth:** 24.8 **Sample Number:** 8B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: JC/ARS **Checked By:** TB

UNCONFINED COMPRESSION TEST



Sample No.	1				
Unconfined strength, psf	590				
Undrained shear strength, psf	295				
Failure strain, %	3.3				
Strain rate, %/min.	1.00				
Water content, %	74.3				
Wet density, pcf	98.9				
Dry density, pcf	56.7				
Saturation, %	101.0				
Void ratio	2.0152				
Specimen diameter, in.	1.410				
Specimen height, in.	3.103				
Height/diameter ratio	2.20				

Description: SO GR CH4 W/ LNS ML

LL = 83	PL = 24	PI = 59	**Assumed GS=** 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 10/7/09
Remarks:

Figure _____

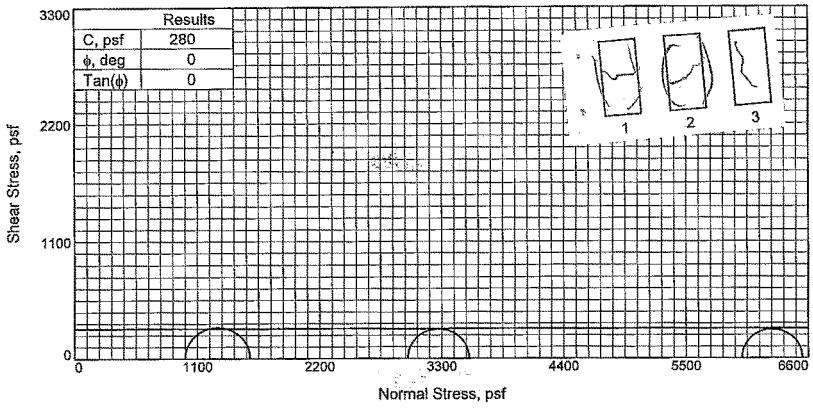
Client: U.S. Army Corps of Engineers

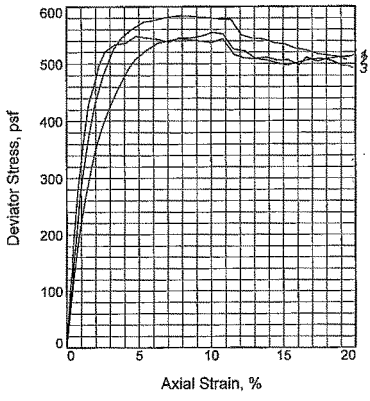
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-30U **Depth:** 29.7
Sample Number: 9C

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: JC/ARS **Checked By:** TB





Sample No.		1	2	3
Initial	Water Content, %	68.5	66.3	69.5
	Dry Density, pcf	60.2	60.7	58.8
	Saturation, %	101.8	100.1	99.8
	Void Ratio	1.8436	1.8164	1.9083
	Diameter, in.	1.407	1.413	1.417
	Height, in.	3.103	3.103	3.101
At Test	Water Content, %	68.5	66.3	65.1
	Dry Density, pcf	60.2	60.7	58.8
	Saturation, %	101.8	100.1	93.5
	Void Ratio	1.8436	1.8164	1.9083
	Diameter, in.	1.407	1.413	1.417
	Height, in.	3.103	3.103	3.101
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.87	20.79	41.69
Fail. Stress, psf		584	554	544
Strain, %		8.3	10.1	7.8
Ult. Stress, psf		578	497	537
Strain, %				
σ_1 Failure, psf		1574	3547	6547
σ_3 Failure, psf		990	2993	6004

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CH4 W/ LNS & LYS SP, WD

LL= 78 **PL=** 23 **PI=** 55
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

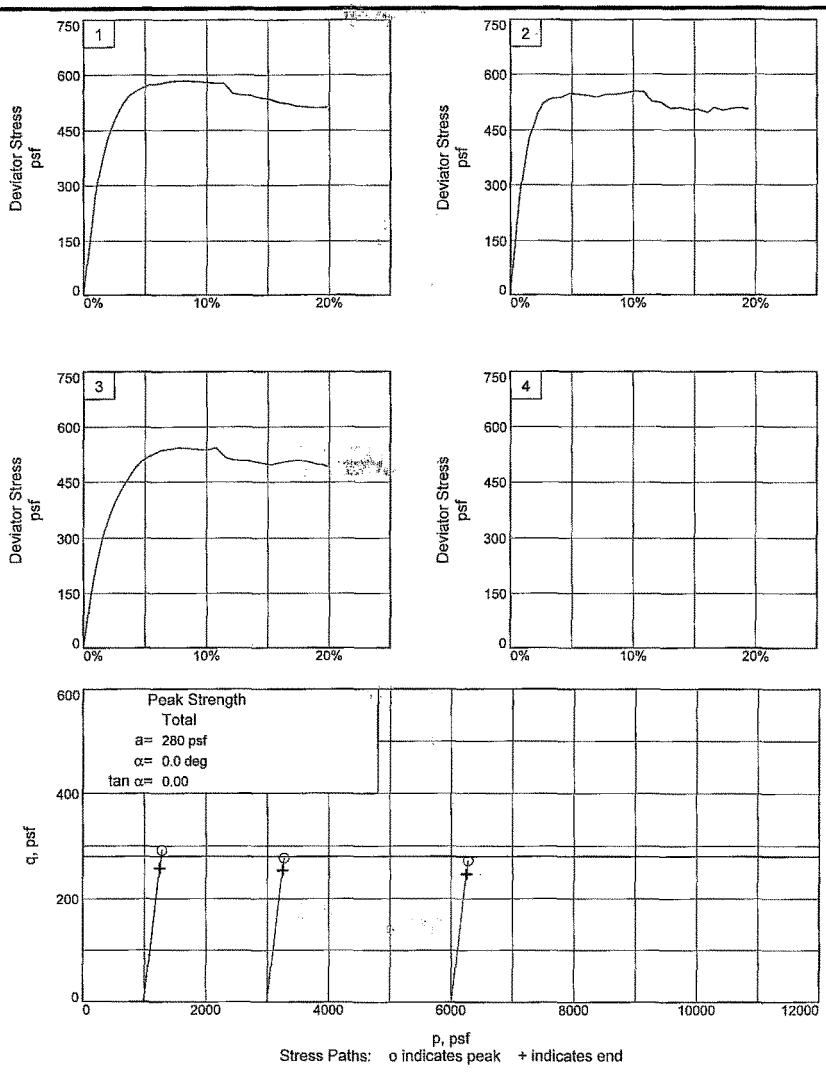
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-30U **Depth:** 33.7
Sample Number: 10C
Proj. No.: 07-022135 **Date Sampled:** 10/7/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

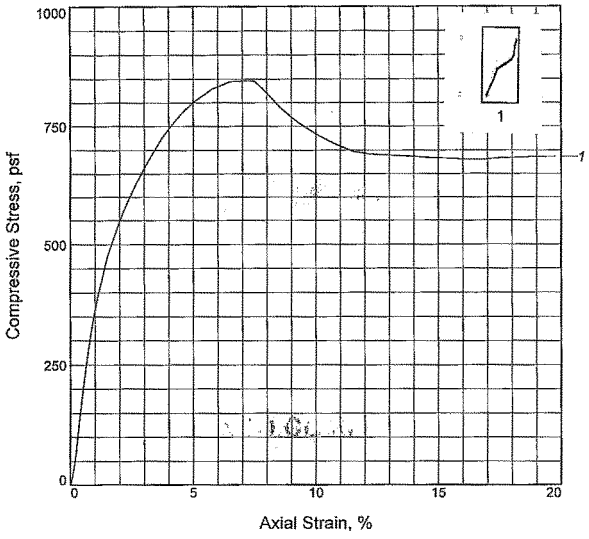
Tested By: JC/ARS **Checked By:** TB



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-30U **Depth:** 33.7 **Sample Number:** 10C
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: JC/ARS **Checked By:** TB

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	847			
Undrained shear strength, psf	423			
Failure strain, %	7.3			
Strain rate, %/min.	1.00			
Water content, %	68.3			
Wet density, pcf	98.4			
Dry density, pcf	58.4			
Saturation, %	97.2			
Void ratio	1.9275			
Specimen diameter, in.	1.426			
Specimen height, in.	3.112			
Height/diameter ratio	2.18			

Description: SO GR CH4 W/ LNS ML

LL = 83	**PL** = 25	**PI** = 58	**Assumed GS=** 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 10/7/09
Remarks:

Client: U.S. Army Corps of Engineers

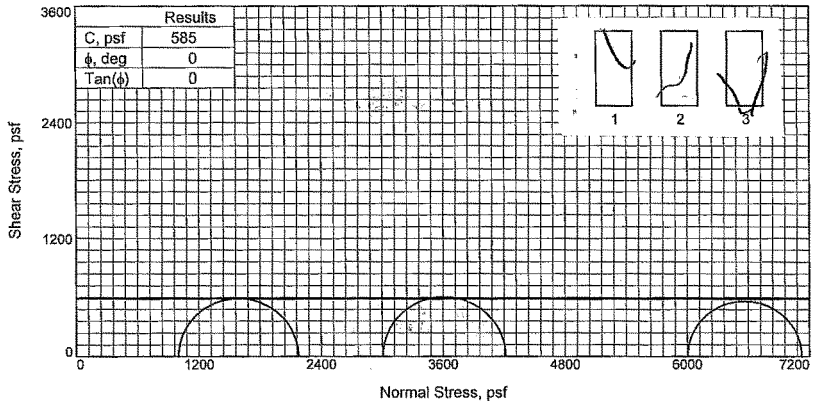
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-30U **Depth:** 40.8
Sample Number: 12B

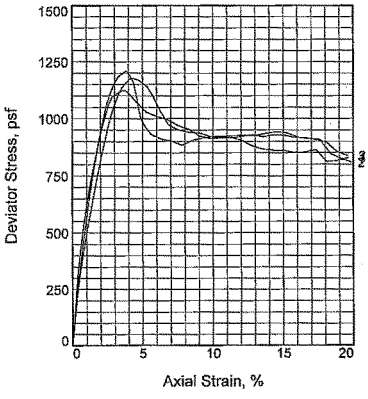
UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Figure _____

Tested By: JC/ARS **Checked By:** TB





Sample No.		1	2	3
Initial	Water Content, %	72.8	73.3	72.2
	Dry Density, pcf	56.9	56.5	57.1
	Saturation, %	99.5	99.2	99.2
	Void Ratio	2.0045	2.0252	1.9943
	Diameter, in.	1.415	1.418	1.411
	Height, in.	3.108	3.104	3.105
At Test	Water Content, %	72.8	73.3	72.2
	Dry Density, pcf	56.9	56.5	57.1
	Saturation, %	99.5	99.2	99.2
	Void Ratio	2.0045	2.0252	1.9943
	Diameter, in.	1.415	1.418	1.411
	Height, in.	3.108	3.104	3.105
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.95	20.88	41.69
Fail. Stress, psf		1176	1209	1123
Strain, %		4.4	3.8	3.8
Ult. Stress, psf		916	883	912
Strain, %				
σ_1 Failure, psf		2177	4216	7126
σ_3 Failure, psf		1000	3006	6003

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: M GR CH4

LL= 89 **PL=** 22 **PI=** 67
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

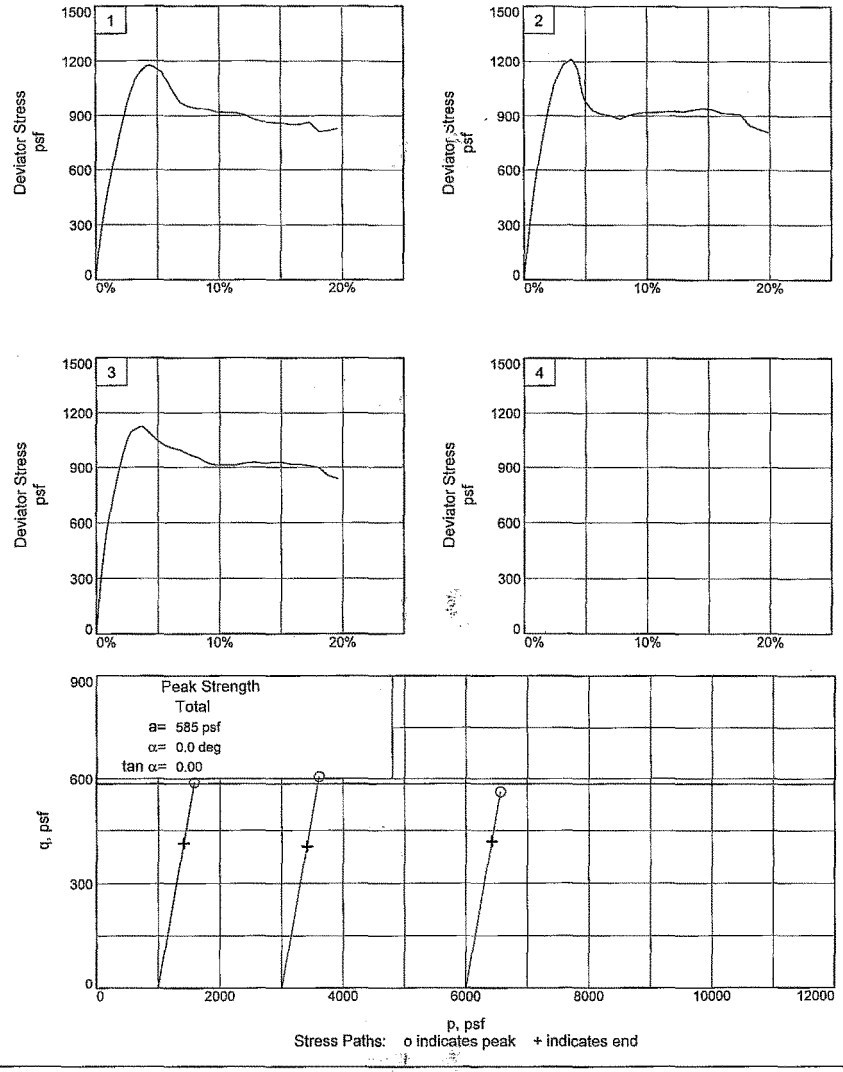
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-30U **Depth:** 44.8
Sample Number: 13B
Proj. No.: 07-022135 **Date Sampled:** 10/7/09

TRIAXIAL SHEAR TEST REPORT

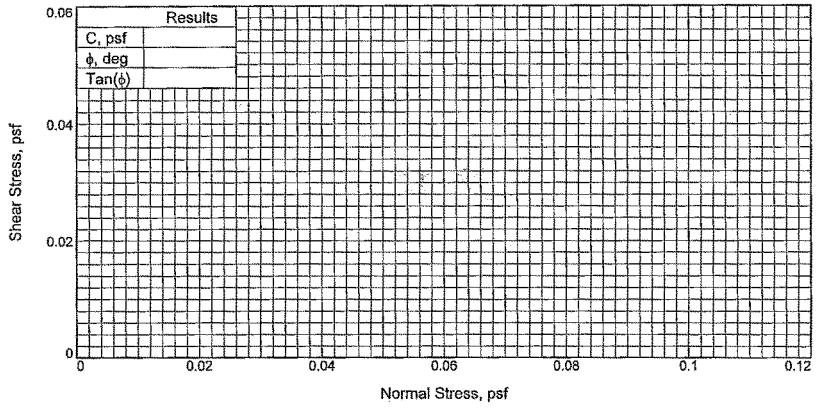
FFEBJV, LLC

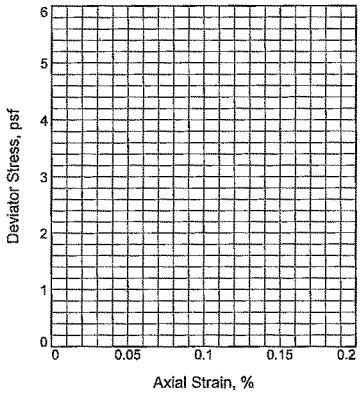
Tested By: JC/ARS **Checked By:** TB



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-30U **Depth:** 44.8 **Sample Number:** 13B
Project No.: 07-022135 **Figure** _____ FFEBJV, LLC

Tested By: JC/ARS **Checked By:** TB





Sample No.	
Initial	Water Content, % Dry Density, pcf Saturation, % Void Ratio Diameter, in. Height, in.
At Test	Water Content, % Dry Density, pcf Saturation, % Void Ratio Diameter, in. Height, in.
Strain rate, %/min.	
Back Pressure, psi	
Cell Pressure, psi	
Fail. Stress, psf	
Strain, %	
Ult. Stress, psf	
Strain, %	
σ_1 Failure, psf	
σ_3 Failure, psf	

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: M GNG CL4 W/ LNS CH

LL= 30 **PL=** 17 **PI=** 13
Assumed Specific Gravity=
Remarks: NOT TESTABLE. SAMPLE 15C ALTERNATE.

Figure _____

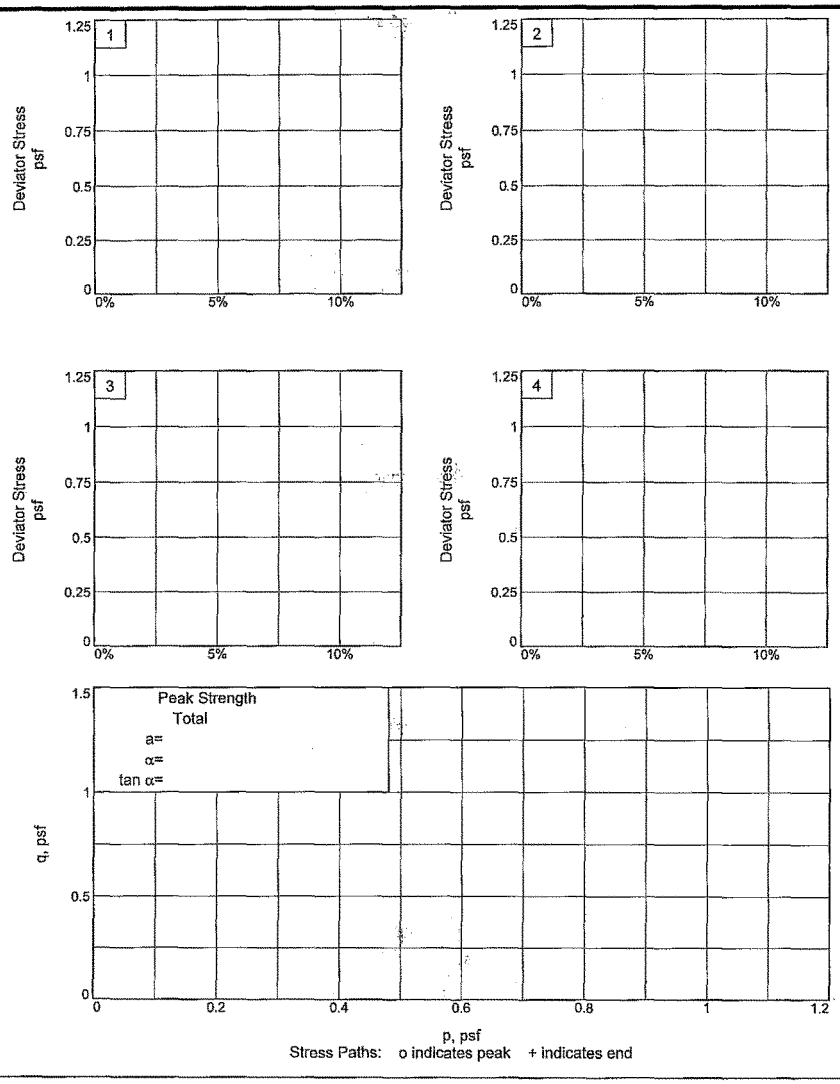
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-30U **Depth:** 52.8
Sample Number: 15B
Proj. No.: 07-022135 **Date Sampled:**

TRIAXIAL SHEAR TEST REPORT

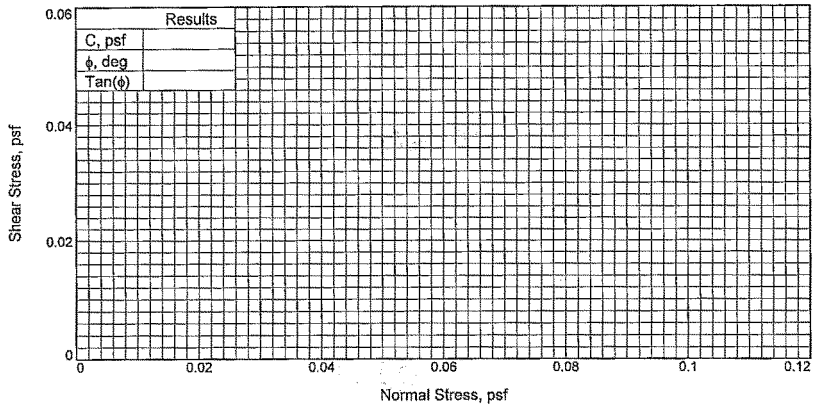
FFEBJV, LLC

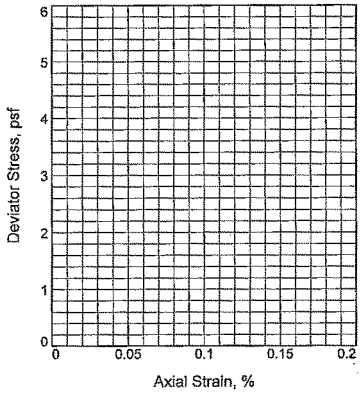
Checked By: TB



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-30U **Depth:** 52.8 **Sample Number:** 15B
Project No.: 07-022135 **Figure** _____ FFEBJV, LLC

Checked By: TB





Sample No.	
Initial	Water Content, % Dry Density, pcf Saturation, % Void Ratio Diameter, in. Height, in.
At Test	Water Content, % Dry Density, pcf Saturation, % Void Ratio Diameter, in. Height, in.
Strain rate, %/min.	
Back Pressure, psi	
Cell Pressure, psi	
Fail. Stress, psf	
Strain, %	
Ult. Stress, psf	
Strain, %	
σ_1 Failure, psf	
σ_3 Failure, psf	

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: M GNG CL6 W/ LNS CH

LL= 49 **PL=** 17 **PI=** 32
Assumed Specific Gravity=
Remarks: NOT TESTABLE. NO OTHER ALTERNATE.

Figure _____

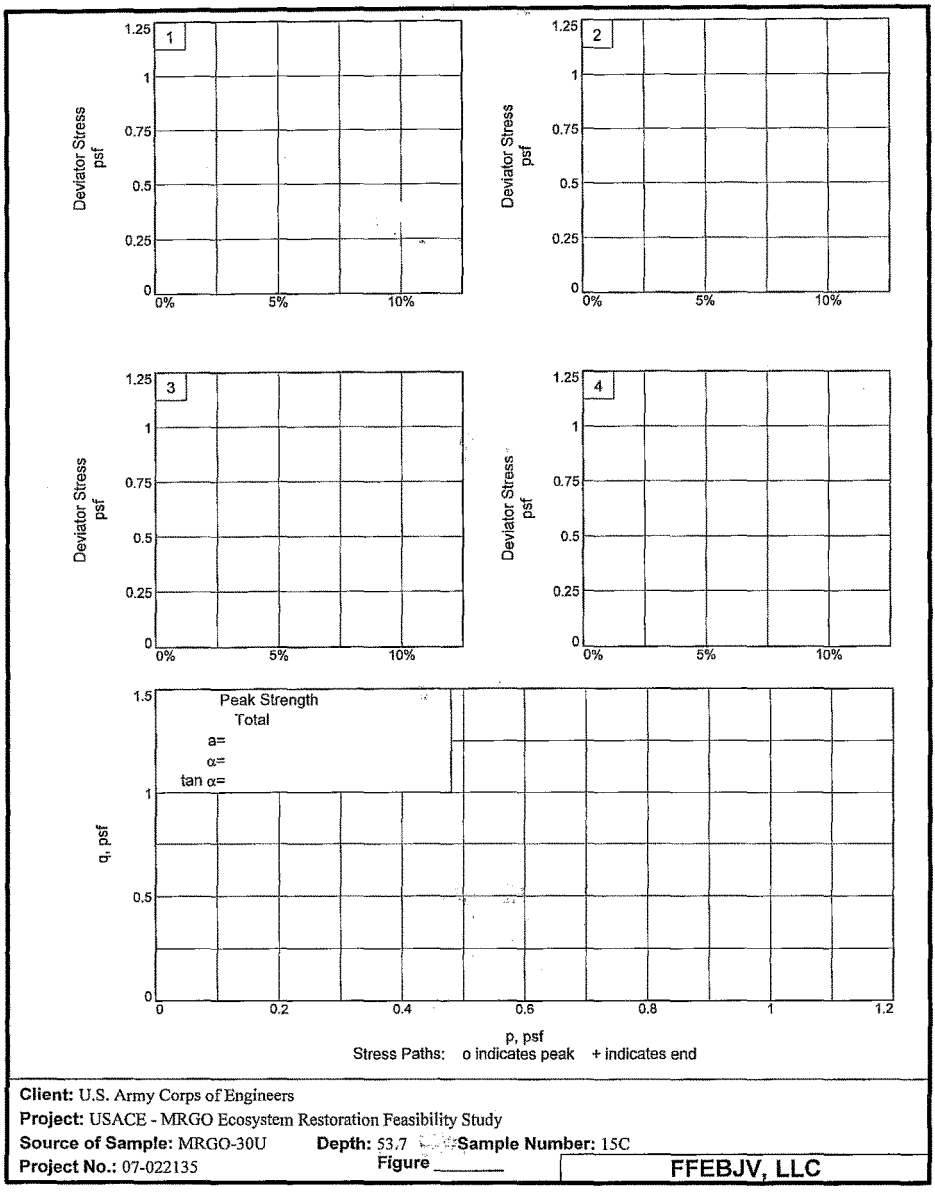
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study St.Bernard Parish, La
Source of Sample: MRGO-30U **Depth:** 53.7
Sample Number: 15C
Proj. No.: 07-022135 **Date Sampled:** 10-07-09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

Checked By: TB



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-30U **Depth:** 53.7 **Sample Number:** 15C
Project No.: 07-022135 **Figure** _____ FFEBJV, LLC

Checked By: TB

SUMMARY OF LABORATORY TEST RESULTS

Project: MRGO Ecosystem Restoration Feasibility Study Assigned By: _____

Project Number: 07-022135 Current Date: 12/2/2009
Boring: MRGO-31U

Sample Number	Depth	Visual Classification	USCS	E(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
1A	0.0	GR SM W/ SIF	SM		31												
1B	0.8	VSO GR CHOA W/ ARS SM, WD	CHOA		77												
1C	1.7	VSO GR CHOA W/ ARS SM, WD	CHOA		125												
2A	4.0	VSO DGR CHOC W/ ARS SM, WD	CHOC		193												
2B	4.8	VSO DGR CH4 W/ ARS SM, WD	CH4		81	54	98	100					74	21	53		Gs, CON
2C	5.7	VSO GR CH4 W/ ARS ML, WD	CH4		58	67	106	100	UU	0	137		71	21	50	0.20	
2D	6.6	VSO GR CH3 W/ ARS ML, WD	CH3		55												
3A	8.0	SO GR CH3 W/ LNS ML	CH3		54												
3B	8.8	SO GR CH3 W/ LNS ML, CC	CH3		54												
3C	9.7	SO GR CH3 W/ LNS ML	CH3		63												
4A	12.0	M GR CH4 W/ LNS & ARS ML	CH4		56												
4B	12.8	SO GR CH2 W/ LNS & ARS ML, CC	CH2	5	51	72	108	100	UC	-	273	547	54	22	32	0.20	
4C	13.7	M GR CH3 W/ LNS & ARS ML, CC	CH3		53												
4D	14.6	M GR CH4 W/ LNS & ARS ML	CH4		61												
5A	16.0	M GR CH4 W/ LNS & ARS ML	CH4		64												
5B	16.8	SO GR CH3 W/ LNS & ARS ML, ARS SM, O	CH3		60	64	103	100					63	20	43		Gs, CON
5C	17.7	M GR CH3 W/ LNS & LYS SM	CH3		51												
5D	18.6	GR SM	SM		33												
6A	20.0	SO GR CH4 W/ LYS SM	CH4		65												
6B	20.8	SO GR CH4	CH4		68	59	99	98	UU	0	379		83	29	54	0.22	
6C	21.7	SO GR CH3 W/ LNS SM	CH3		49												
6D	22.6	M GR CH4 W/ LNS & LYS ML	CH4		52												
7A	24.0	M GR CH3 W/ LYS ML	CH3		37												
7B	24.8	M GR CH3 W/ LYS ML	CH3		37												
7C	25.7	SO GR CL6	CL6	15	31	91	119	99	UC	-	499	998	40	19	21	0.30	
8A	28.0	SO GR CL6	CL6		36												
8B	28.8	SO GR CH2 W/ LNS & LYS ML	CH2		42												
8C	29.7	SO GR CH2 W/ LNS ML	CH2		47	74	109	100	UU	0	346		51	24	27	0.25	
8D	30.6	SO GR CH3 W/ LNS ML	CH3		46												
9A	32.0	SO GR CH4 W/ LNS & LYS ML	CH4		62												
9B	32.8	SO GR CH4 W/ LNS & LYS ML	CH4		61												
9C	33.7	SO GR CH4 W/ LNS ML	CH4		65												
9D	34.6	SO GR CH4 W/ LNS & LYS ML	CH4		65												
10A	36.0	SO GR CH4 W/ LNS ML	CH4		74												
10B	36.8	M GR CH4 W/ LNS & LYS ML	CH4	2	75	56	97	99	UC	-	611	1222	83	26	57	0.30	
10C	37.7	SO GR CH4 W/ LNS & LYS ML	CH4		72												
11A	40.0	SO DGR CH4	CH4		65												

Remarks: _____
FTEB JV, LLC

Checked By: MS/MY
File Name: MRGO-31U.xls

SUMMARY OF LABORATORY TEST RESULTS

Project: MRGO Ecosystem Restoration Feasibility Study **Assigned By:** _____

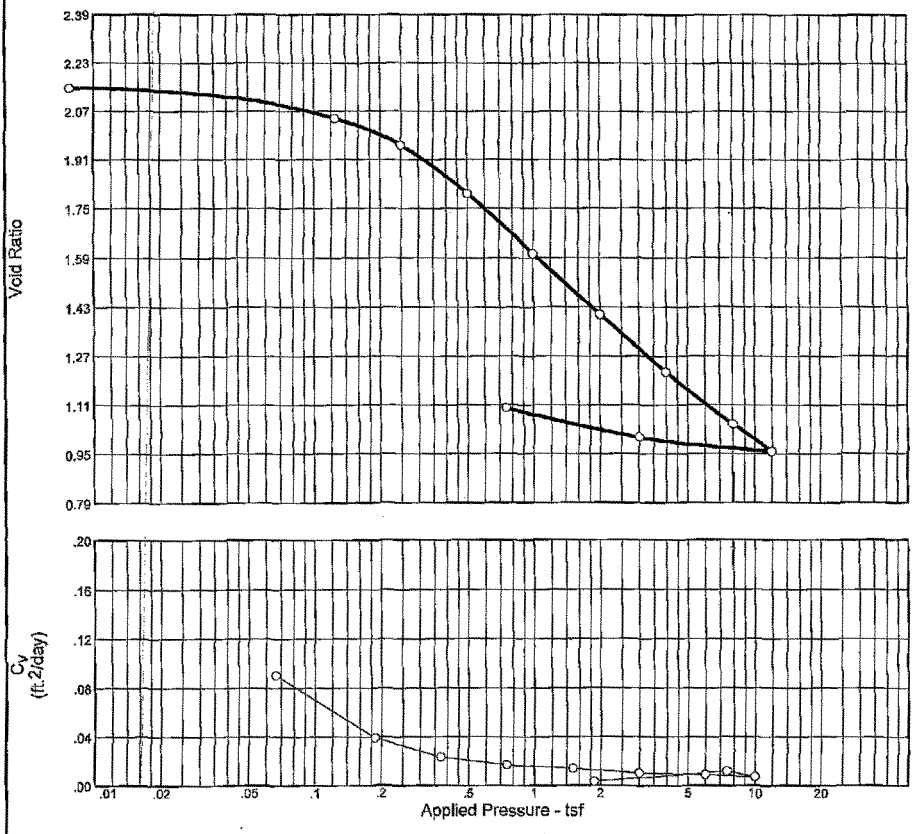
Project Number: 07-022135 **Current Date:** 12/2/2009
Boring: MRGO-31U

Sample Number	Depth	Visual Classification	USCS	E(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
11B	40.8	M GR CH4 W/ LNS ML	CH4		57	66	104	99	UU	0	643		76	25	51	0.30	
11C	41.7	M GR CH4 W/ LNS & LYS SM	CH4		63												
12A	44.0	ST LGR CH3 W/ ARS ML	CH3		34												
12B	44.8	VST LGR CH3 W/ ARS & LYS ML	CH3		28												
12C	45.7	ST LGR CL4 W/ ARS & LYS ML	CL4	2	20	107	128	94	UC	-	1508	3016	32	14	18	0.67	
12D	46.6	VST LGR CH2 W/ ARS SM	CH2		23												
13A	48.0	VST LGR CH2 W/ LNS ML	CH2		23												
13B	48.8	VST LGR CH2 W/ LNS & ARS ML	CH2		22												
13C	49.7	VST LGR CL6	CL6		21												
13D	50.6	VST LGR CL6	CL6		20												
14A	52.0	GR SM W/ LNS CH	SM		24												
14B	52.8	GR SM W/ LYS CH, WD	SM		24												
14C	53.7	M DGR CH2 W/ WD	CH2		41	79	111	95	UU	0	742		54	22	32	0.50	
15A	56.0	ST GR CL6 W/ O, WD	CL6		27												
15B	56.8	ST GR CL4 W/ O, WD	CL4		30				UC				34	18	16		NOT TESTABLE

Remarks:
FFEB JV, LLC

Checked By: MS/WM
File Name: MRGO-31U.xls

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
102.6 %	81.0 %	53.9	74	53	2.72	0.31	0.65	2.149

MATERIAL DESCRIPTION	USCS	AASHTO
VSO DGR CH4 W/ ARS SM, WD	CH4	

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

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

Source: MRGO-31U **Sample No.:** 2B **Elev./Depth:** 4.8

FFEBJV, LLC

St Rose, LA

Remarks:

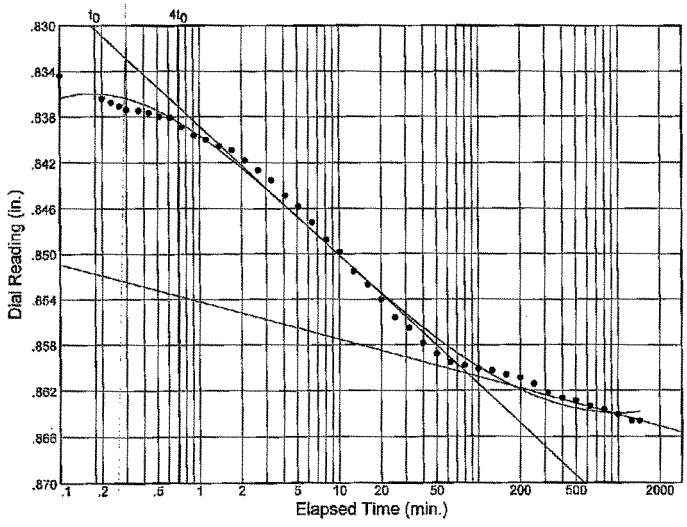
Tested by: ALJ
Calculated & Checked by: WJY
Top portion was CHOC
with LL=191 % and PI=139 %.

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

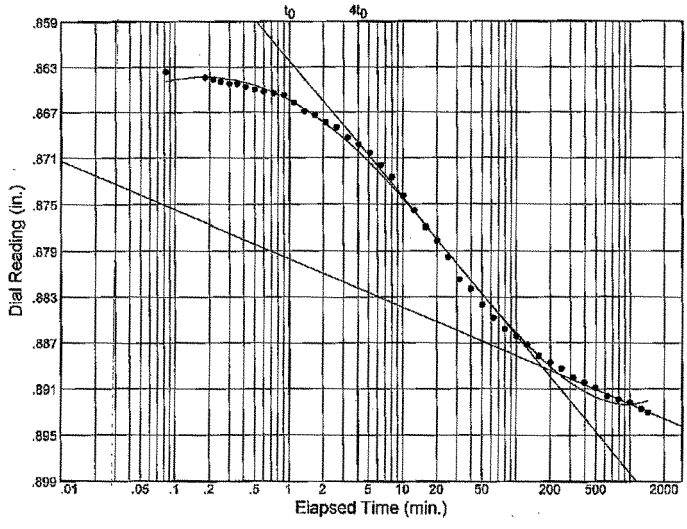
Source: MRGO-31U Sample No.: 2B Elev./Depth: 4.8



Load No.= 2
Load= 0.13 tsf
D_0 = 0.83350
D_{50} = 0.84703
D_{100} = 0.86055
T_{50} = 5.32 min.

C_v @ T_{50}
0.09 ft.2/day

C_α = 0.003



Load No.= 3
Load= 0.25 tsf
D_0 = 0.86141
D_{50} = 0.87524
D_{100} = 0.88907
T_{50} = 11.58 min.

C_v @ T_{50}
0.04 ft.2/day

C_α = 0.004

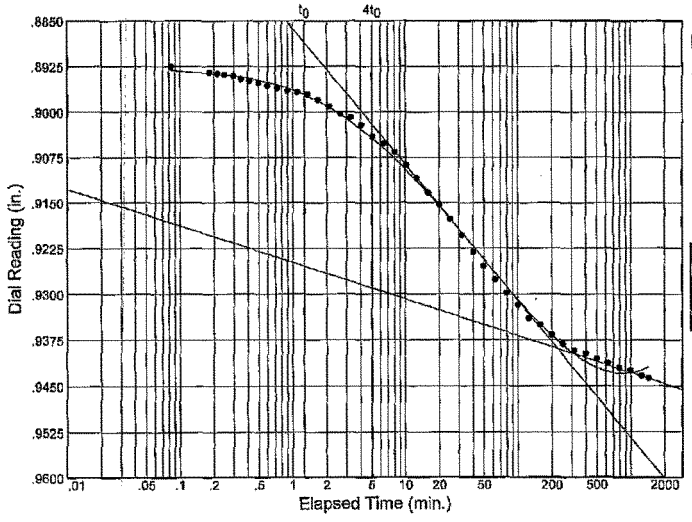
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

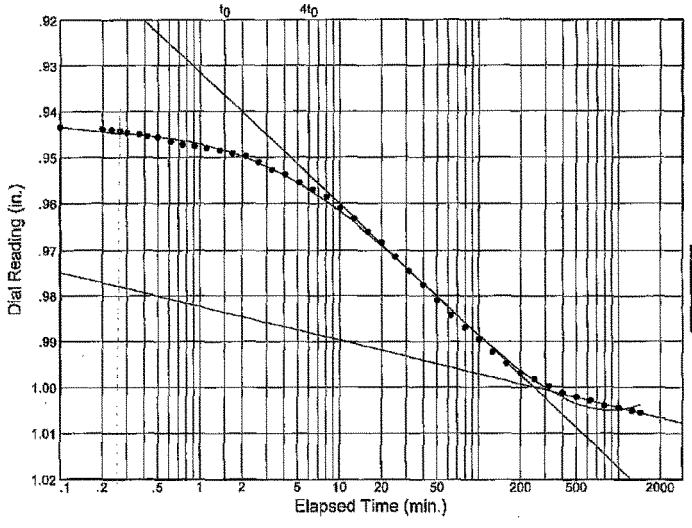
Source: MRGO-31U Sample No.: 2B Elev./Depth: 4.8



Load No.= 4
Load= 0.50 tsf
D_0 = 0.88996
D_{50} = 0.91442
D_{100} = 0.93888
T_{50} = 17.74 min.

C_v @ T_{50}
0.02 ft.2/day

C_α = 0.006



Load No.= 5
Load= 1.00 tsf
D_0 = 0.94008
D_{50} = 0.97001
D_{100} = 0.99994
T_{50} = 21.71 min.

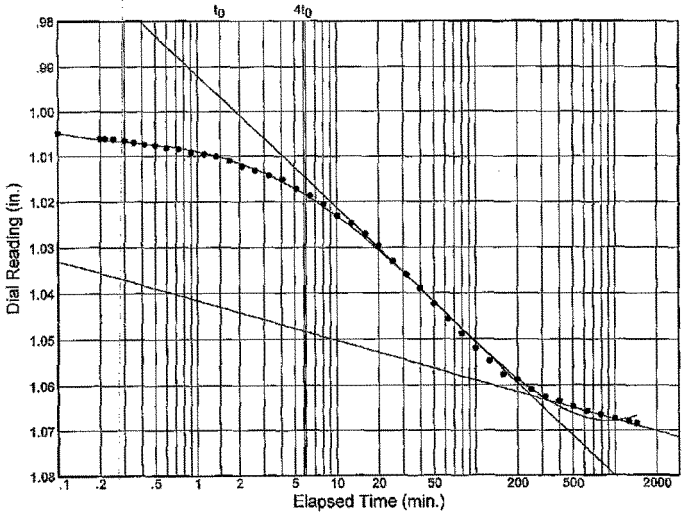
C_v @ T_{50}
0.02 ft.2/day

C_α = 0.008

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

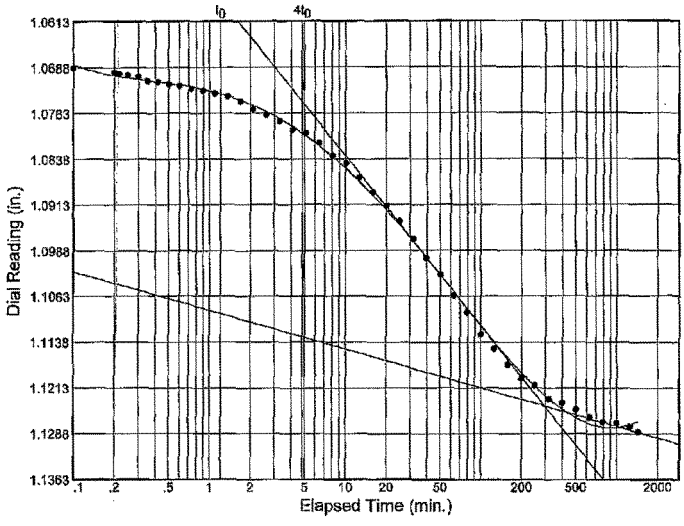
Source: MRGO-31U Sample No.: 2B Elev./Depth: 4.8



Load No.= 6
Load= 2.00 tsf
D_0 = 1.00210
D_{50} = 1.03220
D_{100} = 1.06230
T_{50} = 22.94 min.

C_v @ T_{50}
0.01 ft.^{2}/day

C_α = 0.010



Load No.= 7
Load= 4.00 tsf
D_0 = 1.06672
D_{50} = 1.09547
D_{100} = 1.12421
T_{50} = 26.81 min.

C_v @ T_{50}
0.01 ft.^{2}/day

C_α = 0.008

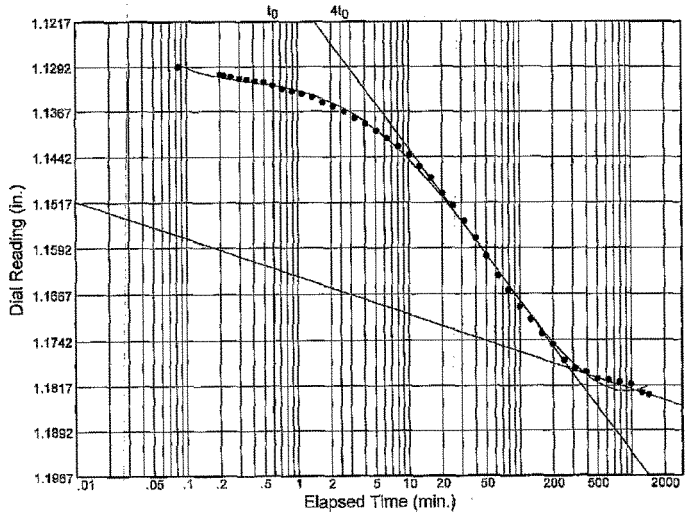
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Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

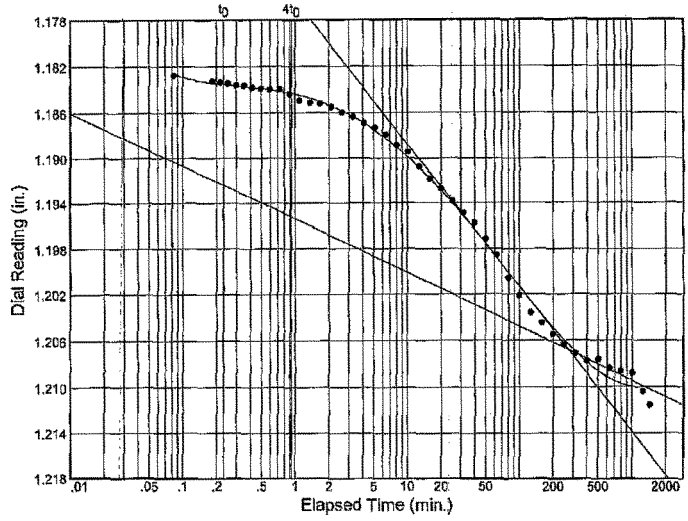
Source: MRGO-31U Sample No.: 2B Elev./Depth: 4.8



Load No.= 8
Load= 8.00 tsf
D_0 = 1.12867
D_{50} = 1.15377
D_{100} = 1.17886
T_{50} = 26.92 min.

C_v @ T_{50}
0.01 ft.2/day

C_α = 0.009



Load No.= 9
Load= 12.00 tsf
D_0 = 1.18280
D_{50} = 1.19480
D_{100} = 1.20680
T_{50} = 29.52 min.

C_v @ T_{50}
0.01 ft.2/day

C_α = 0.007

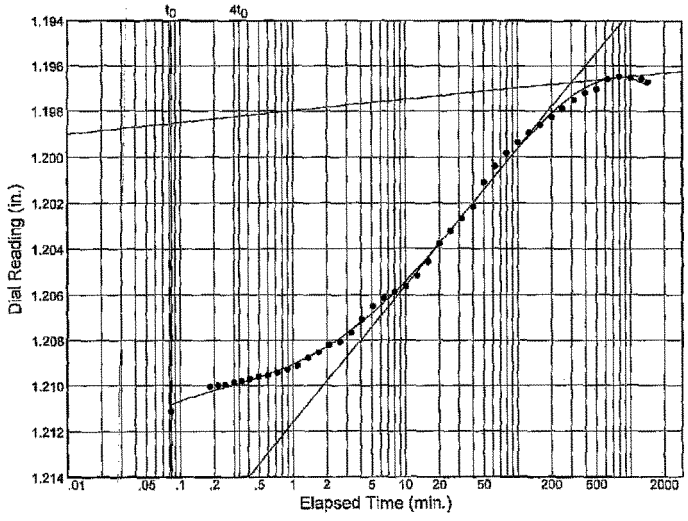
FFEBJV, LLC

Figure

Dial Reading vs. Time

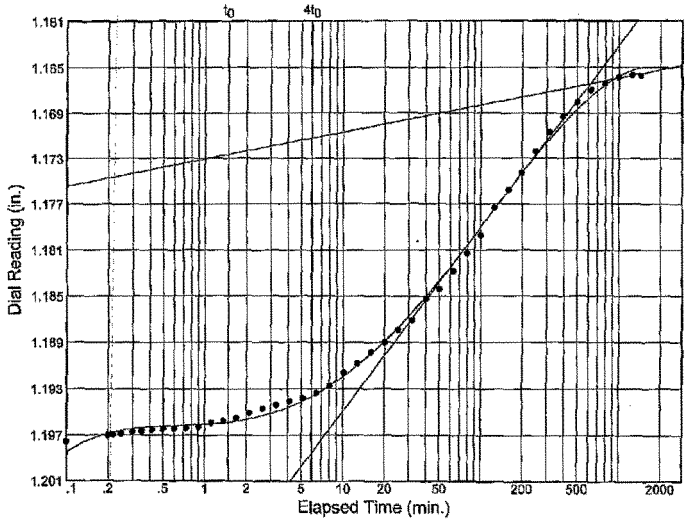
Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-31U Sample No.: 2B Elev./Depth: 4.8



Load No.= 10
Load= 3.00 tsf
D_0 = 1.21176
D_{50} = 1.20424
D_{100} = 1.19673
T_{50} = 16.60 min.

C_v @ T_{50}
0.01 ft.^{2}/day



Load No.= 11
Load= 0.75 tsf
D_0 = 1.19808
D_{50} = 1.18225
D_{100} = 1.16641
T_{50} = 62.51 min.

C_v @ T_{50}
0.00 ft.^{2}/day

FFEBJV, LLC

Figure

CONSOLIDATION TEST DATA

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Contract No. W912P8-07-D-0022
Task Order 135
Project Number: 07-022135

Sample Data

Source: MRGO-31U
Sample No.: 2B
Elev. or Depth: 4.8 Sample Length(in./cm.):
Location:
Description: VSO DGR CH4 W/ ARS SM, WD
Liquid Limit: 74 Plasticity Index: 53
USCS: CH4 AASHTO: Figure No.:
Testing Remarks: Tested by: ALJ
Calculated & Checked by: WJY
Top portion was CHOC
with LL=191 % and PI=139 %.

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST		AFTER TEST	
Wet w+t	= 181.03 g.	Consolidometer # = 8		Wet w+t	= 372.65 g.
Dry w+t	= 100.00 g.			Dry w+t	= 301.69 g.
Tare Wt.	= .00 g.	Spec. Gravity = 2.72		Tare Wt.	= 113.31 g.
Height	= 1.00 in.	Height = 1.00 in.			
Diameter	= 4.00 in.	Diameter = 4.00 in.			
Weight	= 322.85 g.	Defl. Table = n/a			
Moisture	= 81.0 %	Ht. Solids = 0.3185 in.		Moisture	= 37.7 %
Wet Den.	= 97.6 pcf	Dry Wt. = 178.30 g.*		Dry Wt.	= 188.38 g.
Dry Den.	= 53.9 pcf	Void Ratio = 2.149		Void Ratio	= 1.101
		Saturation = 102.6 %			

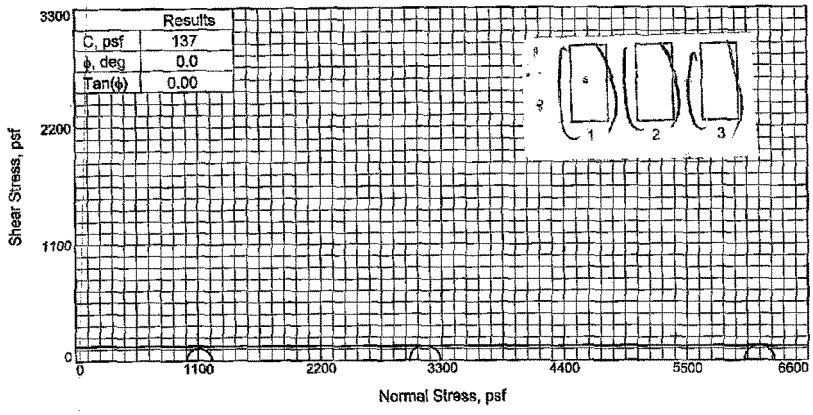
* Initial dry weight used in calculations

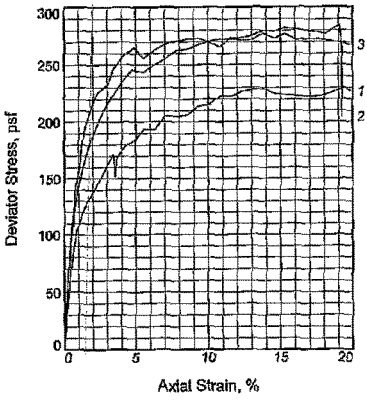
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.83193				2.149	
0.01	0.83214	0.00000			2.148	0.0 Comprs.
0.13	0.86466	0.00000	0.09	0.003	2.046	3.3 Comprs.
0.25	0.89306	0.00000	0.04	0.004	1.957	6.1 Comprs.
0.50	0.94373	0.00000	0.02	0.006	1.798	11.1 Comprs.
1.00	1.00559	0.00000	0.02	0.008	1.603	17.3 Comprs.
2.00	1.06855	0.00000	0.01	0.010	1.406	23.6 Comprs.
4.00	1.12850	0.00000	0.01	0.008	1.217	29.6 Comprs.

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
8.00	1.18328	0.00000	0.01	0.009	1.045	35.0 Comprs.
12.00	1.21157	0.00000	0.01	0.007	0.957	37.9 Comprs.
3.00	1.19671	0.00000	0.01		1.003	36.4 Comprs.
0.75	1.16572	0.00000	0.00		1.101	33.3 Comprs.

C_c = 0.65 P_c = 0.31 tsf C_r = 0.12





Sample No.		1	2	3
Initial	Water Content, %	56.5	54.9	56.6
	Dry Density, pcf	68.1	68.5	66.6
	Saturation, %	102.8	100.9	99.2
	Void Ratio	1.4944	1.4798	1.5514
	Diameter, in.	1.397	1.410	1.420
	Height, in.	3.089	3.103	3.100
At Test	Water Content, %	56.5	54.9	56.6
	Dry Density, pcf	68.1	68.5	66.6
	Saturation, %	102.8	100.9	99.2
	Void Ratio	1.4944	1.4798	1.5514
	Diameter, in.	1.397	1.410	1.420
	Height, in.	3.089	3.103	3.100
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.92	20.87	41.82
Fail. Stress, psf		229	280	277
Strain, %		13.9	13.8	13.8
Ult. Stress, psf		224	279	273
Strain, %				
σ_1 Failure, psf		1226	3285	6299
σ_3 Failure, psf		997	3005	6022

Type of Test: Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: VSO GR CH4 W/ ARS ML, WD

LL= 71 **PL=** 21 **PI=** 50
Assumed Specific Gravity= 2.72
Remarks:

Figure _____

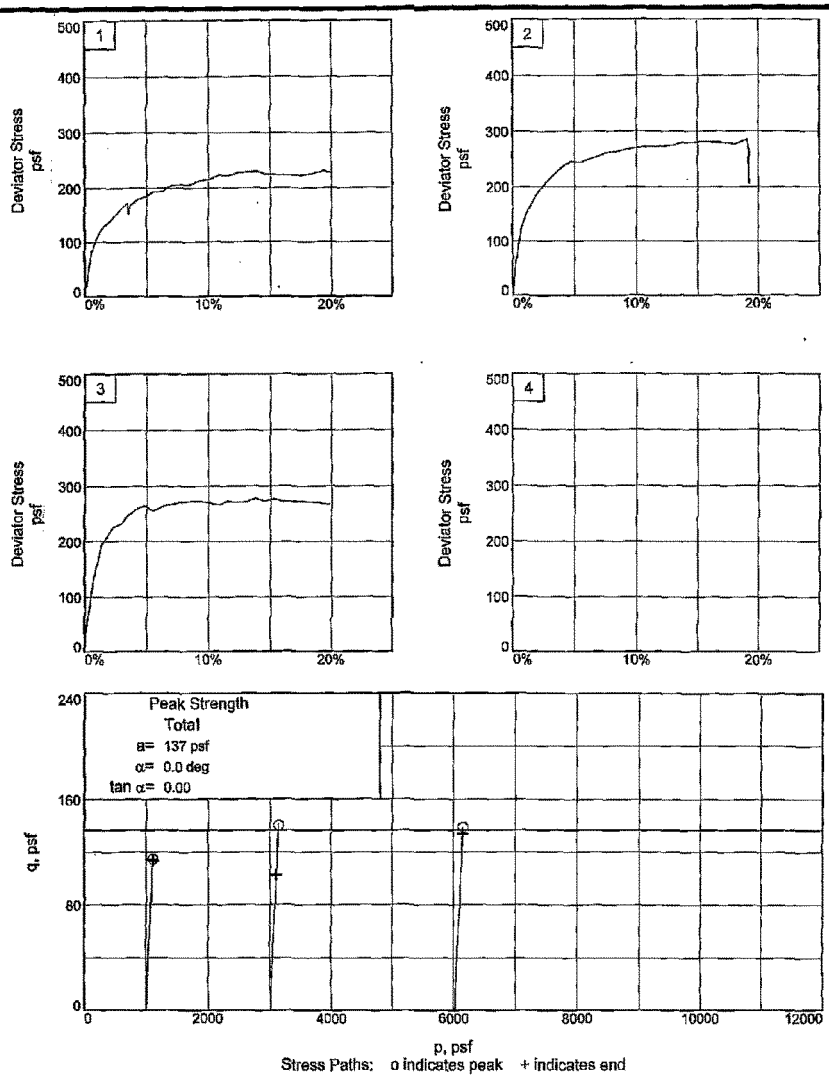
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-31U **Depth:** 5.7
Sample Number: 2C
Proj. No.: 07-022135 **Date Sampled:** 10/6/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

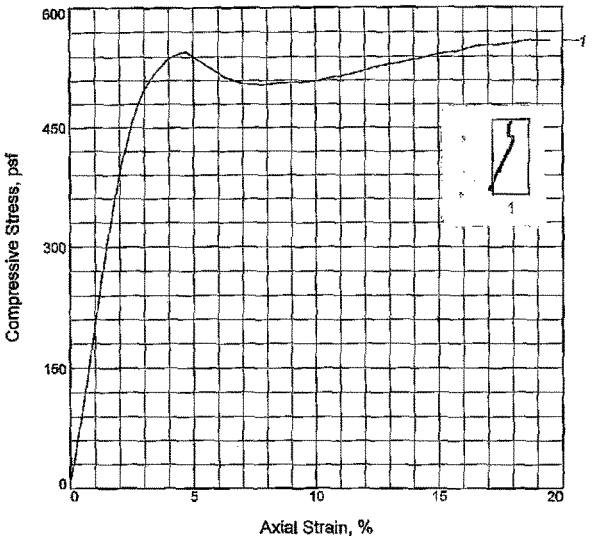
Tested By: VF/ARS **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-31U **Depth:** 5.7 **Sample Number:** 2C
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: VF/ARS **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	547			
Undrained shear strength, psf	273			
Failure strain, %	4.7			
Strain rate, %/min.	1.00			
Water content, %	50.6			
Wet density, pcf	107.8			
Dry density, pcf	71.6			
Saturation, %	100.9			
Void ratio	1.3536			
Specimen diameter, in.	1.407			
Specimen height, in.	3.101			
Height/diameter ratio	2.20			

Description: SO GR CH2 W/ LNS & ARS ML, CC

LL = 54	PL = 22	PI = 32	Assumed GS= 2.70	Type: undisturbed

Project No.: 07-022135
Date Sampled: 10/6/09
Remarks:

Figure _____

Client: U.S. Army Corps of Engineers

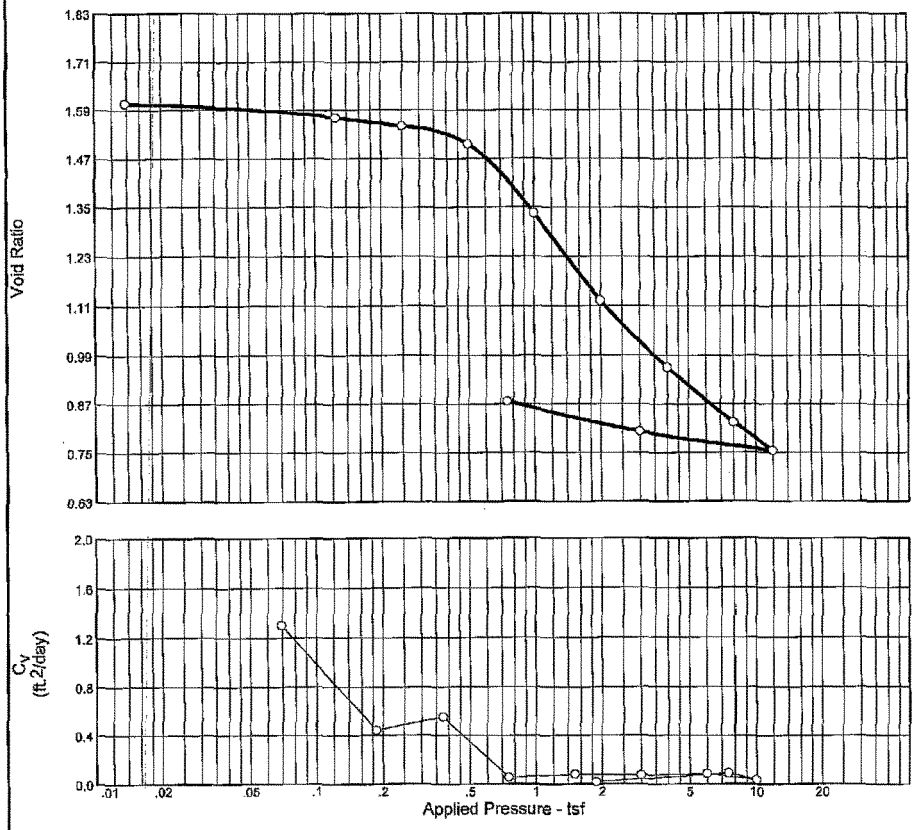
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-31U **Depth:** 12.8
Sample Number: 4B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: VF/ARS **Checked By:** MS

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
100.8 %	60.4 %	64.2	63	43	2.68	0.61	0.71	1.607

MATERIAL DESCRIPTION	USCS	AASHTO
SO GR CH3 W/ ARS SM, LNS & ARS ML, O	CH3	

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

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

Source: MRGO-31U **Sample No.:** 5B **Elev./Depth:** 16.8

FFEBJV, LLC

St Rose, LA

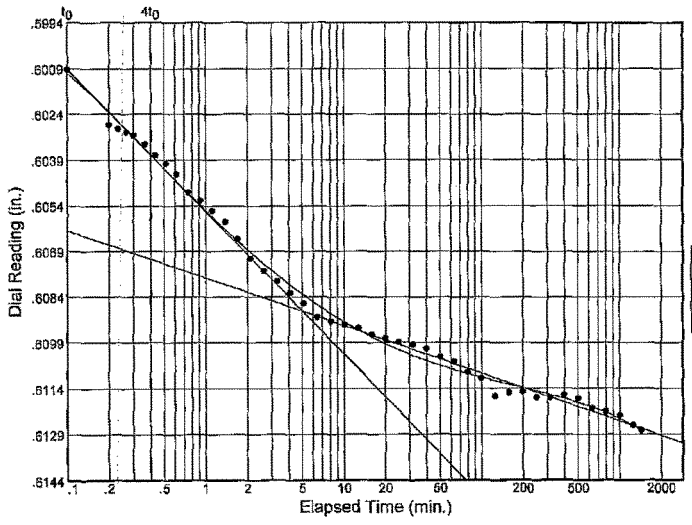
Remarks:
Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

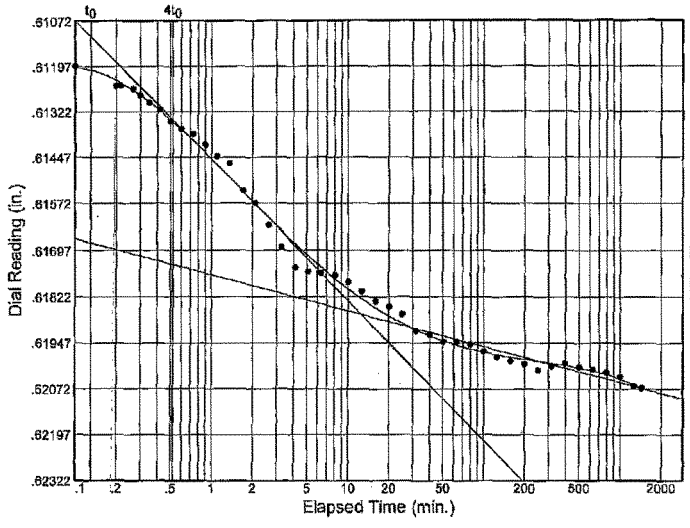
Source: MRGO-31U Sample No.: 5B Elev./Depth: 16.8



Load No.= 2
Load= 0.13 tsf
D_0 = 0.59835
D_{50} = 0.60361
D_{100} = 0.60887
T_{50} = 0.38 min.

C_v @ T_{50}
1.30 ft.2/day

C_α = 0.002



Load No.= 3
Load= 0.25 tsf
D_0 = 0.61063
D_{50} = 0.61466
D_{100} = 0.61869
T_{50} = 1.09 min.

C_v @ T_{50}
0.44 ft.2/day

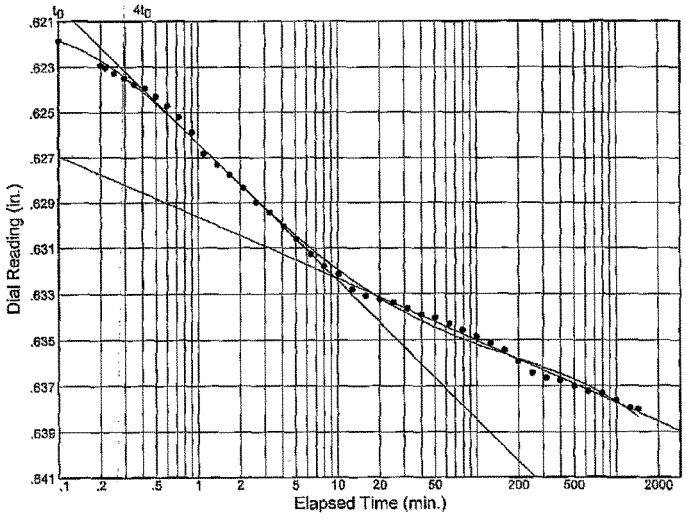
C_α = 0.001

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

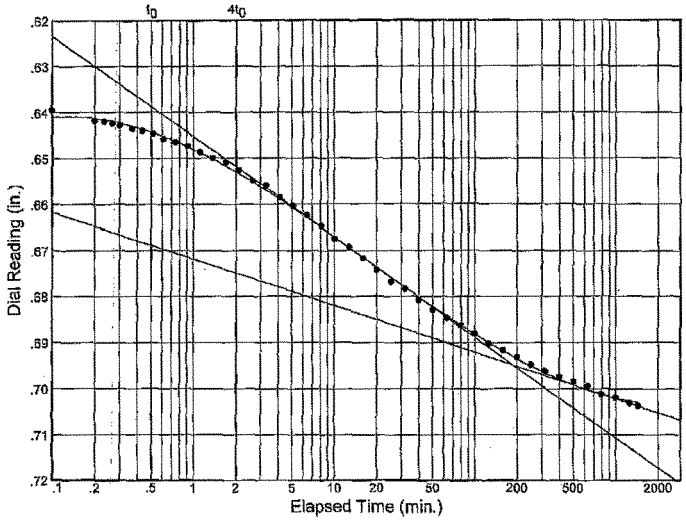
Source: MRGO-31U Sample No.: 5B Elev./Depth: 16.8



Load No.= 4
Load= 0.50 tsf
D_0 = 0.61963
D_{50} = 0.62594
D_{100} = 0.63225
T_{50} = 0.85 min.

C_v @ T_{50}
0.55 ft.2/day

C_α = 0.003



Load No.= 5
Load= 1.00 tsf
D_0 = 0.63546
D_{50} = 0.66513
D_{100} = 0.69481
T_{50} = 8.10 min.

C_v @ T_{50}
0.05 ft.2/day

C_α = 0.010

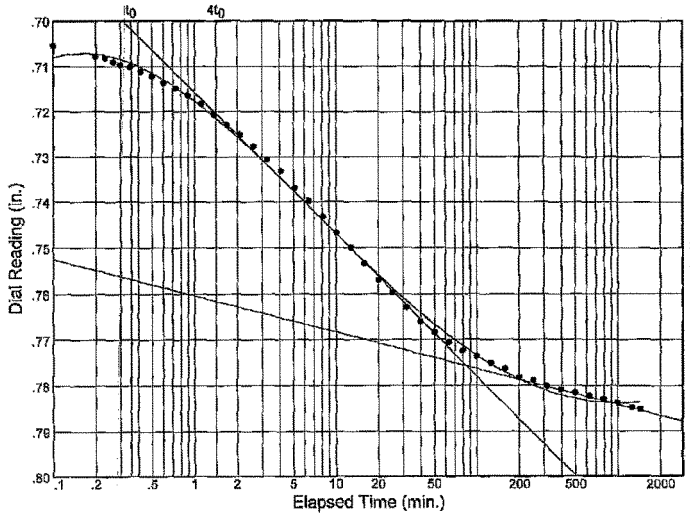
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

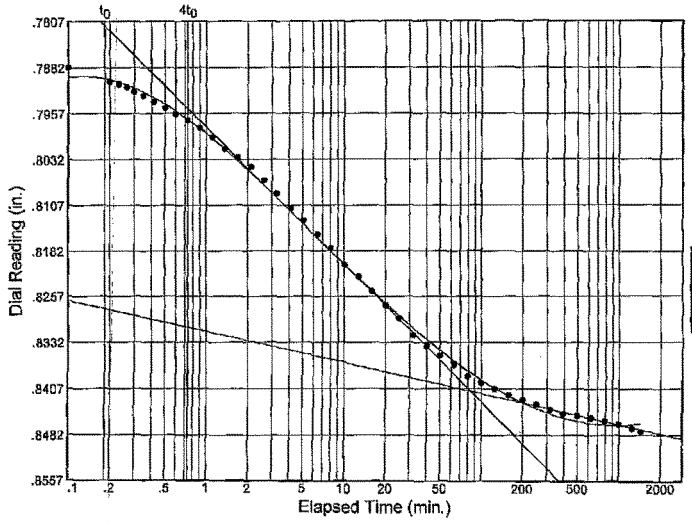
Source: MRGO-31U Sample No.: 5B Elev./Depth: 16.8



Load No.= 6
Load= 2.00 tsf
D_0 = 0.69709
D_{50} = 0.73636
D_{100} = 0.77563
T_{50} = 4.59 min.

C_v @ T_{50}
0.08 ft.2/day

C_α = 0.009



Load No.= 7
Load= 4.00 tsf
D_0 = 0.78334
D_{50} = 0.81222
D_{100} = 0.84110
T_{50} = 4.31 min.

C_v @ T_{50}
0.07 ft.2/day

C_α = 0.006

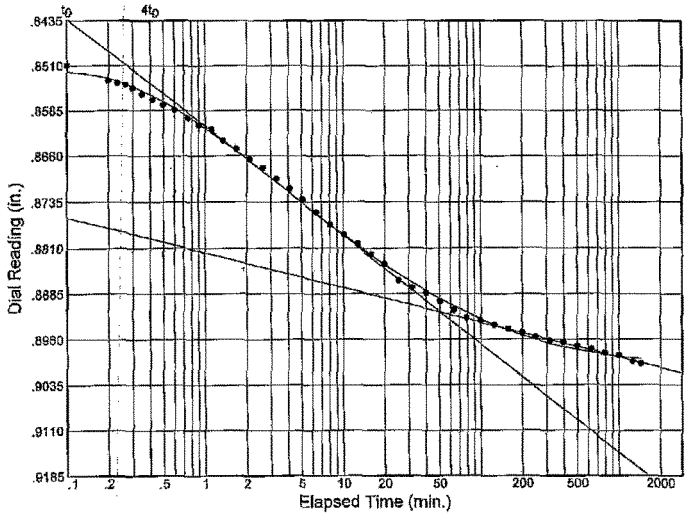
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

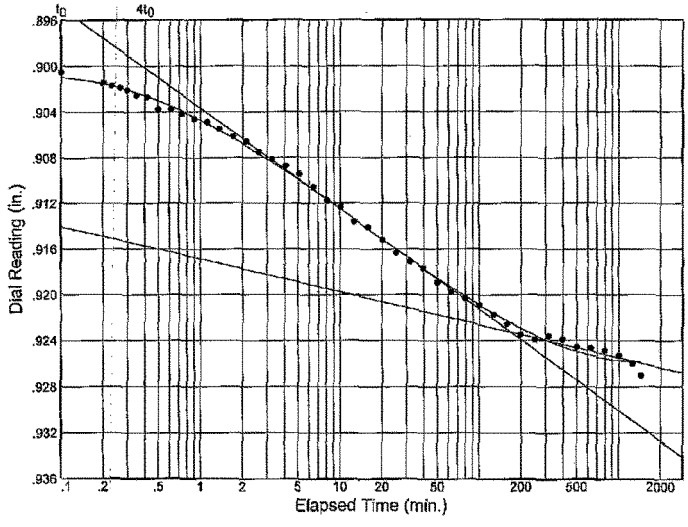
Source: MRGO-31U Sample No.: 5B Elev./Depth: 16.8



Load No.= 8
Load= 8.00 tsf
D_0 = 0.84852
D_{50} = 0.87000
D_{100} = 0.89147
T_{50} = 3.15 min.

C_v @ T_{50}
0.08 ft.2/day

C_α = 0.008



Load No.= 9
Load= 12.00 tsf
D_0 = 0.89931
D_{50} = 0.91129
D_{100} = 0.92328
T_{50} = 7.28 min.

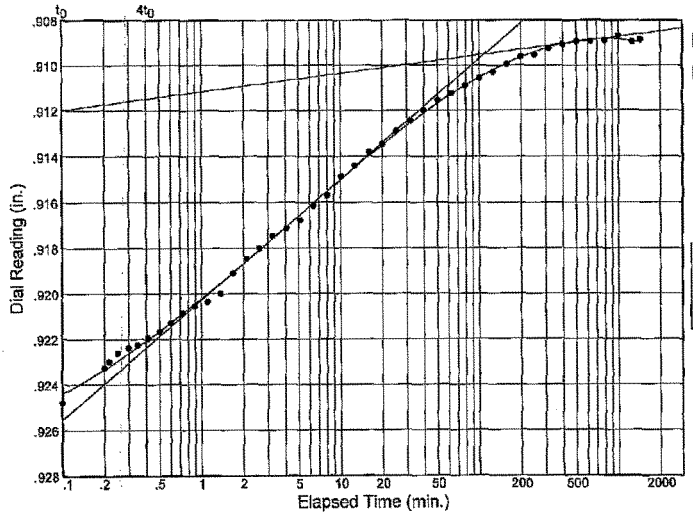
C_v @ T_{50}
0.03 ft.2/day

C_α = 0.004

Dial Reading vs. Time

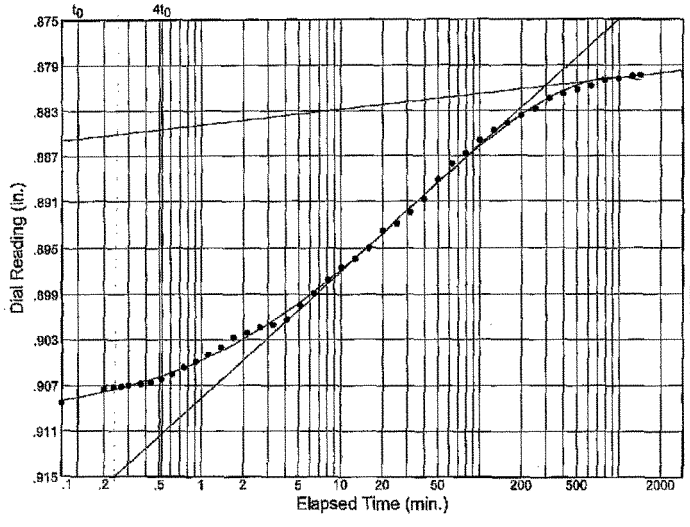
Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-31U Sample No.: 5B Elev./Depth: 16.8



Load No.= 10
Load= 3.00 tsf
D_0 = 0.92673
D_{50} = 0.91811
D_{100} = 0.90950
T_{50} = 2.59 min.

C_v @ T_{50}
0.09 ft.2/day



Load No.= 11
Load= 0.75 tsf
D_0 = 0.90993
D_{50} = 0.89539
D_{100} = 0.88085
T_{50} = 14.10 min.

C_v @ T_{50}
0.02 ft.2/day

FFEBJV, LLC

Figure

CONSOLIDATION TEST DATA

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Contract No. W912P8-07-D-0022
Task Order 135
Project Number: 07-022135

Sample Data

Source: MRGO-31U
Sample No.: 5B
Elev. or Depth: 16.8 Sample Length(in./cm.):
Location:
Description: SO GR CH3 W/ ARS SM, LNS & ARS ML, O
Liquid Limit: 63 Plasticity Index: 43
USCS: CH3 AASHTO: Figure No.:
Testing Remarks: Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST		AFTER TEST	
Wet w+t =	160.41 g.	Consolidometer # =	12	Wet w+t =	411.98 g.
Dry w+t =	100.00 g.			Dry w+t =	322.77 g.
Tare Wt. =	.00 g.	Spec. Gravity =	2.68	Tare Wt. =	113.30 g.
Height =	1.00 in.	Height =	1.00 in.		
Diameter =	4.00 in.	Diameter =	4.00 in.		
Weight =	340.22 g.	Defl. Table =	n/a		
Moisture =	60.4 %	Ht. Solids =	0.3849 in.	Moisture =	42.6 %
Wet Den. =	103.0 pcf	Dry Wt. =	212.24 g.*	Dry Wt. =	209.47 g.
Dry Den. =	64.2 pcf	Void Ratio =	1.607	Void Ratio =	0.877
		Saturation =	100.8 %		

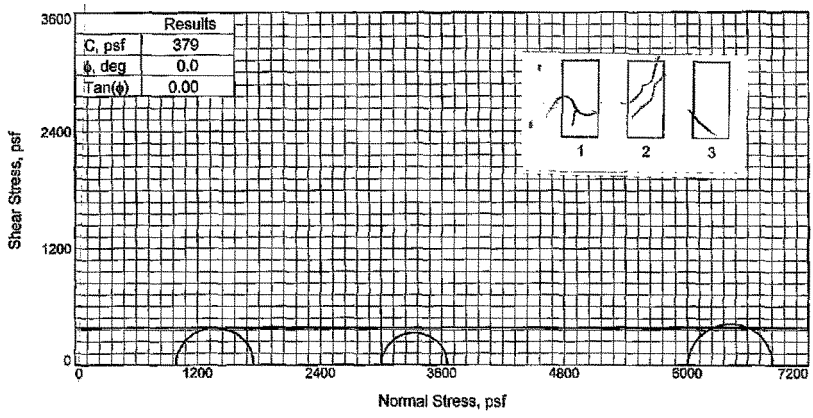
* Initial dry weight used in calculations

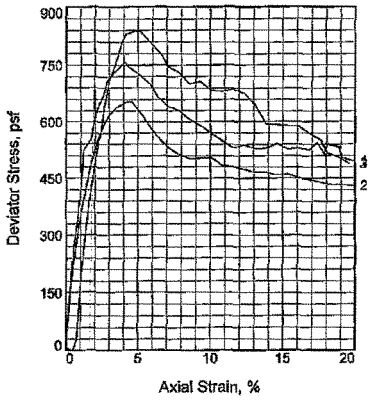
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.59915				1.607	
0.01	0.59923	0.00000			1.606	0.0 Comprs.
0.13	0.61279	0.00000	1.30	0.002	1.571	1.4 Comprs.
0.25	0.62070	0.00000	0.44	0.001	1.551	2.1 Comprs.
0.50	0.63803	0.00000	0.55	0.003	1.506	3.9 Comprs.
1.00	0.70380	0.00000	0.05	0.010	1.335	10.4 Comprs.
2.00	0.78518	0.00000	0.08	0.009	1.123	18.5 Comprs.
4.00	0.84773	0.00000	0.07	0.006	0.961	24.8 Comprs.
8.00	0.90005	0.00000	0.08	0.008	0.825	30.0 Comprs.

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
12.00	0.92705	0.00000	0.03	0.004	0.755	32.7 Comprs.
3.00	0.90886	0.00000	0.09		0.802	30.9 Comprs.
0.75	0.87991	0.00000	0.02		0.877	28.0 Comprs.

C_c = 0.71 P_c = 0.61 tsf C_r = 0.10





Sample No.		1	2	3
Initial	Water Content, %	67.6	68.3	68.8
	Dry Density, pcf	58.9	58.9	58.6
	Saturation, %	97.3	98.4	98.3
	Void Ratio	1.9051	1.9029	1.9169
	Diameter, in.	1.418	1.416	1.417
	Height, in.	3.111	3.106	3.102
At Test	Water Content, %	67.6	68.3	68.8
	Dry Density, pcf	58.9	58.9	58.6
	Saturation, %	97.3	98.4	98.3
	Void Ratio	1.9051	1.9029	1.9169
	Diameter, in.	1.418	1.416	1.417
	Height, in.	3.111	3.106	3.102
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.88	20.84	41.71
Fail. Stress, psf		757	654	840
Strain, %		4.1	4.6	5.1
Ult. Stress, psf		530	502	701
Strain, %				
σ_1 Failure, psf		1748	3655	6846
σ_3 Failure, psf		991	3001	6007

Type of Test: Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CH4

LL= 83 **PL=** 29 **PI=** 54
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

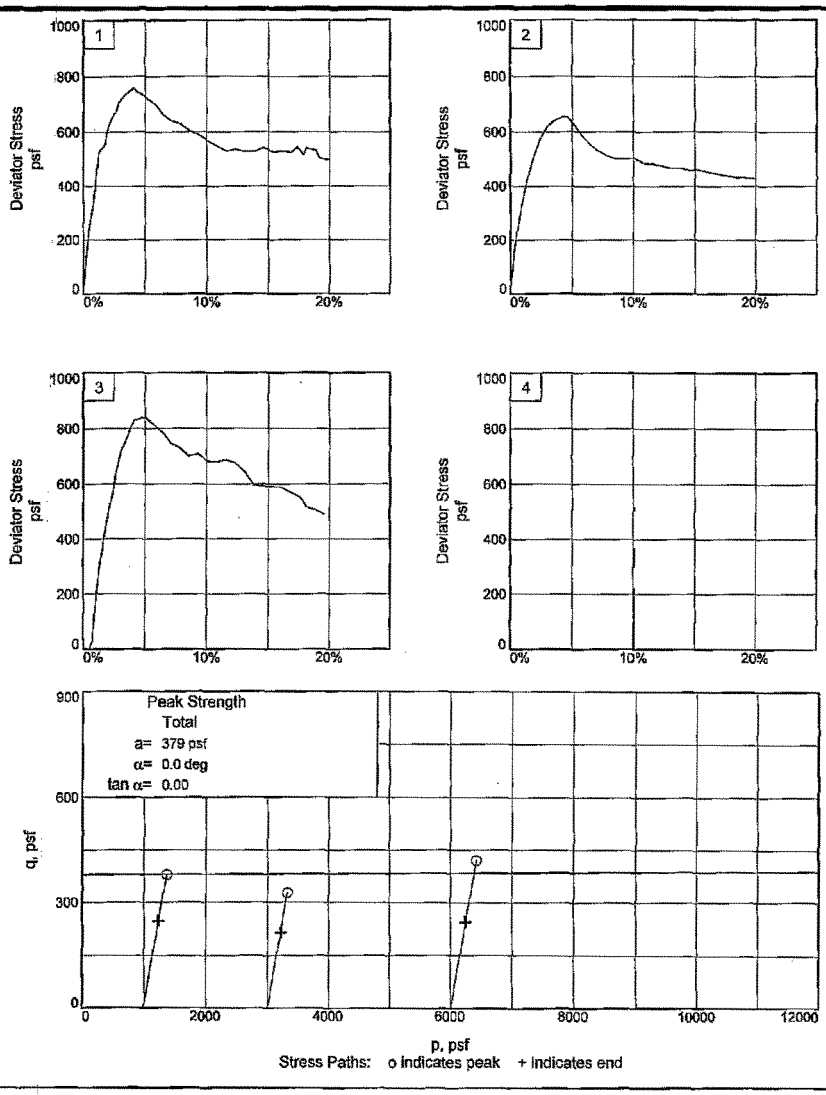
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-31U **Depth:** 20.8
Sample Number: 6B
Proj. No.: 07-022135 **Date Sampled:** 10/6/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

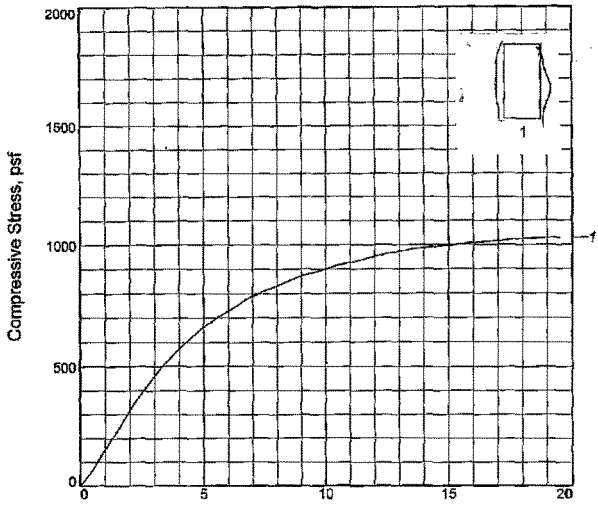
Tested By: VF/ARS **Checked By:** MS/WH



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-31U **Depth:** 20.8 **Sample Number:** 6B
Project No.: 07-022135 **Figure** _____ FFEBJV, LLC

Tested By: VF/ARS **Checked By:** MS/WH

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	998			
Undrained shear strength, psf	499			
Failure strain, %	15.0			
Strain rate, %/min.	1.00			
Water content, %	31.4			
Wet density, pcf	119.0			
Dry density, pcf	90.6			
Saturation, %	98.6			
Void ratio	0.8613			
Specimen diameter, in.	1.411			
Specimen height, in.	3.097			
Height/diameter ratio	2.19			

Description: SO GR CL6

LL = 40	PL = 19	PI = 21	**Assumed GS=** 2.70	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 10/6/09
Remarks:

Figure _____

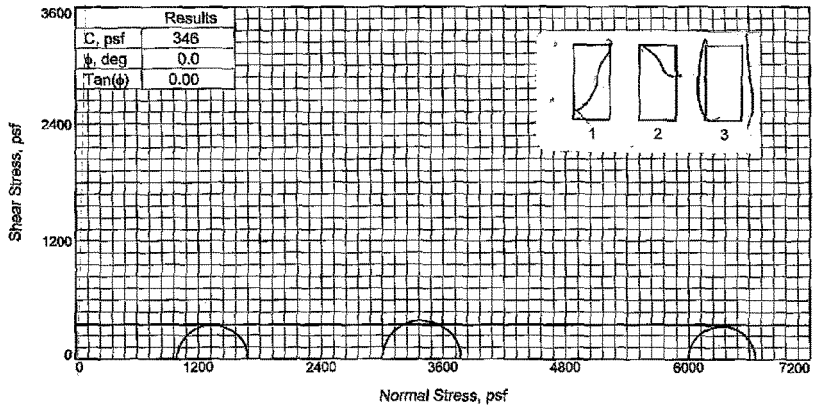
Client: U.S. Army Corps of Engineers

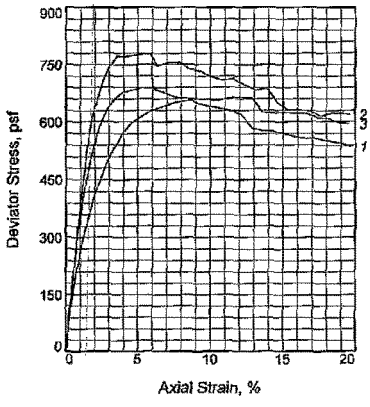
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-31U **Depth:** 25.7
Sample Number: 7C

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: VF/ARS **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	47.7	46.9	46.5
	Dry Density, pcf	73.8	74.2	74.6
	Saturation, %	100.4	99.6	99.7
	Void Ratio	1.2835	1.2720	1.2596
	Diameter, in.	1.406	1.413	1.414
	Height, in.	3.102	3.102	3.103
At Test	Water Content, %	47.7	46.9	46.5
	Dry Density, pcf	73.8	74.2	74.6
	Saturation, %	100.4	99.6	99.7
	Void Ratio	1.2835	1.2720	1.2596
	Diameter, in.	1.406	1.413	1.414
	Height, in.	3.102	3.102	3.103
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.89	20.81	41.63
Fail. Stress, psf		689	779	664
Strain, %		5.3	5.8	12.1
Ult. Stress, psf		569	747	623
Strain, %				
σ_1 Failure, psf		1680	3775	6659
σ_3 Failure, psf		991	2997	5995

Type of Test: Unconsolidated Undrained
Sample Type: C
Description: SO GR CH2 W/ LNS ML

LL= 51 PL= 24 PI= 27
Assumed Specific Gravity= 2.70
Remarks:

Figure _____

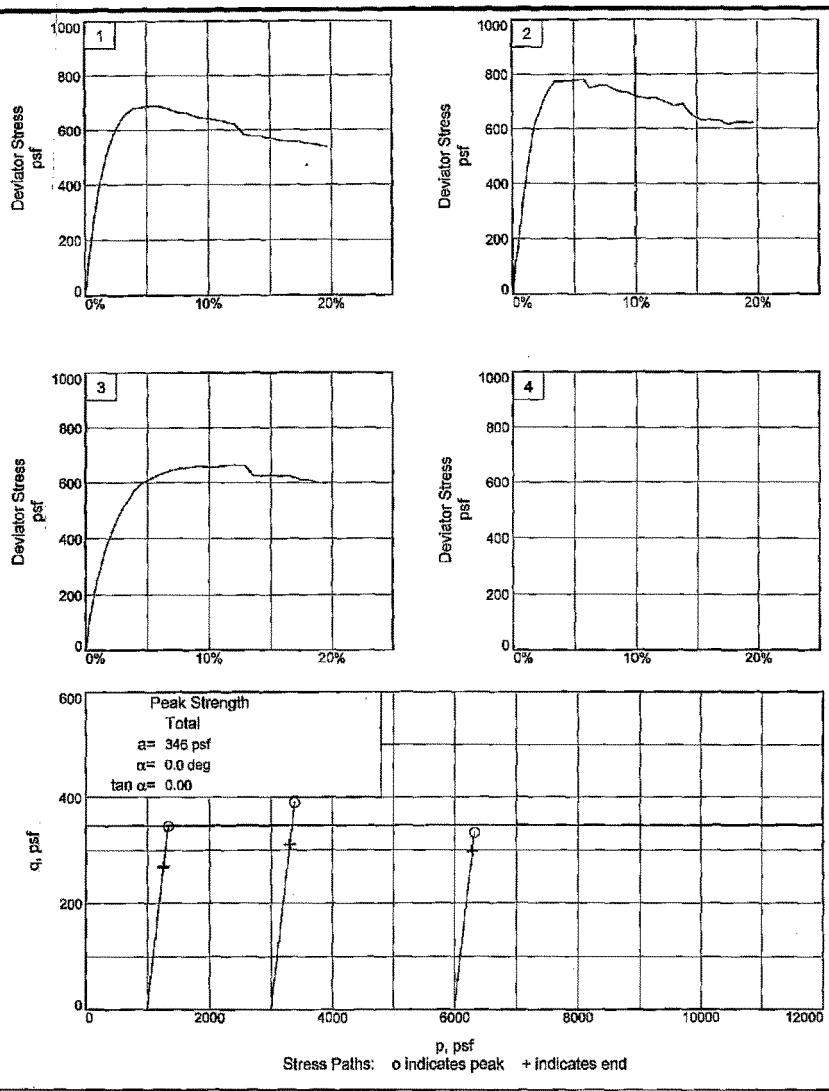
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-31U **Depth:** 29.7
Sample Number: 8C
Proj. No.: 07-022135 **Date Sampled:**

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

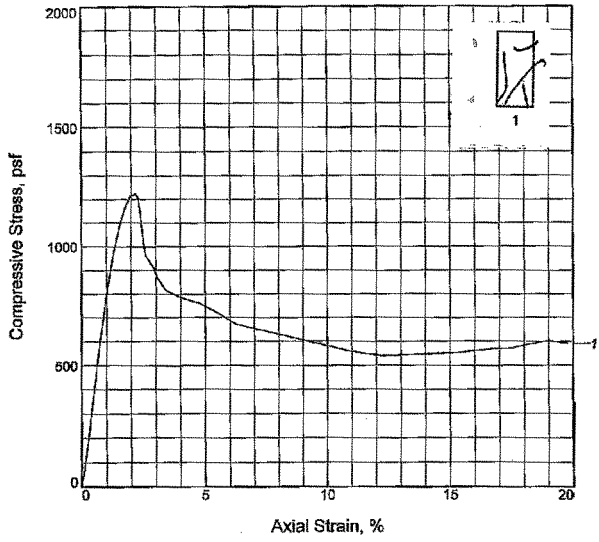
Checked By: MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-31U **Depth:** 29.7 **Sample Number:** 8C
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Checked By: MS

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	1222			
Undrained shear strength, psf	611			
Failure strain, %	2.2			
Strain rate, %/min.	1.00			
Water content, %	74.9			
Wet density, pcf	97.3			
Dry density, pcf	55.6			
Saturation, %	99.0			
Void ratio	2.0739			
Specimen diameter, in.	1.415			
Specimen height, in.	3.102			
Height/diameter ratio	2.19			

Description: M GR CH4 W/ LNS & LYS ML

LL = 83	PL = 26	PI = 57	Assumed GS= 2.74	Type: UNDISTURBED

Project No.: 07-022135
Date Sampled: 10/6/09
Remarks:

Figure _____

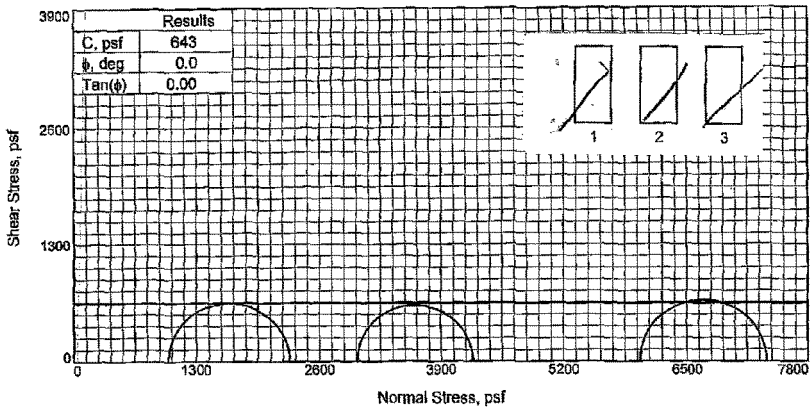
Client: U.S. Army Corps of Engineers

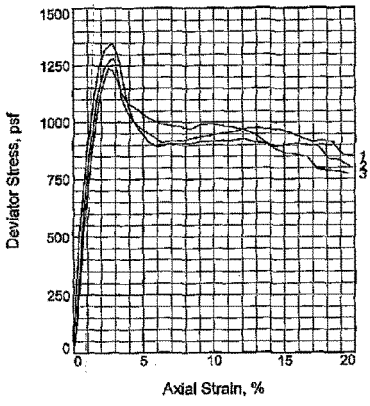
Project: USACE - MRGO Ecosystem Restoration Feasibility Study St.Bernard Parish, La
Source of Sample: MRGO-31U **Depth:** 36.8
Sample Number: 10B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: VF/ARS **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	56.3	56.9	57.1
	Dry Density, pcf	66.6	66.5	66.3
	Saturation, %	98.5	99.3	99.0
	Void Ratio	1.5677	1.5712	1.5806
	Diameter, in.	1.414	1.411	1.417
	Height, in.	3.108	3.108	3.104
At Test	Water Content, %	56.3	56.9	57.1
	Dry Density, pcf	66.6	66.5	66.3
	Saturation, %	98.5	99.3	99.0
	Void Ratio	1.5677	1.5712	1.5806
	Diameter, in.	1.414	1.411	1.417
	Height, in.	3.108	3.108	3.104
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.97	20.84	41.74
Fail. Stress, psf		1280	1237	1348
Strain, %		2.9	2.5	2.7
Ult. Stress, psf		910	968	890
Strain, %				
σ_1 Failure, psf		2283	4237	7358
σ_3 Failure, psf		1003	3001	6010

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: M GR CH4 W/ LNS ML

LL= 76 **PL=** 25 **PI=** 51
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

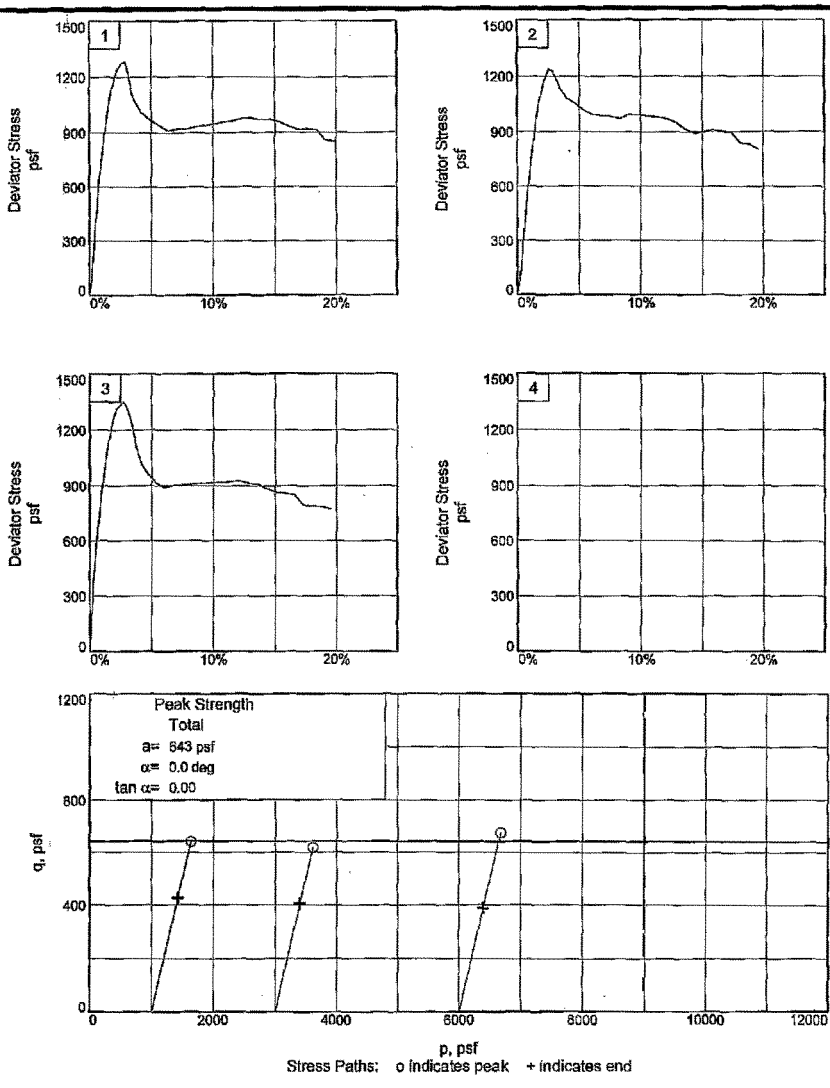
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-31U **Depth:** 40.8
Sample Number: 11B
Proj. No.: 07-022135 **Date Sampled:** 10/6/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

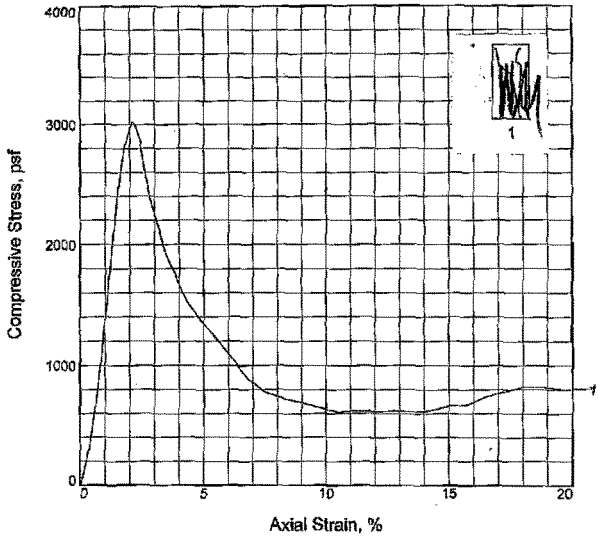
Tested By: VF/ARS **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-31U **Depth:** 40.8 **Sample Number:** 11B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: VF/ARS **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	3016			
Undrained shear strength, psf	1508			
Failure strain, %	2.1			
Strain rate, %/min.	1.00			
Water content, %	19.8			
Wet density, pcf	127.9			
Dry density, pcf	106.7			
Saturation, %	94.2			
Void ratio	0.5617			
Specimen diameter, in.	1.430			
Specimen height, in.	3.106			
Height/diameter ratio	2.17			

Description: ST LGR CL4 W/ ARS & LYS ML

LL = 32	PL = 14	PI = 18	**Assumed GS=** 2.67	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 10/6/09
Remarks:

Figure _____

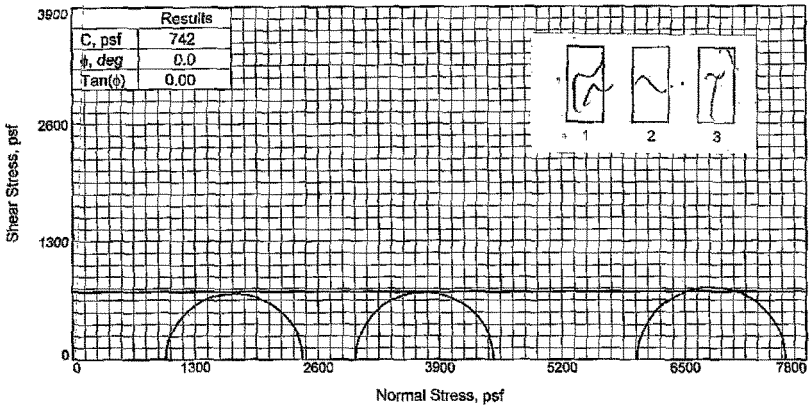
Client: U.S. Army Corps of Engineers

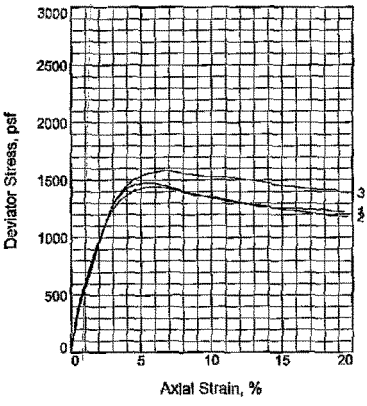
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-31U **Depth:** 45.7
Sample Number: 12C

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: VF/ARS **Checked By:** MS





Sample No.		1	2	3
Initial	Water Content, %	37.7	43.7	40.3
	Dry Density, pcf	82.1	75.7	78.9
	Saturation, %	96.5	96.1	95.6
	Void Ratio	1.0542	1.2274	1.1370
	Diameter, in.	1.416	1.419	1.414
	Height, in.	3.111	3.112	3.114
At Test	Water Content, %	37.7	43.7	40.3
	Dry Density, pcf	82.1	75.7	78.9
	Saturation, %	96.5	96.1	95.6
	Void Ratio	1.0542	1.2274	1.1370
	Diameter, in.	1.416	1.419	1.414
	Height, in.	3.111	3.112	3.114
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.88	20.82	41.64
Fail. Stress, psf		1444	1477	1583
Strain, %		6.1	5.3	6.8
Ult. Stress, psf		1261	1373	1499
Strain, %				
σ_1 Failure, psf		2434	4475	7578
σ_3 Failure, psf		990	2998	5996

Type of Test: Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: *M DGR CH2 W/ WD*

LL= 54 PL= 22 PI= 32
Assumed Specific Gravity= 2.70
Remarks:

Figure _____

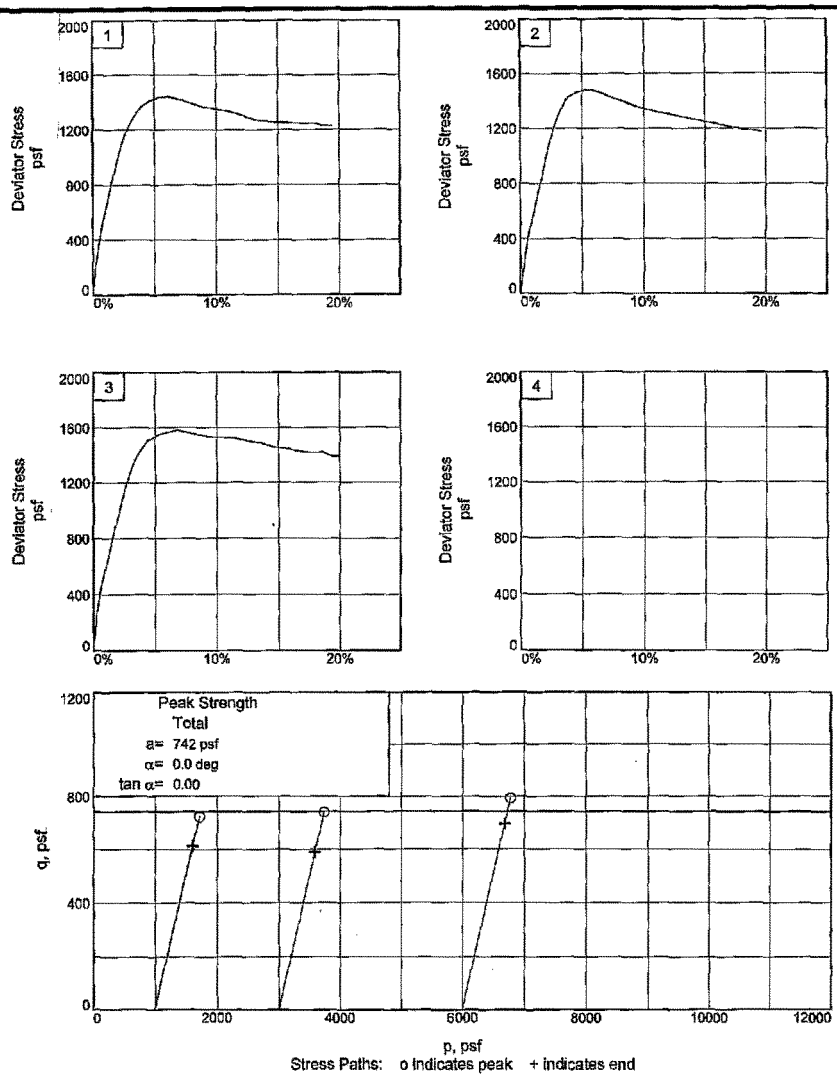
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-31U **Depth:** 53.7
Sample Number: 14C
Proj. No.: 07-022135 **Date Sampled:** 10/6/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

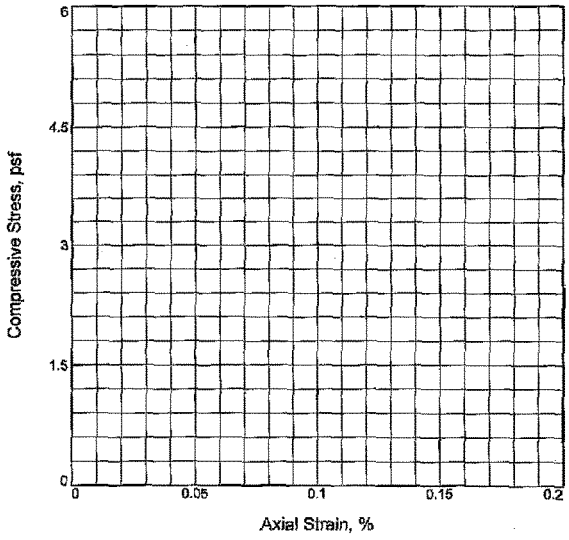
Tested By: VF/ARS **Checked By:** MS



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-31U **Depth:** 53.7 **Sample Number:** 14C
Project No.: 07-022135 **Figure** _____ FFEBJV, LLC

Tested By: VF/ARS **Checked By:** MS

UNCONFINED COMPRESSION TEST



Sample No.				
Unconfined strength, psf				
Undrained shear strength, psf				
Failure strain, %				
Strain rate, %/min.				
Water content, %				
Wet density, pcf				
Dry density, pcf				
Saturation, %				
Void ratio				
Specimen diameter, in.				
Specimen height, in.				
Height/diameter ratio				

Description: ST GR CL4 W/ O, WD

LL = 34	PL = 18	PI = 16	Assumed GS=	Type: UNDISTURBED

Project No.: 07-022135
Date Sampled:

Remarks:
JAR SAMPLE, NOT TESTABLE. NO ALTERNATE SAMPLE.

Figure _____

Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-31U **Depth:** 56.8
Sample Number: 15B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Checked By: WH

SUMMARY OF LABORATORY TEST RESULTS

Project: MRGO Ecosystem Restoration Feasibility Study Assigned By: _____

Project Number: 07-022135 Current Date: 12/3/2009
Boring: MRGO-32U

Sample Number	Depth	Visual Classification	USCS	E(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
1A	0.0	VSO DGR CH3 W/ LNS ML, O, RT	CH3		82												
1B	0.8	VSO DGR CH3 W/ LNS ML, RT	CH3		75												
1C	1.7	VSO DGR CH3 W/ LNS ML, RT	CH3		91												
1D	2.6	VSO DGR CH3 W/ LNS ML	CH3		85												
2A	4.0	VSO DGR CH3	CH3		76												
2B	4.8	VSO DGR CH4 W/ ARS SM, WD, RT, O	CH4	4	86	50	93	98	UC	-	157	314	81	29	52	0.70	
2C	5.7	VSO DGR CH3	CH3		82												
2D	6.6	VSO DGR CHOA W/ WD	CHOA		116												
3A	8.0	VSO DGR CHOA	CHOA		120												
3B	8.8	VSO DGR CHOA W/ ARS SM, WD, RT	CHOA		94	47	92	100	UU	0	168		117	28	89	0.11	
3C	9.7	SO DGR CH4 W/ ARS & LNS ML, WD, RT	CH4		94	47	91	99					88	26	62		Gs, CON
4A	12.0	VSO GR CH4 W/ LNS SM	CH4		106												
4B	12.8	VSO GR CHOA W/ LNS & LYS SM, WD, RT	CHOA	9	106	43	88	98	UC	-	215	431	123	30	93	0.11	
4C	13.7	VSO GR CH4 W/ LNS & LYS SM, O	CH4		75												
4D	14.6	VSO GR CH4 W/ LNS & LYS SM, O	CH4		68												
5A	16.0	VSO GR CH4 W/ LNS & LYS SM	CH4		80												
5B	16.8	VSO GR CH4 W/ LNS & LYS SM, WD	CH4		78												
5C	17.7	VSO GR CL4 W/ LNS & LYS ML, WD	CL4		52	68	103	95					36	18	18		Gs, CON
5D	18.6	SO GR CL6 W/ LNS & LYS SM	CL6		55												
6A	20.0	SO GR CH3 W/ LNS & LYS SM	CH3		59												
6B	20.8	SO GR CL6 W/ LNS & LYS ML, ARS SP	CL6		46	75	109	100	UU	0	254		44	21	23	0.20	
6C	21.7	SO GR CH2 W/ LNS & LYS SM	CH2		52												
6D	22.6	SO GR CH3 W/ LNS & LYS SM	CH3		50												
7A	24.0	SO GR CHOB W/ LNS ML	CHOB		164												
7B	24.8	VSO GR CH2 W/ LNS ML	CH2	6	53	69	106	100	UC	-	239	478	53	23	30	0.20	
7C	25.7	SO GR CH4 W/ LNS ML	CH4		56												
7D	26.6	SO GR CH4 W/ LNS ML	CH4		65												
8A	28.0	SO GR CH4	CH4		67												
8B	28.8	SO GR CH4 W/ ARS ML	CH4		69	60	101	100	UU	0	339		82	25	57	0.20	
8C	29.7	SO GR CH4	CH4		64												
9A	32.0	M GR CH4 W/ LNS ML	CH4		51												
9B	32.8	SO GR CH3 W/ LNS ML	CH3	5	50	73	109	100	UC	-	363	726	62	21	41	0.24	
9C	33.7	M GR CH4 W/ LNS ML	CH4		50												
10A	36.0	SO GR CH4 W/ LNS ML	CH4		68												
10B	36.8	SO GR CH4 W/ LNS ML	CH4		72												
10C	37.7	SO GR CH4 W/ ARS ML	CH4		72	57	99	100	UU	0	356		90	28	62	0.26	
11A	40.0	SO GR CH4	CH4		69												

Remarks: _____
FFEB JV, LLC

Checked By: MKA/WM
File Name: MRGO-32U.xls

SUMMARY OF LABORATORY TEST RESULTS

Project: MRGO Ecosystem Restoration Feasibility Study Assigned By: _____

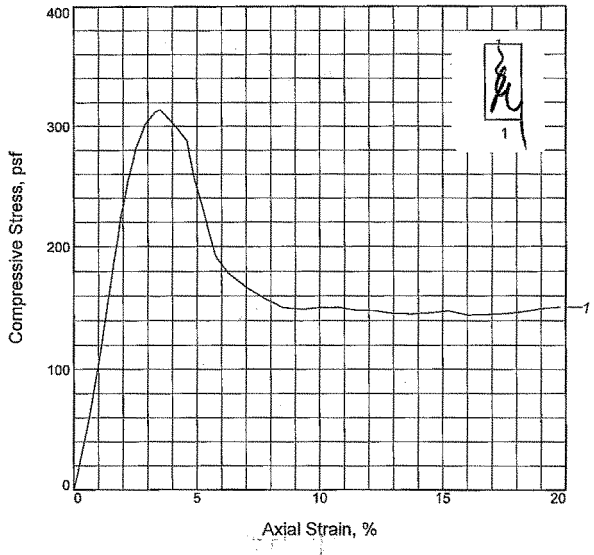
Project Number: 07-022135 Current Date: 12/3/2009
Boring: MRGO-32U

Sample Number	Depth	Visual Classification	USCS	E(f)	W%	Dry Dens (pcf)	Wet Dens (pcf)	Sat %	Shear Test Type	Angle	Cohesion (psf)	Unconf. Comp. Str.	LL	PL	PI	Torvane (tsf)	Other Tests
11B	40.8	SO GR CH4	CH4		66												
11C	41.7	SO GR CH3 W/ LNS & ARS SP	CH3		56												
11D	42.6	GR SP	SP		24												
12A	44.0	GR SP W/ LNS CH	SP		29												
12B	44.8	ST LGR CL4	CL4		18												
12C	45.7	ST LGR CL4	CL4		19												
12D	46.6	ST LGR CL4	CL4		21												
13A	48.0	LGR ML	ML	8	22	107	130	100	UC	-	647	1295	26	18	8	0.45	
13	50.0	GR ML	ML		21												
14A	52.0	LGR SP	SP		4												
14B	52.8	LGR SP	SP		6												
14C	53.7	LGR SP	SP		7												
15A	56.0	GR SP	SP		31												
15	58.0	GR SP	SP		33												

Remarks: _____
FFEB JV, LLC

Checked By: MKM
File Name: MRGO-32U.xls

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	314			
Undrained shear strength, psf	157			
Failure strain, %	3.5			
Strain rate, %/min.	1.00			
Water content, %	85.6			
Wet density, pcf	93.4			
Dry density, pcf	50.3			
Saturation, %	97.8			
Void ratio	2.3983			
Specimen diameter, in.	1.406			
Specimen height, in.	3.088			
Height/diameter ratio	2.20			

Description: VSO DGR CH4 W/ ARS SM, WD, RT, O

LL = 81	**PL** = 29	**PI** = 52	**Assumed GS=** 2.74	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 10/6/09
Remarks:

Figure _____

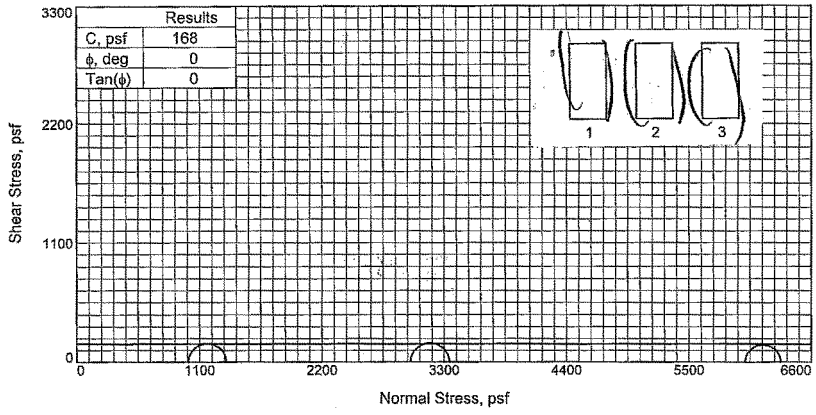
Client: U.S. Army Corps of Engineers

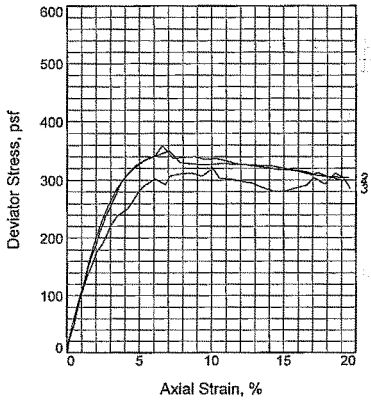
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-32U **Depth:** 4.8
Sample Number: 2B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: JC/ARS **Checked By:** MKA





Sample No.		1	2	3
Initial	Water Content, %	95.0	95.4	92.9
	Dry Density, pcf	47.4	46.8	47.1
	Saturation, %	101.9	100.5	98.7
	Void Ratio	2.4226	2.4685	2.4476
	Diameter, in.	1.400	1.396	1.404
	Height, in.	3.089	3.100	3.087
At Test	Water Content, %	95.0	95.4	92.9
	Dry Density, pcf	47.4	46.8	47.1
	Saturation, %	101.9	100.5	98.7
	Void Ratio	2.4226	2.4685	2.4476
	Diameter, in.	1.400	1.396	1.404
	Height, in.	3.089	3.100	3.087
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.94	20.81	41.71
Fail. Stress, psf		340	350	320
Strain, %		8.8	7.1	10.1
Ult. Stress, psf		321	327	280
Strain, %				
σ_1 Failure, psf		1340	3347	6326
σ_3 Failure, psf		999	2997	6006

Type of Test: Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: VSO DGR CHOA W/ ARS SM, WD, RT
LL= 117 **PL=** 28 **PI=** 89
Assumed Specific Gravity= 2.60
Remarks:

Figure _____

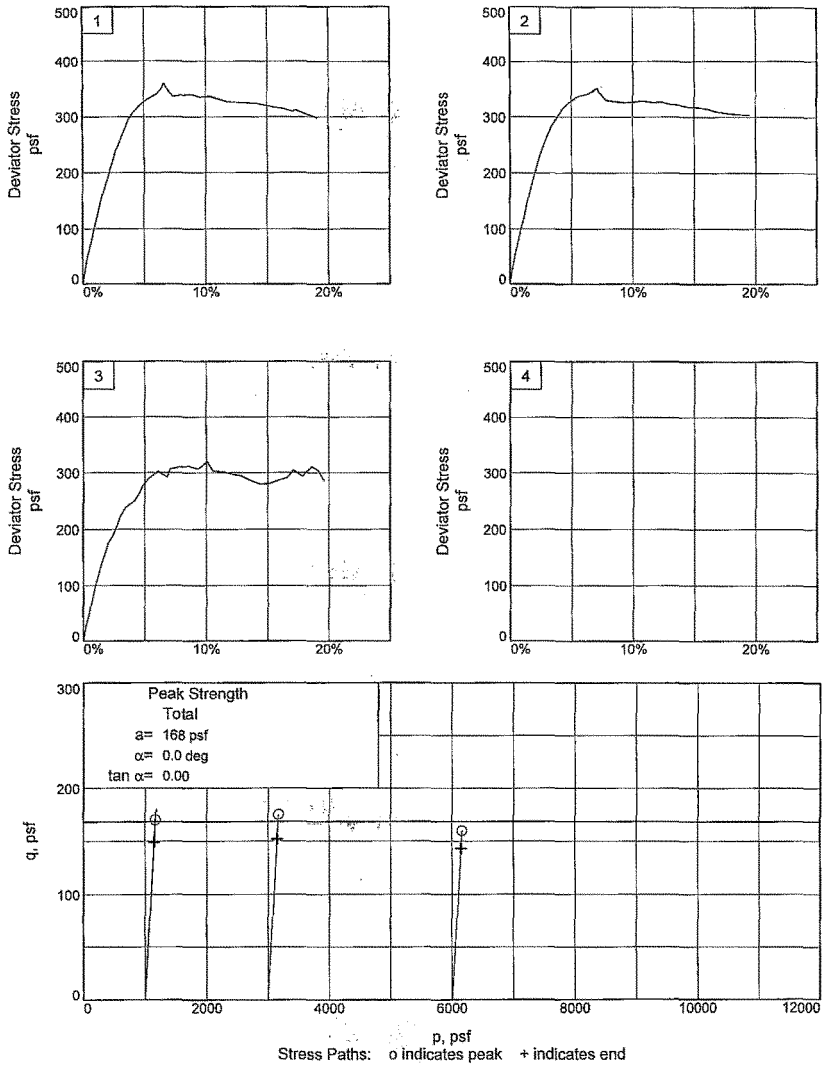
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-32U **Depth:** 8.8
Sample Number: 3B
Proj. No.: 07-022135 **Date Sampled:** 10/6/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

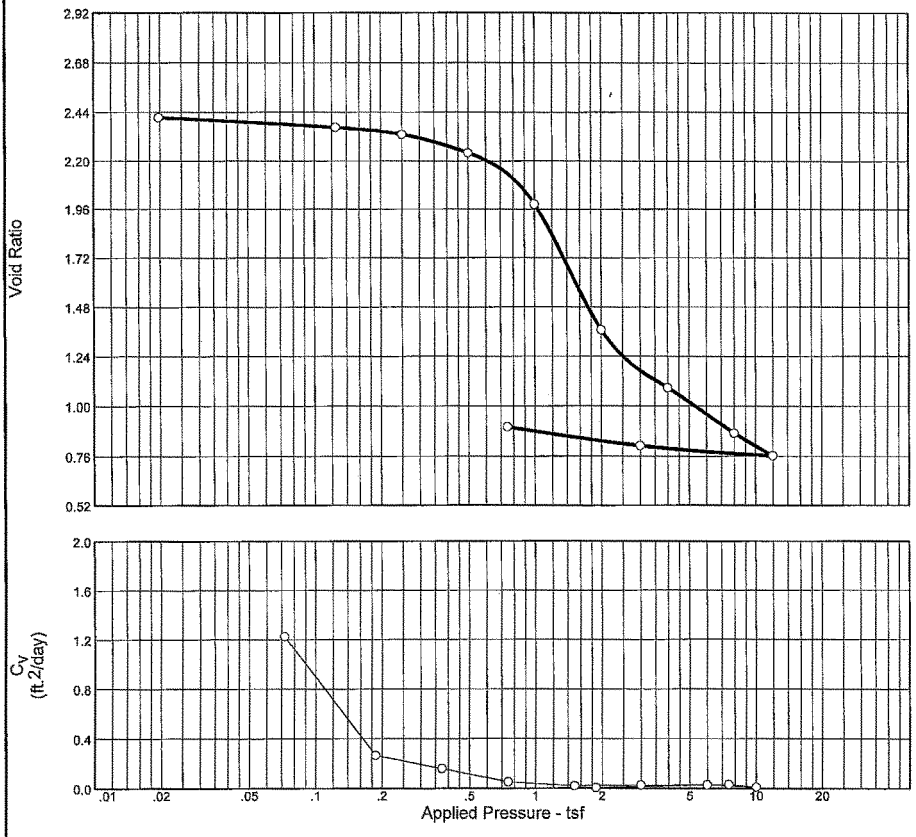
Tested By: JC/ARS **Checked By:** MKA



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-32U **Depth:** 8.8 **Sample Number:** 3B
Project No.: 07-022135 **Figure** _____ FFEBJV, LLC

Tested By: JC/ARS **Checked By:** MKA

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
99.4 %	93.8 %	46.8	88	62	2.56	0.92	2.12	2.417

MATERIAL DESCRIPTION	USCS	AASHTO
SO DGR CH4 W/ ARS & LNS ML, WD, RT	CH4	

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

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

Source: MRGO-32U **Sample No.:** 3C **Elev./Depth:** 9.7

FFEBJV, LLC

St Rose, LA

Remarks:

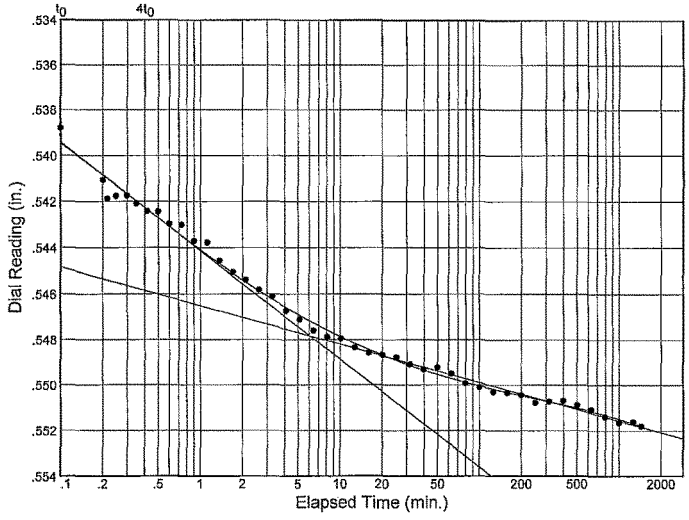
Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

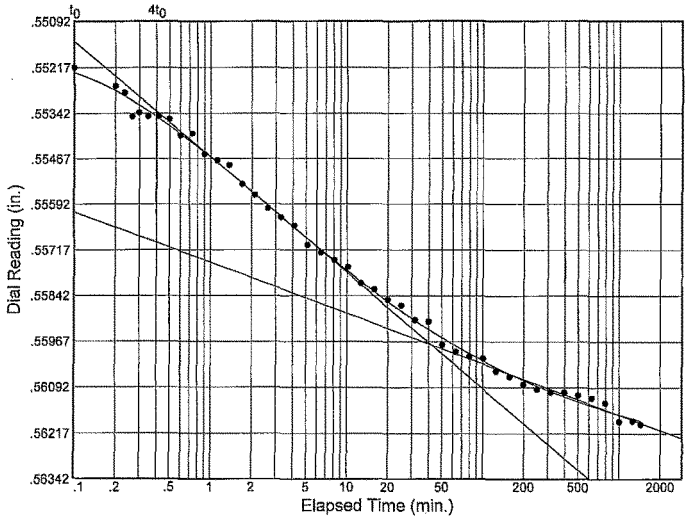
Source: MRGO-32U Sample No.: 3C Elev./Depth: 9.7



Load No.= 2
Load= 0.13 tsf
D_0 = 0.53668
D_{50} = 0.54226
D_{100} = 0.54783
T_{50} = 0.40 min.

C_v @ T_{50}
1.23 ft.2/day

C_α = 0.002



Load No.= 3
Load= 0.25 tsf
D_0 = 0.55111
D_{50} = 0.55543
D_{100} = 0.55975
T_{50} = 1.80 min.

C_v @ T_{50}
0.26 ft.2/day

C_α = 0.001

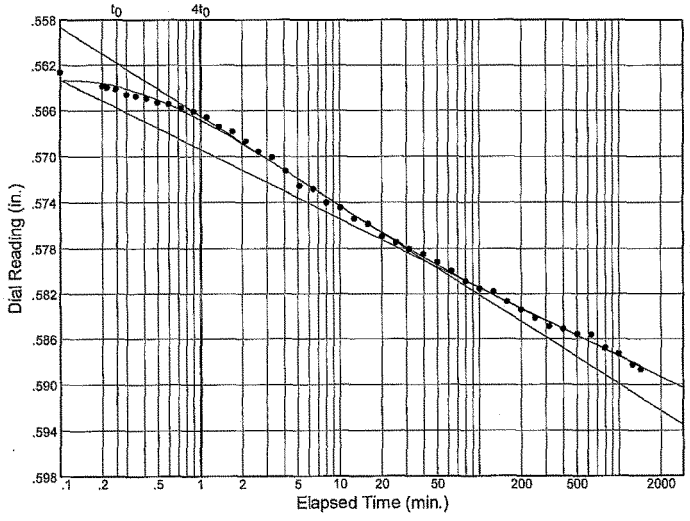
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

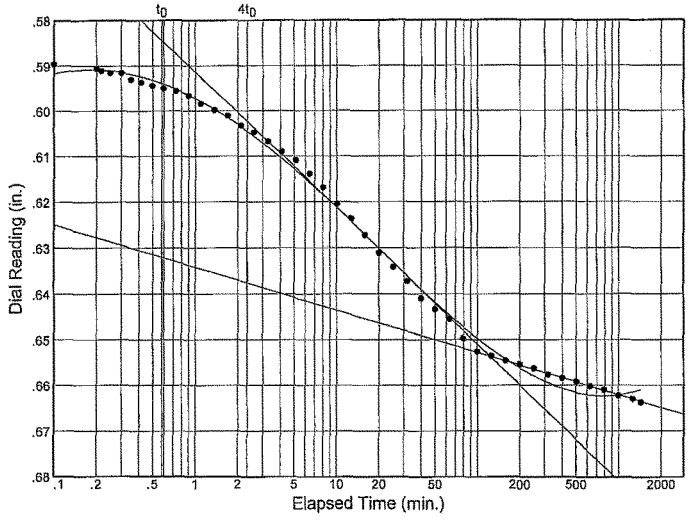
Source: MRGO-32U Sample No.: 3C Elev./Depth: 9.7



Load No.= 4
Load= 0.50 tsf
D_0 = 0.56089
D_{50} = 0.57006
D_{100} = 0.57924
T_{50} = 2.87 min.

C_v @ T_{50}
0.16 ft.2/day

C_α = 0.006



Load No.= 5
Load= 1.00 tsf
D_0 = 0.58327
D_{50} = 0.61842
D_{100} = 0.65358
T_{50} = 7.95 min.

C_v @ T_{50}
0.05 ft.2/day

C_α = 0.010

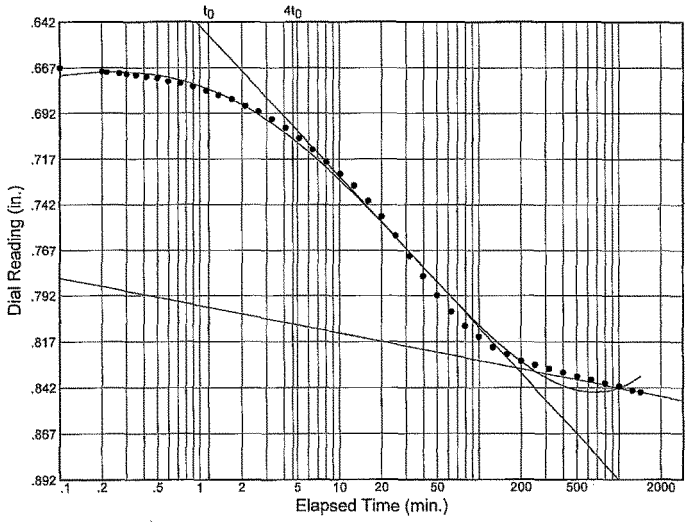
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

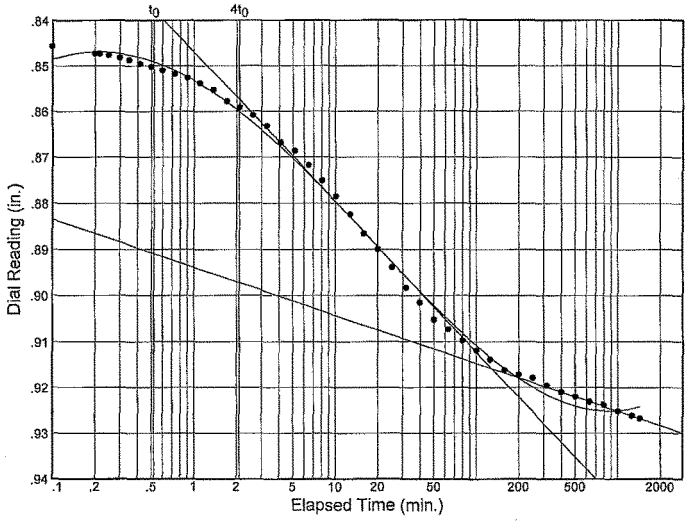
Source: MRGO-32U Sample No.: 3C Elev./Depth: 9.7



Load No.= 6
Load= 2.00 tsf
D_0 = 0.65145
D_{50} = 0.74129
D_{100} = 0.83114
T_{50} = 14.79 min.

C_v @ T_{50}
0.02 ft.^{2}/day

C_α = 0.017



Load No.= 7
Load= 4.00 tsf
D_0 = 0.83818
D_{50} = 0.87703
D_{100} = 0.91588
T_{50} = 8.25 min.

C_v @ T_{50}
0.03 ft.^{2}/day

C_α = 0.015

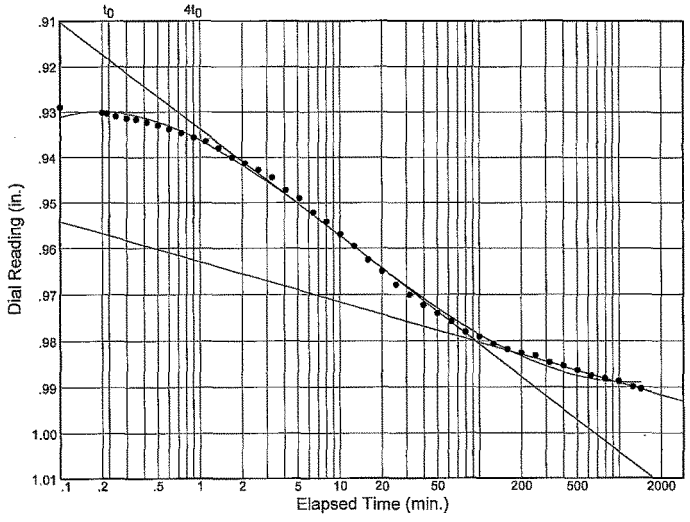
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

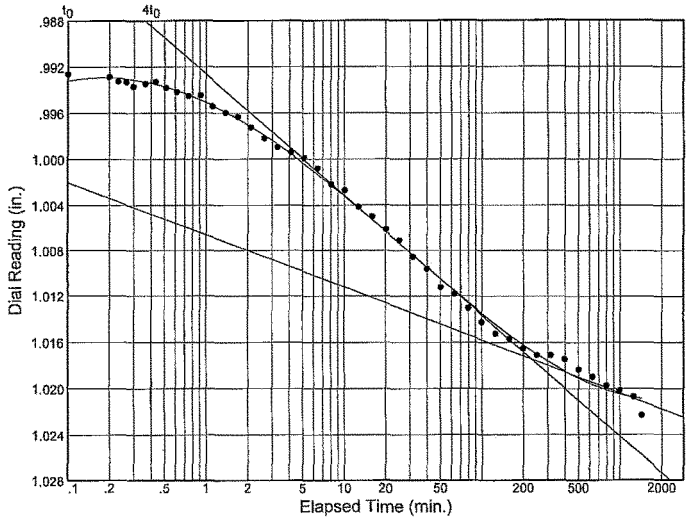
Source: MRGO-32U Sample No.: 3C Elev./Depth: 9.7



Load No.= 8
Load= 8.00 tsf
D_0 = 0.92447
D_{50} = 0.95227
D_{100} = 0.98007
T_{50} = 6.13 min.

C_v @ T_{50}
0.03 ft.2/day

C_α = 0.014



Load No.= 9
Load= 12.00 tsf
D_0 = 0.99304
D_{50} = 1.00524
D_{100} = 1.01743
T_{50} = 15.77 min.

C_v @ T_{50}
0.01 ft.2/day

C_α = 0.008

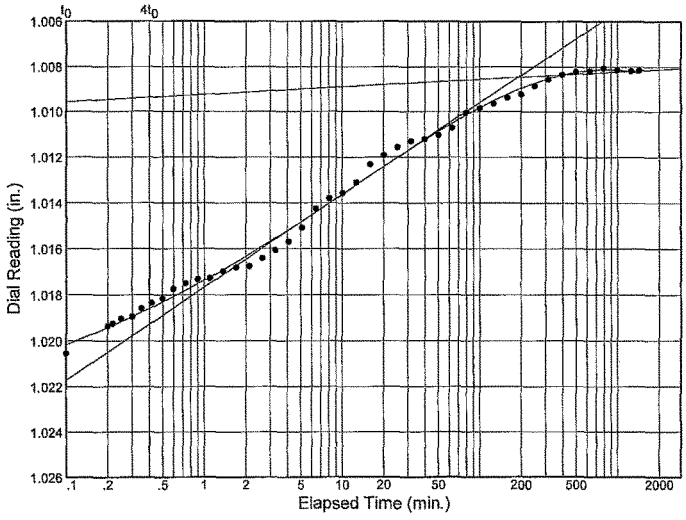
FFEBJV, LLC

Figure

Dial Reading vs. Time

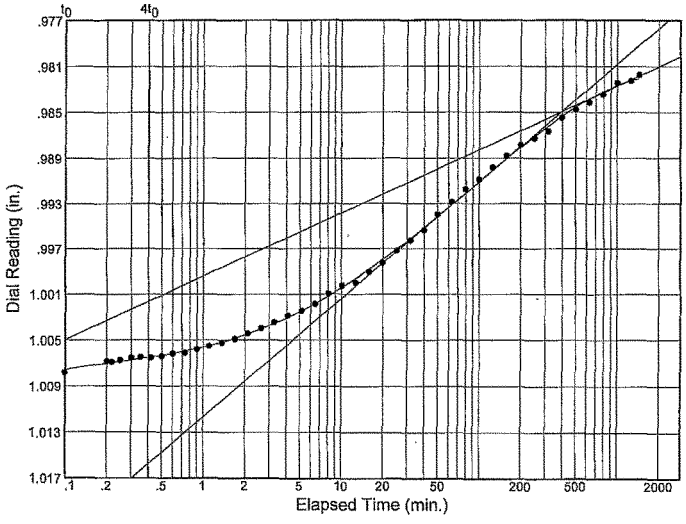
Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-32U Sample No.: 3C Elev./Depth: 9.7



Load No.= 10
Load= 3.00 tsf
D_0 = 1.02174
D_{50} = 1.01510
D_{100} = 1.00845
T_{50} = 4.29 min.

C_v @ T_{50}
0.03 ft.^{2}/day



Load No.= 11
Load= 0.75 tsf
D_0 = 1.00869
D_{50} = 0.99681
D_{100} = 0.98492
T_{50} = 27.02 min.

C_v @ T_{50}
0.01 ft.^{2}/day

FFEBJV, LLC

Figure

CONSOLIDATION TEST DATA

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Contract No. W912P8-07-D-0022
Task Order 135
Project Number: 07-022135

Sample Data

Source: MRGO-32U
Sample No.: 3C
Elev. or Depth: 9.7 Sample Length(in./cm.):
Location:
Description: SO DGR CH4 W/ ARS & LNS ML, WD, RT
Liquid Limit: 88 Plasticity Index: 62
USCS: CH4 AASHTO: Figure No.:
Testing Remarks: Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST	AFTER TEST	
Wet w+t	= 193.83 g.	Consolidometer # = 2	Wet w+t	= 336.94 g.
Dry w+t	= 100.00 g.		Dry w+t	= 267.33 g.
Tare Wt.	= .00 g.	Spec. Gravity = 2.56	Tare Wt.	= 112.12 g.
Height	= 1.00 in.	Height = 1.00 in.		
Diameter	= 4.00 in.	Diameter = 4.00 in.		
Weight	= 299.55 g.	Defl. Table = n/a		
Moisture	= 93.8 %	Ht. Solids = 0.2933 in.	Moisture	= 44.8 %
Wet Den.	= 90.7 pcf	Dry Wt. = 154.53 g.*	Dry Wt.	= 155.21 g.
Dry Den.	= 46.8 pcf	Void Ratio = 2.417	Void Ratio	= 0.900
		Saturation = 99.4 %		

* Initial dry weight used in calculations

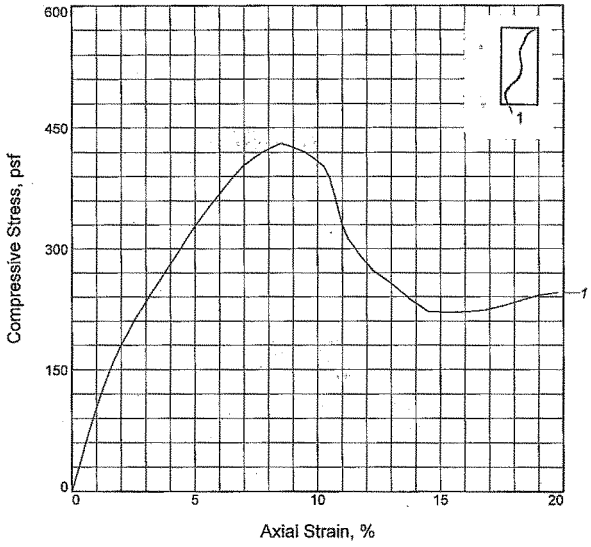
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.53691				2.417	
0.02	0.53763	0.00000			2.415	0.1 Comprs.
0.13	0.55181	0.00000	1.23	0.002	2.366	1.5 Comprs.
0.25	0.56192	0.00000	0.26	0.001	2.332	2.5 Comprs.
0.50	0.58869	0.00000	0.16	0.006	2.240	5.2 Comprs.
1.00	0.66373	0.00000	0.05	0.010	1.985	12.7 Comprs.
2.00	0.84449	0.00000	0.02	0.017	1.368	30.7 Comprs.
4.00	0.92683	0.00000	0.03	0.015	1.087	38.9 Comprs.
8.00	0.99042	0.00000	0.03	0.014	0.871	45.3 Comprs.

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
12.00	1.02232	0.00000	0.01	0.008	0.762	48.4 Comprs.
3.00	1.00815	0.00000	0.03		0.810	47.0 Comprs.
0.75	0.98173	0.00000	0.01		0.900	44.4 Comprs.

C_c = 2.12 P_c = 0.92 tsf C_r = 0.11

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	431			
Undrained shear strength, psf	215			
Failure strain, %	8.5			
Strain rate, %/min.	1.00			
Water content, %	105.9			
Wet density, pcf	87.6			
Dry density, pcf	42.6			
Saturation, %	97.8			
Void ratio	2.8130			
Specimen diameter, in.	1.412			
Specimen height, in.	3.108			
Height/diameter ratio	2.20			

Description: VSO GR CHOA W/ LNS & LYS SM, WD, RT

LL = 123	**PL** = 30	**PI** = 93	**Assumed GS=** 2.60	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 10/6/09
Remarks:

Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-32U **Depth:** 12.8
Sample Number: 4B

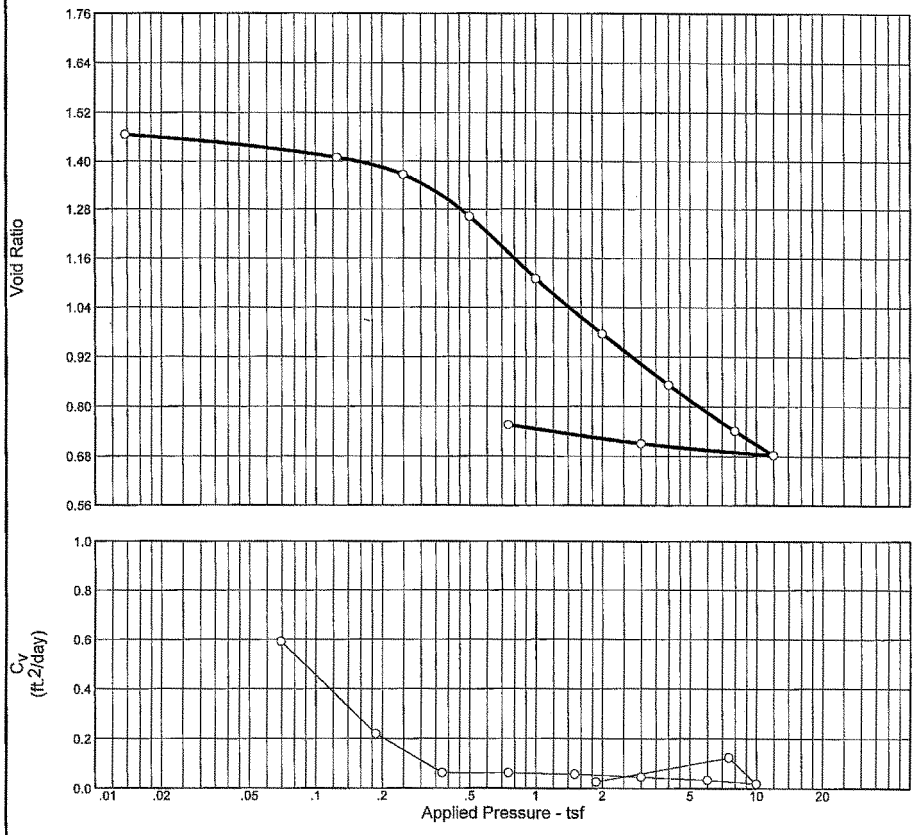
UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Figure _____

Tested By: JC **Checked By:** JAC/MKA

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
95.4 %	52.1 %	67.9	36	18	2.68	0.33	0.51	1.465

MATERIAL DESCRIPTION	USCS	AASHTO
VSO GR CL4 W/ LNS & LYS ML, WD	CL4	

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

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

Source: MRGO-32U **Sample No.:** 5C **Elev./Depth:** 17.7

FFEBJV, LLC

St Rose, LA

Remarks:

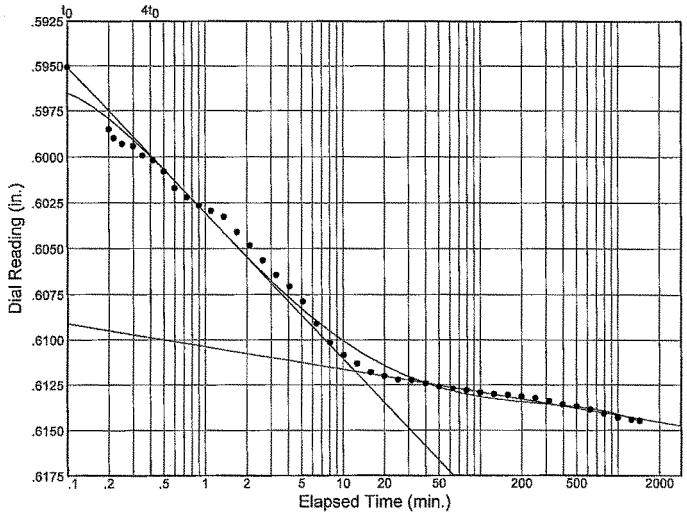
Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

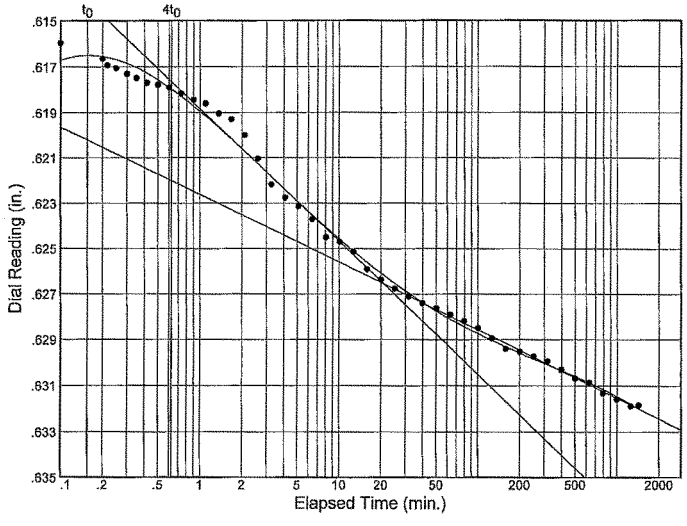
Source: MRGO-32U Sample No.: 5C Elev./Depth: 17.7



Load No.= 2
Load= 0.13 tsf
D_0 = 0.59304
D_{50} = 0.60239
D_{100} = 0.61175
T_{50} = 0.82 min.

C_v @ T_{50}
0.59 ft.2/day

C_α = 0.001



Load No.= 3
Load= 0.25 tsf
D_0 = 0.61502
D_{50} = 0.62078
D_{100} = 0.62654
T_{50} = 2.14 min.

C_v @ T_{50}
0.22 ft.2/day

C_α = 0.003

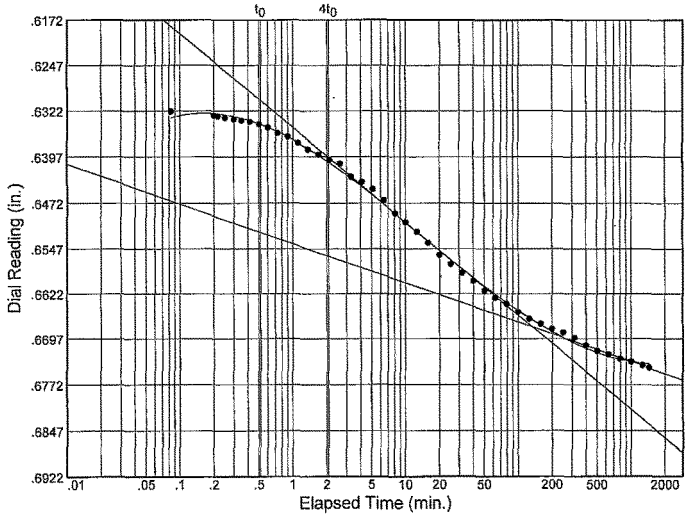
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

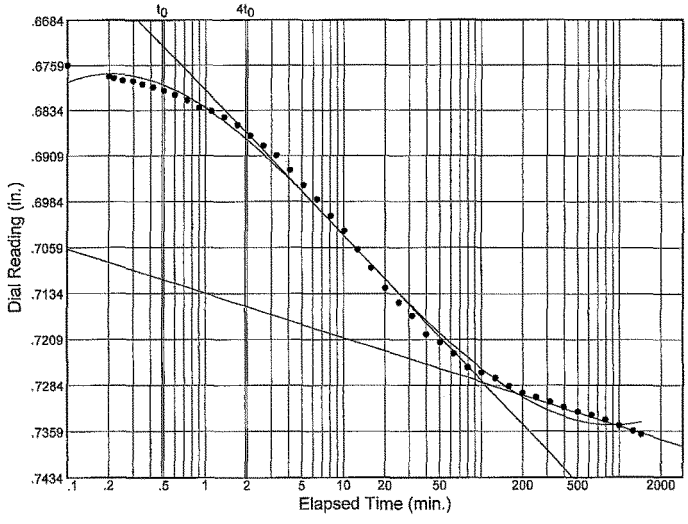
Source: MRGO-32U Sample No.: 5C Elev./Depth: 17.7



Load No.= 4
Load= 0.50 tsf
D_0 = 0.62829
D_{50} = 0.64799
D_{100} = 0.66769
T_{50} = 6.99 min.

C_v @ T_{50}
0.06 ft.2/day

C_α = 0.007



Load No.= 5
Load= 1.00 tsf
D_0 = 0.67016
D_{50} = 0.69904
D_{100} = 0.72793
T_{50} = 6.24 min.

C_v @ T_{50}
0.06 ft.2/day

C_α = 0.008

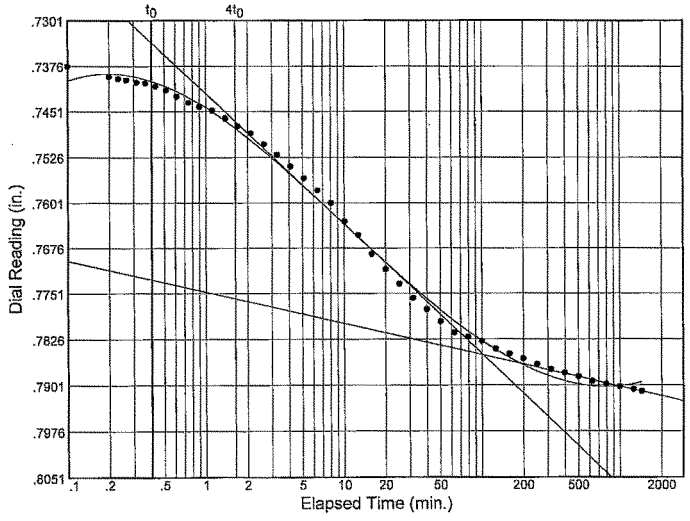
FFEBJV, LLC

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

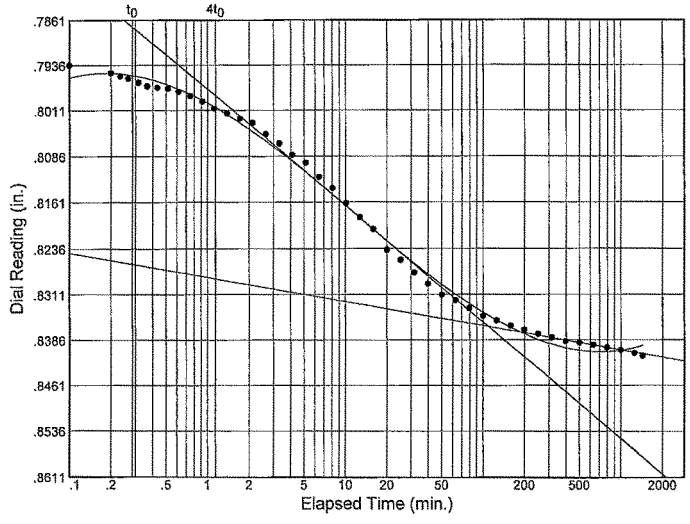
Source: MRGO-32U Sample No.: 5C Elev./Depth: 17.7



Load No.= 6
Load= 2.00 tsf
D_0 = 0.73244
D_{50} = 0.75882
D_{100} = 0.78520
T_{50} = 5.97 min.

C_v @ T_{50}
0.06 ft.^{2}/day

C_α = 0.006



Load No.= 7
Load= 4.00 tsf
D_0 = 0.78994
D_{50} = 0.81318
D_{100} = 0.83642
T_{50} = 6.56 min.

C_v @ T_{50}
0.05 ft.^{2}/day

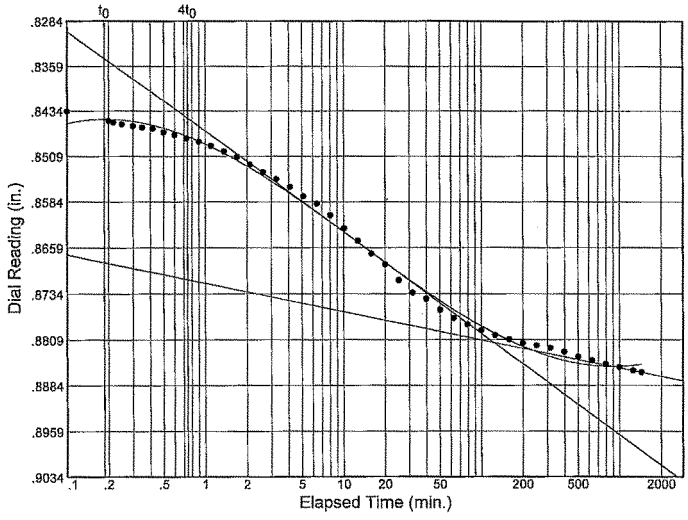
C_α = 0.005

Figure

Dial Reading vs. Time

Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

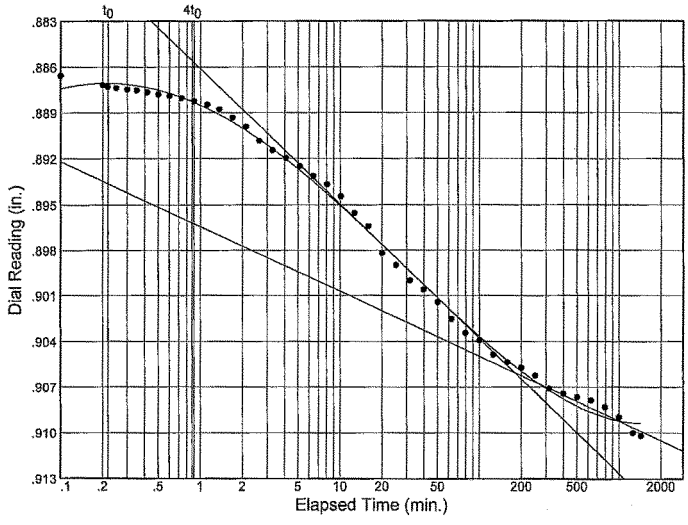
Source: MRGO-32U Sample No.: 5C Elev./Depth: 17.7



Load No.= 8
Load= 8.00 tsf
D_0 = 0.84186
D_{50} = 0.86160
D_{100} = 0.88134
T_{50} = 7.88 min.

C_v @ T_{50}
0.03 ft.2/day

C_α = 0.006



Load No.= 9
Load= 12.00 tsf
D_0 = 0.88581
D_{50} = 0.89592
D_{100} = 0.90604
T_{50} = 12.70 min.

C_v @ T_{50}
0.02 ft.2/day

C_α = 0.006

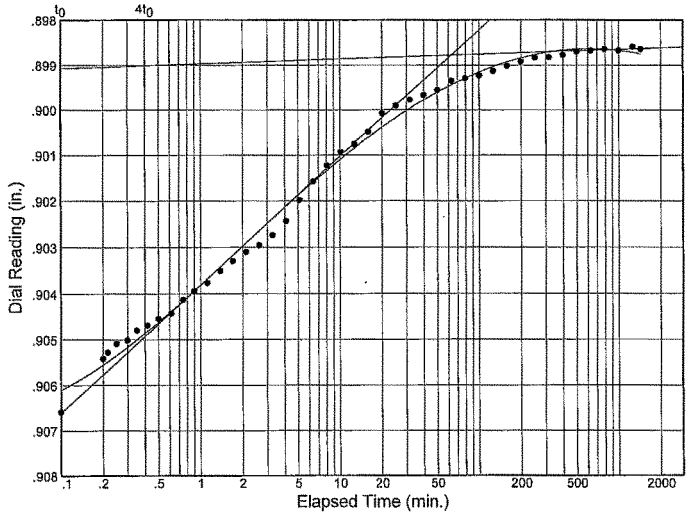
FFEBJV, LLC

Figure

Dial Reading vs. Time

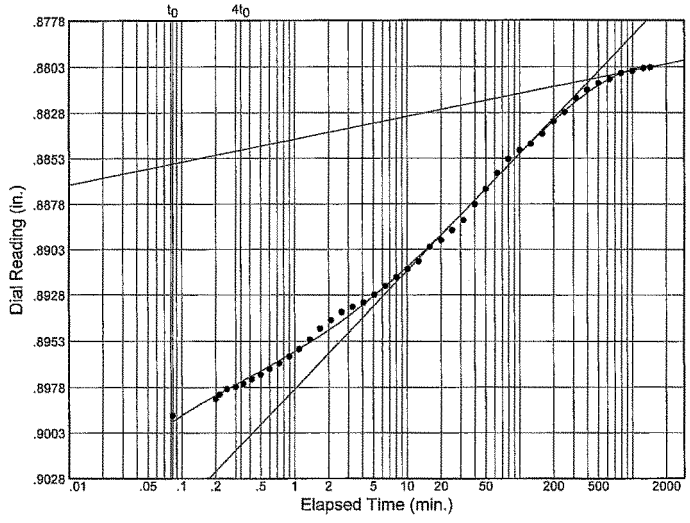
Project No.: 07-022135
Project: USACE - MRGO Ecosystem Restoration Feasibility Study

Source: MRGO-32U Sample No.: 5C Elev./Depth: 17.7



Load No.= 10
Load= 3.00 tsf
D_0 = 0.90736
D_{50} = 0.90306
D_{100} = 0.89877
T_{50} = 1.87 min.

C_v @ T_{50}
0.12 ft.^{2}/day



Load No.= 11
Load= 0.75 tsf
D_0 = 0.90191
D_{50} = 0.89143
D_{100} = 0.88096
T_{50} = 9.42 min.

C_v @ T_{50}
0.03 ft.^{2}/day

FFEBJV, LLC

Figure

SWELL/CONSOLIDATION TEST DATA

Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Contract No. W912P8-07-D-0022
Task Order 135
Project Number: 07-022135

Sample Data

Source: MRGO-32U
Sample No.: 5C
Elev. or Depth: 17.7 Sample Length(in./cm.):
Location:
Description: VSO GR CL4 W/ LNS & LYS ML, WD
Liquid Limit: 36 Plasticity Index: 18
USCS: CL4 AASHTO: Figure No.:
Testing Remarks: Tested by: ALJ
Calculated by: WJY
Checked by: WJY

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST		AFTER TEST	
Wet w+t =	152.14 g.	Consolidometer # =	20	Wet w+t =	404.66 g.
Dry w+t =	100.00 g.			Dry w+t =	328.38 g.
Tare Wt. =	.00 g.	Spec. Gravity =	2.68	Tare Wt. =	109.05 g.
Height =	1.00 in.	Height =	1.00 in.		
Diameter =	4.00 in.	Diameter =	4.00 in.		
Weight =	341.46 g.	Defl. Table =	n/a		
Moisture =	52.1 %	Ht. Solids =	0.4072 in.	Moisture =	34.8 %
Wet Den. =	103.3 pcf	Dry Wt. =	224.44 g.*	Dry Wt. =	219.33 g.
Dry Den. =	67.9 pcf	Void Ratio =	1.465	Void Ratio =	0.756
		Saturation =	95.4 %		

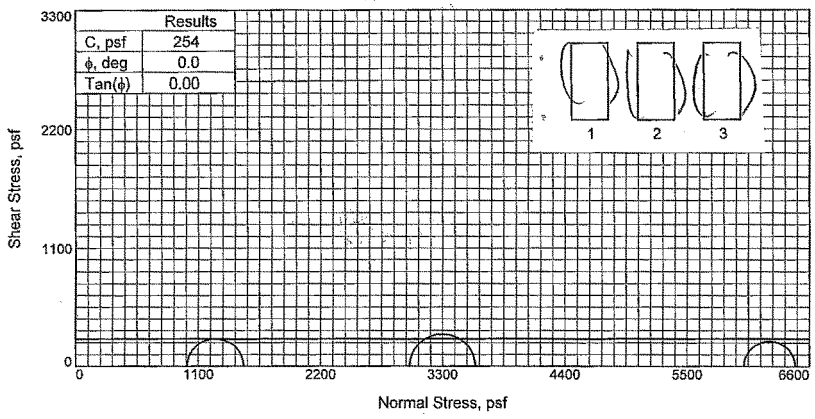
* Initial dry weight used in calculations

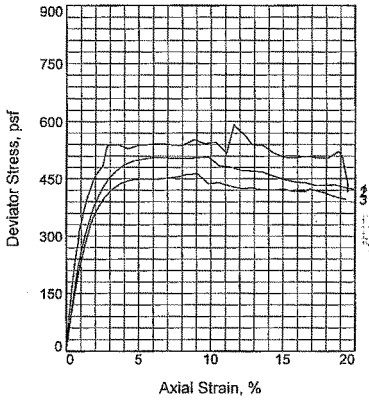
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.59181				1.465	
0.01	0.59177	0.00000			1.465	0.0 Swell
0.13	0.61448	0.00000	0.59	0.001	1.409	2.3 Comprs.
0.25	0.63186	0.00000	0.22	0.003	1.366	4.0 Comprs.
0.50	0.67443	0.00000	0.06	0.007	1.262	8.2 Comprs.
1.00	0.73641	0.00000	0.06	0.008	1.110	14.4 Comprs.
2.00	0.79111	0.00000	0.06	0.006	0.975	19.9 Comprs.
4.00	0.84129	0.00000	0.05	0.005	0.852	24.9 Comprs.
8.00	0.88630	0.00000	0.03	0.006	0.742	29.3 Comprs.

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
12.00	0.91021	0.00000	0.02	0.006	0.683	31.7 Comprs.
3.00	0.89864	0.00000	0.12		0.711	30.6 Comprs.
0.75	0.88034	0.00000	0.03		0.756	28.7 Comprs.

C_c = 0.51 P_c = 0.33 tsf C_r = 0.06





Sample No.		1	2	3
Initial	Water Content, %	44.7	43.4	48.9
	Dry Density, pcf	75.7	77.2	72.2
	Saturation, %	98.3	99.1	101.9
	Void Ratio	1.2280	1.1821	1.2476
	Diameter, in.	1.403	1.389	1.399
	Height, in.	3.127	3.079	3.099
At Test	Water Content, %	44.7	43.4	48.9
	Dry Density, pcf	75.7	77.2	72.2
	Saturation, %	98.3	99.1	101.9
	Void Ratio	1.2280	1.1821	1.2476
	Diameter, in.	1.403	1.389	1.399
	Height, in.	3.127	3.079	3.099
Strain rate, %/min.		1.00	1.00	10.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.94	20.85	41.74
Fail. Stress, psf		508	592	463
Strain, %		9.8	11.6	9.1
Ult. Stress, psf		457	505	420
Strain, %				
σ_1 Failure, psf		1507	3594	6474
σ_3 Failure, psf		1000	3002	6011

Type of Test: Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CL6 W/ LNS & LYS ML, ARS SP
LL= 44 **PL=** 21 **PI=** 23
Assumed Specific Gravity= 2.70
Remarks:

Figure _____

Client: U.S. Army Corps of Engineers

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

Source of Sample: MRGO-32U **Depth:** 20.8

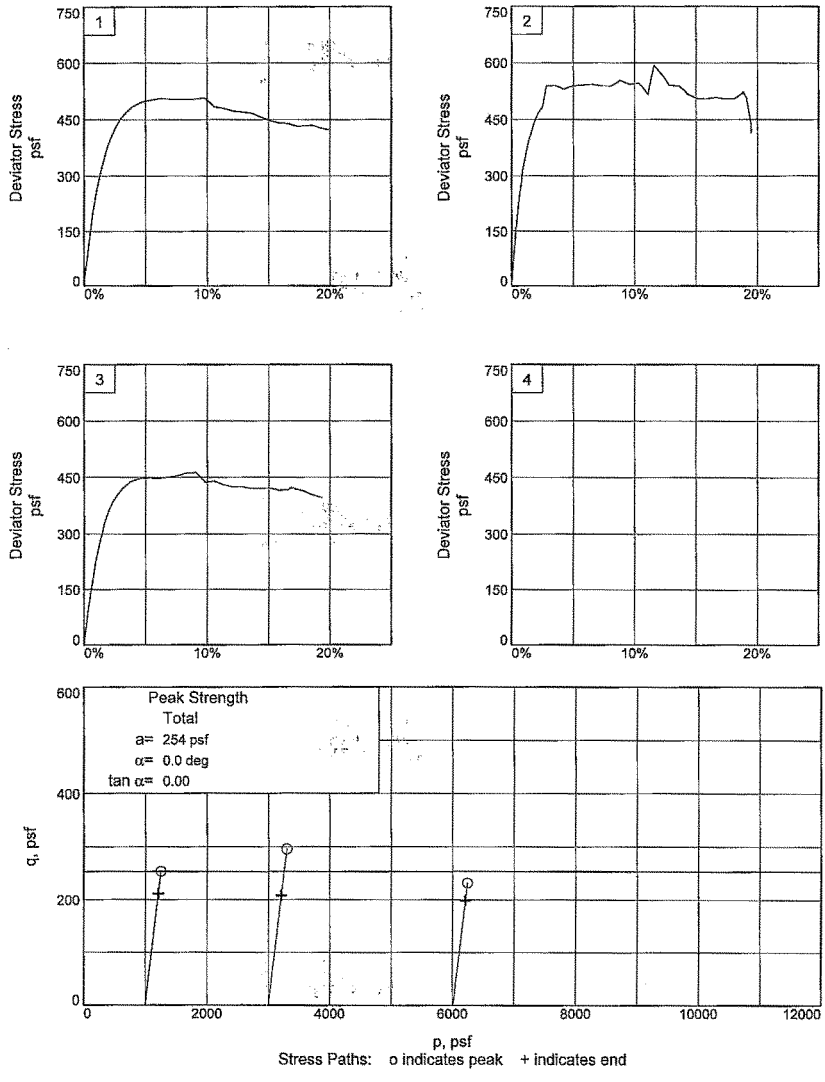
Sample Number: 6B

Proj. No.: 07-022135 **Date Sampled:** 10/6/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

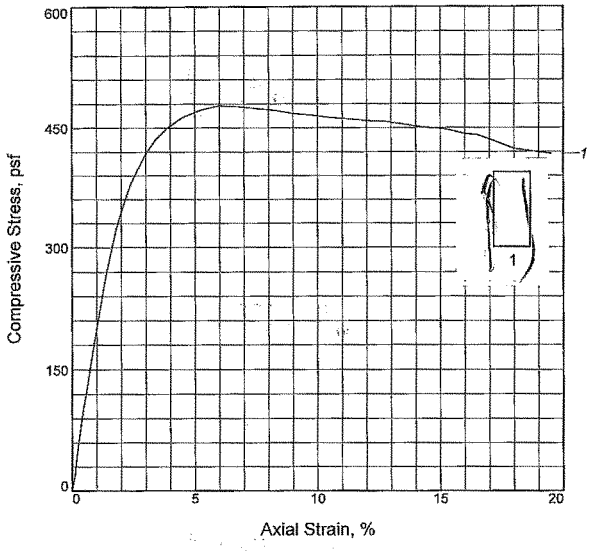
Tested By: JC/ARS **Checked By:** MKA



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-32U **Depth:** 20.8 **Sample Number:** 6B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: JC/ARS **Checked By:** MKA

UNCONFINED COMPRESSION TEST



Sample No.		1			
Unconfined strength, psf		478			
Undrained shear strength, psf		239			
Failure strain, %		6.0			
Strain rate, %/min.		1.00			
Water content, %		53.3			
Wet density, pcf		106.3			
Dry density, pcf		69.4			
Saturation, %		99.6			
Void ratio		1.4658			
Specimen diameter, in.		1.401			
Specimen height, in.		3.105			
Height/diameter ratio		2.22			
Description: VSO GR CH2 W/ LNS ML					
LL = 53	**PL** = 23	**PI** = 30	**Assumed GS=** 2.74	**Type:** UNDISTURBED	

Project No.: 07-022135
Date Sampled: 10/6/07
Remarks:

Figure _____

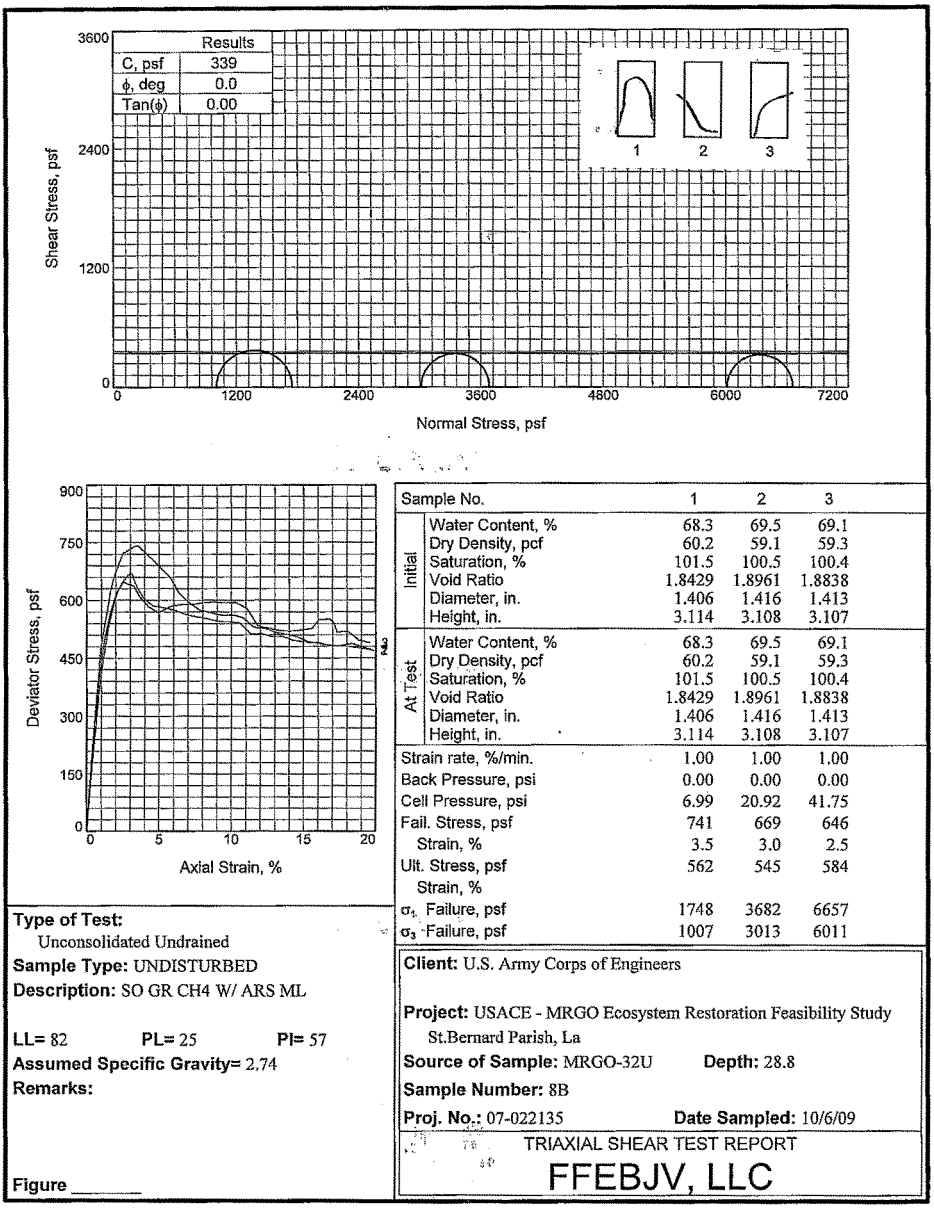
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-32U **Depth:** 24.8
Sample Number: 7B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: ALJ/ARS **Checked By:** MKA



Sample No.		1	2	3
Initial	Water Content, %	68.3	69.5	69.1
	Dry Density, pcf	60.2	59.1	59.3
	Saturation, %	101.5	100.5	100.4
	Void Ratio	1.8429	1.8961	1.8838
	Diameter, in.	1.406	1.416	1.413
	Height, in.	3.114	3.108	3.107
At Test	Water Content, %	68.3	69.5	69.1
	Dry Density, pcf	60.2	59.1	59.3
	Saturation, %	101.5	100.5	100.4
	Void Ratio	1.8429	1.8961	1.8838
	Diameter, in.	1.406	1.416	1.413
	Height, in.	3.114	3.108	3.107
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.99	20.92	41.75
Fail. Stress, psf		741	669	646
Strain, %		3.5	3.0	2.5
Ult. Stress, psf		562	545	584
Strain, %				
σ_1 Failure, psf		1748	3682	6657
σ_3 Failure, psf		1007	3013	6011

Type of Test: Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CH4 W/ ARS ML

LL= 82 **PL=** 25 **PI=** 57
Assumed Specific Gravity= 2.74
Remarks:

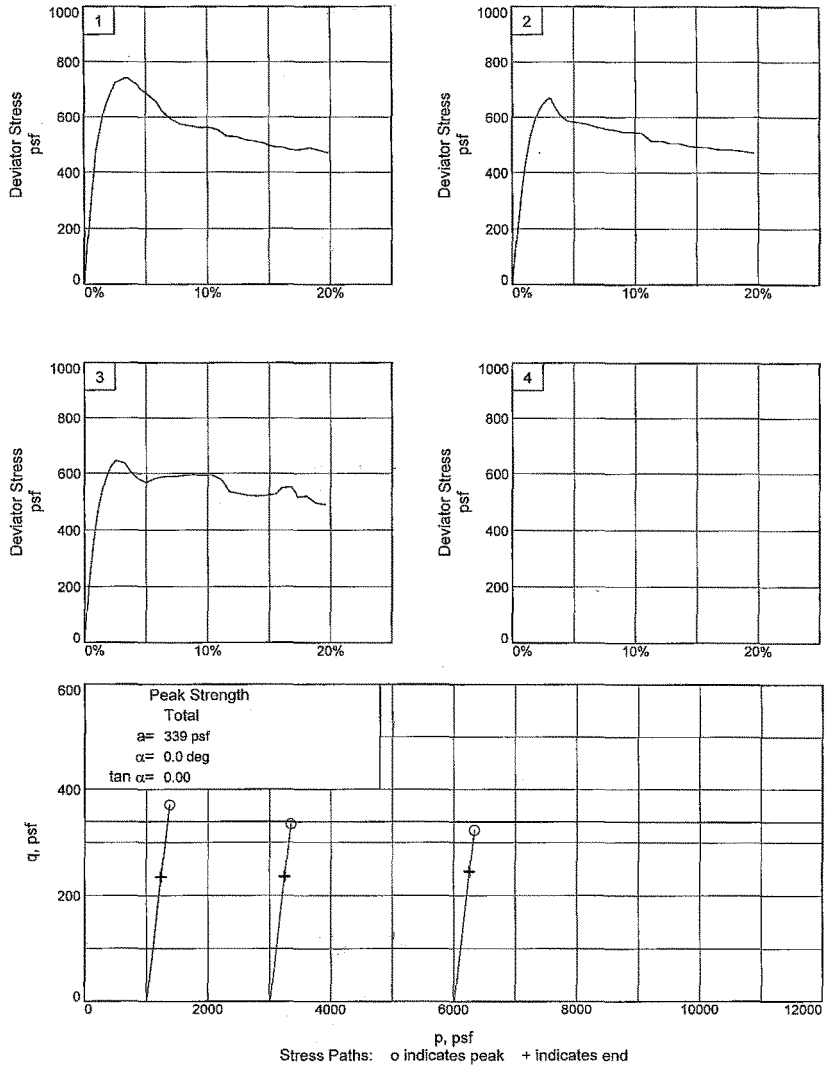
Figure _____

Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-32U **Depth:** 28.8
Sample Number: 8B
Proj. No.: 07-022135 **Date Sampled:** 10/6/09

TRIAXIAL SHEAR TEST REPORT
FFEBJV, LLC

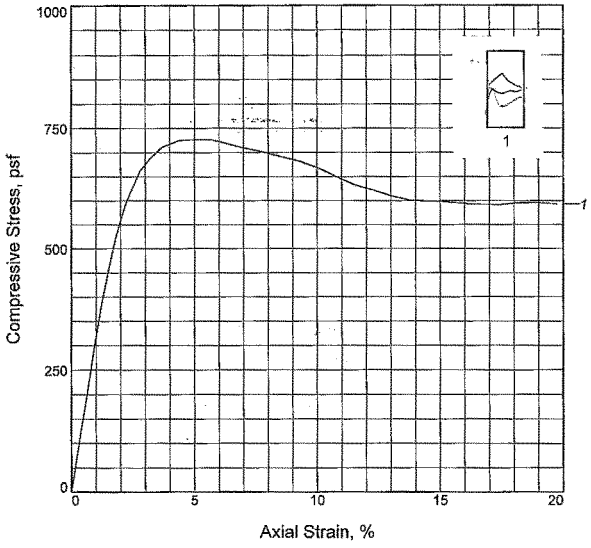
Tested By: JC/ARS **Checked By:** MKA



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-32U **Depth:** 28.8 **Sample Number:** 8B
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: JC/ARS **Checked By:** MKA

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	726			
Undrained shear strength, psf	363			
Failure strain, %	5.2			
Strain rate, %/min.	1.00			
Water content, %	49.9			
Wet density, pcf	108.6			
Dry density, pcf	72.5			
Saturation, %	100.5			
Void ratio	1.3604			
Specimen diameter, in.	1.406			
Specimen height, in.	3.091			
Height/diameter ratio	2.20			

Description: SO GR CH3 W/ LNS ML

LL = 62	PL = 21	PI = 41	Assumed GS= 2.74	Type: UNDISTURBED

Project No.: 07-022135
Date Sampled: 10/6/09
Remarks:

Figure _____

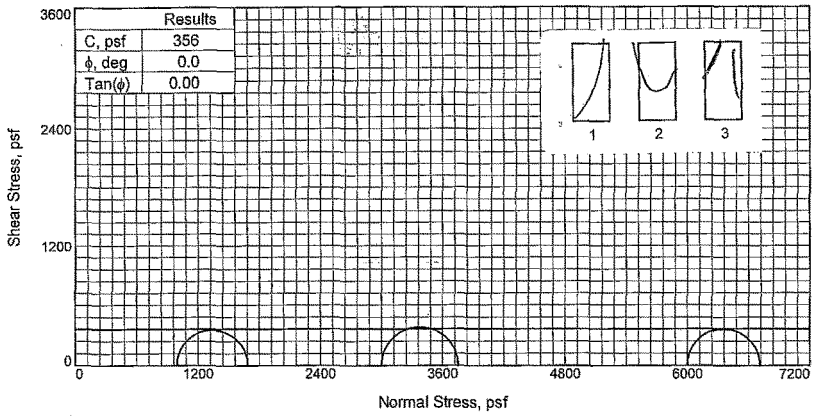
Client: U.S. Army Corps of Engineers

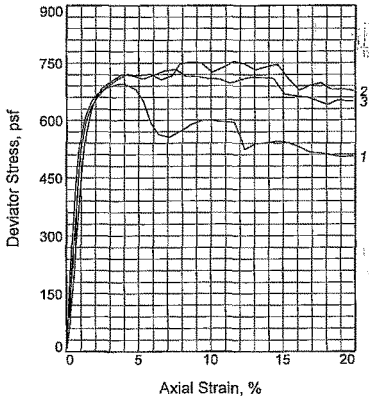
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-32U **Depth:** 32.8
Sample Number: 9B

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Tested By: JC/ARS **Checked By:** MKA





Sample No.		1	2	3
Initial	Water Content, %	72.5	71.7	72.8
	Dry Density, pcf	57.4	57.5	56.7
	Saturation, %	100.4	99.5	98.9
	Void Ratio	1.9776	1.9748	2.0173
	Diameter, in.	1.416	1.412	1.420
	Height, in.	3.103	3.112	3.112
At Test	Water Content, %	72.5	71.7	72.8
	Dry Density, pcf	57.4	57.5	56.7
	Saturation, %	100.4	99.5	98.9
	Void Ratio	1.9776	1.9748	2.0173
	Diameter, in.	1.416	1.412	1.420
	Height, in.	3.103	3.112	3.112
Strain rate, %/min.		1.00	1.00	1.00
Back Pressure, psi		0.00	0.00	0.00
Cell Pressure, psi		6.89	20.82	41.65
Fail. Stress, psf		695	754	714
Strain, %		3.6	11.6	12.8
Ult. Stress, psf		555	677	710
Strain, %				
σ_1 Failure, psf		1687	3752	6712
σ_3 Failure, psf		993	2998	5998

Type of Test:
Unconsolidated Undrained
Sample Type: UNDISTURBED
Description: SO GR CH4 W/ ARS ML

LL= 90 **PL=** 28 **PI=** 62
Assumed Specific Gravity= 2.74
Remarks:

Figure _____

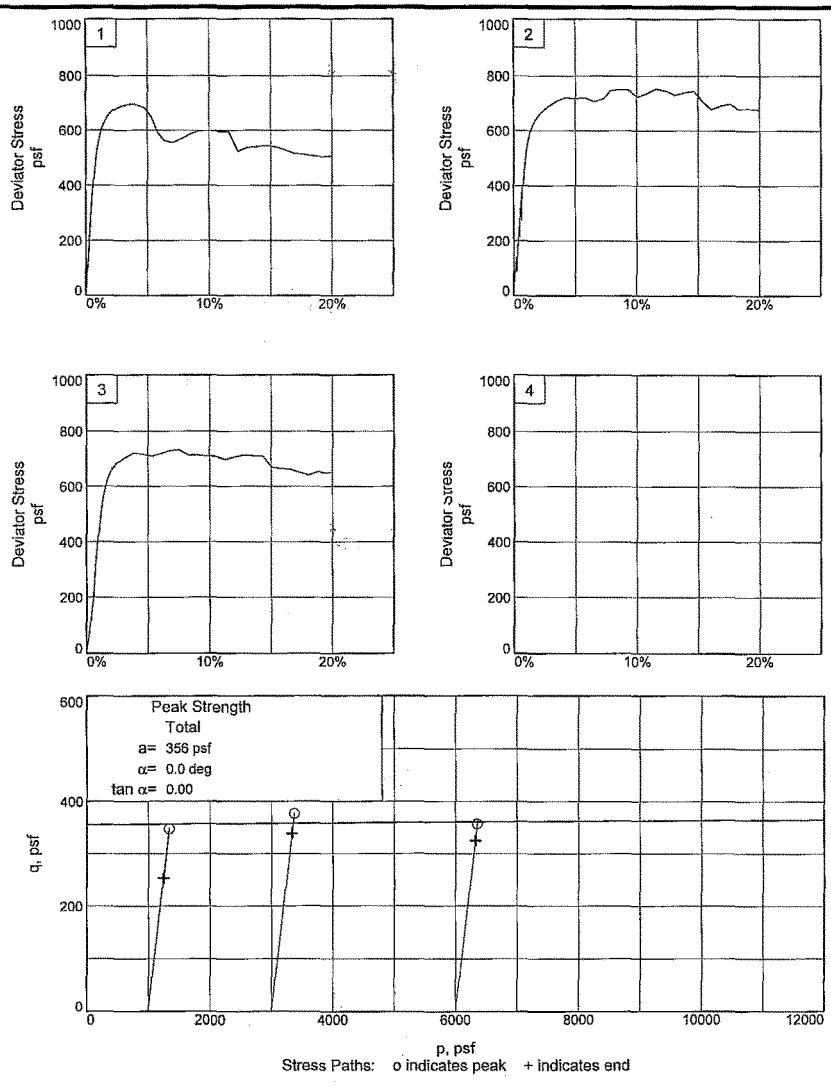
Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-32U **Depth:** 37.7
Sample Number: 10C
Proj. No.: 07-022135 **Date Sampled:** 10/7/09

TRIAXIAL SHEAR TEST REPORT

FFEBJV, LLC

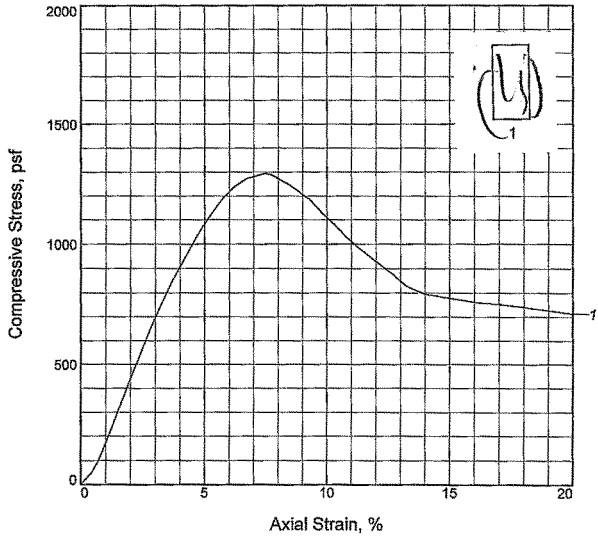
Tested By: JC/ARS **Checked By:** MKA



Client: U.S. Army Corps of Engineers
Project: USACE - MRGO Ecosystem Restoration Feasibility Study
Source of Sample: MRGO-32U **Depth:** 37.7 **Sample Number:** 10C
Project No.: 07-022135 **Figure** _____ **FFEBJV, LLC**

Tested By: JC/ARS **Checked By:** MKA

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	1295			
Undrained shear strength, psf	647			
Failure strain, %	7.5			
Strain rate, %/min.	1.00			
Water content, %	21.8			
Wet density, pcf	130.1			
Dry density, pcf	106.8			
Saturation, %	101.8			
Void ratio	0.5775			
Specimen diameter, in.	1.414			
Specimen height, in.	3.066			
Height/diameter ratio	2.17			

Description: LGR ML

LL = 26	PL = 18	PI = 8	**Assumed GS=** 2.70	**Type:** UNDISTURBED

Project No.: 07-022135
Date Sampled: 10/6/09
Remarks:

Client: U.S. Army Corps of Engineers

Project: USACE - MRGO Ecosystem Restoration Feasibility Study
St.Bernard Parish, La
Source of Sample: MRGO-32U **Depth:** 48.0
Sample Number: 13A

UNCONFINED COMPRESSION TEST

FFEBJV, LLC

Figure _____

Tested By: JC **Checked By:** MKA/WH

ANNEX 7

SLOPE STABILITY INPUT-OUTPUT FILES

APPENDIX ED-F-4

SLOPE STABILITY INPUT-OUTPUT FILES

MRGO REACH 1
Normal Water Level (EL. 0.0)
10 10 1 220 1 0
9 1 2 1
200
0 62.4 0 0
40 132 0 0
0 86 120 120
0 100 120 120
0 108 200 200
0 100 320 440
0 104 440 440
0 104 600 600
0 100 600 600

0 0 189.5 0 197.5 4 202.5 4 208.5 1 222.5 1 224.5 0
400 0 9999.9 0

0 -6 143.5 -3.5 153.5 -1 189.5 0 197.5 4 202.5 4
208.5 1 222.5 1 224.5 0 400 0 9999.9 0

0 -6 143.5 -3.5 184.3 -2.6 210.5 0 224.5 0 400 0
9999.9 0

0 -10 400 -10 9999.9 0
0 -21 400 -21 9999.9 0
0 -27 400 -27 9999.9 0
0 -37 400 -37 9999.9 0
0 -50 400 -50 9999.9 0
0 -54 400 -54 9999.9 0
0 -60 400 -60 9999.9 0

0 0 400 0 9999.9 0

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
3 205 -10 223 -10 1
223
4 210 -21 225 -21 1
225
5 225 -27 247 -27 1
247

**** STABILITY WITH UPLIFT ****

MRGO REACH 1
Normal Water Level (EL. 0.0)
10 PROFILES
1VERTICALS
UPLIFT WITH 1 PIEZOMETRIC GRADE LINES

* * STRATUM 3 ACT. WEDGE LOC. 205.0 EL. -10.0 PASS.WEDGE LOC. 223.0 EL. -10.0

ASSUMED FAILURE SURFACE DATA

DIST.	ELEV.	WT.	UPLIFT	STR 1	STR 2	STR USED
.0	-10.0	718.	625.	120.	120.	120.
143.5	-10.0	778.	625.	120.	120.	120.
153.5	-10.0	941.	625.	120.	120.	120.
184.3	-10.0	970.	625.	120.	120.	120.
189.5	-10.0	956.	625.	120.	120.	120.
197.5	-10.0	1447.	625.	120.	120.	120.
200.0	-10.0	1436.	625.	120.	120.	120.
202.5	-10.0	1424.	625.	120.	120.	120.
208.5	-10.0	1001.	625.	120.	120.	120.
210.5	-10.0	992.	625.	120.	120.	120.
222.5	-10.0	991.	625.	120.	120.	120.
224.5	-10.0	860.	625.	120.	120.	120.
400.0	-10.0	860.	625.	120.	120.	120.

ASSUMED CRIT. PASSIVE LOC. 223.0 EL. -10.0 DP 4374. RP 2400.

ACTIVE WEDGE DATA

DIST.	ELEV.	DA	RA	DB	RB	FS
205.0	-10.0	10152.	3001.	0.	2160.	1.31
210.0	-10.0	9079.	3415.	0.	1560.	1.57
215.0	-10.0	6670.	2879.	0.	960.	2.72
220.0	-10.0	5684.	2446.	0.	360.	3.97
225.0	-10.0	5484.	2451.	0.	-240.	4.15
230.0	-10.0	4826.	2451.	0.	-840.	8.88

CRIT. ACTIVE LOC 205.0 EL -10.0 DA 10152. RA 3001.

DIS.	EL.	DP	RP	DB	RB	FS
223.0	-10.0	4374.	2400.	0.	2160.	1.31

* * STRATUM 4 ACT. WEDGE LOC. 210.0 EL. -21.0 PASS.WEDGE LOC. 225.0 EL. -21.0

ASSUMED FAILURE SURFACE DATA

DIST.	ELEV.	WT.	UPLIFT	STR 1	STR 2	STR USED
.0	-21.0	1818.	1313.	120.	200.	120.
143.5	-21.0	1878.	1313.	120.	200.	120.
153.5	-21.0	2041.	1313.	120.	200.	120.
184.3	-21.0	2070.	1313.	120.	200.	120.
189.5	-21.0	2056.	1313.	120.	200.	120.
197.5	-21.0	2547.	1313.	120.	200.	120.
200.0	-21.0	2536.	1313.	120.	200.	120.
202.5	-21.0	2524.	1313.	120.	200.	120.
208.5	-21.0	2101.	1313.	120.	200.	120.
210.5	-21.0	2092.	1313.	120.	200.	120.
222.5	-21.0	2091.	1313.	120.	200.	120.
224.5	-21.0	1960.	1313.	120.	200.	120.
400.0	-21.0	1960.	1313.	120.	200.	120.

ASSUMED CRIT. PASSIVE LOC. 225.0 EL. -21.0 DP 19809. RP 5040.

ACTIVE WEDGE DATA

DIST.	ELEV.	DA	RA	DB	RB	FS
210.0	-21.0	27760.	4780.	0.	1800.	1.46
215.0	-21.0	27708.	5471.	0.	1200.	1.48
220.0	-21.0	26480.	6075.	0.	600.	1.76
225.0	-21.0	23949.	5734.	0.	0.	2.60
230.0	-21.0	21790.	5074.	0.	-600.	4.80
235.0	-21.0	21125.	5092.	0.	-1200.	6.79

CRIT. ACTIVE LOC 210.0 EL -21.0 DA 27760. RA 4780.

DIS.	EL.	DP	RP	DB	RB	FS
225.0	-21.0	19809.	5040.	0.	1800.	1.46

* * STRATUM 5 ACT. WEDGE LOC. 225.0 EL. -27.0 PASS.WEDGE LOC. 247.0 EL. -27.0

ASSUMED FAILURE SURFACE DATA

DIST.	ELEV.	WT.	UPLIFT	STR 1	STR 2	STR USED
.0	-27.0	2466.	1688.	200.	440.	200.
143.5	-27.0	2526.	1688.	200.	440.	200.
153.5	-27.0	2689.	1688.	200.	440.	200.
184.3	-27.0	2718.	1688.	200.	440.	200.
189.5	-27.0	2704.	1688.	200.	440.	200.
197.5	-27.0	3195.	1688.	200.	440.	200.
200.0	-27.0	3184.	1688.	200.	440.	200.
202.5	-27.0	3172.	1688.	200.	440.	200.
208.5	-27.0	2749.	1688.	200.	440.	200.
210.5	-27.0	2740.	1688.	200.	440.	200.
222.5	-27.0	2739.	1688.	200.	440.	200.
224.5	-27.0	2608.	1688.	200.	440.	200.
400.0	-27.0	2608.	1688.	200.	440.	200.

ASSUMED CRIT. PASSIVE LOC. 247.0 EL. -27.0 DP 33513. RP 7440.

ACTIVE WEDGE DATA

DIST.	ELEV.	DA	RA	DB	RB	FS
225.0	-27.0	41189.	8470.	0.	4400.	2.65
230.0	-27.0	38321.	8317.	0.	3400.	3.98
235.0	-27.0	35697.	7510.	0.	2400.	7.94
240.0	-27.0	34961.	7492.	0.	1400.	11.28
245.0	-27.0	34302.	7491.	0.	400.	19.43
250.0	-27.0	33635.	7477.	0.	-600.	117.37

CRIT. ACTIVE LOC 225.0 EL -27.0 DA 41189. RA 8470.

DIS.	EL.	DP	RP	DB	RB	FS
247.0	-27.0	33513.	7440.	0.	4400.	2.65

NWL (nc) PS Check

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File Information

Title: MRGO Reach 1_1 on 2
Created By: Chaisson, Kathryn MVN
Revision Number: 104
Last Edited By: Chaisson, Kathryn MVN
Date: 6/9/2010
Time: 9:03:00 AM
File Name: MRGO Reach 1_1 on 2.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 1\
Last Solved Date: 6/9/2010
Last Solved Time: 9:08:30 AM

Project Settings

Length(L) Units: feet
Time(t) Units: Seconds
Force(F) Units: lbf
Pressure(p) Units: psf
Strength Units: psf
Unit Weight of Water: 62.4 pcf
View: 2D

Analysis Settings

NWL (nc) PS Check

Kind: SLOPE/W
Method: Spencer
Settings
- Apply Phreatic Correction: No
- PWP Conditions Source: Piezometric Line
- Use Staged Rapid Drawdown: No

SlipSurface
- Direction of movement: Left to Right
- Use Passive Mode: No
- Slip Surface Option: Block
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: Yes
- Tension Crack
  - Tension Crack Option: Search for Tension Crack
  - Percentage Wet: 1
  - Tension Crack Fluid Unit Weight: 62.4 pcf

FOS Distribution
FOS Calculation Option: Constant
Restrict Block Crossing: Yes
Advanced
Number of Slices: 30
Optimization Tolerance: 0.01
Minimum Slip Surface Depth: 0.1 ft
Optimization Maximum Iterations: 3000
Optimization Convergence Tolerance: 1e-007
Starting Optimization Points: 8
Ending Optimization Points: 16
Complete Passes per Insertion: 1
Driving Side Maximum Convex Angle: 5 °
Resisting Side Maximum Convex Angle: 1 °

Materials

ROCK
Model: Mohr-Coulomb
Unit Weight: 132 pcf
Cohesion: 0 psf
Phi: 40 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (NG to -10)
Model: Undrained (Phi=0)
Unit Weight: 86 pcf
Cohesion: 120 psf
Pore Water Pressure
Piezometric Line: 1

CH (-10 to -21)
Model: Undrained (Phi=0)
Unit Weight: 100 pcf
Cohesion: 120 psf
Pore Water Pressure
Piezometric Line: 1

CH (-21 to -27)
Model: Undrained (Phi=0)
Unit Weight: 108 pcf
Cohesion: 200 psf
Pore Water Pressure
Piezometric Line: 1

NWL (nc) PS Check

CH (-27 to -37)

Model: S=f(depth)
Unit Weight: 100 pcf
C-Top of Layer: 200 psf
C-Rate of Change: 24 psf/ft
Limiting C: 440 psf
Pore Water Pressure
Piezometric Line: 1

CH (-37 to -50)

Model: Undrained (Phi=0)
Unit Weight: 104 pcf
Cohesion: 440 psf
Pore Water Pressure
Piezometric Line: 1

CH (-50 to -54)

Model: Undrained (Phi=0)
Unit Weight: 104 pcf
Cohesion: 600 psf
Pore Water Pressure
Piezometric Line: 1

CH (-54 to -60)

Model: Undrained (Phi=0)
Unit Weight: 100 pcf
Cohesion: 600 psf
Pore Water Pressure
Piezometric Line: 1

Slip Surface Limits

Left Coordinate: (-200, -6) ft
Right Coordinate: (200, 0) ft

Slip Surface Block

Left Grid
Upper Left: (-20, -1) ft
Lower Left: (-20, -31) ft
Lower Right: (10, -31) ft
X Increments: 12
Y Increments: 12
Starting Angle: 125 °
Ending Angle: 145 °
Angle Increments: 4
Right Grid
Upper Left: (17, -1) ft

NWL (nc) PS Check

Lower Left: (17, -31) ft
Lower Right: (47, -31) ft
X Increments: 12
Y Increments: 12
Starting Angle: 25 °
Ending Angle: 45 °
Angle Increments: 4

Piezometric Lines

Piezometric Line 1

Coordinates

	X (ft)	Y (ft)
	-200	0
	200	0

Regions

	Material	Points	Area (ft²)
Region 1	CH (-27 to -37)	15,7,8,16	4000
Region 2	CH (-21 to -27)	7,5,6,8	2400
Region 3	CH (-10 to -21)	5,3,4,6	4400
Region 4	CH (NG to -10)	3,1,21,19,14,24,2,4	3159.875
Region 5	ROCK	21,20,13,11,12,22,23,24,14,19	182
Region 6	CH (-37 to -50)	9,15,16,10	5200
Region 7	CH (-50 to -54)	17,9,10,18	1600
Region 8	CH (-54 to -60)	25,17,18,26	2400

Points

	X (ft)	Y (ft)
Point 1	-200	-6
Point 2	200	0
Point 3	-200	-10
Point 4	200	-10
Point 5	-200	-21
Point 6	200	-21
Point 7	-200	-27
Point 8	200	-27
Point 9	-200	-50
Point 10	200	-50
Point 11	-2.5	4
Point 12	2.5	4
Point 13	-10.5	0
Point 14	10.5	0

NWL (nc) PS Check

Point 15	-200	-37
Point 16	200	-37
Point 17	-200	-54
Point 18	200	-54
Point 19	-15.7	-2.6
Point 20	-46.5	-1
Point 21	-56.5	-3.5
Point 22	8.5	1
Point 23	20.5	1
Point 24	22.5	0
Point 25	-200	-60
Point 26	200	-60

Critical Slip Surfaces

	Slip Surface	FOS	Center (ft)	Radius (ft)	Entry (ft)	Exit (ft)
1	Optimized	1.31	(18.559, 0.368)	24.85547	(-8.26012, 1.11994)	(45.2642, 0)
2	37064	1.37	(18.559, 0.368)	26.103	(-9.91068, 0.29466)	(47.0268, 0)

Slices of Slip Surface: Optimized

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	Optimized	-7.9519645	0.559969	-34.941873	43.257455	36.297315	0
2	Optimized	-7.174033	-0.8536465	53.265132	180.81922	107.03058	0
3	Optimized	-6.115205	-2.7776915	173.3295	430.11122	0	120
4	Optimized	-4.852395	-5.0367725	314.29356	702.05291	0	120
5	Optimized	-3.504885	-7.4141375	462.65598	984.11827	0	120
6	Optimized	-2.665565	-8.9156355	556.34118	1148.7914	0	120
7	Optimized	-2.29582	-9.6142255	599.92976	1216.7906	0	120
8	Optimized	-1.466515	-11.1811	697.69443	1361.4152	0	120
9	Optimized	-0.0060425	-13.65619	852.13015	1633.9447	0	120
10	Optimized	1.6646525	-16.24417	1013.6353	1881.1206	0	120
11	Optimized	2.760065	-17.94101	1119.4918	2026.2634	0	120
12	Optimized	4.22077	-19.425075	1212.1195	2143.7765	0	120
13	Optimized	6.313775	-20.751105	1294.8789	2200.0081	0	120
14	Optimized	7.85307	-20.903595	1304.3911	2154.4488	0	120
15	Optimized	9.5	-20.668555	1289.7318	2080.5686	0	120
16	Optimized	11.83204	-20.33574	1268.9362	2042.6796	0	120

NWL (nc) PS Check

17	Optimized	14.174705	-19.98164	1246.8684	2009.435	0	120
18	Optimized	16.07111	-19.681735	1228.1508	1978.3651	0	120
19	Optimized	17.842665	-19.40992	1211.1893	1951.1373	0	120
20	Optimized	19.61422	-19.138105	1194.2277	1923.9653	0	120
21	Optimized	21.01831	-18.922675	1180.7378	1868.1269	0	120
22	Optimized	22.01831	-18.515315	1155.3749	1819.6469	0	120
23	Optimized	23.565975	-17.46198	1089.622	1681.5853	0	120
24	Optimized	25.70853	-15.936485	994.42917	1534.7372	0	120
25	Optimized	27.861685	-14.336495	894.59856	1373.4723	0	120
26	Optimized	29.90239	-12.823365	800.19146	1220.6339	0	120
27	Optimized	31.83065	-11.39709	711.17475	1076.8729	0	120
28	Optimized	33.214245	-10.341975	645.34368	978.28899	0	120
29	Optimized	34.384325	-9.3880475	585.82759	890.74499	0	120
30	Optimized	35.88556	-8.1641425	509.44335	784.59697	0	120
31	Optimized	37.722025	-6.6374725	414.18462	654.89135	0	120
32	Optimized	39.893715	-4.8080375	300.02236	496.16929	0	120
33	Optimized	42.05073	-2.91999	182.20749	338.72635	0	120
34	Optimized	44.193065	-0.97333	60.735829	169.71209	0	120

Slices of Slip Surface: 37064

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	37064	-9.8075195	0.14732975	-9.1934454	13.94974	11.705222	0
2	37064	-9.0480035	-0.937372	58.493254	143.69232	71.490508	0
3	37064	-7.443421	-3.2289535	201.48689	431.68201	0	120
4	37064	-5.5469655	-5.937372	370.49706	776.92478	0	120
5	37064	-3.6505105	-8.6457905	539.50421	1122.1675	0	120
6	37064	-2.6011415	-10.144445	633.00059	1315.1974	0	120
7	37064	-1.6666667	-11.479015	716.30511	1449.439	0	120
8	37064	0	-13.85926	864.80403	1677.0914	0	120
9	37064	1.6666667	-16.239505	1013.3374	1904.7439	0	120
10	37064	3.75	-19.214815	1199.0042	2107.8246	0	120
11	37064	5.875	-21	1310.4	2287.0857	0	120

NWL (nc) PS Check

12	37064	7.625	-21	1310.4	2163.6	0	120
13	37064	9.5	-21	1310.4	2097.3	0	120
14	37064	11.5	-21	1310.4	2092.75	0	120
15	37064	13.5	-21	1310.4	2092.75	0	120
16	37064	15.5	-21	1310.4	2092.75	0	120
17	37064	17.5	-21	1310.4	2092.75	0	120
18	37064	19.5	-21	1310.4	2092.75	0	120
19	37064	21.25	-21	1310.4	2043.2667	0	120
20	37064	22.25	-20.790225	1297.3117	2044.4195	0	120
21	37064	23.400665	-19.824705	1237.0586	1930.4986	0	120
22	37064	25.20199	-18.31321	1142.7344	1778.2957	0	120
23	37064	27.003315	-16.801715	1048.4102	1626.0501	0	120
24	37064	28.804645	-15.290225	954.1286	1473.8046	0	120
25	37064	30.605975	-13.778735	859.80442	1321.5591	0	120
26	37064	32.4073	-12.26724	765.48024	1169.3561	0	120
27	37064	34.208625	-10.755745	671.15607	1017.1106	0	120
28	37064	36.10242	-9.1666665	571.99099	868.8046	0	120
29	37064	38.088675	-7.5	468.01367	724.44736	0	120
30	37064	40.07493	-5.8333335	364.00163	580.09012	0	120
31	37064	42.061185	-4.1666665	260.00116	435.73287	0	120
32	37064	44.04744	-2.5	156.0007	291.36406	0	120
33	37064	46.0337	-0.8333335	52.000233	147.00296	0	120

NWL (c) PS Check

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File Information

Title: MRGO Reach 1_1 on 2
Created By: Chaisson, Kathryn MVN
Revision Number: 104
Last Edited By: Chaisson, Kathryn MVN
Date: 6/9/2010
Time: 9:03:00 AM
File Name: MRGO Reach 1_1 on 2.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 1\
Last Solved Date: 6/9/2010
Last Solved Time: 9:07:12 AM

Project Settings

Length(L) Units: feet
Time(t) Units: Seconds
Force(F) Units: lbf
Pressure(p) Units: psf
Strength Units: psf
Unit Weight of Water: 62.4 pcf
View: 2D

Analysis Settings

NWL (c) PS Check

Kind: SLOPE/W
Method: Spencer
Settings
- Apply Phreatic Correction: No
- PWP Conditions Source: Piezometric Line
- Use Staged Rapid Drawdown: No

SlipSurface
- Direction of movement: Left to Right
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: Yes
- Tension Crack
  - Tension Crack Option: Search for Tension Crack
  - Percentage Wet: 1
  - Tension Crack Fluid Unit Weight: 62.4 pcf

FOS Distribution
FOS Calculation Option: Constant
Advanced
Number of Slices: 30
Optimization Tolerance: 0.01
Minimum Slip Surface Depth: 0.1 ft
Optimization Maximum Iterations: 3000
Optimization Convergence Tolerance: 1e-007
Starting Optimization Points: 8
Ending Optimization Points: 16
Complete Passes per Insertion: 1
Driving Side Maximum Convex Angle: 5 °
Resisting Side Maximum Convex Angle: 1 °

Materials

ROCK

Model: Mohr-Coulomb
Unit Weight: 132 pcf
Cohesion: 0 psf
Phi: 40 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (NG to -10)

Model: Undrained (Phi=0)
Unit Weight: 86 pcf
Cohesion: 120 psf
Pore Water Pressure
Piezometric Line: 1

CH (-10 to -21)

Model: Undrained (Phi=0)
Unit Weight: 100 pcf
Cohesion: 120 psf
Pore Water Pressure
Piezometric Line: 1

CH (-21 to -27)

Model: Undrained (Phi=0)
Unit Weight: 108 pcf
Cohesion: 200 psf
Pore Water Pressure
Piezometric Line: 1

CH (-27 to -37)

Model: S=f(depth)
Unit Weight: 100 pcf
C-Top of Layer: 200 psf
C-Rate of Change: 24 psf/ft
Limiting C: 440 psf
Pore Water Pressure
Piezometric Line: 1

CH (-37 to -50)

Model: Undrained (Phi=0)
Unit Weight: 104 pcf
Cohesion: 440 psf
Pore Water Pressure
Piezometric Line: 1

CH (-50 to -54)

Model: Undrained (Phi=0)
Unit Weight: 104 pcf
Cohesion: 600 psf
Pore Water Pressure
Piezometric Line: 1

CH (-54 to -60)

Model: Undrained (Phi=0)
Unit Weight: 100 pcf
Cohesion: 600 psf
Pore Water Pressure
Piezometric Line: 1

Slip Surface Entry and Exit

Left Projection: Range
Left-Zone Left Coordinate: (-63.91307, -3.62915) ft
Left-Zone Right Coordinate: (-2.5, 4) ft
Left-Zone Increment: 20
Right Projection: Range
Right-Zone Left Coordinate: (13.68599, 1) ft
Right-Zone Right Coordinate: (171.37047, 0) ft
Right-Zone Increment: 20
Radius Increments: 20

Slip Surface Limits

Left Coordinate: (-200, -6) ft
Right Coordinate: (200, 0) ft

Piezometric Lines

NWL (c) PS Check

Piezometric Line 1

Coordinates

	X (ft)	Y (ft)
	-200	0
	200	0

Regions

	Material	Points	Area (ft²)
Region 1	CH (-27 to -37)	15,7,8,16	4000
Region 2	CH (-21 to -27)	7,5,6,8	2400
Region 3	CH (-10 to -21)	5,3,4,6	4400
Region 4	CH (NG to -10)	3,1,21,19,14,24,2,4	3159.875
Region 5	ROCK	21,20,13,11,12,22,23,24,14,19	182
Region 6	CH (-37 to -50)	9,15,16,10	5200
Region 7	CH (-50 to -54)	17,9,10,18	1600
Region 8	CH (-54 to -60)	25,17,18,26	2400

Points

	X (ft)	Y (ft)
Point 1	-200	-6
Point 2	200	0
Point 3	-200	-10
Point 4	200	-10
Point 5	-200	-21
Point 6	200	-21
Point 7	-200	-27
Point 8	200	-27
Point 9	-200	-50
Point 10	200	-50
Point 11	-2.5	4
Point 12	2.5	4
Point 13	-10.5	0
Point 14	10.5	0
Point 15	-200	-37
Point 16	200	-37
Point 17	-200	-54
Point 18	200	-54
Point 19	-15.7	-2.6
Point 20	-46.5	-1
Point 21	-56.5	-3.5
Point 22	8.5	1
Point 23	20.5	1
Point 24	22.5	0

NWL (c) PS Check

Point 25	-200	-60
Point 26	200	-60

Critical Slip Surfaces

	Slip Surface	FOS	Center (ft)	Radius (ft)	Entry (ft)	Exit (ft)
1	Optimized	1.33	(12.338, 6.194)	17.5054	(-5.5571, 2.47145)	(31.2812, 0)
2	8439	1.49	(12.338, 6.194)	18.003	(-5.30314, 2.59843)	(29.242, 0)

Slices of Slip Surface: Optimized

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	Optimized	-5.258767	1.766864	-110.2539	44.168868	37.062081	0
2	Optimized	-4.7257595	0.53114	-33.143496	125.10505	104.9756	0
3	Optimized	-4.1964895	-0.66678	41.607164	226.29469	154.97123	0
4	Optimized	-3.200945	-2.3542605	146.90609	586.13026	0	120
5	Optimized	-2.012455	-4.0849135	254.90021	768.60198	0	120
6	Optimized	-1.037365	-5.504818	343.49931	880.47569	0	120
7	Optimized	-0.05066	-6.880865	429.36331	1003.3375	0	120
8	Optimized	0.961375	-8.121572	506.78551	1127.4235	0	120
9	Optimized	1.987125	-9.270796	578.49995	1217.9835	0	120
10	Optimized	2.568991	-9.922704	619.16636	1264.9718	0	120
11	Optimized	3.020381	-10.42843	650.73503	1281.8972	0	120
12	Optimized	3.892065	-11.186695	698.05119	1354.9892	0	120
13	Optimized	4.870635	-11.84637	739.21521	1352.0235	0	120
14	Optimized	5.8500475	-12.26183	765.14026	1393.1283	0	120
15	Optimized	6.8303025	-12.433065	775.82262	1341.3746	0	120
16	Optimized	7.910215	-12.354855	770.94236	1319.4427	0	120
17	Optimized	8.993745	-12.053885	752.15855	1244.7347	0	120
18	Optimized	9.981235	-11.779595	735.0443	1212.5357	0	120
19	Optimized	11.23228	-11.407025	711.80839	1176.9112	0	120
20	Optimized	12.73437	-10.94006	682.67197	1129.6878	0	120
21	Optimized	14.08148	-10.53139	657.15817	1086.1316	0	120
22	Optimized	15.28612	-10.17713	635.05008	1050.3732	0	120
23	Optimized	16.761245	-9.743325	607.95886	1010.1504	0	120
24	Optimized	18.35054	-9.2875235	579.53845	968.54205	0	120
25	Optimized	19.783515	-8.8892705	554.68783	933.91524	0	120
26	Optimized	20.968775	-8.559862	534.1365	874.07611	0	120

27	Optimized	21.968775	-8.0412925	501.77621	816.8662	0	120
28	Optimized	23.24704	-7.1069725	443.47265	698.40553	0	120
29	Optimized	24.603035	-6.0478185	377.38136	617.72549	0	120
30	Optimized	25.820945	-5.021575	313.34903	526.76291	0	120
31	Optimized	27.038855	-3.9953315	249.31042	435.79406	0	120
32	Optimized	28.55532	-2.644715	165.02989	324.48037	0	120
33	Optimized	30.372035	-0.90361	56.386813	176.77047	0	120

Slices of Slip Surface: 8439

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	8439	-4.934973	1.299215	-81.070193	63.604648	53.370637	0
2	8439	-4.2679775	-0.717935	44.798834	234.8507	159.47245	0
3	8439	-3.2345745	-2.719251	169.68185	604.77245	0	120
4	8439	-1.875	-4.80989	300.13914	861.6683	0	120
5	8439	-0.625	-6.267298	391.07716	1003.7229	0	120
6	8439	0.625	-7.4538295	465.11811	1117.4005	0	120
7	8439	1.875	-8.4371465	526.47882	1210.6963	0	120
8	8439	2.992779	-9.1835425	573.04881	1249.2304	0	120
9	8439	3.978337	-9.7415015	607.87346	1237.8148	0	120
10	8439	5.1425965	-10.29304	642.28899	1218.0649	0	120
11	8439	6.485558	-10.81708	674.98611	1187.0101	0	120
12	8439	7.8285195	-11.22193	700.24502	1143.1307	0	120
13	8439	9	-11.490145	716.98169	1128.4767	0	120
14	8439	10	-11.650015	726.95886	1146.6034	0	120
15	8439	11.106505	-11.75711	733.64773	1162.2264	0	120
16	8439	12.31951	-11.79931	736.27709	1174.3533	0	120
17	8439	13.532515	-11.759555	733.79666	1178.3422	0	120
18	8439	14.745525	-11.637285	726.16638	1174.1667	0	120
19	8439	15.95853	-11.430775	713.28438	1161.7146	0	120
20	8439	17.171535	-11.137005	694.94516	1140.7853	0	120
21	8439	18.384545	-10.751405	670.88378	1110.9317	0	120
22	8439	19.597555	-	640.69172	1071.7042	0	120

NWL (c) PS Check

			10.267485				
23	8439	20.35203	-9.9264335	619.42155	1044.6233	0	120
24	8439	21	-9.578255	597.68761	986.59213	0	120
25	8439	22	-8.9853655	560.69114	877.16338	0	120
26	8439	23.06183	-8.2499385	514.79572	790.33901	0	120
27	8439	24.185495	-7.340982	458.07533	724.3412	0	120
28	8439	25.30916	-6.2641845	390.88709	646.29	0	120
29	8439	26.43282	-4.969827	310.11491	553.64836	0	120
30	8439	27.55648	-3.3660525	210.03968	442.38986	0	120
31	8439	28.680145	-1.2358225	77.113807	307.21401	0	120

MRGO REACH 1
Low Water Level (EL. -1.0)
10 10 1 220 1 1
9 1 2 1
200
0 62.4 0 0
40 132 0 0
0 86 120 120
0 100 120 120
0 108 200 200
0 100 320 440
0 104 440 440
0 104 600 600
0 100 600 600

0 0 175.5 0 177.5 1 191.5 1 197.5 4 202.5 4 210.5 0
246.5 -1 400 -1 9999.9 0

0 0 175.5 0 177.5 1 191.5 1 197.5 4 202.5 4 210.5 0
246.5 -1 256.5 -3.5 400 -6 9999.9 0

0 0 175.5 0 189.5 0 215.7 -2.6 256.5 -3.5 400 -6
9999.9 0

0 -10 400 -10 9999.9 0
0 -21 400 -21 9999.9 0
0 -27 400 -27 9999.9 0
0 -37 400 -37 9999.9 0
0 -50 400 -50 9999.9 0
0 -54 400 -54 9999.9 0
0 -60 400 -60 9999.9 0

0 -1 400 -1 9999.9 0

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
3 210 -10 252 -10 1
252
4 215 -21 251 -21 1
251
5 225 -27 249 -27 1
249

**** STABILITY WITH UPLIFT ****

MRGO REACH 1
Low Water Level (EL. -1.0)
10 PROFILES
1VERTICALS
UPLIFT WITH 1 PIEZOMETRIC GRADE LINES

* * STRATUM 3 ACT. WEDGE LOC. 210.0 EL. -10.0 PASS.WEDGE LOC. 252.0 EL. -10.0

ASSUMED FAILURE SURFACE DATA

DIST.	ELEV.	WT.	UPLIFT	STR 1	STR 2	STR USED
.0	-10.0	860.	563.	120.	120.	120.
175.5	-10.0	861.	563.	120.	120.	120.
177.5	-10.0	992.	563.	120.	120.	120.
189.5	-10.0	992.	563.	120.	120.	120.
191.5	-10.0	1002.	563.	120.	120.	120.
197.5	-10.0	1425.	563.	120.	120.	120.
200.0	-10.0	1436.	563.	120.	120.	120.
202.5	-10.0	1447.	563.	120.	120.	120.
210.5	-10.0	956.	563.	120.	120.	120.
215.7	-10.0	961.	563.	120.	120.	120.
246.5	-10.0	879.	563.	120.	120.	120.
256.5	-10.0	715.	563.	120.	120.	120.
400.0	-10.0	656.	563.	120.	120.	120.

ASSUMED CRIT. PASSIVE LOC. 252.0 EL. -10.0 DP 3191. RP 1552.

ACTIVE WEDGE DATA

DIST.	ELEV.	DA	RA	DB	RB	FS
210.0	-10.0	9456.	3495.	0.	5040.	1.61
215.0	-10.0	6535.	2851.	0.	4440.	2.64
220.0	-10.0	5155.	2075.	0.	3840.	3.80
225.0	-10.0	5029.	2012.	0.	3240.	3.70
230.0	-10.0	4886.	1968.	0.	2640.	3.63
235.0	-10.0	4745.	1924.	0.	2040.	3.55

CRIT. ACTIVE LOC 210.0 EL -10.0 DA 9456. RA 3495.

DIS.	EL.	DP	RP	DB	RB	FS
252.0	-10.0	3191.	1552.	0.	5040.	1.61

* * STRATUM 4 ACT. WEDGE LOC. 215.0 EL. -21.0 PASS.WEDGE LOC. 251.0 EL. -21.0

ASSUMED FAILURE SURFACE DATA

DIST.	ELEV.	WT.	UPLIFT	STR 1	STR 2	STR USED
.0	-21.0	1960.	1250.	120.	200.	120.
175.5	-21.0	1961.	1250.	120.	200.	120.
177.5	-21.0	2092.	1250.	120.	200.	120.
189.5	-21.0	2092.	1250.	120.	200.	120.
191.5	-21.0	2102.	1250.	120.	200.	120.
197.5	-21.0	2525.	1250.	120.	200.	120.
200.0	-21.0	2536.	1250.	120.	200.	120.
202.5	-21.0	2547.	1250.	120.	200.	120.
210.5	-21.0	2056.	1250.	120.	200.	120.
215.7	-21.0	2061.	1250.	120.	200.	120.
246.5	-21.0	1979.	1250.	120.	200.	120.
256.5	-21.0	1815.	1250.	120.	200.	120.
400.0	-21.0	1756.	1250.	120.	200.	120.

ASSUMED CRIT. PASSIVE LOC. 251.0 EL. -21.0 DP 17159. RP 4151.

ACTIVE WEDGE DATA

DIST.	ELEV.	DA	RA	DB	RB	FS
215.0	-21.0	27708.	5297.	0.	4320.	1.31
220.0	-21.0	26518.	6104.	0.	3720.	1.49
225.0	-21.0	23645.	5750.	0.	3120.	2.01
230.0	-21.0	21539.	4738.	0.	2520.	2.60
235.0	-21.0	21269.	4661.	0.	1920.	2.61
240.0	-21.0	20980.	4617.	0.	1320.	2.64

CRIT. ACTIVE LOC 215.0 EL -21.0 DA 27708. RA 5297.

DIS.	EL.	DP	RP	DB	RB	FS
251.0	-21.0	17159.	4151.	0.	4320.	1.31

* * STRATUM 5 ACT. WEDGE LOC. 225.0 EL. -27.0 PASS.WEDGE LOC. 249.0 EL. -27.0

ASSUMED FAILURE SURFACE DATA

DIST.	ELEV.	WT.	UPLIFT	STR 1	STR 2	STR USED
.0	-27.0	2608.	1625.	200.	440.	200.
175.5	-27.0	2609.	1625.	200.	440.	200.
177.5	-27.0	2740.	1625.	200.	440.	200.
189.5	-27.0	2740.	1625.	200.	440.	200.
191.5	-27.0	2750.	1625.	200.	440.	200.
197.5	-27.0	3173.	1625.	200.	440.	200.
200.0	-27.0	3184.	1625.	200.	440.	200.
202.5	-27.0	3195.	1625.	200.	440.	200.
210.5	-27.0	2704.	1625.	200.	440.	200.
215.7	-27.0	2709.	1625.	200.	440.	200.
246.5	-27.0	2627.	1625.	200.	440.	200.
256.5	-27.0	2463.	1625.	200.	440.	200.
400.0	-27.0	2404.	1625.	200.	440.	200.

ASSUMED CRIT. PASSIVE LOC. 249.0 EL. -27.0 DP 30183. RP 6534.

ACTIVE WEDGE DATA

DIST.	ELEV.	DA	RA	DB	RB	FS
225.0	-27.0	41165.	8441.	0.	4800.	1.80
230.0	-27.0	38484.	8411.	0.	3800.	2.26
235.0	-27.0	35784.	7271.	0.	2800.	2.96
240.0	-27.0	35295.	7070.	0.	1800.	3.01
245.0	-27.0	34926.	7026.	0.	800.	3.03
250.0	-27.0	34474.	6982.	0.	-200.	3.10

CRIT. ACTIVE LOC 225.0 EL -27.0 DA 41165. RA 8441.

DIS.	EL.	DP	RP	DB	RB	FS
249.0	-27.0	30183.	6534.	0.	4800.	1.80

LWL (nc) FS Check

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File Information

Title: MRGO Reach 1_1 on 2
Created By: Chaisson, Kathryn MVN
Revision Number: 104
Last Edited By: Chaisson, Kathryn MVN
Date: 6/9/2010
Time: 9:03:00 AM
File Name: MRGO Reach 1_1 on 2.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 1\
Last Solved Date: 6/9/2010
Last Solved Time: 9:06:48 AM

Project Settings

Length(L) Units: feet
Time(t) Units: Seconds
Force(F) Units: lbf
Pressure(p) Units: psf
Strength Units: psf
Unit Weight of Water: 62.4 pcf
View: 2D

Analysis Settings

LWL (nc) FS Check

Kind: SLOPE/W
Method: Spencer
Settings
    Apply Phreatic Correction: No
    PWP Conditions Source: Piezometric Line
    Use Staged Rapid Drawdown: No
SlipSurface
    Direction of movement: Right to Left
    Use Passive Mode: No
    Slip Surface Option: Block
    Critical slip surfaces saved: 1
    Optimize Critical Slip Surface Location: Yes
    Tension Crack
        Tension Crack Option: Search for Tension Crack
        Percentage Wet: 1
        Tension Crack Fluid Unit Weight: 62.4 pcf

FOS Distribution
FOS Calculation Option: Constant
Restrict Block Crossing: Yes
Advanced
Number of Slices: 30
Optimization Tolerance: 0.01
Minimum Slip Surface Depth: 0.1 ft
Optimization Maximum Iterations: 3000
Optimization Convergence Tolerance: 1e-007
Starting Optimization Points: 8
Ending Optimization Points: 16
Complete Passes per Insertion: 1
Driving Side Maximum Convex Angle: 5 °
Resisting Side Maximum Convex Angle: 1 °

Materials

ROCK

Model: Mohr-Coulomb
Unit Weight: 132 pcf
Cohesion: 0 psf
Phi: 40 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (NG to -10)

Model: Undrained (Phi=0)
Unit Weight: 86 pcf
Cohesion: 120 psf
Pore Water Pressure
Piezometric Line: 1

CH (-10 to -21)

Model: Undrained (Phi=0)
Unit Weight: 100 pcf
Cohesion: 120 psf
Pore Water Pressure
Piezometric Line: 1

CH (-21 to -27)

Model: Undrained (Phi=0)
Unit Weight: 108 pcf
Cohesion: 200 psf
Pore Water Pressure
Piezometric Line: 1

LWL (nc) FS Check

CH (-27 to -37)

Model: S=f(depth)
Unit Weight: 100 pcf
C-Top of Layer: 200 psf
C-Rate of Change: 24 psf/ft
Limiting C: 440 psf
Pore Water Pressure
Piezometric Line: 1

CH (-37 to -50)

Model: Undrained (Phi=0)
Unit Weight: 104 pcf
Cohesion: 440 psf
Pore Water Pressure
Piezometric Line: 1

CH (-50 to -54)

Model: Undrained (Phi=0)
Unit Weight: 104 pcf
Cohesion: 600 psf
Pore Water Pressure
Piezometric Line: 1

CH (-54 to -60)

Model: Undrained (Phi=0)
Unit Weight: 100 pcf
Cohesion: 600 psf
Pore Water Pressure
Piezometric Line: 1

Slip Surface Limits

Left Coordinate: (-200, -6) ft
Right Coordinate: (200, 0) ft

Slip Surface Block

Left Grid
Upper Left: (-69, -1) ft
Lower Left: (-69, -31) ft
Lower Right: (-39, -31) ft
X Increments: 12
Y Increments: 12
Starting Angle: 145 °
Ending Angle: 165 °
Angle Increments: 4
Right Grid
Upper Left: (-20, -1) ft

Lower Left: (-20, -31) ft
Lower Right: (10, -31) ft
X Increments: 12
Y Increments: 12
Starting Angle: 35 °
Ending Angle: 55 °
Angle Increments: 4

Piezometric Lines

Piezometric Line 1

Coordinates

	X (ft)	Y (ft)
	-200	-1
	200	-1

Regions

	Material	Points	Area (ft²)
Region 1	CH (-27 to -37)	15,7,8,16	4000
Region 2	CH (-21 to -27)	7,5,6,8	2400
Region 3	CH (-10 to -21)	5,3,4,6	4400
Region 4	CH (NG to -10)	3,1,21,19,14,24,2,4	3159.875
Region 5	ROCK	21,20,13,11,12,22,23,24,14,19	182
Region 6	CH (-37 to -50)	9,15,16,10	5200
Region 7	CH (-50 to -54)	17,9,10,18	1600
Region 8	CH (-54 to -60)	25,17,18,26	2400

Points

	X (ft)	Y (ft)
Point 1	-200	-6
Point 2	200	0
Point 3	-200	-10
Point 4	200	-10
Point 5	-200	-21
Point 6	200	-21
Point 7	-200	-27
Point 8	200	-27
Point 9	-200	-50
Point 10	200	-50
Point 11	-2.5	4
Point 12	2.5	4
Point 13	-10.5	0
Point 14	10.5	0

LWL (nc) FS Check

Point 15	-200	-37
Point 16	200	-37
Point 17	-200	-54
Point 18	200	-54
Point 19	-15.7	-2.6
Point 20	-46.5	-1
Point 21	-56.5	-3.5
Point 22	8.5	1
Point 23	20.5	1
Point 24	22.5	0
Point 25	-200	-60
Point 26	200	-60

Critical Slip Surfaces

	Slip Surface	FOS	Center (ft)	Radius (ft)	Entry (ft)	Exit (ft)
1	Optimized	1.34	(-34.203, 2.486)	36.18432	(6.91667, 1.79167)	(-74.3944, -3.81175)
2	36105	1.40	(-34.203, 2.486)	36.158	(8.05897, 1.22051)	(-76.0072, -3.83985)

Slices of Slip Surface: Optimized

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	Optimized	-72.926055	-5.053725	252.95324	375.31559	0	120
2	Optimized	-69.989305	-7.537675	407.94382	597.78549	0	120
3	Optimized	-67.704475	-9.389825	523.51167	751.41977	0	120
4	Optimized	-64.87813	-11.502085	655.33714	961.654	0	120
5	Optimized	-61.4924	-13.8968	804.76794	1196.0089	0	120
6	Optimized	-58.74072	-15.68206	916.1678	1380.5168	0	120
7	Optimized	-56.93244	-16.8053	986.25527	1478.9238	0	120
8	Optimized	-54.56916	-18.06557	1064.9023	1641.3959	0	120
9	Optimized	-50.6879	-19.65258	1163.9191	1826.579	0	120
10	Optimized	-47.61874	-20.349155	1207.3676	1920.0883	0	120
11	Optimized	-45.583985	-20.602375	1223.1863	1966.2413	0	120
12	Optimized	-43.455365	-20.76364	1233.2657	1973.5465	0	120
13	Optimized	-41.030155	-20.858185	1239.1576	1989.4506	0	120
14	Optimized	-38.604945	-20.95273	1245.0495	2005.3546	0	120
15	Optimized	-35.96328	-21	1247.9869	2010.4453	0	120
16	Optimized	-33.105155	-21	1247.9869	2018.0027	0	120
17	Optimized	-30.24703	-21	1247.9869	2025.5951	0	120
18	Optimized	-27.34723	-21	1248.0133	2033.2996	0	120
19	Optimized	-24.405755	-21	1248.0133	2041.0848	0	120
20	Optimized	-21.729185	-20.945005	1244.5634	2034.8524	0	120
21	Optimized	-19.31751	-20.83501	1237.6873	2030.2546	0	120
			-				

LWL (nc) FS Check

22	Optimized	-16.905835	20.725015	1230.8527	2025.6567	0	120
23	Optimized	-14.35808	-20.608815	1223.5775	2016.0201	0	120
24	Optimized	-11.75808	-20.34683	1207.2596	1968.2873	0	120
25	Optimized	-9.098165	-19.922325	1180.7407	2010.5313	0	120
26	Optimized	-6.665505	-18.73684	1106.7752	1912.7312	0	120
27	Optimized	-4.603855	-16.81332	986.75962	1849.4251	0	120
28	Optimized	-3.036515	-14.976945	872.17122	1659.7957	0	120
29	Optimized	-1.241753	-12.051165	689.59542	1410.8572	0	120
30	Optimized	0.21978542	-9.668599	540.91523	1185.4609	0	120
31	Optimized	1.0187385	-8.366164	459.63087	1076.9636	0	120
32	Optimized	2.0572	-6.5545125	346.60179	894.68541	0	120
33	Optimized	3.17512	-4.4322375	214.17282	679.07109	0	120
34	Optimized	4.517406	-2.07529	67.098767	431.46775	0	120
35	Optimized	5.3407765	-0.7482414	-15.709775	269.81188	0	120
36	Optimized	6.2068245	0.6475916	-102.81143	96.490857	80.965442	0

Slices of Slip Surface: 36105

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	36105	-74.54097	-4.8665395	241.27324	339.10937	0	120
2	36105	-71.60843	-6.919924	369.41692	522.01613	0	120
3	36105	-68.675895	-8.973308	497.54662	704.95083	0	120
4	36105	-65.870925	-10.93737	620.09907	893.43462	0	120
5	36105	-63.193515	-12.81211	737.06368	1087.4374	0	120
6	36105	-60.51611	-14.68685	854.05888	1281.4708	0	120
7	36105	-57.838705	-16.56159	971.05409	1475.4735	0	120
8	36105	-55.25	-18.37422	1084.1643	1684.9305	0	120
9	36105	-52.75	-20.12474	1193.3736	1906.7569	0	120
10	36105	-50.25	-21	1248	1921.44	0	120
11	36105	-47.75	-21	1248	1962	0	120
12	36105	-45.1	-21	1248	1986	0	120
13	36105	-42.3	-21	1248	1993.4286	0	120
14	36105	-39.5	-21	1248	2000.8571	0	120
15	36105	-36.7	-21	1248	2008.2857	0	120
16	36105	-33.9	-21	1248	2015.7143	0	120
17	36105	-31.1	-21	1248	2023.1429	0	120
18	36105	-28.3	-21	1248	2030.5714	0	120

LWL (nc) FS Check

19	36105	-25.5	-21	1248	2038	0	120
20	36105	-22.7	-21	1248	2045.4286	0	120
21	36105	-19.9	-21	1248	2052.8571	0	120
22	36105	-17.1	-21	1248	2060.2857	0	120
23	36105	-14.4	-21	1248	2062.8077	0	120
24	36105	-11.8	-21	1248	2060.4615	0	120
25	36105	-9	-21	1248	2151.4667	0	120
26	36105	-6.25	-19.214815	1136.5991	1910.2848	0	120
27	36105	-3.75	-15.644445	913.82198	1717.8614	0	120
28	36105	-1.1488585	-11.92963	682.00063	1433.2817	0	120
29	36105	0.3126799	-9.8423365	551.77058	1231.6382	0	120
30	36105	1.4615384	-8.2015965	449.378	1093.2048	0	120
31	36105	4.5020755	-3.85926	178.41222	601.87445	0	120
32	36105	6.7312035	-0.6757354	-20.234733	194.13723	0	120
33	36105	7.508614	0.4345216	-89.513553	74.203807	62.264387	0

LWL (c) FS Check

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File Information

Title: MRGO Reach 1_1 on 2
Created By: Chaisson, Kathryn MVN
Revision Number: 104
Last Edited By: Chaisson, Kathryn MVN
Date: 6/9/2010
Time: 9:03:00 AM
File Name: MRGO Reach 1_1 on 2.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 1\
Last Solved Date: 6/9/2010
Last Solved Time: 9:04:00 AM

Project Settings

Length(L) Units: feet
Time(t) Units: Seconds
Force(F) Units: lbf
Pressure(p) Units: psf
Strength Units: psf
Unit Weight of Water: 62.4 pcf
View: 2D

Analysis Settings

LWL (c) FS Check

Kind: SLOPE/W
Method: Spencer
Settings
    Apply Phreatic Correction: No
    PWP Conditions Source: Piezometric Line
    Use Staged Rapid Drawdown: No
SlipSurface
    Direction of movement: Right to Left
    Use Passive Mode: No
    Slip Surface Option: Entry and Exit
    Critical slip surfaces saved: 1
    Optimize Critical Slip Surface Location: Yes
    Tension Crack
        Tension Crack Option: Search for Tension Crack
        Percentage Wet: 1
        Tension Crack Fluid Unit Weight: 62.4 pcf

FOS Distribution
FOS Calculation Option: Constant
Advanced
Number of Slices: 30
Optimization Tolerance: 0.01
Minimum Slip Surface Depth: 0.1 ft
Optimization Maximum Iterations: 3000
Optimization Convergence Tolerance: 1e-007
Starting Optimization Points: 8
Ending Optimization Points: 16
Complete Passes per Insertion: 1
Driving Side Maximum Convex Angle: 5 °
Resisting Side Maximum Convex Angle: 1 °

Materials

ROCK

Model: Mohr-Coulomb
Unit Weight: 132 pcf
Cohesion: 0 psf
Phi: 40 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (NG to -10)

Model: Undrained (Phi=0)
Unit Weight: 86 pcf
Cohesion: 120 psf
Pore Water Pressure
Piezometric Line: 1

CH (-10 to -21)

Model: Undrained (Phi=0)
Unit Weight: 100 pcf
Cohesion: 120 psf
Pore Water Pressure
Piezometric Line: 1

CH (-21 to -27)

Model: Undrained (Phi=0)
Unit Weight: 108 pcf
Cohesion: 200 psf
Pore Water Pressure
Piezometric Line: 1

CH (-27 to -37)

Model: S=f(depth)
Unit Weight: 100 pcf
C-Top of Layer: 200 psf
C-Rate of Change: 24 psf/ft
Limiting C: 440 psf
Pore Water Pressure
Piezometric Line: 1

CH (-37 to -50)

Model: Undrained (Phi=0)
Unit Weight: 104 pcf
Cohesion: 440 psf
Pore Water Pressure
Piezometric Line: 1

CH (-50 to -54)

Model: Undrained (Phi=0)
Unit Weight: 104 pcf
Cohesion: 600 psf
Pore Water Pressure
Piezometric Line: 1

CH (-54 to -60)

Model: Undrained (Phi=0)
Unit Weight: 100 pcf
Cohesion: 600 psf
Pore Water Pressure
Piezometric Line: 1

Slip Surface Entry and Exit

Left Projection: Range
Left-Zone Left Coordinate: (-110.00591, -4.43216) ft
Left-Zone Right Coordinate: (-21.42792, -0.30355) ft
Left-Zone Increment: 20
Right Projection: Range
Right-Zone Left Coordinate: (2.4, 4) ft
Right-Zone Right Coordinate: (59.68851, 0) ft
Right-Zone Increment: 20
Radius Increments: 20

Slip Surface Limits

Left Coordinate: (-200, -6) ft
Right Coordinate: (200, 0) ft

Piezometric Lines

LWL (c) FS Check

Piezometric Line 1

Coordinates

	X (ft)	Y (ft)
	-200	-1
	200	-1

Regions

	Material	Points	Area (ft^2)
Region 1	CH (-27 to -37)	15,7,8,16	4000
Region 2	CH (-21 to -27)	7,5,6,8	2400
Region 3	CH (-10 to -21)	5,3,4,6	4400
Region 4	CH (NG to -10)	3,1,21,19,14,24,2,4	3159.875
Region 5	ROCK	21,20,13,11,12,22,23,24,14,19	182
Region 6	CH (-37 to -50)	9,15,16,10	5200
Region 7	CH (-50 to -54)	17,9,10,18	1600
Region 8	CH (-54 to -60)	25,17,18,26	2400

Points

	X (ft)	Y (ft)
Point 1	-200	-6
Point 2	200	0
Point 3	-200	-10
Point 4	200	-10
Point 5	-200	-21
Point 6	200	-21
Point 7	-200	-27
Point 8	200	-27
Point 9	-200	-50
Point 10	200	-50
Point 11	-2.5	4
Point 12	2.5	4
Point 13	-10.5	0
Point 14	10.5	0
Point 15	-200	-37
Point 16	200	-37
Point 17	-200	-54
Point 18	200	-54
Point 19	-15.7	-2.6
Point 20	-46.5	-1
Point 21	-56.5	-3.5
Point 22	8.5	1
Point 23	20.5	1
Point 24	22.5	0

LWL (c) FS Check

Point 25	-200	-60
Point 26	200	-60

Critical Slip Surfaces

	Slip Surface	FOS	Center (ft)	Radius (ft)	Entry (ft)	Exit (ft)
1	Optimized	1.36	(-30.83, 25.58)	32.20085	(6.53, 1.985)	(-66.1529, -3.66817)
2	4464	1.52	(-30.83, 25.58)	45.399	(7.61906, 1.44047)	(-65.5609, -3.65786)

Slices of Slip Surface: Optimized

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	Optimized	-64.39789	-5.345454	271.15425	419.38799	0	120
2	Optimized	-60.83771	-8.56766	472.21298	698.66057	0	120
3	Optimized	-57.766245	-11.00323	624.21396	912.11396	0	120
4	Optimized	-54.765405	-13.11396	755.90233	1162.0398	0	120
5	Optimized	-51.9563	-14.75972	858.61697	1331.0358	0	120
6	Optimized	-49.807285	-15.611075	911.74246	1453.337	0	120
7	Optimized	-47.61639	-16.21481	949.40208	1512.1614	0	120
8	Optimized	-45.28358	-16.58689	972.60462	1571.1618	0	120
9	Optimized	-42.85074	-16.974925	996.83754	1616.7456	0	120
10	Optimized	-40.332505	-17.29682	1016.9107	1645.5804	0	120
11	Optimized	-37.72888	-17.552585	1032.8883	1678.2237	0	120
12	Optimized	-35.125255	-17.80835	1048.8277	1710.867	0	120
13	Optimized	-32.544975	-17.98218	1059.6889	1724.4715	0	120
14	Optimized	-29.988045	-18.074085	1065.4343	1740.4569	0	120
15	Optimized	-27.085145	-18.113495	1067.8704	1745.239	0	120
16	Optimized	-24.384635	-18.079585	1065.752	1745.3176	0	120
17	Optimized	-22.232485	-18.02485	1062.3612	1745.5498	0	120
18	Optimized	-19.792305	-17.878625	1053.2251	1726.8319	0	120
19	Optimized	-17.0641	-17.640915	1038.3996	1710.3633	0	120
20	Optimized	-14.4	-17.40879	1023.8899	1689.675	0	120
21	Optimized	-11.8	-17.18225	1009.7894	1664.8077	0	120
22	Optimized	-10.412625	-17.061365	1002.2114	1656.9552	0	120
23	Optimized	-9.101685	-16.79286	985.47683	1689.1148	0	120
24	Optimized	-6.2432	-15.4212	899.87331	1649.7635	0	120
25	Optimized	-3.55414	-12.998315	748.70396	1487.6046	0	120
26	Optimized	-1.8945	-10.93252	619.78876	1351.185	0	120
27	Optimized	-1.232212	-10.08942	567.17583	1223.0437	0	120
		-					

28	Optimized	0.37617355	-8.741478	483.07526	1110.4963	0	120
29	Optimized	1.4615384	-5.8477655	302.49255	871.41808	0	120
30	Optimized	2.82458	-3.7014825	168.56925	674.19442	0	120
31	Optimized	3.8645985	-2.095195	68.33982	482.12444	0	120
32	Optimized	4.7241185	-0.7794405	-13.762958	320.2886	0	120
33	Optimized	5.6990985	0.7130605	-106.89568	112.06916	94.037194	0

Slices of Slip Surface: 4464

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	4464	-64.47213	-4.8610905	240.93185	381.9253	0	120
2	4464	-62.29463	-7.1121915	381.41279	571.50704	0	120
3	4464	-60.11713	-9.0800285	504.17904	735.94074	0	120
4	4464	-57.76419	-10.93255	619.79249	903.03254	0	120
5	4464	-55.25	-12.66327	727.80037	1092.4085	0	120
6	4464	-52.75	-14.151075	820.63327	1275.0969	0	120
7	4464	-50.25	-15.432595	900.58172	1436.4262	0	120
8	4464	-47.75	-16.526765	968.86522	1578.3774	0	120
9	4464	-45.315385	-17.428035	1025.1204	1683.4407	0	120
10	4464	-42.946155	-18.15519	1070.4651	1753.6966	0	120
11	4464	-40.576925	-18.743855	1107.2059	1809.974	0	120
12	4464	-38.207695	-19.199515	1135.6552	1852.8475	0	120
13	4464	-35.838465	-19.52621	1156.0163	1882.8001	0	120
14	4464	-33.469235	-19.72674	1168.5683	1900.098	0	120
15	4464	-31.1	-19.80278	1173.3135	1904.9303	0	120
16	4464	-28.730765	-19.75496	1170.3074	1897.3594	0	120
17	4464	-26.361535	-19.582885	1159.5677	1877.4354	0	120
18	4464	-23.992305	-19.285125	1140.9957	1844.9957	0	120
19	4464	-21.623075	-18.85914	1114.423	1799.799	0	120
20	4464	-19.253845	-18.301185	1079.5861	1741.5482	0	120

LWL (c) FS Check

21	4464	-16.884615	-17.60613	1036.2305	1669.6811	0	120
22	4464	-14.4	-16.718625	980.83398	1574.1457	0	120
23	4464	-11.8	-15.613085	911.8575	1452.5266	0	120
24	4464	-9.1886905	-14.30092	829.99149	1390.2006	0	120
25	4464	-6.566072	-12.75943	733.79686	1384.0166	0	120
26	4464	-3.9434535	-10.964765	621.81564	1351.6489	0	120
27	4464	-2.566072	-9.9474355	558.32113	1327.4777	0	120
28	4464	-1.0384616	-8.6217775	475.60637	1205.2547	0	120
29	4464	1.4615384	-6.2966945	330.51279	985.25033	0	120
30	4464	4.2371185	-3.1223525	132.43543	582.67288	0	120
31	4464	6.1846475	-0.7036803	-18.490732	241.02615	0	120
32	4464	7.007057	0.5165557	-94.633267	86.358778	72.463619	0

LWL (c) FS Check (Toe)

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File Information

Title: MRGO Reach 1_1 on 2
Created By: Chaisson, Kathryn MVN
Revision Number: 104
Last Edited By: Chaisson, Kathryn MVN
Date: 6/9/2010
Time: 9:03:00 AM
File Name: MRGO Reach 1_1 on 2.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 1\
Last Solved Date: 6/9/2010
Last Solved Time: 9:04:42 AM

Project Settings

Length(L) Units: feet
Time(t) Units: Seconds
Force(F) Units: lbf
Pressure(p) Units: psf
Strength Units: psf
Unit Weight of Water: 62.4 pcf
View: 2D

Analysis Settings

LWL (c) FS Check (Toe)

Kind: SLOPE/W
Method: Spencer
Settings
- Apply Phreatic Correction: No
- PWP Conditions Source: Piezometric Line
- Use Staged Rapid Drawdown: No

SlipSurface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: Yes
- Tension Crack
  - Tension Crack Option: Search for Tension Crack
  - Percentage Wet: 1
  - Tension Crack Fluid Unit Weight: 62.4 pcf

FOS Distribution
FOS Calculation Option: Constant
Advanced
Number of Slices: 30
Optimization Tolerance: 0.01
Minimum Slip Surface Depth: 0.1 ft
Optimization Maximum Iterations: 3000
Optimization Convergence Tolerance: 1e-007
Starting Optimization Points: 8
Ending Optimization Points: 16
Complete Passes per Insertion: 1
Driving Side Maximum Convex Angle: 5 °
Resisting Side Maximum Convex Angle: 1 °

Materials

ROCK

Model: Mohr-Coulomb
Unit Weight: 132 pcf
Cohesion: 0 psf
Phi: 40 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (NG to -10)

Model: Undrained (Phi=0)
Unit Weight: 86 pcf
Cohesion: 120 psf
Pore Water Pressure
Piezometric Line: 1

CH (-10 to -21)

Model: Undrained (Phi=0)
Unit Weight: 100 pcf
Cohesion: 120 psf
Pore Water Pressure
Piezometric Line: 1

CH (-21 to -27)

Model: Undrained (Phi=0)
Unit Weight: 108 pcf
Cohesion: 200 psf
Pore Water Pressure
Piezometric Line: 1

CH (-27 to -37)

LWL (c) FS Check (Toe)

Model: S=f(depth)
Unit Weight: 100 pcf
C-Top of Layer: 200 psf
C-Rate of Change: 24 psf/ft
Limiting C: 440 psf
Pore Water Pressure
Piezometric Line: 1

CH (-37 to -50)

Model: Undrained (Phi=0)
Unit Weight: 104 pcf
Cohesion: 440 psf
Pore Water Pressure
Piezometric Line: 1

CH (-50 to -54)

Model: Undrained (Phi=0)
Unit Weight: 104 pcf
Cohesion: 600 psf
Pore Water Pressure
Piezometric Line: 1

CH (-54 to -60)

Model: Undrained (Phi=0)
Unit Weight: 100 pcf
Cohesion: 600 psf
Pore Water Pressure
Piezometric Line: 1

Slip Surface Entry and Exit

Left Projection: Range
Left-Zone Left Coordinate: (-130.60271, -4.79099) ft
Left-Zone Right Coordinate: (-74.41202, -3.81206) ft
Left-Zone Increment: 20
Right Projection: Range
Right-Zone Left Coordinate: (-59.77266, -3.55701) ft
Right-Zone Right Coordinate: (-17.6984, -0.19996) ft
Right-Zone Increment: 20
Radius Increments: 20

Slip Surface Limits

Left Coordinate: (-200, -6) ft
Right Coordinate: (200, 0) ft

Piezometric Lines

LWL (c) FS Check (Toe)

Piezometric Line 1

Coordinates

	X (ft)	Y (ft)
	-200	-1
	200	-1

Regions

	Material	Points	Area (ft²)
Region 1	CH (-27 to -37)	15,7,8,16	4000
Region 2	CH (-21 to -27)	7,5,6,8	2400
Region 3	CH (-10 to -21)	5,3,4,6	4400
Region 4	CH (NG to -10)	3,1,21,19,14,24,2,4	3159.875
Region 5	ROCK	21,20,13,11,12,22,23,24,14,19	182
Region 6	CH (-37 to -50)	9,15,16,10	5200
Region 7	CH (-50 to -54)	17,9,10,18	1600
Region 8	CH (-54 to -60)	25,17,18,26	2400

Points

	X (ft)	Y (ft)
Point 1	-200	-6
Point 2	200	0
Point 3	-200	-10
Point 4	200	-10
Point 5	-200	-21
Point 6	200	-21
Point 7	-200	-27
Point 8	200	-27
Point 9	-200	-50
Point 10	200	-50
Point 11	-2.5	4
Point 12	2.5	4
Point 13	-10.5	0
Point 14	10.5	0
Point 15	-200	-37
Point 16	200	-37
Point 17	-200	-54
Point 18	200	-54
Point 19	-15.7	-2.6
Point 20	-46.5	-1
Point 21	-56.5	-3.5
Point 22	8.5	1
Point 23	20.5	1
Point 24	22.5	0

LWL (c) FS Check (Toe)

Point 25	-200	-60
Point 26	200	-60

Critical Slip Surfaces

	Slip Surface	FOS	Center (ft)	Radius (ft)	Entry (ft)	Exit (ft)
1	Optimized	2.84	(-49.86, 14.666)	27.40182	(-17.6984, -0.199956)	(-78.858, -3.88951)
2	8372	2.99	(-49.86, 14.666)	35.431	(-17.6984, -0.199956)	(-80.0311, -3.90995)

Slices of Slip Surface: Optimized

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	Optimized	-77.76357	-4.8021745	237.25684	299.36304	0	120
2	Optimized	-75.57465	-6.627498	351.14336	459.45466	0	120
3	Optimized	-72.95417	-8.77008	484.8572	645.90653	0	120
4	Optimized	-71.23398	-10.156495	571.36533	769.71319	0	120
5	Optimized	-69.519755	-11.4539	652.32375	898.72092	0	120
6	Optimized	-66.845085	-13.36378	771.49147	1088.0895	0	120
7	Optimized	-64.53585	-14.90172	867.47287	1244.5504	0	120
8	Optimized	-61.88829	-16.600865	973.50546	1414.6358	0	120
9	Optimized	-59.421515	-18.06721	1065.0064	1558.807	0	120
10	Optimized	-57.47384	-19.139555	1131.8869	1667.8758	0	120
11	Optimized	-55.97811	-19.96307	1183.2725	1760.5994	0	120
12	Optimized	-54.13195	-20.62347	1224.5115	1837.8938	0	120
13	Optimized	-51.626065	-20.99458	1247.6526	1895.2387	0	120
14	Optimized	-49.26283	-20.990675	1247.3987	1933.4066	0	120
15	Optimized	-47.290605	-20.751685	1232.5314	1919.5529	0	120
16	Optimized	-45.302925	-20.155745	1195.3077	1876.2603	0	120
17	Optimized	-43.1586	-19.39849	1148.064	1797.9281	0	120
18	Optimized	-41.264105	-18.601795	1098.3365	1723.7747	0	120
19	Optimized	-39.36961	-17.8051	1048.6576	1649.6699	0	120
20	Optimized	-37.568245	-16.940335	994.689	1560.0073	0	120
21	Optimized	-35.86001	-16.00751	936.47708	1472.0472	0	120
22	Optimized	-34.151775	-15.074685	878.26517	1384.1385	0	120
23	Optimized	-32.44462	-14.028255	812.95257	1276.479	0	120

LWL (c) FS Check (Toe)

24	Optimized	-30.738545	-12.868225	740.58563	1166.2564	0	120
25	Optimized	-29.03247	-11.708195	668.17023	1056.0337	0	120
26	Optimized	-27.51634	-10.56409	596.79599	937.09204	0	120
27	Optimized	-25.969975	-9.248595	514.72405	821.79933	0	120
28	Optimized	-24.20342	-7.745785	420.93717	699.00371	0	120
29	Optimized	-22.479915	-6.13187	320.23011	557.71089	0	120
30	Optimized	-20.799465	-4.40685	212.58705	416.2381	0	120
31	Optimized	-19.667455	-3.1127105	131.83251	288.83766	0	120
32	Optimized	-18.807455	-1.8405405	52.450197	161.45081	91.46237	0
33	Optimized	-17.96882	-0.5999778	-24.96116	35.576255	29.852022	0

Slices of Slip Surface: 8372

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	8372	-78.84714	-5.603162	287.23393	394.70767	0	120
2	8372	-76.479235	-8.6481875	477.24502	648.8106	0	120
3	8372	-74.2511	-10.992615	623.55322	858.7869	0	120
4	8372	-72.162735	-12.83214	738.32589	1038.4463	0	120
5	8372	-70.07437	-14.405125	836.48534	1191.7272	0	120
6	8372	-67.986005	-15.753405	920.60388	1322.7819	0	120
7	8372	-65.89764	-16.90603	992.54598	1434.4507	0	120
8	8372	-63.809275	-17.88394	1053.5373	1528.7448	0	120
9	8372	-61.72091	-18.702595	1104.6426	1607.1753	0	120
10	8372	-59.632545	-19.37354	1146.531	1670.9409	0	120
11	8372	-57.54418	-19.905415	1179.7146	1720.8183	0	120
12	8372	-55.5	-20.29882	1204.2335	1773.5245	0	120
13	8372	-53.5	-20.563455	1220.7507	1828.7637	0	120
14	8372	-51.5	-20.713135	1230.0789	1872.439	0	120
15	8372	-49.5	-20.749325	1232.3365	1904.7519	0	120
16	8372	-47.5	-20.67238	1227.5656	1925.6606	0	120
17	8372	-45.496575	-20.481025	1215.6201	1921.4641	0	120

LWL (c) FS Check (Toe)

18	8372	-43.48972	-20.172975	1196.3961	1891.892	0	120
19	8372	-41.482865	-19.745225	1169.7118	1850.3815	0	120
20	8372	-39.47601	-19.193215	1135.243	1796.3327	0	120
21	8372	-37.469155	-18.51072	1092.6814	1729.2075	0	120
22	8372	-35.462305	-17.689445	1041.4376	1648.1538	0	120
23	8372	-33.45545	-16.71844	980.84718	1552.0181	0	120
24	8372	-31.448595	-15.5832	909.99057	1439.3251	0	120
25	8372	-29.44174	-14.26425	827.69149	1308.1198	0	120
26	8372	-27.434885	-12.734825	732.23927	1155.6031	0	120
27	8372	-25.42803	-10.9568	621.32005	977.94168	0	120
28	8372	-23.51396	-8.985606	498.31992	794.42891	0	120
29	8372	-21.69268	-6.7748685	360.35988	602.59515	0	120
30	8372	-19.8714	-4.125227	195.01363	371.45036	0	120
31	8372	-18.520585	-1.8359645	52.164046	154.33394	85.730721	0
32	8372	-17.889405	-0.5999778	-24.961376	32.243376	27.055405	0

HWL.txt

```
VIOLET DIVERSION CHANNEL
High Water Level (EL. 2.0)
10 10 1 20 1 0
9 1 2 1
300
0 62.4 0 0
0 100 100 100
0 112 100 100
0 112 200 200
0 112 400 400
15 117 200 200
0 112 940 940
15 117 200 200
0 112 1200 1200

0 2 10 2 34 8 120 8 144 2 164 2 300 2 9999.9 0

0 2 10 2 34 8 120 8 144 2 164 2 200 -10 300 -10
9999.9 0

0 2 164 2 197 -9 200 -10 300 -10 9999.9 0

0 0 170 0 197 -9 200 -10 300 -10 9999.9 0

0 -9 170 -9 197 -9 200 -10 300 -10 9999.9 0

0 -17 300 -17 9999.9 0
0 -32 300 -32 9999.9 0
0 -37 300 -37 9999.9 0
0 -42 300 -42 9999.9 0
0 -60 300 -60 9999.9 0

0 2 300 2 9999.9 0

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
3 90125 0 142 0 1
142
4 125 -9 183 -9 1
183
5 125 -17 194 -17 1
194
6 125 -32 185 -32 1
185
```

HWL-output

**** STABILITY WITH UPLIFT ****

VIOLET DIVERSION CHANNEL

High Water Level (EL. 2.0)

10 PROFILES
1VERTICALS
UPLIFT WITH 1 PIEZOMETRIC GRADE LINES

* * STRATUM 3 ACT. WEDGE LOC. 90125.0 EL. .0 PASS.WEDGE LOC. 142.0 EL. .0

ASSUMED FAILURE SURFACE DATA

DIST.	ELEV.	WT.	UPLIFT	STR 1	STR 2	STR USED
.0	.0	224.	125.	100.	200.	100.
10.0	.0	224.	125.	100.	200.	100.
34.0	.0	824.	125.	100.	200.	100.
120.0	.0	824.	125.	100.	200.	100.
144.0	.0	224.	125.	100.	200.	100.
164.0	.0	224.	125.	100.	200.	100.
170.0	.0	125.	125.	100.	200.	100.
197.0	.0	125.	125.	100.	999999.	100.
200.0	.0	125.	125.	100.	999999.	100.
300.0	.0	125.	125.	100.	999999.	100.
300.0	.0	125.	125.	100.	999999.	100.

ASSUMED CRIT. PASSIVE LOC. 142.0 EL. .0 DP 274. RP 400.

ACTIVE WEDGE DATA

DIST.	ELEV.	DA	RA	DB	RB	FS
125.0	.0	2910.	1600.	0.	1700.	1.40

CRIT. ACTIVE LOC 125.0 EL .0 DA 2910. RA 1600.

DIS.	EL.	DP	RP	DB	RB	FS
142.0	.0	274.	400.	0.	1700.	1.40

* * STRATUM 4 ACT. WEDGE LOC. 125.0 EL. -9.0 PASS.WEDGE LOC. 183.0 EL. -9.0

ASSUMED FAILURE SURFACE DATA

DIST.	ELEV.	WT.	UPLIFT	STR 1	STR 2	STR USED

HWL-output

.0	-9.0	1232.	688.	200.	400.	200.
10.0	-9.0	1232.	688.	200.	400.	200.
34.0	-9.0	1832.	688.	200.	400.	200.
120.0	-9.0	1832.	688.	200.	400.	200.
144.0	-9.0	1232.	688.	200.	400.	200.
164.0	-9.0	1232.	688.	200.	400.	200.
170.0	-9.0	1133.	688.	200.	400.	200.
197.0	-9.0	686.	688.	200.	400.	200.
200.0	-9.0	686.	688.	200.	999999.	200.
300.0	-9.0	686.	688.	200.	999999.	200.
300.0	-9.0	686.	688.	200.	999999.	200.

ASSUMED CRIT. PASSIVE LOC. 183.0 EL. -9.0 DP 4180. RP 1399.

ACTIVE WEDGE DATA

DIST.	ELEV.	DA	RA	DB	RB	FS
125.0	-9.0	14860.	5200.	0.	11600.	1.70
130.0	-9.0	13922.	5200.	0.	10600.	1.77
135.0	-9.0	12360.	5200.	0.	9600.	1.98
140.0	-9.0	10324.	4999.	0.	8600.	2.44
145.0	-9.0	8442.	4666.	0.	7600.	3.21
150.0	-9.0	7192.	4333.	0.	6600.	4.09

CRIT. ACTIVE LOC 125.0 EL -9.0 DA 14860. RA 5200.

DIS.	EL.	DP	RP	DB	RB	FS
183.0	-9.0	4180.	1399.	0.	11600.	1.70

* * STRATUM 5 ACT. WEDGE LOC. 125.0 EL. -17.0 PASS.WEDGE LOC. 194.0 EL. -17.0

ASSUMED FAILURE SURFACE DATA

DIST.	ELEV.	WT.	UPLIFT	STR 1	STR 2	STR USED
.0	-17.0	2128.	1188.	400.	452.	400.
10.0	-17.0	2128.	1188.	400.	452.	400.
34.0	-17.0	2728.	1188.	400.	613.	400.
120.0	-17.0	2728.	1188.	400.	613.	400.
144.0	-17.0	2128.	1188.	400.	452.	400.
164.0	-17.0	2128.	1188.	400.	452.	400.
170.0	-17.0	2029.	1188.	400.	425.	400.
SHEAR STRENGTHS ARE EQUAL 400.0 AT DIST. 175.7						
197.0	-17.0	1582.	1188.	400.	306.	306.
200.0	-17.0	1533.	1188.	400.	293.	293.
300.0	-17.0	1533.	1188.	400.	292.	292.
300.0	-17.0	1533.	1188.	400.	292.	292.

ASSUMED CRIT. PASSIVE LOC. 194.0 EL. -17.0 DP 12775. RP 5600.

HWL-output

ACTIVE WEDGE DATA

DIST.	ELEV.	DA	RA	DB	RB	FS
125.0	-17.0	33098.	11600.	0.	26861.	2.17
130.0	-17.0	32160.	11600.	0.	24861.	2.17
135.0	-17.0	30598.	11600.	0.	22861.	2.25
140.0	-17.0	28412.	11600.	0.	20861.	2.43
145.0	-17.0	25613.	11599.	0.	18861.	2.81
150.0	-17.0	23031.	11266.	0.	16861.	3.29

CRIT. ACTIVE LOC 125.0 EL -17.0 DA 33098. RA 11600.

DIS.	EL.	DP	RP	DB	RB	FS
194.0	-17.0	12775.	5600.	0.	26861.	2.17

* * STRATUM 6 ACT. WEDGE LOC. 125.0 EL. -32.0 PASS.WEDGE LOC. 185.0 EL. -32.0

ASSUMED FAILURE SURFACE DATA

DIST.	ELEV.	WT.	UPLIFT	STR 1	STR 2	STR USED
.0	-32.0	3883.	2125.	671.	940.	671.
10.0	-32.0	3883.	2125.	671.	940.	671.
34.0	-32.0	4483.	2125.	832.	940.	832.
120.0	-32.0	4483.	2125.	832.	940.	832.
144.0	-32.0	3883.	2125.	671.	940.	671.
164.0	-32.0	3883.	2125.	671.	940.	671.
170.0	-32.0	3784.	2125.	644.	940.	644.
197.0	-32.0	3337.	2125.	525.	940.	525.
200.0	-32.0	3288.	2125.	512.	940.	512.
300.0	-32.0	3288.	2125.	512.	940.	512.
300.0	-32.0	3288.	2125.	512.	940.	512.

ASSUMED CRIT. PASSIVE LOC. 185.0 EL. -32.0 DP 50057. RP 22314.

ACTIVE WEDGE DATA

DIST.	ELEV.	DA	RA	DB	RB	FS
125.0	-32.0	87081.	28058.	0.	40494.	2.45
130.0	-32.0	85859.	27555.	0.	36586.	2.41
135.0	-32.0	83870.	26800.	0.	32846.	2.42
140.0	-32.0	81247.	26029.	0.	29273.	2.49
145.0	-32.0	78016.	25265.	0.	25864.	2.63
150.0	-32.0	74713.	24729.	0.	22509.	2.82
155.0	-32.0	71600.	24527.	0.	19154.	3.06

CRIT. ACTIVE LOC 130.0 EL -32.0 DA 85859. RA 27555.

HWL-output

DIS.	EL.	DP	RP	DB	RB	FS
185.0	-32.0	50057.	22314.	0.	36586.	2.41

High Water Embankment_Left to Right (c)

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File Information

Title: Violet Diversion Channel
Created By: Chaisson, Kathryn MVN
Revision Number: 27
Last Edited By: Chaisson, Kathryn MVN
Date: 4/27/2010
Time: 12:25:52 PM
File Name: Violet Diversion Channel.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 2\
Last Solved Date: 4/27/2010
Last Solved Time: 12:26:30 PM

Project Settings

Length(L) Units: feet
Time(t) Units: Seconds
Force(F) Units: lbf
Pressure(p) Units: psf
Strength Units: psf
Unit Weight of Water: 62.4 pcf
View: 2D

Analysis Settings

High Water Embankment_Left to Right (c)

Kind: SLOPE/W
Method: Spencer
Settings
- Apply Phreatic Correction: No
- PWP Conditions Source: Piezometric Line
- Use Staged Rapid Drawdown: No

SlipSurface
- Direction of movement: Left to Right
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: Yes
- Tension Crack
  - Tension Crack Option: Search for Tension Crack
  - Percentage Wet: 1
  - Tension Crack Fluid Unit Weight: 62.4 pcf

FOS Distribution
FOS Calculation Option: Constant
Advanced
Number of Slices: 30
Optimization Tolerance: 0.01
Minimum Slip Surface Depth: 0.1 ft
Optimization Maximum Iterations: 3000
Optimization Convergence Tolerance: 1e-007
Starting Optimization Points: 8
Ending Optimization Points: 16
Complete Passes per Insertion: 1
Driving Side Maximum Convex Angle: 5 °
Resisting Side Maximum Convex Angle: 1 °

Materials

EMBANKMENT FILL

Model: Undrained (Phi=0)
Unit Weight: 100 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

CH (NG to 0)

Model: Undrained (Phi=0)
Unit Weight: 112 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

CH (0 to -9)

Model: Undrained (Phi=0)
Unit Weight: 112 pcf
Cohesion: 200 psf
Pore Water Pressure
Piezometric Line: 1

CH (-9 to -17)

Model: Undrained (Phi=0)
Unit Weight: 112 pcf
Cohesion: 400 psf
Pore Water Pressure
Piezometric Line: 1

ML (-17 to -32)

Model: Mohr-Coulomb
Unit Weight: 117 pcf

Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (-32 to -37)

Model: Undrained (Phi=0)
Unit Weight: 112 pcf
Cohesion: 940 psf
Pore Water Pressure
Piezometric Line: 1

ML (-37 to -42)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (-42 to -60)

Model: Undrained (Phi=0)
Unit Weight: 112 pcf
Cohesion: 1200 psf
Pore Water Pressure
Piezometric Line: 1

Slip Surface Entry and Exit

Left Projection: Range
Left-Zone Left Coordinate: (-446.2, 8) ft
Left-Zone Right Coordinate: (-202.64706, 7.41176) ft
Left-Zone Increment: 20
Right Projection: Range
Right-Zone Left Coordinate: (-155.3, 0.1) ft
Right-Zone Right Coordinate: (-95.4, -10) ft
Right-Zone Increment: 20
Radius Increments: 20

Slip Surface Limits

Left Coordinate: (-700, 2) ft
Right Coordinate: (50, -10) ft

Piezometric Lines

High Water Embankment_Left to Right (c)

Piezometric Line 1

Coordinates

	X (ft)	Y (ft)
	-700	2
	-161	2
	50	2

Regions

	Material	Points	Area (ft²)
Region 1	CH (-42 to -60)	1,3,4,2	13500
Region 2	ML (-37 to -42)	3,5,6,4	3750
Region 3	CH (-32 to -37)	5,7,8,6	3750
Region 4	ML (-17 to -32)	7,9,10,8	11250
Region 5	CH (-9 to -17)	9,11,18,14,15,10	5823.5
Region 6	CH (NG to 0)	12,13,22,19,16,17	1084
Region 7	CH (0 to -9)	11,12,17,18	5026.5
Region 8	EMBANKMENT FILL	22,21,20,19	2244

Points

	X (ft)	Y (ft)
Point 1	-700	-60
Point 2	50	-60
Point 3	-700	-42
Point 4	50	-42
Point 5	-700	-37
Point 6	50	-37
Point 7	-700	-32
Point 8	50	-32
Point 9	-700	-17
Point 10	50	-17
Point 11	-700	-9
Point 12	-700	0
Point 13	-700	2
Point 14	-125	-10
Point 15	50	-10
Point 16	-161	2
Point 17	-155	0
Point 18	-128	-9
Point 19	-181	2
Point 20	-205	8
Point 21	-555	8
Point 22	-579	2

High Water Embankment_Left to Right (c)

Critical Slip Surfaces

	Slip Surface	FOS	Center (ft)	Radius (ft)	Entry (ft)	Exit (ft)
1	Optimized	1.93	(-183.535, 55.026)	31.27094	(-223.005, 8)	(-150.688, -1.43732)
2	7967	2.03	(-183.535, 55.026)	63.994	(-226.937, 8)	(-152.381, -0.873017)

Slices of Slip Surface: Optimized

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	Optimized	-222.0941	7.2057875	-324.84175	35.538827	0	100
2	Optimized	-220.27325	5.6173625	-225.72388	185.51389	0	100
3	Optimized	-218.38705	4.1173625	-132.12514	337.66789	0	100
4	Optimized	-216.4355	2.7057875	-44.043096	472.23433	0	100
5	Optimized	-214.4801	1.29142	44.216899	615.15748	0	100
6	Optimized	-213.1156	0.29142	106.62043	718.67805	0	100
7	Optimized	-211.50275	-0.92985	182.82394	814.70772	0	200
8	Optimized	-209.106	-2.6989525	293.21427	1009.605	0	200
9	Optimized	-206.76845	-4.3774575	397.94854	1188.8765	0	200
10	Optimized	-205.29985	-5.3853455	460.84872	1325.2671	0	200
11	Optimized	-204.07265	-6.075516	503.93211	1377.3894	0	200
12	Optimized	-202.218	-7.1185855	569.02079	1445.2508	0	200
13	Optimized	-199.72405	-8.134205	632.377	1544.4171	0	200
14	Optimized	-196.9425	-8.813175	674.75389	1584.5161	0	200
15	Optimized	-194.48665	-8.997785	686.26282	1576.003	0	200
16	Optimized	-192.0048	-8.997235	686.22252	1513.9122	0	200
17	Optimized	-189.52295	-8.996685	686.18223	1451.7811	0	200
18	Optimized	-187.0411	-8.996135	686.14194	1389.6903	0	200
19	Optimized	-184.5593	-8.995585	686.14194	1327.5591	0	200
20	Optimized	-182.50695	-8.90903	680.69519	1286.8197	0	200
21	Optimized	-181.34775	-8.7527365	670.97397	1258.122	0	200
22	Optimized	-179.94665	-8.470649	653.34628	1217.2995	0	200
23	Optimized	-177.84	-8.0465015	626.91461	1169.1362	0	200
24	Optimized	-175.73335	-7.622354	600.4364	1120.9728	0	200

25	Optimized	-173.27955	-7.1287875	569.63244	1064.8493	0	200
26	Optimized	-170.47865	-6.5658025	534.48982	1000.9346	0	200
27	Optimized	-167.90065	-6.0688925	503.51184	941.44811	0	200
28	Optimized	-165.54555	-5.6380575	476.61333	892.57968	0	200
29	Optimized	-162.684	-5.142681	445.69542	833.69091	0	200
30	Optimized	-159.19825	-4.563186	409.53	738.76913	0	200
31	Optimized	-156.19825	-3.8880145	367.41167	635.44003	0	200
32	Optimized	-154.6499	-3.4026345	337.1187	554.4823	0	200
33	Optimized	-152.4939	-2.3651035	272.37535	427.5505	0	200

Slices of Slip Surface: 7967

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	7967	-225.67435	6.894376	-305.40509	66.824493	0	100
2	7967	-223.1487	4.7928755	-174.27595	271.05793	0	100
3	7967	-220.6231	2.8984995	-56.066969	456.98177	0	100
4	7967	-217.7828	1	62.399376	656.65378	0	100
5	7967	-215.0848	-0.635154	164.4336	815.39408	0	200
6	7967	-212.84375	-1.847766	240.10056	954.32564	0	200
7	7967	-210.60265	-2.948403	308.78104	1081.5079	0	200
8	7967	-208.3616	-3.943349	370.86418	1197.5287	0	200
9	7967	-206.12055	-4.8378845	426.67442	1302.8599	0	200
10	7967	-203.8	-5.661375	478.08957	1371.5484	0	200
11	7967	-201.4	-6.4110515	524.84281	1403.0483	0	200
12	7967	-199	-7.0589305	565.26733	1423.2559	0	200
13	7967	-196.6	-7.608177	599.55271	1432.4166	0	200
14	7967	-194.2	-8.0613715	627.84094	1430.8216	0	200
15	7967	-191.8	-8.4205745	650.25534	1418.5962	0	200
16	7967	-189.4	-8.6873785	666.88823	1395.9303	0	200
17	7967	-187	-8.8629435	677.83691	1362.9132	0	200
18	7967	-184.6	-8.9480215	683.15521	1319.5669	0	200

High Water Embankment_Left to Right (c)

19	7967	-182.2	-8.9429735	682.85148	1265.8913	0	200
20	7967	-179.75	-8.843872	676.65315	1231.6397	0	200
21	7967	-177.25	-8.646428	664.33188	1216.4888	0	200
22	7967	-174.75	-8.349788	645.82539	1190.1413	0	200
23	7967	-172.25	-7.952548	621.02948	1152.3674	0	200
24	7967	-169.75	-7.4527855	589.85447	1102.9158	0	200
25	7967	-167.25	-6.8480125	552.11774	1041.3761	0	200
26	7967	-164.75	-6.135108	507.63653	967.40014	0	200
27	7967	-162.25	-5.3102315	456.16817	880.38609	0	200
28	7967	-159.5	-4.261181	390.68389	743.37132	0	200
29	7967	-156.5	-2.9536715	309.11481	551.79652	0	200
30	7967	-153.69045	-1.563635	222.37097	352.25145	0	200

High Water_Left to Right (c)

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File Information

Title: Violet Diversion Channel
Created By: Chaisson, Kathryn MVN
Revision Number: 25
Last Edited By: Chaisson, Kathryn MVN
Date: 4/21/2010
Time: 8:39:18 AM
File Name: Violet Diversion Channel.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 2\
Last Solved Date: 4/21/2010
Last Solved Time: 8:41:56 AM

Project Settings

Length(L) Units: feet
Time(t) Units: Seconds
Force(F) Units: lbf
Pressure(p) Units: psf
Strength Units: psf
Unit Weight of Water: 62.4 pcf
View: 2D

Analysis Settings

High Water_Left to Right (c)

Kind: SLOPE/W
Method: Spencer
Settings
- Apply Phreatic Correction: No
- PWP Conditions Source: Piezometric Line
- Use Staged Rapid Drawdown: No

SlipSurface
- Direction of movement: Left to Right
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: Yes
- Tension Crack
  - Tension Crack Option: Tension Crack Line
  - Percentage Wet: 1
  - Tension Crack Fluid Unit Weight: 62.4 pcf

FOS Distribution
FOS Calculation Option: Constant
Advanced
Number of Slices: 30
Optimization Tolerance: 0.01
Minimum Slip Surface Depth: 0.1 ft
Optimization Maximum Iterations: 3000
Optimization Convergence Tolerance: 1e-007
Starting Optimization Points: 8
Ending Optimization Points: 16
Complete Passes per Insertion: 1
Driving Side Maximum Convex Angle: 5 °
Resisting Side Maximum Convex Angle: 1 °

Materials

CH (NG to 0)

Model: Undrained (Phi=0)
Unit Weight: 112 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

CH (0 to -9)

Model: Undrained (Phi=0)
Unit Weight: 112 pcf
Cohesion: 200 psf
Pore Water Pressure
Piezometric Line: 1

CH (-9 to -17)

Model: Undrained (Phi=0)
Unit Weight: 112 pcf
Cohesion: 400 psf
Pore Water Pressure
Piezometric Line: 1

ML (-17 to -32)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (-32 to -37)

Model: Undrained (Phi=0)
Unit Weight: 112 pcf
Cohesion: 940 psf
Pore Water Pressure
Piezometric Line: 1

ML (-37 to -42)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (-42 to -60)

Model: Undrained (Phi=0)
Unit Weight: 112 pcf
Cohesion: 1200 psf
Pore Water Pressure
Piezometric Line: 1

Slip Surface Entry and Exit

Left Projection: Range
Left-Zone Left Coordinate: (-300, 2) ft
Left-Zone Right Coordinate: (-161.1, 2) ft
Left-Zone Increment: 20
Right Projection: Range
Right-Zone Left Coordinate: (-150, -1.66667) ft
Right-Zone Right Coordinate: (0, -10) ft
Right-Zone Increment: 20
Radius Increments: 20

Slip Surface Limits

Left Coordinate: (-700, 2) ft
Right Coordinate: (50, -10) ft

Piezometric Lines

Piezometric Line 1

Coordinates

	X (ft)	Y (ft)
	-700	2

High Water_Left to Right (c)

	50	2

Tension Crack Line

	X (ft)	Y (ft)
	-211	1
	-161	1

Regions

	Material	Points	Area (ft²)
Region 1	CH (-42 to -60)	1,3,4,2	13500
Region 2	ML (-37 to -42)	3,5,6,4	3750
Region 3	CH (-32 to -37)	5,7,8,6	3750
Region 4	ML (-17 to -32)	7,9,10,8	11250
Region 5	CH (-9 to -17)	9,11,18,14,15,10	5823.5
Region 6	CH (NG to 0)	12,13,22,19,16,17	1084
Region 7	CH (0 to -9)	11,12,17,18	5026.5
Region 8		22,21,20,19	2244

Points

	X (ft)	Y (ft)
Point 1	-700	-60
Point 2	50	-60
Point 3	-700	-42
Point 4	50	-42
Point 5	-700	-37
Point 6	50	-37
Point 7	-700	-32
Point 8	50	-32
Point 9	-700	-17
Point 10	50	-17
Point 11	-700	-9
Point 12	-700	0
Point 13	-700	2
Point 14	-125	-10
Point 15	50	-10
Point 16	-161	2
Point 17	-155	0
Point 18	-128	-9
Point 19	-181	2
Point 20	-205	8
Point 21	-555	8
Point 22	-579	2

High Water_Left to Right (c)

Critical Slip Surfaces

	Slip Surface	FOS	Center (ft)	Radius (ft)	Entry (ft)	Exit (ft)
1	Optimized	3.41	(-146.575, 17.97)	16.63575	(-167.719, 2)	(-133.341, -7.21953)
2	8431	3.60	(-146.575, 17.97)	26.759	(-167.264, 2)	(-135.642, -6.45285)

Slices of Slip Surface: Optimized

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	Optimized	-167.2801	0.59889	87.431869	125.11178	0	100
2	Optimized	-166.7372	0.09889	118.62876	179.30668	0	100
3	Optimized	-166.15445	-0.4535525	153.10209	213.25231	0	200
4	Optimized	-165.19755	-1.3606575	209.70291	311.02013	0	200
5	Optimized	-164.287	-2.20649	262.48149	405.09164	0	200
6	Optimized	-163.42285	-2.99105	311.4376	489.79239	0	200
7	Optimized	-162.4931	-3.810853	362.5944	582.18578	0	200
8	Optimized	-161.4977	-4.665899	415.95476	674.67097	0	200
9	Optimized	-160.84165	-5.229446	451.10988	733.14338	0	200
10	Optimized	-160.2464	-5.675975	478.98019	785.1469	0	200
11	Optimized	-159.37265	-6.296985	517.73146	838.92664	0	200
12	Optimized	-158.49055	-6.852875	552.41713	900.34678	0	200
13	Optimized	-157.60005	-7.343645	583.04304	939.94213	0	200
14	Optimized	-156.7148	-7.7662625	609.41718	986.57806	0	200
15	Optimized	-155.8348	-8.1207275	631.53181	1011.5703	0	200
16	Optimized	-155.1974	-8.3493405	645.80747	1040.8271	0	200
17	Optimized	-154.1913	-8.6112205	662.1625	1053.6443	0	200
18	Optimized	-152.57665	-8.91071	680.79774	1076.2031	0	200
19	Optimized	-151.1511	-8.9991065	686.34476	1074.4437	0	200
20	Optimized	-149.91185	-8.99792	686.27214	1054.1087	0	200
21	Optimized	-148.6726	-8.9967335	686.19951	1033.8545	0	200
22	Optimized	-147.43335	-8.9955465	686.11882	1013.6002	0	200
23	Optimized	-146.1941	-8.99436	686.04619	993.34595	0	200
24	Optimized	-144.9549	-8.9931735	685.97357	973.0917	0	200
25	Optimized	-144.2382	-8.994	686.04848	959.97338	0	200

26	Optimized	-143.5122	-8.9959175	686.14902	949.7626	0	200
27	Optimized	-142.25445	-8.9969125	686.20467	929.40941	0	200
28	Optimized	-140.9967	-8.9979075	686.26827	909.13572	0	200
29	Optimized	-139.7389	-8.9989025	686.33188	888.78253	0	200
30	Optimized	-138.27135	-8.88858	679.46877	865.11694	0	200
31	Optimized	-136.9744	-8.6525175	664.71446	830.56417	0	200
32	Optimized	-136.05785	-8.4020325	649.08514	787.12834	0	200
33	Optimized	-135.03505	-8.012476	624.78193	743.81398	0	200
34	Optimized	-133.90595	-7.483848	591.79144	664.73467	0	200

Slices of Slip Surface: 8431

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	8431	-166.8325	0.5	93.600767	129.49621	0	100
2	8431	-165.86115	-0.5621065	159.87388	222.14682	0	200
3	8431	-164.7809	-1.6260265	226.263	344.02312	0	200
4	8431	-163.70065	-2.5780095	285.66593	453.65786	0	200
5	8431	-162.6204	-3.433103	339.02373	552.66526	0	200
6	8431	-161.54015	-4.2025835	387.04475	642.24583	0	200
7	8431	-160.5	-4.8719555	428.80868	712.68598	0	200
8	8431	-159.5	-5.452683	465.04359	765.16152	0	200
9	8431	-158.5	-5.97758	497.8033	811.4021	0	200
10	8431	-157.5	-6.4502565	527.29586	851.80107	0	200
11	8431	-156.5	-6.8737015	553.71686	886.68803	0	200
12	8431	-155.5	-7.2503995	577.22112	916.34206	0	200
13	8431	-154.46225	-7.593262	598.62017	941.71061	0	200
14	8431	-153.3868	-7.9007715	617.80436	962.65551	0	200
15	8431	-152.31135	-8.160416	634.01042	978.21605	0	200
16	8431	-151.23585	-8.3736135	647.31148	988.57422	0	200
17	8431	-150.16035	-8.541486	657.79265	993.76558	0	200

High Water_Left to Right (c)

18	8431	-149.0849	-8.6648925	665.491	994.03836	0	200
19	8431	-148.00945	-8.74445	670.44931	989.30015	0	200
20	8431	-146.93395	-8.7805505	672.70252	979.66477	0	200
21	8431	-145.85845	-8.7733705	672.26219	965.08839	0	200
22	8431	-144.783	-8.722875	669.1097	945.73219	0	200
23	8431	-143.70755	-8.628817	663.23998	921.3695	0	200
24	8431	-142.63205	-8.4907305	654.62083	892.03355	0	200
25	8431	-141.55655	-8.3079205	643.21386	857.62457	0	200
26	8431	-140.4811	-8.079444	628.95878	818.02033	0	200
27	8431	-139.40565	-7.804084	611.77889	773.08829	0	200
28	8431	-138.33015	-7.4803165	591.57167	722.63792	0	200
29	8431	-137.25465	-7.106262	568.22966	666.44703	0	200
30	8431	-136.1792	-6.6796255	541.61194	604.24897	0	200

```
VIOLET DIVERSION CHANNEL
Low Water Level (EL. -4.0)
10 10 1 20 1 0
9 1 2 1
300
0 62.4 0 0
0 100 100 100
0 112 100 100
0 112 200 200
0 112 400 400
15 117 200 200
0 112 940 940
15 117 200 200
0 112 1200 1200

0 2 10 2 34 8 120 8 144 2 164 2 182 -4 300 -4 9999.9 0

0 2 10 2 34 8 120 8 144 2 164 2 182 -4 200 -10
300 -10 9999.9 0

0 2 164 2 182 -4 197 -9 200 -10 300 -10 9999.9 0

0 0 170 0  182 -4 197 -9 200 -10 300 -10 9999.9 0

0 -9 170 -9 197 -9 200 -10 300 -10 9999.9 0

0 -17 300 -17 9999.9 0
0 -32 300 -32 9999.9 0
0 -37 300 -37 9999.9 0
0 -42 300 -42 9999.9 0
0 -60 300 -60 9999.9 0

0 2 10 2 164 2 182 -4 300 -4 9999.9 0

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
3 90125 0 142 0 1
142
4 125 -9 181 -9 1
181
5 125 -17 183 -17 1
183
6 125 -32 179 -32 1
179
```

LWL-output

**** STABILITY WITH UPLIFT ****

VIOLET DIVERSION CHANNEL

Low Water Level (EL. -4.0)

10 PROFILES
1VERTICALS
UPLIFT WITH 1 PIEZOMETRIC GRADE LINES

* * STRATUM 3 ACT. WEDGE LOC. 90125.0 EL. .0 PASS.WEDGE LOC. 142.0 EL. .0

ASSUMED FAILURE SURFACE DATA

DIST.	ELEV.	WT.	UPLIFT	STR 1	STR 2	STR USED
.0	.0	224.	125.	100.	200.	100.
10.0	.0	224.	125.	100.	200.	100.
34.0	.0	824.	125.	100.	200.	100.
120.0	.0	824.	125.	100.	200.	100.
144.0	.0	224.	125.	100.	200.	100.
164.0	.0	224.	125.	100.	200.	100.
170.0	.0	0.	0.	100.	200.	100.
182.0	.0	-250.	0.	100.	999999.	100.
STRATUM 3 STARTS FAILURE POSSIBLE FROM DIST. 182.0						
197.0	.0	-250.	0.	100.	999999.	100.
200.0	.0	-250.	0.	100.	999999.	100.
300.0	.0	-250.	0.	100.	999999.	100.
300.0	.0	-250.	0.	100.	999999.	100.

ASSUMED CRIT. PASSIVE LOC. 142.0 EL. .0 DP 274. RP 400.

ACTIVE WEDGE DATA

DIST.	ELEV.	DA	RA	DB	RB	FS
125.0	.0	2910.	1600.	0.	1700.	1.40

CRIT. ACTIVE LOC 125.0 EL .0 DA 2910. RA 1600.

DIS.	EL.	DP	RP	DB	RB	FS
142.0	.0	274.	400.	0.	1700.	1.40

* * STRATUM 4 ACT. WEDGE LOC. 125.0 EL. -9.0 PASS.WEDGE LOC. 181.0 EL. -9.0

ASSUMED FAILURE SURFACE DATA

LWL-output

DIST.	ELEV.	WT.	UPLIFT	STR 1	STR 2	STR USED
.0	-9.0	1232.	688.	200.	400.	200.
10.0	-9.0	1232.	688.	200.	400.	200.
34.0	-9.0	1832.	688.	200.	400.	200.
120.0	-9.0	1832.	688.	200.	400.	200.
144.0	-9.0	1232.	688.	200.	400.	200.
164.0	-9.0	1232.	688.	200.	400.	200.
170.0	-9.0	1008.	562.	200.	400.	200.
182.0	-9.0	560.	312.	200.	400.	200.
197.0	-9.0	312.	313.	200.	400.	200.
200.0	-9.0	312.	313.	200.	999999.	200.
300.0	-9.0	312.	313.	200.	999999.	200.
300.0	-9.0	312.	313.	200.	999999.	200.

ASSUMED CRIT. PASSIVE LOC. 181.0 EL. -9.0 DP 1319. RP 1599.

ACTIVE WEDGE DATA

DIST.	ELEV.	DA	RA	DB	RB	FS
125.0	-9.0	14860.	5200.	0.	11200.	1.33
130.0	-9.0	13922.	5200.	0.	10200.	1.35
135.0	-9.0	12360.	5200.	0.	9200.	1.45
140.0	-9.0	10324.	4999.	0.	8200.	1.64
145.0	-9.0	8442.	4666.	0.	7200.	1.89
150.0	-9.0	7192.	4333.	0.	6200.	2.07

CRIT. ACTIVE LOC 125.0 EL -9.0 DA 14860. RA 5200.

DIS.	EL.	DP	RP	DB	RB	FS
181.0	-9.0	1319.	1599.	0.	11200.	1.33

* * STRATUM 5 ACT. WEDGE LOC. 125.0 EL. -17.0 PASS.WEDGE LOC. 183.0 EL. -17.0

ASSUMED FAILURE SURFACE DATA

DIST.	ELEV.	WT.	UPLIFT	STR 1	STR 2	STR USED
.0	-17.0	2128.	1188.	400.	452.	400.
10.0	-17.0	2128.	1188.	400.	452.	400.
34.0	-17.0	2728.	1188.	400.	613.	400.
120.0	-17.0	2728.	1188.	400.	613.	400.
144.0	-17.0	2128.	1188.	400.	452.	400.
164.0	-17.0	2128.	1188.	400.	452.	400.
170.0	-17.0	1904.	1062.	400.	425.	400.
SHEAR STRENGTHS ARE EQUAL 400.0 AT DIST. 175.8						
182.0	-17.0	1456.	812.	400.	372.	372.
197.0	-17.0	1208.	813.	400.	306.	306.
200.0	-17.0	1158.	813.	400.	293.	293.
300.0	-17.0	1158.	813.	400.	293.	293.
300.0	-17.0	1158.	813.	400.	293.	293.

LWL-output

ASSUMED CRIT. PASSIVE LOC. 183.0 EL. -17.0 DP 8256. RP 6998.

ACTIVE WEDGE DATA

DIST.	ELEV.	DA	RA	DB	RB	FS
125.0	-17.0	33098.	11600.	0.	23084.	1.68
130.0	-17.0	32160.	11600.	0.	21084.	1.66
135.0	-17.0	30598.	11600.	0.	19084.	1.69
140.0	-17.0	28412.	11600.	0.	17084.	1.77
145.0	-17.0	25613.	11599.	0.	15084.	1.94
150.0	-17.0	23030.	11266.	0.	13084.	2.12
155.0	-17.0	21280.	10933.	0.	11084.	2.23

CRIT. ACTIVE LOC 130.0 EL -17.0 DA 32160. RA 11600.

DIS.	EL.	DP	RP	DB	RB	FS
183.0	-17.0	8256.	6998.	0.	21084.	1.66

* * STRATUM 6 ACT. WEDGE LOC. 125.0 EL. -32.0 PASS.WEDGE LOC. 179.0 EL. -32.0

ASSUMED FAILURE SURFACE DATA

DIST.	ELEV.	WT.	UPLIFT	STR 1	STR 2	STR USED
.0	-32.0	3883.	2125.	671.	940.	671.
10.0	-32.0	3883.	2125.	671.	940.	671.
34.0	-32.0	4483.	2125.	832.	940.	832.
120.0	-32.0	4483.	2125.	832.	940.	832.
144.0	-32.0	3883.	2125.	671.	940.	671.
164.0	-32.0	3883.	2125.	671.	940.	671.
170.0	-32.0	3659.	2000.	644.	940.	644.
182.0	-32.0	3211.	1750.	591.	940.	591.
197.0	-32.0	2963.	1750.	525.	940.	525.
200.0	-32.0	2913.	1750.	512.	940.	512.
300.0	-32.0	2913.	1750.	512.	940.	512.
300.0	-32.0	2913.	1750.	512.	940.	512.

ASSUMED CRIT. PASSIVE LOC. 179.0 EL. -32.0 DP 39897. RP 22991.

ACTIVE WEDGE DATA

DIST.	ELEV.	DA	RA	DB	RB	FS
125.0	-32.0	87081.	28058.	0.	36946.	1.86
130.0	-32.0	85859.	27555.	0.	33039.	1.82
135.0	-32.0	83870.	26800.	0.	29298.	1.80
140.0	-32.0	81247.	26029.	0.	25725.	1.81
145.0	-32.0	78016.	25265.	0.	22316.	1.85

LWL-output

150.0	-32.0	74713.	24729.	0.	18961.	1.92
155.0	-32.0	71599.	24527.	0.	15606.	1.99
160.0	-32.0	68801.	24291.	0.	12251.	2.06

CRIT. ACTIVE LOC 135.0 EL -32.0 DA 83870. RA 26800.

DIS.	EL.	DP	RP	DB	RB	FS
179.0	-32.0	39897.	22991.	0.	29298.	1.80

Low Water Embankment_Left to Right (c)

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File Information

Title: Violet Diversion Channel
Created By: Chaisson, Kathryn MVN
Revision Number: 25
Last Edited By: Chaisson, Kathryn MVN
Date: 4/21/2010
Time: 8:39:18 AM
File Name: Violet Diversion Channel.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 2\
Last Solved Date: 4/21/2010
Last Solved Time: 8:42:36 AM

Project Settings

Length(L) Units: feet
Time(t) Units: Seconds
Force(F) Units: lbf
Pressure(p) Units: psf
Strength Units: psf
Unit Weight of Water: 62.4 pcf
View: 2D

Analysis Settings

Low Water Embankment_Left to Right (c)

Kind: SLOPE/W
Method: Spencer
Settings
- Apply Phreatic Correction: No
- PWP Conditions Source: Piezometric Line
- Use Staged Rapid Drawdown: No

SlipSurface
- Direction of movement: Left to Right
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: Yes
- Tension Crack
  - Tension Crack Option: Search for Tension Crack
  - Percentage Wet: 1
  - Tension Crack Fluid Unit Weight: 62.4 pcf

FOS Distribution
FOS Calculation Option: Constant
Advanced
Number of Slices: 30
Optimization Tolerance: 0.01
Minimum Slip Surface Depth: 0.1 ft
Optimization Maximum Iterations: 3000
Optimization Convergence Tolerance: 1e-007
Starting Optimization Points: 8
Ending Optimization Points: 16
Complete Passes per Insertion: 1
Driving Side Maximum Convex Angle: 5 °
Resisting Side Maximum Convex Angle: 1 °

Materials

EMBANKMENT FILL

Model: Undrained (Phi=0)
Unit Weight: 100 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

CH (NG to 0)

Model: Undrained (Phi=0)
Unit Weight: 112 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

CH (0 to -9)

Model: Undrained (Phi=0)
Unit Weight: 112 pcf
Cohesion: 200 psf
Pore Water Pressure
Piezometric Line: 1

CH (-9 to -17)

Model: Undrained (Phi=0)
Unit Weight: 112 pcf
Cohesion: 400 psf
Pore Water Pressure
Piezometric Line: 1

ML (-17 to -32)

Model: Mohr-Coulomb
Unit Weight: 117 pcf

Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (-32 to -37)

Model: Undrained (Phi=0)
Unit Weight: 112 pcf
Cohesion: 940 psf
Pore Water Pressure
Piezometric Line: 1

ML (-37 to -42)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (-42 to -60)

Model: Undrained (Phi=0)
Unit Weight: 112 pcf
Cohesion: 1200 psf
Pore Water Pressure
Piezometric Line: 1

Slip Surface Entry and Exit

Left Projection: Range
Left-Zone Left Coordinate: (-376.8, 8) ft
Left-Zone Right Coordinate: (-206.2, 8) ft
Left-Zone Increment: 20
Right Projection: Range
Right-Zone Left Coordinate: (-160.7, 1.9) ft
Right-Zone Right Coordinate: (-95.40004, -10) ft
Right-Zone Increment: 20
Radius Increments: 20

Slip Surface Limits

Left Coordinate: (-700, 2) ft
Right Coordinate: (50, -10) ft

Piezometric Lines

Low Water Embankment_Left to Right (c)

Piezometric Line 1

Coordinates

	X (ft)	Y (ft)
	-700	2
	-161	2
	-143	-4
	50	-4

Regions

	Material	Points	Area (ft²)
Region 1	CH (-42 to -60)	1,3,4,2	13500
Region 2	ML (-37 to -42)	3,5,6,4	3750
Region 3	CH (-32 to -37)	5,7,8,6	3750
Region 4	ML (-17 to -32)	7,9,10,8	11250
Region 5	CH (-9 to -17)	9,11,18,14,15,10	5823.5
Region 6	CH (NG to 0)	12,13,22,19,16,17	1084
Region 7	CH (0 to -9)	11,12,17,18	5026.5
Region 8	EMBANKMENT FILL	22,21,20,19	2244

Points

	X (ft)	Y (ft)
Point 1	-700	-60
Point 2	50	-60
Point 3	-700	-42
Point 4	50	-42
Point 5	-700	-37
Point 6	50	-37
Point 7	-700	-32
Point 8	50	-32
Point 9	-700	-17
Point 10	50	-17
Point 11	-700	-9
Point 12	-700	0
Point 13	-700	2
Point 14	-125	-10
Point 15	50	-10
Point 16	-161	2
Point 17	-155	0
Point 18	-128	-9
Point 19	-181	2
Point 20	-205	8
Point 21	-555	8
Point 22	-579	2

Low Water Embankment_Left to Right (c)

Critical Slip Surfaces

	Slip Surface	FOS	Center (ft)	Radius (ft)	Entry (ft)	Exit (ft)
1	Optimized	1.41	(-162.648, 79.635)	34.03982	(-214.969, 8)	(-137.402, -5.866)
2	8532	1.60	(-162.648, 79.635)	88.566	(-214.73, 8)	(-138.377, -5.54111)

Slices of Slip Surface: Optimized

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	Optimized	-213.88145	6.92607	-307.387	40.979262	0	100
2	Optimized	-211.7073	4.77821	-173.36021	232.55175	0	100
3	Optimized	-209.74535	2.85214	-53.172892	405.84656	0	100
4	Optimized	-208.8385	1.968835	1.9446507	485.08803	0	100
5	Optimized	-207.6943	0.968835	64.345545	598.40475	0	100
6	Optimized	-205.79105	-0.689058	167.79816	718.16811	0	200
7	Optimized	-204.13365	-2.132793	257.8855	844.67729	0	200
8	Optimized	-202.2005	-3.58777	348.67516	999.54511	0	200
9	Optimized	-200.06685	-4.98837	436.08393	1095.3817	0	200
10	Optimized	-197.8051	-6.188525	510.94857	1232.0516	0	200
11	Optimized	-195.4153	-7.188235	573.33092	1281.7336	0	200
12	Optimized	-192.67135	-8.11415	631.12522	1357.1729	0	200
13	Optimized	-189.5681	-8.748035	670.67655	1393.5838	0	200
14	Optimized	-186.8449	-8.958491	683.79571	1390.2178	0	200
15	Optimized	-184.50695	-8.9637525	684.13788	1332.3901	0	200
16	Optimized	-182.169	-8.969014	684.48006	1274.5196	0	200
17	Optimized	-179.81415	-8.9743135	684.77845	1245.8912	0	200
18	Optimized	-177.44245	-8.979651	685.11576	1246.5236	0	200
19	Optimized	-175.02705	-8.984835	685.45347	1247.1626	0	200
20	Optimized	-172.56795	-8.989865	685.77879	1247.6912	0	200
21	Optimized	-170.10885	-8.994895	686.06345	1248.2605	0	200
22	Optimized	-167.08445	-8.994615	686.05498	1249.3126	0	200
23	Optimized	-164.2172	-8.9933085	685.97767	1248.3087	0	200
24	Optimized	-162.0724	-8.9962855	686.16417	1248.6351	0	200
25	Optimized	-	-8.998837	670.39974	1220.309	0	200

Low Water Embankment_Left to Right (c)

		160.23395					
26	Optimized	-158.35095	-8.9996565	631.29906	1150.5552	0	200
27	Optimized	-156.117	-8.99917	584.78982	1067.1161	0	200
28	Optimized	-153.86535	-8.99868	537.92558	983.00205	0	200
29	Optimized	-151.5961	-8.9981855	490.68578	898.21718	0	200
30	Optimized	-149.32685	-8.997691	443.44598	813.43232	0	200
31	Optimized	-147.05755	-8.997197	396.22381	728.64746	0	200
32	Optimized	-144.93135	-8.83972	342.17232	667.08237	0	200
33	Optimized	-143.4699	-8.525026	292.14063	614.66865	0	200
34	Optimized	-142.125	-8.074366	254.24211	529.42047	0	200
35	Optimized	-139.326	-6.8235835	176.19173	369.33447	0	200

Slices of Slip Surface: 8532

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	8532	-213.5479	7.169695	-322.59014	43.002788	0	100
2	8532	-211.1837	5.564806	-222.4422	195.00929	0	100
3	8532	-208.81955	4.067964	-129.04264	338.22802	0	100
4	8532	-206.4554	2.672853	-41.987306	473.02806	0	100
5	8532	-205.13665	1.9252935	4.6617479	546.60512	0	100
6	8532	-203.20425	0.9252935	67.062167	613.64544	0	100
7	8532	-200.13295	-0.595941	161.98497	687.84394	0	200
8	8532	-197.58185	-1.7394615	233.34087	756.46676	0	200
9	8532	-195.0308	-2.788174	298.78349	815.21234	0	200
10	8532	-192.47975	-3.74566	358.52771	864.35665	0	200
11	8532	-189.9287	-4.6150345	412.7599	904.13364	0	200
12	8532	-187.37765	-5.399003	461.69261	934.71487	0	200
13	8532	-184.8266	-6.0999105	505.421	956.30753	0	200
14	8532	-182.27555	-6.7197815	544.12642	969.0687	0	200
15	8532	-179.75	-7.255716	577.55963	1003.6649	0	200
16	8532	-177.25	-7.7107045	605.95133	1060.6811	0	200

Low Water Embankment_Left to Right (c)

17	8532	-174.75	-8.0921035	629.75621	1109.8893	0	200
18	8532	-172.25	-8.4008705	649.03124	1151.2928	0	200
19	8532	-169.75	-8.6377675	663.81508	1184.9313	0	200
20	8532	-167.25	-8.803373	674.12804	1210.802	0	200
21	8532	-164.75	-8.8980875	680.0485	1228.8939	0	200
22	8532	-162.25	-8.9221385	681.55318	1239.1876	0	200
23	8532	-159.5	-8.863153	646.65755	1184.7504	0	200
24	8532	-156.5	-8.705392	574.4105	1063.0285	0	200
25	8532	-153.8	-8.4804925	504.21422	943.33912	0	200
26	8532	-151.4	-8.206327	437.18024	827.78248	0	200
27	8532	-149	-7.865486	366.00754	703.94616	0	200
28	8532	-146.6	-7.4571855	290.60738	571.6262	0	200
29	8532	-144.2	-6.9804715	210.94328	430.63205	0	200
30	8532	-141.84415	-6.445534	152.60101	309.33115	0	200
31	8532	-139.5325	-5.853651	115.66837	208.11871	0	200

Low Water_Left to Right (c)

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File Information

Title: Violet Diversion Channel
Created By: Chaisson, Kathryn MVN
Revision Number: 25
Last Edited By: Chaisson, Kathryn MVN
Date: 4/21/2010
Time: 8:39:18 AM
File Name: Violet Diversion Channel.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 2\
Last Solved Date: 4/21/2010
Last Solved Time: 8:43:24 AM

Project Settings

Length(L) Units: feet
Time(t) Units: Seconds
Force(F) Units: lbf
Pressure(p) Units: psf
Strength Units: psf
Unit Weight of Water: 62.4 pcf
View: 2D

Analysis Settings

Low Water_Left to Right (c)

Kind: SLOPE/W
Method: Spencer
Settings
- Apply Phreatic Correction: No
- PWP Conditions Source: Piezometric Line
- Use Staged Rapid Drawdown: No

SlipSurface
- Direction of movement: Left to Right
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: Yes
- Tension Crack
  - Tension Crack Option: Search for Tension Crack
  - Percentage Wet: 1
  - Tension Crack Fluid Unit Weight: 62.4 pcf

FOS Distribution
FOS Calculation Option: Constant
Advanced
Number of Slices: 30
Optimization Tolerance: 0.01
Minimum Slip Surface Depth: 0.1 ft
Optimization Maximum Iterations: 3000
Optimization Convergence Tolerance: 1e-007
Starting Optimization Points: 8
Ending Optimization Points: 16
Complete Passes per Insertion: 1
Driving Side Maximum Convex Angle: 5 °
Resisting Side Maximum Convex Angle: 1 °

Materials

CH (NG to 0)

Model: Undrained (Phi=0)
Unit Weight: 112 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

CH (0 to -9)

Model: Undrained (Phi=0)
Unit Weight: 112 pcf
Cohesion: 200 psf
Pore Water Pressure
Piezometric Line: 1

CH (-9 to -17)

Model: Undrained (Phi=0)
Unit Weight: 112 pcf
Cohesion: 400 psf
Pore Water Pressure
Piezometric Line: 1

ML (-17 to -32)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (-32 to -37)

Model: Undrained (Phi=0)
Unit Weight: 112 pcf
Cohesion: 940 psf
Pore Water Pressure
Piezometric Line: 1

ML (-37 to -42)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (-42 to -60)

Model: Undrained (Phi=0)
Unit Weight: 112 pcf
Cohesion: 1200 psf
Pore Water Pressure
Piezometric Line: 1

Slip Surface Entry and Exit

Left Projection: Range
Left-Zone Left Coordinate: (-300, 2) ft
Left-Zone Right Coordinate: (-161.1, 2) ft
Left-Zone Increment: 20
Right Projection: Range
Right-Zone Left Coordinate: (-150, -1.66667) ft
Right-Zone Right Coordinate: (0, -10) ft
Right-Zone Increment: 20
Radius Increments: 20

Slip Surface Limits

Left Coordinate: (-700, 2) ft
Right Coordinate: (50, -10) ft

Piezometric Lines

Piezometric Line 1

Coordinates

	X (ft)	Y (ft)
	-700	2

Low Water_Left to Right (c)

	-161	2
	-143.1	-4
	50	-4

Regions

	Material	Points	Area (ft²)
Region 1	CH (-42 to -60)	1,3,4,2	13500
Region 2	ML (-37 to -42)	3,5,6,4	3750
Region 3	CH (-32 to -37)	5,7,8,6	3750
Region 4	ML (-17 to -32)	7,9,10,8	11250
Region 5	CH (-9 to -17)	9,11,18,14,15,10	5823.5
Region 6	CH (NG to 0)	12,13,22,19,16,17	1084
Region 7	CH (0 to -9)	11,12,17,18	5026.5
Region 8		22,21,20,19	2244

Points

	X (ft)	Y (ft)
Point 1	-700	-60
Point 2	50	-60
Point 3	-700	-42
Point 4	50	-42
Point 5	-700	-37
Point 6	50	-37
Point 7	-700	-32
Point 8	50	-32
Point 9	-700	-17
Point 10	50	-17
Point 11	-700	-9
Point 12	-700	0
Point 13	-700	2
Point 14	-125	-10
Point 15	50	-10
Point 16	-161	2
Point 17	-155	0
Point 18	-128	-9
Point 19	-181	2
Point 20	-205	8
Point 21	-555	8
Point 22	-579	2

Critical Slip Surfaces

	Slip Surface	FOS	Center (ft)	Radius (ft)	Entry (ft)	Exit (ft)
1	Optimized	1.66	(-146.575, 17.97)	15.1914	(-167.257, 2)	(-136.251, -6.24949)
2	8431	1.72	(-146.575, 17.97)	26.759	(-167.223, 2)	(-135.642, -6.45285)

Low Water_Left to Right (c)

Slices of Slip Surface: Optimized

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	Optimized	-166.7823	0.47922	94.895727	93.064941	0	100
2	Optimized	-165.81315	-0.56073	159.78946	154.18281	0	200
3	Optimized	-164.87975	-1.4953035	218.10362	258.81342	0	200
4	Optimized	-164.00205	-2.32611	269.9507	340.29923	0	200
5	Optimized	-163.12435	-3.1569165	321.78951	421.78504	0	200
6	Optimized	-162.2641	-3.925306	369.73903	515.98643	0	200
7	Optimized	-161.42135	-4.631278	413.79154	586.23575	0	200
8	Optimized	-160.80315	-5.149162	441.98187	631.24412	0	200
9	Optimized	-160.07165	-5.66683	458.9906	693.92665	0	200
10	Optimized	-159.0024	-6.37237	480.65214	729.50623	0	200
11	Optimized	-157.95165	-6.984105	496.84569	790.50952	0	200
12	Optimized	-156.91935	-7.502035	507.57365	808.62324	0	200
13	Optimized	-155.7016	-8.0133815	514.0097	852.39103	0	200
14	Optimized	-154.77915	-8.3452065	515.42537	854.96615	0	200
15	Optimized	-154.07415	-8.5307925	512.25818	883.4083	0	200
16	Optimized	-153.10585	-8.7430775	505.25725	871.43409	0	200
17	Optimized	-151.8882	-8.924385	491.09583	875.49891	0	200
18	Optimized	-150.64135	-8.999059	469.67805	863.36373	0	200
19	Optimized	-149.61465	-8.9980775	448.14266	824.9195	0	200
20	Optimized	-148.58795	-8.997096	426.60726	786.47527	0	200
21	Optimized	-147.5613	-8.996114	405.07187	748.03104	0	200
22	Optimized	-146.53465	-8.9951325	383.53648	709.5868	0	200
23	Optimized	-145.50795	-8.994151	362.00109	671.14257	0	200
24	Optimized	-144.4017	-8.93238	335.00625	645.14938	0	200
25	Optimized	-143.4544	-8.8008975	306.99062	614.71473	0	200
26	Optimized	-143.05	-8.72079	294.57609	589.91732	0	200
27	Optimized	-142.68645	-8.6487775	290.07676	574.6783	0	200
28	Optimized	-	-8.379775	273.29478	543.23527	0	200

Low Water_Left to Right (c)

		141.62745					
29	Optimized	-140.29125	-7.9629275	247.28614	488.64691	0	200
30	Optimized	-139.10975	-7.5430225	221.08854	419.63201	0	200
31	Optimized	-137.9521	-7.0621745	191.08331	366.48044	0	200
32	Optimized	-136.81835	-6.520384	157.27565	282.19209	0	200

Slices of Slip Surface: 8431

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	8431	-166.8122	0.4753534	95.137757	89.973454	0	100
2	8431	-165.86115	-0.5621065	159.87388	158.47564	0	200
3	8431	-164.7809	-1.6260265	226.263	276.3809	0	200
4	8431	-163.70065	-2.5780095	285.66593	384.28226	0	200
5	8431	-162.6204	-3.433103	339.02373	483.27842	0	200
6	8431	-161.54015	-4.2025835	387.04475	574.23313	0	200
7	8431	-160.5028	-4.870344	418.31151	637.81708	0	200
8	8431	-159.50835	-5.448157	433.56326	674.62246	0	200
9	8431	-158.5139	-5.9707275	445.37553	705.4629	0	200
10	8431	-157.51945	-6.4416125	453.95737	730.6738	0	200
11	8431	-156.525	-6.8637595	459.49866	750.5288	0	200
12	8431	-155.5139	-7.2451635	462.14781	765.41654	0	200
13	8431	-154.4591	-7.5941675	461.86733	775.46153	0	200
14	8431	-153.3773	-7.9032055	458.5172	780.24538	0	200
15	8431	-152.29545	-8.1638255	452.15336	779.50469	0	200
16	8431	-151.2136	-8.377467	442.85717	773.35683	0	200
17	8431	-150.1318	-8.545267	430.70648	761.89019	0	200
18	8431	-149.05	-8.668094	415.73744	745.15936	0	200
19	8431	-147.9682	-8.7465695	398.01013	723.17729	0	200
20	8431	-146.8864	-8.7810835	377.53306	695.94747	0	200
21	8431	-145.80455	-8.7718075	354.33031	663.44072	0	200
22	8431	-144.7227	-8.7186955	328.38753	625.58787	0	200

Low Water_Left to Right (c)

23	8431	-143.6409	-8.621484	299.69257	582.29555	0	200
24	8431	-143.05	-8.555163	284.24152	556.94446	0	200
25	8431	-142.4744	-8.466999	278.73949	541.19755	0	200
26	8431	-141.4232	-8.282339	267.21605	511.59	0	200
27	8431	-140.37195	-8.0539215	252.96414	476.69634	0	200
28	8431	-139.3207	-7.7805805	235.90512	436.31093	0	200
29	8431	-138.2695	-7.460865	215.95901	390.16763	0	200
30	8431	-137.2183	-7.092996	193.00728	337.96104	0	200
31	8431	-136.1671	-6.674813	166.90722	279.29749	0	200

Embankment_Left to Right (c)_Local

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File Information

Title: Violet Diversion Channel
Created By: Chaisson, Kathryn MVN
Revision Number: 25
Last Edited By: Chaisson, Kathryn MVN
Date: 4/21/2010
Time: 8:39:18 AM
File Name: Violet Diversion Channel.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 2\
Last Solved Date: 4/21/2010
Last Solved Time: 8:40:06 AM

Project Settings

Length(L) Units: feet
Time(t) Units: Seconds
Force(F) Units: lbf
Pressure(p) Units: psf
Strength Units: psf
Unit Weight of Water: 62.4 pcf
View: 2D

Analysis Settings

Embankment_Left to Right (c)_Local

Kind: SLOPE/W
Method: Spencer
Settings
- Apply Phreatic Correction: No
- PWP Conditions Source: Piezometric Line
- Use Staged Rapid Drawdown: No

SlipSurface
- Direction of movement: Left to Right
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: Yes
- Tension Crack
  - Tension Crack Option: Search for Tension Crack
  - Percentage Wet: 1
  - Tension Crack Fluid Unit Weight: 62.4 pcf

FOS Distribution
FOS Calculation Option: Constant
Advanced
Number of Slices: 30
Optimization Tolerance: 0.01
Minimum Slip Surface Depth: 0.1 ft
Optimization Maximum Iterations: 3000
Optimization Convergence Tolerance: 1e-007
Starting Optimization Points: 8
Ending Optimization Points: 16
Complete Passes per Insertion: 1
Driving Side Maximum Convex Angle: 5 °
Resisting Side Maximum Convex Angle: 1 °

Materials

EMBANKMENT FILL

Model: Undrained (Phi=0)
Unit Weight: 100 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

CH (NG to 0)

Model: Undrained (Phi=0)
Unit Weight: 112 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

CH (0 to -9)

Model: Undrained (Phi=0)
Unit Weight: 112 pcf
Cohesion: 200 psf
Pore Water Pressure
Piezometric Line: 1

CH (-9 to -17)

Model: Undrained (Phi=0)
Unit Weight: 112 pcf
Cohesion: 400 psf
Pore Water Pressure
Piezometric Line: 1

ML (-17 to -32)

Model: Mohr-Coulomb
Unit Weight: 117 pcf

Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (-32 to -37)

Model: Undrained (Phi=0)
Unit Weight: 112 pcf
Cohesion: 940 psf
Pore Water Pressure
Piezometric Line: 1

ML (-37 to -42)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (-42 to -60)

Model: Undrained (Phi=0)
Unit Weight: 112 pcf
Cohesion: 1200 psf
Pore Water Pressure
Piezometric Line: 1

Slip Surface Entry and Exit

Left Projection: Range
Left-Zone Left Coordinate: (-299.99999, 8) ft
Left-Zone Right Coordinate: (-206, 8) ft
Left-Zone Increment: 20
Right Projection: Range
Right-Zone Left Coordinate: (-200.38824, 6.84706) ft
Right-Zone Right Coordinate: (-161, 2) ft
Right-Zone Increment: 20
Radius Increments: 20

Slip Surface Limits

Left Coordinate: (-700, 2) ft
Right Coordinate: (50, -10) ft

Piezometric Lines

Embankment_Left to Right (c)_Local

Piezometric Line 1

Coordinates

	X (ft)	Y (ft)
	-700	2
	-161	2
	-143	-4
	50	-4

Regions

	Material	Points	Area (ft²)
Region 1	CH (-42 to -60)	1,3,4,2	13500
Region 2	ML (-37 to -42)	3,5,6,4	3750
Region 3	CH (-32 to -37)	5,7,8,6	3750
Region 4	ML (-17 to -32)	7,9,10,8	11250
Region 5	CH (-9 to -17)	9,11,18,14,15,10	5823.5
Region 6	CH (NG to 0)	12,13,22,19,16,17	1084
Region 7	CH (0 to -9)	11,12,17,18	5026.5
Region 8	EMBANKMENT FILL	22,21,20,19	2244

Points

	X (ft)	Y (ft)
Point 1	-700	-60
Point 2	50	-60
Point 3	-700	-42
Point 4	50	-42
Point 5	-700	-37
Point 6	50	-37
Point 7	-700	-32
Point 8	50	-32
Point 9	-700	-17
Point 10	50	-17
Point 11	-700	-9
Point 12	-700	0
Point 13	-700	2
Point 14	-125	-10
Point 15	50	-10
Point 16	-161	2
Point 17	-155	0
Point 18	-128	-9
Point 19	-181	2
Point 20	-205	8
Point 21	-555	8
Point 22	-579	2

Embankment_Left to Right (c)_Local

Critical Slip Surfaces

	Slip Surface	FOS	Center (ft)	Radius (ft)	Entry (ft)	Exit (ft)
1	Optimized	1.35	(-191.272, 27.65)	12.10923	(-209.181, 8)	(-181.009, 2.00214)
2	8597	1.45	(-191.272, 27.65)	27.633	(-209.75, 8)	(-180.993, 2)

Slices of Slip Surface: Optimized

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	Optimized	-208.9612	5.946075	-246.24267	104.15026	0	100
2	Optimized	-208.3263	5.369195	-210.23691	181.1204	0	100
3	Optimized	-207.49565	4.597605	-162.09455	249.41763	0	100
4	Optimized	-206.65075	3.867455	-116.5266	327.52047	0	100
5	Optimized	-205.7916	3.178745	-73.554066	389.4573	0	100
6	Optimized	-205.181	2.7109725	-44.364019	446.19627	0	100
7	Optimized	-204.5691	2.2937775	-18.331735	474.45829	0	100
8	Optimized	-203.9641	1.88129	7.4073986	499.6002	0	100
9	Optimized	-203.3769	1.5583775	27.557159	544.93666	0	100
10	Optimized	-202.55075	1.1499725	53.041861	568.40641	0	100
11	Optimized	-201.7514	0.81862	73.718009	609.03206	0	100
12	Optimized	-200.9788	0.56432	89.586826	617.78591	0	100
13	Optimized	-200.1859	0.353605	102.73466	640.7486	0	100
14	Optimized	-199.3727	0.186475	113.16447	639.18275	0	100
15	Optimized	-198.38075	0.051495	121.58606	648.62915	0	100
16	Optimized	-197.30845	0.000572857	124.76817	642.16949	0	100
17	Optimized	-196.33455	0.0015585715	124.70656	617.71078	0	100
18	Optimized	-195.36065	0.002544286	124.64495	593.25207	0	100
19	Optimized	-194.38675	0.00353	124.58334	568.79336	0	100
20	Optimized	-193.41285	0.004515714	124.52174	544.32438	0	100
21	Optimized	-192.43895	0.0055014285	124.46013	519.86567	0	100
22	Optimized	-191.4651	0.006487143	124.39852	495.40696	0	100
23	Optimized	-190.9716	0.00691	124.36755	481.37557	0	100
24	Optimized	-190.5266	0.006419	124.40342	471.67681	0	100
25	Optimized	-189.64985	0.005577	124.44904	449.84604	0	100
26	Optimized	-188.7731	0.004735	124.50607	428.02669	0	100
27	Optimized	-187.89635	0.003893	124.55169	406.20733	0	100
28	Optimized	-187.0196	0.003051	124.60872	384.38797	0	100
		-					

29	Optimized	186.10465	0.07924	119.85995	373.419	0	100
30	Optimized	-185.15155	0.23246	110.29891	331.48718	0	100
31	Optimized	-183.97485	0.535725	91.368875	285.67041	0	100
32	Optimized	-182.70915	1.071785	57.920622	213.99225	0	100
33	Optimized	-181.57805	1.690595	19.306615	108.32243	0	100
34	Optimized	-181.01055	2.0010715	-0.06685823	55.251552	0	100

Slices of Slip Surface: 8597

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	8597	-209.275	6.6959915	-293.03298	68.830255	0	100
2	8597	-208.325	5.915189	-244.31187	147.87406	0	100
3	8597	-207.375	5.201756	-199.79387	218.30296	0	100
4	8597	-206.425	4.5494255	-159.08055	283.72914	0	100
5	8597	-205.475	3.953134	-121.87877	344.482	0	100
6	8597	-204.56885	3.431704	-89.338765	388.39008	0	100
7	8597	-203.70655	2.9776775	-61.006785	415.85273	0	100
8	8597	-202.84425	2.5614995	-35.037291	439.78792	0	100
9	8597	-201.98195	2.181311	-11.313329	460.33691	0	100
10	8597	-201.0615	1.814587	11.569863	480.66338	0	100
11	8597	-200.0829	1.464526	33.41317	500.22905	0	100
12	8597	-199.1043	1.1552255	52.713584	515.41583	0	100
13	8597	-198.1257	0.8852697	69.55933	526.31787	0	100
14	8597	-197.14705	0.6534761	84.023536	533.04138	0	100
15	8597	-196.1684	0.4588677	96.166175	535.64549	0	100
16	8597	-195.1898	0.30064945	106.03871	534.16888	0	100
17	8597	-194.2112	0.1781918	113.67657	528.65497	0	100
18	8597	-193.2326	0.09101742	119.12339	519.11988	0	100
19	8597	-192.254	0.03879167	122.38206	505.55105	0	100
20	8597	-191.2754	0.02131612	123.47113	487.94754	0	100
21	8597	-190.2968	0.038524705	122.39346	466.25934	0	100
22	8597	-189.3182	0.090482485	119.15627	440.4501	0	100
23	8597	-188.3396	0.17738685	113.7307	410.44863	0	100
24	8597	-187.361	0.29957135	106.10359	376.17259	0	100
25	8597	-186.38235	0.45751225	96.251421	337.49297	0	100
26	8597	-185.4037	0.6518379	84.125429	294.3012	0	100
27	8597	-184.4251	0.88334165	69.679195	246.42739	0	100
28	8597	-183.4465	1.153	52.853217	193.69027	0	100
29	8597	-182.4679	1.461993	33.571381	135.84496	0	100

Embankment_Left to Right (c)_Local

30	8597	-181.4893	1.811734	11.747931	72.642601	0	100
31	8597	-180.99625	1.998492	0.094107352	40.035845	0	100

Embankment_Left to Right (nc)_Local

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File Information

Title: Violet Diversion Channel
Created By: Chaisson, Kathryn MVN
Revision Number: 25
Last Edited By: Chaisson, Kathryn MVN
Date: 4/21/2010
Time: 8:39:18 AM
File Name: Violet Diversion Channel.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 2\
Last Solved Date: 4/21/2010
Last Solved Time: 8:40:46 AM

Project Settings

Length(L) Units: feet
Time(t) Units: Seconds
Force(F) Units: lbf
Pressure(p) Units: psf
Strength Units: psf
Unit Weight of Water: 62.4 pcf
View: 2D

Analysis Settings

Embankment_Left to Right (nc)_Local

Kind: SLOPE/W
Method: Spencer
Settings
    Apply Phreatic Correction: No
    PWP Conditions Source: Piezometric Line
    Use Staged Rapid Drawdown: No
SlipSurface
    Direction of movement: Left to Right
    Use Passive Mode: No
    Slip Surface Option: Block
    Critical slip surfaces saved: 1
    Optimize Critical Slip Surface Location: Yes
    Tension Crack
        Tension Crack Option: Search for Tension Crack
        Percentage Wet: 1
        Tension Crack Fluid Unit Weight: 62.4 pcf

FOS Distribution
FOS Calculation Option: Constant
Restrict Block Crossing: Yes
Advanced
Number of Slices: 30
Optimization Tolerance: 0.01
Minimum Slip Surface Depth: 0.1 ft
Optimization Maximum Iterations: 3000
Optimization Convergence Tolerance: 1e-007
Starting Optimization Points: 8
Ending Optimization Points: 16
Complete Passes per Insertion: 1
Driving Side Maximum Convex Angle: 5 °
Resisting Side Maximum Convex Angle: 1 °

Materials

EMBANKMENT FILL

Model: Undrained (Phi=0)
Unit Weight: 100 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

CH (NG to 0)

Model: Undrained (Phi=0)
Unit Weight: 112 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

CH (0 to -9)

Model: Undrained (Phi=0)
Unit Weight: 112 pcf
Cohesion: 200 psf
Pore Water Pressure
Piezometric Line: 1

CH (-9 to -17)

Model: Undrained (Phi=0)
Unit Weight: 112 pcf
Cohesion: 400 psf
Pore Water Pressure
Piezometric Line: 1

ML (-17 to -32)

Model: Mohr-Coulomb

Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (-32 to -37)

Model: Undrained (Phi=0)
Unit Weight: 112 pcf
Cohesion: 940 psf
Pore Water Pressure
Piezometric Line: 1

ML (-37 to -42)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (-42 to -60)

Model: Undrained (Phi=0)
Unit Weight: 112 pcf
Cohesion: 1200 psf
Pore Water Pressure
Piezometric Line: 1

Slip Surface Limits

Left Coordinate: (-700, 2) ft
Right Coordinate: (50, -10) ft

Slip Surface Block

Left Grid
Upper Left: (-207, 8) ft
Lower Left: (-207, -10) ft
Lower Right: (-197, -10) ft
X Increments: 5
Y Increments: 9
Starting Angle: 125 °
Ending Angle: 145 °
Angle Increments: 4
Right Grid
Upper Left: (-190, 8) ft

Embankment_Left to Right (nc)_Local

Lower Left: (-190, -10) ft
Lower Right: (-180, -10) ft
X Increments: 5
Y Increments: 9
Starting Angle: 25 °
Ending Angle: 45 °
Angle Increments: 4

Piezometric Lines

Piezometric Line 1

Coordinates

	X (ft)	Y (ft)
	-700	2
	-161	2
	-143	-4
	50	-4

Regions

	Material	Points	Area (ft²)
Region 1	CH (-42 to -60)	1,3,4,2	13500
Region 2	ML (-37 to -42)	3,5,6,4	3750
Region 3	CH (-32 to -37)	5,7,8,6	3750
Region 4	ML (-17 to -32)	7,9,10,8	11250
Region 5	CH (-9 to -17)	9,11,18,14,15,10	5823.5
Region 6	CH (NG to 0)	12,13,22,19,16,17	1084
Region 7	CH (0 to -9)	11,12,17,18	5026.5
Region 8	EMBANKMENT FILL	22,21,20,19	2244

Points

	X (ft)	Y (ft)
Point 1	-700	-60
Point 2	50	-60
Point 3	-700	-42
Point 4	50	-42
Point 5	-700	-37
Point 6	50	-37
Point 7	-700	-32
Point 8	50	-32
Point 9	-700	-17
Point 10	50	-17
Point 11	-700	-9
Point 12	-700	0

Embankment_Left to Right (nc)_Local

Point 13	-700	2
Point 14	-125	-10
Point 15	50	-10
Point 16	-161	2
Point 17	-155	0
Point 18	-128	-9
Point 19	-181	2
Point 20	-205	8
Point 21	-555	8
Point 22	-579	2

Critical Slip Surfaces

	Slip Surface	FOS	Center (ft)	Radius (ft)	Entry (ft)	Exit (ft)
1	Optimized	1.37	(-195.751, 8.543)	12.90358	(-210.968, 8)	(-181.187, 2.04667)
2	4181	1.44	(-195.751, 8.543)	13.303	(-211.364, 8)	(-181.463, 2.11571)

Slices of Slip Surface: Optimized

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	Optimized	-210.3554	5.950715	-246.52492	110.64539	0	100
2	Optimized	-209.30515	4.9282625	-182.72626	236.18907	0	100
3	Optimized	-208.4288	4.2495475	-140.36921	297.78949	0	100
4	Optimized	-207.46275	3.53986	-96.086	370.2397	0	100
5	Optimized	-206.407	2.7992	-49.869812	438.05508	0	100
6	Optimized	-205.51255	2.214435	-13.380814	506.45509	0	100
7	Optimized	-205.073	1.957283	2.6655412	530.81485	0	100
8	Optimized	-204.46495	1.601538	24.863743	555.3911	0	100
9	Optimized	-203.4771	1.1072625	55.706728	610.1384	0	100
10	Optimized	-202.5715	0.7447675	78.326278	627.1966	0	100
11	Optimized	-201.43525	0.389495	100.49863	660.10761	0	100
12	Optimized	-200.1298	0.12989	116.69096	674.97272	0	100
13	Optimized	-199.10315	0.02291	123.37054	674.98629	0	100
14	Optimized	-198.2227	0.001477	124.71011	663.91214	0	100
15	Optimized	-197.27105	0.001411	124.71011	640.13232	0	100
16	Optimized	-196.3194	0.001345	124.72062	616.35249	0	100
17	Optimized	-195.36775	0.001279	124.72062	592.56216	0	100
18	Optimized	-194.4161	0.001213	124.72062	568.78233	0	100
		-					

19	Optimized	193.46445	0.001147	124.73112	544.992	0	100
20	Optimized	-192.5128	0.001081	124.73112	521.21217	0	100
21	Optimized	-191.56115	0.001015	124.74163	497.43235	0	100
22	Optimized	-190.6095	0.000949	124.74163	473.64201	0	100
23	Optimized	-189.65785	0.000883	124.74163	449.86219	0	100
24	Optimized	-188.6838	0.0020175	124.66972	425.69561	0	100
25	Optimized	-187.6874	0.0043525	124.52921	400.51478	0	100
26	Optimized	-186.7681	0.03086	122.87659	381.6783	0	100
27	Optimized	-186.0063	0.10135	118.47568	363.32193	0	100
28	Optimized	-184.93485	0.326455	104.43125	323.77143	0	100
29	Optimized	-183.46895	0.801015	74.816305	247.801	0	100
30	Optimized	-181.9982	1.54781	28.216474	141.35164	0	100
31	Optimized	-181.22465	2.0233365	-1.4562296	62.670163	0	100

Slices of Slip Surface: 4181

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	4181	-210.83405	6.885892	-304.88252	63.941927	0	100
2	4181	-209.77335	6.1431535	-258.53235	133.96143	0	100
3	4181	-208.7126	5.400415	-212.18217	202.05803	0	100
4	4181	-207.65185	4.6576765	-165.83972	270.14692	0	100
5	4181	-206.5911	3.914938	-119.48955	338.24353	0	100
6	4181	-205.53035	3.1721995	-73.145549	406.33241	0	100
7	4181	-204.42815	2.400415	-24.985586	463.98631	0	100
8	4181	-203.38025	1.6666665	20.800173	510.90168	0	100
9	4181	-202.42815	0.99999985	62.39966	557.53344	0	100
10	4181	-201.47605	0.33333335	104.00087	604.1652	0	100
11	4181	-200.5	0	124.8	720.52	0	100
12	4181	-199.5	0	124.8	695.52	0	100
13	4181	-198.5	0	124.8	670.52	0	100
14	4181	-197.5	0	124.8	645.52	0	100
15	4181	-196.5	0	124.8	620.52	0	100
16	4181	-195.5	0	124.8	595.52	0	100
17	4181	-194.5	0	124.8	570.52	0	100
18	4181	-193.5	0	124.8	545.52	0	100

Embankment_Left to Right (nc)_Local

19	4181	-192.5	0	124.8	520.52	0	100
20	4181	-191.5	0	124.8	495.52	0	100
21	4181	-190.5	0	124.8	470.52	0	100
22	4181	-189.5	0	124.8	445.52	0	100
23	4181	-188.5	0	124.8	420.52	0	100
24	4181	-187.5	0	124.8	395.52	0	100
25	4181	-186.5	0	124.8	370.52	0	100
26	4181	-185.46385	0.25	109.19609	371.28698	0	100
27	4181	-184.3916	0.75	78.000103	283.15419	0	100
28	4181	-183.31935	1.25	46.799893	195.02984	0	100
29	4181	-182.2471	1.75	15.599683	106.89704	0	100
30	4181	-181.5869	2.0578555	-3.6101802	53.361052	0	100

HWL_c_Guide Levee (around)

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File Information

Title: Central Wetlands Diversion Channel
Created By: Chaisson, Kathryn MVN
Revision Number: 128
Last Edited By: Chaisson, Kathryn MVN
Date: 7/29/2010
Time: 10:52:34 AM
File Name: Central Wetlands Diversion Channel.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 2\
Last Solved Date: 7/29/2010
Last Solved Time: 10:53:16 AM

Project Settings

Length(L) Units: feet
Time(t) Units: Seconds
Force(F) Units: lbf
Pressure(p) Units: psf
Strength Units: psf
Unit Weight of Water: 62.4 pcf
View: 2D

Analysis Settings

HWL_c_Guide Levee (around)

Kind: SLOPE/W
Method: Spencer
Settings
- Apply Phreatic Correction: No
- PWP Conditions Source: Piezometric Line
- Use Staged Rapid Drawdown: No

SlipSurface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: Yes
- Tension Crack
  - Tension Crack Option: Tension Crack Line
  - Percentage Wet: 1
  - Tension Crack Fluid Unit Weight: 62.4 pcf

FOS Distribution
FOS Calculation Option: Constant
Advanced
Number of Slices: 30
Optimization Tolerance: 0.01
Minimum Slip Surface Depth: 0.1 ft
Optimization Maximum Iterations: 3000
Optimization Convergence Tolerance: 1e-007
Starting Optimization Points: 8
Ending Optimization Points: 16
Complete Passes per Insertion: 1
Driving Side Maximum Convex Angle: 5 °
Resisting Side Maximum Convex Angle: 1 °

Materials

EMBANKMENT FILL

Model: Undrained (Phi=0)
Unit Weight: 100 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

CH (NG to -18)

Model: Undrained (Phi=0)
Unit Weight: 98 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

ML (-18 to -30)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (-30 to -57)

Model: S=f(depth)
Unit Weight: 105 pcf
C-Top of Layer: 250 psf
C-Rate of Change: 12.96 psf/ft
Limiting C: 600 psf
Pore Water Pressure
Piezometric Line: 1

ML (-57 to -72)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (-72 to -92)

Model: S=f(depth)
Unit Weight: 105 pcf
C-Top of Layer: 800 psf
C-Rate of Change: 15 psf/ft
Limiting C: 1100 psf
Pore Water Pressure
Piezometric Line: 1

ML (-92 to -100)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

SAND

Model: Mohr-Coulomb
Unit Weight: 122 pcf
Cohesion: 0 psf
Phi: 30 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Slip Surface Entry and Exit

Left Projection: Range
Left-Zone Left Coordinate: (-481.1, 1.3) ft
Left-Zone Right Coordinate: (-419.32647, 1.3) ft
Left-Zone Increment: 20
Right Projection: Range
Right-Zone Left Coordinate: (-300.2, 4.53182) ft
Right-Zone Right Coordinate: (-226.6, 1.3) ft
Right-Zone Increment: 20
Radius Increments: 20

Slip Surface Limits

Left Coordinate: (-500, 1.3) ft
Right Coordinate: (50, -11.7) ft

Piezometric Lines

Piezometric Line 1

Coordinates

	X (ft)	Y (ft)
	-500	0
	-413	1.3
	-410.2	2
	-289.3	2
	50	2

Reinforcements

Reinforcement 1

Type: Fabric
Outside Point: (-392, 1.3) ft
Inside Point: (-302, 1.3) ft
Slip Surface Intersection: (-302, 1.3) ft
Total Length: 90 ft
Reinforcement Direction: 180 °
Applied Load Option: Variable
F of S Dependent: No
Contact Cohesion: 223.5 psf
Contact Phi: 0 °
Interface Factor: 2
Bond Safety Factor: 1
Fabric Capacity: 12000 lbs
Fabric Safety Factor: 1
Fabric Load: 12000 lbs
Load Distribution: Even along reinf.
Load Orientation: 0
Applied Load: 12000 lbs
Fabric Load Used: 0 lbs
Resisting Force Used: 447 lbs/ft
Available Bond Length: 0 ft
Required Bond Length: 0 ft
Governing Component: Bond

HWL_c_Guide Levee (around)

Tension Crack Line

	X (ft)	Y (ft)
	-299.5	2.5
	-286.5	-0.7
	-226.5	-0.7

Regions

	Material	Points	Area (ft²)
Region 1	ML (-92 to -100)	1,3,4,2	4400
Region 2	CH (-72 to -92)	3,5,6,4	11000
Region 3	ML (-57 to -72)	5,7,8,6	8250
Region 4	CH (-30 to -57)	7,9,10,8	14850
Region 5	ML (-18 to -30)	9,11,12,10	6600
Region 6	CH (NG to -18)	11,13,28,17,18,22,21,25,16,15,14,12	7115.5
Region 7	SAND	29,19,20,32	73.5
Region 8	EMBANKMENT FILL	28,27,26,23,24,30,31,25,21,32,20,19,29,17	395.3
Region 9	SAND	18,17,29,32,21,22	243

Points

	X (ft)	Y (ft)
Point 1	-500	-100
Point 2	50	-100
Point 3	-500	-92
Point 4	50	-92
Point 5	-500	-72
Point 6	50	-72
Point 7	-500	-57
Point 8	50	-57
Point 9	-500	-30
Point 10	50	-30
Point 11	-500	-18
Point 12	50	-18
Point 13	-500	1.3
Point 14	50	-11.7
Point 15	-174.5	-11.7
Point 16	-226.5	1.3
Point 17	-392	1.3
Point 18	-383	-1.7
Point 19	-331	4.8
Point 20	-319	4.8
Point 21	-302	1.3
Point 22	-311	-1.7
Point 23	-331	7.8
Point 24	-319	7.8
Point 25	-286.5	1.3

HWL_c_Guide Levee (around)

Point 26	-338	5.5
Point 27	-400.5	4.5
Point 28	-413	1.3
Point 29	-340	1.3
Point 30	-310.5	5
Point 31	-299.5	4.5
Point 32	-310	1.3

Critical Slip Surfaces

	Slip Surface	FOS	Center (ft)	Radius (ft)	Entry (ft)	Exit (ft)
1	Optimized	1.32	(-373.983, 131.489)	52.91543	(-299.391, 4.47321)	(-432.048, 1.3)
2	4878	1.67	(-373.983, 131.489)	149.328	(-298.97, 4.36962)	(-447.125, 1.3)

Slices of Slip Surface: Optimized

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	Optimized	-431.88995	1.1600515	-8.8805391	83.739518	0	100
2	Optimized	-428.83785	-1.5376535	162.30841	352.74924	0	100
3	Optimized	-422.74645	-6.76115	493.9257	868.86486	0	100
4	Optimized	-416.2744	-11.7946	814.05236	1358.775	0	100
5	Optimized	-411.70775	-15.09673	1043.3	1720.5749	0	100
6	Optimized	-410.30775	-16.06747	1125.7098	1809.869	0	100
7	Optimized	-408.8739	-16.55079	1157.57	1894.5303	0	100
8	Optimized	-405.78585	-17.202575	1198.2345	2012.8051	0	100
9	Optimized	-402.26195	-17.61214	1223.8009	2143.4273	0	100
10	Optimized	-399.7308	-17.906325	1242.1261	2218.7557	0	100
11	Optimized	-398.64245	-17.99302	1247.5698	2214.1175	0	100
12	Optimized	-395.16165	-17.990725	1247.4242	2220.5283	0	100
13	Optimized	-389.75	-17.991435	1247.4667	2247.3333	0	100
14	Optimized	-385.25	-17.992025	1247.5111	2290.4444	0	100
15	Optimized	-380.91475	-17.992595	1247.5291	2315.5106	0	100
16	Optimized	-376.74425	-17.99314	1247.577	2322.2245	0	100
17	Optimized	-372.57375	-17.993685	1247.601	2328.9623	0	100
18	Optimized	-368.4033	-17.994235	1247.649	2335.6761	0	100

HWL_c_Guide Levee (around)

19	Optimized	-364.23285	-17.994785	1247.6729	2342.414	0	100
20	Optimized	-360.06235	-17.99533	1247.6969	2349.1278	0	100
21	Optimized	-355.89185	-17.995875	1247.7449	2355.8657	0	100
22	Optimized	-351.87885	-17.99353	1247.5996	2361.8594	0	100
23	Optimized	-348.0233	-17.988285	1247.2624	2367.5135	0	100
24	Optimized	-343.8908	-17.920795	1243.0468	2364.1782	0	100
25	Optimized	-340.84305	-17.66183	1226.874	2319.3167	0	100
26	Optimized	-339.1	-17.260525	1201.8371	2290.5772	0	100
27	Optimized	-338.1	-17.030295	1187.4842	2278.2487	0	100
28	Optimized	-336.43045	-16.645915	1163.5137	2306.4761	0	100
29	Optimized	-332.99245	-15.252635	1076.5612	2273.7372	0	100
30	Optimized	-331.062	-14.178205	1009.5051	2232.9098	0	100
31	Optimized	-327.823	-11.95781	870.96636	2020.7365	0	100
32	Optimized	-321.823	-8.1871595	635.67885	1669.0638	0	100
33	Optimized	-318.18865	-6.1366445	507.72851	1436.9584	0	100
34	Optimized	-314.58865	-4.409474	399.95039	1132.3578	0	100
35	Optimized	-311.4	-2.9579765	309.37953	860.19661	0	100
36	Optimized	-310.75	-2.662094	290.91733	802.74396	0	100
37	Optimized	-310.25	-2.434492	276.71913	763.13465	0	100
38	Optimized	-308.4995	-1.6376505	226.98999	661.83932	0	100
39	Optimized	-304.4995	0.1715715	114.0935	436.73498	0	100
40	Optimized	-301.2207	1.6488765	21.910056	257.94258	0	100
41	Optimized	-299.9707	2.2120835	-13.234162	196.4738	0	100
42	Optimized	-299.4456	2.4486875	-27.997685	147.43515	0	100

Slices of Slip Surface: 4878

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	4878	-446.67905	1.0517036	-15.908681	58.963485	0	100
2	4878	-443.8597	-0.45375845	80.661358	205.88805	0	100

HWL_c_Guide Levee (around)

3	4878	-439.11205	-2.861672	235.34514	440.63008	0	100
4	4878	-434.3644	-5.0620905	377.06939	654.77616	0	100
5	4878	-429.61675	-7.064918	506.48242	849.32363	0	100
6	4878	-424.8691	-8.8786265	624.08119	1025.1518	0	100
7	4878	-420.12145	-10.510474	730.3335	1183.0008	0	100
8	4878	-415.3738	-11.966675	825.63159	1323.4957	0	100
9	4878	-411.6	-13.016015	915.14468	1460.4711	0	100
10	4878	-407.775	-13.943905	994.89918	1647.675	0	100
11	4878	-402.925	-14.986505	1059.9612	1871.7512	0	100
12	4878	-398.375	-15.817515	1111.8026	2016.2637	0	100
13	4878	-394.125	-16.458675	1151.8221	2083.4402	0	100
14	4878	-389.75	-16.986895	1184.7833	2157.6691	0	100
15	4878	-385.25	-17.396085	1210.3173	2238.2672	0	100
16	4878	-380.6111	-17.672495	1227.5609	2287.9286	0	100
17	4878	-375.8333	-17.808235	1236.0236	2306.1251	0	100
18	4878	-371.05555	-17.790975	1234.9601	2308.9976	0	100
19	4878	-366.2778	-17.62067	1224.3338	2297.1673	0	100
20	4878	-361.5	-17.296785	1204.1134	2270.0704	0	100
21	4878	-356.7222	-16.81831	1174.2546	2227.8447	0	100
22	4878	-351.94445	-16.183745	1134.6612	2170.496	0	100
23	4878	-347.1667	-15.391065	1085.2097	2097.6961	0	100
24	4878	-342.3889	-14.43769	1025.7178	2009.1321	0	100
25	4878	-339.1	-13.70424	979.9473	1948.3347	0	100
26	4878	-338.1	-13.463255	964.92284	1934.3109	0	100
27	4878	-334.5	-12.478615	903.46752	1981.2691	0	100
28	4878	-328	-10.547499	782.95778	1932.8963	0	100
29	4878	-322	-8.461944	652.82033	1725.4805	0	100
30	4878	-315.4	-5.8115695	487.44158	1314.1263	0	100
31	4878	-311.4	-4.0908785	380.07438	978.90519	0	100
32	4878	-310.75	-3.7893805	361.26161	920.33927	0	100
33	4878	-310.25	-3.554535	346.59904	879.60155	0	100
34	4878	-308	-2.45128	277.75055	740.58592	0	100
35	4878	-304	-0.4048017	150.05936	489.02347	0	100
36	4878	-301.4212	0.9782043	63.760051	325.33504	0	100
37	4878	-300.2263	1.65	21.840341	253.16223	0	100
38	4878	-299.5551	2.031674	-1.9765094	211.83687	0	100
39	4878	-299.23515	2.2164835	-13.508613	183.34658	0	100

HWL_nc_Guide Levee (around)

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File Information

Title: Central Wetlands Diversion Channel
Created By: Chaisson, Kathryn MVN
Revision Number: 128
Last Edited By: Chaisson, Kathryn MVN
Date: 7/29/2010
Time: 10:52:34 AM
File Name: Central Wetlands Diversion Channel.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 2\
Last Solved Date: 7/29/2010
Last Solved Time: 10:54:15 AM

Project Settings

Length(L) Units: feet
Time(t) Units: Seconds
Force(F) Units: lbf
Pressure(p) Units: psf
Strength Units: psf
Unit Weight of Water: 62.4 pcf
View: 2D

Analysis Settings

HWL_nc_Guide Levee (around)

Kind: SLOPE/W
Method: Spencer
Settings
- Apply Phreatic Correction: No
- PWP Conditions Source: Piezometric Line
- Use Staged Rapid Drawdown: No

SlipSurface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Block
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: Yes
- Tension Crack
  - Tension Crack Option: Tension Crack Line
  - Percentage Wet: 1
  - Tension Crack Fluid Unit Weight: 62.4 pcf

FOS Distribution
FOS Calculation Option: Constant
Restrict Block Crossing: Yes
Advanced
Number of Slices: 30
Optimization Tolerance: 0.01
Minimum Slip Surface Depth: 0.1 ft
Optimization Maximum Iterations: 3000
Optimization Convergence Tolerance: 1e-007
Starting Optimization Points: 8
Ending Optimization Points: 16
Complete Passes per Insertion: 1
Driving Side Maximum Convex Angle: 5 °
Resisting Side Maximum Convex Angle: 1 °

Materials

EMBANKMENT FILL

Model: Undrained (Phi=0)
Unit Weight: 100 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

CH (NG to -18)

Model: Undrained (Phi=0)
Unit Weight: 98 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

ML (-18 to -30)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (-30 to -57)

Model: S=f(depth)
Unit Weight: 105 pcf
C-Top of Layer: 250 psf
C-Rate of Change: 12.96 psf/ft
Limiting C: 600 psf
Pore Water Pressure

Piezometric Line: 1

ML (-57 to -72)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (-72 to -92)

Model: S=f(depth)
Unit Weight: 105 pcf
C-Top of Layer: 800 psf
C-Rate of Change: 15 psf/ft
Limiting C: 1100 psf
Pore Water Pressure
Piezometric Line: 1

ML (-92 to -100)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

SAND

Model: Mohr-Coulomb
Unit Weight: 122 pcf
Cohesion: 0 psf
Phi: 30 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Slip Surface Limits

Left Coordinate: (-500, 1.3) ft
Right Coordinate: (50, -11.7) ft

Slip Surface Block

Left Grid
Upper Left: (-417, -0.4) ft
Lower Left: (-417, -22.4) ft

Lower Right: (-397, -22.4) ft
X Increments: 5
Y Increments: 5
Starting Angle: 145 °
Ending Angle: 165 °
Angle Increments: 4

Right Grid
Upper Left: (-335, -0.4) ft
Lower Left: (-335, -22.4) ft
Lower Right: (-316, -22.4) ft
X Increments: 5
Y Increments: 5
Starting Angle: 35 °
Ending Angle: 55 °
Angle Increments: 4

Piezometric Lines

Piezometric Line 1

Coordinates

	X (ft)	Y (ft)
	-500	0
	-413.3	1.3
	-410.5	2
	-289.5	2
	50	2

Reinforcements

Reinforcement 1

Type: Fabric
Outside Point: (-392, 1.3) ft
Inside Point: (-302, 1.3) ft
Slip Surface Intersection: (-301.96, 1.3) ft
Total Length: 90 ft
Reinforcement Direction: 180 °
Applied Load Option: Variable
F of S Dependent: No
Contact Cohesion: 223.5 psf
Contact Phi: 0 °
Interface Factor: 2
Bond Safety Factor: 1
Fabric Capacity: 12000 lbs
Fabric Safety Factor: 1

Fabric Load: 12000 lbs
Load Distribution: Even along reinf.
Load Orientation: 0
Applied Load: 12000 lbs
Fabric Load Used: 0 lbs
Resisting Force Used: 447 lbs/ft
Available Bond Length: 0 ft
Required Bond Length: 0 ft
Governing Component: Bond

Tension Crack Line

	X (ft)	Y (ft)
	-302.7	2.7
	-299.5	2.5
	-286.5	-0.7
	-226.5	-0.7

Regions

	Material	Points	Area (ft²)
Region 1	ML (-92 to -100)	1,3,4,2	4400
Region 2	CH (-72 to -92)	3,5,6,4	11000
Region 3	ML (-57 to -72)	5,7,8,6	8250
Region 4	CH (-30 to -57)	7,9,10,8	14850
Region 5	ML (-18 to -30)	9,11,12,10	6600
Region 6	CH (NG to -18)	11,13,28,17,18,22,21,25,16,15,14,12	7115.5
Region 7	SAND	29,19,20,32	73.5
Region 8	EMBANKMENT FILL	28,27,26,23,24,30,31,25,21,32,20,19,29,17	395.3
Region 9	SAND	18,17,29,32,21,22	243

Points

	X (ft)	Y (ft)
Point 1	-500	-100
Point 2	50	-100
Point 3	-500	-92
Point 4	50	-92
Point 5	-500	-72
Point 6	50	-72
Point 7	-500	-57
Point 8	50	-57
Point 9	-500	-30
Point 10	50	-30
Point 11	-500	-18
Point 12	50	-18
Point 13	-500	1.3

HWL_nc_Guide Levee (around)

Point 14	50	-11.7
Point 15	-174.5	-11.7
Point 16	-226.5	1.3
Point 17	-392	1.3
Point 18	-383	-1.7
Point 19	-331	4.8
Point 20	-319	4.8
Point 21	-302	1.3
Point 22	-311	-1.7
Point 23	-331	7.8
Point 24	-319	7.8
Point 25	-286.5	1.3
Point 26	-338	5.5
Point 27	-400.5	4.5
Point 28	-413	1.3
Point 29	-340	1.3
Point 30	-310.5	5
Point 31	-299.5	4.5
Point 32	-310	1.3

Critical Slip Surfaces

	Slip Surface	FOS	Center (ft)	Radius (ft)	Entry (ft)	Exit (ft)
1	Optimized	1.33	(-369.154, 2.974)	51.73693	(-299.679, 4.50816)	(-431.215, 1.3)
2	3906	1.42	(-369.154, 2.974)	53.001	(-301.724, 4.60111)	(-436.563, 1.3)

Slices of Slip Surface: Optimized

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	Optimized	-431.08225	1.167682	-8.3810269	90.396161	0	100
2	Optimized	-428.31285	-1.5856145	166.01277	365.08553	0	100
3	Optimized	-423.0402	-6.8275715	498.05177	888.07352	0	100
4	Optimized	-417.5736	-11.724175	808.71585	1357.4008	0	100
5	Optimized	-414.02165	-14.325375	974.32043	1579.1102	0	100
6	Optimized	-413.15	-14.718625	1001.9163	1620.3547	0	100
7	Optimized	-411.75	-15.35026	1063.1646	1716.9092	0	100
8	Optimized	-410.3828	-15.96709	1121.13	1810.757	0	100
9	Optimized	-408.78345	-16.688655	1166.1628	1921.4135	0	100
10	Optimized	-405.601	-17.40868	1211.0955	2027.565	0	100
11	Optimized	-402.20035	-17.51134	1217.5031	2124.7372	0	100
12	Optimized	-397.394	-	1226.5661	2187.5096	0	100

HWL_nc_Guide Levee (around)

			17.656435				
13	Optimized	-393.144	-17.786015	1234.6661	2207.1354	0	100
14	Optimized	-389.1543	-17.910915	1242.4357	2248.5967	0	100
15	Optimized	-384.6543	-18	1248.0014	2296.8533	0	100
16	Optimized	-380.59675	-18	1247.9949	2316.6497	0	100
17	Optimized	-375.79025	-18	1247.9949	2324.3476	0	100
18	Optimized	-371.50125	-18	1248.0091	2331.1248	0	100
19	Optimized	-367.7297	-18	1248.0091	2337.1701	0	100
20	Optimized	-363.95815	-18	1248.0091	2343.2154	0	100
21	Optimized	-360.1072	-17.99992	1247.9869	2349.3478	0	100
22	Optimized	-356.1768	-17.99976	1247.9869	2355.6321	0	100
23	Optimized	-352.10575	-17.9996	1247.964	2362.1327	0	100
24	Optimized	-347.8941	-17.99944	1247.964	2368.8522	0	100
25	Optimized	-342.89415	-17.984215	1247.0071	2374.7745	0	100
26	Optimized	-339.1	-17.96436	1245.7605	2386.578	0	100
27	Optimized	-338.1	-17.959125	1245.4332	2396.2177	0	100
28	Optimized	-335.57755	-17.945925	1244.6346	2496.2043	0	100
29	Optimized	-332.07755	-17.19401	1197.7015	2486.3153	0	100
30	Optimized	-329.13525	-15.17548	1071.7516	2335.0667	0	100
31	Optimized	-325.40575	-12.6169	912.09328	2087.2547	0	100
32	Optimized	-321.67625	-10.05832	752.43495	1839.5532	0	100
33	Optimized	-319.40575	-8.540515	657.73049	1702.8625	0	100
34	Optimized	-317.2	-7.243855	576.82476	1503.1496	0	100
35	Optimized	-313.6	-5.1275645	444.75947	1150.0575	0	100
36	Optimized	-311.4	-3.8342755	364.05474	934.28577	0	100
37	Optimized	-310.75	-3.4521675	340.20971	868.55891	0	100
38	Optimized	-310.25	-3.158238	321.88197	822.57577	0	100
39	Optimized	-309.5423	-2.7422015	295.91577	771.33225	0	100
40	Optimized	-307.31345	-1.5344982	220.55247	631.45769	0	100
41	Optimized	-303.77115	0.3427653	103.4104	405.19055	0	100

42	Optimized	-301.322	1.6406985	22.420724	253.446	0	100
43	Optimized	-300.1617	2.2556065	-15.95009	185.02947	0	100

Slices of Slip Surface: 3906

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	3906	-436.3194	1.1292491	-10.882947	67.577532	0	100
2	3906	-433.79795	-0.6362624	101.64438	242.26904	0	100
3	3906	-429.24285	-3.8257835	304.94033	557.87338	0	100
4	3906	-424.68775	-7.0153045	508.2219	873.47773	0	100
5	3906	-420.13265	-10.204828	711.50346	1189.0821	0	100
6	3906	-415.57755	-13.39435	914.80301	1504.6864	0	100
7	3906	-413.15	-15.09414	1025.3325	1675.2477	0	100
8	3906	-411.75	-16.07443	1108.3457	1806.4599	0	100
9	3906	-410.3828	-17.031745	1187.5828	1934.1253	0	100
10	3906	-409.6328	-17.5569	1220.3544	2003.5688	0	100
11	3906	-406.875	-18	1248	2049.1765	0	100
12	3906	-402.625	-18	1248	2157.9765	0	100
13	3906	-398.375	-18	1248	2215.7647	0	100
14	3906	-394.125	-18	1248	2222.5647	0	100
15	3906	-389.75	-18	1248	2247.5556	0	100
16	3906	-385.25	-18	1248	2290.8889	0	100
17	3906	-380.85	-18	1248	2315.8837	0	100
18	3906	-376.55	-18	1248	2322.7674	0	100
19	3906	-372.25	-18	1248	2329.7674	0	100
20	3906	-367.95	-18	1248	2336.5116	0	100
21	3906	-363.65	-18	1248	2343.4884	0	100
22	3906	-359.35	-18	1248	2350.2326	0	100
23	3906	-355.05	-18	1248	2357.2093	0	100
24	3906	-350.75	-18	1248	2363.9535	0	100
25	3906	-346.45	-18	1248	2370.9302	0	100
26	3906	-342.15	-18	1248	2377.907	0	100
27	3906	-339.1	-18	1248	2390.5	0	100
28	3906	-338.1	-18	1248	2402.3	0	100
29	3906	-336.3	-18	1248	2472	0	100
30	3906	-332.9	-18	1248	2612.7941	0	100
31	3906	-331.1	-17.92998	1243.6367	2607.9755	0	100
32	3906	-329	-16.459545	1151.8712	2467.4909	0	100
33	3906	-325	-13.658715	977.10511	2195.7372	0	100
34	3906	-321	-10.857884	802.33901	1923.8402	0	100
35	3906	-317.2	-8.1970945	636.29904	1591.5895	0	100
36	3906	-313.6	-5.6763475	478.99911	1198.9427	0	100
37	3906	-311.4	-4.135891	382.88189	959.33965	0	100

HWL_nc_Guide Levee (around)

38	3906	-310.75	-3.680756	354.47985	886.73208	0	100
39	3906	-310.25	-3.330652	332.62488	835.27295	0	100
40	3906	-307.56195	-1.4484418	215.18039	616.39463	0	100
41	3906	-304.3803	0.77935825	76.169618	331.59783	147.47155	0
42	3906	-303.13685	1.65	21.840148	250.8659	0	100
43	3906	-302.1807	2.319513	-19.937923	178.45667	0	100

HWL_c_Guide Levee (through)

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File Information

Title: Central Wetlands Diversion Channel
Created By: Chaisson, Kathryn MVN
Revision Number: 128
Last Edited By: Chaisson, Kathryn MVN
Date: 7/29/2010
Time: 10:52:34 AM
File Name: Central Wetlands Diversion Channel.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 2\
Last Solved Date: 7/29/2010
Last Solved Time: 10:53:52 AM

Project Settings

Length(L) Units: feet
Time(t) Units: Seconds
Force(F) Units: lbf
Pressure(p) Units: psf
Strength Units: psf
Unit Weight of Water: 62.4 pcf
View: 2D

Analysis Settings

HWL_c_Guide Levee (through)

Kind: SLOPE/W
Method: Spencer
Settings
- Apply Phreatic Correction: No
- PWP Conditions Source: Piezometric Line
- Use Staged Rapid Drawdown: No

SlipSurface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: Yes
- Tension Crack
  - Tension Crack Option: Tension Crack Line
  - Percentage Wet: 1
  - Tension Crack Fluid Unit Weight: 62.4 pcf

FOS Distribution
FOS Calculation Option: Constant
Advanced
Number of Slices: 30
Optimization Tolerance: 0.01
Minimum Slip Surface Depth: 0.1 ft
Optimization Maximum Iterations: 3000
Optimization Convergence Tolerance: 1e-007
Starting Optimization Points: 8
Ending Optimization Points: 16
Complete Passes per Insertion: 1
Driving Side Maximum Convex Angle: 5 °
Resisting Side Maximum Convex Angle: 1 °

Materials

EMBANKMENT FILL

Model: Undrained (Phi=0)
Unit Weight: 100 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

CH (NG to -18)

Model: Undrained (Phi=0)
Unit Weight: 98 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

ML (-18 to -30)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (-30 to -57)

Model: S=f(depth)
Unit Weight: 105 pcf
C-Top of Layer: 250 psf
C-Rate of Change: 12.96 psf/ft
Limiting C: 600 psf
Pore Water Pressure
Piezometric Line: 1

ML (-57 to -72)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (-72 to -92)

Model: S=f(depth)
Unit Weight: 105 pcf
C-Top of Layer: 800 psf
C-Rate of Change: 15 psf/ft
Limiting C: 1100 psf
Pore Water Pressure
Piezometric Line: 1

ML (-92 to -100)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

SAND

Model: Mohr-Coulomb
Unit Weight: 122 pcf
Cohesion: 0 psf
Phi: 30 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Slip Surface Entry and Exit

Left Projection: Range
Left-Zone Left Coordinate: (-481.1, 1.3) ft
Left-Zone Right Coordinate: (-399.9, 4.5096) ft
Left-Zone Increment: 20
Right Projection: Range
Right-Zone Left Coordinate: (-323.2, 7.8) ft
Right-Zone Right Coordinate: (-308.9, 4.92727) ft
Right-Zone Increment: 20
Radius Increments: 20

Slip Surface Limits

Left Coordinate: (-500, 1.3) ft
Right Coordinate: (50, -11.7) ft

Piezometric Lines

Piezometric Line 1

Coordinates

	X (ft)	Y (ft)
	-500	0
	-413.3	1.3
	-410.5	2
	-289.3	2
	50	2

Reinforcements

Reinforcement 1

Type: Fabric
Outside Point: (-392, 1.3) ft
Inside Point: (-302, 1.3) ft
Slip Surface Intersection: (-311.8, 1.3) ft
Total Length: 90 ft
Reinforcement Direction: 180 °
Applied Load Option: Variable
F of S Dependent: No
Contact Cohesion: 223.5 psf
Contact Phi: 0 °
Interface Factor: 2
Bond Safety Factor: 1
Fabric Capacity: 12000 lbs
Fabric Safety Factor: 1
Fabric Load: 12000 lbs
Load Distribution: Even along reinf.
Load Orientation: 0
Applied Load: 12000 lbs
Fabric Load Used: 4379.1 lbs
Resisting Force Used: 447 lbs/ft
Available Bond Length: 9.7966 ft
Required Bond Length: 9.7966 ft
Governing Component: Bond

HWL_c_Guide Levee (through)

Tension Crack Line

	X (ft)	Y (ft)
	-323.2	6.8
	-319	6.8
	-310.5	4
	-308.9	3.9

Regions

	Material	Points	Area (ft²)
Region 1	ML (-92 to -100)	1,3,4,2	4400
Region 2	CH (-72 to -92)	3,5,6,4	11000
Region 3	ML (-57 to -72)	5,7,8,6	8250
Region 4	CH (-30 to -57)	7,9,10,8	14850
Region 5	ML (-18 to -30)	9,11,12,10	6600
Region 6	CH (NG to -18)	11,13,28,17,18,22,21,25,16,15,14,12	7115.5
Region 7	SAND	29,19,20,32	73.5
Region 8	EMBANKMENT FILL	28,27,26,23,24,30,31,25,21,32,20,19,29,17	395.3
Region 9	SAND	18,17,29,32,21,22	243

Points

	X (ft)	Y (ft)
Point 1	-500	-100
Point 2	50	-100
Point 3	-500	-92
Point 4	50	-92
Point 5	-500	-72
Point 6	50	-72
Point 7	-500	-57
Point 8	50	-57
Point 9	-500	-30
Point 10	50	-30
Point 11	-500	-18
Point 12	50	-18
Point 13	-500	1.3
Point 14	50	-11.7
Point 15	-174.5	-11.7
Point 16	-226.5	1.3
Point 17	-392	1.3
Point 18	-383	-1.7
Point 19	-331	4.8
Point 20	-319	4.8
Point 21	-302	1.3
Point 22	-311	-1.7
Point 23	-331	7.8
Point 24	-319	7.8

HWL_c_Guide Levee (through)

Point 25	-286.5	1.3
Point 26	-338	5.5
Point 27	-400.5	4.5
Point 28	-413	1.3
Point 29	-340	1.3
Point 30	-310.5	5
Point 31	-299.5	4.5
Point 32	-310	1.3

Critical Slip Surfaces

	Slip Surface	FOS	Center (ft)	Radius (ft)	Entry (ft)	Exit (ft)
1	Optimized	1.60	(-379.267, 101.276)	48.87176	(-309.681, 4.96279)	(-429.33, 1.3)
2	4396	2.56	(-379.267, 101.276)	119.309	(-310.213, 4.98695)	(-444.379, 1.3)

Slices of Slip Surface: Optimized

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	Optimized	-429.2169	1.1815175	-7.4993164	76.650252	0	100
2	Optimized	-426.45935	-1.7056025	175.23512	358.67173	0	100
3	Optimized	-421.4519	-6.890575	503.46152	863.70457	0	100
4	Optimized	-416.1944	-12.35253	849.20516	1398.9989	0	100
5	Optimized	-413.15	-15.55599	1054.1464	1714.2767	0	100
6	Optimized	-412.7778	-15.94765	1084.394	1760.4081	0	100
7	Optimized	-411.5278	-16.820575	1158.3563	1852.7753	0	100
8	Optimized	-410.3828	-17.53255	1218.8375	1949.4008	0	100
9	Optimized	-410.12995	-17.689785	1228.6278	1969.3785	0	100
10	Optimized	-409.4177	-17.877715	1240.3515	1981.0802	0	100
11	Optimized	-406.7558	-17.98192	1246.8694	2049.3103	0	100
12	Optimized	-402.58525	-17.983195	1246.9413	2156.2034	0	100
13	Optimized	-398.375	-17.98448	1247.0353	2213.1059	0	100
14	Optimized	-394.125	-17.985785	1247.1059	2220.0235	0	100
15	Optimized	-390.4401	-17.986915	1247.1793	2238.3453	0	100
16	Optimized	-385.9401	-17.98978	1247.3636	2281.8789	0	100
17	Optimized	-380.6042	-17.99412	1247.6295	2314.4443	0	100
18	Optimized	-375.81255	-17.99802	1247.8799	2322.3747	0	100
19	Optimized	-371.10455	-17.99212	1247.5113	2329.2038	0	100
20	Optimized	-366.48025	-17.976425	1246.5381	2335.0425	0	100
		-					

21	Optimized	361.85595	-17.96073	1245.5434	2340.8812	0	100
22	Optimized	-357.2645	-17.961855	1245.6278	2348.7139	0	100
23	Optimized	-352.7059	-17.979805	1246.7466	2357.7078	0	100
24	Optimized	-348.6888	-17.985985	1247.1224	2364.48	0	100
25	Optimized	-345.21325	-17.980395	1246.7771	2369.5152	0	100
26	Optimized	-341.73775	-17.974805	1246.4318	2374.5217	0	100
27	Optimized	-339.1	-17.97056	1246.1653	2385.8862	0	100
28	Optimized	-338.1	-17.96895	1246.0481	2393.4464	0	100
29	Optimized	-336.35785	-17.96615	1245.8956	2464.7536	0	100
30	Optimized	-333.70065	-17.052845	1188.8869	2435.9257	0	100
31	Optimized	-331.8428	-15.311825	1080.2555	2337.0319	0	100
32	Optimized	-329.30565	-12.812185	924.27535	2126.5396	0	100
33	Optimized	-325.8586	-9.6926575	729.63102	1828.8579	0	100
34	Optimized	-322.35315	-6.7921725	548.6354	1543.8805	0	100
35	Optimized	-319.8002	-4.7868615	423.49956	1354.488	0	100
36	Optimized	-317.17505	-2.9658965	309.87903	1099.9636	0	100
37	Optimized	-314.0523	-0.79979	174.70571	657.58004	278.78763	0
38	Optimized	-312.27725	0.698083	81.238735	384.79717	175.25954	0
39	Optimized	-311.58545	1.564432	27.179402	274.67322	142.89062	0
40	Optimized	-311.30425	1.916559	5.2068945	257.32454	0	100
41	Optimized	-310.8688	2.461837	-28.818578	188.18155	0	100
42	Optimized	-310.09065	3.436254	-89.624094	76.42211	0	100

Slices of Slip Surface: 4396

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	4396	-444.02625	1.0722836	-14.538767	46.972411	0	100
2	4396	-441.5043	-0.4823669	84.830886	197.23358	0	100
3	4396	-437.16515	-3.013759	246.8492	442.05572	0	100
4	4396	-	-	394.09853	664.14807	0	100

HWL_c_Guide Levee (through)

		432.82605	5.3084195				
5	4396	-428.48695	-7.381387	527.50708	864.88236	0	100
6	4396	-424.1478	-9.245166	647.86358	1045.4303	0	100
7	4396	-419.80865	-10.910205	755.82638	1206.7603	0	100
8	4396	-415.46955	-12.385255	851.92818	1349.6988	0	100
9	4396	-413.15	-13.120705	902.19258	1423.3152	0	100
10	4396	-411.75	-13.51883	948.86491	1495.6371	0	100
11	4396	-407.9414	-14.50618	1029.9941	1684.3843	0	100
12	4396	-402.9414	-15.634205	1100.3796	1921.409	0	100
13	4396	-398.375	-16.47341	1152.7332	2068.4259	0	100
14	4396	-394.125	-17.084985	1190.9128	2134.2859	0	100
15	4396	-389.75	-17.55022	1219.929	2203.5314	0	100
16	4396	-385.25	-17.861695	1239.3717	2276.465	0	100
17	4396	-382.53835	-17.98734	1247.1821	2308.6782	0	100
18	4396	-379.26745	-18	1248.0055	2316.6058	0	100
19	4396	-374.17955	-17.90272	1241.9367	2314.4088	0	100
20	4396	-369.62225	-17.620595	1224.3225	2293.1852	0	100
21	4396	-365.065	-17.162505	1195.7504	2254.7229	0	100
22	4396	-360.50775	-16.526395	1156.0458	2198.8447	0	100
23	4396	-355.95045	-15.70936	1105.056	2125.1093	0	100
24	4396	-351.39315	-14.70757	1042.5568	2033.1617	0	100
25	4396	-346.8359	-13.51618	968.20697	1922.5194	0	100
26	4396	-342.27865	-12.129195	881.66262	1792.5311	0	100
27	4396	-339.1	-11.064185	815.181	1699.1525	0	100
28	4396	-338.1	-10.70563	792.82246	1663.7821	0	100
29	4396	-336.25	-9.9923	748.30851	1677.5648	0	100
30	4396	-332.75	-8.574674	659.84789	1682.6647	0	100
31	4396	-329.00215	-6.9053465	555.68455	1590.2251	0	100
32	4396	-325.0065	-4.956632	434.10428	1397.2599	0	100
33	4396	-321.00435	-2.8142905	300.41934	1184.8725	0	100
34	4396	-316.5782	-0.196196	137.04183	728.80316	341.65356	0
35	4396	-313.6252	1.65	21.84037	405.74498	221.64743	0

36	4396	-312.85635	2.1592015	-9.9341592	320.07835	184.79732	0
37	4396	-311.55935	3.0486295	-65.432753	203.96537	0	100
38	4396	-310.3564	3.8804535	-117.33906	84.760987	0	100

HWL_nc_Guide Levee (through)

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File Information

Title: Central Wetlands Diversion Channel
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Revision Number: 128
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Force(F) Units: lbf
Pressure(p) Units: psf
Strength Units: psf
Unit Weight of Water: 62.4 pcf
View: 2D

Analysis Settings

HWL_nc_Guide Levee (through)

Kind: SLOPE/W
Method: Spencer
Settings
    Apply Phreatic Correction: No
    PWP Conditions Source: Piezometric Line
    Use Staged Rapid Drawdown: No
SlipSurface
    Direction of movement: Right to Left
    Use Passive Mode: No
    Slip Surface Option: Fully-Specified
    Critical slip surfaces saved: 1
    Optimize Critical Slip Surface Location: Yes
    Tension Crack
        Tension Crack Option: Tension Crack Line
        Percentage Wet: 1
        Tension Crack Fluid Unit Weight: 62.4 pcf

FOS Distribution
FOS Calculation Option: Constant
Advanced
Number of Slices: 30
Optimization Tolerance: 0.01
Minimum Slip Surface Depth: 0.1 ft
Optimization Maximum Iterations: 3000
Optimization Convergence Tolerance: 1e-007
Starting Optimization Points: 8
Ending Optimization Points: 16
Complete Passes per Insertion: 1
Driving Side Maximum Convex Angle: 5 °
Resisting Side Maximum Convex Angle: 1 °

Materials

EMBANKMENT FILL

Model: Undrained (Phi=0)
Unit Weight: 100 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

CH (NG to -18)

Model: Undrained (Phi=0)
Unit Weight: 98 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

ML (-18 to -30)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (-30 to -57)

Model: S=f(depth)
Unit Weight: 105 pcf
C-Top of Layer: 250 psf
C-Rate of Change: 12.96 psf/ft
Limiting C: 600 psf
Pore Water Pressure
Piezometric Line: 1

ML (-57 to -72)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (-72 to -92)

Model: S=f(depth)
Unit Weight: 105 pcf
C-Top of Layer: 800 psf
C-Rate of Change: 15 psf/ft
Limiting C: 1100 psf
Pore Water Pressure
Piezometric Line: 1

ML (-92 to -100)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

SAND

Model: Mohr-Coulomb
Unit Weight: 122 pcf
Cohesion: 0 psf
Phi: 30 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Slip Surface Limits

Left Coordinate: (-500, 1.3) ft
Right Coordinate: (50, -11.7) ft

Fully Specified Slip Surfaces

Fully Specified Slip Surface 1

	X (ft)	Y (ft)
	-439	8.2
	-409.6	-18

	-335.9	-18
	-310.4	11.2

Piezometric Lines

Piezometric Line 1

Coordinates

	X (ft)	Y (ft)
	-500	0
	-413.3	1.3
	-410.5	2
	-289.5	2
	50	2

Reinforcements

Reinforcement 1

Type: Fabric
Outside Point: (-392, 1.3) ft
Inside Point: (-302, 1.3) ft
Slip Surface Intersection: (-310.48, 1.3) ft
Total Length: 90 ft
Reinforcement Direction: 180 °
Applied Load Option: Variable
F of S Dependent: No
Contact Cohesion: 223.5 psf
Contact Phi: 0 °
Interface Factor: 2
Bond Safety Factor: 1
Fabric Capacity: 12000 lbs
Fabric Safety Factor: 1
Fabric Load: 12000 lbs
Load Distribution: Even along reinf.
Load Orientation: 0
Applied Load: 12000 lbs
Fabric Load Used: 3788.6 lbs
Resisting Force Used: 447 lbs/ft
Available Bond Length: 8.4755 ft
Required Bond Length: 8.4755 ft
Governing Component: Bond

Tension Crack Line

	X (ft)	Y (ft)

	-331	6.8
	-319	6.8
	-310.5	4
	-305.3	3.7

Regions

	Material	Points	Area (ft²)
Region 1	ML (-92 to -100)	1,3,4,2	4400
Region 2	CH (-72 to -92)	3,5,6,4	11000
Region 3	ML (-57 to -72)	5,7,8,6	8250
Region 4	CH (-30 to -57)	7,9,10,8	14850
Region 5	ML (-18 to -30)	9,11,12,10	6600
Region 6	CH (NG to -18)	11,13,28,17,18,22,21,25,16,15,14,12	7115.5
Region 7	SAND	29,19,20,32	73.5
Region 8	EMBANKMENT FILL	28,27,26,23,24,30,31,25,21,32,20,19,29,17	395.3
Region 9	SAND	18,17,29,32,21,22	243

Points

	X (ft)	Y (ft)
Point 1	-500	-100
Point 2	50	-100
Point 3	-500	-92
Point 4	50	-92
Point 5	-500	-72
Point 6	50	-72
Point 7	-500	-57
Point 8	50	-57
Point 9	-500	-30
Point 10	50	-30
Point 11	-500	-18
Point 12	50	-18
Point 13	-500	1.3
Point 14	50	-11.7
Point 15	-174.5	-11.7
Point 16	-226.5	1.3
Point 17	-392	1.3
Point 18	-383	-1.7
Point 19	-331	4.8
Point 20	-319	4.8
Point 21	-302	1.3
Point 22	-311	-1.7
Point 23	-331	7.8
Point 24	-319	7.8
Point 25	-286.5	1.3
Point 26	-338	5.5
Point 27	-400.5	4.5

Point 28	-413	1.3
Point 29	-340	1.3
Point 30	-310.5	5
Point 31	-299.5	4.5
Point 32	-310	1.3

Critical Slip Surfaces

	Slip Surface	FOS	Center (ft)	Radius (ft)	Entry (ft)	Exit (ft)
1	Optimized	1.56	(-373.4, 6.654)	49.02766	(-306.936, 4.83801)	(-429.127, 1.3)
2	1	1.93	(-373.4, 6.654)	46.985	(-315.305, 6.58293)	(-431.257, 1.3)

Slices of Slip Surface: Optimized

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	Optimized	-429.012	1.183068	-7.4042283	77.267212	0	100
2	Optimized	-426.42285	-1.448683	159.23366	335.34736	0	100
3	Optimized	-421.4746	-6.478321	477.71515	828.58195	0	100
4	Optimized	-416.15025	-11.910115	821.64177	1361.72	0	100
5	Optimized	-413.15	-14.9806	1018.2393	1665.1423	0	100
6	Optimized	-411.75	-16.413385	1129.4956	1839.5537	0	100
7	Optimized	-410.3828	-17.81259	1236.3136	2009.4531	0	100
8	Optimized	-410.23265	-17.96626	1245.8618	2026.5129	0	100
9	Optimized	-407.77475	-17.997355	1247.8329	2024.8676	0	100
10	Optimized	-402.9249	-17.992065	1247.503	2148.5209	0	100
11	Optimized	-399.86025	-17.988725	1247.3124	2211.3045	0	100
12	Optimized	-396.52875	-17.98842	1247.2741	2216.7405	0	100
13	Optimized	-392.9185	-17.98777	1247.2298	2222.3238	0	100
14	Optimized	-390.16715	-17.98466	1247.036	2241.0747	0	100
15	Optimized	-385.66715	-17.985615	1247.1053	2284.4382	0	100
16	Optimized	-380.0737	-17.99196	1247.5024	2315.3915	0	100
17	Optimized	-375.1913	-17.9938	1247.612	2323.3035	0	100
18	Optimized	-371.27905	-17.990835	1247.4331	2329.2847	0	100
19	Optimized	-367.36675	-17.98787	1247.2542	2335.2403	0	100
20	Optimized	-363.4152	-17.988195	1247.2681	2341.7098	0	100
21	Optimized	-359.4244	-	1247.4936	2348.4503	0	100

			17.991805				
22	Optimized	-355.2673	-17.9792	1246.7095	2353.4386	0	100
23	Optimized	-350.94395	-17.95038	1244.9054	2357.3706	0	100
24	Optimized	-347.22375	-17.94345	1244.4817	2363.495	0	100
25	Optimized	-344.10665	-17.95841	1245.412	2369.9433	0	100
26	Optimized	-341.27405	-17.970185	1246.1324	2375.5516	0	100
27	Optimized	-339.1	-17.977515	1246.6042	2387.4312	0	100
28	Optimized	-338.1	-17.980885	1246.7931	2398.3868	0	100
29	Optimized	-335.14175	-17.990855	1247.4281	2517.6323	0	100
30	Optimized	-331.64175	-17.37771	1209.1918	2538.6486	0	100
31	Optimized	-328.70095	-14.52393	1031.0915	2285.713	0	100
32	Optimized	-323.46105	-9.43915	713.79757	1787.6358	0	100
33	Optimized	-319.7601	-5.9652325	497.0326	1457.6062	0	100
34	Optimized	-316.76605	-3.5225475	344.61439	1125.6374	0	100
35	Optimized	-313.8972	-1.182005	198.55665	673.28644	274.08537	0
36	Optimized	-312.53115	-0.1487213	134.08282	530.84766	229.07229	0
37	Optimized	-311.15	0.8246647	73.339487	378.84523	176.38382	0
38	Optimized	-310.48775	1.291381	44.21854	309.34598	153.0714	0
39	Optimized	-310.39095	1.3595865	39.961638	297.70258	148.8068	0
40	Optimized	-309.89435	1.7095865	18.121462	280.63421	0	100
41	Optimized	-308.20925	2.8971985	-55.986177	154.26617	0	100

Slices of Slip Surface: 1

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	1	-431.1087	1.1676	-8.4007876	57.983424	0	100
2	1	-429.1941	-0.538592	99.856035	223.39834	0	100
3	1	-425.6621	-3.686176	299.57656	528.5551	0	100
4	1	-422.13005	-6.8337605	499.28017	833.69073	0	100
5	1	-418.598	-9.9813465	699.00493	1138.8475	0	100
6	1	-415.066	-13.12893	898.70854	1444.0043	0	100

HWL_nc_Guide Levee (through)

7	1	-413.15	-14.836395	1009.2604	1611.8404	0	100
8	1	-411.75	-16.084015	1108.9524	1766.2907	0	100
9	1	-410.3828	-17.30239	1204.4792	1916.7252	0	100
10	1	-409.9328	-17.70341	1229.5031	1965.1636	0	100
11	1	-407.325	-18	1248	2036.044	0	100
12	1	-402.775	-18	1248	2152.5275	0	100
13	1	-398.375	-18	1248	2214.1647	0	100
14	1	-394.125	-18	1248	2220.9647	0	100
15	1	-389.75	-18	1248	2244.8889	0	100
16	1	-385.25	-18	1248	2288.2222	0	100
17	1	-381.04545	-18	1247.9883	2312.7116	0	100
18	1	-377.13635	-18	1247.9883	2318.9534	0	100
19	1	-373.22725	-18	1247.9883	2325.2209	0	100
20	1	-369.31815	-18	1247.9883	2331.4627	0	100
21	1	-365.40905	-18	1247.9883	2337.7302	0	100
22	1	-361.5	-18	1247.9883	2343.972	0	100
23	1	-357.59095	-18	1247.9883	2350.2395	0	100
24	1	-353.68185	-18	1247.9883	2356.4813	0	100
25	1	-349.77275	-18	1247.9883	2362.7488	0	100
26	1	-345.86365	-18	1247.9883	2368.9906	0	100
27	1	-341.95455	-18	1247.9883	2375.2581	0	100
28	1	-339.1	-18	1248	2386.1111	0	100
29	1	-338.1	-18	1248	2375.65	0	100
30	1	-336.95	-18	1248	2441.1429	0	100
31	1	-333.45	-15.19451	1072.9365	2284.8915	0	100
32	1	-328.66635	-9.716765	731.12997	1843.2571	0	100
33	1	-323.99905	-4.372255	397.62715	1312.1104	0	100
34	1	-320.3327	-0.1739215	135.65328	714.33348	334.10117	0
35	1	-318.7171	1.6760785	20.212688	507.4623	281.3137	0
36	1	-317.5933	2.96296	-60.087683	349.42294	201.73943	0
37	1	-316.02885	4.7544245	-171.8749	148.95128	0	100

LWL_c_Guide Levee (around)

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File Information

Title: Central Wetlands Diversion Channel
Created By: Chaisson, Kathryn MVN
Revision Number: 128
Last Edited By: Chaisson, Kathryn MVN
Date: 7/29/2010
Time: 10:52:34 AM
File Name: Central Wetlands Diversion Channel.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 2\
Last Solved Date: 7/29/2010
Last Solved Time: 10:55:02 AM

Project Settings

Length(L) Units: feet
Time(t) Units: Seconds
Force(F) Units: lbf
Pressure(p) Units: psf
Strength Units: psf
Unit Weight of Water: 62.4 pcf
View: 2D

Analysis Settings

LWL_c_Guide Levee (around)

Kind: SLOPE/W
Method: Spencer
Settings
- Apply Phreatic Correction: No
- PWP Conditions Source: Piezometric Line
- Use Staged Rapid Drawdown: No

SlipSurface
- Direction of movement: Left to Right
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: Yes
- Tension Crack
  - Tension Crack Option: Tension Crack Line
  - Percentage Wet: 1
  - Tension Crack Fluid Unit Weight: 62.4 pcf

FOS Distribution
FOS Calculation Option: Constant
Advanced
Number of Slices: 30
Optimization Tolerance: 0.01
Minimum Slip Surface Depth: 0.1 ft
Optimization Maximum Iterations: 3000
Optimization Convergence Tolerance: 1e-007
Starting Optimization Points: 8
Ending Optimization Points: 16
Complete Passes per Insertion: 1
Driving Side Maximum Convex Angle: 5 °
Resisting Side Maximum Convex Angle: 1 °

Materials

EMBANKMENT FILL

Model: Undrained (Phi=0)
Unit Weight: 100 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

CH (NG to -18)

Model: Undrained (Phi=0)
Unit Weight: 98 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

ML (-18 to -30)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (-30 to -57)

Model: S=f(depth)
Unit Weight: 105 pcf
C-Top of Layer: 250 psf
C-Rate of Change: 12.96 psf/ft
Limiting C: 600 psf
Pore Water Pressure
Piezometric Line: 1

ML (-57 to -72)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (-72 to -92)

Model: S=f(depth)
Unit Weight: 105 pcf
C-Top of Layer: 800 psf
C-Rate of Change: 15 psf/ft
Limiting C: 1100 psf
Pore Water Pressure
Piezometric Line: 1

ML (-92 to -100)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

SAND

Model: Mohr-Coulomb
Unit Weight: 122 pcf
Cohesion: 0 psf
Phi: 30 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Slip Surface Entry and Exit

Left Projection: Range
Left-Zone Left Coordinate: (-481.1, 1.3) ft
Left-Zone Right Coordinate: (-393.7, 4.6088) ft
Left-Zone Increment: 20
Right Projection: Range
Right-Zone Left Coordinate: (-297, 3.88462) ft
Right-Zone Right Coordinate: (-226.6, 1.3) ft
Right-Zone Increment: 20
Radius Increments: 20

LWL_c_Guide Levee (around)

Slip Surface Limits

Left Coordinate: (-500, 1.3) ft
Right Coordinate: (50, -11.7) ft

Piezometric Lines

Piezometric Line 1

Coordinates

	X (ft)	Y (ft)
	-500	0
	50	0

Reinforcements

Reinforcement 1

Type: Fabric
Outside Point: (-302, 1.3) ft
Inside Point: (-392, 1.3) ft
Slip Surface Intersection: (-392, 1.3) ft
Total Length: 90 ft
Reinforcement Direction: 0 °
Applied Load Option: Variable
F of S Dependent: No
Contact Cohesion: 223.5 psf
Contact Phi: 0 °
Interface Factor: 2
Bond Safety Factor: 1
Fabric Capacity: 12000 lbs
Fabric Safety Factor: 1
Fabric Load: 12000 lbs
Load Distribution: Even along reinf.
Load Orientation: 0
Applied Load: 12000 lbs
Fabric Load Used: 1.6202 lbs
Resisting Force Used: 447 lbs/ft
Available Bond Length: 0.0036245 ft
Required Bond Length: 0.0036245 ft
Governing Component: Bond

Tension Crack Line

	X (ft)	Y (ft)
	-481.3	0.3

	-413	0.3
	-400.5	3.5
	-393.9	3.6056

Regions

	Material	Points	Area (ft²)
Region 1	ML (-92 to -100)	1,3,4,2	4400
Region 2	CH (-72 to -92)	3,5,6,4	11000
Region 3	ML (-57 to -72)	5,7,8,6	8250
Region 4	CH (-30 to -57)	7,9,10,8	14850
Region 5	ML (-18 to -30)	9,11,12,10	6600
Region 6	CH (NG to -18)	11,13,28,17,18,22,21,25,16,15,14,12	7115.5
Region 7	SAND	29,19,20,32	73.5
Region 8	EMBANKMENT FILL	28,27,26,23,24,30,31,25,21,32,20,19,29,17	395.3
Region 9	SAND	18,17,29,32,21,22	243

Points

	X (ft)	Y (ft)
Point 1	-500	-100
Point 2	50	-100
Point 3	-500	-92
Point 4	50	-92
Point 5	-500	-72
Point 6	50	-72
Point 7	-500	-57
Point 8	50	-57
Point 9	-500	-30
Point 10	50	-30
Point 11	-500	-18
Point 12	50	-18
Point 13	-500	1.3
Point 14	50	-11.7
Point 15	-174.5	-11.7
Point 16	-226.5	1.3
Point 17	-392	1.3
Point 18	-383	-1.7
Point 19	-331	4.8
Point 20	-319	4.8
Point 21	-302	1.3
Point 22	-311	-1.7
Point 23	-331	7.8
Point 24	-319	7.8
Point 25	-286.5	1.3
Point 26	-338	5.5
Point 27	-400.5	4.5
Point 28	-413	1.3

LWL_c_Guide Levee (around)

Point 29	-340	1.3
Point 30	-310.5	5
Point 31	-299.5	4.5
Point 32	-310	1.3

Critical Slip Surfaces

	Slip Surface	FOS	Center (ft)	Radius (ft)	Entry (ft)	Exit (ft)
1	Optimized	1.33	(-318.395, 135.369)	50.26467	(-396.104, 4.57034)	(-266.444, 1.3)
2	8700	2.06	(-318.395, 135.369)	153.192	(-396.468, 4.56451)	(-244.278, 1.3)

Slices of Slip Surface: Optimized

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	Optimized	-394.04995	2.4351725	-151.95535	175.11836	0	100
2	Optimized	-390.82055	0.65	-40.560244	367.36439	0	100
3	Optimized	-388.87235	-0.42693325	26.6404	491.93434	0	100
4	Optimized	-387.7912	-1.0245783	63.934161	561.05344	0	100
5	Optimized	-385.18195	-1.447645	90.33207	659.3096	0	100
6	Optimized	-380.61025	-1.9491515	121.62676	733.96214	0	100
7	Optimized	-376.06775	-2.447454	152.72058	790.09252	0	100
8	Optimized	-371.5253	-2.945756	183.81441	846.2229	0	100
9	Optimized	-366.98285	-3.4440585	214.90823	902.35327	0	100
10	Optimized	-362.42135	-4.1257365	257.45175	970.85546	0	100
11	Optimized	-357.84085	-4.99079	311.4263	1063.037	0	100
12	Optimized	-353.26035	-5.8558435	365.40085	1155.2185	0	100
13	Optimized	-349.14175	-6.769012	422.37972	1246.1921	0	100
14	Optimized	-345.48505	-7.7302955	482.36452	1346.3519	0	100
15	Optimized	-341.82835	-8.691579	542.34932	1446.5382	0	100
16	Optimized	-339.7979	-9.2253455	575.661	1503.8925	0	100
17	Optimized	-338.7979	-9.527445	594.51557	1540.3352	0	100
18	Optimized	-336.31165	-10.303235	642.93137	1694.5717	0	100
19	Optimized	-332.81165	-11.53395	719.7191	1955.3865	0	100
20	Optimized	-329.33445	-12.884975	804.0131	2163.1654	0	100
21	Optimized	-325.585	-14.494955	904.47553	2316.4035	0	100

LWL_c_Guide Levee (around)

22	Optimized	-321.25055	-16.55611	1033.1041	2517.1219	0	100
23	Optimized	-318.65345	-17.82352	1112.1872	2627.1629	0	100
24	Optimized	-316.4802	-17.99282	1122.7393	2584.7994	0	100
25	Optimized	-312.82675	-17.993205	1122.7667	2433.2177	0	100
26	Optimized	-310.75	-17.993425	1122.78	2345	0	100
27	Optimized	-310.25	-17.993475	1122.8	2327.4	0	100
28	Optimized	-307.95	-17.99372	1122.8049	2296.439	0	100
29	Optimized	-303.95	-17.994145	1122.8462	2246.3077	0	100
30	Optimized	-300.75	-17.99448	1122.84	2216.2	0	100
31	Optimized	-297.14645	-17.994855	1122.8722	2152.6941	0	100
32	Optimized	-292.43935	-17.99535	1122.9147	2036.8059	0	100
33	Optimized	-289.35975	-17.82647	1112.4011	1959.9992	0	100
34	Optimized	-288.02565	-17.352495	1082.7682	1898.777	0	100
35	Optimized	-286.9588	-16.66664	1039.9584	1827.7244	0	100
36	Optimized	-284.57445	-14.686535	916.43641	1623.1208	0	100
37	Optimized	-280.7234	-11.488345	716.87237	1310.8501	0	100
38	Optimized	-276.666	-8.094	505.06129	980.27062	0	100
39	Optimized	-271.9808	-3.96346	247.3266	582.27814	0	100
40	Optimized	-268.59805	-0.814085	50.800075	279.85214	0	100
41	Optimized	-267.1063	0.65	-40.559727	137.00055	0	100

Slices of Slip Surface: 8700

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	8700	-394.4901	2.432255	-151.77259	187.6278	0	100
2	8700	-392.25605	1.1590925	-72.326775	318.46022	0	100
3	8700	-391.0551	0.5090925	-31.767512	391.68426	0	100
4	8700	-389.1051	-0.5229965	32.635015	511.63626	0	100
5	8700	-385.55	-2.289974	142.89365	719.32329	0	100
6	8700	-380.3125	-4.7217785	294.64361	987.4092	0	100
7	8700	-374.9375	-6.977125	435.37537	1218.5323	0	100
8	8700	-369.5625	-8.997173	561.42645	1426.8712	0	100
9	8700	-364.1875	-10.791694	673.39828	1613.333	0	100
10	8700	-358.8125	-12.368925	771.82427	1778.6951	0	100

LWL_c_Guide Levee (around)

11	8700	-353.4375	-13.73577	857.11259	1923.5907	0	100
12	8700	-348.0625	-14.89798	929.62726	2048.6406	0	100
13	8700	-342.6875	-15.86028	989.67597	2154.153	0	100
14	8700	-339	-16.427715	1025.0993	2226.0361	0	100
15	8700	-334.5	-16.93355	1056.6519	2432.865	0	100
16	8700	-328	-17.49215	1091.5142	2635.9685	0	100
17	8700	-322	-17.75128	1107.6765	2664.7619	0	100
18	8700	-317	-17.80369	1110.9539	2589.6425	0	100
19	8700	-313	-17.714985	1105.4138	2417.1246	0	100
20	8700	-310.75	-17.632005	1100.2274	2314.7122	0	100
21	8700	-310.25	-17.6062	1098.6237	2294.7493	0	100
22	8700	-307.95	-17.452775	1089.0444	2249.9943	0	100
23	8700	-303.95	-17.127945	1068.7798	2170.0041	0	100
24	8700	-300.75	-16.79828	1048.2161	2109.147	0	100
25	8700	-297.33335	-16.352555	1020.3918	2008.0514	0	100
26	8700	-293	-15.687525	978.89373	1838.0599	0	100
27	8700	-288.66665	-14.89461	929.43085	1655.3902	0	100
28	8700	-284.01125	-13.89264	866.90383	1505.7266	0	100
29	8700	-279.0338	-12.657555	789.83558	1386.7167	0	100
30	8700	-274.05635	-11.24313	701.56168	1250.0113	0	100
31	8700	-269.07885	-9.644101	601.79513	1095.0583	0	100
32	8700	-264.10135	-7.8542765	490.10749	921.227	0	100
33	8700	-259.1239	-5.866397	366.06028	727.74859	0	100
34	8700	-254.14645	-3.671952	229.13686	513.78888	0	100
35	8700	-249.16895	-1.2609705	78.684037	278.30188	0	100
36	8700	-245.4793	0.65	-40.558616	91.395107	0	100

LWL_nc_Guide Levee (around)

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File Information

Title: Central Wetlands Diversion Channel
Created By: Chaisson, Kathryn MVN
Revision Number: 128
Last Edited By: Chaisson, Kathryn MVN
Date: 7/29/2010
Time: 10:52:34 AM
File Name: Central Wetlands Diversion Channel.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 2\
Last Solved Date: 7/29/2010
Last Solved Time: 10:56:52 AM

Project Settings

Length(L) Units: feet
Time(t) Units: Seconds
Force(F) Units: lbf
Pressure(p) Units: psf
Strength Units: psf
Unit Weight of Water: 62.4 pcf
View: 2D

Analysis Settings

LWL_nc_Guide Levee (around)

Kind: SLOPE/W
Method: Spencer
Settings
    Apply Phreatic Correction: No
    PWP Conditions Source: Piezometric Line
    Use Staged Rapid Drawdown: No
SlipSurface
    Direction of movement: Left to Right
    Use Passive Mode: No
    Slip Surface Option: Block
    Critical slip surfaces saved: 1
    Optimize Critical Slip Surface Location: Yes
    Tension Crack
        Tension Crack Option: Tension Crack Line
        Percentage Wet: 1
        Tension Crack Fluid Unit Weight: 62.4 pcf

FOS Distribution
FOS Calculation Option: Constant
Restrict Block Crossing: Yes
Advanced
Number of Slices: 30
Optimization Tolerance: 0.01
Minimum Slip Surface Depth: 0.1 ft
Optimization Maximum Iterations: 3000
Optimization Convergence Tolerance: 1e-007
Starting Optimization Points: 8
Ending Optimization Points: 16
Complete Passes per Insertion: 1
Driving Side Maximum Convex Angle: 5 °
Resisting Side Maximum Convex Angle: 1 °

Materials

EMBANKMENT FILL

Model: Undrained (Phi=0)
Unit Weight: 100 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

CH (NG to -18)

Model: Undrained (Phi=0)
Unit Weight: 98 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

ML (-18 to -30)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (-30 to -57)

Model: S=f(depth)
Unit Weight: 105 pcf
C-Top of Layer: 250 psf
C-Rate of Change: 12.96 psf/ft
Limiting C: 600 psf
Pore Water Pressure

Piezometric Line: 1

ML (-57 to -72)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (-72 to -92)

Model: S=f(depth)
Unit Weight: 105 pcf
C-Top of Layer: 800 psf
C-Rate of Change: 15 psf/ft
Limiting C: 1100 psf
Pore Water Pressure
Piezometric Line: 1

ML (-92 to -100)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

SAND

Model: Mohr-Coulomb
Unit Weight: 122 pcf
Cohesion: 0 psf
Phi: 30 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Slip Surface Limits

Left Coordinate: (-500, 1.3) ft
Right Coordinate: (50, -11.7) ft

Slip Surface Block

Left Grid
Upper Left: (-372, 1) ft
Lower Left: (-372, -21) ft

Lower Right: (-352, -21) ft
X Increments: 5
Y Increments: 5
Starting Angle: 125 °
Ending Angle: 145 °
Angle Increments: 4

Right Grid
Upper Left: (-302, 1) ft
Lower Left: (-302, -21) ft
Lower Right: (-282, -21) ft
X Increments: 5
Y Increments: 5
Starting Angle: 25 °
Ending Angle: 45 °
Angle Increments: 4

Piezometric Lines

Piezometric Line 1

Coordinates

	X (ft)	Y (ft)
	-500	0
	50	0

Reinforcements

Reinforcement 1

Type: Fabric
Outside Point: (-302, 1.3) ft
Inside Point: (-392, 1.3) ft
Slip Surface Intersection: (-392.01, 1.3) ft
Total Length: 90 ft
Reinforcement Direction: 0 °
Applied Load Option: Variable
F of S Dependent: No
Contact Cohesion: 223.5 psf
Contact Phi: 0 °
Interface Factor: 2
Bond Safety Factor: 1
Fabric Capacity: 12000 lbs
Fabric Safety Factor: 1
Fabric Load: 12000 lbs
Load Distribution: Even along reinf.
Load Orientation: 0

LWL_nc_Guide Levee (around)

Applied Load: 12000 lbs
Fabric Load Used: 0 lbs
Resisting Force Used: 447 lbs/ft
Available Bond Length: 0 ft
Required Bond Length: 0 ft
Governing Component: Bond

Tension Crack Line

	X (ft)	Y (ft)
	-466.6	0.3
	-413	0.3
	-400.5	3.5
	-393.3	3.6152

Regions

	Material	Points	Area (ft^2)
Region 1	ML (-92 to -100)	1,3,4,2	4400
Region 2	CH (-72 to -92)	3,5,6,4	11000
Region 3	ML (-57 to -72)	5,7,8,6	8250
Region 4	CH (-30 to -57)	7,9,10,8	14850
Region 5	ML (-18 to -30)	9,11,12,10	6600
Region 6	CH (NG to -18)	11,13,28,17,18,22,21,25,16,15,14,12	7115.5
Region 7	SAND	29,19,20,32	73.5
Region 8	EMBANKMENT FILL	28,27,26,23,24,30,31,25,21,32,20,19,29,17	395.3
Region 9	SAND	18,17,29,32,21,22	243

Points

	X (ft)	Y (ft)
Point 1	-500	-100
Point 2	50	-100
Point 3	-500	-92
Point 4	50	-92
Point 5	-500	-72
Point 6	50	-72
Point 7	-500	-57
Point 8	50	-57
Point 9	-500	-30
Point 10	50	-30
Point 11	-500	-18
Point 12	50	-18
Point 13	-500	1.3
Point 14	50	-11.7
Point 15	-174.5	-11.7
Point 16	-226.5	1.3

LWL_nc_Guide Levee (around)

Point 17	-392	1.3
Point 18	-383	-1.7
Point 19	-331	4.8
Point 20	-319	4.8
Point 21	-302	1.3
Point 22	-311	-1.7
Point 23	-331	7.8
Point 24	-319	7.8
Point 25	-286.5	1.3
Point 26	-338	5.5
Point 27	-400.5	4.5
Point 28	-413	1.3
Point 29	-340	1.3
Point 30	-310.5	5
Point 31	-299.5	4.5
Point 32	-310	1.3

Critical Slip Surfaces

	Slip Surface	FOS	Center (ft)	Radius (ft)	Entry (ft)	Exit (ft)
1	Optimized	1.45	(-330.584, 4.124)	48.82225	(-395.725, 4.5764)	(-268.272, 1.3)
2	3888	2.21	(-330.584, 4.124)	51.495	(-396.791, 4.55935)	(-264.436, 1.3)

Slices of Slip Surface: Optimized

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	Optimized	-393.86835	2.4381995	-152.1428	174.2409	0	100
2	Optimized	-390.9514	0.65	-40.560881	364.67002	0	100
3	Optimized	-389.44205	-0.275285	17.178007	469.68029	0	100
4	Optimized	-388.5465	-0.63539855	39.649071	543.20261	0	100
5	Optimized	-385.58765	-1.1975651	74.727295	626.67694	0	100
6	Optimized	-380.97015	-2.0748705	129.47115	740.38848	0	100
7	Optimized	-376.8259	-2.862257	178.60434	824.45001	0	100
8	Optimized	-372.74775	-3.637095	226.95502	906.88538	0	100
9	Optimized	-368.6696	-4.411933	275.29847	989.32074	0	100
10	Optimized	-364.5914	-5.186771	323.64674	1071.7561	0	100
11	Optimized	-360.4374	-6.0639625	378.39825	1161.3595	0	100
12	Optimized	-356.20765	-7.0435075	439.52607	1264.0837	0	100
13	Optimized	-352.29225	-8.1030335	505.63016	1368.0714	0	100
14	Optimized	-348.69115	-9.24254	576.7435	1485.4375	0	100

LWL_nc_Guide Levee (around)

15	Optimized	-345.09005	-10.382047	647.83037	1602.8037	0	100
16	Optimized	-341.64475	-11.462995	715.29388	1714.5861	0	100
17	Optimized	-339	-12.28499	766.57861	1807.8936	0	100
18	Optimized	-337.27255	-12.82189	800.08296	1900.7057	0	100
19	Optimized	-334.965	-13.558575	846.05441	2067.5007	0	100
20	Optimized	-332.40815	-14.37771	897.17531	2254.0676	0	100
21	Optimized	-331.2157	-14.731985	919.27614	2345.6984	0	100
22	Optimized	-329.74645	-15.04346	938.6929	2385.186	0	100
23	Optimized	-326.11965	-15.92917	993.98071	2468.3385	0	100
24	Optimized	-321.3732	-17.169085	1071.3596	2589.8292	0	100
25	Optimized	-318.71605	-17.863215	1114.6688	2645.9412	0	100
26	Optimized	-318.25845	-17.96272	1120.8763	2645.3136	0	100
27	Optimized	-316.3136	-17.988685	1122.4844	2577.906	0	100
28	Optimized	-312.7712	-17.98996	1122.5691	2431.0286	0	100
29	Optimized	-310.75	-17.99069	1122.62	2345.2	0	100
30	Optimized	-310.25	-17.99087	1122.64	2327.6	0	100
31	Optimized	-307.95	-17.991695	1122.6829	2296.6829	0	100
32	Optimized	-303.95	-17.99313	1122.7692	2246.641	0	100
33	Optimized	-300.75	-17.99428	1122.84	2216.6	0	100
34	Optimized	-297.17635	-17.995565	1122.9316	2153.9388	0	100
35	Optimized	-292.52905	-17.997235	1123.0177	2039.6359	0	100
36	Optimized	-288.4451	-17.015135	1061.7345	1883.4304	0	100
37	Optimized	-286.5924	-15.94629	995.06194	1759.8449	0	100
38	Optimized	-283.5169	-13.08687	816.62324	1476.8353	0	100
39	Optimized	-277.3504	-7.254245	452.66107	906.55658	0	100
40	Optimized	-271.9169	-2.097565	130.88825	398.32446	0	100
41	Optimized	-268.96955	0.65	-40.559983	128.6189	0	100

Slices of Slip Surface: 3888

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	3888	-395.17715	2.4296755	-151.61235	182.19326	0	100
2	3888	-392.7819	0.75249045	-46.955437	350.6821	0	100
3	3888	-391.85365	0.10249045	-6.3952735	416.20345	0	100
4	3888	-389.90365	-1.262914	78.805118	566.8255	0	100
5	3888	-385.55	-4.3113575	269.03525	903.09109	0	100

LWL_nc_Guide Levee (around)

6	3888	-380.5	-7.847406	489.6727	1273.4046	0	100
7	3888	-375.5	-11.348443	708.14055	1620.1025	0	100
8	3888	-370.5	-14.84948	926.6084	1966.784	0	100
9	3888	-365.66665	-16.6	1035.8356	2202.857	0	100
10	3888	-361	-16.6	1035.8356	2210.1427	0	100
11	3888	-356.33335	-16.6	1035.8356	2217.6427	0	100
12	3888	-351.66665	-16.6	1035.8356	2225.1427	0	100
13	3888	-347	-16.6	1035.8356	2232.6427	0	100
14	3888	-342.33335	-16.6	1035.8356	2240.1427	0	100
15	3888	-339	-16.6	1035.85	2254	0	100
16	3888	-336.25	-16.6	1035.8286	2336.6	0	100
17	3888	-332.75	-16.6	1035.8286	2481.5429	0	100
18	3888	-329	-16.6	1035.85	2554	0	100
19	3888	-325	-16.6	1035.85	2554	0	100
20	3888	-321	-16.6	1035.85	2554	0	100
21	3888	-317	-16.6	1035.85	2471.025	0	100
22	3888	-313	-16.6	1035.85	2305.05	0	100
23	3888	-310.75	-16.6	1035.84	2209.6	0	100
24	3888	-310.25	-16.6	1035.84	2192	0	100
25	3888	-307.95	-16.6	1035.8293	2161.0244	0	100
26	3888	-303.95	-16.6	1035.8462	2110.8462	0	100
27	3888	-300.75	-16.6	1035.84	2080.72	0	100
28	3888	-297.125	-16.6	1035.8316	2016.5684	0	100
29	3888	-292.375	-16.6	1035.8316	1899.6421	0	100
30	3888	-288.25	-15.374635	959.36748	1731.7109	0	100
31	3888	-284.47925	-12.734345	794.61646	1425.9883	0	100
32	3888	-280.4378	-9.904492	618.03502	1145.1038	0	100
33	3888	-276.39635	-7.0746365	441.45359	864.19911	0	100
34	3888	-272.3549	-4.244782	264.87215	583.31464	0	100
35	3888	-268.31345	-1.4149275	88.290717	302.40989	0	100
36	3888	-265.36445	0.65	-40.559793	97.446217	0	100

LWL_c_Guide Levee (through)

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File Information

Title: Central Wetlands Diversion Channel
Created By: Chaisson, Kathryn MVN
Revision Number: 128
Last Edited By: Chaisson, Kathryn MVN
Date: 7/29/2010
Time: 10:52:34 AM
File Name: Central Wetlands Diversion Channel.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 2\
Last Solved Date: 7/29/2010
Last Solved Time: 10:55:43 AM

Project Settings

Length(L) Units: feet
Time(t) Units: Seconds
Force(F) Units: lbf
Pressure(p) Units: psf
Strength Units: psf
Unit Weight of Water: 62.4 pcf
View: 2D

Analysis Settings

LWL_c_Guide Levee (through)

Kind: SLOPE/W
Method: Spencer
Settings
- Apply Phreatic Correction: No
- PWP Conditions Source: Piezometric Line
- Use Staged Rapid Drawdown: No

SlipSurface
- Direction of movement: Left to Right
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: Yes
- Tension Crack
  - Tension Crack Option: Tension Crack Line
  - Percentage Wet: 1
  - Tension Crack Fluid Unit Weight: 62.4 pcf

FOS Distribution
FOS Calculation Option: Constant
Advanced
Number of Slices: 30
Optimization Tolerance: 0.01
Minimum Slip Surface Depth: 0.1 ft
Optimization Maximum Iterations: 3000
Optimization Convergence Tolerance: 1e-007
Starting Optimization Points: 8
Ending Optimization Points: 16
Complete Passes per Insertion: 1
Driving Side Maximum Convex Angle: 5 °
Resisting Side Maximum Convex Angle: 1 °

Materials

EMBANKMENT FILL

Model: Undrained (Phi=0)
Unit Weight: 100 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

CH (NG to -18)

Model: Undrained (Phi=0)
Unit Weight: 98 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

ML (-18 to -30)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (-30 to -57)

Model: S=f(depth)
Unit Weight: 105 pcf
C-Top of Layer: 250 psf
C-Rate of Change: 12.96 psf/ft
Limiting C: 600 psf
Pore Water Pressure
Piezometric Line: 1

ML (-57 to -72)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (-72 to -92)

Model: S=f(depth)
Unit Weight: 105 pcf
C-Top of Layer: 800 psf
C-Rate of Change: 15 psf/ft
Limiting C: 1100 psf
Pore Water Pressure
Piezometric Line: 1

ML (-92 to -100)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

SAND

Model: Mohr-Coulomb
Unit Weight: 122 pcf
Cohesion: 0 psf
Phi: 30 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Slip Surface Entry and Exit

Left Projection: Range
Left-Zone Left Coordinate: (-390.8, 4.6552) ft
Left-Zone Right Coordinate: (-325.9, 7.8) ft
Left-Zone Increment: 20
Right Projection: Range
Right-Zone Left Coordinate: (-299.7, 4.50909) ft
Right-Zone Right Coordinate: (-226.6, 1.3) ft
Right-Zone Increment: 20
Radius Increments: 20

Slip Surface Limits

Left Coordinate: (-500, 1.3) ft
Right Coordinate: (50, -11.7) ft

Piezometric Lines

Piezometric Line 1

Coordinates

	X (ft)	Y (ft)
	-500	0
	50	0

Reinforcements

Reinforcement 1

Type: Fabric
Outside Point: (-302, 1.3) ft
Inside Point: (-392, 1.3) ft
Slip Surface Intersection: (-329.03, 1.3) ft
Total Length: 90 ft
Reinforcement Direction: 0 °
Applied Load Option: Variable
F of S Dependent: No
Contact Cohesion: 223.5 psf
Contact Phi: 0 °
Interface Factor: 2
Bond Safety Factor: 1
Fabric Capacity: 12000 lbs
Fabric Safety Factor: 1
Fabric Load: 12000 lbs
Load Distribution: Even along reinf.
Load Orientation: 0
Applied Load: 12000 lbs
Fabric Load Used: 12000 lbs
Resisting Force Used: 447 lbs/ft
Available Bond Length: 62.975 ft
Required Bond Length: 26.846 ft
Governing Component: Fabric

Tension Crack Line

	X (ft)	Y (ft)
	-390.9	3.6536

	-338	4.5
	-331	6.8
	-325.9	6.8

Regions

	Material	Points	Area (ft²)
Region 1	ML (-92 to -100)	1,3,4,2	4400
Region 2	CH (-72 to -92)	3,5,6,4	11000
Region 3	ML (-57 to -72)	5,7,8,6	8250
Region 4	CH (-30 to -57)	7,9,10,8	14850
Region 5	ML (-18 to -30)	9,11,12,10	6600
Region 6	CH (NG to -18)	11,13,28,17,18,22,21,25,16,15,14,12	7115.5
Region 7	SAND	29,19,20,32	73.5
Region 8	EMBANKMENT FILL	28,27,26,23,24,30,31,25,21,32,20,19,29,17	395.3
Region 9	SAND	18,17,29,32,21,22	243

Points

	X (ft)	Y (ft)
Point 1	-500	-100
Point 2	50	-100
Point 3	-500	-92
Point 4	50	-92
Point 5	-500	-72
Point 6	50	-72
Point 7	-500	-57
Point 8	50	-57
Point 9	-500	-30
Point 10	50	-30
Point 11	-500	-18
Point 12	50	-18
Point 13	-500	1.3
Point 14	50	-11.7
Point 15	-174.5	-11.7
Point 16	-226.5	1.3
Point 17	-392	1.3
Point 18	-383	-1.7
Point 19	-331	4.8
Point 20	-319	4.8
Point 21	-302	1.3
Point 22	-311	-1.7
Point 23	-331	7.8
Point 24	-319	7.8
Point 25	-286.5	1.3
Point 26	-338	5.5
Point 27	-400.5	4.5
Point 28	-413	1.3

LWL_c_Guide Levee (through)

Point 29	-340	1.3
Point 30	-310.5	5
Point 31	-299.5	4.5
Point 32	-310	1.3

Critical Slip Surfaces

	Slip Surface	FOS	Center (ft)	Radius (ft)	Entry (ft)	Exit (ft)
1	Optimized	1.33	(-295.978, 27.675)	31.4545	(-333.151, 7.09312)	(-264.707, 1.3)
2	7741	2.73	(-295.978, 27.675)	44.877	(-334.988, 6.48974)	(-259.67, 1.3)

Slices of Slip Surface: Optimized

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	Optimized	-332.4414	5.3043485	-330.99113	127.43439	0	100
2	Optimized	-331.3657	4.10931	-256.418	260.88189	150.62023	0
3	Optimized	-330.6108	3.2706825	-204.09303	343.89397	198.54728	0
4	Optimized	-329.6235	2.06916	-129.11652	389.41759	224.83035	0
5	Optimized	-328.51995	0.65	-40.560284	499.53607	288.40729	0
6	Optimized	-327.3535	-0.85	53.038795	656.69291	348.51987	0
7	Optimized	-326.5676	-1.860605	116.10201	826.73713	0	100
8	Optimized	-325.23105	-3.895005	243.0514	1367.8279	0	100
9	Optimized	-322.97615	-7.7393525	482.94001	1853.677	0	100
10	Optimized	-320.8896	-11.680457	728.85013	2330.6072	0	100
11	Optimized	-319.42315	-14.188975	885.3779	2442.3865	0	100
12	Optimized	-318.82875	-14.94463	932.55217	2377.3238	0	100
13	Optimized	-317.53325	-15.69268	979.23357	2444.846	0	100
14	Optimized	-315.28475	-16.7534	1045.4007	2456.028	0	100
15	Optimized	-312.58025	-17.284605	1078.5499	2323.8434	0	100
16	Optimized	-310.75	-17.28558	1078.6198	2126.1996	0	100
17	Optimized	-310.25	-17.285845	1078.6398	2108.5996	0	100
18	Optimized	-309.55845	-17.286215	1078.6642	2159.5024	0	100
19	Optimized	-307.50845	-17.361805	1083.372	2206.4596	0	100
20	Optimized	-304.925	-17.482835	1090.9059	2171.413	0	100
		-	-				

LWL_c_Guide Levee (through)

21	Optimized	302.95525	17.575115	1096.7112	2192.4685	0	100
22	Optimized	-300.7528	-17.78369	1109.7132	2207.9781	0	100
23	Optimized	-299.52255	-17.945985	1119.8399	2200.6817	0	100
24	Optimized	-298.3235	-17.96323	1120.926	2173.2655	0	100
25	Optimized	-296.0823	-17.98118	1122.0046	2117.9176	0	100
26	Optimized	-293.9529	-17.98324	1122.1455	2065.6963	0	100
27	Optimized	-291.8235	-17.9853	1122.2864	2013.4751	0	100
28	Optimized	-289.6941	-17.98736	1122.4273	1961.2539	0	100
29	Optimized	-287.5647	-17.98942	1122.5212	1909.0327	0	100
30	Optimized	-285.1987	-17.99171	1122.6915	1883.0509	0	100
31	Optimized	-282.5961	-17.99423	1122.8452	1883.3199	0	100
32	Optimized	-279.99355	-17.99675	1122.9989	1883.5504	0	100
33	Optimized	-278.15695	-17.230945	1075.2154	1674.535	0	100
34	Optimized	-276.28015	-14.595415	910.75069	1451.3275	0	100
35	Optimized	-273.59725	-10.858485	677.56878	1130.1725	0	100
36	Optimized	-271.1516	-7.470005	466.12807	839.08375	0	100
37	Optimized	-268.94315	-4.429975	276.43005	577.45058	0	100
38	Optimized	-266.7564	-1.45498	90.789757	320.15872	0	100
39	Optimized	-265.19035	0.65	-40.56014	138.47967	0	100

Slices of Slip Surface: 7741

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	7741	-334.4425	4.5815245	-285.88825	178.81114	0	100
2	7741	-333.09185	2.486656	-155.16616	381.44812	220.22917	0
3	7741	-331.79605	0.65	-40.560016	599.80657	346.29849	0
4	7741	-331.1528	-0.19287145	12.035112	570.8393	322.62575	0
5	7741	-330.4526	-1.0428715	65.073969	837.93477	446.21139	0
6	7741	-328.54205	-3.1404925	195.96577	1312.4052	0	100
7	7741	-325.81575	-5.796155	361.69029	1581.115	0	100
8	7741	-323.08945	-8.045923	502.07254	1801.9858	0	100
9	7741	-320.36315	-9.9636655	621.74057	1985.2478	0	100
10	7741	-317.66665	-11.58342	722.81738	2076.6434	0	100
11	7741	-315	-12.944425	807.71993	2084.0967	0	100

LWL_c_Guide Levee (through)

12	7741	-312.33335	-14.09094	879.2749	2070.9279	0	100
13	7741	-310.75	-14.70021	917.30229	1926.6898	0	100
14	7741	-310.25	-14.87122	927.9629	1923.4671	0	100
15	7741	-308.975	-15.26532	952.5437	2057.1059	0	100
16	7741	-306.925	-15.833455	987.9885	2078.2529	0	100
17	7741	-304.925	-16.289765	1016.4988	2087.2195	0	100
18	7741	-302.975	-16.642115	1038.4701	2088.7935	0	100
19	7741	-300.75	-16.92978	1056.4117	2128.7724	0	100
20	7741	-298.2	-17.12798	1068.802	2099.3817	0	100
21	7741	-295.6	-17.18149	1072.1159	2029.7359	0	100
22	7741	-293	-17.084035	1066.0275	1946.2734	0	100
23	7741	-290.4	-16.83462	1050.4752	1849.0363	0	100
24	7741	-287.8	-16.43065	1025.2553	1737.9535	0	100
25	7741	-285.20755	-15.869915	990.29607	1644.222	0	100
26	7741	-282.6226	-15.14713	945.17763	1566.9866	0	100
27	7741	-280.03765	-14.25265	889.36476	1474.1144	0	100
28	7741	-277.4527	-13.17514	822.13837	1364.9576	0	100
29	7741	-274.86775	-11.899565	742.5283	1238.4119	0	100
30	7741	-272.2828	-10.405898	649.33401	1093.183	0	100
31	7741	-269.69785	-8.667047	540.81606	927.49391	0	100
32	7741	-267.11295	-6.6453855	414.66786	738.94725	0	100
33	7741	-264.528	-4.286567	267.48188	524.331	0	100
34	7741	-261.94305	-1.50739	94.061064	279.03053	0	100
35	7741	-260.16015	0.65	-40.560016	94.828142	0	100

LWL_nc_Guide Levee (through)

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File Information

Title: Central Wetlands Diversion Channel
Created By: Chaisson, Kathryn MVN
Revision Number: 128
Last Edited By: Chaisson, Kathryn MVN
Date: 7/29/2010
Time: 10:52:34 AM
File Name: Central Wetlands Diversion Channel.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 2\
Last Solved Date: 7/29/2010
Last Solved Time: 10:57:10 AM

Project Settings

Length(L) Units: feet
Time(t) Units: Seconds
Force(F) Units: lbf
Pressure(p) Units: psf
Strength Units: psf
Unit Weight of Water: 62.4 pcf
View: 2D

Analysis Settings

LWL_nc_Guide Levee (through)

Kind: SLOPE/W
Method: Spencer
Settings
    Apply Phreatic Correction: No
    PWP Conditions Source: Piezometric Line
    Use Staged Rapid Drawdown: No
SlipSurface
    Direction of movement: Left to Right
    Use Passive Mode: No
    Slip Surface Option: Fully-Specified
    Critical slip surfaces saved: 1
    Optimize Critical Slip Surface Location: Yes
    Tension Crack
        Tension Crack Option: Tension Crack Line
        Percentage Wet: 1
        Tension Crack Fluid Unit Weight: 62.4 pcf

FOS Distribution
FOS Calculation Option: Constant
Advanced
Number of Slices: 30
Optimization Tolerance: 0.01
Minimum Slip Surface Depth: 0.1 ft
Optimization Maximum Iterations: 3000
Optimization Convergence Tolerance: 1e-007
Starting Optimization Points: 8
Ending Optimization Points: 16
Complete Passes per Insertion: 1
Driving Side Maximum Convex Angle: 5 °
Resisting Side Maximum Convex Angle: 1 °

Materials

EMBANKMENT FILL

Model: Undrained (Phi=0)
Unit Weight: 100 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

CH (NG to -18)

Model: Undrained (Phi=0)
Unit Weight: 98 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

ML (-18 to -30)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (-30 to -57)

Model: S=f(depth)
Unit Weight: 105 pcf
C-Top of Layer: 250 psf
C-Rate of Change: 12.96 psf/ft
Limiting C: 600 psf
Pore Water Pressure
Piezometric Line: 1

ML (-57 to -72)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (-72 to -92)

Model: S=f(depth)
Unit Weight: 105 pcf
C-Top of Layer: 800 psf
C-Rate of Change: 15 psf/ft
Limiting C: 1100 psf
Pore Water Pressure
Piezometric Line: 1

ML (-92 to -100)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

SAND

Model: Mohr-Coulomb
Unit Weight: 122 pcf
Cohesion: 0 psf
Phi: 30 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Slip Surface Limits

Left Coordinate: (-500, 1.3) ft
Right Coordinate: (50, -11.7) ft

Fully Specified Slip Surfaces

Fully Specified Slip Surface 1

	X (ft)	Y (ft)
	-343.9	15.9
	-305.6	-17.9

LWL_nc_Guide Levee (through)

	-262.2	-18
	-233.5	13.4

Piezometric Lines

Piezometric Line 1

Coordinates

	X (ft)	Y (ft)
	-500	0
	50	0

Reinforcements

Reinforcement 1

Type: Fabric
Outside Point: (-302, 1.3) ft
Inside Point: (-392, 1.3) ft
Slip Surface Intersection: (-325.63, 1.3) ft
Total Length: 90 ft
Reinforcement Direction: 0 °
Applied Load Option: Variable
F of S Dependent: No
Contact Cohesion: 223.5 psf
Contact Phi: 0 °
Interface Factor: 2
Bond Safety Factor: 1
Fabric Capacity: 12000 lbs
Fabric Safety Factor: 1
Fabric Load: 12000 lbs
Load Distribution: Even along reinf.
Load Orientation: 0
Applied Load: 12000 lbs
Fabric Load Used: 12000 lbs
Resisting Force Used: 447 lbs/ft
Available Bond Length: 66.372 ft
Required Bond Length: 26.846 ft
Governing Component: Fabric

Tension Crack Line

	X (ft)	Y (ft)
	-374.7	3.9128
	-338	4.5
	-331	6.8

LWL_nc_Guide Levee (through)

-326.4	6.8

Regions

	Material	Points	Area (ft²)
Region 1	ML (-92 to -100)	1,3,4,2	4400
Region 2	CH (-72 to -92)	3,5,6,4	11000
Region 3	ML (-57 to -72)	5,7,8,6	8250
Region 4	CH (-30 to -57)	7,9,10,8	14850
Region 5	ML (-18 to -30)	9,11,12,10	6600
Region 6	CH (NG to -18)	11,13,28,17,18,22,21,25,16,15,14,12	7115.5
Region 7	SAND	29,19,20,32	73.5
Region 8	EMBANKMENT FILL	28,27,26,23,24,30,31,25,21,32,20,19,29,17	395.3
Region 9	SAND	18,17,29,32,21,22	243

Points

	X (ft)	Y (ft)
Point 1	-500	-100
Point 2	50	-100
Point 3	-500	-92
Point 4	50	-92
Point 5	-500	-72
Point 6	50	-72
Point 7	-500	-57
Point 8	50	-57
Point 9	-500	-30
Point 10	50	-30
Point 11	-500	-18
Point 12	50	-18
Point 13	-500	1.3
Point 14	50	-11.7
Point 15	-174.5	-11.7
Point 16	-226.5	1.3
Point 17	-392	1.3
Point 18	-383	-1.7
Point 19	-331	4.8
Point 20	-319	4.8
Point 21	-302	1.3
Point 22	-311	-1.7
Point 23	-331	7.8
Point 24	-319	7.8
Point 25	-286.5	1.3
Point 26	-338	5.5
Point 27	-400.5	4.5
Point 28	-413	1.3
Point 29	-340	1.3
Point 30	-310.5	5

Point 31	-299.5	4.5
Point 32	-310	1.3

Critical Slip Surfaces

	Slip Surface	FOS	Center (ft)	Radius (ft)	Entry (ft)	Exit (ft)
1	Optimized	1.89	(-288.521, 7.4)	36.25447	(-329.976, 7.8)	(-248.632, 1.3)
2	1	3.16	(-288.521, 7.4)	38.162	(-332.886, 7.18025)	(-244.56, 1.3)

Slices of Slip Surface: Optimized

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	Optimized	-329.18585	5.8	-361.91984	144.03136	0	100
2	Optimized	-327.0115	3.05	-190.32057	372.779	215.22405	0
3	Optimized	-325.11385	0.65	-40.559955	565.69972	326.60688	0
4	Optimized	-323.9278	-0.85	53.040668	732.41802	392.2387	0
5	Optimized	-322.14925	-3.09935	193.39901	1247.6957	0	100
6	Optimized	-320.0214	-6.0411515	376.97654	1580.7447	0	100
7	Optimized	-317.7976	-9.3993865	586.52945	1900.5556	0	100
8	Optimized	-315.4833	-12.86094	802.52122	2168.4361	0	100
9	Optimized	-313.25945	-16.15248	1007.9157	2427.1994	0	100
10	Optimized	-311.57375	-17.804155	1111.0133	2304.808	0	100
11	Optimized	-310.75	-17.812635	1111.5011	2197.4835	0	100
12	Optimized	-310.25	-17.81778	1111.8211	2180.2844	0	100
13	Optimized	-308.975	-17.8309	1112.6725	2259.8311	0	100
14	Optimized	-306.925	-17.852	1113.9408	2236.1738	0	100
15	Optimized	-303.95	-17.882625	1115.8639	2216.6003	0	100
16	Optimized	-300.75	-17.915565	1117.941	2206.0035	0	100
17	Optimized	-298.3647	-17.940115	1119.4569	2174.7498	0	100
18	Optimized	-296.0941	-17.963485	1120.9102	2121.111	0	100
19	Optimized	-293.82345	-17.986855	1122.3634	2067.4722	0	100
20	Optimized	-291.1411	-17.976925	1121.748	1998.1146	0	100
21	Optimized	-288.04705	-17.93369	1119.0657	1917.8074	0	100
22	Optimized	-285.7066	-17.900985	1117.01	1876.534	0	100

23	Optimized	-282.91405	-17.838715	1113.1474	1869.4636	0	100
24	Optimized	-279.23545	-17.767885	1108.713	1863.7024	0	100
25	Optimized	-275.87655	-17.72859	1106.2719	1859.8621	0	100
26	Optimized	-272.9739	-17.71228	1105.2662	1859.4829	0	100
27	Optimized	-270.52755	-17.71896	1105.675	1860.137	0	100
28	Optimized	-268.0812	-17.725635	1106.0837	1860.791	0	100
29	Optimized	-265.6348	-17.73231	1106.4925	1861.445	0	100
30	Optimized	-263.18845	-17.73899	1106.9013	1862.099	0	100
31	Optimized	-260.4522	-17.869395	1115.0618	1881.9693	0	100
32	Optimized	-257.55335	-15.35397	958.09324	1514.3822	0	100
33	Optimized	-254.78185	-10.068985	628.31143	1060.7814	0	100
34	Optimized	-251.3689	-3.713245	231.70543	514.30215	0	100
35	Optimized	-248.9868	0.65	-40.559847	137.96316	0	100

Slices of Slip Surface: 1

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	1	-332.0549	5.446639	-339.87179	183.96812	0	100
2	1	-331.1118	4.6143475	-287.93401	286.82765	165.60002	0
3	1	-329.1781	2.907833	-181.4497	461.56182	266.48284	0
4	1	-326.61965	0.65	-40.559848	684.6418	395.27813	0
5	1	-324.91995	-0.85	53.040001	868.0936	470.57141	0
6	1	-322.7176	-2.793603	174.32143	1223.0816	0	100
7	1	-320.2392	-4.9808095	310.81503	1452.6987	0	100
8	1	-317.66665	-7.251088	452.45523	1633.8661	0	100
9	1	-315	-9.6044365	599.30917	1762.3879	0	100
10	1	-312.33335	-11.957785	746.16311	1890.9097	0	100
11	1	-310.75	-13.35509	833.35133	1844.0108	0	100
12	1	-310.25	-13.796345	860.89827	1871.4528	0	100
13	1	-307.95	-15.82611	987.55272	2182.0449	0	100
14	1	-305.75	-17.767625	1108.7007	2126.2531	0	100

LWL_nc_Guide Levee (through)

15	1	-303.8	-17.904145	1117.2191	2214.5494	0	100
16	1	-300.75	-17.911175	1117.6769	2206.3138	0	100
17	1	-297.875	-17.9178	1118.0584	2161.2556	0	100
18	1	-294.625	-17.925285	1118.5507	2081.9635	0	100
19	1	-291.375	-17.932775	1119.0123	2002.7021	0	100
20	1	-288.125	-17.940265	1119.4738	1923.4101	0	100
21	1	-284.98125	-17.94751	1119.9312	1884.1103	0	100
22	1	-281.94375	-17.95451	1120.3592	1884.8016	0	100
23	1	-278.90625	-17.96151	1120.7872	1885.493	0	100
24	1	-275.86875	-17.968505	1121.2481	1886.1843	0	100
25	1	-272.83125	-17.9755	1121.6761	1886.8757	0	100
26	1	-269.79375	-17.9825	1122.104	1887.5341	0	100
27	1	-266.75625	-17.9895	1122.532	1888.2255	0	100
28	1	-263.71875	-17.9965	1122.9929	1888.9168	0	100
29	1	-260.829	-16.5	1029.5918	1641.4026	0	100
30	1	-258.08695	-13.5	842.40228	1369.7956	0	100
31	1	-255.3449	-10.5	655.1881	1098.1887	0	100
32	1	-252.60285	-7.5	467.99853	826.5571	0	100
33	1	-249.8608	-4.5	280.80896	554.95015	0	100
34	1	-247.1188	-1.5	93.599706	283.3432	0	100
35	1	-245.1537	0.65	-40.560206	88.672043	0	100

LWL_c_Guide Levee to Bottom

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File Information

Title: Central Wetlands Diversion Channel
Created By: Chaisson, Kathryn MVN
Revision Number: 128
Last Edited By: Chaisson, Kathryn MVN
Date: 7/29/2010
Time: 10:52:34 AM
File Name: Central Wetlands Diversion Channel.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 2\
Last Solved Date: 7/29/2010
Last Solved Time: 10:56:24 AM

Project Settings

Length(L) Units: feet
Time(t) Units: Seconds
Force(F) Units: lbf
Pressure(p) Units: psf
Strength Units: psf
Unit Weight of Water: 62.4 pcf
View: 2D

Analysis Settings

LWL_c_Guide Levee to Bottom

Kind: SLOPE/W
Method: Spencer
Settings
    Apply Phreatic Correction: No
    PWP Conditions Source: Piezometric Line
    Use Staged Rapid Drawdown: No
SlipSurface
    Direction of movement: Left to Right
    Use Passive Mode: No
    Slip Surface Option: Entry and Exit
    Critical slip surfaces saved: 1
    Optimize Critical Slip Surface Location: Yes
    Tension Crack
        Tension Crack Option: Tension Crack Line
        Percentage Wet: 1
        Tension Crack Fluid Unit Weight: 62.4 pcf

FOS Distribution
FOS Calculation Option: Constant
Advanced
Number of Slices: 30
Optimization Tolerance: 0.01
Minimum Slip Surface Depth: 0.1 ft
Optimization Maximum Iterations: 3000
Optimization Convergence Tolerance: 1e-007
Starting Optimization Points: 8
Ending Optimization Points: 16
Complete Passes per Insertion: 1
Driving Side Maximum Convex Angle: 5 °
Resisting Side Maximum Convex Angle: 1 °

Materials

EMBANKMENT FILL

Model: Undrained (Phi=0)
Unit Weight: 100 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

CH (NG to -18)

Model: Undrained (Phi=0)
Unit Weight: 98 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

ML (-18 to -30)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (-30 to -57)

Model: S=f(depth)
Unit Weight: 105 pcf
C-Top of Layer: 250 psf
C-Rate of Change: 12.96 psf/ft
Limiting C: 600 psf
Pore Water Pressure
Piezometric Line: 1

ML (-57 to -72)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
    Piezometric Line: 1

CH (-72 to -92)

Model: S=f(depth)
Unit Weight: 105 pcf
C-Top of Layer: 800 psf
C-Rate of Change: 15 psf/ft
Limiting C: 1100 psf
Pore Water Pressure
    Piezometric Line: 1

ML (-92 to -100)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
    Piezometric Line: 1

SAND

Model: Mohr-Coulomb
Unit Weight: 122 pcf
Cohesion: 0 psf
Phi: 30 °
Phi-B: 0 °
Pore Water Pressure
    Piezometric Line: 1

Slip Surface Entry and Exit

Left Projection: Range
Left-Zone Left Coordinate: (-442.4, 1.3) ft
Left-Zone Right Coordinate: (-325.9, 7.8) ft
Left-Zone Increment: 20
Right Projection: Range
Right-Zone Left Coordinate: (-188.9, -8.1) ft
Right-Zone Right Coordinate: (48.1, -11.7) ft
Right-Zone Increment: 20
Radius Increments: 20

LWL_c_Guide Levee to Bottom

Slip Surface Limits

Left Coordinate: (-500, 1.3) ft
Right Coordinate: (50, -11.7) ft

Piezometric Lines

Piezometric Line 1

Coordinates

	X (ft)	Y (ft)
	-500	0
	50	0

Reinforcements

Reinforcement 1

Type: Fabric
Outside Point: (-302, 1.3) ft
Inside Point: (-392, 1.3) ft
Slip Surface Intersection: (-392.01, 1.3) ft
Total Length: 90 ft
Reinforcement Direction: 0 °
Applied Load Option: Variable
F of S Dependent: No
Contact Cohesion: 223.5 psf
Contact Phi: 0 °
Interface Factor: 2
Bond Safety Factor: 1
Fabric Capacity: 12000 lbs
Fabric Safety Factor: 1
Fabric Load: 12000 lbs
Load Distribution: Even along reinf.
Load Orientation: 0
Applied Load: 12000 lbs
Fabric Load Used: 0 lbs
Resisting Force Used: 447 lbs/ft
Available Bond Length: 0 ft
Required Bond Length: 0 ft
Governing Component: Bond

Tension Crack Line

	X (ft)	Y (ft)
	-447.5	-0.7

	-413.3	-0.7
	-400.5	2.5
	-372.9	2.94089

Regions

	Material	Points	Area (ft²)
Region 1	ML (-92 to -100)	1,3,4,2	4400
Region 2	CH (-72 to -92)	3,5,6,4	11000
Region 3	ML (-57 to -72)	5,7,8,6	8250
Region 4	CH (-30 to -57)	7,9,10,8	14850
Region 5	ML (-18 to -30)	9,11,12,10	6600
Region 6	CH (NG to -18)	11,13,28,17,18,22,21,25,16,15,14,12	7115.5
Region 7	SAND	29,19,20,32	73.5
Region 8	EMBANKMENT FILL	28,27,26,23,24,30,31,25,21,32,20,19,29,17	395.3
Region 9	SAND	18,17,29,32,21,22	243

Points

	X (ft)	Y (ft)
Point 1	-500	-100
Point 2	50	-100
Point 3	-500	-92
Point 4	50	-92
Point 5	-500	-72
Point 6	50	-72
Point 7	-500	-57
Point 8	50	-57
Point 9	-500	-30
Point 10	50	-30
Point 11	-500	-18
Point 12	50	-18
Point 13	-500	1.3
Point 14	50	-11.7
Point 15	-174.5	-11.7
Point 16	-226.5	1.3
Point 17	-392	1.3
Point 18	-383	-1.7
Point 19	-331	4.8
Point 20	-319	4.8
Point 21	-302	1.3
Point 22	-311	-1.7
Point 23	-331	7.8
Point 24	-319	7.8
Point 25	-286.5	1.3
Point 26	-338	5.5
Point 27	-400.5	4.5
Point 28	-413	1.3

LWL_c_Guide Levee to Bottom

Point 29	-340	1.3
Point 30	-310.5	5
Point 31	-299.5	4.5
Point 32	-310	1.3

Critical Slip Surfaces

	Slip Surface	FOS	Center (ft)	Radius (ft)	Entry (ft)	Exit (ft)
1	Optimized	1.31	(-278.179, 400.039)	80.458	(-395.398, 4.58164)	(-183.993, -9.3268)
2	2649	1.75	(-278.179, 400.039)	417.79	(-403.964, 3.61333)	(-188.9, -8.1)

Slices of Slip Surface: Optimized

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	Optimized	-393.6988	1.9384935	-120.96126	236.91814	0	100
2	Optimized	-390.28875	0.6477395	-40.417935	383.35692	0	100
3	Optimized	-388.33875	-0.09036285	5.6385657	473.57605	0	100
4	Optimized	-387.97845	-0.22673785	14.1483	490.24152	0	100
5	Optimized	-385.60025	-0.929115	57.976497	588.93449	0	100
6	Optimized	-379.1122	-2.8162	175.73207	802.1293	0	100
7	Optimized	-371.3078	-4.4716215	279.02902	994.22154	0	100
8	Optimized	-364.16175	-5.321025	332.02786	1088.6162	0	100
9	Optimized	-357.01565	-6.1704285	385.0406	1183.0108	0	100
10	Optimized	-350.7425	-7.1170975	444.11169	1277.4824	0	100
11	Optimized	-345.3423	-8.1610325	509.25486	1387.8968	0	100
12	Optimized	-341.3211	-9.0537685	564.96187	1471.5464	0	100
13	Optimized	-339	-9.705192	605.60138	1547.1238	0	100
14	Optimized	-334.58565	-10.944098	682.91559	1818.2508	0	100
15	Optimized	-331.08565	-11.933915	744.69699	2047.3142	0	100
16	Optimized	-328	-13.070965	815.63505	2161.2648	0	100
17	Optimized	-322	-15.281935	953.59943	2375.9838	0	100
18	Optimized	-316.81295	-17.19333	1072.8565	2471.6973	0	100
19	Optimized	-312.81295	-17.998835	1123.1264	2435.4721	0	100
20	Optimized	-310.75	-17.998375	1123.1	2347.8	0	100
21	Optimized	-310.25	-17.99826	1123.1	2330.2	0	100
22	Optimized	-307.95	-17.99774	1123.0488	2299.122	0	100
23	Optimized	-303.95	-17.996845	1123	2248.8462	0	100
24	Optimized	-301.2619	-17.996245	1122.9889	2220.9803	0	100
25	Optimized	-300.0119	-17.99615	1122.9184	2215.2659	0	100

26	Optimized	-296.29675	-17.996675	1122.9957	2134.0742	0	100
27	Optimized	-289.89025	-17.99758	1123.0425	1976.5786	0	100
28	Optimized	-286.5935	-17.99555	1122.8998	1898.4492	0	100
29	Optimized	-283.28705	-17.907835	1117.4494	1887.4878	0	100
30	Optimized	-276.8612	-17.737365	1106.8087	1870.8422	0	100
31	Optimized	-270.10755	-17.581535	1097.0927	1854.7482	0	100
32	Optimized	-263.02605	-17.44034	1088.2827	1840.9121	0	100
33	Optimized	-257.5486	-17.342625	1082.1869	1830.5871	0	100
34	Optimized	-251.97295	-17.32115	1080.8335	1826.6022	0	100
35	Optimized	-244.695	-17.33243	1081.548	1827.7014	0	100
36	Optimized	-237.417	-17.343705	1082.2488	1828.8006	0	100
37	Optimized	-230.139	-17.35498	1082.9495	1829.8998	0	100
38	Optimized	-223.9	-17.36465	1083.5564	1767.1518	0	100
39	Optimized	-216.35935	-17.376335	1084.2734	1661.1222	0	100
40	Optimized	-207.3131	-16.7226	1043.4883	1536.1118	0	100
41	Optimized	-199.1019	-15.39982	960.94758	1333.397	0	100
42	Optimized	-192.4364	-13.664425	852.65496	1130.8035	0	100
43	Optimized	-186.93465	-10.958608	683.81762	827.1237	0	100

Slices of Slip Surface: 2649

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	2649	-403.432	1.4670535	-91.544146	207.63885	0	100
2	2649	-401.7002	0.92854895	-57.940918	307.18358	0	100
3	2649	-399.5828	0.27854895	-17.381521	402.82169	0	100
4	2649	-395.3328	-0.973656	60.755721	532.28578	0	100
5	2649	-390.05	-2.489257	155.33068	704.79982	0	100
6	2649	-385.55	-3.709337	231.46486	867.51475	0	100
7	2649	-379.41665	-5.2824845	329.62705	1052.1288	0	100
8	2649	-372.25	-7.0056305	437.15201	1233.0528	0	100
9	2649	-365.08335	-8.5958305	536.37649	1401.13	0	100
10	2649	-357.91665	-10.054634	627.40373	1556.5245	0	100
11	2649	-350.75	-11.383435	710.33184	1699.2559	0	100
12	2649	-343.58335	-12.583485	785.21098	1829.6232	0	100
13	2649	-339	-13.29862	829.81456	1916.3646	0	100
14	2649	-334.5	-13.921955	868.72513	2133.0627	0	100

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15	2649	-328	-14.75847	920.93096	2361.0305	0	100
16	2649	-322	-15.435215	963.15753	2428.6951	0	100
17	2649	-315	-16.105555	1004.9861	2330.5199	0	100
18	2649	-310.75	-16.479025	1028.3008	2190.114	0	100
19	2649	-310.25	-16.51782	1030.7097	2176.3593	0	100
20	2649	-307.95	-16.683525	1041.0542	2162.2212	0	100
21	2649	-303.95	-16.950495	1057.6999	2139.2262	0	100
22	2649	-300.75	-17.13864	1069.4361	2128.3275	0	100
23	2649	-296.25	-17.34698	1082.4475	2064.2201	0	100
24	2649	-289.75	-17.577735	1096.8561	1928.4908	0	100
25	2649	-282.75	-17.708815	1105.0272	1863.0885	0	100
26	2649	-275.25	-17.723555	1105.9462	1866.2209	0	100
27	2649	-267.75	-17.60362	1098.4709	1856.2214	0	100
28	2649	-260.25	-17.348895	1082.5751	1832.9764	0	100
29	2649	-252.75	-16.95913	1058.2475	1796.5294	0	100
30	2649	-245.25	-16.43395	1025.4795	1746.6821	0	100
31	2649	-237.75	-15.77284	984.22545	1683.3951	0	100
32	2649	-230.25	-14.97515	934.45565	1606.7869	0	100
33	2649	-223.9	-14.201385	886.17474	1468.2948	0	100
34	2649	-218.06	-13.389555	835.50265	1297.2053	0	100
35	2649	-211.58	-12.39522	773.46837	1143.4596	0	100
36	2649	-205.1	-11.296405	704.90299	979.34004	0	100
37	2649	-198.62	-10.09227	629.75748	804.7667	0	100
38	2649	-192.14	-8.7818795	547.9956	619.60591	0	100

LWL_nc_Guide Levee to Bottom

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File Information

Title: Central Wetlands Diversion Channel
Created By: Chaisson, Kathryn MVN
Revision Number: 128
Last Edited By: Chaisson, Kathryn MVN
Date: 7/29/2010
Time: 10:52:34 AM
File Name: Central Wetlands Diversion Channel.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 2\
Last Solved Date: 7/29/2010
Last Solved Time: 10:57:29 AM

Project Settings

Length(L) Units: feet
Time(t) Units: Seconds
Force(F) Units: lbf
Pressure(p) Units: psf
Strength Units: psf
Unit Weight of Water: 62.4 pcf
View: 2D

Analysis Settings

LWL_nc_Guide Levee to Bottom

Kind: SLOPE/W
Method: Spencer
Settings
    Apply Phreatic Correction: No
    PWP Conditions Source: Piezometric Line
    Use Staged Rapid Drawdown: No
SlipSurface
    Direction of movement: Left to Right
    Use Passive Mode: No
    Slip Surface Option: Block
    Critical slip surfaces saved: 1
    Optimize Critical Slip Surface Location: Yes
    Tension Crack
        Tension Crack Option: Tension Crack Line
        Percentage Wet: 1
        Tension Crack Fluid Unit Weight: 62.4 pcf

FOS Distribution
FOS Calculation Option: Constant
Restrict Block Crossing: Yes
Advanced
Number of Slices: 30
Optimization Tolerance: 0.01
Minimum Slip Surface Depth: 0.1 ft
Optimization Maximum Iterations: 3000
Optimization Convergence Tolerance: 1e-007
Starting Optimization Points: 8
Ending Optimization Points: 16
Complete Passes per Insertion: 1
Driving Side Maximum Convex Angle: 5 °
Resisting Side Maximum Convex Angle: 1 °

Materials

EMBANKMENT FILL

Model: Undrained (Phi=0)
Unit Weight: 100 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

CH (NG to -18)

Model: Undrained (Phi=0)
Unit Weight: 98 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

ML (-18 to -30)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (-30 to -57)

Model: S=f(depth)
Unit Weight: 105 pcf
C-Top of Layer: 250 psf
C-Rate of Change: 12.96 psf/ft
Limiting C: 600 psf
Pore Water Pressure

Piezometric Line: 1

ML (-57 to -72)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (-72 to -92)

Model: S=f(depth)
Unit Weight: 105 pcf
C-Top of Layer: 800 psf
C-Rate of Change: 15 psf/ft
Limiting C: 1100 psf
Pore Water Pressure
Piezometric Line: 1

ML (-92 to -100)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

SAND

Model: Mohr-Coulomb
Unit Weight: 122 pcf
Cohesion: 0 psf
Phi: 30 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Slip Surface Limits

Left Coordinate: (-500, 1.3) ft
Right Coordinate: (50, -11.7) ft

Slip Surface Block

Left Grid
Upper Left: (-380, -0.4) ft
Lower Left: (-380, -22.4) ft

Lower Right: (-360, -22.4) ft
X Increments: 5
Y Increments: 5
Starting Angle: 125 °
Ending Angle: 145 °
Angle Increments: 4

Right Grid
Upper Left: (-195, -0.4) ft
Lower Left: (-195, -22.4) ft
Lower Right: (-175, -22.4) ft
X Increments: 5
Y Increments: 5
Starting Angle: 25 °
Ending Angle: 45 °
Angle Increments: 4

Piezometric Lines

Piezometric Line 1

Coordinates

	X (ft)	Y (ft)
	-500	0
	50	0

Reinforcements

Reinforcement 1

Type: Fabric
Outside Point: (-302, 1.3) ft
Inside Point: (-392, 1.3) ft
Slip Surface Intersection: (-391.98, 1.3) ft
Total Length: 90 ft
Reinforcement Direction: 0 °
Applied Load Option: Variable
F of S Dependent: No
Contact Cohesion: 223.5 psf
Contact Phi: 0 °
Interface Factor: 2
Bond Safety Factor: 1
Fabric Capacity: 12000 lbs
Fabric Safety Factor: 1
Fabric Load: 12000 lbs
Load Distribution: Even along reinf.
Load Orientation: 0

LWL_nc_Guide Levee to Bottom

Applied Load: 12000 lbs
Fabric Load Used: 10.501 lbs
Resisting Force Used: 447 lbs/ft
Available Bond Length: 0.023492 ft
Required Bond Length: 0.023492 ft
Governing Component: Bond

Tension Crack Line

	X (ft)	Y (ft)
	-441.1	0.3
	-413	0.3
	-400.5	3.5
	-371.2	3.88818

Regions

	Material	Points	Area (ft²)
Region 1	ML (-92 to -100)	1,3,4,2	4400
Region 2	CH (-72 to -92)	3,5,6,4	11000
Region 3	ML (-57 to -72)	5,7,8,6	8250
Region 4	CH (-30 to -57)	7,9,10,8	14850
Region 5	ML (-18 to -30)	9,11,12,10	6600
Region 6	CH (NG to -18)	11,13,28,17,18,22,21,25,16,15,14,12	7115.5
Region 7	SAND	29,19,20,32	73.5
Region 8	EMBANKMENT FILL	28,27,26,23,24,30,31,25,21,32,20,19,29,17	395.3
Region 9	SAND	18,17,29,32,21,22	243

Points

	X (ft)	Y (ft)
Point 1	-500	-100
Point 2	50	-100
Point 3	-500	-92
Point 4	50	-92
Point 5	-500	-72
Point 6	50	-72
Point 7	-500	-57
Point 8	50	-57
Point 9	-500	-30
Point 10	50	-30
Point 11	-500	-18
Point 12	50	-18
Point 13	-500	1.3
Point 14	50	-11.7
Point 15	-174.5	-11.7
Point 16	-226.5	1.3

Point 17	-392	1.3
Point 18	-383	-1.7
Point 19	-331	4.8
Point 20	-319	4.8
Point 21	-302	1.3
Point 22	-311	-1.7
Point 23	-331	7.8
Point 24	-319	7.8
Point 25	-286.5	1.3
Point 26	-338	5.5
Point 27	-400.5	4.5
Point 28	-413	1.3
Point 29	-340	1.3
Point 30	-310.5	5
Point 31	-299.5	4.5
Point 32	-310	1.3

Critical Slip Surfaces

	Slip Surface	FOS	Center (ft)	Radius (ft)	Entry (ft)	Exit (ft)
1	Optimized	1.50	(-283.36, 7.394)	84.48448	(-397.108, 4.55427)	(-175.485, -11.4539)
2	4331	1.61	(-283.36, 7.394)	84.375	(-394.813, 4.591)	(-173.49, -11.7)

Slices of Slip Surface: Optimized

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	Optimized	-394.5422	2.42247	-151.16145	187.4677	0	100
2	Optimized	-390.49075	0.65	-40.559202	379.63167	0	100
3	Optimized	-388.5525	-0.1979716	12.35309	480.19436	0	100
4	Optimized	-385.55	-1.5115491	94.321354	635.77903	0	100
5	Optimized	-379.1862	-4.2956575	268.05311	935.45334	0	100
6	Optimized	-371.52545	-7.761855	484.34222	1279.9455	0	100
7	Optimized	-363.83155	-11.357245	708.69182	1639.7904	0	100
8	Optimized	-356.1376	-14.952635	933.04142	1999.6352	0	100
9	Optimized	-349.21795	-16.771005	1046.5126	2246.0487	0	100
10	Optimized	-343.07265	-16.812355	1049.0836	2259.88	0	100
11	Optimized	-339	-16.839755	1050.7764	2277.6988	0	100
12	Optimized	-334.63855	-16.8691	1052.6289	2429.8416	0	100

13	Optimized	-331.13855	-16.901555	1054.6586	2569.0023	0	100
14	Optimized	-328	-17.124325	1068.5617	2596.4677	0	100
15	Optimized	-322	-17.550195	1095.1282	2638.1961	0	100
16	Optimized	-317.3314	-17.881565	1115.7985	2601.4277	0	100
17	Optimized	-313.3314	-18	1123.2068	2457.102	0	100
18	Optimized	-310.75	-18	1123.2	2348	0	100
19	Optimized	-310.25	-18	1123.2	2330.4	0	100
20	Optimized	-307.95	-18	1123.1951	2299.3415	0	100
21	Optimized	-303.95	-18	1123.2051	2249.1538	0	100
22	Optimized	-300.75	-18	1123.2	2219	0	100
23	Optimized	-297.72905	-18	1123.2139	2169.7173	0	100
24	Optimized	-291.22905	-18	1123.1631	2009.7038	0	100
25	Optimized	-286.29695	-18	1123.2023	1893.3215	0	100
26	Optimized	-282.72305	-17.986015	1122.3246	1892.5182	0	100
27	Optimized	-275.9813	-17.95805	1120.5891	1889.7	0	100
28	Optimized	-269.23955	-17.930085	1118.8388	1887.0301	0	100
29	Optimized	-261.85335	-17.92659	1118.6188	1885.7617	0	100
30	Optimized	-253.82265	-17.947565	1119.9263	1887.8786	0	100
31	Optimized	-246.08485	-17.96854	1121.2374	1889.8844	0	100
32	Optimized	-238.64	-17.989515	1122.5403	1891.8992	0	100
33	Optimized	-230.7088	-18	1123.1996	1893.304	0	100
34	Optimized	-224.8166	-18	1123.2097	1852.0664	0	100
35	Optimized	-222.2166	-17.992435	1122.7405	1788.5955	0	100
36	Optimized	-217.11165	-17.95031	1120.0981	1725.2113	0	100
37	Optimized	-208.735	-17.881185	1115.7886	1644.7524	0	100
38	Optimized	-200.35835	-17.81206	1111.4672	1564.4128	0	100
39	Optimized	-192.7224	-16.723565	1043.5529	1422.5728	0	100
40	Optimized	-185.82725	-14.61569	912.01657	1153.0232	0	100
41	Optimized	-178.9321	-12.507815	780.49412	883.50132	0	100

Slices of Slip Surface: 4331

LWL_nc_Guide Levee to Bottom

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	4331	-393.18805	2.4376735	-152.11198	172.58869	0	100
2	4331	-391.36485	1.1610735	-72.451352	279.42602	161.32669	0
3	4331	-390.43655	0.5110735	-31.8912	376.81693	0	100
4	4331	-388.90335	-0.562499	35.099866	494.33178	0	100
5	4331	-385.55	-2.9105275	181.61084	751.27491	0	100
6	4331	-379.83335	-6.913381	431.39998	1164.6661	0	100
7	4331	-373.5	-11.348028	708.12249	1600.5801	0	100
8	4331	-367.16665	-15.782675	984.845	2036.3259	0	100
9	4331	-360	-18	1123.2	2350	0	100
10	4331	-352	-18	1123.2	2362.875	0	100
11	4331	-344	-18	1123.2	2375.625	0	100
12	4331	-339	-18	1123.2	2392.3	0	100
13	4331	-334.5	-18	1123.2	2547.2857	0	100
14	4331	-328	-18	1123.2	2692.3333	0	100
15	4331	-322	-18	1123.2	2692.3333	0	100
16	4331	-315	-18	1123.2	2526.25	0	100
17	4331	-310.75	-18	1123.2	2348.4	0	100
18	4331	-310.25	-18	1123.2	2330.8	0	100
19	4331	-307.95	-18	1123.1951	2299.2927	0	100
20	4331	-303.95	-18	1123.2051	2249.1026	0	100
21	4331	-300.75	-18	1123.2	2218.88	0	100
22	4331	-296.25	-18	1123.2	2133.2308	0	100
23	4331	-289.75	-18	1123.2	1973.2308	0	100
24	4331	-282.75	-18	1123.2	1893.2	0	100
25	4331	-275.25	-18	1123.2	1893.2	0	100
26	4331	-267.75	-18	1123.2	1893.2	0	100
27	4331	-260.25	-18	1123.2	1893.2	0	100
28	4331	-252.75	-18	1123.2	1893.2	0	100
29	4331	-245.25	-18	1123.2	1893.2	0	100
30	4331	-237.75	-18	1123.2	1893.2	0	100
31	4331	-230.25	-18	1123.2	1893.2	0	100
32	4331	-223.9	-18	1123.1923	1829.5	0	100
33	4331	-217.87	-18	1123.207	1735.7143	0	100
34	4331	-211.01	-18	1123.207	1675.3644	0	100
35	4331	-204.15	-18	1123.207	1615.1603	0	100
36	4331	-197.29	-18	1123.207	1554.8105	0	100
37	4331	-190.43	-18	1123.207	1494.6064	0	100
38	4331	-183.875	-16.54279	1032.2628	1341.292	0	100
39	4331	-177.625	-13.628365	850.40672	996.08301	0	100

40	4331	-173.9948	-11.935575	744.78448	794.68375	0	100

LWL_c_NG to Bottom (no guide levee)

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File Information

Title: Central Wetlands Diversion Channel
Created By: Chaisson, Kathryn MVN
Revision Number: 115
Last Edited By: Chaisson, Kathryn MVN
Date: 7/29/2010
Time: 10:14:15 AM
File Name: Central Wetlands Diversion Channel.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 2\
Last Solved Date: 7/29/2010
Last Solved Time: 10:18:55 AM

Project Settings

Length(L) Units: feet
Time(t) Units: Seconds
Force(F) Units: lbf
Pressure(p) Units: psf
Strength Units: psf
Unit Weight of Water: 62.4 pcf
View: 2D

Analysis Settings

LWL_c_NG to Bottom (no guide levee)

Kind: SLOPE/W
Method: Spencer
Settings
- Apply Phreatic Correction: No
- PWP Conditions Source: Piezometric Line
- Use Staged Rapid Drawdown: No

SlipSurface
- Direction of movement: Left to Right
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: Yes
- Tension Crack
  - Tension Crack Option: Search for Tension Crack
  - Percentage Wet: 1
  - Tension Crack Fluid Unit Weight: 62.4 pcf

FOS Distribution
FOS Calculation Option: Constant
Advanced
Number of Slices: 30
Optimization Tolerance: 0.01
Minimum Slip Surface Depth: 0.1 ft
Optimization Maximum Iterations: 3000
Optimization Convergence Tolerance: 1e-007
Starting Optimization Points: 8
Ending Optimization Points: 16
Complete Passes per Insertion: 1
Driving Side Maximum Convex Angle: 5 °
Resisting Side Maximum Convex Angle: 1 °

Materials

CH (NG to -18)

Model: Undrained (Phi=0)
Unit Weight: 98 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

ML (-18 to -30)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (-30 to -57)

Model: S=f(depth)
Unit Weight: 105 pcf
C-Top of Layer: 250 psf
C-Rate of Change: 12.96 psf/ft
Limiting C: 600 psf
Pore Water Pressure
Piezometric Line: 1

ML (-57 to -72)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °

LWL_c_NG to Bottom (no guide levee)

Pore Water Pressure
Piezometric Line: 1

CH (-72 to -92)

Model: S=f(depth)
Unit Weight: 105 pcf
C-Top of Layer: 800 psf
C-Rate of Change: 15 psf/ft
Limiting C: 1100 psf
Pore Water Pressure
Piezometric Line: 1

ML (-92 to -100)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Slip Surface Entry and Exit

Left Projection: Range
Left-Zone Left Coordinate: (-332, 1.3) ft
Left-Zone Right Coordinate: (-226.87482, 1.3) ft
Left-Zone Increment: 20
Right Projection: Range
Right-Zone Left Coordinate: (-188.19, -8.2775) ft
Right-Zone Right Coordinate: (48.1, -11.7) ft
Right-Zone Increment: 20
Radius Increments: 20

Slip Surface Limits

Left Coordinate: (-500, 1.3) ft
Right Coordinate: (50, -11.7) ft

Piezometric Lines

Piezometric Line 1

Coordinates

	X (ft)	Y (ft)
	-500	0
	50	0

LWL_c_NG to Bottom (no guide levee)

Regions

	Material	Points	Area (ft^2)
Region 1	ML (-92 to -100)	1,3,4,2	4400
Region 2	CH (-72 to -92)	3,5,6,4	11000
Region 3	ML (-57 to -72)	5,7,8,6	8250
Region 4	CH (-30 to -57)	7,9,10,8	14850
Region 5	ML (-18 to -30)	9,11,12,10	6600
Region 6	CH (NG to -18)	11,13,28,17,18,22,21,25,16,15,14,12	7115.5
Region 7		29,19,20,32	73.5
Region 8		28,27,26,23,24,30,31,25,21,32,20,19,29,17	395.3
Region 9	CH (NG to -18)	18,17,29,32,21,22	243

Points

	X (ft)	Y (ft)
Point 1	-500	-100
Point 2	50	-100
Point 3	-500	-92
Point 4	50	-92
Point 5	-500	-72
Point 6	50	-72
Point 7	-500	-57
Point 8	50	-57
Point 9	-500	-30
Point 10	50	-30
Point 11	-500	-18
Point 12	50	-18
Point 13	-500	1.3
Point 14	50	-11.7
Point 15	-174.5	-11.7
Point 16	-226.5	1.3
Point 17	-392	1.3
Point 18	-383	-1.7
Point 19	-331	4.8
Point 20	-319	4.8
Point 21	-302	1.3
Point 22	-311	-1.7
Point 23	-331	7.8
Point 24	-319	7.8
Point 25	-286.5	1.3
Point 26	-338	5.5
Point 27	-400.5	4.5
Point 28	-413	1.3
Point 29	-340	1.3
Point 30	-310.5	5
Point 31	-299.5	4.5

LWL_c_NG to Bottom (no guide levee)

Point 32	-310	1.3

Critical Slip Surfaces

	Slip Surface	FOS	Center (ft)	Radius (ft)	Entry (ft)	Exit (ft)
1	Optimized	1.45	(-201.576, 37.979)	29.5509	(-241.747, 1.3)	(-176.131, -11.2922)
2	7527	1.49	(-201.576, 37.979)	55.063	(-241.444, 1.3)	(-176.708, -11.1481)

Slices of Slip Surface: Optimized

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	Optimized	-240.8218	-0.915105	57.103488	144.81254	0	100
2	Optimized	-238.9716	-2.745315	171.30662	318.56684	0	100
3	Optimized	-236.6294	-4.778275	298.15561	527.66589	0	100
4	Optimized	-233.753	-6.99365	436.3964	741.76708	0	100
5	Optimized	-231.2853	-8.79647	548.89733	918.77018	0	100
6	Optimized	-229.26855	-10.20707	636.90618	1053.3433	0	100
7	Optimized	-227.3801	-11.472865	715.92423	1181.0833	0	100
8	Optimized	-225.8425	-12.45209	777.04055	1259.0186	0	100
9	Optimized	-224.22045	-13.2368	825.98567	1325.6093	0	100
10	Optimized	-222.2913	-13.96876	871.63951	1349.7448	0	100
11	Optimized	-220.1313	-14.688515	916.55657	1395.3895	0	100
12	Optimized	-217.7538	-15.39211	960.45894	1443.0003	0	100
13	Optimized	-215.28395	-15.985345	997.4698	1492.5612	0	100
14	Optimized	-212.70845	-16.472175	1027.8765	1517.5504	0	100
15	Optimized	-210.50765	-16.83489	1050.519	1541.2426	0	100
16	Optimized	-208.6816	-17.073495	1065.3976	1548.5733	0	100
17	Optimized	-206.8556	-17.3121	1080.2762	1555.9584	0	100
18	Optimized	-204.65755	-17.45589	1089.2361	1565.3271	0	100
19	Optimized	-202.08745	-17.504865	1092.3094	1547.6264	0	100
20	Optimized	-199.20285	-17.459555	1089.4616	1526.0644	0	100
21	Optimized	-196.47145	-17.286765	1078.6838	1491.2136	0	100
22	Optimized	-194.20775	-17.08077	1065.8376	1451.0472	0	100
23	Optimized	-191.9802	-16.754415	1045.4962	1413.4901	0	100
24	Optimized	-189.7888	-16.30771	1017.5948	1350.0414	0	100
25	Optimized	-187.5974	-	989.7382	1286.5926	0	100

			15.861005				
26	Optimized	-185.19595	-15.165525	946.34225	1215.2288	0	100
27	Optimized	-182.5844	-14.221275	887.39391	1098.1963	0	100
28	Optimized	-179.99175	-13.13491	819.60229	979.77784	0	100
29	Optimized	-177.41805	-11.906435	742.95086	834.15414	0	100

Slices of Slip Surface: 7527

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	7527	-240.37695	-1.0609175	66.202812	160.18642	0	100
2	7527	-238.24205	-3.0751905	191.89041	359.0325	0	100
3	7527	-236.10715	-4.888414	305.03568	538.2253	0	100
4	7527	-233.97225	-6.525317	407.17325	700.88937	0	100
5	7527	-231.8373	-8.0048275	499.50484	848.68087	0	100
6	7527	-229.70235	-9.3417725	582.91277	982.98331	0	100
7	7527	-227.56745	-10.547981	658.21311	1104.8533	0	100
8	7527	-225.2	-11.73744	732.4049	1194.5394	0	100
9	7527	-222.6	-12.89242	804.50377	1250.1746	0	100
10	7527	-220.2383	-13.812255	861.86348	1304.5139	0	100
11	7527	-218.11485	-14.529245	906.62491	1360.8806	0	100
12	7527	-215.9914	-15.151725	945.4565	1408.0039	0	100
13	7527	-213.868	-15.68299	978.63923	1446.3149	0	100
14	7527	-211.74455	-16.12573	1006.2417	1475.9693	0	100
15	7527	-209.6211	-16.482105	1028.474	1497.1947	0	100
16	7527	-207.49765	-16.75381	1045.4489	1510.1396	0	100
17	7527	-205.3742	-16.94211	1057.1719	1514.9102	0	100
18	7527	-203.2508	-17.047855	1063.7722	1511.5648	0	100
19	7527	-201.12735	-17.071515	1065.2656	1500.1592	0	100
20	7527	-199.0039	-17.013205	1061.6443	1480.6476	0	100
21	7527	-196.8805	-16.87266	1052.8326	1453.0291	0	100
22	7527	-194.75705	-16.649245	1038.9193	1417.2519	0	100

LWL_c_NG to Bottom (no guide levee)

23	7527	-192.6336	-16.34194	1019.741	1373.1304	0	100
24	7527	-190.51015	-15.9493	995.2576	1320.5362	0	100
25	7527	-188.3867	-15.469445	965.28195	1259.2741	0	100
26	7527	-186.2633	-14.9	929.76085	1189.0481	0	100
27	7527	-184.13985	-14.23803	888.46602	1109.5775	0	100
28	7527	-182.0164	-13.47995	841.14848	1020.489	0	100
29	7527	-179.893	-12.621435	787.55734	921.26981	0	100
30	7527	-177.76955	-11.657265	727.42019	811.41045	0	100

LWL_nc_NG to Bottom (no guide levee)

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File Information

Title: Central Wetlands Diversion Channel
Created By: Chaisson, Kathryn MVN
Revision Number: 119
Last Edited By: Chaisson, Kathryn MVN
Date: 7/29/2010
Time: 10:28:59 AM
File Name: Central Wetlands Diversion Channel.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 2\
Last Solved Date: 7/29/2010
Last Solved Time: 10:31:47 AM

Project Settings

Length(L) Units: feet
Time(t) Units: Seconds
Force(F) Units: lbf
Pressure(p) Units: psf
Strength Units: psf
Unit Weight of Water: 62.4 pcf
View: 2D

Analysis Settings

LWL_nc_NG to Bottom (no guide levee)

Kind: SLOPE/W
Method: Spencer
Settings
    Apply Phreatic Correction: No
    PWP Conditions Source: Piezometric Line
    Use Staged Rapid Drawdown: No
SlipSurface
    Direction of movement: Left to Right
    Use Passive Mode: No
    Slip Surface Option: Block
    Critical slip surfaces saved: 1
    Optimize Critical Slip Surface Location: Yes
    Tension Crack
        Tension Crack Option: Tension Crack Line
        Percentage Wet: 1
        Tension Crack Fluid Unit Weight: 62.4 pcf

LWL_nc_NG to Bottom (no guide levee)

FOS Distribution
FOS Calculation Option: Constant
Restrict Block Crossing: Yes
Advanced
Number of Slices: 30
Optimization Tolerance: 0.01
Minimum Slip Surface Depth: 0.1 ft
Optimization Maximum Iterations: 3000
Optimization Convergence Tolerance: 1e-007
Starting Optimization Points: 8
Ending Optimization Points: 16
Complete Passes per Insertion: 1
Driving Side Maximum Convex Angle: 5 °
Resisting Side Maximum Convex Angle: 1 °

Materials

CH (NG to -18)

Model: Undrained (Phi=0)
Unit Weight: 98 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

ML (-18 to -30)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (-30 to -57)

Model: S=f(depth)
Unit Weight: 105 pcf
C-Top of Layer: 250 psf
C-Rate of Change: 12.96 psf/ft
Limiting C: 600 psf
Pore Water Pressure
Piezometric Line: 1

ML (-57 to -72)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °

LWL_nc_NG to Bottom (no guide levee)

Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (-72 to -92)

Model: S=f(depth)
Unit Weight: 105 pcf
C-Top of Layer: 800 psf
C-Rate of Change: 15 psf/ft
Limiting C: 1100 psf
Pore Water Pressure
Piezometric Line: 1

ML (-92 to -100)

Model: Mohr-Coulomb
Unit Weight: 117 pcf
Cohesion: 200 psf
Phi: 15 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

Slip Surface Limits

Left Coordinate: (-500, 1.3) ft
Right Coordinate: (50, -11.7) ft

Slip Surface Block

Left Grid
Upper Left: (-240, -0.4) ft
Lower Left: (-240, -22.4) ft
Lower Right: (-220, -22.4) ft
X Increments: 5
Y Increments: 5
Starting Angle: 125 °
Ending Angle: 145 °
Angle Increments: 4
Right Grid
Upper Left: (-185, -0.4) ft
Lower Left: (-185, -22.4) ft
Lower Right: (-165, -22.4) ft
X Increments: 5
Y Increments: 5
Starting Angle: 25 °
Ending Angle: 45 °
Angle Increments: 4

LWL_nc_NG to Bottom (no guide levee)

Piezometric Lines

Piezometric Line 1

Coordinates

	X (ft)	Y (ft)
	-500	0
	50	0

Tension Crack Line

	X (ft)	Y (ft)
	-286.5	0.3
	-226.5	0.3

Regions

	Material	Points	Area (ft²)
Region 1	ML (-92 to -100)	1,3,4,2	4400
Region 2	CH (-72 to -92)	3,5,6,4	11000
Region 3	ML (-57 to -72)	5,7,8,6	8250
Region 4	CH (-30 to -57)	7,9,10,8	14850
Region 5	ML (-18 to -30)	9,11,12,10	6600
Region 6	CH (NG to -18)	11,13,28,17,18,22,21,25,16,15,14,12	7115.5
Region 7		29,19,20,32	73.5
Region 8		28,27,26,23,24,30,31,25,21,32,20,19,29,17	395.3
Region 9	CH (NG to -18)	18,17,29,32,21,22	243

Points

	X (ft)	Y (ft)
Point 1	-500	-100
Point 2	50	-100
Point 3	-500	-92
Point 4	50	-92
Point 5	-500	-72
Point 6	50	-72
Point 7	-500	-57
Point 8	50	-57
Point 9	-500	-30
Point 10	50	-30
Point 11	-500	-18
Point 12	50	-18
Point 13	-500	1.3
Point 14	50	-11.7
Point 15	-174.5	-11.7

LWL_nc_NG to Bottom (no guide levee)

Point 16	-226.5	1.3
Point 17	-392	1.3
Point 18	-383	-1.7
Point 19	-331	4.8
Point 20	-319	4.8
Point 21	-302	1.3
Point 22	-311	-1.7
Point 23	-331	7.8
Point 24	-319	7.8
Point 25	-286.5	1.3
Point 26	-338	5.5
Point 27	-400.5	4.5
Point 28	-413	1.3
Point 29	-340	1.3
Point 30	-310.5	5
Point 31	-299.5	4.5
Point 32	-310	1.3

Critical Slip Surfaces

	Slip Surface	FOS	Center (ft)	Radius (ft)	Entry (ft)	Exit (ft)
1	Optimized	1.39	(-208.443, 3.3)	31.69908	(-244.927, 1.3)	(-174.498, -11.7)
2	4292	1.41	(-208.443, 3.3)	32.096	(-245.809, 1.3)	(-174.088, -11.7)

Slices of Slip Surface: Optimized

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	Optimized	-244.7669	0.15	-9.3600034	42.534682	0	100
2	Optimized	-243.54795	-0.99498	62.087162	154.4782	0	100
3	Optimized	-241.42945	-2.98494	186.26149	343.18244	0	100
4	Optimized	-239.2173	-4.981865	310.86714	538.75127	0	100
5	Optimized	-236.91155	-6.985755	435.89816	729.23575	0	100
6	Optimized	-234.35975	-9.1097	568.45367	938.02662	0	100
7	Optimized	-231.6149	-11.279735	703.85318	1147.3337	0	100
8	Optimized	-229.32675	-13.01261	812.00411	1318.5999	0	100
9	Optimized	-227.44225	-14.382285	897.46694	1449.434	0	100
10	Optimized	-225.79345	-15.58066	972.20982	1547.0409	0	100
11	Optimized	-223.72435	-16.68985	1041.4411	1640.4555	0	100
12	Optimized	-221.8309	-17.371755	1083.9758	1696.4719	0	100

LWL_nc_NG to Bottom (no guide levee)

13	Optimized	-219.65175	-17.725795	1106.0768	1703.6696	0	100
14	Optimized	-216.5837	-17.995185	1122.888	1724.6188	0	100
15	Optimized	-213.74405	-17.998395	1123.0993	1700.0735	0	100
16	Optimized	-211.04005	-17.999545	1123.165	1676.6876	0	100
17	Optimized	-208.4718	-17.998635	1123.1261	1654.1044	0	100
18	Optimized	-205.90355	-17.99773	1123.0482	1631.5212	0	100
19	Optimized	-203.33525	-17.996825	1123.0093	1608.899	0	100
20	Optimized	-200.76695	-17.995915	1122.9314	1586.3158	0	100
21	Optimized	-198.146	-17.99558	1122.9147	1563.2837	0	100
22	Optimized	-195.47235	-17.99582	1122.9521	1539.8701	0	100
23	Optimized	-192.79865	-17.99606	1122.9521	1516.4566	0	100
24	Optimized	-190.2932	-17.899085	1116.918	1495.4635	0	100
25	Optimized	-187.65835	-17.530355	1093.8992	1448.7525	0	100
26	Optimized	-184.45285	-16.74046	1044.6169	1356.2442	0	100
27	Optimized	-181.50165	-15.652395	976.71869	1242.5806	0	100
28	Optimized	-179.07775	-14.51278	905.59568	1107.4282	0	100
29	Optimized	-176.1829	-12.82209	800.10168	934.12786	0	100
30	Optimized	-174.4991	-11.700605	730.1252	799.81355	0	100

Slices of Slip Surface: 4292

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	4292	-245.63035	0.15	-9.3600599	51.009487	0	100
2	4292	-244.2671	-0.9938905	62.019008	162.86821	0	100
3	4292	-241.89815	-2.981672	186.05702	351.82586	0	100
4	4292	-239.5292	-4.9694535	310.09504	540.77057	0	100
5	4292	-237.16025	-6.9572345	434.12336	729.74762	0	100
6	4292	-234.7913	-8.945016	558.16784	918.69233	0	100
7	4292	-232.42235	-10.932799	682.21232	1107.637	0	100
8	4292	-230.0534	-12.92058	806.25681	1296.5818	0	100

LWL_nc_NG to Bottom (no guide levee)

9	4292	-227.68445	-14.90836	930.26896	1485.5588	0	100
10	4292	-225.25	-16.951125	1057.7542	1650.0292	0	100
11	4292	-222.65	-18	1123.1852	1799.7037	0	100
12	4292	-220.09	-18	1123.1818	1756.0331	0	100
13	4292	-217.67	-18	1123.1818	1734.8347	0	100
14	4292	-215.25	-18	1123.1818	1713.6364	0	100
15	4292	-212.83	-18	1123.1818	1692.438	0	100
16	4292	-210.41	-18	1123.1818	1671.2397	0	100
17	4292	-207.99	-18	1123.1818	1650.0826	0	100
18	4292	-205.57	-18	1123.1818	1628.8843	0	100
19	4292	-203.15	-18	1123.1818	1607.686	0	100
20	4292	-200.73	-18	1123.1818	1586.4876	0	100
21	4292	-198.31	-18	1123.1818	1565.2893	0	100
22	4292	-195.89	-18	1123.1818	1544.1322	0	100
23	4292	-193.47	-18	1123.1818	1522.9339	0	100
24	4292	-191.05	-18	1123.1818	1501.7355	0	100
25	4292	-188.63	-18	1123.1818	1480.5372	0	100
26	4292	-186.21	-18	1123.1818	1459.3802	0	100
27	4292	-183.6875	-17.24223	1075.9169	1434.435	0	100
28	4292	-181.0625	-15.726685	981.33047	1259.2174	0	100
29	4292	-178.4375	-14.21114	886.777	1083.9669	0	100
30	4292	-175.8125	-12.695595	792.19053	908.71631	0	100
31	4292	-174.29405	-11.81891	737.5049	802.32224	0	100

MRGO REACH 8
Normal Water Level (EL. 0.0)
10 10 1 220 1 0
7 1 2 1
200
0 62.4 0 0
40 132 0 0
0 96 150 150
0 105 240 240
0 105 317.5 395
0 100 492.5 590
0 125 960 960

0 0 189.5 0 197.5 4 202.5 4 210.5 0 400 0 9999.9 0

0 -6 166.9 -2.4 174.5 -.5 188.5 -.5 189.5 0
197.5 4 202.5 4 210.5 0 400 0 9999.9 0

0 -6 166.9 -2.4 185.5 -2 210.5 0 400 0 9999.9 0

0 -14 400 -14 9999.9 0
0 -30 400 -30 9999.9 0
0 -38 400 -38 9999.9 0
0 -48 400 -48 9999.9 0
0 -60 400 -60 9999.9 0

0 0 400 0 9999.9 0

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
3 90210 -14 222 -14 1
222
4 90220 -30 241 -30 1
241
5 90225 -38 251 -38 1
251

**** STABILITY WITH UPLIFT ****

MRGO REACH 8
Normal Water Level (EL. 0.0)
8 PROFILES
1VERTICALS
UPLIFT WITH 1 PIEZOMETRIC GRADE LINES

* * STRATUM 3 ACT. WEDGE LOC. 90210.0 EL. -14.0 PASS.WEDGE LOC. 222.0 EL. -14.0

ASSUMED FAILURE SURFACE DATA

DIST.	ELEV.	WT.	UPLIFT	STR 1	STR 2	STR USED
.0	-14.0	1142.	875.	150.	240.	150.
166.9	-14.0	1264.	875.	150.	240.	150.
174.5	-14.0	1390.	875.	150.	240.	150.
185.5	-14.0	1381.	875.	150.	240.	150.
188.5	-14.0	1373.	875.	150.	240.	150.
189.5	-14.0	1405.	875.	150.	240.	150.
197.5	-14.0	1909.	875.	150.	240.	150.
200.0	-14.0	1902.	875.	150.	240.	150.
202.5	-14.0	1894.	875.	150.	240.	150.
210.5	-14.0	1344.	875.	150.	240.	150.
400.0	-14.0	1344.	875.	150.	240.	150.

ASSUMED CRIT. PASSIVE LOC. 222.0 EL. -14.0 DP 9408. RP 4200.

ACTIVE WEDGE DATA

DIST.	ELEV.	DA	RA	DB	RB	FS
210.0	-14.0	15836.	4839.	0.	1800.	1.69

CRIT. ACTIVE LOC 210.0 EL -14.0 DA 15836. RA 4839.

DIS.	EL.	DP	RP	DB	RB	FS
222.0	-14.0	9408.	4200.	0.	1800.	1.69

* * STRATUM 4 ACT. WEDGE LOC. 90220.0 EL. -30.0 PASS.WEDGE LOC. 241.0 EL. -30.0

ASSUMED FAILURE SURFACE DATA

DIST.	ELEV.	WT.	UPLIFT	STR 1	STR 2	STR USED
.0	-30.0	2822.	1875.	240.	395.	240.
166.9	-30.0	2944.	1875.	240.	395.	240.
174.5	-30.0	3070.	1875.	240.	395.	240.
185.5	-30.0	3061.	1875.	240.	395.	240.
188.5	-30.0	3053.	1875.	240.	395.	240.
189.5	-30.0	3085.	1875.	240.	395.	240.
197.5	-30.0	3589.	1875.	240.	395.	240.
200.0	-30.0	3582.	1875.	240.	395.	240.
202.5	-30.0	3574.	1875.	240.	395.	240.
210.5	-30.0	3024.	1875.	240.	395.	240.
400.0	-30.0	3024.	1875.	240.	395.	240.

ASSUMED CRIT. PASSIVE LOC. 241.0 EL. -30.0 DP 44351. RP 11880.

ACTIVE WEDGE DATA

DIST.	ELEV.	DA	RA	DB	RB	FS
220.0	-30.0	51829.	11637.	0.	5040.	3.82

CRIT. ACTIVE LOC 220.0 EL -30.0 DA 51829. RA 11637.

DIS.	EL.	DP	RP	DB	RB	FS
241.0	-30.0	44351.	11880.	0.	5040.	3.82

* * STRATUM 5 ACT. WEDGE LOC. 90225.0 EL. -38.0 PASS.WEDGE LOC. 251.0 EL. -38.0

ASSUMED FAILURE SURFACE DATA

DIST.	ELEV.	WT.	UPLIFT	STR 1	STR 2	STR USED
.0	-38.0	3662.	2375.	395.	590.	395.
166.9	-38.0	3784.	2375.	395.	590.	395.
174.5	-38.0	3910.	2375.	395.	590.	395.
185.5	-38.0	3901.	2375.	395.	590.	395.
188.5	-38.0	3893.	2375.	395.	590.	395.
189.5	-38.0	3925.	2375.	395.	590.	395.
197.5	-38.0	4429.	2375.	395.	590.	395.

200.0	-38.0	4422.	2375.	395.	590.	395.
202.5	-38.0	4414.	2375.	395.	590.	395.
210.5	-38.0	3864.	2375.	395.	590.	395.
400.0	-38.0	3864.	2375.	395.	590.	395.

ASSUMED CRIT. PASSIVE LOC. 251.0 EL. -38.0 DP 71901. RP 16960.

ACTIVE WEDGE DATA

DIST.	ELEV.	DA	RA	DB	RB	FS
225.0	-38.0	79442.	16482.	0.	10270.	5.80

CRIT. ACTIVE LOC 225.0 EL -38.0 DA 79442. RA 16482.

DIS.	EL.	DP	RP	DB	RB	FS
251.0	-38.0	71901.	16960.	0.	10270.	5.80

NWL (nc) PS Check

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File Information

Title: MRGO Reach 1_1 on 2
Created By: Chaisson, Kathryn MVN
Revision Number: 126
Last Edited By: Chaisson, Kathryn MVN
Date: 6/10/2010
Time: 10:52:03 AM
File Name: MRGO Reach 8_1 on 2.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 8\
Last Solved Date: 6/10/2010
Last Solved Time: 10:55:32 AM

Project Settings

Length(L) Units: feet
Time(t) Units: Seconds
Force(F) Units: lbf
Pressure(p) Units: psf
Strength Units: psf
Unit Weight of Water: 62.4 pcf
View: 2D

Analysis Settings

NWL (nc) PS Check

Kind: SLOPE/W
Method: Spencer
Settings
- Apply Phreatic Correction: No
- PWP Conditions Source: Piezometric Line
- Use Staged Rapid Drawdown: No

SlipSurface
- Direction of movement: Left to Right
- Use Passive Mode: No
- Slip Surface Option: Block
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: Yes
- Tension Crack
  - Tension Crack Option: Search for Tension Crack
  - Percentage Wet: 1
  - Tension Crack Fluid Unit Weight: 62.4 pcf

NWL (nc) PS Check

FOS Distribution
FOS Calculation Option: Constant
Restrict Block Crossing: Yes
Advanced
Number of Slices: 30
Optimization Tolerance: 0.01
Minimum Slip Surface Depth: 0.1 ft
Optimization Maximum Iterations: 3000
Optimization Convergence Tolerance: 1e-007
Starting Optimization Points: 8
Ending Optimization Points: 16
Complete Passes per Insertion: 1
Driving Side Maximum Convex Angle: 5 °
Resisting Side Maximum Convex Angle: 1 °

Materials

ROCK
Model: Mohr-Coulomb
Unit Weight: 132 pcf
Cohesion: 0 psf
Phi: 40 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (NG to -14)
Model: Undrained (Phi=0)
Unit Weight: 96 pcf
Cohesion: 150 psf
Pore Water Pressure
Piezometric Line: 1

CH (-14 to -30)
Model: Undrained (Phi=0)
Unit Weight: 105 pcf
Cohesion: 240 psf
Pore Water Pressure
Piezometric Line: 1

CH (-30 to -38)
Model: S=f(depth)
Unit Weight: 105 pcf
C-Top of Layer: 240 psf
C-Rate of Change: 9.69 psf/ft
Limiting C: 395 psf
Pore Water Pressure

Piezometric Line: 1

CH (-38 to -48)

Model: S=f(depth)
Unit Weight: 100 pcf
C-Top of Layer: 395 psf
C-Rate of Change: 19.5 psf/ft
Limiting C: 590 psf
Pore Water Pressure
Piezometric Line: 1

CH (-48 to -60)

Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Cohesion: 960 psf
Pore Water Pressure
Piezometric Line: 1

Slip Surface Limits

Left Coordinate: (-200, -6) ft
Right Coordinate: (200, 0) ft

Slip Surface Block

Left Grid
Upper Left: (-13, -1.5) ft
Lower Left: (-13, -31.5) ft
Lower Right: (7, -31.5) ft
X Increments: 8
Y Increments: 12
Starting Angle: 125 °
Ending Angle: 145 °
Angle Increments: 4
Right Grid
Upper Left: (16, -1.5) ft
Lower Left: (16, -31.5) ft
Lower Right: (36, -31.5) ft
X Increments: 8
Y Increments: 12
Starting Angle: 25 °
Ending Angle: 45 °
Angle Increments: 4

Piezometric Lines

Piezometric Line 1

NWL (nc) PS Check

Coordinates

	X (ft)	Y (ft)
	-200	0
	200	0

Regions

	Material	Points	Area (ft²)
Region 1	CH (-38 to -48)	15,7,8,16	4000
Region 2	CH (-30 to -38)	7,5,6,8	3200
Region 3	CH (-14 to -30)	5,3,4,6	6400
Region 4	CH (NG to -14)	3,1,19,17,14,2,4	4833.1
Region 5	ROCK	19,18,13,11,12,14,17	99.65
Region 6	CH (-48 to -60)	9,15,16,10	4800

Points

	X (ft)	Y (ft)
Point 1	-200	-6
Point 2	200	0
Point 3	-200	-14
Point 4	200	-14
Point 5	-200	-30
Point 6	200	-30
Point 7	-200	-38
Point 8	200	-38
Point 9	-200	-60
Point 10	200	-60
Point 11	-2.5	4
Point 12	2.5	4
Point 13	-11.5	-0.5
Point 14	10.5	0
Point 15	-200	-48
Point 16	200	-48
Point 17	-14.5	-2
Point 18	-25.5	-0.5
Point 19	-33.1	-2.4

Critical Slip Surfaces

	Slip Surface	FOS	Center (ft)	Radius (ft)	Entry (ft)	Exit (ft)
1	Optimized	1.39	(12.262, 1.432)	17.07689	(-6.92008, 1.78996)	(28.2034, 0)
2	11749	1.62	(12.262, 1.432)	18.803	(-8.20871, 1.14565)	(32.6846, 0)

Slices of Slip Surface: Optimized

	Slip	X (ft)	Y (ft)	PWP (psf)	Base Normal	Frictional	Cohesive

NWL (nc) PS Check

	Surface				Stress (psf)	Strength (psf)	Strength (psf)
1	Optimized	-6.3772845	0.89498	-55.846041	76.821146	64.460596	0
2	Optimized	-5.4565585	-0.623145	38.884075	226.2572	157.22472	0
3	Optimized	-4.849454	-1.62416	101.34754	389.65028	0	150
4	Optimized	-4.1713025	-2.64094	164.79305	552.73576	0	150
5	Optimized	-3.2733475	-3.91876	244.52915	729.23343	0	150
6	Optimized	-2.662185	-4.7911435	298.96796	847.76185	0	150
7	Optimized	-1.91244	-5.8704405	366.31612	958.12552	0	150
8	Optimized	-0.73732	-7.562087	471.87257	1114.6007	0	150
9	Optimized	0.432275	-9.152905	571.13361	1280.7271	0	150
10	Optimized	1.757155	-10.746695	670.59591	1444.565	0	150
11	Optimized	3.053195	-12.22759	762.99118	1545.2089	0	150
12	Optimized	4.12946	-13.14286	820.11532	1633.5729	0	150
13	Optimized	5.1756	-13.7092	855.41287	1615.92	0	150
14	Optimized	6.216155	-13.99233	873.1171	1639.5644	0	150
15	Optimized	7.251125	-13.992255	873.1171	1568.258	0	150
16	Optimized	8.286095	-13.99218	873.10743	1496.9516	0	150
17	Optimized	9.321535	-13.844985	863.9279	1446.7359	0	150
18	Optimized	10.169745	-13.50984	843.0123	1391.0078	0	150
19	Optimized	11.044985	-13.011625	811.91974	1320.0573	0	150
20	Optimized	11.933015	-12.46031	777.52831	1283.1209	0	150
21	Optimized	12.956915	-11.74993	733.20184	1212.8123	0	150
22	Optimized	14.318625	-10.811345	674.611	1121.9935	0	150
23	Optimized	15.680335	-9.87276	616.08062	1031.1747	0	150
24	Optimized	16.95839	-8.9615425	559.19804	949.07999	0	150
25	Optimized	18.152785	-8.0776875	504.0448	863.47301	0	150
26	Optimized	19.437185	-7.1026425	443.20207	773.32567	0	150
27	Optimized	20.811595	-6.0364075	376.67146	670.02012	0	150
28	Optimized	22.155635	-4.9714335	310.21753	570.8057	0	150
29	Optimized	23.469305	-3.90772	243.83996	467.7489	0	150
30	Optimized	24.782975	-2.8440065	177.46831	364.69802	0	150
31	Optimized	26.130695	-1.7341125	108.20877	260.17285	0	150
32	Optimized	27.512465	-	36.069405	148.13417	0	150

NWL (nc) PS Check

			0.5780375				

Slices of Slip Surface: 11749

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	11749	-7.728051	0.5728235	-35.744375	65.874041	55.274884	0
2	11749	-6.6891925	-0.6652395	41.510994	223.66202	152.84286	0
3	11749	-5.525825	-2.0516865	128.02327	452.23451	0	150
4	11749	-4.315495	-3.494102	218.03149	661.99702	0	150
5	11749	-3.105165	-4.9365175	308.03972	871.72234	0	150
6	11749	-1.875	-6.402571	399.52074	1044.6583	0	150
7	11749	-0.625	-7.892263	492.4781	1180.775	0	150
8	11749	0.625	-9.3819545	585.45089	1316.8403	0	150
9	11749	1.875	-10.871645	678.37226	1452.957	0	150
10	11749	3.5	-12.808245	799.24202	1565.4448	0	150
11	11749	5.25	-14	873.6	1707.4667	0	150
12	11749	6.75	-14	873.6	1604.2	0	150
13	11749	8.25	-14	873.6	1500.8667	0	150
14	11749	9.75	-14	873.6	1397.5333	0	150
15	11749	11.1875	-14	873.6	1345.8909	0	150
16	11749	12.5625	-14	873.6	1345.8909	0	150
17	11749	13.9375	-14	873.6	1345.8909	0	150
18	11749	15.3125	-14	873.6	1345.8909	0	150
19	11749	16.69519	-13.416665	837.18501	1391.2312	0	150
20	11749	18.08557	-12.25	764.40308	1277.2925	0	150
21	11749	19.47595	-11.083335	691.62115	1163.3538	0	150
22	11749	20.86633	-9.9166665	618.78413	1049.36	0	150
23	11749	22.25671	-8.75	546.0022	935.42133	0	150
24	11749	23.64709	-7.5833335	473.19823	821.48262	0	150
25	11749	25.037465	-6.4166665	400.39978	707.48883	0	150
26	11749	26.42784	-5.25	327.60132	593.55012	0	150
27	11749	27.81822	-4.0833335	254.79735	479.58938	0	150
28	11749	29.2086	-2.9166665	181.9989	365.63415	0	150
29	11749	30.59898	-1.75	109.20044	251.67892	0	150
30	11749	31.98936	-0.5833335	36.399779	137.72368	0	150

NWL (c) PS Check

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File Information

Title: MRGO Reach 1_1 on 2
Created By: Chaisson, Kathryn MVN
Revision Number: 126
Last Edited By: Chaisson, Kathryn MVN
Date: 6/10/2010
Time: 10:52:03 AM
File Name: MRGO Reach 8_1 on 2.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 8\
Last Solved Date: 6/10/2010
Last Solved Time: 10:54:56 AM

Project Settings

Length(L) Units: feet
Time(t) Units: Seconds
Force(F) Units: lbf
Pressure(p) Units: psf
Strength Units: psf
Unit Weight of Water: 62.4 pcf
View: 2D

Analysis Settings

NWL (c) PS Check

Kind: SLOPE/W
Method: Spencer
Settings
- Apply Phreatic Correction: No
- PWP Conditions Source: Piezometric Line
- Use Staged Rapid Drawdown: No

SlipSurface
- Direction of movement: Left to Right
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: Yes
- Tension Crack
  - Tension Crack Option: Search for Tension Crack
  - Percentage Wet: 1
  - Tension Crack Fluid Unit Weight: 62.4 pcf

FOS Distribution
FOS Calculation Option: Constant
Advanced
Number of Slices: 30
Optimization Tolerance: 0.01
Minimum Slip Surface Depth: 0.1 ft
Optimization Maximum Iterations: 3000
Optimization Convergence Tolerance: 1e-007
Starting Optimization Points: 8
Ending Optimization Points: 16
Complete Passes per Insertion: 1
Driving Side Maximum Convex Angle: 5 °
Resisting Side Maximum Convex Angle: 1 °

Materials

ROCK

Model: Mohr-Coulomb
Unit Weight: 132 pcf
Cohesion: 0 psf
Phi: 40 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (NG to -14)

Model: Undrained (Phi=0)
Unit Weight: 96 pcf
Cohesion: 150 psf
Pore Water Pressure
Piezometric Line: 1

CH (-14 to -30)

Model: Undrained (Phi=0)
Unit Weight: 105 pcf
Cohesion: 240 psf
Pore Water Pressure
Piezometric Line: 1

CH (-30 to -38)

Model: S=f(depth)
Unit Weight: 105 pcf
C-Top of Layer: 240 psf
C-Rate of Change: 9.69 psf/ft
Limiting C: 395 psf
Pore Water Pressure
Piezometric Line: 1

NWL (c) PS Check

CH (-38 to -48)

Model: S=f(depth)
Unit Weight: 100 pcf
C-Top of Layer: 395 psf
C-Rate of Change: 19.5 psf/ft
Limiting C: 590 psf
Pore Water Pressure
Piezometric Line: 1

CH (-48 to -60)

Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Cohesion: 960 psf
Pore Water Pressure
Piezometric Line: 1

Slip Surface Entry and Exit

Left Projection: Range
Left-Zone Left Coordinate: (-24.78235, -0.5) ft
Left-Zone Right Coordinate: (-2.5, 4) ft
Left-Zone Increment: 20
Right Projection: Range
Right-Zone Left Coordinate: (13.68599, 0) ft
Right-Zone Right Coordinate: (171.37047, 0) ft
Right-Zone Increment: 20
Radius Increments: 20

Slip Surface Limits

Left Coordinate: (-200, -6) ft
Right Coordinate: (200, 0) ft

Piezometric Lines

Piezometric Line 1

Coordinates

	X (ft)	Y (ft)
	-200	0
	200	0

Regions

	Material	Points	Area (ft²)
Region 1	CH (-38 to -48)	15,7,8,16	4000

NWL (c) PS Check

Region 2	CH (-30 to -38)	7,5,6,8	3200
Region 3	CH (-14 to -30)	5,3,4,6	6400
Region 4	CH (NG to -14)	3,1,19,17,14,2,4	4833.1
Region 5	ROCK	19,18,13,11,12,14,17	99.65
Region 6	CH (-48 to -60)	9,15,16,10	4800

Points

	X (ft)	Y (ft)
Point 1	-200	-6
Point 2	200	0
Point 3	-200	-14
Point 4	200	-14
Point 5	-200	-30
Point 6	200	-30
Point 7	-200	-38
Point 8	200	-38
Point 9	-200	-60
Point 10	200	-60
Point 11	-2.5	4
Point 12	2.5	4
Point 13	-11.5	-0.5
Point 14	10.5	0
Point 15	-200	-48
Point 16	200	-48
Point 17	-14.5	-2
Point 18	-25.5	-0.5
Point 19	-33.1	-2.4

Critical Slip Surfaces

	Slip Surface	FOS	Center (ft)	Radius (ft)	Entry (ft)	Exit (ft)
1	Optimized	1.42	(8.968, 5.698)	13.18113	(-4.45043, 3.02478)	(21.5633, 0)
2	7977	1.61	(8.968, 5.698)	13.831	(-4.58801, 2.956)	(21.5702, 0)

Slices of Slip Surface: Optimized

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	Optimized	-4.143746	2.173707	-135.63839	48.618358	40.795646	0
2	Optimized	-3.5058825	0.661315	-41.265918	167.40681	140.471	0
3	Optimized	-2.9137375	-0.521115	32.517598	271.49616	200.52683	0
4	Optimized	-2.649006	-1.0469245	65.327886	398.72603	279.75426	0
5	Optimized	-2.572621	-1.14219	71.27235	517.14232	0	150
6	Optimized	-2.169225	-1.645296	102.66288	566.57012	0	150

7	Optimized	-1.507675	-2.4703655	154.15034	640.17497	0	150
8	Optimized	-0.72638	-3.377855	210.77576	740.13562	0	150
9	Optimized	0.17466	-4.367765	272.55022	828.63992	0	150
10	Optimized	1.093885	-5.326437	332.36695	929.19874	0	150
11	Optimized	2.031295	-6.2538705	390.24375	1012.2374	0	150
12	Optimized	2.544985	-6.7620935	421.95263	1054.9013	0	150
13	Optimized	2.98925	-7.1420625	445.66848	1081.8844	0	150
14	Optimized	3.78781	-7.8129875	487.5287	1090.9928	0	150
15	Optimized	4.7198525	-8.3844025	523.19091	1140.2593	0	150
16	Optimized	5.7853775	-8.8563075	552.63273	1112.6281	0	150
17	Optimized	6.7262535	-9.080095	566.60068	1140.4633	0	150
18	Optimized	7.54248	-9.055765	565.08217	1081.8291	0	150
19	Optimized	8.3587065	-9.031435	563.56366	1023.2073	0	150
20	Optimized	9.200115	-8.781156	547.94432	1017.3711	0	150
21	Optimized	10.066705	-8.3049285	518.23223	909.62681	0	150
22	Optimized	10.921455	-7.8352075	488.91509	832.98763	0	150
23	Optimized	11.79276	-7.30022	455.52937	798.05414	0	150
24	Optimized	12.692455	-6.69346	417.6738	738.18372	0	150
25	Optimized	13.737305	-5.952615	371.44058	673.37697	0	150
26	Optimized	14.717315	-5.23186	326.46488	602.14517	0	150
27	Optimized	15.48733	-4.66528	291.10918	546.08861	0	150
28	Optimized	16.257345	-4.0987	255.76395	490.03205	0	150
29	Optimized	17.165445	-3.41501	213.09314	426.14833	0	150
30	Optimized	18.21164	-2.61421	163.12726	346.82379	0	150
31	Optimized	19.124315	-1.912235	119.32156	278.33577	0	150
32	Optimized	19.90346	-1.309085	81.68711	218.56843	0	150
33	Optimized	20.92816	-0.503755	31.434438	140.94767	0	150

Slices of Slip Surface: 7977

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	7977	-4.1110815	1.4779975	-92.225481	83.143303	69.765515	0
2	7977	-3.3590255	-0.543356	33.905763	275.99948	203.14075	0
3	7977	-2.791949	-1.5597395	97.325264	515.05933	0	150
4	7977	-2.0833335	-2.5884335	161.5186	656.15313	0	150
5	7977	-1.2500002	-3.6018815	224.7535	773.99208	0	150
6	7977	-0.41666665	-4.4451565	277.37602	870.59427	0	150

NWL (c) PS Check

7	7977	0.41666665	-5.158824	321.90706	951.85393	0	150
8	7977	1.2500002	-5.7674685	359.88648	1021.0654	0	150
9	7977	2.0833335	-6.287276	392.33021	1080.6146	0	150
10	7977	2.9444445	-6.7418135	420.6934	1104.2847	0	150
11	7977	3.8333335	-7.13484	445.217	1092.6487	0	150
12	7977	4.7222225	-7.4561165	465.25715	1073.1845	0	150
13	7977	5.6111115	-7.7108305	481.15303	1046.6762	0	150
14	7977	6.5	-7.9027415	493.13458	1013.5106	0	150
15	7977	7.3888885	-8.0344955	501.34882	974.08617	0	150
16	7977	8.2777775	-8.1078225	505.9331	928.65262	0	150
17	7977	9.1666665	-8.1236555	506.91764	877.37563	0	150
18	7977	10.055556	-8.082194	504.33325	820.33079	0	150
19	7977	10.925775	-7.9862075	498.33474	788.46813	0	150
20	7977	11.77733	-7.836924	489.02884	782.18629	0	150
21	7977	12.628885	-7.6316205	476.21717	770.76429	0	150
22	7977	13.48044	-7.3676445	459.73679	754.01806	0	150
23	7977	14.331995	-7.0413315	439.38192	731.72236	0	150
24	7977	15.18355	-6.647709	414.81868	703.51771	0	150
25	7977	16.035105	-6.1800405	385.63132	668.96855	0	150
26	7977	16.88666	-5.6290805	351.25222	627.47053	0	150
27	7977	17.738215	-4.9818045	310.86273	578.21756	0	150
28	7977	18.58977	-4.219094	263.27101	520.14483	0	150
29	7977	19.441325	-3.31106	206.61182	451.79057	0	150
30	7977	20.29288	-2.2060915	137.65769	371.2409	0	150
31	7977	21.144435	-0.798039	49.797793	276.81041	0	150

MRGO REACH 8
Low Water Level (EL. -1.0)
10 10 1 220 1 1
7 1 2 1
200
0 62.4 0 0
40 132 0 0
0 96 150 150
0 105 240 240
0 105 317.5 395
0 100 492.5 590
0 125 960 960

0 0 189.5 0 197.5 4 202.5 4 211.5 -.5 225.5 -.5
227.5 -1 400 -1 9999.9 0

0 0 189.5 0 197.5 4 202.5 4 211.5 -.5 225.5 -.5
227.5 -1 233.1 -2.4 400 -6 9999.9 0

0 0 189.5 0 214.5 -2 233.1 -2.4 400 -6 9999.9 0

0 -14 400 -14 9999.9 0
0 -30 400 -30 9999.9 0
0 -38 400 -38 9999.9 0
0 -48 400 -48 9999.9 0
0 -60 400 -60 9999.9 0

0 -1 400 -1 9999.9 0

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
3 90210 -14 227 -14 1
227
4 220 -30 241 -30 1
241
5 225 -38 252 -38 1
252

**** STABILITY WITH UPLIFT ****

MRGO REACH 8
Low Water Level (EL. -1.0)
8 PROFILES
1VERTICALS
UPLIFT WITH 1 PIEZOMETRIC GRADE LINES

* * STRATUM 3 ACT. WEDGE LOC. 90210.0 EL. -14.0 PASS.WEDGE LOC. 227.0 EL. -14.0

ASSUMED FAILURE SURFACE DATA

DIST.	ELEV.	WT.	UPLIFT	STR 1	STR 2	STR USED
.0	-14.0	1344.	813.	150.	240.	150.
189.5	-14.0	1345.	813.	150.	240.	150.
197.5	-14.0	1895.	813.	150.	240.	150.
200.0	-14.0	1902.	813.	150.	240.	150.
202.5	-14.0	1909.	813.	150.	240.	150.
211.5	-14.0	1341.	813.	150.	240.	150.
214.5	-14.0	1350.	813.	150.	240.	150.
225.5	-14.0	1358.	813.	150.	240.	150.
227.5	-14.0	1294.	813.	150.	240.	150.
233.1	-14.0	1201.	813.	150.	240.	150.
400.0	-14.0	1080.	813.	150.	240.	150.

ASSUMED CRIT. PASSIVE LOC. 227.0 EL. -14.0 DP 7833. RP 3445.

ACTIVE WEDGE DATA

DIST.	ELEV.	DA	RA	DB	RB	FS
210.0	-14.0	16030.	4734.	0.	2550.	1.31

CRIT. ACTIVE LOC 210.0 EL -14.0 DA 16030. RA 4734.

DIS.	EL.	DP	RP	DB	RB	FS
227.0	-14.0	7833.	3445.	0.	2550.	1.31

* * STRATUM 4 ACT. WEDGE LOC. 220.0 EL. -30.0 PASS.WEDGE LOC. 241.0 EL. -30.0

ASSUMED FAILURE SURFACE DATA

DIST.	ELEV.	WT.	UPLIFT	STR 1	STR 2	STR USED
.0	-30.0	3024.	1813.	240.	395.	240.
189.5	-30.0	3025.	1813.	240.	395.	240.
197.5	-30.0	3575.	1813.	240.	395.	240.
200.0	-30.0	3582.	1813.	240.	395.	240.
202.5	-30.0	3589.	1813.	240.	395.	240.
211.5	-30.0	3021.	1813.	240.	395.	240.
214.5	-30.0	3030.	1813.	240.	395.	240.
225.5	-30.0	3038.	1813.	240.	395.	240.
227.5	-30.0	2974.	1813.	240.	395.	240.
233.1	-30.0	2881.	1813.	240.	395.	240.
400.0	-30.0	2760.	1813.	240.	395.	240.

ASSUMED CRIT. PASSIVE LOC. 241.0 EL. -30.0 DP 39763. RP 10935.

ACTIVE WEDGE DATA

DIST.	ELEV.	DA	RA	DB	RB	FS
220.0	-30.0	51922.	11871.	0.	5040.	2.29
225.0	-30.0	51387.	12241.	0.	3840.	2.32
230.0	-30.0	49230.	12853.	0.	2640.	2.79
235.0	-30.0	45360.	12261.	0.	1440.	4.40
240.0	-30.0	42852.	11422.	0.	240.	7.31
245.0	-30.0	42071.	11361.	0.	-960.	9.24

CRIT. ACTIVE LOC 220.0 EL -30.0 DA 51922. RA 11871.

DIS.	EL.	DP	RP	DB	RB	FS
241.0	-30.0	39763.	10935.	0.	5040.	2.29

* * STRATUM 5 ACT. WEDGE LOC. 225.0 EL. -38.0 PASS.WEDGE LOC. 252.0 EL. -38.0

ASSUMED FAILURE SURFACE DATA

DIST.	ELEV.	WT.	UPLIFT	STR 1	STR 2	STR USED
.0	-38.0	3864.	2313.	395.	590.	395.
189.5	-38.0	3865.	2313.	395.	590.	395.

197.5	-38.0	4415.	2313.	395.	590.	395.
200.0	-38.0	4422.	2313.	395.	590.	395.
202.5	-38.0	4429.	2313.	395.	590.	395.
211.5	-38.0	3861.	2313.	395.	590.	395.
214.5	-38.0	3870.	2313.	395.	590.	395.
225.5	-38.0	3878.	2313.	395.	590.	395.
227.5	-38.0	3814.	2313.	395.	590.	395.
233.1	-38.0	3721.	2313.	395.	590.	395.
400.0	-38.0	3600.	2313.	395.	590.	395.

ASSUMED CRIT. PASSIVE LOC. 252.0 EL. -38.0 DP 65670. RP 15895.

ACTIVE WEDGE DATA

DIST.	ELEV.	DA	RA	DB	RB	FS
225.0	-38.0	79540.	16960.	0.	10665.	3.14
230.0	-38.0	79209.	16999.	0.	8690.	3.07
235.0	-38.0	77580.	17700.	0.	6715.	3.38
240.0	-38.0	74271.	17950.	0.	4740.	4.49
245.0	-38.0	70390.	16921.	0.	2765.	7.54
250.0	-38.0	68875.	16460.	0.	790.	10.34
255.0	-38.0	68052.	16433.	0.	-1185.	13.07

CRIT. ACTIVE LOC 230.0 EL -38.0 DA 79209. RA 16999.

DIS.	EL.	DP	RP	DB	RB	FS
252.0	-38.0	65670.	15895.	0.	8690.	3.07

LWL (nc) FS Check

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File Information

Title: MRGO Reach 1_1 on 2
Created By: Chaisson, Kathryn MVN
Revision Number: 126
Last Edited By: Chaisson, Kathryn MVN
Date: 6/10/2010
Time: 10:52:03 AM
File Name: MRGO Reach 8_1 on 2.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 8\
Last Solved Date: 6/10/2010
Last Solved Time: 10:54:32 AM

Project Settings

Length(L) Units: feet
Time(t) Units: Seconds
Force(F) Units: lbf
Pressure(p) Units: psf
Strength Units: psf
Unit Weight of Water: 62.4 pcf
View: 2D

Analysis Settings

LWL (nc) FS Check

Kind: SLOPE/W
Method: Spencer
Settings
    Apply Phreatic Correction: No
    PWP Conditions Source: Piezometric Line
    Use Staged Rapid Drawdown: No
SlipSurface
    Direction of movement: Right to Left
    Use Passive Mode: No
    Slip Surface Option: Block
    Critical slip surfaces saved: 1
    Optimize Critical Slip Surface Location: Yes
    Tension Crack
        Tension Crack Option: Search for Tension Crack
        Percentage Wet: 1
        Tension Crack Fluid Unit Weight: 62.4 pcf

FOS Distribution
FOS Calculation Option: Constant
Restrict Block Crossing: Yes
Advanced
Number of Slices: 30
Optimization Tolerance: 0.01
Minimum Slip Surface Depth: 0.1 ft
Optimization Maximum Iterations: 3000
Optimization Convergence Tolerance: 1e-007
Starting Optimization Points: 8
Ending Optimization Points: 16
Complete Passes per Insertion: 1
Driving Side Maximum Convex Angle: 5 °
Resisting Side Maximum Convex Angle: 1 °

Materials

ROCK
Model: Mohr-Coulomb
Unit Weight: 132 pcf
Cohesion: 0 psf
Phi: 40 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (NG to -14)
Model: Undrained (Phi=0)
Unit Weight: 96 pcf
Cohesion: 150 psf
Pore Water Pressure
Piezometric Line: 1

CH (-14 to -30)
Model: Undrained (Phi=0)
Unit Weight: 105 pcf
Cohesion: 240 psf
Pore Water Pressure
Piezometric Line: 1

CH (-30 to -38)
Model: S=f(depth)
Unit Weight: 105 pcf
C-Top of Layer: 240 psf
C-Rate of Change: 9.69 psf/ft
Limiting C: 395 psf
Pore Water Pressure

Piezometric Line: 1

CH (-38 to -48)

Model: S=f(depth)
Unit Weight: 100 pcf
C-Top of Layer: 395 psf
C-Rate of Change: 19.5 psf/ft
Limiting C: 590 psf
Pore Water Pressure
Piezometric Line: 1

CH (-48 to -60)

Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Cohesion: 960 psf
Pore Water Pressure
Piezometric Line: 1

Slip Surface Limits

Left Coordinate: (-200, -6) ft
Right Coordinate: (200, 0) ft

Slip Surface Block

Left Grid
Upper Left: (-46, -1.5) ft
Lower Left: (-46, -31.5) ft
Lower Right: (-26, -31.5) ft
X Increments: 8
Y Increments: 12
Starting Angle: 145 °
Ending Angle: 165 °
Angle Increments: 4
Right Grid
Upper Left: (-7.5, -1.5) ft
Lower Left: (-7.5, -31.5) ft
Lower Right: (12.5, -31.5) ft
X Increments: 8
Y Increments: 12
Starting Angle: 35 °
Ending Angle: 55 °
Angle Increments: 4

Piezometric Lines

Piezometric Line 1

LWL (nc) FS Check

Coordinates

	X (ft)	Y (ft)
	-200	-1
	200	-1

Regions

	Material	Points	Area (ft²)
Region 1	CH (-38 to -48)	15,7,8,16	4000
Region 2	CH (-30 to -38)	7,5,6,8	3200
Region 3	CH (-14 to -30)	5,3,4,6	6400
Region 4	CH (NG to -14)	3,1,19,17,14,2,4	4833.1
Region 5	ROCK	19,18,13,11,12,14,17	99.65
Region 6	CH (-48 to -60)	9,15,16,10	4800

Points

	X (ft)	Y (ft)
Point 1	-200	-6
Point 2	200	0
Point 3	-200	-14
Point 4	200	-14
Point 5	-200	-30
Point 6	200	-30
Point 7	-200	-38
Point 8	200	-38
Point 9	-200	-60
Point 10	200	-60
Point 11	-2.5	4
Point 12	2.5	4
Point 13	-11.5	-0.5
Point 14	10.5	0
Point 15	-200	-48
Point 16	200	-48
Point 17	-14.5	-2
Point 18	-25.5	-0.5
Point 19	-33.1	-2.4

Critical Slip Surfaces

	Slip Surface	FOS	Center (ft)	Radius (ft)	Entry (ft)	Exit (ft)
1	Optimized	1.41	(-17.443, 2.302)	21.87358	(6.47973, 2.01014)	(-40.9227, -2.56874)
2	11934	1.51	(-17.443, 2.302)	22.401	(7.85648, 1.32176)	(-42.2836, -2.59809)

Slices of Slip Surface: Optimized

	Slip	X (ft)	Y (ft)	PWP (psf)	Base Normal	Frictional	Cohesive

LWL (nc) FS Check

	Surface				Stress (psf)	Strength (psf)	Strength (psf)
1	Optimized	-39.992805	-3.3418525	146.1299	279.86042	0	150
2	Optimized	-37.8841	-5.064315	253.61342	451.16562	0	150
3	Optimized	-36.00536	-6.5031875	343.4011	581.79864	0	150
4	Optimized	-34.605425	-7.4822425	404.49025	680.60899	0	150
5	Optimized	-33.50273	-8.207503	449.74893	736.45249	0	150
6	Optimized	-32.24505	-8.943672	495.68665	825.42099	0	150
7	Optimized	-30.535145	-9.944544	558.12066	953.67064	0	150
8	Optimized	-28.590095	-10.865785	615.61989	1044.333	0	150
9	Optimized	-27.172565	-11.41299	649.77173	1127.0716	0	150
10	Optimized	-26.172565	-11.64294	664.11703	1142.4856	0	150
11	Optimized	-24.55168	-11.8925	679.68081	1187.7608	0	150
12	Optimized	-22.757065	-12.169675	696.98983	1213.3391	0	150
13	Optimized	-21.06448	-12.432	713.33739	1237.4518	0	150
14	Optimized	-19.371895	-12.694325	729.74333	1261.5061	0	150
15	Optimized	-17.854665	-12.92595	744.16322	1281.8151	0	150
16	Optimized	-16.5128	-13.126875	756.69246	1300.2404	0	150
17	Optimized	-15.170935	-13.3278	769.2217	1318.5921	0	150
18	Optimized	-14.302865	-13.45778	777.36869	1330.1129	0	150
19	Optimized	-13.4543	-13.58785	785.48488	1341.0514	0	150
20	Optimized	-12.151435	-13.788955	798.00105	1356.7535	0	150
21	Optimized	-11.160605	-13.941895	807.56684	1391.2787	0	150
22	Optimized	-10.031233	-13.994825	810.84588	1439.598	0	150
23	Optimized	-8.4512775	-13.99592	810.97246	1539.4109	0	150
24	Optimized	-6.9657425	-13.66622	790.34777	1511.4727	0	150
25	Optimized	-5.5746275	-13.00572	749.17774	1535.2397	0	150
26	Optimized	-4.2843025	-12.086265	691.76729	1435.4336	0	150
27	Optimized	-3.0947675	-10.90786	618.24873	1399.3611	0	150
28	Optimized	-2.30679	-10.127255	569.53978	1363.373	0	150
29	Optimized	-2.05679	-9.862131	552.99529	1286.9015	0	150
30	Optimized	-1.25803	-8.825264	488.27872	1191.8475	0	150
31	Optimized	0.22591	-6.898968	368.09463	1015.2562	0	150

LWL (nc) FS Check

32	Optimized	1.73394	-4.816879	238.17302	801.81291	0	150
33	Optimized	2.977395	-3.000634	124.8421	607.9396	0	150
34	Optimized	3.911788	-1.651665	40.664048	432.69783	0	150
35	Optimized	4.558056	-0.73010695	-16.840877	309.39405	0	150
36	Optimized	5.613527	0.77496105	-110.75619	116.31753	97.601997	0

Slices of Slip Surface: 11934

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	11934	-41.365255	-3.2411325	139.8477	245.88523	0	150
2	11934	-39.52853	-4.52722	220.09834	375.39498	0	150
3	11934	-37.69181	-5.8133075	300.34898	504.90027	0	150
4	11934	-35.855085	-7.099395	380.60409	634.41448	0	150
5	11934	-34.01836	-8.3854825	460.83689	763.92869	0	150
6	11934	-32.166665	-9.682053	541.78137	910.79477	0	150
7	11934	-30.3	-10.989105	623.31626	1072.8114	0	150
8	11934	-28.433335	-12.29616	704.89503	1234.8279	0	150
9	11934	-26.75	-13.474845	778.41283	1393.2683	0	150
10	11934	-25.75	-14	811.2	1355.62	0	150
11	11934	-24.714285	-14	811.17251	1363.0905	0	150
12	11934	-23.142855	-14	811.17251	1361.8814	0	150
13	11934	-21.571425	-14	811.17251	1360.6724	0	150
14	11934	-20	-14	811.17251	1359.3996	0	150
15	11934	-18.428575	-14	811.17251	1358.1905	0	150
16	11934	-16.857145	-14	811.17251	1356.9814	0	150
17	11934	-15.285715	-14	811.17251	1355.7724	0	150
18	11934	-13.75	-14	811.2	1353	0	150
19	11934	-12.25	-14	811.2	1348.6667	0	150
20	11934	-10.6875	-14	811.2	1397.7846	0	150
21	11934	-9.0625	-14	811.2	1500.3692	0	150
22	11934	-7.4375	-14	811.2	1602.9538	0	150
23	11934	-5.8125	-14	811.2	1705.5385	0	150
24	11934	-3.75	-12.51031	718.2508	1482.3709	0	150
25	11934	-2.25	-10.72268	606.68867	1394.3349	0	150
26	11934	-1.25	-9.5309245	532.31379	1283.9467	0	150
27	11934	0.25	-7.7432935	420.78158	1118.2789	0	150
28	11934	1.75	-5.955663	309.23223	952.61113	0	150
29	11934	3.352074	-4.046386	190.09627	722.73396	0	150

LWL (nc) FS Check

30	11934	5.0562215	-2.015462	63.364166	428.60112	0	150
31	11934	6.192829	-0.66090545	-21.159748	232.43757	0	150
32	11934	7.1669225	0.49997405	-93.599338	90.826128	76.21217	0

LWL (c) FS Check

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File Information

Title: MRGO Reach 1_1 on 2
Created By: Chaisson, Kathryn MVN
Revision Number: 126
Last Edited By: Chaisson, Kathryn MVN
Date: 6/10/2010
Time: 10:52:03 AM
File Name: MRGO Reach 8_1 on 2.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 8\
Last Solved Date: 6/10/2010
Last Solved Time: 10:52:48 AM

Project Settings

Length(L) Units: feet
Time(t) Units: Seconds
Force(F) Units: lbf
Pressure(p) Units: psf
Strength Units: psf
Unit Weight of Water: 62.4 pcf
View: 2D

Analysis Settings

LWL (c) FS Check

Kind: SLOPE/W
Method: Spencer
Settings
- Apply Phreatic Correction: No
- PWP Conditions Source: Piezometric Line
- Use Staged Rapid Drawdown: No

SlipSurface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: Yes
- Tension Crack
  - Tension Crack Option: Search for Tension Crack
  - Percentage Wet: 1
  - Tension Crack Fluid Unit Weight: 62.4 pcf

FOS Distribution
FOS Calculation Option: Constant
Advanced
Number of Slices: 30
Optimization Tolerance: 0.01
Minimum Slip Surface Depth: 0.1 ft
Optimization Maximum Iterations: 3000
Optimization Convergence Tolerance: 1e-007
Starting Optimization Points: 8
Ending Optimization Points: 16
Complete Passes per Insertion: 1
Driving Side Maximum Convex Angle: 5 °
Resisting Side Maximum Convex Angle: 1 °

Materials

ROCK

Model: Mohr-Coulomb
Unit Weight: 132 pcf
Cohesion: 0 psf
Phi: 40 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (NG to -14)

Model: Undrained (Phi=0)
Unit Weight: 96 pcf
Cohesion: 150 psf
Pore Water Pressure
Piezometric Line: 1

CH (-14 to -30)

Model: Undrained (Phi=0)
Unit Weight: 105 pcf
Cohesion: 240 psf
Pore Water Pressure
Piezometric Line: 1

CH (-30 to -38)

Model: S=f(depth)
Unit Weight: 105 pcf
C-Top of Layer: 240 psf
C-Rate of Change: 9.69 psf/ft
Limiting C: 395 psf
Pore Water Pressure
Piezometric Line: 1

LWL (c) FS Check

CH (-38 to -48)

Model: S=f(depth)
Unit Weight: 100 pcf
C-Top of Layer: 395 psf
C-Rate of Change: 19.5 psf/ft
Limiting C: 590 psf
Pore Water Pressure
Piezometric Line: 1

CH (-48 to -60)

Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Cohesion: 960 psf
Pore Water Pressure
Piezometric Line: 1

Slip Surface Entry and Exit

Left Projection: Range
Left-Zone Left Coordinate: (-58.90089, -2.95652) ft
Left-Zone Right Coordinate: (-9.5, 0.5) ft
Left-Zone Increment: 20
Right Projection: Range
Right-Zone Left Coordinate: (2.4, 4) ft
Right-Zone Right Coordinate: (59.68851, 0) ft
Right-Zone Increment: 20
Radius Increments: 20

Slip Surface Limits

Left Coordinate: (-200, -6) ft
Right Coordinate: (200, 0) ft

Piezometric Lines

Piezometric Line 1

Coordinates

	X (ft)	Y (ft)
	-200	-1
	200	-1

Regions

	Material	Points	Area (ft^2)
Region 1	CH (-38 to -48)	15,7,8,16	4000

LWL (c) FS Check

Region 2	CH (-30 to -38)	7,5,6,8	3200
Region 3	CH (-14 to -30)	5,3,4,6	6400
Region 4	CH (NG to -14)	3,1,19,17,14,2,4	4833.1
Region 5	ROCK	19,18,13,11,12,14,17	99.65
Region 6	CH (-48 to -60)	9,15,16,10	4800

Points

	X (ft)	Y (ft)
Point 1	-200	-6
Point 2	200	0
Point 3	-200	-14
Point 4	200	-14
Point 5	-200	-30
Point 6	200	-30
Point 7	-200	-38
Point 8	200	-38
Point 9	-200	-60
Point 10	200	-60
Point 11	-2.5	4
Point 12	2.5	4
Point 13	-11.5	-0.5
Point 14	10.5	0
Point 15	-200	-48
Point 16	200	-48
Point 17	-14.5	-2
Point 18	-25.5	-0.5
Point 19	-33.1	-2.4

Critical Slip Surfaces

	Slip Surface	FOS	Center (ft)	Radius (ft)	Entry (ft)	Exit (ft)
1	Optimized	1.42	(-16.928, 9.717)	20.54601	(5.73787, 2.38106)	(-38.6444, -2.51959)
2	4006	1.54	(-16.928, 9.717)	23.025	(5.01481, 2.7426)	(-36.4615, -2.47251)

Slices of Slip Surface: Optimized

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	Optimized	-37.996115	-3.0282105	126.55908	246.51592	0	150
2	Optimized	-36.699625	-4.04545	190.03887	350.37981	0	150
3	Optimized	-34.94256	-5.3734	272.90056	479.44098	0	150
4	Optimized	-33.46687	-6.4271875	338.65083	571.82139	0	150
5	Optimized	-32.03272	-7.3437175	395.85872	683.43658	0	150
6	Optimized	-	-	461.66409	790.32587	0	150

LWL (c) FS Check

		30.134675	8.3984275				
7	Optimized	-28.473145	-9.1437025	508.16547	892.02706	0	150
8	Optimized	-27.57119	-9.5381115	532.77802	921.89236	0	150
9	Optimized	-26.90883	-9.7406765	545.41631	962.3947	0	150
10	Optimized	-25.90883	-9.993605	561.20171	997.55543	0	150
11	Optimized	-24.82663	-10.18455	573.11501	1028.9248	0	150
12	Optimized	-23.479885	-10.422165	587.94452	1050.9351	0	150
13	Optimized	-22.13314	-10.65978	602.77402	1072.9454	0	150
14	Optimized	-20.7864	-10.8974	617.59622	1094.9556	0	150
15	Optimized	-19.24415	-11.17326	634.79695	1121.3425	0	150
16	Optimized	-17.50639	-11.48736	654.39015	1150.4491	0	150
17	Optimized	-15.568755	-11.840075	676.42659	1183.643	0	150
18	Optimized	-13.75	-12.17305	697.21187	1212.9729	0	150
19	Optimized	-12.25	-12.44767	714.3274	1235.269	0	150
20	Optimized	-10.77314	-12.71805	731.18152	1305.7876	0	150
21	Optimized	-9.4123725	-12.72631	731.7228	1320.0419	0	150
22	Optimized	-8.1445575	-12.476685	716.14418	1375.3757	0	150
23	Optimized	-6.425635	-11.768265	671.9499	1350.3932	0	150
24	Optimized	-4.7764375	-10.694685	604.94885	1291.009	0	150
25	Optimized	-3.6480725	-9.71474	543.79755	1269.3293	0	150
26	Optimized	-2.791945	-8.8974755	492.80481	1202.3995	0	150
27	Optimized	-2.25	-8.28991	454.88379	1164.5014	0	150
28	Optimized	-1.367295	-7.3003245	393.14211	1073.5448	0	150
29	Optimized	-0.14813	-5.86478	303.56448	923.71491	0	150
30	Optimized	1.02479	-4.41232	212.92847	791.46486	0	150
31	Optimized	2.055625	-3.1102925	131.67989	665.10892	0	150
32	Optimized	3.0921275	-1.7672475	47.876191	507.32769	0	150
33	Optimized	3.8770625	-0.75017	-15.589463	367.11937	0	150
34	Optimized	4.903871	0.940362	-121.07989	117.05511	98.220898	0

Slices of Slip Surface: 4006

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	4006	-35.62114	-3.6479485	165.23323	383.19466	0	150

LWL (c) FS Check

2	4006	-33.94038	-5.7478805	296.26956	562.32386	0	150
3	4006	-32.4	-7.3085085	393.65325	708.55366	0	150
4	4006	-31	-8.4858005	467.11242	831.217	0	150
5	4006	-29.6	-9.4888205	529.7019	937.82623	0	150
6	4006	-28.2	-10.344008	583.06749	1030.7192	0	150
7	4006	-26.5	-11.19506	636.17269	1142.2739	0	150
8	4006	-24.8125	-11.903505	680.38055	1228.0179	0	150
9	4006	-23.4375	-12.35696	708.66477	1258.6316	0	150
10	4006	-22.0625	-12.71705	731.13169	1280.6325	0	150
11	4006	-20.6875	-12.988235	748.06938	1294.2332	0	150
12	4006	-19.3125	-13.173685	759.67131	1299.8756	0	150
13	4006	-17.9375	-13.27548	766.02602	1297.5869	0	150
14	4006	-16.5625	-13.294735	767.17564	1287.4734	0	150
15	4006	-15.1875	-13.231665	763.2619	1269.5167	0	150
16	4006	-13.75	-13.07494	753.44352	1240.5968	0	150
17	4006	-12.25	-12.81464	737.2106	1199.6807	0	150
18	4006	-10.857145	-12.483115	716.54498	1194.7418	0	150
19	4006	-9.5714305	-12.09044	692.0455	1226.3202	0	150
20	4006	-8.285714	-11.613095	662.25505	1248.9503	0	150
21	4006	-7	-11.045215	626.82393	1262.1101	0	150
22	4006	-5.714286	-10.37908	585.25606	1264.8513	0	150
23	4006	-4.4285715	-9.6044605	536.91867	1255.9818	0	150
24	4006	-3.142857	-8.707576	480.95396	1233.9897	0	150
25	4006	-2.25	-8.019687	438.03329	1195.7204	0	150
26	4006	-1.25	-7.114157	381.52303	1093.8707	0	150
27	4006	0.25	-5.5728775	285.34957	921.79359	0	150
28	4006	1.75	-3.684938	167.5406	712.73447	0	150
29	4006	2.975188	-1.819821	51.157077	477.5948	0	150
30	4006	3.56672	-0.7726774	-14.184968	326.27756	0	150
31	4006	4.348935	1.0986211	-130.95448	105.66283	88.661638	0

LWL (c) FS Check (Toe)

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File Information

Title: MRGO Reach 1_1 on 2
Created By: Chaisson, Kathryn MVN
Revision Number: 126
Last Edited By: Chaisson, Kathryn MVN
Date: 6/10/2010
Time: 10:52:03 AM
File Name: MRGO Reach 8_1 on 2.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 8\
Last Solved Date: 6/10/2010
Last Solved Time: 10:53:20 AM

Project Settings

Length(L) Units: feet
Time(t) Units: Seconds
Force(F) Units: lbf
Pressure(p) Units: psf
Strength Units: psf
Unit Weight of Water: 62.4 pcf
View: 2D

Analysis Settings

LWL (c) FS Check (Toe)

Kind: SLOPE/W
Method: Spencer
Settings
    Apply Phreatic Correction: No
    PWP Conditions Source: Piezometric Line
    Use Staged Rapid Drawdown: No
SlipSurface
    Direction of movement: Right to Left
    Use Passive Mode: No
    Slip Surface Option: Entry and Exit
    Critical slip surfaces saved: 1
    Optimize Critical Slip Surface Location: Yes
    Tension Crack
        Tension Crack Option: Search for Tension Crack
        Percentage Wet: 1
        Tension Crack Fluid Unit Weight: 62.4 pcf

LWL (c) FS Check (Toe)

FOS Distribution
FOS Calculation Option: Constant
Advanced
Number of Slices: 30
Optimization Tolerance: 0.01
Minimum Slip Surface Depth: 0.1 ft
Optimization Maximum Iterations: 3000
Optimization Convergence Tolerance: 1e-007
Starting Optimization Points: 8
Ending Optimization Points: 16
Complete Passes per Insertion: 1
Driving Side Maximum Convex Angle: 5 °
Resisting Side Maximum Convex Angle: 1 °

Materials

ROCK

Model: Mohr-Coulomb
Unit Weight: 132 pcf
Cohesion: 0 psf
Phi: 40 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (NG to -14)

Model: Undrained (Phi=0)
Unit Weight: 96 pcf
Cohesion: 150 psf
Pore Water Pressure
Piezometric Line: 1

CH (-14 to -30)

Model: Undrained (Phi=0)
Unit Weight: 105 pcf
Cohesion: 240 psf
Pore Water Pressure
Piezometric Line: 1

CH (-30 to -38)

Model: S=f(depth)
Unit Weight: 105 pcf
C-Top of Layer: 240 psf
C-Rate of Change: 9.69 psf/ft
Limiting C: 395 psf
Pore Water Pressure
Piezometric Line: 1

LWL (c) FS Check (Toe)

CH (-38 to -48)

Model: S=f(depth)
Unit Weight: 100 pcf
C-Top of Layer: 395 psf
C-Rate of Change: 19.5 psf/ft
Limiting C: 590 psf
Pore Water Pressure
Piezometric Line: 1

CH (-48 to -60)

Model: Undrained (Phi=0)
Unit Weight: 125 pcf
Cohesion: 960 psf
Pore Water Pressure
Piezometric Line: 1

Slip Surface Entry and Exit

Left Projection: Range
Left-Zone Left Coordinate: (-88.73333, -3.6) ft
Left-Zone Right Coordinate: (-33.1, -2.4) ft
Left-Zone Increment: 20
Right Projection: Range
Right-Zone Left Coordinate: (-25.44117, -0.5) ft
Right-Zone Right Coordinate: (-11.5, -0.5) ft
Right-Zone Increment: 20
Radius Increments: 20

Slip Surface Limits

Left Coordinate: (-200, -6) ft
Right Coordinate: (200, 0) ft

Piezometric Lines

Piezometric Line 1

Coordinates

	X (ft)	Y (ft)
	-200	-1
	200	-1

Regions

	Material	Points	Area (ft²)
Region 1	CH (-38 to -48)	15,7,8,16	4000

LWL (c) FS Check (Toe)

Region 2	CH (-30 to -38)	7,5,6,8	3200
Region 3	CH (-14 to -30)	5,3,4,6	6400
Region 4	CH (NG to -14)	3,1,19,17,14,2,4	4833.1
Region 5	ROCK	19,18,13,11,12,14,17	99.65
Region 6	CH (-48 to -60)	9,15,16,10	4800

Points

	X (ft)	Y (ft)
Point 1	-200	-6
Point 2	200	0
Point 3	-200	-14
Point 4	200	-14
Point 5	-200	-30
Point 6	200	-30
Point 7	-200	-38
Point 8	200	-38
Point 9	-200	-60
Point 10	200	-60
Point 11	-2.5	4
Point 12	2.5	4
Point 13	-11.5	-0.5
Point 14	10.5	0
Point 15	-200	-48
Point 16	200	-48
Point 17	-14.5	-2
Point 18	-25.5	-0.5
Point 19	-33.1	-2.4

Critical Slip Surfaces

	Slip Surface	FOS	Center (ft)	Radius (ft)	Entry (ft)	Exit (ft)
1	Optimized	3.03	(-33.556, 15.824)	3.303751	(-25.4357, -0.5)	(-32.8611, -2.34028)
2	8823	3.23	(-33.556, 15.824)	18.23	(-25.4412, -0.5)	(-33.1, -2.4)

Slices of Slip Surface: Optimized

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	Optimized	-32.767635	-2.3201	82.3729	82.864335	0.41236307	0
2	Optimized	-32.580665	-2.27974	79.858216	80.746981	0.745763	0
3	Optimized	-32.36314	-2.23479	77.050148	78.678747	1.3665572	0
4	Optimized	-32.11506	-2.18525	73.958971	76.382106	2.0332514	0
5	Optimized	-31.870055	-2.1411665	71.209093	75.07445	3.2434193	0
6	Optimized	-31.62812	-2.102539	68.796817	74.0826	4.4352988	0
7	Optimized	-	-	66.388622	73.090751	5.6237534	0

		31.386185	2.0639115				
8	Optimized	-31.144255	-2.025284	63.976346	72.094819	6.812208	0
9	Optimized	-30.885925	-1.9824625	61.305495	70.719998	7.8997062	0
10	Optimized	-30.6112	-1.9354475	58.370638	69.180813	9.0708136	0
11	Optimized	-30.35498	-1.89585	55.900272	68.668544	10.713853	0
12	Optimized	-30.117255	-1.86367	53.89103	68.447611	12.214422	0
13	Optimized	-29.87953	-1.83149	51.885957	68.226677	13.711493	0
14	Optimized	-29.757205	-1.81502	50.856703	68.429556	14.745374	0
15	Optimized	-29.64892	-1.7949835	49.606747	66.723676	14.362809	0
16	Optimized	-29.439275	-1.75567	47.154773	65.106218	15.06305	0
17	Optimized	-29.22963	-1.7163565	44.700456	63.493448	15.769192	0
18	Optimized	-28.954535	-1.66873	41.728253	62.153393	17.138728	0
19	Optimized	-28.643155	-1.6220375	38.815049	61.654455	19.164538	0
20	Optimized	-28.360945	-1.5845925	36.47912	61.492872	20.98903	0
21	Optimized	-28.099865	-1.552894	34.500661	62.064396	23.12872	0
22	Optimized	-27.85992	-1.526942	32.880995	62.706628	25.026677	0
23	Optimized	-27.619975	-1.50099	31.261744	63.348859	26.924286	0
24	Optimized	-27.393195	-1.476462	29.731103	65.644027	30.134521	0
25	Optimized	-27.19137	-1.443615	27.681588	65.924192	32.089354	0
26	Optimized	-27.00133	-1.401025	25.023876	66.453064	34.763216	0
27	Optimized	-26.746695	-1.323875	20.209851	62.437299	35.433036	0
28	Optimized	-26.49069	-1.21888	13.657975	54.652233	34.398267	0
29	Optimized	-26.29791	-1.1206	7.5254267	48.394908	34.293567	0
30	Optimized	-26.149005	-1.03573	2.2295187	40.320581	31.962196	0
31	Optimized	-25.98779	-0.92604	-4.6152875	32.595278	27.350686	0
32	Optimized	-25.77039	-0.77812	-13.845482	22.565698	18.934869	0
33	Optimized	-25.580845	-0.6311175	-23.018292	11.115634	9.3271243	0
34	Optimized	-25.46786	-0.5290375	-29.387628	2.9102502	2.4419899	0

Slices of Slip Surface: 8823

	Slip	X (ft)	Y (ft)	PWP (psf)	Base Normal	Frictional	Cohesive

LWL (c) FS Check (Toe)

	Surface				Stress (psf)	Strength (psf)	Strength (psf)
1	8823	-32.972725	-2.395926	87.106824	90.365869	2.7346638	0
2	8823	-32.71818	-2.3859965	86.486376	93.326641	5.7396636	0
3	8823	-32.463635	-2.372501	85.645816	95.786845	8.509334	0
4	8823	-32.20909	-2.3554315	84.578192	97.746031	11.049129	0
5	8823	-31.954545	-2.334778	83.288525	99.21208	13.361449	0
6	8823	-31.7	-2.3105285	81.77818	100.1856	15.445658	0
7	8823	-31.445455	-2.2826685	80.037086	100.67168	17.314478	0
8	8823	-31.19091	-2.251181	78.074878	100.66412	18.954626	0
9	8823	-30.936365	-2.216047	75.882015	100.17297	20.38253	0
10	8823	-30.68182	-2.1772455	73.46098	99.193272	21.591957	0
11	8823	-30.427275	-2.134752	70.806728	97.73225	22.593195	0
12	8823	-30.172725	-2.088541	67.926186	95.786114	23.377255	0
13	8823	-29.91818	-2.0385835	64.807255	93.355553	23.954867	0
14	8823	-29.663635	-1.9848475	61.453648	90.44187	24.324006	0
15	8823	-29.40909	-1.927299	57.861803	87.043279	24.486166	0
16	8823	-29.154545	-1.865901	54.032313	83.158601	24.439857	0
17	8823	-28.9	-1.800613	49.958675	78.791359	24.193495	0
18	8823	-28.645455	-1.7313915	45.638623	73.934342	23.742928	0
19	8823	-28.39091	-1.65819	41.0704	68.588811	23.090689	0
20	8823	-28.136365	-1.580958	36.251688	62.756939	22.240547	0
21	8823	-27.88182	-1.499642	31.177747	56.426831	21.186497	0
22	8823	-27.627275	-1.414184	25.844874	49.606377	19.938268	0
23	8823	-27.37954	-1.3270315	20.406872	44.22999	19.989969	0
24	8823	-27.138615	-1.238344	14.872479	40.30278	21.338556	0
25	8823	-26.89769	-1.145773	9.0964029	35.887941	22.480769	0
26	8823	-26.656765	-1.0492545	3.0734665	30.984006	23.419724	0
27	8823	-26.406765	-0.9447736	-3.4461295	25.647135	21.520501	0
28	8823	-26.14769	-0.8319318	-10.487555	19.88569	16.686075	0
29	8823	-25.888615	-0.7142619	-17.830047	13.622918	11.430986	0
30	8823	-25.62954	-0.59165995	-25.480412	6.8569025	5.7536244	0
31	8823	-25.470585	-0.51455625	-30.291336	1.6781123	1.4081034	0

MRGO REACH 9
Normal Water Level (EL. 0.0)
10 10 1 220 1 0
7 1 2 1
200
0 62.4 0 0
40 132 0 0
0 86 100 100
0 94 100 100
0 108 200 200
0 118 470 600
0 105 600 600

0 0 136.5 0 191.5 1 197.5 4 202.5 4 207.5 1.5 231.5 1.5
234.5 0 400 0 9999.9 0

0 -5.5 122.9 -3.4 136.5 0 191.5 1 197.5 4 202.5 4
207.5 1.5 231.5 1.5 234.5 0 400 0 9999.9 0

0 -5.5 122.9 -3.4 184.9 -2.3 210.5 0 245.5 0 400 0
9999.9 0

0 -13 400 -13 9999.9 0
0 -20 400 -20 9999.9 0
0 -33 400 -33 9999.9 0
0 -47 400 -47 9999.9 0
0 -60 400 -60 9999.9 0

0 0 400 0 9999.9 0

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
3 210 -13 233 -13 1
233
4 220 -20 237 -20 1
237
5 225 -33 249 -33 1
249

**** STABILITY WITH UPLIFT ****

MRGO REACH 9
Normal Water Level (EL. 0.0)
8 PROFILES
1VERTICALS
UPLIFT WITH 1 PIEZOMETRIC GRADE LINES

* * STRATUM 3 ACT. WEDGE LOC. 210.0 EL. -13.0 PASS.WEDGE LOC. 233.0 EL. -13.0

ASSUMED FAILURE SURFACE DATA

DIST.	ELEV.	WT.	UPLIFT	STR 1	STR 2	STR USED
.0	-13.0	988.	813.	100.	100.	100.
122.9	-13.0	1038.	813.	100.	100.	100.
136.5	-13.0	1263.	813.	100.	100.	100.
184.9	-13.0	1340.	813.	100.	100.	100.
191.5	-13.0	1329.	813.	100.	100.	100.
197.5	-13.0	1700.	813.	100.	100.	100.
200.0	-13.0	1689.	813.	100.	100.	100.
202.5	-13.0	1678.	813.	100.	100.	100.
207.5	-13.0	1328.	813.	100.	100.	100.
210.5	-13.0	1316.	813.	100.	100.	100.
231.5	-13.0	1315.	813.	100.	100.	100.
234.5	-13.0	1118.	813.	100.	100.	100.
245.5	-13.0	1118.	813.	100.	100.	100.
400.0	-13.0	1118.	813.	100.	100.	100.

ASSUMED CRIT. PASSIVE LOC. 233.0 EL. -13.0 DP 7341. RP 2600.

ACTIVE WEDGE DATA

DIST.	ELEV.	DA	RA	DB	RB	FS
210.0	-13.0	13699.	3556.	0.	2300.	1.33
215.0	-13.0	12018.	3585.	0.	1800.	1.71
220.0	-13.0	10110.	2782.	0.	1300.	2.41
225.0	-13.0	9986.	2716.	0.	800.	2.31
230.0	-13.0	9984.	2716.	0.	300.	2.12
235.0	-13.0	9588.	2716.	0.	-200.	2.28

CRIT. ACTIVE LOC 210.0 EL -13.0 DA 13699. RA 3556.

DIS.	EL.	DP	RP	DB	RB	FS
233.0	-13.0	7341.	2600.	0.	2300.	1.33

* * STRATUM 4 ACT. WEDGE LOC. 220.0 EL. -20.0 PASS.WEDGE LOC. 237.0 EL. -20.0

ASSUMED FAILURE SURFACE DATA

DIST.	ELEV.	WT.	UPLIFT	STR 1	STR 2	STR USED
.0	-20.0	1646.	1250.	100.	200.	100.
122.9	-20.0	1696.	1250.	100.	200.	100.
136.5	-20.0	1921.	1250.	100.	200.	100.
184.9	-20.0	1998.	1250.	100.	200.	100.
191.5	-20.0	1987.	1250.	100.	200.	100.
197.5	-20.0	2358.	1250.	100.	200.	100.
200.0	-20.0	2347.	1250.	100.	200.	100.
202.5	-20.0	2336.	1250.	100.	200.	100.
207.5	-20.0	1986.	1250.	100.	200.	100.
210.5	-20.0	1974.	1250.	100.	200.	100.
231.5	-20.0	1973.	1250.	100.	200.	100.
234.5	-20.0	1776.	1250.	100.	200.	100.
245.5	-20.0	1776.	1250.	100.	200.	100.
400.0	-20.0	1776.	1250.	100.	200.	100.

ASSUMED CRIT. PASSIVE LOC. 237.0 EL. -20.0 DP 17396. RP 4000.

ACTIVE WEDGE DATA

DIST.	ELEV.	DA	RA	DB	RB	FS
220.0	-20.0	24266.	5031.	0.	1700.	1.56
225.0	-20.0	22205.	4500.	0.	1200.	2.02
230.0	-20.0	21499.	4114.	0.	700.	2.15
235.0	-20.0	21101.	4116.	0.	200.	2.24
240.0	-20.0	20112.	4116.	0.	-300.	2.88
245.0	-20.0	19123.	4116.	0.	-800.	4.23

CRIT. ACTIVE LOC 220.0 EL -20.0 DA 24266. RA 5031.

DIS.	EL.	DP	RP	DB	RB	FS
237.0	-20.0	17396.	4000.	0.	1700.	1.56

* * STRATUM 5 ACT. WEDGE LOC. 225.0 EL. -33.0 PASS.WEDGE LOC. 249.0 EL. -33.0

ASSUMED FAILURE SURFACE DATA

DIST.	ELEV.	WT.	UPLIFT	STR 1	STR 2	STR USED
.0	-33.0	3050.	2063.	200.	600.	200.
122.9	-33.0	3100.	2063.	200.	600.	200.
136.5	-33.0	3325.	2063.	200.	600.	200.
184.9	-33.0	3402.	2063.	200.	600.	200.
191.5	-33.0	3391.	2063.	200.	600.	200.
197.5	-33.0	3762.	2063.	200.	600.	200.
200.0	-33.0	3751.	2063.	200.	600.	200.
202.5	-33.0	3740.	2063.	200.	600.	200.
207.5	-33.0	3390.	2063.	200.	600.	200.
210.5	-33.0	3378.	2063.	200.	600.	200.
231.5	-33.0	3377.	2063.	200.	600.	200.
234.5	-33.0	3180.	2063.	200.	600.	200.
245.5	-33.0	3180.	2063.	200.	600.	200.
400.0	-33.0	3180.	2063.	200.	600.	200.

ASSUMED CRIT. PASSIVE LOC. 249.0 EL. -33.0 DP 49608. RP 9200.

ACTIVE WEDGE DATA

DIST.	ELEV.	DA	RA	DB	RB	FS
225.0	-33.0	60267.	9363.	0.	4800.	2.19
230.0	-33.0	59996.	10156.	0.	3800.	2.23
235.0	-33.0	57917.	10185.	0.	2800.	2.67
240.0	-33.0	55020.	9382.	0.	1800.	3.77
245.0	-33.0	53908.	9316.	0.	800.	4.49
250.0	-33.0	52918.	9316.	0.	-200.	5.53

CRIT. ACTIVE LOC 225.0 EL -33.0 DA 60267. RA 9363.

DIS.	EL.	DP	RP	DB	RB	FS
249.0	-33.0	49608.	9200.	0.	4800.	2.19

NWL (nc) PS Check

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File Information

Title: MRGO Reach 9_1 on 2
Created By: Chaisson, Kathryn MVN
Revision Number: 152
Last Edited By: Chaisson, Kathryn MVN
Date: 6/17/2010
Time: 8:59:08 AM
File Name: MRGO Reach 9_1 on 2.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 9\
Last Solved Date: 6/17/2010
Last Solved Time: 9:02:50 AM

Project Settings

Length(L) Units: feet
Time(t) Units: Seconds
Force(F) Units: lbf
Pressure(p) Units: psf
Strength Units: psf
Unit Weight of Water: 62.4 pcf
View: 2D

Analysis Settings

NWL (nc) PS Check

Kind: SLOPE/W
Method: Spencer
Settings
- Apply Phreatic Correction: No
- PWP Conditions Source: Piezometric Line
- Use Staged Rapid Drawdown: No

SlipSurface
- Direction of movement: Left to Right
- Use Passive Mode: No
- Slip Surface Option: Block
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: Yes
- Tension Crack
  - Tension Crack Option: Search for Tension Crack
  - Percentage Wet: 1
  - Tension Crack Fluid Unit Weight: 62.4 pcf

FOS Distribution
FOS Calculation Option: Constant
Restrict Block Crossing: Yes
Advanced
Number of Slices: 30
Optimization Tolerance: 0.01
Minimum Slip Surface Depth: 0.1 ft
Optimization Maximum Iterations: 3000
Optimization Convergence Tolerance: 1e-007
Starting Optimization Points: 8
Ending Optimization Points: 16
Complete Passes per Insertion: 1
Driving Side Maximum Convex Angle: 5 °
Resisting Side Maximum Convex Angle: 1 °

Materials

ROCK

Model: Mohr-Coulomb
Unit Weight: 132 pcf
Cohesion: 0 psf
Phi: 40 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (NG to -13)

Model: Undrained (Phi=0)
Unit Weight: 86 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

CH (-13 to -20)

Model: Undrained (Phi=0)
Unit Weight: 94 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

CH (-20 to -33)

Model: Undrained (Phi=0)
Unit Weight: 108 pcf
Cohesion: 200 psf
Pore Water Pressure
Piezometric Line: 1

NWL (nc) PS Check

CH (-33 to -47)

Model: S=f(depth)
Unit Weight: 118 pcf
C-Top of Layer: 340 psf
C-Rate of Change: 18.57 psf/ft
Limiting C: 600 psf
Pore Water Pressure
Piezometric Line: 1

CH (-47 to -60)

Model: Undrained (Phi=0)
Unit Weight: 105 pcf
Cohesion: 600 psf
Pore Water Pressure
Piezometric Line: 1

Slip Surface Limits

Left Coordinate: (-200, -5.5) ft
Right Coordinate: (200, 0) ft

Slip Surface Block

Left Grid
Upper Left: (-13, -3) ft
Lower Left: (-13, -33) ft
Lower Right: (7, -33) ft
X Increments: 8
Y Increments: 12
Starting Angle: 125 °
Ending Angle: 145 °
Angle Increments: 4
Right Grid
Upper Left: (26, -3) ft
Lower Left: (26, -33) ft
Lower Right: (46, -33) ft
X Increments: 8
Y Increments: 12
Starting Angle: 25 °
Ending Angle: 45 °
Angle Increments: 4

Piezometric Lines

Piezometric Line 1

NWL (nc) PS Check

Coordinates

	X (ft)	Y (ft)
	-200	0
	200	0

Regions

	Material	Points	Area (ft²)
Region 1	CH (-33 to -47)	15,7,8,16	5600
Region 2	CH (-20 to -33)	7,5,6,8	5200
Region 3	CH (-13 to -20)	5,3,4,6	2800
Region 4	CH (NG to -13)	3,1,18,19,14,22,2,4	4446.955
Region 5	ROCK	18,17,13,11,12,20,21,22,14,19	297.52
Region 6	CH (-47 to -60)	9,15,16,10	5200

Points

	X (ft)	Y (ft)
Point 1	-200	-5.5
Point 2	200	0
Point 3	-200	-13
Point 4	200	-13
Point 5	-200	-20
Point 6	200	-20
Point 7	-200	-33
Point 8	200	-33
Point 9	-200	-60
Point 10	200	-60
Point 11	-2.5	4
Point 12	2.5	4
Point 13	-8.5	1
Point 14	10.5	0
Point 15	-200	-47
Point 16	200	-47
Point 17	-63.5	0
Point 18	-77.1	-3.4
Point 19	-15.1	-2.3
Point 20	7.5	1.5
Point 21	31.5	1.5
Point 22	34.5	0

Critical Slip Surfaces

	Slip Surface	FOS	Center (ft)	Radius (ft)	Entry (ft)	Exit (ft)
1	Optimized	1.31	(23.087, 1.243)	26.88033	(-7.55874, 1.47063)	(54.2026, 0)
2	13744	1.33	(23.087, 1.243)	27.673	(-8.80012, 0.994543)	(54.9516, 0)

NWL (nc) PS Check

Slices of Slip Surface: Optimized

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	Optimized	-7.0680005	0.735314	-45.883416	65.235048	54.738704	0
2	Optimized	-6.094234	-0.723746	45.16185	216.17559	143.49756	0
3	Optimized	-4.7740105	-2.701926	168.60083	539.27068	0	100
4	Optimized	-3.218405	-5.1455235	321.08107	819.03259	0	100
5	Optimized	-1.360985	-8.2200785	512.9297	1110.3224	0	100
6	Optimized	0.927831	-11.552735	720.89004	1419.166	0	100
7	Optimized	2.288816	-13.26582	827.78224	1558.3325	0	100
8	Optimized	3.38766	-14.648945	914.08934	1623.0271	0	100
9	Optimized	5.43961	-16.339175	1019.5601	1728.4741	0	100
10	Optimized	7.05195	-16.912775	1055.3609	1729.4925	0	100
11	Optimized	9	-16.91571	1055.5323	1692.1316	0	100
12	Optimized	11.61266	-16.919645	1055.8018	1686.2721	0	100
13	Optimized	13.83798	-16.922995	1055.9815	1686.5866	0	100
14	Optimized	16.0633	-16.926345	1056.2062	1686.9012	0	100
15	Optimized	18.71786	-16.95293	1057.8749	1687.6327	0	100
16	Optimized	20.318385	-16.97734	1059.4068	1692.9017	0	100
17	Optimized	21.48931	-16.973255	1059.1519	1691.8921	0	100
18	Optimized	23.71391	-16.96609	1058.7024	1691.2178	0	100
19	Optimized	25.938505	-16.958925	1058.2529	1690.5435	0	100
20	Optimized	28.1631	-16.95176	1057.8034	1689.8692	0	100
21	Optimized	30.3877	-16.944595	1057.3539	1689.195	0	100
22	Optimized	31.745935	-16.94022	1057.0623	1672.5672	0	100
23	Optimized	32.55824	-16.77679	1046.9072	1637.7335	0	100
24	Optimized	33.812305	-16.19044	1010.2811	1537.7368	0	100
25	Optimized	34.957125	-15.485085	966.24296	1424.2213	0	100
26	Optimized	36.906485	-14.10172	879.95267	1305.804	0	100
27	Optimized	39.23925	-12.379435	772.49789	1145.682	0	100
28	Optimized	41.58176	-10.57754	660.03414	992.68088	0	100
29	Optimized	44.60423	-8.147425	508.39218	782.66374	0	100
30	Optimized	47.105285	-6.0798425	379.3818	602.16537	0	100
			-				

31	Optimized	49.066415	4.4422475	277.19568	458.13101	0	100
32	Optimized	51.08588	-2.7175875	169.57742	309.61627	0	100
33	Optimized	53.163675	-0.9058625	56.527015	150.09422	0	100

Slices of Slip Surface: 13744

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	13744	-8.650061	0.78023365	-48.686338	14.955067	12.548791	0
2	13744	-8.301868	0.28296205	-17.657556	56.233795	47.185756	0
3	13744	-7.553196	-0.786252	49.062002	178.37413	108.50576	0
4	13744	-5.876992	-3.180119	198.43972	524.80579	0	100
5	13744	-3.625664	-6.395349	399.07558	928.31442	0	100
6	13744	-1.6252594	-9.252222	577.35301	1230.834	0	100
7	13744	0.12422175	-11.75074	733.24816	1432.3338	0	100
8	13744	1.7494812	-14.07185	878.07353	1627.8694	0	100
9	13744	3.5	-16.57185	1034.0722	1784.8549	0	100
10	13744	6	-18	1123.2	1905.2	0	100
11	13744	9	-18	1123.2	1793.8	0	100
12	13744	11.55	-18	1123.1905	1787.619	0	100
13	13744	13.65	-18	1123.1905	1787.619	0	100
14	13744	15.75	-18	1123.1905	1787.619	0	100
15	13744	17.85	-18	1123.1905	1787.619	0	100
16	13744	19.95	-18	1123.1905	1787.619	0	100
17	13744	22.05	-18	1123.1905	1787.619	0	100
18	13744	24.15	-18	1123.1905	1787.619	0	100
19	13744	26.25	-18	1123.1905	1787.619	0	100
20	13744	28.35	-18	1123.1905	1787.619	0	100
21	13744	30.45	-18	1123.1905	1787.619	0	100
22	13744	32.5	-18	1123.2	1721.6	0	100
23	13744	34	-17.58045	1097.0525	1676.029	0	100
24	13744	35.73969	-16.120675	1005.9303	1502.7161	0	100
25	13744	38.219075	-14.040225	876.10293	1303.5878	0	100
26	13744	40.565395	-12.07143	753.25324	1122.7325	0	100
27	13744	42.77865	-10.214287	637.37345	960.09243	0	100
28	13744	44.99191	-8.3571425	521.49366	797.48692	0	100
29	13744	47.205165	-6.5	405.61387	634.8468	0	100
30	13744	49.41842	-4.6428575	289.71332	472.24129	0	100
31	13744	51.63168	-2.7857145	173.83007	309.61847	0	100
32	13744	53.844935	-0.9285715	57.943355	146.99566	0	100

NWL (c) PS Check

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File Information

Title: MRGO Reach 9_1 on 2
Created By: Chaisson, Kathryn MVN
Revision Number: 152
Last Edited By: Chaisson, Kathryn MVN
Date: 6/17/2010
Time: 8:59:08 AM
File Name: MRGO Reach 9_1 on 2.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 9\
Last Solved Date: 6/17/2010
Last Solved Time: 9:01:50 AM

Project Settings

Length(L) Units: feet
Time(t) Units: Seconds
Force(F) Units: lbf
Pressure(p) Units: psf
Strength Units: psf
Unit Weight of Water: 62.4 pcf
View: 2D

Analysis Settings

NWL (c) PS Check

Kind: SLOPE/W
Method: Spencer
Settings
- Apply Phreatic Correction: No
- PWP Conditions Source: Piezometric Line
- Use Staged Rapid Drawdown: No

SlipSurface
- Direction of movement: Left to Right
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: Yes
- Tension Crack
  - Tension Crack Option: Search for Tension Crack
  - Percentage Wet: 1
  - Tension Crack Fluid Unit Weight: 62.4 pcf

FOS Distribution
FOS Calculation Option: Constant
Advanced
Number of Slices: 30
Optimization Tolerance: 0.01
Minimum Slip Surface Depth: 0.1 ft
Optimization Maximum Iterations: 3000
Optimization Convergence Tolerance: 1e-007
Starting Optimization Points: 8
Ending Optimization Points: 16
Complete Passes per Insertion: 1
Driving Side Maximum Convex Angle: 5 °
Resisting Side Maximum Convex Angle: 1 °

Materials

ROCK

Model: Mohr-Coulomb
Unit Weight: 132 pcf
Cohesion: 0 psf
Phi: 40 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (NG to -13)

Model: Undrained (Phi=0)
Unit Weight: 86 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

CH (-13 to -20)

Model: Undrained (Phi=0)
Unit Weight: 94 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

CH (-20 to -33)

Model: Undrained (Phi=0)
Unit Weight: 108 pcf
Cohesion: 200 psf
Pore Water Pressure
Piezometric Line: 1

CH (-33 to -47)

Model: S=f(depth)
Unit Weight: 118 pcf
C-Top of Layer: 340 psf
C-Rate of Change: 18.57 psf/ft
Limiting C: 600 psf
Pore Water Pressure
Piezometric Line: 1

CH (-47 to -60)

Model: Undrained (Phi=0)
Unit Weight: 105 pcf
Cohesion: 600 psf
Pore Water Pressure
Piezometric Line: 1

Slip Surface Entry and Exit

Left Projection: Range
Left-Zone Left Coordinate: (-24.7783, 0.70403) ft
Left-Zone Right Coordinate: (-2.5, 4) ft
Left-Zone Increment: 20
Right Projection: Range
Right-Zone Left Coordinate: (13.69117, 1.5) ft
Right-Zone Right Coordinate: (171.37047, 0) ft
Right-Zone Increment: 20
Radius Increments: 20

Slip Surface Limits

Left Coordinate: (-200, -5.5) ft
Right Coordinate: (200, 0) ft

Piezometric Lines

Piezometric Line 1

Coordinates

	X (ft)	Y (ft)
	-200	0
	200	0

Regions

	Material	Points	Area (ft²)
Region 1	CH (-33 to -47)	15,7,8,16	5600
Region 2	CH (-20 to -33)	7,5,6,8	5200

NWL (c) PS Check

Region 3	CH (-13 to -20)	5,3,4,6	2800
Region 4	CH (NG to -13)	3,1,18,19,14,22,2,4	4446.955
Region 5	ROCK	18,17,13,11,12,20,21,22,14,19	297.52
Region 6	CH (-47 to -60)	9,15,16,10	5200

Points

	X (ft)	Y (ft)
Point 1	-200	-5.5
Point 2	200	0
Point 3	-200	-13
Point 4	200	-13
Point 5	-200	-20
Point 6	200	-20
Point 7	-200	-33
Point 8	200	-33
Point 9	-200	-60
Point 10	200	-60
Point 11	-2.5	4
Point 12	2.5	4
Point 13	-8.5	1
Point 14	10.5	0
Point 15	-200	-47
Point 16	200	-47
Point 17	-63.5	0
Point 18	-77.1	-3.4
Point 19	-15.1	-2.3
Point 20	7.5	1.5
Point 21	31.5	1.5
Point 22	34.5	0

Critical Slip Surfaces

	Slip Surface	FOS	Center (ft)	Radius (ft)	Entry (ft)	Exit (ft)
1	Optimized	1.30	(23.468, 11.726)	27.20628	(-6.71342, 1.89329)	(54.4481, 0)
2	7177	1.45	(23.468, 11.726)	31.631	(-6.61243, 1.94378)	(52.8454, 0)

Slices of Slip Surface: Optimized

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	Optimized	-6.166781	0.9466445	-59.068453	74.931036	62.874604	0
2	Optimized	-5.2226045	-0.688431	42.957785	226.33658	153.87308	0
3	Optimized	-4.1969495	-2.464606	153.79269	531.45754	0	100
4	Optimized	-3.034415	-4.5215655	282.1454	760.94101	0	100

NWL (c) PS Check

5	Optimized	-1.75997	-6.8329005	426.36098	978.48686	0	100
6	Optimized	-0.16659	-9.535215	594.99788	1216.5571	0	100
7	Optimized	1.472654	-11.947705	745.52203	1437.2894	0	100
8	Optimized	2.379274	-13.16165	821.29071	1535.4964	0	100
9	Optimized	3.06756	-14.08325	878.81004	1580.129	0	100
10	Optimized	4.800585	-15.753915	983.0362	1681.3029	0	100
11	Optimized	6.46856	-16.846815	1051.2304	1718.9366	0	100
12	Optimized	7.235535	-17.043425	1063.5129	1722.3185	0	100
13	Optimized	9	-17.13967	1069.5104	1706.6633	0	100
14	Optimized	11.42718	-17.27206	1077.8002	1712.8709	0	100
15	Optimized	13.28154	-17.373205	1084.1003	1722.4018	0	100
16	Optimized	15.1359	-17.474355	1090.4004	1731.8789	0	100
17	Optimized	16.99026	-17.5755	1096.7005	1741.356	0	100
18	Optimized	18.84462	-17.676645	1103.0006	1750.833	0	100
19	Optimized	20.665935	-17.79325	1110.287	1759.3718	0	100
20	Optimized	22.454205	-17.92531	1118.5407	1771.7523	0	100
21	Optimized	24.22766	-18.0729	1127.7414	1783.1654	0	100
22	Optimized	25.986295	-18.236015	1137.9329	1798.4526	0	100
23	Optimized	27.74493	-18.39913	1148.1243	1813.7398	0	100
24	Optimized	30.062125	-18.550575	1157.5659	1833.6346	0	100
25	Optimized	32.14281	-18.651705	1163.9001	1800.7393	0	100
26	Optimized	33.64281	-18.205425	1136.0284	1736.4	0	100
27	Optimized	34.85759	-17.528695	1093.7907	1614.21	0	100
28	Optimized	36.483805	-16.364555	1021.1447	1527.9527	0	100
29	Optimized	39.021055	-14.434685	900.71664	1342.5267	0	100
30	Optimized	40.57053	-13.234875	825.86164	1235.9314	0	100
31	Optimized	42.37678	-11.72432	731.60067	1100.9464	0	100
32	Optimized	44.81718	-9.6229235	600.45014	922.80518	0	100
33	Optimized	46.647185	-7.97149	497.40688	777.04358	0	100
34	Optimized	48.47719	-6.3200565	394.37173	631.28199	0	100
35	Optimized	50.65617	-4.120755	257.13465	454.15621	0	100
36	Optimized	53.184125	-1.373585	85.712441	210.38776	0	100

NWL (c) PS Check

Slices of Slip Surface: 7177

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	7177	-6.2608725	0.971892	-60.646992	57.037973	47.860542	0
2	7177	-5.6056905	-0.7098585	44.295436	198.42863	129.33311	0
3	7177	-3.901034	-3.8772725	241.93453	677.49799	0	100
4	7177	-1.6666667	-7.428364	463.5349	1089.9944	0	100
5	7177	0	-9.44564	589.39112	1271.1798	0	100
6	7177	1.6666667	-11.16312	696.56726	1424.1548	0	100
7	7177	3.1204195	-12.47843	778.62969	1500.5678	0	100
8	7177	4.680629	-13.694575	854.5224	1512.1863	0	100
9	7177	6.5602095	-14.98406	934.98822	1513.2253	0	100
10	7177	8.25	-15.990765	997.82028	1547.5418	0	100
11	7177	9.75	-16.763695	1046.049	1620.52	0	100
12	7177	11.454545	-17.51698	1093.0677	1695.3694	0	100
13	7177	13.363635	-18.2311	1137.6011	1770.2304	0	100
14	7177	15.272725	-18.80926	1173.7	1832.1862	0	100
15	7177	17.181815	-19.25911	1201.7546	1881.9447	0	100
16	7177	19.090905	-19.58621	1222.1592	1920.106	0	100
17	7177	21	-19.79439	1235.1862	1947.0123	0	100
18	7177	22.909095	-19.88601	1240.8682	1962.984	0	100
19	7177	24.818185	-19.86209	1239.4065	1968.0935	0	100
20	7177	26.727275	-19.72236	1230.6989	1962.3658	0	100
21	7177	28.636365	-19.465265	1214.6521	1945.7171	0	100
22	7177	30.545455	-19.087855	1191.0858	1917.8058	0	100
23	7177	32.25	-18.65179	1163.8735	1833.8389	0	100
24	7177	33.75	-18.177085	1134.223	1695.4399	0	100
25	7177	35.58691	-17.468	1089.9966	1586.199	0	100
26	7177	37.760725	-16.465755	1027.4775	1501.0887	0	100
27	7177	39.93454	-15.25127	951.67231	1396.5085	0	100
28	7177	42.10836	-13.793915	860.74702	1269.8164	0	100
29	7177	44.160285	-12.16415	759.04145	1134.1562	0	100
30	7177	46.090315	-10.338891	645.14449	988.97072	0	100
31	7177	48.020345	-8.157874	509.04682	815.66186	0	100
32	7177	49.950375	-5.481039	342.02762	604.30713	0	100
33	7177	51.880405	-1.9979055	124.66893	334.9624	0	100

MRGO REACH 9
Low Water Level (EL. -1.0)
10 10 1 220 1 1
7 1 2 1
200
0 62.4 0 0
40 132 0 0
0 86 100 100
0 94 100 100
0 108 200 200
0 118 470 600
0 105 600 600

0 0 165.5 0 168.5 1.5 192.5 1.5 197.5 4 202.5 4
208.5 1 263.5 0 267.5 -1 400 -1 9999.9 0

0 0 165.5 0 168.5 1.5 192.5 1.5 197.5 4 202.5 4
208.5 1 263.5 0 267.5 -1 277.1 -3.4 400 -5.5
9999.9 0

0 0 165.5 0 189.5 0 215.1 -2.3 277.1 -3.4
400 -5.5 9999.9 0

0 -13 400 -13 9999.9 0
0 -20 400 -20 9999.9 0
0 -33 400 -33 9999.9 0
0 -47 400 -47 9999.9 0
0 -60 400 -60 9999.9 0

0 -1 400 -1 9999.9 0

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
3 210 -13 295 -13 1
295
3 90265 -13 275 -13 1
275
4 220 -20 296 -20 1
296
4 90265 -20 280 -20 1
280
5 230 -33 294 -33 1
294

**** STABILITY WITH UPLIFT ****

MRGO REACH 9
Low Water Level (EL. -1.0)
8 PROFILES
1VERTICALS
UPLIFT WITH 1 PIEZOMETRIC GRADE LINES

* * STRATUM 3 ACT. WEDGE LOC. 210.0 EL. -13.0 PASS.WEDGE LOC. 295.0 EL. -13.0

ASSUMED FAILURE SURFACE DATA

DIST.	ELEV.	WT.	UPLIFT	STR 1	STR 2	STR USED
.0	-13.0	1118.	750.	100.	100.	100.
165.5	-13.0	1119.	750.	100.	100.	100.
168.5	-13.0	1316.	750.	100.	100.	100.
189.5	-13.0	1316.	750.	100.	100.	100.
192.5	-13.0	1329.	750.	100.	100.	100.
197.5	-13.0	1679.	750.	100.	100.	100.
200.0	-13.0	1689.	750.	100.	100.	100.
202.5	-13.0	1699.	750.	100.	100.	100.
208.5	-13.0	1329.	750.	100.	100.	100.
215.1	-13.0	1340.	750.	100.	100.	100.
263.5	-13.0	1263.	750.	100.	100.	100.
267.5	-13.0	1134.	750.	100.	100.	100.
277.1	-13.0	975.	750.	100.	100.	100.
400.0	-13.0	926.	750.	100.	100.	100.

ASSUMED CRIT. PASSIVE LOC. 295.0 EL. -13.0 DP 5495. RP 1828.

ACTIVE WEDGE DATA

DIST.	ELEV.	DA	RA	DB	RB	FS
210.0	-13.0	13918.	3439.	0.	8500.	1.63
215.0	-13.0	12339.	3735.	0.	8000.	1.98
220.0	-13.0	10177.	2704.	0.	7500.	2.57
225.0	-13.0	10015.	2625.	0.	7000.	2.53
230.0	-13.0	9892.	2605.	0.	6500.	2.49
235.0	-13.0	9769.	2579.	0.	6000.	2.43

CRIT. ACTIVE LOC 210.0 EL -13.0 DA 13918. RA 3439.

DIS.	EL.	DP	RP	DB	RB	FS
295.0	-13.0	5495.	1828.	0.	8500.	1.63

* * STRATUM 3 ACT. WEDGE LOC. 90265.0 EL. -13.0 PASS.WEDGE LOC. 275.0 EL. -13.0

ASSUMED FAILURE SURFACE DATA

DIST.	ELEV.	WT.	UPLIFT	STR 1	STR 2	STR USED
.0	-13.0	1118.	750.	100.	100.	100.
165.5	-13.0	1119.	750.	100.	100.	100.
168.5	-13.0	1316.	750.	100.	100.	100.
189.5	-13.0	1316.	750.	100.	100.	100.
192.5	-13.0	1329.	750.	100.	100.	100.
197.5	-13.0	1679.	750.	100.	100.	100.
200.0	-13.0	1689.	750.	100.	100.	100.
202.5	-13.0	1699.	750.	100.	100.	100.
208.5	-13.0	1329.	750.	100.	100.	100.
215.1	-13.0	1340.	750.	100.	100.	100.
263.5	-13.0	1263.	750.	100.	100.	100.
267.5	-13.0	1134.	750.	100.	100.	100.
277.1	-13.0	975.	750.	100.	100.	100.
400.0	-13.0	926.	750.	100.	100.	100.

ASSUMED CRIT. PASSIVE LOC. 275.0 EL. -13.0 DP 5605. RP 1895.

ACTIVE WEDGE DATA

DIST.	ELEV.	DA	RA	DB	RB	FS
265.0	-13.0	9013.	2420.	0.	1000.	1.56

CRIT. ACTIVE LOC 265.0 EL -13.0 DA 9013. RA 2420.

DIS.	EL.	DP	RP	DB	RB	FS
275.0	-13.0	5605.	1895.	0.	1000.	1.56

* * STRATUM 4 ACT. WEDGE LOC. 220.0 EL. -20.0 PASS.WEDGE LOC. 296.0 EL. -20.0

ASSUMED FAILURE SURFACE DATA

DIST.	ELEV.	WT.	UPLIFT	STR 1	STR 2	STR USED
.0	-20.0	1776.	1188.	100.	200.	100.
165.5	-20.0	1777.	1188.	100.	200.	100.
168.5	-20.0	1974.	1188.	100.	200.	100.
189.5	-20.0	1974.	1188.	100.	200.	100.
192.5	-20.0	1987.	1188.	100.	200.	100.
197.5	-20.0	2337.	1188.	100.	200.	100.
200.0	-20.0	2347.	1188.	100.	200.	100.
202.5	-20.0	2357.	1188.	100.	200.	100.
208.5	-20.0	1987.	1188.	100.	200.	100.
215.1	-20.0	1998.	1188.	100.	200.	100.
263.5	-20.0	1921.	1188.	100.	200.	100.
267.5	-20.0	1792.	1188.	100.	200.	100.
277.1	-20.0	1633.	1188.	100.	200.	100.
400.0	-20.0	1584.	1188.	100.	200.	100.

ASSUMED CRIT. PASSIVE LOC. 296.0 EL. -20.0 DP 14532. RP 3201.

ACTIVE WEDGE DATA

DIST.	ELEV.	DA	RA	DB	RB	FS
220.0	-20.0	24740.	5103.	0.	7600.	1.56
225.0	-20.0	22437.	4518.	0.	7100.	1.87
230.0	-20.0	21607.	4026.	0.	6600.	1.95
235.0	-20.0	21441.	4014.	0.	6100.	1.93
240.0	-20.0	21263.	3989.	0.	5600.	1.90
245.0	-20.0	21084.	3964.	0.	5100.	1.87

CRIT. ACTIVE LOC 220.0 EL -20.0 DA 24740. RA 5103.

DIS.	EL.	DP	RP	DB	RB	FS
296.0	-20.0	14532.	3201.	0.	7600.	1.56

* * STRATUM 4 ACT. WEDGE LOC. 90265.0 EL. -20.0 PASS.WEDGE LOC. 280.0 EL. -20.0

ASSUMED FAILURE SURFACE DATA

DIST.	ELEV.	WT.	UPLIFT	STR 1	STR 2	STR USED
.0	-20.0	1776.	1188.	100.	200.	100.
165.5	-20.0	1777.	1188.	100.	200.	100.

168.5	-20.0	1974.	1188.	100.	200.	100.
189.5	-20.0	1974.	1188.	100.	200.	100.
192.5	-20.0	1987.	1188.	100.	200.	100.
197.5	-20.0	2337.	1188.	100.	200.	100.
200.0	-20.0	2347.	1188.	100.	200.	100.
202.5	-20.0	2357.	1188.	100.	200.	100.
208.5	-20.0	1987.	1188.	100.	200.	100.
215.1	-20.0	1998.	1188.	100.	200.	100.
263.5	-20.0	1921.	1188.	100.	200.	100.
267.5	-20.0	1792.	1188.	100.	200.	100.
277.1	-20.0	1633.	1188.	100.	200.	100.
400.0	-20.0	1584.	1188.	100.	200.	100.

ASSUMED CRIT. PASSIVE LOC. 280.0 EL. -20.0 DP 14637. RP 3254.

ACTIVE WEDGE DATA

DIST.	ELEV.	DA	RA	DB	RB	FS
265.0	-20.0	20345.	3859.	0.	1500.	1.51

CRIT. ACTIVE LOC 265.0 EL -20.0 DA 20345. RA 3859.

DIS.	EL.	DP	RP	DB	RB	FS
280.0	-20.0	14637.	3254.	0.	1500.	1.51

* * STRATUM 5 ACT. WEDGE LOC. 230.0 EL. -33.0 PASS.WEDGE LOC. 294.0 EL. -33.0

ASSUMED FAILURE SURFACE DATA

DIST.	ELEV.	WT.	UPLIFT	STR 1	STR 2	STR USED
.0	-33.0	3180.	2000.	200.	600.	200.
165.5	-33.0	3181.	2000.	200.	600.	200.
168.5	-33.0	3378.	2000.	200.	600.	200.
189.5	-33.0	3378.	2000.	200.	600.	200.
192.5	-33.0	3391.	2000.	200.	600.	200.
197.5	-33.0	3741.	2000.	200.	600.	200.
200.0	-33.0	3751.	2000.	200.	600.	200.
202.5	-33.0	3761.	2000.	200.	600.	200.
208.5	-33.0	3391.	2000.	200.	600.	200.
215.1	-33.0	3402.	2000.	200.	600.	200.
263.5	-33.0	3325.	2000.	200.	600.	200.
267.5	-33.0	3196.	2000.	200.	600.	200.
277.1	-33.0	3037.	2000.	200.	600.	200.

400.0 -33.0 2988. 2000. 200. 600. 200.

ASSUMED CRIT. PASSIVE LOC. 294.0 EL. -33.0 DP 44697. RP 8364.

ACTIVE WEDGE DATA

DIST.	ELEV.	DA	RA	DB	RB	FS
230.0	-33.0	60500.	10039.	0.	12800.	1.97
235.0	-33.0	58805.	10335.	0.	11800.	2.16
240.0	-33.0	56484.	9304.	0.	10800.	2.42
245.0	-33.0	56163.	9225.	0.	9800.	2.39
250.0	-33.0	55881.	9205.	0.	8800.	2.36
255.0	-33.0	55600.	9179.	0.	7800.	2.32

CRIT. ACTIVE LOC 230.0 EL -33.0 DA 60500. RA 10039.

DIS.	EL.	DP	RP	DB	RB	FS
294.0	-33.0	44697.	8364.	0.	12800.	1.97

LWL (nc) FS Check

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File Information

Title: MRGO Reach 9_1 on 2
Created By: Chaisson, Kathryn MVN
Revision Number: 152
Last Edited By: Chaisson, Kathryn MVN
Date: 6/17/2010
Time: 8:59:08 AM
File Name: MRGO Reach 9_1 on 2.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 9\
Last Solved Date: 6/17/2010
Last Solved Time: 9:01:18 AM

Project Settings

Length(L) Units: feet
Time(t) Units: Seconds
Force(F) Units: lbf
Pressure(p) Units: psf
Strength Units: psf
Unit Weight of Water: 62.4 pcf
View: 2D

Analysis Settings

LWL (nc) FS Check

Kind: SLOPE/W
Method: Spencer
Settings
- Apply Phreatic Correction: No
- PWP Conditions Source: Piezometric Line
- Use Staged Rapid Drawdown: No

SlipSurface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Block
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: Yes
- Tension Crack
  - Tension Crack Option: Search for Tension Crack
  - Percentage Wet: 1
  - Tension Crack Fluid Unit Weight: 62.4 pcf

LWL (nc) FS Check

FOS Distribution
FOS Calculation Option: Constant
Restrict Block Crossing: Yes
Advanced
Number of Slices: 30
Optimization Tolerance: 0.01
Minimum Slip Surface Depth: 0.1 ft
Optimization Maximum Iterations: 3000
Optimization Convergence Tolerance: 1e-007
Starting Optimization Points: 8
Ending Optimization Points: 16
Complete Passes per Insertion: 1
Driving Side Maximum Convex Angle: 5 °
Resisting Side Maximum Convex Angle: 1 °

Materials

ROCK
Model: Mohr-Coulomb
Unit Weight: 132 pcf
Cohesion: 0 psf
Phi: 40 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (NG to -13)
Model: Undrained (Phi=0)
Unit Weight: 86 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

CH (-13 to -20)
Model: Undrained (Phi=0)
Unit Weight: 94 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

CH (-20 to -33)
Model: Undrained (Phi=0)
Unit Weight: 108 pcf
Cohesion: 200 psf
Pore Water Pressure
Piezometric Line: 1

CH (-33 to -47)

Model: S=f(depth)
Unit Weight: 118 pcf
C-Top of Layer: 340 psf
C-Rate of Change: 18.57 psf/ft
Limiting C: 600 psf
Pore Water Pressure
Piezometric Line: 1

CH (-47 to -60)

Model: Undrained (Phi=0)
Unit Weight: 105 pcf
Cohesion: 600 psf
Pore Water Pressure
Piezometric Line: 1

Slip Surface Limits

Left Coordinate: (-200, -5.5) ft
Right Coordinate: (200, 0) ft

Slip Surface Block

Left Grid
Upper Left: (-86, -2.5) ft
Lower Left: (-86, -32.5) ft
Lower Right: (-66, -32.5) ft
X Increments: 8
Y Increments: 12
Starting Angle: 145 °
Ending Angle: 165 °
Angle Increments: 4
Right Grid
Upper Left: (-17.5, -2.5) ft
Lower Left: (-17.5, -32.5) ft
Lower Right: (2.5, -32.5) ft
X Increments: 8
Y Increments: 12
Starting Angle: 35 °
Ending Angle: 55 °
Angle Increments: 4

Piezometric Lines

Piezometric Line 1

LWL (nc) FS Check

Coordinates

	X (ft)	Y (ft)
	-200	-1
	200	-1

Regions

	Material	Points	Area (ft²)
Region 1	CH (-33 to -47)	15,7,8,16	5600
Region 2	CH (-20 to -33)	7,5,6,8	5200
Region 3	CH (-13 to -20)	5,3,4,6	2800
Region 4	CH (NG to -13)	3,1,18,19,14,22,2,4	4446.955
Region 5	ROCK	18,17,13,11,12,20,21,22,14,19	297.52
Region 6	CH (-47 to -60)	9,15,16,10	5200

Points

	X (ft)	Y (ft)
Point 1	-200	-5.5
Point 2	200	0
Point 3	-200	-13
Point 4	200	-13
Point 5	-200	-20
Point 6	200	-20
Point 7	-200	-33
Point 8	200	-33
Point 9	-200	-60
Point 10	200	-60
Point 11	-2.5	4
Point 12	2.5	4
Point 13	-8.5	1
Point 14	10.5	0
Point 15	-200	-47
Point 16	200	-47
Point 17	-63.5	0
Point 18	-77.1	-3.4
Point 19	-15.1	-2.3
Point 20	7.5	1.5
Point 21	31.5	1.5
Point 22	34.5	0

Critical Slip Surfaces

	Slip Surface	FOS	Center (ft)	Radius (ft)	Entry (ft)	Exit (ft)
1	Optimized	1.30	(-44.784, 2.809)	42.5782	(5.41196, 2.54402)	(-94.1958, -3.69212)
2	15325	1.36	(-44.784, 2.809)	43.069	(7.55446, 1.5)	(-96.7283, -3.73539)

LWL (nc) FS Check

Slices of Slip Surface: Optimized

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	Optimized	-92.26903	-5.236018	264.33377	379.13559	0	100
2	Optimized	-88.41545	-8.3238195	456.99994	655.45785	0	100
3	Optimized	-84.3248	-11.43386	651.06594	924.61771	0	100
4	Optimized	-80.382195	-14.287405	829.14476	1189.9088	0	100
5	Optimized	-77.851725	-15.94948	932.82416	1321.3719	0	100
6	Optimized	-75.392045	-17.175425	1009.3584	1469.5225	0	100
7	Optimized	-71.97614	-18.87797	1115.5763	1690.2378	0	100
8	Optimized	-68.884095	-19.77338	1171.4701	1756.5371	0	100
9	Optimized	-66.115955	-19.86166	1176.9646	1832.21	0	100
10	Optimized	-64.115955	-19.917015	1180.4103	1899.743	0	100
11	Optimized	-61.529185	-19.964115	1183.3499	1927.1067	0	100
12	Optimized	-58.02302	-20	1185.594	1933.1767	0	100
13	Optimized	-54.952325	-20	1185.594	1938.0291	0	100
14	Optimized	-51.88163	-20	1185.594	1942.9139	0	100
15	Optimized	-48.748745	-20	1185.6078	1947.8759	0	100
16	Optimized	-45.553675	-20	1185.6078	1952.915	0	100
17	Optimized	-42.37119	-20	1185.5906	1957.9816	0	100
18	Optimized	-39.201295	-20	1185.5906	1962.9975	0	100
19	Optimized	-36.0314	-20	1185.5906	1968.0135	0	100
20	Optimized	-32.82237	-19.92724	1181.0539	1959.1452	0	100
21	Optimized	-29.57421	-19.78172	1171.981	1950.6259	0	100
22	Optimized	-26.47495	-19.59642	1160.4183	1933.1969	0	100
23	Optimized	-23.52459	-19.371335	1146.3592	1916.772	0	100
24	Optimized	-20.54587	-19.105685	1129.8086	1892.6196	0	100
25	Optimized	-17.538785	-18.79947	1110.6862	1868.7	0	100
26	Optimized	-15.56762	-18.48898	1091.3218	1807.1819	0	100
27	Optimized	-13.45	-17.776295	1046.8492	1738.9758	0	100
28	Optimized	-10.15	-16.66568	977.54746	1630.385	0	100
29	Optimized	-7.711165	-15.84489	926.33643	1599.6424	0	100
30	Optimized	-5.730983	-14.289705	829.27666	1474.4152	0	100
31	Optimized	-3.766418	-12.162945	696.55941	1405.8434	0	100
32	Optimized	-2.7466	-10.939095	620.19511	1304.3946	0	100
33	Optimized	-1.5652174	-9.0860775	504.58433	1165.507	0	100
34	Optimized	0.3869776	-6.0240275	313.49031	910.74931	0	100

35	Optimized	1.952195	-3.4751505	154.44795	681.95257	0	100
36	Optimized	2.9374455	-1.7610505	47.489613	513.79964	0	100
37	Optimized	3.483943	-0.81027565	-11.838735	401.83702	0	100
38	Optimized	4.502479	0.96173385	-122.41345	123.97506	104.02743	0

Slices of Slip Surface: 15325

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	15325	-95.074365	-4.8934655	242.95155	333.99462	0	100
2	15325	-91.766555	-7.2096185	387.48527	539.93362	0	100
3	15325	-88.458745	-9.5257725	532.00908	745.87261	0	100
4	15325	-85.15094	-11.841925	676.53288	951.83638	0	100
5	15325	-81.89778	-14.119815	818.68634	1163.5554	0	100
6	15325	-78.69926	-16.35944	958.41646	1381.1154	0	100
7	15325	-75.3	-18.739625	1106.9473	1643.2871	0	100
8	15325	-72	-20	1185.6	1721.3667	0	100
9	15325	-69	-20	1185.6	1770.7	0	100
10	15325	-65.5	-20	1185.6	1859.725	0	100
11	15325	-61.77143	-20	1185.6033	1926.8222	0	100
12	15325	-58.314285	-20	1185.6033	1932.2892	0	100
13	15325	-54.85714	-20	1185.6033	1937.785	0	100
14	15325	-51.4	-20	1185.6033	1943.252	0	100
15	15325	-47.94286	-20	1185.6033	1948.7189	0	100
16	15325	-44.485715	-20	1185.6033	1954.1859	0	100
17	15325	-41.02857	-20	1185.6033	1959.6817	0	100
18	15325	-37.57143	-20	1185.6033	1965.1487	0	100
19	15325	-34.114285	-20	1185.6033	1970.6156	0	100
20	15325	-30.65714	-20	1185.6033	1976.1115	0	100
21	15325	-27.2	-20	1185.6033	1981.5784	0	100
22	15325	-23.74286	-20	1185.6033	1987.0454	0	100
23	15325	-20.285715	-20	1185.6033	1992.5412	0	100
24	15325	-16.82857	-20	1185.6033	1998.0082	0	100
25	15325	-13.45	-20	1185.6061	1997.8788	0	100
26	15325	-10.15	-20	1185.6061	1992.1515	0	100
27	15325	-8	-20	1185.6	2020.2	0	100
28	15325	-5	-16.42963	962.8054	1676.2198	0	100
29	15325	-1.5652174	-11.52425	656.69843	1392.2129	0	100

30	15325	0.9347826	-7.95388	433.91539	1090.9998	0	100
31	15325	4.1519715	-3.35926	147.21759	599.90462	0	100
32	15325	6.019921	-0.6915514	-19.247306	257.8568	0	100
33	15325	6.8679495	0.5195586	-94.818621	89.632341	75.210465	0
34	15325	7.527231	1.46111	-153.57278	2.6887349	2.2561164	0

LWL (c) FS Check

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File Information

Title: MRGO Reach 9_1 on 2
Created By: Chaisson, Kathryn MVN
Revision Number: 152
Last Edited By: Chaisson, Kathryn MVN
Date: 6/17/2010
Time: 8:59:08 AM
File Name: MRGO Reach 9_1 on 2.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 9\
Last Solved Date: 6/17/2010
Last Solved Time: 8:59:46 AM

Project Settings

Length(L) Units: feet
Time(t) Units: Seconds
Force(F) Units: lbf
Pressure(p) Units: psf
Strength Units: psf
Unit Weight of Water: 62.4 pcf
View: 2D

Analysis Settings

LWL (c) FS Check

Kind: SLOPE/W
Method: Spencer
Settings
- Apply Phreatic Correction: No
- PWP Conditions Source: Piezometric Line
- Use Staged Rapid Drawdown: No

SlipSurface
- Direction of movement: Right to Left
- Use Passive Mode: No
- Slip Surface Option: Entry and Exit
- Critical slip surfaces saved: 1
- Optimize Critical Slip Surface Location: Yes
- Tension Crack
  - Tension Crack Option: Search for Tension Crack
  - Percentage Wet: 1
  - Tension Crack Fluid Unit Weight: 62.4 pcf

FOS Distribution
FOS Calculation Option: Constant
Advanced
Number of Slices: 30
Optimization Tolerance: 0.01
Minimum Slip Surface Depth: 0.1 ft
Optimization Maximum Iterations: 3000
Optimization Convergence Tolerance: 1e-007
Starting Optimization Points: 8
Ending Optimization Points: 16
Complete Passes per Insertion: 1
Driving Side Maximum Convex Angle: 5 °
Resisting Side Maximum Convex Angle: 1 °

Materials

ROCK

Model: Mohr-Coulomb
Unit Weight: 132 pcf
Cohesion: 0 psf
Phi: 40 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (NG to -13)

Model: Undrained (Phi=0)
Unit Weight: 86 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

CH (-13 to -20)

Model: Undrained (Phi=0)
Unit Weight: 94 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

CH (-20 to -33)

Model: Undrained (Phi=0)
Unit Weight: 108 pcf
Cohesion: 200 psf
Pore Water Pressure
Piezometric Line: 1

CH (-33 to -47)

LWL (c) FS Check

Model: S=f(depth)
Unit Weight: 118 pcf
C-Top of Layer: 340 psf
C-Rate of Change: 18.57 psf/ft
Limiting C: 600 psf
Pore Water Pressure
Piezometric Line: 1

CH (-47 to -60)

Model: Undrained (Phi=0)
Unit Weight: 105 pcf
Cohesion: 600 psf
Pore Water Pressure
Piezometric Line: 1

Slip Surface Entry and Exit

Left Projection: Range
Left-Zone Left Coordinate: (-134.30015, -4.37738) ft
Left-Zone Right Coordinate: (-9.50934, 0.98165) ft
Left-Zone Increment: 20
Right Projection: Range
Right-Zone Left Coordinate: (2.4, 4) ft
Right-Zone Right Coordinate: (59.68851, 0) ft
Right-Zone Increment: 20
Radius Increments: 20

Slip Surface Limits

Left Coordinate: (-200, -5.5) ft
Right Coordinate: (200, 0) ft

Piezometric Lines

Piezometric Line 1

Coordinates

	X (ft)	Y (ft)
	-200	-1
	200	-1

Regions

	Material	Points	Area (ft²)
Region 1	CH (-33 to -47)	15,7,8,16	5600
Region 2	CH (-20 to -33)	7,5,6,8	5200

LWL (c) FS Check

Region 3	CH (-13 to -20)	5,3,4,6	2800
Region 4	CH (NG to -13)	3,1,18,19,14,22,2,4	4446.955
Region 5	ROCK	18,17,13,11,12,20,21,22,14,19	297.52
Region 6	CH (-47 to -60)	9,15,16,10	5200

Points

	X (ft)	Y (ft)
Point 1	-200	-5.5
Point 2	200	0
Point 3	-200	-13
Point 4	200	-13
Point 5	-200	-20
Point 6	200	-20
Point 7	-200	-33
Point 8	200	-33
Point 9	-200	-60
Point 10	200	-60
Point 11	-2.5	4
Point 12	2.5	4
Point 13	-8.5	1
Point 14	10.5	0
Point 15	-200	-47
Point 16	200	-47
Point 17	-63.5	0
Point 18	-77.1	-3.4
Point 19	-15.1	-2.3
Point 20	7.5	1.5
Point 21	31.5	1.5
Point 22	34.5	0

Critical Slip Surfaces

	Slip Surface	FOS	Center (ft)	Radius (ft)	Entry (ft)	Exit (ft)
1	Optimized	1.31	(-47.868, 64.987)	39.93981	(5.2127, 2.64365)	(-89.5611, -3.61292)
2	2696	1.54	(-47.868, 64.987)	84.327	(7.63311, 1.5)	(-96.7376, -3.73555)

Slices of Slip Surface: Optimized

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	Optimized	-87.2063	-6.0839165	317.24185	481.83202	0	100
2	Optimized	-83.59746	-9.666185	540.76523	787.395	0	100
3	Optimized	-81.089335	-11.88873	679.46277	987.32475	0	100
4	Optimized	-79.48518	-13.31023	768.15841	1117.7547	0	100
5	Optimized	-78.117545	-14.357935	833.54056	1199.2242	0	100

6	Optimized	-75.607055	-16.17743	947.08474	1403.204	0	100
7	Optimized	-72.46058	-17.85983	1052.0422	1565.813	0	100
8	Optimized	-69.153525	-19.06059	1126.9932	1735.6962	0	100
9	Optimized	-67.213715	-19.764915	1170.9382	1839.959	0	100
10	Optimized	-65.213715	-19.857795	1176.7174	1855.0542	0	100
11	Optimized	-63.18119	-19.84467	1175.911	1909.4047	0	100
12	Optimized	-61.03609	-19.78187	1171.9754	1902.6985	0	100
13	Optimized	-57.38351	-19.660395	1164.3959	1897.0618	0	100
14	Optimized	-53.73093	-19.53892	1156.8164	1891.4524	0	100
15	Optimized	-50.227285	-19.37185	1146.4104	1876.5419	0	100
16	Optimized	-46.87257	-19.159185	1133.1423	1861.9054	0	100
17	Optimized	-43.259065	-18.849175	1113.7844	1832.0286	0	100
18	Optimized	-39.38677	-18.44182	1088.3585	1800.0278	0	100
19	Optimized	-35.989165	-18.079725	1065.7696	1770.9993	0	100
20	Optimized	-33.06625	-17.76289	1046.008	1745.9656	0	100
21	Optimized	-30.143335	-17.446055	1026.2463	1720.9319	0	100
22	Optimized	-26.784645	-16.99987	998.39078	1678.0375	0	100
23	Optimized	-22.99017	-16.424325	962.4855	1630.2767	0	100
24	Optimized	-19.594695	-15.860025	927.2499	1578.1692	0	100
25	Optimized	-16.59823	-15.306975	892.75781	1531.3046	0	100
26	Optimized	-13.741125	-14.779645	859.83866	1482.166	0	100
27	Optimized	-11.02337	-14.278035	828.53957	1430.7125	0	100
28	Optimized	-9.082245	-13.738165	794.85949	1335.4316	0	100
29	Optimized	-8.047704	-13.22455	762.80845	1314.5348	0	100
30	Optimized	-6.346774	-12.380095	710.12645	1344.7175	0	100
31	Optimized	-3.79907	-10.30567	580.66346	1244.755	0	100
32	Optimized	-2.22352	-8.5415845	470.59937	1175.6732	0	100
33	Optimized	-1.2887374	-7.2935195	392.71626	1034.3591	0	100
34	Optimized	0.5289376	-4.7021745	231.0146	817.56583	0	100
35	Optimized	2.094155	-2.393765	86.968928	606.3766	0	100

LWL (c) FS Check

36	Optimized	2.728501	-1.3691	23.031284	507.5613	0	100
37	Optimized	3.0626445	-0.8293543	-10.64825	442.35254	0	100
38	Optimized	4.1904935	0.9924707	-124.3291	137.75867	115.59325	0

Slices of Slip Surface: 2696

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	2696	-95.05856	-4.869819	241.47749	324.53296	0	100
2	2696	-91.7004	-7.026094	376.03213	510.71996	0	100
3	2696	-88.34224	-8.9670375	497.15414	677.44827	0	100
4	2696	-84.98408	-10.709273	605.86259	826.33668	0	100
5	2696	-81.62592	-12.266285	703.01685	958.66679	0	100
6	2696	-78.52342	-13.55556	783.47718	1072.1887	0	100
7	2696	-75.5	-14.666165	852.77094	1201.9807	0	100
8	2696	-72.3	-15.70565	917.64193	1349.0512	0	100
9	2696	-69.1	-16.60643	973.8508	1482.5964	0	100
10	2696	-65.5	-17.450535	1026.509	1648.223	0	100
11	2696	-61.79606	-18.16371	1071.0046	1777.0683	0	100
12	2696	-58.38818	-18.663405	1102.1856	1823.9327	0	100
13	2696	-54.980305	-19.021945	1124.568	1857.4187	0	100
14	2696	-51.57243	-19.241135	1138.2598	1877.7417	0	100
15	2696	-48.16455	-19.32206	1143.2851	1885.003	0	100
16	2696	-44.75667	-19.26512	1139.7565	1879.3315	0	100
17	2696	-41.34879	-19.07003	1127.5812	1860.705	0	100
18	2696	-37.94091	-18.735825	1106.7233	1829.0366	0	100
19	2696	-34.533035	-18.26083	1077.0649	1784.2718	0	100
20	2696	-31.12516	-17.642615	1038.4984	1726.1908	0	100
21	2696	-27.71728	-16.877925	990.79639	1654.5471	0	100
22	2696	-24.3094	-15.9626	933.65731	1568.9714	0	100
23	2696	-20.90152	-14.891455	866.81619	1469.0391	0	100
24	2696	-17.493645	-13.658105	789.87809	1354.2566	0	100
25	2696	-15.444855	-12.85636	739.8317	1280.8795	0	100
26	2696	-13.45	-11.97482	684.81934	1200.6192	0	100
27	2696	-10.15	-10.411502	587.28102	1057.3226	0	100
28	2696	-7	-8.7547695	483.88926	1000.2574	0	100
29	2696	-4	-7.0094875	375.00423	1029.1979	0	100
30	2696	-1.5652174	-5.481294	279.63253	982.85996	0	100
31	2696	0.9347826	-3.755862	171.96707	823.21227	0	100
32	2696	3.568097	-1.8223275	51.313761	577.34472	0	100
33	2696	4.9675005	-0.73364735	-16.620903	388.74634	0	100
34	2696	6.3994035	0.45829265	-90.997404	142.88317	119.89322	0
35	2696	7.566554	1.44194	-152.3778	5.1465156	4.3184393	0

LWL (c) FS Check (Toe)

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File Information

Title: MRGO Reach 9_1 on 2
Created By: Chaisson, Kathryn MVN
Revision Number: 152
Last Edited By: Chaisson, Kathryn MVN
Date: 6/17/2010
Time: 8:59:08 AM
File Name: MRGO Reach 9_1 on 2.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 9\
Last Solved Date: 6/17/2010
Last Solved Time: 9:00:18 AM

Project Settings

Length(L) Units: feet
Time(t) Units: Seconds
Force(F) Units: lbf
Pressure(p) Units: psf
Strength Units: psf
Unit Weight of Water: 62.4 pcf
View: 2D

Analysis Settings

LWL (c) FS Check (Toe)

Kind: SLOPE/W
Method: Spencer
Settings
    Apply Phreatic Correction: No
    PWP Conditions Source: Piezometric Line
    Use Staged Rapid Drawdown: No
SlipSurface
    Direction of movement: Right to Left
    Use Passive Mode: No
    Slip Surface Option: Entry and Exit
    Critical slip surfaces saved: 1
    Optimize Critical Slip Surface Location: Yes
    Tension Crack
        Tension Crack Option: Search for Tension Crack
        Percentage Wet: 1
        Tension Crack Fluid Unit Weight: 62.4 pcf

LWL (c) FS Check (Toe)

FOS Distribution
FOS Calculation Option: Constant
Advanced
Number of Slices: 30
Optimization Tolerance: 0.01
Minimum Slip Surface Depth: 0.1 ft
Optimization Maximum Iterations: 3000
Optimization Convergence Tolerance: 1e-007
Starting Optimization Points: 8
Ending Optimization Points: 16
Complete Passes per Insertion: 1
Driving Side Maximum Convex Angle: 5 °
Resisting Side Maximum Convex Angle: 1 °

Materials

ROCK
Model: Mohr-Coulomb
Unit Weight: 132 pcf
Cohesion: 0 psf
Phi: 40 °
Phi-B: 0 °
Pore Water Pressure
Piezometric Line: 1

CH (NG to -13)
Model: Undrained (Phi=0)
Unit Weight: 86 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

CH (-13 to -20)
Model: Undrained (Phi=0)
Unit Weight: 94 pcf
Cohesion: 100 psf
Pore Water Pressure
Piezometric Line: 1

CH (-20 to -33)
Model: Undrained (Phi=0)
Unit Weight: 108 pcf
Cohesion: 200 psf
Pore Water Pressure
Piezometric Line: 1

CH (-33 to -47)

LWL (c) FS Check (Toe)

Model: S=f(depth)
Unit Weight: 118 pcf
C-Top of Layer: 340 psf
C-Rate of Change: 18.57 psf/ft
Limiting C: 600 psf
Pore Water Pressure
Piezometric Line: 1

CH (-47 to -60)

Model: Undrained (Phi=0)
Unit Weight: 105 pcf
Cohesion: 600 psf
Pore Water Pressure
Piezometric Line: 1

Slip Surface Entry and Exit

Left Projection: Range
Left-Zone Left Coordinate: (-120.10019, -4.13475) ft
Left-Zone Right Coordinate: (-88.17431, -3.58923) ft
Left-Zone Increment: 20
Right Projection: Range
Right-Zone Left Coordinate: (-71.00038, -1.8751) ft
Right-Zone Right Coordinate: (-11.49926, 0.94547) ft
Right-Zone Increment: 20
Radius Increments: 20

Slip Surface Limits

Left Coordinate: (-200, -5.5) ft
Right Coordinate: (200, 0) ft

Piezometric Lines

Piezometric Line 1

Coordinates

	X (ft)	Y (ft)
	-200	-1
	200	-1

Regions

	Material	Points	Area (ft²)
Region 1	CH (-33 to -47)	15,7,8,16	5600
Region 2	CH (-20 to -33)	7,5,6,8	5200

Region 3	CH (-13 to -20)	5,3,4,6	2800
Region 4	CH (NG to -13)	3,1,18,19,14,22,2,4	4446.955
Region 5	ROCK	18,17,13,11,12,20,21,22,14,19	297.52
Region 6	CH (-47 to -60)	9,15,16,10	5200

Points

	X (ft)	Y (ft)
Point 1	-200	-5.5
Point 2	200	0
Point 3	-200	-13
Point 4	200	-13
Point 5	-200	-20
Point 6	200	-20
Point 7	-200	-33
Point 8	200	-33
Point 9	-200	-60
Point 10	200	-60
Point 11	-2.5	4
Point 12	2.5	4
Point 13	-8.5	1
Point 14	10.5	0
Point 15	-200	-47
Point 16	200	-47
Point 17	-63.5	0
Point 18	-77.1	-3.4
Point 19	-15.1	-2.3
Point 20	7.5	1.5
Point 21	31.5	1.5
Point 22	34.5	0

Critical Slip Surfaces

	Slip Surface	FOS	Center (ft)	Radius (ft)	Entry (ft)	Exit (ft)
1	Optimized	1.61	(-66.935, 15.045)	27.3298	(-34.1028, 0.534495)	(-95.5099, -3.71457)
2	6881	1.72	(-66.935, 15.045)	34.73	(-35.3915, 0.511063)	(-96.1558, -3.72561)

Slices of Slip Surface: Optimized

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	Optimized	-94.307455	-4.743175	233.57305	318.54893	0	100
2	Optimized	-91.90267	-6.800385	361.93427	499.73725	0	100
3	Optimized	-89.42165	-8.8334425	488.81155	673.4074	0	100
4	Optimized	-86.864385	-10.842347	614.151	850.16186	0	100
5	Optimized	-	-12.4234	712.84197	983.11237	0	100

		84.775845					
6	Optimized	-82.43199	-14.092075	816.94756	1138.6442	0	100
7	Optimized	-79.94853	-15.80057	923.54374	1297.0247	0	100
8	Optimized	-78.04951	-17.03341	1000.4836	1415.3054	0	100
9	Optimized	-76.65284	-17.940125	1057.0672	1510.3371	0	100
10	Optimized	-74.714545	-18.870515	1115.1061	1610.0173	0	100
11	Optimized	-71.986715	-19.750035	1170.0001	1715.4259	0	100
12	Optimized	-69.937515	-19.990955	1185.0367	1752.9706	0	100
13	Optimized	-68.312505	-19.99394	1185.2213	1780.1088	0	100
14	Optimized	-66.323565	-19.997595	1185.4438	1831.7173	0	100
15	Optimized	-64.323565	-19.65427	1164.0399	1821.3037	0	100
16	Optimized	-62.66862	-18.960015	1120.7104	1784.2189	0	100
17	Optimized	-61.00586	-18.262485	1077.1753	1721.8278	0	100
18	Optimized	-59.18475	-17.410915	1024.027	1636.8848	0	100
19	Optimized	-57.205285	-16.405305	961.28641	1546.4447	0	100
20	Optimized	-55.22582	-15.399695	898.54584	1456.0496	0	100
21	Optimized	-53.409485	-14.422665	837.58843	1362.1043	0	100
22	Optimized	-51.75628	-13.47422	778.40529	1276.635	0	100
23	Optimized	-49.78864	-12.345385	707.9537	1180.0622	0	100
24	Optimized	-47.759325	-11.12153	631.6	1073.63	0	100
25	Optimized	-45.98278	-9.983045	560.55863	979.79278	0	100
26	Optimized	-44.22574	-8.7998475	486.69337	876.94107	0	100
27	Optimized	-42.488205	-7.5719425	410.09145	775.60733	0	100
28	Optimized	-40.666055	-6.2088325	325.03197	657.06593	0	100
29	Optimized	-38.75928	-4.7105175	231.53595	533.31453	0	100
30	Optimized	-36.98094	-3.293635	143.12372	413.49942	0	100
31	Optimized	-35.62784	-1.812955	50.728143	190.04035	116.89682	0
32	Optimized	-34.601235	-0.2327526	-47.876076	54.932234	46.093617	0

Slices of Slip Surface: 6881

LWL (c) FS Check (Toe)

	Slip Surface	X (ft)	Y (ft)	PWP (psf)	Base Normal Stress (psf)	Frictional Strength (psf)	Cohesive Strength (psf)
1	6881	-95.06395	-5.2397075	264.55678	393.74149	0	100
2	6881	-92.88029	-7.9839455	435.80045	618.65059	0	100
3	6881	-90.69663	-10.240161	576.58391	803.94045	0	100
4	6881	-88.51297	-12.13312	694.70197	959.27691	0	100
5	6881	-86.389025	-13.69857	792.38641	1093.1169	0	100
6	6881	-84.324795	-14.994645	873.26743	1209.2588	0	100
7	6881	-82.260565	-16.100045	942.22468	1307.8219	0	100
8	6881	-80.19634	-17.03462	1000.5529	1390.495	0	100
9	6881	-78.132115	-17.81303	1049.1558	1458.6842	0	100
10	6881	-76.14	-18.428765	1087.5417	1528.1126	0	100
11	6881	-74.22	-18.898815	1116.9073	1598.8992	0	100
12	6881	-72.3	-19.25503	1139.1166	1658.9926	0	100
13	6881	-70.38	-19.500945	1154.481	1708.6589	0	100
14	6881	-68.46	-19.638905	1163.0424	1748.1018	0	100
15	6881	-66.5	-19.6686	1164.9086	1793.6092	0	100
16	6881	-64.5	-19.585775	1159.7372	1844.6465	0	100
17	6881	-62.434265	-19.37613	1146.6699	1852.9356	0	100
18	6881	-60.30279	-19.02936	1125.0438	1817.7079	0	100
19	6881	-58.171315	-18.543875	1094.7301	1769.3635	0	100
20	6881	-56.03984	-17.913525	1055.4084	1707.3267	0	100
21	6881	-53.908365	-17.12975	1006.5052	1630.7602	0	100
22	6881	-51.776895	-16.180925	947.27001	1538.4486	0	100
23	6881	-49.64542	-15.051345	876.79652	1428.9591	0	100
24	6881	-47.513945	-13.719555	793.68104	1300.1329	0	100
25	6881	-45.51075	-12.264565	702.8902	1165.329	0	100
26	6881	-43.63583	-10.680072	604.04568	1024.7034	0	100
27	6881	-41.76091	-8.84308	489.41719	861.53726	0	100
28	6881	-39.88599	-6.6883905	354.94447	669.66746	0	100
29	6881	-38.01107	-4.105744	193.79792	438.66442	0	100
30	6881	-36.60313	-1.844927	52.725458	186.0126	111.8412	0
31	6881	-35.76209	-0.24446845	-47.144873	48.824587	40.968693	0

ANNEX 8

CWALSHT INPUT-OUTPUT FILES

APPENDIX ED-F-5

CWALSHT INPUT-OUTPUT FILES

1-LWL-Anchor at 1.dat

```
'MRGO WALLS 1
'IHNC TO CHEF PASS WALLS
CONTROL  ANCHORED  DESIGN  1.30  1.30
WALL   4    1
SURFACE RIGHTSIDE   2    0    4
                  200    4
SURFACE LEFTSIDE   4    0   -6
                  16   -6.2
                  100   -7
                  200   -7.8
SOIL RIGHTSIDE  STRENGTHS   7
   85    85    0    50    0    0   -6   0
   99    99    0    160    0    0   -20   0
   102    102    0    220    0    0   -28   0
   102    102    0    300    0    0   -35   0
   100    100    0    475    0    0   -48   0
   108    108    0    700    0    0   -60   0
   120    120    30    0    0    0
SOIL LEFTSIDE  STRENGTHS   6
   99    99    0    160    0    0   -20   0
   102    102    0    220    0    0   -28   0
   102    102    0    300    0    0   -35   0
   100    100    0    475    0    0   -48   0
   108    108    0    700    0    0   -60   0
   120    120    30    0    0    0
WATER ELEVATIONS   62.4   -2   -2
FINISHED
```

1-LWL-Sweep-Anchor at 1.out

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS

DATE: 8-JUNE-2010 TIME: 11:19:04

****
* INPUT DATA *
****

I.--HEADING
'MRGO WALLS 1
'IHNC TO CHEF PASS WALLS

II.--CONTROL
ANCHORED WALL DESIGN
FACTOR OF SAFETY FOR ACTIVE PRESSURES = 1.30
FACTOR OF SAFETY FOR PASSIVE PRESSURES = 1.30

III.--WALL DATA
ELEVATION AT TOP OF WALL = 4.00 FT.
ELEVATION AT ANCHOR = 1.00 FT.

IV.--SURFACE POINT DATA

IV.A.--RIGHTSIDE

DIST. FROM WALL (FT)	ELEVATION (FT)
0.00	4.00
200.00	4.00

IV.B.--LEFTSIDE

DIST. FROM WALL (FT)	ELEVATION (FT)
0.00	-6.00
16.00	-6.20
100.00	-7.00
200.00	-7.80

V.--SOIL LAYER DATA

V.A.--RIGHTSIDE
LEVEL 2 FACTOR OF SAFETY FOR ACTIVE PRESSURE = DEFAULT
LEVEL 2 FACTOR OF SAFETY FOR PASSIVE PRESSURE = DEFAULT

SAT. WGHT. (PCF)	MOIST WGHT. (PCF)	ANGLE OF INTERNAL FRICTION (DEG)	COH-ESION (PSF)	ANGLE OF WALL FRICTION (DEG)	ADH-ESION (PSF)	<--BOTTOM--> ELEV. (FT)	SLOPE (FT/FT)	<-SAFETY-> <-FACTOR-> ACT.	PASS.
85.00	85.00	0.00	50.00	0.00	0.00	-6.00	0.00	DEF	DEF
99.00	99.00	0.00	160.00	0.00	0.00	-20.00	0.00	DEF	DEF
102.00	102.00	0.00	220.00	0.00	0.00	-28.00	0.00	DEF	DEF
102.00	102.00	0.00	300.00	0.00	0.00	-35.00	0.00	DEF	DEF
100.00	100.00	0.00	475.00	0.00	0.00	-48.00	0.00	DEF	DEF
108.00	108.00	0.00	700.00	0.00	0.00	-60.00	0.00	DEF	DEF
120.00	120.00	30.00	0.00	0.00	0.00			DEF	DEF

V.B.--LEFTSIDE
LEVEL 2 FACTOR OF SAFETY FOR ACTIVE PRESSURE = DEFAULT
LEVEL 2 FACTOR OF SAFETY FOR PASSIVE PRESSURE = DEFAULT

SAT. WGHT. (PCF)	MOIST WGHT. (PCF)	ANGLE OF INTERNAL FRICTION (DEG)	COH-ESION (PSF)	ANGLE OF WALL FRICTION (DEG)	ADH-ESION (PSF)	<--BOTTOM--> ELEV. (FT)	SLOPE (FT/FT)	<-SAFETY-> <-FACTOR-> ACT.	PASS.

99.00	99.00	0.00	160.00	0.00	0.00	-20.00	0.00	DEF	DEF
102.00	102.00	0.00	220.00	0.00	0.00	-28.00	0.00	DEF	DEF
102.00	102.00	0.00	300.00	0.00	0.00	-35.00	0.00	DEF	DEF
100.00	100.00	0.00	475.00	0.00	0.00	-48.00	0.00	DEF	DEF
108.00	108.00	0.00	700.00	0.00	0.00	-60.00	0.00	DEF	DEF
120.00	120.00	30.00	0.00	0.00	0.00			DEF	DEF

VI.--WATER DATA
UNIT WEIGHT = 62.40 (PCF)
RIGHTSIDE ELEVATION = -2.00 (FT)
LEFTSIDE ELEVATION = -2.00 (FT)
NO SEEPAGE

VII.--VERTICAL SURCHARGE LOADS
NONE

VIII.--HORIZONTAL LOADS
NONE

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS
DATE: 8-JUNE-2010 TIME: 11:19:17

****
* SOIL PRESSURES FOR *
* ANCHORED WALL DESIGN *
****

I.--HEADING
'MRGO WALLS 1
'IHNC TO CHEF PASS WALLS

II.--SOIL PRESSURES

RIGHTSIDE SOIL PRESSURES DETERMINED BY SWEEP SEARCH WEDGE METHOD.

LEFTSIDE SOIL PRESSURES DETERMINED BY SWEEP SEARCH WEDGE METHOD.

				<------NET------>		
	NET	<---LEFTSIDE--->		(SOIL + WATER)	<--RIGHTSIDE--->	
ELEV.	WATER	PASSIVE	ACTIVE	ACTIVE	ACTIVE	PASSIVE
(FT)	(PSF)	(PSF)	(PSF)	(PSF)	(PSF)	(PSF)
4.0	0.0	0.0	0.0	0.0	0.0	76.9
3.0	0.0	0.0	0.0	8.1	8.1	161.9
2.0	0.0	0.0	0.0	75.9	75.9	246.9
1.0	0.0	0.0	0.0	178.1	178.1	331.9
0.0	0.0	0.0	0.0	263.1	263.1	416.9
-1.0	0.0	0.0	0.0	348.1	348.1	501.9
-2.0	0.0	0.0	0.0	417.5	417.5	571.3
-3.0	0.0	0.0	0.0	455.7	455.7	609.5
-4.0	0.0	0.0	0.0	478.3	478.3	632.1
-5.0	0.0	0.0	0.0	500.9	500.9	654.7
-6.0+	0.0	0.0	0.0	442.4	442.4	765.4
-6.0-	0.0	246.2	0.0	196.2	442.4	765.4

-7.0	0.0	279.3	0.0	111.6	390.8	883.2
-8.0	0.0	315.4	0.0	112.0	427.4	919.8
-9.0	0.0	351.6	0.0	112.5	464.0	956.4
-10.0	0.0	387.7	0.0	112.9	500.6	993.0
-11.0	0.0	423.9	0.0	113.4	537.2	1029.6
-12.0	0.0	460.0	0.0	113.8	573.8	1066.2
-13.0	0.0	496.2	0.0	114.3	610.4	1102.8
-14.0	0.0	532.3	0.0	114.7	647.0	1139.4
-15.0	0.0	568.4	0.0	115.2	683.6	1176.0
-16.0	0.0	604.6	0.0	115.6	720.2	1212.6
-17.0	0.0	640.7	0.0	116.1	756.8	1249.2
-18.0	0.0	676.9	0.0	116.6	793.4	1285.8
-19.0	0.0	713.0	69.5	117.0	830.0	1322.4
-20.0	0.0	796.1	164.6	25.1	821.2	1405.9
-20.3	0.0	819.2	177.0	0.0	819.2	1429.1
-21.0	0.0	880.6	209.8	-66.7	813.9	1490.9
-22.0	0.0	920.1	248.7	-66.6	853.5	1530.5
-23.0	0.0	959.7	287.5	-66.5	893.1	1570.1
-24.0	0.0	999.0	326.7	-66.3	932.7	1609.7
-25.0	0.0	1038.3	366.0	-65.9	972.3	1649.3
-26.0	0.0	1077.5	405.2	-65.6	1011.9	1688.9
-27.0	0.0	1116.8	444.5	-65.2	1051.5	1728.5
-28.0	0.0	1217.6	422.2	-188.0	1029.6	1829.6
-29.0	0.0	1318.3	399.9	-310.7	1007.7	1930.7
-30.0	0.0	1357.6	439.2	-310.3	1047.3	1970.3
-31.0	0.0	1396.9	478.4	-310.0	1086.9	2009.9
-32.0	0.0	1436.1	517.7	-309.7	1126.5	2049.5
-33.0	0.0	1475.4	556.9	-309.3	1166.1	2089.1
-34.0	0.0	1514.6	596.2	-309.0	1205.7	2128.7
-35.0	0.0	1688.0	500.3	-577.8	1110.1	2302.5
-36.0	0.0	1860.4	403.5	-846.7	1013.6	2475.2
-37.0	0.0	1897.6	440.7	-846.4	1051.2	2512.8

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS

DATE: 8-JUNE-2010 TIME: 11:19:19

****
* SUMMARY OF RESULTS FOR *
* ANCHORED WALL DESIGN *
****

I.--HEADING
'MRGO WALLS 1
'IHNC TO CHEF PASS WALLS

II.--SUMMARY

RIGHTSIDE SOIL PRESSURES DETERMINED BY SWEEP SEARCH WEDGE METHOD.

LEFTSIDE SOIL PRESSURES DETERMINED BY SWEEP SEARCH WEDGE METHOD.

METHOD : FREE EARTH FIXED EARTH

WALL BOTTOM ELEVATION (FT) :	-30.19	-37.08
PENETRATION (FT) :	24.19	31.08
MAXIMUM BENDING MOMENT (LB-FT) :	-1.4541E+04	-1.2398E+04
AT ELEVATION (FT) :	-9.49	-7.48
MAXIMUM SCALED DEFLECTION (LB-IN^3):	2.3201E+09	1.6961E+09
AT ELEVATION (FT) :	-13.00	-12.00
ANCHOR FORCE (LB) :	3.3796E+03	3.1537E+03

NOTE: DIVIDE SCALED DEFLECTION MODULUS OF ELLASTICITY IN PSI TIMES PILE MOMENT OF INERTIA IN IN^4 TO OBTAIN DEFLECTION IN INCHES.

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHOREDOR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS

DATE: 8-JUNE-2010 TIME: 11:19:19

****
* COMPLETE OF RESULTS FOR *
* ANCHORED WALL DESIGN *
* BY FREE EARTH METHOD *
****

I.--HEADING
'MRGO WALLS 1
'IHNC TO CHEF PASS WALLS

II.--RESULTS (ANCHOR FORCE= 3380. (LB))

ELEVATION (FT)	BENDING MOMENT (LB-FT)	SHEAR (LB)	SCALED DEFLECTION (LB-IN^3)	NET PRESSURE (PSF)
4.00	0.0000E+00	0.	-8.3778E+08	0.00
3.00	1.3462E+00	4.	-5.5854E+08	8.08
2.00	2.0721E+01	46.	-2.7929E+08	75.87
1.00+	1.2170E+02	173.	0.0000E+00	178.08
1.00-	1.2170E+02	-3207.	0.0000E+00	178.08
0.00	-2.9817E+03	-2986.	2.7856E+08	263.08
-1.00	-5.8220E+03	-2680.	5.5200E+08	348.08
-2.00	-8.3168E+03	-2298.	8.1543E+08	417.48
-3.00	-1.0399E+04	-1861.	1.0645E+09	455.68
-4.00	-1.2029E+04	-1394.	1.2958E+09	478.28
-5.00	-1.3180E+04	-905.	1.5063E+09	500.88
-6.00+	-1.3844E+04	-433.	1.6941E+09	442.36
-6.00-	-1.3844E+04	-433.	1.6941E+09	196.21
-7.00	-1.4193E+04	-279.	1.8580E+09	111.58
-8.00	-1.4416E+04	-167.	1.9974E+09	112.03
-9.00	-1.4527E+04	-55.	2.1119E+09	112.49
-10.00	-1.4526E+04	58.	2.2013E+09	112.94
-11.00	-1.4411E+04	171.	2.2657E+09	113.39
-12.00	-1.4184E+04	285.	2.3051E+09	113.84
-13.00	-1.3842E+04	399.	2.3201E+09	114.29
-14.00	-1.3386E+04	513.	2.3111E+09	114.75
-15.00	-1.2816E+04	628.	2.2791E+09	115.20
-16.00	-1.2130E+04	744.	2.2249E+09	115.65
-17.00	-1.1329E+04	859.	2.1498E+09	116.10

-18.00	-1.0411E+04	976.	2.0551E+09	116.55
-19.00	-9.3769E+03	1093.	1.9424E+09	117.01
-20.00	-8.2412E+03	1164.	1.8136E+09	25.15
-20.27	-7.9220E+03	1167.	1.7757E+09	0.00
-21.00	-7.0804E+03	1143.	1.6705E+09	-66.71
-22.00	-5.9709E+03	1076.	1.5152E+09	-66.56
-23.00	-4.9280E+03	1010.	1.3495E+09	-66.53
-24.00	-3.9516E+03	943.	1.1753E+09	-66.26
-25.00	-3.0414E+03	877.	9.9433E+08	-65.91
-26.00	-2.1972E+03	811.	8.0804E+08	-65.57
-27.00	-1.4185E+03	746.	6.1795E+08	-65.22
-28.00	-7.2553E+02	619.	4.2540E+08	-187.96
-29.00	-2.2054E+02	370.	2.3157E+08	-310.69
-30.00	-5.7211E+00	60.	3.7313E+07	-310.34
-30.19	0.0000E+00	0.	0.0000E+00	-310.28

NOTE: DIVIDE SCALED DEFLECTION MODULUS OF ELLASTICITY IN PSI TIMES PILE MOMENT OF INERTIA IN IN^4 TO OBTAIN DEFLECTION IN INCHES.

III.--WATER AND SOIL PRESSURES

		<----------SOIL PRESSURES---------->			
	WATER	<----LEFTSIDE----->		<---RIGHTSIDE---->	
ELEVATION (FT)	PRESSURE (PSF)	PASSIVE (PSF)	ACTIVE (PSF)	ACTIVE (PSF)	PASSIVE (PSF)
4.00	0.	0.	0.	0.	77.
3.00	0.	0.	0.	8.	162.
2.00	0.	0.	0.	76.	247.
1.00	0.	0.	0.	178.	332.
0.00	0.	0.	0.	263.	417.
-1.00	0.	0.	0.	348.	502.
-2.00	0.	0.	0.	417.	571.
-3.00	0.	0.	0.	456.	610.
-4.00	0.	0.	0.	478.	632.
-5.00	0.	0.	0.	501.	655.
-6.00+	0.	0.	0.	442.	765.
-6.00-	0.	246.	0.	442.	765.
-7.00	0.	279.	0.	391.	883.
-8.00	0.	315.	0.	427.	920.
-9.00	0.	352.	0.	464.	956.
-10.00	0.	388.	0.	501.	993.
-11.00	0.	424.	0.	537.	1030.
-12.00	0.	460.	0.	574.	1066.
-13.00	0.	496.	0.	610.	1103.
-14.00	0.	532.	0.	647.	1139.
-15.00	0.	568.	0.	684.	1176.
-16.00	0.	605.	0.	720.	1213.
-17.00	0.	641.	0.	757.	1249.
-18.00	0.	677.	0.	793.	1286.
-19.00	0.	713.	69.	830.	1322.
-20.00	0.	796.	165.	821.	1406.
-20.27	0.	819.	177.	819.	1429.
-21.00	0.	881.	210.	814.	1491.
-22.00	0.	920.	249.	854.	1530.
-23.00	0.	960.	288.	893.	1570.
-24.00	0.	999.	327.	933.	1610.
-25.00	0.	1038.	366.	972.	1649.
-26.00	0.	1078.	405.	1012.	1689.
-27.00	0.	1117.	444.	1052.	1728.
-28.00	0.	1218.	422.	1030.	1830.
-29.00	0.	1318.	400.	1008.	1931.

-30.00	0.	1358.	439.	1047.	1970.
-31.00	0.	1397.	478.	1087.	2010.

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHOREDOR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS

DATE: 8-JUNE-2010 TIME: 11:19:19

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*******************************
* COMPLETE OF RESULTS FOR     *
*   ANCHORED WALL DESIGN      *
*   BY FIXED EARTH METHOD     *
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I.--HEADING
'MRGO WALLS 1
'IHNC TO CHEF PASS WALLS

II.--RESULTS (ANCHOR FORCE= 3154. (LB))

ELEVATION (FT)	BENDING MOMENT (LB-FT)	SHEAR (LB)	SCALED DEFLECTION (LB-IN^3)	NET PRESSURE (PSF)
4.00	0.0000E+00	0.	-6.6425E+08	0.00
3.00	1.3462E+00	4.	-4.4285E+08	8.08
2.00	2.0721E+01	46.	-2.2145E+08	75.87
1.00+	1.2170E+02	173.	0.0000E+00	178.08
1.00-	1.2170E+02	-2981.	0.0000E+00	178.08
0.00	-2.7558E+03	-2760.	2.2078E+08	263.08
-1.00	-5.3702E+03	-2455.	4.3683E+08	348.08
-2.00	-7.6392E+03	-2072.	6.4365E+08	417.48
-3.00	-9.4958E+03	-1635.	8.3733E+08	455.68
-4.00	-1.0899E+04	-1168.	1.0147E+09	478.28
-5.00	-1.1825E+04	-679.	1.1732E+09	500.88
-6.00+	-1.2263E+04	-207.	1.3115E+09	442.36
-6.00-	-1.2263E+04	-207.	1.3115E+09	196.21
-7.00	-1.2386E+04	-53.	1.4285E+09	111.58
-8.00	-1.2383E+04	59.	1.5242E+09	112.03
-9.00	-1.2268E+04	171.	1.5985E+09	112.49
-10.00	-1.2041E+04	284.	1.6516E+09	112.94
-11.00	-1.1701E+04	397.	1.6839E+09	113.39
-12.00	-1.1247E+04	510.	1.6961E+09	113.84
-13.00	-1.0680E+04	625.	1.6888E+09	114.29
-14.00	-9.9980E+03	739.	1.6630E+09	114.75
-15.00	-9.2015E+03	854.	1.6200E+09	115.20
-16.00	-8.2899E+03	969.	1.5612E+09	115.65
-17.00	-7.2626E+03	1085.	1.4880E+09	116.10
-18.00	-6.1191E+03	1202.	1.4023E+09	116.55
-19.00	-4.8592E+03	1318.	1.3060E+09	117.01
-20.00	-3.4976E+03	1389.	1.2013E+09	25.15
-20.27	-3.1165E+03	1393.	1.1715E+09	0.00
-21.00	-2.1108E+03	1369.	1.0906E+09	-66.71
-22.00	-7.7545E+02	1302.	9.7629E+08	-66.56
-23.00	4.9335E+02	1236.	8.6059E+08	-66.53
-24.00	1.6956E+03	1169.	7.4573E+08	-66.26
-25.00	2.8317E+03	1103.	6.3379E+08	-65.91
-26.00	3.9018E+03	1037.	5.2673E+08	-65.57
-27.00	4.9064E+03	972.	4.2641E+08	-65.22
-28.00	5.8252E+03	845.	3.3456E+08	-187.96
-29.00	6.5561E+03	596.	2.5274E+08	-310.69

-30.00	6.9968E+03	285.	1.8221E+08	-310.34
-31.00	7.1272E+03	-25.	1.2373E+08	-310.00
-32.00	6.9476E+03	-335.	7.7513E+07	-309.65
-33.00	6.4583E+03	-644.	4.3261E+07	-309.31
-34.00	5.6597E+03	-953.	2.0125E+07	-308.96
-35.00	4.5073E+03	-1397.	6.7194E+06	-577.85
-36.00	2.7770E+03	-2109.	1.0196E+06	-846.73
-37.00	2.4487E+02	-2955.	4.7574E+02	-846.39
-38.00+	0.0000E+00	-3025.	0.0000E+00	-846.36

NOTE: DIVIDE SCALED DEFLECTION MODULUS OF ELLASTICITY IN PSI TIMES PILE MOMENT OF INERTIA IN IN^4 TO OBTAIN DEFLECTION IN INCHES.

III.--WATER AND SOIL PRESSURES

		<----------SOIL PRESSURES---------->			
	WATER	<----LEFTSIDE----->		<---RIGHTSIDE---->	
ELEVATION (FT)	PRESSURE (PSF)	PASSIVE (PSF)	ACTIVE (PSF)	ACTIVE (PSF)	PASSIVE (PSF)
4.00	0.	0.	0.	0.	77.
3.00	0.	0.	0.	8.	162.
2.00	0.	0.	0.	76.	247.
1.00	0.	0.	0.	178.	332.
0.00	0.	0.	0.	263.	417.
-1.00	0.	0.	0.	348.	502.
-2.00	0.	0.	0.	417.	571.
-3.00	0.	0.	0.	456.	610.
-4.00	0.	0.	0.	478.	632.
-5.00	0.	0.	0.	501.	655.
-6.00+	0.	0.	0.	442.	765.
-6.00-	0.	246.	0.	442.	765.
-7.00	0.	279.	0.	391.	883.
-8.00	0.	315.	0.	427.	920.
-9.00	0.	352.	0.	464.	956.
-10.00	0.	388.	0.	501.	993.
-11.00	0.	424.	0.	537.	1030.
-12.00	0.	460.	0.	574.	1066.
-13.00	0.	496.	0.	610.	1103.
-14.00	0.	532.	0.	647.	1139.
-15.00	0.	568.	0.	684.	1176.
-16.00	0.	605.	0.	720.	1213.
-17.00	0.	641.	0.	757.	1249.
-18.00	0.	677.	0.	793.	1286.
-19.00	0.	713.	69.	830.	1322.
-20.00	0.	796.	165.	821.	1406.
-20.27	0.	819.	177.	819.	1429.
-21.00	0.	881.	210.	814.	1491.
-22.00	0.	920.	249.	854.	1530.
-23.00	0.	960.	288.	893.	1570.
-24.00	0.	999.	327.	933.	1610.
-25.00	0.	1038.	366.	972.	1649.
-26.00	0.	1078.	405.	1012.	1689.
-27.00	0.	1117.	444.	1052.	1728.
-28.00	0.	1218.	422.	1030.	1830.
-29.00	0.	1318.	400.	1008.	1931.
-30.00	0.	1358.	439.	1047.	1970.
-31.00	0.	1397.	478.	1087.	2010.
-32.00	0.	1436.	518.	1126.	2050.
-33.00	0.	1475.	557.	1166.	2089.
-34.00	0.	1515.	596.	1206.	2129.
-35.00	0.	1688.	500.	1110.	2302.

1-LWL-Sweep-Anchor at 1.out

-36.00	0.	1860.	403.	1014.	2475.
-37.00	0.	1898.	441.	1051.	2513.
-38.00	0.	1935.	478.	1089.	2550.

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS

DATE: 8-JUNE-2010 TIME: 11:19:21

****
* PRELIMINARY DESIGN DATA FOR *
* FREE EARTH DESIGN IN CLAY *
****

I.--HEADING
'MRGO WALLS 1
'IHNC TO CHEF PASS WALLS

II.--DESIGN PARAMETERS
WALL HEIGHT RATIO (ALPHA) = 0.29
ANCHOR HEIGHT RATIO (BETA) = 0.09
STABILITY NUMBER = 0.25

SHEET PILE DATA:

SHEET PILE NAME	<SECTION PROPERTIES> (PER FOOT OF WALL) SECTION MODULUS (IN^3)	MOMENT OF INERTIA (IN^4)	ALLOWABLE STRESS (PSI)	MODULUS OF ELLASTICITY (PSI)
PZ40	60.70	490.80	24000.00	2.90E+07
PZ38	46.80	280.80	24000.00	2.90E+07
PZ35	48.50	361.20	24000.00	2.90E+07
PZ32	38.30	220.40	24000.00	2.90E+07
PZ27	30.20	184.20	24000.00	2.90E+07
PZ22	18.10	84.40	24000.00	2.90E+07
PLZ25	32.80	223.25	24000.00	2.90E+07
PLZ23	30.20	203.75	24000.00	2.90E+07

III.--PRELIMINARY DESIGN DATA

SHEET PILE NAME	LOG(H^4/EI)	ROWE'S MOMENT REDUCTION COEF.	RATIO OF ALLOWABLE MOMENT TO FREE EARTH MOMENT
PZ40	-4.02	1.0 (***)	8.35
PZ38	-3.78	1.0 (***)	6.44
PZ35	-3.88	1.0 (***)	6.67
PZ32	-3.67	1.0 (***)	5.27
PZ27	-3.59	1.0 (***)	4.15
PZ22	-3.25	1.0 (***)	2.49
PLZ25	-3.68	1.0 (***)	4.51
PLZ23	-3.64	1.0 (***)	4.15

*** REDUCTION NOT APPLICABLE DUE TO ALPHA LESS THAN 0.6.

*** REDUCTION NOT APPLICABLE DUE TO STABILITY NUMBER LESS THAN 0.5.

1-LWL-Anchor at 1.dat

```
'MRGO WALLS 1
'IHNC TO CHEF PASS WALLS
CONTROL  ANCHORED  DESIGN  1.00  1.00
WALL   4    1
SURFACE RIGHTSIDE   2    0    4
                  200    4
SURFACE LEFTSIDE   4    0   -6
                  16   -6.2
                  100   -7
                  200   -7.8
SOIL RIGHTSIDE  STRENGTHS   7
   85    85    0    50    0    0   -6   0
   99    99    0    160   0    0   -20  0
   102    102    0    220    0    0   -28   0
   102    102    0    300    0    0   -35   0
   100    100    0    475    0    0   -48   0
   108    108    0    700    0    0   -60   0
   120    120    30    0    0    0
SOIL LEFTSIDE  STRENGTHS   6
   99    99    0    160   0    0   -20  0
   102    102    0    220    0    0   -28   0
   102    102    0    300    0    0   -35   0
   100    100    0    475    0    0   -48   0
   108    108    0    700    0    0   -60   0
   120    120    30    0    0    0
WATER ELEVATIONS   62.4   -2   -2
FINISHED
```

1-LWL-Fixed-Anchor at 1.out
PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS
DATE: 10-JUNE-2010 TIME: 11:22:08

****
* INPUT DATA *
****

I.--HEADING
'MRGO WALLS 1
'IHNC TO CHEF PASS WALLS

II.--CONTROL
ANCHORED WALL DESIGN
FACTOR OF SAFETY FOR ACTIVE PRESSURES = 1.00
FACTOR OF SAFETY FOR PASSIVE PRESSURES = 1.00

III.--WALL DATA
ELEVATION AT TOP OF WALL = 4.00 FT.
ELEVATION AT ANCHOR = 1.00 FT.

IV.--SURFACE POINT DATA

IV.A.--RIGHTSIDE

DIST. FROM WALL (FT)	ELEVATION (FT)
0.00	4.00
200.00	4.00

IV.B.--LEFTSIDE

DIST. FROM WALL (FT)	ELEVATION (FT)
0.00	-6.00
16.00	-6.20
100.00	-7.00
200.00	-7.80

V.--SOIL LAYER DATA

V.A.--RIGHTSIDE
LEVEL 2 FACTOR OF SAFETY FOR ACTIVE PRESSURE = DEFAULT
LEVEL 2 FACTOR OF SAFETY FOR PASSIVE PRESSURE = DEFAULT

SAT. WGHT. (PCF)	MOIST WGHT. (PCF)	ANGLE OF INTERNAL FRICTION (DEG)	COH-ESION (PSF)	ANGLE OF WALL FRICTION (DEG)	ADH-ESION (PSF)	<--BOTTOM--> ELEV. (FT)	SLOPE (FT/FT)	<-SAFETY-> <-FACTOR-> ACT.	PASS.
85.00	85.00	0.00	50.00	0.00	0.00	-6.00	0.00	DEF	DEF
99.00	99.00	0.00	160.00	0.00	0.00	-20.00	0.00	DEF	DEF
102.00	102.00	0.00	220.00	0.00	0.00	-28.00	0.00	DEF	DEF
102.00	102.00	0.00	300.00	0.00	0.00	-35.00	0.00	DEF	DEF
100.00	100.00	0.00	475.00	0.00	0.00	-48.00	0.00	DEF	DEF
108.00	108.00	0.00	700.00	0.00	0.00	-60.00	0.00	DEF	DEF
120.00	120.00	30.00	0.00	0.00	0.00			DEF	DEF

V.B.--LEFTSIDE
LEVEL 2 FACTOR OF SAFETY FOR ACTIVE PRESSURE = DEFAULT
LEVEL 2 FACTOR OF SAFETY FOR PASSIVE PRESSURE = DEFAULT

SAT. WGHT. (PCF)	MOIST WGHT. (PCF)	ANGLE OF INTERNAL FRICTION (DEG)	COH-ESION (PSF)	ANGLE OF WALL FRICTION (DEG)	ADH-ESION (PSF)	<--BOTTOM--> ELEV. (FT)	SLOPE (FT/FT)	<-SAFETY-> <-FACTOR-> ACT.	PASS.

99.00	99.00	0.00	160.00	0.00	0.00	-20.00	0.00	DEF	DEF
102.00	102.00	0.00	220.00	0.00	0.00	-28.00	0.00	DEF	DEF
102.00	102.00	0.00	300.00	0.00	0.00	-35.00	0.00	DEF	DEF
100.00	100.00	0.00	475.00	0.00	0.00	-48.00	0.00	DEF	DEF
108.00	108.00	0.00	700.00	0.00	0.00	-60.00	0.00	DEF	DEF
120.00	120.00	30.00	0.00	0.00	0.00			DEF	DEF

VI.--WATER DATA
UNIT WEIGHT = 62.40 (PCF)
RIGHTSIDE ELEVATION = -2.00 (FT)
LEFTSIDE ELEVATION = -2.00 (FT)
NO SEEPAGE

VII.--VERTICAL SURCHARGE LOADS
NONE

VIII.--HORIZONTAL LOADS
NONE

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS
DATE: 10-JUNE-2010 TIME: 11:22:12

****
* SOIL PRESSURES FOR *
* ANCHORED WALL DESIGN *
****

I.--HEADING
'MRGO WALLS 1
'IHNC TO CHEF PASS WALLS

II.--SOIL PRESSURES

RIGHTSIDE SOIL PRESSURES DETERMINED BY FIXED SURFACE WEDGE METHOD.

LEFTSIDE SOIL PRESSURES DETERMINED BY FIXED SURFACE WEDGE METHOD.

				<------NET------>		
	NET	<---LEFTSIDE--->		(SOIL + WATER)	<--RIGHTSIDE--->	
ELEV.	WATER	PASSIVE	ACTIVE	ACTIVE	ACTIVE	PASSIVE
(FT)	(PSF)	(PSF)	(PSF)	(PSF)	(PSF)	(PSF)
4.0	0.0	0.0	0.0	0.0	0.0	100.0
3.0	0.0	0.0	0.0	0.0	0.0	185.0
2.8+	0.0	0.0	0.0	0.0	0.0	270.0
2.8-	0.0	0.0	0.0	0.0	0.0	200.0
2.0	0.0	0.0	0.0	70.0	70.0	270.0
1.0	0.0	0.0	0.0	155.0	155.0	355.0
0.0	0.0	0.0	0.0	240.2	240.2	440.2
-1.0	0.0	0.0	0.0	325.0	325.0	525.0
-2.0	0.0	0.0	0.0	393.9	393.9	593.9
-3.0	0.0	0.0	0.0	432.6	432.6	632.6
-4.0	0.0	0.0	0.0	458.8	458.8	652.0
-5.0	0.0	0.0	0.0	457.2	457.2	698.4

-6.0+	0.0	0.0	0.0	394.0	394.0	814.0
-6.0-	0.0	320.0	0.0	74.0	394.0	814.0
-6.8	0.0	346.9	0.0	0.0	346.9	916.2
-7.0	0.0	352.2	0.0	-14.6	337.6	936.4
-8.0	0.0	388.3	0.0	-38.2	350.1	997.0
-9.0	0.0	424.5	0.0	-34.3	390.2	1030.2
-10.0	0.0	460.6	0.0	-33.8	426.8	1066.8
-11.0	0.0	496.8	0.0	-33.4	463.4	1103.4
-12.0	0.0	532.9	0.0	-32.9	500.0	1140.0
-13.0	0.0	569.1	0.0	-32.5	536.6	1176.6
-14.0	0.0	605.2	0.0	-32.0	573.2	1213.2
-14.7+	0.0	641.4	0.0	-36.3	600.4	1240.4
-14.7-	0.0	632.1	0.0	-36.3	600.4	1240.4
-15.0	0.0	641.4	9.3	-31.6	609.8	1249.8
-16.0	0.0	677.5	45.4	-31.1	646.4	1286.4
-17.0	0.0	713.7	81.6	-30.7	683.0	1323.0
-18.0	0.0	747.9	119.6	-26.5	721.5	1357.7
-19.0	0.0	797.2	142.6	-52.3	745.0	1407.5
-20.0	0.0	882.9	130.8	-149.3	733.6	1493.6
-21.0	0.0	970.1	120.4	-246.4	723.7	1581.2
-22.0	0.0	1022.7	146.1	-272.5	750.1	1633.9
-23.0	0.0	1060.5	186.8	-268.9	791.6	1671.6
-24.0	0.0	1099.9	225.9	-268.7	831.2	1711.2
-25.0	0.0	1139.1	265.1	-268.3	870.8	1750.8
-26.0	0.0	1175.8	306.9	-262.9	912.9	1787.9
-27.0	0.0	1232.6	328.6	-297.6	935.0	1845.0
-28.0	0.0	1336.9	302.9	-427.3	909.6	1949.6
-29.0	0.0	1441.1	277.2	-556.9	884.2	2054.2
-30.0	0.0	1497.9	298.9	-591.6	906.3	2111.3
-31.0	0.0	1534.6	340.7	-586.2	948.4	2148.4
-32.0	0.0	1573.9	379.9	-585.9	988.0	2188.0
-33.0	0.0	1607.7	424.6	-574.6	1033.1	2222.1
-34.0	0.0	1685.2	425.6	-650.8	1034.4	2300.0
-35.0	0.0	1866.1	322.2	-934.8	931.3	2481.3
-36.0	0.0	2046.1	217.7	-1218.9	827.2	2661.6
-37.0	0.0	2121.6	216.7	-1295.1	826.5	2737.5

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS

DATE: 10-JUNE-2010 TIME: 11:22:13

****
* SUMMARY OF RESULTS FOR *
* ANCHORED WALL DESIGN *
****

I.--HEADING
'MRGO WALLS 1
'IHNC TO CHEF PASS WALLS

II.--SUMMARY

RIGHTSIDE SOIL PRESSURES DETERMINED BY FIXED SURFACE WEDGE METHOD.

1-LWL-Fixed-Anchor at 1.out
LEFTSIDE SOIL PRESSURES DETERMINED BY FIXED SURFACE WEDGE METHOD.

METHOD	:	FREE EARTH	FIXED EARTH
WALL BOTTOM ELEVATION (FT)	:	-20.69	-25.26
PENETRATION (FT)	:	14.69	19.26
MAXIMUM BENDING MOMENT (LB-FT)	:	-6.3708E+03	-5.7981E+03
AT ELEVATION (FT)	:	-4.64	-4.41
MAXIMUM SCALED DEFLECTION (LB-IN^3)	:	3.7880E+08	2.8597E+08
AT ELEVATION (FT)	:	-8.00	-7.00
ANCHOR FORCE (LB)	:	2.1329E+03	2.0292E+03

NOTE: DIVIDE SCALED DEFLECTION MODULUS OF
ELLASTICITY IN PSI TIMES PILE MOMENT
OF INERTIA IN IN^4 TO OBTAIN DEFLECTION
IN INCHES.

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHOREDOR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS
DATE: 10-JUNE-2010 TIME: 11:22:13

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*****************************
* COMPLETE OF RESULTS FOR   *
*   ANCHORED WALL DESIGN    *
*   BY FREE EARTH METHOD    *
*****************************
```

I.--HEADING
'MRGO WALLS 1
'IHNC TO CHEF PASS WALLS

II.--RESULTS (ANCHOR FORCE= 2133. (LB))

ELEVATION (FT)	BENDING MOMENT (LB-FT)	SHEAR (LB)	SCALED DEFLECTION (LB-IN^3)	NET PRESSURE (PSF)
4.00	0.0000E+00	0.	-2.1790E+08	0.00
3.00	0.0000E+00	0.	-1.4527E+08	0.00
2.82	1.6711E-09	0.	-1.3246E+08	0.00
2.00	7.9123E+00	29.	-7.2648E+07	70.00
1.00+	8.5903E+01	141.	0.0000E+00	155.00
1.00-	8.5903E+01	-1992.	0.0000E+00	155.00
0.00	-1.8139E+03	-1794.	7.2205E+07	240.24
-1.00	-3.4736E+03	-1511.	1.4131E+08	325.00
-2.00	-4.8109E+03	-1152.	2.0446E+08	393.91
-3.00	-5.7593E+03	-739.	2.5935E+08	432.60
-4.00	-6.2772E+03	-293.	3.0435E+08	458.83
-5.00	-6.3410E+03	165.	3.3857E+08	457.18
-6.00+	-5.9578E+03	591.	3.6190E+08	394.01
-6.00-	-5.9578E+03	591.	3.6190E+08	74.01
-6.84	-5.4470E+03	622.	3.7348E+08	0.00
-7.00	-5.3448E+03	620.	3.7497E+08	-14.57
-8.00	-4.7356E+03	594.	3.7880E+08	-38.24
-9.00	-4.1600E+03	558.	3.7444E+08	-34.29
-10.00	-3.6193E+03	524.	3.6289E+08	-33.84
-11.00	-3.1125E+03	490.	3.4508E+08	-33.39

1-LWL-Fixed-Anchor at 1.out

-12.00	-2.6390E+03	457.	3.2188E+08	-32.94
-13.00	-2.1985E+03	424.	2.9412E+08	-32.49
-14.00	-1.7904E+03	392.	2.6256E+08	-32.03
-14.74	-1.5084E+03	367.	2.3706E+08	-36.34
-15.00	-1.4154E+03	358.	2.2790E+08	-31.58
-16.00	-1.0733E+03	326.	1.9079E+08	-31.13
-17.00	-7.6230E+02	296.	1.5181E+08	-30.68
-18.00	-4.8138E+02	267.	1.1152E+08	-26.48
-19.00	-2.3194E+02	228.	7.0394E+07	-52.28
-20.00	-4.6640E+01	127.	2.8856E+07	-149.31
-20.69	0.0000E+00	0.	0.0000E+00	-216.60

NOTE: DIVIDE SCALED DEFLECTION MODULUS OF ELLASTICITY IN PSI TIMES PILE MOMENT OF INERTIA IN IN^4 TO OBTAIN DEFLECTION IN INCHES.

III.--WATER AND SOIL PRESSURES

		<----------SOIL PRESSURES---------->			
	WATER	<----LEFTSIDE----->		<---RIGHTSIDE---->	
ELEVATION (FT)	PRESSURE (PSF)	PASSIVE (PSF)	ACTIVE (PSF)	ACTIVE (PSF)	PASSIVE (PSF)
4.00	0.	0.	0.	0.	100.
3.00	0.	0.	0.	0.	185.
2.82+	0.	0.	0.	0.	270.
2.82-	0.	0.	0.	0.	200.
2.00	0.	0.	0.	70.	270.
1.00	0.	0.	0.	155.	355.
0.00	0.	0.	0.	240.	440.
-1.00	0.	0.	0.	325.	525.
-2.00	0.	0.	0.	394.	594.
-3.00	0.	0.	0.	433.	633.
-4.00	0.	0.	0.	459.	652.
-5.00	0.	0.	0.	457.	698.
-6.00+	0.	0.	0.	394.	814.
-6.00-	0.	320.	0.	394.	814.
-6.84	0.	347.	0.	347.	916.
-7.00	0.	352.	0.	338.	936.
-8.00	0.	388.	0.	350.	997.
-9.00	0.	424.	0.	390.	1030.
-10.00	0.	461.	0.	427.	1067.
-11.00	0.	497.	0.	463.	1103.
-12.00	0.	533.	0.	500.	1140.
-13.00	0.	569.	0.	537.	1177.
-14.00	0.	605.	0.	573.	1213.
-14.74+	0.	641.	0.	600.	1240.
-14.74-	0.	632.	0.	600.	1240.
-15.00	0.	641.	9.	610.	1250.
-16.00	0.	678.	45.	646.	1286.
-17.00	0.	714.	82.	683.	1323.
-18.00	0.	748.	120.	721.	1358.
-19.00	0.	797.	143.	745.	1407.
-20.00	0.	883.	131.	734.	1494.
-21.00	0.	970.	120.	724.	1581.

1-LWL-Fixed-Anchor at 1.out

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*****************************
* COMPLETE OF RESULTS FOR   *
*    ANCHORED WALL DESIGN   *
*    BY FIXED EARTH METHOD  *
*****************************
```

I.--HEADING
'MRGO WALLS 1
'IHNC TO CHEF PASS WALLS

II.--RESULTS (ANCHOR FORCE= 2029. (LB))

ELEVATION (FT)	BENDING MOMENT (LB-FT)	SHEAR (LB)	SCALED DEFLECTION (LB-IN^3)	NET PRESSURE (PSF)
4.00	0.0000E+00	0.	-1.7879E+08	0.00
3.00	-4.3656E-11	0.	-1.1920E+08	0.00
2.82	1.1948E-10	0.	-1.0869E+08	0.00
2.00	7.9123E+00	29.	-5.9613E+07	70.00
1.00+	8.5903E+01	141.	0.0000E+00	155.00
1.00-	8.5903E+01	-1888.	0.0000E+00	155.00
0.00	-1.7103E+03	-1690.	5.9200E+07	240.24
-1.00	-3.2663E+03	-1408.	1.1548E+08	325.00
-2.00	-4.5000E+03	-1048.	1.6616E+08	393.91
-3.00	-5.3448E+03	-635.	2.0912E+08	432.60
-4.00	-5.7591E+03	-189.	2.4291E+08	458.83
-5.00	-5.7192E+03	269.	2.6681E+08	457.18
-6.00+	-5.2324E+03	694.	2.8089E+08	394.01
-6.00-	-5.2324E+03	694.	2.8089E+08	74.01
-6.84	-4.6350E+03	725.	2.8570E+08	0.00
-7.00	-4.5158E+03	724.	2.8597E+08	-14.57
-8.00	-3.8029E+03	698.	2.8324E+08	-38.24
-9.00	-3.1237E+03	661.	2.7394E+08	-34.29
-10.00	-2.4794E+03	627.	2.5923E+08	-33.84
-11.00	-1.8689E+03	594.	2.4023E+08	-33.39
-12.00	-1.2918E+03	561.	2.1800E+08	-32.94
-13.00	-7.4765E+02	528.	1.9353E+08	-32.49
-14.00	-2.3598E+02	496.	1.6776E+08	-32.03
-14.74	1.2308E+02	470.	1.4830E+08	-36.34
-15.00	2.4269E+02	461.	1.4159E+08	-31.58
-16.00	6.8842E+02	430.	1.1582E+08	-31.13
-17.00	1.1030E+03	399.	9.1244E+07	-30.68
-18.00	1.4876E+03	371.	6.8568E+07	-26.48
-19.00	1.8407E+03	331.	4.8457E+07	-52.28
-20.00	2.1296E+03	230.	3.1519E+07	-149.31
-21.00	2.2692E+03	33.	1.8240E+07	-246.41
-22.00	2.1742E+03	-227.	8.8467E+06	-272.55
-23.00	1.8116E+03	-498.	3.1719E+06	-268.85
-24.00	1.1796E+03	-766.	5.8889E+05	-268.66
-25.00	2.7901E+02	-1035.	5.5551E+03	-268.29
-26.00	0.0000E+00	-1105.	0.0000E+00	-266.90

NOTE: DIVIDE SCALED DEFLECTION MODULUS OF
ELLASTICITY IN PSI TIMES PILE MOMENT
OF INERTIA IN IN^4 TO OBTAIN DEFLECTION
IN INCHES.

III.--WATER AND SOIL PRESSURES

		<----------SOIL PRESSURES---------->			
	WATER	<----LEFTSIDE----->		<---RIGHTSIDE---->	
ELEVATION	PRESSURE	PASSIVE	ACTIVE	ACTIVE	PASSIVE

(FT)	(PSF)	(PSF)	(PSF)	(PSF)	(PSF)
4.00	0.	0.	0.	0.	100.
3.00	0.	0.	0.	0.	185.
2.82+	0.	0.	0.	0.	270.
2.82-	0.	0.	0.	0.	200.
2.00	0.	0.	0.	70.	270.
1.00	0.	0.	0.	155.	355.
0.00	0.	0.	0.	240.	440.
-1.00	0.	0.	0.	325.	525.
-2.00	0.	0.	0.	394.	594.
-3.00	0.	0.	0.	433.	633.
-4.00	0.	0.	0.	459.	652.
-5.00	0.	0.	0.	457.	698.
-6.00+	0.	0.	0.	394.	814.
-6.00-	0.	320.	0.	394.	814.
-6.84	0.	347.	0.	347.	916.
-7.00	0.	352.	0.	338.	936.
-8.00	0.	388.	0.	350.	997.
-9.00	0.	424.	0.	390.	1030.
-10.00	0.	461.	0.	427.	1067.
-11.00	0.	497.	0.	463.	1103.
-12.00	0.	533.	0.	500.	1140.
-13.00	0.	569.	0.	537.	1177.
-14.00	0.	605.	0.	573.	1213.
-14.74+	0.	641.	0.	600.	1240.
-14.74-	0.	632.	0.	600.	1240.
-15.00	0.	641.	9.	610.	1250.
-16.00	0.	678.	45.	646.	1286.
-17.00	0.	714.	82.	683.	1323.
-18.00	0.	748.	120.	721.	1358.
-19.00	0.	797.	143.	745.	1407.
-20.00	0.	883.	131.	734.	1494.
-21.00	0.	970.	120.	724.	1581.
-22.00	0.	1023.	146.	750.	1634.
-23.00	0.	1060.	187.	792.	1672.
-24.00	0.	1100.	226.	831.	1711.
-25.00	0.	1139.	265.	871.	1751.
-26.00	0.	1176.	307.	913.	1788.

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS

DATE: 10-JUNE-2010 TIME: 11:22:16

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*********************************
* PRELIMINARY DESIGN DATA FOR *
*  FREE EARTH DESIGN IN CLAY  *
*********************************

 I.--HEADING
 'MRGO WALLS 1
 'IHNC TO CHEF PASS WALLS

II.--DESIGN PARAMETERS
    WALL HEIGHT RATIO (ALPHA)  = 0.40
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1-LWL-Fixed-Anchor at 1.out

ANCHOR HEIGHT RATIO (BETA) = 0.12
STABILITY NUMBER = 0.27

SHEET PILE DATA:

SHEET PILE NAME	<SECTION PROPERTIES> (PER FOOT OF WALL) SECTION MODULUS (IN^3)	MOMENT OF INERTIA (IN^4)	ALLOWABLE STRESS (PSI)	MODULUS OF ELLASTICITY (PSI)
PZ40	60.70	490.80	24000.00	2.90E+07
PZ38	46.80	280.80	24000.00	2.90E+07
PZ35	48.50	361.20	24000.00	2.90E+07
PZ32	38.30	220.40	24000.00	2.90E+07
PZ27	30.20	184.20	24000.00	2.90E+07
PZ22	18.10	84.40	24000.00	2.90E+07
PLZ25	32.80	223.25	24000.00	2.90E+07
PLZ23	30.20	203.75	24000.00	2.90E+07

III.--PRELIMINARY DESIGN DATA

SHEET PILE NAME	LOG(H^4/EI)	ROWE'S MOMENT REDUCTION COEF.	RATIO OF ALLOWABLE MOMENT TO FREE EARTH MOMENT
PZ40	-4.58	1.0 (***)	19.06
PZ38	-4.34	1.0 (***)	14.69
PZ35	-4.45	1.0 (***)	15.23
PZ32	-4.24	1.0 (***)	12.02
PZ27	-4.16	1.0 (***)	9.48
PZ22	-3.82	1.0 (***)	5.68
PLZ25	-4.24	1.0 (***)	10.30
PLZ23	-4.20	1.0 (***)	9.48

*** REDUCTION NOT APPLICABLE DUE TO ALPHA LESS THAN 0.6.

*** REDUCTION NOT APPLICABLE DUE TO STABILITY NUMBER LESS THAN 0.5.

ANNEX 9

PILE CAPACITY CALCULATIONS

APPENDIX ED-F-6

PILE CAPACITY CALCULATIONS

** PILE CAPACITY COMPUTATIONS Ver. 1.04.2, 12 MAY 94 **

MRGO - Ecosystem Restoration Project
Violet Diversion Structure Foundations
Mississippi River Location
Pile Capacity (Q-case)
Based on one boring (R-85.5-LU)

****
REG.POLYGON OR CIRCULAR 14x14 Concrete
****

PILE DIM.: 56.0 IN. BLOCK PERIMETER, 1.36 SQ.FT.TIP AREA
TOP SURFACE ELEV.: 3.0 FT.
WATER TABLE IS AT ELEV.: .0 FT.
VERTICAL STRESS LIMITED AT ELEV.: -36.0 FT.

**** Q-CASE ****
---

* STRATUM NUMBER	SOIL/SOIL FRIC.ANG DEG.	WEIGHT DENSITY LB/CU FT	TOP STRA COHESION LB/SQ FT	BOT STRA COHESION LB/SQ FT	COEF LAT EAR.PRES (KC)
1	15.00	117.00	200.00	200.00	1.00
2	15.00	54.60	200.00	200.00	1.00
3	.00	49.60	450.00	450.00	1.00
4	.00	33.60	450.00	450.00	1.00
5	15.00	54.60	200.00	200.00	1.00
6	.00	47.60	650.00	650.00	1.00
7	.00	47.60	720.00	720.00	1.00
8	30.00	59.60	.00	.00	1.25

* STRATUM NUMBER	COEF LAT EAR.PRES (KT)	TERZAGHI BEAR.CAP. (NC)	TERZAGHI BEAR.CAP. (NQ)	BOTTOM ELEVATION FEET	SOIL/PILE FRIC.ANG. DEG.	SOIL TYPE
1	.50	12.90	4.40	.00		ML
2	.50	12.90	4.40	-7.00		ML
3	1.00	9.00	1.00	-12.00		CH
4	1.00	9.00	1.00	-22.00		CH
5	.50	12.90	4.40	-36.00		ML
6	1.00	9.00	1.00	-42.00		CL
7	1.00	9.00	1.00	-58.00		CH
8	.70	.00	22.50	-80.00		SM

STRAT NUM	EL.TIP (FT)	COH/ADH. RESISTAN TONS	FRICTION COMPRESS TONS	RESISTAN TENSION TONS	END BEARING TONS	PILE CAPAC IN COMPRS. TONS	PILE CAPAC IN TENSION TONS
1	1.500	.700	.068	.034	.000	.768	.734
1	.000	1.400	.271	.136	.000	1.671	1.536
2	.000			.000	1.671	1.536	
2	-3.500	3.033	1.076	.538	.000	4.110	3.572
2	-7.000	4.667	2.226	1.113	.000	6.893	5.780
3	-7.000			.000	6.893	5.780	
3	-9.500	7.292	2.226	1.113	.000	9.518	8.405
3	-12.000	9.917	2.226	1.113	.000	12.143	11.030
4	-12.000			.000	12.143	11.030	
4	-17.000	15.167	2.226	1.113	.000	17.393	16.280
4	-22.000	20.417	2.226	1.113	.000	22.643	21.530
5	-22.000			.000	22.643	21.530	
5	-29.000	23.683	7.665	3.833	.000	31.348	27.516
5	-36.000	26.950	14.482	7.241	.000	41.432	34.191
6	-36.000			.000	41.432	34.191	
6	-39.000	30.975	14.482	7.241	.000	45.457	38.216
6	-42.000	35.000	14.482	7.241	.000	49.482	42.241
7	-42.000			.000	49.482	42.241	
7	-50.000	46.387	14.482	7.241	.000	60.869	53.628
7	-58.000	57.773	14.482	7.241	.000	72.256	65.015
8	-58.000			31.872	104.128	65.015	
8	-69.000	57.773	45.483	24.601	31.872	135.128	82.375
8	-80.000	57.773	76.483	41.962	31.872	166.128	99.735

*** STANDARD S-CASE ****

STRATUM NUMBER	SOIL/SOIL FRIC.ANG DEG.	WEIGHT DENSITY LB/CU FT	TOP STRA COHESION LB/SQ FT	BOT STRA COHESION LB/SQ FT	COEF LAT EAR.PRES (KC)
1	28.00	117.00	.00	.00	1.00
2	28.00	54.60	.00	.00	1.00
3	23.00	49.60	.00	.00	1.00
4	23.00	33.60	.00	.00	1.00
5	28.00	54.60	.00	.00	1.00
6	23.00	47.60	.00	.00	1.00
7	23.00	47.60	.00	.00	1.00
8	30.00	59.60	.00	.00	1.25

STRATUM NUMBER	COEF LAT EAR.PRES (KT)	TERZAGHI BEAR.CAP. (NC)	TERZAGHI BEAR.CAP. (NQ)	BOTTOM ELEVATION FEET	SOIL/PILE FRIC.ANG. DEG.	SOIL TYPE
1	.50	.00	17.50	.00		ML
2	.50	.00	17.50	-7.00		ML

3	1.00	.00	10.00	-12.00	CH
4	1.00	.00	10.00	-22.00	CH
5	.50	.00	17.50	-36.00	ML
6	1.00	.00	10.00	-42.00	CL
7	1.00	.00	10.00	-58.00	CH
8	.70	.00	20.00	-80.00	SM

STRAT NUM	EL.TIP (FT)	COH/ADH. RESISTAN	FRICTION COMPRESS	RESISTAN TENSION	END BEARING	PILE CAPAC IN COMPRS.	PILE CAPAC IN TENSION
*		TONS	TONS	TONS	TONS	TONS	TONS
1	1.500	.000	.132	.066	.000	.132	.066
1	.000	.000	.528	.264	.000	.528	.264
2	.000			.000	.528	.264	
2	-3.500	.000	2.094	1.047	.000	2.094	1.047
2	-7.000	.000	4.330	2.165	.000	4.330	2.165
3	-7.000			.000	4.330	2.165	
3	-9.500	.000	5.935	3.770	.000	5.935	3.770
3	-12.000	.000	7.791	5.626	.000	7.791	5.626
4	-12.000			.000	7.791	5.626	
4	-17.000	.000	12.092	9.927	.000	12.092	9.927
4	-22.000	.000	17.071	14.906	.000	17.071	14.906
5	-22.000			.000	17.071	14.906	
5	-29.000	.000	27.650	20.196	.000	27.650	20.196
5	-36.000	.000	40.910	26.826	.000	40.910	26.826
6	-36.000			.000	40.910	26.826	
6	-39.000	.000	45.953	31.869	.000	45.953	31.869
6	-42.000	.000	50.996	36.911	.000	50.996	36.911
7	-42.000			.000	50.996	36.911	
7	-50.000	.000	64.444	50.359	.000	64.444	50.359
7	-58.000	.000	77.891	63.807	.000	77.891	63.807
8	-58.000			28.331	106.222	63.807	
8	-69.000	.000	108.892	81.167	28.331	137.222	81.167
8	-80.000	.000	139.892	98.527	28.331	168.223	98.527

* RUN COMPLETED * 1 TON = 2000 LBS.

** PILE CAPACITY COMPUTATIONS Ver. 1.04.2, 12 MAY 94 **

MRGO - Ecosystem Restoration Project
Violet Diversion Structure Foundations
40 Arpent Location
Pile Capacity (Q-case)
Based on one boring (1-AU-A)

****
REG.POLYGON OR CIRCULAR 14x14 Concrete
****

PILE DIM.: 56.0 IN. BLOCK PERIMETER, 1.36 SQ.FT.TIP AREA
TOP SURFACE ELEV.: 3.0 FT.
WATER TABLE IS AT ELEV.: .0 FT.
VERTICAL STRESS LIMITED AT ELEV.: -32.0 FT.

**** Q-CASE ****
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* STRATUM NUMBER	SOIL/SOIL FRIC.ANG DEG.	WEIGHT DENSITY LB/CU FT	TOP STRA COHESION LB/SQ FT	BOT STRA COHESION LB/SQ FT	COEF LAT EAR.PRES (KC)
1	.00	112.00	100.00	100.00	1.00
2	.00	49.60	187.00	187.00	1.00
3	.00	49.60	400.00	400.00	1.00
4	15.00	54.60	200.00	200.00	1.00
5	.00	49.60	940.00	940.00	1.00
6	.00	54.60	200.00	200.00	1.00
7	.00	49.60	1200.00	1200.00	1.00

* STRATUM NUMBER	COEF LAT EAR.PRES (KT)	TERZAGHI BEAR.CAP. (NC)	TERZAGHI BEAR.CAP. (NQ)	BOTTOM ELEVATION FEET	SOIL/PILE FRIC.ANG. DEG.	SOIL TYPE
1	1.00	9.00	1.00	.00		CH
2	1.00	9.00	1.00	-9.00		CH
3	1.00	9.00	1.00	-17.00		CH
4	.50	12.90	4.40	-32.00		ML
5	1.00	9.00	1.00	-37.00		CH
6	.50	12.90	4.40	-42.00		ML
7	1.00	9.00	1.00	-90.00		CH

STRAT NUM	EL.TIP (FT)	COH/ADH. RESISTAN	FRICTION RESISTAN	END COMPRESS	PILE CAPAC BEARING	PILE CAPAC IN COMPRS.	PILE CAPAC IN TENSION

*	TONS	TONS	TONS	TONS	TONS	TONS
1	1.500	.350	.000	.000	.000	.350	.350
1	.000	.700	.000	.000	.000	.700	.700
2	.000			.000	.700	.700	
2	-4.500	2.664	.000	.000	.000	2.664	2.664
2	-9.000	4.627	.000	.000	.000	4.627	4.627
3	-9.000			.000	4.627	4.627	
3	-13.000	8.360	.000	.000	.000	8.360	8.360
3	-17.000	12.094	.000	.000	.000	12.094	12.094
4	-17.000			.000	12.094	12.094	
4	-24.500	15.594	5.347	2.674	.000	20.941	18.267
4	-32.000	19.094	12.276	6.138	.000	31.370	25.232
5	-32.000			.000	31.370	25.232	
5	-34.500	23.294	12.276	6.138	.000	35.570	29.432
5	-37.000	27.494	12.276	6.138	.000	39.770	33.632
6	-37.000			.000	39.770	33.632	
6	-39.500	28.660	12.276	6.138	.000	40.937	34.798
6	-42.000	29.827	12.276	6.138	.000	42.103	35.965
7	-42.000			8.709	50.812	35.965	
7	-66.000	71.827	12.276	6.138	8.709	92.812	77.965
7	-90.000	113.827	12.276	6.138	8.709	134.812	119.965

*** STANDARD S-CASE ****

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* STRATUM NUMBER	SOIL/SOIL FRIC.ANG DEG.	WEIGHT DENSITY LB/CU FT	TOP STRA COHESION LB/SQ FT	BOT STRA COHESION LB/SQ FT	COEF LAT EAR.PRES (KC)
1	23.00	112.00	.00	.00	1.00
2	23.00	49.60	.00	.00	1.00
3	23.00	49.60	.00	.00	1.00
4	28.00	54.60	.00	.00	1.00
5	23.00	49.60	.00	.00	1.00
6	28.00	54.60	.00	.00	1.00
7	23.00	49.60	.00	.00	1.00

* STRATUM NUMBER	COEF LAT EAR.PRES (KT)	TERZAGHI BEAR.CAP. (NC)	TERZAGHI BEAR.CAP. (NQ)	BOTTOM ELEVATION FEET	SOIL/PILE FRIC.ANG. DEG.	SOIL TYPE
1	1.00	.00	10.00	.00		CH
2	1.00	.00	10.00	-9.00		CH
3	1.00	.00	10.00	-17.00		CH
4	.50	.00	17.50	-32.00		ML
5	1.00	.00	10.00	-37.00		CH
6	.50	.00	17.50	-42.00		ML
7	1.00	.00	10.00	-90.00		CH

STRAT NUM	EL.TIP (FT)	COH/ADH. RESISTAN TONS	FRICTION COMPRESS TONS	RESISTAN TENSION TONS	END BEARING TONS	PILE CAPAC IN COMPRS. TONS	PILE CAPAC IN TENSION TONS
1	1.500	.000	.102	.102	.000	.102	.102
1	.000	.000	.407	.407	.000	.407	.407
2	.000			.000	.407	.407	
2	-4.500	.000	2.034	2.034	.000	2.034	2.034
2	-9.000	.000	4.471	4.471	.000	4.471	4.471
3	-9.000			.000	4.471	4.471	
3	-13.000	.000	7.319	7.319	.000	7.319	7.319
3	-17.000	.000	10.807	10.807	.000	10.807	10.807
4	-17.000			.000	10.807	10.807	
4	-24.500	.000	21.208	16.008	.000	21.208	16.008
4	-32.000	.000	34.685	22.746	.000	34.685	22.746
5	-32.000			.000	34.685	22.746	
5	-34.500	.000	38.719	26.780	.000	38.719	26.780
5	-37.000	.000	42.754	30.814	.000	42.754	30.814
6	-37.000			.000	42.754	30.814	
6	-39.500	.000	47.759	33.317	.000	47.759	33.317
6	-42.000	.000	52.764	35.820	.000	52.764	35.820
7	-42.000			13.598	66.362	35.820	
7	-66.000	.000	91.491	74.547	13.598	105.089	74.547
7	-90.000	.000	130.218	113.273	13.598	143.816	113.273

* RUN COMPLETED * 1 TON = 2000 LBS.

** PILE CAPACITY COMPUTATIONS Ver. 1.04.2, 12 MAY 94 **

MRGO - Ecosystem Restoration Project
Violet Diversion Structure Foundations
Mississippi River Gulf Outlet Location
Pile Capacity (Q-case)
Based on one boring (LPV-145-10TU)

****
REG.POLYGON OR CIRCULAR 14x14 Concrete
****

PILE DIM.: 56.0 IN. BLOCK PERIMETER, 1.36 SQ.FT.TIP AREA
TOP SURFACE ELEV.: 3.0 FT.
WATER TABLE IS AT ELEV.: .0 FT.
VERTICAL STRESS LIMITED AT ELEV.: -36.0 FT.

**** Q-CASE ****
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* STRATUM NUMBER	SOIL/SOIL FRIC.ANG DEG.	WEIGHT DENSITY LB/CU FT	TOP STRA COHESION LB/SQ FT	BOT STRA COHESION LB/SQ FT	COEF LAT EAR.PRES (KC)
1	.00	100.00	600.00	600.00	1.00
2	.00	37.60	600.00	600.00	1.00
3	15.00	54.60	200.00	200.00	1.00
4	.00	47.60	500.00	500.00	1.00
5	.00	55.60	700.00	700.00	1.00
6	.00	42.60	900.00	900.00	1.00
7	30.00	59.60	.00	.00	1.25
8	.00	52.60	1200.00	1200.00	1.00

* STRATUM NUMBER	COEF LAT EAR.PRES (KT)	TERZAGHI BEAR.CAP. (NC)	TERZAGHI BEAR.CAP. (NQ)	BOTTOM ELEVATION FEET	SOIL/PILE FRIC.ANG. DEG.	SOIL TYPE
1	1.00	9.00	1.00	.00		CH
2	1.00	9.00	1.00	-21.00		CH
3	.50	12.90	4.40	-25.00		ML
4	1.00	9.00	1.00	-36.00		CH
5	1.00	9.00	1.00	-46.00		CL
6	1.00	9.00	1.00	-55.00		CH
7	.70	.00	22.50	-81.00		SM
8	1.00	9.00	1.00	-90.00		CH

STRAT NUM	EL.TIP (FT)	COH/ADH. RESISTAN COMPRESS TONS	FRICTION RESISTAN TENSION TONS	END BEARING TONS	PILE CAPAC IN COMPRS. TONS	PILE CAPAC IN TENSION TONS
1	1.500	1.925	.000	.000	1.925	1.925
1	.000	3.850	.000	.000	3.850	3.850
2	.000			.000	3.850	3.850
2	-10.500	17.325	.000	.000	17.325	17.325
2	-21.000	30.800	.000	.000	30.800	30.800
3	-21.000			.000	30.800	30.800
3	-23.000	31.733	1.179	.589	.000	32.912	32.323
3	-25.000	32.667	2.470	1.235	.000	35.137	33.902
4	-25.000			.000	35.137	33.902
4	-30.500	39.083	2.470	1.235	.000	41.554	40.318
4	-36.000	45.500	2.470	1.235	.000	47.970	46.735
5	-36.000			.000	47.970	46.735
5	-41.000	52.500	2.470	1.235	.000	54.970	53.735
5	-46.000	59.500	2.470	1.235	.000	61.970	60.735
6	-46.000			.000	61.970	60.735
6	-50.500	66.850	2.470	1.235	.000	69.320	68.085
6	-55.000	74.200	2.470	1.235	.000	76.670	75.435
7	-55.000			28.044	104.714	75.435
7	-68.000	74.200	34.707	19.288	28.044	136.951	93.488
7	-81.000	74.200	66.944	37.340	28.044	169.188	111.540
8	-81.000			8.596	149.740	111.540
8	-85.500	82.075	66.944	37.340	8.596	157.615	119.415
8	-90.000	89.950	66.944	37.340	8.596	165.490	127.290

*** STANDARD S-CASE ****

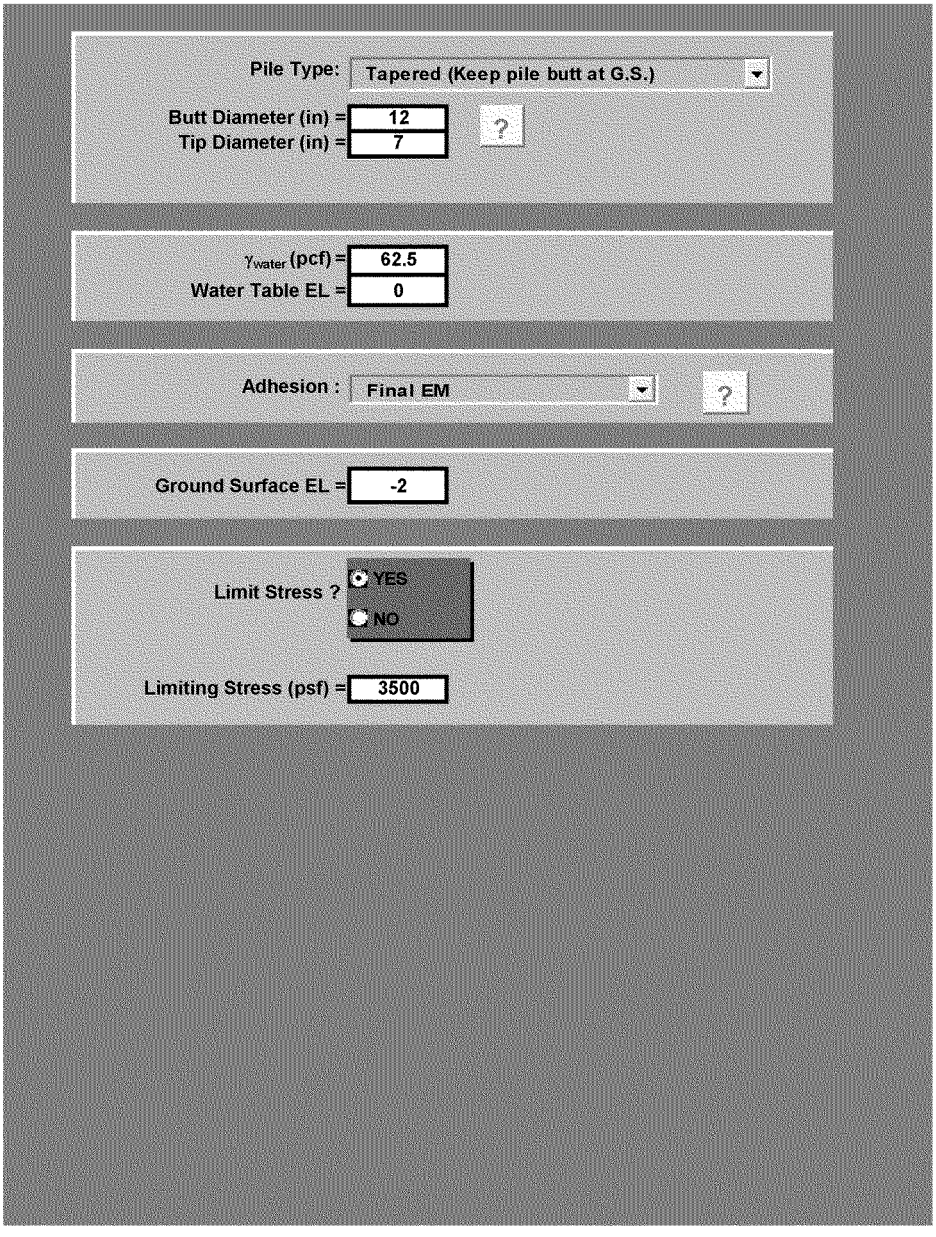
STRATUM NUMBER	SOIL/SOIL FRIC.ANG DEG.	WEIGHT DENSITY LB/CU FT	TOP STRA COHESION LB/SQ FT	BOT STRA COHESION LB/SQ FT	COEF LAT EAR.PRES (KC)
1	23.00	100.00	.00	.00	1.00
2	23.00	37.60	.00	.00	1.00
3	28.00	54.60	.00	.00	1.00
4	23.00	47.60	.00	.00	1.00
5	23.00	55.60	.00	.00	1.00
6	23.00	42.60	.00	.00	1.00
7	30.00	59.60	.00	.00	1.25
8	23.00	52.60	.00	.00	1.00

STRATUM NUMBER	COEF LAT EAR.PRES (KT)	TERZAGHI BEAR.CAP. (NC)	TERZAGHI BEAR.CAP. (NQ)	BOTTOM ELEVATION FEET	SOIL/PILE FRIC.ANG. DEG.	SOIL TYPE
1	1.00	.00	10.00	.00		CH
2	1.00	.00	10.00	-21.00		CH

3	.50	.00	17.50	-25.00	ML
4	1.00	.00	10.00	-36.00	CH
5	1.00	.00	10.00	-46.00	CL
6	1.00	.00	10.00	-55.00	CH
7	.70	.00	20.00	-81.00	SM
8	1.00	.00	10.00	-90.00	CH

STRAT	EL.TIP	COH/ADH.	FRICTION	RESISTAN	END	PILE CAPAC	PILE CAPAC
*NUM	(FT)	RESISTAN	COMPRESS	TENSION	BEARING	IN COMPRS.	IN TENSION
*		TONS	TONS	TONS	TONS	TONS	TONS
1	1.500	.000	.091	.091	.000	.091	.091
1	.000	.000	.363	.363	.000	.363	.363
2	.000			.000	.363	.363	
2	-10.500	.000	4.581	4.581	.000	4.581	4.581
2	-21.000	.000	12.146	12.146	.000	12.146	12.146
3	-21.000			.000	12.146	12.146	
3	-23.000	.000	14.439	13.292	.000	14.439	13.292
3	-25.000	.000	16.951	14.548	.000	16.951	14.548
4	-25.000			.000	16.951	14.548	
4	-30.500	.000	23.341	20.939	.000	23.341	20.939
4	-36.000	.000	30.895	28.493	.000	30.895	28.493
5	-36.000			.000	30.895	28.493	
5	-41.000	.000	38.290	35.888	.000	38.290	35.888
5	-46.000	.000	45.686	43.283	.000	45.686	43.283
6	-46.000			.000	45.686	43.283	
6	-50.500	.000	52.342	49.939	.000	52.342	49.939
6	-55.000	.000	58.998	56.595	.000	58.998	56.595
7	-55.000			24.928	83.926	56.595	
7	-68.000	.000	91.234	74.648	24.928	116.162	74.648
7	-81.000	.000	123.471	92.700	24.928	148.399	92.700
8	-81.000			12.464	135.935	92.700	
8	-85.500	.000	130.127	99.356	12.464	142.591	99.356
8	-90.000	.000	136.783	106.012	12.464	149.247	106.012

* RUN COMPLETED * 1 TON = 2000 LBS.


Pile Type:
Tapered (Keep pile butt at G.S.)
Butt Diameter (in) =
12
Tip Diameter (in) =
7
?
γwater (pcf) =
62.5
Water Table EL =
0
Adhesion :
Final EM
?
Ground Surface EL =
-2
Limit Stress ?
YES
NO
Limiting Stress (psf) =
3500

Q-CASE STRATIFICATION

DONE

Fill Kc, Kt, Nc, Nq

Fills Table with HSDRRSG values.

NOTES: A MAXIMUM OF TWENTY (20) STRATA CAN BE USED WITH THIS SPREADSHEET!

Clear Contents

Clears Table Contents.

Stratum Number	Bottom EL. (ft)	Total Unit Weight (pcf)	Submerged Unit Weight (pcf)	Cohesion Top (psf)	Cohesion Bottom (psf)	ϕ (degrees)	δ (degrees)	Kc	Kt	Nc	Nq	End Bearing?	Soil Type	Maximum Unit Friction* (psf)	Maximum Unit End Bearing* (psf)
1	-20	99	36.5	160	160	0	0	1	1	9	1		CH		
2	-28	102	39.5	220	220	0	0	1	1	9	1		CH		
3	-35	102	39.5	300	300	0	0	1	1	9	1		CH		
4	-48	100	37.5	300	650	0	0	1	1	9	1		CH		
5	-60	108	45.5	700	700	0	0	1	1	9	1		CH		
6	-90	120	57.5	0	0	30	0	1.25	0.7	0	22.5		SP		
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															

S-CASE STRATIFICATION

DONE

Fill Kc, Kt, Nc, Nq

Fills Table with HSDRRSG values.

NOTES: A MAXIMUM OF TWENTY (20) STRATA CAN BE USED WITH THIS SPREADSHEET!

Clear Contents

Clears Table Contents.

Stratum Number	Bottom EL. (ft)	Total Unit Weight (pcf)	Submerged Unit Weight (pcf)	Cohesion Top (psf)	Cohesion Bottom (psf)	ϕ (degrees)	δ (degrees)	Kc	Kt	Nc	Nq	End Bearing?	Soil Type	Maximum Unit Friction* (psf)	Maximum Unit End Bearing* (psf)
1	-20	99	36.5	0	0	23	15	1	0.7	0	10		CH		
2	-28	102	39.5	0	0	23	15	1	0.7	0	10		CH		
3	-35	102	39.5	0	0	23	15	1	0.7	0	10		CH		
4	-48	100	37.5	0	0	23	15	1	0.7	0	10		CH		
5	-60	108	45.5	0	0	23	15	1	0.7	0	10		CH		
6	-90	120	57.5	0	0	30	15	1	0.7	0	10		SP		
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															

			Q-CASE						S-CASE					
Stratum	Tip	Increment	Coh./Adh Resistance	Friction Compression	Friction Tension	End Bearing	Pile Capacity Compression	Pile Capacity Tension	Coh./Adh Resistance	Friction Compression	Friction Tension	End Bearing	Pile Capacity Compression	Pile Capacity Tension
1	-2	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1	-3	1	0.080	0.000	0.000	0.000	0.080	0.080	0.000	0.003	0.002	0.000	0.003	0.002
1	-4	1	0.160	0.000	0.000	0.000	0.160	0.160	0.000	0.013	0.009	0.000	0.013	0.009
1	-5	1	0.240	0.000	0.000	0.000	0.240	0.240	0.000	0.028	0.020	0.000	0.028	0.020
1	-6	1	0.320	0.000	0.000	0.000	0.320	0.320	0.000	0.051	0.035	0.000	0.051	0.035
1	-7	1	0.400	0.000	0.000	0.000	0.400	0.400	0.000	0.079	0.055	0.000	0.079	0.055
1	-8	1	0.480	0.000	0.000	0.000	0.480	0.480	0.000	0.114	0.080	0.000	0.114	0.080
1	-9	1	0.560	0.000	0.000	0.000	0.560	0.560	0.000	0.155	0.108	0.000	0.155	0.108
1	-10	1	0.640	0.000	0.000	0.000	0.640	0.640	0.000	0.202	0.142	0.000	0.202	0.142
1	-11	1	0.720	0.000	0.000	0.000	0.720	0.720	0.000	0.256	0.179	0.000	0.256	0.179
1	-12	1	0.800	0.000	0.000	0.000	0.800	0.800	0.000	0.316	0.221	0.000	0.316	0.221
1	-13	1	0.880	0.000	0.000	0.000	0.880	0.880	0.000	0.382	0.268	0.000	0.382	0.268
1	-14	1	0.960	0.000	0.000	0.000	0.960	0.960	0.000	0.455	0.318	0.000	0.455	0.318
1	-15	1	1.040	0.000	0.000	0.000	1.040	1.040	0.000	0.534	0.374	0.000	0.534	0.374
1	-16	1	1.120	0.000	0.000	0.000	1.120	1.120	0.000	0.619	0.433	0.000	0.619	0.433
1	-17	1	1.200	0.000	0.000	0.000	1.200	1.200	0.000	0.711	0.498	0.000	0.711	0.498
1	-18	1	1.280	0.000	0.000	0.000	1.280	1.280	0.000	0.809	0.566	0.000	0.809	0.566
1	-19	1	1.360	0.000	0.000	0.000	1.360	1.360	0.000	0.913	0.639	0.000	0.913	0.639
1	-20	1	1.440	0.000	0.000	0.000	1.440	1.440	0.000	1.024	0.717	0.000	1.024	0.717
2	-21	1	1.550	0.000	0.000	0.000	1.550	1.550	0.000	1.141	0.799	0.000	1.141	0.799
2	-22	1	1.660	0.000	0.000	0.000	1.660	1.660	0.000	1.265	0.885	0.000	1.265	0.885
2	-23	1	1.770	0.000	0.000	0.000	1.770	1.770	0.000	1.396	0.977	0.000	1.396	0.977
2	-24	1	1.880	0.000	0.000	0.000	1.880	1.880	0.000	1.533	1.073	0.000	1.533	1.073
2	-25	1	1.990	0.000	0.000	0.000	1.990	1.990	0.000	1.678	1.174	0.000	1.678	1.174
2	-26	1	2.100	0.000	0.000	0.000	2.100	2.100	0.000	1.829	1.280	0.000	1.829	1.280
2	-27	1	2.210	0.000	0.000	0.000	2.210	2.210	0.000	1.987	1.391	0.000	1.987	1.391
2	-28	1	2.320	0.000	0.000	0.000	2.320	2.320	0.000	2.152	1.507	0.000	2.152	1.507
3	-29	1	2.470	0.000	0.000	0.000	2.470	2.470	0.000	2.324	1.627	0.000	2.324	1.627
3	-30	1	2.620	0.000	0.000	0.000	2.620	2.620	0.000	2.503	1.752	0.000	2.503	1.752
3	-31	1	2.770	0.000	0.000	0.000	2.770	2.770	0.000	2.688	1.882	0.000	2.688	1.882
3	-32	1	2.920	0.000	0.000	0.000	2.920	2.920	0.000	2.881	2.016	0.000	2.881	2.016
3	-33	1	3.070	0.000	0.000	0.000	3.070	3.070	0.000	3.080	2.156	0.000	3.080	2.156
3	-34	1	3.220	0.000	0.000	0.000	3.220	3.220	0.000	3.286	2.300	0.000	3.286	2.300
3	-35	1	3.370	0.000	0.000	0.000	3.370	3.370	0.000	3.499	2.449	0.000	3.499	2.449
4	-36	1	3.527	0.000	0.000	0.000	3.527	3.527	0.000	3.718	2.603	0.000	3.718	2.603
4	-37	1	3.697	0.000	0.000	0.000	3.697	3.697	0.000	3.944	2.761	0.000	3.944	2.761
4	-38	1	3.881	0.000	0.000	0.000	3.881	3.881	0.000	4.177	2.924	0.000	4.177	2.924
4	-39	1	4.078	0.000	0.000	0.000	4.078	4.078	0.000	4.416	3.091	0.000	4.416	3.091
4	-40	1	4.288	0.000	0.000	0.000	4.288	4.288	0.000	4.661	3.263	0.000	4.661	3.263
4	-41	1	4.512	0.000	0.000	0.000	4.512	4.512	0.000	4.913	3.439	0.000	4.913	3.439
4	-42	1	4.750	0.000	0.000	0.000	4.750	4.750	0.000	5.172	3.620	0.000	5.172	3.620
4	-43	1	5.000	0.000	0.000	0.000	5.000	5.000	0.000	5.437	3.806	0.000	5.437	3.806
4	-44	1	5.263	0.000	0.000	0.000	5.263	5.263	0.000	5.708	3.996	0.000	5.708	3.996
4	-45	1	5.537	0.000	0.000	0.000	5.537	5.537	0.000	5.986	4.190	0.000	5.986	4.190
4	-46	1	5.822	0.000	0.000	0.000	5.822	5.822	0.000	6.271	4.390	0.000	6.271	4.390
4	-47	1	6.118	0.000	0.000	0.000	6.118	6.118	0.000	6.562	4.593	0.000	6.562	4.593
4	-48	1	6.426	0.000	0.000	0.000	6.426	6.426	0.000	6.859	4.801	0.000	6.859	4.801

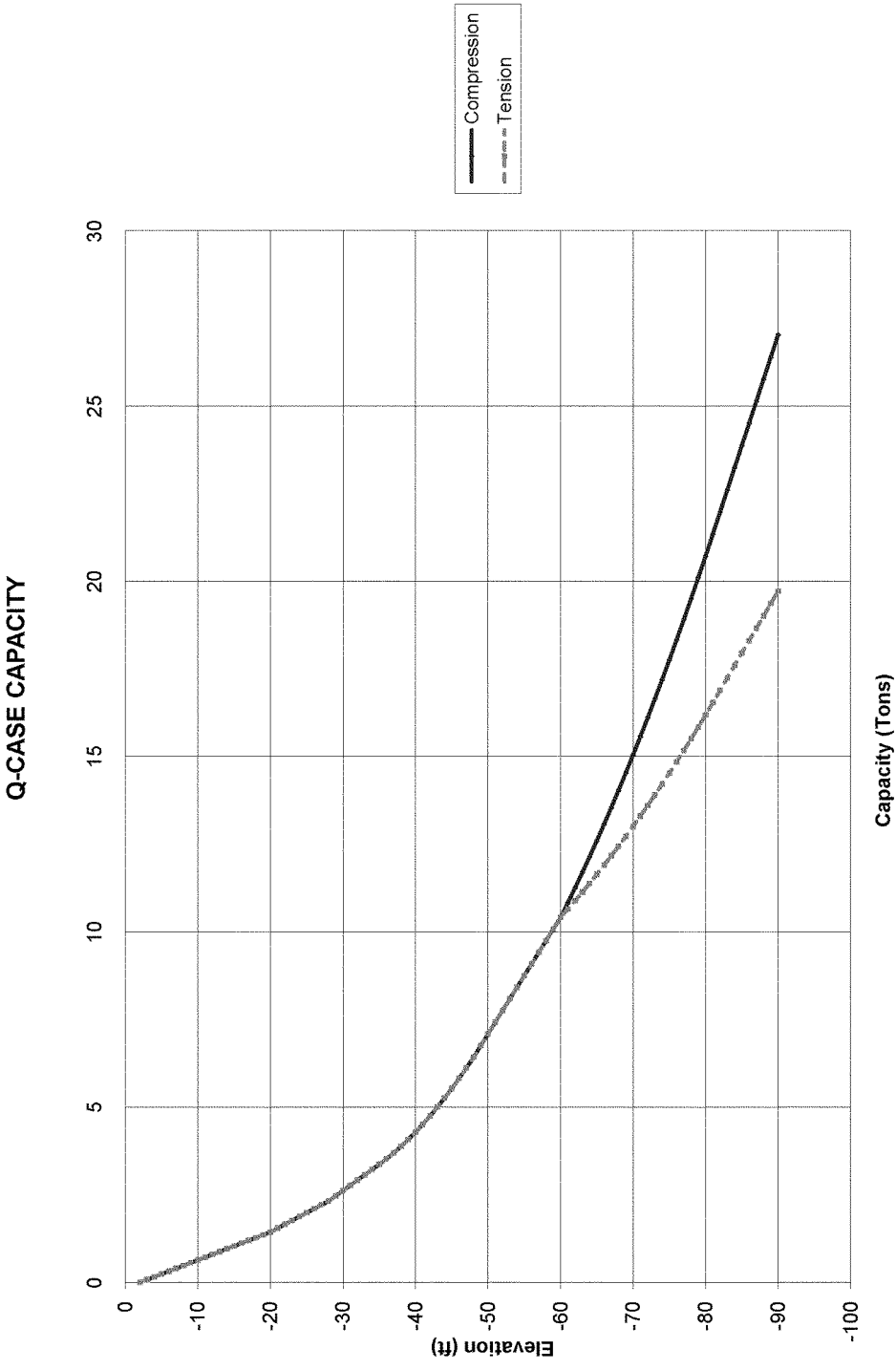
			Q-CASE						S-CASE					
Stratum	Tip	Increment	Coh./Adh Resistance	Friction Compression	Friction Tension	End Bearing	Pile Capacity Compression	Pile Capacity Tension	Coh./Adh Resistance	Friction Compression	Friction Tension	End Bearing	Pile Capacity Compression	Pile Capacity Tension
5	-49	1	6.758	0.000	0.000	0.000	6.758	6.758	0.000	7.164	5.015	0.000	7.164	5.015
5	-50	1	7.091	0.000	0.000	0.000	7.091	7.091	0.000	7.476	5.233	0.000	7.476	5.233
5	-51	1	7.423	0.000	0.000	0.000	7.423	7.423	0.000	7.797	5.458	0.000	7.797	5.458
5	-52	1	7.756	0.000	0.000	0.000	7.756	7.756	0.000	8.125	5.687	0.000	8.125	5.687
5	-53	1	8.088	0.000	0.000	0.000	8.088	8.088	0.000	8.461	5.923	0.000	8.461	5.923
5	-54	1	8.421	0.000	0.000	0.000	8.421	8.421	0.000	8.805	6.164	0.000	8.805	6.164
5	-55	1	8.753	0.000	0.000	0.000	8.753	8.753	0.000	9.157	6.410	0.000	9.157	6.410
5	-56	1	9.086	0.000	0.000	0.000	9.086	9.086	0.000	9.517	6.662	0.000	9.517	6.662
5	-57	1	9.418	0.000	0.000	0.000	9.418	9.418	0.000	9.884	6.919	0.000	9.884	6.919
5	-58	1	9.751	0.000	0.000	0.000	9.751	9.751	0.000	10.260	7.182	0.000	10.260	7.182
5	-59	1	10.083	0.000	0.000	0.000	10.083	10.083	0.000	10.643	7.450	0.000	10.643	7.450
5	-60	1	10.416	0.000	0.000	0.000	10.416	10.416	0.000	11.034	7.724	0.000	11.034	7.724
6	-61	1	10.416	0.417	0.234	0.000	10.833	10.649	0.000	11.523	8.066	0.000	11.523	8.066
6	-62	1	10.416	0.845	0.473	0.000	11.260	10.889	0.000	12.024	8.417	0.000	12.024	8.417
6	-63	1	10.416	1.282	0.718	0.000	11.698	11.134	0.000	12.537	8.776	0.000	12.537	8.776
6	-64	1	10.416	1.731	0.969	0.000	12.146	11.385	0.000	13.061	9.143	0.000	13.061	9.143
6	-65	1	10.416	2.189	1.226	0.000	12.605	11.642	0.000	13.599	9.519	0.000	13.599	9.519
6	-66	1	10.416	2.658	1.489	0.000	13.074	11.904	0.000	14.148	9.904	0.000	14.148	9.904
6	-67	1	10.416	3.137	1.757	0.000	13.553	12.173	0.000	14.709	10.297	0.000	14.709	10.297
6	-68	1	10.416	3.627	2.031	0.000	14.043	12.447	0.000	15.283	10.698	0.000	15.283	10.698
6	-69	1	10.416	4.127	2.311	0.000	14.543	12.727	0.000	15.869	11.108	0.000	15.869	11.108
6	-70	1	10.416	4.638	2.597	0.000	15.054	13.013	0.000	16.467	11.527	0.000	16.467	11.527
6	-71	1	10.416	5.159	2.889	0.000	15.574	13.305	0.000	17.077	11.954	0.000	17.077	11.954
6	-72	1	10.416	5.690	3.186	0.000	16.106	13.602	0.000	17.699	12.389	0.000	17.699	12.389
6	-73	1	10.416	6.231	3.490	0.000	16.647	13.905	0.000	18.333	12.833	0.000	18.333	12.833
6	-74	1	10.416	6.783	3.799	0.000	17.199	14.215	0.000	18.980	13.286	0.000	18.980	13.286
6	-75	1	10.416	7.346	4.114	0.000	17.762	14.529	0.000	19.638	13.747	0.000	19.638	13.747
6	-76	1	10.416	7.918	4.434	0.000	18.334	14.850	0.000	20.309	14.216	0.000	20.309	14.216
6	-77	1	10.416	8.501	4.761	0.000	18.917	15.177	0.000	20.992	14.694	0.000	20.992	14.694
6	-78	1	10.416	9.095	5.093	0.000	19.511	15.509	0.000	21.687	15.181	0.000	21.687	15.181
6	-79	1	10.416	9.699	5.431	0.000	20.115	15.847	0.000	22.394	15.676	0.000	22.394	15.676
6	-80	1	10.416	10.313	5.775	0.000	20.729	16.191	0.000	23.114	16.180	0.000	23.114	16.180
6	-81	1	10.416	10.937	6.125	0.000	21.353	16.541	0.000	23.845	16.692	0.000	23.845	16.692
6	-82	1	10.416	11.569	6.479	0.000	21.985	16.894	0.000	24.585	17.209	0.000	24.585	17.209
6	-83	1	10.416	12.200	6.832	0.000	22.616	17.248	0.000	25.325	17.727	0.000	25.325	17.727
6	-84	1	10.416	12.832	7.186	0.000	23.248	17.602	0.000	26.064	18.245	0.000	26.064	18.245
6	-85	1	10.416	13.463	7.540	0.000	23.879	17.955	0.000	26.804	18.763	0.000	26.804	18.763
6	-86	1	10.416	14.095	7.893	0.000	24.511	18.309	0.000	27.544	19.280	0.000	27.544	19.280
6	-87	1	10.416	14.726	8.247	0.000	25.142	18.663	0.000	28.283	19.798	0.000	28.283	19.798
6	-88	1	10.416	15.358	8.600	0.000	25.774	19.016	0.000	29.023	20.316	0.000	29.023	20.316
6	-89	1	10.416	15.989	8.954	0.000	26.405	19.370	0.000	29.762	20.834	0.000	29.762	20.834
6	-90	1	10.416	16.621	9.308	0.000	27.037	19.724	0.000	30.502	21.351	0.000	30.502	21.351

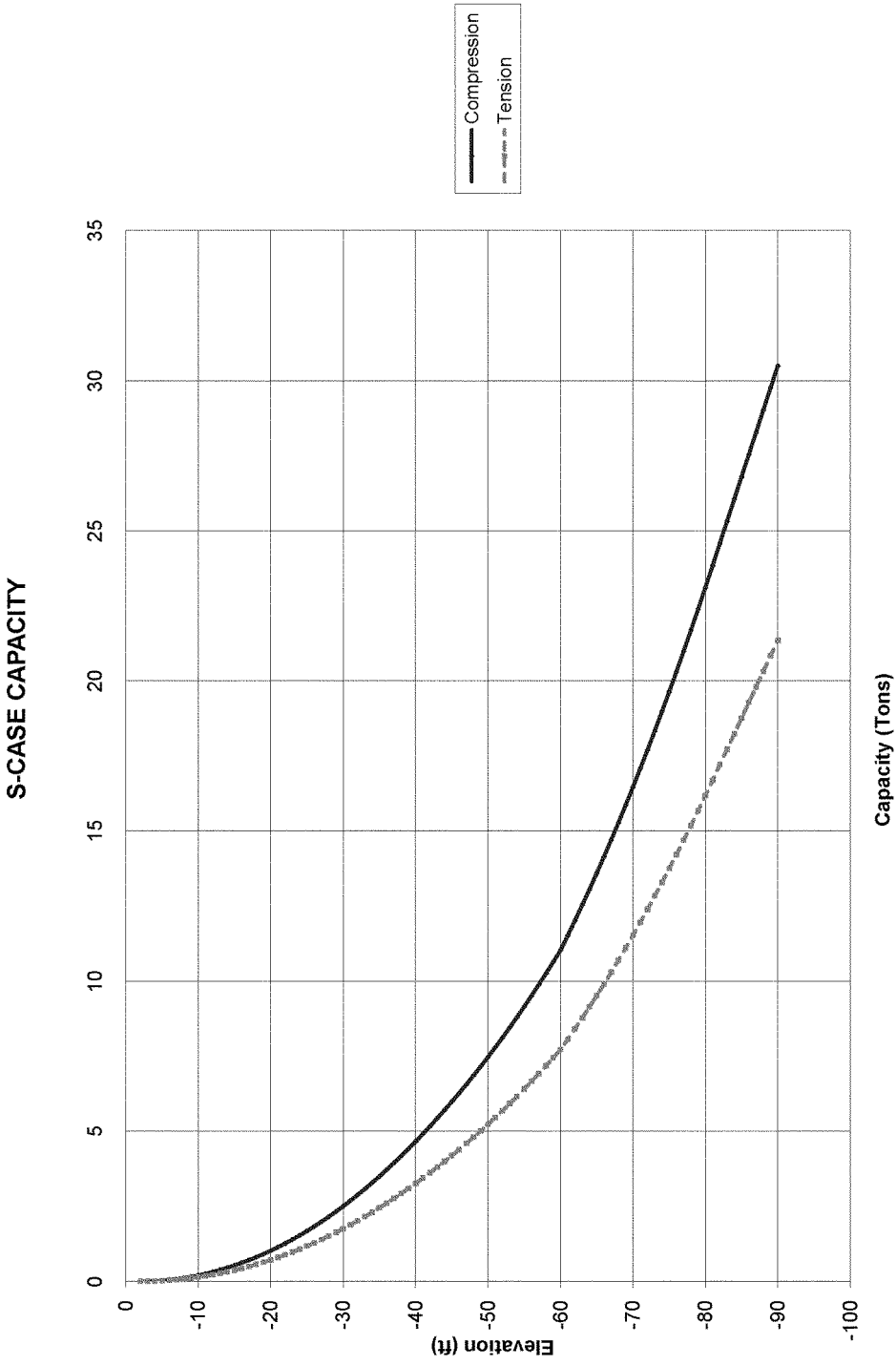
								Q-CASE															
Stratum	Tip	Increment	$\gamma_{(moist)}$	$\gamma_{(sub)}$	γh	Mid-layer γh (used)	Bottom γh (used)	Cohesion	Mid-Layer Adhesion	ϕ	δ	Kc	Kt	Nq	Nc	End Bearing	Coh./Adh Resistance	Friction Compression	Friction Tension	End Bearing	Pile Capacity Compression	Pile Capacity Tension
1	-2	0	99	36.5	0	0	0	160	160	0	0	1.00	1.00	1.00	9.00	No	0.000	0.000	0.000	0.000	0.000	0.000
1	-3	1	99	36.5	18.25	18.25	36.5	160	160	0	0	1.00	1.00	1.00	9.00	No	0.080	0.000	0.000	0.000	0.080	0.080
1	-4	1	99	36.5	54.75	54.75	73	160	160	0	0	1.00	1.00	1.00	9.00	No	0.160	0.000	0.000	0.000	0.160	0.160
1	-5	1	99	36.5	91.25	91.25	109.5	160	160	0	0	1.00	1.00	1.00	9.00	No	0.240	0.000	0.000	0.000	0.240	0.240
1	-6	1	99	36.5	127.75	127.75	146	160	160	0	0	1.00	1.00	1.00	9.00	No	0.320	0.000	0.000	0.000	0.320	0.320
1	-7	1	99	36.5	164.25	164.25	182.5	160	160	0	0	1.00	1.00	1.00	9.00	No	0.400	0.000	0.000	0.000	0.400	0.400
1	-8	1	99	36.5	200.75	200.75	219	160	160	0	0	1.00	1.00	1.00	9.00	No	0.480	0.000	0.000	0.000	0.480	0.480
1	-9	1	99	36.5	237.25	237.25	255.5	160	160	0	0	1.00	1.00	1.00	9.00	No	0.560	0.000	0.000	0.000	0.560	0.560
1	-10	1	99	36.5	273.75	273.75	292	160	160	0	0	1.00	1.00	1.00	9.00	No	0.640	0.000	0.000	0.000	0.640	0.640
1	-11	1	99	36.5	310.25	310.25	328.5	160	160	0	0	1.00	1.00	1.00	9.00	No	0.720	0.000	0.000	0.000	0.720	0.720
1	-12	1	99	36.5	346.75	346.75	365	160	160	0	0	1.00	1.00	1.00	9.00	No	0.800	0.000	0.000	0.000	0.800	0.800
1	-13	1	99	36.5	383.25	383.25	401.5	160	160	0	0	1.00	1.00	1.00	9.00	No	0.880	0.000	0.000	0.000	0.880	0.880
1	-14	1	99	36.5	419.75	419.75	438	160	160	0	0	1.00	1.00	1.00	9.00	No	0.960	0.000	0.000	0.000	0.960	0.960
1	-15	1	99	36.5	456.25	456.25	474.5	160	160	0	0	1.00	1.00	1.00	9.00	No	1.040	0.000	0.000	0.000	1.040	1.040
1	-16	1	99	36.5	492.75	492.75	511	160	160	0	0	1.00	1.00	1.00	9.00	No	1.120	0.000	0.000	0.000	1.120	1.120
1	-17	1	99	36.5	529.25	529.25	547.5	160	160	0	0	1.00	1.00	1.00	9.00	No	1.200	0.000	0.000	0.000	1.200	1.200
1	-18	1	99	36.5	565.75	565.75	584	160	160	0	0	1.00	1.00	1.00	9.00	No	1.280	0.000	0.000	0.000	1.280	1.280
1	-19	1	99	36.5	602.25	602.25	620.5	160	160	0	0	1.00	1.00	1.00	9.00	No	1.360	0.000	0.000	0.000	1.360	1.360
1	-20	1	99	36.5	638.75	638.75	657	160	160	0	0	1.00	1.00	1.00	9.00	No	1.440	0.000	0.000	0.000	1.440	1.440
2	-21	1	102	39.5	676.75	676.75	696.5	220	220	0	0	1.00	1.00	1.00	9.00	No	1.550	0.000	0.000	0.000	1.550	1.550
2	-22	1	102	39.5	716.25	716.25	736	220	220	0	0	1.00	1.00	1.00	9.00	No	1.660	0.000	0.000	0.000	1.660	1.660
2	-23	1	102	39.5	755.75	755.75	775.5	220	220	0	0	1.00	1.00	1.00	9.00	No	1.770	0.000	0.000	0.000	1.770	1.770
2	-24	1	102	39.5	795.25	795.25	815	220	220	0	0	1.00	1.00	1.00	9.00	No	1.880	0.000	0.000	0.000	1.880	1.880
2	-25	1	102	39.5	834.75	834.75	854.5	220	220	0	0	1.00	1.00	1.00	9.00	No	1.990	0.000	0.000	0.000	1.990	1.990
2	-26	1	102	39.5	874.25	874.25	894	220	220	0	0	1.00	1.00	1.00	9.00	No	2.100	0.000	0.000	0.000	2.100	2.100
2	-27	1	102	39.5	913.75	913.75	933.5	220	220	0	0	1.00	1.00	1.00	9.00	No	2.210	0.000	0.000	0.000	2.210	2.210
2	-28	1	102	39.5	953.25	953.25	973	220	220	0	0	1.00	1.00	1.00	9.00	No	2.320	0.000	0.000	0.000	2.320	2.320
3	-29	1	102	39.5	992.75	992.75	1012.5	300	300	0	0	1.00	1.00	1.00	9.00	No	2.470	0.000	0.000	0.000	2.470	2.470
3	-30	1	102	39.5	1032.25	1032.25	1052	300	300	0	0	1.00	1.00	1.00	9.00	No	2.620	0.000	0.000	0.000	2.620	2.620
3	-31	1	102	39.5	1071.75	1071.75	1091.5	300	300	0	0	1.00	1.00	1.00	9.00	No	2.770	0.000	0.000	0.000	2.770	2.770
3	-32	1	102	39.5	1111.25	1111.25	1131	300	300	0	0	1.00	1.00	1.00	9.00	No	2.920	0.000	0.000	0.000	2.920	2.920
3	-33	1	102	39.5	1150.75	1150.75	1170.5	300	300	0	0	1.00	1.00	1.00	9.00	No	3.070	0.000	0.000	0.000	3.070	3.070
3	-34	1	102	39.5	1190.25	1190.25	1210	300	300	0	0	1.00	1.00	1.00	9.00	No	3.220	0.000	0.000	0.000	3.220	3.220
3	-35	1	102	39.5	1229.75	1229.75	1249.5	300	300	0	0	1.00	1.00	1.00	9.00	No	3.370	0.000	0.000	0.000	3.370	3.370
4	-36	1	100	37.5	1268.25	1268.25	1287	326.92307	313.46155	0	0	1.00	1.00	1.00	9.00	No	3.527	0.000	0.000	0.000	3.527	3.527
4	-37	1	100	37.5	1305.75	1305.75	1324.5	353.84616	340.38461	0	0	1.00	1.00	1.00	9.00	No	3.697	0.000	0.000	0.000	3.697	3.697
4	-38	1	100	37.5	1343.25	1343.25	1362	380.76923	367.30768	0	0	1.00	1.00	1.00	9.00	No	3.881	0.000	0.000	0.000	3.881	3.881
4	-39	1	100	37.5	1380.75	1380.75	1399.5	407.69232	394.23077	0	0	1.00	1.00	1.00	9.00	No	4.078	0.000	0.000	0.000	4.078	4.078
4	-40	1	100	37.5	1418.25	1418.25	1437	434.61539	421.15387	0	0	1.00	1.00	1.00	9.00	No	4.288	0.000	0.000	0.000	4.288	4.288
4	-41	1	100	37.5	1455.75	1455.75	1474.5	461.53845	448.0769	0	0	1.00	1.00	1.00	9.00	No	4.512	0.000	0.000	0.000	4.512	4.512
4	-42	1	100	37.5	1493.25	1493.25	1512	488.46155	475	0	0	1.00	1.00	1.00	9.00	No	4.750	0.000	0.000	0.000	4.750	4.750
4	-43	1	100	37.5	1530.75	1530.75	1549.5	515.38464	499.94086	0	0	1.00	1.00	1.00	9.00	No	5.000	0.000	0.000	0.000	5.000	5.000
4	-44	1	100	37.5	1568.25	1568.25	1587	542.30768	521.12799	0	0	1.00	1.00	1.00	9.00	No	5.263	0.000	0.000	0.000	5.263	5.263
4	-45	1	100	37.5	1605.75	1605.75	1624.5	569.23077	540.18121	0	0	1.00	1.00	1.00	9.00	No	5.537	0.000	0.000	0.000	5.537	5.537
4	-46	1	100	37.5	1643.25	1643.25	1662	596.15387	558.50964	0	0	1.00	1.00	1.00	9.00	No	5.822	0.000	0.000	0.000	5.822	5.822
4	-47	1	100	37.5	1680.75	1680.75	1699.5	623.0769	576.11316	0	0	1.00	1.00	1.00	9.00	No	6.118	0.000	0.000	0.000	6.118	6.118
4	-48	1	100	37.5	1718.25	1718.25	1737	650	592.99182	0	0	1.00	1.00	1.00	9.00	No	6.426	0.000	0.000	0.000	6.426	6.426
5	-49	1	108	45.5	1759.75	1759.75	1782.5	700	630	0	0	1.00	1.00	1.00	9.00	No	6.758	0.000	0.000	0.000	6.758	6.758
5	-50	1	108	45.5	1805.25	1805.25	1828	700	630	0	0	1.00	1.00	1.00	9.00	No	7.091	0.000	0.000	0.000	7.091	7.091
5	-51	1	108	45.5	1850.75	1850.75	1873.5	700	630	0	0	1.00	1.00	1.00	9.00	No	7.423	0.000	0.000	0.000	7.423	7.423
5	-52	1	108	45.5	1896.25	1896.25	1919	700	630	0	0	1.00	1.00	1.00	9.00	No	7.756	0.000	0.000	0.000	7.756	7.756
5	-53	1	108	45.5	1941.75	1941.75	1964.5	700	630	0	0	1.00	1.00	1.00	9.00	No	8.088	0.000	0.000	0.000	8.088	8.088
5	-54	1	108	45.5	1987.25	1987.25	2010	700	630	0	0	1.00	1.00	1.00	9.00	No	8.421	0.000	0.000	0.000	8.421	8.421
5	-55	1	108	45.5	2032.75	2032.75	2055.5	700	630	0	0	1.00	1.00	1.00	9.00	No	8.753	0.000	0.000	0.000	8.753	8.753
5	-56	1	108	45.5	2078.25	2078.25	2101	700	630	0	0	1.00	1.00	1.00	9.00	No	9.086	0.000	0.000	0.000	9.086	9.086
5	-57	1	108	45.5	2123.75	2123.75	2146.5	700	630	0	0	1.00	1.00	1.00	9.00	No	9.418	0.000	0.000	0.000	9.418	9.418
5	-58	1	108	45.5	2169.25	2169.25	2192	700	630	0	0	1.00	1.00	1.00	9.00	No	9.751	0.000	0.000	0.000	9.751	9.751
5	-59	1	108	45.5	2214.75	2214.75	2237.5	700	630	0	0	1.00	1.00	1.00	9.00	No	10.083	0.000	0.000	0.000	10.083	10.083
5	-60	1	108	45.5	2260.25	2260.25	2283	700	630	0	0	1.00	1.00	1.00	9.00	No	10.416	0.000	0.000	0.000	10.416	10.416
6	-61	1	120	57.5	2311.75	2311.75	2340.5	0	0	30	0	1.25	0.70	22.50	0.00	No	10.416	0.417	0.234	0.000	10.833	10.649

								Q-CASE														
Stratum	Tip	Increment	$\gamma_{(moist)}$	$\gamma_{(sub)}$	γh	Mid-layer γh (used)	Bottom γh (used)	Cohesion	Mid-Layer Adhesion	ϕ	δ	Kc	Kt	Nq	Nc	End Bearing	Coh./Adh Resistance	Friction Compression	Friction Tension	End Bearing	Pile Capacity Compression	Pile Capacity Tension
6	-62	1	120	57.5	2369.25	2369.25	2398	0	0	30	0	1.25	0.70	22.50	0.00	No	10.416	0.845	0.473	0.000	11.260	10.889
6	-63	1	120	57.5	2426.75	2426.75	2455.5	0	0	30	0	1.25	0.70	22.50	0.00	No	10.416	1.282	0.718	0.000	11.698	11.134
6	-64	1	120	57.5	2484.25	2484.25	2513	0	0	30	0	1.25	0.70	22.50	0.00	No	10.416	1.731	0.969	0.000	12.146	11.385
6	-65	1	120	57.5	2541.75	2541.75	2570.5	0	0	30	0	1.25	0.70	22.50	0.00	No	10.416	2.189	1.226	0.000	12.605	11.642
6	-66	1	120	57.5	2599.25	2599.25	2628	0	0	30	0	1.25	0.70	22.50	0.00	No	10.416	2.658	1.489	0.000	13.074	11.904
6	-67	1	120	57.5	2656.75	2656.75	2685.5	0	0	30	0	1.25	0.70	22.50	0.00	No	10.416	3.137	1.757	0.000	13.553	12.173
6	-68	1	120	57.5	2714.25	2714.25	2743	0	0	30	0	1.25	0.70	22.50	0.00	No	10.416	3.627	2.031	0.000	14.043	12.447
6	-69	1	120	57.5	2771.75	2771.75	2800.5	0	0	30	0	1.25	0.70	22.50	0.00	No	10.416	4.127	2.311	0.000	14.543	12.727
6	-70	1	120	57.5	2829.25	2829.25	2858	0	0	30	0	1.25	0.70	22.50	0.00	No	10.416	4.638	2.597	0.000	15.054	13.013
6	-71	1	120	57.5	2886.75	2886.75	2915.5	0	0	30	0	1.25	0.70	22.50	0.00	No	10.416	5.159	2.889	0.000	15.574	13.305
6	-72	1	120	57.5	2944.25	2944.25	2973	0	0	30	0	1.25	0.70	22.50	0.00	No	10.416	5.690	3.186	0.000	16.106	13.602
6	-73	1	120	57.5	3001.75	3001.75	3030.5	0	0	30	0	1.25	0.70	22.50	0.00	No	10.416	6.231	3.490	0.000	16.647	13.905
6	-74	1	120	57.5	3059.25	3059.25	3088	0	0	30	0	1.25	0.70	22.50	0.00	No	10.416	6.783	3.799	0.000	17.199	14.215
6	-75	1	120	57.5	3116.75	3116.75	3145.5	0	0	30	0	1.25	0.70	22.50	0.00	No	10.416	7.346	4.114	0.000	17.762	14.529
6	-76	1	120	57.5	3174.25	3174.25	3203	0	0	30	0	1.25	0.70	22.50	0.00	No	10.416	7.918	4.434	0.000	18.334	14.850
6	-77	1	120	57.5	3231.75	3231.75	3260.5	0	0	30	0	1.25	0.70	22.50	0.00	No	10.416	8.501	4.761	0.000	18.917	15.177
6	-78	1	120	57.5	3289.25	3289.25	3318	0	0	30	0	1.25	0.70	22.50	0.00	No	10.416	9.095	5.093	0.000	19.511	15.509
6	-79	1	120	57.5	3346.75	3346.75	3375.5	0	0	30	0	1.25	0.70	22.50	0.00	No	10.416	9.699	5.431	0.000	20.115	15.847
6	-80	1	120	57.5	3404.25	3404.25	3433	0	0	30	0	1.25	0.70	22.50	0.00	No	10.416	10.313	5.775	0.000	20.729	16.191
6	-81	1	120	57.5	3461.75	3461.75	3490.5	0	0	30	0	1.25	0.70	22.50	0.00	No	10.416	10.937	6.125	0.000	21.353	16.541
6	-82	1	120	57.5	3519.25	3500	3500	0	0	30	0	1.25	0.70	22.50	0.00	No	10.416	11.569	6.479	0.000	21.985	16.894
6	-83	1	120	57.5	3576.75	3500	3500	0	0	30	0	1.25	0.70	22.50	0.00	No	10.416	12.200	6.832	0.000	22.616	17.248
6	-84	1	120	57.5	3634.25	3500	3500	0	0	30	0	1.25	0.70	22.50	0.00	No	10.416	12.832	7.186	0.000	23.248	17.602
6	-85	1	120	57.5	3691.75	3500	3500	0	0	30	0	1.25	0.70	22.50	0.00	No	10.416	13.463	7.540	0.000	23.879	17.955
6	-86	1	120	57.5	3749.25	3500	3500	0	0	30	0	1.25	0.70	22.50	0.00	No	10.416	14.095	7.893	0.000	24.511	18.309
6	-87	1	120	57.5	3806.75	3500	3500	0	0	30	0	1.25	0.70	22.50	0.00	No	10.416	14.726	8.247	0.000	25.142	18.663
6	-88	1	120	57.5	3864.25	3500	3500	0	0	30	0	1.25	0.70	22.50	0.00	No	10.416	15.358	8.600	0.000	25.774	19.016
6	-89	1	120	57.5	3921.75	3500	3500	0	0	30	0	1.25	0.70	22.50	0.00	No	10.416	15.989	8.954	0.000	26.405	19.370
6	-90	1	120	57.5	3979.25	3500	3500	0	0	30	0	1.25	0.70	22.50	0.00	No	10.416	16.621	9.308	0.000	27.037	19.724

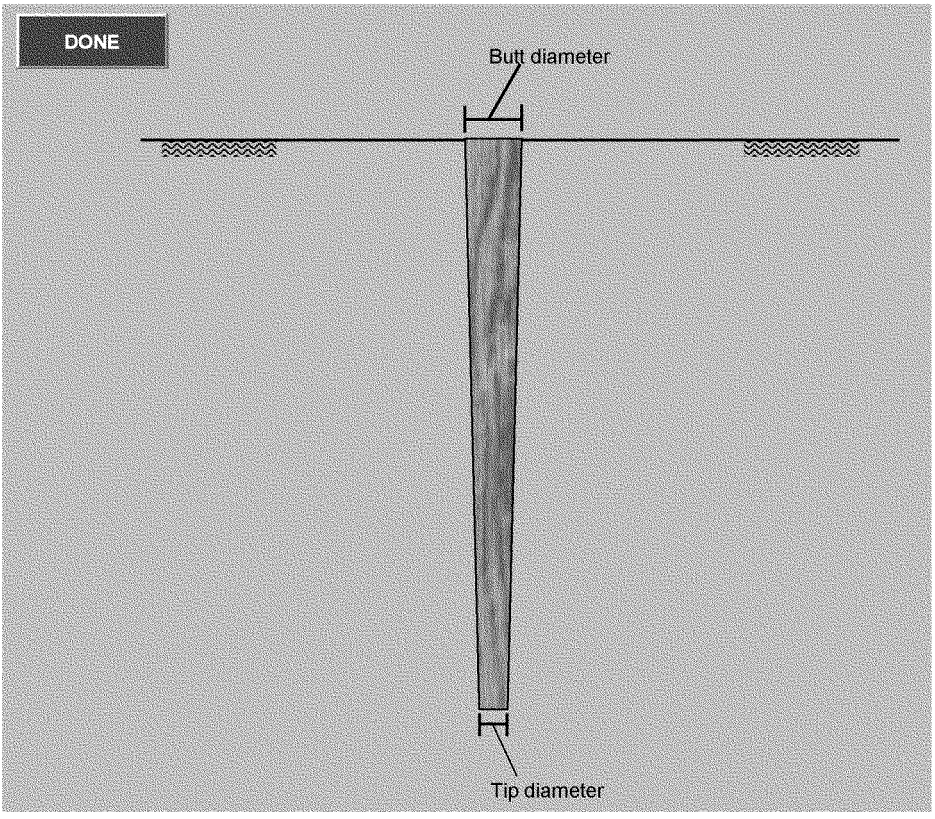
								S-CASE															
Stratum	Tip	Increment	γ (moist)	γ (sub)	γh	Mid-layer γh (used)	Bottom γh (used)	Cohesion	Mid-Layer Adhesion	ϕ	δ	Kc	Kt	Nq	Nc	End Bearing	Coh./Adh Resistance	Friction Compression	Friction Tension	End Bearing	Pile Capacity Compression	Pile Capacity Tension
1	-2	0	99	36.5	0	0	0	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.000	0.000	0.000	0.000	0.000
1	-3	1	99	36.5	18.25	18.25	36.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.003	0.002	0.000	0.003	0.002
1	-4	1	99	36.5	54.75	54.75	73	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.013	0.009	0.000	0.013	0.009
1	-5	1	99	36.5	91.25	91.25	109.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.028	0.020	0.000	0.028	0.020
1	-6	1	99	36.5	127.75	127.75	146	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.051	0.035	0.000	0.051	0.035
1	-7	1	99	36.5	164.25	164.25	182.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.079	0.055	0.000	0.079	0.055
1	-8	1	99	36.5	200.75	200.75	219	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.114	0.080	0.000	0.114	0.080
1	-9	1	99	36.5	237.25	237.25	255.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.155	0.108	0.000	0.155	0.108
1	-10	1	99	36.5	273.75	273.75	292	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.202	0.142	0.000	0.202	0.142
1	-11	1	99	36.5	310.25	310.25	328.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.256	0.179	0.000	0.256	0.179
1	-12	1	99	36.5	346.75	346.75	365	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.316	0.221	0.000	0.316	0.221
1	-13	1	99	36.5	383.25	383.25	401.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.382	0.268	0.000	0.382	0.268
1	-14	1	99	36.5	419.75	419.75	438	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.455	0.318	0.000	0.455	0.318
1	-15	1	99	36.5	456.25	456.25	474.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.534	0.374	0.000	0.534	0.374
1	-16	1	99	36.5	492.75	492.75	511	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.619	0.433	0.000	0.619	0.433
1	-17	1	99	36.5	529.25	529.25	547.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.711	0.498	0.000	0.711	0.498
1	-18	1	99	36.5	565.75	565.75	584	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.809	0.566	0.000	0.809	0.566
1	-19	1	99	36.5	602.25	602.25	620.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.913	0.639	0.000	0.913	0.639
1	-20	1	99	36.5	638.75	638.75	657	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	1.024	0.717	0.000	1.024	0.717
2	-21	1	102	39.5	676.75	676.75	696.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	1.141	0.799	0.000	1.141	0.799
2	-22	1	102	39.5	716.25	716.25	736	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	1.265	0.885	0.000	1.265	0.885
2	-23	1	102	39.5	755.75	755.75	775.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	1.396	0.977	0.000	1.396	0.977
2	-24	1	102	39.5	795.25	795.25	815	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	1.533	1.073	0.000	1.533	1.073
2	-25	1	102	39.5	834.75	834.75	854.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	1.678	1.174	0.000	1.678	1.174
2	-26	1	102	39.5	874.25	874.25	894	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	1.829	1.280	0.000	1.829	1.280
2	-27	1	102	39.5	913.75	913.75	933.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	1.987	1.391	0.000	1.987	1.391
2	-28	1	102	39.5	953.25	953.25	973	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	2.152	1.507	0.000	2.152	1.507
3	-29	1	102	39.5	992.75	992.75	1012.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	2.324	1.627	0.000	2.324	1.627
3	-30	1	102	39.5	1032.25	1032.25	1052	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	2.503	1.752	0.000	2.503	1.752
3	-31	1	102	39.5	1071.75	1071.75	1091.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	2.688	1.882	0.000	2.688	1.882
3	-32	1	102	39.5	1111.25	1111.25	1131	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	2.881	2.016	0.000	2.881	2.016
3	-33	1	102	39.5	1150.75	1150.75	1170.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	3.080	2.156	0.000	3.080	2.156
3	-34	1	102	39.5	1190.25	1190.25	1210	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	3.286	2.300	0.000	3.286	2.300
3	-35	1	102	39.5	1229.75	1229.75	1249.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	3.499	2.449	0.000	3.499	2.449
4	-36	1	100	37.5	1268.25	1268.25	1287	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	3.718	2.603	0.000	3.718	2.603
4	-37	1	100	37.5	1305.75	1305.75	1324.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	3.944	2.761	0.000	3.944	2.761
4	-38	1	100	37.5	1343.25	1343.25	1362	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	4.177	2.924	0.000	4.177	2.924
4	-39	1	100	37.5	1380.75	1380.75	1399.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	4.416	3.091	0.000	4.416	3.091
4	-40	1	100	37.5	1418.25	1418.25	1437	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	4.661	3.263	0.000	4.661	3.263
4	-41	1	100	37.5	1455.75	1455.75	1474.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	4.913	3.439	0.000	4.913	3.439
4	-42	1	100	37.5	1493.25	1493.25	1512	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	5.172	3.620	0.000	5.172	3.620
4	-43	1	100	37.5	1530.75	1530.75	1549.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	5.437	3.806	0.000	5.437	3.806
4	-44	1	100	37.5	1568.25	1568.25	1587	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	5.708	3.996	0.000	5.708	3.996
4	-45	1	100	37.5	1605.75	1605.75	1624.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	5.986	4.190	0.000	5.986	4.190
4	-46	1	100	37.5	1643.25	1643.25	1662	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	6.271	4.390	0.000	6.271	4.390
4	-47	1	100	37.5	1680.75	1680.75	1699.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	6.562	4.593	0.000	6.562	4.593
4	-48	1	100	37.5	1718.25	1718.25	1737	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	6.859	4.801	0.000	6.859	4.801
5	-49	1	108	45.5	1759.75	1759.75	1782.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	7.164	5.015	0.000	7.164	5.015
5	-50	1	108	45.5	1805.25	1805.25	1828	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	7.476	5.233	0.000	7.476	5.233
5	-51	1	108	45.5	1850.75	1850.75	1873.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	7.797	5.458	0.000	7.797	5.458
5	-52	1	108	45.5	1896.25	1896.25	1919	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	8.125	5.687	0.000	8.125	5.687
5	-53	1	108	45.5	1941.75	1941.75	1964.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	8.461	5.923	0.000	8.461	5.923
5	-54	1	108	45.5	1987.25	1987.25	2010	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	8.805	6.164	0.000	8.805	6.164
5	-55	1	108	45.5	2032.75	2032.75	2055.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	9.157	6.410	0.000	9.157	6.410
5	-56	1	108	45.5	2078.25	2078.25	2101	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	9.517	6.662	0.000	9.517	6.662
5	-57	1	108	45.5	2123.75	2123.75	2146.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	9.884	6.919	0.000	9.884	6.919
5	-58	1	108	45.5	2169.25	2169.25	2192	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	10.260	7.182	0.000	10.260	7.182
5	-59	1	108	45.5	2214.75	2214.75	2237.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	10.643	7.450	0.000	10.643	7.450
5	-60	1	108	45.5	2260.25	2260.25	2283	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	11.034	7.724	0.000	11.034	7.724
6	-61	1	120	57.5	2311.75	2311.75	2340.5	0	0	30	15	1.00	0.70	10.00	0.00	No	0.000	11.523	8.066	0.000	11.523	8.066

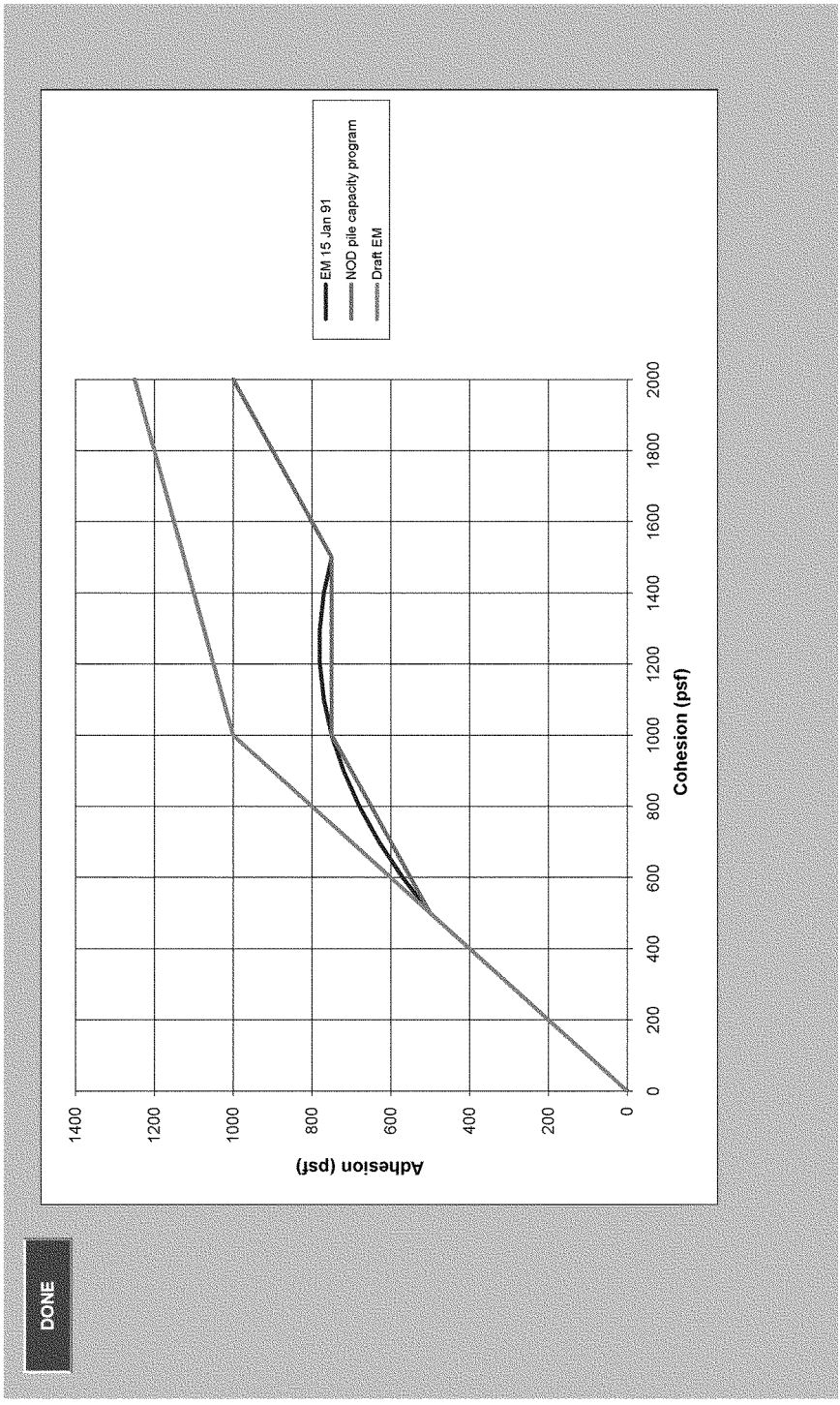
								S-CASE														
Stratum	Tip	Increment	$\gamma_{(moist)}$	$\gamma_{(sub)}$	γh	Mid-layer γh (used)	Bottom γh (used)	Cohesion	Mid-Layer Adhesion	ϕ	δ	Kc	Kt	Nq	Nc	End Bearing	Coh./Adh Resistance	Friction Compression	Friction Tension	End Bearing	Pile Capacity Compression	Pile Capacity Tension
6	-62	1	120	57.5	2369.25	2369.25	2398	0	0	30	15	1.00	0.70	10.00	0.00	No	0.000	12.024	8.417	0.000	12.024	8.417
6	-63	1	120	57.5	2426.75	2426.75	2455.5	0	0	30	15	1.00	0.70	10.00	0.00	No	0.000	12.537	8.776	0.000	12.537	8.776
6	-64	1	120	57.5	2484.25	2484.25	2513	0	0	30	15	1.00	0.70	10.00	0.00	No	0.000	13.061	9.143	0.000	13.061	9.143
6	-65	1	120	57.5	2541.75	2541.75	2570.5	0	0	30	15	1.00	0.70	10.00	0.00	No	0.000	13.599	9.519	0.000	13.599	9.519
6	-66	1	120	57.5	2599.25	2599.25	2628	0	0	30	15	1.00	0.70	10.00	0.00	No	0.000	14.148	9.904	0.000	14.148	9.904
6	-67	1	120	57.5	2656.75	2656.75	2685.5	0	0	30	15	1.00	0.70	10.00	0.00	No	0.000	14.709	10.297	0.000	14.709	10.297
6	-68	1	120	57.5	2714.25	2714.25	2743	0	0	30	15	1.00	0.70	10.00	0.00	No	0.000	15.283	10.698	0.000	15.283	10.698
6	-69	1	120	57.5	2771.75	2771.75	2800.5	0	0	30	15	1.00	0.70	10.00	0.00	No	0.000	15.869	11.108	0.000	15.869	11.108
6	-70	1	120	57.5	2829.25	2829.25	2858	0	0	30	15	1.00	0.70	10.00	0.00	No	0.000	16.467	11.527	0.000	16.467	11.527
6	-71	1	120	57.5	2886.75	2886.75	2915.5	0	0	30	15	1.00	0.70	10.00	0.00	No	0.000	17.077	11.954	0.000	17.077	11.954
6	-72	1	120	57.5	2944.25	2944.25	2973	0	0	30	15	1.00	0.70	10.00	0.00	No	0.000	17.699	12.389	0.000	17.699	12.389
6	-73	1	120	57.5	3001.75	3001.75	3030.5	0	0	30	15	1.00	0.70	10.00	0.00	No	0.000	18.333	12.833	0.000	18.333	12.833
6	-74	1	120	57.5	3059.25	3059.25	3088	0	0	30	15	1.00	0.70	10.00	0.00	No	0.000	18.980	13.286	0.000	18.980	13.286
6	-75	1	120	57.5	3116.75	3116.75	3145.5	0	0	30	15	1.00	0.70	10.00	0.00	No	0.000	19.638	13.747	0.000	19.638	13.747
6	-76	1	120	57.5	3174.25	3174.25	3203	0	0	30	15	1.00	0.70	10.00	0.00	No	0.000	20.309	14.216	0.000	20.309	14.216
6	-77	1	120	57.5	3231.75	3231.75	3260.5	0	0	30	15	1.00	0.70	10.00	0.00	No	0.000	20.992	14.694	0.000	20.992	14.694
6	-78	1	120	57.5	3289.25	3289.25	3318	0	0	30	15	1.00	0.70	10.00	0.00	No	0.000	21.687	15.181	0.000	21.687	15.181
6	-79	1	120	57.5	3346.75	3346.75	3375.5	0	0	30	15	1.00	0.70	10.00	0.00	No	0.000	22.394	15.676	0.000	22.394	15.676
6	-80	1	120	57.5	3404.25	3404.25	3433	0	0	30	15	1.00	0.70	10.00	0.00	No	0.000	23.114	16.180	0.000	23.114	16.180
6	-81	1	120	57.5	3461.75	3461.75	3490.5	0	0	30	15	1.00	0.70	10.00	0.00	No	0.000	23.845	16.692	0.000	23.845	16.692
6	-82	1	120	57.5	3519.25	3500	3500	0	0	30	15	1.00	0.70	10.00	0.00	No	0.000	24.585	17.209	0.000	24.585	17.209
6	-83	1	120	57.5	3576.75	3500	3500	0	0	30	15	1.00	0.70	10.00	0.00	No	0.000	25.325	17.727	0.000	25.325	17.727
6	-84	1	120	57.5	3634.25	3500	3500	0	0	30	15	1.00	0.70	10.00	0.00	No	0.000	26.064	18.245	0.000	26.064	18.245
6	-85	1	120	57.5	3691.75	3500	3500	0	0	30	15	1.00	0.70	10.00	0.00	No	0.000	26.804	18.763	0.000	26.804	18.763
6	-86	1	120	57.5	3749.25	3500	3500	0	0	30	15	1.00	0.70	10.00	0.00	No	0.000	27.544	19.280	0.000	27.544	19.280
6	-87	1	120	57.5	3806.75	3500	3500	0	0	30	15	1.00	0.70	10.00	0.00	No	0.000	28.283	19.798	0.000	28.283	19.798
6	-88	1	120	57.5	3864.25	3500	3500	0	0	30	15	1.00	0.70	10.00	0.00	No	0.000	29.023	20.316	0.000	29.023	20.316
6	-89	1	120	57.5	3921.75	3500	3500	0	0	30	15	1.00	0.70	10.00	0.00	No	0.000	29.762	20.834	0.000	29.762	20.834
6	-90	1	120	57.5	3979.25	3500	3500	0	0	30	15	1.00	0.70	10.00	0.00	No	0.000	30.502	21.351	0.000	30.502	21.351

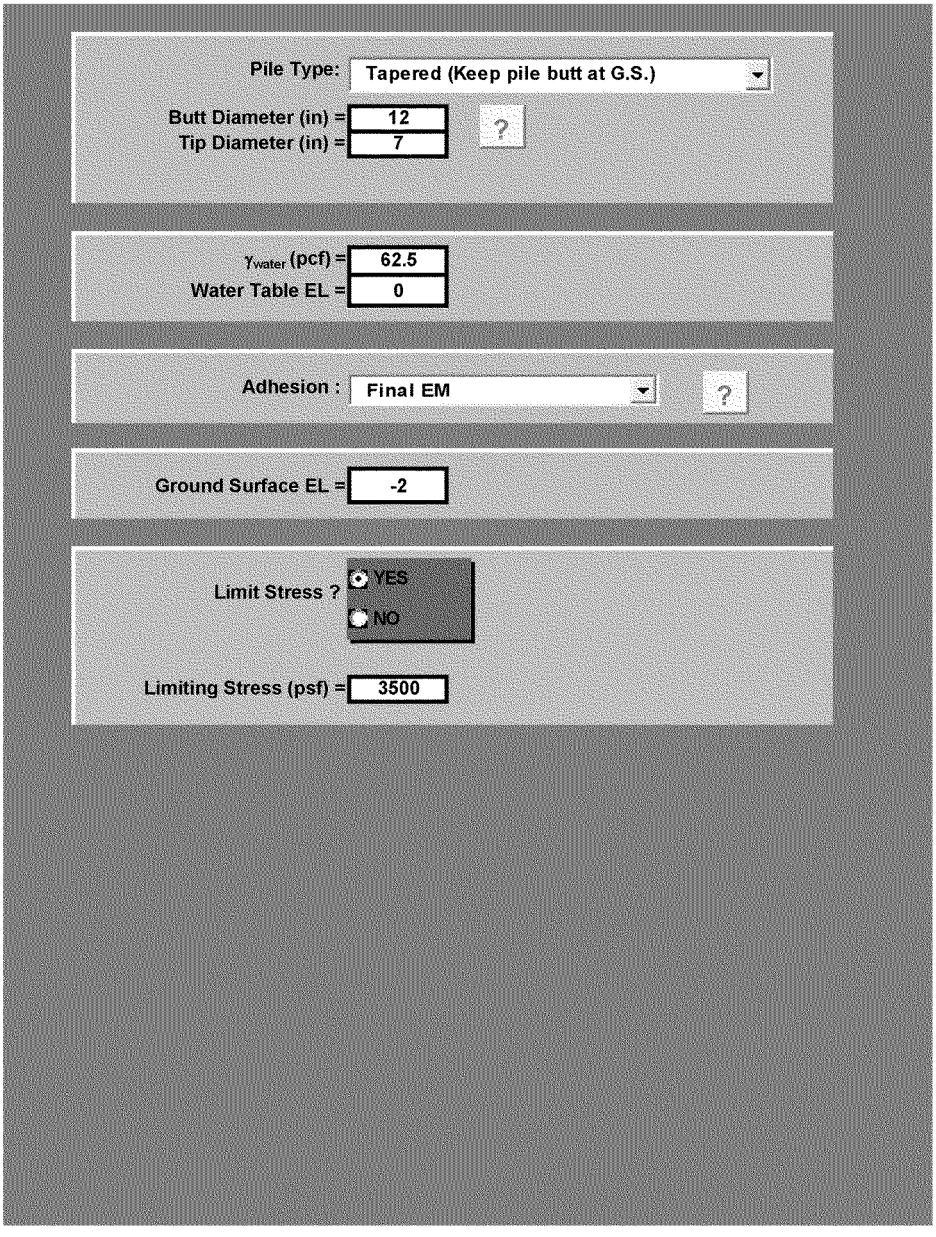

Q-CASE CAPACITY
Compression
Tension
Elevation (ft)
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
0
5
10
15
20
25
30
Capacity (Tons)


S-CASE CAPACITY
Compression
Tension
Elevation (ft)
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
0
5
10
15
20
25
30
35
Capacity (Tons)

EL	SOIL TYPE	Q-CASE				S-CASE			
		Kc	Kt	Nc	Nq	Kc	Kt	Nc	Nq
-20	CH	1	1	9	1	1	0.7	0	10
-28	CH	1	1	9	1	1	0.7	0	10
-35	CH	1	1	9	1	1	0.7	0	10
-48	CH	1	1	9	1	1	0.7	0	10
-60	CH	1	1	9	1	1	0.7	0	10
-90	SP	1.25	0.7	0	22.5	1	0.7	0	10


DONE
Butt diameter
Tip diameter


DONE
Adhesion (psf)
1400
1200
1000
800
600
400
200
0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Cohesion (psf)
EM 15 Jan 91
NOD pile capacity program
Draft EM


Pile Type:
Tapered (Keep pile butt at G.S.)
Butt Diameter (in) =
12
Tip Diameter (in) =
7
?
γwater (pcf) =
62.5
Water Table EL =
0
Adhesion :
Final EM
?
Ground Surface EL =
-2
Limit Stress ?
YES
NO
Limiting Stress (psf) =
3500

Q-CASE STRATIFICATION

DONE

Fill Kc, Kt, Nc, Nq

Fills Table with HSDRRSG values.

NOTES: A MAXIMUM OF TWENTY (20) STRATA CAN BE USED WITH THIS SPREADSHEET!

Clear Contents

Clears Table Contents.

Stratum Number	Bottom EL. (ft)	Total Unit Weight (pcf)	Submerged Unit Weight (pcf)	Cohesion Top (psf)	Cohesion Bottom (psf)	ϕ (degrees)	δ (degrees)	Kc	Kt	Nc	Nq	End Bearing?	Soil Type	Maximum Unit Friction* (psf)	Maximum Unit End Bearing* (psf)
1	-10	105	42.5	200	200	0	0	1	1	9	1		CH		
2	-23	100	37.5	300	450	0	0	1	1	9	1		CH		
3	-48	102	39.5	450	450	0	0	1	1	9	1		CH		
4	-63	105	42.5	450	800	0	0	1	1	9	1		CH		
5	-70	105	42.5	1000	1000	0	0	1	1	9	1		CH		
6	-100	120	57.5	0	0	30	0	1.25	0.7	0	22.5		SP		
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															

S-CASE STRATIFICATION

DONE

Fill Kc, Kt, Nc, Nq

Fills Table with HSDRRSG values.

NOTES: A MAXIMUM OF TWENTY (20) STRATA CAN BE USED WITH THIS SPREADSHEET

Clear Contents

Clears Table Contents.

Stratum Number	Bottom EL. (ft)	Total Unit Weight (pcf)	Submerged Unit Weight (pcf)	Cohesion Top (psf)	Cohesion Bottom (psf)	ϕ (degrees)	δ (degrees)	Kc	Kt	Nc	Nq	End Bearing?	Soil Type	Maximum Unit Friction* (psf)	Maximum Unit End Bearing* (psf)
1	-10	105	42.5	0	0	23	15	1	0.7	0	10		CH		
2	-23	100	37.5	0	0	23	15	1	0.7	0	10		CH		
3	-48	102	39.5	0	0	23	15	1	0.7	0	10		CH		
4	-63	105	42.5	0	0	23	15	1	0.7	0	10		CH		
5	-70	105	42.5	0	0	23	15	1	0.7	0	10		CH		
6	-100	120	57.5	0	0	30	15	1.25	0.7	0	22.5		SP		
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															

			Q-CASE						S-CASE					
Stratum	Tip	Increment	Coh./Adh Resistance	Friction Compression	Friction Tension	End Bearing	Pile Capacity Compression	Pile Capacity Tension	Coh./Adh Resistance	Friction Compression	Friction Tension	End Bearing	Pile Capacity Compression	Pile Capacity Tension
1	-2	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1	-3	1	0.100	0.000	0.000	0.000	0.100	0.100	0.000	0.004	0.003	0.000	0.004	0.003
1	-4	1	0.200	0.000	0.000	0.000	0.200	0.200	0.000	0.015	0.010	0.000	0.015	0.010
1	-5	1	0.300	0.000	0.000	0.000	0.300	0.300	0.000	0.033	0.023	0.000	0.033	0.023
1	-6	1	0.400	0.000	0.000	0.000	0.400	0.400	0.000	0.059	0.041	0.000	0.059	0.041
1	-7	1	0.500	0.000	0.000	0.000	0.500	0.500	0.000	0.092	0.064	0.000	0.092	0.064
1	-8	1	0.600	0.000	0.000	0.000	0.600	0.600	0.000	0.132	0.093	0.000	0.132	0.093
1	-9	1	0.700	0.000	0.000	0.000	0.700	0.700	0.000	0.180	0.126	0.000	0.180	0.126
1	-10	1	0.800	0.000	0.000	0.000	0.800	0.800	0.000	0.235	0.165	0.000	0.235	0.165
2	-11	1	0.953	0.000	0.000	0.000	0.953	0.953	0.000	0.298	0.208	0.000	0.298	0.208
2	-12	1	1.112	0.000	0.000	0.000	1.112	1.112	0.000	0.366	0.256	0.000	0.366	0.256
2	-13	1	1.276	0.000	0.000	0.000	1.276	1.276	0.000	0.441	0.309	0.000	0.441	0.309
2	-14	1	1.446	0.000	0.000	0.000	1.446	1.446	0.000	0.523	0.366	0.000	0.523	0.366
2	-15	1	1.622	0.000	0.000	0.000	1.622	1.622	0.000	0.611	0.428	0.000	0.611	0.428
2	-16	1	1.804	0.000	0.000	0.000	1.804	1.804	0.000	0.705	0.494	0.000	0.705	0.494
2	-17	1	1.991	0.000	0.000	0.000	1.991	1.991	0.000	0.806	0.565	0.000	0.806	0.565
2	-18	1	2.185	0.000	0.000	0.000	2.185	2.185	0.000	0.914	0.640	0.000	0.914	0.640
2	-19	1	2.384	0.000	0.000	0.000	2.384	2.384	0.000	1.028	0.720	0.000	1.028	0.720
2	-20	1	2.588	0.000	0.000	0.000	2.588	2.588	0.000	1.149	0.804	0.000	1.149	0.804
2	-21	1	2.799	0.000	0.000	0.000	2.799	2.799	0.000	1.276	0.893	0.000	1.276	0.893
2	-22	1	3.015	0.000	0.000	0.000	3.015	3.015	0.000	1.409	0.986	0.000	1.409	0.986
2	-23	1	3.238	0.000	0.000	0.000	3.238	3.238	0.000	1.549	1.084	0.000	1.549	1.084
3	-24	1	3.463	0.000	0.000	0.000	3.463	3.463	0.000	1.696	1.187	0.000	1.696	1.187
3	-25	1	3.688	0.000	0.000	0.000	3.688	3.688	0.000	1.849	1.294	0.000	1.849	1.294
3	-26	1	3.912	0.000	0.000	0.000	3.912	3.912	0.000	2.010	1.407	0.000	2.010	1.407
3	-27	1	4.137	0.000	0.000	0.000	4.137	4.137	0.000	2.177	1.524	0.000	2.177	1.524
3	-28	1	4.362	0.000	0.000	0.000	4.362	4.362	0.000	2.351	1.646	0.000	2.351	1.646
3	-29	1	4.587	0.000	0.000	0.000	4.587	4.587	0.000	2.532	1.772	0.000	2.532	1.772
3	-30	1	4.812	0.000	0.000	0.000	4.812	4.812	0.000	2.719	1.904	0.000	2.719	1.904
3	-31	1	5.037	0.000	0.000	0.000	5.037	5.037	0.000	2.914	2.040	0.000	2.914	2.040
3	-32	1	5.262	0.000	0.000	0.000	5.262	5.262	0.000	3.115	2.181	0.000	3.115	2.181
3	-33	1	5.487	0.000	0.000	0.000	5.487	5.487	0.000	3.323	2.326	0.000	3.323	2.326
3	-34	1	5.712	0.000	0.000	0.000	5.712	5.712	0.000	3.538	2.477	0.000	3.538	2.477
3	-35	1	5.937	0.000	0.000	0.000	5.937	5.937	0.000	3.760	2.632	0.000	3.760	2.632
3	-36	1	6.162	0.000	0.000	0.000	6.162	6.162	0.000	3.989	2.792	0.000	3.989	2.792
3	-37	1	6.387	0.000	0.000	0.000	6.387	6.387	0.000	4.225	2.957	0.000	4.225	2.957
3	-38	1	6.612	0.000	0.000	0.000	6.612	6.612	0.000	4.467	3.127	0.000	4.467	3.127
3	-39	1	6.837	0.000	0.000	0.000	6.837	6.837	0.000	4.716	3.301	0.000	4.716	3.301
3	-40	1	7.062	0.000	0.000	0.000	7.062	7.062	0.000	4.972	3.481	0.000	4.972	3.481
3	-41	1	7.287	0.000	0.000	0.000	7.287	7.287	0.000	5.235	3.665	0.000	5.235	3.665
3	-42	1	7.512	0.000	0.000	0.000	7.512	7.512	0.000	5.505	3.853	0.000	5.505	3.853
3	-43	1	7.737	0.000	0.000	0.000	7.737	7.737	0.000	5.782	4.047	0.000	5.782	4.047
3	-44	1	7.962	0.000	0.000	0.000	7.962	7.962	0.000	6.065	4.245	0.000	6.065	4.245
3	-45	1	8.187	0.000	0.000	0.000	8.187	8.187	0.000	6.355	4.449	0.000	6.355	4.449
3	-46	1	8.412	0.000	0.000	0.000	8.412	8.412	0.000	6.652	4.657	0.000	6.652	4.657
3	-47	1	8.637	0.000	0.000	0.000	8.637	8.637	0.000	6.956	4.869	0.000	6.956	4.869
3	-48	1	8.862	0.000	0.000	0.000	8.862	8.862	0.000	7.267	5.087	0.000	7.267	5.087
4	-49	1	9.093	0.000	0.000	0.000	9.093	9.093	0.000	7.585	5.309	0.000	7.585	5.309
4	-50	1	9.336	0.000	0.000	0.000	9.336	9.336	0.000	7.910	5.537	0.000	7.910	5.537
4	-51	1	9.589	0.000	0.000	0.000	9.589	9.589	0.000	8.243	5.770	0.000	8.243	5.770

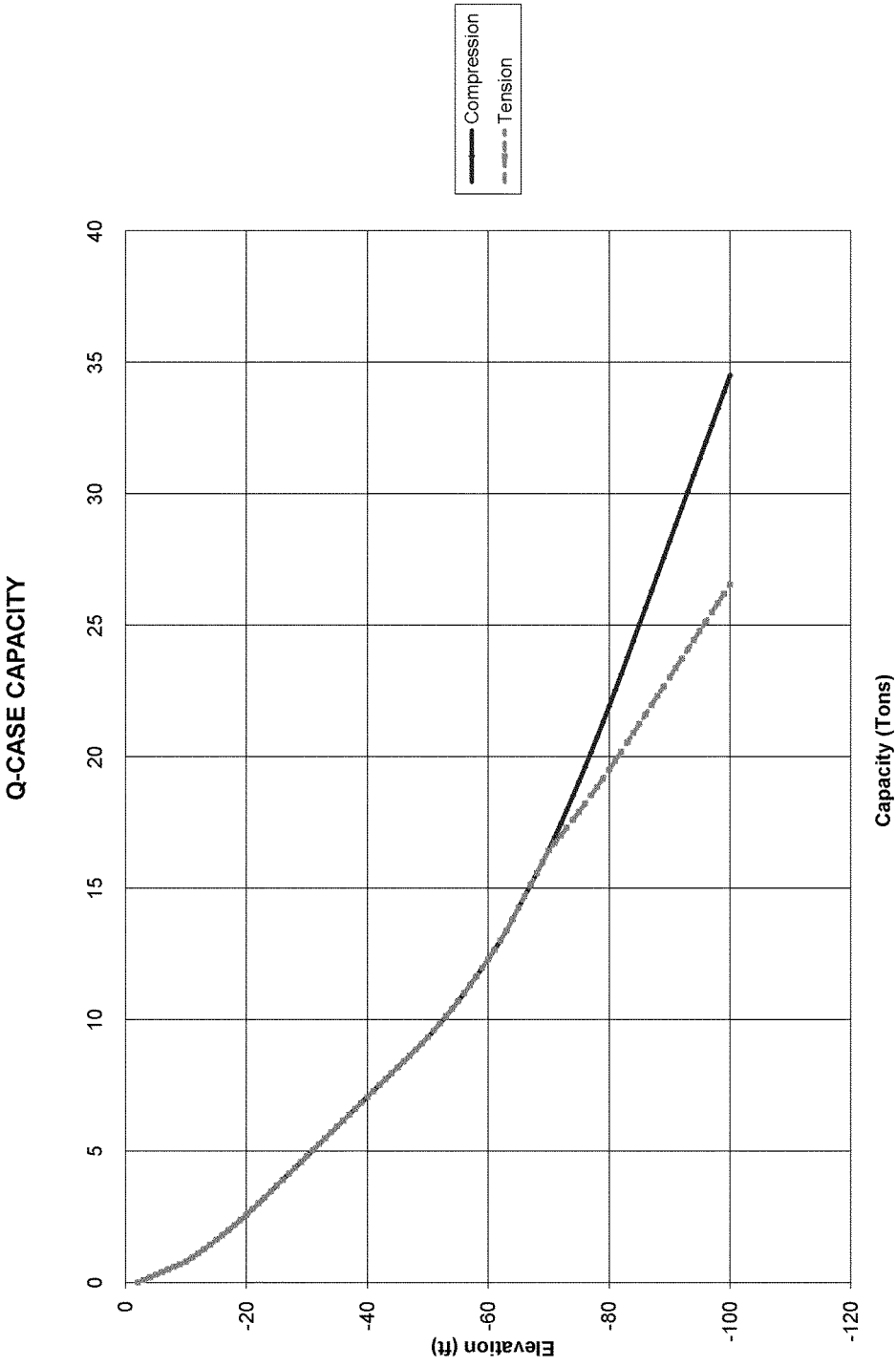
			Q-CASE						S-CASE					
Stratum	Tip	Increment	Coh./Adh Resistance	Friction Compression	Friction Tension	End Bearing	Pile Capacity Compression	Pile Capacity Tension	Coh./Adh Resistance	Friction Compression	Friction Tension	End Bearing	Pile Capacity Compression	Pile Capacity Tension
4	-52	1	9.853	0.000	0.000	0.000	9.853	9.853	0.000	8.583	6.008	0.000	8.583	6.008
4	-53	1	10.127	0.000	0.000	0.000	10.127	10.127	0.000	8.930	6.251	0.000	8.930	6.251
4	-54	1	10.410	0.000	0.000	0.000	10.410	10.410	0.000	9.285	6.499	0.000	9.285	6.499
4	-55	1	10.703	0.000	0.000	0.000	10.703	10.703	0.000	9.647	6.753	0.000	9.647	6.753
4	-56	1	11.006	0.000	0.000	0.000	11.006	11.006	0.000	10.016	7.011	0.000	10.016	7.011
4	-57	1	11.318	0.000	0.000	0.000	11.318	11.318	0.000	10.393	7.275	0.000	10.393	7.275
4	-58	1	11.640	0.000	0.000	0.000	11.640	11.640	0.000	10.777	7.544	0.000	10.777	7.544
4	-59	1	11.970	0.000	0.000	0.000	11.970	11.970	0.000	11.168	7.818	0.000	11.168	7.818
4	-60	1	12.310	0.000	0.000	0.000	12.310	12.310	0.000	11.567	8.097	0.000	11.567	8.097
4	-61	1	12.658	0.000	0.000	0.000	12.658	12.658	0.000	11.973	8.381	0.000	11.973	8.381
4	-62	1	13.015	0.000	0.000	0.000	13.015	13.015	0.000	12.387	8.671	0.000	12.387	8.671
4	-63	1	13.381	0.000	0.000	0.000	13.381	13.381	0.000	12.807	8.965	0.000	12.807	8.965
5	-64	1	13.819	0.000	0.000	0.000	13.819	13.819	0.000	13.236	9.265	0.000	13.236	9.265
5	-65	1	14.256	0.000	0.000	0.000	14.256	14.256	0.000	13.671	9.570	0.000	13.671	9.570
5	-66	1	14.694	0.000	0.000	0.000	14.694	14.694	0.000	14.114	9.880	0.000	14.114	9.880
5	-67	1	15.131	0.000	0.000	0.000	15.131	15.131	0.000	14.564	10.195	0.000	14.564	10.195
5	-68	1	15.569	0.000	0.000	0.000	15.569	15.569	0.000	15.022	10.515	0.000	15.022	10.515
5	-69	1	16.006	0.000	0.000	0.000	16.006	16.006	0.000	15.487	10.841	0.000	15.487	10.841
5	-70	1	16.444	0.000	0.000	0.000	16.444	16.444	0.000	15.960	11.172	0.000	15.960	11.172
6	-71	1	16.444	0.501	0.281	0.000	16.945	16.724	0.000	16.694	11.583	0.000	16.694	11.583
6	-72	1	16.444	1.013	0.567	0.000	17.457	17.011	0.000	17.443	12.002	0.000	17.443	12.002
6	-73	1	16.444	1.535	0.860	0.000	17.979	17.303	0.000	18.207	12.430	0.000	18.207	12.430
6	-74	1	16.444	2.068	1.158	0.000	18.511	17.601	0.000	18.987	12.867	0.000	18.987	12.867
6	-75	1	16.444	2.610	1.462	0.000	19.054	17.905	0.000	19.782	13.312	0.000	19.782	13.312
6	-76	1	16.444	3.164	1.772	0.000	19.607	18.215	0.000	20.591	13.766	0.000	20.591	13.766
6	-77	1	16.444	3.727	2.087	0.000	20.171	18.531	0.000	21.417	14.228	0.000	21.417	14.228
6	-78	1	16.444	4.301	2.409	0.000	20.745	18.852	0.000	22.257	14.698	0.000	22.257	14.698
6	-79	1	16.444	4.886	2.736	0.000	21.329	19.179	0.000	23.113	15.177	0.000	23.113	15.177
6	-80	1	16.444	5.480	3.069	0.000	21.924	19.512	0.000	23.983	15.665	0.000	23.983	15.665
6	-81	1	16.444	6.085	3.408	0.000	22.529	19.851	0.000	24.869	16.161	0.000	24.869	16.161
6	-82	1	16.444	6.701	3.752	0.000	23.144	20.196	0.000	25.770	16.666	0.000	25.770	16.666
6	-83	1	16.444	7.327	4.103	0.000	23.770	20.546	0.000	26.687	17.179	0.000	26.687	17.179
6	-84	1	16.444	7.958	4.457	0.000	24.402	20.900	0.000	27.611	17.697	0.000	27.611	17.697
6	-85	1	16.444	8.590	4.810	0.000	25.033	21.254	0.000	28.536	18.214	0.000	28.536	18.214
6	-86	1	16.444	9.221	5.164	0.000	25.665	21.607	0.000	29.460	18.732	0.000	29.460	18.732
6	-87	1	16.444	9.853	5.517	0.000	26.296	21.961	0.000	30.385	19.250	0.000	30.385	19.250
6	-88	1	16.444	10.484	5.871	0.000	26.928	22.315	0.000	31.309	19.768	0.000	31.309	19.768
6	-89	1	16.444	11.116	6.225	0.000	27.559	22.668	0.000	32.234	20.285	0.000	32.234	20.285
6	-90	1	16.444	11.747	6.578	0.000	28.191	23.022	0.000	33.158	20.803	0.000	33.158	20.803
6	-91	1	16.444	12.379	6.932	0.000	28.822	23.375	0.000	34.083	21.321	0.000	34.083	21.321
6	-92	1	16.444	13.010	7.286	0.000	29.454	23.729	0.000	35.007	21.839	0.000	35.007	21.839
6	-93	1	16.444	13.641	7.639	0.000	30.085	24.083	0.000	35.932	22.356	0.000	35.932	22.356
6	-94	1	16.444	14.273	7.993	0.000	30.716	24.436	0.000	36.857	22.874	0.000	36.857	22.874
6	-95	1	16.444	14.904	8.346	0.000	31.348	24.790	0.000	37.781	23.392	0.000	37.781	23.392
6	-96	1	16.444	15.536	8.700	0.000	31.979	25.144	0.000	38.706	23.910	0.000	38.706	23.910
6	-97	1	16.444	16.167	9.054	0.000	32.611	25.497	0.000	39.630	24.427	0.000	39.630	24.427
6	-98	1	16.444	16.799	9.407	0.000	33.242	25.851	0.000	40.555	24.945	0.000	40.555	24.945
6	-99	1	16.444	17.430	9.761	0.000	33.874	26.204	0.000	41.479	25.463	0.000	41.479	25.463
6	-100	1	16.444	18.062	10.115	0.000	34.505	26.558	0.000	42.404	25.980	0.000	42.404	25.980

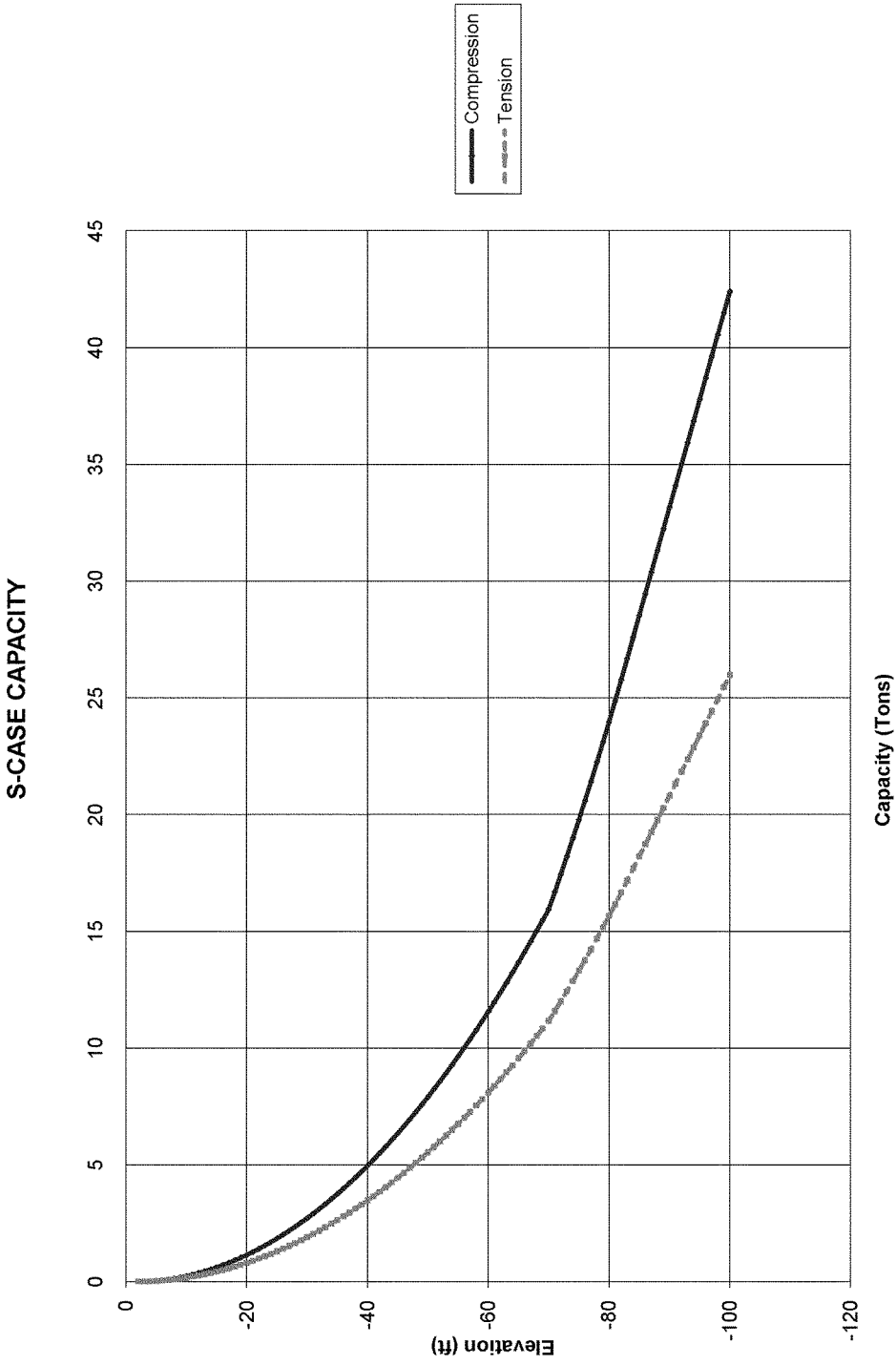
								Q-CASE															
Stratum	Tip	Increment	$\gamma_{(moist)}$	$\gamma_{(sub)}$	γh	Mid-layer γh (used)	Bottom γh (used)	Cohesion	Mid-Layer Adhesion	ϕ	δ	Kc	Kt	Nq	Nc	End Bearing	Coh./Adh Resistance	Friction Compression	Friction Tension	End Bearing	Pile Capacity Compression	Pile Capacity Tension
1	-2	0	105	42.5	0	0	0	200	200	0	0	1.00	1.00	1.00	9.00	No	0.000	0.000	0.000	0.000	0.000	0.000
1	-3	1	105	42.5	21.25	21.25	42.5	200	200	0	0	1.00	1.00	1.00	9.00	No	0.100	0.000	0.000	0.000	0.100	0.100
1	-4	1	105	42.5	63.75	63.75	85	200	200	0	0	1.00	1.00	1.00	9.00	No	0.200	0.000	0.000	0.000	0.200	0.200
1	-5	1	105	42.5	106.25	106.25	127.5	200	200	0	0	1.00	1.00	1.00	9.00	No	0.300	0.000	0.000	0.000	0.300	0.300
1	-6	1	105	42.5	148.75	148.75	170	200	200	0	0	1.00	1.00	1.00	9.00	No	0.400	0.000	0.000	0.000	0.400	0.400
1	-7	1	105	42.5	191.25	191.25	212.5	200	200	0	0	1.00	1.00	1.00	9.00	No	0.500	0.000	0.000	0.000	0.500	0.500
1	-8	1	105	42.5	233.75	233.75	255	200	200	0	0	1.00	1.00	1.00	9.00	No	0.600	0.000	0.000	0.000	0.600	0.600
1	-9	1	105	42.5	276.25	276.25	297.5	200	200	0	0	1.00	1.00	1.00	9.00	No	0.700	0.000	0.000	0.000	0.700	0.700
1	-10	1	105	42.5	318.75	318.75	340	200	200	0	0	1.00	1.00	1.00	9.00	No	0.800	0.000	0.000	0.000	0.800	0.800
2	-11	1	100	37.5	358.75	358.75	377.5	311.538452	305.769226	0	0	1.00	1.00	1.00	9.00	No	0.953	0.000	0.000	0.000	0.953	0.953
2	-12	1	100	37.5	396.25	396.25	415	323.076935	317.307678	0	0	1.00	1.00	1.00	9.00	No	1.112	0.000	0.000	0.000	1.112	1.112
2	-13	1	100	37.5	433.75	433.75	452.5	334.615387	328.846161	0	0	1.00	1.00	1.00	9.00	No	1.276	0.000	0.000	0.000	1.276	1.276
2	-14	1	100	37.5	471.25	471.25	490	346.153839	340.384613	0	0	1.00	1.00	1.00	9.00	No	1.446	0.000	0.000	0.000	1.446	1.446
2	-15	1	100	37.5	508.75	508.75	527.5	357.692322	351.923096	0	0	1.00	1.00	1.00	9.00	No	1.622	0.000	0.000	0.000	1.622	1.622
2	-16	1	100	37.5	546.25	546.25	565	369.230774	363.461548	0	0	1.00	1.00	1.00	9.00	No	1.804	0.000	0.000	0.000	1.804	1.804
2	-17	1	100	37.5	583.75	583.75	602.5	380.769226	375	0	0	1.00	1.00	1.00	9.00	No	1.991	0.000	0.000	0.000	1.991	1.991
2	-18	1	100	37.5	621.25	621.25	640	392.307678	386.538452	0	0	1.00	1.00	1.00	9.00	No	2.185	0.000	0.000	0.000	2.185	2.185
2	-19	1	100	37.5	658.75	658.75	677.5	403.846161	398.076904	0	0	1.00	1.00	1.00	9.00	No	2.384	0.000	0.000	0.000	2.384	2.384
2	-20	1	100	37.5	696.25	696.25	715	415.384613	409.615387	0	0	1.00	1.00	1.00	9.00	No	2.588	0.000	0.000	0.000	2.588	2.588
2	-21	1	100	37.5	733.75	733.75	752.5	426.923065	421.153839	0	0	1.00	1.00	1.00	9.00	No	2.799	0.000	0.000	0.000	2.799	2.799
2	-22	1	100	37.5	771.25	771.25	790	438.461548	432.692322	0	0	1.00	1.00	1.00	9.00	No	3.015	0.000	0.000	0.000	3.015	3.015
2	-23	1	100	37.5	808.75	808.75	827.5	450	444.230774	0	0	1.00	1.00	1.00	9.00	No	3.238	0.000	0.000	0.000	3.238	3.238
3	-24	1	102	39.5	847.25	847.25	867	450	450	0	0	1.00	1.00	1.00	9.00	No	3.463	0.000	0.000	0.000	3.463	3.463
3	-25	1	102	39.5	886.75	886.75	906.5	450	450	0	0	1.00	1.00	1.00	9.00	No	3.688	0.000	0.000	0.000	3.688	3.688
3	-26	1	102	39.5	926.25	926.25	946	450	450	0	0	1.00	1.00	1.00	9.00	No	3.912	0.000	0.000	0.000	3.912	3.912
3	-27	1	102	39.5	965.75	965.75	985.5	450	450	0	0	1.00	1.00	1.00	9.00	No	4.137	0.000	0.000	0.000	4.137	4.137
3	-28	1	102	39.5	1005.25	1005.25	1025	450	450	0	0	1.00	1.00	1.00	9.00	No	4.362	0.000	0.000	0.000	4.362	4.362
3	-29	1	102	39.5	1044.75	1044.75	1064.5	450	450	0	0	1.00	1.00	1.00	9.00	No	4.587	0.000	0.000	0.000	4.587	4.587
3	-30	1	102	39.5	1084.25	1084.25	1104	450	450	0	0	1.00	1.00	1.00	9.00	No	4.812	0.000	0.000	0.000	4.812	4.812
3	-31	1	102	39.5	1123.75	1123.75	1143.5	450	450	0	0	1.00	1.00	1.00	9.00	No	5.037	0.000	0.000	0.000	5.037	5.037
3	-32	1	102	39.5	1163.25	1163.25	1183	450	450	0	0	1.00	1.00	1.00	9.00	No	5.262	0.000	0.000	0.000	5.262	5.262
3	-33	1	102	39.5	1202.75	1202.75	1222.5	450	450	0	0	1.00	1.00	1.00	9.00	No	5.487	0.000	0.000	0.000	5.487	5.487
3	-34	1	102	39.5	1242.25	1242.25	1262	450	450	0	0	1.00	1.00	1.00	9.00	No	5.712	0.000	0.000	0.000	5.712	5.712
3	-35	1	102	39.5	1281.75	1281.75	1301.5	450	450	0	0	1.00	1.00	1.00	9.00	No	5.937	0.000	0.000	0.000	5.937	5.937
3	-36	1	102	39.5	1321.25	1321.25	1341	450	450	0	0	1.00	1.00	1.00	9.00	No	6.162	0.000	0.000	0.000	6.162	6.162
3	-37	1	102	39.5	1360.75	1360.75	1380.5	450	450	0	0	1.00	1.00	1.00	9.00	No	6.387	0.000	0.000	0.000	6.387	6.387
3	-38	1	102	39.5	1400.25	1400.25	1420	450	450	0	0	1.00	1.00	1.00	9.00	No	6.612	0.000	0.000	0.000	6.612	6.612
3	-39	1	102	39.5	1439.75	1439.75	1459.5	450	450	0	0	1.00	1.00	1.00	9.00	No	6.837	0.000	0.000	0.000	6.837	6.837
3	-40	1	102	39.5	1479.25	1479.25	1499	450	450	0	0	1.00	1.00	1.00	9.00	No	7.062	0.000	0.000	0.000	7.062	7.062
3	-41	1	102	39.5	1518.75	1518.75	1538.5	450	450	0	0	1.00	1.00	1.00	9.00	No	7.287	0.000	0.000	0.000	7.287	7.287
3	-42	1	102	39.5	1558.25	1558.25	1578	450	450	0	0	1.00	1.00	1.00	9.00	No	7.512	0.000	0.000	0.000	7.512	7.512
3	-43	1	102	39.5	1597.75	1597.75	1617.5	450	450	0	0	1.00	1.00	1.00	9.00	No	7.737	0.000	0.000	0.000	7.737	7.737
3	-44	1	102	39.5	1637.25	1637.25	1657	450	450	0	0	1.00	1.00	1.00	9.00	No	7.962	0.000	0.000	0.000	7.962	7.962
3	-45	1	102	39.5	1676.75	1676.75	1696.5	450	450	0	0	1.00	1.00	1.00	9.00	No	8.187	0.000	0.000	0.000	8.187	8.187
3	-46	1	102	39.5	1716.25	1716.25	1736	450	450	0	0	1.00	1.00	1.00	9.00	No	8.412	0.000	0.000	0.000	8.412	8.412
3	-47	1	102	39.5	1755.75	1755.75	1775.5	450	450	0	0	1.00	1.00	1.00	9.00	No	8.637	0.000	0.000	0.000	8.637	8.637
3	-48	1	102	39.5	1795.25	1795.25	1815	450	450	0	0	1.00	1.00	1.00	9.00	No	8.862	0.000	0.000	0.000	8.862	8.862
4	-49	1	105	42.5	1838.25	1838.25	1857.5	473.333344	461.666687	0	0	1.00	1.00	1.00	9.00	No	9.093	0.000	0.000	0.000	9.093	9.093
4	-50	1	105	42.5	1878.75	1878.75	1900	496.666656	485	0	0	1.00	1.00	1.00	9.00	No	9.336	0.000	0.000	0.000	9.336	9.336
4	-51	1	105	42.5	1921.25	1921.25	1942.5	520	505.733337	0	0	1.00	1.00	1.00	9.00	No	9.589	0.000	0.000	0.000	9.589	9.589
4	-52	1	105	42.5	1963.75	1963.75	1985	543.333313	523.180542	0	0	1.00	1.00	1.00	9.00	No	9.853	0.000	0.000	0.000	9.853	9.853
4	-53	1	105	42.5	2006.25	2006.25	2027.5	566.666687	539.669434	0	0	1.00	1.00	1.00	9.00	No	10.127	0.000	0.000	0.000	10.127	10.127
4	-54	1	105	42.5	2048.75	2048.75	2070	590	555.613892	0	0	1.00	1.00	1.00	9.00	No	10.410	0.000	0.000	0.000	10.410	10.410
4	-55	1	105	42.5	2091.25	2091.25	2112.5	613.333313	571.013916	0	0	1.00	1.00	1.00	9.00	No	10.703	0.000	0.000	0.000	10.703	10.703
4	-56	1	105	42.5	2133.75	2133.75	2155	636.666687	585.869446	0	0	1.00	1.00	1.00	9.00	No	11.006	0.000	0.000	0.000	11.006	11.006
4	-57	1	105	42.5	2176.25	2176.25	2197.5	660	600.180542	0	0	1.00	1.00	1.00	9.00	No	11.318	0.000	0.000	0.000	11.318	11.318
4	-58	1	105	42.5	2218.75	2218.75	2240	683.333313	613.947266	0	0	1.00	1.00	1.00	9.00	No	11.640	0.000	0.000	0.000	11.640	11.640
4	-59	1	105	42.5	2261.25	2281.25	2282.5	706.666687	627.169434	0	0	1.00	1.00	1.00	9.00	No	11.970	0.000	0.000	0.000	11.970	11.970
4	-60	1	105	42.5	2303.75	2303.75	2325	730	639.847229	0	0	1.00	1.00	1.00	9.00	No	12.310	0.000	0.000	0.000	12.310	12.310

								Q CASE													
Stratum	Tip	Increment	$\gamma_{(moist)}$	$\gamma_{(sub)}$	γh	Mid-layer γh (used)	Bottom γh (used)	Cohesion	Mid-Layer Adhesion	ϕ	δ	Kc	Kt	Nq	Nc	End Bearing	Con./Adh Resistance	Friction Compression	Friction Tension	End Bearing	Pile Capacity Compression	Pile Capacity Tension
4	-61	1	105	42.5	2346.25	2346.25	2367.5	753.333313	651.98053	0	0	1.00	1.00	1.00	9.00	No	12.658	0.000	0.000	0.000	12.658	12.658
4	-62	1	105	42.5	2388.75	2388.75	2410	776.666687	663.569458	0	0	1.00	1.00	1.00	9.00	No	13.015	0.000	0.000	0.000	13.015	13.015
4	-63	1	105	42.5	2431.25	2431.25	2452.5	800	674.613892	0	0	1.00	1.00	1.00	9.00	No	13.381	0.000	0.000	0.000	13.381	13.381
5	-64	1	105	42.5	2473.75	2473.75	2495	1000	750	0	0	1.00	1.00	1.00	9.00	No	13.819	0.000	0.000	0.000	13.819	13.819
5	-65	1	105	42.5	2516.25	2516.25	2537.5	1000	750	0	0	1.00	1.00	1.00	9.00	No	14.256	0.000	0.000	0.000	14.256	14.256
5	-66	1	105	42.5	2558.75	2558.75	2580	1000	750	0	0	1.00	1.00	1.00	9.00	No	14.694	0.000	0.000	0.000	14.694	14.694
5	-67	1	105	42.5	2601.25	2601.25	2622.5	1000	750	0	0	1.00	1.00	1.00	9.00	No	15.131	0.000	0.000	0.000	15.131	15.131
5	-68	1	105	42.5	2643.75	2643.75	2665	1000	750	0	0	1.00	1.00	1.00	9.00	No	15.569	0.000	0.000	0.000	15.569	15.569
5	-69	1	105	42.5	2686.25	2686.25	2707.5	1000	750	0	0	1.00	1.00	1.00	9.00	No	16.006	0.000	0.000	0.000	16.006	16.006
5	-70	1	105	42.5	2728.75	2728.75	2750	1000	750	0	0	1.00	1.00	1.00	9.00	No	16.444	0.000	0.000	0.000	16.444	16.444
6	-71	1	120	57.5	2778.75	2778.75	2807.5	0	0	30	0	1.25	0.70	22.50	0.00	No	16.444	0.501	0.281	0.000	16.945	16.724
6	-72	1	120	57.5	2836.25	2836.25	2865	0	0	30	0	1.25	0.70	22.50	0.00	No	16.444	1.013	0.567	0.000	17.457	17.011
6	-73	1	120	57.5	2893.75	2893.75	2922.5	0	0	30	0	1.25	0.70	22.50	0.00	No	16.444	1.535	0.860	0.000	17.979	17.303
6	-74	1	120	57.5	2951.25	2951.25	2980	0	0	30	0	1.25	0.70	22.50	0.00	No	16.444	2.068	1.158	0.000	18.511	17.601
6	-75	1	120	57.5	3008.75	3008.75	3037.5	0	0	30	0	1.25	0.70	22.50	0.00	No	16.444	2.610	1.462	0.000	19.054	17.905
6	-76	1	120	57.5	3066.25	3066.25	3095	0	0	30	0	1.25	0.70	22.50	0.00	No	16.444	3.164	1.772	0.000	19.607	18.215
6	-77	1	120	57.5	3123.75	3123.75	3152.5	0	0	30	0	1.25	0.70	22.50	0.00	No	16.444	3.727	2.087	0.000	20.171	18.531
6	-78	1	120	57.5	3181.25	3181.25	3210	0	0	30	0	1.25	0.70	22.50	0.00	No	16.444	4.301	2.409	0.000	20.745	18.852
6	-79	1	120	57.5	3238.75	3238.75	3267.5	0	0	30	0	1.25	0.70	22.50	0.00	No	16.444	4.886	2.736	0.000	21.329	19.179
6	-80	1	120	57.5	3296.25	3296.25	3325	0	0	30	0	1.25	0.70	22.50	0.00	No	16.444	5.480	3.069	0.000	21.924	19.512
6	-81	1	120	57.5	3353.75	3353.75	3382.5	0	0	30	0	1.25	0.70	22.50	0.00	No	16.444	6.085	3.408	0.000	22.529	19.851
6	-82	1	120	57.5	3411.25	3411.25	3440	0	0	30	0	1.25	0.70	22.50	0.00	No	16.444	6.701	3.752	0.000	23.144	20.196
6	-83	1	120	57.5	3468.75	3468.75	3497.5	0	0	30	0	1.25	0.70	22.50	0.00	No	16.444	7.327	4.103	0.000	23.770	20.546
6	-84	1	120	57.5	3526.25	3500	3500	0	0	30	0	1.25	0.70	22.50	0.00	No	16.444	7.958	4.457	0.000	24.402	20.900
6	-85	1	120	57.5	3583.75	3500	3500	0	0	30	0	1.25	0.70	22.50	0.00	No	16.444	8.590	4.810	0.000	25.033	21.254
6	-86	1	120	57.5	3641.25	3500	3500	0	0	30	0	1.25	0.70	22.50	0.00	No	16.444	9.221	5.164	0.000	25.665	21.607
6	-87	1	120	57.5	3698.75	3500	3500	0	0	30	0	1.25	0.70	22.50	0.00	No	16.444	9.853	5.517	0.000	26.296	21.961
6	-88	1	120	57.5	3756.25	3500	3500	0	0	30	0	1.25	0.70	22.50	0.00	No	16.444	10.484	5.871	0.000	26.928	22.315
6	-89	1	120	57.5	3813.75	3500	3500	0	0	30	0	1.25	0.70	22.50	0.00	No	16.444	11.116	6.225	0.000	27.559	22.668
6	-90	1	120	57.5	3871.25	3500	3500	0	0	30	0	1.25	0.70	22.50	0.00	No	16.444	11.747	6.578	0.000	28.191	23.022
6	-91	1	120	57.5	3928.75	3500	3500	0	0	30	0	1.25	0.70	22.50	0.00	No	16.444	12.379	6.932	0.000	28.822	23.375
6	-92	1	120	57.5	3986.25	3500	3500	0	0	30	0	1.25	0.70	22.50	0.00	No	16.444	13.010	7.286	0.000	29.454	23.729
6	-93	1	120	57.5	4043.75	3500	3500	0	0	30	0	1.25	0.70	22.50	0.00	No	16.444	13.641	7.639	0.000	30.085	24.083
6	-94	1	120	57.5	4101.25	3500	3500	0	0	30	0	1.25	0.70	22.50	0.00	No	16.444	14.273	7.993	0.000	30.716	24.436
6	-95	1	120	57.5	4158.75	3500	3500	0	0	30	0	1.25	0.70	22.50	0.00	No	16.444	14.904	8.346	0.000	31.348	24.790
6	-96	1	120	57.5	4216.25	3500	3500	0	0	30	0	1.25	0.70	22.50	0.00	No	16.444	15.536	8.700	0.000	31.979	25.144
6	-97	1	120	57.5	4273.75	3500	3500	0	0	30	0	1.25	0.70	22.50	0.00	No	16.444	16.167	9.054	0.000	32.611	25.497
6	-98	1	120	57.5	4331.25	3500	3500	0	0	30	0	1.25	0.70	22.50	0.00	No	16.444	16.799	9.407	0.000	33.242	25.851
6	-99	1	120	57.5	4388.75	3500	3500	0	0	30	0	1.25	0.70	22.50	0.00	No	16.444	17.430	9.761	0.000	33.874	26.204
6	-100	1	120	57.5	4446.25	3500	3500	0	0	30	0	1.25	0.70	22.50	0.00	No	16.444	18.062	10.115	0.000	34.505	26.558

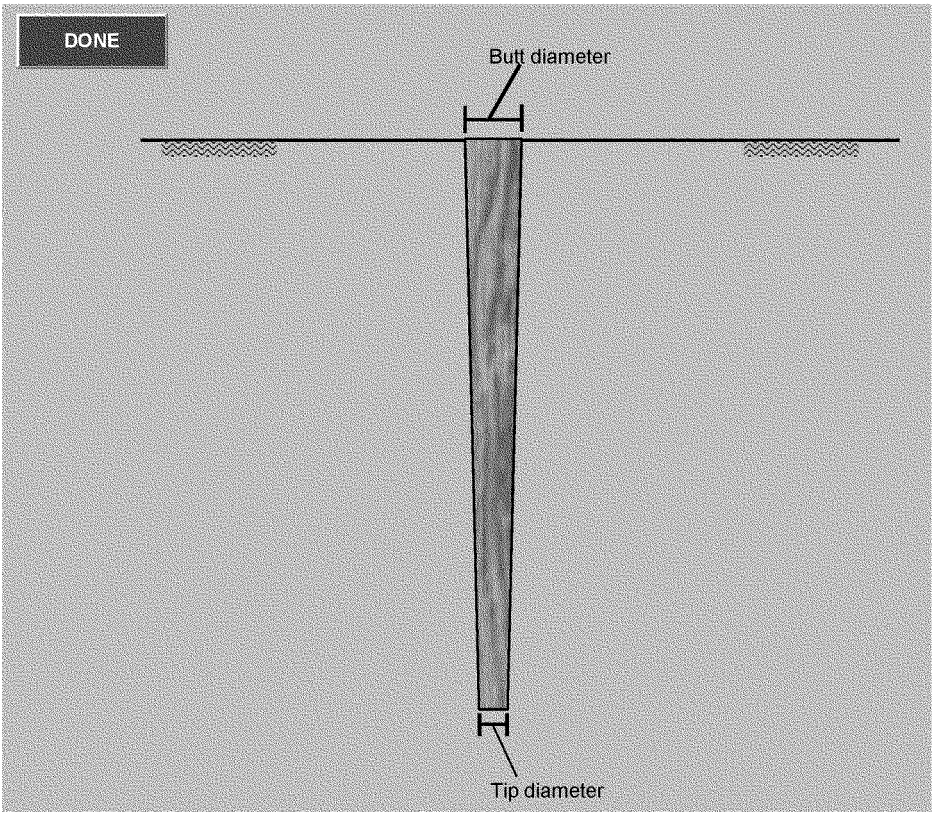
								S-CASE															
Stratum	Tip	Increment	$\gamma_{(moist)}$	$\gamma_{(sat)}$	γh	Mid-layer γh (used)	Bottom γh (used)	Cohesion	Mid-Layer Adhesion	ϕ	δ	Kc	Kt	Nq	Nc	End Bearing	Coh./Adh Resistance	Friction Compression	Friction Tension	End Bearing	Pile Capacity Compression	Pile Capacity Tension
1	-2	0	105	42.5	0	0	0	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.000	0.000	0.000	0.000	0.000
1	-3	1	105	42.5	21.25	21.25	42.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.004	0.003	0.000	0.004	0.003
1	-4	1	105	42.5	63.75	63.75	85	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.015	0.010	0.000	0.015	0.010
1	-5	1	105	42.5	106.25	106.25	127.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.033	0.023	0.000	0.033	0.023
1	-6	1	105	42.5	148.75	148.75	170	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.059	0.041	0.000	0.059	0.041
1	-7	1	105	42.5	191.25	191.25	212.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.092	0.064	0.000	0.092	0.064
1	-8	1	105	42.5	233.75	233.75	255	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.132	0.093	0.000	0.132	0.093
1	-9	1	105	42.5	276.25	276.25	297.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.180	0.126	0.000	0.180	0.126
1	-10	1	105	42.5	318.75	318.75	340	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.235	0.165	0.000	0.235	0.165
2	-11	1	100	37.5	358.75	358.75	377.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.298	0.208	0.000	0.298	0.208
2	-12	1	100	37.5	396.25	396.25	415	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.366	0.256	0.000	0.366	0.256
2	-13	1	100	37.5	433.75	433.75	452.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.441	0.309	0.000	0.441	0.309
2	-14	1	100	37.5	471.25	471.25	490	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.523	0.366	0.000	0.523	0.366
2	-15	1	100	37.5	508.75	508.75	527.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.611	0.428	0.000	0.611	0.428
2	-16	1	100	37.5	546.25	546.25	565	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.705	0.494	0.000	0.705	0.494
2	-17	1	100	37.5	583.75	583.75	602.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.806	0.565	0.000	0.806	0.565
2	-18	1	100	37.5	621.25	621.25	640	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.914	0.640	0.000	0.914	0.640
2	-19	1	100	37.5	658.75	658.75	677.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	1.028	0.720	0.000	1.028	0.720
2	-20	1	100	37.5	696.25	696.25	715	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	1.149	0.804	0.000	1.149	0.804
2	-21	1	100	37.5	733.75	733.75	752.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	1.276	0.893	0.000	1.276	0.893
2	-22	1	100	37.5	771.25	771.25	790	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	1.409	0.986	0.000	1.409	0.986
2	-23	1	100	37.5	808.75	808.75	827.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	1.549	1.084	0.000	1.549	1.084
3	-24	1	102	39.5	847.25	847.25	867	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	1.696	1.187	0.000	1.696	1.187
3	-25	1	102	39.5	886.75	886.75	906.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	1.849	1.294	0.000	1.849	1.294
3	-26	1	102	39.5	926.25	926.25	946	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	2.010	1.407	0.000	2.010	1.407
3	-27	1	102	39.5	965.75	965.75	985.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	2.177	1.524	0.000	2.177	1.524
3	-28	1	102	39.5	1005.25	1005.25	1025	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	2.351	1.646	0.000	2.351	1.646
3	-29	1	102	39.5	1044.75	1044.75	1064.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	2.532	1.772	0.000	2.532	1.772
3	-30	1	102	39.5	1084.25	1084.25	1104	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	2.719	1.904	0.000	2.719	1.904
3	-31	1	102	39.5	1123.75	1123.75	1143.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	2.914	2.040	0.000	2.914	2.040
3	-32	1	102	39.5	1163.25	1163.25	1183	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	3.115	2.181	0.000	3.115	2.181
3	-33	1	102	39.5	1202.75	1202.75	1222.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	3.323	2.326	0.000	3.323	2.326
3	-34	1	102	39.5	1242.25	1242.25	1262	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	3.538	2.477	0.000	3.538	2.477
3	-35	1	102	39.5	1281.75	1281.75	1301.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	3.760	2.632	0.000	3.760	2.632
3	-36	1	102	39.5	1321.25	1321.25	1341	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	3.989	2.792	0.000	3.989	2.792
3	-37	1	102	39.5	1360.75	1360.75	1380.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	4.225	2.957	0.000	4.225	2.957
3	-38	1	102	39.5	1400.25	1400.25	1420	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	4.467	3.127	0.000	4.467	3.127
3	-39	1	102	39.5	1439.75	1439.75	1459.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	4.716	3.301	0.000	4.716	3.301
3	-40	1	102	39.5	1479.25	1479.25	1499	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	4.972	3.481	0.000	4.972	3.481
3	-41	1	102	39.5	1518.75	1518.75	1538.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	5.235	3.665	0.000	5.235	3.665
3	-42	1	102	39.5	1558.25	1558.25	1578	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	5.505	3.853	0.000	5.505	3.853
3	-43	1	102	39.5	1597.75	1597.75	1617.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	5.782	4.047	0.000	5.782	4.047
3	-44	1	102	39.5	1637.25	1637.25	1657	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	6.065	4.245	0.000	6.065	4.245
3	-45	1	102	39.5	1676.75	1676.75	1696.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	6.355	4.449	0.000	6.355	4.449
3	-46	1	102	39.5	1716.25	1716.25	1736	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	6.652	4.657	0.000	6.652	4.657
3	-47	1	102	39.5	1755.75	1755.75	1775.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	6.956	4.869	0.000	6.956	4.869
3	-48	1	102	39.5	1795.25	1795.25	1815	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	7.267	5.087	0.000	7.267	5.087
4	-49	1	105	42.5	1836.25	1836.25	1857.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	7.585	5.309	0.000	7.585	5.309
4	-50	1	105	42.5	1878.75	1878.75	1900	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	7.910	5.537	0.000	7.910	5.537
4	-51	1	105	42.5	1921.25	1921.25	1942.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	8.243	5.770	0.000	8.243	5.770
4	-52	1	105	42.5	1963.75	1963.75	1985	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	8.583	6.008	0.000	8.583	6.008
4	-53	1	105	42.5	2006.25	2006.25	2027.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	8.930	6.251	0.000	8.930	6.251
4	-54	1	105	42.5	2048.75	2048.75	2070	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	9.285	6.499	0.000	9.285	6.499
4	-55	1	105	42.5	2091.25	2091.25	2112.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	9.647	6.753	0.000	9.647	6.753
4	-56	1	105	42.5	2133.75	2133.75	2155	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	10.016	7.011	0.000	10.016	7.011
4	-57	1	105	42.5	2176.25	2176.25	2197.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	10.393	7.275	0.000	10.393	7.275
4	-58	1	105	42.5	2218.75	2218.75	2240	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	10.777	7.544	0.000	10.777	7.544
4	-59	1	105	42.5	2261.25	2261.25	2282.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	11.168	7.818	0.000	11.168	7.818
4	-60	1	105	42.5	2303.75	2303.75	2325	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	11.567	8.097	0.000	11.567	8.097

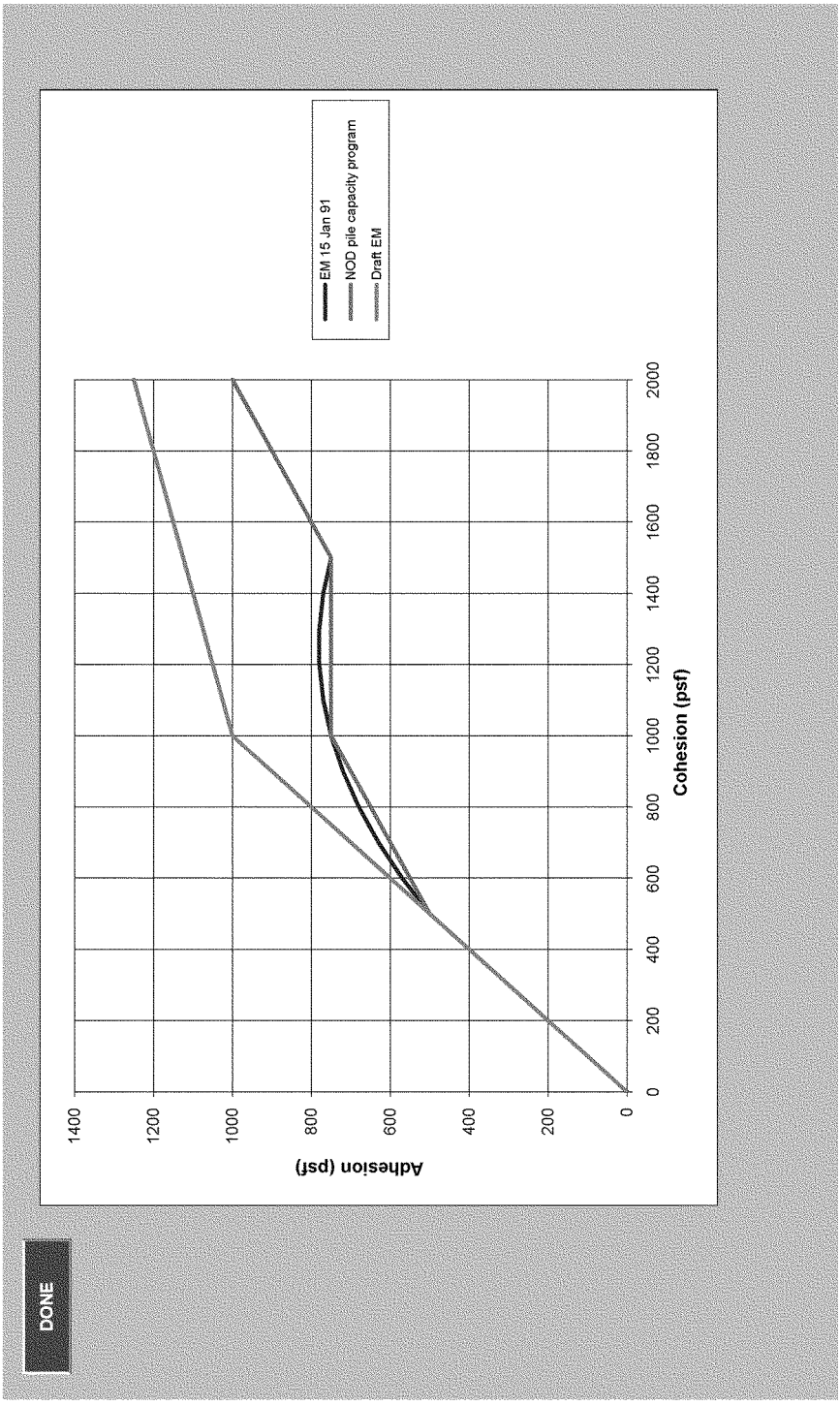
								S-CASE														
Stratum	Tip	Increment	$\gamma_{(moist)}$	$\gamma_{(sub)}$	γh	Mid-layer γh (used)	Bottom γh (used)	Cohesion	Mid-Layer Adhesion	ϕ	δ	Kc	Kt	Nq	Nc	End Bearing	Coh./Adh Resistance	Friction Compression	Friction Tension	End Bearing	Pile Capacity Compression	Pile Capacity Tension
4	-61	1	105	42.5	2346.25	2346.25	2367.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	11.973	8.381	0.000	11.973	8.381
4	-62	1	105	42.5	2388.75	2388.75	2410	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	12.387	8.671	0.000	12.387	8.671
4	-63	1	105	42.5	2431.25	2431.25	2452.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	12.807	8.965	0.000	12.807	8.965
5	-64	1	105	42.5	2473.75	2473.75	2495	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	13.236	9.265	0.000	13.236	9.265
5	-65	1	105	42.5	2516.25	2516.25	2537.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	13.671	9.570	0.000	13.671	9.570
5	-66	1	105	42.5	2558.75	2558.75	2580	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	14.114	9.880	0.000	14.114	9.880
5	-67	1	105	42.5	2601.25	2601.25	2622.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	14.564	10.195	0.000	14.564	10.195
5	-68	1	105	42.5	2643.75	2643.75	2665	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	15.022	10.515	0.000	15.022	10.515
5	-69	1	105	42.5	2686.25	2686.25	2707.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	15.487	10.841	0.000	15.487	10.841
5	-70	1	105	42.5	2728.75	2728.75	2750	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	15.960	11.172	0.000	15.960	11.172
6	-71	1	120	57.5	2778.75	2778.75	2807.5	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	16.694	11.583	0.000	16.694	11.583
6	-72	1	120	57.5	2836.25	2836.25	2865	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	17.443	12.002	0.000	17.443	12.002
6	-73	1	120	57.5	2893.75	2893.75	2922.5	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	18.207	12.430	0.000	18.207	12.430
6	-74	1	120	57.5	2951.25	2951.25	2980	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	18.987	12.867	0.000	18.987	12.867
6	-75	1	120	57.5	3008.75	3008.75	3037.5	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	19.782	13.312	0.000	19.782	13.312
6	-76	1	120	57.5	3066.25	3066.25	3095	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	20.591	13.766	0.000	20.591	13.766
6	-77	1	120	57.5	3123.75	3123.75	3152.5	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	21.417	14.228	0.000	21.417	14.228
6	-78	1	120	57.5	3181.25	3181.25	3210	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	22.257	14.698	0.000	22.257	14.698
6	-79	1	120	57.5	3238.75	3238.75	3267.5	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	23.113	15.177	0.000	23.113	15.177
6	-80	1	120	57.5	3296.25	3296.25	3325	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	23.983	15.665	0.000	23.983	15.665
6	-81	1	120	57.5	3353.75	3353.75	3382.5	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	24.869	16.161	0.000	24.869	16.161
6	-82	1	120	57.5	3411.25	3411.25	3440	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	25.770	16.666	0.000	25.770	16.666
6	-83	1	120	57.5	3468.75	3468.75	3497.5	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	26.687	17.179	0.000	26.687	17.179
6	-84	1	120	57.5	3526.25	3500	3500	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	27.611	17.697	0.000	27.611	17.697
6	-85	1	120	57.5	3583.75	3500	3500	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	28.536	18.214	0.000	28.536	18.214
6	-86	1	120	57.5	3641.25	3500	3500	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	29.460	18.732	0.000	29.460	18.732
6	-87	1	120	57.5	3698.75	3500	3500	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	30.385	19.250	0.000	30.385	19.250
6	-88	1	120	57.5	3756.25	3500	3500	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	31.309	19.768	0.000	31.309	19.768
6	-89	1	120	57.5	3813.75	3500	3500	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	32.234	20.285	0.000	32.234	20.285
6	-90	1	120	57.5	3871.25	3500	3500	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	33.158	20.803	0.000	33.158	20.803
6	-91	1	120	57.5	3928.75	3500	3500	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	34.083	21.321	0.000	34.083	21.321
6	-92	1	120	57.5	3986.25	3500	3500	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	35.007	21.839	0.000	35.007	21.839
6	-93	1	120	57.5	4043.75	3500	3500	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	35.932	22.356	0.000	35.932	22.356
6	-94	1	120	57.5	4101.25	3500	3500	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	36.857	22.874	0.000	36.857	22.874
6	-95	1	120	57.5	4158.75	3500	3500	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	37.781	23.392	0.000	37.781	23.392
6	-96	1	120	57.5	4216.25	3500	3500	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	38.706	23.910	0.000	38.706	23.910
6	-97	1	120	57.5	4273.75	3500	3500	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	39.630	24.427	0.000	39.630	24.427
6	-98	1	120	57.5	4331.25	3500	3500	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	40.555	24.945	0.000	40.555	24.945
6	-99	1	120	57.5	4388.75	3500	3500	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	41.479	25.463	0.000	41.479	25.463
6	-100	1	120	57.5	4446.25	3500	3500	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	42.404	25.980	0.000	42.404	25.980

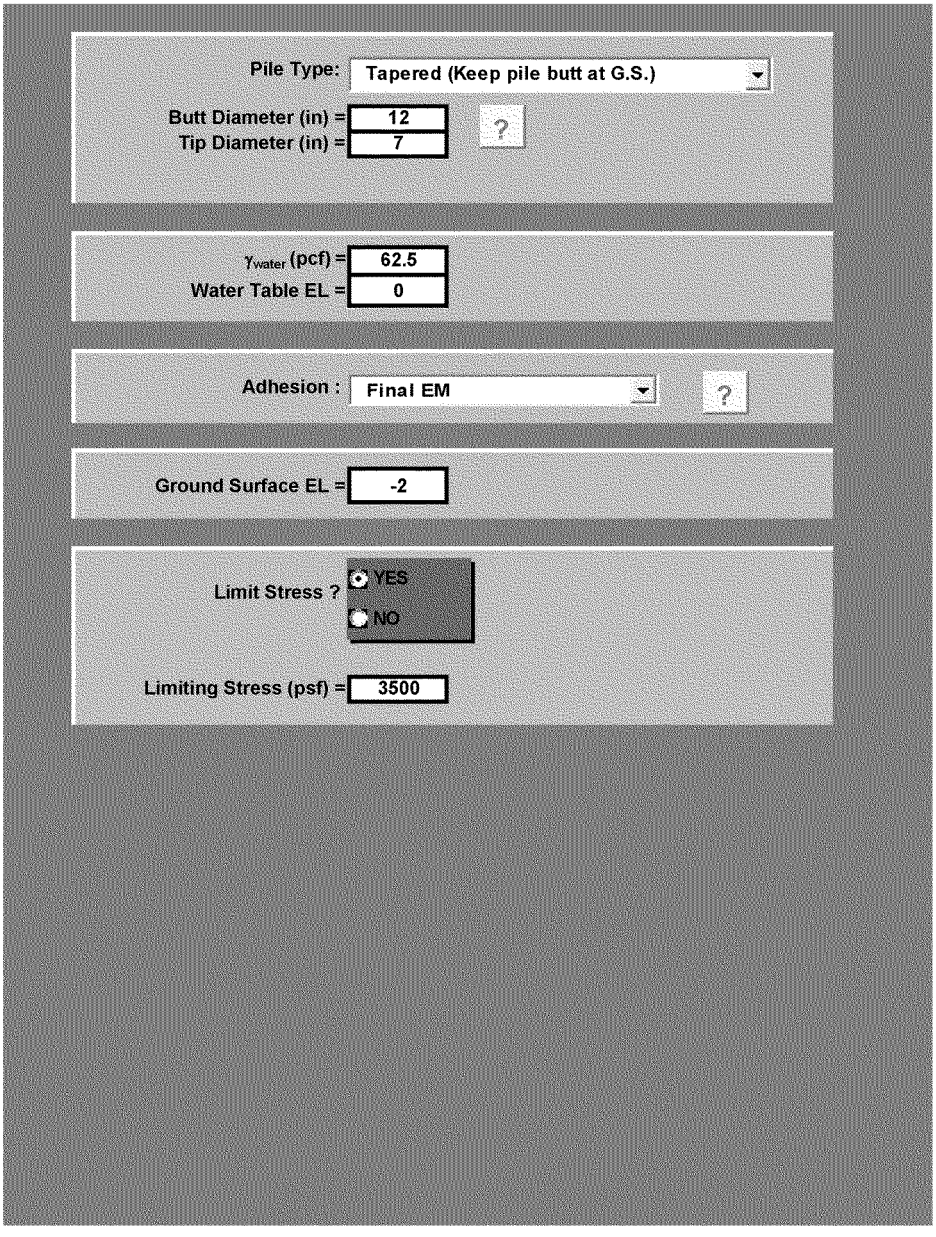

Q-CASE CAPACITY
Compression
Tension
Elevation (ft)
0
-20
-40
-60
-80
-100
-120
0
5
10
15
20
25
30
35
40
Capacity (Tons)


S-CASE CAPACITY
Compression
Tension
Elevation (ft)
0
-20
-40
-60
-80
-100
-120
0
5
10
15
20
25
30
35
40
45
Capacity (Tons)

EL	SOIL TYPE	Q-CASE				S-CASE			
		Kc	Kt	Nc	Nq	Kc	Kt	Nc	Nq
-20	CH	1	1	9	1	1	0.7	0	10
-28	CH	1	1	9	1	1	0.7	0	10
-35	CH	1	1	9	1	1	0.7	0	10
-48	CH	1	1	9	1	1	0.7	0	10
-60	CH	1	1	9	1	1	0.7	0	10
-90	SP	1.25	0.7	0	22.5	1	0.7	0	10


DONE
Butt diameter
Tip diameter


DONE
Adhesion (psf)
1400
1200
1000
800
600
400
200
0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Cohesion (psf)
EM 15 Jan 91
NOD pile capacity program
Draft EM


Pile Type:
Tapered (Keep pile butt at G.S.)
Butt Diameter (in) =
12
Tip Diameter (in) =
7
?
γwater (pcf) =
62.5
Water Table EL =
0
Adhesion :
Final EM
?
Ground Surface EL =
-2
Limit Stress ?
YES
NO
Limiting Stress (psf) =
3500

Q-CASE STRATIFICATION

DONE

Fill Kc, Kt, Nc, Nq

Fills Table with HSDRRSG values.

NOTES: A MAXIMUM OF TWENTY (20) STRATA CAN BE USED WITH THIS SPREADSHEET!

Clear Contents

Clears Table Contents.

Stratum Number	Bottom EL. (ft)	Total Unit Weight (pcf)	Submerged Unit Weight (pcf)	Cohesion Top (psf)	Cohesion Bottom (psf)	ϕ (degrees)	δ (degrees)	Kc	Kt	Nc	Nq	End Bearing?	Soil Type	Maximum Unit Friction* (psf)	Maximum Unit End Bearing* (psf)
1	-15	88	25.5	160	160	0	0	1	1	9	1		CH		
2	-23	100	37.5	160	160	0	0	1	1	9	1		CH		
3	-40	100	37.5	160	400	0	0	1	1	9	1		CH		
4	-60	102	39.5	550	550	0	0	1	1	9	1		CH		
5	-75	102	39.5	550	675	0	0	1	1	9	1		CH		
6	-100	120	57.5	0	0	30	0	1.25	0.7	0	22.5		SP		
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															

S-CASE STRATIFICATION

DONE

Fill Kc, Kt, Nc, Nq

Fills Table with HSDRRSG values.

NOTES: A MAXIMUM OF TWENTY (20) STRATA CAN BE USED WITH THIS SPREADSHEET

Clear Contents

Clears Table Contents.

Stratum Number	Bottom EL. (ft)	Total Unit Weight (pcf)	Submerged Unit Weight (pcf)	Cohesion Top (psf)	Cohesion Bottom (psf)	ϕ (degrees)	δ (degrees)	Kc	Kt	Nc	Nq	End Bearing?	Soil Type	Maximum Unit Friction* (psf)	Maximum Unit End Bearing* (psf)
1	-15	88	25.5	0	0	23	15	1	0.7	0	10		CH		
2	-23	100	37.5	0	0	23	15	1	0.7	0	10		CH		
3	-40	100	37.5	0	0	23	15	1	0.7	0	10		CH		
4	-60	102	39.5	0	0	23	15	1	0.7	0	10		CH		
5	-75	102	39.5	0	0	23	15	1	0.7	0	10		CH		
6	-100	120	57.5	0	0	30	15	1.25	0.7	0	22.5		SP		
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															

			Q-CASE						S-CASE					
Stratum	Tip	Increment	Coh./Adh Resistance	Friction Compression	Friction Tension	End Bearing	Pile Capacity Compression	Pile Capacity Tension	Coh./Adh Resistance	Friction Compression	Friction Tension	End Bearing	Pile Capacity Compression	Pile Capacity Tension
1	-2	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1	-3	1	0.080	0.000	0.000	0.000	0.080	0.080	0.000	0.002	0.002	0.000	0.002	0.002
1	-4	1	0.160	0.000	0.000	0.000	0.160	0.160	0.000	0.009	0.006	0.000	0.009	0.006
1	-5	1	0.240	0.000	0.000	0.000	0.240	0.240	0.000	0.020	0.014	0.000	0.020	0.014
1	-6	1	0.320	0.000	0.000	0.000	0.320	0.320	0.000	0.035	0.025	0.000	0.035	0.025
1	-7	1	0.400	0.000	0.000	0.000	0.400	0.400	0.000	0.055	0.039	0.000	0.055	0.039
1	-8	1	0.480	0.000	0.000	0.000	0.480	0.480	0.000	0.079	0.056	0.000	0.079	0.056
1	-9	1	0.560	0.000	0.000	0.000	0.560	0.560	0.000	0.108	0.076	0.000	0.108	0.076
1	-10	1	0.640	0.000	0.000	0.000	0.640	0.640	0.000	0.141	0.099	0.000	0.141	0.099
1	-11	1	0.720	0.000	0.000	0.000	0.720	0.720	0.000	0.179	0.125	0.000	0.179	0.125
1	-12	1	0.800	0.000	0.000	0.000	0.800	0.800	0.000	0.221	0.154	0.000	0.221	0.154
1	-13	1	0.880	0.000	0.000	0.000	0.880	0.880	0.000	0.267	0.187	0.000	0.267	0.187
1	-14	1	0.960	0.000	0.000	0.000	0.960	0.960	0.000	0.318	0.222	0.000	0.318	0.222
1	-15	1	1.040	0.000	0.000	0.000	1.040	1.040	0.000	0.373	0.261	0.000	0.373	0.261
2	-16	1	1.120	0.000	0.000	0.000	1.120	1.120	0.000	0.434	0.304	0.000	0.434	0.304
2	-17	1	1.200	0.000	0.000	0.000	1.200	1.200	0.000	0.501	0.351	0.000	0.501	0.351
2	-18	1	1.280	0.000	0.000	0.000	1.280	1.280	0.000	0.574	0.402	0.000	0.574	0.402
2	-19	1	1.360	0.000	0.000	0.000	1.360	1.360	0.000	0.654	0.458	0.000	0.654	0.458
2	-20	1	1.440	0.000	0.000	0.000	1.440	1.440	0.000	0.741	0.519	0.000	0.741	0.519
2	-21	1	1.520	0.000	0.000	0.000	1.520	1.520	0.000	0.834	0.584	0.000	0.834	0.584
2	-22	1	1.600	0.000	0.000	0.000	1.600	1.600	0.000	0.934	0.654	0.000	0.934	0.654
2	-23	1	1.680	0.000	0.000	0.000	1.680	1.680	0.000	1.040	0.728	0.000	1.040	0.728
3	-24	1	1.764	0.000	0.000	0.000	1.764	1.764	0.000	1.152	0.807	0.000	1.152	0.807
3	-25	1	1.854	0.000	0.000	0.000	1.854	1.854	0.000	1.271	0.890	0.000	1.271	0.890
3	-26	1	1.952	0.000	0.000	0.000	1.952	1.952	0.000	1.397	0.978	0.000	1.397	0.978
3	-27	1	2.056	0.000	0.000	0.000	2.056	2.056	0.000	1.529	1.070	0.000	1.529	1.070
3	-28	1	2.168	0.000	0.000	0.000	2.168	2.168	0.000	1.668	1.167	0.000	1.668	1.167
3	-29	1	2.287	0.000	0.000	0.000	2.287	2.287	0.000	1.813	1.269	0.000	1.813	1.269
3	-30	1	2.413	0.000	0.000	0.000	2.413	2.413	0.000	1.964	1.375	0.000	1.964	1.375
3	-31	1	2.546	0.000	0.000	0.000	2.546	2.546	0.000	2.122	1.485	0.000	2.122	1.485
3	-32	1	2.686	0.000	0.000	0.000	2.686	2.686	0.000	2.287	1.601	0.000	2.287	1.601
3	-33	1	2.833	0.000	0.000	0.000	2.833	2.833	0.000	2.458	1.720	0.000	2.458	1.720
3	-34	1	2.987	0.000	0.000	0.000	2.987	2.987	0.000	2.635	1.845	0.000	2.635	1.845
3	-35	1	3.148	0.000	0.000	0.000	3.148	3.148	0.000	2.819	1.973	0.000	2.819	1.973
3	-36	1	3.316	0.000	0.000	0.000	3.316	3.316	0.000	3.009	2.107	0.000	3.009	2.107
3	-37	1	3.492	0.000	0.000	0.000	3.492	3.492	0.000	3.206	2.244	0.000	3.206	2.244
3	-38	1	3.674	0.000	0.000	0.000	3.674	3.674	0.000	3.410	2.387	0.000	3.410	2.387
3	-39	1	3.864	0.000	0.000	0.000	3.864	3.864	0.000	3.620	2.534	0.000	3.620	2.534
3	-40	1	4.060	0.000	0.000	0.000	4.060	4.060	0.000	3.836	2.685	0.000	3.836	2.685
4	-41	1	4.332	0.000	0.000	0.000	4.332	4.332	0.000	4.059	2.842	0.000	4.059	2.842
4	-42	1	4.603	0.000	0.000	0.000	4.603	4.603	0.000	4.289	3.002	0.000	4.289	3.002
4	-43	1	4.875	0.000	0.000	0.000	4.875	4.875	0.000	4.526	3.168	0.000	4.526	3.168
4	-44	1	5.146	0.000	0.000	0.000	5.146	5.146	0.000	4.770	3.339	0.000	4.770	3.339
4	-45	1	5.418	0.000	0.000	0.000	5.418	5.418	0.000	5.020	3.514	0.000	5.020	3.514
4	-46	1	5.689	0.000	0.000	0.000	5.689	5.689	0.000	5.277	3.694	0.000	5.277	3.694
4	-47	1	5.961	0.000	0.000	0.000	5.961	5.961	0.000	5.541	3.879	0.000	5.541	3.879
4	-48	1	6.233	0.000	0.000	0.000	6.233	6.233	0.000	5.812	4.069	0.000	5.812	4.069
4	-49	1	6.504	0.000	0.000	0.000	6.504	6.504	0.000	6.090	4.263	0.000	6.090	4.263
4	-50	1	6.776	0.000	0.000	0.000	6.776	6.776	0.000	6.375	4.462	0.000	6.375	4.462
4	-51	1	7.047	0.000	0.000	0.000	7.047	7.047	0.000	6.666	4.666	0.000	6.666	4.666

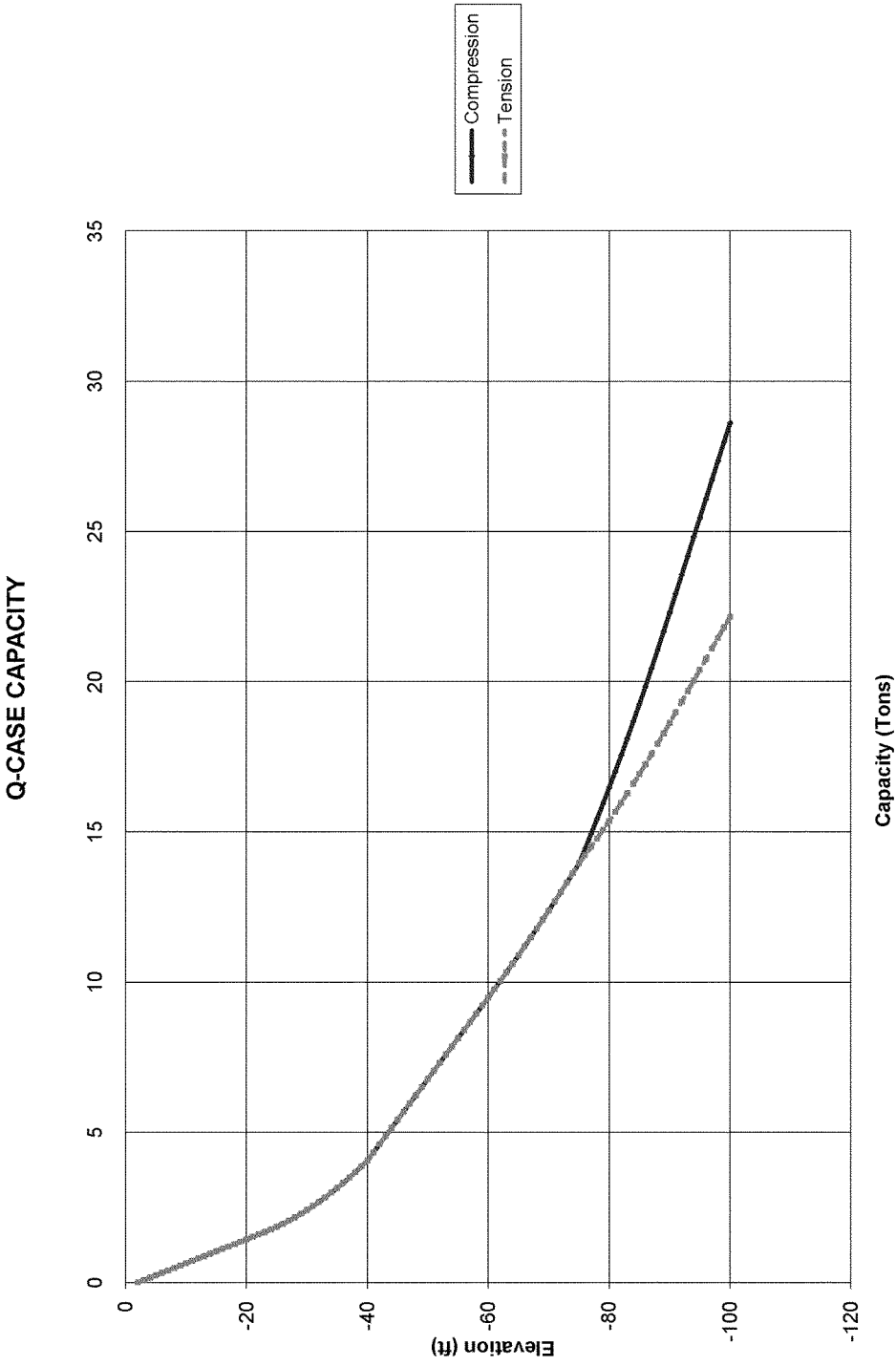
			Q-CASE						S-CASE					
Stratum	Tip	Increment	Coh./Adh Resistance	Friction Compression	Friction Tension	End Bearing	Pile Capacity Compression	Pile Capacity Tension	Coh./Adh Resistance	Friction Compression	Friction Tension	End Bearing	Pile Capacity Compression	Pile Capacity Tension
4	-52	1	7.319	0.000	0.000	0.000	7.319	7.319	0.000	6.965	4.875	0.000	6.965	4.875
4	-53	1	7.590	0.000	0.000	0.000	7.590	7.590	0.000	7.270	5.089	0.000	7.270	5.089
4	-54	1	7.862	0.000	0.000	0.000	7.862	7.862	0.000	7.582	5.307	0.000	7.582	5.307
4	-55	1	8.133	0.000	0.000	0.000	8.133	8.133	0.000	7.901	5.530	0.000	7.901	5.530
4	-56	1	8.405	0.000	0.000	0.000	8.405	8.405	0.000	8.226	5.758	0.000	8.226	5.758
4	-57	1	8.677	0.000	0.000	0.000	8.677	8.677	0.000	8.559	5.991	0.000	8.559	5.991
4	-58	1	8.948	0.000	0.000	0.000	8.948	8.948	0.000	8.898	6.229	0.000	8.898	6.229
4	-59	1	9.220	0.000	0.000	0.000	9.220	9.220	0.000	9.244	6.471	0.000	9.244	6.471
4	-60	1	9.491	0.000	0.000	0.000	9.491	9.491	0.000	9.597	6.718	0.000	9.597	6.718
5	-61	1	9.765	0.000	0.000	0.000	9.765	9.765	0.000	9.957	6.970	0.000	9.957	6.970
5	-62	1	10.041	0.000	0.000	0.000	10.041	10.041	0.000	10.324	7.227	0.000	10.324	7.227
5	-63	1	10.322	0.000	0.000	0.000	10.322	10.322	0.000	10.697	7.488	0.000	10.697	7.488
5	-64	1	10.606	0.000	0.000	0.000	10.606	10.606	0.000	11.078	7.754	0.000	11.078	7.754
5	-65	1	10.893	0.000	0.000	0.000	10.893	10.893	0.000	11.465	8.025	0.000	11.465	8.025
5	-66	1	11.184	0.000	0.000	0.000	11.184	11.184	0.000	11.859	8.301	0.000	11.859	8.301
5	-67	1	11.478	0.000	0.000	0.000	11.478	11.478	0.000	12.260	8.582	0.000	12.260	8.582
5	-68	1	11.776	0.000	0.000	0.000	11.776	11.776	0.000	12.667	8.867	0.000	12.667	8.867
5	-69	1	12.077	0.000	0.000	0.000	12.077	12.077	0.000	13.082	9.157	0.000	13.082	9.157
5	-70	1	12.381	0.000	0.000	0.000	12.381	12.381	0.000	13.503	9.452	0.000	13.503	9.452
5	-71	1	12.689	0.000	0.000	0.000	12.689	12.689	0.000	13.932	9.752	0.000	13.932	9.752
5	-72	1	13.000	0.000	0.000	0.000	13.000	13.000	0.000	14.367	10.057	0.000	14.367	10.057
5	-73	1	13.314	0.000	0.000	0.000	13.314	13.314	0.000	14.808	10.366	0.000	14.808	10.366
5	-74	1	13.632	0.000	0.000	0.000	13.632	13.632	0.000	15.257	10.680	0.000	15.257	10.680
5	-75	1	13.953	0.000	0.000	0.000	13.953	13.953	0.000	15.713	10.999	0.000	15.713	10.999
6	-76	1	13.953	0.484	0.271	0.000	14.437	14.224	0.000	16.421	11.395	0.000	16.421	11.395
6	-77	1	13.953	0.978	0.547	0.000	14.931	14.501	0.000	17.144	11.800	0.000	17.144	11.800
6	-78	1	13.953	1.482	0.830	0.000	15.435	14.783	0.000	17.882	12.214	0.000	17.882	12.214
6	-79	1	13.953	1.997	1.118	0.000	15.950	15.071	0.000	18.636	12.636	0.000	18.636	12.636
6	-80	1	13.953	2.522	1.412	0.000	16.475	15.365	0.000	19.405	13.066	0.000	19.405	13.066
6	-81	1	13.953	3.057	1.712	0.000	17.010	15.665	0.000	20.189	13.505	0.000	20.189	13.505
6	-82	1	13.953	3.603	2.018	0.000	17.556	15.971	0.000	20.988	13.953	0.000	20.988	13.953
6	-83	1	13.953	4.159	2.329	0.000	18.112	16.282	0.000	21.802	14.409	0.000	21.802	14.409
6	-84	1	13.953	4.726	2.646	0.000	18.679	16.600	0.000	22.632	14.874	0.000	22.632	14.874
6	-85	1	13.953	5.303	2.969	0.000	19.256	16.923	0.000	23.476	15.347	0.000	23.476	15.347
6	-86	1	13.953	5.890	3.298	0.000	19.843	17.252	0.000	24.336	15.828	0.000	24.336	15.828
6	-87	1	13.953	6.488	3.633	0.000	20.441	17.586	0.000	25.211	16.318	0.000	25.211	16.318
6	-88	1	13.953	7.096	3.974	0.000	21.049	17.927	0.000	26.102	16.817	0.000	26.102	16.817
6	-89	1	13.953	7.714	4.320	0.000	21.667	18.273	0.000	27.007	17.324	0.000	27.007	17.324
6	-90	1	13.953	8.343	4.672	0.000	22.296	18.625	0.000	27.928	17.839	0.000	27.928	17.839
6	-91	1	13.953	8.974	5.026	0.000	22.928	18.979	0.000	28.852	18.357	0.000	28.852	18.357
6	-92	1	13.953	9.606	5.379	0.000	23.559	19.333	0.000	29.777	18.875	0.000	29.777	18.875
6	-93	1	13.953	10.237	5.733	0.000	24.191	19.686	0.000	30.701	19.393	0.000	30.701	19.393
6	-94	1	13.953	10.869	6.087	0.000	24.822	20.040	0.000	31.626	19.910	0.000	31.626	19.910
6	-95	1	13.953	11.500	6.440	0.000	25.454	20.394	0.000	32.550	20.428	0.000	32.550	20.428
6	-96	1	13.953	12.132	6.794	0.000	26.085	20.747	0.000	33.475	20.946	0.000	33.475	20.946
6	-97	1	13.953	12.763	7.147	0.000	26.717	21.101	0.000	34.400	21.464	0.000	34.400	21.464
6	-98	1	13.953	13.395	7.501	0.000	27.348	21.454	0.000	35.324	21.981	0.000	35.324	21.981
6	-99	1	13.953	14.026	7.855	0.000	27.980	21.808	0.000	36.249	22.499	0.000	36.249	22.499
6	-100	1	13.953	14.658	8.208	0.000	28.611	22.162	0.000	37.173	23.017	0.000	37.173	23.017

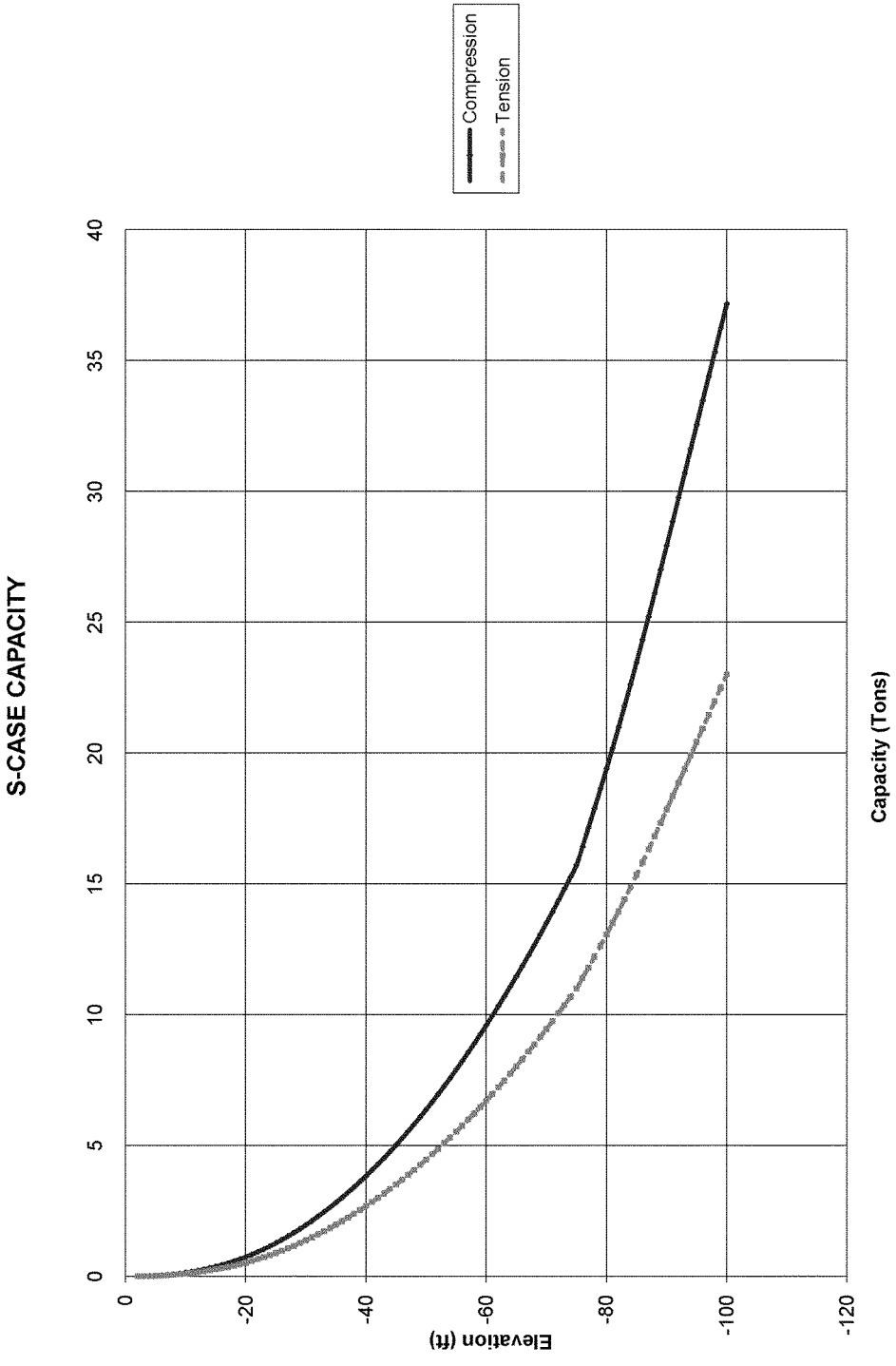
								Q-CASE															
Stratum	Tip	Increment	$\gamma_{(moist)}$	$\gamma_{(sat)}$	γh	Mid-layer γh (used)	Bottom γh (used)	Cohesion	Mid-Layer Adhesion	ϕ	δ	Kc	Kt	Nq	Nc	End Bearing	Coh./Adh Resistance	Friction Compression	Friction Tension	End Bearing	Pile Capacity Compression	Pile Capacity Tension
1	-2	0	88	25.5	0	0	0	160	160	0	0	1.00	1.00	1.00	9.00	No	0.000	0.000	0.000	0.000	0.000	0.000
1	-3	1	88	25.5	12.75	12.75	25.5	160	160	0	0	1.00	1.00	1.00	9.00	No	0.080	0.000	0.000	0.000	0.080	0.080
1	-4	1	88	25.5	38.25	38.25	51	160	160	0	0	1.00	1.00	1.00	9.00	No	0.160	0.000	0.000	0.000	0.160	0.160
1	-5	1	88	25.5	63.75	63.75	76.5	160	160	0	0	1.00	1.00	1.00	9.00	No	0.240	0.000	0.000	0.000	0.240	0.240
1	-6	1	88	25.5	89.25	89.25	102	160	160	0	0	1.00	1.00	1.00	9.00	No	0.320	0.000	0.000	0.000	0.320	0.320
1	-7	1	88	25.5	114.75	114.75	127.5	160	160	0	0	1.00	1.00	1.00	9.00	No	0.400	0.000	0.000	0.000	0.400	0.400
1	-8	1	88	25.5	140.25	140.25	153	160	160	0	0	1.00	1.00	1.00	9.00	No	0.480	0.000	0.000	0.000	0.480	0.480
1	-9	1	88	25.5	165.75	165.75	178.5	160	160	0	0	1.00	1.00	1.00	9.00	No	0.560	0.000	0.000	0.000	0.560	0.560
1	-10	1	88	25.5	191.25	191.25	204	160	160	0	0	1.00	1.00	1.00	9.00	No	0.640	0.000	0.000	0.000	0.640	0.640
1	-11	1	88	25.5	216.75	216.75	229.5	160	160	0	0	1.00	1.00	1.00	9.00	No	0.720	0.000	0.000	0.000	0.720	0.720
1	-12	1	88	25.5	242.25	242.25	255	160	160	0	0	1.00	1.00	1.00	9.00	No	0.800	0.000	0.000	0.000	0.800	0.800
1	-13	1	88	25.5	267.75	267.75	280.5	160	160	0	0	1.00	1.00	1.00	9.00	No	0.880	0.000	0.000	0.000	0.880	0.880
1	-14	1	88	25.5	293.25	293.25	306	160	160	0	0	1.00	1.00	1.00	9.00	No	0.960	0.000	0.000	0.000	0.960	0.960
1	-15	1	88	25.5	318.75	318.75	331.5	160	160	0	0	1.00	1.00	1.00	9.00	No	1.040	0.000	0.000	0.000	1.040	1.040
2	-16	1	100	37.5	350.25	350.25	369	160	160	0	0	1.00	1.00	1.00	9.00	No	1.120	0.000	0.000	0.000	1.120	1.120
2	-17	1	100	37.5	387.75	387.75	406.5	160	160	0	0	1.00	1.00	1.00	9.00	No	1.200	0.000	0.000	0.000	1.200	1.200
2	-18	1	100	37.5	425.25	425.25	444	160	160	0	0	1.00	1.00	1.00	9.00	No	1.280	0.000	0.000	0.000	1.280	1.280
2	-19	1	100	37.5	462.75	462.75	481.5	160	160	0	0	1.00	1.00	1.00	9.00	No	1.360	0.000	0.000	0.000	1.360	1.360
2	-20	1	100	37.5	500.25	500.25	519	160	160	0	0	1.00	1.00	1.00	9.00	No	1.440	0.000	0.000	0.000	1.440	1.440
2	-21	1	100	37.5	537.75	537.75	556.5	160	160	0	0	1.00	1.00	1.00	9.00	No	1.520	0.000	0.000	0.000	1.520	1.520
2	-22	1	100	37.5	575.25	575.25	594	160	160	0	0	1.00	1.00	1.00	9.00	No	1.600	0.000	0.000	0.000	1.600	1.600
2	-23	1	100	37.5	612.75	612.75	631.5	160	160	0	0	1.00	1.00	1.00	9.00	No	1.680	0.000	0.000	0.000	1.680	1.680
3	-24	1	100	37.5	650.25	650.25	669	174.117645	167.058823	0	0	1.00	1.00	1.00	9.00	No	1.764	0.000	0.000	0.000	1.764	1.764
3	-25	1	100	37.5	687.75	687.75	706.5	188.235291	181.176468	0	0	1.00	1.00	1.00	9.00	No	1.854	0.000	0.000	0.000	1.854	1.854
3	-26	1	100	37.5	725.25	725.25	744	202.352936	195.294113	0	0	1.00	1.00	1.00	9.00	No	1.952	0.000	0.000	0.000	1.952	1.952
3	-27	1	100	37.5	762.75	762.75	781.5	216.470581	209.411758	0	0	1.00	1.00	1.00	9.00	No	2.056	0.000	0.000	0.000	2.056	2.056
3	-28	1	100	37.5	800.25	800.25	819	230.588242	223.529419	0	0	1.00	1.00	1.00	9.00	No	2.168	0.000	0.000	0.000	2.168	2.168
3	-29	1	100	37.5	837.75	837.75	856.5	244.705887	237.647064	0	0	1.00	1.00	1.00	9.00	No	2.287	0.000	0.000	0.000	2.287	2.287
3	-30	1	100	37.5	875.25	875.25	894	258.823517	251.764709	0	0	1.00	1.00	1.00	9.00	No	2.413	0.000	0.000	0.000	2.413	2.413
3	-31	1	100	37.5	912.75	912.75	931.5	272.941162	265.882324	0	0	1.00	1.00	1.00	9.00	No	2.546	0.000	0.000	0.000	2.546	2.546
3	-32	1	100	37.5	950.25	950.25	969	287.058838	280	0	0	1.00	1.00	1.00	9.00	No	2.686	0.000	0.000	0.000	2.686	2.686
3	-33	1	100	37.5	987.75	987.75	1006.5	301.176483	294.117676	0	0	1.00	1.00	1.00	9.00	No	2.833	0.000	0.000	0.000	2.833	2.833
3	-34	1	100	37.5	1025.25	1025.25	1044	315.294128	308.235291	0	0	1.00	1.00	1.00	9.00	No	2.987	0.000	0.000	0.000	2.987	2.987
3	-35	1	100	37.5	1062.75	1062.75	1081.5	329.411774	322.352966	0	0	1.00	1.00	1.00	9.00	No	3.148	0.000	0.000	0.000	3.148	3.148
3	-36	1	100	37.5	1100.25	1100.25	1119	343.529419	336.470581	0	0	1.00	1.00	1.00	9.00	No	3.316	0.000	0.000	0.000	3.316	3.316
3	-37	1	100	37.5	1137.75	1137.75	1156.5	357.647064	350.588257	0	0	1.00	1.00	1.00	9.00	No	3.492	0.000	0.000	0.000	3.492	3.492
3	-38	1	100	37.5	1175.25	1175.25	1194	371.764709	364.705872	0	0	1.00	1.00	1.00	9.00	No	3.674	0.000	0.000	0.000	3.674	3.674
3	-39	1	100	37.5	1212.75	1212.75	1231.5	385.882355	378.823547	0	0	1.00	1.00	1.00	9.00	No	3.864	0.000	0.000	0.000	3.864	3.864
3	-40	1	100	37.5	1250.25	1250.25	1269	400	392.941162	0	0	1.00	1.00	1.00	9.00	No	4.060	0.000	0.000	0.000	4.060	4.060
4	-41	1	102	39.5	1288.75	1288.75	1308.5	550	536.25	0	0	1.00	1.00	1.00	9.00	No	4.332	0.000	0.000	0.000	4.332	4.332
4	-42	1	102	39.5	1328.25	1328.25	1348	550	536.25	0	0	1.00	1.00	1.00	9.00	No	4.603	0.000	0.000	0.000	4.603	4.603
4	-43	1	102	39.5	1367.75	1367.75	1387.5	550	536.25	0	0	1.00	1.00	1.00	9.00	No	4.875	0.000	0.000	0.000	4.875	4.875
4	-44	1	102	39.5	1407.25	1407.25	1427	550	536.25	0	0	1.00	1.00	1.00	9.00	No	5.146	0.000	0.000	0.000	5.146	5.146
4	-45	1	102	39.5	1446.75	1446.75	1466.5	550	536.25	0	0	1.00	1.00	1.00	9.00	No	5.418	0.000	0.000	0.000	5.418	5.418
4	-46	1	102	39.5	1486.25	1486.25	1506	550	536.25	0	0	1.00	1.00	1.00	9.00	No	5.689	0.000	0.000	0.000	5.689	5.689
4	-47	1	102	39.5	1525.75	1525.75	1545.5	550	536.25	0	0	1.00	1.00	1.00	9.00	No	5.961	0.000	0.000	0.000	5.961	5.961
4	-48	1	102	39.5	1565.25	1565.25	1585	550	536.25	0	0	1.00	1.00	1.00	9.00	No	6.233	0.000	0.000	0.000	6.233	6.233
4	-49	1	102	39.5	1604.75	1604.75	1624.5	550	536.25	0	0	1.00	1.00	1.00	9.00	No	6.504	0.000	0.000	0.000	6.504	6.504
4	-50	1	102	39.5	1644.25	1644.25	1664	550	536.25	0	0	1.00	1.00	1.00	9.00	No	6.776	0.000	0.000	0.000	6.776	6.776
4	-51	1	102	39.5	1683.75	1683.75	1703.5	550	536.25	0	0	1.00	1.00	1.00	9.00	No	7.047	0.000	0.000	0.000	7.047	7.047
4	-52	1	102	39.5	1723.25	1723.25	1743	550	536.25	0	0	1.00	1.00	1.00	9.00	No	7.319	0.000	0.000	0.000	7.319	7.319
4	-53	1	102	39.5	1762.75	1762.75	1782.5	550	536.25	0	0	1.00	1.00	1.00	9.00	No	7.590	0.000	0.000	0.000	7.590	7.590
4	-54	1	102	39.5	1802.25	1802.25	1822	550	536.25	0	0	1.00	1.00	1.00	9.00	No	7.862	0.000	0.000	0.000	7.862	7.862
4	-55	1	102	39.5	1841.75	1841.75	1861.5	550	536.25	0	0	1.00	1.00	1.00	9.00	No	8.133	0.000	0.000	0.000	8.133	8.133
4	-56	1	102	39.5	1881.25	1881.25	1901	550	536.25	0	0	1.00	1.00	1.00	9.00	No	8.405	0.000	0.000	0.000	8.405	8.405
4	-57	1	102	39.5	1920.75	1920.75	1940.5	550	536.25	0	0	1.00	1.00	1.00	9.00	No	8.677	0.000	0.000	0.000	8.677	8.677
4	-58	1	102	39.5	1960.25	1960.25	1980	550	536.25	0	0	1.00	1.00	1.00	9.00	No	8.948	0.000	0.000	0.000	8.948	8.948
4	-59	1	102	39.5	1999.75	1999.75	2019.5	550	536.25	0	0	1.00	1.00	1.00	9.00	No	9.220	0.000	0.000	0.000	9.220	9.220
4	-60	1	102	39.5	2039.25	2039.25	2059	550	536.25	0	0	1.00	1.00	1.00	9.00	No	9.491	0.000	0.000	0.000	9.491	9.491

								Q-CASE															
Stratum	Tip	Increment	$\gamma_{(moist)}$	$\gamma_{(sub)}$	γh	Mid-layer γh (used)	Bottom γh (used)	Cohesion	Mid-Layer Adhesion	ϕ	δ	Kc	Kt	Nq	Nc	End Bearing	Coh./Adh Resistance	Friction Compression	Friction Tension	End Bearing	Pile Capacity Compression	Pile Capacity Tension
5	-61	1	102	39.5	2078.75	2078.75	2098.5	558.333313	539.149292	0	0	1.00	1.00	1.00	9.00	No	9.765	0.000	0.000	0.000	9.765	9.765
5	-62	1	102	39.5	2118.25	2118.25	2138	566.666687	544.913208	0	0	1.00	1.00	1.00	9.00	No	10.041	0.000	0.000	0.000	10.041	10.041
5	-63	1	102	39.5	2157.75	2157.75	2177.5	575	550.607666	0	0	1.00	1.00	1.00	9.00	No	10.322	0.000	0.000	0.000	10.322	10.322
5	-64	1	102	39.5	2197.25	2197.25	2217	583.333313	556.232666	0	0	1.00	1.00	1.00	9.00	No	10.606	0.000	0.000	0.000	10.606	10.606
5	-65	1	102	39.5	2236.75	2236.75	2256.5	591.666687	561.788208	0	0	1.00	1.00	1.00	9.00	No	10.893	0.000	0.000	0.000	10.893	10.893
5	-66	1	102	39.5	2276.25	2276.25	2296	600	567.274292	0	0	1.00	1.00	1.00	9.00	No	11.184	0.000	0.000	0.000	11.184	11.184
5	-67	1	102	39.5	2315.75	2315.75	2335.5	608.333313	572.690979	0	0	1.00	1.00	1.00	9.00	No	11.478	0.000	0.000	0.000	11.478	11.478
5	-68	1	102	39.5	2355.25	2355.25	2375	616.666687	578.038208	0	0	1.00	1.00	1.00	9.00	No	11.776	0.000	0.000	0.000	11.776	11.776
5	-69	1	102	39.5	2394.75	2394.75	2414.5	625	583.315979	0	0	1.00	1.00	1.00	9.00	No	12.077	0.000	0.000	0.000	12.077	12.077
5	-70	1	102	39.5	2434.25	2434.25	2454	633.333313	588.524292	0	0	1.00	1.00	1.00	9.00	No	12.381	0.000	0.000	0.000	12.381	12.381
5	-71	1	102	39.5	2473.75	2473.75	2493.5	641.666687	593.663208	0	0	1.00	1.00	1.00	9.00	No	12.689	0.000	0.000	0.000	12.689	12.689
5	-72	1	102	39.5	2513.25	2513.25	2533	650	598.732666	0	0	1.00	1.00	1.00	9.00	No	13.000	0.000	0.000	0.000	13.000	13.000
5	-73	1	102	39.5	2552.75	2552.75	2572.5	658.333313	603.732666	0	0	1.00	1.00	1.00	9.00	No	13.314	0.000	0.000	0.000	13.314	13.314
5	-74	1	102	39.5	2592.25	2592.25	2612	666.666687	608.663208	0	0	1.00	1.00	1.00	9.00	No	13.632	0.000	0.000	0.000	13.632	13.632
5	-75	1	102	39.5	2631.75	2631.75	2651.5	675	613.524292	0	0	1.00	1.00	1.00	9.00	No	13.953	0.000	0.000	0.000	13.953	13.953
6	-76	1	120	57.5	2680.25	2680.25	2709	0	0	30	0	1.25	0.70	22.50	0.00	No	13.953	0.484	0.271	0.000	14.437	14.224
6	-77	1	120	57.5	2737.75	2737.75	2766.5	0	0	30	0	1.25	0.70	22.50	0.00	No	13.953	0.978	0.547	0.000	14.931	14.501
6	-78	1	120	57.5	2795.25	2795.25	2824	0	0	30	0	1.25	0.70	22.50	0.00	No	13.953	1.482	0.830	0.000	15.435	14.783
6	-79	1	120	57.5	2852.75	2852.75	2881.5	0	0	30	0	1.25	0.70	22.50	0.00	No	13.953	1.997	1.118	0.000	15.950	15.071
6	-80	1	120	57.5	2910.25	2910.25	2939	0	0	30	0	1.25	0.70	22.50	0.00	No	13.953	2.522	1.412	0.000	16.475	15.365
6	-81	1	120	57.5	2967.75	2967.75	2996.5	0	0	30	0	1.25	0.70	22.50	0.00	No	13.953	3.057	1.712	0.000	17.010	15.665
6	-82	1	120	57.5	3025.25	3025.25	3054	0	0	30	0	1.25	0.70	22.50	0.00	No	13.953	3.603	2.018	0.000	17.556	15.971
6	-83	1	120	57.5	3082.75	3082.75	3111.5	0	0	30	0	1.25	0.70	22.50	0.00	No	13.953	4.159	2.329	0.000	18.112	16.282
6	-84	1	120	57.5	3140.25	3140.25	3169	0	0	30	0	1.25	0.70	22.50	0.00	No	13.953	4.726	2.646	0.000	18.679	16.600
6	-85	1	120	57.5	3197.75	3197.75	3226.5	0	0	30	0	1.25	0.70	22.50	0.00	No	13.953	5.303	2.969	0.000	19.256	16.923
6	-86	1	120	57.5	3255.25	3255.25	3284	0	0	30	0	1.25	0.70	22.50	0.00	No	13.953	5.890	3.298	0.000	19.843	17.252
6	-87	1	120	57.5	3312.75	3312.75	3341.5	0	0	30	0	1.25	0.70	22.50	0.00	No	13.953	6.488	3.633	0.000	20.441	17.586
6	-88	1	120	57.5	3370.25	3370.25	3399	0	0	30	0	1.25	0.70	22.50	0.00	No	13.953	7.096	3.974	0.000	21.049	17.927
6	-89	1	120	57.5	3427.75	3427.75	3456.5	0	0	30	0	1.25	0.70	22.50	0.00	No	13.953	7.714	4.320	0.000	21.667	18.273
6	-90	1	120	57.5	3485.25	3485.25	3500	0	0	30	0	1.25	0.70	22.50	0.00	No	13.953	8.343	4.672	0.000	22.296	18.625
6	-91	1	120	57.5	3542.75	3500	3500	0	0	30	0	1.25	0.70	22.50	0.00	No	13.953	8.974	5.026	0.000	22.928	18.979
6	-92	1	120	57.5	3600.25	3500	3500	0	0	30	0	1.25	0.70	22.50	0.00	No	13.953	9.606	5.379	0.000	23.559	19.333
6	-93	1	120	57.5	3657.75	3500	3500	0	0	30	0	1.25	0.70	22.50	0.00	No	13.953	10.237	5.733	0.000	24.191	19.686
6	-94	1	120	57.5	3715.25	3500	3500	0	0	30	0	1.25	0.70	22.50	0.00	No	13.953	10.869	6.087	0.000	24.822	20.040
6	-95	1	120	57.5	3772.75	3500	3500	0	0	30	0	1.25	0.70	22.50	0.00	No	13.953	11.500	6.440	0.000	25.454	20.394
6	-96	1	120	57.5	3830.25	3500	3500	0	0	30	0	1.25	0.70	22.50	0.00	No	13.953	12.132	6.794	0.000	26.085	20.747
6	-97	1	120	57.5	3887.75	3500	3500	0	0	30	0	1.25	0.70	22.50	0.00	No	13.953	12.763	7.147	0.000	26.717	21.101
6	-98	1	120	57.5	3945.25	3500	3500	0	0	30	0	1.25	0.70	22.50	0.00	No	13.953	13.395	7.501	0.000	27.348	21.454
6	-99	1	120	57.5	4002.75	3500	3500	0	0	30	0	1.25	0.70	22.50	0.00	No	13.953	14.026	7.855	0.000	27.980	21.808
6	-100	1	120	57.5	4060.25	3500	3500	0	0	30	0	1.25	0.70	22.50	0.00	No	13.953	14.658	8.208	0.000	28.611	22.162

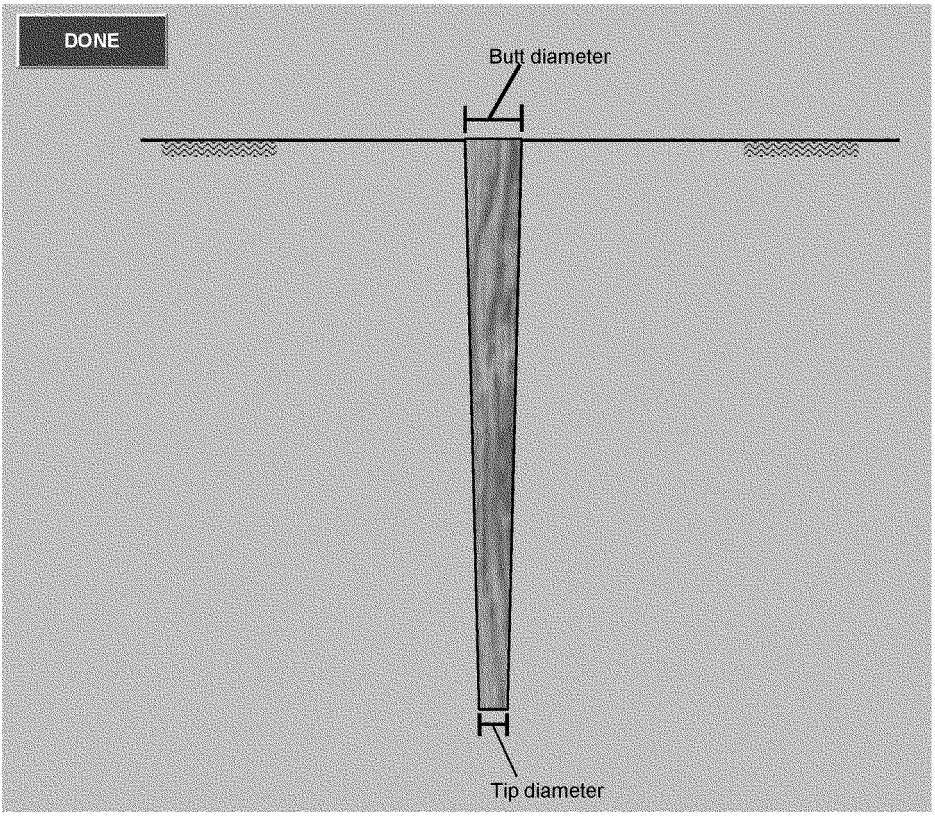
								S-CASE															
Stratum	Tip	Increment	$\gamma_{(moist)}$	$\gamma_{(sub)}$	γh	Mid-layer γh (used)	Bottom γh (used)	Cohesion	Mid-Layer Adhesion	ϕ	δ	Kc	Kt	Nq	Nc	End Bearing	Coh./Adh Resistance	Friction Compression	Friction Tension	End Bearing	Pile Capacity Compression	Pile Capacity Tension
1	-2	0	88	25.5	0	0	0	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.000	0.000	0.000	0.000	0.000
1	-3	1	88	25.5	12.75	12.75	25.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.002	0.002	0.000	0.002	0.002
1	-4	1	88	25.5	38.25	38.25	51	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.009	0.006	0.000	0.009	0.006
1	-5	1	88	25.5	63.75	63.75	76.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.020	0.014	0.000	0.020	0.014
1	-6	1	88	25.5	89.25	89.25	102	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.035	0.025	0.000	0.035	0.025
1	-7	1	88	25.5	114.75	114.75	127.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.055	0.039	0.000	0.055	0.039
1	-8	1	88	25.5	140.25	140.25	153	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.079	0.056	0.000	0.079	0.056
1	-9	1	88	25.5	165.75	165.75	178.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.108	0.076	0.000	0.108	0.076
1	-10	1	88	25.5	191.25	191.25	204	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.141	0.099	0.000	0.141	0.099
1	-11	1	88	25.5	216.75	216.75	229.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.179	0.125	0.000	0.179	0.125
1	-12	1	88	25.5	242.25	242.25	255	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.221	0.154	0.000	0.221	0.154
1	-13	1	88	25.5	267.75	267.75	280.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.267	0.187	0.000	0.267	0.187
1	-14	1	88	25.5	293.25	293.25	306	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.318	0.222	0.000	0.318	0.222
1	-15	1	88	25.5	318.75	318.75	331.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.373	0.261	0.000	0.373	0.261
2	-16	1	100	37.5	350.25	350.25	369	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.434	0.304	0.000	0.434	0.304
2	-17	1	100	37.5	387.75	387.75	406.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.501	0.351	0.000	0.501	0.351
2	-18	1	100	37.5	425.25	425.25	444	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.574	0.402	0.000	0.574	0.402
2	-19	1	100	37.5	462.75	462.75	481.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.654	0.458	0.000	0.654	0.458
2	-20	1	100	37.5	500.25	500.25	519	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.741	0.519	0.000	0.741	0.519
2	-21	1	100	37.5	537.75	537.75	556.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.834	0.584	0.000	0.834	0.584
2	-22	1	100	37.5	575.25	575.25	594	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	0.934	0.654	0.000	0.934	0.654
2	-23	1	100	37.5	612.75	612.75	631.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	1.040	0.728	0.000	1.040	0.728
3	-24	1	100	37.5	650.25	650.25	669	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	1.152	0.807	0.000	1.152	0.807
3	-25	1	100	37.5	687.75	687.75	706.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	1.271	0.890	0.000	1.271	0.890
3	-26	1	100	37.5	725.25	725.25	744	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	1.397	0.978	0.000	1.397	0.978
3	-27	1	100	37.5	762.75	762.75	781.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	1.529	1.070	0.000	1.529	1.070
3	-28	1	100	37.5	800.25	800.25	819	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	1.668	1.167	0.000	1.668	1.167
3	-29	1	100	37.5	837.75	837.75	856.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	1.813	1.269	0.000	1.813	1.269
3	-30	1	100	37.5	875.25	875.25	894	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	1.964	1.375	0.000	1.964	1.375
3	-31	1	100	37.5	912.75	912.75	931.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	2.122	1.485	0.000	2.122	1.485
3	-32	1	100	37.5	950.25	950.25	969	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	2.287	1.601	0.000	2.287	1.601
3	-33	1	100	37.5	987.75	987.75	1006.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	2.458	1.720	0.000	2.458	1.720
3	-34	1	100	37.5	1025.25	1025.25	1044	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	2.635	1.845	0.000	2.635	1.845
3	-35	1	100	37.5	1062.75	1062.75	1081.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	2.819	1.973	0.000	2.819	1.973
3	-36	1	100	37.5	1100.25	1100.25	1119	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	3.009	2.107	0.000	3.009	2.107
3	-37	1	100	37.5	1137.75	1137.75	1156.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	3.208	2.244	0.000	3.208	2.244
3	-38	1	100	37.5	1175.25	1175.25	1194	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	3.410	2.387	0.000	3.410	2.387
3	-39	1	100	37.5	1212.75	1212.75	1231.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	3.620	2.534	0.000	3.620	2.534
3	-40	1	100	37.5	1250.25	1250.25	1269	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	3.836	2.685	0.000	3.836	2.685
4	-41	1	102	39.5	1288.75	1288.75	1308.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	4.059	2.842	0.000	4.059	2.842
4	-42	1	102	39.5	1328.25	1328.25	1348	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	4.289	3.002	0.000	4.289	3.002
4	-43	1	102	39.5	1367.75	1367.75	1387.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	4.526	3.168	0.000	4.526	3.168
4	-44	1	102	39.5	1407.25	1407.25	1427	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	4.770	3.339	0.000	4.770	3.339
4	-45	1	102	39.5	1446.75	1446.75	1466.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	5.020	3.514	0.000	5.020	3.514
4	-46	1	102	39.5	1486.25	1486.25	1506	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	5.277	3.694	0.000	5.277	3.694
4	-47	1	102	39.5	1525.75	1525.75	1545.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	5.541	3.879	0.000	5.541	3.879
4	-48	1	102	39.5	1565.25	1565.25	1585	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	5.812	4.069	0.000	5.812	4.069
4	-49	1	102	39.5	1604.75	1604.75	1624.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	6.090	4.263	0.000	6.090	4.263
4	-50	1	102	39.5	1644.25	1644.25	1664	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	6.375	4.462	0.000	6.375	4.462
4	-51	1	102	39.5	1683.75	1683.75	1703.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	6.666	4.666	0.000	6.666	4.666
4	-52	1	102	39.5	1723.25	1723.25	1743	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	6.965	4.875	0.000	6.965	4.875
4	-53	1	102	39.5	1762.75	1762.75	1782.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	7.270	5.089	0.000	7.270	5.089
4	-54	1	102	39.5	1802.25	1802.25	1822	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	7.582	5.307	0.000	7.582	5.307
4	-55	1	102	39.5	1841.75	1841.75	1861.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	7.901	5.530	0.000	7.901	5.530
4	-56	1	102	39.5	1881.25	1881.25	1901	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	8.226	5.758	0.000	8.226	5.758
4	-57	1	102	39.5	1920.75	1920.75	1940.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	8.559	5.991	0.000	8.559	5.991
4	-58	1	102	39.5	1960.25	1960.25	1980	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	8.898	6.229	0.000	8.898	6.229
4	-59	1	102	39.5	1999.75	1999.75	2019.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	9.244	6.471	0.000	9.244	6.471
4	-60	1	102	39.5	2039.25	2039.25	2059	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	9.597	6.718	0.000	9.597	6.718

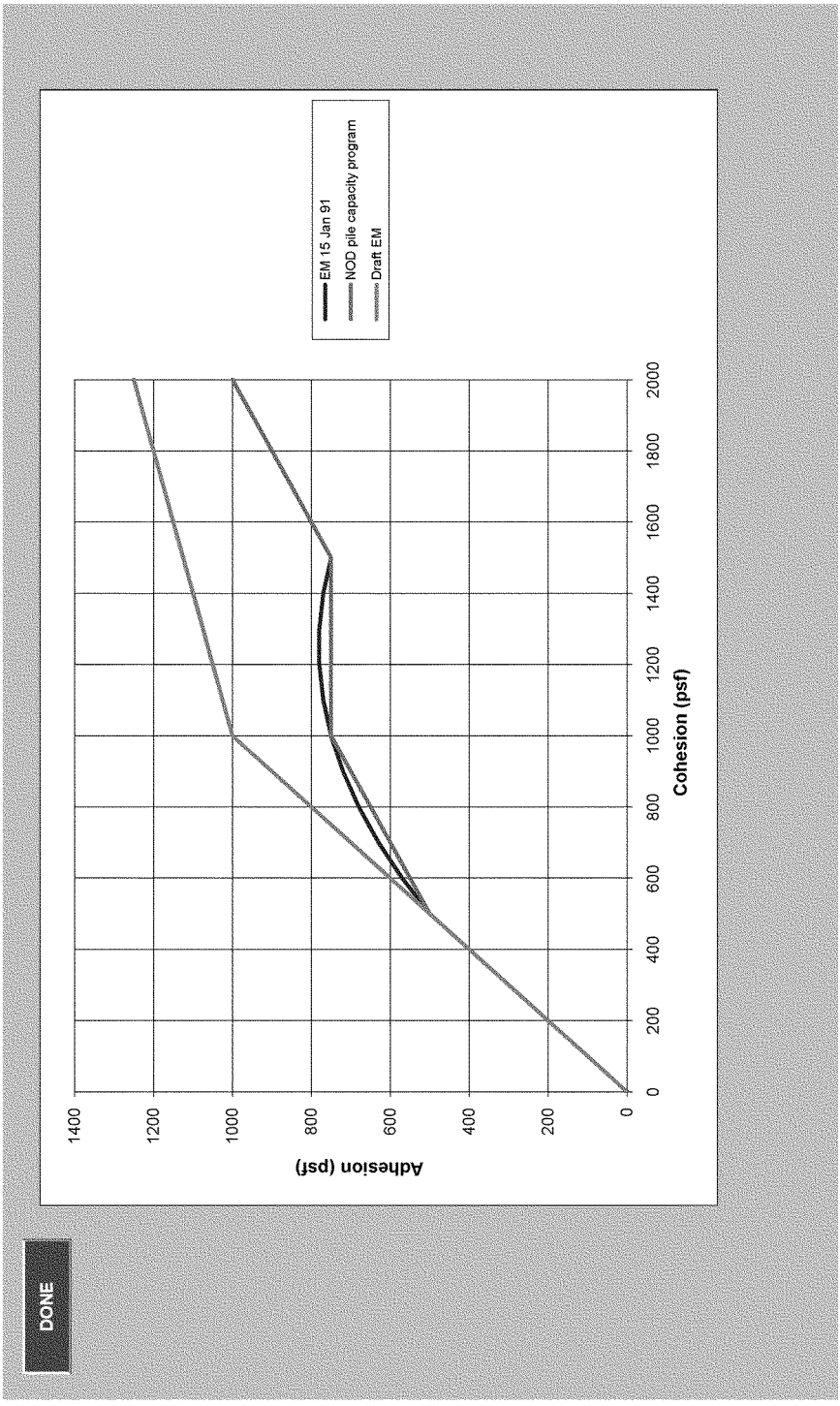
									S-CASE														
Stratum	Tip	Increment	$\gamma_{(mm/cal)}$	$\gamma_{(sub)}$	γh	Mid-layer γh (used)	Bottom γh (used)	Cohesion	Mid-Layer Adhesion	ϕ	δ	Kc	Kt	Nq	Nc	End Bearing	Coh./Adh Resistance	Friction Compression	Friction Tension	End Bearing	Pile Capacity Compression	Pile Capacity Tension
5	-61	1	102	39.5	2078.75	2078.75	2098.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	9.957	6.970	0.000	9.957	6.970
5	-62	1	102	39.5	2118.25	2118.25	2138	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	10.324	7.227	0.000	10.324	7.227
5	-63	1	102	39.5	2157.75	2157.75	2177.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	10.697	7.488	0.000	10.697	7.488
5	-64	1	102	39.5	2197.25	2197.25	2217	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	11.078	7.754	0.000	11.078	7.754
5	-65	1	102	39.5	2236.75	2236.75	2256.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	11.465	8.025	0.000	11.465	8.025
5	-66	1	102	39.5	2276.25	2276.25	2296	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	11.859	8.301	0.000	11.859	8.301
5	-67	1	102	39.5	2315.75	2315.75	2335.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	12.260	8.582	0.000	12.260	8.582
5	-68	1	102	39.5	2355.25	2355.25	2375	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	12.667	8.867	0.000	12.667	8.867
5	-69	1	102	39.5	2394.75	2394.75	2414.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	13.082	9.157	0.000	13.082	9.157
5	-70	1	102	39.5	2434.25	2434.25	2454	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	13.503	9.452	0.000	13.503	9.452
5	-71	1	102	39.5	2473.75	2473.75	2493.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	13.932	9.752	0.000	13.932	9.752
5	-72	1	102	39.5	2513.25	2513.25	2533	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	14.367	10.057	0.000	14.367	10.057
5	-73	1	102	39.5	2552.75	2552.75	2572.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	14.808	10.366	0.000	14.808	10.366
5	-74	1	102	39.5	2592.25	2592.25	2612	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	15.257	10.680	0.000	15.257	10.680
5	-75	1	102	39.5	2631.75	2631.75	2651.5	0	0	23	15	1.00	0.70	10.00	0.00	No	0.000	15.713	10.999	0.000	15.713	10.999
6	-76	1	120	57.5	2680.25	2680.25	2709	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	16.421	11.395	0.000	16.421	11.395
6	-77	1	120	57.5	2737.75	2737.75	2766.5	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	17.144	11.800	0.000	17.144	11.800
6	-78	1	120	57.5	2795.25	2795.25	2824	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	17.882	12.214	0.000	17.882	12.214
6	-79	1	120	57.5	2852.75	2852.75	2881.5	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	18.636	12.636	0.000	18.636	12.636
6	-80	1	120	57.5	2910.25	2910.25	2939	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	19.405	13.066	0.000	19.405	13.066
6	-81	1	120	57.5	2967.75	2967.75	2996.5	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	20.189	13.505	0.000	20.189	13.505
6	-82	1	120	57.5	3025.25	3025.25	3054	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	20.988	13.953	0.000	20.988	13.953
6	-83	1	120	57.5	3082.75	3082.75	3111.5	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	21.802	14.409	0.000	21.802	14.409
6	-84	1	120	57.5	3140.25	3140.25	3169	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	22.632	14.874	0.000	22.632	14.874
6	-85	1	120	57.5	3197.75	3197.75	3226.5	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	23.476	15.347	0.000	23.476	15.347
6	-86	1	120	57.5	3255.25	3255.25	3284	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	24.336	15.828	0.000	24.336	15.828
6	-87	1	120	57.5	3312.75	3312.75	3341.5	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	25.211	16.318	0.000	25.211	16.318
6	-88	1	120	57.5	3370.25	3370.25	3399	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	26.102	16.817	0.000	26.102	16.817
6	-89	1	120	57.5	3427.75	3427.75	3456.5	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	27.007	17.324	0.000	27.007	17.324
6	-90	1	120	57.5	3485.25	3485.25	3500	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	27.928	17.839	0.000	27.928	17.839
6	-91	1	120	57.5	3542.75	3500	3500	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	28.852	18.357	0.000	28.852	18.357
6	-92	1	120	57.5	3600.25	3500	3500	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	29.777	18.875	0.000	29.777	18.875
6	-93	1	120	57.5	3657.75	3500	3500	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	30.701	19.393	0.000	30.701	19.393
6	-94	1	120	57.5	3715.25	3500	3500	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	31.626	19.910	0.000	31.626	19.910
6	-95	1	120	57.5	3772.75	3500	3500	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	32.550	20.428	0.000	32.550	20.428
6	-96	1	120	57.5	3830.25	3500	3500	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	33.475	20.946	0.000	33.475	20.946
6	-97	1	120	57.5	3887.75	3500	3500	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	34.400	21.464	0.000	34.400	21.464
6	-98	1	120	57.5	3945.25	3500	3500	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	35.324	21.981	0.000	35.324	21.981
6	-99	1	120	57.5	4002.75	3500	3500	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	36.249	22.499	0.000	36.249	22.499
6	-100	1	120	57.5	4060.25	3500	3500	0	0	30	15	1.25	0.70	22.50	0.00	No	0.000	37.173	23.017	0.000	37.173	23.017


Q-CASE CAPACITY
Compression
Tension
Elevation (ft)
0
-20
-40
-60
-80
-100
-120
0
5
10
15
20
25
30
35
Capacity (Tons)


S-CASE CAPACITY
Compression
Tension
Elevation (ft)
Capacity (Tons)
0
-20
-40
-60
-80
-100
-120
0
5
10
15
20
25
30
35
40

EL	SOIL TYPE	Q-CASE				S-CASE			
		Kc	Kt	Nc	Nq	Kc	Kt	Nc	Nq
-20	CH	1	1	9	1	1	0.7	0	10
-28	CH	1	1	9	1	1	0.7	0	10
-35	CH	1	1	9	1	1	0.7	0	10
-48	CH	1	1	9	1	1	0.7	0	10
-60	CH	1	1	9	1	1	0.7	0	10
-90	SP	1.25	0.7	0	22.5	1	0.7	0	10


DONE
Butt diameter
Tip diameter


DONE
EM 15 Jan 91
NOD pile capacity program
Draft EM
Adhesion (psf)
Cohesion (psf)
0
200
400
600
800
1000
1200
1400
1600
1800
2000

ANNEX 10

COST ESTIMATES

****** TOTAL PROJECT COST SUMMARY ******

PROJECT: MRGO Ecosystem Restoration
LOCATION: St. Bernard and Orleans Parishes, LA

DISTRICT: MVN New Orleans District PREPARED: 3/9/2012
POC: CHIEF, COST ENGINEERING, THOMAS D. MURPHY, PE

This Estimate reflects the scope and schedule in report;

Program Year (Budget EC): 2013
Effective Price Level Date: 1 OCT 12

WBS NUMBER	Civil Works Feature & Sub-Feature Description	ESTIMATED COST COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	PROJECT FIRST COST ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	TOTAL PROJECT COST (FULLY FUNDED) Spent Thru: 1-Oct-11 ($K)		COST ($K)	CNTG ($K)	FULL ($K)
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
02	RELOCATIONS					-								
06	FISH & WILDLIFE FACILITIES INITIAL CONST.	$107,536	$26,454	24.6%	$133,990	1.9%	$109,532	$26,945	**$136,477**			$131,692	$32,396	$164,088
06	FISH & WILDLIFE FACILITIES A&M	$89,100	$53,015	59.5%	$142,115	1.9%	$90,754	$53,998	**$144,752**			$122,012	$72,597	$194,610
14	RECREATION FACILITIES	$3,501	$861	24.6%	$4,362	1.9%	$3,566	$877	**$4,443**			$3,825	$941	$4,766
17	BEACH REPLENISHMENT	$1,750,855	$430,710	24.6%	$2,181,565	1.9%	$1,783,352	$438,705	**$2,222,056**			$2,039,969	$501,832	$2,541,801
	CONSTRUCTION ESTIMATE TOTALS:	$1,950,992	$511,040		**$2,462,032**	1.9%	$1,987,204	$520,525	**$2,507,729**			$2,297,498	$607,767	**$2,905,265**
01	LANDS AND DAMAGES	$75,888	$23,172	30.5%	$99,060		$75,888	$23,172	**$99,060**			$75,888	$23,172	$99,060
30	PLANNING, ENGINEERING & DESIGN	$77,598	$19,089	24.6%	$96,687	1.4%	$78,675	$19,354	**$98,030**			$98,080	$24,128	$122,208
30	PLANNING, ENGINEERING & DESIGN A&M	$21,761	$12,948	59.5%	$34,709	1.4%	$22,063	$13,128	**$35,191**			$32,777	$19,502	$52,279
31	CONSTRUCTION MANAGEMENT	$106,416	$26,178	24.6%	$132,594	1.4%	$107,894	$26,542	**$134,435**			$141,334	$34,768	$176,102
31	CONSTRUCTION MANAGEMENT A&M	$6,000	$3,570	59.5%	$9,570	1.4%	$6,083	$3,620	**$9,703**			$10,494	$6,244	$16,739
	PROJECT COST TOTALS:	$2,238,855	$595,997	26.6%	**$2,834,652**	1.7%	$2,277,807	$606,340	**$2,884,147**			$2,656,071	$715,581	$3,371,652

CHIEF, COST ENGINEERING, THOMAS D. MURPHY, PE

PROJECT MANAGER, DARREL BROUSSARD

CHIEF, REAL ESTATE, LINDA LABURE

ESTIMATED FEDERAL COST:	65%	**$2,188,476**
ESTIMATED NON-FEDERAL COST:	35%	**$1,178,410**
RECREATION FACILITIES FEDERAL COST:	50%	**$2,383**
RECREATION FACILITIES NON-FEDERAL COST:	50%	**$2,383**
ESTIMATED TOTAL PROJECT COST:		**$3,371,652**

****** CONTRACT COST SUMMARY ******

PROJECT: MRGO Ecosystem Restoration
LOCATION: St. Bernard and Orleans Parishes, LA
This Estimate reflects the scope and schedule in report;

DISTRICT: MVN New Orleans District PREPARED: 3/9/2012
POC: CHIEF, COST ENGINEERING, THOMAS D. MURPHY, PE

Filename: REVTPCS_MRGO-May2012 REVIEW by JGN.xlsx
TPCS

**** CONTRACT COST SUMMARY ****

PROJECT: MRGO Ecosystem Restoration
LOCATION: St. Bernard and Orleans Parishes, LA
This Estimate reflects the scope and schedule in report;

DISTRICT: MVN New Orleans District PREPARED: 3/9/2012
POC: CHIEF, COST ENGINEERING, THOMAS D. MURPHY, PE

Estimate Prepared: 9-Nov-11
Effective Price Level: 1-Oct-11

Program Year (Budget EC): 2013
Effective Price Level Date: 1 OCT 12

WBS NUMBER	Civil Works Feature & Sub-Feature Description	RISK BASED COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	FULLY FUNDED PROJECT ESTIMATE Mid-Point Date	ESC (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	B	C	D	E	F	G	H	I	J	P	L	M	N	O
	FY14													
02	RELOCATIONS													
06	FISH & WILDLIFE FACILITIES/INITIAL CONST.	$15,640	$3,847	24.6%	$19,487	1.9%	$15,930	$3,919	$19,849	2016Q1	5.2%	$16,756	$4,122	$20,878
14	RECREATION FACILITIES	$1,466	$361	24.6%	$1,827	1.9%	$1,493	$367	$1,861	2014Q4	2.8%	$1,535	$378	$1,913
17	BEACH REPLENISHMENT	$219,484	$53,993	24.6%	$273,477	1.9%	$223,558	$54,995	$278,553	2014Q4	2.8%	$229,820	$56,536	$286,356
	CONSTRUCTION ESTIMATE TOTALS:	$236,590	$58,201	24.6%	**$294,791**		$240,981	$59,281	$300,263			$248,112	$61,035	$309,147
01	LANDS AND DAMAGES	$6,324	$1,931	30.5%	$8,255		$6,324	$1,931	$8,255	2013Q3		$6,324	$1,931	$8,255
30	PLANNING, ENGINEERING & DESIGN													
4.1%	30 Account - All Offices included	$9,655	$2,375	24.6%	$12,030	1.4%	$9,789	$2,408	$12,197	2013Q3	1.2%	$9,909	$2,438	$12,346
31	CONSTRUCTION MANAGEMENT													
5.9%	Construction Management	$14,045	$3,455	24.6%	$17,500	1.4%	$14,240	$3,503	$17,743	2014Q4	5.8%	$15,072	$3,708	$18,780
	CONTRACT COST TOTALS:	$266,614	$65,962		**$332,576**		$271,334	$67,124	$338,458			$279,417	$69,112	**$348,529**

**** CONTRACT COST SUMMARY ****

PROJECT: MRGO Ecosystem Restoration
LOCATION: St. Bernard and Orleans Parishes, LA
This Estimate reflects the scope and schedule in report;

DISTRICT: MVN New Orleans District PREPARED: 3/9/2012
POC: CHIEF, COST ENGINEERING, THOMAS D. MURPHY, PE

Estimate Prepared: 9-Nov-11
Effective Price Level: 1-Oct-11

Program Year (Budget EC): 2013
Effective Price Level Date: 1 OCT 12

WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	FULLY FUNDED PROJECT ESTIMATE Mid-Point Date	ESC (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	B	C	D	E	F	G	H	I	J	P	L	M	N	O
	FY15													
02	RELOCATIONS													
06	FISH & WILDLIFE FACILITIES/INITIAL CONST.	$1,753	$431	24.6%	$2,184	1.9%	$1,786	$439	$2,225	2017Q1	7.1%	$1,912	$470	$2,382
17	BEACH REPLENISHMENT	$144,954	$35,659	24.6%	$180,613	1.9%	$147,644	$36,321	$183,965	2017Q2	7.6%	$158,812	$39,068	$197,880
	CONSTRUCTION ESTIMATE TOTALS:	$146,707	$36,090	24.6%	**$182,797**		$149,430	$36,760	$186,190			$160,724	$39,538	$200,262
01	LANDS AND DAMAGES	$6,324	$1,931	30.5%	$8,255		$6,324	$1,931	$8,255	2014Q3		$6,324	$1,931	$8,255
30	PLANNING, ENGINEERING & DESIGN													
4.5%	30 Account - All Offices included	$6,659	$1,638	24.6%	$8,297	1.4%	$6,751	$1,661	$8,412	2014Q3	4.8%	$7,077	$1,741	$8,818
31	CONSTRUCTION MANAGEMENT													
6.2%	Construction Management	$9,038	$2,223	24.6%	$11,261	1.4%	$9,163	$2,254	$11,418	2017Q2	16.3%	$10,658	$2,622	$13,280
	CONTRACT COST TOTALS:	$168,728	$41,882		**$210,610**		$171,669	$42,606	$214,275			$184,783	$45,832	**$230,615**

Filename: REVTPCS_MRGO-May2012 REVIEW by JGN.xlsx
TPCS

**** CONTRACT COST SUMMARY ****

PROJECT: MRGO Ecosystem Restoration
LOCATION: St. Bernard and Orleans Parishes, LA
This Estimate reflects the scope and schedule in report;

DISTRICT: MVN New Orleans District PREPARED: 3/9/2012
POC: CHIEF, COST ENGINEERING, THOMAS D. MURPHY, PE

Estimate Prepared: 9-Nov-11
Effective Price Level: 1-Oct-11

Program Year (Budget EC): 2013
Effective Price Level Date: 1 OCT 12

WBS NUMBER	Civil Works Feature & Sub-Feature Description	RISK BASED COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	FULLY FUNDED PROJECT ESTIMATE Mid-Point Date	ESC (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	B	C	D	E	F	G	H	I	J	P	L	M	N	O
	FY16													
02	RELOCATIONS													
06	FISH & WILDLIFE FACILITIES/INITIAL CONST.													
17	BEACH REPLENISHMENT	$12,732	$3,132	24.6%	$15,864	1.9%	$12,968	$3,190	$16,159	2017Q1	7.1%	$13,886	$3,416	$17,302
	CONSTRUCTION ESTIMATE TOTALS:	$12,732	$3,132	24.6%	**$15,864**		$12,968	$3,190	$16,159			$13,886	$3,416	$17,302
01	LANDS AND DAMAGES	$6,324	$1,931	30.5%	$8,255		$6,324	$1,931	$8,255	2015Q3		$6,324	$1,931	$8,255
30	PLANNING, ENGINEERING & DESIGN													
6.0%	30 Account - All Offices included	$764	$188	24.6%	$952	1.4%	$775	$191	$965	2015Q3	9.0%	$844	$208	$1,052
31	CONSTRUCTION MANAGEMENT													
8.0%	Construction Management	$1,019	$251	24.6%	$1,270	1.4%	$1,033	$254	$1,287	2017Q1	15.3%	$1,191	$293	$1,484
	CONTRACT COST TOTALS:	$20,839	$5,502		**$26,341**		$21,100	$5,566	$26,666			$22,245	$5,848	**$28,093**

**** CONTRACT COST SUMMARY ****

PROJECT: MRGO Ecosystem Restoration
LOCATION: St. Bernard and Orleans Parishes, LA
This Estimate reflects the scope and schedule in report;

DISTRICT: MVN New Orleans District PREPARED: 3/9/2012
POC: CHIEF, COST ENGINEERING, THOMAS D. MURPHY, PE

Estimate Prepared: 9-Nov-11
Effective Price Level: 1-Oct-11

Program Year (Budget EC): 2013
Effective Price Level Date: 1 OCT 12

WBS NUMBER	Civil Works Feature & Sub-Feature Description	RISK BASED COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	FULLY FUNDED PROJECT ESTIMATE Mid-Point Date	ESC (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	B	C	D	E	F	G	H	I	J	P	L	M	N	O
	FY17													
02	RELOCATIONS													
06	FISH & WILDLIFE FACILITIES/INITIAL CONST.													
17	BEACH REPLENISHMENT	$59,966	$14,752	24.6%	$74,718	1.9%	$61,079	$15,025	$76,104	2018Q1	9.0%	$66,580	$16,379	$82,958
	CONSTRUCTION ESTIMATE TOTALS:	$59,966	$14,752	24.6%	**$74,718**		$61,079	$15,025	$76,104			$66,580	$16,379	$82,958
01	LANDS AND DAMAGES	$6,324	$1,931	30.5%	$8,255		$6,324	$1,931	$8,255	2016Q3		$6,324	$1,931	$8,255
30	PLANNING, ENGINEERING & DESIGN													
4.6%	30 Account - All Offices included	$2,779	$684	24.6%	$3,463	1.4%	$2,818	$693	$3,511	2016Q3	13.2%	$3,188	$784	$3,973
31	CONSTRUCTION MANAGEMENT													
6.6%	Construction Management	$3,978	$979	24.6%	$4,957	1.4%	$4,033	$992	$5,025	2018Q1	19.5%	$4,818	$1,185	$6,004
	Project Operation:			24.6%										
	Project Management			24.6%										
	CONTRACT COST TOTALS:	$73,047	$18,345		**$91,392**		$74,254	$18,642	$92,896			$80,910	$20,279	**$101,190**

1080

**** CONTRACT COST SUMMARY ****

PROJECT: MRGO Ecosystem Restoration
LOCATION: St. Bernard and Orleans Parishes, LA
This Estimate reflects the scope and schedule in report;

DISTRICT: MVN New Orleans District PREPARED: 3/9/2012
POC: CHIEF, COST ENGINEERING, THOMAS D. MURPHY, PE

Estimate Prepared: 9-Nov-11
Effective Price Level: 1-Oct-11

Program Year (Budget EC): 2013
Effective Price Level Date: 1 OCT 12

WBS NUMBER	Civil Works Feature & Sub-Feature Description	RISK BASED COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	FULLY FUNDED PROJECT ESTIMATE Mid-Point Date	ESC (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	B	C	D	E	F	G	H	I	J	P	L	M	N	O
	FY18													
02	RELOCATIONS													
06	FISH & WILDLIFE FACILITIES/INITIAL CONST.	$15,560	$3,828	24.6%	$19,388	1.9%	$15,849	$3,899	$19,748	2020Q4	14.5%	$18,147	$4,464	$22,611
14	RECREATION FACILITIES	$2,035	$501	24.6%	$2,536	1.9%	$2,073	$510	$2,583	2018Q4	10.5%	$2,290	$563	$2,854
17	BEACH REPLENISHMENT	$326,632	$80,351	24.6%	$406,983	1.9%	$332,694	$81,843	$414,537	2018Q4	10.5%	$367,586	$90,426	$458,012
	CONSTRUCTION ESTIMATE TOTALS:	$344,227	$84,680	24.6%	**$428,907**		$350,616	$86,252	$436,868			$388,023	$95,454	$483,477
01	LANDS AND DAMAGES	$6,324	$1,931	30.5%	$8,255		$6,324	$1,931	$8,255	2017Q3		$6,324	$1,931	$8,255
30	PLANNING, ENGINEERING & DESIGN													
4.3%	30 Account - All Offices included	$14,679	$3,611	24.6%	$18,290	1.4%	$14,883	$3,661	$18,544	2017Q3	17.4%	$17,467	$4,297	$21,764
31	CONSTRUCTION MANAGEMENT													
5.0%	Construction Management	$17,288	$4,253	24.6%	$21,541	1.4%	$17,528	$4,312	$21,840	2018Q4	22.6%	$21,493	$5,287	$26,781
	CONTRACT COST TOTALS:	$382,518	$94,475		**$476,993**		$389,351	$96,156	$485,507			$433,307	$106,969	**$540,276**

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****** TOTAL PROJECT COST SUMMARY ******

****** CONTRACT COST SUMMARY ******

PROJECT: MRGO Ecosystem Restoration
LOCATION: St. Bernard and Orleans Parishes, LA
This Estimate reflects the scope and schedule in report;

DISTRICT: MVN New Orleans District PREPARED: 3/9/2012
POC: CHIEF, COST ENGINEERING, THOMAS D. MURPHY, PE

Estimate Prepared: 9-Nov-11
Effective Price Level: 1-Oct-11

Program Year (Budget EC): 2013
Effective Price Level Date: 1 OCT 12

WBS NUMBER	Civil Works Feature & Sub-Feature Description	RISK BASED COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	FULLY FUNDED PROJECT ESTIMATE Mid-Point Date	ESC (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*P*	*L*	*M*	*N*	*O*
	FY19													
02	RELOCATIONS													
06	FISH & WILDLIFE FACILITIES/INITIAL CONST.	$7,458	$1,835	24.6%	$9,293	1.9%	$7,596	$1,869	$9,465	2021Q2	15.5%	$8,775	$2,159	$10,934
17	BEACH REPLENISHMENT	$105,280	$25,899	24.6%	$131,179	1.9%	$107,234	$26,380	$133,614	2019Q3	12.0%	$120,074	$29,538	$149,612
	CONSTRUCTION ESTIMATE TOTALS:	$112,738	$27,734	24.6%	**$140,472**		$114,830	$28,248	$143,079			$128,849	$31,697	$160,546
01	LANDS AND DAMAGES	$6,324	$1,931	30.5%	$8,255		$6,324	$1,931	$8,255	2018Q3		$6,324	$1,931	$8,255
30	PLANNING, ENGINEERING & DESIGN													
3.2%	30 Account - All Offices included	$3,638	$895	24.6%	$4,533	1.4%	$3,689	$907	$4,596	2018Q3	21.6%	$4,484	$1,103	$5,587
31	CONSTRUCTION MANAGEMENT													
4.7%	Construction Management	$5,307	$1,306	24.6%	$6,613	1.4%	$5,381	$1,324	$6,704	2019Q3	25.8%	$6,769	$1,665	$8,434
	CONTRACT COST TOTALS:	$126,007	$31,865		**$159,872**		$130,224	$32,410	$162,634			$146,426	$36,396	**$182,822**

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**** CONTRACT COST SUMMARY ****

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LOCATION: St. Bernard and Orleans Parishes, LA
This Estimate reflects the scope and schedule in report;

DISTRICT: MVN New Orleans District PREPARED: 3/9/2012
POC: CHIEF, COST ENGINEERING, THOMAS D. MURPHY, PE

Estimate Prepared: 9-Nov-11
Effective Price Level: 1-Oct-11

Program Year (Budget EC): 2013
Effective Price Level Date: 1 OCT 12

WBS NUMBER	Civil Works Feature & Sub-Feature Description	RISK BASED COST ($K)	RISK BASED CNTG ($K)	RISK BASED CNTG (%)	RISK BASED TOTAL ($K)	ESC (%)	FULLY FUNDED PROJECT ESTIMATE COST ($K)	CNTG ($K)	TOTAL ($K)	Mid-Point Date	ESC (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	B	C	D	E	F	G	H	I	J	P	L	M	N	O
	FY20													
02	RELOCATIONS													
06	FISH & WILDLIFE FACILITIES/INITIAL CONST.	$4,074	$1,002	24.6%	$5,076	1.9%	$4,150	$1,021	$5,170	2022Q4	18.7%	$4,924	$1,211	$6,135
17	BEACH REPLENISHMENT	$136,629	$33,611	24.6%	$170,240	1.9%	$139,165	$34,235	$173,399	2020Q3	14.0%	$158,633	$39,024	$197,657
	CONSTRUCTION ESTIMATE TOTALS:	$140,703	$34,613	24.6%	**$175,316**		$143,315	$35,255	$178,570			$163,557	$40,235	$203,792
01	LANDS AND DAMAGES	$6,324	$1,931	30.5%	$8,255		$6,324	$1,931	$8,255	2019Q3		$6,324	$1,931	$8,255
30	PLANNING, ENGINEERING & DESIGN													
4.0%	30 Account - All Offices included	$5,590	$1,375	24.6%	$6,965	1.4%	$5,668	$1,394	$7,062	2019Q3	25.8%	$7,130	$1,754	$8,884
31	CONSTRUCTION MANAGEMENT													
5.9%	Construction Management	$8,322	$2,047	24.6%	$10,369	1.4%	$8,438	$2,076	$10,513	2020Q3	30.1%	$10,978	$2,701	$13,678
	CONTRACT COST TOTALS:	$160,939	$39,966		**$200,905**		$163,744	$40,656	$204,400			$187,988	$46,620	**$234,609**

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**** CONTRACT COST SUMMARY ****

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This Estimate reflects the scope and schedule in report;

DISTRICT: MVN New Orleans District PREPARED: 3/9/2012
POC: CHIEF, COST ENGINEERING, THOMAS D. MURPHY, PE

Estimate Prepared: 9-Nov-11
Effective Price Level: 1-Oct-11

Program Year (Budget EC): 2013
Effective Price Level Date: 1 OCT 12

WBS NUMBER	Civil Works Feature & Sub-Feature Description	RISK BASED COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	FULLY FUNDED PROJECT ESTIMATE Mid-Point Date	ESC (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*P*	*L*	*M*	*N*	*O*
	FY21													
02	RELOCATIONS													
06	FISH & WILDLIFE FACILITIES/INITIAL CONST.	$6,821	$1,678	24.6%	$8,499	1.9%	$6,948	$1,709	$8,657	2023Q2	19.7%	$8,317	$2,046	$10,363
17	BEACH REPLENISHMENT	$142,169	$34,974	24.6%	$177,143	1.9%	$144,808	$35,623	$180,430	2021Q3	16.0%	$168,036	$41,337	$209,373
	CONSTRUCTION ESTIMATE TOTALS:	$148,990	$36,652	24.6%	**$185,642**		$151,755	$37,332	$189,087			$176,354	$43,383	$219,737
01	LANDS AND DAMAGES	$6,324	$1,931	30.5%	$8,255		$6,324	$1,931	$8,255	2020Q3		$6,324	$1,931	$8,255
30	PLANNING, ENGINEERING & DESIGN													
4.9%	30 Account - All Offices included	$7,279	$1,791	24.6%	$9,070	1.4%	$7,380	$1,815	$9,196	2020Q3	30.1%	$9,602	$2,362	$11,964
31	CONSTRUCTION MANAGEMENT													
5.9%	Construction Management	$8,803	$2,166	24.6%	$10,969	1.4%	$8,925	$2,196	$11,121	2021Q3	34.4%	$11,996	$2,951	$14,947
	CONTRACT COST TOTALS:	$171,396	$42,539		**$213,935**		$174,385	$43,274	$217,659			$204,276	$50,627	**$254,903**

**** CONTRACT COST SUMMARY ****

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PROJECT: MRGO Ecosystem Restoration
LOCATION: St. Bernard and Orleans Parishes, LA
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DISTRICT: MVN New Orleans District PREPARED: 3/9/2012
POC: CHIEF, COST ENGINEERING, THOMAS D. MURPHY, PE

Estimate Prepared: 9-Nov-11
Effective Price Level: 1-Oct-11

Program Year (Budget EC): 2013
Effective Price Level Date: 1 OCT 12

WBS NUMBER	Civil Works Feature & Sub-Feature Description	RISK BASED COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	FULLY FUNDED PROJECT ESTIMATE Mid-Point Date	ESC (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	B	C	D	E	F	G	H	I	J	P	L	M	N	O
	FY22													
02	RELOCATIONS													
06	FISH & WILDLIFE FACILITIES/INITIAL CONST.	$20,501	$5,043	24.6%	$25,544	1.9%	$20,882	$5,137	$26,018	2024Q2	21.9%	$25,448	$6,260	$31,709
17	BEACH REPLENISHMENT	$119,014	$29,277	24.6%	$148,291	1.9%	$121,223	$29,821	$151,044	2022Q2	17.6%	$142,557	$35,069	$177,626
	CONSTRUCTION ESTIMATE TOTALS:	$139,515	$34,321	24.6%	**$173,836**		$142,104	$34,958	$177,062			$168,006	$41,329	$209,335
01	LANDS AND DAMAGES	$6,324	$1,931	30.5%	$8,255		$6,324	$1,931	$8,255	2021Q3		$6,324	$1,931	$8,255
30	PLANNING, ENGINEERING & DESIGN													
4.0%	30 Account - All Offices included	$5,581	$1,373	24.6%	$6,954	1.4%	$5,658	$1,392	$7,050	2021Q3	34.4%	$7,606	$1,871	$9,477
31	CONSTRUCTION MANAGEMENT													
5.7%	Construction Management	$7,961	$1,958	24.6%	$9,919	1.4%	$8,072	$1,986	$10,057	2022Q2	37.6%	$11,109	$2,733	$13,842
	CONTRACT COST TOTALS:	$159,381	$39,583		**$198,964**		$162,159	$40,266	$202,425			$193,045	$47,864	**$240,909**

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**** CONTRACT COST SUMMARY ****

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POC: CHIEF, COST ENGINEERING, THOMAS D. MURPHY, PE

Estimate Prepared: 9-Nov-11
Effective Price Level: 1-Oct-11

Program Year (Budget EC): 2013
Effective Price Level Date: 1 OCT 12

WBS NUMBER	Civil Works Feature & Sub-Feature Description	RISK BASED COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	FULLY FUNDED PROJECT ESTIMATE Mid-Point Date	ESC (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	B	C	D	E	F	G	H	I	J	P	L	M	N	O
	FY23													
02	RELOCATIONS													
06	FISH & WILDLIFE FACILITIES/INITIAL CONST.			24.6%										
17	BEACH REPLENISHMENT	$14,252	$3,506	24.6%	$17,758	1.9%	$14,517	$3,571	$18,088	2023Q2	19.7%	$17,379	$4,275	$21,654
	CONSTRUCTION ESTIMATE TOTALS:	$14,252	$3,506	24.6%	**$17,758**		$14,517	$3,571	$18,088			$17,379	$4,275	$21,654
01	LANDS AND DAMAGES	$6,324	$1,931	30.5%	$8,255		$6,324	$1,931	$8,255	2022Q3		$6,324	$1,931	$8,255
30	PLANNING, ENGINEERING & DESIGN													
5.2%	30 Account - All Offices Included	$746	$184	24.6%	$930	1.4%	$756	$186	$942	2022Q3	38.7%	$1,049	$258	$1,307
31	CONSTRUCTION MANAGEMENT													
7.2%	Construction Management	$1,031	$254	24.6%	$1,285	1.4%	$1,045	$257	$1,302	2023Q2	42.0%	$1,485	$365	$1,850
	CONTRACT COST TOTALS:	$22,353	$5,874		**$28,227**		$22,642	$5,945	$28,587			$26,237	$6,830	**$33,066**

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TPCS

**** CONTRACT COST SUMMARY ****

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POC: CHIEF, COST ENGINEERING, THOMAS D. MURPHY, PE

Estimate Prepared: 9-Nov-11
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Program Year (Budget EC): 2013
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WBS NUMBER	Civil Works Feature & Sub-Feature Description	RISK BASED COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	FULLY FUNDED PROJECT ESTIMATE Mid-Point Date	ESC (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	B	C	D	E	F	G	H	I	J	P	L	M	N	O
	FY24													
02	RELOCATIONS													
06	FISH & WILDLIFE FACILITIES/INITIAL CONST.	$13,794	$3,393	24.6%	$17,187	1.9%	$14,050	$3,456	$17,506	2026Q4	27.4%	$17,905	$4,405	$22,310
17	BEACH REPLENISHMENT	$226,610	$55,746	24.6%	$282,356	1.9%	$230,816	$56,781	$287,597	2024Q4	23.0%	$283,835	$69,823	$353,658
	CONSTRUCTION ESTIMATE TOTALS:	$240,404	$59,139	24.6%	**$299,543**		$244,866	$60,237	$305,103			$301,740	$74,228	$375,968
01	LANDS AND DAMAGES	$6,324	$1,931	30.5%	$8,255		$6,324	$1,931	$8,255	2023Q3		$6,324	$1,931	$8,255
30	PLANNING, ENGINEERING & DESIGN													
4.0%	30 Account - All Offices included	$9,622	$2,367	24.6%	$11,989	1.4%	$9,756	$2,400	$12,155	2023Q3	43.2%	$13,967	$3,436	$17,402
31	CONSTRUCTION MANAGEMENT													
5.9%	Construction Management	$14,154	$3,482	24.6%	$17,636	1.4%	$14,351	$3,530	$17,881	2024Q4	48.8%	$21,352	$5,253	$26,605
	CONTRACT COST TOTALS:	$270,504	$66,919		**$337,423**		$275,296	$68,098	$343,394			$343,383	$84,847	**$428,230**

****** TOTAL PROJECT COST SUMMARY ******

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A	B	C	D	E	F	G	H	I	J	P	L	M	N	O
	FY25													
02	RELOCATIONS													
06	FISH & WILDLIFE FACILITIES/INITIAL CONST.	$21,935	$5,396	24.6%	$27,331	1.9%	$22,342	$5,496	$27,838	2028Q4	32.1%	$29,506	$7,259	$36,765
17	BEACH REPLENISHMENT	$243,133	$59,811	24.6%	$302,944	1.9%	$247,646	$60,921	$308,567	2026Q2	26.3%	$312,771	$76,942	$389,713
	CONSTRUCTION ESTIMATE TOTALS:	$265,068	$65,207	24.6%	**$330,275**		$269,988	$66,417	$336,405			$342,277	$84,200	$426,478
01	LANDS AND DAMAGES	$6,324	$1,931	30.5%	$8,255		$6,324	$1,931	$8,255	2024Q2		$6,324	$1,931	$8,255
30	PLANNING, ENGINEERING & DESIGN													
4.0%	30 Account - All Offices included	$10,606	$2,609	24.6%	$13,215	1.4%	$10,753	$2,645	$13,399	2024Q2	46.5%	$15,758	$3,876	$19,634
31	CONSTRUCTION MANAGEMENT													
5.8%	Construction Management	$15,470	$3,806	24.6%	$19,276	1.4%	$15,685	$3,858	$19,543	2026Q2	55.6%	$24,411	$6,005	$30,417
	CONTRACT COST TOTALS:	$297,468	$73,552		**$371,020**		$302,750	$74,852	$377,602			$388,771	$96,013	**$484,783**

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Program Year (Budget EC): 2013
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WBS NUMBER	Civil Works Feature & Sub-Feature Description	RISK BASED COST ($K)	RISK BASED CNTG ($K)	RISK BASED CNTG (%)	RISK BASED TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	FULLY FUNDED PROJECT ESTIMATE Mid-Point Date	ESC (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	B	C	D	E	F	G	H	I	J	P	L	M	N	O
	ADAPTIVE MANAGEMENT													
06	FISH & WILDLIFE FACILITIES FY25-FY34	$89,100	$53,015	59.5%	$142,115	1.9%	$90,754	$53,998	$144,752	2029Q4	34.4%	$122,012	$72,597	$194,610
	CONSTRUCTION ESTIMATE TOTALS:	$89,100	$53,015	59.5%	**$142,115**		$90,754	$53,998	$144,752			$122,012	$72,597	$194,610
01	LANDS AND DAMAGES													
30	PLANNING, ENGINEERING & DESIGN													
19.9%	SET UP & MONITORING PHASE FY13-FY34	$17,761	$10,568	59.5%	$28,329	1.4%	$18,008	$10,715	$28,722	2023Q3	43.2%	$25,781	$15,339	$41,120
4.5%	RENOURISHMENT PHASE FY25-FY34	$4,000	$2,380	59.5%	$6,380	1.4%	$4,056	$2,413	$6,469	2029Q4	72.5%	$6,996	$4,163	$11,159
31	CONSTRUCTION MANAGEMENT													
6.7%	Construction Management	$6,000	$3,570	59.5%	$9,570	1.4%	$6,083	$3,620	$9,703	2029Q4	72.5%	$10,494	$6,244	$16,739
	CONTRACT COST TOTALS:	$116,861	$69,532		**$186,393**		$118,900	$70,746	$189,646			$165,284	$98,344	**$263,627**

MRGO Ecosystem Restoration Feasibility Cost Comparison
MRGO Ecosystem Restoration Feasibility Cost Comparison Mississippi River Borrow and Lake Borgne Borrow.

Estimated by	Miguel Ramos and Eric Salamone
Designed by	USACE
Prepared by	Miguel Ramos and Eric Salamone
Preparation Date	11/9/2011
Effective Date of Pricing	11/9/2011
Estimated Construction Time	Days

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Designed by
USACE
Estimated by
Miguel Ramos and Eric Salamone
Prepared by
Miguel Ramos and Eric Salamone

Design Document	Feasibility Study
Document Date	7/25/2011
District	New Orleans District
Contact	Eric Salamone or Miguel Ramos
Budget Year	2012
UOM System	Original

Direct Costs
LaborCost
EQCost
MatlCost
SubBidCost
CEDEP

Timeline/Currency

Preparation Date	11/9/2011
Escalation Date	11/9/2011
Eff. Pricing Date	11/9/2011
Estimated Duration	0 Day(s)
Currency	US dollars
Exchange Rate	1.000000

Costbook CB10EB: MII English Cost Book 2010

Labor NLS2010: National Labor Library - Seattle 2010

wdol.gov is the website for current Davis Bacon & Service Labor Rates. Fringes paid to the laborers are taxable. In a non-union job the whole fringes are taxable. In a union job, the vacation pay fringes i

Labor Rates
LaborCost1
LaborCost2
LaborCost3
LaborCost4

Equipment EP09R08: MII Equipment Region 8 2009

08 NORTHWEST

Sales Tax	6.00
Working Hours per Year	1,540
Labor Adjustment Factor	1.01
Cost of Money	4.88
Cost of Money Discount	25.00
Tire Recap Cost Factor	1.50
Tire Recap Wear Factor	1.80
Tire Repair Factor	0.15
Equipment Cost Factor	1.00
Standby Depreciation Factor	0.50

Fuel

Electricity	0.067
Gas	3.130
Diesel Off-Road	2.870
Diesel On-Road	3.410

Shipping Rates

Over 0 CWT	27.78
Over 240 CWT	26.06
Over 300 CWT	23.69
Over 400 CWT	21.52
Over 500 CWT	11.26
Over 700 CWT	9.51
Over 800 CWT	6.48

Direct Cost Markups | **Category** | **Method**
Productivity | Productivity | Productivity
Overtime 7/12 | Overtime | Overtime

	Days/Week	*Hours/Shift*	*Shifts/Day*	*1st Shift*	*2nd Shift*	*3rd Shift*
Standard	*5.00*	*8.00*	*1.00*	*8.00*	*0.00*	*0.00*
Actual	*7.00*	*8.00*	*1.00*	*12.00*	*0.00*	*0.00*

Day	*OT Factor*	*Working*	*OT Percent*	*FCCM Percent*
Monday	*1.50*	*Yes*	*26.19*	*(52.38)*
Tuesday	*1.50*	*Yes*		
Wednesday	*1.50*	*Yes*		
Thursday	*1.50*	*Yes*		
Friday	*1.50*	*Yes*		
Saturday	*1.50*	*Yes*		
Sunday	*1.50*	*Yes*		

Sales Tax | TaxAdj | Running % on Selected Costs
MatlCost

small tools | MiscDirect | Running % on Selected Costs
LaborCost

overtime 7/10 | Overtime | Overtime

	Days/Week	*Hours/Shift*	*Shifts/Day*	*1st Shift*	*2nd Shift*	*3rd Shift*
Standard	*5.00*	*8.00*	*1.00*	*8.00*	*0.00*	*0.00*
Actual	*7.00*	*8.00*	*1.00*	*10.00*	*0.00*	*0.00*

Day	*OT Factor*	*Working*	*OT Percent*	*FCCM Percent*
Monday	*1.50*	*Yes*	*21.43*	*(42.86)*
Tuesday	*1.50*	*Yes*		
Wednesday	*1.50*	*Yes*		
Thursday	*1.50*	*Yes*		
Friday	*1.50*	*Yes*		
Saturday	*1.50*	*Yes*		
Sunday	*1.50*	*Yes*		

overtime dredge marine 15.5 | Overtime | Overtime

	Days/Week	*Hours/Shift*	*Shifts/Day*	*1st Shift*	*2nd Shift*	*3rd Shift*
Standard	*6.00*	*8.00*	*1.00*	*8.00*	*0.00*	*0.00*
Actual	*7.00*	*8.00*	*1.00*	*10.00*	*0.00*	*0.00*

Day	*OT Factor*	*Working*	*OT Percent*	*FCCM Percent*
Monday	*1.50*	*Yes*	*15.71*	*(42.86)*
Tuesday	*1.50*	*Yes*		
Wednesday	*1.50*	*Yes*		
Thursday	*1.50*	*Yes*		
Friday	*1.50*	*Yes*		

Saturday	*1.50*	*Yes*
Sunday	*1.50*	*Yes*

Overtime 6/10	Overtime			Overtime		
	Days/Week	*Hours/Shift*	*Shifts/Day*	*1st Shift*	*2nd Shift*	*3rd Shift*
Standard	*5.00*	*8.00*	*1.00*	*8.00*	*0.00*	*0.00*
Actual	*6.00*	*8.00*	*1.00*	*10.00*	*0.00*	*0.00*

Day	*OT Factor*	*Working*	*OT Percent*	*FCCM Percent*
Monday	*1.50*	*Yes*	*16.67*	*(33.33)*
Tuesday	*1.50*	*Yes*		
Wednesday	*1.50*	*Yes*		
Thursday	*1.50*	*Yes*		
Friday	*1.50*	*Yes*		
Saturday	*1.50*	*Yes*		
Sunday	*2.00*	*No*		

Contractor Markups	**Category**	**Method**
JOOH	JOOH	Running %
HOOH	HOOH	Running %
Profit	Profit	Profit Weighted Guidelines

Guideline	*Value*	*Weight*	*Percentage*
Risk	*0.100*	*20*	*2.00*
Difficulty	*0.090*	*15*	*1.35*
Size	*0.030*	*15*	*0.45*
Period	*0.120*	*15*	*1.80*
Invest (Contractor's)	*0.100*	*5*	*0.50*
Assist (Assistance by)	*0.120*	*5*	*0.60*
SubContracting	*0.119*	*25*	*2.98*
Total		*100*	*9.67*

Bond	Bond	Running %
Excise Tax	Excise	Running %
Mobilization and Demobilization	MiscContract	Direct %

Owner Markups	**Category**	**Method**
Contingency	Contingency	Contract %
Escalation	Escalation	Running %
SIOH	SIOH	Running %

Description	UOM	Quantity	ContractCost	ProjectCost
Summary			**2,238,646,456.26**	**2,261,819,106.26**
MRGO Marsh Creation	**LS**	**1.0000**	**2,238,646,456.26**	**2,261,819,106.26**
01 Lands and Damages	**EA**	**1.0000**	*75,883,300.0000* **75,883,300.00**	*99,055,950.0000* **99,055,950.00**
01 01 MRGO	**EA**	**1.0000**	*75,883,300.0000* **75,883,300.00**	*99,055,950.0000* **99,055,950.00**
B Acquisition Costs	**LS**	**1.0000**	**43,845,000.00**	**56,998,500.00**
C Fee Excluding Minerals with Restrictions	**ACR**	**1.0000**	*20,038,300.0000* **20,038,300.00**	*30,057,450.0000* **30,057,450.00**
A Condemnations	**EA**	**1.0000**	*12,000,000.0000* **12,000,000.00**	*12,000,000.0000* **12,000,000.00**
06 FISH AND WILDLIFE FACILITIES	**EA**	**1.0000**	*196,634,095.1306* **196,634,095.13**	*196,634,095.1306* **196,634,095.13**
06 01 Plantings	**EA**	**1.0000**	*107,534,095.1306* **107,534,095.13**	*107,534,095.1306* **107,534,095.13**
FY14 YR01 Plantings	**EA**	**1.0000**	*15,639,601.6286* **15,639,601.63**	*15,639,601.6286* **15,639,601.63**
01 MRGO planting - feature LM1	**EA**	**1.0000**	*13,554,247.8349* **13,554,247.83**	*13,554,247.8349* **13,554,247.83**
01 marsh plants - Fresh/Intermediate	**ACR**	**3,253.0000**	*4,160.3155* **13,533,506.17**	*4,160.3155* **13,533,506.17**
02 shoreline plants	**LF**	**3,895.0000**	*5.3252* **20,741.67**	*5.3252* **20,741.67**
02 MRGO planting - feature LM2	**EA**	**1.0000**	*1,145,122.5015* **1,145,122.50**	*1,145,122.5015* **1,145,122.50**
01 marsh plants - Fresh/Intermediate	**ACR**	**225.0000**	*4,160.3155* **936,070.98**	*4,160.3155* **936,070.98**
02 shoreline plants	**LF**	**39,267.0000**	*5.3252* **209,051.52**	*5.3252* **209,051.52**
03 MRGO planting - feature LM4	**EA**	**1.0000**	*940,231.2922* **940,231.29**	*940,231.2922* **940,231.29**
01 marsh plants - Fresh/Intermediate	**ACR**	**226.0000**	*4,160.3155* **940,231.29**	*4,160.3155* **940,231.29**
FY15 YR02 Plantings	**EA**	**1.0000**	*1,753,456.4743* **1,753,456.47**	*1,753,456.4743* **1,753,456.47**

Description	UOM	Quantity	ContractCost	ProjectCost
			734,179.1885	*734,179.1885*
01 MRGO planting - feature BR1	**EA**	**1.0000**	**734,179.19**	**734,179.19**
			5,824.4416	*5,824.4416*
03 ridge plants 100% understory TY1	**ACR**	**54.0000**	**314,519.85**	**314,519.85**
			2,912.2208	*2,912.2208*
04 ridge plants 50% understory TY2	**ACR**	**54.0000**	**157,259.92**	**157,259.92**
			1,996.9514	*1,996.9514*
05 ridge plants - midstory TY4	**ACR**	**54.0000**	**107,835.38**	**107,835.38**
			1,996.9514	*1,996.9514*
06 ridge plants forest canopy TY7	**ACR**	**54.0000**	**107,835.38**	**107,835.38**
			665.6505	*665.6505*
07 Initial stabilization planting TY1	**ACR**	**54.0000**	**35,945.13**	**35,945.13**
			199.6951	*199.6951*
08 pre-planting herbicide application TY7	**ACR**	**54.0000**	**10,783.54**	**10,783.54**
			1,019,277.2858	*1,019,277.2858*
01 MRGO planting - feature CM5	**EA**	**1.0000**	**1,019,277.29**	**1,019,277.29**
			4,160.3155	*4,160.3155*
01 marsh plants - Fresh/Intermediate	**ACR**	**245.0000**	**1,019,277.29**	**1,019,277.29**
			15,559,586.4479	*15,559,586.4479*
FY18 YR05 Plantings	**EA**	**1.0000**	**15,559,586.45**	**15,559,586.45**
			4,647,904.4232	*4,647,904.4232*
01 MRGO planting - feature TM1	**EA**	**1.0000**	**4,647,904.42**	**4,647,904.42**
			5,824.4416	*5,824.4416*
02 marsh plants - Brackish	**ACR**	**798.0000**	**4,647,904.42**	**4,647,904.42**
			4,484,820.0575	*4,484,820.0575*
01 MRGO planting - feature TM2	**EA**	**1.0000**	**4,484,820.06**	**4,484,820.06**
			5,824.4416	*5,824.4416*
02 marsh plants - Brackish	**ACR**	**770.0000**	**4,484,820.06**	**4,484,820.06**
			4,409,102.3163	*4,409,102.3163*
01 MRGO planting - feature HM1	**EA**	**1.0000**	**4,409,102.32**	**4,409,102.32**
			5,824.4416	*5,824.4416*
02 marsh plants - Brackish	**ACR**	**757.0000**	**4,409,102.32**	**4,409,102.32**
			920,128.6479	*920,128.6479*
01 MRGO planting - feature MRGO 5	**EA**	**1.0000**	**920,128.65**	**920,128.65**
			4,160.3155	*4,160.3155*
01 marsh plants - Fresh/Intermediate	**ACR**	**202.0000**	**840,383.72**	**840,383.72**

Description	UOM	Quantity	ContractCost	ProjectCost
			5.3252	*5.3252*
02 shoreline plants	**LF**	**14,975.0000**	**79,744.93**	**79,744.93**
			1,097,631.0029	*1,097,631.0029*
01 MRGO planting - feature MRGO 8	**EA**	**1.0000**	**1,097,631.00**	**1,097,631.00**
			4,160.3155	*4,160.3155*
01 marsh plants - Fresh/Intermediate	**ACR**	**236.0000**	**981,834.45**	**981,834.45**
			5.3252	*5.3252*
02 shoreline plants	**LF**	**21,745.0000**	**115,796.56**	**115,796.56**
			7,457,435.3414	*7,457,435.3414*
FY19 YR06 Plantings	**EA**	**1.0000**	**7,457,435.34**	**7,457,435.34**
			6,927,484.3744	*6,927,484.3744*
01 MRGO planting - feature EM1	**EA**	**1.0000**	**6,927,484.37**	**6,927,484.37**
			5,824.4416	*5,824.4416*
02 marsh plants - Brackish	**ACR**	**1,175.0000**	**6,843,718.92**	**6,843,718.92**
			5.3252	*5.3252*
02 shoreline plants	**LF**	**15,730.0000**	**83,765.46**	**83,765.46**
			529,950.9671	*529,950.9671*
01 MRGO planting - feature MRGO 7	**EA**	**1.0000**	**529,950.97**	**529,950.97**
			4,160.3155	*4,160.3155*
01 marsh plants - Fresh/Intermediate	**ACR**	**110.0000**	**457,634.70**	**457,634.70**
			5.3252	*5.3252*
02 shoreline plants	**LF**	**13,580.0000**	**72,316.27**	**72,316.27**
			4,074,029.8441	*4,074,029.8441*
FY20 YR07 Plantings	**EA**	**1.0000**	**4,074,029.84**	**4,074,029.84**
			210,925.9965	*210,925.9965*
01 MRGO planting - feature BM1	**EA**	**1.0000**	**210,926.00**	**210,926.00**
			5.3252	*5.3252*
02 shoreline plants	**LF**	**39,609.0000**	**210,926.00**	**210,926.00**
			3,863,103.8476	*3,863,103.8476*
01 MRGO planting - feature LM3	**EA**	**1.0000**	**3,863,103.85**	**3,863,103.85**
			4,160.3155	*4,160.3155*
01 marsh plants - Fresh/Intermediate	**ACR**	**911.0000**	**3,790,047.38**	**3,790,047.38**
			5.3252	*5.3252*
02 shoreline plants	**LF**	**13,719.0000**	**73,056.47**	**73,056.47**
			6,820,421.1524	*6,820,421.1524*
FY21 YR08 Plantings	**EA**	**1.0000**	**6,820,421.15**	**6,820,421.15**

Description	UOM	Quantity	ContractCost	ProjectCost
			1,248,094.6357	*1,248,094.6357*
01 MRGO planting - feature CM3	**EA**	**1.0000**	**1,248,094.64**	**1,248,094.64**
			4,160.3155	*4,160.3155*
01 marsh plants - Fresh/Intermediate	**ACR**	**300.0000**	**1,248,094.64**	**1,248,094.64**
			407,710.9143	*407,710.9143*
01 MRGO planting - feature CM4	**EA**	**1.0000**	**407,710.91**	**407,710.91**
			4,160.3155	*4,160.3155*
01 marsh plants - Fresh/Intermediate	**ACR**	**98.0000**	**407,710.91**	**407,710.91**
			3,307,450.7845	*3,307,450.7845*
01 MRGO planting - feature CM2	**EA**	**1.0000**	**3,307,450.78**	**3,307,450.78**
			4,160.3155	*4,160.3155*
01 marsh plants - Fresh/Intermediate	**ACR**	**795.0000**	**3,307,450.78**	**3,307,450.78**
			748,856.7814	*748,856.7814*
01 MRGO planting - feature CC2	**EA**	**1.0000**	**748,856.78**	**748,856.78**
			332.8252	*332.8252*
07 Cypress swamp - bald cypress bare root seedling	**ACR**	**250.0000**	**83,206.31**	**83,206.31**
			2,662.6019	*2,662.6019*
08 Cypress swamp - bald cypress container grown	**ACR**	**250.0000**	**665,650.47**	**665,650.47**
			1,108,308.0365	*1,108,308.0365*
01 MRGO planting - feature CC3	**EA**	**1.0000**	**1,108,308.04**	**1,108,308.04**
			332.8252	*332.8252*
07 Cypress swamp - bald cypress bare root seedling	**ACR**	**370.0000**	**123,145.34**	**123,145.34**
			2,662.6019	*2,662.6019*
08 Cypress swamp - bald cypress container grown	**ACR**	**370.0000**	**985,162.70**	**985,162.70**
			20,500,775.1380	*20,500,775.1380*
FY22 YR09 Plantings	**EA**	**1.0000**	**20,500,775.14**	**20,500,775.14**
			98,862.4082	*98,862.4082*
01 MRGO planting - feature EM2	**EA**	**1.0000**	**98,862.41**	**98,862.41**
			5.3252	*5.3252*
02 shoreline plants	**LF**	**18,565.0000**	**98,862.41**	**98,862.41**
			5,014,844.2461	*5,014,844.2461*
01 MRGO planting - feature EM3	**EA**	**1.0000**	**5,014,844.25**	**5,014,844.25**
			5,824.4416	*5,824.4416*
02 marsh plants - Brackish	**ACR**	**861.0000**	**5,014,844.25**	**5,014,844.25**
			15,387,068.4837	*15,387,068.4837*
01 MRGO planting - feature EM4	**EA**	**1.0000**	**15,387,068.48**	**15,387,068.48**

Description	UOM	Quantity	ContractCost	ProjectCost
			5,824.4416	*5,824.4416*
02 marsh plants - Brackish	**ACR**	**2,625.0000**	**15,289,159.29**	**15,289,159.29**
			5.3252	*5.3252*
02 shoreline plants	**LF**	**18,386.0000**	**97,909.20**	**97,909.20**
			13,793,941.9135	*13,793,941.9135*
FY24 YR11 Plantings	**EA**	**1.0000**	**13,793,941.91**	**13,793,941.91**
			3,055,335.6681	*3,055,335.6681*
01 MRGO planting - feature CC1	**EA**	**1.0000**	**3,055,335.67**	**3,055,335.67**
			332.8252	*332.8252*
07 Cypress swamp - bald cypress bare root seedling	**ACR**	**1,020.0000**	**339,481.74**	**339,481.74**
			2,662.6019	*2,662.6019*
08 Cypress swamp - bald cypress container grown	**ACR**	**1,020.0000**	**2,715,853.93**	**2,715,853.93**
			4,388,300.7390	*4,388,300.7390*
01 MRGO planting - feature CC4	**EA**	**1.0000**	**4,388,300.74**	**4,388,300.74**
			332.8252	*332.8252*
07 Cypress swamp - bald cypress bare root seedling	**ACR**	**1,465.0000**	**487,588.97**	**487,588.97**
			2,662.6019	*2,662.6019*
08 Cypress swamp - bald cypress container grown	**ACR**	**1,465.0000**	**3,900,711.77**	**3,900,711.77**
			3,354,878.3807	*3,354,878.3807*
01 MRGO planting - feature CC5	**EA**	**1.0000**	**3,354,878.38**	**3,354,878.38**
			332.8252	*332.8252*
07 Cypress swamp - bald cypress bare root seedling	**ACR**	**1,120.0000**	**372,764.26**	**372,764.26**
			2,662.6019	*2,662.6019*
08 Cypress swamp - bald cypress container grown	**ACR**	**1,120.0000**	**2,982,114.12**	**2,982,114.12**
			2,995,427.1256	*2,995,427.1256*
01 MRGO planting - feature CC6	**EA**	**1.0000**	**2,995,427.13**	**2,995,427.13**
			332.8252	*332.8252*
07 Cypress swamp - bald cypress bare root seedling	**ACR**	**1,000.0000**	**332,825.24**	**332,825.24**
			2,662.6019	*2,662.6019*
08 Cypress swamp - bald cypress container grown	**ACR**	**1,000.0000**	**2,662,601.89**	**2,662,601.89**
			21,934,847.1904	*21,934,847.1904*
FY25 YR12 Plantings	**EA**	**1.0000**	**21,934,847.19**	**21,934,847.19**
			13,134,115.8827	*13,134,115.8827*
01 MRGO planting - feature TM7	**EA**	**1.0000**	**13,134,115.88**	**13,134,115.88**
			5,824.4416	*5,824.4416*
02 marsh plants - Brackish	**ACR**	**2,255.0000**	**13,134,115.88**	**13,134,115.88**

Description	UOM	Quantity	ContractCost	ProjectCost
			8,800,731.3077	*8,800,731.3077*
01 MRGO planting - feature TM8	**EA**	**1.0000**	**8,800,731.31**	**8,800,731.31**
			5,824.4416	*5,824.4416*
02 marsh plants - Brackish	**ACR**	**1,511.0000**	**8,800,731.31**	**8,800,731.31**
			89,100,000.0000	*89,100,000.0000*
06 02 Adaptive Management Renourishment Phase	**EA**	**1.0000**	**89,100,000.00**	**89,100,000.00**
			27,000.0000	*27,000.0000*
06 12 FY 25 Renourishment Phase	**ACR**	**330.0000**	**8,910,000.00**	**8,910,000.00**
			27,000.0000	*27,000.0000*
06 13 FY 26 Renourishment Phase	**ACR**	**330.0000**	**8,910,000.00**	**8,910,000.00**
			27,000.0000	*27,000.0000*
06 14 FY 27 Renourishment Phase	**ACR**	**330.0000**	**8,910,000.00**	**8,910,000.00**
			27,000.0000	*27,000.0000*
06 15 FY 28 Renourishment Phase	**ACR**	**330.0000**	**8,910,000.00**	**8,910,000.00**
			27,000.0000	*27,000.0000*
06 16 FY 29 Renourishment Phase	**ACR**	**330.0000**	**8,910,000.00**	**8,910,000.00**
			27,000.0000	*27,000.0000*
06 17 FY 30 Renourishment Phase	**ACR**	**330.0000**	**8,910,000.00**	**8,910,000.00**
			27,000.0000	*27,000.0000*
06 18 FY 31 Renourishment Phase	**ACR**	**330.0000**	**8,910,000.00**	**8,910,000.00**
			27,000.0000	*27,000.0000*
06 19 FY 32 Renourishment Phase	**ACR**	**330.0000**	**8,910,000.00**	**8,910,000.00**
			27,000.0000	*27,000.0000*
06 20 FY 33 Renourishment Phase	**ACR**	**330.0000**	**8,910,000.00**	**8,910,000.00**
			27,000.0000	*27,000.0000*
06 21 FY 34 Renourishment Phase	**ACR**	**330.0000**	**8,910,000.00**	**8,910,000.00**
14 Recreation Facilities	**LS**	**1.0000**	**3,500,730.40**	**3,500,730.40**
			3,500,730.3955	*3,500,730.3955*
Recreation Facilities	**EA**	**1.0000**	**3,500,730.40**	**3,500,730.40**
			1,465,859.9360	*1,465,859.9360*
14 01 Bienveneu Outlook FY14	**EA**	**1.0000**	**1,465,859.94**	**1,465,859.94**
14 01 01 Bienveneu Outlook	**LS**	**1.0000**	**1,465,859.94**	**1,465,859.94**
			45,592.0163	*45,592.0163*
Mob/Demob	**EA**	**1.0000**	**45,592.02**	**45,592.02**
			22.2792	*22.2792*
Crushed Stone Parking Lot	**SF**	**15,150.0000**	**337,529.94**	**337,529.94**

Description	UOM	Quantity	ContractCost	ProjectCost
			45.9914	*45.9914*
Composite Wooden Deck	**SF**	**12,940.0000**	**595,128.66**	**595,128.66**
			2.0385	*2.0385*
Crushed Stone Path	**SF**	**11,000.0000**	**22,423.86**	**22,423.86**
Tree Planting	**LS**	**1.0000**	**11,314.91**	**11,314.91**
			867.0282	*867.0282*
Bald Cypress, 95 Gal	**EA**	**10.0000**	**8,670.28**	**8,670.28**
			440.7708	*440.7708*
Crape Myrtle 'Tuskegee', 65 Gal.	**EA**	**6.0000**	**2,644.62**	**2,644.62**
			1,197.0909	*1,197.0909*
Promenade Bench Seating	**EA**	**8.0000**	**9,576.73**	**9,576.73**
			34,862.4267	*34,862.4267*
30 x 30 Shelter w/ Bench	**EA**	**1.0000**	**34,862.43**	**34,862.43**
			15,952.7713	*15,952.7713*
15 x 15 Shelter w/ Bench	**EA**	**4.0000**	**63,811.09**	**63,811.09**
			3,889.5413	*3,889.5413*
10 x 10 Shelter w/ Bench	**EA**	**4.0000**	**15,558.17**	**15,558.17**
			3,889.5413	*3,889.5413*
8 x 8 Shelter w/ Bench	**EA**	**7.0000**	**27,226.79**	**27,226.79**
			11,463.3480	*11,463.3480*
Railroad Crossing	**EA**	**1.0000**	**11,463.35**	**11,463.35**
			39.1904	*39.1904*
70' Class B Timber Piles	**LF**	**2,800.0000**	**109,733.03**	**109,733.03**
Lighting Fixtures	**LS**	**1.0000**	**181,638.99**	**181,638.99**
			2,034,870.4595	*2,034,870.4595*
14 03 Shell Beach FY18	**EA**	**1.0000**	**2,034,870.46**	**2,034,870.46**
14 03 02 Shell Beach	**LS**	**1.0000**	**2,034,870.46**	**2,034,870.46**
			64,497.3570	*64,497.3570*
Mob/Demob	**EA**	**1.0000**	**64,497.36**	**64,497.36**
			37.0438	*37.0438*
Crushed Stone Parking Lot	**SF**	**8,760.0000**	**324,503.71**	**324,503.71**
Tree Planting	**LS**	**1.0000**	**29,624.09**	**29,624.09**
			867.0282	*867.0282*
Bald Cypress, 95 Gal	**EA**	**24.0000**	**20,808.68**	**20,808.68**
			440.7708	*440.7708*

Description	UOM	Quantity	ContractCost	ProjectCost
Crape Myrtle 'Tuskegee', 65 Gal.	EA	20.0000	8,815.42	8,815.42
Composite Wooden Deck	SF	24,050.0000	*45.9914* 1,106,093.06	*45.9914* 1,106,093.06
Shelter with Bench	EA	4.0000	*13,252.3751* 53,009.50	*13,252.3751* 53,009.50
Large Picnic Pavillion with Bench	EA	1.0000	*30,495.7349* 30,495.73	*30,495.7349* 30,495.73
Promenade Bench Seating	EA	34.0000	*1,197.0909* 40,701.09	*1,197.0909* 40,701.09
70' Class B Timber Piles	LF	5,040.0000	*39.1904* 197,519.45	*39.1904* 197,519.45
Hand Railings	LF	1,280.0000	*105.5094* 135,052.05	*105.5094* 135,052.05
Restrooms	LS	1.0000	53,374.40	53,374.40
Concrete	LS	1.0000	32,994.31	32,994.31
Accessories	LS	1.0000	20,380.10	20,380.10
17 Beach Replenishment	EA	1.0000	*1,750,853,546.9593* 1,750,853,546.96	*1,750,853,546.9593* 1,750,853,546.96
Habitat Replinshment/Construction	EA	1.0000	*1,750,853,546.9593* 1,750,853,546.96	*1,750,853,546.9593* 1,750,853,546.96
FY14 Year 1 Habitat Replinshment/Construction	EA	1.0000	*219,483,652.4115* 219,483,652.41	*219,483,652.4115* 219,483,652.41
YR01 01 LS1	LS	1.0000	53,886,149.85	53,886,149.85
01 Mob & Demob	DAY	10.0000	*22,997.7423* 229,977.42	*22,997.7423* 229,977.42
MOB S Survey Boat	DAY	10.0000	*2,354.7227* 23,547.23	*2,354.7227* 23,547.23
MOB C Crew Boat	DAY	10.0000	*3,794.8485* 37,948.48	*3,794.8485* 37,948.48
MOB Stone 1500# stone crew	DAY	10.0000	*8,134.7117* 81,347.12	*8,134.7117* 81,347.12
MOB F Flotation Crew	DAY	80.0000	*1,089.1824* 87,134.59	*1,089.1824* 87,134.59
02 Flotation Dredging and Placement of Material	CY	350,000.0000	*6.9383* 2,428,398.79	*6.9383* 2,428,398.79

Description	UOM	Quantity	ContractCost	ProjectCost
			5.5226	*5.5226*
02 Flotation Dredging Backfill	**CY**	**87,500.0000**	**483,225.26**	**483,225.26**
			6.3326	*6.3326*
03 Geotextile Fabric	**SY**	**450,000.0000**	**2,849,653.03**	**2,849,653.03**
			52.0195	*52.0195*
04 Stone 1500# gradation	**TON**	**930,000.0000**	**48,378,120.61**	**48,378,120.61**
YR01 02 MRGO1 Rock	**LS**	**1.0000**	**2,572,624.66**	**2,572,624.66**
			22,997.7423	*22,997.7423*
01 Mob & Demob	**DAY**	**5.0000**	**114,988.71**	**114,988.71**
			2,354.7227	*2,354.7227*
MOB S Survey Boat	**DAY**	**5.0000**	**11,773.61**	**11,773.61**
			3,794.8485	*3,794.8485*
MOB C Crew Boat	**DAY**	**5.0000**	**18,974.24**	**18,974.24**
			8,134.7117	*8,134.7117*
MOB Stone 650# stone crew	**DAY**	**5.0000**	**40,673.56**	**40,673.56**
			1,089.1824	*1,089.1824*
MOB F Flotation Crew	**DAY**	**40.0000**	**43,567.30**	**43,567.30**
			11.7099	*11.7099*
02 Flotation Dredging and Placement of Material	**CY**	**12,000.0000**	**140,519.03**	**140,519.03**
			6.8862	*6.8862*
02 Flotation Dredging Backfill	**CY**	**9,000.0000**	**61,975.65**	**61,975.65**
			6.3326	*6.3326*
03 Geotextile Fabric	**SY**	**20,000.0000**	**126,651.25**	**126,651.25**
			48.6770	*48.6770*
04 Stone 650# gradation	**TON**	**45,000.0000**	**2,190,465.67**	**2,190,465.67**
YR01 03 MRGO 06 Rock	**LS**	**1.0000**	**6,659,504.07**	**6,659,504.07**
			22,997.7423	*22,997.7423*
01 Mob & Demob	**DAY**	**5.0000**	**114,988.71**	**114,988.71**
			2,354.7227	*2,354.7227*
MOB S Survey Boat	**DAY**	**5.0000**	**11,773.61**	**11,773.61**
			3,794.8485	*3,794.8485*
MOB C Crew Boat	**DAY**	**5.0000**	**18,974.24**	**18,974.24**
			8,134.7117	*8,134.7117*
MOB Stone 650# stone crew	**DAY**	**5.0000**	**40,673.56**	**40,673.56**
			1,089.1824	*1,089.1824*
MOB F Flotation Crew	**DAY**	**40.0000**	**43,567.30**	**43,567.30**

Description	UOM	Quantity	ContractCost	ProjectCost
			9.9875	*9.9875*
02 Flotation Dredging and Placement of Material	**CY**	**76,000.0000**	**759,047.37**	**759,047.37**
			5.7379	*5.7379*
02 Flotation Dredging Backfilling	**CY**	**57,000.0000**	**327,059.23**	**327,059.23**
			6.3326	*6.3326*
03 Geotextile Fabric	**SY**	**45,000.0000**	**284,965.30**	**284,965.30**
			48.6770	*48.6770*
04 Stone 650# gradation	**TON**	**113,000.0000**	**5,500,502.69**	**5,500,502.69**
YR01 04 LM1	**LS**	**1.0000**	**109,496,733.18**	**109,496,733.18**
			3,523,641.5661	*3,523,641.5661*
01 Mob & Demob	**EA**	**1.0000**	**3,523,641.57**	**3,523,641.57**
			77,009.8836	*77,009.8836*
mob/demob pipeline Mob/Demob pipeline	**DAY**	**13.6000**	**1,047,334.42**	**1,047,334.42**
			662,775.0591	*662,775.0591*
prelay shore pipe	**EA**	**1.0000**	**662,775.06**	**662,775.06**
			88,370.0079	*88,370.0079*
pickup shore pipe	**EA**	**1.0000**	**88,370.01**	**88,370.01**
			512,614.6530	*512,614.6530*
prelay submerged pipe	**EA**	**1.0000**	**512,614.65**	**512,614.65**
			85,011.1698	*85,011.1698*
pickup submerged pipe	**EA**	**1.0000**	**85,011.17**	**85,011.17**
			5,228.1102	*5,228.1102*
Mob/Demob monthly pipeline crew Mob/Demob monthly pipeline crew	**DAY**	**7.8000**	**40,779.26**	**40,779.26**
			52,736.0259	*52,736.0259*
MOB EX Marsh Backhoe	**DAY**	**3.0000**	**158,208.08**	**158,208.08**
			2,427.6569	*2,427.6569*
MOB S Survey Boat	**DAY**	**7.8000**	**18,935.72**	**18,935.72**
			3,938.8461	*3,938.8461*
MOB C Crew Boat	**DAY**	**7.8000**	**30,723.00**	**30,723.00**
			17,024.4119	*17,024.4119*
MOB Sheetpile	**DAY**	**10.0000**	**170,244.12**	**170,244.12**
			5.9192	*5.9192*
02 Dredging	**CY**	**14,300,000.0000**	**84,645,214.94**	**84,645,214.94**
			6.5000	*6.5000*
03 Perimeter Retention Dikes	**CY**	**783,511.0000**	**5,092,815.33**	**5,092,815.33**

Description	UOM	Quantity	ContractCost	ProjectCost
			6.5924	*6.5924*
04 Interior Weirs	**CY**	**364,389.0000**	**2,402,185.58**	**2,402,185.58**
			1,376.4055	*1,376.4055*
06 Vinyl/Timber Retention Wall	**LF**	**10,050.0000**	**13,832,875.76**	**13,832,875.76**
			1,242.3291	*1,242.3291*
A install retention wall	**LF**	**10,050.0000**	**12,485,406.99**	**12,485,406.99**
			177.2985	*177.2985*
B Remove Vinyl/Timber wall	**LF**	**7,600.0000**	**1,347,468.77**	**1,347,468.77**
			177.2985	*177.2985*
remove retention wall	**LF**	**7,600.0000**	**1,347,468.77**	**1,347,468.77**
YR01 05 LM2	**LS**	**1.0000**	**32,068,022.05**	**32,068,022.05**
			1,955,324.4475	*1,955,324.4475*
01 Mob & Demob	**EA**	**1.0000**	**1,955,324.45**	**1,955,324.45**
			15,713.8071	*15,713.8071*
mob/demob pipeline Mob/Demob pipeline	**DAY**	**13.6000**	**213,707.78**	**213,707.78**
			710,465.6075	*710,465.6075*
prelay shore pipe	**EA**	**1.0000**	**710,465.61**	**710,465.61**
			22,202.0502	*22,202.0502*
pickup shore pipe	**EA**	**1.0000**	**22,202.05**	**22,202.05**
			56,575.8905	*56,575.8905*
prelay submerged pipe	**EA**	**1.0000**	**56,575.89**	**56,575.89**
			43,222.6052	*43,222.6052*
pickup submerged pipe	**EA**	**1.0000**	**43,222.61**	**43,222.61**
			5,228.1102	*5,228.1102*
Mob/Demob monthly pipeline crew Mob/Demob monthly pipeline crew	**DAY**	**7.8000**	**40,779.26**	**40,779.26**
			38,214.5115	*38,214.5115*
MOB EX Marsh Backhoe	**DAY**	**3.0000**	**114,643.53**	**114,643.53**
			2,427.6569	*2,427.6569*
MOB S Survey Boat	**DAY**	**7.8000**	**18,935.72**	**18,935.72**
			3,938.8461	*3,938.8461*
MOB C Crew Boat	**DAY**	**7.8000**	**30,723.00**	**30,723.00**
			17,024.4119	*17,024.4119*
MOB Sheetpile	**DAY**	**10.0000**	**170,244.12**	**170,244.12**
			6.0490	*6.0490*
02A Marsh Creation at Proctor Point:	**CY**	**2,070,000.0000**	**12,521,398.77**	**12,521,398.77**

Description	UOM	Quantity	ContractCost	ProjectCost
			6.0349	*6.0349*
02B Marsh Nourishment	**CY**	**2,380,000.0000**	**14,362,960.81**	**14,362,960.81**
			6.5985	*6.5985*
03 Perimeter Retention Dikes	**CY**	**310,000.0000**	**2,045,534.71**	**2,045,534.71**
			7.6189	*7.6189*
04 Interior Weirs	**CY**	**12,000.0000**	**91,427.07**	**91,427.07**
			1,251.3986	*1,251.3986*
05 Vinyl/Timber Retention Wall	**LF**	**600.0000**	**750,839.16**	**750,839.16**
			1,251.3986	*1,251.3986*
A install retention wall	**LF**	**600.0000**	**750,839.16**	**750,839.16**
			35,459.7044	*35,459.7044*
07 Remove 3 closures Item 5 Vinyl/Timber Retention Wall	**EA**	**3.0000**	**106,379.11**	**106,379.11**
			177.2985	*177.2985*
remove retention wall	**LF**	**600.0000**	**106,379.11**	**106,379.11**
			8.3628	*8.3628*
08 Dredge Access Channels withing Lake Borgne to Access Sheetpile Closures	**CY**	**28,000.0000**	**234,157.97**	**234,157.97**
			5.5752	*5.5752*
Flotation Excavaiton	**CY**	**28,000.0000**	**156,105.31**	**156,105.31**
			2.7876	*2.7876*
Flotation channel backfilliing	**CY**	**28,000.0000**	**78,052.66**	**78,052.66**
YR01 06 LM4	**LS**	**1.0000**	**14,800,618.60**	**14,800,618.60**
			4,210,710.1184	*4,210,710.1184*
01 Mob & Demob	**EA**	**1.0000**	**4,210,710.12**	**4,210,710.12**
			109,232.3597	*109,232.3597*
mob/demob pipeline Mob/Demob pipeline	**DAY**	**13.6000**	**1,485,560.09**	**1,485,560.09**
			215,294.7483	*215,294.7483*
prelay shore pipe	**EA**	**1.0000**	**215,294.75**	**215,294.75**
			21,529.4748	*21,529.4748*
pickup shore pipe	**EA**	**1.0000**	**21,529.47**	**21,529.47**
			623,305.9745	*623,305.9745*
prelay submerged pipe	**EA**	**1.0000**	**623,305.97**	**623,305.97**
			591,198.4194	*591,198.4194*
pickup submerged pipe	**EA**	**1.0000**	**591,198.42**	**591,198.42**
			5,228.1102	*5,228.1102*
Mob/Demob monthly pipeline crew Mob/Demob monthly pipeline crew	**DAY**	**7.8000**	**40,779.26**	**40,779.26**

Description	UOM	Quantity	ContractCost	ProjectCost
			52,736.0259	*52,736.0259*
MOB EX Marsh Backhoe	**DAY**	**3.0000**	**158,208.08**	**158,208.08**
			2,427.6569	*2,427.6569*
MOB S Survey Boat	**DAY**	**7.8000**	**18,935.72**	**18,935.72**
			3,938.8461	*3,938.8461*
MOB C Crew Boat	**DAY**	**7.8000**	**30,723.00**	**30,723.00**
			17,024.4119	*17,024.4119*
MOB Sheetpile	**DAY**	**10.0000**	**170,244.12**	**170,244.12**
			7.1673	*7.1673*
02A Dredging - Site MC1	**CY**	**555,000.0000**	**3,977,863.85**	**3,977,863.85**
			7.0599	*7.0599*
02B Dredging - Site MC2	**CY**	**605,000.0000**	**4,271,245.81**	**4,271,245.81**
			6.6277	*6.6277*
03 Perimeter Retention Dikes	**CY**	**181,333.0000**	**1,201,812.67**	**1,201,812.67**
			7.5810	*7.5810*
04 Interior Weirs	**CY**	**12,444.0000**	**94,338.56**	**94,338.56**
			1,251.3986	*1,251.3986*
05 Vinyl/Timber Retention Wall	**LF**	**800.0000**	**1,001,118.88**	**1,001,118.88**
			1,251.3986	*1,251.3986*
A install retention wall	**LF**	**800.0000**	**1,001,118.88**	**1,001,118.88**
			15.9446	*15.9446*
06 Flotation Dredging and Placement of Material	**CY**	**2,730.0000**	**43,528.72**	**43,528.72**
			23.5447	*23.5447*
05 Flotation Dredging Backfilling	**CY**	**682.5000**	**16,069.23**	**16,069.23**
			144,953,642.4214	*144,953,642.4214*
FY15 Year 2 Habitat Replinshment/Construction	**EA**	**1.0000**	**144,953,642.42**	**144,953,642.42**
YR02 01 BS1	**LS**	**1.0000**	**51,874,048.98**	**51,874,048.98**
			22,876.4382	*22,876.4382*
01 Mob & Demob	**DAY**	**10.0000**	**228,764.38**	**228,764.38**
			2,410.0402	*2,410.0402*
MOB S Survey Boat	**DAY**	**10.0000**	**24,100.40**	**24,100.40**
			3,794.8485	*3,794.8485*
MOB C Crew Boat	**DAY**	**10.0000**	**37,948.48**	**37,948.48**
			7,943.1582	*7,943.1582*
MOB Stone 1500# stone crew	**DAY**	**10.0000**	**79,431.58**	**79,431.58**

Description	UOM	Quantity	ContractCost	ProjectCost
			1,091.0489	*1,091.0489*
MOB F Flotation Crew	**DAY**	**80.0000**	**87,283.91**	**87,283.91**
			6.9754	*6.9754*
02 Flotation Dredging and Placement of Material	**CY**	**340,000.0000**	**2,371,639.10**	**2,371,639.10**
			5.6670	*5.6670*
02 Flotation Dredging Backfilling	**CY**	**85,000.0000**	**481,691.31**	**481,691.31**
			6.3326	*6.3326*
03 Geotextile Fabric	**SY**	**470,000.0000**	**2,976,304.27**	**2,976,304.27**
			52.0195	*52.0195*
04 Stone 1500# gradation	**TON**	**890,000.0000**	**46,297,341.23**	**46,297,341.23**
YR 02 02 BS2	**LS**	**1.0000**	**13,252,081.00**	**13,252,081.00**
			1,891.2093	*1,891.2093*
Triangular Steel Structures	**EA**	**2,250.0000**	**4,255,221.02**	**4,255,221.02**
			22,997.7423	*22,997.7423*
01 Mob & Demob	**DAY**	**5.0000**	**114,988.71**	**114,988.71**
			2,354.7227	*2,354.7227*
MOB S Survey Boat	**DAY**	**5.0000**	**11,773.61**	**11,773.61**
			3,794.8485	*3,794.8485*
MOB C Crew Boat	**DAY**	**5.0000**	**18,974.24**	**18,974.24**
			8,134.7117	*8,134.7117*
MOB Stone 1500# stone crew	**DAY**	**5.0000**	**40,673.56**	**40,673.56**
			1,089.1824	*1,089.1824*
MOB F Flotation Crew	**DAY**	**40.0000**	**43,567.30**	**43,567.30**
			6.3326	*6.3326*
02 Geotextile Fabric	**SY**	**21,000.0000**	**132,983.81**	**132,983.81**
			44.9953	*44.9953*
03 Crushed Stone	**TON**	**8,775.0000**	**394,833.49**	**394,833.49**
			1,605.5178	*1,605.5178*
04 Reefblk Steel Triangular Units (5-ft sections)	**EA**	**2,250.0000**	**3,612,415.01**	**3,612,415.01**
			1,316.1731	*1,316.1731*
Concrete Ring Structures	**EA**	**5,700.0000**	**7,502,186.41**	**7,502,186.41**
			6.3326	*6.3326*
02 Geotextile Fabric	**SY**	**21,000.0000**	**132,983.81**	**132,983.81**
			44.9953	*44.9953*
03 Crushed Stone	**TON**	**8,775.0000**	**394,833.49**	**394,833.49**

Description	UOM	Quantity	ContractCost	ProjectCost
			1,223.5735	*1,223.5735*
04 Oyster Break Concrete Ring Units	**EA**	**5,700.0000**	**6,974,369.11**	**6,974,369.11**
			78.6670	*78.6670*
Crushed Stone/Oyster Shell Pad	**CY**	**19,000.0000**	**1,494,673.57**	**1,494,673.57**
			6.3326	*6.3326*
02 Geotextile Fabric	**SY**	**25,000.0000**	**158,314.06**	**158,314.06**
			44.9953	*44.9953*
03 Crushed Stone	**TON**	**29,700.0000**	**1,336,359.51**	**1,336,359.51**
YR02 03 CC 4 - Site 1	**LS**	**1.0000**	**36,760,173.90**	**36,760,173.90**
			3,115,238.6449	*3,115,238.6449*
01 Mob & Demob	**EA**	**1.0000**	**3,115,238.64**	**3,115,238.64**
			7,856.9036	*7,856.9036*
mob/demob pipeline Mob/Demob pipeline	**DAY**	**13.6000**	**106,853.89**	**106,853.89**
			149,310.8461	*149,310.8461*
prelay shore pipe	**EA**	**1.0000**	**149,310.85**	**149,310.85**
			513,804.9703	*513,804.9703*
pickup shore pipe	**EA**	**1.0000**	**513,804.97**	**513,804.97**
			5,228.1102	*5,228.1102*
Mob/Demob monthly pipeline crew Mob/Demob monthly pipeline crew	**DAY**	**7.8000**	**40,779.26**	**40,779.26**
			163,065.6006	*163,065.6006*
Mob Barge Crew Daily	**DAY**	**7.8000**	**1,271,911.68**	**1,271,911.68**
			30,953.7543	*30,953.7543*
MOB EX Marsh Backhoe	**DAY**	**3.0000**	**92,861.26**	**92,861.26**
			2,427.6569	*2,427.6569*
MOB S Survey Boat	**DAY**	**7.8000**	**18,935.72**	**18,935.72**
			3,938.8461	*3,938.8461*
MOB C Crew Boat	**DAY**	**7.8000**	**30,723.00**	**30,723.00**
			12.6126	*12.6126*
02 Swamp Restoration Site 1	**CY**	**2,600,000.0000**	**32,792,848.83**	**32,792,848.83**
			6.6569	*6.6569*
04 Retention Dikes	**CY**	**128,000.0000**	**852,086.42**	**852,086.42**
			17,052,881.8867	*17,052,881.8867*
YR02 04 MRGO Ecosystem - feature BR1	**EA**	**1.0000**	**17,052,881.89**	**17,052,881.89**
			569,790.1259	*569,790.1259*
01 Mob & Demob	**EA**	**1.0000**	**569,790.13**	**569,790.13**

Description	UOM	Quantity	ContractCost	ProjectCost
			53,753.7855	*53,753.7855*
mob/demob Mob/Demob	**DAY**	**10.6000**	**569,790.13**	**569,790.13**
			41.2077	*41.2077*
02 Ridge restoration	**CY**	**400,000.0000**	**16,483,091.76**	**16,483,091.76**
YR02 05 CM1&CM5	**LS**	**1.0000**	**26,014,456.66**	**26,014,456.66**
			2,903,522.3226	*2,903,522.3226*
01 Mob & Demob	**EA**	**1.0000**	**2,903,522.32**	**2,903,522.32**
			69,152.9800	*69,152.9800*
mob/demob pipeline Mob/Demob pipeline	**DAY**	**13.6000**	**940,480.53**	**940,480.53**
			331,387.5295	*331,387.5295*
prelay shore pipe	**EA**	**1.0000**	**331,387.53**	**331,387.53**
			243,017.5217	*243,017.5217*
pickup shore pipe	**EA**	**1.0000**	**243,017.52**	**243,017.52**
			308,337.8695	*308,337.8695*
prelay submerged pipe	**EA**	**1.0000**	**308,337.87**	**308,337.87**
			26,706.5708	*26,706.5708*
pickup submerged pipe	**EA**	**1.0000**	**26,706.57**	**26,706.57**
			5,228.1102	*5,228.1102*
Mob/Demob monthly pipeline crew Mob/Demob monthly pipeline crew	**DAY**	**7.8000**	**40,779.26**	**40,779.26**
			30,953.7543	*30,953.7543*
MOB EX Marsh Backhoe	**DAY**	**3.0000**	**92,861.26**	**92,861.26**
			2,427.6569	*2,427.6569*
MOB S Survey Boat	**DAY**	**7.8000**	**18,935.72**	**18,935.72**
			3,938.8461	*3,938.8461*
MOB C Crew Boat	**DAY**	**7.8000**	**30,723.00**	**30,723.00**
			17,057.3886	*17,057.3886*
MOB Sheetpile	**DAY**	**10.0000**	**170,573.89**	**170,573.89**
			6.4615	*6.4615*
02 Dredging - Item 2 CM5 245 acres	**CY**	**1,000,000.0000**	**6,461,495.74**	**6,461,495.74**
			6.7022	*6.7022*
03A Perimeter Dikes	**CY**	**88,000.0000**	**589,790.09**	**589,790.09**
			6.9214	*6.9214*
03B Perimeter Dikes Refurbishment	**CY**	**35,000.0000**	**242,247.46**	**242,247.46**
			4.7221	*4.7221*
04A Dredging-400 acre site	**CY**	**500,000.0000**	**2,361,025.82**	**2,361,025.82**

Description	UOM	Quantity	ContractCost	ProjectCost
			6.2111	*6.2111*
04B Dredging-165 acre site	**CY**	**200,000.0000**	**1,242,229.54**	**1,242,229.54**
			5.5450	*5.5450*
04C Dredging-330 acre site	**CY**	**400,000.0000**	**2,218,018.36**	**2,218,018.36**
			6.6312	*6.6312*
04D Dredging-345 acre site	**CY**	**400,000.0000**	**2,652,475.95**	**2,652,475.95**
			4.0988	*4.0988*
05A Earthen Perimeter Closure	**CY**	**128,000.0000**	**524,649.46**	**524,649.46**
			6.6181	*6.6181*
05B Earthen Perimeter Dikes	**CY**	**210,000.0000**	**1,389,793.89**	**1,389,793.89**
			4.7905	*4.7905*
05C Removal of Seven Earthen Closures	**CY**	**16,100.0000**	**77,127.01**	**77,127.01**
			1,098.9899	*1,098.9899*
06 Vinyl/Timber Retention Wall	**LF**	**4,870.0000**	**5,352,081.02**	**5,352,081.02**
			964.6893	*964.6893*
A install retention wall	**LF**	**4,870.0000**	**4,698,037.11**	**4,698,037.11**
			134.3006	*134.3006*
B Remove Vinyl/Timber wall	**LF**	**4,870.0000**	**654,043.91**	**654,043.91**
			134.3006	*134.3006*
remove retention wall	**LF**	**4,870.0000**	**654,043.91**	**654,043.91**
			12,731,757.8427	*12,731,757.8427*
FY16 Year 3 Habitat Replinshment/Construction	**EA**	**1.0000**	**12,731,757.84**	**12,731,757.84**
YR03 01 ES1	**LS**	**1.0000**	**12,731,757.84**	**12,731,757.84**
			22,876.4382	*22,876.4382*
01 Mob & Demob	**DAY**	**5.0000**	**114,382.19**	**114,382.19**
			2,410.0402	*2,410.0402*
MOB S Survey Boat	**DAY**	**5.0000**	**12,050.20**	**12,050.20**
			3,794.8485	*3,794.8485*
MOB C Crew Boat	**DAY**	**5.0000**	**18,974.24**	**18,974.24**
			7,943.1582	*7,943.1582*
MOB Stone 1500# stone crew	**DAY**	**5.0000**	**39,715.79**	**39,715.79**
			1,091.0489	*1,091.0489*
MOB F Flotation Crew	**DAY**	**40.0000**	**43,641.96**	**43,641.96**
			7.0669	*7.0669*
02 Flotation Dredging and Placement of Material	**CY**	**150,000.0000**	**1,060,027.67**	**1,060,027.67**

Description	UOM	Quantity	ContractCost	ProjectCost
			5.8498	*5.8498*
02 Flotation Dredging and Placement of Material	**CY**	**37,500.0000**	**219,369.03**	**219,369.03**
			6.3326	*6.3326*
03 Geotextile Fabric	**SY**	**100,000.0000**	**633,256.23**	**633,256.23**
			52.0195	*52.0195*
04 Stone 1500# gradation	**TON**	**210,000.0000**	**10,924,091.75**	**10,924,091.75**
			59,966,052.4816	*59,966,052.4816*
FY17 Year 4 Habitat Replinshment/Construction	**EA**	**1.0000**	**59,966,052.48**	**59,966,052.48**
YR04 01 ES2	**LS**	**1.0000**	**19,010,294.91**	**19,010,294.91**
			22,997.7423	*22,997.7423*
01 Mob & Demob	**DAY**	**5.0000**	**114,988.71**	**114,988.71**
			2,354.7227	*2,354.7227*
MOB S Survey Boat	**DAY**	**5.0000**	**11,773.61**	**11,773.61**
			3,794.8485	*3,794.8485*
MOB C Crew Boat	**DAY**	**5.0000**	**18,974.24**	**18,974.24**
			8,134.7117	*8,134.7117*
MOB Stone 1500# stone crew	**DAY**	**5.0000**	**40,673.56**	**40,673.56**
			1,089.1824	*1,089.1824*
MOB F Flotation Crew	**DAY**	**40.0000**	**43,567.30**	**43,567.30**
			6.9976	*6.9976*
02 Flotation Dredging and Placement of Material	**CY**	**260,000.0000**	**1,819,381.66**	**1,819,381.66**
			5.7114	*5.7114*
02 Flotation Dredging Backfilling	**CY**	**65,000.0000**	**371,239.82**	**371,239.82**
			6.3326	*6.3326*
03 Geotextile Fabric	**SY**	**150,000.0000**	**949,884.34**	**949,884.34**
			52.0195	*52.0195*
04 Stone 1500# gradation	**TON**	**310,000.0000**	**16,126,040.20**	**16,126,040.20**
			40,955,757.5688	*40,955,757.5688*
YR04 02 ES3	**EA**	**1.0000**	**40,955,757.57**	**40,955,757.57**
			46,288.2299	*46,288.2299*
01 Mob and Demob	**EA**	**2.0000**	**92,576.46**	**92,576.46**
			46,288.2299	*46,288.2299*
01A First Mobilization	**EA**	**1.0000**	**46,288.23**	**46,288.23**
			7,943.1582	*7,943.1582*
01A Mobilize Stone Crew	**DAY**	**5.0000**	**39,715.79**	**39,715.79**

Description	UOM	Quantity	ContractCost	ProjectCost
			1,314.4878	*1,314.4878*
01B Mobilize Survey Crew	**DAY**	**5.0000**	**6,572.44**	**6,572.44**
			46,288.2299	*46,288.2299*
01B Secondt Mobilization	**EA**	**1.0000**	**46,288.23**	**46,288.23**
			7,943.1582	*7,943.1582*
01A Mobilize Stone Crew	**DAY**	**5.0000**	**39,715.79**	**39,715.79**
			1,314.4878	*1,314.4878*
01B Mobilize Survey Crew	**DAY**	**5.0000**	**6,572.44**	**6,572.44**
			6.8318	*6.8318*
02 Flotation Dredging and Placement of Material	**CY**	**600,000.0000**	**4,099,079.77**	**4,099,079.77**
			5.4654	*5.4654*
02 Flotation Dredging and Placement of Mateial Backfilling	**CY**	**150,000.0000**	**819,815.95**	**819,815.95**
			6.3326	*6.3326*
03 Geotextile Fabric	**SY**	**425,000.0000**	**2,691,338.97**	**2,691,338.97**
			52.0195	*52.0195*
04 Stone	**TON**	**655,000.0000**	**34,072,762.37**	**34,072,762.37**
			326,632,007.9064	*326,632,007.9064*
FY18 Year 5 Habitat Replinshment/Construction	**EA**	**1.0000**	**326,632,007.91**	**326,632,007.91**
YR04 01 TM1	**LS**	**1.0000**	**46,586,487.24**	**46,586,487.24**
			4,164,812.4619	*4,164,812.4619*
01 Mob & Demob	**EA**	**1.0000**	**4,164,812.46**	**4,164,812.46**
			69,152.9800	*69,152.9800*
mob/demob pipeline Mob/Demob pipeline	**DAY**	**13.6000**	**940,480.53**	**940,480.53**
			849,566.0723	*849,566.0723*
prelay shore pipe	**EA**	**1.0000**	**849,566.07**	**849,566.07**
			298,496.1876	*298,496.1876*
pickup shore pipe	**EA**	**1.0000**	**298,496.19**	**298,496.19**
			319,716.4005	*319,716.4005*
prelay submerged pipe	**EA**	**1.0000**	**319,716.40**	**319,716.40**
			317,168.7664	*317,168.7664*
pickup submerged pipe	**EA**	**1.0000**	**317,168.77**	**317,168.77**
			5,228.1102	*5,228.1102*
Mob/Demob monthly pipeline crew Mob/Demob monthly pipeline crew	**DAY**	**7.8000**	**40,779.26**	**40,779.26**
			30,953.7543	*30,953.7543*
MOB EX Marsh Backhoe	**DAY**	**3.0000**	**92,861.26**	**92,861.26**

Description	UOM	Quantity	ContractCost	ProjectCost
			2,427.6569	*2,427.6569*
MOB S Survey Boat	**DAY**	**7.8000**	**18,935.72**	**18,935.72**
			3,938.8461	*3,938.8461*
MOB C Crew Boat	**DAY**	**7.8000**	**30,723.00**	**30,723.00**
			382,145.1150	*382,145.1150*
Jack and Bore	**EA**	**1.0000**	**382,145.12**	**382,145.12**
			17,024.4119	*17,024.4119*
MOB Sheetpile	**DAY**	**10.0000**	**170,244.12**	**170,244.12**
			9.5308	*9.5308*
02 Dredging - Marsh Creation	**CY**	**3,400,000.0000**	**32,404,669.77**	**32,404,669.77**
			9.5460	*9.5460*
02B Dredging - Marsh Nourishmenet	**CY**	**400,000.0000**	**3,818,403.45**	**3,818,403.45**
			6.6036	*6.6036*
04 Perimeter Dikes	**CY**	**276,000.0000**	**1,822,582.83**	**1,822,582.83**
			6.6743	*6.6743*
05 Marsh Creation Rear Weirs	**CY**	**109,000.0000**	**727,495.66**	**727,495.66**
			7.1112	*7.1112*
06 Marsh Nourishment Weirs	**CY**	**23,000.0000**	**163,558.56**	**163,558.56**
			1,173.1212	*1,173.1212*
07A Install Vinyl/Timber Retaining Wall	**LF**	**2,630.0000**	**3,085,308.68**	**3,085,308.68**
			1,173.1212	*1,173.1212*
install retention wall	**LF**	**2,630.0000**	**3,085,308.68**	**3,085,308.68**
			1,332.1861	*1,332.1861*
07B Install Vinyl/Timber Retaining Wall	**LF**	**300.0000**	**399,655.83**	**399,655.83**
			1,332.1861	*1,332.1861*
install retention wall	**LF**	**300.0000**	**399,655.83**	**399,655.83**
YR04 02 TM2	**LS**	**1.0000**	**97,255,517.39**	**97,255,517.39**
			3,556,944.5316	*3,556,944.5316*
01 Mob & Demob	**EA**	**1.0000**	**3,556,944.53**	**3,556,944.53**
			95,872.5665	*95,872.5665*
mob/demob pipeline Mob/Demob pipeline	**DAY**	**13.6000**	**1,303,866.90**	**1,303,866.90**
			219,090.7231	*219,090.7231*
prelay shore pipe	**EA**	**1.0000**	**219,090.72**	**219,090.72**
			21,909.0723	*21,909.0723*
pickup shore pipe	**EA**	**1.0000**	**21,909.07**	**21,909.07**

Description	UOM	Quantity	ContractCost	ProjectCost
			642,467.8656	*642,467.8656*
prelay submerged pipe	**EA**	**1.0000**	**642,467.87**	**642,467.87**
			357,164.7804	*357,164.7804*
pickup submerged pipe	**EA**	**1.0000**	**357,164.78**	**357,164.78**
			5,228.1102	*5,228.1102*
Mob/Demob monthly pipeline crew Mob/Demob monthly pipeline crew	**DAY**	**7.8000**	**40,779.26**	**40,779.26**
			38,214.5115	*38,214.5115*
MOB EX Marsh Backhoe	**DAY**	**3.0000**	**114,643.53**	**114,643.53**
			2,427.6569	*2,427.6569*
MOB S Survey Boat	**DAY**	**7.8000**	**18,935.72**	**18,935.72**
			3,938.8461	*3,938.8461*
MOB C Crew Boat	**DAY**	**7.8000**	**30,723.00**	**30,723.00**
			9,063.9041	*9,063.9041*
MOB Sheetpile	**DAY**	**10.0000**	**90,639.04**	**90,639.04**
			9.7611	*9.7611*
02 Dredging - Marsh Creation	**CY**	**5,900,000.0000**	**57,590,639.61**	**57,590,639.61**
			9.7469	*9.7469*
03 Dredging - Marsh Nourishmenet	**CY**	**2,900,000.0000**	**28,266,026.34**	**28,266,026.34**
			6.5686	*6.5686*
04 Perimeter Dikes	**CY**	**1,140,000.0000**	**7,488,183.51**	**7,488,183.51**
			6.8024	*6.8024*
05 Marsh Creation Rear Weirs	**CY**	**52,000.0000**	**353,723.40**	**353,723.40**
YR4 03 HM1	**LS**	**1.0000**	**41,327,885.46**	**41,327,885.46**
			3,183,850.3742	*3,183,850.3742*
01 Mob & Demob	**EA**	**1.0000**	**3,183,850.37**	**3,183,850.37**
			55,793.1868	*55,793.1868*
mob/demob pipeline Mob/Demob pipeline	**DAY**	**13.6000**	**758,787.34**	**758,787.34**
			730,846.6803	*730,846.6803*
prelay shore pipe	**EA**	**1.0000**	**730,846.68**	**730,846.68**
			155,304.9196	*155,304.9196*
pickup shore pipe	**EA**	**1.0000**	**155,304.92**	**155,304.92**
			275,570.5075	*275,570.5075*
prelay submerged pipe	**EA**	**1.0000**	**275,570.51**	**275,570.51**
			273,022.8734	*273,022.8734*
pickup submerged pipe	**EA**	**1.0000**	**273,022.87**	**273,022.87**

Description	UOM	Quantity	ContractCost	ProjectCost
			5,228.1102	*5,228.1102*
Mob/Demob monthly pipeline crew Mob/Demob monthly pipeline crew	**DAY**	**7.8000**	**40,779.26**	**40,779.26**
			52,736.0259	*52,736.0259*
MOB EX Marsh Backhoe	**DAY**	**3.0000**	**158,208.08**	**158,208.08**
			2,427.6569	*2,427.6569*
MOB S Survey Boat	**DAY**	**7.8000**	**18,935.72**	**18,935.72**
			3,938.8461	*3,938.8461*
MOB C Crew Boat	**DAY**	**7.8000**	**30,723.00**	**30,723.00**
			9,063.9041	*9,063.9041*
MOB Sheetpile	**DAY**	**5.0000**	**45,319.52**	**45,319.52**
			7.2773	*7.2773*
02A Dredging - Marsh Creation Item 2a	**CY**	**3,300,000.0000**	**24,015,167.92**	**24,015,167.92**
			8.2118	*8.2118*
02B Dredging - Marsh Nourishment Item 2b	**CY**	**1,200,000.0000**	**9,854,190.32**	**9,854,190.32**
			6.5784	*6.5784*
03 Perimeter Retention Dikes	**CY**	**606,000.0000**	**3,986,527.53**	**3,986,527.53**
			6.8607	*6.8607*
04 Interior Earthen Weirs	**CY**	**42,000.0000**	**288,149.31**	**288,149.31**
YR04 04 MRGO5 Wall	**LS**	**1.0000**	**57,601,211.68**	**57,601,211.68**
			2,415,257.5943	*2,415,257.5943*
01 Mob & Demob	**EA**	**1.0000**	**2,415,257.59**	**2,415,257.59**
			47,141.4214	*47,141.4214*
mob/demob pipeline Mob/Demob pipeline	**DAY**	**13.6000**	**641,123.33**	**641,123.33**
			21,468.3316	*21,468.3316*
prelay shore pipe	**EA**	**1.0000**	**21,468.33**	**21,468.33**
			21,468.3316	*21,468.3316*
pickup shore pipe	**EA**	**1.0000**	**21,468.33**	**21,468.33**
			445,427.7151	*445,427.7151*
prelay submerged pipe	**EA**	**1.0000**	**445,427.72**	**445,427.72**
			210,391.5946	*210,391.5946*
pickup submerged pipe	**EA**	**1.0000**	**210,391.59**	**210,391.59**
			5,228.1102	*5,228.1102*
Mob/Demob monthly pipeline crew Mob/Demob monthly pipeline crew	**DAY**	**7.8000**	**40,779.26**	**40,779.26**
			30,953.7543	*30,953.7543*
MOB EX Marsh Backhoe	**DAY**	**3.0000**	**92,861.26**	**92,861.26**

Description	UOM	Quantity	ContractCost	ProjectCost
			2,427.6569	*2,427.6569*
MOB S Survey Boat	**DAY**	**7.8000**	**18,935.72**	**18,935.72**
			3,938.8461	*3,938.8461*
MOB C Crew Boat	**DAY**	**7.8000**	**30,723.00**	**30,723.00**
			17,024.4119	*17,024.4119*
MOB Sheetpile	**DAY**	**20.0000**	**340,488.24**	**340,488.24**
			9.7566	*9.7566*
02 Flotation Dredging and Placement of Material	**CY**	**20,000.0000**	**195,131.64**	**195,131.64**
			5.5752	*5.5752*
Flotation Excavaiton	**CY**	**20,000.0000**	**111,503.80**	**111,503.80**
			5.5752	*5.5752*
Flotation Excavaiton Backfiling	**CY**	**15,000.0000**	**83,627.85**	**83,627.85**
			2,392.7856	*2,392.7856*
03 Install Vinyl/Timber wall	**LF**	**13,685.0000**	**32,745,270.50**	**32,745,270.50**
			2,392.7856	*2,392.7856*
install retention wall	**LF**	**13,685.0000**	**32,745,270.50**	**32,745,270.50**
			6.9694	*6.9694*
04 Dredging	**CY**	**3,000,000.0000**	**20,908,271.35**	**20,908,271.35**
			4.3853	*4.3853*
05 Earthen Closure Dikes	**CY**	**33,000.0000**	**144,715.30**	**144,715.30**
			6.6423	*6.6423*
06 Earthen Retention Dikes	**CY**	**150,000.0000**	**996,349.40**	**996,349.40**
			98.1079	*98.1079*
07 Stone Tie Ins	**TON**	**2,000.0000**	**196,215.89**	**196,215.89**
YR04 05 MRGO8 Rock	**LS**	**1.0000**	**9,515,988.79**	**9,515,988.79**
			22,997.7423	*22,997.7423*
01 Mob & Demob	**DAY**	**5.0000**	**114,988.71**	**114,988.71**
			2,354.7227	*2,354.7227*
MOB S Survey Boat	**DAY**	**5.0000**	**11,773.61**	**11,773.61**
			3,794.8485	*3,794.8485*
MOB C Crew Boat	**DAY**	**5.0000**	**18,974.24**	**18,974.24**
			8,134.7117	*8,134.7117*
MOB Stone 650# stone crew	**DAY**	**5.0000**	**40,673.56**	**40,673.56**
			1,089.1824	*1,089.1824*
MOB F Flotation Crew	**DAY**	**40.0000**	**43,567.30**	**43,567.30**

Description	UOM	Quantity	ContractCost	ProjectCost
			9.9372	*9.9372*
02 Flotation Dredging and Placement of Material	**CY**	**90,000.0000**	**894,350.44**	**894,350.44**
			5.7044	*5.7044*
02 Flotation Dredging and Placement of Material Backfilling	**CY**	**67,500.0000**	**385,046.26**	**385,046.26**
			6.3326	*6.3326*
03 Geotextile Fabric	**SY**	**75,000.0000**	**474,942.17**	**474,942.17**
			48.6770	*48.6770*
04 Stone 650# gradation	**TON**	**165,000.0000**	**8,031,707.47**	**8,031,707.47**
YR04 06 MRGO8 Wall	**LS**	**1.0000**	**74,344,917.34**	**74,344,917.34**
			2,609,449.9696	*2,609,449.9696*
01 Mob & Demob	**EA**	**1.0000**	**2,609,449.97**	**2,609,449.97**
			69,152.9800	*69,152.9800*
mob/demob pipeline Mob/Demob pipeline	**DAY**	**13.6000**	**940,480.53**	**940,480.53**
			42,936.6632	*42,936.6632*
prelay shore pipe	**EA**	**1.0000**	**42,936.66**	**42,936.66**
			21,468.3316	*21,468.3316*
pickup shore pipe	**EA**	**1.0000**	**21,468.33**	**21,468.33**
			331,284.5006	*331,284.5006*
prelay submerged pipe	**EA**	**1.0000**	**331,284.50**	**331,284.50**
			197,242.1199	*197,242.1199*
pickup submerged pipe	**EA**	**1.0000**	**197,242.12**	**197,242.12**
			5,228.1102	*5,228.1102*
Mob/Demob monthly pipeline crew Mob/Demob monthly pipeline crew	**DAY**	**7.8000**	**40,779.26**	**40,779.26**
			30,953.7543	*30,953.7543*
MOB EX Marsh Backhoe	**DAY**	**3.0000**	**92,861.26**	**92,861.26**
			2,427.6569	*2,427.6569*
MOB S Survey Boat	**DAY**	**7.8000**	**18,935.72**	**18,935.72**
			3,938.8461	*3,938.8461*
MOB C Crew Boat	**DAY**	**7.8000**	**30,723.00**	**30,723.00**
			17,057.3886	*17,057.3886*
MOB Sheetpile	**DAY**	**20.0000**	**341,147.77**	**341,147.77**
			2,391.1100	*2,391.1100*
03 Install Vinyl/Timber wall	**LF**	**17,785.0000**	**42,525,891.69**	**42,525,891.69**
			2,391.1100	*2,391.1100*
install retention wall	**LF**	**17,785.0000**	**42,525,891.69**	**42,525,891.69**

Description	UOM	Quantity	ContractCost	ProjectCost
			7.4091	*7.4091*
04 Dredging	**CY**	**3,500,000.0000**	**25,931,786.40**	**25,931,786.40**
			4.2824	*4.2824*
05 Earthen Closure Dikes	**CY**	**45,000.0000**	**192,706.98**	**192,706.98**
			6.6140	*6.6140*
06 Earthen Retention Dikes	**CY**	**225,000.0000**	**1,488,155.01**	**1,488,155.01**
			79.3582	*79.3582*
07 Stone Tie Ins	**TON**	**4,000.0000**	**317,432.90**	**317,432.90**
			60.1778	*60.1778*
08 Stone Foreshore Dike Construction	**TON**	**20,000.0000**	**1,203,555.64**	**1,203,555.64**
			7.8287	*7.8287*
09 Geotextile Fabric	**SY**	**9,700.0000**	**75,938.75**	**75,938.75**
			105,279,905.2129	*105,279,905.2129*
FY19 Year 6 Habitat Replinshment/Construction	**EA**	**1.0000**	**105,279,905.21**	**105,279,905.21**
YR06 01 EM1	**LS**	**1.0000**	**63,358,290.33**	**63,358,290.33**
			4,028,087.4652	*4,028,087.4652*
01 Mob & Demob	**EA**	**1.0000**	**4,028,087.47**	**4,028,087.47**
			82,512.7732	*82,512.7732*
mob/demob pipeline Mob/Demob pipeline	**DAY**	**13.6000**	**1,122,173.72**	**1,122,173.72**
			522,483.4634	*522,483.4634*
prelay shore pipe	**EA**	**1.0000**	**522,483.46**	**522,483.46**
			22,716.6723	*22,716.6723*
pickup shore pipe	**EA**	**1.0000**	**22,716.67**	**22,716.67**
			460,020.4370	*460,020.4370*
prelay submerged pipe	**EA**	**1.0000**	**460,020.44**	**460,020.44**
			374,295.9297	*374,295.9297*
pickup submerged pipe	**EA**	**1.0000**	**374,295.93**	**374,295.93**
			5,228.1102	*5,228.1102*
Mob/Demob monthly pipeline crew Mob/Demob monthly pipeline crew	**DAY**	**7.8000**	**40,779.26**	**40,779.26**
			38,214.5115	*38,214.5115*
MOB EX Marsh Backhoe	**DAY**	**3.0000**	**114,643.53**	**114,643.53**
			2,427.6569	*2,427.6569*
MOB S Survey Boat	**DAY**	**7.8000**	**18,935.72**	**18,935.72**
			3,938.8461	*3,938.8461*
MOB C Crew Boat	**DAY**	**7.8000**	**30,723.00**	**30,723.00**

Description	UOM	Quantity	ContractCost	ProjectCost
			9,063.9041	*9,063.9041*
MOB Sheetpile	**DAY**	**10.0000**	**90,639.04**	**90,639.04**
			382,145.1150	*382,145.1150*
Jack and Bore	**EA**	**1.0000**	**382,145.12**	**382,145.12**
			6.2219	*6.2219*
02 Dredging - Marsh Creation and Nourishment	**CY**	**4,700,000.0000**	**29,243,092.92**	**29,243,092.92**
			6.2211	*6.2211*
03 Dredging - Marsh Nourishmenet	**CY**	**3,400,000.0000**	**21,151,701.34**	**21,151,701.34**
			6.6026	*6.6026*
04 Earthen Retention Dikes	**CY**	**282,074.0000**	**1,862,412.53**	**1,862,412.53**
			6.7141	*6.7141*
05 Earthen Weirs	**CY**	**81,278.0000**	**545,711.19**	**545,711.19**
			1,548.4603	*1,548.4603*
06A Install Vinyl/Timber wall	**LF**	**3,270.0000**	**5,063,465.18**	**5,063,465.18**
			1,548.4603	*1,548.4603*
install retention wall	**LF**	**3,270.0000**	**5,063,465.18**	**5,063,465.18**
			1,322.7274	*1,322.7274*
06B Install Vinyl/Timber wall	**LF**	**550.0000**	**727,500.06**	**727,500.06**
			1,322.7274	*1,322.7274*
install retention wall	**LF**	**550.0000**	**727,500.06**	**727,500.06**
			192.7538	*192.7538*
07 Remove Vinyl/Timber wall 3 closures	**LF**	**3,820.0000**	**736,319.65**	**736,319.65**
			199.7266	*199.7266*
remove retention wall 6A	**LF**	**3,270.0000**	**653,105.96**	**653,105.96**
			151.2976	*151.2976*
remove retention wall 6B	**LF**	**550.0000**	**83,213.70**	**83,213.70**
YR06 02 MRGO7 Wall	**LS**	**1.0000**	**41,921,614.88**	**41,921,614.88**
			2,945,664.0214	*2,945,664.0214*
01 Mob & Demob	**EA**	**1.0000**	**2,945,664.02**	**2,945,664.02**
			69,152.9800	*69,152.9800*
mob/demob pipeline Mob/Demob pipeline	**DAY**	**13.6000**	**940,480.53**	**940,480.53**
			176,040.3192	*176,040.3192*
prelay shore pipe	**EA**	**1.0000**	**176,040.32**	**176,040.32**
			21,468.3316	*21,468.3316*
pickup shore pipe	**EA**	**1.0000**	**21,468.33**	**21,468.33**

Description	UOM	Quantity	ContractCost	ProjectCost
			380,445.6106	*380,445.6106*
prelay submerged pipe	**EA**	**1.0000**	**380,445.61**	**380,445.61**
			351,191.4058	*351,191.4058*
pickup submerged pipe	**EA**	**1.0000**	**351,191.41**	**351,191.41**
			5,228.1102	*5,228.1102*
Mob/Demob monthly pipeline crew Mob/Demob monthly pipeline crew	**DAY**	**7.8000**	**40,779.26**	**40,779.26**
			30,953.7543	*30,953.7543*
MOB EX Marsh Backhoe	**DAY**	**3.0000**	**92,861.26**	**92,861.26**
			2,427.6569	*2,427.6569*
MOB S Survey Boat	**DAY**	**7.8000**	**18,935.72**	**18,935.72**
			3,938.8461	*3,938.8461*
MOB C Crew Boat	**DAY**	**7.8000**	**30,723.00**	**30,723.00**
			17,057.3886	*17,057.3886*
MOB Sheetpile	**DAY**	**20.0000**	**341,147.77**	**341,147.77**
			3,000.7405	*3,000.7405*
02 Install Vinyl/Timber wall	**LF**	**9,170.0000**	**27,516,790.26**	**27,516,790.26**
			3,000.7405	*3,000.7405*
install retention wall	**LF**	**9,170.0000**	**27,516,790.26**	**27,516,790.26**
			6.3029	*6.3029*
03 Dredging/Marsh Creation	**CY**	**1,650,000.0000**	**10,399,850.95**	**10,399,850.95**
			4.2048	*4.2048*
04 Earthen Closure Dikes	**CY**	**62,000.0000**	**260,695.20**	**260,695.20**
			6.7697	*6.7697*
05 Earthen Retention Dikes	**CY**	**60,000.0000**	**406,182.66**	**406,182.66**
			98.1079	*98.1079*
06 Stone Tie Ins	**TON**	**4,000.0000**	**392,431.79**	**392,431.79**
			136,628,651.8453	*136,628,651.8453*
FY20 Year 7 Habitat Replinshment/Construction	**EA**	**1.0000**	**136,628,651.85**	**136,628,651.85**
YR07 01 BM1	**LS**	**1.0000**	**77,632,998.16**	**77,632,998.16**
			3,085,519.5809	*3,085,519.5809*
01 Mob & Demob	**EA**	**1.0000**	**3,085,519.58**	**3,085,519.58**
			69,152.9800	*69,152.9800*
mob/demob pipeline Mob/Demob pipeline	**DAY**	**13.6000**	**940,480.53**	**940,480.53**
			410,000.6797	*410,000.6797*
prelay shore pipe	**EA**	**1.0000**	**410,000.68**	**410,000.68**

Description	UOM	Quantity	ContractCost	ProjectCost
			22,777.8155	*22,777.8155*
pickup shore pipe	**EA**	**1.0000**	**22,777.82**	**22,777.82**
			297,954.0812	*297,954.0812*
prelay submerged pipe	**EA**	**1.0000**	**297,954.08**	**297,954.08**
			321,093.9642	*321,093.9642*
pickup submerged pipe	**EA**	**1.0000**	**321,093.96**	**321,093.96**
			5,228.1102	*5,228.1102*
Mob/Demob monthly pipeline crew Mob/Demob monthly pipeline crew	**DAY**	**7.8000**	**40,779.26**	**40,779.26**
			30,953.7543	*30,953.7543*
MOB EX Marsh Backhoe	**DAY**	**3.0000**	**92,861.26**	**92,861.26**
			2,427.6569	*2,427.6569*
MOB S Survey Boat	**DAY**	**7.8000**	**18,935.72**	**18,935.72**
			3,938.8461	*3,938.8461*
MOB C Crew Boat	**DAY**	**7.8000**	**30,723.00**	**30,723.00**
			9,807.9358	*9,807.9358*
MOB Flotation/Closure crew	**DAY**	**5.0000**	**49,039.68**	**49,039.68**
			6.5402	*6.5402*
02 Dredging - Marsh Nourishment	**CY**	**11,000,000.0000**	**71,941,857.64**	**71,941,857.64**
			6.6148	*6.6148*
03 PERIMETER RETENTION DIKE	**CY**	**222,000.0000**	**1,468,482.79**	**1,468,482.79**
			4.1110	*4.1110*
03B PERIMETER RETENTION DIKES ALONG BAYOU ST. MALO	**CY**	**114,000.0000**	**468,659.16**	**468,659.16**
			6.6848	*6.6848*
03B REAR EARTHEN WEIR	**CY**	**100,000.0000**	**668,478.99**	**668,478.99**
YR07 02 LM3	**LS**	**1.0000**	**58,995,653.68**	**58,995,653.68**
			3,165,553.9334	*3,165,553.9334*
01 Mob & Demob	**EA**	**1.0000**	**3,165,553.93**	**3,165,553.93**
			69,152.9800	*69,152.9800*
mob/demob pipeline Mob/Demob pipeline	**DAY**	**13.6000**	**940,480.53**	**940,480.53**
			397,665.0354	*397,665.0354*
prelay shore pipe	**EA**	**1.0000**	**397,665.04**	**397,665.04**
			265,110.0236	*265,110.0236*
pickup shore pipe	**EA**	**1.0000**	**265,110.02**	**265,110.02**
			341,784.4358	*341,784.4358*
prelay submerged pipe	**EA**	**1.0000**	**341,784.44**	**341,784.44**

Description	UOM	Quantity	ContractCost	ProjectCost
			339,236.8017	*339,236.8017*
pickup submerged pipe	**EA**	**1.0000**	**339,236.80**	**339,236.80**
			5,228.1102	*5,228.1102*
Mob/Demob monthly pipeline crew Mob/Demob monthly pipeline crew	**DAY**	**7.8000**	**40,779.26**	**40,779.26**
			30,953.7543	*30,953.7543*
MOB EX Marsh Backhoe	**DAY**	**3.0000**	**92,861.26**	**92,861.26**
			2,427.6569	*2,427.6569*
MOB S Survey Boat	**DAY**	**7.8000**	**18,935.72**	**18,935.72**
			3,938.8461	*3,938.8461*
MOB C Crew Boat	**DAY**	**7.8000**	**30,723.00**	**30,723.00**
			8.3591	*8.3591*
02 Dredging - Marsh Creation	**CY**	**5,100,000.0000**	**42,631,408.59**	**42,631,408.59**
			8.3577	*8.3577*
03 Dredging - Marsh Nourishment	**CY**	**1,300,000.0000**	**10,865,007.14**	**10,865,007.14**
			6.5986	*6.5986*
03 PERIMETER RETENTION DIKE	**CY**	**309,000.0000**	**2,038,977.30**	**2,038,977.30**
			6.8536	*6.8536*
04 INTERIOR WEIR	**CY**	**43,000.0000**	**294,706.72**	**294,706.72**
			142,169,108.2252	*142,169,108.2252*
FY21 Year 8 Habitat Replinshment/Construction	**EA**	**1.0000**	**142,169,108.23**	**142,169,108.23**
YR08 01 CM3	**LS**	**1.0000**	**18,521,545.05**	**18,521,545.05**
			3,012,951.7306	*3,012,951.7306*
01 Mob & Demob	**EA**	**1.0000**	**3,012,951.73**	**3,012,951.73**
			69,152.9800	*69,152.9800*
mob/demob pipeline Mob/Demob pipeline	**DAY**	**13.6000**	**940,480.53**	**940,480.53**
			683,334.4662	*683,334.4662*
prelay shore pipe	**EA**	**1.0000**	**683,334.47**	**683,334.47**
			22,777.8155	*22,777.8155*
pickup shore pipe	**EA**	**1.0000**	**22,777.82**	**22,777.82**
			163,094.6162	*163,094.6162*
prelay submerged pipe	**EA**	**1.0000**	**163,094.62**	**163,094.62**
			231,187.6543	*231,187.6543*
pickup submerged pipe	**EA**	**1.0000**	**231,187.65**	**231,187.65**
			5,228.1102	*5,228.1102*
Mob/Demob monthly pipeline crew Mob/Demob monthly pipeline crew	**DAY**	**7.8000**	**40,779.26**	**40,779.26**

Description	UOM	Quantity	ContractCost	ProjectCost
			30,953.7543	*30,953.7543*
MOB EX Marsh Backhoe	**DAY**	**3.0000**	**92,861.26**	**92,861.26**
			2,427.6569	*2,427.6569*
MOB S Survey Boat	**DAY**	**7.8000**	**18,935.72**	**18,935.72**
			3,938.8461	*3,938.8461*
MOB C Crew Boat	**DAY**	**7.8000**	**30,723.00**	**30,723.00**
			9,063.9041	*9,063.9041*
MOB Sheetpile	**DAY**	**10.0000**	**90,639.04**	**90,639.04**
			5.6101	*5.6101*
02A Dredging - Marsh Creation	**CY**	**1,200,000.0000**	**6,732,097.86**	**6,732,097.86**
			5.9141	*5.9141*
02B Dredging - Marsh Nourishmenet	**CY**	**400,000.0000**	**2,365,654.15**	**2,365,654.15**
			6.6189	*6.6189*
03A Perimeter Dikes	**CY**	**207,000.0000**	**1,370,121.67**	**1,370,121.67**
			4.1334	*4.1334*
03B Earthen Perimeter Closure	**CY**	**95,000.0000**	**392,672.33**	**392,672.33**
			6.9967	*6.9967*
03C Interior Weirs	**CY**	**29,000.0000**	**202,903.01**	**202,903.01**
			6.3194	*6.3194*
03D Removal of Eight Earthen Closures	**CY**	**18,400.0000**	**116,277.74**	**116,277.74**
			1,390.0925	*1,390.0925*
04A Install Vinyl/Timber Retaining Wall	**LF**	**2,285.0000**	**3,176,361.43**	**3,176,361.43**
			1,214.5804	*1,214.5804*
install retention wall	**LF**	**2,285.0000**	**2,775,316.26**	**2,775,316.26**
			175.5121	*175.5121*
remove retention wall	**LF**	**2,285.0000**	**401,045.17**	**401,045.17**
			1,829.3732	*1,829.3732*
04B Install Vinyl/Timber Retaining Wall	**LF**	**630.0000**	**1,152,505.13**	**1,152,505.13**
			1,605.4322	*1,605.4322*
install retention wall	**LF**	**630.0000**	**1,011,422.25**	**1,011,422.25**
			223.9411	*223.9411*
remove retention wall	**LF**	**630.0000**	**141,082.88**	**141,082.88**
YR08 02 CM4	**LS**	**1.0000**	**7,896,967.69**	**7,896,967.69**
			2,854,237.2303	*2,854,237.2303*
01 Mob & Demob	**EA**	**1.0000**	**2,854,237.23**	**2,854,237.23**

Description	UOM	Quantity	ContractCost	ProjectCost
			82,512.7732	*82,512.7732*
mob/demob pipeline Mob/Demob pipeline	**DAY**	**13.6000**	**1,122,173.72**	**1,122,173.72**
			87,880.8621	*87,880.8621*
prelay shore pipe	**EA**	**1.0000**	**87,880.86**	**87,880.86**
			43,940.4311	*43,940.4311*
pickup shore pipe	**EA**	**1.0000**	**43,940.43**	**43,940.43**
			422,817.6138	*422,817.6138*
prelay submerged pipe	**EA**	**1.0000**	**422,817.61**	**422,817.61**
			244,027.7301	*244,027.7301*
pickup submerged pipe	**EA**	**1.0000**	**244,027.73**	**244,027.73**
			5,228.1102	*5,228.1102*
Mob/Demob monthly pipeline crew Mob/Demob monthly pipeline crew	**DAY**	**7.8000**	**40,779.26**	**40,779.26**
			30,953.7543	*30,953.7543*
MOB EX Marsh Backhoe	**DAY**	**3.0000**	**92,861.26**	**92,861.26**
			2,427.6569	*2,427.6569*
MOB S Survey Boat	**DAY**	**7.8000**	**18,935.72**	**18,935.72**
			3,938.8461	*3,938.8461*
MOB C Crew Boat	**DAY**	**7.8000**	**30,723.00**	**30,723.00**
			9,807.9358	*9,807.9358*
MOB Flotation/Closure crew	**DAY**	**5.0000**	**49,039.68**	**49,039.68**
			5.9523	*5.9523*
02A Dredging - Marsh Creation	**CY**	**400,000.0000**	**2,380,939.95**	**2,380,939.95**
			6.2111	*6.2111*
02B Dredging - Marsh Nourishmenet	**CY**	**200,000.0000**	**1,242,229.54**	**1,242,229.54**
			6.6294	*6.6294*
03A Perimeter Dikes	**CY**	**177,000.0000**	**1,173,399.42**	**1,173,399.42**
			4.3259	*4.3259*
03B Earthen Perimeter Closure(5)	**CY**	**39,000.0000**	**168,711.14**	**168,711.14**
			6.7348	*6.7348*
03C Removal of Five Earthen Closures	**CY**	**11,500.0000**	**77,450.40**	**77,450.40**
YR08 03 CM2	**LS**	**1.0000**	**65,984,132.15**	**65,984,132.15**
			4,287,489.5164	*4,287,489.5164*
01 Mob & Demob	**EA**	**1.0000**	**4,287,489.52**	**4,287,489.52**
			77,009.8836	*77,009.8836*
mob/demob pipeline Mob/Demob pipeline	**DAY**	**13.6000**	**1,047,334.42**	**1,047,334.42**

Description	UOM	Quantity	ContractCost	ProjectCost
			352,501.7400	*352,501.7400*
prelay shore pipe	**EA**	**1.0000**	**352,501.74**	**352,501.74**
			22,031.3588	*22,031.3588*
pickup shore pipe	**EA**	**1.0000**	**22,031.36**	**22,031.36**
			910,119.2267	*910,119.2267*
prelay submerged pipe	**EA**	**1.0000**	**910,119.23**	**910,119.23**
			907,571.5926	*907,571.5926*
pickup submerged pipe	**EA**	**1.0000**	**907,571.59**	**907,571.59**
			5,228.1102	*5,228.1102*
Mob/Demob monthly pipeline crew Mob/Demob monthly pipeline crew	**DAY**	**7.8000**	**40,779.26**	**40,779.26**
			52,736.0259	*52,736.0259*
MOB EX Marsh Backhoe	**DAY**	**3.0000**	**158,208.08**	**158,208.08**
			2,427.6569	*2,427.6569*
MOB S Survey Boat	**DAY**	**7.8000**	**18,935.72**	**18,935.72**
			3,938.8461	*3,938.8461*
MOB C Crew Boat	**DAY**	**7.8000**	**30,723.00**	**30,723.00**
			9,063.9041	*9,063.9041*
MOB Sheetpile	**DAY**	**10.0000**	**90,639.04**	**90,639.04**
			9.6757	*9.6757*
02 Dredging	**CY**	**4,720,000.0000**	**45,669,256.39**	**45,669,256.39**
			6.6126	*6.6126*
03 Perimeter Retention Dikes	**CY**	**231,000.0000**	**1,527,499.46**	**1,527,499.46**
			1,197.7030	*1,197.7030*
04 Install Vinyl/Timber Retaining Wall	**LF**	**3,750.0000**	**4,491,386.36**	**4,491,386.36**
			1,197.7030	*1,197.7030*
install retention wall	**LF**	**3,750.0000**	**4,491,386.36**	**4,491,386.36**
			1,187.8314	*1,187.8314*
05A Option 1 Install Vinyl/Timber Retaining Wall	**LF**	**7,900.0000**	**9,383,868.29**	**9,383,868.29**
			1,187.8314	*1,187.8314*
install retention wall	**LF**	**7,900.0000**	**9,383,868.29**	**9,383,868.29**
			4.0826	*4.0826*
05B Option 2 Earthen Closure	**CY**	**153,000.0000**	**624,632.13**	**624,632.13**
YR08 04 CC2	**LS**	**1.0000**	**14,750,218.54**	**14,750,218.54**
			3,707,725.6344	*3,707,725.6344*
01 Mob & Demob	**EA**	**1.0000**	**3,707,725.63**	**3,707,725.63**

Description	UOM	Quantity	ContractCost	ProjectCost
			82,512.7732	*82,512.7732*
mob/demob pipeline Mob/Demob pipeline	**DAY**	**13.6000**	**1,122,173.72**	**1,122,173.72**
			755,703.3653	*755,703.3653*
prelay shore pipe	**EA**	**1.0000**	**755,703.37**	**755,703.37**
			609,142.7126	*609,142.7126*
pickup shore pipe	**EA**	**1.0000**	**609,142.71**	**609,142.71**
			175,483.4834	*175,483.4834*
prelay submerged pipe	**EA**	**1.0000**	**175,483.48**	**175,483.48**
			172,935.8493	*172,935.8493*
pickup submerged pipe	**EA**	**1.0000**	**172,935.85**	**172,935.85**
			5,228.1102	*5,228.1102*
Mob/Demob monthly pipeline crew Mob/Demob monthly pipeline crew	**DAY**	**7.8000**	**40,779.26**	**40,779.26**
			30,953.7543	*30,953.7543*
MOB EX Marsh Backhoe	**DAY**	**3.0000**	**92,861.26**	**92,861.26**
			2,427.6569	*2,427.6569*
MOB S Survey Boat	**DAY**	**7.8000**	**18,935.72**	**18,935.72**
			3,938.8461	*3,938.8461*
MOB C Crew Boat	**DAY**	**7.8000**	**30,723.00**	**30,723.00**
			5.4834	*5.4834*
02A Dredging - Marsh Creation	**CY**	**1,300,000.0000**	**7,128,456.10**	**7,128,456.10**
			6.3935	*6.3935*
02B Dredging - Marsh Nourishmenet	**CY**	**400,000.0000**	**2,557,406.60**	**2,557,406.60**
			6.6323	*6.6323*
03A Perimeter Dikes	**CY**	**170,000.0000**	**1,127,497.56**	**1,127,497.56**
			6.9434	*6.9434*
03B Interior Earthen Weirs	**CY**	**33,000.0000**	**229,132.64**	**229,132.64**
YR08 05 CC3	**LS**	**1.0000**	**35,016,244.81**	**35,016,244.81**
			5,597,315.2007	*5,597,315.2007*
01 Mob & Demob	**EA**	**1.0000**	**5,597,315.20**	**5,597,315.20**
			82,512.7732	*82,512.7732*
mob/demob pipeline Mob/Demob pipeline	**DAY**	**13.6000**	**1,122,173.72**	**1,122,173.72**
			1,265,378.3968	*1,265,378.3968*
prelay shore pipe	**EA**	**1.0000**	**1,265,378.40**	**1,265,378.40**
			830,706.4284	*830,706.4284*
pickup shore pipe	**EA**	**1.0000**	**830,706.43**	**830,706.43**

Description	UOM	Quantity	ContractCost	ProjectCost
			545,822.0494	*545,822.0494*
prelay submerged pipe	**EA**	**1.0000**	**545,822.05**	**545,822.05**
			543,274.4153	*543,274.4153*
pickup submerged pipe	**EA**	**1.0000**	**543,274.42**	**543,274.42**
			5,228.1102	*5,228.1102*
Mob/Demob monthly pipeline crew Mob/Demob monthly pipeline crew	**DAY**	**7.8000**	**40,779.26**	**40,779.26**
			30,953.7543	*30,953.7543*
MOB EX Marsh Backhoe	**DAY**	**3.0000**	**92,861.26**	**92,861.26**
			2,427.6569	*2,427.6569*
MOB S Survey Boat	**DAY**	**7.8000**	**18,935.72**	**18,935.72**
			3,938.8461	*3,938.8461*
MOB C Crew Boat	**DAY**	**7.8000**	**30,723.00**	**30,723.00**
			9,807.9358	*9,807.9358*
MOB Flotation/Closure crew	**DAY**	**10.0000**	**98,079.36**	**98,079.36**
			7.2638	*7.2638*
02A Dredging - Swamp Restoration	**CY**	**2,100,000.0000**	**15,253,912.62**	**15,253,912.62**
			7.4766	*7.4766*
02B Dredging - Swamp Nourishmenet	**CY**	**1,600,000.0000**	**11,962,488.47**	**11,962,488.47**
			6.6248	*6.6248*
03A Perimeter Dikes	**CY**	**189,000.0000**	**1,252,088.32**	**1,252,088.32**
			4.1686	*4.1686*
03B Earthen Closure(6)	**CY**	**228,000.0000**	**950,440.19**	**950,440.19**
			119,013,817.4894	*119,013,817.4894*
FY22 Year 9 Habitat Replinshment/Construction	**EA**	**1.0000**	**119,013,817.49**	**119,013,817.49**
YR09 01 EM2	**LS**	**1.0000**	**11,644,769.16**	**11,644,769.16**
			2,031,215.2894	*2,031,215.2894*
01 Mob & Demob	**EA**	**1.0000**	**2,031,215.29**	**2,031,215.29**
			42,433.3936	*42,433.3936*
mob/demob pipeline Mob/Demob pipeline	**DAY**	**13.6000**	**577,094.15**	**577,094.15**
			313,753.3872	*313,753.3872*
prelay shore pipe	**EA**	**1.0000**	**313,753.39**	**313,753.39**
			22,410.9562	*22,410.9562*
pickup shore pipe	**EA**	**1.0000**	**22,410.96**	**22,410.96**
			196,634.3705	*196,634.3705*
prelay submerged pipe	**EA**	**1.0000**	**196,634.37**	**196,634.37**

Description	UOM	Quantity	ContractCost	ProjectCost
			194,086.7364	*194,086.7364*
pickup submerged pipe	**EA**	**1.0000**	**194,086.74**	**194,086.74**
			5,228.1102	*5,228.1102*
Mob/Demob monthly pipeline crew Mob/Demob monthly pipeline crew	**DAY**	**7.8000**	**40,779.26**	**40,779.26**
			30,953.7543	*30,953.7543*
MOB EX Marsh Backhoe	**DAY**	**3.0000**	**92,861.26**	**92,861.26**
			2,427.6569	*2,427.6569*
MOB S Survey Boat	**DAY**	**7.8000**	**18,935.72**	**18,935.72**
			3,938.8461	*3,938.8461*
MOB C Crew Boat	**DAY**	**7.8000**	**30,723.00**	**30,723.00**
			6.2049	*6.2049*
02 Dredging	**CY**	**1,300,000.0000**	**8,066,382.18**	**8,066,382.18**
			6.6118	*6.6118*
03 Perimeter Retention Dikes	**CY**	**234,000.0000**	**1,547,171.69**	**1,547,171.69**
YR09 02 EM3	**LS**	**1.0000**	**42,047,705.22**	**42,047,705.22**
			5,431,482.2158	*5,431,482.2158*
01 Mob & Demob	**EA**	**1.0000**	**5,431,482.22**	**5,431,482.22**
			122,592.1529	*122,592.1529*
mob/demob pipeline Mob/Demob pipeline	**DAY**	**13.6000**	**1,667,253.28**	**1,667,253.28**
			709,903.1613	*709,903.1613*
prelay shore pipe	**EA**	**1.0000**	**709,903.16**	**709,903.16**
			91,600.4079	*91,600.4079*
pickup shore pipe	**EA**	**1.0000**	**91,600.41**	**91,600.41**
			721,153.5375	*721,153.5375*
prelay submerged pipe	**EA**	**1.0000**	**721,153.54**	**721,153.54**
			718,605.9034	*718,605.9034*
pickup submerged pipe	**EA**	**1.0000**	**718,605.90**	**718,605.90**
			5,228.1102	*5,228.1102*
Mob/Demob monthly pipeline crew Mob/Demob monthly pipeline crew	**DAY**	**7.8000**	**40,779.26**	**40,779.26**
			45,475.2687	*45,475.2687*
MOB EX Marsh Backhoe	**DAY**	**3.0000**	**136,425.81**	**136,425.81**
			2,427.6569	*2,427.6569*
MOB S Survey Boat	**DAY**	**7.8000**	**18,935.72**	**18,935.72**
			3,938.8461	*3,938.8461*
MOB C Crew Boat	**DAY**	**7.8000**	**30,723.00**	**30,723.00**

Description	UOM	Quantity	ContractCost	ProjectCost
			9,063.9041	*9,063.9041*
MOB Sheetpile	**DAY**	**5.0000**	**45,319.52**	**45,319.52**
			382,145.1150	*382,145.1150*
Jack and Bore	**EA**	**1.0000**	**382,145.12**	**382,145.12**
			8.3119	*8.3119*
02 Dredging	**CY**	**4,100,000.0000**	**34,078,682.27**	**34,078,682.27**
			6.6659	*6.6659*
03 Perimeter Retention Dikes	**CY**	**117,363.0000**	**782,335.27**	**782,335.27**
			6.6053	*6.6053*
04 Interior Weirs	**CY**	**265,725.0000**	**1,755,205.46**	**1,755,205.46**
YR09 03 EM4	**LS**	**1.0000**	**65,321,343.12**	**65,321,343.12**
			3,390,913.4349	*3,390,913.4349*
01 Mob & Demob	**EA**	**1.0000**	**3,390,913.43**	**3,390,913.43**
			95,872.5665	*95,872.5665*
mob/demob pipeline Mob/Demob pipeline	**DAY**	**13.6000**	**1,303,866.90**	**1,303,866.90**
			412,201.8356	*412,201.8356*
prelay shore pipe	**EA**	**1.0000**	**412,201.84**	**412,201.84**
			22,581.6477	*22,581.6477*
pickup shore pipe	**EA**	**1.0000**	**22,581.65**	**22,581.65**
			534,324.1782	*534,324.1782*
prelay submerged pipe	**EA**	**1.0000**	**534,324.18**	**534,324.18**
			301,819.1196	*301,819.1196*
pickup submerged pipe	**EA**	**1.0000**	**301,819.12**	**301,819.12**
			5,228.1102	*5,228.1102*
Mob/Demob monthly pipeline crew Mob/Demob monthly pipeline crew	**DAY**	**7.8000**	**40,779.26**	**40,779.26**
			45,475.2687	*45,475.2687*
MOB EX Marsh Backhoe	**DAY**	**3.0000**	**136,425.81**	**136,425.81**
			2,427.6569	*2,427.6569*
MOB S Survey Boat	**DAY**	**7.8000**	**18,935.72**	**18,935.72**
			3,938.8461	*3,938.8461*
MOB C Crew Boat	**DAY**	**7.8000**	**30,723.00**	**30,723.00**
			9,063.9041	*9,063.9041*
MOB Sheetpile	**DAY**	**5.0000**	**45,319.52**	**45,319.52**
			6.3775	*6.3775*
02 Dredging	**CY**	**9,200,000.0000**	**58,673,075.70**	**58,673,075.70**

Description	UOM	Quantity	ContractCost	ProjectCost
			6.5862	*6.5862*
03 Perimeter Retention Dikes	**CY**	**442,630.0000**	**2,915,243.76**	**2,915,243.76**
			6.8110	*6.8110*
04 Interior Weirs	**CY**	**50,229.0000**	**342,110.23**	**342,110.23**
			14,252,424.1774	*14,252,424.1774*
FY23 Year 10 Habitat Replinshment/Construction	**EA**	**1.0000**	**14,252,424.18**	**14,252,424.18**
YR10 01 MRGO 02 Shoreline Protection	**LS**	**1.0000**	**5,824,566.71**	**5,824,566.71**
			22,876.4382	*22,876.4382*
01 Mob & Demob	**DAY**	**5.0000**	**114,382.19**	**114,382.19**
			2,410.0402	*2,410.0402*
MOB S Survey Boat	**DAY**	**5.0000**	**12,050.20**	**12,050.20**
			3,794.8485	*3,794.8485*
MOB C Crew Boat	**DAY**	**5.0000**	**18,974.24**	**18,974.24**
			7,943.1582	*7,943.1582*
MOB Stone 650# stone crew	**DAY**	**5.0000**	**39,715.79**	**39,715.79**
			1,091.0489	*1,091.0489*
MOB F Flotation Crew	**DAY**	**40.0000**	**43,641.96**	**43,641.96**
			9.8463	*9.8463*
02 Flotation Dredging and Placement of Material	**CY**	**135,000.0000**	**1,329,253.18**	**1,329,253.18**
			5.6438	*5.6438*
02 Flotation Dredging and Placement of Material Backfilling	**CY**	**101,250.0000**	**571,433.14**	**571,433.14**
			48.6770	*48.6770*
03 Stone 650# gradation	**TON**	**90,000.0000**	**4,380,931.35**	**4,380,931.35**
YR10 02 MRGO 03 Shoreline Protection	**LS**	**1.0000**	**5,468,853.84**	**5,468,853.84**
			22,876.4382	*22,876.4382*
01 Mob & Demob	**DAY**	**5.0000**	**114,382.19**	**114,382.19**
			2,410.0402	*2,410.0402*
MOB S Survey Boat	**DAY**	**5.0000**	**12,050.20**	**12,050.20**
			3,794.8485	*3,794.8485*
MOB C Crew Boat	**DAY**	**5.0000**	**18,974.24**	**18,974.24**
			7,943.1582	*7,943.1582*
MOB Stone 650# stone crew	**DAY**	**5.0000**	**39,715.79**	**39,715.79**
			1,091.0489	*1,091.0489*
MOB F Flotation Crew	**DAY**	**40.0000**	**43,641.96**	**43,641.96**
			48.6770	*48.6770*
03 Stone 650# gradation	**TON**	**110,000.0000**	**5,354,471.65**	**5,354,471.65**

Description	UOM	Quantity	ContractCost	ProjectCost
YR10 03 MRGO 04 Shoreline Protection	**LS**	**1.0000**	**2,959,003.63**	**2,959,003.63**
			22,876.4382	*22,876.4382*
01 Mob & Demob	**DAY**	**5.0000**	**114,382.19**	**114,382.19**
			2,410.0402	*2,410.0402*
MOB S Survey Boat	**DAY**	**5.0000**	**12,050.20**	**12,050.20**
			3,794.8485	*3,794.8485*
MOB C Crew Boat	**DAY**	**5.0000**	**18,974.24**	**18,974.24**
			7,943.1582	*7,943.1582*
MOB Stone 650# stone crew	**DAY**	**5.0000**	**39,715.79**	**39,715.79**
			1,091.0489	*1,091.0489*
MOB F Flotation Crew	**HR**	**40.0000**	**43,641.96**	**43,641.96**
			10.2099	*10.2099*
02 Flotation Dredging and Placement of Material	**CY**	**45,000.0000**	**459,447.70**	**459,447.70**
			5.8862	*5.8862*
02 Flotation Dredging and Placement of Material Backfilling	**CY**	**33,750.0000**	**198,659.37**	**198,659.37**
			48.6770	*48.6770*
03 Stone (Inside MRGO Closure) 650# gradation	**TON**	**19,000.0000**	**924,863.28**	**924,863.28**
			48.6770	*48.6770*
04 Stone (Outside MRGO Closure) 650# gradation	**TON**	**30,000.0000**	**1,460,310.45**	**1,460,310.45**
			226,609,977.4414	*226,609,977.4414*
FY24 Year 11 Habitat Replinshment/Construction	**EA**	**1.0000**	**226,609,977.44**	**226,609,977.44**
YR11 01 CC1	**LS**	**1.0000**	**47,907,132.61**	**47,907,132.61**
			4,233,904.7201	*4,233,904.7201*
01 Mob & Demob	**EA**	**1.0000**	**4,233,904.72**	**4,233,904.72**
			82,512.7732	*82,512.7732*
mob/demob pipeline Mob/Demob pipeline	**DAY**	**13.6000**	**1,122,173.72**	**1,122,173.72**
			687,890.0294	*687,890.0294*
prelay shore pipe	**EA**	**1.0000**	**687,890.03**	**687,890.03**
			355,333.9224	*355,333.9224*
pickup shore pipe	**EA**	**1.0000**	**355,333.92**	**355,333.92**
			472,496.9680	*472,496.9680*
prelay submerged pipe	**EA**	**1.0000**	**472,496.97**	**472,496.97**
			469,949.3339	*469,949.3339*
pickup submerged pipe	**EA**	**1.0000**	**469,949.33**	**469,949.33**
			5,228.1102	*5,228.1102*
Mob/Demob monthly pipeline crew Mob/Demob monthly pipeline crew	**DAY**	**7.8000**	**40,779.26**	**40,779.26**

Description	UOM	Quantity	ContractCost	ProjectCost
			30,953.7543	*30,953.7543*
MOB EX Marsh Backhoe	**DAY**	**3.0000**	**92,861.26**	**92,861.26**
			2,427.6569	*2,427.6569*
MOB S Survey Boat	**DAY**	**7.8000**	**18,935.72**	**18,935.72**
			3,938.8461	*3,938.8461*
MOB C Crew Boat	**DAY**	**7.8000**	**30,723.00**	**30,723.00**
			9,063.9041	*9,063.9041*
MOB Sheetpile	**DAY**	**10.0000**	**90,639.04**	**90,639.04**
			6.7773	*6.7773*
02A Dredging - Swamp Creation	**CY**	**4,100,000.0000**	**27,786,776.14**	**27,786,776.14**
			6.9898	*6.9898*
02B Dredging - Swamp Nourishmenet	**CY**	**1,900,000.0000**	**13,280,553.11**	**13,280,553.11**
			6.5959	*6.5959*
03A Perimeter Dikes	**CY**	**331,000.0000**	**2,183,240.28**	**2,183,240.28**
			1,432.6917	*1,432.6917*
03B Vinyl/Timber Retention Wall	**LF**	**200.0000**	**286,538.34**	**286,538.34**
			1,298.3911	*1,298.3911*
install retention wall	**LF**	**200.0000**	**259,678.22**	**259,678.22**
			134.3006	*134.3006*
06 Remove Vinyl/Timber Retention Wall	**LF**	**200.0000**	**26,860.12**	**26,860.12**
			134.3006	*134.3006*
remove retention wall	**LF**	**200.0000**	**26,860.12**	**26,860.12**
			4.5373	*4.5373*
03C Earthen Closure(3)	**CY**	**30,000.0000**	**136,120.02**	**136,120.02**
YR11 02 CC 4 - Sites 2, 3 and 4 with Lake Borrow	**LS**	**1.0000**	**82,569,814.33**	**82,569,814.33**
			6,666,508.1002	*6,666,508.1002*
01 Mob & Demob	**EA**	**1.0000**	**6,666,508.10**	**6,666,508.10**
			135,951.9461	*135,951.9461*
mob/demob pipeline Mob/Demob pipeline	**DAY**	**13.6000**	**1,848,946.47**	**1,848,946.47**
			936,079.4358	*936,079.4358*
prelay shore pipe	**EA**	**1.0000**	**936,079.44**	**936,079.44**
			655,255.6051	*655,255.6051*
pickup shore pipe	**EA**	**1.0000**	**655,255.61**	**655,255.61**
			932,134.4680	*932,134.4680*
prelay submerged pipe	**EA**	**1.0000**	**932,134.47**	**932,134.47**

Description	UOM	Quantity	ContractCost	ProjectCost
			929,586.8339	*929,586.8339*
pickup submerged pipe	**EA**	**1.0000**	**929,586.83**	**929,586.83**
			5,228.1102	*5,228.1102*
Mob/Demob monthly pipeline crew Mob/Demob monthly pipeline crew	**DAY**	**7.8000**	**40,779.26**	**40,779.26**
			52,736.0259	*52,736.0259*
MOB EX Marsh Backhoe	**DAY**	**3.0000**	**158,208.08**	**158,208.08**
			2,427.6569	*2,427.6569*
MOB S Survey Boat	**DAY**	**7.8000**	**18,935.72**	**18,935.72**
			3,938.8461	*3,938.8461*
MOB C Crew Boat	**DAY**	**7.8000**	**30,723.00**	**30,723.00**
			9,063.9041	*9,063.9041*
MOB Sheetpile	**DAY**	**10.0000**	**90,639.04**	**90,639.04**
			9.1048	*9.1048*
02a Item 2a CC4 Stie 2	**CY**	**4,900,000.0000**	**44,613,725.84**	**44,613,725.84**
			9.0296	*9.0296*
02b Item 2b CC4 Stie 3	**CY**	**2,200,000.0000**	**19,865,183.19**	**19,865,183.19**
			9.1933	*9.1933*
02c Item 2c CC4 Stie 4	**CY**	**700,000.0000**	**6,435,339.51**	**6,435,339.51**
			6.5993	*6.5993*
04a Perimeter Dikes Site 2	**CY**	**304,000.0000**	**2,006,190.26**	**2,006,190.26**
			6.6062	*6.6062*
04b Perimeter Dikes Site 3	**CY**	**261,000.0000**	**1,724,221.71**	**1,724,221.71**
			6.6245	*6.6245*
04c Perimeter Dikes Site 4	**CY**	**190,000.0000**	**1,258,645.73**	**1,258,645.73**
YR11 03 CC5	**LS**	**1.0000**	**55,314,141.72**	**55,314,141.72**
			3,437,883.1852	*3,437,883.1852*
01 Mob & Demob	**EA**	**1.0000**	**3,437,883.19**	**3,437,883.19**
			69,152.9800	*69,152.9800*
mob/demob pipeline Mob/Demob pipeline	**DAY**	**13.6000**	**940,480.53**	**940,480.53**
			276,824.7157	*276,824.7157*
prelay shore pipe	**EA**	**1.0000**	**276,824.72**	**276,824.72**
			101,062.9914	*101,062.9914*
pickup shore pipe	**EA**	**1.0000**	**101,062.99**	**101,062.99**
			487,123.3339	*487,123.3339*
prelay submerged pipe	**EA**	**1.0000**	**487,123.33**	**487,123.33**

Description	UOM	Quantity	ContractCost	ProjectCost
			502,729.8327	*502,729.8327*
pickup submerged pipe	**EA**	**1.0000**	**502,729.83**	**502,729.83**
			5,228.1102	*5,228.1102*
Mob/Demob monthly pipeline crew Mob/Demob monthly pipeline crew	**DAY**	**7.8000**	**40,779.26**	**40,779.26**
			30,953.7543	*30,953.7543*
MOB EX Marsh Backhoe	**DAY**	**3.0000**	**92,861.26**	**92,861.26**
			2,427.6569	*2,427.6569*
MOB S Survey Boat	**DAY**	**7.8000**	**18,935.72**	**18,935.72**
			3,938.8461	*3,938.8461*
MOB C Crew Boat	**DAY**	**7.8000**	**30,723.00**	**30,723.00**
			9,807.9358	*9,807.9358*
MOB Flotation/Closure crew	**DAY**	**10.0000**	**98,079.36**	**98,079.36**
			6.4016	*6.4016*
02A Dredging - Swamp Restoration	**CY**	**4,500,000.0000**	**28,807,021.57**	**28,807,021.57**
			6.5834	*6.5834*
02B Dredging - Swamp Nourishmenet	**CY**	**3,300,000.0000**	**21,725,344.93**	**21,725,344.93**
			6.6202	*6.6202*
03A Perimeter Dikes	**CY**	**203,000.0000**	**1,343,892.03**	**1,343,892.03**
YR11 04 CC6	**LS**	**1.0000**	**40,818,888.79**	**40,818,888.79**
			4,490,912.8827	*4,490,912.8827*
01 Mob & Demob	**EA**	**1.0000**	**4,490,912.88**	**4,490,912.88**
			95,872.5665	*95,872.5665*
mob/demob pipeline Mob/Demob pipeline	**DAY**	**13.6000**	**1,303,866.90**	**1,303,866.90**
			868,279.3476	*868,279.3476*
prelay shore pipe	**EA**	**1.0000**	**868,279.35**	**868,279.35**
			130,708.7190	*130,708.7190*
pickup shore pipe	**EA**	**1.0000**	**130,708.72**	**130,708.72**
			548,696.5172	*548,696.5172*
prelay submerged pipe	**EA**	**1.0000**	**548,696.52**	**548,696.52**
			546,148.8831	*546,148.8831*
pickup submerged pipe	**EA**	**1.0000**	**546,148.88**	**546,148.88**
			5,228.1102	*5,228.1102*
Mob/Demob monthly pipeline crew Mob/Demob monthly pipeline crew	**DAY**	**7.8000**	**40,779.26**	**40,779.26**
			30,953.7543	*30,953.7543*
MOB EX Marsh Backhoe	**DAY**	**3.0000**	**92,861.26**	**92,861.26**

Description	UOM	Quantity	ContractCost	ProjectCost
			2,427.6569	*2,427.6569*
MOB S Survey Boat	**DAY**	**7.8000**	**18,935.72**	**18,935.72**
			3,938.8461	*3,938.8461*
MOB C Crew Boat	**DAY**	**7.8000**	**30,723.00**	**30,723.00**
			9,807.9358	*9,807.9358*
MOB Flotation/Closure crew	**DAY**	**5.0000**	**49,039.68**	**49,039.68**
			6.8420	*6.8420*
02A Dredging - Swamp Nourishment	**CY**	**5,200,000.0000**	**35,578,521.79**	**35,578,521.79**
			6.7022	*6.7022*
03A Retention Dikes- Approx 28,160-LF OF EARTHEN DIKES TO BE CONSTRUCTED	**CY**	**88,000.0000**	**589,790.09**	**589,790.09**
			4.5531	*4.5531*
03B Earthen Closures(5)	**CY**	**23,000.0000**	**104,722.23**	**104,722.23**
			7.3256	*7.3256*
03C Removal of Five Earthen Closures	**CY**	**7,500.0000**	**54,941.80**	**54,941.80**
			243,132,549.5042	*243,132,549.5042*
FY25 Year 12 Habitat Replinshment/Construction	**EA**	**1.0000**	**243,132,549.50**	**243,132,549.50**
01 TM7	**LS**	**1.0000**	**129,845,544.81**	**129,845,544.81**
			4,648,608.0645	*4,648,608.0645*
01 Mob & Demob	**EA**	**1.0000**	**4,648,608.06**	**4,648,608.06**
			69,152.9800	*69,152.9800*
mob/demob pipeline Mob/Demob pipeline	**DAY**	**13.6000**	**940,480.53**	**940,480.53**
			1,152,461.2353	*1,152,461.2353*
prelay shore pipe	**EA**	**1.0000**	**1,152,461.24**	**1,152,461.24**
			315,611.7906	*315,611.7906*
pickup shore pipe	**EA**	**1.0000**	**315,611.79**	**315,611.79**
			318,135.0260	*318,135.0260*
prelay submerged pipe	**EA**	**1.0000**	**318,135.03**	**318,135.03**
			315,587.3919	*315,587.3919*
pickup submerged pipe	**EA**	**1.0000**	**315,587.39**	**315,587.39**
			5,228.1102	*5,228.1102*
Mob/Demob monthly pipeline crew Mob/Demob monthly pipeline crew	**DAY**	**7.8000**	**40,779.26**	**40,779.26**
			38,214.5115	*38,214.5115*
MOB EX Marsh Backhoe	**DAY**	**3.0000**	**114,643.53**	**114,643.53**
			2,427.6569	*2,427.6569*
MOB S Survey Boat	**DAY**	**7.8000**	**18,935.72**	**18,935.72**

Description	UOM	Quantity	ContractCost	ProjectCost
			3,938.8461	*3,938.8461*
MOB C Crew Boat	**DAY**	**7.8000**	**30,723.00**	**30,723.00**
			17,057.3886	*17,057.3886*
MOB Sheetpile	**DAY**	**10.0000**	**170,573.89**	**170,573.89**
			382,145.1150	*382,145.1150*
Jack and Bore	**EA**	**1.0000**	**382,145.12**	**382,145.12**
			8.4689	*8.4689*
02 Dredging - Marsh Creation	**CY**	**9,800,000.0000**	**82,994,996.91**	**82,994,996.91**
			8.4829	*8.4829*
03 Dredging - Marsh Nourishmenet	**CY**	**2,600,000.0000**	**22,055,476.50**	**22,055,476.50**
			6.5705	*6.5705*
04 Earthen Retention Dikes	**CY**	**971,250.0000**	**6,381,620.88**	**6,381,620.88**
			1,164.1319	*1,164.1319*
05 Install Vinyl/Timber wall	**LF**	**10,275.0000**	**11,961,455.52**	**11,961,455.52**
			1,164.1319	*1,164.1319*
install retention wall	**LF**	**10,275.0000**	**11,961,455.52**	**11,961,455.52**
			175.5121	*175.5121*
06 Remove Vinyl/Timber wall	**LF**	**10,275.0000**	**1,803,386.94**	**1,803,386.94**
			175.5121	*175.5121*
remove retention wall	**LF**	**10,275.0000**	**1,803,386.94**	**1,803,386.94**
02 TM8	**LS**	**1.0000**	**113,287,004.69**	**113,287,004.69**
			5,909,555.2221	*5,909,555.2221*
01 Mob & Demob	**EA**	**1.0000**	**5,909,555.22**	**5,909,555.22**
			95,872.5665	*95,872.5665*
mob/demob pipeline Mob/Demob pipeline	**DAY**	**13.6000**	**1,303,866.90**	**1,303,866.90**
			760,283.3857	*760,283.3857*
prelay shore pipe	**EA**	**1.0000**	**760,283.39**	**760,283.39**
			297,701.3257	*297,701.3257*
pickup shore pipe	**EA**	**1.0000**	**297,701.33**	**297,701.33**
			1,068,505.9413	*1,068,505.9413*
prelay submerged pipe	**EA**	**1.0000**	**1,068,505.94**	**1,068,505.94**
			833,595.6637	*833,595.6637*
pickup submerged pipe	**EA**	**1.0000**	**833,595.66**	**833,595.66**
			5,228.1102	*5,228.1102*
Mob/Demob monthly pipeline crew Mob/Demob monthly pipeline crew	**DAY**	**7.8000**	**40,779.26**	**40,779.26**

Description	UOM	Quantity	ContractCost	ProjectCost
			30,953.7543	*30,953.7543*
MOB EX Marsh Backhoe	**DAY**	**3.0000**	**92,861.26**	**92,861.26**
			2,427.6569	*2,427.6569*
MOB S Survey Boat	**DAY**	**7.8000**	**18,935.72**	**18,935.72**
			3,938.8461	*3,938.8461*
MOB C Crew Boat	**DAY**	**7.8000**	**30,723.00**	**30,723.00**
			9,807.9358	*9,807.9358*
MOB Flotation/Closure crew	**DAY**	**5.0000**	**49,039.68**	**49,039.68**
			382,145.1150	*382,145.1150*
Jack and Bore	**EA**	**1.0000**	**382,145.12**	**382,145.12**
			10.7099	*10.7099*
02 Dredging - Marsh Creation	**CY**	**9,700,000.0000**	**103,885,702.21**	**103,885,702.21**
			6.5891	*6.5891*
03 Earthen Retention Dikes	**CY**	**402,333.0000**	**2,650,999.88**	**2,650,999.88**
			7.0891	*7.0891*
04 Earthen Weirs	**CY**	**23,956.0000**	**169,827.44**	**169,827.44**
			4.0870	*4.0870*
05 Earthen Closures(5)	**CY**	**145,208.0000**	**593,469.53**	**593,469.53**
			6.7348	*6.7348*
06 Removal of Five Earthen Closures	**CY**	**11,500.0000**	**77,450.40**	**77,450.40**
30 Planning, Engineering & Design	**LS**	**1.0000**	**99,358,862.40**	**99,358,862.40**
			77,597,412.4000	*77,597,412.4000*
E&D Habitat Replinishment/ Construction Features	**EA**	**1.0000**	**77,597,412.40**	**77,597,412.40**
			9,655,388.0000	*9,655,388.0000*
30 01 FY14 Habitat Replinishment/Construction Features	**EA**	**1.0000**	**9,655,388.00**	**9,655,388.00**
			6,659,492.0000	*6,659,492.0000*
30 02 FY15 Habitat Replinishment/ Construction Features	**EA**	**1.0000**	**6,659,492.00**	**6,659,492.00**
			763,905.0000	*763,905.0000*
30 03 FY16 Habitat Replinishment/ Construction Features	**EA**	**1.0000**	**763,905.00**	**763,905.00**
			2,778,848.0000	*2,778,848.0000*
30 04 FY17 Habitat Replinishment/Construction Features	**EA**	**1.0000**	**2,778,848.00**	**2,778,848.00**
			14,679,028.1600	*14,679,028.1600*
30 05 FY18 Habitat Replinishment/ Construction Features	**EA**	**1.0000**	**14,679,028.16**	**14,679,028.16**
			3,637,604.3800	*3,637,604.3800*
30 06 FY19 Habitat Replinishment/Construction Features	**EA**	**1.0000**	**3,637,604.38**	**3,637,604.38**

Description	UOM	Quantity	ContractCost	ProjectCost
			5,589,653.0000	*5,589,653.0000*
30 07 FY20 Habitat Replinishment/Construction Features	**EA**	**1.0000**	**5,589,653.00**	**5,589,653.00**
			7,279,264.0000	*7,279,264.0000*
30 08 FY21 Habitat Replinishment/Construction Features	**EA**	**1.0000**	**7,279,264.00**	**7,279,264.00**
			5,580,584.0000	*5,580,584.0000*
30 09 FY22 Habitat Replinishment/ Construction Features	**EA**	**1.0000**	**5,580,584.00**	**5,580,584.00**
			745,768.0000	*745,768.0000*
30 10 FY23 Habitat Replinishment/Construction Features	**EA**	**1.0000**	**745,768.00**	**745,768.00**
			9,622,322.6800	*9,622,322.6800*
30 11 FY24 Habitat Replinishment/Construction Features	**EA**	**1.0000**	**9,622,322.68**	**9,622,322.68**
			10,605,555.1800	*10,605,555.1800*
30 12 FY25 Habitat Replinishment/Construction Features	**EA**	**1.0000**	**10,605,555.18**	**10,605,555.18**
			17,761,450.0000	*17,761,450.0000*
E&D Adaptive Management Set Up and Monitoring Phase	**EA**	**1.0000**	**17,761,450.00**	**17,761,450.00**
			968,870.0000	*968,870.0000*
30 01 FY13 Set Up and Monitoring Phase	**EA**	**1.0000**	**968,870.00**	**968,870.00**
			968,870.0000	*968,870.0000*
30 02 FY14 Set Up and Monitoring Phase	**EA**	**1.0000**	**968,870.00**	**968,870.00**
			627,130.0000	*627,130.0000*
30 03 FY15 Set Up and Monitoring Phase	**EA**	**1.0000**	**627,130.00**	**627,130.00**
			627,130.0000	*627,130.0000*
30 04 FY16 Set Up and Monitoring Phase	**EA**	**1.0000**	**627,130.00**	**627,130.00**
			627,130.0000	*627,130.0000*
30 05 FY17 Set Up and Monitoring Phase	**EA**	**1.0000**	**627,130.00**	**627,130.00**
			627,130.0000	*627,130.0000*
30 06 FY18 Set Up and Monitoring Phase	**EA**	**1.0000**	**627,130.00**	**627,130.00**
			627,130.0000	*627,130.0000*
30 07 FY19 Set Up and Monitoring Phase	**EA**	**1.0000**	**627,130.00**	**627,130.00**
			627,130.0000	*627,130.0000*
30 08 FY20 Set Up and Monitoring Phase	**EA**	**1.0000**	**627,130.00**	**627,130.00**
			627,130.0000	*627,130.0000*
30 09 FY21 Set Up and Monitoring Phase	**EA**	**1.0000**	**627,130.00**	**627,130.00**
			627,130.0000	*627,130.0000*
30 10 FY22 Set Up and Monitoring Phase	**EA**	**1.0000**	**627,130.00**	**627,130.00**
			627,130.0000	*627,130.0000*
30 11 FY23 Set Up and Monitoring Phase	**EA**	**1.0000**	**627,130.00**	**627,130.00**

Description	UOM	Quantity	ContractCost	ProjectCost
			627,130.0000	*627,130.0000*
30 12 FY24 Set Up and Monitoring Phase	**EA**	**1.0000**	**627,130.00**	**627,130.00**
			955,241.0000	*955,241.0000*
30 13 FY25 Set Up and Monitoring Phase	**EA**	**1.0000**	**955,241.00**	**955,241.00**
			955,241.0000	*955,241.0000*
30 14 FY26 Set Up and Monitoring Phase	**EA**	**1.0000**	**955,241.00**	**955,241.00**
			955,241.0000	*955,241.0000*
30 15 FY27 Set Up and Monitoring Phase	**EA**	**1.0000**	**955,241.00**	**955,241.00**
			955,241.0000	*955,241.0000*
30 16 FY28 Set Up and Monitoring Phase	**EA**	**1.0000**	**955,241.00**	**955,241.00**
			955,241.0000	*955,241.0000*
30 17 FY29 Set Up and Monitoring Phase	**EA**	**1.0000**	**955,241.00**	**955,241.00**
			955,241.0000	*955,241.0000*
30 18 FY30 Set Up and Monitoring Phase	**EA**	**1.0000**	**955,241.00**	**955,241.00**
			955,241.0000	*955,241.0000*
30 19 FY31 Set Up and Monitoring Phase	**EA**	**1.0000**	**955,241.00**	**955,241.00**
			955,241.0000	*955,241.0000*
30 20 FY32 Set Up and Monitoring Phase	**EA**	**1.0000**	**955,241.00**	**955,241.00**
			955,241.0000	*955,241.0000*
30 21 FY33 Set Up and Monitoring Phase	**EA**	**1.0000**	**955,241.00**	**955,241.00**
			955,241.0000	*955,241.0000*
30 22 FY34 Set Up and Monitoring Phase	**EA**	**1.0000**	**955,241.00**	**955,241.00**
			4,000,000.0000	*4,000,000.0000*
E&D Adaptive Management Renourishment	**EA**	**1.0000**	**4,000,000.00**	**4,000,000.00**
			400,000.0000	*400,000.0000*
30 12 FY25 Adaptive Management Renourishment Phase E&D	**EA**	**1.0000**	**400,000.00**	**400,000.00**
			400,000.0000	*400,000.0000*
30 13 FY26 Adaptive Management Renourishment Phase E&D	**EA**	**1.0000**	**400,000.00**	**400,000.00**
			400,000.0000	*400,000.0000*
30 14 FY27 Adaptive Management Renourishment Phase E&D	**EA**	**1.0000**	**400,000.00**	**400,000.00**
			400,000.0000	*400,000.0000*
30 15 FY28 Adaptive Management Renourishment Phase E&D	**EA**	**1.0000**	**400,000.00**	**400,000.00**
			400,000.0000	*400,000.0000*
30 16 FY29 Adaptive Management Renourishment Phase E&D	**EA**	**1.0000**	**400,000.00**	**400,000.00**
			400,000.0000	*400,000.0000*
30 17 FY30 Adaptive Management Renourishment Phase E&D	**EA**	**1.0000**	**400,000.00**	**400,000.00**

Description	UOM	Quantity	ContractCost	ProjectCost
			400,000.0000	*400,000.0000*
30 18 FY31 Adaptive Management Renourishment Phase E&D	**EA**	**1.0000**	**400,000.00**	**400,000.00**
			400,000.0000	*400,000.0000*
30 19 FY32 Adaptive Management Renourishment Phase E&D	**EA**	**1.0000**	**400,000.00**	**400,000.00**
			400,000.0000	*400,000.0000*
30 21 FY33 Adaptive Management Renourishment Phase E&D	**EA**	**1.0000**	**400,000.00**	**400,000.00**
			400,000.0000	*400,000.0000*
30 22 FY34 Adaptive Management Renourishment Phase E&D	**EA**	**1.0000**	**400,000.00**	**400,000.00**
31 S & A	**LS**	**1.0000**	**112,415,921.37**	**112,415,921.37**
			106,415,921.3700	*106,415,921.3700*
S&A Habitat Replinishment/Construction Features	**EA**	**1.0000**	**106,415,921.37**	**106,415,921.37**
			14,045,061.0000	*14,045,061.0000*
31 01 FY14 Habitat Replinishment/ Construction Features	**EA**	**1.0000**	**14,045,061.00**	**14,045,061.00**
			9,038,276.0000	*9,038,276.0000*
31 02 FY15 Habitat Replinishment/Construction Features	**EA**	**1.0000**	**9,038,276.00**	**9,038,276.00**
			1,018,541.0000	*1,018,541.0000*
31 03 FY16 Habitat Replinishment/Construction Features	**EA**	**1.0000**	**1,018,541.00**	**1,018,541.00**
			3,978,169.0000	*3,978,169.0000*
31 04 FY17 Habitat Replinishment/Construction Features	**EA**	**1.0000**	**3,978,169.00**	**3,978,169.00**
			17,287,977.1600	*17,287,977.1600*
31 05 FY18 Habitat Replinishment/ Construction Features	**EA**	**1.0000**	**17,287,977.16**	**17,287,977.16**
			5,307,257.0800	*5,307,257.0800*
31 06 FY19 Habitat Replinishment/ Construction Features	**EA**	**1.0000**	**5,307,257.08**	**5,307,257.08**
			8,322,226.0000	*8,322,226.0000*
31 07 PY20 Habitat Replinishment/ Construction Features	**EA**	**1.0000**	**8,322,226.00**	**8,322,226.00**
			8,802,963.0000	*8,802,963.0000*
31 08 FY21 Habitat Replinishment/Construction Features	**EA**	**1.0000**	**8,802,963.00**	**8,802,963.00**
			7,960,860.0000	*7,960,860.0000*
31 09 FY22 Habitat Replinishment/Construction Features	**EA**	**1.0000**	**7,960,860.00**	**7,960,860.00**
			1,030,816.0000	*1,030,816.0000*
31 10 FY23 Habitat Replinishment/ Construction Features	**EA**	**1.0000**	**1,030,816.00**	**1,030,816.00**
			14,154,139.3600	*14,154,139.3600*
31 11 FY24 Habitat Replinishment/Construction Features	**EA**	**1.0000**	**14,154,139.36**	**14,154,139.36**
			15,469,635.7700	*15,469,635.7700*
31 12 FY25 Habitat Replinishment/ Construction Features	**EA**	**1.0000**	**15,469,635.77**	**15,469,635.77**

Description	UOM	Quantity	ContractCost	ProjectCost
			6,000,000.0000	*6,000,000.0000*
S&A Adaptive Management Renourishment Phase S&A	**EA**	**1.0000**	**6,000,000.00**	**6,000,000.00**
			600,000.0000	*600,000.0000*
31 12 FY25 Adaptive Management Renourishment Phase S&A	**EA**	**1.0000**	**600,000.00**	**600,000.00**
			600,000.0000	*600,000.0000*
31 13 FY26 Adaptive Management Renourishment Phase S&A	**EA**	**1.0000**	**600,000.00**	**600,000.00**
			600,000.0000	*600,000.0000*
31 14 FY27 Adaptive Management Renourishment Phase S&A	**EA**	**1.0000**	**600,000.00**	**600,000.00**
			600,000.0000	*600,000.0000*
31 15 FY28 Adaptive Management Renourishment Phase S&A	**EA**	**1.0000**	**600,000.00**	**600,000.00**
			600,000.0000	*600,000.0000*
31 16 FY29 Adaptive Management Renourishment Phase S&A	**EA**	**1.0000**	**600,000.00**	**600,000.00**
			600,000.0000	*600,000.0000*
31 17 FY30 Adaptive Management Renourishment Phase S&A	**EA**	**1.0000**	**600,000.00**	**600,000.00**
			600,000.0000	*600,000.0000*
31 18 FY31 Adaptive Management Renourishment Phase S&A	**EA**	**1.0000**	**600,000.00**	**600,000.00**
			600,000.0000	*600,000.0000*
31 19 FY32 Adaptive Management Renourishment Phase S&A	**EA**	**1.0000**	**600,000.00**	**600,000.00**
			600,000.0000	*600,000.0000*
31 20 FY33 Adaptive Management Renourishment Phase S&A	**EA**	**1.0000**	**600,000.00**	**600,000.00**
			600,000.0000	*600,000.0000*
31 21 FY34 Adaptive Management Renourishment Phase S&A	**EA**	**1.0000**	**600,000.00**	**600,000.00**

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RISK MANAGEMENT PLAN (RMP) FOR MRGO Ecosystem Restoration Project

Prepared for:

U.S. Army Corps of Engineers,
New Orleans District

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April 4, 2012

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Appendix A Cost and Schedule Risk Analysis Report

1. INTRODUCTION

1.1 Purpose: This Risk Management Plan (RMP) presents the process for implementing the comprehensive and proactive management of risk as part of the overall management of the [ENTER PROJECT NAME HERE]. Risk management is a project management tool to handle events that might adversely impact the program, thereby increasing the probability/likelihood of success. This RMP describes a management tool that will:

- Serve as a basis for identifying alternatives to achieve cost, schedule, and performance goals,
- Assist in making decisions on budget and funding priorities,
- Provide risk information for Milestone decisions, and
- Allow monitoring the health of the program as it proceeds.

The RMP describes methods for assessing (identifying and analyzing), prioritizing, and monitoring risk drivers; developing risk-handling approaches, and applying adequate resources to handle risk. It assigns specific responsibilities for these functions, and prescribes the documenting, monitoring, and reporting processes to be followed.

The four main building blocks of the risk management process are identification, assessment, response, and documentation. The CSRA process addresses the "identification" and "assessment" portions of the risk management process. The activities of "response" and "documentation" are PM and PDT management efforts to mitigate, monitor, and manage the risks throughout the life cycle of the project.

If necessary, this RMP will be updated at the following milestones: (1) following approval of the FCSA; (2) Congressional authorization for construction; (3) receipt of Construction General funding; or (4) concurrent with the review and update of other program plans.

1.2 Objectives: The objectives of the risk management plan are:

- To focus attention on minimizing threats to achievement of the project objectives.
- To provide an approach for:
  - Identifying and assessing risks.
  - Determining cost-effective risk reduction actions.
  - Monitoring and reporting progress in reducing risk.

The overall goal of this process is to progressively reduce the project's exposure to events that threaten the accomplishment of its objectives by:

- Incorporating approaches into the project plans that minimize or avoid identified risks,
- Developing proactive, contingent risk response actions, and
- Rapidly implementing risk responses based on timely identification of risk occurrence.

2. PROJECT SUMMARY

2.1 Project Area Description

The study area includes portions of the Mississippi River Deltaic Plain in coastal southeast Louisiana and parts of coastal southwest Mississippi. It encompasses approximately 3.86 million acres (6,023 square miles) of land and open water.

In Mississippi, the study area includes the Western Mississippi Sound, its bordering wetlands, and Cat Island. The Lake Borgne ecosystem and areas that may have been affected by the construction, operation, and maintenance of the MRGO navigation channel are included in the study area. The MRGO channel may have affected salinity as far northwest as Lake Maurepas. To the east, the MRGO channel was dredged through open water between Breton and Grand Gossier Islands (segments of the lower Chandeleur Island chain). The MRGO channel affected portions of the Lake Borgne ecosystem to the north and potentially altered hydrology to the west as far as the Bayou Terre aux Boeufs ridge.

Louisiana parishes in the study area include Ascension, Jefferson, Livingston, Orleans, Plaquemines, St. Bernard, St. Charles, St. James, St. John the Baptist, St. Tammany and Tangipahoa. Mississippi counties in the study area include Hancock and Harrison.

2.2 Project Scope

The federally identified plan includes a series of marsh creation, marsh nourishment, swamp creation, swamp nourishment, ridge restoration and shoreline protection features.

Approximately 11,222 acres of the restoration and protection features would be located in the East Orleans Landbridge/Pearl River area and approximately 9,012 acres of restoration features would be located in the Biloxi Marsh area. The plan would restore 3,281 acres of fresh marsh in the Central Wetlands, 10,366 acres of cypress forest, and 54 acres of coastal ridge habitat. The plan would restore and nourish 12,797 acres of brackish marsh in the Hopedale and Bayou Terre aux Boeufs area south of the channel.

In the Golden Triangle area, 4,317 acres of intermediate marsh would be restored on the Lake Borgne side of the IHNC Surge Barrier and 280 acres of marsh would be restored on the GIWW/MRGO side of the barrier. The plan also includes approximately 70 miles of shoreline protection (including 7.8 miles of artificial oyster reef). The majority of the borrow for this effort would be taken from Lake Borgne.

3. RISK-RELATED DEFINITIONS

The U.S. Army Corps of Engineers Cost Engineering Directory of Expertise for Civil Works (Cost Dx) recommends the following definitions for risk, as contained in current project and risk management guidance and literature, as noted.

3.1 Risk: An uncertain event or condition that, if it occurs, has a positive or negative effect on a project's objectives (source: *PMBoK® Guide*, p. 373).

3.1.1 Technical Risk: Risks having to do with product, process, or "technique" issues involved with designing and producing the deliverable (source: *Project Risk Management*, p. 78).

3.1.2 Cost Risk: The risk associated with the ability of the program to achieve its life cycle cost objectives (source: *Defense Acquisition Deskbook*).

3.1.3 Schedule Risk: Events or conditions that may have a negative influence on the project's timing (source: *Risk Management Concepts and Guidance*, p. 376).

3.1.4 Life-Safety Risk: Risk relating to the safety and/or security of human interests.

3.1.5 Reliability Risk: Risk relating to the performance and/or reliability of the system, product, or project feature being acquired.

3.1.6 Non-Technical Risk: Any risk that is not technical in nature and does not directly influence cost growth. Such risks would include organizational risks, political exposure, public relations issues, or potential loss of "goodwill" (public trust).

3.1.7 Internal Risk: An item or activity upon which the PDT has control or influence.

3.1.8 External Risk: An item or activity upon which the PDT has no control or influence.

3.2 Risk Management: Project Risk Management includes the processes concerned with conducting risk management planning, identification, analysis, responses, and monitoring and control on a project; most of these processes are updated throughout the project (source: *PMBoK® Guide*, 3rd edition, p. 237).

3.3 Risk Analysis: Qualitative or quantitative evaluations of the potential impact and probability of project risk events (source: *Risk Management Concepts and Guidance*, p. 373).

3.3.1 Qualitative Risk Analysis: Prioritizing risks for subsequent further analysis or action by assessing and combining their probability of occurrence and impact (source: *PMBoK® Guide*, 3rd edition, p. 237).

3.3.2 Quantitative Risk Analysis: Numerically analyzing the effect on overall project objectives of identified risks (source: *PMBoK® Guide*, 3rd edition, p. 237).

3.3.3 Cost and Schedule Risk Analysis (CSRA): Technique used to improve the development of contingencies by studying the variance of project cost caused by the effects of cost and schedule risk events. This process relies on qualitative and quantitative (e.g. Monte Carlo simulation) risk analysis techniques. CSRA is required on projects costs anticipated to be $40 Million or higher.

3.4 Risk Communication: Exchange or sharing of information about risk between the decision-maker, often the project manager, and other stakeholders (source: *Project Risk Management Guidelines*, p. 372).

3.5 Risk Response Planning/Mitigation: Developing options and actions to enhance opportunities, and to reduce threats to project objectives (source: *PMBoK® Guide*, 3rd edition, p. 237).

3.6 Risk Monitoring and Control: Tracking identified risks, monitoring residual risks, identifying new risks, executing risk response plans, and evaluating their effectiveness throughout the project life cycle (source: *PMBoK® Guide*, 3rd edition, p. 237).

3.7 Risk Register: The document containing the results of the qualitative risk analysis, quantitative risk analysis and risk response planning. The risk register details all identified risks, including description, category, cause, probability of occurring, impact(s) on objectives, proposed responses, owners, and current status (source: *PMBoK® Guide*, 4th edition, p. 439).

3.8 Risk Trigger: An indicator of the imminent occurrence of a given risk event that serves as an immediate precursor to the occurrence of the risk. Often used to initiate specific actions, behaviors, or responses (source: *Risk Management Concepts and Guidance*, p. 376).

3.9 Watch List: A list of major risks examined at each project risk review meeting (source: *Project Risk Management Guidelines*, p. 372).

4. RISK MANAGEMENT STRATEGY

The *MRGO Ecosystem Restoration Project* risk management strategy is to handle program risks, both technical and non-technical, before they become problems, causing serious cost, schedule, or performance impacts. This strategy is an integral part of

project success, and will be executed primarily through the Government Project Delivery Team (PDT). The PDT will continuously and proactively assess critical areas to identify and analyze specific risks and will develop options to mitigate all risks designated as moderate and high.

The PDT will keep risk information current by maintaining the risk register described in paragraph 6.2.4. Risk status will be reported at all project milestone reviews.

5. RESPONSIBILITIES AND ASSIGNMENTS

Over the course of the project, the Project manager may make specific assignments to individual members of the PDT, within their functional areas, to provide updates or input to the risk register. Table 1 below lists the general assignments and responsibilities:

Table 1-Risk Management Responsibilities

Task	Lead	Support
Risk Management Planning	**PM**	**Cost Dx**
Risk Identification	**PM**	**PDT**
Risk Analysis and Quantification	**Cost Dx**	**PDT**
Risk Response/Mitigation Plan	**PM**	**PDT**
Risk Monitoring and Control	**PM**	**PDT**
Risk Communication	**PM**	**PDT**
Risk Documentation/Closeout	**PM**	**PDT**

6. RISK MANAGEMENT PROCESS AND PROCEDURES

Led by the project manager, the PDT will conduct risk management activities to address those risks that are pertinent to the project. The project manager will employ the

assistance of members of the PDT, project sponsors/customers and other subject matter experts as appropriate.

Overview of Project Risk Management Activities

- Risk Management Planning
- Risk Identification
- Risk Analysis and Quantification
- Risk Response Planning and Mitigation
- Risk Monitoring and Control
- Risk Communication
- Risk Documentation/Closeout

6.1 Risk Management Planning

Risk Management Planning will occur in conjunction with the development of the Project Management Plan (PMP) and will culminate with the approval of the Risk Management Plan (RMP). The RMP will present the strategy for procedures for identifying, analyzing, responding to, and monitoring risk throughout the project life cycle. The RMP will include treatment for both technical and non-technical risks, as well as risks that affect the project cost and schedule performance. Per ER 1110-2-1302 and ETL 1110-2-573, this project is anticipated to require and will undergo a formal Cost and Schedule Risk Analysis (CSRA).

6.2 Risk Identification

6.2.1 Initial Risk Discussions

Identification of risks will be accomplished through brainstorming sessions held with the PDT and project stakeholders. The PDT brainstorming session is the initial attempt to develop the risk register that serves as the basis for both the risk register development and the CSRA.

6.2.2 PDT Coordination

The PM will coordinate an initial risk discussion meeting, also referred to as a PDT brainstorming session. This is the first meeting where the PDT attempts to collectively capture the project risks and place them into the risk register. The brainstorming session will include the major PDT members.

6.2.3 PDT Brainstorming Session

The PDT brainstorming session is the opportunity to bring the PDT together to qualitatively define the risk concerns as well as potential opportunities. As the concerns

are discussed, the facilitator or risk analyst begins developing the initial risk register, capturing the PDT's concerns and discussions.

6.2.4 Risk Level

Each identified risk will be assigned a risk rating based on the joint consideration of event probability/likelihood and consequence/impact (see the Probability vs. Impact Risk Matrix below in Figure 1). This rating is a reflection of the severity of the risk and provides a starting point for the development of options to handle the risk. Probabilities are described as, VERY UNLIKELY, UNLIKELY, LIKELY, or VERY LIKELY. Impacts are described as, NEGLIGIBLE, MARGINAL SIGNIFICANT, CRITICAL, or CRISIS. Risk levels are described as, LOW, MODERATE, or HIGH.

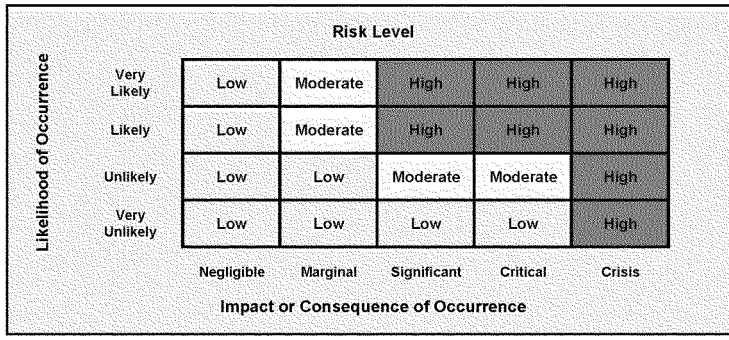
It is important to consider both the probability/likelihood and consequences/impacts in establishing the rating, as there may be risk events that have a low probability/likelihood, but whose consequences/impacts are so severe that the occurrence of the event would be disastrous to the project.

6.2.5 Completing Initial Risk Register

The risk register will serve as the basis for risk management, including the CSRA process. When referring to the risk register, the PDT should focus on the following:

- Risk/Opportunity – *Event.*
- PDT Event Concerns – *Describe the risk event.*
- PDT Discussions – *List the implications or any relevant background for this risk.*
- Responsibility/POC – *List who should have the action on the status of this risk.*
- Likelihood – *Describe the likelihood of this risk occurring, using VERY UNLIKELY, UNLIKELY, LIKELY, or VERY LIKELY.*
- Impact – *Describe the impact of this risk if it occurs, using NEGLIGIBLE, MARGINAL SIGNIFICANT, CRITICAL, or CRISIS.*
- Risk Level – *Determine the risk level according to the matrix below, using LOW, MODERATE, or HIGH.*

Figure 1-Probability vs. Impact Risk Matrix



The PDT should capture all concerns for all project features even if the risk level is considered low. The register serves as an archive of discussions and there is potential that low-level risks may become higher following market studies, more information being made available, or over time during the risk management and mitigation processes.

Within the risk register, the PDT concerns and discussions must be adequately and clearly captured, because the logic presented in those discussions must support the "likelihood" and "impact" decisions reflected within the risk register. While this product is the initial risk register, it has already captured the PDT's greatest concerns. The PDT can begin using this data to prepare for project risk management.

6.3 Risk Analysis

Risk analysis includes both qualitative and quantitative techniques to determine the key drivers of risk. Qualitative risk analysis shall occur on all risks, both technical and non-technical. The Project Risk "Watch List" will incorporate all risks identified as "Moderate" or "High" by qualitative analysis. All risks determined to have cost and/or schedule impacts and rated as "Moderate" or "High" will be quantitatively studied through the CSRA process. The PDT will enlist the support of the Cost Engineering Dx for completion of the CSRA process.

6.3.1 Qualitative Risk Analysis

Qualitative risk analysis will be conducted on all project risks, utilizing the collective judgment of the PDT and project stakeholders. Qualitative analysis will occur simultaneously to the completion of the initial risk register. Additionally, the qualitative analysis will be updated as the risks change throughout the project life cycle. Changes to the status of risks shall be captured by the project risk register at each monthly risk review meeting.

6.3.2 Quantitative Risk Analysis

Quantitative analysis will be conducted on all risks qualitatively rated as MODERATE or HIGH that affect cost and/or schedule performance. Quantitative analysis shall be conducted using the Monte Carlo technique with the support of the Cost Engineering Dx. Other risks may also be studied quantitatively, as directed. The results of the quantitative analysis will be presented in a final report and will include identification of the key drivers of risk for cost and schedule. The results of the quantitative analysis will include recommended levels for contingency and management reserve for completion of the project through implementation.

6.3.3 Cost and Schedule Risk Analysis (CSRA)

The CSRA will be performed in accordance with ER 1110-2-1302, ETL 1110-2-573, and Cost and Schedule Risk Analysis Guidance published by the Cost Engineering Dx. The project will utilize the Cost Engineering Dx for performance of the CSRA, using Crystal Ball software. At a minimum, the CSRA will include but not be limited to:

- Review of planning, design and/or construction contract documents:
  - Deliverables and work processes
  - Milestones and schedule dates
  - Resource estimates/needs/sources
  - Performance requirements

- Discussions and brainstorming activities with PDT members, appropriate stakeholders/sponsor representatives and other qualified/knowledgeable individuals to develop a comprehensive list of risks for this project, referred to as the Risk Register.

- Investigation of the various sources and symptoms of risks to aid in subsequent determination of risk controllability and selection of appropriate risk response actions.

The guidance and processes recommended to perform an acceptable cost and schedule risk analysis (CSRA) that meets Headquarters (HQ), U.S. Army Corps of Engineers (USACE) requirements and successfully passes an agency technical review (ATR) can be found at *http://www.nww.usace.army.mil/html/OFFICES/Ed/C/default.asp*.

6.3.4 Risk Prioritization

The PM and the PDT will prioritize the MODERATE and HIGH risks in their disciplines or functional areas. This prioritization will provide the basis for the development of risk handling plans and the allocation of risk management resources. Prioritization will be accomplished using expert opinion within the PDT, and will be based on the following criteria:

- Risk Rating – MODERATE to HIGH
- Consequence/Impact – Within each rating, the highest value of consequence/impact
- Urgency – How much time is available before risk-handling actions must be initiated
- Probability/Likelihood – Within each rating, the highest value

The PDT will review the prioritized list of developed risks, and integrate them into a single list of prioritized project risks, using the same criteria.

6.4 Risk Response Planning and Mitigation

Following initial identification and analysis of risks, the PDT will develop an approach for risk handling for all key drivers of risk, including each MODERATE and HIGH risk. For all such risks, the various handling techniques should be evaluated in terms of feasibility, expected effectiveness, cost and schedule implications, and the effect on the project's performance. Risk responses will also include an accompanying "fallback" plan if the primary treatment strategy is not effective at mitigating the impact of risk. Reducing requirements as a risk avoidance technique will be used only as a last resort, and then only with the participation and approval of District and Division Management.

In addition to developing approaches for handling each MODERATE and HIGH risk, the following will act as risk triggers requiring an immediate response and mitigation plan:

- Cost growth greater than 1% of the estimated project cost
- Schedule delays greater than 3 months
- Potential for significant damage to private or public property
- Potential for injury or loss of life
- Potential to generate media coverage (either positive or negative)
- Potential environmental degradation or release of deleterious substances
- Potential to alter political or stakeholder support

The results of the evaluation and selection will be included and documented. This documentation will include the following elements:

- What must be done,
- List of all assumptions,
- Level of effort and resources required,
- Resources needed that are outside the expertise of the PDT,
- Estimated cost to implement the plan,

- Proposed schedule showing the proposed start date, the time phasing of significant risk reduction activities, the completion date, and their relationship to significant project activities/milestones,
- Recommended metrics for tracking risk-handling activity,
- Considerations for secondary or residual risks implications, and
- Person responsible for implementing and tracking the selected option.

6.5 Risk Monitoring and Control

Risk monitoring is the systematic tracking and evaluation of the progress and effectiveness of risk-handling actions by the comparison of predicted results of planned actions with the results actually achieved to determine status and the need for any change in risk-handling actions. The Project Manager and the PDT will monitor all identified risks in their disciplines or areas, with particular attention to those risks rated as MODERATE OR HIGH.

6.5.1 Monitor Risk Status

As work is performed on the project, the PDT will monitor and assess:

- Progress in reducing risk,
- Occurrence of risks that call for initiation of contingent risk responses,
- Effectiveness of implemented risk reduction actions and any needs to modify these actions.

Risk status will be updated immediately when risks change and upon the completion of a project milestone. The status of the risks and the effectiveness of the risk-handling actions will be agenda items for all design and program reviews, and will be reported to the PM on the following occasions:

- Monthly,
- When the PDT determines that the status of the risk area has changed significantly (as a minimum when the risk changes from high to moderate to low, or vice versa),
- When requested by Management.

There are a number of techniques and tools available for monitoring the effectiveness of risk-handling actions. At a minimum, the PM and PDT will use the Risk Register and Watch List for day-to-day management and monitoring of risks.

MODERATE or HIGH risks will be monitored by the PM until the risk is considered LOW and recommended for "Close Out." Functional area leads will continue to monitor LOW risk events in their areas to ensure that appropriate risk-handling action can be initiated if there are indications that the rating may change.

6.5.2 Maintenance of Project Risk Register

Throughout the life cycle of the project, the PDT will update the Risk Register to reflect the results of monitoring risk status. This list will also reflect the effect of any project re-planning changes and/or change controls. Updates shall be made monthly to the risk register. Any changes to risk status upon event occurrence or completion of a project milestone will also be captured immediately on the risk register.

The Risk Register will be discussed at project team meetings and specific risks of concern should be elevated to the Pre-PRB, PRB and/or project sponsors as appropriate.

6.5.3 Maintenance of Project Watch List

Throughout the life cycle of the project, the PM and the PDT will maintain a project watch list to reflect the results of monitoring risk status. The watch list, at a minimum, will contain the:

- Potential Risk Event,
- Planned Risk Reduction Actions,
- Point of Contact/Assignment,
- Due Date, and
- Status.

6.6 Risk Communication

Risk communication is essential to actively managing risks throughout the project life cycle. Communication begins with the preparation of the Risk Management Plan and continues through project closeout. Subsequently, the preparation of the project risk register facilitates communication of risks at all levels. The Cost Engineering Dx will also prepare a report regarding the formal CSRA process to be incorporated within the Cost Appendix to the Engineering Appendix of the Feasibility Report.

The PDT will review the risk register monthly to provide visibility of risks and progress in mitigating them. If necessary, risk occurrences will be elevated to the Pre-PRB, PRB and/or project sponsors for their attention (note "internal" vs. "external" risks).

The following risk triggers, as contained in paragraph 6.4 above, shall prompt the immediate communication of risks to Management:

- Cost growth greater than 1% of the estimated project cost
- Schedule delays greater than 3 months
- Potential for significant damage to private or public property
- Potential for injury or loss of life

- Potential to generate media coverage (either positive or negative)
- Potential environmental degradation or release of deleterious substances
- Potential to alter political or stakeholder support

6.7 Risk Documentation and Closeout

When the project reaches the closeout phase, the PM and the PDT will document the final results of the execution of the Risk Management Plan for inclusion in the final project records and the District and/or Enterprise Lessons Learned database. At a minimum, this information will include risk assessment documents (including the risk register), risk-handling plans (including the project watch list), contract deliverables, if appropriate, and any other risk-related reports.

Appendix A – Cost and Schedule Risk analysis Report



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MISSISSIPPI RIVER GULF OUTLET ECOSYSTEM RESTORATION COST RISK ANALYSIS FEASIBILITY REPORT FOR MISSISSIPPI VALLEY DIVISION, NEW ORLEANS DISTRICT, LA.

DRAFT

Prepared for:

U.S. Army Corps of Engineers

Prepared by:

New Orleans District

Date: 16 May 2012

Disclaimer: These are sample pages for instructional use only.

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APPENDIX A Detailed Risk Report on Adaptive Management

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EXECUTIVE SUMMARY

This report presents a recommendation for the total project cost and schedule contingencies for the Mississippi River Gulf Outlet Ecosystem Restoration Project near New Orleans, Louisiana. In the Water Resources Development Act (WRDA) 2007, Congress requested an ecosystem restoration plan for the areas affected by MRGO channel and a plan to restore natural features that reduce storm surge damages. In compliance with the Engineer Regulation (ER) 1110-2-1302 CIVIL WORKS COST ENGINEERING, dated 15 September 2008, a formal risk analysis study was performed for the development of contingency on the total project cost. This report reveals how Cost/Schedule Risk was developed and applied to the baseline estimate.

The study is 100% federally funded. The States of Louisiana and Mississippi have been identified as potential sponsors for implementation of the ecosystem restoration plan. Both states have been actively participating on the planning team and both support the recommended plan.

The State of Louisiana disagrees with the USACE over the cost-share requirement for plan implementation and has expressed its unwillingness to participate in plan implementation unless it is undertaken at full (100%) federal cost. The USACE will continue to coordinate with the States of Louisiana and Mississippi to finalize the ecosystem restoration plan and to identify a non-Federal sponsor to cost share in plan implementation.

Within the risk analysis process, it was recognized that there are three main project categories that carry specific risks and resulting contingencies. For this reason, three analyses were performed with the following results presented at the 80% confidence level of successful execution:

CSRA Studies	Base Cost	Contingency	Base + Contingency (2011)
	($1,000)		($1,000)
Habitat Creation	$2,045,906	24.60%	$2,549,199
Real Estate	$75,888	30.50%	$99,034
Adaptive Management (Habitat Renourishment)	$116,861	59.5%	$186,394
Aggregate Results	**$2,238,655**	**26.6%**	**$2,834,652**

Habitat Creation is schedule to begin in FY14 with the last contract of creation work to be awarded in FY 28. Project scope for this effort is fairly confident in design and quantities. The Adaptive Management program is scheduled to begin in FY 19 with monitoring, the first habitat renourishment event to occur in FY 25, with monitoring and renourishment to occur annually through FY34. This effort, while similar in design and construction nature, carries much greater unknowns because design is reliant on the results of the initial Habitat Creation. For this reason, a separate Adaptive Management CSRA was performed and is presented in Appendix A.

Main risk contributors cost and schedule risk are:

- Revision to the borrow plan/borrow availability (habitat creation and adaptive management)
- Violet Freshwater diversion implementation (adaptive management)
- Funding Stream to support the scheduled plan
- Hydraulic Cutterhead Dredge Availability
- Fuel Costs variations for Dredges

The circumstances which could mitigate these main contributors to risk are as follows:

Revisions to borrow plan/borrow availability (Habitat Construction and Adaptive Management): Borrow sources are obtained from dredging activities, but if the planned dredging depths are insufficient, material dredging from farther sources increases costs.. After the environmental impact is determined the acreages of borrow required in the future projects can be assessed. Hopefully an excavation depth close to the established by the designer is the selected depth, thus this risk diminishes. The borrow pits are sized twice as large as needed which does reduce some risk for cultural resources and unknown utilities. Additionally the larger pits allow for some borrow availability during the Adaptive Management renourishment phase, but that period is more uncertain because it stretches further into the future.

Violet Freshwater Diversion Implementation (Adaptive Management); deflection dikes and weirs can be installed to minimize impacts to newly created habitat. These features could direct the flows into areas which could reduce impacts. Furthermore, the management plan for the Freshwater Diversion could be implemented to reduce negative impacts to created habitat.

Funding Stream (Habitat Construction and Adaptive Management); the opportunity to mitigate the funding stream is to stress to congress the importance of the marsh system buffer zone in reducing the quantities in the current hurricane protection system. This is a challenging concept which requires influence.

Hydraulic Cutterhead Dredge Availability (Habitat Construction and Adaptive Management); to mitigate the risk for the Dredge Availability the project manager can schedule the notice to proceeds around the main dredging seasons. Also if a project of

this magnitude is approved, industry would obtain more equipment to address the requirements for this project and maintenance dredging projects.

For the Habitat Creation portion of the project, 40 different construction features were analyzed. The features of work include analyzed include the following items of work:

- Dredging/habitat creation.
- Earthen retaining dikes and weirs.
- Vinyl/timber walls.
- Rock maintenance and new rock features.

For the Adaptive Management phase of the project features can be broken down into four (4) parts;

- Habitat Renourishment (same features as the Habitat Creation Phase).
- Planning Engineering and Design Set Up & Monitoring Phase.
- Planning Engineering and Design Renourishment Phase.
- Construction Management during the renourishment phase.

The CRA described in this report was implemented in an effort to determine a true contingency cost required for cost estimating and based on the risk items associated with the project. The results of this analysis are determined by qualifying and quantifying all potential cost risks and running a Monte Carlo simulation to produce the frequency spectrum and probability range for the applied risk costs. The cost contingency is obtained from the 80-percent confidence level as determined by this analysis.

The risk analysis for this project used a Micro Computer Aided Cost Estimating Software (MCACES) estimate associated with the recommended plan. The potential cost risks developed during this analysis also serve as an indicator of how to avoid unforeseen escalation of project costs throughout project implementation and therefore, may be used as a valuable tool in all future aspect of the project study, design, and construction planning and estimation.

The following tables ES-2 portray both the baseline cost and fully funded cost, respectively.

Table ES-2. Cost Summary – Baseline Project Cost

MRGO Ecosystem Restoration Total Project Cost	*COST* ($1,000)	*CNTG* ($1,000)	TOTAL FY 2011 ($1,000)	First Project Cost (FY 2013) ($1,000)
01 LANDS AND DAMAGES	$75,888	$23,172	$99,060	$99,060
01 RELOCATIONS	$0	$0	$0	$0
06 FISH & WILDLIFE FACILITES(Plantings)	$107,536	$26,454	$133,990	$136,083
06 FISH & WILDLIFE FACILITES ADAPTIVE MANAGEMENT*	$89,100	$53,015	$142,15	$144,752
14 RECREATION FACILITIES	$3,501	$861	$4,362	$4,430
17 BEACH REPLENISHMENT	$1,750,855	$430,710	$2,181,565	$2,215,647
30 PLANNING, ENGINEERING & DESIGN	$77,598	$19,089	$96,687	$99,049
30 PLANNING, ENGINEERING & DESIGN ADAPTIVE MANAGEMENT*	$21,761	$12,948	$34,709	$35,191
30 CONSTRUCTION MANAGEMENT	$106,416	$26,178	$132,594	$135,833
30 CONSTRUCTION MANAGEMENT ADAPTIVE MANAGEMENT*	$6,000	$3,570	$9,570	$9,703
BASELINE TOTAL COST:	$2,238,655	$595,997	$2,834,652	$2,884,1474

Notes:

1) Cost includes all contingencies, supported by a risk analysis.
2) *Adaptive Management contingency developed from separate cost risk analysis.
3) Real Estate contingencies provided by Real Estate Division.
4) All cost taken from TPCS.

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MAIN REPORT – HABITAT CREATION RISK ANALYSIS

PURPOSE

The Mississippi River Gulf Outlet (MRGO) Ecosystem Restoration Plan Feasibility Study is being developed as a supplement to the June 2008 MRGO Deep-Draft De-Authorization Report and is intended to fully meet the requirements of the Water Resources Development Act (WRDA) of 2007 Section 7013. This feasibility study will result in a Report of the Chief of Engineers containing a recommended MRGO Ecosystem Restoration Plan. The Plan will address systematic ecosystem restoration and protection of the Lake Borgne ecosystem and areas affected by the MRGO navigation channel, and will include considerations of measures to reduce or prevent damage from storm surge. The study integrates the findings of ongoing comprehensive restoration planning efforts in the study area, including the Louisiana Coastal Protection and Restoration (LACPR) Final Technical Report, the Louisiana Coastal Area (LCA) Program, and Louisiana's Comprehensive Master Plan for a Sustainable Coast.

The authorized project for the Mississippi River Gulf Outlet Ecosystem Restoration consists of the following features: forty-eight (48) items of dredging creating marsh or swamp ecosystems requiring 151,580,000 CY of excavation with a cuttherhead/pipeline dredge; forty-four (44) perimeter retaining dikes predominantly constructed with a floating dragline but some built with marsh equipment featuring 10,619,702 CY ; fourteen (14) earthen weir features constructed with marshcranes excavating 1,218,021 CY; seventeen (17) vinyl sheetpile wall alignments traversing 88,750 LF; removing 14,095 LF of vinyl sheetpile wall; removing thirty-three (33) earthen closures totaling 65,003 CY; 3,597,000 TONS of stone installed in various areas to protect the ecosystem restoration features; 1,744,700 SY of geotextile fabric to be installed in conjunction with a portion of the rock features; and some miscellaneous flotation dredging for access to the areas of work. The cost for the construction items of work without contingency is $1,750,855,000.

In addition to the construction all of the features of work will be planted with marsh, swamp or upland types of vegetation totaling $107,535,000. Recreation facilities will also be included to a cost of $3,501,000. The cost for Adaptive management totals approximately $117 million and will be detailed in an additional report.

BACKGROUND

The Mississippi River Gulf-Outlet (MRGO or "Mister Go") was a 76-mile manmade navigation channel built to provide a shortcut from the inner harbor area of the Port of New Orleans to the Gulf of Mexico. Constructed in 1950s-1960s, the MRGO navigation channel directly removed wetland habitat and caused ecosystem changes. The channel allowed the intrusion of saltwater into the vast wetland complex bordering the City of

New Orleans and surrounding coastal communities east of the Mississippi River. The dredging and filling during the construction of MRGO destroyed thousands of acres of wetlands, interrupted the local circulation patterns of natural waterways that transected the length of the channel, and breached an important hydrologic boundary in the estuary when the channel was cut through the ridge at Bayou La Loutre.

After the MRGO was completed, significant habitat shifts occurred because the impacted area converted to a higher salinity system as a result of saltwater intrusion from the gulf into the estuary. Operation of the MRGO resulted in high rates of shoreline erosion from ship wakes, further destroying wetlands and threatening the integrity of the Lake Borgne shoreline and adjacent communities, infrastructure, and cultural resources. Erosion of the MRGO channel banks and the daily influx of saltwater in the tides facilitated the transition of the estuary toward a more saline system.

Prior to construction of the MRGO, tidal movement into Lake Borgne was dominated by flow from Mississippi Sound because the tidal flow from the Breton Sound area was reduced as it moved northwest across the marshes and wetlands toward Lake Borgne. Construction of the MRGO caused a reversal of the circulation pattern, with the dominant tidal flow into Lake Borgne coming from the Breton Sound area directly via the MRGO. Before channel construction, habitats in the area were aligned along salinity gradients and reflected the varied landscape and interspersed watercourses.

Public controversy surrounding the channel arose even before its construction and spanned over five decades before the landfall of Hurricane Katrina in 2005. After the storm, the Corps of Engineers responded to Congressional direction and developed a channel closure plan. In 2009, the ship channel was closed with a large rock structure at the site of a prominent coastal ridge (Bayou La Loutre) that had been severed during channel construction. As a result of the closure ship traffic no longer transits the channel and environmental conditions are improving with salinity falling throughout the estuary. Although positive, these environmental benefits will not replace the habitats lost in the area.

In the Water Resources Development Act (WRDA) 2007, Congress requested an ecosystem restoration plan for the areas affected by the MRGO channel and a plan to restore natural features that reduce storm surge damages. This report tells how the United States Army Corps of Engineers (USACE), along with an interagency team and local stakeholders, developed a plan to restore one of the most unique and productive ecosystems in the world.

REPORT SCOPE

1.1. Project Scope

The MRGO was authorized by Congress in 1956 as a Federal navigation channel to provide a short route between the Port of New Orleans and the Gulf of Mexico. The MRGO was authorized as a 36-foot-deep, 500-foot-bottom-width waterway (38 feet deep, 600 feet wide at the Gulf of Mexico entrance) extending from the Inner Harbor

Navigation Canal (IHNC) to the 38-foot depth contour in the Gulf of Mexico. Construction of the channel began in 1958 and the channel was completed in 1968. In August 2005, Hurricane Katrina caused shoaling in the MRGO channel limiting its depth to 22 feet, and thus restricted deep-draft vessel access. Rather than continue funding operation and maintenance of the channel, in June 2006, the Congress requested a plan for deauthorization of the MRGO (see Public Law 109-234). The USACE submitted an interim report in December 2006 highlighting a plan to close the MRGO from the Gulf Intracoastal Waterway (GIWW) to the Gulf of Mexico. In January 2008, the Chief of Engineers signed a report recommending deauthorization of the channel, construction of a closure structure across the channel at Bayou La Loutre, and development of a supplemental report to provide an ecosystem restoration plan for the areas affected by the MRGO. On June 5, 2008, the Assistant Secretary of the Army (Civil Works) (ASA (CW)) forwarded the *Final MRGO Deep-Draft De-authorization Report to Congress*, officially deauthorizing the MRGO federal navigation project from the GIWW to the Gulf of Mexico.

The MRGO Deep Draft De-authorization Report recommendations resulted in the construction of a rock closure structure across the MRGO near the Bayou La Loutre ridge in St. Bernard Parish, Louisiana, which was completed on July 9, 2009. The Mississippi River Gulf Outlet (MRGO) Ecosystem Restoration Plan Feasibility Study is being developed as a supplement to the June 2008 MRGO Deep-Draft De-Authorization Report and is intended to fully meet the requirements of the Water Resources Development Act (WRDA) of 2007 Section 7013. This feasibility study will result in a Report of the Chief of Engineers containing a recommended MRGO Ecosystem Restoration Plan. The Plan will address systematic ecosystem restoration and protection of the Lake Borgne ecosystem and areas affected by the MRGO navigation channel, and will include considerations of measures to reduce or prevent damage from storm surge. The study integrates the findings of ongoing comprehensive restoration planning efforts in the study area, including the Louisiana Coastal Protection and Restoration (LACPR) Final Technical Report, the Louisiana Coastal Area (LCA) Program, and Louisiana's Comprehensive Master Plan for a Sustainable Coast.

The study purpose is to develop alternative plans to restore natural features and processes in the Lake Borgne ecosystem and areas affected by the former navigation channel. Construction recommendations will be developed to restore historic habitat types and natural ecological processes in concert with other large-scale comprehensive ecosystem restoration plans.

The report includes the project technical scope, estimates, and schedules as developed and presented by USACE New Orleans District. Consequently, these documents serve as the basis for the risk analysis. In general terms, the construction scope consists of the following:

- Lands and Damages
- Relocations (Shown as zero in the MII)
- Fish and Wildlife Facilities (Plantings)

- Fish and Wildlife Facilities (Adaptive Management)
- Recreation Facilities
- Beach Replenishment (Habitat Creation/Dredging)
- Planning, Engineering and Design (Construction Features)
- Planning, Engineering and Design (Adaptive Management Habitat Renourishment)
- Planning Engineering and Design (Adaptive Management Set Up and Monitoring Phase)
- Construction Management (Construction Features)
- Construction Management (Adaptive Management)

The design is spiritually complete however the project must transcend an important stage which would finalize cost. The first three (3) borrow pits will be constructed to varying depths and then evaluated for the best environmental coexistence and performance.

After the evaluation the remaining project borrow pits will be sized accordingly and final costs determined. This uncertainty is a main driver in the risk analysis.

USACE Risk Analysis Process

The risk analysis process follows the USACE Headquarters requirements as well as the guidance provided by the Cost Engineering Directory of Expertise for Civil Works (Cost Engineering DX). The risk analysis process reflected within the risk analysis report uses probabilistic cost and schedule risk analysis methods within the framework of the Crystal Ball software. The risk analysis results are intended to serve several functions, one being the establishment of reasonable contingencies reflective of an 80 percent confidence level to successfully accomplish the project work within that established contingency amount. Furthermore, the scope of the report includes the identification and communication of important steps, logic, key assumptions, limitations, and decisions to help ensure that risk analysis results can be appropriately interpreted.

Risk analysis results are also intended to provide project leadership with contingency information for scheduling, budgeting, and project control purposes, as well as provide tools to support decision making and risk management as the project progresses through planning and implementation. To fully recognize its benefits, cost and schedule risk analyses should be considered as an ongoing process conducted concurrent to, and iteratively with, other important project processes such as scope and execution plan development, resource planning, procurement planning, cost estimating, budgeting, and scheduling.
In addition to broadly defined risk analysis standards and recommended

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practices, the risk analysis is performed to meet the requirements and recommendations of the following documents and sources:

- ER 1110-2-1150, Engineering and Design for Civil Works Projects.
- ER 1110-2-1302, Civil Works Cost Engineering.
- ETL 1110-2-573, Construction Cost Estimating Guide for Civil Works.
- Cost and Schedule Risk Analysis Process guidance prepared by the USACE Cost Engineering DX.
- Memorandum from Major General Don T. Riley (U.S. Army Director of Civil Works), dated July 3, 2007.
- Engineering and Construction Bulletin issued by James C. Dalton, P.E. (Chief, Engineering and Construction, Directorate of Civil Works), dated September 10, 2007.

METHODOLOGY/PROCESS

PDT members involved in Risk Register Development: Risk Facilitator, Project Engineer, 2 Geotechnical Engineers, 1 Hydraulic Engineer, 1 Civil Designer, 1 Relocations Engineer, 3 Cost Engineers, 1 Structural Engineer and a Project Manager.

The risk analysis process for this study is intended to determine the probability of various cost outcomes and quantify the required contingency needed in the cost estimate to achieve any desired level of cost confidence. A parallel process is also used to determine the probability of various project schedule duration outcomes and quantify the required schedule contingency (float) needed in the schedule to achieve any desired level of schedule confidence.

In simple terms, contingency is an amount added to an estimate (cost or schedule) to allow for items, conditions, or events for which the occurrence or impact is uncertain and that experience suggests will likely result in additional costs being incurred or additional time being required. The amount of contingency included in project control plans depends, at least in part, on the project leadership's willingness to accept risk of project overruns. The less risk that project leadership is willing to accept the more contingency should be applied in the project control plans. The risk of overrun is expressed, in a probabilistic context, using confidence levels.

The Cost Engineering DX guidance for cost and schedule risk analysis generally focuses on the 80-percent level of confidence (P80) for cost contingency calculation. It should be noted that use of P80 as a decision criteria is a risk adverse approach (whereas the use of P50 would be a risk neutral approach, and use of levels less than 50 percent would be risk seeking). Thus, a P80 confidence level results in greater contingency as compared to a P50 confidence level.

The risk analysis process uses Monte Carlo techniques to determine probabilities and contingency. The Monte Carlo techniques are facilitated computationally by a commercially available risk analysis software package (Crystal Ball) that is an add-in to Microsoft Excel. Cost estimates are packaged into an Excel format and used directly for cost risk analysis purposes. Because Crystal Ball is an Excel add-in, the schedules for each option are recreated in an Excel format from their native format. The level of detail recreated in the Excel-format schedule is sufficient for risk analysis purposes that reflect the established risk register, but generally less than that of the native format.

The primary steps, in functional terms, of the risk analysis process are described in the following subsections. Risk analysis results would be provided in section 6.

Identify and Assess Risk Factors

Identifying the risk factors via the PDT are considered a qualitative process that results in establishing a risk register that serves as the document for the further study using the Crystal Ball risk software. Risk factors are events and conditions that may influence or drive uncertainty in project performance. They may be inherent characteristics or conditions of the project or external influences, events, or conditions such as weather or economic conditions. Risk factors may have either favorable or unfavorable impacts on project cost and schedule.

A meeting held at New Orleans District to develop the Risk Register was held on Wednesday 23 June, 2010. Risk was reassessed in January 2012 since the project scope was revised removing a freshwater diversion structure. The following Project Development Team participated in developing the risk register:

- 1 Risk Facilitator
- 1 Project Engineer
- 1 Project manager.
- 1 Contracting/acquisition.
- 1 Real Estate.
- 1 Relocations.
- 1 Environmental.
- 1 Civil Design Engineer
- 1 Structural Engineer
- 1 Geotechnical Engineer
- 1 Hydraulic design.
- 3 Cost Engineers.

Additionally, numerous conference calls and informal meetings are conducted throughout the risk analysis process on an as-needed basis to further facilitate risk factor identification, market analysis, and risk assessment.

Quantify Risk Factor Impacts

The quantitative impacts of risk factors on project plans are analyzed using a combination of professional judgment, empirical data, and analytical techniques. Risk factor impacts are quantified using probability distributions (density functions), because risk factors are entered into the Crystal Ball software in the form of probability density functions.

Similar to the identification and assessment process, risk factor quantification involves multiple project team disciplines and functions. However, the quantification process relies more extensively on collaboration between cost engineering, designers, and risk analysis team members with lesser inputs from other functions and disciplines.

The probabilistic distribution functions are used to describe the characteristic population (tendencies) of the risk factor inputs. The following elements of each risk factor were addressed in the risk factor quantification process:

- Maximum possible value for the risk factor.
- Minimum possible value for the risk factor.
- Most likely value (the statistical mode), if applicable.
- Nature of the probability density function used to approximate risk factor uncertainty.
- Mathematical correlations between risk factors.
- Affected cost estimate and schedule elements.

The PDT recognized that the various features carry differing degrees of risk as related to cost, schedule, design complexity, and design progress. To further complicate, the Adaptive Management carried even greater risks and uncertainties related to design, quantities and outyear efforts. The example features under study are presented in table 1:

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Table 1. Work Breakdown Structure by Feature

01	LANDS AND DAMAGES
02	RELOCATIONS
06	FISH AND WILDLIFE FACILITIES (Plantings)
06	FISH AND WILDLIFE FACILITIES ADAPTIVE MANAGEMENT (Habitat Renourishment)
14	RECREATION FACILITIES
17	BEACH REPLENISHMENT
30	PLANNING, ENGINEERING & DESIGN
30	PLANNING, ENGINEERING & DESIGN ADAPTIVE MANAGEMENT (monitoring and set up)
30	PLANNING, ENGINEERING & DESIGN ADAPTIVE MANAGEMENT (Habitat Renourishment)
31	CONSTRUCTION MANAGEMENT
31	CONSTRUCTION MANAGEMENT ADAPTIVE MANAGEMENT (Habitat Renourishment)

The resulting product from the PDT discussions is captured within a risk register as presented in section 6 for both cost and schedule risk concerns. Note that the risk register records the PDT's risk concerns, discussions related to those concerns, and potential impacts to the current cost and schedule estimates. The concerns and discussions are meant to support the team's decisions related to event likelihood, impact, and the resulting risk levels for each risk event.

Analyze Cost Estimate and Schedule Contingency

Contingency is analyzed using the Crystal Ball software, an add-in to the Microsoft Excel format of the cost estimate and schedule. Monte Carlo simulations are performed by applying the risk factors (quantified as probability density functions) to the appropriate estimated cost and schedule elements identified by the PDT. Contingencies are calculated by applying only the moderate and high level risks identified for each option (i.e., low-level risks are typically not considered, but remain within the risk register to serve historical purposes as well as support follow-on risk studies as the project and risks evolve).

For the cost estimate, the contingency is calculated as the difference between the P80 cost forecast and the base cost estimate. Each option-specific contingency is then allocated on a civil works feature level based on the dollar-weighted relative risk of each feature as quantified by Monte Carlo simulation. Standard deviation is used as the feature-specific measure of risk for contingency allocation purposes. This approach results in a relatively larger portion of all the project feature cost contingency being allocated to features with relatively higher estimated cost uncertainty.

For schedule contingency analysis, the option schedule contingency is calculated as the difference between the P80 option duration forecast and the base schedule duration. These contingencies are then used to calculate the time value of money impact of project delays that are included in the presentation of total cost contingency in section 6. The resulting time value of money, or added risk escalation, is then added into the contingency amount to reflect the USACE standard for presenting the "total project cost" for the fully funded project amount. Schedule contingency is analyzed only on the basis of each option and not allocated to specific tasks. Based on Cost Engineering DX guidance, only critical path and near critical path tasks are considered to be uncertain for the purposes of contingency analysis.

KEY ASSUMPTIONS

The design of the physical features is complete. The only remaining design feature that can be modified is the acreage of the borrow pits to be excavated for the ecosystem restoration. Currently the borrow pits are sized twice as large as required for the minimum ecosystem restoration to allow for Cultural Resources which may be found and is still ongoing.

No maintenance is required/included for the subject project however adaptive management cost and procedures have been developed. The costs analyzed in this analysis on relate to the Marsh Restoration Features and all other costs associated with its construction.

Major features of work and codes of accounts include (01) Real Estate Acquisition, (02) Relocations (none), (06) Fish and Wildlife Facilities (plantings and Adaptive Management), (17) Beach Replenishment which encompasses; Borrow Excavation, marsh/swamp replenishment, planting, adaptive management. Other features of work are (30) Planning Engineering and Design and (31) Construction Management. The codes of account associated with these categories and all feature details are detailed in the Micro-Computer Aided Cost Estimating System file that accompanies this report.

If the funding stream becomes apparent and relevant the schedule is realistic. After the borrow acreage is determined the projects are spaced along the timeline consequently the funding stream to support this timeline is aggressive. Planting of the created areas will occur two years after the construction to improve plant mortality.

New Orleans District has high confidence in the developed cost and schedule using the current pricing levels of October 2011. The escalation method applied to the current estimate reflects the current cost and schedule using the Civil Works Construction Cost Index System (CWCCIS) EM1110-2-1304.

All of the high risk levels and most of the moderate risk levels were assessed by the Risk Analysis Software. The risk assessment describes in detail which were included or considered so small of a risk to be ignored.

The following list identifies the key risk analysis assumptions and limitations within the MRGO Ecosystem Restoration Project CSRA. For each item, the context is first provided and then followed by the key assumption or limitation.

- *Unknown Decisions or Decision Makers:* The CSRA was prepared using a framework to generate contingency information that is appropriate for use by State of Louisiana and USACE decision makers for scheduling, budgeting, and project control purposes. The framework may generate results that are appropriate for use by a wide variety of decision makers or stakeholders; however, the assumed use of CSRA results is limited to scheduling, budgeting, and project control. Other uses by unknown decision makers may not be appropriate.
- *Dynamic Risks:* Risk events are dynamic, not static, and should be evaluated regularly through all phases of design, construction and O&M (if required). The CSRA is based on the identification and assessment of risks as of the date of this document. Reduced utility of current CSRA results should be assumed if the likelihood and impact of risks change over time.
- *Causal Relationships:* With the exception of risk events identified as correlated in the risk register, it is assumed that the impacts of risks are independent and that the realization of one risk does not cause the realization of another. Significant variance of the risk model results from actual project costs and schedules may be experienced if significant causal relationships exist between risks assumed to be independent.
- *Conservation of Market Pricing Risk:* The CSRA assumes that market pricing risks are not created or destroyed but can only be transferred or shared *at a price* as a result of various contract acquisition strategies. As an example, it is assumed that a contractor will add a level of contingency to a fixed price bid, relative to a cost reimbursable bid, that is reflective of the risk transferred contractually from the Government to the contractor. Other aspects of contract acquisition strategies not related to market pricing, such as the management cost of modifications or claims, are not included in this assumption. Any contract acquisition strategy that actually transfers market pricing risk to a contractor *at no cost* to the Government is not reflected in the CSRA.
- *Unknown and Unknowable Risks*: The Cynefin Framework describes decision-making contexts, in part, by characteristic types of uncertainty. Simple, complicated, complex and chaotic contexts within the framework are respectively

associated with *known known*, *known unknown*, *unknown unknown* and *unknowable* uncertainties. The CSRA process focuses on *known known* and *known unknown* risks and is not intended to quantify the impacts of *unknown unknown* or *unknowable* risks. Significant variance of the risk model results from actual project costs and schedules may be experienced if *unknown unknowable* risks, as defined in the Cynefin Framework, are realized.

RISK ANALYSIS RESULTS

The following results reflect the studies performed on the Habitat Creation phase of construction. Present the risk products and results in narrative form as well as tables and figures including the cost and schedule risk analysis results. In addition to contingency calculation results, sensitivity analyses provide decision makers with an understanding of variability and the key contributors to the cause of this variability.

6.1 Risk Register

A risk register is a tool commonly used in project planning and risk analysis and serves as the basis for the risk studies and Crystal Ball risk models. A summary risk register that includes typical risk events studied (high and moderate levels) should be presented in a table in this section. The risk register reflects the results of risk factor identification and assessment, risk factor quantification, and contingency analysis. A more detailed risk register would be provided in appendix A. The detailed risk registers of appendix A include low level and unrated risks, as well as additional information regarding the specific nature and impacts of each risk.

It is important to note that a risk register can be an effective tool for managing identified risks throughout the project life cycle. As such, it is generally recommended that risk registers be updated as the designs, cost estimates, and schedule are further refined, especially on large projects with extended schedules. Recommended uses of the risk register going forward include:

- Documenting risk mitigation strategies being pursued in response to the identified risks and their assessment in terms of probability and impact.
- Providing project sponsors, stakeholders, and leadership/management with a documented framework from which risk status can be reported in the context of project controls.
- Communicating risk management issues.
- Providing a mechanism for eliciting risk analysis feedback and project control input.
- Identifying risk transfer, elimination, or mitigation actions required for implementation of risk management plans.
- In simple terms, a correlation is a dependency that exists between two risks and may be direct or indirect. An indirect correlation is one in which large values of one risk are associated with small values of the other. Indirect correlations have correlation coefficients between 0 and -1. A direct

correlation is one in which large values of one risk are associated with large values of the other. Direct correlations have correlation coefficients between 0 and 1.

- Correlations are important to understand the logic used in the risk analyses. The mathematical correlations used in the Monte Carlo simulations are as follows:

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Table 2. Abbreviated Risk Register

Risk No.	Risk/Opportunity Event	Affected Items	Concerns	PDT Discussions	Project Cost				Project Schedule			
					Likelihood*	Impact*	Risk Level*	Rough Order Impact ($)	Likelihood*	Impact*	Risk Level*	Rough Order Impact (mo)
Contract Risks (Internal Risk Items are those that are generated, caused, or controlled within the PDT's sphere of influence.)												
	CONTRACT ACQUISITION											
CA-01	Dredging plant contractor availability	Dredging	Will contractor be available to do the work?	Lack of competitive pricing could result in higher costs. Limited availability of contractors/equipment versus the amount of jobs advertised could result in longer construction schedule. If this project is approved, and with the three year lag between the initial dredging event and subsequent dredging events the dredging industry would have time to gear up for the work load associated with the marsh creation features. A significant risk to contractor availability could happen but critical or crisis events would be unlikely.	Very Likely	Significant	HIGH		Very Likely	Significant	HIGH	
CA-02	Unknown acquisition strategy	Rock	The acquisition strategy could impact the construction costs and schedule	Contracts could be advertised as 8-A, small business, best value, design build, DBO etc.	Likely	Marginal	MODERATE		Likely	Negligible	LOW	
	CONSTRUCTION											
CON-1	Loss of marsh acreage in project areas	Dredging/Closures	Loss of acreage due to storms, environmental conditions, etc.	Event could impact scope of work and result in an increase in cost and schedule. However all of the creation areas are surrounded by a rim of shoreline which we assume will still exist if the project is approved. In 16 years damage would be minimal but a longer wait would incur damage to the acreage edges.	Unlikely	Marginal	LOW		Unlikely	Marginal	LOW	
CON-02	UXO(Unexploded Ordinances)	Dredging	Portions of borrow area of Shell Reach used to be anti aircraft target range	Equipment could be modified to prevent impacts to dredging plant as well as placement site. The could result in loss of production and increase cost and excavation durations.	Likely	Marginal	MODERATE		Likely	Negligible	LOW	
CON-03	Dredge Running Time	Dredging	Variations in dredge running time could impact cost and schedule	If there is excessive debris in the borrow pit or rough seas affecting pipeline handling or other unforeseen issues affecting dredge running time. Low impact to schedule for renourishment activities since need is uncertain.	Likely	Marginal	MODERATE		Likely	Marginal	MODERATE	
CON-04	Labor	All items of work except Real Estate	Labor Availability	A short term labor shortage would impact costs and schedule, however a long term labor shortage is unlikely, therefore the impacts on the program would be minimal.	Unlikely	Marginal	LOW		Unlikely	Marginal	LOW	
CON-05	Weather	All items of work except Real Estate	Adverse weather impacting cost and schedule	Weather issues would have minimal impacts over the life of the program. Weather already built into the schedule. A large storm event	Likely	Marginal	MODERATE		Unlikely	Marginal	LOW	
CON-06	Productivity	All items of work except Real Estate	Changes in productivity from original estimate.	Dredging productivity is conservative and variations of production are covered in PM 05 Contract Modifications CON 03 Dredge Running Time. Other features of work could have different productivity but since they are a smaller portion of the work and with the existence of PM 05 risk is considered low.	Unlikely	Marginal	LOW		Unlikely	Marginal	LOW	
	PROJECT & PROGRAM MGMT											

PM-01	Internal Red Tape	All items of work/ except Real Estate	Additional reviews, new requirement, changing HQ & District priorities could delay the project schedule	A "waive" or creation of new requirement to conduct business could impact the project schedule	Likely	Negligible	LOW		Likely	Marginal	MODERATE	
PM-02	Adaptive Management	All items of work/ except Real Estate	Results of first few years of project implementation may influence future implementation of remainder of project.	The PM would implement the project for optimum efficiency.	Unlikely	Marginal	LOW		Unlikely	Marginal	LOW	
PM-03	Funding	All items of work/ except Real Estate	May not receive funding consistent with project schedule. The current funding schedule is extremely aggressive. However assuming project approval minimal impact to cost since project features would not be awarded unless it is fully funded	This would result in a project duration longer than the anticipated 10-year period.	Very Likely	Negligible	LOW		Very Likely	Critical	HIGH	
PM-04	Resourcing / staff priorities	Engineering and Design and Supervision and Administration	Due to changing district priorities, staff may be moved to other projects.	Could result in longer design time due to new PDT members or having to contract it out.	Likely	Negligible	LOW		Likely	Marginal	MODERATE	
PM-05	Accelerated Schedule for Product Delivery Causing Modifications	All items of work/ except Real Estate	Unanticipated additional work or scheduling demands may limit confidence in design deliverables, including cost and schedule estimates creating modifications	Accelerated schedules for certain products increase quality risks. Event could increase project costs by creating modifications	Likely	Marginal	MODERATE		Likely	Marginal	MODERATE	
PM-06	Numerous Separate contracts	All items of work/ except Real Estate	Potential for contractors to use the same access routes.	PDT feels this could be scheduled to avoid these conflicts.	Likely	Negligible	LOW		Likely	Negligible	LOW	
PM-07	External Red Tape	All items of work/ except Real Estate	Priorities change on existing program/Local communities pose objections/Loss of public trust and goodwill/ Political factors change at local, state or federal/ New stakeholders emerge and demand new work/ Influential stakeholders request additional needs to serve other purposes./ Political opposition/ threat of lawsuits/ Stakeholder choose time and or cost over quality/ Unexpected escalation on key materials Labor disruptions .	Since Diversion structure has been removed external red tape is a minimum. Project is deemed desirable by the public.	Unlikely	Negligible	LOW		Unlikely	Negligible	LOW	
	REGULATORY AND ENVIRONMENTAL											
REG-01	Contamination in project areas	All items of work/ except Real Estate	Contamination of borrow, placement, or construction sites.	This could result in removing the feature, finding alternative sites, etc. PDT assumes the site would be avoided in lieu of cleaning the site.	Likely	Negligible	LOW		Likely	Significant	HIGH	
REG-02	Environmental windows	Dredging	Currently none are identified.	There is an alternating borrow plan to allow for environmental adaptation.	Unlikely	Marginal	LOW		Unlikely	Marginal	LOW	
REG-03	Cultural Findings	All items of work/ except Real Estate	Identification of cultural sites could move borrow pits and placement sites.	The borrow pits are sized more as large to account for the occurrence of any cultural findings. Minimal impacts	Likely	Marginal	MODERATE		Likely	Marginal	MODERATE	
	TECHNICAL DESIGN											
TD-01	Change refinement in hycraulic design	Rock	Hydraulic design is complete for the rock structure	The rock sizes are finalized and the wolet structure is removed therefore this is negligible affects.	Unlikely	Negligible	LOW		Unlikely	Negligible	LOW	
TD-02	Revisions to Borrow Plan	Dredging	Potential reasons for revision could be critical habitat, outside agencies intervention, etc. Currently waiting on info from NMFS which could affect likelihood.	After the first three borrow pits of varying depths are assessed changes could occur. A shallow excavation in the pit would cause the pipeline lengths to increase to roughly 5,000 to 10,000 LF.	Likely	Significant	HIGH		Likely	Significant	HIGH	
TD-03	Unknown infrastructure (relocations)	All items of work/ except Real Estate	Find unknown pipelines or utilities	Could affect borrow plan.	Likely	Marginal	MODERATE		Likely	Marginal	MODERATE	
TD-04	Coordination with railroads/highway/utility agencies	Dredging	Extended time periods could be incurred when coordinating with other agencies.	Design requirement could result in increased real estate or construction costs. Jacking and boring costs are included in the mobilization costs in the estimate making it minimal impacts to costs. Since the projects are scheduled far in advance coordination can occur to have minimal impacts on the schedule	Likely	Negligible	LOW		Likely	Negligible	LOW	

TD-05	Field Data, Civil	vinyl closures	Limited data could affect closure quantities for vinyl closures.	Ground surveys are up to date however soil boring for the stone was taken every mile of rock alignment. These features are prevalent in the area therefore engineering has a feel for the sectional requirements of rock and vinyl closures.	Likely	Marginal	MODERATE		Likely	Marginal	MODERATE	
TD-06	Field Data, Geotechnica	Rock	Sufficient borings have been obtained to have confidence in the Geotechnical Design for rock	Rock features are prevalent in the area therefore engineering has a feel for the sectional requirements of rock and vinyl closures. Rock cross-sections have been somewhat overdesigned to compensate for irregular soil conditions.	Likely	Marginal	MODERATE		Likely	Marginal	MODERATE	
TD-07	Field Data, Geotechnica	Earthen Closures	Earthen designs used have adequate side slopes but overbuilding of the dikes may have to occur to offset squat of the dike cross section	Earthen designs used have adequate side slopes but overbuilding of the dikes may have to occur to offset squat of the dike cross section.	Likely	Significant	HIGH		Likely	Marginal	MODERATE	
TD-08	A-E Design	Engineering and Design	Certain aspects of the project could be contracted out to an A-E Designer.	Contracting certain aspects of the project to an A-E designer could enable the PDT to focus on other components of the project, thus speeding up the design process. However, there oversight on an A-E design work still remains and could provide a negative impact if a sub par quality design is submitted.	Very Likely	Negligible	LOW		Very Likely	Negligible	LOW	
	LANDS AND DAMAGES											
LD-01	Timely Acquisition		Concerns that RE cannot acquire real estate timely to support the construction contracts	The potentia for design c hanges can affect the amount of real estate required. There are currently over 1,900 land owners.	Likely	Negligible	LOW		Likely	Significant	HIGH	
Programmatic Risks (External Risk Items are those that are generated, caused, or controlled exclusively outside the PDT's sphere of influence.)												
EXT-01	Fuel Dredging	Dredging	Cost of fuel could impact dredging costs	Variance in fuel costs could increase or decrease the project costs.	Very Likely	Significant	HIGH		Very Likely	Negligible	LOW	
EXT-02	Fuel Shoreline Protection	Rock	Cost of fuel could impact delivery costs for stone	Variance in fuel costs could increase or decrease the project costs.	Very Likely	Significant	HIGH		Very Likely	Negligible	LOW	

6.2 Cost Risk Analysis - Cost Contingency Results

A cost risk analysis was conducted on the thirteen (13) risks on the risk register, shown in Appendix A, which had a cost impact of moderate or high. The risk was analyzed using the low, most likely, and high estimates for each risk item and the items associated variance distribution. The analysis produced a sensitivity chart of the risk items and confidence levels from 0 to 100% and the associated contingency amount. The cost sensitivity chart is shown in Figure 1 below. The sensitivity chart shows the influence of each risk items on the resulting cost contingency. The risk items are ranked according to their importance to the cost contingency. As shown in the Cost Sensitivity Chart, the Revisions to Borrow Plan, Dredge Availability and Fuel had the most influence on the cost contingency. Unknown Infrastructure, Unexploded Ordinances and Accelerated Schedule, other risk items had the least amount of influence on the cost contingency.
The results reflect only those contingencies established from the cost risk analysis

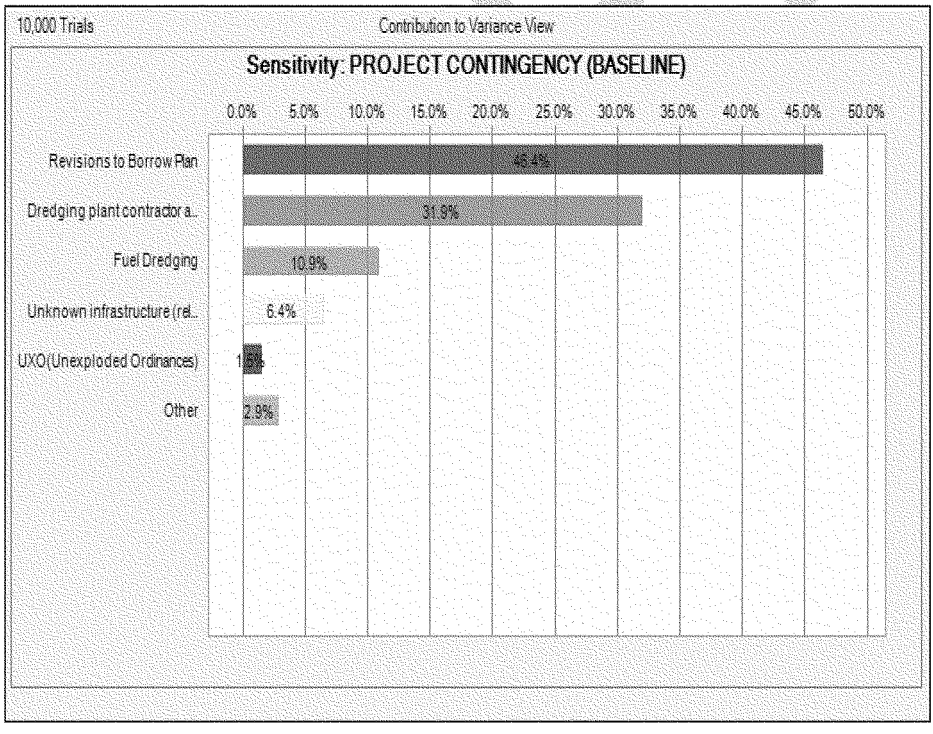
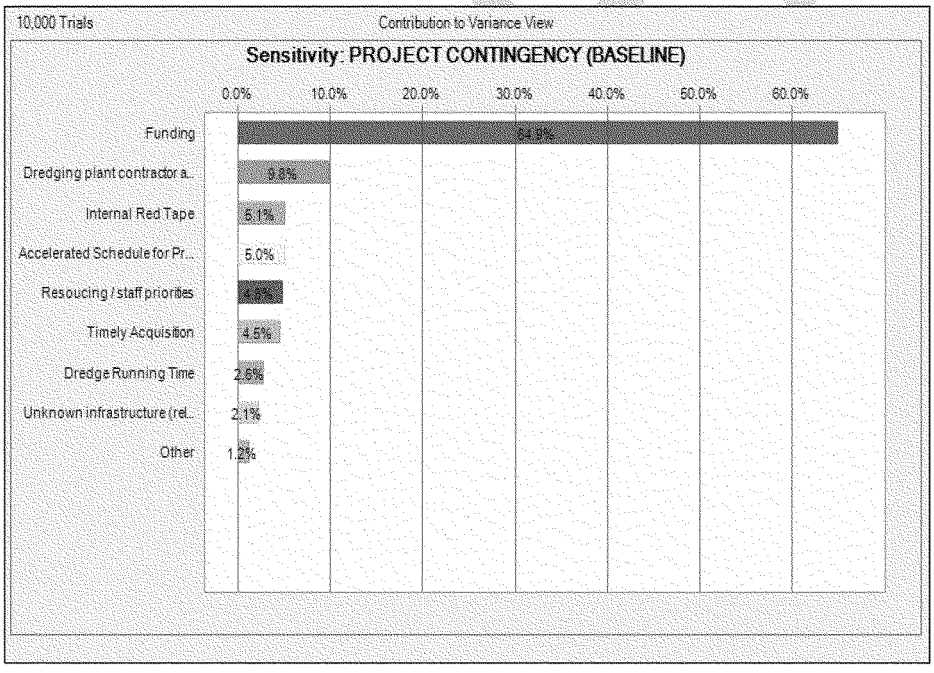


Figure 1 Cost Sensitivity Chart.

6.3 Schedule Risk Analysis - Schedule Contingency Results

A schedule risk analysis was conducted on the ten risks on the risk register, shown in Table 1, which had a schedule impact of moderate or high. The risk was analyzed using the low, most likely, and high estimates for each risk item and the items associated variance distribution. The analysis produced a sensitivity chart of the risk items and confidence levels from 0 to 100% and the associated contingency amount. The schedule sensitivity chart is shown in Figure 3 below. The sensitivity chart shows the influence of each risk items on the resulting schedule contingency. The risk items are ranked according to their importance to the schedule contingency. As shown in the Schedule Sensitivity Chart, the Funding Stream, Dredge Contractor Availability and Internal Red Tape items had the most influence on the schedule contingency. The Accelerated Schedule/Modifications, Resourcing, Timely Acquisition had the least amount of influence on the Schedule contingency.

Figure 3. Schedule Sensitivity Chart



7. MAJOR FINDINGS/OBSERVATIONS

The cost and schedule risk analysis resulted in a recommended cost contingency of $2,548,450,161 and a schedule recommended contingency of 304.2 months. Those two results are combined to produce a total project contingency. The total project contingencies for confidence levels 0 to 100% are shown below. Table 5 presents project contingencies, which include base cost plus cost and schedule contingencies. The recommended total project contingency is 24.7%, based on the 80% confidence level. This contingency was applied to the detailed estimate for the tentatively selected plan for the MRGO Ecosystem Restoration project.

Table 5 Combined Confidence Table

Combined Confidence Table(excludes Real Estate and Adaptive Management)

Most Likely Cost Estimate	$2,045,901,706	
Confidence Level	Value	Months
5%	$2,041,822,140	172.6 Months
10%	$2,110,173,253	190.6 Months
15%	$2,156,611,192	202.3 Months
20%	$2,195,241,893	212.2 Months
25%	$2,215,452,136	221.0 Months
30%	$2,254,972,295	228.6 Months
35%	$2,283,587,074	236.1 Months
40%	$2,310,734,481	242.8 Months
45%	$2,335,145,631	249.8 Months
50%	$2,361,008,632	257.0 Months
55%	$2,388,695,501	263.8 Months
60%	$2,416,748,710	270.9 Months
65%	$2,446,119,246	278.7 Months
70%	$2,475,317,615	287.0 Months
75%	$2,510,214,105	294.8 Months
80%	$2,548,450,161	304.2 Months
85%	$2,589,766,647	315.7 Months
90%	$2,642,184,670	330.2 Months
95%	$2,726,090,880	350.8 Months

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The risk items that had the most influence on the resulting total project cost contingency for the construction items of work were the Revisions to Borrow Plan, Dredging Plant Availability, and Fuel items. These items are discussed in more detail in the Mitigation Recommendations section.

The above risk analysis results are intended to provide project leadership with contingency information for scheduling, budgeting, and project control purposes, as well as to provide tools to support decision making and risk management as projects progress through planning and implementation. These conclusions were reached by identifying and assessing risk items for use in the risk analysis. These quantitative impacts of these risk items are then analyzed using a combination of professional judgment, empirical data, and analytical techniques. The total project cost contingency is then analyzed using the Crystal Ball software. Monte Carlo simulations are performed by applying the risk factors (quantified as probability density functions) to the appropriate estimated cost and schedule elements identified by the PDT.

8. MITIGATION RECOMMENDATIONS

An important outcome of the cost and schedule risk analysis is the communication of high risk areas which have a high potential to affect the project cost and/or schedule. For the MRGO Ecosystem Restoration project, those risks are Revisions to the Borrow Plan, Dredge Availability, and the Fuel costs. The funding stream is the main driver on the schedule risk analysis. Not all of these risk items can be mitigated, reducing the risk of an increased project cost.

The Borrow Plan determination at this time is the wildest of wild cards. After the environmental impact is determined the acreages of borrow required in the future projects can be assessed. Hopefully an excavation depth close to the one used by the designer is the selected depth thus this risk diminishes.

To mitigate the risk for the Dredge Availability the project manager can schedule the notice to proceeds around the main dredging seasons. Also if a project of this magnitude is approved industry would obtain more equipment to address the requirements for this project and maintenance dredging projects.
The opportunity to mitigate fuel costs is remote and unlikely.

The opportunity to mitigate the funding stream is to stress to congress the importance of the marsh system buffer zone in reducing the quantities in the current hurricane protection system. This is a challenging concept which requires influence.

APPENDIX A
Adaptive Management Report

MISSISSIPPI RIVER GULF OUTLET ECOSYSTEM RESTORATION COST RISK ANALYSIS FOR ADAPTIVE MANAGEMENT FEASIBILITY REPORT FOR MISSISSIPPI VALLEY DIVISION, NEW ORLEANS DISTRICT, LA.

DRAFT

Prepared for:

U.S. Army Corps of Engineers

Prepared by:

New Orleans District

Date: 21-March-2012

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Figure 1. Sample of Project Confidence Curves ..... **Error! Bookmark not defined.**

APPENDIX

APPENDIX A Detailed Risk Register

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EXECUTIVE SUMMARY (INCLUDED IN BEGINNING OF MAIN REPORT)

The most likely total Adaptive Management cost for the project is estimated to be approximately $117 million. Based on the results of the analysis, the New Orleans District Cost Engineering Section recommends an average total project contingency value of approximately $69 million dollars or 59.5%. This equates to a total estimated cost of $186 million for Adaptive Management.

The Adaptive Management Program features can be broken down into four (4) parts; Marsh Renourishment, Planning Engineering and Design Set Up & Monitoring Phase, Planning Engineering and Design Renourishement Phase and Construction Management during the renourishment phase.

A quantity of Marsh Renourishment was developed by the environmentalist and an average cost of renourishement was used to develop cost from the Construction Feature of the MCACES estimate. This was deemed a reasonable approach since no specific details of renourishement can be determined since the areas of habitat loss are unknown.

Since the Violet Freshwater Diversion does not impact construction features and the magnitude of cost for the Adaptive Management Program a separate risk register was developed.

The CRA described in this report was implemented in an effort to determine a true contingency cost required for cost estimating and based on the risk items associated with the Adaptive Management Program. The results of this analysis are determined by qualifying and quantifying all potential cost risks and running a Monte Carlo simulation to produce the frequency spectrum and probability range for the applied risk costs. The cost contingency is obtained from the 80-percent contingency as determined by this analysis.

A total of 29 potential risk items were developed by the CRA team and applied to a risk registry for analysis. Assumptions were made for each risk item before running the Monte Carlo simulation. The result of the simulation gave a 57.7 percent contingency at the 80-percent confidence level.

The contingency cost for this project was utilized for a Micro Computer Aided Cost Estimation Software (MCACES) estimation of the costs associated with the recommended plan. The potential cost risks developed during this analysis also serve as an indicator of how to avoid unforeseen escalation of project costs throughout project implementation and therefore, may be used as a valuable tool in all future aspect of the project study, design, and construction planning and estimation.

Table ES-1 displays the baseline Adaptive Management Cost.

Table ES-1. Cost Summary – Baseline Adaptive Management Cost

MRGO Ecosystem Restoration Adaptive Management Cost	COST ($1,000)	CNTG ($1,000)	TOTAL ($1,000)
06 FISH & WILDLIFE FACILITES ADAPTIVE MANAGEMENT*	$89,100	$53,015	$142,115
30 PLANNING, ENGINEERING & DESIGN ADAPTIVE MANAGEMENT*	$21,761	$12,948	$34,709
30 CONSTRUCTION MANAGEMENT ADAPTIVE MANAGEMENT*	$6,000	$3,570	$9,570
BASELINE ADAPTIVE MANAGEMENT COST:	$116,861	$69,532	$186,393

Notes:

5) Cost includes all contingencies, supported by a risk analysis.
6) *Adaptive Management contingency developed from separate cost risk analysis.
7) Real Estate contingencies provided by Real Estate Division.
8) All cost taken from TPCS.

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PURPOSE

The Mississippi River Gulf Outlet (MRGO) Ecosystem Restoration Plan Feasibility Study is being developed as a supplement to the June 2008 MRGO Deep-Draft De-Authorization Report and is intended to fully meet the requirements of the Water Resources Development Act (WRDA) of 2007 Section 7013. This feasibility study will

result in a Report of the Chief of Engineers containing a recommended MRGO Ecosystem Restoration Plan. The Plan will address systematic ecosystem restoration and protection of the Lake Borgne ecosystem and areas affected by the MRGO navigation channel, and will include considerations of measures to reduce or prevent damage from storm surge. The study integrates the findings of ongoing comprehensive restoration planning efforts in the study area, including the Louisiana Coastal Protection and Restoration (LACPR) Final Technical Report, the Louisiana Coastal Area (LCA) Program, and Louisiana's Comprehensive Master Plan for a Sustainable Coast.

Details of the authorized project for the Mississippi River Gulf Outlet Ecosystem Restoration are described in the construction feature report. An average cost for the beach replenishment phase of the Adaptive Management Program was developed from the MCACES construction estimate. An average replenishment cost of $27,000 per acre was used for the Adaptive Management Program. As determined by Environmental Division, approximately 3,300 acres of habitat will need restoration yielding $89,100,000 cost for renourishment in the Adaptive Management Program. Other features include program Planning Engineering and Design (set up and renourishment), and Construction Management. The cost for Adaptive management totals approximately $117 million.

BACKGROUND

The Mississippi River Gulf-Outlet (MRGO or "Mister Go") was a 76-mile manmade navigation channel built to provide a shortcut from the inner harbor area of the Port of New Orleans to the Gulf of Mexico. Constructed in 1950s-1960s, the MRGO navigation channel directly removed wetland habitat and caused ecosystem changes. The channel allowed the intrusion of saltwater into the vast wetland complex bordering the City of New Orleans and surrounding coastal communities east of the Mississippi River. The dredging and filling during the construction of MRGO destroyed thousands of acres of wetlands, interrupted the local circulation patterns of natural waterways that transected the length of the channel, and breached an important hydrologic boundary in the estuary when the channel was cut through the ridge at Bayou La Loutre.

After the MRGO was completed, significant habitat shifts occurred because the impacted area converted to a higher salinity system as a result of saltwater intrusion from the gulf into the estuary. Operation of the MRGO resulted in high rates of shoreline erosion from ship wakes, further destroying wetlands and threatening the integrity of the Lake Borgne shoreline and adjacent communities, infrastructure, and cultural resources. Erosion of the MRGO channel banks and the daily influx of saltwater in the tides facilitated the transition of the estuary toward a more saline system.

Prior to construction of the MRGO, tidal movement into Lake Borgne was dominated by flow from Mississippi Sound because the tidal flow from the Breton Sound area was reduced as it moved northwest across the marshes and wetlands toward Lake Borgne. Construction of the MRGO caused a reversal of the circulation pattern, with the dominant tidal flow into Lake Borgne coming from the Breton Sound area directly via the

MRGO. Before channel construction, habitats in the area were aligned along salinity gradients and reflected the varied landscape and interspersed watercourses.

Public controversy surrounding the channel arose even before its construction and spanned over five decades before the landfall of Hurricane Katrina in 2005. After the storm, the Corps of Engineers responded to Congressional direction and developed a channel closure plan. In 2009, the ship channel was closed with a large rock structure at the site of a prominent coastal ridge (Bayou La Loutre) that had been severed during channel construction. As a result of the closure ship traffic no longer transits the channel and environmental conditions are improving with salinity falling throughout the estuary. Although positive, these environmental benefits will not replace the habitats lost in the area.

In the Water Resources Development Act (WRDA) 2007, Congress requested an ecosystem restoration plan for the areas affected by the MRGO channel and a plan to restore natural features that reduce storm surge damages. This report tells how the United States Army Corps of Engineers (USACE), along with an interagency team and local stakeholders, developed a plan to restore one of the most unique and productive ecosystems in the world.

REPORT SCOPE

The scope of the risk analysis report is to calculate and present the cost and schedule contingencies at the 80 percent confidence level using the risk analysis processes as mandated by U.S. Army Corps of Engineers (USACE) Engineer Regulation (ER) 1110-2-1150, Engineering and Design for Civil Works, ER 1110-2-1302, Civil Works Cost Engineering, and Engineer Technical Letter 1110-2-573, Construction Cost Estimating Guide for Civil Works. The report presents the contingency results for both cost and schedule risks for Adaptive Management features.
The study and presentation can include or exclude consideration for operation and maintenance or life cycle costs, depending upon the program or decision document intended for funding.

1.1 Project Scope

The MRGO was authorized by Congress in 1956 as a Federal navigation channel to provide a short route between the Port of New Orleans and the Gulf of Mexico. The MRGO was authorized as a 36-foot-deep, 500-foot-bottom-width waterway (38 feet deep, 600 feet wide at the Gulf of Mexico entrance) extending from the Inner Harbor Navigation Canal (IHNC) to the 38-foot depth contour in the Gulf of Mexico. Construction of the channel began in 1958 and the channel was completed in 1968. In August 2005, Hurricane Katrina caused shoaling in the MRGO channel limiting its depth to 22 feet, and thus restricted deep-draft vessel access. Rather than continue funding operation and maintenance of the channel, in June 2006, the Congress requested a plan for deauthorization of the MRGO (see Public Law 109-234).
The USACE submitted an interim report in December 2006 highlighting a plan to close the MRGO from the Gulf Intracoastal Waterway (GIWW) to the Gulf of Mexico. In

January 2008, the Chief of Engineers signed a report recommending deauthorization of the channel, construction of a closure structure across the channel at Bayou La Loutre, and development of a supplemental report to provide an ecosystem restoration plan for the areas affected by the MRGO. On June 5, 2008, the Assistant Secretary of the Army (Civil Works) (ASA (CW)) forwarded the *Final MRGO Deep-Draft De-authorization Report to Congress*, officially deauthorizing the MRGO federal navigation project from the GIWW to the Gulf of Mexico. The MRGO Deep Draft De-authorization Report recommendations resulted in the construction of a rock closure structure across the MRGO near the Bayou La Loutre ridge in St. Bernard Parish, Louisiana, which was completed on July 9, 2009.

The Mississippi River Gulf Outlet (MRGO) Ecosystem Restoration Plan Feasibility Study is being developed as a supplement to the June 2008 MRGO Deep-Draft De-Authorization Report and is intended to fully meet the requirements of the Water Resources Development Act (WRDA) of 2007 Section 7013. This feasibility study will result in a Report of the Chief of Engineers containing a recommended MRGO Ecosystem Restoration Plan. The Plan will address systematic ecosystem restoration and protection of the Lake Borgne ecosystem and areas affected by the MRGO navigation channel, and will include considerations of measures to reduce or prevent damage from storm surge. The study integrates the findings of ongoing comprehensive restoration planning efforts in the study area, including the Louisiana Coastal Protection and Restoration (LACPR) Final Technical Report, the Louisiana Coastal Area (LCA) Program, and Louisiana's Comprehensive Master Plan for a Sustainable Coast.

The study purpose is to develop alternative plans to restore natural features and processes in the Lake Borgne ecosystem and areas affected by the former navigation channel. Construction recommendations will be developed to restore historic habitat types and natural ecological processes in concert with other large-scale comprehensive ecosystem restoration plans. Adaptive Management is required to insure the success of the project.

The report includes the project technical scope, estimates, and schedules as developed and presented by USACE New Orleans District. Consequently, these documents serve as the basis for the Adaptive Management risk analysis. In general terms, the Adaptive Management scope consists of the following:

- Fish and Wildlife Facilities (Adaptive Management Habitat Renourishment)
- Planning, Engineering and Design (Adaptive Management Renourishment)
- Planning Engineering and Design (Adaptive Management Set Up and Monitoring Phase)
- Construction Management (Adaptive Management)

The Adaptive Management plan begins with monitoring, program set up and stakeholder outreach. Six years of this work transcend before we assume any renourishement begins.
The quantity of habitat to be renourished can vary greatly. Environmental Division

determined the amount habitat renourishment; therefore an average need was used of 10,000 acres renourished per year beginning in FY25.

The funding for Adaptive Management is approved for the work features as the overall funding of each construction feature is granted.

The design is spiritually complete however the project must transcend an important stage which would finalize cost. The first three (3) borrow pits will be constructed to varying depths and then evaluated for the best environmental coexistence and performance.

After the evaluation the remaining project borrow pits will be sized accordingly and final costs determined. The uncertainty of the renourishment quantity and borrow material availability are the main drivers in the risk analysis for Adaptive Management.

1.2 USACE Risk Analysis Process

The risk analysis process follows the USACE Headquarters requirements as well as the guidance provided by the Cost Engineering Directory of Expertise for Civil Works (Cost Engineering DX). The risk analysis process reflected within the risk analysis report uses probabilistic cost and schedule risk analysis methods within the framework of the Crystal Ball software. The risk analysis results are intended to serve several functions, one being the establishment of reasonable contingencies reflective of an 80 percent confidence level to successfully accomplish the project work within that established contingency amount. Furthermore, the scope of the report includes the identification and communication of important steps, logic, key assumptions, limitations, and decisions to help ensure that risk analysis results can be appropriately interpreted.

Risk analysis results are also intended to provide project leadership with contingency information for scheduling, budgeting, and project control purposes, as well as provide tools to support decision making and risk management as the project progresses through planning and implementation. To fully recognize its benefits, cost and schedule risk analyses should be considered as an ongoing process conducted concurrent to, and iteratively with, other important project processes such as scope and execution plan development, resource planning, procurement planning, cost estimating, budgeting, and scheduling.

In addition to broadly defined risk analysis standards and recommended practices, the risk analysis is performed to meet the requirements and recommendations of the following documents and sources:

- ER 1110-2-1150, Engineering and Design for Civil Works Projects.
- ER 1110-2-1302, Civil Works Cost Engineering.
- ETL 1110-2-573, Construction Cost Estimating Guide for Civil Works.
- Cost and Schedule Risk Analysis Process guidance prepared by the USACE Cost Engineering DX.

- Memorandum from Major General Don T. Riley (U.S. Army Director of Civil Works), dated July 3, 2007.
- Engineering and Construction Bulletin issued by James C. Dalton, P.E. (Chief, Engineering and Construction, Directorate of Civil Works), dated September 10, 2007.

4.0 METHODOLOGY/PROCESS

PDT members involved in Risk Register Development for the construction/Habitat Renourishment: Risk Facilitator, Project Engineer, 2 Geotechnical Engineers, 1 Hydraulic Engineer, 1 Civil Designer, 1 Relocations Engineer, 3 Cost Engineers, 1 Structural Engineer and a Project Manager. Risks identified with this risk register development were used for the habitat renourishment phase of Adaptive Management. A separate PDT of an Environmental Engineer, Project Engineer and a Cost Engineer developed a new risk register for adaptive management which also included the input from the earlier risk identification on the construction estimate. Therefore this adaptive management risk register incorporates opinions developed from both meetings to adequately asses Adaptive Management Cost Risk.
This CRA outcome is pending approval by Agency Technical Review (ATR) and reflects the feedback from the ATR.
The risk analysis process for this study is intended to determine the probability of various cost outcomes and quantify the required contingency needed in the cost estimate to achieve any desired level of cost confidence. A parallel process is also used to determine the probability of various project schedule duration outcomes and quantify the required schedule contingency (float) needed in the schedule to achieve any desired level of schedule confidence. However the schedule risk for Adaptive Management was considered to track the same risk as the project itself. Therefore, the risk on schedule developed in the construction phase shall be applied to the Adaptive Management cash flow.
In simple terms, contingency is an amount added to an estimate (cost or schedule) to allow for items, conditions, or events for which the occurrence or impact is uncertain and that experience suggests will likely result in additional costs being incurred or additional time being required. The amount of contingency included in project control plans depends, at least in part, on the project leadership's willingness to accept risk of project overruns. The less risk that project leadership is willing to accept the more contingency should be applied in the project control plans. The risk of overrun is expressed, in a probabilistic context, using confidence levels.
The Cost Engineering DX guidance for cost and schedule risk analysis generally focuses on the 80-percent level of confidence (P80) for cost contingency calculation. It should be noted that use of P80 as a decision criteria is a risk adverse approach (whereas the use of P50 would be a risk neutral approach, and use of levels less than 50 percent would be risk seeking). Thus, a P80 confidence level results in greater contingency as compared to a P50 confidence level.
The risk analysis process uses Monte Carlo techniques to determine probabilities and contingency. The Monte Carlo techniques are facilitated computationally by a commercially available risk analysis software package (Crystal Ball) that is an add-in to

Microsoft Excel. Cost estimates are packaged into an Excel format and used directly for cost risk analysis purposes. Because Crystal Ball is an Excel add-in, the schedules for each option are recreated in an Excel format from their native format. The level of detail recreated in the Excel-format schedule is sufficient for risk analysis purposes that reflect the established risk register, but generally less than that of the native format.
The primary steps, in functional terms, of the risk analysis process are described in the following subsections. Risk analysis results would be provided in section 6.

4.1 Identify and Assess Risk Factors

Identifying the risk factors via the PDT are considered a qualitative process that results in establishing a risk register that serves as the document for the further study using the Crystal Ball risk software. Risk factors are events and conditions that may influence or drive uncertainty in project performance. They may be inherent characteristics or conditions of the project or external influences, events, or conditions such as weather or economic conditions. Risk factors may have either favorable or unfavorable impacts on project cost and schedule.

A meeting held at New Orleans District to develop the Risk Register was held on Wednesday 23 June, 2010. Risk was reassessed in January 2012 since the project scope was revised removing a freshwater diversion structure. The following Project Development Team participated in developing the risk register:

- 1 Risk Facilitator
- 1 Project Engineer
- 1 Project manager.
- 1 Contracting/acquisition.
- 1 Real Estate.
- 1 Relocations.
- 1 Environmental.
- 1 Civil Design Engineer
- 1 Structural Engineer
- 1 Geotechnical Engineer
- 1 Hydraulic design.
- 3 Cost Engineers.

The initial formal meetings focused primarily on risk factor identification using brainstorming techniques, but also included some facilitated discussions based on risk factors common to projects of similar scope and geographic location. Subsequent meetings should focus primarily on risk factor assessment and quantification. Additionally, numerous conference calls and informal meetings are conducted throughout the risk analysis process on an as-needed basis to further facilitate risk factor identification, market analysis, and risk assessment.
The Adaptive Management Risk Assessment meeting was held on 14 March 2012 which identified risk factors additional too the risk meeting conducted in 2010.

4.2 Quantify Risk Factor Impacts

The quantitative impacts of risk factors on project plans are analyzed using a combination of professional judgment, empirical data, and analytical techniques. Risk factor impacts are quantified using probability distributions (density functions), because risk factors are entered into the Crystal Ball software in the form of probability density functions.

Similar to the identification and assessment process, risk factor quantification involves multiple project team disciplines and functions. However, the quantification process relies more extensively on collaboration between cost engineering, designers, and risk analysis team members with lesser inputs from other functions and disciplines.
The probabilistic distribution functions are used to describe the characteristic population (tendencies) of the risk factor inputs. The following elements of each risk factor were addressed in the risk factor quantification process:

- Maximum possible value for the risk factor.
- Minimum possible value for the risk factor.
- Most likely value (the statistical mode), if applicable.
- Nature of the probability density function used to approximate risk factor uncertainty.
- Mathematical correlations between risk factors.
- Affected cost estimate and schedule elements.

It was recognized that the various features carry differing degrees of risk as related to cost, schedule, design complexity, and design progress. The example features under study are presented in table 1:

Table 1. Work Breakdown Structure by Feature

06	FISH AND WILDLIFE FACILITIES ADAPTIVE MANAGEMENT (Habitat Renourishment)
30	PLANNING, ENGINEERING & DESIGN (Monitoring and Set Up Phase)
30	PLANNING, ENGINEERING & DESIGN (Renourishment Phase)
31	CONSTRUCTION MANAGEMENT (Renourishment Phase)

The Resulting product from the PDT discussions is captured within a risk register as presented in section 6 for both cost and schedule risk concerns. Note that the risk register records the PDT's risk concerns, discussions related to those concerns, and

potential impacts to the current cost and schedule estimates. The concerns and discussions are meant to support the team's decisions related to event likelihood, impact, and the resulting risk levels for each risk event.

4.3 Analyze Cost Estimate and Schedule Contingency

Contingency is analyzed using the Crystal Ball software, an add-in to the Microsoft Excel format of the cost estimate and schedule. Monte Carlo simulations are performed by applying the risk factors (quantified as probability density functions) to the appropriate estimated cost and schedule elements identified by the PDT. Contingencies are calculated by applying only the moderate and high level risks identified for each option (i.e., low-level risks are typically not considered, but remain within the risk register to serve historical purposes as well as support follow-on risk studies as the project and risks evolve).

For the cost estimate, the contingency is calculated as the difference between the P80 cost forecast and the base cost estimate. Each option-specific contingency is then allocated on a civil works feature level based on the dollar-weighted relative risk of each feature as quantified by Monte Carlo simulation. Standard deviation is used as the feature-specific measure of risk for contingency allocation purposes. This approach results in a relatively larger portion of all the project feature cost contingency being allocated to features with relatively higher estimated cost uncertainty.

For schedule contingency analysis, the option schedule contingency is calculated as the difference between the P80 option duration forecast and the base schedule duration. These contingencies are then used to calculate the time value of money impact of project delays that are included in the presentation of total cost contingency in section 6. The resulting time value of money, or added risk escalation, is then added into the contingency amount to reflect the USACE standard for presenting the "total project cost" for the fully funded project amount.

Schedule contingency is analyzed only on the basis of each option and not allocated to specific tasks. Based on Cost Engineering DX guidance, only critical path and near critical path tasks are considered to be uncertain for the purposes of contingency analysis.

Even though Adaptive Management is not on the critical path Schedule contingency was determined to mirror the same schedule risk as the entire project. Therefore the risk register for the project was used to capture schedule risk for the Adaptive Management Plan.

5.0 KEY ASSUMPTIONS.

The quantity of acreage (wetland loss) to be renourished is determined by the Environmental team and varies between renourishing 6,600 acres to 1,700 acres. 3,300 acres was selected by the Environmental team as the acreage to be renourished during the adaptive management phase of the project.

Why wetland loss as most likely uncertainty driver? Diversion of freshwater after construction of marsh features in brackish and saline marsh would cause habitat switching from more saline tolerant plants to less saline tolerant plants. Depending on the operation of the diversion (which is still in programmatic state and not fully determined) and the operation and maintenance plan for the project, the habitat switching may or may not occur. If diversion is operated that does not allow enough time for habitat switching, then the brackish and saline marsh would likely have die-off along the coastline and some interior pond areas resulting in the subsequent erosion of land.

Since an average cost per acre slightly above the average was selected all of the uncertainties associated with the construction of habitat features remain. A slightly higher average cost was used, to address the assumed borrow location, for the adaptive management feature renourishement phase assuming borrow would be somewhat farther than the original habitat creation.

Consequently, the design of the physical features of habitat creation is complete. The only remaining design feature that can be modified is the acreage of the borrow pits to be excavated for the ecosystem restoration. Currently the borrow pits are sized twice as large as required for the minimum ecosystem restoration to allow for Cultural Resources which may be found and is still ongoing. Additionally, this increase in borrow allows for material availability in the Adaptive Management phase.

Adaptive management cost and procedures have been developed to monitor created habitat and maintain for during the project life. The costs analyzed in this analysis on relate to the Adaptive Management monitoring and set up and the Habitat Renourishment Features and all other costs associated with its construction.

Major features of work and codes of accounts include (06) Fish and Wildlife Facilities/ habitat renourishment which encompasses; Borrow Excavation, marsh/swamp replenishment, other features of work are (30) Planning Engineering and Design (monitoring and plan set up) and (31) Construction Management (for habitat renourishment). The codes of account associated with these categories and all feature details are detailed in the Micro-Computer Aided Cost Estimating System file that accompanies this report.

New Orleans District has high confidence in the developed cost and schedule using the current pricing levels of October 2011. The escalation method applied to the current estimate reflects the current cost and schedule using the Civil Works Construction Cost Index System (CWCCIS) EM1110-2-1304.

All of the high risk levels and most of the moderate risk levels were assessed by the Risk Analysis Software. The risk assessment describes in detail which were included or considered so small of a risk to be ignored.

The following list identifies the key risk analysis assumptions and limitations within the MRGO Ecosystem Restoration Project CSRA. For each item, the context is first provided and then followed by the key assumption or limitation.

- *Unknown Decisions or Decision Makers:* The CSRA was prepared using a framework to generate contingency information that is appropriate for use by State of Louisiana and USACE decision makers for scheduling, budgeting, and project control purposes. The framework may generate results that are appropriate for use by a wide variety of decision makers or stakeholders; however, the assumed use of CSRA results is limited to scheduling, budgeting, and project control. Other uses by unknown decision makers may not be appropriate.
- *Dynamic Risks:* Risk events are dynamic, not static, and should be evaluated regularly through all phases of design, construction and O&M (if required). The CSRA is based on the identification and assessment of risks as of the date of this document. Reduced utility of current CSRA results should be assumed if the likelihood and impact of risks change over time.
- *Causal Relationships:* With the exception of risk events identified as correlated in the risk register, it is assumed that the impacts of risks are independent and that the realization of one risk does not cause the realization of another. Significant variance of the risk model results from actual project costs and schedules may be experienced if significant causal relationships exist between risks assumed to be independent.
- *Conservation of Market Pricing Risk:* The CSRA assumes that market pricing risks are not created or destroyed but can only be transferred or shared *at a price* as a result of various contract acquisition strategies. As an example, it is assumed that a contractor will add a level of contingency to a fixed price bid, relative to a cost reimbursable bid, that is reflective of the risk transferred contractually from the Government to the contractor. Other aspects of contract acquisition strategies not related to market pricing, such as the management cost of modifications or claims, are not included in this assumption. Any contract acquisition strategy that actually transfers market pricing risk to a contractor *at no cost* to the Government is not reflected in the CSRA.
- *Unknown and Unknowable Risks*: The Cynefin Framework describes decision-making contexts, in part, by characteristic types of uncertainty. Simple, complicated, complex and chaotic contexts within the framework are respectively associated with *known known*, *known unknown*, *unknown unknown* and *unknowable* uncertainties. The CSRA process focuses on *known known* and *known unknown* risks and is not intended to quantify the impacts of *unknown unknown* or *unknowable* risks. Significant variance of the risk model results from

actual project costs and schedules may be experienced if *unknown unknowable* risks, as defined in the Cynefin Framework, are realized.

RISK ANALYSIS RESULTS

6.1 Risk Register

A risk register is a tool commonly used in project planning and risk analysis and serves as the basis for the risk studies and Crystal Ball risk models. A summary risk register that includes typical risk events studied (high and moderate levels) should be presented in a table in this section. The risk register reflects the results of risk factor identification and assessment, risk factor quantification, and contingency analysis. A more detailed risk register would be provided in appendix A. The detailed risk registers of appendix A include low level and unrated risks, as well as additional information regarding the specific nature and impacts of each risk.

It is important to note that a risk register can be an effective tool for managing identified risks throughout the project life cycle. As such, it is generally recommended that risk registers be updated as the designs, cost estimates, and schedule are further refined, especially on large projects with extended schedules. Recommended uses of the risk register going forward include:

- Documenting risk mitigation strategies being pursued in response to the identified risks and their assessment in terms of probability and impact.
- Providing project sponsors, stakeholders, and leadership/management with a documented framework from which risk status can be reported in the context of project controls.
- Communicating risk management issues.
- Providing a mechanism for eliciting risk analysis feedback and project control input.
- Identifying risk transfer, elimination, or mitigation actions required for implementation of risk management plans.

In simple terms, a correlation is a dependency that exists between two risks and may be direct or indirect. An indirect correlation is one in which large values of one risk are associated with small values of the other. Indirect correlations have correlation coefficients between 0 and -1. A direct correlation is one in which large values of one risk are associated with large values of the other. Direct correlations have correlation coefficients between 0 and 1.

Correlations are important to understand the logic used in the risk analyses. The mathematical correlations used in the *Monte Carlo* simulations are as follows:

Table 2. Risk Register

Risk No.	Risk/Opportunity Event	Affected Items	Concerns	PDT Discussions	Project Cost		
					Likelihood*	Impact*	Risk Level*
Contract Risks (Internal Risk Items are those that are generated, caused, or controlled within the PDT's sphere of influence.)							
	CONTRACT ACQUISITION						
CA-01	Dredging plant contractor availability	Dredging	Will contractor be available to do the work?	Lack of competitive pricing could result in higher costs. Limited availability of contractors/equipment versus the amount of jobs advertised could result in longer construction schedule. If this project is approved, and with the three year lag between the initial dredging event and subsequent dredging events the dredging industry would have time to gear up for the work load associated with the marsh creation features. A significant risk to contractor availability could happen but critical or crisis events would be unlikely.	Very Likely	Significant	HIGH
CA-02	Unknown acquisition strategy	Rock/recreation facilities/Fish and Wildlife Facilities.	The acquisition strategy could impact the construction costs and schedule	Stone contracts could be advertised as 8-A, small business, best value, design build, IDIQ etc.	Likely	Marginal	MODERATE
	CONSTRUCTION						
CON-1	Loss of marsh acreage in project areas	Dredging/Closures	Loss of acreage due to storms, environmental conditions, etc.	Event could impact scope of work and result in an increase in cost and schedule. However all of the creation areas are surrounded by a rim of shoreline which we assume will still exist if the project is approved. In 18 years damage would be minimal but a longer wait would incur damage to the acreage edges.	Unlikely	Marginal	LOW
CON-02	UXO(Unexploded Ordinances)	Dredging	Portions of borrow area of Shell Beach used to be anti aircraft target range	Equipment could be modified to prevent impacts to dredging plant as well as placement site. The could result in loss of production and increase cost and excavation durations.	Likely	Marginal	MODERATE
CON-03	Dredge Running Time	Dredging	Variations in dredge running time could impact cost and schedule	If there is excessive debris in the borrow pit or rough seas affecting pipeline handling or other unforseen issues affecting dredge running time. Low impact to schedule for rencurishment activities since need is uncertain.	Likely	Marginal	MODERATE

CON-04	Labor	All items of work/ except Real Estate	Labor Availability	A short term labor shortage would impact costs and schedule, however a long term labor shortage is unlikely, therefore the impacts on the program would be minimal.	Unlikely	Marginal	LOW
CON-05	Weather	All items of work/ except Real Estate	Adverse weather impacting cost and schedule	over the life of the program. Weather already built into the schedule. A large storm event could occur every 5 years causing additional mobilizations.	Likely	Marginal	MODERATE
CON-06	Productivity	All items of work/ except Real Estate	Changes in productivity from original estimate.	Dredging productivity is conservative and variations of production are covered in PM 05 Contract Modifications CON 03 Dredge Running Time. Other features of work could have different productivity but since they are a smaller portion of the work and with the existence of PM 05 risk is considered low.	Unlikely	Marginal	LOW
	PROJECT & PROGRAM MGMT						
PM-01	Internal Red Tape	All items of work/ except Real Estate	Additional reviews, new requirement, changing HQ & District priorities could delay the project schedule.	A waiver of creation of new requirement to conduct business could impact the project schedule.	Likely	Negligible	LOW
PM-02	Adaptive Management	All items of work/ except Real Estate	Results of first few years of project implementation may influence future implementation of remainder of project.	The PM would implement the project for optimum efficiency.	Unlikely	Marginal	LOW
PM-03	Funding	All items of work/ except Real Estate	May not receive funding consistent with project schedule. The current funding schedule is extremely aggressive. However assuming project approval minimal impact to cost since project features would not be awarded unless it is fully funded	This would result in a project duration longer than the anticipated 10-year period.	Very Likely	Negligible	LOW
PM-04	Resourcing / staff priorities	Engineering and Design and Supervision and Administration	Due to changing district priorities, staff may be move dto other projects.	Could result in longer design time due to new PDT members or having to contract it out.	Likely	Negligible	LOW
PM-05	Accelerated Schedule for Product Delivery Causing Modifications	All items of work/ except Real Estate	Unanticipated additional work or scheduling demands may limit confidence in design deliverables, including cost and schedule estimates creating modifications.	Accelerated schedules for certain products increase quality risks. Event could increase project costs by creating modifications.	Likely	Marginal	MODERATE
PM-06	Numerous Separate contracts	All items of work/ except Real Estate	Potential for contractors to use the same access routes.	PDT feels this could be scheduled to avoid these conflicts.	Likely	Negligible	LOW
PM-07	External Red Tape	All items of work/ except Real Estate	Priorites change on existing program/Local communities pose objections/Loss of public trust and goodwill/ Political factors chage at local, state or federal/ New stakeholders emerge and demand new work/ Influential stakeholders request additional needs to serve other purposes./ Political opposition/ threat of lawsuits/ Stakeholder chaoose time and or cost over quality/ Unexpected escalation on key mateirals Labor disruptions .	Since Diversion structure has been removed external red tape is a minimum. Project is deemed desirable by the public.	Unlikely	Negligible	LOW

	REGULATORY AND ENVIRONMENTAL						
REG-01	Contamination in project areas	All items of work/ except Real Estate	Contanimation of borrow, placemenet, or construction sites.	This could result in reomoving the freature, finding alternative sites, etc. PDT assumes the site would be avoided in lieu of cleaning the site.	Likely	Negligible	LOW
REG-02	Environmental windows	Dredging	Currently none are identified.	There is an alternating borrow plan to allow for environamental adaptation.	Unlikely	Marginal	LOW
REG-03	Cultural Findings	All items of work/ except Real Estate	Identification of cultural sites could move borrow pits and placement sites.	The borrow pits are sized twice as large to account for the occurance of any cultural findings. Minamal implacts. Risk is considered in PM-05	Likely	Marginal	MODERATE
	TECHNICAL DESIGN						
TD-01	Change refinemenht in hydraulic design	Rock	Hydraulic design is complete for the rock structure	The rock sizes are finalized and the violet structure is removed therefore this is negligble affects.	Unlikely	Negligible	LOW
TD-02	Revisions to Borrow Plan	Dredging	Potental reasons for revision could be critical habitat, outside agencies intervention, etc. Currently waiting on info from NMFS which could affect likelihood.	After the first three borrow pits of varying depths are assesed changes could occur. A shallow excavation in the pit would cause the pipeline lengths to increase to roughly 5,000 to 10,000 LF	Likely	Significant	HIGH
TD-03	Unknown infrastructure (relocations)	All items of work/ except Real Estate	Find unknown pipelines or utilitites	Could affect borrow plan.	Likely	Marginal	MODERATE
TD-04	Coordination with railroads/highway/utility agencies	Dredging	Extended time periods could be incurred when coordinating with other agnecies.	Design requirement could result in increased real estate or construction costs. Jacking and boring costs are included in the mobilization costs in the estimate making it minimal impacts to costs. Since the projects are scheduled far in advance coordination can occur to have minimal impacts on the schedule.	Likely	Negligible	LOW
TD-05	Field Data, Civil	vinyl closures	Limited data could affect closure quantities for vinyl closures.	Ground surveys are up to date however soil boring for the stone was taken every mile of rock alignement. These features are prevelant in t he area therefore engineering has a feel for the sectional requirements of rock and vinyl closures.	Likely	Marginal	MODERATE

TD-06	Field Data, Geotechnical	Rock	Suffecient borings have been obtained to have confidence in the Geotechnical Design for rock.	Rock features are prevelant in t he area therefore engineering has a feel for the sectional requirements of rock and vinyl closures. Rock cross-sections have been somewhat overdesigned to compensate for irregular soil conditions.	Likely	Marginal	MODERATE
TD-07	Field Data, Geotechnical	Earthen Closures	Earthen designs used have adequate side slopes but overbuilding of the dikes may have to occur to offset squat of the dike cross section.	Earthen designs used have adequate side slopes but overbuilding of the dikes may have to occur to offset squat of the dike cross section.	Likely	Significant	HIGH
TD-08	A-E Design	Engineering and Design	Certain aspects of the project could be contracted out to an A-E Designer.	Contrtacting certain aspects fo the project to an A-E desginer could enable thte PDT to focus on other components of the project, thus speeding up the design process. However, there oversight on a A-E design work still remains and could provide a negative impact if a sub par quality design is submitted.	Very Likely	Negligible	LOW
	LANDS AND DAMAGES						
LD-01	Timely Acquisition		Concerns that RE cannot acquire real estat timely to support the constrution contracts	The potential for design c hanges can affect the amount of real estate required. There are currently over 1,800 land owners.	Likely	Negligible	LOW
Programmatic Risks (External Risk Items are those that are generated, caused, or controlled exclusively outside the PDT's sphere of influence.)							
EXT-01	Fuel Dredging	Dreging	Cost of fuel could impact dredging costs	Variance in fuel costs could increasae or decreaae the project costs.	Very Likely	Significant	HIGH
EXT-02	Fuel Shoreline Protection	Rock	Cost of fuel could impact delivery costs for stone	Variance in fuel costs could increasae or decreaae the project costs.	Very Likely	Significant	HIGH

6.2 Cost Risk Analysis - Cost Contingency Results

A cost risk analysis was conducted on the thirteen (12) risks on the risk register, shown in Appendix A, which had a cost impact of moderate or high. The risk was analyzed using the low, most likely, and high estimates for each risk item and the items associated variance distribution. The analysis produced a sensitivity chart of the risk items and confidence levels from 0 to 100% and the associated contingency amount.

The cost sensitivity chart is shown in Figure 1 below. The sensitivity chart shows the influence of each risk items on the resulting cost contingency. The risk items are ranked according to their importance to the cost contingency. As shown in the Cost Sensitivity Chart, the Revisions to Borrow Plan, Dredge Availability and Fuel had the most influence on the cost contingency. Unknown Infrastructure, Unexploded Ordinances and Accelerated Schedule, other risk items had the least amount of influence on the cost contingency.

The results reflect only those contingencies established from the cost risk analysis

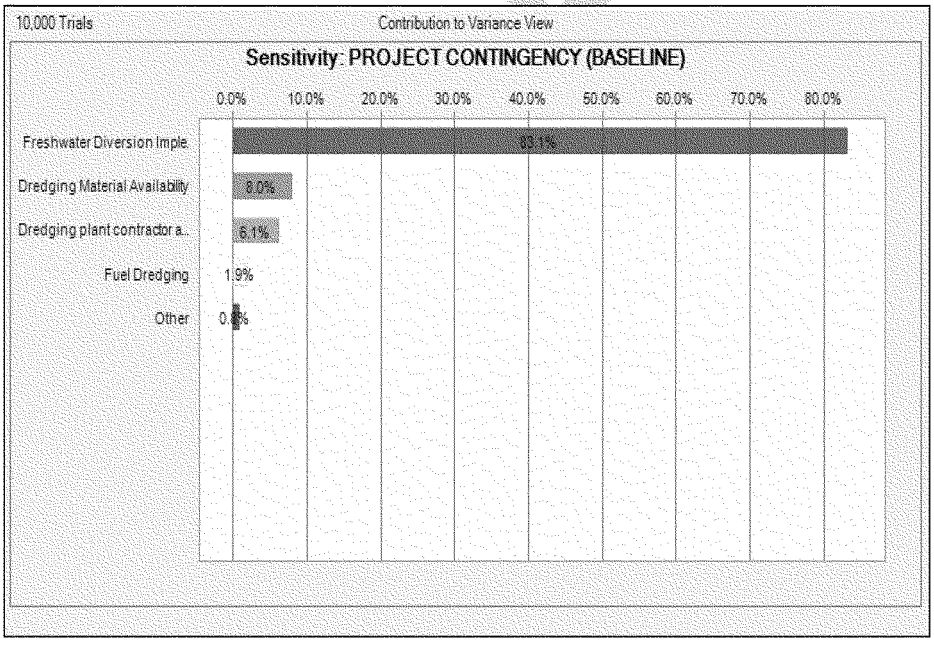


Figure 1 Cost Sensitivity Chart.

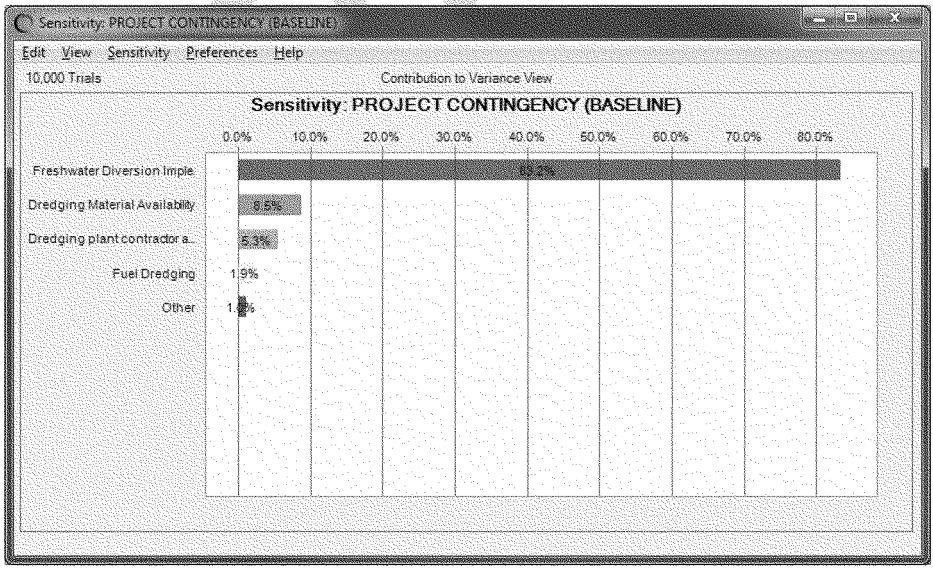
The cost risk analysis also produced a confidence table in ten percent increments of project confidence associated with contingency dollars. The confidence table is shown

in Table 3 below. As seen in the table, all but two of the associated contingency dollar amounts are positive. The contingency dollar amounts range from just over negative $155 million to well over $747 million. The recommended cost contingency amount is $522,687,672.

6.3 Schedule Risk Analysis - Schedule Contingency Results

A schedule risk analysis was not specifically conducted on the Adaptive Management Program since it is not on the critical path for the project. There is no schedule for Adaptive Management since the occurrence of habitat renourishment occurs only if a need is identified by the monitoring program. The dollars for Adaptive Management were evenly distributed over the years of need. However in conversation with the PDT team and the Cost DX it was agreed that the schedule risk for the Adaptive Management shall be considered the same as for the overall project and that resulting risk was incorporated into the risk analysis for Adaptive Management. Therefore the project schedule risk register was used for the Adaptive Management schedule risk.

The schedule sensitivity chart is shown in Figure 3 below. The sensitivity chart shows the influence of each risk items on the resulting schedule contingency. The risk items are ranked according to their importance to the schedule contingency. As shown in the Schedule Sensitivity Chart, the Funding Stream, Dredge Contractor Availability and Internal Red Tape items had the most influence on the schedule contingency. The Accelerated Schedule/Modifications, Resourcing, Timely Acquisition had the least amount of influence on the Schedule contingency. This resulting risk is applied to Adaptive Management.



6.4 Combined Cost and Schedule Contingency Results

To obtain the overall project contingency, the cost risk analysis confidence table and the schedule risk analysis confidence table are combined. That combined table is shown in Table 5. To obtain the final contingency dollar amount, the schedule contingency is converted into dollars by using the time value of money.

Table 5 Combined Confidence Table

Combined Confidence Table

Most Likely Cost Estimate	$116,861,450	
Confidence Level	Value	Months
0%	$57,558,360	101.2 Months
5%	$101,854,043	172.6 Months
10%	$111,254,593	190.6 Months
15%	$118,182,962	202.3 Months
20%	$124,057,849	212.2 Months
25%	$129,289,149	221.0 Months
30%	$133,874,181	228.6 Months
35%	$138,567,412	236.1 Months
40%	$143,058,128	242.8 Months
45%	$147,721,482	249.8 Months
50%	$152,426,971	257.0 Months
55%	$157,187,499	263.8 Months
60%	$161,955,957	270.9 Months
65%	$167,067,752	278.7 Months
70%	$173,175,853	287.0 Months
75%	$179,275,837	294.8 Months
80%	$186,344,049	304.2 Months
85%	$193,638,421	315.7 Months
90%	$203,074,955	330.2 Months
95%	$216,687,172	350.8 Months
100%	$269,953,746	456.8 Months

DRAFT

MAJOR FINDINGS/OBSERVATIONS

The cost and schedule risk analysis resulted in a recommended cost contingency of $186,344,049 and a schedule recommended contingency of 304.2 months. Those two results are combined to produce a total project contingency. The total project contingencies for confidence levels 0 to 100% are shown below.

The risk items that had the most influence on the resulting total project cost contingency were the Revisions to Borrow Plan, Dredging Plant Availability, and Fuel items. These items are discussed in more detail in the Mitigation Recommendations section. Therefore the risk affecting the overall schedule would affect the non critical path Adaptive Management Program. Therefore the schedule risk for the entire project was correlated to the Adaptive Management cost.

The above risk analysis results are intended to provide project leadership with contingency information for scheduling, budgeting, and project control purposes, as well as to provide tools to support decision making and risk management as projects progress through planning and implementation. These conclusions were reached by identifying and assessing risk items for use in the risk analysis. These quantitative impacts of these risk items are then analyzed using a combination of professional judgment, empirical data, and analytical techniques. The total project cost contingency is then analyzed using the Crystal Ball software. *Monte Carlo* simulations are performed by applying the risk factors (quantified as probability density functions) to the appropriate estimated cost and schedule elements identified by the PDT.

MITIGATION RECOMMENDATIONS

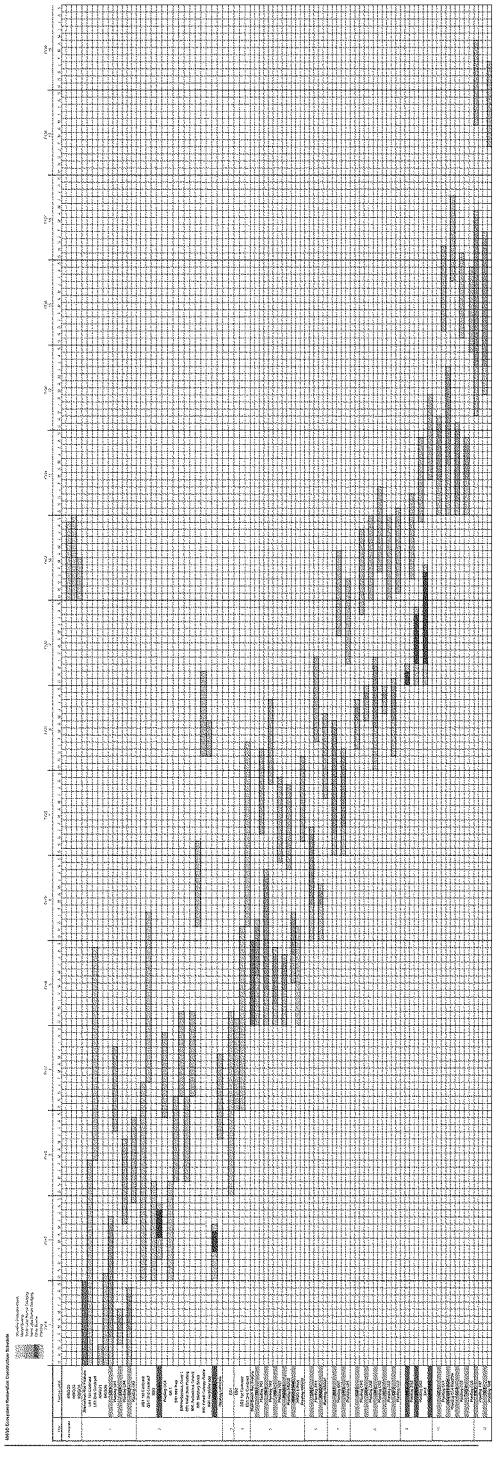
An important outcome of the cost and schedule risk analysis is the communication of high risk areas which have a high potential to affect the project cost and/or schedule. For the MRGO Ecosystem Restoration project Adaptive Management Plan, those risks are Violet Freshwater Diversion, Revisions to the Borrow Plan, Dredge Availability, and the Fuel costs. The funding stream is the main driver on the schedule risk analysis. Not all of these risk items can be mitigated, reducing the risk of an increased project cost.

The opportunity to mitigate the Violet Freshwater Diversion could be the installation of deflection dikes and weirs. These features could direct the flows into areas which would reduce impact on the created habitat features. Additionally the management plan for the Freshwater Diversion could be implemented to reduce negative impacts to created habitat.

Since the schedule for the Adaptive Management Plan mirrors the overall project schedule the mitigating factors which affect the project are repeated below for the Adaptive Management Plan.

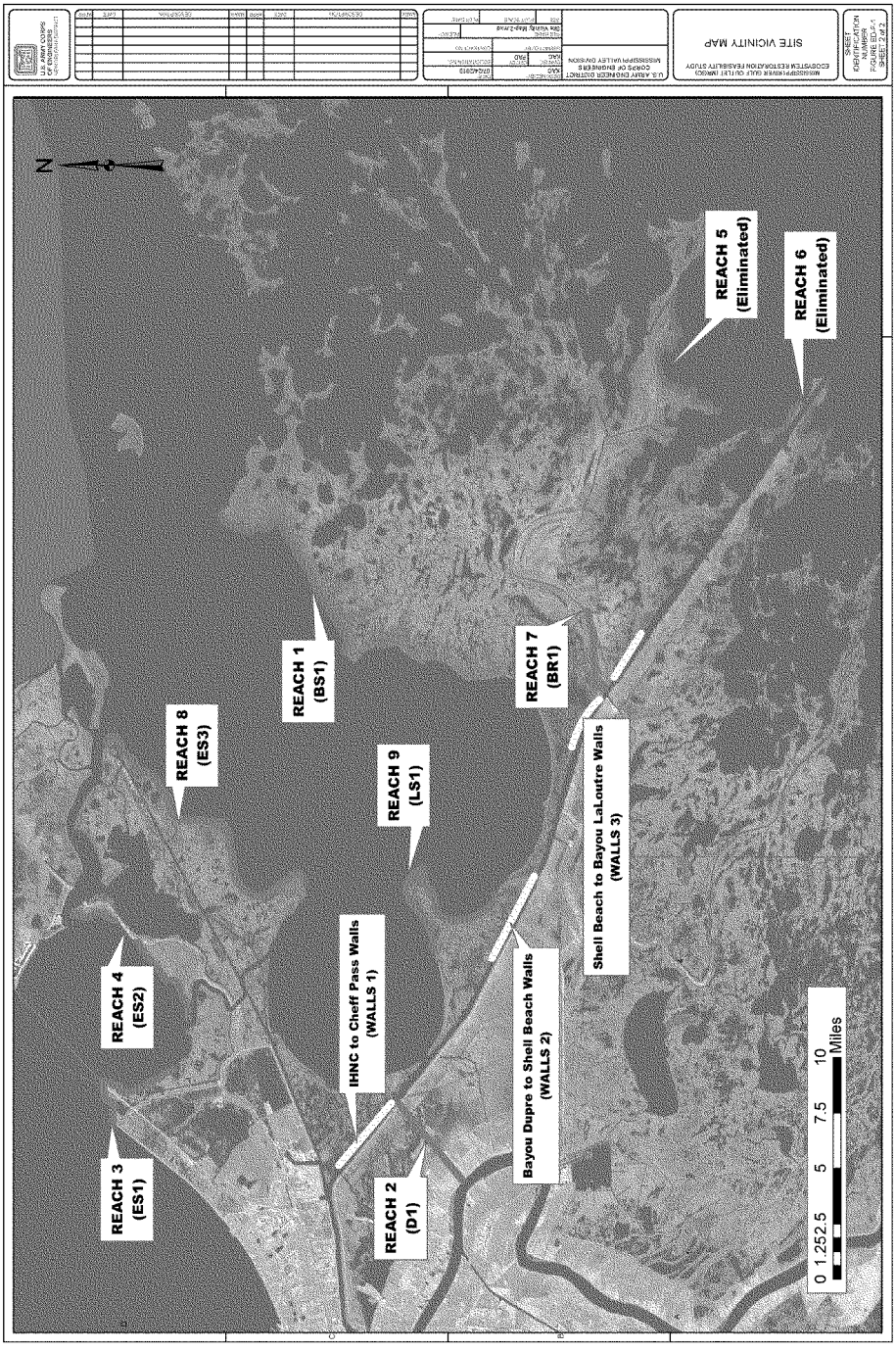
ANNEX 11

CONSTRUCTION SCHEDULE

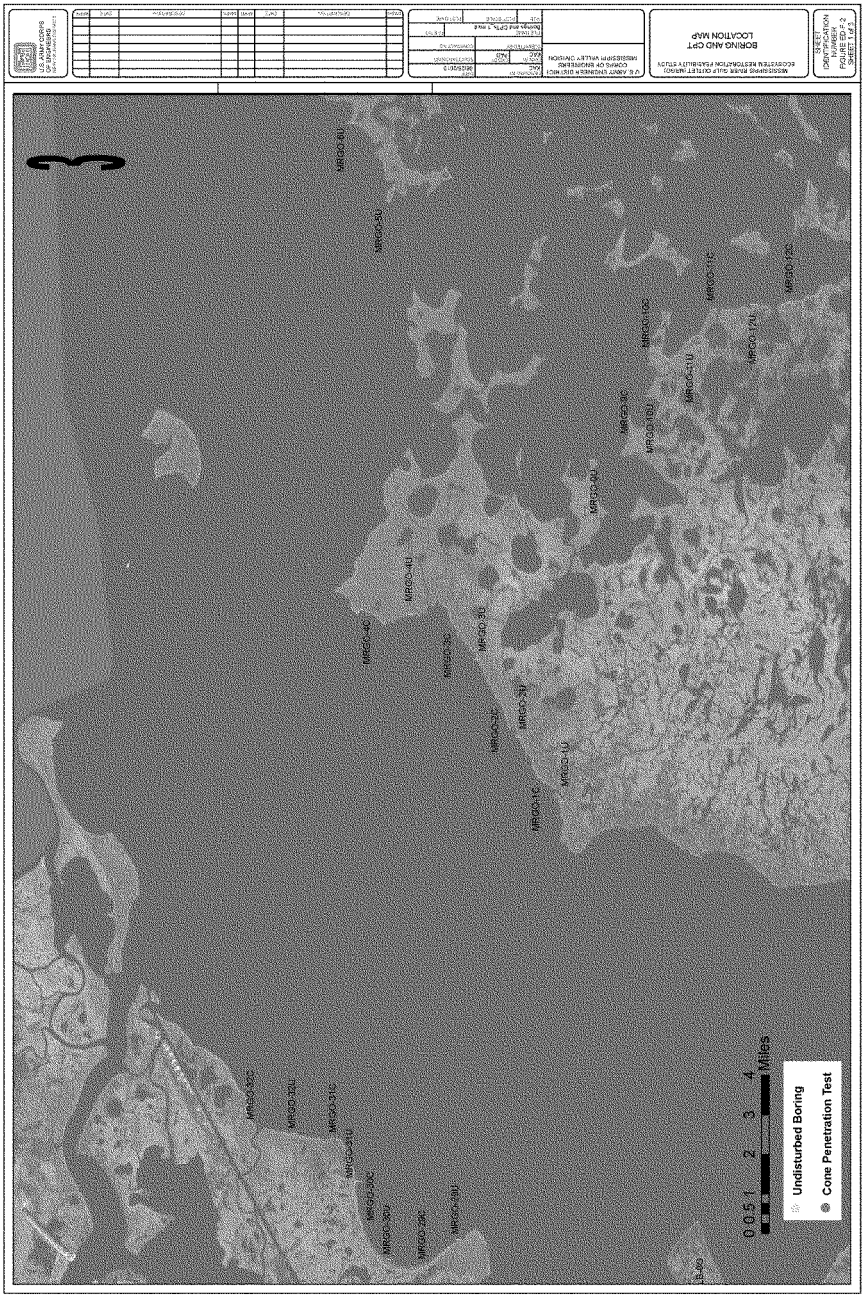


GEOTECHNICAL FIGURES

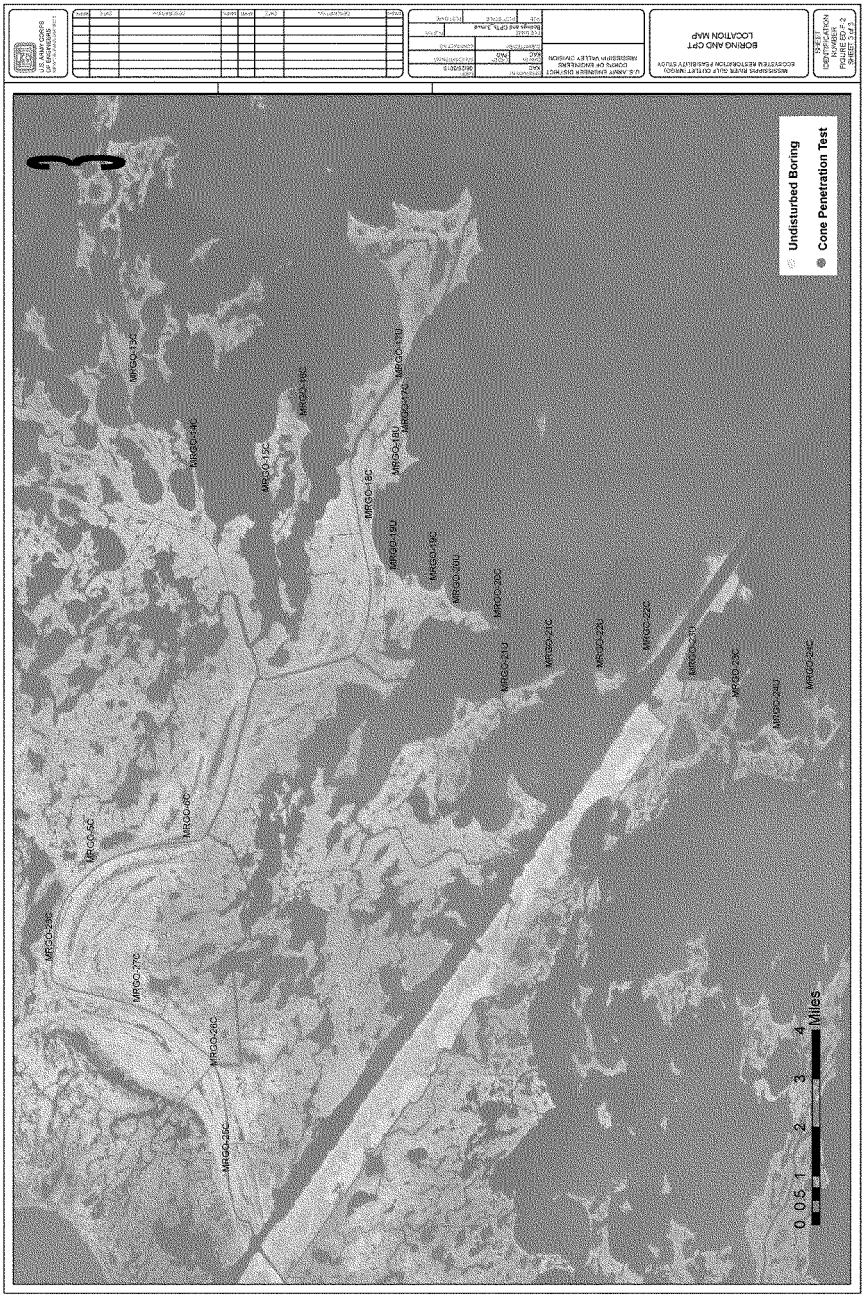
Location of Work
ORLEANS
ST. BERNARD
(pt.)
ST. BERNARD
(pt.)
0 2.5 5 10 15 20 Miles
SITE VICINITY MAP
MISSISSIPPI RIVER GULF OUTLET (MRGO)
ECOSYSTEM RESTORATION FEASIBILITY STUDY
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
MISSISSIPPI VALLEY DIVISION
SHEET IDENTIFICATION NUMBER
FIGURE ED.F-1
SHEET 1 OF 1

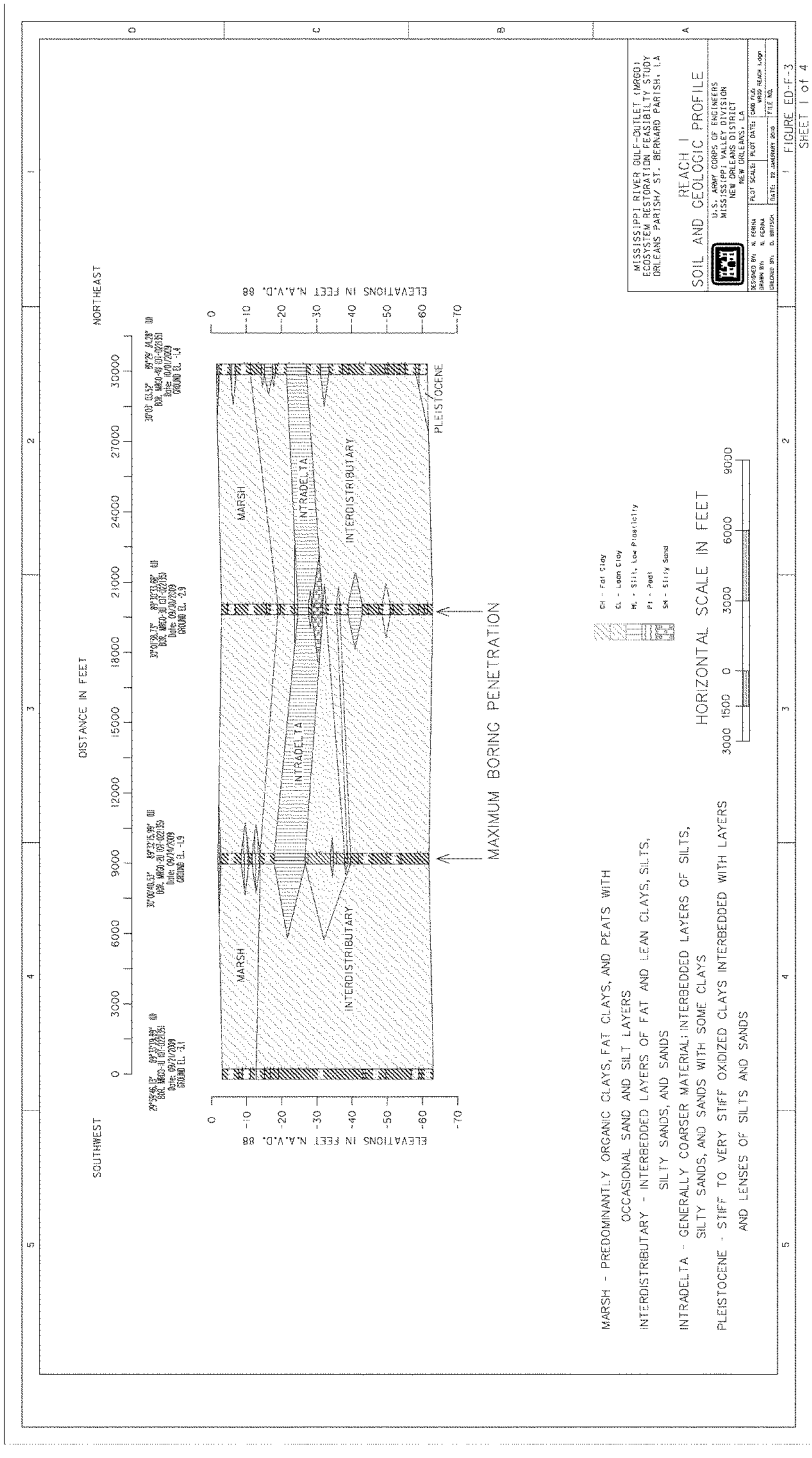


NOTE: REACHES 5 & 6 HAVE BEEN ELIMINATED

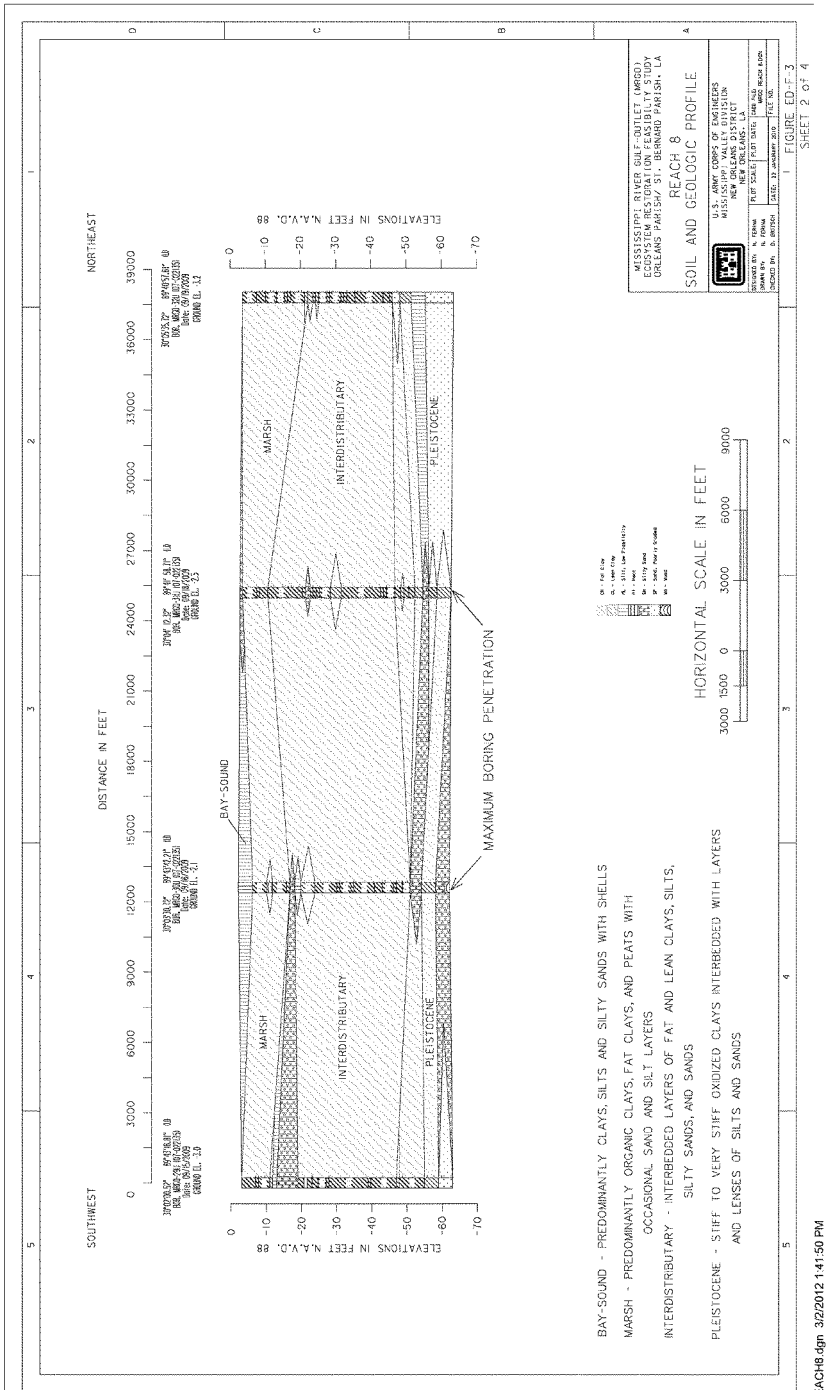

MRGO-3SC
MRGO-3DU
MRGO-3SU
MRGO-4SU
MRGO-3SC
MRGO-3DC
MRGO-3SC
MRGO-4SC
MRGO-4DU
MRGO-4SC
MRGO-5SC
MRGO-5DU
MRGO-5SC
MRGO-6SC
MRGO-6DU
MRGO-6SC
MRGO-7SC
MRGO-7DU
MRGO-7SC
MRGO-8SC
MRGO-8DU
MRGO-8SC
MRGO-9SC
MRGO-9DU
MRGO-9SC
MRGO-10SC
MRGO-10DU
MRGO-10SC
MRGO-11SC
MRGO-11DU
MRGO-11SC
MRGO-12SC
MRGO-12DU
MRGO-12SC
0 0.5 1 2 3 4 Miles
Undisturbed Boring
Cone Penetration Test
MISSISSIPPI RIVER GULF OUTLET (MRGO)
ECOSYSTEM RESTORATION FEASIBILITY STUDY
BORING AND CPT
LOCATION MAP
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
MISSISSIPPI VALLEY DIVISION
SHEET
DRAWING NUMBER
PLATE NO. P-2
SHEET 1 of 2


Undisturbed Boring
Cone Penetration Test
0 0.5 1 2 3 4 Miles
BORING AND CPT LOCATION MAP
MISSISSIPPI RIVER GULF OUTLET (MRGO) ECOSYSTEM RESTORATION FEASIBILITY STUDY
U.S. ARMY ENGINEER DISTRICT, MOBILE CORPS OF ENGINEERS MISSISSIPPI VALLEY DIVISION
DRAWING NUMBER
SHEET 1 OF 2
PROJECT DESCRIPTION
DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS

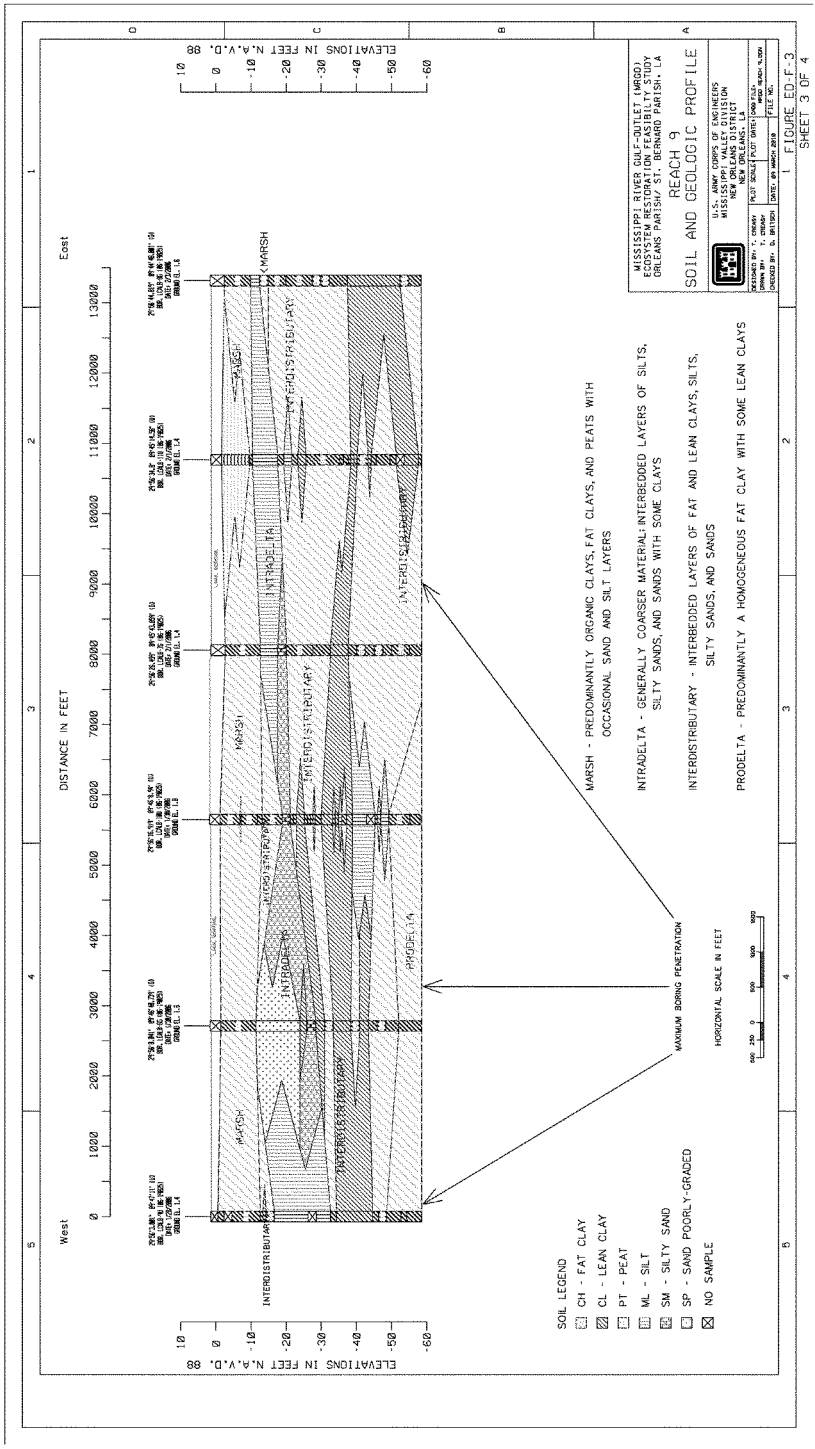

Undisturbed Boring
Cone Penetration Test
0 0.5 1 2 3 4 Miles
MRGO-24C
MRGO-23U
MRGO-23C
MRGO-22C
MRGO-21C
MRGO-20U
MRGO-20C
MRGO-19U
MRGO-19C
MRGO-18U
MRGO-18C
MRGO-17C
MRGO-16C
MRGO-15C
MRGO-14C
MRGO-13C
MRGO-26C
MRGO-27C
MRGO-28C
MRGO-6C
MRGO-5C
MRGO-4C
MRGO-3C
MRGO-2C
MRGO-1C
BORING AND CPT LOCATION MAP
MISSISSIPPI RIVER GULF OUTLET NMGO1 ECOSYSTEM RESTORATION FEASIBILITY STUDY
U.S. ARMY ENGINEER DISTRICT MISSISSIPPI VALLEY DIVISION
DRAWING NUMBER
SHEET 1 OF 2

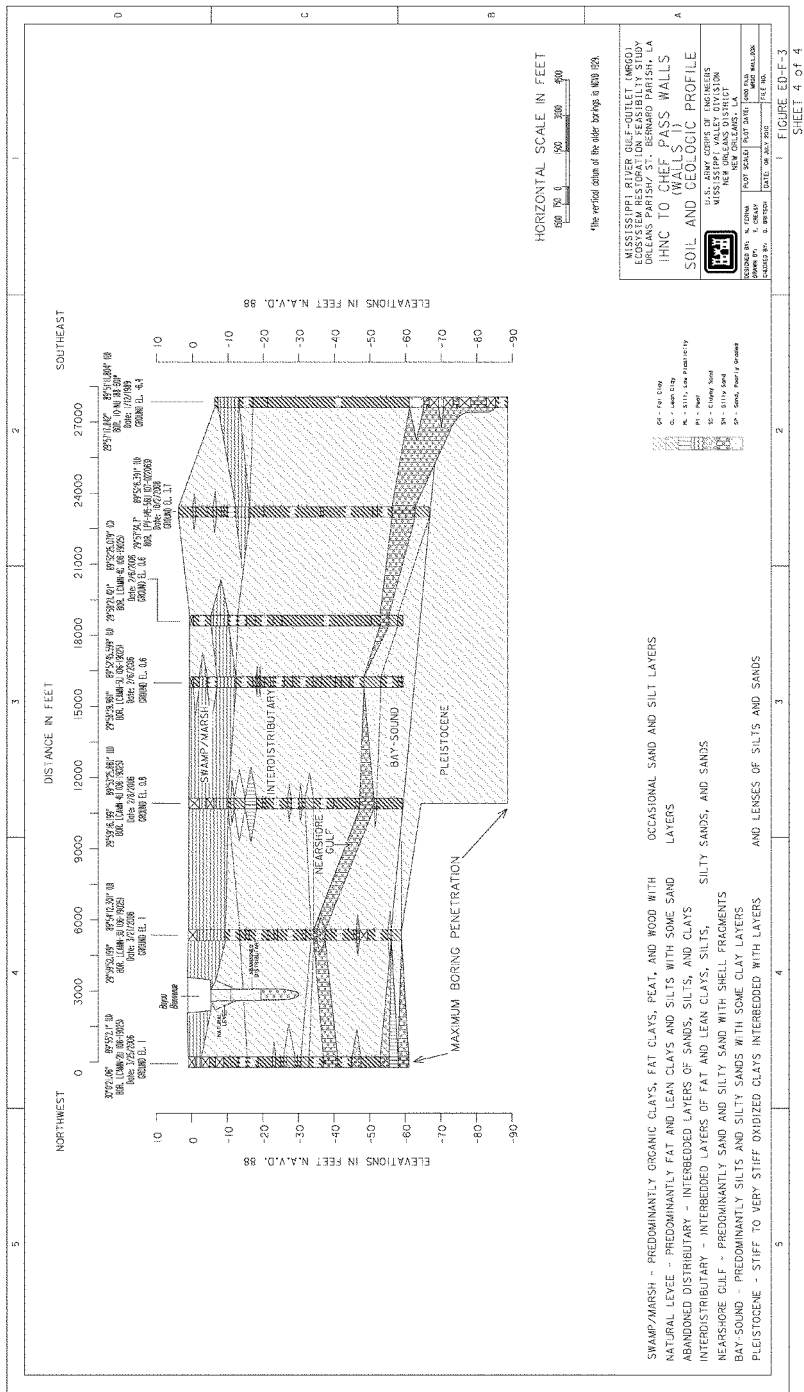


MRGO-REACH1.dgn 3/2/2012 1:39:10 PM



MRGO-REACH8.dgn 3/2/2012 1:41:50 PM


DISTANCE IN FEET
West
East
ELEVATIONS IN FEET N.A.V.D. 88
SOIL LEGEND
CH - FAT CLAY
CL - LEAN CLAY
PT - PEAT
ML - SILTY
SM - SILTY SAND
SP - SAND POORLY-GRADED
NO SAMPLE
MAXIMUM BORING PENETRATION
HORIZONTAL SCALE IN FEET
MARSH - PREDOMINANTLY ORGANIC CLAYS, FAT CLAYS, AND PEATS WITH OCCASIONAL SAND AND SILT LAYERS
INTRADELTA - GENERALLY COARSER MATERIAL; INTERBEDDED LAYERS OF SILTS, SILTY SANDS, AND SANDS WITH SOME CLAYS
INTERDISTRIBUTARY - INTERBEDDED LAYERS OF FAT AND LEAN CLAYS, SILTS, SILTY SANDS, AND SANDS
PRODELTA - PREDOMINANTLY A HOMOGENEOUS FAT CLAY WITH SOME LEAN CLAYS
MARSH
INTRADELTA
INTERDISTRIBUTARY
PRODELTA
MISSISSIPPI RIVER GULF OUTLET (MRGO) ECOSYSTEM RESTORATION FEASIBILITY STUDY ORLEANS PARISH/ ST. BERNARD PARISH, LA
REACH 9
SOIL AND GEOLOGIC PROFILE
U.S. ARMY CORPS OF ENGINEERS
MISSISSIPPI VALLEY DIVISION
NEW ORLEANS DISTRICT
NEW ORLEANS, LA
FIGURE ED-F-3
SHEET 3 OF 4



MRGOWALL.dgn 3/2/2012 1:45:52 PM

UNIFIED SOIL CLASSIFICATION

MAJOR DIVISION		TYPE	LETTER SYMBOL	TYPICAL NAMES
COARSE - GRAINED SOILS (More than half of material is larger than No. 200 sieve size.)	GRAVELS (More than half of coarse fraction is larger than No. 4 sieve size.)	GRAVELS WITH FINES (Appreciable amount of fines)	GW	GRAVEL, Well Graded, gravel-sand mixtures, little or no fines
			GP	GRAVEL, Poorly Graded, gravel-sand mixtures, little or no fines
			GM	SILTY GRAVEL, gravel-sand-silt mixtures
			GC	CLAYEY GRAVEL, gravel-sand-clay mixtures
	SANDS (More than half of coarse fraction is smaller than No. 4 sieve size.)	CLEAN SANDS (Little or no fines)	SW	SAND, Well-Graded, gravelly sands
			SP	SAND, Poorly-Graded, gravelly sands
		SANDS WITH FINES (Appreciable amount of fines)	SM	SILTY SAND, sand-silt mixtures
			SC	CLAYEY SAND, sand-clay mixtures
FINE - GRAINED SOILS (More than half of material is smaller than No. 200 sieve size.)	SILTS AND CLAYS (Liquid limit less than 50)		ML	SILT & very fine sand, silty or clayey fine sand or clayey silt with slight plasticity
			CL	LEAN CLAY, Sandy Clay, Silty Clay, of low to medium plasticity
			OL	ORGANIC SILTS, and organic silty clays of low plasticity
	SILTS AND CLAYS (Liquid limit greater than 50)		MH	SILT, fine sandy or silty soils with high plasticity
			CH	FAT CLAY, inorganic clay of high plasticity
			OH	ORGANIC CLAYS of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS			Pt	PEAT, and other highly organic soil
WOOD			Wd	WOOD
SHELLS			Sl	SHELLS
NO SAMPLE			NS	No Sample Retrieved

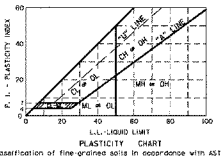
NOTE: Soils possessing characteristics of two groups are designated by combinations of group symbols.

DESCRIPTIVE SYMBOLS

COLOR	
COLOR	SYMBOL
TAN	t
YELLOW	Y
RED	R
BLACK	Bk
GRAY	Gr
LIGHT GRAY	lGr
DARK GRAY	dGr
BROWN	Br
LIGHT BROWN	lBr
DARK BROWN	dBr
BROWNISH-GRAY	brGr
GRAYISH-BROWN	gyBr
GREENISH-GRAY	grGr
GRAYISH-GREEN	gyGn
GREEN	Gn
BLUE	Bl
BLUE-GREEN	BlGn
WHITE	Wh
MOTTLED	Mot

CONSISTENCY FOR COHESIVE SOILS		
CONSISTENCY	COHESION IN LBS./SQ.FT. FROM UNCONFINED COMPRESSION TEST	SYMBOL
VERY SOFT	< 250	vSo
SOFT	250-500	So
MEDIUM	500-1000	M
STIFF	1000-2000	St
VERY STIFF	2000-4000	vSt
HARD	> 4000	H

MODIFICATIONS	
MODIFICATION	SYMBOL
Traces	Tr
Fine	f
Medium	M
Coarse	C
Concretions	cc
Rootlets	rt
Lignite fragments	lg
Shale fragments	sh
Sandstone fragments	sds
Shell fragments	slf
Organic matter	O
Clay strata or lenses	CS
Silt strata or lenses	SiS
Sand strata or lenses	SS
Sandy	S
Gravelly	G
Boulders	B
Slickensides	SL
Wood	Wd
Oxidized	Ox



For classification of fine-grained soils in accordance with ASTM D 2487

NOTES:

FIGURES TO LEFT OF BORING UNDER COLUMN " W OR D_{10}"

Are natural water contents in percent dry weight

When underlined denotes D_{10} size in mm*

FIGURES TO LEFT OF BORING UNDER COLUMNS " LL" AND " PL"

Are liquid and plastic limits, respectively

SYMBOLS TO LEFT OF BORING

▽	Ground-water surface and date observed
C	Denotes location of consolidation test**
S	Denotes location of consolidated-drained direct shear test**
R	Denotes location of consolidated-undrained triaxial compression test**
U	Denotes location of unconsolidated-undrained triaxial compression test**
T	Denotes location of sample subjected to consolidation test and each of the above three types of shear test**
FW	Denotes free water encountered in boring or sample

FIGURES TO RIGHT OF BORING

Are values of cohesion in lbs./sq.ft. from unconfined compression tests

In parenthesis are driving resistances in blows per foot determined with a standard split spoon sampler (1 3/8" I.D., 2" O.D.) and a 140 lb. driving hammer with a 30" drop

Where underlined with a solid line denotes laboratory permeability in centimeters per second of undisturbed sample

Where underlined with a dashed line denotes laboratory permeability in centimeters per second of sample remolded to the estimated natural void ratio

*The D_{10} size of a soil is the grain diameter in millimeters of which 10% of the soil is finer, and 90% coarser than D_{10}.
(Where a 0999 is shown, a D_{10} size does not exist.)

**Results of these tests are available for inspection in the U.S. Army Engineer District Office, if these symbols appear beside the boring logs on the drawings.

TYPICAL NOTES:

1. While the borings are representative of subsurface conditions at their respective locations and for their respective vertical reaches, local variations characteristic of the subsurface materials of the region are anticipated and, if encountered, such variations will not be considered as differing materially within the purview of the contract clause entitled "Differing Site Conditions".

2. Ground-water elevations shown on the boring logs represent ground-water surfaces encountered in such borings on the dates shown. Absence of water surface data on certain borings indicates that no ground-water data are available from the boring but does not necessarily mean that ground-water will not be encountered at the locations or within the vertical reaches of such borings.

3. Consistency of cohesive soils shown on the boring logs is based on driller's log and visual examination and is approximate, except within those vertical reaches of the borings where shear strengths from unconfined compression tests are shown.

4. Unless otherwise noted:

   a. Undisturbed borings, indicated by the letter "U", are taken with a 5" I.D. Piston Type Sampler.

   b. General type borings are taken with a 1 7/8" I.D. Tube Sampler and/or a 1 3/8 I.D. Split Spoon Sampler.

Safety is a Part of Your Contract

SOIL BORING LEGEND

U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

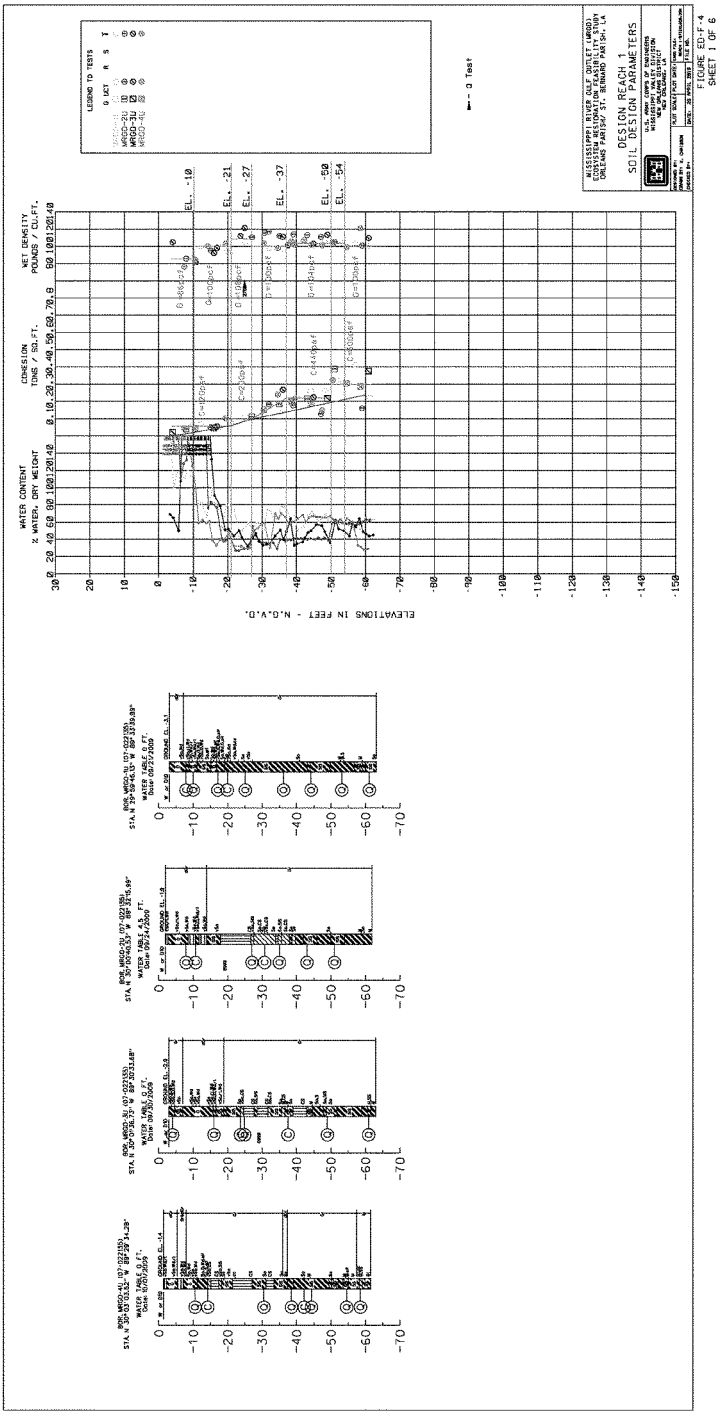
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DRAWN BY: x	X	X	TELL NO.
CHECKED BY: x	DATE:	X	X

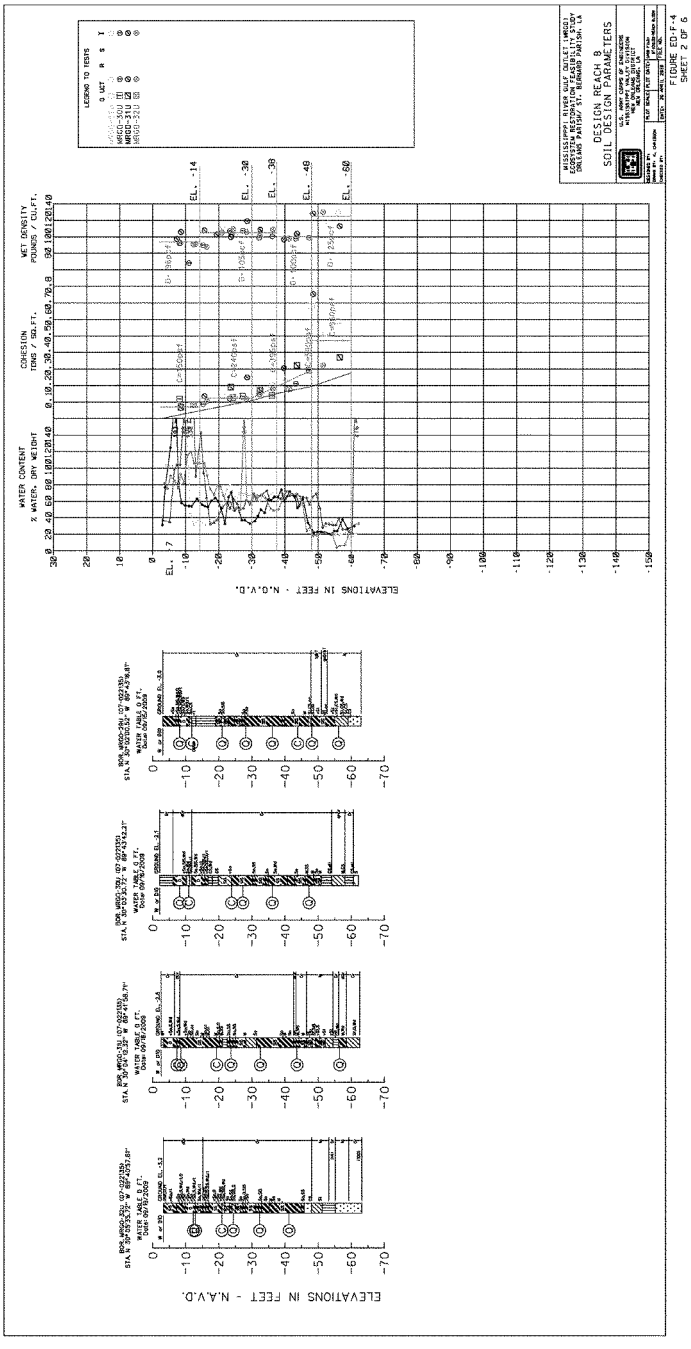
REVISED 29 JUNE 92

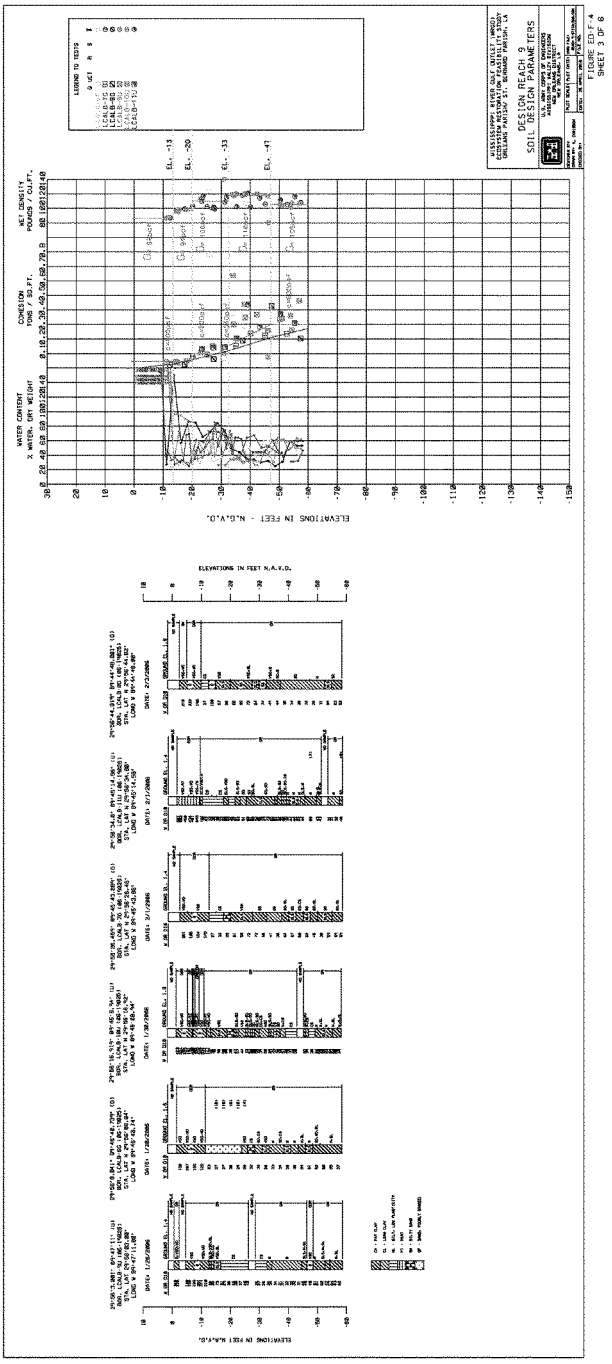
PLATE A

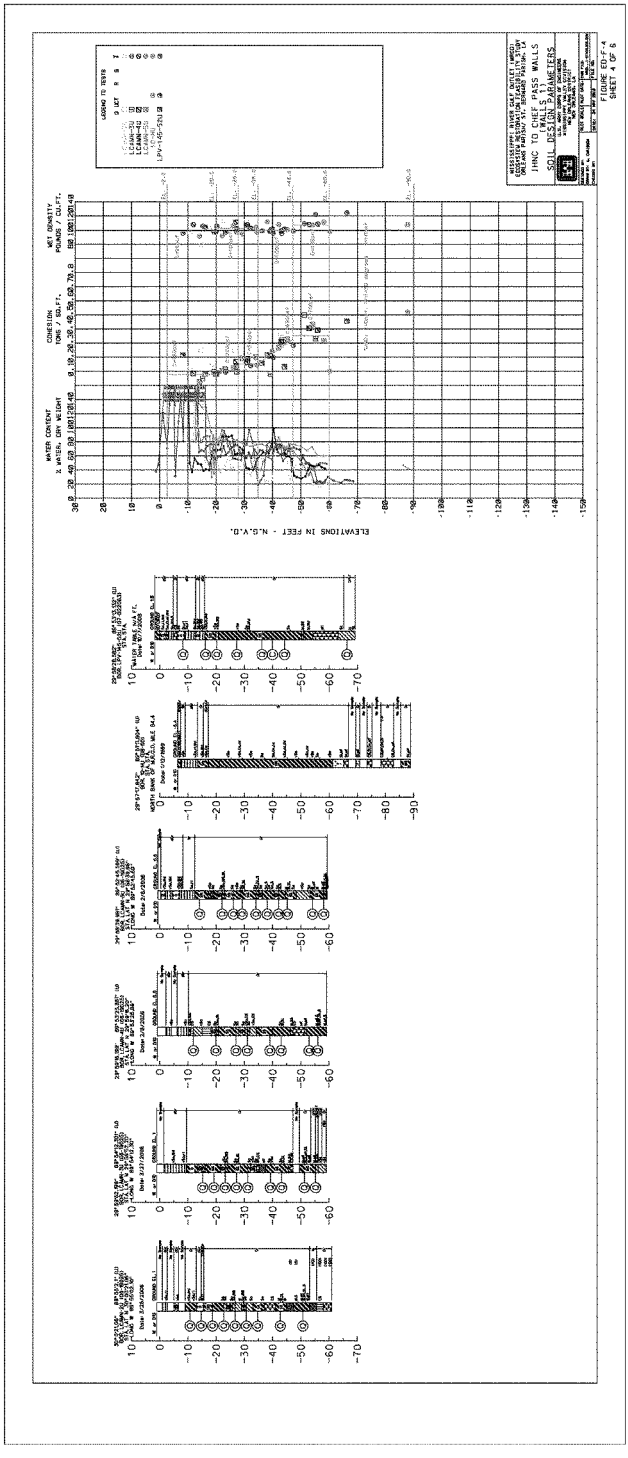
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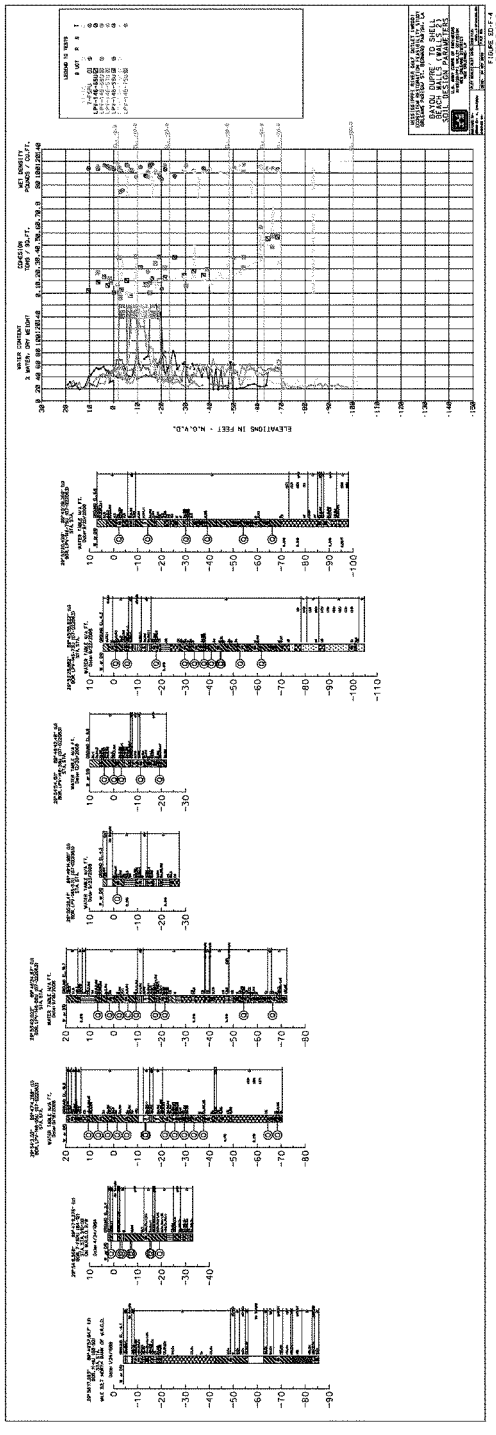
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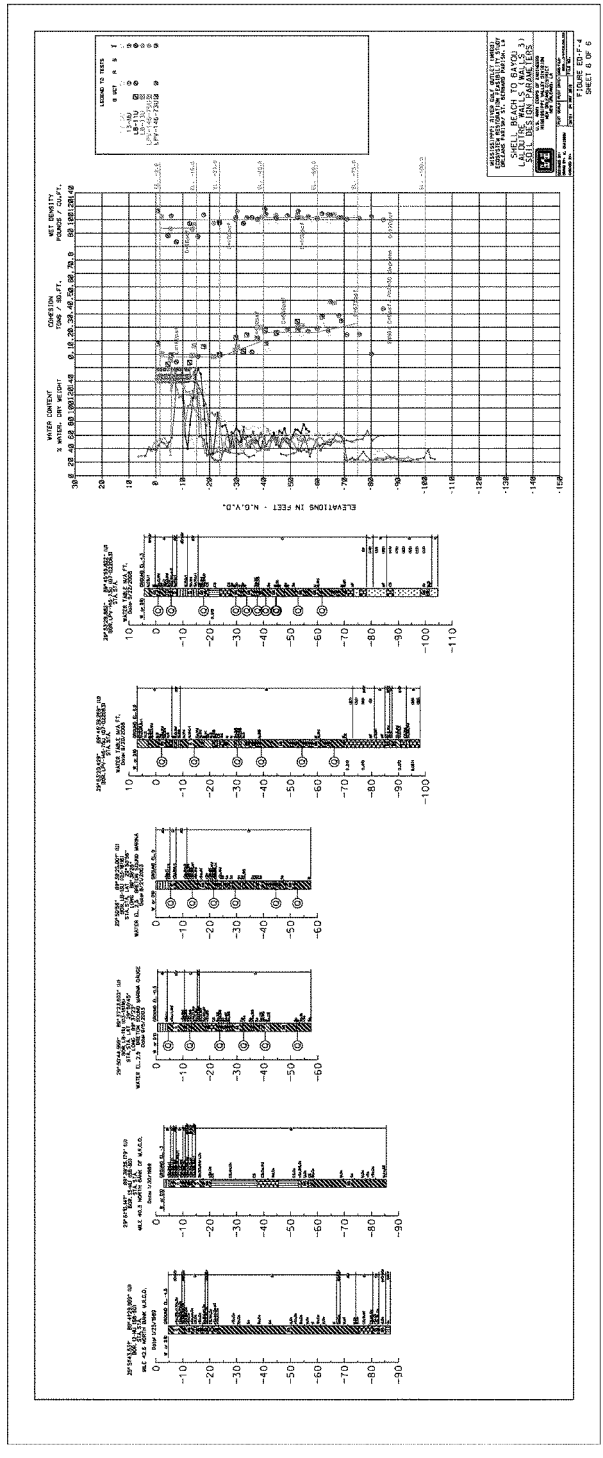

MISSISSIPPI RIVER GULF OUTLET (MRGO)
ECOSYSTEM RESTORATION FEASIBILITY STUDY
ORLEANS / ST. BERNARD PARISH, LA
DESIGN REACH 1
SOIL DESIGN PARAMETERS
FIGURE ED-F-4
SHEET 1 OF 6
LEGEND TO TESTS
WATER CONTENT
% WATER, DRY WEIGHT
COHESION
TONS / SQ.FT.
NET DENSITY
POUNDS / CU.FT.
ELEVATIONS IN FEET - N.G.V.D.
EL. -10
EL. -21
EL. -27
EL. -37
EL. -50
EL. -54
Q Test

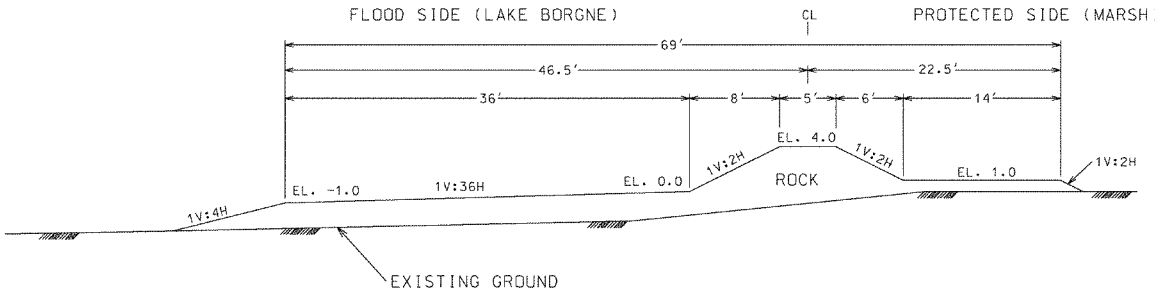

MISSISSIPPI RIVER GULF OUTLET LWMOOD
EAST BANK HURRICANE PROTECTION
ORLEANS PARISH/ ST. BERNARD PARISH, LA
DESIGN REACH B
SOIL DESIGN PARAMETERS
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
FIGURE EDF-4
SHEET 2 OF 6
LEGEND TO TESTS
Q UCT R S Y
MRGO-30U
MRGO-31U
WATER CONTENT
% WATER, DRY WEIGHT
COHESION
TONS / SQ.FT.
WET DENSITY
POUNDS / CU.FT.
ELEVATIONS IN FEET - N.A.V.D.
EL. -14
EL. -30
EL. -39
EL. -49
EL. -60
ELEVATIONS IN FEET - N.A.V.D.


DESIGN REACH 8
SOIL DESIGN PARAMETERS
SHEET 3 OF 6
ELEVATIONS IN FEET - N.G.V.D.
ELEVATIONS IN FEET N.A.V.D.









MISSISSIPPI RIVER GULF-OUTLET (MRGO)
ECOSYSTEM RESTORATION FEASIBILITY STUDY
ORLEANS PARISH/ ST. BERNARD PARISH, LA

DESIGN REACH 1
TYPICAL ROCK DIKE SECTION

U.S. ARMY CORPS OF ENGINEERS
MISSISSIPPI VALLEY DIVISION
NEW ORLEANS DISTRICT
NEW ORLEANS, LA

DESIGNED BY:	PLOT SCALE: PLOT DATE:	CADD FILE: REACH 1 DESIGN.DGN
DRAWN BY: K. CHAISSON		
CHECKED BY:	DATE: 9 JUNE 2010	FILE NO.

FIGURE ED-F-5
SHEET 1 OF 6

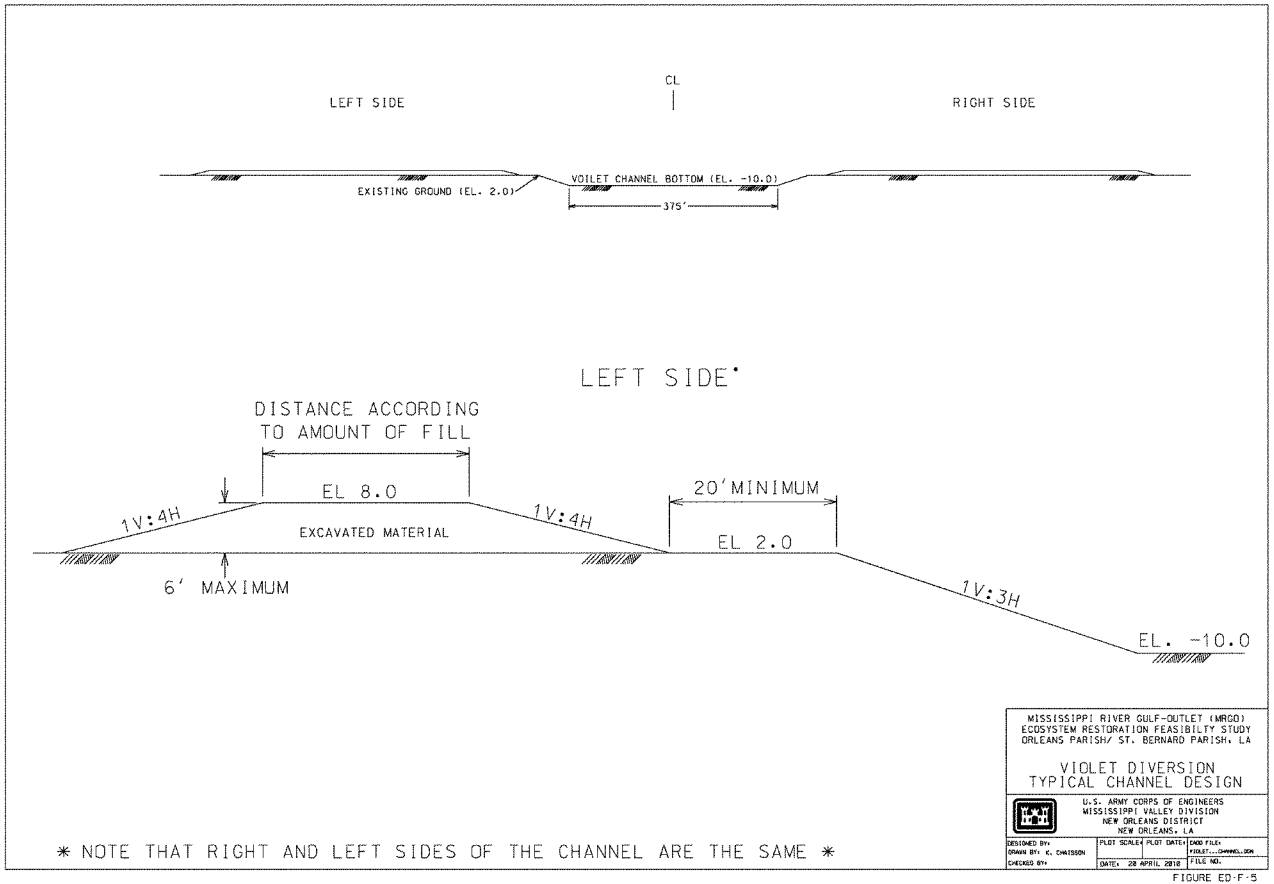
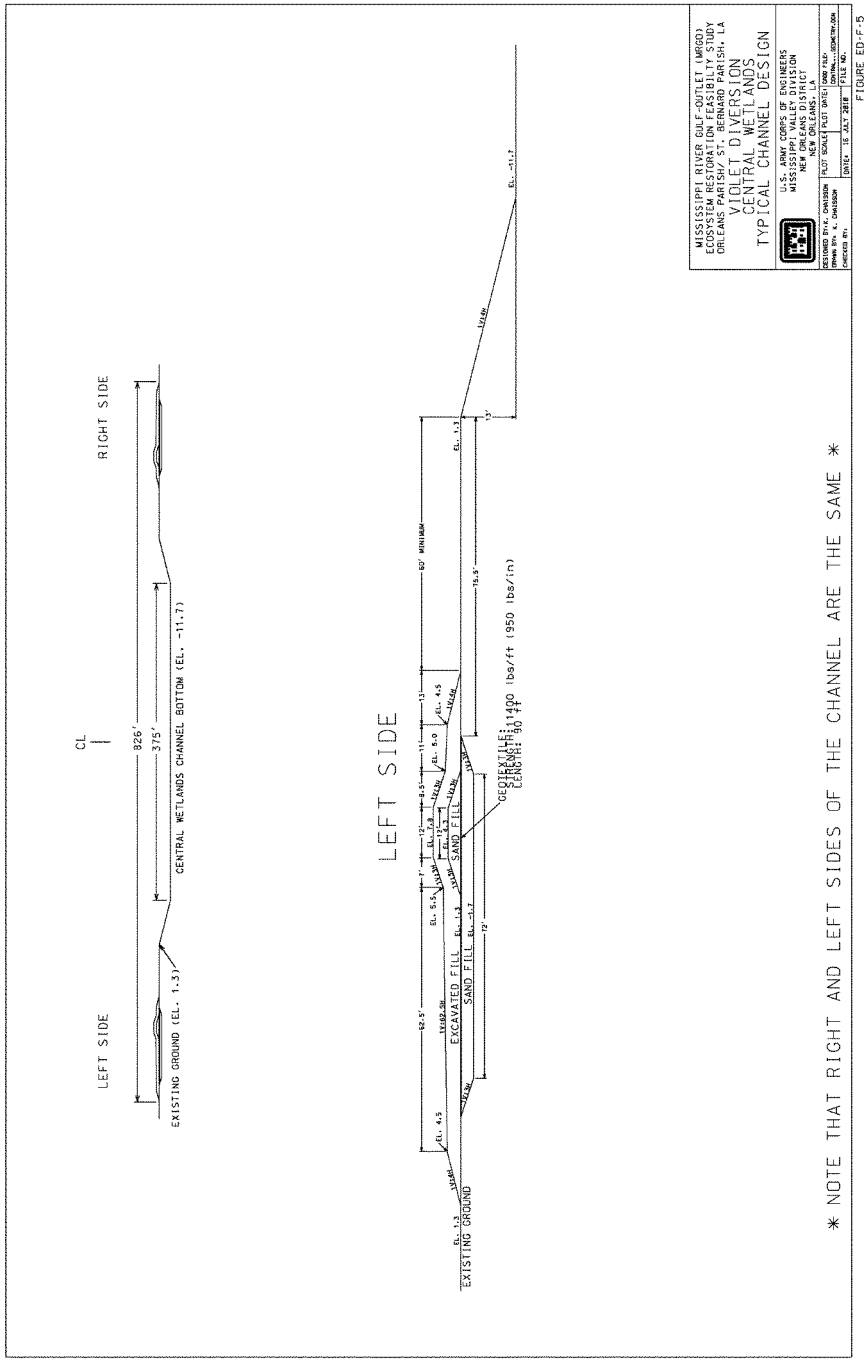
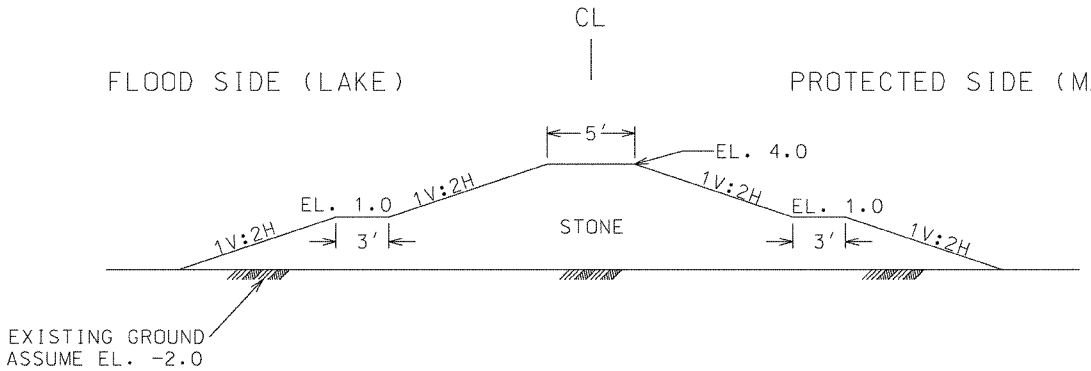


FIGURE ED-F-5
SHEET 2 OF 6


CL
LEFT SIDE
RIGHT SIDE
926'
375'
EXISTING GROUND (EL. 1.3)
CENTRAL WETLANDS CHANNEL BOTTOM (EL. -11.7)
LEFT SIDE
EXISTING GROUND
EXCAVATED FILL
SAND FILL
GEOTEXTILE
STRENGTH: 1400 lbs/ft (950 lbs/in)
LENGTH: 90 ft
60' MINIMUM
* NOTE THAT RIGHT AND LEFT SIDES OF THE CHANNEL ARE THE SAME *
MISSISSIPPI RIVER GULF OUTLET (MRGO)
ECOSYSTEM RESTORATION FEASIBILITY STUDY
ORLEANS / PARISH/ ST. BERNARD PARISH, LA
VIOLET DIVERSION
CENTRAL WETLANDS
TYPICAL CHANNEL DESIGN
U.S. ARMY CORPS OF ENGINEERS
MISSISSIPPI VALLEY DIVISION
NEW ORLEANS DISTRICT
NEW ORLEANS, LA
DESIGNED BY: K. CHRISSON
DRAWN BY: K. CHRISSON
CHECKED BY:
PLOT SCALE:
PLOT DATE: 18 JULY 2018
DRAWING FILE:
FILE NO.
FIGURE ED-F-5
SHEET 3 OF 6



MISSISSIPPI RIVER GULF-OUTLET (MRGO)
ECOSYSTEM RESTORATION FEASIBILTY STUDY
ORLEANS PARISH/ ST. BERNARD PARISH, LA

REACHES 3 & 4
TYPICAL ROCK DIKE SECTION

U.S. ARMY CORPS OF ENGINEERS
MISSISSIPPI VALLEY DIVISION
NEW ORLEANS DISTRICT
NEW ORLEANS, LA

DESIGNED BY:	PLOT SCALE:	CADD FILE: REACHES 3 & 4... .DGN
DRAWN BY: K. CHAISSON	PLOT DATE:	
CHECKED BY:	DATE: 19 APRIL 2010	FILE NO.

FIGURE ED-F-5
SHEET 4 OF 6

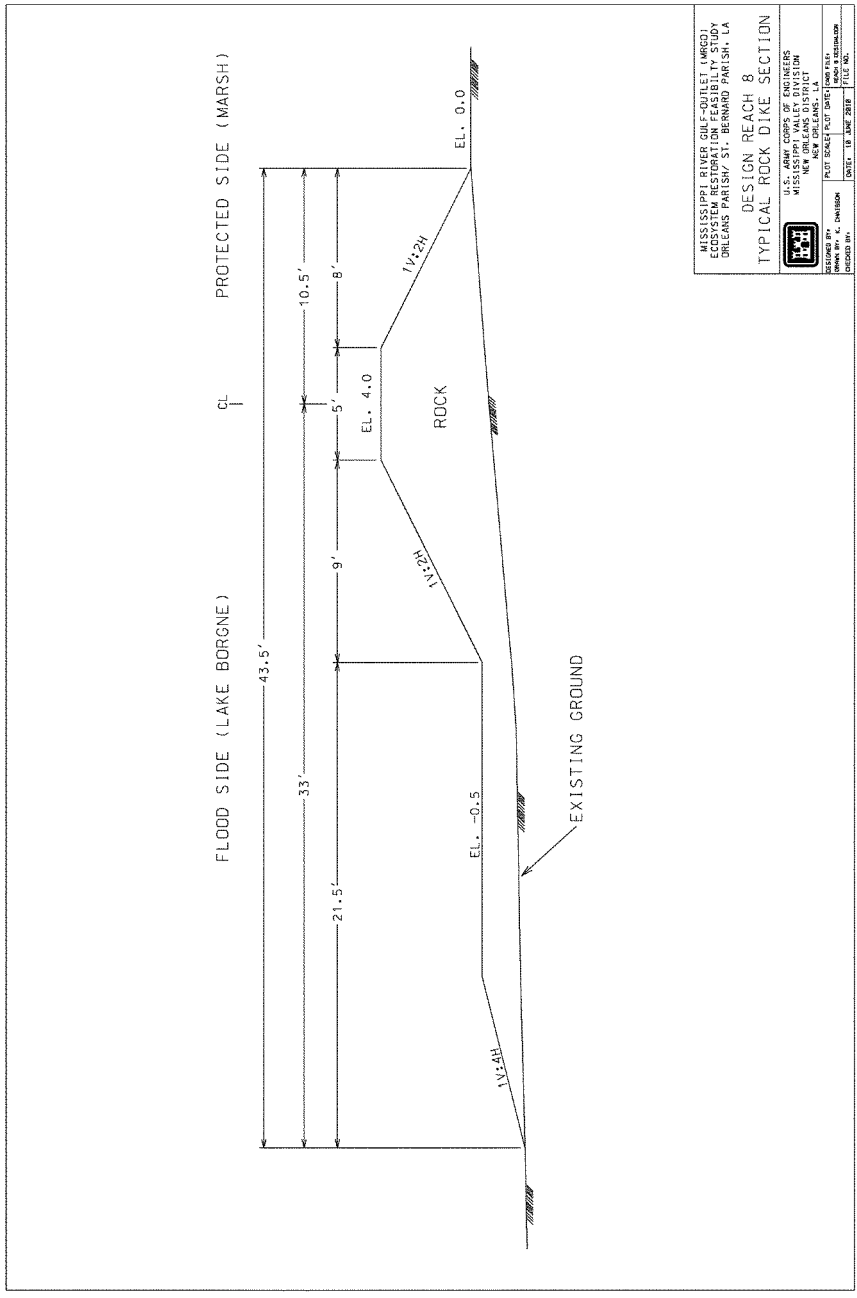
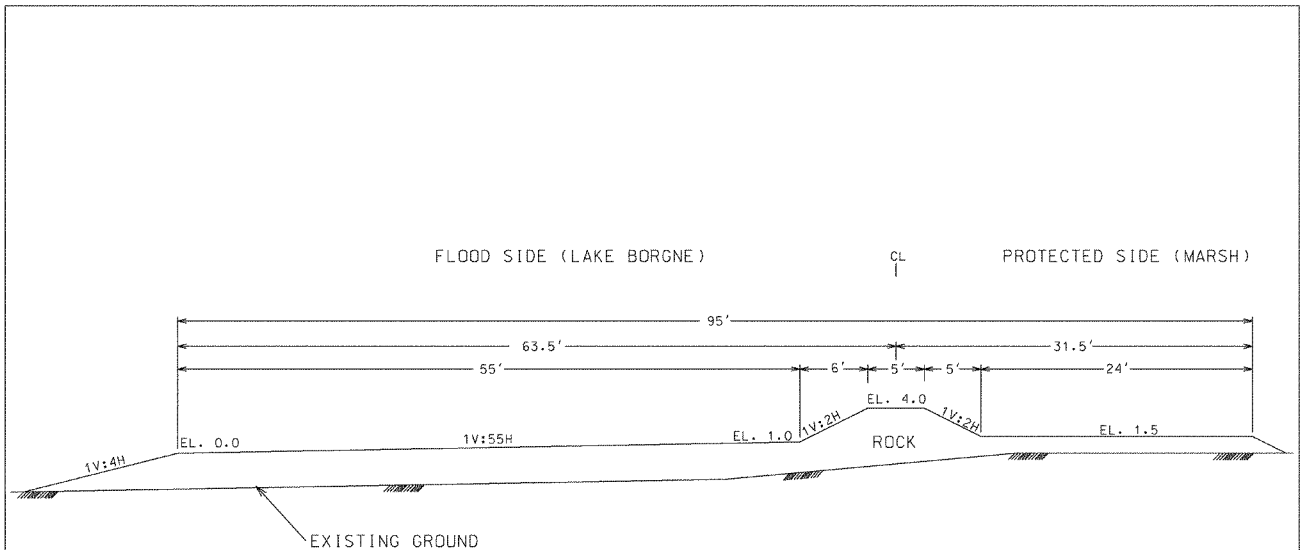


FIGURE ED-F-5
SHEET 5 OF 6



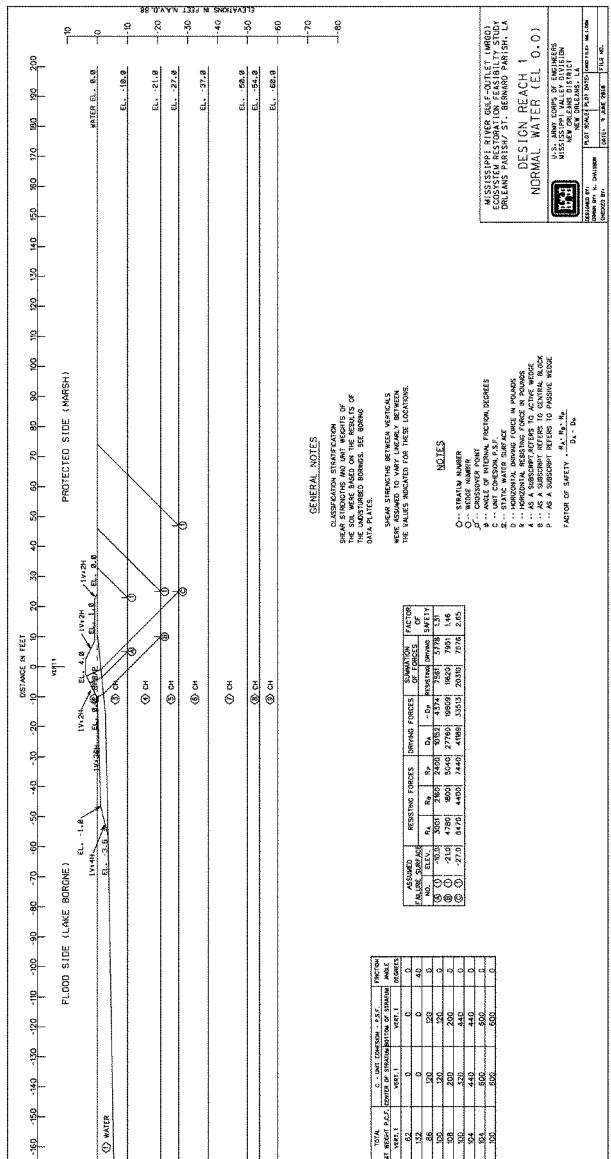
MISSISSIPPI RIVER GULF-OUTLET (MRGO)
ECOSYSTEM RESTORATION FEASIBILTY STUDY
ORLEANS PARISH/ ST. BERNARD PARISH, LA

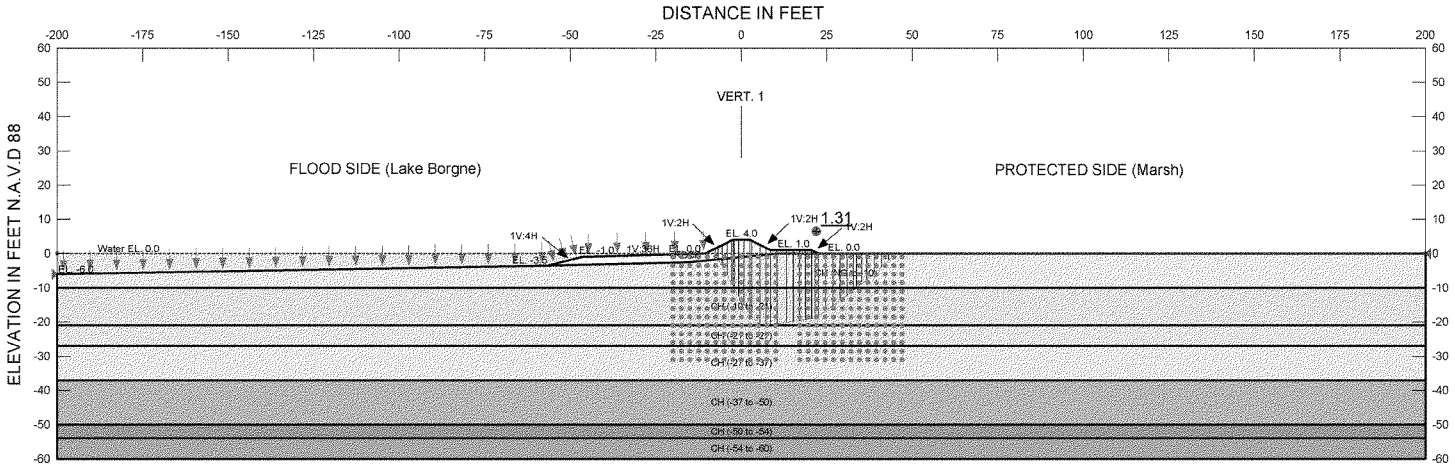
DESIGN REACH 9
TYPICAL ROCK DIKE SECTION

U.S. ARMY CORPS OF ENGINEERS
MISSISSIPPI VALLEY DIVISION
NEW ORLEANS DISTRICT
NEW ORLEANS, LA

DESIGNED BY:	PLOT SCALE:	CADD FILE: REACH 9 DESIGN.DGN
DRAWN BY: K. CHAISSON	PLOT DATE:	
CHECKED BY:	DATE: 22 JUNE 2010	FILE NO.:

FIGURE ED-F-5
SHEET 6 OF 6


FLOOD SIDE (LAKE BORGNE)
PROTECTED SIDE (MARSH)
DISTANCE IN FEET
ELEVATIONS IN FEET N.A.V.D. 88
WATER EL. 0.0
EL. -6.0
EL. -18.0
EL. -21.0
EL. -27.0
EL. -37.0
EL. -48.0
EL. -54.0
EL. -68.0
1V:4H
1V:2H
1V:1H
EL. -1.0
EL. -3.0
EL. 4.0
EL. 1.0
EL. 0.0
GENERAL NOTES
CLASSIFICATION STRATIFICATION
THESE STRENGTHS AND UNIT WEIGHTS OF THE SOILS ARE BASED ON TESTS OF THE UNDISTURBED BORINGS, SEE BORING DATA PLATES.
SHEAR STRENGTHS BETWEEN VERTICALS
WORK CONSTRUCTED UNDER WATER
THE VALUES INDICATED FOR THESE LOCATIONS.
NOTES
O -- STRATUM NUMBER
WEDGE NUMBER
C -- COHESION IN PSF
ϕ -- ANGLE OF INTERNAL FRICTION DEGREES
γ -- UNIT WEIGHT IN PCF
Σ -- STATIC WATER SURFACE
D -- HORIZONTAL DRIVING FORCE IN POUNDS
R -- HORIZONTAL RESISTING FORCE IN POUNDS
A -- AS A SUBSCRIPT REFERS TO ACTIVE WEDGE
B -- AS A SUBSCRIPT REFERS TO CENTRAL BLOCK
P -- AS A SUBSCRIPT REFERS TO PASSIVE WEDGE
FACTOR OF SAFETY = $\frac{R_A + R_B + R_P}{D_A - D_P}$
STRATUM NO. | SOIL TYPE | TOTAL UNIT WEIGHT PCF | C - UNIT COHESION - PSF: CENTER OF STRATUM | BOTTOM OF STRATUM | FRICTION ANGLE DEGREES
WATER | 62 | 0 | 0
BORROW | 132 | 0 | 0 | 40
CH | 86 | 120 | 120 | 0
CH | 106 | 240 | 240 | 0
CH | 118 | 280 | 280 | 0
CH | 120 | 420 | 440 | 0
CH | 104 | 440 | 440 | 0
CH | 104 | 600 | 650 | 0
CH | 120 | 650 | 700 | 0
ASSUMED FAILURE SURFACE NO. | VERTICAL SLICE NO. | ELEV. | RESISTING FORCES R_A | R_B | R_P | DRIVING FORCES D_A | D_P | SUMMATION OF FORCES RESISTING | DRIVING | FACTOR OF SAFETY
1 | 1 | -21.0 | 4780 | 1800 | 5040 | 27780 | 9890 | 18620 | 7951 | 1.46
2 | 1 | -27.0 | 5470 | 4400 | 7440 | 41888 | 33515 | 29310 | 7076 | 2.65
MISSISSIPPI RIVER GULF-OUTLET (MRGO) DISPOSAL AREA STABILITY STUDY DELACROIX ISLAND, LOUISIANA
DESIGN REACH 1 NORMAL WATER (EL 0.0)
U.S. ARMY CORPS OF ENGINEERS MISSISSIPPI VALLEY DIVISION NEW ORLEANS DISTRICT
DESIGNED BY: CHECKED BY: DRAWN BY: SUBMITTED BY:
PLOT SCALE: PLOT DATE: CARD FILE NO.: ITEM
DATE: JUNE 1964 FILE NO.
FIGURE ED-F-6
SHEET 1 OF 4



Use Passive Mode: No
Name: ROCK Model: Mohr-Coulomb Unit Weight: 132 pcf Cohesion: 0 psf Phi: 40 ° Piezometric Line: 1
Name: CH (NG to -10) Model: Undrained (Phi=0) Unit Weight: 86 pcf Cohesion: 120 psf Piezometric Line: 1
Name: CH (-10 to -21) Model: Undrained (Phi=0) Unit Weight: 100 pcf Cohesion: 120 psf Piezometric Line: 1
Name: CH (-21 to -27) Model: Undrained (Phi=0) Unit Weight: 108 pcf Cohesion: 200 psf Piezometric Line: 1
Name: CH (-27 to -37) Model: S=f(depth) Unit Weight: 100 pcf C-Top of Layer: 200 psf C-Rate of Change: 24 psf/ft Limiting C: 440 psf Piezometric Line: 1
Name: CH (-37 to -50) Model: Undrained (Phi=0) Unit Weight: 104 pcf Cohesion: 440 psf Piezometric Line: 1
Name: CH (-50 to -54) Model: Undrained (Phi=0) Unit Weight: 104 pcf Cohesion: 600 psf Piezometric Line: 1
Name: CH (-54 to -60) Model: Undrained (Phi=0) Unit Weight: 100 pcf Cohesion: 600 psf Piezometric Line: 1

GENERAL NOTES

CLASSIFICATION STRATIFICATION SHEAR STRENGTHS AND UNIT WEIGHTS OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS AND CPT DATA. SEE BOTH BORING AND CPT DATA PLATES.

SHEAR STRENGTHS BETWEEN VERTICALS WERE ASSUMED TO VARY LINEARLY BETWEEN THE VALUES INDICATED FOR THESE LOCATIONS.

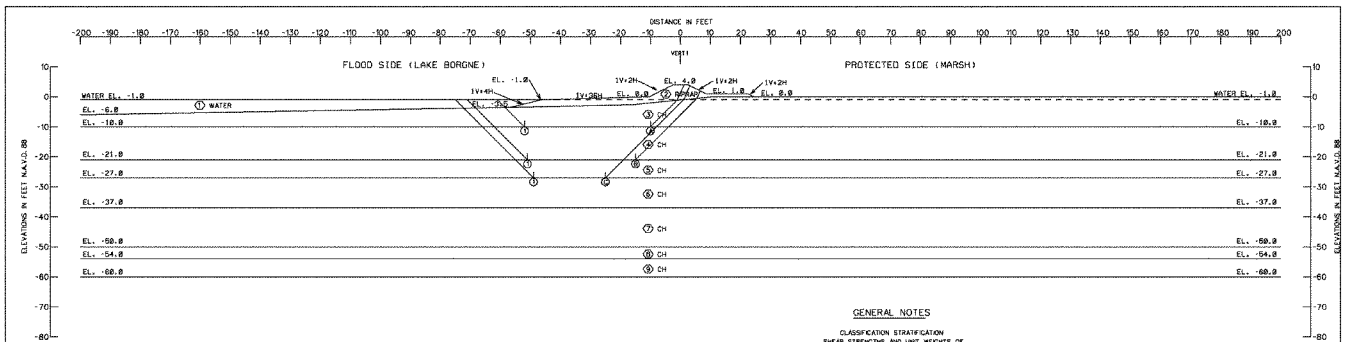
US Army Corps of Engineers
New Orleans District

MISSISSIPPI RIVER GULF OUTLET (MRGO)
ECOSYSTEM RESTORATION FEASIBILITY STUDY

DESIGN REACH 1
ORLEANS PARISH/ ST. BERNARD PARISH, LA

FIGURE ED-F-6
SHEET 2 of 4

Name: NWL (nc) PS Check
File Name: MRGO Reach 1_1 on 2.gsz
Directory: G:\F&M\HOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 1\
Last Edited By: Chaisson, Kathryn MVN



STRATUM NO.	SOIL TYPE	TOTAL UNIT WEIGHT P.C.F.	C - UNIT COHESION - P.S.F.		FRICTION ANGLE
		VERT. I	CENTER OF STRATUM VERT. I	BOTTOM OF STRATUM VERT. I	DEGREES
①	WATER	62	0	0	0
②	RIPRAP	132	0	0	40
③	CH	86	120	120	0
④	CH	100	120	120	0
⑤	CH	108	200	200	0
⑥	CH	110	320	440	0
⑦	CH	104	440	440	0
⑧	CH	104	600	600	0
⑨	CH	100	600	600	0

ASSUMED FAILURE SURFACE			RESISTING FORCES			DRIVING FORCES		SUMMATION OF FORCES		FACTOR OF SAFETY
NO.		ELEV.	R_A	R_B	R_P	D_A	$-D_P$	RESISTING	DRIVING	
Ⓐ	①	-10.0	3495	5040	8532	9456	3191	16937	8565	1.61
Ⓑ	①	-21.0	5297	4320	4151	27708	17159	13768	10549	1.31
Ⓒ	①	-27.0	8441	4800	6534	41165	30183	19775	10982	1.80

GENERAL NOTES

CLASSIFICATION STRATIFICATION SHEAR STRENGTHS AND UNIT WEIGHTS OF THE SOIL WERE BASED ON THE RESULTS OF THE UNDISTURBED BORINGS. SEE BORING DATA PLATES.

SHEAR STRENGTHS BETWEEN VERTICALS WERE ASSUMED TO VARY LINEARLY BETWEEN THE VALUES INDICATED FOR THESE LOCATIONS.

NOTES

◇-- STRATUM NUMBER
○-- WEDGE NUMBER
𝒳-- CROSSOVER POINT
φ -- ANGLE OF INTERNAL FRICTION, DEGREES
C -- UNIT COHESION, P.S.F.
▽ -- STATIC WATER SURFACE
D -- HORIZONTAL DRIVING FORCE IN POUNDS
R -- HORIZONTAL RESISTING FORCE IN POUNDS
A -- AS A SUBSCRIPT REFERS TO ACTIVE WEDGE
B -- AS A SUBSCRIPT REFERS TO CENTRAL BLOCK
P -- AS A SUBSCRIPT REFERS TO PASSIVE WEDGE

FACTOR OF SAFETY = $\frac{R_A + R_B + R_P}{D_A - D_P}$

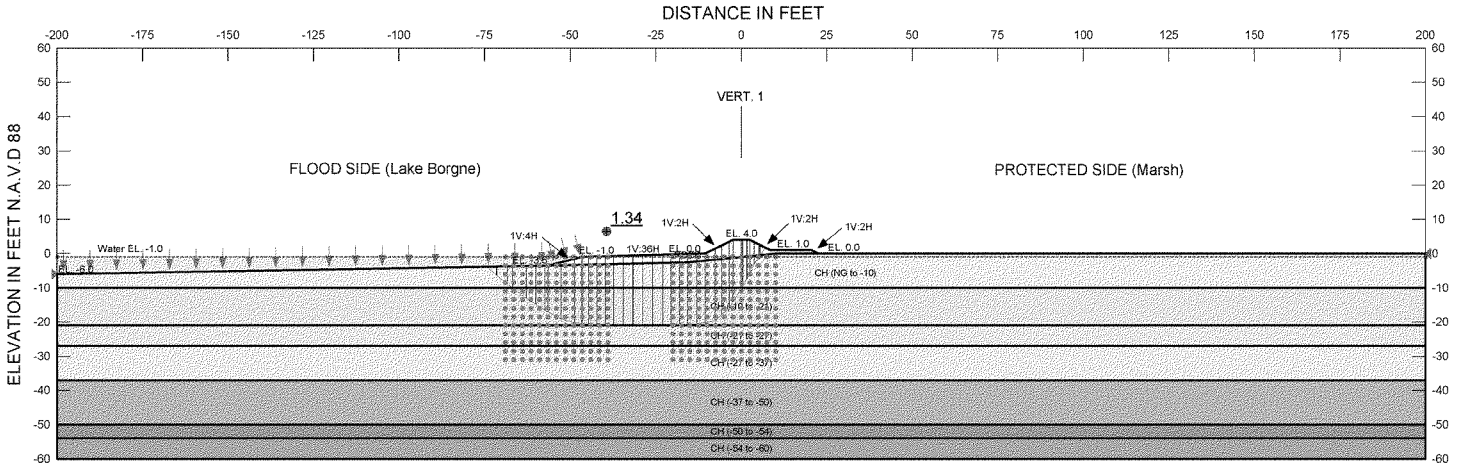
MISSISSIPPI RIVER GULF-OUTLET (MRGO)
ECOSYSTEM RESTORATION FEASIBILITY STUDY
ORLEANS PARISH/ ST. BERNARD PARISH, LA

DESIGN REACH 1
LOW WATER LEVEL(EL -1.0)

U.S. ARMY CORPS OF ENGINEERS
MISSISSIPPI VALLEY DIVISION
NEW ORLEANS DISTRICT
NEW ORLEANS, LA

DESIGNED BY:	PLOT SCALE:	PLOT DATE:	DWG NO.& ext./DIM
DRAWN BY: K. DAWSON			
CHECKED BY:	DATE: 9 JUNE 2010		FILE NO.

FIGURE ED-F-6
SHEET 3 OF 4



Use Passive Mode: No
Name: ROCK Model: Mohr-Coulomb Unit Weight: 132 pcf Cohesion: 0 psf Phi: 40 ° Piezometric Line: 1
Name: CH (NG to -10) Model: Undrained (Phi=0) Unit Weight: 86 pcf Cohesion: 120 psf Piezometric Line: 1
Name: CH (-10 to -21) Model: Undrained (Phi=0) Unit Weight: 100 pcf Cohesion: 120 psf Piezometric Line: 1
Name: CH (-21 to -27) Model: Undrained (Phi=0) Unit Weight: 108 pcf Cohesion: 200 psf Piezometric Line: 1
Name: CH (-27 to -37) Model: S=f(depth) Unit Weight: 100 pcf C-Top of Layer: 200 psf C-Rate of Change: 24 psf/ft Limiting C: 440 psf Piezometric Line: 1
Name: CH (-37 to -50) Model: Undrained (Phi=0) Unit Weight: 104 pcf Cohesion: 440 psf Piezometric Line: 1
Name: CH (-50 to -54) Model: Undrained (Phi=0) Unit Weight: 104 pcf Cohesion: 600 psf Piezometric Line: 1
Name: CH (-54 to -60) Model: Undrained (Phi=0) Unit Weight: 100 pcf Cohesion: 600 psf Piezometric Line: 1

GENERAL NOTES

CLASSIFICATION STRATIFICATION SHEAR STRENGTHS AND UNIT WEIGHTS OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS AND CPT DATA. SEE BOTH BORING AND CPT DATA PLATES.

SHEAR STRENGTHS BETWEEN VERTICALS WERE ASSUMED TO VARY LINEARLY BETWEEN THE VALUES INDICATED FOR THESE LOCATIONS.

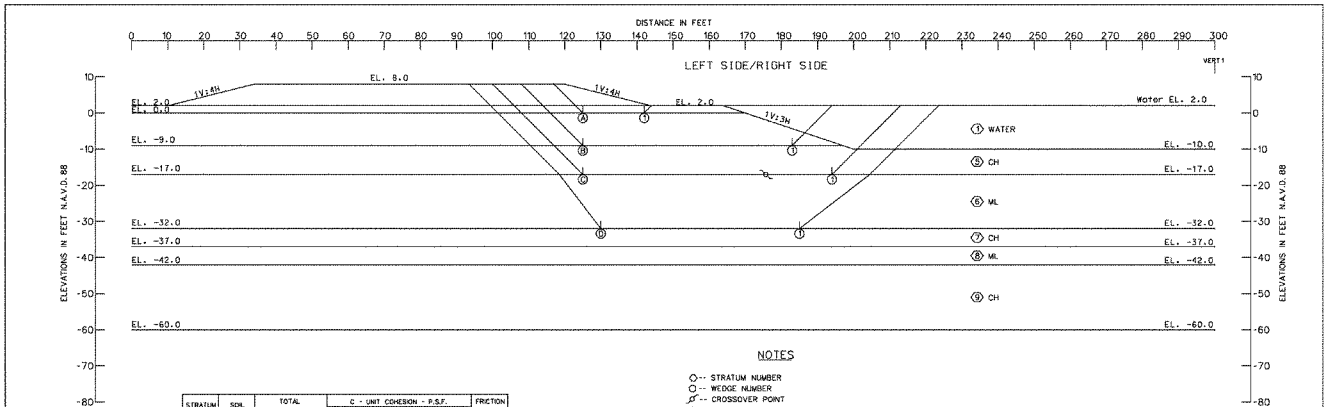
US Army Corps of Engineers
New Orleans District

MISSISSIPPI RIVER GULF OUTLET (MRGO)
ECOSYSTEM RESTORATION FEASIBILITY STUDY

DESIGN REACH 1
ORLEANS PARISH/ ST. BERNARD PARISH, LA

FIGURE ED-F-6
SHEET 4 of 4

Name: LWL (nc) FS Check
File Name: MRGO Reach 1_1 on 2.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 1\
Last Edited By: Chaisson, Kathryn MVN



STRATUM NO.	SOIL TYPE	TOTAL UNIT WEIGHT P.C.F. VERT.:1	C - UNIT COHESION - P.S.F. CENTER OF STRATUM VERT.:1	C - UNIT COHESION - P.S.F. BOTTOM OF STRATUM VERT.:1	FRICTION ANGLE DEGREES
①	WATER	62	0	0	0
②	CH	100	100	100	0
③	CH	112	100	100	0
④	CH	112	200	200	0
⑤	CH	112	400	400	0
⑥	ML	117	200	200	15
⑦	CH	112	940	940	0
⑧	ML	117	200	200	15
⑨	CH	112	1200	1200	0

ASSUMED FAILURE SURFACE NO.		ELEV.	RESISTING FORCES R_A	R_B	R_P	DRIVING FORCES D_A	$-D_P$	SUMMATION OF FORCES RESISTING	DRIVING	FACTOR OF SAFETY
Ⓐ	①	2.0	1600	1700	400	2910	274	3700	2636	1.40
Ⓑ	①	-9.0	5200	11600	1399	14860	4180	18199	10680	1.70
Ⓒ	①	-17.0	11600	26861	5600	33098	12775	44061	20323	2.17
Ⓓ	①	-32.0	27555	36586	22314	85859	50057	86455	35802	2.41

NOTES

◇-- STRATUM NUMBER
⬡-- WEDGE NUMBER
⊠ -- CROSSOVER POINT
Φ -- ANGLE OF INTERNAL FRICTION, DEGREES
C -- UNIT COHESION, P.S.F.
▽ -- STATIC WATER SURFACE
D -- HORIZONTAL DRIVING FORCE IN POUNDS
R -- HORIZONTAL RESISTING FORCE IN POUNDS
A -- AS A SUBSCRIPT,REFERS TO ACTIVE WEDGE
B -- AS A SUBSCRIPT REFERS TO CENTRAL BLOCK
P -- AS A SUBSCRIPT REFERS TO PASSIVE WEDGE

FACTOR OF SAFETY $= \frac{R_A + R_B + R_P}{D_A - D_P}$

GENERAL NOTES

CLASSIFICATION STRATIFICATION SHEAR STRENGTHS AND UNIT WEIGHTS OF THE SOIL WERE BASED ON THE RESULTS OF THE UNDISTURBED BORINGS. SEE BORING DATA PLATES.

SHEAR STRENGTHS BETWEEN VERTICALS WERE ASSUMED TO VARY LINEARLY BETWEEN THE VALUES INDICATED FOR THESE LOCATIONS.

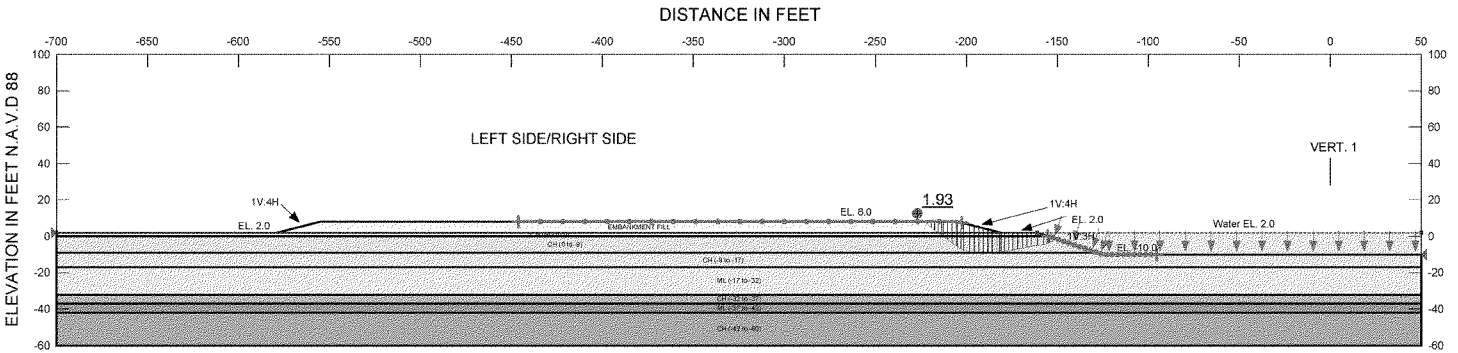
MISSISSIPPI RIVER GULF-OUTLET (MRGO)
ECOSYSTEM RESTORATION FEASIBILTY STUDY
ORLEANS PARISH/ ST. BERNARD PARISH, LA

VIOLET DIVERSION CHANNEL
HIGH WATER LEVEL (EL. 2.0)

U.S. ARMY CORPS OF ENGINEERS
MISSISSIPPI VALLEY DIVISION
NEW ORLEANS DISTRICT
NEW ORLEANS, LA

DESIGNED BY:	PLOT SCALE:	PLOT DATE: DGN FILE: MAIL.DGN
DRAWN BY: K. CHAISSON		
CHECKED BY:	DATE: 27 APRIL 2010	FILE NO.

FIGURE ED-F-7
SHEET 1 OF 10



Use Passive Mode: No

Name: EMBANKMENT FILL Model: Undrained (Phi=0) Unit Weight: 100 pcf Cohesion: 100 psf Piezometric Line: 1
Name: CH (NG to 0) Model: Undrained (Phi=0) Unit Weight: 112 pcf Cohesion: 100 psf Piezometric Line: 1
Name: CH (0 to -9) Model: Undrained (Phi=0) Unit Weight: 112 pcf Cohesion: 200 psf Piezometric Line: 1
Name: CH (-9 to -17) Model: Undrained (Phi=0) Unit Weight: 112 pcf Cohesion: 400 psf Piezometric Line: 1
Name: ML (-17 to -32) Model: Mohr-Coulomb Unit Weight: 117 pcf Cohesion: 200 psf Phi: 15 ° Piezometric Line: 1
Name: CH (-32 to -37) Model: Undrained (Phi=0) Unit Weight: 112 pcf Cohesion: 940 psf Piezometric Line: 1
Name: ML (-37 to -42) Model: Mohr-Coulomb Unit Weight: 117 pcf Cohesion: 200 psf Phi: 15 ° Piezometric Line: 1
Name: CH (-42 to -60) Model: Undrained (Phi=0) Unit Weight: 112 pcf Cohesion: 1200 psf Piezometric Line: 1

Name: High Water Embankment_Left to Right (c)
File Name: Violet Diversion Channel.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 2\
Last Edited By: Chaisson, Kathryn MVN

GENERAL NOTES

CLASSIFICATION STRATIFICATION SHEAR STRENGTHS AND UNIT WEIGHTS OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS AND CPT DATA. SEE BOTH BORING AND CPT DATA PLATES.

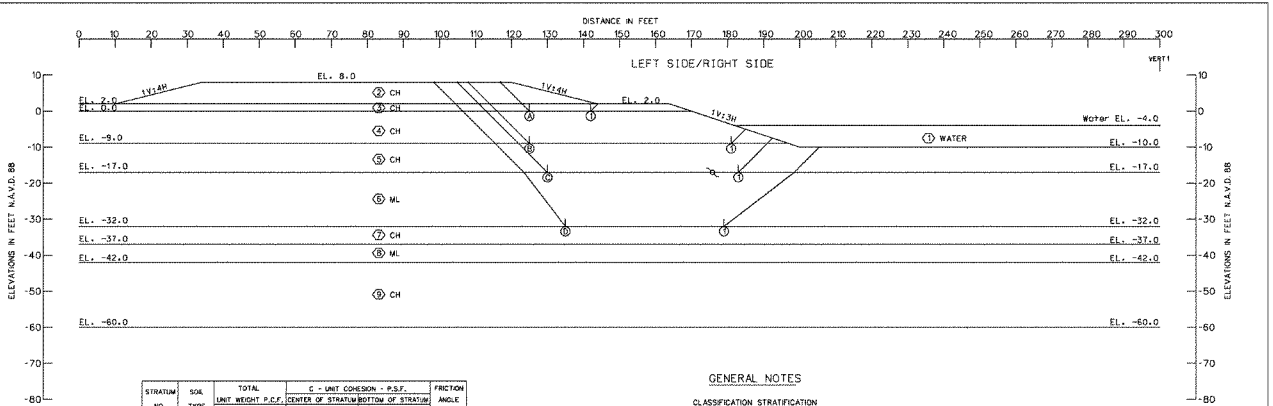
SHEAR STRENGTHS BETWEEN VERTICALS WERE ASSUMED TO VARY LINEARLY BETWEEN THE VALUES INDICATED FOR THESE LOCATIONS.

US Army Corps of Engineers
New Orleans District

MISSISSIPPI RIVER GULF OUTLET (MRGO)
ECOSYSTEM RESTORATION FEASIBILITY STUDY

VIOLET DIVERSION (REACH 2)
CHANNEL AND BERM DESIGN
ORLEANS PARISH/ ST. BERNARD PARISH, LA

FIGURE ED-F-7
SHEET 2 of 10



STRATUM NO.	SOIL TYPE	TOTAL UNIT WEIGHT P.C.F. VERT. 1	C - UNIT COHESION - P.S.F. CENTER OF STRATUM VERT. 1	C - UNIT COHESION - P.S.F. BOTTOM OF STRATUM VERT. 1	FRICTION ANGLE DEGREES
①	WATER	62	0	0	0
②	CH	100	100	100	0
③	CH	112	100	100	0
④	CH	112	200	200	0
⑤	CH	112	400	400	0
⑥	ML	117	200	200	15
⑦	CH	112	940	940	0
⑧	ML	117	200	200	15
⑨	CH	112	1200	1200	0

ASSUMED FAILURE SURFACE NO.	ASSUMED FAILURE SURFACE ELEV.	RESISTING FORCES R_A	RESISTING FORCES R_B	RESISTING FORCES R_P	DRIVING FORCES D_A	DRIVING FORCES $-D_P$	SUMMATION OF FORCES RESISTING	SUMMATION OF FORCES DRIVING	FACTOR OF SAFETY
Ⓐ ①	2.0	1600	1700	400	2910	274	3700	2636	1.40
Ⓑ ①	-9.0	5200	11200	1599	14860	1319	17999	13541	1.33
Ⓒ ①	-17.0	11600	21084	6998	32160	8256	39682	23904	1.66
Ⓓ ①	-32.0	26800	29298	22991	83870	39897	79089	43973	1.80

GENERAL NOTES

CLASSIFICATION STRATIFICATION SHEAR STRENGTHS AND UNIT WEIGHTS OF THE SOIL WERE BASED ON THE RESULTS OF THE UNDISTURBED BORINGS. SEE BORING DATA PLATES.

SHEAR STRENGTHS BETWEEN VERTICALS WERE ASSUMED TO VARY LINEARLY BETWEEN THE VALUES INDICATED FOR THESE LOCATIONS.

NOTES

○-- STRATUM NUMBER
○-- WEDGE NUMBER
𝒸-- CROSSOVER POINT
φ -- ANGLE OF INTERNAL FRICTION, DEGREES
C -- UNIT COHESION, P.S.F.
▽ -- STATIC WATER SURFACE
D -- HORIZONTAL DRIVING FORCE IN POUNDS
R -- HORIZONTAL RESISTING FORCE IN POUNDS
A -- AS A SUBSCRIPT,REFERS TO ACTIVE WEDGE
B -- AS A SUBSCRIPT REFERS TO CENTRAL BLOCK
P -- AS A SUBSCRIPT REFERS TO PASSIVE WEDGE

FACTOR OF SAFETY $= \frac{R_A + R_B + R_P}{D_A - D_P}$

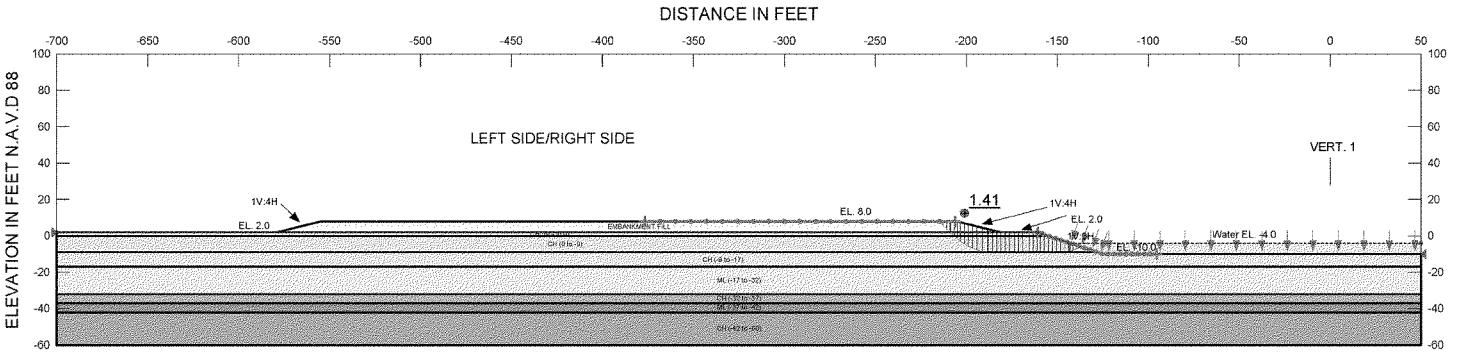
MISSISSIPPI RIVER GULF-OUTLET (MRGO)
ECOSYSTEM RESTORATION FEASIBILTY STUDY
ORLEANS PARISH/ ST. BERNARD PARISH, LA

VIOLET DIVERSION CHANNEL LOW WATER LEVEL (EL. -4.0)

U.S. ARMY CORPS OF ENGINEERS
MISSISSIPPI VALLEY DIVISION
NEW ORLEANS DISTRICT
NEW ORLEANS, LA

DESIGNED BY:	PLOT SCALE:	PLOT DATE:	CADD FILE: LWL1.DGN
DRAWN BY: K. CHAISSON			
CHECKED BY:	DATE: 21 APRIL 2010		FILE NO.

FIGURE ED-F-7
SHEET 3 OF 10



Use Passive Mode: No

Name: EMBANKMENT FILL Model: Undrained (Phi=0) Unit Weight: 100 pcf Cohesion: 100 psf Piezometric Line: 1
Name: CH (NG to 0) Model: Undrained (Phi=0) Unit Weight: 112 pcf Cohesion: 100 psf Piezometric Line: 1
Name: CH (0 to -9) Model: Undrained (Phi=0) Unit Weight: 112 pcf Cohesion: 200 psf Piezometric Line: 1
Name: CH (-9 to -17) Model: Undrained (Phi=0) Unit Weight: 112 pcf Cohesion: 400 psf Piezometric Line: 1
Name: ML (-17 to -32) Model: Mohr-Coulomb Unit Weight: 117 pcf Cohesion: 200 psf Phi: 15 ° Piezometric Line: 1
Name: CH (-32 to -37) Model: Undrained (Phi=0) Unit Weight: 112 pcf Cohesion: 940 psf Piezometric Line: 1
Name: ML (-37 to -42) Model: Mohr-Coulomb Unit Weight: 117 pcf Cohesion: 200 psf Phi: 15 ° Piezometric Line: 1
Name: CH (-42 to -60) Model: Undrained (Phi=0) Unit Weight: 112 pcf Cohesion: 1200 psf Piezometric Line: 1

GENERAL NOTES

CLASSIFICATION STRATIFICATION SHEAR STRENGTHS AND UNIT WEIGHTS OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS AND CPT DATA. SEE BOTH BORING AND CPT DATA PLATES.

SHEAR STRENGTHS BETWEEN VERTICALS WERE ASSUMED TO VARY LINEARLY BETWEEN THE VALUES INDICATED FOR THESE LOCATIONS.

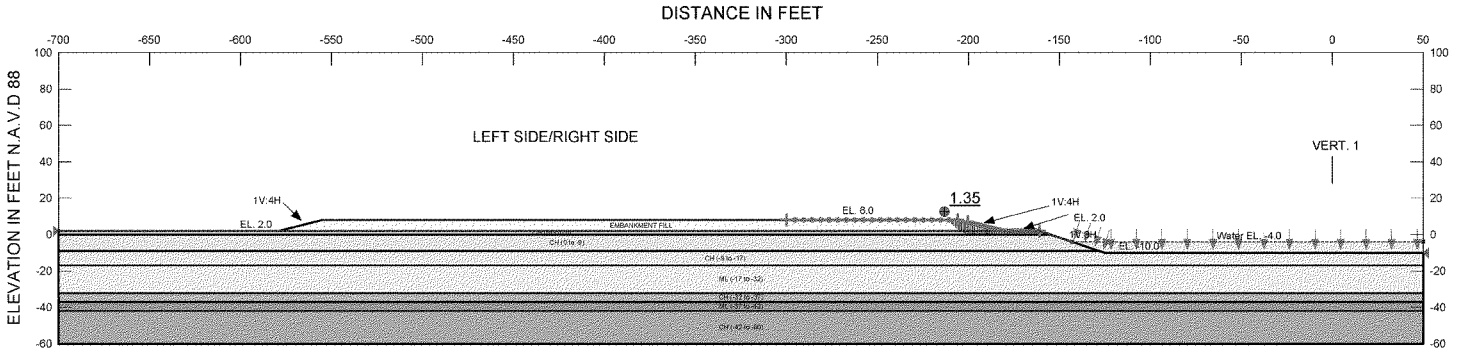
Name: Low Water Embankment_Left to Right (c)
File Name: Violet Diversion Channel.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 2\
Last Edited By: Chaisson, Kathryn MVN

US Army Corps of Engineers
New Orleans District

MISSISSIPPI RIVER GULF OUTLET (MRGO)
ECOSYSTEM RESTORATION FEASIBILITY STUDY

VIOLET DIVERSION (REACH 2)
CHANNEL AND BERM DESIGN
ORLEANS PARISH/ ST. BERNARD PARISH, LA

FIGURE ED-F-7
SHEET 4 of 10



Use Passive Mode: No

Name: EMBANKMENT FILL Model: Undrained (Phi=0) Unit Weight: 100 pcf Cohesion: 100 psf Piezometric Line: 1
Name: CH (NG to 0) Model: Undrained (Phi=0) Unit Weight: 112 pcf Cohesion: 100 psf Piezometric Line: 1
Name: CH (0 to -9) Model: Undrained (Phi=0) Unit Weight: 112 pcf Cohesion: 200 psf Piezometric Line: 1
Name: CH (-9 to -17) Model: Undrained (Phi=0) Unit Weight: 112 pcf Cohesion: 400 psf Piezometric Line: 1
Name: ML (-17 to -32) Model: Mohr-Coulomb Unit Weight: 117 pcf Cohesion: 200 psf Phi: 15 ° Piezometric Line: 1
Name: CH (-32 to -37) Model: Undrained (Phi=0) Unit Weight: 112 pcf Cohesion: 940 psf Piezometric Line: 1
Name: ML (-37 to -42) Model: Mohr-Coulomb Unit Weight: 117 pcf Cohesion: 200 psf Phi: 15 ° Piezometric Line: 1
Name: CH (-42 to -60) Model: Undrained (Phi=0) Unit Weight: 112 pcf Cohesion: 1200 psf Piezometric Line: 1

Name: Embankment_Left to Right (c)_Local
File Name: Violet Diversion Channel.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 2\
Last Edited By: Chaisson, Kathryn MVN

GENERAL NOTES

CLASSIFICATION STRATIFICATION SHEAR STRENGTHS AND UNIT WEIGHTS OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS AND CPT DATA. SEE BOTH BORING AND CPT DATA PLATES.

SHEAR STRENGTHS BETWEEN VERTICALS WERE ASSUMED TO VARY LINEARLY BETWEEN THE VALUES INDICATED FOR THESE LOCATIONS.

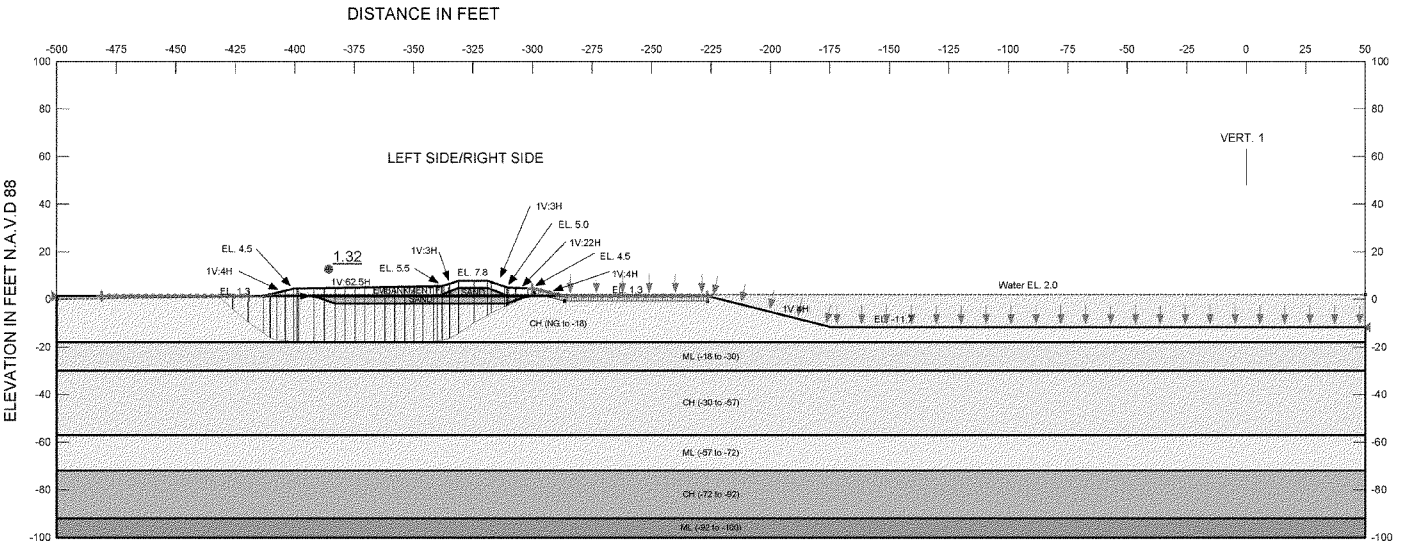
US Army Corps of Engineers
New Orleans District

MISSISSIPPI RIVER GULF OUTLET (MRGO)
ECOSYSTEM RESTORATION FEASIBILITY STUDY

VIOLET DIVERSION (REACH 2)
CHANNEL AND BERM DESIGN
ORLEANS PARISH/ ST. BERNARD PARISH, LA

FIGURE ED-F-7
SHEET 5 of 10

1260



Use Passive Mode: No

Type: Fabric Fabric Capacity: 12000 lbs @ 5% strain Total Length: 90 ft Inside Point: (-302, 1.3) ft Outside Point: (-392, 1.3) ft Contact Cohesion: 223.5 psf Contact Phi: 0 ° Interface Factor: 2 Governing Component: Bond

Name: EMBANKMENT FILL Model: Undrained (Phi=0) Unit Weight: 100 pcf Cohesion: 100 psf Piezometric Line: 1
Name: CH (NG to -18) Model: Undrained (Phi=0) Unit Weight: 98 pcf Cohesion: 100 psf Piezometric Line: 1
Name: ML (-18 to -30) Model: Mohr-Coulomb Unit Weight: 117 pcf Cohesion: 200 psf Phi: 15 ° Piezometric Line: 1
Name: CH (-30 to -57) Model: S=f(depth) Unit Weight: 105 pcf C-Top of Layer: 250 psf C-Rate of Change: 12.96 psf/ft Limiting C: 600 psf Piezometric Line: 1
Name: ML (-57 to -72) Model: Mohr-Coulomb Unit Weight: 117 pcf Cohesion: 200 psf Phi: 15 ° Piezometric Line: 1
Name: CH (-72 to -92) Model: S=f(depth) Unit Weight: 105 pcf C-Top of Layer: 800 psf C-Rate of Change: 15 psf/ft Limiting C: 1100 psf Piezometric Line: 1
Name: ML (-92 to -100) Model: Mohr-Coulomb Unit Weight: 117 pcf Cohesion: 200 psf Phi: 15 ° Piezometric Line: 1
Name: SAND Model: Mohr-Coulomb Unit Weight: 122 pcf Cohesion: 0 psf Phi: 30 ° Piezometric Line: 1

GENERAL NOTES

CLASSIFICATION STRATIFICATION SHEAR STRENGTHS AND UNIT WEIGHTS OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS AND CPT DATA. SEE BOTH BORING AND CPT DATA PLATES.

SHEAR STRENGTHS BETWEEN VERTICALS WERE ASSUMED TO VARY LINEARLY BETWEEN THE VALUES INDICATED FOR THESE LOCATIONS.

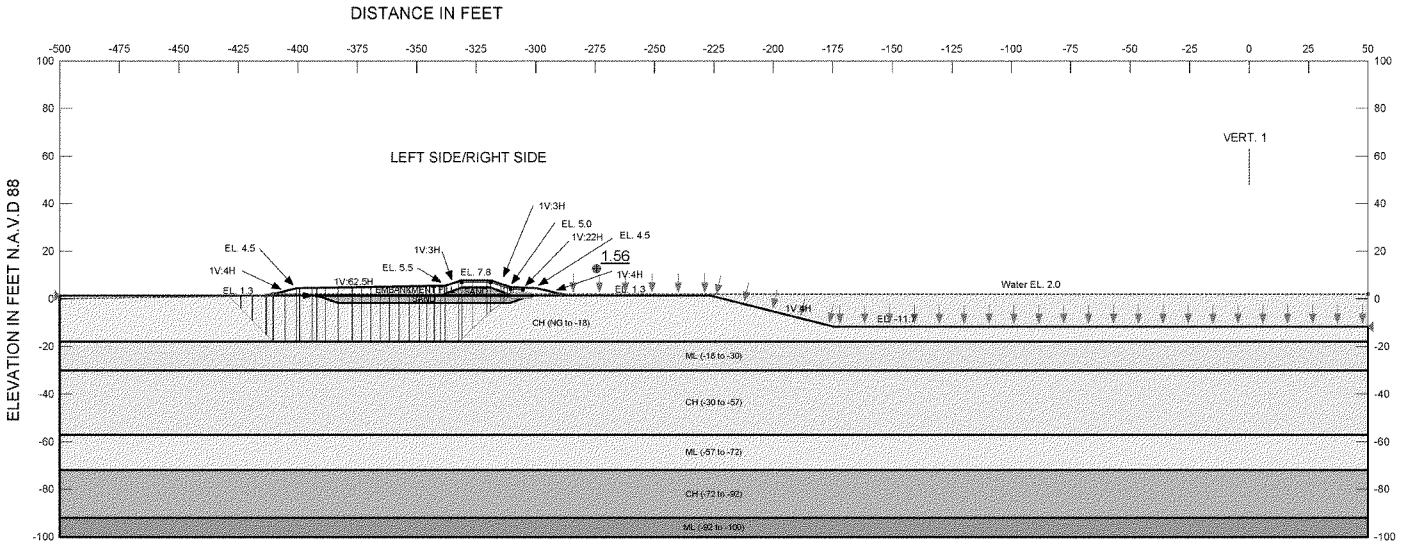
US Army Corps of Engineers
New Orleans District

MISSISSIPPI RIVER GULF OUTLET (MRGO)
ECOSYSTEM RESTORATION FEASIBILITY STUDY

VIOLET DIVERSION (REACH 2)
CENTRAL WETLANDS CHANNEL AND BERM DESIGN
ORLEANS PARISH/ ST. BERNARD PARISH, LA

Name: HWL_c_Guide Levee (around)
File Name: Central Wetlands Diversion Channel.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 2\
Last Edited By: Chaisson, Kathryn MVN

FIGURE ED-F-7
SHEET 6 of 10



Use Passive Mode: No

Type: Fabric Fabric Capacity: 12000 lbs @ 5% strain Total Length: 90 ft Inside Point: (-302, 1.3) ft Outside Point: (-392, 1.3) ft Contact Cohesion: 223.5 psf Contact Phi: 0 ° Interface Factor: 2 Governing Component: Bond

Name: EMBANKMENT FILL Model: Undrained (Phi=0) Unit Weight: 100 pcf Cohesion: 100 psf Piezometric Line: 1
Name: CH (NG to -18) Model: Undrained (Phi=0) Unit Weight: 98 pcf Cohesion: 100 psf Piezometric Line: 1
Name: ML (-18 to -30) Model: Mohr-Coulomb Unit Weight: 117 pcf Cohesion: 200 psf Phi: 15 ° Piezometric Line: 1
Name: CH (-30 to -57) Model: S=f(depth) Unit Weight: 105 pcf C-Top of Layer: 250 psf C-Rate of Change: 12.96 psf/ft Limiting C: 600 psf Piezometric Line: 1
Name: ML (-57 to -72) Model: Mohr-Coulomb Unit Weight: 117 pcf Cohesion: 200 psf Phi: 15 ° Piezometric Line: 1
Name: CH (-72 to -92) Model: S=f(depth) Unit Weight: 105 pcf C-Top of Layer: 800 psf C-Rate of Change: 15 psf/ft Limiting C: 1100 psf Piezometric Line: 1
Name: ML (-92 to -100) Model: Mohr-Coulomb Unit Weight: 117 pcf Cohesion: 200 psf Phi: 15 ° Piezometric Line: 1
Name: SAND Model: Mohr-Coulomb Unit Weight: 122 pcf Cohesion: 0 psf Phi: 30 ° Piezometric Line: 1

GENERAL NOTES

CLASSIFICATION STRATIFICATION SHEAR STRENGTHS AND UNIT WEIGHTS OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS AND CPT DATA. SEE BOTH BORING AND CPT DATA PLATES.

SHEAR STRENGTHS BETWEEN VERTICALS WERE ASSUMED TO VARY LINEARLY BETWEEN THE VALUES INDICATED FOR THESE LOCATIONS.

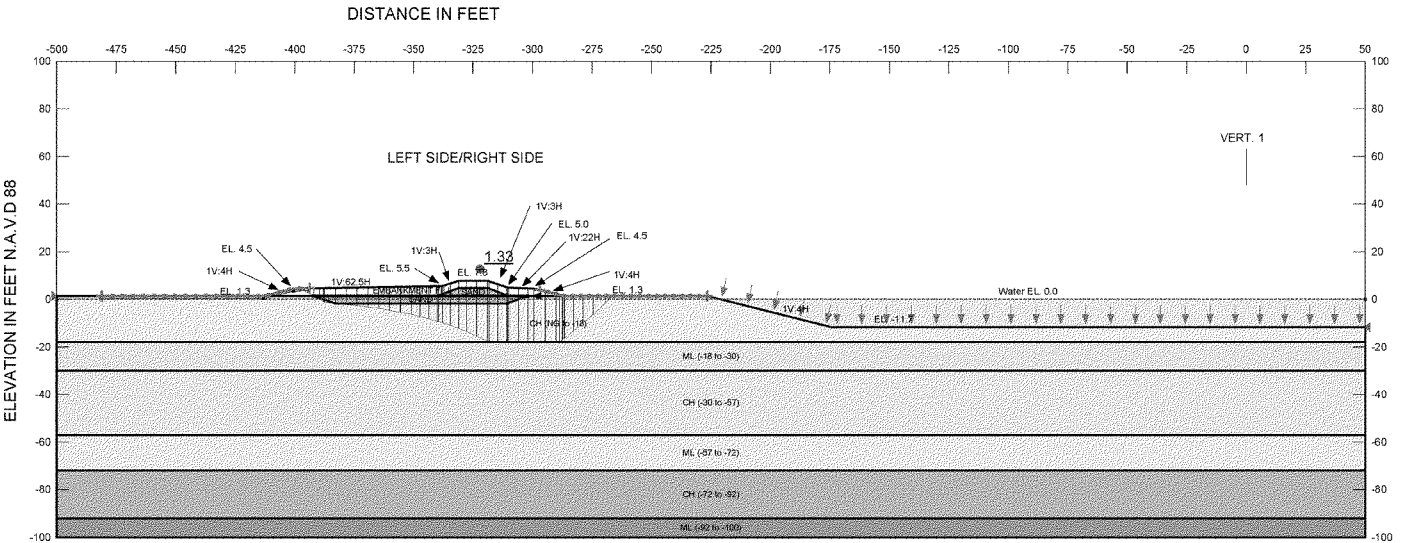
US Army Corps of Engineers
New Orleans District

MISSISSIPPI RIVER GULF OUTLET (MRGO)
ECOSYSTEM RESTORATION FEASIBILITY STUDY

VIOLET DIVERSION (REACH 2)
CENTRAL WETLANDS CHANNEL AND BERM DESIGN
ORLEANS PARISH/ ST. BERNARD PARISH, LA

Name: HWL_nc_Guide Levee (through)
File Name: Central Wetlands Diversion Channel.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 2\
Last Edited By: Chaisson, Kathryn MVN

FIGURE ED-F-7
SHEET 7 of 10



Use Passive Mode: No

Type: Fabric Fabric Capacity: 12000 lbs @ 5% strain Total Length: 90 ft Inside Point: (-392, 1.3) ft Outside Point: (-302, 1.3) ft Contact Cohesion: 223.5 psf Contact Phi: 0 ° Interface Factor: 2 Governing Component: Bond

Name: EMBANKMENT FILL Model: Undrained (Phi=0) Unit Weight: 100 pcf Cohesion: 100 psf Piezometric Line: 1
Name: CH (NG to -18) Model: Undrained (Phi=0) Unit Weight: 98 pcf Cohesion: 100 psf Piezometric Line: 1
Name: ML (-18 to -30) Model: Mohr-Coulomb Unit Weight: 117 pcf Cohesion: 200 psf Phi: 15 ° Piezometric Line: 1
Name: CH (-30 to -57) Model: S=f(depth) Unit Weight: 105 pcf C-Top of Layer: 250 psf C-Rate of Change: 12.96 psf/ft Limiting C: 600 psf Piezometric Line: 1
Name: ML (-57 to -72) Model: Mohr-Coulomb Unit Weight: 117 pcf Cohesion: 200 psf Phi: 15 ° Piezometric Line: 1
Name: CH (-72 to -92) Model: S=f(depth) Unit Weight: 105 pcf C-Top of Layer: 800 psf C-Rate of Change: 15 psf/ft Limiting C: 1100 psf Piezometric Line: 1
Name: ML (-92 to -100) Model: Mohr-Coulomb Unit Weight: 117 pcf Cohesion: 200 psf Phi: 15 ° Piezometric Line: 1
Name: SAND Model: Mohr-Coulomb Unit Weight: 122 pcf Cohesion: 0 psf Phi: 30 ° Piezometric Line: 1

GENERAL NOTES

CLASSIFICATION STRATIFICATION SHEAR STRENGTHS AND UNIT WEIGHTS OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS AND CPT DATA. SEE BOTH BORING AND CPT DATA PLATES.

SHEAR STRENGTHS BETWEEN VERTICALS WERE ASSUMED TO VARY LINEARLY BETWEEN THE VALUES INDICATED FOR THESE LOCATIONS.

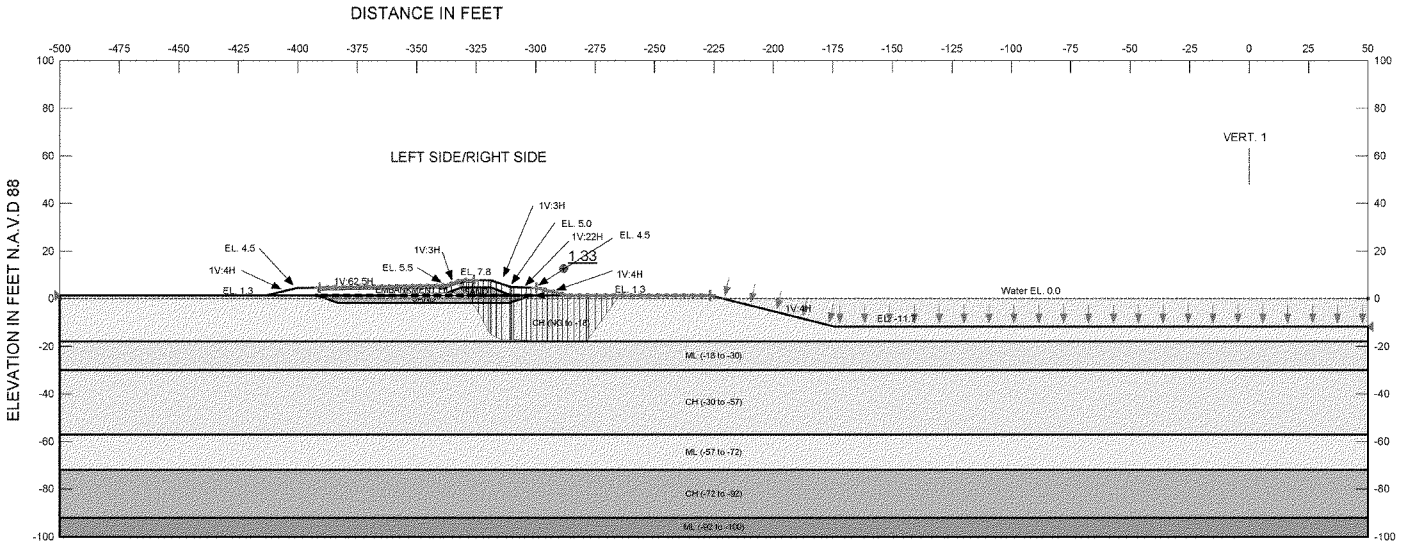
US Army Corps of Engineers
New Orleans District

MISSISSIPPI RIVER GULF OUTLET (MRGO)
ECOSYSTEM RESTORATION FEASIBILITY STUDY

VIOLET DIVERSION (REACH 2)
CENTRAL WETLANDS CHANNEL AND BERM DESIGN
ORLEANS PARISH/ ST. BERNARD PARISH, LA

Name: LWL_c_Guide Levee (around)
File Name: Central Wetlands Diversion Channel.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 2\
Last Edited By: Chaisson, Kathryn MVN

FIGURE ED-F-7
SHEET 8 of 10



Use Passive Mode: No

Type: Fabric Fabric Capacity: 12000 lbs @ 5% strain Total Length: 90 ft Inside Point: (-392, 1.3) ft Outside Point: (-302, 1.3) ft Contact Cohesion: 223.5 psf Contact Phi: 0 ° Interface Factor: 2 Governing Component: Fabric

Name: EMBANKMENT FILL Model: Undrained (Phi=0) Unit Weight: 100 pcf Cohesion: 100 psf Piezometric Line: 1
Name: CH (NG to -18) Model: Undrained (Phi=0) Unit Weight: 98 pcf Cohesion: 100 psf Piezometric Line: 1
Name: ML (-18 to -30) Model: Mohr-Coulomb Unit Weight: 117 pcf Cohesion: 200 psf Phi: 15 ° Piezometric Line: 1
Name: CH (-30 to -57) Model: S=f(depth) Unit Weight: 105 pcf C-Top of Layer: 250 psf C-Rate of Change: 12.96 psf/ft Limiting C: 600 psf Piezometric Line: 1
Name: ML (-57 to -72) Model: Mohr-Coulomb Unit Weight: 117 pcf Cohesion: 200 psf Phi: 15 ° Piezometric Line: 1
Name: CH (-72 to -92) Model: S=f(depth) Unit Weight: 105 pcf C-Top of Layer: 800 psf C-Rate of Change: 15 psf/ft Limiting C: 1100 psf Piezometric Line: 1
Name: ML (-92 to -100) Model: Mohr-Coulomb Unit Weight: 117 pcf Cohesion: 200 psf Phi: 15 ° Piezometric Line: 1
Name: SAND Model: Mohr-Coulomb Unit Weight: 122 pcf Cohesion: 0 psf Phi: 30 ° Piezometric Line: 1

GENERAL NOTES

CLASSIFICATION STRATIFICATION SHEAR STRENGTHS AND UNIT WEIGHTS OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS AND CPT DATA. SEE BOTH BORING AND CPT DATA PLATES.

SHEAR STRENGTHS BETWEEN VERTICALS WERE ASSUMED TO VARY LINEARLY BETWEEN THE VALUES INDICATED FOR THESE LOCATIONS.

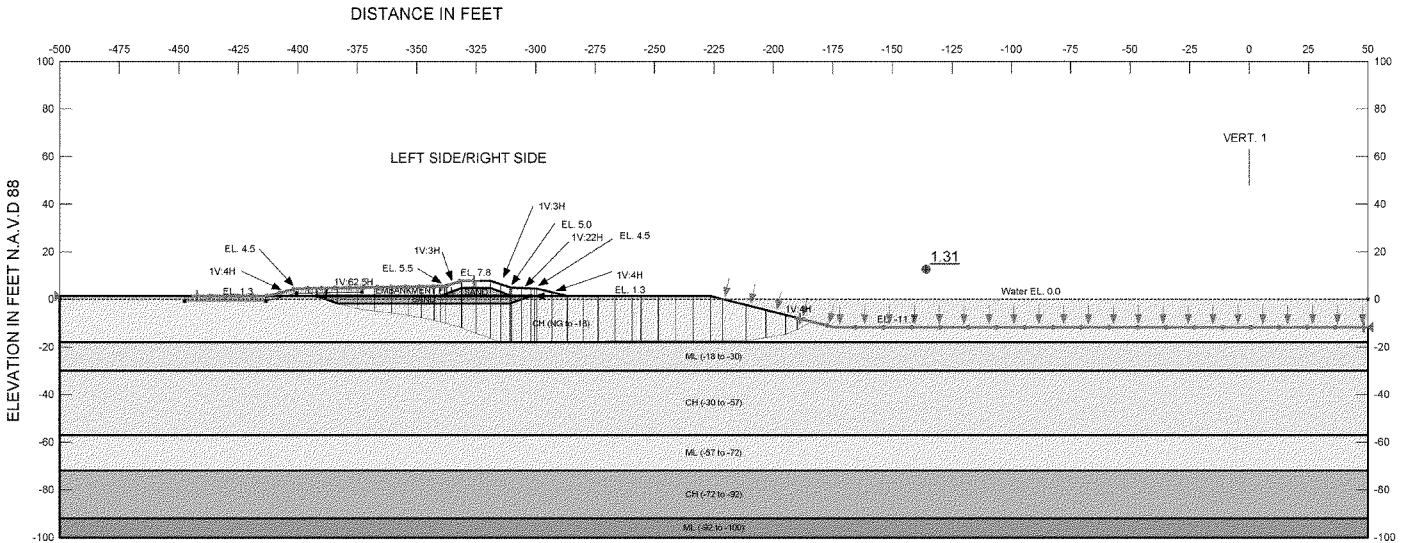
US Army Corps of Engineers
New Orleans District

MISSISSIPPI RIVER GULF OUTLET (MRGO)
ECOSYSTEM RESTORATION FEASIBILITY STUDY

VIOLET DIVERSION (REACH 2)
CENTRAL WETLANDS CHANNEL AND BERM DESIGN
ORLEANS PARISH/ ST. BERNARD PARISH, LA

Name: LWL_c_Guide Levee (through)
File Name: Central Wetlands Diversion Channel.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 2\
Last Edited By: Chaisson, Kathryn MVN

FIGURE ED-F-7
SHEET 9 of 10



Use Passive Mode: No

Type: Fabric Fabric Capacity: 12000 lbs @ 5% strain Total Length: 90 ft Inside Point: (-392, 1.3) ft Outside Point: (-302, 1.3) ft Contact Cohesion: 223.5 psf Contact Phi: 0 ° Interface Factor: 2 Governing Component: Bond

Name: EMBANKMENT FILL Model: Undrained (Phi=0) Unit Weight: 100 pcf Cohesion: 100 psf Piezometric Line: 1
Name: CH (NG to -18) Model: Undrained (Phi=0) Unit Weight: 98 pcf Cohesion: 100 psf Piezometric Line: 1
Name: ML (-18 to -30) Model: Mohr-Coulomb Unit Weight: 117 pcf Cohesion: 200 psf Phi: 15 ° Piezometric Line: 1
Name: CH (-30 to -57) Model: S=f(depth) Unit Weight: 105 pcf C-Top of Layer: 250 psf C-Rate of Change: 12.96 psf/ft Limiting C: 600 psf Piezometric Line: 1
Name: ML (-57 to -72) Model: Mohr-Coulomb Unit Weight: 117 pcf Cohesion: 200 psf Phi: 15 ° Piezometric Line: 1
Name: CH (-72 to -92) Model: S=f(depth) Unit Weight: 105 pcf C-Top of Layer: 800 psf C-Rate of Change: 15 psf/ft Limiting C: 1100 psf Piezometric Line: 1
Name: ML (-92 to -100) Model: Mohr-Coulomb Unit Weight: 117 pcf Cohesion: 200 psf Phi: 15 ° Piezometric Line: 1
Name: SAND Model: Mohr-Coulomb Unit Weight: 122 pcf Cohesion: 0 psf Phi: 30 ° Piezometric Line: 1

GENERAL NOTES

CLASSIFICATION STRATIFICATION SHEAR STRENGTHS AND UNIT WEIGHTS OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS AND CPT DATA. SEE BOTH BORING AND CPT DATA PLATES.

SHEAR STRENGTHS BETWEEN VERTICALS WERE ASSUMED TO VARY LINEARLY BETWEEN THE VALUES INDICATED FOR THESE LOCATIONS.

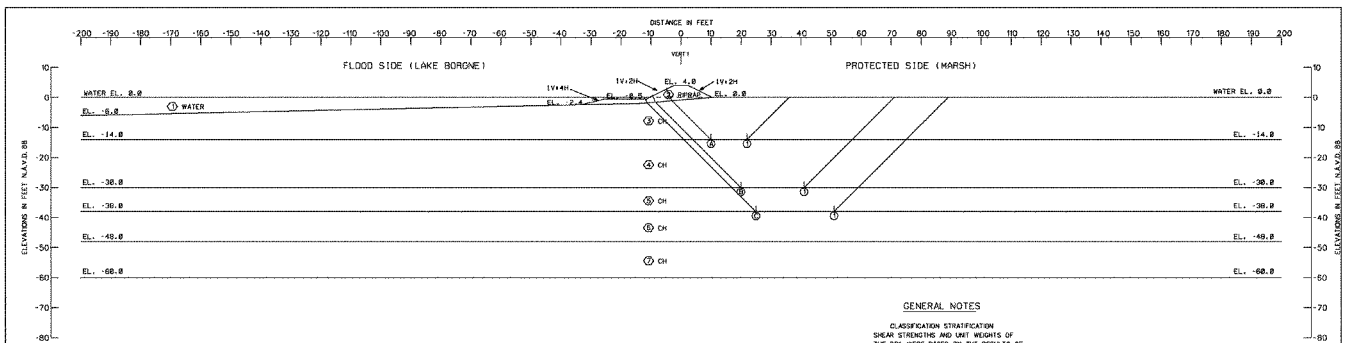
US Army Corps of Engineers
New Orleans District

MISSISSIPPI RIVER GULF OUTLET (MRGO)
ECOSYSTEM RESTORATION FEASIBILITY STUDY

VIOLET DIVERSION (REACH 2)
CENTRAL WETLANDS CHANNEL AND BERM DESIGN
ORLEANS PARISH/ ST. BERNARD PARISH, LA

Name: LWL_c_Guide Levee to Bottom
File Name: Central Wetlands Diversion Channel.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 2\
Last Edited By: Chaisson, Kathryn MVN

FIGURE ED-F-7
SHEET 10 of 10



STRATUM NO.	SOIL TYPE	TOTAL UNIT WEIGHT P.C.F. VERT. 1	C - UNIT COHESION - P.S.F. CENTER OF STRATUM VERT. 1	BOTTOM OF STRATUM VERT. 1	FRICTION ANGLE DEGREES
1	WATER	62	0	0	0
3	RIPRAP	132	0	0	40
2	CH	98	150	150	0
4	CH	105	240	240	0
5	CH	105	317	395	0
6	CH	100	492	590	0
7	CH	120	980	980	0

ASSUMED FAILURE SURFACE NO.	ASSUMED FAILURE SURFACE ELEV.	RESISTING FORCES R_A	RESISTING FORCES R_B	RESISTING FORCES R_P	DRIVING FORCES D_A	DRIVING FORCES $-D_P$	SUMMATION OF FORCES RESISTING	SUMMATION OF FORCES DRIVING	FACTOR OF SAFETY
(A) (3)	-14.0	48339	1805	4200	15836	94081	108336	54235	1.69
(B) (1)	-30.0	11637	5040	11880	51829	44351	28557	7478	3.82
(C) (1)	-38.0	16482	10270	16960	79442	71801	43712	7541	5.80

GENERAL NOTES

CLASSIFICATION STRATIFICATION SHEAR STRENGTHS AND UNIT WEIGHTS OF THE SOIL WERE BASED ON THE RESULTS OF THE UNDISTURBED BORINGS. SEE BORING DATA PLATES.

SHEAR STRENGTHS BETWEEN VERTICALS WERE ASSUMED TO VARY LINEARLY BETWEEN THE VALUES INDICATED FOR THESE LOCATIONS.

NOTES

○-- STRATUM NUMBER
⬡-- WEDGE NUMBER
𝒸-- CROSSOVER POINT
φ -- ANGLE OF INTERNAL FRICTION, DEGREES
C -- UNIT COHESION, P.S.F.
▽-- STATIC WATER SURFACE
D -- HORIZONTAL DRIVING FORCE IN POUNDS
R -- HORIZONTAL RESISTING FORCE IN POUNDS
A -- AS A SUBSCRIPT, REFERS TO ACTIVE WEDGE
B -- AS A SUBSCRIPT REFERS TO CENTRAL BLOCK
P -- AS A SUBSCRIPT REFERS TO PASSIVE WEDGE

FACTOR OF SAFETY $= \frac{R_A + R_B + R_P}{D_A - D_P}$

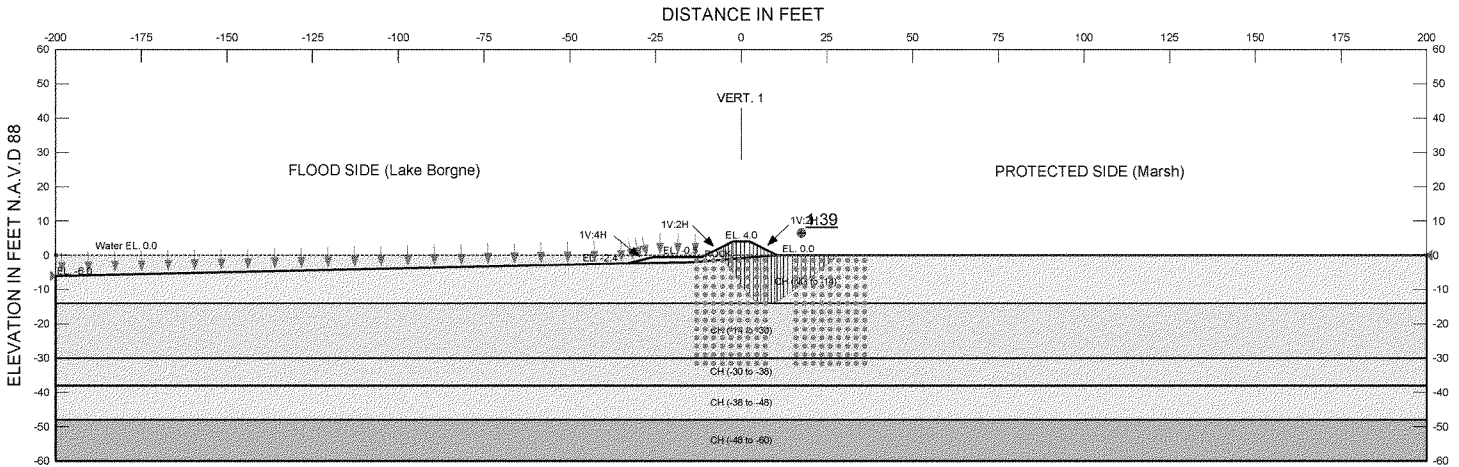
MISSISSIPPI RIVER GULF-OUTLET (MRGO) ECOSYSTEM RESTORATION FEASIBILTY STUDY ORLEANS PARISH/ ST. BERNARD PARISH, LA

DESIGN REACH 8
NORMAL WATER (EL 0.0)

U.S. ARMY CORPS OF ENGINEERS
MISSISSIPPI VALLEY DIVISION
NEW ORLEANS DISTRICT
NEW ORLEANS, LA

DESIGNED BY:	PLOT SCALE	PLOT DATE	DGN FILE: MR1_D08
DRAWN BY: K. CHAUSSON			
CHECKED BY:	DATE: 18 JUNE 2010		FILE NO.

FIGURE ED-F-8
SHEET 1 OF 4



Use Passive Mode: No

Name: ROCK Model: Mohr-Coulomb Unit Weight: 132 pcf Cohesion: 0 psf Phi: 40 ° Piezometric Line: 1
Name: CH (NG to -14) Model: Undrained (Phi=0) Unit Weight: 96 pcf Cohesion: 150 psf Piezometric Line: 1
Name: CH (-14 to -30) Model: Undrained (Phi=0) Unit Weight: 105 pcf Cohesion: 240 psf Piezometric Line: 1
Name: CH (-30 to -38) Model: S=f(depth) Unit Weight: 105 pcf C-Top of Layer: 240 psf C-Rate of Change: 9.69 psf/ft Limiting C: 395 psf Piezometric Line: 1
Name: CH (-38 to -48) Model: S=f(depth) Unit Weight: 100 pcf C-Top of Layer: 395 psf C-Rate of Change: 19.5 psf/ft Limiting C: 590 psf Piezometric Line: 1
Name: CH (-48 to -60) Model: Undrained (Phi=0) Unit Weight: 125 pcf Cohesion: 960 psf Piezometric Line: 1

GENERAL NOTES

CLASSIFICATION STRATIFICATION SHEAR STRENGTHS AND UNIT WEIGHTS OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS AND CPT DATA. SEE BOTH BORING AND CPT DATA PLATES.

SHEAR STRENGTHS BETWEEN VERTICALS WERE ASSUMED TO VARY LINEARLY BETWEEN THE VALUES INDICATED FOR THESE LOCATIONS.

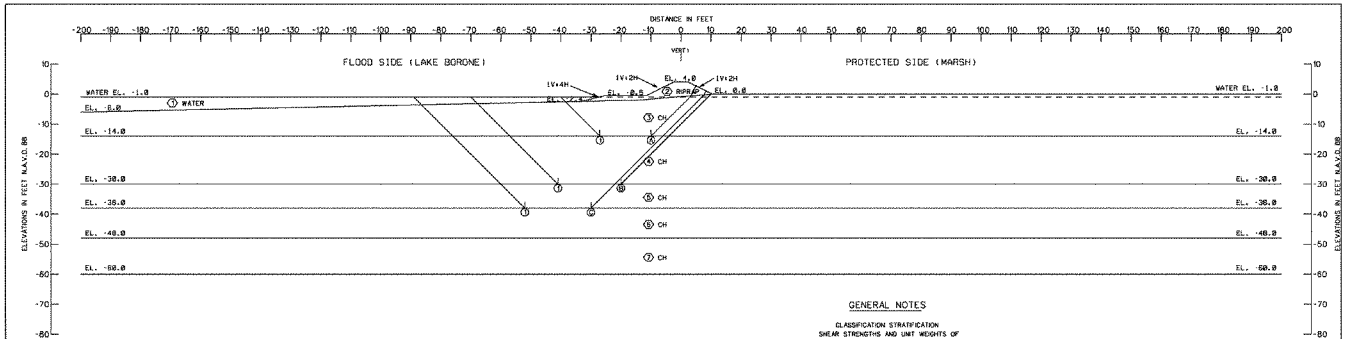
US Army Corps of Engineers
New Orleans District

MISSISSIPPI RIVER GULF OUTLET (MRGO)
ECOSYSTEM RESTORATION FEASIBILITY STUDY

DESIGN REACH 8
ORLEANS PARISH/ ST. BERNARD PARISH, LA

FIGURE ED-F-8
SHEET 2 of 4

Name: NWL (nc) PS Check
File Name: MRGO Reach 8_1 on 2.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 8\
Last Edited By: Chaisson, Kathryn MVN



STRATUM NO.	SOIL TYPE	TOTAL UNIT WEIGHT P.C.F.	C - UNIT COHESION - P.S.F.		FRICTION ANGLE
			CENTER OF STRATUM	BOTTOM OF STRATUM	
		VERT. 1	VERT. 1	VERT. 1	DEGREES
①	WATER	62	0	0	0
②	RIPRAP	132	0	0	40
③	CH	98	150	150	0
④	CH	105	240	240	0
⑤	CH	105	317	335	0
⑥	CH	100	492	590	0
⑦	CH	128	960	980	0

ASSUMED FAILURE SURFACE		RESISTING FORCES			DRIVING FORCES		SUMMATION OF FORCES		FACTOR OF SAFETY
NO.	ELEV.	R_A	R_B	R_P	D_A	$-D_P$	RESISTING	DRIVING	
(A) ①	-14.0	4734	2550	3445	16030	7833	10729	8197	1.31
(B) ③	-30.0	11871	5040	10935	51622	39763	27846	12159	2.29
(C) ③	-38.0	15999	8690	15895	79209	63670	41584	13539	3.07

GENERAL NOTES

CLASSIFICATION STRATIFICATION SHEAR STRENGTHS AND UNIT WEIGHTS OF THE SOIL WERE BASED ON THE RESULTS OF THE UNDISTURBED BORINGS. SEE BORING DATA PLATES.

SHEAR STRENGTHS BETWEEN VERTICALS WERE ASSUMED TO VARY LINEARLY BETWEEN THE VALUES INDICATED FOR THESE LOCATIONS.

NOTES

○-- STRATUM NUMBER
⬡-- WEDGE NUMBER
⊿-- CROSSOVER POINT
ϕ -- ANGLE OF INTERNAL FRICTION, DEGREES
C -- UNIT COHESION, P.S.F.
▽ -- STATIC WATER SURFACE
D -- HORIZONTAL DRIVING FORCE IN POUNDS
R -- HORIZONTAL RESISTING FORCE IN POUNDS
A -- AS A SUBSCRIPT, REFERS TO ACTIVE WEDGE
B -- AS A SUBSCRIPT REFERS TO CENTRAL BLOCK
P -- AS A SUBSCRIPT REFERS TO PASSIVE WEDGE

FACTOR OF SAFETY $= \frac{R_A + R_B + R_P}{D_A - D_P}$

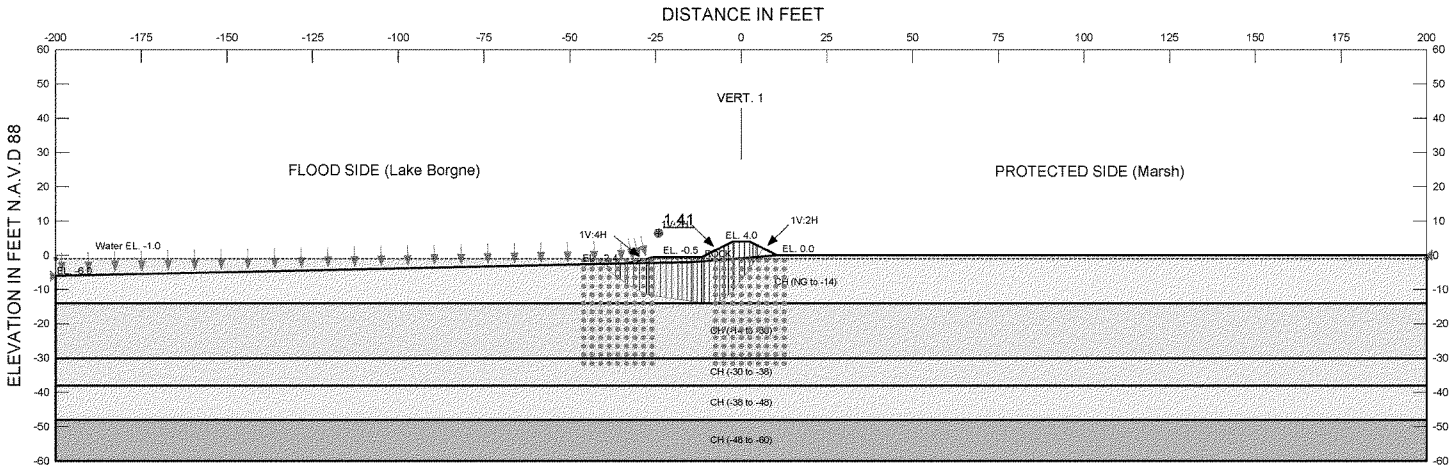
MISSISSIPPI RIVER GULF-OUTLET (MRGO) ECOSYSTEM RESTORATION FEASIBILITY STUDY ORLEANS PARISH/ ST. BERNARD PARISH, LA

DESIGN REACH 8
LOW WATER LEVEL (EL -1.0)

U.S. ARMY CORPS OF ENGINEERS
MISSISSIPPI VALLEY DIVISION
NEW ORLEANS DISTRICT
NEW ORLEANS, LA

DESIGNED BY:
DRAWN BY: E. CHRISSION
CHECKED BY:
PLOT SCALE: PLOT DATE: DGN FILE: UNIT: ENG
DATE: 18 JUNE 2018
FILE NO.:

FIGURE ED-F-8
SHEET 3 OF 4



Use Passive Mode: No

Name: ROCK Model: Mohr-Coulomb Unit Weight: 132 pcf Cohesion: 0 psf Phi: 40 ° Piezometric Line: 1
Name: CH (NG to -14) Model: Undrained (Phi=0) Unit Weight: 96 pcf Cohesion: 150 psf Piezometric Line: 1
Name: CH (-14 to -30) Model: Undrained (Phi=0) Unit Weight: 105 pcf Cohesion: 240 psf Piezometric Line: 1
Name: CH (-30 to -38) Model: S=f(depth) Unit Weight: 105 pcf C-Top of Layer: 240 psf C-Rate of Change: 9.69 psf/ft Limiting C: 395 psf Piezometric Line: 1
Name: CH (-38 to -48) Model: S=f(depth) Unit Weight: 100 pcf C-Top of Layer: 395 psf C-Rate of Change: 19.5 psf/ft Limiting C: 590 psf Piezometric Line: 1
Name: CH (-48 to -60) Model: Undrained (Phi=0) Unit Weight: 125 pcf Cohesion: 960 psf Piezometric Line: 1

GENERAL NOTES

CLASSIFICATION STRATIFICATION SHEAR STRENGTHS AND UNIT WEIGHTS OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS AND CPT DATA. SEE BOTH BORING AND CPT DATA PLATES.

SHEAR STRENGTHS BETWEEN VERTICALS WERE ASSUMED TO VARY LINEARLY BETWEEN THE VALUES INDICATED FOR THESE LOCATIONS.

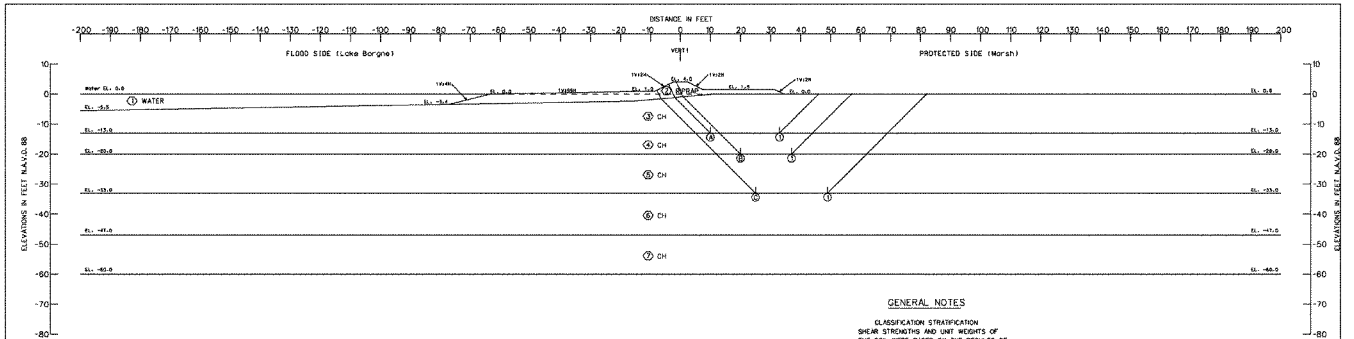
Name: LWL (nc) FS Check
File Name: MRGO Reach 8_1 on 2.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 8\
Last Edited By: Chaisson, Kathryn MVN

US Army Corps of Engineers
New Orleans District

MISSISSIPPI RIVER GULF OUTLET (MRGO)
ECOSYSTEM RESTORATION FEASIBILITY STUDY

DESIGN REACH 8
ORLEANS PARISH/ ST. BERNARD PARISH, LA

FIGURE ED-F-8
SHEET 4 of 4



STRATUM NO.	SOIL TYPE	TOTAL UNIT WEIGHT P.C.F. VERT.	C - UNIT COHESION - P.S.F. CENTER OF STRATUM VERT.	BOTTOM OF STRATUM VERT.	FRICTION ANGLE DEGREES
1	WATER	62	0	0	0
2	RIPRAP	132	0	0	40
3	CH	86	100	100	0
4	CH	94	100	100	0
5	CH	108	200	200	0
6	CH	118	470	600	0
7	CH	105	600	600	0

ASSUMED FAILURE SURFACE NO.		ELEV.	RESISTING FORCES R_A	R_B	R_P	DRIVING FORCES D_A	$-D_P$	SUMMATION OF FORCES RESISTING	DRIVING	FACTOR OF SAFETY
(A)	(1)	-13.0	3556	2300	3600	13699	7341	84356	6358	1.33
(B)	(1)	-20.0	5031	1700	4000	24266	17396	10731	6870	1.56
(C)	(1)	-33.0	9363	4800	9200	60267	49608	23363	10659	2.19

GENERAL NOTES

CLASSIFICATION STRATIFICATION SHEAR STRENGTHS AND UNIT WEIGHTS OF THE SOIL WERE BASED ON THE RESULTS OF THE UNDISTURBED BORINGS. SEE BORING DATA PLATES.

SHEAR STRENGTHS BETWEEN VERTICALS WERE ASSUMED TO VARY LINEARLY BETWEEN THE VALUES INDICATED FOR THESE LOCATIONS.

NOTES

○-- STRATUM NUMBER
○-- WEDGE NUMBER
○-- CROSSOVER POINT
φ -- ANGLE OF INTERNAL FRICTION, DEGREES
C -- UNIT COHESION, P.S.F.
▽ -- STATIC WATER SURFACE
D -- HORIZONTAL DRIVING FORCE IN POUNDS
R -- HORIZONTAL RESISTING FORCE IN POUNDS
A -- AS A SUBSCRIPT, REFERS TO ACTIVE WEDGE
B -- AS A SUBSCRIPT REFERS TO CENTRAL BLOCK
P -- AS A SUBSCRIPT REFERS TO PASSIVE WEDGE

FACTOR OF SAFETY $= \frac{R_A + R_B + R_P}{D_A - D_P}$

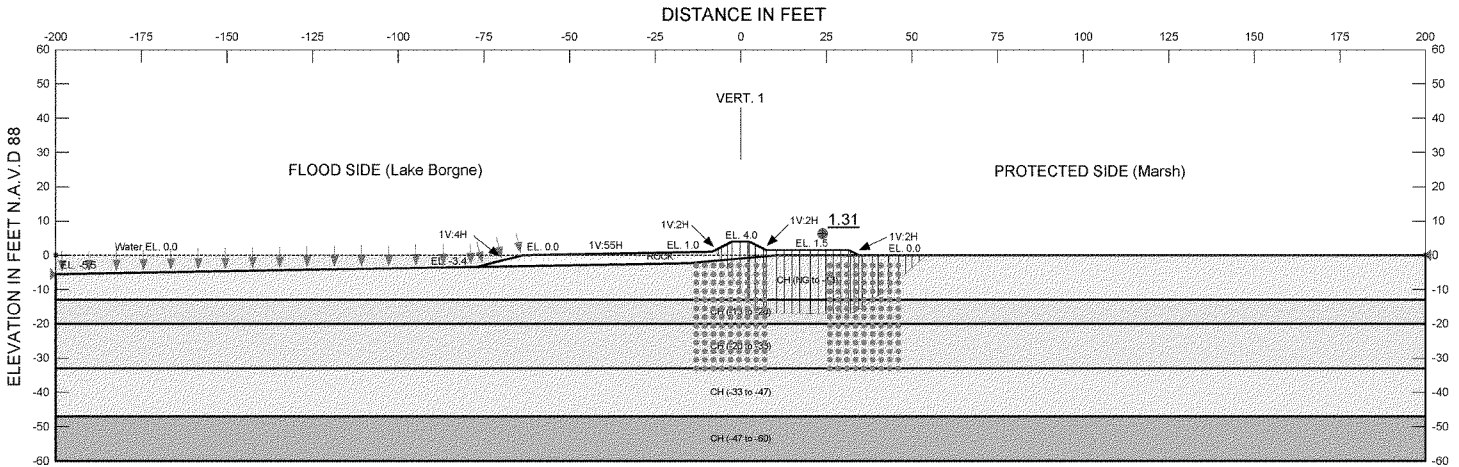
MISSISSIPPI RIVER GULF-OUTLET (MRGO)
ECOSYSTEM RESTORATION FEASIBILITY STUDY
ORLEANS PARISH/ ST. BERNARD PARISH, LA

DESIGN REACH 9
NORMAL WATER (EL 0.0)

U.S. ARMY CORPS OF ENGINEERS
MISSISSIPPI VALLEY DIVISION
NEW ORLEANS DISTRICT
NEW ORLEANS, LA.

DESIGNED BY:
DRAWN BY: K. CHAISSON
CHECKED BY:
PLOT SCALE: PLOT DATE: 29 JUNE 2018
CADD FILE: MR_1.DWN
FILE NO.

FIGURE E0-F-9
SHEET 1 OF 4



Use Passive Mode: No

Name: ROCK Model: Mohr-Coulomb Unit Weight: 132 pcf Cohesion: 0 psf Phi: 40 ° Piezometric Line: 1
Name: CH (NG to -13) Model: Undrained (Phi=0) Unit Weight: 86 pcf Cohesion: 100 psf Piezometric Line: 1
Name: CH (-13 to -20) Model: Undrained (Phi=0) Unit Weight: 94 pcf Cohesion: 100 psf Piezometric Line: 1
Name: CH (-20 to -33) Model: Undrained (Phi=0) Unit Weight: 108 pcf Cohesion: 200 psf Piezometric Line: 1
Name: CH (-33 to -47) Model: S=f(depth) Unit Weight: 118 pcf C-Top of Layer: 340 psf C-Rate of Change: 18.57 psf/ft Limiting C: 600 psf Piezometric Line: 1
Name: CH (-47 to -60) Model: Undrained (Phi=0) Unit Weight: 105 pcf Cohesion: 600 psf Piezometric Line: 1

GENERAL NOTES

CLASSIFICATION STRATIFICATION SHEAR STRENGTHS AND UNIT WEIGHTS OF THE SOIL WERE BASED ON THE RESULTS OF UNDISTURBED BORINGS AND CPT DATA. SEE BOTH BORING AND CPT DATA PLATES.

SHEAR STRENGTHS BETWEEN VERTICALS WERE ASSUMED TO VARY LINEARLY BETWEEN THE VALUES INDICATED FOR THESE LOCATIONS.

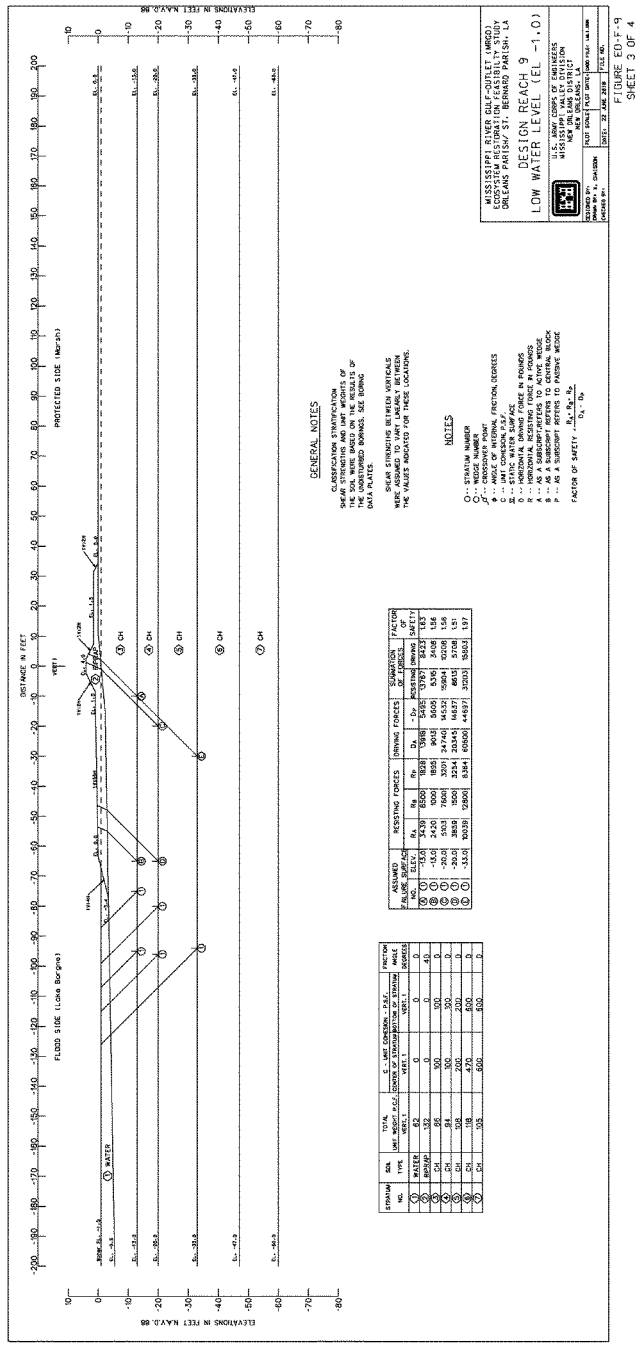
US Army Corps of Engineers
New Orleans District

MISSISSIPPI RIVER GULF OUTLET (MRGO)
ECOSYSTEM RESTORATION FEASIBILITY STUDY

DESIGN REACH 9
ORLEANS PARISH/ ST. BERNARD PARISH, LA

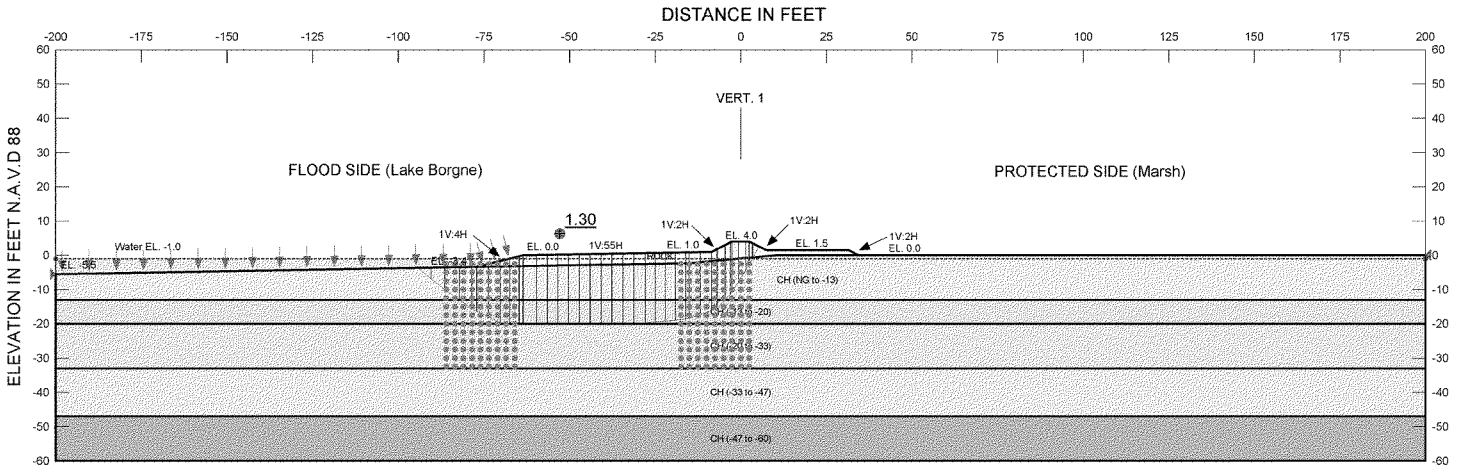
FIGURE ED-F-9
SHEET 2 of 4

Name: NWL (nc) PS Check
File Name: MRGO Reach 9_1 on 2.gsz
Directory: G:\F&MHOME\CHAISSON\MRGO Ecosystem Restoration\Design Reaches\Reach 9\
Last Edited By: Chaisson, Kathryn MVN



STRATUM NO.	SOIL TYPE	TOTAL UNIT WEIGHT, PCF	C, UNIT COHESION, PSF. ANGLE OF INTERNAL FRICTION, DEGREES VERT. 1		FRICTION ANGLE DEGREES
			VERT. 1		
①	WATER	62	0	0	0
②	SP/SM	132	0	40	
③	CL	125	300	0	
④	CH	84	300	0	
⑤	CH	108	200	0	
⑥	CH	118	470	500	0
⑦	CH	105	1060	1100	0

ASSUMED FAILURE SURFACE			RESISTING FORCES			DRIVING FORCES		SUMMATION OF FORCES		FACTOR OF SAFETY
NO.		ELEV.	Rx	Rv	Rp	Dx	Dv	RESISTING	DRIVING	
⑦	①	-15.0	2453	1000	1938	7938	2000	5391	9938	1.54
⑦	①	-15.0	2420	1000	1895	9013	5605	5315	14618	1.56
⑦	①	-20.0	5303	7600	3701	24740	14532	15804	39272	1.56
⑦	①	-30.0	38838	8506	13254	28345	14637	60515	57081	1.51
⑦	①	-40.0	108393	13866	36941	58069	44697	123800	102863	1.97



Use Passive Mode: No

Name: ROCK Model: Mohr-Coulomb Unit Weight: 132 pcf Cohesion: 0 psf Phi: 40 ° Piezometric Line: 1
Name: CH (NG to -13) Model: Undrained (Phi=0) Unit Weight: 86 pcf Cohesion: 100 psf Piezometric Line: 1
Name: CH (-13 to -20) Model: Undrained (Phi=0) Unit Weight: 94 pcf Cohesion: 100 psf Piezometric Line: 1
Name: CH (-20 to -33) Model: Undrained (Phi=0) Unit Weight: 108 pcf Cohesion: 200 psf Piezometric Line: 1
Name: CH (-33 to -47) Model: S=f(depth) Unit Weight: 118 pcf C-Top of Layer: 340 psf C-Rate of Change: 18.57 psf/ft Limiting C: 600 psf Piezometric Line: 1
Name: CH (-47 to -60) Model: Undrained (Phi=0) Unit Weight: 105 pcf Cohesion: 600 psf Piezometric Line: 1

GENERAL NOTES

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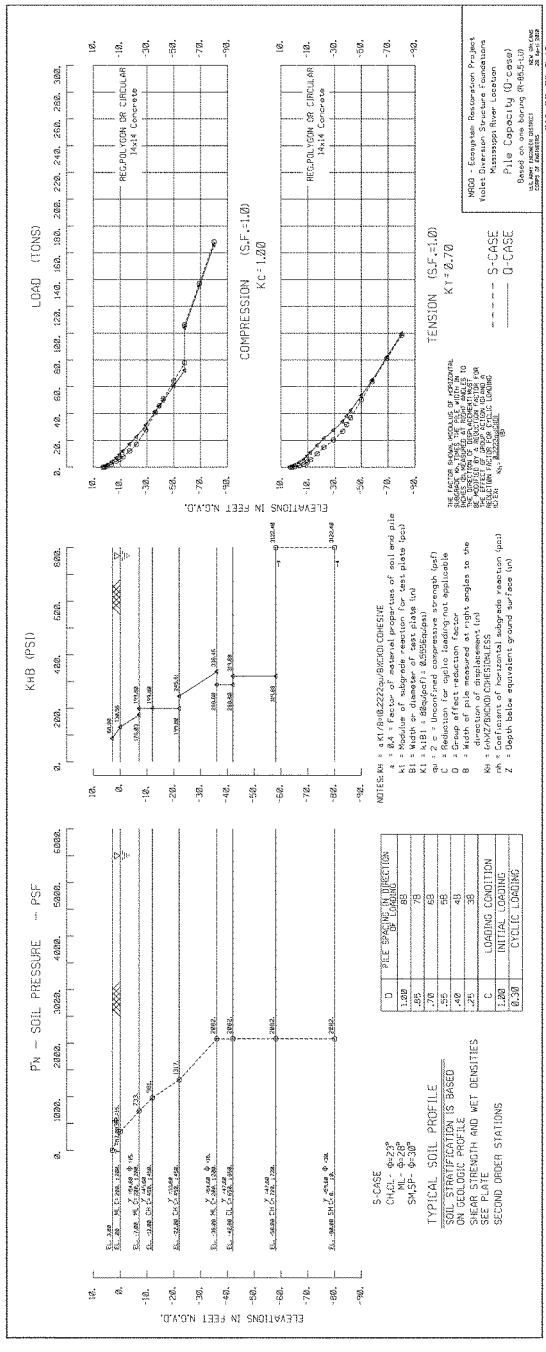
US Army Corps of Engineers
New Orleans District

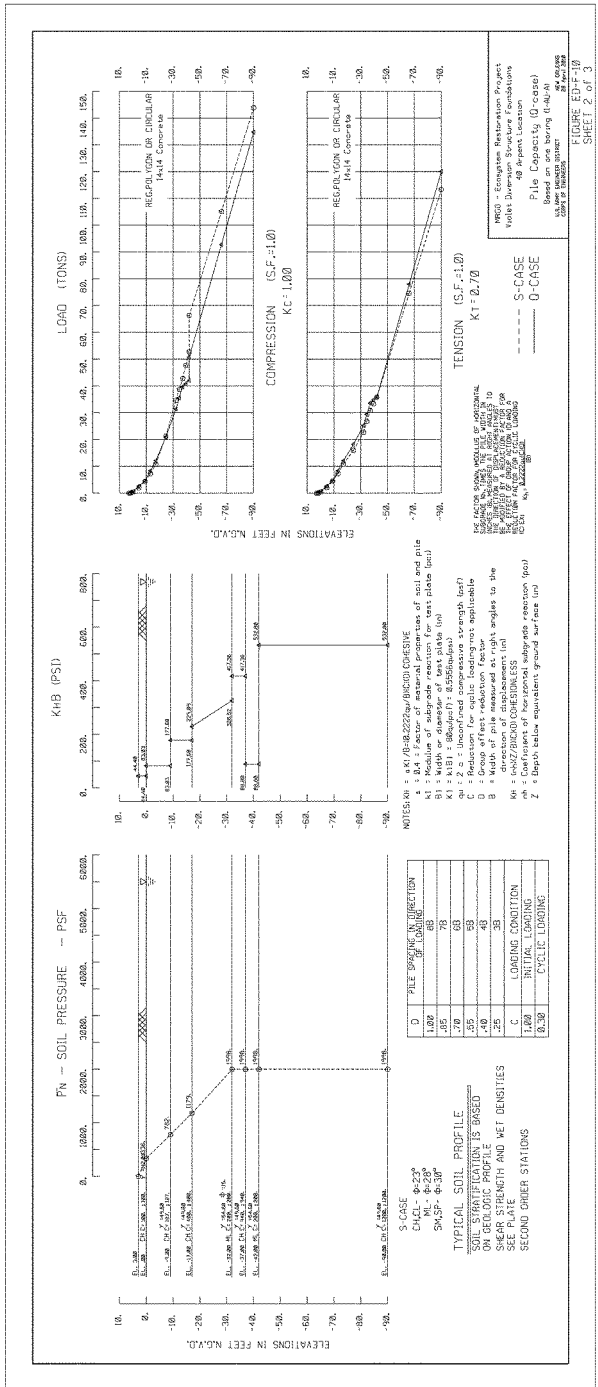
MISSISSIPPI RIVER GULF OUTLET (MRGO)
ECOSYSTEM RESTORATION FEASIBILITY STUDY

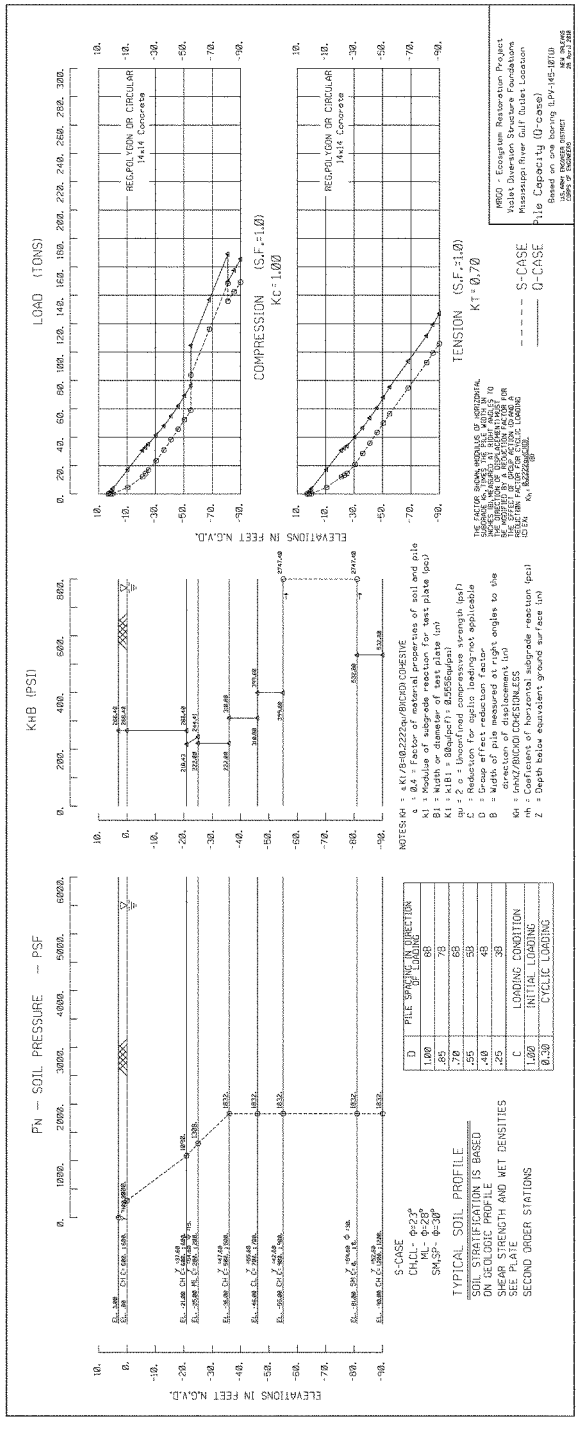
DESIGN REACH 9
ORLEANS PARISH/ ST. BERNARD PARISH, LA

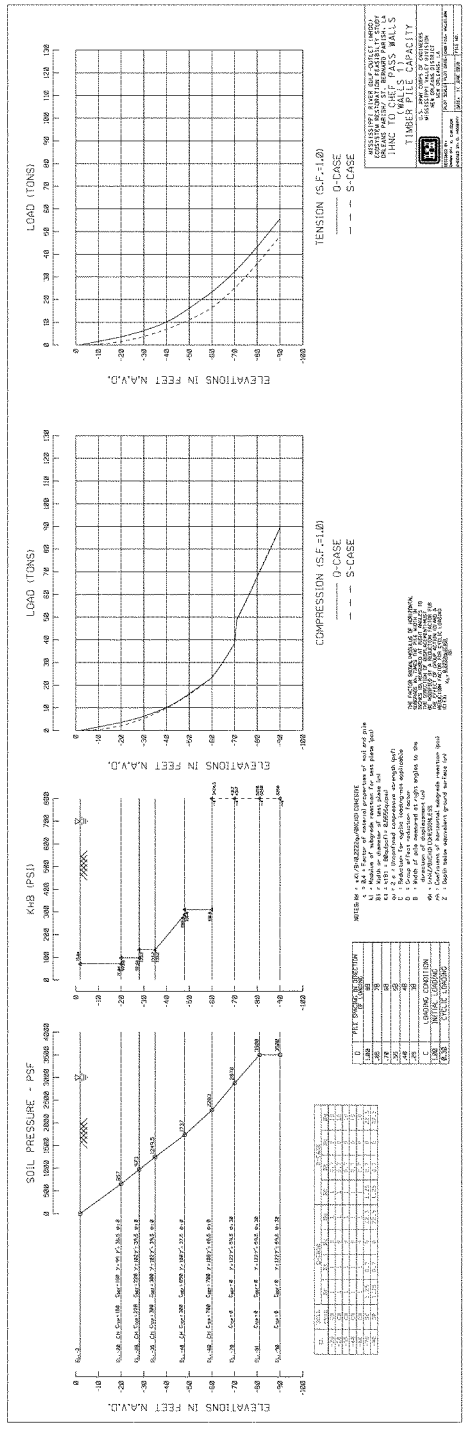
FIGURE ED-F-8
SHEET 4 of 4

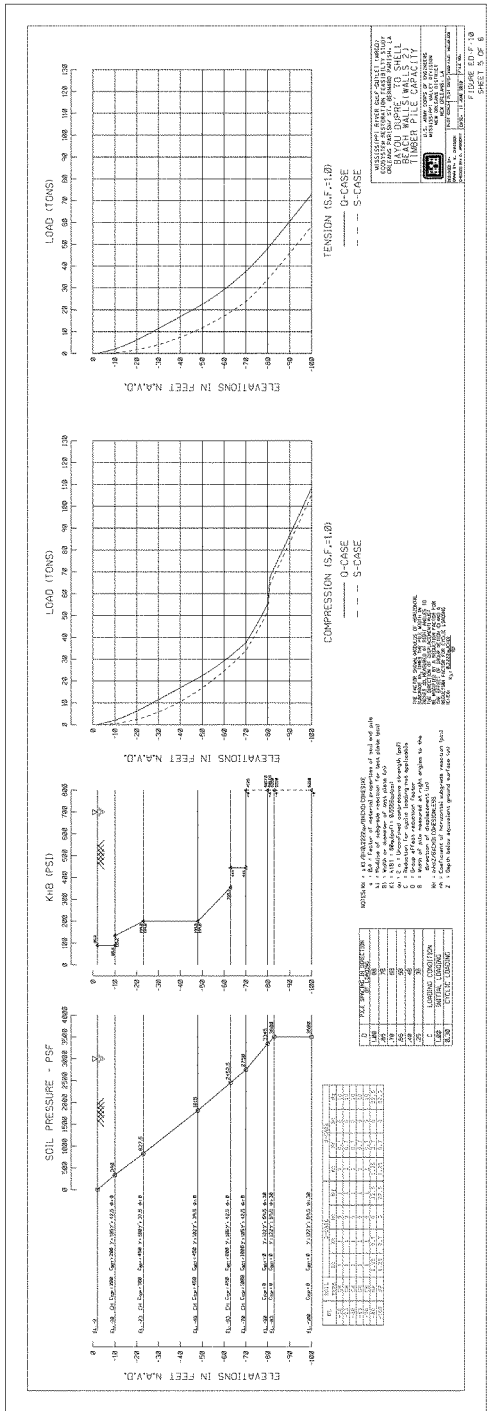
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Last Edited By: Chaisson, Kathryn MVN

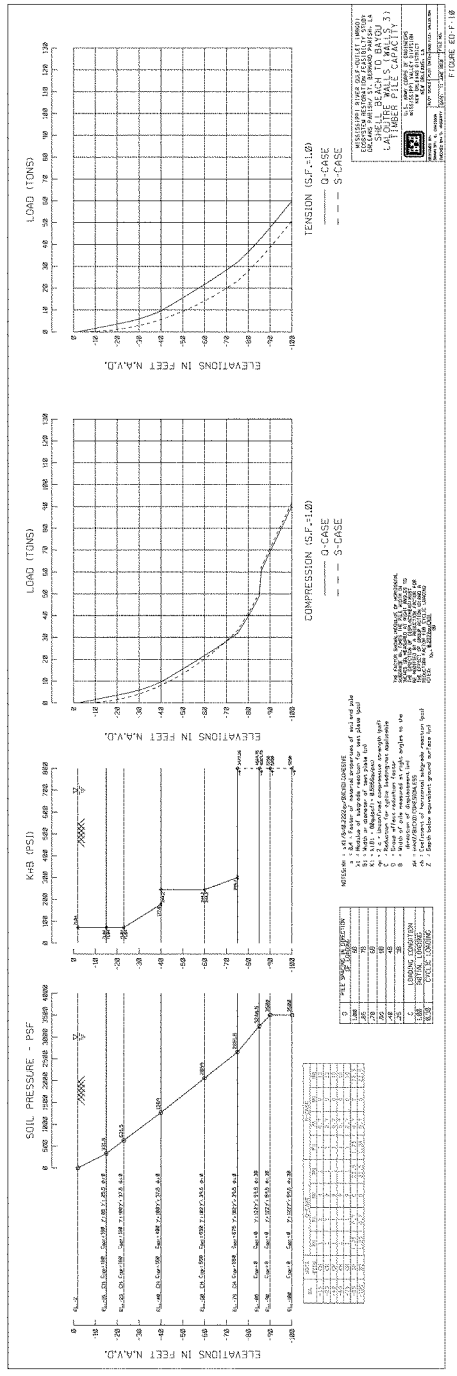

PN — SOIL PRESSURE — PSF
KHB (PSI)
LOAD (TONS)
ELEVATIONS IN FEET N.G.V.D.
COMPRESSION (S.F.=1.00)
Kc=1.00
TENSION (S.F.=1.00)
Kt=0.70
REC/POLYGON OR CIRCULAR 14x14 Concrete
S-CASE
CH,CL - φ=23°
SM - φ=26°
SM,SP - φ=30°
TYPICAL SOIL PROFILE
SOIL STRATIFICATION IS BASED ON GEOLOGIC PROFILE
SHEAR STRENGTH AND WET DENSITIES SEE PLATE
SECOND ORDER STATIONS
PILE SPACING IN DIRECTION OF LOADING
INITIAL CONDITION
CYCLIC LOADING
S-CASE
Q-CASE
MRGO - Ecosystem Restoration Project
Violet Diversion Structure Foundations
Mississippi River Location
Pile Capacity (Q-Case)
Based on one boring (B-96,E-10)
FIGURE ED-F-10
SHEET 1 of 6


PN -- SOIL PRESSURE -- PSF
KHB (PSI)
LOAD (TONS)
ELEVATIONS IN FEET N.G.V.D.
TYPICAL SOIL PROFILE
SOIL STRATIFICATION IS BASED ON GEOLOGIC PROFILE
SHEAR STRENGTH AND WET DENSITIES SEE PLATE
SECOND ORDER STATIONS
S-CASE
CH-CL: Φ=23°
ML: Φ=28°
SM,SP: Φ=30°
COMPRESSION (S.F.=1.00
Kc=1.00
TENSION (S.F.=1.0)
Kt=0.70
REG.POLYGON OR CIRCULAR 14x14 Concrete
S-CASE
Q-CASE
MRGO - Ecnogtom Restoration Project
Violet Diversion Structure Foundations
40 Ayent Lecasion
Pile Capacity (Q-case)
Based on one boring (L-4A)-A1
FIGURE ED-F-10
SHEET 2 of 3

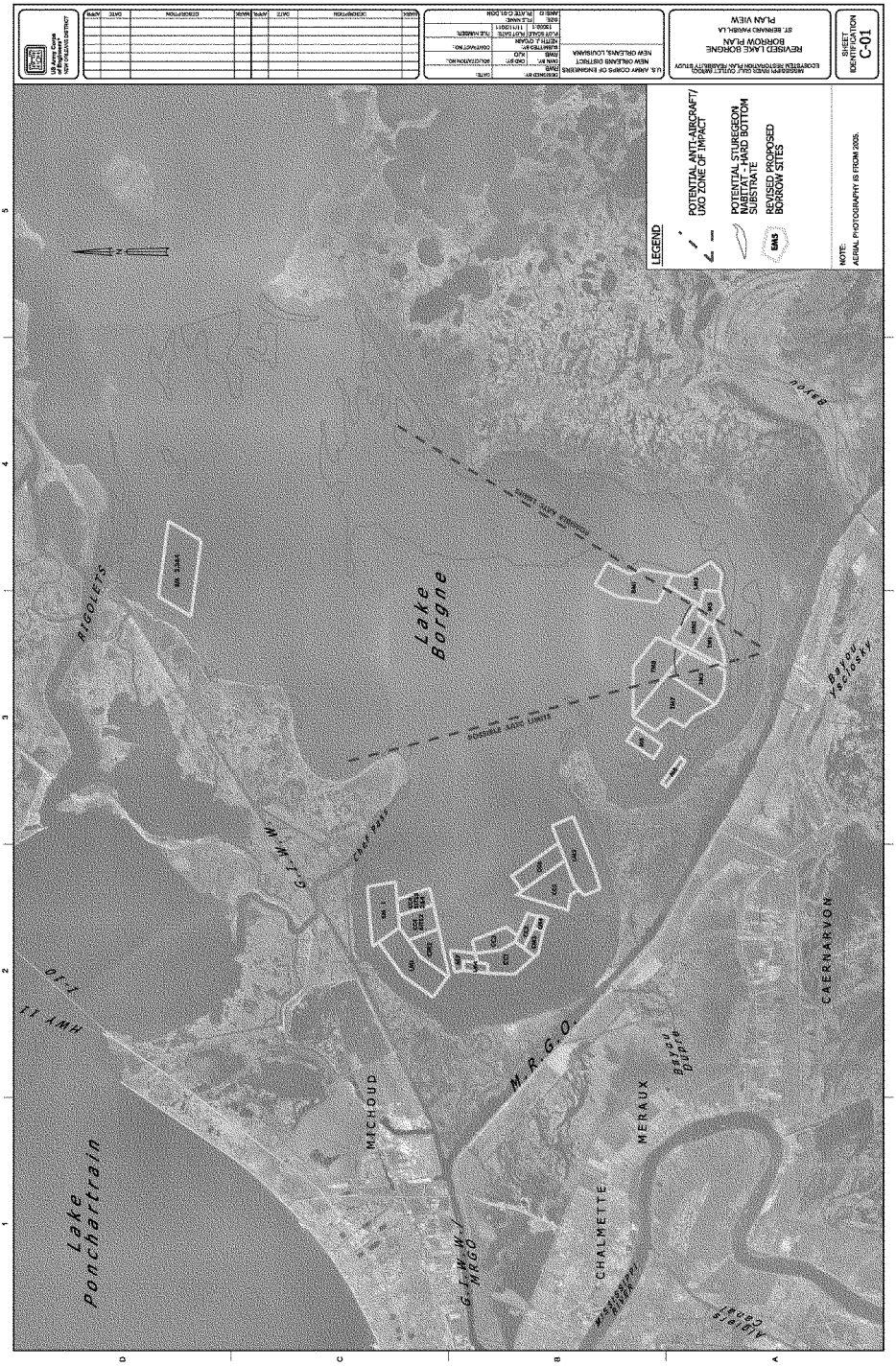

Pn — SOIL PRESSURE — PSF
KHB (PSI)
LOAD (TONS)
ELEVATIONS IN FEET N.G.V.D.
TYPICAL SOIL PROFILE
SOIL STRATIFICATION IS BASED ON GEOLOGIC PROFILE
SHEAR STRENGTH AND WET DENSITIES SEE PLATE
SECOND ORDER STATIONS
S-CASE
CH,CL- Φ=23°
ML- Φ=28°
SM,SP- Φ=30°
PILE SPACING IN DIRECTION OF LOADING
D
1.00
.85
.70
.55
.40
.25
LOADING CONDITION
INITIAL LOADING
CYCLIC LOADING
COMPRESSION (S.F.=1.0)
Kc=1.00
TENSION (S.F.=1.0)
Kt=0.70
REGULAR POLYGON OR CIRCULAR
14x14 Concrete
S-CASE
Q-CASE
MRGO - Ecosystem Restoration Project
Violet Diversion Structure Foundations
Mississippi River Gulf Outlet Location
Pile Capacity (Q-case)
Based on one boring (LPV-145-1B1B)
FIGURE ED-F-10
SHEET 3 of 6

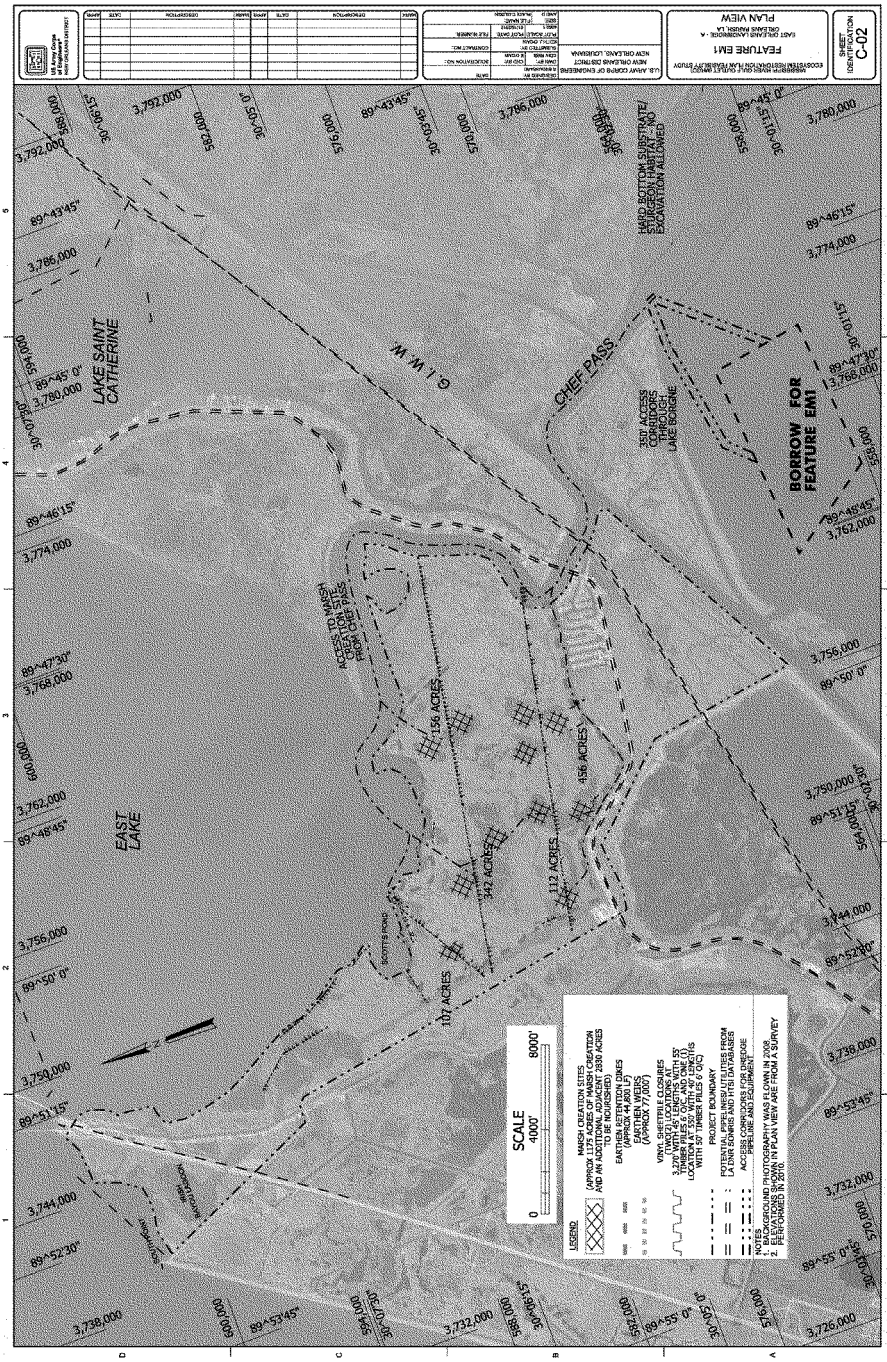

SOIL PRESSURE - PSF
K+B (PSI)
LOAD (TONS)
ELEVATIONS IN FEET N.A.V.D.
COMPRESSION (S.F.=1.0)
Q-CASE
S-CASE
TENSION (S.F.=1.0)
Q-CASE
S-CASE
TIMBER PILE CAPACITY
WALLS (1) - (15)
JHNC
DREAMS PARISH, ST. BERNARD PARISH, LA
MISSISSIPPI RIVER GULF OUTLET LWRDCU
FIGURE 10 OF 10
SHEET 4 OF 6

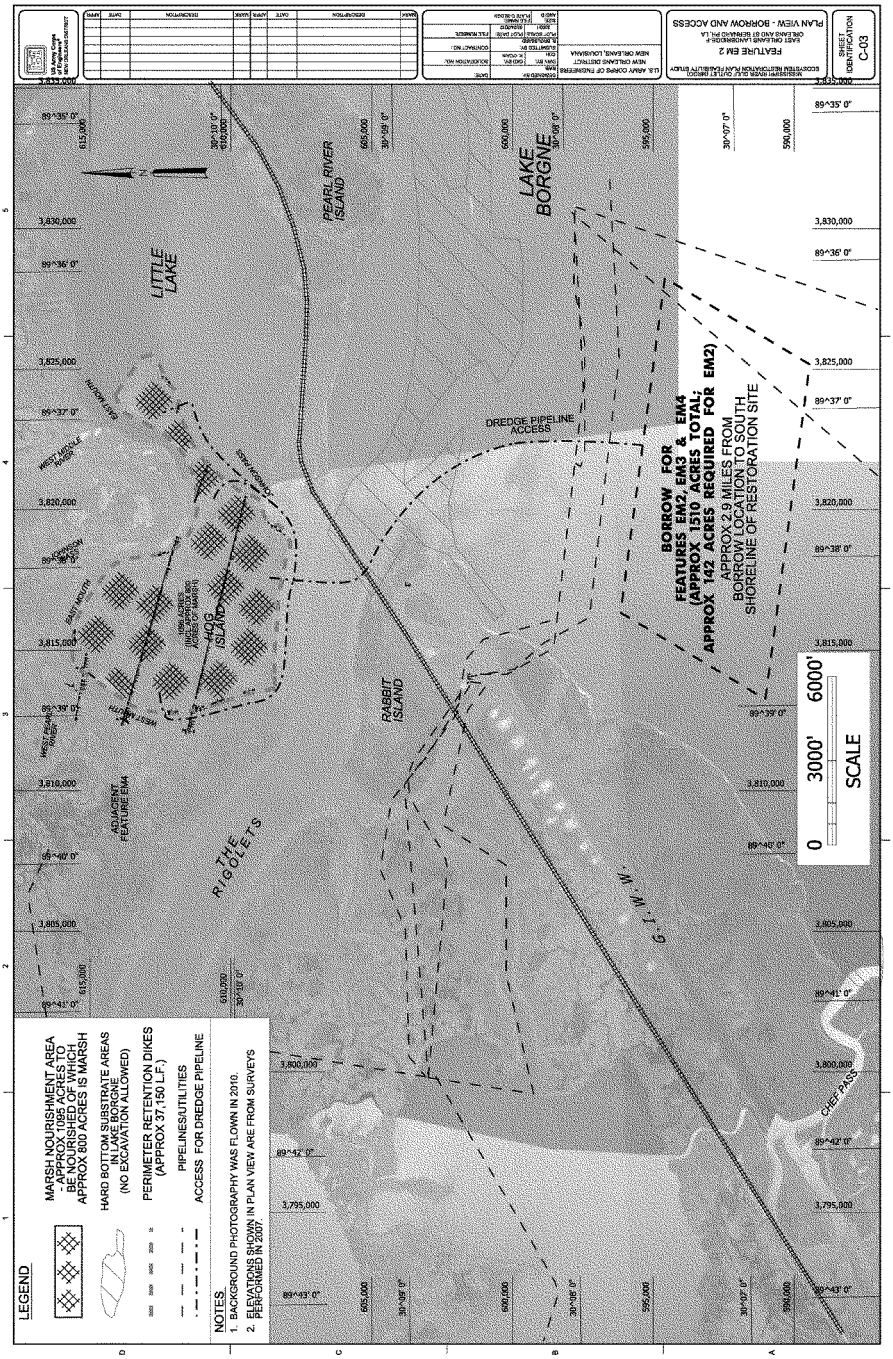

SOIL PRESSURE - PSF
Kx/B (PSI)
ELEVATIONS IN FEET N.A.V.D.
LOAD (TONS)
COMPRESSION (S.F.=1.0)
Q-CASE
S-CASE
TENSION (S.F.=1.0)
Q-CASE
S-CASE
MISSISSIPPI RIVER GULF OUTLET, LOUISIANA
CONSTRUCTION FEATURES - REACH 1
BAYOU DUPRE TO SHELL
TIMBER PILE TEST
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
PLATE 10 OF 10
SHEET 5 OF 6

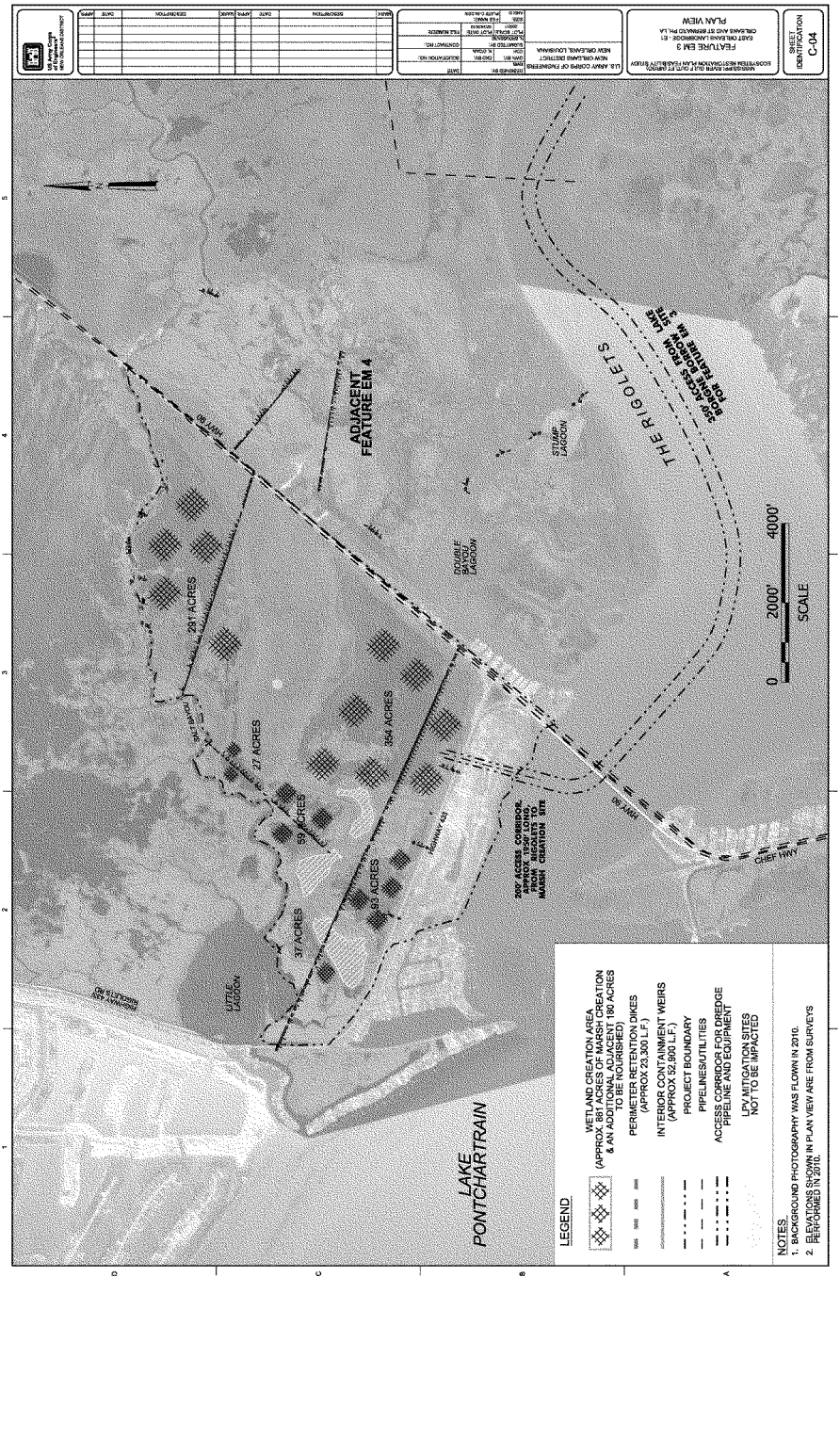

SOIL PRESSURE - PSF
K+B (PSI)
ELEVATIONS IN FEET N.A.V.D.
LOAD (TONS)
COMPRESSION (S.F.=1.0)
TENSION (S.F.=1.0)
Q-CASE
S-CASE
SHELL BEACH TO BAYOU
LATTICE PILE (PILE 3)
LOADING CONDITION
INITIAL LOADING
CYCLIC LOADING

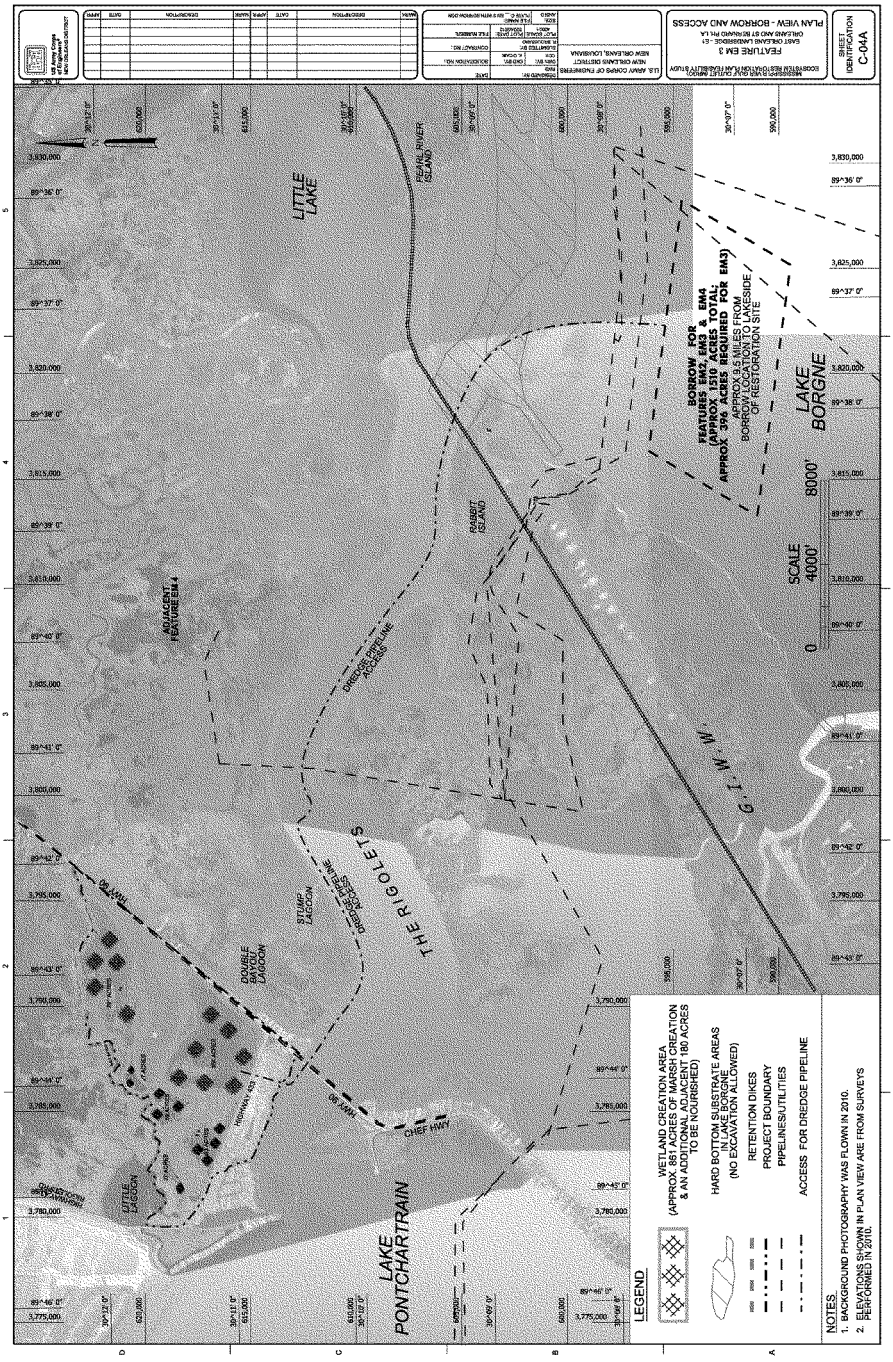
PLATES


Lake Pontchartrain
Lake Borgne
RIGOLETS
CHALMETTE
MERAUX
CAERNARVON
MICHOUD
HWY 11
I-10
G.I.W.W.
M.R.G.O.
Bayou Yscloskey
LEGEND
POTENTIAL ANTI-AIRCRAFT/ UXO ZONE OF IMPACT
POTENTIAL STURGEON HABITAT - HARD BOTTOM SUBSTRATE
REVISED PROPOSED BORROW SITES
NOTE:
AERIAL PHOTOGRAPHY IS FROM 2005.
REVISED LAKE BORGNE BORROW PLAN
ST. BERNARD PARISH, LA
PLAN VIEW
SHEET IDENTIFICATION
C-01
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA
DESIGNED BY
DRAWN BY
CHECKED BY
APPROVED BY
SCALE
1"=1000'-0"
SHEET NUMBER
DATE
PLATE C-01 DGN
DESIGNED
DRAWN
CHECKED
APPROVED
DATE
DESCRIPTION
MARK

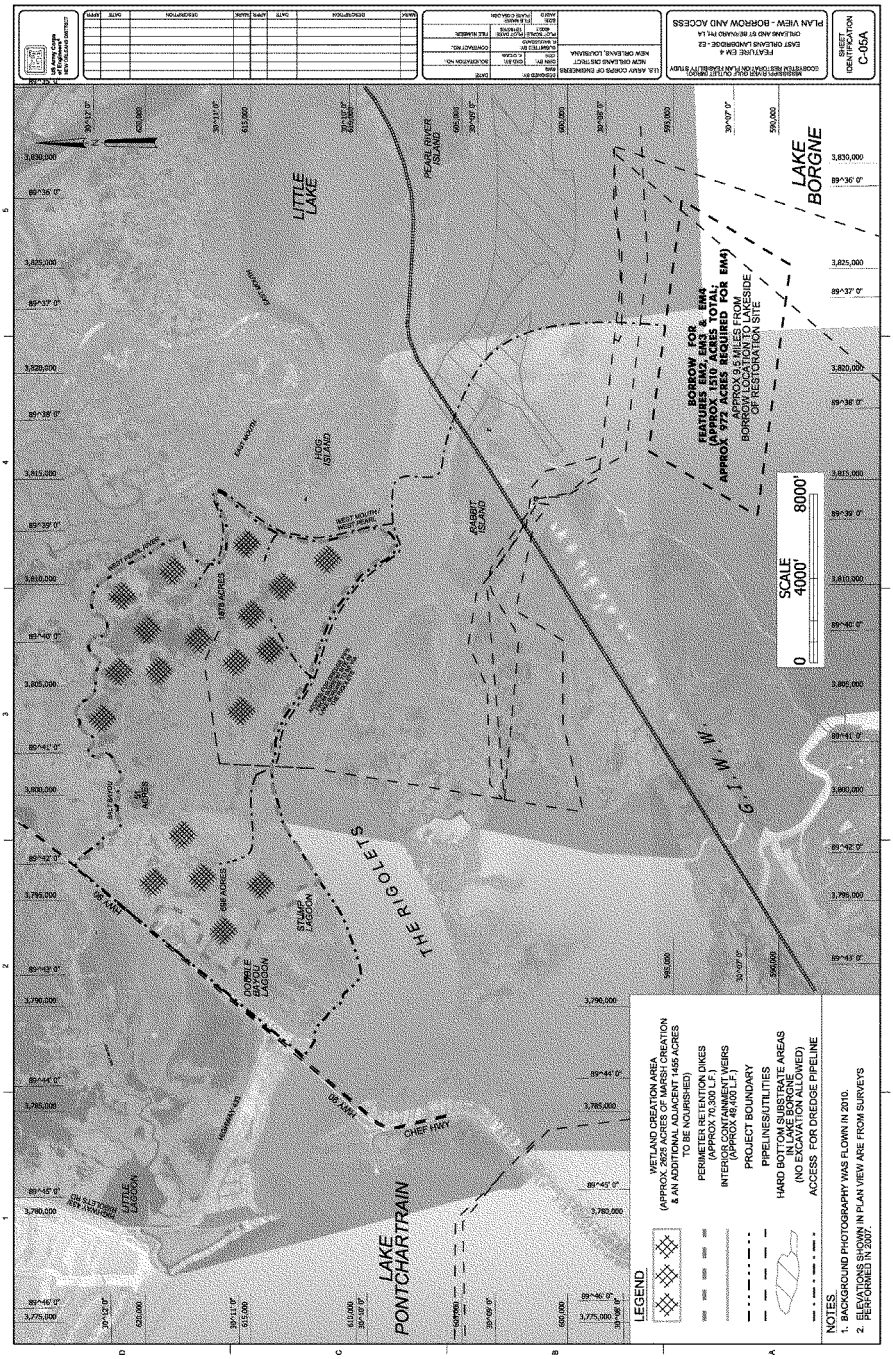

FEATURE EM1
PLAN VIEW
SHEET IDENTIFICATION
C-02
LAKE SAINT CATHERINE
EAST LAKE
CHEF PASS
BORROW FOR FEATURE EM1
HARD BOTTOM SUBSTRATE/ STURGEON HABITAT - NO EXCAVATION ALLOWED
350' ACCESS CORRIDORS THROUGH LAKE BORGNE
ACCESS TO MARSH CREATION SITES VIA CHEF PASS
G.I.W.W.
SCOTTS POINT
156 ACRES
342 ACRES
113 ACRES
456 ACRES
107 ACRES
SCALE
0
4000'
8000'
LEGEND
MARSH CREATION SITES (APPROX 1,400 ACRES WITHIN FOOTPRINT AND AN ADDITIONAL ADJACENT 3330 ACRES TO BE NOURISHED)
EARTHEN DIKES (APPROX 44,200 LF)
VINYL SHEETPILE CLOSURES (TWO) LOCATIONS AT 3,200 LF EACH, WITH ONE (1) TIMBER PILE 5' O/C AND ONE (1) LOCATION AT 1,800 LF WITH TIMBER PILE 5' O/C
PROJECT BOUNDARY
POTENTIAL PIPELINE/UTILITIES FROM DREDGE AREA TO MARSH CREATION SITES
ACCESS CORRIDORS FOR DREDGE PIPELINE AND EQUIPMENT
NOTES
1. BACKGROUND PHOTOGRAPHY WAS FLOWN IN 2009
2. ELEVATIONS ARE IN FEET AND REFERENCED TO NAVD88
PLAN VIEW AGE FROM A SURVEY PERFORMED IN 2016

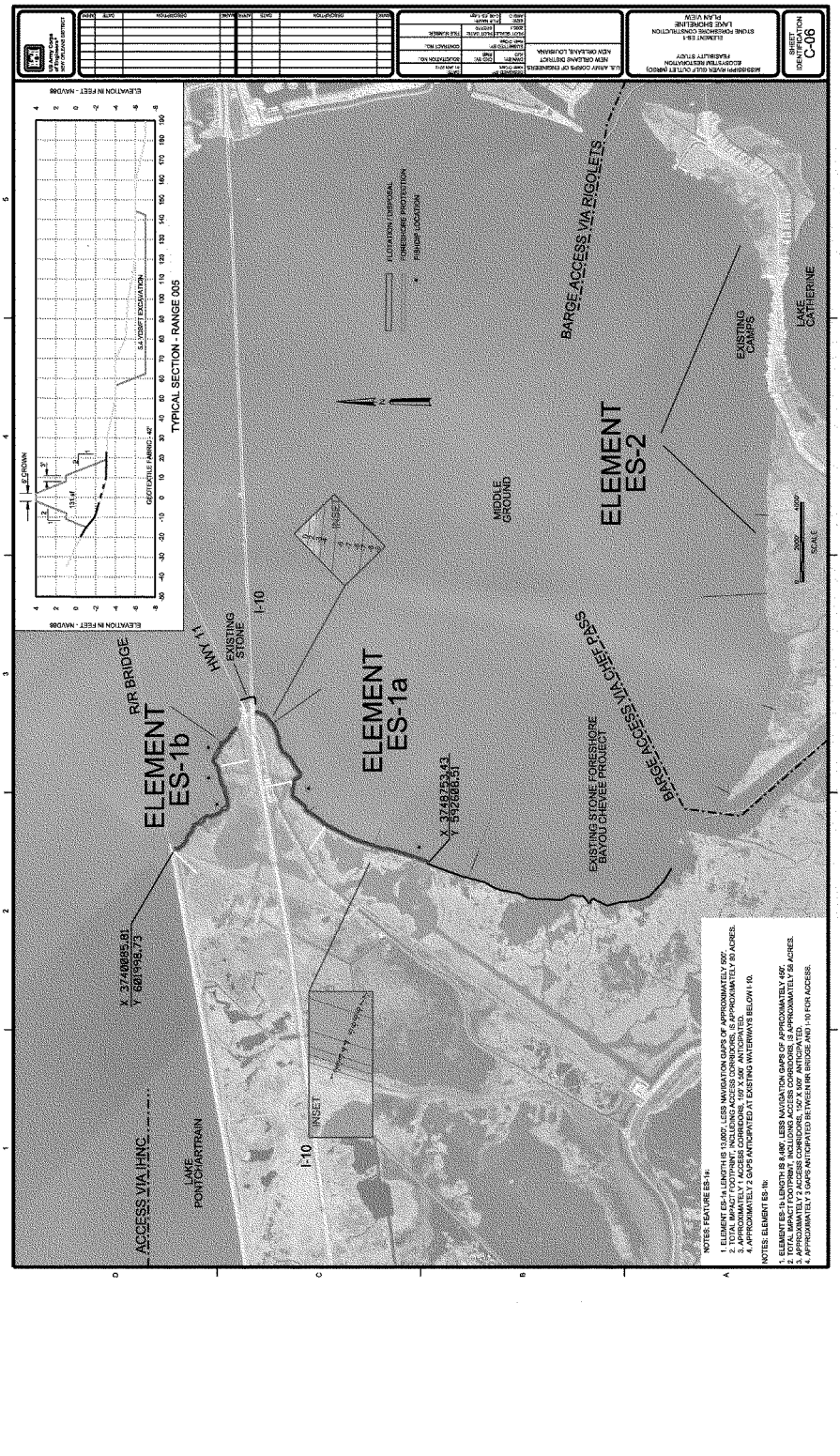

LEGEND
MARSH NOURISHMENT AREA APPROX 1086 ACRES TO BE BUILT TO +2.5' NAVD88 APPROX 800 ACRES IS MARSH
HARD BOTTOM SUBSTRATE AREAS (NO EXCAVATION ALLOWED)
PERIMETER RETENTION DIKES (APPROX 37,150 LF.)
PIPELINES/UTILITIES
ACCESS FOR DREDGE PIPELINE
NOTES
1. BACKGROUND PHOTOGRAPHY WAS FLOWN IN 2010.
2. ELEVATIONS SHOWN IN PLAN VIEW ARE FROM SURVEYS PERFORMED IN 2007.
LITTLE LAKE
PEARL RIVER ISLAND
LAKE BORGNE
RABBIT ISLAND
THE RIGOLETS
HOG ISLAND
ADJACENT FEATURE EM4
DREDGE PIPELINE ACCESS
BORROW FOR FEATURES EM2, EM3 & EM4 (APPROX 1510 ACRES TOTAL; APPROX 142 ACRES REQUIRED FOR EM2)
APPROX 2.9 MILES FROM BORROW LOCATION TO SOUTH SHORELINE OF RESTORATION SITE
G.I.W.W.
CHEF PASS
0 3000' 6000'
SCALE
FEATURE EM 2
EAST ORLEANS LANDBRIDGE F
CWPPRA NEED
PLAN VIEW - BORROW AND ACCESS
SHEET IDENTIFICATION
C-03

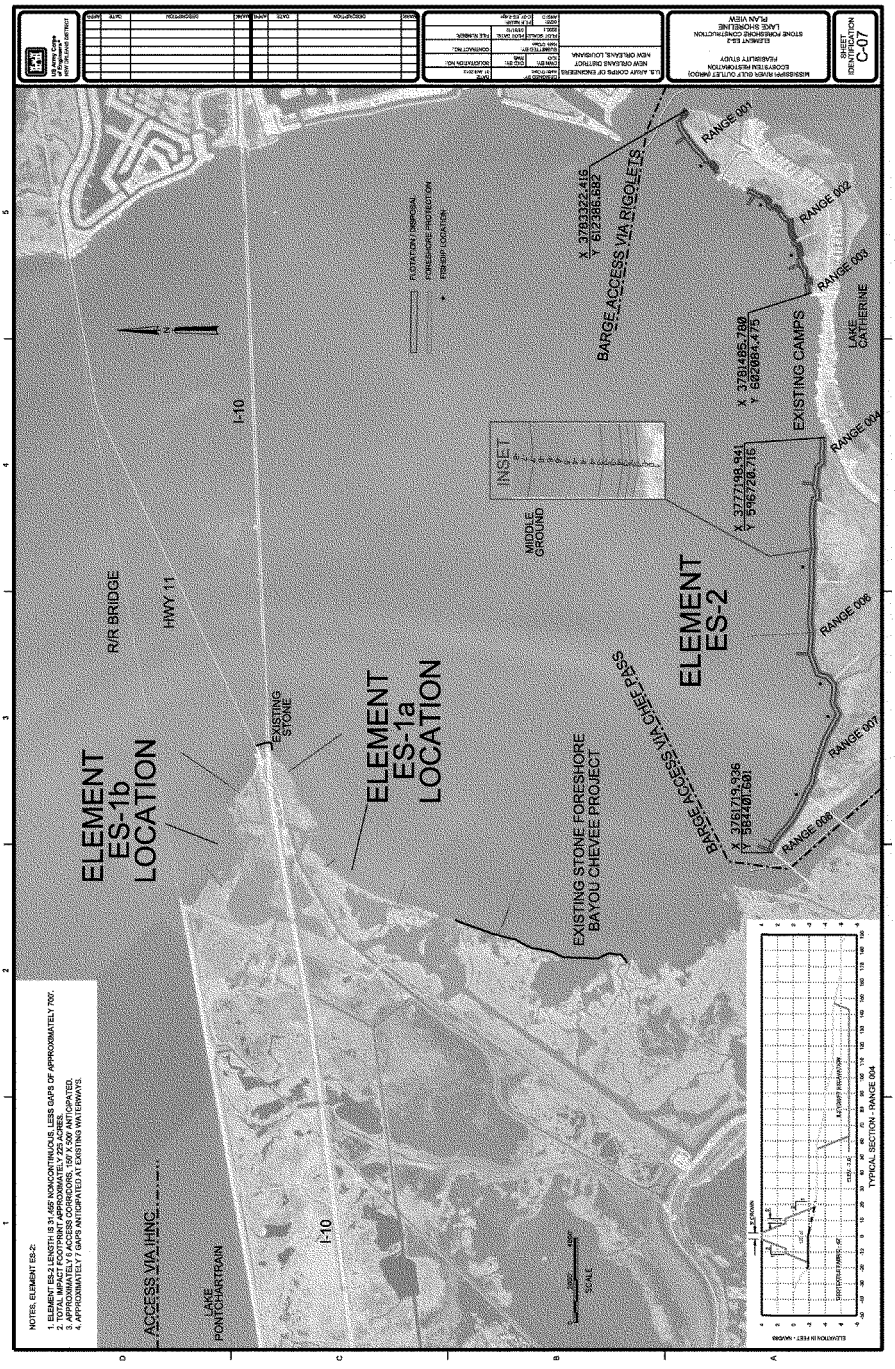

LAKE PONTCHARTRAIN
LITTLE LAGOON
DOUBLE BAYOU LAGOON
STUMP LAGOON
THE RIGOLETS
ADJACENT FEATURE EM 4
291 ACRES
27 ACRES
59 ACRES
37 ACRES
93 ACRES
354 ACRES
397 ACRES OTHERWISE IMPACTED FROM RESULTS TO MARSH CREATION SITE
350 ACRES BROWN WATER BOTTOMLAND HARDWOOD SWAMP MITIGATION SITE
CHEF HWY
0
2000'
4000'
SCALE
LEGEND
WETLAND CREATION AREA (APPROX. 861 ACRES OF MARSH CREATION & AN ADDITIONAL ADJACENT 180 ACRES TO BE ACQUIRED, IF NEEDED)
PERIMETER RETENTION DIKES (APPROX 23,300 L.F.)
INTERIOR CONTAINMENT WEIRS (APPROX 52,900 L.F.)
PROJECT BOUNDARY
PIPELINES/UTILITIES
ACCESS CORRIDOR FOR DREDGE PIPELINE AND EQUIPMENT
LPV MITIGATION SITES NOT TO BE IMPACTED
NOTES:
1. BACKGROUND PHOTOGRAPHY WAS FLOWN IN 2010.
2. ELEVATIONS SHOWN IN PLAN VIEW ARE FROM SURVEYS PERFORMED IN 2010.
FEATURE EM 3
PLAN VIEW
C-04

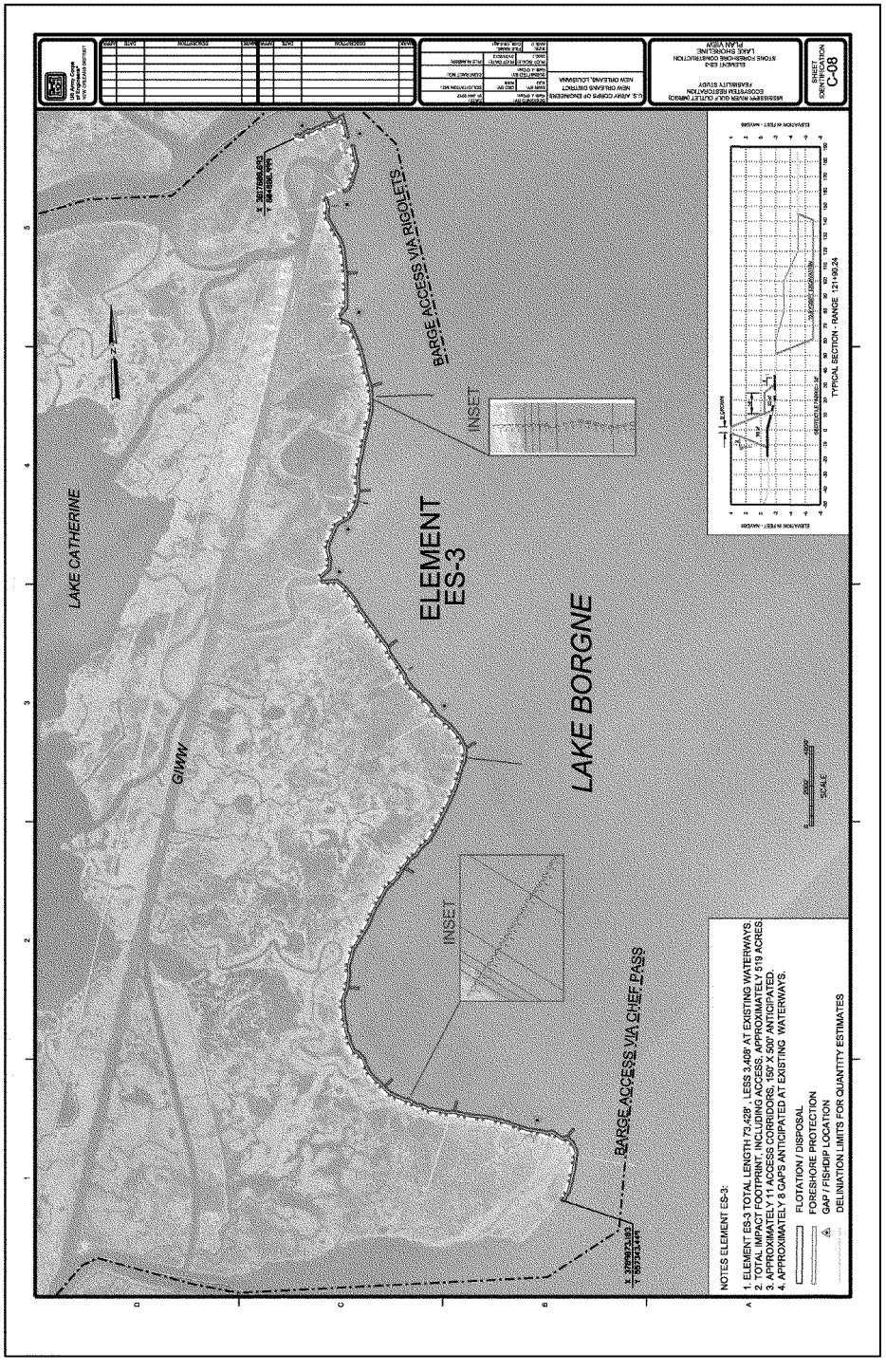

FEATURE EM 3
EAST ORLEANS LANDBRIDGE - ST. CHARLES AND ST BERNARD PAR. LA
PLAN VIEW - BORROW AND ACCESS
SHEET IDENTIFICATION
C-04A
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
LITTLE LAKE
PEARL RIVER ISLAND
RABBIT ISLAND
LAKE BORGNE
LAKE PONTCHARTRAIN
THE RIGOLETS
CHEF HWY
ADJACENT FEATURE EM 4
DREDGE PIPELINE ACCESS
BORROW FOR FEATURES EM 3 & EM4
(APPROX. 1310 ACRES TOTAL)
APPROX. 399 ACRES REQUIRED FOR EM3
APPROX 9.5 MILES FROM BORROW LOCATION TO LAKESIDE OF RESTORATION SITE
SCALE
0 4000' 8000'
LEGEND
WETLAND CREATION AREA (APPROX 1,131 ACRES OF MARSH CREATION & AN ADDITIONAL ADJACENT 180 ACRES TO BE NOURISHED)
HARD BOTTOM SUBSTRATE AREAS IN LAKE BORGNE (NO EXCAVATION ALLOWED)
RETENTION DIKES
PROJECT BOUNDARY
PIPELINES/UTILITIES
ACCESS FOR DREDGE PIPELINE
NOTES:
1. BACKGROUND PHOTOGRAPHY WAS FLOWN IN 2010.
2. ELEVATIONS SHOWN IN PLAN VIEW ARE FROM SURVEYS PERFORMED IN 2010.

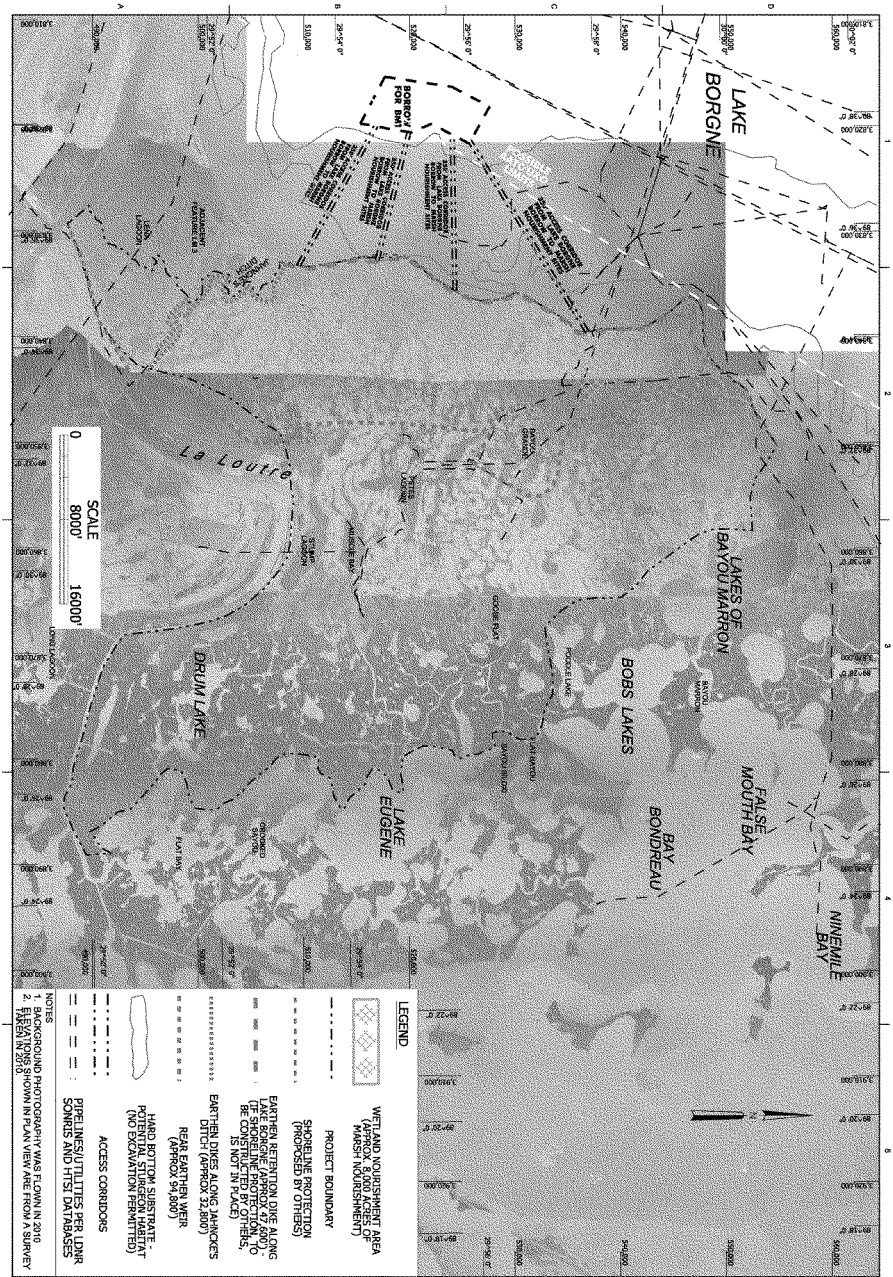
LEGEND
WETLAND CREATION AREA (APPROX. 2625 ACRES OF MARSH CREATION & AN ADDITIONAL ADJACENT 1455 ACRES TO BE NOURISHED)
PERIMETER RETENTION DIKES (APPROX 70,300 L.F.)
INTERIOR CONTAINMENT WEIRS (APPROX 49,400 L.F.)
PROJECT BOUNDARY
PIPELINES/UTILITIES
NOTES
1. BACKGROUND PHOTOGRAPHY WAS FLOWN IN 2010.
2. ELEVATIONS SHOWN IN PLAN VIEW ARE FROM SURVEYS PERFORMED IN 2010.
ADJACENT FEATURE EM 1
51 ACRES
1870 ACRES
696 ACRES
DOUBLE BAYOU LAGOON
STUMP LAGOON
THE RIGOLETS
HOG ISLAND
ADJACENT FEATURE EM 2
WEST MOUTH WEST PASS
ACCESS FOR DREDGE PIPE FROM BORROW SITE IN LAKE BORGNE TO BE VIA THE RIGOLETS
RABBIT ISLAND
HIGHWAY 433
WEST PEARL RIVER
0 2000' 4000'
SCALE
FEATURE EM 4
EAST CHALMETTE LANDBRIDGE - E2
ST. BERNARD PAR. LA.
PLAN VIEW
SHEET IDENTIFICATION
C-05


PLAN VIEW - BORROW AND ACCESS
SHEET IDENTIFICATION
C-05A
LAKE PONTCHARTRAIN
LAKE BORGNE
LITTLE LAKE
PEARL RIVER ISLAND
HOG ISLAND
RABBIT ISLAND
THE RIGOLETS
LITTLE LAGOON
DOUBLE BATTURE LAGOON
STUMP LAGOON
CHEF HWY
90 APPX
BORROW FOR EM4 FEATURES AND EM5 (APPROX 1510 ACRES TOTAL; APPROX 972 ACRES REQUIRED FOR EM4)
APPROX 9.5 MILES FROM BORROW LOCATION TO LAKESIDE OF RESTORATION SITE
SCALE 4000' 8000'
LEGEND
WETLAND CREATION AREA (APPROX 2626 ACRES OF MARSH CREATION & AN ADDITIONAL 1465 ACRES TO BE ACQUIRED)
PERIMETER RETENTION DIKES (APPROX 10,300 L.F.)
INTERIOR CONTAINMENT WEIRS (APPROX 48,400 L.F.)
PROJECT BOUNDARY
PIPELINES/UTILITIES
HARD BOTTOM SUBSTRATE AREAS IN LAKE BORGNE (NO EXCAVATION ALLOWED)
ACCESS FOR DREDGE PIPELINE
NOTES:
1. BACKGROUND PHOTOGRAPHY WAS FLOWN IN 2010.
2. ELEVATIONS SHOWN IN PLAN VIEW ARE FROM SURVEYS PERFORMED IN 2007.

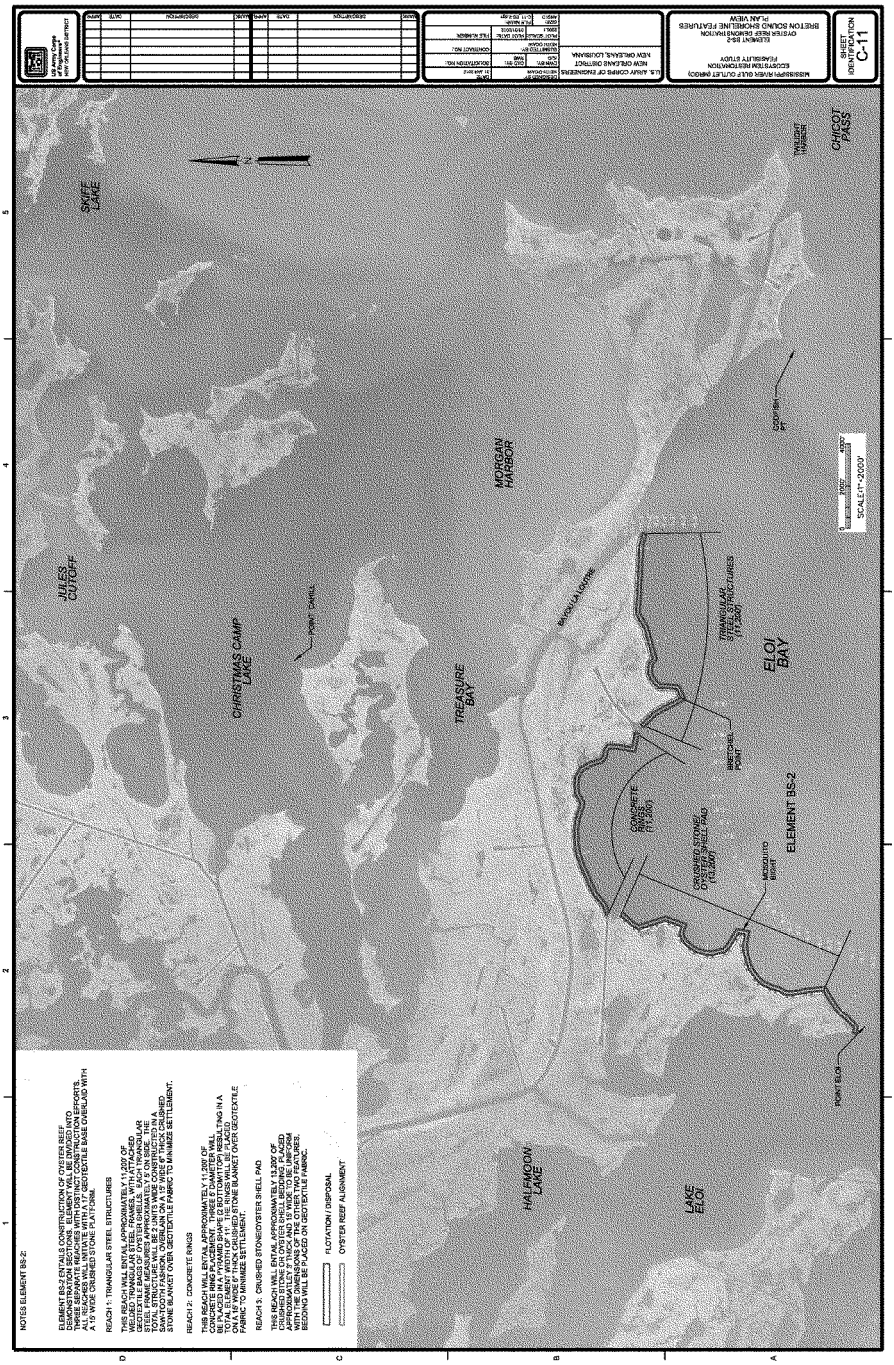

ELEMENT ES-1b
ELEMENT ES-1a
ELEMENT ES-2
RR BRIDGE
HWY 11
I-10
EXISTING STONE
MIDDLE GROUND
EXISTING CAMPS
LAKE CATHERINE
LAKE PONTCHARTRAIN
ACCESS VIA HNC
BARGE ACCESS VIA RIGOLETS
BARGE ACCESS VIA CHEF PASS
EXISTING STONE FORESHORE BAYOU CHEVEE PROJECT
X 3746895.81
Y 681948.73
X 3749253.43
Y 692686.51
FLOTATION / DISPOSAL
FORESHORE PROTECTION
RIPRAP LOCATION
TYPICAL SECTION - RANGE 005
ELEVATION IN FEET - NAVD88
STA/DIST EXCAVATION
DEPTH/STA / RANGE -45'
2.5%SLOPE
INSET
SCALE
1000'
2000'
NOTES: FEATURE ES-1a:
1. ELEMENT ES-1a LENGTH IS 13,800', LESS NAVIGATION GAPS OF APPROXIMATELY 500'.
2. TOTAL IMPACT FOOTPRINT, INCLUDING ACCESS CORRIDORS, IS APPROXIMATELY 80 ACRES.
3. ESTIMATED CONSTRUCTION TIME IS APPROXIMATELY 1 YEAR.
4. APPROXIMATELY 2 GAPS ANTICIPATED AT EXISTING WATERWAYS BELOW I-10.
NOTES: ELEMENT ES-1b:
1. ELEMENT ES-1b LENGTH IS 8,400', LESS NAVIGATION GAPS OF APPROXIMATELY 450'.
2. TOTAL IMPACT FOOTPRINT, INCLUDING ACCESS CORRIDORS, IS APPROXIMATELY 55 ACRES.
3. APPROXIMATELY 2 ACCESS CORRIDORS, 150' X 800' ANTICIPATED.
4. APPROXIMATELY 3 GAPS ANTICIPATED BETWEEN RR BRIDGE AND I-10 FOR ACCESS.
MISSISSIPPI RIVER GULF OUTLET (MRGO)
ECOSYSTEM RESTORATION
FEASIBILITY STUDY
ELEMENT ES-1
STONE FORESHORE CONSTRUCTION
LAKE SHORELINE
PLAN VIEW
SHEET IDENTIFICATION
C-06
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA
US Army Corps of Engineers
New Orleans District

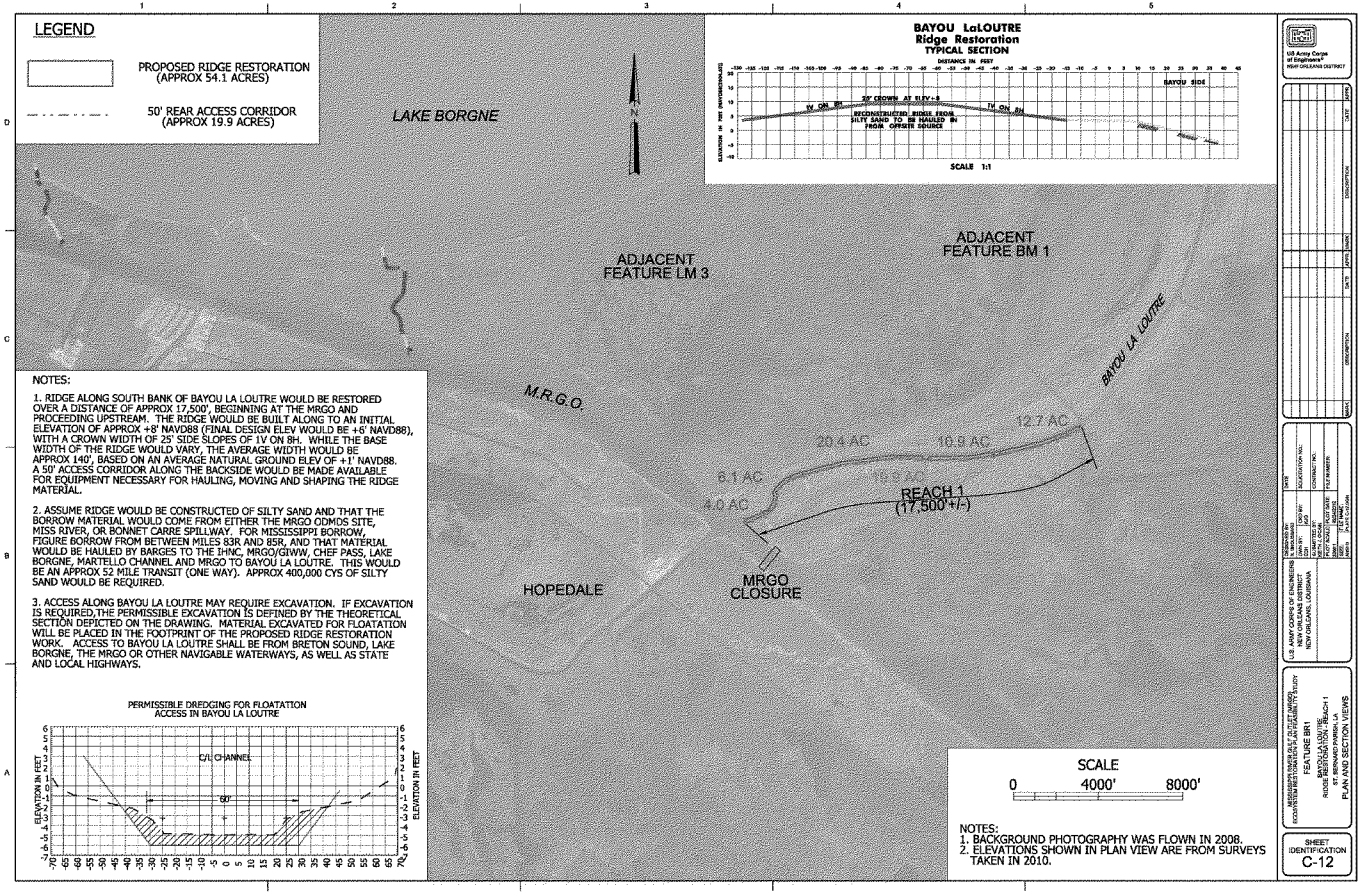

NOTES, ELEMENT ES-2:
1. ELEMENT ES-2 LENGTH IS 31,455' NONCONTINUOUS, LESS GAPS OF APPROXIMATELY 700'.
2. ALL ELEMENTS ARE APPROXIMATELY 1,000' WIDE.
3. APPROXIMATELY 7 ACCESS CORRIDORS, 150' X 500' ANTICIPATED.
4. APPROXIMATELY 7 GAPS ANTICIPATED AT EXISTING WATERWAYS.
ELEMENT ES-1b LOCATION
ACCESS VIA HNC
LAKE PONTCHARTRAIN
I-10
R/R BRIDGE
HWY 11
EXISTING STONE
ELEMENT ES-1a LOCATION
EXISTING STONE FORESHORE BAYOU CHEVEE PROJECT
BARGE ACCESS VIA CHEF PASS
ELEMENT ES-2
MIDDLE GROUND
INSET
FLOTATION / DISPOSAL
FORESHORE PROTECTION
FISHUP LOCATION
X 3793322.416
Y 612386.882
BARGE ACCESS VIA RIGOLETS
X 3791485.780
Y 582084.475
EXISTING CAMPS
X 3777198.941
Y 546726.716
X 3761719.338
Y 538401.501
RANGE 001
RANGE 002
RANGE 003
RANGE 004
RANGE 006
RANGE 007
RANGE 008
LAKE CATHERINE
SCALE
TYPICAL SECTION - RANGE 004
ELEVATION IN FEET - NAVD88
STATIONING IN FEET
EXISTING BATHYMETRY
PROPOSED TEMPLATE
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA
MISSISSIPPI RIVER GULF OUTLET (MRGO)
ECOSYSTEM RESTORATION
FEASIBILITY STUDY
ELEMENT ES-2
STONE NOURISHED CONSTRUCTION
LAKE SHORELINE
PLAN VIEW
SHEET IDENTIFICATION
C-07

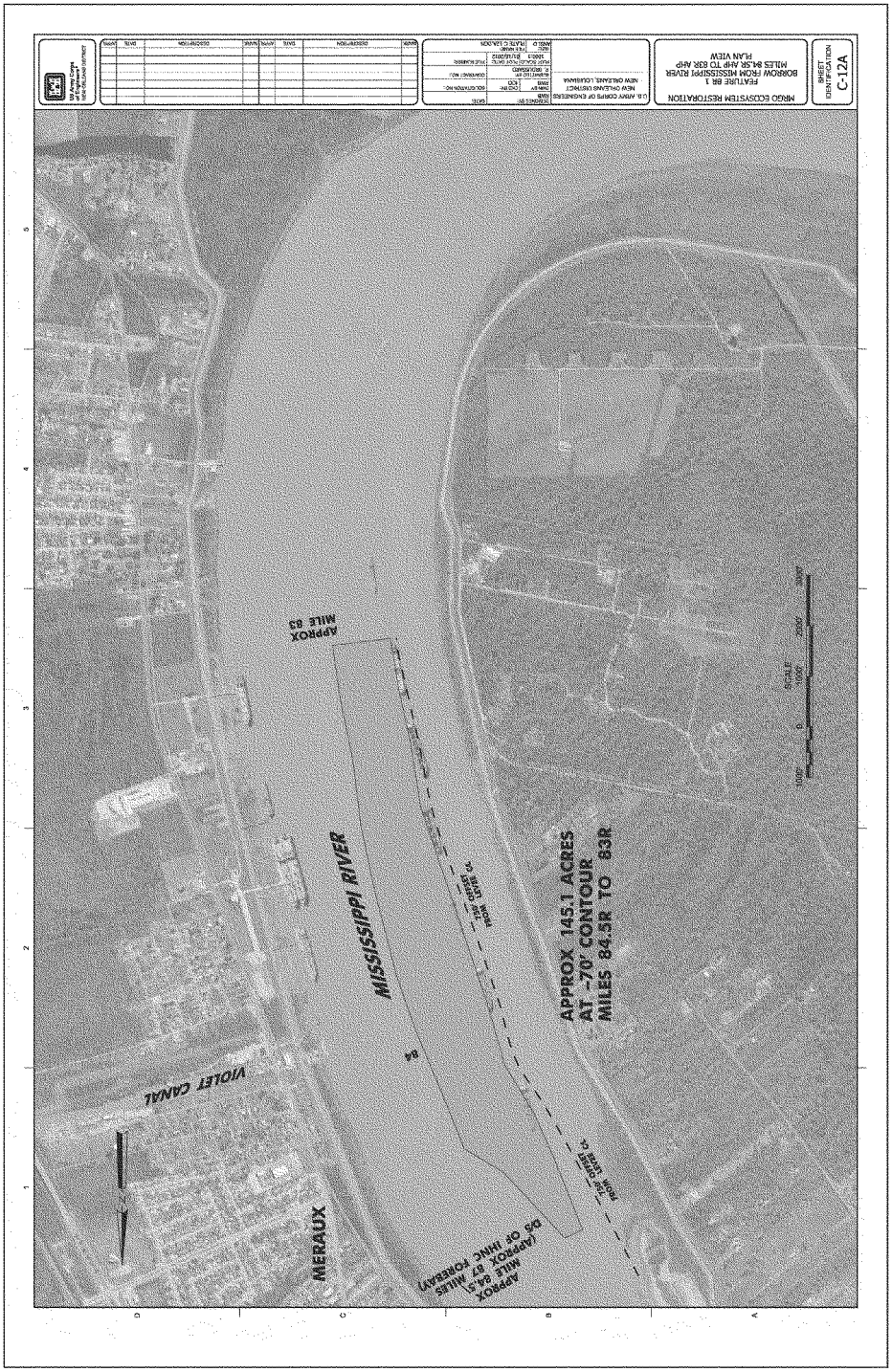

LAKE CATHERINE
GIWW
LAKE BORGNE
ELEMENT ES-3
INSET
INSET
BARGE ACCESS VIA RIGOLETS
BARGE ACCESS VIA CHEF PASS
NOTES ELEMENT ES-3:
1. ELEMENT ES-3 TOTAL LENGTH 73,428'. LESS 3,408' AT EXISTING WATERWAYS.
2. TOTAL IMPACT FOOTPRINT, INCLUDING ACCESS, APPROXIMATELY 519 ACRES.
3. APPROXIMATELY 11 ACCESS CORRIDORS, 150' X 500' ANTICIPATED.
4. APPROXIMATELY 8 GAPS ANTICIPATED AT EXISTING WATERWAYS.
FLOTATION / DISPOSAL
FORESHORE PROTECTION
GAP / FISHDIP LOCATION
DELINIATION LIMITS FOR QUANTITY ESTIMATES
SCALE
TYPICAL SECTION - RANGE 121+90.24
MISSISSIPPI RIVER GULF OUTLET (MRGO)
ECOSYSTEM RESTORATION
FEASIBILITY STUDY
ELEMENT ES-3
STONE POWER-CWE CONSTRUCTION
LAKE SHORELINE
PLAN VIEW
SHEET IDENTIFICATION
C-08

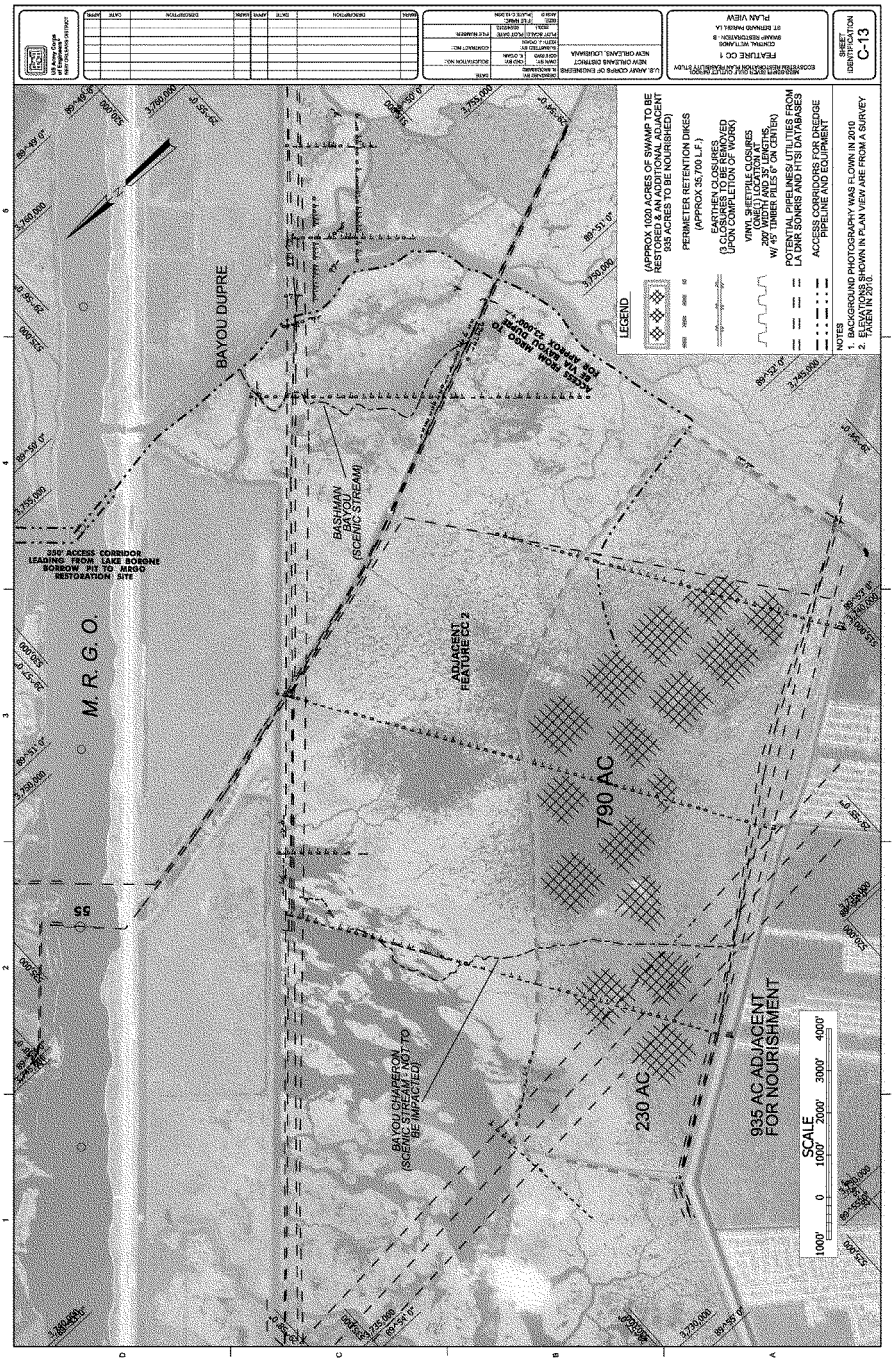

LAKE BORGNE
LAKES OF BAYOU MARRON
BOBS LAKES
FALSE MOUTH BAY
BAY BONDREAU
NINEMILE BAY
LAKE EUGENE
DRUM LAKE
La Loutre
SCALE
0
8000'
16000'
LEGEND
WETLAND NOURISHMENT AREA (APPROX 10,000 ACRES OF MARSH NOURISHMENT)
PROJECT BOUNDARY
SHORELINE PROTECTION (PROPOSED BY OTHERS)
EARTHEN RETENTION DIKE ALONG LAKE BORGNE (APPROX 47,000') (PROPOSED TO BE CONSTRUCTED BY OTHERS, IS NOT IN PLACE)
EARTHEN DIKES ALONG JAHNCKES DITCH (APPROX 32,800')
REAR EARTHEN WEIR (APPROX 99,800')
HARD BOTTOM SUBSTRATE POTENTIAL (NO EXCAVATION PERMITTED)
ACCESS CORRIDORS
PIPELINES/UTILITIES PER LDNR SONRIS AND HTSL DATABASES
NOTES
1. BACKGROUND PHOTOGRAPHY WAS FLOWN IN 2010
2. AREA IN 2018 SHOWN IN PLAN VIEW ARE FROM A SURVEY
MISSISSIPPI RIVER GULF OUTLET (MRGO) ECOSYSTEM RESTORATION PLAN FEASIBILITY STUDY
FEATURE BM 1
BILOXI MARSHES MARSH NOURISHMENT
ST. BERNARD PH., LA
PLAN VIEW
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA
DESIGNED BY: SML, TMS
DATE:
DRAWN BY: GNH MAK
CHKD BY: RMS
SUBMITTED BY: KEITH A. CRUSH
CONTRACT NO.:
PLOT SCALE: 1
PLOT DATE: 20190702
FILE NUMBER:
DATE AND D
FILE NAME: PLATE C-09.DGN
MARK
DESCRIPTION
DATE
APPR
SHEET IDENTIFICATION
C-09

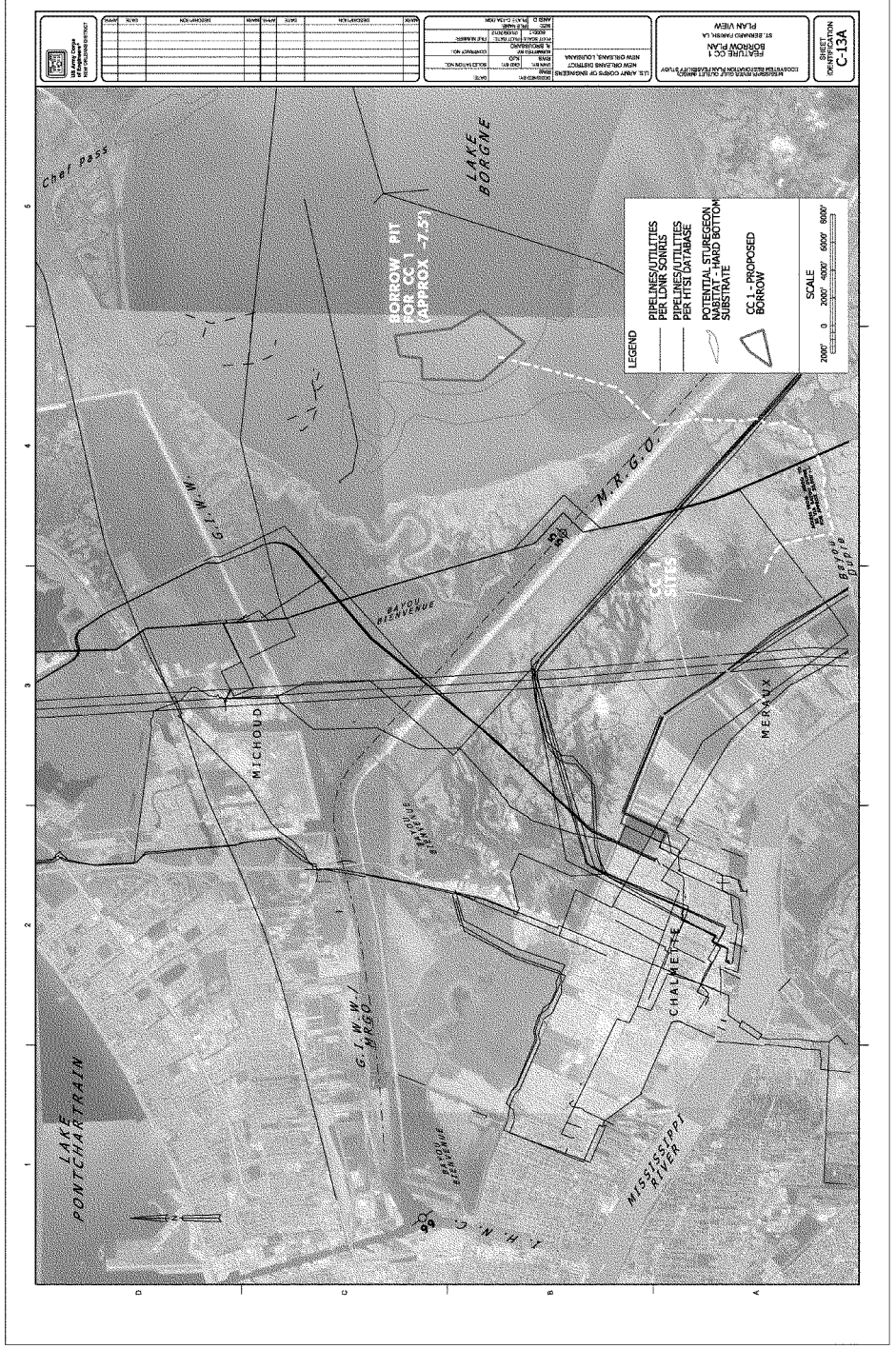
NOTES FEATURE BS-1:
1. FEATURE BS-1 TOTAL LENGTH IS 52,387' LESS 1,750' AT NAVIGATION GAPS.
2. TOTAL AREA OF FOOTPRINT INCLUDING GAPS APPROXIMATELY 280 ACRES.
3. NO ACRES OF CORRIDORS REQUIRED TO REACH FLOTATION CHANNEL ALIGNMENT.
4. APPROXIMATELY 11 GAPS ANTICIPATED AT EXISTING WATERWAYS.
FLOTATION / DISPOSAL
FORESHORE PROTECTION
GAP / FISHDIP LOCATION
REACH DELINIATION FOR QUANTITY ESTIMATE
LAKE BORGNE
ELEMENT BS-1
BARGE ACCESS VIA
GIWW AT RIGOLETS
MALHEAREUX POINT
INSET
LAKE SHORE BAYOU
MARCHETTES, POINTE AUX
BAYOU LA FEE
SCALE
TYPICAL SECTION - STATION 220+15.97
10.0 YDS/FT EXCAVATION
4' CROWN
ELEVATION IN FEET - NAVD88
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
MISSISSIPPI RIVER GULF OUTLET (MRGO)
ECOSYSTEM RESTORATION
FEASIBILITY STUDY
ELEMENT BS-1
STONE FOREBAY/REL CONSTRUCTION
LAKE BORGNE
PLAN VIEW
SHEET IDENTIFICATION
C-10

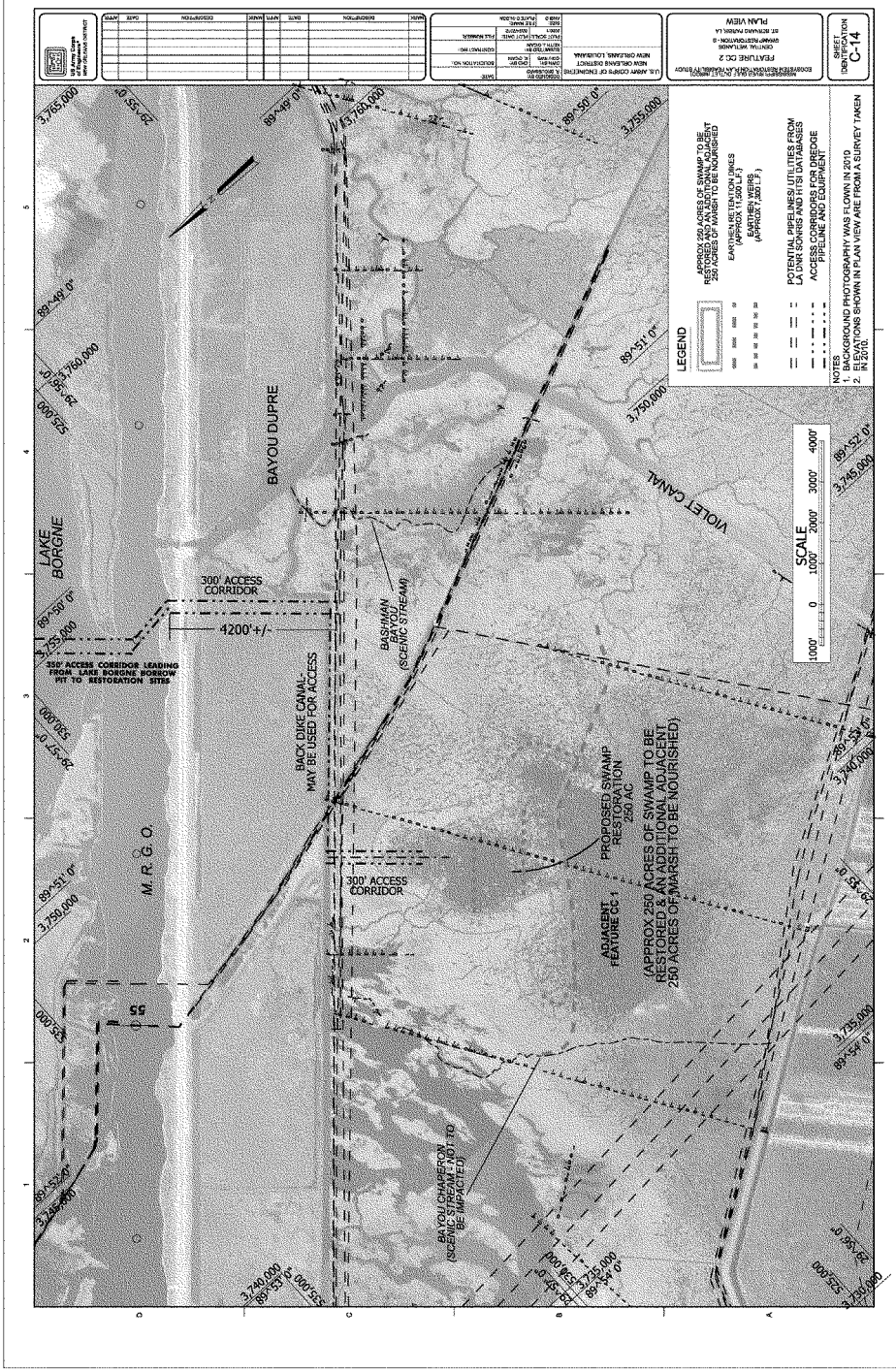

NOTES ELEMENT BS-2:
ELEMENT BS-2 ENTAILS CONSTRUCTION OF OYSTER REEF ELEMENTS WITHIN FOUR DISTINCT CONSTRUCTION EFFORTS. THESE SEPARATE REACHES WITH DISTINCT CONSTRUCTION EFFORTS ARE DESCRIBED BELOW. THE ENTIRE PROJECT FEATURE WILL END WITH A 15' WIDE CRUSHED STONE PLATFORM.
REACH 1: TRIANGULAR STEEL STRUCTURES
THIS REACH WILL ENTAIL APPROXIMATELY 11,200' OF CONSTRUCTED REEF FEATURE CONSISTING OF WELDED TRIANGULAR STEEL FRAMES WITH ATTACHED WELDED STEEL PLATES. THE BASE OF EACH TRIANGULAR STEEL FRAME MEASURES APPROXIMATELY 9' ON SIDE. THE STEEL STRUCTURES WILL BE PLACED ON THE BOTTOM IN A SAWTOOTH FASHION, OVERLAIN ON A 18' WIDE 8" THICK CRUSHED STONE BLANKET OVER GEOTEXTILE FABRIC TO MINIMIZE SETTLEMENT.
REACH 2: CONCRETE RINGS
THIS REACH WILL ENTAIL APPROXIMATELY 11,200' OF CONSTRUCTED REEF FEATURE CONSISTING OF CONCRETE RINGS. THE CONCRETE RINGS WILL BE PLACED IN A PYRAMID SHAPE (2 BOTTOM/1 TOP) RESULTING IN A 10' TALL FEATURE WITH A 7' TOP. THE RINGS WILL BE PLACED ON A 15' WIDE 8" THICK CRUSHED STONE BLANKET OVER GEOTEXTILE FABRIC TO MINIMIZE SETTLEMENT.
REACH 3: CRUSHED STONE/OYSTER SHELL PAD
THIS REACH WILL ENTAIL APPROXIMATELY 13,200' OF CONSTRUCTED REEF FEATURE CONSISTING OF CRUSHED STONE/OYSTER SHELL PAD. THE PAD WILL BE APPROXIMATELY 3' THICK AND 15' WIDE TO BE UNIFORM WITH THE CONCRETE RING REACH. TO PREVENT SETTLEMENT, BEDDING WILL BE PLACED ON GEOTEXTILE FABRIC.
FLOTATION / DISPOSAL
OYSTER REEF ALIGNMENT
HALFMOON LAKE
LAKE ELOI
JULES CUTOFF
SKIFF LAKE
CHRISTMAS CAMP LAKE
POINT CHRIS
TREASURE BAY
MORGAN HARBOR
BACKLAY CUTOFF
ELOI BAY
CONCRETE RINGS FY13/FY15
TRIANGULAR STEEL STRUCTURES FY17/FY20
BREEZE POINT
CRUSHED STONE/OYSTER SHELL PAD FY13/FY17
MOSQUITO POINT
ELEMENT BS-2
POINT ELOI
CHICOT PASS
TAYLORS HARBOR
CONCRETE RINGS
SCALE 1" = 2000'
2000' 0 4000'
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA
MISSISSIPPI RIVER GULF OUTLET (MRGO)
ECOSYSTEM RESTORATION
FEASIBILITY STUDY
ELEMENT BS-2
OYSTER REEF GROWOUT FUNCTION
BRETON SOUND SHORELINE FEATURES
PLAN VIEW
SHEET IDENTIFICATION
C-11

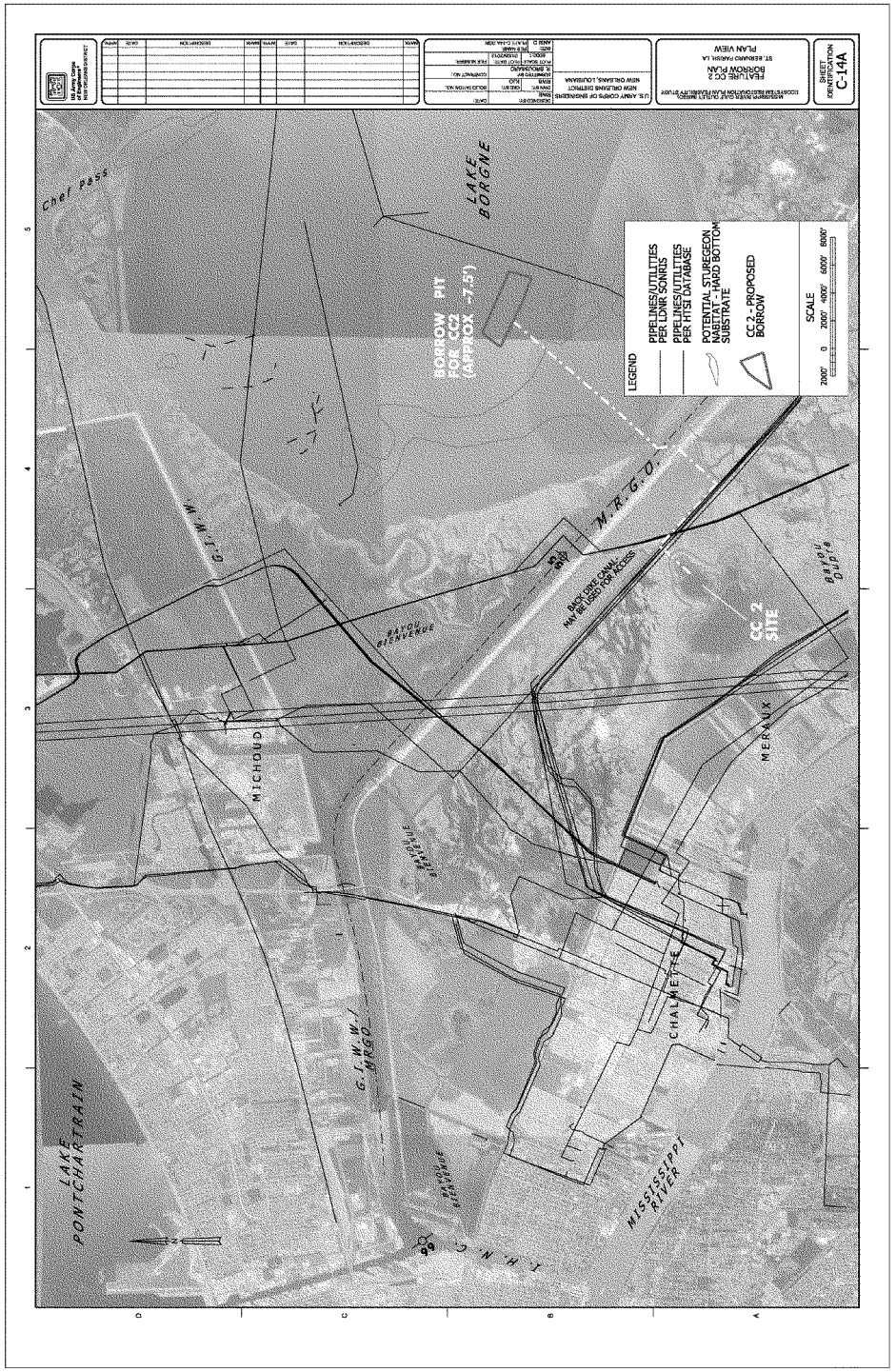

LEGEND
PROPOSED RIDGE RESTORATION (APPROX 54.1 ACRES)
50' REAR ACCESS CORRIDOR (APPROX 19.9 ACRES)
LAKE BORGNE
N
BAYOU LaLOUTRE
Ridge Restoration
TYPICAL SECTION
DISTANCE IN FEET
BAYOU SIDE
50' CROWN AT ELEV.+8
1V ON 8H
1V ON 8H
RECONSTRUCTED RIDGE FROM SILTY SAND TO BE HAULED IN FROM OFFSITE SOURCE
SCALE 1:1
ADJACENT FEATURE LM 3
ADJACENT FEATURE BM 1
BAYOU LA LOUTRE
M.R.G.O.
20.4 AC
16.9 AC
12.7 AC
8.1 AC
4.0 AC
REACH 1
(17,500'+/-)
MRGO CLOSURE
HOPEDALE
NOTES:
1. RIDGE ALONG SOUTH BANK OF BAYOU LA LOUTRE WOULD BE RESTORED OVER A DISTANCE OF APPROX 17,500', BEGINNING AT THE MRGO AND PROCEEDING UPSTREAM. THE RIDGE WOULD BE BUILT ALONG TO AN INITIAL ELEVATION OF APPROX +8' NAVD88 (FINAL DESIGN ELEV WOULD BE +6' NAVD88), WITH A CROWN WIDTH OF 25' SIDE SLOPES OF 1V ON 8H. WHILE THE BASE WIDTH OF THE RIDGE WOULD VARY, THE AVERAGE WIDTH WOULD BE APPROX 140', BASED ON AN AVERAGE NATURAL GROUND ELEV OF +1' NAVD88. A 50' ACCESS CORRIDOR ALONG THE BACKSIDE WOULD BE MADE AVAILABLE FOR EQUIPMENT NECESSARY FOR HAULING, MOVING AND SHAPING THE RIDGE MATERIAL.
2. ASSUME RIDGE WOULD BE CONSTRUCTED OF SILTY SAND AND THAT THE BORROW MATERIAL WOULD COME FROM EITHER THE MRGO ODMDS SITE, MISS RIVER, OR BONNET CARRE SPILLWAY. FOR MISSISSIPPI BORROW, FIGURE BORROW FROM BETWEEN MILES 83R AND 85R, AND THAT MATERIAL WOULD BE HAULED BY BARGES TO THE IHNC, MRGO/GIWW, CHEF PASS, LAKE BORGNE, MARTELLO CHANNEL AND MRGO TO BAYOU LA LOUTRE. THIS WOULD BE AN APPROX 52 MILE TRANSIT (ONE WAY). APPROX 400,000 CYS OF SILTY SAND WOULD BE REQUIRED.
3. ACCESS ALONG BAYOU LA LOUTRE MAY REQUIRE EXCAVATION. IF EXCAVATION IS REQUIRED,THE PERMISSIBLE EXCAVATION IS DEFINED BY THE THEORETICAL SECTION DEPICTED ON THE DRAWING. MATERIAL EXCAVATED FOR FLOATATION WILL BE PLACED IN THE FOOTPRINT OF THE PROPOSED RIDGE RESTORATION WORK. ACCESS TO BAYOU LA LOUTRE SHALL BE FROM BRETON SOUND, LAKE BORGNE, THE MRGO OR OTHER NAVIGABLE WATERWAYS, AS WELL AS STATE AND LOCAL HIGHWAYS.
PERMISSIBLE DREDGING FOR FLOATATION
ACCESS IN BAYOU LA LOUTRE
C/L CHANNEL
60'
ELEVATION IN FEET
SCALE
0 4000' 8000'
NOTES:
1. BACKGROUND PHOTOGRAPHY WAS FLOWN IN 2008.
2. ELEVATIONS SHOWN IN PLAN VIEW ARE FROM SURVEYS TAKEN IN 2010.
US Army Corps of Engineers
NEW ORLEANS DISTRICT
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
FEATURE BR1
BAYOU LA LOUTRE
RIDGE RESTORATION
ST. BERNARD PARISH, LA
PLAN AND SECTION VIEWS
SHEET IDENTIFICATION
C-12

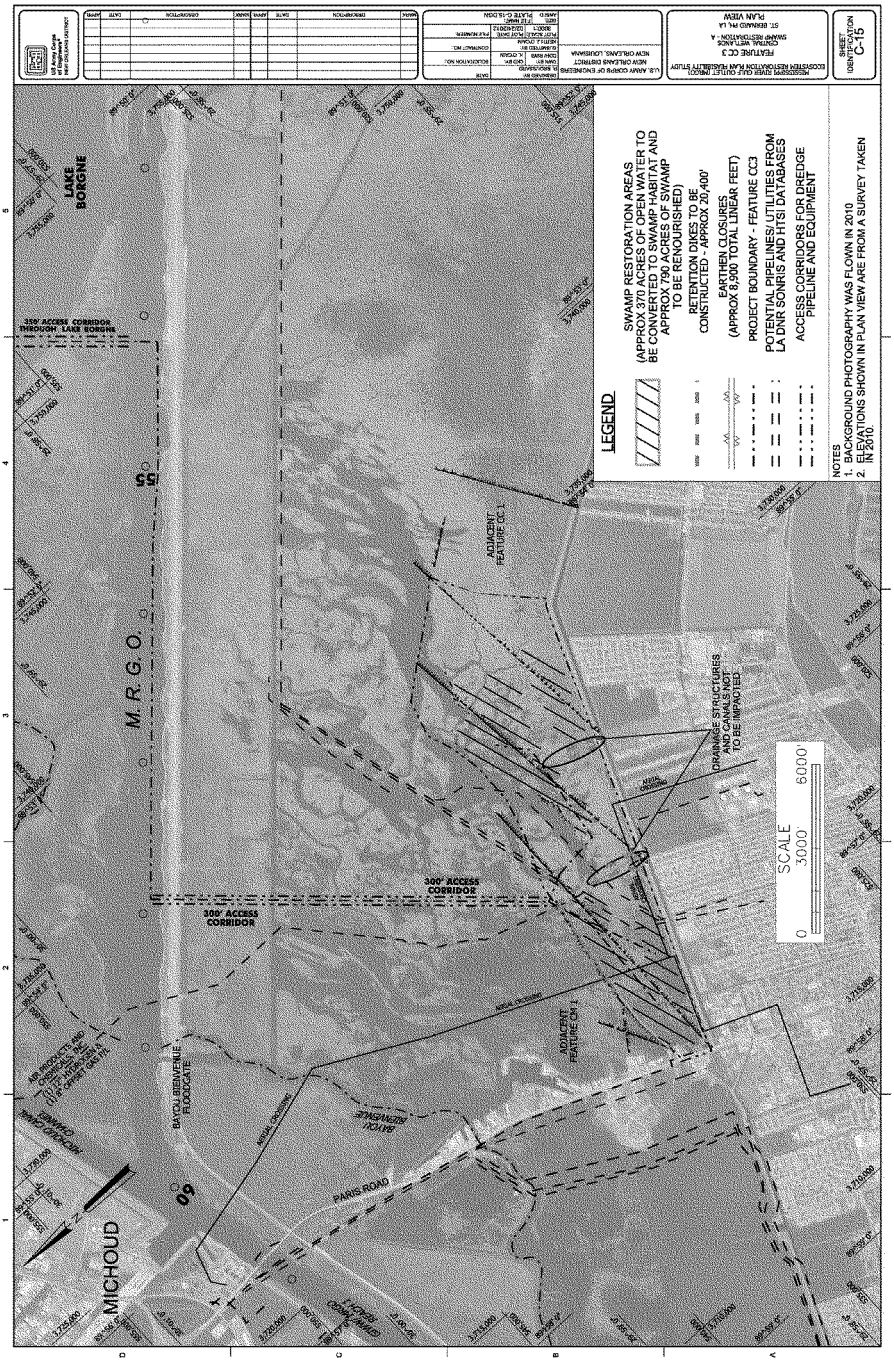

MRGO ECOSYSTEM RESTORATION
FEATURE BR 1
BORROW FROM MISSISSIPPI RIVER
MILES 84.5R A-P TO 83R A-P
PLAN VIEW
SHEET IDENTIFICATION
C-12A
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA
APPROX MILE 83
MISSISSIPPI RIVER
VIOLET CANAL
MERAUX
APPROX MILE 84.5R APPROX 87 MILES DS OF HNC FORESHAY
APPROX 145.1 ACRES AT -70' CONTOUR MILES 84.5R TO 83R
SCALE
1000 0 1000 2000 3000

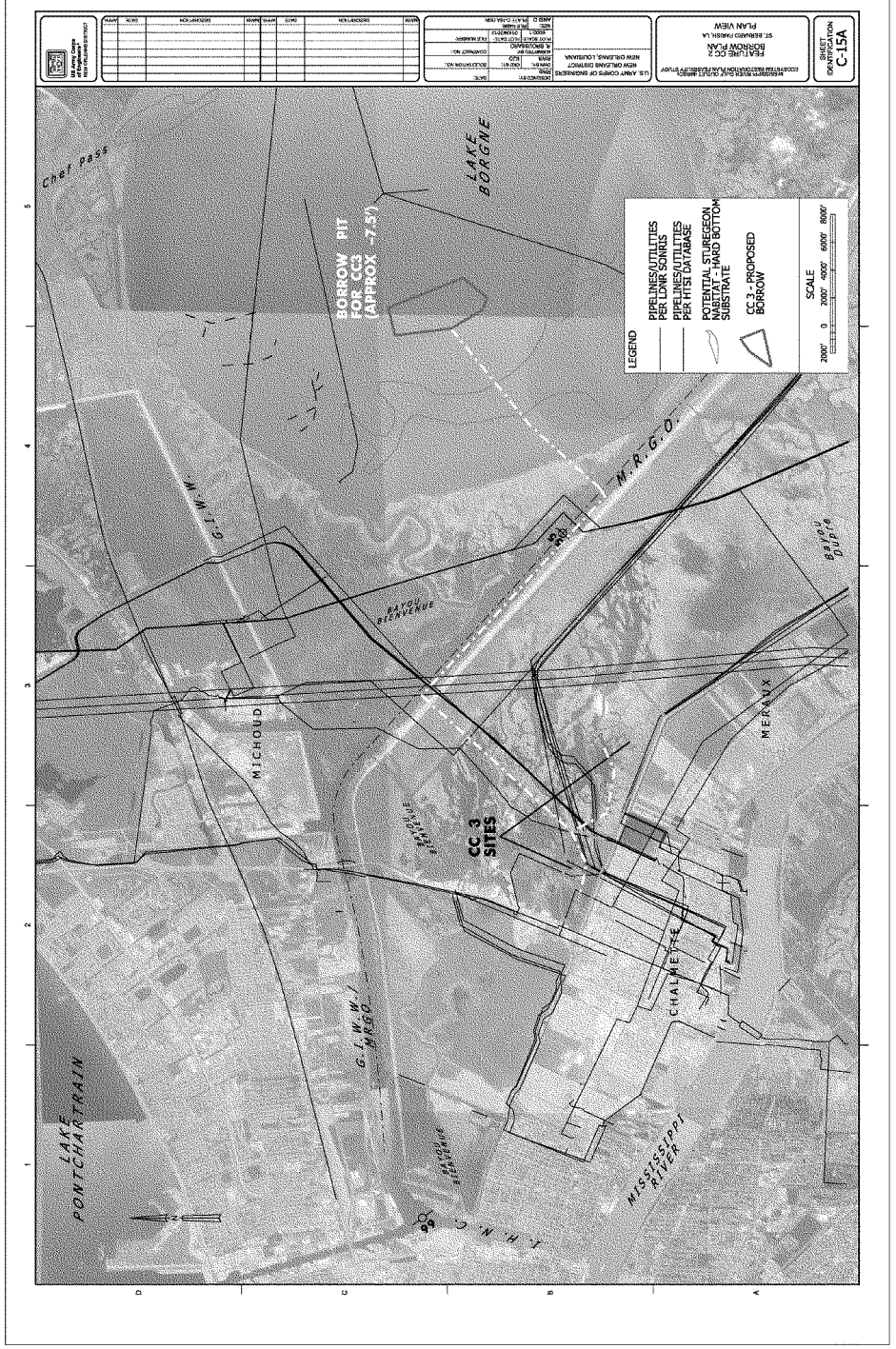

M.R.G.O.
BAYOU DUPRE
BASHMAN BAYOU (SCENIC STREAM)
ADJACENT FEATURE EC 2
790 AC
230 AC
935 AC ADJACENT FOR NOURISHMENT
BAYOU CHAPEON (SCENIC STREAM) NOT TO BE IMPACTED
55
200' ACCESS CORRIDOR LEADING FROM LAKE BORGNE BORROW PIT TO MRGO RESTORATION SITE
ACCESS FROM HWY 39 TO LAKE BORGNE BORROW PIT VIA MRGO 23,000 +/-
LEGEND
(APPROX 1929 ACRES OF SWAMP TO BE RESTORED & AN ADDITIONAL ADJACENT 935 ACRES TO BE NOURISHED)
PERIMETER RETENTION DIKES (APPROX 35,700 L.F.)
EARTHEN CLOSURES (3 CLOSURES TO BE REMOVED UPON COMPLETION OF WORK)
VINYL SHEETPILE CLOSURES (1 CLOSURE 200' WIDTH AND 297' LENGTHS W/ 45' TIMBER PILES 6' ON CENTER)
ACCESS CORRIDORS FOR DREDGE PIPELINE AND EQUIPMENT
NOTES
1. BACKGROUND PHOTOGRAPHY WAS FLOWN IN 2010
2. ELEVATIONS SHOWN IN PLAN VIEW ARE FROM A SURVEY FLOWN IN 2010
SCALE
1000' 0 1000' 2000' 3000' 4000'
FEATURE CO 1
CRITICAL WETLANDS
SWAMP RESTORATION 9
ST BERNARD PARISH, LA
PLAN VIEW
C-13

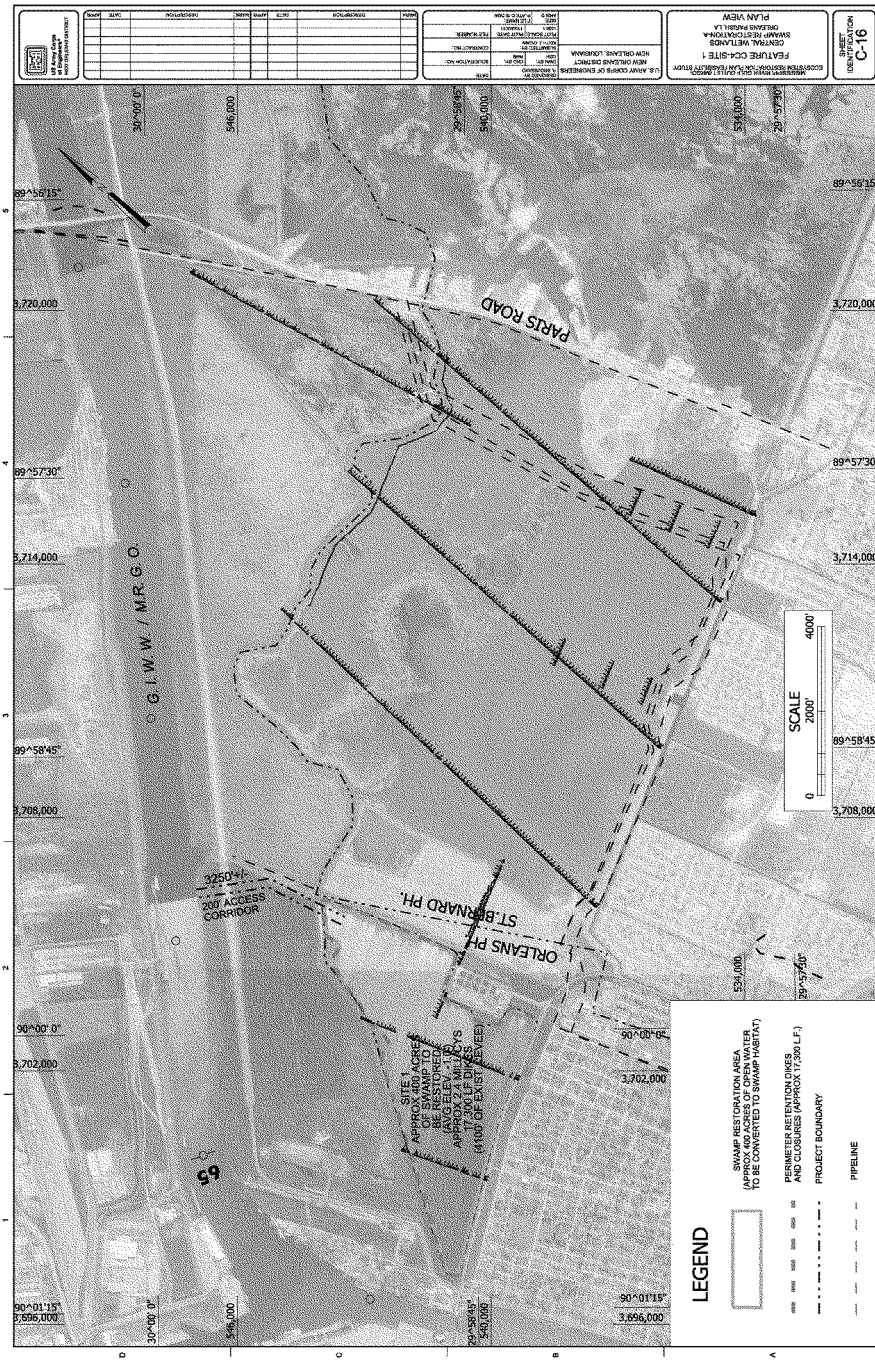

LAKE PONTCHARTRAIN
LAKE BORGNE
Chef Pass
MISSISSIPPI RIVER
CHALMETTE
MERAUX
MICHOUD
G.I.W.W.
M.R.G.O.
BAYOU DUPRE
BORROW PIT FOR CC1 (APPROX. -7.5')
CC-1 SITES
LEGEND
PIPELINES/UTILITIES PER LOUISIANA ONE CALL
PIPELINES/UTILITIES PER HTSI DATABASE
POTENTIAL STURGEON HABITAT - HARD BOTTOM SUBSTRATE
CC-1 - PROPOSED BORROW
SCALE
2000' 0 2000' 4000' 6000' 8000'
FEATURE CC 1
BORROW PLAN
ST. BERNARD PARISH, LA
PLAN VIEW
C-13A

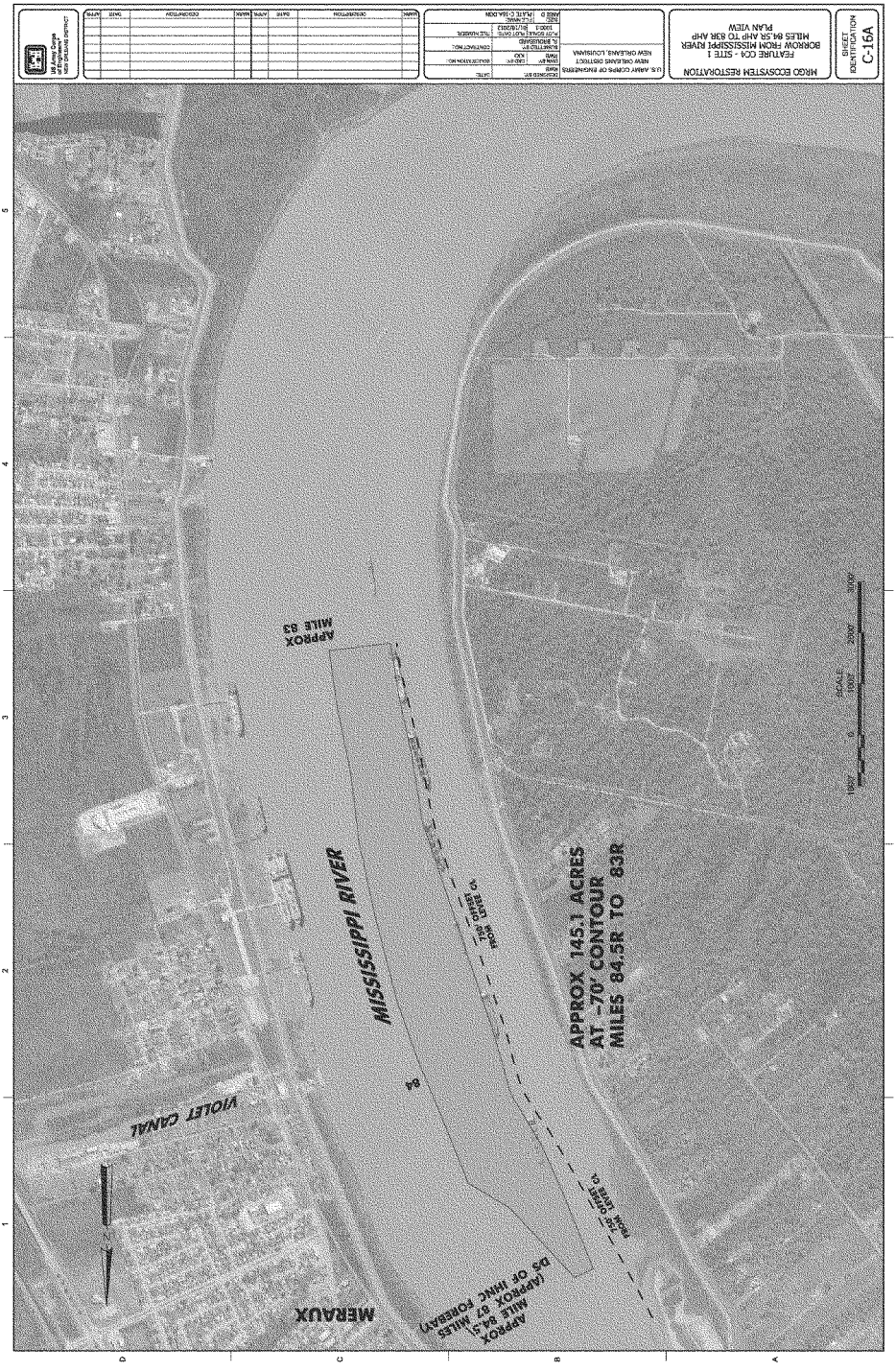

BAYOU DUPRE
LAKE BORGNE
M.R.G.O.
VIOLET CANAL
BAYOU CHAPERON (SCENIC STREAM - NOT TO BE IMPACTED)
BASINMAN BAYOU (SCENIC STREAM)
BACK DIKE CANAL - MAY BE USED FOR ACCESS
300' ACCESS CORRIDOR
4200'+/-
350' ACCESS CORRIDOR LEADING FROM LAKE BORGNE BORROW PIT TO RESTORATION SITES
PROPOSED SWAMP RESTORATION 250 AC
ADJACENT FEATURE CC-1
(APPROX 250 ACRES OF SWAMP TO BE RESTORED AND ADDITIONAL ADJACENT 250 ACRES OF MARSH TO BE NOURISHED)
LEGEND
APPROX 250 ACRES OF SWAMP TO BE RESTORED AND AN ADDITIONAL ADJACENT 250 ACRES OF MARSH TO BE NOURISHED
EARTHEN RIM TIE-IN LINES (APPROX 1,150 L.F.)
EARTHEN WEIRS (APPROX 7,300 L.F.)
POTENTIAL PIPELINES/ UTILITIES FROM LA DNR SONRIS AND HTSI DATABASES
ACCESS CORRIDORS FOR DREDGE PIPELINE AND EQUIPMENT
SCALE
1000' 0 1000' 2000' 3000' 4000'
NOTES
1. BACKGROUND PHOTOGRAPHY WAS FLOWN IN 2019
2. ELEVATIONS SHOWN IN PLAN VIEW ARE FROM A SURVEY TAKEN IN 2018.
PLAN VIEW
FEATURE CC-2
SHEET IDENTIFICATION
C-14


LAKE PONTCHARTRAIN
LAKE BORGNE
Chef Pass
MISSISSIPPI RIVER
G.I.W.W.
M.R.G.O.
MICHOUD
CHALMETTE
MERAUX
BAYOU DUPRE
BACK LEVEE CANAL NOW BEING USED FOR ACCESS
CC.2 SITE
BORROW PIT FOR CC2 (APPROX -7.5')
LEGEND
PIPELINES/UTILITIES PIPELINES SHOWN PIPELINES/UTILITIES PER HTSI DATABASE
POTENTIAL STURGEON HABITAT - HARD BOTTOM SUBSTRATE
CC.2 - PROPOSED BORROW
SCALE
2000' 0 2000' 4000' 6000' 8000'
FEATURE CC 2
BORROW PLAN
PLAN VIEW
C-14A
SHEET IDENTIFICATION

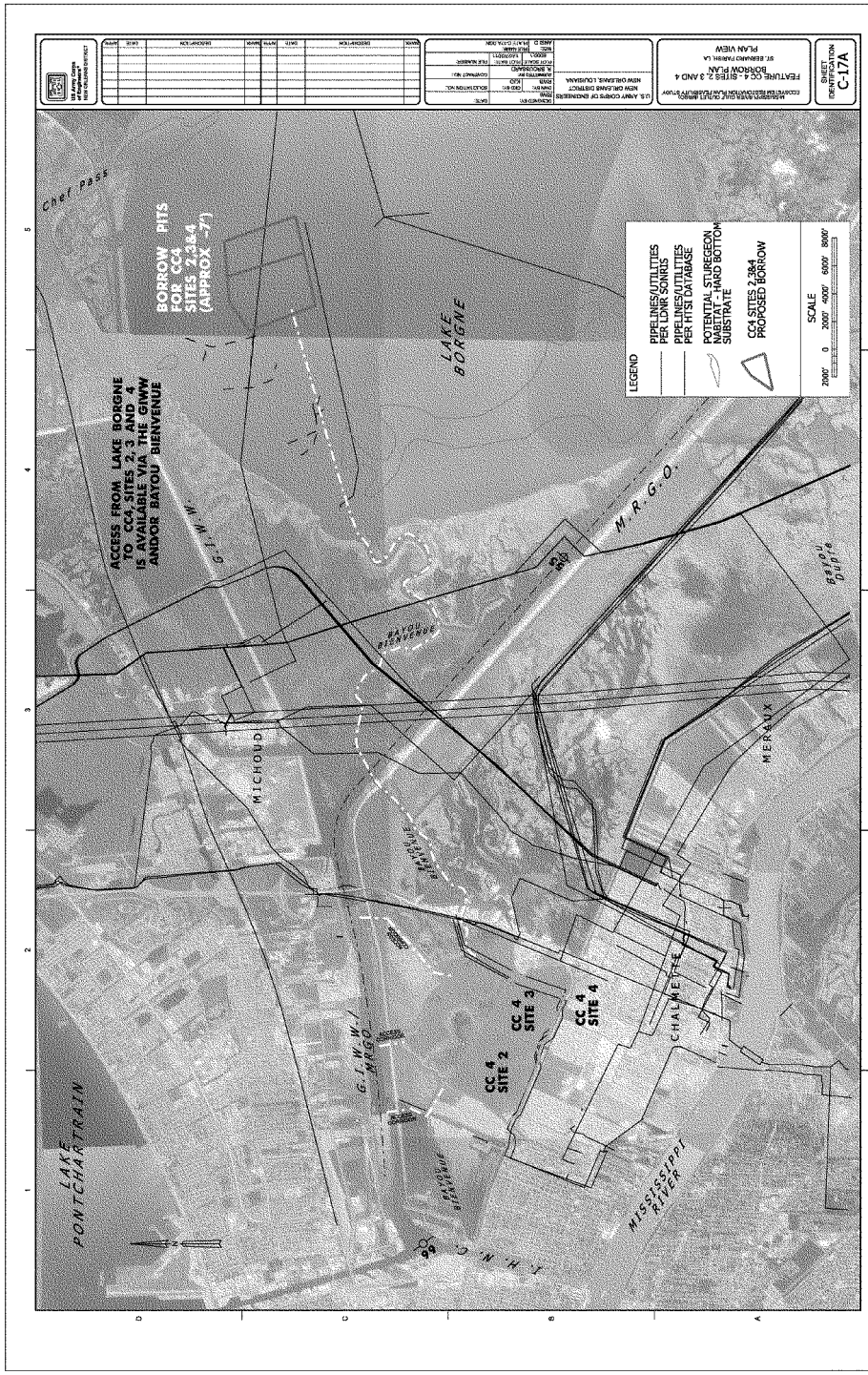

LEGEND
SWAMP RESTORATION AREAS (APPROX 370 ACRES OF OPEN WATER TO BE CONVERTED TO SWAMP HABITAT AND APPROX 790 ACRES OF SWAMP TO BE RENOURISHED)
RETENTION DIKES TO BE CONSTRUCTED - APPROX 20,400'
EARTHEN CLOSURES (APPROX 8,500 TOTAL LINEAR FEET)
PROJECT BOUNDARY - FEATURE CC3
POTENTIAL PIPELINES/UTILITIES FROM LA DNR SONRIS AND HTSI DATABASES
ACCESS CORRIDORS FOR DREDGE PIPELINE AND EQUIPMENT
NOTES
1. BACKGROUND PHOTOGRAPHY WAS FLOWN IN 2010
2. ELEVATIONS SHOWN IN PLAN VIEW ARE FROM A SURVEY TAKEN IN 2010.
SCALE
0 3000 6000
M.R.G.O.
LAKE BORGNE
MICHOUD
PARIS ROAD
300' ACCESS CORRIDOR
ADJACENT FEATURE CC1
ADJACENT FEATURE CW1
DRAINAGE STRUCTURES AND CANALS NOT TO BE IMPACTED
BAYOU BIENVENUE FLOODGATE
BAYOU BIENVENUE
SHORELINE PROTECTION
SHEET IDENTIFICATION C-15
PLAN VIEW

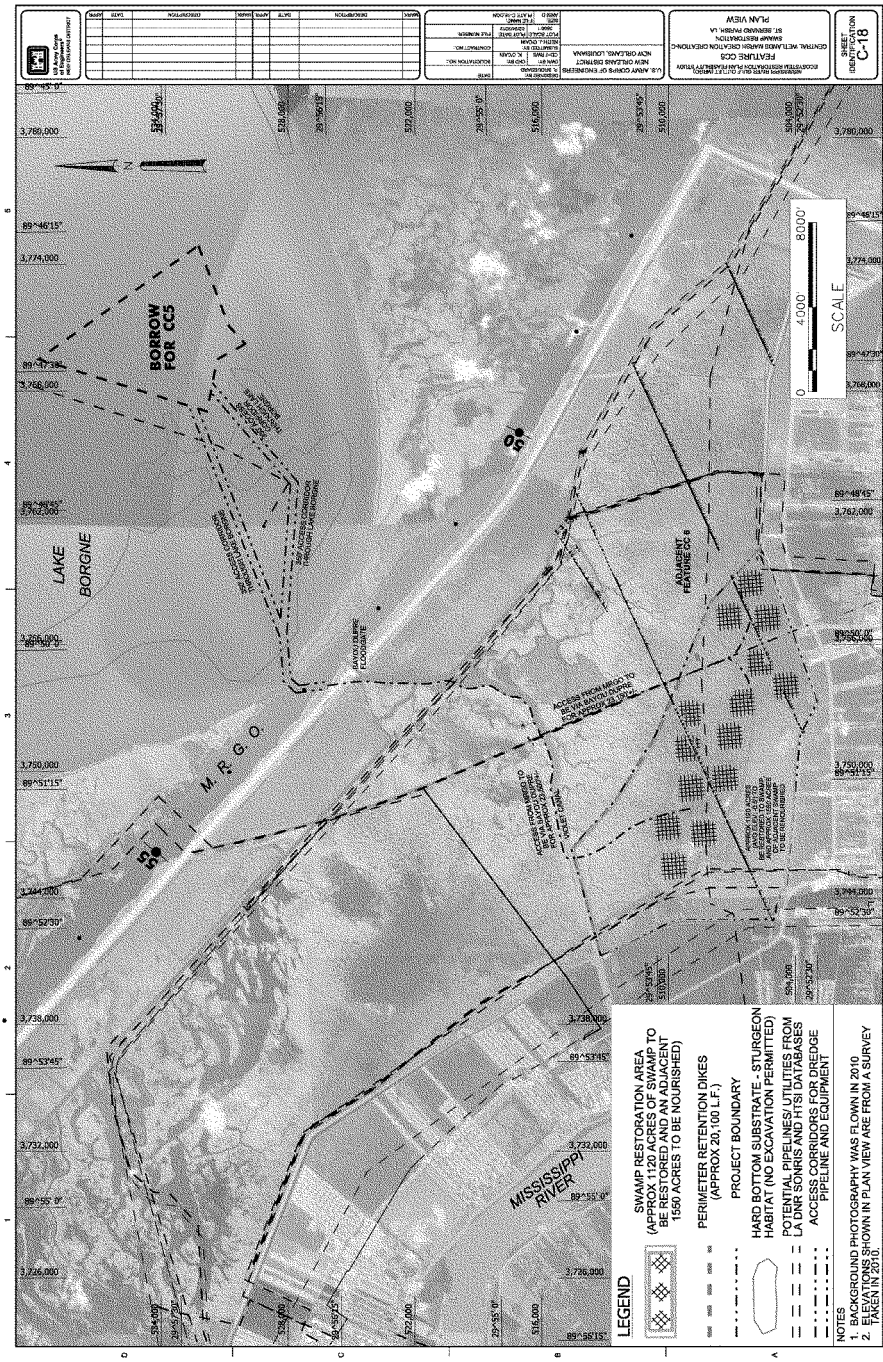

LAKE PONTCHARTRAIN
LAKE BORGNE
Chef Pass
MICHOUD
MERAUX
CHALMETTE
MISSISSIPPI RIVER
G.I.W.W.
M.R.G.O.
BAYOU DUPRE
BAYOU BIENVENUE
BAYOU TERRE AUX BOEUFS
BAYOU LA LOUTRE
CC 3 SITES
BORROW PIT FOR CC3 (APPROX -7.5')
LEGEND
PIPELINES/UTILITIES PER LOUISIANA ONE CALL
PIPELINES/UTILITIES PER HTSI DATABASE
POTENTIAL STURGEON HABITAT - HARD BOTTOM SUBSTRATE
CC 3 - PROPOSED BORROW
SCALE
2000' 0 2000' 4000' 6000' 8000'
FEATURE CC 2
BORROW PLAN
ST. BERNARD PARISH, LA
PLAN VIEW
SHEET IDENTIFICATION
C-15A
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
U.S. Army Corps of Engineers
New Orleans District

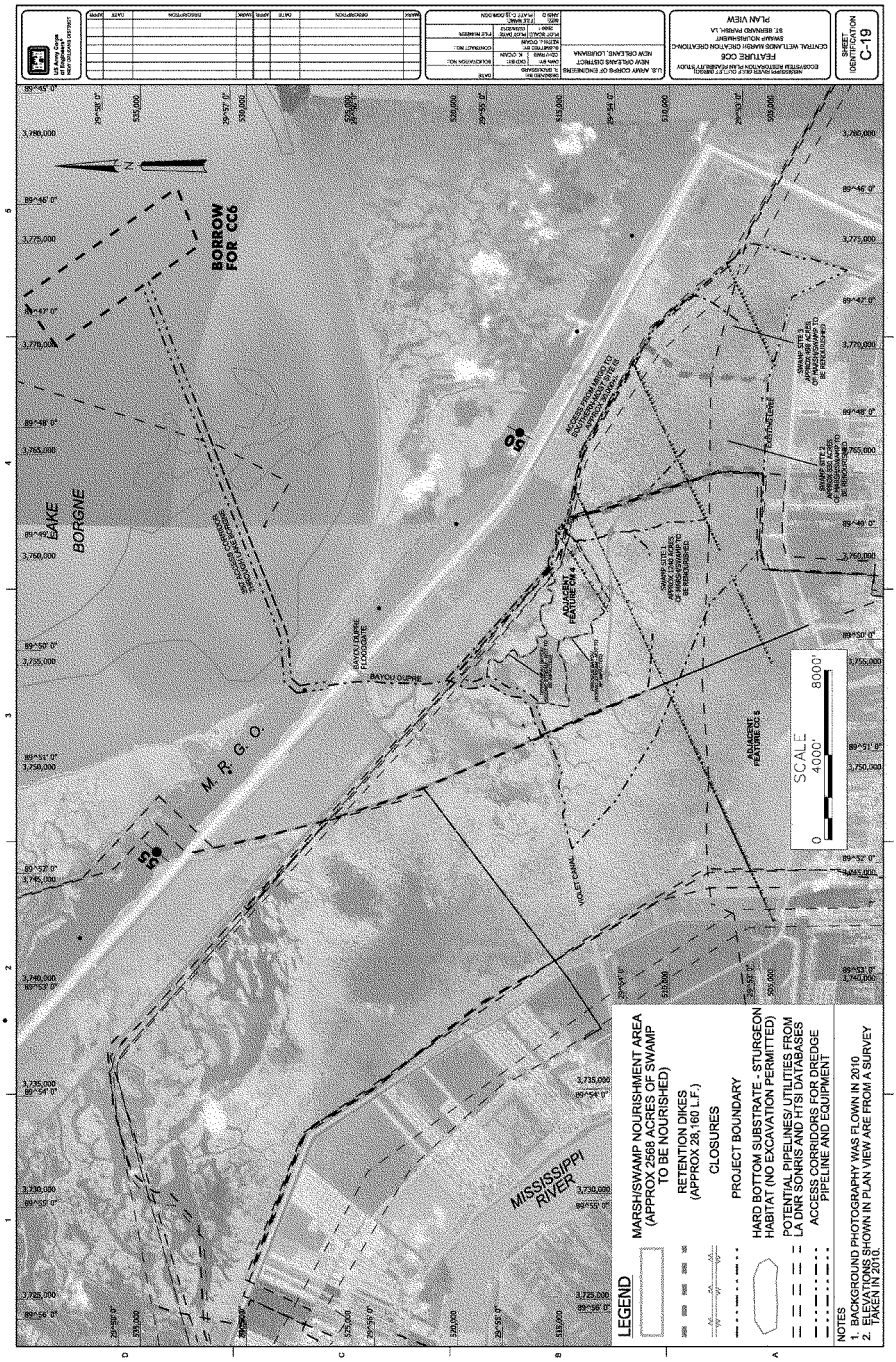

FEATURE CC4-SITE 1
CENTRAL WETLANDS
SWAMP RESTORATION
ORLEANS PARISH, LA
PLAN VIEW
SHEET IDENTIFICATION
C-16
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA
LEGEND
SWAMP RESTORATION AREA
(APPROX 1,400 ACRES OF OPEN WATER
TO BE CONVERTED TO SWAMP HABITAT)
PERIMETER RETENTION DIKES
AND CLOSURES (APPROX 17,200 L.F.)
PROJECT BOUNDARY
PIPELINE
SCALE
0
2000'
4000'
PARIS ROAD
ORLEANS PL.
ST. BERNARD PH.
G. I. W. W. / M.R.G.O.
3250'+/-
200' ACCESS
CORRIDOR
SITE 1
APPROX 400 ACRES
OF SWAMP TO
BE RESTORED
(AVG ELEV. -1.0')
APPROX 2.4 MILES
OF 7,200 LF DIKES
(1100' OF EXISTING LEVEE)
65
89^56'15"
89^57'30"
89^58'45"
90^00'0"
90^01'15"
29^58'45"
29^57'30"
30^00'0"
546,000
534,000
3,720,000
3,714,000
3,708,000
3,702,000
3,696,000

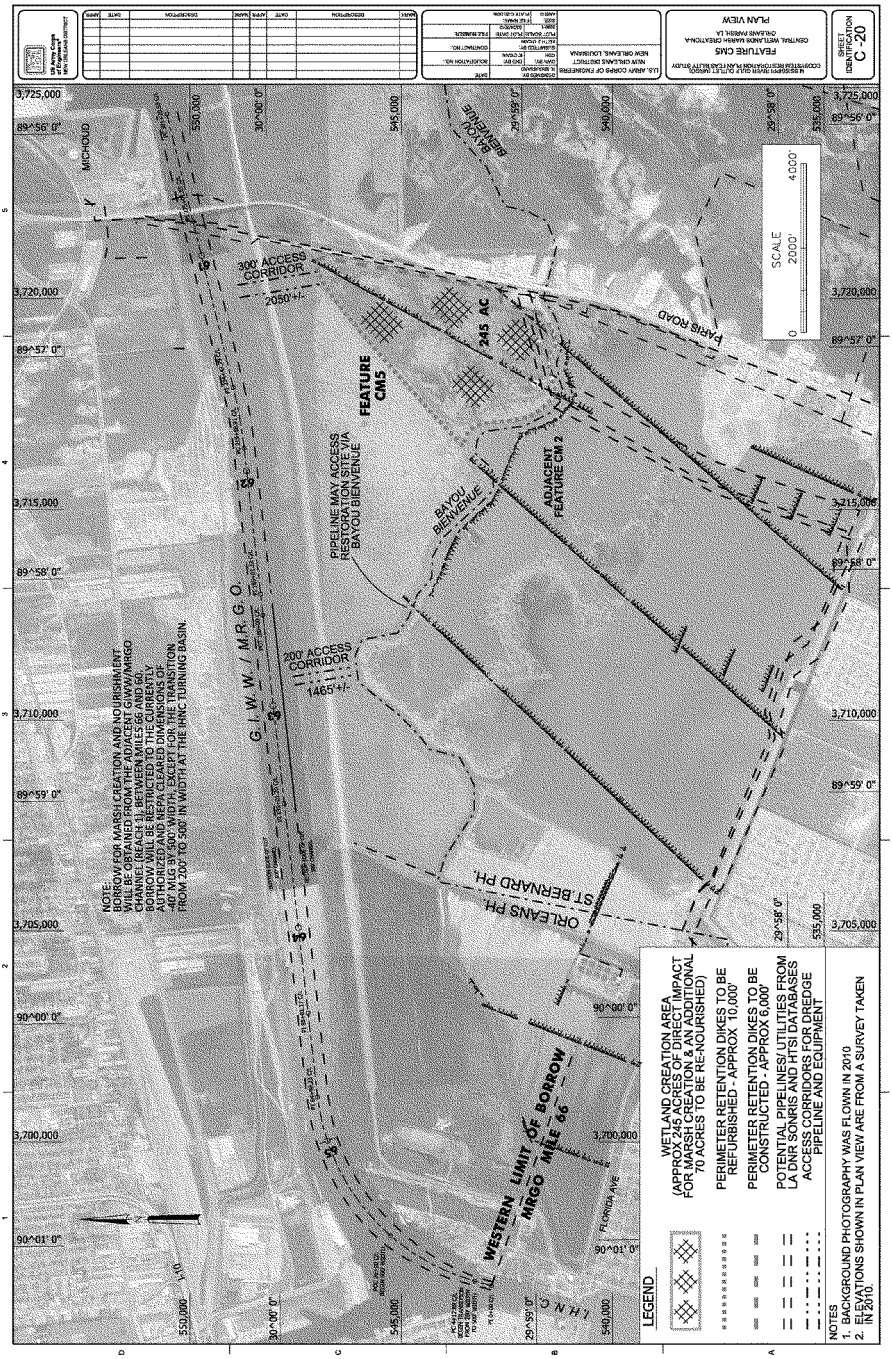

MRGO ECOSYSTEM RESTORATION
FEATURE CO4 - SITE 1
BORROW FROM MISSISSIPPI RIVER
MILES 84.5R AHP TO 83R AHP
PLAN VIEW
SHEET IDENTIFICATION
C-16A
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA
DESIGNED BY
DRAWN BY
CHECKED BY
APPROVED BY
DATE
1"=2,000'
PLATE C-16A (ADD)
SCALE
1000
0
2000
3000
APPROX MILE 83
MISSISSIPPI RIVER
VIOLET CANAL
MERAUX
APPROX MILE 84.5L (APPROX 67+ MILES D/S OF HNC FORESAY)
APPROX 145.1 ACRES AT -70' CONTOUR MILES 84.5R TO 83R
64
1
2
3
4
5
A
B
C
D

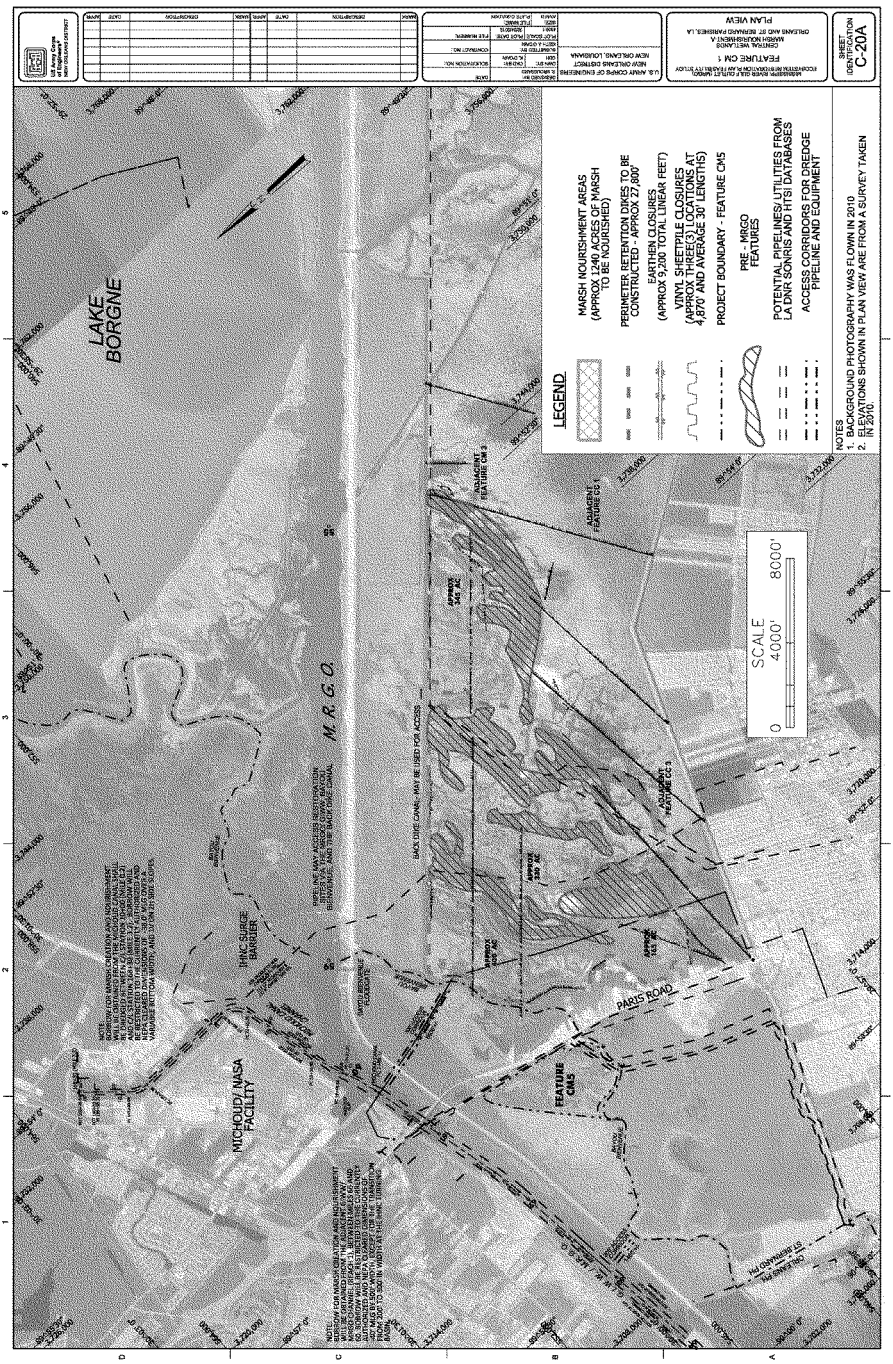
SHEET IDENTIFICATION
C-17
CENTRAL WETLANDS
SWAMP RESTORATION A
DELEAUS PARISH, LA
PLAN VIEW
FEATURE CCA - SITES 2, 3 AND 4
ECOSYSTEM RESTORATION PLAN FEASIBILITY STUDY
ENVIRONMENTAL MODELING BRANCH
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA
SCALE
0
2000'
4000'
LEGEND
SWAMP RESTORATION AREA
(APPROX 1865 ACRES OF OPEN WATER TO BE CONVERTED TO SWAMP HABITAT)
PERIMETER RETENTION DIKES TO BE CONSTRUCTED
PIPELINES/ UTILITIES
ACCESS CORRIDORS FOR DREDGE PIPELINE AND EQUIPMENT
NOTES
1. BACKGROUND PHOTOGRAPHY WAS FLOWN IN 2010
2. ELEVATIONS SHOWN IN PLAN VIEW ARE FROM A SURVEY TAKEN IN 2010.
SITE 2
APPROX 606 ACRES OF SWAMP TO BE RESTORED (AVG ELEV -3.0') APPROX 11.9 MILL CYS (APPROX 10,200' OF EXIST LEVEE TO BE UTILIZED)
SITE 3
APPROX 365 ACRES OF SWAMP TO BE RESTORED (AVG ELEV -3.0') APPROX 7.2 MILL CYS (APPROX 7,100' OF EXIST LEVEE)
SITE 4
APPROX 115 ACRES OF SWAMP TO BE RESTORED (AVG ELEV -2.0') APPROX 0.7 MILL CYS (APPROX 2,000' OF EXIST LEVEE)
ADJACENT FEATURE CM 2
200' ACCESS CORRIDOR
1465'+/-
300' ACCESS CORRIDOR
5700'+/-
12,500'+/-
300' ACCESS CORRIDOR
14,100'+/-
3250'+/-
200' ACCESS CORRIDOR
ACCESS FOR DREDGE PIPELINE WILL ALSO BE ALLOWED VIA BAYOU BIENVENUE
BAYOU BIENVENUE
PARIS ROAD
ORLEANS PK.
ST. BERNARD PK.
G.I.W.W. / M.R.G.O.
I.H.N.C.
65

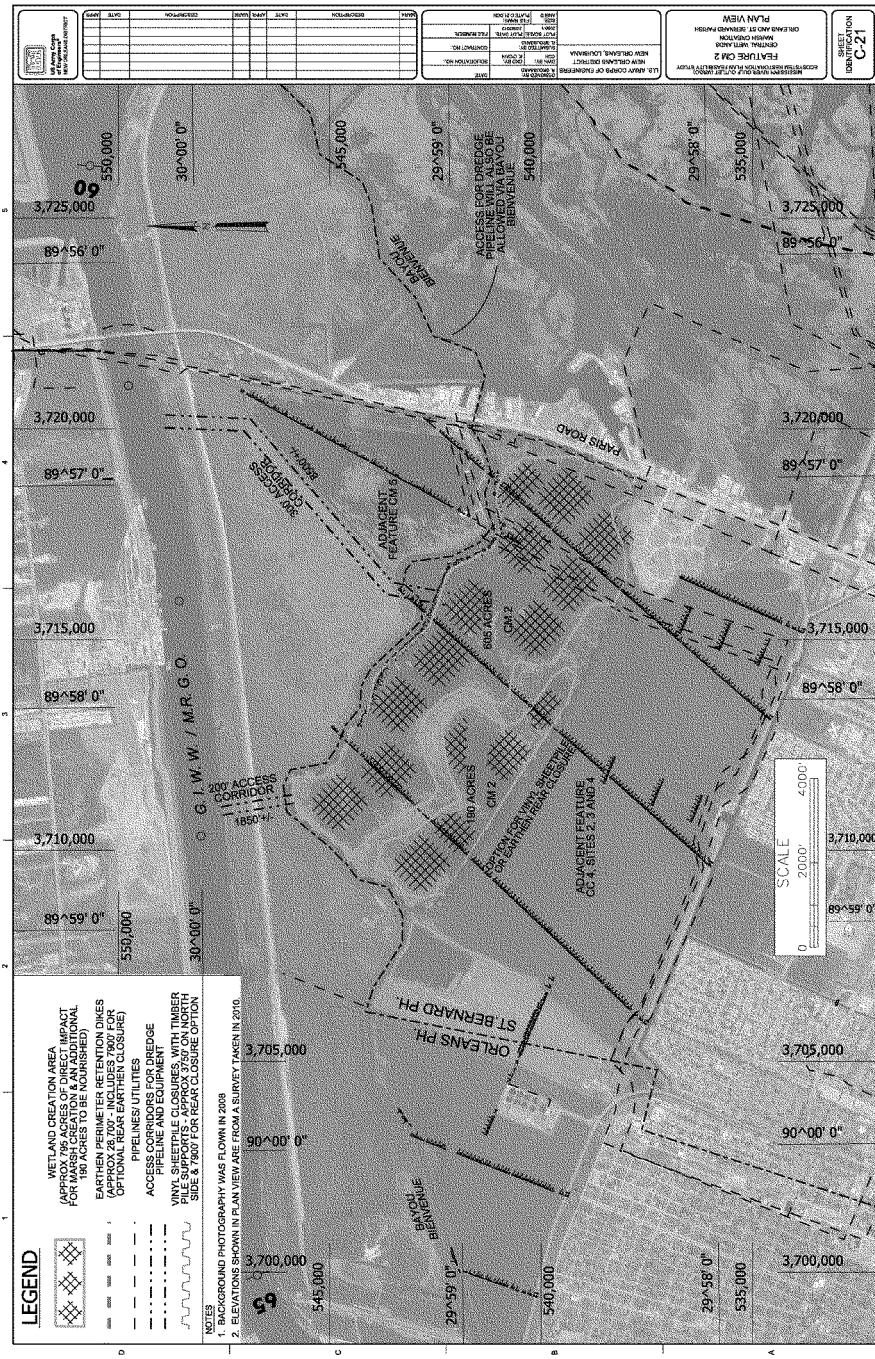

LAKE PONTCHARTRAIN
LAKE BORGNE
MISSISSIPPI RIVER
G.I.W.W.
M.R.G.O.
MICHOUD
CHALMETTE
MERAUX
BAYOU DUPRE
BAYOU BIENVENUE
CC 4 SITE 2
CC 4 SITE 3
CC 4 SITE 4
BORROW PITS FOR CC4 SITES 2,3&4 (APPROX -7)
ACCESS FROM LAKE BORGNE TO CC4 SITES 2, 3 AND 4 IS AVAILABLE VIA THE GIWW AND/OR BAYOU BIENVENUE
LEGEND
PIPELINES/UTILITIES PER LOUISIANA ONE-CALL SYSTEM
PIPELINES/UTILITIES PER HTSI DATABASE
POTENTIAL STURGEON HABITAT - HARD BOTTOM SUBSTRATE
CC4 SITES 2,3&4 PROPOSED BORROW
SCALE
2000' 0 2000' 4000' 6000' 8000'
ENGINEERING BRANCH, NEW ORLEANS DISTRICT
MISSISSIPPI RIVER GULF OUTLET IMPROVEMENTS
FEATURE CC 4 - SITES 2, 3 AND 4
BORROW PLAN
PLAN VIEW
SHEET IDENTIFICATION
C-17A
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA
DESIGNED
DRAWN
CHECKED
APPROVED
SCALE
AS SHOWN
DATE
DESCRIPTION
DRAWN
CHECKED
APPROVED
DATE

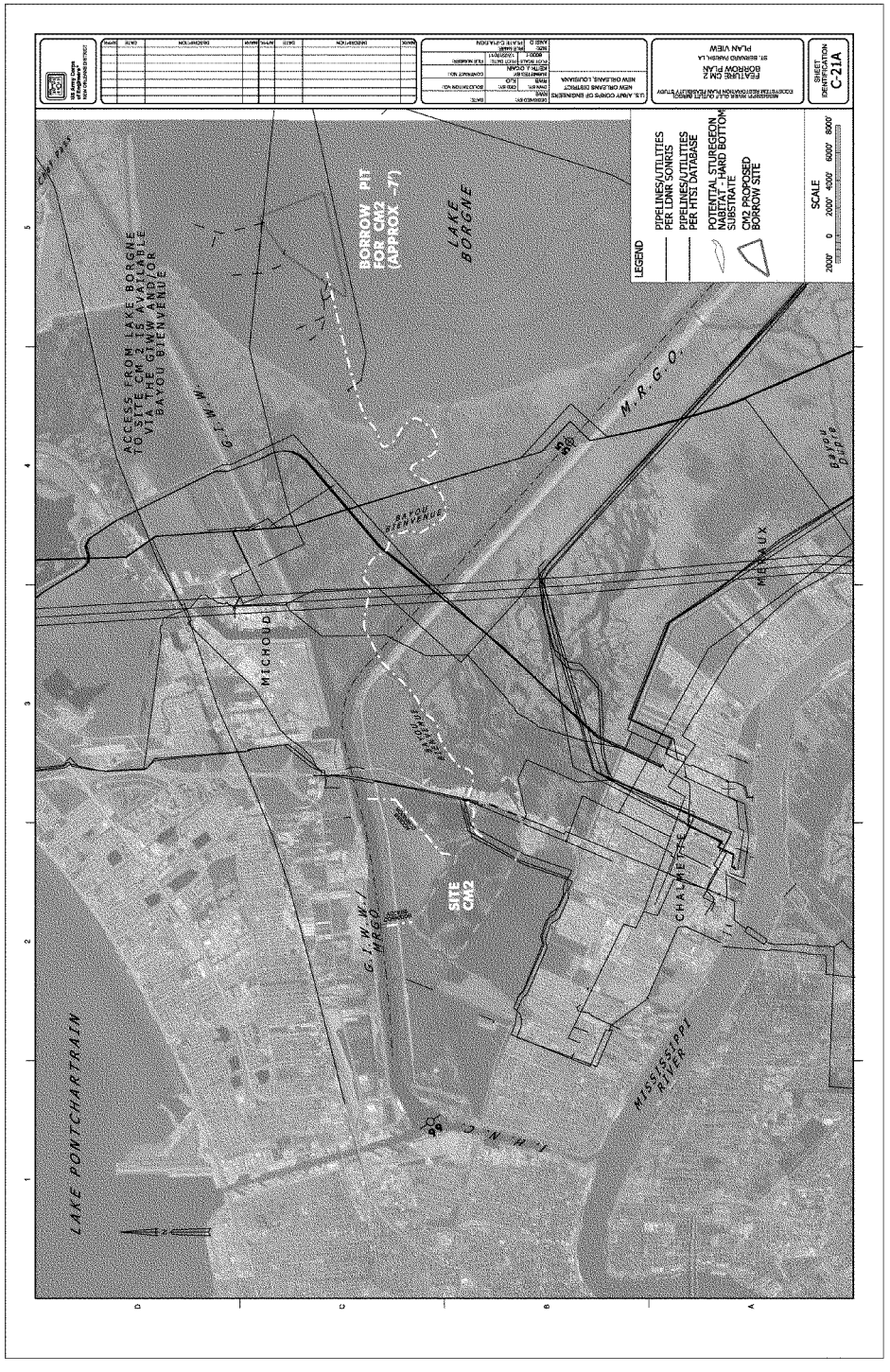

LEGEND
SWAMP RESTORATION AREA (APPROX 112 0 ACRES OF SWAMP TO BE RESTORED AND AN ADJACENT 1550 ACRES TO BE NOURISHED)
PERIMETER RETENTION DIKES (APPROX 20,100 L.F.)
PROJECT BOUNDARY
HARD BOTTOM SUBSTRATE - STURGEON HABITAT (NO EXCAVATION PERMITTED)
POTENTIAL PIPELINES/ UTILITIES FROM LA DNR SONRIS AND HTSI DATABASES
ACCESS CORRIDORS FOR DREDGE PIPELINE AND EQUIPMENT
NOTES
1. BACKGROUND PHOTOGRAPHY WAS FLOWN IN 2010
2. ELEVATIONS SHOWN IN PLAN VIEW ARE FROM A SURVEY TAKEN IN 2010.
BORROW FOR CC5
LAKE BORGNE
M.R.G.O.
MISSISSIPPI RIVER
SCALE
0
4,000'
8,000'
CENTRAL WETLANDS WATER DISTRIBUTION CREATION
SWAMP RESTORATION
ST. BERNARD PARISH, LA
PLAN VIEW
C-18

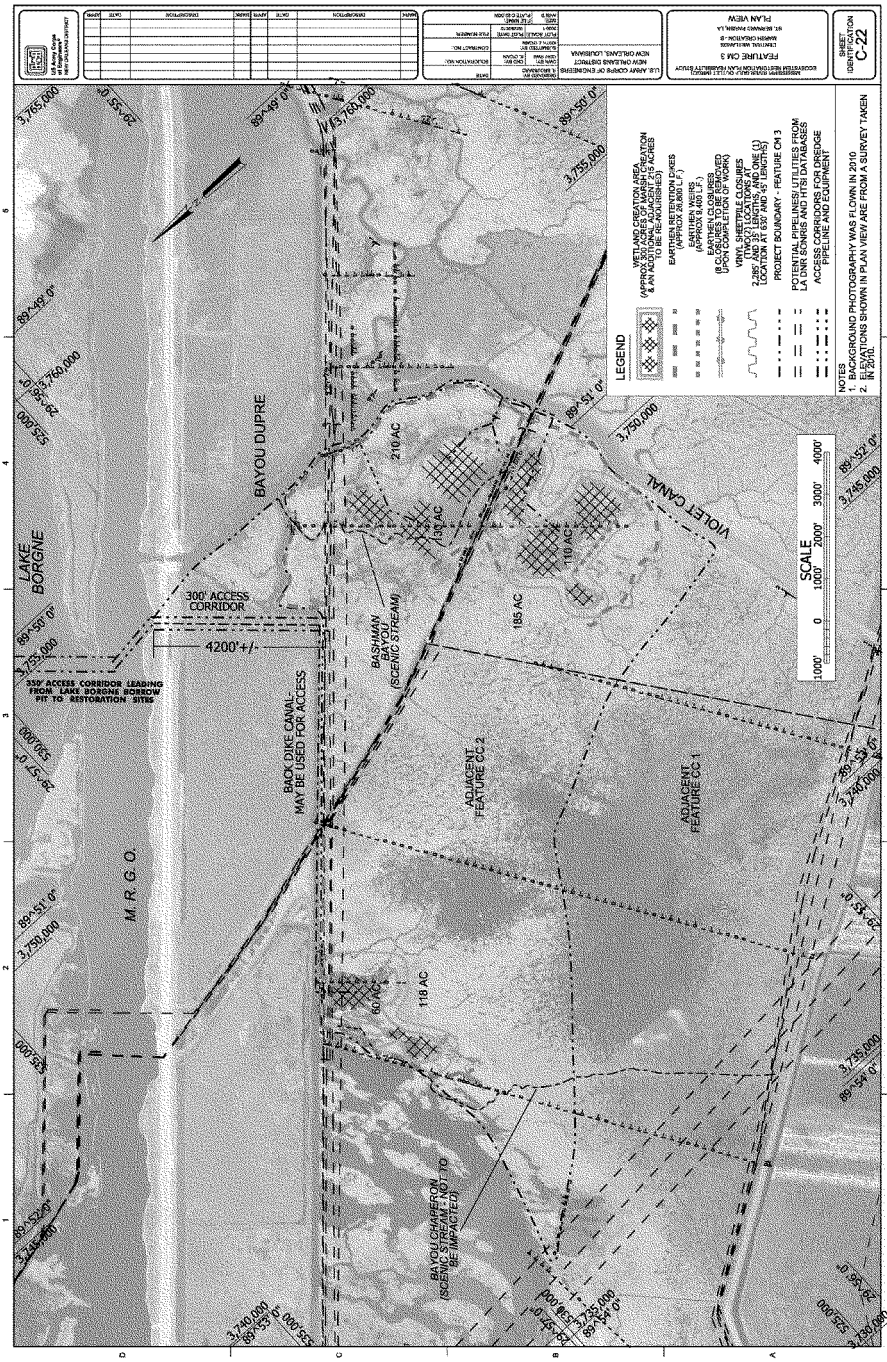

BORROW FOR CC6
BORGNE LAKE
M.R.G.O.
MISSISSIPPI RIVER
BAYOU DUPRE
VIOLET CANAL
SCALE
4000'
8000'
0
LEGEND
MARSH/SWAMP NOURISHMENT AREA (APPROX 2566 ACRES OF SWAMP TO BE NOURISHED)
RETENTION DIKES (APPROX 28,160 L.F.)
CLOSURES
PROJECT BOUNDARY
HARD BOTTOM SUBSTRATE - STURGEON HABITAT (NO EXCAVATION PERMITTED)
POTENTIAL PIPELINES/ UTILITIES FROM LA DNR SONRIS AND HTSI DATABASES
ACCESS CORRIDORS FOR DREDGE PIPELINE AND EQUIPMENT
NOTES
1. BACKGROUND PHOTOGRAPHY WAS FLOWN IN 2010
2. ELEVATIONS SHOWN IN PLAN VIEW ARE FROM A SURVEY TAKEN IN 2010.
CENTRAL WETLANDS MARSH CREATION CREATION/ SWAMP NOURISHMENT
ST BERNARD PARISH, LA
PLAN VIEW
SHEET IDENTIFICATION
C-19

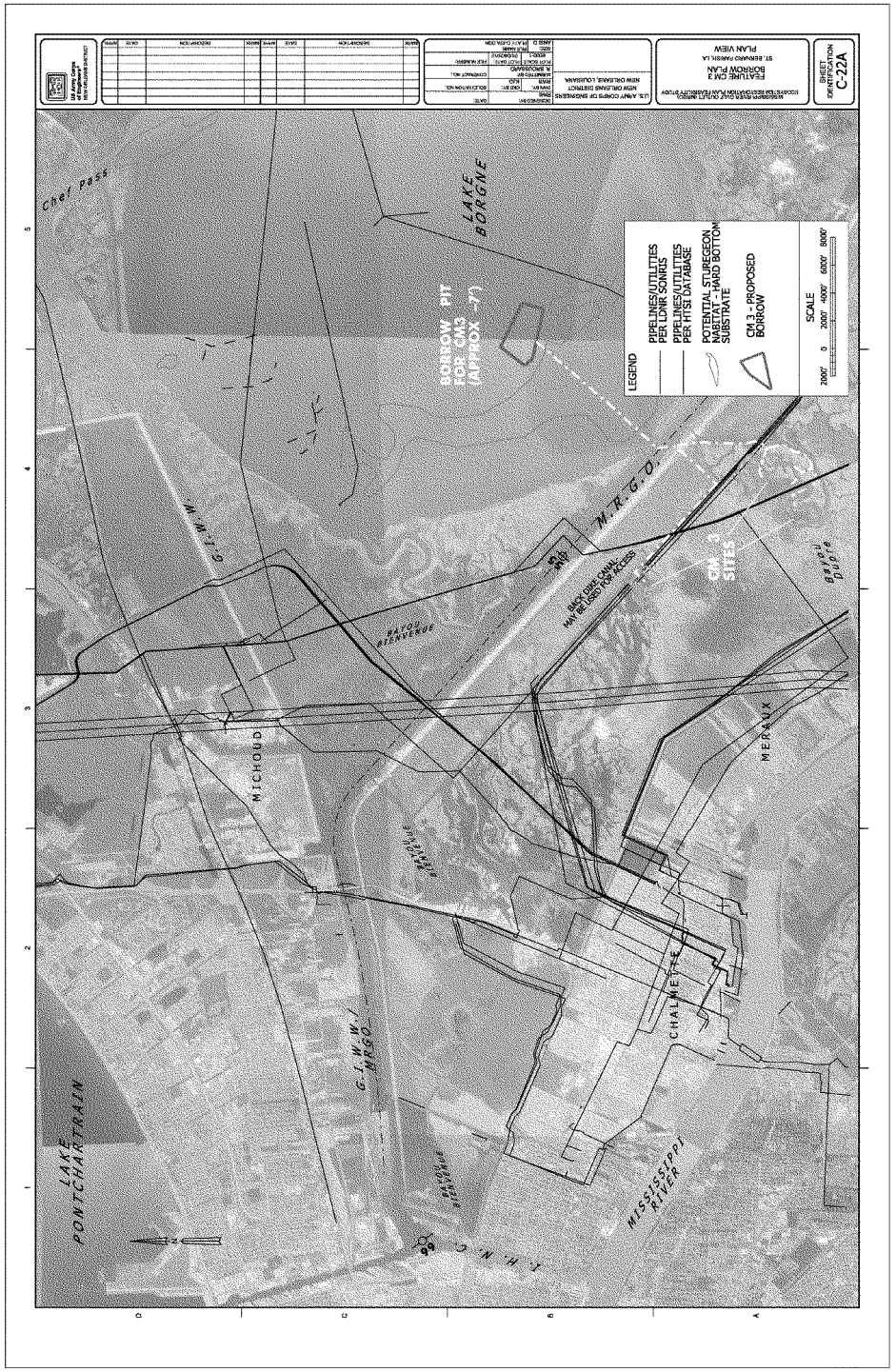

PLAN VIEW
FEATURE CM5
245 AC
ADJACENT FEATURE CM 2
PIPELINE MAY ACCESS RESTORATION SITE VIA BAYOU BIENVENUE
300' ACCESS CORRIDOR
2050 +/-
200' ACCESS CORRIDOR
1465 +/-
BAYOU BIENVENUE
PARIS ROAD
ORLEANS PH.
ST. BERNARD PH.
MICHOUD
G.I.W.W. / MRGO
WESTERN LIMIT OF BORROW
MRGO MILE 66
NOTE:
BORROW FOR MARSH CREATION AND NOURISHMENT
WILL BE PERMITTED FROM THE WESTERN SIDE OF MRGO
CHANNEL (REACH 1), BETWEEN MILES 66 AND 60.
BORROW WILL BE RESTRICTED TO THE CURRENTLY
AUTHORIZED AND NEPA CLEARED DIMENSIONS OF
400' WIDE BY 600' WIDE, EXCEPT FOR THE TRANSITION
FROM 400' TO 600' IN WIDTH AT THE ENC TURNING BASIN.
LEGEND
WETLAND CREATION AREA
(APPROX 245 ACRES OF DIRECT IMPACT
FOR MARSH CREATION & AN ADDITIONAL
70 ACRES TO BE RE-NOURISHED)
PERIMETER RETENTION DIKES TO BE
REFURBISHED - APPROX 10,000'
PERIMETER RETENTION DIKES TO BE
CONSTRUCTED - APPROX 6,000'
POTENTIAL PIPELINES/ UTILITIES FROM
LA DNR SONRIS AND HTSI DATABASES
ACCESS CORRIDORS FOR DREDGE
PIPELINE AND EQUIPMENT
NOTES
1. BACKGROUND PHOTOGRAPHY WAS FLOWN IN 2010
2. ELEVATIONS SHOWN IN PLAN VIEW ARE FROM A SURVEY TAKEN IN 2010.
SCALE
0 2000' 4000'
FEATURE CMS
CENTRAL WETLANDS MARSH CREATION
CSDR STUDY
C-20

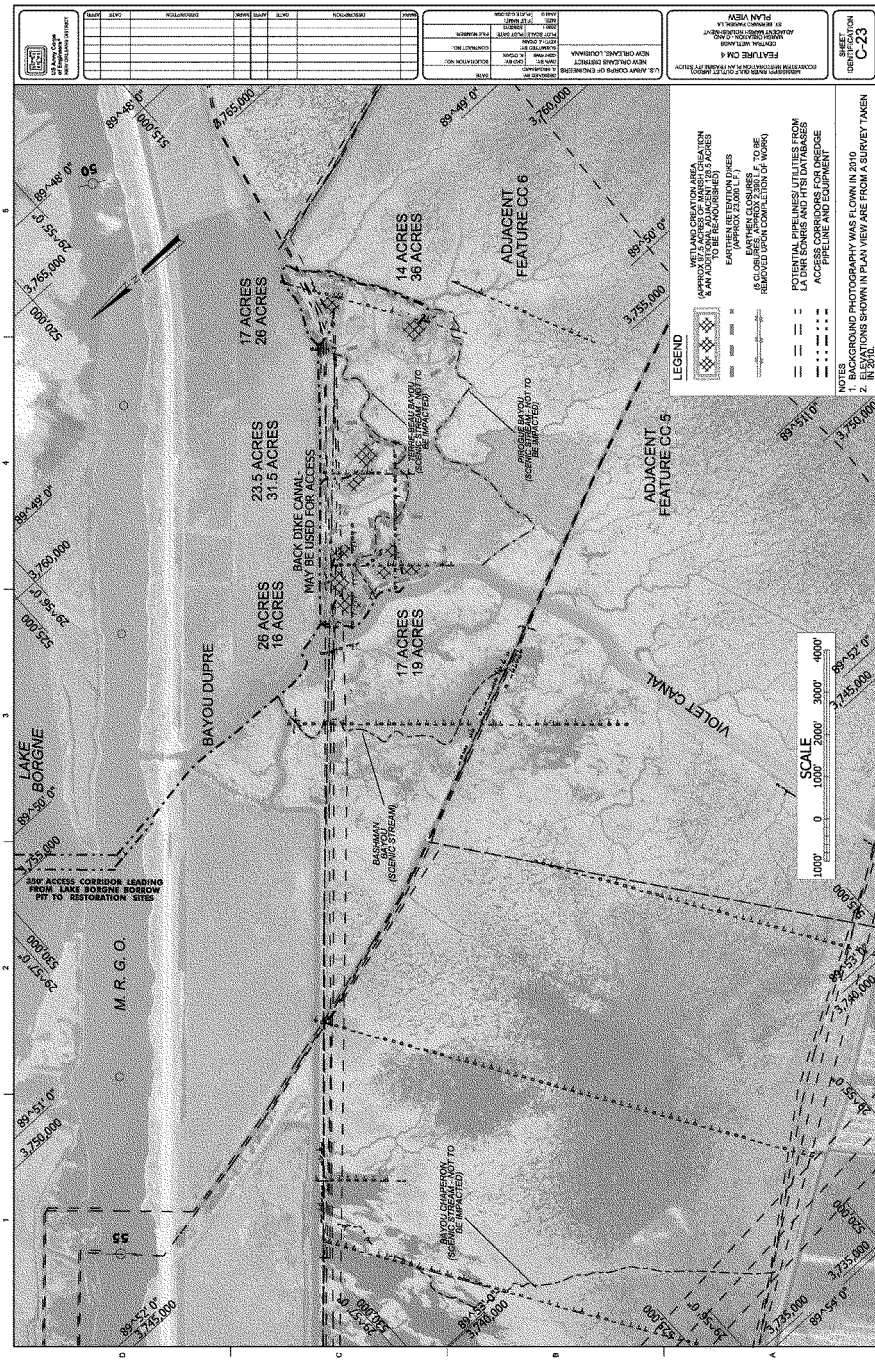

LAKE BORGNE
M.R.G.O.
MICHOUD/ NASA FACILITY
PARIS ROAD
INNER HARBOR NAVIGATION CANAL
FEATURE CM5
LEGEND
MARSH NOURISHMENT AREAS (APPROX 1240 ACRES OF MARSH TO BE NOURISHED)
PERIMETER RETENTION DIKES TO BE CONSTRUCTED - APPROX 27,800'
EARTHEN CLOSURES (APPROX 5,200 TOTAL LINEAR FEET)
VINYL SHEETPILE CLOSURES (APPROX THREE (3) LOCATIONS AT 4,870' AND AVERAGE 30' LENGTHS)
PROJECT BOUNDARY - FEATURE CM5
PRE - MRGO FEATURES
POTENTIAL PIPELINES/ UTILITIES FROM LA DNR SONRIS AND HTSI DATABASES
ACCESS CORRIDORS FOR DREDGE PIPELINE AND EQUIPMENT
SCALE
0 4000' 8000'
NOTES
1. BACKGROUND PHOTOGRAPHY WAS FLOWN IN 2010
2. ELEVATIONS SHOWN IN PLAN VIEW ARE FROM A SURVEY TAKEN IN 2010
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
CENTRAL WETLANDS
MARSH NOURISHMENT A
PLAN VIEW
FEATURE CM 1
SHEET IDENTIFICATION
C-20A

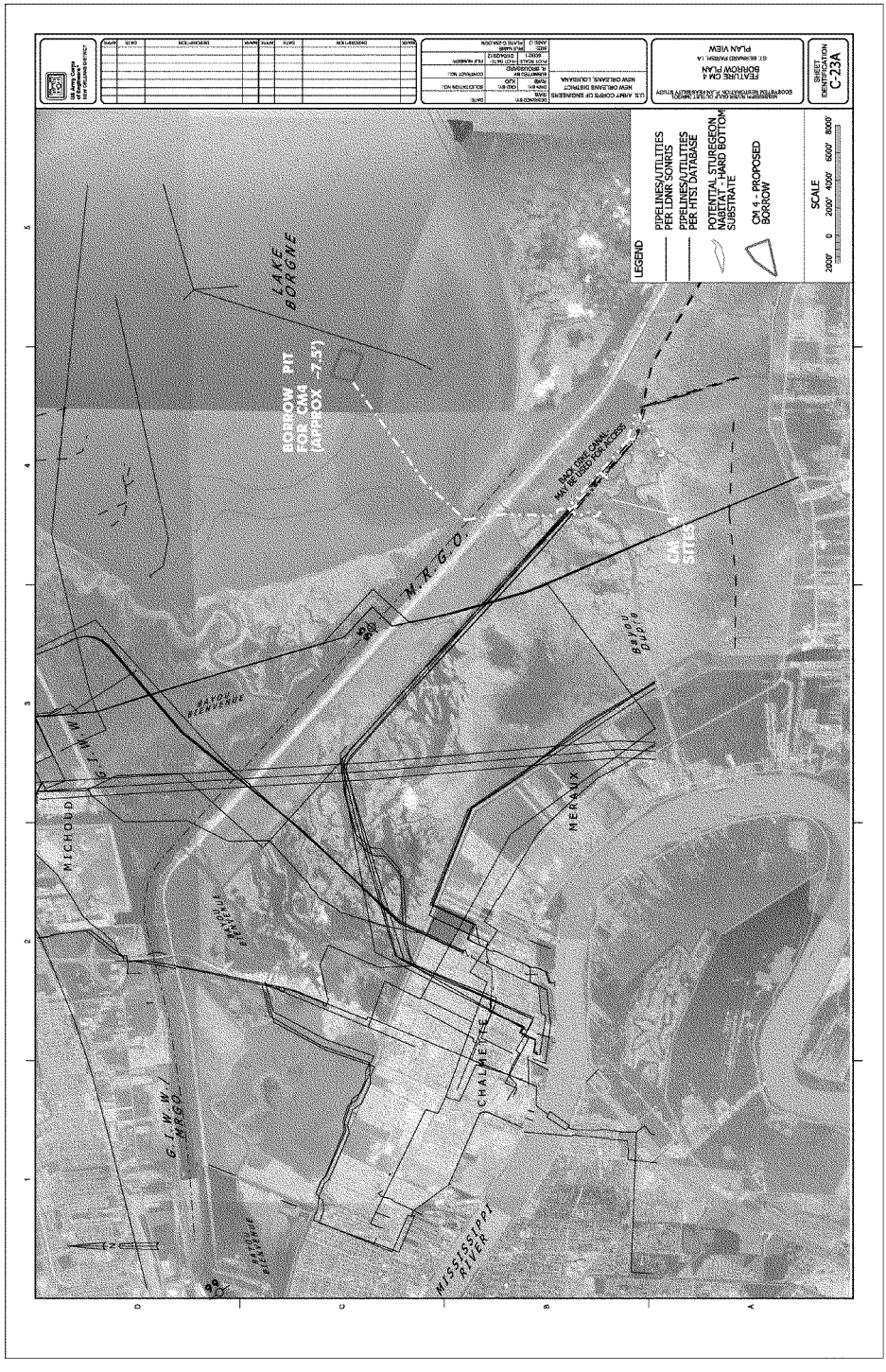

LEGEND
WETLAND CREATION AREA (APPROX 795 ACRES OF DIRECT IMPACT FOR 1,180 ACRES TO BE ACQUIRED; ADDITIONAL 180 ACRES TO BE ACQUIRED)
EARTHEN PERIMETER RETENTION DIKES (APPROX 28,700' - INCLUDES 7900' FOR OPTIONAL REAR EARTHEN CLOSURE)
PIPELINES/ UTILITIES
ACCESS CORRIDORS FOR DREDGE PIPELINE AND EQUIPMENT
VINYL SHEETPILE CLOSURES, WITH TIMBER PILE SUPPORTS, FOR CREAM CANAL NORTH SIDE & 7900' FOR REAR CLOSURE OPTION
NOTES
1. BACKGROUND PHOTOGRAPHY WAS FLOWN IN 2009
2. ELEVATIONS SHOWN IN PLAN VIEW ARE FROM A SURVEY TAKEN IN 2010.
G I W W / M.R. G.O.
CM 2
795 ACRES
1,180 ACRES
ADJACENT FEATURE CM 4
ADJACENT FEATURE CC-4, SITES 2, 3 AND 4
ACCESS FOR DREDGE PIPELINE WILL ALSO BE ALLOWED VIA BAYOU BIENVENUE
BAYOU BIENVENUE
PARIS ROAD
ORLEANS PH.
ST BERNARD PH.
SCALE
0
2000'
4000'
FEATURE CM 2
CENTRAL WETLANDS
MARSH CREATION
ORLEANS AND ST. BERNARD PARISH
PLAN VIEW
SHEET IDENTIFICATION
C-21

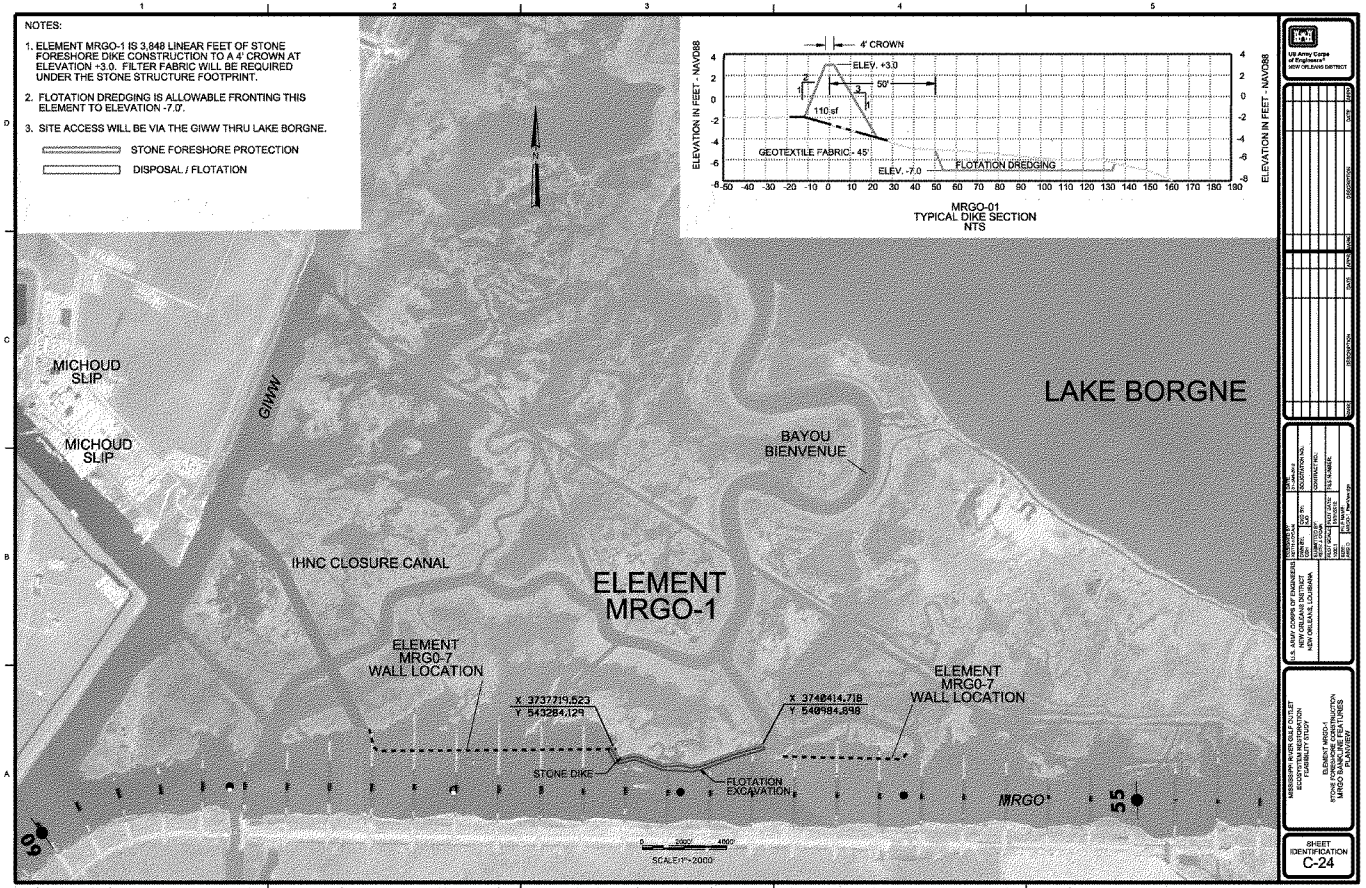

LAKE PONTCHARTRAIN
LAKE BORGNE
BORROW PIT FOR CM2 (APPROX. -7')
ACCESS FROM LAKE BORGNE TO SITE CM2 IS AVAILABLE VIA THE GIWW AND/OR BAYOU BIENVENUE
SITE CM2
MICHOUD
CHALMETTE
MEraux
MISSISSIPPI RIVER
G.I.W.W.
M.R.G.O.
BAYOU BIENVENUE
BAYOU DUPRE
CM2 PASS
LEGEND
PIPELINES/UTILITIES PER LDNR SONRIS
PIPELINES/UTILITIES PER HTSI DATABASE
POTENTIAL STURGEON HABITAT - HARD BOTTOM SUBSTRATE
CM2 PROPOSED BORROW SITE
SCALE
2000' 0 2000' 4000' 6000' 8000'
FEATURES CM2
BORROW PLAN
ST. BERNARD PARISH, LA
PLAN VIEW
SHEET IDENTIFICATION
C-21A
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

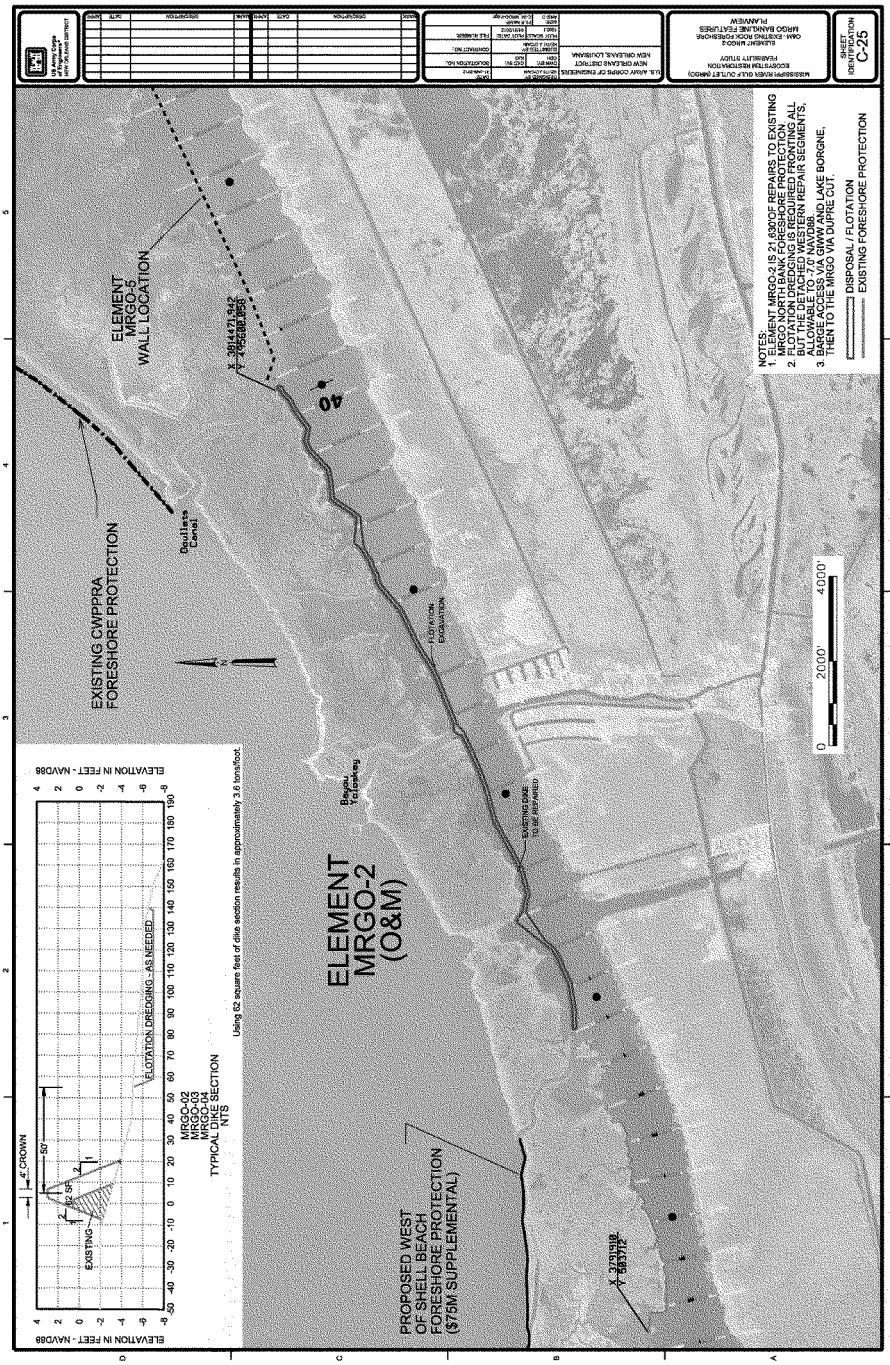

LEGEND
VETIVER ESTABLISHMENT AREA (APPROX 1,515 ACRES & AN ADDITIONAL ADJACENT 515 ACRES IF NEEDED)
EARTHEN RETENTION DIKES (APPROX 26,800 L.F.)
GAPS/OPEN ENDS (ACCESS TO BORROW)
EARTHEN CLOSURES (EXISTING TO BE REMOVED UPON COMPLETION OF WORK)
VINYL SHEETPILE CLOSURES 2,285' AND 35' LONG AT ONE (1) LOCATION AT 6.5' AND 45' LENGTHS)
PROJECT BOUNDARY - FEATURE CM 3
POTENTIAL PIPELINES/ UTILITIES FROM LA DNR SONRIS AND HTSI DATABASES
ACCESS CORRIDORS FOR DREDGE PIPELINE AND EQUIPMENT
NOTES
1. BACKGROUND PHOTOGRAPHY WAS FLOWN IN 2010
2. ELEVATIONS SHOWN IN PLAN VIEW ARE FROM A SURVEY TAKEN IN 2010.
SCALE
1000' 0 1000' 2000' 3000' 4000'
BAYOU DUPRE
LAKE BORGNE
M.R.G.O.
BACK DIKE CANAL- MAY BE USED FOR ACCESS
300' ACCESS CORRIDOR
4200'+/-
350' ACCESS CORRIDOR LEADING FROM LAKE BORGNE BORROW PIT TO RESTORATION SITES
BASHMAN BAYOU (SCENIC STREAM)
BAYOU CHAPERON (SCENIC STREAM - NOT TO BE IMPACTED)
ADJACENT FEATURE CC-2
ADJACENT FEATURE CC-1
VIOLET CANAL
210 AC
60 AC
110 AC
185 AC
118 AC
FEATURE CM-3
DEPARTMENTAL WORKSHOP
MARSH CREATION - B
91, REYNOLDS PARISH, LA.
PLAN VIEW
SHEET IDENTIFICATION
C-22

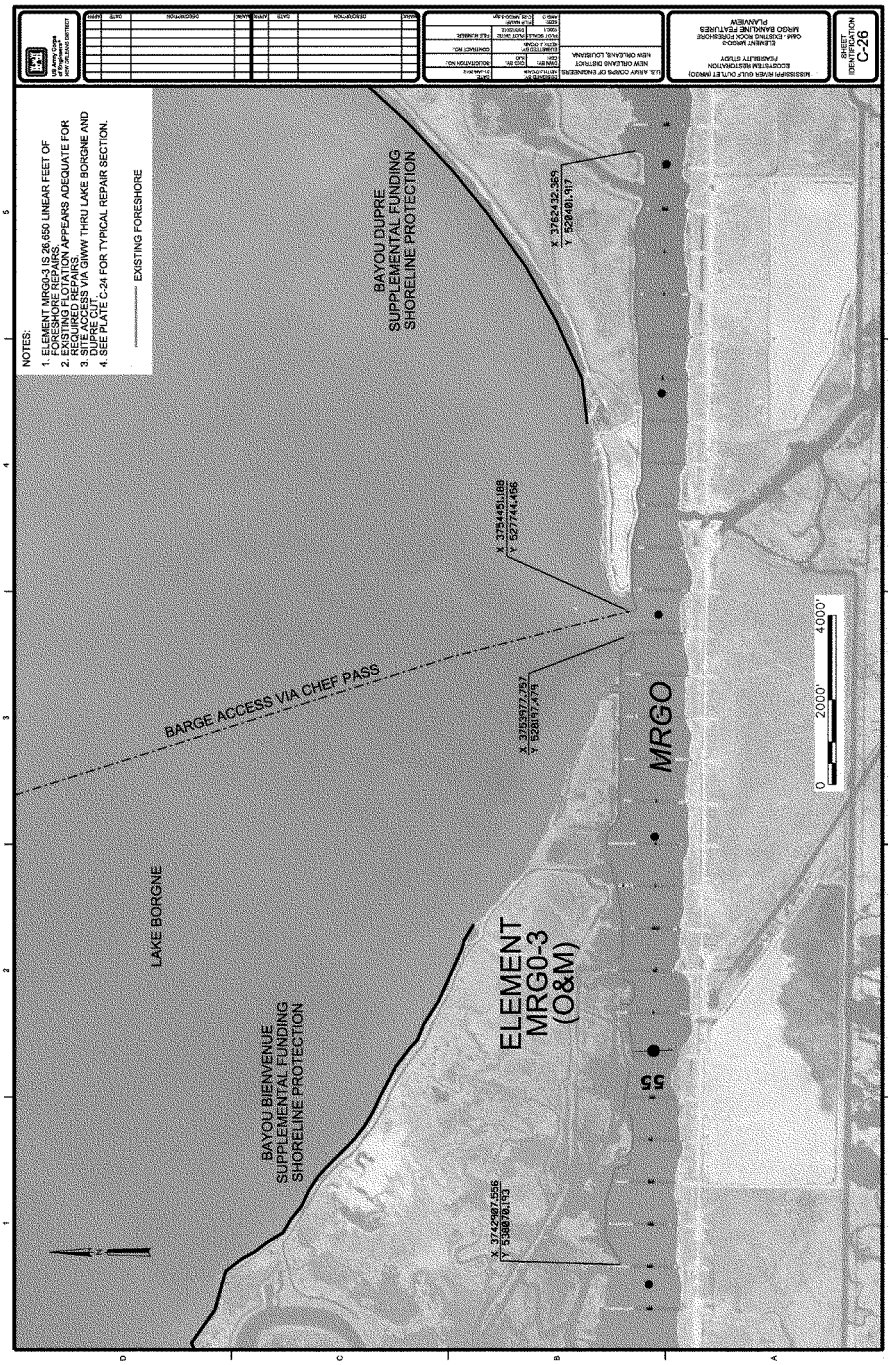

LAKE PONTCHARTRAIN
LAKE BORGNE
Chef Pass
MISSISSIPPI RIVER
G.I.W.W.
M.R.G.O.
MICHOUD
CHALMETTE
MERAUX
BORROW PIT FOR CM3 (APPROX -7')
CM 3 SITES
BACK DIKE CANAL MAY BE USED FOR ACCESS
PATOUTVILLE RESERVOIR
LEGEND
PIPELINES/UTILITIES PER LOCAL AUTHORITIES
PIPELINES/UTILITIES PER HTSI DATABASE
POTENTIAL STURGEON HABITAT - HARD BOTTOM SUBSTRATE
CM 3 - PROPOSED BORROW
SCALE
FEATURE CM 3
BORROW PLAN
PLAN VIEW
C-22A

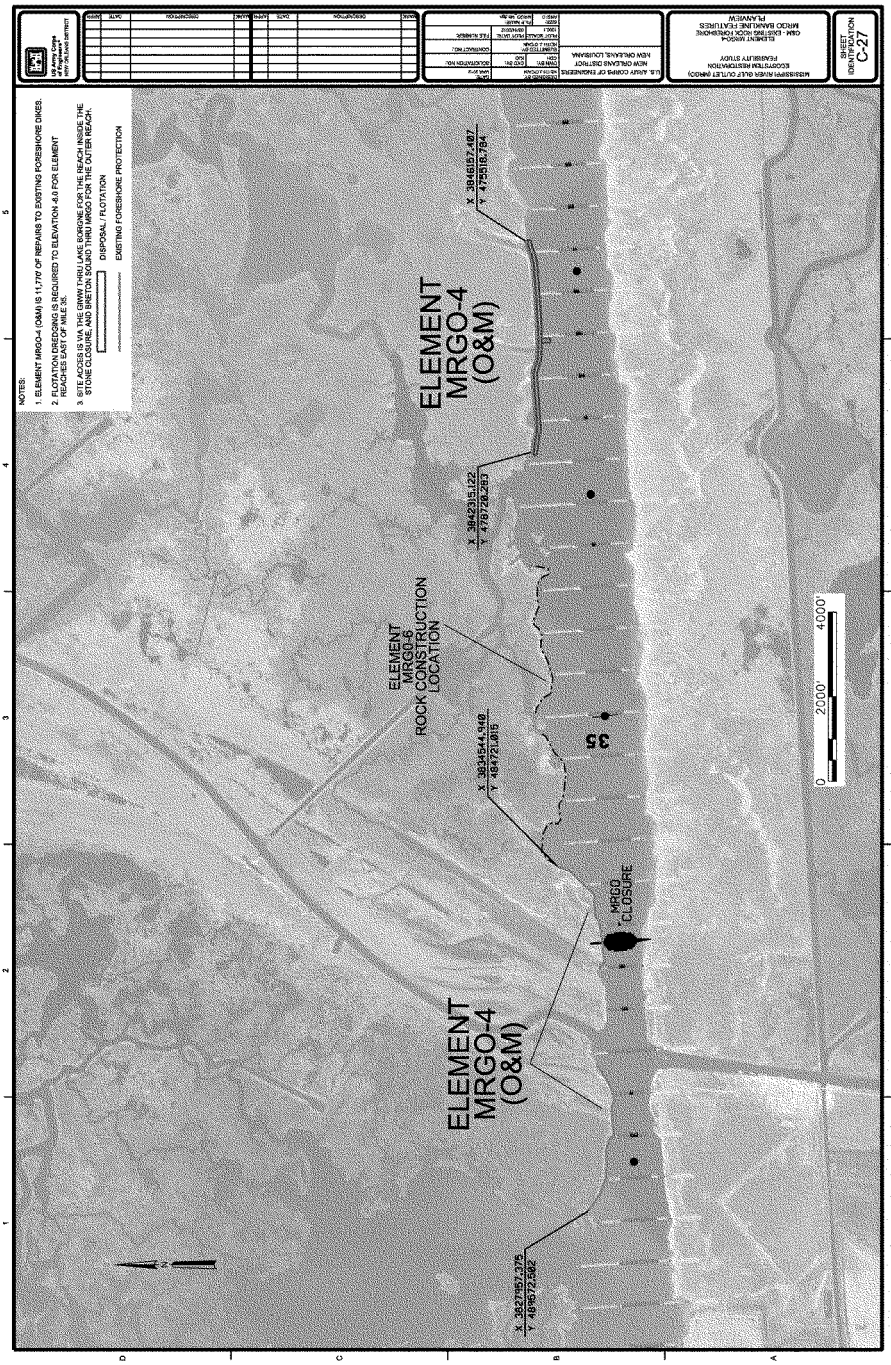

FEATURE CM 4
PLAN VIEW
SHEET IDENTIFICATION
C-23
LEGEND
WETLAND CREATION AREA
(APPROX. 78.5 ACRES)
& AN ADDITIONAL ADJACENT 78.5 ACRES
EARTHEN RETENTION DIKES
(APPROX 23,000 L.F.)
EARTHEN CLOSURES
(APPROX. 1,000 L.F. TO BE
REMOVED UPON COMPLETION OF WORK)
POTENTIAL PIPELINES/ UTILITIES FROM
LA DNR SONRIS AND HTSI DATABASES
ACCESS CORRIDORS FOR DREDGE
PIPELINE AND EQUIPMENT
NOTES
1. BACKGROUND PHOTOGRAPHY WAS FLOWN IN 2010
2. ELEVATIONS SHOWN IN PLAN VIEW ARE FROM A SURVEY TAKEN IN 2010.
SCALE
1000' 0 1000' 2000' 3000' 4000'
LAKE BORGNE
BAYOU DUPRE
VIOLET CANAL
M.R.G.O.
320' ACCESS CORRIDOR LEADING FROM LAKE BORGNE BORROW PIT TO RESTORATION SITES
BACK DIKE CANAL MAY BE USED FOR ACCESS
17 ACRES
26 ACRES
23.5 ACRES
31.5 ACRES
26 ACRES
16 ACRES
14 ACRES
36 ACRES
17 ACRES
19 ACRES
ADJACENT FEATURE CC 6
ADJACENT FEATURE CC 5
BASHMAY (SCENIC STREAM)
BAYOU GRAPEFARM (SCENIC STREAM TO BE IMPACTED)
BAYOU DUPRE (SCENIC STREAM TO BE IMPACTED)
BAYOU DUPRE (SCENIC STREAM TO BE IMPACTED)
89°-51' 0"
89°-52' 0"
89°-53' 0"
89°-54' 0"
89°-55' 0"
89°-56' 0"
89°-57' 0"
89°-50' 0"
89°-49' 0"
89°-48' 0"
89°-47' 0"
89°-46' 0"
3,735,000
3,740,000
3,745,000
3,750,000
3,755,000
3,760,000
3,765,000
3,770,000
500'
525'
550'
575'
600'
625'
650'
675'
700'
725'
750'
775'
800'
825'
850'
875'
900'
925'
950'
975'
1000'
1025'
1050'
1075'
1100'
1125'
1150'
1175'
1200'
1225'
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1825'
1850'
1875'
1900'
1925'
1950'
1975'
2000'
2025'
2050'
2075'
2100'
2125'
2150'
2175'
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3000'
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3100'
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3200'
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7900'
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8000'
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8175'
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9800'
9825'
9850'
9875'
9900'
9925'
9950'
9975'
10000'


LEGEND
PIPELINES/UTILITIES PER LDNR SONRIS
PIPELINES/UTILITIES PER HTSI DATABASE
POTENTIAL STURGEON HABITAT - HARD BOTTOM SUBSTRATE
CM 4 - PROPOSED BORROW
SCALE
2000' 0 2000' 4000' 6000' 8000'
FEATLINE CM 4
BORROW PLAN
PLAN VIEW
SHEET IDENTIFICATION
C-23A
BORROW PIT FOR CMR (APPROX. 7.5')
LAKE BORGNE
M.R.G.O.
G.I.W.W.
MICHOUD
MERAUX
CHALMETTE
MISSISSIPPI RIVER
CMR SITES
PAR ENVIRONMENTAL
MAY BE USED FOR BORROW
INTRACOASTAL WATERWAY

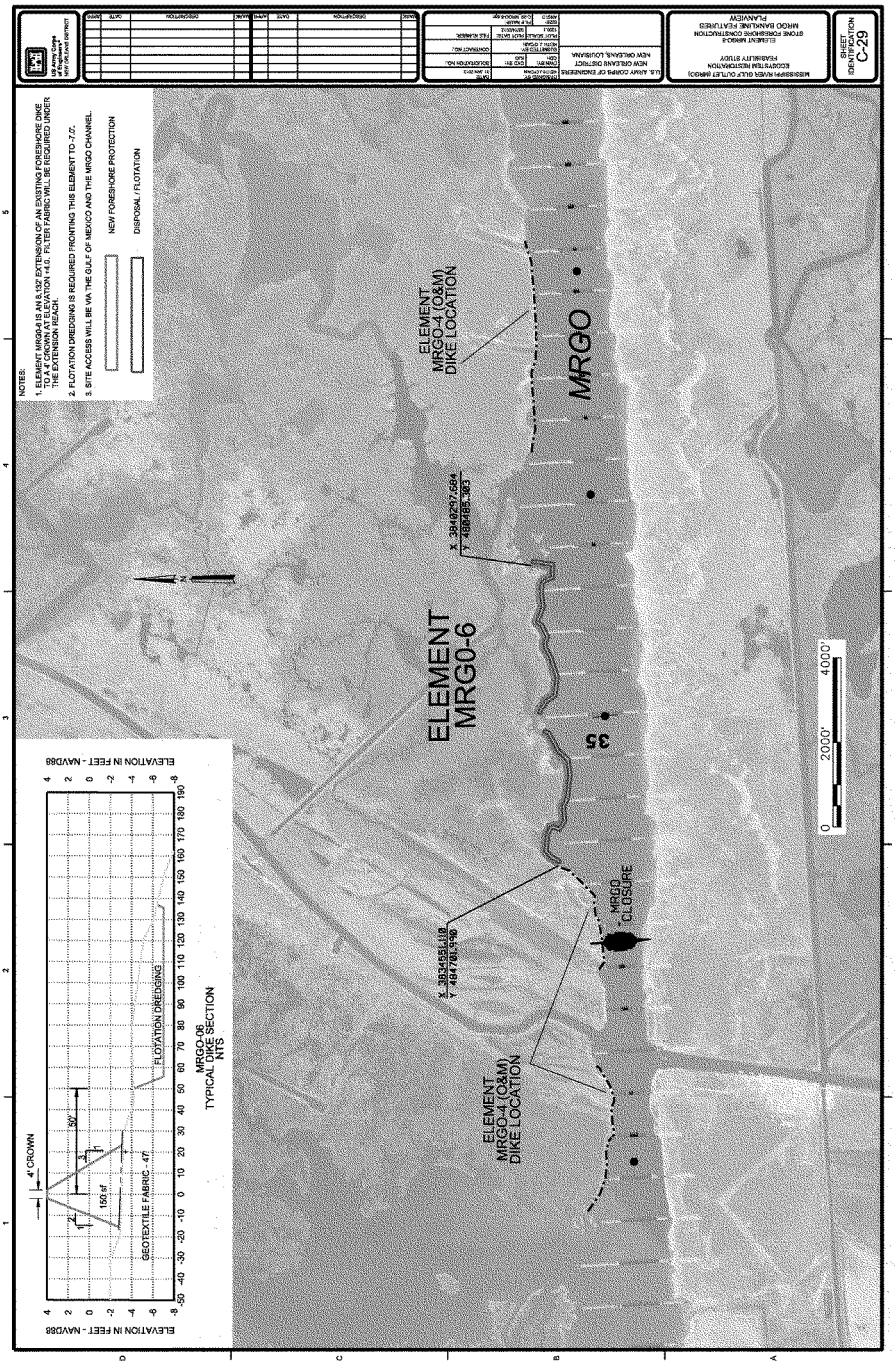

NOTES:
1. ELEMENT MRGO-1 IS 3,848 LINEAR FEET OF STONE FORESHORE DIKE CONSTRUCTION TO A 4' CROWN AT ELEVATION +3.0. FILTER FABRIC WILL BE REQUIRED UNDER THE STONE STRUCTURE FOOTPRINT.
2. FLOTATION DREDGING IS ALLOWABLE FRONTING THIS ELEMENT TO ELEVATION -7.0'.
3. SITE ACCESS WILL BE VIA THE GIWW THRU LAKE BORGNE.
STONE FORESHORE PROTECTION
DISPOSAL / FLOTATION
4' CROWN
ELEV. +3.0
50'
110 sf
GEOTEXTILE FABRIC - 45'
ELEV. -7.0
FLOTATION DREDGING
ELEVATION IN FEET - NAVD88
MRGO-01
TYPICAL DIKE SECTION
NTS
MICHOUD SLIP
MICHOUD SLIP
GIWW
LAKE BORGNE
BAYOU BIENVENUE
IHNC CLOSURE CANAL
ELEMENT MRGO-1
ELEMENT MRG0-7 WALL LOCATION
X 3737719.523
Y 543284.129
X 3748414.718
Y 540984.898
ELEMENT MRG0-7 WALL LOCATION
STONE DIKE
FLOTATION EXCAVATION
MRGO
55
SCALE:1"=2000'
SHEET IDENTIFICATION
C-24

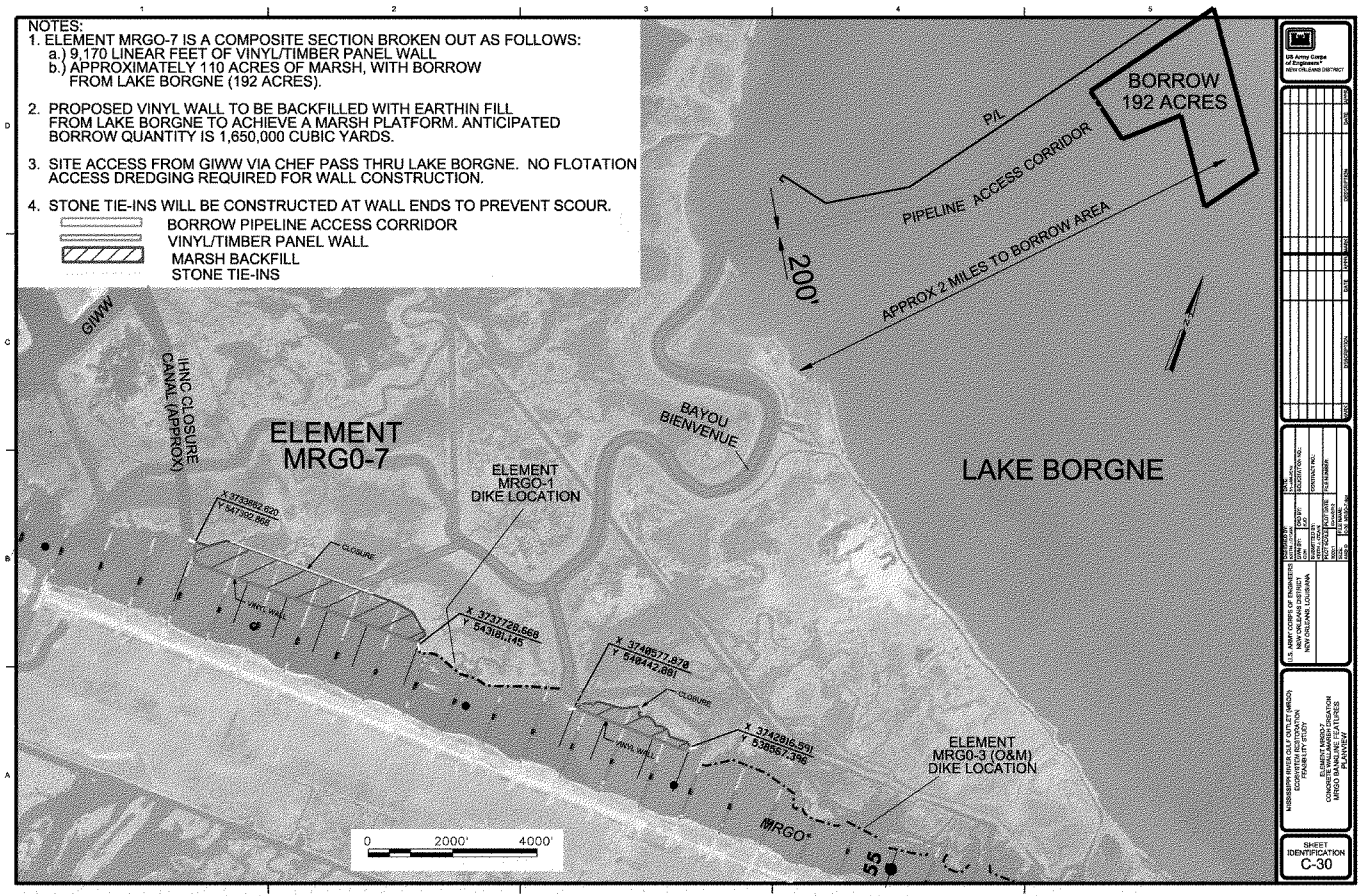

ELEMENT
MRGO-2
(O&M)
EXISTING CWPPRA
FORESHORE PROTECTION
ELEMENT
MRGO-5
WALL LOCATION
Bayou Terre aux Boeufs
Bayou La Loutre
Bayou Dupre
Gardner Canal
Bayou Terre aux Boeufs
FLOTATION EXCAVATION
EXISTING DIKE TO BE DISPOSED
PROPOSED WEST
OF SHELL BEACH
FORESHORE PROTECTION
($75M SUPPLEMENTAL)
X 3814471.842
Y 476588.955
X 3797619
Y 483712
40
0
2000'
4000'
NOTES
1. ELEMENT MRGO-2 IS 21,630'OF REPAIRS TO EXISTING MRGO NORTH BANK FORESHORE PROTECTION.
2. FLOTATION DREDGING IS REQUIRED FRONTING ALL BUT THE TWO WESTERN-MOST REPAIR SEGMENTS, ALLOWABLE TO -7.0' NAVD88.
3. BARGE ACCESS VIA GIWW AND LAKE BORGNE, THEN TO THE MRGO VIA DUPRE CUT.
DISPOSAL / FLOTATION
EXISTING FORESHORE PROTECTION
TYPICAL DIKE SECTION
NTS
MRGO-02
MRGO-03
MRGO-04
MRGO-05
4' CROWN
50'
1:2
1:3
EXISTING
FLOTATION DREDGING - AS NEEDED
ELEVATION IN FEET - NAVD88
Using 62 square feet of dike section results in approximately 3.6 tons/foot.
MISSISSIPPI RIVER GULF OUTLET (MRGO)
BOOSTER/SILL WORK ALTERNATIVES
FEASIBILITY STUDY
ST. BERNARD PARISH, LOUISIANA
MRGO BANK/LINE FEATURES
SHEET IDENTIFICATION
C-25

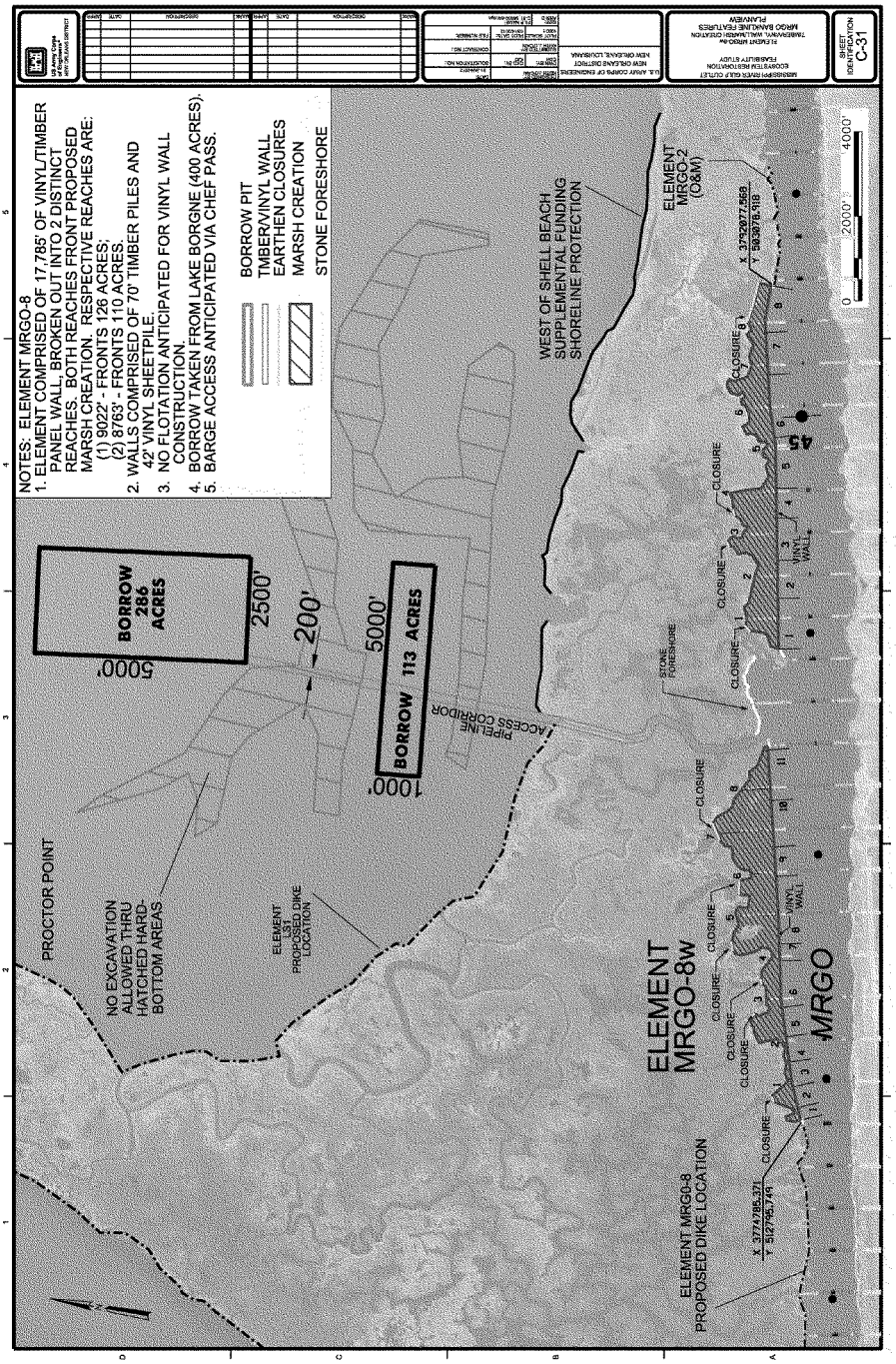

NOTES:
1. ELEMENT MRG0-3 IS 26,650 LINEAR FEET OF FORESHORE REPAIRS
2. EXISTING FLOTATION APPEARS ADEQUATE FOR REQUIRED REPAIRS.
3. SITE ACCESS VIA GIWW THRU LAKE BORGNE AND DUPRE CUT.
4. SEE PLATE C-24 FOR TYPICAL REPAIR SECTION.
EXISTING FORESHORE
LAKE BORGNE
BAYOU BIENVENUE SUPPLEMENTAL FUNDING SHORELINE PROTECTION
BARGE ACCESS VIA CHEF PASS
BAYOU DUPRE SUPPLEMENTAL FUNDING SHORELINE PROTECTION
ELEMENT MRG0-3 (O&M)
MRGO
X 3745987.556
Y 538780.193
X 3759977.737
Y 528810.474
X 3754451.188
Y 527744.466
X 376243.32.369
Y 529481.517
0
2000'
4000'
MISSISSIPPI RIVER GULF OUTLET (MRGO)
ECOSYSTEM RESTORATION
FEASIBILITY STUDY
ELEMENT MRG0-3
OAM - EXISTING ROCK FORESHORE
MRGO BANKLINE FEATURES
PLAN VIEW
SHEET IDENTIFICATION
C-26
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

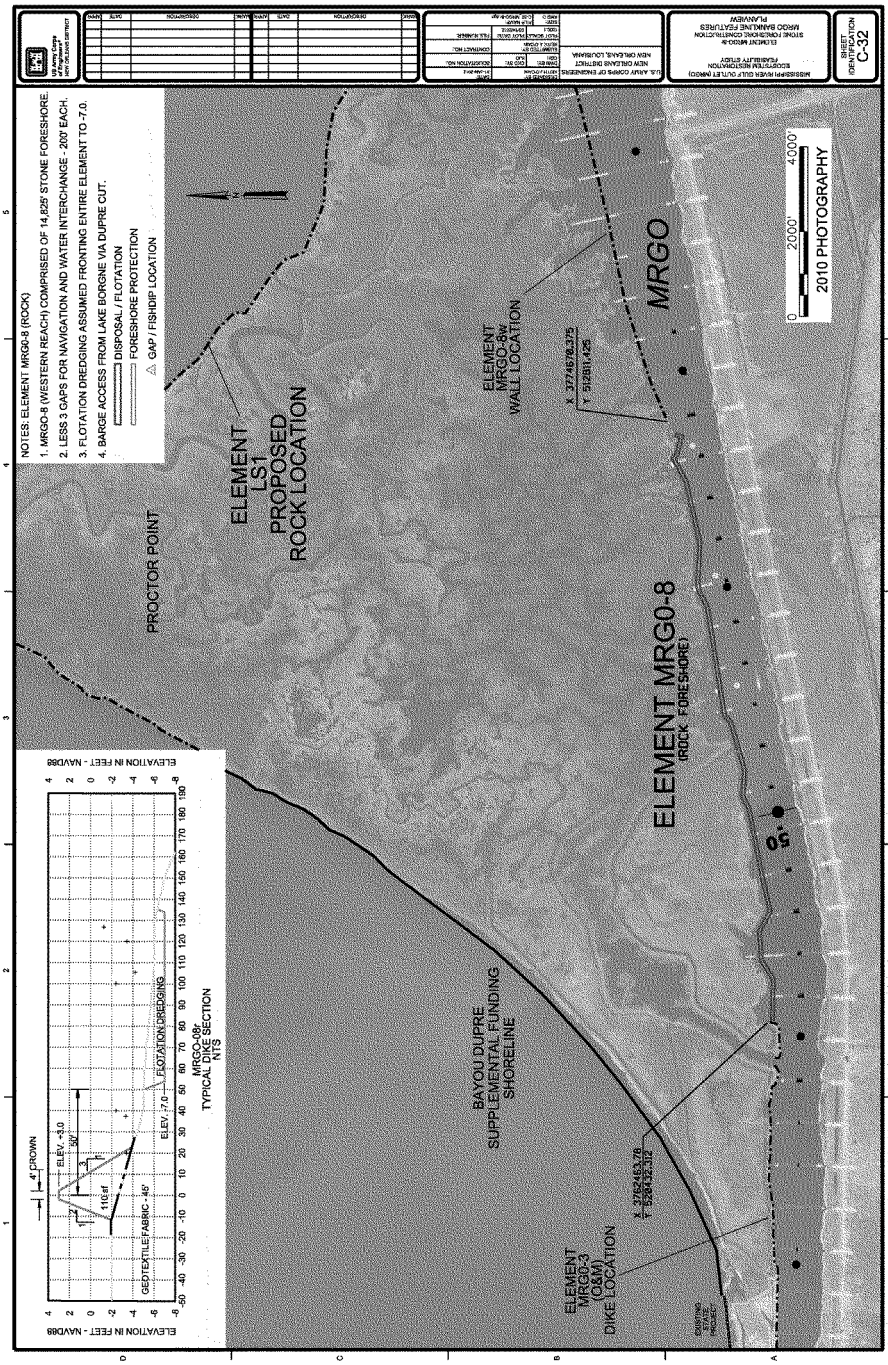

NOTES:
1. ELEMENT MRGO-4 (O&M) IS 11,770' OF REPAIRS TO EXISTING FORESHORE DIKES.
2. FLOTATION DREDGING IS REQUIRED TO ELEVATION -4.0 FOR ELEMENT REACHES EAST OF MILE 35.
3. SITE ACCESS IS VIA THE GIWW THRU LAKE BORGNE FOR THE REACH INSIDE THE STONE CLOSURE, AND BRETON SOUND THRU MRGO FOR THE OUTER REACH.
DISPOSAL / FLOTATION
EXISTING FORESHORE PROTECTION
ELEMENT MRGO-4 (O&M)
ELEMENT MRGO-6 ROCK CONSTRUCTION LOCATION
MRGO CLOSURE
35
X: 3827957.375
Y: 489572.582
X: 3834544.149
Y: 484722.865
X: 3842315.122
Y: 478728.253
X: 3846157.487
Y: 475816.784
0
2000'
4000'
MISSISSIPPI RIVER GULF OUTLET (MRGO)
ECOSYSTEM RESTORATION
FEASIBILITY STUDY
ELEMENT MRGO-4
CAM - DISTRIBUTION ROCK FOR BANKLINE
MRGO BANKLINE FEATURES
PLAN VIEW
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA
SHEET IDENTIFICATION
C-27

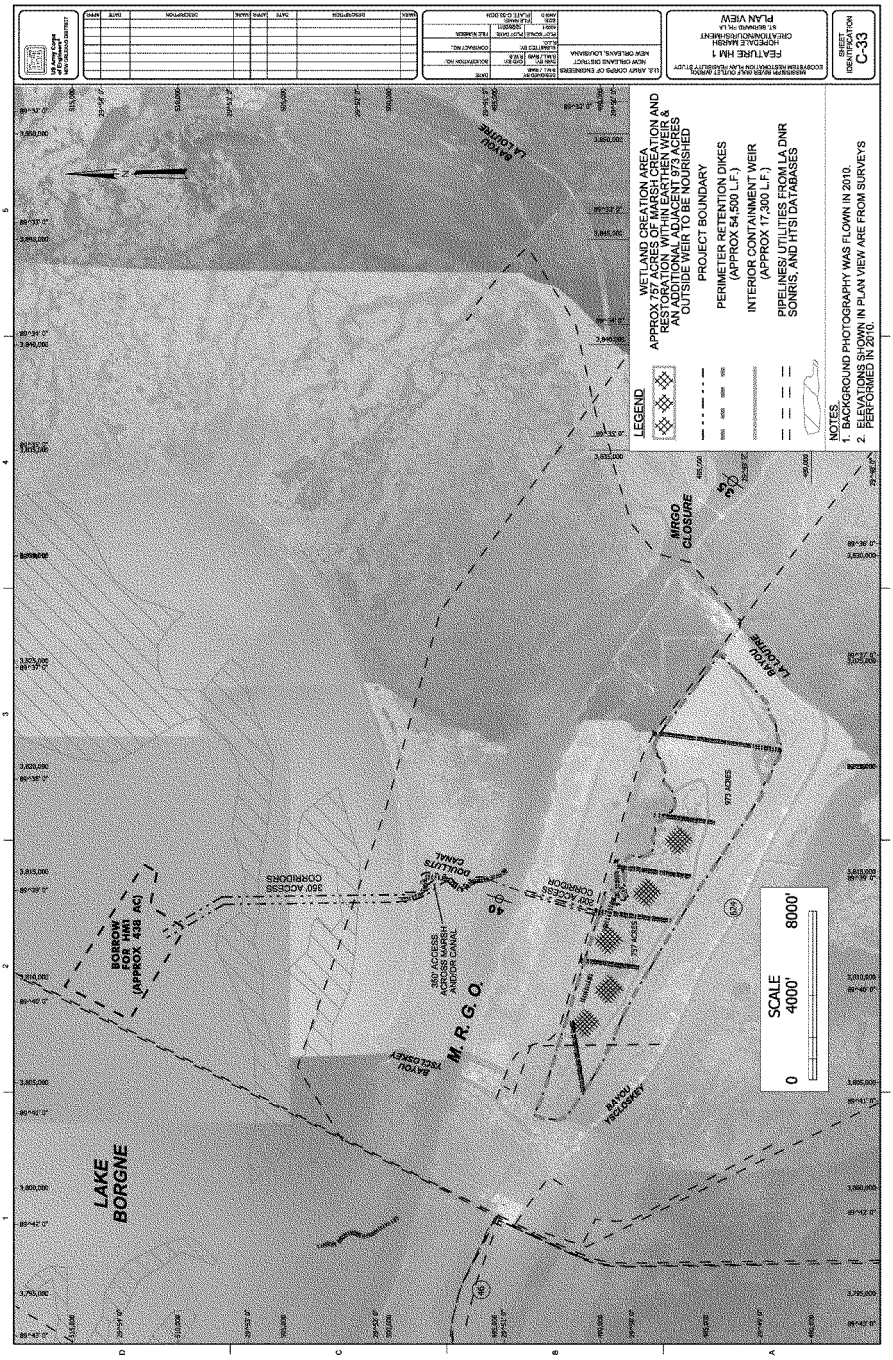
ELEMENT MRGO-5
1. VINYL/TIMBER WALL, 13,685' IN LENGTH FOR SHORELINE ESTABLISHMENT.
2. MARSH CREATION OF 202 ACRES BEHIND WALL CALLS FOR 3,000,000 YARDS OF DREDGING FOR FILL MATERIAL FROM LAKE BORGNE. 2,050' OF CLOSURE DIKES AND 14,950' OF RETENTION DIKES REQUIRED ON BACKSIDE OF MARSH PLATFORM.
3. WALLS COMPRISED OF 70' TIMBER PILES AND 42' VINYL SHEETPILE.
4. MINIMUM FLOTATION ANTICIPATED FOR VINYL WALL CONSTRUCTION.
5. ROCK PROTECTION (150') REQUIRED AT EACH WALL/LAND TIE-IN POINT.
BORROW PIPELINE ACCESS CORRIDOR
VINYL/TIMBER WALL ALIGNMENT
EARTHEN CLOSURE DIKE
MARSH CREATION
STONE TIE-INS
BORROW AREA 336 ACRES
EXISTING CWPPRA FORESHORE PROTECTION
PIPELINE ACCESS CORRIDOR
APPROXIMATELY 2 MILES TO BORROW SITE
200'
NO EXCAVATION ALLOWED THRU HATCHED HARD BOTTOM AREAS
ELEMENT MRGO-2 (O&M) DIKE LOCATION
MRGO
ELEMENT MRGO-5
CLOSURE
CLOSURE
CLOSURE
VINYL WALL
FLOTATION EXCAVATION
X: 3827955.224
Y: 491241.769
X: 3814748.339
Y: 486882.248
0
2000'
4000'
MISSISSIPPI RIVER GULF OUTLET (MRGO) ECOSYSTEM RESTORATION FEASIBILITY STUDY
ELEMENT MRGO-5
VINYL WALL/MARSH CREATION
MRGO SHIP CHANNEL
MRGO BANKLINE FEATURES
PLAN VIEW
SHEET IDENTIFICATION
C-28
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

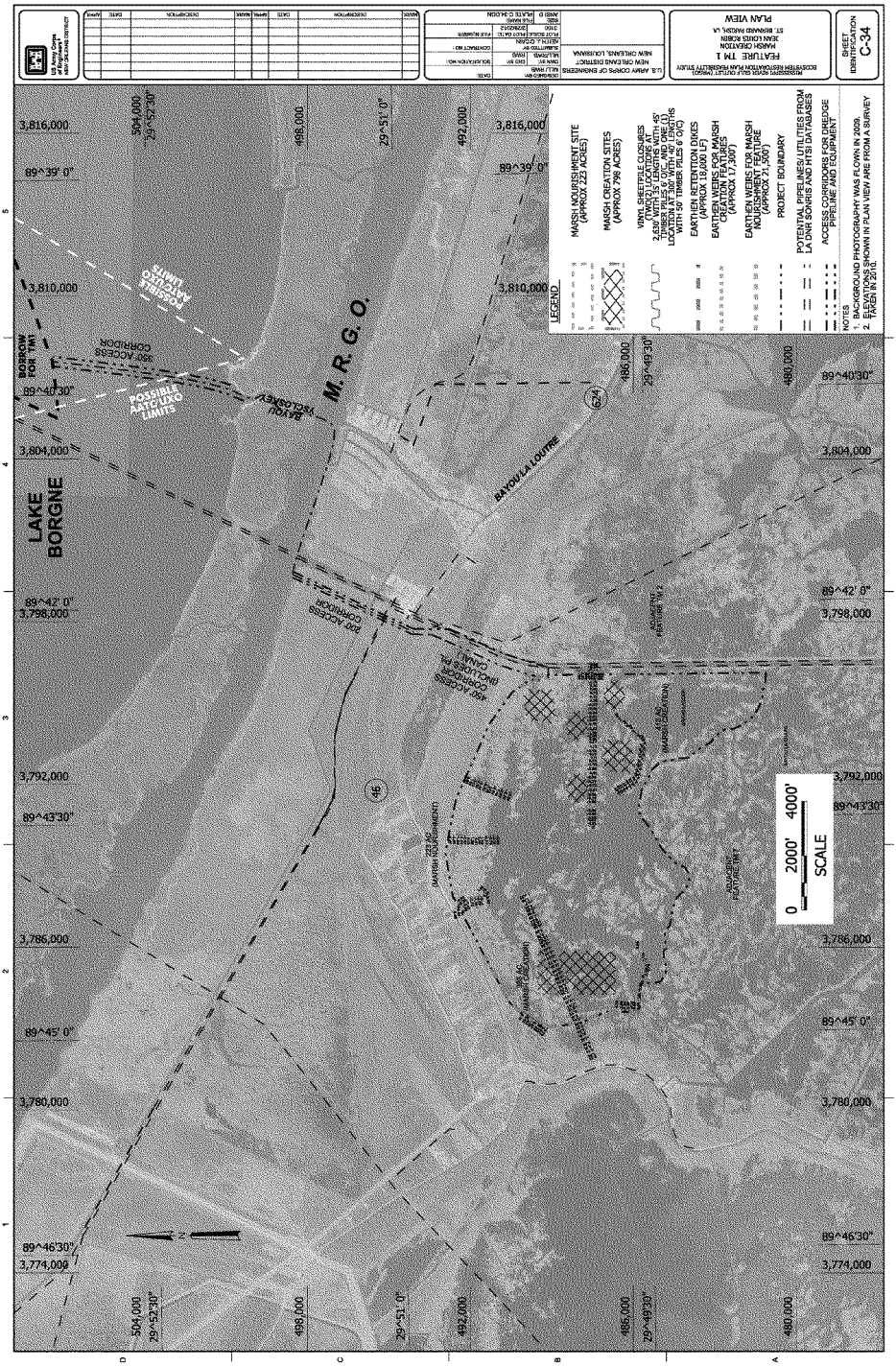

NOTES:
1. ELEMENT MRGO-6 IS AN 8,132' EXTENSION OF AN EXISTING FORESHORE DIKE TO A TOP WIDTH OF 10' AND ELEVATION +4.0'. FILTER FABRIC WILL BE REQUIRED UNDER THE EXTENSION REACH.
2. FLOTATION DREDGING IS REQUIRED FRONTING THIS ELEMENT TO -7.0'.
3. SITE ACCESS WILL BE VIA THE G.U.C. OF MEXICO AND THE MRGO CHANNEL.
NEW FORESHORE PROTECTION
DISPOSAL / FLOTATION
ELEMENT MRGO-6
ELEMENT MRGO-4 (O&M) DIKE LOCATION
ELEMENT MRGO-4 (O&M) DIKE LOCATION
MRGO CLOSURE
MRGO
35
0
2000'
4000'
MRGO 06 TYPICAL DIKE SECTION NTS
4' CROWN
GEOTEXTILE FABRIC -47'
FLOTATION DREDGING
ELEVATION IN FEET - NAVD88
MISSISSIPPI RIVER GULF OUTLET (MRGO) FEASIBILITY STUDY
ST. BERNARD PARISH, LOUISIANA
ELEMENT MRGO-6
STONE FORESHORE CONSTRUCTION
MRGO DANNEMILLER, PEARLMAN & PLAQUEMINES
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA
SHEET IDENTIFICATION
C-29

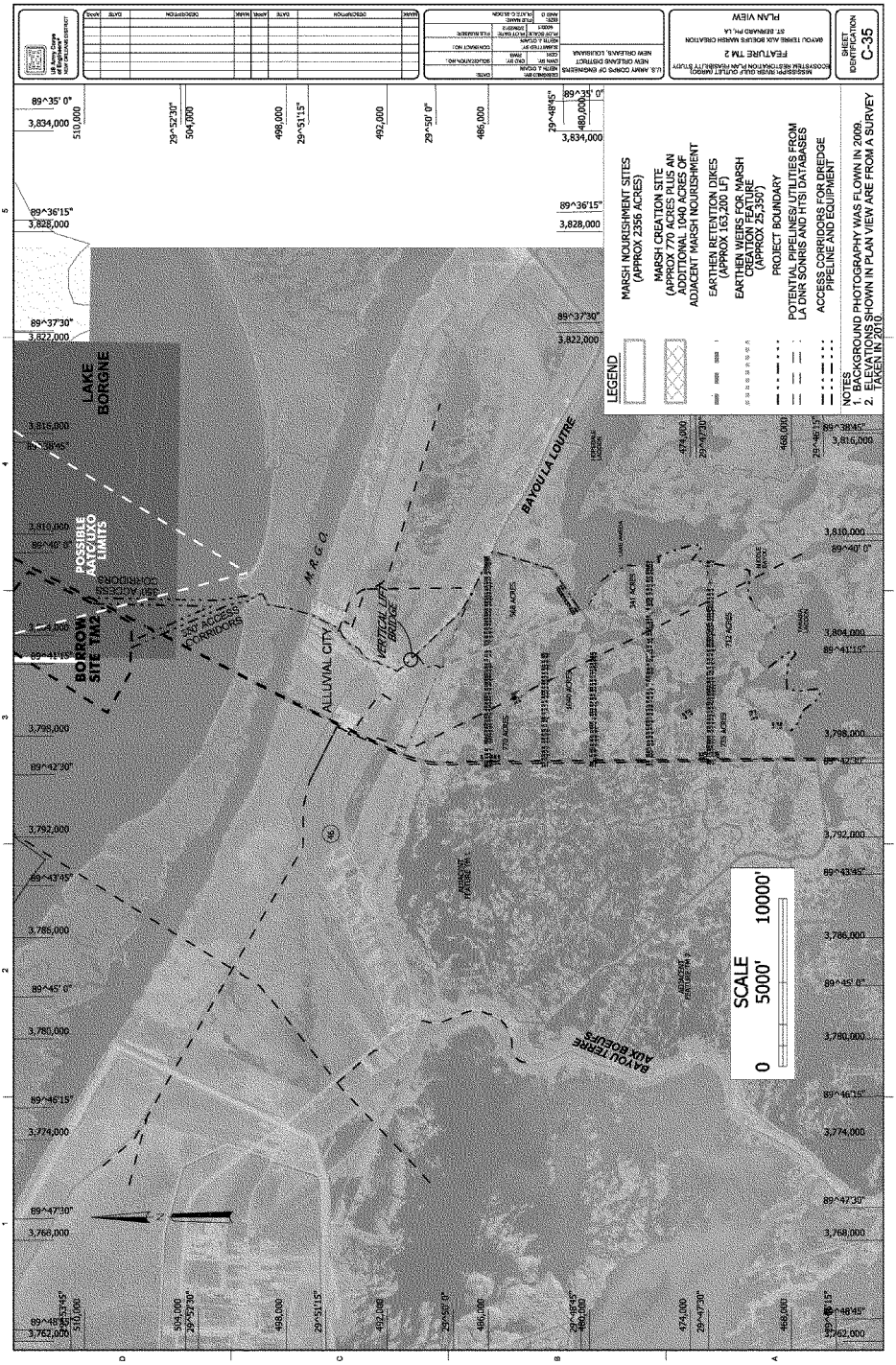

NOTES:
1. ELEMENT MRGO-7 IS A COMPOSITE SECTION BROKEN OUT AS FOLLOWS:
a.) 9,170 LINEAR FEET OF VINYL/TIMBER PANEL WALL
b.) APPROXIMATELY 110 ACRES OF MARSH, WITH BORROW FROM LAKE BORGNE (192 ACRES).
2. PROPOSED VINYL WALL TO BE BACKFILLED WITH EARTHIN FILL FROM LAKE BORGNE TO ACHIEVE A MARSH PLATFORM. ANTICIPATED BORROW QUANTITY IS 1,650,000 CUBIC YARDS.
3. SITE ACCESS FROM GIWW VIA CHEF PASS THRU LAKE BORGNE. NO FLOTATION ACCESS DREDGING REQUIRED FOR WALL CONSTRUCTION.
4. STONE TIE-INS WILL BE CONSTRUCTED AT WALL ENDS TO PREVENT SCOUR.
BORROW PIPELINE ACCESS CORRIDOR
VINYL/TIMBER PANEL WALL
MARSH BACKFILL
STONE TIE-INS
BORROW 192 ACRES
P/L
PIPELINE ACCESS CORRIDOR
APPROX 2 MILES TO BORROW AREA
200'
GIWW
IHNC CLOSURE CANAL (APPROX)
ELEMENT MRG0-7
ELEMENT MRGO-1 DIKE LOCATION
BAYOU BIENVENUE
LAKE BORGNE
X 3733952.820
Y 547302.566
CLOSURE
VINYL WALL
X 3731726.668
Y 543181.145
X 3740571.870
Y 540442.681
CLOSURE
VINYL WALL
X 3740816.591
Y 539567.394
ELEMENT MRG0-3 (O&M) DIKE LOCATION
MRGO*
55
0 2000' 4000'
US Army Corps of Engineers
NEW ORLEANS DISTRICT
SHEET IDENTIFICATION
C-30

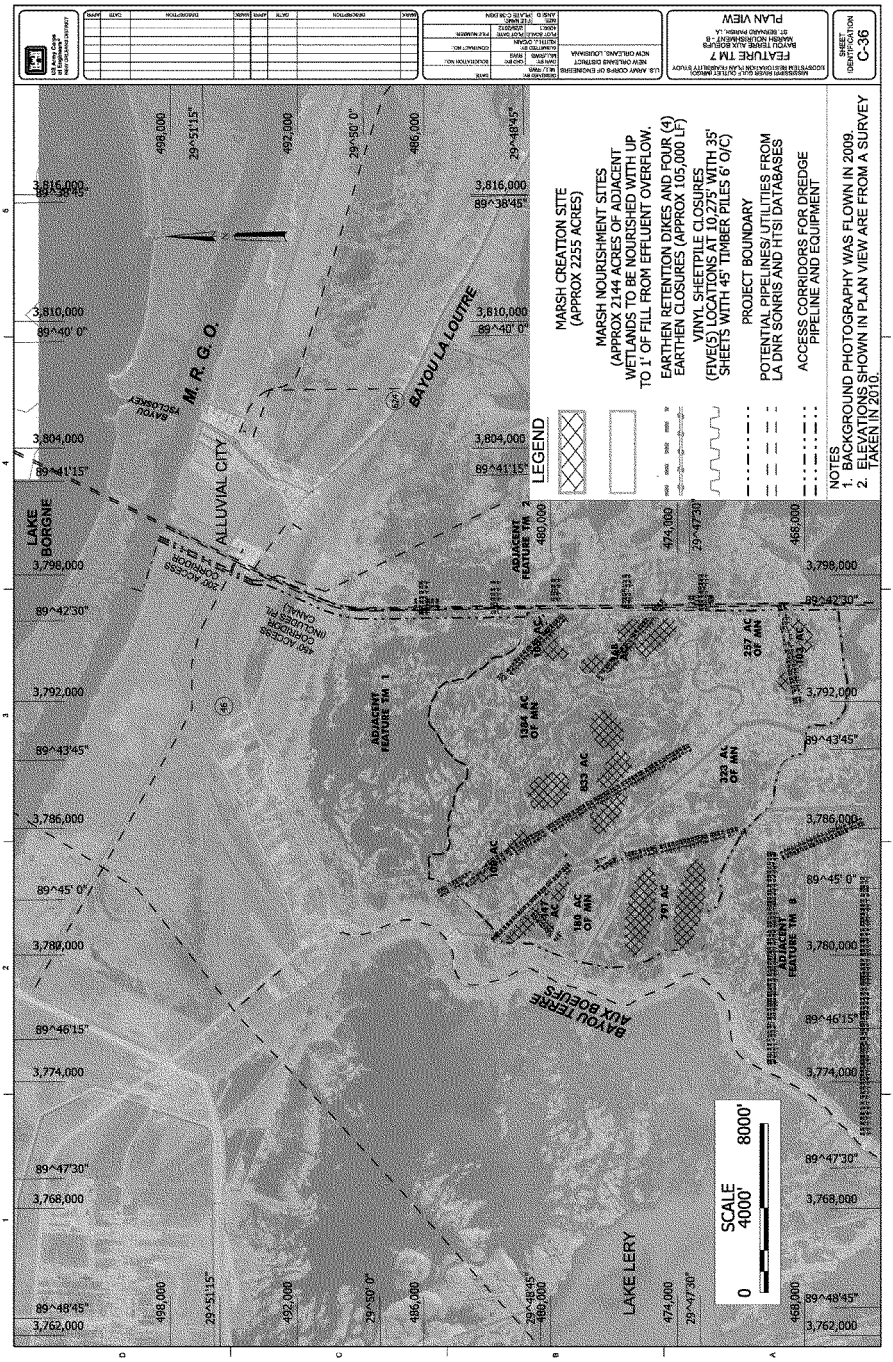

NOTES: ELEMENT MRGO-8
1. ELEMENT COMPRISED OF 17,785' OF VINYL/TIMBER PANEL WALL, BROKEN OUT INTO 2 DISTINCT REACHES. BOTH REACHES FRONT PROPOSED MARSH CREATION. RESPECTIVE REACHES ARE:
(1) 9022' - FRONTS 126 ACRES;
(2) 8763' - FRONTS 110 ACRES.
2. WALLS COMPRISED OF 70' TIMBER PILES AND 42' VINYL SHEETPILE.
3. NO FLOTATION ANTICIPATED FOR VINYL WALL CONSTRUCTION.
4. BORROW TAKEN FROM LAKE BORGNE (400 ACRES).
5. BARGE ACCESS ANTICIPATED VIA CHEF PASS.
BORROW PIT
TMBER/VINYL WALL
EARTHEN CLOSURES
MARSH CREATION
STONE FORESHORE
PROCTOR POINT
NO EXCAVATION ALLOWED THRU HATCHED HARD-BOTTOM AREAS
ELEMENT 1ST PROPOSED DIKE LOCATION
BORROW 286 ACRES
5000'
2500'
200'
5000'
1000'
BORROW 113 ACRES
PIPELINE ACCESS CORRIDOR
WEST OF SHELL BEACH SUPPLEMENTAL FUNDING SHORELINE PROTECTION
ELEMENT MRGO-2 (O&M)
ELEMENT MRGO-8w
ELEMENT MRGO-8 PROPOSED DIKE LOCATION
MRGO
STONE FORESHORE
CLOSURE
VINYL WALL
X: 3774785.371
Y: 512794.749
X: 3792077.568
Y: 503975.918
0
2000'
4000'
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA
ENGINEERING DIVISION
GEOMETRIC RESTORATION
FEASIBILITY STUDY
MRGO BANQUETTE FEATURES
PLANVIEW
SHEET IDENTIFICATION
C-31

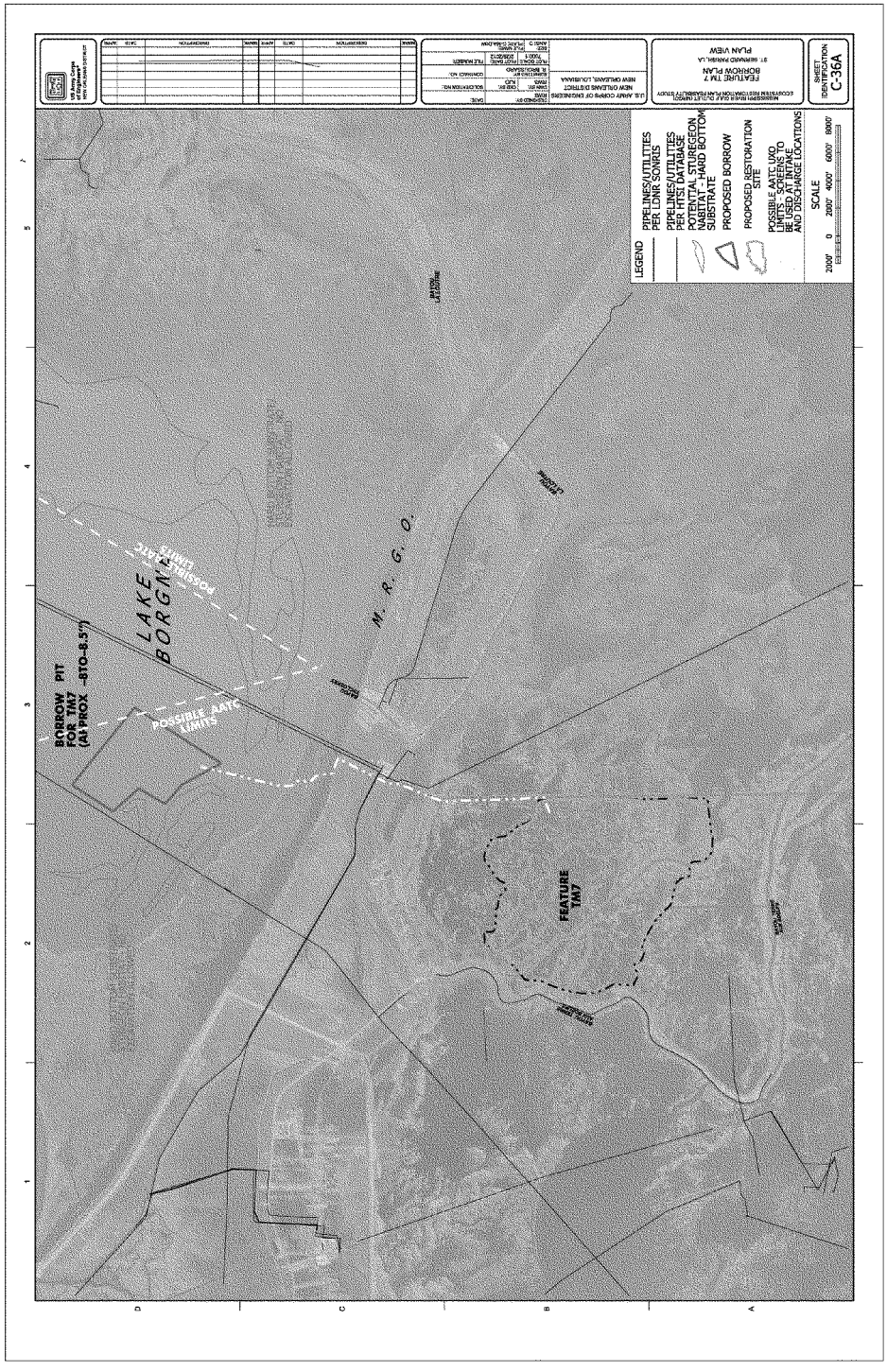

NOTES: ELEMENT MRG0-8 (ROCK)
1. MRG0-8 (WESTERN REACH) COMPRISED OF 14,825' STONE FORESHORE.
2. LESS 3 GAPS FOR NAVIGATION AND WATER INTERCHANGE - 200' EACH.
3. FLOTATION DREDGING ASSUMED FRONTING ENTIRE ELEMENT TO -7.0.
4. BARGE ACCESS FROM LAKE BORGNE VIA DUPRE CUT.
DISPOSAL / FLOTATION
FORESHORE PROTECTION
GAP / FISHDIP LOCATION
PROCTOR POINT
ELEMENT LS1 PROPOSED ROCK LOCATION
ELEMENT MRG0-8w WALL LOCATION
X: 3774578.375
Y: 512811.425
MRGO
ELEMENT MRG0-8
(ROCK - FORESHORE)
BAYOU DUPRE SUPPLEMENTAL FUNDING SHORELINE
ELEMENT MRG0-3 (O&M) DIKE LOCATION
X: 3766419.178
Y: 524612.532
2000'
4000'
2010 PHOTOGRAPHY
TYPICAL DIKE SECTION
MRGO-08r
NTS
4' CROWN
ELEV. +3.0
3V
3H
110.5 ft
GEOTEXTILE FABRIC - 45°
ELEV. -7.0
FLOTATION DREDGING
ELEVATION IN FEET - NAVD88
MISSISSIPPI RIVER GULF OUTLET (MRGO)
ECOSYSTEM RESTORATION
STAGE I FORESHORE CONSTRUCTION
MRGO BANKLINE FEATURES
PLAN VIEW
SHEET IDENTIFICATION
C-32

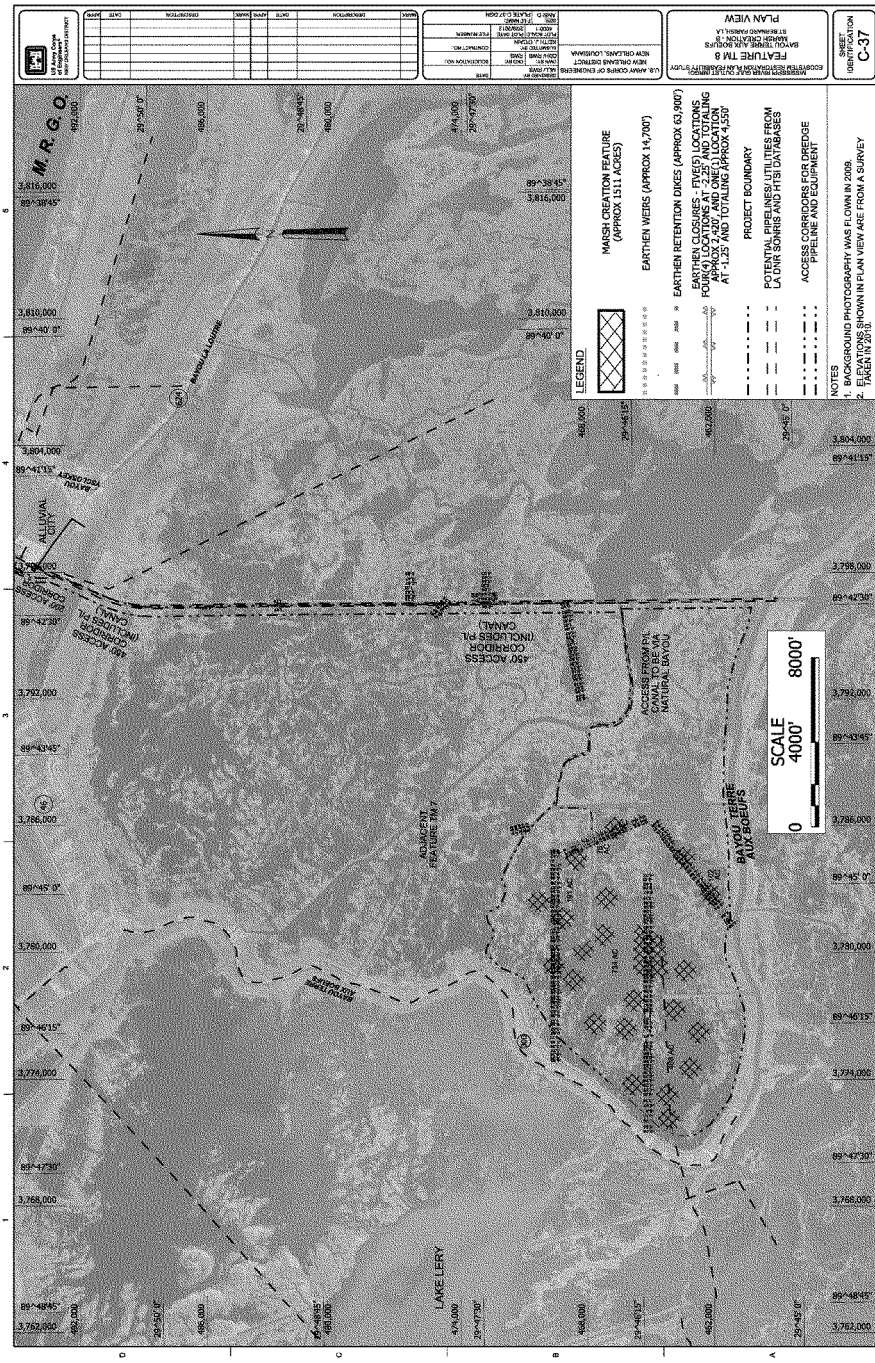

LAKE BORGNE
BATON ROUGE
MRGO CLOSURE
BAYOU LA LOUTRE
BAYOU YSCLOSKEY
M.R.G.O.
EXISTING ROAD
EXISTING CANAL
EXISTING LEVEE
EXISTING PIPELINE
EXISTING TRANSMISSION LINE
EXISTING RAILROAD
EXISTING BUILDING
EXISTING TANK
EXISTING WELL
EXISTING MARSH
EXISTING WATER
EXISTING SPOIL
EXISTING SHELL
EXISTING SHELL RIDGE
EXISTING SHELL PAD
EXISTING SHELL PAD RIDGE
EXISTING SHELL PAD RIDGE
EXISTING SHELL PAD RIDGE

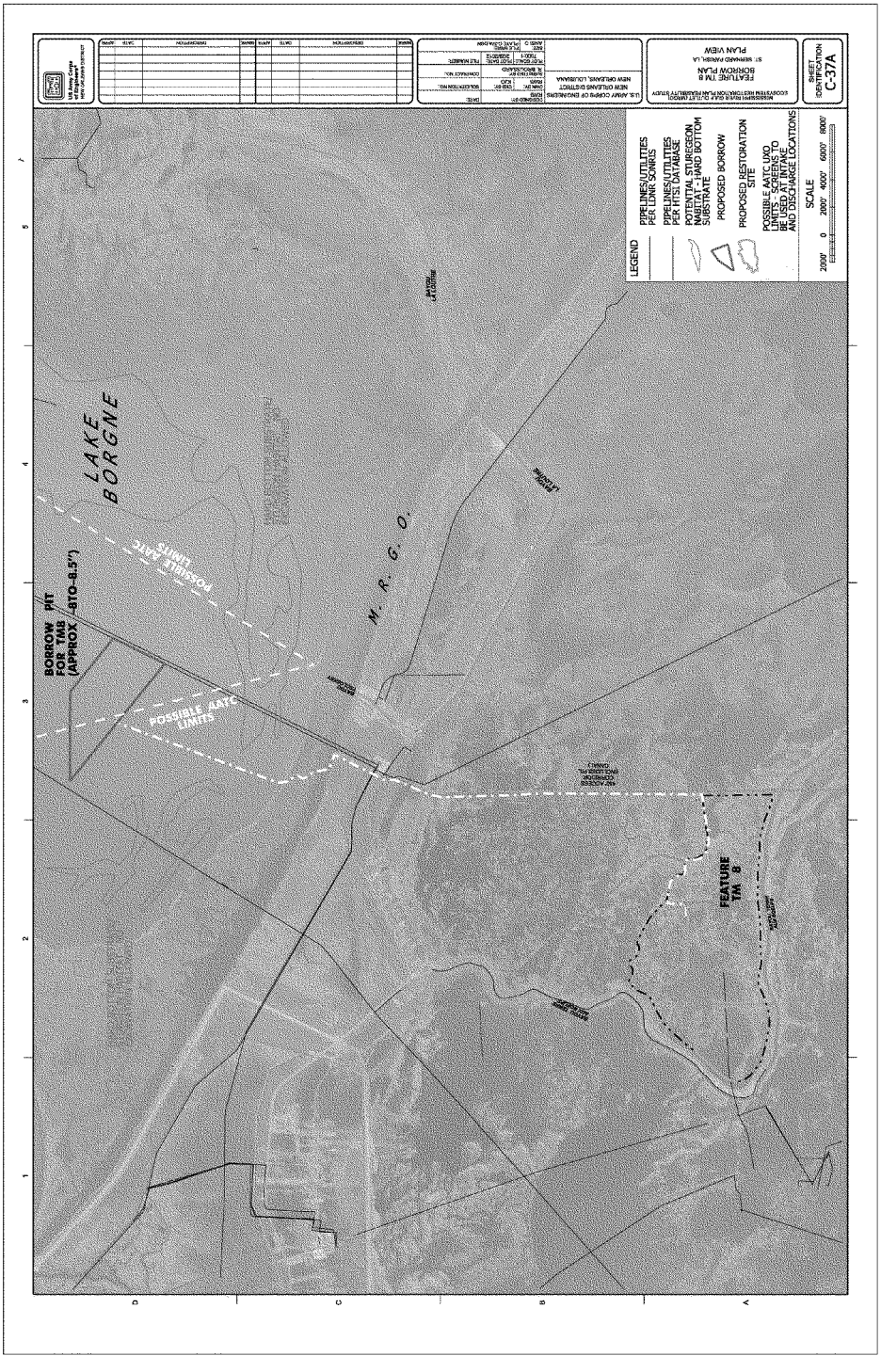

LAKE BORGNE
M.R.G.O.
BAYOU LA LOUTRE
BAYOU VELOSKEY
POSSIBLE ANTICLIZIO LIMITS
POSSIBLE ANTICLIZIO LIMITS
BORROW FOR TM1
950' ACCESS CORRIDOR
20' ACCESS CORRIDOR
10' ACCESS CORRIDOR (INCLUDES PL CANAL)
LEGEND
MARSH NOURISHMENT SITE (APPROX 223 ACRES)
MARSH CREATION SITES (APPROX 798 ACRES)
VINYL SHEETPILE CLOSURES (TWO) LOCATIONS AT: 2,858' WITH 3.5' LENGTHS WITH 45' LONGER PILES AND 1,000' WITH 40' LENGTHS LOCATION AT 386' WITH 40' LENGTHS
EARTHEN RETENTION DIKES (APPROX 18,000 LF)
EARTHEN WEIRS FOR MARSH CREATION FEATURES (APPROX 7,000 LF)
EARTHEN MARSH NOURISHMENT FEATURE (APPROX 21,500')
PROJECT BOUNDARY
POTENTIAL PIPELINES/UTILITIES FROM LA DNR SONRIS AND HTSI DATABASES
ACCESS CORRIDORS FOR DREDGE PIPELINE AND EQUIPMENT
NOTES
1. BACKGROUND PHOTOGRAPHY WAS FLOWN IN 2020.
2. ELEVATIONS SHOWN IN FEET NGVD AND TAKEN FROM A SURVEY
0 2000' 4000'
SCALE
3,816,000
3,810,000
3,804,000
3,798,000
3,792,000
3,786,000
3,780,000
3,774,000
504,000
498,000
492,000
486,000
480,000
89^39' 0"
89^40'30"
89^42' 0"
89^43'30"
89^45' 0"
89^46'30"
29^52'30"
29^51' 0"
29^49'30"
N
A
B
C
D
1
2
3
4
5
MISSISSIPPI RIVER GULF OUTLET (MRGO) ECOSYSTEM RESTORATION PLAN FEASIBILITY STUDY
FEATURE TM 1
MARSH CREATION
ST. BERNARD PARISH, LA
JEAN LOUIS ROBIN
PLAN VIEW
SHEET IDENTIFICATION
C-34
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA
DESIGNED BY
DRAWN BY
CHECKED BY
SUBMITTED BY
SUBMITTED TO
APPROVED BY
SCALE C-34,GDN
DATE
US Army Corps of Engineers
New Orleans District

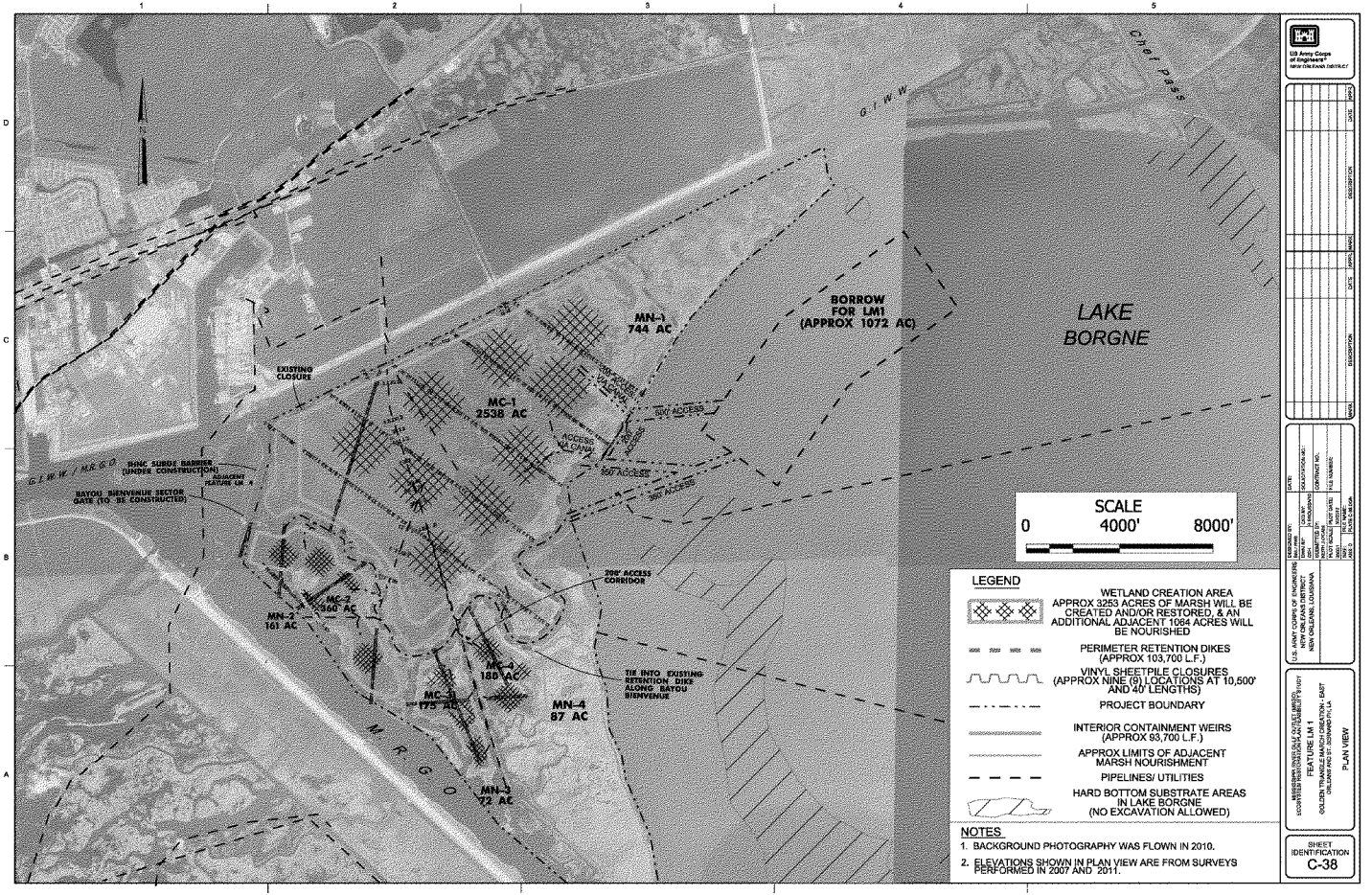

MISSISSIPPI RIVER GULF OUTLET (MRGO)
ECOSYSTEM RESTORATION PLAN FEASIBILITY STUDY
FEATURE TM 2
BAYOU TERRE AUX BOEUFS MARSH CREATION
ST. BERNARD PH., LA
PLAN VIEW
SHEET IDENTIFICATION
C-35
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA
LEGEND
MARSH NOURISHMENT SITES (APPROX 2356 ACRES)
MARSH CREATION SITE (APPROX 770 ACRES PLUS AN ADDITIONAL 1040 ACRES OF ADJACENT MARSH NOURISHMENT
EARTHEN RETENTION DIKES (APPROX 163,200 LF)
EARTHEN WEIRS FOR MARSH CREATION FEATURE (APPROX 25,350')
PROJECT BOUNDARY
POTENTIAL PIPELINES/ UTILITIES FROM LA DNR SONRIS AND HTSI DATABASES
ACCESS CORRIDORS FOR DREDGE PIPELINE AND EQUIPMENT
NOTES
1. BACKGROUND PHOTOGRAPHY WAS FLOWN IN 2009.
2. ELEVATIONS SHOWN IN PLAN VIEW ARE FROM A SURVEY TAKEN IN 2010
SCALE
0 5000' 10000'
LAKE BORGNE
BORROW SITE TM2
POSSIBLE ARTIZUXO LIMITS
NEW ACCESS CORRIDORS
ALLUVIAL CITY
MRGO
VERTICAL LIFT BRIDGE
BAYOU LA LOUTRE
BAYOU TERRE AUX BOEUFS


LEGEND
MARSH CREATION SITE (APPROX 2255 ACRES)
MARSH NOURISHMENT SITES (APPROX 2144 ACRES OF ADJACENT WETLANDS TO BE NOURISHED WITH UP TO 1' OF FILL FROM EFFLUENT OVERFLOW.
EARTHEN RETENTION DIKES AND FOUR (4) EARTHEN CLOSURES (APPROX 105,000 LF)
VINYL SHEETPILE CLOSURES (FIVE(5) LOCATIONS AT 10,275' WITH 35' SHEETS WITH 45' TIMBER PILES 6' O/C)
PROJECT BOUNDARY
POTENTIAL PIPELINES/ UTILITIES FROM LA DNR SONRIS AND HTSI DATABASES
ACCESS CORRIDORS FOR DREDGE PIPELINE AND EQUIPMENT
NOTES
1. BACKGROUND PHOTOGRAPHY WAS FLOWN IN 2009.
2. ELEVATIONS SHOWN IN PLAN VIEW ARE FROM A SURVEY TAKEN IN 2010.
FEATURE TM 7
PLAN VIEW
C-36
SCALE 4000' 8000'
0
LAKE BORGNE
LAKE LERY
ALLUVIAL CITY
M.R.G.O.
BAYOU LA LOUTRE
BAYOU TERRE AUX BOEUFS
ADJACENT FEATURE TM 1
ADJACENT FEATURE TM 2
ADJACENT FEATURE TM 6
498,000
492,000
486,000
480,000
474,000
468,000
3,816,000
3,810,000
3,804,000
3,798,000
3,792,000
3,786,000
3,780,000
3,774,000
3,768,000
3,762,000
29^51'15"
29^50' 0"
29^48'45"
89^38'45"
89^40' 0"
89^41'15"
89^42'30"
89^43'45"
89^45' 0"
89^46'15"
89^47'30"
89^48'45"

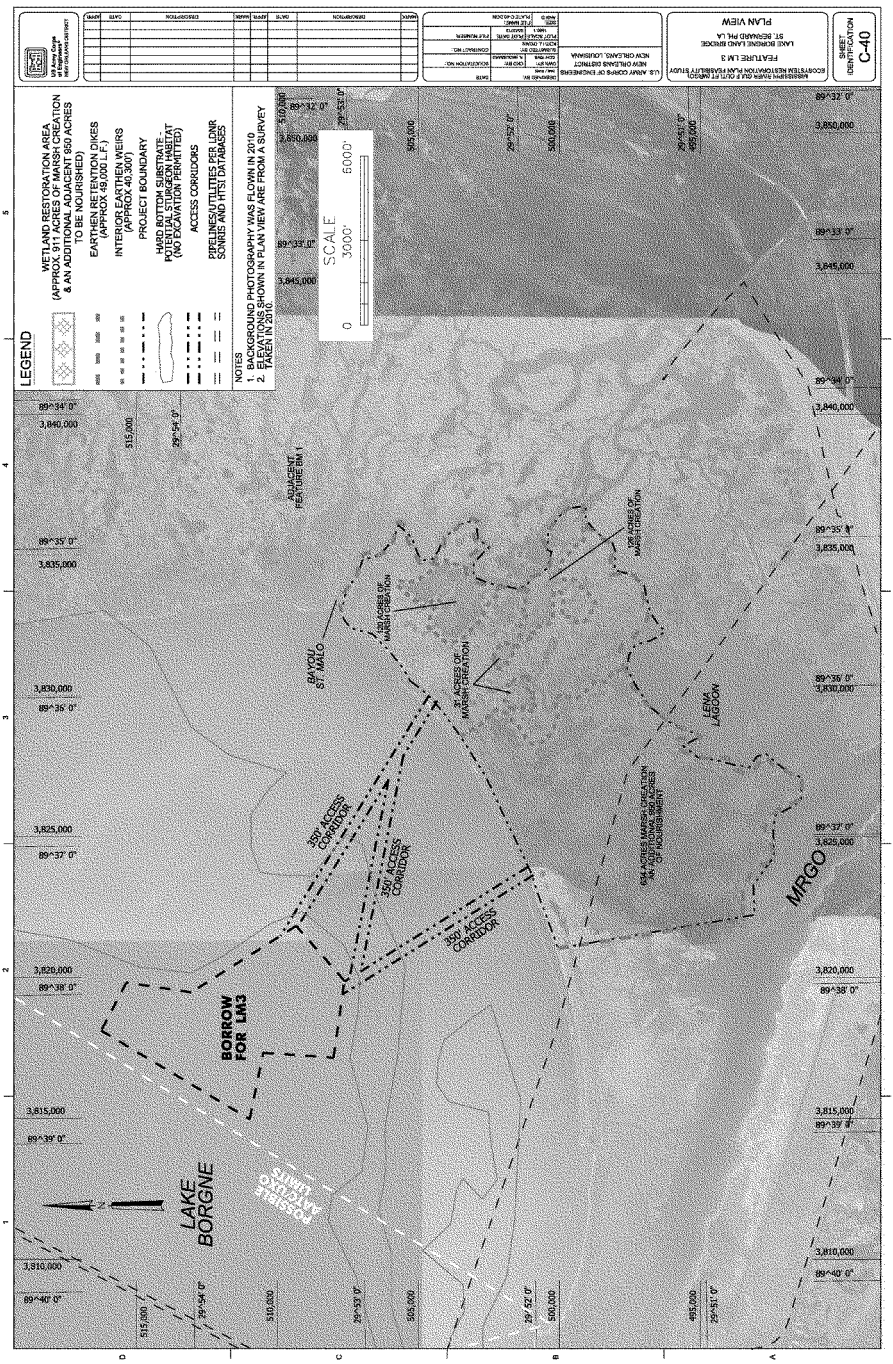

LAKE BORGNE
M. R. G. O.
BORROW PIT FOR TM7 (APPROX. -8TO-8.5')
POSSIBLE AATC LIMITS
FEATURE TM7
LEGEND
PIPELINES/UTILITIES PER LDNR, SONRIS
PIPELINES/UTILITIES PER HTSI DATABASE
POTENTIAL STURGEON HABITAT - HARD BOTTOM SUBSTRATE
PROPOSED BORROW
PROPOSED RESTORATION SITE
POSSIBLE AATC UXO LIMITS - REFER TO LIMITED ACCESS PLAN AND DISCHARGE LOCATIONS
SCALE
2000' 0 2000' 4000' 6000' 8000'
MISSISSIPPI RIVER GULF OUTLET (MRGO) ECOSYSTEM RESTORATION PLAN REFINEMENT/EIS STUDY
FEATURE TM 7
BORROW PLAN
PLAN VIEW
SHEET IDENTIFICATION
C-36A

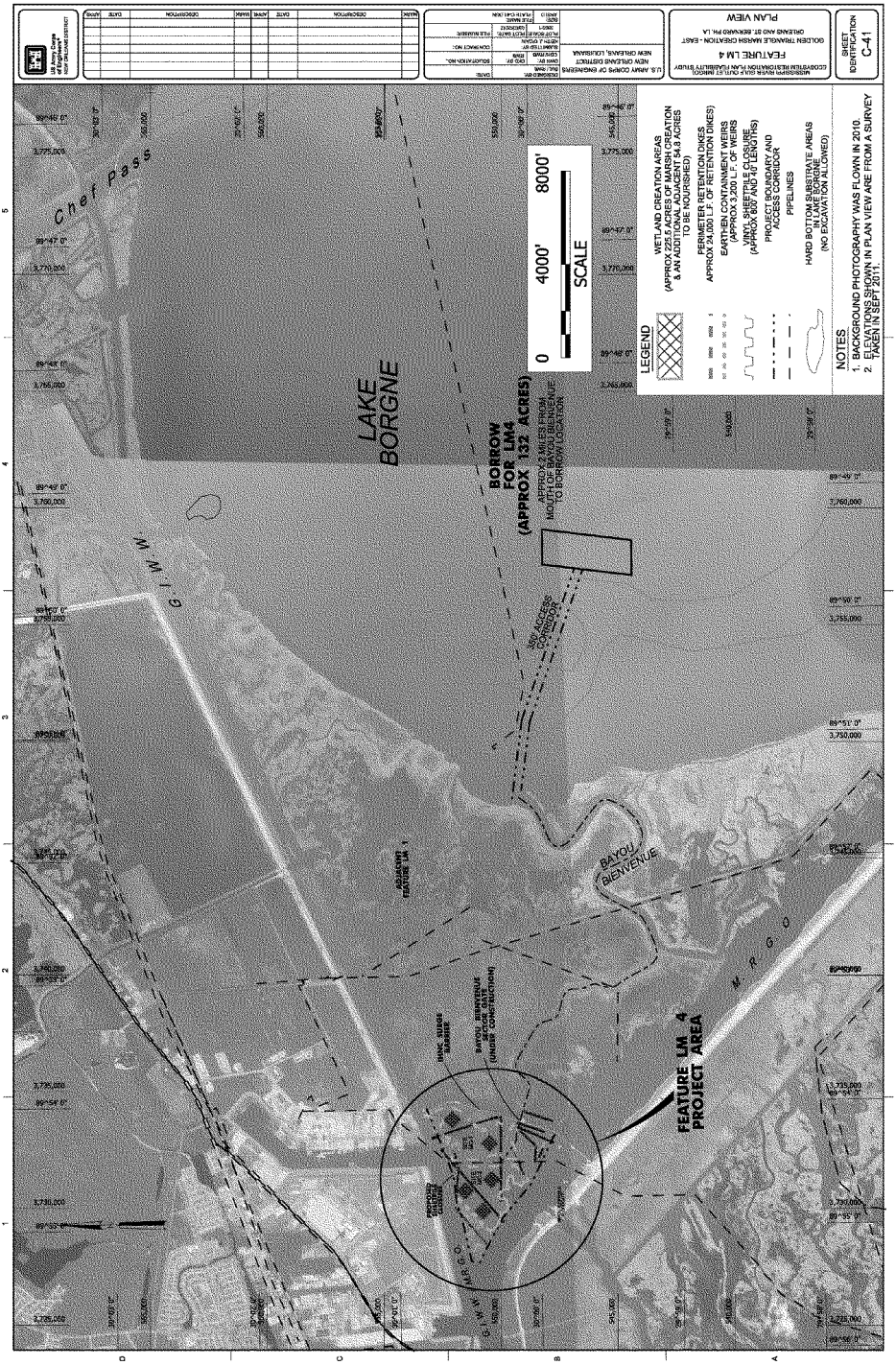

FEATURE TM 6
BAYOU TERRE AUX BOEUFS MARSH CREATION - 6
ST BERNARD PARISH, LA
PLAN VIEW
SHEET IDENTIFICATION
C-37
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
LEGEND
MARSH CREATION FEATURE (APPROX 1511 ACRES)
EARTHEN WEIRS (APPROX 14,700')
EARTHEN RETENTION DIKES (APPROX 63,900')
EARTHEN CLOSURES - FIVE(5) LOCATIONS FOUR(4) LOCATIONS AT -2.25' AND TOTALING APPROX 2,125' AND ONE(1) LOCATION AT -1.25' AND TOTALING APPROX 4,550'
PROJECT BOUNDARY
POTENTIAL PIPELINES/ UTILITIES FROM LA DNR SONRIS AND HTSI DATABASES
ACCESS CORRIDORS FOR DREDGE PIPELINE AND EQUIPMENT
NOTES
1. BACKGROUND PHOTOGRAPHY WAS FLOWN IN 2009.
2. ELEVATIONS SHOWN IN PLAN VIEW ARE FROM A SURVEY FLOWN IN 2010.
SCALE
0 4000' 8000'
M.R.G.O.
LAKE LERY
BAYOU LA LOUTRE
BAYOU TERRE AUX BOEUFS
ADJACENT FEATURE TM7
ACCESS FROM PL CANAL TO BE VIA NATURAL BAYOU
450' ACCESS CORRIDOR (INCLUDES PL CANAL)
ALLUVIAL CITY
BAYOU ROAD
PROPOSED ACCESS CHANNEL TO PL CANAL
ACCESS CHANNEL TO PL CANAL

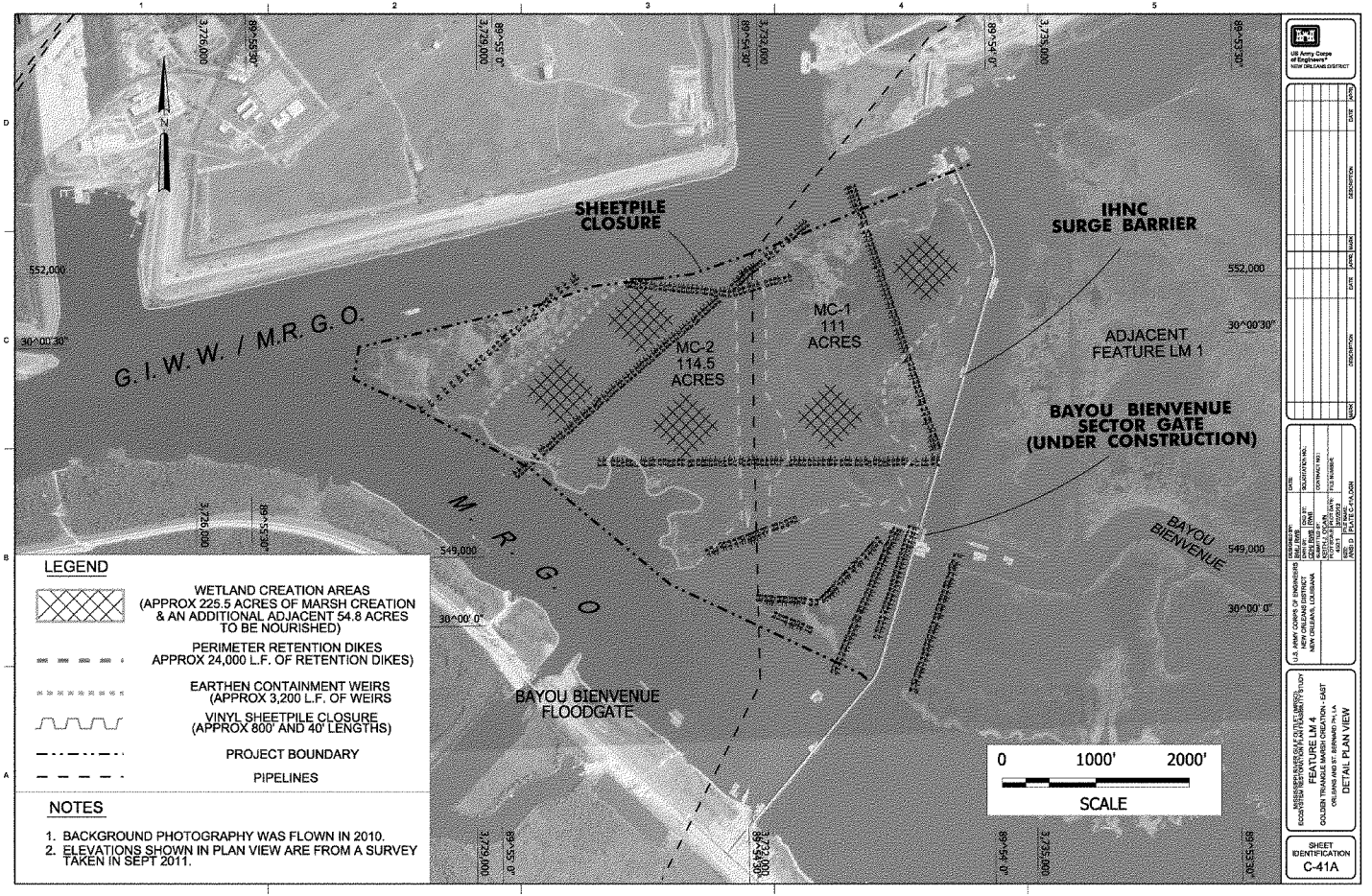

LAKE BORGNE
M. R. G. O.
POSSIBLE AATC LIMITS
POSSIBLE AATC LIMITS
BORROW PIT FOOTPRINT (APPROX. -8TO-8.5')
FEATURE TM 8
LEGEND
PIPE LINES/UTILITIES PER LDNR/SONRIS
PIPELINES/UTILITIES PER HTRS DATABASE
POTENTIAL STURGEON HABITAT - HARD BOTTOM SUBSTRATE
PROPOSED BORROW
PROPOSED RESTORATION SITE
POSSIBLE AATC UXO LIMITS SCREENS TO BE USED AT INLET AND DISCHARGE LOCATIONS
SCALE
2000' 0 2000' 4000' 6000' 8000'
BORROW PLAN
PLAN VIEW
C-37A

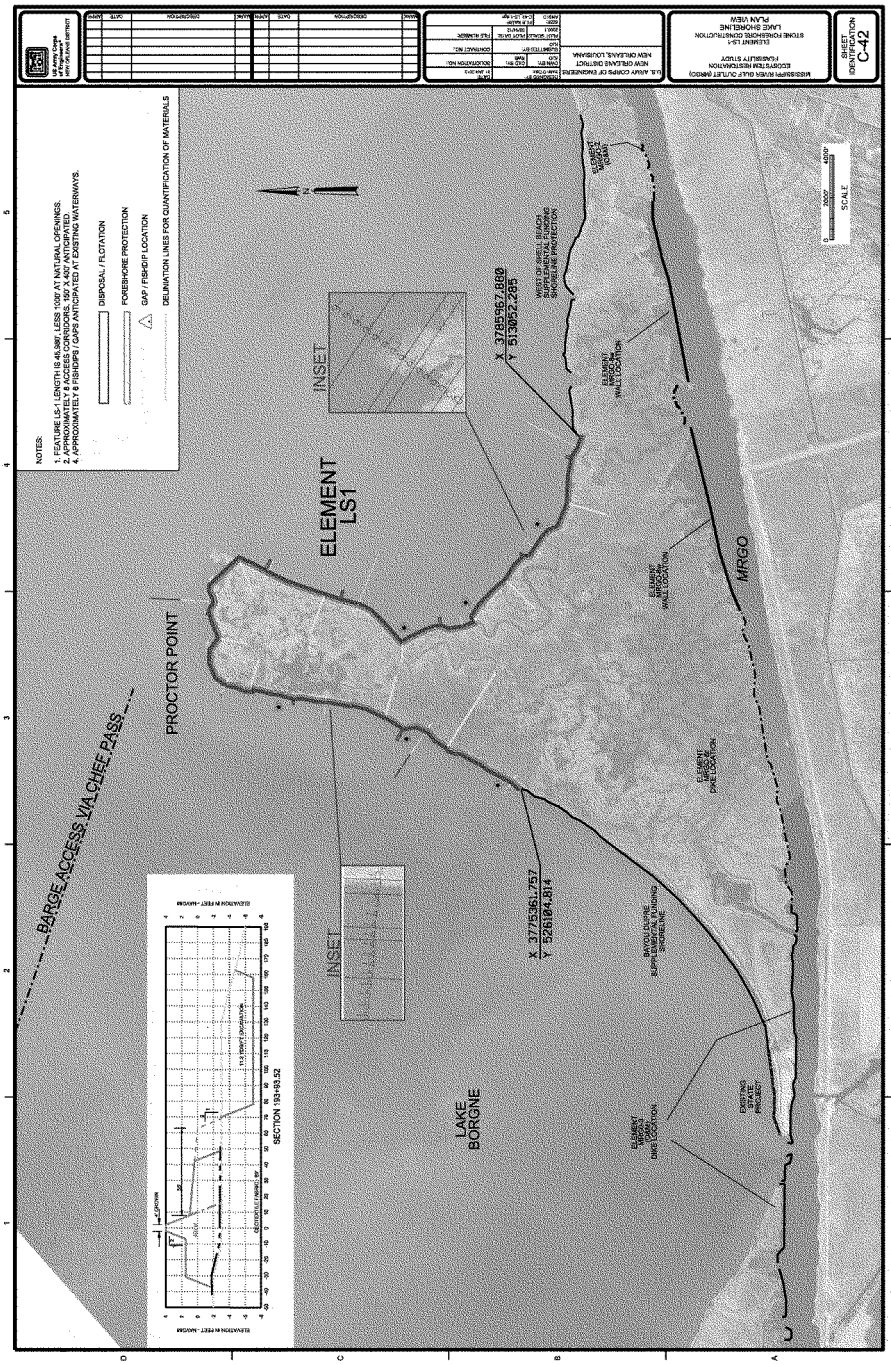

LAKE BORGNE
BORROW FOR LM1 (APPROX 1072 AC)
MN-1 744 AC
MC-1 2538 AC
MC-2 340 AC
MN-2 161 AC
MC-3 175 AC
MC-4 188 AC
MN-4 87 AC
MN-3 72 AC
EXISTING CLOSURE
RINC SUBDI BARRIER (UNDER CONSTRUCTION)
BAYOU BIENVENUE SECTOR GATE (TO BE CONSTRUCTED)
ADJACENT FEATURE LM 4
G I W W
M R G O
Chef Pass
500' ACCESS
300' ACCESS
ACCESS CHANNEL
TIE INTO EXISTING RETENTION DIKE ALONG BAYOU BIENVENUE
SCALE
0 4000' 8000'
LEGEND
WETLAND CREATION AREA APPROX 3253 ACRES OF MARSH WILL BE CREATED AND/OR RESTORED, & AN ADDITIONAL ADJACENT 1094 ACRES WILL BE NOURISHED
PERIMETER RETENTION DIKES (APPROX 103,700 L.F.)
VINYL SHEETPILE CLOSURES (APPROX NINE (9) LOCATIONS AT 10,500' AND 40' LENGTHS)
PROJECT BOUNDARY
INTERIOR CONTAINMENT WEIRS (APPROX 93,700 L.F.)
APPROX LIMITS OF ADJACENT MARSH NOURISHMENT
PIPELINES/ UTILITIES
HARD BOTTOM SUBSTRATE AREAS IN LAKE BORGNE (NO EXCAVATION ALLOWED)
NOTES
1. BACKGROUND PHOTOGRAPHY WAS FLOWN IN 2010.
2. ELEVATIONS SHOWN IN PLAN VIEW ARE FROM SURVEYS PERFORMED IN 2007 AND 2011.
US Army Corps of Engineers NEW ORLEANS DISTRICT
DESCRIPTION
DATE
APPR'D
MISSISSIPPI RIVER GULF OUTLET (MRGO) SCUPPERNONG WETLANDS CREATION PROJECT STUDY
FEATURE LM 1
GOLDEN TRIANGLE MARSH CREATION - EAST
ORLEANS AND ST. BERNARD PH., LA
PLAN VIEW
U.S. ARMY CORPS OF ENGINEERS NEW ORLEANS DISTRICT NEW ORLEANS, LOUISIANA
SHEET IDENTIFICATION
C-38

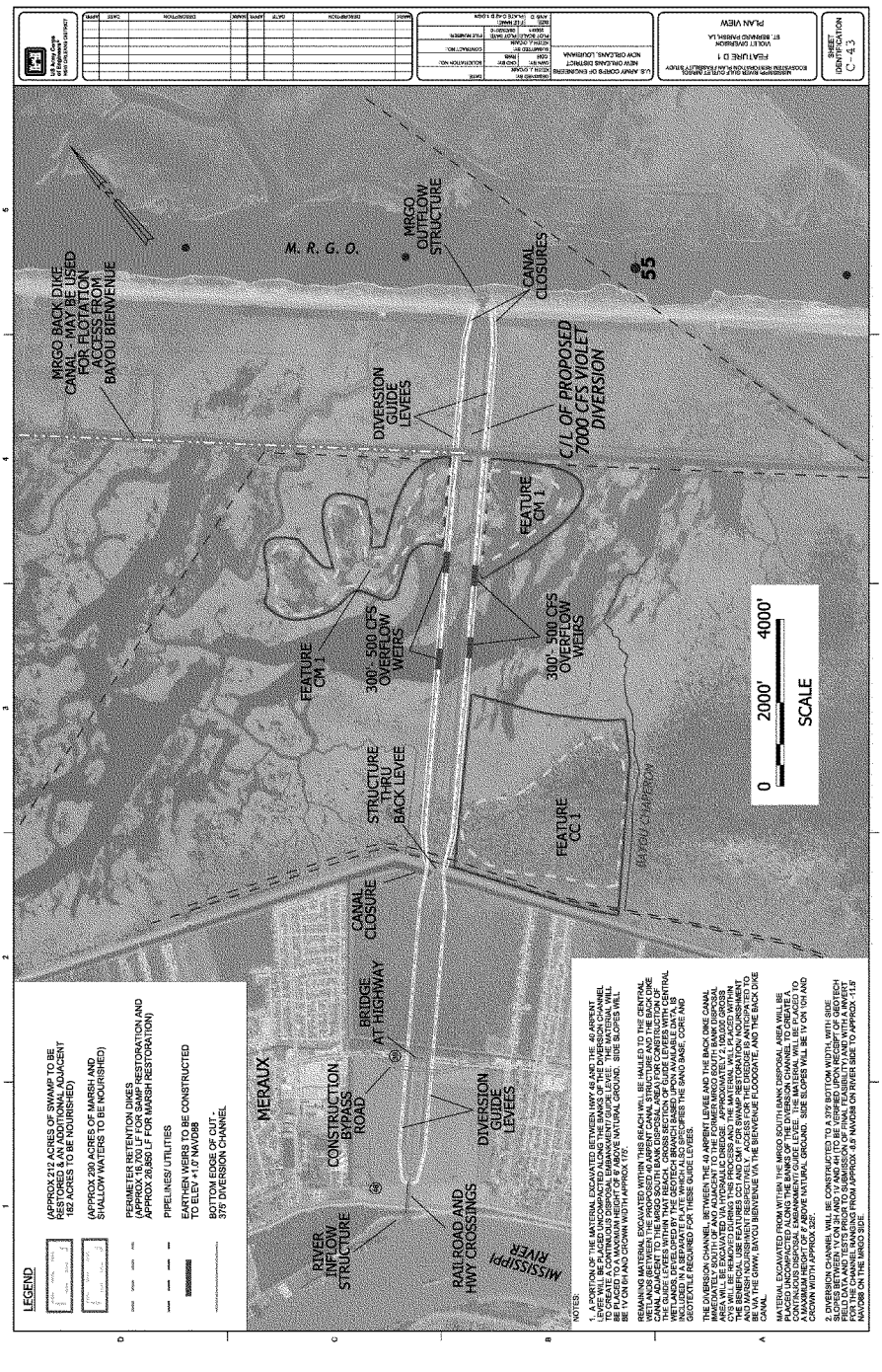
LEGEND
WETLAND CREATION AREAS (APPROX. 1,243 ACRES) & AN ADDITIONAL ADJACENT 2628 ACRES TO BE NOURISHED)
INTERIOR CONTAINMENT WIERS (APPROX. 11,500 LF)
RETENTION DIKES (APPROX. 49,200 LF)
CANAL CLOSURES (3)
HARD BOTTOM SUBSTRATE AREAS IN LAKE BORGNE (NO EXCAVATION ALLOWED)
PROPOSED FORESHORE PROTECTION
PIPELINE/ UTILITY
NOTES
1. BACKGROUND PHOTOGRAPHY FLOWN IN 2009.
2. ELEVATIONS SHOWN IN PLAN VIEW ARE TAKEN FROM A SURVEY PERFORMED IN SEPT 2011.
3. BORROW IN LAKE BORGNE SITE LM2 NOT TO EXCEED 6.5' BELOW MUDLINE.
PROCTOR POINT
LAKE BORGNE
PROPOSED FEATURE LS1
FEATURE LM2 (MARSH CREATION AND NOURISHMENT)
BORROW FOR LM2 (APPROX. 830 ACRES)
MRGO
MAYOU DUPRE MARTELLO CHANNEL
EXISTING STATE PARK
0
4000'
8000'
SCALE
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
LAKE BORGNE MARSH CREATION
ST. BERNARD PARISH, LA
PLAN VIEW
SHEET IDENTIFICATION
C-39

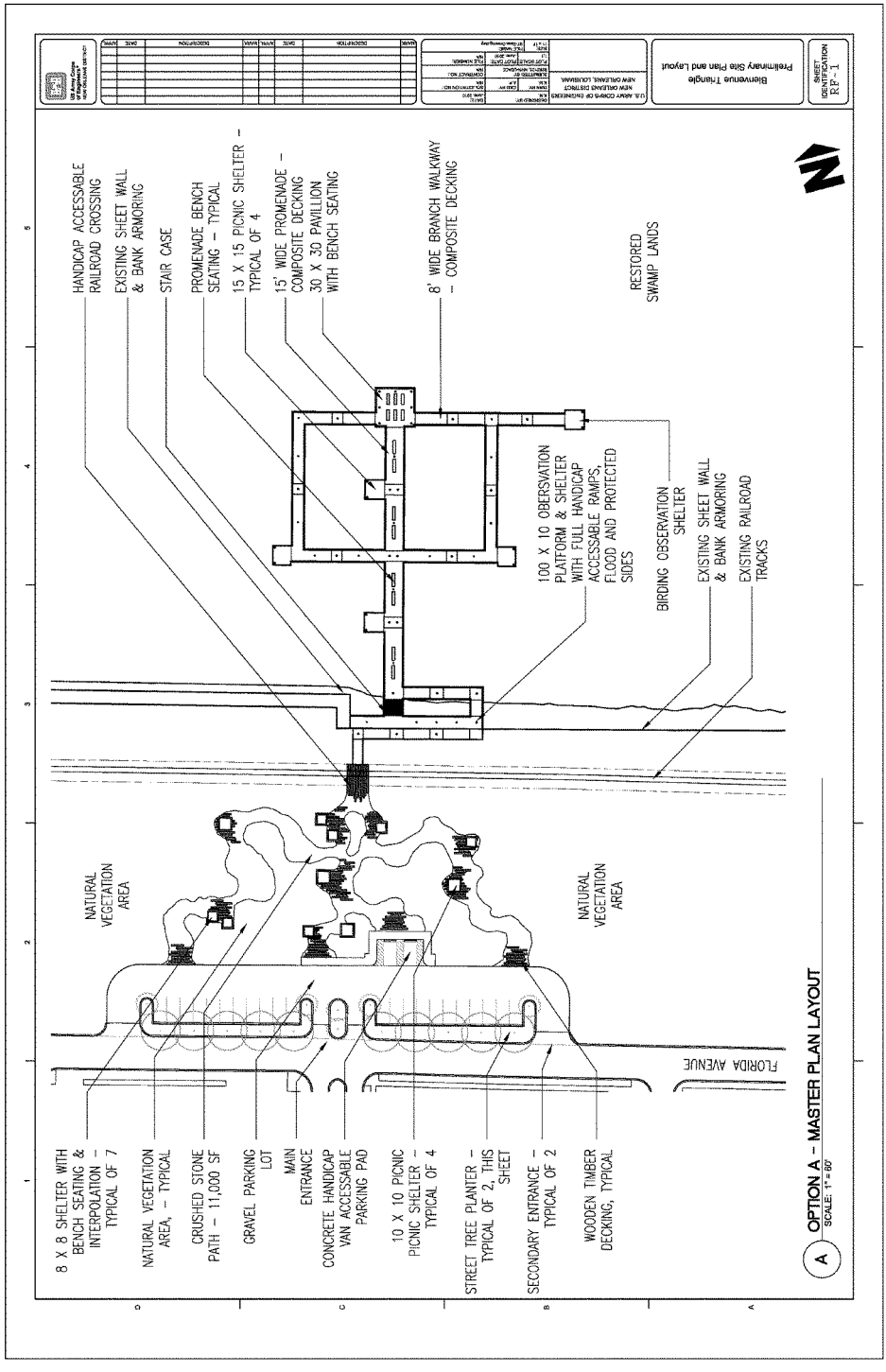

LEGEND
WETLAND RESTORATION AREA (APPROX. 911 ACRES OF MARSH CREATION & AN ADDITIONAL ADJACENT 950 ACRES TO BE NOURISHED)
EARTHEN RETENTION DIKES (APPROX 49,000 L.F.)
INTERIOR EARTHEN WEIRS (APPROX 40,000 L.F.)
PROJECT BOUNDARY
HARD BOTTOM SUBSTRATE POTENTIAL BORROW AREA (NO EXCAVATION PERMITTED)
ACCESS CORRIDORS
PIPELINES/UTILITIES PER LDNR, SONRIS AND HTSI DATABASES
NOTES
1. BACKGROUND PHOTOGRAPHY WAS FLOWN IN 2010
2. ELEVATIONS SHOWN IN PLAN VIEW ARE FROM A SURVEY TAKEN IN 2010
SCALE
0 3000' 6000'
LAKE BORGNE
BORROW FOR LM3
FOSSIL PLUVIO LAMES
BAYOU ST. MALO
ADJACENT FEATURE EM 1
350 ACRES OF MARSH CREATION
350 ACRES OF MARSH CREATION
350 ACRES OF MARSH CREATION
350 ACCESS CORRIDOR
350 ACCESS CORRIDOR
350 ACCESS CORRIDOR
350 ACCESS CORRIDOR
600 ACRES MARSH CREATION AND ADDITIONAL 950 ACRES OF NOURISHMENT
LEVEE
MRGO
MRGO
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA
MISSISSIPPI RIVER GULF OUTLET ECOSYSTEM RESTORATION PLAN FEASIBILITY STUDY
PLAN VIEW
FEATURE LM 3
LAKE BORGNE LAND BRIDGE
ST. BERNARD PAR, LA
SHEET IDENTIFICATION
C-40

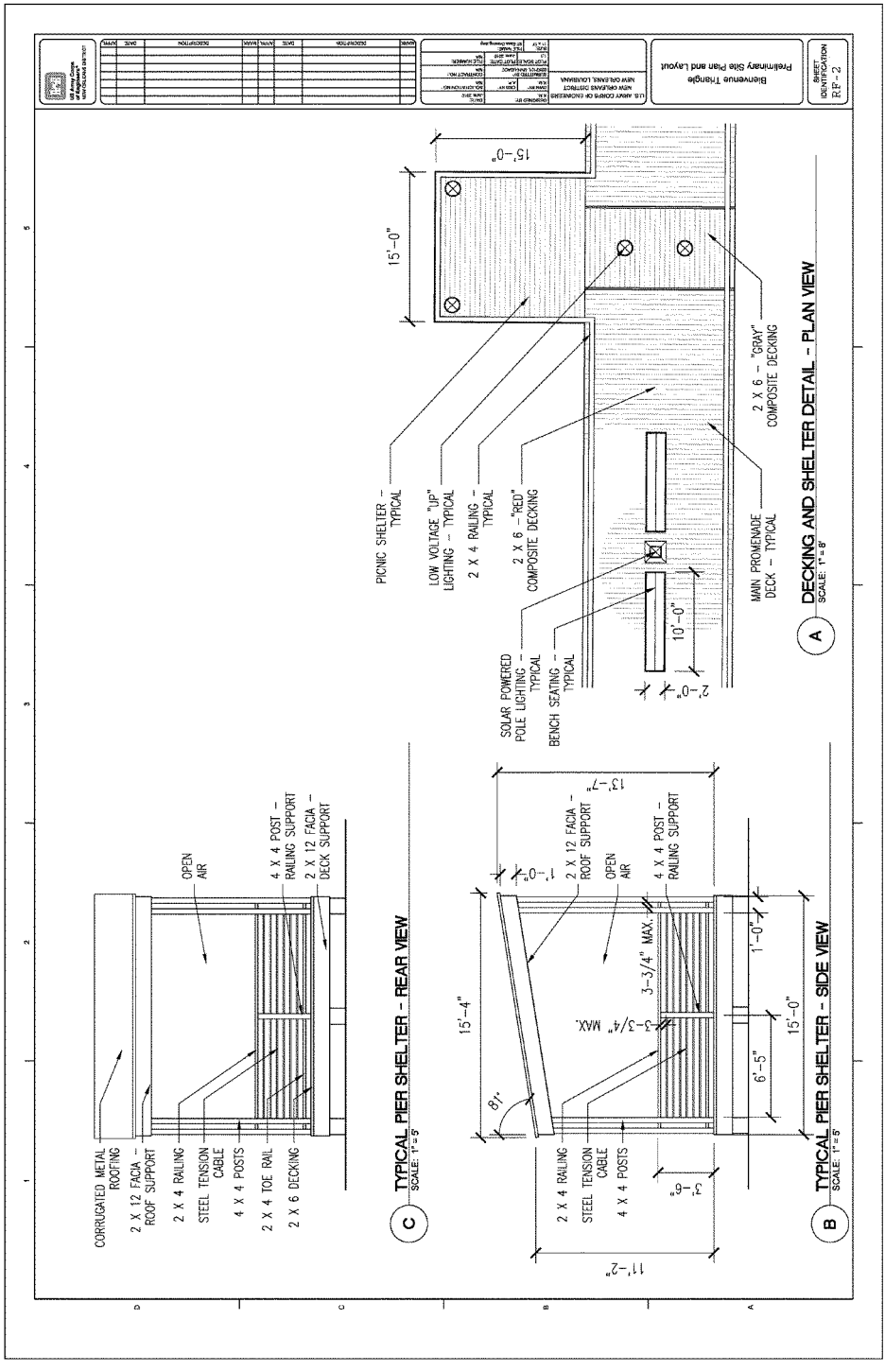

MISSISSIPPI RIVER GULF OUTLET (MRGO)
FEATURE LM 4
PLAN VIEW
NOTES
1. BACKGROUND PHOTOGRAPHY WAS FLOWN IN 2010
2. FEATURE LM 4 IS SHOWN IN PLAN VIEW ARE FROM A SURVEY TAKEN IN SEPT 2011
LEGEND
WETLAND CREATION AREAS (APPROX 225.5 ACRES OF MARSH CREATION & APPROX 132 ACRES OF BEACH TO BE NOURISHED)
FERMETER RETENTION DIKES APPROX 24,000 L.F. OF RETENTION DIKES)
EARTHEN CONTAINMENT WEIRS (APPROX 3,200 L.F. OF WEIRS (APPROX 400' AND 4.0 LENGTHS)
PROJECT BOUNDARY AND ACCESS CORRIDOR
PIPELINES
HARD BOTTOM SUBSTRATE AREAS AT LAKE BORGNE (NO BEACH NOURISHMENT ALLOWED)
SCALE
0 4000' 8000'
LAKE BORGNE
BORROW FOR LM4 (APPROX 132 ACRES)
APPROX 2 MILES FROM MOUTH OF BAYOU BIENVENUE TO BORROW LOCATION
35' ACCESS CORRIDOR
BAYOU BIENVENUE
FEATURE LM 4 PROJECT AREA
Chef Pass
Inner Harbor Navigation Canal
MRGO

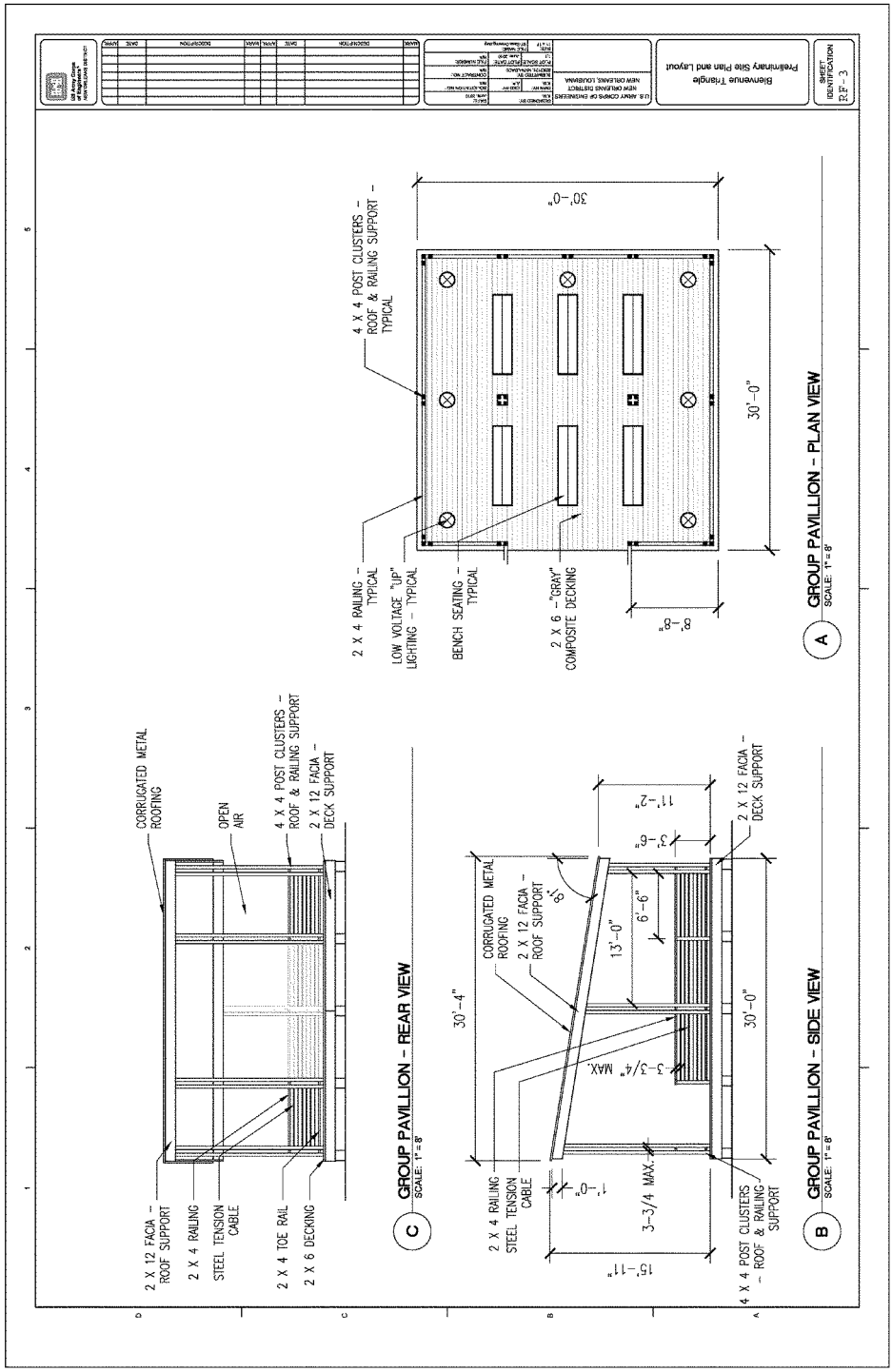

SHEETPILE CLOSURE
IHNC SURGE BARRIER
G.I.W.W. / M.R.G.O.
MC-1 111 ACRES
MC-2 114.5 ACRES
ADJACENT FEATURE LM 1
BAYOU BIENVENUE SECTOR GATE (UNDER CONSTRUCTION)
M. R. G. O.
BAYOU BIENVENUE
BAYOU BIENVENUE FLOODGATE
552,000
549,000
30^00'30"
30^00'0"
89^55'30"
89^54'0"
3,726,000
3,732,000
3,738,000
N
0 1000' 2000'
SCALE
LEGEND
WETLAND CREATION AREAS (APPROX 225.5 ACRES OF MARSH CREATION & AN ADDITIONAL ADJACENT 54.8 ACRES TO BE NOURISHED)
PERIMETER RETENTION DIKES APPROX 24,000 L.F. OF RETENTION DIKES)
EARTHEN CONTAINMENT WEIRS (APPROX 3,200 L.F. OF WEIRS
VINYL SHEETPILE CLOSURE (APPROX 800' AND 40' LENGTHS)
PROJECT BOUNDARY
PIPELINES
NOTES
1. BACKGROUND PHOTOGRAPHY WAS FLOWN IN 2010.
2. ELEVATIONS SHOWN IN PLAN VIEW ARE FROM A SURVEY TAKEN IN SEPT 2011.
US Army Corps of Engineers
NEW ORLEANS DISTRICT
MISSISSIPPI RIVER GULF OUTLET ECOSYSTEM RESTORATION FEASIBILITY STUDY
FEATURE LM 4
GOLDEN TRIANGLE MARSH CREATION - EAST
ORLEANS AND ST. BERNARD PH, LA
DETAIL PLAN VIEW
SHEET IDENTIFICATION
C-41A

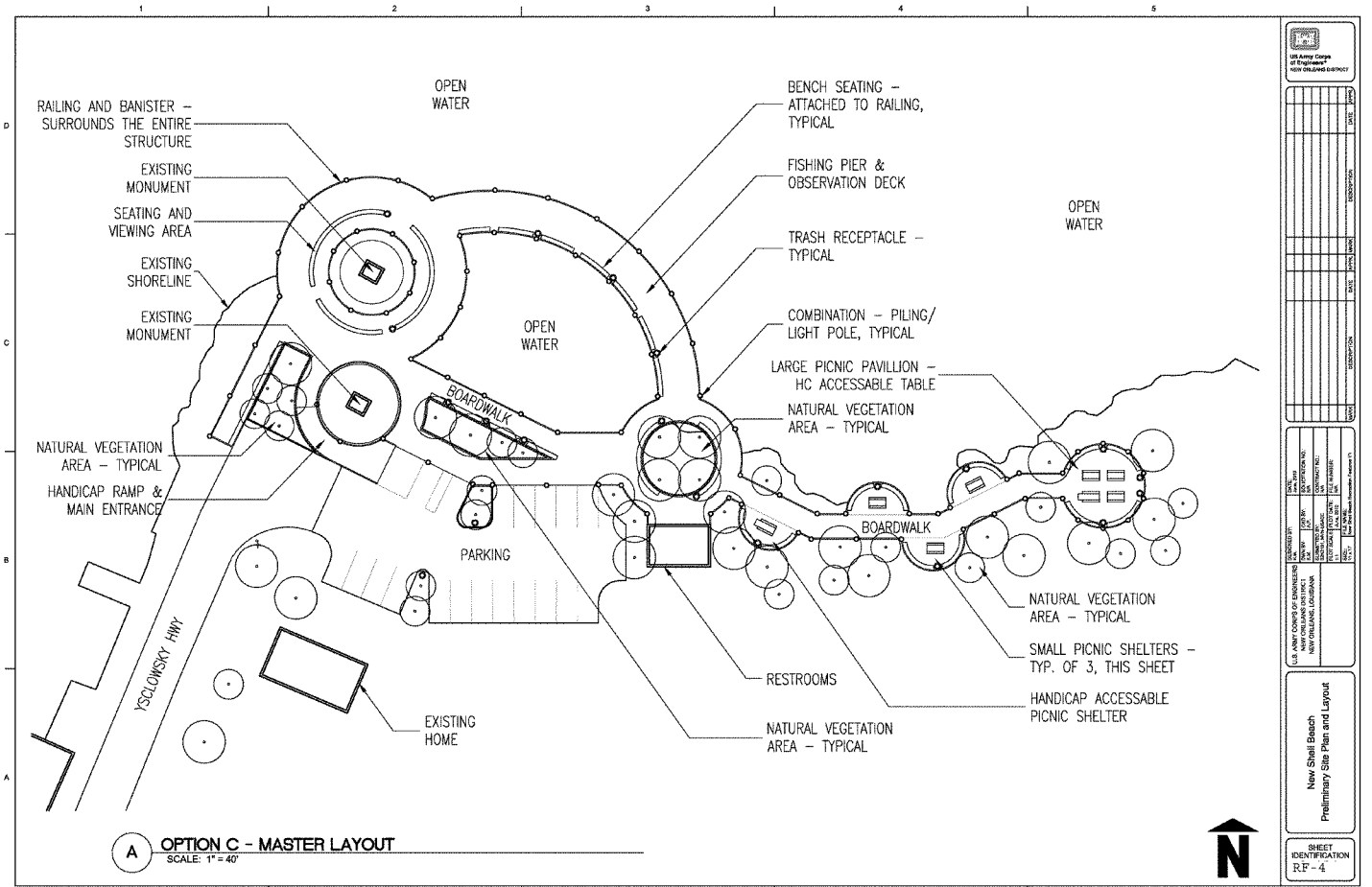

BARGE ACCESS VIA CHEF PASS
PROCTOR POINT
ELEMENT LS1
INSET
INSET
LAKE BORGNE
MRGO
X 3785967.880
Y 513052.285
X 3775361.757
Y 526104.814
NOTES:
1. FEATURE LS-1 LENGTH IS 46,500', LESS 1000' AT NATURAL OPENINGS.
2. APPROXIMATELY 6 ACCESS CORRIDORS, 150' X 400' ANTICIPATED.
4. APPROXIMATELY 6 FISHDIPS / GAPS ANTICIPATED AT EXISTING WATERWAYS.
DISPOSAL / FLOTATION
FOREBERM PROTECTION
GAP / FISHDIP LOCATION
DELINATION LINES FOR QUANTIFICATION OF MATERIALS
SECTION 193+93.52
SCALE
MISSISSIPPI RIVER GULF OUTLET (MRGO)
ECOSYSTEM RESTORATION
FEASIBILITY STUDY
ELEMENT LS-1
STONE FOUNDATION CONSTRUCTION
LAKE SHORELINE
PLAN VIEW
SHEET IDENTIFICATION
C-42

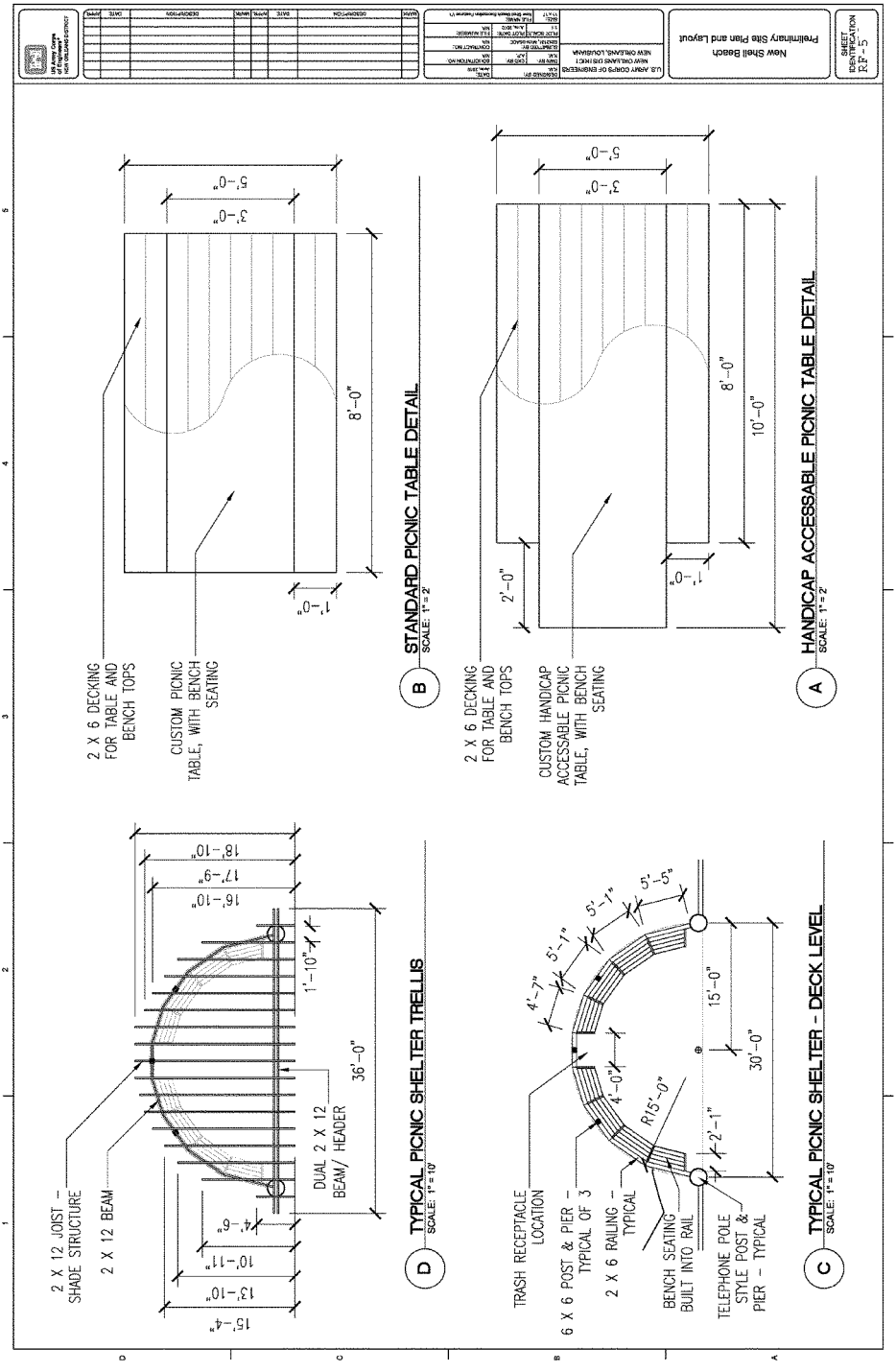

LEGEND
(APPROX 212 ACRES OF SWAMP TO BE RESTORED & (AT ADDITIONAL ADJACENT TBE ACRES TO BE NOURISHED)
(APPROX 230 ACRES OF MARSH AND SHALLOW WATERS TO BE NOURISHED)
PERIMETER RETENTION DIKES (APPROX 18,000 LF FOR SWAMP RESTORATION AND APPROX 26,950 LF FOR MARSH RESTORATION)
PIPELINES/ UTILITIES
EARTHEN WERRS TO BE CONSTRUCTED TO ELEV +1.0' NAVD88
BOTTOM EDGE OF CUT - 370' DIVERSION CHANNEL
MERAUX
RIVER INFLOW STRUCTURE
CONSTRUCTION BYPASS ROAD
BRIDGE AT HIGHWAY
CANAL CLOSURE
STRUCTURE THRU BACK LEVEE
FEATURE CM 1
300' - 500 CFS OVERFLOW WEIRS
DIVERSION GUIDE LEVEES
M. R. G. O.
MRGO OUTFLOW STRUCTURE
MRGO BACK DIKE CANAL - MAY BE USED FOR FLOTATION ACCESS FROM BAYOU BIENVENUE
CANAL CLOSURES
C/L OF PROPOSED 7000 CFS VIOLET DIVERSION
55
RAIL ROAD AND HWY CROSSINGS
MISSISSIPPI RIVER
DIVERSION GUIDE LEVEES
FEATURE CC 1
BAYOU CHAPERON
300' - 500 CFS OVERFLOW WEIRS
FEATURE CM 1
0
2000'
4000'
SCALE
NOTES
1. A PORTION OF THE MATERIAL EXCAVATED BETWEEN HWY 46 AND THE 40 ARPENT LEVEE WILL BE PLACED UNCOMPACTED ALONG THE BANKS OF THE DIVERSION CHANNEL TO CREATE A CHANNEL MARGIN HABITAT FEATURE. THE MATERIAL WILL BE PLACED TO A MAXIMUM HEIGHT OF 6' ABOVE NATURAL GROUND. SIDE SLOPES WILL BE 1V ON 6H AND CROWN WIDTH APPROX 15'.
REMAINING MATERIAL EXCAVATED WITHIN THIS REACH WILL BE HAULED TO THE CENTRAL WETLANDS AREA (CWA) FOR USE AS FILL MATERIAL FOR CONSTRUCTION OF THE BENEFICIAL USE FEATURES (CC1 AND CM1) FOR SWAMP RESTORATION. CENTRAL WETLANDS, DEVELOPED BY THE GEOTECH BRANCH BASED UPON AVAILABLE DATA, IS DESCRIBED AS FILLED TO THE FOLLOWING: 1' LAYER OF SAND FOR THE BASE, 3' LAYER OF CLAY FOR THE CORE, AND 1' LAYER OF SAND FOR THE OUTER SLOPES.
THE DIVERSION CHANNEL, BETWEEN THE 40 ARPENT LEVEE AND THE BACK DIKE CANAL IMMEDIATELY SOUTH OF AND ADJACENT TO THE FORMER MRGO SOUTH BANK DISPOSAL AREA, WILL BE EXCAVATED TO A DEPTH OF -17.0' NAVD88 AND A BOTTOM WIDTH OF 370'. THE MATERIAL WILL BE REMOVED DURING THIS PROCESS AND THE MATERIAL WILL BE PLACED WITHIN THE BENEFICIAL USE FEATURES (CC1 AND CM1 FOR SWAMP RESTORATION NOURISHMENT AND MARSH RESTORATION NOURISHMENT). THE DIVERSION CHANNEL WILL BE CONSTRUCTED TO BE MA THE GIWW, BAYOU BIENVENUE FLOODGATE, AND THE BACK DIKE CANAL.
MATERIAL EXCAVATED FROM WITHIN THE MRGO SOUTH BANK DISPOSAL AREA WILL BE PLACED UNCOMPACTED ALONG THE BANKS OF THE DIVERSION CHANNEL TO CREATE A CHANNEL MARGIN HABITAT FEATURE. THE MATERIAL WILL BE PLACED TO A MAXIMUM HEIGHT OF 6' ABOVE NATURAL GROUND. SIDE SLOPES WILL BE 1V ON 10H AND CROWN WIDTH APPROX 25'.
2. DIVERSION CHANNEL WILL BE CONSTRUCTED TO A 370' BOTTOM WIDTH, WITH SIDE SLOPES BETWEEN 1V ON 3H AND 1V AND 4H (TO BE VERIFIED UPON RECEIPT OF GEOTECH REPORT) AND TO A DEPTH OF -17.0' NAVD88. THE BOTTOM ELEVATION WILL VARY FOR THE CHANNEL RANGING FROM APPROX -8.9' NAVD88 ON RIVER SIDE TO APPROX -11.8' NAVD88 ON THE MRGO SIDE.
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS LOUISIANA
DESIGNED
DRAWN
CHECKED
APPROVED
DATE
SCALE
AS NOTED
CONSTRUCTION NO.
SOLICITATION NO.
DRAWING NO.
SHEET IDENTIFICATION
C - 4.3
VIOLET DIVERSION
ST. BERNARD PARISH, LA.
PLAN VIEW
FEATURE D 1
ENVIRONMENTAL IMPACT STATEMENT
MISSISSIPPI RIVER GULF OUTLET
DESCRIPTION
DATE
APPR'D
DRAWN
CHECKED
DESIGNED
DATE
SHEET

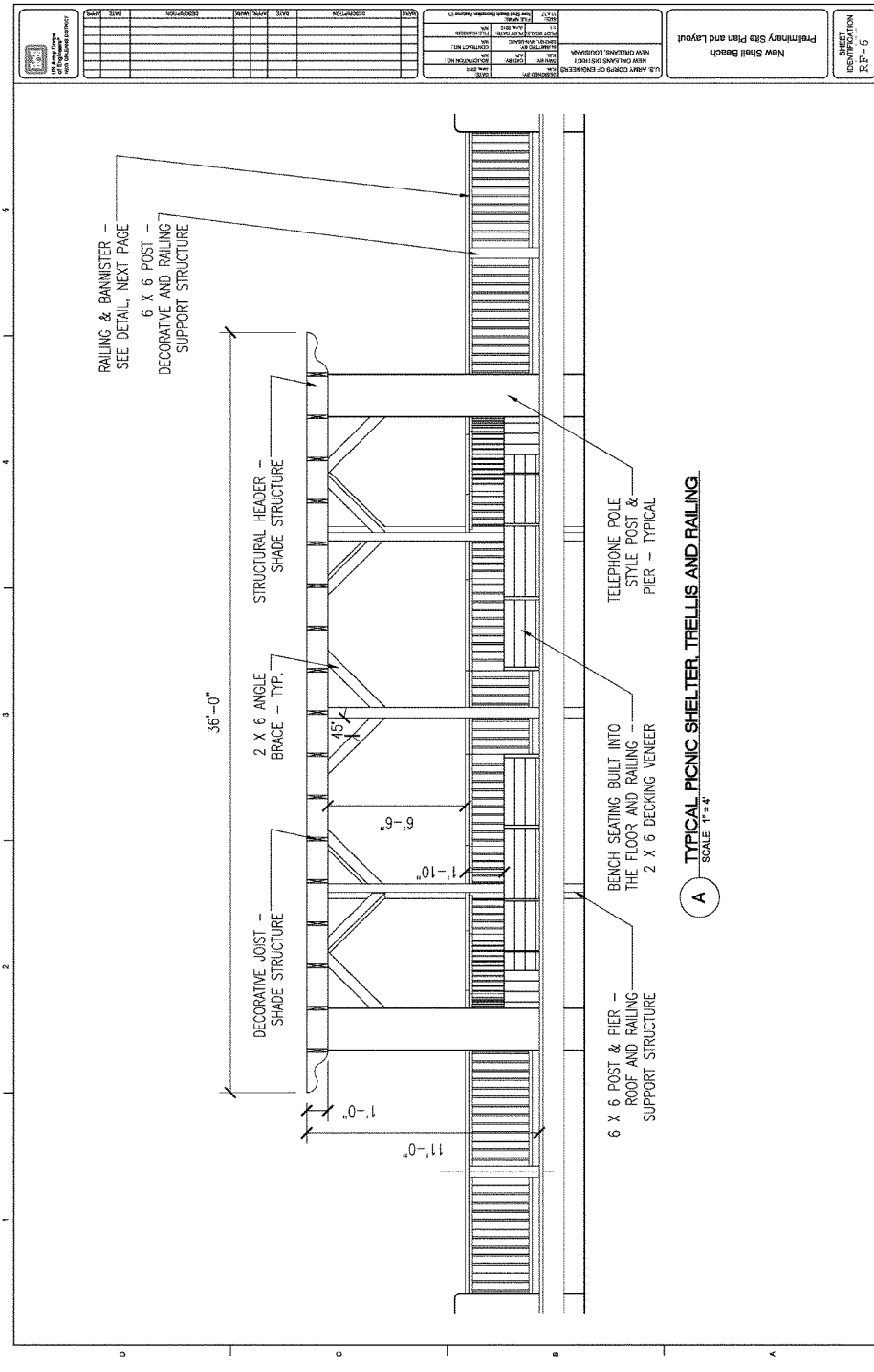

Blenheim Triangle
Preliminary Site Plan and Layout
SHEET IDENTIFICATION
R.P. - 1
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA
HANDICAP ACCESSABLE RAILROAD CROSSING
EXISTING SHEET WALL & BANK ARMORING
STAIR CASE
PROMENADE BENCH SEATING - TYPICAL
15 X 15 PICNIC SHELTER - TYPICAL OF 4
15' WIDE PROMENADE - COMPOSITE DECKING
30 X 30 PAVILLION WITH BENCH SEATING
8' WIDE BRANCH WALKWAY - COMPOSITE DECKING
RESTORED SWAMP LANDS
100 X 10 OBERSVATION PLATFORM & SHELTER WITH FULL HANDICAP ACCESSABLE RAMPS, FLOOD AND PROTECTED SIDES
BIRDING OBSERVATION SHELTER
EXISTING SHEET WALL & BANK ARMORING
EXISTING RAILROAD TRACKS
NATURAL VEGETATION AREA
NATURAL VEGETATION AREA
FLORIDA AVENUE
8 X 8 SHELTER WITH BENCH SEATING & INTERPOLATION - TYPICAL OF 7
NATURAL VEGETATION AREA, - TYPICAL
CRUSHED STONE PATH - 11,000 SF
GRAVEL PARKING LOT
MAIN ENTRANCE
CONCRETE HANDICAP VAN ACCESSABLE PARKING PAD
10 X 10 PICNIC PICNIC SHELTER - TYPICAL OF 4
STREET TREE PLANTER - TYPICAL OF 2, THIS SHEET
SECONDARY ENTRANCE - TYPICAL OF 2
WOODEN TIMBER DECKING, TYPICAL
A
OPTION A - MASTER PLAN LAYOUT
SCALE: 1" = 80'

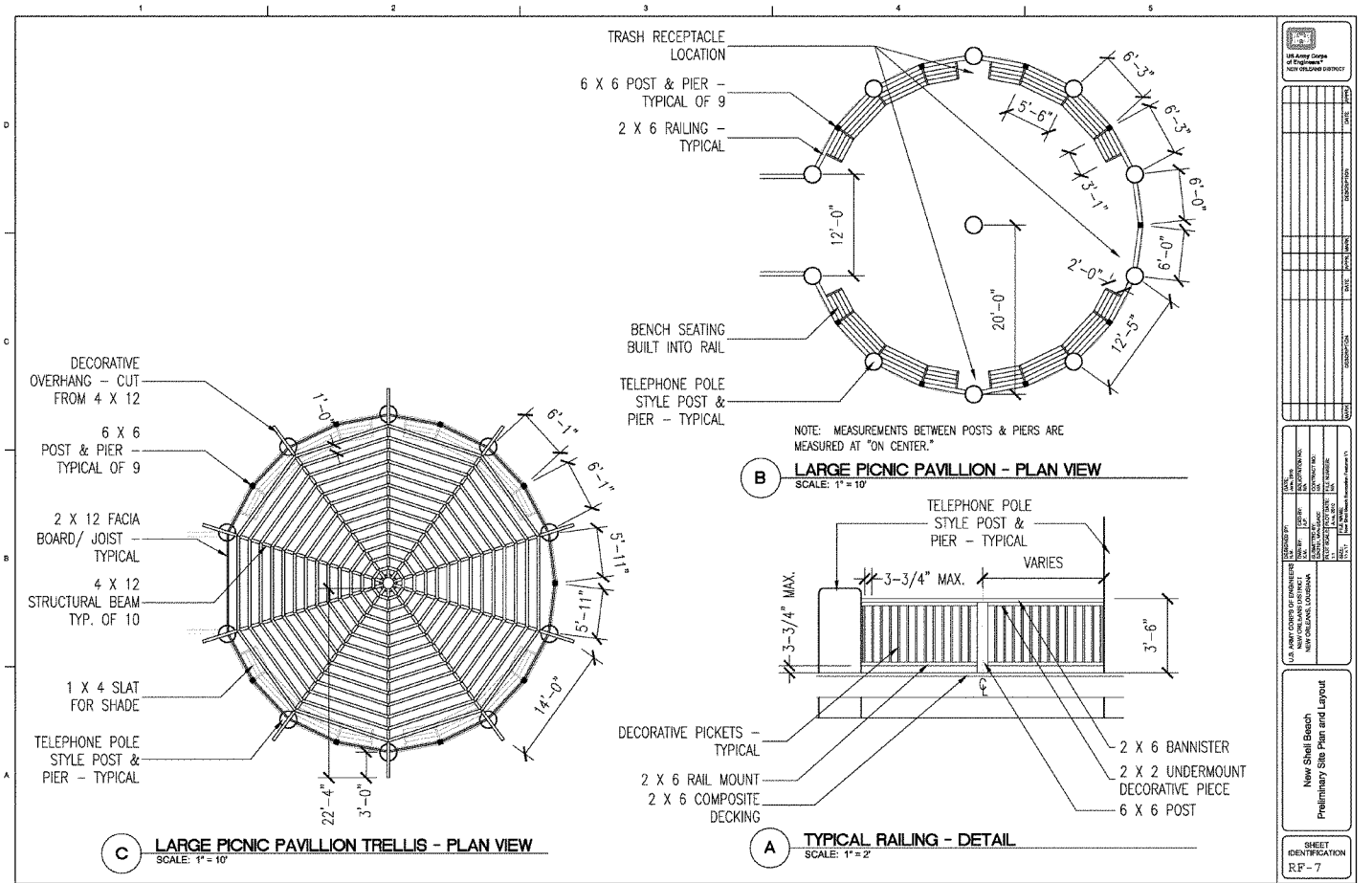

Bienvenue Triangle
Preliminary Site Plan and Layout
SHEET IDENTIFICATION
P.P - 2
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA
DESIGNED BY
DRAWN BY
CHECKED BY
QUANTITY NO.
PROJECT NAME AND DATE
SHEET NUMBER
DESCRIPTION
DATE
NAME
DESCRIPTION
DATE
NAME
DESCRIPTION
DATE
NAME
PICNIC SHELTER – TYPICAL
LOW VOLTAGE "UP" LIGHTING – TYPICAL
2 X 4 RAILING – TYPICAL
2 X 6 – "RED" COMPOSITE DECKING
SOLAR POWERED POLE LIGHTING – TYPICAL
BENCH SEATING – TYPICAL
MAIN PROMENADE DECK – TYPICAL
2 X 6 – "GRAY" COMPOSITE DECKING
15'-0"
15'-0"
10'-0"
2'-0"
A DECKING AND SHELTER DETAIL – PLAN VIEW
SCALE: 1" = 8'
CORRUGATED METAL ROOFING
2 X 12 FACIA – ROOF SUPPORT
2 X 4 RAILING
STEEL TENSION CABLE
4 X 4 POSTS
2 X 4 TOE RAIL
2 X 6 DECKING
OPEN AIR
4 X 4 POST – RAILING SUPPORT
2 X 12 FACIA – DECK SUPPORT
C TYPICAL PIER SHELTER – REAR VIEW
SCALE: 1" = 5'
15'-4"
81°
13'-7"
1'-0"
2 X 12 FACIA – ROOF SUPPORT
OPEN AIR
4 X 4 POST – RAILING SUPPORT
3-3/4" MAX.
3-3/4" MAX.
1'-0"
6'-5"
15'-0"
3'-6"
11'-2"
2 X 4 RAILING
STEEL TENSION CABLE
4 X 4 POSTS
B TYPICAL PIER SHELTER – SIDE VIEW
SCALE: 1" = 5'

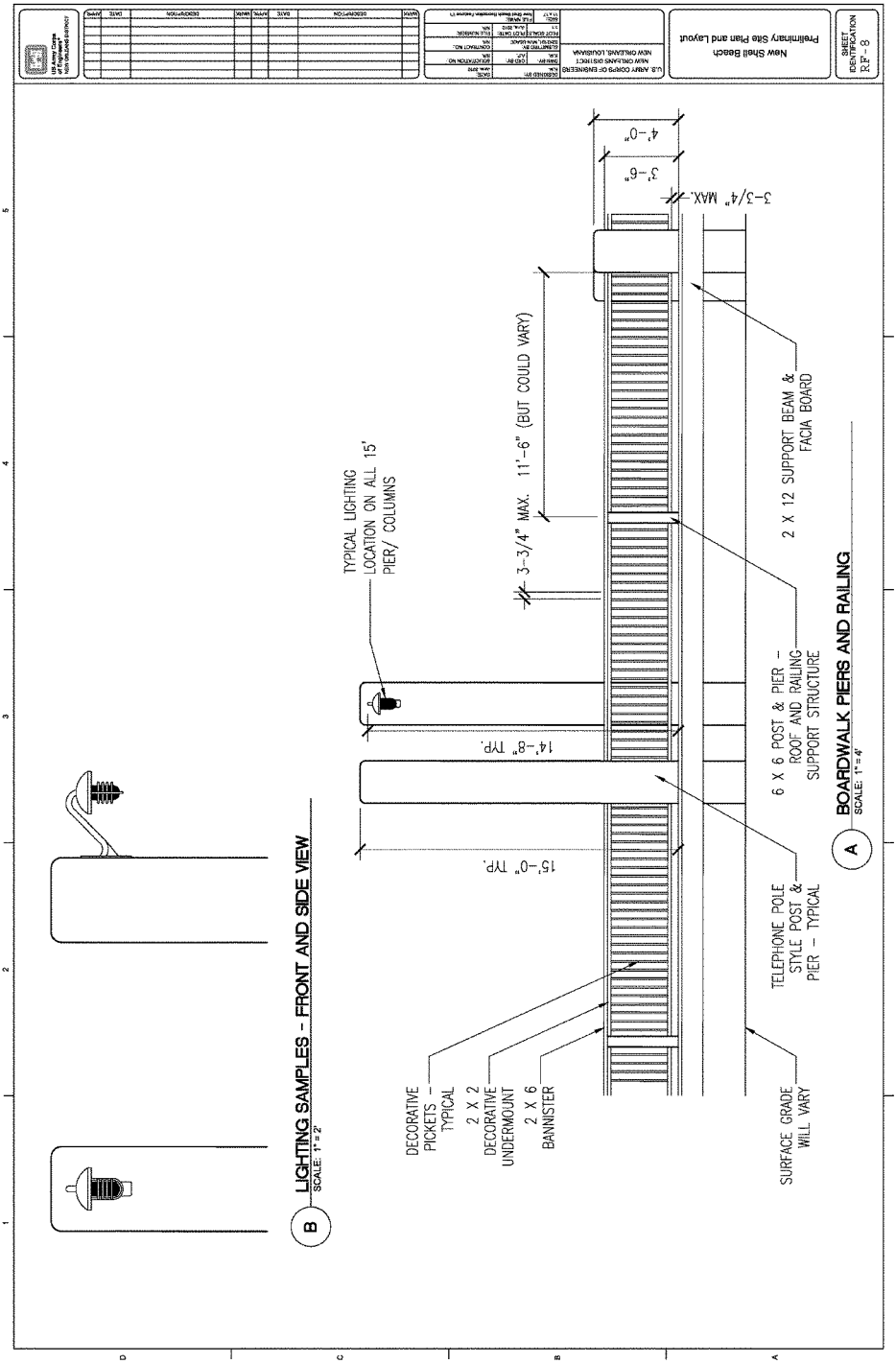

Bienvenue Triangle
Preliminary Site Plan and Layout
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS LOUISIANA
SHEET IDENTIFICATION
2 X 12 FACIA – ROOF SUPPORT
2 X 4 RAILING
STEEL TENSION CABLE
2 X 4 TOE RAIL
2 X 6 DECKING
CORRUGATED METAL ROOFING
OPEN AIR
4 X 4 POST CLUSTERS – ROOF & RAILING SUPPORT
2 X 12 FACIA – DECK SUPPORT
C GROUP PAVILLION – REAR VIEW
SCALE: 1" = 8'
30'-4"
CORRUGATED METAL ROOFING
2 X 12 FACIA – ROOF SUPPORT
13'-0"
6'-6"
3'-6"
11'-2"
8°
3-3/4" MAX.
1'-0"
3-3/4 MAX.
15'-11"
30'-0"
2 X 4 RAILING STEEL TENSION CABLE
4 X 4 POST CLUSTERS – ROOF & RAILING SUPPORT
2 X 12 FACIA – DECK SUPPORT
B GROUP PAVILLION – SIDE VIEW
SCALE: 1" = 8'
4 X 4 POST CLUSTERS – ROOF & RAILING SUPPORT – TYPICAL
30'-0"
2 X 4 RAILING – TYPICAL
LOW VOLTAGE "UP" LIGHTING – TYPICAL
BENCH SEATING – TYPICAL
2 X 6 – "GRAY" COMPOSITE DECKING
8'-8"
30'-0"
A GROUP PAVILLION – PLAN VIEW
SCALE: 1" = 8'

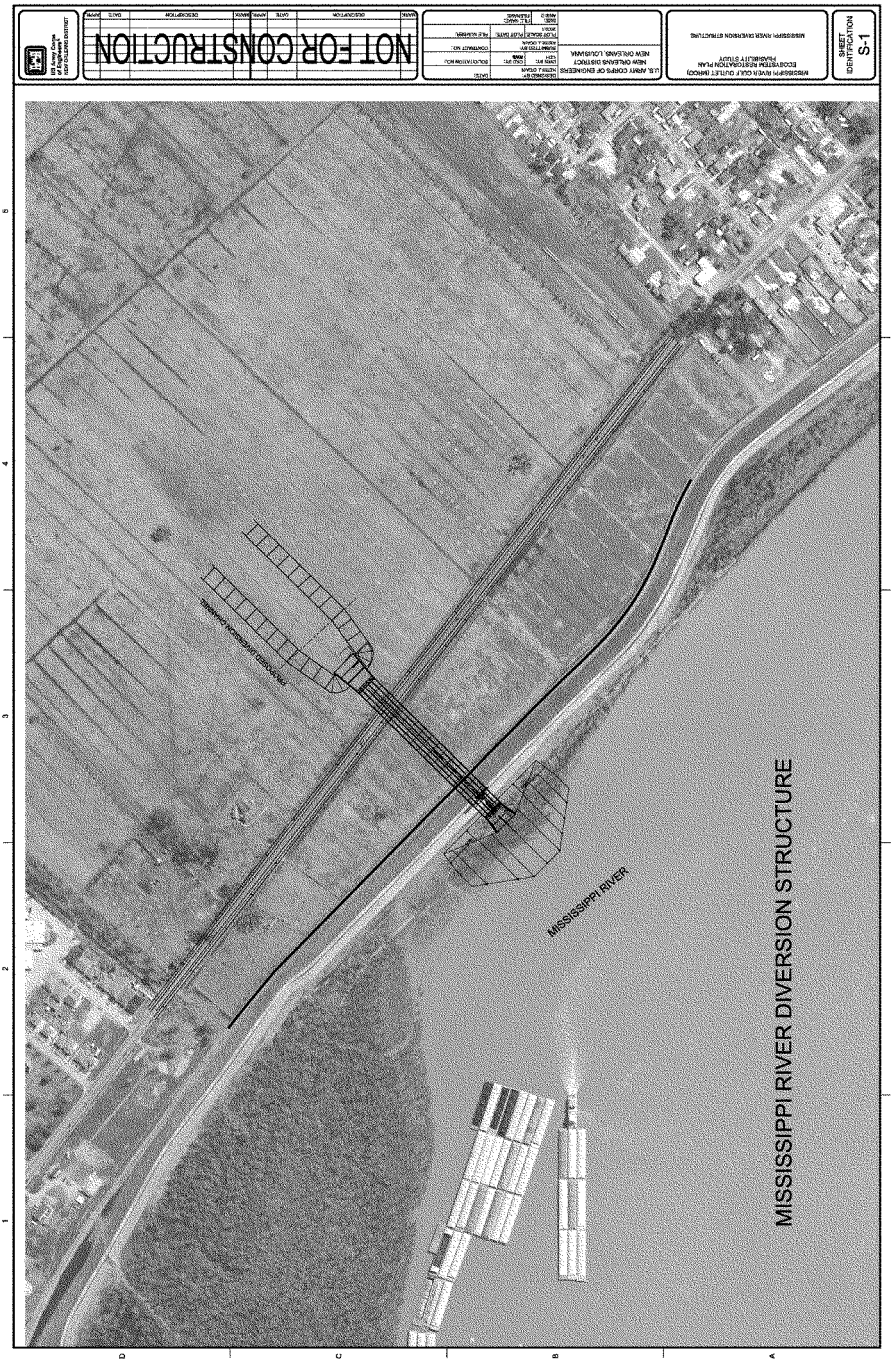

OPEN WATER
RAILING AND BANISTER – SURROUNDS THE ENTIRE STRUCTURE
EXISTING MONUMENT
SEATING AND VIEWING AREA
EXISTING SHORELINE
EXISTING MONUMENT
NATURAL VEGETATION AREA – TYPICAL
HANDICAP RAMP & MAIN ENTRANCE
BENCH SEATING – ATTACHED TO RAILING, TYPICAL
FISHING PIER & OBSERVATION DECK
TRASH RECEPTACLE – TYPICAL
COMBINATION – PILING/ LIGHT POLE, TYPICAL
LARGE PICNIC PAVILLION – HC ACCESSABLE TABLE
NATURAL VEGETATION AREA – TYPICAL
OPEN WATER
OPEN WATER
BOARDWALK
BOARDWALK
PARKING
YSCLOWSKY HWY
EXISTING HOME
RESTROOMS
NATURAL VEGETATION AREA – TYPICAL
NATURAL VEGETATION AREA – TYPICAL
SMALL PICNIC SHELTERS – TYP. OF 3, THIS SHEET
HANDICAP ACCESSABLE PICNIC SHELTER
N
A OPTION C – MASTER LAYOUT
SCALE: 1" = 40'
US Army Corps of Engineers NEW ORLEANS DISTRICT
U.S. ARMY CORPS OF ENGINEERS NEW ORLEANS DISTRICT NEW ORLEANS, LOUISIANA
New Shell Beach
Preliminary Site Plan and Layout
SHEET IDENTIFICATION
RF-4

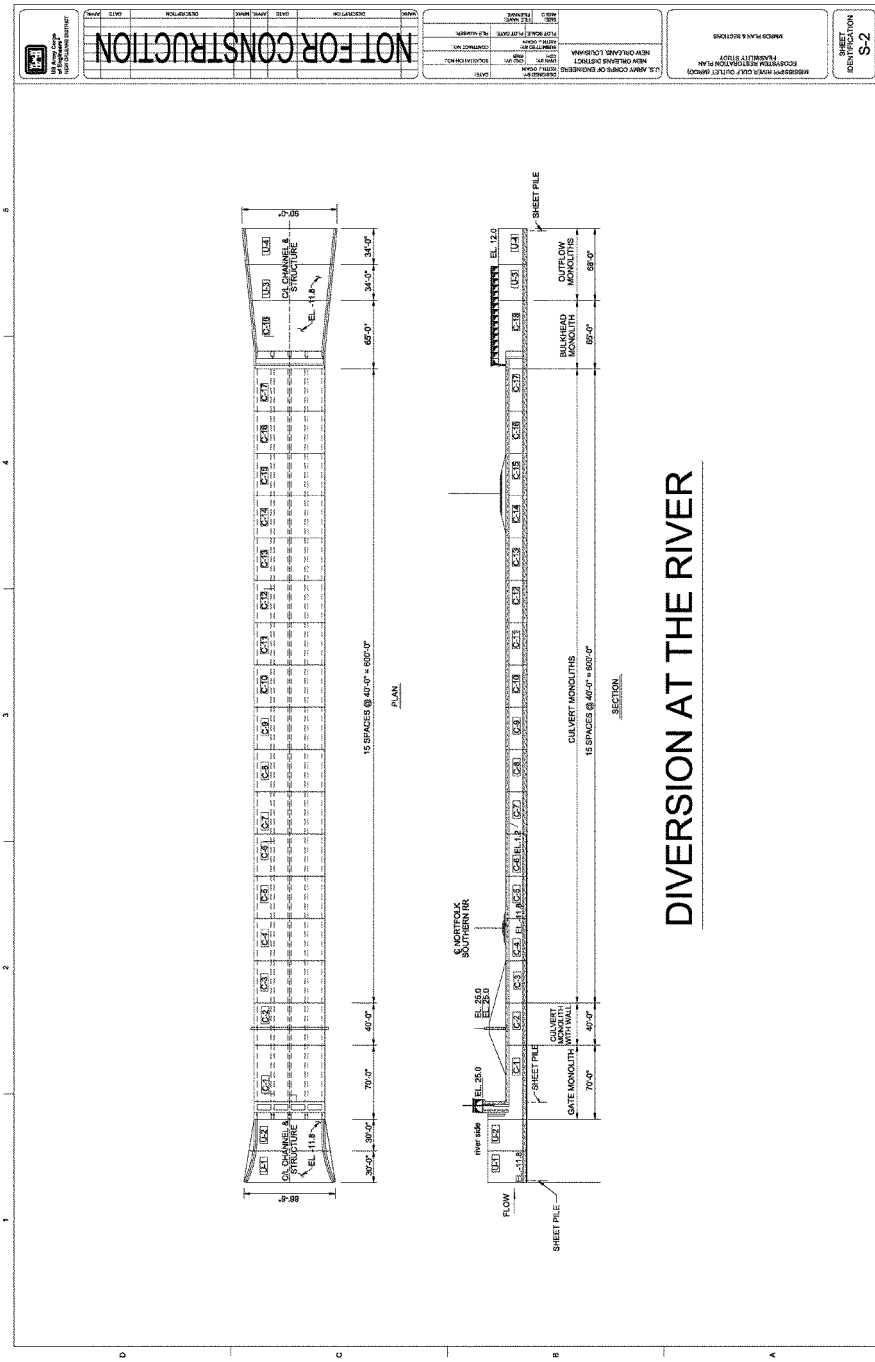

US Army Corps of Engineers
New Orleans District
DESIGNED BY
DRAWN BY
CHECKED BY
QUANTITY BY
SUBMITTED BY
APPROVED BY
DATE
SCALE
FILE NAME
US ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA
New Shell Beach
Preliminary Site Plan and Layout
SHEET
CP - 5
2 X 6 DECKING FOR TABLE AND BENCH TOPS
CUSTOM PICNIC TABLE, WITH BENCH SEATING
8'-0"
5'-0"
3'-0"
1'-0"
B STANDARD PICNIC TABLE DETAIL
SCALE: 1" = 2'
2 X 6 DECKING FOR TABLE AND BENCH TOPS
CUSTOM HANDICAP ACCESSABLE PICNIC TABLE, WITH BENCH SEATING
2'-0"
1'-0"
10'-0"
8'-0"
5'-0"
3'-0"
A HANDICAP ACCESSABLE PICNIC TABLE DETAIL
SCALE: 1" = 2'
2 X 12 JOIST - SHADE STRUCTURE
2 X 12 BEAM
DUAL 2 X 12 BEAM/ HEADER
36'-0"
1'-10"
4'-6"
10'-11"
13'-10"
15'-4"
16'-10"
17'-9"
18'-10"
D TYPICAL PICNIC SHELTER TRELLIS
SCALE: 1" = 10'
TRASH RECEPTACLE LOCATION
6 X 6 POST & PIER - TYPICAL OF 3
2 X 6 RAILING - TYPICAL
BENCH SEATING BUILT INTO RAIL
TELEPHONE POLE STYLE POST & PIER - TYPICAL
4'-7"
5'-1"
5'-1"
5'-5"
4'-0"
R15'-0"
2'-1"
15'-0"
30'-0"
C TYPICAL PICNIC SHELTER - DECK LEVEL
SCALE: 1" = 10'


RAILING & BANNISTER – SEE DETAIL, NEXT PAGE
6 X 6 POST – DECORATIVE AND RAILING SUPPORT STRUCTURE
STRUCTURAL HEADER – SHADE STRUCTURE
2 X 6 ANGLE BRACE – TYP.
DECORATIVE JOIST – SHADE STRUCTURE
36'–0"
45°
6'–6"
1'–10"
11'–0"
1'–0"
TELEPHONE POLE STYLE POST & PIER – TYPICAL
BENCH SEATING BUILT INTO THE FLOOR AND RAILING – 2 X 6 DECKING VENEER
6 X 6 POST & PIER – ROOF AND RAILING SUPPORT STRUCTURE
A TYPICAL PICNIC SHELTER, TRELLIS AND RAILING
SCALE: 1" = 4'
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA
New Shell Beach
Preliminary Site Plan and Layout
SHEET IDENTIFICATION
EP - 5

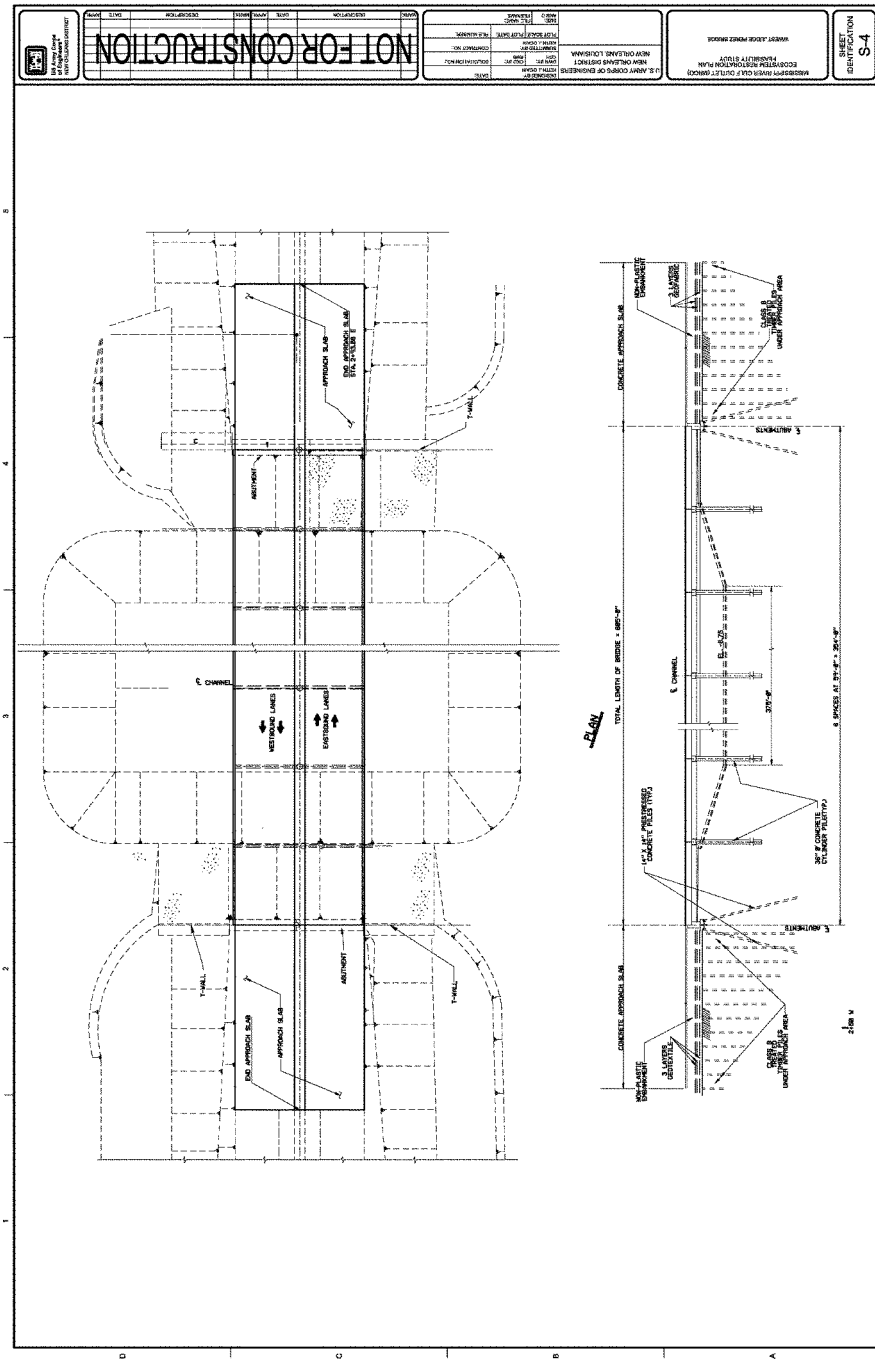

TRASH RECEPTACLE LOCATION
6 X 6 POST & PIER – TYPICAL OF 9
2 X 6 RAILING – TYPICAL
BENCH SEATING BUILT INTO RAIL
TELEPHONE POLE STYLE POST & PIER – TYPICAL
6'-3"
6'-3"
5'-6"
3'-1"
6'-0"
12'-0"
20'-0"
2'-0"
12'-5"
NOTE: MEASUREMENTS BETWEEN POSTS & PIERS ARE MEASURED AT "ON CENTER."
B LARGE PICNIC PAVILLION - PLAN VIEW
SCALE: 1" = 10'
DECORATIVE OVERHANG – CUT FROM 4 X 12
6 X 6 POST & PIER – TYPICAL OF 9
2 X 12 FACIA BOARD/ JOIST – TYPICAL
4 X 12 STRUCTURAL BEAM TYP. OF 10
1 X 4 SLAT FOR SHADE
TELEPHONE POLE STYLE POST & PIER – TYPICAL
1'-0"
6'-1"
6'-1"
5'-11"
5'-11"
14'-0"
22'-4"
3'-0"
C LARGE PICNIC PAVILLION TRELLIS - PLAN VIEW
SCALE: 1" = 10'
TELEPHONE POLE STYLE POST & PIER – TYPICAL
VARIES
3-3/4" MAX.
3-3/4" MAX.
3'-6"
DECORATIVE PICKETS – TYPICAL
2 X 6 RAIL MOUNT
2 X 6 COMPOSITE DECKING
2 X 6 BANNISTER
2 X 2 UNDERMOUNT DECORATIVE PIECE
6 X 6 POST
A TYPICAL RAILING - DETAIL
SCALE: 1" = 2'
US Army Corps of Engineers
NEW ORLEANS DISTRICT
U.S. ARMY CORPS OF ENGINEERS NEW ORLEANS DISTRICT NEW ORLEANS, LOUISIANA
New Shell Beach
Preliminary Site Plan and Layout
SHEET IDENTIFICATION
RF-7

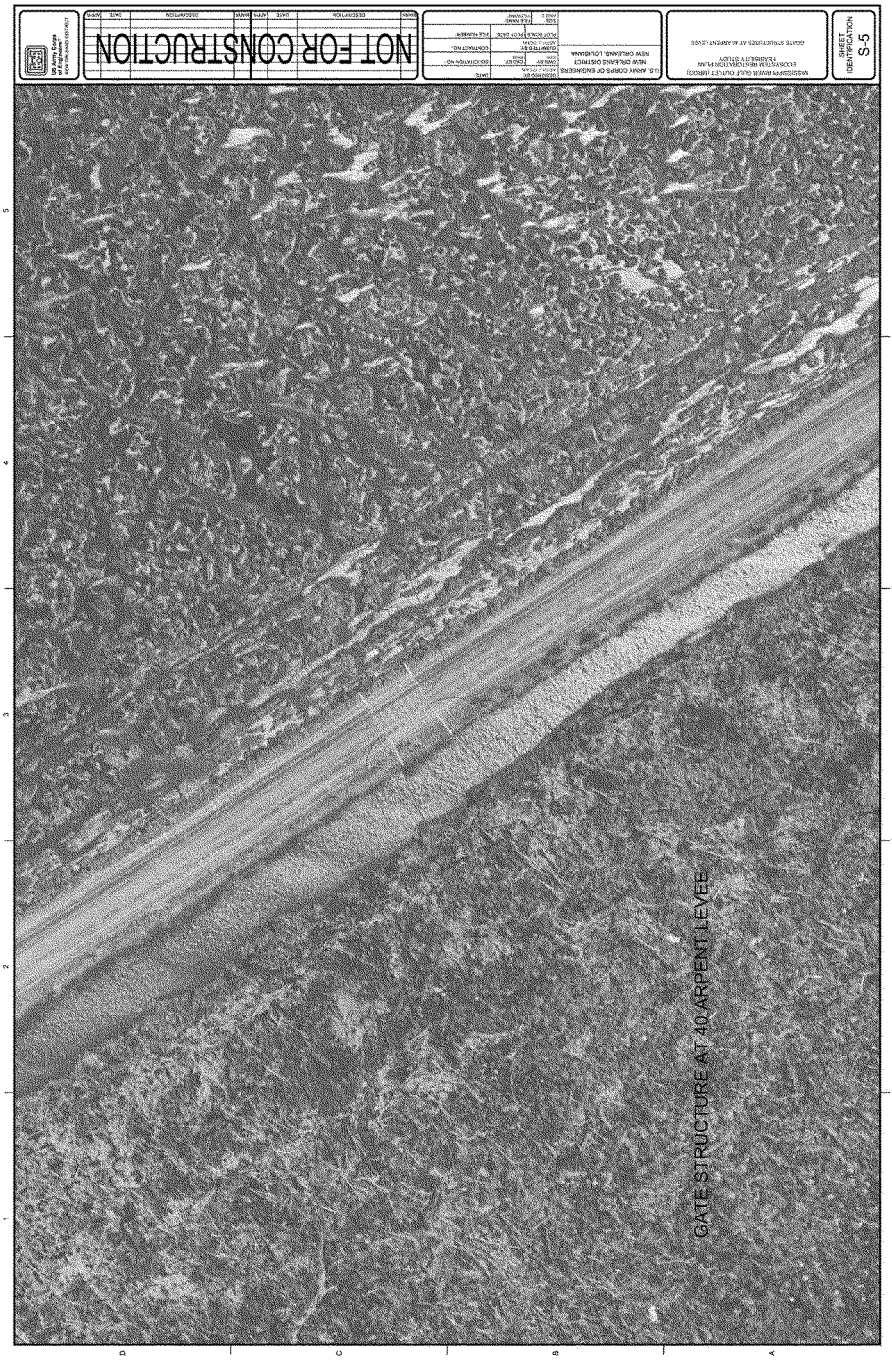

B LIGHTING SAMPLES - FRONT AND SIDE VIEW
SCALE: 1" = 2'
A BOARDWALK PIERS AND RAILING
SCALE: 1" = 4'
TYPICAL LIGHTING LOCATION ON ALL 15' PIER/ COLUMNS
3-3/4" MAX. 11'-6" (BUT COULD VARY)
14'-8" TYP.
15'-0" TYP.
3-3/4" MAX.
3'-6"
4'-0"
2 X 12 SUPPORT BEAM & FACIA BOARD
6 X 6 POST & PIER - ROOF AND RAILING SUPPORT STRUCTURE
TELEPHONE POLE STYLE POST & PIER - TYPICAL
SURFACE GRADE WILL VARY
DECORATIVE PICKETS - TYPICAL
2 X 2 DECORATIVE UNDERMOUNT
2 X 6 BANNISTER
New Shell Beach
Preliminary Site Plan and Layout
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

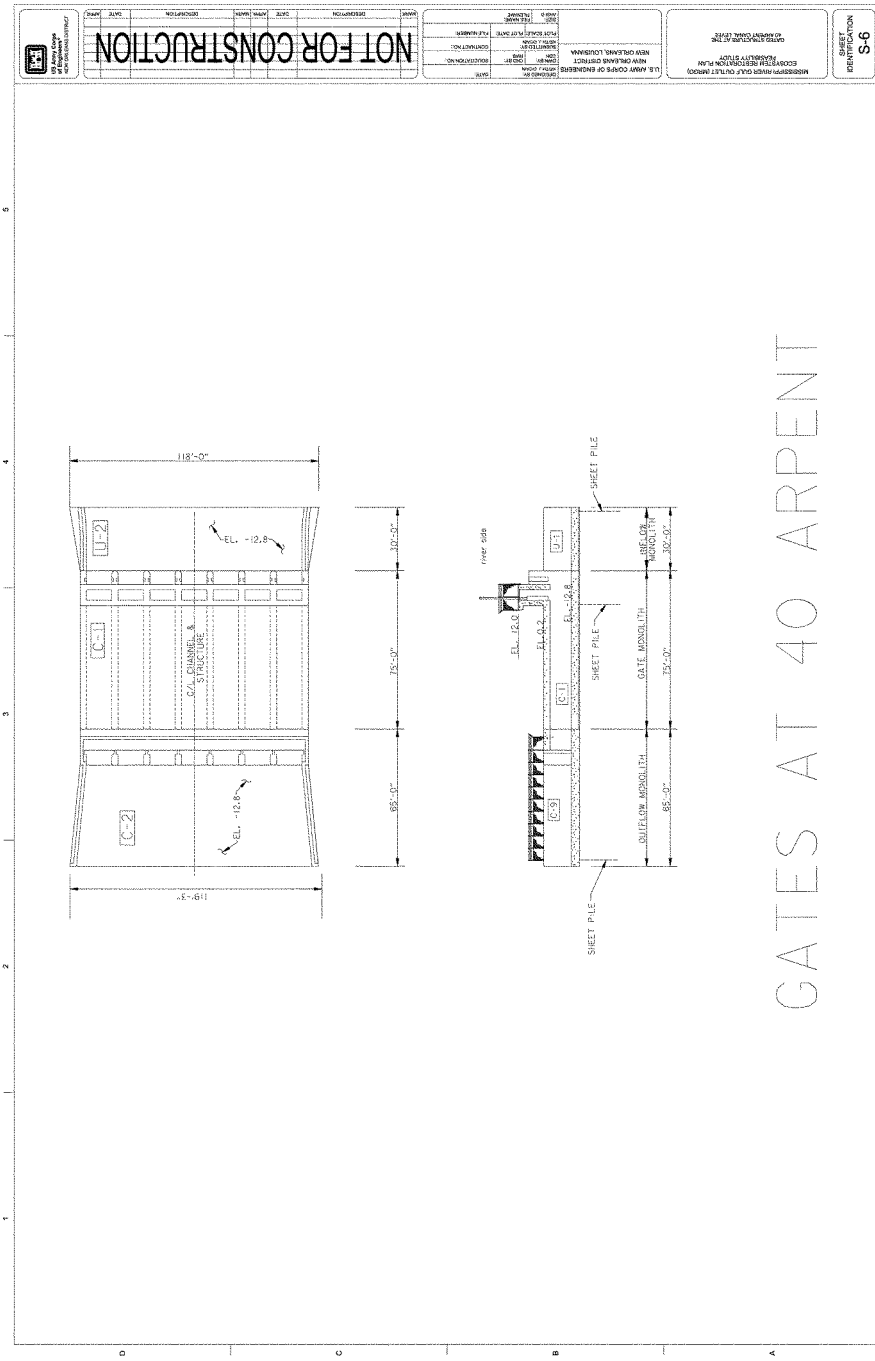

MISSISSIPPI RIVER DIVERSION STRUCTURE
MISSISSIPPI RIVER
NOT FOR CONSTRUCTION
SHEET IDENTIFICATION
S-1
MISSISSIPPI RIVER GULF OUTLET (MRGO)
ECOSYSTEM RESTORATION PLAN
FEASIBILITY STUDY
MISSISSIPPI RIVER DIVERSION STRUCTURE
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA


NOT FOR CONSTRUCTION
DIVERSION AT THE RIVER
PLAN
SECTION
15 SPACES @ 40'-0" = 600'-0"
CULVERT MONOLITHS
GATE MONOLITH WITH WALL
BULKHEAD MONOLITH
OUTFLOW MONOLITHS
SHEET PILE
FLOW
EL. 12.0
EL. 25.0
EL. 11.8
EL. -11.8
S-2

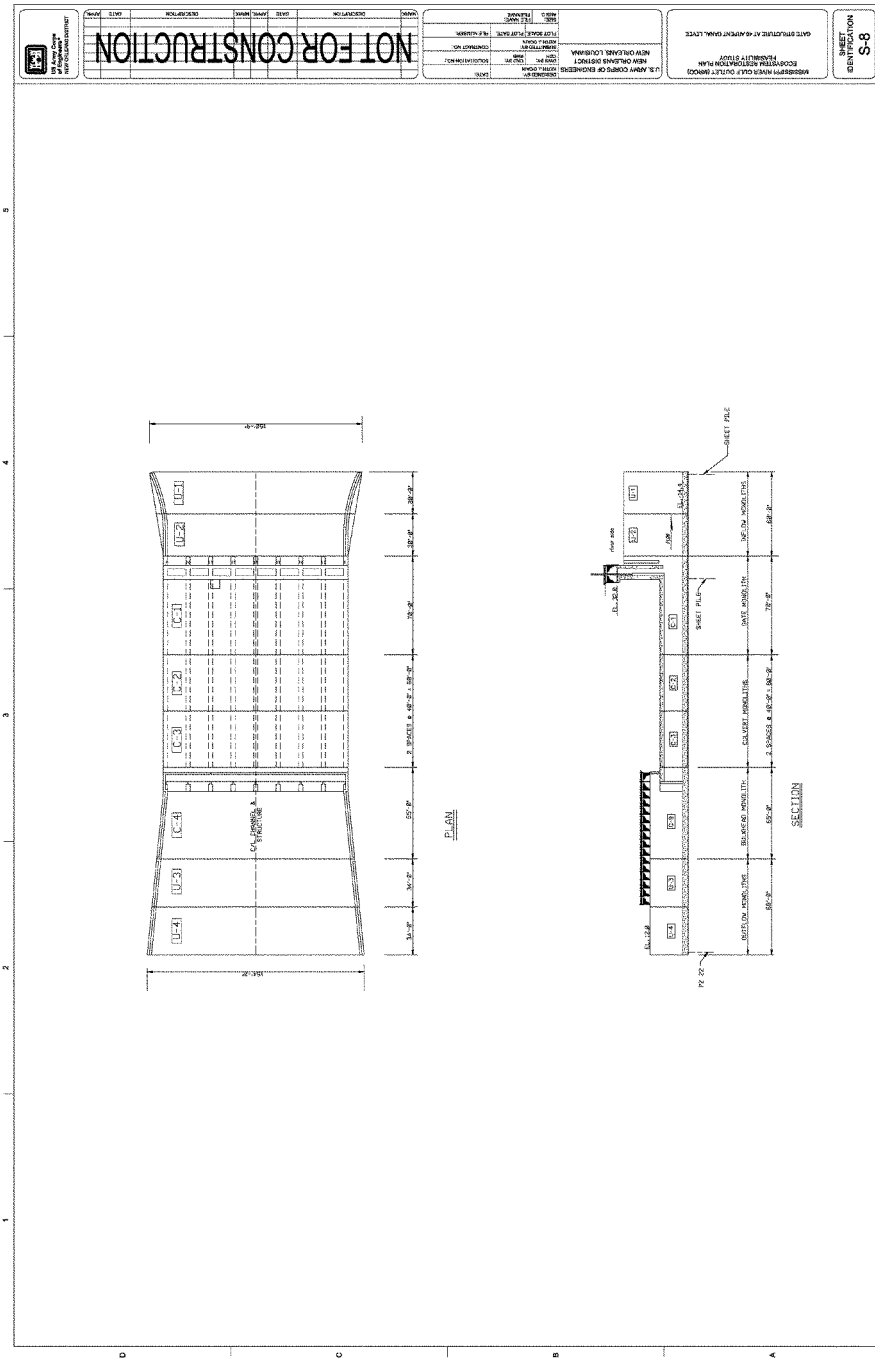

WEST JUDGE PEREZ BRIDGE
NOT FOR CONSTRUCTION
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
MISSISSIPPI RIVER GULF OUTLET (MRGO)
ECOSYSTEM RESTORATION PLAN
FEASIBILITY STUDY
BRIDGE @ WEST JUDGE PEREZ DRIVE
SHEET IDENTIFICATION
S-3

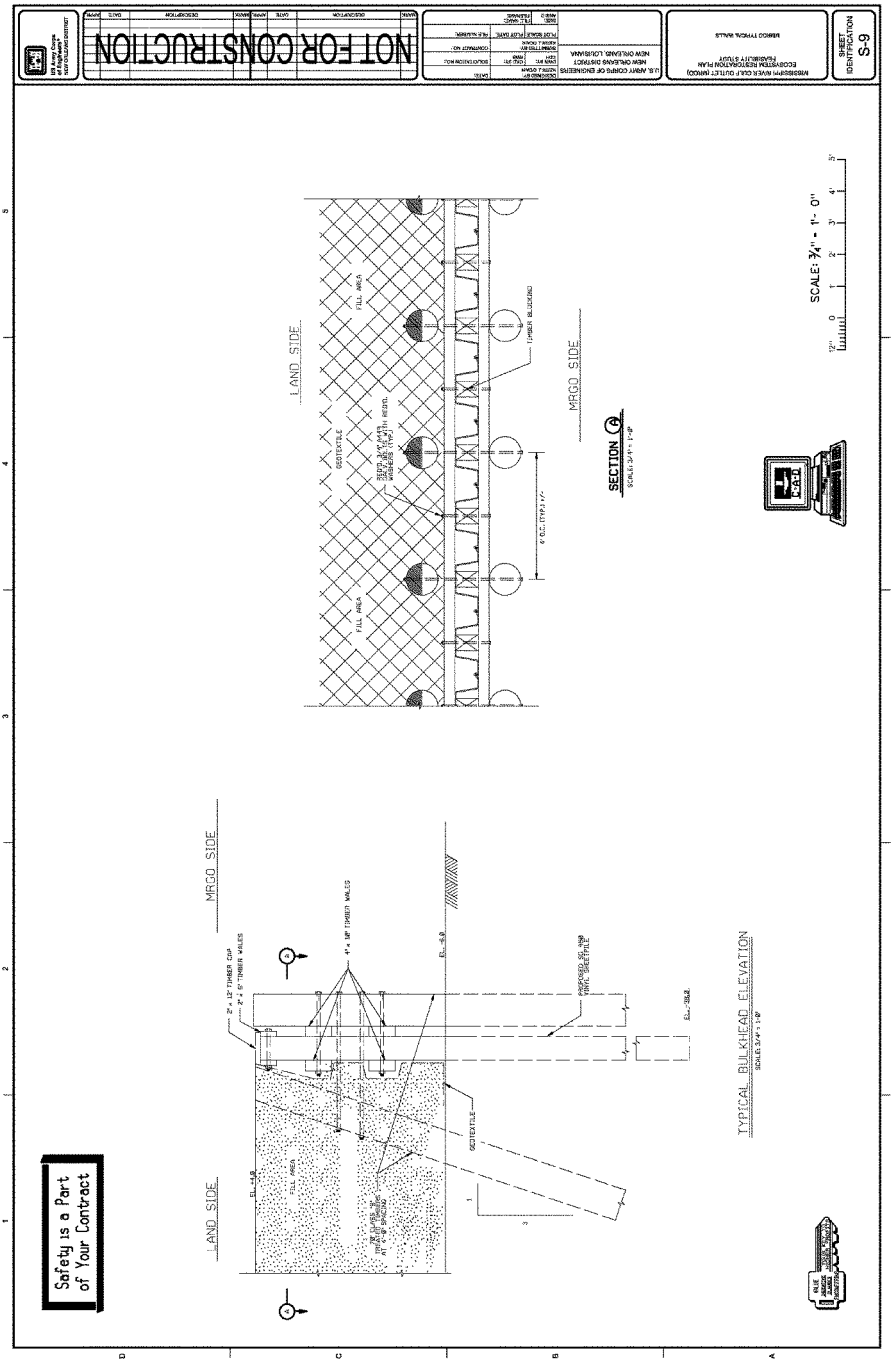

NOT FOR CONSTRUCTION
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA
HISTORIC FLOODGATE COMPLEX
ECOSYSTEM RESTORATION PLAN
PHASE I FEASIBILITY STUDY
WEST END BOAT BASIN
SHEET IDENTIFICATION
S-4
PLAN
ELEVATION
CONCRETE APPROACH SLAB
TOTAL LENGTH OF BRIDGE = 880'-0"
6 SPACES AT 30'-0" = 180'-0"
ABUTMENTS
ABUTMENT
T-WALL
APPROACH SLAB
END APPROACH SLAB
STA. 7+10.00
WESTBOUND LANES
EASTBOUND LANES
CHANNEL
NON-PLASTIC EMBANKMENT
CLASS B RIPRAP
UNDER APPROACH AREA
CLASS B RIPRAP
UNDER ABUTMENT AREA
24" X 24" PRESTRESSED CONCRETE PILES (TYP.)
30" X 30" CONCRETE PILE CAP (TYP.)
2 on 1


GATE STRUCTURE AT 40 ARPENT LEVEE
NOT FOR CONSTRUCTION
MISSISSIPPI RIVER GULF OUTLET (MRGO)
ECOSYSTEM RESTORATION PLAN
FEASIBILITY STUDY
GATE STRUCTURES AT 40 ARPENT LEVEE
SHEET IDENTIFICATION
S-5
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA


NOT FOR CONSTRUCTION
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA
MISSISSIPPI RIVER GULF OUTLET (MRGO)
ECOSYSTEM RESTORATION PLAN
PARABOLIC STUDY
GATES AT 40 ARPENT
SHEET IDENTIFICATION
S-6
118'-0"
EL. -12.8
U-2
C-1
C-2
C/L CHANNEL & STRUCTURE
65'-0"
75'-0"
30'-0"
SHEET PILE
U-1
C-1
C-3
EL. -12.0
EL. -12.8
GATE MONOLITH
OUTFLOW MONOLITH
SIDE OF MONOLITH
River Side


SHEET IDENTIFICATION
S-7
MISSISSIPPI RIVER GULF OUTLET (MRGO)
ECOSYSTEM RESTORATION PLAN
FEASIBILITY STUDY
GATE STRUCTURES @ THE MRGO
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA
NOT FOR CONSTRUCTION
DESIGNED BY
DRAWN BY
CHECKED BY
SUBMITTED BY
PROJECT MANAGER
PROJECT SCALE
PLOT DATE
FILE NUMBER
SCALE IN FEET
DATE
TIME
CONTRACT NO.
SCALE IN INCHES
DESCRIPTION
DATE
MARK
APPR.
US Army Corps of Engineers
NEW ORLEANS DISTRICT


NOT FOR CONSTRUCTION
PLAN
SECTION
SHEET PILE
GATE MONOLITH
GALLERY MONOLITH
BAFFLE MONOLITH
SHEET IDENTIFICATION
S-8


NOT FOR CONSTRUCTION
MISSISSIPPI RIVER GULF OUTLET (MRGO)
ECOSYSTEM RESTORATION PLAN
FEASIBILITY STUDY
MRGO TYPICAL WALLS
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA
SHEET IDENTIFICATION
S-9
Safety is a Part of Your Contract
LAND SIDE
MRGO SIDE
FILL AREA
GEOTEXTILE
TIMBER BULKHEAD
SECTION A
TYPICAL BULKHEAD ELEVATION
SCALE: 3/4" = 1'- 0"