



Aptim Environmental & Infrastructure, LLC

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Legend for Geotechnical Data

Grain Size Scale for Sediments

Unified Soil Classification System (USCS) (ASTM D2487/2488)		APTIM Standard Sieve Stack		
		Sieve Number	Size (phi)	Size (mm)
Gravel	Coarse Gravel	3/4	-4.25	19.03
	Fine Gravel	5/8	-4.00	16.00
		7/16	-3.50	11.20
		5/16	-3.00	8.00
		3 1/2	-2.50	5.60
		4	-2.25	4.75
Sand	Coarse Sand	5	-2.00	4.00
		7	-1.50	2.80
		10	-1.00	2.00
	Medium Sand	14	-0.50	1.40
		18	0.00	1.00
		25	0.50	0.71
		35	1.00	0.50
	Fine Sand	45	1.50	0.36
		60	2.00	0.25
		80	2.50	0.18
		120	3.00	0.13
		170	3.50	0.09
		200	3.75	0.08
Fines	Silt/Clay	230	4.00	0.06

Proportional Definition of Descriptive Terms

<u>Descriptive Term</u>	<u>Range of Proportions</u>
Sandy, gravelly, etc.	35 % to 50 %
Some	20 % to 35 %
Little	10 % to 20 %
Trace	1 % to 10 %

Consistency of Cohesive Soils

Description	Consistency Index	Approximate Undrained Shear Strength (kPa)	Field Identification
Hard		Over 300	Indented with difficulty by thumbnail, brittle.
Very Stiff	>1	150-300	Readily indented by thumbnail, still very tough.
Stiff	0.75-1	75-150	Readily indented by thumb but penetrated only with difficulty. Cannot be moulded in the fingers.
Firm	0.5-0.75	40-75	Can be penetrated several centimeters by thumb with moderate effort and moulded in fingers by strong pressure.
Soft	< 0.5	20-40	Easily penetrated several centimeters by thumb, easily moulded.
Very Soft		Less than 20	Easily penetrated several centimeters by fist, exudes between fingers when squeezed in fist.

Source: *Engineering Properties of Soils and Rocks, Fourth Edition by Fred G. Bell*

USCS Classifications

Refers to the Army Corps of Engineers Unified Soils Classification System. Class types are defined primarily by grain size, sorting and percent of material passing the #200 sieve. Classification of materials on the core logs based on visual field examinations are identified on the core logs under the Classification of Materials Description. Classifications based on laboratory sieve analyses are identified on the core logs in the Legend and under Remarks.

GW		Well graded gravels or gravel-sand mixtures, little or no fines
GP		Poorly graded gravels or gravel-sand mixtures, w/ little or no fines
GM		Silty gravels, gravel-sand-silt mixtures
GC		Clayey gravels, gravel-sand-clay mixtures
SW		Well graded sands or gravelly sands, little or no fines
SP		Poorly graded sands or gravelly sands, little or no fines
SM		Silty sands, sand-silt mixtures
SC		Clayey sands, sand-clay mixtures
SW-SM		Well-graded silty sand
GW-GM		Well-graded silty gravel
GM-GC		Clayey silty gravel
ML		Inorganic silts and very fine sands, rock flour, sandy silts or clayey silts with slight plasticity
MH		Inorganic silts, micaceous or diatomaceous fine sandy or silty soil, elastic silts
OL		Organic silts and organic silt-clays of low plasticity
OH		Organic clays of medium to high plasticity, organic silts
CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
CH		Inorganic clays of high plasticity, fat clays
PT		Peat and other highly organic soils
SP-SM		Poorly-graded silty sand
SM-SC		Silty clayey sand
ML-CL		Inorganic silty lean clay

Note: Information is after ACOE Atlantic Division Manual # 1110-1-1 titled *Engineering and Design Geotechnical Manual for Surface and Subsurface Investigations*

DRILLING LOG		DIVISION		INSTALLATION		SHEET 1 OF 1 SHEETS	
1. PROJECT TX GLO Region 1 Recon Geotechnical Sand Search Jefferson, Chambers, Galveston and Brazoria Co. 				9. SIZE AND TYPE OF BIT 3.0 In.			
2. BORING DESIGNATION TXGLO1-VC-23-052				10. COORDINATE SYSTEM/DATUM Texas State Plane South		HORIZONTAL NAD 1983	
3. DRILLING AGENCY APTIM				11. MANUFACTURER'S DESIGNATION OF DRILL APTIM SEAS VC-700 Vibracore		VERTICAL NAVD88	
4. NAME OF DRILLER APTIM				12. TOTAL SAMPLES 3			
5. DIRECTION OF BORING ☒ VERTICAL ☐ INCLINED				13. TOTAL NUMBER CORE BOXES			
6. THICKNESS OF OVERBURDEN 0.0 Ft.				14. ELEVATION GROUND WATER			
7. DEPTH DRILLED INTO ROCK 0.0 Ft.				15. DATE BORING 10-10-23			
8. TOTAL DEPTH OF BORING 16.9 Ft.				16. ELEVATION TOP OF BORING -20.8 Ft.			
				17. TOTAL RECOVERY FOR BORING 16.7 Ft.			
				18. SIGNATURE AND TITLE OF INSPECTOR BF			
ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS The USCS classification system defines silt as the percent passing the No.200 (0.075 mm) sieve	
-20.8	0.0						
-22.9	2.1		LEAN CLAY, very soft, trace sand, fine grained, quartz, trace shell hash, sand distributed in laminae, dark gray (5Y-4/1), (CL).		T1	Sample #T1, Depth = 1.0' Ave. Field Vane (tsf): 0.00	
-23.5	2.7		SAND, fine grained, quartz, trace shell hash, trace silt, very dark gray (5Y-3/1), (SP).				
-24.9	4.1		LEAN CLAY, very soft, trace shell hash, 1.5" shell hash pockets @ 3.2' and 3.5', dark gray (N-4/0), (CL).		T2	Sample #T2, Depth = 3.0' Ave. Field Vane (tsf): 0.00	
-27.6	6.8		SAND, fine grained, quartz, trace clay, trace silt, clay distributed in pockets up to 1.0", clay decreases with depth in layer, color is mottled dark gray (N-4/0) and dark greenish gray (10Y-4/1), (SM).		1	Sample #1, Depth = 5.6' Mean (mm): 0.18, Phi Sorting: 0.47 Fines (230): 14.83% Fines (200): 15.93% (SM)	
-29.8	9.0		SAND, fine grained, quartz, trace clay, trace silt, silt distributed in pockets up to 0.5", 1.5" clay pocket @ 7.1', 0.5" clay pocket @ 7.5', light brownish gray (10YR-6/2), (SP).		2	Sample #2, Depth = 8.0' Mean (mm): 0.17, Phi Sorting: 0.32 Fines (230): 3.48% Fines (200): 3.70% (SP)	
-30.8	10.0		SAND, fine grained, quartz, trace clay, trace shell hash, trace silt, oxidation throughout layer, (1.5" x 3.0") clay pocket @ 9.1', brown (7.5YR-4/4), (SP-SM).		3	Sample #3, Depth = 9.5' Mean (mm): 0.20, Phi Sorting: 0.30 Fines (230): 7.60% Fines (200): 7.72% (SP-SM)	
-34.8	14.0		FAT CLAY, hard, oxidation throughout layer, color is mottled yellowish brown (10YR-5/6) and gray (5Y-5/1), (CH).		T3	Sample #T3, Depth = 11.5' Ave. Field Vane (tsf): 0.77	
-36.2	15.4		FAT CLAY, hard, color is mottled greenish gray (10Y-5/1), very dark gray (5YR-3/1) and brown (7.5YR-4/4), (CH).		T4	Sample #T4, Depth = 14.6' Ave. Field Vane (tsf): 0.82	
-37.5	16.7		FAT CLAY, hard, Bit sample from 16.2' to 16.7', brown (7.5YR-4/4), (CH).		T5	Sample #T5, Depth = 16.0' Ave. Field Vane (tsf): 0.92	
-37.7	16.9		No recovery.				
			End of Boring				

REGION 1 RECON GEOTECH GP-1 3/25/24



Texas General
Land Office

Texas GLO
Region 1
Geotechnical
Reconnaissance
Survey

TXGLO1-VC-23-052

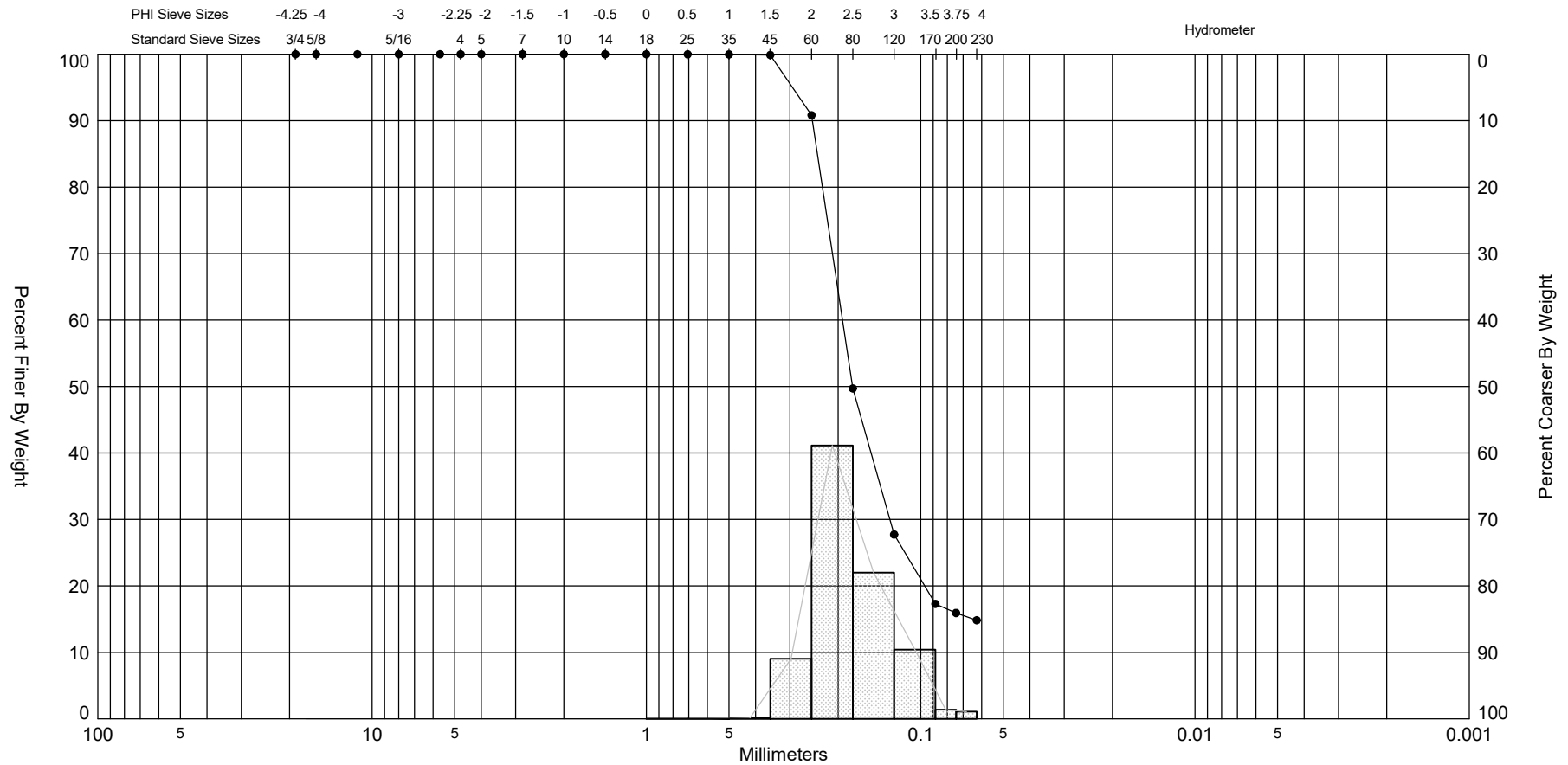
Date Collected: 10/10/23
Top Elev. (ft NAVD88): -20.8
Bottom Elev. (ft NAVD88): -37.5
Core Length (ft): 16.7

Granularmetric Report				 APTIM 6401 Congress Avenue, Suite 140 Boca Raton, FL 33487 ph (561) 391-8102			
Depths and elevations based on measured values							
Project Name: TX GLO Region 1 Recon Geotechnical Sand Search							
Sample Name: TXGLO1-VC-23-052 #1							
Analysis Date: 01-25-24							
Analyzed By: LH							
Easting (ft):		Northing (ft):		Coordinate System:		Elevation (ft):	
3,350,067		13,722,317		Texas State Plane South		-26.4 NAVD88	
USCS:		Munsell: Wet - 10YR-4/1 Dry - 2.5Y-7/2 Washed - 2.5Y-8/2		Comments:			
SM							
Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%): #200 - 15.93 #230 - 14.83	Organics (%):	Carbonates (%):	Shell Hash (%):
101.36	86.76	0.43	0.01				
Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained	
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00	
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00	
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00	
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00	
3.5	-2.50	5.66	0.00	0.00	0.00	0.00	
4	-2.25	4.76	0.00	0.00	0.00	0.00	
5	-2.00	4.00	0.00	0.00	0.00	0.00	
7	-1.50	2.83	0.00	0.00	0.00	0.00	
10	-1.00	2.00	0.00	0.00	0.00	0.00	
14	-0.50	1.41	0.00	0.00	0.00	0.00	
18	0.00	1.00	0.00	0.00	0.00	0.00	
25	0.50	0.71	0.01	0.01	0.01	0.01	
35	1.00	0.50	0.02	0.02	0.03	0.03	
45	1.50	0.35	0.09	0.09	0.12	0.12	
60	2.00	0.25	9.18	9.06	9.30	9.18	
80	2.50	0.18	41.67	41.11	50.97	50.29	
120	3.00	0.13	22.28	21.98	73.25	72.27	
170	3.50	0.09	10.57	10.43	83.82	82.70	
200	3.75	0.07	1.39	1.37	85.21	84.07	
230	4.00	0.06	1.11	1.10	86.32	85.17	
Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95	
	3.74	3.13	2.50	2.19	2.08	1.77	
Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis		
Statistics	2.49	0.18	0.47	0.59	3.17		

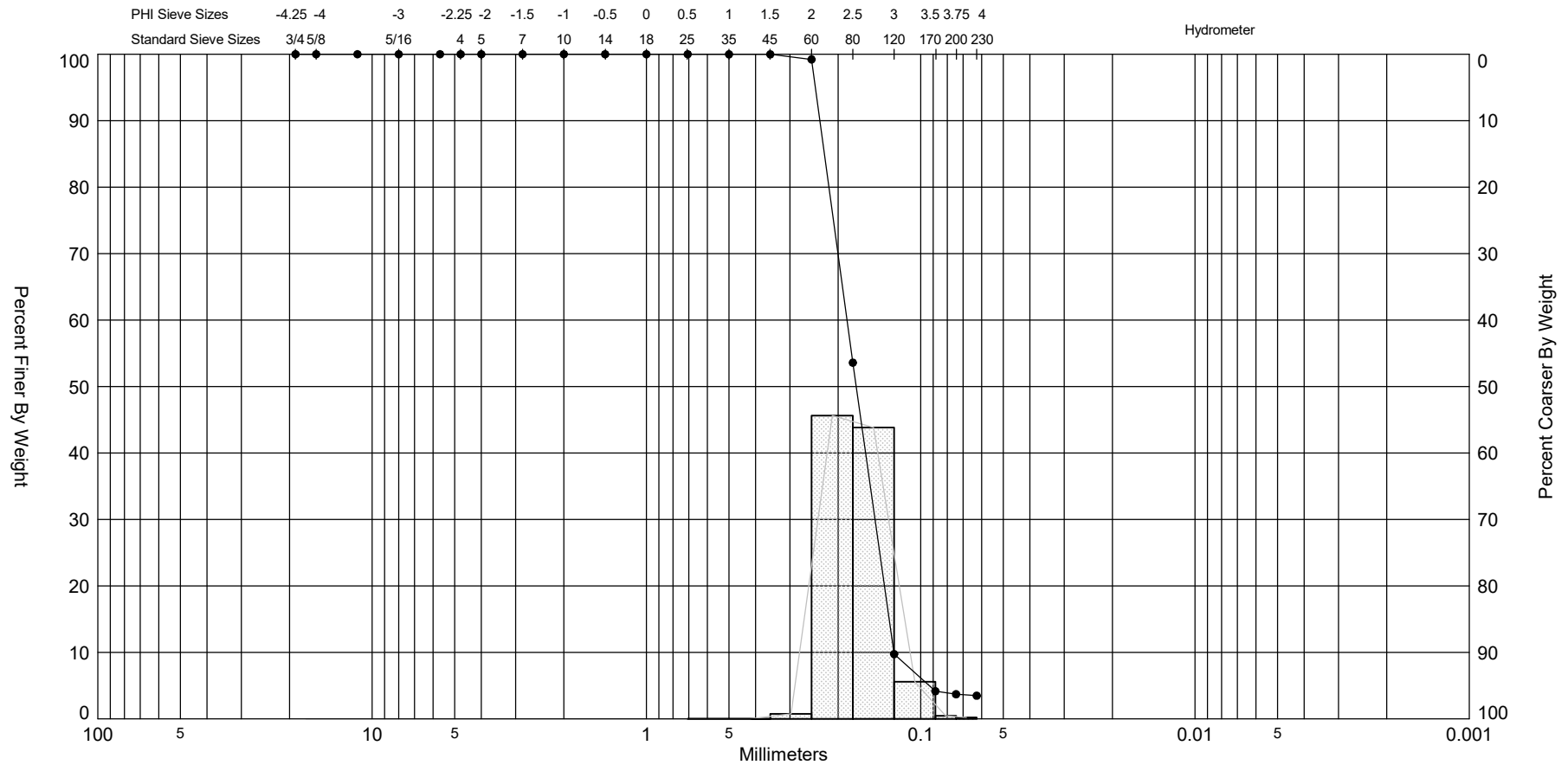
Granularmetric Report				 APTIM 6401 Congress Avenue, Suite 140 Boca Raton, FL 33487 ph (561) 391-8102			
Depths and elevations based on measured values							
Project Name: TX GLO Region 1 Recon Geotechnical Sand Search							
Sample Name: TXGLO1-VC-23-052 #2							
Analysis Date: 01-25-24							
Analyzed By: LH							
Easting (ft):		Northing (ft):		Coordinate System:		Elevation (ft):	
3,350,067		13,722,317		Texas State Plane South		-28.8 NAVD88	
USCS:		Munsell:		Comments:			
SP		Wet - 10YR-6/2 Dry - 10YR-7/2 Washed - 10YR-8/1					
Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
103.27	99.74	0.06	0.01	#200 - 3.70 #230 - 3.48			
Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained	
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00	
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00	
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00	
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00	
3.5	-2.50	5.66	0.00	0.00	0.00	0.00	
4	-2.25	4.76	0.00	0.00	0.00	0.00	
5	-2.00	4.00	0.00	0.00	0.00	0.00	
7	-1.50	2.83	0.00	0.00	0.00	0.00	
10	-1.00	2.00	0.00	0.00	0.00	0.00	
14	-0.50	1.41	0.00	0.00	0.00	0.00	
18	0.00	1.00	0.00	0.00	0.00	0.00	
25	0.50	0.71	0.00	0.00	0.00	0.00	
35	1.00	0.50	0.01	0.01	0.01	0.01	
45	1.50	0.35	0.01	0.01	0.02	0.02	
60	2.00	0.25	0.79	0.76	0.81	0.78	
80	2.50	0.18	47.12	45.63	47.93	46.41	
120	3.00	0.13	45.28	43.85	93.21	90.26	
170	3.50	0.09	5.76	5.58	98.97	95.84	
200	3.75	0.07	0.47	0.46	99.44	96.30	
230	4.00	0.06	0.23	0.22	99.67	96.52	
Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95	
3.42	2.93	2.83	2.54	2.27	2.17	2.05	
Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis		
Statistics	2.54	0.17	0.32	0.59	3.43		

Granularmetric Report Depths and elevations based on measured values				 APTIM 6401 Congress Avenue, Suite 140 Boca Raton, FL 33487 ph (561) 391-8102			
Project Name: TX GLO Region 1 Recon Geotechnical Sand Search							
Sample Name: TXGLO1-VC-23-052 #3							
Analysis Date: 01-25-24							
Analyzed By: LH							
Easting (ft): 3,350,067		Northing (ft): 13,722,317		Coordinate System: Texas State Plane South		Elevation (ft): -30.3 NAVD88	
USCS: SP-SM		Munsell: Wet - 7.5YR-4/4 Dry - 10YR-6/8 Washed - 10YR-8/3		Comments:			
Dry Weight (g): 99.52	Wash Weight (g): 92.00	Pan Retained (g): 0.04	Sieve Loss (%): 0.00	Fines (%): #200 - 7.72 #230 - 7.60	Organics (%):	Carbonates (%):	Shell Hash (%):
Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained	
3/4"	-4.25	19.03	0.00	0.00	0.00	0.00	
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00	
7/16"	-3.50	11.31	0.00	0.00	0.00	0.00	
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00	
3.5	-2.50	5.66	0.00	0.00	0.00	0.00	
4	-2.25	4.76	0.00	0.00	0.00	0.00	
5	-2.00	4.00	0.00	0.00	0.00	0.00	
7	-1.50	2.83	0.00	0.00	0.00	0.00	
10	-1.00	2.00	0.00	0.00	0.00	0.00	
14	-0.50	1.41	0.00	0.00	0.00	0.00	
18	0.00	1.00	0.00	0.00	0.00	0.00	
25	0.50	0.71	0.00	0.00	0.00	0.00	
35	1.00	0.50	0.01	0.01	0.01	0.01	
45	1.50	0.35	0.03	0.03	0.04	0.04	
60	2.00	0.25	6.11	6.14	6.15	6.18	
80	2.50	0.18	65.04	65.35	71.19	71.53	
120	3.00	0.13	17.99	18.08	89.18	89.61	
170	3.50	0.09	2.49	2.50	91.67	92.11	
200	3.75	0.07	0.17	0.17	91.84	92.28	
230	4.00	0.06	0.12	0.12	91.96	92.40	
Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95	
	2.84	2.60	2.34	2.14	2.08	1.90	
Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis		
Statistics	2.35	0.20	0.3	0.95	5.44		

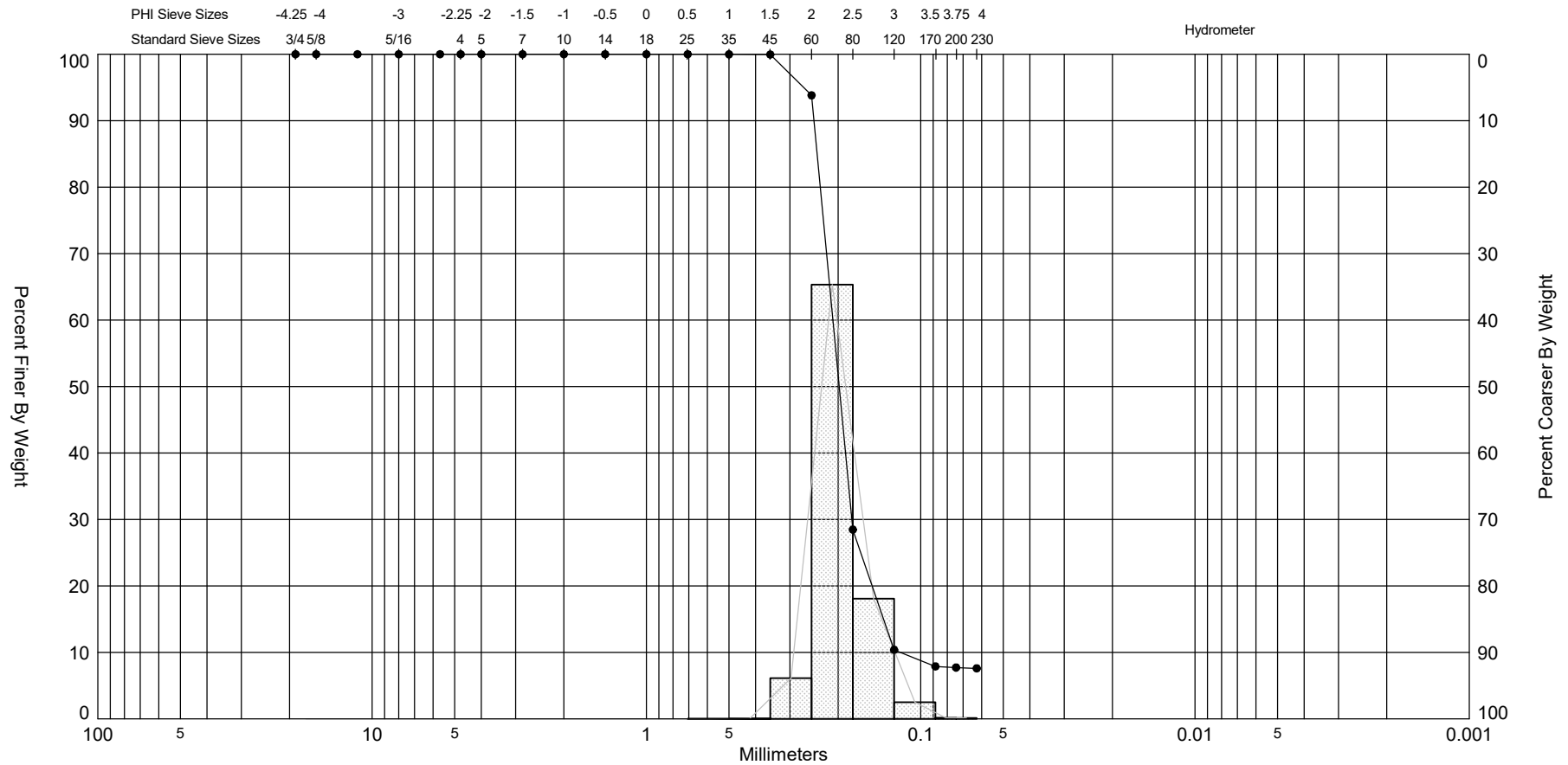
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REGION1_RECON_GEOTECH.GPJ 3/6/24



REGION1_RECON_GEOTECH.GPJ 3/6/24



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort	Sample Information	
TXGLO1-VC-23-052 #3	—●—	-30.3	SP-SM	#200 - 7.72 #230 - 7.60			2.34	2.35	0.95	5.44	0.3	Project Name:	TX GLO Region 1 Recon Geotechnical Sand Search
Comments:												Analysis Date:	01-25-24
Depths and elevations based on measured values												Analyzed By:	LH
						APTIM 6401 Congress Avenue, Suite 140 Boca Raton, FL 33487 ph (561) 391-8102						Easting (X, ft):	3,350,067
												Northing (Y, ft):	13,722,317
												Horizontal Datum:	NAD 1983
												Vertical Datum:	NAVD88



Mini Vane Shear Test Results

CORE ID	SAMPLE DEPTH (ft)	TORVANE (kg/cm ²)	TORVANE (tsf)	TORVANE (kpa)	DESCRIPTION ¹
TXGLO1-VC-23-048	2.2	2.8	0.28	269.68	Very Stiff
	4.8	1.5	0.15	147.10	Stiff
TXGLO1-VC-23-049	3.0	1.5	0.15	147.10	Stiff
	4.0	5.0	0.51	490.33	Hard
	5.1	1.5	0.15	147.10	Stiff
	9.4	6.5	0.67	637.43	Hard
	15.5	9.5	0.97	931.63	Hard
TXGLO1-VC-23-050	4.8	1.0	0.10	98.07	Stiff
	8.1	1.5	0.15	147.10	Stiff
	10.4	2.0	0.20	196.13	Very Stiff
	11.7	2.0	0.20	196.13	Very Stiff
	14.7	2.5	0.26	245.17	Very Stiff
TXGLO1-VC-23-051	1.0	1.0	0.10	98.07	Stiff
	1.8	1.5	0.15	147.10	Stiff
	3.1	3.5	0.36	343.23	Hard
	6.4	10.0	1.02	980.67	Hard
	11.0	10.0	1.02	980.67	Hard
TXGLO1-VC-23-052	1.0	0.0	0.00	0.00	Very Soft
	3.0	0.0	0.00	0.00	Very Soft
	11.5	7.5	0.77	735.50	Hard
	14.6	8.0	0.82	784.53	Hard
	16.0	9.0	0.92	882.60	Hard
TXGLO1-VC-23-053	0.5	0.0	0.00	0.00	Very Soft
	2.2	0.5	0.05	49.03	Firm
	18.0	2.5	0.26	245.17	Very Stiff
TXGLO1-VC-23-054	0.6	0.0	0.00	0.00	Very Soft
	2.2	0.0	0.00	0.00	Very Soft
	7.0	0.3	0.03	24.52	Soft
	13.7	1.0	0.10	98.07	Stiff
TXGLO1-VC-23-055	0.3	0.5	0.05	49.03	Firm
	1.6	1.0	0.10	98.07	Stiff
	3.1	1.0	0.10	98.07	Stiff
	8.9	4.0	0.41	392.27	Hard
	14.1	4.8	0.49	465.82	Hard
TXGLO1-VC-23-056	No Torvane Conducted				
TXGLO1-VC-23-057	6.4	1.5	0.15	147.10	Stiff
TXGLO1-VC-23-058	0.8	0.5	0.05	49.03	Firm
	4.2	1.0	0.10	98.07	Stiff
	12.9	1.5	0.15	147.10	Stiff
	15.5	2.0	0.20	196.13	Very Stiff