

8/26/08

Date:

AW

Drawn By:

8/26/08

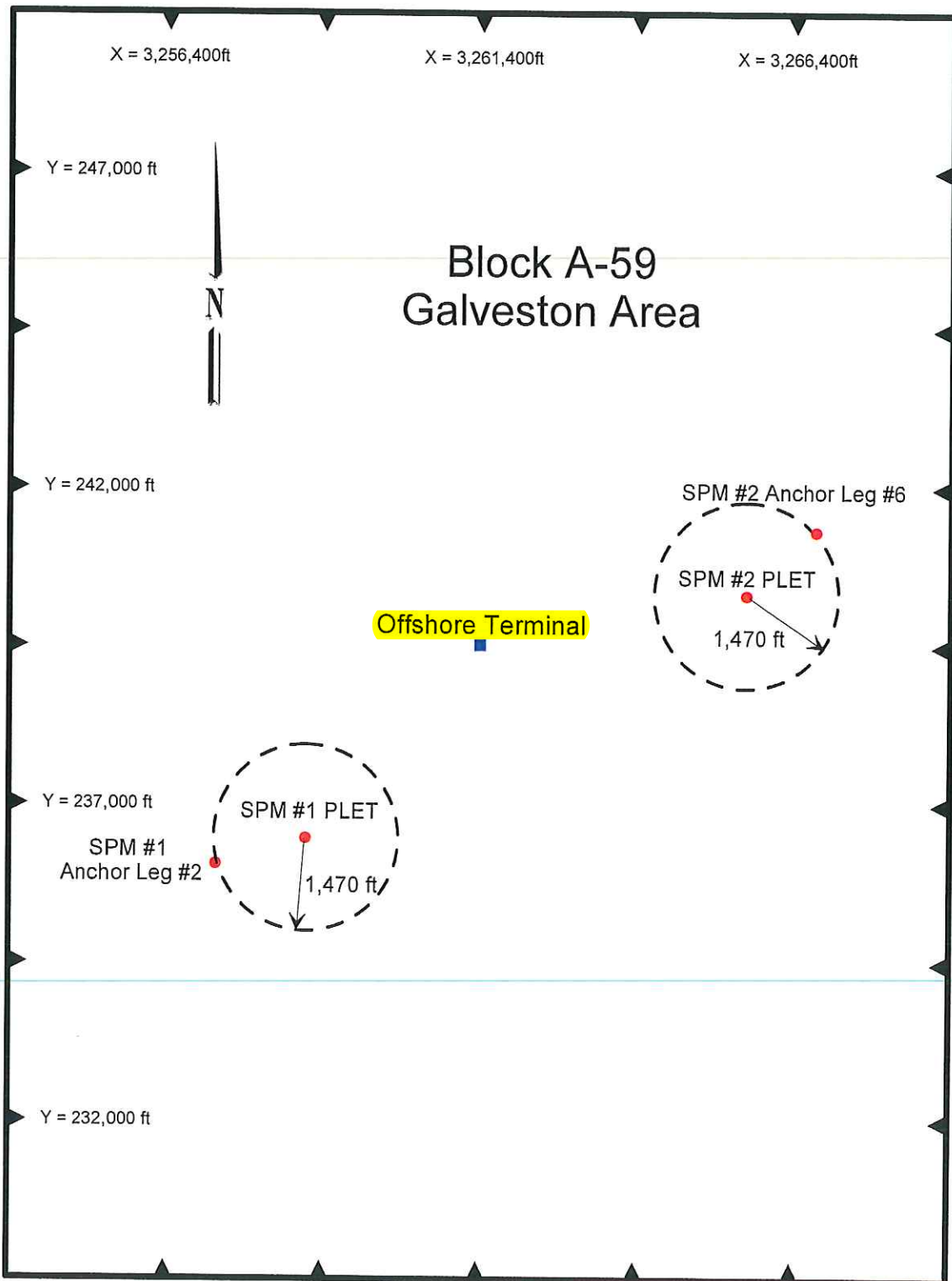
Date:

Date:

PMF

Checked By:

Approved By:

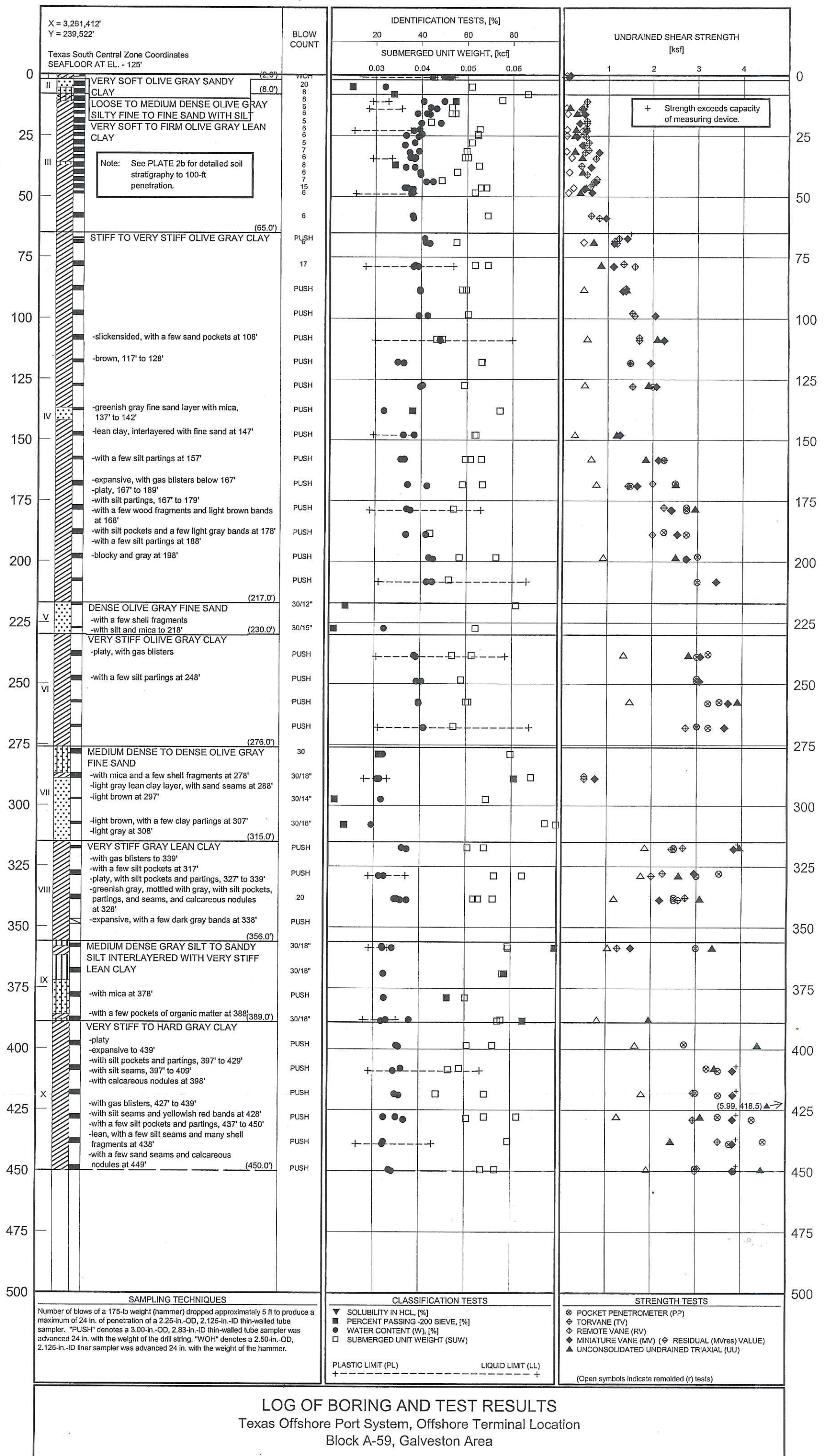


Projection: Texas South Central Zone Coordinates

PLAN OF BORINGS

Texas Offshore Port System
Block A-59, Galveston Area

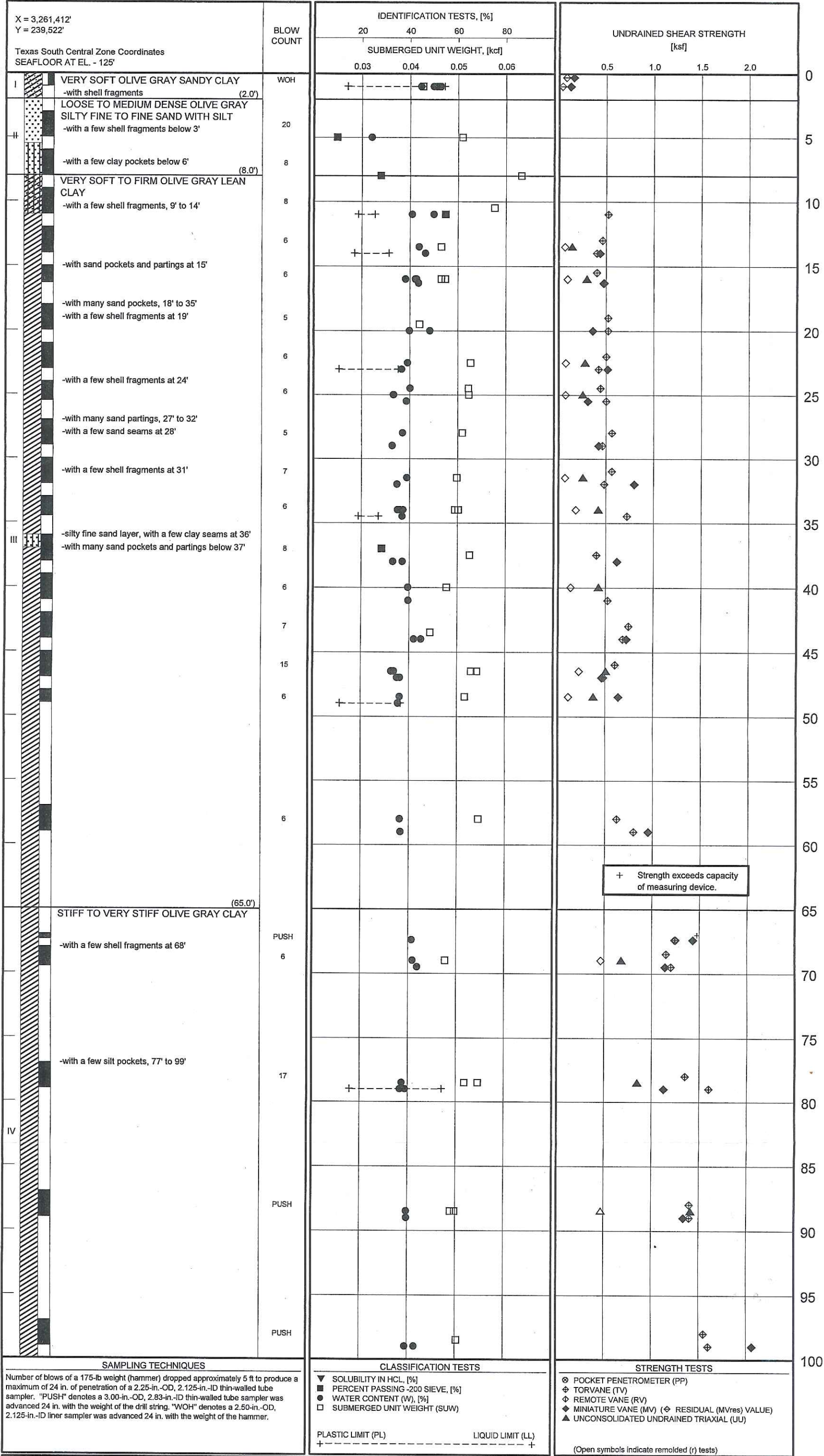




Report No. 0201-6504

Penetration Below Seafloor, [feet]

Penetration Below Seafloor, [feet]

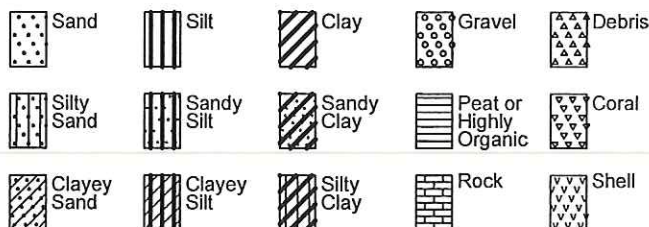


LOG OF BORING AND TEST RESULTS
Texas Offshore Port System, Offshore Terminal Location
Block A-59, Galveston Area

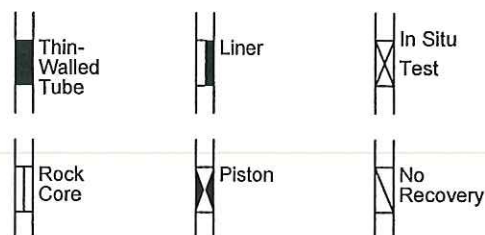


TERMS AND SYMBOLS USED ON BORING LOG

SOIL TYPES



SAMPLER TYPES



SOIL GRAIN SIZE

U.S. STANDARD SIEVE

6"	3"	3/4"	4	10	40	200		
BOULDERS	COBBLES	GRAVEL		SAND			SILT	CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE		
152	76.2	19.1	4.75	2.00	0.425	0.075	0.002	
SOIL GRAIN SIZE IN MILLIMETERS								

STRENGTH OF COHESIVE SOILS⁽¹⁾

Consistency	Undrained Shear Strength, Kips Per Sq Ft
Very Soft.....	less than 0.25
Soft.....	0.25 to 0.50
Firm.....	0.50 to 1.00
Stiff.....	1.00 to 2.00
Very Stiff.....	2.00 to 4.00
Hard.....	greater than 4.00

DENSITY OF GRANULAR SOILS^(2,3)

Descriptive Term	*Relative Density, %
Very Loose.....	less than 15
Loose.....	15 to 35
Medium Dense.....	35 to 65
Dense.....	65 to 85
Very Dense.....	greater than 85

*Estimated from sampler driving record

SOIL STRUCTURE⁽¹⁾

Slickensided.....	Having planes of weakness that appear slick and glossy. The degree of slickensidedness depends upon the spacing of slickensides and the ease of breaking along these planes.
Fissured.....	Containing shrinkage or relief cracks, often filled with fine sand or silt, usually more or less vertical.
Pocket.....	Inclusion of material of different texture that is smaller than the diameter of the sample.
Parting.....	Inclusion less than 1/8 inch thick extending through the sample.
Seam.....	Inclusion 1/8 inch to 3 inches thick extending through the sample.
Layer.....	Inclusion greater than 3 inches thick extending through the sample.
Laminated.....	Soil sample composed of alternating partings or seams of different soil types.
Interlayered.....	Soil sample composed of alternating layers of different soil types.
Intermixed.....	Soil sample composed of pockets of different soil types and layered or laminated structure is not evident.
Calcareous.....	Having appreciable quantities of carbonate.

REFERENCES:

- (1) ASTM D 2488
- (2) ASCE Manual 56 (1976)
- (3) ASTM D 2049

Information on each boring log is a compilation of subsurface conditions and soil or rock classifications obtained from the field as well as from laboratory testing of samples. Strata have been interpreted by commonly accepted procedures. The stratum lines on the log may be transitional and approximate in nature. Water level measurements refer only to those observed at the times and places indicated in the text, and may vary with time, geologic condition or construction activity.



8/21/08

Date:

AW

Drawn By:

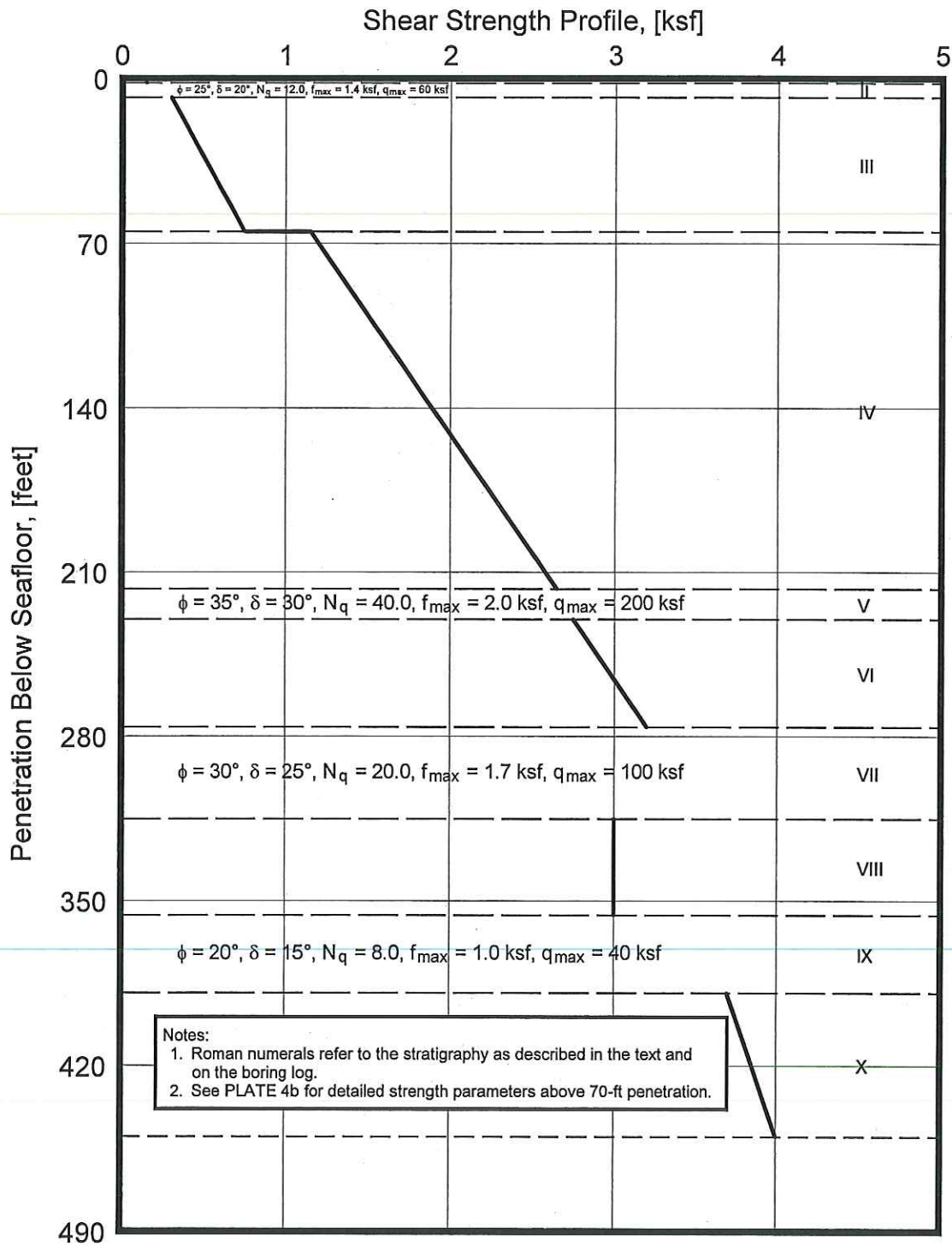
8/25/08

Date:

Checked By: PMP/MB

8/31/08

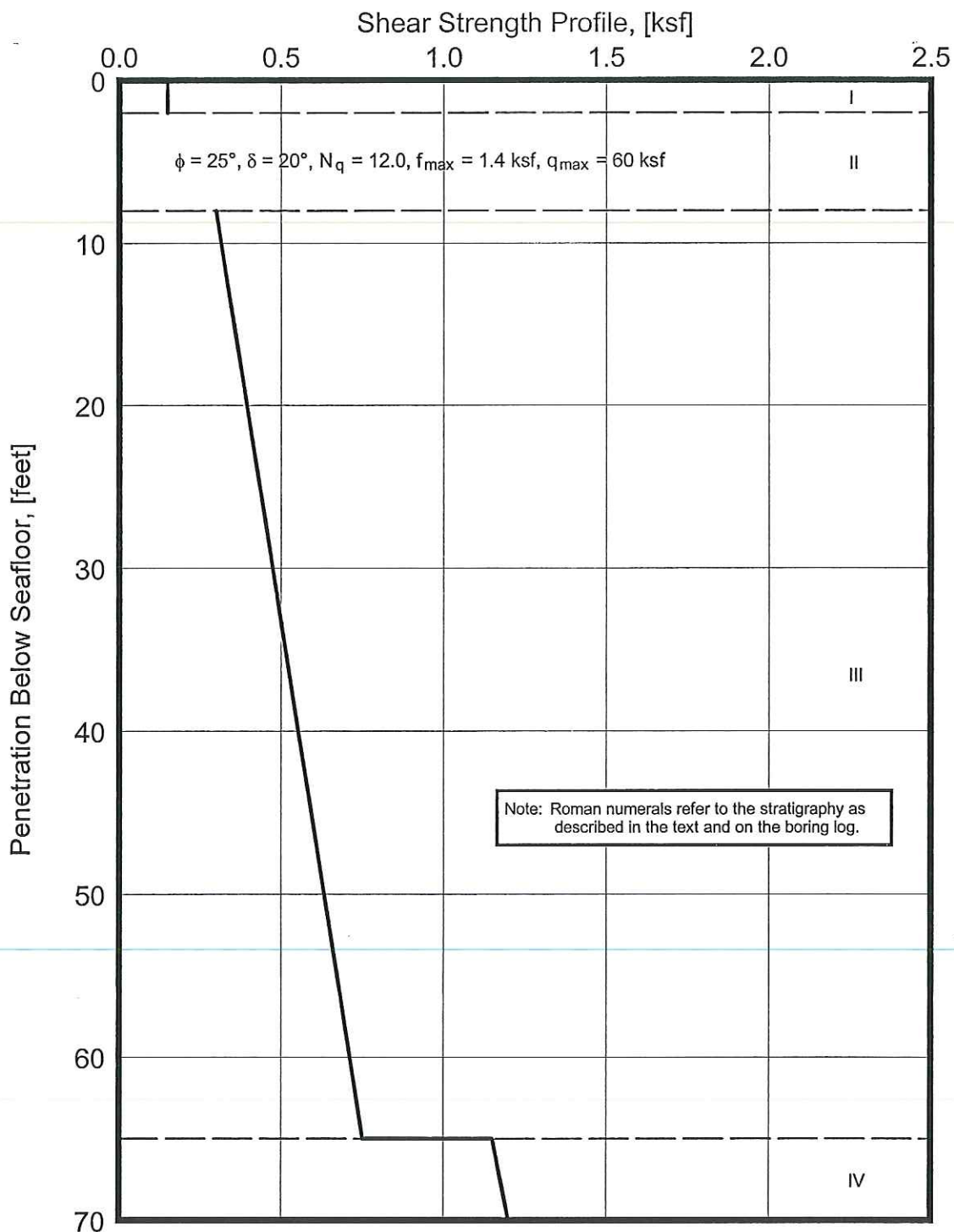
Approved By: DR



DESIGN STRENGTH PARAMETERS

Texas Offshore Port System, Offshore Terminal Location
Block A-59, Galveston Area





DESIGN STRENGTH PARAMETERS

Texas Offshore Port System, Offshore Terminal Location
Block A-59, Galveston Area



Date: 9/12/00

Drawn By: JFW

Date: 9/24/01

Date: 9/16/00

Checked By: WMP

Approved By: Dr

Date: 8/21/08

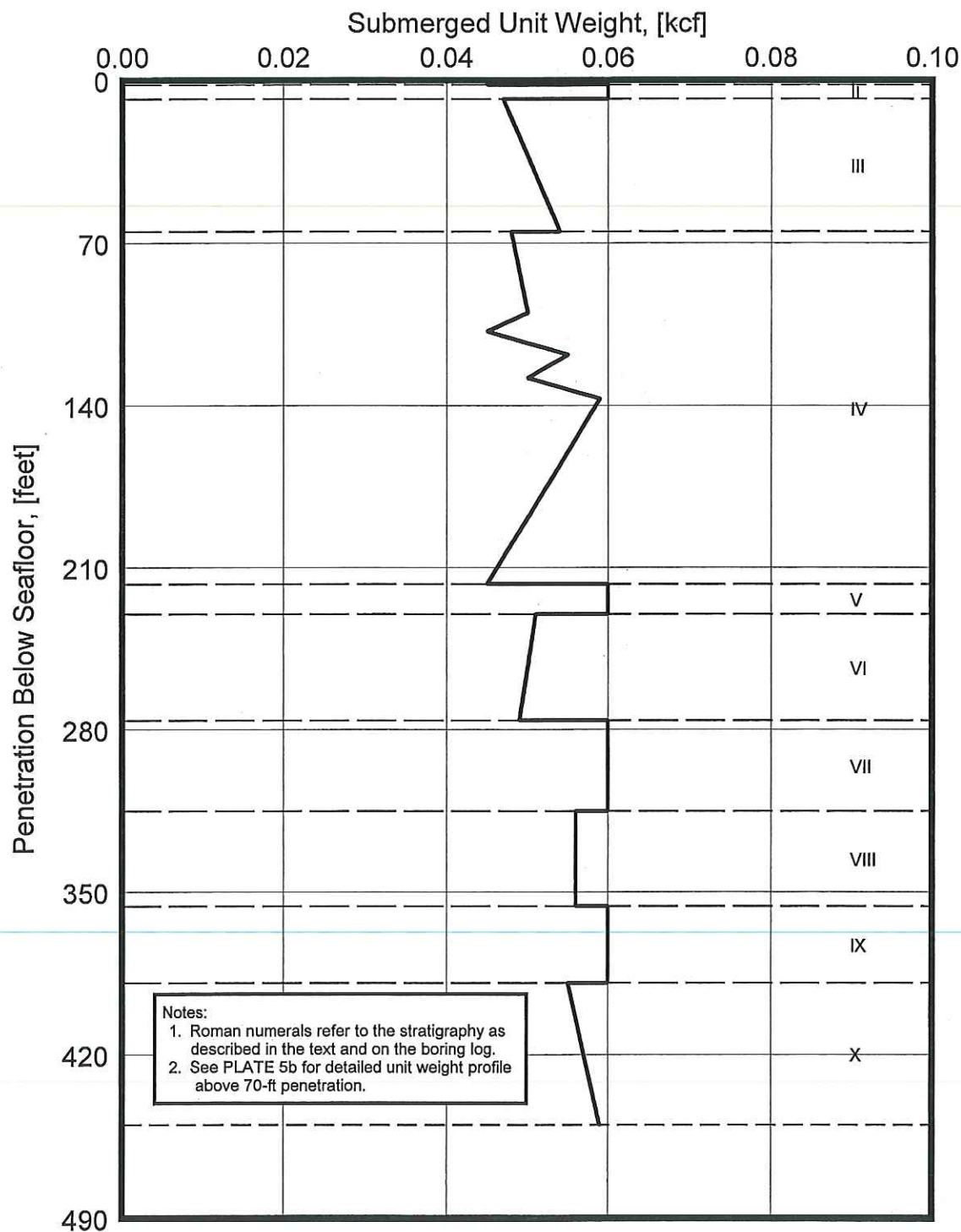
Drawn By: AW

Checked By: PMP/MB

Approved By: DR

Date: 8/25/08

Date: 8/15/08

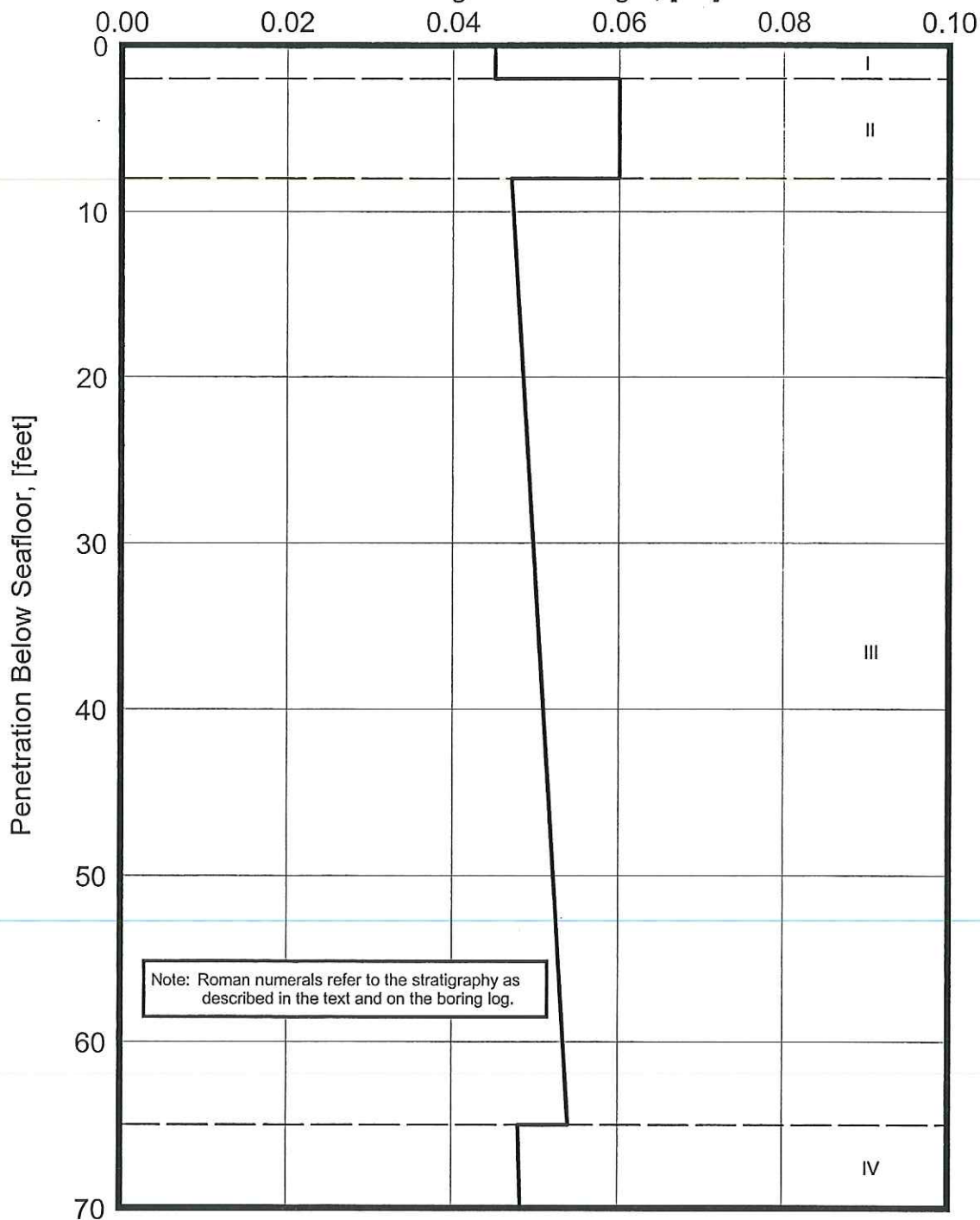


DESIGN SUBMERGED UNIT WEIGHT

Texas Offshore Port System, Offshore Terminal Location
Block A-59, Galveston Area



Submerged Unit Weight, [kcf]



DESIGN SUBMERGED UNIT WEIGHT

Texas Offshore Port System, Offshore Terminal Location
Block A-59, Galveston Area



Date: 9/12/08
 Drawn By: HUV
 Date: 9/12/08
 Checked By: DMM
 Approved By: DA

Date: 9/2/08

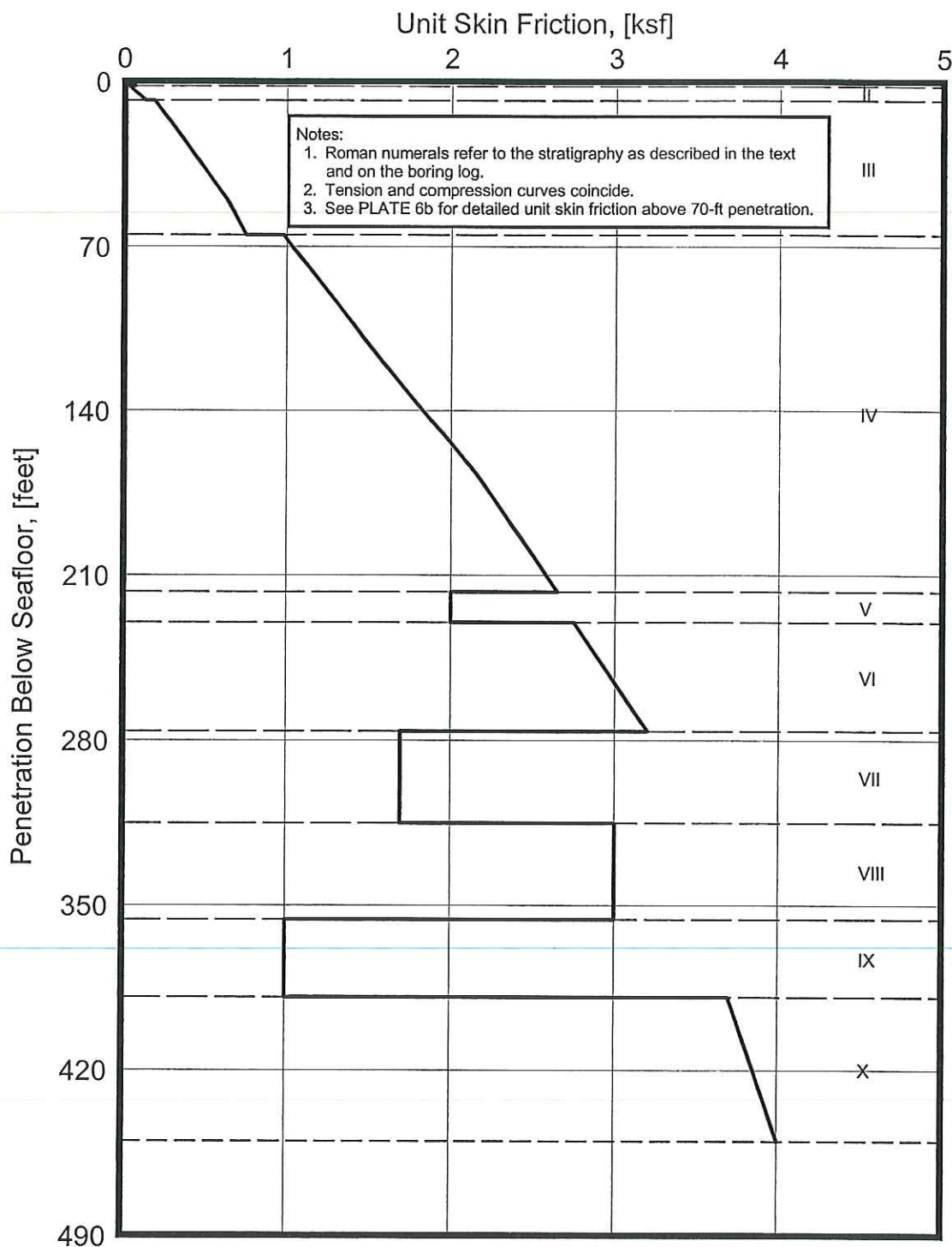
Drawn By: AW

Date: 9/2/08

Checked By: DMS

Date: 9/6/08

Approved By: A



UNIT SKIN FRICTION
API RP 2A (2000) Method

Texas Offshore Port System, Offshore Terminal Location
Block A-59, Galveston Area

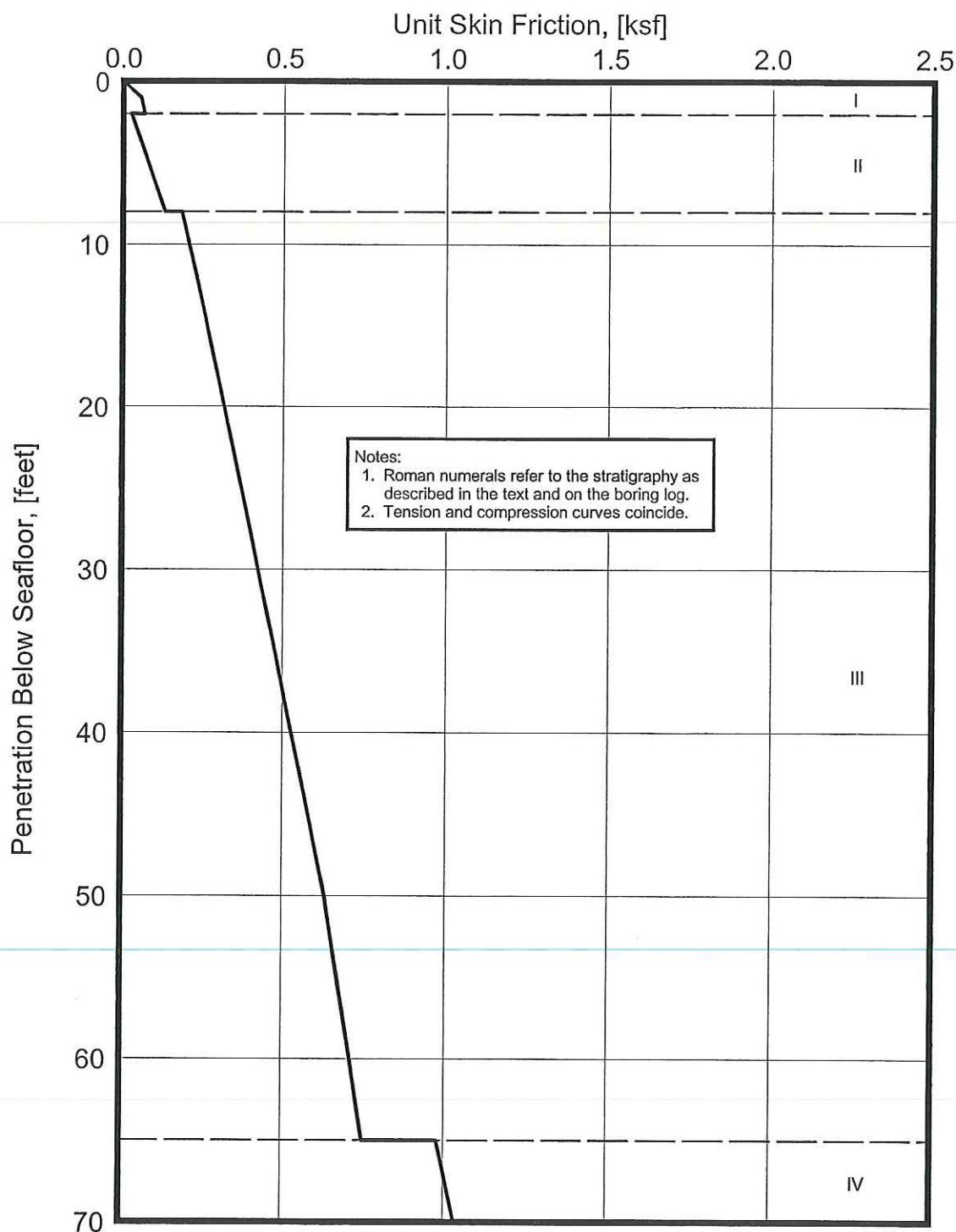


Date: 9/12/08

Drawn By: AW

Date: 9/12/08

Checked By: JWP
Approved By: A



UNIT SKIN FRICTION
API RP 2A (2000) Method

Texas Offshore Port System, Offshore Terminal Location
Block A-59, Galveston Area



Date: 9/2/08

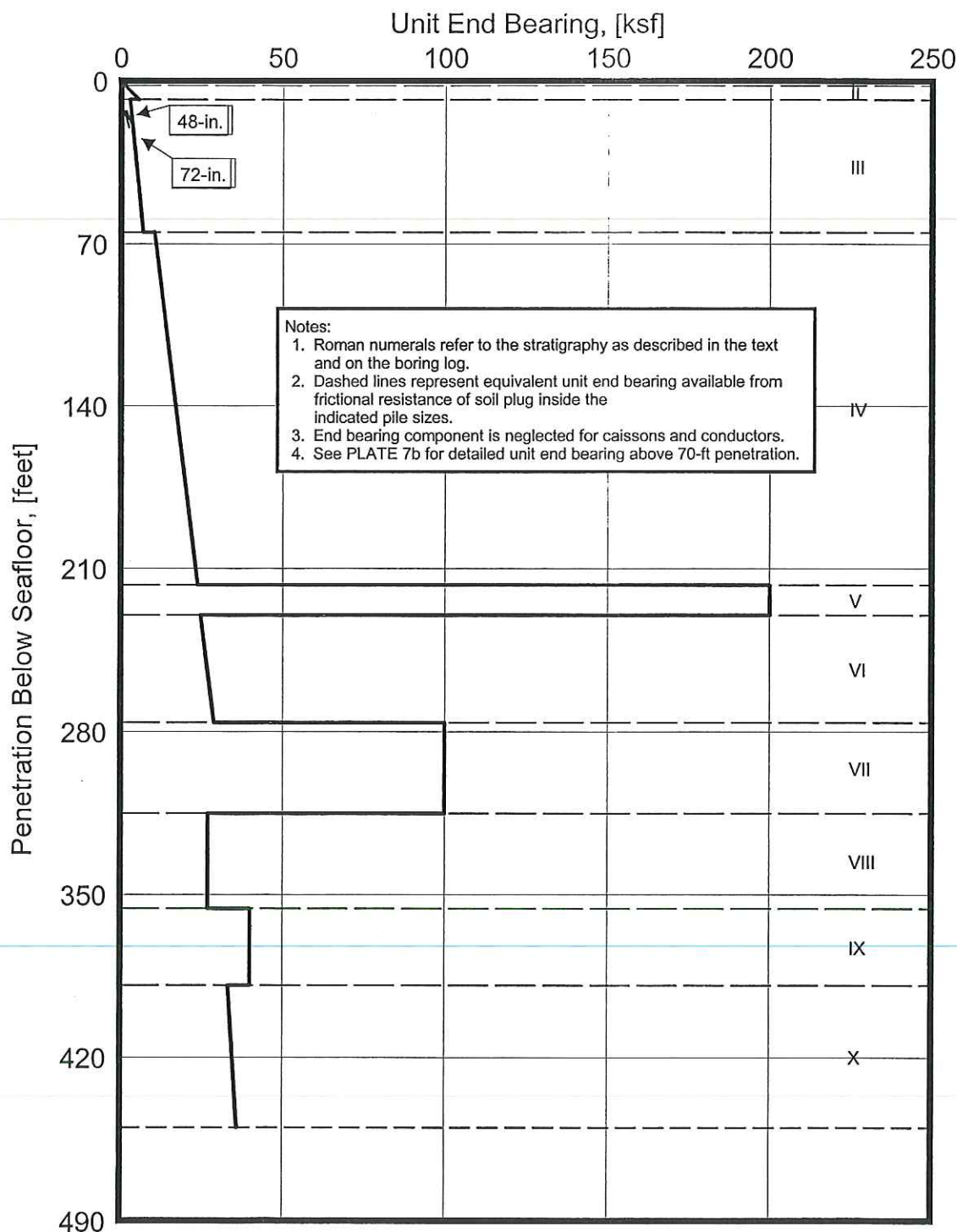
Drawn By: AW

Date: 9/2/08

Checked By: JWP

Date: 9/2/08

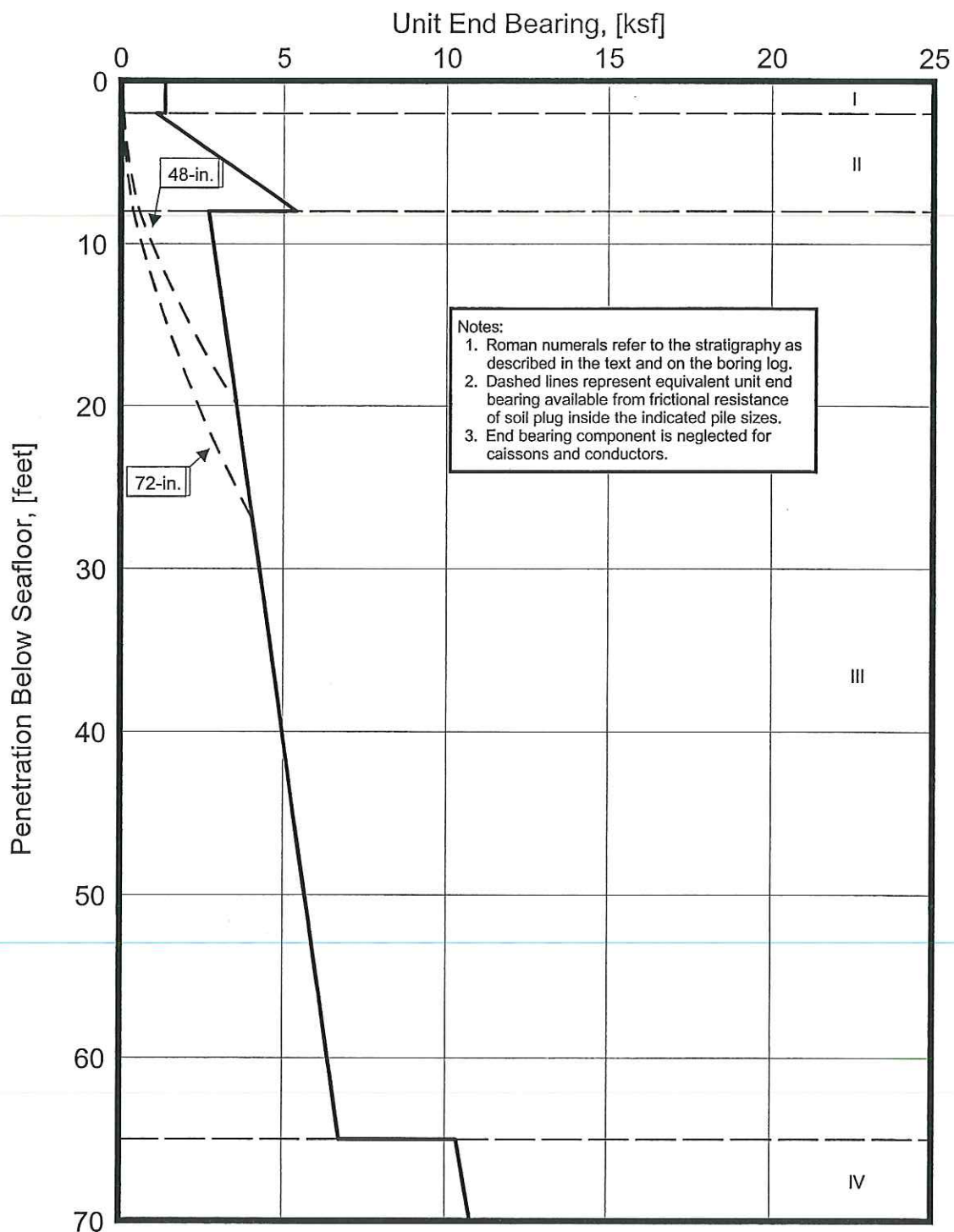
Approved By: A



UNIT END BEARING
API RP 2A (2000) Method

Texas Offshore Port System, Offshore Terminal Location
Block A-59, Galveston Area





UNIT END BEARING
API RP 2A (2000) Method

Texas Offshore Port System, Offshore Terminal Location
Block A-59, Galveston Area



Date: 11/2/00

Drawn By: H

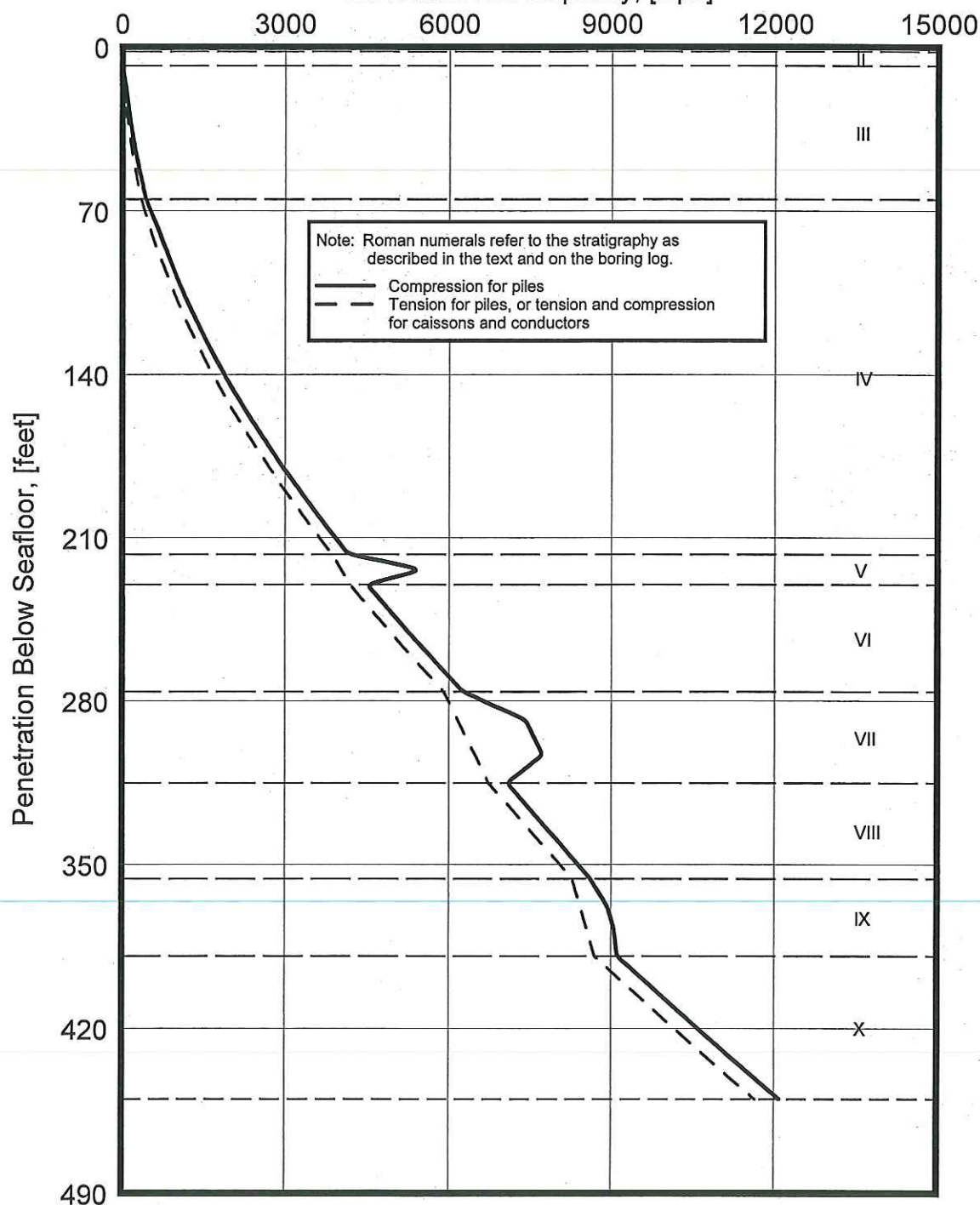
Date: 8/2/08

Date: 9/6/00

Checked By: JMP

Approved By: A

Ultimate Axial Capacity, [kips]



ULTIMATE AXIAL CAPACITY

API RP 2A (2000) Method

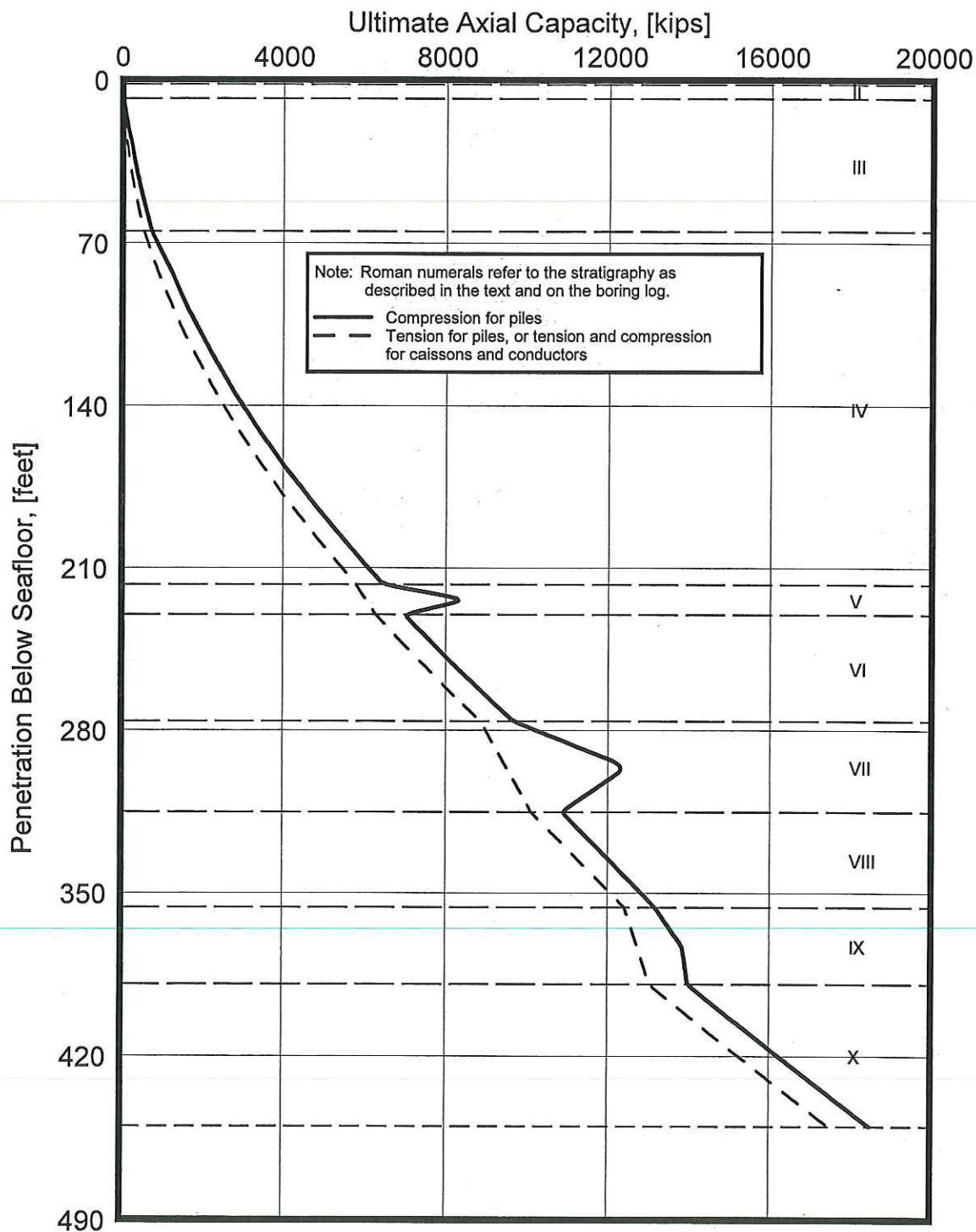
48-in.-Diameter Driven Pipe Piles

Texas Offshore Port System, Offshore Terminal Location

Block A-59, Galveston Area

Date: 8/21/08
 Drawn By: AW
 Checked By: PMP/MB Date: 8/25/08
 Approved By: D-2 Date: 8/31/08





ULTIMATE AXIAL CAPACITY
 API RP 2A (2000) Method
 72-in.-Diameter Driven Pipe Piles
 Texas Offshore Port System, Offshore Terminal Location
 Block A-59, Galveston Area



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	0.08	0.15	0.27	0.38	0.48	0.96	48.00
2.0	t	0.00	0.02	0.03	0.05	0.06	0.07	0.06	0.06
	z	0.00	0.08	0.15	0.27	0.38	0.48	0.96	48.00
2.0	t	0.00	0.03	0.03					
	z	0.00	0.10	48.00					
8.0	t	0.00	0.13	0.13					
	z	0.00	0.10	48.00					
8.0	t	0.00	0.06	0.09	0.14	0.17	0.18	0.17	0.17
	z	0.00	0.08	0.15	0.27	0.38	0.48	0.96	48.00
50.0	t	0.00	0.19	0.32	0.47	0.57	0.63	0.57	0.57
	z	0.00	0.08	0.15	0.27	0.38	0.48	0.96	48.00
65.0	t	0.00	0.23	0.38	0.56	0.68	0.75	0.68	0.68
	z	0.00	0.08	0.15	0.27	0.38	0.48	0.96	48.00
65.0	t	0.00	0.29	0.49	0.73	0.88	0.98	0.88	0.88
	z	0.00	0.08	0.15	0.27	0.38	0.48	0.96	48.00
100.0	t	0.00	0.41	0.69	1.03	1.24	1.37	1.24	1.24
	z	0.00	0.08	0.15	0.27	0.38	0.48	0.96	48.00
108.0	t	0.00	0.44	0.73	1.10	1.31	1.46	1.31	1.31
	z	0.00	0.08	0.15	0.27	0.38	0.48	0.96	48.00
118.0	t	0.00	0.47	0.79	1.18	1.42	1.57	1.42	1.42
	z	0.00	0.08	0.15	0.27	0.38	0.48	0.96	48.00
128.0	t	0.00	0.51	0.85	1.27	1.52	1.69	1.52	1.52
	z	0.00	0.08	0.15	0.27	0.38	0.48	0.96	48.00
137.0	t	0.00	0.54	0.90	1.35	1.62	1.80	1.62	1.62
	z	0.00	0.08	0.15	0.27	0.38	0.48	0.96	48.00
167.0	t	0.00	0.65	1.08	1.62	1.94	2.16	1.94	1.94
	z	0.00	0.08	0.15	0.27	0.38	0.48	0.96	48.00
217.0	t	0.00	0.79	1.32	1.99	2.38	2.65	2.38	2.38
	z	0.00	0.08	0.15	0.27	0.38	0.48	0.96	48.00
217.0	t	0.00	2.00	2.00					
	z	0.00	0.10	48.00					
230.0	t	0.00	2.00	2.00					
	z	0.00	0.10	48.00					
230.0	t	0.00	0.83	1.38	2.06	2.48	2.75	2.48	2.48
	z	0.00	0.08	0.15	0.27	0.38	0.48	0.96	48.00
276.0	t	0.00	0.96	1.60	2.40	2.88	3.20	2.88	2.88
	z	0.00	0.08	0.15	0.27	0.38	0.48	0.96	48.00
276.0	t	0.00	1.70	1.70					
	z	0.00	0.10	48.00					

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
 48-in.-Diameter Driven Pipe Piles
 Texas Offshore Port System, Offshore Terminal Location
 Block A-59, Galveston Area



Date: 8/21/08

Drawn By: AW

Checked By: PMP/MB Date: 8/25/08
 Approved By: Dr. Date: 8/25/08

PENETRATION BELOW MUDLINE (feet)	CURVE POINTS								
		1	2	3	4	5	6	7	8
315.0	t	0.00	1.70	1.70					
	z	0.00	0.10	48.00					
315.0	t	0.00	0.90	1.50	2.25	2.70	3.00	2.70	2.70
	z	0.00	0.08	0.15	0.27	0.38	0.48	0.96	48.00
356.0	t	0.00	0.90	1.50	2.25	2.70	3.00	2.70	2.70
	z	0.00	0.08	0.15	0.27	0.38	0.48	0.96	48.00
356.0	t	0.00	1.00	1.00					
	z	0.00	0.10	48.00					
389.0	t	0.00	1.00	1.00					
	z	0.00	0.10	48.00					
389.0	t	0.00	1.11	1.85	2.77	3.33	3.70	3.33	3.33
	z	0.00	0.08	0.15	0.27	0.38	0.48	0.96	48.00
450.0	t	0.00	1.20	2.00	3.00	3.60	4.00	3.60	3.60
	z	0.00	0.08	0.15	0.27	0.38	0.48	0.96	48.00

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
 48-in.-Diameter Driven Pipe Piles
 Texas Offshore Port System, Offshore Terminal Location
 Block A-59, Galveston Area



Date: 8/21/08

Drawn By: AW

Checked By: DMR/MB Date: 8/25/08
 Approved By: BR Date: 9/2/08

PENETRATION BELOW MUDLINE (feet)	CURVE POINTS							
		1	2	3	4	5	6	7
100.0	Q	0	42	85	127	152	169	169
	z	0.00	0.10	0.62	2.02	3.50	4.80	48.00
217.0	Q	0	75	150	225	270	300	300
	z	0.00	0.10	0.62	2.02	3.50	4.80	48.00
223.0	Q	0	352	703	1055	1266	1406	1406
	z	0.00	0.10	0.62	2.02	3.50	4.80	48.00
230.0	Q	0	78	156	233	280	311	311
	z	0.00	0.10	0.62	2.02	3.50	4.80	48.00
276.0	Q	0	90	181	271	326	362	362
	z	0.00	0.10	0.62	2.02	3.50	4.80	48.00
288.0	Q	0	314	628	942	1131	1257	1257
	z	0.00	0.10	0.62	2.02	3.50	4.80	48.00
289.0	Q	0	314	628	942	1131	1257	1257
	z	0.00	0.10	0.62	2.02	3.50	4.80	48.00
303.0	Q	0	314	628	942	1131	1257	1257
	z	0.00	0.10	0.62	2.02	3.50	4.80	48.00
315.0	Q	0	85	170	254	305	339	339
	z	0.00	0.10	0.62	2.02	3.50	4.80	48.00
356.0	Q	0	85	170	254	305	339	339
	z	0.00	0.10	0.62	2.02	3.50	4.80	48.00
368.0	Q	0	126	251	377	452	503	503
	z	0.00	0.10	0.62	2.02	3.50	4.80	48.00
377.0	Q	0	126	251	377	452	503	503
	z	0.00	0.10	0.62	2.02	3.50	4.80	48.00
389.0	Q	0	105	209	314	377	418	418
	z	0.00	0.10	0.62	2.02	3.50	4.80	48.00
450.0	Q	0	113	226	339	407	452	452
	z	0.00	0.10	0.62	2.02	3.50	4.80	48.00

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

AXIAL LOAD TRANSFER DATA (Q-Z DATA)

API RP 2A (2000) Method
48-in.-Diameter Driven Pipe Piles
Texas Offshore Port System, Offshore Terminal Location
Block A-59, Galveston Area



Date: 8/25/08

Drawn By: Aed

Checked By: RMP/MB Date: 8/25/08
Approved By: D12 Date: 8/31/08

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	0.12	0.22	0.41	0.58	0.72	1.44	72.00
2.0	t	0.00	0.02	0.03	0.05	0.06	0.07	0.06	0.06
	z	0.00	0.12	0.22	0.41	0.58	0.72	1.44	72.00
2.0	t	0.00	0.03	0.03					
	z	0.00	0.10	72.00					
8.0	t	0.00	0.13	0.13					
	z	0.00	0.10	72.00					
8.0	t	0.00	0.06	0.09	0.14	0.17	0.18	0.17	0.17
	z	0.00	0.12	0.22	0.41	0.58	0.72	1.44	72.00
50.0	t	0.00	0.19	0.32	0.47	0.57	0.63	0.57	0.57
	z	0.00	0.12	0.22	0.41	0.58	0.72	1.44	72.00
65.0	t	0.00	0.23	0.38	0.56	0.68	0.75	0.68	0.68
	z	0.00	0.12	0.22	0.41	0.58	0.72	1.44	72.00
65.0	t	0.00	0.29	0.49	0.73	0.88	0.98	0.88	0.88
	z	0.00	0.12	0.22	0.41	0.58	0.72	1.44	72.00
100.0	t	0.00	0.41	0.69	1.03	1.24	1.37	1.24	1.24
	z	0.00	0.12	0.22	0.41	0.58	0.72	1.44	72.00
108.0	t	0.00	0.44	0.73	1.10	1.31	1.46	1.31	1.31
	z	0.00	0.12	0.22	0.41	0.58	0.72	1.44	72.00
118.0	t	0.00	0.47	0.79	1.18	1.42	1.57	1.42	1.42
	z	0.00	0.12	0.22	0.41	0.58	0.72	1.44	72.00
128.0	t	0.00	0.51	0.85	1.27	1.52	1.69	1.52	1.52
	z	0.00	0.12	0.22	0.41	0.58	0.72	1.44	72.00
137.0	t	0.00	0.54	0.90	1.35	1.62	1.80	1.62	1.62
	z	0.00	0.12	0.22	0.41	0.58	0.72	1.44	72.00
167.0	t	0.00	0.65	1.08	1.62	1.94	2.16	1.94	1.94
	z	0.00	0.12	0.22	0.41	0.58	0.72	1.44	72.00
217.0	t	0.00	0.79	1.32	1.99	2.38	2.65	2.38	2.38
	z	0.00	0.12	0.22	0.41	0.58	0.72	1.44	72.00
217.0	t	0.00	2.00	2.00					
	z	0.00	0.10	72.00					
230.0	t	0.00	2.00	2.00					
	z	0.00	0.10	72.00					
230.0	t	0.00	0.83	1.38	2.06	2.48	2.75	2.48	2.48
	z	0.00	0.12	0.22	0.41	0.58	0.72	1.44	72.00
276.0	t	0.00	0.96	1.60	2.40	2.88	3.20	2.88	2.88
	z	0.00	0.12	0.22	0.41	0.58	0.72	1.44	72.00
276.0	t	0.00	1.70	1.70					
	z	0.00	0.10	72.00					

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
 72-in.-Diameter Driven Pipe Piles
 Texas Offshore Port System, Offshore Terminal Location
 Block A-59, Galveston Area



PENETRATION BELOW MUDLINE (feet)	CURVE POINTS								
		1	2	3	4	5	6	7	8
315.0	t	0.00	1.70	1.70					
	z	0.00	0.10	72.00					
315.0	t	0.00	0.90	1.50	2.25	2.70	3.00	2.70	2.70
	z	0.00	0.12	0.22	0.41	0.58	0.72	1.44	72.00
356.0	t	0.00	0.90	1.50	2.25	2.70	3.00	2.70	2.70
	z	0.00	0.12	0.22	0.41	0.58	0.72	1.44	72.00
356.0	t	0.00	1.00	1.00					
	z	0.00	0.10	72.00					
389.0	t	0.00	1.00	1.00					
	z	0.00	0.10	72.00					
389.0	t	0.00	1.11	1.85	2.77	3.33	3.70	3.33	3.33
	z	0.00	0.12	0.22	0.41	0.58	0.72	1.44	72.00
450.0	t	0.00	1.20	2.00	3.00	3.60	4.00	3.60	3.60
	z	0.00	0.12	0.22	0.41	0.58	0.72	1.44	72.00

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
 72-in.-Diameter Driven Pipe Piles
 Texas Offshore Port System, Offshore Terminal Location
 Block A-59, Galveston Area



Date: 8/21/08
 Drawn By: [Signature]
 Date: 8/25/08
 Checked By: PMP/MB
 Date: 8/31/08
 Approved By: [Signature]

Date: 8/21/08

Drawn By: Hew

Date: 8/25/08

Date: 8/31/08

Checked By: MB/PMF

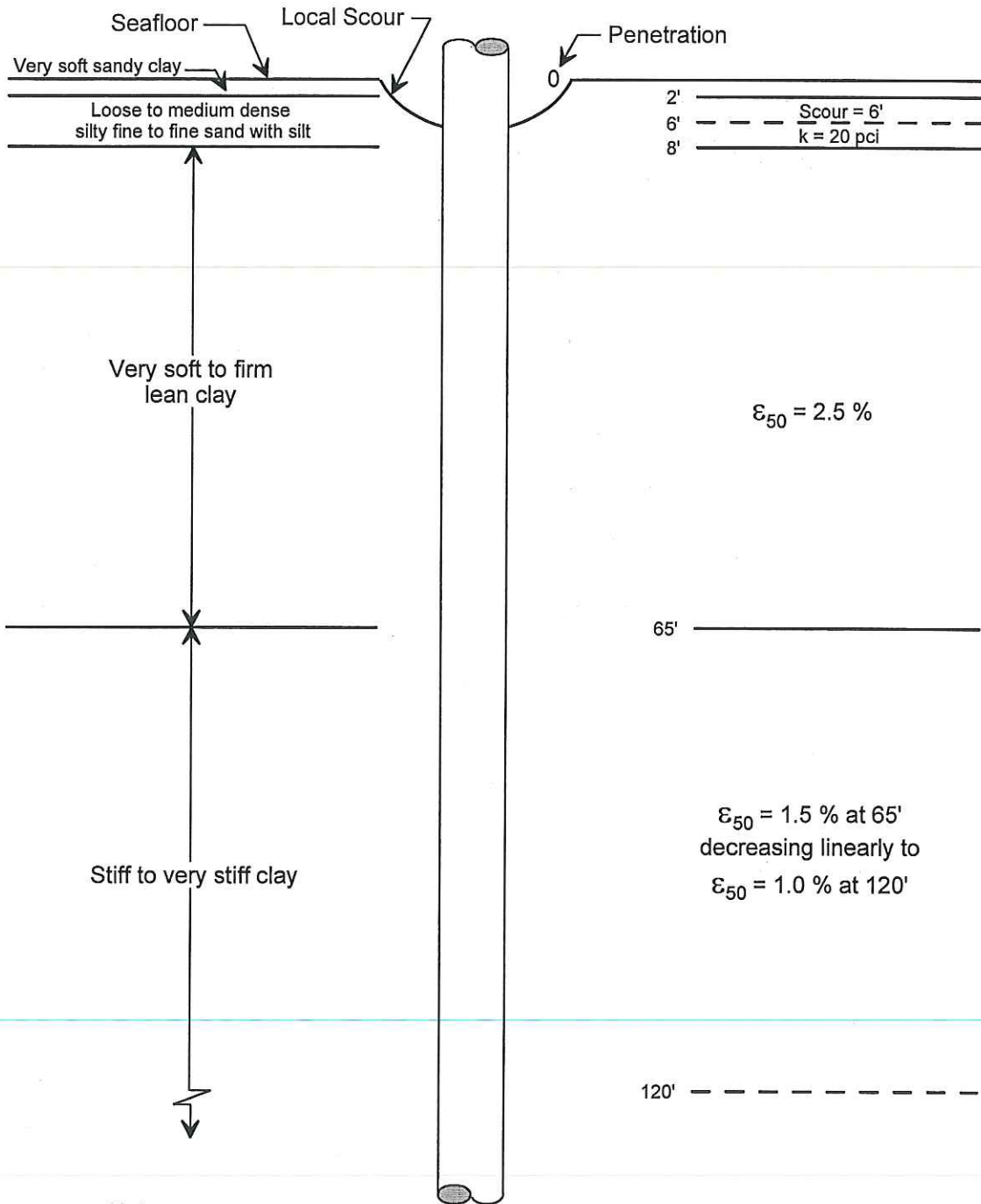
Approved By: [Signature]

PENETRATION BELOW MUDLINE (feet)	CURVE POINTS							
		1	2	3	4	5	6	7
100.0	Q	0	95	190	285	342	380	380
	z	0.00	0.14	0.94	3.02	5.26	7.20	72.00
217.0	Q	0	169	337	506	607	674	674
	z	0.00	0.14	0.94	3.02	5.26	7.20	72.00
223.0	Q	0	584	1167	1751	2101	2335	2335
	z	0.00	0.14	0.94	3.02	5.26	7.20	72.00
230.0	Q	0	175	350	525	630	700	700
	z	0.00	0.14	0.94	3.02	5.26	7.20	72.00
276.0	Q	0	204	407	611	733	814	814
	z	0.00	0.14	0.94	3.02	5.26	7.20	72.00
294.0	Q	0	707	1414	2121	2545	2827	2827
	z	0.00	0.14	0.94	3.02	5.26	7.20	72.00
297.0	Q	0	707	1414	2121	2545	2827	2827
	z	0.00	0.14	0.94	3.02	5.26	7.20	72.00
315.0	Q	0	191	382	573	687	763	763
	z	0.00	0.14	0.94	3.02	5.26	7.20	72.00
356.0	Q	0	191	382	573	687	763	763
	z	0.00	0.14	0.94	3.02	5.26	7.20	72.00
372.0	Q	0	273	545	818	981	1090	1090
	z	0.00	0.14	0.94	3.02	5.26	7.20	72.00
389.0	Q	0	235	471	706	847	942	942
	z	0.00	0.14	0.94	3.02	5.26	7.20	72.00
450.0	Q	0	254	509	763	916	1018	1018
	z	0.00	0.14	0.94	3.02	5.26	7.20	72.00

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

AXIAL LOAD TRANSFER DATA (Q-Z DATA)

API RP 2A (2000) Method
72-in.-Diameter Driven Pipe Piles
Texas Offshore Port System, Offshore Terminal Location
Block A-59, 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 4.
3. Submerged unit weight profile is shown on Plate 5.
4. k is the modulus of horizontal subgrade reaction for granular soils.

STRATIGRAPHY AND PARAMETERS FOR P-Y DATA

Texas Offshore Port System, Offshore Terminal Location
Block A-59, Galveston Area

8/25/08

Drawn By: AW Date:

Checked By: AW Date: 8/25/08
Approved By: AW Date: 8/31/08

PENETRATION BELOW MUDLINE (feet)	CURVE POINTS							
	1	2	3	4	5	6	7	8
0.0	p y	0 0.00	0 48.00					
6.0	p y	0 0.00	0 48.00					
8.0	p y	0 0.00	47 0.07	79 0.12	104 0.17	131 0.25	150 0.39	156 0.56
8.0	p y	0 0.00	60 0.08	91 0.30	135 0.90	199 3.00	286 9.00	46 45.00
12.0	p y	0 0.00	92 0.08	141 0.30	208 0.90	306 3.00	441 9.00	187 45.00
16.0	p y	0 0.00	127 0.08	195 0.30	288 0.90	424 3.00	610 9.00	407 45.00
20.0	p y	0 0.00	160 0.08	245 0.30	362 0.90	532 3.00	767 9.00	650 45.00
25.0	p y	0 0.00	195 0.08	300 0.30	443 0.90	651 3.00	938 9.00	938 48.00
65.0	p y	0 0.00	338 0.08	518 0.30	765 0.90	1125 3.00	1620 9.00	1620 48.00
65.0	p y	0 0.00	518 0.05	794 0.18	1173 0.54	1725 1.80	2484 5.40	2484 48.00
120.0 (and below)	p y	0 0.00	762 0.03	1168 0.12	1727 0.36	2540 1.20	3657 3.60	3657 48.00

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

P-Y DATA
(CYCLIC LOADING)
API RP 2A (2000) Method
48-in.-Diameter Driven Pipe Piles
Texas Offshore Port System, Offshore Terminal Location
Block A-59, Galveston Area

Date: 8/21/88

Drawn By: MW

Checked By: RMP/MB Date: 8/25/88
Approved By: CH Date: 8/31/88



Date: 8/21/08

Drawn By: AW

Date: 8/25/08

Checked By: PMP/MB

Date: 8/31/08

Approved By: [Signature]

PENETRATION BELOW MUDLINE (feet)	CURVE POINTS								
		1	2	3	4	5	6	7	8
0.0	p y	0 0.00	0 72.00						
6.0	p y	0 0.00	0 72.00						
8.0	p y	0 0.00	55 0.09	92 0.15	122 0.22	154 0.33	176 0.51	183 0.73	185 72.00
8.0	p y	0 0.00	84 0.12	130 0.45	191 1.35	282 4.50	405 13.50	51 67.50	51 72.00
14.0	p y	0 0.00	142 0.12	218 0.45	322 1.35	474 4.50	683 13.50	280 67.50	280 72.00
20.0	p y	0 0.00	206 0.12	316 0.45	467 1.35	686 4.50	988 13.50	651 67.50	651 72.00
26.0	p y	0 0.00	270 0.12	414 0.45	612 1.35	900 4.50	1296 13.50	1111 67.50	1111 72.00
33.0	p y	0 0.00	336 0.12	515 0.45	761 1.35	1119 4.50	1611 13.50	1611 72.00	
65.0	p y	0 0.00	506 0.12	776 0.45	1147 1.35	1687 4.50	2430 13.50	2430 72.00	
65.0	p y	0 0.00	776 0.07	1190 0.27	1759 0.81	2587 2.70	3726 8.10	3726 72.00	
120.0 (and below)	p y	0 0.00	1143 0.05	1752 0.18	2590 0.54	3809 1.80	5485 5.40	5485 72.00	

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

P-Y DATA
(CYCLIC LOADING)
API RP 2A (2000) Method
72-in.-Diameter Driven Pipe Piles
Texas Offshore Port System, Offshore Terminal Location
Block A-59, Galveston Area



FIELD OPERATIONS

Drilling Procedures

A drilling rig mounted on a suitable offshore platform was used to perform the boring. The drilling platform is usually an anchored or dynamically positioned vessel or a mobile drilling platform. The borehole is advanced with open hole, wet rotary techniques, using a drag bit attached to the drill pipe. A combination of fresh water gel and weight materials mixed with salt water are used as necessary to suspend and remove drill cuttings and to provide lateral pressure to support the sides of the borehole. A brief chronological Summary of Field Operations is presented on Plate A-1.

Sampling Procedures

Samples are obtained through the open bore of the drill pipe. Cohesive samples are generally obtained by the push sampling technique, and granular samples by the percussion technique.

Push samples are taken by lowering the sample tube into the soil formation with the weight of the drill pipe. After the boring is drilled to the desired depth, the drill bit is raised from the borehole bottom, and the sampler is allowed to fall through the drill pipe until it rests on a catch ring above the drill bit. The sampler is then pushed about 24 to 30 in. into the soil by lowering the drill string. The sampler is retrieved by pulling it out of the soil formation with the drill pipe and then raising it to the deck using an overshot retrieving device attached to a wireline. After retrieving the sampler, the boring is advanced and the sampling procedure is repeated. Samples obtained in this fashion are noted by "PUSH" on the boring log.

Percussion samples are obtained by advancing the sampler tube with a hammer and slide assembly, which is lowered to the desired sampling depth. The hammer, a 175-lb sliding weight, is repeatedly raised approximately 5 ft and dropped, to achieve a maximum penetration of 24 in. or a maximum of 30 blows. The number of blows required to achieve 24-in. penetration, or the penetration for a maximum of 30 blows, is recorded on the boring log.

Samples recovered with the liner sampler are advanced 24 in. into the formation with the weight of the hammer and slide assembly. Liner samples are noted as "WOH" on the boring log.

Water Depth Measuring Procedures

The water depth measurements are usually taken at the boring location by one or more of the following methods: (1) the vessel's echo sounder, (2) an electronic bottom sensor, (3) pressure transducer located in the bottom sensor and (4) the first sample recovery during the coring operation. An initial water depth is estimated using the vessel's echo sounder. After the initial water depth estimate is made, a bottom sensor is used to more accurately measure the water depth. The bottom sensor is an electronic seafloor sensor that is operated on an electric cable and latches into the drill bit. The drill string is slowly lowered to the seafloor until the electronic sensor signals that its tip has contacted the soil. The bottom sensor contains a pressure transducer that provides an independent water depth measurement. This pressure transducer measurement also checks the pipe tally length used for the bottom sensor measurement. The water depths obtained from these methods are then confirmed by recovery of the first soil sample. The Cavins wireline counter is used in conjunction with the sampling equipment to obtain the mudline sample. The water depth measurement thought to be most representative is indicated on the boring log. After completing the soil boring, a confirmatory water depth measurement is sometimes taken. The coring vessel is repositioned, and the water depth is confirmed. Some variations in these procedures may occur due to available equipment and conditions at the time of the boring.



FIELD AND LABORATORY TESTING

A summary of the field and laboratory test results is presented on Plate A-2. In the field, each sample is extruded from the sampler and carefully examined, classified, and tested by the soil technician or field engineer. Representative portions of each recovered sample are appropriately packaged for shipment to the laboratory in Houston. The test procedures, which are in general accordance with ASTM Standards (2008), are described in the following paragraphs.

Classification Tests

The classification tests, performed to verify field soil classifications, are assigned to granular and cohesive soils. These data are tabulated on the Summary of Test Results, and most results are also plotted on the Log of Boring and Test Results.

For cohesive samples, plastic and liquid limits are determined to provide information for soil classification. Water content and density determinations are made for soil compression test specimens.

For granular samples, classification tests are directed toward determining grain size. Grain-size analyses performed include sieve analysis and/or the percent material passing the No. 200 sieve. These values are presented on the Summary of Test Results.

Strength Tests

The undrained shear strength of cohesive samples is obtained from Torvane, pocket penetrometer, miniature vane, and unconsolidated-undrained triaxial compression tests. The results are tabulated on the Summary of Test Results and are plotted on the boring log.

The Torvane is a small, hand-operated device consisting of a metal disc with thin, radial vanes projecting from one face. The disc is pressed against a flat surface of the soil until the vanes are fully embedded and is rotated through a torsion spring until the soil is sheared. The device is calibrated to indicate shear strength of the soil directly from the rotation of the torsion spring.

The pocket penetrometer is a small, hand-held device consisting of a flat-faced cylindrical plunger and spring encased in a cylindrical housing. The plunger is pressed against a flat soil surface, compressing the spring until the soil experiences a punching type bearing failure. The penetrometer is calibrated to indicate shear strength of the soil directly from compression of the spring.

The miniature vane test is used to measure the undrained shear strength of cohesive soils. In this test, a small, 4-bladed vane is inserted into either an undisturbed or remolded cohesive specimen. Torque is applied to the vane through a calibrated spring until soil shear failure occurs. The undrained shear strength is determined by multiplying the rotation, in degrees, by the spring constant.

In the unconsolidated-undrained triaxial compression test, either an undisturbed or remolded soil specimen is enclosed in a thin rubber membrane and subjected to a confining pressure of at least the computed effective overburden pressure. The specimen is then loaded axially to failure at a nearly constant rate of strain without allowing drainage. The undrained shear strength of cohesive soils is computed as one-half the maximum observed deviator stress. Normalized stress-strain curves from undisturbed UU triaxial compression tests are presented on Plate A-3.

<u>Date</u>	<u>Time</u>		<u>Description of Activities</u>
	<u>From</u>	<u>To</u>	
July 3, 2008	****	1235	Arrive in Block A-59, Galveston Area onboard the vessel <i>R/V Seaprobe</i> .
	1235	1430	Set 4-pt anchors.
	1430	1445	Rig up to drill and sample.
	****	1445	Estimate water depth of 120 ft with vessel's echo sounder and 126 ft using wireline technique.
	1445	1515	Perform scanning sonar survey.
	1450	1525	Run drill pipe to mudline.
	****	1525	Measure water depth of 125 ft with the bottom sensor/pipe tally and 124.6 ft with pressure transducer.
	1525	2400	Drill and sample.
	****	2345	Conduct pre-shift safety meeting.
	0000	0640	Drill and sample. Boring terminated at 450-ft penetration.
July 4, 2008	0640	0810	Pull drill pipe above mudline and reposition vessel.
	****	0810	Measure supplemental water depth of 125 ft with the bottom sensor/pipe tally and 125 ft with pressure transducer.
	0810	0845	Pull drill pipe to deck and secure equipment for travel.
	0845	0935	Pull anchors.
	0935	****	Depart location.

SUMMARY OF FIELD OPERATIONS

Texas Offshore Port System, Offshore Terminal Location
Block A-59, Galveston Area



Checked By: *AW* Date: *8/21/08*
 Approved By: *DM* Date: *8/31/08*

Drawn By: *mm* Date: *8/21/08*

Summary of Test Results

Job No.: 0201-6504

21-Aug-2008 (Ver. #7)

Boring: Texas Offshore Port System, Offshore Terminal Location

Block: A-59

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	
1	0.30									0.16		0.08										
2	1.00				50	43	52			0.12		0.04										
2	1.00				45						0.12											
2	1.00	.96	54	14	53																	
3	5.00				24	51	10															
4	8.00				28	63	28															
5	10.00																					
6	10.50					58																
7	11.00	3.24	25	19	41																	
7	11.00				50		55		0.52													
8	13.00								0.46													
9	13.50										0.07											
9	13.50												UU	44	38	0.14		2.2	47	14	A	
10	14.00	2.05	31	17	46				0.40	0.44												
11	15.50								0.40													
12	16.00				38						0.09											
12	16.00				42	47							UU	43	120	0.30		1.8	47	13	A	
13	16.30				44				0.48	0.47												
14	19.00								0.52													
15	19.50					42																
16	20.00				40																	
16	20.00				48				0.52	0.36												

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

Checked By: *AW* Date: *8/2/08*
 Approved By: *DM* Date: *8/31/08*

Drawn By: *mm* Date: *8/2/08*

Summary of Test Results

Job No.: 0201-6504

21-Aug-2008 (Ver. #7)

Boring: Texas Offshore Port System, Offshore Terminal Location

Block: A-59

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
17	22.00								0.50												
18	22.50												UU	39	38	0.28		2.5	53	14	A
18	22.50										0.08										
19	23.00	1.06	35	11	37				0.42	0.52											
20	24.50				40	52			0.44												
21	25.00												UU	33	120	0.26		2.2	52	14	A
21	25.00				33						0.07										
22	25.50				39				0.50	0.31											
23	28.00				37	51			0.56												
24	28.50																				
25	29.00				33				0.46	0.42											
26	31.00								0.56												
27	31.50												UU	39	40	0.26		3.8	50	16	A
27	31.50										0.07										
28	32.00				35				0.48	0.80											
29	33.50																				
30	34.00				35	49							UU	37	120	0.42		1.8	50	13	A
30	34.00				36						0.18										
31	34.50	2.18	27	19	37				0.72												
32	37.00						28														
34	37.50					53			0.40												
35	38.00				37																

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

Checked By: *AW* Date: *8/21/08*
 Approved By: *Dr* Date: *8/31/08*

Drawn By: *mm* Date: *8/21/08*

Summary of Test Results

Job No.: 0201-6504

21-Aug-2008 (Ver. #7)

Boring: Texas Offshore Port System, Offshore Terminal Location

Block: A-59

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 (psf)	Undisturbed Strength (ksf)	Remolded Strength (ksf)	E ₅₀ Strain (%)	Submerged Unit Weight (pcf)	Failure Strain (%)	Type of Failure
35	38.00				33					0.62											
36	40.00										0.13										
36	40.00												UU	39	40	0.43		3.2	48	18	A
37	40.50																				
38	41.00				39				0.52												
39	43.00								0.74												
40	43.50					44															
41	44.00				42				0.68	0.72											
41	44.00				45																
42	46.00								0.60												
43	46.50				34						0.22										
43	46.50					53							UU	33	120	0.51		3.6	54	20	A
44	47.00				36																
44	47.00				35				0.48	0.46											
45	48.50									0.64			UU	36	51	0.38		4.1	52	21	A
45	48.50										0.11										
46	49.00	.96	37	11	35																
47	58.00				36	54			0.62												
48	58.50																				
49	59.00				37				0.80	0.96											
50	67.40								1.25												
50	67.40				41				1.24	1.43 +											

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

Checked By: *AW* Date: *8/21/08*
 Approved By: *an* Date: *8/21/08*

Drawn By: *mm* Date: *8/21/08*

Summary of Test Results

Job No.: 0201-6504

21-Aug-2008 (Ver. #7)

Boring: Texas Offshore Port System, Offshore Terminal Location

Block: A-59

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
51	68.50								1.15												
52	69.00										0.46										
52	69.00												UU	42	70	0.68		1.4	48	12	AB
53	69.50				44				1.20	1.14											
54	78.00								1.35												
55	78.50					55							UU	37	120	0.85		1.3	52	11	AB
56	79.00				37				1.60	1.13											
56	79.00	.60	54	16	39																
57	88.00								1.40												
58	88.50												UU	40	90	1.41		1.1	49	3	B
58	88.50												UU		118		0.47		50		
59	89.00				40				1.40	1.34											
60	98.00								1.55												
61	98.50					50															
62	99.00				43																
62	99.00				39				1.60	2.06											
63	108.00								1.70												
64	108.50												UU	48	112	2.10		0.8	43	3	B
64	108.50												UU		121		0.54		45		
65	109.00	.47	80	20	48				1.70	2.25											
66	117.50																				
67	118.00				30	53															

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

Checked By: *AW* Date: *8/21/08*
 Approved By: *DM* Date: *8/31/08*

Drawn By: *mm* Date: *8/21/08*

Summary of Test Results

Job No.: 0201-6504

21-Aug-2008 (Ver. #7)

Boring: Texas Offshore Port System, Offshore Terminal Location

Block: A-59

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)	E ₅₀ Strain (%)	Submerged Unit Weight (pcf)	Failure Strain (%)	Type of Failure
68	118.30				32			1.50	1.50	1.96											
69	127.50												UU	41	121	1.91		1.5	50	4	B
69	127.50												UU		121		0.49		49		
70	128.00				40			2.00	1.55	2.08											
71	138.00				24	57	36														
72	148.00	1.01	37	19	37					1.28			UU		121		0.27		52		
72	148.00												UU	32	119	1.20		4.9	52	16	AC
73	148.50																				
74	157.50																				
75	158.00				31	50							UU	33	120		0.64		53		
75	158.00												UU	32	120	1.85		1.2	51	6	AB
76	158.30							2.25	2.25	2.13											
77	168.00							2.50	2.00												
78	168.50												UU	34	121	2.51		1.5	49	5	B
78	168.50												UU		120		0.75		53		
79	169.00				43			1.50	1.45	1.66											
80	178.00							2.75	2.25												
81	178.50												UU	34	119	2.95		1.0	47	3	B
82	179.00	.37	66	18	35			2.75	2.40	2.42											
83	188.00							2.25													
84	188.50					42															
85	189.00				42			2.75	2.00	2.55											

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



Checked By: *AW* Date: *8/21/08*
 Approved By: *mm* Date: *8/31/08*

Drawn By: *mm* Date: *8/21/08*

Summary of Test Results

Job No.: 0201-6504

21-Aug-2008 (Ver. #7)

Boring: Texas Offshore Port System, Offshore Terminal Location

Block: A-59

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	
85	189.00				33																	
86	198.00							3.00														
87	198.50											UU	44	121	2.52		0.7	56	2	C		
87	198.50											UU		120		0.91		48				
88	199.00				45			2.75		2.76												
89	207.50					46																
90	208.30	.36	86	22	45																	
90	208.30				43			3.00		3.42												
91	218.00					61	7															
92	227.40				24	52	2															
93	238.00							3.25														
94	238.50											UU		121		1.37		51				
94	238.50											UU	37	118	2.82		0.8	47	3	B		
95	239.00	.31	77	21	38			3.00		3.08												
96	248.00							3.00														
97	248.50					49																
98	249.00				40			3.00		3.06												
98	249.00				38																	
99	257.50							3.50				UU	39	121	3.91		2.4	51	7	B		
99	257.50											UU		121		1.51		50				
100	258.00				39			3.25		3.70												
101	267.50					47		3.00	3.00													

NOTES:

TYPE OF TEST

U - Unconfined Compression
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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

Checked By: *AW*
 Approved By: *on*

Date: *8/21/08*
 Date: *8/31/08*

Drawn By: *mm* Date: *8/21/08*

Summary of Test Results

Job No.: 0201-6504

21-Aug-2008 (Ver. #7)

Boring: Texas Offshore Port System, Offshore Terminal Location

Block: A-59

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)	E ₅₀ Strain (%)	Submerged Unit Weight (pcf)	Failure Strain (%)	Type of Failure	
102	268.00				41			3.25	2.75	3.61												
102	268.00	.30	88	22	42																	
103	279.00				24	60	22															
104	288.00								0.50													
105	288.50					64																
106	289.00	.67	26	16	22																	
106	289.00				21		81		0.50	0.74												
107	297.50				23	54	3															
108	307.50					67																
109	308.00				19	70	7															
110	317.50											UU		121		1.86		54				
110	317.50							2.50	2.70			UU	32	121	3.96		1.7	50	5	AB		
111	318.00				34			2.50	2.45	3.83 +												
112	328.00							3.50	2.25	2.95												
113	328.50																					
114	329.00	.42	34	18	25			3.00	2.00			UU	22	120	2.61		2.0	56	14	B		
114	329.00											UU		121		1.77		62				
115	338.00							2.50	2.75													
116	338.50											UU	29	120	3.08		2.0	53	11	AC		
116	338.50					52						UU	30	120		1.17		56				
117	339.00				32																	
117	339.00				34			2.50	2.60	2.19												

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

Checked By: *AW* Date: *8/21/08*
 Approved By: *on* Date: *8/3/08*

Drawn By: *mm* Date: *8/21/08*

Summary of Test Results

Job No.: 0201-6504

21-Aug-2008 (Ver. #7)

Boring: Texas Offshore Port System, Offshore Terminal Location

Block: A-59

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 (psf)	Undisturbed Strength (ksf)	Remolded Strength (ksf)	ε ₅₀ Strain (%)	Submerged Unit Weight (pcf)	Failure Strain (%)	Type of Failure
118	358.00				24	59															
119	358.50												UU	24	121	3.37		6.3		20	A
119	358.50	1.23	26	18	28		99	3.00	1.25	1.55			UU		121		1.04		59		
120	369.00				25	58	77														
121	379.00				25	50	52														
122	388.00												UU		120		0.81		58		
122	388.00	.70	30	16	26								UU	36	121	1.96		2.4		16	A
123	388.50				24	57	85														
124	398.00							2.75													
125	398.50												UU	30	120	4.38		2.3	50	9	AB
125	398.50												UU		121		1.66		56		
126	399.00				31																
127	408.00							3.25					UU	32	121	3.42		2.5	49	7	B
128	408.50					46															
129	409.00	.22	67	18	29			3.50		3.83 +											
130	418.00							3.00	2.95												
131	418.50												UU	30	121	5.99		1.8	44	5	B
131	418.50												UU		121		1.80		54		
132	419.00				31			3.50		3.83 +											
133	428.00												UU	25	120		1.25		61		
133	428.00							3.50					UU	30	118	3.11		2.2	54	9	B
134	428.50					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

Checked By: *AW* Date: *8/21/08*
 Approved By: *on* Date: *8/31/08*

Drawn By: *mm* Date: *8/21/08*

Summary of Test Results

Job No.: 0201-6504

21-Aug-2008 (Ver. #7)

Boring: Texas Offshore Port System, Offshore Terminal Location

Block: A-59

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)	C ₅₀ Strain (%)	Submerged Unit Weight (pcf)	Failure Strain (%)	Type of Failure
135	429.00				33			4.25	2.95	3.83 +											
136	438.00							4.50	3.50				UU	25	120	2.45		1.5	59	7	A
137	438.50																				
138	439.00	.35	46	13	24			3.75		3.83 +											
139	449.00							3.00	3.05												
140	449.50												UU		120		1.92		57		
140	449.50												UU	27	121	4.46		1.4	54	5	B
141	450.00				28			3.85	3.00	3.83 +											

NOTES:

TYPE OF TEST

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 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



Date: 8/20/08

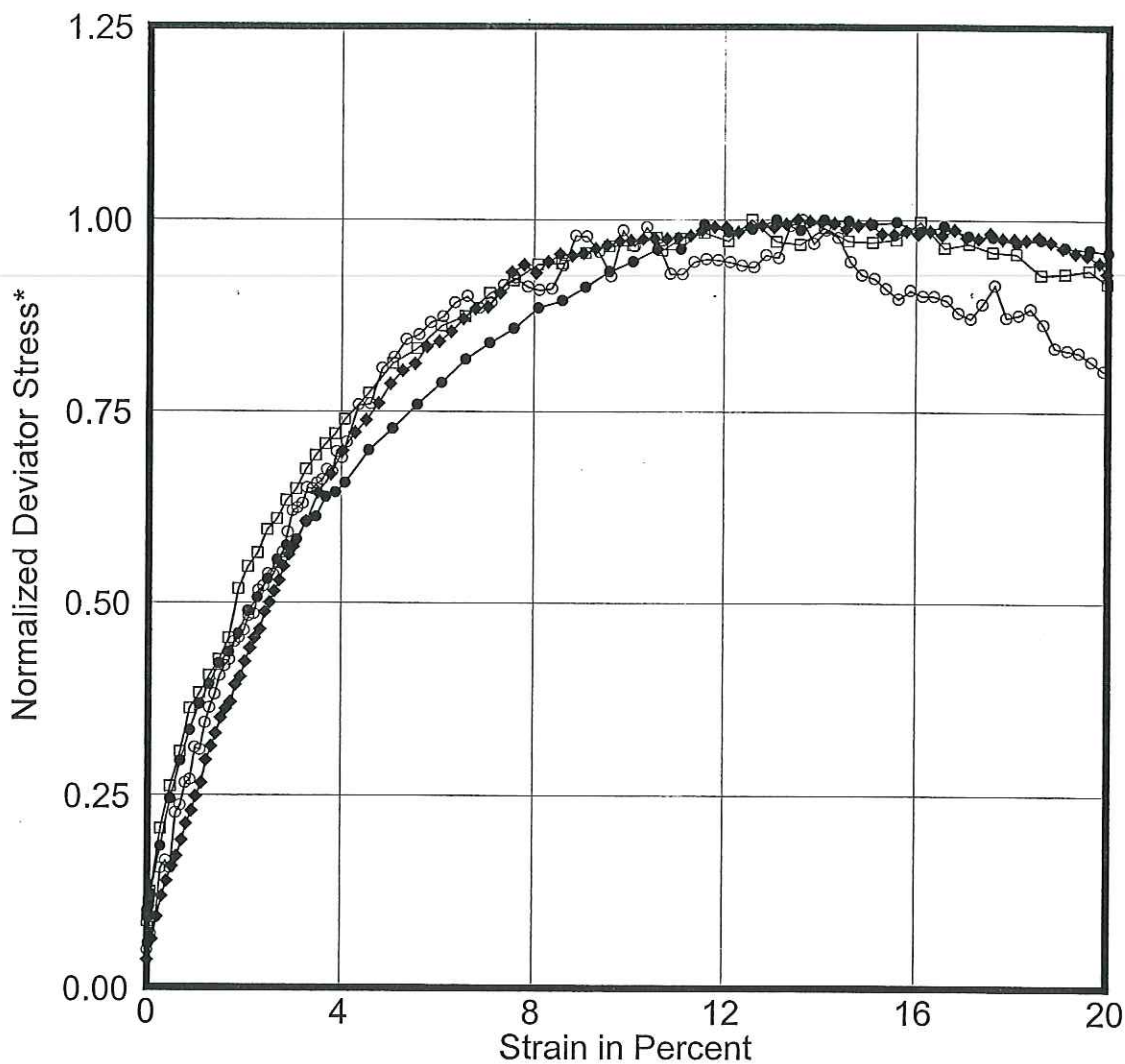
Drawn By: m m

Date: 8/17/08

Date: 8/21/08

Checked By: [Signature]

Approved By: [Signature]



Curve	Sample No.	Depth [ft]	Test Type	Confining Pressure [psi]	Maximum Deviator Stress [ksf]	E50 [%]
○—○	9	13.50	UU	38.5	0.28	2.2
□—□	12	16.00	UU	120.1	0.59	1.8
◆—◆	18	22.50	UU	38.3	0.56	2.5
●—●	21	25.00	UU	120.0	0.51	2.2

* Normalized with respect to maximum deviator stress.

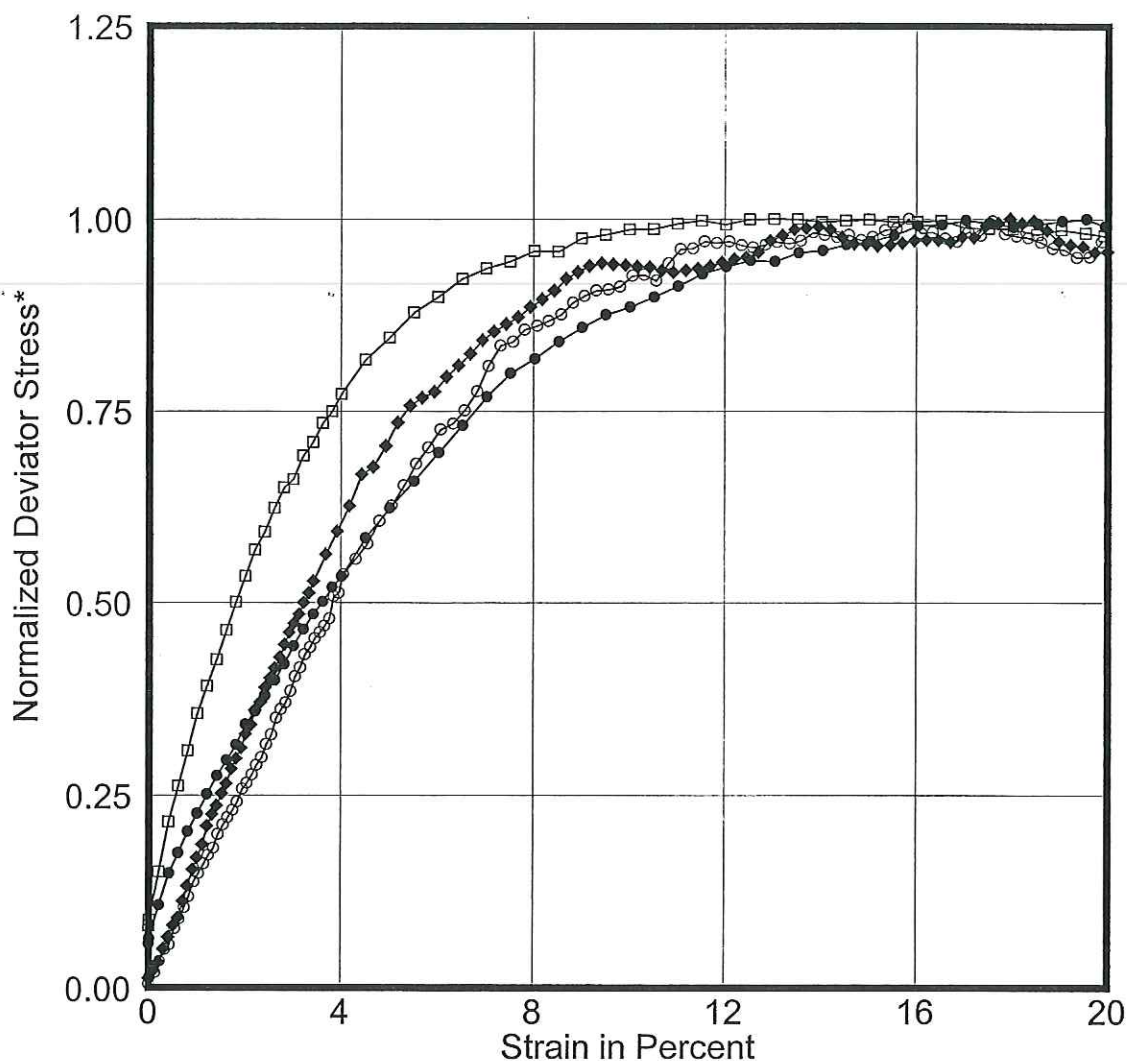
STRESS-STRAIN CURVES

Unconsolidated-Undrained Triaxial Compression Test

Texas Offshore Port System, Offshore Terminal Location
Block A-59, Galveston Area

Date: 8/20/08

Drawn By: [Signature]



Curve	Sample No.	Depth [ft]	Test Type	Confining Pressure [psi]	Maximum Deviator Stress [ksf]	E50 [%]
○—○	27	31.50	UU	40.1	0.51	3.8
□—□	30	34.00	UU	120.1	0.84	1.8
◆—◆	36	40.00	UU	40.1	0.85	3.2
●—●	43	46.50	UU	120.2	1.01	3.6

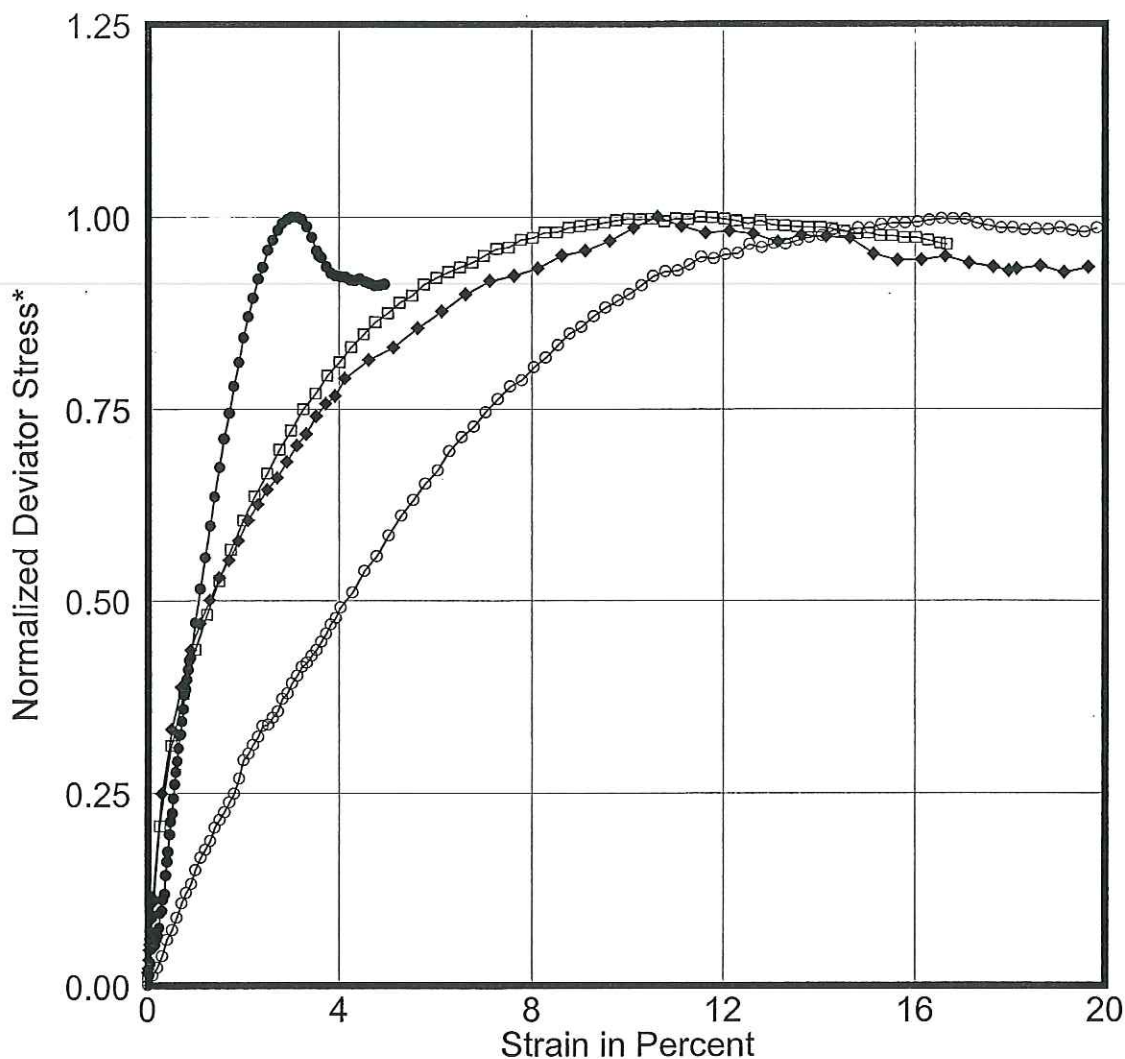
* Normalized with respect to maximum deviator stress.

STRESS-STRAIN CURVES

Unconsolidated-Undrained Triaxial Compression Test

Texas Offshore Port System, Offshore Terminal Location
Block A-59, Galveston Area





Curve	Sample No.	Depth [ft]	Test Type	Confining Pressure [psi]	Maximum Deviator Stress [ksf]	ϵ_{50} [%]
○—○	45	48.50	UU	51.0	0.75	4.1
□—□	52	69.00	UU	70.1	1.36	1.4
◆—◆	55	78.50	UU	120.2	1.70	1.3
●—●	58	88.50	UU	90.4	2.82	1.1

* Normalized with respect to maximum deviator stress.

STRESS-STRAIN CURVES

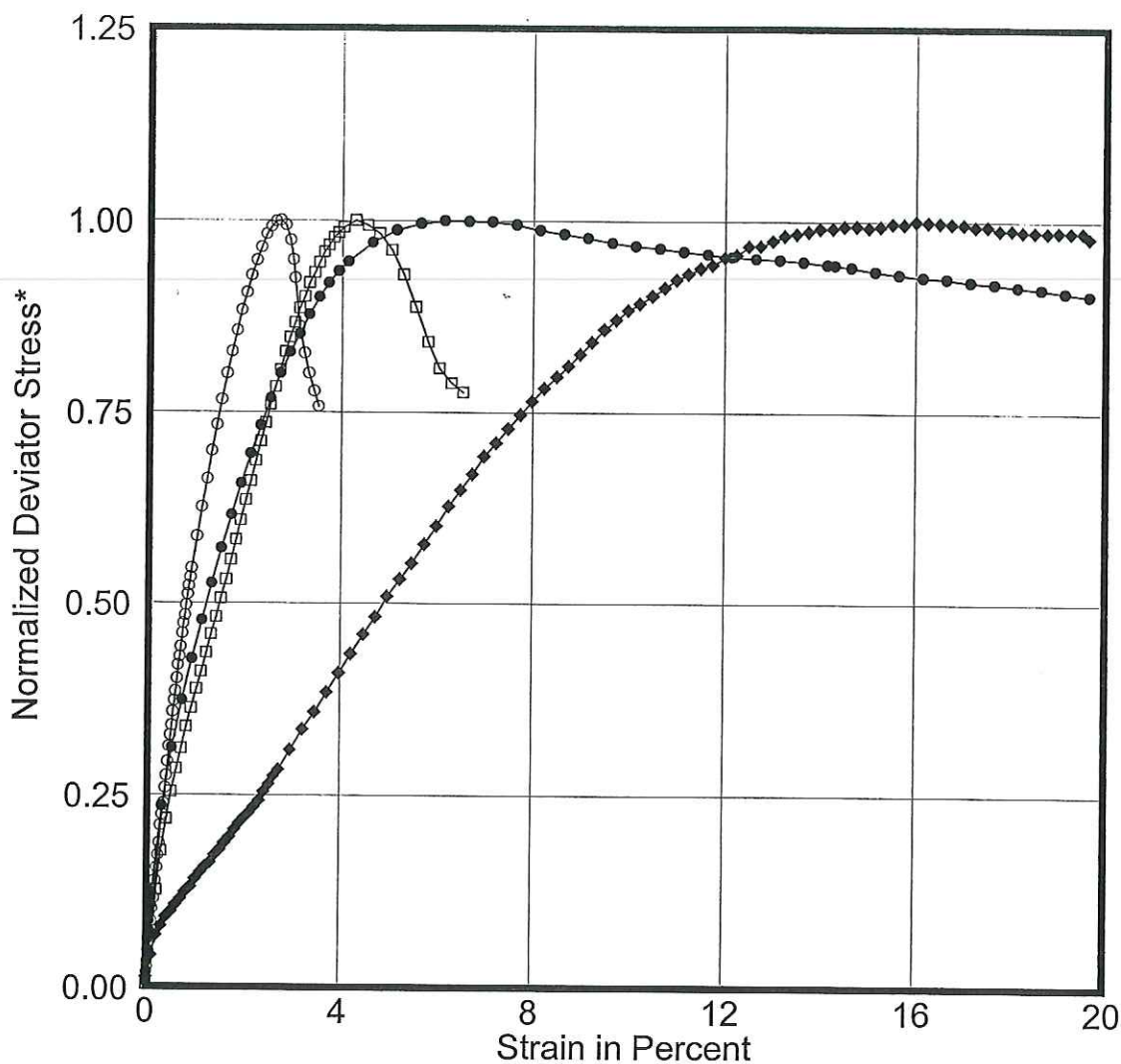
Unconsolidated-Undrained Triaxial Compression Test

Texas Offshore Port System, Offshore Terminal Location
Block A-59, Galveston Area



Date: 8/20/08

Drawn By: [Signature]



Curve	Sample No.	Depth [ft]	Test Type	Confining Pressure [psi]	Maximum Deviator Stress [ksf]	ε ₅₀ [%]
○—○	64	108.50	UU	112.3	4.20	0.8
□—□	69	127.50	UU	121.0	3.81	1.5
◆—◆	72	148.00	UU	118.9	2.40	4.9
●—●	75	158.00	UU	120.3	3.70	1.2

* Normalized with respect to maximum deviator stress.

STRESS-STRAIN CURVES

Unconsolidated-Undrained Triaxial Compression Test

Texas Offshore Port System, Offshore Terminal Location
Block A-59, Galveston Area



Date: 8/20/08

Drawn By: m m

8/20/08

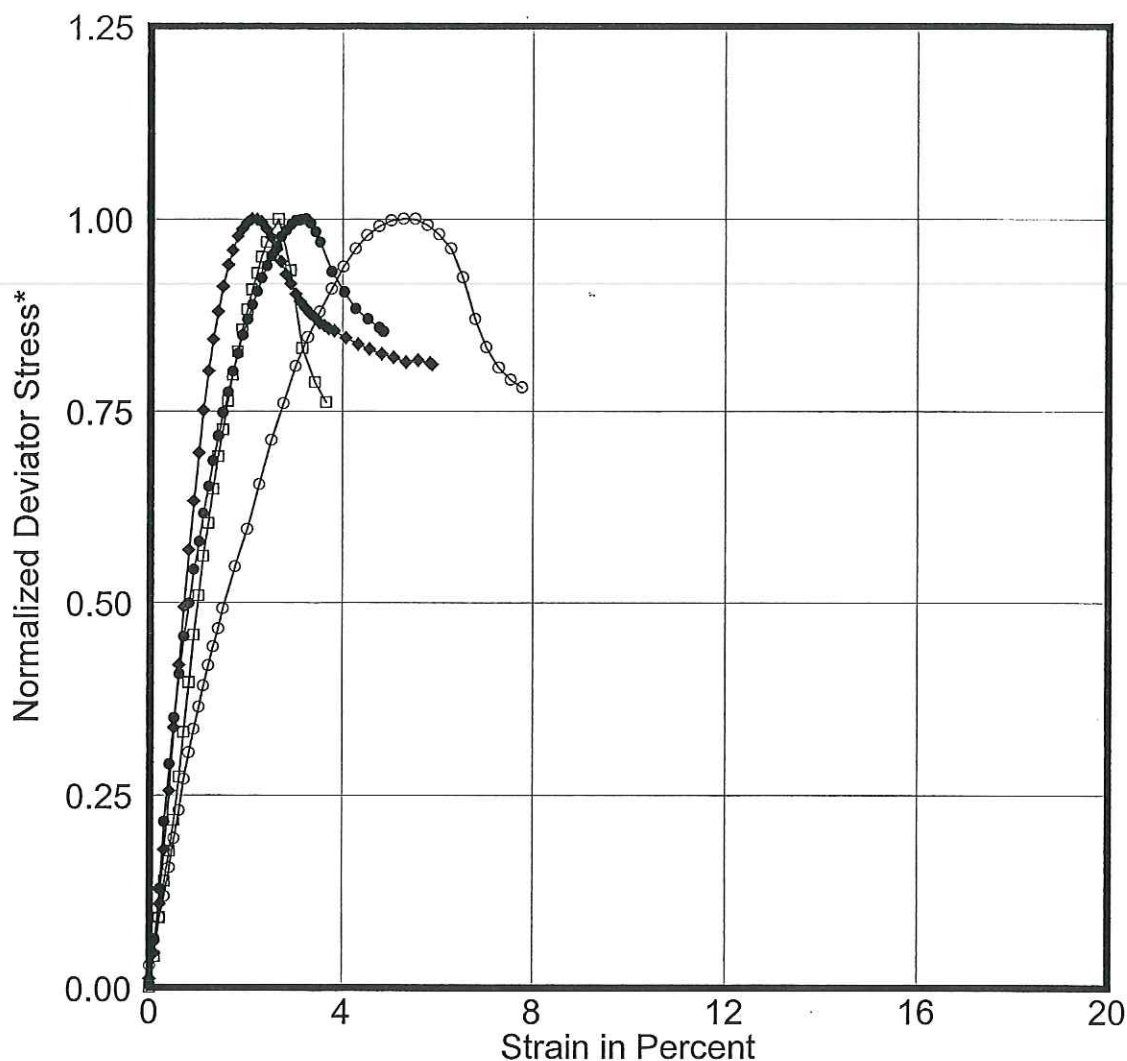
Date:

Date: 8/31/08

HW

Checked By:

Approved By:



Curve	Sample No.	Depth [ft]	Test Type	Confining Pressure [psi]	Maximum Deviator Stress [ksf]	ϵ_{50} [%]
○—○	78	168.50	UU	121.2	5.02	1.5
□—□	81	178.50	UU	118.5	5.89	1.0
◆—◆	87	198.50	UU	120.7	5.03	0.7
●—●	94	238.50	UU	118.3	5.64	0.8

* Normalized with respect to maximum deviator stress.

STRESS-STRAIN CURVES

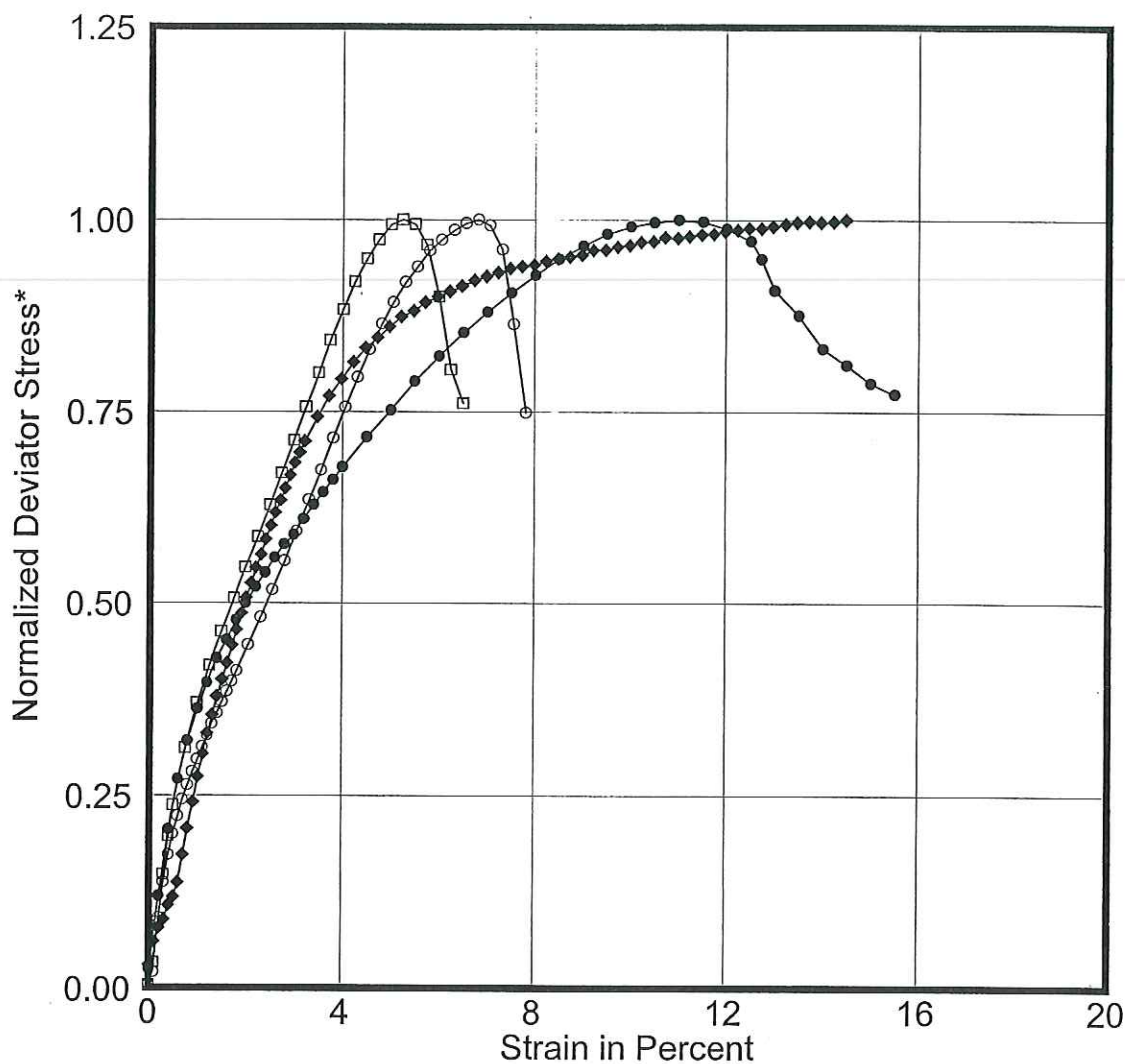
Unconsolidated-Undrained Triaxial Compression Test

Texas Offshore Port System, Offshore Terminal Location
Block A-59, Galveston Area



Date: 8/20/08

Drawn By: [Signature]



Curve	Sample No.	Depth [ft]	Test Type	Confining Pressure [psi]	Maximum Deviator Stress [ksf]	E50 [%]
○—○	99	257.50	UU	120.6	7.82	2.4
□—□	110	317.50	UU	121.1	7.91	1.7
◆—◆	114	329.00	UU	120.0	5.21	2.0
●—●	116	338.50	UU	120.2	6.16	2.0

* Normalized with respect to maximum deviator stress.

STRESS-STRAIN CURVES

Unconsolidated-Undrained Triaxial Compression Test

Texas Offshore Port System, Offshore Terminal Location
Block A-59, Galveston Area



Date: 8/27/08
 Date: 8/31/08
 Checked By: [Signature]
 Approved By: [Signature]

Date: 8/20/08

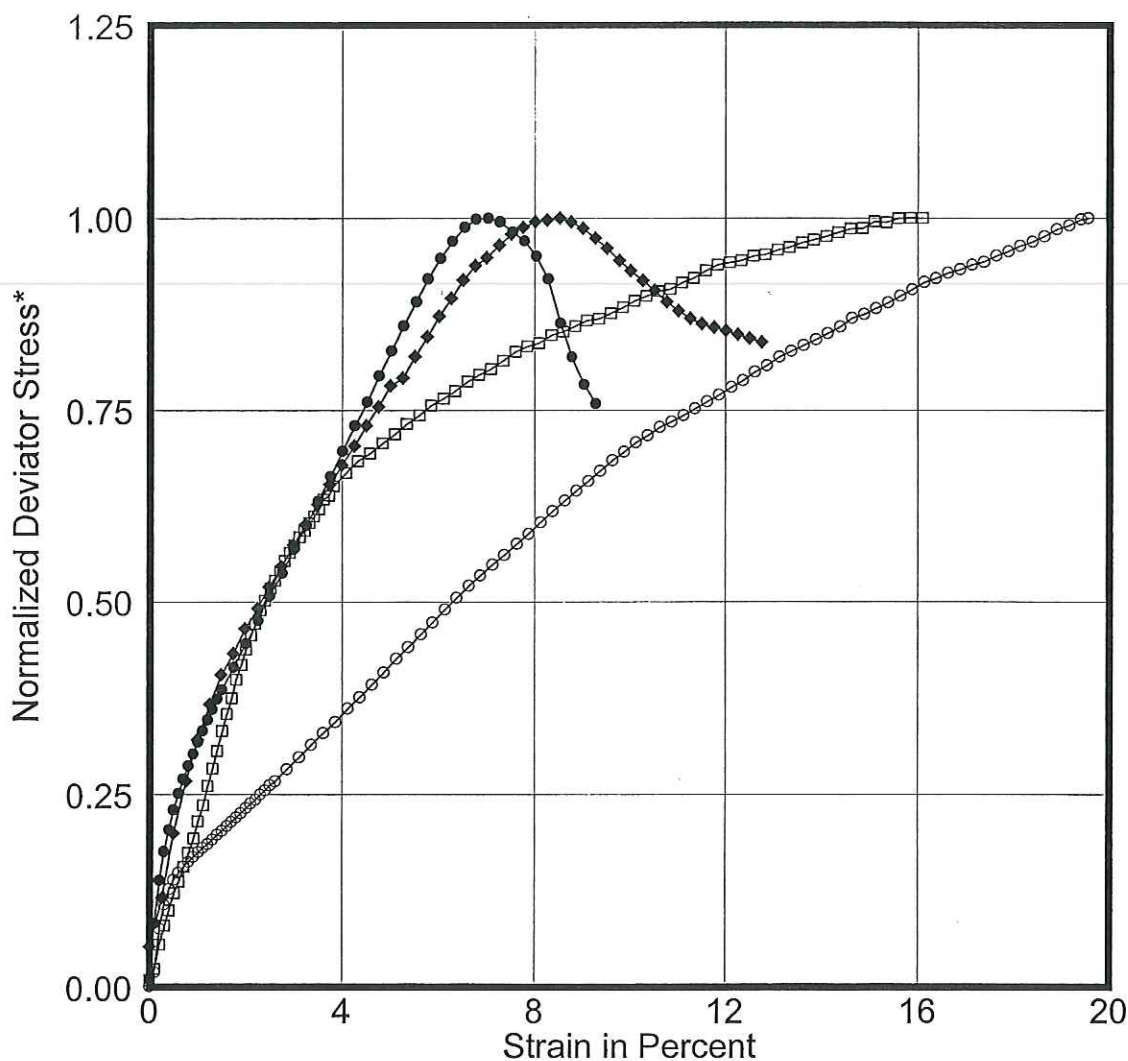
Drawn By: [Signature]

Date: 8/27/08

[Signature]

Checked By: [Signature]

Approved By: [Signature]



Curve	Sample No.	Depth [ft]	Test Type	Confining Pressure [psi]	Maximum Deviator Stress [ksf]	ϵ_{50} [%]
○—○	119	358.50	UU	120.6	6.73	6.3
□—□	122	388.00	UU	120.9	3.92	2.4
◆—◆	125	398.50	UU	119.7	8.75	2.3
●—●	127	408.00	UU	120.7	6.85	2.5

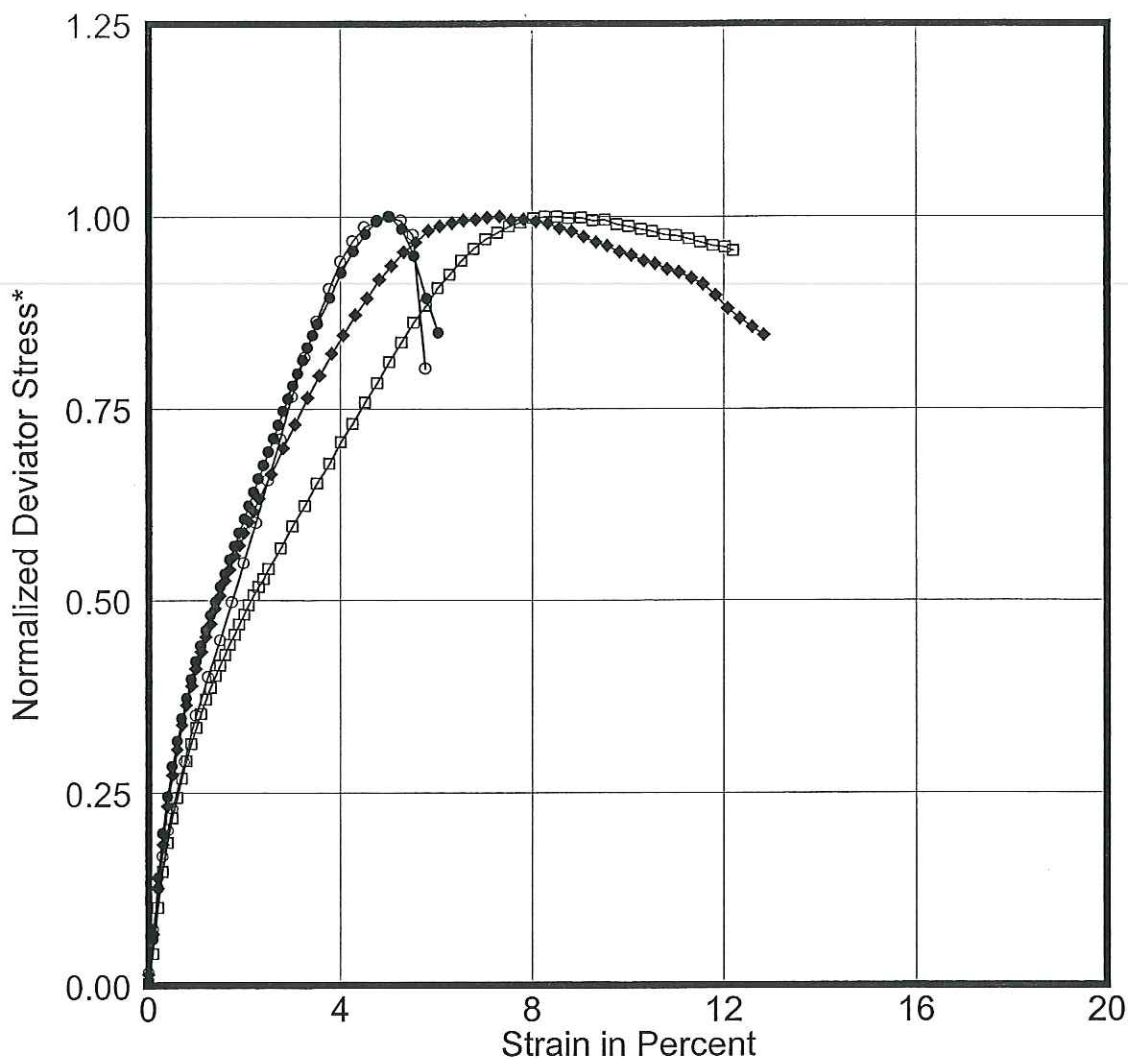
* Normalized with respect to maximum deviator stress.

STRESS-STRAIN CURVES

Unconsolidated-Undrained Triaxial Compression Test

Texas Offshore Port System, Offshore Terminal Location
Block A-59, Galveston Area





Curve	Sample No.	Depth [ft]	Test Type	Confining Pressure [psi]	Maximum Deviator Stress [ksf]	ε ₅₀ [%]
○—○	131	418.50	UU	121.2	11.99	1.8
□—□	133	428.00	UU	118.3	6.23	2.2
◆—◆	136	438.00	UU	120.4	4.91	1.5
●—●	140	449.50	UU	121.1	8.92	1.4

* Normalized with respect to maximum deviator stress.

STRESS-STRAIN CURVES

Unconsolidated-Undrained Triaxial Compression Test

Texas Offshore Port System, Offshore Terminal Location
Block A-59, Galveston Area



Date: 8/20/08

Drawn By: *mm*

Density	Soil Description	Soil-Pile Friction Angle, δ Degrees	Limiting Skin Friction Values kips/ft ² (kPa)	N_q	Limiting Unit End Bearing Values kips/ft ² (MPa)
Very Loose Loose Medium	Sand Sand-Silt* Silt	15	1.0 (47.8)	8	40 (1.9)
Loose Medium Dense	Sand Sand-Silt* Silt	20	1.4 (67.0)	12	60 (2.9)
Medium Dense	Sand Sand-Silt*	25	1.7 (81.3)	20	100 (4.8)
Dense Very Dense	Sand Sand-Silt*	30	2.0 (95.7)	40	200 (9.6)
Dense Very Dense	Gravel Sand	35	2.4 (114.8)	50	250 (12.0)

* Sand-Silt includes those soils with significant fractions of both sand and silt. Strength values generally increase with increasing sand fractions and decrease with increasing silt fractions.

Note: API RP 2A notes that the parameters listed above are intended as guidelines only. Where detailed information, such as in situ cone tests, strength tests on high quality samples, model tests, or pile driving performance is available, other values may be justified.

8/21/08
8/3/08

Date:

Checked By: *AW*

Approved By: *mm*

SUMMARY OF RECOMMENDED DESIGN PARAMETERS (API RP 2A, 2000) FOR COHESIONLESS SILICEOUS SOILS



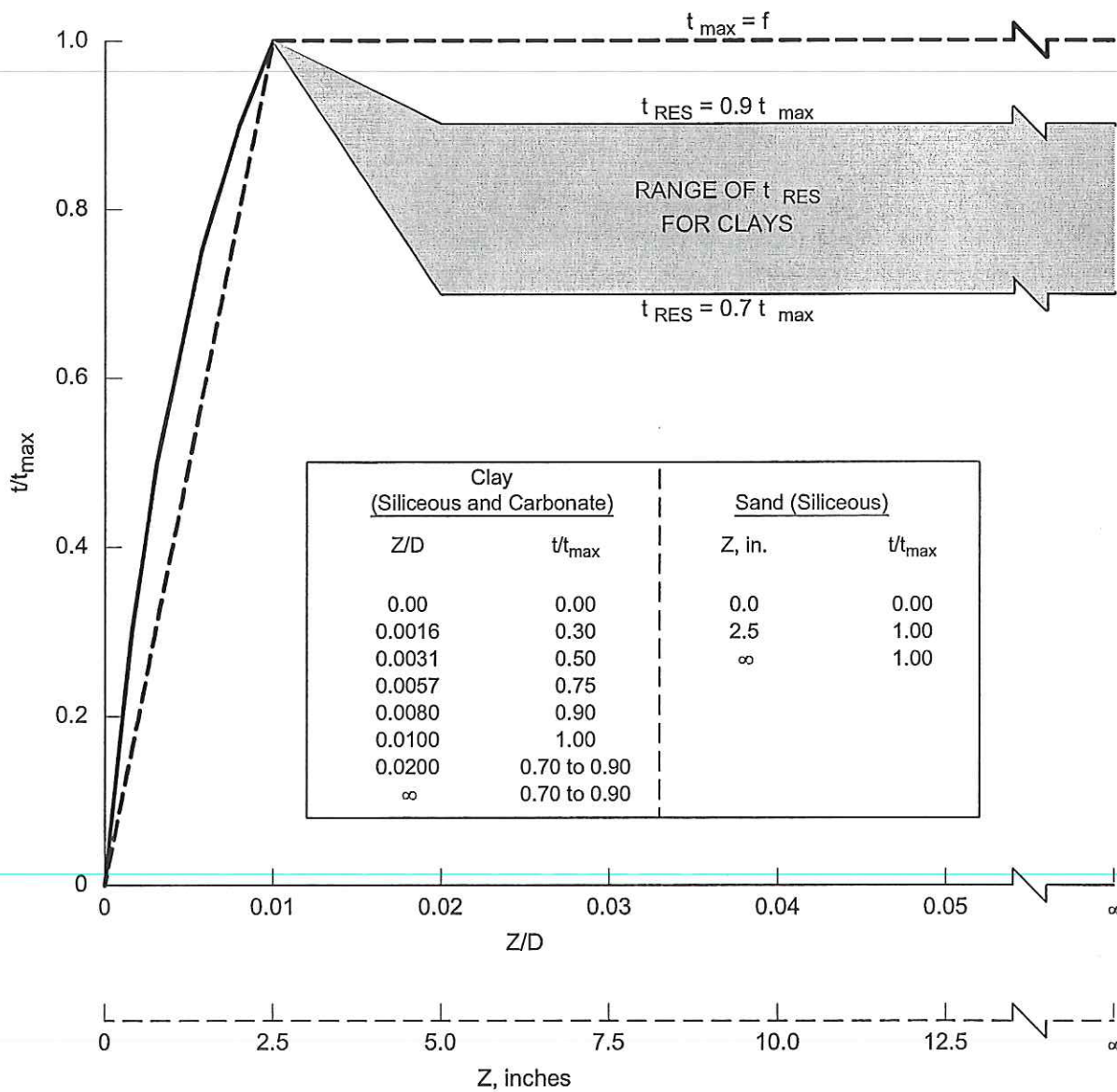
Date: 8/20/08

Drawn By: mm

8/24/08
8/31/08

Date: Date:

Checked By: AW
Approved By: AC

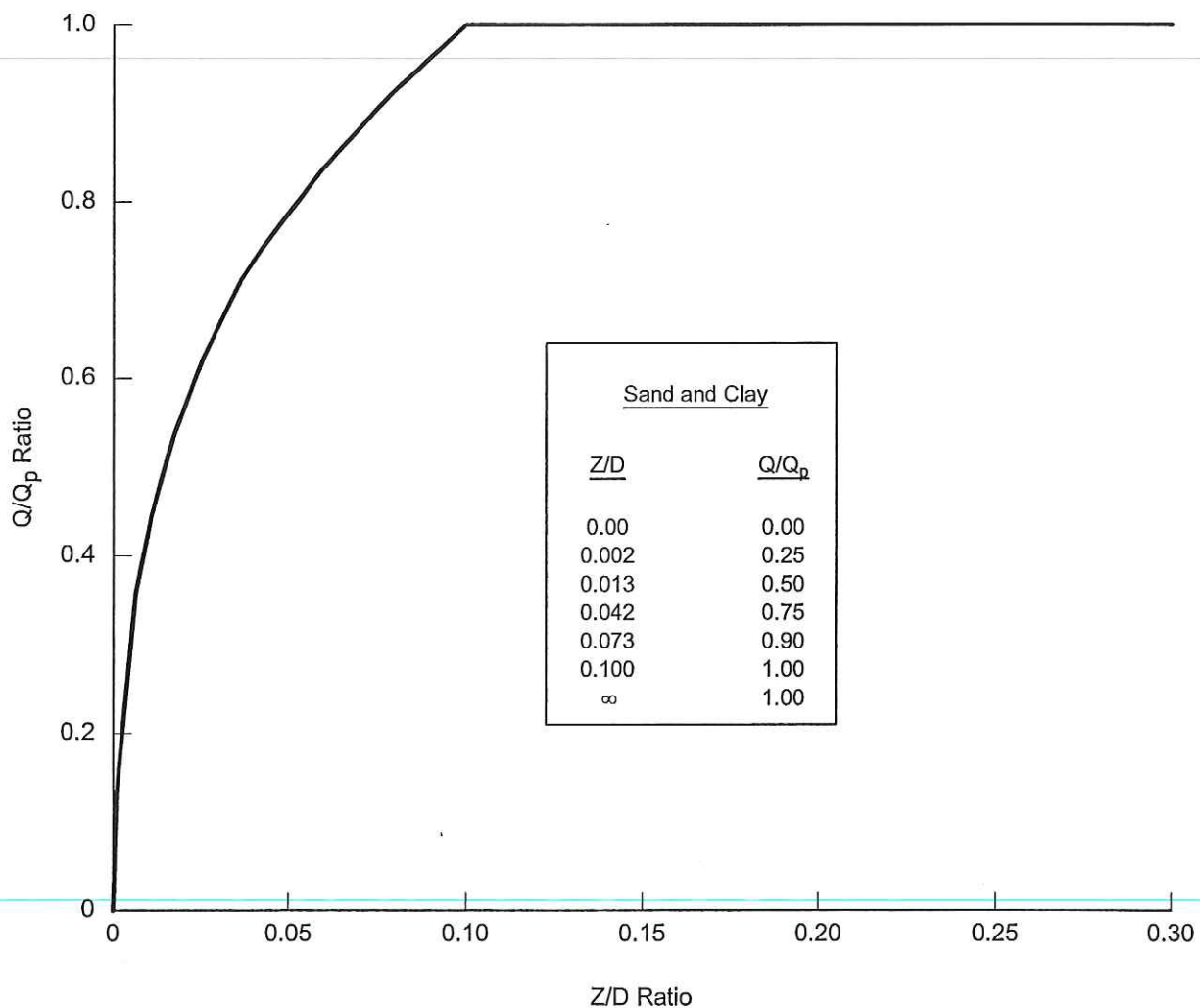


TYPICAL SIDE LOAD TRANSFER (t-z) CURVES



Date: 8/24/08

Drawn By: [Signature]



Date: 8/21/08

Date: 8/21/08

Checked By: [Signature]

Approved By: [Signature]

TYPICAL PILE TIP LOAD TRANSFER (Q-z) CURVES



Date: 8/20/08

Drawn By: mm

8/24/08

Date:

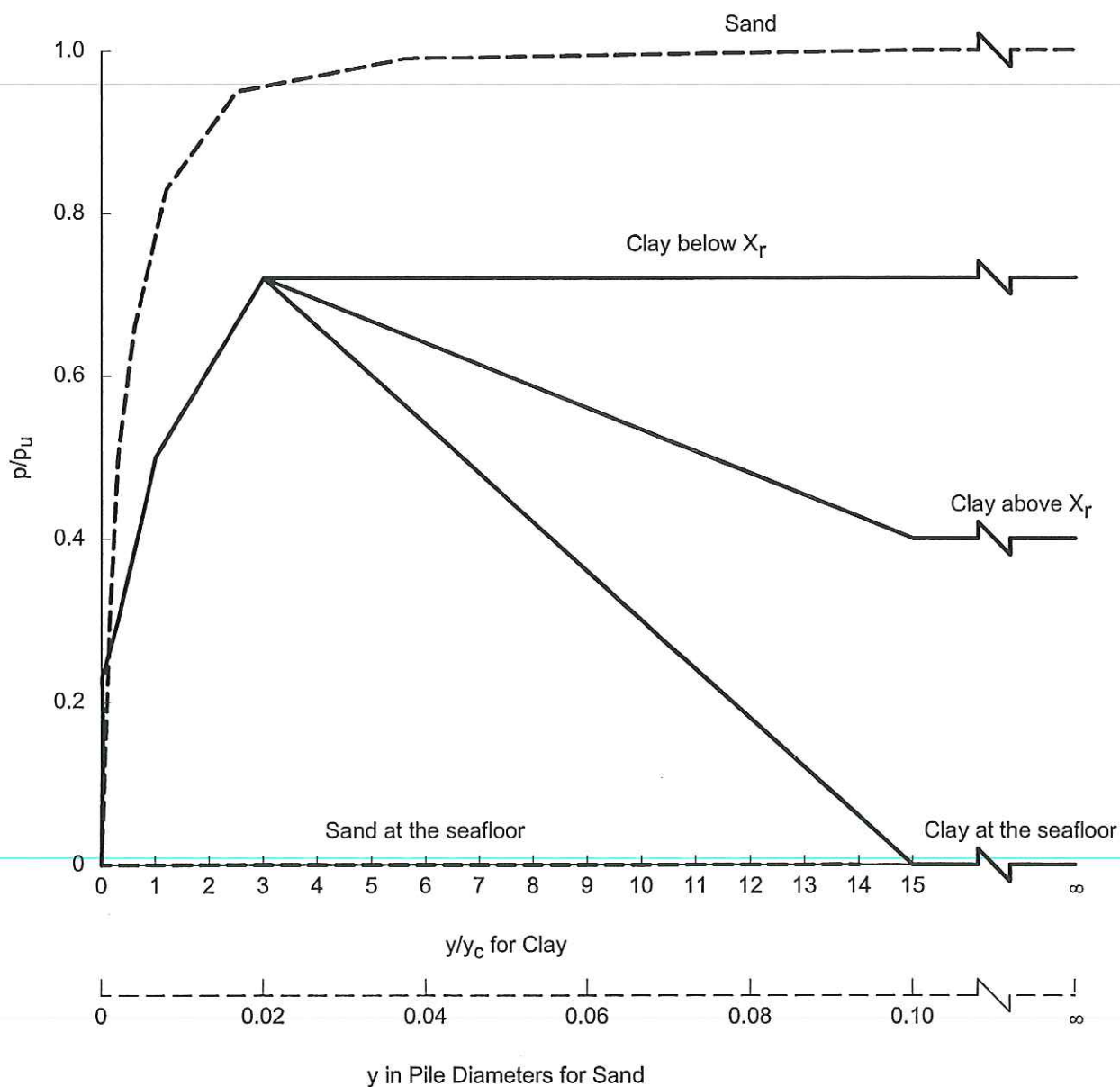
8/31/09

Date:

AW

Checked By:

Approved By:



TYPICAL LATERAL LOAD - PILE DEFLECTION (p-y) CURVES



ENTERPRISE FIELD SERVICES, LLC

SOIL BORING

TEXAS OFFSHORE PORT SYSTEM

OFFSHORE TERMINAL LOCATION

GALVESTON AREA BLOCK A59

1. INTRODUCTION:

Fugro Chance Inc. (CHANCE) was contracted by Fugro-McClelland Marine Geosciences, Inc. to position the *M/V "Seaprobe"* for a soil boring in Galveston Area, Block A59, Offshore Texas.

2. REQUIREMENTS:

Positioning requirements were transmitted, via e-mail, to Mr. Tony Parker of **CHANCE** by Mr. Frank Ortiz of Fugro-McClelland Marine Geosciences, Inc. A "Survey Request" form dated June 25, 2008 e-mailed to Mr. Manuel Lopez of Enterprise Field Services, LLC, confirmed these requirements. A copy of this form was also e-mailed to Mr. Frank Ortiz.

Requirements were as follows:

A) Proposed Location – Offshore Terminal

The Texas South Zone Coordinates are:

Y = 239,522.83'

X = 3,261,410.20'

3. CHANCE PERSONNEL:

Party Chief - C. Evans

4. EQUIPMENT AND METHOD:

A) Primary Positioning System - **STARFIX® Satellite Positioning System**

Continuous dynamic positioning through the use of Navstar GPS with differential signals from multiple reference stations corrected for ionospheric and tropospheric effects transmitted via the **STARFIX®** equatorial geosynchronous satellite.

B) Secondary Positioning System - **Differential Global Positioning System (DGPS)**

DGPS utilizes the Navstar Satellite Constellation with data from selected reference sites transmitted via LF radio-link for enhanced accuracy through differential techniques.

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 $\pm 2^\circ$ 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 July 3, 2008 to July 4, 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.

Y = 239,522.49'

X = 3,261,412.18'

Latitude: 28° 26' 01.870" N

Longitude: 95° 04' 28.663" W

This location being 5,997.51' FNL and 7,376.37' FWL of Block A59, Galveston Area

6. CONFIRMATION:

DGPS was used for confirmation.

The results were as follows:

Y = 239,523'

X = 3,261,413'

7. HSE INCIDENTS:

No incidents.

8. **CHRONOLOGY:**

July 3, 2008

1230 Conducted job change in field; onboard "Seaprobe" at location GA. A59; preparing to set out anchors; start time for job
1239 PB #1 Anchor on bottom
1252 SB #2 Anchor on bottom
1325 SS #3 Anchor on bottom
1337 PS #4 Anchor on bottom; moving onto location
1415 Winching vessel into position
1436 Deployed Sonar; conducting site investigation; archiving Sonar data on proposed core site
1500 Sonar on deck; preparing to start final tie; drill crew performing soil boring
1604 Starting final tie
1704 Final tie complete
1730 Received final tie confirmation from office
2400 Soil boring continues

July 4, 2008

0001 Standing by for completion of soil boring
0850 Soil boring complete; starting anchor recovery
0903 SS #3 Anchor off bottom
0914 PS #4 Anchor off bottom
0924 SB #2 Anchor off bottom
0932 PB #1 Anchor off bottom; anchor recovery complete
1000 En route to next location; end time for job

Sincerely,

FUGRO CHANCE INC.



James P. O'Neal, P.L.S.
Vice-President, Marine Operations

JPO: mmg

Attachment

5,997.51'

7,376.37'

CORE

Final Soil Boring	
X=	3,261,412.18'
Y=	239,522.49'
Lat.	28° 26' 01.870"N
Lon.	95° 04' 28.663"W

GAA59

GRID NORTH

I HEREBY CERTIFY THAT THE ABOVE FINAL
SOIL BORING POSITION IS CORRECT.



REG. PROFESSIONAL LAND SURVEYOR NO. 4903
STATE OF LOUISIANA

NOTES:

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

ENTERPRISE FIELD SERVICES, LLC

**FINAL SOIL BORING
NO LEASE NUMBER (PLATFORM CENTER)**

BLOCK A59
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.: 08-01928 Date: 7/7/08

Drwn: TCG

Chart: Of:

Dwgfile: O:\WellPermit\TXsc\GA\Permit\A59_CORE_NO LEASE_0801928

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Printed: 7/7/08