PROJECT NO. 160-93

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

PROJECT ARANSAS WILDLIFE REFUGE BORING 92-271

DATE MAY 11, 1993 TYPE SPLIT SPOON LOCATION SEE PLAN

MLT = +3 FEET
WATER DEPTH = 3 FEET

COMPRESSIVE STRENGTH, TSF
○ POCKET PENETROMETER
△ CONFINED COMPRESSION
● UNCONFINED COMPRESSION
□ TORVANE

DEPTH IN FEET	SYMBOL	CORES	DESCRIPTION	BLOWS/FOOT	M.C.%	U.D.W. PCF	COMPRESSIVE STRENGTH, TSF (0.5 1.0 1.5 2.0)	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT
0		X	Very loose gray Silty Sand (SM) W/ shell	3						
5		X	Firm from 4' to 15'	13				27		
10		X		26						
15		X	Firm gray Sandy Silt (ML) W/ shell	22				52		
20		X	Loose	12						
25		X	"	11				51		
30		X	Very dense gray Silty Sand (SM)	73						
35		X		54				27		
40		X	Firm from 40'-to 45'	23						
45		X	Firm gray Silt (ML) W/ clay partings	16				96		
50		■	Medium gray Sandy Clay (CL)		24	105	●C	70	38	17

BORING DRILLED TO ___ FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT ___ FEET WHILE DRILLING
WATER LEVEL AT ___ FEET AFTER ___ HOURS

PROJECT NO. 160-93

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

PROJECT ARANSAS WILDLIFE REFUGE BORING 92-271

DATE MAY 11, 1993 TYPE CORE LOCATION SEE PLAN

DEPTH IN FEET	SYMBOL	CORES	DESCRIPTION	BLOWS/FOOT	M.C.%	U.D.W. PCF	COMPRESSIVE STRENGTH, TSF (○ POCKET PENETROMETER, △ CONFINED COMPRESSION, ● UNCONFINED COMPRESSION, □ TORVANE)	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT
			Boring Continued				0.5 1.0 1.5 2.0			
50			Sandy Clay (CL)							
			Stiff greenish gray Clay (CH)		23					
					24	101		100	76	27
55			Bottom @ 55'							

BORING DRILLED TO ___ FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT ___ FEET WHILE DRILLING
WATER LEVEL AT ___ FEET AFTER ___ HOURS

PLATE 6A

TABLE A.1

AVILES ENGINEERING CORP.
GEOTECHNICAL ENGINEERS

SUMMARY OF LABORATORY TEST DATA

PROJECT: AEC 160-93; ARANSAS WILDLIFE REFUGE

BORING NUMBER	DEPTH IN FEET	MOISTURE, %	DRY DENSITY, PCF	COMPRES-SION, TSF	STRAIN, %	TYPE FAILURE	LAT. PRESSURE	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SIEVE (NO. 200)	CONSOLI-DATION	SWELL, %
92-269	0- 2										19		
	2- 4										37		
	7- 8.5										18		
	17-18.5										20		
	27-28.5										14		
	36-38										12		
	42-43.5										28		
	47-49										80		
	49-51										69		
	53.5-55										76		
92-270	5- 6.5										28		
	6.5-8.5	22	106	0.75				38	20	18	51		
	8.5-10										18		
	13.5-15										16		
	18.5-20										42		
	21.5-23										18		
92-271	5-6.5										27		
	15-16.5										52		
	25-26.5										51		
	35-36.5										27		
	45-46.5										96		

TABLE A.2

AVILES ENGINEERING CORP.
GEOTECHNICAL ENGINEERS

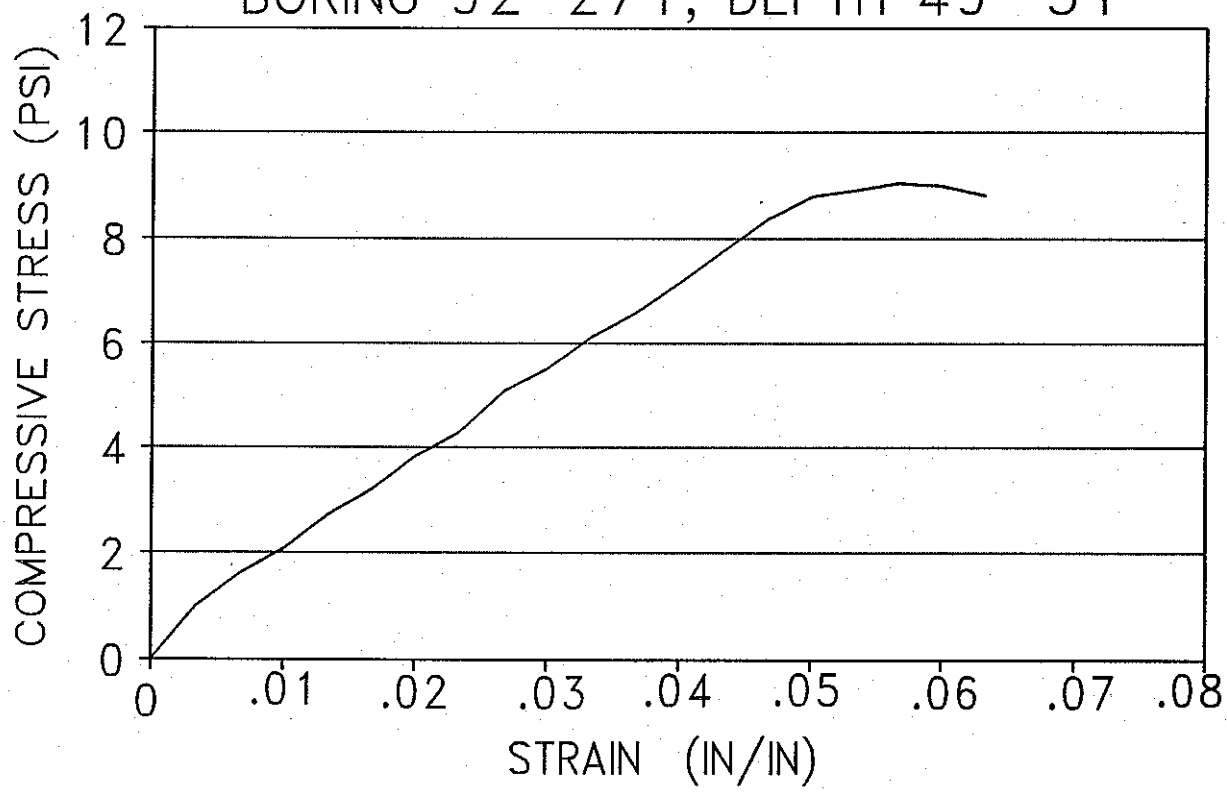
SUMMARY OF LABORATORY TEST DATA

PROJECT: AEC 160-93; ARANSAS WILDLIFE REFUGE

BORING NUMBER	DEPTH IN FEET	MOISTURE, %	DRY DENSITY, PCF	COMPRES-SION, TSF	STRAIN, %	TYPE FAILURE	LAT. PRESSURE	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SIEVE (NO. 200)	CONSOLI-DATION	SWELL, %
92-271	49-51	24	105	0.65				38	17	21	70		
	53-55	24	101	1.61				76	27	49	100		
92-272	0-1.5										24		
	5-6.5										39		
	10-11.5										47		
	15-16.5										68		
	21-22.5										34		
92-273	0-1.5										36		
	5-6.5										33		
	10-11.5										19		
	15-16.5										13		
	21.5-23										61		
92-274	0-1.5										22		
	10-11.5										20		
	19.5-21										12		
	21-22.5										15		
92-275	0-1.5										27		
	10-11.5										32		
	19.5-21										18		

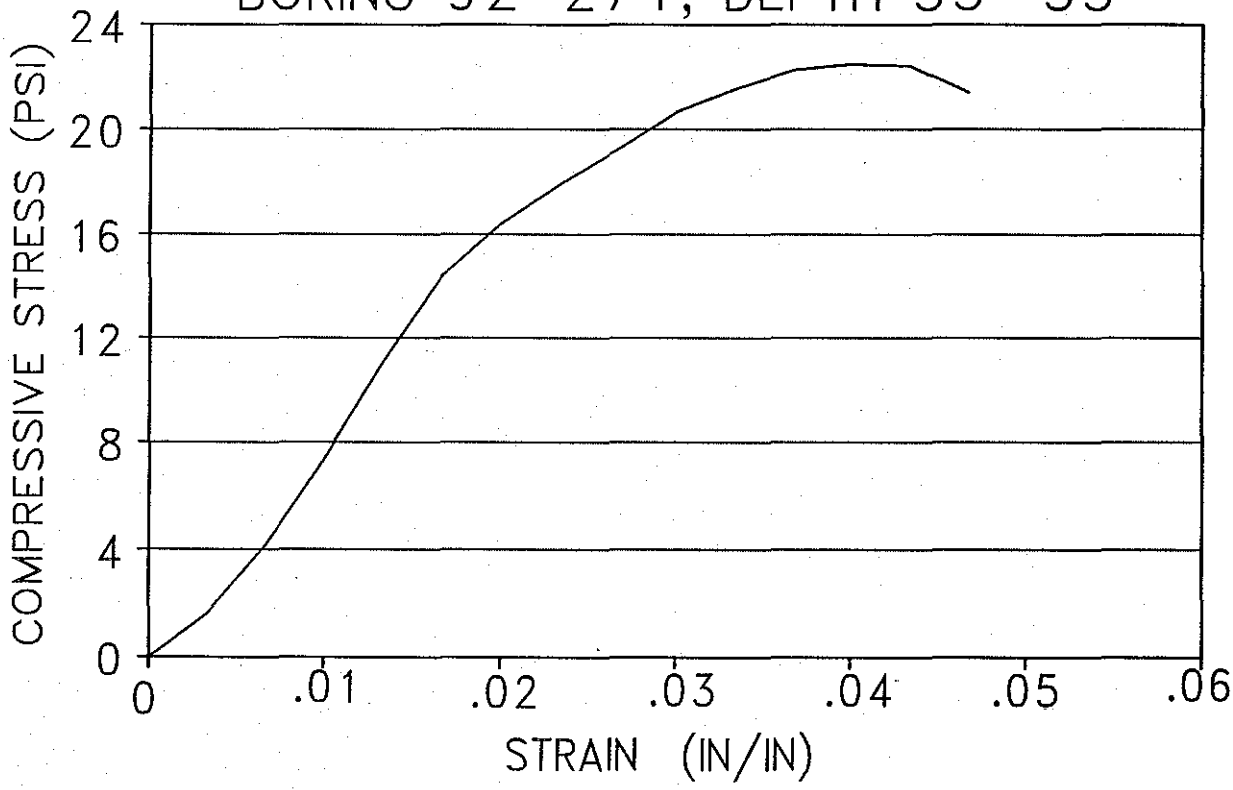
AVILES ENGINEERING CORP.

TABLE C.2
UNCONFINED COMPRESSION TEST
BORING 92-271; DEPTH 49'-51'



AVILES ENGINEERING CORP.

TABLE C.3
UNCONFINED COMPRESSION TEST
BORING 92-271; DEPTH 53'-55'



AVILES ENGINEERING CORP.

TABLE B.17

PROJECT: ARANSAS WILDLIFE REFUGE
PROJECT NO.: 160-93
BORING NO.: 92-271 **DEPTH:** 5 - 6.5 FEET

SEIVE ANALYSYS

SIEVE NO.	PERCENT PASSING
4	97
10	94
40	91
100	45
200	27

AVILES ENGINEERING CORP.

TABLE B.18

PROJECT: ARANSAS WILDLIFE REFUGE
PROJECT NO.: 160-93
BORING NO.: 92-271 **DEPTH:** 15 - 16.5 FEET

SEIVE ANALYSYS

SIEVE NO.	PERCENT PASSING
4	96
10	94
40	92
100	82
200	52

AVILES ENGINEERING CORP.

TABLE B.19

PROJECT: ARANSAS WILDLIFE REFUGE
PROJECT NO.: 160-93
BORING NO.: 92-271 **DEPTH:** 25 - 26.5 FEET

SEIVE ANALYSYS

SIEVE NO.	PERCENT PASSING
4	100
10	99
40	96
100	85
200	51

AVILES ENGINEERING CORP.

TABLE B.20

PROJECT: ARANSAS WILDLIFE REFUGE
PROJECT NO.: 160-93
BORING NO.: 92-271 **DEPTH:** 35 - 36.5 FEET

SEIVE ANALYSYS

SIEVE NO.	PERCENT PASSING
4	100
10	96
40	92
100	74
200	27

AVILES ENGINEERING CORP.

TABLE B.21

PROJECT: ARANSAS WILDLIFE REFUGE
PROJECT NO.: 160-93
BORING NO.: 92-271 **DEPTH:** 45 - 46.5 FEET

SEIVE ANALYSYS

SIEVE NO.	PERCENT PASSING
4	100
10	100
40	99
100	98
200	96

AVILES ENGINEERING CORP.

TABLE B.22

PROJECT: ARANSAS WILDLIFE REFUGE
PROJECT NO.: 160-93
BORING NO.: 92-271 **DEPTH:** 49 - 51 FEET

SEIVE ANALYSYS

SIEVE NO.	PERCENT PASSING
4	100
10	100
40	99
100	81
200	70

AVILES ENGINEERING CORP.

TABLE B.23

PROJECT: ARANSAS WILDLIFE REFUGE
PROJECT NO.: 160-93
BORING NO.: 92-271 **DEPTH:** 53 - 55 FEET

SEIVE ANALYSYS

SIEVE NO.	PERCENT PASSING
4	100
10	100
40	100
100	100
200	100

GEAREN ENTERPRISES

PROJECT 160-93 ARANSAS Refuge DATE 5-11-93 BORING NO. 92-271

	Dph. in Ft.	Type	Pen Rdg	Blow Foot	N= No recovery P= Penetration test C= Undisturbed core A= Auger Description of Stratum		
					MLT = 3'		
					water level = 3'		
S1	0	P		1/1/2	0-49	JAR	G SI SA & Shell Very loose
S2	5	P		4/4/9		JAR	Medium Dense
S3	10	P		12/12/14		JAR	"
S4	15	P		12/10/12		JAR	"
S5	20	P		7/7/5		JAR	"
S6	25	P		3/4/7		JAR	"
S7	30	P		9/27/46		JAR	Very Dense
S8	35	P		12/19/35		JAR	"
	40						

----------GEAREN ENTERPRISES----------

PROJECT 160-93 ARANSAS Refuge DATE 5-11-93 BORING NO. 92-271

	Dph. in Ft.	Type	Pen Rdg	Blow	N= No recovery P= Penetration test C= Undisturbed core A= Auger Description of Stratum
S9	40	P		6/8/15	JAR GR SISA & Shell Medium dense
S10	45	P		8/8/8	JAR "
S11	49	C	1.50	49-55	Stiff G & Green SACL sand pockets
S12	52	C	1.50		"
S13	55	C	1.75		"

Bottom - 55'
Drill Rig - D&R 75
Driller - Dempsey Gearen
Logger - Charnell Gearen
Weather - Sunny, Windy

PROJECT: ARANSAS NATIONAL WILDLIFE REFUGE

TEST ASSIGNMENT SHEET

CONTRACT NO. DACW64-93-M-0385

DATE: 20 MAY 93 ASSIGNED BY: SYED

BORING NO.	SAMPLE NO.	SAMPLE DEPTH	VISUAL CLASSIFICATION TEST (0015)	MOISTURE CONTENT TEST (0016)	UNIT DRY WEIGHT TEST (0017)	UNIT WET WEIGHT TEST (0018)	SPECIFIC GRAVITY OF SOILDS TEST (0019)	LIQUID LIMIT TEST (0020)	PLASTIC LIMIT TEST (0021)	BAR LINEAR SHRINKAGE (0022)	ABBREVIATED MECHANICAL ANALYSIS TEST (0023)	COMPLETE MECHANICAL ANALYSIS TEST (0024)	HYDROMETER ANALYSIS TEST (0025)	STANDARD COMPACTION TEST (0026)	MODIFIED COMPACTION TEST (0027)	UNCONFINED COMPRESSION TEST (0028)	TORVANE SHEAR TEST (0029)	SOIL SALINITY (0030)	REMARKS
92-269	S-1	0'- 2'	1								1								
	S-2	2'- 4'	1								1								
	S-3	7' - 8.5'	1								1								
	S-4	12' - 13.5'	1																
	S-5	17' - 18.5'	1								1								
	S-6	22' - 23.5'	1																
	S-7	27' - 28.5'	1								1								
	S-8	32' - 34'	1																
	S-9	36' - 38'	1								1								
	S-10	42' - 43.5'	1								1								
	S-11	47' - 49'	1								1								
	S-12	49' - 51'	1								1								
	S-13	53.5' - 55'	1								1								
92-270	S-1	0'- 1.5'	1																
	S-2	5' - 6.5'	1								1								
	S-3	6.5' - 8.5'	1	1	1			1	1		1					1			
	S-4	8.5' - 10'	1								1								
	S-5	13.5' - 15'	1								1								
	S-6	18.5' - 20'	1								1								
	S-7	21.5' - 23'	1								1								
92-271	S-1	0' - 2'	1																
	S-2	5' - 6.5'	1								1								
	S-3	10' - 11.5'	1																
	S-4	15' - 16.5'	1								1								
TOTAL TESTS	THIS PAGE		24	1	1	0	0	1	1	0	18	0	0	0	0	1	0	0	
TOTAL TEST			24	1	1	0	0	1	1	0	18	0	0	0	0	1	0	0	

PROJECT: ARANSAS NATIONAL WILDLIFE REFUGE

TEST ASSIGNMENT SHEET

CONTRACT NO. DACW64-93-M-0385

DATE: 20 MAY 93 ASSIGNED BY: SYED

BORING NO.	SAMPLE NO.	SAMPLE DEPTH	VISUAL CLASSIFICATION TEST (0015)	MOISTURE CONTENT TEST (0016)	UNIT DRY WEIGHT TEST (0017)	UNIT WET WEIGHT TEST (0018)	SPECIFIC GRAVITY OF SOILDS TEST (0019)	LIQUID LIMIT TEST (0020)	PLASTIC LIMIT TEST (0021)	BAR LINEAR SHRINKAGE (0022)	ABBREVIATED MECHANICAL ANALYSIS TEST (0023)	COMPLETE MECHANICAL ANALYSIS TEST (0024)	HYDROMETER ANALYSIS TEST (0025)	STANDARD COMPACTION TEST (0026)	MODIFIED COMPACTION TEST (0027)	UNCONFINED COMPRESSION TEST (0028)	TORVANE SHEAR TEST (0029)	SOIL SALINITY (0030)	REMARKS
92-271	S-5	20' - 21.5'	X 1																
	S-6	25' - 26.5'	1								1								
	S-7	30' - 31.5'	X 1																
	S-8	35' - 36.5	1								1								
	S-9	40 ' - 41.5'	X 1																
	S-10	45' - 46.5'	1								1								
	S-11	49' - 51'	1	1	1			1	1		1					1			
	S-12	51' - 53'	X 1	1															
	S-13	53' - 55'	1	1	1			1	1		1					1			
91-272	S-1	0' - 1.5'	1								1								
	S-2	5' - 6.5'	1								1								
	S-3	10' - 11.5'	1								1								
	S-4	15' - 16.5'	1								1								
	S-5	21' - 22.5'	1								1								
92-273	S-1	0' - 1.5'	1								1								
	S-2	5' - 6.5'	1								1								
	S-3	10' - 11.5'	1								1								
	S-4	15' - 16.5'	1								1								
	S-5	20' - 21.5'	X 1																
	S-6	21.5' - 23	1								1								
92-274	S-1	0' - 1.5'	1								1								
	S-2	5' - 6.5'	X 1																
	S-3	10' - 11.5'	1								1								
TOTAL TESTS	THIS PAGE		23	3	2	0	0	2	2	0	17	0	0	0	0	2	0	0	
TOTAL TEST			47	4	3	0	0	3	3	0	35	0	0	0	0	3	0	0	

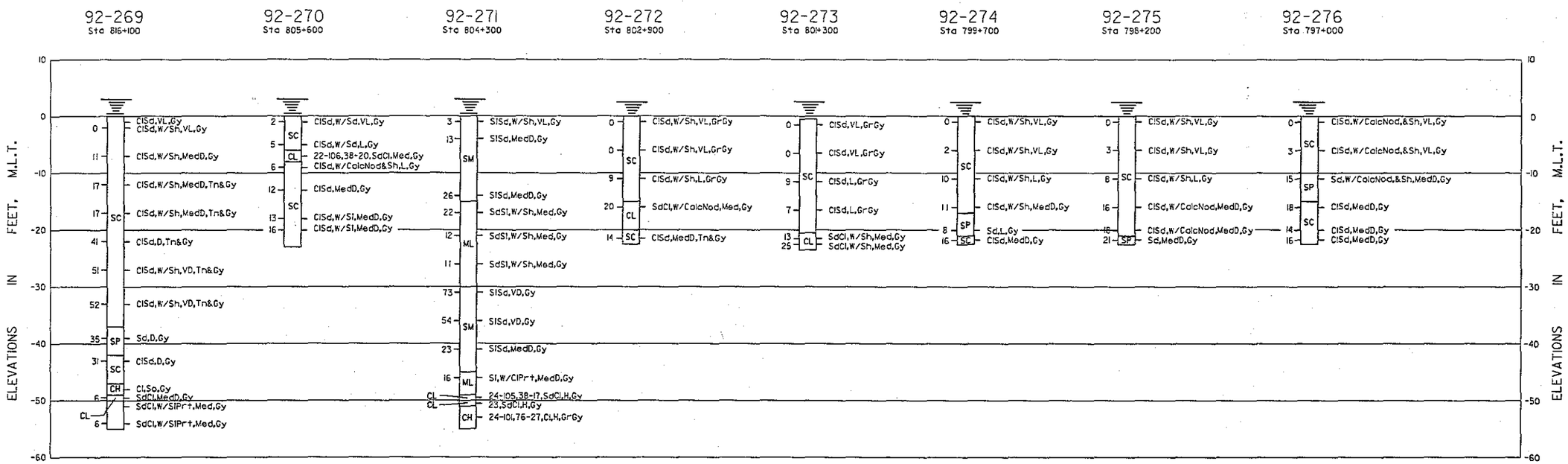
PROJECT: ARANSAS NATIONAL WILDLIFE REFUGE

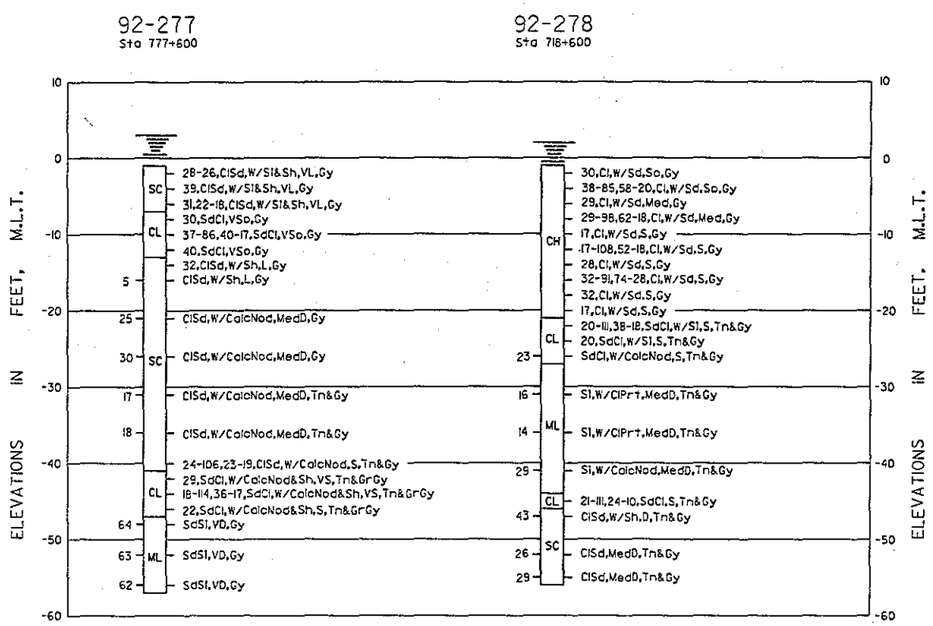
TEST ASSIGNMENT SHEET

CONTRACT NO. DACW64-93-M-0385

DATE: 20 MAY 93 ASSIGNED BY: SYED

BORING NO.	SAMPLE NO.	SAMPLE DEPTH	VISUAL CLASSIFICATION TEST (0015)	MOISTURE CONTENT TEST (0016)	UNIT DRY WEIGHT TEST (0017)	UNIT WET WEIGHT TEST (0018)	SPECIFIC GRAVITY OF SOILDS TEST (0019)	LIQUID LIMIT TEST (0020)	PLASTIC LIMIT TEST (0021)	BAR LINEAR SHRINKAGE (0022)	ABBREVIATED MECHANICAL ANALYSIS TEST (0023)	COMPLETE MECHANICAL ANALYSIS TEST (0024)	HYDROMETER ANALYSIS TEST (0025)	STANDARD COMPACTION TEST (0026)	MODIFIED COMPACTION TEST (0027)	UNCONFINED COMPRESSION TEST (0028)	TORVANE SHEAR TEST (0029)	SOIL SALINITY (0030)	REMARKS
92-271	S-5	20' - 21.5'	X 1																
	S-6	25' - 26.5'	1								1								
	S-7	30' - 31.5'	X 1																
	S-8	35' - 36.5	1								1								
	S-9	40 ' - 41.5'	X 1																
	S-10	45' - 46.5'	1								1								
	S-11	49' - 51'	1	1	1			1	1		1					1			
	S-12	51' - 53'	X 1	1															
	S-13	53' - 55'	1	1	1			1	1		1					1			
91-272	S-1	0' - 1.5'	1								1								
	S-2	5' - 6.5'	1								1								
	S-3	10' - 11.5'	1								1								
	S-4	15' - 16.5'	1								1								
	S-5	21' - 22.5'	1								1								
92-273	S-1	0' - 1.5'	1								1								
	S-2	5' - 6.5'	1								1								
	S-3	10' - 11.5'	1								1								
	S-4	15' - 16.5'	1								1								
	S-5	20' - 21.5'	X 1																
	S-6	21.5' - 23	1								1								
92-274	S-1	0' - 1.5'	1								1								
	S-2	5' - 6.5'	X 1																
	S-3	10' - 11.5'	1								1								
TOTAL TESTS	THIS PAGE		23	3	2	0	0	2	2	0	17	0	0	0	0	2	0	0	
TOTAL TEST			47	4	3	0	0	3	3	0	35	0	0	0	0	3	0	0	





NOTES:

1. SOILS HAVE BEEN CLASSIFIED IN ACCORDANCE WITH MILITARY STANDARD 619B "UNIFIED SOIL CLASSIFICATION SYSTEM FOR ROADS, AIRFIELDS, EMBANKMENTS, AND FOUNDATIONS." CONSISTENCY OF SOILS SUCH AS SOFT, MEDIUM, HARD, LOOSE, DENSE, ETC., ARE RELATIVE TERMS BASED ON ESTIMATED UNDISTURBED SHEAR STRENGTH OF THE MATERIAL AS DETERMINED BY VISUAL CLASSIFICATION POCKET PENETROMETER TESTS AND PENETRATION RESISTANCE DURING SAMPLING.
2. FIGURES TO THE RIGHT OF BORING LOGS ARE WATER CONTENTS IN PERCENT OF THE DRY WEIGHT, DRY DENSITY, LIQUID LIMIT, PLASTIC LIMIT, AND BAR LINEAR SHRINKAGE. (MC-UDW),(LL-PL),(B.L.S.)
3. FIGURES TO THE LEFT OF BORING LOGS ARE BLOWS PER FOOT OF PENETRATION FROM STANDARD PENETRATION TESTING.
4. BORINGS WERE DRILLED USING WET ROTARY DRILLING TECHNIQUES AND UNDISTURBED SAMPLES WHERE RECOVERED WITH A 3-INCH DIAMETER THIN WALL SAMPLER WHERE COHESIVE MATERIALS WERE ENCOUNTERED. WHERE COHESIVE MATERIALS WERE ENCOUNTERED, DISTURBED SAMPLES WERE TAKEN WITH A SPLIT SPOON SAMPLER DURING PERFORMANCE OF STANDARD PENETRATION TESTING.

VISUAL CLASSIFICATIONS

Bn Brown(ish)	Gy Gray(ish)	Sd Sandy)
Calc Calcereous	H Hard	Sh Shell(y)
Cl Clay(ey)	L Loose	Sl Silty
D Dense	Med Medium	Sms Seams
Fer Ferrous	Nod Nodules	So Soft
Frag Fragment(s)	Prt Parting	Tn Tan(ish)
Gr Green(ish)	S Stiff	V Very
		W With

LABORATORY CLASSIFICATION

CH INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS.
CL INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, LEAN CLAYS.
ML INORGANIC SILTS AND VERY FINE SANDS, WITH SLIGHT PLASTICITY.
SC CLAYEY SANDS, SAND-CLAY MIXTURES.
SM SILTY SANDS, SAND-SILT MIXTURES.
SP POORLY GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES.

NOTE:

1. BORING STATIONS ARE APPROXIMATE.
2. ALL BORINGS WERE DRILLED APPROXIMATELY 300 FEET NW. OF CHANNEL CENTERLINE.

GULF INTRACOASTAL WATERWAY, TEXAS
ARANSAS NATIONAL WILDLIFE REFUGE

BORING LOGS

U.S. ARMY ENGINEER DISTRICT, GALVESTON, TEXAS

TO ACCOMPANY
SECTION 216 STUDY
DATED: X