LOG OF BORING AND TEST RESULTS

EUSTIS ENGINEERING SINCE 1946

Ducks Unlimited, Inc.
Pierce Marsh Beneficial Use
Marsh Creation
Phase 1
North of West Bay Near Galveston Island
Galveston County, Texas

Boring: B-4

Project No: H0048
Date: 07/16/2022
Latitude: 29.31479°
Longitude: -94.95743°

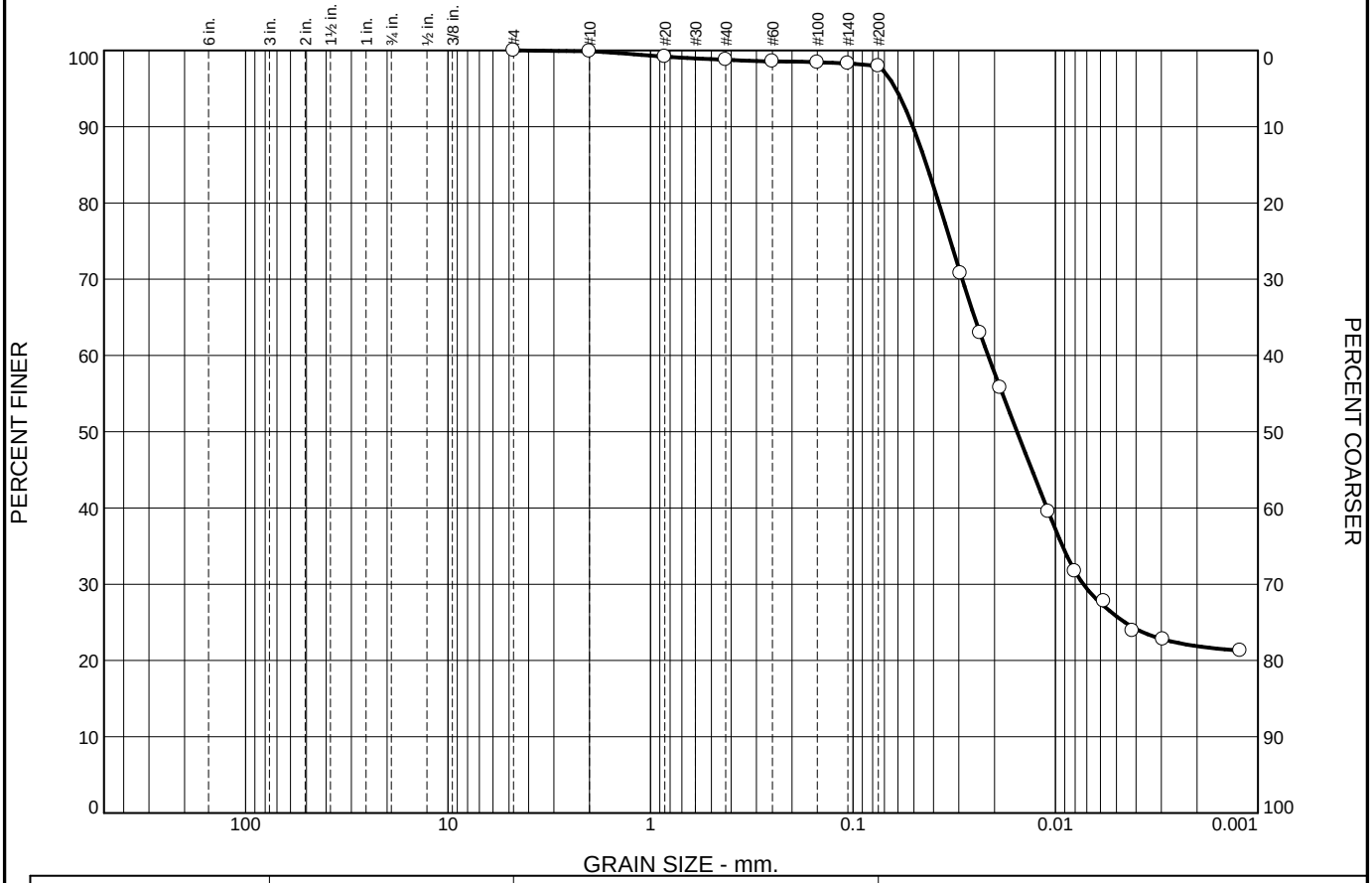
Water Depth: See Text
Total Depth: 40.0 ft

Scale in Feet	PP	SPT	SPLR	Symbol	Visual Classification	USC	Sample Number	Depth in Feet	Water Content %	Density Dry pcf	Density Wet pcf	Shear Tests Type	Shear Tests ϕ	Shear Tests C psf	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI	Other Tests
0	0.50				Moist, soft gray FAT CLAY w/few organic matter & roots	CH	1A	0	39									
							1B	1	27	95	121	OB	0	185				
	1.00				w/trace of fine sand pockets & roots		2A	2	27									
							2B	3	27						58	18	40	
							3A	4	26									
5	1.00				Moist, medium stiff to stiff gray & tan FAT CLAY w/trace of fine sand pockets	CH	3B	5	21	106	129	OB	0	946				
							4A	6	23									
	1.00						4B	7	11									
					w/few fine sand pockets		5A	8	29									
	1.00						5B	9	30	92	120	OB	0	810				
10							6A	10	31									
	1.00						6B	11	33									
							7A	12	33									
	1.00				Moist, stiff reddish-tan, reddish-brown, & gray FAT CLAY w/trace of fine sand pockets	CH	7B	13	35	87	117	OB	0	1144				
							8A	14	30									
15	1.00						8B	15	29									
							9A	16	30									
	1.00						9B	17	31						72	21	51	CON
							10A	18	85									
	1.00						10B	19	27						58	17	41	
20					w/few fine sand pockets													
							11A	23	32	90	119							
	1.00						NS	24										
25					w/trace of fine sand pockets													
							12A	28	31									
	1.00						12B	29	28									
30																		
							13A	33	37									
	0.50						13B	34	29	92	119							
35					Moist, stiff tan fine LEAN CLAY	CL												
							14A	38	26									
	0.50						14B	39	27									PD
40																		
45																		
50																		

EUSTIS_GINT_LIBRARY_4-18-2022.GLB EE STANDARD BORING LOG H0048.GPJ 8/18/22

NOTES: Boring 4 was drilled in 3 in. of water.

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.1	1.1	0.8	72.2	25.8

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.0433	0.0215	0.0155	0.0073				

Material Description	USCS	AASHTO
○ Moist, stiff tan fine LEAN CLAY w/ trace concretion	CL	

Project No. H0048 **Client:** DUCKS UNLIMITED, INC., RICHMOND, TEXAS

Project: DUCKS UNLIMITED, INC. - PIERCE MARSH BENEFICIAL USE MARSH CREATION, PHASES 1 AND 2,

○ **Source of Sample:** B-4 **Depth:** 37.5 **Sample Number:** 14B

Remarks:

○Soil Specific Gravity was Estimated

ASTM D7928-17 was Performed

EUSTIS ENGINEERING SINCE 1946

Figure

Tested By: BH & KP **Checked By:** CD

GRAIN SIZE DISTRIBUTION TEST DATA

8/11/2022

Client: DUCKS UNLIMITED, INC., RICHMOND, TEXAS
Project: DUCKS UNLIMITED, INC. - PIERCE MARSH BENEFICIAL USE MARSH CREATION, PHASES 1 AND 2,
NORTH OF WEST BAY NEAR GALVESTON ISLAND, GALVESTON COUNTY, TEXAS.
DU CONTRACT NO. TX-0-2. DU PROJECT NO. TX-194-4. DU TASK ORDER NO. 1
Project Number: H0048
Location: B-4
Depth: 37.5 **Sample Number:** 14B
Material Description: Moist, stiff tan fine LEAN CLAY w/ trace concretion
USCS Classification: CL
Testing Remarks: Soil Specific Gravity was Estimated
ASTM D7928-17 was Performed
Tested by: BH & KP **Checked by:** CD

Sieve Test Data

Post #200 Wash Test Weights (grams): **Dry Sample and Tare =** 1.61
Tare Wt. = 0.00
Minus #200 from wash = 97.9%

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer	Percent Retained
75.86	0.00	0.00	#4	0.00	100.0	0.0
			#10	0.08	99.9	0.1
			#20	0.62	99.2	0.8
			#40	0.93	98.8	1.2
			#60	1.09	98.6	1.4
			#100	1.20	98.4	1.6
			#140	1.30	98.3	1.7
			#200	1.55	98.0	2.0

Hydrometer Test Data

Hydrometer test uses material passing #10
Percent passing #10 based upon complete sample = 99.9
Weight of hydrometer sample =75.86
Automatic temperature correction
Composite correction (fluid density and meniscus height) at 20 deg. C = -6.06
Meniscus correction only = 0.9
Specific gravity of solids = 2.70
Hydrometer type = 152H
Hydrometer effective depth equation: L = 16.294964 **-** 0.164 **x Rm**

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer	Percent Retained
1.25	22.0	60.0	54.3	0.0131	60.9	6.3	0.0295	70.8	29.2
2.25	22.0	54.0	48.3	0.0131	54.9	7.3	0.0236	63.0	37.0
4.00	22.0	48.5	42.8	0.0131	49.4	8.2	0.0188	55.8	44.2
15.00	22.0	36.0	30.3	0.0131	36.9	10.2	0.0108	39.5	60.5
30.00	22.0	30.0	24.3	0.0131	30.9	11.2	0.0080	31.7	68.3
60.00	22.0	27.0	21.3	0.0131	27.9	11.7	0.0058	27.8	72.2
120.00	22.0	24.0	18.3	0.0131	24.9	12.2	0.0042	23.9	76.1

Hydrometer Test Data (continued)

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer	Percent Retained
241.50	22.6	23.0	17.5	0.0130	23.9	12.4	0.0029	22.8	77.2
1440.00	22.0	22.0	16.3	0.0131	22.9	12.5	0.0012	21.3	78.7

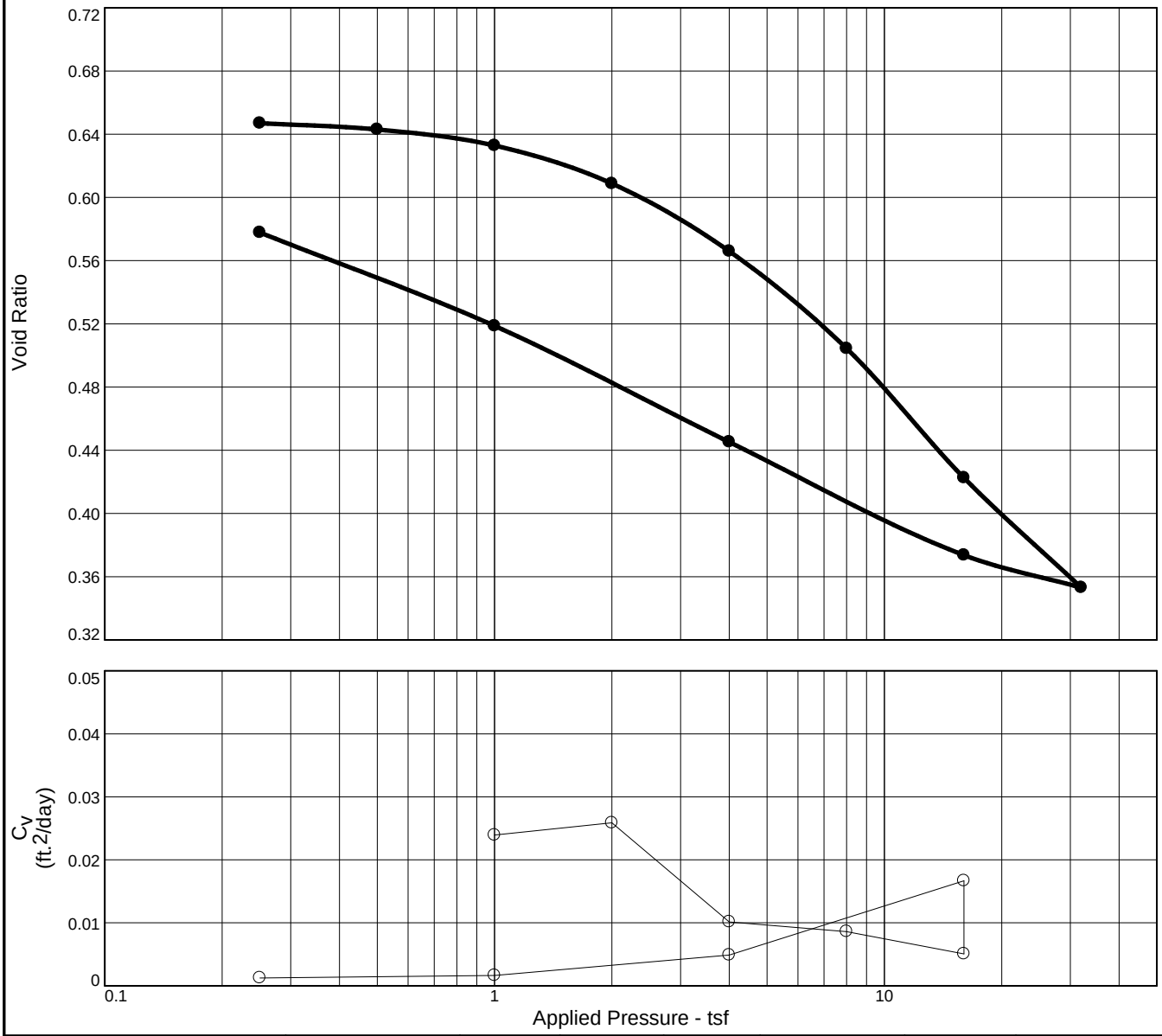
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	0.1	1.1	0.8	2.0	72.2	25.8	98.0

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
				0.0073	0.0110	0.0155	0.0215	0.0377	0.0433	0.0506	0.0615

Fineness Modulus
0.05

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	P_c (tsf)	C_c	Initial Void Ratio
Saturation	Moisture							
99.0 %	23.5 %	103.2	72	51	2.72	3.8	0.28	0.646

MATERIAL DESCRIPTION	USCS	AASHTO
M, st rd-t FT CL w/ tr fisa poc & conc	CH	

Project No. H0048 **Client:** DUCKS UNLIMITED, INC., RICHMOND, TEXAS

Project: DUCKS UNLIMITED, INC. - PIERCE MARSH BENEFICIAL USE MARSH CREATION, PHASES 1 AND 2,

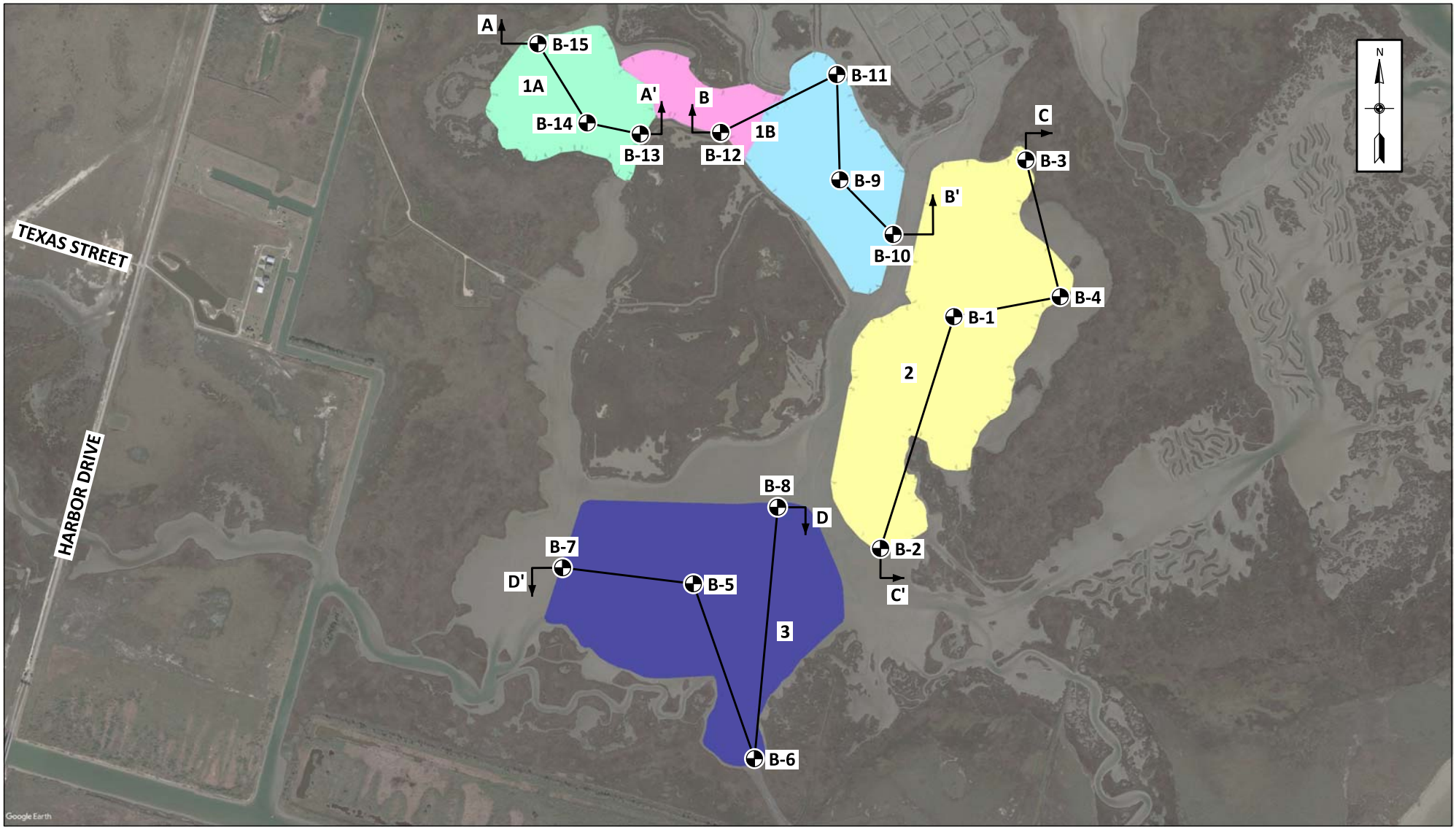
Source of Sample: B-4 **Depth:** 17 **Sample Number:** 9B

EUSTIS ENGINEERING SINCE 1946

Remarks:

Figure

Tested By: BH **Checked By:** RR



SATELLITE IMAGERY DATED: JANUARY 2022

NOT TO SCALE

◓ DENOTES APPROXIMATE LOCATIONS OF SOIL BORINGS DRILLED BETWEEN 11 AND 18 JULY 2022

BORING LOCATION PLAN

PHASE 1
DUCKS UNLIMITED, INC.
PIERCE MARSH BENEFICIAL USE MARSH CREATION
NORTH OF WEST BAY NEAR GALVESTON ISLAND
GALVESTON COUNTY, TEXAS
DU CONTRACT NO. TX-0-2
DU PROJECT NO. TX-194-4
DU TASK ORDER NO. 1

EUSTIS ENGINEERING L.L.C. SINCE 1946

DRAWN BY: S.T.S.	JOB NO.: H0048
CHECKED BY: H.C.W.	DATE: 15 AUG 2022
CADD FILE: LOCATION PLAN.DGN	FIGURE 2

C

B-3
G.S.E. -0.41
16 JUL 2022

B-4
G.S.E. 1.06
16 JUL 2022

B-1
G.S.E. -0.77
16 JUL 2022

B-2
G.S.E. -1.12
17 JUL 2022

C'

ELEVATION IN FEET (NAVD 88)

10
0
-10
-20
-30
-40
-50
-60

BORING MATERIAL GRAPHICS

FAT CLAY

LEAN CLAY

NOTE:

1. G.S.E. = GROUND SURFACE ELEVATION

SUBSURFACE SOIL PROFILE
MCA-2
PHASE 1
DUCKS UNLIMITED, INC.
PIERCE MARSH BENEFICIAL USE MARSH CREATION
NORTH OF WEST BAY NEAR GALVESTON ISLAND
GALVESTON COUNTY, TEXAS
DU CONTRACT NO. TX-0-2
DU PROJECT NO. TX-194-4
DU TASK ORDER NO. 1

EUSTIS ENGINEERING L.L.C. SINCE 1946

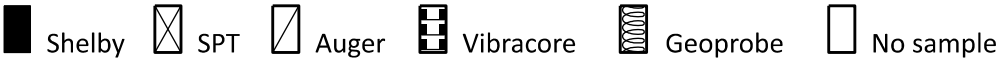
DRAWN BY: S.T.S.	JOB NO.: H0048
CHECKED BY: H.C.W.	DATE: 23 AUG 2022
CADD FILE: PROFILE.DGN	FIGURE 3 (SHEET 3 OF 4)

EUSTIS ENGINEERING SINCE 1946

LEGEND AND NOTES FOR LOG OF BORING AND TEST RESULTS

PP Pocket penetrometer: Resistance in tons per square foot

SPT Standard Penetration Test: Number of blows of a 140-lb hammer dropped 30 inches required to drive 2-in. O.D., 1.4-in. I.D. sampler a distance of 1 foot into the soil after first seating it 6 inches. Values shown have not been corrected.

SPLR Type of Sampling  Shelby, SPT, Auger, Vibracore, Geoprobe, No sample

SYMBOL Clay, Silt, Sand, Peat/Humus, Shells, Stone/Gravel

Predominant type shown heavy; modifying type shown light

USC Unified Soil Classification

DENSITY Unit weight in pounds per cubic foot

SHEAR TESTS

TYPE

- UC Unconfined compression shear
- OB Unconsolidated undrained triaxial compression shear on one specimen confined at the approximate overburden pressure
- UU Unconsolidated undrained triaxial compression shear
- ϕ Angle of internal friction in degrees
- c Cohesion in pounds per square foot

ATTERBERG LIMITS

- LL Liquid Limit
- PL Plastic Limit
- PI Plasticity Index

OTHER TESTS

- CON Consolidation
- -#200 Percent passing a U.S. No. 200 sieve
- SV Particle size distribution (sieve only)
- PD Particle size distribution (sieve and hydrometer)
- k Coefficient of permeability in centimeters per second
- SP Swelling pressure in pounds per square foot

Other laboratory test results reported on separate figures

GENERAL NOTES

(1) If a ground water depth is shown on the boring log, these observations were made at the time of drilling and were measured below the existing ground surface. These observations are shown on the boring logs. However, ground water levels may vary due to seasonal fluctuations and other factors. If important to construction, the depth to ground water should be determined by those persons responsible for construction immediately prior to beginning work.

(2) While the individual logs of borings are considered to be representative of subsurface conditions at their respective locations on the dates shown, it is not warranted that they are representative of subsurface conditions at other locations and times.