BORING LOG NO. 10-B17

CLIENT:	USACE, Galveston District Galveston, Texas	PROJECT:	Galveston Channel Deepening, TO-0010
BORING LOCATION:	N: 136887121.3 E: 3317681.82	SITE:	San Jacinto Placement Area Galveston, Texas

Approx. Surface Elevation: 11.4 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: FAT CLAY brownish gray, dark bluish gray, soft to very soft	1	CH	ST	8		0.5		56	67	101	33	68				
		3		ST	18		0.0	0.2	56								
		5		ST	21		0.0	0.2			81	27	54				
		7		ST	21		0.0	0.15	83								
		9		ST	19		0.0	0.1	87								
		11		ST	21		0.0	0.1	93	47	123	35	88	100			
		13		ST	5		0.0	0.1	62								
	-3.6 15.0	15															
	POORLY GRADED SAND w/ SILT dark bluish gray, fine, some cohesion, loose to medium dense	15	SP-SM	SS	16	0			50								
		17		SS	17	22			26					5			
	-8.6 20.0	19		SS	11	10			34								
	Boring terminated at 20 feet.	20															

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

REMARKS: **Dry auger to 4 feet; wet rotary thereafter.**

WATER LEVEL OBSERVATIONS			
▽ **4 ft**	WS	▼ **1.5 ft**	at 5 min
▼ **1.5 ft**	at 10 min	▼ **1.5 ft**	at 15 min

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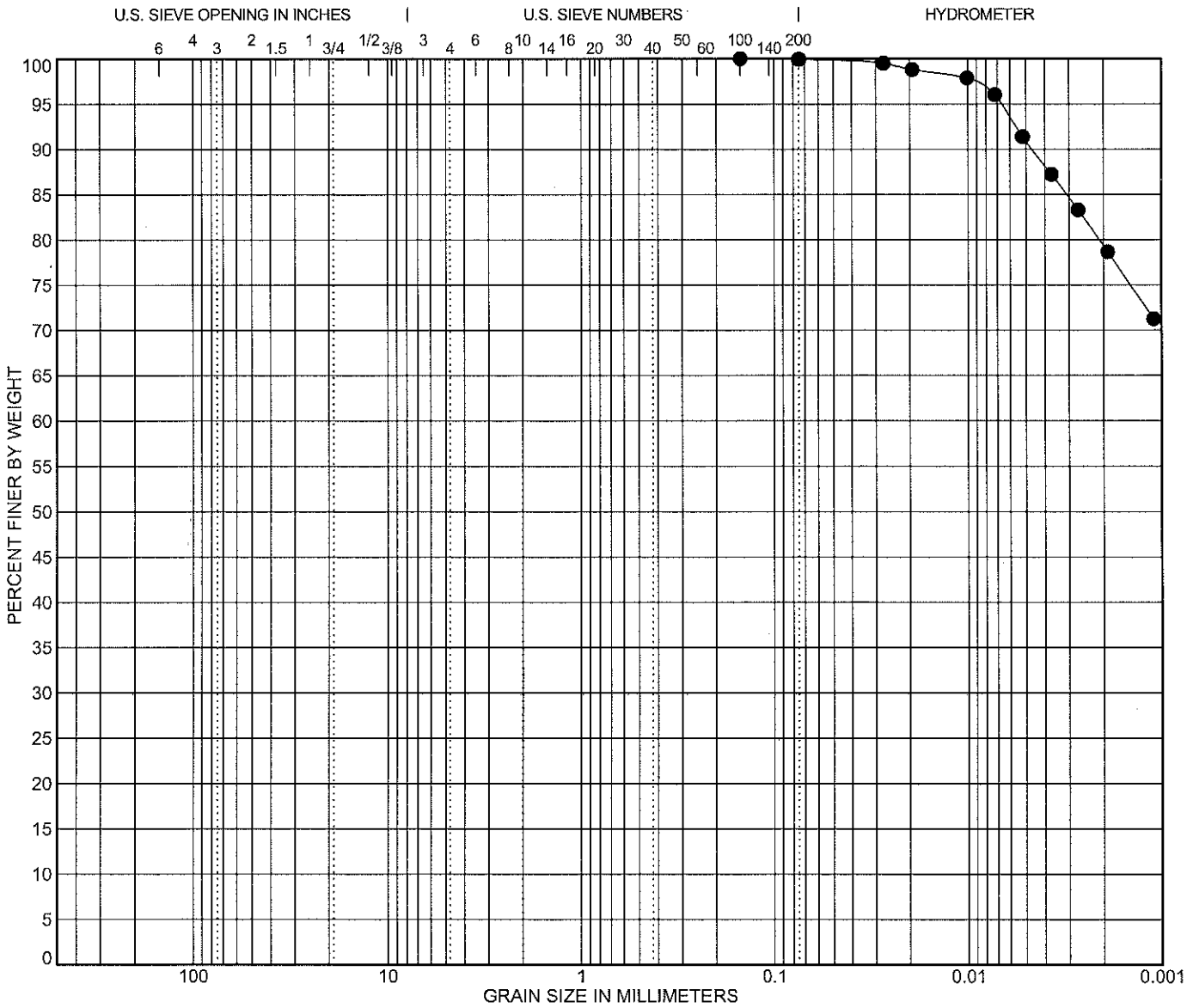
DATE DRILLED	Page 1 of 1
4/14/2010	10-B17
PROJECT NUMBER 92105154	EXHIBIT A-17



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**10-B17**	**10.0**	**FAT CLAY(CH)**	**123**	**35**	**88**		

Percent Passing the Indicated Sieve

	Specimen Identification		3/8"	#4	#10	#40	#100	#200
●	**10-B17**	**10.0**					**100**	**99.9**

	Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**10-B17**	**10.0**	**0.15**				**0.0**	**0.1**	**20.6**	**79.3**

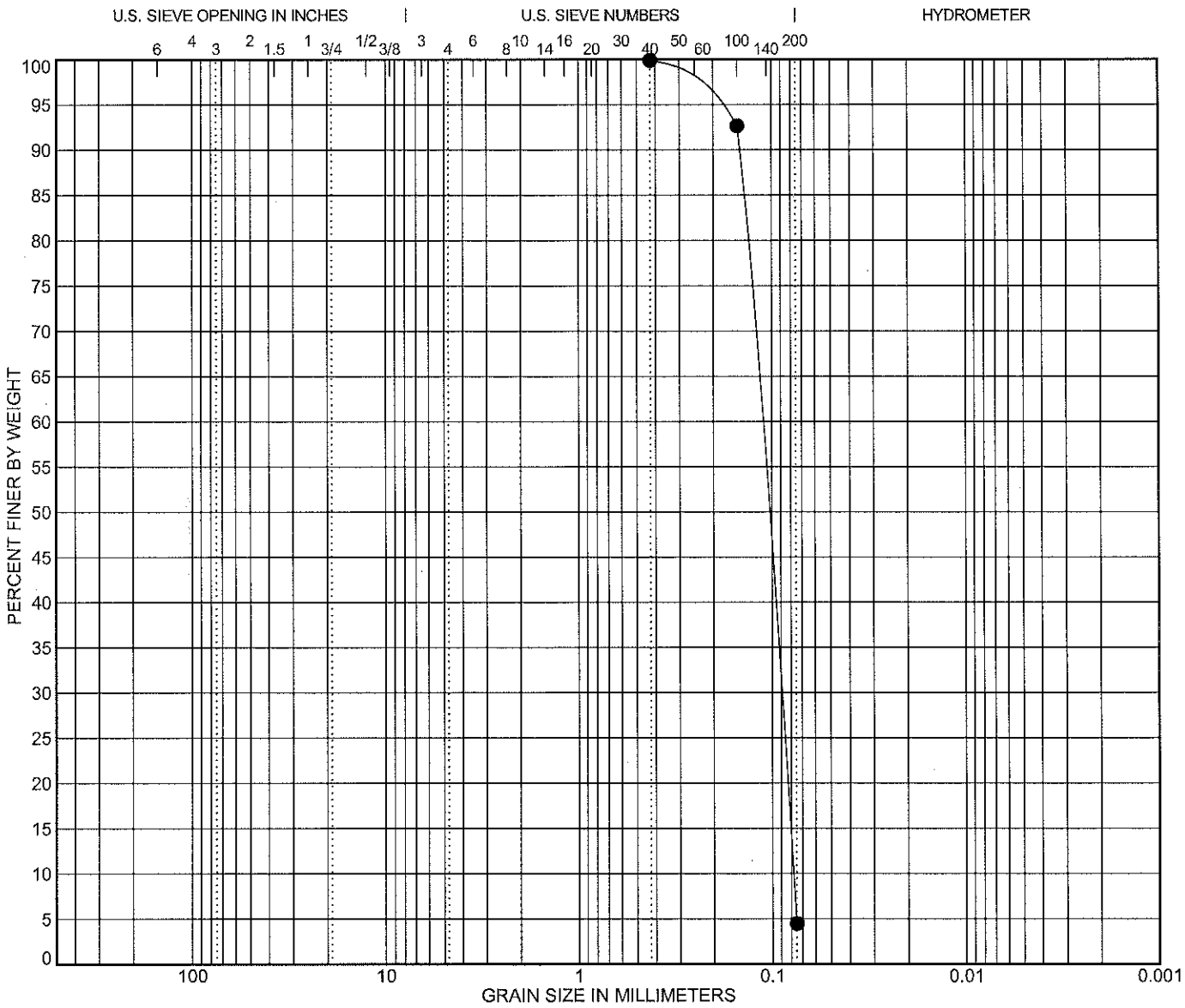
GRAIN SIZE DISTRIBUTION

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-B17, 10.0



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	LL	PL	PI	Cc	Cu
● 10-B17	16.5	**POORLY GRADED SAND(SP)**				**0.92**	**1.48**

Percent Passing the Indicated Sieve

Specimen Identification		3/8"	#4	#10	#40	#100	#200
● 10-B17	16.5				**99.9**	**92.6**	**4.5**

Specimen Identification		D100	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
● 10-B17	16.5	**0.425**	**0.107**	**0.092**	**0.078**	**0.0**	**95.4**	**4.5**	

GRAIN SIZE DISTRIBUTION

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TO-0010
Galveston, Texas
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Houston, Texas 77043
Telephone: 713-690-8989
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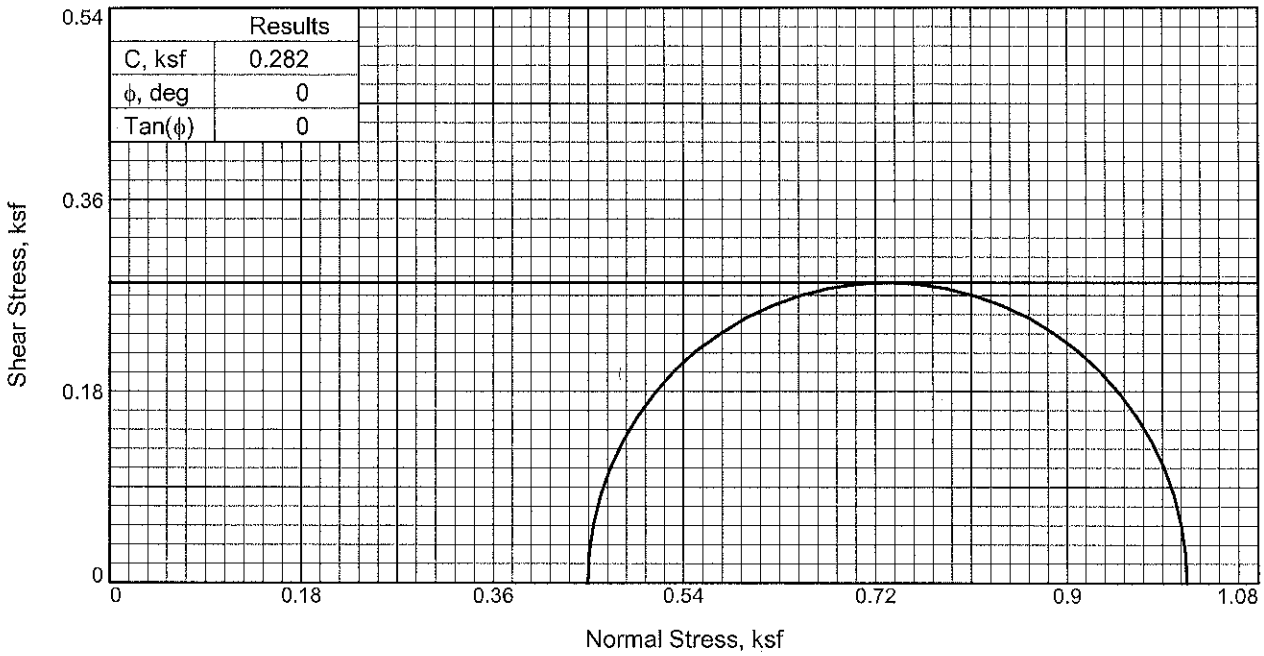
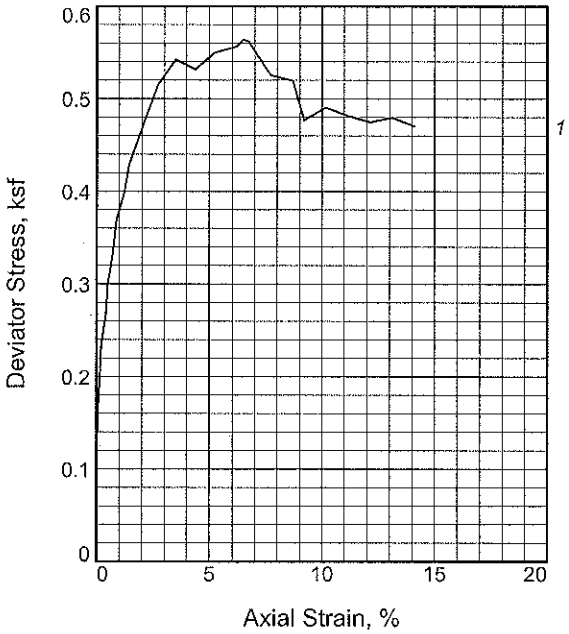
SPECIMEN ID
10-B17, 16.5





Sample No.		1
Initial	Water Content, %	76.1
	Dry Density, pcf	54.0
	Saturation, %	96.0
	Void Ratio	2.1787
	Diameter, in.	2.852
	Height, in.	6.000
At Test	Water Content, %	76.1
	Dry Density, pcf	54.0
	Saturation, %	96.0
	Void Ratio	2.1787
	Diameter, in.	2.852
	Height, in.	6.000
Strain rate, in./min.		1.000
Back Pressure, psi		0.000
Cell Pressure, psi		3.120
Fail. Stress, ksf		0.564
Ult. Stress, ksf		
σ_1 Failure, ksf		1.013
σ_3 Failure, ksf		0.449

Type of Test:
Unconsolidated Undrained
Sample Type: undisturbed
Description: Gray Fat Clay

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-B17
Depth: 4-6 ft.
Proj. No.: 92105154 **Date Sampled:**

TRIAXIAL SHEAR TEST REPORT
Terracon, Inc.
Houston, TX

TRIAXIAL COMPRESSION TEST

Unconsolidated Undrained

7/20/2010
2:44 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-B17
Depth: 4-6 ft.
Description: Gray Fat Clay
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.	176.820	176.820
Moisture content: Dry soil+tare, gms.	126.670	126.670
Moisture content: Tare, gms.	60.730	60.730
Moisture, %	76.1	76.1
Moist specimen weight, gms.	956.69	
Diameter, in.	2.852	
Area, in.^{2}	6.388	
Height, in.	6.000	
Wet density, pcf	95.1	
Dry density, pcf	54.0	
Void ratio	2.1787	
Saturation, %	96.0	

Test Readings for Specimen No. 1

Cell pressure = 3.120 psi (0.449 ksf)
Back pressure = 0.000 psi (0.000 ksf)
Strain rate, in./min. = 1.000
Fail. Stress = 0.564 ksf **at reading no.** 18

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	0.449	0.449	1.00	0.449	0.000
1	0.0000	2.220	2.2	0.0	0.050	0.449	0.499	1.11	0.474	0.025
2	0.0016	4.001	4.0	0.0	0.090	0.449	0.539	1.20	0.494	0.045
3	0.0028	6.936	6.9	0.0	0.156	0.449	0.606	1.35	0.527	0.078
4	0.0078	8.463	8.5	0.1	0.191	0.449	0.640	1.42	0.545	0.095
5	0.0122	10.375	10.4	0.2	0.233	0.449	0.683	1.52	0.566	0.117
6	0.0247	11.927	11.9	0.4	0.268	0.449	0.717	1.60	0.583	0.134
7	0.0297	13.268	13.3	0.5	0.298	0.449	0.747	1.66	0.598	0.149
8	0.0435	14.975	15.0	0.7	0.335	0.449	0.784	1.75	0.617	0.168
9	0.0523	16.489	16.5	0.9	0.368	0.449	0.818	1.82	0.633	0.184
10	0.0734	17.911	17.9	1.2	0.399	0.449	0.848	1.89	0.649	0.199
11	0.0853	19.290	19.3	1.4	0.429	0.449	0.878	1.95	0.664	0.214
12	0.1273	21.614	21.6	2.1	0.477	0.449	0.926	2.06	0.688	0.238
13	0.1631	23.493	23.5	2.7	0.515	0.449	0.964	2.15	0.707	0.258
14	0.2106	24.933	24.9	3.5	0.542	0.449	0.992	2.21	0.720	0.271
15	0.2639	24.673	24.7	4.4	0.532	0.449	0.981	2.18	0.715	0.266
16	0.3147	25.756	25.8	5.2	0.550	0.449	0.999	2.22	0.724	0.275
17	0.3737	26.345	26.3	6.2	0.557	0.449	1.006	2.24	0.728	0.278
18	0.3882	26.753	26.8	6.5	0.564	0.449	1.013	2.26	0.731	0.282
19	0.4033	26.733	26.7	6.7	0.562	0.449	1.011	2.25	0.730	0.281
20	0.4627	25.259	25.3	7.7	0.525	0.449	0.975	2.17	0.712	0.263
21	0.5217	25.244	25.2	8.7	0.520	0.449	0.969	2.16	0.709	0.260
22	0.5512	23.299	23.3	9.2	0.477	0.449	0.926	2.06	0.688	0.238
23	0.6102	24.228	24.2	10.2	0.491	0.449	0.940	2.09	0.695	0.245
24	0.6691	24.056	24.1	11.2	0.482	0.449	0.931	2.07	0.690	0.241
25	0.7282	23.976	24.0	12.1	0.475	0.449	0.924	2.06	0.687	0.237
26	0.7872	24.482	24.5	13.1	0.479	0.449	0.929	2.07	0.689	0.240
27	0.8462	24.295	24.3	14.1	0.470	0.449	0.920	2.05	0.684	0.235

SUMMARY TABLE OF LABORATORY TEST DATA

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

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