BORING LOG NO. 10-B3

CLIENT: USACE, Galveston District Galveston, Texas	PROJECT: Galveston Channel Deepening, TO-0010
BORING LOCATION: N: 13688978.71 E: 3316256.93	SITE: San Jacinto Placement Area Galveston, Texas

Approx. Surface Elevation: 19.7 feet

Graphic Log	DESCRIPTION	Elevation	Depth
	FILL: CLAYEY SAND gray, dark gray, with shell and gravel, dry, compacted, dense to very dense	17.7	2.0
	FILL: POORLY GRADED SAND w/ SILT brown, dark gray, w/ some shell and gravel, non plastic, dry, compacted, dense	14.7	5.0
	FAT CLAY gray, yellowish brown, with CaCO3, plastic, compacted, medium stiff to stiff	10.7	9.0
	SILTY SAND bluish gray, fine grain, slightly cohesive, medium dense to dense	1.7	18.0
	CLAYEY SAND bluish gray, fine grain, some cohesion, very loose to loose	-6.3	26.0
	FAT CLAY bluish gray to dark bluish gray, very soft to stiff	-10.3	30.0

Continued Next Page

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
1	SC	ST	10		4.5		15		55	20	35	24			
3	SP-SM	ST	14				10								
5	CH	ST	13		1.0		30								
7		ST	11		1.5				65	21	44	93			
9	SM	ST	16		1.0		25	95							
11		SS	10	18			21								
13		SS	14	21			25								
15		SS	14	32			23					13			
17		SS	10	36			23								
19	SC	SS	9	8			29								
21		SS	3	2			35								
23		SS	11	1			27					19			
25		SS	10	4			30								
27	CH	SS	3	0			34								
29		ST	10		1.5				97	33	64	98			

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

REMARKS: **Dry auger to 14 feet; wet rotary thereafter.**

WATER LEVEL OBSERVATIONS			
12 ft	WS	12 ft	WCI
12 ft	WCI	12 ft	WCI

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DATE DRILLED 4/16/2010

PROJECT NUMBER 92105154

10-B3

EXHIBIT A-3

BORING LOG NO. 10-B3

CLIENT:	USACE, Galveston District Galveston, Texas	PROJECT:	Galveston Channel Deepening, TO-0010
BORING LOCATION:	N: 13688978.71 E: 3316256.93	SITE:	San Jacinto Placement Area Galveston, Texas

Approx. Surface Elevation: 19.7 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 to dark bluish gray, fine grain, with traces of finely crushed shell, some cohesion, medium dense to dense	31	SP-SM	SS	10	25			29								
		32															
		33		SS	9	40			25								
		34															
		35		SS	7	24			27								
		36															
		37		SS	9	28			19								
		38															
		39		SS	8	30			26					8			
		40															
		41		SS	10	33			26								
		42															
		43		SS	7	24			25								
	-24.3 44.0	44															
	FAT CLAY dark bluish gray, soft to medium stiff,	45	CH	SS	18	2			52								
		46															
		47		SS	10	6			54								
	-28.3 48.0	48															
	CLAYEY SAND bluish gray, with thin layers of fat clay, cohesive, fine grain, density decreases with depth from medium dense to very loose	49	SC	SS	11	22			39					29			
		50															
		51		SS	12	9			45								
		52															
		53		SS	16	3			49								
		54															
		55		ST	9		0.0	0.15	36		50	18	32	49			
		56															
		57		ST	11		0.5	0.2	54								
		58															
		59		ST	10		0.5	0.25			60	21	39	41			
		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 14 feet; wet rotary thereafter.**

WATER LEVEL OBSERVATIONS			
▽ 12 ft	WS	▼ 12 ft	WCI
▼ 12 ft	WCI	▼ 12 ft	WCI

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DATE DRILLED	Page 2 of 3
4/16/2010	10-B3
PROJECT NUMBER 92105154	EXHIBIT A-3

BORING LOG NO. 10-B3

CLIENT:	USACE, Galveston District Galveston, Texas	PROJECT:	Galveston Channel Deepening, TO-0010
BORING LOCATION:	N: 13688978.71 E: 3316256.93	SITE:	San Jacinto Placement Area Galveston, Texas

Approx. Surface Elevation: 19.7 feet

Graphic Log	DESCRIPTION	Elevation	Depth, feet
		-42.8	62.5
	FAT CLAY w/ SAND bluish gray, with traces of broken shell, very soft to medium stiff	-50.3	70.0
	LEAN CLAY w/ SAND bluish gray, plastic, very soft	-52.3	72.0
	SANDY FAT CLAY reddish brown and bluish gray, with sand pockets, high p[lasticity, very soft to stiff	-56.3	76.0
	SANDY LEAN CLAY light gray, yellow, with Fe nods and stains and CaCO3 nods, low plasticity, very stiff to hard	-60.3	80.0
	Boring terminated at 80 feet.		

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
61		ST	4		0.25	0.15	40								
62															
63	CH	ST	9		0.0	0.1	26								
64															
65		ST	16		0.75				73	25	48	78			
66															
67		ST	6		0.0	0.3	47								
68															
69		ST	16		0.25	0.2	53	70							
70	CL														
71		ST	8		0.0	0.25	28		44	26	18	74			
72	CH														
73		ST	14		2.0		30								
74															
75		ST	7		0.0	0.15	48	73	57	20	37	56			
76	CL														
77		ST	8		4.5		19								
78															
79		ST	11		2.0		22								
80															

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

REMARKS: **Dry auger to 14 feet; wet rotary thereafter.**

WATER LEVEL OBSERVATIONS			
▽ 12 ft	WS	▼ 12 ft	WCI
▼ 12 ft	WCI	▼ 12 ft	WCI

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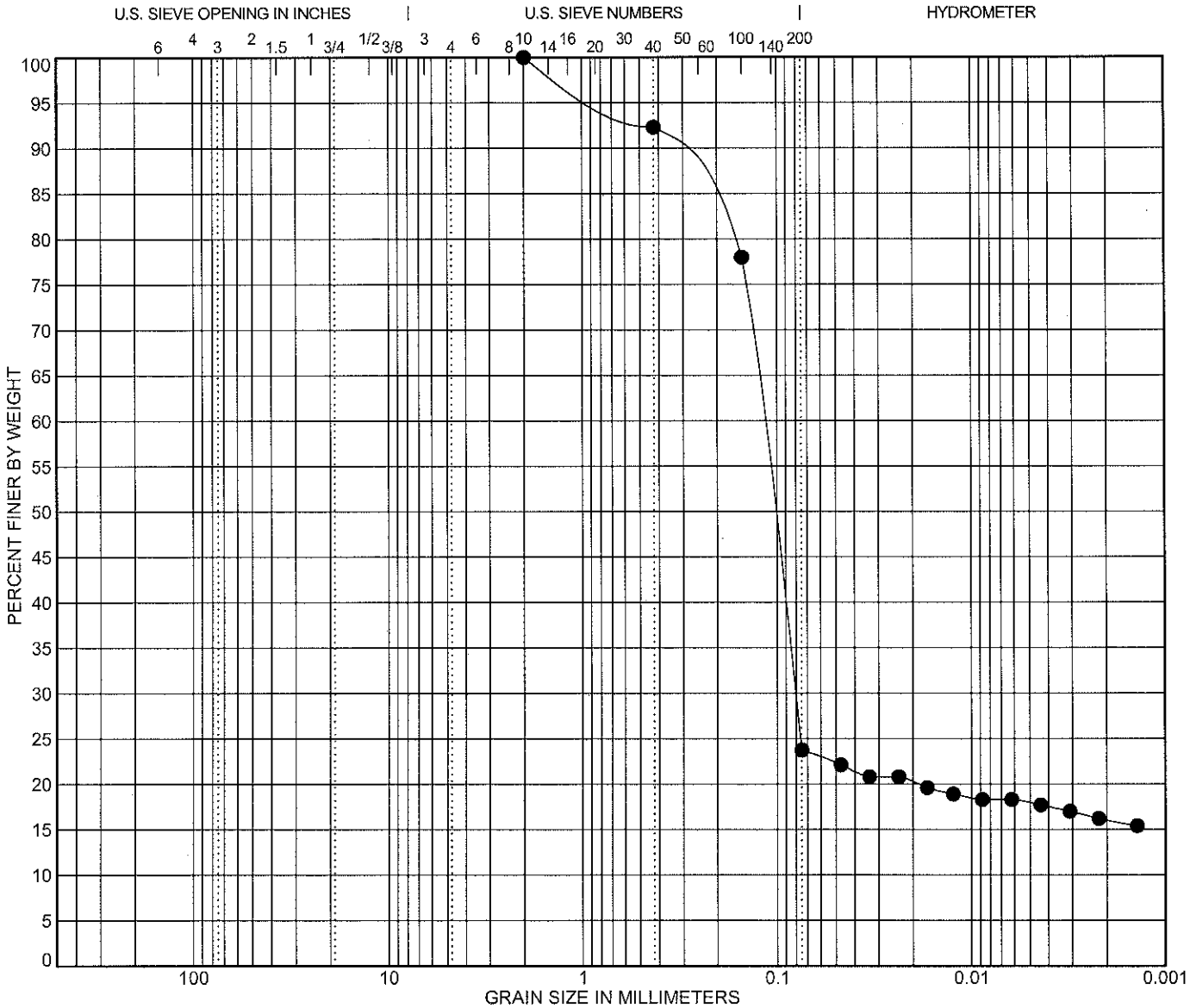
DATE DRILLED	Page 3 of 3
4/16/2010	10-B3
PROJECT NUMBER 92105154	EXHIBIT A-3



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**10-B3**	**0.0**	**CLAYEY SAND(SC)**	**55**	**20**	**35**		

Percent Passing the Indicated Sieve

	Specimen Identification		3/8"	#4	#10	#40	#100	#200
●	**10-B3**	**0.0**			**100**	**92.3**	**78**	**23.7**

	Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**10-B3**	**0.0**	**2**	**0.105**	**0.081**		**0.0**	**76.3**	**7.7**	**16.0**

GRAIN SIZE DISTRIBUTION

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

Terracon

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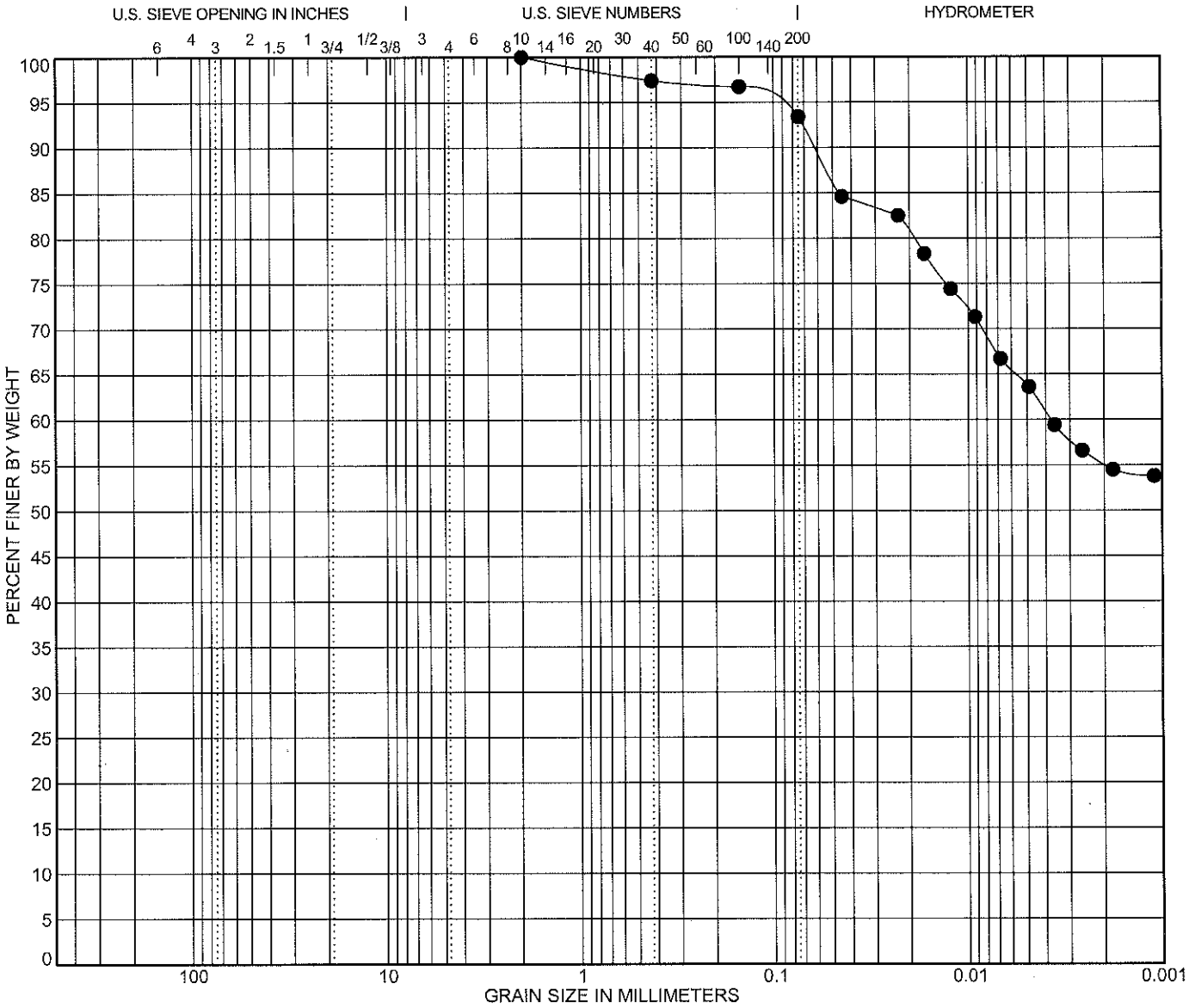
Fax: 713-690-8787

SPECIMEN ID
10-B3, 0.0



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	LL	PL	PI	Cc	Cu
● **10-B3**	**6.0**	**FAT CLAY(CH)**	**65**	**21**	**44**		

Percent Passing the Indicated Sieve

Specimen Identification		3/8"	#4	#10	#40	#100	#200
● **10-B3**	**6.0**			**100**	**97.4**	**96.7**	**93.4**

Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
● **10-B3**	**6.0**	**2**				**0.0**	**6.6**	**38.3**	**55.1**

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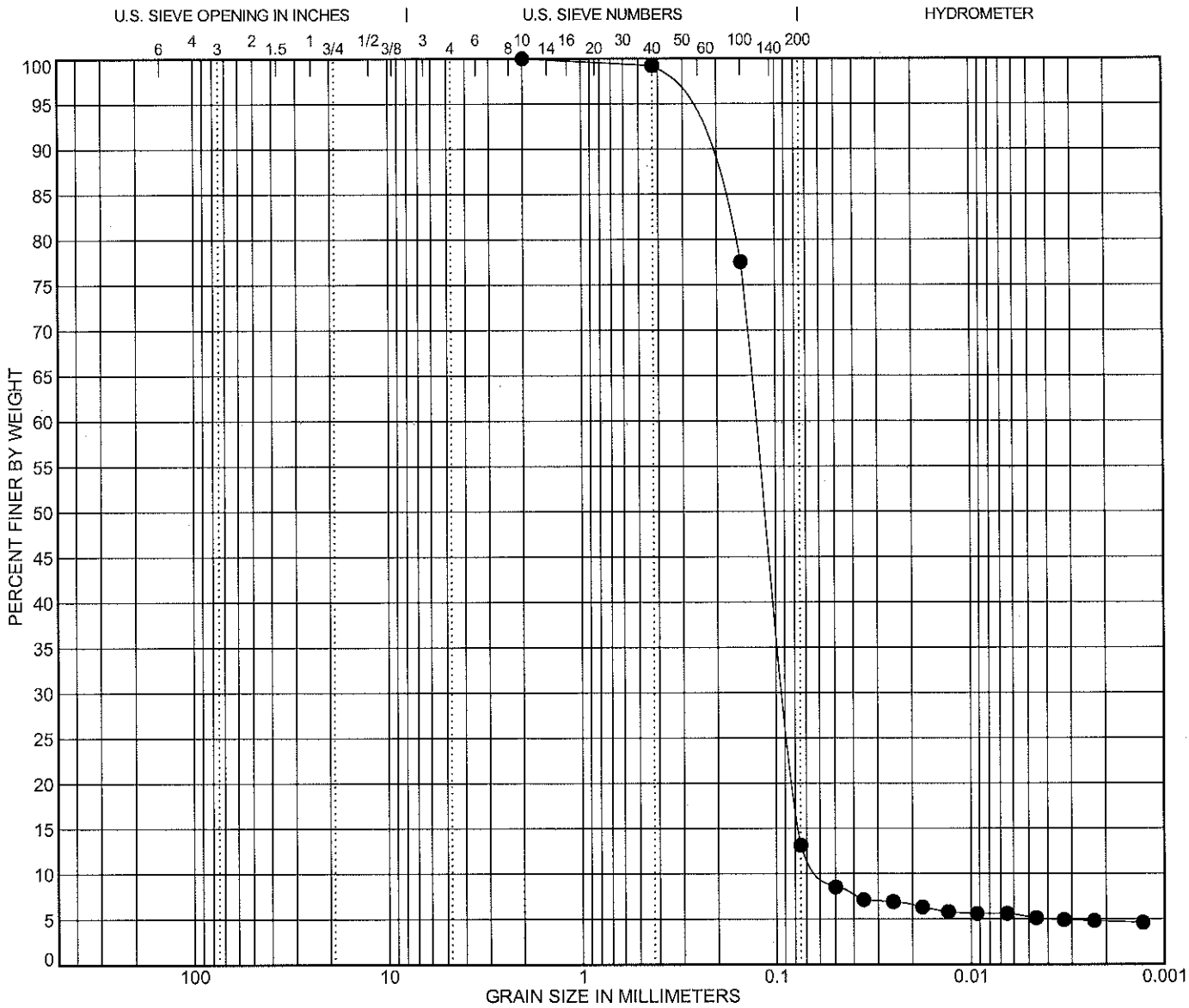
SPECIMEN ID
10-B3, 6.0



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	LL	PL	PI	Cc	Cu
● 10-B3	14.5					1.14	2.18

Percent Passing the Indicated Sieve

Specimen Identification		3/8"	#4	#10	#40	#100	#200
● 10-B3	14.5			100	99.2	77.5	13.1

Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
● 10-B3	14.5	2	0.112	0.09	0.057	0.0	86.9	8.4	4.8

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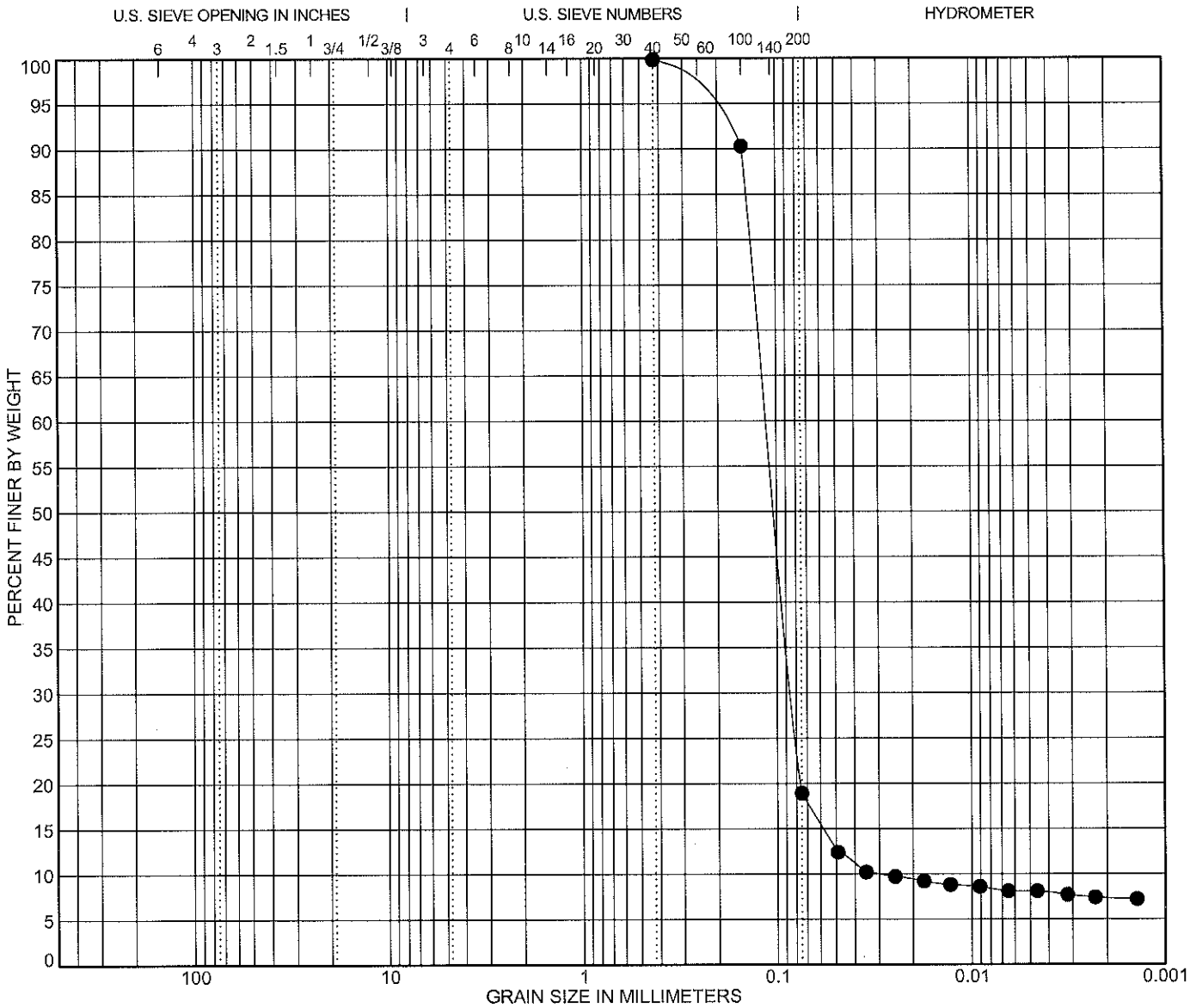
SPECIMEN ID
10-B3, 14.5



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	LL	PL	PI	Cc	Cu
● **10-B3**	**22.5**					**2.05**	**3.67**

Percent Passing the Indicated Sieve

Specimen Identification		3/8"	#4	#10	#40	#100	#200
● **10-B3**	**22.5**				**99.8**	**90.3**	**18.9**

Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
● **10-B3**	**22.5**	**0.425**	**0.101**	**0.084**	**0.03**	**0.0**	**80.9**	**11.6**	**7.3**

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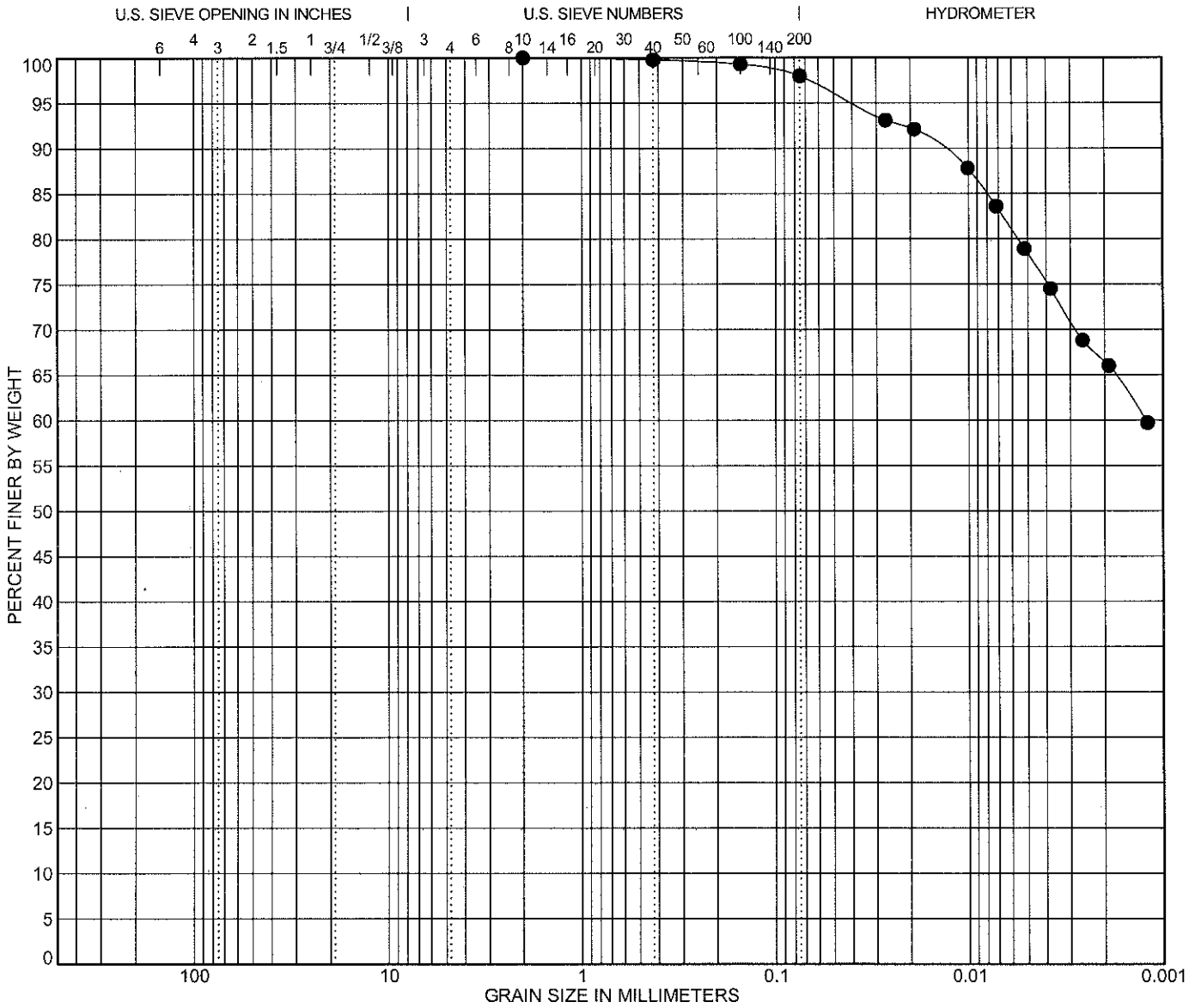
SPECIMEN ID
10-B3, 22.5



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	LL	PL	PI	Cc	Cu
● **10-B3**	**28.0**	**FAT CLAY(CH)**	**97**	**33**	**64**		

Percent Passing the Indicated Sieve

Specimen Identification		3/8"	#4	#10	#40	#100	#200
● **10-B3**	**28.0**			**100**	**99.8**	**99.3**	**98**

Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
● **10-B3**	**28.0**	**2**				**0.0**	**2.0**	**31.5**	**66.5**

GRAIN SIZE DISTRIBUTION

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TO-0010
Galveston, Texas
Project Number 92105154

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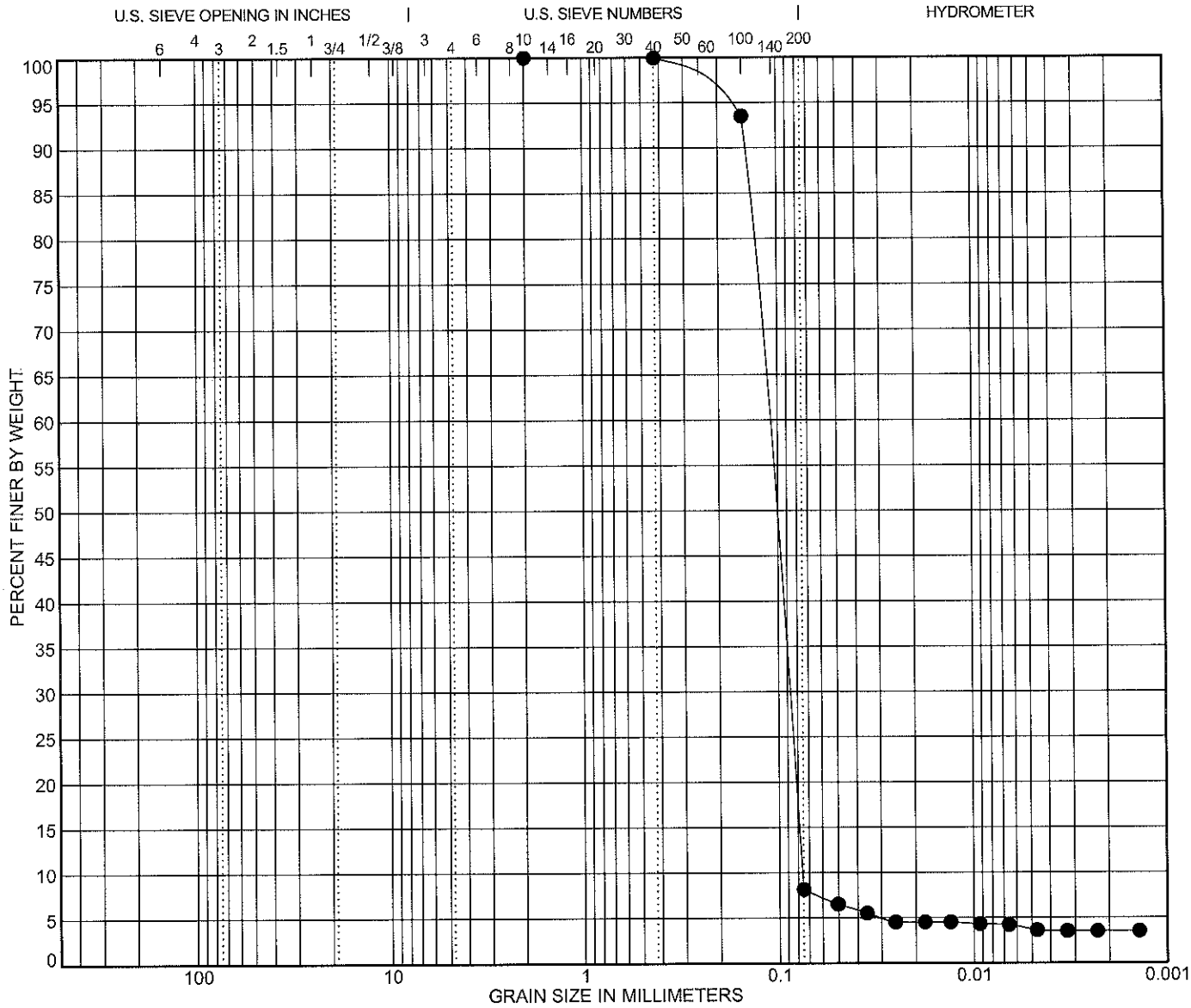
SPECIMEN ID
10-B3, 28.0



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	LL	PL	PI	Cc	Cu
● **10-B3**	**38.5**					**0.92**	**1.50**

Percent Passing the Indicated Sieve

Specimen Identification		3/8"	#4	#10	#40	#100	#200
● **10-B3**	**38.5**			**100**	**99.9**	**93.5**	**8.1**

Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
● **10-B3**	**38.5**	**2**	**0.105**	**0.09**	**0.076**	**0.0**	**91.9**	**4.6**	**3.5**

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TO-0010
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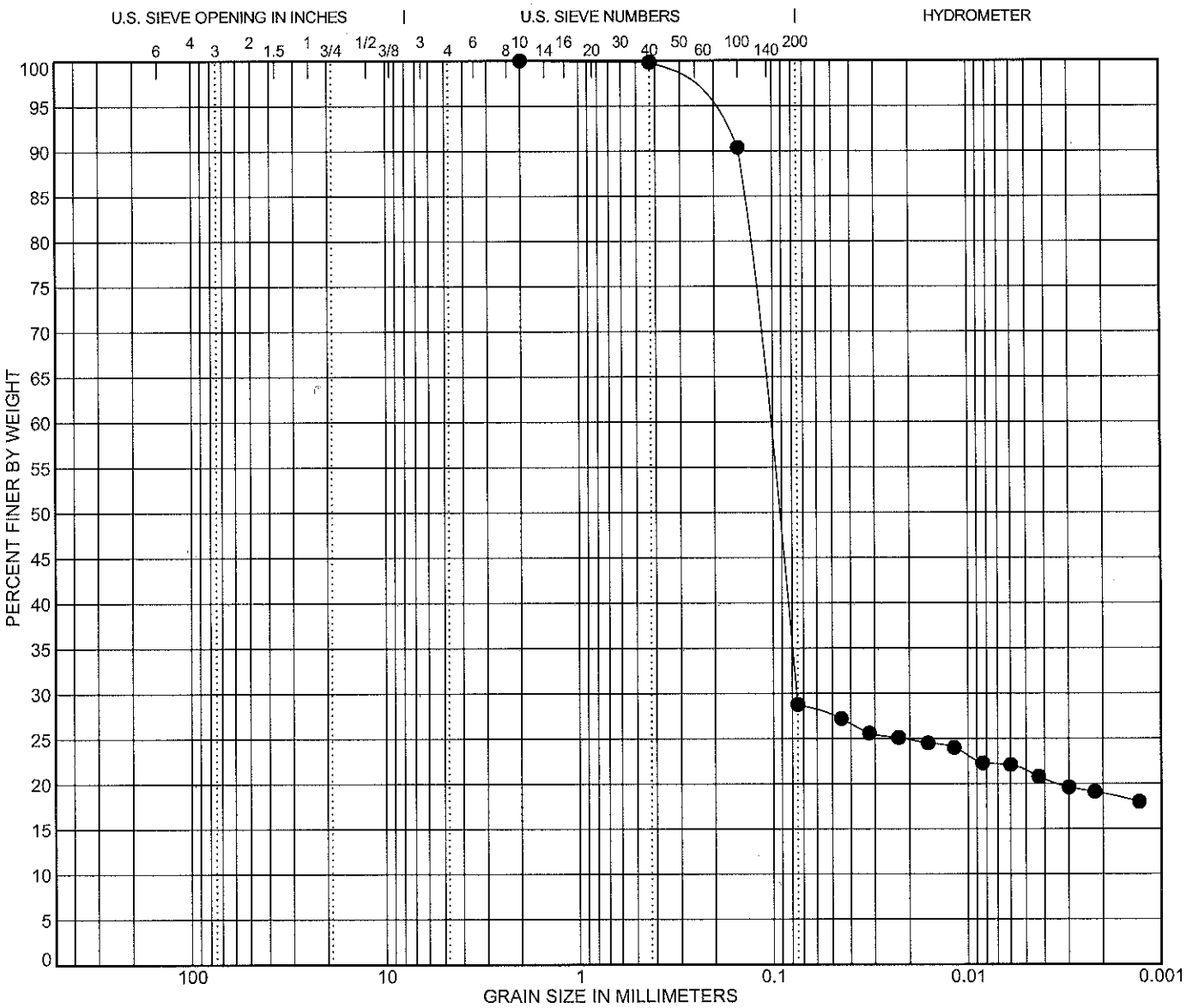
SPECIMEN ID
10-B3, 38.5



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	LL	PL	PI	Cc	Cu
● **10-B3**	**48.5**						

Percent Passing the Indicated Sieve

Specimen Identification		3/8"	#4	#10	#40	#100	#200
● **10-B3**	**48.5**			**100**	**99.8**	**90.4**	**28.8**

Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
● **10-B3**	**48.5**	**2**	**0.095**	**0.076**		**0.0**	**71.2**	**9.9**	**18.9**

GRAIN SIZE DISTRIBUTION

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TO-0010
Galveston, Texas
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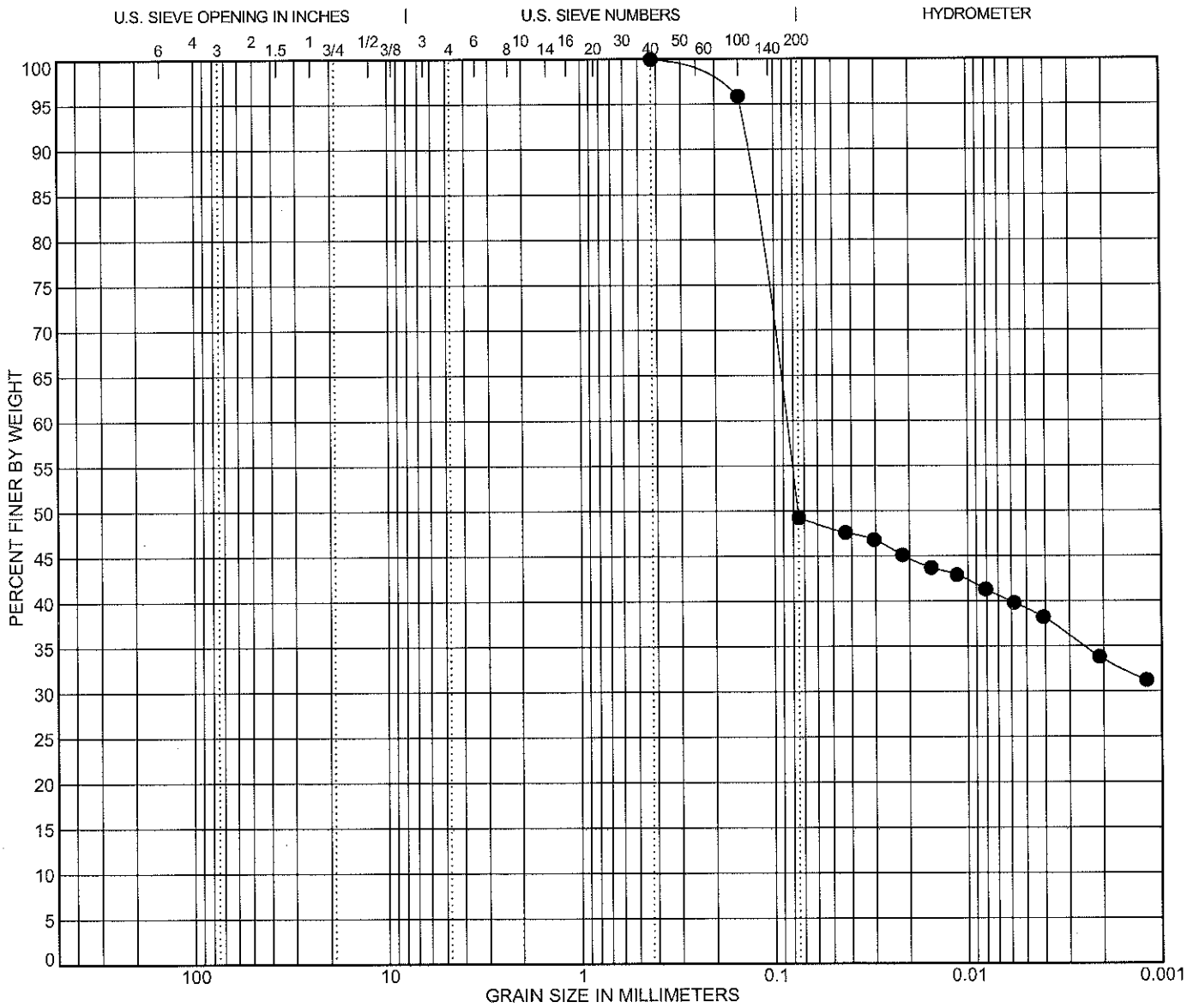
SPECIMEN ID
10-B3, 48.5



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	LL	PL	PI	Cc	Cu
● **10-B3**	**54.0**	**CLAYEY SAND(SC)**	**50**	**18**	**32**		

Percent Passing the Indicated Sieve

Specimen Identification		3/8"	#4	#10	#40	#100	#200
● **10-B3**	**54.0**				**100**	**95.9**	**49.2**

Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
● **10-B3**	**54.0**	**0.425**	**0.076**			**0.0**	**50.7**	**15.7**	**33.6**

GRAIN SIZE DISTRIBUTION

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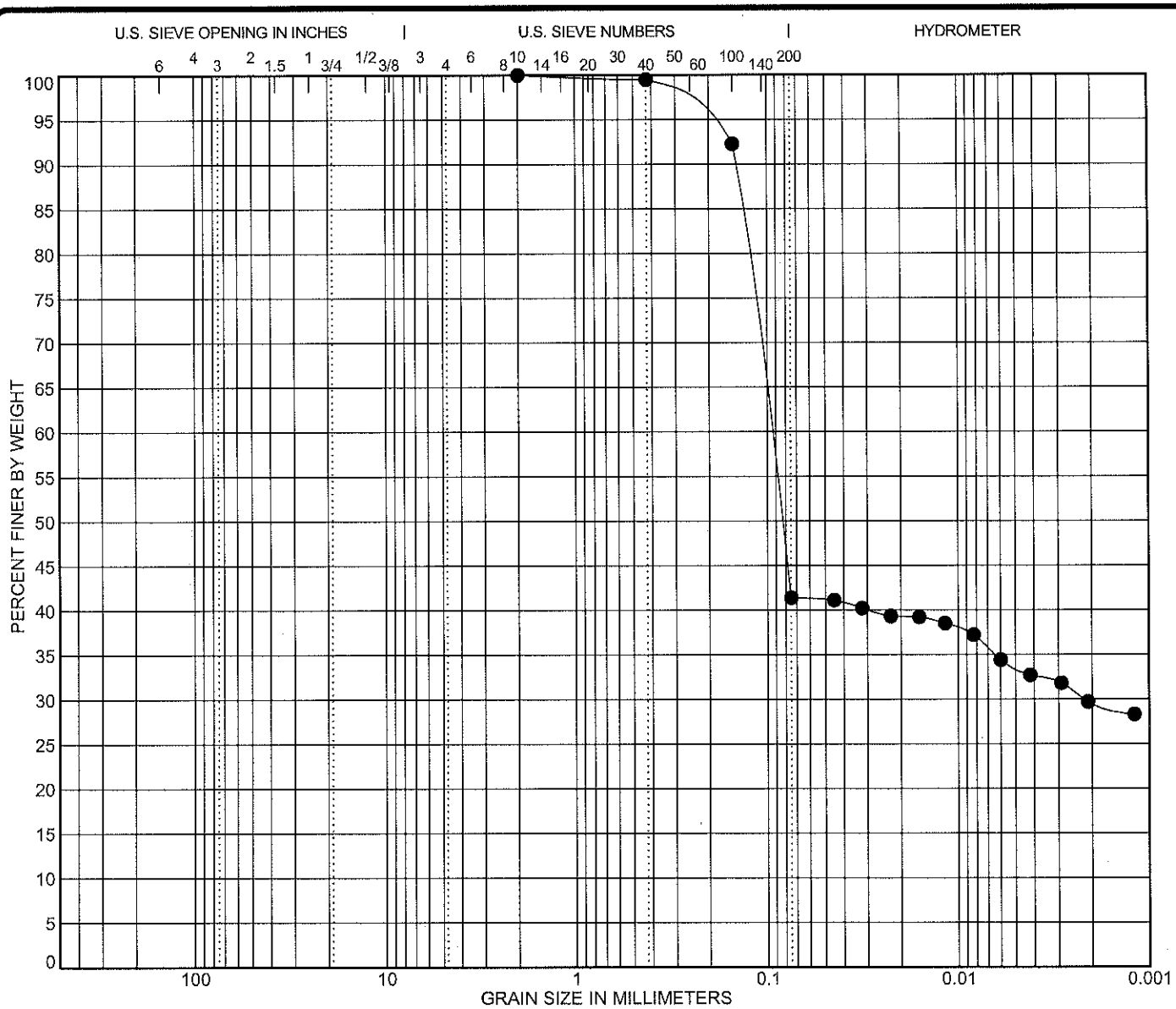
SPECIMEN ID
10-B3, 54.0



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**10-B3**	**58.0**	**CLAYEY SAND(SC)**	**60**	**21**	**39**		

Percent Passing the Indicated Sieve

	Specimen Identification		3/8"	#4	#10	#40	#100	#200
●	**10-B3**	**58.0**			**100**	**99.5**	**92.3**	**41.4**

	Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**10-B3**	**58.0**	**2**	**0.084**	**0.002**		**0.0**	**58.6**	**11.8**	**29.6**

GRAIN SIZE DISTRIBUTION

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

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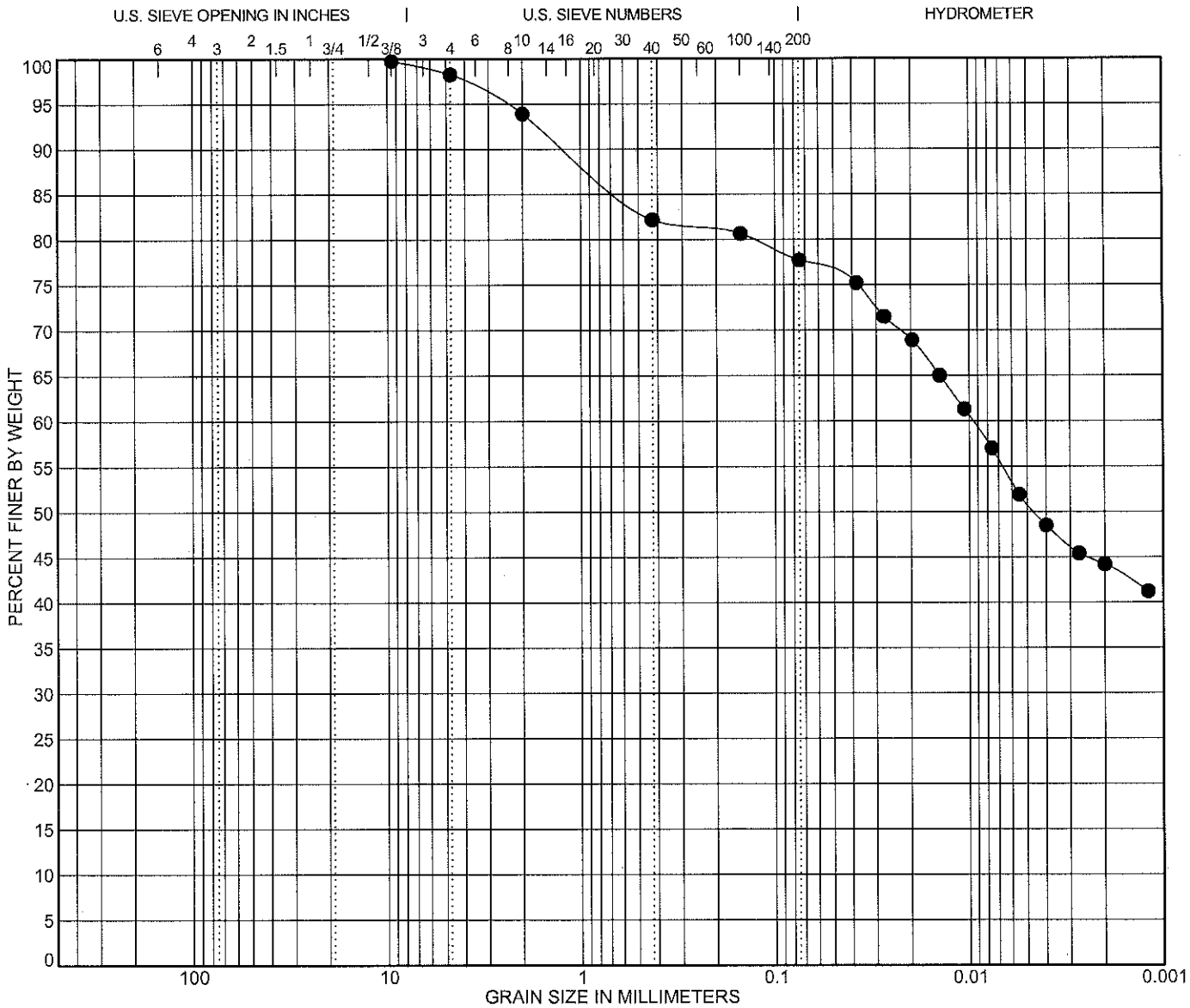
SPECIMEN ID
10-B3, 58.0



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	LL	PL	PI	Cc	Cu
● **10-B3**	**64.0**	**FAT CLAY with SAND(CH)**	**73**	**25**	**48**		

Percent Passing the Indicated Sieve

Specimen Identification		3/8"	#4	#10	#40	#100	#200
● **10-B3**	**64.0**	**99.7**	**98.3**	**93.9**	**82.2**	**80.7**	**77.7**

Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
● **10-B3**	**64.0**	**9.5**	**0.005**			**1.5**	**20.5**	**33.5**	**44.2**

GRAIN SIZE DISTRIBUTION

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

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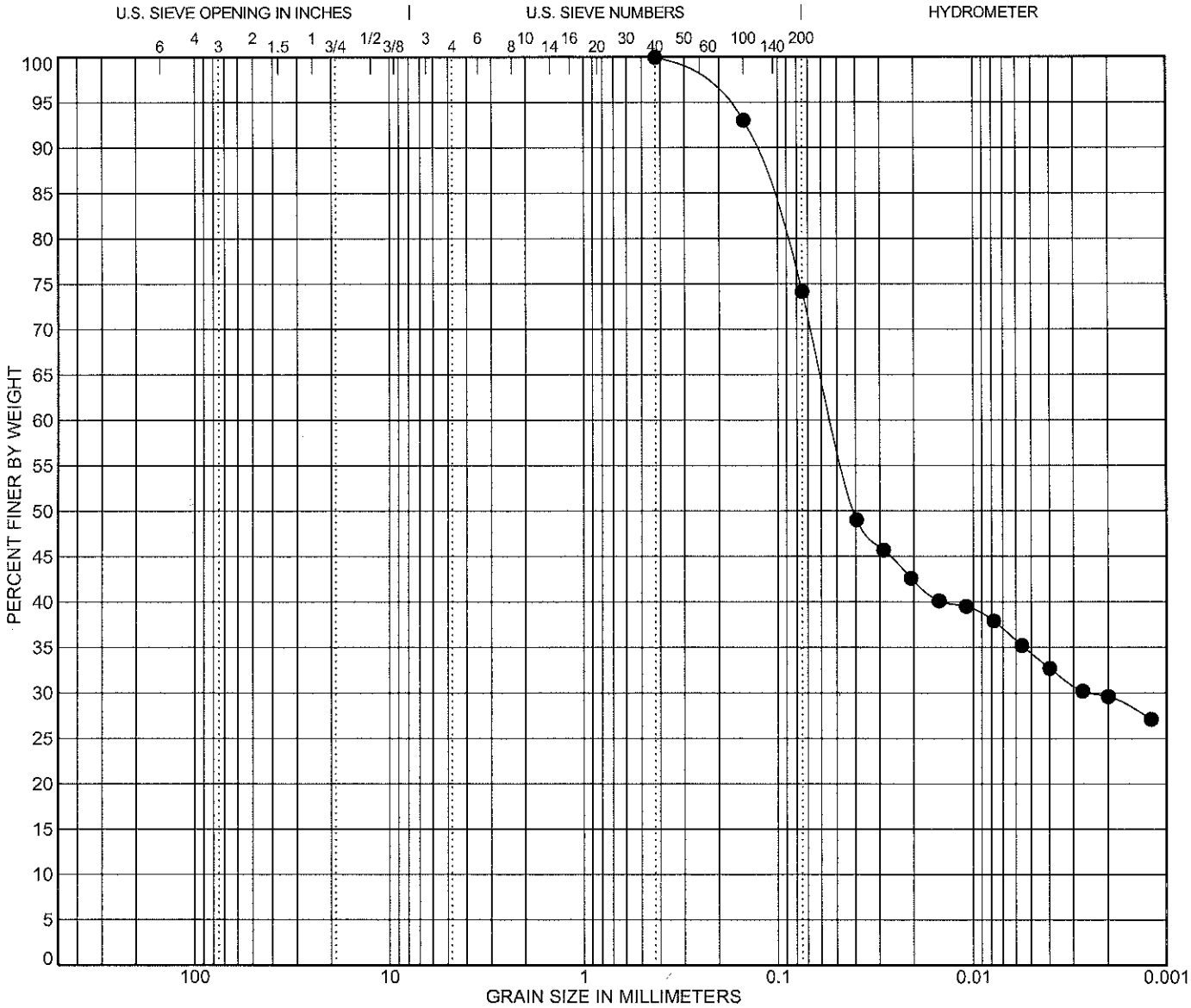
SPECIMEN ID
10-B3, 64.0



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**10-B3**	**70.0**	**LEAN CLAY with SAND(CL)**	**44**	**26**	**18**		

Percent Passing the Indicated Sieve

	Specimen Identification		3/8"	#4	#10	#40	#100	#200
●	**10-B3**	**70.0**				**99.9**	**93**	**74.1**

	Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**10-B3**	**70.0**	**0.425**	**0.041**	**0.002**		**0.0**	**25.8**	**44.5**	**29.6**

GRAIN SIZE DISTRIBUTION

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TO-0010
Galveston, Texas
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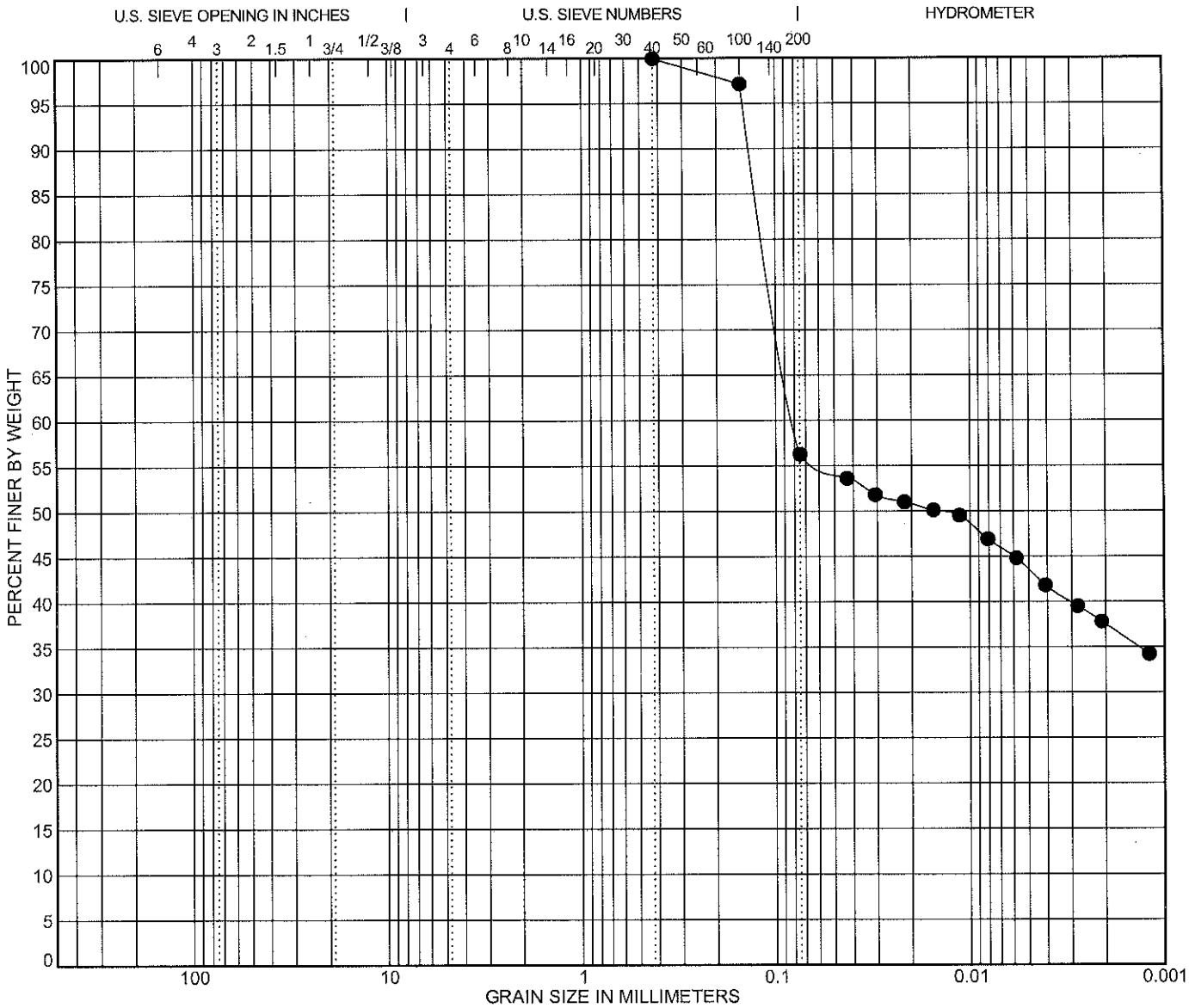
SPECIMEN ID
10-B3, 70.0



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	LL	PL	PI	Cc	Cu
● **10-B3**	**74.0**	**SANDY FAT CLAY(CH)**	**57**	**20**	**37**		

Percent Passing the Indicated Sieve

Specimen Identification		3/8"	#4	#10	#40	#100	#200
● **10-B3**	**74.0**				**99.9**	**97.1**	**56.3**

Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
● **10-B3**	**74.0**	**0.425**	**0.015**			**0.0**	**43.7**	**18.8**	**37.5**

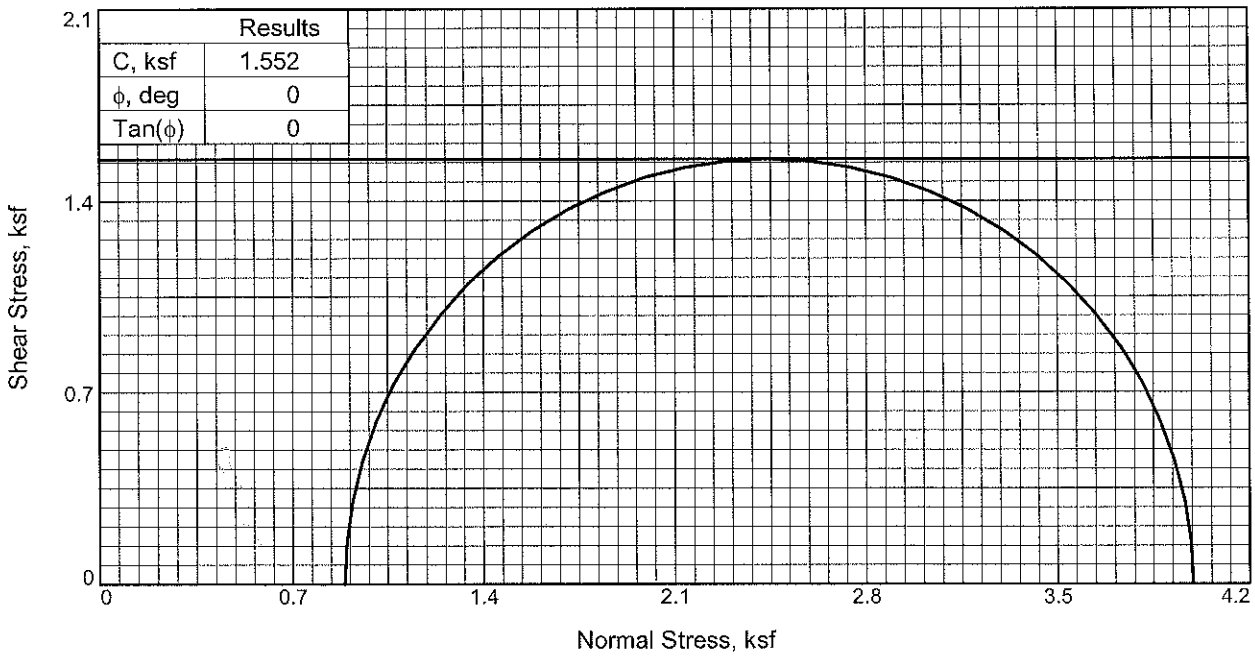
GRAIN SIZE DISTRIBUTION

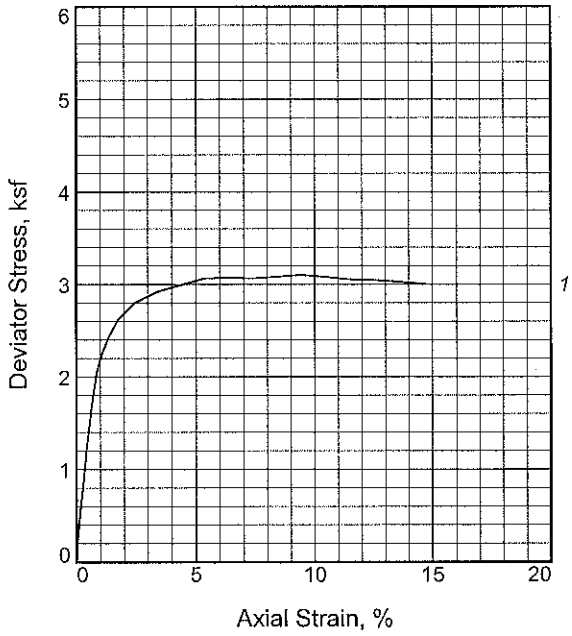
Galveston Channel Deepening,
TO-0010
Galveston, Texas
Project Number 92105154

Terracon

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

SPECIMEN ID
10-B3, 74.0





Sample No.		1
Initial	Water Content, %	20.0
	Dry Density, pcf	107.1
	Saturation, %	91.2
	Void Ratio	0.6027
	Diameter, in.	2.787
	Height, in.	5.844
At Test	Water Content, %	20.0
	Dry Density, pcf	107.1
	Saturation, %	91.2
	Void Ratio	0.6027
	Diameter, in.	2.787
	Height, in.	5.844
Strain rate, in./min.		0.055
Back Pressure, psi		0.000
Cell Pressure, psi		6.180
Fail. Stress, ksf		3.104
Ult. Stress, ksf		
σ_1 Failure, ksf		3.994
σ_3 Failure, ksf		0.890

Type of Test:
Unconsolidated Undrained

Sample Type: Undisturbed

Description: Gray and tan Fat Clay w/calacareous and
ferrous nodules (fill)

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-B3

Depth: 6-8 ft.

Proj. No.: 92105154 **Date Sampled:**

TRIAXIAL SHEAR TEST REPORT
Terracon, Inc.
Houston, TX

TRIAXIAL COMPRESSION TEST

Unconsolidated Undrained

7/20/2010
2:12 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-B3
Depth: 6-8 ft.
Description: Gray and tan Fat Clay w/calacareous and ferrous nodules (fill)
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

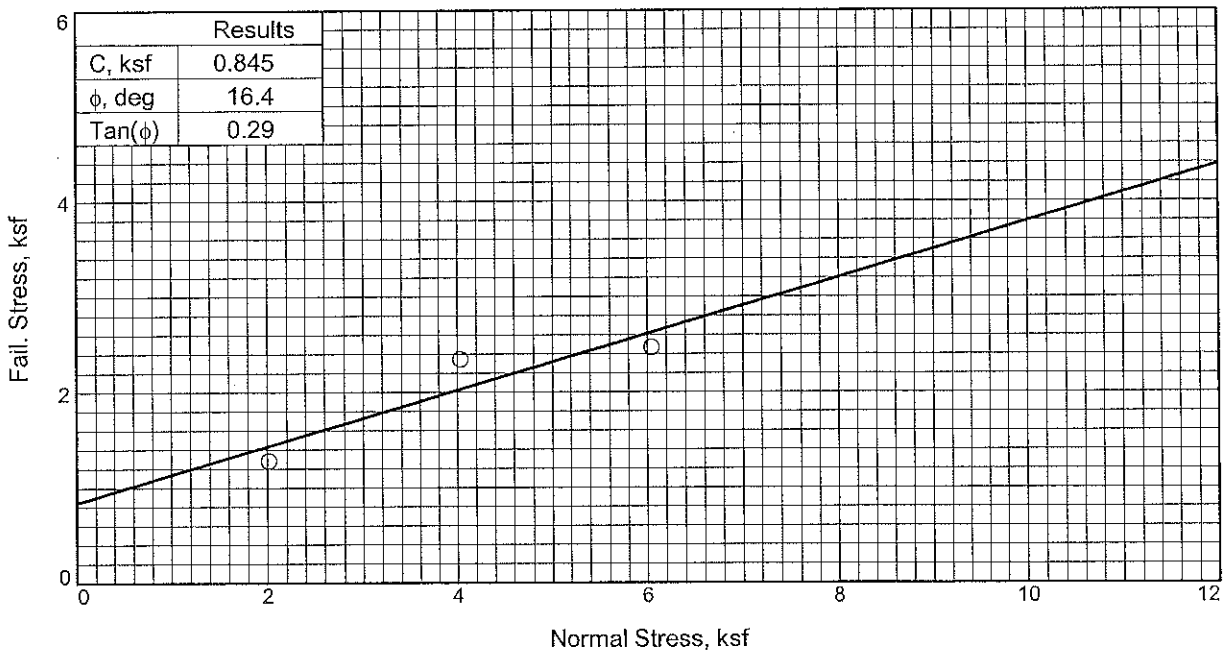
Specimen Parameter	Initial	Final
Moisture content: Moist soil+tare, gms.	196.280	196.280
Moisture content: Dry soil+tare, gms.	173.670	173.670
Moisture content: Tare, gms.	60.510	60.510
Moisture, %	20.0	20.0
Moist specimen weight, gms.	1202.76	
Diameter, in.	2.787	
Area, in.^{2}	6.100	
Height, in.	5.844	
Wet density, pcf	128.5	
Dry density, pcf	107.1	
Void ratio	0.6027	
Saturation, %	91.2	

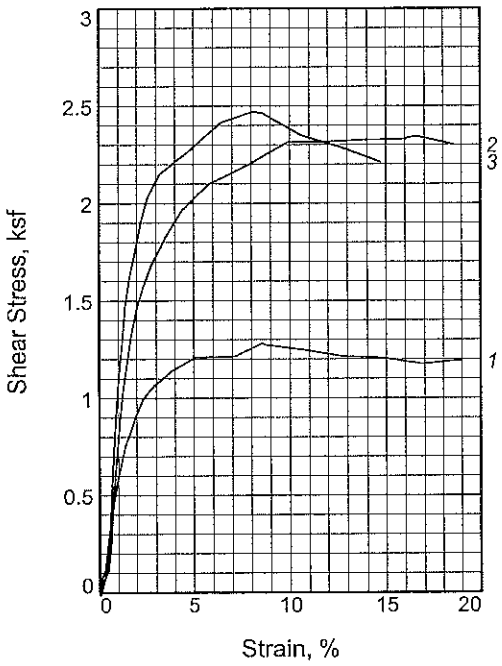
Test Readings for Specimen No. 1

Cell pressure = 6.180 psi (0.890 ksf)
Back pressure = 0.000 psi (0.000 ksf)
Strain rate, in./min. = 0.055
Fail. Stress = 3.104 ksf **at reading no.** 22

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	0.890	0.890	1.00	0.890	0.000
1	0.0000	0.593	0.6	0.0	0.014	0.890	0.904	1.02	0.897	0.007
2	0.0031	9.324	9.3	0.1	0.220	0.890	1.110	1.25	1.000	0.110
3	0.0074	18.368	18.4	0.1	0.433	0.890	1.323	1.49	1.106	0.217
4	0.0118	27.273	27.3	0.2	0.642	0.890	1.532	1.72	1.211	0.321
5	0.0169	35.251	35.3	0.3	0.830	0.890	1.720	1.93	1.305	0.415
6	0.0213	44.259	44.3	0.4	1.041	0.890	1.931	2.17	1.410	0.520
7	0.0257	52.530	52.5	0.4	1.235	0.890	2.124	2.39	1.507	0.617
8	0.0308	60.526	60.5	0.5	1.421	0.890	2.311	2.60	1.601	0.711
9	0.0370	70.142	70.1	0.6	1.645	0.890	2.535	2.85	1.713	0.823
10	0.0428	78.751	78.8	0.7	1.845	0.890	2.735	3.07	1.813	0.923
11	0.0504	87.455	87.5	0.9	2.047	0.890	2.936	3.30	1.913	1.023
12	0.0617	95.825	95.8	1.1	2.238	0.890	3.128	3.51	2.009	1.119
13	0.0793	104.462	104.5	1.4	2.432	0.890	3.322	3.73	2.106	1.216
14	0.1031	113.347	113.3	1.8	2.628	0.890	3.518	3.95	2.204	1.314
15	0.1449	121.761	121.8	2.5	2.803	0.890	3.693	4.15	2.291	1.401
16	0.1982	128.120	128.1	3.4	2.922	0.890	3.812	4.28	2.351	1.461
17	0.2514	132.426	132.4	4.3	2.991	0.890	3.881	4.36	2.386	1.496
18	0.3143	137.365	137.4	5.4	3.068	0.890	3.958	4.45	2.424	1.534
19	0.3732	139.158	139.2	6.4	3.075	0.890	3.965	4.46	2.427	1.538
20	0.4322	140.209	140.2	7.4	3.065	0.890	3.955	4.44	2.422	1.532
21	0.4912	142.672	142.7	8.4	3.085	0.890	3.975	4.47	2.432	1.542
22	0.5502	145.158	145.2	9.4	3.104	0.890	3.994	4.49	2.442	1.552
23	0.6091	145.783	145.8	10.4	3.082	0.890	3.972	4.46	2.431	1.541
24	0.6682	146.212	146.2	11.4	3.057	0.890	3.947	4.43	2.418	1.528
25	0.7273	147.467	147.5	12.4	3.048	0.890	3.938	4.42	2.414	1.524
26	0.7862	148.369	148.4	13.5	3.031	0.890	3.921	4.41	2.405	1.516
27	0.8458	149.160	149.2	14.5	3.011	0.890	3.901	4.38	2.396	1.506
28	0.8602	149.562	149.6	14.7	3.011	0.890	3.901	4.38	2.395	1.505





Sample No.		1	2	3
Initial	Water Content, %	48.5	48.5	48.5
	Dry Density, pcf	70.4	72.5	72.4
	Saturation, %	92.7	97.6	97.3
	Void Ratio	1.4399	1.3674	1.3711
	Diameter, in.	2.500	2.500	2.500
	Height, in.	1.030	1.010	1.005
At Test	Water Content, %	46.4	42.8	39.8
	Dry Density, pcf	75.6	79.0	83.5
	Saturation, %	100.4	100.4	103.5
	Void Ratio	1.2717	1.1731	1.0568
	Diameter, in.	2.500	2.500	2.500
	Height, in.	0.959	0.927	0.872
Normal Stress, ksf		2.016	4.032	6.048
Fail. Stress, ksf		1.283	2.345	2.471
Strain, %		8.6	16.6	8.1
Ult. Stress, ksf				
Strain, %				
Strain rate, in./min.		0.001	0.001	0.001

Sample Type: Undisturbed
Description: Gray Fat Clay w/shell

Assumed Specific Gravity= 2.75
Remarks: ASTM D3080

Figure No. _____

Client: USACE

Project: Galveston Channel Deepening San Jacinto Placement Area
Contract #W912HY-09-D-0021, Task Order #0010
Location: 10-B3
Sample Number: 33 **Depth:** 64-66 ft.
Proj. No.: 92105154 **Date Sampled:**

DIRECT SHEAR TEST REPORT
Terracon, Inc.
Houston, TX

DIRECT SHEAR TEST

9/13/2010

Date:
Client: USACE
Project: Galveston Channel Deepening San Jacinto Placement Area
Contract #W912HY-09-D-0021, Task Order #0010
Project No.: 92105154
Location: 10-B3
Depth: 64-66 ft. **Sample Number:** 33
Description: Gray Fat Clay w/shell
Remarks: ASTM D3080
Type of Sample: Undisturbed
Assumed Specific Gravity=2.75 **LL=** **PL=** **PI=**

Parameters for Specimen No. 1

Specimen Parameter	Initial	Consolidated	Final
Moisture content: Moist soil+tare, gms.	75.020		92.060
Moisture content: Dry soil+tare, gms.	60.650		69.930
Moisture content: Tare, gms.	31.030		22.280
Moisture, %	48.5	46.4	46.4
Moist specimen weight, gms.	138.69		
Diameter, in.	2.500	2.500	
Area, in.^{2}	4.909	4.909	
Height, in.	1.030	0.959	
Net decrease in height, in.		0.071	
Wet density, pcf	104.5	110.7	
Dry density, pcf	70.4	75.6	
Void ratio	1.4399	1.2717	
Saturation, %	92.7	100.4	

Test Readings for Specimen No. 1

Normal stress = 2.016 ksf
Strain rate, in./min. = 0.001
Fail. Stress = 1.283 ksf **at reading no.** 20

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	1.595	1.6	0.0	0.047
2	0.0005	1.591	1.6	0.0	0.047
3	0.0070	3.911	3.9	0.3	0.115
4	0.0095	6.472	6.5	0.4	0.190
5	0.0115	8.743	8.7	0.5	0.256
6	0.0140	11.262	11.3	0.6	0.330
7	0.0165	13.651	13.7	0.7	0.400
8	0.0190	15.848	15.8	0.8	0.465
9	0.0221	18.139	18.1	0.9	0.532
10	0.0251	20.438	20.4	1.0	0.600
11	0.0301	23.002	23.0	1.2	0.675
12	0.0346	25.692	25.7	1.4	0.754
13	0.0421	28.147	28.1	1.7	0.826

Test Readings for Specimen No. 1

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Strain %	Shear Stress ksf
14	0.0481	30.743	30.7	1.9	0.902
15	0.0586	34.013	34.0	2.3	0.998
16	0.0736	36.413	36.4	2.9	1.068
17	0.0946	38.801	38.8	3.8	1.138
18	0.1277	41.251	41.3	5.1	1.210
19	0.1787	41.413	41.4	7.1	1.215
20	0.2147	43.733	43.7	8.6	1.283
21	0.2177	43.456	43.5	8.7	1.275
22	0.2687	42.514	42.5	10.7	1.247
23	0.3198	41.402	41.4	12.8	1.215
24	0.3708	41.136	41.1	14.8	1.207
25	0.4218	40.063	40.1	16.9	1.175
26	0.4729	40.714	40.7	18.9	1.194

Parameters for Specimen No. 2

Specimen Parameter	Initial	Consolidated	Final
Moisture content: Moist soil+tare, gms.	75.020		76.210
Moisture content: Dry soil+tare, gms.	60.650		62.600
Moisture content: Tare, gms.	31.030		30.810
Moisture, %	48.5	42.8	42.8
Moist specimen weight, gms.	140.16		
Diameter, in.	2.500	2.500	
Area, in.^{2}	4.909	4.909	
Height, in.	1.010	0.927	
Net decrease in height, in.		0.083	
Wet density, pcf	107.7	112.8	
Dry density, pcf	72.5	79.0	
Void ratio	1.3674	1.1731	
Saturation, %	97.6	100.4	

Test Readings for Specimen No. 2

Normal stress = 4.032 ksf

Strain rate, in./min. = 0.001

Fail. Stress = 2.345 ksf **at reading no.** 25

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	0.0010	0.321	0.3	0.0	0.009
2	0.0020	1.152	1.2	0.1	0.034
3	0.0115	3.738	3.7	0.5	0.110
4	0.0145	8.011	8.0	0.6	0.235
5	0.0165	12.086	12.1	0.7	0.355
6	0.0185	16.132	16.1	0.7	0.473
7	0.0210	20.775	20.8	0.8	0.609
8	0.0241	25.089	25.1	1.0	0.736
9	0.0271	29.748	29.7	1.1	0.873
10	0.0316	35.249	35.2	1.3	1.034
11	0.0361	39.332	39.3	1.4	1.154

Test Readings for Specimen No. 2

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Strain %	Shear Stress ksf
12	0.0421	44.516	44.5	1.7	1.306
13	0.0496	49.444	49.4	2.0	1.450
14	0.0586	53.518	53.5	2.3	1.570
15	0.0706	57.662	57.7	2.8	1.692
16	0.0871	62.271	62.3	3.5	1.827
17	0.1096	66.961	67.0	4.4	1.964
18	0.1456	71.589	71.6	5.8	2.100
19	0.1967	74.956	75.0	7.9	2.199
20	0.2477	78.922	78.9	9.9	2.315
21	0.2987	78.957	79.0	11.9	2.316
22	0.3498	79.286	79.3	14.0	2.326
23	0.4008	79.446	79.4	16.0	2.331
24	0.4038	79.725	79.7	16.2	2.339
25	0.4158	79.950	79.9	16.6	2.345
26	0.4668	78.431	78.4	18.7	2.301

Parameters for Specimen No. 3

Specimen Parameter	Initial	Consolidated	Final
Moisture content: Moist soil+tare, gms.	75.020		72.300
Moisture content: Dry soil+tare, gms.	60.650		58.180
Moisture content: Tare, gms.	31.030		22.670
Moisture, %	48.5	39.8	39.8
Moist specimen weight, gms.	139.25		
Diameter, in.	2.500	2.500	
Area, in.^{2}	4.909	4.909	
Height, in.	1.005	0.872	
Net decrease in height, in.		0.133	
Wet density, pcf	107.5	116.7	
Dry density, pcf	72.4	83.5	
Void ratio	1.3711	1.0568	
Saturation, %	97.3	103.5	

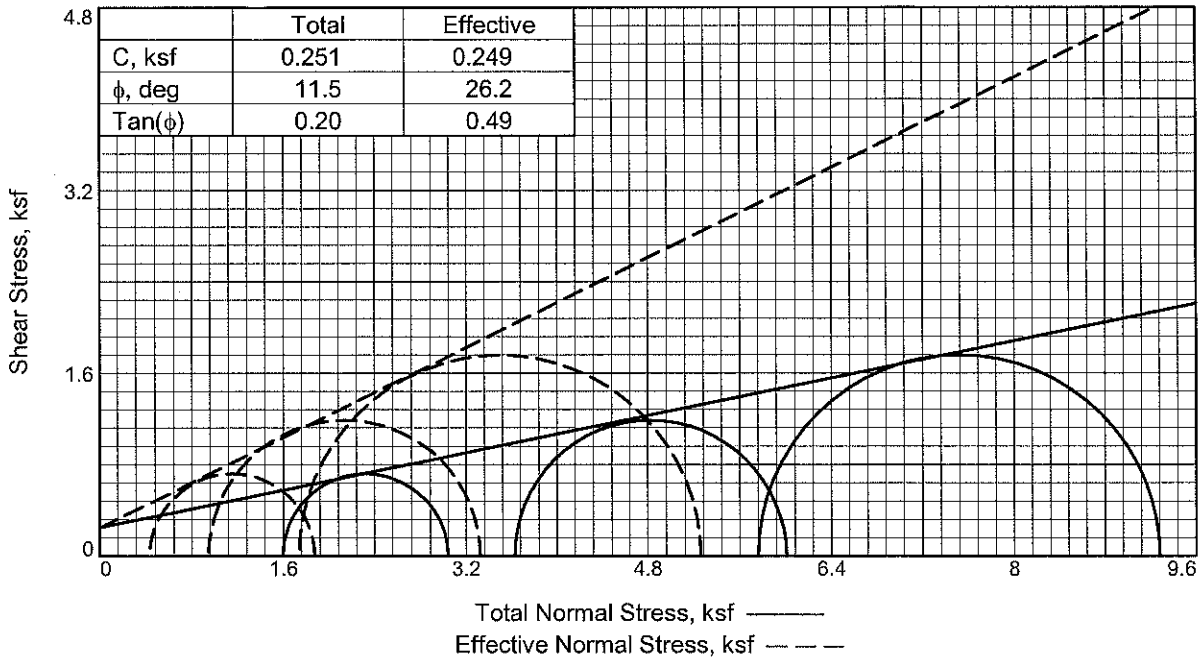
Test Readings for Specimen No. 3

Normal stress = 6.048 ksf

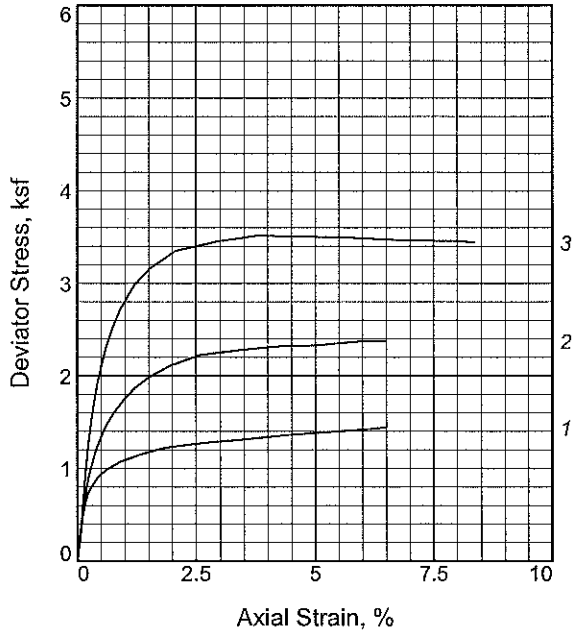
Strain rate, in./min. = 0.001

Fail. Stress = 2.471 ksf **at reading no.** 20

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	-0.130	-0.1	0.0	-0.004
2	0.0015	-0.392	-0.4	0.1	-0.012
3	0.0100	3.982	4.0	0.4	0.117
4	0.0125	8.310	8.3	0.5	0.244
5	0.0145	13.357	13.4	0.6	0.392
6	0.0165	18.627	18.6	0.7	0.546
7	0.0185	23.973	24.0	0.7	0.703
8	0.0206	28.517	28.5	0.8	0.837
9	0.0231	33.375	33.4	0.9	0.979
10	0.0256	37.881	37.9	1.0	1.111
11	0.0301	43.532	43.5	1.2	1.277
12	0.0346	50.145	50.1	1.4	1.471
13	0.0406	55.307	55.3	1.6	1.622
14	0.0481	59.911	59.9	1.9	1.758
15	0.0556	64.868	64.9	2.2	1.903
16	0.0646	69.111	69.1	2.6	2.027
17	0.0796	73.343	73.3	3.2	2.152
18	0.1216	77.649	77.6	4.9	2.278
19	0.1607	82.309	82.3	6.4	2.415
20	0.2027	84.247	84.2	8.1	2.471
21	0.2147	84.015	84.0	8.6	2.465
22	0.2657	80.013	80.0	10.6	2.347
23	0.3168	77.994	78.0	12.7	2.288
24	0.3678	75.388	75.4	14.7	2.212



	Total	Effective
C, ksf	0.251	0.249
ϕ, deg	11.5	26.2
Tan(ϕ)	0.20	0.49



Sample No.		1	2	3
Initial	Water Content, %	45.0	45.0	45.0
	Dry Density, pcf	76.4	76.4	76.4
	Saturation, %	99.1	99.1	99.1
	Void Ratio	1.2473	1.2473	1.2473
	Diameter, in.	2.775	2.775	2.775
	Height, in.	5.816	5.816	5.816
At Test	Water Content, %	43.3	43.3	43.3
	Dry Density, pcf	76.4	76.4	76.4
	Saturation, %	95.6	95.6	95.6
	Void Ratio	1.2473	1.2473	1.2473
	Diameter, in.	2.775	2.775	2.775
	Height, in.	5.816	5.816	5.816
Strain rate, in./min.		0.001	0.001	0.001
Back Pressure, psi		30.000	30.000	30.000
Cell Pressure, psi		41.090	55.200	70.010
Fail. Stress, ksf		1.440	2.376	3.519
Excess Pore Pr., ksf		1.164	2.682	4.023
Ult. Stress, ksf				
Excess Pore Pr., ksf				
$\bar{\sigma}_1$ Failure, ksf		1.872	3.323	5.258
$\bar{\sigma}_3$ Failure, ksf		0.433	0.947	1.739

Type of Test:
CU with Pore Pressures

Sample Type: Undisturbed

Description: Dark Gray Fat Clay w/sand layers

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-B3

Sample Number: 30 **Depth:** 58-60 ft.

Proj. No.: 92105154 **Date Sampled:**

TRIAXIAL SHEAR TEST REPORT
Terracon, Inc.
Houston, TX

TRIAXIAL COMPRESSION TEST

CU with Pore Pressures

8/4/2010
1:00 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-B3
Depth: 58-60 ft. **Sample Number:** 30
Description: Dark Gray Fat Clay w/sand layers
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.	95.440			134.920
Moisture content: Dry soil+tare, gms.	83.690			108.470
Moisture content: Tare, gms.	57.550			47.450
Moisture, %	45.0	43.3	43.3	43.3
Moist specimen weight, gms.	1022.41			
Diameter, in.	2.775	2.775	2.775	
Area, in.^{2}	6.048	6.048	6.048	
Height, in.	5.816	5.816	5.816	
Net decrease in height, in.		0.000	0.000	
Net decrease in water volume, cc.			0.000	
Wet density, pcf	110.7	109.5	109.5	
Dry density, pcf	76.4	76.4	76.4	
Void ratio	1.2473	1.2473	1.2473	
Saturation, %	99.1	95.6	95.6	

Test Readings for Specimen No. 1

Consolidation cell pressure = 41.090 psi (5.917 ksf)
Consolidation back pressure = 30.000 psi (4.320 ksf)
Consolidation effective confining stress = 1.597 ksf
Strain rate, in./min. = 0.001
Fail. Stress = 1.440 ksf **at reading no.** 19

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	5.917	5.917	1.00	0.000	5.917	0.000
1	0.0009	3.685	3.7	0.0	0.088	1.532	1.620	1.06	30.452	1.576	0.044
2	0.0025	8.547	8.5	0.0	0.203	1.419	1.622	1.14	31.238	1.520	0.102
3	0.0040	13.535	13.5	0.1	0.322	1.331	1.653	1.24	31.849	1.492	0.161
4	0.0056	17.820	17.8	0.1	0.424	1.254	1.678	1.34	32.382	1.466	0.212
5	0.0072	21.820	21.8	0.1	0.519	1.189	1.708	1.44	32.836	1.448	0.259
6	0.0103	26.947	26.9	0.2	0.640	1.100	1.741	1.58	33.450	1.420	0.320
7	0.0134	30.971	31.0	0.2	0.736	1.019	1.755	1.72	34.011	1.387	0.368
8	0.0197	35.124	35.1	0.3	0.833	0.918	1.751	1.91	34.718	1.334	0.417
9	0.0259	38.500	38.5	0.4	0.913	0.841	1.754	2.09	35.250	1.297	0.456
10	0.0369	41.974	42.0	0.6	0.993	0.751	1.744	2.32	35.873	1.248	0.497
11	0.0525	45.410	45.4	0.9	1.071	0.671	1.742	2.60	36.430	1.207	0.536
12	0.0760	48.843	48.8	1.3	1.148	0.590	1.737	2.95	36.996	1.163	0.574
13	0.1072	52.304	52.3	1.8	1.222	0.529	1.751	3.31	37.417	1.140	0.611
14	0.1572	55.176	55.2	2.7	1.278	0.473	1.751	3.70	37.804	1.112	0.639
15	0.2073	57.278	57.3	3.6	1.315	0.446	1.761	3.95	37.991	1.104	0.658
16	0.2573	59.870	59.9	4.4	1.362	0.431	1.793	4.16	38.099	1.112	0.681
17	0.3073	61.762	61.8	5.3	1.393	0.429	1.822	4.25	38.112	1.125	0.696
18	0.3605	63.925	63.9	6.2	1.428	0.432	1.860	4.30	38.087	1.146	0.714
19	0.3762	64.644	64.6	6.5	1.440	0.433	1.872	4.33	38.084	1.153	0.720

Parameters for Specimen No. 2

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	95.440			134.920
Moisture content: Dry soil+tare, gms.	83.690			108.470
Moisture content: Tare, gms.	57.550			47.450
Moisture, %	45.0	43.3	43.3	43.3
Moist specimen weight, gms.	1022.41			
Diameter, in.	2.775	2.775	2.775	
Area, in.^{2}	6.048	6.048	6.048	
Height, in.	5.816	5.816	5.816	
Net decrease in height, in.		0.000	0.000	
Net decrease in water volume, cc.			0.000	
Wet density, pcf	110.7	109.5	109.5	
Dry density, pcf	76.4	76.4	76.4	
Void ratio	1.2473	1.2473	1.2473	
Saturation, %	99.1	95.6	95.6	

Test Readings for Specimen No. 2

Consolidation cell pressure = 55.200 psi (7.949 ksf)

Consolidation back pressure = 30.000 psi (4.320 ksf)

Consolidation effective confining stress = 3.629 ksf

Strain rate, in./min. = 0.001

Fail. Stress = 2.376 ksf **at reading no.** 20

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	7.949	7.949	1.00	0.000	7.949	0.000
1	0.0011	2.301	2.3	0.0	0.055	3.463	3.518	1.02	31.152	3.490	0.027
2	0.0042	13.948	13.9	0.1	0.332	2.905	3.237	1.11	35.026	3.071	0.166
3	0.0074	23.075	23.1	0.1	0.549	2.637	3.186	1.21	36.888	2.911	0.274
4	0.0105	30.858	30.9	0.2	0.733	2.447	3.180	1.30	38.206	2.814	0.367
5	0.0136	37.521	37.5	0.2	0.891	2.293	3.184	1.39	39.278	2.738	0.446
6	0.0183	44.215	44.2	0.3	1.049	2.121	3.171	1.49	40.470	2.646	0.525
7	0.0230	50.710	50.7	0.4	1.203	1.981	3.184	1.61	41.441	2.583	0.601
8	0.0293	56.637	56.6	0.5	1.342	1.839	3.181	1.73	42.430	2.510	0.671
9	0.0355	62.027	62.0	0.6	1.468	1.728	3.196	1.85	43.200	2.462	0.734
10	0.0449	67.866	67.9	0.8	1.603	1.595	3.198	2.01	44.127	2.396	0.802
11	0.0558	73.398	73.4	1.0	1.731	1.478	3.209	2.17	44.935	2.344	0.865
12	0.0699	79.419	79.4	1.2	1.868	1.366	3.234	2.37	45.712	2.300	0.934
13	0.0887	84.856	84.9	1.5	1.990	1.262	3.252	2.58	46.435	2.257	0.995
14	0.1137	90.374	90.4	2.0	2.110	1.169	3.279	2.80	47.082	2.224	1.055
15	0.1512	96.102	96.1	2.6	2.229	1.085	3.313	3.05	47.668	2.199	1.114
16	0.2012	99.346	99.3	3.5	2.284	1.019	3.303	3.24	48.121	2.161	1.142
17	0.2513	102.005	102.0	4.3	2.324	0.985	3.309	3.36	48.360	2.147	1.162
18	0.2888	102.860	102.9	5.0	2.327	0.962	3.289	3.42	48.521	2.125	1.164
19	0.3450	105.956	106.0	5.9	2.373	0.950	3.323	3.50	48.605	2.136	1.187
20	0.3763	106.699	106.7	6.5	2.376	0.947	3.323	3.51	48.625	2.135	1.188

Parameters for Specimen No. 3

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	95.440			134.920
Moisture content: Dry soil+tare, gms.	83.690			108.470
Moisture content: Tare, gms.	57.550			47.450
Moisture, %	45.0	43.3	43.3	43.3
Moist specimen weight, gms.	1022.41			
Diameter, in.	2.775	2.775	2.775	
Area, in.^{2}	6.048	6.048	6.048	
Height, in.	5.816	5.816	5.816	
Net decrease in height, in.		0.000	0.000	
Net decrease in water volume, cc.			0.000	
Wet density, pcf	110.7	109.5	109.5	
Dry density, pcf	76.4	76.4	76.4	
Void ratio	1.2473	1.2473	1.2473	
Saturation, %	99.1	95.6	95.6	

Test Readings for Specimen No. 3

Consolidation cell pressure = 70.010 psi (10.081 ksf)

Consolidation back pressure = 30.000 psi (4.320 ksf)

Consolidation effective confining stress = 5.761 ksf

Strain rate, in./min. = 0.001

Fail. Stress = 3.519 ksf **at reading no.** 18

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	10.081	10.081	1.00	0.000	10.081	0.000
1	0.0010	2.697	2.7	0.0	0.064	5.758	5.822	1.01	30.027	5.790	0.032
2	0.0042	11.328	11.3	0.1	0.270	4.942	5.212	1.05	35.689	5.077	0.135
3	0.0057	19.245	19.2	0.1	0.458	4.655	5.113	1.10	37.685	4.884	0.229
4	0.0073	27.409	27.4	0.1	0.652	4.424	5.076	1.15	39.288	4.750	0.326
5	0.0104	41.466	41.5	0.2	0.986	4.052	5.038	1.24	41.870	4.545	0.493
6	0.0136	53.388	53.4	0.2	1.268	3.772	5.040	1.34	43.814	4.406	0.634
7	0.0167	62.498	62.5	0.3	1.484	3.557	5.041	1.42	45.310	4.299	0.742
8	0.0198	70.571	70.6	0.3	1.675	3.369	5.044	1.50	46.612	4.207	0.837
9	0.0245	80.600	80.6	0.4	1.911	3.148	5.059	1.61	48.150	4.103	0.955
10	0.0292	88.642	88.6	0.5	2.100	2.973	5.073	1.71	49.367	4.023	1.050
11	0.0355	98.006	98.0	0.6	2.319	2.788	5.108	1.83	50.646	3.948	1.160
12	0.0433	106.876	106.9	0.7	2.526	2.606	5.132	1.97	51.911	3.869	1.263
13	0.0527	115.513	115.5	0.9	2.725	2.436	5.161	2.12	53.094	3.799	1.363
14	0.0699	126.827	126.8	1.2	2.983	2.223	5.206	2.34	54.574	3.714	1.492
15	0.0886	134.774	134.8	1.5	3.160	2.076	5.236	2.52	55.591	3.656	1.580
16	0.1199	143.597	143.6	2.1	3.348	1.931	5.279	2.73	56.602	3.605	1.674
17	0.1699	149.409	149.4	2.9	3.453	1.797	5.251	2.92	57.528	3.524	1.727
18	0.2199	153.613	153.6	3.8	3.519	1.739	5.258	3.02	57.937	3.498	1.760
19	0.2700	154.576	154.6	4.6	3.510	1.715	5.225	3.05	58.097	3.470	1.755
20	0.3294	155.725	155.7	5.7	3.498	1.688	5.186	3.07	58.289	3.437	1.749
21	0.3919	156.289	156.3	6.7	3.470	1.673	5.144	3.07	58.389	3.409	1.735
22	0.4544	157.698	157.7	7.8	3.461	1.658	5.119	3.09	58.498	3.388	1.731
23	0.4700	158.050	158.0	8.1	3.459	1.665	5.124	3.08	58.445	3.395	1.729
24	0.4857	157.712	157.7	8.4	3.441	1.658	5.100	3.08	58.496	3.379	1.721

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-B2	22.5-24			39				99	98	95	80	10	1	89	6	4		SP-SM*	27																						
	24.5-26			59														SP-SM**	25																						
	26.5-28			7	40	18	22	100	100	100	94	41	0	59	18	23		SC	46																						
	28.5-30			25														SP-SM**	35																						
	30.5-32			54														SP-SM**	25																						
	32.5-34			60														SP-SM**	24																						
	34.5-36			50/5"				100	100	100	95	8	0	92	5	3		SP-SM*	25																						
	36.5-38			35														SP-SM**	26																						
	38.5-40			33														SP-SM**	26																						
	40.5-42			13														SP-SM**	35																						
	42.5-44			26														SP-SM**	31																						
	44.5-46			24														SP-SM**	27																						
	46.5-48			7				100	100	99	90	33	0	67	13	20		SC*	42																						
	48.5-50			14														SC**	37																						
	50.5-52			8														CL**	52																						
	54-56	0.00	0.15		28	13	15	100	100	99	77	53	0	47	28	25		CL																	0.20	15	0.33	27	39	83	CL**
	56-58	0.00	0.15															CH**	57																						
	58-60	0.00	0.15															CH**	60																						
	62.5-64			12														CH**	59																						
	64-66	0.75																CH**	57																						
	66-68	0.00	0.20															CH**	43																						
	68-70	0.25	0.15		84	24	60	100	100	100	99	92	0	8	36	56		CH			0.03	25	44	74	CH**																
	70-72	1.25																CH**	46	71																					
	72-74	1.25																CL**	25																						
	74-76	0.00																CL**	32																						
	76-78	0.50																CL**	26	101																					
10-B3	0-2	4.50			55	20	35	100	100	92	78	24	0	76	8	16		SC	15																						
	2-4																	SP-SM**	10																						
	4-6	1.00																SP-SM**	30																						
	6-8	1.50			65	21	44	100	100	97	97	93	0	7	38	55		CH												1.55	20	107	CH**							
	8-10	1.00																CH**	25	95																					
	10.5-12			18														SM**	21																						
	12.5-14			21														SM**	25																						
	14.5-16			32				100	100	99	78	13	0	87	8	5		SM*	23																						
	16.5-18			36														SM**	23																						
	18.5-20			8														SC**	29																						
	20.5-22			2														SC**	35																						
	22.5-24			1				100	100	100	90	19	0	81	12	7		SC*	27																						
	24.5-26			4														SC**	30																						
	26.5-28			0														CH**	34																						
	28-30	1.50			97	33	64	100	100	100	99	98	0	2	32	66		CH																						
	30.5-32			25														SP-SM**	29																						
	32.5-34			40														SP-SM**	25																						
	34.5-36			24														SP-SM**	27																						
	36.5-38			28														SP-SM**	19																						
	38.5-40			30				100	100	100	94	8	0	92	5	3		SP-SM*	26																						
	40.5-42			33														SP-SM**	26																						
	42.5-44			24														SP-SM**	25																						
	44.5-46			2														CH**	52																						
	46.5-48			6														CH**	54																						

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	
	48.5-50			22				100	100	100	90	29	0	71	10	19		SC*	39																					
	50.5-52			9														SC**	45																					
	52.5-54			3														SC**	49																					
	54-56	0.00	0.15		50	18	32	100	100	100	96	49	0	51	16	33		SC	36																					
	56-58	0.50	0.20															SC**	54																					
	58-60	0.50	0.25		60	21	39	100	100	99	92	41	0	59	12	29		SC																0.25	12	0.25	26	45	76	SC**
	60-62	0.25	0.15															SC**	40																					
	62-64	0.00	0.10															SC**	26																					
	64-66	0.75			73	25	48	98	94	82	81	78	2	21	33	44		CH			0.85	16	49	70	CH**															
	66-68	0.00	0.30															CH**	47																					
	68-70	0.25	0.20															CH**	53	70																				
	70-72	0.00	0.25		44	26	18	100	100	100	93	74	0	26	44	30		CL	28																					
	72-74	2.00																CH**	30																					
	74-76	0.00	0.15		57	20	37	100	100	100	97	56	0	44	19	37		CH	48	73																				
	76-78	4.50																CL**	19																					
	78-80	2.00																CL**	22																					
10-B4	0-2	4.50																SC**	14																					
	2-4	1.50																CH**	41																					
	4-6	0.50																CH**	32																					
	6-7	0.00	0.25		99	31	68	100	100	100	100	100	0	0	51	49		CH	70																					
	7-8	0.00	0.35		76	24	52	100	100	100	97	63	0	37	22	41		CH																						
	8-10	0.00	0.25															CH**	55	66																				
	10-12	0.00	0.30		93	27	66	100	100	100	99	95	0	5	28	67		CH												0.38	55	69	CH**							
	12-14	0.00	0.40															CH**	46																					
	14-16	0.00	0.35		94	29	65	100	100	100	99	94	0	5	31	64		CH								0.35	55	67	CH**											
	16-18	0.00	0.35															CH**	65																					
	18-20	0.25	0.40															CH**	64																					
	20-22	0.00	0.40		127	34	93	100	100	100	100	98	0	2	25	73		CH																0.38	6	0.29	15	64	64	CH**
	22.5-24			38														SP-SM**	25																					
	24.5-26			52				100	100	91	75	10	0	90	5	5		SP-SM*	18																					
	26.5-28			38														SP-SM**	25																					
	28.5-30			24														SP-SM**	26																					
	30.5-32			23														SP-SM**	25																					
	32.5-34			24														SP-SM**	26																					
	34.5-36			23														SP-SM**	27																					
	36-38							100	99	98	84	12	0	88	5	7		SP-SM*	30																					
	38.5-40			10														GP-GM**	23																					
	40.5-42			8														GP-GM**	23																					
	42.5-44			42														SP-SM**	23																					
	44.5-46			55														SP-SM**	24																					
	46.5-48			5														CL**	35																					
	48.5-50			36														SP-SM**	23																					
	50.5-52			52														CL**	43																					
	52.5-54			2	35	16	19	100	100	99	93	60	0	40	27	33		CL	40																					
	54.5-56			7														SC**	25																					
	56-58																	SC**	30																					
	58-60																	SC**	34																					
	60-62	0.00	0.15															CH**	43																					
	62-64	0.25	0.25		64	22	42	100	100	94	92	89	0	11	40	49		CH	43	75																				
	64-66	0.25	0.40															CH**	54																					