BORING LOG NO. 10-B7

CLIENT: **USACE, Galveston District Galveston, Texas**	PROJECT: **Galveston Channel Deepening, TO-0010**
BORING LOCATION: **N: 13686596.28 E: 3316974.06**	SITE: **San Jacinto Placement Area Galveston, Texas**

Approx. Surface Elevation: 17.2 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: CLAYEY SAND brown, light brown, w/ roots, very dense, dry (15.2 – 2.0)	1	SC	ST	10		4.5		29								
	FILL: FAT CLAY gray, w/ sand pockets and layers, dry, soft to medium stiff (11.2 – 6.0)	2–4	CH	ST	10		0.75				78	28	50	95			
		5		ST	9		0.25	0.3	53								
	FILL: SILTY SAND light gray, brown, wet, fine, some cohesion, loose (7.2 – 10.0)	6–8	SM	SS	13				25								
		9		SS	2												
	FILL: FAT CLAY bluish gray, yellowish brown, with organic matter, roots and undecomposed wood, w/ organic matter stains, very soft to medium stiff (-6.9 – 24.0)	10–12	CH	ST	11		0.75		51	71							
		13		ST	12		0.5		37		76	27	49	95			
		15		SS	18				61								
		17		ST	13		0.0	0.3	46								
		19		SS	18				64								
		21		ST	18		0.0	0.2			111	33	78	95			
		23		ST	18		0.0	0.2	65								
	POORLY GRADED SAND gray, w/ shell, clean, slight cohesion, fine, loose (-8.9 – 26.0)	24–26	SP	SS	12	9			27					4			
	FAT CLAY bluish gray, w/ sand pockets, soft (-10.9 – 28.0)	26–28	CH	SS	17	4			58								
		29	SP-SM	ST	10				27								
		30															

Continued Next Page

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			
▽ 8 ft	WS	▼ 8 ft	WCI
▼ 7.5 ft	WCI	▼ 7.5 ft	WCI

Terracon

DATE DRILLED 5/29/2010

PROJECT NUMBER 92105154

10-B7

EXHIBIT A-7

BORING LOG NO. 10-B7

CLIENT: **USACE, Galveston District Galveston, Texas**	PROJECT: **Galveston Channel Deepening, TO-0010**
BORING LOCATION: **N: 13686596.28 E: 3316974.06**	SITE: **San Jacinto Placement Area Galveston, Texas**

Approx. Surface Elevation: 17.2 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
	POORLY GRADED SAND w/ SILT bluish gray, w/ shell, fine, slight cohesion, medium dense	31		SS	9	23			26								
	-14.9 / 32.0	32	SC														
	CLAYEY SAND bluish gray, w/ few finely broken shell and fat clay layers, medium dense	33		SS	12	13			42								
		34															
		35		SS	10	23			30								
		36															
		37		SS	16				39		41	19	22	44			
	-20.9 / 38.0	38	CH														
	FAT CLAY w/ SAND bluish gray, w/ shell & sand seams, soft	39		ST	10		0.5	0.2	60								
	-22.9 / 40.0	40	SC														
	CLAYEY SAND bluish gray, fine, slightly cohesive to cohesive, medium dense to dense	41		SS	4				25								
		42															
		43		SS	13	33			26								
		44															
		45		SS	12	27			30								
		46															
		47		SS	12	17			26					20			
	-30.9 / 48.0	48	CH														
	FAT CLAY bluish gray, with shell, sand pockets & thin layers, medium stiff	49		SS	14	4			42								
		50															
		51		SS	18	5			42								
		52															
		53		ST	11				45								
		54															
		55		ST	N/A												
	-38.9 / 56.0	56	CL														
	LEAN CLAY w/ SAND bluish gray, with interbedded thin layers of sand & shell, very soft	57		SS	18				30								
		58															
		59		SS	18	0			35		41	17	24	76			
		60															

Continued Next Page

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			
∇ 8 ft	WS	▼ 8 ft	WCI
▼ 7.5 ft	WCI	▼ 7.5 ft	WCI

Terracon

DATE DRILLED	5/29/2010
PROJECT NUMBER	92105154

10-B7

EXHIBIT A-7

BORING LOG NO. 10-B7

CLIENT:	USACE, Galveston District Galveston, Texas	PROJECT:	Galveston Channel Deepening, TO-0010
BORING LOCATION:	N: 13686596.28 E: 3316974.06	SITE:	San Jacinto Placement Area Galveston, Texas

Approx. Surface Elevation: 17.2 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
	-44.9 62.0	61		SS	18	2			40								
	FAT CLAY bluish gray, with shell and sand layers, very soft to medium stiff	62	CH														
		63		SS	18				50								
		64															
		65		ST	9		0.5	0.4	51								
		66															
		67		ST	3.5		1.0		51								
		68															
	-52.9 70.0	69		ST	16		0.0	0.25	42	86							
	SANDY FAT CLAY light red, light gray w/ large sand pockets, stiff	70	CH														
		71		ST	21		1.0		40								
		72															
		73		ST	5		1.25		44								
	-56.9 74.0	74															
	LEAN CLAY light gray, with silt pockets, partings and seams, stiff to very stiff	75	CL	ST	13		2.25		24	102	35	24	11	98			
		76															
		77		ST	5		1.0		26								
		78															
	-62.9 80.0	79		SS	13	11			31								
	Boring terminated at 80 feet.	80															

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			
8 ft	WS	8 ft	WCI
7.5 ft	WCI	7.5 ft	WCI

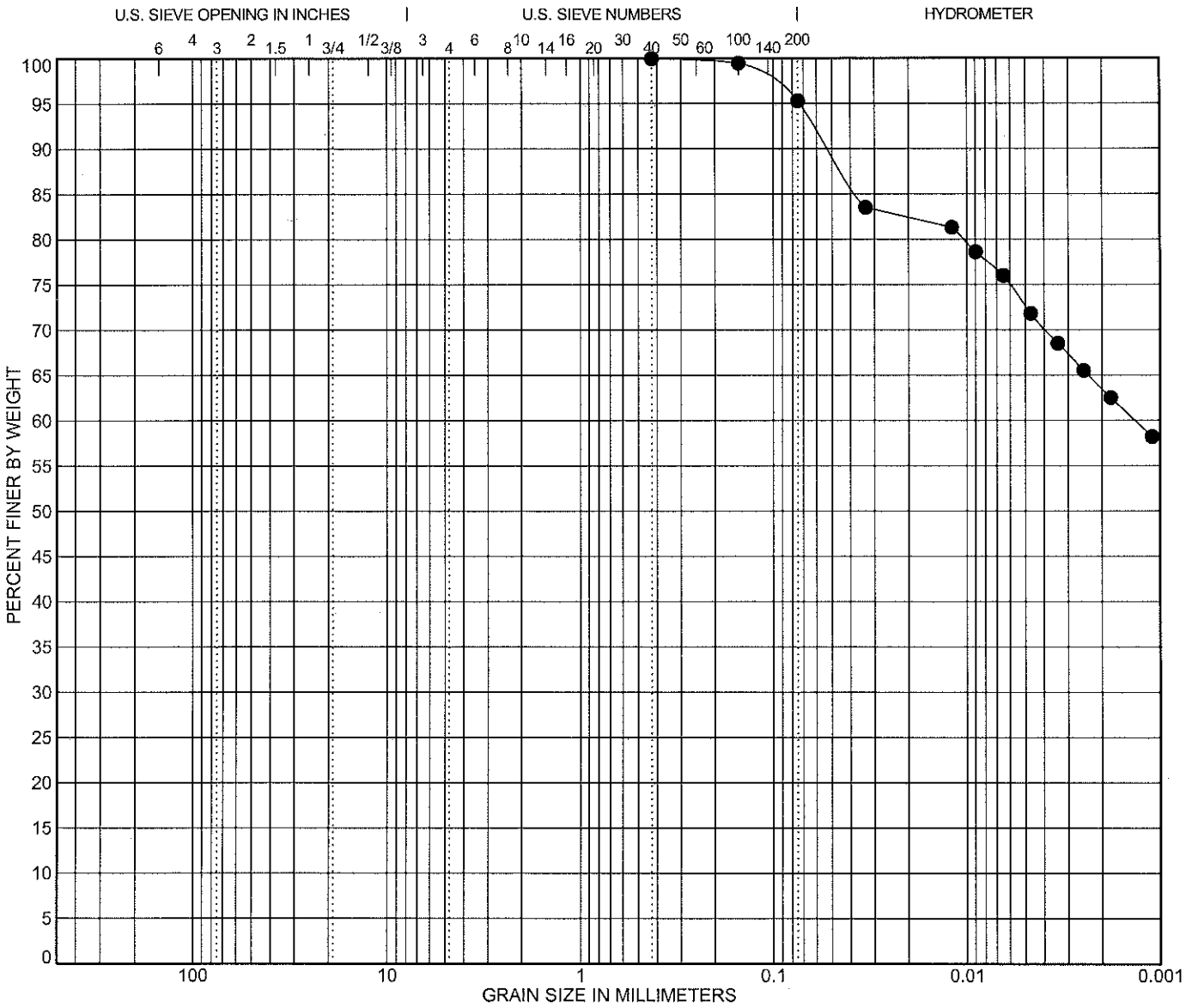
Terracon

DATE DRILLED 5/29/2010

PROJECT NUMBER 92105154

10-B7

EXHIBIT A-7



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**10-B7**	**2.0**	**FAT CLAY(CH)**	**78**	**28**	**50**		

Percent Passing the Indicated Sieve

	Specimen Identification		3/8"	#4	#10	#40	#100	#200
●	**10-B7**	**2.0**				**100**	**99.4**	**95.3**

	Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**10-B7**	**2.0**	**0.425**				**0.0**	**4.7**	**31.8**	**63.5**

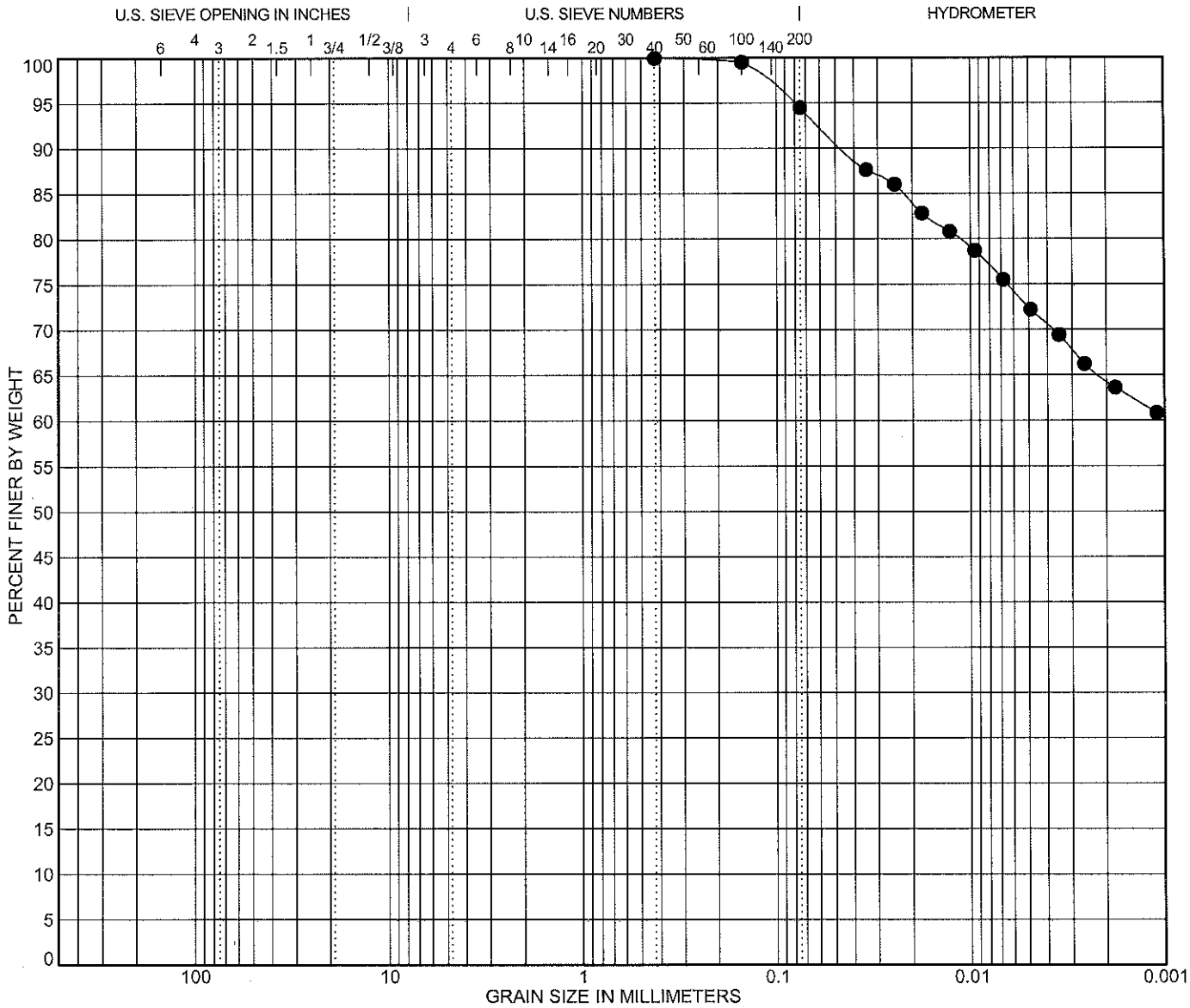
GRAIN SIZE DISTRIBUTION

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-B7, 2.0



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**10-B7**	**12.0**	**FAT CLAY(CH)**	**76**	**27**	**49**		

Percent Passing the Indicated Sieve

	Specimen Identification		3/8"	#4	#10	#40	#100	#200
●	**10-B7**	**12.0**				**100**	**99.5**	**94.5**

	Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**10-B7**	**12.0**	**0.425**				**0.0**	**5.5**	**30.1**	**64.3**

GRAIN SIZE DISTRIBUTION

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TO-0010
Galveston, Texas
Project Number 92105154

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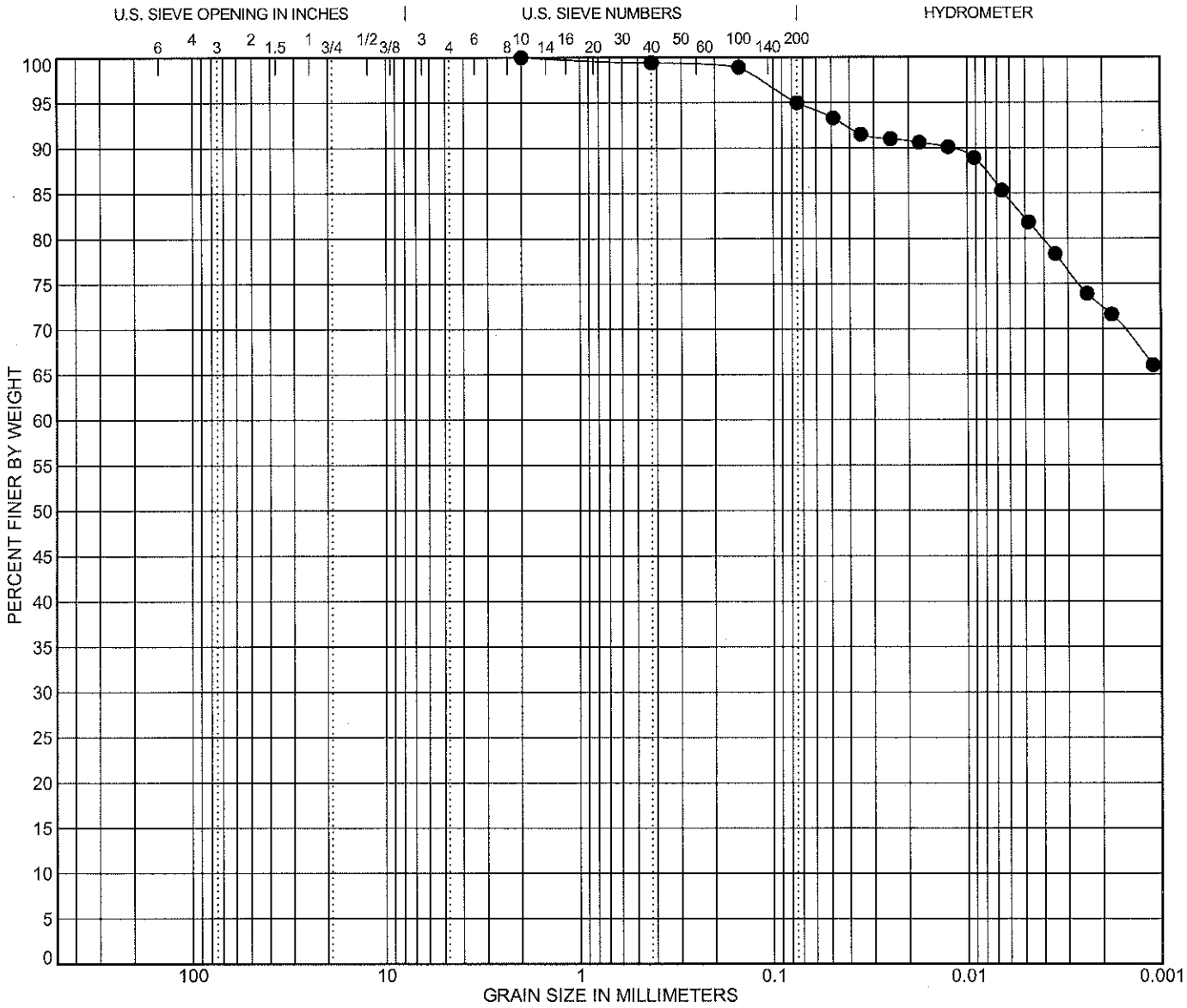
SPECIMEN ID
10-B7, 12.0



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**10-B7**	**20.0**	**FAT CLAY(CH)**	**111**	**33**	**78**		

Percent Passing the Indicated Sieve

	Specimen Identification		3/8"	#4	#10	#40	#100	#200
●	**10-B7**	**20.0**			**100**	**99.4**	**98.9**	**95**

	Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**10-B7**	**20.0**	**2**				**0.0**	**5.0**	**22.5**	**72.4**

GRAIN SIZE DISTRIBUTION

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TO-0010
Galveston, Texas
Project Number 92105154

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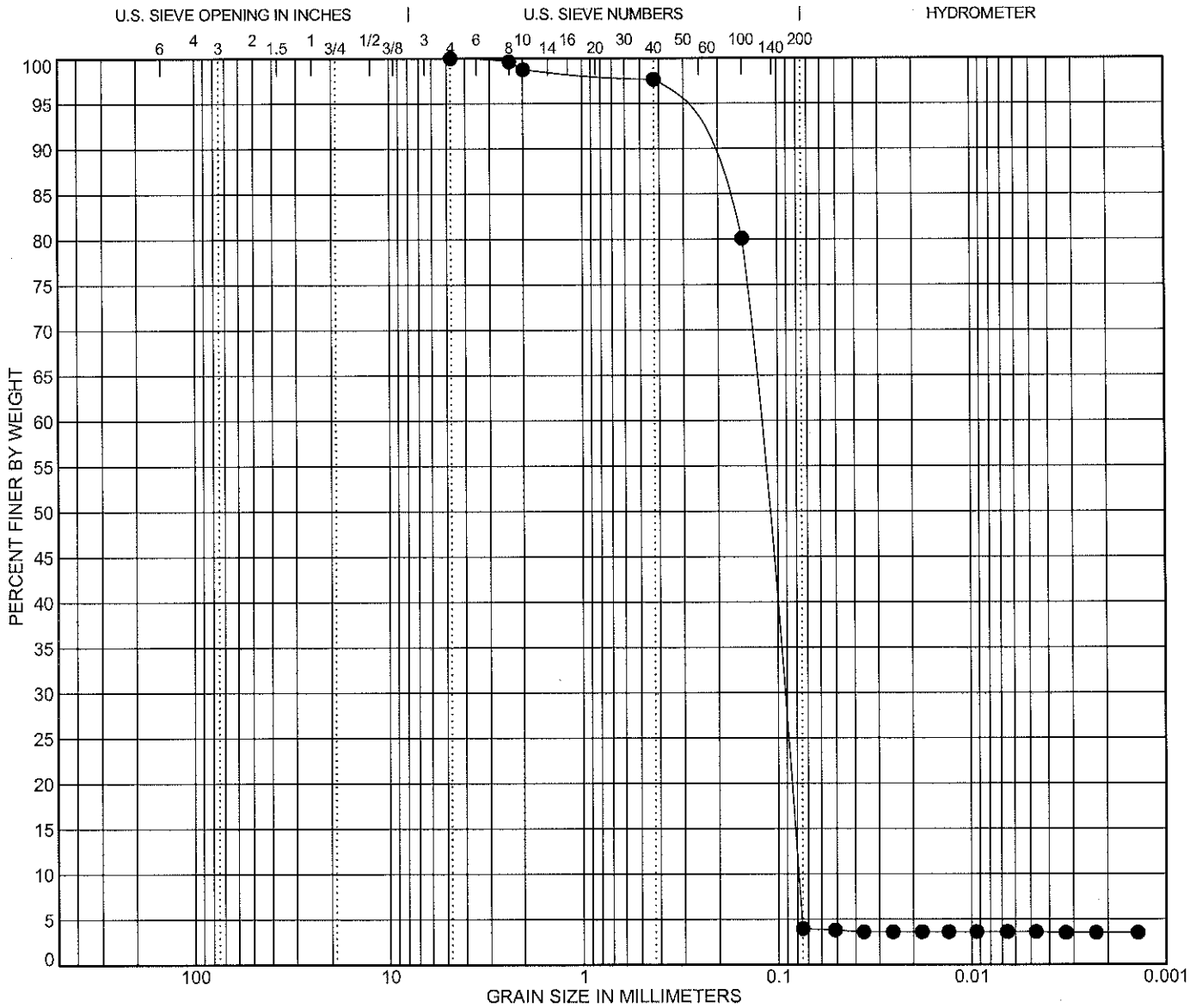
SPECIMEN ID
10-B7, 20.0



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	LL	PL	PI	Cc	Cu
● 10-B7	24.5	**POORLY GRADED SAND(SP)**				**0.91**	**1.58**

Percent Passing the Indicated Sieve

Specimen Identification		3/8"	#4	#10	#40	#100	#200
● 10-B7	24.5		**100**	**98.8**	**97.7**	**80.1**	**3.9**

Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
● 10-B7	24.5	**4.75**	**0.114**	**0.095**	**0.079**	**0.0**	**96.1**	**0.4**	**3.5**

GRAIN SIZE DISTRIBUTION

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

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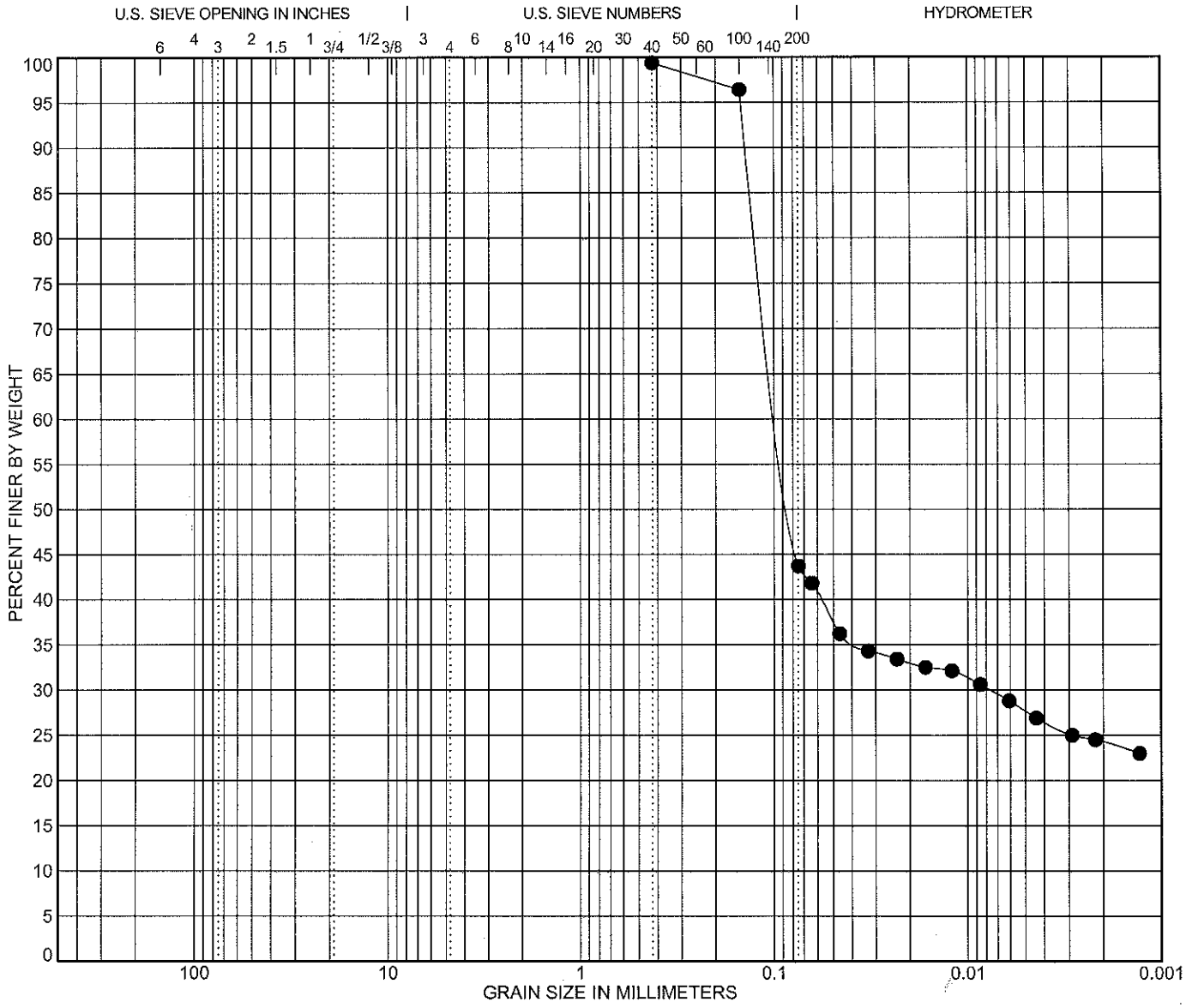
SPECIMEN ID
10-B7, 24.5



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**10-B7**	**36.5**	**CLAYEY SAND(SC)**	**41**	**19**	**22**		

Percent Passing the Indicated Sieve

	Specimen Identification		3/8"	#4	#10	#40	#100	#200
●	**10-B7**	**36.5**				**99.4**	**96.4**	**43.7**

	Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**10-B7**	**36.5**	**0.425**	**0.081**	**0.008**		**0.0**	**55.7**	**19.5**	**24.2**

GRAIN SIZE DISTRIBUTION

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

Terracon

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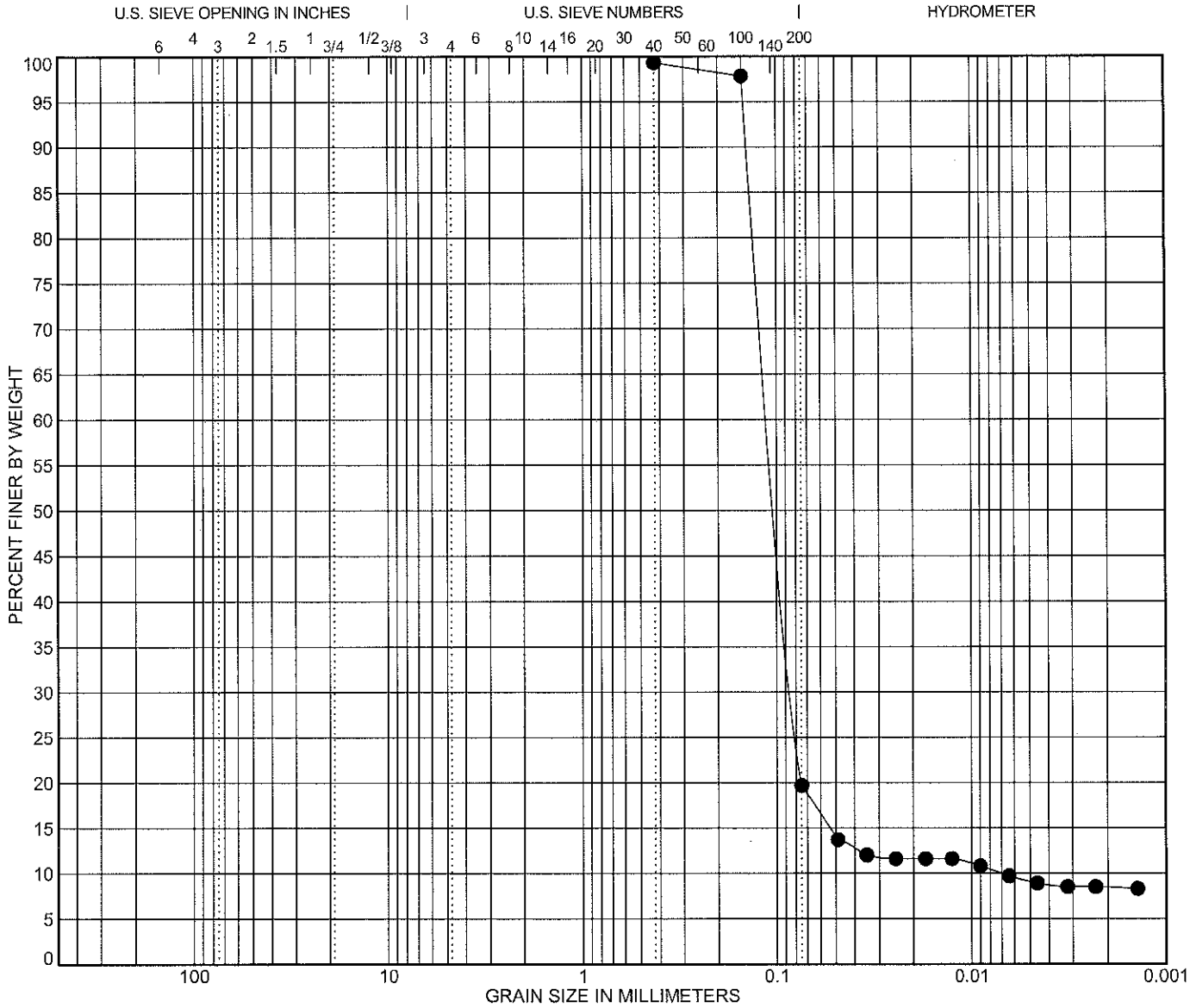
SPECIMEN ID
10-B7, 36.5



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	LL	PL	PI	Cc	Cu
● **10-B7**	**46.5**					**8.97**	**15.27**

Percent Passing the Indicated Sieve

Specimen Identification		3/8"	#4	#10	#40	#100	#200
● **10-B7**	**46.5**				**99.3**	**97.8**	**19.7**

Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
● **10-B7**	**46.5**	**0.425**	**0.098**	**0.082**	**0.007**	**0.0**	**79.6**	**11.2**	**8.4**

GRAIN SIZE DISTRIBUTION

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TO-0010
Galveston, Texas
Project Number 92105154

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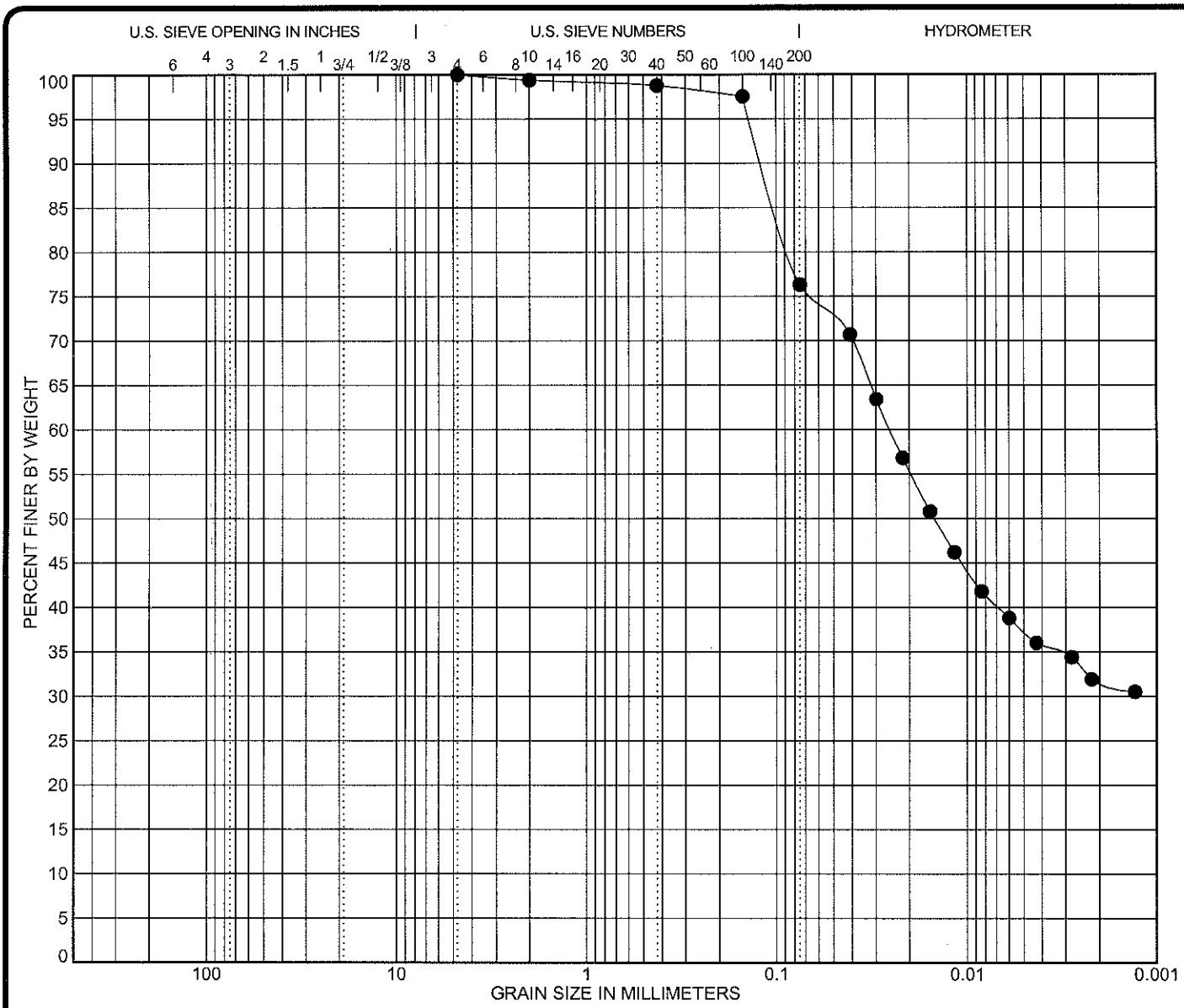
SPECIMEN ID
10-B7, 46.5



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**10-B7**	**58.5**	**LEAN CLAY with SAND(CL)**	**41**	**17**	**24**		

Percent Passing the Indicated Sieve

	Specimen Identification		3/8"	#4	#10	#40	#100	#200
●	**10-B7**	**58.5**		**100**	**99.4**	**98.8**	**97.5**	**76.3**

	Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**10-B7**	**58.5**	**4.75**	**0.015**			**0.0**	**23.7**	**44.7**	**31.6**

GRAIN SIZE DISTRIBUTION

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

Terracon

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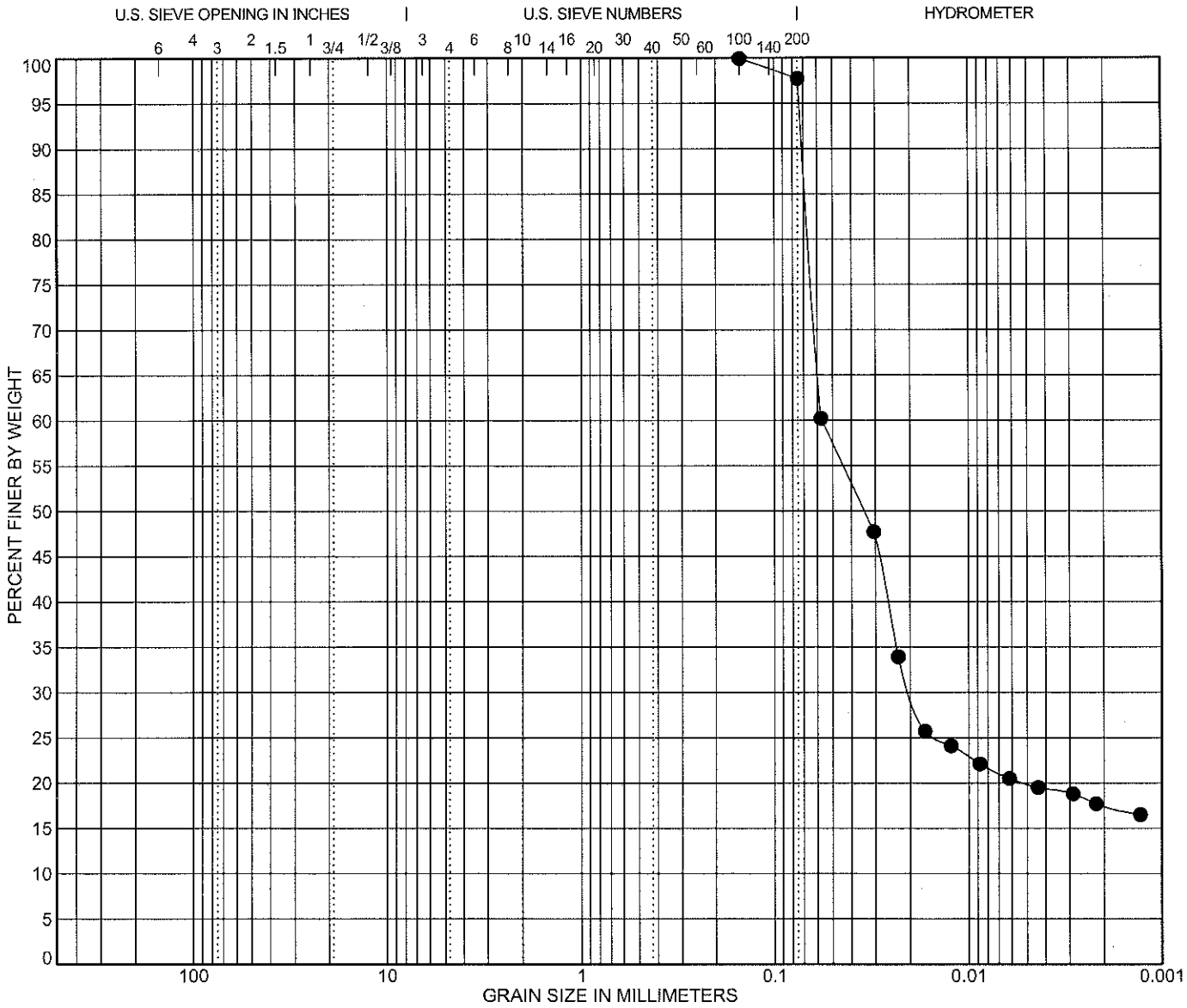
Telephone: 713-690-8989
Fax: 713-690-8787

SPECIMEN ID
10-B7, 58.5



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**10-B7**	**74.0**	**LEAN CLAY(CL)**	**35**	**24**	**11**		

Percent Passing the Indicated Sieve

	Specimen Identification		3/8"	#4	#10	#40	#100	#200
●	**10-B7**	**74.0**					**99.9**	**97.7**

	Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**10-B7**	**74.0**	**0.15**	**0.034**	**0.02**		**0.0**	**2.2**	**80.2**	**17.5**

GRAIN SIZE DISTRIBUTION

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

Terracon

Terracon Consultants, Inc.
11555 Clay Road, Suite 100
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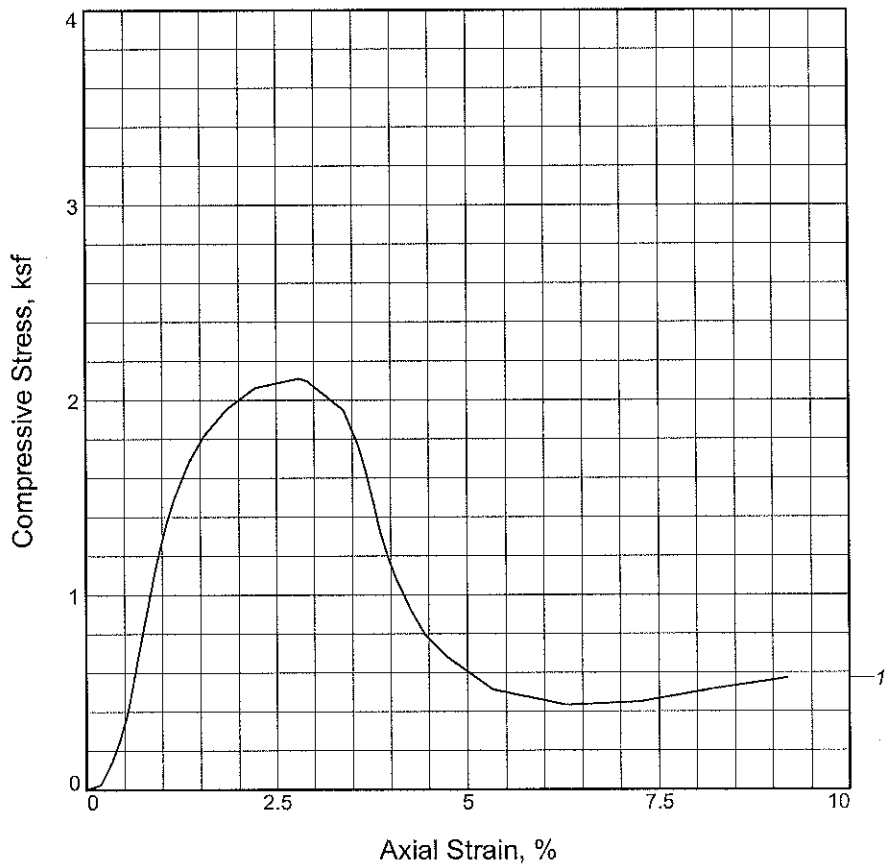
SPECIMEN ID
10-B7, 74.0

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, ksf	2.111			
Undrained shear strength, ksf	1.056			
Failure strain, %	2.8			
Strain rate, in./min.	0.055			
Water content, %	40.0			
Wet density, pcf	115.7			
Dry density, pcf	82.6			
Saturation, %	102.2			
Void ratio	1.0773			
Specimen diameter, in.	2.758			
Specimen height, in.	5.693			
Height/diameter ratio	2.06			

Description: Gray Fat Clay w/sand & silt 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: 10-B7

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-B7
Depth: 2-4 ft. **Sample Number:** 2
Description: Gray Fat Clay w/sand & silt 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.	164.880
Moisture content: Dry soil+tare, gms.	134.790
Moisture content: Tare, gms.	59.620
Moisture, %	40.0
Moist specimen weight, gms.	1033.18
Diameter, in.	2.758
Area, in.^{2}	5.974
Height, in.	5.693
Wet density, pcf	115.7
Dry density, pcf	82.6
Void ratio	1.0773
Saturation, %	102.2

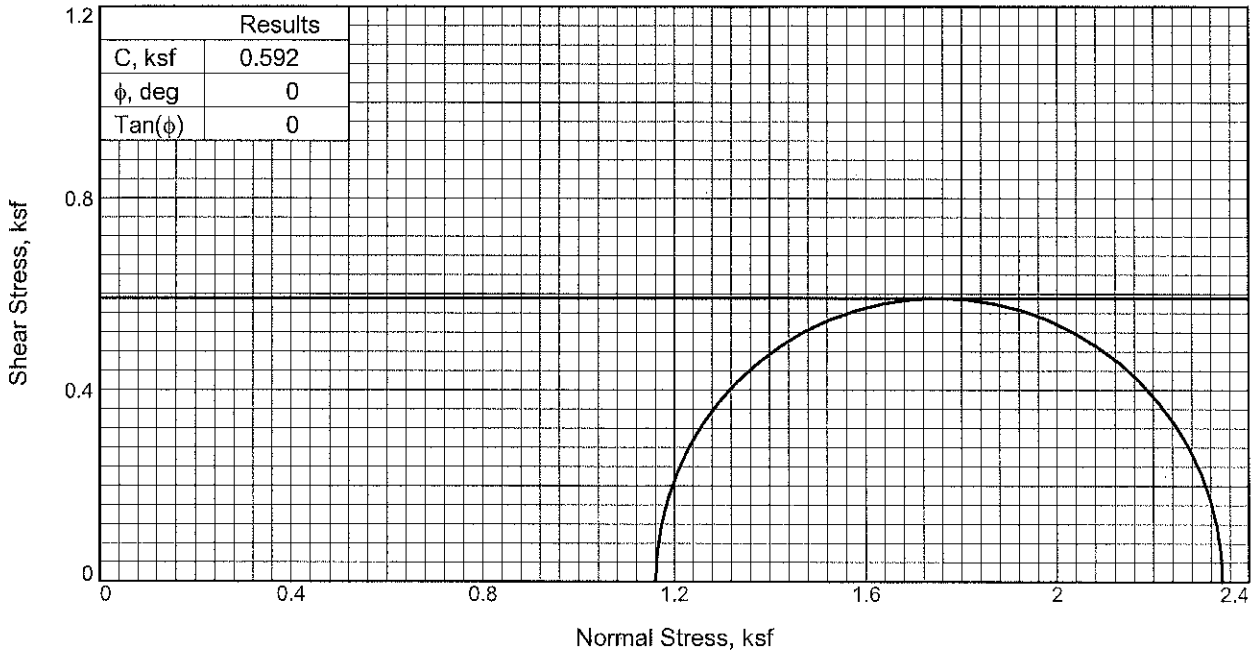
Test Readings for Specimen No. 1

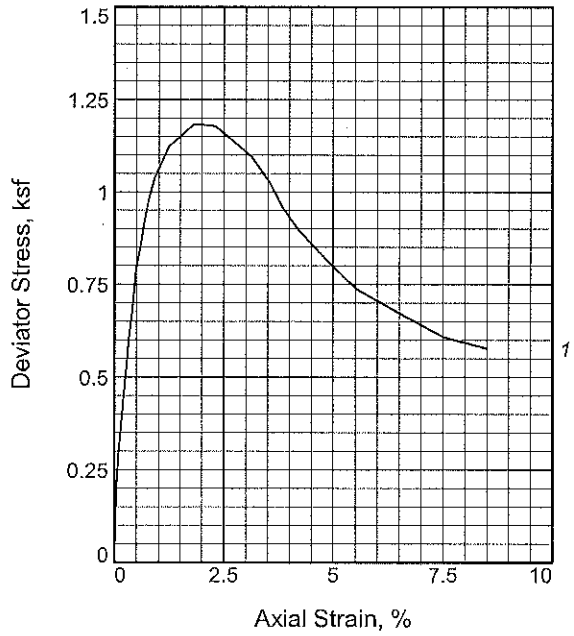
Strain rate, in./min. = 0.055
Unconfined compressive strength = 2.111 ksf **at reading no.** 18

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf
0	0.0000	0.000	0.0	0.0	0.000
1	0.0100	1.000	1.0	0.2	0.024
2	0.0111	1.236	1.2	0.2	0.030
3	0.0192	6.007	6.0	0.3	0.144
4	0.0249	10.635	10.6	0.4	0.255
5	0.0305	16.395	16.4	0.5	0.393
6	0.0343	22.026	22.0	0.6	0.528
7	0.0386	28.339	28.3	0.7	0.678
8	0.0428	34.555	34.6	0.8	0.827
9	0.0471	40.793	40.8	0.8	0.975
10	0.0509	46.393	46.4	0.9	1.108
11	0.0551	51.589	51.6	1.0	1.231
12	0.0608	57.681	57.7	1.1	1.375
13	0.0660	62.571	62.6	1.2	1.491
14	0.0773	70.714	70.7	1.4	1.681
15	0.0882	76.544	76.5	1.5	1.816

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf
16	0.1047	82.583	82.6	1.8	1.954
17	0.1265	87.528	87.5	2.2	2.063
18	0.1596	90.109	90.1	2.8	2.111
19	0.1653	89.700	89.7	2.9	2.099
20	0.1927	83.634	83.6	3.4	1.948
21	0.2036	76.165	76.2	3.6	1.770
22	0.2093	70.625	70.6	3.7	1.640
23	0.2149	63.770	63.8	3.8	1.479
24	0.2201	57.057	57.1	3.9	1.322
25	0.2258	51.538	51.5	4.0	1.193
26	0.2315	46.929	46.9	4.1	1.085
27	0.2424	39.970	40.0	4.3	0.922
28	0.2532	34.538	34.5	4.4	0.795
29	0.2698	29.692	29.7	4.7	0.682
30	0.3029	22.501	22.5	5.3	0.514
31	0.3577	19.205	19.2	6.3	0.434
32	0.4130	20.128	20.1	7.3	0.450
33	0.4679	23.298	23.3	8.2	0.515
34	0.5227	26.130	26.1	9.2	0.572





Sample No.		1
Initial	Water Content, %	37.0
	Dry Density, pcf	82.5
	Saturation, %	94.1
	Void Ratio	1.0797
	Diameter, in.	2.784
	Height, in.	5.955
At Test	Water Content, %	37.0
	Dry Density, pcf	82.5
	Saturation, %	94.1
	Void Ratio	1.0797
	Diameter, in.	2.784
	Height, in.	5.955
Strain rate, in./min.		0.055
Back Pressure, psi		0.000
Cell Pressure, psi		8.060
Fail. Stress, ksf		1.184
Ult. Stress, ksf		
σ_1 Failure, ksf		2.344
σ_3 Failure, ksf		1.161

Type of Test:
Unconsolidated Undrained
Sample Type: Undisturbed
Description: Gray Fat Clay w/sand pockets

Assumed Specific Gravity= 2.75
Remarks: ASTM D2850

Client: USACE

Project: Galveston Channel Deepening San Jacinto Placement Area
Contract #W912HY-09-D-0021, Task Order #0010
Location: 10-B7
Sample Number: 7 **Depth:** 12-14 ft.
Proj. No.: 92105154 **Date Sampled:**

TRIAXIAL SHEAR TEST REPORT
Terracon, Inc.
Houston, TX

TRIAXIAL COMPRESSION TEST

Unconsolidated Undrained

7/20/2010
2:28 PM

Date:
Client: USACE
Project: Galveston Channel Deepening San Jacinto Placement Area
Contract #W912HY-09-D-0021, Task Order #0010
Project No.: 92105154
Location: 10-B7
Depth: 12-14 ft. **Sample Number:** 7
Description: Gray Fat Clay w/sand pockets
Remarks: ASTM D2850
Type of Sample: Undisturbed
Assumed Specific Gravity=2.75 **LL=** **PL=** **PI=**
Test Method: ASTM D 2850

Parameters for Specimen No. 1

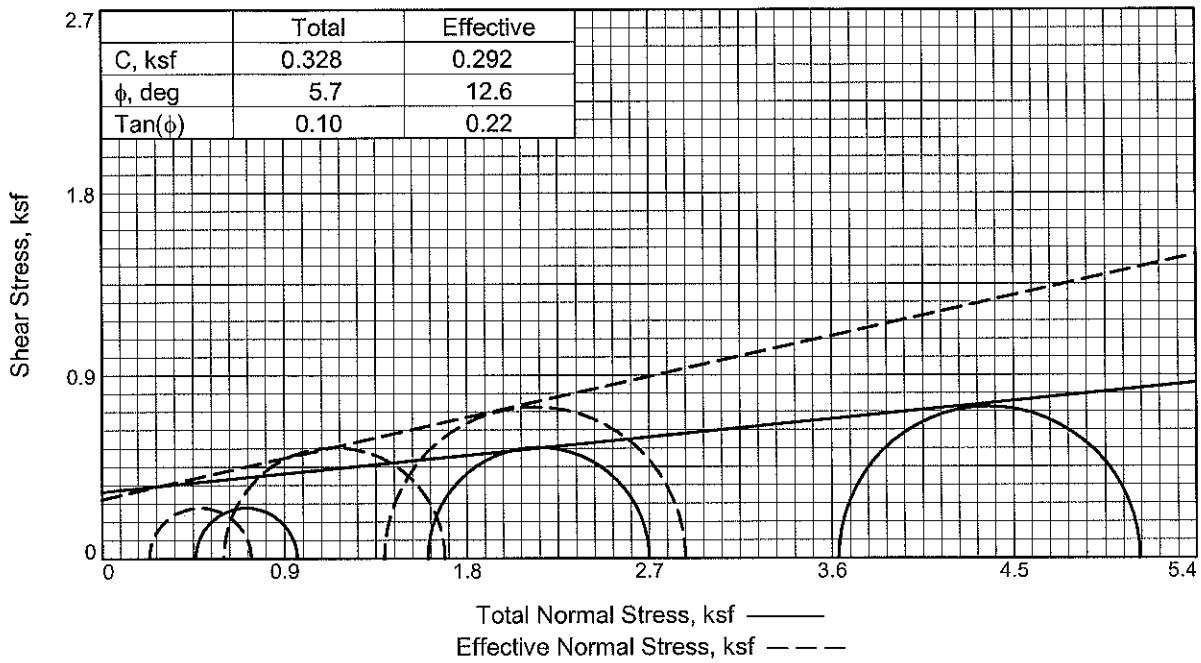
Specimen Parameter	Initial	Final
Moisture content: Moist soil+tare, gms.	175.460	175.460
Moisture content: Dry soil+tare, gms.	145.790	145.790
Moisture content: Tare, gms.	65.500	65.500
Moisture, %	37.0	37.0
Moist specimen weight, gms.	1075.76	
Diameter, in.	2.784	
Area, in.^{2}	6.087	
Height, in.	5.955	
Wet density, pcf	113.1	
Dry density, pcf	82.5	
Void ratio	1.0797	
Saturation, %	94.1	

Test Readings for Specimen No. 1

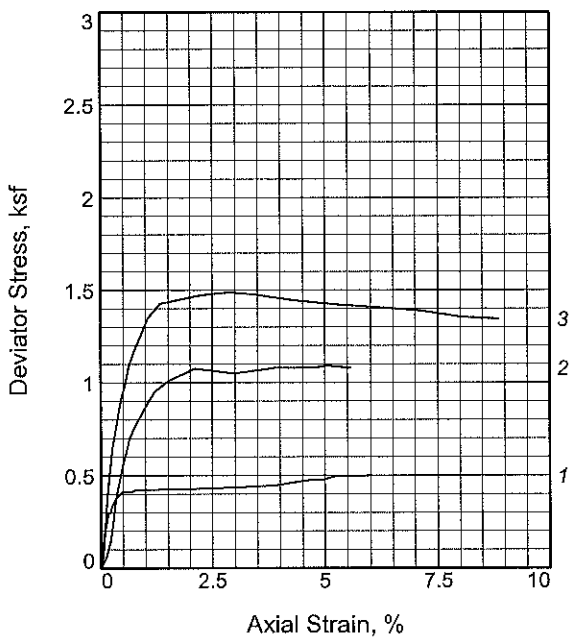
Cell pressure = 8.060 psi (1.161 ksf)
Back pressure = 0.000 psi (0.000 ksf)
Strain rate, in./min. = 0.055
Fail. Stress = 1.184 ksf **at reading no.** 16

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Princ. Stress ksf	Major Princ. Stress ksf	1:3 Ratio	P ksf	Q ksf
0	0.0000	0.000	0.0	0.0	0.000	1.161	1.161	1.00	1.161	0.000
1	0.0000	0.000	0.0	0.0	0.000	1.161	1.161	1.00	1.161	0.000
2	0.0017	4.567	4.6	0.0	0.108	1.161	1.269	1.09	1.215	0.054
3	0.0029	8.152	8.2	0.0	0.193	1.161	1.353	1.17	1.257	0.096
4	0.0060	12.360	12.4	0.1	0.292	1.161	1.453	1.25	1.307	0.146
5	0.0092	15.625	15.6	0.2	0.369	1.161	1.530	1.32	1.345	0.185
6	0.0137	19.657	19.7	0.2	0.464	1.161	1.625	1.40	1.393	0.232
7	0.0169	22.333	22.3	0.3	0.527	1.161	1.687	1.45	1.424	0.263
8	0.0194	25.226	25.2	0.3	0.595	1.161	1.755	1.51	1.458	0.297
9	0.0246	29.004	29.0	0.4	0.683	1.161	1.844	1.59	1.502	0.342
10	0.0290	33.343	33.3	0.5	0.785	1.161	1.946	1.68	1.553	0.392
11	0.0352	36.429	36.4	0.6	0.857	1.161	2.017	1.74	1.589	0.428
12	0.0403	39.055	39.1	0.7	0.918	1.161	2.078	1.79	1.619	0.459
13	0.0460	41.637	41.6	0.8	0.977	1.161	2.138	1.84	1.649	0.489
14	0.0535	44.204	44.2	0.9	1.036	1.161	2.197	1.89	1.679	0.518
15	0.0732	48.079	48.1	1.2	1.123	1.161	2.284	1.97	1.722	0.562
16	0.1088	50.965	51.0	1.8	1.184	1.161	2.344	2.02	1.752	0.592
17	0.1327	51.033	51.0	2.2	1.180	1.161	2.341	2.02	1.751	0.590
18	0.1390	50.879	50.9	2.3	1.175	1.161	2.336	2.01	1.748	0.588
19	0.1866	47.764	47.8	3.1	1.094	1.161	2.255	1.94	1.708	0.547
20	0.2104	44.990	45.0	3.5	1.027	1.161	2.187	1.88	1.674	0.513
21	0.2279	42.138	42.1	3.8	0.959	1.161	2.119	1.83	1.640	0.479
22	0.2517	39.446	39.4	4.2	0.894	1.161	2.054	1.77	1.607	0.447
23	0.2817	36.854	36.9	4.7	0.831	1.161	1.991	1.72	1.576	0.415
24	0.3287	33.023	33.0	5.5	0.738	1.161	1.899	1.64	1.530	0.369
25	0.3882	30.383	30.4	6.5	0.672	1.161	1.833	1.58	1.497	0.336
26	0.4470	27.813	27.8	7.5	0.609	1.161	1.769	1.52	1.465	0.304
27	0.5066	26.701	26.7	8.5	0.578	1.161	1.739	1.50	1.450	0.289



	Total	Effective
C, ksf	0.328	0.292
ϕ, deg	5.7	12.6
Tan(ϕ)	0.10	0.22



Sample No.		1	2	3
Initial	Water Content, %	66.1	66.1	66.1
	Dry Density, pcf	61.5	61.5	61.5
	Saturation, %	101.4	101.4	101.4
	Void Ratio	1.7935	1.7935	1.7935
	Diameter, in.	2.837	2.837	2.837
	Height, in.	6.056	6.056	6.056
At Test	Water Content, %	64.0	64.0	64.0
	Dry Density, pcf	61.5	61.5	61.5
	Saturation, %	98.2	98.2	98.2
	Void Ratio	1.7935	1.7935	1.7935
	Diameter, in.	2.837	2.837	2.837
	Height, in.	6.056	6.056	6.056
Strain rate, in./min.		0.001	0.001	0.001
Back Pressure, psi		30.000	30.000	30.000
Cell Pressure, psi		33.210	41.160	55.220
Fail. Stress, ksf		0.500	1.091	1.488
Excess Pore Pr., ksf		0.227	1.007	2.241
Ult. Stress, ksf				
Excess Pore Pr., ksf				
$\bar{\sigma}_1$ Failure, ksf		0.735	1.691	2.879
$\bar{\sigma}_3$ Failure, ksf		0.235	0.600	1.390

Type of Test:
CU with Pore Pressures
Sample Type: Undisturbed
Description: Dark Gray fat Clay

Assumed Specific Gravity= 2.75
Remarks: ASTM D4767

Client: USACE

Project: Galveston Channel Deepening San Jacinto Placement Area
Contract #W912HY-09-D-0021, Task Order #0010
Location: 10-B7
Sample Number: 11 **Depth:** 20-22 ft.
Proj. No.: 92105154 **Date Sampled:**

TRIAXIAL SHEAR TEST REPORT
Terracon, Inc.
Houston, TX

TRIAXIAL COMPRESSION TEST

CU with Pore Pressures

8/4/2010
1:02 PM

Date:
Client: USACE
Project: Galveston Channel Deepening San Jacinto Placement Area
Contract #W912HY-09-D-0021, Task Order #0010
Project No.: 92105154
Location: 10-B7
Depth: 20-22 ft. **Sample Number:** 11
Description: Dark Gray fat Clay
Remarks: ASTM D4767
Type of Sample: Undisturbed
Assumed Specific Gravity=2.75 **LL=** **PL=** **PI=**
Test Method: ASTM D 4767 Method A

Parameters for Specimen No. 1

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. 1

Consolidation cell pressure = 33.210 psi (4.782 ksf)
Consolidation back pressure = 30.000 psi (4.320 ksf)
Consolidation effective confining stress = 0.462 ksf
Strain rate, in./min. = 0.001
Fail. Stress = 0.500 ksf **at reading no.** 24

Test Readings for Specimen No. 1

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	4.782	4.782	1.00	0.000	4.782	0.000
1	0.0009	3.402	3.4	0.0	0.077	0.437	0.514	1.18	30.178	0.475	0.039
2	0.0024	5.032	5.0	0.0	0.115	0.406	0.520	1.28	30.392	0.463	0.057
3	0.0039	6.238	6.2	0.1	0.142	0.382	0.524	1.37	30.555	0.453	0.071
4	0.0054	8.542	8.5	0.1	0.194	0.361	0.555	1.54	30.703	0.458	0.097
5	0.0084	11.097	11.1	0.1	0.252	0.324	0.577	1.78	30.959	0.450	0.126
6	0.0099	12.961	13.0	0.2	0.295	0.312	0.607	1.94	31.042	0.460	0.147
7	0.0114	13.102	13.1	0.2	0.298	0.301	0.599	1.99	31.120	0.450	0.149
8	0.0129	13.126	13.1	0.2	0.298	0.290	0.588	2.03	31.198	0.439	0.149
9	0.0144	14.398	14.4	0.2	0.327	0.280	0.608	2.17	31.263	0.444	0.164
10	0.0189	16.030	16.0	0.3	0.364	0.257	0.621	2.42	31.428	0.439	0.182
11	0.0249	17.462	17.5	0.4	0.396	0.245	0.641	2.62	31.507	0.443	0.198
12	0.0294	18.152	18.2	0.5	0.411	0.255	0.666	2.61	31.439	0.461	0.206
13	0.0429	18.256	18.3	0.7	0.413	0.255	0.668	2.62	31.438	0.462	0.206
14	0.0444	18.415	18.4	0.7	0.416	0.258	0.674	2.61	31.418	0.466	0.208
15	0.0474	18.759	18.8	0.8	0.424	0.258	0.682	2.64	31.418	0.470	0.212
16	0.0849	18.960	19.0	1.4	0.426	0.246	0.672	2.73	31.500	0.459	0.213
17	0.1329	19.258	19.3	2.2	0.429	0.242	0.671	2.77	31.529	0.457	0.215
18	0.1809	19.712	19.7	3.0	0.436	0.237	0.672	2.84	31.566	0.455	0.218
19	0.2349	20.344	20.3	3.9	0.445	0.234	0.680	2.90	31.583	0.457	0.223
20	0.2829	21.897	21.9	4.7	0.476	0.235	0.711	3.02	31.578	0.473	0.238
21	0.3009	22.052	22.1	5.0	0.477	0.238	0.716	3.00	31.555	0.477	0.239
22	0.3159	22.860	22.9	5.2	0.494	0.238	0.731	3.08	31.559	0.485	0.247
23	0.3459	23.047	23.0	5.7	0.495	0.235	0.730	3.11	31.577	0.483	0.248
24	0.3610	23.334	23.3	6.0	0.500	0.235	0.735	3.12	31.576	0.485	0.250

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-B6	4.5-6																	SM**	15																						
	6-8	0.00	0.15															CH**	69																						
	8-10	0.00	0.15		99	29	70	100	100	100	99	92	0	8	30	62		CH																0.29	7	0.16	22	49	68	CH**
	10-12	0.00	0.10															CH**	53																						
	12-14	0.50			94	30	64	100	100	100	100	95	0	5	26	69		CH	51							0.55	51	72	CH**												
	14-16	0.00	0.20															CH**	50																						
	16-18	0.00	0.15															CH**	63	61																					
	18-20	0.00	0.20		80	27	53	100	100	100	100	98	0	2	24	74		CH												0.58	48	70	CH**							
	20-22	0.25	0.25															CH**	60																						
	22-24	0.00	0.25		83	24	59	100	100	100	100	99	0	1	30	69		CH	65	60																					
	24.5-26			56				100	100	99	91	7	0	93	4	3		SP-SM*	25																						
	26.5-28			6														CH**	67																						
	28-30	0.00	0.15															SC**	36																						
	30-32	0.00	0.20					100	100	100	97	49	0	51	17	32		SC**	39																						
	32.5-34			25														SP-SM**	25																						
	34.5-36			35														SP-SM**	27																						
	36.5-38			15														SP-SM**	26																						
	38.5-40			3				99	97	95	92	52	1	47	25	27		CH*	44																						
	40-42	0.00	0.20															CH**	61																						
	42.5-44			30														SC**	25																						
	44.5-46			32														SC**	26																						
	46.5-48			29														SC**	23																						
	48.5-50			5				98	97	97	93	22	2	76	7	15		SC*	28																						
	50.5-52			2														CH**	46																						
	52.5-54			2														CH**	52																						
	54.5-56																	SC**	29																						
	56.5-58			5				100	100	100	98	65	0	35	30	35		CH*	43																						
	58.5-60			2														CH**	35																						
	60.5-62			0														CH**	49																						
	62-64	0.00	0.25		67	21	46	100	100	99	99	95	0	5	43	52		CH			0.29	21	49	72	CH**																
	64-66	0.25	0.10															CH**	52																						
	66-68	0.00	0.20															CH**	56																						
	68-70	0.00	0.15		74	24	50	100	100	100	96	88	0	12	39	49		CH	50	71																					
	70-72	0.00	0.25															CH**	48																						
	72-74	0.00	0.15					100	100	100	88	51	0	49	26	25		CH*	30																						
	74-76	0.00	0.20															CH**	30																						
	76-78	1.25																CH**	33	91																					
	78-80	1.50																CL**	20																						
	0-2	4.50																SC**	29																						
	2-4	0.75			78	28	50	100	100	100	99	95	0	5	32	63		CH								1.06	40	83	CH**												
	4-6	0.25	0.30															CH**	53																						
	6-8																	SM**	25																						
	8-10																	SM**																							
	10-12	0.75																CH**	51	71																					
	12-14	0.50			76	27	49	100	100	100	99	94	0	6	30	64		CH	37											0.59	37	83	CH**							
	14-16																	CH**	61																						
	16-18	0.00	0.30															CH**	46																						
	18-20																	CH**	64																						
	20-22	0.00	0.20		111	33	78	100	100	99	99	95	0	5	23	72		CH																0.33	6	0.29	13	66	62	CH**
	22-24	0.00	0.20															CH**	65																						

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-B7	24.5-26			9				100	99	98	80	4	0	96	0	4		SP*	27																						
	26.5-28			4														CH**	58																						
	28-30																	SP-SM**	27																						
	30.5-32			23														SP-SM**	26																						
	32.5-34			13														SC**	42																						
	34.5-36			23														SC**	30																						
	36-38				41	19	22	100	100	99	96	44	0	56	20	24		SC	39																						
	38-40	0.50	0.20															CH**	60																						
	40-42																	SC**	25																						
	42.5-44			33														SC**	26																						
	44.5-46			27														SC**	30																						
	46.5-48			17				100	100	99	98	20	0	80	11	9		SC*	26																						
	48.5-50			4														CH**	42																						
	50.5-52			5														CH**	42																						
	52-54																	CH**	45																						
	56-58																	CL**	30																						
	58.5-60			0	41	17	24	100	99	99	98	76	0	24	45	31		CL	35																						
	60.5-62			2														CL**	40																						
	62.5-64																	CH**	50																						
	64.5-66	0.50	0.40															CH**	51																						
	66-68	1.00																CH**	51																						
	68-70	0.00	0.25															CH**	42	86																					
	70-72	1.00																CH**	40																						
	72-74	1.25																CH**	44																						
	74-76	2.25			35	24	11	100	100	100	100	98	0	2	80	18		CL	24	102																					
	76-78	1.00																CL**	26																						
	78.5-80			11														CL**	31																						
10-B8	0-2	0.75																SC**	5																						
	2-4																	SC**	8																						
	4-6	0.75																SC**	26																						
	6-8	0.25	0.10		107	31	76	100	100	100	98	89	0	11	26	63		CH												0.49	50	70	CH**							
	8-10	0.00	0.10															CH**	90																						
	10.5-12			5														CH**	51																						
	12.5-14			2	54	21	33	100	100	99	96	71	0	29	22	49		CH	45																						
	14-16	0.00	0.10					100	100	100	99	94	0	6	28	66		CL*	32																						
	16.5-18																	CL**	34																						
	18.5-20			2														CH**	66																						
	20-22	0.00	0.20		114	33	81	100	100	100	100	97	0	3	28	69		CH			0.19	20	77	55	CH**																
	22-24	0.00	0.10															CH**	71																						
	24-26	0.00	0.50		31	23	8	100	100	100	97	32	0	68	8	24		SM	33																						
	26-28	0.25																SM**	43																						
	28.5-30			75														SP-SM**	24																						
	30.5-32			16														SP-SM**	25																						
	32.5-34			7														SP-SM**	51																						
	34.5-36			53				100	100	98	81	10	0	90	6	4		SP-SM*	24																						
	36.5-38			24														SP-SM**	24																						
	38.5-40			42														SP-SM**	26																						
	40.5-42			27														SP-SM**	24																						
	42.5-44			38				100	100	98	96	14	0	86	8	6		SM**	23																						