Appendix B contains discussions of analytical procedures used in our engineering analyses. Appendix C contains a positioning report by Fugro Chance, Inc., of Lafayette, Louisiana.

For the purposes of discussion and presentation, "driven pipe pile" is used in this report to represent foundation piles, caissons and conductors, unless otherwise specified.

2.2 FIELD AND LABORATORY INVESTIGATIONS

The field investigation was performed on June 26 through 28, 2008, from the R/V *Seaprobe*. The soil conditions were determined by performing four exploratory borings, two at each SPM location with one boring at a selected anchor leg location, and one boring at the proposed PLET location. Enterprise Field Services selected the boring locations. These borings were drilled to a penetration of 131-ft below mudline. The water depths at the boring locations ranged from 110 to 113 ft. A chronological summary of field operations is presented in Appendix A.

2.2.1 Exploratory Borings

FMMG personnel drilled the soil borings with a DMX drill rig positioned over the centerwell of the R/V *Seaprobe*. The vessel was anchored at the boring location by a 4-point mooring system. Soil conditions at the site were explored by drilling a group of four soil borings to 131-ft penetration below the seafloor. The final coordinates for the boring locations are presented in Table 2-1. A plan of borings within Block A-36, of the Galveston Area is presented on Plate 2-1. Fugro Chance, Inc., of Lafayette, Louisiana, conducted surveying utilizing STARFIX and DGPS, and performed a 360-degree scanning sonar survey. The positioning report, prepared by Fugro Chance, is presented in Appendix C. The scanning sonar reports are available from Fugro Chance upon request.

Table 2-1: Final Boring Coordinates
(Texas South Central Zone Coordinates)

FMMG Boring Designation	Fugro Chance Boring Designation	Proposed Boring Coordinates	Final Boring Coordinates	Boring Termination Depth (ft)
SPM #1 PLET	Core 3	X = 3,276,605.26 ft Y = 265,296.65 ft	X = 3,276,615 ft Y = 265,270 ft	131
SPM #1 Anchor Leg #2	Core 1	X = 3,275,201.70 ft Y = 264,859.70 ft	X = 3,275,180 ft Y = 264,853 ft	131
SPM #2 PLET	Core 4	X = 3,283,609.94 ft Y = 269,139.12 ft	X = 3,283,617 ft Y = 269,118 ft	131
SPM #2 Anchor Leg #6	Core 2	X = 3,284,713.02 ft Y = 270,110.77 ft	X = 3,284,733 ft Y = 270,117 ft	131

Samples were obtained through 5.0-in.-OD, 4.5-in.-IF drill pipe at all the locations. Samples were spaced at 3-ft intervals to 20-ft penetration, at 5-ft intervals to 68-ft penetration, and at 10-ft intervals thereafter to the final boring depth at all the locations, except at the SPM #2 PLET location. Sampling intervals at the SPM #2 PLET location was completed as follows: 3-ft intervals to 23-ft penetration, 5-ft intervals to 71-ft penetration, and 10-ft intervals thereafter to the final boring depth. Additionally, a 5-ft

shallow boring, designated as Core 4A by Fugro Chance, was drilled at the SPM #2 PLET location to allow re-sampling. The drilling and sampling techniques used to complete these borings are explained in detail in Appendix A.

Two water depths were measured at each boring location using a seafloor sensor seated in the drill bit. The water depth measurements are tabulated in Table 2-2. These water depth measurements are intended for the purpose of the geotechnical investigation only, and are not corrected for tidal or other variations. If utilized for other purposes, the water depth measurement should be adjusted to account for meteorological tide and datum corrections. The water depth measuring procedures are explained in detail in Appendix A.

Table 2-2: Measured Water Depths

Boring Designation	Water Depth (ft)	Time and Date of Measurement	Supplemental Water Depth (ft)	Time and Date of Measurement
SPM #1 PLET	112	1630 hours on June 27, 2008	113	2245 hours on June 27, 2008
SPM #1 ANCHOR LEG #2	113	2400 hours on June 26, 2008	113	0605 hours on June 27, 2008
SPM #2 PLET	112	0250 hours on June 28, 2008	112	1030 hours on June 28, 2008
SPM #2 ANCHOR LEG #6	110	1450 hours on June 28, 2008	111	2105 hours on June 28, 2008

2.2.2 Field and Laboratory Tests

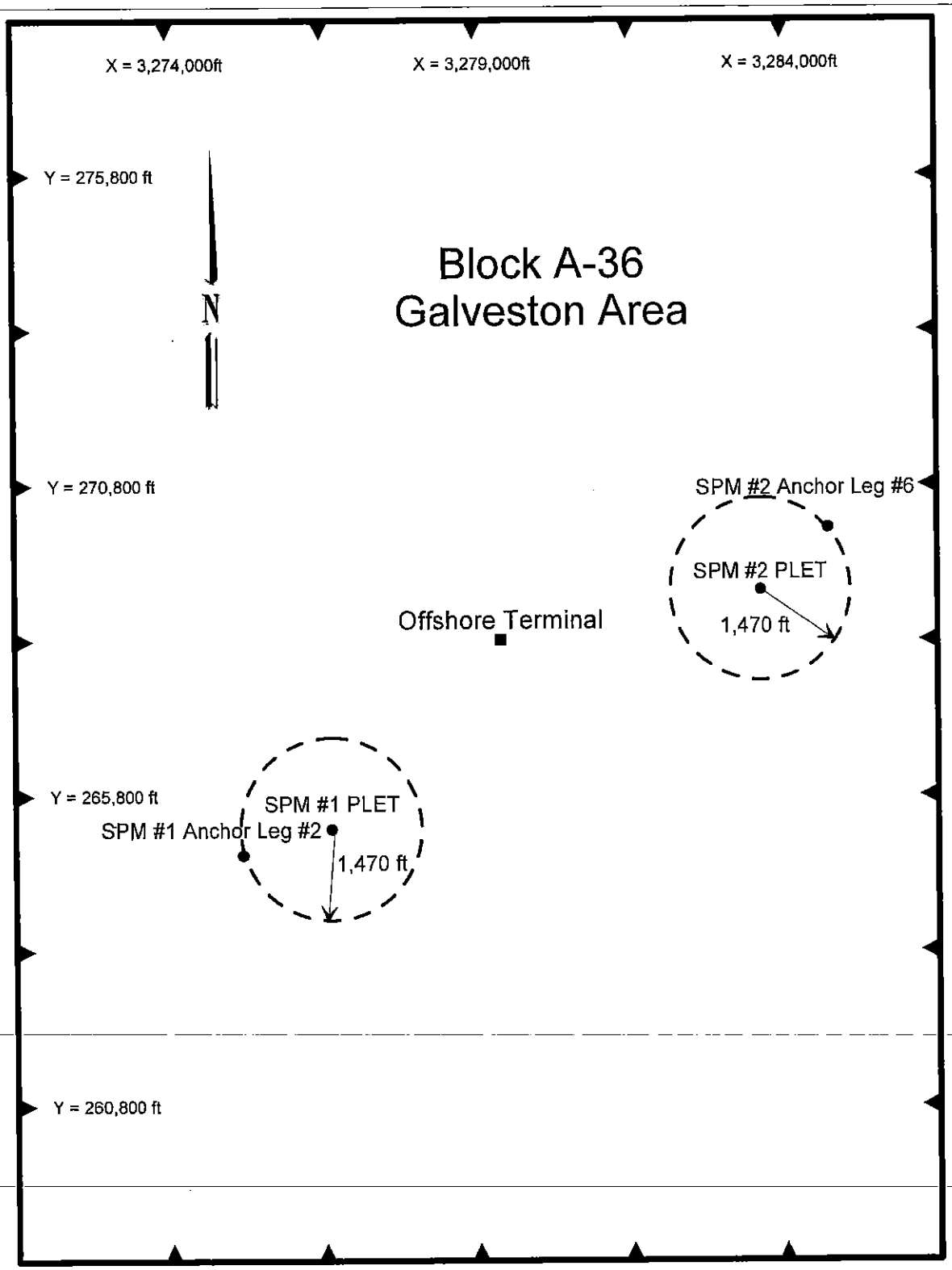
The soil testing program was designed to evaluate pertinent index and engineering properties of the foundation soils. During the field operation, all samples were extruded from the sampler and classified by the soil technician or field engineer. Unit weight, Torvane, pocket penetrometer, miniature vane and unconsolidated-undrained triaxial compression tests were performed in the field on selected cohesive samples. All of the samples were shipped to Fugro's Houston laboratory where Atterberg limit tests, water content tests, and grain-size analyses, as well as additional density tests, unconsolidated-undrained triaxial compression tests, and miniature vane tests, were performed.

A description of relevant laboratory procedures is provided in Appendix A. The strength and classification test results are presented graphically on the Logs of Boring and Test Results in Section 3. Grain-size distribution curves from sieve-analyses and stress-strain curves from triaxial compression tests are presented in Appendix A.

2.3 GENERAL SOIL CONDITIONS

2.3.1 Soil Stratigraphy

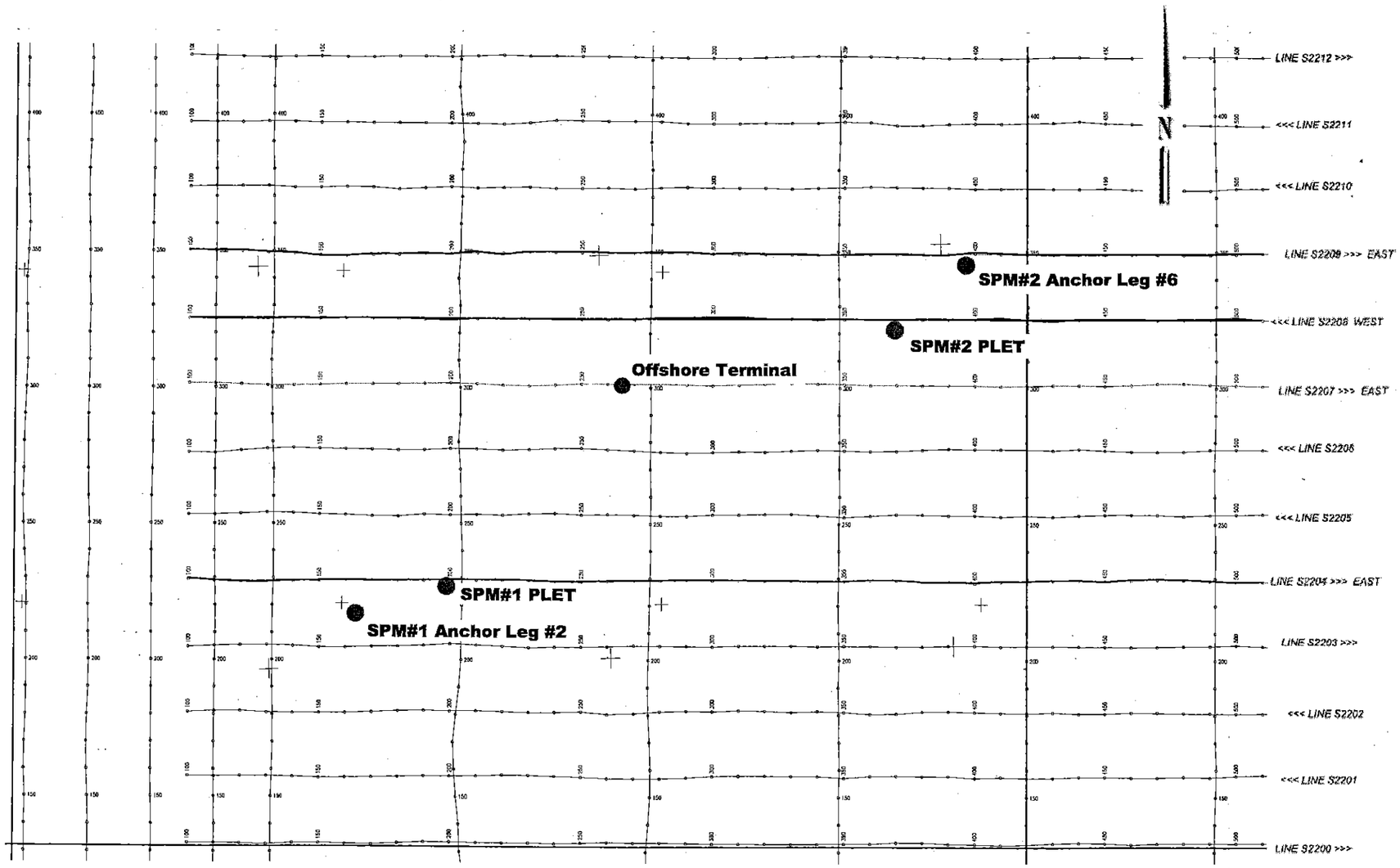
The soil stratigraphy at each of the boring locations disclosed by the field and laboratory investigation is presented in Section 3. The soil stratigraphy is based on the classification of soil samples



Projection: Texas South Central Zone Coordinates

PLAN OF BORINGS

Texas Offshore Port System, Offshore Terminal Location
Block A-36, Galveston Area



MAP OF SOIL BORINGS AND SUBBOTTOM PROFILE LINES

Texas Offshore Port System

Block A-36, Galveston Area

3.2 SPM #1 ANCHOR LEG #2 LOCATION

3.2.1 Introduction

The field investigation at the location designated as SPM #1 ANCHOR LEG #2 was performed on June 26 and 27, 2008. Soil sampling was performed to 131-ft penetration at Texas South Central Zone Coordinates X = 3,275,180 ft and Y = 264,853 ft. The measured water depth was 113 ft.

3.2.2 Soil Stratigraphy

The soil stratigraphy disclosed by the field and laboratory investigations is presented on the boring log, Plate 3-12. The soil stratigraphy is based on the classification of soil samples recovered from the boring and observations made during drilling operations. A generalized summary of the major soil strata is tabulated below.

Stratum	Penetration, ft From	To	Description
I	0	5	Very soft lean clay
II	5	11	Loose to medium dense silty fine sand interlayered with firm to stiff clay
III	11	28	Medium dense sandy silt to silty fine sand
IV	28	48	Firm lean clay interlayered with medium dense sand
V	48	131	Stiff to very stiff clay

Detailed soil descriptions that include textural variations and inclusions are noted on the boring log. A key to the terms and symbols used on the boring log is presented on Plate 2-2. The Roman numeral representing each stratum is also shown on the boring log and on relevant plates. The variation in soil stratigraphy across this site is indicated in a comparison (integration) of the geophysical and geotechnical soil information presented on Plate 3-13.

3.2.2.1 Interpretation of Soil Properties

The shear strength and submerged unit weight profiles shown on Plates 3-14 and 3-15, respectively, best represent the assembled test results plotted on the boring log. These profiles were used in the engineering analyses.

3.2.3 Pile Design Information

The pile design information developed for this study includes ultimate axial capacities, axial load-pile movement data, and lateral soil resistance-pile deflection (p-y) characteristics. The analytical methods used to develop this information are presented briefly in Section 2.5 and in more detail in Appendix B.

3.2.3.1 Axial Pile Design

Ultimate Axial Capacity. The unit skin friction and unit end bearing values plotted on Plates 3-16 and 3-17, respectively, was calculated using the API RP 2A methods described in Appendix B. These values were used to calculate the ultimate axial compressive and tensile capacities for 42-in.-diameter pipe piles, driven to final penetration at the boring location. Capacity curves for driven pipe piles (conductors, caissons and foundation piles) are presented on Plate 3-18.

API RP 2A recommends that pile penetrations be selected using appropriate factors of safety or pile resistance factors. These factors are discussed in Section 2.5.1 of this report.

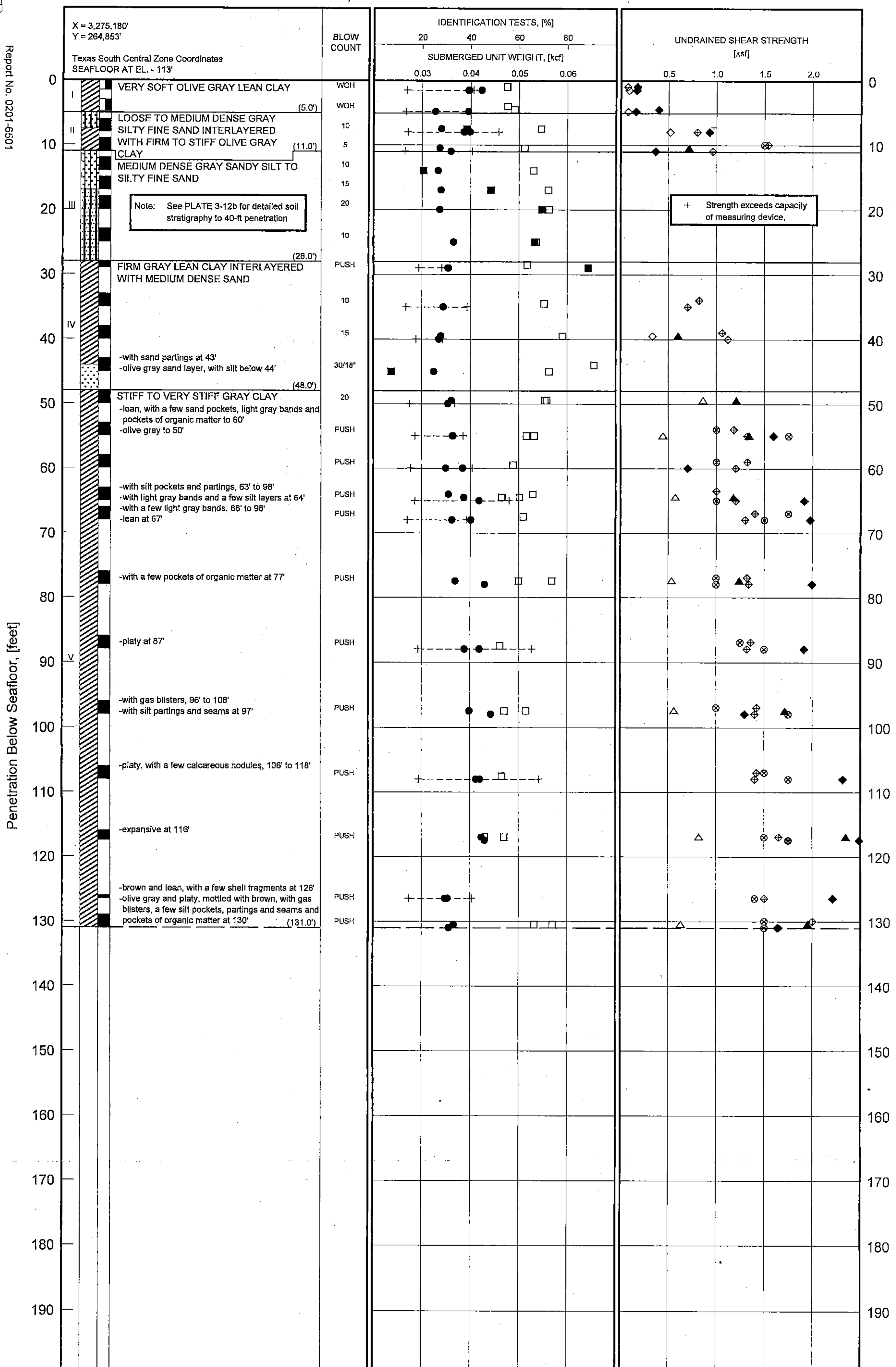
Axial Load Transfer Data. Axial load-pile movement analyses are usually performed using a computer solution based on methods developed by Reese (1964) or Matlock, et al. (1976). Plates 3-19 and 3-20 present the results as side load-side movement (t-z) and tip load-tip movement (Q-z) data for 42-in.-diameter driven pipe piles, respectively. The Q-z data should be used for foundation piles and neglected for caissons and conductor design. In developing the axial load transfer data in the cohesive soils, a post-peak adhesion ratio of 0.90 was utilized.

3.2.3.2 Lateral Pile Design Data

The soil resistance-pile deflection (p-y) characteristics of the soils at the boring location were developed for individual 42-in.-diameter driven pipe piles. These data may be used in lateral load analyses of driven piles, conductors and caissons. The p-y data for cyclic loading were developed to 100-ft penetration using procedures that have been outlined in API RP 2A and briefly explained in Appendix B. The stratigraphy and parameters used to develop the p-y data are presented on Plate 3-21. The p-y data for 42-in.-diameter driven pipe piles are presented on Plate 3-22. P-y values presented at 100-ft penetration may be used for lateral load analyses at greater depths.

Checked By: AB Date: 7/2/08
Approved By: DA Date: 9/3/08

Drawn By: AW Date: 9/2/08



SAMPLING TECHNIQUES

Number of blows of a 175-lb weight (hammer) dropped approximately 5 ft to produce a maximum of 24 in. of penetration of a 2.25-in.-OD, 2.125-in.-ID thin-walled tube sampler. "PUSH" denotes a 3.00-in.-OD, 2.83-in.-ID thin-walled tube sampler was advanced 24 in. with the weight of the drill string. "WOH" denotes a 2.50-in.-OD, 2.125-in.-ID liner sampler was advanced 24 in. with the weight of the hammer.

CLASSIFICATION TESTS

- ▼ SOLUBILITY IN HCL, [%]
- ■ PERCENT PASSING -200 SIEVE, [%]
- ● WATER CONTENT (W), [%]
- □ SUBMERGED UNIT WEIGHT (SUW)

PLASTIC LIMIT (PL) + – – – – – – – – – – + LIQUID LIMIT (LL)

STRENGTH TESTS

- ⊗ POCKET PENETROMETER (PP)
- ⊕ TORVANE (TV)
- ◇ REMOTE VANE (RV)
- ◆ MINIATURE VANE (MV) (◇ RESIDUAL (MVres) VALUE)
- ▲ UNCONSOLIDATED UNDRAINED TRIAXIAL (UU)

(Open symbols indicate remolded (r) tests)

LOG OF BORING AND TEST RESULTS

Texas Offshore Port System, SPM #1 Anchor Leg #2
Block A-36, Galveston Area

Checked By: MS Date: 8/20/08

Approved By: DL Date: 9/26/08

Drawn By: f Date: 8/20

Report No. 0201-6501

X = 3,275,180'
Y = 264,853'

Texas South Central Zone Coordinates
SEAFLOOR AT EL. - 113'

Penetration Below Seafloor, [feet]			BLOW COUNT
0	I	VERY SOFT OLIVE GRAY LEAN CLAY -with sand pockets and a few shell fragments	WOH
		-mottled with brownish yellow at 3'	WOH
5		(5.0')	
	II	LOOSE TO MEDIUM DENSE GRAY SILTY FINE SAND INTERLAYERED WITH FIRM TO STIFF OLIVE GRAY CLAY -with clay partings to 7'	10
		-brownish yellow at 7'	
10		-mottled with brownish yellow, with sand pockets and partings at 8'	5
		(11.0')	
		-lean below 9'	
	III	MEDIUM DENSE GRAY SANDY SILT TO SILTY FINE SAND -with many shells and shell fragments to 14'	10
15		-with a few shell fragments at 16'	15
		-with a few clay pockets and pockets of organic matter at 19'	20
20			
		-with a few shell fragments at 24'	10
25		(28.0')	
	IV	FIRM GRAY LEAN CLAY INTERLAYERED WITH MEDIUM DENSE SAND -with sand pockets to 29'	PUSH
30			
		-with a few shell fragments at 34'	10
35			
			15
40			

IDENTIFICATION TESTS, [%]

20 40 60 80

SUBMERGED UNIT WEIGHT, [kcf]

0.03 0.04 0.05 0.06

UNDRAINED SHEAR STRENGTH [ksf]

0.3 0.6 0.9 1.2

(1.54, 10.0)

+ Strength exceeds capacity of measuring device.

Penetration Below Seafloor, [feet]

0 5 10 15 20 25 30 35 40

SAMPLING TECHNIQUES

Number of blows of a 175-lb weight (hammer) dropped approximately 5 ft to produce a maximum of 24 in. of penetration of a 2.25-in.-OD, 2.125-in.-ID thin-walled tube sampler. "PUSH" denotes a 3.00-in.-OD, 2.83-in.-ID thin-walled tube sampler was advanced 24 in. with the weight of the drill string. "WOH" denotes a 2.50-in.-OD, 2.125-in.-ID liner sampler was advanced 24 in. with the weight of the hammer.

CLASSIFICATION TESTS

- ▼ SOLUBILITY IN HCL, [%]
- ■ PERCENT PASSING #200 SIEVE, [%]
- ● WATER CONTENT (W), [%]
- □ SUBMERGED UNIT WEIGHT (SUW)

PLASTIC LIMIT (PL) LIQUID LIMIT (LL)

STRENGTH TESTS

- ⊗ POCKET PENETROMETER (PP)
- ⊕ TORVANE (TV)
- ◇ REMOTE VANE (RV)
- ◆ MINIATURE VANE (MV) (⊕ RESIDUAL (MVres) VALUE)
- ▲ UNCONSOLIDATED UNDRAINED TRIAXIAL (UU)

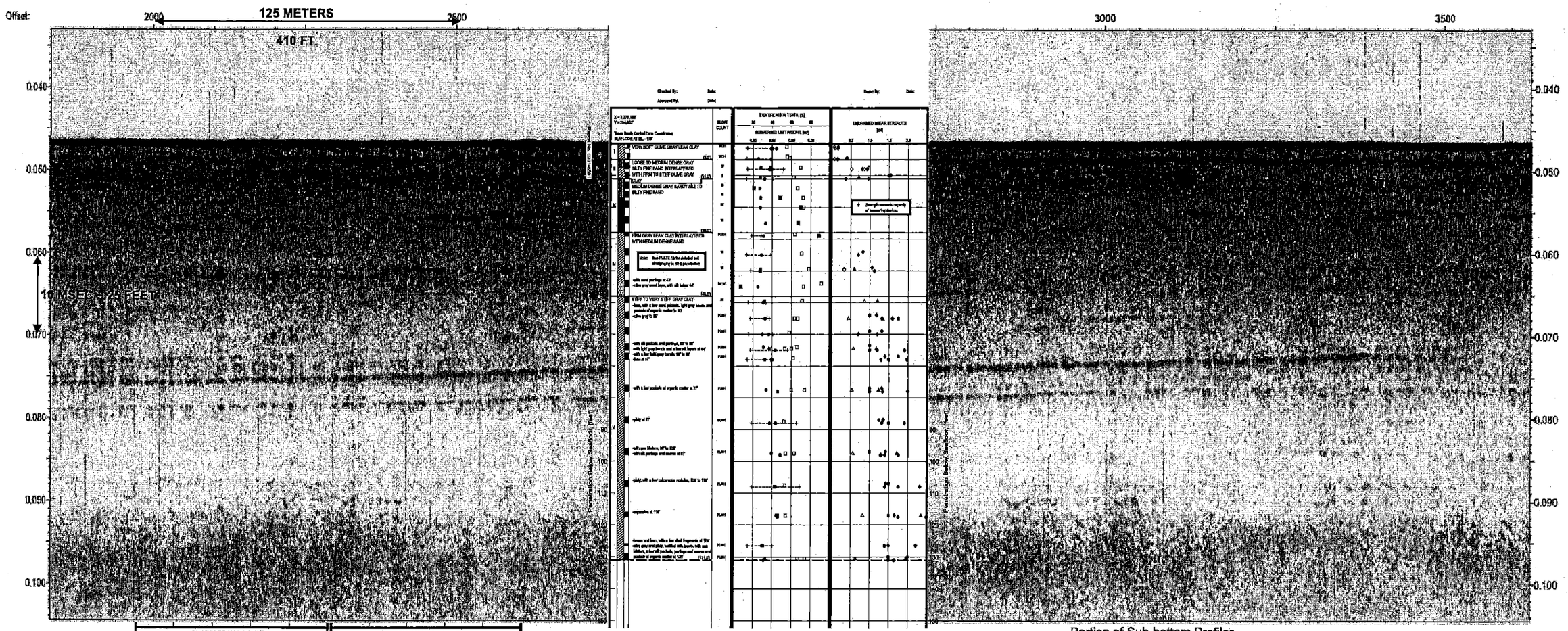
(Open symbols indicate remolded (r) tests)

LOG OF BORING AND TEST RESULTS

Texas Offshore Port System, SPM #1 Anchor Leg #2
Block A-36, Galveston Area

PLATE 3-12b

FUGRO

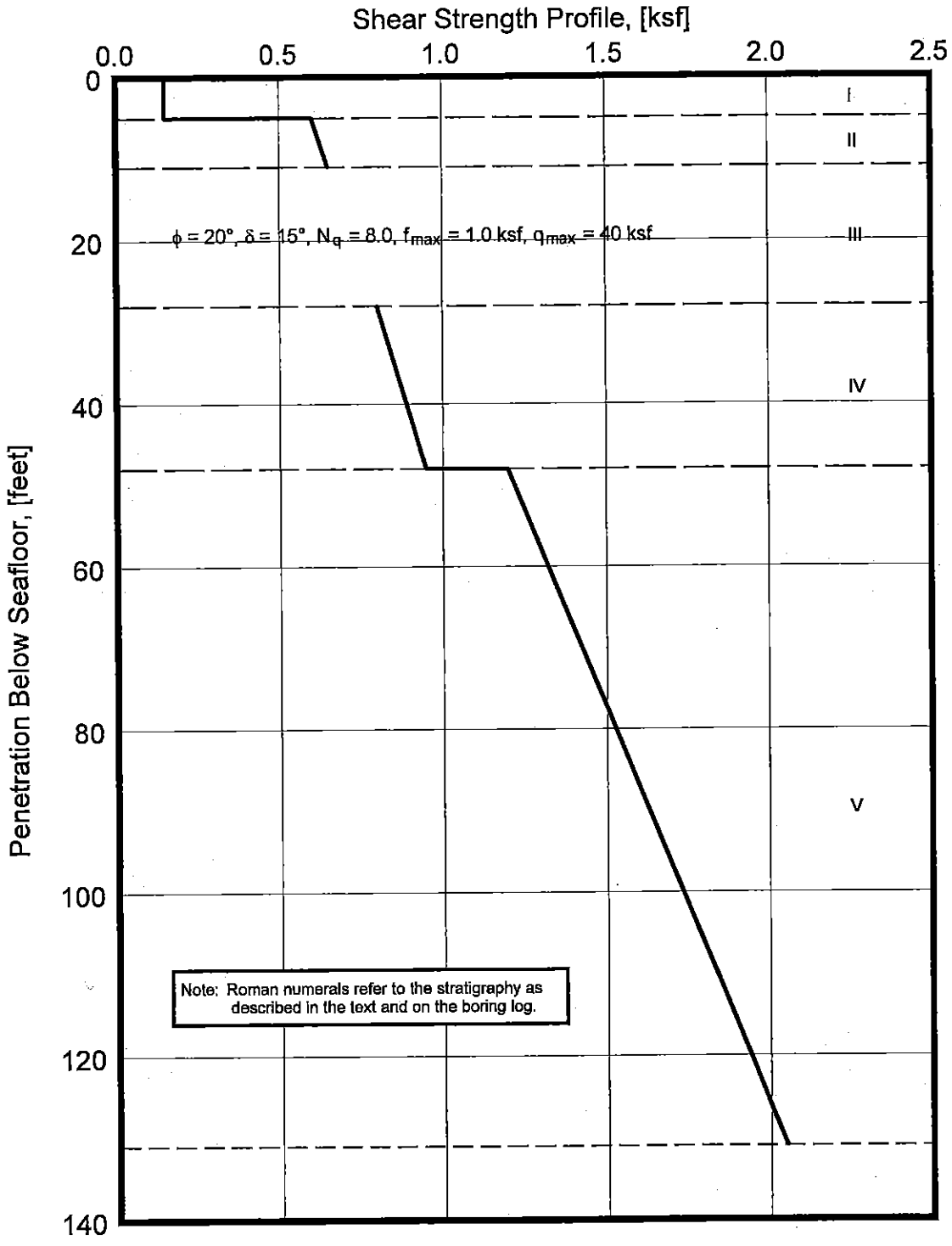


Portion of Sub-bottom Profiler
Line 2204

GEOPHYSICAL AND GEOTECHNICAL INTEGRATION

Texas Offshore Port System, SPM #1 Anchor Leg #2
Block A-36, Galveston Area

Date: 8/20/08
Drawn By: MW
Date: 8/26/08
Date: 8/26/08
Checked By: MB
Approved By: AL



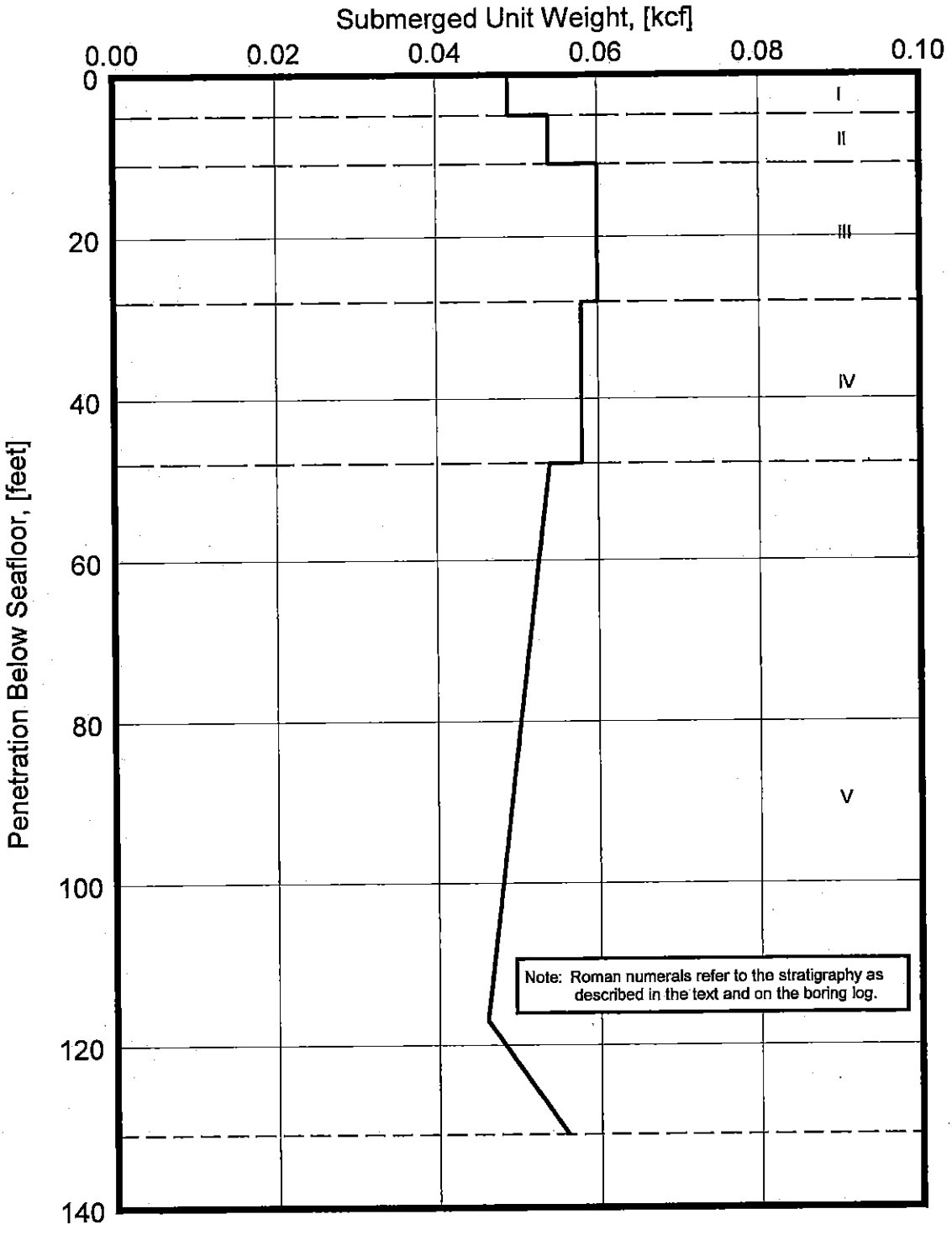
DESIGN STRENGTH PARAMETERS

Texas Offshore Port System, SPM #1 Anchor Leg #2
Block A-36, Galveston Area

Drawn By: AW Date: 8/20/08

Checked By: HB Date: 8/20/08

Approved By: DK Date: 8/26/08



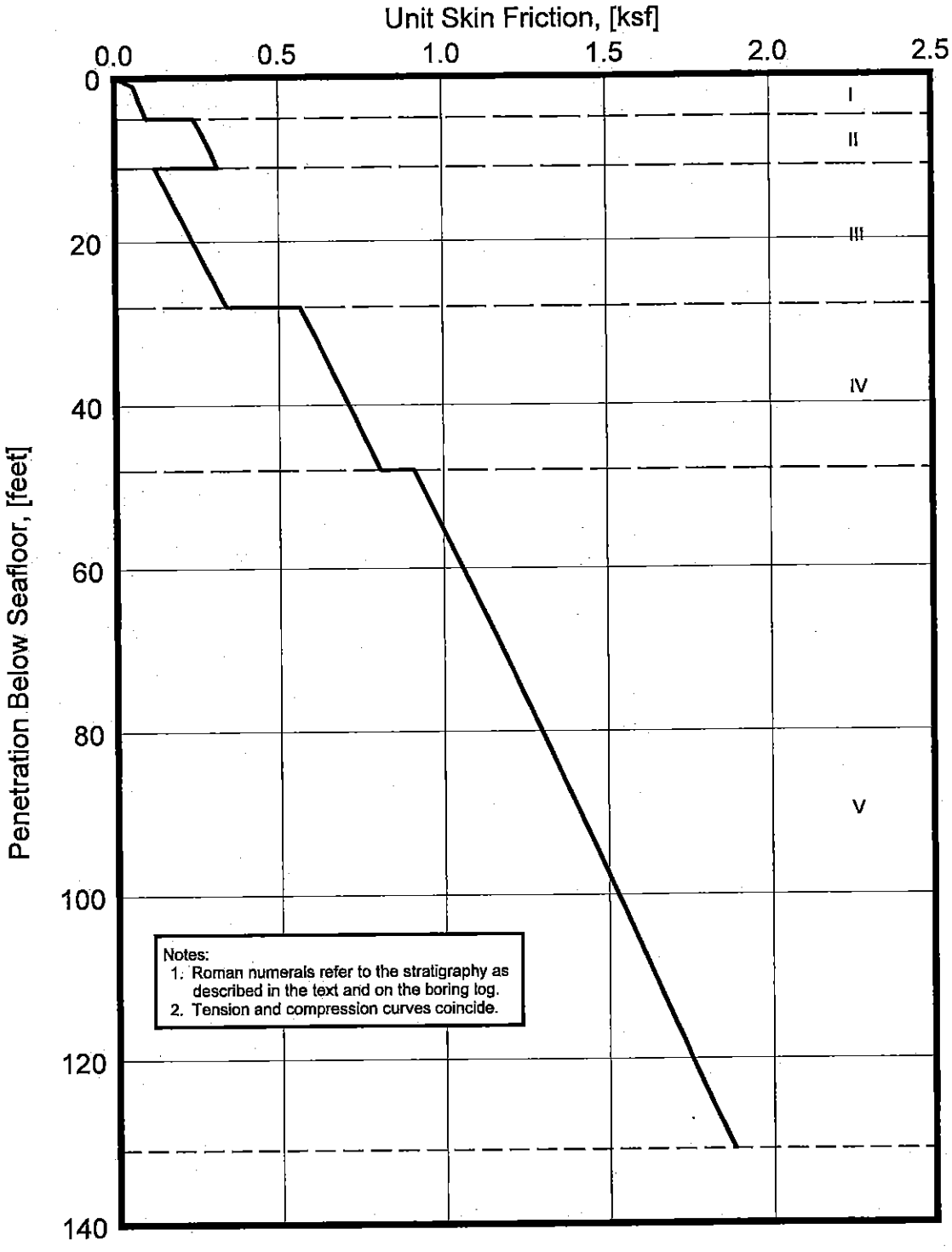
DESIGN SUBMERGED UNIT WEIGHT

Texas Offshore Port System, SPM #1 Anchor Leg #2
Block A-36, Galveston Area

Drawn By: MW Date: 8/20/08

Checked By: MP Date: 8/26/08

Approved By: DH Date: 8/26/08



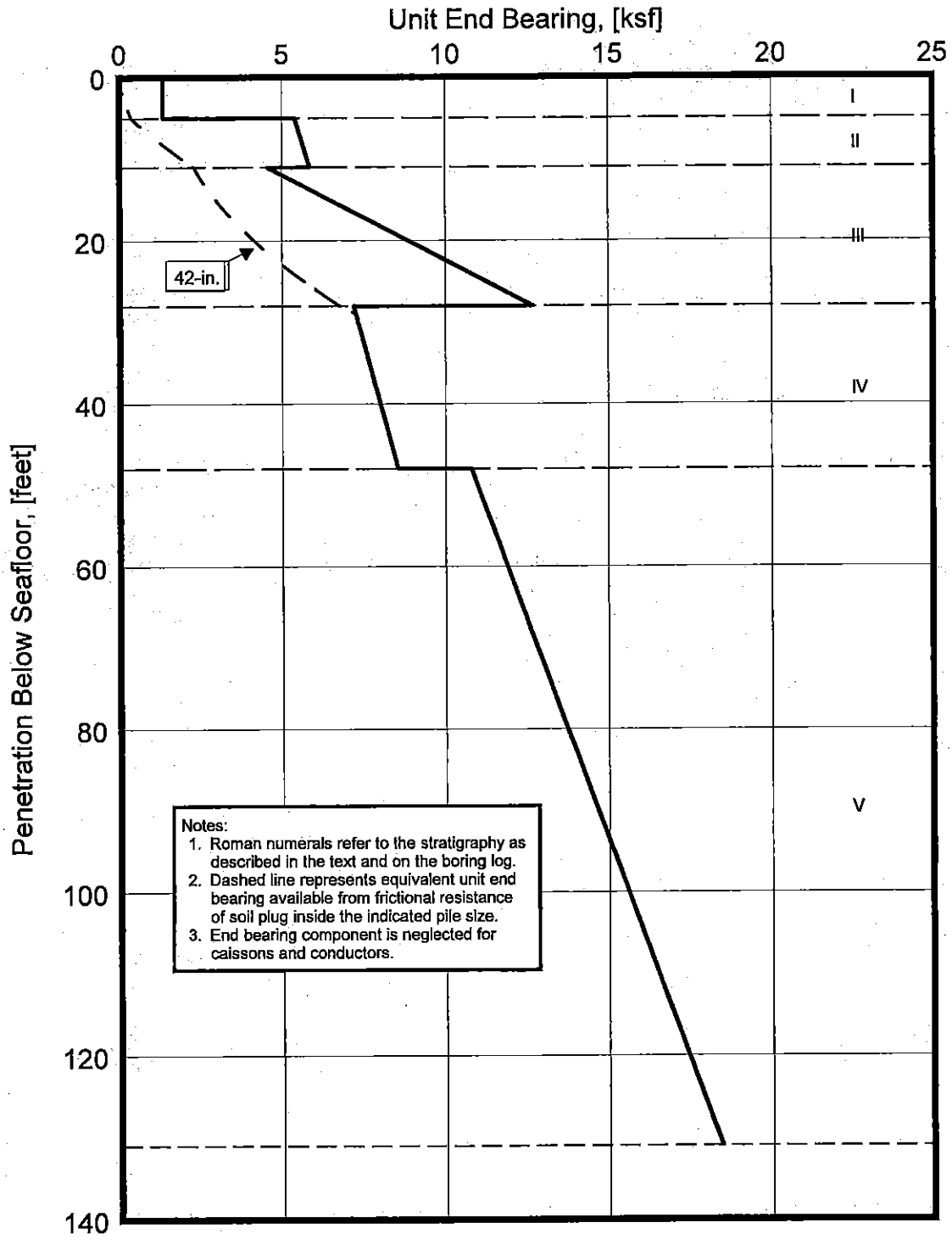
UNIT SKIN FRICTION
API RP 2A (2000) Method

Texas Offshore Port System, SPM #1 Anchor Leg #2
Block A-36, Galveston Area

Drawn By: AM Date: 8/20/08

Checked By: MB Date: 8/20/08

Approved By: DH Date: 8/22/08



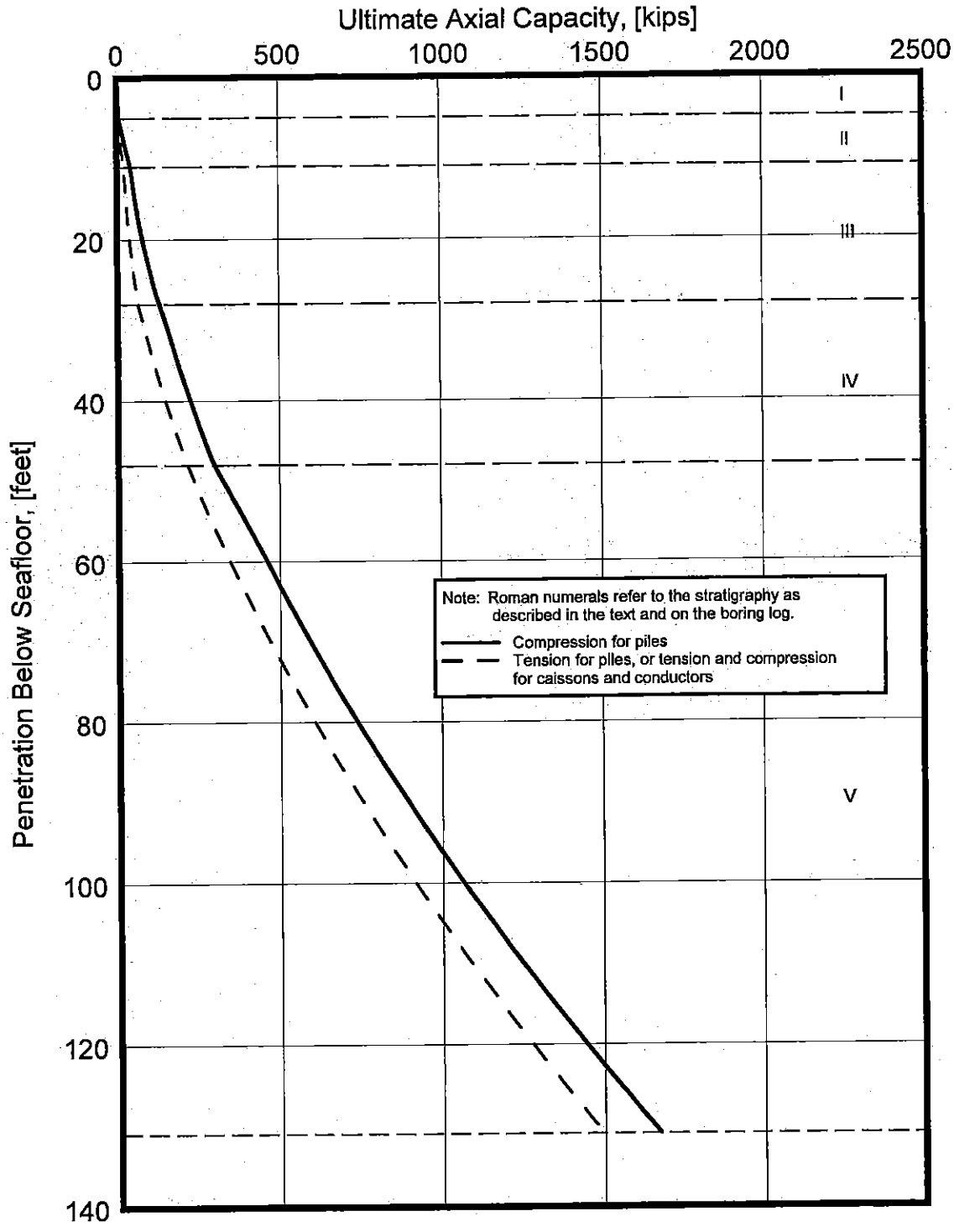
UNIT END BEARING
API RP 2A (2000) Method

Texas Offshore Port System, SPM #1 Anchor Leg #2
Block A-36, Galveston Area

Drawn By: AW Date: 8/20/08

Checked By: RB Date: 8/20/08

Approved By: DM Date: 8/26/08



ULTIMATE AXIAL CAPACITY
API RP 2A (2000) Method
42-in.-Diameter Driven Pipe Piles
Texas Offshore Port System, SPM #1 Anchor Leg #2
Block A-36, Galveston Area

Date: 8/20/08
Drawn By: MW
Date: 8/20/08
Date: 8/26/08
Checked By: MB
Approved By: DM

PENETRATION BELOW MUDLINE (feet)		CURVE POINTS							
		1	2	3	4	5	6	7	8
0.0	t	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	z	0.00	0.07	0.13	0.24	0.34	0.42	0.84	42.00
1.0	t	0.00	0.02	0.03	0.04	0.05	0.06	0.05	0.05
	z	0.00	0.07	0.13	0.24	0.34	0.42	0.84	42.00
3.0	t	0.00	0.02	0.04	0.06	0.07	0.07	0.07	0.07
	z	0.00	0.07	0.13	0.24	0.34	0.42	0.84	42.00
5.0	t	0.00	0.03	0.05	0.07	0.09	0.10	0.09	0.09
	z	0.00	0.07	0.13	0.24	0.34	0.42	0.84	42.00
5.0	t	0.00	0.07	0.12	0.18	0.22	0.24	0.22	0.22
	z	0.00	0.07	0.13	0.24	0.34	0.42	0.84	42.00
11.0	t	0.00	0.09	0.16	0.24	0.28	0.31	0.28	0.28
	z	0.00	0.07	0.13	0.24	0.34	0.42	0.84	42.00
11.0	t	0.00	0.12	0.12					
	z	0.00	0.10	42.00					
28.0	t	0.00	0.34	0.34					
	z	0.00	0.10	42.00					
28.0	t	0.00	0.17	0.28	0.42	0.51	0.56	0.51	0.51
	z	0.00	0.07	0.13	0.24	0.34	0.42	0.84	42.00
48.0	t	0.00	0.24	0.40	0.61	0.73	0.81	0.73	0.73
	z	0.00	0.07	0.13	0.24	0.34	0.42	0.84	42.00
48.0	t	0.00	0.27	0.45	0.68	0.82	0.91	0.82	0.82
	z	0.00	0.07	0.13	0.24	0.34	0.42	0.84	42.00
117.0	t	0.00	0.52	0.86	1.29	1.55	1.72	1.55	1.55
	z	0.00	0.07	0.13	0.24	0.34	0.42	0.84	42.00
131.0	t	0.00	0.56	0.94	1.41	1.69	1.88	1.69	1.69
	z	0.00	0.07	0.13	0.24	0.34	0.42	0.84	42.00

Notes: 1. "t" is mobilized soil-pile adhesion, [ksf].
2. "z" is axial pile displacement, [in.].
3. Data for tension and compression coincide.

AXIAL LOAD TRANSFER DATA
(T-Z DATA)
API RP 2A (2000) Method
42-in.-Diameter Driven Pipe Piles
Texas Offshore Port System, SPM #1 Anchor Leg #2
Block A-36, Galveston Area

PENETRATION BELOW MUDLINE (feet)		CURVE POINTS						
		1	2	3	4	5	6	7
48.0	Q	0	21	41	62	74	82	82
	z	0.00	0.08	0.55	1.76	3.07	4.20	42.00
59.0	Q	0	28	57	85	102	114	114
	z	0.00	0.08	0.55	1.76	3.07	4.20	42.00
131.0	Q	0	44	89	133	160	178	178
	z	0.00	0.08	0.55	1.76	3.07	4.20	42.00

Notes: 1. "Q" is mobilized end bearing capacity, [kips].
2. "z" is axial tip displacement, [in.].

Drawn By: AW Date: 8/20/08

Checked By: MB Date: 8/26/08

Approved By: MH Date: 8/26/08

AXIAL LOAD TRANSFER DATA

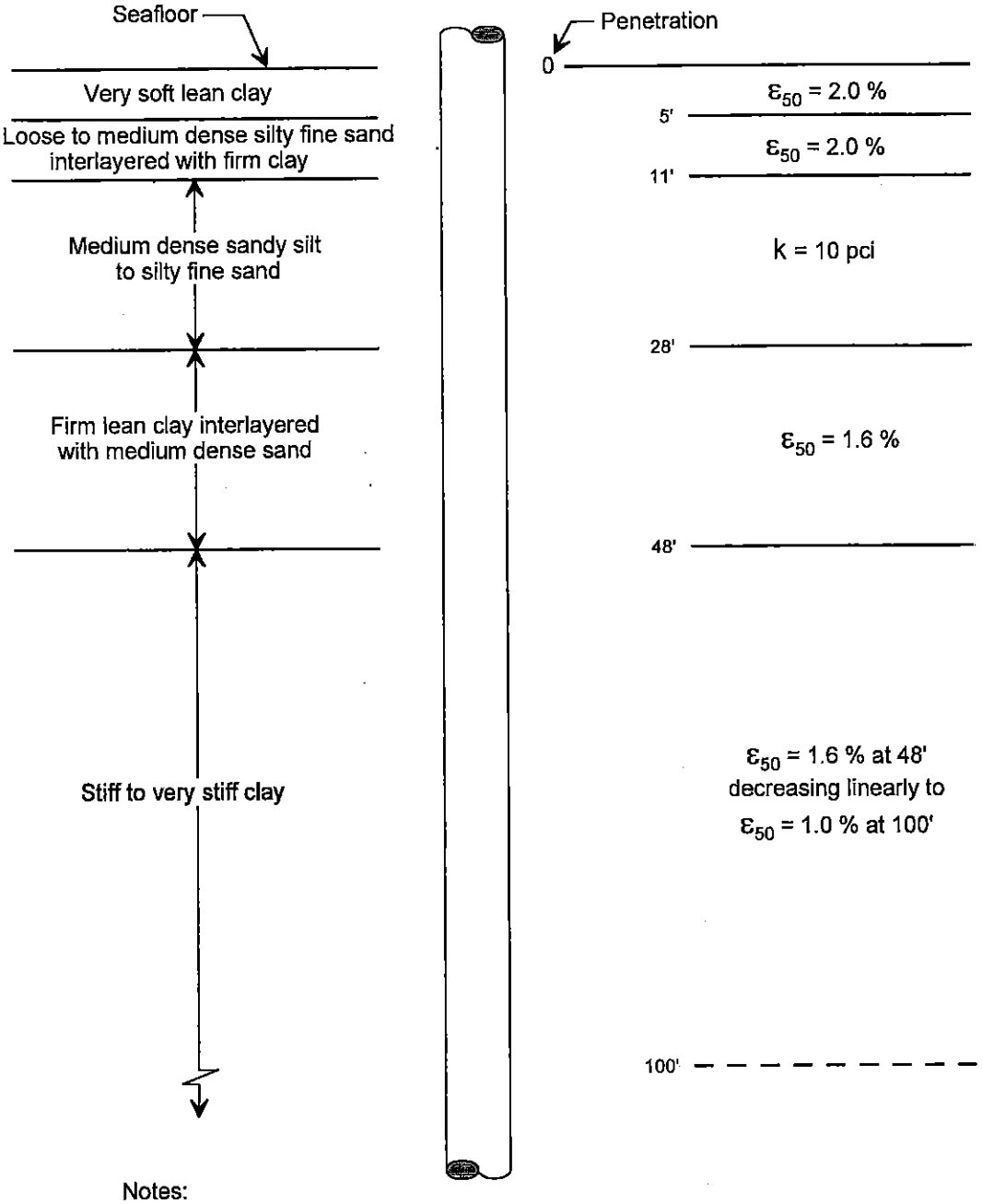
(Q-Z DATA)

API RP 2A (2000) Method

42-in.-Diameter Driven Pipe Piles

Texas Offshore Port System, SPM #1 Anchor Leg #2

Block A-36, Galveston Area



Notes:

1. ε_{50} is axial strain at half of peak deviator stress for cohesive soils.
2. Soil strength parameters are shown on Plate 3-14.
3. Submerged unit weight profile is shown on Plate 3-15.
4. k is the modulus of horizontal subgrade reaction for granular soils.

STRATIGRAPHY AND PARAMETERS FOR P-Y DATA

Texas Offshore Port System, SPM #1 Anchor Leg #2
Block A-36, Galveston Area

PENETRATION BELOW MUDLINE (feet)		CURVE POINTS							
		1	2	3	4	5	6	7	8
0.0	p	0	20	30	45	66	94	0	0
	y	0.00	0.06	0.21	0.63	2.10	6.30	31.50	42.00
3.0	p	0	29	44	66	96	139	33	33
	y	0.00	0.06	0.21	0.63	2.10	6.30	31.50	42.00
5.0	p	0	35	54	80	117	168	66	66
	y	0.00	0.06	0.21	0.63	2.10	6.30	31.50	42.00
5.0	p	0	108	166	245	361	519	97	97
	y	0.00	0.06	0.21	0.63	2.10	6.30	31.50	42.00
8.0	p	0	131	201	297	437	629	188	188
	y	0.00	0.06	0.21	0.63	2.10	6.30	31.50	42.00
11.0	p	0	155	238	351	516	743	303	303
	y	0.00	0.06	0.21	0.63	2.10	6.30	31.50	42.00
11.0	p	0	176	293	387	487	557	581	586
	y	0.00	0.14	0.24	0.35	0.53	0.81	1.18	42.00
15.0	p	0	305	509	671	844	966	1007	1017
	y	0.00	0.17	0.31	0.45	0.67	1.04	1.50	42.00
19.0	p	0	467	779	1028	1292	1479	1541	1557
	y	0.00	0.21	0.38	0.54	0.81	1.25	1.81	42.00
28.0	p	0	951	1585	2092	2631	3011	3138	3170
	y	0.00	0.29	0.52	0.75	1.12	1.73	2.50	42.00
28.0	p	0	315	482	713	1048	1510	1506	1506
	y	0.00	0.05	0.17	0.50	1.68	5.04	25.20	42.00
29.0	p	0	318	488	721	1060	1526	1526	
	y	0.00	0.05	0.17	0.50	1.68	5.04	42.00	
48.0	p	0	374	574	848	1247	1795	1795	
	y	0.00	0.05	0.17	0.50	1.68	5.04	42.00	
48.0	p	0	472	724	1071	1575	2268	2268	
	y	0.00	0.05	0.17	0.50	1.68	5.04	42.00	
100.0 (and below)	p	0	682	1046	1547	2275	3275	3275	
	y	0.00	0.03	0.10	0.31	1.05	3.15	42.00	

Notes: 1. "p" is soil resistance, [lb/in.].
2. "y" is lateral deflection, [in.].

Drawn By: MW Date: 8/20/08

Checked By: MB Date: 8/20/08

Approved By: JM Date: 8/22/08

P-Y DATA
(CYCLIC LOADING)
API RP 2A (2000) Method
42-in.-Diameter Driven Pipe Piles
Texas Offshore Port System, SPM #1 Anchor Leg #2
Block A-36, Galveston Area

Date	Time From	Time To	Description of Activities
June 26, 2008	****	2155	Arrive in Block A-36, Galveston Area, SPM #1 Anchor Leg #2 location aboard the vessel *R/V Seaprobe*.
	2155	2245	Set 4-point anchors.
	2245	2305	Rig up to drill and sample.
	****	2305	Estimate water depth of 108 ft with vessel's echo sounder and 113 ft using wireline technique.
	2305	2320	Perform scanning sonar survey.
	2320	2400	Run drill pipe to mudline.
	****	2330	Conduct pre-shift safety meeting.
	****	2400	Measure water depth of 113 ft using bottom sensor/pipe tally and 111.0 ft with the pressure transducer.
June 27, 2008	0000	0500	Drill and sample. Boring terminated at 131-ft penetration.
	0500	0605	Pull drill pipe above mudline and reposition vessel.
	****	0605	Measure supplemental water depth of 113 ft with the bottom sensor/pipe tally and 111.0 ft with pressure transducer.
	0605	0650	Pull drill pipe to deck and secure equipment for travel.
	0650	0740	Pull anchors.
	0740	****	Depart location.

SUMMARY OF FIELD OPERATIONS

Texas Offshore Port System, SPM #1 Anchor Leg #2
Block A-36, Galveston Area

Checked By: MB Date: 9/2/08
Approved By: [signature] Date: 9/2/2

Drawn By: Tomol Date: 9/2/08

Report No. 0201-6501

Summary of Test Results

Job No.: 0201-6501-1 02-Sep-2008 (Ver. #8)
Boring: Texas Offshore Port System, SPM #1 Anchor Leg #2
Block: A-36
Area: Galveston

		Identification Tests						Strength Estimate (ksf)		Miniature Vane Tests (ksf)			Compression Tests								
Sample No.	Depth (ft)	Liquidity Index	Liquid Limit (%)	Plastic Limit (%)	Moisture Content (%)	Submerged Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer	Torvane	Undisturbed	Remolded	Residual	Type Test	Moisture Content (%)	Confining Pressure (psi)	Undisturbed Strength (ksf)	Remolded Strength (ksf)	ε_{50} Strain (%)	Submerged Unit Weight (pcf)	Failure Strain (%)	Type of Failure
1	1.00					47				0.17		0.07									
2	1.50	.92	41	14	39																
2	1.50				39						0.09										
2	1.50				45					0.17											
3	4.00					48															
4	4.50					49				0.40											
5	4.80				25					0.16											
5	4.80	1.02	38	13	39																
5	4.80										0.08										
6	7.50				28	55	38														
7	8.00				38				0.80	0.93 +											
7	8.00	.69	52	14	40																
7	8.00				37						0.52										
8	10.00							1.50	1.54												
9	10.50																				
9	10.50												UU	27	120	0.71		2.9	51	13	A
10	11.00	.68	41	13	32				0.96	0.37											
11	14.00				27	53	21														
12	17.00				28	56	48														
13	20.00				27	56	69														
14	25.00				33	54	66														
15	28.50					52															

NOTES:

TYPE OF TEST
U - Unconfined Compression
UU- Unconsolidated-Undrained Triaxial
CU- Consolidated-Undrained Triaxial

TYPE OF FAILURE
A - Bulge
B - Single Shear Plane
C - Multiple Shear Plane
D - Vertical Fracture

Plus Signs [+] denote tests which exceeded the capacity of the measuring device.

NP = Non Plastic Material

PLATE A-6a

FUGRO

Checked By: MB Date: 9/2/08
Approved By: [illegible] Date: 9/2/08

Drawn By: Tomol Date: 9/2/08

Summary of Test Results

Job No.: 0201-6501-1 02-Sep-2008 (Ver. #8)
Boring: Texas Offshore Port System, SPM #1 Anchor Leg #2
Block: A-36
Area: Galveston

		Identification Tests						Strength Estimate (ksf)		Miniature Vane Tests (ksf)			Compression Tests								
Sample No.	Depth (ft)	Liquidity Index	Liquid Limit (%)	Plastic Limit (%)	Moisture Content (%)	Submerged Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer	Torvane	Undisturbed	Remolded	Residual	Type Test	Moisture Content (%)	Confining Pressure (psi)	Undisturbed Strength (ksf)	Remolded Strength (ksf)	ε_{50} Strain (%)	Submerged Unit Weight (pcf)	Failure Strain (%)	Type of Failure
16	29.00				31		89														
16	29.00	1.25	28	19	31																
17	34.00								0.82												
18	34.50					55															
19	35.00	.61	39	13	29																
19	35.00				29				0.70												
20	39.00								1.06												
21	39.50										0.33										
21	39.50												UU	28	60	0.60		3.5	59	18	A
22	40.00	.85	29	18	27				1.12												
23	44.00					66															
24	45.00				25	56	7														
25	49.00																				
26	49.50												UU		119		0.86		55		
26	49.50												UU	32	60	1.21		7.0	56	22	A
27	50.00	.84	34	15	31																
28	54.00							1.00	1.18												
29	54.50																				
30	55.00												UU		121		0.44		53		
30	55.00	.78	37	17	33			1.75	1.32	1.59			UU	33	80	1.34		1.4	52	8	A
31	59.00							1.00	1.32												
32	59.50					49															

NOTES:

TYPE OF TEST
U - Unconfined Compression
UU- Unconsolidated-Undrained Triaxial
CU- Consolidated-Undrained Triaxial

TYPE OF FAILURE
A - Bulge
B - Single Shear Plane
C - Multiple Shear Plane
D - Vertical Fracture

Plus Signs [+] denote tests which exceeded the capacity of the measuring device.

NP = Non Plastic Material

Report No. 0201-6501

PLATE A-6b

Checked By: MB Date: 9/2/08
Approved By: [illegible] Date: 9/2/08

Drawn By: Tomd Date: 9/2/08

Report No. 0201-6501

Summary of Test Results

Job No.: 0201-6501-1 02-Sep-2008 (Ver. #8)
Boring: Texas Offshore Port System, SPM #1 Anchor Leg #2
Block: A-36
Area: Galveston

Sample No.	Depth (ft)	Identification Tests						Strength Estimate (ksf)		Miniature Vane Tests (ksf)			Compression Tests								
		Liquidity Index	Liquid Limit (%)	Plastic Limit (%)	Moisture Content (%)	Submerged Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer	Torvane	Undisturbed	Remolded	Residual	Type Test	Moisture Content (%)	Confining Pressure (psi)	Undisturbed Strength (ksf)	Remolded Strength (ksf)	ε_{50} Strain (%)	Submerged Unit Weight (pcf)	Failure Strain (%)	Type of Failure
33	60.00	.84	41	15	37																
33	60.00				30				1.20	0.70											
34	63.50								1.00												
35	64.00				31	53															
36	64.50												UU	37	80	1.18		1.1	50	4	AC
36	64.50												UU		120		0.57		47		
37	65.00	.68	56	17	44			1.00	1.20	1.91											
38	67.00							1.75	1.40												
39	67.50					51															
40	68.00				40			1.50	1.30	1.98											
40	68.00	.76	38	14	32																
41	77.00							1.00	1.32												
42	77.50												UU		119		0.54		57		
42	77.50												UU	34	100	1.24		2.7	50	9	B
43	78.00				46			1.00	1.34	2.00											
44	87.00							1.25	1.36												
45	87.50					46															
46	88.00	.54	65	19	44																
46	88.00				38			1.50	1.32	1.91											
47	97.00							1.00	1.42												
48	97.50												UU		121		0.56		52		
48	97.50												UU	40	122	1.72		1.0	47	3	B

NOTES:

TYPE OF TEST
U - Unconfined Compression
UU- Unconsolidated-Undrained Triaxial
CU- Consolidated-Undrained Triaxial

TYPE OF FAILURE
A - Bulge
B - Single Shear Plane
C - Multiple Shear Plane
D - Vertical Fracture

Plus Signs [+] denote tests which exceeded the capacity of the measuring device.

NP = Non Plastic Material

PLATE A-6c

Checked By: MB Date: 9/2/08
Approved By: [illegible] Date: 9/2/08

Drawn By: Tomol Date: 9/2/08

Report No. 0201-6501

Summary of Test Results

Job No.: 0201-6501-1 02-Sep-2008 (Ver. #8)
Boring: Texas Offshore Port System, SPM #1 Anchor Leg #2
Block: A-36
Area: Galveston

		Identification Tests						Strength Estimate (ksf)		Miniature Vane Tests (ksf)			Compression Tests								
Sample No.	Depth (ft)	Liquidity Index	Liquid Limit (%)	Plastic Limit (%)	Moisture Content (%)	Submerged Unit Weight (pcf)	Passing No. 200 Sieve (%)	Penetrometer	Torvane	Undisturbed	Remolded	Residual	Type Test	Moisture Content (%)	Confining Pressure (psi)	Undisturbed Strength (ksf)	Remolded Strength (ksf)	ε_{50} Strain (%)	Submerged Unit Weight (pcf)	Failure Strain (%)	Type of Failure
49	98.00				49			1.75	1.40	1.30											
50	107.00							1.50	1.42												
51	107.50					47															
52	108.00				42			1.75	1.40	2.32											
52	108.00	.51	68	19	44																
53	117.00							1.50	1.65				UU	45	123	2.35		1.0	43	3	B
53	117.00												UU		120		0.82		47		
54	117.50				46			1.75	1.75	2.49											
55	126.50				30			1.40	1.50	2.21											
55	126.50	.61	41	15	31																
56	130.00							1.50	2.00												
57	130.50												UU		120		0.63		57		
57	130.50												UU	33	122	1.95		0.9	53	4	C
58	131.00				31			1.50	1.65	1.64											
59	131.50																				

NOTES:

TYPE OF TEST
U - Unconfined Compression
UU- Unconsolidated-Undrained Triaxial
CU- Consolidated-Undrained Triaxial

TYPE OF FAILURE
A - Bulge
B - Single Shear Plane
C - Multiple Shear Plane
D - Vertical Fracture

Plus Signs [+] denote tests which exceeded the capacity of the measuring device.

NP = Non Plastic Material

PLATE A-6d

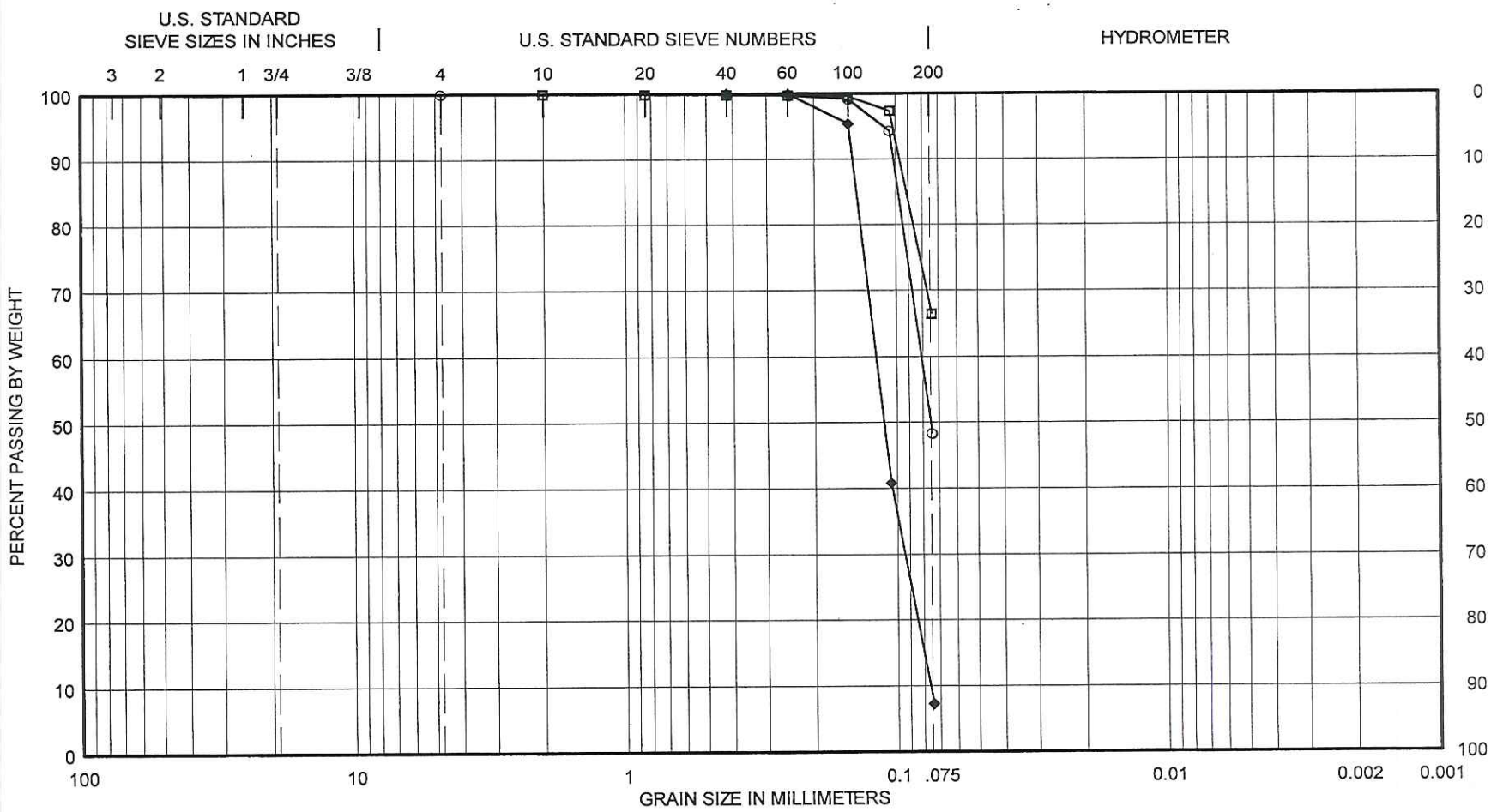
FUGRO

Checked by: HSB Date: 9/2/08

Approved by: DT Date: 9/2/08

Drawn by: Tomol Date: 9/2/08

Report No. 0201-6501



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SAMPLE NO.	DEPTH, FT	SYMBOL	CLASSIFICATION
12	17.00	○	SILTY FINE SAND (SM) with a few shell fragments
14	25.00	□	SANDY SILT (ML) with a few shell fragments
24	45.00	◆	FINE SAND (SP-SM) with silt

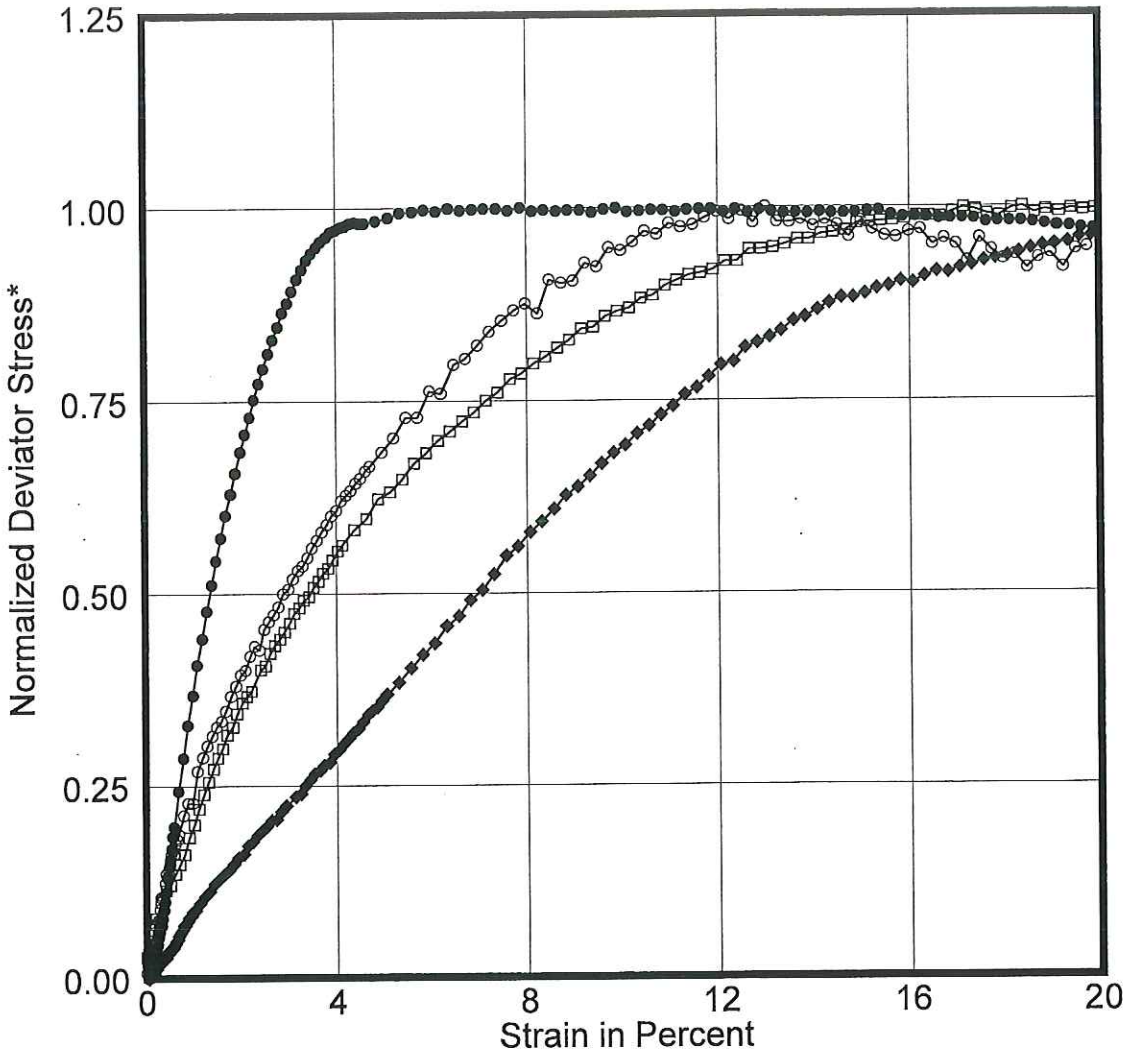
GRAIN-SIZE DISTRIBUTION CURVES

Texas Offshore Port System, SPM #1 Anchor Leg #2

Block A-36, Galveston Area

PLATE A-10

Drawn By: Temel Date: 9/2/08



Curve	Sample No.	Depth [ft]	Test Type	Confining Pressure [psi]	Maximum Deviator Stress [ksf]	ε50 [%]
○—○	9	10.50	UU	119.7	1.42	2.9
□—□	21	39.50	UU	60.0	1.20	3.5
◆—◆	26	49.50	UU	60.1	2.42	7.0
●—●	30	55.00	UU	80.2	2.68	1.4

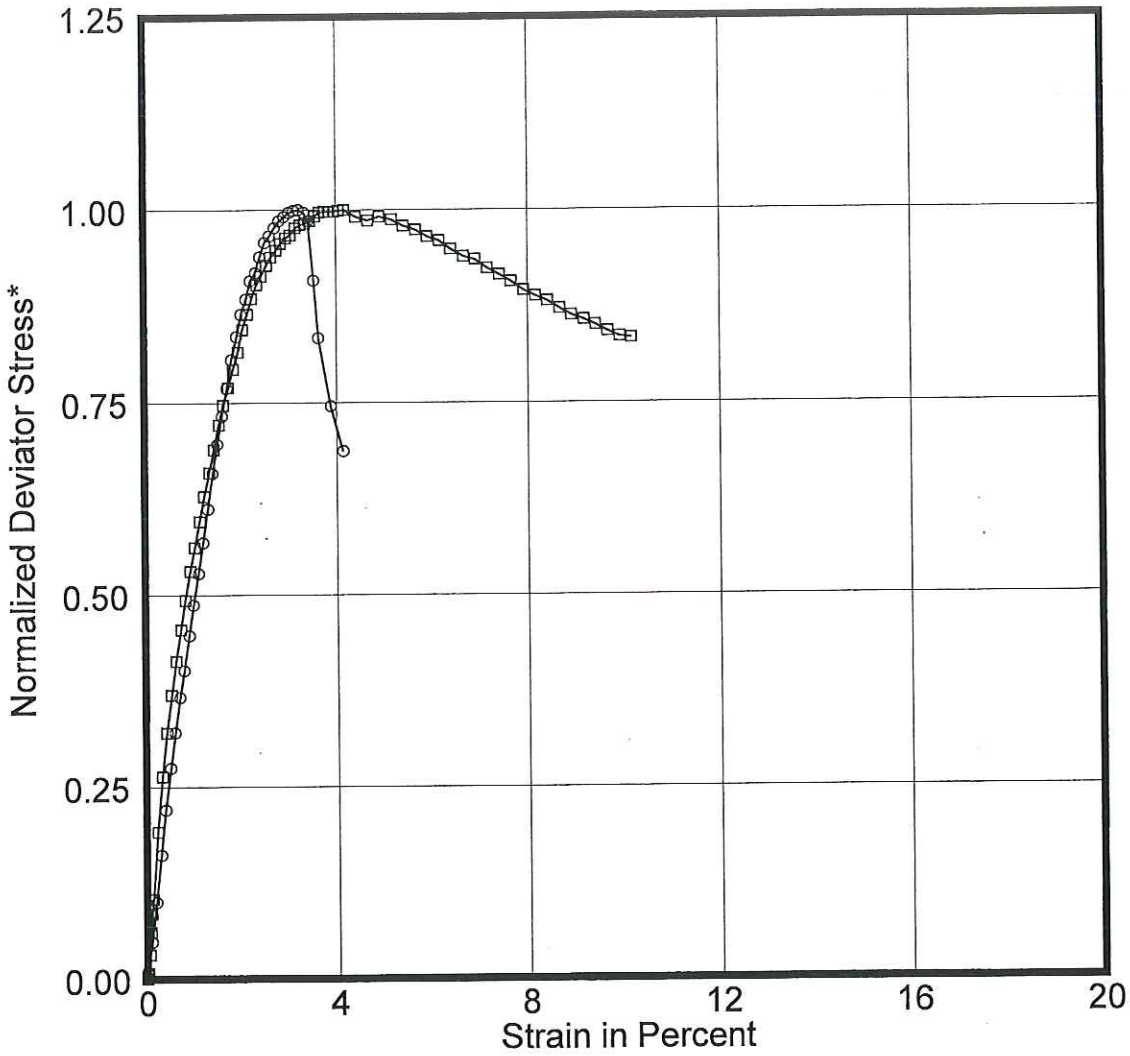
* Normalized with respect to maximum deviator stress.

Checked By: NB Date: 9/2/08
Approved By: DM Date: 9/2/08

STRESS-STRAIN CURVES
Unconsolidated-Undrained Triaxial Compression Test

Texas Offshore Port System, SPM #1 Anchor Leg #2
Block A-36, Galveston Area

Drawn By: Tomi Date: 9/2/08



Curve	Sample No.	Depth [ft]	Test Type	Confining Pressure [psi]	Maximum Deviator Stress [ksf]	ε50 [%]
○—○	53	117.00	UU	122.5	4.70	1.0
□—□	57	130.50	UU	122.1	3.90	0.9

* Normalized with respect to maximum deviator stress.

Checked By: KB Date: 9/2/08
Approved By: BM Date: 9/2/08

STRESS-STRAIN CURVES
Unconsolidated-Undrained Triaxial Compression Test

Texas Offshore Port System, SPM #1 Anchor Leg #2
Block A-36, Galveston Area

C) **STARFIX.NAV®**

STARFIX.NAV® is an on board computer graphic system interfaced to the primary positioning system capable of displaying real time position of a vessel in relation to known hazards, fairways, proposed location, etc. **DRONE®** units when used on anchor handling vessels utilize Differential GPS transmitted to the master station via radio telemetry link to display in real time the position of that vessel.

D) Vessel orientation by Sperry SR 50 Mod 1 North Seeking Gyro or a S. G. Brown Meridian North Seeking Gyro

North seeking Gyro compass. Accuracy $\pm$ 2° after 4 hours initial spin up.

E) Scanning Sonar

Simrad MS1000 High Resolution Sonar

5. RESULTS:

Geographic positions are based on Clarke 1866 Spheroid, North American Datum 1927. Grid coordinates are based on Texas South Central Zone Lambert, NAD 27.

Field operations were conducted from June 26, 2008 to June 28, 2008 with the following results:

A) **STARFIX®** position derived by averaging readings over a one hour period at an update rate of 750 ms. per reading.

CORE 1(Leg #2 - West)

Y = 264,853.21
X = 3,275,180.44'

Latitude: 28° 30' 07.937" N
Longitude: 95° 01' 44.907" W

This location being 3493.21' FSL and 5304.63' FWL of Block A36, Galveston Area

CORE 2 (Leg #6 - East)

Y = 270,117.00'
X = 3,284,733.18'

Latitude: 28° 30' 56.803" N
Longitude: 94° 59' 55.883" W

This location being 7083.00' FNL and 982.63' FEL of Block A36, Galveston Area

CORE 3 (PLET #1)

Y = 265,270.45'
X = 3,276,615.21'

Latitude: 28° 30' 11.583" N
Longitude: 95° 01' 28.676" W

This location being 3910.45' FSL and 6739.40' FWL of Block A36, Galveston Area

CORE 4 (PLET #2)

Y = 269,117.95'
X = 3,283,617.17'

Latitude: 28° 30' 47.295" N
Longitude: 95° 00' 08.769" W

This location being 7757.95' FSL and 2098.64' FEL of Block A36, Galveston Area

CORE 4A (PLET #2 - Amended)

Y = 269,121.01'
X = 3,283,587.30'

Latitude: 28° 30' 47.335" N
Longitude: 95° 00' 09.102" W

This location being 7761.01' FSL and 2128.51' FEL of Block A36, Galveston Area

6. CONFIRMATION:

DGPS was used for confirmation.

The results were as follows:

CORE 1 (Leg #2 - West)	CORE 2 (Leg #6 - East)	CORE 3 (PLET #1)
Y = 264,853'	Y = 270,117'	Y = 265,271'
X = 3,275,181'	X = 3,284,733'	X = 3,276,615'

CORE 4 (PLET #2)	CORE 4A (PLET #2 - Amended)
Y = 269,118'	Y = 269,121'
X = 3,283,617'	X = 3,283,588'

7. HSE INCIDENTS:

No incidents.

FINAL SOIL BORINGS

LOCATION	CALLNS	CALLEW	X COORDINATE	Y COORDINATE	LATITUDE	LONGITUDE
CORE 1	3,493.21' FSL	5,304.63' FWL	3,275,180.44'	264,853.21'	28° 30' 07.937"N	95° 01' 44.907"W
CORE 2	7,083.00' FNL	982.63' FEL	3,284,733.18'	270,117.00'	28° 30' 56.803"N	94° 59' 55.883"W
CORE 3	3,910.45' FSL	6,739.40' FWL	3,276,615.21'	265,270.45'	28° 30' 11.583"N	95° 01' 28.676"W
CORE 4	7,757.95' FSL	2,098.64' FEL	3,283,617.17'	269,117.95'	28° 30' 47.295"N	95° 00' 08.769"W
CORE 4A	7,761.01' FSL	2,128.51' FEL	3,283,587.30'	269,121.01'	28° 30' 47.335"N	95° 00' 09.102"W

I HEREBY CERTIFY THAT THE ABOVE FINAL SOIL BORING POSITIONS ARE CORRECT.

STATE OF LOUISIANA
STEPHEN R. HENRY
REG. No. 4903
REGISTERED PROFESSIONAL LAND SURVEYOR

REG. PROFESSIONAL LAND SURVEYOR NO. 4903
STATE OF LOUISIANA 7-8-08

NOTES:
1) SURVEYED COORDINATES TRANSFORMED FROM NAD83 (GPS DATUM) TO NAD27 (CHART DATUM) USING NADCON VERSION 2.1.

Printed: 7/8/08

ENTERPRISE FIELD SERVICES, LLC

FINAL SOIL BORINGS
NO LEASE NUMBER (PROP. ANC & PLET)

BLOCK A36
GALVESTON AREA
GULF OF MEXICO

FUGRO CHANCE INC.
200 Dulles Dr. Lafayette, Louisiana 70506-3001 (337) 237-1300

GEODETIC DATUM: NAD27
PROJECTION: TEXAS SOUTH CENTRAL
GRID UNITS: US SURVEY FEET

SCALE IN FEET 0 2,000'

Job No.: 08-01930 | Date: 7/8/08 | Drwn: TCG | Chart: 1 Of: 1

Dwgfile: O:\WellPermit\TXsc\GA\Permit\A36_CORE_NoLease_0801930