

1.0 Introduction

Task Order DY08, Core Drilling, Soil Sampling, and Laboratory Testing for the Port Arthur Resident Office Shoreline Stabilization project, Port Arthur, Texas, was awarded to Quaternary Resource Investigations, LLC (QRI) on November 19, 2013 (Notice to Proceed (NTP) received on November 29, 2013). The primary purpose of this Task Order was to obtain geotechnical information for shoreline stabilization at the Port Arthur Resident Office, Jefferson County, Texas. A total of 5 borings, numbered 13-1001 through 13-1005, were drilled to depths of 80 and 100 feet as shown on [Table 1](#) below.

2.0 Borings

Below is a table summarizing the 5 borings drilled under Task Order DY08. The table includes Boring Number, Investigation Feature, Depth (ft), and a description of unusual subsurface conditions or difficulties in drilling that were encountered (if any). Boring Summary Sheets and Field boring logs ([Appendix A](#)) should be referenced for information concerning each boring.

Table 1			
Boring	Investigation Feature	Depth (ft)	Conditions / Difficulties Encountered
13-1001	East Bank SNWW PARO	100	<i>See boring log</i>
13-1002	East Bank SNWW PARO	80	<i>See boring log</i>
13-1003	East Bank SNWW PARO	100	<i>See boring log</i>
13-1004	East Bank SNWW PARO	80	<i>See boring log</i>
13-1005	East Bank SNWW PARO	100	<i>See boring log</i>

Final gINT Boring Logs are included in ([Appendix B](#)).

3.0 Test data

As per the Table of Required Services, test assignments were provided by the USACE POC as listed in Table 2. All tests were performed by QRI's contract laboratory, Terracon Consultants, Inc., on portions of the samples that were considered representative of the predominant material composition of the overall sample. The laboratory recorded on the final summary sheets the results of unit dry weight tests, moisture content tests, and visual classifications incidental to performing unconfined compression tests, triaxial tests (including UU and CU tests), and other tests. Results of moisture content testing and visual classifications incidental to performing moisture content, unit dry weight, Atterberg limits, and sieve analyses, were also included on the final test summary sheets provided by the laboratory. A complete set of

PORT ARTHUR RESIDENT OFFICE BORING SUMMARY SHEET

BORING ID:	<u>13-1004</u>
BORING TYPE:	<u>Continuous Sampling</u>
DEPTH:	<u>80'</u>
ELEVATION:	<u>7.63'</u>
X (US SURVEY FT):	<u>3574785.97</u>
Y (US SURVEY FT):	<u>13898080.74</u>
DEPTH TO WATER:	<u>11.8'</u>

Client: USACE-Galveston District

W912HY-13-D-0001-DY08

Boring: 13-1004

Page 1 of 4

Date/Time Drilling Begun: 12/10/13 1240

Date/Time Drilling Ended: 12/17/13 1030

Driller: Tom

Logger: Pete

Designated X (Easting): 3574785.968

Drill Rig: B57

Designated Y (Northing): 1389080.74 Designated Z (Elevation): 7.6315'

Total depth: 60'

Initial Water Encounter (Depth, date/time): 13.3 12/16/13 1020 Water Depth (15 min.): 11.8

Feet	USCS Log	Sample Interval (ft)	Amount Material Obtained (in)	Sample Type Blow Counts	Number of Tubes	Pocket Pene. (tsf)	Shear Strength (tsf)	Description (SOIL TYPE, color, moisture, plasticity, consistency, density, inclusions, etc.)
0	CI	0-2	14	ST	1	2.4	-	slightly sandy clay, light brown, moderately moist, moderately plastic, no trace roots
	CI	2-4	13	ST	1	2.1	-	slightly sandy clay, light brown, moderately moist, moderately plastic, sand seams and cracks
5	CI	4-6	16	ST	1	1.7	-	slightly sandy clay, light brown and greenish gray modelling, moderately moist, moderately plastic, sand seams, cracks
	CI	6-8	14	ST	1	1.5	-	SAA ↑
	CI	8-10	10	ST	1	1.6	-	sandy clay, greenish gray and light brown, moderately moist, slightly plastic, sand seams
10	CI	10-12	18	ST	1	0.75	2.6	sandy clay, greenish gray, moderately moist, slightly plastic, sand seams
	CI	12-14	19	ST	1	2.2	-	slightly sandy clay, greenish gray and light brown modelling, moderately moist, shell fragments, moderately plastic
15	CI	14-16	10	ST	1	2.4	-	SAA ↑
	CI	16-18	20	SI	1	2.75	-	slightly sandy clay, greenish gray and light brown modelling, moderately moist, moderately plastic, trace shell fragments
20	CI	18-20	19	ST	1	2.9	-	clay, greenish gray and light brown modelling, moderately moist, moderately plastic

Weather: Partly cloudy / to clear, sunny, 40's windy / clear, lite wind 30's

Comments:

SAA = same as above

USCS Log Legend:



W912HY-13-D-0001 DY06



US Army Corps of Engineers, Southwestern Division
Galveston District
2000 Fort Point Road/P.O. Box 1229
Galveston, TX 77553-1229

Port Arthur Resident Office
Sabine Neches Waterway (SNWW)
Port Arthur, TX



Quaternary Resource Investigations, L.L.C.
Government & Industry in Harmony with the Environment
13588 Florida Boulevard, Baton Rouge, Louisiana 70819

13r 1004
12/16/13

Feet	USCS Log	Sample Interval (ft)	Amount Material Obtained (in)	Sample Type Blow Counts	Number of Tubes	Pocket Pene. (tsf)	Shear Strength (tsf)	Description (SOIL TYPE, color, moisture, plasticity, consistency, density, inclusions, etc.)
20	CI	20-22	14	ST	1	3.75	-	slightly sandy clay, light brown and greenish gray mottling, moderately moist, moderately plastic, sand seems and cracks
	CI	22-24	17	ST	1	2.2	-	Sandy clay, light brown, wet, low plasticity, sand seems, cracks
25	SP	24-26	14	ST	1 bag	0	-	fine sand, light brown, wet, no plasticity
	SP	26-28	18	SS 10/20/23	1 bag	-	-	SP Dense, fine sand, light brown, wet, no plasticity
	CI	28-30	17	SS 5/4/7	1 bag	1.75	-	slip, sandy clay, light brown, moderately wet, moderately plastic, sand seems
30	CI	30-32	17	ST	1	1.75	-	sandy clay, light brown and greenish gray mottling, moderately moist, moderately plastic, sand seems
	CI	32-34	19	ST	1	2.1	-	SAA SAA cracks
35	CI	34-36	19	ST	1	1.7	-	SAA
	CI	36-38	18	ST	2	1.7	-	SAA
40	CI	38-40	20	ST	1	1.5	-	sandy clay, greenish gray, moderately moist, moderately plastic, sand seems

Weather: Clear, light wind, 40's

Comments: SAA = same as above

USCS Log Legend:



W912HY-13-D-0001 DY06



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12/16/13

Feet	USCS Log	Sample Interval (ft)	Amount Material Obtained (in)	Sample Type Blow Counts	Number of Tubes	Pocket Pene. (tsf)	Shear Strength (tsf)	Description (SOIL TYPE, color, moisture, plasticity, consistency, density, inclusions, etc.)
40	C1	40-42	18	ST	1	1.4	-	slightly sandy clay, greenish gray, moderately moist, moderately plastic, sand seems crumbly
	C1	42-44	19	ST	1	1.0	-	slightly sandy clay, dark gray, moderately moist, moderately plastic, sand seems
45	C1	44-46	18	ST	1	1.6	-	SAA ↑
	C1	46-48	19	ST	2	1.9	-	clay, dark gray, moderately moist, moderately plastic
	C1	48-50	18	ST	1	1.8	-	SAA ↑
50	C1	50-52	19	ST	1	1.1	-	SAA ↑
	C1	52-54	19	ST	1	1.6	-	SAA ↑
55	C1	54-56	19	ST	2	1.9	-	SAA ↑
	C1	56-58	19	ST	1	2.0	-	SAA ↑
60	C1	58-60	19	ST	1	1.7	-	SAA ↑

Weather:

Comments:

USCS Log Legend:

clear, lite wind, 50's
SAA = same as above

W912HY-13-D-0001-DY08



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12/17/13

1030

TD=80

Feet	USCS Log	Sample Interval (ft)	Amount Material Obtained (lb)	Sample Type Blow Counts	Number of Tubes	Pocket Pene. (tsf)	Shear Strength (tsf)	Description (SOIL TYPE, color, moisture, plasticity, consistency, density, inclusions, etc.)
60	CI	60-62	19	ST	1	1.6	—	clay, dark gray, moderately moist, moderately plastic
	CI	62-64	18	ST	1	1.75	—	SAA ↑
65	CI	64-66	18	ST	1	1.75	—	SAA ↑
	CI	66-68	19	ST	2	1.7	—	SAA ↑
	CI	68-70	18	ST	1	1.9	—	slightly sandy clay, greenish gray, moderately moist, moderately plastic, sand seams, cracks
70	CI	70-72	19	ST	1	1.8	—	SAA ↑
	CI	72-74	19	ST	1	2.0	—	SAA ↑
75	CI	74-76	18	ST	1	2.0	—	clay, greenish gray, moderately moist, moderately plastic, w trace organic material
	CI	76-78	18	ST	1	2.2	—	SAA ↑
80	CI	78-80	19	ST	1	1.7	—	clay, greenish gray, moderately moist, moderately plastic, with organic layer

Weather: clear, calm, 30's

Comments: SAA = same as above

USCS Log Legend:

GW	GP	GM	GC	SW	SP	SM	SC	ML	CL	OL	MH	CH	OH	PT
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D912HY-13-D-0001 DY06



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BORING NUMBER 13-1004

PAGE 1 OF 3

CLIENT USACE-Galveston District PROJECT NAME Port Arthur Resident Office (PARO)
PROJECT NUMBER W912HY-13-D-0001, Task Order No.0008 PROJECT LOCATION Port Arthur, TX
DATE STARTED 12/10/2013 12:40:00 PM COMPLETED 12/17/2013 10:30:00 AM GROUND ELEVATION 7.6315 ft HOLE SIZE 8.25 inches
DRILLING CONTRACTOR QRI NORTHING 13898080.74 ft EASTING 3574785.97 ft
DRILLING METHOD Hollow Stem Auger DRILLING RIG MAKE/MODEL Mobile B57 on Gemco Articulated Platform
LOGGED BY Pete Herold TOTAL DEPTH 80 ft GROUND WATER LEVEL AT TIME OF DRILLING 13.30 ft / Elev -5.67 ft
WEATHER partly cloudy to sunny, 30s to 50s, windy to light wind AFTER 15 MINUTES 11.80 ft / Elev -4.17 ft

GRAPHIC LOG	USCS SYMBOL	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE	RECOVERY (in)	SPT BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	FIELD TORVANE (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	MINUS #200 SIEVE CONTENT (%)	COMPRESSION STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)
			0														
	CH	CLAY, light brown, moderately moist, moderately plastic, with trace roots and a little sand with sand seams and cracks		ST	14		2.4			24							
	CH	light brown and greenish gray mottling		ST	13		2.4			23							
			5	ST	16		1.7			33							
	CL	Sandy CLAY, light brown, moderately moist, low plasticity		ST	14		1.5			37	49	21	28	95			
				ST	10		1.6			28							
			10														
	CH	CLAY, greenish gray, moderately moist, moderately plastic		ST	18		0.75	2.6	92	31	53	17	36	95	0.36	15	9
	CH	greenish gray and light brown mottling, with shell fragments		ST	19		2.2		109	23							
	CH	trace of shell fragments	15	ST	10		2.4		100	27	62	23	39		2.07	8	0
				ST	20		2.75		95	26							
		no shell fragments		ST	19		2.9			24							
			20														
	CL	Slightly sandy CLAY, greenish gray and light brown mottled, moderately moist, moderately plastic with sand seams and cracks		ST	14		3.75			23	36	17	19	87			
		more sand, light brown, wet, low plasticity		ST	17		2.2		108	20							
	SP-SM	SAND, with SILT, fine grained, light brown, wet, no plasticity	25	ST	14		0			29							
		dense		SS	18	10-20-23 (43)	-			24				8			
				SS	17	5-4-7 (11)	1.75			29							
	CH	CLAY, light brown, moderately wet, moderately plastic, with sand seams, stiff	30	ST	17		1.75		93	30	54	21	33	99	0.89	5	17
		light brown and greenish gray mottling, moderately moist		ST	19		2.1		90	35							
		cracks															
			35														

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BORING NUMBER 13-1004

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CLIENT USACE-Galveston District

PROJECT NAME Port Arthur Resident Office (PARO)

PROJECT NUMBER W912HY-13-D-0001, Task Order No.0008

PROJECT LOCATION Port Arthur, TX

GRAPHIC LOG	USCS SYMBOL	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE	RECOVERY (in)	SPT BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	FIELD TORVANE (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			MINUS #200 SIEVE CONTENT (%)	COMPRESSION STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)
											LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX				
	CH		35	ST	19		1.7			31							
	CL	Sandy CLAY, light brown, moderately wet, moderately plastic, with sand seams, stiff		ST	18		1.7			38	40	18	22	98			
		greenish gray		ST	20		1.5			36							
		decreasing sand	40							37							
																	
	CH	CLAY, greenish gray, moderately wet, moderately plastic dark gray		ST	18		1.4			37							
				ST	19		1.0		87	38	50	20	30	100	1.15	9	21
		moderately moist		45	ST	18		1.6			40						
				ST	19		1.9			48							
				ST	18		1.8			55							
			50														
				ST	19		1.1		71	50	94	27	67		0.91	10	0
				ST	19		1.6				44						
		55		ST	19		1.9				56						
				ST	19		2.0				53						
				ST	19		1.7				37						
		60															
				ST	19		1.6		87	33	57	21	36		1.01	12	0
				ST	18		1.75				50						
		65		ST	18		1.75				56	96	29	67			
				ST	19		1.7				47						
			with sand seams and cracks		ST	18		1.9			45						
		70															
				ST	19		1.8				53	93	27	66	99		
				ST	19		2.0				55						
		with trace organic material	75														

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BORING NUMBER 13-1004

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CLIENT USACE-Galveston District

PROJECT NAME Port Arthur Resident Office (PARO)

PROJECT NUMBER W912HY-13-D-0001, Task Order No.0008

PROJECT LOCATION Port Arthur, TX

GRAPHIC LOG	USCS SYMBOL	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE	RECOVERY (in)	SPT BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	FIELD TORVANE (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			MINUS #200 SIEVE CONTENT (%)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)
											LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX				
	CH	CLAY, greenish gray, moderately wet, moderately plastic (<i>continued</i>) with organic layer	75	ST	18		2.0			46							
				ST	18		2.2			53							
			80	ST	19		1.7		72	48	81	25	56		1.07	5	0

Bottom of borehole at 80.0 feet.

SUMMARY TABLE OF LABORATORY TEST DATA																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
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Abbreviated Sieve Analysis Worksheet (ASTM D422)

Date: 01 - 16 - 2014

Project No.: 92145005

Project Name.: Port Arthur resident Office - USACE

Boring No.: 13-B1004/6-8 Contract No: W912HY-13-D-0001, DY08

Description: G.T. fat clay w/silty sand lenses

Pan No. & Weight : N13/43.73 Wet Sample + Pan Weight : 147.73

Dry Sample + Pan Weight: 119.76 Dry Sample Weight: 76.03

Sieve Size	Accum. Wt. of Sample	Percent of Retained	Percent Passing
1/2 inch			
3/8 inch	0		
No. 4	0		
No. 10	0		
No. 40	0.16		
No. 200	3.97		

Prepared By: Rodrigo Date: 1/16

Tested By: RG

Date: 1-20-14

Computed By: Date:

Checked By: JY

Date: 1/28

Abbreviated Sieve Analysis Worksheet (ASTM D422)

Date: 02-14-2014

Project No.: 92145005

Project Name.: Port Arthur resident Office - USACE

Boring No.: B-1004/10-12

Contract No.: W912HY-13-D-0001, DY08

Description: Gravel, Red clay silt

Pan No. & Weight NC 2/31.03

Wet Sample + Pan Weight: 115.25

Dry Sample + Pan Weight: 95.45

Dry Sample Weight: 64.42

Sieve Size	Accum. Wt. of Sample	Percent of Retained	Percent Passing
1/2 inch	0		
3/8 inch	0		
No. 4	0		
No. 10	0		
No. 40	0.06		
No. 200	3.31		

Prepared By: SN

Date: 2/14/14

Tested By: RG

Date: 2.18

Computed By:

Date:

Checked By:

Date:

Abbreviated Sieve Analysis Worksheet (ASTM D422)

Date: 01 - 16 - 2014

Project No.: 92145005

Project Name.: Port Arthur resident Office - USACE

Boring No.: 13-B1004/20-22 Contract No.: W912HY-13-D-0001, DY08

Description: L/T fat clay w/FE w/cal w/sandy lean clay seem

Pan No. & Weight: N16/42.41 Wet Sample + Pan Weight: 180.37

Dry Sample + Pan Weight: 154.98 Dry Sample Weight: 112.57

Sieve Size	Accum. Wt. of Sample	Percent of Retained	Percent Passing
1/2 inch			
3/8 inch	0		
No. 4	0.64		
No. 10	0.96		
No. 40	1.12		
No. 200	14.28		

Prepared By: Rodrigo Date: 1/16

Tested By: RG Date: 1-20-14

Computed By: _____ Date: _____

Checked By: JG Date: 1/28

Abbreviated Sieve Analysis Worksheet (ASTM D422)

Date: 01 - 16-2014

Project No.: 92145005

Project Name.: Port Arthur resident Office - USACE

Boring No.: 13-B1004/26-28 Contract No: W912HY-13-D-0001, DY08

Description: G/T Silty sand

Pan No. & Weight : 1A / 40.22 Wet Sample + Pan Weight : 174.82

Dry Sample + Pan Weight: 148.61 Dry Sample Weight: 108.39

Sieve Size	Accum. Wt. of Sample	Percent of Retained	Percent Passing
1/2 inch			
3/8 inch	0		
No. 4	0		
No. 10	0		
No. 40	0		
No. 200	99.32		

Prepared By: Rodrigo

Date: 4/16

Tested By: RC

Date: 1-20-14

Computed By:

Date:

Checked By: CY

Date: 1/28

Abbreviated Sieve Analysis Worksheet (ASTM D422)

Date: 02/14 -2014

Project No.: 92145005

Project Name.: Port Arthur resident Office - USACE

Boring No.: B-1004/30-32 Contract No: W912HY-13-D-0001, DY08

Description: Gr+T, Lem cl & silt

Pan No. & Weight: E18/49.18 Wet Sample + Pan Weight: 147.80

Dry Sample + Pan Weight: 125.31 Dry Sample Weight: 76.13

Sieve Size	Accum. Wt. of Sample	Percent of Retained	Percent Passing
1/2 inch	0		
3/8 inch	0		
No. 4	0		
No. 10	0.04		
No. 40	0.12		
No. 200	0.59		

Prepared By: SA

Date: 2/14/14

Tested By: RG

Date: 2-18

Computed By:

Date:

Checked By: RP

Date: 2/10

Abbreviated Sieve Analysis Worksheet (ASTM D422)

Date: 01 - 16 -2014

Project No.: 92145005

Project Name.: Port Arthur resident Office - USACE

Boring No.: 13-B1004/36-38 Contract No: W912HY-13-D-0001, DY08

Description: G, T futchx w/kanndux w/silly sand lenses

Pan No. & Weight : 514/ 41.55 Wet Sample + Pan Weight : 156.96

Dry Sample + Pan Weight: 125.47 Dry Sample Weight: 83.92

Sieve Size	Accum. Wt. of Sample	Percent of Retained	Percent Passing
1/2 inch			
3/8 inch	0		
No. 4	0		
No. 10	0		
No. 40	0		
No. 200	1.38		

Prepared By: Rodrigo Date: 1/16

Tested By: RA Date: 1/20

Computed By: Date:

Checked By: J Date: 1/28

Abbreviated Sieve Analysis Worksheet (ASTM D422)

Date: 02-14 -2014 Project No.: 92145005

Project Name.: Port Arthur resident Office - USACE

Boring No.: B-100A/42-44 Contract No: W912HY-13-D-0001, DY08

Description: Gr, Fct cl

Pan No. & Weight: C24/50.52 Wet Sample + Pan Weight: 138.28

Dry Sample + Pan Weight: 108.5 Dry Sample Weight: 57.98

Sieve Size	Accum. Wt. of Sample	Percent of Retained	Percent Passing
1/2 inch	0		
3/8 inch	0		
No. 4	0		
No. 10	0.01		
No. 40	0.01		
No. 200	0.13		

Prepared By: SL Date: 2/14/14 Tested By: RG Date: 2-18

Computed By: Date: Checked By: RP Date: 2/21

Abbreviated Sieve Analysis Worksheet (ASTM D422)

Date: 01 - 16 - 2014

Project No.: 92145005

Project Name.: Port Arthur resident Office - USACE

Boring No.: 13-B1004/70-72 Contract No.: W912HY-13-D-0001, DY08

Description: G Sat clay w/FE

Pan No. & Weight : S10/40.40 Wet Sample + Pan Weight : 166.49

Dry Sample + Pan Weight: 122.60 Dry Sample Weight: 82.20

Sieve Size	Accum. Wt. of Sample	Percent of Retained	Percent Passing
1/2 inch			
3/8 inch	0		
No. 4	0		
No. 10	0		
No. 40	0		
No. 200	0.6?		

Prepared By: Rodrigo Date: 1/16

Tested By: Rh Date: 1/20

Computed By: Date:

Checked By: ✓ Date: 1/20

Terracon Consultants, Inc.
11555 Clay Road, Suite 100 Houston, TX 77043 P [713] 690 8989

Liquid Limit, Plastic Limit, and Plasticity Index of Soils

☒ ASTM D 4318 ☐ AASHTO T 89 & T 90 ☐ TEX 104, 105, & 106

Project: Port Arthur Resident Office - USACE

Project No. 92145005

USACE : Contract No. W912HY-13-D-0001-DY08

Boring No: 13-1004 **Depth** 6-8

Date: 1-20-2014

Material Description: CH

BRN fat clay

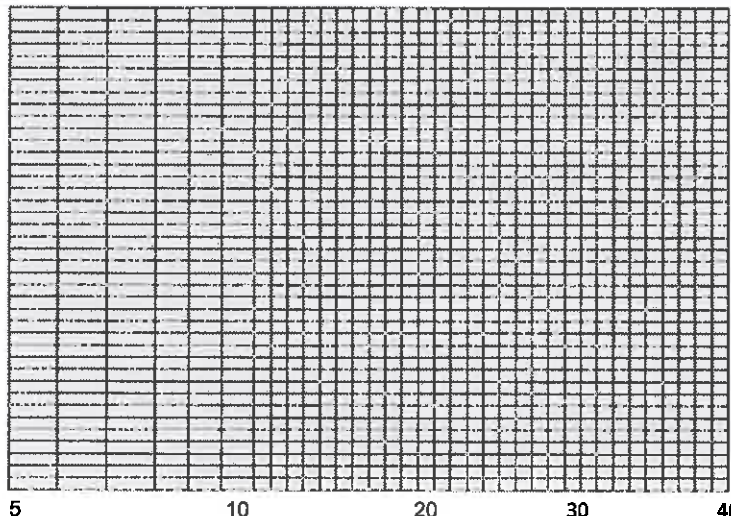
☐ One Point

☒ Three Points

☒ Pass #40 sieve

Liquid Limit						
Run No.	1	2	3	4	5	6
Tare No.	414	705	23			
Weight in grams	Tare + Wet Soil	31.58	31.65	32.37		
	Tare + Dry Soil	26.425	26.18	26.55		
	Water W _w					
	Tare	15.15	15.14	15.03		
	Dry Soil W _d					
Water Content	W					
No. of Blows	31	23	16			

Water Content, W



LL _____

PL _____

PI _____

Symbol from plasticity chart

LL MTE No. G26105
 Scale MTE No. B2894

Plastic Limit						Natural Water Content
Run No.	1	2	3	4	5	
Tare No.	102	117				
Weight in grams	Tare + Wet Soil	36.96	37.14			
	Tare + Dry Soil	35.67	35.74			
	Water W _w					
	Tare	29.52	29.26			
	Dry Soil W _d					
Water Content	W					
Plastic Limit						

Remarks _____

Technician Ch/3C

Computed by _____

Checked by _____

Date: 1-20-14

Date: _____

Che Date: _____

1/20

Terracon Consultants, Inc.

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Liquid Limit, Plastic Limit, and Plasticity Index of Soils

☒ ASTM D 4318 ☐ AASHTO T 89 & T 90 ☐ TEX 104, 105, & 106

Project: Port Arthur Resident Office - USACE

Project No. 92145005

USACE : Contract No. W912HY-13-D-0001-DYO8

Boring No: 13-1004 Depth 10 - 12

Date: 2/20/2014

Material Description: Grey Fat clay

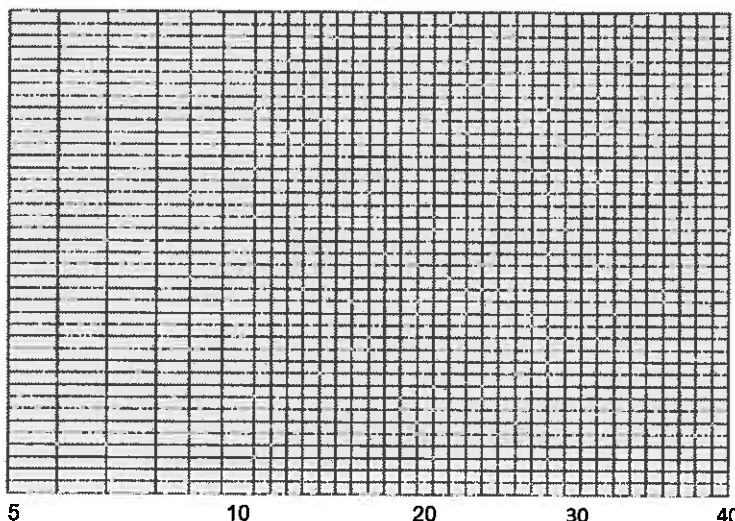
☐ One Point

☒ Three Points

☒ Pass #40 sieve

Liquid Limit						
Run No.	1	2	3	4	5	6
Tare No.	405	410	507			
Weight in grams	Tare + Wet Soil	32.08	31.69	31.66		
	Tare + Dry Soil	26.45	25.88	25.74		
	Water W _w					
	Tare	15.13	15.13	15.21		
	Dry Soil W _d					
Water Content	W					
No. of Blows	35	24	15			

Water Content, W



LL _____

PL _____

PI _____

Symbol from plasticity chart

LL MTE No. G26105
Scale MTE No. B7894

Plastic Limit						Natural Water Content
Run No.	1	2	3	4	5	
Tare No.	704	87				
Weight in grams	Tare + Wet Soil	22.67	22.50			
	Tare + Dry Soil	21.58	21.43			
	Water W _w					
	Tare	15.11	14.98			
	Dry Soil W _d					
Water Content	W					
Plastic Limit						

Remarks

Technician JC

Computed by _____

Checked by TAP

Date: _____

Date: _____

Che Date: 2/24

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Liquid Limit, Plastic Limit, and Plasticity Index of Soils

☒ ASTM D 4318 ☐ AASHTO T 89 & T 90 ☐ TEX 104, 105, & 106

Project: Port Arthur Resident Office - USACE

Project No. 92145005

USACE : Contract No. W912HY-13-D-0001-DY08

Boring No: 13-1004 Depth 20 - 22

Date: 1-20-2014

Material Description: lean clay w/ some cl. frags

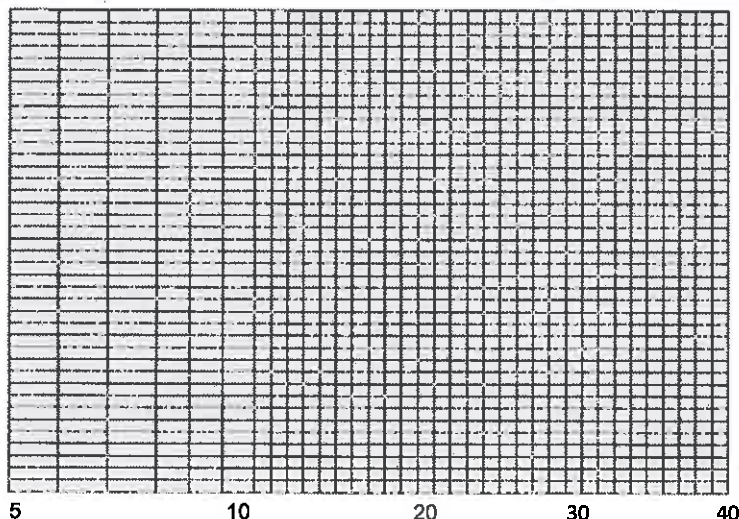
☐ One Point

☒ Three Points

☒ Pass #40 sieve

Liquid Limit						
Run No.	1	2	3	4	5	6
Tare No.	212	420	522			
Weight in grams	Tare + Wet Soil	32.49	31.19	32.28		
	Tare + Dry Soil	27.96	26.91	27.44		
	Water W _w					
	Tare	14.84	15.16	15.00		
	Dry Soil W _d					
Water Content	W					
No. of Blows	35	23	15			

Water Content, W



LL _____

PL _____

PI _____

Symbol from plasticity chart

LL MTE No. G26105
 Scale MTE No. B7894

Plastic Limit						Natural Water Content
Run No.	1	2	3	4	5	
Tare No.	123	121				
Weight in grams	Tare + Wet Soil	37.67	37.55			
	Tare + Dry Soil	36.42	36.32			
	Water W _w					
	Tare	29.22	29.13			
	Dry Soil W _d					
Water Content	W					
Plastic Limit						

Remarks

Technician ehw, JC Computed by _____

Checked by _____

Date: 1-20-14

Date: _____

Che Date: _____

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Liquid Limit, Plastic Limit, and Plasticity Index of Soils

☒ ASTM D 4318 ☐ AASHTO T 89 & T 90 ☐ TEX 104, 105, & 106

Project: Port Arthur Resident Office - USACE

Project No. 92145005

USACE : Contract No. W912HY-13-D-0001-DY08

Boring No: 13-1004 **Depth** 30.32

Date: 2/17/2014

Material Description: Grey fat clay

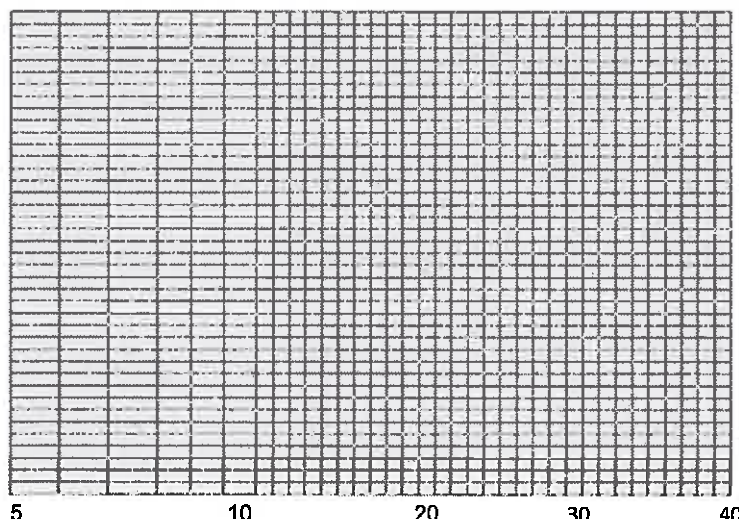
☐ One Point

☒ Three Points

☒ Pass #40 sieve

Liquid Limit						
Run No.	1	2	3	4	5	6
Tare No.	410	420	513			
Weight in grams	Tare + Wet Soil	29.80	29.65	30.70		
	Tare + Dry Soil	24.80	24.55	25.03		
	Water W _w					
	Tare	15.15	15.17	15.13		
	Dry Soil W _d					
Water Content	W					
No. of Blows	35	24	15			

Water Content, W



LL _____

PL _____

PI _____

Symbol from plasticity chart

LL MTE No. 626105
 Scale MTE No. 137894

Plastic Limit						Natural Water Content
Run No.	1	2	3	4	5	
Tare No.	721	832				
Weight in grams	Tare + Wet Soil	22.10	22.56			
	Tare + Dry Soil	20.91	21.29			
	Water W _w					
	Tare	15.12	15.25			
	Dry Soil W _d					
Water Content	W					
Plastic Limit						

Remarks

Technician JC

Computed by _____

Checked by TSP

Date: _____

Date: _____

Che Date: _____

2/21

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Liquid Limit, Plastic Limit, and Plasticity Index of Soils

☒ ASTM D 4318 ☐ AASHTO T 89 & T 90 ☐ TEX 104, 105, & 106

Project: Port Arthur Resident Office - USACE

Project No. 92145005

USACE : Contract No. W912HY-13-D-0001-DY08

Boring No: 13-1004 **Depth** 36-38

Date: 1-20-2014

Material Description: lean clay w/ silt & few fine pits (CL)

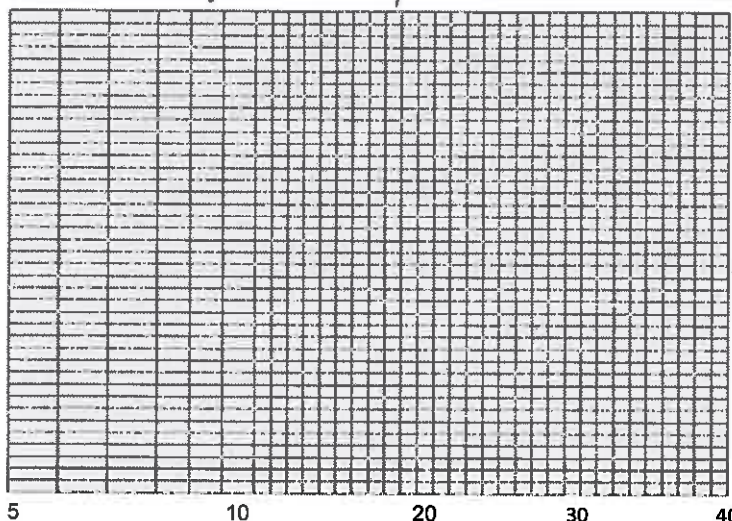
☐ One Point

☒ Three Points

☒ Pass #40 sieve

Liquid Limit						
Run No.	1	2	3	4	5	6
Tare No.	807	830	4P			
Weight in grams	Tare + Wet Soil	31.99	32.14	31.62		
	Tare + Dry Soil	27.26	27.31	26.73		
	Water W _w					
	Tare	14.95	15.21	14.82		
	Dry Soil W _d					
Water Content	W					
No. of Blows	34	26	16			

Water Content, W



LL _____

PL _____

PI _____

Symbol from plasticity chart

LL MTE No. G26105
 Scale MTE No. B7834

Plastic Limit						Natural Water Content
Run No.	1	2	3	4	5	
Tare No.	113	108				
Weight in grams	Tare + Wet Soil	36.66	37.42			
	Tare + Dry Soil	35.51	36.18			
	Water W _w					
	Tare	29.13	29.43			
	Dry Soil W _d					
Water Content	W					
Plastic Limit						

Remarks

Technician ch jc **Computed by** _____

Checked by _____

Date: 01-20-14 **Date:** _____

Che Date: _____

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Liquid Limit, Plastic Limit, and Plasticity Index of Soils

☒ ASTM D 4318 ☐ AASHTO T 89 & T 90 ☐ TEX 104, 105, & 106

Project: Port Arthur Resident Office - USACE

Project No. 92145005

USACE : Contract No. W912HY-13-D-0001-DY08

Boring No: 13-1004 **Depth** 42-44

Date: 2/17/2014

Material Description: G lean clay

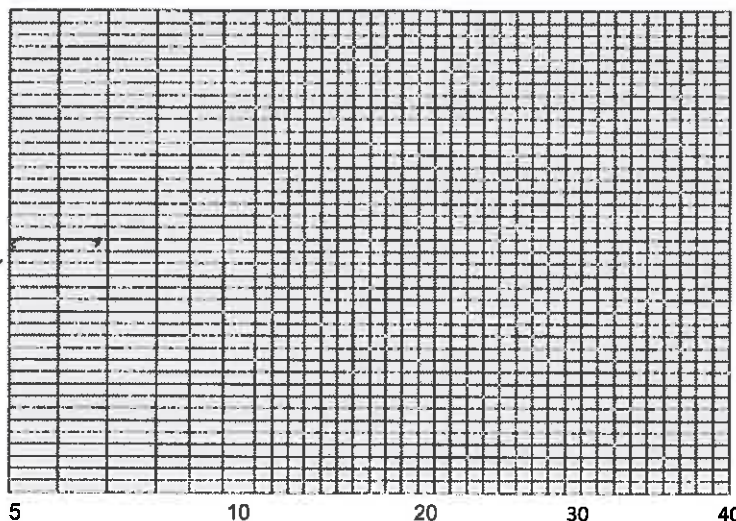
☐ One Point

☒ Three Points

☒ Pass #40 sieve

Liquid Limit						
Run No.	1	2	3	4	5	6
Tare No.	704	813	830			
Weight in grams	Tare + Wet Soil	33.74	31.32	30.84		
	Tare + Dry Soil	27.71	25.89	25.40		
	Water W _w					
	Tare	15.12	15.04	15.20		
	Dry Soil W _d					
Water Content	W					
No. of Blows	35	26	17			

Water Content, W



LL _____

PL _____

PI _____

Symbol from plasticity chart

LL MTE No. 26105
 Scale MTE No. B7854

Plastic Limit						Natural Water Content
Run No.	1	2	3	4	5	
Tare No.	2P	23				
Weight in grams	Tare + Wet Soil	22.00	22.42			
	Tare + Dry Soil	20.82	21.20			
	Water W _w					
	Tare	14.93	15.04			
	Dry Soil W _d					
Water Content	W					
Plastic Limit						

Remarks

Technician JC

Computed by _____

Checked by TRD

Date: _____

Date: _____

Che Date: 2/21

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Liquid Limit, Plastic Limit, and Plasticity Index of Soils

☒ ASTM D 4318 ☐ AASHTO T 89 & T 90 ☐ TEX 104, 105, & 106

Project: Port Arthur Resident Office - USACE

Project No. 92145005

USACE: Contract No. W912HY-13-D-0001-DYO8

Boring No: 13-1004 **Depth** 14-16

Date: 1/27/2014

Material Description: L + T fat clay

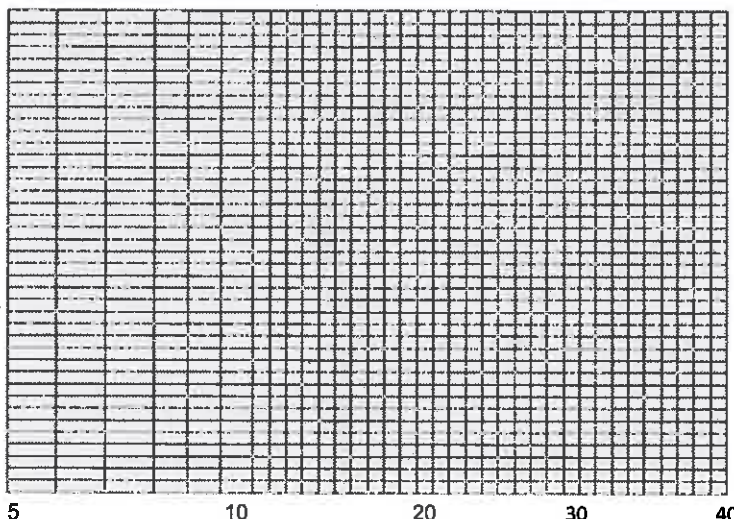
☐ One Point

☒ Three Points

☒ Pass #40 sieve

Liquid Limit						
Run No.	1	2	3	4	5	6
Tare No.	714	820A	822			
Weight in grams	Tare + Wet Soil	31.77	29.78	32.74		
	Tare + Dry Soil	25.49	24.27	25.77		
	Water W _w					
	Tare	15.10	15.14	15.04		
	Dry Soil W _d					
Water Content	W					
No. of Blows	34	26	15			

Water Content, W



LL _____

PL _____

PI _____

Symbol from
plasticity chart

LL MTE No. G-26105
 Scale MTE No. B-2854

Plastic Limit						Natural Water Content
Run No.	1	2	3	4	5	
Tare No.	7P	24				
Weight in grams	Tare + Wet Soil	22.15	22.12			
	Tare + Dry Soil	20.80	20.80			
	Water W _w					
	Tare	14.98	15.09			
	Dry Soil W _d					
Water Content	W					
Plastic Limit						

Remarks

Technician JC

Computed by _____

Checked by BJP

Date: _____

Date: _____

Che Date: 2/21

Terracon Consultants, Inc.
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Liquid Limit, Plastic Limit, and Plasticity Index of Soils

☒ ASTM D 4318 ☐ AASHTO T 89 & T 90 ☐ TEX 104, 105, & 106

Project: Port Arthur Resident Office - USACE

Project No. 92145005

USACE: Contract No. W912HY-13-D-0001-DY08

Boring No: 13- ¹⁰⁰⁴ **Depth** 50-52

Date: 1-25-2014

Material Description: Gray Sat clay

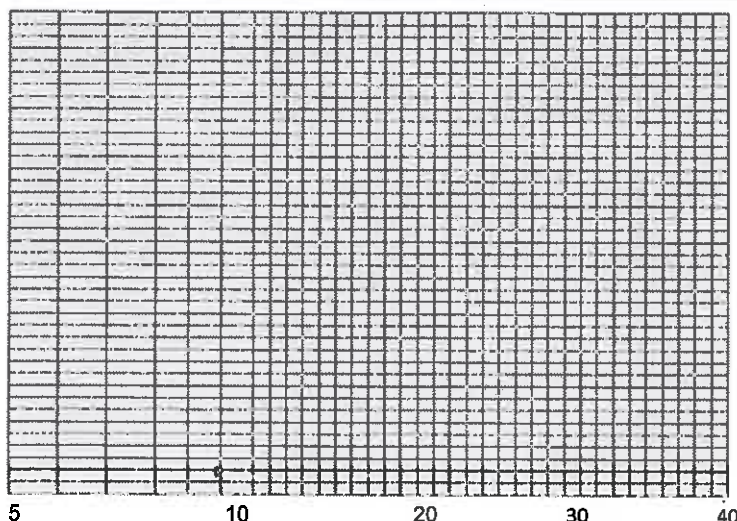
☐ One Point

☒ Three Points

☒ Pass #40 sieve

Liquid Limit						
Run No.	1	2	3	4	5	6
Tare No.	401	510	522			
Weight in grams	Tare + Wet Soil	29.79	29.61	29.13		
	Tare + Dry Soil	22.86	22.58	22.12		
	Water W _w					
	Tare	15.24	15.19	15.00		
	Dry Soil W _d					
Water Content	W					
No. of Blows	35	23	15			

Water Content, W



LL _____

PL _____

PI _____

Symbol from plasticity chart

LL MTE No. G26105
 Scale MTE No. B7894

Plastic Limit						Natural Water Content
Run No.	1	2	3	4	5	
Tare No.	822	830				
Weight in grams	Tare + Wet Soil	22.15	22.97			
	Tare + Dry Soil	20.64	21.31			
	Water W _w					
	Tare	15.04	15.19			
	Dry Soil W _d					
Water Content	W					
Plastic Limit						

Remarks

Technician JC

Computed by _____

Checked by DP

Date:

Date:

Che Date: 2/21

Liquid Limit, Plastic Limit, and Plasticity Index of Soils

☒ ASTM D 4318 ☐ AASHTO T 89 & T 90 ☐ TEX 104, 105, & 106

Project: Port Arthur Resident Office - USACE

Project No. 92145005

USACE: Contract No. W912HY-13-D-0001-DY08

Boring No: 13-1004 **Depth** 60-62

Date: 1/25/2014

Material Description: Grey lean clay

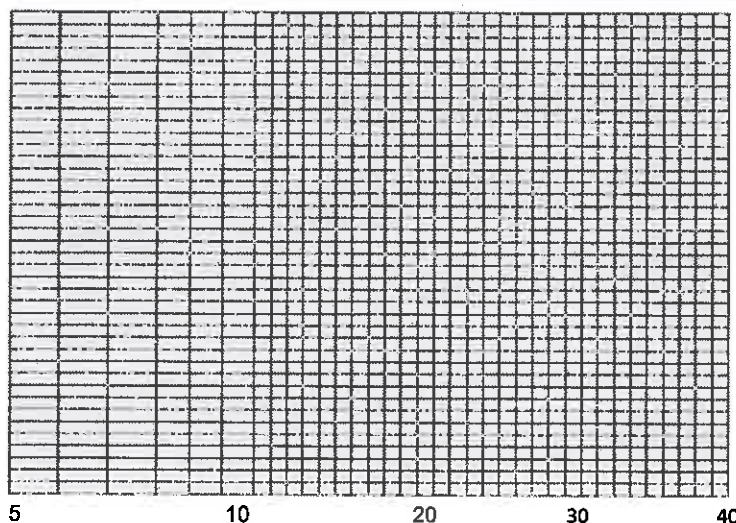
☐ One Point

☒ Three Points

☒ Pass #40 sieve

Liquid Limit						
Run No.	1	2	3	4	5	6
Tare No.	402	414	504			
Weight in grams	Tare + Wet Soil	31.16	30.73	31.77		
	Tare + Dry Soil	25.52	25.11	20.56		
	Water W _w					
	Tare	15.18	15.16	15.22		
	Dry Soil W _d					
Water Content	W					
No. of Blows	35	25	16			

Water Content, W



LL _____

PL _____

PI _____

Symbol from plasticity chart

LL MTE No. G2610J
Scale MTE No. B7894

Plastic Limit						Natural Water Content
Run No.	1	2	3	4	5	
Tare No.	706	709				
Weight in grams	Tare + Wet Soil	22.05	22.91			
	Tare + Dry Soil	20.81	21.63			
	Water W _w					
	Tare	15.13	15.16			
	Dry Soil W _d					
Water Content	W					
Plastic Limit						

Remarks

Technician JC

Computed by _____

Checked by BP

Date: _____

Date: _____

Che Date: 2/21

Terracon Consultants, Inc.
11555 Clay Road, Suite 100 Houston, TX 77043 P [713] 690 8989

Liquid Limit, Plastic Limit, and Plasticity Index of Soils

☒ ASTM D 4318 ☐ AASHTO T 89 & T 90 ☐ TEX 104, 105, & 106

Project: Port Arthur Resident Office - USACE

Project No. 92145005

USACE : Contract No. W912HY-13-D-0001-DY08

Boring No: 13-1004 Depth 64-66

Date: 1-22-2014

Material Description: CH

Grey fat clay

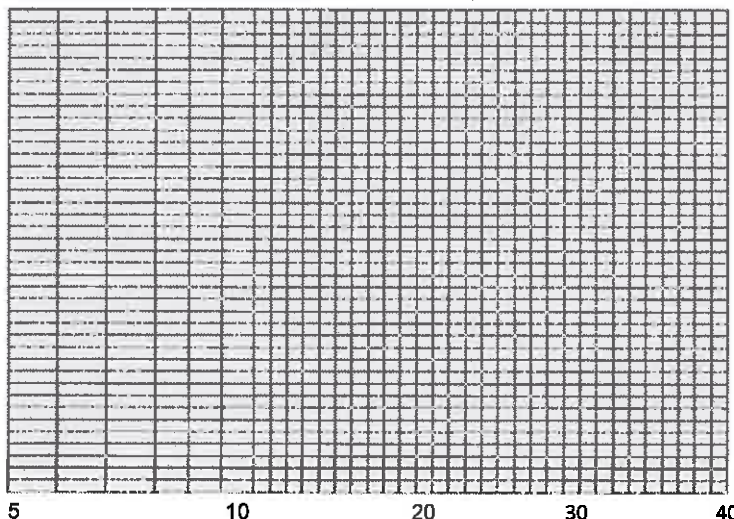
☐ One Point

☒ Three Points

☒ Pass #40 sieve

Liquid Limit						
Run No.	1	2	3	4	5	6
Tare No.	522	907	9001			
Weight in grams	Tare + Wet Soil	31.05	31.73	31.70		
	Tare + Dry Soil	23.30	23.68	23.44		
	Water W_w					
	Tare	15.99	15.18	15.10		
	Dry Soil W_d					
Water Content	W					
No. of Blows	35	26	17			

Water Content, W



LL _____

PL _____

PI _____

Symbol from plasticity chart

LL MTE No. 626105

Scale MTE No. 87894

Plastic Limit						Natural Water Content
Run No.	1	2	3	4	5	
Tare No.	119	103				
Weight in grams	Tare + Wet Soil	37.93	36.23			
	Tare + Dry Soil	35.94	34.62			
	Water W_w					
	Tare	29.13	29.16			
	Dry Soil W_d					
Water Content	W					
Plastic Limit						

Remarks

Technician CH / JC Computed by _____

Checked by TJR

Date: 1-21-14

Date: _____

Che Date: 2/21

Terracon Consultants, Inc.

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Liquid Limit, Plastic Limit, and Plasticity Index of Soils

☒ ASTM D 4318 ☐ AASHTO T 89 & T 90 ☐ TEX 104, 105, & 106

Project: Port Arthur Resident Office - USACE

Project No. 92145005

USACE : Contract No. W912HY-13-D-0001-DY08

Boring No: 13-1004 Depth 70-72

Date: 1-22-2014

Material Description: lt Gray fat clay

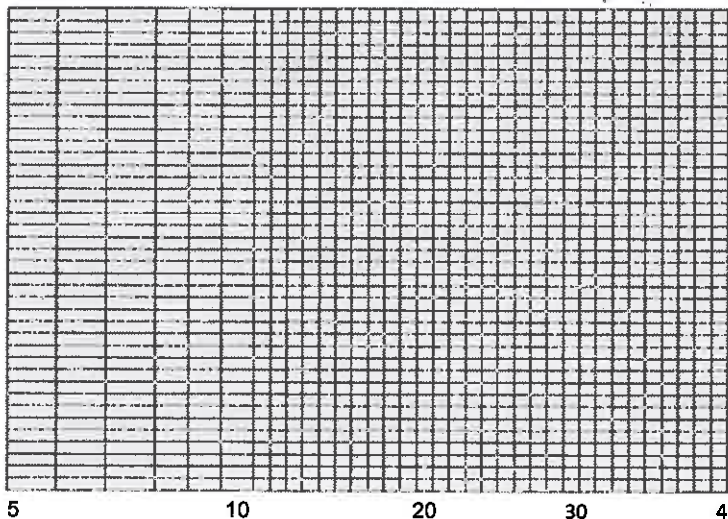
☐ One Point

☒ Three Points

☒ Pass #40 sieve

Liquid Limit						
Run No.	1	2	3	4	5	6
Tare No.	517	2P	29			
Weight in grams	Tare + Wet Soil	31.23	30.38	29.87		
	Tare + Dry Soil	23.60	22.91	22.51		
	Water W_w					
	Tare	15.14	14.92	14.86		
	Dry Soil W_d					
Water Content	W					
No. of Blows	33	26	19			

Water Content, W



LL _____

PL _____

PI _____

Symbol from plasticity chart

LL MTE No. G26105
Scale MTE No. B7894

Plastic Limit						Natural Water Content
Run No.	1	2	3	4	5	
Tare No.	108	123				
Weight in grams	Tare + Wet Soil	37.02	37.29			
	Tare + Dry Soil	35.39	35.59			
	Water W_w					
	Tare	29.43	29.21			
	Dry Soil W_d					
Water Content	W					
Plastic Limit						

Remarks

Technician ch, JC

Computed by _____

Checked by TRP

Date: 1-21-14

Date: _____

Che Date: 2/21

Terracon Consultants, Inc.
11555 Clay Road, Suite 100 Houston, TX 77043 P [713] 690 8989

Liquid Limit, Plastic Limit, and Plasticity Index of Soils

☒ ASTM D 4318 ☐ AASHTO T 89 & T 90 ☐ TEX 104, 105, & 106

Project: Port Arthur Resident Office - USACE

Project No. 92145005

USACE : Contract No. W912HY-13-D-0001-DY08

Boring No: 13-104 **Depth 78-80**

Date: 1/27/14

Material Description:

Grey Fat clay

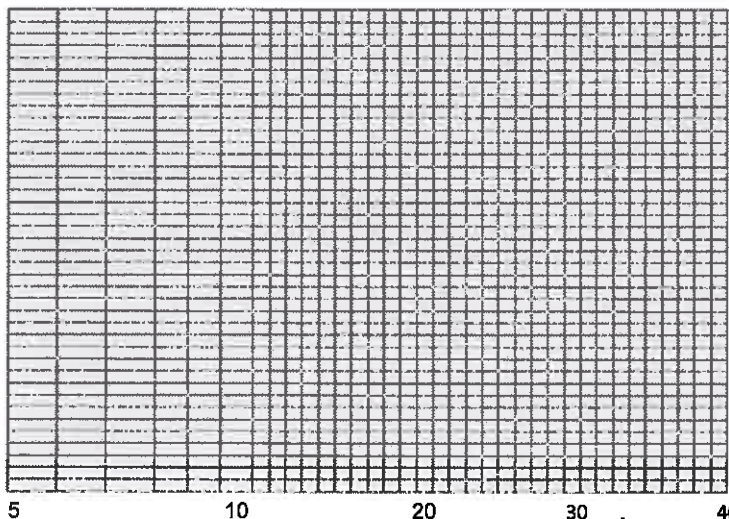
☐ One Point

☒ Three Points

☒ Pass #40 sieve

Liquid Limit						
Run No.	1	2	3	4	5	6
Tare No.	410	414	420			
Weight in grams	Tare + Wet Soil	29.83	30.21	29.57		
	Tare + Dry Soil	23.36	23.43	22.91		
	Water W _w					
	Tare	15.13	15.15	15.16		
	Dry Soil W _d					
Water Content	W					
No. of Blows	33	23	15			

Water Content, W



LL _____

PL _____

PI _____

Symbol from plasticity chart

LL MTE No. *G626105*
 Scale MTE No. *137834*

Plastic Limit						Natural Water Content
Run No.	1	2	3	4	5	
Tare No.	504	510				
Weight in grams	Tare + Wet Soil	22.13	22.21			
	Tare + Dry Soil	20.74	20.78			
	Water W _w					
	Tare	15.22	15.20			
	Dry Soil W _d					
Water Content	W					
Plastic Limit						

Remarks

Technician *JC*

Computed by

Checked by *BP*

Date:

Date:

Che Date: *2/21*

Moisture Content Tests (ASTM D2216)

Terracon

Date: 01 - 16 - 2014

Project No: 92145005

Project Name: Port Arthur Resident Office - USACE

Contract #W912HY-D-0001-DY08

Boring No.	Sample No	Depth (Ft.)	Torvane (tsf)	PPN (tsf)	Description of Material	Tare No.	Wet + Tare (g)	Dry + Tare (g)	Tare Wt. (g)	Water (g)	(%) Moisture
13-B1000		0-2			L.T. lean clay w/silt sand fill w/FE	3H	173. 31	150. 84	58.27		
		2-4			L.T. lean clay w/FE w/silty sand pck w/call	A	189. 50	165. 64	59.60		
		4-6			G. fat clay w/silt sand w/FE	200	181. 00	150. 57	58.54		
ABB PI		6-8			G.I.T. fat clay w/silty sand lenses	N13	147. 73	119. 76	43.73		
		8-10			G.I.T. sandy silty clay fill w/sandy lean seam w/FE	AAA	239. 55	201. 16	62.96		
		18-20			L.T. part clay w/FE	5J	151. 92	133. 69	58.54		
ABB PI		20-22			L.T. fat clay w/FE w/call w/sandy lean seam	N16	180. 37	154. 98	42.41		
		24-26			G.B. silty sand w/call pck	AB	229. 02	190. 96	59.10		
ABB		26-28			G.I.T. silty sand	1A	174. 82	148. 61	40.22		
		28-30			G.I.T. sand silty clay w/call w/FE	HH	211. 32	177. 23	60.77		
		34-36			G.I.T. sandy lean clay w/FE	4B	186. 21	156. 73	61.66		
ABB PI		36-38			G.I.T. fat clay w/lean clay w/silty sand lenses	S14	156. 96	125. 47	41.55		
		38-40			G. fat clay w/some lean clay pck	A	175. 85	145. 49	60.31		
		40-42			G. fat clay	N	160. 24	132. 49	58.40		
		44-46			G. fat clay w/silt w/lean clay pck	FE	156. 28	128. 98	60.61		
		46-48			G. fat clay w/silt	201	154. 51	123. 77	59.86		

Technician: Rodrigo

Scale No.: ☐J350: ☐MTE B93: ☐B8449: ☐

Tested By:

Date: 01 - 2014 Reviewed By:

- 2014

Moisture Content Tests (ASTM D2216)

TerraconDate: 01-16-2014Project No: **92145005**Project Name: **Port Arthur Resident Office - USACE**Contract # **W912HY-D-0001-DY08**

Boring No.	Sample No	Depth (Ft.)	Torvane (tsf)	PPN (tsf)	Description of Material	Tare No.	Wet + Tare (g)	Dry + Tare (g)	Tare Wt. (g)	Water (g)	(%) Moisture
13B609		48-50			G. fat clay w/silt	DD	166. 46	130. 17	64.40		
		52-54			G. fat clay	208	163. 72	131. 85	59.88		
		54-56			G. fat clay	U	155. 10	121. 76	61.58		
		56-58			G. fat clay	G	141. 03	112. 57	58.49		
		58-60			G. fat clay	206	153. 60	128. 21	60.03		
		62-64			G. fat clay w/shell	3I	179. 46	139. 02	59.86		
	PI	64-66			G. fat clay w/shell	B	172. 17	131. 25	58.17		
		66-68			G. fat clay	3F	165. 68	131. 80	59.22		
		68-70			G. fat clay	D	186. 68	148. 03	62.15		
	ABB PI	70-72			G. fat clay w/FE	S10	166. 49	122. 60	40.40		
		72-74			G. fat clay w/grd pck	317	127. 28	90. 03	22.09		
		74-76			G. fat clay w/FE	307	122. 53	91. 20	22.53		
		76-78			G. fat clay w/FE	313	131. 56	93. 85	22.69		

Technician: RodrigoScale No.: ☐J350: ☐MTE B93: ☐B8449: ☐

Tested By:

Date: 01 -

-2014 Reviewed By:

- 2014

✓ 118

Project: Port Arthur Resident Office - USACE
UNCONFINED COMPRESSION TEST (ASTM D2166)

Terracon

Job No. 92145005

Material Description

Boring No.: 13-B1004

LIT Fat Clay w Fe cal
in (1 ft)

Depth (ft) 14-16

Sample Length (inch)

Cohesion (tsf)

Sample Diameter (inch)

Date of Test - -2013

Moist Weight (g)

Contract No. W912HY-13-D-0001-DY06

Caliper No. ☐ W10202 ☐ W10203 ☐ W10204

Strain Dial (0.001 inch)	Load (lbs.)
0	
20	
40	
60	
80	
100	
120	
140	
160	
180	
200	
220	
240	
260	
280	
300	
320	
340	
360	
380	
400	
420	
440	
460	
480	
500	
550	
600	
650	
700	
750	
800	
850	

Unconfined

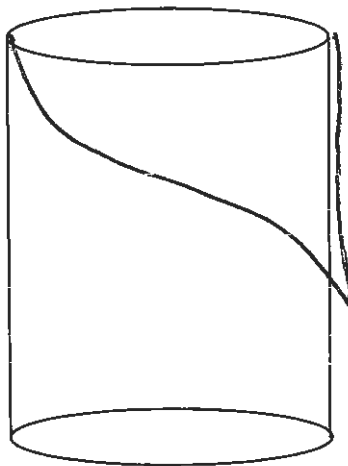
Moisture Content Determination

Tare Number	3F
Wet Soil + Tare (g)	161.96
Dry Soil + Tare (g)	140.47
Tare Weight (g)	59.26

Prepared By: CH Date: 01-24 -2014

Scale No.: ☐ J350 ☐ MTE B93 ☐ B8449

Failed Sample Sketch



Shear

Bulge

Vertical

Split

Tested By: SR 01- -2014

Computed By: - -2014

Machine: ☐ HM 2000 ☐ S 610

Project: Port Arthur Resident Office - USACE
UNCONFINED COMPRESSION TEST (ASTM D2166)

Terracon

Job No. **92145005**

Material Description C Fat Clay (CH)

Boring No.: 13-B1004

Depth (ft) 50-52

Sample Length (inch) 5.760 5.772 5.761 5.767

Cohesion (tsf) _____

Sample Diameter (inch) 2.670 2.665 2.668 2.698

Date of Test - -2013

Moist Weight (g) 923.9

Ave

Contract No. W912HY-13-D-0001-DY06

Caliper No. ☐ W10202 ☐ W10203 ☐ W10204

Strain Dial (0.001 inch)	Load (lbs.)
0	
20	
40	
60	
80	
100	
120	
140	
160	
180	
200	
220	
240	
260	
280	
300	
320	
340	
360	
380	
400	
420	
440	
460	
480	
500	
550	
600	
650	
700	
750	
800	
850	

✓ Unconfined

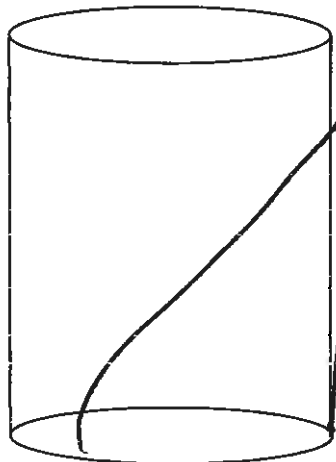
Moisture Content Determination

Tare Number	<u>B'</u>
Wet Soil + Tare (g)	<u>152.49</u>
Dry Soil + Tare (g)	<u>121.01</u>
Tare Weight (g)	<u>58.22</u>

Prepared By: CH Date: 01-24 -2014

Scale No.: ☐ J350 ☐ MTE B93 ☐ B8449

Failed Sample Sketch



Shear 145

Bulge _____

Vertical

Split _____

Tested By: SA 01- -2014

Computed By: _____ -2014

Machine: ☐ HM 2000 ☐ S 610

Project: Port Arthur Resident Office - USACE
UNCONFINED COMPRESSION TEST (ASTM D2166)

Terracon

Job No. 92145005

Material Description

G Fat Clay w/ Shells

Boring No.: 13-B1004

Depth (ft)

60-62

Sample Length (inch)

5.779 5.773 5.776 5.776

Cohesion (tsf)

Sample Diameter (inch)

2.746 2.742 2.746 2.745

Date of Test

- 2013

Moist Weight (g)

1043.1

Ave

Contract No. W912HY-13-D-0001-DY06

Caliper No.

☐ W10202

☐ W10203

☐ W10204

Strain Dial (0.001 inch)	Load (lbs.)
0	
20	
40	
60	
80	
100	
120	
140	
160	
180	
200	
220	
240	
260	
280	
300	
320	
340	
360	
380	
400	
420	
440	
460	
480	
500	
550	
600	
650	
700	
750	
800	
850	

Unconfined

Moisture Content Determination

Tare Number	207
Wet Soil + Tare (g)	210.16
Dry Soil + Tare (g)	172.31
Tare Weight (g)	59.11

Prepared By:

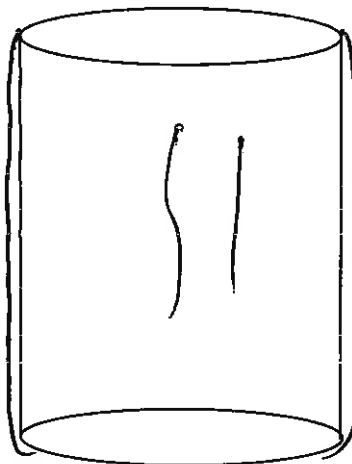
Date: 01-24-2014

Scale No.: ☐ J350

☐ MTE B93

☐ B8449

Failed Sample Sketch



Shear

Bulge

Vertical Split

Tested By:

01- - 2014

Computed By:

- - 2014

Machine: ☐ HM 2000

☐ S 610

Project: Port Arthur Resident Office - USACE
UNCONFINED COMPRESSION TEST (ASTM D2166)

Terracon

Job No. **92145005**

Material Description

G Fat Clay SIS

Boring No.: 13-B1004

Depth (ft)

78-80

Sample Length (inch)

5.767

5.765

5.766

5.766

Cohesion (tsf)

Sample Diameter (inch)

2.8

2.795

2.795

2.797

Date of Test

-2013

Moist Weight (g)

994.6

Ave

Contract No. W912HY-13-D-0001-DY06

Caliper No. ☐ W10202 ☐ W10203 ☐ W10204

Strain Dial (0.001 inch)	Load (lbs.)
0	
20	
40	
60	
80	
100	
120	
140	
160	
180	
200	
220	
240	
260	
280	
300	
320	
340	
360	
380	
400	
420	
440	
460	
480	
500	
550	
600	
650	
700	
750	
800	
850	



Unconfined

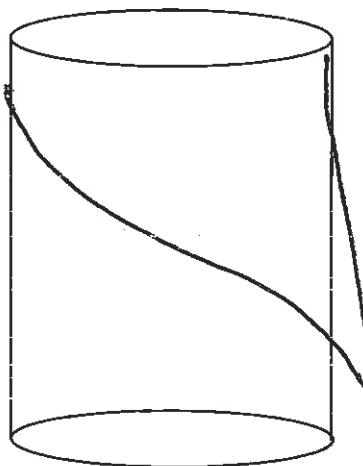
Moisture Content Determination	
Tare Number	<u>3A</u>
Wet Soil + Tare (g)	<u>153.97</u>
Dry Soil + Tare (g)	<u>123.51</u>
Tare Weight (g)	<u>60.59</u>

Prepared By: chw

Date: 01-24 -2014

Scale No.: ☐ J350 ☐ MTE B93 ☐ B8449

Failed Sample Sketch



Shear

45

Bulge

Vertical

Split

Tested By: SL

01- -2014

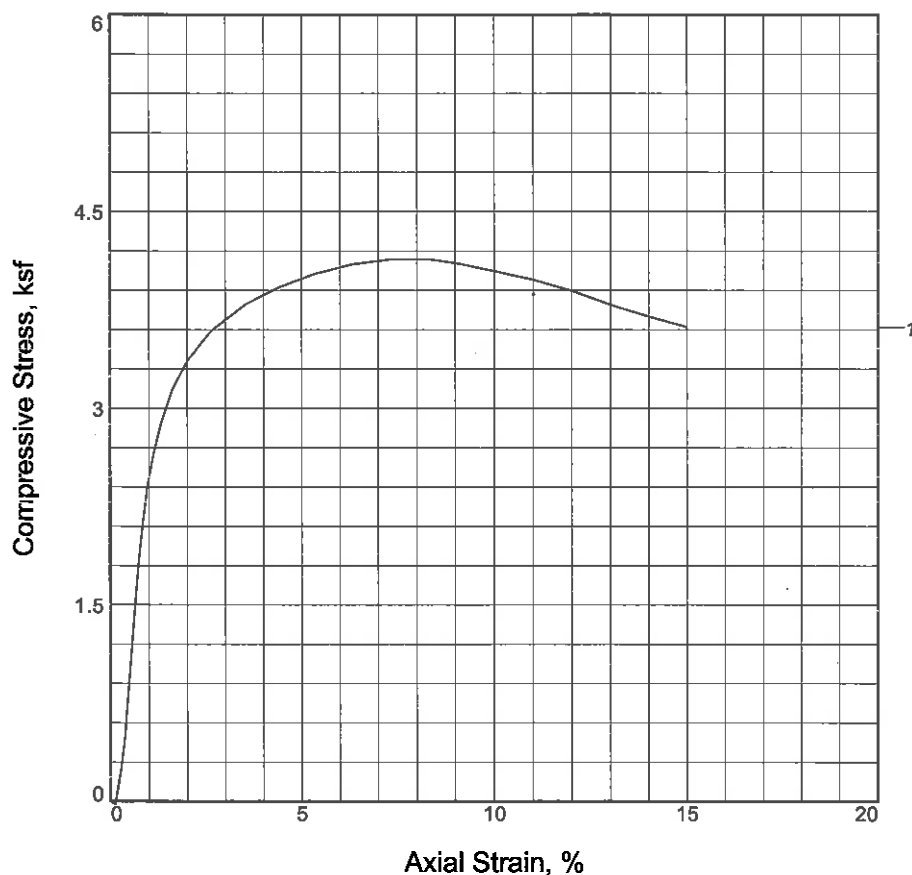
Computed By:

- -2014

Machine: ☐ HM 2000

☐ S 610

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, ksf	4.136			
Undrained shear strength, ksf	2.068			
Failure strain, %	8.3			
Strain rate, in./min.	0.055			
Water content, %	26.5			
Wet density, pcf	126.0			
Dry density, pcf	99.6			
Saturation, %	100.1			
Void ratio	0.7293			
Specimen diameter, in.	2.750			
Specimen height, in.	5.756			
Height/diameter ratio	2.09			

Description: Light gray and tan Clay w/ferrous and calcareous nodules

LL = **PL =** **PI =** **Assumed GS= 2.76** **Type:** Undisturbed

Project No.: 92145005

Date Sampled:

Remarks:

ASTM D2166

Client: Quaternary Resource Investigations, L.L.C.

Project: Port Arthur Resident Office USACE

Location: 13-B1004

Sample Number: 8 **Depth:** 14-16 ft.

UNCONFINED COMPRESSION TEST
Terracon Consultants, Inc.
Houston, TX

UNCONFINED COMPRESSION TEST

2/14/2014

Date:
Client: Quaternary Resource Investigations, L.L.C.
Project: Port Arthur Resident Office USACE
Project No.: 92145005
Location: 13-B1004
Depth: 14-16 ft. **Sample Number:** 8
Description: Light gray and tan Clay w/ferrous and calcareous nodules
Remarks: ASTM D2166
Type of Sample: Undisturbed
Assumed Specific Gravity=2.76 **LL=** **PL=** **PI=**

Parameters for Specimen No. 1

Specimen Parameter	Initial
Moisture content: Moist soil+tare, gms.	161.960
Moisture content: Dry soil+tare, gms.	140.470
Moisture content: Tare, gms.	59.260
Moisture, %	26.5
Moist specimen weight, gms.	1130.80
Diameter, in.	2.750
Area, in. ²	5.940
Height, in.	5.756
Wet density, pcf	126.0
Dry density, pcf	99.6
Void ratio	0.7293
Saturation, %	100.1

Test Readings for Specimen No. 1

Strain rate, in./min. = 0.055

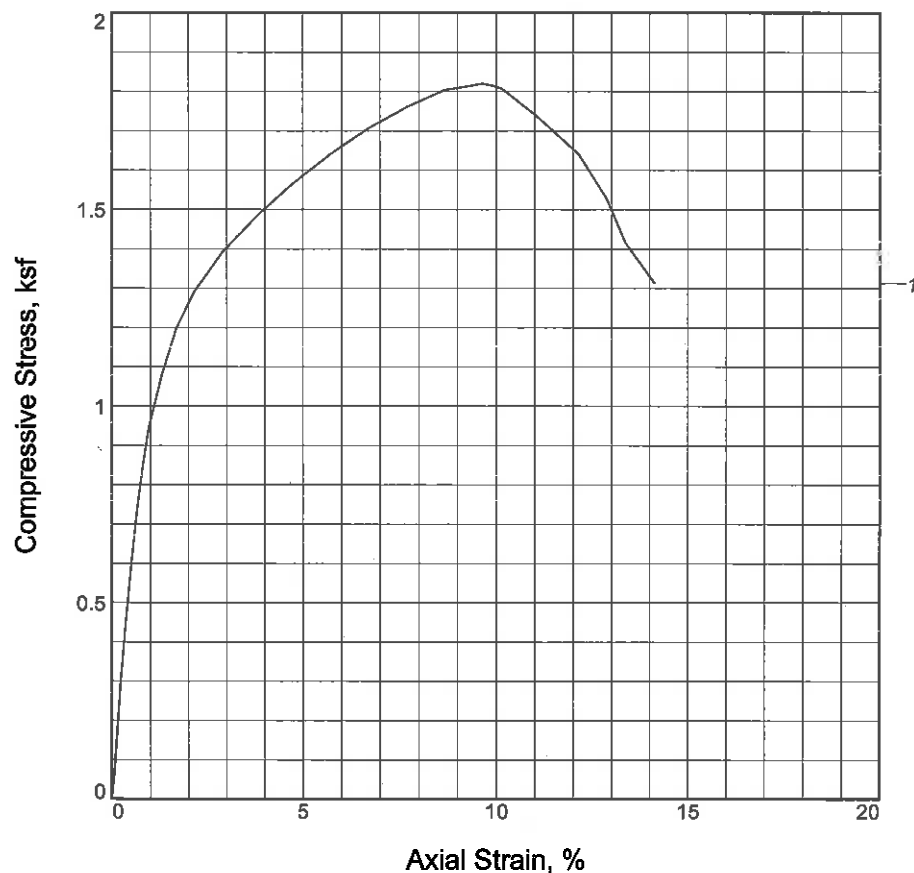
Unconfined compressive strength = 4.136 ksf at reading no. 21

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf
0	0.0000	0.000	0.0	0.0	0.000
1	0.0073	-0.980	-1.0	0.1	-0.024
2	0.0155	9.725	9.7	0.3	0.235
3	0.0215	20.495	20.5	0.4	0.495
4	0.0255	30.700	30.7	0.4	0.741
5	0.0300	42.276	42.3	0.5	1.020
6	0.0340	54.455	54.5	0.6	1.312
7	0.0386	66.297	66.3	0.7	1.597
8	0.0431	77.109	77.1	0.7	1.855
9	0.0486	88.679	88.7	0.8	2.132
10	0.0556	99.839	99.8	1.0	2.397
11	0.0646	110.342	110.3	1.1	2.645
12	0.0761	120.575	120.6	1.3	2.885
13	0.0932	131.728	131.7	1.6	3.142
14	0.1162	141.753	141.8	2.0	3.367
15	0.1502	151.804	151.8	2.6	3.584
16	0.2019	162.075	162.1	3.5	3.792

Test Readings for Specimen No. 1

No.	Def. Dial In.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf
17	0.2535	169.290	169.3	4.4	3.924
18	0.3081	175.464	175.5	5.4	4.026
19	0.3652	180.538	180.5	6.3	4.099
20	0.4224	184.100	184.1	7.3	4.136
21	0.4790	186.085	186.1	8.3	4.136
22	0.4936	186.157	186.2	8.6	4.126
23	0.5221	186.141	186.1	9.1	4.103
24	0.5793	185.393	185.4	10.1	4.042
25	0.6364	184.389	184.4	11.1	3.976
26	0.6935	182.492	182.5	12.0	3.891
27	0.7502	179.511	179.5	13.0	3.785
28	0.8074	177.446	177.4	14.0	3.699
29	0.8635	175.689	175.7	15.0	3.620

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, ksf	1.820			
Undrained shear strength, ksf	0.910			
Failure strain, %	9.7			
Strain rate, in./min.	0.055			
Water content, %	50.1			
Wet density, pcf	106.8			
Dry density, pcf	71.1			
Saturation, %	97.6			
Void ratio	1.4132			
Specimen diameter, in.	2.698			
Specimen height, in.	5.764			
Height/diameter ratio	2.14			

Description: Gray Fat Clay

LL = **PL =** **PI =** **Assumed GS= 2.75** **Type:** Undisturbed

Project No.: 92145005

Date Sampled:

Remarks:

Gray Fat Clay

Client: Quaternary Resource Investigations, L.L.C.

Project: Port Arthur Resident Office USACE

Location: 13-1004

Sample Number: 26 **Depth:** 50-52 ft.

UNCONFINED COMPRESSION TEST
Terracon Consultants, Inc.
Houston, TX

UNCONFINED COMPRESSION TEST

2/14/2014

Date:
Client: Quaternary Resource Investigations, L.L.C.
Project: Port Arthur Resident Office USACE
Project No.: 92145005
Location: 13-1004
Depth: 50-52 ft. **Sample Number:** 26
Description: Gray Fat Clay
Remarks: Gray Fat Clay
Type of Sample: Undisturbed
Assumed Specific Gravity=2.75 **LL=** **PL=** **PI=**

Parameters for Specimen No. 1

Specimen Parameter	Initial
Moisture content: Moist soil+tare, gms.	152.490
Moisture content: Dry soil+tare, gms.	121.010
Moisture content: Tare, gms.	58.220
Moisture, %	50.1
Moist specimen weight, gms.	923.90
Diameter, in.	2.698
Area, in. ²	5.717
Height, in.	5.764
Wet density, pcf	106.8
Dry density, pcf	71.1
Void ratio	1.4132
Saturation, %	97.6

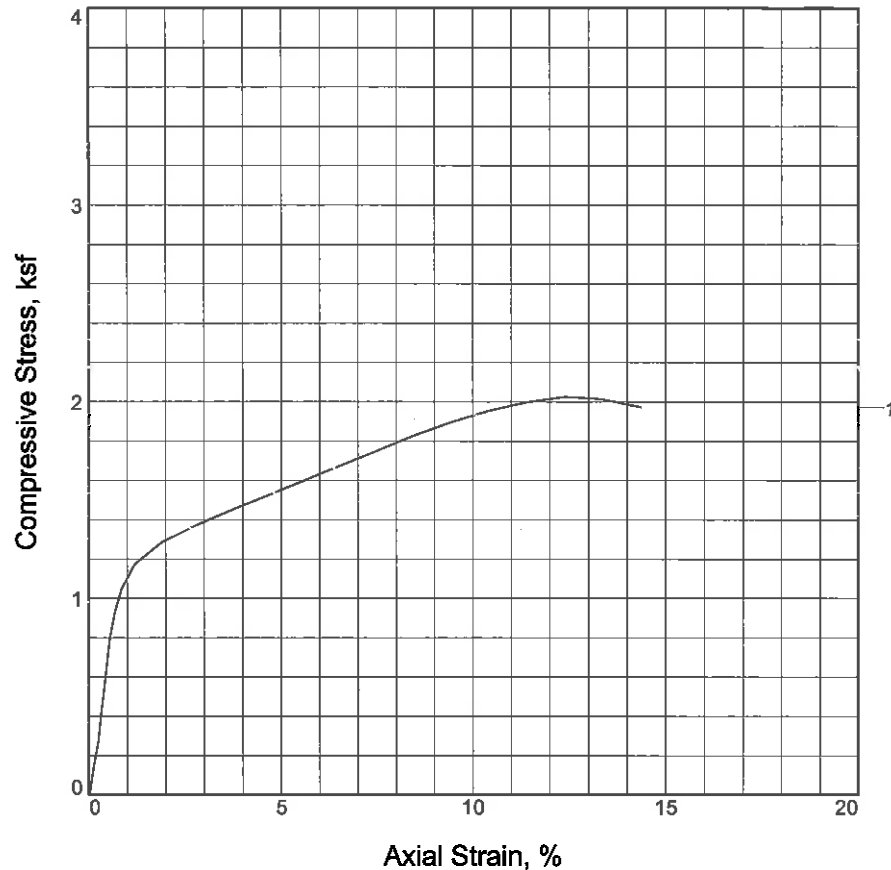
Test Readings for Specimen No. 1**Strain rate, in./min. = 0.055****Unconfined compressive strength = 1.820 ksf at reading no. 21**

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf
0	0.0000	0.000	0.0	0.0	0.000
1	0.0000	0.000	0.0	0.0	0.000
2	0.0040	2.881	2.9	0.1	0.073
3	0.0085	7.627	7.6	0.1	0.192
4	0.0125	11.700	11.7	0.2	0.294
5	0.0185	16.187	16.2	0.3	0.406
6	0.0240	20.312	20.3	0.4	0.509
7	0.0300	24.441	24.4	0.5	0.612
8	0.0370	29.069	29.1	0.6	0.727
9	0.0456	33.693	33.7	0.8	0.842
10	0.0556	37.927	37.9	1.0	0.946
11	0.0746	43.304	43.3	1.3	1.077
12	0.0972	48.369	48.4	1.7	1.198
13	0.1257	52.600	52.6	2.2	1.296
14	0.1657	56.834	56.8	2.9	1.390
15	0.2174	61.145	61.1	3.8	1.482
16	0.2685	64.969	65.0	4.7	1.560

Test Readings for Specimen No. 1

No.	Def. Dial In.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf
17	0.3287	69.054	69.1	5.7	1.640
18	0.3858	72.599	72.6	6.7	1.706
19	0.4429	75.716	75.7	7.7	1.761
20	0.5001	78.415	78.4	8.7	1.804
21	0.5567	79.968	80.0	9.7	1.820
22	0.5712	79.993	80.0	9.9	1.815
23	0.5852	79.845	79.8	10.2	1.807
24	0.6404	77.422	77.4	11.1	1.733
25	0.6995	74.142	74.1	12.1	1.641
26	0.7421	69.599	69.6	12.9	1.527
27	0.7707	64.818	64.8	13.4	1.414
28	0.8138	60.710	60.7	14.1	1.313

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, ksf	2.025			
Undrained shear strength, ksf	1.013			
Failure strain, %	12.4			
Strain rate, in./min.	0.055			
Water content, %	33.4			
Wet density, pcf	116.3			
Dry density, pcf	87.1			
Saturation, %	94.7			
Void ratio	0.9705			
Specimen diameter, in.	2.745			
Specimen height, in.	5.776			
Height/diameter ratio	2.10			

Description: Gray Fat Clay w/shell

LL = **PL =** **PI =** **Assumed GS= 2.75** **Type: Undisturbed**

Project No.: 92145005

Date Sampled:

Remarks:

ASTM D2166

Client: Quaternary Resource Investigations, L.L.C.

Project: Port Arthur Resident Office USACE

Location: 13-B1004

Sample Number: 31 **Depth:** 60-62 ft.

UNCONFINED COMPRESSION TEST
Terracon Consultants, Inc.
Houston, TX

UNCONFINED COMPRESSION TEST

2/14/2014

Date:
Client: Quaternary Resource Investigations, L.L.C.
Project: Port Arthur Resident Office USACE
Project No.: 92145005
Location: 13-B1004
Depth: 60-62 ft. **Sample Number:** 31
Description: Gray Fat Clay w/shell
Remarks: ASTM D2166
Type of Sample: Undisturbed
Assumed Specific Gravity=2.75 **LL=** **PL=** **PI=**

Parameters for Specimen No. 1

Specimen Parameter	Initial
Moisture content: Moist soil+tare, gms.	210.160
Moisture content: Dry soil+tare, gms.	172.310
Moisture content: Tare, gms.	59.110
Moisture, %	33.4
Moist specimen weight, gms.	1043.10
Diameter, in.	2.745
Area, in. ²	5.918
Height, in.	5.776
Wet density, pcf	116.3
Dry density, pcf	87.1
Void ratio	0.9705
Saturation, %	94.7

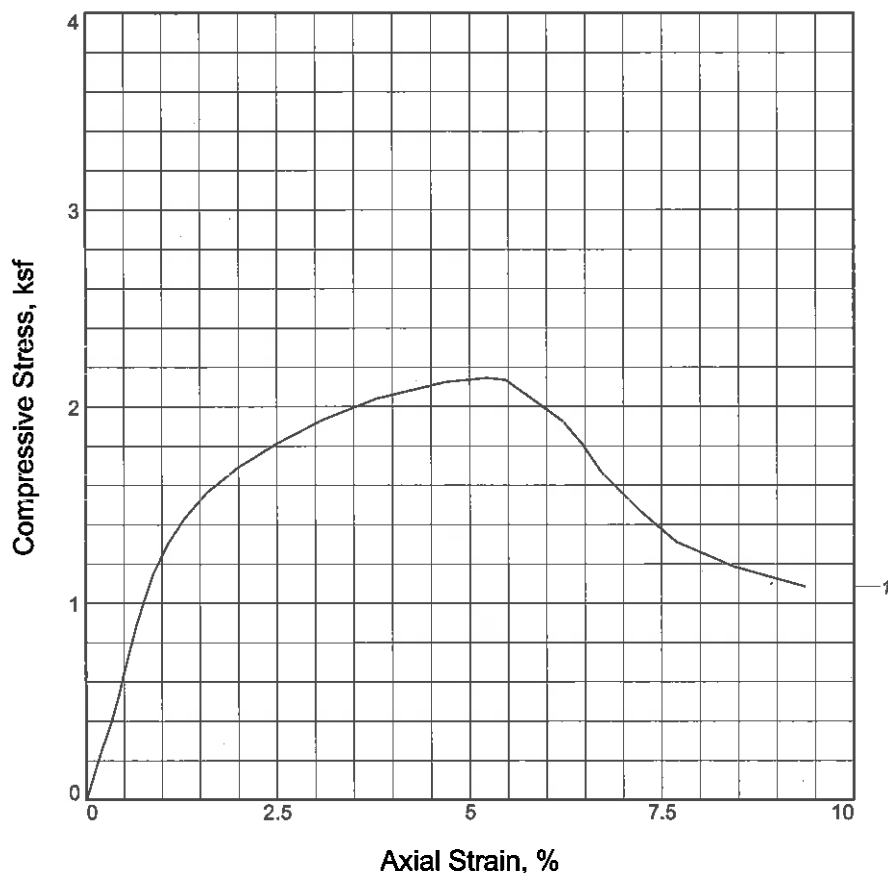
Test Readings for Specimen No. 1**Strain rate, in./min. = 0.055****Unconfined compressive strength = 2.025 ksf at reading no. 22**

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf
0	0.0000	-0.105	0.0	0.0	0.000
1	0.0014	0.355	0.5	0.0	0.011
2	0.0069	5.441	5.5	0.1	0.135
3	0.0144	11.343	11.4	0.2	0.278
4	0.0184	16.765	16.9	0.3	0.409
5	0.0229	21.773	21.9	0.4	0.530
6	0.0274	27.777	27.9	0.5	0.675
7	0.0314	32.686	32.8	0.5	0.794
8	0.0390	38.363	38.5	0.7	0.930
9	0.0490	43.287	43.4	0.8	1.047
10	0.0691	48.660	48.8	1.2	1.172
11	0.1091	53.711	53.8	1.9	1.285
12	0.1607	57.843	57.9	2.8	1.371
13	0.2123	61.590	61.7	3.7	1.446
14	0.2640	65.275	65.4	4.6	1.518
15	0.3156	68.995	69.1	5.5	1.589
16	0.3722	73.140	73.2	6.4	1.667

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf
17	0.4298	77.443	77.5	7.4	1.747
18	0.4865	81.723	81.8	8.4	1.823
19	0.5436	85.856	86.0	9.4	1.895
20	0.6008	89.435	89.5	10.4	1.952
21	0.6579	92.539	92.6	11.4	1.998
22	0.7150	94.877	95.0	12.4	2.025
23	0.7580	95.321	95.4	13.1	2.017
24	0.7721	95.305	95.4	13.4	2.011
25	0.8292	94.582	94.7	14.4	1.973

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, ksf	2.146			
Undrained shear strength, ksf	1.073			
Failure strain, %	5.2			
Strain rate, in./min.	0.055			
Water content, %	48.4			
Wet density, pcf	106.9			
Dry density, pcf	72.1			
Saturation, %	96.3			
Void ratio	1.3823			
Specimen diameter, in.	2.797			
Specimen height, in.	5.766			
Height/diameter ratio	2.06			

Description: Gray fat Clay

LL = PL = PI = Assumed GS= 2.75 Type: Undisturbed

Project No.: 92145005

Date Sampled:

Remarks:
ASTM D2166

Client: Quaternary Resource Investigations, L.L.C.

Project: Port Arthur Resident Office USACE

Location: 13-B1004

Sample Number: 40 **Depth:** 78-80 ft.

UNCONFINED COMPRESSION TEST
Terracon Consultants, Inc.
Houston, TX

UNCONFINED COMPRESSION TEST

2/14/2014

Date:
Client: Quaternary Resource Investigations, L.L.C.
Project: Port Arthur Resident Office USACE
Project No.: 92145005
Location: 13-B1004
Depth: 78-80 ft. **Sample Number:** 40
Description: Gray fat Clay
Remarks: ASTM D2166
Type of Sample: Undisturbed
Assumed Specific Gravity=2.75 **LL=** **PL=** **PI=**

Parameters for Specimen No. 1

Specimen Parameter	Initial
Moisture content: Moist soil+tare, gms.	153.970
Moisture content: Dry soil+tare, gms.	123.510
Moisture content: Tare, gms.	60.590
Moisture, %	48.4
Moist specimen weight, gms.	994.60
Diameter, in.	2.797
Area, in.²	6.144
Height, in.	5.766
Wet density, pcf	106.9
Dry density, pcf	72.1
Void ratio	1.3823
Saturation, %	96.3

Test Readings for Specimen No. 1**Strain rate, in./min. = 0.055****Unconfined compressive strength = 2.146 ksf at reading no. 19**

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf
0	0.0000	0.000	0.0	0.0	0.000
1	0.0010	0.530	0.5	0.0	0.012
2	0.0070	6.251	6.3	0.1	0.146
3	0.0126	11.216	11.2	0.2	0.262
4	0.0186	16.135	16.1	0.3	0.377
5	0.0246	22.279	22.3	0.4	0.520
6	0.0286	27.268	27.3	0.5	0.636
7	0.0331	32.138	32.1	0.6	0.749
8	0.0386	38.434	38.4	0.7	0.895
9	0.0446	43.881	43.9	0.8	1.020
10	0.0516	49.727	49.7	0.9	1.155
11	0.0632	56.658	56.7	1.1	1.313
12	0.0747	61.900	61.9	1.3	1.432
13	0.0917	67.746	67.7	1.6	1.562
14	0.1148	73.558	73.6	2.0	1.690
15	0.1435	79.251	79.3	2.5	1.811
16	0.1776	84.989	85.0	3.1	1.930

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf
17	0.2183	90.412	90.4	3.8	2.039
18	0.2699	95.075	95.1	4.7	2.124
19	0.3010	96.607	96.6	5.2	2.146
20	0.3155	96.370	96.4	5.5	2.135
21	0.3581	87.676	87.7	6.2	1.927
22	0.3727	82.504	82.5	6.5	1.809
23	0.3867	76.368	76.4	6.7	1.670
24	0.4153	67.829	67.8	7.2	1.475
25	0.4438	60.558	60.6	7.7	1.310
26	0.4865	55.293	55.3	8.4	1.187
27	0.5397	51.054	51.1	9.4	1.085

Project Name: Port Arthur Resident Office - USACE

Project No.: 92145005

Boring No.	13-B1003	13-B1003	13-B1004	13-B1004	13-B1004	13-B1004
Depth (ft)	74-76	82-84	12-14	16-18	22-24	32-34
Diameter (mm)	1. 69.5 2. 69.4 3. 69.6 69.5	69.1 69.2 69.1 69.0 69.1	69.2 69.1 69.2 69.3 69.2	63.8 63.9 63.8 63.7 63.8	69.6 69.5 69.6 69.7 69.6	69.6 69.7 69.6 69.7 69.6
Height (mm)	1. 140.2 2. 140.1 3. 140.3 140.2	139.9 140.0 140.0 140.0 140.0	139.8 139.9 139.8 139.7 139.8	140.0 140.1 140.0 140.0 140.0	139.5 139.6 139.5 139.5 139.5	139.6 139.5 139.5 139.7 139.5
Sample Wt.(g)	928.50	890.23	1127.64	856.52	1096.27	1034.50
Tare No.	206	201	3C	PMS	3G	E
Wet Wt. + Tare (g)	150.77	168.82	158.40	188.87	179.53	189.13
Dry Wt. + Tare (g)	120.42	132.99	139.81	162.44	160.13	156.10
Tare Wt. (g)	60.06	59.91	59.68	60.69	60.95	61.89
Dry Soil Wt. (g)						
% Moisture						
Dry Unit Wt. (pcf)						
Discription	G Fat clay	G Fat + clay	LIT lean clay w/ cal w/ FE	LIT Fat clay w/ FE w/ cal	G Sandy lean w/ clay w/ cal w/ FE w/ cal	G Fat + clay w/ s. (Hence)

Tested By: Rodrigo Date: 9/15Reviewed By: [Signature] Date: 1/27

Contract No. W912Hy-13-D-0001 DY08

Project: Port Arthur Resident Office - USACE
Unconsolidated Undrained TEST (ASTM D2850)

Terracon

Job No. 92145005

Material Description

Boring No.: 13-B-1014

Depth (ft) 10-12

Sample Length (inch)

Cohesion (tsf)

Sample Diameter (inch)

Date of Test - 2013

Moist Weight (g)

Contract No. W912HY-13-D-0001-DY08

Caliper No.

☐ W10202

☐ W10203

☐ W10204

Strain Dial (0.001 inch)	Load (lbs.)
0	
20	
40	
60	
80	
100	
120	
140	
160	
180	
200	
220	
240	
260	
280	
300	
320	
340	
360	
380	
400	
420	
440	
460	
480	
500	
550	
600	
650	
700	
750	
800	
850	

Confined

Pressure (psi)

9.1

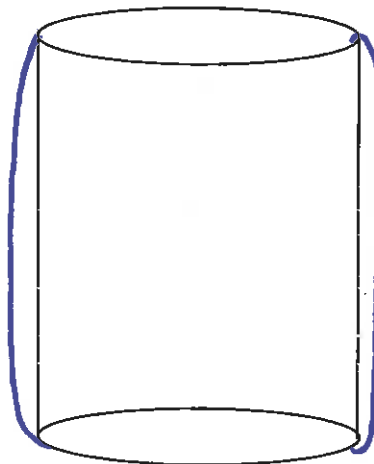
Moisture Content Determination

Tare Number	NC-8
Wet Soil + Tare (g)	115.25
Dry Soil + Tare (g)	95.45
Tare Weight (g)	31.03

Prepared By: SA Date: 01-14 -2014

Scale No.: ☐ J350 ☐ MTE B93 ☐ B8449

Failed Sample Sketch



Shear

Bulge

Vertical

Split

Tested By: SA - 2014

Computed By: - 2014

Machine: ☐ HM 2000 ☐ S 610

PT
AB

Project: Port Arthur Resident Office - USACE
Unconsolidated Undrained TEST (ASTM D2850)

Terracon

Job No. 92145005

Material Description Arti, Lem clays

Boring No.: 13-B-1004

Depth (ft) 30-32

Sample Length (inch) 5.86 5.86 5.86 5.86

Cohesion (tsf)

Sample Diameter (inch) 2.75 2.76 2.75 2.75

Date of Test - -2013

Moist Weight (g) 1100.83 Ave

Contract No. W912HY-13-D-0001-DY08

Caliper No. ☐ W10202 ☐ W10203 ☐ W10204

Strain Dial (0.001 inch)	Load (lbs.)
0	
20	
40	
60	
80	
100	
120	
140	
160	
180	
200	
220	
240	
260	
280	
300	
320	
340	
360	
380	
400	
420	
440	
460	
480	
500	
550	
600	
650	
700	
750	
800	
850	

Confined

Pressure (psi) 16.4

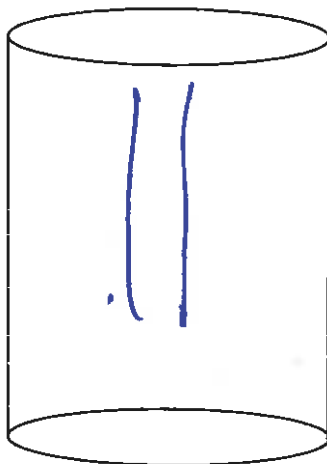
Moisture Content Determination

Tare Number	<u>E18</u>
Wet Soil + Tare (g)	<u>147.80</u>
Dry Soil + Tare (g)	
Tare Weight (g)	<u>49.18</u>

Prepared By: SA Date: 01-14 -2014

Scale No.: ☐ J350 ☐ MTE B93 ☐ B8449

Failed Sample Sketch



Shear _____

Bulge _____

Vertical Split /

Tested By: SA - 2014

Computed By: _____ - 2014

Machine: ☐ HM 2000 ☐ S 610

PI
AB

Project: Port Arthur Resident Office - USACE
Unconsolidated Undrained TEST (ASTM D2850)

Terracon

Job No. **92145005**

Material Description

Gr, Fct cl

Boring No.: **13-B-1004**

Depth (ft)

42-44

Sample Length (inch)

5.86 5.86 5.86 5.86

Cohesion (tsf)

Sample Diameter (inch)

2.71 2.73 2.77 2.737

Date of Test

- 2013

Moist Weight (g)

1080.25

Ave

Contract No. W912HY-13-D-0001-DY08

Caliper No. ☐ W10202 ☐ W10203 ☐ W10204

Strain Dial (0.001 inch)	Load (lbs.)
0	
20	
40	
60	
80	
100	
120	
140	
160	
180	
200	
220	
240	
260	
280	
300	
320	
340	
360	
380	
400	
420	
440	
460	
480	
500	
550	
600	
650	
700	
750	
800	
850	

Confined

Pressure (psi)

20.8

Moisture Content Determination

Tare Number

C24

Wet Soil + Tare (g)

130.28

Dry Soil + Tare (g)

108.50

Tare Weight (g)

50.52

Prepared By:

SA

Date: 01-

7/14

-2014

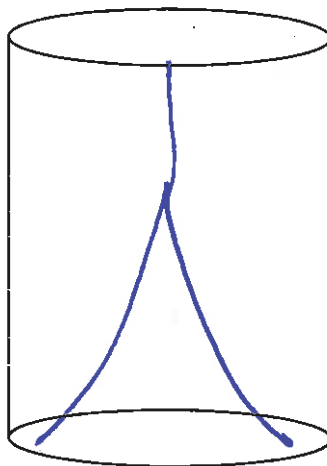
Scale No.:

☐ J350

☐ MTE B93

☐ B8449

Failed Sample Sketch



Shear

145

Bulge

Vertical

Split

/

Tested By:

SA

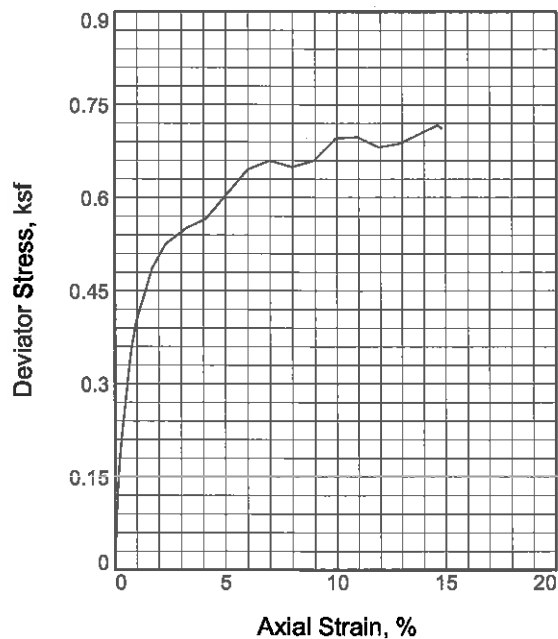
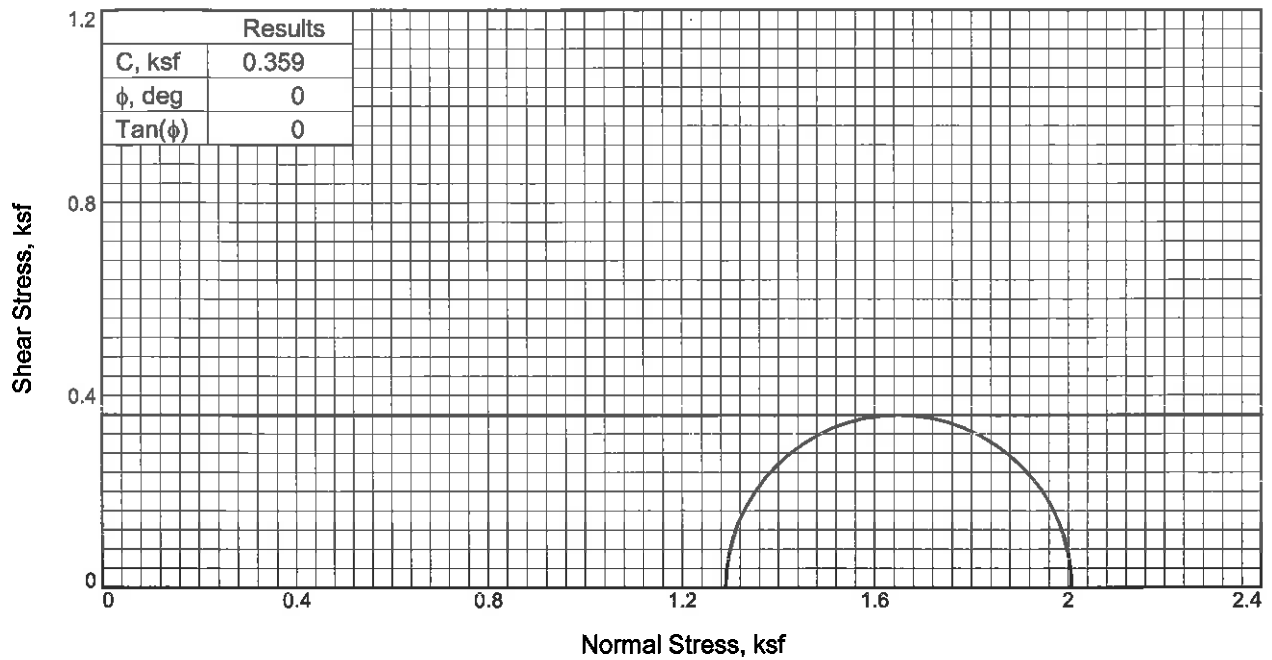
- 2014

Computed By:

- 2014

Machine: ☐ HM 2000

☐ S 610



Sample No.		1
Initial	Water Content, %	30.7
	Dry Density, pcf	91.5
	Saturation, %	96.5
	Void Ratio	0.8757
	Diameter, in.	2.693
	Height, in.	5.880
At Test	Water Content, %	30.7
	Dry Density, pcf	91.5
	Saturation, %	96.5
	Void Ratio	0.8757
	Diameter, in.	2.693
	Height, in.	5.880
Strain rate, in./min.		0.055
Back Pressure, psi		0.000
Cell Pressure, psi		8.960
Fail. Stress, ksf		0.717
Ult. Stress, ksf		
σ_1 Failure, ksf		2.007
σ_3 Failure, ksf		1.290

Type of Test:

Unconsolidated Undrained

Sample Type: Undisturbed

Description: Gray and tan Fat Clay w/sand pockets

Assumed Specific Gravity= 2.75

Remarks: ASTM D2850

Client: Quaternary Resource Investigations, L.L.C.

Project: Port Arthur Residence Office - USACE

Location: 13-B1004

Sample Number: 6 **Depth:** 10-12 ft.

Proj. No.: 92145005

Date Sampled:

TRIAXIAL SHEAR TEST REPORT
Terracon Consultants, Inc.
Houston, TX

TRIAxIAL COMPRESSION TEST

Unconsolidated Undrained

2/14/2014

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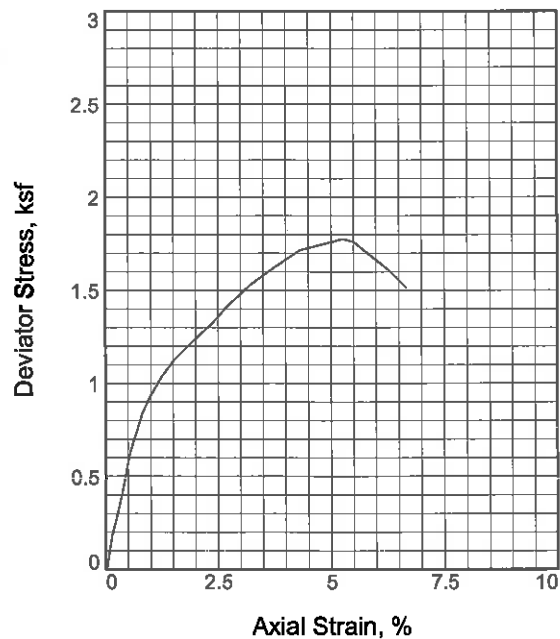
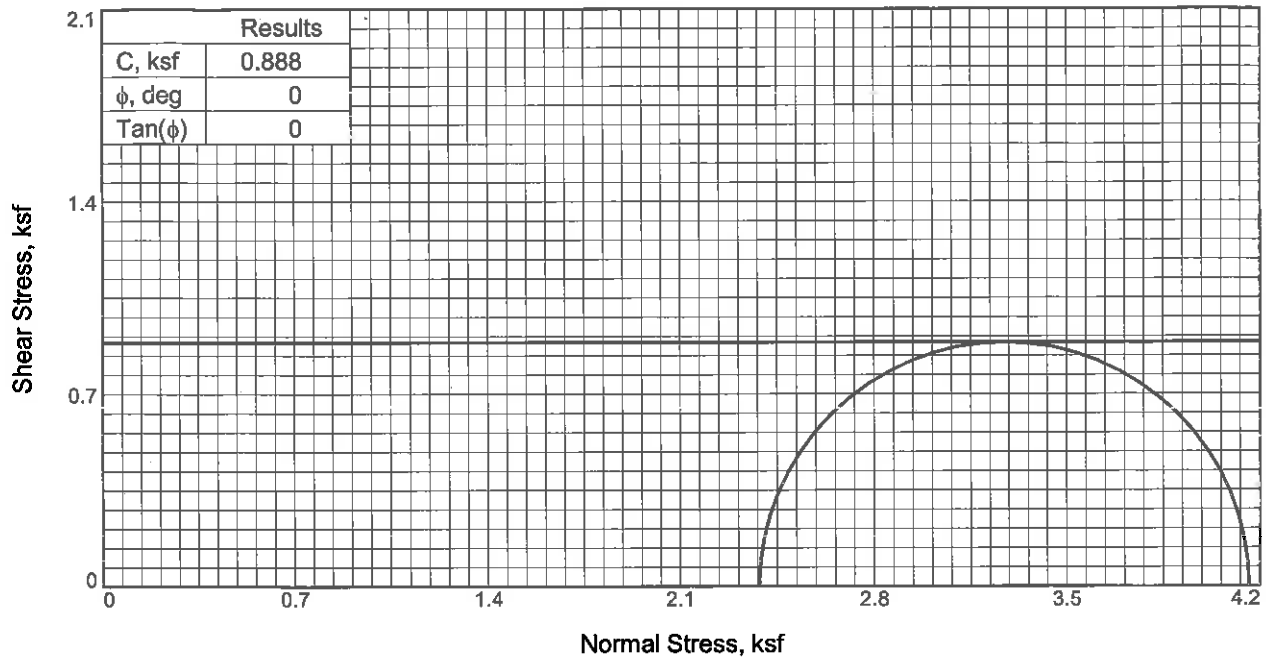
Date:**Client:** Quaternary Resource Investigations, L.L.C.**Project:** Port Arthur Residence Office - USACE**Project No.:** 92145005**Location:** 13-B1004**Depth:** 10-12 ft.**Sample Number:** 6**Description:** Gray and tan Fat Clay w/sand pockets**Remarks:** ASTM D2850**Type of Sample:** Undisturbed**Assumed Specific Gravity=**2.75**LL=****PL=****Pi=****Test Method:** ASTM D 2850**Parameters for Specimen No. 1**

Specimen Parameter	Initial	Final
Moisture content: Moist soil+tare, gms.	115.250	115.250
Moisture content: Dry soil+tare, gms.	95.450	95.450
Moisture content: Tare, gms.	31.030	31.030
Moisture, %	30.7	30.7
Moist specimen weight, gms.	1051.98	
Diameter, in.	2.693	
Area, in.²	5.696	
Height, in.	5.880	
Wet density, pcf	119.7	
Dry density, pcf	91.5	
Void ratio	0.8757	
Saturation, %	96.5	

Test Readings for Specimen No. 1**Cell pressure** = 8.960 psi (1.290 ksf)**Back pressure** = 0.000 psi (0.000 ksf)**Strain rate, in./min.** = 0.055**Fail. Stress** = 0.717 ksf at reading no. 26

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Princ. Stress ksf	Major Princ. Stress ksf	1:3 Ratio	P ksf	Q ksf
0	0.0000	0.000	0.0	0.0	0.000	1.290	1.290	1.00	1.290	0.000
1	0.0000	0.000	0.0	0.0	0.000	1.290	1.290	1.00	1.290	0.000
2	0.0014	1.065	1.1	0.0	0.027	1.290	1.317	1.02	1.304	0.013
3	0.0045	3.181	3.2	0.1	0.080	1.290	1.371	1.06	1.330	0.040
4	0.0088	5.409	5.4	0.2	0.137	1.290	1.427	1.11	1.359	0.068
5	0.0132	7.090	7.1	0.2	0.179	1.290	1.469	1.14	1.380	0.089
6	0.0195	8.870	8.9	0.3	0.223	1.290	1.514	1.17	1.402	0.112
7	0.0272	10.558	10.6	0.5	0.266	1.290	1.556	1.21	1.423	0.133
8	0.0360	12.484	12.5	0.6	0.314	1.290	1.604	1.24	1.447	0.157
9	0.0449	14.224	14.2	0.8	0.357	1.290	1.647	1.28	1.469	0.178
10	0.0568	15.909	15.9	1.0	0.398	1.290	1.689	1.31	1.489	0.199
11	0.0774	17.660	17.7	1.3	0.441	1.290	1.731	1.34	1.511	0.220
12	0.1004	19.592	19.6	1.7	0.487	1.290	1.777	1.38	1.534	0.243
13	0.1356	21.276	21.3	2.3	0.525	1.290	1.816	1.41	1.553	0.263
14	0.1885	22.480	22.5	3.2	0.550	1.290	1.840	1.43	1.565	0.275
15	0.2415	23.345	23.3	4.1	0.566	1.290	1.856	1.44	1.573	0.283
16	0.2940	25.143	25.1	5.0	0.604	1.290	1.894	1.47	1.592	0.302
17	0.3520	27.153	27.2	6.0	0.645	1.290	1.936	1.50	1.613	0.323
18	0.4104	28.060	28.1	7.0	0.660	1.290	1.950	1.51	1.620	0.330
19	0.4690	27.920	27.9	8.0	0.650	1.290	1.940	1.50	1.615	0.325
20	0.5270	28.696	28.7	9.0	0.660	1.290	1.951	1.51	1.620	0.330
21	0.5849	30.569	30.6	9.9	0.696	1.290	1.986	1.54	1.638	0.348
22	0.6435	31.007	31.0	10.9	0.698	1.290	1.988	1.54	1.639	0.349
23	0.7013	30.602	30.6	11.9	0.681	1.290	1.972	1.53	1.631	0.341
24	0.7599	31.223	31.2	12.9	0.687	1.290	1.978	1.53	1.634	0.344
25	0.8178	32.368	32.4	13.9	0.705	1.290	1.995	1.55	1.642	0.352
26	0.8613	33.232	33.2	14.6	0.717	1.290	2.007	1.56	1.649	0.359
27	0.8701	33.026	33.0	14.8	0.711	1.290	2.002	1.55	1.646	0.356



Sample No. 1	
Initial	Water Content, %
	29.5
	Dry Density, pcf
	93.0
	Saturation, %
	96.1
At Test	Void Ratio
	0.8458
	Diameter, in.
	2.750
	Height, in.
	5.860
Strain rate, in./min.	
0.055	
Back Pressure, psi	
0.000	
Cell Pressure, psi	
16.570	
Fail. Stress, ksf	
1.776	
Ult. Stress, ksf	
σ_1 Failure, ksf	
4.162	
σ_3 Failure, ksf	
2.386	

Type of Test:

Unconsolidated Undrained

Sample Type: Undisturbed

Description: Gray and tan Lean Clay w/sand pockets

Assumed Specific Gravity= 2.75

Remarks: ASTM D2850

Client: Quaternary Resource Investigations, L.L.C.

Project: Port Arthur Residence Office - USACE

Location: 13-B1004

Sample Number: 16

Depth: 30-32 ft.

Proj. No.: 92145005

Date Sampled:

TRIAXIAL SHEAR TEST REPORT
Terracon Consultants, Inc.
Houston, TX

TRIAXIAL COMPRESSION TEST
Unconsolidated Undrained

2/14/2014
5:29 PM

Date:
Client: Quaternary Resource Investigations, L.L.C.
Project: Port Arthur Residence Office - USACE
Project No.: 92145005
Location: 13-B1004
Depth: 30-32 ft. **Sample Number:** 16
Description: Gray and tan Lean Clay w/sand pockets
Remarks: ASTM D2850
Type of Sample: Undisturbed
Assumed Specific Gravity=2.75 **LL=** **PL=** **PI=**
Test Method: ASTM D 2850

Parameters for Specimen No. 1

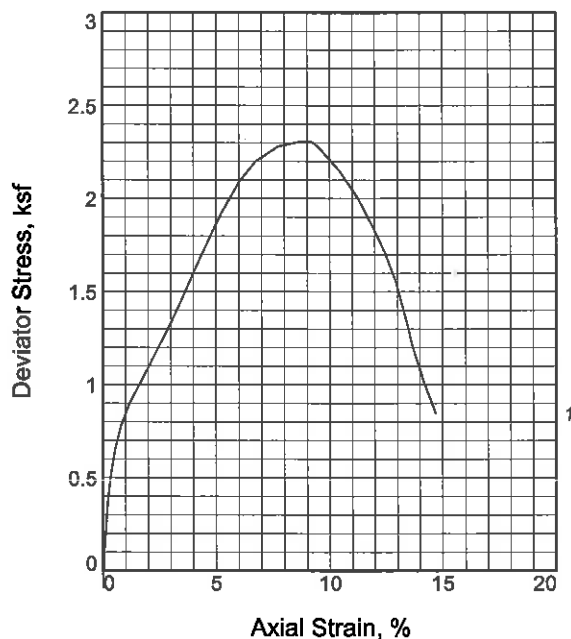
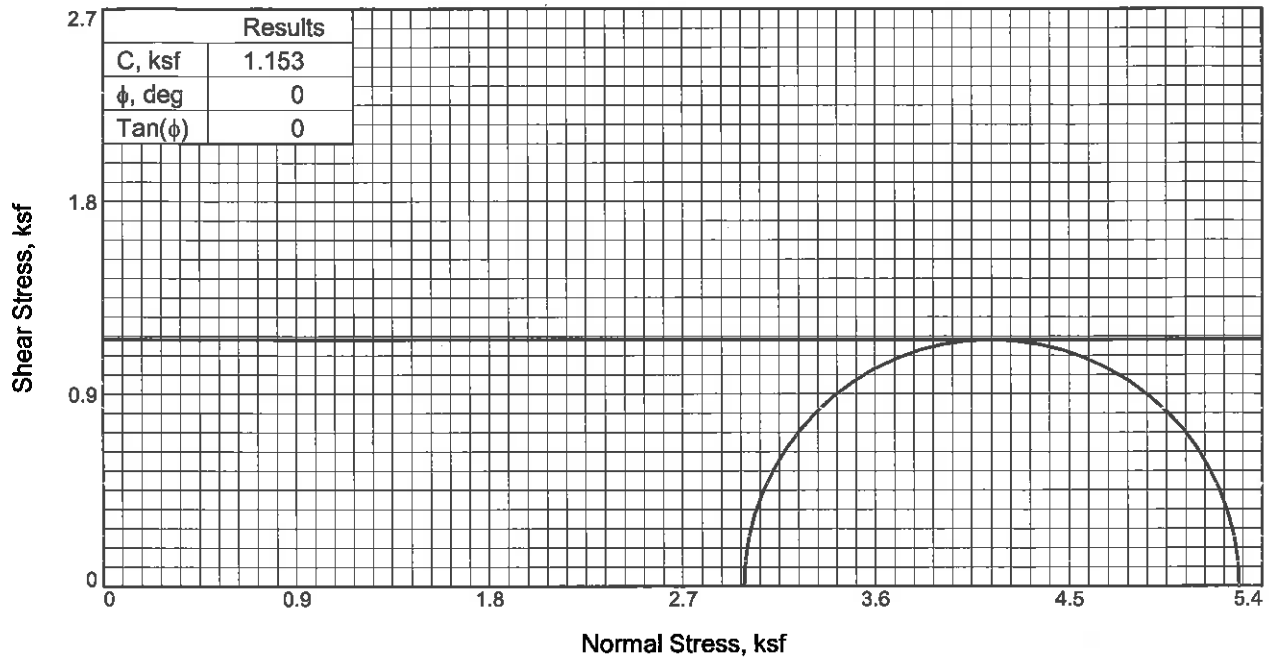
Specimen Parameter	Initial	Final
Moisture content: Moist soil+tare, gms.	147.800	147.800
Moisture content: Dry soil+tare, gms.	125.310	125.310
Moisture content: Tare, gms.	49.180	49.180
Moisture, %	29.5	29.5
Moist specimen weight, gms.	1100.83	
Diameter, in.	2.750	
Area, in. ²	5.940	
Height, in.	5.860	
Wet density, pcf	120.5	
Dry density, pcf	93.0	
Void ratio	0.8458	
Saturation, %	96.1	

Test Readings for Specimen No. 1

Cell pressure = 16.570 psi (2.386 ksf)
Back pressure = 0.000 psi (0.000 ksf)
Strain rate, in./min. = 0.055
Fail. Stress = 1.776 ksf at reading no. 19

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Princ. Stress ksf	Major Princ. Stress ksf	1:3 Ratio	P ksf	Q ksf
0	0.0000	0.000	0.0	0.0	0.000	2.386	2.386	1.00	2.386	0.000
1	0.0015	0.000	0.0	0.0	0.000	2.386	2.386	1.00	2.386	0.000
2	0.0040	2.723	2.7	0.1	0.066	2.386	2.452	1.03	2.419	0.033
3	0.0084	7.347	7.3	0.1	0.178	2.386	2.564	1.07	2.475	0.089
4	0.0149	11.827	11.8	0.3	0.286	2.386	2.672	1.12	2.529	0.143
5	0.0210	16.485	16.5	0.4	0.398	2.386	2.784	1.17	2.585	0.199
6	0.0272	21.758	21.8	0.5	0.525	2.386	2.911	1.22	2.649	0.263
7	0.0316	25.838	25.8	0.5	0.623	2.386	3.009	1.26	2.698	0.312
8	0.0391	29.838	29.8	0.7	0.719	2.386	3.105	1.30	2.745	0.359
9	0.0480	34.838	34.8	0.8	0.838	2.386	3.224	1.35	2.805	0.419
10	0.0586	38.982	39.0	1.0	0.936	2.386	3.322	1.39	2.854	0.468
11	0.0723	43.149	43.1	1.2	1.033	2.386	3.419	1.43	2.903	0.517
12	0.0898	47.326	47.3	1.5	1.130	2.386	3.516	1.47	2.951	0.565
13	0.1129	51.483	51.5	1.9	1.224	2.386	3.610	1.51	2.998	0.612
14	0.1366	55.450	55.5	2.3	1.313	2.386	3.699	1.55	3.043	0.657
15	0.1596	60.078	60.1	2.7	1.417	2.386	3.803	1.59	3.095	0.708
16	0.1890	65.217	65.2	3.2	1.530	2.386	3.916	1.64	3.151	0.765
17	0.2181	69.237	69.2	3.7	1.616	2.386	4.002	1.68	3.194	0.808
18	0.2531	73.943	73.9	4.3	1.715	2.386	4.101	1.72	3.244	0.858
19	0.3086	77.312	77.3	5.3	1.776	2.386	4.162	1.74	3.274	0.888
20	0.3236	76.726	76.7	5.5	1.757	2.386	4.143	1.74	3.265	0.879
21	0.3672	70.888	70.9	6.3	1.611	2.386	3.997	1.68	3.192	0.805
22	0.3902	66.957	67.0	6.7	1.515	2.386	3.901	1.64	3.144	0.758



Sample No. 1	
Initial	Water Content, % 37.6
	Dry Density, pcf 86.8
	Saturation, % 104.0
	Void Ratio 1.0074
	Diameter, in. 2.737
	Height, in. 5.860
At Test	Water Content, % 36.1
	Dry Density, pcf 86.8
	Saturation, % 100.0
	Void Ratio 1.0074
	Diameter, in. 2.737
	Height, in. 5.860
Strain rate, in./min. 0.055	
Back Pressure, psi 0.000	
Cell Pressure, psi 20.730	
Fail. Stress, ksf 2.306	
Ult. Stress, ksf	
σ_1 Failure, ksf 5.291	
σ_3 Failure, ksf 2.985	

Type of Test:

Unconsolidated Undrained

Sample Type: Undisturbed

Description: Gray Fat Clay

Assumed Specific Gravity= 2.79

Remarks: ASTM D2850

Client: Quaternary Resource Investigations, L.L.C.

Project: Port Arthur Residence Office - USACE

Location: 13-B1004

Sample Number: 22

Depth: 42-44 ft.

Proj. No.: 92145005

Date Sampled:

TRIAXIAL SHEAR TEST REPORT

Terracon Consultants, Inc.

Houston, TX

TRIAxIAL COMPRESSION TEST
Unconsolidated Undrained

2/14/2014
4:29 PM

Date:
Client: Quaternary Resource Investigations, L.L.C.
Project: Port Arthur Residence Office - USACE
Project No.: 92145005
Location: 13-B1004
Depth: 42-44 ft. **Sample Number:** 22
Description: Gray Fat Clay
Remarks: ASTM D2850
Type of Sample: Undisturbed
Assumed Specific Gravity=2.79 **LL=** **PL=** **PI=**
Test Method: COE uniform strain

Parameters for Specimen No. 1

Specimen Parameter	Initial	Saturated	Final
Moisture content: Moist soil+tare, gms.	130.280		130.280
Moisture content: Dry soil+tare, gms.	108.500		108.500
Moisture content: Tare, gms.	50.520		50.520
Moisture, %	37.6	36.1	37.6
Moist specimen weight, gms.	1080.25		
Diameter, in.	2.737	2.737	
Area, in. ²	5.884	5.884	
Height, in.	5.860	5.860	
Net decrease in height, in.		0.000	
Wet density, pcf	119.4	118.1	
Dry density, pcf	86.8	86.8	
Void ratio	1.0074	1.0074	
Saturation, %	104.0	100.0	

Test Readings for Specimen No. 1

Cell pressure = 20.730 psi (2.985 ksf)
Back pressure = 0.000 psi (0.000 ksf)
Strain rate, in./min. = 0.055
Fail. Stress = 2.306 ksf at reading no. 20

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Princ. Stress ksf	Major Princ. Stress ksf	1:3 Ratio	P ksf	Q ksf
0	0.0000	0.000	0.0	0.0	0.000	2.985	2.985	1.00	2.985	0.000
1	0.0000	-3.561	-3.6	0.0	-0.087	2.985	2.898	0.97	2.942	-0.044
2	0.0027	3.795	3.8	0.0	0.093	2.985	3.078	1.03	3.032	0.046
3	0.0072	9.002	9.0	0.1	0.220	2.985	3.205	1.07	3.095	0.110
4	0.0128	14.999	15.0	0.2	0.366	2.985	3.351	1.12	3.168	0.183
5	0.0204	21.124	21.1	0.3	0.515	2.985	3.500	1.17	3.243	0.258
6	0.0312	26.783	26.8	0.5	0.652	2.985	3.637	1.22	3.311	0.326
7	0.0477	32.259	32.3	0.8	0.783	2.985	3.768	1.26	3.377	0.392
8	0.0710	37.517	37.5	1.2	0.907	2.985	3.892	1.30	3.439	0.454
9	0.1060	43.452	43.5	1.8	1.044	2.985	4.029	1.35	3.507	0.522
10	0.1353	48.764	48.8	2.3	1.166	2.985	4.151	1.39	3.568	0.583
11	0.1646	54.009	54.0	2.8	1.285	2.985	4.270	1.43	3.627	0.642
12	0.1938	59.597	59.6	3.3	1.410	2.985	4.396	1.47	3.690	0.705
13	0.2232	65.634	65.6	3.8	1.545	2.985	4.530	1.52	3.758	0.773
14	0.2518	71.635	71.6	4.3	1.678	2.985	4.663	1.56	3.824	0.839
15	0.2812	77.633	77.6	4.8	1.809	2.985	4.794	1.61	3.890	0.904
16	0.3074	83.027	83.0	5.2	1.925	2.985	4.911	1.65	3.948	0.963
17	0.3511	90.703	90.7	6.0	2.087	2.985	5.072	1.70	4.029	1.043
18	0.3947	96.362	96.4	6.7	2.200	2.985	5.185	1.74	4.085	1.100
19	0.4530	100.991	101.0	7.7	2.281	2.985	5.266	1.76	4.125	1.140
20	0.5109	103.196	103.2	8.7	2.306	2.985	5.291	1.77	4.138	1.153
21	0.5402	103.681	103.7	9.2	2.304	2.985	5.289	1.77	4.137	1.152
22	0.5545	102.944	102.9	9.5	2.281	2.985	5.266	1.76	4.126	1.141
23	0.6129	97.912	97.9	10.5	2.146	2.985	5.131	1.72	4.058	1.073
24	0.6565	92.506	92.5	11.2	2.010	2.985	4.996	1.67	3.990	1.005
25	0.7001	85.291	85.3	11.9	1.838	2.985	4.823	1.62	3.904	0.919
26	0.7294	79.828	79.8	12.4	1.711	2.985	4.696	1.57	3.840	0.855
27	0.7581	72.982	73.0	12.9	1.555	2.985	4.540	1.52	3.763	0.778
28	0.7873	62.688	62.7	13.4	1.328	2.985	4.313	1.44	3.649	0.664
29	0.8021	56.992	57.0	13.7	1.204	2.985	4.189	1.40	3.587	0.602
30	0.8312	48.291	48.3	14.2	1.014	2.985	3.999	1.34	3.492	0.507
31	0.8603	40.643	40.6	14.7	0.849	2.985	3.834	1.28	3.409	0.424

