BORING LOG NO. 10-B16

CLIENT:	USACE, Galveston District Galveston, Texas	PROJECT:	Galveston Channel Deepening, TO-0010
BORING LOCATION:	N: 13687639.3 E: 3317392.95	SITE:	San Jacinto Placement Area Galveston, Texas

Approx. Surface Elevation: 11.9 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 brownish gray becoming bluish gray with depth, with roots, sand seams, pockets and layers, high plasticity, medium stiff on top 2 ft then very soft	1	CH	ST	14		1.0		38	81	87	31	56				
		3		ST	18		0.0	0.15			83	30	53	98			
		5		ST	16		0.0	0.1	45								
		7		ST	19		0.0	1.5	81	55							
		9		ST	19		0.0	0.1	44		60	22	38	90			
		11		ST	19		0.0	0.15	49	74	86	29	57	89			
		13		ST	21		0.0	0.25	46								
	-4.1 16.0	15		SS	10	0			62								
	POORLY GRADED SAND w/ SILT bluish gray, with shell , fine, medium dense to dense	17	SP-SM	SS	11	40			28					6			
	-8.1 20.0	19		SS	14	26			24								
	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			
▽ 9 ft	WS	▼ 6 ft	at 5 min
▼ 4 ft	at 10 min	▼ 3 ft	at 15 min

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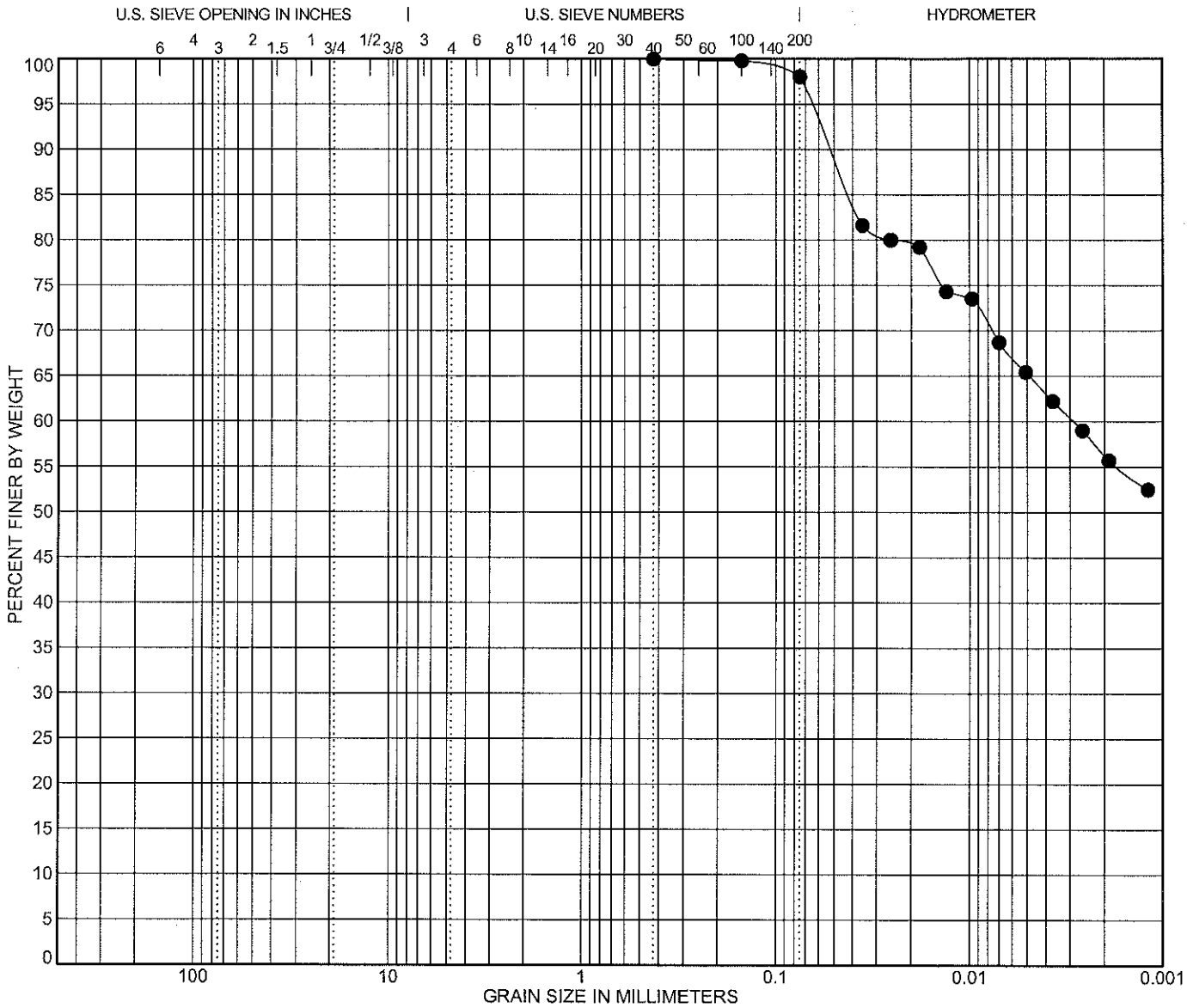
DATE DRILLED	Page 1 of 1
4/14/2010	10-B16
PROJECT NUMBER 92105154	EXHIBIT A-16



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	LL	PL	PI	Cc	Cu
● **10-B16**	**2.0**	**FAT CLAY(CH)**	**83**	**30**	**53**		

Percent Passing the Indicated Sieve

Specimen Identification		3/8"	#4	#10	#40	#100	#200
● **10-B16**	**2.0**				**100**	**99.8**	**98**

Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
● **10-B16**	**2.0**	**0.425**				**0.0**	**1.9**	**41.8**	**56.2**

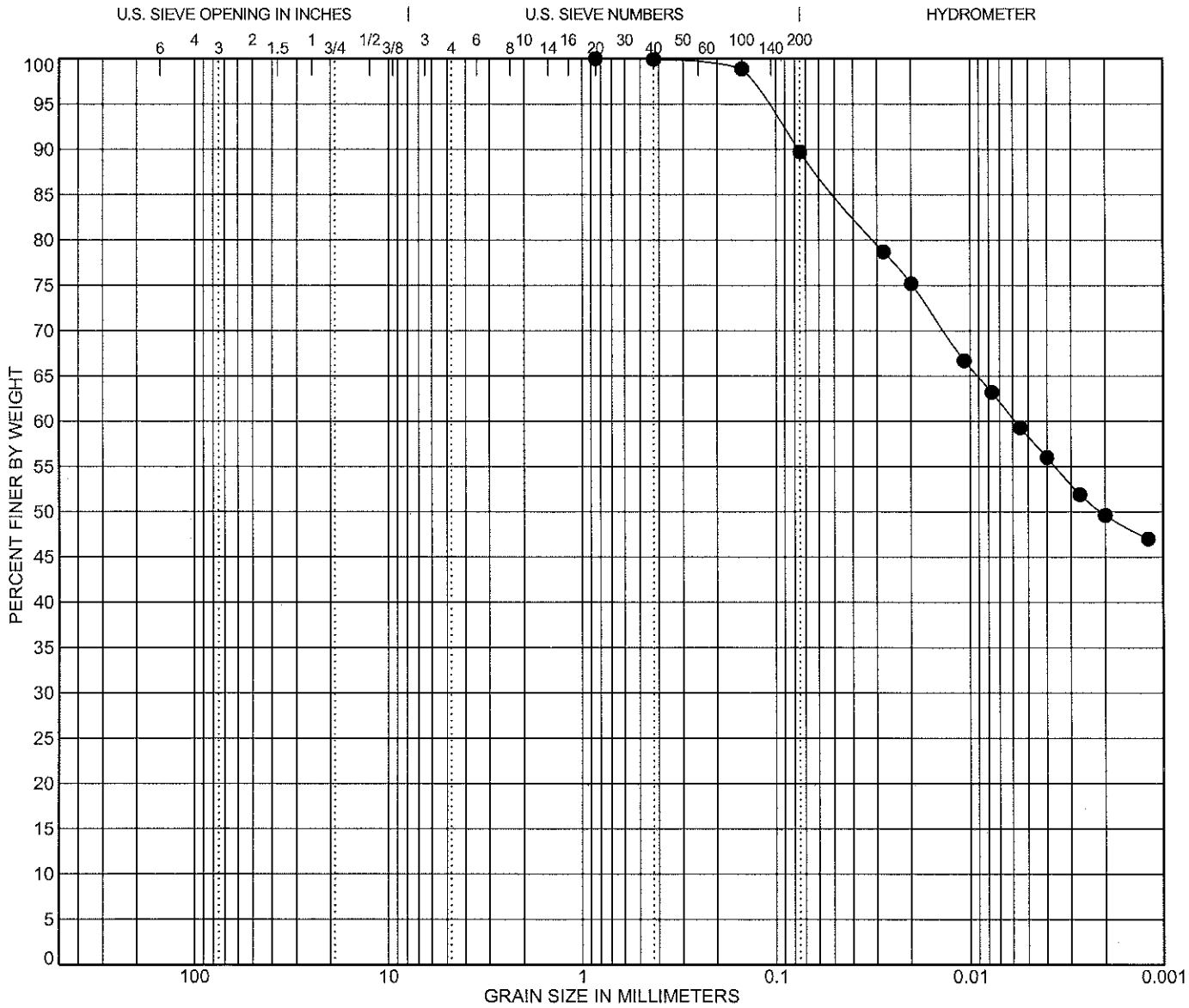
GRAIN SIZE DISTRIBUTION

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-B16, 2.0



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	LL	PL	PI	Cc	Cu
● **10-B16**	**8.0**	**FAT CLAY(CH)**	**60**	**22**	**38**		

Percent Passing the Indicated Sieve

Specimen Identification		3/8"	#4	#10	#40	#100	#200
● **10-B16**	**8.0**				**99.9**	**98.9**	**89.7**

Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
● **10-B16**	**8.0**	**0.85**	**0.002**			**0.0**	**10.3**	**40.1**	**49.6**

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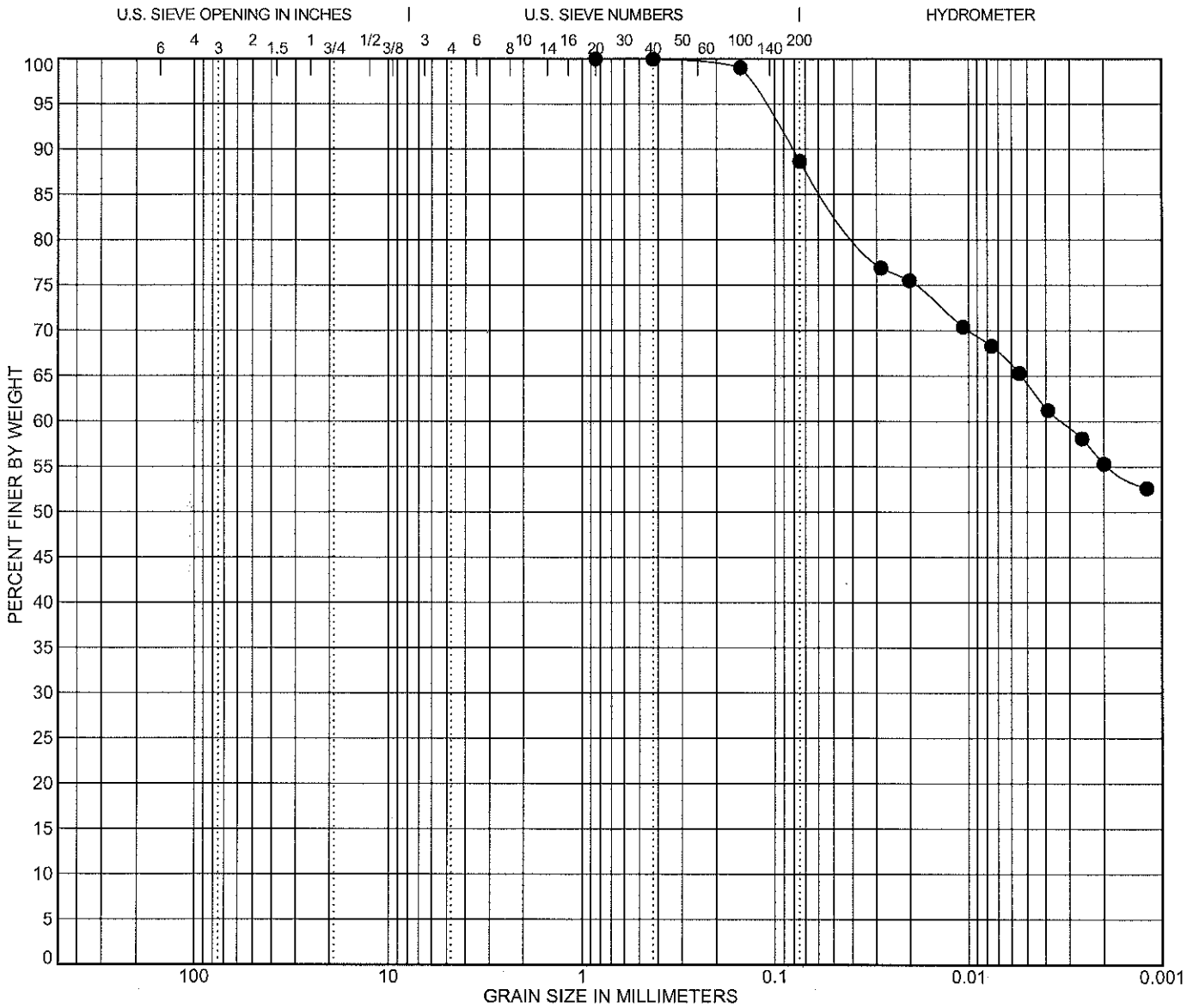
Fax: 713-690-8787

SPECIMEN ID
10-B16, 8.0



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	LL	PL	PI	Cc	Cu
● **10-B16**	**10.0**	**FAT CLAY(CH)**	**86**	**29**	**57**		

Percent Passing the Indicated Sieve

Specimen Identification		3/8"	#4	#10	#40	#100	#200
● **10-B16**	**10.0**				**100**	**99**	**88.6**

Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
● **10-B16**	**10.0**	**0.85**				**0.0**	**11.4**	**33.3**	**55.3**

GRAIN SIZE DISTRIBUTION

Galveston Channel Deepening,
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Galveston, Texas
Project Number 92105154

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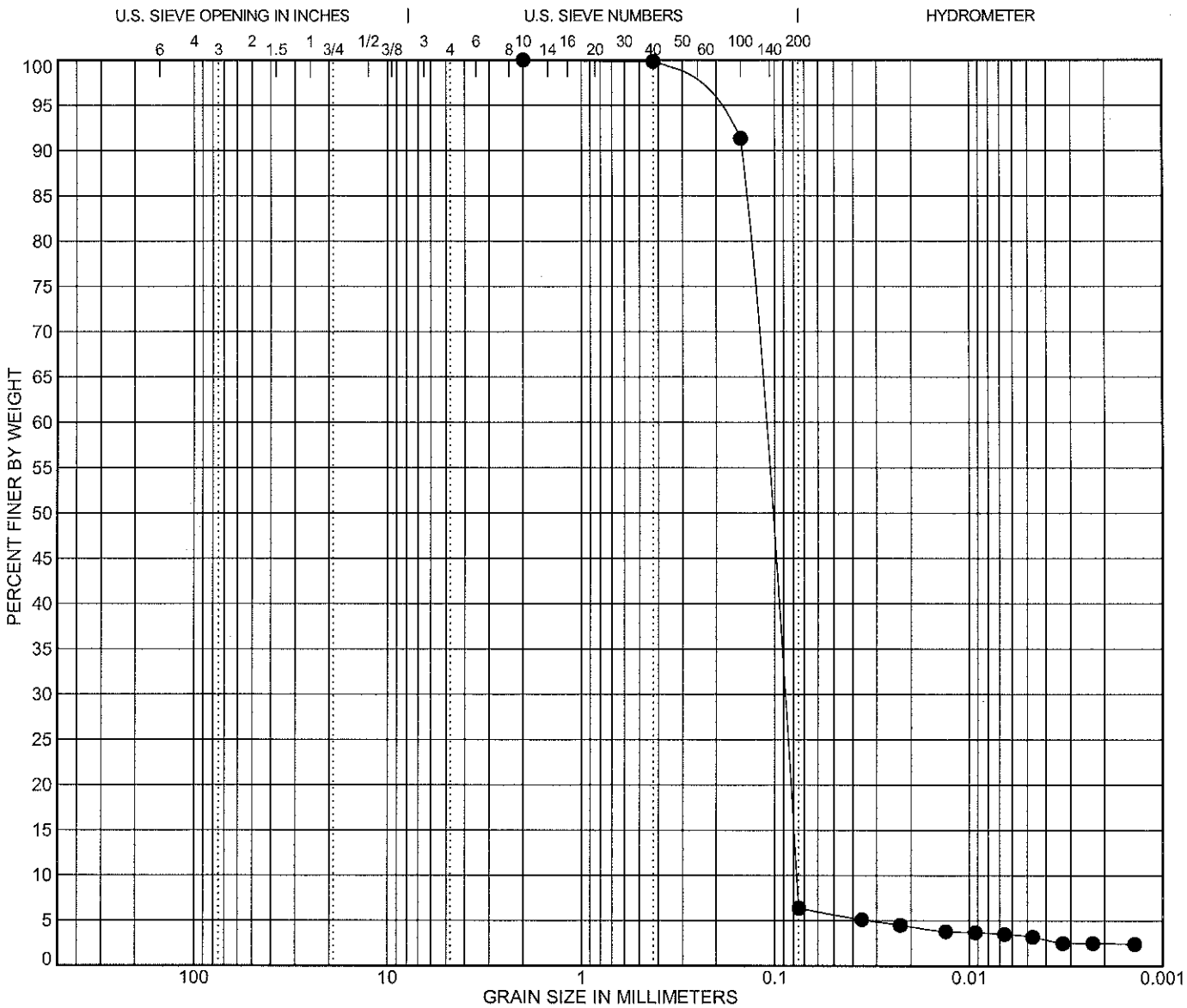
SPECIMEN ID
10-B16, 10.0



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**10-B16**	**16.5**					**0.92**	**1.50**

Percent Passing the Indicated Sieve

	Specimen Identification		3/8"	#4	#10	#40	#100	#200
●	**10-B16**	**16.5**			**100**	**99.8**	**91.3**	**6.4**

	Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**10-B16**	**16.5**	**2**	**0.107**	**0.091**	**0.077**	**0.0**	**93.6**	**3.9**	**2.5**

GRAIN SIZE DISTRIBUTION

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

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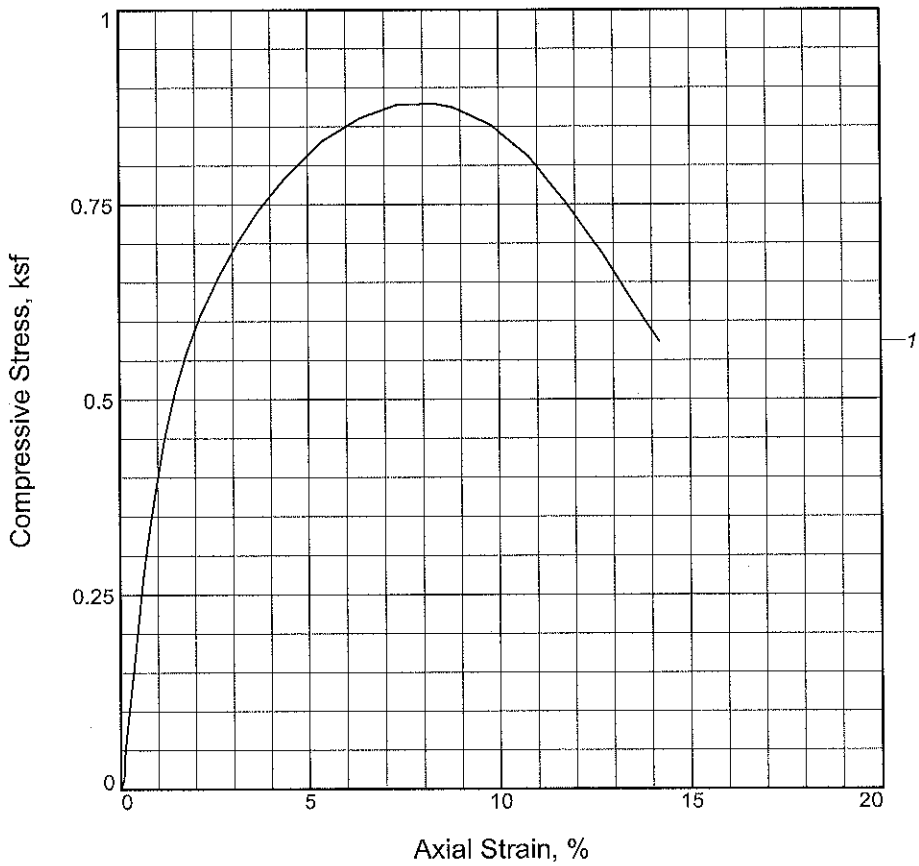
SPECIMEN ID
10-B16, 16.5

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, ksf	0.880			
Undrained shear strength, ksf	0.440			
Failure strain, %	8.3			
Strain rate, in./min.	0.055			
Water content, %	38.4			
Wet density, pcf	111.9			
Dry density, pcf	80.9			
Saturation, %	94.0			
Void ratio	1.1221			
Specimen diameter, in.	2.808			
Specimen height, in.	5.931			
Height/diameter ratio	2.11			

Description: Gray Fat Clay w/sand

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-B16

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-B16
Depth: 2-4 ft. **Sample Number:** 2
Description: Gray Fat Clay w/sand
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.	157.630
Moisture content: Dry soil+tare, gms.	127.090
Moisture content: Tare, gms.	47.480
Moisture, %	38.4
Moist specimen weight, gms.	1079.20
Diameter, in.	2.808
Area, in.^{2}	6.193
Height, in.	5.931
Wet density, pcf	111.9
Dry density, pcf	80.9
Void ratio	1.1221
Saturation, %	94.0

Test Readings for Specimen No. 1

Strain rate, in./min. = 0.055
Unconfined compressive strength = 0.880 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	0.0050	0.500	0.5	0.1	0.012
2	0.0071	2.096	2.1	0.1	0.049
3	0.0147	4.491	4.5	0.2	0.104
4	0.0217	6.738	6.7	0.4	0.156
5	0.0292	9.258	9.3	0.5	0.214
6	0.0367	11.749	11.7	0.6	0.272
7	0.0451	14.133	14.1	0.8	0.326
8	0.0556	16.545	16.5	0.9	0.381
9	0.0700	19.576	19.6	1.2	0.450
10	0.0875	22.308	22.3	1.5	0.511
11	0.1050	24.471	24.5	1.8	0.559
12	0.1279	26.767	26.8	2.2	0.609
13	0.1568	29.070	29.1	2.6	0.658
14	0.1863	31.146	31.1	3.1	0.702
15	0.2207	33.237	33.2	3.7	0.744

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf
16	0.2618	35.336	35.3	4.4	0.785
17	0.3196	37.783	37.8	5.4	0.831
18	0.3777	39.561	39.6	6.4	0.861
19	0.4356	40.765	40.8	7.3	0.878
20	0.4934	41.272	41.3	8.3	0.880
21	0.5228	41.263	41.3	8.8	0.875
22	0.5807	40.649	40.6	9.8	0.853
23	0.6391	39.131	39.1	10.8	0.812
24	0.6969	36.725	36.7	11.8	0.754
25	0.7548	33.877	33.9	12.7	0.687
26	0.7982	31.193	31.2	13.5	0.628
27	0.8417	28.789	28.8	14.2	0.574

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	Strenght tests																				
								% by weight passing sieve					Soil Particle Content								Direct Shear Test					Unconfined Compression				UU Triaxial Test				CU Triaxial Test						
		PP	TV	SPTn	LL	PL	PI	4	10	40	100	200	gravel	sand	silt	clay	sieve 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	
10-B15	0-2	0.00	0.10															CH**	51																						
	2-4	0.00	0.20		96	30	66	100	100	100	100	99	0	1	35	64		CH								0.17	55	69	CH**												
	4-6	0.00	0.15															MH**	48																						
	6-8	0.00	0.10															MH**	65	58																					
	8-10	0.00	0.05		111	59	52	100	100	100	100	97	0	3	44	53		MH												0.28	46	74	CH**							
	10-12	0.00	0.10															CH**	99																						
	12-14	0.00	0.05															CH**	94	45																					
	14.5-16			0														CH**	91																						
	16.5-18			27														SP-SM**	46																						
	18.5-20			46				100	100	98	85	7	0	93	4	3		SP-SM*	26																						
10-B16	0-2	1.00			87	31	56											CH*	38	81																					
	2-4	0.00	0.15		83	30	53	100	100	100	100	98	0	2	42	56		CH								0.44	38	81	CH**												
	4-6	0.00	0.10															CH**	45																						
	6-8	0.00	0.15															CH**	81	55																					
	8-10	0.00	0.10		60	22	38	100	100	100	99	90	0	10	40	50		CH	44																						
	10-12	0.00	0.15		86	29	57	100	100	100	99	88	0	12	33	55		CH	49	74																					
	12-14	0.00	0.25															CH**	46																						
	14.5-16			0														CH**	62																						
	16.5-18			40				100	100	100	91	6	0	94	4	2		SP-SM*	28																						
	18.5-20			26														SP-SM**	24																						
10-B17	0-2	0.50			101	33	68											CH*	56	67																					
	2-4	0.00	0.20															CH**	56																						
	4-6	0.00	0.20		81	27	54											CH*												0.28	76	54	CH**							
	6-8	0.00	0.15															CH**	83																						
	8-10	0.00	0.10															CH**	87																						
	10-12	0.00	0.10		123	35	88	100	100	100	100	100	0	0	21	79		CH	93	47																					
	12-14	0.00	0.10															CH**	62																						
	14.5-16			0														CH**	50																						
	16.5-18			22				100	100	100	93	5	0	95			5	SP-SM*	26																						
	18.5-20			10														SP-SM**	34																						
10-B18	0-2	0.00	0.20															CH**	57																						
	2-4	0.00	0.20		97	28	69	100	100	100	99	82	0	18	31	51		CH																							
	4-6	0.00	0.25		96	29	67	100	100	100	100	98	0	2	28	70		CH	92	52																					
	6-8	0.00	0.10															CH**	95																						
	8-10	0.00	0.05		75	24	51	100	100	100	100	94	0	6	29	65		CH	78							0.09	78	55	CH**												
	10-12	0.00	0.05															CH**	101																						
	12-14	0.00	0.05		114	33	81											CH*	88	51																					
	14.5-16			0														CH**	85																						
	16.5-18			0	109	29	80											CH*	80																						
	18.5-20			0														CH**	80																						
10-B19	0-2	0.75			103	35	68	100	100	100	100	97	0	3	30	67		CH	45																						
	2-4	0.00	0.15		100	29	71	100	100	100	100	96	0	4	31	65		CH												0.42	47	73	CH**							
	4-6	0.00	0.30															CH**	53																						
	6-8	0.00	0.15															CH**	45	73																					
	8-10	0.00	0.10		80	26	54	100	100	100	100	99	0	1	38	61		CH																0.26	3	0.14	21	67	60	CH**
	10-12	0.00	1.00															CH**	54																						
	12.5-14			7														CH**	32																						
	14.5-16			0				100	100	99	95	57	0	43	20	37		CH*	44																						
	16.5-18			31														SP-SM**	26																						