BORING LOG NO. 10-B12

CLIENT:	USACE, Galveston District Galveston, Texas	PROJECT:	Galveston Channel Deepening, TO-0010
BORING LOCATION:	N: 13686122.65 E: 3317179.46	SITE:	San Jacinto Placement Area Galveston, Texas

Approx. Surface Elevation: 12.4 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: CLAYEY SAND brownish gray becoming greenish and bluish gray with depth, w/ roots, cohesive to low cohesion, medium to low plasticity, mediun dense to loose	1	SC	ST	9		1.25		31								
		3		ST	11		0.75		26	94	36	16	20	32			
		5		ST	22		0.0	0.15	21								
		7		SS	17	15			24								
		9		SS	10	8			24					14			
		11		SS	24	9			38								
		13		SS	17	2			33								
	-1.6 14.0																
	FILL: FAT CLAY bluish gray, with sand pockets and thin layer, very soft	15	CH	SS	12	0			61								
		17		SS	12	0			62								
	-6.6 19.0																
	CLAYEY SAND bluish gray with shell, fine, dense to very dense	19	SC	SS	21	26			50					44			
		21		SS	11	17			31								
		23		SS	14	39			79								
		25		SS	10	49			25								
		27		SS	15	60			24					14			
		29		SS	14	9			28								
	-17.6 30.0																
	Boring terminated at 30 feet.	30															

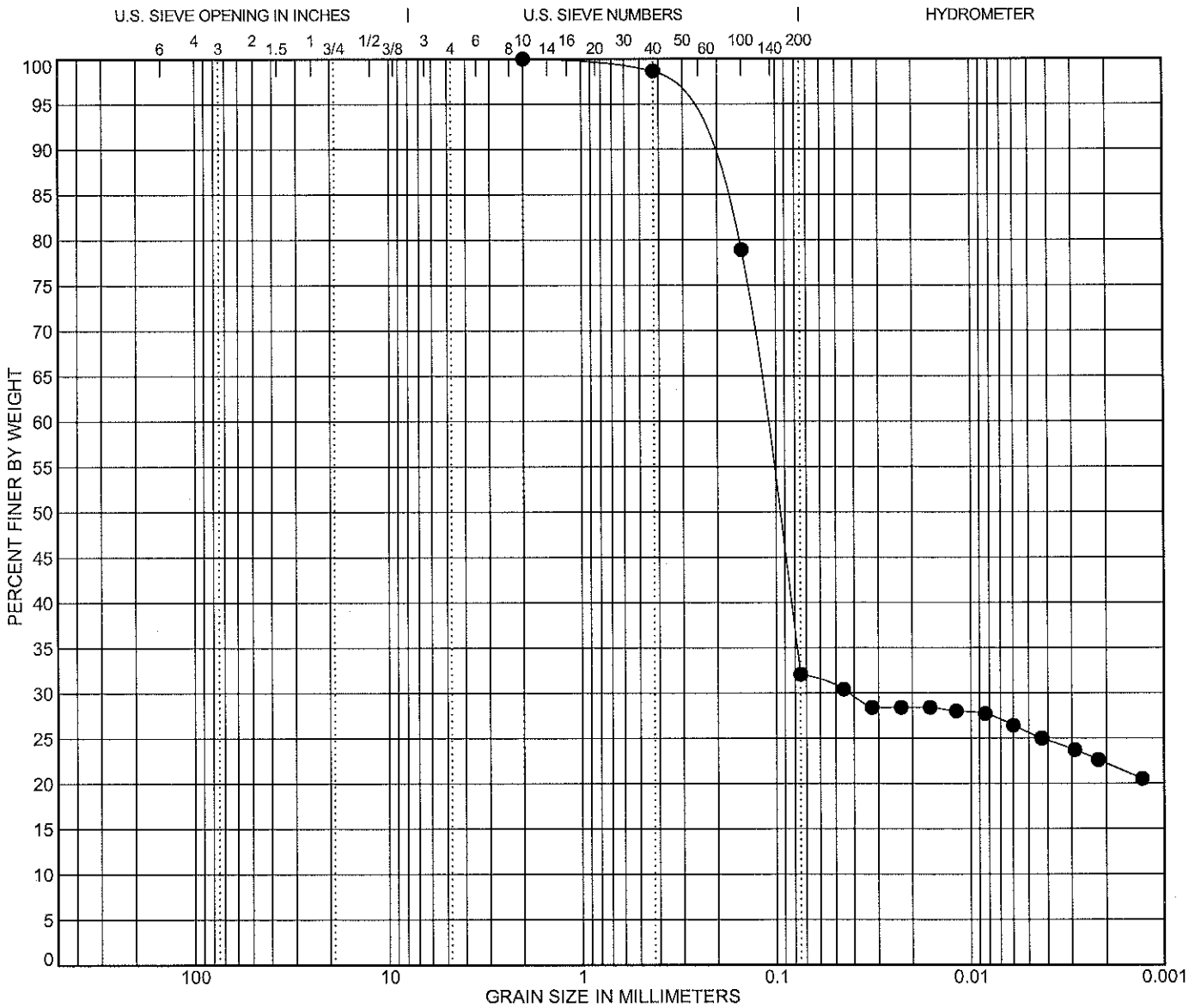
STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION BETWEEN STRATA MAY BE MORE GRADUAL.

REMARKS: **Dry auger to 8 feet; wet rotary thereafter.**

WATER LEVEL OBSERVATIONS			
6 ft	WS	5 ft	DCI
5 ft	DCI	5 ft	WL

Terracon

DATE DRILLED	Page 1 of 1
4/13/2010	10-B12
PROJECT NUMBER 92105154	EXHIBIT A-12



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	LL	PL	PI	Cc	Cu
● **10-B12**	**2.0**	**CLAYEY SAND(SC)**	**36**	**16**	**20**		

Percent Passing the Indicated Sieve

Specimen Identification		3/8"	#4	#10	#40	#100	#200
● **10-B12**	**2.0**			**100**	**98.7**	**78.9**	**32.1**

Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
● **10-B12**	**2.0**	**2**	**0.098**	**0.042**		**0.0**	**67.9**	**9.9**	**22.2**

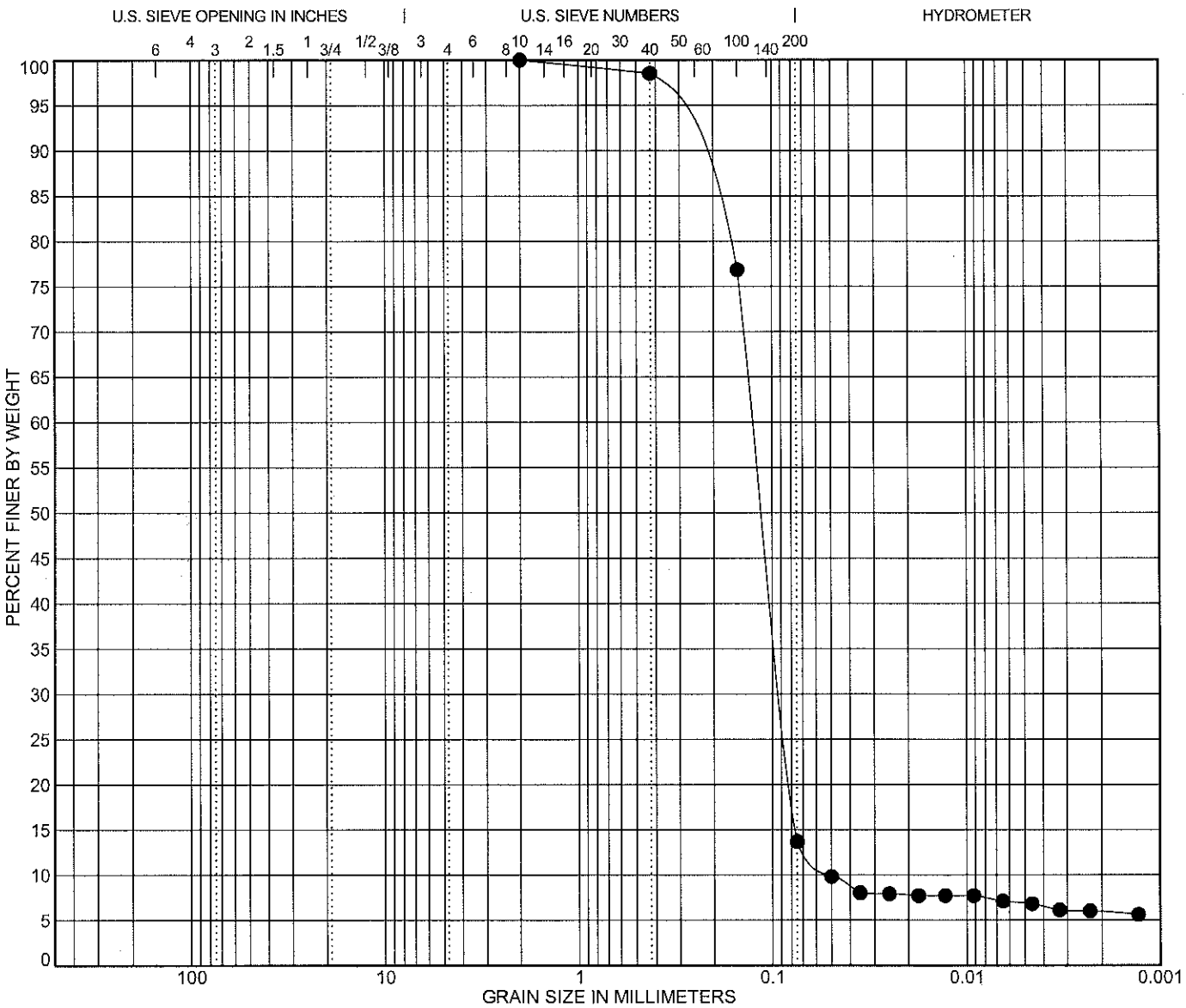
GRAIN SIZE DISTRIBUTION

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-B12, 2.0



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	LL	PL	PI	Cc	Cu
● **10-B12**	**8.5**					**1.26**	**2.44**

Percent Passing the Indicated Sieve

Specimen Identification		3/8"	#4	#10	#40	#100	#200
● **10-B12**	**8.5**			**100**	**98.5**	**76.8**	**13.7**

Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
● **10-B12**	**8.5**	**2**	**0.112**	**0.09**	**0.051**	**0.0**	**86.3**	**7.8**	**5.9**

GRAIN SIZE DISTRIBUTION

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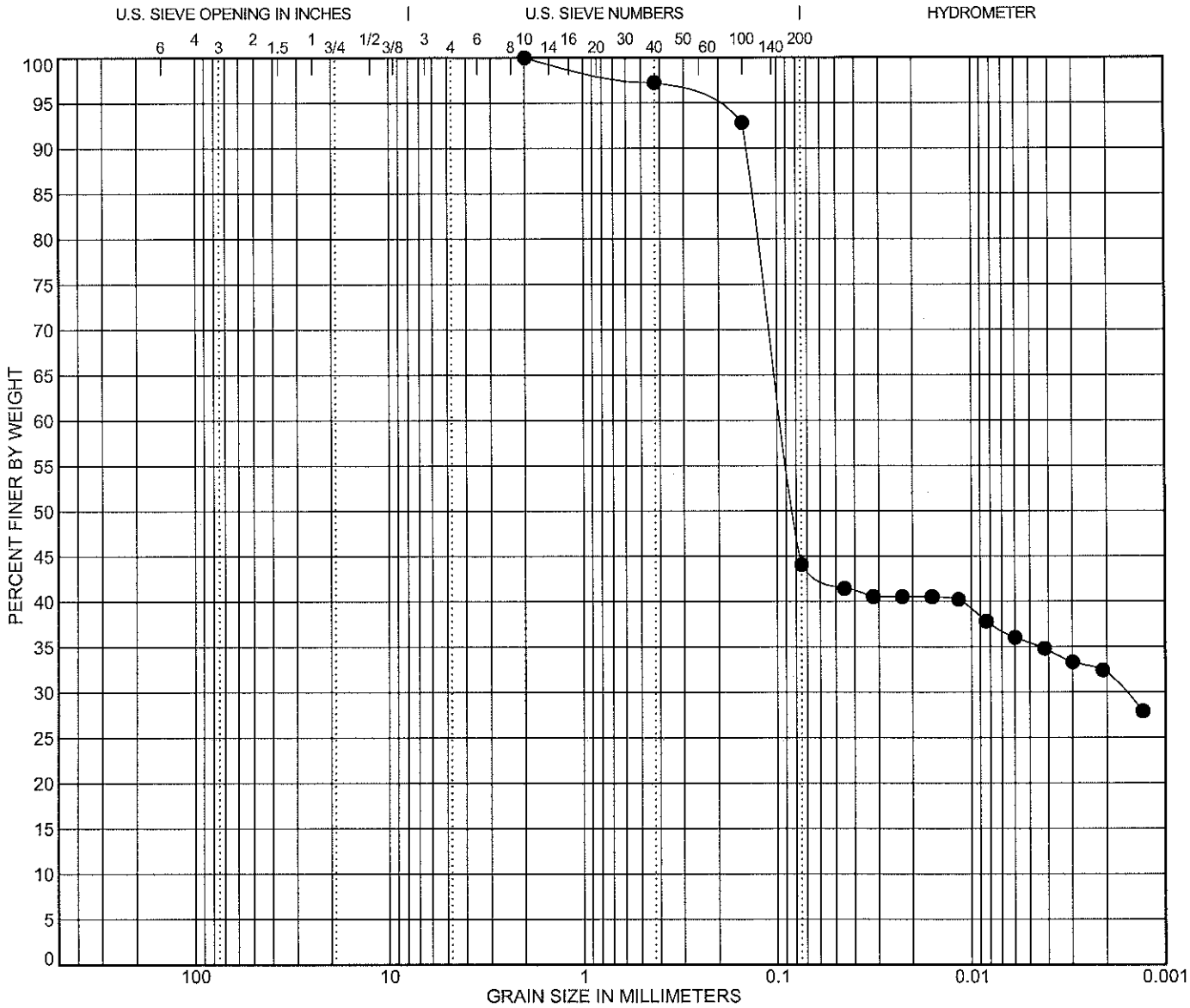
SPECIMEN ID
10-B12, 8.5



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	LL	PL	PI	Cc	Cu
● **10-B12**	**18.5**						

Percent Passing the Indicated Sieve

Specimen Identification		3/8"	#4	#10	#40	#100	#200
● **10-B12**	**18.5**			**100**	**97.2**	**92.8**	**44.1**

Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
● **10-B12**	**18.5**	**2**	**0.082**	**0.002**		**0.0**	**55.9**	**12.1**	**31.9**

GRAIN SIZE DISTRIBUTION

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

Terracon

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Telephone: 713-690-8989
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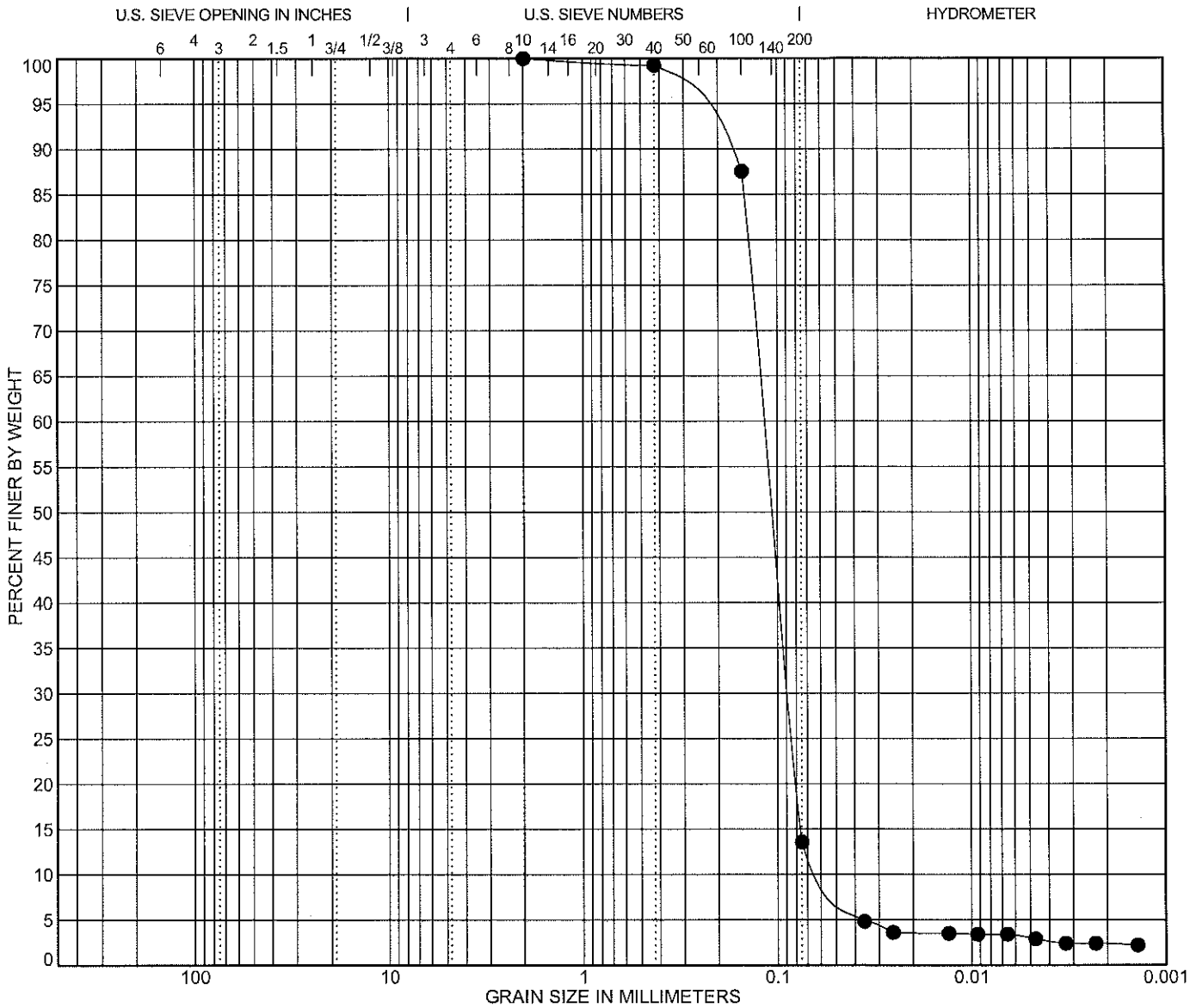
SPECIMEN ID
10-B12, 18.5



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	LL	PL	PI	Cc	Cu
● **10-B12**	**26.5**					**1.19**	**2.09**

Percent Passing the Indicated Sieve

Specimen Identification		3/8"	#4	#10	#40	#100	#200
● **10-B12**	**26.5**			**100**	**99.2**	**87.5**	**13.6**

Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
● **10-B12**	**26.5**	**2**	**0.106**	**0.087**	**0.055**	**0.0**	**86.4**	**11.2**	**2.3**

GRAIN SIZE DISTRIBUTION

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

Terracon

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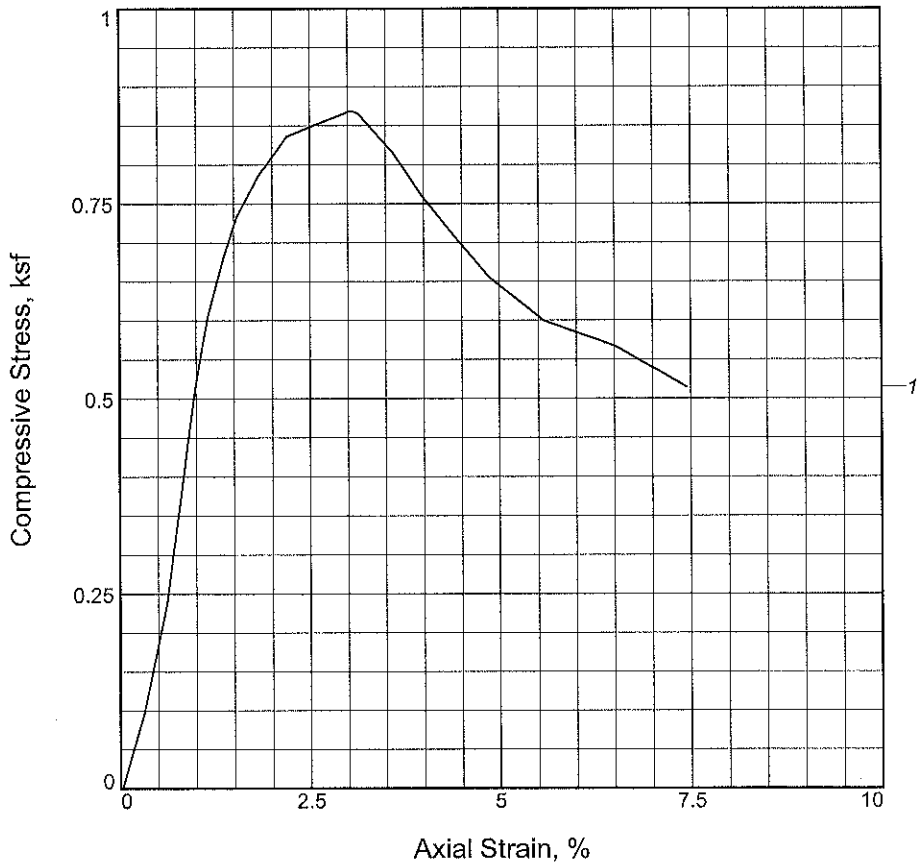
11555 Clay Road, Suite 100
Houston, Texas 77043
Telephone: 713-690-8989
Fax: 713-690-8787

SPECIMEN ID
10-B12, 26.5

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, ksf	0.869			
Undrained shear strength, ksf	0.435			
Failure strain, %	3.0			
Strain rate, in./min.	0.055			
Water content, %	25.8			
Wet density, pcf	118.1			
Dry density, pcf	93.9			
Saturation, %	85.5			
Void ratio	0.8289			
Specimen diameter, in.	2.739			
Specimen height, in.	5.873			
Height/diameter ratio	2.14			

Description: Gray Lean Clay w/calc. nodules and sand pockets

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: B-12

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: B-12
Depth: 2-4 ft. **Sample Number:** 2
Description: Gray Lean Clay w/calc. nodules 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.	187.520
Moisture content: Dry soil+tare, gms.	161.380
Moisture content: Tare, gms.	59.980
Moisture, %	25.8
Moist specimen weight, gms.	1072.46
Diameter, in.	2.739
Area, in.^{2}	5.892
Height, in.	5.873
Wet density, pcf	118.1
Dry density, pcf	93.9
Void ratio	0.8289
Saturation, %	85.5

Test Readings for Specimen No. 1

Strain rate, in./min. = 0.055
Unconfined compressive strength = 0.869 ksf **at reading no.** 16

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf
0	0.0300	0.000	0.0	0.0	0.000
1	0.0320	0.040	0.0	0.0	0.001
2	0.0395	1.844	1.8	0.2	0.045
3	0.0480	3.846	3.8	0.3	0.094
4	0.0546	5.990	6.0	0.4	0.146
5	0.0660	9.798	9.8	0.6	0.238
6	0.0712	12.517	12.5	0.7	0.304
7	0.0768	15.399	15.4	0.8	0.373
8	0.0820	18.212	18.2	0.9	0.441
9	0.0877	21.059	21.1	1.0	0.510
10	0.0934	23.300	23.3	1.1	0.563
11	0.0986	25.189	25.2	1.2	0.608
12	0.1099	28.196	28.2	1.4	0.680
13	0.1208	30.500	30.5	1.5	0.734
14	0.1373	32.792	32.8	1.8	0.787
15	0.1591	35.008	35.0	2.2	0.837

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf
16	0.2087	36.693	36.7	3.0	0.869
17	0.2144	36.569	36.6	3.1	0.866
18	0.2418	34.599	34.6	3.6	0.815
19	0.2641	32.364	32.4	4.0	0.759
20	0.2886	30.321	30.3	4.4	0.708
21	0.3160	28.207	28.2	4.9	0.656
22	0.3572	26.015	26.0	5.6	0.600
23	0.4125	24.810	24.8	6.5	0.567
24	0.4674	22.744	22.7	7.4	0.514

Parameters for Specimen No. 3

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	182.070			129.410
Moisture content: Dry soil+tare, gms.	133.770			97.360
Moisture content: Tare, gms.	60.740			47.300
Moisture, %	66.1	64.0	64.0	64.0
Moist specimen weight, gms.	1026.08			
Diameter, in.	2.837	2.837	2.837	
Area, in.^{2}	6.321	6.321	6.321	
Height, in.	6.056	6.056	6.056	
Net decrease in height, in.		0.000	0.000	
Net decrease in water volume, cc.			0.000	
Wet density, pcf	102.1	100.8	100.8	
Dry density, pcf	61.5	61.5	61.5	
Void ratio	1.7935	1.7935	1.7935	
Saturation, %	101.4	98.2	98.2	

Test Readings for Specimen No. 3

Consolidation cell pressure = 55.220 psi (7.952 ksf)

Consolidation back pressure = 30.000 psi (4.320 ksf)

Consolidation effective confining stress = 3.632 ksf

Strain rate, in./min. = 0.001

Fail. Stress = 1.488 ksf **at reading no.** 16

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
0	0.0000	0.000	0.0	0.0	0.000	7.952	7.952	1.00	0.000	7.952	0.000
1	0.0031	2.755	2.8	0.1	0.063	3.630	3.692	1.02	30.015	3.661	0.031
2	0.0058	8.910	8.9	0.1	0.203	3.474	3.677	1.06	31.097	3.575	0.101
3	0.0086	16.102	16.1	0.1	0.366	3.187	3.554	1.11	33.085	3.371	0.183
4	0.0113	21.689	21.7	0.2	0.493	2.995	3.488	1.16	34.420	3.242	0.247
5	0.0154	28.093	28.1	0.3	0.638	2.783	3.421	1.23	35.896	3.102	0.319
6	0.0196	32.383	32.4	0.3	0.735	2.624	3.359	1.28	36.998	2.992	0.368
7	0.0237	36.812	36.8	0.4	0.835	2.493	3.329	1.34	37.905	2.911	0.418
8	0.0278	40.381	40.4	0.5	0.916	2.388	3.304	1.38	38.633	2.846	0.458
9	0.0333	43.920	43.9	0.6	0.995	2.264	3.259	1.44	39.500	2.761	0.498
10	0.0374	47.823	47.8	0.6	1.083	2.184	3.267	1.50	40.052	2.725	0.541
11	0.0443	51.583	51.6	0.7	1.166	2.067	3.234	1.56	40.863	2.651	0.583
12	0.0526	54.973	55.0	0.9	1.241	1.951	3.192	1.64	41.671	2.572	0.621
13	0.0636	59.772	59.8	1.0	1.347	1.823	3.170	1.74	42.560	2.497	0.674
14	0.0801	63.552	63.6	1.3	1.429	1.692	3.121	1.84	43.469	2.406	0.714
15	0.1351	66.144	66.1	2.2	1.473	1.475	2.948	2.00	44.978	2.211	0.737
16	0.1736	67.261	67.3	2.9	1.488	1.390	2.879	2.07	45.565	2.135	0.744
17	0.2066	67.138	67.1	3.4	1.477	1.345	2.822	2.10	45.880	2.084	0.739
18	0.2616	66.341	66.3	4.3	1.446	1.285	2.731	2.13	46.296	2.008	0.723
19	0.3194	65.952	66.0	5.3	1.423	1.247	2.670	2.14	46.563	1.958	0.712
20	0.3744	65.817	65.8	6.2	1.407	1.218	2.624	2.16	46.763	1.921	0.703
21	0.4294	65.672	65.7	7.1	1.390	1.205	2.595	2.15	46.849	1.900	0.695
22	0.4844	64.688	64.7	8.0	1.356	1.180	2.536	2.15	47.025	1.858	0.678
23	0.5364	64.770	64.8	8.9	1.345	1.165	2.510	2.15	47.129	1.838	0.672

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																				