BORING LOG NO. 09-B83

CLIENT: **USACE, Galveston District**
Galveston, Texas

PROJECT: **TO-0012 Pipeline Dredging, Cedar Bayou & Anahuac Channel, Volume I**

BORING LOCATION: **N: 13826758**
E: 3260974

SITE: **Cedar Bayou PA6**
Baytown, Texas

Approx. Surface Elevation: 15.0 feet

Graphic Log	DESCRIPTION	DEPTH, FEET	SAMPLES: USCS SYMBOL	SAMPLES: TYPE	SAMPLES: RECOVERY, IN	SAMPLES: SPT, BLOWS/FT	SAMPLES: CALIBRATED HAND PENETROM., TSF	SAMPLES: TORVANE, TSF	TESTS: MOISTURE CONTENT, %	TESTS: DRY DENSITY, PCF	TESTS: LIQUID LIMIT, %	TESTS: PLASTIC LIMIT, %	TESTS: PLASTICITY INDEX	TESTS: MINUS #200 SIEVE, %	TESTS: COMPRESSIVE STRENGTH, TSF	TESTS: FAILURE STRAIN, %	TESTS: CONFINING PRESSURE, PSI
	FILL: FAT CLAY light gray, gray and brown, medium stiff to stiff, high plasticity, moist, with broken shell and sand pockets	1	CH	ST	11		1.75		22								
		2															
		3		ST	13		1.0										
	11.0 4.0	4															
	FAT CLAY gray, dark gray, black, light brown and yellowish brown, medium stiff to hard, very high plasticity, moist - with ferrous stains 4 to 6 feet	5	CH	ST	14		4.0		19	108	75	23	52	92			
		6															
		7		ST	14		1.25		36								
		8															
		9		ST	9		1.25		40								
		10															
		11		ST	12		1.0		31								
		12															
	1.0 14.0	13		ST	13		2.25		23								
	LEAN CLAY brownish yellow, soft to medium stiff, medium plasticity, wet, with silt and sand pockets and seams - with calcareous nodules 14 to 16 feet	14															
		15	CL	ST	16		1.0		21	106	33	18	15	89			
		16															
		17		ST	13		1.0		26								
		18															
		19		ST	5		1.0		27								
		20															
		21		ST	17		0.5		64								
		22															
	-8.5 23.5	23		ST	12		0.75		28								
	FAT CLAY brownish yellow, reddish brown and light gray, stiff to very stiff, very high plasticity, moist - with blocky structure 30 to 34 feet	24	CH														
		25		ST	13		2.0		34								
		26															
		27		ST	11		1.5		27	95	63	25	38	100			
		28															
		29		ST	11		2.5		34								
		30															
		31		ST	16		2.75		31								
		32															
		33		ST	5		1.5										
		34															

Continued Next Page

STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION BETWEEN STRATA MAY BE MORE GRADUAL.

REMARKS: **Dry augered to 18 feet; wet rotary thereafter.**

WATER LEVEL OBSERVATIONS			
▽ **16 ft**	WD	▼**11.5 ft**	at 5 min
▼ **9 ft**	at 10 min	▼ **8 ft**	at 15 min

Terracon

DATE DRILLED
3/26/2010

PROJECT NUMBER
92105186-A

09-B83

EXHIBIT A-

BORING LOG NO. 09-B83

CLIENT: **USACE, Galveston District**
Galveston, Texas

PROJECT: **TO-0012 Pipeline Dredging, Cedar Bayou & Anahuac Channel, Volume I**

BORING LOCATION: **N: 13826758**
E: 3260974

SITE: **Cedar Bayou PA6**
Baytown, Texas

Approx. Surface Elevation: 15.0 feet

Graphic Log	DESCRIPTION	DEPTH, FEET	USCS SYMBOL	SAMPLES TYPE	RECOVERY, IN	SPT, BLOWS/FT	CALIBRATED HAND PENETROM., TSF	TORVANE, TSF	TESTS MOISTURE CONTENT, %	DRY DENSITY, PCF	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX	MINUS #200 SIEVE, %	COMPRESSIVE STRENGTH, TSF	FAILURE STRAIN, %	CONFINING PRESSURE, PSI
	FAT CLAY brownish yellow, reddish brown and light gray, stiff to very stiff, very high plasticity, moist - with slickensides 34 to 44 feet	35		ST	15		2.0		37	85	105	30	75	100			
		36															
		37		ST	4		2.25		36								
		38															
		39		ST	10		2.0		37								
		40															
		41		ST	19		2.0		38								
		42															
		43		ST	8		1.5		39								
		44															
		45		ST	16		2.25		41								
		46															
		47		ST	18		1.75		41								
		48															
		49		ST	17		2.0		37	86	100	34	66	94			
		50															
	-37.0 52.0	51		ST	3		2.0		58								
	SANDY LEAN CLAY black and gray, stiff, medium plasticity, moist, with sand seams -39.0 54.0	52	CL														
		53		ST	16		1.75		28								
		54															
		55	CH	ST	2		2.75		30								
	FAT CLAY gray, stiff to very stiff, very high plasticity, moist, homogeneous	56															
		57		ST	12		2.25		32	90	81	26	55				
		58															
		59		ST	30		1.75		34								
		60															
		61		ST	16		2.75		33								
		62															
		63		ST	10		1.75		30								
		64															
	-50.0 65.0	65		ST	0												
	Boring terminated at 65 feet.																

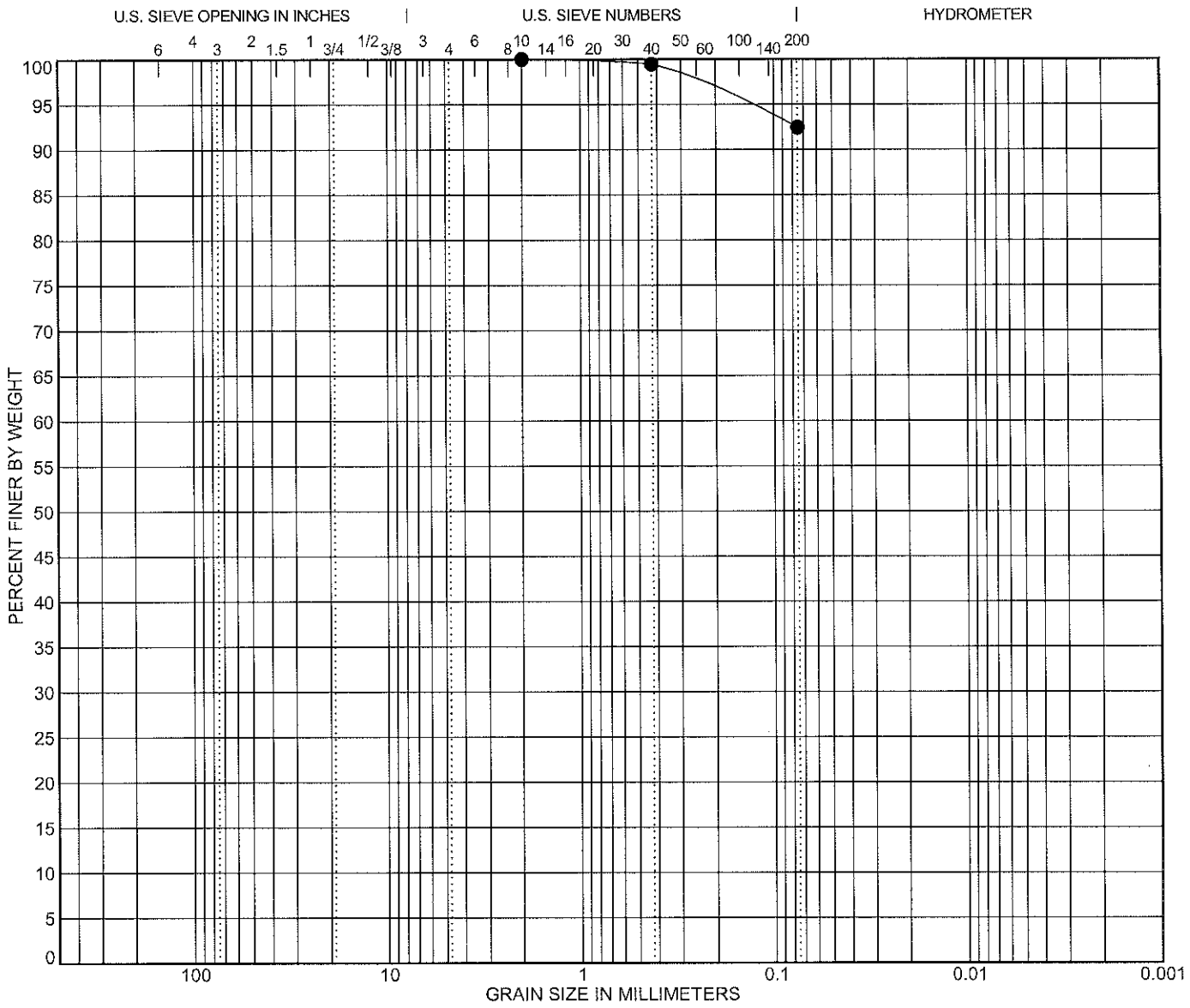
STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION BETWEEN STRATA MAY BE MORE GRADUAL.

REMARKS: **Dry augered to 18 feet; wet rotary thereafter.**

WATER LEVEL OBSERVATIONS			
▽ **16 ft**	WD	▼ **11.5 ft**	at 5 min
▼ **9 ft**	at 10 min	▼ **8 ft**	at 15 min

Terracon

DATE DRILLED	Page 2 of 2
3/26/2010	**09-B83**
PROJECT NUMBER	**EXHIBIT A-**
92105186-A	



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**09-B83**	**4.0**	**FAT CLAY(CH)**	**75**	**23**	**52**		

Percent Passing the Indicated Sieve

	Specimen Identification		3/8"	#4	#10	#40	#100	#200
●	**09-B83**	**4.0**			**100**	**99.4**		**92.4**

	Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**09-B83**	**4.0**	**2**				**0.0**	**7.6**	**92.4**	

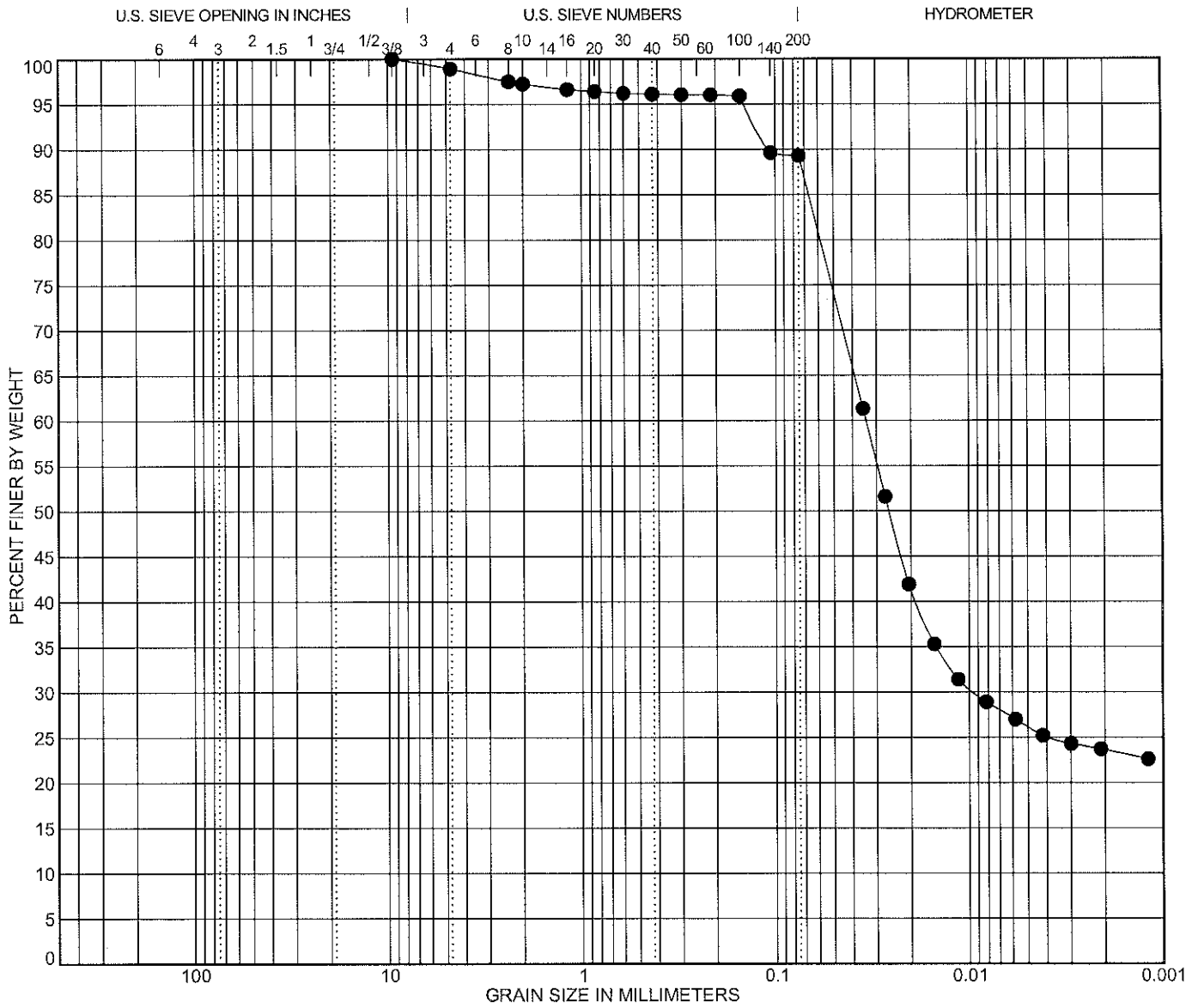
GRAIN SIZE DISTRIBUTION

TO-0012 Pipeline Dredging, Cedar Bayou & Anahuac Channel, Volume I
Baytown, Texas
Project Number 92105186-A

Terracon

Terracon Consultants, Inc.
11555 Clay Road, Suite 100
Houston, Texas 77043
Telephone: 713-690-8989
Fax: 713-690-8787

EXHIBIT ?



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**09-B83**	**14.0**	**LEAN CLAY(CL)**	**33**	**18**	**15**		

Percent Passing the Indicated Sieve

	Specimen Identification		3/8"	#4	#10	#40	#100	#200
●	**09-B83**	**14.0**	**100**	**98.9**	**97.2**	**96.1**	**95.9**	**89.3**

	Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**09-B83**	**14.0**	**9.5**	**0.026**	**0.009**		**1.1**	**9.6**	**65.7**	**23.6**

GRAIN SIZE DISTRIBUTION

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Baytown, Texas
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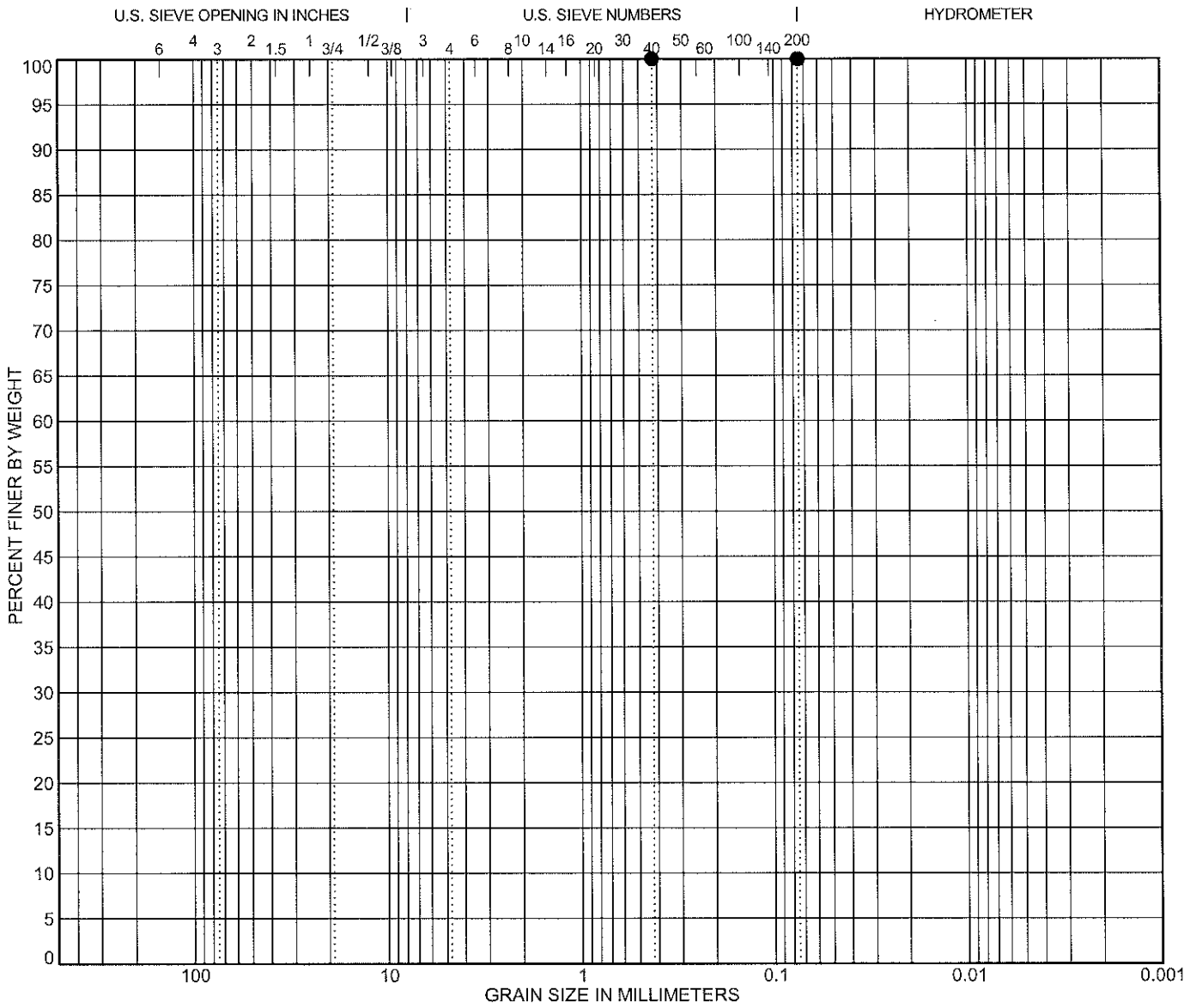

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**09-B83**	**26.0**	**FAT CLAY(CH)**	**63**	**25**	**38**		

Percent Passing the Indicated Sieve

	Specimen Identification		3/8"	#4	#10	#40	#100	#200
●	**09-B83**	**26.0**				**100**		**100**

	Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**09-B83**	**26.0**	**0.425**				**0.0**	**0.0**	**100.0**	

GRAIN SIZE DISTRIBUTION

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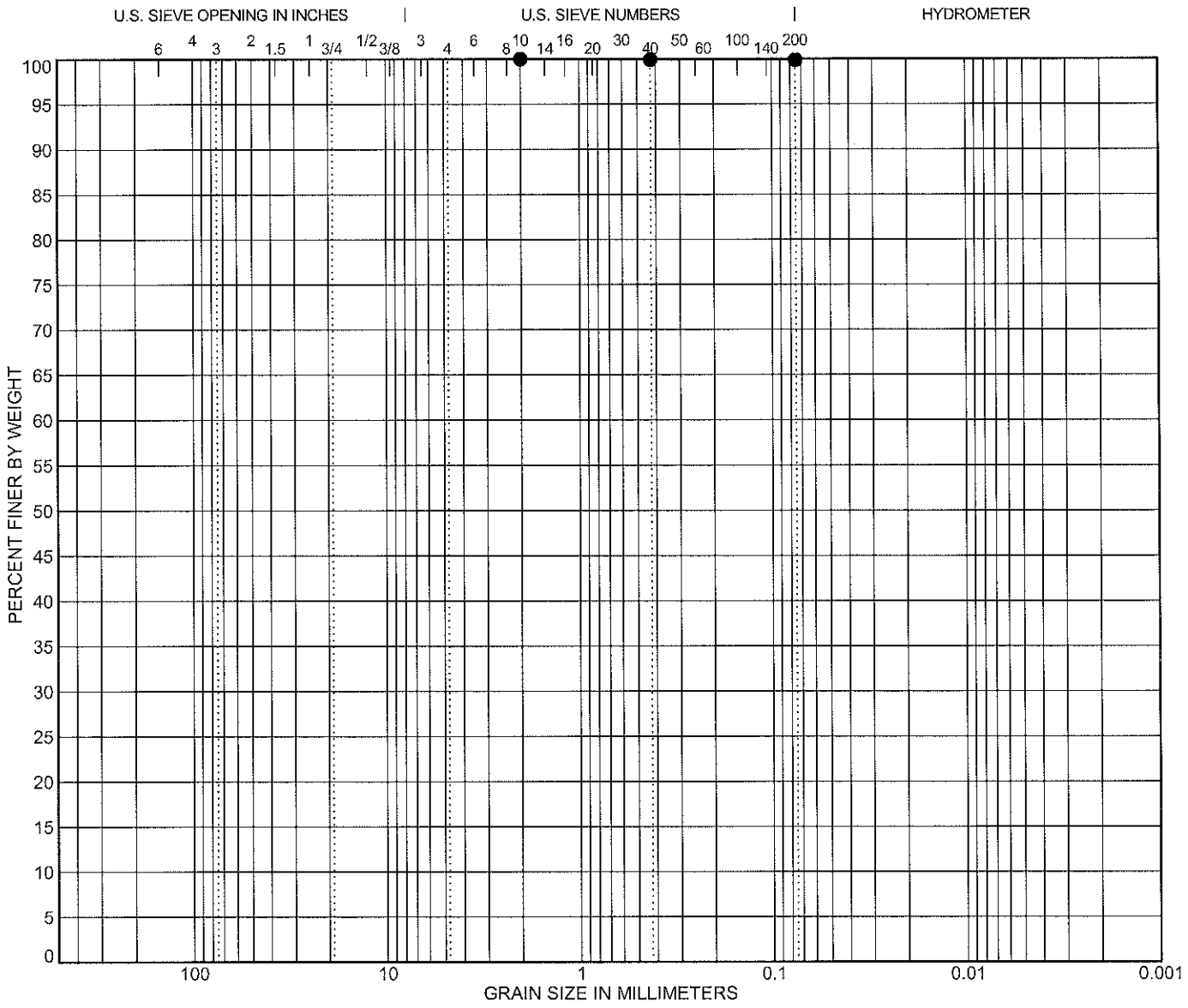

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**09-B83**	**34.0**	**FAT CLAY(CH)**	**105**	**30**	**75**		

Percent Passing the Indicated Sieve

	Specimen Identification		3/8"	#4	#10	#40	#100	#200
●	**09-B83**	**34.0**			**100**	**99.9**		**99.9**

	Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**09-B83**	**34.0**	**2**				**0.0**	**0.1**	**99.9**	

GRAIN SIZE DISTRIBUTION

TO-0012 Pipeline Dredging, Cedar Bayou & Anahuac Channel, Volume I
Baytown, Texas
Project Number 92105186-A

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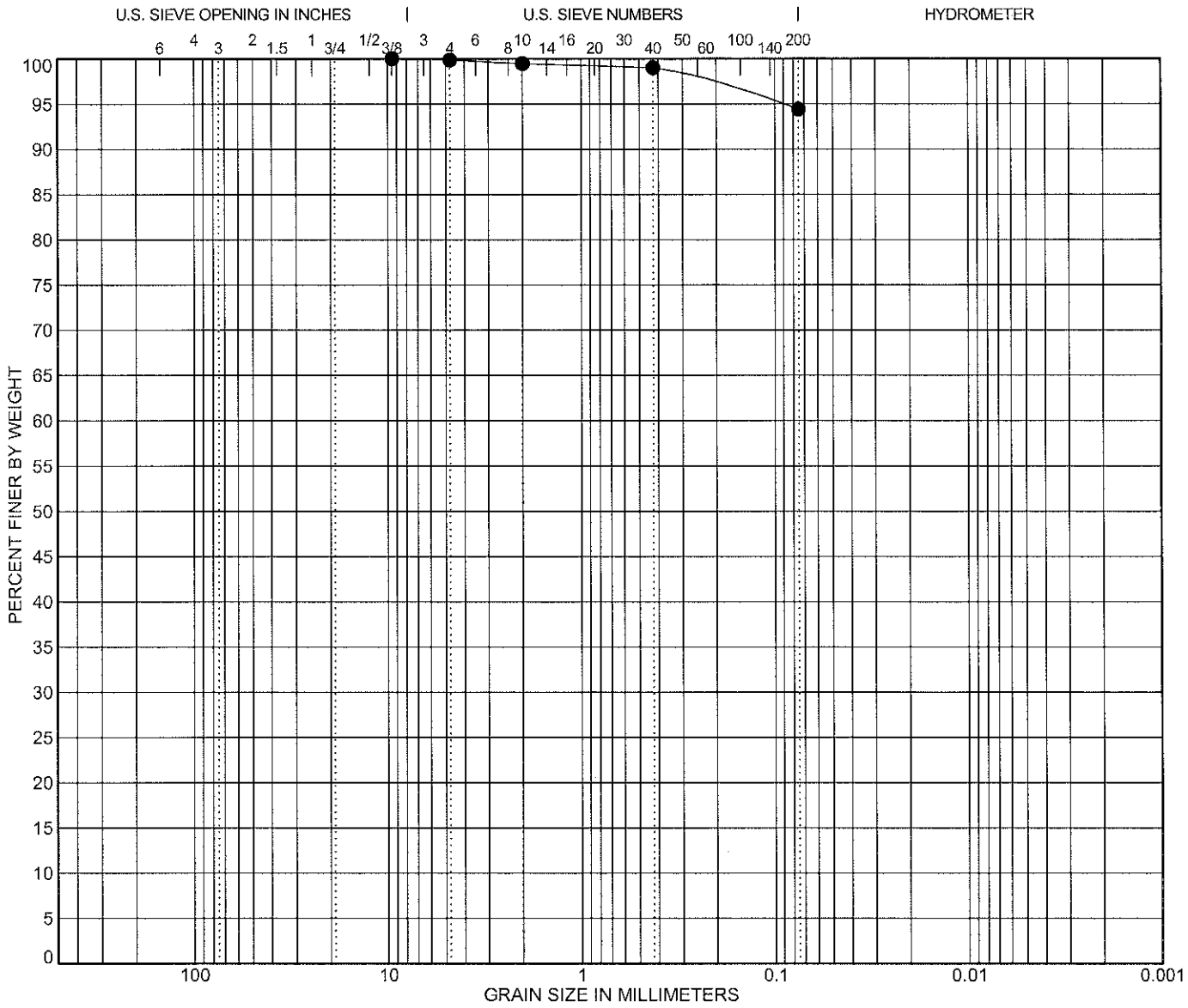

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**09-B83**	**48.0**	**FAT CLAY(CH)**	**100**	**34**	**66**		

Percent Passing the Indicated Sieve

	Specimen Identification		3/8"	#4	#10	#40	#100	#200
●	**09-B83**	**48.0**	**100**	**99.9**	**99.5**	**99**		**94.4**

	Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**09-B83**	**48.0**	**9.5**				**0.1**	**5.5**	**94.4**	

GRAIN SIZE DISTRIBUTION

TO-0012 Pipeline Dredging, Cedar Bayou & Anahuac Channel, Volume I
Baytown, Texas
Project Number 92105186-A

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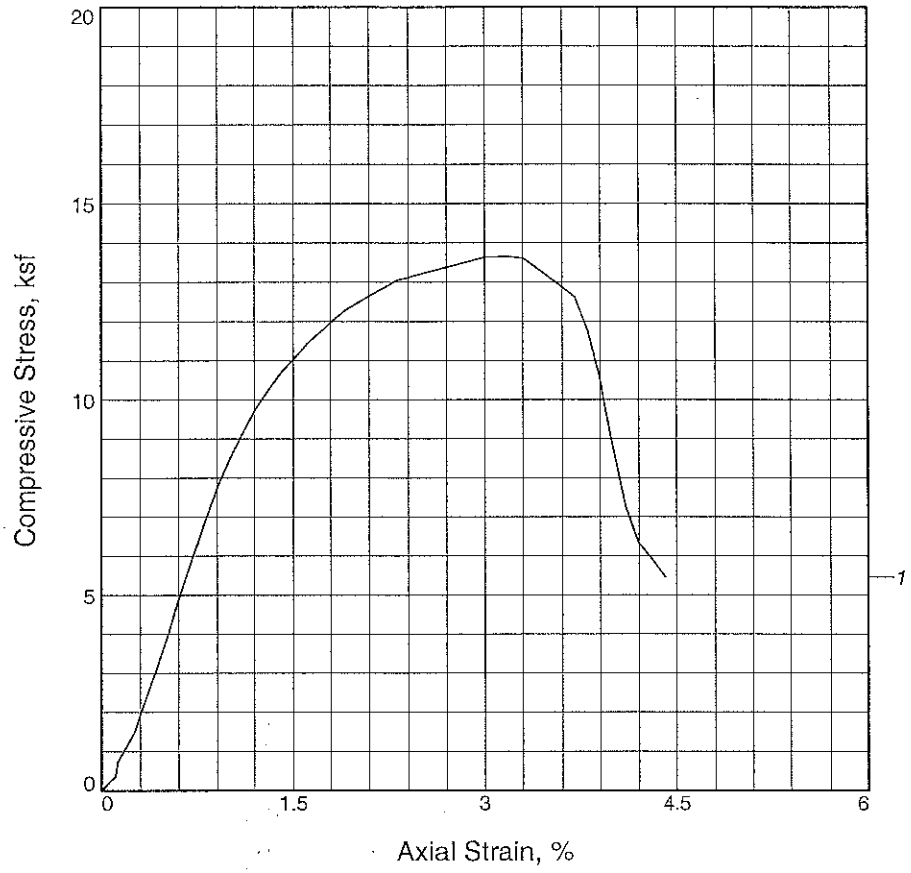
EXHIBIT ?

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, ksf	13.653			
Undrained shear strength, ksf	6.826			
Failure strain, %	3.2			
Strain rate, in./min.	0.055			
Water content, %	18.8			
Wet density, pcf	128.5			
Dry density, pcf	108.2			
Saturation, %	87.9			
Void ratio	0.5872			
Specimen diameter, in.	2.703			
Specimen height, in.	5.535			
Height/diameter ratio	2.05			

Description: Gray Fat Clay w/calc. nodules

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

Project No.: 92105186-B

Date Sampled:

Remarks:
ASTM D2166

Client: USACE

Project: Pipeline Dredging, Cedar Bayou and Anahuac Channel, PA 16.
Contract no. W912HY-09-D-0021, Task Order No. 0012

Location: 09-B83

Sample Number: 3 **Depth:** 4-6 ft.

UNCONFINED COMPRESSION TEST
Terracon, Inc.
Houston, TX

UNCONFINED COMPRESSION TEST

11/24/2010

Date:
Client: USACE
Project: Pipeline Dredging, Cedar Bayou and Anahuac Channel, PA 16.
Contract no. W912HY-09-D-0021, Task Order No. 0012
Project No.: 92105186-B
Location: 09-B83
Depth: 4-6 ft. **Sample Number:** 3
Description: Gray Fat Clay w/calc. 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.	271.230
Moisture content: Dry soil+tare, gms.	260.050
Moisture content: Tare, gms.	200.480
Moisture, %	18.8
Moist specimen weight, gms.	1071.03
Diameter, in.	2.703
Area, in.^{2}	5.738
Height, in.	5.535
Wet density, pcf	128.5
Dry density, pcf	108.2
Void ratio	0.5872
Saturation, %	87.9

Test Readings for Specimen No. 1

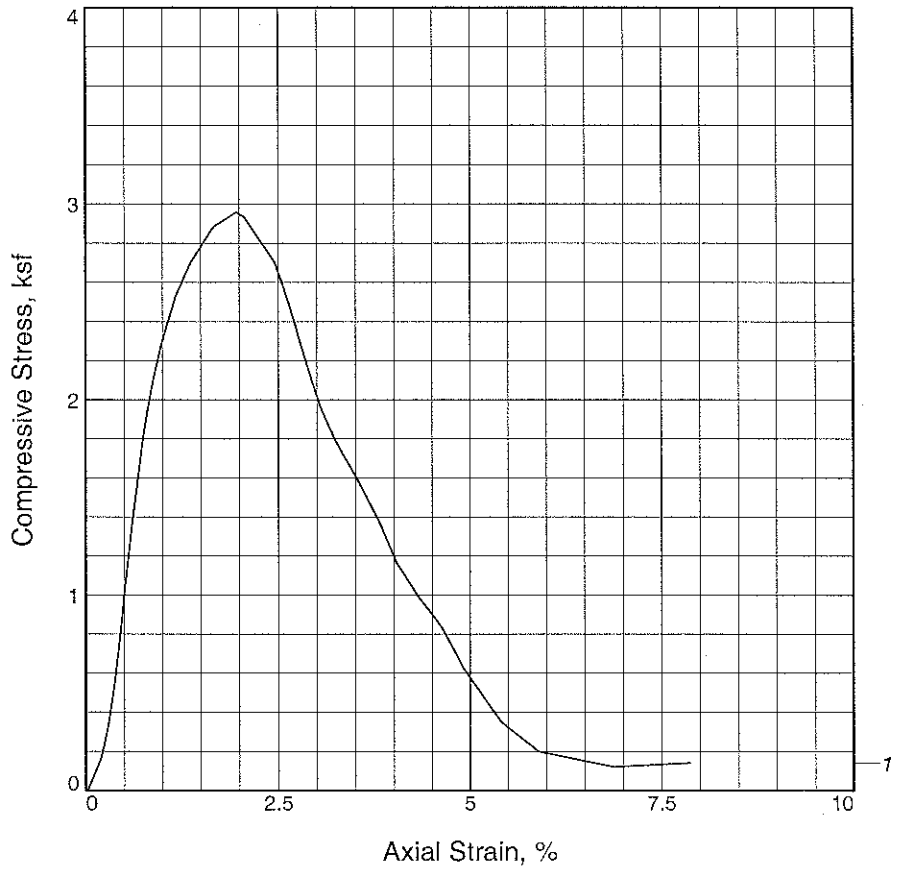
Strain rate, in./min. = 0.055
Unconfined compressive strength = 13.653 ksf **at reading no.** 18

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf
0	0.0150	0.000	0.0	0.0	0.000
1	0.0210	14.200	14.2	0.1	0.356
2	0.0217	28.836	28.8	0.1	0.723
3	0.0288	58.854	58.9	0.2	1.473
4	0.0340	93.660	93.7	0.3	2.342
5	0.0397	131.199	131.2	0.4	3.278
6	0.0440	160.786	160.8	0.5	4.014
7	0.0477	191.845	191.8	0.6	4.786
8	0.0520	223.318	223.3	0.7	5.567
9	0.0605	282.524	282.5	0.8	7.032
10	0.0657	316.438	316.4	0.9	7.868
11	0.0714	346.218	346.2	1.0	8.600
12	0.0822	395.260	395.3	1.2	9.798
13	0.0931	433.300	433.3	1.4	10.720
14	0.1045	463.644	463.6	1.6	11.447
15	0.1210	499.143	499.1	1.9	12.286

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf
16	0.1427	532.113	532.1	2.3	13.045
17	0.1815	560.597	560.6	3.0	13.645
18	0.1924	562.062	562.1	3.2	13.653
19	0.1981	560.787	560.8	3.3	13.607
20	0.2198	522.585	522.6	3.7	12.629
21	0.2255	487.641	487.6	3.8	11.772
22	0.2307	439.597	439.6	3.9	10.602
23	0.2363	367.032	367.0	4.0	8.842
24	0.2420	302.198	302.2	4.1	7.272
25	0.2472	263.242	263.2	4.2	6.329
26	0.2586	227.590	227.6	4.4	5.460

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, ksf	2.958			
Undrained shear strength, ksf	1.479			
Failure strain, %	2.0			
Strain rate, in./min.	0.055			
Water content, %	27.5			
Wet density, pcf	121.3			
Dry density, pcf	95.2			
Saturation, %	93.9			
Void ratio	0.8042			
Specimen diameter, in.	2.758			
Specimen height, in.	5.603			
Height/diameter ratio	2.03			

Description: Tan Fat Clay w/silt and sand pockets

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

Project No.: 92105186-B

Date Sampled:

Remarks:
ASTM D2166

Client: USACE

Project: Pipeline Dredging, Cedar Bayou and Anahuac Channel, PA 16. Contract no. W912HY-09-D-0021, Task Order No. 0012

Location: 09-B83

Sample Number: 14 **Depth:** 26-28 ft.

UNCONFINED COMPRESSION TEST
Terracon, Inc.
Houston, TX

UNCONFINED COMPRESSION TEST

11/5/2010

Date:
Client: USACE
Project: Pipeline Dredging, Cedar Bayou and Anahuac Channel, PA 16.
Contract no. W912HY-09-D-0021, Task Order No. 0012
Project No.: 92105186-B
Location: 09-B83
Depth: 26-28 ft. **Sample Number:** 14
Description: Tan Fat Clay w/silt and sand pockets
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.	201.390
Moisture content: Dry soil+tare, gms.	168.880
Moisture content: Tare, gms.	50.500
Moisture, %	27.5
Moist specimen weight, gms.	1065.66
Diameter, in.	2.758
Area, in.^{2}	5.974
Height, in.	5.603
Wet density, pcf	121.3
Dry density, pcf	95.2
Void ratio	0.8042
Saturation, %	93.9

Test Readings for Specimen No. 1

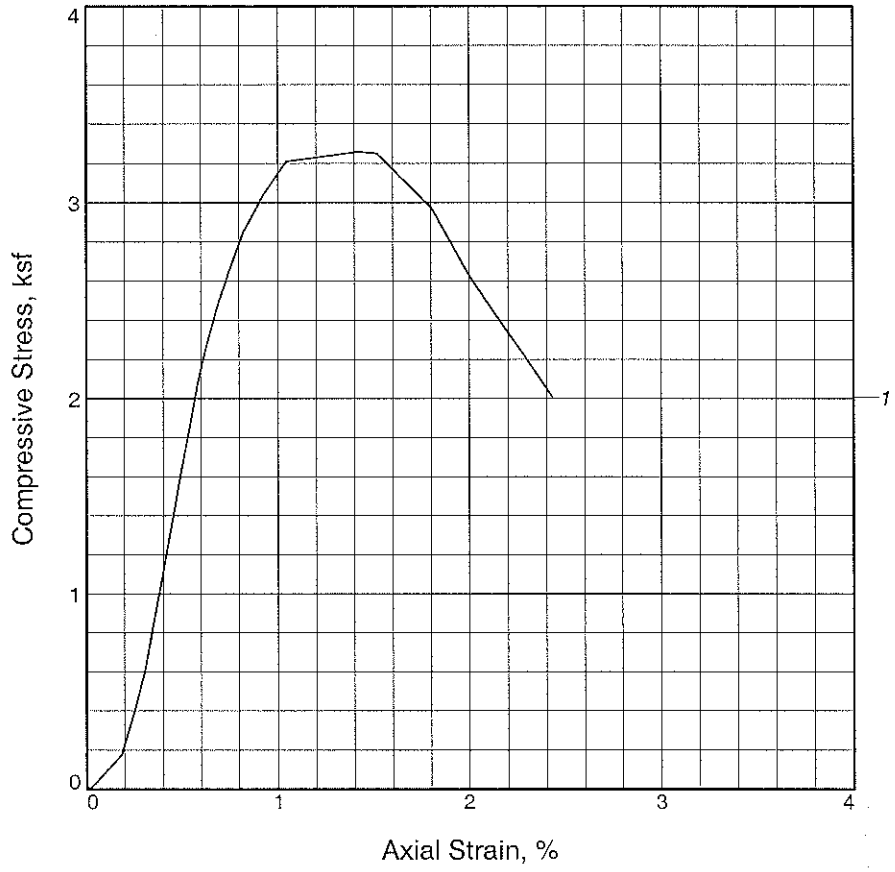
Strain rate, in./min. = 0.055
Unconfined compressive strength = 2.958 ksf **at reading no.** 18

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf
0	0.0000	0.000	0.0	0.0	0.000
1	0.0020	0.325	0.3	0.0	0.008
2	0.0106	6.677	6.7	0.2	0.161
3	0.0163	14.279	14.3	0.3	0.343
4	0.0206	22.681	22.7	0.4	0.545
5	0.0234	29.427	29.4	0.4	0.706
6	0.0263	36.502	36.5	0.5	0.876
7	0.0286	43.574	43.6	0.5	1.045
8	0.0315	50.840	50.8	0.6	1.219
9	0.0343	57.831	57.8	0.6	1.385
10	0.0372	64.523	64.5	0.7	1.545
11	0.0409	73.647	73.6	0.7	1.762
12	0.0452	81.369	81.4	0.8	1.945
13	0.0495	88.250	88.3	0.9	2.108
14	0.0551	95.587	95.6	1.0	2.281
15	0.0660	106.269	106.3	1.2	2.531

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf
16	0.0769	113.627	113.6	1.4	2.701
17	0.0934	121.651	121.7	1.7	2.883
18	0.1100	125.189	125.2	2.0	2.958
19	0.1157	124.179	124.2	2.1	2.931
20	0.1374	114.980	115.0	2.5	2.703
21	0.1487	105.319	105.3	2.7	2.471
22	0.1596	94.076	94.1	2.8	2.203
23	0.1705	84.053	84.1	3.0	1.964
24	0.1814	77.025	77.0	3.2	1.796
25	0.1979	68.186	68.2	3.5	1.585
26	0.2145	58.311	58.3	3.8	1.352
27	0.2258	50.512	50.5	4.0	1.168
28	0.2424	42.804	42.8	4.3	0.987
29	0.2589	36.405	36.4	4.6	0.837
30	0.2754	27.128	27.1	4.9	0.622
31	0.3029	15.382	15.4	5.4	0.351
32	0.3303	8.765	8.8	5.9	0.199
33	0.3852	5.413	5.4	6.9	0.121
34	0.4405	6.311	6.3	7.9	0.140

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, ksf	3.258			
Undrained shear strength, ksf	1.629			
Failure strain, %	1.4			
Strain rate, in./min.	0.055			
Water content, %	37.0			
Wet density, pcf	118.0			
Dry density, pcf	86.1			
Saturation, %	102.5			
Void ratio	0.9928			
Specimen diameter, in.	2.679			
Specimen height, in.	5.789			
Height/diameter ratio	2.16			

Description: Gray Fat Clay

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

Project No.: 92105186-B
Date Sampled:
Remarks:
ASTM D2166

Client: USACE

Project: Pipeline Dredging, Cedar Bayou and Anahuac Channel, PA 16.
Contract no. W912HY-09-D-0021, Task Order No. 0012
Location: 09-B83
Sample Number: 25 **Depth:** 48-50 ft.

UNCONFINED COMPRESSION TEST
Terracon, Inc.
Houston, TX

UNCONFINED COMPRESSION TEST

11/5/2010

Date:
Client: USACE
Project: Pipeline Dredging, Cedar Bayou and Anahuac Channel, PA 16.
Contract no. W912HY-09-D-0021, Task Order No. 0012
Project No.: 92105186-B
Location: 09-B83
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.	167.310
Moisture content: Dry soil+tare, gms.	135.540
Moisture content: Tare, gms.	49.700
Moisture, %	37.0
Moist specimen weight, gms.	1011.03
Diameter, in.	2.679
Area, in.^{2}	5.637
Height, in.	5.789
Wet density, pcf	118.0
Dry density, pcf	86.1
Void ratio	0.9928
Saturation, %	102.5

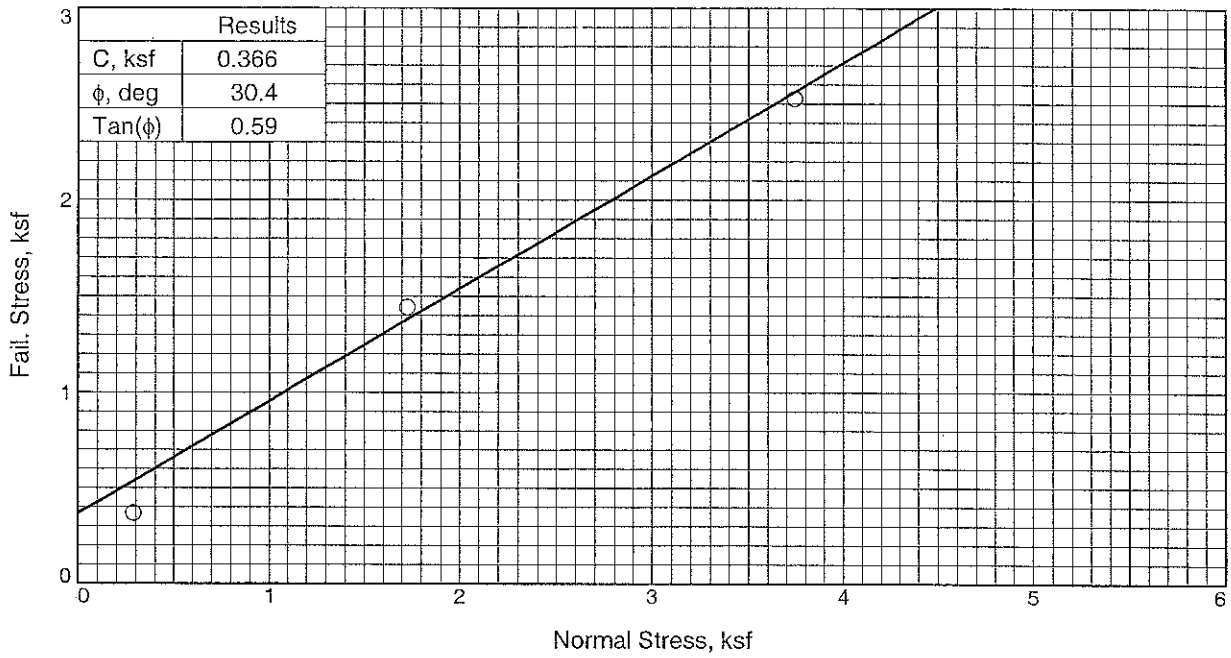
Test Readings for Specimen No. 1

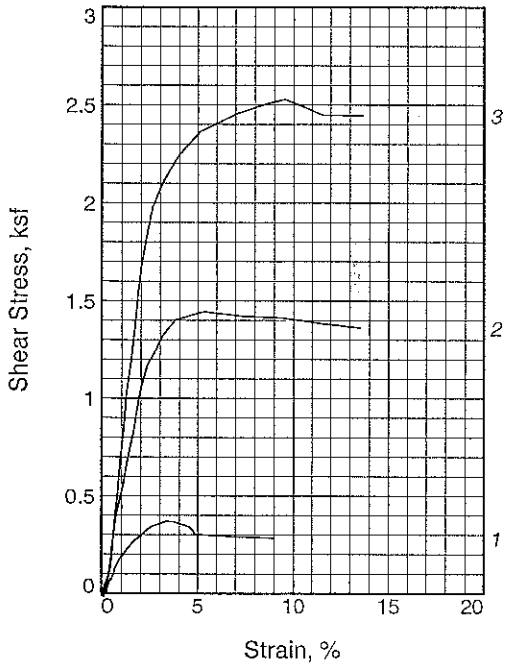
Strain rate, in./min. = 0.055
Unconfined compressive strength = 3.258 ksf **at reading no.** 18

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf
0	0.0000	0.000	0.0	0.0	0.000
1	0.0003	0.321	0.3	0.0	0.008
2	0.0013	0.182	0.2	0.0	0.005
3	0.0107	6.939	6.9	0.2	0.177
4	0.0150	16.697	16.7	0.3	0.425
5	0.0178	24.066	24.1	0.3	0.613
6	0.0202	32.865	32.9	0.3	0.837
7	0.0230	43.465	43.5	0.4	1.106
8	0.0259	53.815	53.8	0.4	1.369
9	0.0287	64.324	64.3	0.5	1.635
10	0.0316	73.920	73.9	0.5	1.878
11	0.0339	82.466	82.5	0.6	2.094
12	0.0368	90.141	90.1	0.6	2.288
13	0.0396	97.031	97.0	0.7	2.462
14	0.0439	105.465	105.5	0.8	2.674
15	0.0476	112.606	112.6	0.8	2.853

Test Readings for Specimen No. 4

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf
16	0.0533	119.991	120.0	0.9	3.037
17	0.0604	126.957	127.0	1.0	3.209
18	0.0822	129.367	129.4	1.4	3.258
19	0.0879	129.184	129.2	1.5	3.250
20	0.1044	118.462	118.5	1.8	2.972
21	0.1153	105.582	105.6	2.0	2.644
22	0.1262	94.649	94.6	2.2	2.365
23	0.1408	80.540	80.5	2.4	2.007





Sample No.		1	2	3
Initial	Water Content, %	21.3	21.3	21.3
	Dry Density, pcf	105.7	105.5	106.3
	Saturation, %	95.1	94.6	96.5
	Void Ratio	0.6129	0.6161	0.6038
	Diameter, in.	2.500	2.500	2.500
	Height, in.	1.000	1.000	1.000
At Test	Water Content, %	22.5	21.1	21.2
	Dry Density, pcf	105.7	105.5	106.3
	Saturation, %	100.0	93.7	95.7
	Void Ratio	0.6129	0.6161	0.6038
	Diameter, in.	2.500	2.500	2.500
	Height, in.	1.000	1.000	1.000
Normal Stress, ksf		0.288	1.728	3.744
Fail. Stress, ksf		0.369	1.444	2.528
Strain, %		3.3	5.3	9.5
Ult. Stress, ksf				
Strain, %				
Strain rate, in./min.		0.001	0.001	0.001

Sample Type: Undisturbed
Description: Brown Lean Clay w/silt

LL= 33 **PL=** 18 **PI=** 15
Assumed Specific Gravity= 2.73
Remarks: ASTM D3080
Specific gravity assumed
Percent pass #200 sieve = 99.9

Client: USACE

Project: Pipeline Dredging, Cedar Bayou and Anahuac Channel, PA 16.
Contract no. W912HY-09-D-0021, Task Order No. 0012
Location: 09-B83
Sample Number: 8 **Depth:** 14-16 ft.
Proj. No.: 92105186 **Date Sampled:**

DIRECT SHEAR TEST REPORT
Terracon, Inc.
Houston, TX

DIRECT SHEAR TEST

11/29/2010

Date:
Client: USACE
Project: Pipeline Dredging, Cedar Bayou and Anahuac Channel, PA 16.
Contract no. W912HY-09-D-0021, Task Order No. 0012
Project No.: 92105186
Location: 09-B83
Depth: 14-16 ft. **Sample Number:** 8
Description: Brown Lean Clay w/silt
Remarks: ASTM D3080
Specific gravity assumed
Percent pass #200 sieve = 99.9
Type of Sample: Undisturbed
Assumed Specific Gravity=2.73 **LL=**33 **PL=**18 **PI=**15

Parameters for Specimen No. 1

Specimen Parameter	Initial	Consolidated	Final
Moisture content: Moist soil+tare, gms.	184.960		156.480
Moisture content: Dry soil+tare, gms.	161.190		138.690
Moisture content: Tare, gms.	49.840		59.450
Moisture, %	21.3	22.5	22.5
Moist specimen weight, gms.	165.22		
Diameter, in.	2.500	2.500	
Area, in.^{2}	4.909	4.909	
Height, in.	1.000	1.000	
Net decrease in height, in.		0.000	
Wet density, pcf	128.2	129.4	
Dry density, pcf	105.7	105.7	
Void ratio	0.6129	0.6129	
Saturation, %	95.1	100.0	

Test Readings for Specimen No. 1

Normal stress = 0.288 ksf
Strain rate, in./min. = 0.001
Fail. Stress = 0.369 ksf **at reading no.** 18

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Strain %	Shear Stress ksf
0	0.0000	0.841	0.0	0.0	0.000
1	0.0005	0.854	0.0	0.0	0.000
2	0.0070	0.666	-0.2	0.3	-0.005
3	0.0075	1.758	0.9	0.3	0.027
4	0.0090	2.669	1.8	0.4	0.054
5	0.0120	3.430	2.6	0.5	0.076
6	0.0145	4.340	3.5	0.6	0.103
7	0.0165	5.307	4.5	0.7	0.131
8	0.0195	6.014	5.2	0.8	0.152
9	0.0220	6.790	5.9	0.9	0.175
10	0.0270	7.695	6.9	1.1	0.201
11	0.0315	8.473	7.6	1.3	0.224

Test Readings for Specimen No. 2

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Strain %	Shear Stress ksf
12	0.0375	9.446	8.6	1.5	0.252
13	0.0420	10.170	9.3	1.7	0.274
14	0.0510	10.982	10.1	2.0	0.297
15	0.0571	11.890	11.0	2.3	0.324
16	0.0661	12.623	11.8	2.6	0.346
17	0.0811	13.326	12.5	3.2	0.366
18	0.0826	13.412	12.6	3.3	0.369
19	0.0916	13.343	12.5	3.7	0.367
20	0.1126	12.551	11.7	4.5	0.344
21	0.1186	11.864	11.0	4.7	0.323
22	0.1216	11.168	10.3	4.9	0.303
23	0.1726	10.776	9.9	6.9	0.291
24	0.2237	10.553	9.7	8.9	0.285

Parameters for Specimen No. 2

Specimen Parameter	Initial	Consolidated	Final
Moisture content: Moist soil+tare, gms.	184.960		225.930
Moisture content: Dry soil+tare, gms.	161.190		197.940
Moisture content: Tare, gms.	49.840		65.520
Moisture, %	21.3	21.1	21.1
Moist specimen weight, gms.	164.89		
Diameter, in.	2.500	2.500	
Area, in.^{2}	4.909	4.909	
Height, in.	1.000	1.000	
Net decrease in height, in.		0.000	
Wet density, pcf	128.0	127.7	
Dry density, pcf	105.5	105.5	
Void ratio	0.6161	0.6161	
Saturation, %	94.6	93.7	

Test Readings for Specimen No. 2

Normal stress = 1.728 ksf

Strain rate, in./min. = 0.001

Fail. Stress = 1.444 ksf **at reading no.** 21

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Strain %	Shear Stress ksf
0	0.0000	0.000	0.0	0.0	0.000
1	0.0000	0.179	0.2	0.0	0.005
2	0.0005	-0.087	-0.1	0.0	-0.003
3	0.0090	3.077	3.1	0.4	0.090
4	0.0115	5.901	5.9	0.5	0.173
5	0.0130	8.652	8.7	0.5	0.254
6	0.0150	11.113	11.1	0.6	0.326
7	0.0180	13.580	13.6	0.7	0.398
8	0.0220	16.234	16.2	0.9	0.476
9	0.0271	19.171	19.2	1.1	0.562
10	0.0316	22.491	22.5	1.3	0.660
11	0.0361	25.520	25.5	1.4	0.749

Test Readings for Specimen No. 3

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Strain %	Shear Stress ksf
12	0.0406	28.470	28.5	1.6	0.835
13	0.0436	31.303	31.3	1.7	0.918
14	0.0481	34.532	34.5	1.9	1.013
15	0.0526	37.110	37.1	2.1	1.089
16	0.0586	39.894	39.9	2.3	1.170
17	0.0691	42.414	42.4	2.8	1.244
18	0.0781	44.981	45.0	3.1	1.320
19	0.0946	47.755	47.8	3.8	1.401
20	0.1246	48.925	48.9	5.0	1.435
21	0.1336	49.214	49.2	5.3	1.444
22	0.1847	48.445	48.4	7.4	1.421
23	0.2357	48.158	48.2	9.4	1.413
24	0.2867	47.188	47.2	11.5	1.384
25	0.3378	46.456	46.5	13.5	1.363

Parameters for Specimen No. 3

Specimen Parameter	Initial	Consolidated	Final
Moisture content: Moist soil+tare, gms.	184.960		185.220
Moisture content: Dry soil+tare, gms.	161.190		156.800
Moisture content: Tare, gms.	49.840		22.590
Moisture, %	21.3	21.2	21.2
Moist specimen weight, gms.	166.15		
Diameter, in.	2.500	2.500	
Area, in.^{2}	4.909	4.909	
Height, in.	1.000	1.000	
Net decrease in height, in.		0.000	
Wet density, pcf	128.9	128.8	
Dry density, pcf	106.3	106.3	
Void ratio	0.6038	0.6038	
Saturation, %	96.5	95.7	

Test Readings for Specimen No. 3

Normal stress = 3.744 ksf

Strain rate, in./min. = 0.001

Fail. Stress = 2.528 ksf **at reading no.** 21

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Strain %	Shear Stress ksf
0	0.0000	0.000	0.0	0.0	0.000
1	0.0000	-0.398	-0.4	0.0	-0.012
2	0.0035	-0.562	-0.6	0.1	-0.016
3	0.0110	4.563	4.6	0.4	0.134
4	0.0135	9.074	9.1	0.5	0.266
5	0.0165	13.641	13.6	0.7	0.400
6	0.0200	17.988	18.0	0.8	0.528
7	0.0230	22.882	22.9	0.9	0.671
8	0.0271	28.349	28.3	1.1	0.832
9	0.0316	35.059	35.1	1.3	1.028
10	0.0376	41.082	41.1	1.5	1.205

Test Readings for Specimen No. 3

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Strain %	Shear Stress ksf
11	0.0421	46.904	46.9	1.7	1.376
12	0.0466	52.719	52.7	1.9	1.547
13	0.0511	57.442	57.4	2.0	1.685
14	0.0571	62.152	62.2	2.3	1.823
15	0.0646	67.264	67.3	2.6	1.973
16	0.0781	71.574	71.6	3.1	2.100
17	0.0976	76.165	76.2	3.9	2.234
18	0.1276	80.555	80.6	5.1	2.363
19	0.1787	83.799	83.8	7.1	2.458
20	0.2177	85.508	85.5	8.7	2.508
21	0.2387	86.167	86.2	9.5	2.528
22	0.2897	83.449	83.4	11.6	2.448
23	0.3408	83.423	83.4	13.6	2.447

Project name: TO-0012 Pipeline Dredging, Volume I, Cedar Bayou PA 6																							Client: USACE, Galveston District																				Terracon Project # : 92105186-A							
Boring	Depth	Field tests			Atterberg Limits			Grain Size Analysis															USCS Symbol (ASTM 2487)	Wc	γd	Strength tests																										
								Percent Pasing Sieve																		Direct Shear Test					Unconfined Compression				UU Triaxial Test				CU Triaxial Test									
		PP	TV	SPTn	LL	PL	PI	3/4"	3/8"	4	8	10	16	20	30	40	50	70	100	140	200				C	φ	Wc	γd	Symbol	C	Wc	γd	Symbol	C	Wc	γd	Symbol	C	φ	c'	φ'	Wc	γd	Symbol
	ft	tsf	tsf	bl/ft	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%		%	pcf	ksf	°	%	pcf		ksf	%	pcf		ksf	%	pcf		ksf	°	ksf	°	%	pcf	
09-B83	0-2	1.75																				CH**	22																					
	4-6	4.00			75	23	52					100				99					92	CH	19						6.8	19	108	CH**											
	6-8	1.25																				CH**	36																					
	8-10	1.25																				CH**	40																					
	10-12	1.00																				CH**	31																					
	12-14	2.25																				CH**	23																					
	14-16	1.00			33	18	15		100	99	98	97	97	96	96	96	96	96	96	90	89	CL	21		0.4	30	21	106	CL**															
	16-18	1.00																				CH**	26																					
	18-20	1.00																				CH**	27																					
	20-22	0.50																				CH**	64																					
	22-24	0.75																				CL**	28																					
	24-26	2.00																				CH**	34																					
	26-28	1.50			63	25	38		100							100					100	CH	28						1.5	28	95	CH**											
	28-30	2.50																				CH**	34																					
	30-32	2.75																				CH**	31																					
	34-36	2.00			105	30	75					100				100					100	CH	37	85																					
	36-38	2.25																				CH**	36																					
	38-40	2.00																				CH**	37																					
	40-42	2.00																				CH**	38																					
	42-44	1.50																				CH**	39																					
	44-46	2.25																				CH**	41																					
	46-48	1.75																				CH**	41																					
	48-50	2.00			100	34	66		100	100		100				99					94	CH	37						1.6	37	86	CH**											
	50-52	2.00																				CH**	58																					
	52-54	1.75																				CL**	28																					
	54-56	2.75																				CH**	30																					
	56-58	2.25			81	26	55															CH*	32	90																				
	58-60	1.75																				CH**	34																					
	60-62	2.75																				CH**	33																					
	62-64	1.75																				CH**	30																					