BORING LOG NO. 10-B14

CLIENT:	USACE, Galveston District Galveston, Texas	PROJECT:	Galveston Channel Deepening, TO-0010
BORING LOCATION:	N: 13687754.5 E: 3317981.61	SITE:	San Jacinto Placement Area Galveston, Texas

Approx. Surface Elevation: 11.2 feet

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
	FILL: FAT CLAY greenish gray, with roots, consistency decreases with depth from medium stiff to very soft.	1	CH	ST	8		1.0		47		97	34	63	100			
		3		ST	17		0.5	0.3			100	35	65	96			
		5		ST	16		0.0	0.25	53								
		7		ST	22		0.0	0.2	71								
		9		ST	17		0.0	0.1	73	55	96	32	64	100			
	1.2 ▽ 10.0	10															
	FILL: SILT gray to bluish gray, w/ shells and roots, plastic, very soft	11	ML	ST	22		0.0	0.25	42	80	33	26	7	99			
	-2.8 14.0	13		SS	8	0			64								
	POORLY GRADED SAND w/ SILT bluish gray, with shell, fine, slight cohesion, dense	15	SP-SM	SS	12	38			28								
		17		SS	11	35			28					11			
	-8.8 20.0	19		SS	18	50			32								
	Boring terminated at 20 feet.	20															

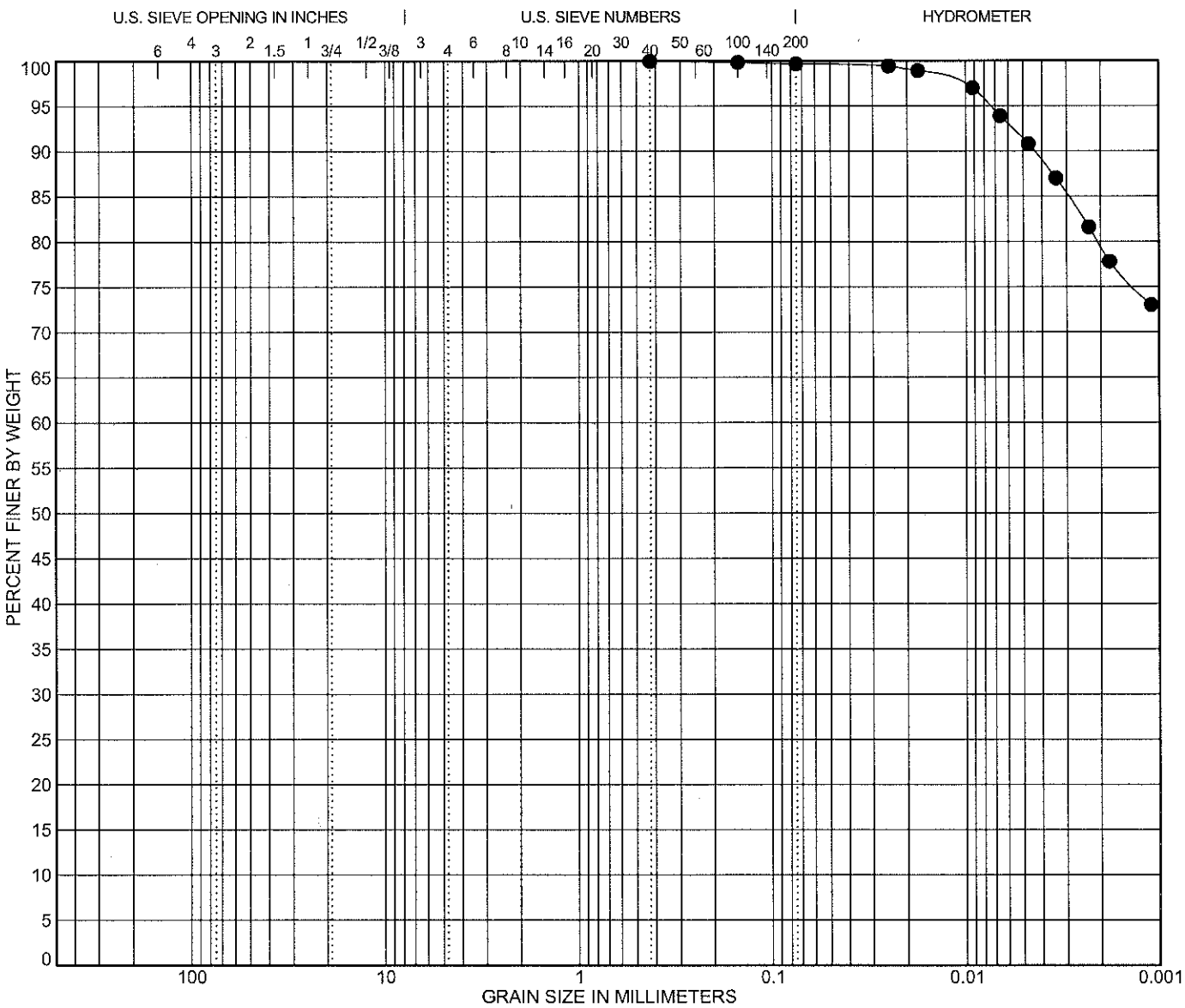
STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION BETWEEN STRATA MAY BE MORE GRADUAL.

REMARKS: **Dry auger to 10 feet; wet rotary thereafter.**

WATER LEVEL OBSERVATIONS			
▽ 10 ft	WS	▼ 6 ft	at 5 min
▼ 6 ft	at 10 min	▼ 6 ft	at 15 min

Terracon

DATE DRILLED	Page 1 of 1
4/14/2010	10-B14
PROJECT NUMBER 92105154	EXHIBIT A-14



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**10-B14**	**0.0**	**FAT CLAY(CH)**	**97**	**34**	**63**		

Percent Passing the Indicated Sieve

	Specimen Identification		3/8"	#4	#10	#40	#100	#200
●	**10-B14**	**0.0**				**100**	**99.8**	**99.7**

	Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**10-B14**	**0.0**	**0.425**				**0.0**	**0.3**	**20.2**	**79.4**

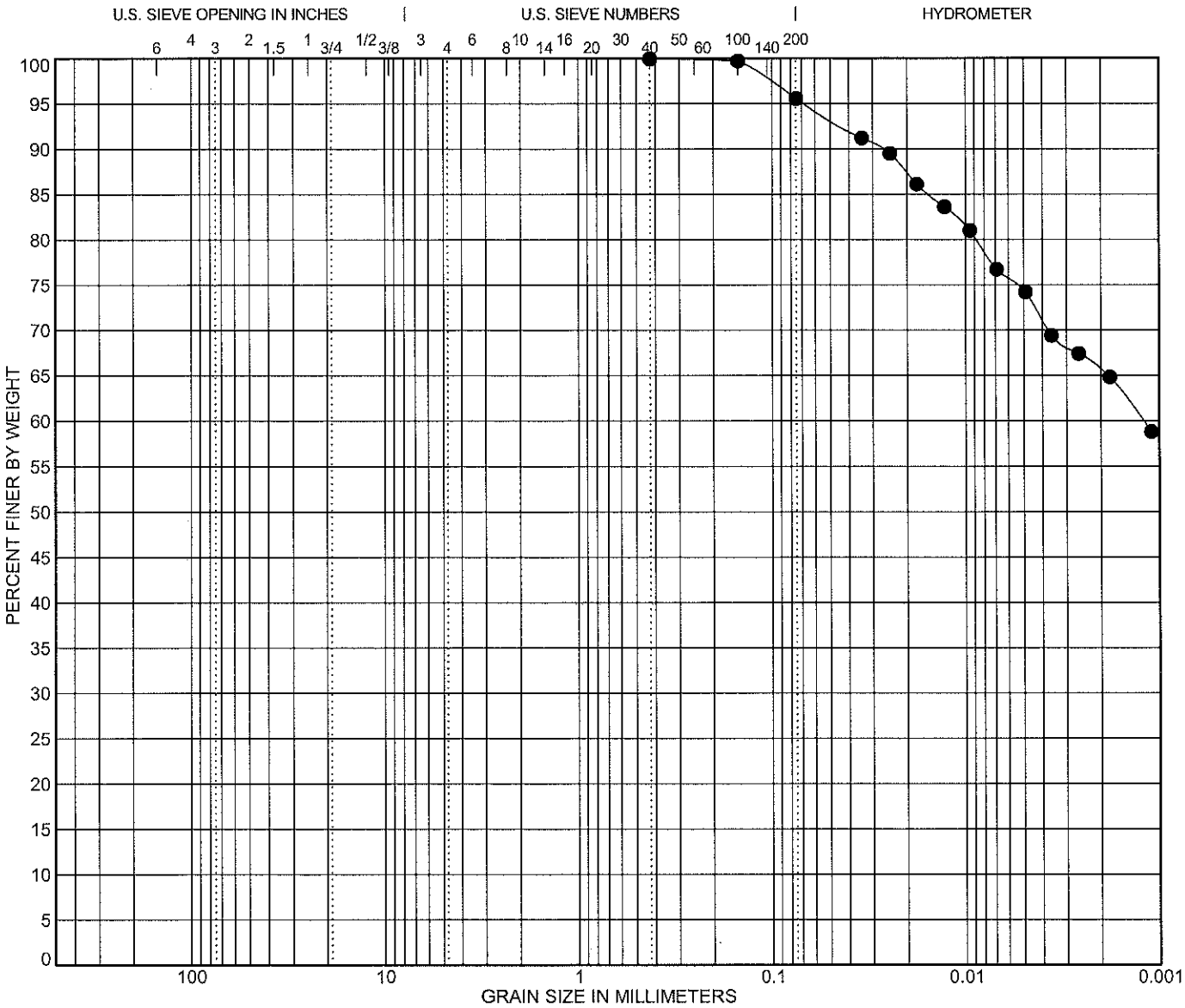
GRAIN SIZE DISTRIBUTION

Galveston Channel Deepening,
TO-0010
Galveston, Texas
Project Number 92105154

Terracon

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

SPECIMEN ID
10-B14, 0.0



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**10-B14**	**2.0**	**FAT CLAY(CH)**	**100**	**35**	**65**		

Percent Passing the Indicated Sieve

	Specimen Identification		3/8"	#4	#10	#40	#100	#200
●	**10-B14**	**2.0**				**99.9**	**99.7**	**95.5**

	Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**10-B14**	**2.0**	**0.425**				**0.0**	**4.4**	**30.0**	**65.5**

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Telephone: 713-690-8989
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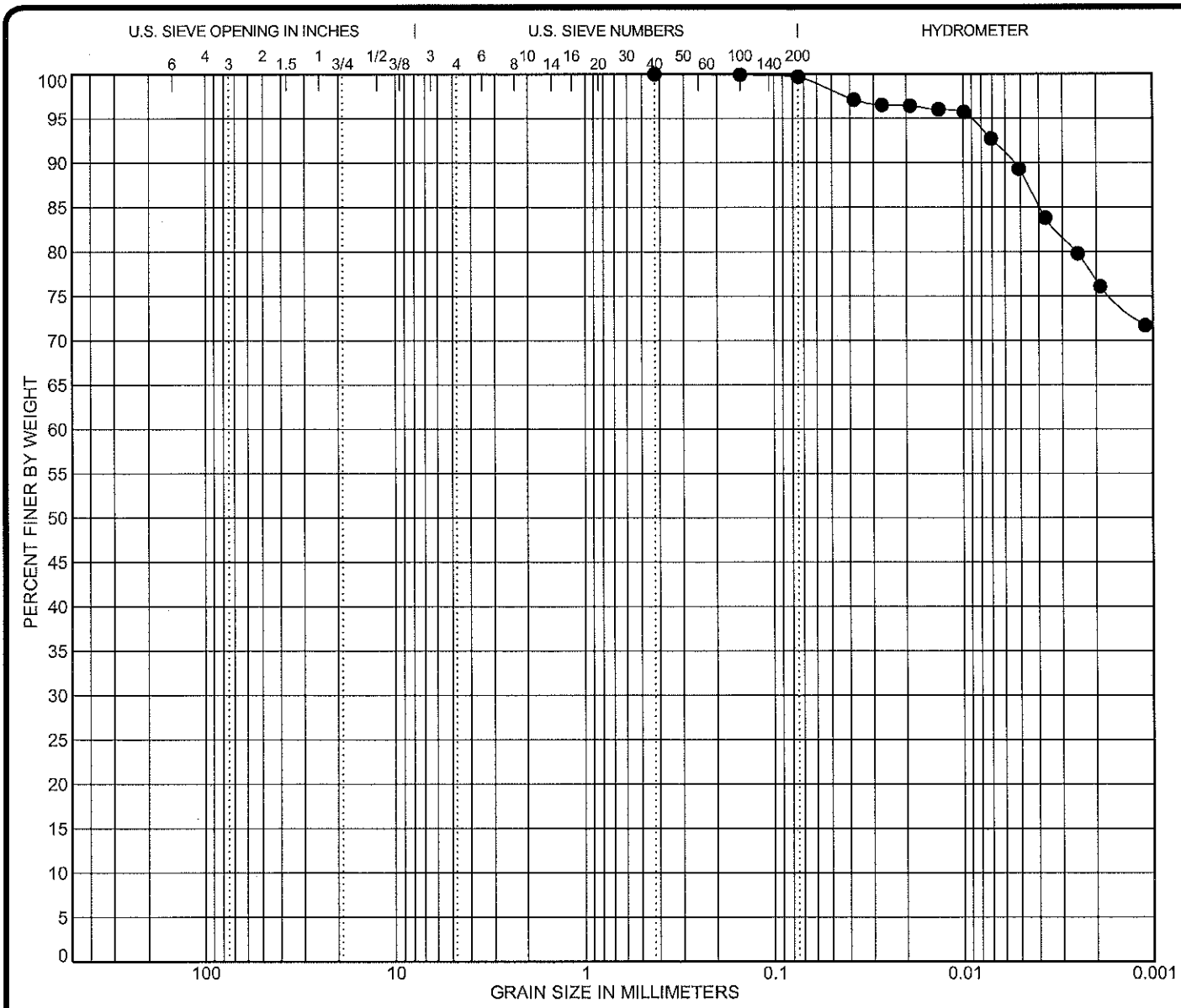
SPECIMEN ID
10-B14, 2.0



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**10-B14**	**8.0**	**FAT CLAY(CH)**	**96**	**32**	**64**		

Percent Passing the Indicated Sieve

	Specimen Identification		3/8"	#4	#10	#40	#100	#200
●	**10-B14**	**8.0**				**100**	**99.9**	**99.7**

	Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**10-B14**	**8.0**	**0.425**				**0.0**	**0.3**	**22.9**	**76.8**

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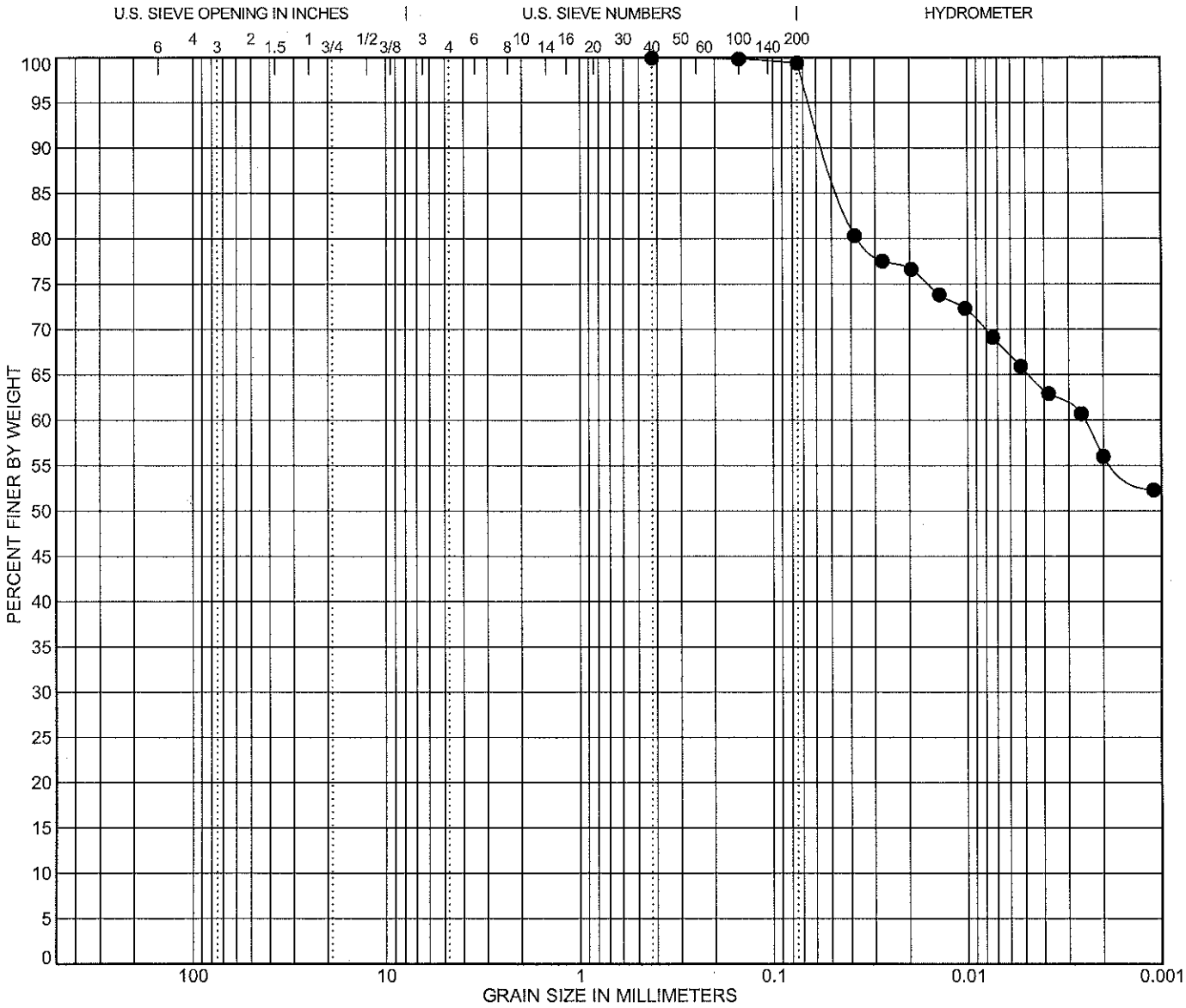
SPECIMEN ID
10-B14, 8.0



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	LL	PL	PI	Cc	Cu
● **10-B14**	**10.0**	**SILT(ML)**	**33**	**26**	**7**		

Percent Passing the Indicated Sieve

Specimen Identification		3/8"	#4	#10	#40	#100	#200
● **10-B14**	**10.0**				**99.9**	**99.8**	**99.4**

Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
● **10-B14**	**10.0**	**0.425**				**0.0**	**0.6**	**43.4**	**56.0**

GRAIN SIZE DISTRIBUTION

Galveston Channel Deepening,
TO-0010
Galveston, Texas
Project Number 92105154

Terracon

Terracon Consultants, Inc.
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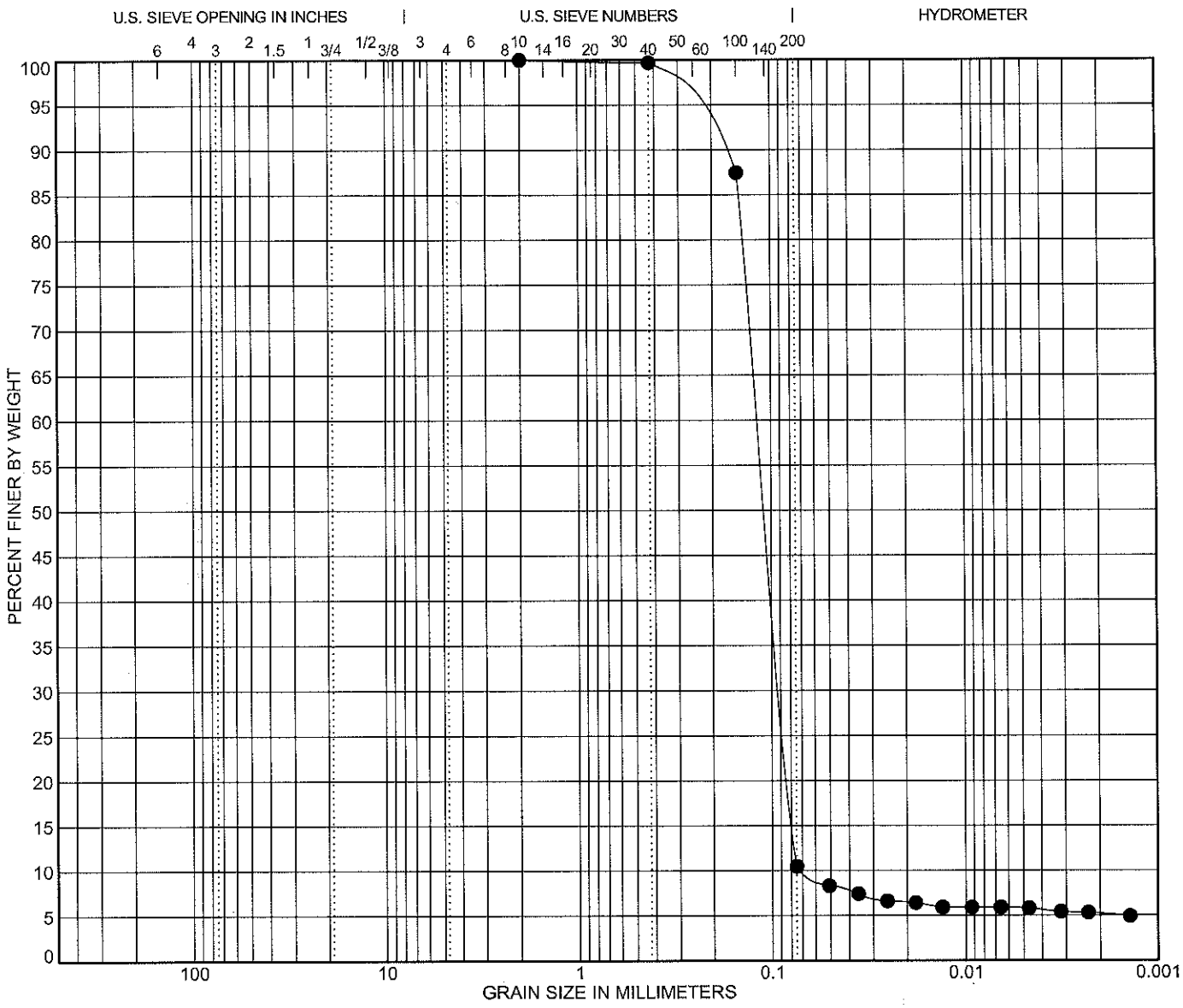
SPECIMEN ID
10-B14, 10.0



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	LL	PL	PI	Cc	Cu
● **10-B14**	**16.5**					**0.99**	**1.70**

Percent Passing the Indicated Sieve

Specimen Identification		3/8"	#4	#10	#40	#100	#200
● **10-B14**	**16.5**			**100**	**99.7**	**87.5**	**10.5**

Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
● **10-B14**	**16.5**	**2**	**0.107**	**0.089**	**0.069**	**0.0**	**89.5**	**5.3**	**5.2**

GRAIN SIZE DISTRIBUTION

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TO-0010
Galveston, Texas
Project Number 92105154

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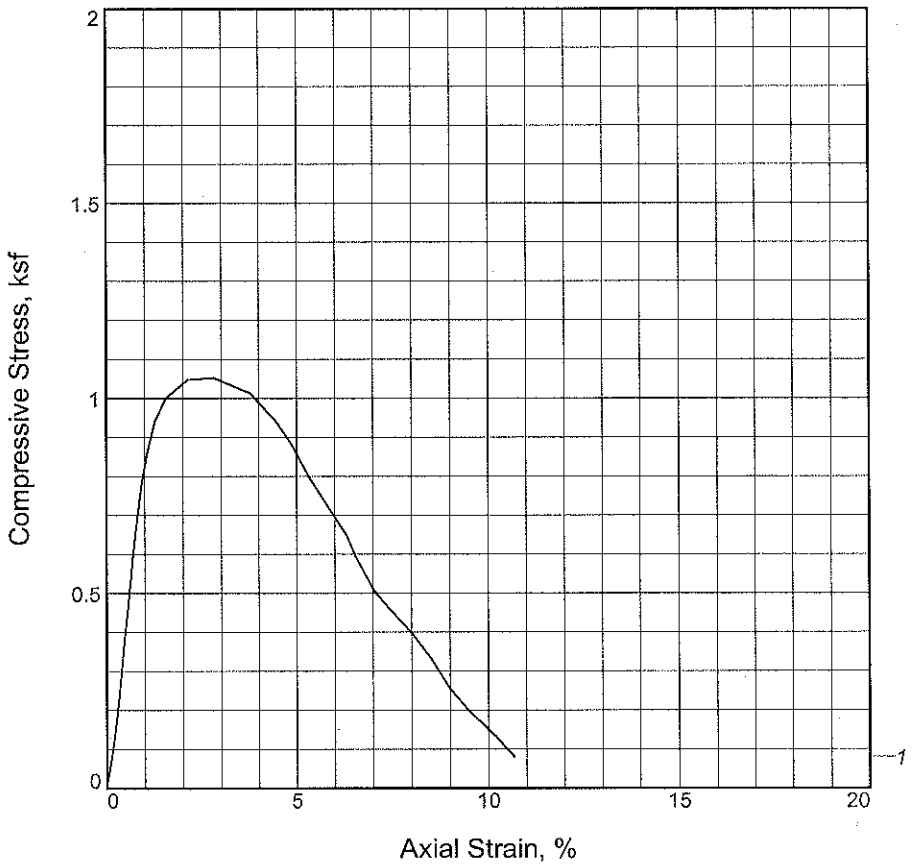
Telephone: 713-690-8989
Fax: 713-690-8787

SPECIMEN ID
10-B14, 16.5

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, ksf	1.053			
Undrained shear strength, ksf	0.526			
Failure strain, %	2.8			
Strain rate, in./min.	0.055			
Water content, %	48.2			
Wet density, pcf	106.6			
Dry density, pcf	71.9			
Saturation, %	95.5			
Void ratio	1.3871			
Specimen diameter, in.	2.829			
Specimen height, in.	5.972			
Height/diameter ratio	2.11			

Description: Gray Fat Clay

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

Project No.: 92105154

Date Sampled:

Remarks:
ASTM D2166

Client: USACE

Project: Galveston Channel Deepening San Jacinto Placement Area
Contract #W912HY-09-D-0021, Task Order #0010

Location: 10-B14

Sample Number: 2 **Depth:** 2-4 ft.

UNCONFINED COMPRESSION TEST
Terracon, Inc.
Houston, TX

UNCONFINED COMPRESSION TEST

7/21/2010

Date:
Client: USACE
Project: Galveston Channel Deepening San Jacinto Placement Area
Contract #W912HY-09-D-0021, Task Order #0010
Project No.: 92105154
Location: 10-B14
Depth: 2-4 ft. **Sample Number:** 2
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.	139.330
Moisture content: Dry soil+tare, gms.	109.860
Moisture content: Tare, gms.	48.710
Moisture, %	48.2
Moist specimen weight, gms.	1050.19
Diameter, in.	2.829
Area, in.^{2}	6.286
Height, in.	5.972
Wet density, pcf	106.6
Dry density, pcf	71.9
Void ratio	1.3871
Saturation, %	95.5

Test Readings for Specimen No. 1

Strain rate, in./min. = 0.055
Unconfined compressive strength = 1.053 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	0.0005	0.550	0.6	0.0	0.013
2	0.0058	2.412	2.4	0.1	0.055
3	0.0112	4.955	5.0	0.2	0.113
4	0.0157	7.420	7.4	0.3	0.170
5	0.0202	10.473	10.5	0.3	0.239
6	0.0242	13.407	13.4	0.4	0.306
7	0.0287	16.873	16.9	0.5	0.385
8	0.0332	19.875	19.9	0.6	0.453
9	0.0377	23.132	23.1	0.6	0.527
10	0.0416	26.303	26.3	0.7	0.598
11	0.0461	29.234	29.2	0.8	0.665
12	0.0506	31.858	31.9	0.8	0.724
13	0.0546	34.225	34.2	0.9	0.777
14	0.0636	37.949	37.9	1.1	0.860
15	0.0750	41.541	41.5	1.3	0.940

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf
16	0.0925	44.341	44.3	1.5	1.000
17	0.1274	46.756	46.8	2.1	1.048
18	0.1678	47.290	47.3	2.8	1.053
19	0.1737	47.126	47.1	2.9	1.048
20	0.2261	45.947	45.9	3.8	1.013
21	0.2665	42.909	42.9	4.5	0.939
22	0.2899	40.525	40.5	4.9	0.883
23	0.3188	36.772	36.8	5.3	0.797
24	0.3477	33.443	33.4	5.8	0.722
25	0.3766	30.195	30.2	6.3	0.648
26	0.3911	27.662	27.7	6.5	0.592
27	0.4205	23.764	23.8	7.0	0.506
28	0.4494	21.265	21.3	7.5	0.450
29	0.4783	18.837	18.8	8.0	0.397
30	0.5072	15.871	15.9	8.5	0.333
31	0.5361	12.403	12.4	9.0	0.259
32	0.5650	9.740	9.7	9.5	0.202
33	0.6089	6.403	6.4	10.2	0.132
34	0.6378	3.916	3.9	10.7	0.080

SUMMARY TABLE OF LABORATORY TEST DATA

Project name: TO-0010 Galveston Channel Deepening | **Client: USACE, Galveston District** | **Terracon Project # : 92105154**

Boring	Depth	Field tests			Atterberg Limits			Grain size Analysis										USCS Symbol	Wc	γd
		PP	TV	SPTn	LL	PL	PI	% by weight passing sieve					Soil Particle Content							
								4	10	40	100	200	gravel	sand	silt	clay	sieve 200			
	ft	tsf	tsf	bl/ft	%	%	%	%	%	%	%	%	%	%	%	%	%		%	pcf
10-B11	2-4	0.00																SC**	19	
	4-6	0.50			90	28	62											CH*	45	
	6-8	0.00	0.05		84	27	57	100	100	100	99	89	0	11	33	56		CH	57	67
	8-10	0.00	0.10															CH**	62	
	10-12	0.00	0.20		96	31	65	100	100	100	100	96	0	4	27	69		CH	47	
	12-14	0.00	0.25															CH**	74	60
	14-16	0.00	0.15		90	29	61	100	100	100	97	69	0	31	14	55		CH	52	
	16-18	0.00	0.10		121	32	89	100	100	100	100	97	0	3	20	77		CH	79	55
	18.5-20			41				100	100	98	87	7	0	93	4	3		SP-SM*	18	
	20.5-22			52														SP-SM**	25	
	22.5-24			29														SP-SC**	37	
	24.5-26			13														SP-SC**	31	
	26.5-28			15														SP-SC**	27	
	28-5-30			18														SP-SC**	28	
10-B12	0-2	1.25																SC**	31	
	2-4	0.75			36	16	20	100	100	99	79	32	0	68	10	22		SC	26	94
	4-6	0.00	0.15															SC**	21	
	6.5-8			15														SC**	24	
	8.5-10			8				100	100	99	77	14	0	86	8	6		SC*	24	
	10.5-12			9														SC**	38	
	12.5-14			2														SC**	33	
	14.5-16			0														CH**	61	
	16.5-18			0														CH**	62	
	18.5-20			26				100	100	97	93	44	0	56	12	32		SC*	50	
	20.5-22			17														SC**	31	
	22.5-24			39														SC**	79	
	24.5-26			49														SC**	25	
	26.5-28			60				100	100	99	88	13	0	87	11	2		SC*	24	
	28.5-30			9														SC**	28	
10-B13	0-2	1.75			75	29	46	100	100	100	100	99	0	1	34	65		CH		
	2-4	0.50																CH**	48	
	4-6	1.00			98	31	67	100	100	100	100	96	0	4	29	67		CH		
	6.5-8			0														SC**	34	
	8.5-10			0				100	100	99	85	21	0	79	11	10		SC*	28	
	10.5-12			0														CH**	56	
	12.5-14			0	96	32	64											CH*	53	
	14.5-16			0														CH**	62	
	16.5-18			0														CH**	63	
	18.5-20			53														SP-SM**	25	
10-B14	0-2	1.00			97	34	63	100	100	100	100	100	0	0	20	80		CH	47	
	2-4	0.50	0.30		100	35	65	100	100	100	100	96	0	4	30	66		CH		
	4-6	0.00	0.25															CH**	53	
	6-8	0.00	0.20															CH**	71	
	8-10	0.00	0.10		96	32	64	100	100	100	100	100	0	0	23	77		CH	73	55
	10-12	0.00	0.25		33	26	7	100	100	100	100	99	0	1	44	56		ML	42	80
	12.5-14			0														ML**	64	
	14.5-16			38														SP-SM**	28	
	16.5-18			35				100	100	100	88	11	0	90	5	5		SP-SM*	28	
	18.5-20			50														SP-SM**	32	

Boring	Depth	Strenght tests: Direct Shear Test					Unconfined Compression				UU Triaxial Test				CU Triaxial Test						
		C	φ	Wc	γd	Symbol	C	Wc	γd	Symbol	C	Wc	γd	Symbol	C	φ	c'	φ'	Wc	γd	Symbol
	ft	ksf	°	%	pcf		ksf	%	pcf		ksf	%	pcf		ksf	°	ksf	°	%	pcf	
10-B11	2-4																				
	4-6																				
	6-8																				
	8-10																				
	10-12						0.48	47	70	CH**											
	12-14																				
	14-16																				
	16-18																				
	18.5-20																				
	20.5-22																				
	22.5-24																				
	24.5-26																				
	26.5-28																				
	28-5-30																				
10-B12	0-2																				
	2-4						0.44	26	94	CL**											
	4-6																				
	6.5-8																				
	8.5-10																				
	10.5-12																				
	12.5-14																				
	14.5-16																				
	16.5-18																				
	18.5-20																				
	20.5-22																				
	22.5-24																				
	24.5-26																				
	26.5-28																				
	28.5-30																				
10-B13	0-2						1.47	35	78	CH**											
	2-4																				
	4-6										0.29	60	67	CH**							
	6.5-8																				
	8.5-10																				
	10.5-12																				
	12.5-14																				
	14.5-16																				
	16.5-18																				
	18.5-20																				
10-B14	0-2																				
	2-4						0.53	48	72	CH**											
	4-6																				
	6-8																				
	8-10																				
	10-12																				
	12.5-14																				
	14.5-16																				
	16.5-18																				
	18.5-20																				