Aptim Environmental & Infrastructure, LLC
6401 Congress Avenue, Suite 140
Boca Raton, Florida 33487
Phone # 1-561-391-8102

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 ½	-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

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

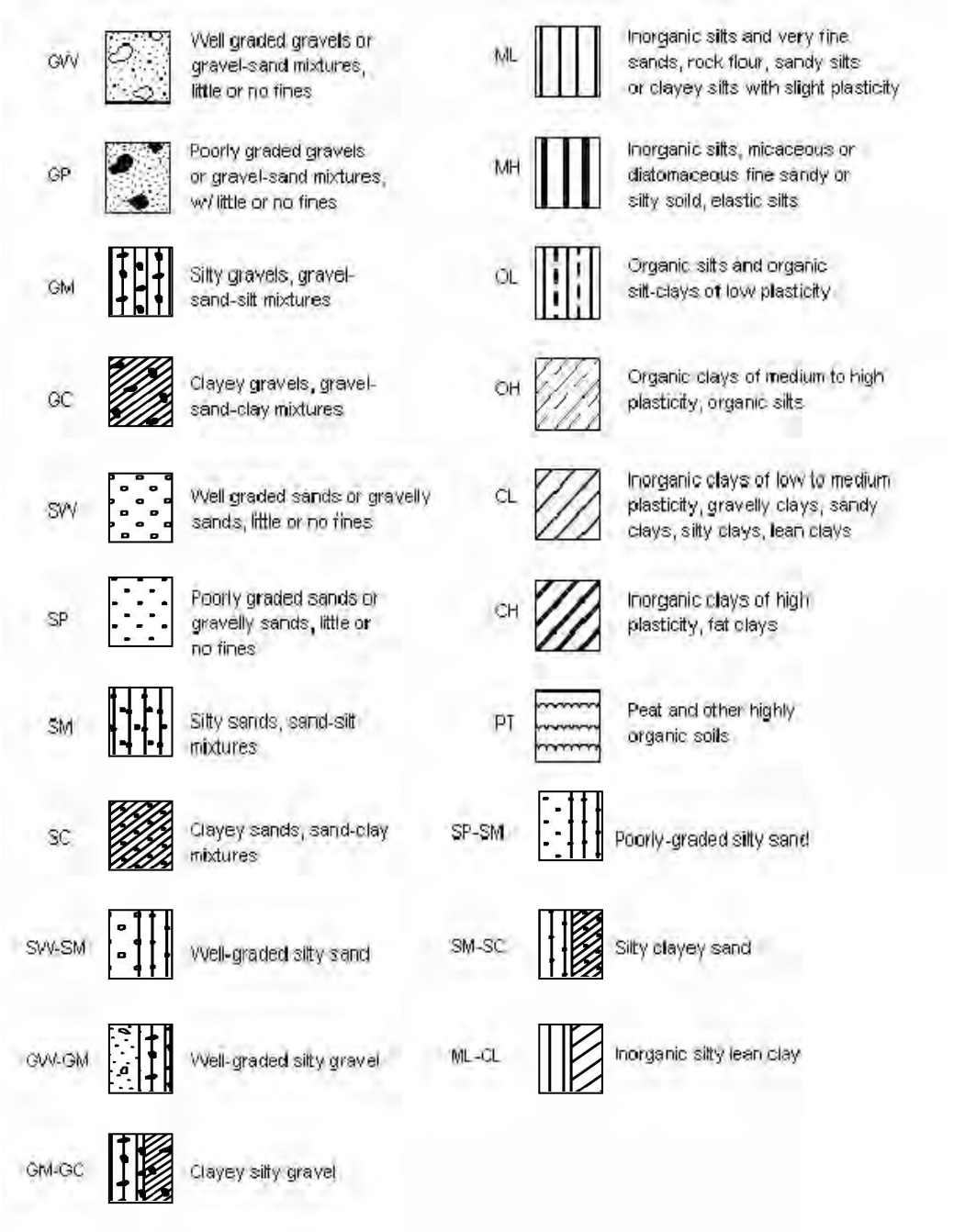
Consistency of Cohesive Soils

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.



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

Boring Designation TXGLO1-VC-23-041

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.

APTIM

9. SIZE AND TYPE OF BIT 3.0 In.

10. COORDINATE SYSTEM/DATUM: Texas State Plane South | HORIZONTAL: NAD 1983 | VERTICAL: NAVD88

2. BORING DESIGNATION: TXGLO1-VC-23-041
LOCATION COORDINATES (ft): X = 3,452,188 Y = 13,745,781

11. MANUFACTURER'S DESIGNATION OF DRILL: APTIM SEAS VC-700 Vibracore
☐ AUTO HAMMER ☐ MANUAL HAMMER

3. DRILLING AGENCY: APTIM
CONTRACTOR FILE NO.:

12. TOTAL SAMPLES: DISTURBED 2 | UNDISTURBED (UD) 2

4. NAME OF DRILLER: APTIM

13. TOTAL NUMBER CORE BOXES

14. ELEVATION GROUND WATER

5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED
DEG. FROM VERTICAL:
BEARING:

15. DATE BORING: STARTED 10-09-23 | COMPLETED 10-09-23

6. THICKNESS OF OVERBURDEN 0.0 Ft.

16. ELEVATION TOP OF BORING -39.9 Ft.

7. DEPTH DRILLED INTO ROCK 0.0 Ft.

17. TOTAL RECOVERY FOR BORING 18.5 Ft.

8. TOTAL DEPTH OF BORING 19.4 Ft.

18. SIGNATURE AND TITLE OF INSPECTOR: WMM

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
-39.9	0.0					
-40.4	0.5		LEAN CLAY, very soft, trace sand, fine grained, quartz, trace shell fragments, trace shell hash, trace silt, sand distributed in laminae, (0.25" x 0.5") bivalve fragment @ 0.3', dark greenish gray (10Y-4/1), (CL).			
-41.5	1.6				T1	Sample #T1, Depth = 1.5' Ave. Field Vane (tsf): 0.20
-43.3	3.4		LEAN CLAY, very stiff, trace sand, fine grained, quartz, trace shell fragments, sand distributed in laminae, (0.75" x 1.0") bivalve fragment @ 1.4', dark greenish gray (10Y-4/1), (CL).			
-44.6	4.7		Sandy LEAN CLAY, firm, trace wood fragments, sand component is fine grained quartz, 6.0" sand pocket @ 2.6', (0.5" x 1.5") root fragment @ 3.3', color is mottled gray (10YR-6/1) and dark greenish gray (10Y-4/1), (CL).			
			Clayey SAND, fine grained, quartz, trace organics, trace silt, clay increases with depth in layer, dark gray (5Y-4/1), (SC).		1	Sample #1, Depth = 6.3' Mean (mm): 0.15, Phi Sorting: 0.40 Fines (230): 7.19% Fines (200): 8.45% (SP-SM)
			SAND, fine grained, quartz, little clay, trace organics, trace shell hash, trace silt, clay distributed in pockets up to 2.5", clay decreases with depth in layer, flaser bedding between 8.7' & 11.5', gray (2.5Y-5/1), (SP).		2	Sample #2, Depth = 10.0' Mean (mm): 0.17, Phi Sorting: 0.45 Fines (230): 3.92% Fines (200): 4.38% (SP)
-51.4	11.5					
-53.9	14.0		SHELL HASH, some sand, fine grained, quartz, little shell fragments, little whole shell, trace organics, trace silt, shell fragments are bivalve fragments up to 1.5", whole shells are whole bivalves up to 1.5", gray (2.5Y-5/1), (GW).			
-55.8	15.9		SHELL HASH, some clay, little shell fragments, trace organics, trace rock fragments, trace sand, fine grained, quartz, trace silt, trace whole shell, clay increases with depth in layer, rock fragments are fragments of partially lithified clay, whole shells are whole bivalves up to 2.5", shell fragments are bivalve fragments up to 1.25", (1.25" x 1.75") rock fragment @ 14.8', (0.5" x 0.75") rock fragment @ 15.4', dark greenish gray (10Y-4/1), (GC).		T2	Sample #T2, Depth = 17.5' Ave. Field Vane (tsf): 0.82
-58.4	18.5		FAT CLAY, hard, trace organics, trace sand, fine grained, quartz, lenticular bedding throughout layer, Bit sample from 18.1' to 18.5', greenish black (10Y-2.5/1), (CH).			
-59.3	19.4		No recovery.			
			End of Boring			

REGION1_RECON_GEOTECH.GPJ 3/25/24

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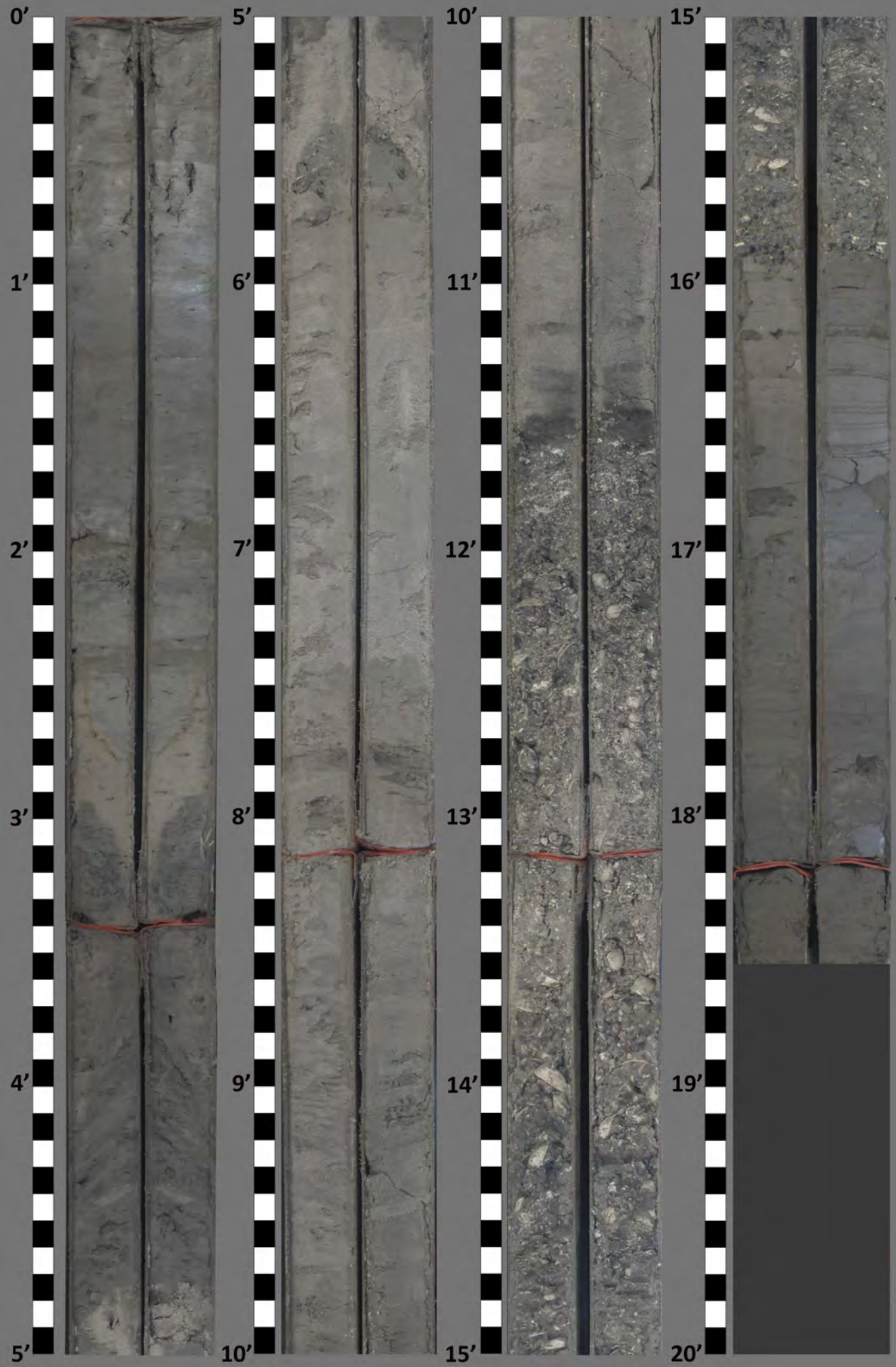

Texas General Land Office

Texas GLO Region 1 Geotechnical Reconnaissance Survey

TXGLO1-VC-23-041

Date Collected: 10/9/23
Top Elev. (ft NAVD88): -39.9
Bottom Elev. (ft NAVD88): -58.4
Core Length (ft): 18.5

APTIM
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Boca Raton, FL 33487
www.aptim.com
(561)391-8102

Granularmetric Report

Depths and elevations based on measured values

Project Name: TX GLO Region 1 Recon Geotechnical Sand Search

Sample Name: TXGLO1-VC-23-041 #1

Analysis Date: 01-26-24

Analyzed By: WMM

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6401 Congress Avenue, Suite 140
Boca Raton, FL 33487
ph (561) 391-8102

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
3,452,188	13,745,781	Texas State Plane South	-46.2 NAVD88

USCS:	Munsell:	Comments:
SP-SM	Wet - 2.5Y-5/1 Dry - 2.5Y-7/1 Washed - 2.5Y-8/1	

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
101.72	94.92	0.48	0.03	#200 - 8.45 #230 - 7.19			

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	0.86	0.85	0.90	0.89
80	2.50	0.18	22.91	22.52	23.81	23.41
120	3.00	0.13	45.86	45.08	69.67	68.49
170	3.50	0.09	21.14	20.78	90.81	89.27
200	3.75	0.07	2.32	2.28	93.13	91.55
230	4.00	0.06	1.28	1.26	94.41	92.81

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
	3.37	3.16	2.79	2.52	2.34	2.09

Moment Statistics	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
	2.77	0.15	0.4	0.21	2.89

REGION1_RECON_GEOTECH.GPJ 3/6/24

Granularmetric Report

Depths and elevations based on measured values

Project Name: TX GLO Region 1 Recon Geotechnical Sand Search

Sample Name: TXGLO1-VC-23-041 #2

Analysis Date: 01-26-24

Analyzed By: WMM

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Boca Raton, FL 33487
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Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
3,452,188	13,745,781	Texas State Plane South	-49.9 NAVD88

USCS:	Munsell:	Comments:
SP	Wet - 2.5Y-5/1 Dry - 2.5Y-7/1 Washed - 2.5Y-7/1	

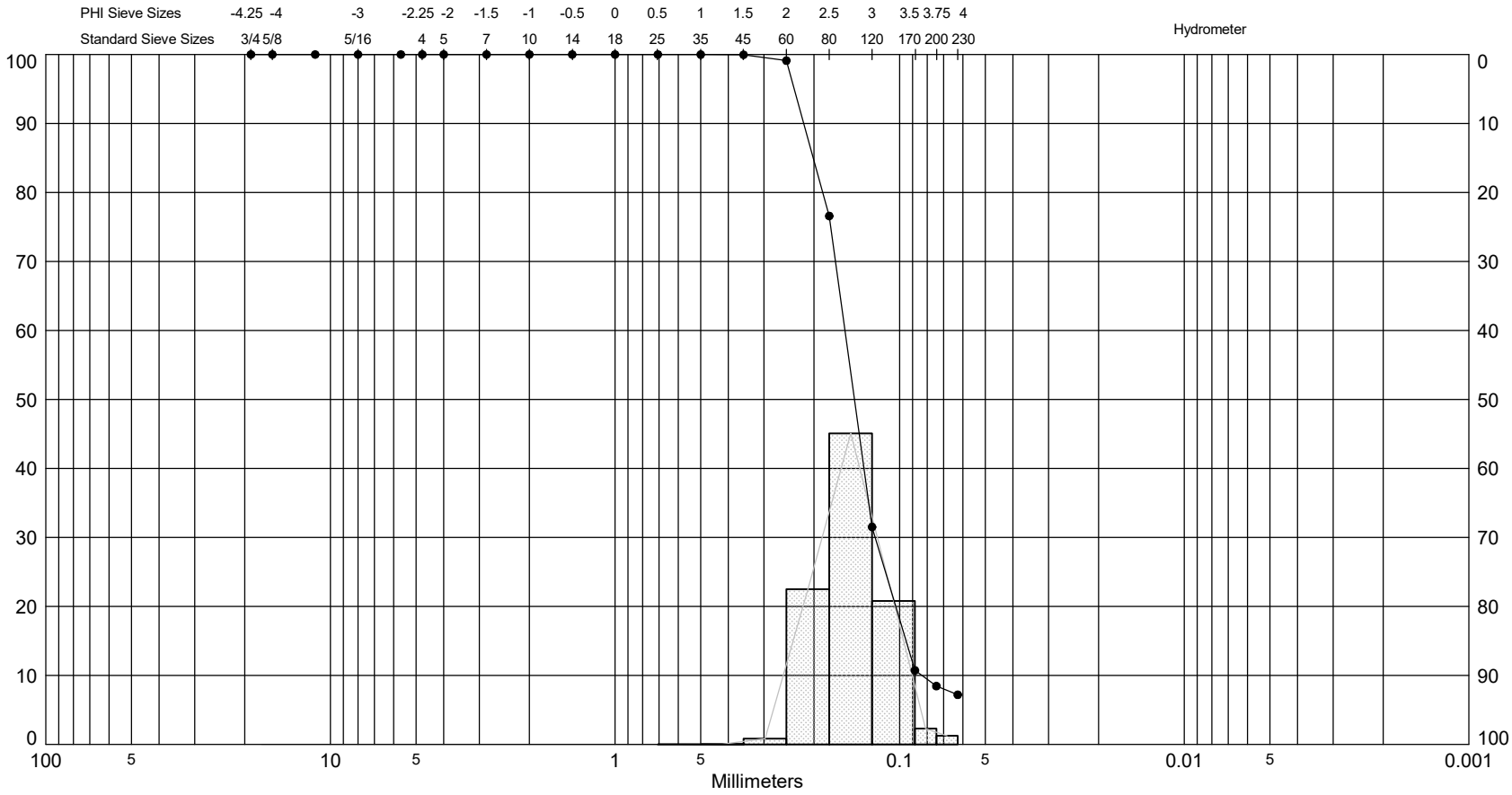
Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shell Hash (%):
100.91	97.09	0.12	0.03	#200 - 4.38 #230 - 3.92			

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	0.01	0.01	0.01	0.01
10	-1.00	2.00	0.12	0.12	0.13	0.13
14	-0.50	1.41	0.10	0.10	0.23	0.23
18	0.00	1.00	0.10	0.10	0.33	0.33
25	0.50	0.71	0.08	0.08	0.41	0.41
35	1.00	0.50	0.09	0.09	0.50	0.50
45	1.50	0.35	0.19	0.19	0.69	0.69
60	2.00	0.25	4.87	4.83	5.56	5.52
80	2.50	0.18	36.02	35.70	41.58	41.22
120	3.00	0.13	43.44	43.05	85.02	84.27
170	3.50	0.09	10.66	10.56	95.68	94.83
200	3.75	0.07	0.80	0.79	96.48	95.62
230	4.00	0.06	0.46	0.46	96.94	96.08

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.55	3.00	2.89	2.60	2.27	2.15	1.95

Moment Statistics	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
	2.56	0.17	0.45	-1.47	14.3

REGION1_RECON_GEOTECH.GPJ 3/6/24



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
TXGLO1-VC-23-041 #1	—●—	-46.2	SP-SM	#200 - 8.45 #230 - 7.19			2.79	2.77	0.21	2.89	0.4

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	TX GLO Region 1 Recon Geotechnical Sand Search
Analysis Date:	01-26-24
Analyzed By:	WMM
Easting (X, ft):	3,452,188
Northing (Y, ft):	13,745,781
Horizontal Datum:	NAD 1983
Vertical Datum:	NAVD88

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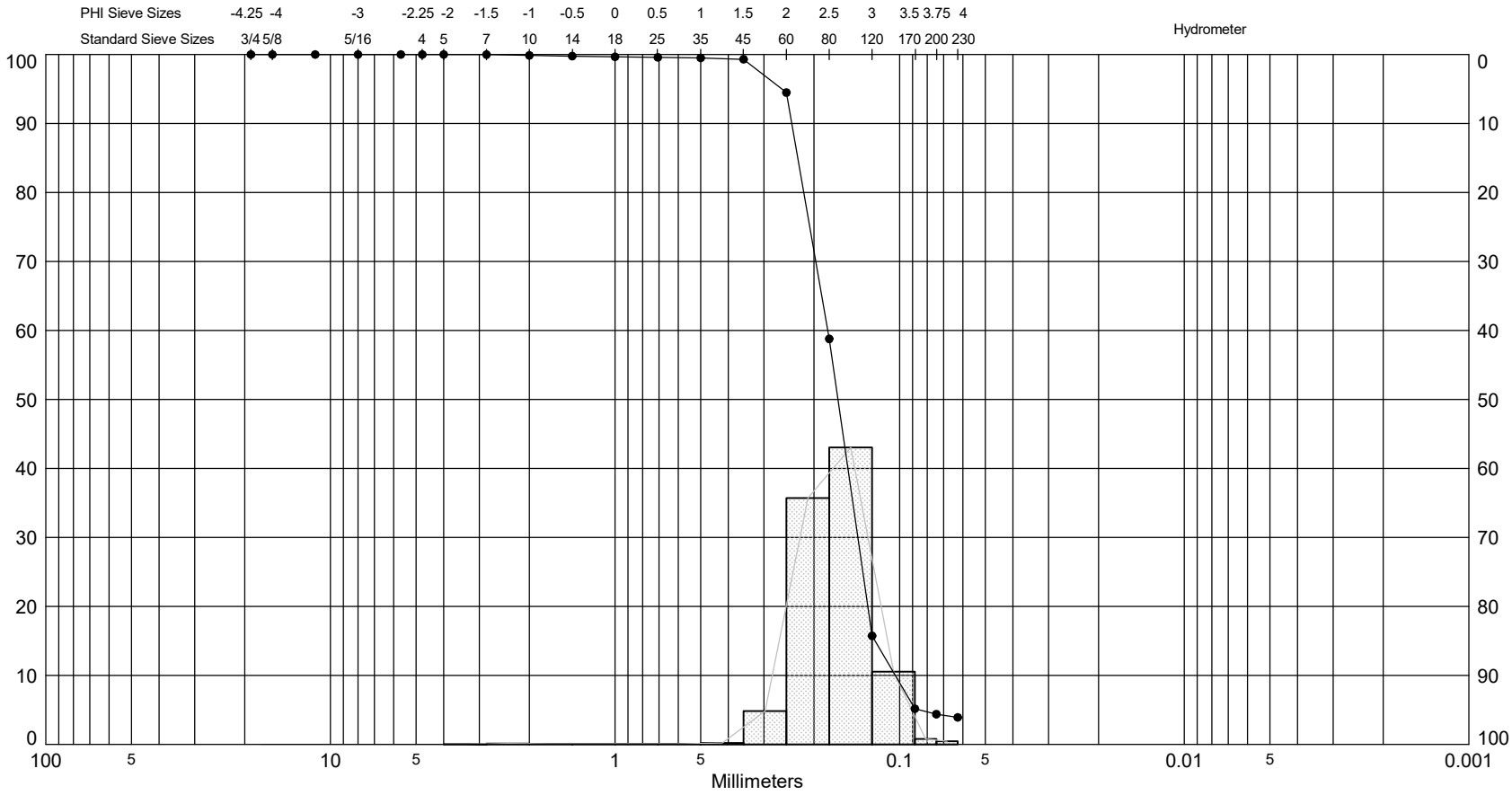

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
TXGLO1-VC-23-041 #2	—●—	-49.9	SP	#200 - 4.38 #230 - 3.92			2.6	2.56	-1.47	14.3	0.45

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	TX GLO Region 1 Recon Geotechnical Sand Search
Analysis Date:	01-26-24
Analyzed By:	WMM
Easting (X, ft):	3,452,188
Northing (Y, ft):	13,745,781
Horizontal Datum:	NAD 1983
Vertical Datum:	NAVD88

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REGION1_RECON_GEOTECH.GPJ 3/6/24

Mini Vane Shear Test Results

CORE ID	SAMPLE DEPTH (ft)	TORVANE (kg/cm²)	TORVANE (tsf)	TORVANE (kpa)	DESCRIPTION[1]
TXGLO1-VC-23-038	3.0	7.5	0.77	735.50	Hard
	9.3	6.0	0.61	588.40	Hard
	15.8	4.0	0.41	392.27	Hard
TXGLO1-VC-23-039	1.7	3.5	0.36	343.23	Hard
	5.0	3.0	0.31	294.20	Very Stiff
	12.2	2.0	0.20	196.13	Very Stiff
	16.0	4.5	0.46	441.30	Hard
TXGLO1-VC-23-040	No Torvane Conducted				
TXGLO1-VC-23-041	1.5	2.0	0.20	196.13	Very Stiff
	17.5	8.0	0.82	784.53	Hard
TXGLO1-VC-23-042	0.6	3.5	0.36	343.23	Hard
	1.7	3.5	0.36	343.23	Hard
	3.3	4.0	0.41	392.27	Hard
	5.5	3.5	0.36	343.23	Hard
	7.7	4.5	0.46	441.30	Hard
	10.3	5.0	0.51	490.33	Hard
	13.0	2.8	0.28	269.68	Very Stiff
	15.0	1.5	0.15	147.10	Stiff
	17.0	1.8	0.18	171.62	Very Stiff
TXGLO1-VC-23-043	No Torvane Conducted				
TXGLO1-VC-23-044	0.7	1.0	0.10	98.07	Stiff
	3.0	5.0	0.51	490.33	Hard
	5.6	8.5	0.87	833.57	Hard
	9.0	6.0	0.61	588.40	Hard
TXGLO1-VC-23-045	1.1	1.5	0.15	147.10	Stiff
	2.3	4.5	0.46	441.30	Hard
	5.4	5.5	0.56	539.37	Hard
	9.5	6.0	0.61	588.40	Hard
	12.4	3.0	0.31	294.20	Very Stiff
	15.0	5.5	0.56	539.37	Hard
TXGLO1-VC-23-046	3.6	5.0	0.51	490.33	Hard
	6.4	5.5	0.56	539.37	Hard
	8.1	6.0	0.61	588.40	Hard
	9.8	4.5	0.46	441.30	Hard
	12.1	5.0	0.51	490.33	Hard
	14.4	2.5	0.26	245.17	Very Stiff
	15.9	4.5	0.46	441.30	Hard
	17.4	3.5	0.36	343.23	Hard
	18.6	3.5	0.36	343.23	Hard
TXGLO1-VC-23-047	4.5	8.0	0.82	784.53	Hard
	9.8	10.0	1.02	980.67	Hard