BORING LOG NO. 09-B81

CLIENT:	**USACE, Galveston District Galveston, Texas**	PROJECT:	**TO-0012 Pipeline Dredging, Cedar Bayou & Anahuac Channel, Volume I**
BORING LOCATION:	**N: 13827184 E: 3259473**	SITE:	**Cedar Bayou PA6 Baytown, Texas**

Graphic Log	DESCRIPTION	DEPTH, FEET	USCS SYMBOL	TYPE	RECOVERY, IN	SPT, BLOWS/FT	CALIBRATED HAND PENETROM., TSF	TORVANE, TSF	MOISTURE CONTENT, %	DRY DENSITY, PCF	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX	MINUS #200 SIEVE, %	COMPRESSIVE STRENGTH, TSF	FAILURE STRAIN, %	CONFINING PRESSURE, PSI
	Approx. Surface Elevation: 15.4 feet																
	FILL: FAT CLAY w/SAND light gray, dark gray reddish brown and yellowish brown, stiff to very stiff, high to very high plasticity, moist	1	CH	ST	10		1.5		27	98	52	16	36	78			
		2															
		3		ST	16		1.5		23								
		4															
		5		ST	8		2.25		23		68	23	45	75			
		6															
	7.9 7.5	7		SS	6	1			35								
	FAT CLAY dark gray, yellowish brown and light brown, medium stiff to very stiff, very high plasticity, moist, with calcareous nodules	8	CH														
		9		SS	9	5			38								
		10															
		11		ST	8		1.75		31								
		12															
		13		ST	12		1.5		24	102	74	23	51	100			
		14															
		15		ST	22		2.75		35								
		16															
		17		ST	11		1.0		23								
	-2.6 18.0	18															
	LEAN CLAY light brown and light gray, medium stiff to stiff, high plasticity, moist, with silt pockets	19	CL	ST	17		2.0		22	104	44	18	26	97			
		20															
		21		ST	24		1.0		30								
		22															
	-7.6 23.0	23		ST	12		1.5		25								
	FAT CLAY brown, light brown, reddish brown, gray and dark bluish gray, medium stiff to very stiff, very high plasticity, moist	24	CH														
		25		ST	14		1.5		37								
		26															
		27		ST	11		2.5		33								
		28															
		29		ST	16		2.25		35	91	99	30	69				
		30															
		31		ST	18		2.75		31								
		32															
		33		ST	10		2.25		40								
		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 10 feet; wet rotary thereafter because of bore hole walls squeezing off.**

WATER LEVEL OBSERVATIONS		Terracon	DATE DRILLED	Page 1 of 2
▽	▼		3/27/2010	09-B81
▼	▼		PROJECT NUMBER	EXHIBIT A-
FREE WATER WAS NOT OBSERVED DURING DRY DRILLING OPERATIONS			92105186-A	

BORING LOG NO. 09-B81

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

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

BORING LOCATION: **N: 13827184 E: 3259473**

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

Approx. Surface Elevation: 15.4 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 brown, light brown, reddish brown, gray and dark bluish gray, medium stiff to very stiff, very high plasticity, moist - with slickensides 34 to 36 feet	35		ST	18		2.0		32	89	97	30	67	100			
		36															
		37		ST	12		2.25		39								
		38															
		39		ST	18		2.0		31								
		40															
		41		ST	23		1.75		39								
	- with slickensides 42 to 44 feet	42															
		43		ST	5		1.75		45								
		44															
		45		ST	20		1.5		40	82	101	30	71				
		46															
		47		ST	5		1.25		41								
	- with slickensides 48 to 50 feet	48															
		49		ST	20		2.0		29								
		50															
		51		ST	22		2.25		25								
		52															
	- interlayered with thin silt layers 52 to 54 feet	53		ST	4		0.75		26								
		54															
		55		ST	16		2.0		32	91	81	25	56	97			
		56															
		57		ST	4		2.0		26								
	-42.6 58.0	58															
	LEAN CLAY bluish gray, stiff, high plasticity, moist, with silt seams	59	CL	ST	20		1.25		31		48	22	26	99			
	-44.6 60.0	60															
	FAT CLAY bluish gray, very soft to stiff, high plasticity, moist	61	CH	SS	5	1			31								
		62															
		63		ST	22		1.0		36								
		64															
	-49.6 65.0	65		ST	3		1.25										
	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 10 feet; wet rotary thereafter because of bore hole walls squeezing off.**

WATER LEVEL OBSERVATIONS

FREE WATER WAS NOT OBSERVED DURING DRY DRILLING OPERATIONS

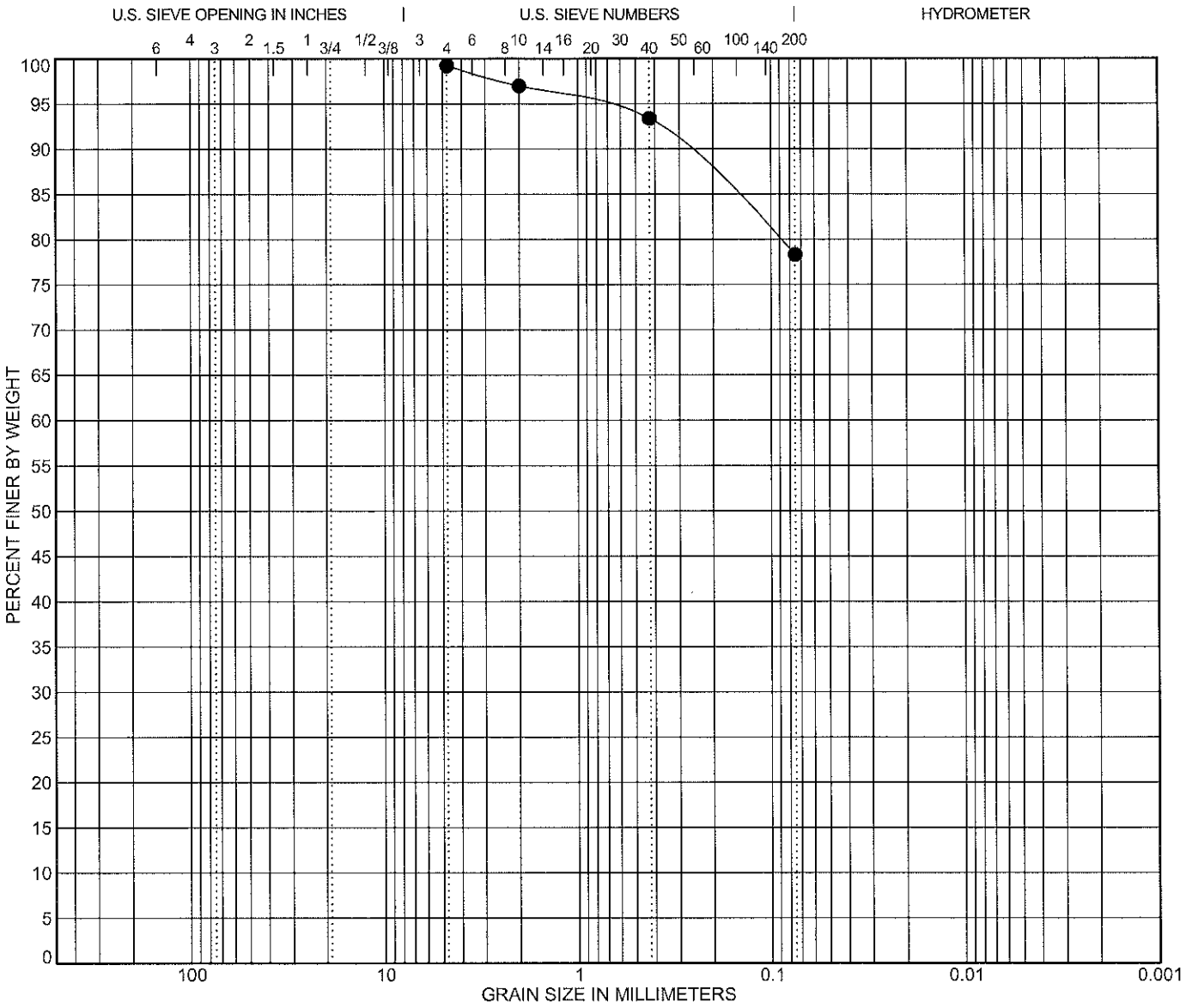
Terracon

DATE DRILLED 3/27/2010

PROJECT NUMBER 92105186-A

09-B81

EXHIBIT A-



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	LL	PL	PI	Cc	Cu
● **09-B81**	**0.0**	**FAT CLAY with SAND(CH)**	**52**	**16**	**36**		

Percent Passing the Indicated Sieve

Specimen Identification		3/8"	#4	#10	#40	#100	#200
● **09-B81**	**0.0**		**99.2**	**97**	**93.4**		**78.3**

Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
● **09-B81**	**0.0**	**4.75**				**0.0**	**20.9**	**78.3**	

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
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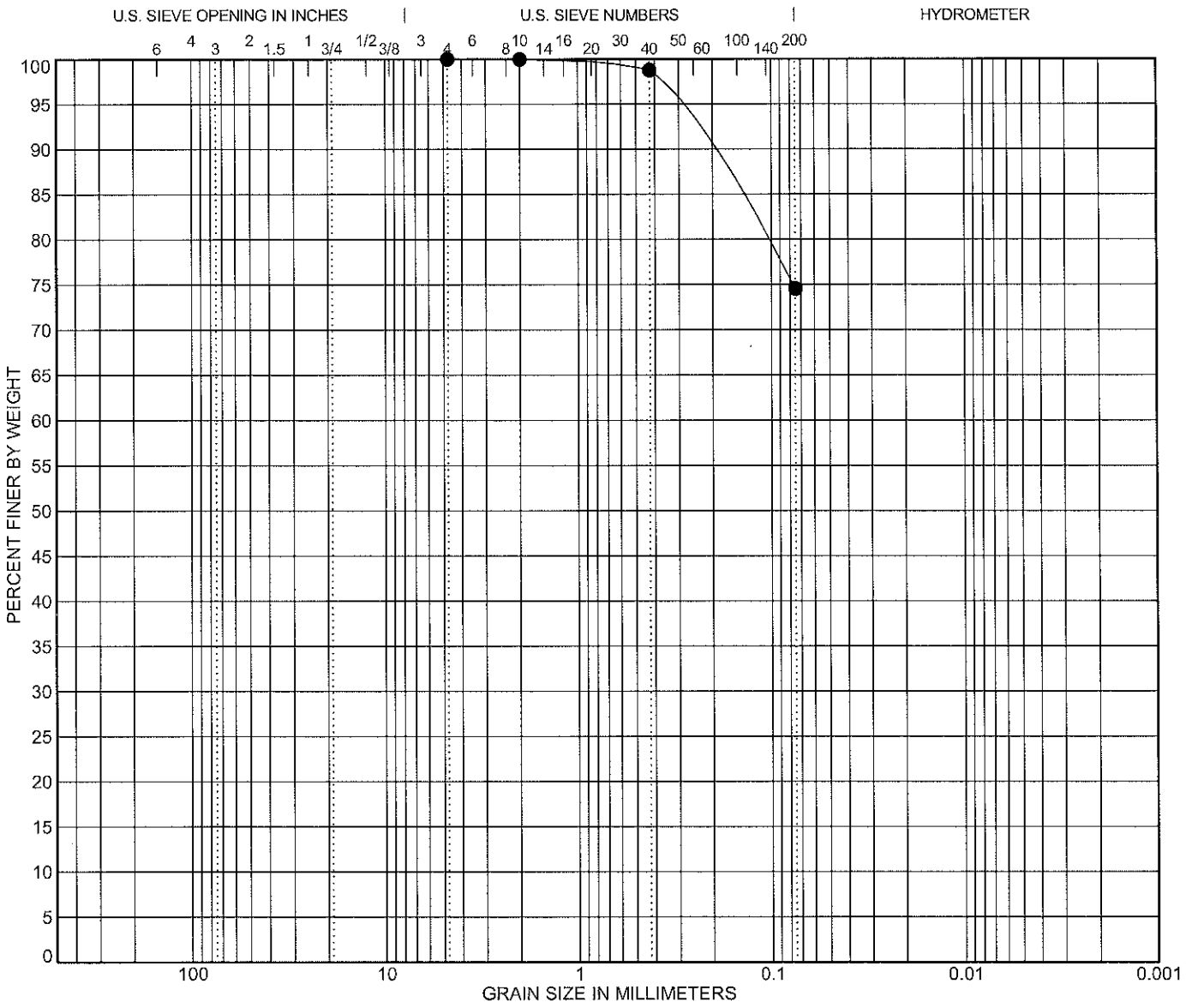

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**09-B81**	**4.0**	**FAT CLAY with SAND(CH)**	**68**	**23**	**45**		

Percent Passing the Indicated Sieve

	Specimen Identification		3/8"	#4	#10	#40	#100	#200
●	**09-B81**	**4.0**		**100**	**100**	**98.8**		**74.5**

	Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**09-B81**	**4.0**	**4.75**				**0.0**	**25.5**	**74.5**	

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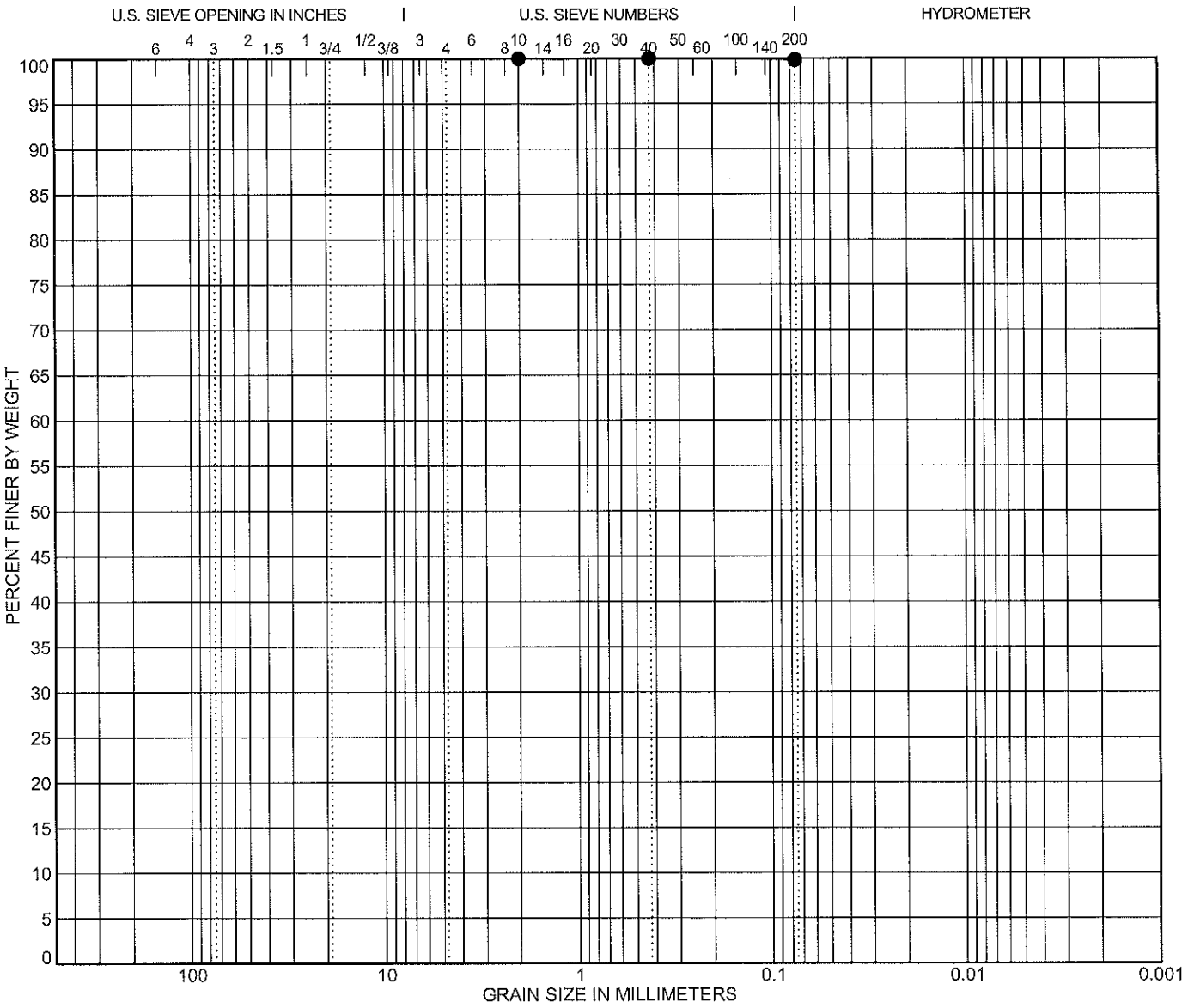

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**09-B81**	**12.0**	**FAT CLAY(CH)**	**74**	**23**	**51**		

Percent Passing the Indicated Sieve

	Specimen Identification		3/8"	#4	#10	#40	#100	#200
●	**09-B81**	**12.0**			**100**	**100**		**99.8**

	Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**09-B81**	**12.0**	**2**				**0.0**	**0.2**	**99.8**	

GRAIN SIZE DISTRIBUTION

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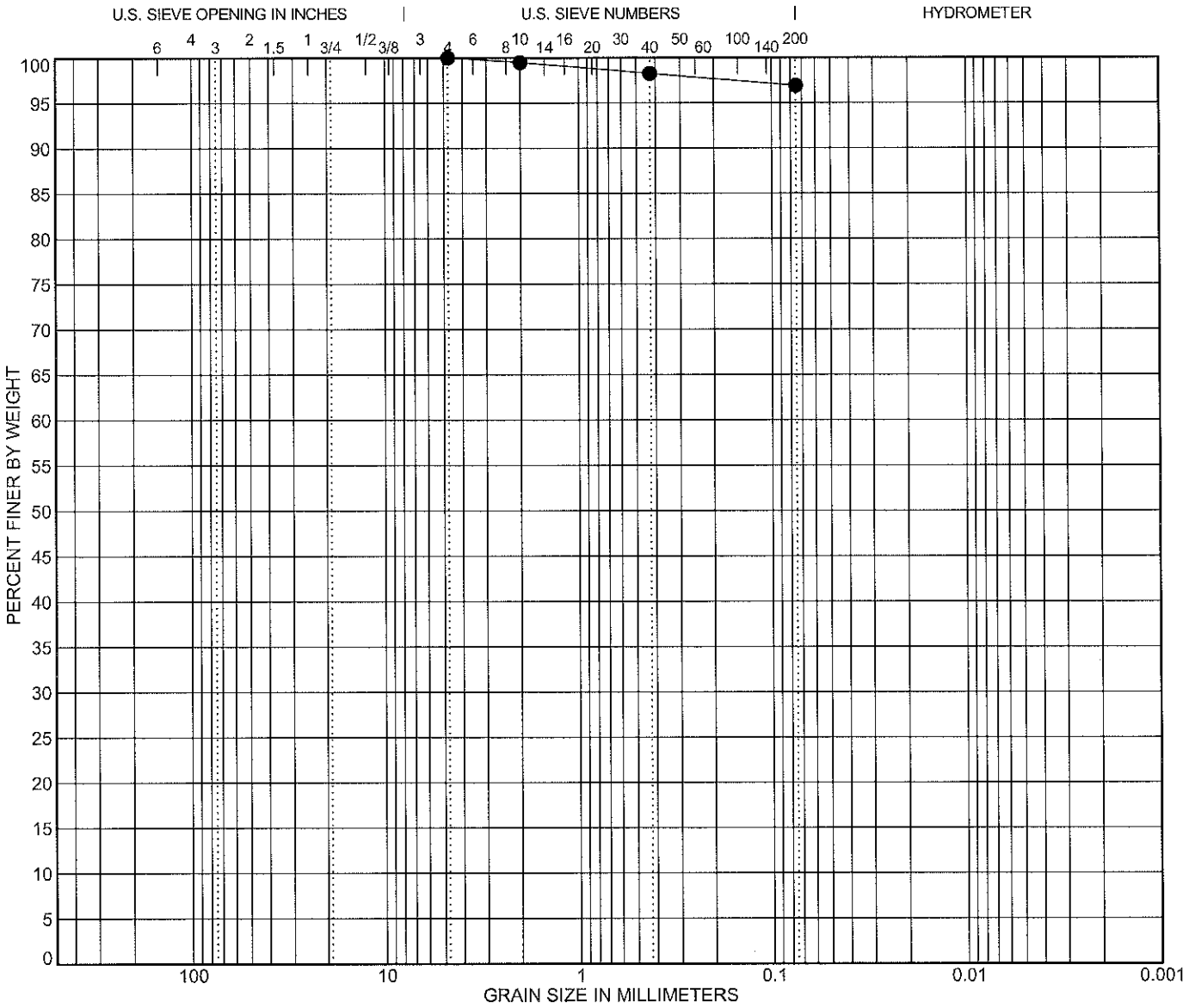

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**09-B81**	**18.0**	**LEAN CLAY(CL)**	**44**	**18**	**26**		

Percent Passing the Indicated Sieve

	Specimen Identification		3/8"	#4	#10	#40	#100	#200
●	**09-B81**	**18.0**		**100**	**99.5**	**98.3**		**96.9**

	Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**09-B81**	**18.0**	**4.75**				**0.0**	**3.1**	**96.9**	

GRAIN SIZE DISTRIBUTION

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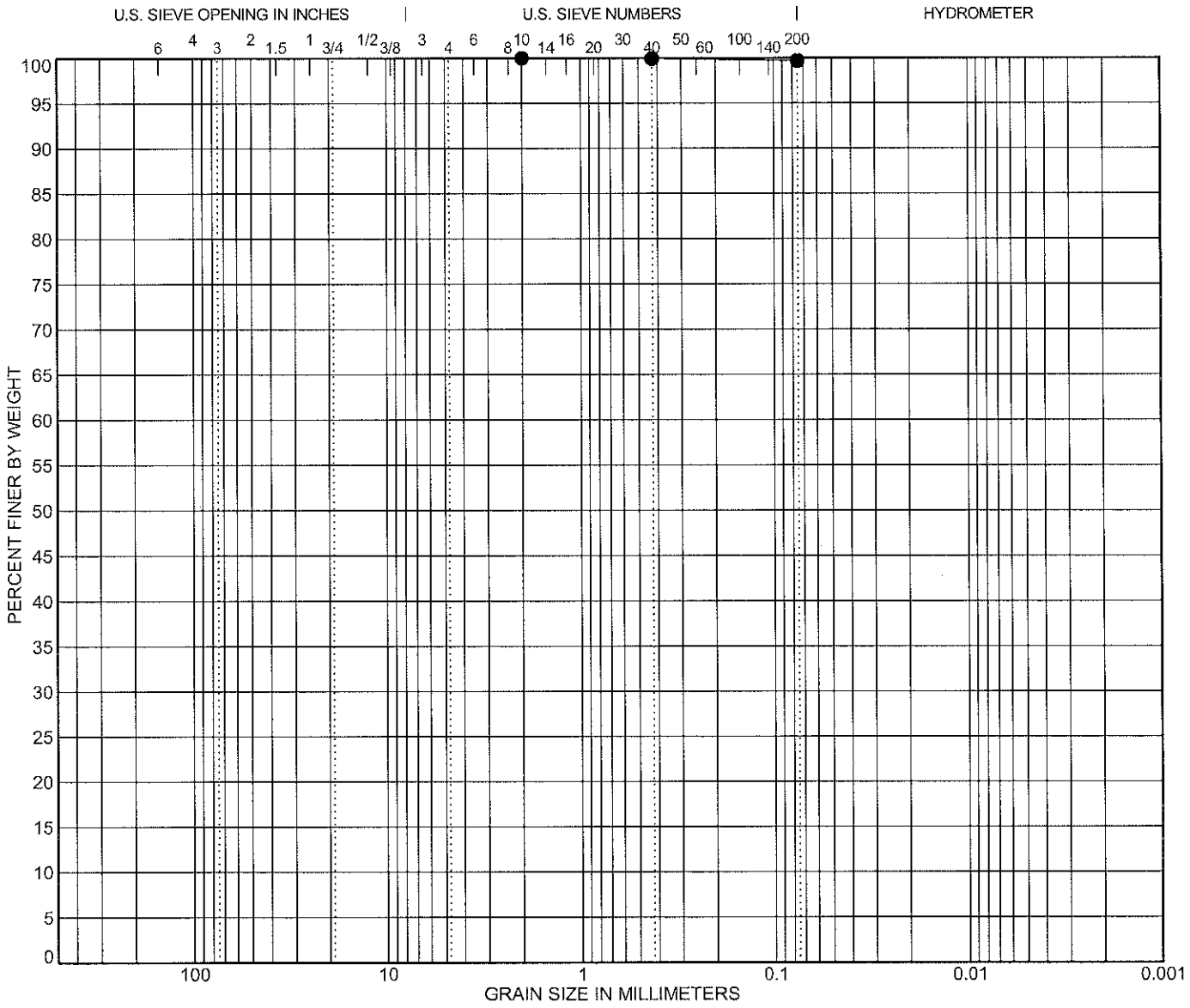

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**09-B81**	**34.0**	**FAT CLAY(CH)**	**97**	**30**	**67**		

Percent Passing the Indicated Sieve

	Specimen Identification		3/8"	#4	#10	#40	#100	#200
●	**09-B81**	**34.0**			**100**	**99.9**		**99.7**

	Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**09-B81**	**34.0**	**2**				**0.0**	**0.3**	**99.7**	

GRAIN SIZE DISTRIBUTION

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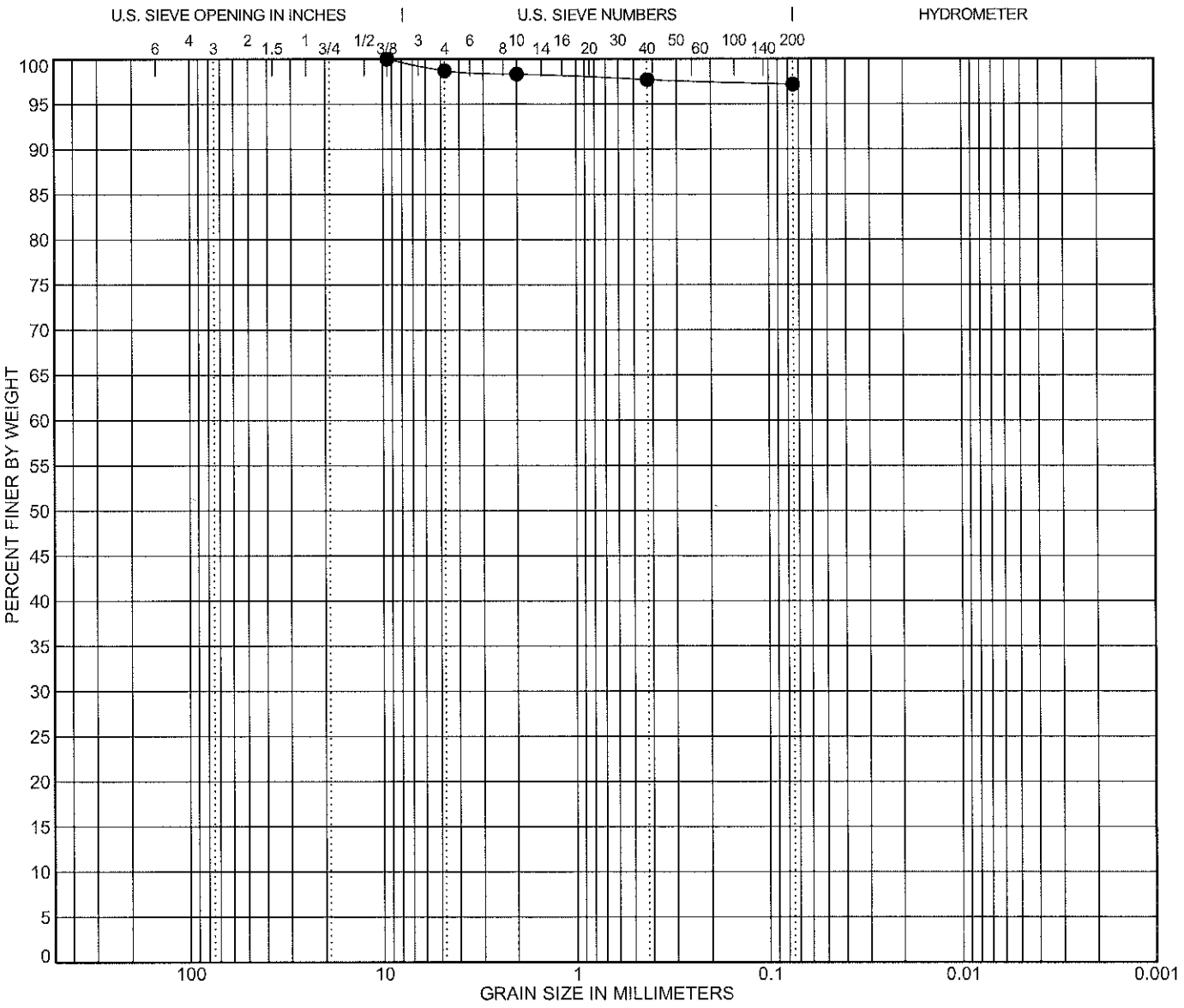

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**09-B81**	**54.0**	**FAT CLAY(CH)**	**81**	**25**	**56**		

Percent Passing the Indicated Sieve

	Specimen Identification		3/8"	#4	#10	#40	#100	#200
●	**09-B81**	**54.0**	**100**	**98.7**	**98.3**	**97.7**		**97.2**

	Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**09-B81**	**54.0**	**9.5**				**1.3**	**1.5**	**97.2**	

GRAIN SIZE DISTRIBUTION

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

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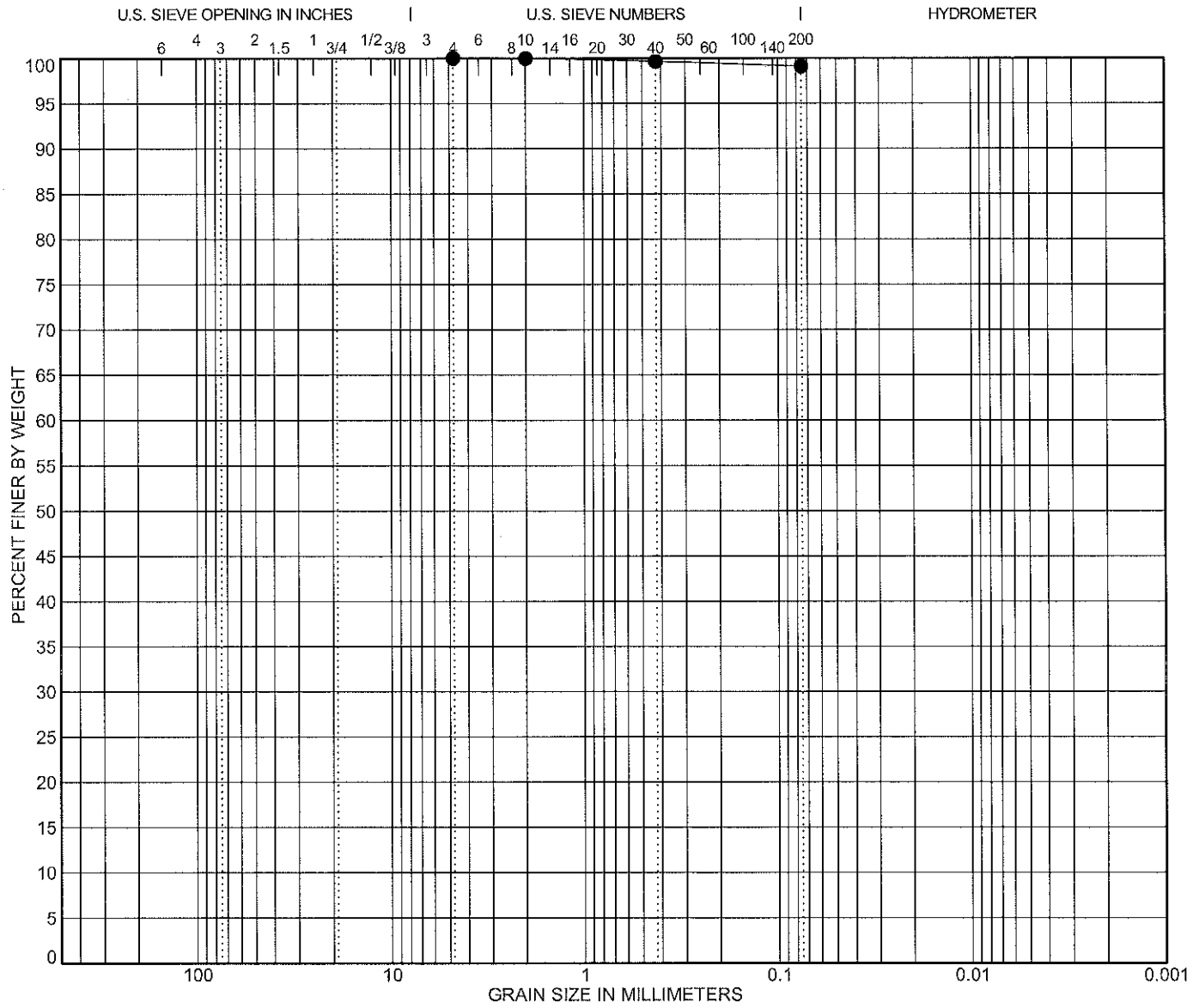

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**09-B81**	**58.0**	**LEAN CLAY(CL)**	**48**	**22**	**26**		

Percent Passing the Indicated Sieve

	Specimen Identification		3/8"	#4	#10	#40	#100	#200
●	**09-B81**	**58.0**		**100**	**100**	**99.6**		**99.1**

	Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**09-B81**	**58.0**	**4.75**				**0.0**	**0.9**	**99.1**	

GRAIN SIZE DISTRIBUTION

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

Terracon

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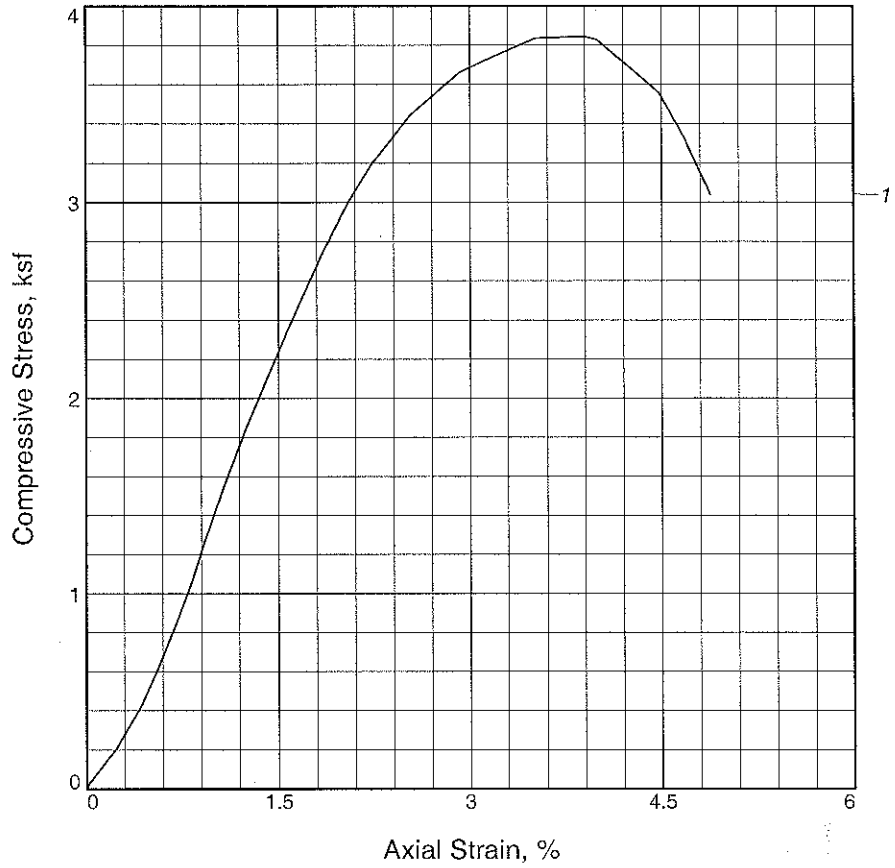
EXHIBIT

☐

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, ksf	3.844			
Undrained shear strength, ksf	1.922			
Failure strain, %	3.9			
Strain rate, in./min.	0.055			
Water content, %	24.4			
Wet density, pcf	126.5			
Dry density, pcf	101.7			
Saturation, %	97.4			
Void ratio	0.6879			
Specimen diameter, in.	2.724			
Specimen height, in.	5.640			
Height/diameter ratio	2.07			

Description: light gray and light brown 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-B81
Sample Number: 7 **Depth:** 12-14 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-B81
Depth: 12-14 ft. **Sample Number:** 7
Description: light gray and light brown 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.	171.810
Moisture content: Dry soil+tare, gms.	147.870
Moisture content: Tare, gms.	49.630
Moisture, %	24.4
Moist specimen weight, gms.	1091.39
Diameter, in.	2.724
Area, in.^{2}	5.828
Height, in.	5.640
Wet density, pcf	126.5
Dry density, pcf	101.7
Void ratio	0.6879
Saturation, %	97.4

Test Readings for Specimen No. 1

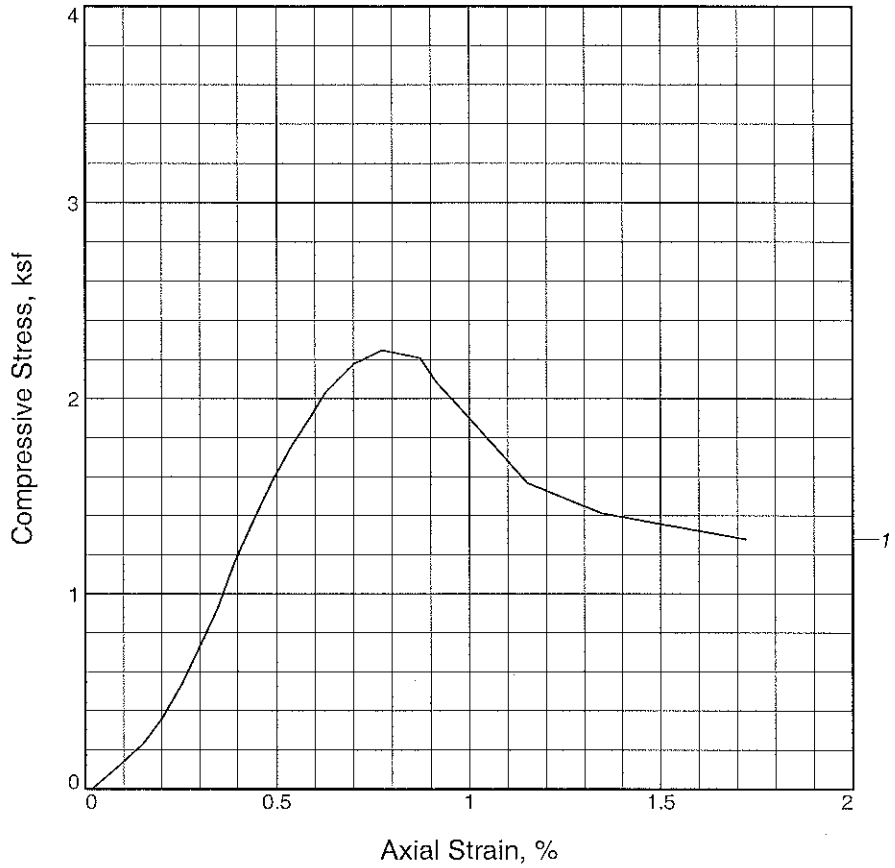
Strain rate, in./min. = 0.055
Unconfined compressive strength = 3.844 ksf **at reading no.** 18

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf
0	0.0000	0.000	0.0	0.0	0.000
1	0.0012	1.120	1.1	0.0	0.028
2	0.0136	8.577	8.6	0.2	0.211
3	0.0245	17.325	17.3	0.4	0.426
4	0.0325	25.915	25.9	0.6	0.637
5	0.0396	34.470	34.5	0.7	0.846
6	0.0467	43.249	43.2	0.8	1.060
7	0.0519	51.344	51.3	0.9	1.257
8	0.0604	62.729	62.7	1.1	1.533
9	0.0713	76.580	76.6	1.3	1.868
10	0.0822	89.266	89.3	1.5	2.174
11	0.0935	101.854	101.9	1.7	2.475
12	0.1044	113.536	113.5	1.9	2.753
13	0.1153	123.936	123.9	2.0	3.000
14	0.1261	132.531	132.5	2.2	3.201
15	0.1427	142.877	142.9	2.5	3.441

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf
16	0.1649	152.654	152.7	2.9	3.662
17	0.1980	160.882	160.9	3.5	3.836
18	0.2197	161.891	161.9	3.9	3.844
19	0.2254	161.381	161.4	4.0	3.828
20	0.2528	150.669	150.7	4.5	3.556
21	0.2637	141.474	141.5	4.7	3.332
22	0.2750	129.348	129.3	4.9	3.040

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, ksf	2.247			
Undrained shear strength, ksf	1.123			
Failure strain, %	0.8			
Strain rate, in./min.	0.055			
Water content, %	32.2			
Wet density, pcf	117.8			
Dry density, pcf	89.1			
Saturation, %	95.5			
Void ratio	0.9266			
Specimen diameter, in.	2.756			
Specimen height, in.	5.784			
Height/diameter ratio	2.10			

Description: Reddish brown and light 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-B81

Sample Number: 18 **Depth:** 34-36 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-B81
Depth: 34-36 ft. **Sample Number:** 18
Description: Reddish brown and light 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.	179.030
Moisture content: Dry soil+tare, gms.	147.720
Moisture content: Tare, gms.	50.370
Moisture, %	32.2
Moist specimen weight, gms.	1066.65
Diameter, in.	2.756
Area, in.^{2}	5.966
Height, in.	5.784
Wet density, pcf	117.8
Dry density, pcf	89.1
Void ratio	0.9266
Saturation, %	95.5

Test Readings for Specimen No. 1

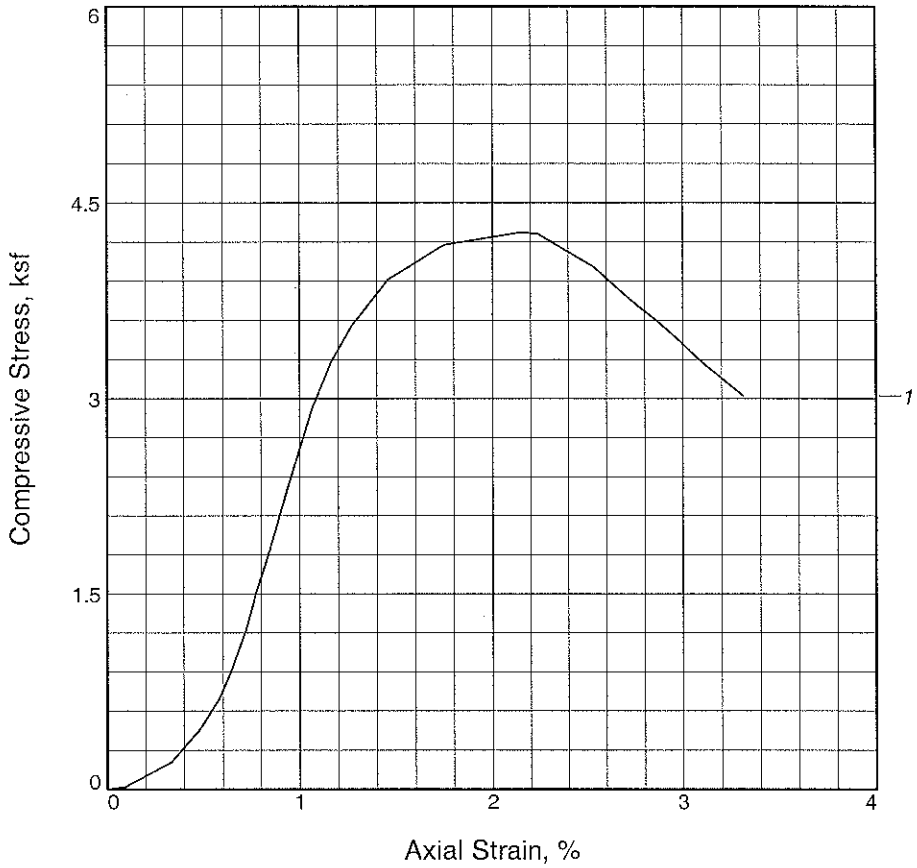
Strain rate, in./min. = 0.055
Unconfined compressive strength = 2.247 ksf **at reading no.** 15

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf
0	0.0100	0.000	0.0	0.0	0.000
1	0.0110	0.029	0.0	0.0	0.001
2	0.0151	4.922	4.9	0.1	0.119
3	0.0188	9.719	9.7	0.2	0.234
4	0.0217	14.965	15.0	0.2	0.360
5	0.0245	21.970	22.0	0.3	0.529
6	0.0274	30.372	30.4	0.3	0.731
7	0.0302	38.878	38.9	0.3	0.935
8	0.0326	48.010	48.0	0.4	1.154
9	0.0354	57.111	57.1	0.4	1.373
10	0.0382	65.719	65.7	0.5	1.579
11	0.0411	72.964	73.0	0.5	1.752
12	0.0439	79.169	79.2	0.6	1.900
13	0.0463	84.797	84.8	0.6	2.034
14	0.0505	90.807	90.8	0.7	2.177
15	0.0548	93.809	93.8	0.8	2.247

Test Readings for Specimen No. 3

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf
16	0.0604	92.282	92.3	0.9	2.208
17	0.0628	87.269	87.3	0.9	2.087
18	0.0713	74.068	74.1	1.1	1.769
19	0.0765	65.683	65.7	1.1	1.567
20	0.0879	59.293	59.3	1.3	1.412
21	0.1096	53.907	53.9	1.7	1.279

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, ksf	4.273			
Undrained shear strength, ksf	2.136			
Failure strain, %	2.1			
Strain rate, in./min.	0.055			
Water content, %	32.0			
Wet density, pcf	120.2			
Dry density, pcf	91.0			
Saturation, %	99.3			
Void ratio	0.8860			
Specimen diameter, in.	2.726			
Specimen height, in.	5.647			
Height/diameter ratio	2.07			

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-B81

Sample Number: 28 **Depth:** 54-56 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-B81
Depth: 54-56 ft. **Sample Number:** 28
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.	187.470
Moisture content: Dry soil+tare, gms.	154.300
Moisture content: Tare, gms.	50.650
Moisture, %	32.0
Moist specimen weight, gms.	1039.51
Diameter, in.	2.726
Area, in.²	5.836
Height, in.	5.647
Wet density, pcf	120.2
Dry density, pcf	91.0
Void ratio	0.8860
Saturation, %	99.3

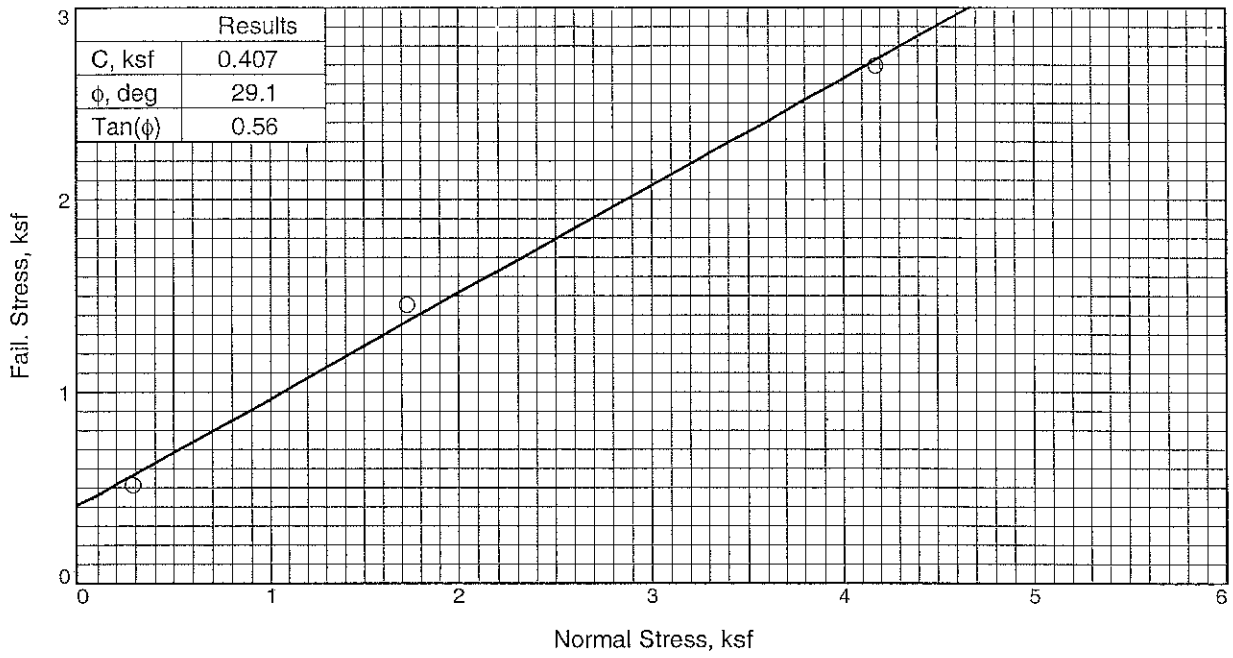
Test Readings for Specimen No. 1

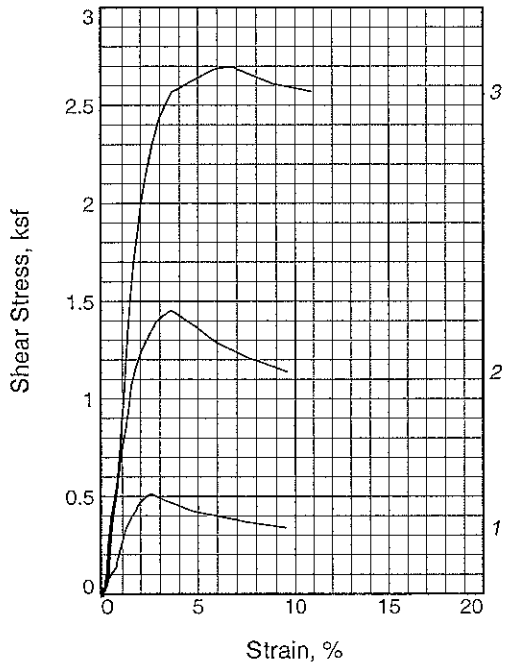
Strain rate, in./min. = 0.055
Unconfined compressive strength = 4.273 ksf **at reading no.** 17

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf
0	0.0000	0.000	0.0	0.0	0.000
1	0.0050	0.715	0.7	0.1	0.018
2	0.0190	8.391	8.4	0.3	0.206
3	0.0270	18.505	18.5	0.5	0.454
4	0.0327	28.083	28.1	0.6	0.689
5	0.0370	38.349	38.3	0.7	0.940
6	0.0412	51.342	51.3	0.7	1.258
7	0.0436	61.091	61.1	0.8	1.496
8	0.0464	70.901	70.9	0.8	1.735
9	0.0492	81.100	81.1	0.9	1.984
10	0.0521	91.504	91.5	0.9	2.237
11	0.0549	101.685	101.7	1.0	2.484
12	0.0601	119.689	119.7	1.1	2.922
13	0.0658	134.668	134.7	1.2	3.284
14	0.0715	145.801	145.8	1.3	3.552
15	0.0823	160.997	161.0	1.5	3.914

Test Readings for Specimen No. 3

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf
16	0.0989	172.409	172.4	1.8	4.179
17	0.1211	176.975	177.0	2.1	4.273
18	0.1263	176.806	176.8	2.2	4.265
19	0.1429	166.906	166.9	2.5	4.014
20	0.1537	156.789	156.8	2.7	3.763
21	0.1651	147.034	147.0	2.9	3.522
22	0.1760	136.423	136.4	3.1	3.261
23	0.1868	126.687	126.7	3.3	3.022





Sample No.		1	2	3
Initial	Water Content, %	21.5	21.5	21.5
	Dry Density, pcf	103.7	103.2	103.6
	Saturation, %	91.1	90.1	90.9
	Void Ratio	0.6440	0.6513	0.6456
	Diameter, in.	2.500	2.500	2.500
	Height, in.	1.010	1.000	1.030
At Test	Water Content, %	23.8	23.8	23.3
	Dry Density, pcf	103.7	103.2	103.6
	Saturation, %	100.7	99.9	98.3
	Void Ratio	0.6440	0.6513	0.6456
	Diameter, in.	2.500	2.500	2.500
	Height, in.	1.010	1.000	1.030
Normal Stress, ksf		0.288	1.728	4.176
Fail. Stress, ksf		0.513	1.453	2.695
Strain, %		2.5	3.5	6.8
Ult. Stress, ksf				
Strain, %				
Strain rate, in./min.		0.001	0.001	0.001

Sample Type: Undisturbed

Description: Gray and tan Lean Clay w/calc. nodules

LL= 44 **PL=** 18 **PI=** 26

Assumed Specific Gravity= 2.73

Remarks: ASTM D3080
Specific gravity assumed
Percent pass #200 sieve = 96.9

Client: USACE

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

Location: B-81

Sample Number: 10 **Depth:** 18-20 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: B-81
Depth: 18-20 ft. **Sample Number:** 10
Description: Gray and tan Lean Clay w/calc. nodules
Remarks: ASTM D3080
Specific gravity assumed
Percent pass #200 sieve = 96.9
Type of Sample: Undisturbed
Assumed Specific Gravity=2.73 **LL=**44 **PL=**18 **PI=**26

Parameters for Specimen No. 1

Specimen Parameter	Initial	Consolidated	Final
Moisture content: Moist soil+tare, gms.	227.250		93.990
Moisture content: Dry soil+tare, gms.	192.230		80.200
Moisture content: Tare, gms.	29.360		22.140
Moisture, %	21.5	23.8	23.8
Moist specimen weight, gms.	163.92		
Diameter, in.	2.500	2.500	
Area, in.^{2}	4.909	4.909	
Height, in.	1.010	1.010	
Net decrease in height, in.		0.000	
Wet density, pcf	126.0	128.3	
Dry density, pcf	103.7	103.7	
Void ratio	0.6440	0.6440	
Saturation, %	91.1	100.7	

Test Readings for Specimen No. 1

Normal stress = 0.288 ksf
Strain rate, in./min. = 0.001
Fail. Stress = 0.513 ksf **at reading no.** 18

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	1.174	1.2	0.0	0.034
2	0.0045	0.514	0.5	0.2	0.015
3	0.0070	1.623	1.6	0.3	0.048
4	0.0090	2.560	2.6	0.4	0.075
5	0.0130	3.585	3.6	0.5	0.105
6	0.0170	4.602	4.6	0.7	0.135
7	0.0185	5.730	5.7	0.7	0.168
8	0.0210	7.047	7.0	0.8	0.207
9	0.0235	8.232	8.2	0.9	0.241
10	0.0255	9.342	9.3	1.0	0.274
11	0.0270	10.220	10.2	1.1	0.300

Test Readings for Specimen No. 2

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Strain %	Shear Stress ksf
12	0.0300	11.441	11.4	1.2	0.336
13	0.0345	12.595	12.6	1.4	0.369
14	0.0390	13.613	13.6	1.6	0.399
15	0.0435	14.498	14.5	1.7	0.425
16	0.0465	15.490	15.5	1.9	0.454
17	0.0541	16.520	16.5	2.2	0.485
18	0.0631	17.493	17.5	2.5	0.513
19	0.0646	17.445	17.4	2.6	0.512
20	0.0826	16.288	16.3	3.3	0.478
21	0.0991	15.403	15.4	4.0	0.452
22	0.1186	14.424	14.4	4.7	0.423
23	0.1546	13.475	13.5	6.2	0.395
24	0.1876	12.505	12.5	7.5	0.367
25	0.2357	11.575	11.6	9.4	0.340

Parameters for Specimen No. 2

Specimen Parameter	Initial	Consolidated	Final
Moisture content: Moist soil+tare, gms.	227.250		88.990
Moisture content: Dry soil+tare, gms.	192.230		76.200
Moisture content: Tare, gms.	29.360		22.540
Moisture, %	21.5	23.8	23.8
Moist specimen weight, gms.	161.58		
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	125.4	127.8	
Dry density, pcf	103.2	103.2	
Void ratio	0.6513	0.6513	
Saturation, %	90.1	99.9	

Test Readings for Specimen No. 2

Normal stress = 1.728 ksf

Strain rate, in./min. = 0.001

Fail. Stress = 1.453 ksf **at reading no.** 19

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	0.0001	-0.513	-0.5	0.0	-0.015
2	0.0005	-0.592	-0.6	0.0	-0.017
3	0.0091	2.753	2.8	0.4	0.081
4	0.0101	5.368	5.4	0.4	0.157
5	0.0116	8.482	8.5	0.5	0.249
6	0.0131	12.189	12.2	0.5	0.358
7	0.0151	14.678	14.7	0.6	0.431
8	0.0176	17.311	17.3	0.7	0.508
9	0.0201	20.203	20.2	0.8	0.593
10	0.0226	23.053	23.1	0.9	0.676

Test Readings for Specimen No. 3

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Strain %	Shear Stress ksf
11	0.0256	25.890	25.9	1.0	0.760
12	0.0301	28.997	29.0	1.2	0.851
13	0.0346	33.065	33.1	1.4	0.970
14	0.0376	36.258	36.3	1.5	1.064
15	0.0436	39.450	39.4	1.7	1.157
16	0.0511	42.334	42.3	2.0	1.242
17	0.0601	44.886	44.9	2.4	1.317
18	0.0706	47.588	47.6	2.8	1.396
19	0.0886	49.521	49.5	3.5	1.453
20	0.0916	49.393	49.4	3.7	1.449
21	0.1217	46.766	46.8	4.9	1.372
22	0.1487	43.911	43.9	5.9	1.288
23	0.1877	41.380	41.4	7.5	1.214
24	0.2387	38.851	38.9	9.5	1.140

Parameters for Specimen No. 3

Specimen Parameter	Initial	Consolidated	Final
Moisture content: Moist soil+tare, gms.	227.250		104.910
Moisture content: Dry soil+tare, gms.	192.230		89.380
Moisture content: Tare, gms.	29.360		22.610
Moisture, %	21.5	23.3	23.3
Moist specimen weight, gms.	167.00		
Diameter, in.	2.500	2.500	
Area, in.^{2}	4.909	4.909	
Height, in.	1.030	1.030	
Net decrease in height, in.		0.000	
Wet density, pcf	125.8	127.7	
Dry density, pcf	103.6	103.6	
Void ratio	0.6456	0.6456	
Saturation, %	90.9	98.3	

Test Readings for Specimen No. 3

Normal stress = 4.176 ksf

Strain rate, in./min. = 0.001

Fail. Stress = 2.695 ksf **at reading no.** 22

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	-0.429	-0.4	0.0	-0.013
2	0.0030	-0.444	-0.4	0.1	-0.013
3	0.0070	4.426	4.4	0.3	0.130
4	0.0090	9.166	9.2	0.4	0.269
5	0.0125	13.811	13.8	0.5	0.405
6	0.0180	18.841	18.8	0.7	0.553
7	0.0215	23.850	23.9	0.9	0.700
8	0.0240	29.290	29.3	1.0	0.859
9	0.0270	34.802	34.8	1.1	1.021
10	0.0300	40.807	40.8	1.2	1.197

Test Readings for Specimen No. 4

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Strain %	Shear Stress ksf
11	0.0330	46.371	46.4	1.3	1.360
12	0.0360	51.038	51.0	1.4	1.497
13	0.0405	57.461	57.5	1.6	1.686
14	0.0450	62.294	62.3	1.8	1.827
15	0.0510	68.421	68.4	2.0	2.007
16	0.0571	73.250	73.3	2.3	2.149
17	0.0646	78.050	78.1	2.6	2.290
18	0.0736	82.651	82.7	2.9	2.425
19	0.0901	87.447	87.4	3.6	2.565
20	0.1426	91.262	91.3	5.7	2.677
21	0.1516	91.727	91.7	6.1	2.691
22	0.1696	91.879	91.9	6.8	2.695
23	0.2207	88.987	89.0	8.8	2.610
24	0.2717	87.623	87.6	10.9	2.570

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 Percent Pasing Sieve															USCS Symbol (ASTM 2487)	Wc	γd	Strength tests																										
																										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-B81	0-2	1.50			52	16	36		100	99		97				93					78	CH	27	98																					
	2-4	1.50																				CH**	23																					
	4-6	2.25			68	23	45			100		100				99					75	CH	23																					
	6-8			1																		CH**	35																					
	8-10			5																		CH**	38																					
	10-12	1.75																				CH**	31																					
	12-14	1.50			74	23	51					100				100					100	CH	24						1.9	24	102	CH**												
	14-16	2.75																				CH**	35																					
	16-18	1.00																				CH**	24																					
	18-20	2.00			44	18	26			100		100				98					97	CL	22		0.4	29	22	104	CL**														
	20-22	1.00																				CL**	30																					
	22-24	1.50																				CL**/CH**	25																					
	24-26	1.50																				CH**	37																					
	26-28	2.50																				CH**	33																					
	28-30	2.25			99	30	69															CH*	35	91																				
	30-32	2.75																				CH**	31																					
	32-34	2.25																				CH**	40																					
	34-36	2.00			97	30	67					100				100					100	CH	32						1.1	32	89	CH**												
	36-38	2.25																				CH**	39																					
	38-40	2.00																				CH**	31																					
	40-42	1.75																				CH**	39																					
	42-44	1.75																				CH**	45																					
	44-46	1.50			101	30	71																40	82																				
	46-48	1.25																				CH**	41																					
	48-50	2.00																				CH**	29																					
	50-52	2.25																				CH**	25																					
	52-54	0.75																				CH**	26																					
	54-56	2.00			81	25	56		100	99		98				98					97	CH	32						2.1	32	91	CH**												
	56-58	2.00																				CH**	26																					
	58-60	1.25			48	22	26					100				100					99	CL	31																					
	60-62			1																		CH**	31																					
	62-64	1.00																				CH**	36																					
	64-66	1.25																				CH**																					