

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	See boring log
13-1002	East Bank SNWW PARO	80	See boring log
13-1003	East Bank SNWW PARO	100	See boring log
13-1004	East Bank SNWW PARO	80	See boring log
13-1005	East Bank SNWW PARO	100	See boring log

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>13-1002</u>
BORING TYPE:	<u>Continuous Sampling</u>
DEPTH:	<u>80'</u>
ELEVATION:	<u>7.52'</u>
X (US SURVEY FT):	<u>3574687.13</u>
Y (US SURVEY FT):	<u>13897866.27</u>
DEPTH TO WATER:	<u>15.2'</u>

Client: USACE-Galveston District

Boring: 13-1002

Date/Time Drilling Begun: 12/8/13 710

Date/Time Drilling Ended: 12/10/13 1000

Driller: Tom Logger: Pete

Designated X (Easting): 3574687.127

Drill Rig: B-57

Designated Y (Northing): 1389780.27 Designated Z (Elevation): 7.5219'

Total depth: 80

Initial Water Encounter (Depth, date/time): 5.4 12/8/13 817 Water Depth (15 min.): 15.2

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	10	ST	1	3.0	-	Slightly sandy clay, light brown, slightly moist, moderately plastic, cracks, trace roots
	CI	2-4	19	ST	1	3.0	-	Slightly sandy clay, light brown, slightly moist, moderately plastic, cracks, sand seams
5	CI	4-6	14	ST	1	1.5	-	Sandy clay, light brown and greenish gray, moderately moist, moderately plastic
	SC	6-8	18	SS 4/15	1 bag	-	1.5	Slightly clayey fine sand, greenish gray and light brown, moderately moist, moderately plastic low plasticity
10	CI	8-10	15	SS 2/12	1 bag	1.5	-	Soft, sandy clay, greenish gray, moderately moist, moderately plastic
	CI	10-12	14	ST	1	0.8	-	Sandy clay, greenish gray and light brown, modelling, moderately moist, moderately plastic
	CI	12-14	19	ST	1	2.2	-	Slightly sandy clay, greenish gray and light brown, modelling, moderately moist, moderately plastic, shell fragments
15	CI	14-16	16	ST	1	1.8	-	Slightly sandy clay, greenish gray and light brown, modelling, moderately moist, moderately plastic
	CI	16-18	20	ST	1	1.5	-	SAA w shell fragments
20	CI	18-20	18	ST	1	2.6	-	SAA

Weather: Cloudy, lite rain, 30s, lite wind
Comments: SAA = Same as above

W912H4-13-D-0001

D408

USCS Log Legend:



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

PARO
Port Arthur, TX



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

Client: USACE-Galveston District

Boring: 13-1002

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of 4

Total depth: 80

Date/Time Drilling Ended: 12/10/13 1000

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	19	ST	1	2.7	-	slightly sandy clay, greenish gray and light brown mottling, moderately moist, moderately plastic, shell fragments
	CI	22-24	18	ST	1	2.5	-	SAA ↑
25	SP	24-25	20	SS	1 log	-	-	Dense fine sand, light brown, wet, no plasticity
	CI	25-27	20	SS	1 log	-	-	
30	CI	27-30	20	SS	1 log	1.5	-	Stiff sandy clay, light brown, moderately wet, moderately plastic, sand seeds, shell fragments
	CI	30-32	17	ST	1	1.75	-	Sandy clay, light brown, moderately wet, moderately plastic, sand seeds
	CI	32-34	18	ST	1	1.2	-	SAA ↑
35	CI	34-36	19	ST	1	1.2	-	Sandy clay, greenish gray and light brown, moderately wet, moderately plastic, sand seeds, cracks
	CI	36-38	19	ST	1	1.6	-	SAA ↑
40	CI	38-40	19	ST	1	0.8	-	Sandy clay, greenish gray, moderately moist, moderately plastic, sand seeds

Weather: Cloudy, rainy, lite breeze, 30's

Comments:

W91ZH4-13-D-0001

DY08

USCS Log Legend:

SAA = Same as above

GW	GP	GM	GC	SW	SP	SM	SC	ML	CL	OL	MH	CH	OH	PT
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Galveston, TX 77553-1229

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Government & Industry in Harmony with the Environment
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Client: USACE-Galveston District

Boring: 13-1002

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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	1.25	-	slightly sandy clay; greenish gray; moderately moist; moderately plastic; sand seems
	C1	42-44	17	ST	1	1.2	-	SAA ↑ w cracks
45	C1	44-46	13	ST	1	1.4	-	SAA ↑
	C1	46-48	18	ST	1	1.25	-	SAA ↑
	C1	48-50	19	ST	1	1.4	-	Clay; greenish gray; moderately moist; moderately plastic
50	C1	50-52	18	ST	1	1.7	-	SAA ↑
	C1	52-54	18	ST	1	1.75	-	SAA ↑
55	C1	54-56	18	ST	1	2.0	-	SAA ↑
	C1	56-58	18	ST	1	2.0	-	SAA ↑
60	C1	58-60	18	ST	1	1.7	-	Clay; dark gray; moderately moist; moderately plastic

Weather: Cloudy, windy, 40's

Comments: SAA = Same as above

W912HY-13-D-0001
D408

USCS Log Legend:



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Government & Industry in Harmony with the Environment
13588 Florida Boulevard, Baton Rouge, Louisiana 70819

Client: USACE-Galveston District

Boring: 13-1002

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12/8/13, 12/9/13 12/10/13

of 4

Total depth: 80

Date/Time Drilling Ended: 12/10/13 1000

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.)
60	CI	60-62	19	ST	1	1.75	-	Clay, dark gray, moderately moist, moderately plastic and shell
	CI	62-64	10	ST	1	1.25	-	Clay, dark gray, moderately moist, moderately plastic
65	CI	64-66	18	ST	1	1.5	-	SAA ↑
	CI	66-68	18	ST	1	1.7	-	SAA ↑
	CI	68-70	19	ST	1	1.5	-	Clay, greenish gray, moderately moist, moderately plastic
70	CI	70-72	19	ST	1	1.5	-	SAA ↑
	CI	72-74	19	ST	1	2.0	-	SAA ↑
75	CI	74-76	20	ST	1	1.5	-	SAA ↑
	CI	76-78	19	ST	1	1.3	-	SAA ↑
80	CI	78-80	17	ST	1	1.7	-	Clay, greenish gray, moderately moist, moderately plastic, w trace wood debris

Weather: Cloudy, windy, 40's / cloudy, windy, 40's / cloudy, windy, 40's
Comments: SAA = same as above

USCS Log Legend:



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2000 Fort Point Road/P.O. Box 1229
Galveston, TX 77553-1229

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Port Arthur, TX



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

W912HY-13-D-0001
D408



Quaternary Resource Investigations, LLC
13588 Florida Boulevard
Baton Rouge, LA 70820
Telephone: 225-292-1400
Fax: 225-292-1404

BORING NUMBER 13-1002

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 12/8/2013 7:10:00 AM COMPLETED 12/10/2013 10:00:00 AM GROUND ELEVATION 7.5219 ft HOLE SIZE 8.25 inches
DRILLING CONTRACTOR QRI NORTHING 13897866.27 ft EASTING 3574687.13 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 15.40 ft / Elev -7.88 ft
WEATHER cloudy, 30s to 40s, light rain, light wind to windy ▽ AFTER 15 MINUTES 15.20 ft / Elev -7.68 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 (%)	ATTERBERG LIMITS	MINUS #200 SIEVE CONTENT (%)	COMPRESSION STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)
			0												
	CL	Slightly sandy CLAY, light brown, slightly moist, moderately plastic, cracks, traces of roots with sand seams		ST	10		3.0			33					
	CL	more sand, some greenish gray color		ST	14		3.0		103	21					
			5	ST	14		1.5			33	44	19	25	86	
	CL	Sandy CLAY, fine grained sand, greenish gray and light brown, moderately moist, low plasticity, loose		SS	18	4-9-5 (14)	-	1.5		24			57		
	CL	Sandy CLAY, greenish gray, moderately moist, moderately plastic, soft		SS	15	2-2-2 (4)	1.5			30					
			10												
	CH	CLAY, greenish gray and light brown mottling, moderately moist, moderately plastic, soft		ST	14		0.8		90	33	54	18	36	88	0.59
	CH	less sand, with shell fragments		ST	19		2.2			30					
	CH	no shell fragments		ST	16		1.8		101	23					
	CH	with shell fragments		ST	20		1.5		107	22				1.49	7
														13	
	CL	Sandy CLAY, greenish gray and light brown mottling, moderately moist, moderately plastic, with shell fragments		ST	18		2.6			26	48	19	29	94	
	CL			ST	19		2.7			23					
	CL			ST	18		2.5			23					
	SM	Silty SAND, fine-grained, dense, light brown, wet, no plasticity		SS	20	1-7-27 (34)	-			23				17	
				NR	0										
	CH	CLAY, light brown, moderately wet, moderately plastic, stiff, with sand seams and shell fragments		SS	20	2-4-7 (11)	1.5			30					
	CH	no shell fragments		ST	17		1.75			31	56	22	34	98	
	CH			ST	18		1.2			35					
		greenish gray and light brown, cracks													
			35												

(Continued Next Page)



Quaternary Resource Investigations, LLC
13588 Florida Boulevard
Baton Rouge, LA 70820
Telephone: 225-292-1400
Fax: 225-292-1404

BORING NUMBER 13-1002

PAGE 2 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

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 (%)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)
	CH	CLAY, light brown, moderately wet, moderately plastic, stiff, with sand seams and shell fragments (continued) greenish gray, moderately moist, no cracks less sand, moderately moist with cracks	35	ST	19		1.2										
				ST	19		1.6		85	37							
				ST	19		0.8			40	51	24	27	100			
			40	ST	18		1.25			39							
				ST	17		1.2		82	37	51	21	30	100	1.13	10	0
			45	ST	13		1.4			47							
				ST	18		1.25		79	43					1.43	4	24
				ST	19		1.4		75	47					1.51	7	0
			50	ST	18		1.7			46	87	29	58				
				ST	18		1.75			52							
			55	ST	18		2.0			50							
				ST	18		2.0			53	95	32	63				
				ST	18		1.7		88	46							
			60	ST	19		1.75			38							
	CH	CLAY, greenish gray, moderately moist, moderately plastic dark gray with shells no shells greenish gray		ST	10		1.25		85	36	61	21	40		0.69	15	29
			65	ST	18		1.5			47							
				ST	18		1.7			52							
				ST	19		1.5			48	78	25	53				
			70	ST	14		1.5			46							
				ST	19		2.0			48	87	24	63				
			75														

(Continued Next Page)



Quaternary Resource Investigations, LLC
13588 Florida Boulevard
Baton Rouge, LA 70820
Telephone: 225-292-1400
Fax: 225-292-1404

BORING NUMBER 13-1002

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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	CLAY, greenish gray, moderately moist, moderately plastic (<i>continued</i>)	75	ST	20		1.5			51							
				ST	19		1.3		68	57	72	23	49		0.83	8	0
		with trace of wood debris		ST	17		1.7			45							
			80														

Bottom of borehole at 80.0 feet.

SUMMARY TABLE OF LABORATORY TEST DATA																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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		PP	TV	SPTn	LL	PL	PI	% by weight passing sieve						Soil Particle Content					Unconfined Compression				UU Triaxial Test				Direct Shear				CU Triaxial Test																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
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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: 13-1002 Depth 4-6

Date: 1-20-2014

Material Description: Fill - Fat clay w/ lean clay PHS, SPHS. CH

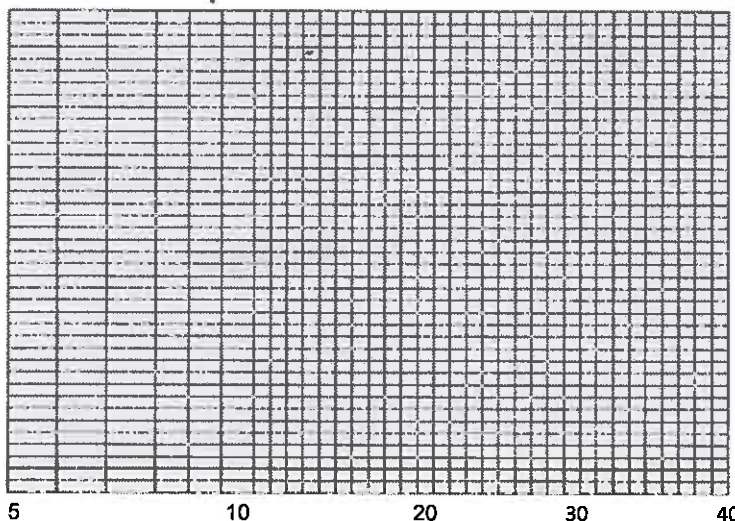
☐ One Point

☒ Three Points

☒ Pass #40 sieve

Liquid Limit						
Run No.	1	2	3	4	5	6
Tare No.	510	720	824			
Weight in grams	Tare + Wet Soil	30.92	31.47	32.03		
	Tare + Dry Soil	26.23	26.53	26.68		
	Water W _w					
	Tare	15.21	15.19	15.04		
	Dry Soil W _d					
Water Content	W					
No. of Blows	34	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.	106	115				
Weight in grams	Tare + Wet Soil	37.70	37.32			
	Tare + Dry Soil	36.34	36.04			
	Water W _w					
	Tare	29.22	29.15			
	Dry Soil W _d					
Water Content	W					
Plastic Limit						

Remarks

Technician CH Computed by JC

Date: 1-17-14 Date:

Checked by

Che Date:

1/21

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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: 13-1002 **Depth** 10-12

Date: 1-27-2014

Material Description:

G & T₂₅ Lat clay

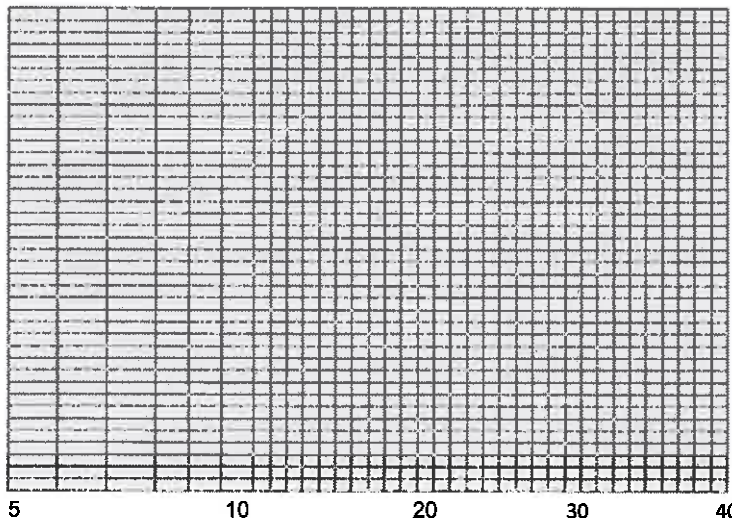
☐ One Point

☒ Three Points

☒ Pass #40 sieve

Liquid Limit						
Run No.	1	2	3	4	5	6
Tare No.	413	507	509			
Weight in grams	Tare + Wet Soil	30.91	30.08	31.17		
	Tare + Dry Soil	25.53	24.83	25.31		
	Water W _w					
	Tare	15.19	15.20	15.19		
	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. G26105
 Scale MTE No. B7894

Plastic Limit						Natural Water Content
Run No.	1	2	3	4	5	
Tare No.	807	814				
Weight in grams	Tare + Wet Soil	22.71	22.68			
	Tare + Dry Soil	21.50	21.49			
	Water W _w					
	Tare	14.95	14.98			
	Dry Soil W _d					
Water Content W						
Plastic Limit						

Remarks

Technician JC Computed by _____ Checked by TAP

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: 13-1002 Depth 18-20

Date: 1-20-2014

Material Description: sanday w/ fine pits

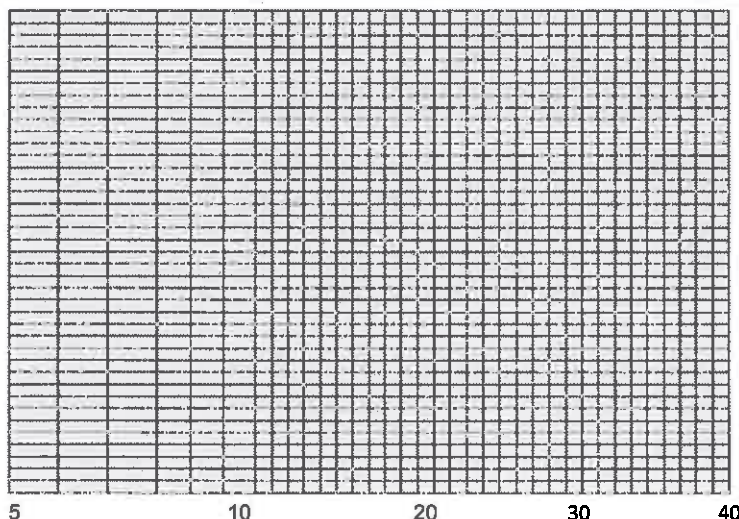
☐ One Point

☒ Three Points

☒ Pass #40 sieve

Liquid Limit						
Run No.	1	2	3	4	5	6
Tare No.	509	710	714			
Weight in grams	Tare + Wet Soil	31.41	32.04	30.62		
	Tare + Dry Soil	26.19	26.55	25.36		
	Water W _w					
	Tare	15.20	15.08	15.12		
	Dry Soil W _d					
Water Content W						
No. of Blows	32	25	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.	122	109				
Weight in grams	Tare + Wet Soil	37.34	37.20			
	Tare + Dry Soil	36.05	35.93			
	Water W _w					
	Tare	29.04	29.25			
	Dry Soil W _d					
Water Content W						
Plastic Limit						

Remarks

Technician CLW JC Computed by _____ Checked by _____
 Date: 1-17-14 Date: _____ Che Date: 1/27

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: 13-1002 Depth 30-32

Date: 1-20-2014

Material Description: CH

Tan Katdai

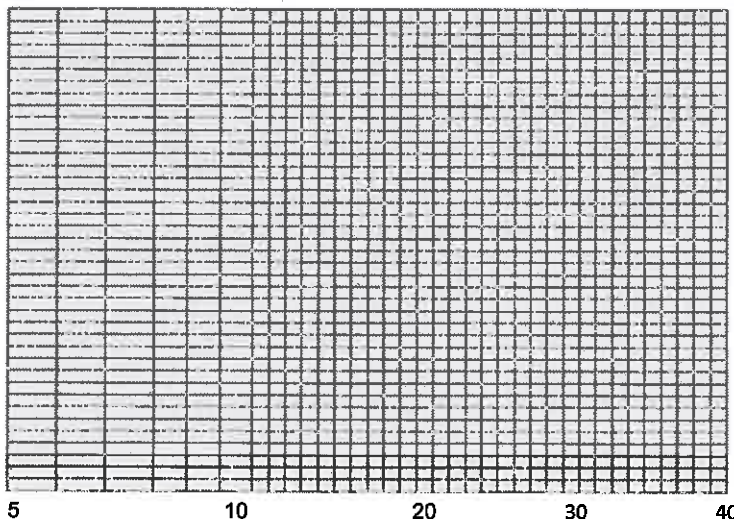
☐ One Point

☒ Three Points

☒ Pass #40 sieve

Liquid Limit						
Run No.	1	2	3	4	5	6
Tare No.	401	402	410			
Weight in grams	Tare + Wet Soil	31.78	31.01	31.14		
	Tare + Dry Soil	25.95	25.34	25.19		
	Water W_w					
	Tare	15.24	15.17	15.14		
	Dry Soil W_d					
Water Content	W					
No. of Blows	33	26	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.	117	113				
Weight in grams	Tare + Wet Soil	38.77	37.02			
	Tare + Dry Soil	37.04	35.57			
	Water W_w					
	Tare	29.27	29.13			
	Dry Soil W_d					
Water Content	W					
Plastic Limit						

Remarks

Technician ch

JC

Computed by

Checked by

Date: 01-17-14

Date:

Che Date:

12-1-20

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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: 13-1002 **Depth** 38-40

Date: 1-20-2014

Material Description: CH Gray fat clay

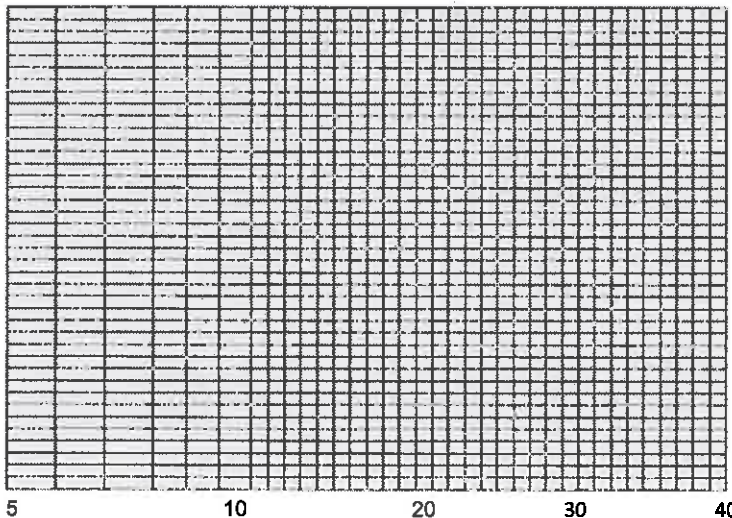
☐ One Point

☒ Three Points

☒ Pass #40 sieve

Liquid Limit						
Run No.	1	2	3	4	5	6
Tare No.	407	501	89			
Weight in grams	Tare + Wet Soil	32.14	32.70	31.95		
	Tare + Dry Soil	26.59	26.79	26.02		
	Water W _w					
	Tare	15.28	15.24	15.07		
	Dry Soil W _d					
Water Content W						
No. of Blows		34	24	15		

Water Content, W



LL _____

PL _____

PI _____

Symbol from
plasticity chart

LL MTE No. G-26105
 Scale MTE No. B-7894

Plastic Limit						Natural Water Content
Run No.	1	2	3	4	5	
Tare No.	105	109				
Weight in grams	Tare + Wet Soil	36.96	37.19			
	Tare + Dry Soil	35.44	35.64			
	Water W _w					
	Tare	29.17	29.25			
	Dry Soil W _d					
Water Content W						
Plastic Limit						

Remarks

Technician ph/jc Computed by _____ Checked by _____

Date: 1-18-14 Date: _____ Che Date: 1/27

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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: 1002 **Depth** 42-44

Date: 1-23-2014

Material Description:

Gray Fat clay

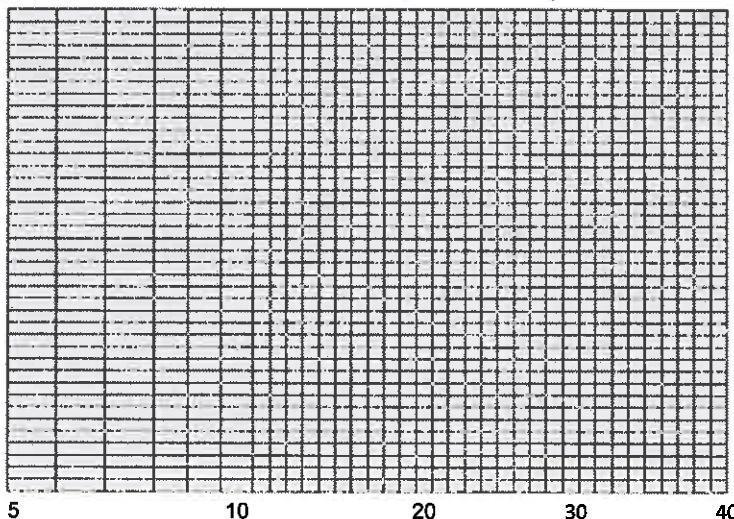
☐ One Point

☒ Three Points

☒ Pass #40 sieve

Liquid Limit						
Run No.	1	2	3	4	5	6
Tare No.	402	504	706			
Weight in grams	Tare + Wet Soil	32.65	31.65	32.61		
	Tare + Dry Soil	26.91	26.11	26.63		
	Water W _w					
	Tare	15.17	15.22	15.12		
	Dry Soil W _d					
Water Content	W					
No. of Blows	35	25	17			

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.	814	23				
Weight in grams	Tare + Wet Soil	22.34	22.68			
	Tare + Dry Soil	21.04	21.33			
	Water W _w					
	Tare	14.99	15.03			
	Dry Soil W _d					
Water Content	W					
Plastic Limit						

Remarks

Technician JC

Computed by _____

Checked by RP

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: 13-1002 **Depth** 50.52

Date: 1-20-2014

Material Description: CH Gray Sat clay

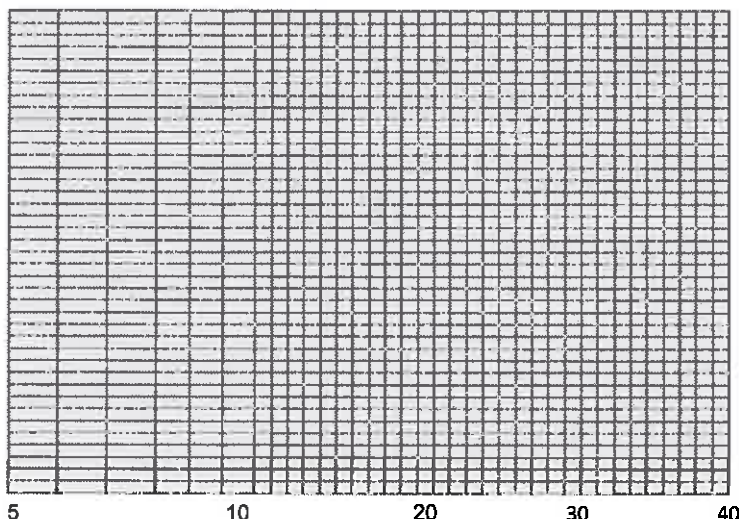
☐ One Point

☒ Three Points

☒ Pass #40 sieve

Liquid Limit						
Run No.	1	2	3	4	5	6
Tare No.	803	820A	9001			
Weight in grams	Tare + Wet Soil	32.40	30.82	30.30		
	Tare + Dry Soil	24.43	23.53	23.03		
	Water W _w					
	Tare	14.92	15.15	15.10		
	Dry Soil W _d					
Water Content	W					
No. of Blows	33	25	15			

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.	118	103				
Weight in grams	Tare + Wet Soil	37.43	36.37			
	Tare + Dry Soil	35.56	34.72			
	Water W _w					
	Tare	29.16	29.16			
	Dry Soil W _d					
Water Content	W					
Plastic Limit						

Remarks

Technician JW JC **Computed by** _____

Checked by JK

Date: 1-17-14

Date: _____

Che Date: _____

427

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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: 13-1002 Depth 56 - 58

Date: 1-20-2014

Material Description: cl Gray loess clay

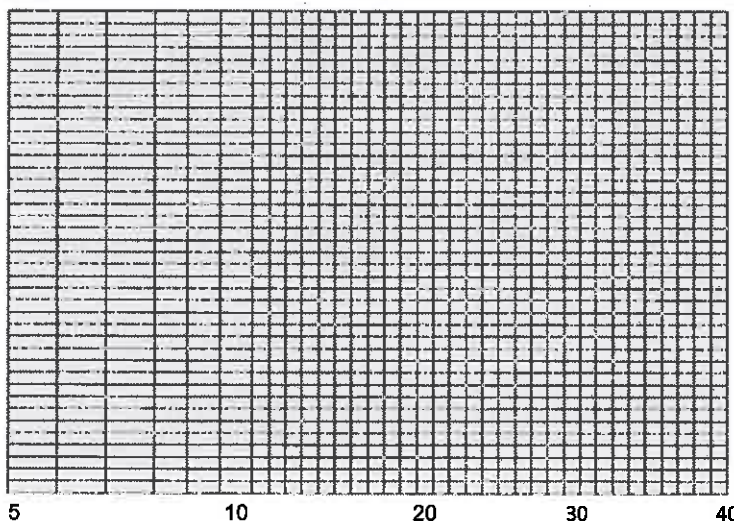
☐ One Point

☒ Three Points

☒ Pass #40 sieve

Liquid Limit						
Run No.	1	2	3	4	5	6
Tare No.	709	822	27			
Weight in grams	Tare + Wet Soil	31.33	30.23	30.70		
	Tare + Dry Soil	23.53	22.80	22.88		
	Water W _w					
	Tare	15.16	15.03	15.1497		
	Dry Soil W _d					
Water Content W						
No. of Blows		32	25	17		

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.	121	111				
Weight in grams	Tare + Wet Soil	37.60	37.03			
	Tare + Dry Soil	35.56	35.13			
	Water W _w					
	Tare	29.12	29.31			
	Dry Soil W _d					
Water Content W						
Plastic Limit						

Remarks

Technician Ch/JS Computed by _____ Checked by _____
 Date: 01-17-14 Date: _____ Che Date: 1/27

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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: 13-1002 **Depth** 62-64

Date: 5/15/2014

Material Description: Grey fat clay

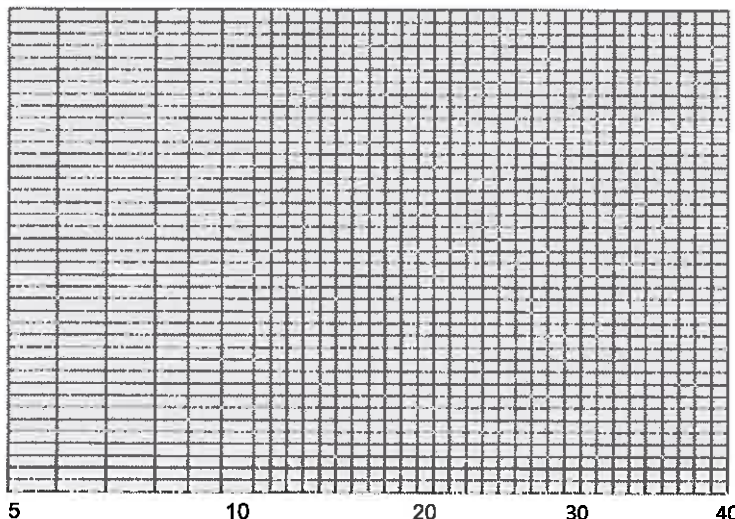
☐ One Point

☒ Three Points

☒ Pass #40 sieve

Liquid Limit						
Run No.	1	2	3	4	5	6
Tare No.	704	711	813			
Weight in grams	Tare + Wet Soil	29.99	30.59	30.72		
	Tare + Dry Soil	24.47	24.75	24.62		
	Water W _w					
	Tare	15.10	15.20	15.01		
	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. B7894

Plastic Limit						Natural Water Content
Run No.	1	2	3	4	5	
Tare No.	2P	7P				
Weight in grams	Tare + Wet Soil	22.50	22.03			
	Tare + Dry Soil	21.17	20.79			
	Water W _w					
	Tare	14.92	14.97			
	Dry Soil W _d					
Water Content	W					
Plastic Limit						

Remarks

Technician JC

Computed by

Checked by TRP

Date:

Date:

Che Date: 201

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: 13-1002 **Depth** 68-70

Date: 1-20-2014

Material Description: CH

Gray Fat clay

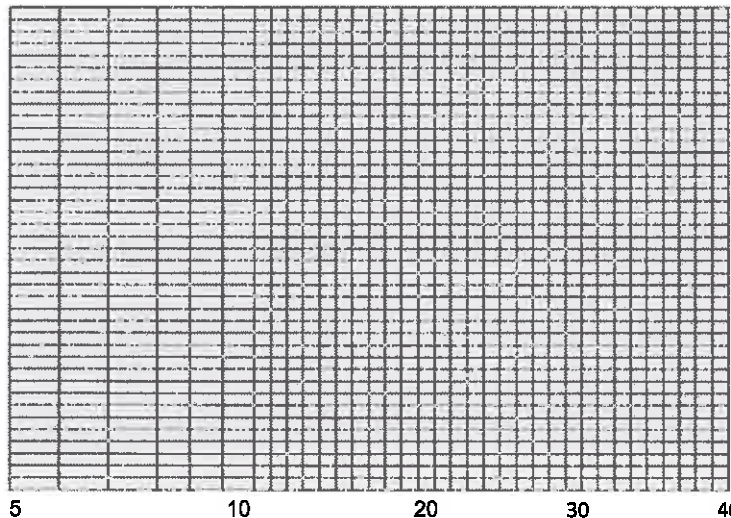
☐ One Point

☒ Three Points

☒ Pass #40 sieve

Liquid Limit									
Run No.		1	2	3	4	5	6		
Tare No.		818	825	7P					
Weight in grams	Tare + Wet Soil	31.09	30.41	29.01					
	Tare + Dry Soil	24.19	23.88	22.71					
	Water	W _w							
	Tare	15.08	15.31	14.98					
	Dry Soil	W _d							
Water Content		W							
No. of Blows		35	25	17					

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.		114	103				
Weight in grams	Tare + Wet Soil	37.45	37.06				
	Tare + Dry Soil	35.79	35.50				
	Water	W _w					
	Tare	29.06	29.15				
	Dry Soil	W _d					
Water Content		W					
Plastic Limit							

Remarks

Technician ch / JC

Computed by _____

Checked by _____

Date: 1-18-14

Date: _____

Che Date: _____

11/10

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: 13-1002 **Depth** 72-74

Date: 1-20-2014

Material Description: CH Gray Cat clay

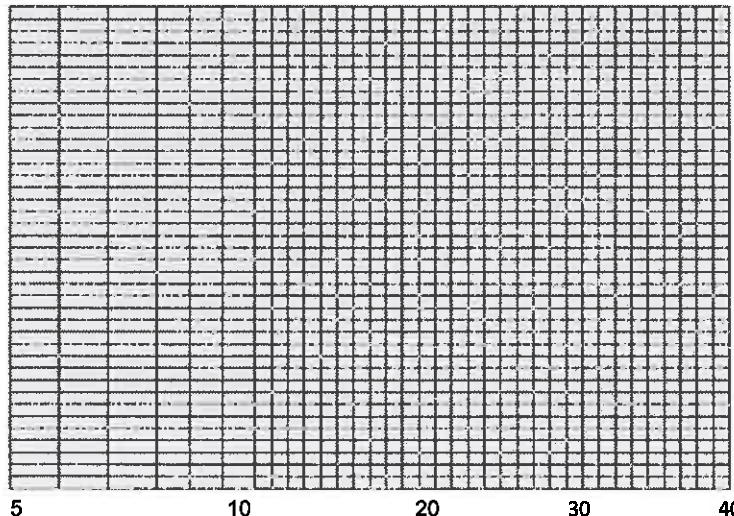
☐ One Point

☒ Three Points

☒ Pass #40 sieve

Liquid Limit						
Run No.	1	2	3	4	5	6
Tare No.	703	821	907			
Weight in grams	Tare + Wet Soil	29.36	30.83	29.83		
	Tare + Dry Soil	22.88	23.55	22.87		
	Water W _w					
	Tare	15.18	15.17	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. G26105

Scale MTE No. B2894

Plastic Limit						Natural Water Content
Run No.	1	2	3	4	5	
Tare No.	114	105				
Weight in grams	Tare + Wet Soil	37.86	36.99			
	Tare + Dry Soil	36.12	35.54			
	Water W _w					
	Tare	29.05	29.16			
	Dry Soil W _d					
Water Content	W					
Plastic Limit						

Remarks _____

Technician ch

Computed by je

Checked by _____

Date: 1-17-14

Date: _____

Che Date: _____

2/1/14

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: 13-1002 **Depth** 76-78

Date: 1/23/2014

Material Description:

Gray fat clay

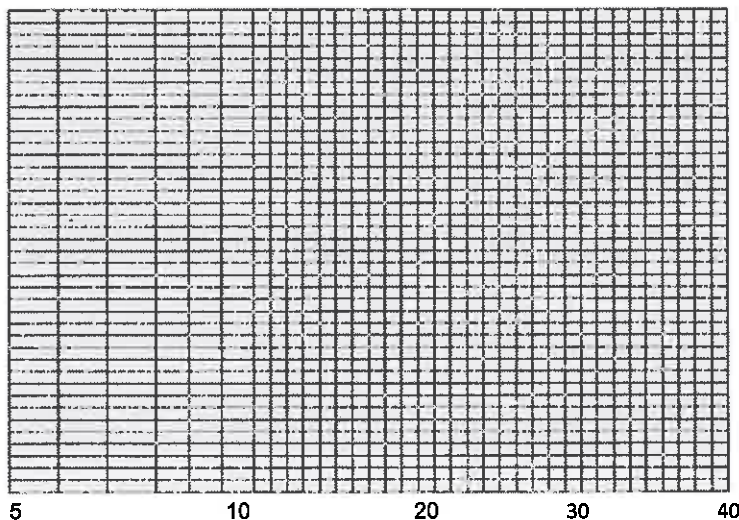
☐ One Point

☒ Three Points

☒ Pass #40 sieve

Liquid Limit									
Run No.		1	2	3	4	5	6		
Tare No.		414	509	517					
Weight in grams	Tare + Wet Soil	30.76	31.27	29.40					
	Tare + Dry Soil	24.36	24.53	23.31					
	Water W _w								
	Tare	15.16	15.20	15.15					
	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. G-26105
 Scale MTE No. B-7894

Plastic Limit							Natural Water Content
Run No.		1	2	3	4	5	
Tare No.		813	817				
Weight in grams	Tare + Wet Soil	22.10	22.07				
	Tare + Dry Soil	20.77	20.74				
	Water W _w						
	Tare	15.02	14.98				
	Dry Soil W _d						
Water Content W							
Plastic Limit							

Remarks

Technician Je **Computed by** _____ **Checked by** TSP

Date: _____ **Date:** _____ **Che Date:** 2/21

Terracon

Project No:92145005

Contract #W912HY-D-0001-DY08

13B1001

Rodrigo

Date: 01 20 -2014 Reviewed By: *[Signature]* *tlay*

B8449: ☐

Date: 01 20

-2014 Reviewed By :

—

- 2014

Moisture Content Tests (ASTM D2216)

Terracon

Date: 01 - 18 - 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
1002		0-2			Brown Sandy lean Clay fill	PP3	228.44	186.84	61.71		
	P1 ABB	4-6			Brown Sandy lean Clay fill	C19	154.05	128.19	50.11		
	APPB	6-8			Gray Brown Silty Clay	E20 38	169.39	146.10	49.17		
		8-10			Green Sandy Silty Clay	SB	185.54	157.24	61.52		
		12-14			Tan Gray Fat Clay w/ cal, Gc	3A	181.64	158.42	60.56		
	P1 ABB	18-20			Gray Tan lean Clay w/ silty Sands Pockets	V24	162.08	139.12	49.72		
		20-22			Tan lean Clay w/ Silty Pockets	G-D	186.77	163.72	61.50		
		22-24			Tan Green lean Clay w/ Silty Pockets	ZOT	208.91	180.55	59.09		
	ABB	24-26			Silty Sand w/ Clay Pockets	C12	184.87	159.88	50.52		
		28-30			Tan Silty Clay	GG	228.98	190.14	61.50		
	P1 ABB	30-32			Tan Fat Clay w/ Silty Pockets	J5	169.58	138.88	40.65		
No Sample		32-34									
	P1 ABB	38-40			Gray Fat Clay w/ Silty Pockets	G70	177.89	141.95	49.99		
		40-42			Green Fat Clay w/ Silty Pockets	Q	193.82	156.70	60.07		
		44-46			Gray Fat Clay w/ Silty layers	O	189.32	147.66	58.89		
1-12-14	P1	50-52			Gray Fat Clay	K69	134.12	101.95	32.66		

Technician:
Tested By:

27

Date: 01 - 2014 Reviewed By:

Scale No.: ☐J350: ☐MTE B93: ☐B8449: ☐

28 1/28 - 2014

Terracon

Project No:92145005

Contract #W912HY-D-0001-DY08

1002

[Signature]

B8449: ☐

✓

- 2014

1/28

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

Terracon

Job No. **92145005**

Material Description

Fin: L.T & G Fat clay w/ cal

Boring No.: **13-B1002**

Depth (ft) **10-12**

Sample Length (inch)

5.790 5.800 5.795 5.795

Cohesion (tsf)

Sample Diameter (inch)

2.610 2.613 2.582 2.602

Date of Test **-2013**

Moist Weight (g)

963.7

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

Caliper No. ☐ W10202 ☐ W10203 ☐ W10204



Unconfined

Please get PI after test

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	

Moisture Content Determination

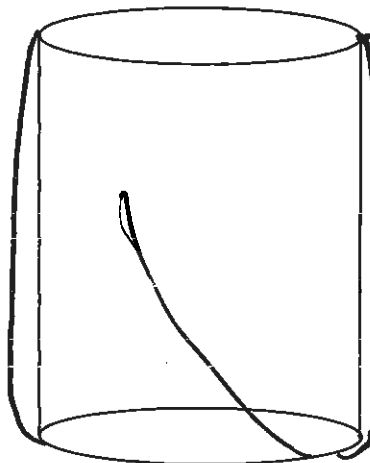
Tare Number	C8
Wet Soil + Tare (g)	136.02
Dry Soil + Tare (g)	114.85
Tare Weight (g)	50.42

Prepared By: *Ch*

Date: **01-23-2014**

Scale No.: ☐ J350 ☐ MTE B93 ☐ B8449

Failed Sample Sketch



Shear **40°**

Bulge **/**

Vertical Split

Tested By: *SN* 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

6 Fat clay w/ shells at

Boring No.: **13-B1002**

Depth (ft)

42-44

Sample Length (inch)

5.775 5.778 5.780 5.778

Cohesion (tsf)

Sample Diameter (inch)

2.801 2.803 2.806 2.803

Date of Test

- 2013

Moist Weight (g)

1046.8

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

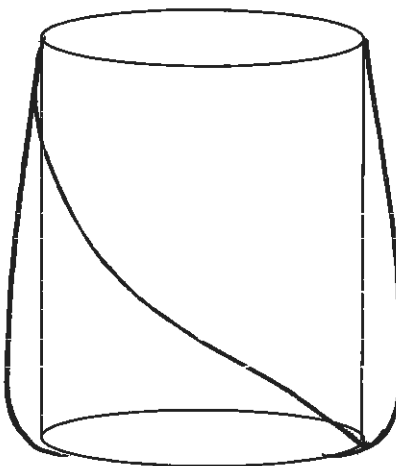
Tare Number	<i>C17</i>
Wet Soil + Tare (g)	<i>147.48</i>
Dry Soil + Tare (g)	<i>121.21</i>
Tare Weight (g)	<i>50.47</i>

Prepared By: *ch*

Date: *01-23* -2014

Scale No.: ☐ J350 ☐ MTE B93 ☐ B8449

Failed Sample Sketch



Shear *145*

Bulge */*

Vertical Split

Tested By: *SP* 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 (CH)

Boring No.: 13-B1002

Depth (ft) 48-50

Sample Length (inch) 5.769 5.774 5.774 5.772

Cohesion (tsf) _____ Sample Diameter (inch) 2.775 2.805 2.786 2.789

Date of Test - -2013

Moist Weight (g) 1021.0 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	

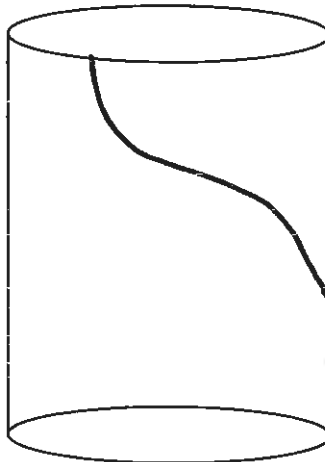
✓ Unconfined

Moisture Content Determination	
Tare Number	<u>3D</u>
Wet Soil + Tare (g)	<u>187.85</u>
Dry Soil + Tare (g)	<u>146.84</u>
Tare Weight (g)	<u>59.54</u>

Prepared By: ch Date: 01- 23 -2014

Scale No.: ☐ J350 ☐ MTE B93 ☐ B8449

Failed Sample Sketch



Shear 1/45'

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

Cor, Ret cl

Boring No.: 13-

10N2

Depth (ft)

76-78

Sample Length (inch)

5.86

5.86

5.86

5.86

Cohesion (tsf)

Sample Diameter (inch)

2.76

2.76

2.76

2.76

Date of Test

-2013

Moist Weight (g)

944.3

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	RAA
Wet Soil + Tare (g)	185.27
Dry Soil + Tare (g)	140.67
Tare Weight (g)	62.26

Prepared By:

SA

Date: 01-

23

-2014

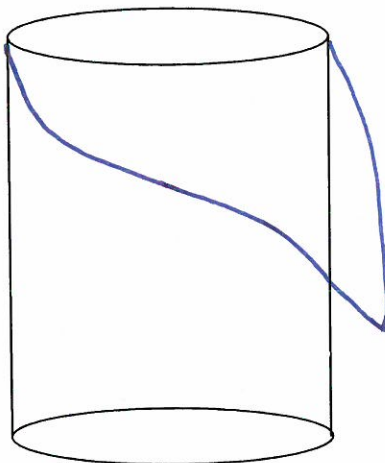
Scale No.:

☐ J350

☐ MTE B93

☐ B8449

Failed Sample Sketch



Shear

45

Bulge

Vertical

Split

Tested By:

SA

01-

-2014

Computed By:

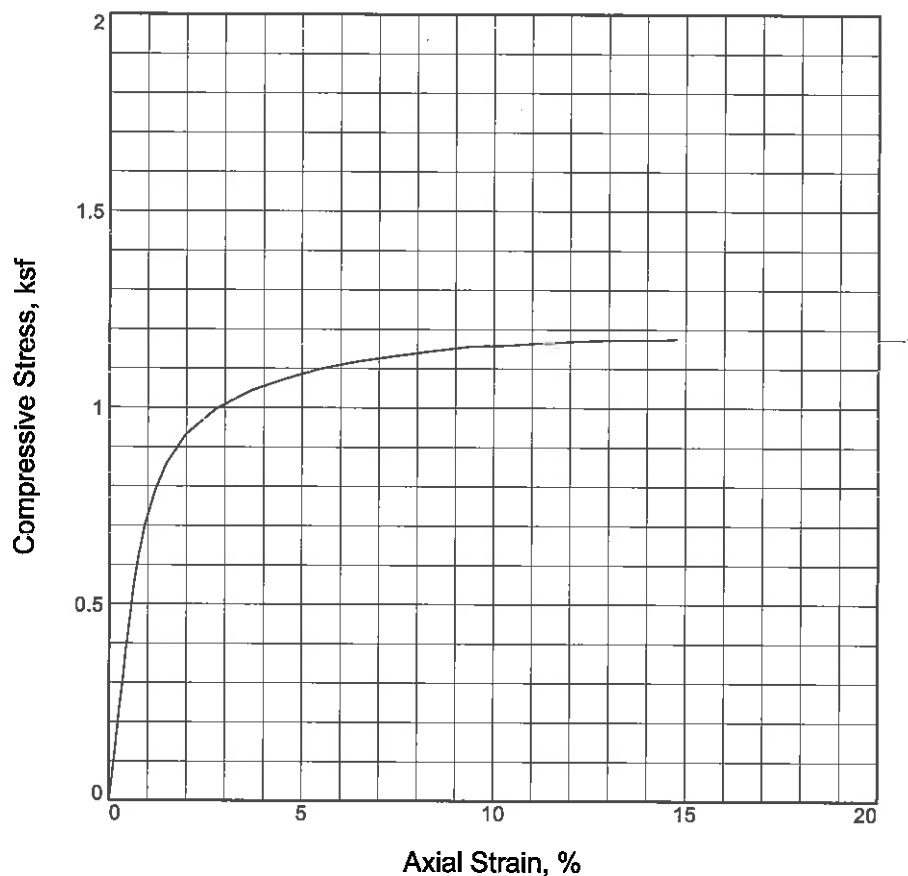
-

-2014

Machine: ☐ HM 2000

☐ S 610

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, ksf	1.175			
Undrained shear strength, ksf	0.588			
Failure strain, %	14.8			
Strain rate, in./min.	0.055			
Water content, %	33.0			
Wet density, pcf	119.1			
Dry density, pcf	89.6			
Saturation, %	99.0			
Void ratio	0.9166			
Specimen diameter, in.	2.602			
Specimen height, in.	5.795			
Height/diameter ratio	2.23			

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

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-B1002

Sample Number: 6 **Depth:** 10-12 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-B1002
Depth: 10-12 ft. **Sample Number:** 6
Description: Light gray and tan Fat Clay w/calcareous nodules
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.	136.020
Moisture content: Dry soil+tare, gms.	114.850
Moisture content: Tare, gms.	50.720
Moisture, %	33.0
Moist specimen weight, gms.	963.70
Diameter, in.	2.602
Area, in. ²	5.317
Height, in.	5.795
Wet density, pcf	119.1
Dry density, pcf	89.6
Void ratio	0.9166
Saturation, %	99.0

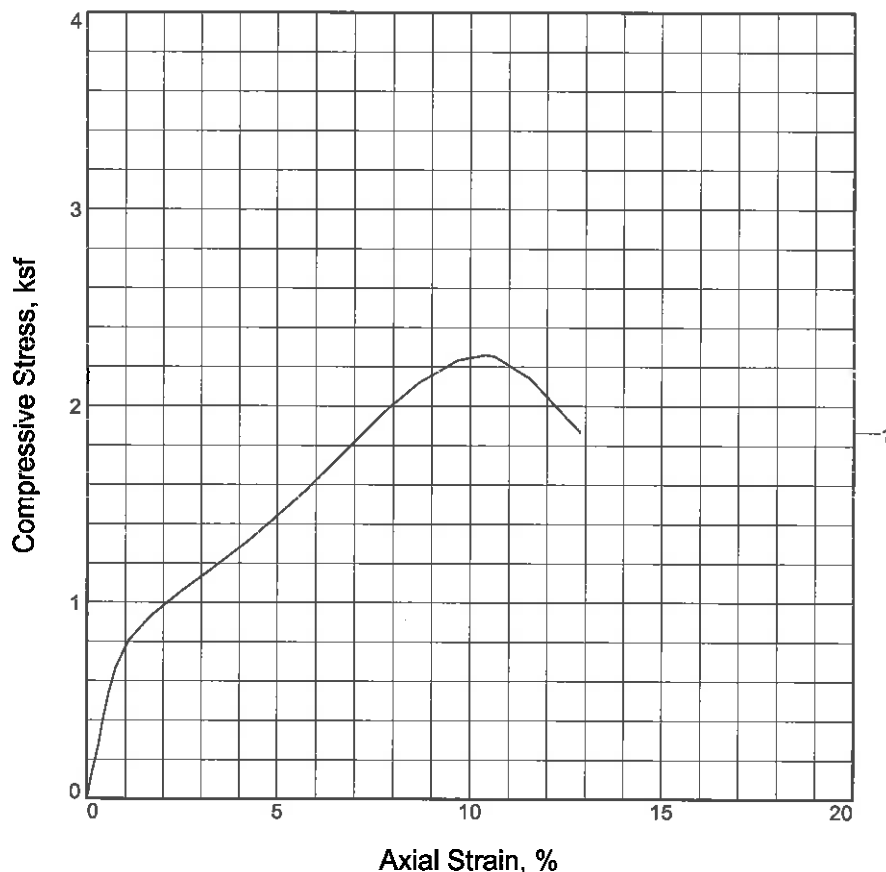
Test Readings for Specimen No. 1**Strain rate, in./min. = 0.055****Unconfined compressive strength = 1.175 ksf at reading no. 27**

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	0.0042	2.188	2.2	0.1	0.059
3	0.0097	5.055	5.1	0.2	0.137
4	0.0152	8.508	8.5	0.3	0.230
5	0.0212	11.626	11.6	0.4	0.314
6	0.0253	14.230	14.2	0.4	0.384
7	0.0313	17.370	17.4	0.5	0.468
8	0.0368	20.235	20.2	0.6	0.544
9	0.0443	23.112	23.1	0.8	0.621
10	0.0528	25.888	25.9	0.9	0.695
11	0.0688	29.448	29.4	1.2	0.788
12	0.0858	32.167	32.2	1.5	0.858
13	0.1144	35.069	35.1	2.0	0.931
14	0.1601	37.844	37.8	2.8	0.997
15	0.2117	39.942	39.9	3.7	1.042
16	0.2633	41.501	41.5	4.5	1.073

Test Readings for Specimen No. 1

No.	Def. Dial In.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf
17	0.3149	42.865	42.9	5.4	1.098
18	0.3721	44.089	44.1	6.4	1.117
19	0.4294	45.127	45.1	7.4	1.132
20	0.4860	46.119	46.1	8.4	1.144
21	0.5432	47.084	47.1	9.4	1.156
22	0.6004	47.749	47.7	10.4	1.159
23	0.6576	48.551	48.6	11.3	1.166
24	0.7147	49.295	49.3	12.3	1.170
25	0.7718	49.962	50.0	13.3	1.173
26	0.8289	50.556	50.6	14.3	1.173
27	0.8554	50.913	50.9	14.8	1.175

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, ksf	2.259			
Undrained shear strength, ksf	1.129			
Failure strain, %	10.4			
Strain rate, in./min.	0.055			
Water content, %	37.1			
Wet density, pcf	111.8			
Dry density, pcf	81.6			
Saturation, %	92.4			
Void ratio	1.1049			
Specimen diameter, in.	2.803			
Specimen height, in.	5.778			
Height/diameter ratio	2.06			

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-B1002

Sample Number: 22 **Depth:** 42-44 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-B1002
Depth: 42-44 ft. **Sample Number:** 22
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.	147.480
Moisture content: Dry soil+tare, gms.	121.210
Moisture content: Tare, gms.	50.470
Moisture, %	37.1
Moist specimen weight, gms.	1046.80
Diameter, in.	2.803
Area, in. ²	6.171
Height, in.	5.778
Wet density, pcf	111.8
Dry density, pcf	81.6
Void ratio	1.1049
Saturation, %	92.4

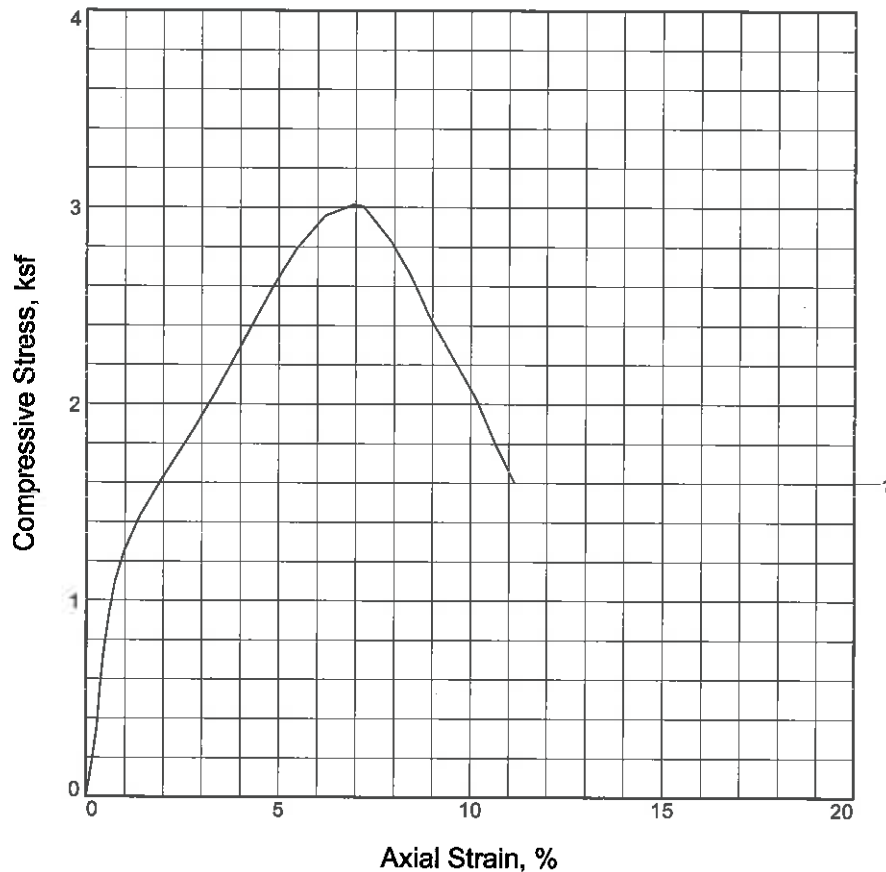
Test Readings for Specimen No. 1**Strain rate, in./min. = 0.055****Unconfined compressive strength = 2.259 ksf at reading no. 19**

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf
0	0.0000	0.000	0.0	0.0	0.000
1	0.0000	0.000	0.0	0.0	0.000
2	0.0068	5.166	5.2	0.1	0.120
3	0.0168	11.410	11.4	0.3	0.265
4	0.0238	17.103	17.1	0.4	0.397
5	0.0328	23.235	23.2	0.6	0.539
6	0.0429	28.649	28.6	0.7	0.664
7	0.0629	34.896	34.9	1.1	0.805
8	0.0970	40.636	40.6	1.7	0.932
9	0.1427	46.381	46.4	2.5	1.056
10	0.1944	52.514	52.5	3.4	1.184
11	0.2402	58.244	58.2	4.2	1.303
12	0.2803	63.764	63.8	4.9	1.416
13	0.3290	71.007	71.0	5.7	1.563
14	0.3716	78.060	78.1	6.4	1.704
15	0.4147	85.531	85.5	7.2	1.853
16	0.4573	92.817	92.8	7.9	1.995

Test Readings for Specimen No. 1

No.	Def. Dial In.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf
17	0.5004	99.367	99.4	8.7	2.118
18	0.5575	105.868	105.9	9.6	2.232
19	0.6000	108.017	108.0	10.4	2.259
20	0.6146	107.924	107.9	10.6	2.251
21	0.6646	103.983	104.0	11.5	2.147
22	0.7002	98.570	98.6	12.1	2.021
23	0.7427	91.823	91.8	12.9	1.867

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, ksf	3.015			
Undrained shear strength, ksf	1.508			
Failure strain, %	6.9			
Strain rate, in./min.	0.055			
Water content, %	47.0			
Wet density, pcf	110.3			
Dry density, pcf	75.0			
Saturation, %	100.3			
Void ratio	1.2875			
Specimen diameter, in.	2.789			
Specimen height, in.	5.772			
Height/diameter ratio	2.07			

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-B1002

Sample Number: 25 **Depth:** 48-50 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-B1002
Depth: 48-50 ft. **Sample Number:** 25
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.	187.850
Moisture content: Dry soil+tare, gms.	146.840
Moisture content: Tare, gms.	59.540
Moisture, %	47.0
Moist specimen weight, gms.	1021.00
Diameter, in.	2.789
Area, in. ²	6.109
Height, in.	5.772
Wet density, pcf	110.3
Dry density, pcf	75.0
Void ratio	1.2875
Saturation, %	100.3

Test Readings for Specimen No. 1

Strain rate, in./min. = 0.055

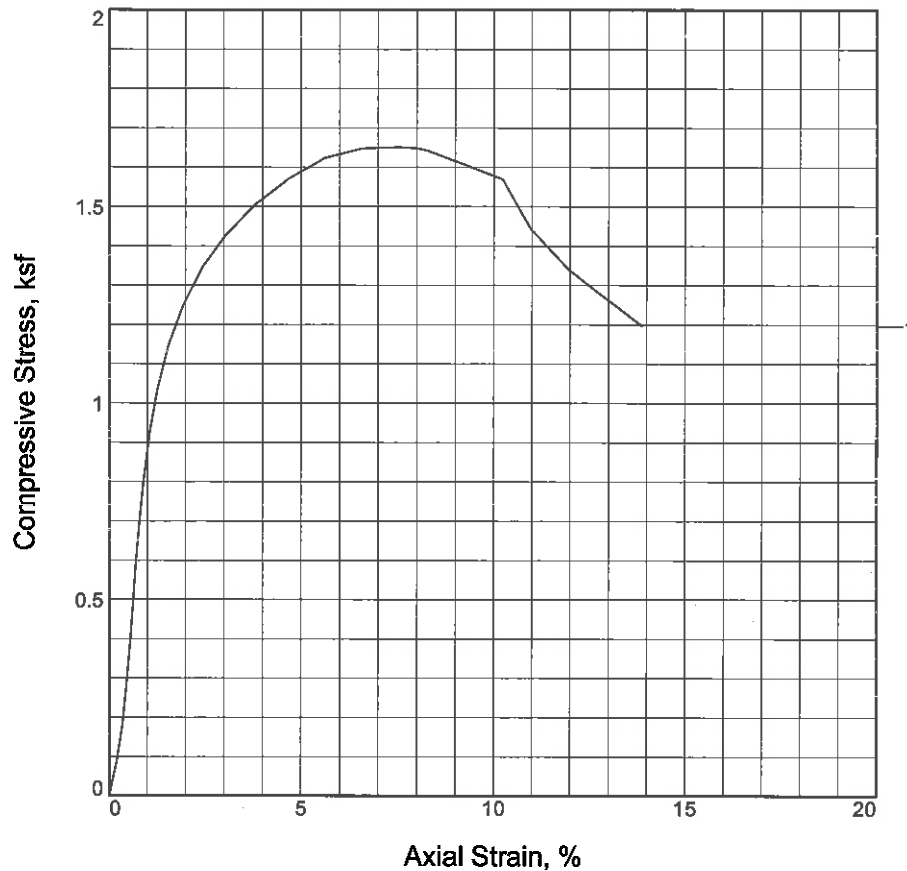
Unconfined compressive strength = 3.015 ksf at reading no. 19

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf
0	0.0000	0.000	0.0	0.0	0.000
1	0.0000	0.000	0.0	0.0	0.000
2	0.0082	7.222	7.2	0.1	0.170
3	0.0157	15.465	15.5	0.3	0.364
4	0.0198	22.912	22.9	0.3	0.538
5	0.0258	31.306	31.3	0.4	0.735
6	0.0333	39.348	39.3	0.6	0.922
7	0.0428	46.862	46.9	0.7	1.096
8	0.0574	53.872	53.9	1.0	1.257
9	0.0804	61.652	61.7	1.4	1.433
10	0.1089	69.084	69.1	1.9	1.598
11	0.1375	76.038	76.0	2.4	1.750
12	0.1660	83.088	83.1	2.9	1.902
13	0.1947	90.754	90.8	3.4	2.067
14	0.2233	99.032	99.0	3.9	2.244
15	0.2524	107.605	107.6	4.4	2.425
16	0.2805	116.068	116.1	4.9	2.603

Test Readings for Specimen No. 1

No.	Def. Dial In.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf
17	0.3151	125.296	125.3	5.5	2.792
18	0.3577	133.764	133.8	6.2	2.958
19	0.4009	137.480	137.5	6.9	3.015
20	0.4149	137.338	137.3	7.2	3.004
21	0.4576	130.127	130.1	7.9	2.824
22	0.4862	122.994	123.0	8.4	2.655
23	0.5147	114.070	114.1	8.9	2.449
24	0.5433	106.596	106.6	9.4	2.276
25	0.5859	95.498	95.5	10.2	2.022
26	0.6145	85.282	85.3	10.6	1.796
27	0.6431	76.594	76.6	11.1	1.604

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, ksf	1.651			
Undrained shear strength, ksf	0.826			
Failure strain, %	7.6			
Strain rate, in./min.	0.055			
Water content, %	56.9			
Wet density, pcf	107.2			
Dry density, pcf	68.3			
Saturation, %	102.5			
Void ratio	1.5485			
Specimen diameter, in.	2.700			
Specimen height, in.	5.860			
Height/diameter ratio	2.17			

Description: Gray Fat Clay

LL =

PL =

PI =

Assumed GS= 2.79

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-B1002

Sample Number: 39 **Depth:** 76-78 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-B1002
Depth: 76-78 ft. **Sample Number:** 39
Description: Gray Fat Clay
Remarks: ASTM D2166
Type of Sample: Undisturbed
Assumed Specific Gravity=2.79 **LL=** **PL=** **Pi=**

Parameters for Specimen No. 1

Specimen Parameter	Initial
Moisture content: Moist soil+tare, gms.	185.270
Moisture content: Dry soil+tare, gms.	140.670
Moisture content: Tare, gms.	62.260
Moisture, %	56.9
Moist specimen weight, gms.	944.30
Diameter, in.	2.700
Area, in. ²	5.726
Height, in.	5.860
Wet density, pcf	107.2
Dry density, pcf	68.3
Void ratio	1.5485
Saturation, %	102.5

Test Readings for Specimen No. 1

Strain rate, in./min. = 0.055

Unconfined compressive strength = 1.651 ksf at reading no. 20

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	0.0111	3.411	3.4	0.2	0.086
3	0.0211	7.528	7.5	0.4	0.189
4	0.0271	11.451	11.5	0.5	0.287
5	0.0326	15.915	15.9	0.6	0.398
6	0.0372	19.937	19.9	0.6	0.498
7	0.0412	23.745	23.7	0.7	0.593
8	0.0472	28.183	28.2	0.8	0.703
9	0.0527	32.128	32.1	0.9	0.801
10	0.0627	37.242	37.2	1.1	0.927
11	0.0742	41.600	41.6	1.3	1.033
12	0.0913	46.318	46.3	1.6	1.147
13	0.1143	50.732	50.7	2.0	1.251
14	0.1429	54.826	54.8	2.4	1.345
15	0.1774	58.424	58.4	3.0	1.425
16	0.2230	62.208	62.2	3.8	1.505

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf
17	0.2741	65.545	65.5	4.7	1.571
18	0.3287	68.359	68.4	5.6	1.623
19	0.3859	70.146	70.1	6.6	1.648
20	0.4425	71.008	71.0	7.6	1.651
21	0.4710	71.243	71.2	8.0	1.648
22	0.4856	71.175	71.2	8.3	1.642
23	0.5428	70.392	70.4	9.3	1.606
24	0.5999	69.503	69.5	10.2	1.569
25	0.6425	64.484	64.5	11.0	1.444
26	0.6996	60.619	60.6	11.9	1.343
27	0.7568	57.895	57.9	12.9	1.268
28	0.8139	55.268	55.3	13.9	1.197

Project Name: Port Arthur Resident Office - USACE

1-16-14

Project No.: 92145005

Boring No.	1002	1002	1002	1002		
Depth (ft)	2-4	14-16	36-38	58-60		
Diameter (mm)	1. 68.44 2. 68.40 3. 68.41	68.47 68.46 68.49	70.45 70.40 70.42	70.67 70.65 70.68		
Height (mm)	1. 105.22 2. 105.20 3. 105.25	142.29 142.29 142.00	134.64 134.62 134.63	142.24 142.21 142.21		
Sample Wt.(g)	775.02	1044.38	977.03	999.55		
Tare No.	S	H45	FF	D		
Wet Wt. + Tare (g)	166.36	165.44	263.53	163.78		
Dry Wt. + Tare (g)	148.29	141.65	208.22	131.89		
Tare Wt. (g)	S - 61.89	38.88	59.13	62.14		
Dry Soil Wt. (g)						
% Moisture						
Dry Unit Wt. (pcf)						
Discription	Brown sandy loam cl w/ fat cl lumps fill	Tan Gray fat clay w/ coal	fat clay w/ silt layers	gray fat clay w/ Ce, Cal		

Tested By: Jnd Date 1/16/14 Reviewed By: [Signature] Date 1/20

Contract No. W912Hy-13-D-0001 DY08

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

Terracon

Job No. **92145005**

Material Description

GWTS, Per cl

Boring No.: **13-B-1002**

Depth (ft)

16-18

Sample Length (inch)

5.85 5.85 5.85 5.85

Cohesion (tsf)

Sample Diameter (inch)

2.68 2.62 2.63 2.64

Date of Test

-2013

Moist Weight (g)

1094.54

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)

12.8

Moisture Content Determination

Tare Number	CC
Wet Soil + Tare (g)	135.98
Dry Soil + Tare (g)	123.32
Tare Weight (g)	65.67

Prepared By:

SA

Date: **07-14**

-2014

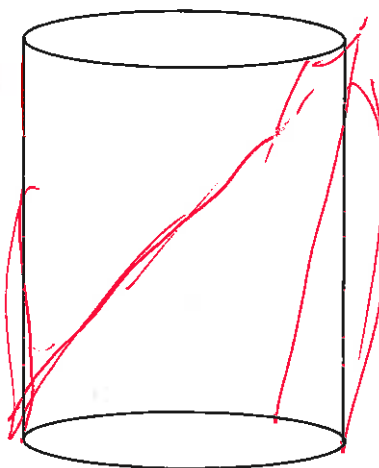
Scale No.:

☐ J350

☐ MTE B93

☐ B8449

Failed Sample Sketch



Shear

Bulge

Vertical

Split

Tested By:

SA

-2014

Computed By:

-2014

Machine:

☐ HM 2000

☐ S 610

Project: SNWW PA-8 - USACE
 Unconsolidated Undrained TEST (ASTM D2850)

Terracon

Job No. **92135388 005**

Material Description **Gr, Fat Cl**

Boring No.: **13-B 1002**

Depth (ft) **46-48**

Sample Length (inch) **5.82 5.82 5.82 5.82**

Cohesion (tsf)

Sample Diameter (inch) **2.77 2.77 2.77 2.77**

Date of Test - -2014

Moist Weight (g) **1048.72**

Ave

Contract No. W912HY-13-D-0001-DY05

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

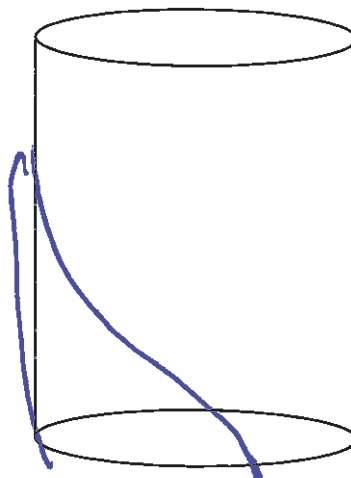
Pressure (psi) **23.8**

Moisture Content Determination	
Tare Number	3C
Wet Soil + Tare (g)	166.33
Dry Soil + Tare (g)	
Tare Weight (g)	59.52

Prepared By: **SR** Date: **2/14** -2014

Scale No.: ☐ J350 ☐ MTE B93 ☐ B8449

Failed Sample Sketch



Shear **45**

Bulge

Vertical

Split

Tested By: **SR** - 2014

Computed By: - 2014

Machine: ☐ HM 2000 ☐ S 610

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

Terracon

Job No. **92145005**

Material Description cr, fat cl

Boring No.: 13-B-102

Depth (ft) 62-64

Sample Length (inch) 5.90 5.90 5.90 5.90

Cohesion (tsf) _____

Sample Diameter (inch) 2.75 2.76 2.75 2.75

Date of Test - -2013

Moist Weight (g) 1066.86 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

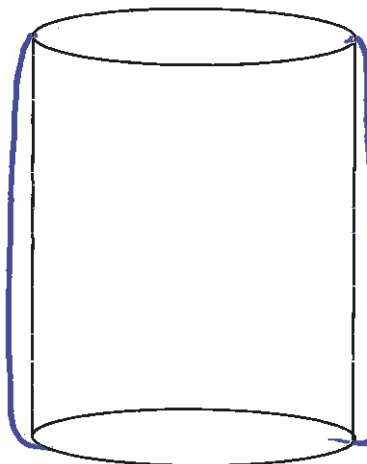
Pressure (psi) 29.6

Moisture Content Determination	
Tare Number	<u>200</u>
Wet Soil + Tare (g)	<u>150.76</u>
Dry Soil + Tare (g)	<u>126.47</u>
Tare Weight (g)	<u>58.56</u>

Prepared By: SA Date: 01-14 -2014

Scale No.: ☐ J350 ☐ MTE B93 ☐ B8449

Failed Sample Sketch



Shear _____

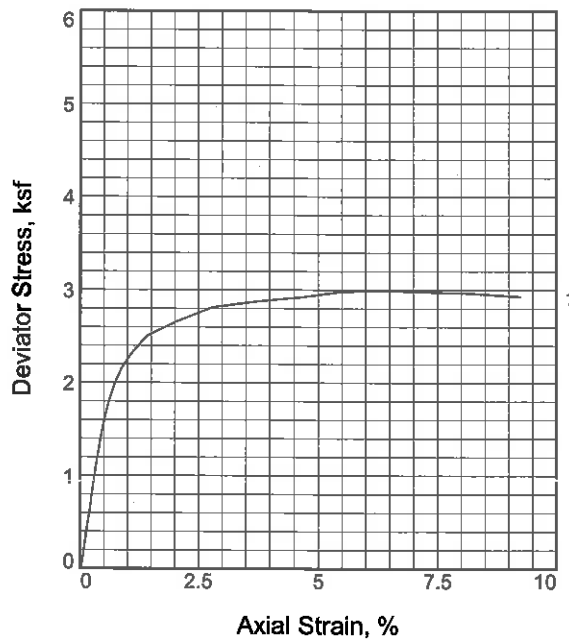
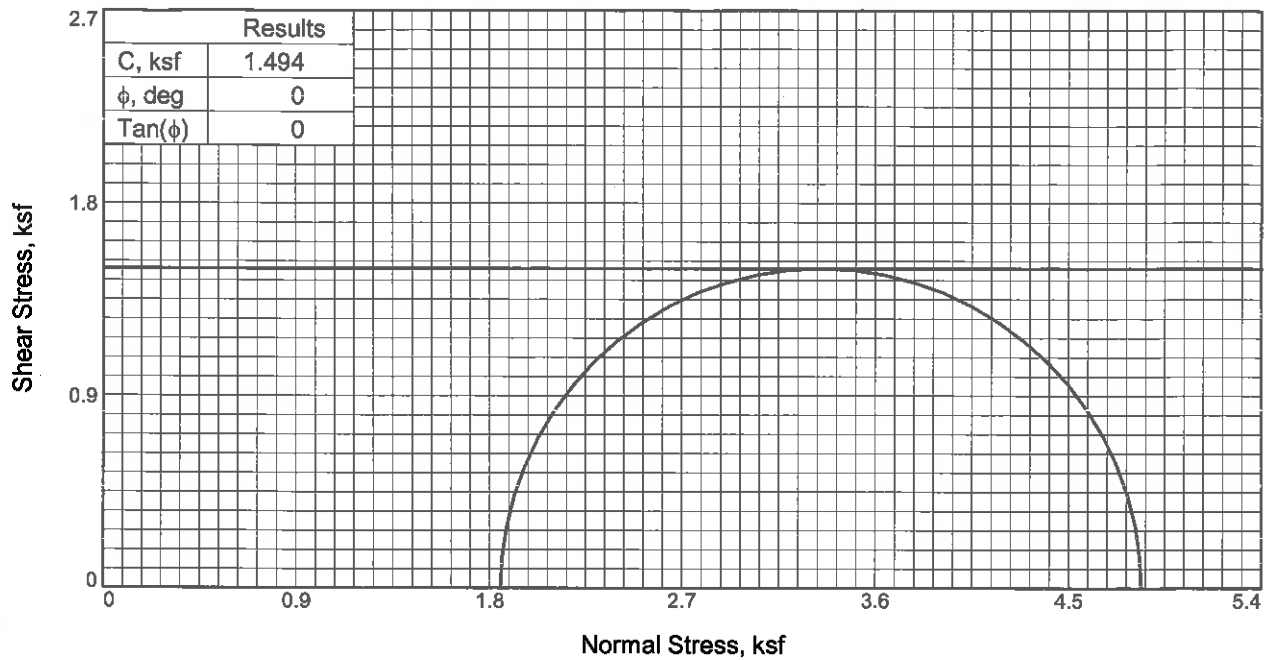
Bulge ✓

Vertical Split _____

Tested By: SA - 2014

Computed By: _____ - 2014

Machine: ☐ HM 2000 ☐ S 610



Sample No.		1
Initial	Water Content, %	21.9
	Dry Density, pcf	106.8
	Saturation, %	99.2
	Void Ratio	0.6070
	Diameter, in.	2.640
	Height, in.	5.850
At Test	Water Content, %	21.9
	Dry Density, pcf	106.8
	Saturation, %	99.2
	Void Ratio	0.6070
	Diameter, in.	2.640
	Height, in.	5.850
Strain rate, in./min.		0.055
Back Pressure, psi		0.000
Cell Pressure, psi		12.860
Fail. Stress, ksf		2.989
Ult. Stress, ksf		
σ_1 Failure, ksf		4.840
σ_3 Failure, ksf		1.852

Type of Test:

Unconsolidated Undrained

Sample Type: Undisturbed

Description: Gray and tan Fat Clay

Assumed Specific Gravity= 2.75

Remarks: ASTM D2850

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

Project: Port Arthur Residence Office - USACE

Location: 13-B1002

Sample Number: 9

Depth: 16-18 ft.

Proj. No.: 92145005

Date Sampled:

TRIAXIAL SHEAR TEST REPORT

Terracon Consultants, Inc.

Houston, TX

TRIAXIAL COMPRESSION TEST
Unconsolidated Undrained

2/14/2014
5:16 PM

Date:

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

Project: Port Arthur Residence Office - USACE

Project No.: 92145005

Location: 13-B1002

Depth: 16-18 ft.

Sample Number: 9

Description: Gray and tan Fat Clay

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.	135.980	135.980
Moisture content: Dry soil+tare, gms.	123.320	123.320
Moisture content: Tare, gms.	65.470	65.470
Moisture, %	21.9	21.9
Moist specimen weight, gms.	1094.54	
Diameter, in.	2.640	
Area, in. ²	5.474	
Height, in.	5.850	
Wet density, pcf	130.2	
Dry density, pcf	106.8	
Void ratio	0.6070	
Saturation, %	99.2	

Test Readings for Specimen No. 1

Cell pressure = 12.860 psi (1.852 ksf)

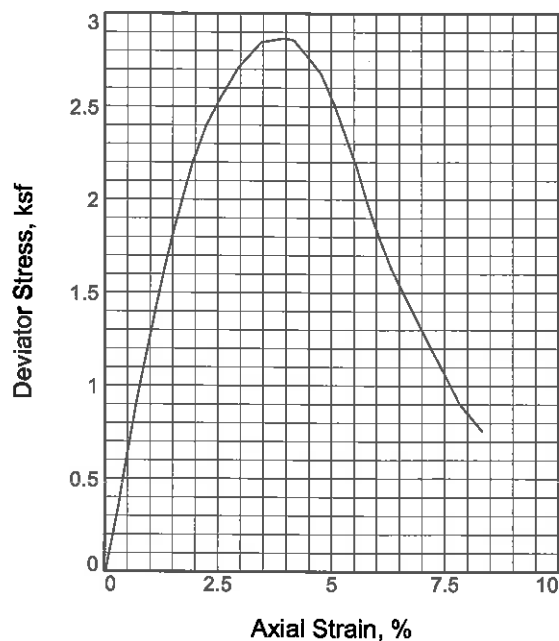
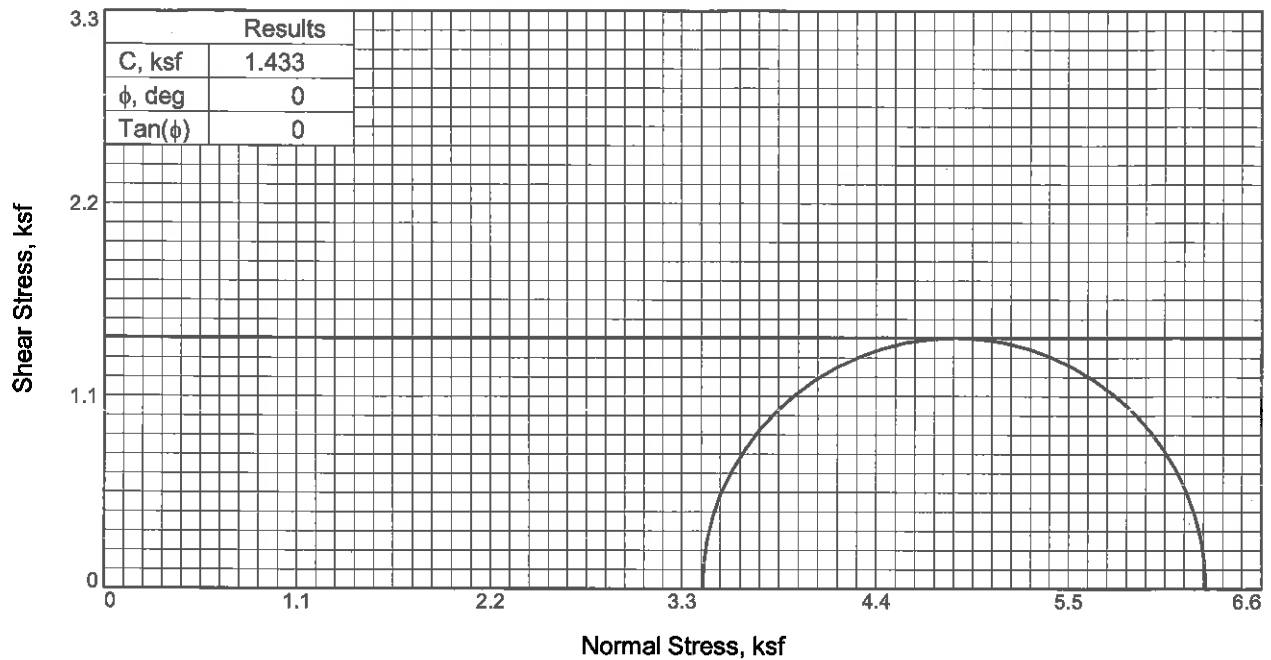
Back pressure = 0.000 psi (0.000 ksf)

Strain rate, in./min. = 0.055

Fail. Stress = 2.989 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	1.852	1.852	1.00	1.852	0.000
1	0.0011	0.285	0.3	0.0	0.008	1.852	1.859	1.00	1.856	0.004
2	0.0043	7.040	7.0	0.1	0.185	1.852	2.037	1.10	1.944	0.093
3	0.0087	18.168	18.2	0.1	0.477	1.852	2.329	1.26	2.090	0.239
4	0.0119	24.427	24.4	0.2	0.641	1.852	2.493	1.35	2.172	0.321
5	0.0144	31.112	31.1	0.2	0.816	1.852	2.668	1.44	2.260	0.408
6	0.0176	38.496	38.5	0.3	1.010	1.852	2.861	1.55	2.357	0.505
7	0.0208	45.150	45.1	0.4	1.184	1.852	3.035	1.64	2.444	0.592
8	0.0253	53.927	53.9	0.4	1.413	1.852	3.264	1.76	2.558	0.706
9	0.0297	61.133	61.1	0.5	1.600	1.852	3.452	1.86	2.652	0.800
10	0.0354	68.848	68.8	0.6	1.800	1.852	3.652	1.97	2.752	0.900
11	0.0431	76.567	76.6	0.7	1.999	1.852	3.851	2.08	2.852	1.000
12	0.0520	83.095	83.1	0.9	2.167	1.852	4.018	2.17	2.935	1.083
13	0.0652	89.533	89.5	1.1	2.329	1.852	4.181	2.26	3.016	1.165
14	0.0826	96.358	96.4	1.4	2.499	1.852	4.351	2.35	3.101	1.250
15	0.1177	102.779	102.8	2.0	2.649	1.852	4.501	2.43	3.177	1.325
16	0.1639	109.818	109.8	2.8	2.808	1.852	4.660	2.52	3.256	1.404
17	0.2169	113.346	113.3	3.7	2.871	1.852	4.723	2.55	3.287	1.436
18	0.2693	116.239	116.2	4.6	2.917	1.852	4.769	2.58	3.310	1.459
19	0.3215	119.884	119.9	5.5	2.980	1.852	4.832	2.61	3.342	1.490
20	0.3801	121.498	121.5	6.5	2.989	1.852	4.840	2.61	3.346	1.494
21	0.4380	122.047	122.0	7.5	2.970	1.852	4.822	2.60	3.337	1.485
22	0.4815	122.632	122.6	8.2	2.961	1.852	4.812	2.60	3.332	1.480
23	0.5401	122.579	122.6	9.2	2.927	1.852	4.779	2.58	3.315	1.463



Sample No.		1
Initial	Water Content, %	43.2
	Dry Density, pcf	79.1
	Saturation, %	100.2
	Void Ratio	1.2016
	Diameter, in.	2.778
	Height, in.	5.820
At Test	Water Content, %	43.2
	Dry Density, pcf	79.1
	Saturation, %	100.2
	Void Ratio	1.2016
	Diameter, in.	2.778
	Height, in.	5.820
Strain rate, in./min.		0.055
Back Pressure, psi		0.000
Cell Pressure, psi		23.730
Fail. Stress, ksf		2.866
Ult. Stress, ksf		
σ_1 Failure, ksf		6.283
σ_3 Failure, ksf		3.417

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-B1002

Sample Number: 24

Depth: 46-48 ft.

Proj. No.: 92145005

Date Sampled:

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

TRIAXIAL COMPRESSION TEST
Unconsolidated Undrained

2/14/2014
4:40 PM

Date:
Client: Quaternary Resource Investigations, L.L.C.
Project: Port Arthur Residence Office - USACE
Project No.: 92145005
Location: 13-B1002
Depth: 46-48 ft. **Sample Number:** 24
Description: Gray Fat Clay
Remarks: ASTM D2850
Type of Sample: Undisturbed
Assumed Specific Gravity=2.79 **LL=** **PL=** **PI=**
Test Method: ASTM D 2850

Parameters for Specimen No. 1

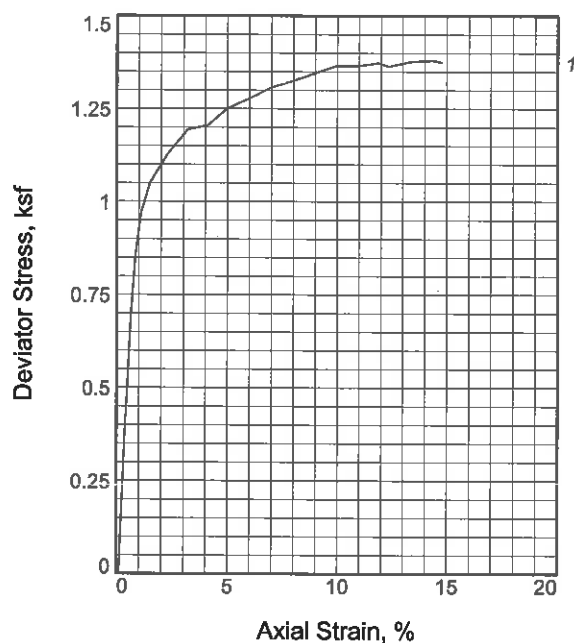
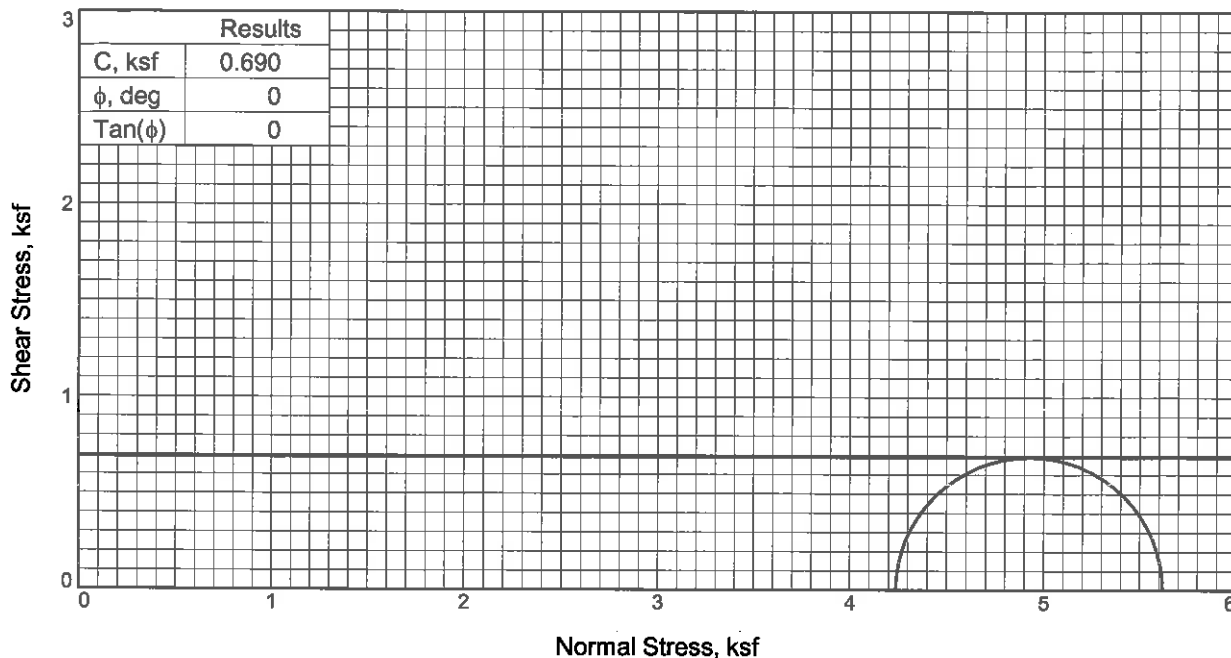
Specimen Parameter	Initial	Final
Moisture content: Moist soil+tare, gms.	166.330	166.330
Moisture content: Dry soil+tare, gms.	134.130	134.130
Moisture content: Tare, gms.	59.520	59.520
Moisture, %	43.2	43.2
Moist specimen weight, gms.	1048.72	
Diameter, in.	2.778	
Area, in. ²	6.061	
Height, in.	5.820	
Wet density, pcf	113.3	
Dry density, pcf	79.1	
Void ratio	1.2016	
Saturation, %	100.2	

Test Readings for Specimen No. 1

Cell pressure = 23.730 psi (3.417 ksf)
Back pressure = 0.000 psi (0.000 ksf)
Strain rate, in./min. = 0.055
Fail. Stress = 2.866 ksf at reading no. 18

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	3.417	3.417	1.00	3.417	0.000
1	0.0010	0.112	0.1	0.0	0.003	3.417	3.420	1.00	3.418	0.001
2	0.0091	6.850	6.8	0.2	0.162	3.417	3.580	1.05	3.498	0.081
3	0.0178	14.908	14.9	0.3	0.353	3.417	3.770	1.10	3.594	0.177
4	0.0234	21.238	21.2	0.4	0.503	3.417	3.920	1.15	3.668	0.251
5	0.0316	29.342	29.3	0.5	0.693	3.417	4.110	1.20	3.764	0.347
6	0.0392	37.129	37.1	0.7	0.876	3.417	4.293	1.26	3.855	0.438
7	0.0461	43.598	43.6	0.8	1.028	3.417	4.445	1.30	3.931	0.514
8	0.0543	50.270	50.3	0.9	1.183	3.417	4.600	1.35	4.009	0.592
9	0.0661	60.625	60.6	1.1	1.424	3.417	4.841	1.42	4.129	0.712
10	0.0779	70.418	70.4	1.3	1.651	3.417	5.068	1.48	4.242	0.825
11	0.0899	79.066	79.1	1.5	1.849	3.417	5.267	1.54	4.342	0.925
12	0.1017	87.055	87.1	1.7	2.032	3.417	5.449	1.59	4.433	1.016
13	0.1129	94.351	94.4	1.9	2.198	3.417	5.615	1.64	4.516	1.099
14	0.1304	103.162	103.2	2.2	2.396	3.417	5.813	1.70	4.615	1.198
15	0.1480	109.811	109.8	2.5	2.543	3.417	5.960	1.74	4.688	1.271
16	0.1715	117.387	117.4	2.9	2.707	3.417	6.124	1.79	4.770	1.353
17	0.2014	124.069	124.1	3.5	2.846	3.417	6.263	1.83	4.840	1.423
18	0.2307	125.625	125.6	4.0	2.866	3.417	6.283	1.84	4.850	1.433
19	0.2425	125.466	125.5	4.2	2.857	3.417	6.274	1.84	4.845	1.428
20	0.2780	118.262	118.3	4.8	2.675	3.417	6.093	1.78	4.755	1.338
21	0.2955	111.276	111.3	5.1	2.509	3.417	5.927	1.73	4.672	1.255
22	0.3099	103.970	104.0	5.3	2.339	3.417	5.756	1.68	4.586	1.169
23	0.3249	96.405	96.4	5.6	2.163	3.417	5.580	1.63	4.498	1.081
24	0.3391	87.688	87.7	5.8	1.962	3.417	5.379	1.57	4.398	0.981
25	0.3535	80.003	80.0	6.1	1.785	3.417	5.202	1.52	4.310	0.893
26	0.3684	73.032	73.0	6.3	1.625	3.417	5.042	1.48	4.230	0.813
27	0.3976	62.471	62.5	6.8	1.383	3.417	4.800	1.40	4.109	0.691
28	0.4262	51.944	51.9	7.3	1.144	3.417	4.561	1.33	3.989	0.572
29	0.4554	41.234	41.2	7.8	0.903	3.417	4.320	1.26	3.869	0.451
30	0.4845	34.677	34.7	8.3	0.755	3.417	4.172	1.22	3.795	0.378



Sample No.		1
Initial	Water Content, %	35.8
	Dry Density, pcf	85.2
	Saturation, %	97.0
	Void Ratio	1.0141
	Diameter, in.	2.753
	Height, in.	5.900
At Test	Water Content, %	35.8
	Dry Density, pcf	85.2
	Saturation, %	97.0
	Void Ratio	1.0141
	Diameter, in.	2.753
	Height, in.	5.900
Strain rate, in./min.		1.000
Back Pressure, psi		0.000
Cell Pressure, psi		29.430
Fail. Stress, ksf		1.380
Ult. Stress, ksf		
σ_1 Failure, ksf		5.618
σ_3 Failure, ksf		4.238

Type of Test:

Unconsolidated Undrained

Sample Type: Undisturbed

Description: Gray Fat Clay

Assumed Specific Gravity= 2.75

Remarks: ASTM D2850

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

Project: Port Arthur Residence Office - USACE

Location: 13-B1002

Sample Number: 32

Depth: 62-64 ft.

Proj. No.: 92145005

Date Sampled:

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

TRIAxIAL COMPRESSION TEST

Unconsolidated Undrained

2/14/2014

4:18 PM

Date:**Client:** Quaternary Resource Investigations, L.L.C.**Project:** Port Arthur Residence Office - USACE**Project No.:** 92145005**Location:** 13-B1002**Depth:** 62-64 ft.**Sample Number:** 32**Description:** Gray Fat Clay**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.	150.760	150.760
Moisture content: Dry soil+tare, gms.	126.470	126.470
Moisture content: Tare, gms.	58.560	58.560
Moisture, %	35.8	35.8
Moist specimen weight, gms.	1066.86	
Diameter, in.	2.753	
Area, in.²	5.953	
Height, in.	5.900	
Wet density, pcf	115.7	
Dry density, pcf	85.2	
Void ratio	1.0141	
Saturation, %	97.0	

Test Readings for Specimen No. 1**Cell pressure** = 29.430 psi (4.238 ksf)**Back pressure** = 0.000 psi (0.000 ksf)**Strain rate, in./min.** = 1.000**Fail. Stress** = 1.380 ksf at reading no. 27

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	4.238	4.238	1.00	4.238	0.000
1	0.0015	0.000	0.0	0.0	0.000	4.238	4.238	1.00	4.238	0.000
2	0.0059	0.287	0.3	0.1	0.007	4.238	4.245	1.00	4.241	0.003
3	0.0102	4.684	4.7	0.2	0.113	4.238	4.351	1.03	4.294	0.057
4	0.0147	8.561	8.6	0.2	0.207	4.238	4.445	1.05	4.341	0.103
5	0.0190	12.594	12.6	0.3	0.304	4.238	4.542	1.07	4.390	0.152
6	0.0235	16.586	16.6	0.4	0.400	4.238	4.638	1.09	4.438	0.200
7	0.0279	20.608	20.6	0.5	0.496	4.238	4.734	1.12	4.486	0.248
8	0.0324	24.221	24.2	0.5	0.583	4.238	4.821	1.14	4.529	0.291
9	0.0369	27.700	27.7	0.6	0.666	4.238	4.904	1.16	4.571	0.333
10	0.0432	31.677	31.7	0.7	0.761	4.238	4.999	1.18	4.618	0.380
11	0.0502	35.564	35.6	0.9	0.853	4.238	5.091	1.20	4.664	0.427
12	0.0654	40.574	40.6	1.1	0.971	4.238	5.209	1.23	4.723	0.485
13	0.0884	44.129	44.1	1.5	1.052	4.238	5.289	1.25	4.764	0.526
14	0.1353	47.730	47.7	2.3	1.128	4.238	5.366	1.27	4.802	0.564
15	0.1883	50.980	51.0	3.2	1.194	4.238	5.432	1.28	4.835	0.597
16	0.2407	51.920	51.9	4.1	1.205	4.238	5.443	1.28	4.840	0.602
17	0.2931	54.393	54.4	5.0	1.250	4.238	5.488	1.30	4.863	0.625
18	0.3518	56.135	56.1	6.0	1.277	4.238	5.515	1.30	4.876	0.639
19	0.4097	58.015	58.0	6.9	1.306	4.238	5.544	1.31	4.891	0.653
20	0.4683	59.480	59.5	7.9	1.325	4.238	5.563	1.31	4.900	0.662
21	0.5268	61.035	61.0	8.9	1.345	4.238	5.583	1.32	4.910	0.672
22	0.5847	62.630	62.6	9.9	1.365	4.238	5.603	1.32	4.920	0.682
23	0.6426	63.316	63.3	10.9	1.365	4.238	5.603	1.32	4.920	0.682
24	0.7008	64.436	64.4	11.9	1.374	4.238	5.612	1.32	4.925	0.687
25	0.7301	64.325	64.3	12.4	1.364	4.238	5.601	1.32	4.920	0.682
26	0.7884	65.698	65.7	13.4	1.377	4.238	5.615	1.32	4.926	0.688
27	0.8468	66.609	66.6	14.4	1.380	4.238	5.618	1.33	4.928	0.690
28	0.8711	66.674	66.7	14.8	1.375	4.238	5.613	1.32	4.925	0.687

