PROJECT NO. 160-93

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

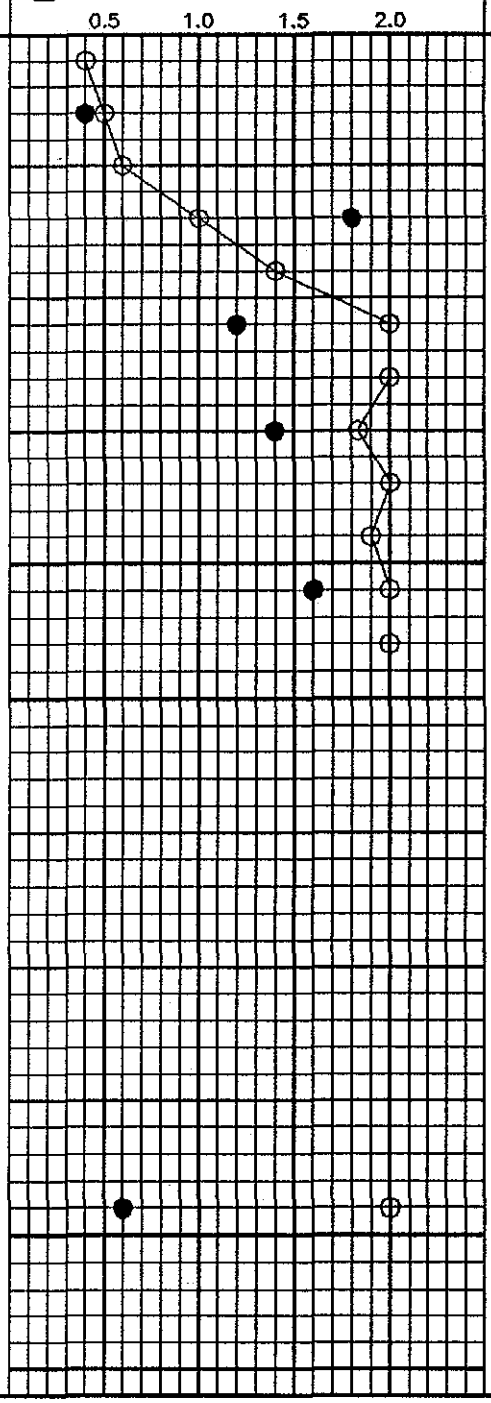
PROJECT ARANSAS WILDLIFE REFUGE BORING 92-278

DATE MAY 13, 1993 TYPE CORE/SPLIT SPOON LOCATION SEE PLAN

DEPTH IN FEET	SYMBOL	CORES	DESCRIPTION MLT = + 2 FEET WATER DEPTH = 3 FEET	BLOWS/FOOT	M.C.%	U.D.W. PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT
0			Soft gray Clay (CH) W/ sand from 0'-4'		30				
			Stiff below 4'		38	85	71	58	20
5			Becomes tan & gray @ 6'		29				
					29	98	94	62	18
					17				
10					17	108	95	52	18
					28				
15					32	91	96	74	28
					32				
					17				
20			Stiff tan & gray Sandy Clay (CL) W/ silt		20	111	80	38	18
					20				
25			W/ calcareous nodules	23			58		
			Firm tan & gray Silt (ML)						
30			W/ clay partings @ 29'-31'	16					
35				14			93		
40			W/ calcareous nodules	29					
			Medium tan & gray Sandy Clay (CL)		21	111	64	24	10
45			Dense tan & gray Clayey Sand (SC) W/ shell	43					
50									

COMPRESSIVE STRENGTH, TSF

○ POCKET PENETROMETER
△ CONFINED COMPRESSION
● UNCONFINED COMPRESSION
□ TORVANE



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

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

PROJECT 160-93 ARANSAS REFUGE DATE 5-13-93 BORING NO. 92-278

N= No recovery C= Undisturbed core
P= Penetration test A= Auger

	Dph. in Ft.	Type	Pen Rdg	Blow Ft	Description of Stratum
					MLT = 2'
					water level = 3'
	0				
S-1		C	.75		0-6' G SICL Firm @ 0'-2'
S-2		C	1.00		Stiff
S-3	-5-	C	1.25		"
S-4		C	2.0		6'-10' G+T SICL
S-5		C	2.75		Stiff
	-10-				10'-18' TAG SICL calcned.
S-6		C	4.0		Very stiff
S-7		C	4.0		
S-8	-15-	C	3.50		
S-9		C	4.0		
S-10		C	3.25		18'-24' G SICL
	-20-				Very stiff
S-11		C	4.0		
S-12		C	4.0		
S-13	-25-	P		7/10/15	24'-43' G SP Medium Dense
					Tan
	29				
	-30-	P		5/6/10	Tan
					"
					Layers of G+T CLSA 2"-3"
S-15	-35-	P		6/7/7	Tan
S-16	-40-	P		7/3/7	Tan
					SA Stone Layers ½"-1"

GEAREN ENTERPRISES

PROJECT 160-93 ARANSAS REFUGE DATE 5-13-93 BORING NO. 92-278

N= No recovery C= Undisturbed core
P= Penetration test A= Auger

Dph. in Ft.	Type	Pen Rdg	Blow Ft	Description of Stratum
40				
S17	C	4.0		43-45' V. Stiff G SACC Layers SA
S18 45	P		12/24/19	45'-53½ Jar G SA + shell SA stone Dense
S19 50	P		12/14/12	Jar Medin dense
S20 55	P		10/12/17	Jar M. Dense 53½-55 Green + G SA Shell

Bottom 55'

weather = sunny 80°

Rig = D+R 75

Driller = Dempsey Gearen

Logger = Channell Gearen

PROJECT NO. 160-93

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

PROJECT ARANSAS WILDLIFE REFUGE BORING 92-278

DATE MAY 13, 1993 TYPE SPLIT SPOON 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) 0.5 1.0 1.5 2.0	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT
			Boring Continued							
50		X	Firm gray Clayey Sand (SC)	26				32		
		X		29						
55			Bottom @ 55'							

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

TABLE A.3

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, %
92-275	21-22.5										10		
92-276	0-1.5										17		
	10-11.5										11		
	19.5-21										13		
	21-22.5										17		
92-277	0- 2	28									26		
	2- 4	39											
	4- 6	31						22	18	4	36		
	6- 8	30											
	8-10	37	86					40	17	23	52		
	10-12	40											
	12-14	32									25		
	38-40	24	106	0.56				23	19	4	40		
	40-42	29											
	42-44	18	114	1.74				36	17	19	60		
	44-46	22											
	51-52.5										71		
92-278	0- 2	30											
	2- 4	38	85	0.39				58	20	38	71		
	4- 6	29											

TABLE A.4

AVILES ENGINEERING CORP.
GEOTECHNICAL ENGINEERS

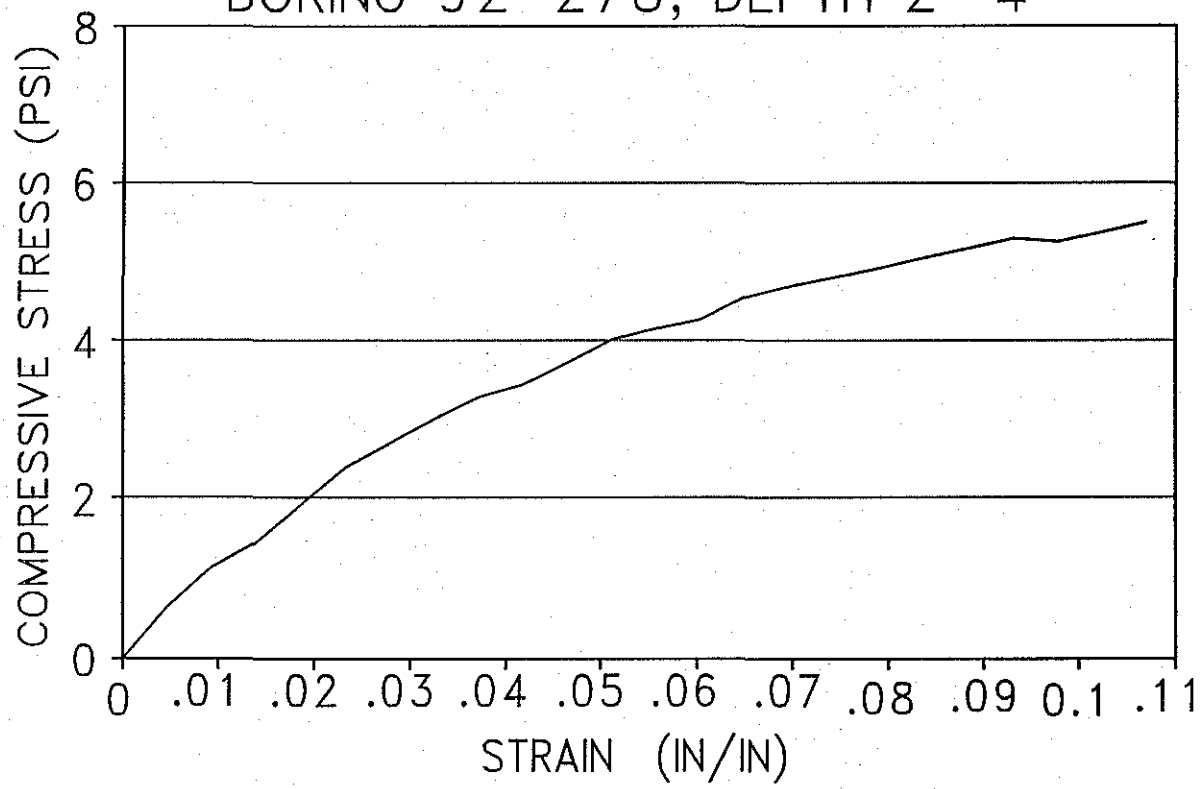
SUMMARY OF LABORATORY TEST DATA

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, %
92-278	6- 8	29	98	1.53				62	18	44	94		
	8-10	17											
	10-12	17	108	1.22				52	18	34	95		
	12-14	28											
	14-16	32	91	1.44				74	28	46	96		
	16-18	32											
	18-20	17											
	20-22	20	111	1.66				38	18	20	80		
	22-24	20											
	24-26										58		
	34-35.5										93		
	43-45	21	111	0.62				24	14	10	64		
	50-51.5										32		

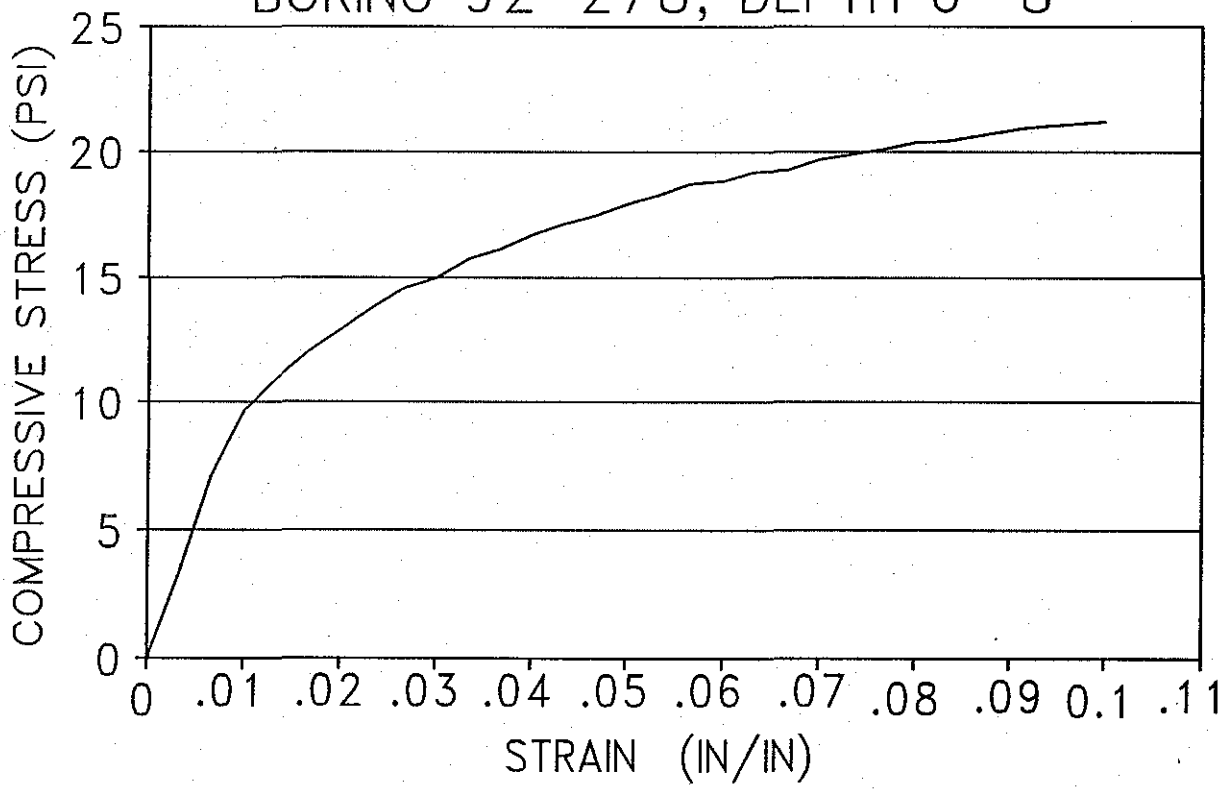
AVILES ENGINEERING CORP.

TABLE C.6
UNCONFINED COMPRESSION TEST
BORING 92-278; DEPTH 2'-4'



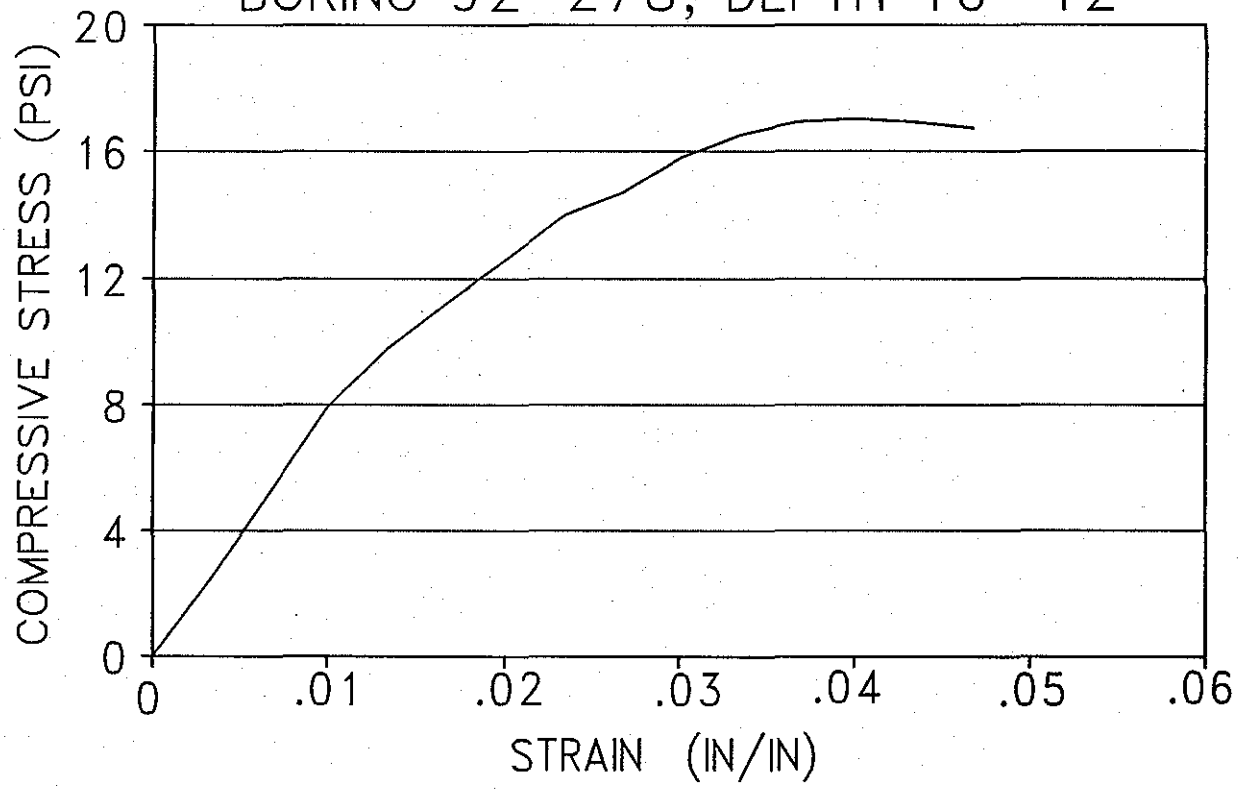
AVILES ENGINEERING CORP.

TABLE C.7
UNCONFINED COMPRESSION TEST
BORING 92-278; DEPTH 6'-8'



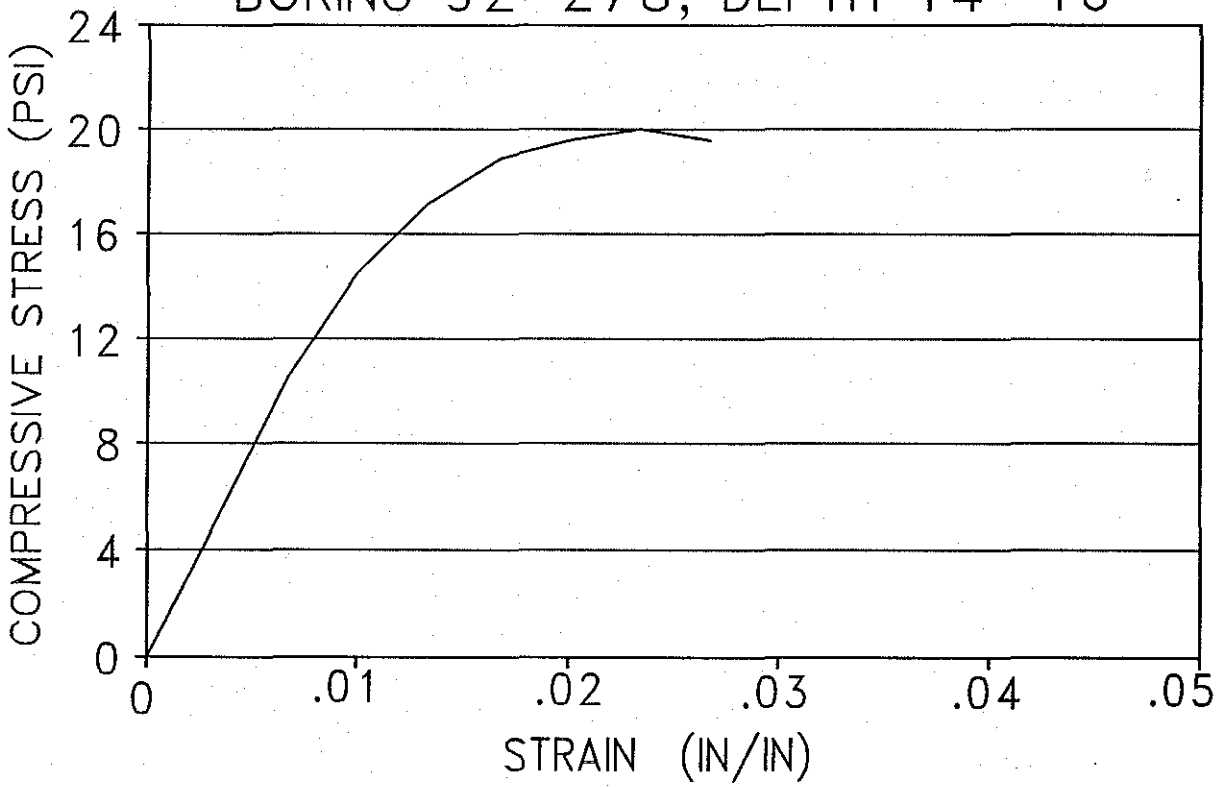
AVILES ENGINEERING CORP.

TABLE C.8
UNCONFINED COMPRESSION TEST
BORING 92-278; DEPTH 10'-12'



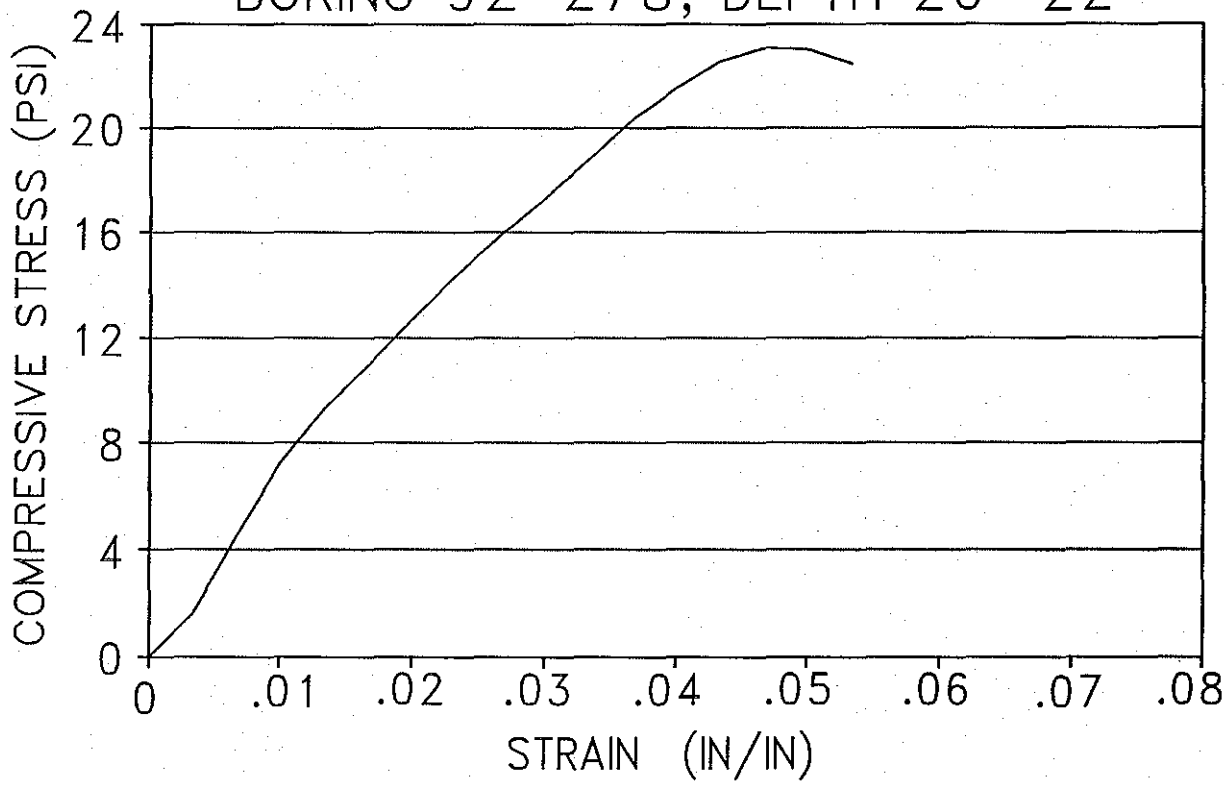
AVILES ENGINEERING CORP.

TABLE C.9
UNCONFINED COMPRESSION TEST
BORING 92-278; DEPTH 14'-16'



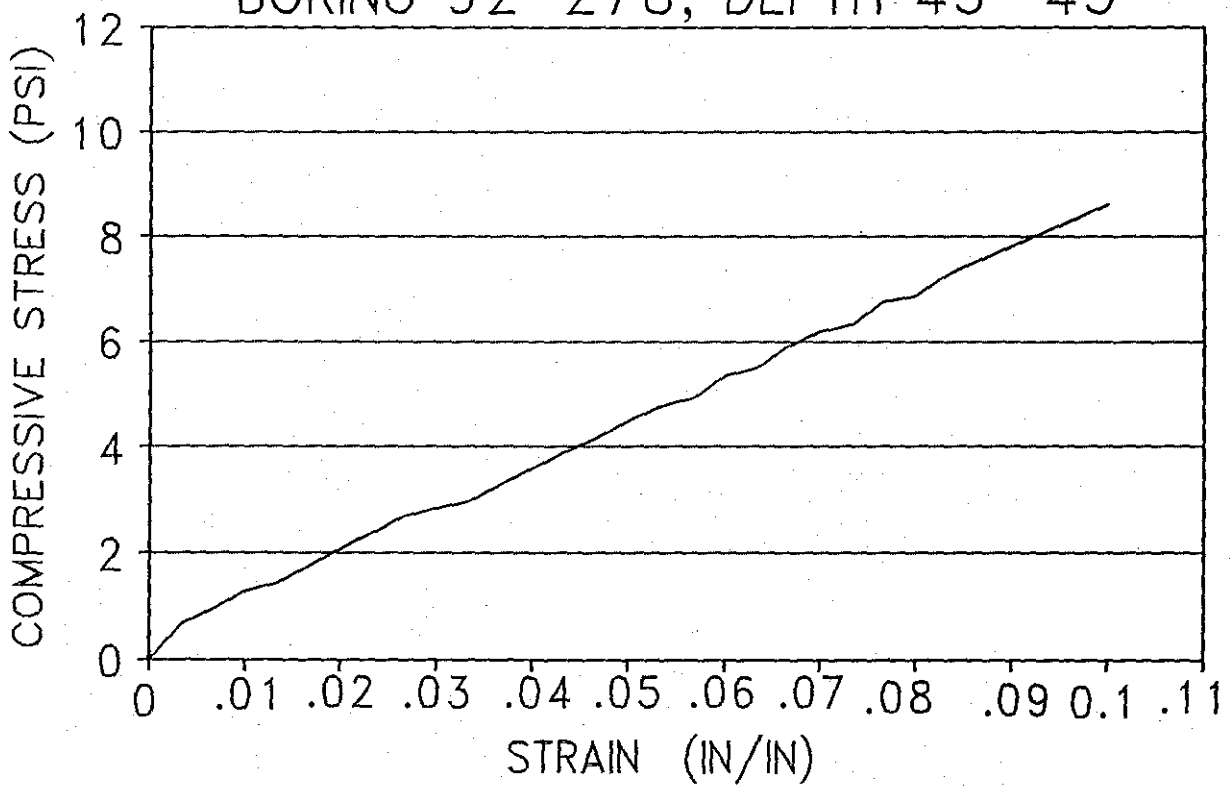
AVILES ENGINEERING CORP.

TABLE C.10
UNCONFINED COMPRESSION TEST
BORING 92-278; DEPTH 20'-22'



AVILES
ENGINEERING CORP.

TABLE C.11
UNCONFINED COMPRESSION TEST
BORING 92-278; DEPTH 43'-45'



AVILES ENGINEERING CORP.

TABLE B.53

PROJECT: ARANSAS WILDLIFE REFUGE
PROJECT NO.: 160-93
BORING NO.: 92-278 **DEPTH:** 2 - 4 FEET

SEIVE ANALYSYS

SIEVE NO.	PERCENT PASSING
4	100
10	100
40	98
100	77
200	71

AVILES ENGINEERING CORP.

TABLE B.54

PROJECT: ARANSAS WILDLIFE REFUGE
PROJECT NO.: 160-93
BORING NO.: 92-278 **DEPTH:** 6 - 8 FEET

SEIVE ANALYSYS

SIEVE NO.	PERCENT PASSING
4	100
10	100
40	99
100	97
200	94

AVILES ENGINEERING CORP.

TABLE B.55

PROJECT: ARANSAS WILDLIFE REFUGE
PROJECT NO.: 160-93
BORING NO.: 92-278 **DEPTH:** 10 - 12 FEET

SEIVE ANALYSYS

SIEVE NO.	PERCENT PASSING
4	100
10	100
40	100
100	97
200	95

AVILES ENGINEERING CORP.

TABLE B.56

PROJECT: ARANSAS WILDLIFE REFUGE
PROJECT NO.: 160-93
BORING NO.: 92-278 **DEPTH:** 14 - 16 FEET

SEIVE ANALYSYS

SIEVE NO.	PERCENT PASSING
4	97
10	96
40	96
100	96
200	96

AVILES ENGINEERING CORP.

TABLE B.57

PROJECT: ARANSAS WILDLIFE REFUGE
PROJECT NO.: 160-93
BORING NO.: 92-278 **DEPTH:** 20 - 22 FEET

SEIVE ANALYSYS

SIEVE NO.	PERCENT PASSING
4	100
10	99
40	97
100	90
200	80

AVILES ENGINEERING CORP.

TABLE B.58

PROJECT: ARANSAS WILDLIFE REFUGE
PROJECT NO.: 160-93
BORING NO.: 92-278 **DEPTH:** 24 - 26 FEET

SEIVE ANALYSYS

SIEVE NO.	PERCENT PASSING
4	100
10	100
40	100
100	74
200	58

AVILES ENGINEERING CORP.

TABLE B.59

PROJECT: ARANSAS WILDLIFE REFUGE
PROJECT NO.: 160-93
BORING NO.: 92-278 **DEPTH:** 34 - 35.5 FEET

SEIVE ANALYSYS

SIEVE NO.	PERCENT PASSING
4	97
10	96
40	96
100	96
200	93

AVILES ENGINEERING CORP.

TABLE B.60

PROJECT: ARANSAS WILDLIFE REFUGE
PROJECT NO.: 160-93
BORING NO.: 92-278 **DEPTH:** 43 - 45 FEET

SEIVE ANALYSYS

SIEVE NO.	PERCENT PASSING
4	98
10	97
40	96
100	73
200	64

AVILES ENGINEERING CORP.

TABLE B.61

PROJECT: ARANSAS WILDLIFE REFUGE
PROJECT NO.: 160-93
BORING NO.: 92-278 **DEPTH:** 50 - 51.5 FEET

SEIVE ANALYSYS

SIEVE NO.	PERCENT PASSING
4	79
10	70
40	65
100	40
200	32

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

PROJECT 160-93 ARANSAS REFUGE DATE 5-13-93 BORING NO. 92-278

N= No recovery C= Undisturbed core
P= Penetration test A= Auger

	Dph. in Ft.	Type	Pen Rdg	Blow Ft	Description of Stratum
					MLT = 2'
					water level = 3'
	0				
S-1		C	.75		0-6' G SICL Firm @ 0'-2'
S-2		C	1.00		Stiff
S-3	-5-	C	1.25		"
S-4		C	2.0		6'-10' G+T SICL
S-5		C	2.75		Stiff
	-10-				10'-18' TAG SICL calcned.
S-6		C	4.0		Very stiff
S-7		C	4.0		
S-8	-15-	C	3.50		
S-9		C	4.0		
S-10		C	3.25		18'-24' G SICL
	-20-				Very stiff
S-11		C	4.0		
S-12		C	4.0		
S-13	-25-	P		7/10/15	24'-43' G SP Medium Dense
					Tan
	29				
	-30-	P		5/6/10	Tan
					"
					Layers of G+T CLSA 2"-3"
S-15	-35-	P		6/7/7	Tan
S-16	-40-	P		7/3/7	Tan
					SA Stone Layers ½"-1"

GEAREN ENTERPRISES

PROJECT 160-93 ARANSAS REFUGE DATE 5-13-93 BORING NO. 92-278

N= No recovery C= Undisturbed core
P= Penetration test A= Auger

Dph. in Ft.	Type	Pen Rdg	Blow Ft	Description of Stratum
40				
S17	C	4.0		43-45' V. Stiff G SACC Layers SA
S18 45	P		12/24/19	45'-53½ Jar G SA + shell SA stone Dense
S19 50	P		12/14/12	Jar Medin dense
S20 55	P		10/12/17	Jar M. Dense 53½-55 Green + G SA Shell

Bottom 55'

weather = sunny 80°

Rig = D+R 75

Driller = Dempsey Gearen

Logger = Channell Gearen

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
92-277	S-9	19' - 20.5'	X 1																
	S-10	24' - 25.5'	X 1																
	S-11	29' - 30.5'	X 1																
	S-12	34' - 35.5'	X 1																
	S-13	38' - 40'	1	1	1			1	1		1					1			
	S-14	40' - 42'	1	1															
	S-15	42' - 44'	1	1	1			1	1		1					1			
	S-16	44' - 46'	1	1															
	S-17	46' - 47.5'	X 1																
	S-18	51' - 52.5'	X 1								1								
	S-19	54.5' - 56'	1																
92-278	S-1	0' - 2'	1	1															
	S-2	2' - 4'	1	1	1			1	1		1					1			
	S-3	4' - 6'	1	1															
	S-4	6' - 8'	1	1	1			1	1		1					1			
	S-5	8' - 10'	1	1															
	S-6	10' - 12'	1	1	1			1	1		1					1			
	S-7	12' - 14'	1	1															
	S-8	14' - 16'	1	1	1			1	1		1					1			
	S-9	16' - 18'	1	1															
	S-10	18' - 20'	1	1															
	S-11	20' - 22'	1	1	1			1	1		1					1			
	S-12	22' - 24'	1	1															
	S-13	24' - 26'	1								1								
	S-14	29' - 30.5'	X 1																
	S-15	34' - 35.5'	1								1								
TOTAL TESTS	THIS PAGE		26	16	7	0	0	7	7	0	10	0	0	0	0	7	0	0	
TOTAL TESTS			96	27	11	0	0	12	10	0	59	0	0	0	0	10	0	0	0

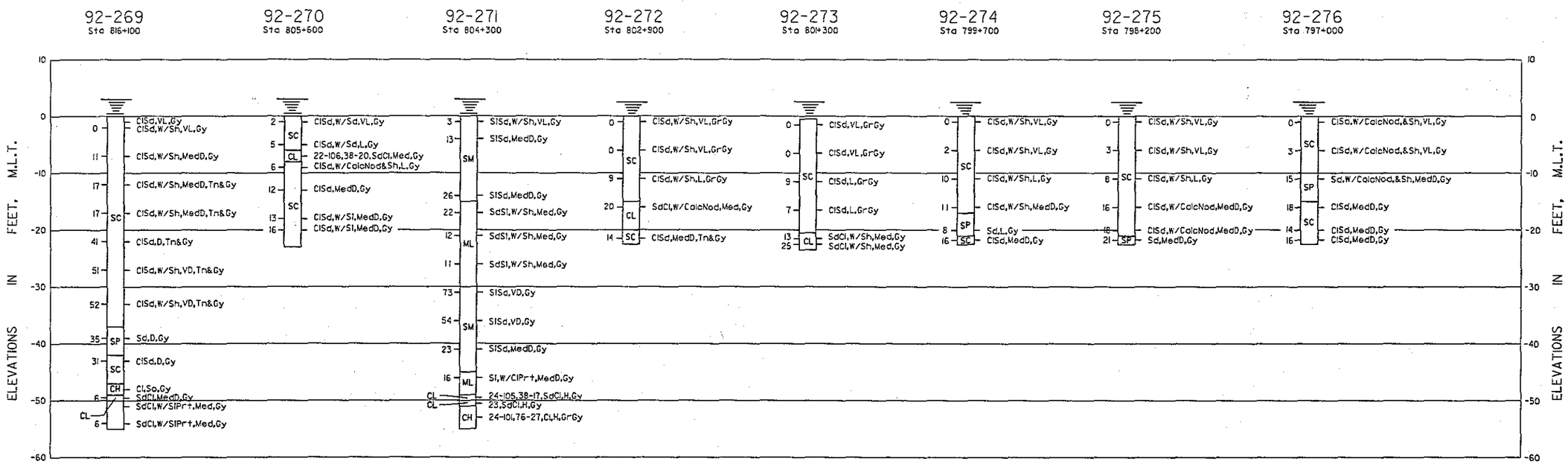
PROJECT: ARANSAS NATIONAL WILDLIFE REFUGE

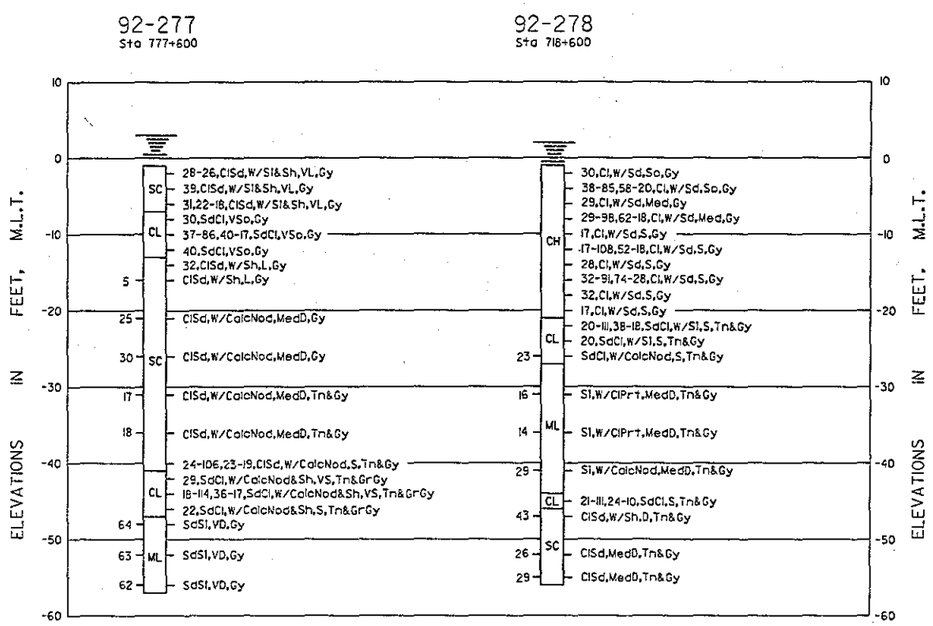
TEST ASSIGNMENT SHEET

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
92-278	S-16	39' - 40.5'	X 1																
	S-17	43' - 45'	1	1	1			1	1		1					1			
	S-18	45' - 46.5'	X 1																
	S-19	50' - 51.5'	1								1								
	S-20	53.5' - 55'	X 1																
TOTAL TESTS	THIS PAGE		5	1	1	0	0	1	1	0	2	0	0	0	0	1	0	0	
TOTAL TESTS			101	28	12	0	0	13	11	0	61	0	0	0	0	11	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