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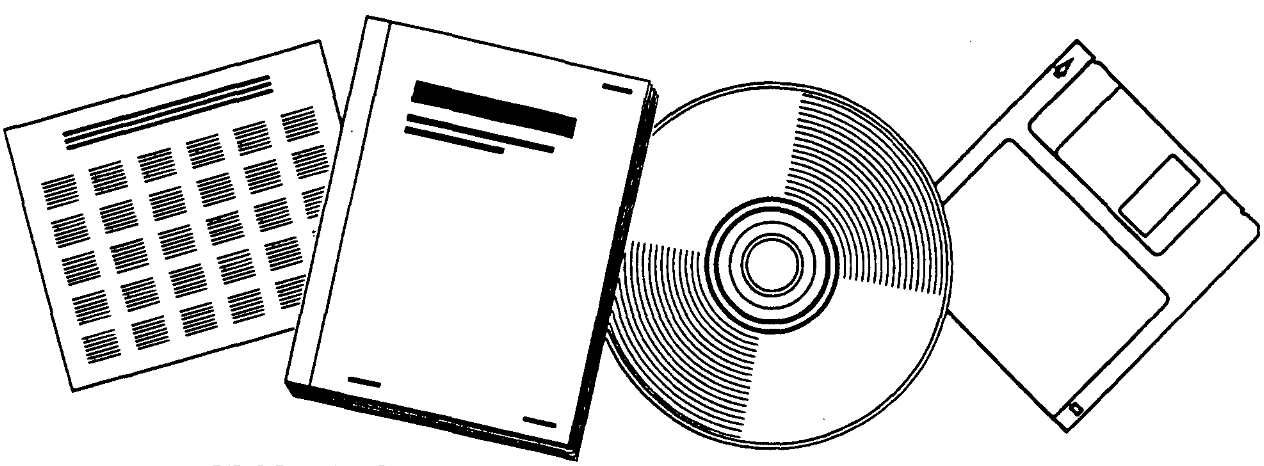
DETERMINATION OF PILE DRIVEABILITY AND CAPACITY FROM PENETRATION TESTS. VOLUME 2 APPENDIXES

GOBLE, RAUSCHE, LIKINS AND ASSOCIATES, INC., CLEVELAND, OH

MAY 97



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Determination of Pile Driveability and Capacity From Penetration Tests

Volume II: Appendixes

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U.S. Department of Transportation
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Research and Development
Turner-Fairbank Highway Research Center
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McLean, VA 22101-2296

FOREWORD

This report, *Determination of Pile Driveability and Capacity from Penetration Tests*, is comprised of three volumes. Volume II (FHWA-RD-96-180), contained here, describes the data bank that has been assembled as part of the study and contains dynamic and static load test data. Volume I (FHWA-RD-96-179) summarizes the design and experimental use of a method that extracts dynamic soil resistance parameters as the Standard Penetration Test is being performed. Extensive correlations with full scale load tests were made based on these results. Volume III (FHWA-RD-96-181) documents the results oa literature study and summarizes available information on dynamic soil models and their parameters.

Charles J. Nemmers, P.E.
Office of Engineering
Research and Development

NOTICE

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16. Abstract
Research has been conducted on the potential improvement of dynamic wave equation analysis methodology using in-situ soil testing techniques. As a basis for this investigation, the literature was reviewed and a summary was compiled of efforts made to date on the development of models and associated parameters for pile driving analysis. Furthermore a data base was developed containing more than 150 cases of test piles with static load tests, dynamic restrike tests, soil information, driving system data and installation records. One hundred data base cases were subjected to correlation studies using both wave equation and CAPWAP. This work yielded dynamic soil model parameters which did not indicate a specific relationship with soil grain size.

The in-situ soil testing device utilized was a Modified SPT which yielded data from both static and dynamic measurements. Either static uplift or torque tests yielded static ultimate shaft resistance, and uplift tests also indicated a shaft resistance quake. Static compressive tests on a special tip indicated ultimate end bearing and associated toe quake. Indirectly, by signal matching, soil damping parameters were calculated. These quantities were then used for the prediction of full-scale pile behavior. Data from the Modified SPT were gathered and analyzed on six sites with previous full-scale static pile tests and on three sites where static load tests were to be performed at a later date.

Recommendations derived from these tests pertain to the current soil model and to proposals for future changes. In general, the current approach was found to yield, on the average, very reasonable results for end of installation situations. For restrike tests, standard parameters may be misleading. Any necessary modifications to the current approach, for example, the use of particularly large toe quakes or low toe damping factors should be based on Modified SPT measurements. Differences between prediction and full-scale pile field behavior were attributed to soil strength changes over relatively small distances which cannot be detected with standard SPT spacings of 5 ft (1.5 m).

This volume is the first in a series. Other volumes in the series are:
FHWA-RD-96-179 Volume I: Final Report
FHWA-RD-96-181 Volume III: Literature Review, Data Base and Appendixes

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SI* (MODERN METRIC) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
		LENGTH		
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
		AREA		
in^2	square inches	645.2	square millimeters	mm^2
ft^2	square feet	0.093	square meters	m^2
yd^2	square yards	0.836	square meters	m^2
ac	acres	0.405	hectares	ha
mi^2	square miles	2.59	square kilometers	km^2
		VOLUME		
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft^3	cubic feet	0.028	cubic meters	m^3
yd^3	cubic yards	0.765	cubic meters	m^3
NOTE: Volumes greater than 1000 l shall be shown in m^3.				
		MASS		
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
		TEMPERATURE (exact)		
°F	Fahrenheit temperature	5(F-32)/9 or (F-32)/1.8	Celcius temperature	°C
		ILLUMINATION		
fc	foot-candles	10.76	lux	lx
fl	foot-Lamberts	3.426	candela/m^2	cd/m^2
		FORCE and PRESSURE or STRESS		
lbf	poundforce	4.45	newtons	N
lbf/in^2	poundforce per square inch	6.89	kilopascals	kPa

APPROXIMATE CONVERSIONS FROM SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
		LENGTH		
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
		AREA		
mm^2	square millimeters	0.0016	square inches	in^2
m^2	square meters	10.764	square feet	ft^2
m^2	square meters	1.195	square yards	yd^2
ha	hectares	2.47	acres	ac
km^2	square kilometers	0.386	square miles	mi^2
		VOLUME		
mL	milliliters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m^3	cubic meters	35.71	cubic feet	ft^3
m^3	cubic meters	1.307	cubic yards	yd^3
		MASS		
g	grams	0.035	ounces	oz
kg	kilograms	2.202	pounds	lb
Mg (or "t")	megagrams (or "metric ton")	1.103	short tons (2000 lb)	T
		TEMPERATURE (exact)		
°C	Celcius temperature	1.8C + 32	Fahrenheit temperature	°F
		ILLUMINATION		
lx	lux	0.0929	foot-candles	fc
cd/m^2	candela/m^2	0.2919	foot-Lamberts	fl
		FORCE and PRESSURE or STRESS		
N	newtons	0.225	poundforce	lbf
kPa	kilopascals	0.145	poundforce per square inch	lbf/in^2

* SI is the symbol for the International System of Units. Appropriate rounding should be made to comply with Section 4 of ASTM E380.

(Revised September 1993)

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LIST OF SYMBOLS

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A	-	cross section area or setup parameter
A3	-	average of the three highest shaft resistance per unit length
A_s	-	pile soil contact area
A_{toe}	-	toe area
B	-	pile width
Cl	-	circumference of the pile
c	-	velocity of wave propagation
E	-	modulus of elasticity
F1	-	loading toe quake multiplier (hyperbolic model)
F2	-	unloading toe quake multiplier (hyperbolic model)
$F_m(t)$	-	force measured near the top of drill string
$F^{\downarrow}(t)$	-	downward traveling force wave
$F^{\uparrow}(t)$	-	upward traveling force wave
$\bar{f}_s$	-	average unit sleeve friction
J or J_c	-	Smith damping constant
J_s	-	shaft damping
J_t	-	Toe damping
L	-	pile length below gauges
MS	-	shaft support soil mass
NFac	-	ratio of number of pile segments to soil segments
K	-	ratio of unit pile friction to unit sleeve friction
k	-	cushion stiffness
m	-	mass constant
N	-	SPT N-value
N_{60}	-	SPT N-value corrected to 60 percent transfer efficiency
n	-	damping exponent
q	-	quake
Q_p	-	pile toe resistance
Q_s	-	pile shaft resistance or shaft quake
Q_t	-	toe quake
q_{c1}, q_{c2}, q_{c3}	-	average cone tip resistance
R	-	total measured toe resistance
R(t)	-	toe resistance force
R_a	-	inertia or acceleration dependent resistance
R_{cT}	-	total calculated toe resistance
R_d	-	dynamic or velocity dependent resistance

LIST OF SYMBOLS (continued)

Volume I: Final Report

R_s	-	static or displacement dependent resistance
R_u	-	ultimate static capacity
SK	-	shaft radiation damping parameter
$u(t)$	-	displacement at the toe
$\dot{u}(t)$	-	velocity of soil
$\ddot{u}(t)$	-	acceleration
$\dot{u}_m$	-	measured velocity
v_{impact}	-	SPT hammer impact velocity
Z1	-	impedance of the very top pile segment
ϕ_a	-	toe radiation damping constant
τ_o	-	soil shear strength at time t_0
$\tau(t)$	-	soil shear strength at time t
Δ_i	-	final displacement

Volume III: Literature Review, Data Base and Appendixes

A	-	setup factor
C_1	-	frequency dependent parameter for toe soil stiffness (Mitwally and Novak, 1988)
C_2	-	frequency dependence parameter for toe soil damping (Mitwally and Novak, 1988)
c_H	-	damping factor at toe (Holeyman, 1988)
c_s	-	frequency dependent shaft damping (Mitwally and Novak, 1988)
c_t	-	frequency dependent toe damping (Mitwally and Novak, 1988)
c_u	-	undrained shear strength
E	-	elastic modulus
E'	-	modulus of viscosity (Holeyman, 1988)
E_i	-	initial tangent modulus (Holeyman, 1988)
f_s	-	cone shaft friction or unit shaft resistance
G	-	soil's shear modulus
G_b	-	toe soil shear modulus (Mitwally and Novak, 1988)
I_p	-	influence coefficient (Hussein, 1992)
J	-	Smith damping factor
J_c	-	Coyle-Gibson exponent damping factor
J_G	-	toe damping prior to failure (Lee et al., 1988)
J_G'	-	toe damping during failure (Lee et al., 1988)

LIST OF SYMBOLS (continued)

Volume III: Literature Review, Data Base and Appendixes

J_L'	-	shaft damping prior to failure (Lee et al., 1988)
J_M	-	purely viscous damping factor (Middendorp and Brederode, 1984)
$J_{R,toe}$	-	toe damping value (Randolph and Simons, 1986)
J_s	-	shaft damping
J_t	-	toe damping
k	-	soil stiffness
k_H	-	soil stiffness at toe (Holeyman, 1988)
k_s	-	shaft soil stiffness
k_t	-	soil stiffness (Randolph and Simons, 1986)
m_S	-	soil mass
n	-	Coyle-Gibson damping exponent
p_c	-	cone tip pressure
p_y	-	yield pressure (Liang and Sheng, 1992)
q	-	quake
q_r	-	ultimate strength at the base (Holeyman, 1988)
q_s	-	shaft quake
q_t	-	toe quake
q_{ut}	-	unit toe resistance
r_o	-	pile radius
r_H	-	cone bottom radius (Holeyman, 1988)
r_m	-	radius of zone of soil deformation (Nguyen et al., 1988)
R_d	-	total dynamic soil resistance
R_f	-	failure load (Lee et al., 1988)
R_t	-	total shaft resistance (Middendorp and Brederode, 1984)
R_s	-	total static soil resistance
R_u	-	ultimate resistance
R_{t1}	-	failure load at time t_1
R_{t2}	-	failure load at time t_2
S_1	-	frequency dependent parameter for shaft soil stiffness (Mitwally and Novak, 1988)
S_2	-	frequency dependent parameter for shaft soil damping (Mitwally and Novak, 1988)
t_i	-	time to failure
u	-	displacement of pile segment
$\dot{u}$	-	velocity of pile segment
$\ddot{u}$	-	acceleration of pile segment

LIST OF SYMBOLS (continued)

Volume III: Literature Review, Data Base and Appendixes

u_p	-	pore water pressure
v_1	-	pile velocity (Briaud and Garland, 1984)
v_2	-	pile static reference velocity (Briaud and Garland, 1984)
v_s	-	shear wave velocity
σ	-	stress
ϵ	-	strain
ϵ_l	-	average volumetric locking strain (Liang and Hussein, 1992)
ρ	-	soil mass density
τ_{max}	-	maximum shear strain (Nguyen et al., 1988)
τ_o	-	soil shear strength (Liang and Hussein, 1992)
τ_u	-	ultimate shear stress
ν	-	Poisson's ratio
ϕ	-	friction angle of soil
ω	-	frequency

APPENDIX A

WAVE EQUATION ANALYSIS RESULTS

A.1 INTRODUCTION

The wave equation analyses were performed with GRLWEAP™, Version 1.993-1. Two types of analysis were performed: bearing graph analysis and driveability analysis. This appendix presents the GRLWEAP summary results for six correlation study sites and three verification sites which are discussed in chapters 6 and 7, respectively. For each site, several analyses were performed with different distributions and magnitudes of soil resistance, and with a number of different dynamic soil parameters. These analyses were identified as summarized in the following (see chapter 6.3 for detail discussion).

STD-ST:	soil resistance from "Modified SPT STATIC" analysis and standard GRLWEAP soil parameters.
MDF-ST:	soil resistance from "Modified SPT STATIC" analysis, standard shaft GRLWEAP soil parameters; toe damping (J_t) as per SPT-ST (except Portland: J_t=.01 s/ft).
SPT-ST:	soil resistance from "Modified SPT STATIC" analysis; soil parameters from the "static" analysis of the Modified SPT data.
SPT-DYN:	soil resistance from "Modified SPT DYNAMIC" analysis; soil parameters from the "dynamic" analysis of the Modified SPT data.
MDF-Cap-STD:	modified shaft resistance (see chapter 6.3), toe resistance from "Modified SPT STATIC" analysis; standard GRLWEAP soil parameters.
MDF-Cap-SPT:	modified shaft resistance (see chapter 6.3), toe resistance from "Modified SPT STATIC" analysis; soil parameters from the "static analysis" of the Modified SPT data.
STD (FHWA):	soil resistance from the FHWA method (see chapter 6.1); standard GRLWEAP soil parameters.

A.2 Bearing Graph Analysis

The bearing graph analysis results for nine sites are presented in figures A.1 through A.52 and are summarized in table A.1.

A.3 Driveability Analysis

The driveability analysis results for nine sites are presented in figures A.53 through A.104 and are summarized in table A.2.

Table A.1: Summary of Bearing Graph Analysis Results		
Sites	Parameters Type	Figure
St. Mary, OH	STD-ST	A.1
	SPT-ST	A.2
	SPT-DYN	A.3
	MDF-ST	A.4
Portland, ME	STD-ST	A.5
	SPT-ST	A.6
	SPT-DYN	A.7
	MDF-ST	A.8
	MDF-Cap-STD	A.9
	MDF-Cap-SPT	A.10
C&D Canal, Pier 17, DE	STD-ST	A.11
	SPT-ST	A.12
	SPT-DYN	A.13
	MDF-ST	A.14
	MDF-Cap-STD	A.15
	MDF-Cap-SPT	A.16
C&D Canal, Pier 21, DE	STD-ST	A.17
	SPT-ST	A.18
	SPT-DYN	A.19
	MDF-ST	A.20
	MDF-Cap-STD	A.21
	MDF-Cap-SPT	A.22
White City Bridge, FL	STD-ST	A.23
	SPT-ST	A.24
	SPT-DYN	A.25
Apalachicola, FL	STD-ST	A.26

Table A.1: Summary of Bearing Graph Analysis Results (continued)		
Sites	Parameters Type	Figure
Apalachicola, FL (continued)	SPT-ST	A.27
	SPT-DYN	A.28
	MDF-ST	A.29
	MDF-Cap-STD	A.30
	MDF-Cap-SPT	A.31
Aucilla, FL	STD-ST	A.32
	STD-DYN	A.33
	SPT-ST	A.34
	SPT-DYN	A.35
	MDF-ST	A.36
	MDF-DYN	A.37
	STD (FHWA)	A.38
Vilano - East, FL	STD-ST	A.39
	STD-DYN	A.40
	SPT-ST	A.41
	SPT-DYN	A.42
	MDF-ST	A.43
	MDF-DYN	A.44
	STD (FHWA)	A.45
Vilano - West, FL	STD-ST	A.46
	STD-DYN	A.47
	SPT-ST	A.48
	SPT-DYN	A.49
	MDF-ST	A.50
	MDF-DYN	A.51
	STD (FHWA)	A.52

Table A.2: Summary of Driveability Analysis Results		
Sites	Parameters Type	Figure
St. Mary, OH	STD-ST	A.53
	SPT-ST	A.54
	SPT-DYN	A.55
	MDF-ST	A.56
Portland, ME	STD-ST	A.57
	SPT-ST	A.58
	SPT-DYN	A.59
	MDF-ST	A.60
	MDF-Cap-STD	A.61
	MDF-Cap-SPT	A.62
C&D Canal, Pier 17, DE	STD-ST	A.63
	SPT-ST	A.64
	SPT-DYN	A.65
	MDF-ST	A.66
	MDF-Cap-STD	A.67
	MDF-Cap-SPT	A.68
C&D Canal, Pier 21, DE	STD-ST	A.69
	SPT-ST	A.70
	SPT-DYN	A.71
	MDF-ST	A.72
	MDF-Cap-STD	A.73
	MDF-Cap-SPT	A.74
White City Bridge, FL	STD-ST	A.75
	SPT-ST	A.76
	SPT-DYN	A.77
Apalachicola, FL	STD-ST	A.78

Table A.2: Summary of Driveability Analysis Results (continued)		
Sites	Parameters Type	Figure
Apalachicola, FL (continued)	SPT-ST	A.79
	SPT-DYN	A.80
	MDF-ST	A.81
	MDF-Cap-STD	A.82
	MDF-Cap-SPT	A.83
Aucilla, FL	STD-ST	A.84
	STD-DYN	A.85
	SPT-ST	A.86
	SPT-DYN	A.87
	MDF-ST	A.88
	MDF-DYN	A.80
	STD (FHWA)	A.90
Vilano - East, FL	STD-ST	A.91
	STD-DYN	A.92
	SPT-ST	A.93
	SPT-DYN	A.94
	MDF-ST	A.95
	MDF-DYN	A.96
	STD (FHWA)	A.97
Vilano - West, FL	STD-ST	A.98
	STD-DYN	A.99
	SPT-ST	A.100
	SPT-DYN	A.101
	MDF-ST	A.102
	MDF-DYN	A.103
	STD (FHWA)	A.104

St.Mary, Bearing Graph, STD Parm. Static 10/07/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	50.0	25.472	6.904	6.7	5.00	20.63
2	100.0	25.489	1.072	12.7	5.00	20.64
3	150.0	25.506	2.168	18.7	5.00	20.31
4	200.0	25.523	3.573	28.2	5.00	19.78
5	250.0	25.540	1.898	45.7	5.00	19.51
6	275.0	25.548	2.084	61.5	5.00	19.38
7	300.0	25.555	1.750	88.7	5.00	19.27
8	325.0	25.578	1.842	146.6	5.00	19.15
9	350.0	25.599	1.994	347.3	5.00	19.05
10	375.0	25.607	2.051	6925.8	5.00	18.95

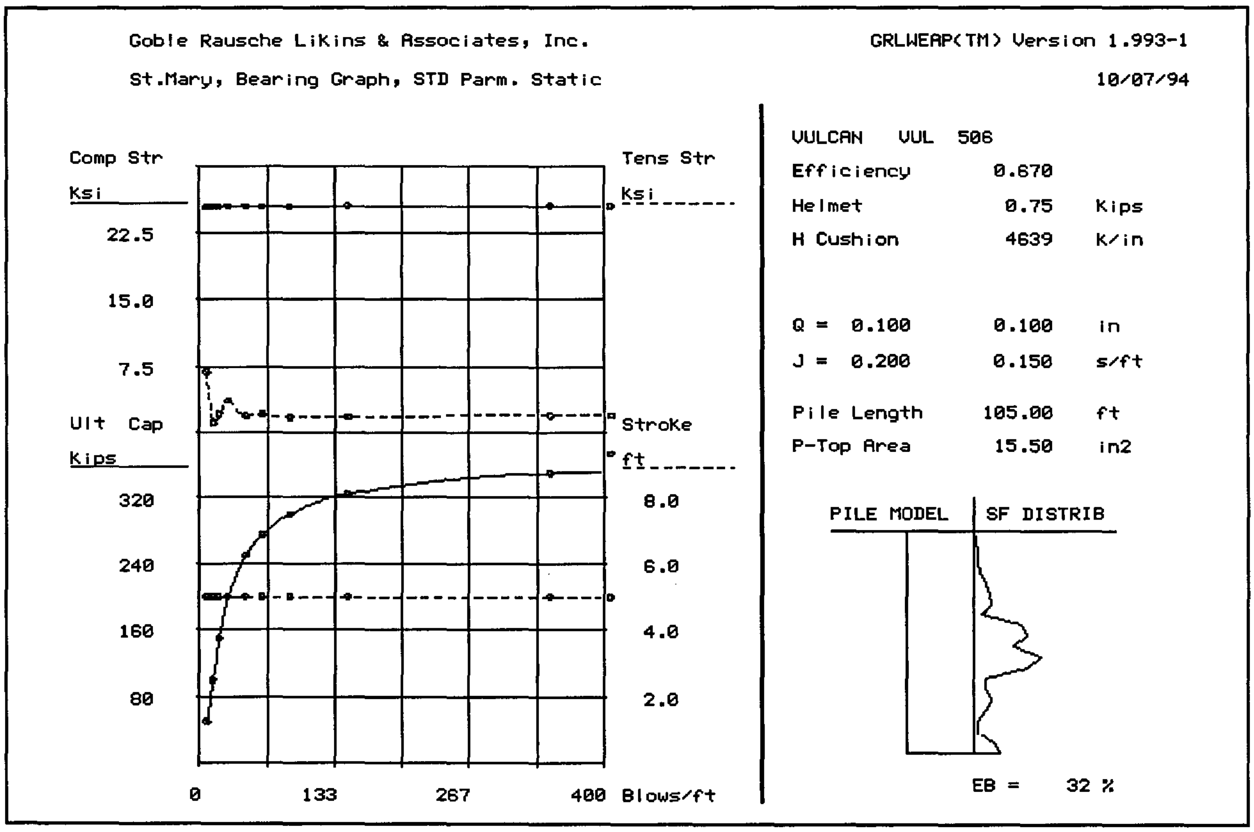

Figure A.1: Bearing Graph STD-ST Analysis for St. Mary, OH

St.Mary, Bearing Graph, SPT Parm. Static 10/07/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	50.0	25.481	11.686	4.7	5.00	20.64
2	100.0	25.508	6.009	8.8	5.00	20.62
3	150.0	25.538	4.083	13.2	5.00	20.49
4	200.0	25.568	2.253	18.1	5.00	20.17
5	250.0	25.598	2.353	25.9	5.00	19.69
6	275.0	25.613	2.337	30.5	5.00	19.57
7	300.0	25.628	2.419	38.0	5.00	19.44
8	325.0	25.642	2.779	50.5	5.00	19.32
9	350.0	25.657	2.433	73.6	5.00	19.21
10	375.0	25.672	2.637	113.0	5.00	19.09

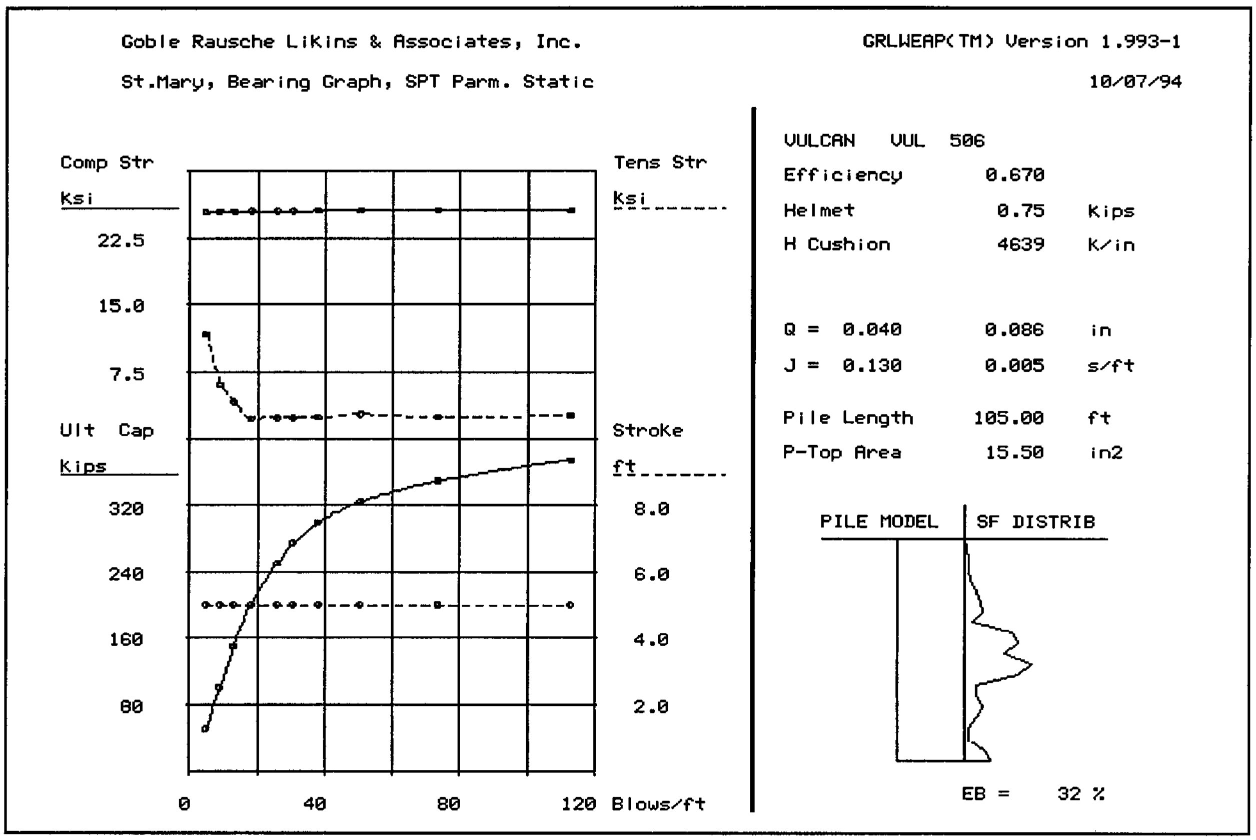

Figure A.2: Bearing Graph SPT-ST Analysis for St. Mary, OH

St.Mary, Bearing Graph,SPT Parm, Dynamic 10/07/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	50.0	24.953	8.163	6.9	5.00	19.76
2	100.0	24.962	2.817	13.3	5.00	19.58
3	150.0	24.970	1.463	20.0	5.00	19.16
4	200.0	24.978	2.072	31.3	5.00	18.92
5	250.0	24.989	1.942	54.1	5.00	18.70
6	275.0	24.995	2.143	77.3	5.00	18.60
7	300.0	25.000	2.290	124.2	5.00	18.50
8	325.0	25.006	2.414	265.5	5.00	18.40
9	350.0	25.011	2.494	1289.8	5.00	18.31
10	375.0	25.016	2.508	9999.0	5.00	18.23

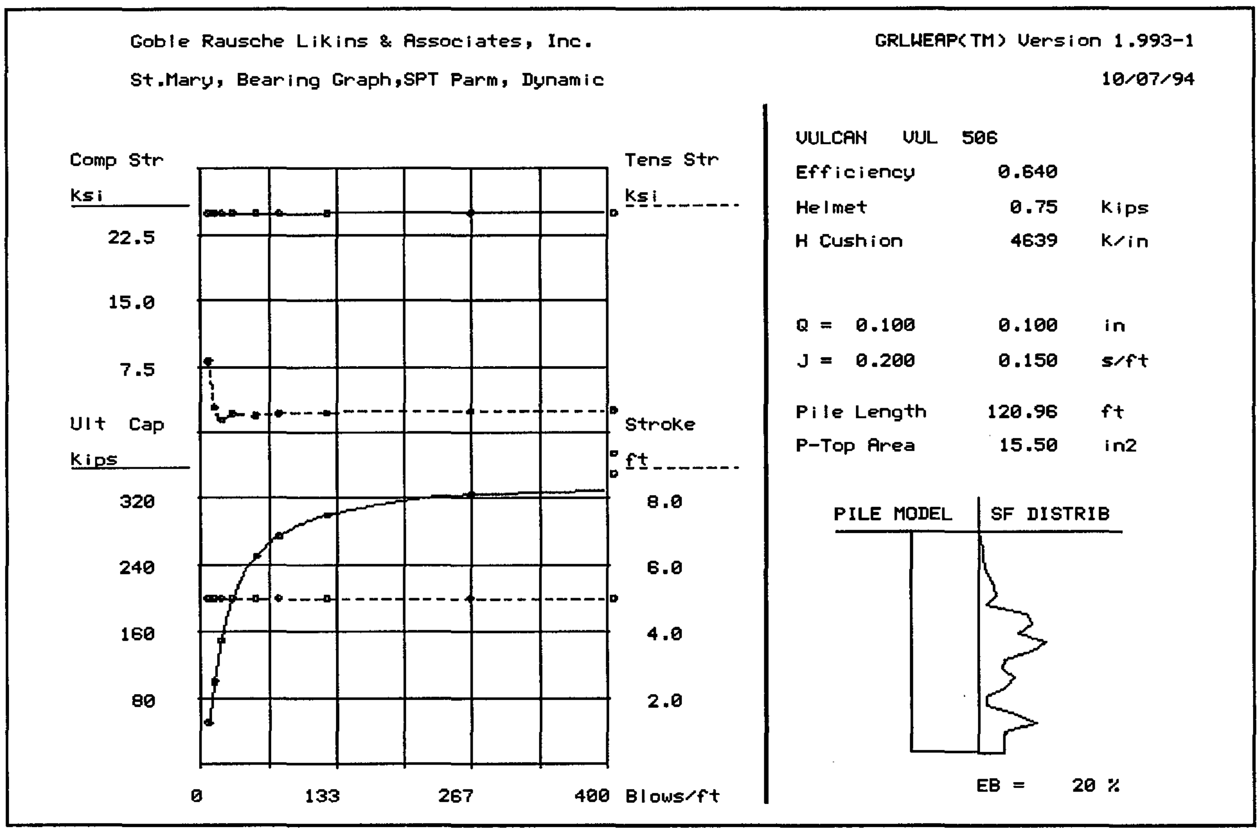

Figure A.3: Bearing Graph SPT-DYN Analysis for St. Mary, OH

St.Mary, Bearing Graph, MDF Parm. Static 10/07/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	50.0	25.472	9.718	5.7	5.00	20.58
2	100.0	25.489	4.548	10.8	5.00	20.62
3	150.0	25.506	2.291	16.0	5.00	20.38
4	200.0	25.523	2.882	23.3	5.00	19.88
5	250.0	25.540	3.706	36.3	5.00	19.51
6	275.0	25.548	2.532	47.8	5.00	19.38
7	300.0	25.557	2.740	67.1	5.00	19.27
8	325.0	25.565	2.586	106.3	5.00	19.15
9	350.0	25.573	2.297	211.3	5.00	19.05
10	375.0	25.582	2.036	494.8	5.00	18.95

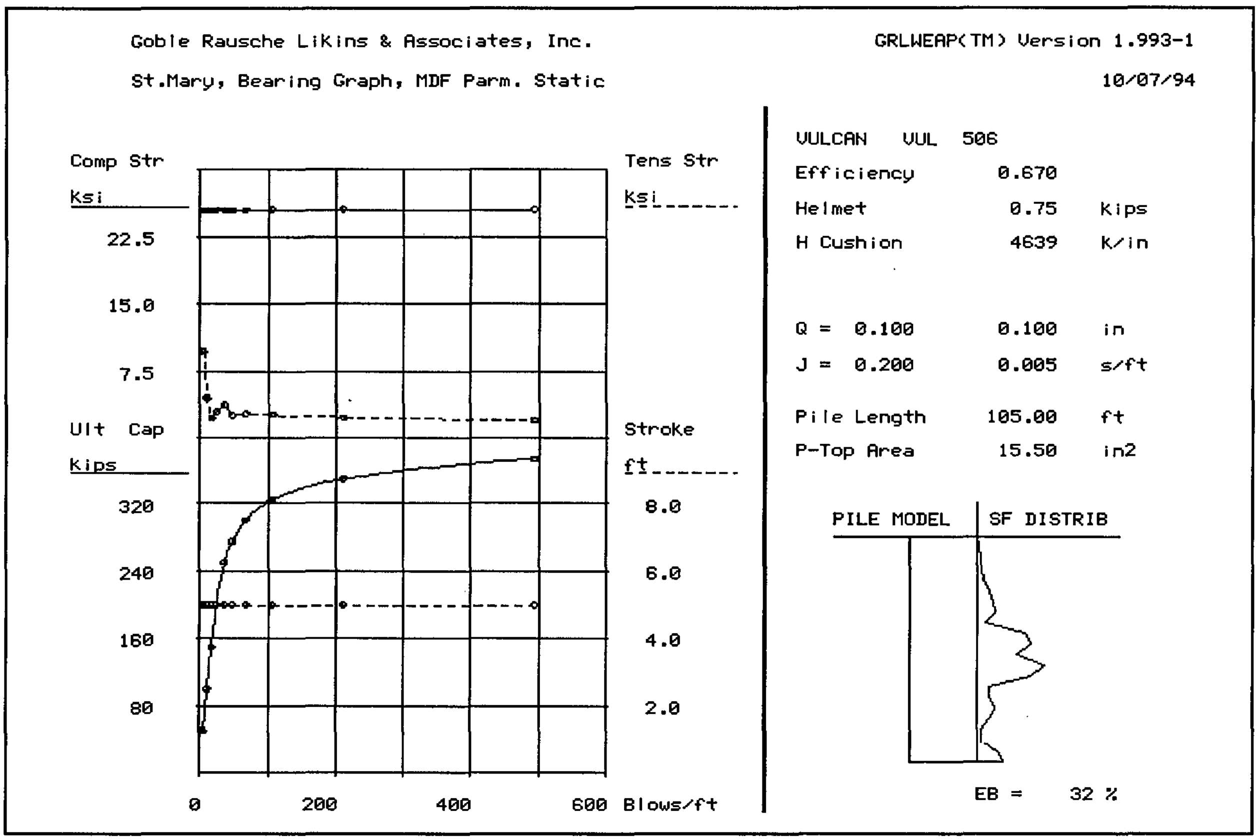

Figure A.4: Bearing Graph MDF-ST Analysis for St. Mary, OH

Portland, Bearing Graph, STD, Static 10/07/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	50.0	.000	.000	-1.0	.00	.00
2	100.0	15.298	.000	4.5	4.56	42.00
3	150.0	17.719	.132	7.5	5.00	37.31
4	200.0	18.824	.718	11.0	5.21	33.89
5	250.0	20.700	.866	14.8	5.65	32.86
6	300.0	21.926	.954	18.8	5.87	31.75
7	325.0	22.935	.989	21.0	5.98	31.40
8	350.0	23.650	1.103	23.5	6.04	30.98
9	375.0	24.791	1.206	26.0	6.21	31.16
10	400.0	25.574	1.347	28.7	6.30	31.20

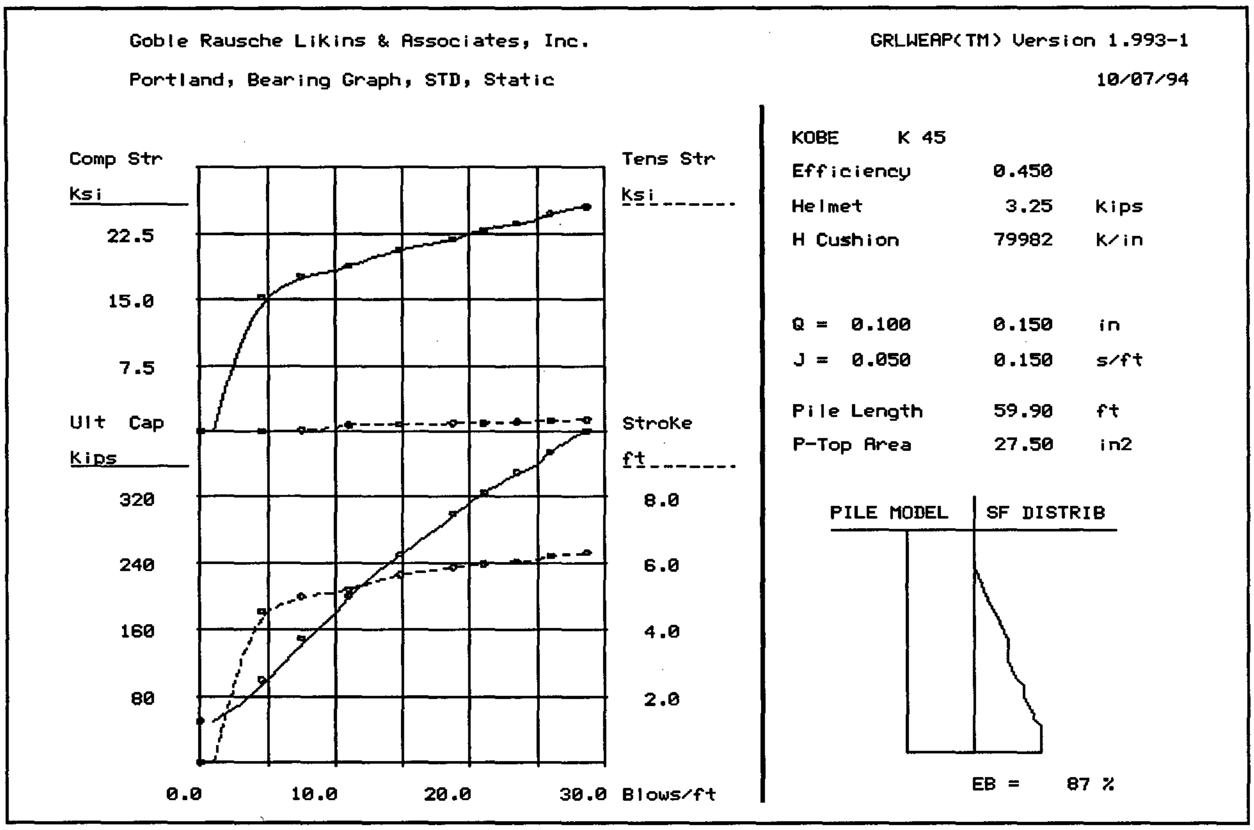

Figure A.5: Bearing Graph STD-ST Analysis for Portland, ME

Portland, Bearing Graph, SPT, Static 10/07/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	50.0	10.981	.000	2.9	3.93	44.99
2	100.0	15.593	.000	6.7	4.72	37.38
3	150.0	18.352	.000	11.0	5.30	34.34
4	200.0	21.405	.000	15.9	5.59	32.00
5	250.0	24.140	.000	20.9	5.95	31.56
6	300.0	25.718	.000	26.8	6.12	31.03
7	325.0	26.477	.210	30.2	6.21	30.86
8	350.0	27.557	.550	33.5	6.40	31.27
9	375.0	28.263	.694	37.6	6.50	31.52
10	400.0	28.728	.699	42.3	6.54	31.56

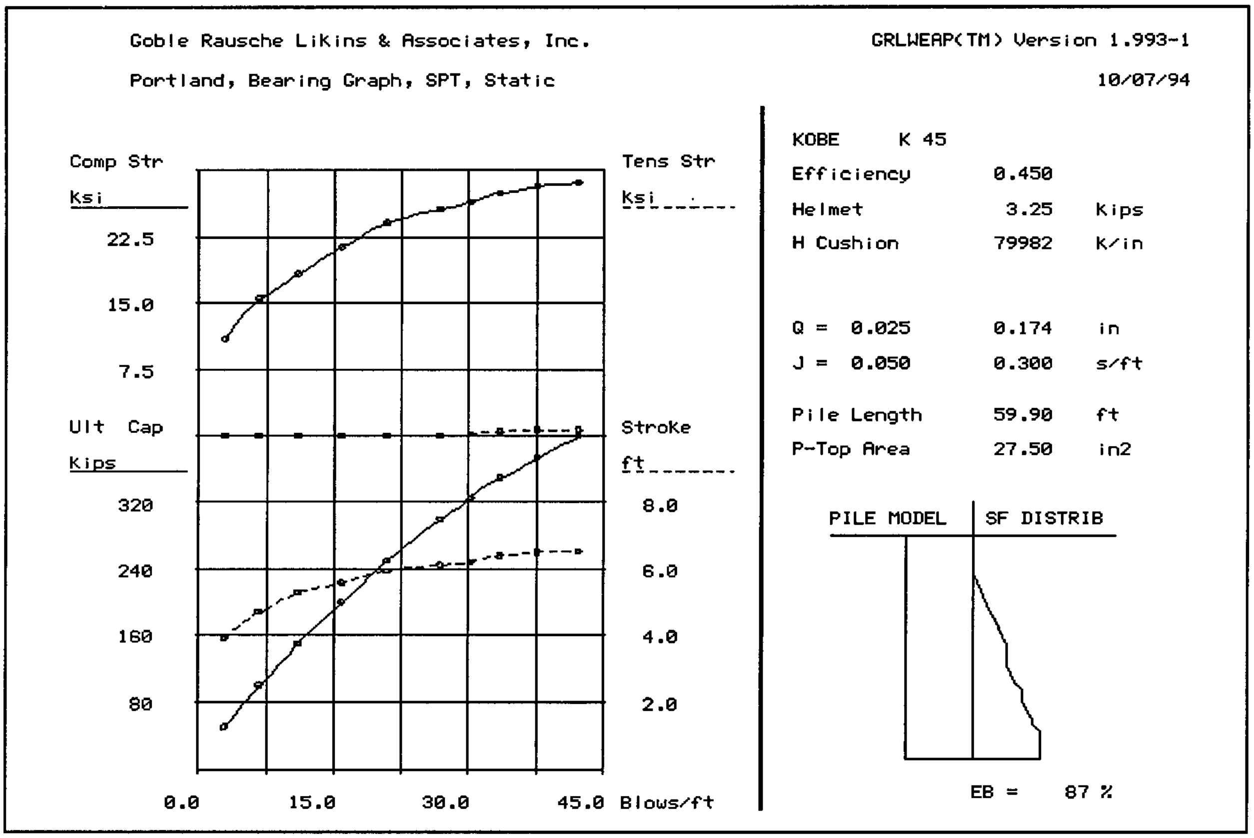

Figure A.6: Bearing Graph SPT-ST Analysis for Portland, ME

Portland, Bearing Graph, SPT, Dynamic 10/07/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	50.0	10.910	.000	2.9	3.93	44.96
2	100.0	15.534	.000	6.7	4.72	37.25
3	150.0	18.375	.000	11.1	5.30	34.30
4	200.0	21.345	.000	16.1	5.60	31.95
5	250.0	23.850	.000	21.2	5.94	31.55
6	300.0	25.461	.000	27.2	6.11	31.12
7	325.0	26.186	.208	30.7	6.20	30.99
8	350.0	27.371	.463	34.1	6.40	31.55
9	375.0	28.085	.590	38.3	6.51	31.67
10	400.0	28.607	.558	43.2	6.56	31.75

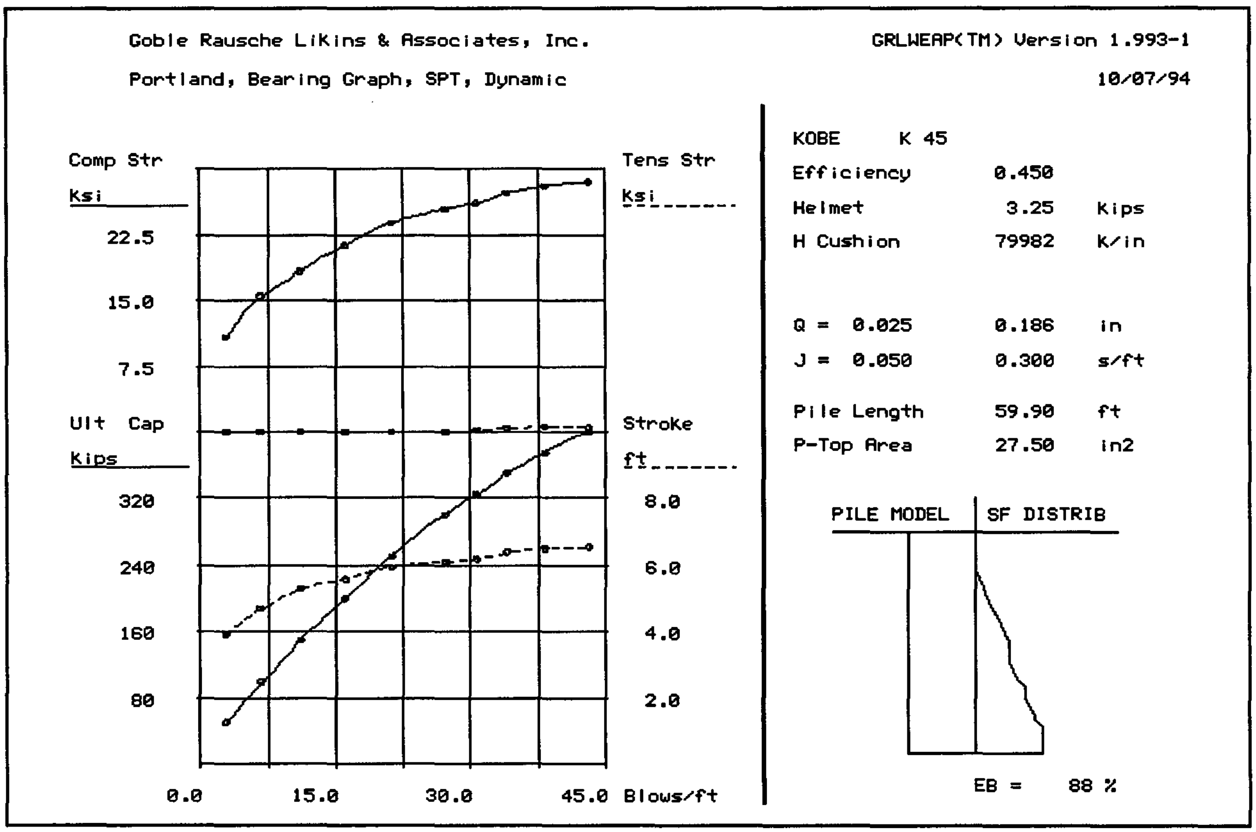

Figure A.7: Bearing Graph SPT-DYN Analysis for Portland, ME

Portland, Bearing Graph, MDF, Static 10/07/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	50.0	.000	.000	-1.0	.00	.00
2	100.0	.000	.000	-1.0	.00	.00
3	150.0	14.687	.000	4.0	4.19	41.53
4	200.0	15.991	.399	5.9	4.51	38.34
5	250.0	17.512	2.580	8.0	4.89	36.97
6	300.0	19.089	1.717	10.1	5.26	35.97
7	325.0	19.421	2.542	11.5	5.31	34.76
8	350.0	20.279	1.934	12.6	5.53	34.62
9	375.0	20.737	1.343	14.2	5.65	34.12
10	400.0	21.023	2.407	16.2	5.70	33.45

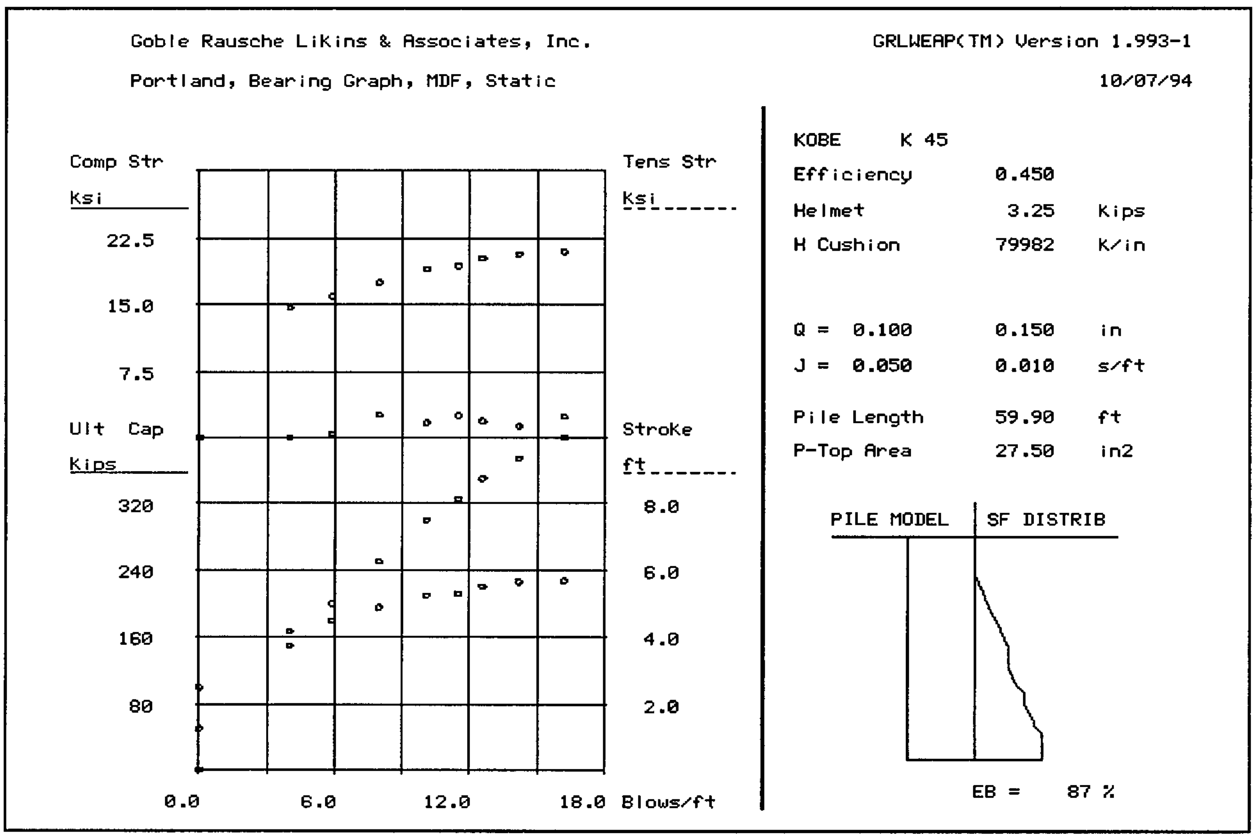

Figure A.8: Bearing Graph MDF-ST Analysis for Portland, ME

Portland, Bearing Graph, MDF-Cap-STD, ST 10/07/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	50.0	.000	.000	-1.0	.00	.00
2	100.0	15.463	.000	4.6	4.58	41.71
3	150.0	18.003	.212	7.7	5.02	37.15
4	200.0	19.123	.499	11.3	5.24	33.68
5	250.0	21.039	.635	15.1	5.69	32.85
6	300.0	23.497	.690	19.2	5.91	31.73
7	325.0	24.662	.770	21.4	6.03	31.60
8	350.0	25.504	.886	23.9	6.08	31.26
9	375.0	26.737	1.013	26.3	6.27	31.46
10	400.0	27.554	1.221	29.1	6.36	31.40

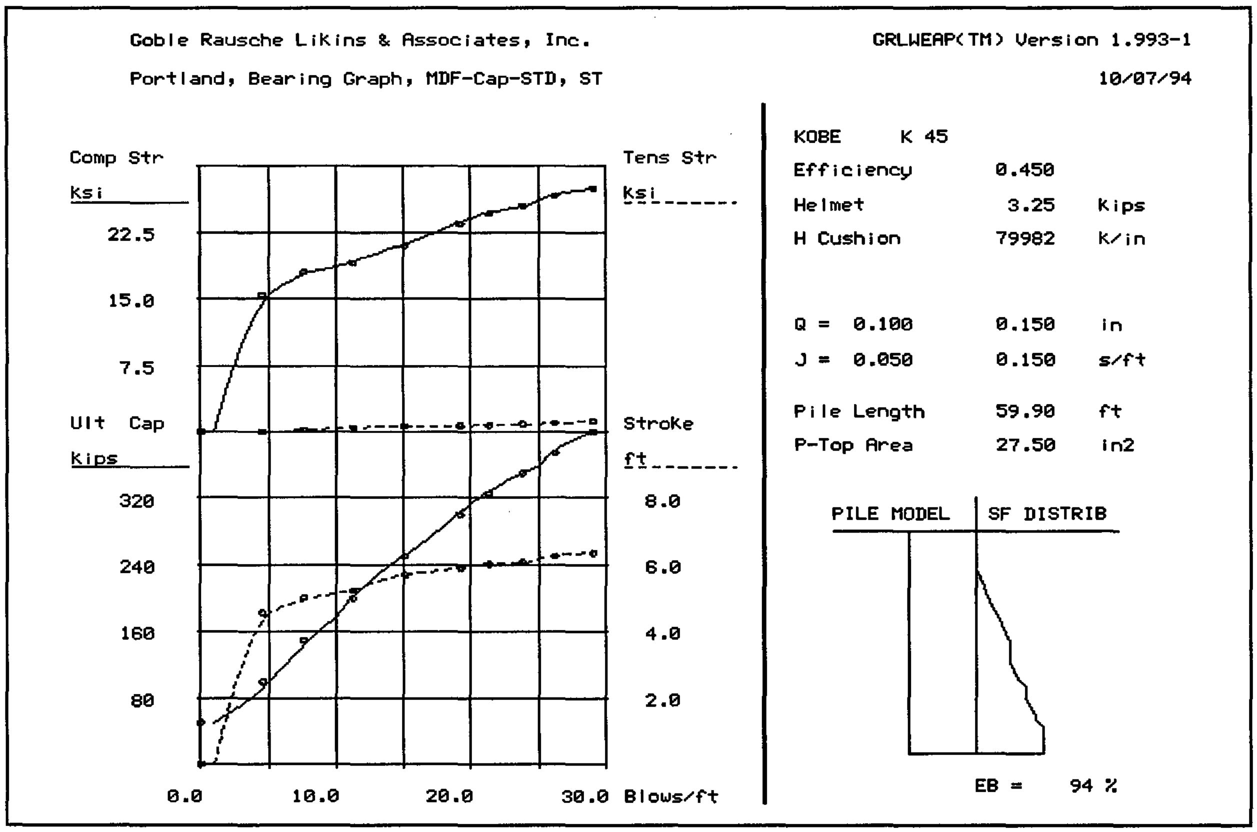

Figure A.9: Bearing Graph MDF-Cap-STD Analysis for Portland, ME

Portland, Bearing Graph, MDF-Cap-SPT, ST 10/07/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	50.0	11.001	.000	3.0	3.93	44.23
2	100.0	16.034	.000	7.0	4.72	36.44
3	150.0	19.546	.000	11.5	5.40	33.69
4	200.0	23.516	.000	16.6	5.74	31.83
5	250.0	25.544	.000	22.2	5.91	30.88
6	300.0	28.015	.195	28.1	6.26	31.32
7	325.0	29.176	.265	31.3	6.43	31.68
8	350.0	29.948	.175	35.3	6.52	31.79
9	375.0	30.434	.201	39.9	6.57	31.83
10	400.0	31.584	.294	44.2	6.75	32.51

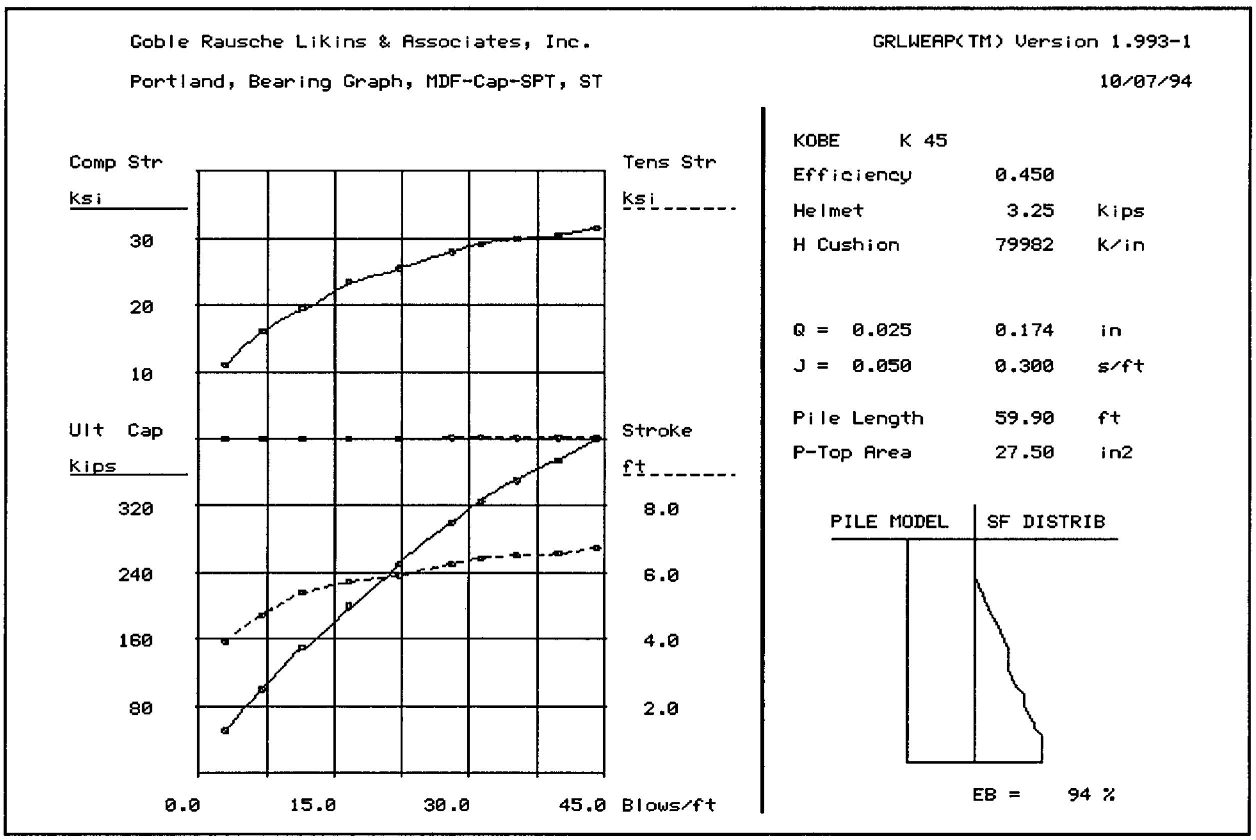

Figure A.10: Bearing Graph MDF-Cap-SPT Analysis for Portland, ME

C&D P17, Bearing Graph, STD Parm, ST 10/07/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	100.0	2.607	1.753	4.1	7.15	43.53
2	200.0	2.672	1.477	9.8	7.34	37.24
3	300.0	2.813	1.295	17.3	7.81	34.53
4	400.0	2.894	1.108	25.1	8.04	32.86
5	500.0	2.924	.923	36.2	8.15	31.87
6	600.0	2.985	.772	50.9	8.42	31.70
7	700.0	3.018	.617	67.8	8.55	32.18
8	800.0	3.031	.500	78.3	8.62	32.21
9	900.0	3.036	.349	89.7	8.65	31.92
10	1000.0	3.096	.244	100.4	8.86	32.42

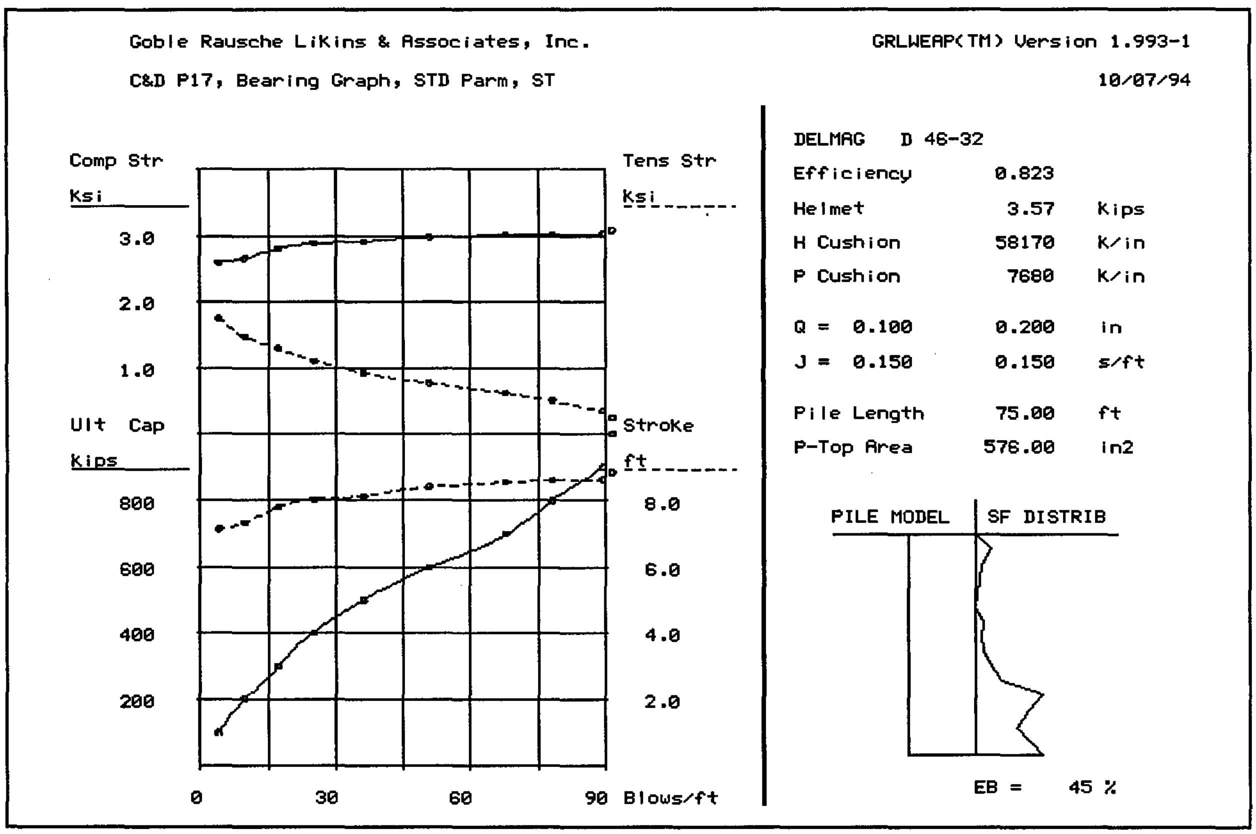

Figure A.11: Bearing Graph STD-ST C&D Canal, Pier 17, DE

C&D P17, Bearing Graph, SPT Parm, ST 10/07/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	100.0	2.713	1.809	5.0	7.15	41.20
2	200.0	2.866	1.585	11.7	7.63	36.40
3	300.0	2.927	1.314	19.9	7.87	33.98
4	400.0	3.037	1.118	27.8	8.25	33.10
5	500.0	3.098	.907	39.7	8.44	32.34
6	600.0	3.131	.691	53.0	8.54	31.49
7	700.0	3.199	.509	59.6	8.78	31.86
8	800.0	3.236	.325	67.8	8.90	31.70
9	900.0	3.252	.245	77.9	8.96	31.63
10	1000.0	3.270	.173	90.0	8.99	31.63

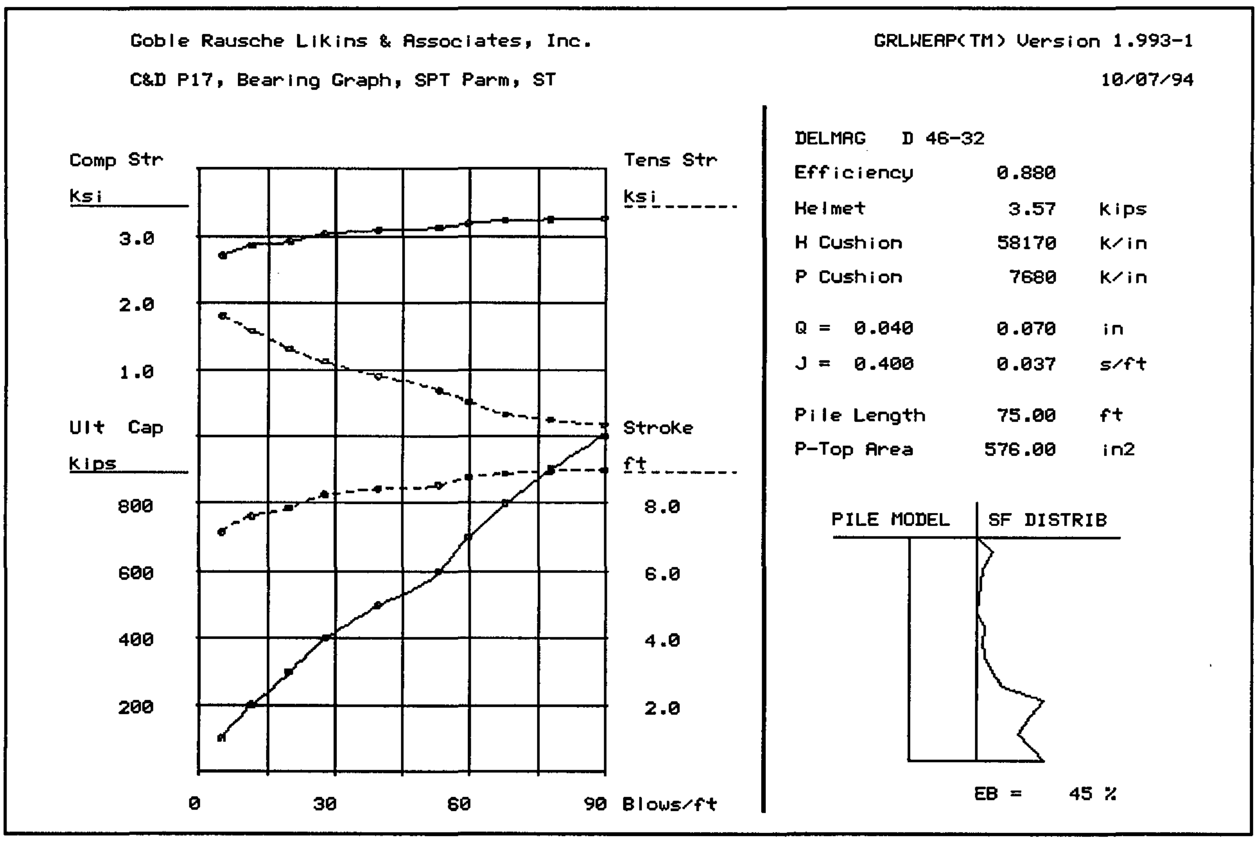

Figure A.12: Bearing Graph SPT-ST C&D Canal, Pier 17, DE

C&D P17, Bearing Graph, SPT Parm, DYN 10/07/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	100.0	2.734	1.887	4.5	7.15	41.74
2	200.0	2.837	1.642	10.3	7.56	37.07
3	300.0	2.964	1.455	17.4	7.96	34.60
4	400.0	3.036	1.241	24.5	8.17	32.98
5	500.0	3.067	1.020	33.6	8.27	32.04
6	600.0	3.136	.842	43.5	8.53	32.15
7	700.0	3.173	.658	51.7	8.66	32.02
8	800.0	3.195	.475	57.8	8.73	31.67
9	900.0	3.204	.301	65.1	8.76	31.09
10	1000.0	3.208	.199	73.5	8.78	30.85

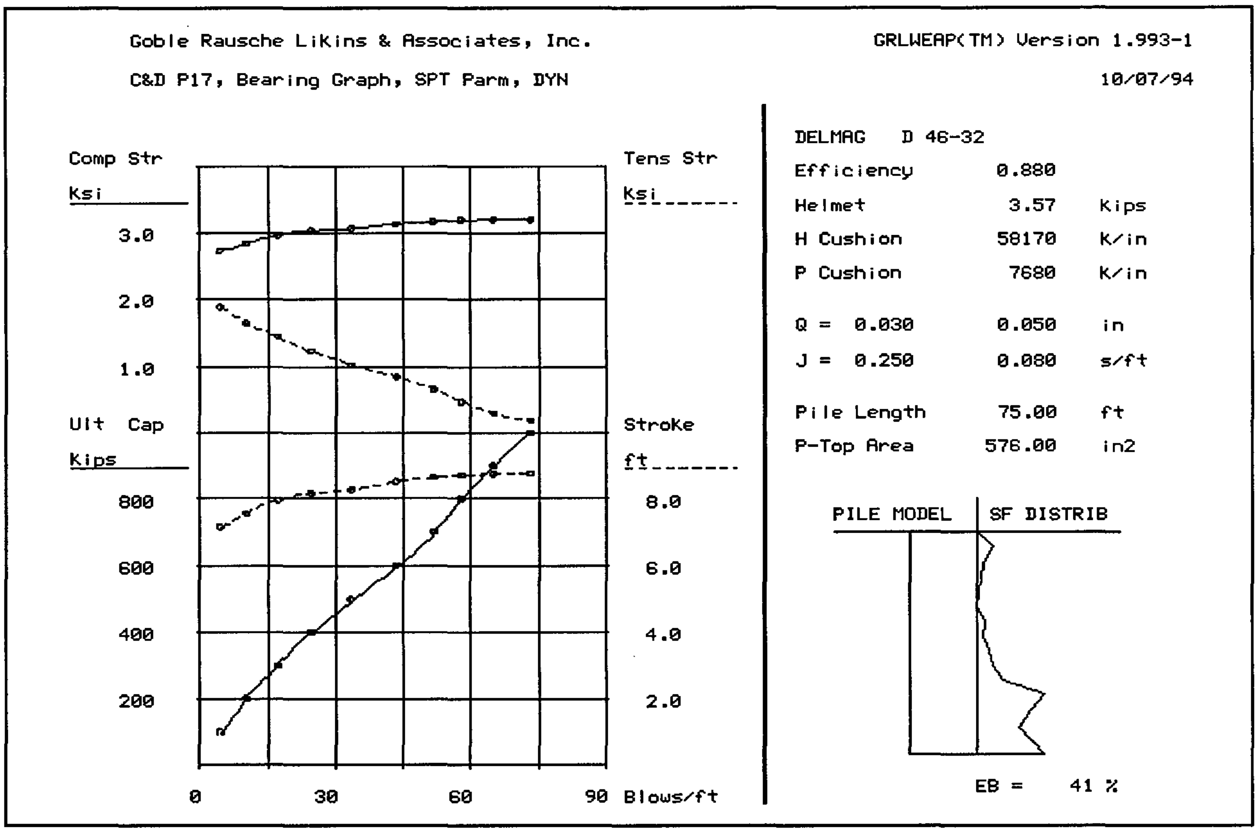

Figure A.13: Bearing Graph SPT-DYN C&D Canal, Pier 17, DE

C&D P17, Bearing Graph, MDF Parm, ST 10/07/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	100.0	2.567	1.811	3.6	6.83	43.79
2	200.0	2.709	1.689	8.2	7.28	38.58
3	300.0	2.851	1.581	14.4	7.73	35.46
4	400.0	2.924	1.425	21.6	7.95	33.65
5	500.0	2.953	1.238	29.5	8.07	32.48
6	600.0	3.024	1.098	40.0	8.33	32.29
7	700.0	3.053	.939	52.6	8.46	32.62
8	800.0	3.075	.787	64.6	8.52	32.81
9	900.0	3.078	.642	72.6	8.55	32.62
10	1000.0	3.082	.512	82.1	8.57	32.27

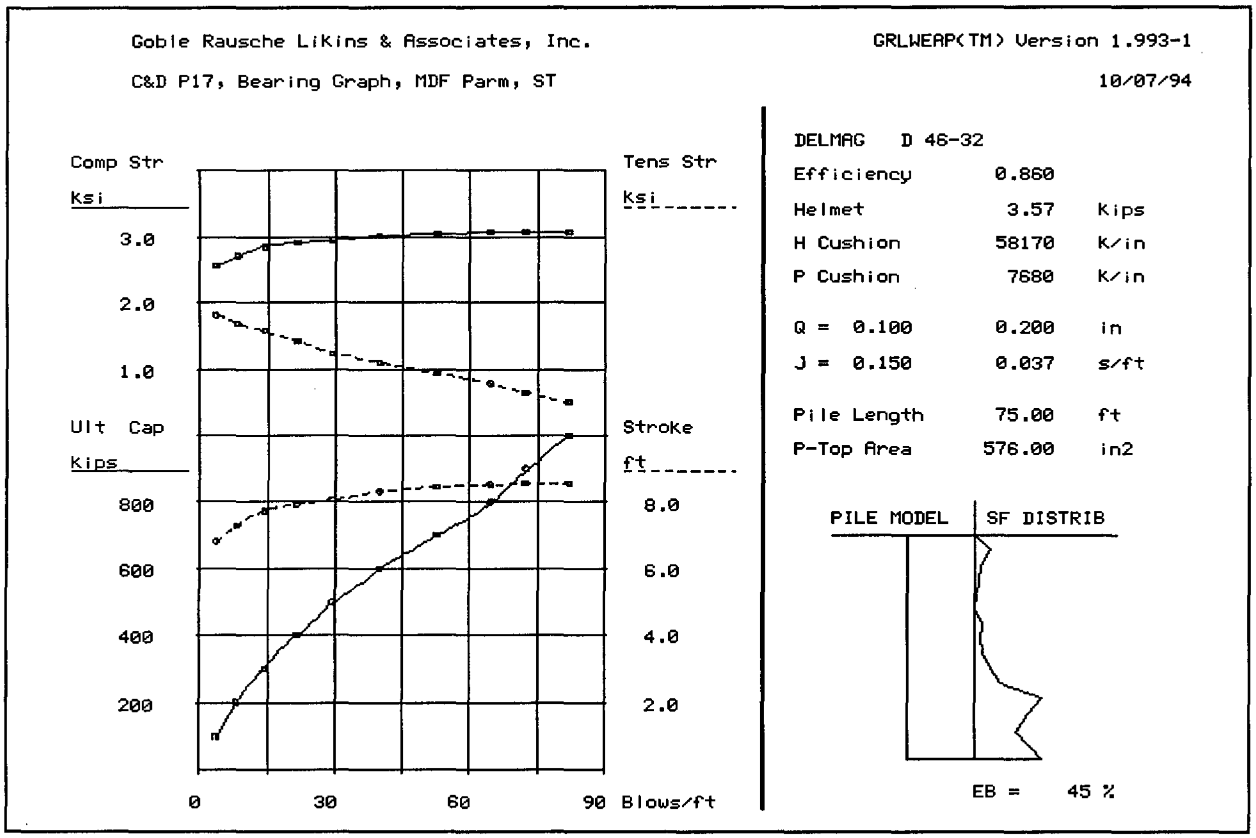

Figure A.14: Bearing Graph MDF-ST C&D Canal, Pier 17, DE

C&D P17, Brng.G, STD Parm, MDF Capacity 10/07/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	100.0	2.447	1.623	4.3	7.15	40.50
2	200.0	2.529	1.406	10.4	7.41	34.17
3	300.0	2.664	1.266	18.5	7.87	31.35
4	400.0	2.728	1.085	26.8	8.10	29.58
5	500.0	2.753	.900	39.3	8.21	28.58
6	600.0	2.808	.750	55.0	8.44	28.48
7	700.0	2.837	.599	70.0	8.56	28.73
8	800.0	2.848	.452	79.8	8.61	28.45
9	900.0	2.857	.326	91.9	8.64	27.96
10	1000.0	2.930	.288	102.4	8.91	28.40

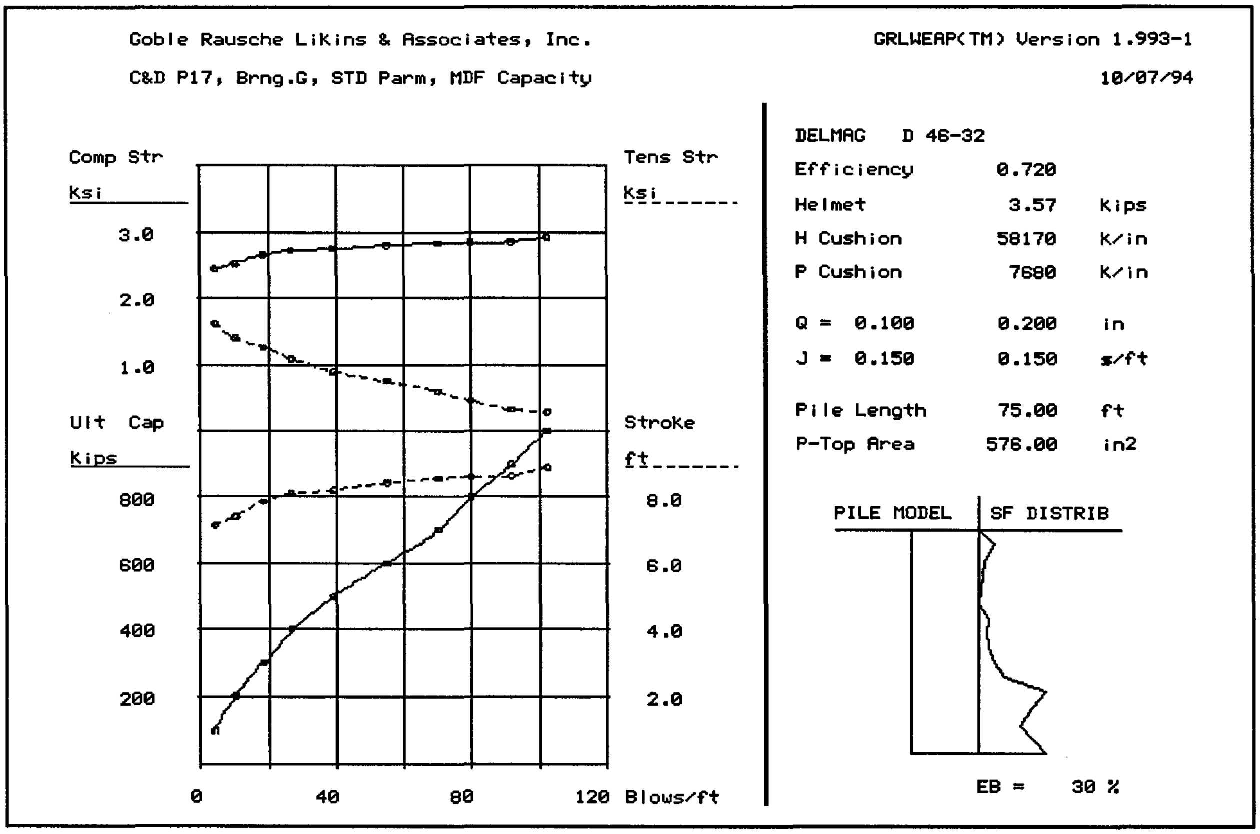

Figure A.15: Bearing Graph MDF-Cap-STD C&D Canal, Pier 17, DE

C&D P17, Brng.G, SPT Parm, MDF Capacity 10/07/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	100.0	2.480	1.553	6.0	7.15	35.86
2	200.0	2.637	1.345	14.0	7.74	31.73
3	300.0	2.714	1.114	23.8	8.03	29.29
4	400.0	2.804	.918	35.5	8.35	28.04
5	500.0	2.851	.715	52.3	8.51	26.77
6	600.0	2.879	.524	64.0	8.58	26.24
7	700.0	2.948	.379	73.1	8.85	26.41
8	800.0	2.976	.227	85.2	8.99	26.46
9	900.0	3.003	.087	99.8	9.05	26.61
10	1000.0	3.011	.038	119.3	9.09	26.56

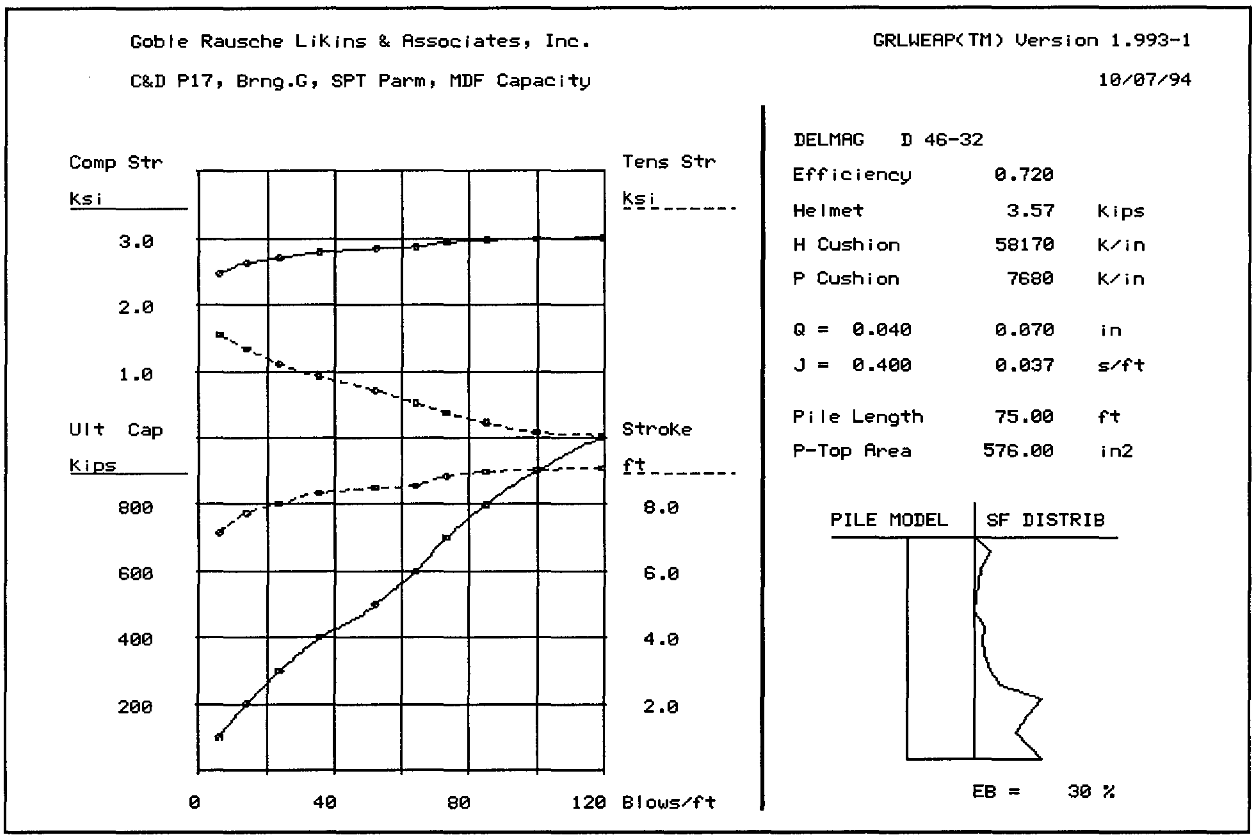

Figure A.16: Bearing Graph MDF-Cap-SPT C&D Canal, Pier 17, DE

C&D P21, Bearing Graph, STD Parm, ST 10/10/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	100.0	2.583	1.820	4.0	7.15	43.65
2	250.0	2.753	1.594	13.1	7.59	34.84
3	400.0	2.893	1.370	24.6	8.06	32.26
4	550.0	2.966	1.125	42.1	8.30	31.02
5	700.0	2.999	.912	59.8	8.41	30.76
6	850.0	3.104	.765	69.3	8.75	31.31
7	1000.0	3.167	.632	82.6	8.92	30.98
8	1150.0	3.211	.514	100.2	9.00	31.14
9	1300.0	3.229	.408	124.8	9.04	31.05
10	1500.0	3.307	.292	163.7	9.27	31.95

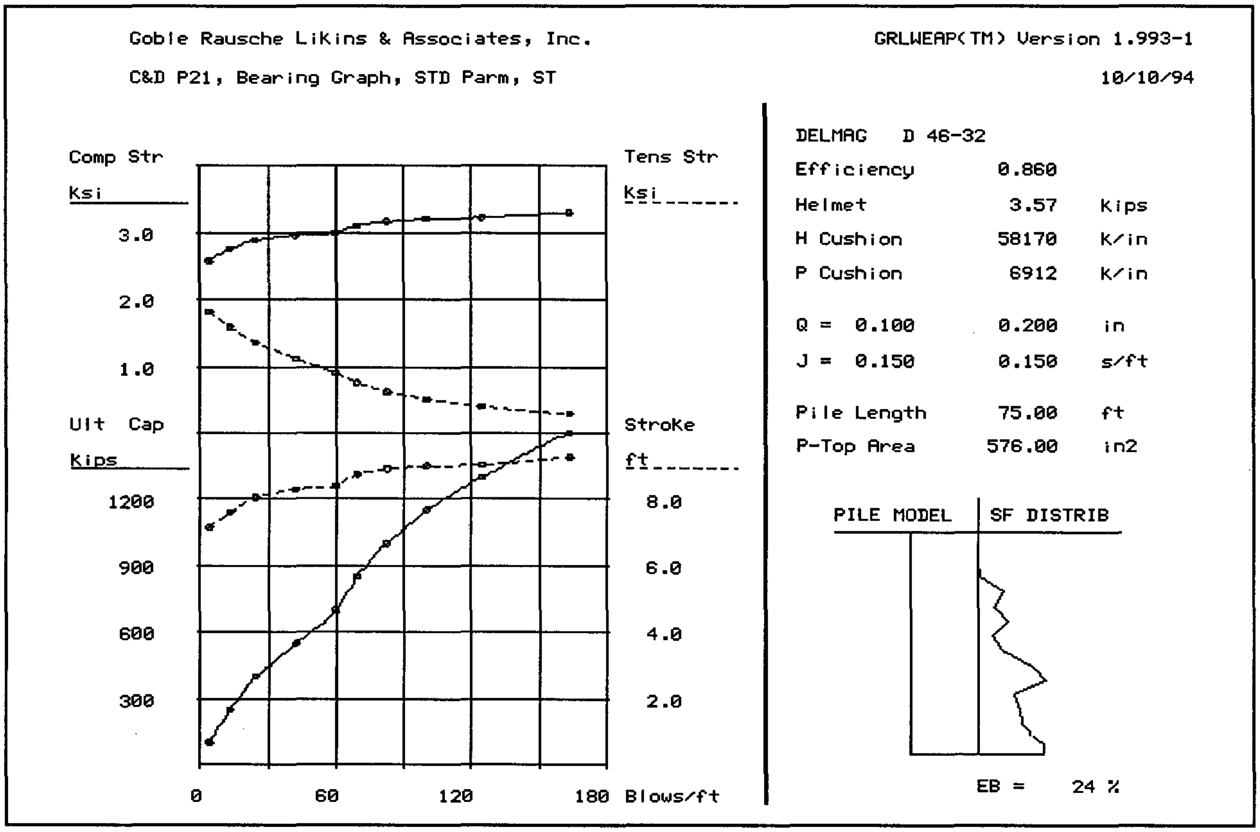

Figure A.17: Bearing Graph STD-ST, C&D Canal, Pier 21, DE

C&D P21, Bearing Graph, SPT Parm, ST 10/10/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	100.0	2.616	1.968	3.3	7.15	42.97
2	250.0	2.738	1.819	9.7	7.47	35.12
3	400.0	2.906	1.733	18.2	8.01	31.94
4	550.0	2.983	1.577	26.6	8.27	30.75
5	700.0	3.026	1.395	36.0	8.41	30.11
6	850.0	3.057	1.215	45.7	8.48	29.85
7	1000.0	3.072	1.033	51.6	8.51	29.38
8	1150.0	3.137	.897	57.2	8.77	29.63
9	1300.0	3.167	.754	64.3	8.90	30.13
10	1500.0	3.193	.602	77.4	8.96	30.12

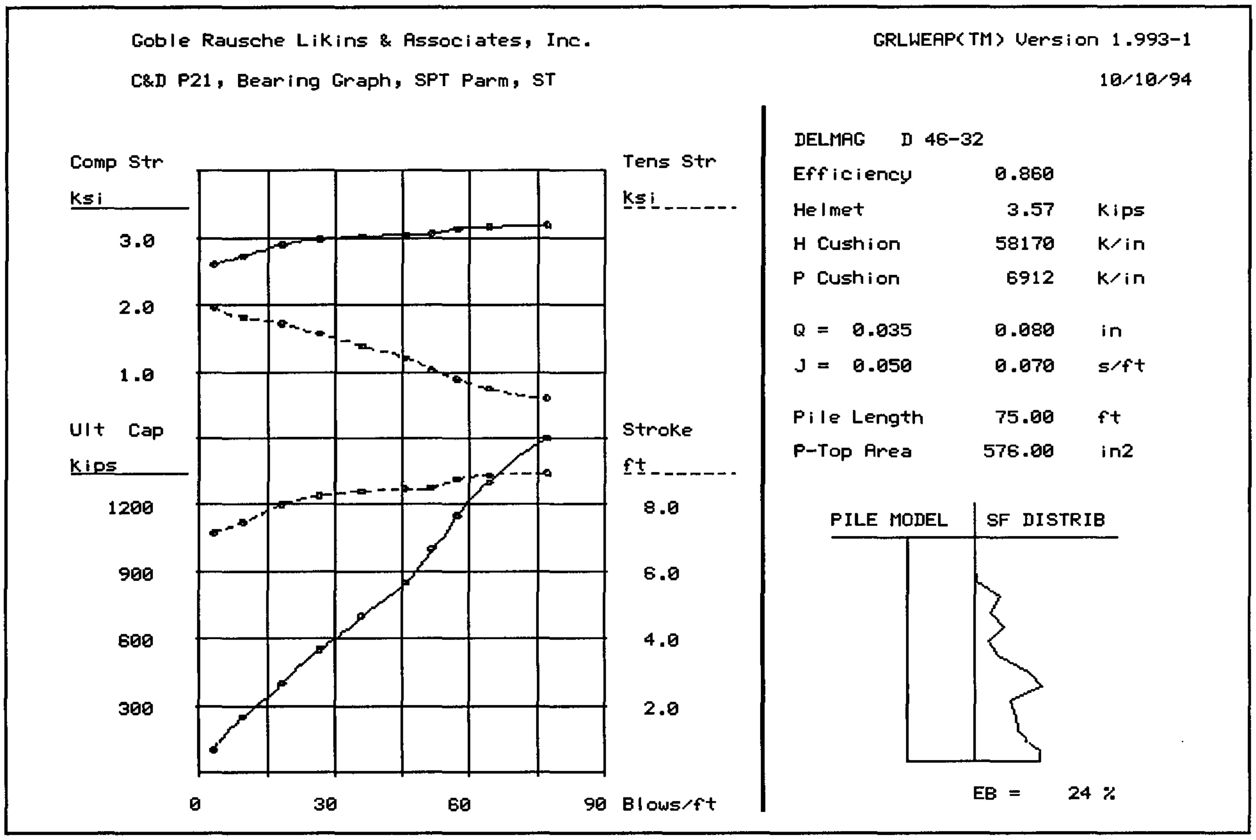

Figure A.18: Bearing Graph SPT-ST, C&D Canal, Pier 21, DE

C&D P21, Bearing Graph, SPT Parm, Dyn 10/10/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	100.0	2.629	2.004	3.2	7.15	42.65
2	250.0	2.760	1.892	9.8	7.53	34.37
3	400.0	2.910	1.822	17.9	8.03	31.59
4	550.0	2.986	1.691	25.6	8.29	30.66
5	700.0	3.030	1.528	35.0	8.41	29.82
6	850.0	3.053	1.363	44.2	8.48	29.14
7	1000.0	3.113	1.237	48.8	8.69	29.39
8	1150.0	3.174	1.098	54.3	8.80	29.89
9	1300.0	3.197	.955	61.2	8.85	30.14
10	1500.0	3.206	.745	74.5	8.88	30.06

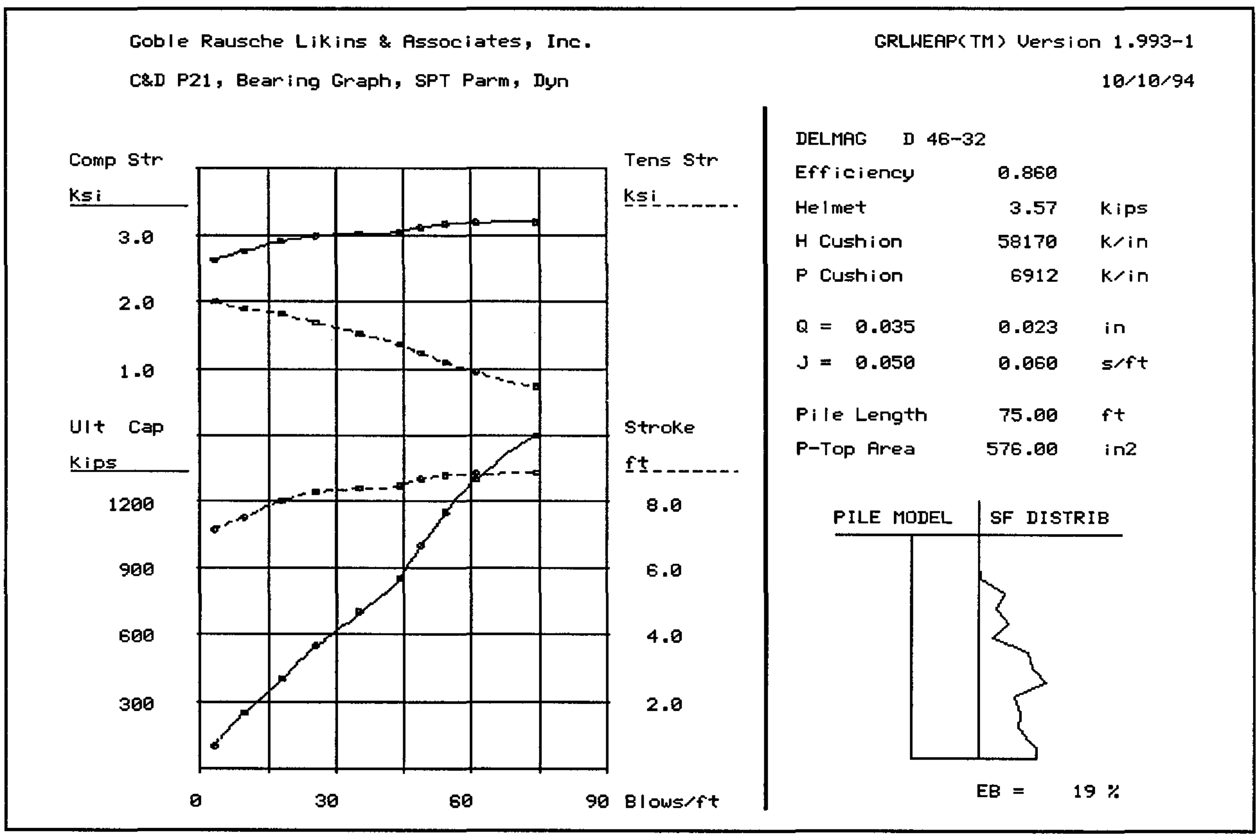

Figure A.19: Bearing Graph SPT-DYN, C&D Canal, Pier 21, DE

C&D P21, Bearing Graph, MDF Parm, ST 10/10/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	100.0	2.504	1.777	3.9	6.86	42.51
2	250.0	2.753	1.674	12.4	7.58	34.98
3	400.0	2.863	1.463	23.8	7.94	31.66
4	550.0	2.969	1.263	38.9	8.32	31.05
5	700.0	3.023	1.051	56.2	8.51	31.11
6	850.0	3.065	.877	66.6	8.60	30.60
7	1000.0	3.163	.757	77.2	8.90	30.95
8	1150.0	3.216	.638	92.0	9.05	31.26
9	1300.0	3.250	.526	112.1	9.13	31.43
10	1500.0	3.279	.398	151.1	9.17	31.48

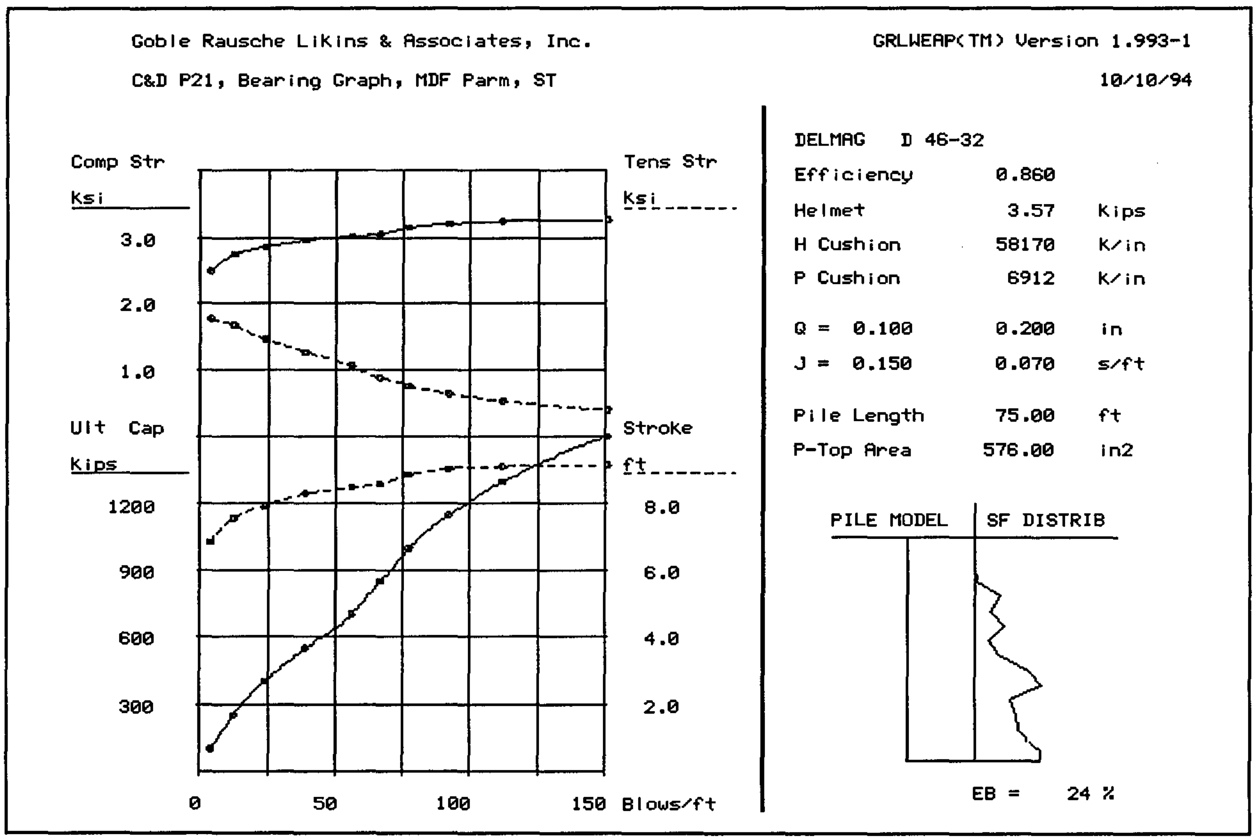

Figure A.20: Bearing Graph MDF-ST, C&D Canal, Pier 21, DE

C&D P21, B.G, STD Parm, MDF Capacity 10/10/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	100.0	2.582	1.846	4.0	7.15	43.46
2	250.0	2.770	1.671	13.1	7.63	34.55
3	400.0	2.901	1.470	24.4	8.09	32.00
4	550.0	2.981	1.248	41.0	8.32	30.75
5	700.0	3.016	1.027	56.6	8.43	30.27
6	850.0	3.131	.887	65.1	8.79	30.78
7	1000.0	3.202	.742	76.7	8.97	31.06
8	1150.0	3.241	.616	92.2	9.06	31.24
9	1300.0	3.264	.509	113.0	9.10	31.26
10	1500.0	3.288	.377	152.6	9.13	31.17

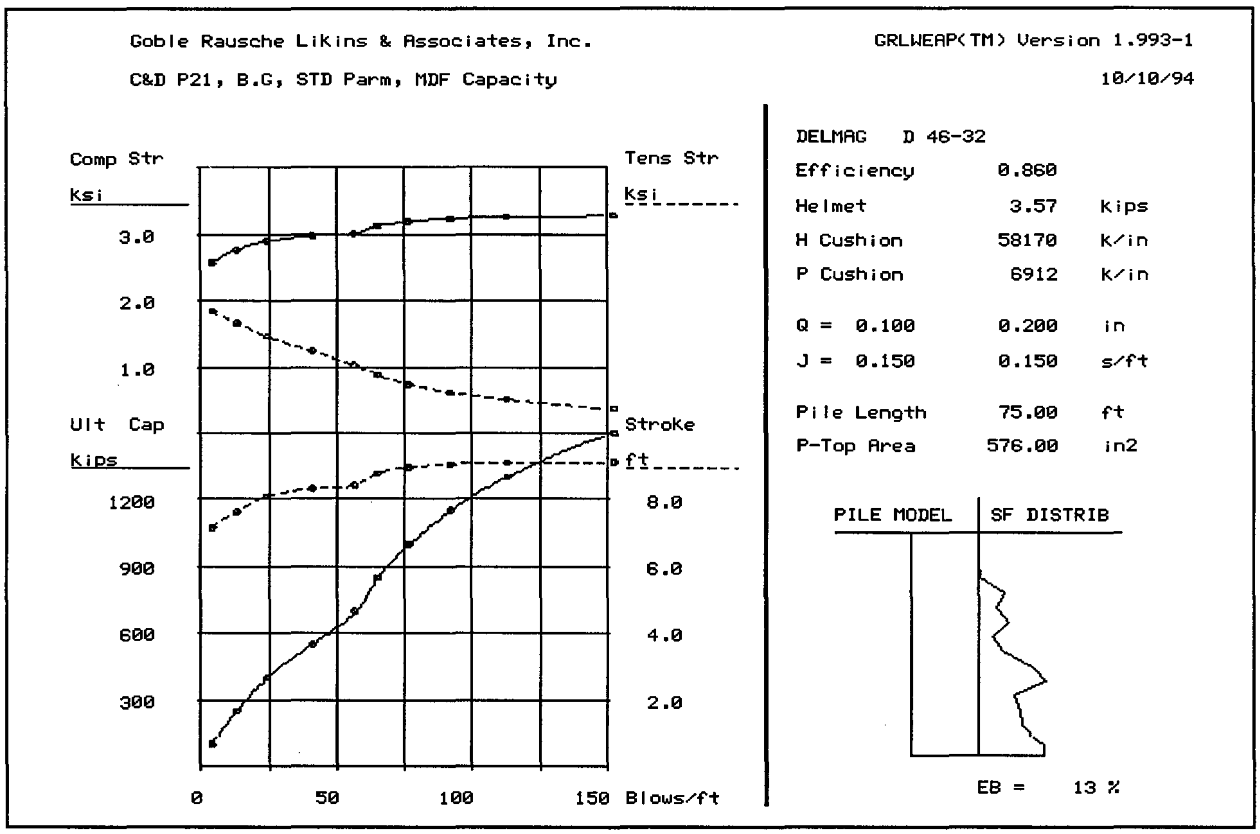

Figure A.21: Bearing Graph MDF-Cap-STD, C&D Canal, Pier 21, DE

C&D P21, B.G, SPT Parm, MDF Capacity 10/10/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	100.0	2.628	1.996	3.3	7.15	42.72
2	250.0	2.751	1.876	9.7	7.49	34.74
3	400.0	2.919	1.821	18.1	8.03	31.68
4	550.0	2.998	1.691	26.2	8.29	30.53
5	700.0	3.038	1.532	35.0	8.43	29.79
6	850.0	3.075	1.378	44.1	8.49	29.47
7	1000.0	3.087	1.214	50.1	8.53	28.80
8	1150.0	3.142	1.100	55.6	8.78	29.52
9	1300.0	3.197	.982	61.7	8.90	30.21
10	1500.0	3.212	.801	74.5	8.97	30.27

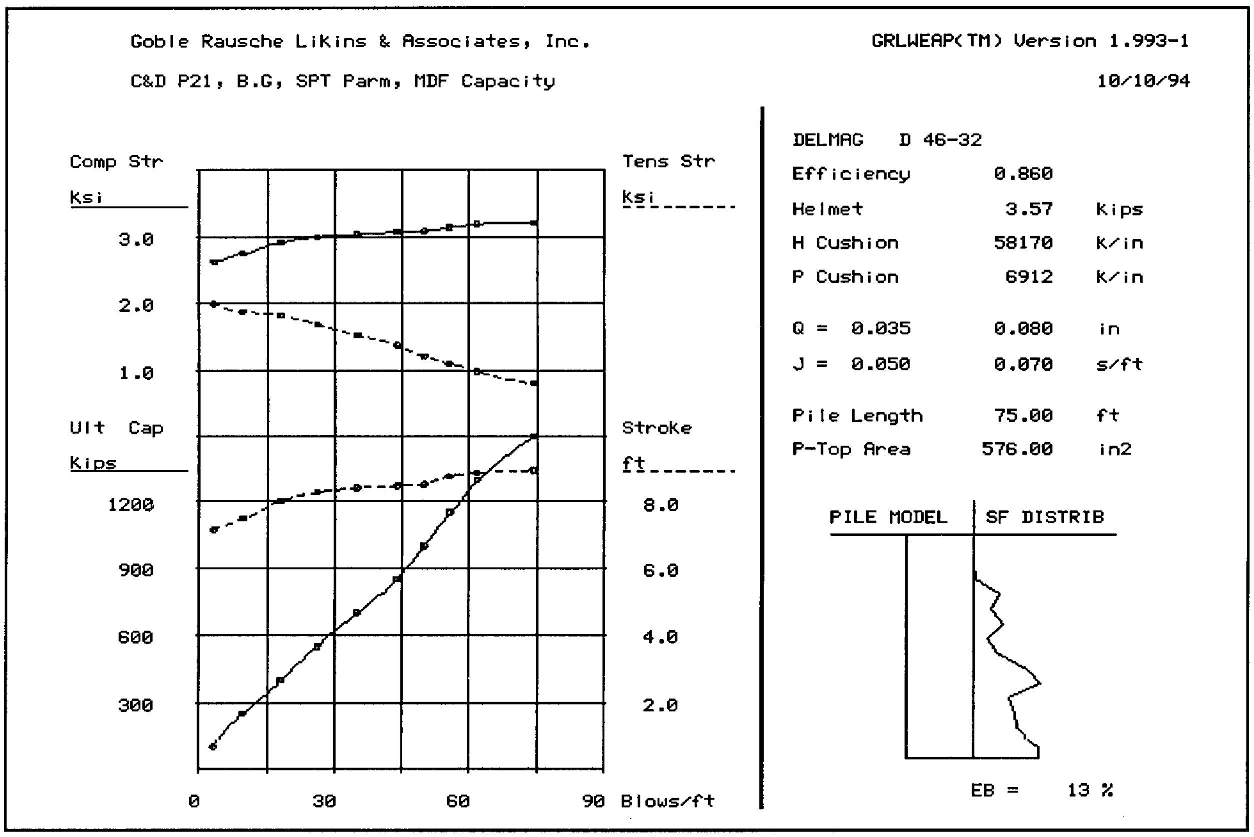

Figure A.22: Bearing Graph MDF-Cap-SPT, C&D Canal, Pier 21, DE

WHITE CITY, Bearing Graph, STD Parm, ST 10/10/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	50.0	1.504	.750	2.4	5.96	36.57
2	100.0	1.566	.663	5.1	6.18	30.80
3	200.0	1.779	.574	13.9	6.94	23.54
4	300.0	1.881	.454	28.0	7.32	19.87
5	400.0	1.921	.383	44.8	7.50	18.42
6	500.0	1.930	.286	77.1	7.60	17.11
7	550.0	1.974	.264	103.2	7.84	16.96
8	600.0	1.998	.233	127.9	7.96	16.58
9	650.0	2.010	.205	157.1	8.02	16.38
10	700.0	2.019	.226	181.5	8.05	16.46

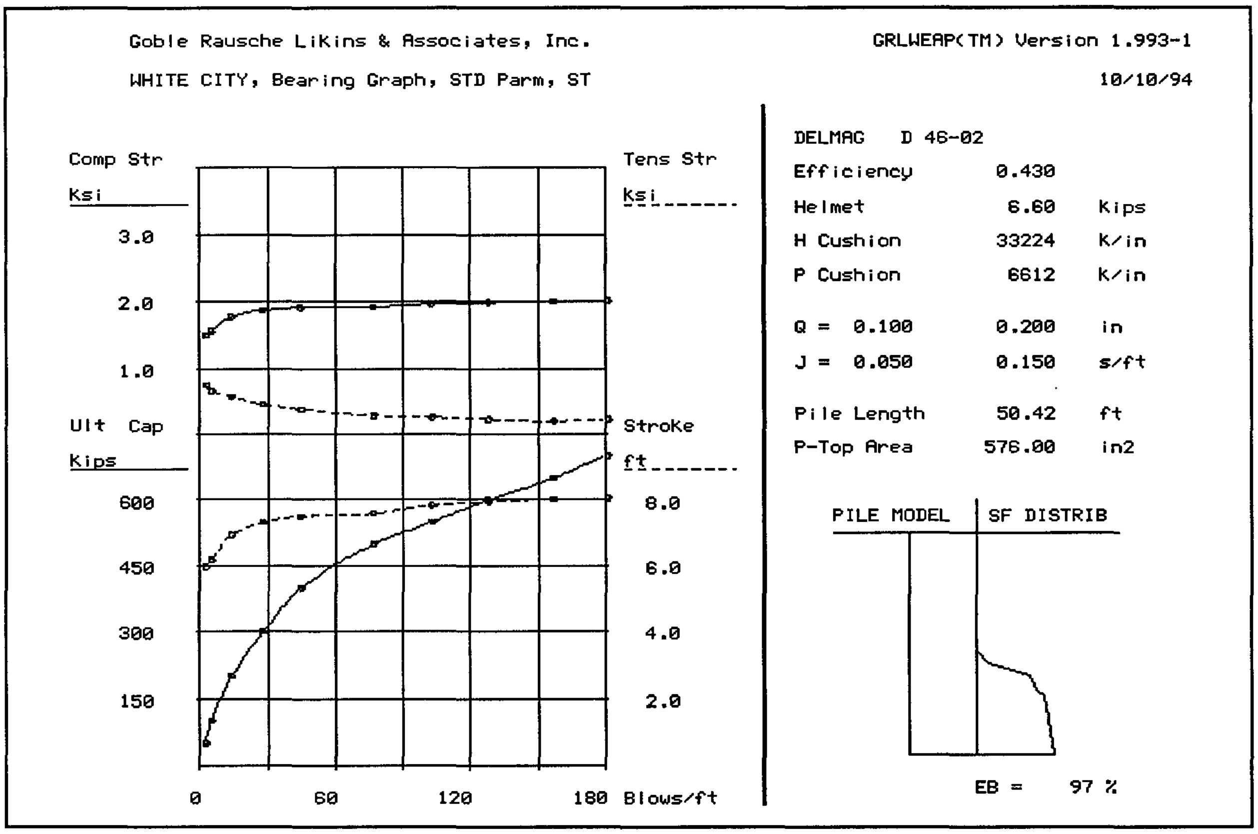

Figure A.23: Bearing Graph STD-ST, White City Bridge, FL

WHITE CITY, Bearing Graph, SPT Parm, ST 10/10/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	50.0	1.458	.770	2.0	5.79	36.89
2	100.0	1.509	.750	3.1	5.94	33.99
3	200.0	1.754	.829	8.8	6.71	25.59
4	300.0	1.840	.736	16.4	7.10	22.15
5	400.0	1.869	.587	25.8	7.29	19.89
6	500.0	1.897	.494	37.7	7.39	18.34
7	550.0	1.945	.467	45.2	7.64	18.05
8	600.0	1.970	.502	56.7	7.76	17.33
9	650.0	1.985	.654	71.0	7.82	16.50
10	700.0	2.001	.793	83.8	7.85	15.76

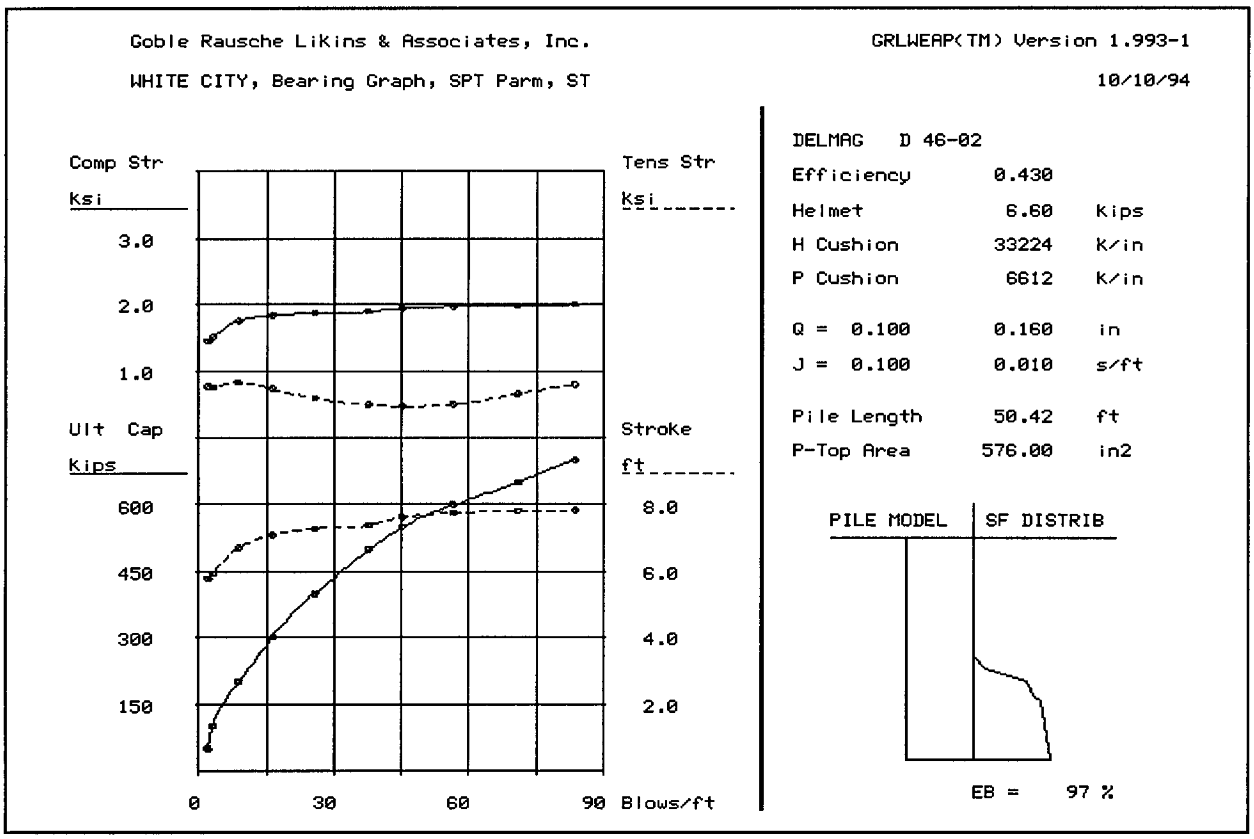

Figure A.24: Bearing Graph SPT-ST, White City Bridge, FL

WHITE CITY, Bearing Graph, SPT Parm, DYN 10/10/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	50.0	1.473	.753	2.2	5.86	37.33
2	100.0	1.532	.689	4.1	6.07	32.78
3	200.0	1.706	.643	11.2	6.72	25.54
4	300.0	1.810	.611	23.3	7.04	20.95
5	400.0	1.907	.612	38.8	7.44	19.18
6	500.0	1.943	.560	63.9	7.64	18.18
7	550.0	1.963	.533	85.6	7.74	17.80
8	600.0	1.966	.492	126.2	7.79	17.18
9	650.0	1.973	.453	167.7	7.81	16.62
10	700.0	2.002	.436	223.4	7.99	16.32

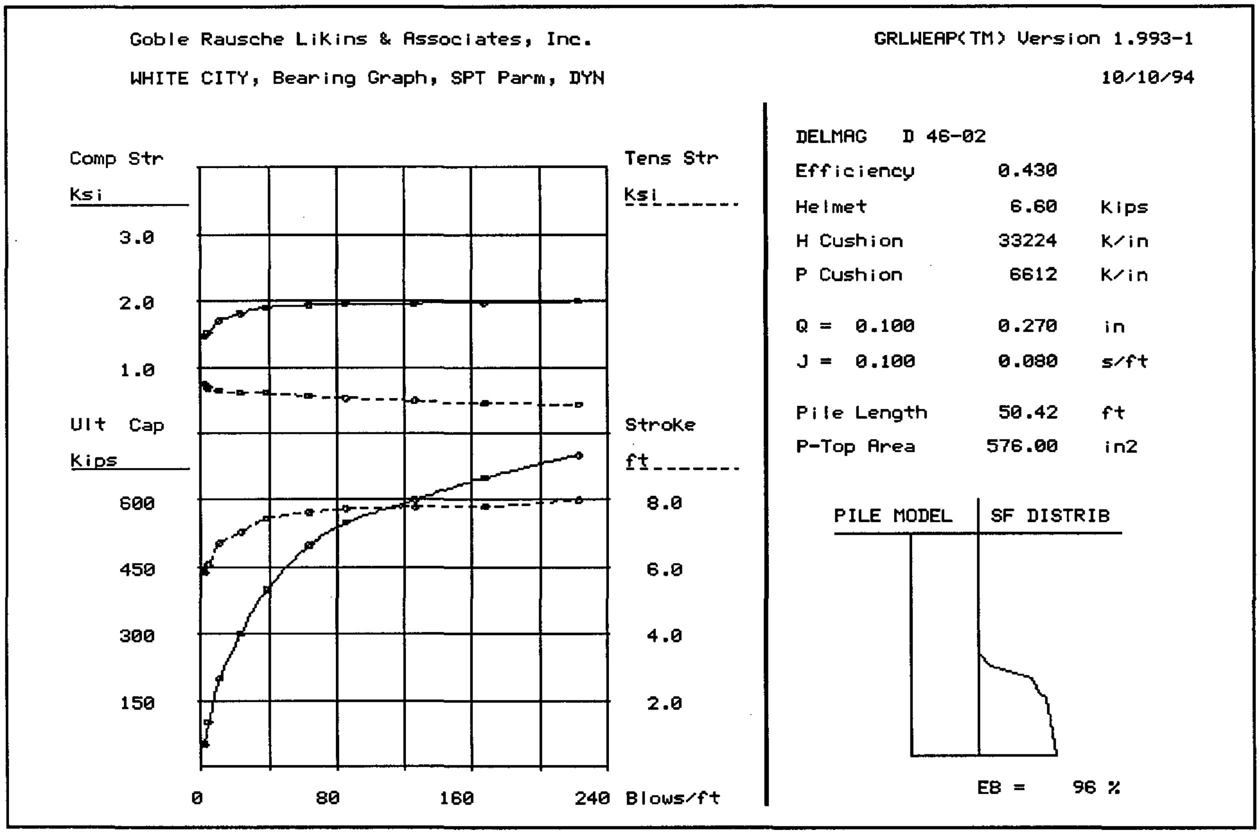

Figure A.25: Bearing Graph SPT-DYN, White City Bridge, FL

APALACHICOLA, STD, STATIC, BEARING GRAPH 10/10/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	100.0	2.001	1.179	7.4	3.00	22.84
2	200.0	2.007	.892	15.2	3.00	22.41
3	300.0	2.014	.653	23.5	3.00	22.03
4	400.0	2.020	.453	33.0	3.00	21.89
5	500.0	2.026	.299	41.0	3.00	21.52
6	600.0	2.031	.429	51.6	3.00	21.03
7	700.0	2.037	.419	67.0	3.00	20.34
8	800.0	2.042	.367	89.9	3.00	19.76
9	900.0	2.048	.374	123.6	3.00	19.43
10	1000.0	2.054	.362	178.6	3.00	19.13

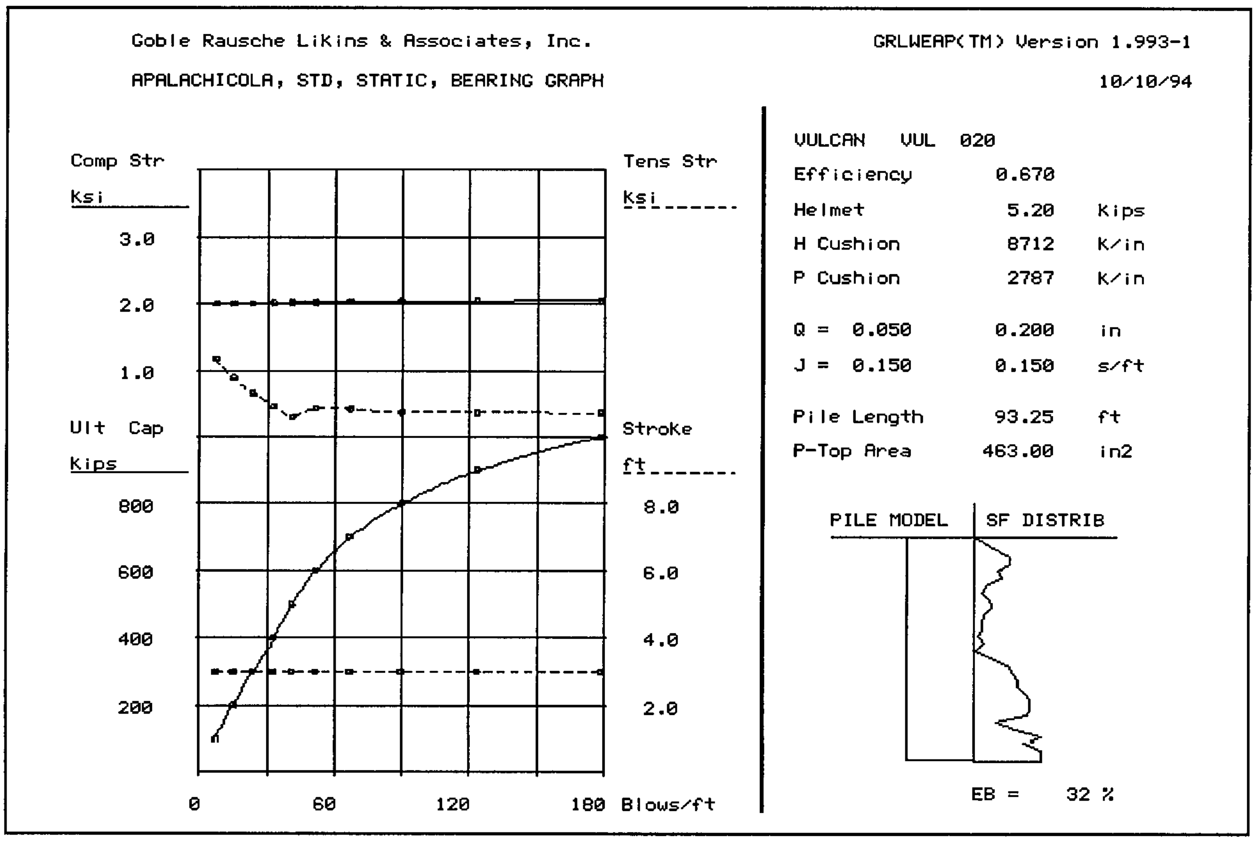

Figure A.26: Bearing Graph STD-ST, Apalachicola, FL

APALACHICOLA, SPT, STATIC, BEARING GRAPH 10/10/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	100.0	1.999	1.236	7.1	3.00	22.99
2	200.0	2.005	.977	13.8	3.00	22.51
3	300.0	2.010	.738	21.2	3.00	22.16
4	400.0	2.014	.513	29.7	3.00	21.91
5	500.0	2.018	.378	36.7	3.00	21.88
6	600.0	2.023	.418	45.5	3.00	21.42
7	700.0	2.028	.446	58.1	3.00	20.76
8	800.0	2.032	.445	77.8	3.00	20.15
9	900.0	2.036	.451	113.1	3.00	19.87
10	1000.0	2.040	.460	186.3	3.00	19.58

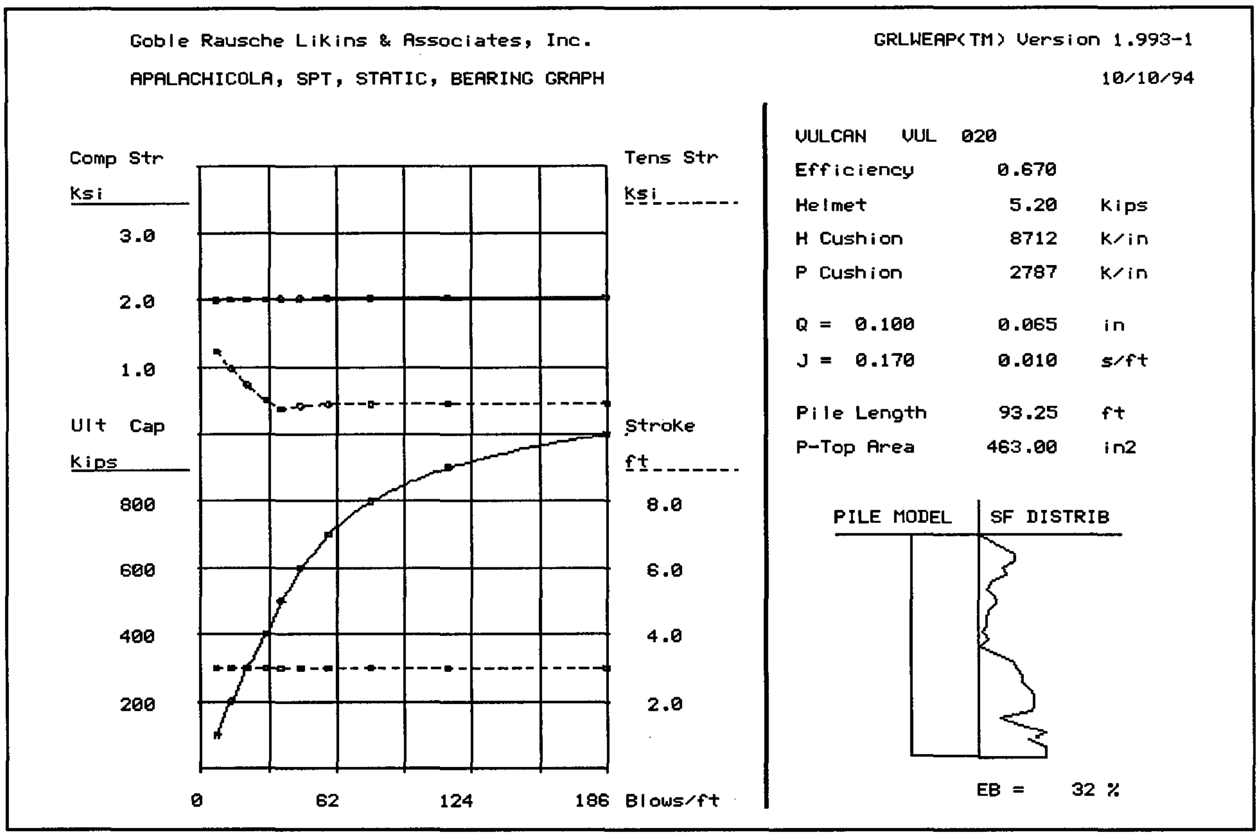

Figure A.27: Bearing Graph SPT-ST, Apalachicola, FL

APALACHICOLA, SPT, DYN, BEARING GRAPH 10/10/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	100.0	1.999	1.246	6.6	3.00	23.74
2	200.0	2.005	.995	13.4	3.00	22.54
3	300.0	2.010	.760	20.6	3.00	22.22
4	400.0	2.014	.535	29.1	3.00	22.00
5	500.0	2.018	.351	36.6	3.00	21.80
6	600.0	2.023	.444	45.3	3.00	21.46
7	700.0	2.028	.419	58.1	3.00	21.07
8	800.0	2.032	.396	78.5	3.00	20.42
9	900.0	2.036	.384	115.9	3.00	20.06
10	1000.0	2.040	.384	198.5	3.00	19.79

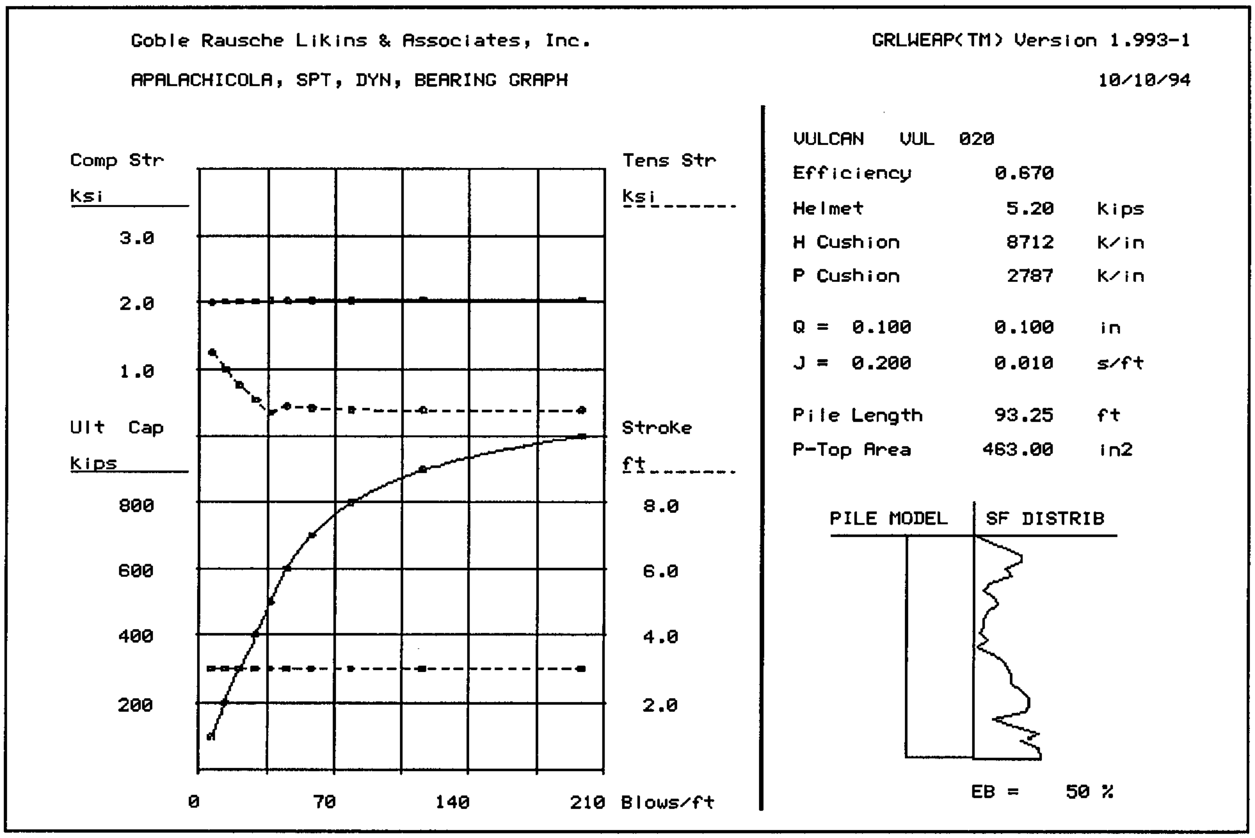

Figure A.28: Bearing Graph SPT-DYN, Apalachicola, FL

APALACHICOLA, MDF, STATIC, BEARING GRAPH 10/10/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	100.0	2.001	1.249	6.9	3.00	22.81
2	200.0	2.007	1.008	13.6	3.00	22.37
3	300.0	2.013	.786	21.0	3.00	21.98
4	400.0	2.020	.587	29.8	3.00	21.89
5	500.0	2.026	.408	37.5	3.00	21.32
6	600.0	2.032	.469	46.7	3.00	21.02
7	700.0	2.037	.534	59.9	3.00	20.42
8	800.0	2.043	.521	80.4	3.00	19.78
9	900.0	2.048	.537	111.5	3.00	19.45
10	1000.0	2.054	.517	160.6	3.00	19.13

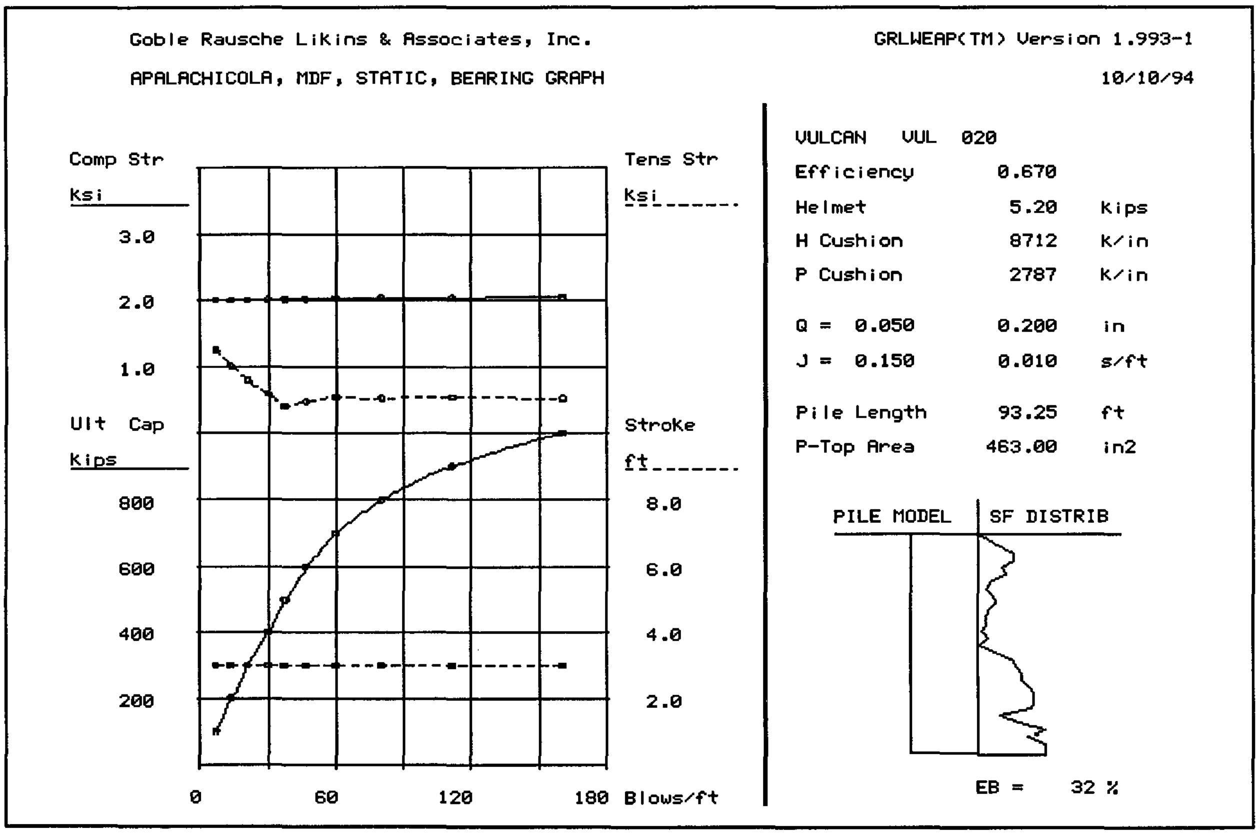

Figure A.29: Bearing Graph MDF-ST, Apalachicola, FL

APALACHICOLA, MODIFIED CAPACITY, STD, BG 10/10/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	100.0	2.009	1.212	7.4	3.00	22.88
2	200.0	2.013	.915	15.5	3.00	22.54
3	300.0	2.018	.675	24.3	3.00	22.19
4	400.0	2.022	.483	34.5	3.00	21.97
5	500.0	2.026	.432	43.7	3.00	21.92
6	600.0	2.031	.439	55.6	3.00	21.49
7	700.0	2.036	.418	73.4	3.00	20.87
8	800.0	2.040	.439	102.6	3.00	20.29
9	900.0	2.044	.442	152.8	3.00	20.02
10	1000.0	2.048	.446	247.4	3.00	19.75

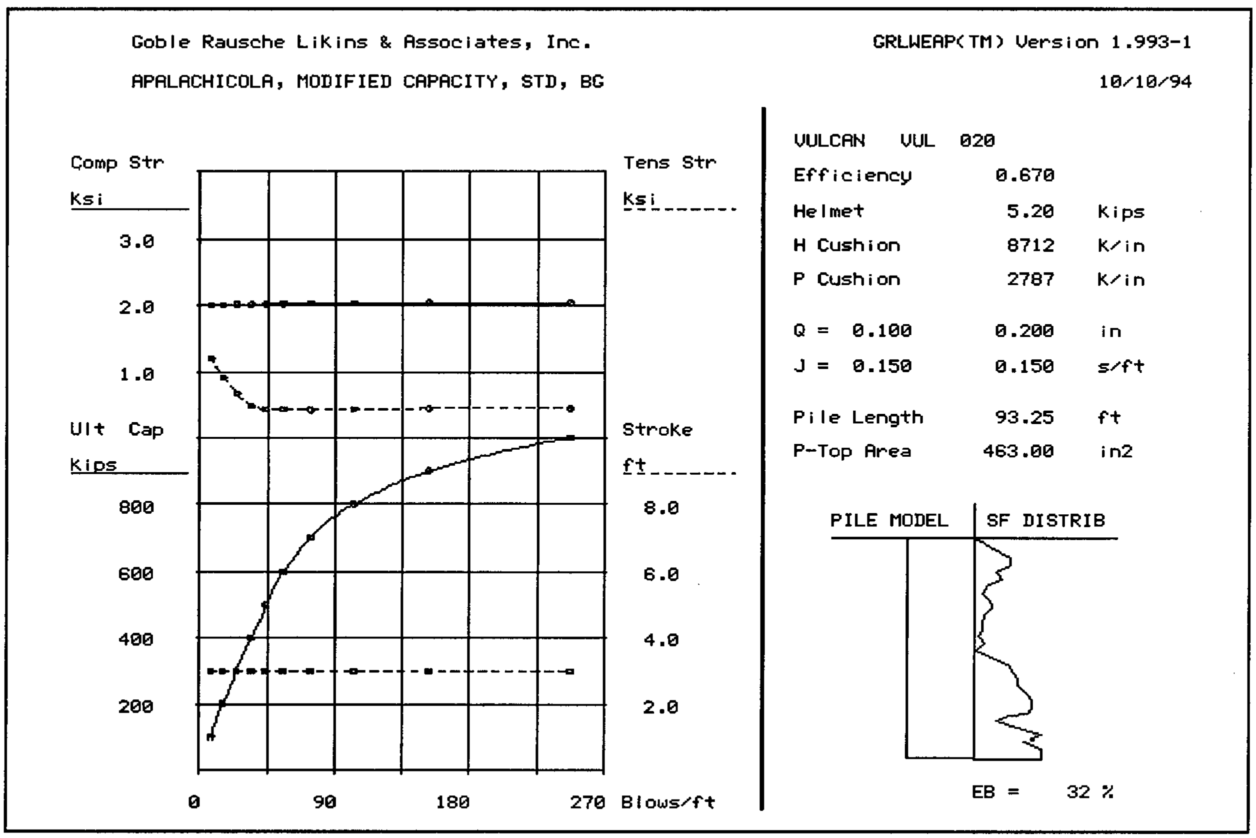

Figure A.30: Bearing Graph MDF-Cap-STD, Apalachicola, FL

APALACHICOLA, MODIFIED CAPACITY, SPT, BG 10/10/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	100.0	2.009	1.286	6.9	3.00	22.88
2	200.0	2.013	1.037	13.3	3.00	22.49
3	300.0	2.018	.801	20.4	3.00	22.16
4	400.0	2.022	.580	28.6	3.00	21.91
5	500.0	2.026	.413	35.8	3.00	21.86
6	600.0	2.031	.449	44.1	3.00	21.45
7	700.0	2.036	.482	55.8	3.00	20.97
8	800.0	2.040	.490	74.0	3.00	20.25
9	900.0	2.044	.489	105.8	3.00	19.98
10	1000.0	2.048	.497	169.5	3.00	19.71

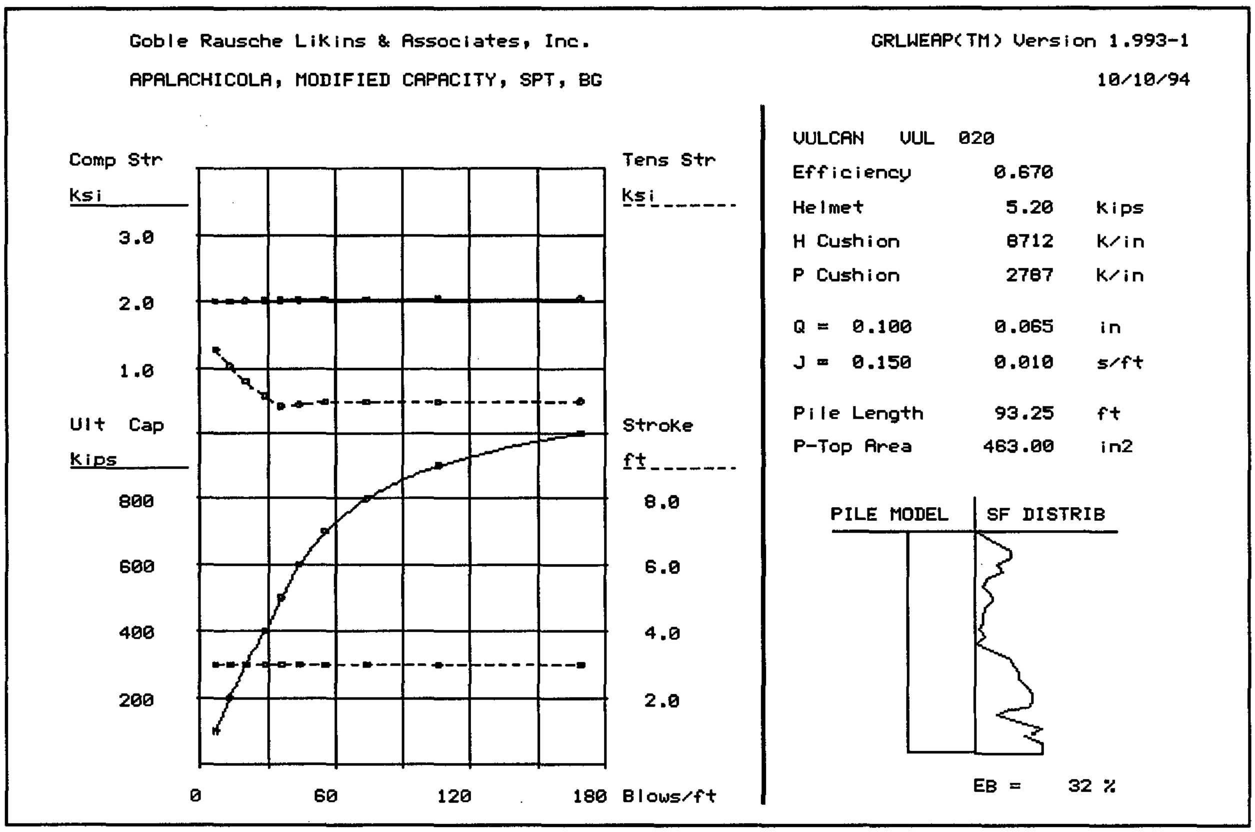

Figure A.31: Bearing Graph MDF-Cap-SPT, Apalachicola, FL

Aucilla, Bearing Graph, STD, Static 10/10/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	100.0	1.642	.589	13.0	3.00	12.49
2	300.0	1.695	.298	45.8	3.00	11.45
3	400.0	1.719	.226	70.5	3.00	10.73
4	500.0	1.741	.167	123.5	3.00	9.81
5	600.0	1.763	.090	290.0	3.00	9.01
6	700.0	1.784	.100	1214.6	3.00	8.33
7	800.0	1.804	.155	9999.0	3.00	7.77

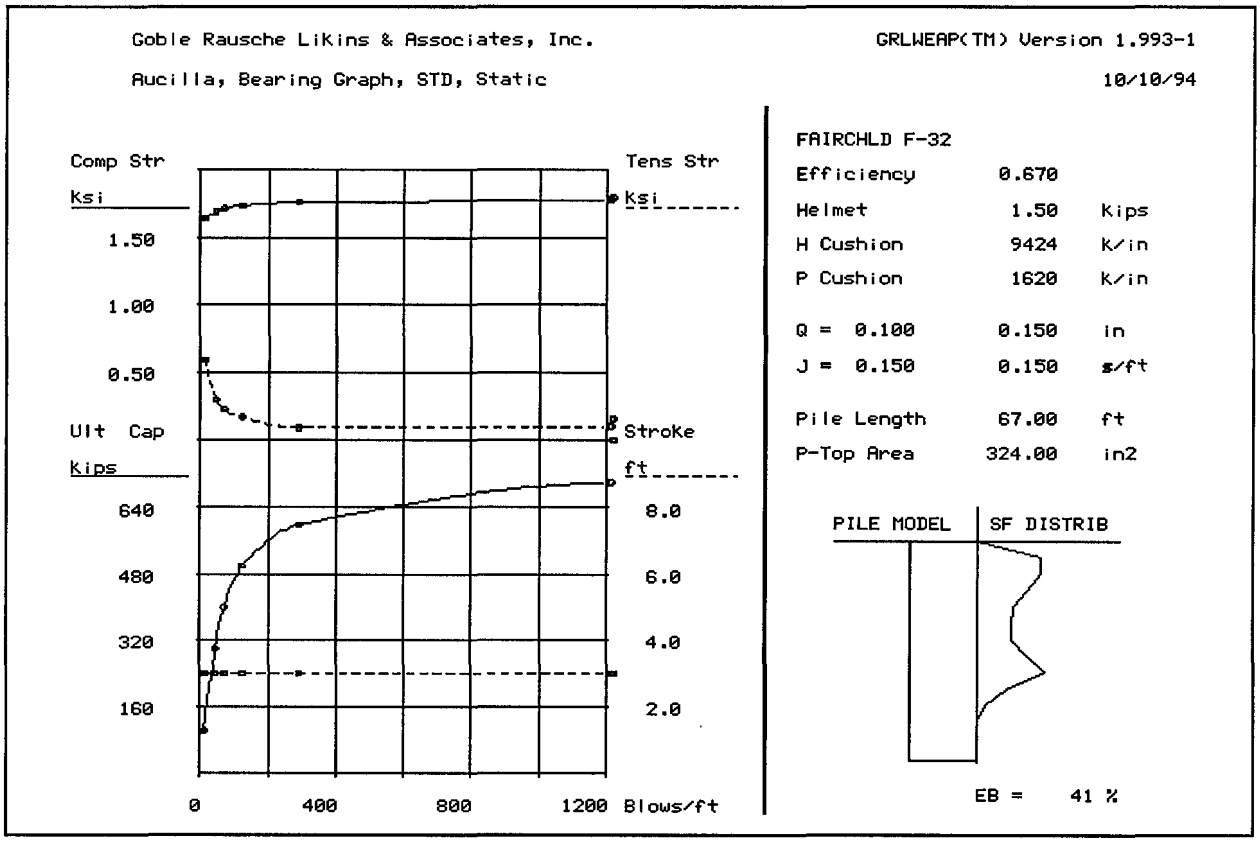

Figure A.32: Bearing Graph STD-ST Analysis for Aucilla, FL

Aucilla, Bearing Graph, STD, Dynamic 10/10/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	100.0	1.644	.607	12.9	3.00	12.46
2	300.0	1.701	.304	45.6	3.00	11.36
3	400.0	1.726	.255	70.1	3.00	10.58
4	500.0	1.750	.205	122.7	3.00	9.61
5	600.0	1.772	.125	286.1	3.00	8.76
6	700.0	1.794	.133	1182.9	3.00	8.09
7	800.0	1.815	.175	9999.0	3.00	7.52

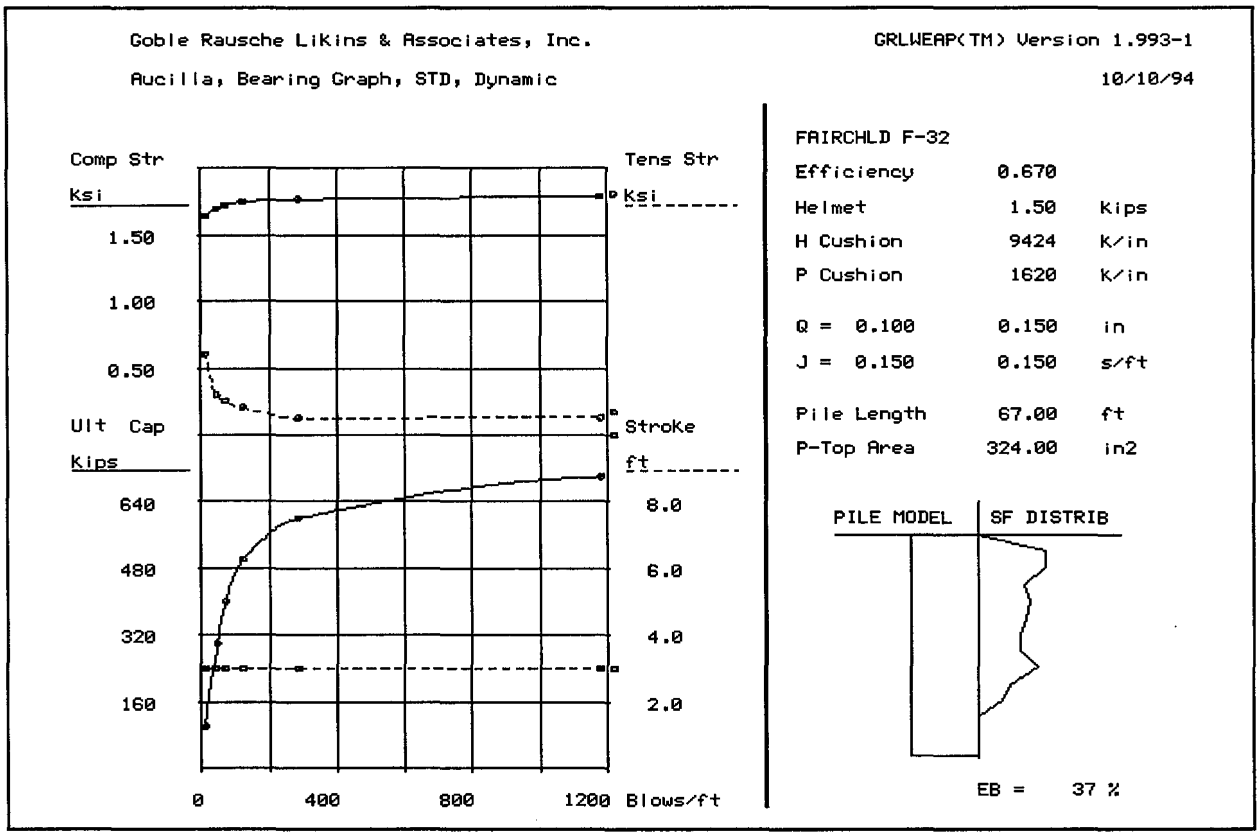

Figure A.33: Bearing Graph STD-DYN Analysis for Aucilla, FL

Aucilla, Bearing Graph, SPT, Static 10/10/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	100.0	1.639	.687	10.8	3.00	12.55
2	300.0	1.685	.360	36.0	3.00	11.60
3	400.0	1.707	.306	51.1	3.00	11.05
4	500.0	1.727	.196	80.1	3.00	10.17
5	600.0	1.747	.161	158.5	3.00	9.45
6	700.0	1.765	.256	583.5	3.00	8.84
7	800.0	1.784	.301	9999.0	3.00	8.33

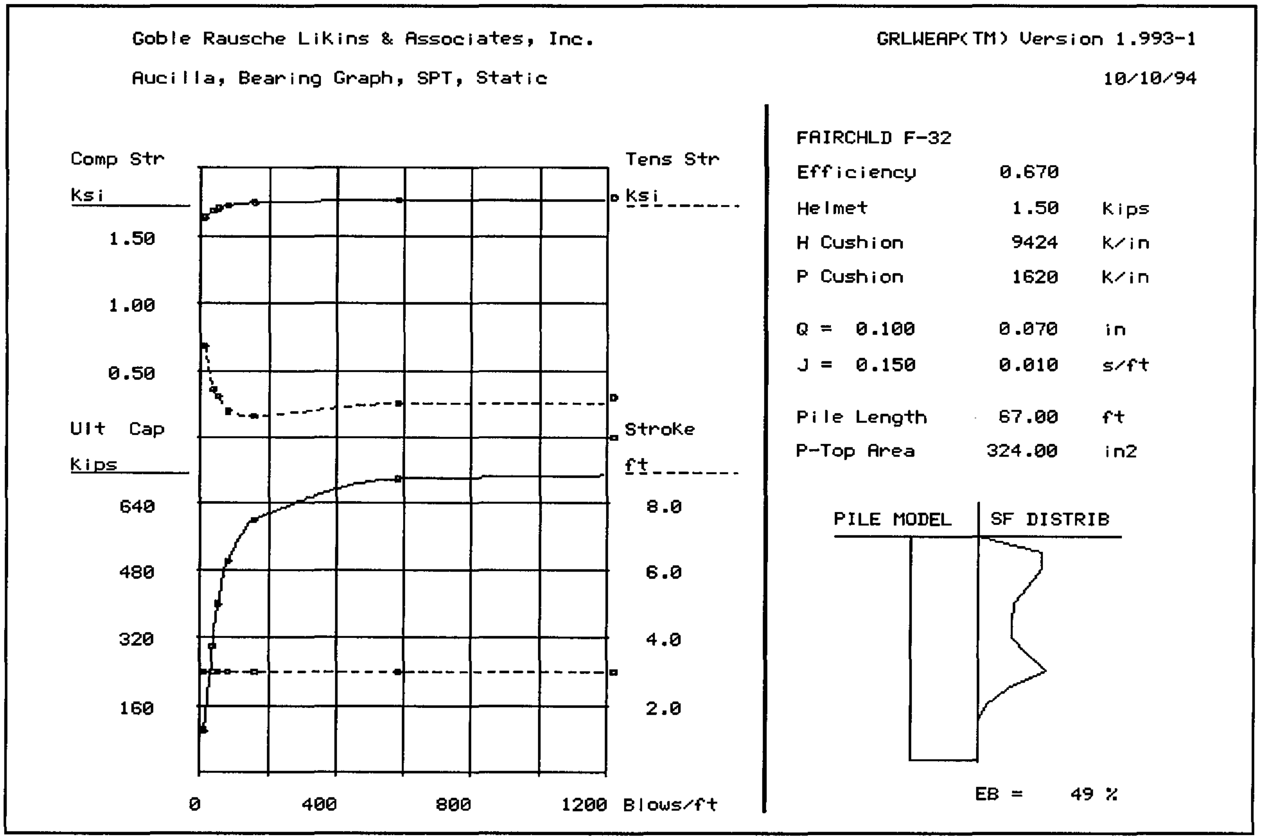

Figure A.34: Bearing Graph SPT-ST Analysis for Aucilla, FL

Aucilla, Bearing Graph, SPT, Dynamic 10/10/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	100.0	1.645	.639	12.3	3.00	12.45
2	300.0	1.702	.329	40.8	3.00	11.27
3	400.0	1.728	.262	60.7	3.00	10.27
4	500.0	1.752	.245	101.9	3.00	9.31
5	600.0	1.774	.283	230.7	3.00	8.66
6	700.0	1.796	.292	1929.1	3.00	8.05
7	800.0	1.817	.278	9999.0	3.00	7.47

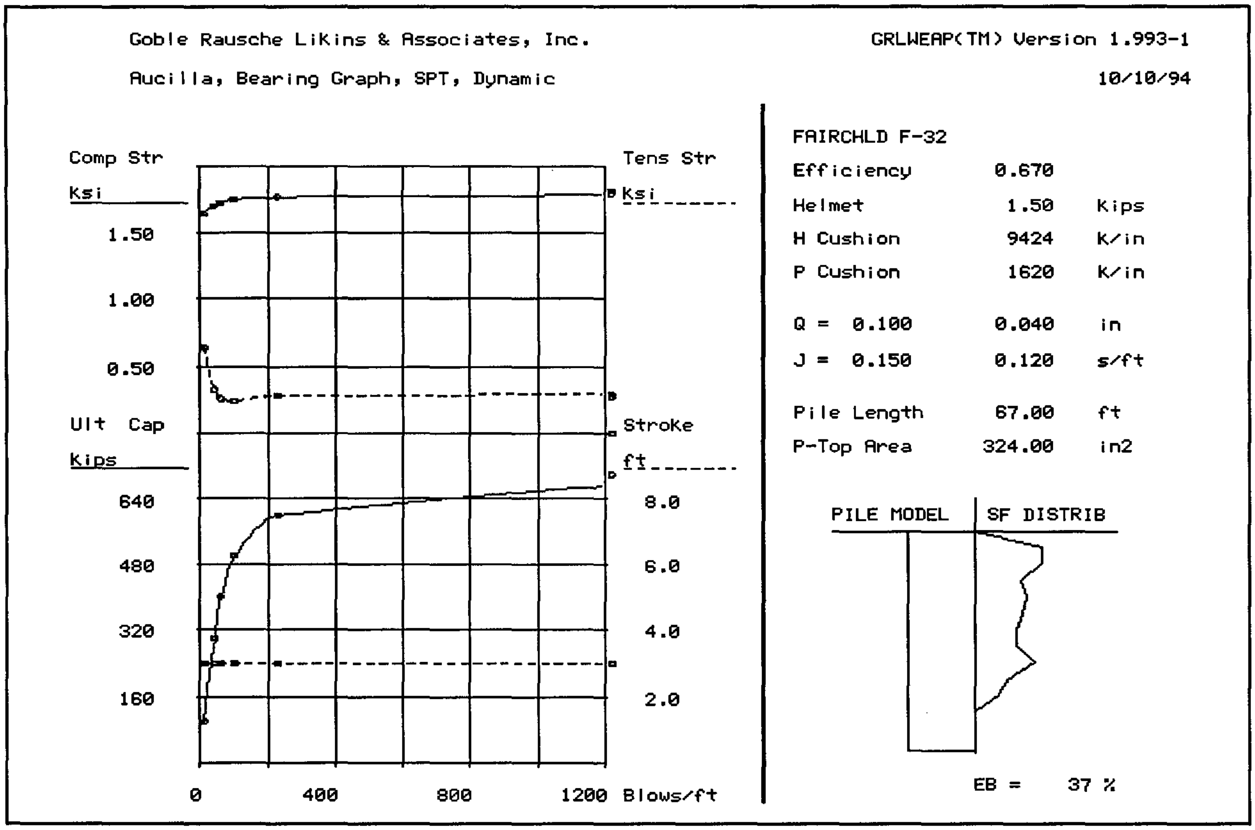

Figure A.35: Bearing Graph SPT-DYN Analysis for Aucilla, FL

Aucilla, Bearing Graph, MDF, Static 10/10/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	100.0	1.639	.681	11.0	3.00	12.55
2	300.0	1.684	.334	38.9	3.00	11.62
3	400.0	1.706	.287	57.1	3.00	11.05
4	500.0	1.726	.189	93.0	3.00	10.39
5	600.0	1.746	.067	194.3	3.00	9.66
6	700.0	1.764	.058	564.9	3.00	8.96
7	800.0	1.782	.109	9999.0	3.00	8.37

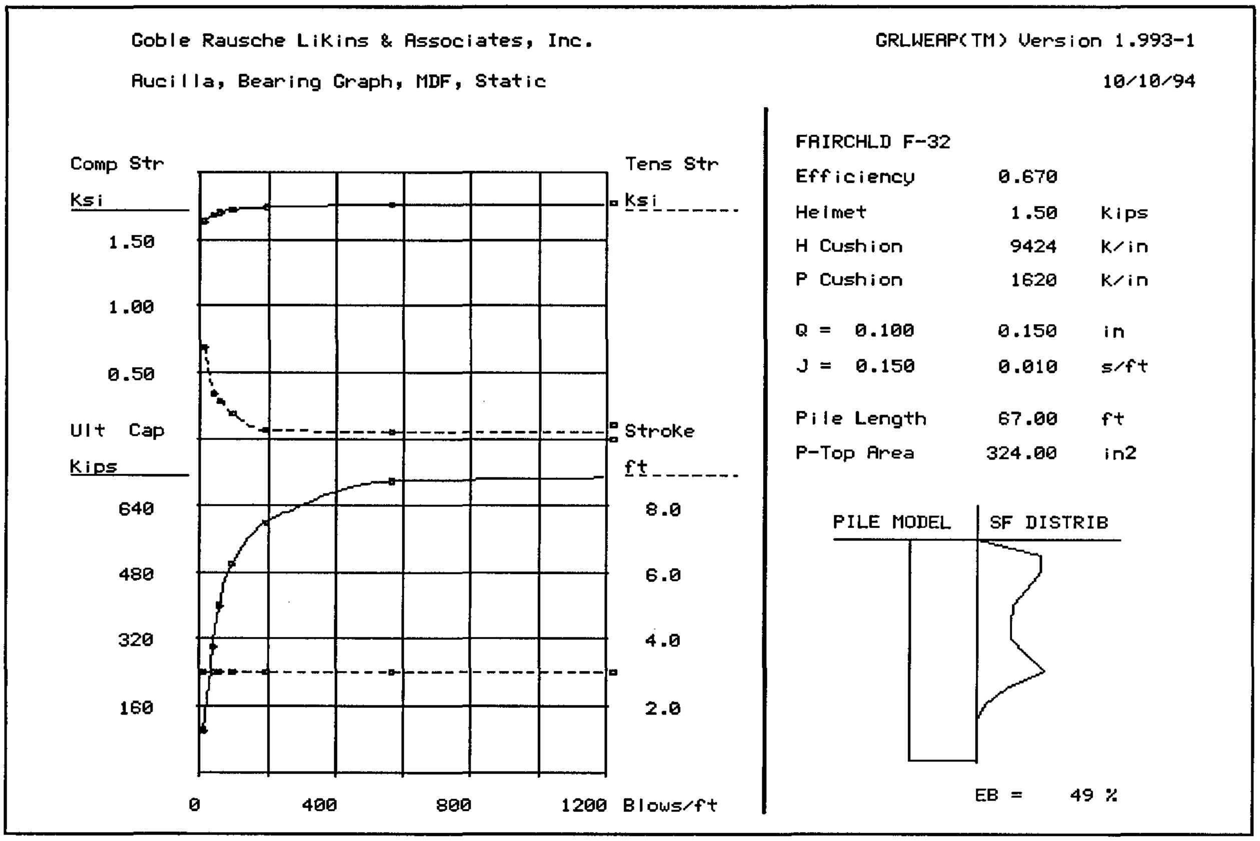

Figure A.36: Bearing Graph MDF-ST Analysis for Aucilla, FL

Aucilla, Bearing Graph, MDF, Dynamic 10/10/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	100.0	1.644	.706	11.4	3.00	12.45
2	300.0	1.701	.346	40.4	3.00	11.29
3	400.0	1.726	.303	59.5	3.00	10.61
4	500.0	1.750	.211	98.9	3.00	9.68
5	600.0	1.772	.139	211.5	3.00	8.82
6	700.0	1.794	.168	635.8	3.00	8.09
7	800.0	1.815	.191	9999.0	3.00	7.52

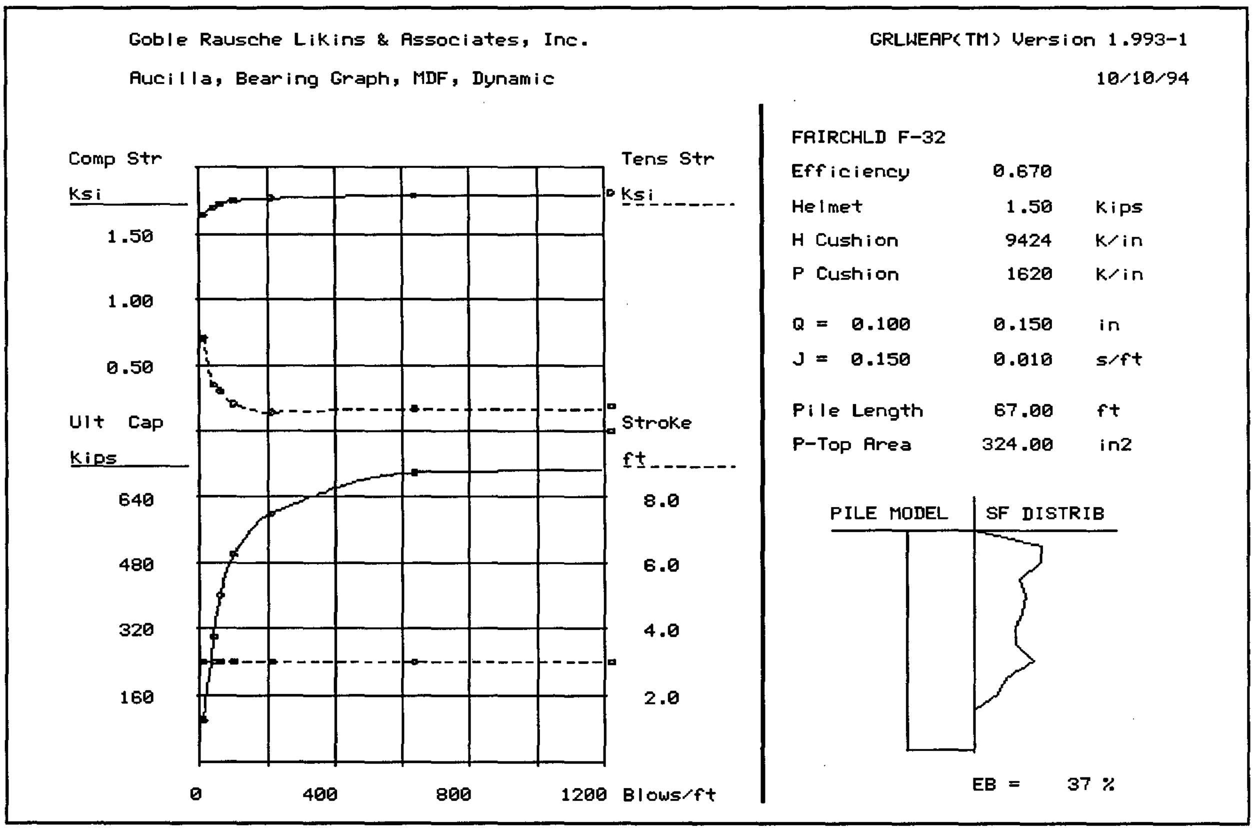

Figure A.37: Bearing Graph MDF-DYN Analysis for Aucilla, FL

Aucilla, Bearing Graph, STD Method 10/10/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	100.0	1.621	.387	13.2	3.00	12.94
2	300.0	1.636	.205	45.0	3.00	12.75
3	400.0	1.642	.204	69.5	3.00	12.57
4	500.0	1.800	.300	113.5	3.00	12.37
5	600.0	1.923	.278	223.4	3.00	12.15
6	700.0	1.959	.252	688.8	3.00	11.93
7	800.0	1.965	.233	9999.0	3.00	11.70

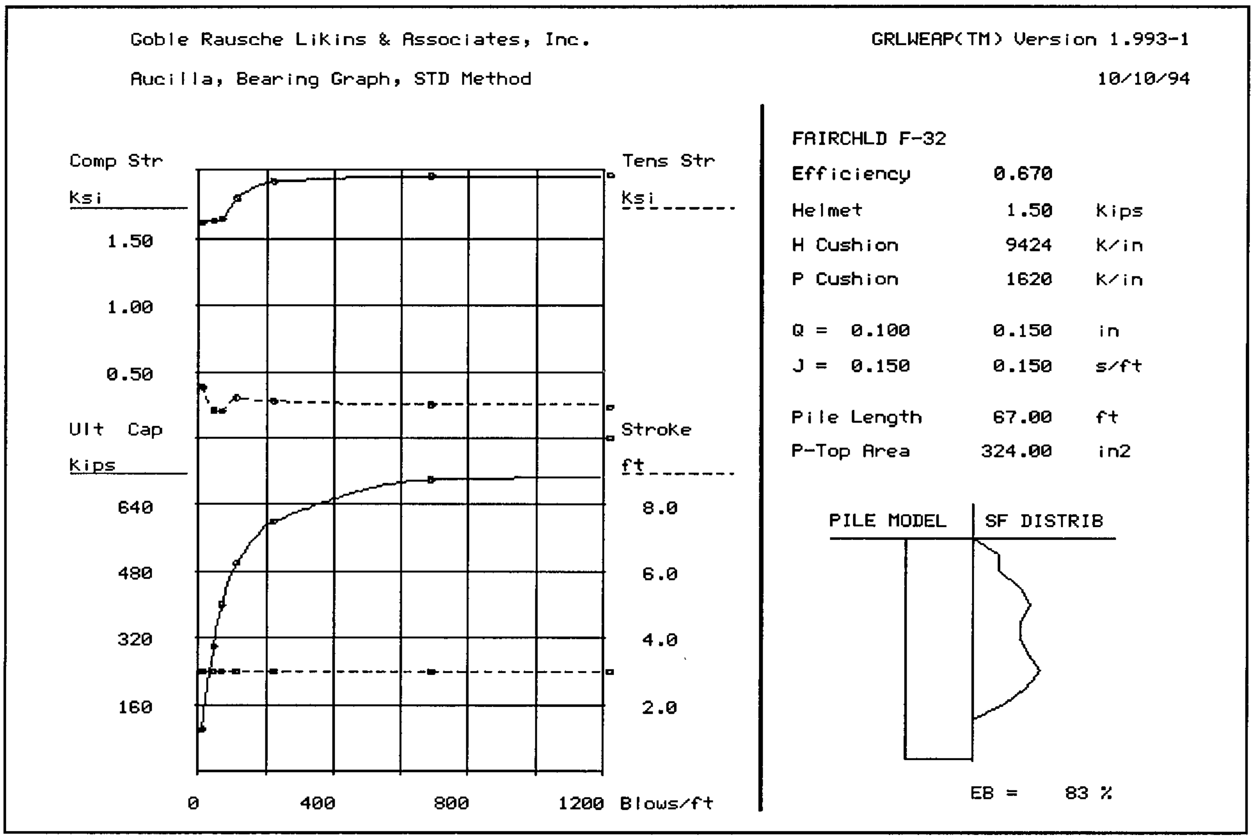

Figure A.38: Bearing Graph STD (FHWA) Analysis for Aucilla, FL

Vilano-East, Bearing Graph, STD, Static 10/10/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	100.0	1.707	.093	4.7	4.48	36.33
2	200.0	1.934	.000	11.8	5.20	28.79
3	300.0	2.113	.032	21.3	5.69	26.04
4	400.0	2.369	.000	28.9	5.93	25.24
5	500.0	2.617	.055	39.2	6.18	24.03
6	550.0	2.743	.096	45.7	6.31	23.43
7	600.0	2.847	.105	54.0	6.37	22.70
8	650.0	2.980	.084	61.9	6.62	22.63
9	700.0	3.089	.060	73.1	6.74	22.25
10	750.0	3.183	.047	87.3	6.80	21.92

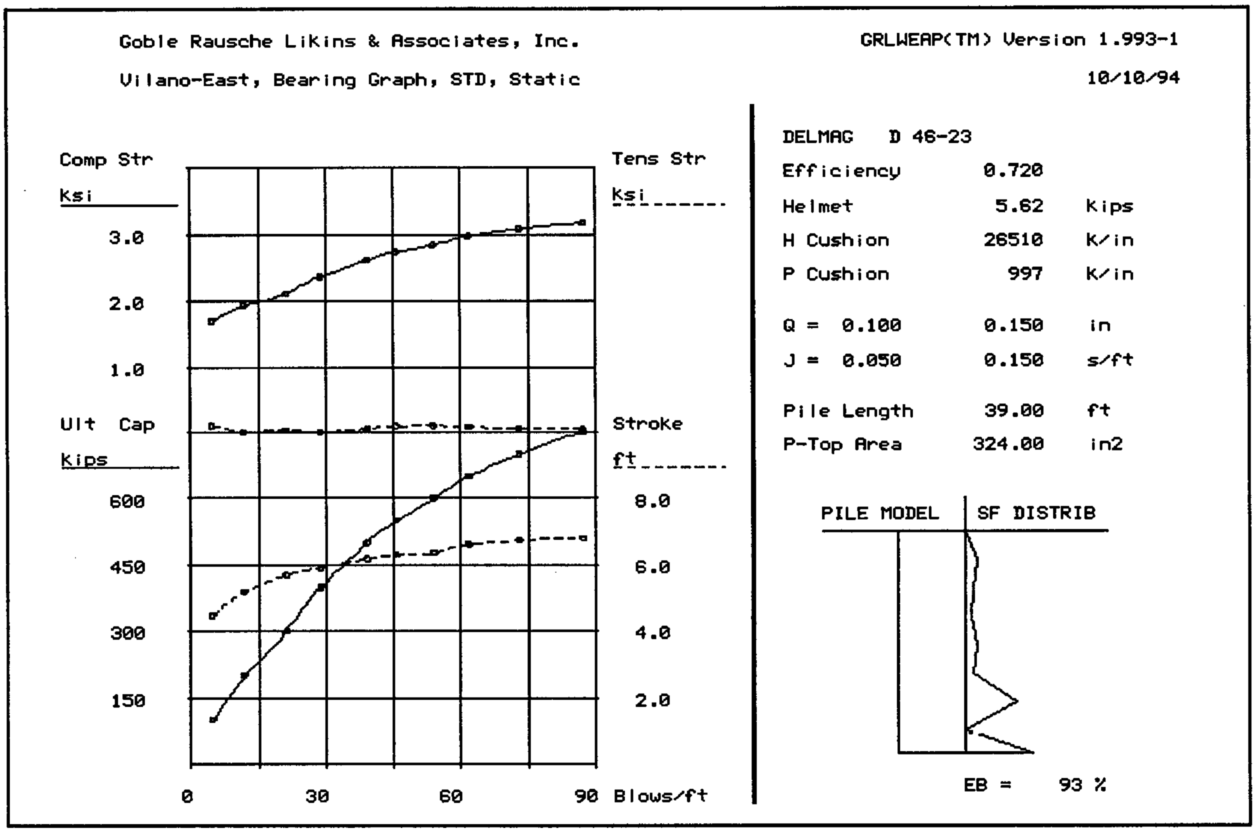

Figure A.39: Bearing Graph STD-ST Analysis for Vilano - East, FL

Vilano-East, Bearing Graph, STD, Dynamic 10/10/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	100.0	1.706	.097	4.6	4.48	36.39
2	200.0	1.933	.000	11.7	5.20	28.85
3	300.0	2.106	.049	21.1	5.68	26.02
4	400.0	2.361	.000	28.7	5.92	25.24
5	500.0	2.611	.069	38.8	6.17	24.02
6	550.0	2.736	.125	45.1	6.29	23.41
7	600.0	2.841	.158	53.4	6.35	22.68
8	650.0	2.975	.150	61.3	6.58	22.56
9	700.0	3.083	.134	72.5	6.70	22.16
10	750.0	3.178	.126	87.1	6.75	21.76

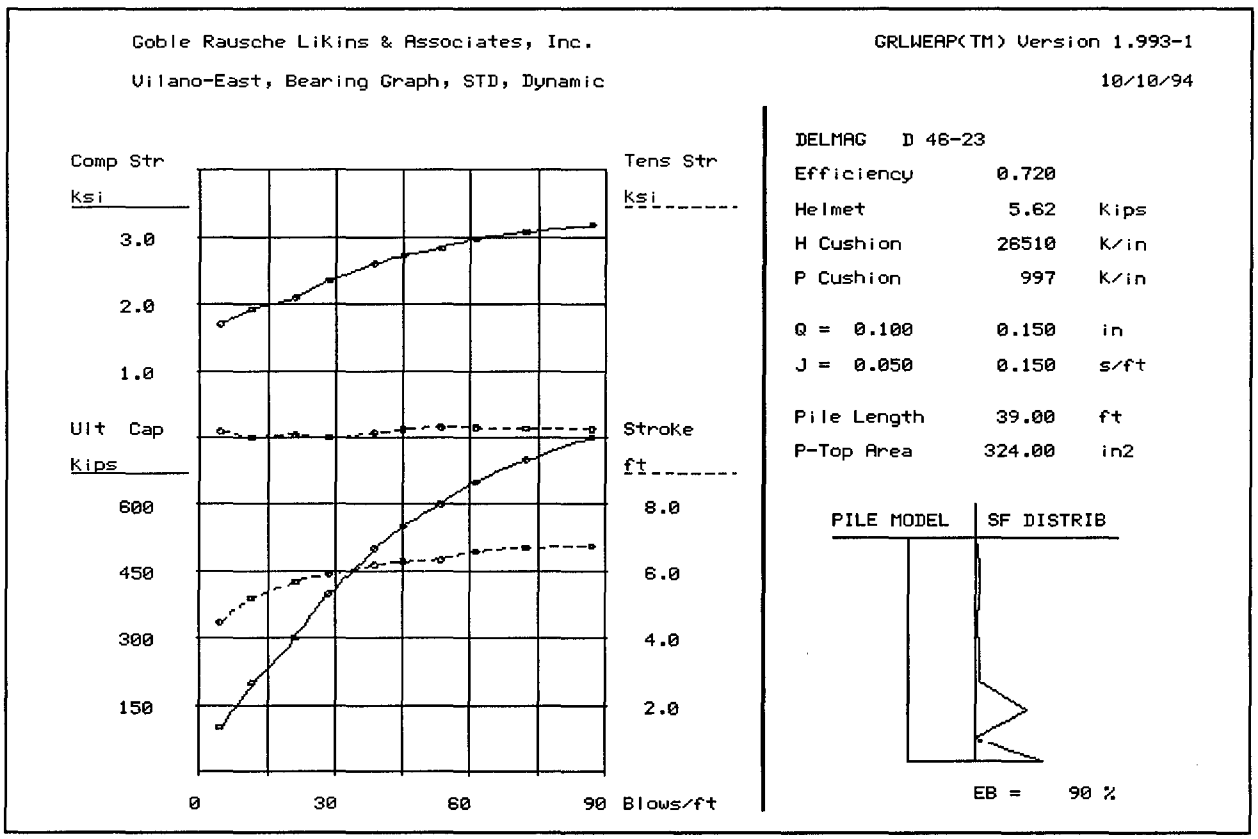

Figure A.40: Bearing Graph STD-DYN Analysis for Vilano - East, FL

Vilano-East, Bearing Graph, SPT, Static 10/10/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	100.0	1.710	.091	4.7	4.49	36.24
2	200.0	1.938	.000	11.9	5.21	28.70
3	300.0	2.118	.031	21.5	5.70	26.02
4	400.0	2.371	.000	29.3	5.94	25.13
5	500.0	2.618	.051	39.8	6.20	23.90
6	550.0	2.744	.093	46.4	6.32	23.33
7	600.0	2.847	.102	54.9	6.39	22.60
8	650.0	2.979	.083	63.2	6.62	22.50
9	700.0	3.084	.061	75.0	6.74	22.10
10	750.0	3.178	.050	89.8	6.80	21.79

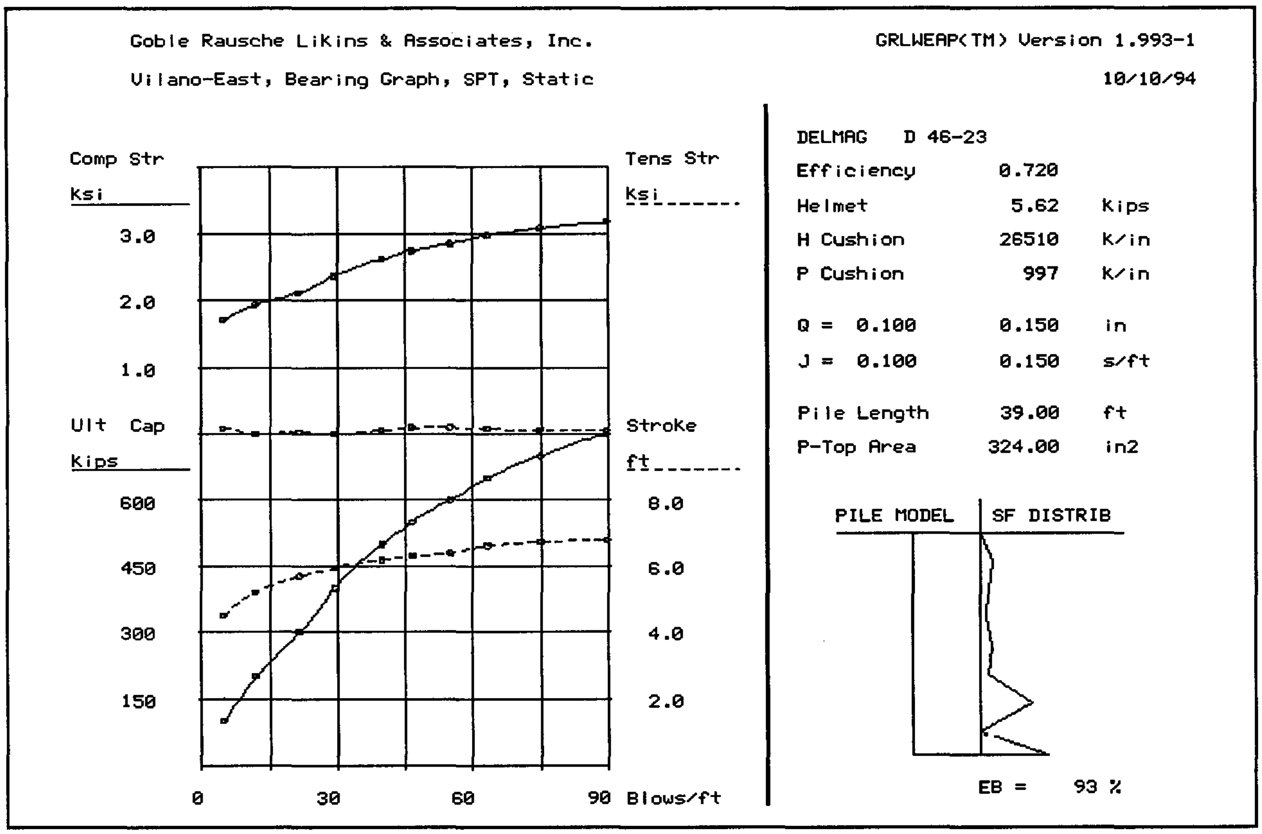

Figure A.41: Bearing Graph SPT-ST Analysis for Vilano - East, FL

Vilano-East, Bearing Graph, SPT, Dynamic 10/10/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	100.0	1.706	.097	4.6	4.48	36.39
2	200.0	1.933	.000	11.7	5.20	28.85
3	300.0	2.106	.049	21.1	5.68	26.02
4	400.0	2.361	.000	28.7	5.92	25.24
5	500.0	2.611	.069	38.8	6.17	24.02
6	550.0	2.736	.125	45.1	6.29	23.41
7	600.0	2.841	.158	53.4	6.35	22.68
8	650.0	2.975	.150	61.3	6.58	22.56
9	700.0	3.083	.134	72.5	6.70	22.16
10	750.0	3.178	.126	87.1	6.75	21.76

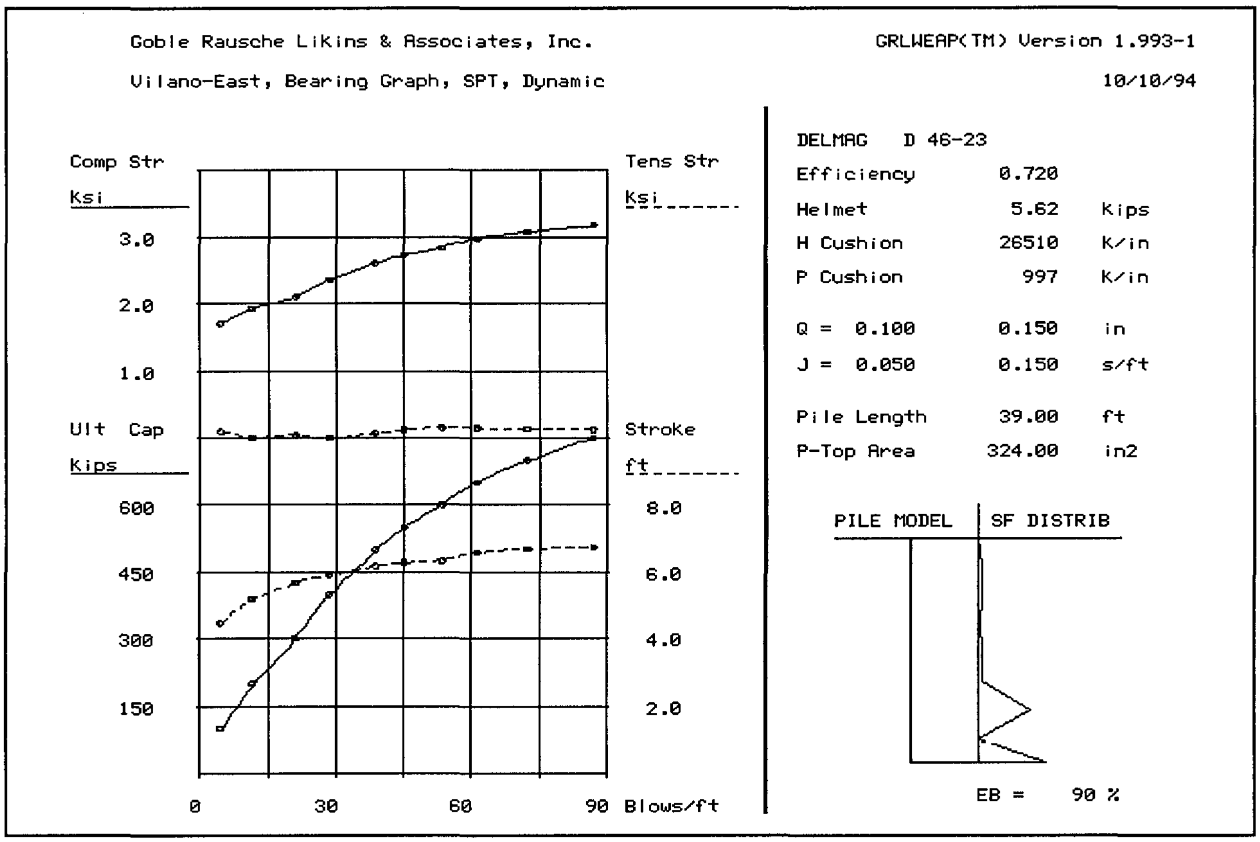

Figure A.42: Bearing Graph SPT-DYN Analysis for Vilano - East, FL

Vilano-East, Bearing Graph, MDF, Static 10/10/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	100.0	1.649	.297	2.5	4.35	43.13
2	200.0	1.790	.146	6.9	4.64	31.71
3	300.0	1.932	.050	12.4	5.21	27.62
4	400.0	2.006	.320	18.7	5.49	25.63
5	500.0	2.191	.161	24.3	5.64	25.44
6	550.0	2.288	.144	27.5	5.71	25.15
7	600.0	2.422	.195	30.6	5.93	25.29
8	650.0	2.529	.223	34.7	6.04	24.91
9	700.0	2.631	.289	40.0	6.09	24.23
10	750.0	2.760	.319	44.8	6.32	24.13

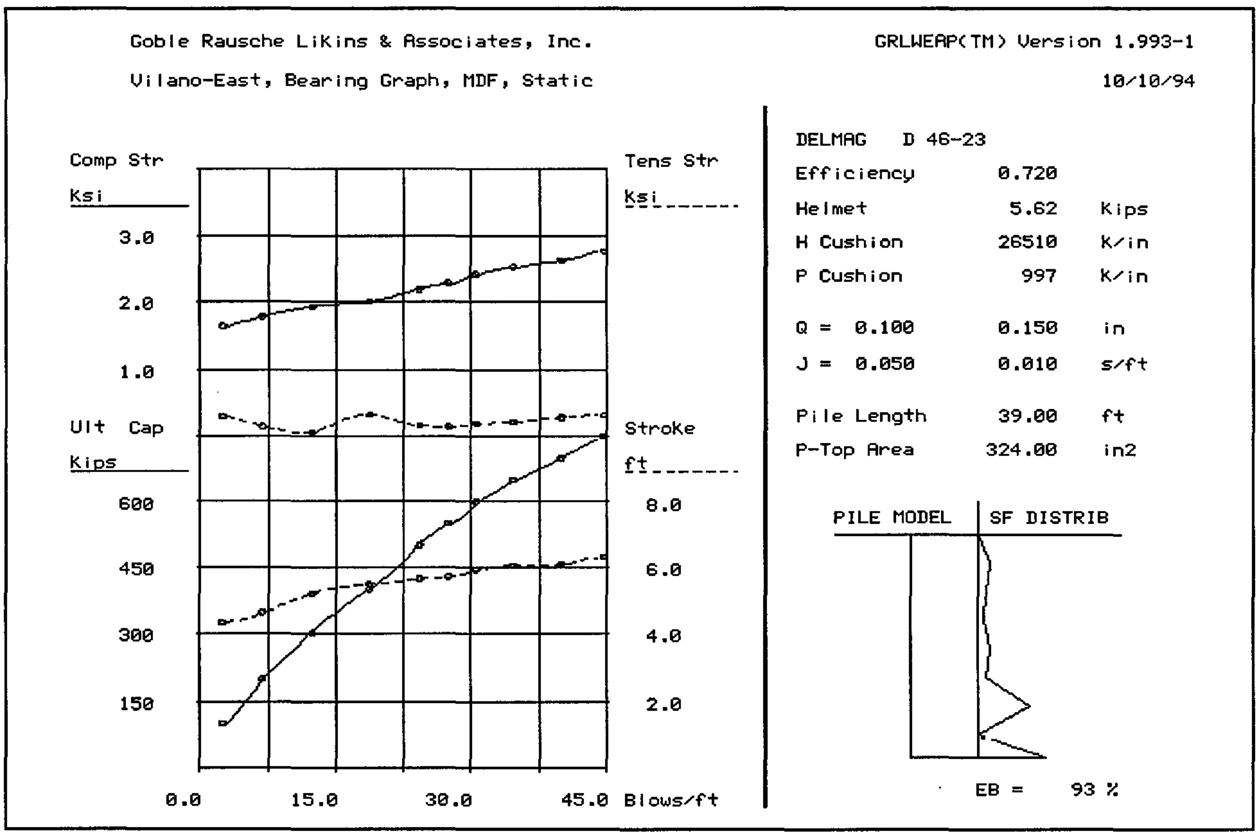

Figure A.43: Bearing Graph MDF-ST Analysis for Vilano - East, FL

Vilano-East, Bearing Graph, MDF, Dynamic 10/10/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	100.0	1.651	.294	2.5	4.35	43.01
2	200.0	1.793	.143	7.0	4.65	31.66
3	300.0	1.934	.073	12.5	5.21	27.56
4	400.0	2.007	.336	18.8	5.49	25.58
5	500.0	2.195	.158	24.5	5.64	25.39
6	550.0	2.292	.180	27.7	5.71	25.09
7	600.0	2.426	.234	30.8	5.93	25.21
8	650.0	2.533	.239	34.9	6.04	24.82
9	700.0	2.640	.316	40.2	6.09	24.15
10	750.0	2.769	.358	45.4	6.30	23.95

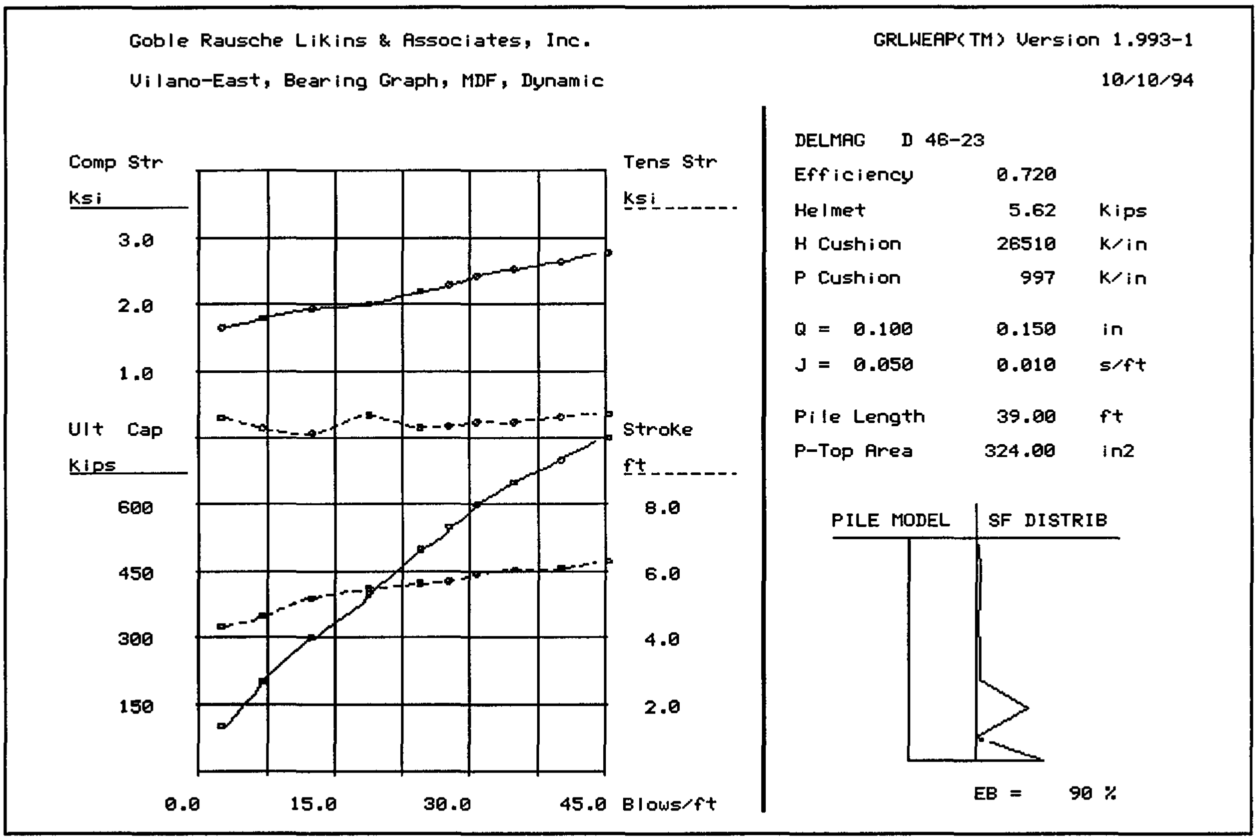

Figure A.44: Bearing Graph MDF-DYN Analysis for Vilano - East, FL

Vilano-East, Bearing Graph, STD Method 10/10/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	100.0	1.707	.091	4.7	4.48	36.34
2	200.0	1.935	.000	11.8	5.20	28.81
3	300.0	2.118	.034	21.3	5.69	26.06
4	400.0	2.373	.000	28.9	5.93	25.26
5	500.0	2.622	.061	39.1	6.18	24.06
6	550.0	2.746	.101	45.6	6.31	23.43
7	600.0	2.852	.106	53.9	6.37	22.74
8	650.0	2.984	.085	61.8	6.62	22.66
9	700.0	3.093	.061	73.0	6.74	22.27
10	750.0	3.183	.047	87.2	6.80	21.94

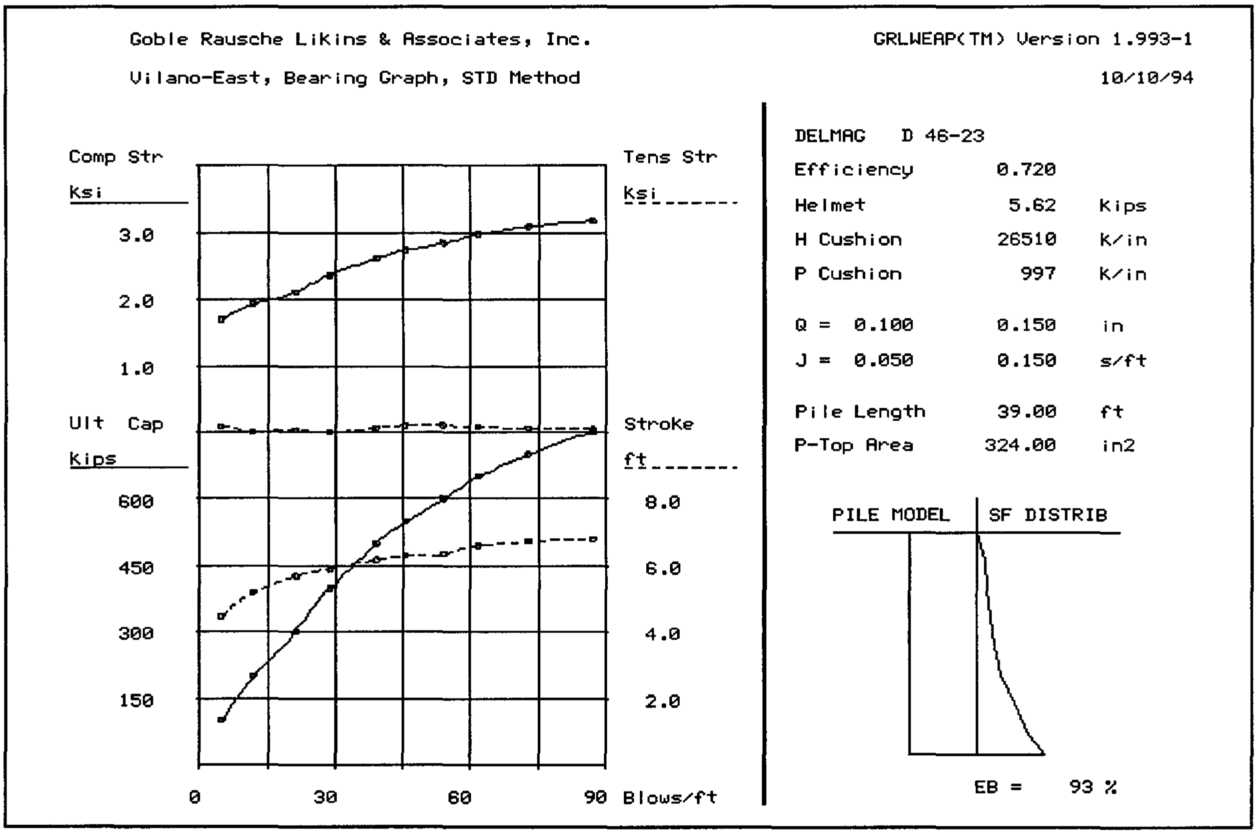

Figure A.45: Bearing Graph STD (FHWA) Analysis for Vilano - East, FL

Vilano-West, Bearing Graph, STD, Static 10/10/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	100.0	2.073	.544	4.6	5.44	38.80
2	200.0	2.233	.399	12.1	5.89	29.62
3	250.0	2.297	.329	17.7	6.12	27.36
4	300.0	2.337	.249	22.1	6.23	26.23
5	350.0	2.392	.178	25.2	6.45	26.06
6	400.0	2.427	.130	29.1	6.56	25.41
7	450.0	2.451	.076	33.9	6.61	24.92
8	500.0	2.468	.000	39.9	6.64	24.40
9	550.0	2.514	.000	46.1	6.84	24.45
10	600.0	2.543	.009	54.6	6.94	24.18

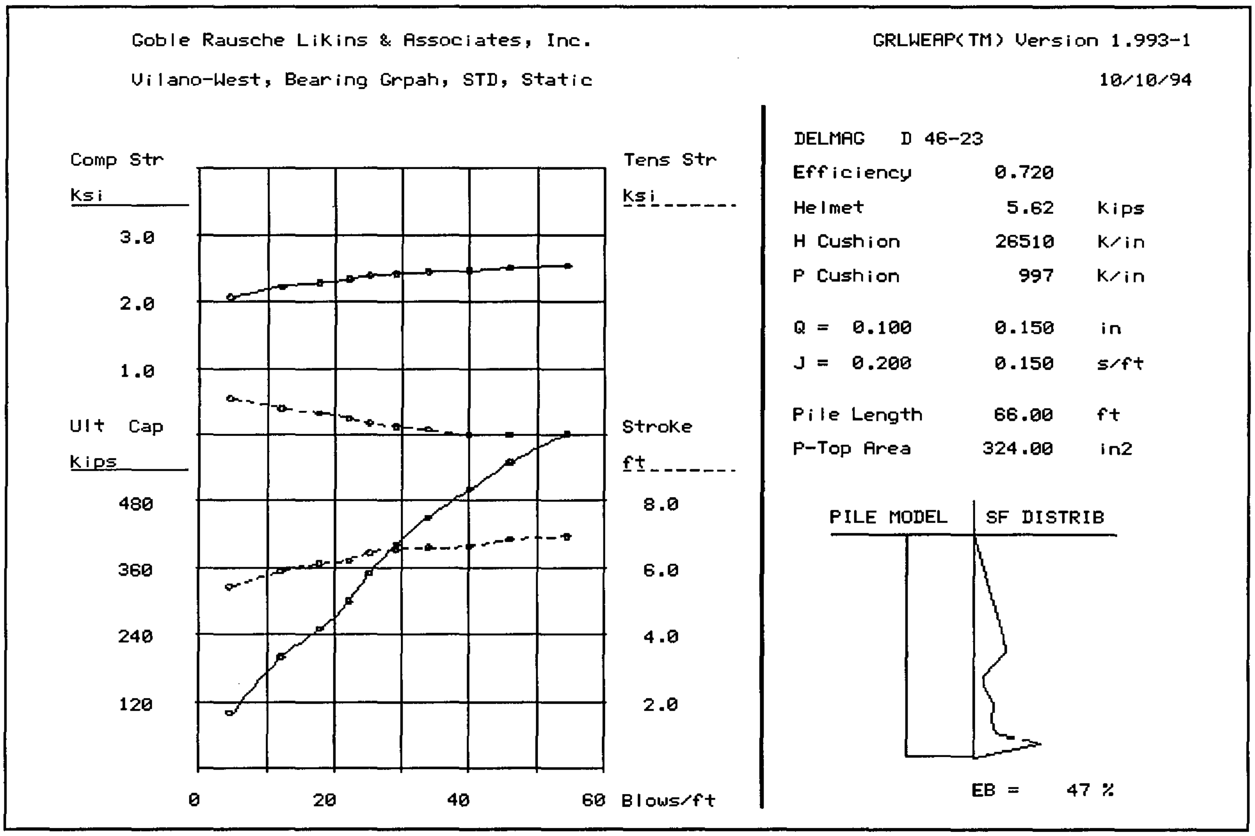

Figure A.46: Bearing Graph STD-ST Analysis for Vilano - West, FL

Vilano-West, Bearing Graph, STD, Dynamic 10/10/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	100.0	2.072	.553	4.6	5.44	38.81
2	200.0	2.236	.417	12.0	5.89	29.58
3	250.0	2.301	.351	17.7	6.12	27.31
4	300.0	2.342	.274	22.1	6.23	26.12
5	350.0	2.396	.206	25.3	6.45	25.90
6	400.0	2.431	.139	29.2	6.55	25.22
7	450.0	2.455	.082	34.0	6.61	24.70
8	500.0	2.475	.000	40.0	6.63	24.21
9	550.0	2.522	.000	46.3	6.84	24.23
10	600.0	2.553	.010	54.8	6.94	23.96

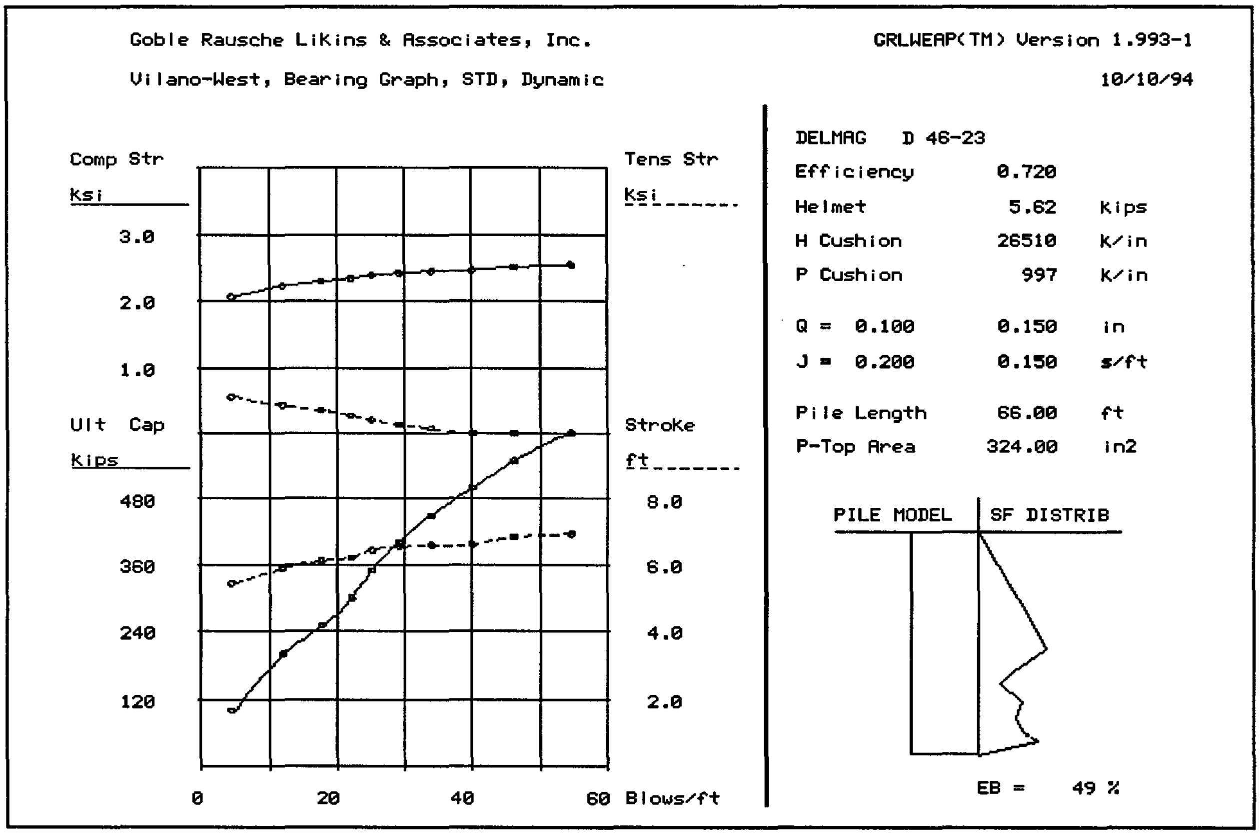

Figure A.47: Bearing Graph STD-DYN Analysis for Vilano - West, FL

Vilano-West, Bearing Graph, SPT, Static 10/10/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	100.0	2.034	.569	3.6	5.32	41.27
2	200.0	2.179	.448	9.4	5.70	31.51
3	250.0	2.256	.395	12.8	6.05	29.74
4	300.0	2.302	.330	17.9	6.22	27.69
5	350.0	2.335	.285	20.9	6.31	27.14
6	400.0	2.354	.264	23.7	6.35	26.65
7	450.0	2.370	.204	26.9	6.38	26.06
8	500.0	2.410	.170	30.0	6.57	26.03
9	550.0	2.436	.083	33.9	6.67	25.90
10	600.0	2.453	.032	38.8	6.72	25.58

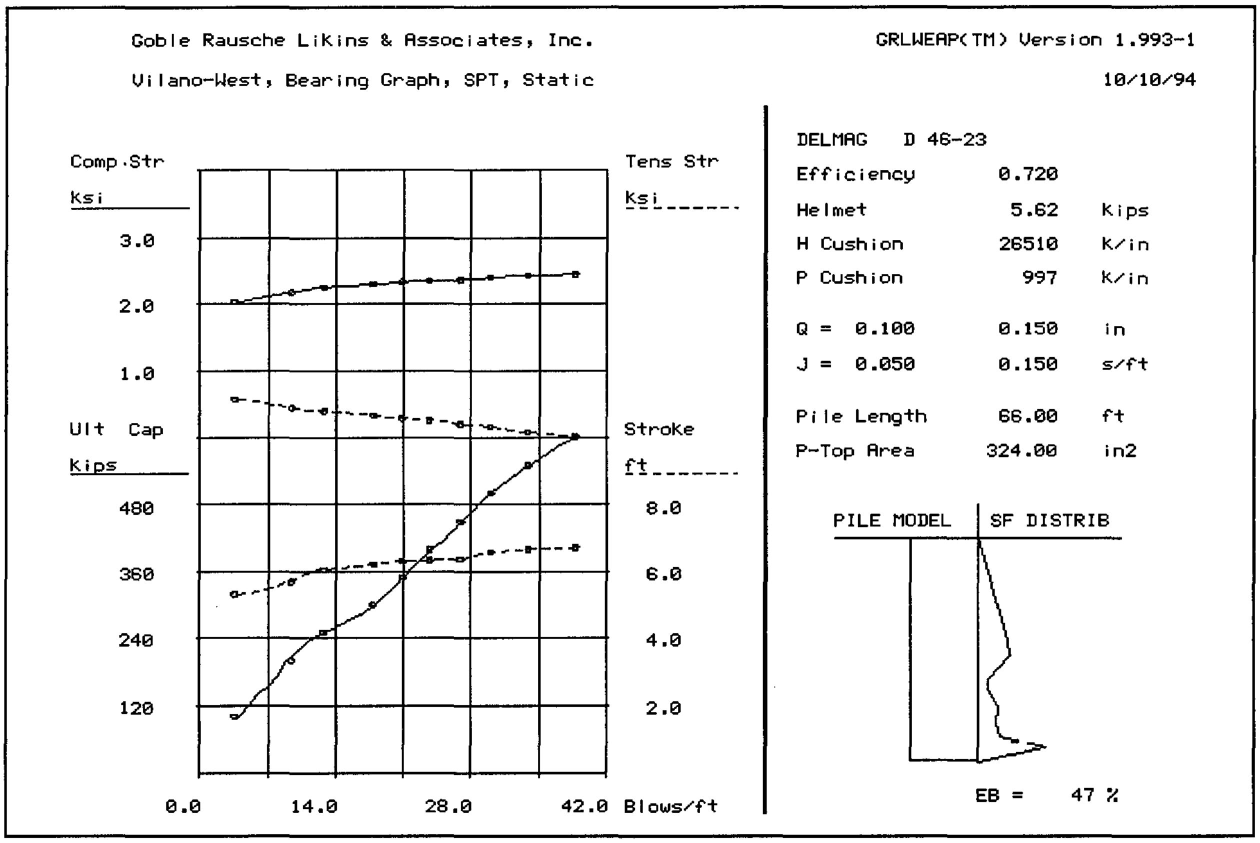

Figure A.48: Bearing Graph SPT-ST Analysis for Vilano - West, FL

Vilano-West, Bearing Graph, SPT, Dynamic 10/10/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	100.0	2.072	.553	4.6	5.44	38.81
2	200.0	2.236	.417	12.0	5.89	29.58
3	250.0	2.301	.351	17.7	6.12	27.31
4	300.0	2.342	.274	22.1	6.23	26.12
5	350.0	2.396	.206	25.3	6.45	25.90
6	400.0	2.431	.139	29.2	6.55	25.22
7	450.0	2.455	.082	34.0	6.61	24.70
8	500.0	2.475	.000	40.0	6.63	24.21
9	550.0	2.522	.000	46.3	6.84	24.23
10	600.0	2.553	.010	54.8	6.94	23.96

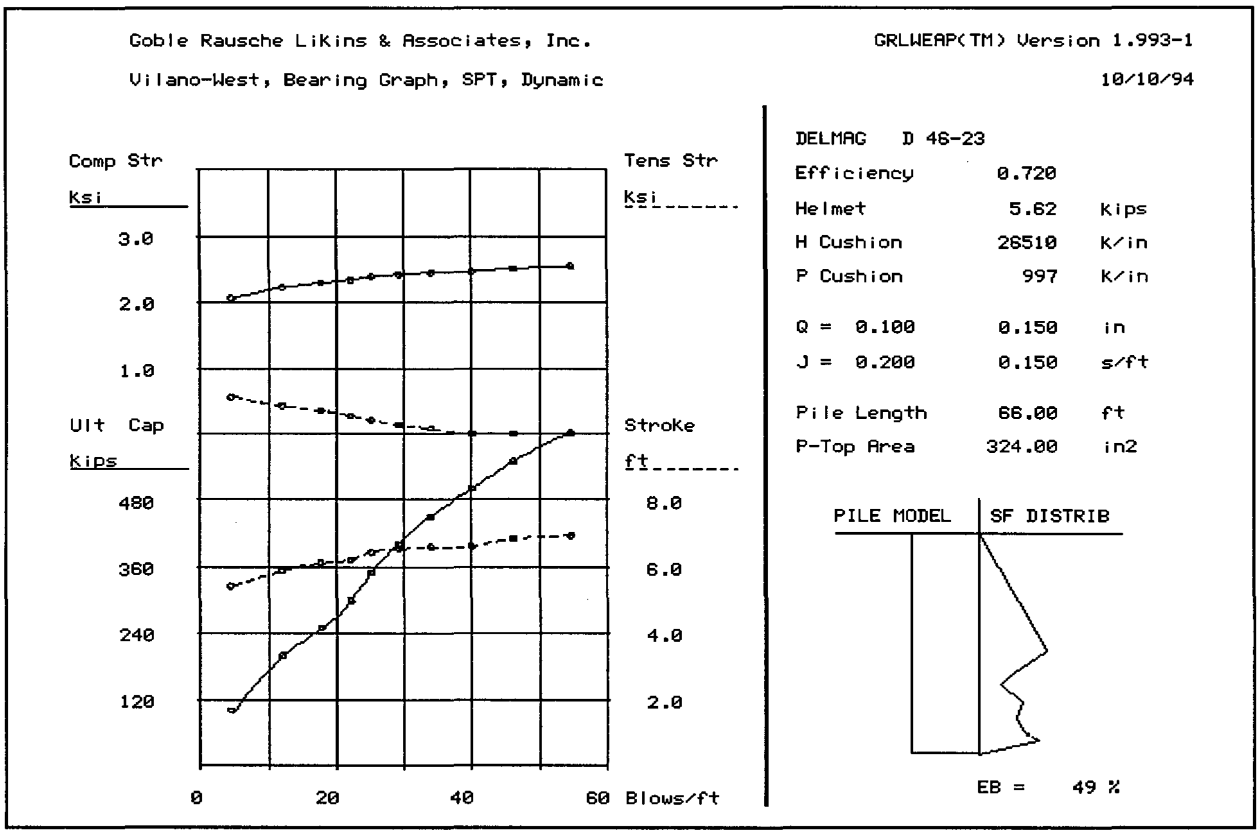

Figure A.49: Bearing Graph SPT-DYN Analysis for Vilano - West, FL

Vilano-West, Bearing Graph, MDF, Static 10/10/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	100.0	2.050	.641	3.7	5.35	40.59
2	200.0	2.211	.562	9.7	5.77	30.85
3	250.0	2.290	.526	13.3	6.11	29.01
4	300.0	2.340	.467	18.5	6.28	26.93
5	350.0	2.374	.396	21.6	6.36	26.07
6	400.0	2.398	.352	24.7	6.40	25.49
7	450.0	2.414	.267	28.4	6.42	24.77
8	500.0	2.456	.230	32.1	6.60	24.64
9	550.0	2.483	.143	37.0	6.68	24.34
10	600.0	2.501	.164	43.4	6.72	23.91

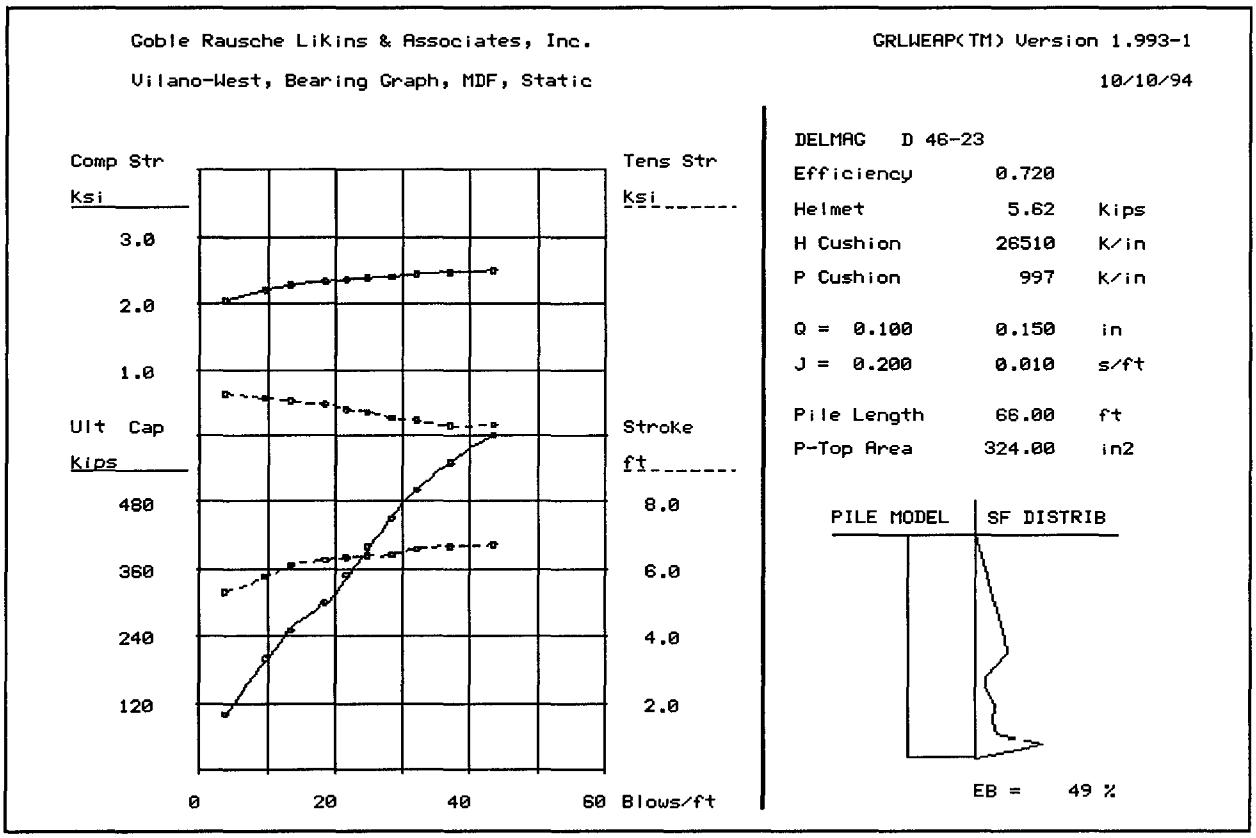

Figure A.50: Bearing Graph MDF-ST Analysis for Vilano - West, FL

Vilano-West, Bearing Graph, MDF, Dynamic 10/10/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	100.0	2.055	.662	3.8	5.36	40.37
2	200.0	2.220	.598	9.8	5.79	30.53
3	250.0	2.285	.559	13.9	6.00	28.07
4	300.0	2.350	.511	18.9	6.26	26.53
5	350.0	2.390	.449	21.8	6.39	25.73
6	400.0	2.420	.378	24.9	6.46	25.19
7	450.0	2.441	.298	28.6	6.49	24.48
8	500.0	2.458	.234	33.1	6.50	23.85
9	550.0	2.502	.157	37.8	6.69	23.79
10	600.0	2.531	.181	44.1	6.79	23.47

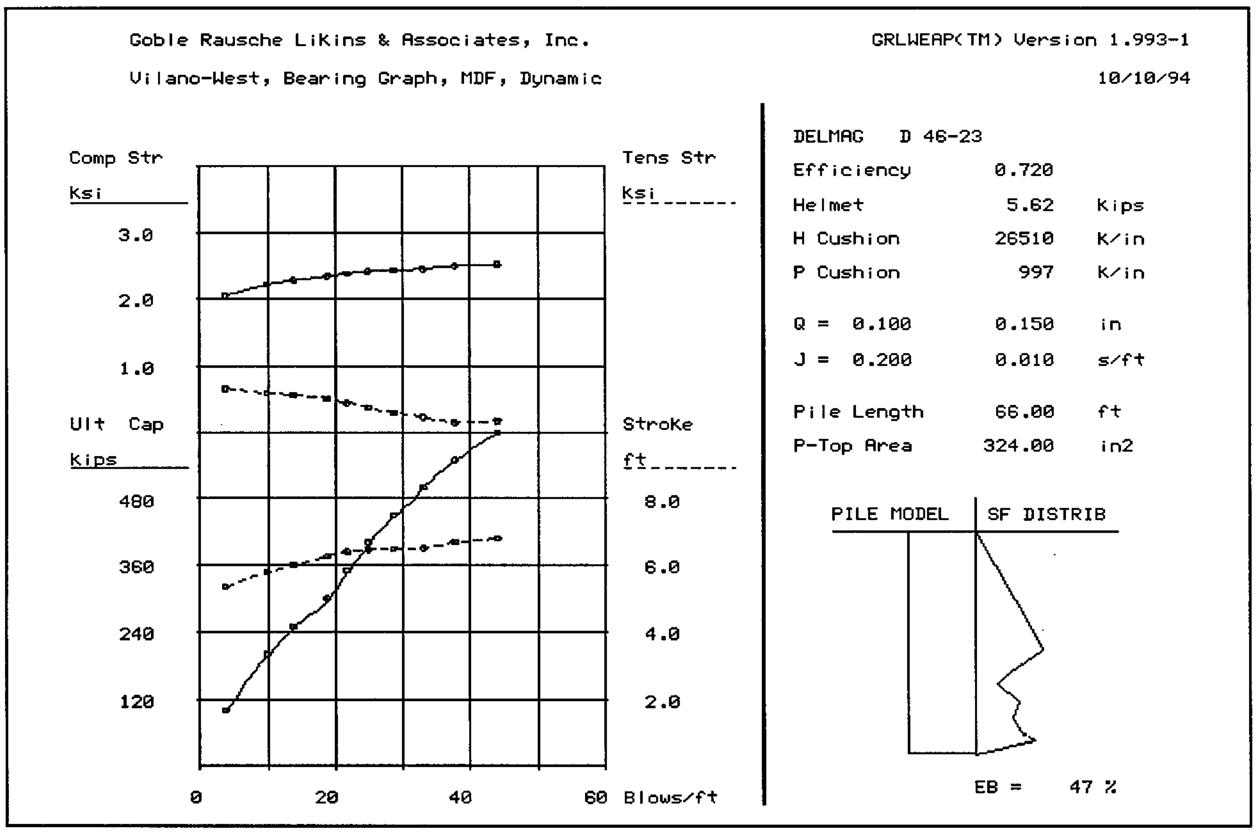

Figure A.51: Bearing Graph MDF-DYN Analysis for Vilano - West, FL

Vilano-West, Bearing Graph, STD Method 10/10/94

No.	Ultimate Capacity kips	Max C. Stress ksi	Max T. Stress ksi	Blow Count BPF	Stroke ft	Energy k-ft
1	100.0	2.077	.596	4.6	5.45	38.72
2	200.0	2.241	.478	12.1	5.90	29.43
3	250.0	2.303	.416	17.8	6.13	27.09
4	300.0	2.343	.342	22.2	6.24	25.88
5	350.0	2.395	.276	25.5	6.45	25.60
6	400.0	2.427	.199	29.6	6.55	24.83
7	450.0	2.451	.117	34.5	6.60	24.30
8	500.0	2.469	.030	40.7	6.63	23.73
9	550.0	2.516	.000	47.4	6.84	23.69
10	600.0	2.547	.000	56.3	6.95	23.40

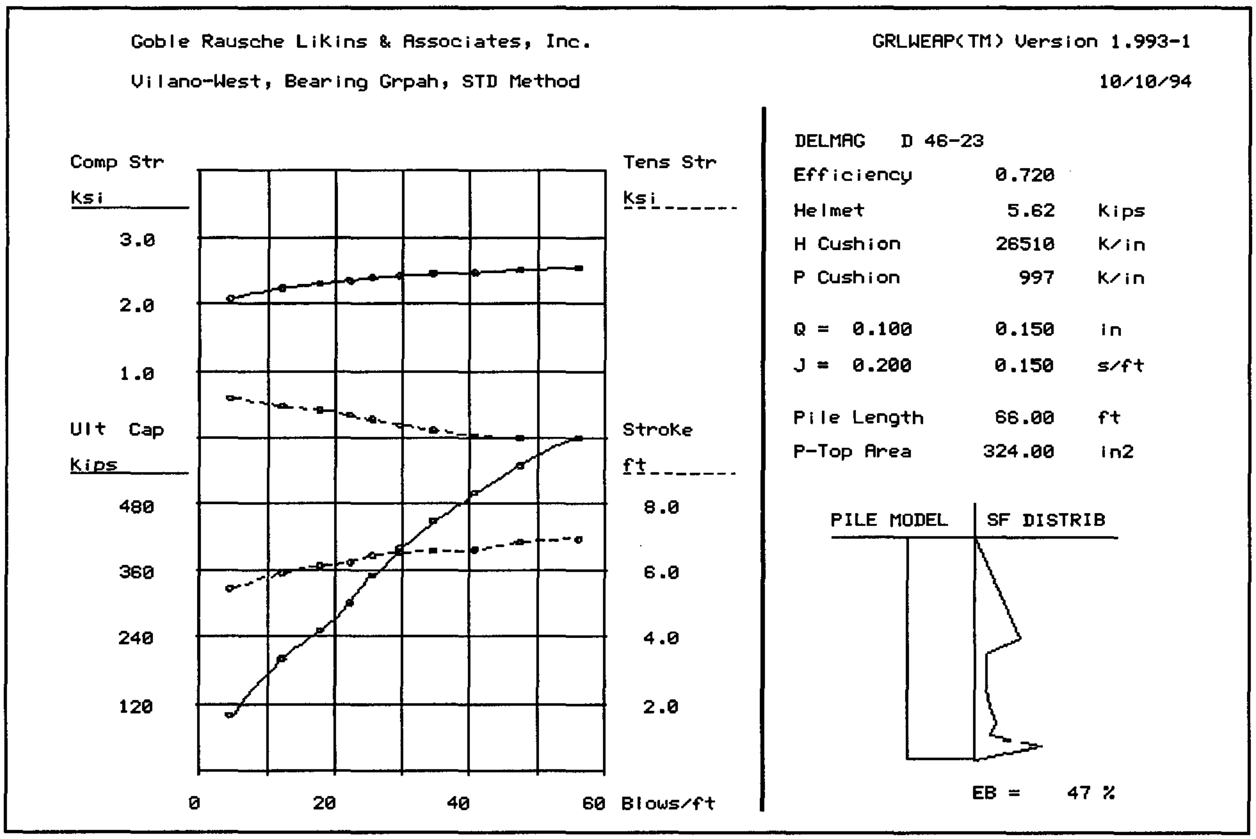

Figure A.52: Bearing Graph STD (FHWA) Analysis for Vilano - West, FL

St.Mary, Driveability, STD Parm. Static 10/07/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
10.0	.0	.0	.0	.0	.000	.000	.0	.0
15.0	.0	.0	.0	.0	.000	.000	.0	.0
20.0	.0	.0	.0	.0	.000	.000	.0	.0
25.0	7.0	4.4	2.6	2.4	24.578	17.254	60.0	18.7
30.0	16.3	11.1	5.2	3.1	24.578	14.414	60.0	18.8
35.0	25.7	18.8	6.8	4.1	24.609	11.865	60.0	18.8
40.0	28.1	24.3	3.9	4.5	24.648	11.369	60.0	18.8
45.0	64.4	41.2	23.3	9.4	24.772	3.275	60.0	19.0
50.0	93.4	65.7	27.7	13.4	24.824	1.846	60.0	19.1
55.0	108.3	87.9	20.4	15.4	24.835	1.707	60.0	19.1
60.0	150.5	115.0	35.5	22.6	24.850	4.278	60.0	18.8
65.0	173.5	144.3	29.2	28.3	24.846	5.201	60.0	18.6
70.0	188.2	160.8	27.3	32.5	24.816	5.431	60.0	18.4
75.0	192.5	167.1	25.4	33.1	24.777	5.059	60.0	18.3
80.0	209.3	174.9	34.4	38.9	24.756	5.397	60.0	18.2
85.0	208.9	182.3	26.5	37.5	24.748	5.141	60.0	18.1
90.0	196.0	186.1	9.8	31.4	24.732	3.858	60.0	18.0
95.0	198.4	188.5	9.9	31.3	24.720	2.991	60.0	17.9
100.0	237.5	195.8	41.7	48.6	24.700	3.331	60.0	17.8
105.0	308.6	208.3	100.3	186.7	24.688	3.642	60.0	17.8

Total Driving Time 37.38 min. for 60.0 bl/min

Blow Rate:	50 bl/min	40 bl/min	30 bl/min
Total Driving Time:	44.86 min	56.07 min	74.76 min

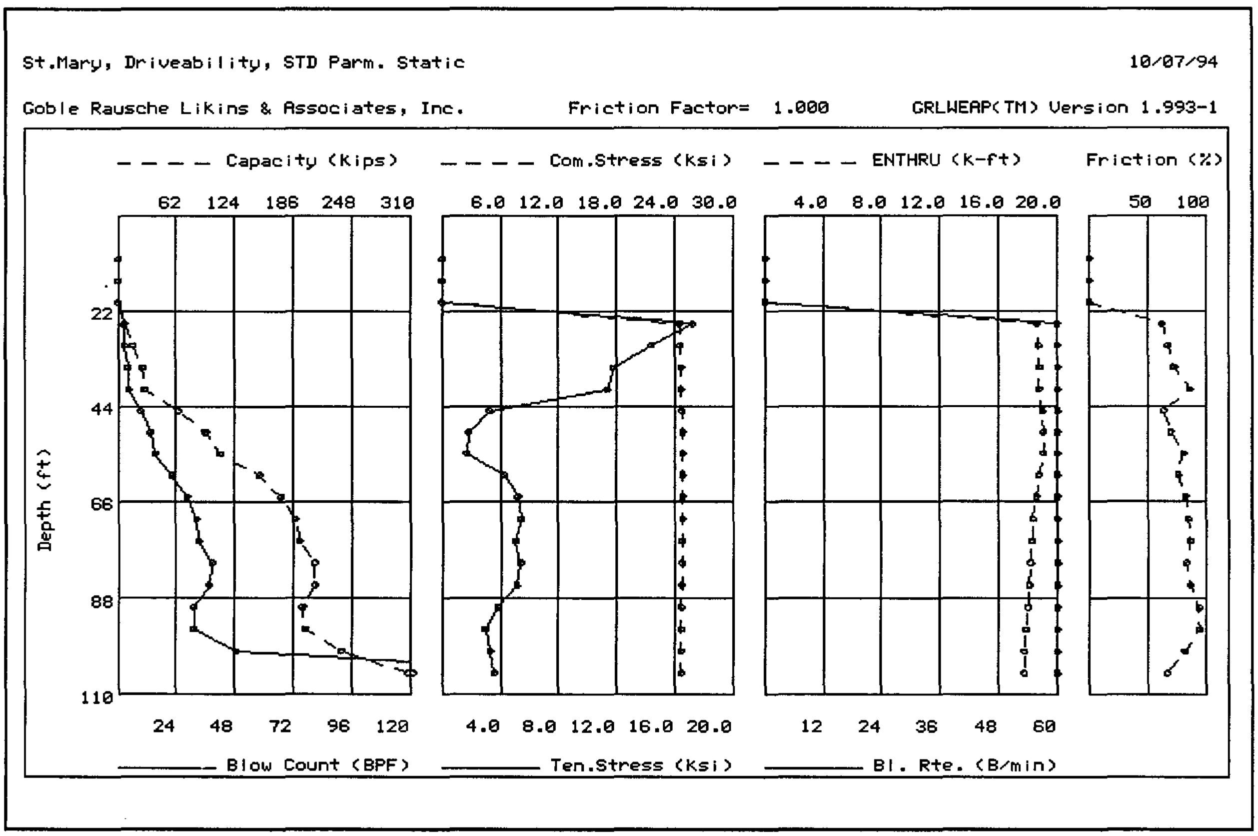

Figure A.53: Driveability Graph STD-ST Analysis for St. Mary, OH

St.Mary, Driveability, SPT Param. Static 10/07/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
10.0	.0	.0	.0	.0	.000	.000	.0	.0
15.0	.0	.0	.0	.0	.000	.000	.0	.0
20.0	.0	.0	.0	.0	.000	.000	.0	.0
25.0	6.6	4.2	2.4	2.2	25.160	18.600	60.0	19.3
30.0	16.0	10.9	5.1	2.6	25.162	16.780	60.0	19.4
35.0	25.7	18.8	6.8	3.2	25.164	14.895	60.0	19.4
40.0	27.5	24.0	3.5	3.5	25.166	14.143	60.0	19.4
45.0	64.0	41.1	22.9	6.3	25.375	9.443	60.0	19.7
50.0	93.3	65.6	27.7	9.2	25.443	4.966	60.0	19.7
55.0	108.8	87.9	20.9	11.1	25.487	2.306	60.0	19.7
60.0	150.3	114.9	35.5	15.3	25.516	1.981	60.0	19.7
65.0	173.5	144.3	29.2	18.7	25.545	2.912	60.0	19.5
70.0	188.2	160.7	27.5	21.1	25.553	3.348	60.0	19.3
75.0	192.7	167.0	25.7	21.8	25.537	3.592	60.0	19.2
80.0	213.3	175.0	38.3	25.1	25.524	4.448	60.0	18.9
90.0	195.5	185.9	9.6	21.4	25.445	4.380	60.0	18.6
100.0	237.2	195.7	41.5	27.7	25.358	4.406	60.0	18.5
105.0	308.5	208.2	100.3	55.0	25.315	2.935	60.0	18.5

Total Driving Time 21.95 min. for 60.0 bl/min

Blow Rate:	50 bl/min	40 bl/min	30 bl/min
Total Driving Time:	26.34 min	32.93 min	43.90 min

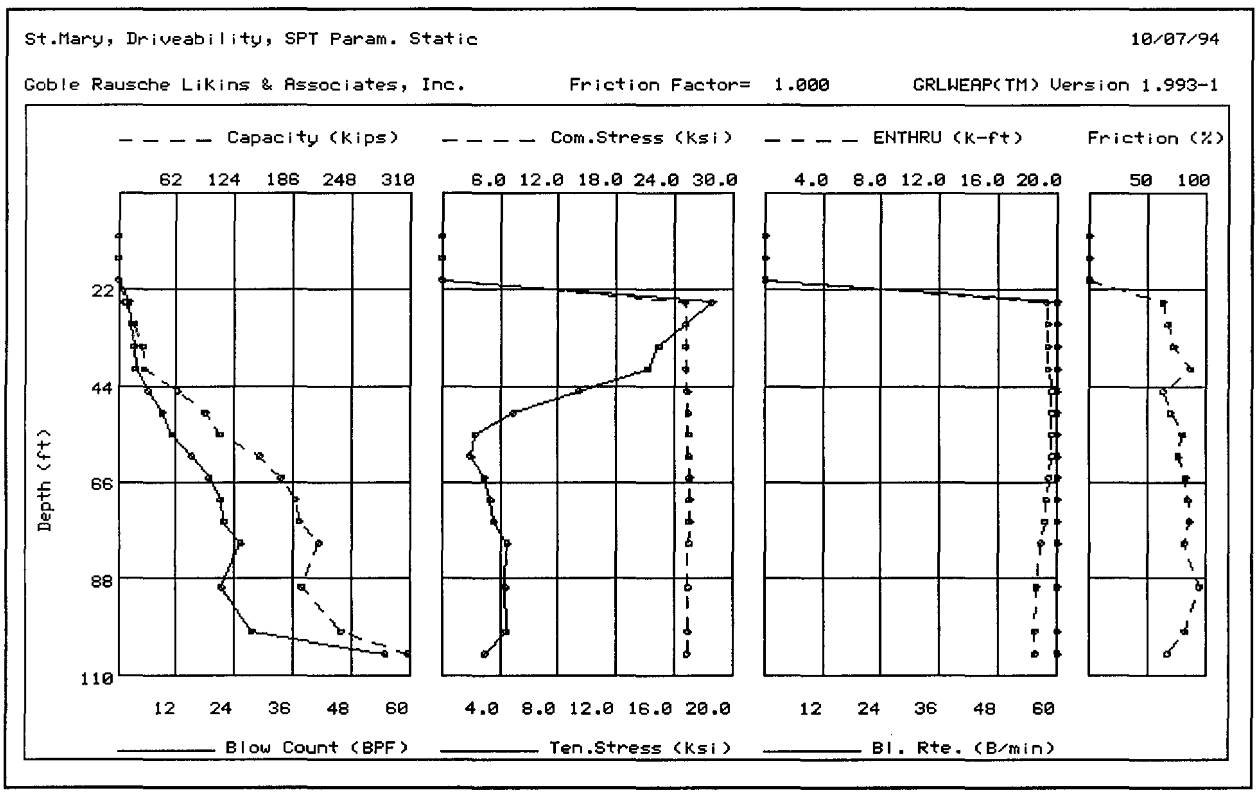

Figure A.54: Driveability Graph SPT-ST Analysis for St. Mary, OH

St.Mary, Driveability, SPT Parm, Dynamic 10/07/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
10.0	.0	.0	.0	.0	.000	.000	.0	.0
15.0	.0	.0	.0	.0	.000	.000	.0	.0
20.0	.0	.0	.0	.0	.000	.000	.0	.0
25.0	6.7	4.2	2.4	2.2	25.024	18.226	60.0	19.3
30.0	16.0	10.9	5.1	2.8	25.026	15.978	60.0	19.4
35.0	25.6	18.8	6.8	3.5	25.103	13.879	60.0	19.4
40.0	27.6	24.1	3.5	3.7	25.110	13.646	60.0	19.4
45.0	63.9	41.0	22.9	7.6	25.287	6.441	60.0	19.7
50.0	93.3	65.7	27.7	10.9	25.341	1.610	60.0	19.7
55.0	108.8	87.9	20.9	12.6	25.376	1.974	60.0	19.7
60.0	150.3	114.9	35.5	17.7	25.415	2.670	60.0	19.6
65.0	173.5	144.3	29.2	21.5	25.438	3.754	60.0	19.3
70.0	179.5	163.4	16.1	22.4	25.440	4.034	60.0	19.2
75.0	190.9	175.7	15.2	24.2	25.432	4.537	60.0	18.9
80.0	213.0	191.0	22.0	29.4	25.405	4.923	60.0	18.8
85.0	221.3	206.0	15.4	31.1	25.375	5.205	60.0	18.7
90.0	219.9	214.1	5.8	29.6	25.328	5.162	60.0	18.6
95.0	224.7	218.9	5.8	30.0	25.283	4.855	60.0	18.5
100.0	256.8	231.6	25.2	41.1	25.250	4.721	60.0	18.4
105.0	316.3	255.9	60.4	84.1	25.224	3.677	60.0	18.4

Total Driving Time 27.60 min. for 60.0 bl/min

Blow Rate:	50 bl/min	40 bl/min	30 bl/min
Total Driving Time:	33.12 min	41.40 min	55.20 min

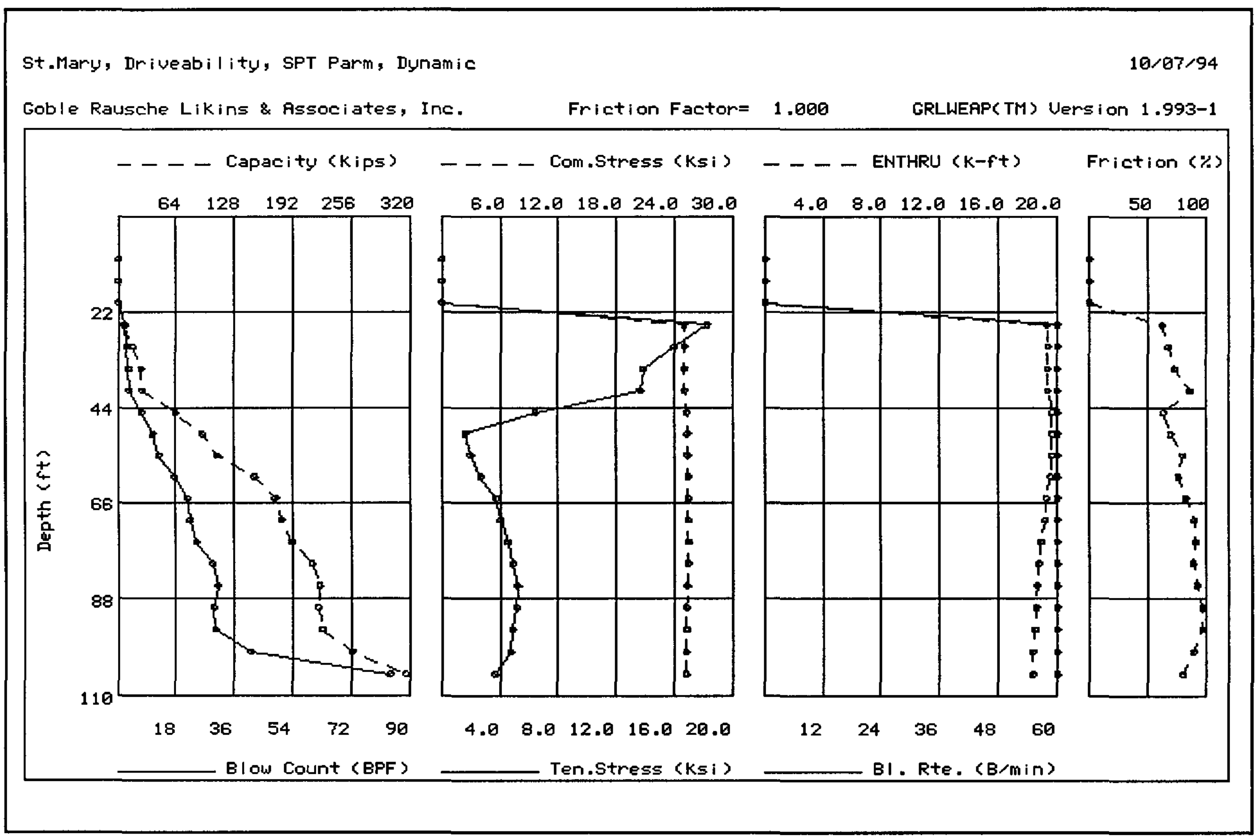

Figure A.55: Driveability Graph SPT-DYN Analysis for St. Mary, OH

St.Mary, Driviability, MDF Param. Static 10/07/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
10.0	.0	.0	.0	.0	.000	.000	.0	.0
15.0	.0	.0	.0	.0	.000	.000	.0	.0
20.0	.0	.0	.0	.0	.000	.000	.0	.0
25.0	6.7	4.3	2.4	2.2	24.578	18.185	60.0	18.7
30.0	16.2	11.0	5.1	2.7	24.578	16.195	60.0	18.7
35.0	25.7	18.8	6.8	3.4	24.592	14.224	60.0	18.8
40.0	27.6	24.1	3.5	3.8	24.626	13.394	60.0	18.8
45.0	64.1	41.2	22.9	7.0	24.750	8.378	60.0	19.0
50.0	93.4	65.7	27.7	10.5	24.803	3.915	60.0	19.1
55.0	108.9	88.0	20.9	12.8	24.816	2.907	60.0	19.1
60.0	150.5	115.0	35.5	17.9	24.834	3.029	60.0	19.1
65.0	173.5	144.3	29.2	22.5	24.829	3.473	60.0	18.9
70.0	188.4	160.8	27.5	25.7	24.800	4.199	60.0	18.7
75.0	192.8	167.1	25.7	26.5	24.766	5.192	60.0	18.6
80.0	213.3	175.1	38.3	31.0	24.738	5.712	60.0	18.4
85.0	209.2	182.3	26.8	29.6	24.731	5.345	60.0	18.2
90.0	195.7	186.1	9.6	25.9	24.715	4.209	60.0	18.1
95.0	198.1	188.5	9.6	25.8	24.706	3.453	60.0	17.9
100.0	237.3	195.8	41.5	35.9	24.686	2.976	60.0	17.9
105.0	308.6	208.3	100.3	73.4	24.655	3.255	60.0	17.9

Total Driving Time 26.57 min. for 60.0 bl/min

Blow Rate:	50 bl/min	40 bl/min	30 bl/min
Total Driving Time:	31.88 min	39.85 min	53.14 min

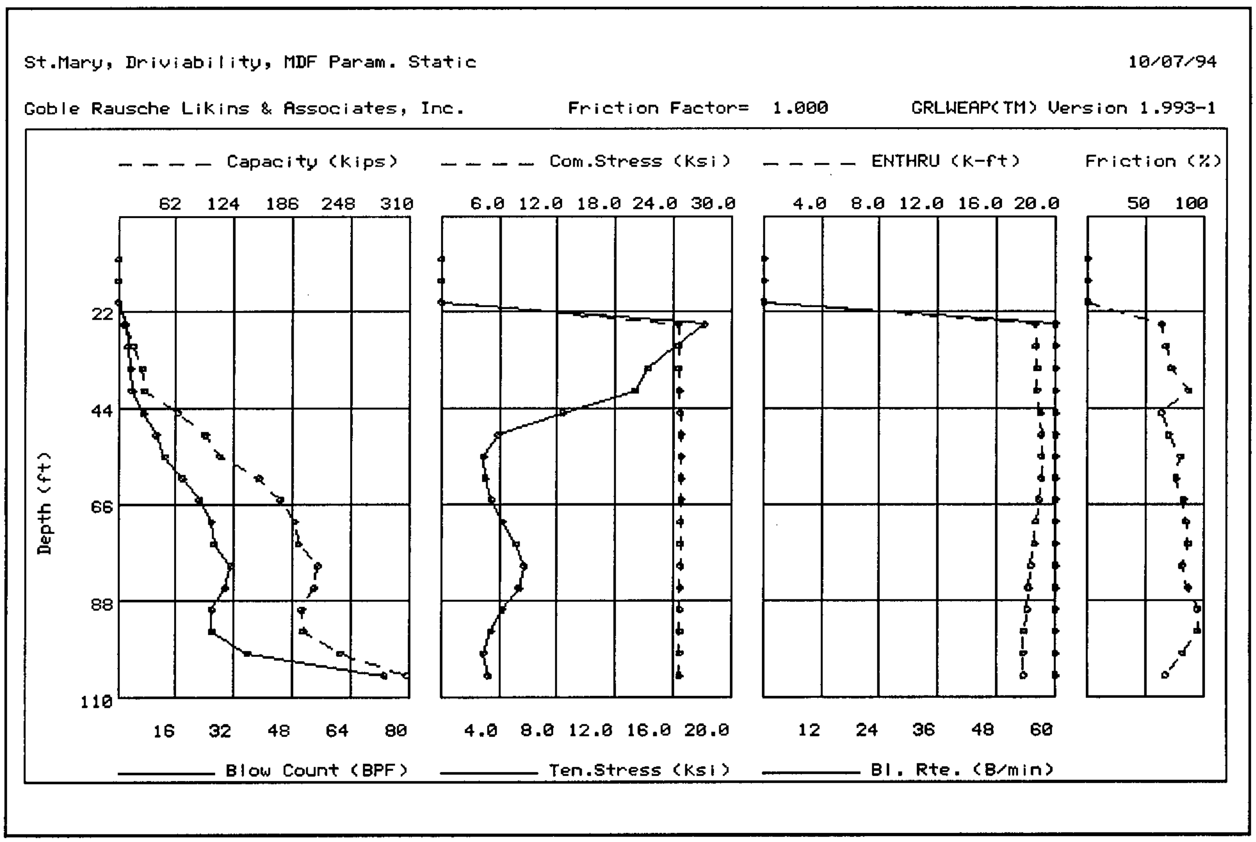

Figure A.56: Driveability Graph MDF-ST Analysis for St. Mary, OH

Portland, Driveability, STD Parm, Static 10/07/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
5.0	.0	.0	.0	.0	.000	.000	.0	.0
10.0	.6	.0	.6	-1.0	.000	.000	95.9	.0
15.0	4.1	.1	4.0	-1.0	.000	.000	95.4	.0
20.0	8.4	.4	8.0	-1.0	.000	.000	94.6	.0
25.0	12.8	1.1	11.7	-1.0	.000	.000	93.5	.0
30.0	18.0	2.4	15.7	-1.0	.000	.000	83.3	.0
35.0	112.4	5.2	107.2	5.4	15.586	.000	55.1	39.2
40.0	207.5	7.8	199.7	11.9	19.876	.478	50.6	33.7
42.0	208.6	8.9	199.8	12.0	19.860	.503	50.6	33.7
45.0	193.7	10.6	183.2	10.7	19.700	.518	50.9	34.8
51.0	162.5	14.5	148.0	8.6	17.841	.542	52.6	35.8
53.0	147.0	15.8	131.2	7.4	17.666	.000	53.1	37.4

Total Driving Time 3.65 min. only if hammer runs continuously

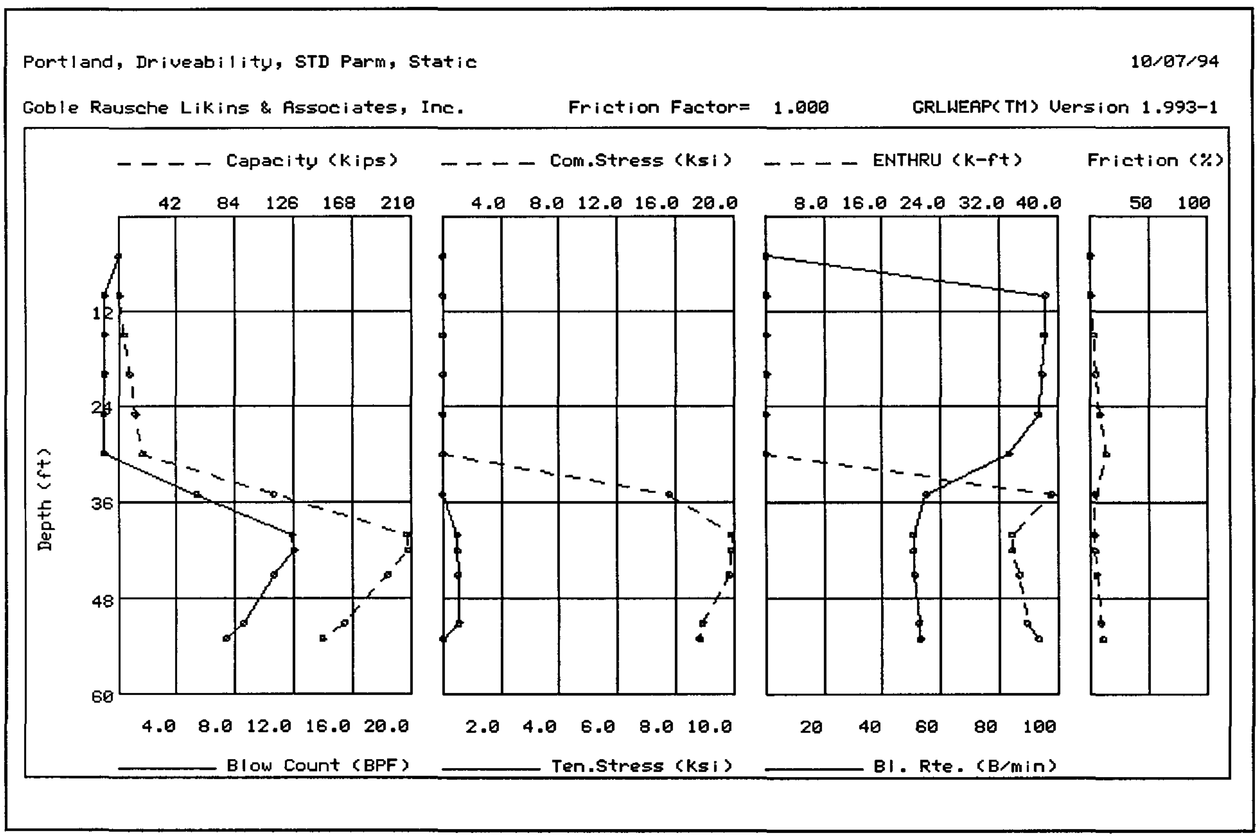

Figure A.57: Driveability Graph STD-ST Analysis for Portland, ME

Portland, Driveability, SPT Parm, Static   10/07/94

Friction Loss/Gain Factor   1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
5.0	.0	.0	.0	.0	.000	.000	.0	.0
10.0	.6	.0	.6	-1.0	.000	.000	95.9	.0
15.0	4.1	.1	4.0	-1.0	.000	.000	95.4	.0
20.0	8.4	.4	8.0	-1.0	.000	.000	94.6	.0
25.0	12.8	1.1	11.7	-1.0	.000	.000	93.5	.0
30.0	18.0	2.4	15.7	-1.0	.000	.000	81.9	.0
35.0	112.4	5.2	107.2	5.4	15.222	.000	55.2	39.3
40.0	207.5	7.8	199.7	11.9	19.394	.414	50.8	34.0
42.0	208.6	8.9	199.8	11.9	19.353	.420	50.8	33.9
45.0	193.7	10.6	183.2	10.6	19.108	.396	51.1	35.2
51.0	162.5	14.5	148.0	9.8	17.745	.336	51.9	34.9
53.0	147.0	15.8	131.2	10.9	18.584	.000	51.1	34.2

Total Driving Time   3.80 min. only if hammer runs continuously

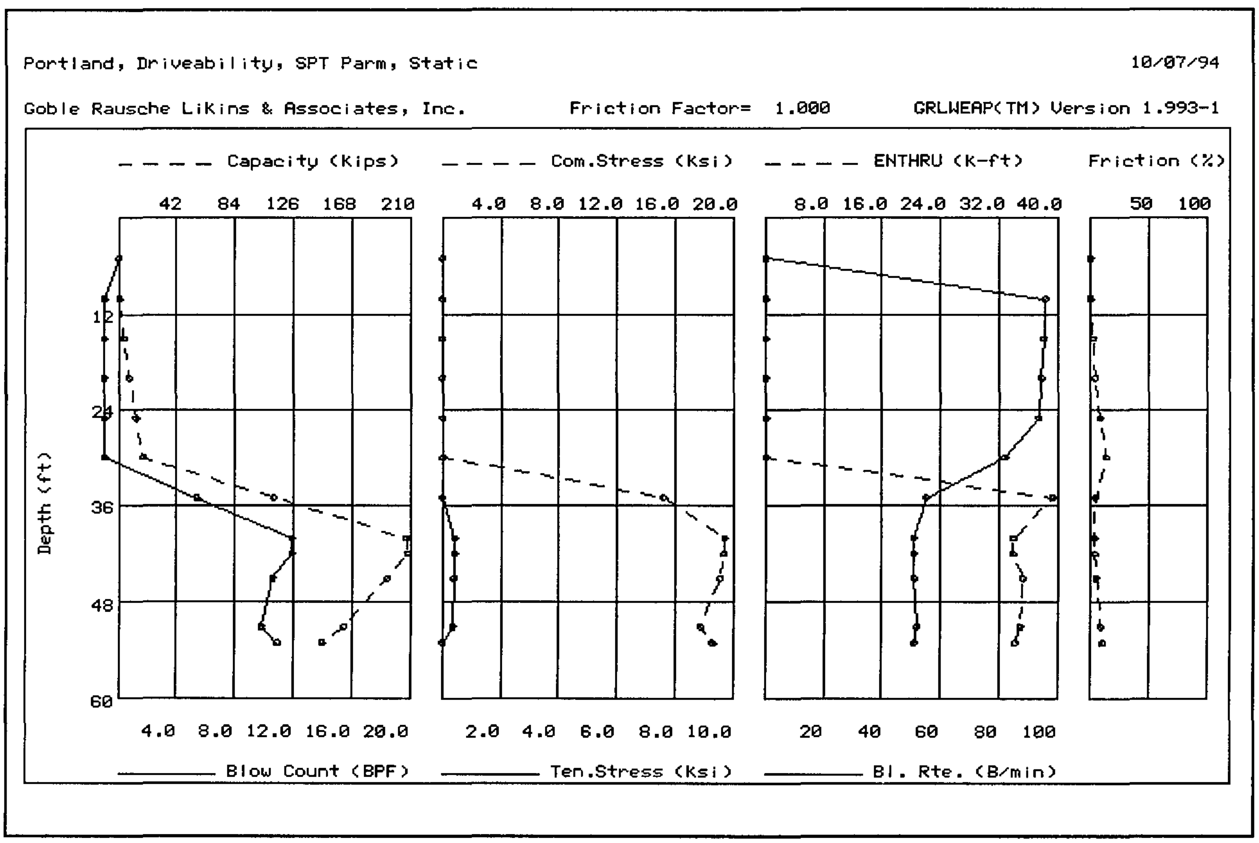

Figure A.58: Driveability Graph SPT-ST Analysis for Portland, ME

Portland, Driveability, SPT Parm, Dynamic 10/07/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
5.0	.0	.0	.0	.0	.000	.000	.0	.0
10.0	2.6	.0	2.6	-1.0	.000	.000	95.7	.0
15.0	11.1	.1	11.0	-1.0	.000	.000	78.9	.0
20.0	35.4	.7	34.7	-1.0	.000	.000	78.7	.0
25.0	58.8	1.7	57.1	2.4	11.335	.000	59.9	47.5
30.0	83.0	3.2	79.8	3.7	14.027	.000	57.1	43.7
35.0	166.4	5.3	161.1	8.9	18.350	.346	52.3	35.4
40.0	251.5	7.8	243.7	15.2	21.456	.524	49.4	32.5
42.0	234.6	8.9	225.7	13.6	21.013	.530	49.7	33.6
45.0	220.7	10.6	210.1	14.7	21.583	.364	49.5	32.3
51.0	179.5	14.5	164.9	14.3	21.590	.000	49.7	32.9
53.0	157.0	15.9	141.1	12.0	18.819	.000	50.8	33.4

Total Driving Time 5.87 min. only if hammer runs continuously

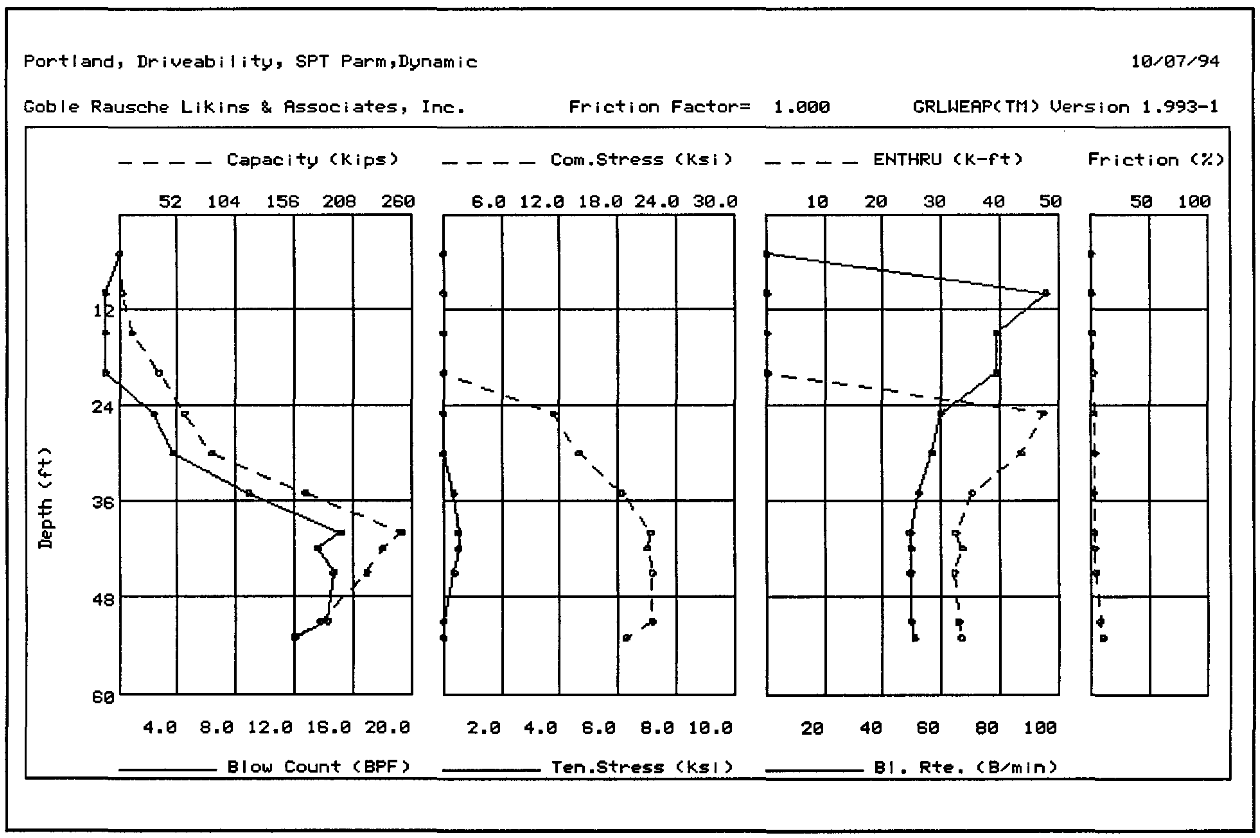

Figure A.59: Driveability Graph SPT-DYN Analysis for Portland, ME

Portland, Driveability, MDF Parm, Static 10/07/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
5.0	.0	.0	.0	.0	.000	.000	.0	.0
10.0	.6	.0	.6	-1.0	.000	.000	96.1	.0
15.0	4.1	.1	4.0	-1.0	.000	.000	96.3	.0
20.0	8.4	.4	8.0	-1.0	.000	.000	96.6	.0
25.0	12.8	1.1	11.7	-1.0	.000	.000	96.9	.0
30.0	18.0	2.4	15.7	-1.0	.000	.000	76.8	.0
35.0	112.4	5.2	107.2	2.7	13.129	.000	59.3	45.5
40.0	207.5	7.8	199.7	5.8	16.640	.320	54.7	39.7
42.0	208.6	8.9	199.8	5.9	16.640	.328	54.6	39.5
45.0	193.7	10.6	183.2	5.3	16.446	.222	55.1	41.0
51.0	162.5	14.5	148.0	4.5	15.128	.000	56.7	40.5
53.0	147.0	15.8	131.2	3.8	14.825	.429	57.2	42.6

Total Driving Time 1.68 min. only if hammer runs continuously

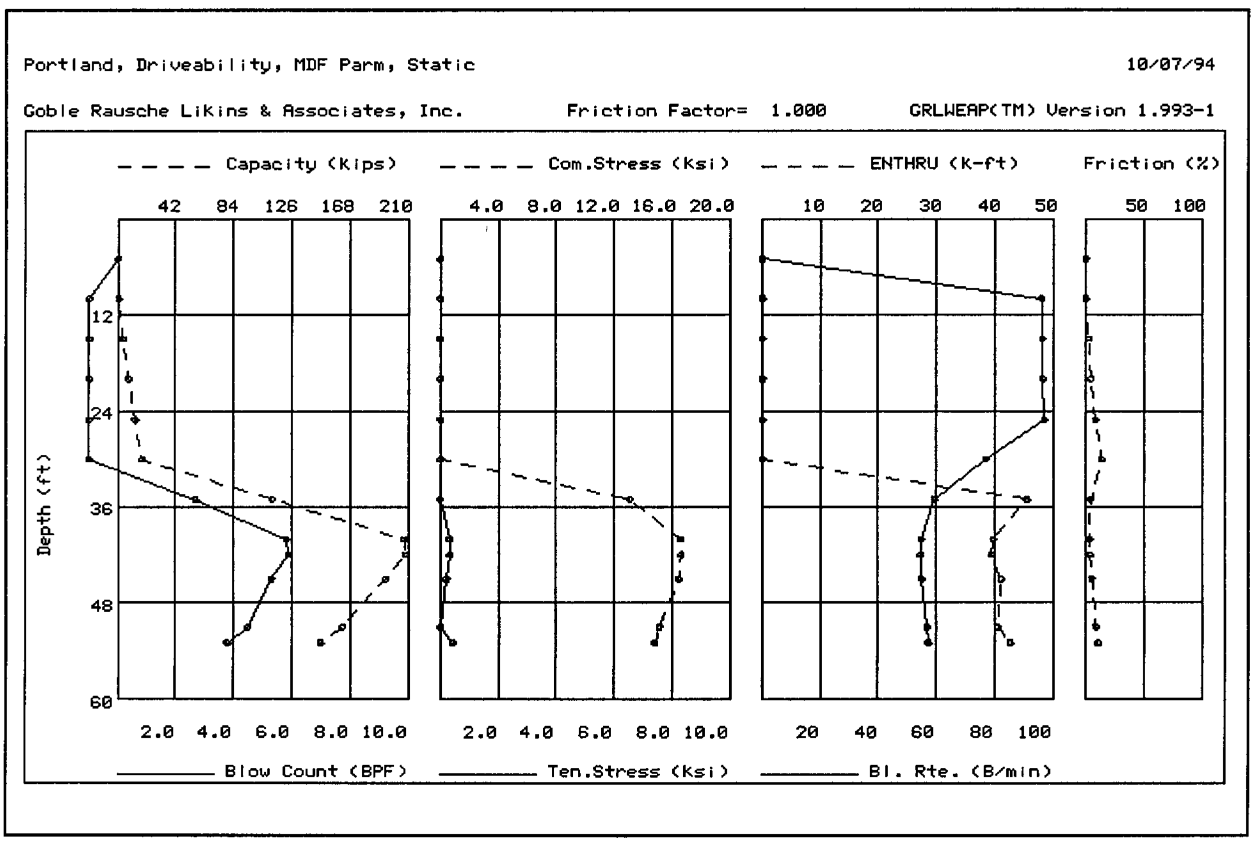

Figure A.60: Driveability Graph STD-ST Analysis for Portland, ME

Portland, Drvblty, MDF-Cap-STD, Static 10/07/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
5.0	8.9	.0	8.9	-1.0	.000	.000	94.4	.0
10.0	17.6	.0	17.6	-1.0	.000	.000	87.5	.0
15.0	25.1	.2	25.0	-1.0	.000	.000	84.4	.0
20.0	33.4	.7	32.7	-1.0	.000	.000	79.1	.0
25.0	41.8	1.6	40.2	-1.0	.000	.000	80.4	.0
30.0	51.0	3.0	48.0	-1.0	.000	.000	65.7	.0
35.0	273.4	5.4	267.9	17.3	22.929	.511	48.9	31.9
40.0	495.5	8.0	487.5	41.4	32.971	1.698	44.5	33.3
42.0	496.6	9.1	487.5	41.7	32.911	1.725	44.5	33.3
45.0	457.7	10.8	446.9	36.4	30.943	1.558	45.3	32.4
51.0	377.5	14.8	362.6	26.7	27.235	1.028	46.9	31.5
53.0	338.0	16.3	321.7	22.6	25.516	.835	47.6	31.5

Total Driving Time 13.70 min. only if hammer runs continuously

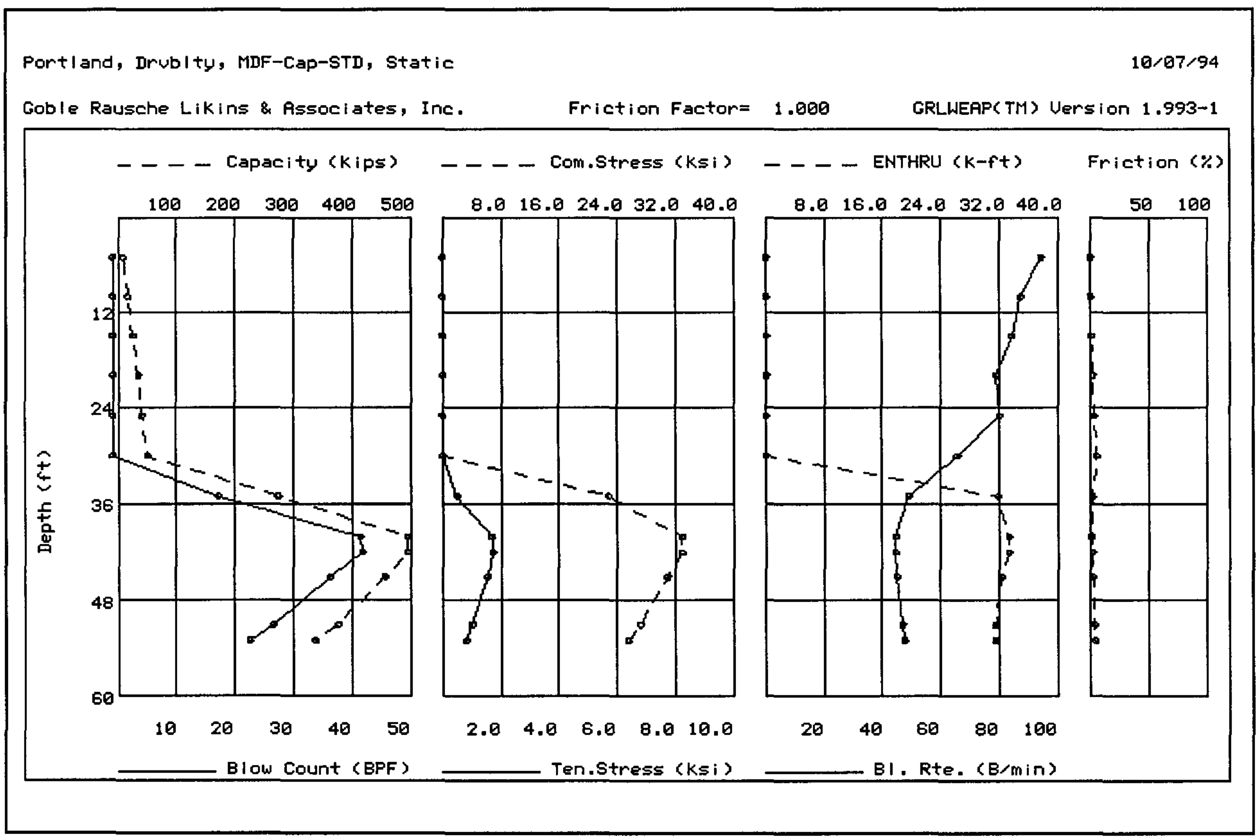

Figure A.61: Driveability Graph MDF-Cap-STD Analysis for Portland, ME

Portland, Drvblty, MDF-Cap-SPT, Static 10/07/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
5.0	8.9	.0	8.9	-1.0	.000	.000	94.4	.0
10.0	17.6	.0	17.6	-1.0	.000	.000	87.5	.0
15.0	25.1	.2	25.0	-1.0	.000	.000	84.4	.0
20.0	33.4	.7	32.7	-1.0	.000	.000	78.9	.0
25.0	41.8	1.6	40.2	-1.0	.000	.000	80.8	.0
30.0	51.0	3.0	48.0	2.1	9.701	.000	61.4	47.6
35.0	273.4	5.4	267.9	17.3	22.720	.485	49.0	31.9
40.0	495.5	8.0	487.5	41.6	32.245	1.480	44.6	33.6
42.0	496.6	9.1	487.5	41.8	32.198	1.500	44.6	33.6
45.0	457.7	10.8	446.9	36.5	30.146	1.351	45.5	32.6
51.0	377.5	14.8	362.6	31.3	28.195	.581	46.5	31.8
53.0	338.0	16.3	321.7	34.0	29.569	.189	46.4	31.3

Total Driving Time 14.55 min. only if hammer runs continuously

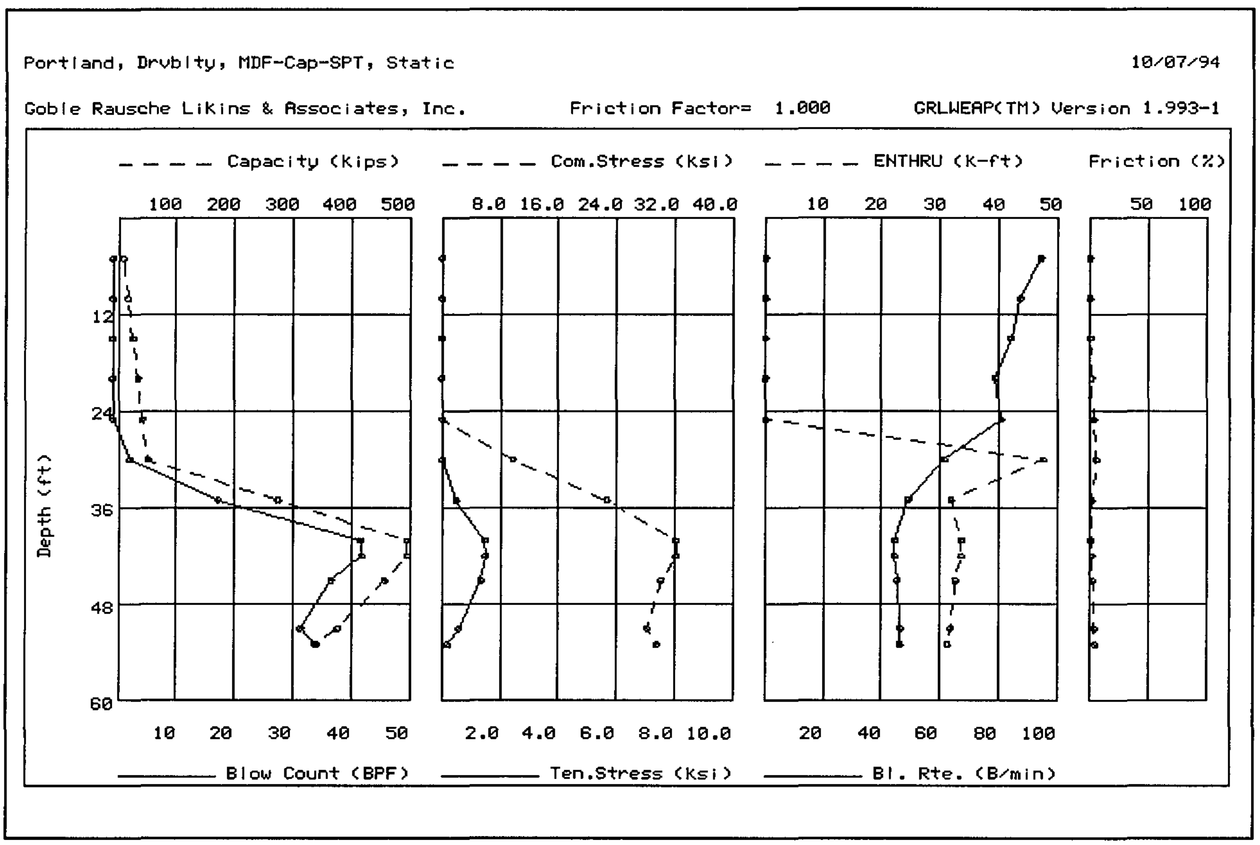

Figure A.62: Driveability Graph MDF-Cap-SPT Analysis for Portland, ME

C&D P17, Driveability, STD Parm, ST 10/07/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
5.0	80.8	6.8	74.0	3.4	2.498	1.657	45.5	44.1
10.0	33.0	11.3	21.7	2.3	2.431	1.794	46.3	46.9
15.0	26.6	13.2	13.4	2.2	2.389	1.783	46.6	46.6
20.0	26.8	16.3	10.5	2.2	2.393	1.788	46.5	46.3
25.0	6.1	6.1	.0	2.2	2.381	1.840	46.8	45.7
30.0	108.1	36.8	71.4	4.6	2.474	1.567	45.4	41.0
35.0	95.6	44.4	51.3	4.0	2.475	1.657	45.5	41.8
40.0	168.9	60.2	108.7	7.8	2.640	1.544	43.9	39.3
45.0	198.2	78.4	119.8	9.6	2.686	1.494	43.5	38.1
50.0	657.9	114.1	543.9	62.3	3.036	.685	40.4	33.4
55.0	634.6	179.2	455.4	57.7	3.013	.686	40.5	32.9
60.0	633.8	265.8	368.1	56.2	3.021	.645	40.5	32.8
65.0	630.8	335.3	295.5	55.0	3.015	.662	40.6	32.5
66.0	627.8	348.2	279.7	54.3	3.021	.675	40.6	32.5

Total Driving Time 30.76 min. only if hammer runs continuously

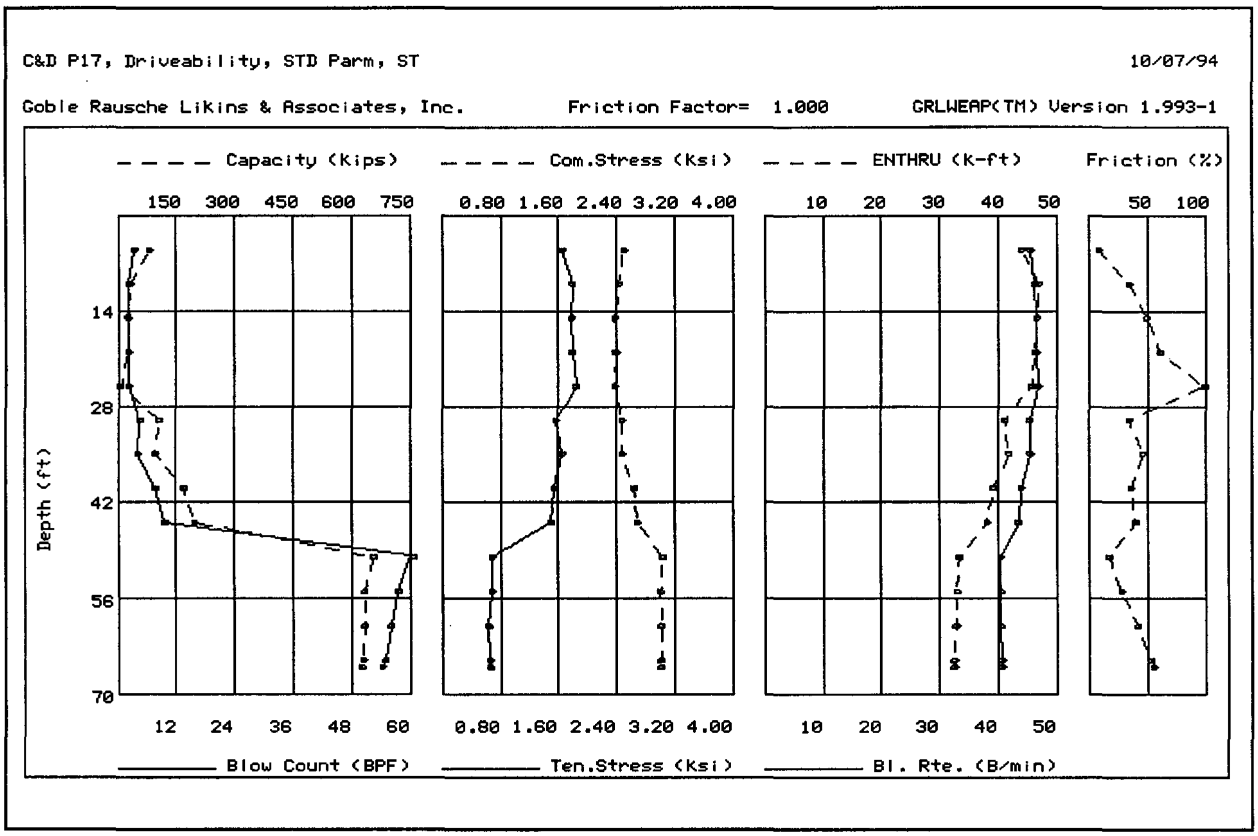

Figure A.63: Driveability Graph STD-ST Analysis for C&D Canal, Pier 17, DE

C&D P17, Driveability, SPT Parm, ST 10/07/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
5.0	80.8	6.8	74.0	2.8	2.633	1.946	45.4	43.7
10.0	33.0	11.3	21.7	2.2	2.540	1.948	46.2	47.9
15.0	26.6	13.2	13.4	2.1	2.495	1.916	46.5	48.1
20.0	26.8	16.3	10.5	2.1	2.496	1.916	46.5	47.9
25.0	6.1	6.1	.0	2.0	2.363	1.824	47.3	47.9
30.0	108.1	36.8	71.4	3.8	2.735	1.963	44.6	42.7
35.0	95.6	44.4	51.3	3.6	2.711	1.991	44.8	43.1
40.0	168.9	60.2	108.7	6.5	2.876	1.965	43.5	38.9
45.0	198.2	78.4	119.8	8.0	2.887	1.885	43.1	38.1
50.0	657.9	114.1	543.9	36.5	3.133	.909	40.8	33.5
55.0	634.6	179.2	455.4	41.5	3.164	.646	40.6	33.1
60.0	633.8	265.8	368.1	47.3	3.218	.461	40.2	33.5
65.0	630.8	335.3	295.5	51.5	3.227	.419	40.1	33.0
66.0	627.8	348.2	279.7	53.9	3.226	.423	40.1	33.0

Total Driving Time 23.71 min. only if hammer runs continuously

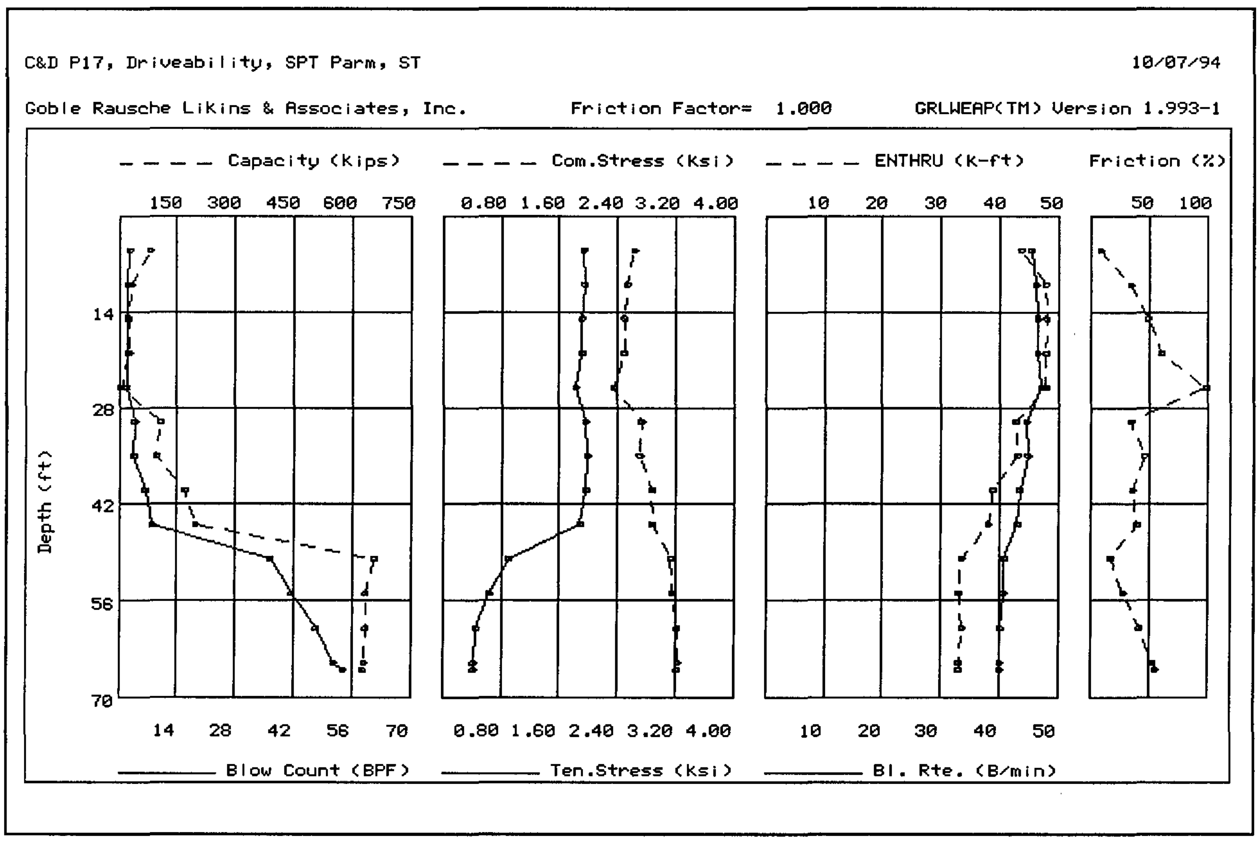

Figure A.64: Driveability Graph SPT-ST Analysis for C&D Canal, Pier 17, DE

C&D P17, Driveability, SPT Parm, DYN 10/07/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
5.0	65.0	6.4	58.7	2.6	2.608	1.959	45.6	44.9
10.0	26.6	10.2	16.4	2.1	2.536	1.964	46.3	48.4
15.0	22.4	12.1	10.2	2.1	2.503	1.939	46.6	48.2
20.0	24.8	16.0	8.8	2.1	2.505	1.933	46.5	47.8
25.0	7.1	7.1	.0	2.0	2.350	1.809	47.4	48.0
30.0	96.1	36.5	59.6	3.4	2.685	1.958	44.9	43.4
35.0	87.6	44.1	43.5	3.4	2.677	1.975	44.9	43.3
40.0	154.2	61.5	92.7	6.1	2.870	1.960	43.6	39.6
45.0	183.0	81.0	101.9	8.1	2.920	1.903	43.0	37.7
50.0	477.7	116.5	361.2	24.4	3.097	1.220	41.4	33.3
55.0	553.4	182.2	371.2	33.4	3.134	.860	40.9	33.2
60.0	585.6	269.0	316.6	39.0	3.164	.711	40.6	33.1
65.0	592.6	338.6	254.0	41.8	3.178	.707	40.5	32.8
66.0	592.6	351.6	241.0	42.8	3.180	.717	40.5	32.7

Total Driving Time 19.04 min. only if hammer runs continuously

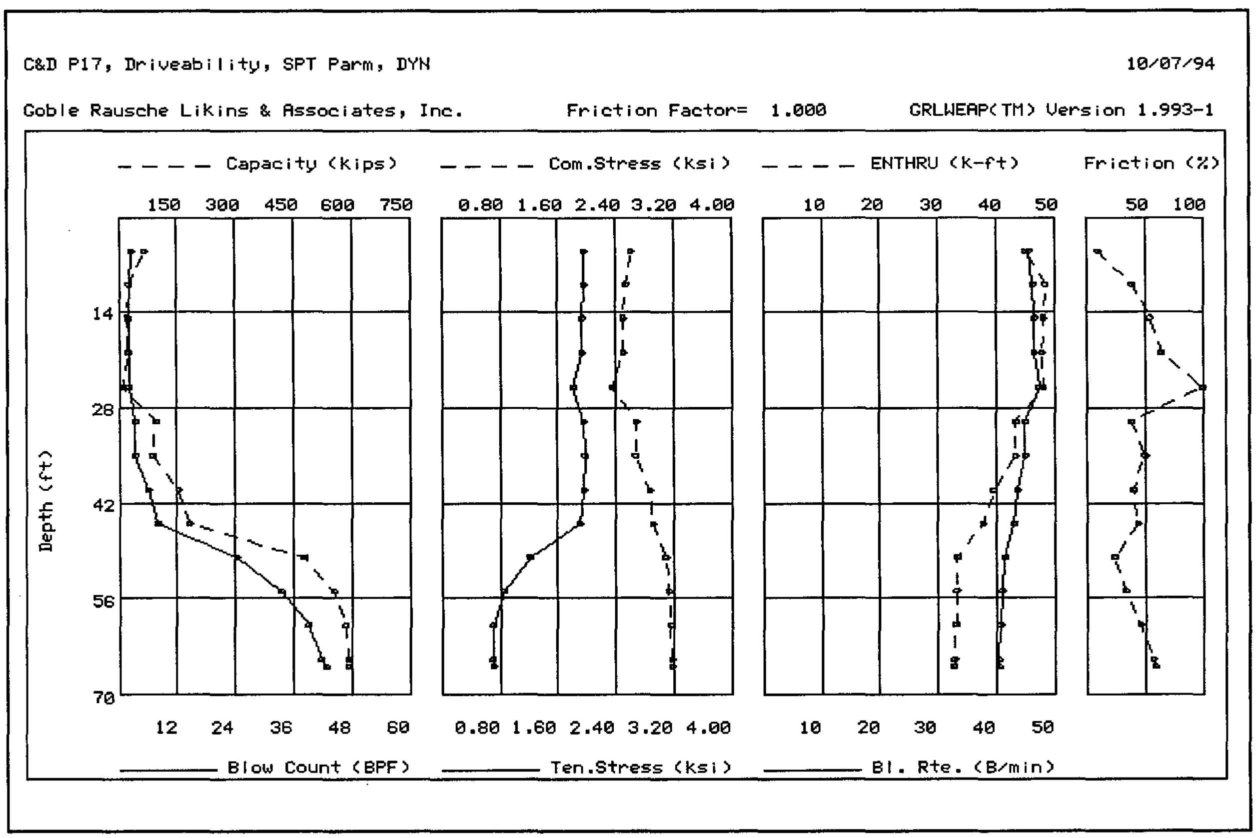

Figure A.65: Driveability Graph SPT-DYN Analysis for C&D Canal, Pier 17, DE

C&D P17, Driveability, MDF Parm, ST   10/07/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
5.0	80.8	6.8	74.0	2.8	2.549	1.859	45.7	45.7
10.0	33.0	11.3	21.7	2.2	2.386	1.794	46.9	46.3
15.0	26.6	13.2	13.4	2.1	2.437	1.857	46.7	48.6
20.0	26.8	16.3	10.5	2.1	2.446	1.868	46.6	48.3
25.0	6.1	6.1	.0	2.1	2.347	1.809	47.3	47.4
30.0	108.1	36.8	71.4	3.7	2.523	1.761	45.6	43.3
35.0	95.6	44.4	51.3	3.4	2.525	1.814	45.6	43.8
40.0	168.9	60.2	108.7	6.1	2.656	1.782	44.3	40.9
45.0	198.2	78.4	119.8	7.6	2.712	1.753	43.9	39.5
50.0	657.9	114.1	543.9	39.5	3.051	1.168	40.9	33.2
55.0	634.6	179.2	455.4	39.5	3.039	1.097	40.9	33.2
60.0	633.8	265.8	368.1	41.9	3.056	1.000	40.9	33.2
65.0	630.8	335.3	295.5	43.2	3.056	.964	40.8	32.9
66.0	627.8	348.2	279.7	43.2	3.061	.967	40.8	32.9

Total Driving Time 22.03 min. only if hammer runs continuously

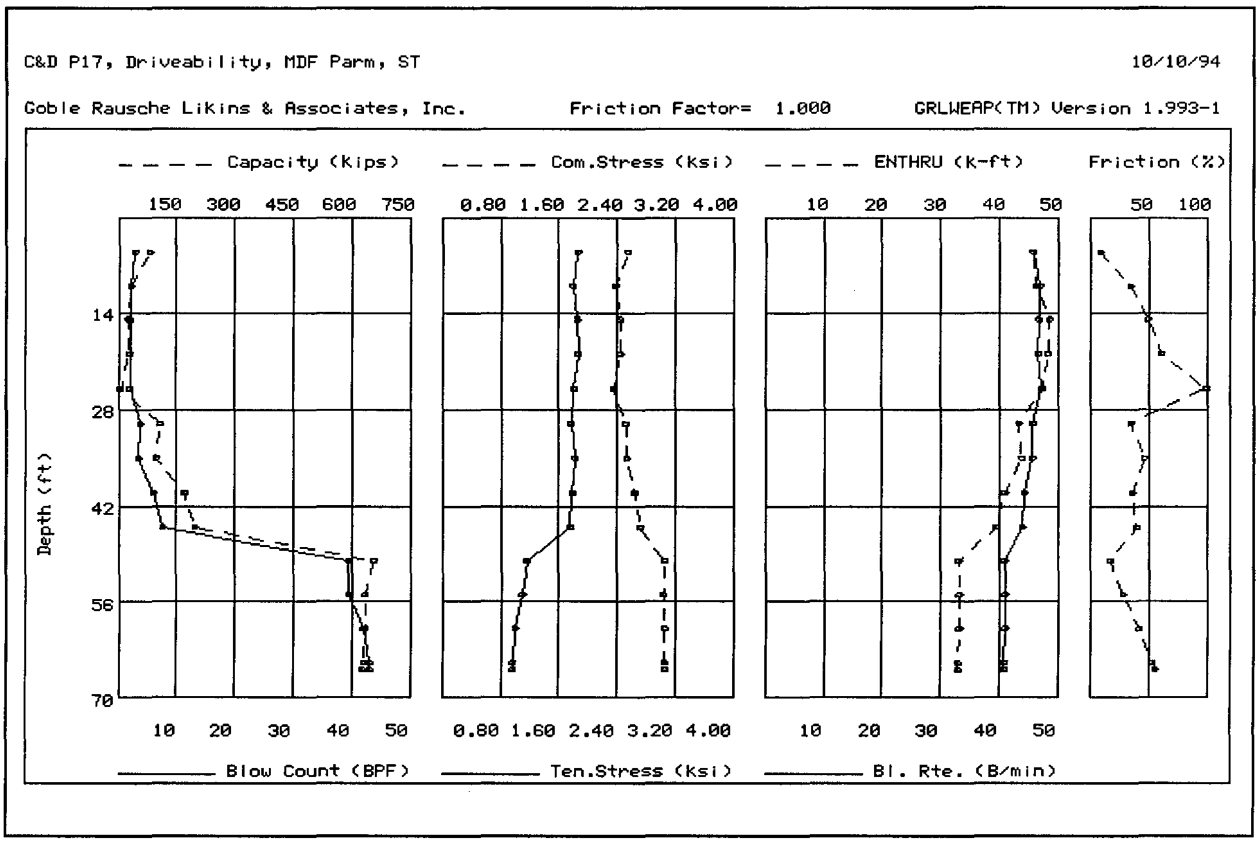

Figure A.66: Driveability Graph MDF-ST Analysis for C&D Canal, Pier 17, DE

C&D P17, Drvblty, STD Parm, MDF Capacity 10/07/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
5.0	90.4	13.4	77.0	3.7	2.603	1.713	45.5	45.2
10.0	56.3	28.0	28.4	2.7	2.603	1.870	45.8	47.1
15.0	56.8	37.0	19.7	2.7	2.605	1.881	45.7	46.8
20.0	61.9	46.2	15.6	2.8	2.604	1.874	45.7	46.7
25.0	43.2	43.2	.0	2.6	2.554	1.878	45.9	48.2
30.0	154.1	77.6	76.5	6.7	2.733	1.700	44.2	41.6
35.0	157.0	100.5	56.5	6.9	2.747	1.756	44.1	41.0
40.0	242.9	129.7	113.2	12.0	2.901	1.577	42.9	38.1
45.0	288.7	164.8	123.9	15.6	2.964	1.513	42.4	36.7
50.0	775.3	229.0	546.2	79.9	3.214	.632	40.1	35.6
55.0	812.1	354.0	458.1	78.5	3.210	.563	40.1	35.5
60.0	889.8	519.5	370.3	81.1	3.217	.397	40.0	35.0
65.0	949.8	652.5	297.3	80.4	3.272	.274	39.7	35.2
66.0	957.8	676.7	281.1	80.3	3.278	.268	39.7	35.0

Total Driving Time 43.31 min. only if hammer runs continuously

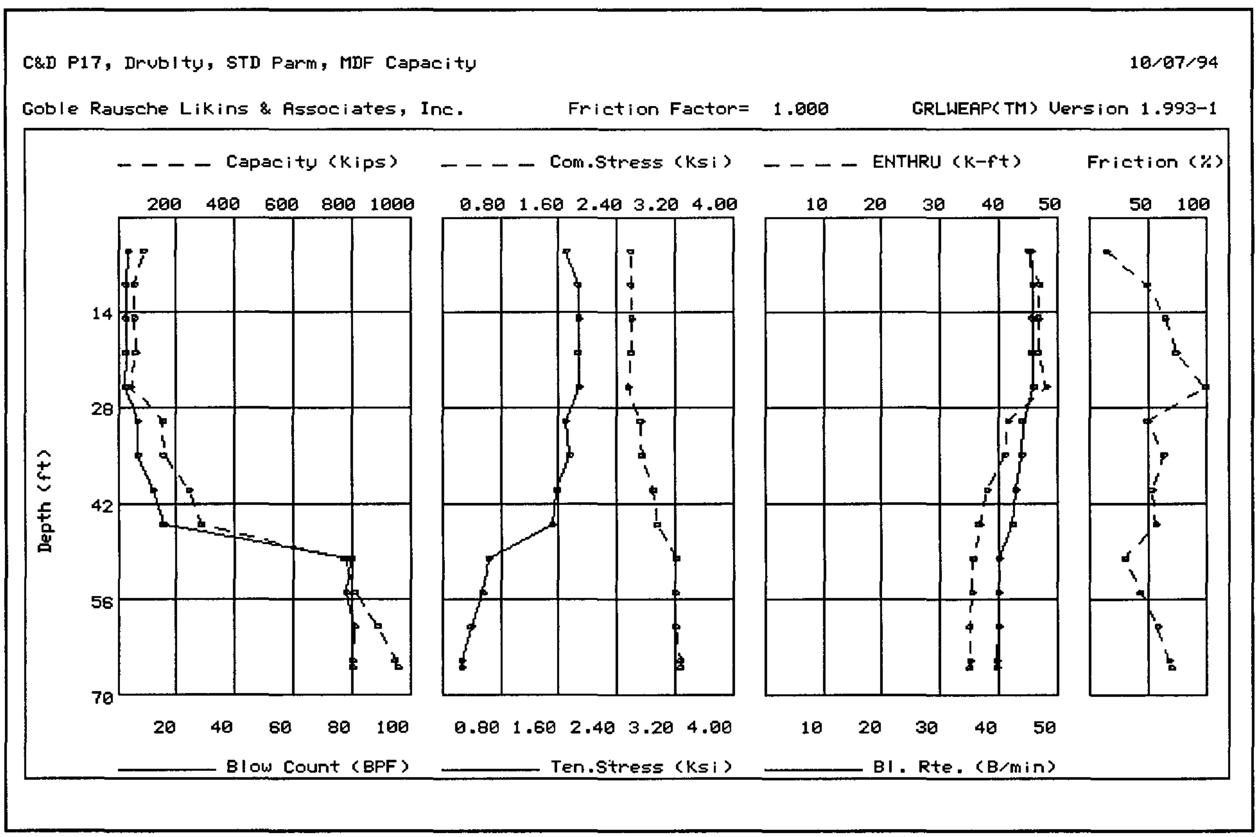

Figure A.67: Driveability Graph MDF-Cap-STD Analysis for C&D Canal, Pier 17, DE

C&D P17, Drvblty, SPT Parm, MDF Capacity 10/07/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
5.0	90.4	13.4	77.0	3.0	2.683	1.964	45.3	44.0
10.0	56.3	28.0	28.4	2.6	2.651	1.980	45.5	45.7
15.0	56.8	37.1	19.7	2.6	2.656	1.973	45.5	45.5
20.0	61.9	46.2	15.6	2.8	2.661	1.966	45.4	44.7
25.0	43.2	43.2	.0	2.7	2.645	1.982	45.5	45.5
30.0	154.1	77.6	76.5	6.2	2.915	1.973	43.6	39.9
35.0	157.0	100.5	56.5	6.9	2.915	1.971	43.5	38.6
40.0	242.9	129.7	113.2	10.9	3.027	1.892	42.5	36.1
45.0	288.7	164.8	123.9	14.3	3.023	1.743	42.3	34.4
50.0	775.3	229.0	546.2	51.1	3.281	.632	40.3	33.9
55.0	812.1	354.0	458.1	62.1	3.374	.238	39.6	34.2
60.0	889.8	519.5	370.3	77.3	3.386	.181	39.5	32.7
65.0	949.9	652.5	297.3	87.7	3.427	.136	39.2	33.3
66.0	957.8	676.7	281.1	89.7	3.432	.108	39.2	33.1

Total Driving Time 37.80 min. only if hammer runs continuously

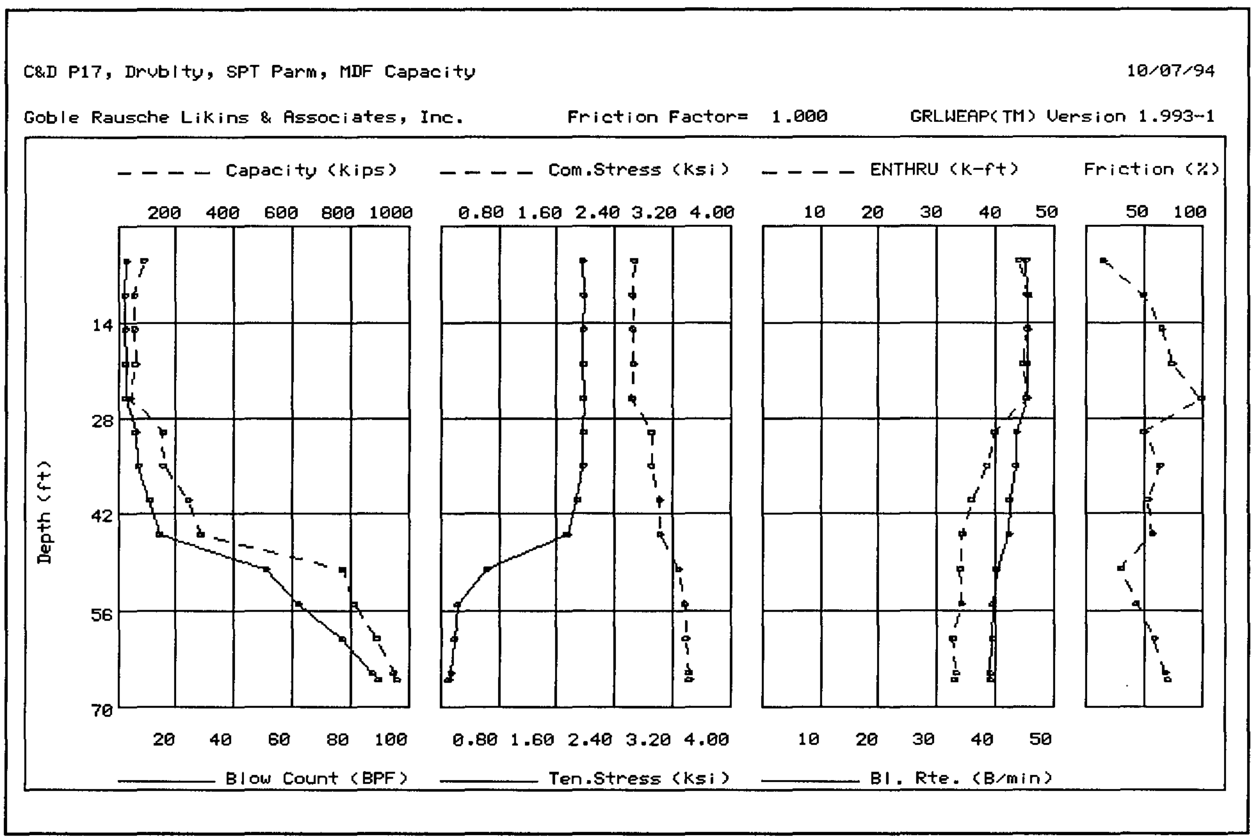

Figure A.68: Driveability Graph MDF-Cap-SPT Analysis for C&D Canal, Pier 17, DE

C&D P21, Driveability, STD Parm, ST 10/10/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
15.0	.0	.0	.0	.0	.000	.000	.0	.0
20.0	75.5	15.2	60.3	3.2	2.420	1.611	45.9	43.8
25.0	78.4	37.0	41.4	3.3	2.425	1.612	45.9	43.4
30.0	168.3	74.6	93.6	7.7	2.598	1.421	44.1	39.7
35.0	142.1	100.7	41.4	6.2	2.576	1.535	44.4	40.6
40.0	304.4	137.4	167.1	17.3	2.780	1.113	42.5	35.4
45.0	372.6	192.9	179.7	22.5	2.858	.991	42.0	33.9
50.0	514.9	282.7	232.2	36.6	2.952	.753	41.2	32.8
55.0	483.0	356.6	126.4	32.4	2.944	.923	41.3	32.5
60.0	564.6	417.1	147.4	43.2	2.974	.845	40.9	31.6
65.0	609.5	481.0	128.5	48.9	2.996	.925	40.7	31.4
70.0	727.5	558.3	169.2	60.8	3.036	.833	40.4	31.3
72.0	785.0	595.4	189.6	63.3	3.113	.795	40.0	32.2

Total Driving Time 33.31 min. only if hammer runs continuously

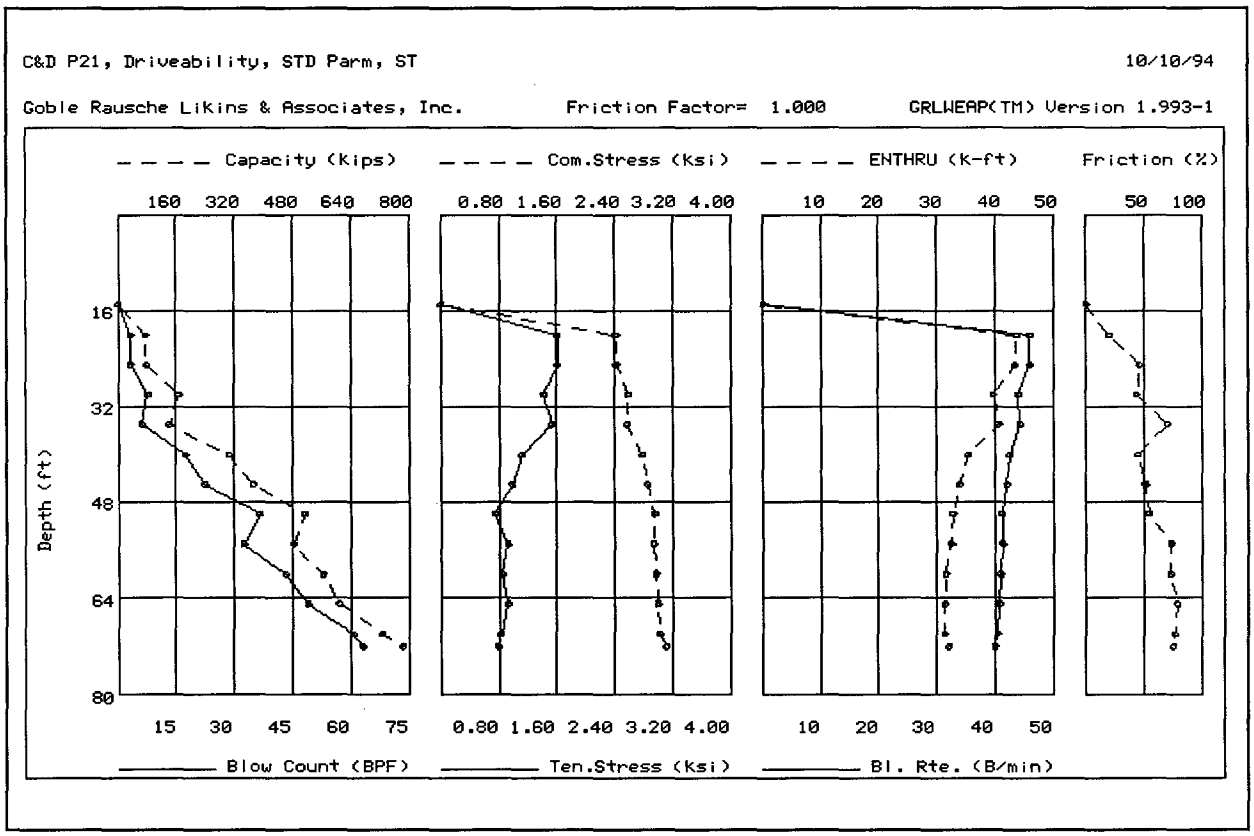

Figure A.69: Driveability Graph STD-ST Analysis for C&D Canal, Pier 21, DE

C&D P21, Driveability, SPT Parm, ST 10/10/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
15.0	.0	.0	.0	.0	.000	.000	.0	.0
20.0	75.5	15.2	60.3	2.9	2.464	1.791	45.8	41.7
25.0	78.4	37.0	41.4	2.8	2.464	1.808	45.8	41.6
30.0	168.3	74.6	93.6	5.6	2.650	1.768	44.2	39.5
35.0	142.1	100.7	41.4	4.3	2.609	1.841	44.6	40.8
40.0	304.4	137.4	167.1	11.8	2.842	1.588	42.6	35.0
45.0	372.6	192.9	179.7	15.7	2.888	1.439	42.1	34.1
50.0	514.9	282.7	232.2	25.9	2.974	1.093	41.4	32.1
55.0	483.0	356.6	126.4	25.5	2.991	1.211	41.4	32.0
60.0	564.6	417.1	147.4	33.5	3.023	1.103	41.0	30.9
65.0	609.5	481.0	128.5	36.5	3.050	1.186	40.8	30.4
70.0	727.5	558.3	169.2	44.1	3.079	1.175	40.5	30.1
72.0	785.0	595.4	189.6	47.6	3.086	1.128	40.4	30.1

Total Driving Time 24.58 min. only if hammer runs continuously

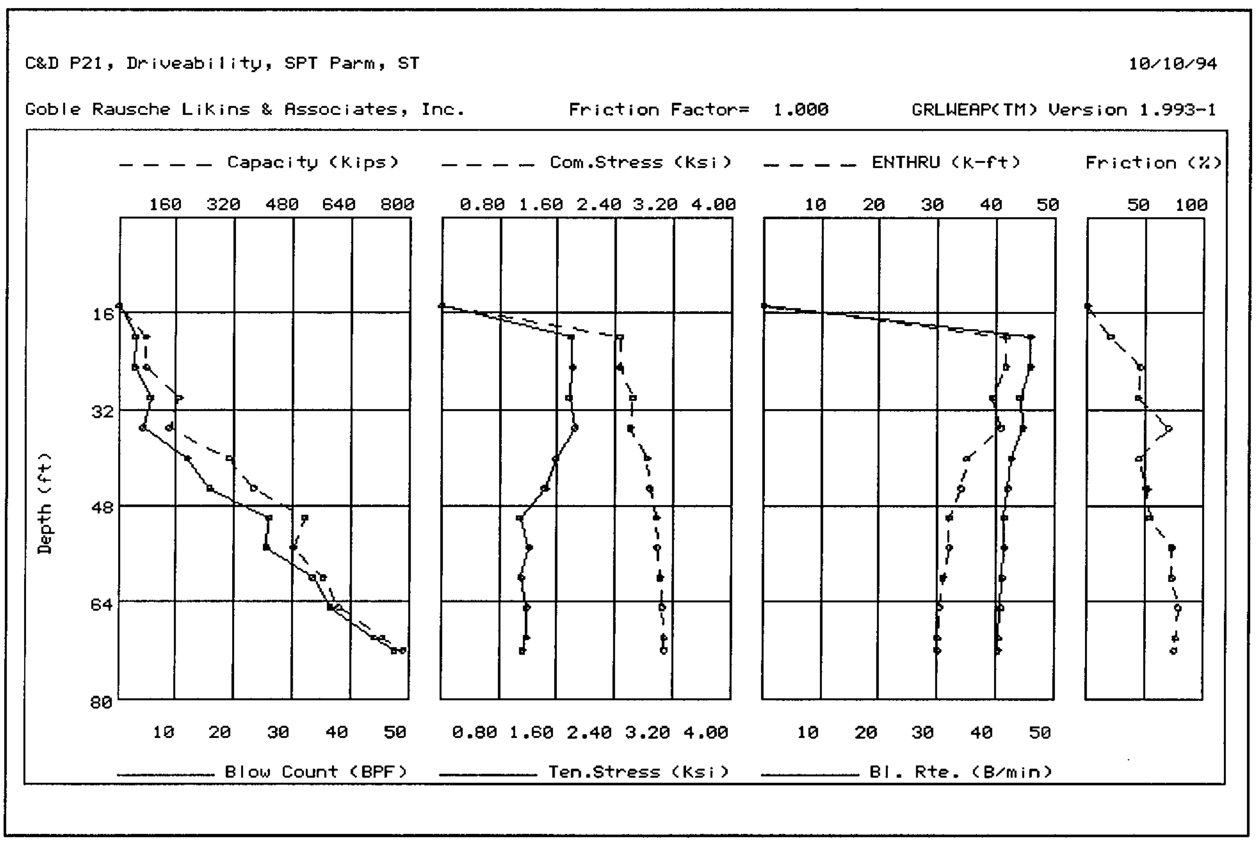

Figure A.70: Driveability Graph SPT-ST Analysis for C&D Canal, Pier 21, DE

C&D P21, Driveability, SPT Parm, DYN 10/10/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
15.0	.0	.0	.0	.0	.000	.000	.0	.0
20.0	59.6	14.6	45.0	2.5	2.441	1.811	46.1	43.3
25.0	69.8	37.3	32.6	2.6	2.461	1.830	45.9	42.3
30.0	151.4	76.8	74.6	4.8	2.624	1.817	44.5	40.3
35.0	138.8	105.0	33.9	4.1	2.604	1.860	44.7	41.0
40.0	298.3	162.8	135.5	10.9	2.842	1.657	42.7	35.2
45.0	388.0	241.8	146.2	16.3	2.899	1.448	42.1	33.5
50.0	525.6	336.6	189.0	26.2	2.987	1.122	41.4	32.0
55.0	517.3	414.8	102.5	27.8	3.011	1.187	41.2	31.5
60.0	597.6	478.3	119.3	35.4	3.042	1.136	40.9	30.5
65.0	646.5	542.4	104.1	38.8	3.066	1.268	40.6	29.9
70.0	754.0	616.4	137.6	45.2	3.084	1.279	40.4	29.6
72.0	805.8	651.9	153.9	47.4	3.098	1.247	40.3	29.7

Total Driving Time 25.37 min. only if hammer runs continuously

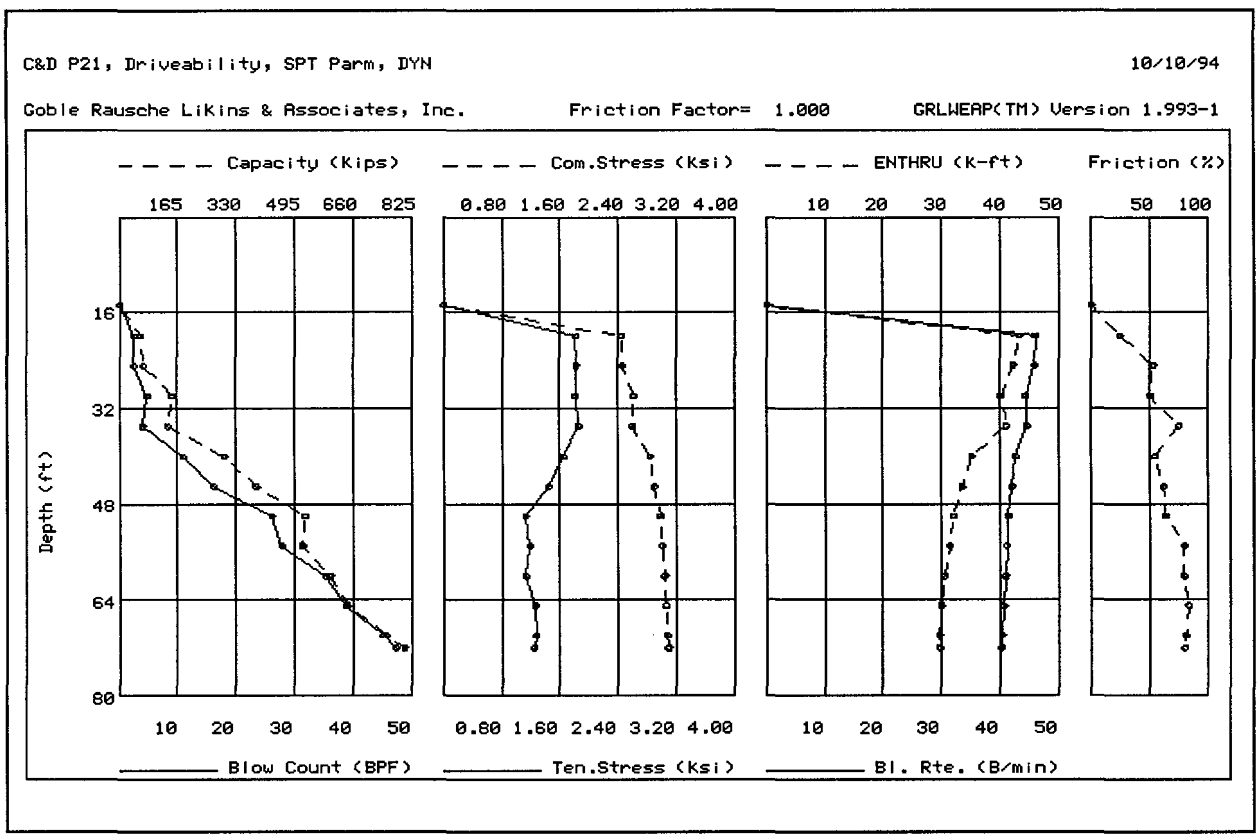

Figure A.71: Driveability Graph SPT-DYN Analysis for C&D Canal, Pier 21, DE

C&D P21, Driveability, MDF Parm, ST 10/10/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
15.0	.0	.0	.0	.0	.000	.000	.0	.0
20.0	75.5	15.2	60.3	2.9	2.419	1.697	46.1	44.5
25.0	78.4	37.0	41.4	3.1	2.425	1.670	46.0	43.9
30.0	168.3	74.6	93.6	6.7	2.582	1.533	44.3	40.2
35.0	142.1	100.7	41.4	5.8	2.562	1.583	44.5	40.8
40.0	304.4	137.4	167.1	15.1	2.773	1.306	42.6	35.5
45.0	372.6	192.9	179.7	20.3	2.859	1.197	42.0	34.2
50.0	514.9	282.7	232.2	32.6	2.921	.926	41.4	32.5
55.0	483.0	356.6	126.4	30.3	2.941	1.053	41.4	32.4
60.0	564.6	417.1	147.4	40.0	2.969	.970	41.0	31.5
65.0	609.5	481.0	128.5	45.5	3.000	1.058	40.8	31.4
70.0	727.5	558.3	169.2	57.8	3.036	.991	40.5	31.2
72.0	785.0	595.4	189.6	61.1	3.071	.925	40.3	31.3

Total Driving Time 30.67 min. only if hammer runs continuously

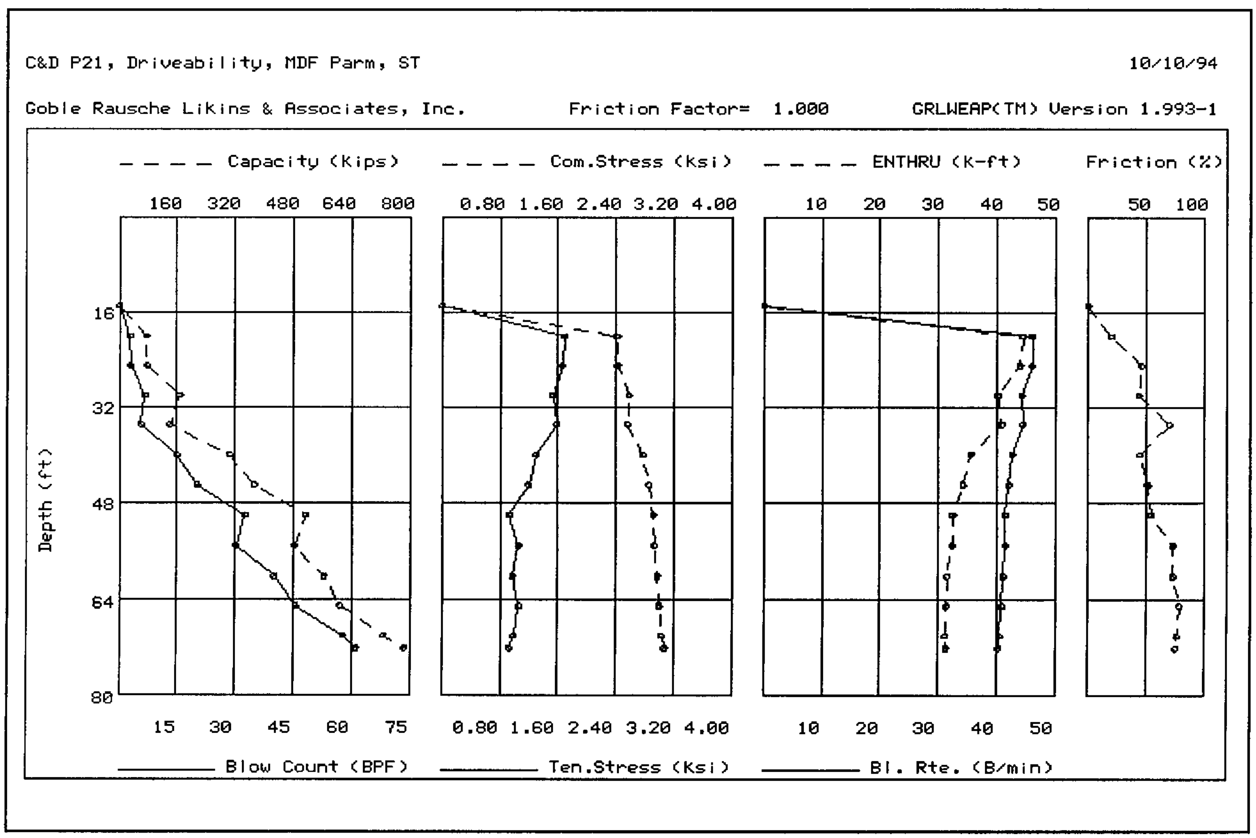

Figure A.72: Driveability Graph MDF-ST Analysis for C&D Canal, Pier 21, DE

C&D P21, Drvblty, STD Parm, MDF Capacity 10/10/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
15.0	.0	.0	.0	.0	.000	.000	.0	.0
20.0	95.9	31.1	64.9	4.0	2.424	1.534	45.7	42.2
25.0	126.6	79.6	46.9	5.4	2.547	1.536	44.8	41.6
30.0	247.9	149.4	98.6	12.6	2.712	1.240	43.0	37.0
35.0	251.4	206.7	44.8	12.9	2.772	1.306	42.8	36.3
40.0	438.4	267.3	171.1	27.8	2.921	.847	41.6	33.2
45.0	557.1	373.8	183.3	41.9	3.018	.677	41.0	32.4
50.0	779.1	544.0	235.1	68.6	3.111	.610	40.3	33.1
55.0	815.7	687.4	128.2	65.5	3.155	.443	40.1	32.7
60.0	949.1	800.2	148.9	75.0	3.198	.419	39.7	31.8
65.0	1050.7	921.1	129.6	81.6	3.235	.596	39.4	31.3
70.0	1235.4	1065.5	169.9	102.7	3.269	.496	39.1	31.5
72.0	1324.9	1134.8	190.2	116.1	3.296	.425	39.0	31.7

Total Driving Time 60.88 min. only if hammer runs continuously

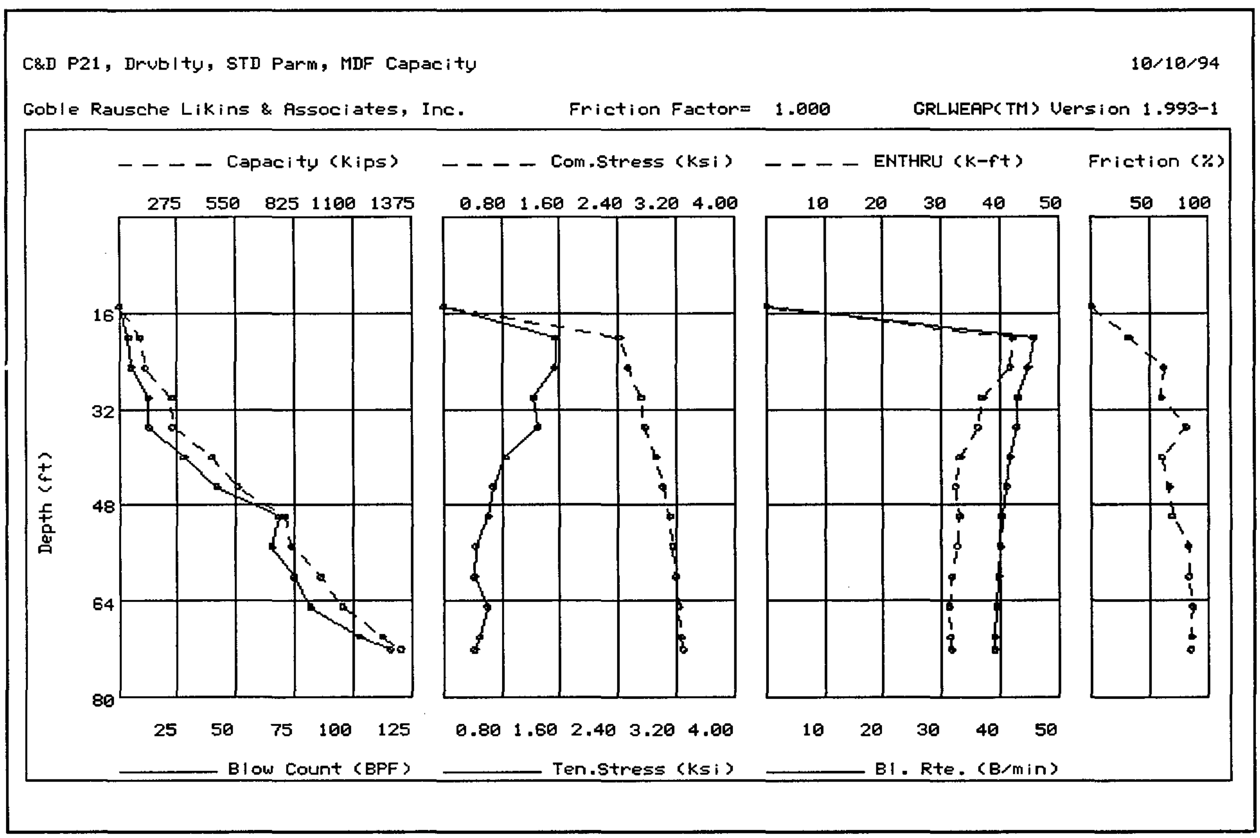

Figure A.73: Driveability Graph MDF-Cap-STD Analysis for C&D Canal, Pier 21, DE

C&D P21, Drvblty, SPT Parm, MDF Capacity 10/10/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
15.0	.0	.0	.0	.0	.000	.000	.0	.0
20.0	95.9	31.1	64.9	3.2	2.563	1.855	45.1	42.3
25.0	126.6	79.6	46.9	3.8	2.592	1.849	44.8	41.4
30.0	247.9	149.4	98.6	8.6	2.783	1.716	43.2	37.1
35.0	251.4	206.7	44.8	8.4	2.798	1.774	43.2	36.9
40.0	438.4	267.3	171.1	18.1	2.964	1.428	41.8	32.4
45.0	557.1	373.8	183.3	25.6	3.020	1.212	41.4	31.6
50.0	779.1	544.0	235.1	45.6	3.138	.723	40.5	31.7
55.0	815.7	687.4	128.2	49.5	3.179	.697	40.3	31.2
60.0	949.1	800.2	148.9	56.9	3.215	.622	39.9	30.4
65.0	1050.7	921.1	129.6	60.8	3.244	.821	39.7	30.5
70.0	1235.4	1065.5	169.9	69.7	3.234	.763	39.5	30.5
72.0	1324.9	1134.8	190.2	77.7	3.206	.667	39.7	29.8

Total Driving Time 42.53 min. only if hammer runs continuously

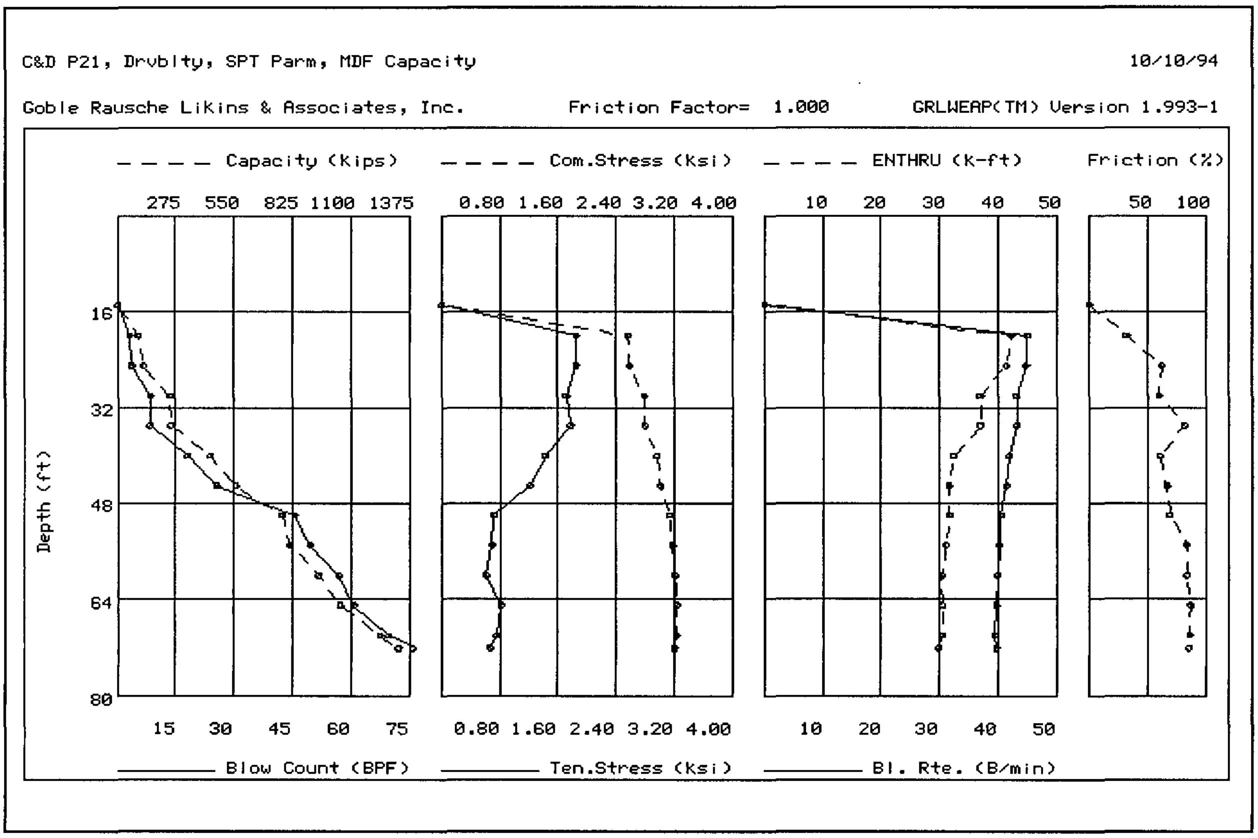

Figure A.74: Driveability Graph MDF-Cap-SPT Analysis for C&D Canal, Pier 21, DE

WHITE CITY, Driveability, STD Parm, ST 10/10/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
3.0	122.2	.0	122.2	6.7	1.652	.674	46.3	29.2
6.0	108.2	.0	108.2	5.6	1.647	.711	46.5	30.9
9.0	94.2	.0	94.2	4.7	1.567	.676	47.4	31.5
12.0	128.3	.0	128.3	7.2	1.644	.649	46.3	28.4
15.0	146.3	.0	146.3	8.8	1.655	.608	46.0	26.4
18.0	37.3	.0	37.3	2.1	1.443	.720	49.3	37.1
21.0	23.3	.0	23.3	1.7	1.367	.678	50.0	39.1
24.0	168.3	.0	168.3	10.8	1.732	.614	45.2	25.5
27.0	90.3	.0	90.3	4.5	1.558	.680	47.5	31.9
30.0	107.1	.6	106.5	5.7	1.563	.636	47.2	29.7
33.0	495.0	4.4	490.5	72.4	1.981	.324	42.1	17.8
35.0	533.2	8.5	524.6	92.1	1.980	.286	42.0	17.3
37.2	620.2	13.5	606.7	143.8	1.982	.201	41.8	16.1

Total Driving Time 16.40 min. only if hammer runs continuously

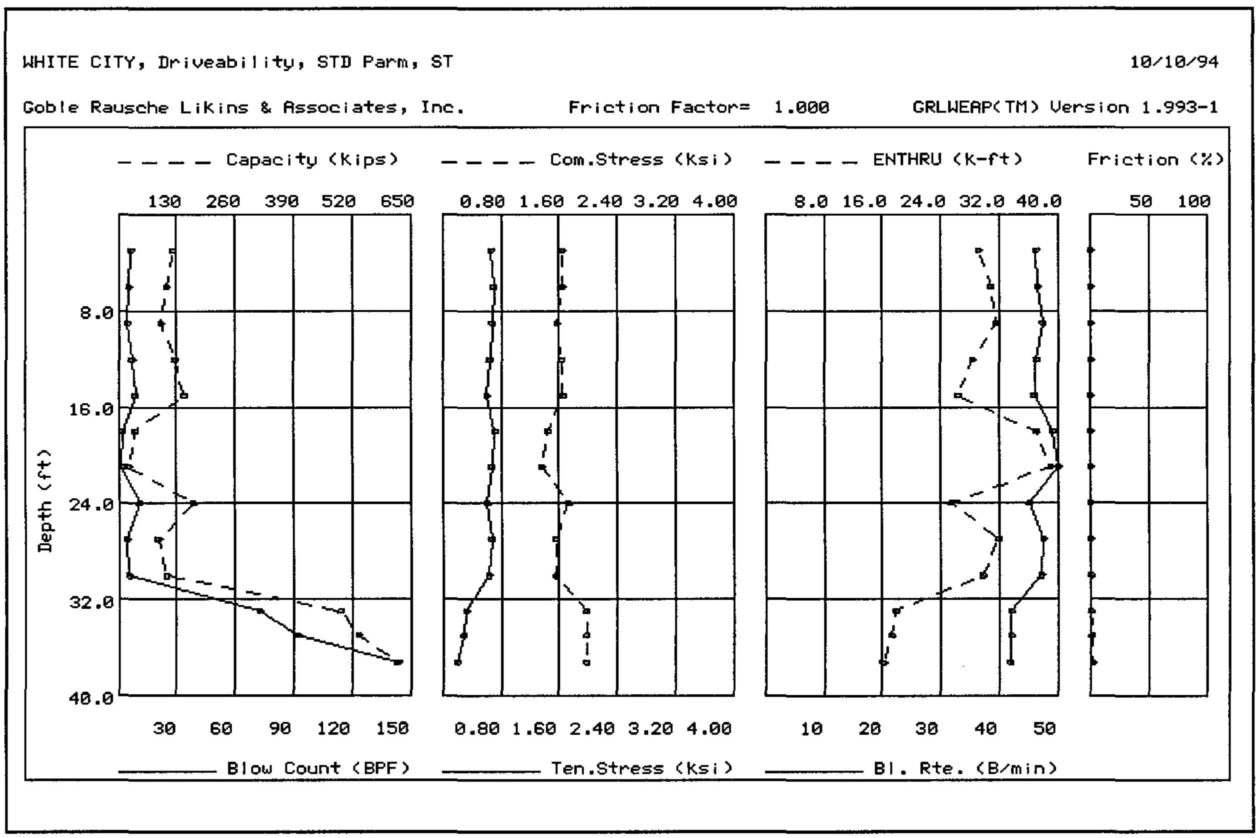

Figure A.75: Driveability Graph STD-ST Analysis for White City Bridge, FL

WHITE CITY, Driveability, SPT Parm, ST 10/10/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
3.0	122.2	.0	122.2	4.0	1.625	.838	47.3	32.6
6.0	108.2	.0	108.2	3.4	1.549	.781	48.0	33.5
9.0	94.2	.0	94.2	2.8	1.536	.791	48.2	35.7
12.0	128.3	.0	128.3	4.5	1.570	.769	47.5	30.5
15.0	146.3	.0	146.3	5.3	1.654	.827	46.7	29.6
18.0	37.3	.0	37.3	1.8	1.416	.745	49.8	36.0
21.0	23.3	.0	23.3	1.6	1.337	.681	50.4	37.3
24.0	168.3	.0	168.3	6.5	1.710	.844	46.1	28.1
27.0	90.3	.0	90.3	2.7	1.491	.750	48.6	35.4
30.0	107.1	.6	106.5	3.5	1.515	.745	48.3	32.9
33.0	495.0	4.4	490.5	35.9	1.907	.493	43.0	18.7
35.0	533.2	8.5	524.6	42.9	1.911	.462	42.8	17.9
37.2	620.2	13.5	606.7	61.3	1.982	.540	42.1	17.2

Total Driving Time 8.08 min. only if hammer runs continuously

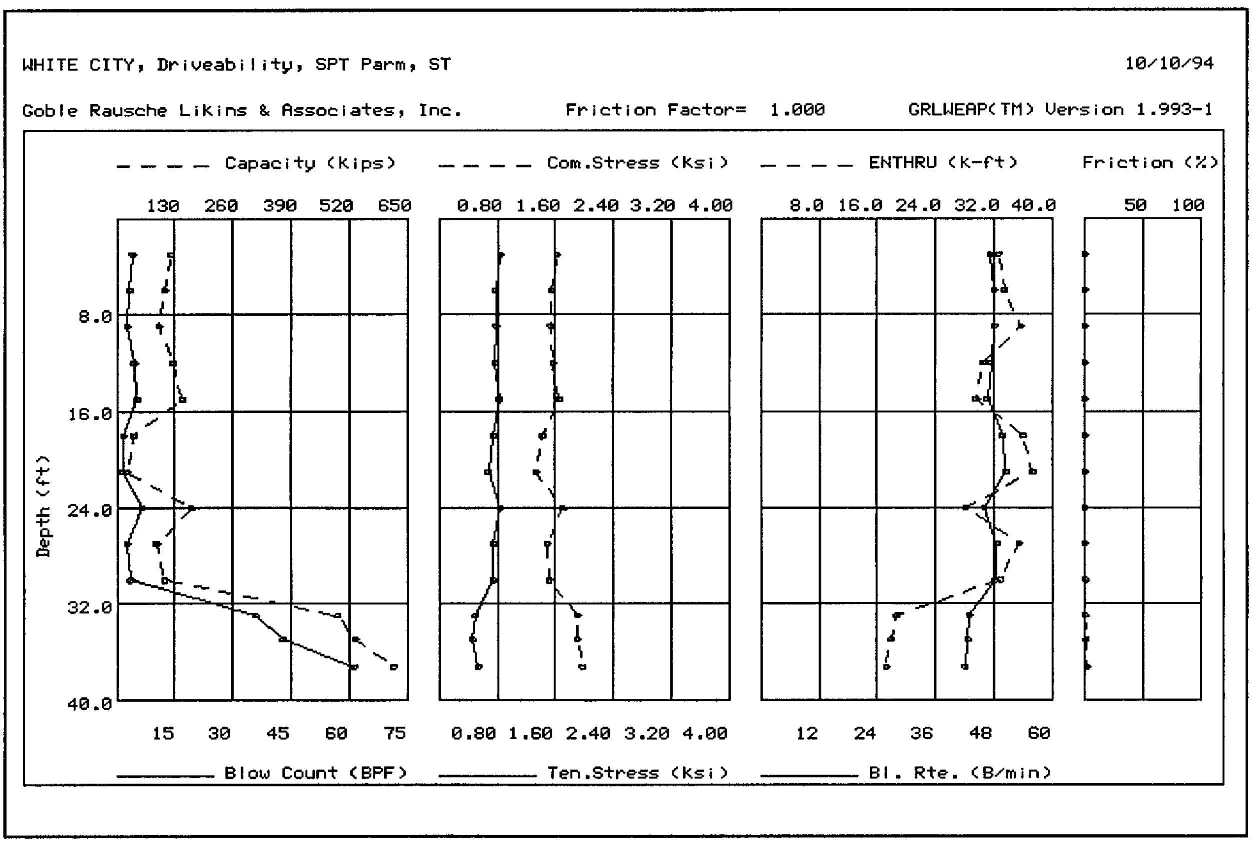

Figure A.76: Driveability Graph SPT-ST Analysis for White City Bridge, FL

WHITE CITY, Driveability, SPT Parm, DYN 10/10/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
3.0	101.2	.0	101.2	4.2	1.564	.719	47.6	33.0
6.0	89.2	.0	89.2	3.5	1.563	.747	47.8	34.4
9.0	78.2	.0	78.2	3.0	1.567	.780	48.0	35.8
12.0	107.3	.0	107.3	4.5	1.557	.696	47.5	32.3
15.0	123.3	.0	123.3	5.5	1.558	.660	47.3	30.6
18.0	28.3	.0	28.3	1.7	1.309	.623	50.4	37.9
21.0	16.3	.0	16.3	1.5	1.204	.535	51.2	39.7
24.0	143.3	.0	143.3	6.7	1.623	.676	46.5	29.6
27.0	76.3	.0	76.3	2.9	1.511	.726	48.4	35.3
30.0	91.1	.6	90.5	3.7	1.508	.687	48.2	33.5
33.0	456.1	4.6	451.6	50.6	1.935	.588	42.7	18.7
35.0	471.9	8.8	463.0	54.8	1.939	.579	42.6	18.5
37.2	538.8	14.0	524.8	82.4	1.937	.527	42.4	17.6

Total Driving Time 10.14 min. only if hammer runs continuously

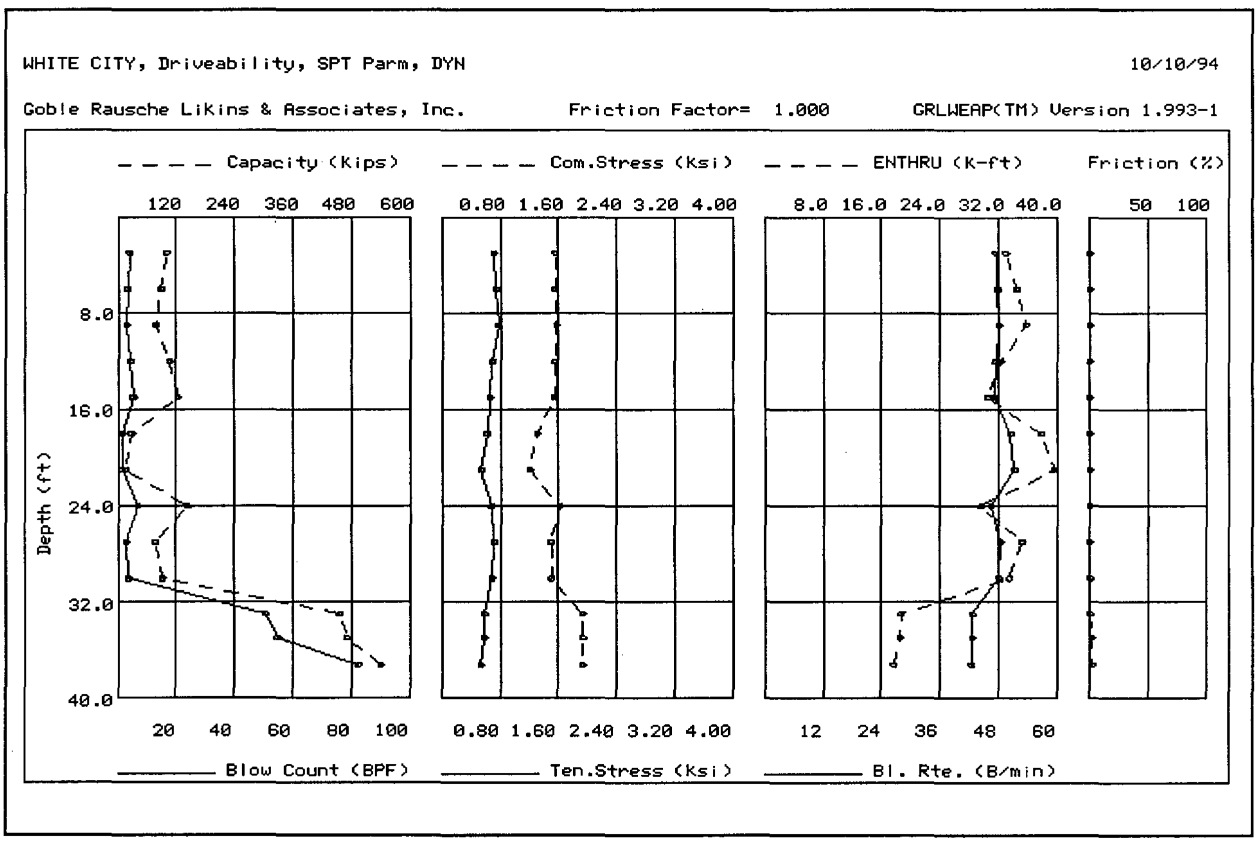

Figure A.77: Driveability Graph SPT-DYN Analysis for White City Bridge, FL

APALACHICOLA, STD, STATIC, DRIVEABILITY 10/10/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
10.0	235.2	20.0	215.2	20.9	1.890	.639	60.0	20.8
15.0	169.4	31.2	138.2	14.4	1.891	.785	60.0	20.8
20.0	92.3	34.0	58.4	7.4	1.891	1.043	60.0	22.1
25.0	102.0	39.5	62.5	8.2	1.891	1.019	60.0	20.8
30.0	134.5	50.9	83.7	11.0	1.891	.919	60.0	20.9
35.0	82.7	47.0	35.7	6.5	1.891	1.113	60.0	21.9
40.0	76.3	49.2	27.1	6.3	1.892	1.144	60.0	20.7
45.0	95.8	57.2	38.6	7.6	1.904	1.074	60.0	20.8
50.0	164.1	71.3	92.7	13.6	1.919	.843	60.0	20.6
55.0	215.5	90.0	125.5	18.4	1.930	.686	60.0	20.5
60.0	268.3	115.1	153.2	23.7	1.938	.538	60.0	20.3
65.0	339.5	143.6	195.9	31.4	1.946	.375	60.0	20.2
70.0	474.1	180.1	294.0	48.5	1.951	.354	60.0	20.2
75.0	428.9	209.2	219.7	41.8	1.951	.330	60.0	20.1
80.0	450.7	229.3	221.4	43.4	1.948	.341	60.0	20.1
85.0	560.1	266.0	294.1	57.3	1.943	.335	60.0	19.8
89.0	655.2	295.0	360.2	76.0	1.932	.353	60.0	19.5

Total Driving Time 32.96 min. for 60.0 bl/min

Blow Rate:	50 bl/min	40 bl/min	30 bl/min
Total Driving Time:	39.55 min	49.44 min	65.92 min

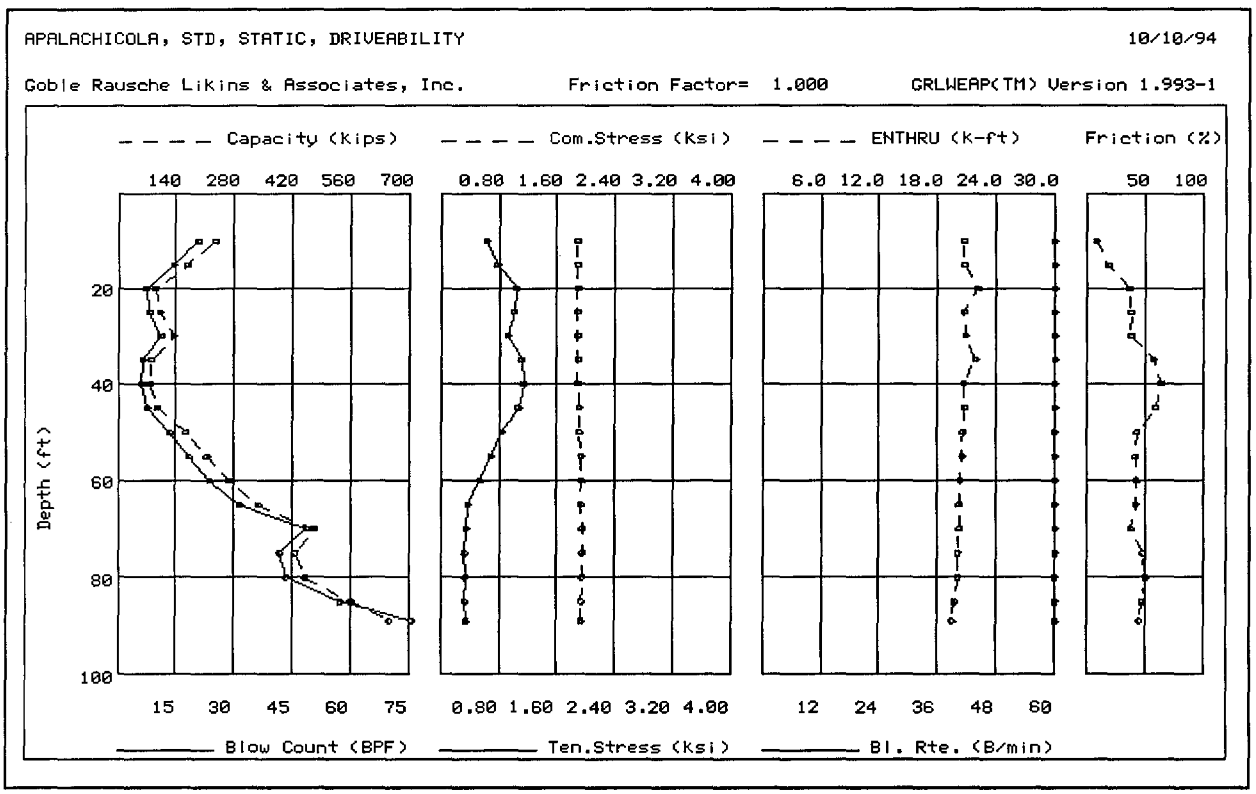

Figure A.78: Driveability Graph STD-ST Analysis for Apalachicola, FL

APALACHICOLA, SPT, STATIC, DRIVEABILITY 10/10/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
10.0	235.2	20.0	215.2	13.1	1.891	.883	60.0	20.8
15.0	169.4	31.2	138.2	10.0	1.891	1.011	60.0	20.9
20.0	92.3	34.0	58.4	6.1	1.890	1.181	60.0	20.6
25.0	102.0	39.5	62.5	6.4	1.891	1.162	60.0	21.7
30.0	134.5	50.9	83.7	8.9	1.897	1.087	60.0	20.6
35.0	82.7	47.0	35.7	6.1	1.906	1.209	60.0	20.5
40.0	76.3	49.2	27.1	6.1	1.912	1.217	60.0	20.5
45.0	95.8	57.2	38.6	6.5	1.923	1.172	60.0	21.8
50.0	164.1	71.3	92.7	10.6	1.940	1.017	60.0	20.6
55.0	215.5	90.0	125.5	13.8	1.948	.871	60.0	20.4
60.0	268.3	115.1	153.2	17.6	1.955	.717	60.0	20.2
65.0	339.5	143.6	195.9	23.1	1.963	.530	60.0	20.5
70.0	474.1	180.1	294.0	32.9	1.966	.491	60.0	20.2
75.0	428.9	209.2	219.7	31.0	1.966	.436	60.0	20.1
80.0	450.7	229.3	221.4	32.4	1.959	.464	60.0	19.9
85.0	560.1	266.0	294.1	40.5	1.949	.558	60.0	19.6
89.0	655.2	295.0	360.2	50.6	1.936	.614	60.0	19.2

Total Driving Time 23.99 min. for 60.0 bl/min

Blow Rate:	50 bl/min	40 bl/min	30 bl/min
Total Driving Time:	28.79 min	35.99 min	47.98 min

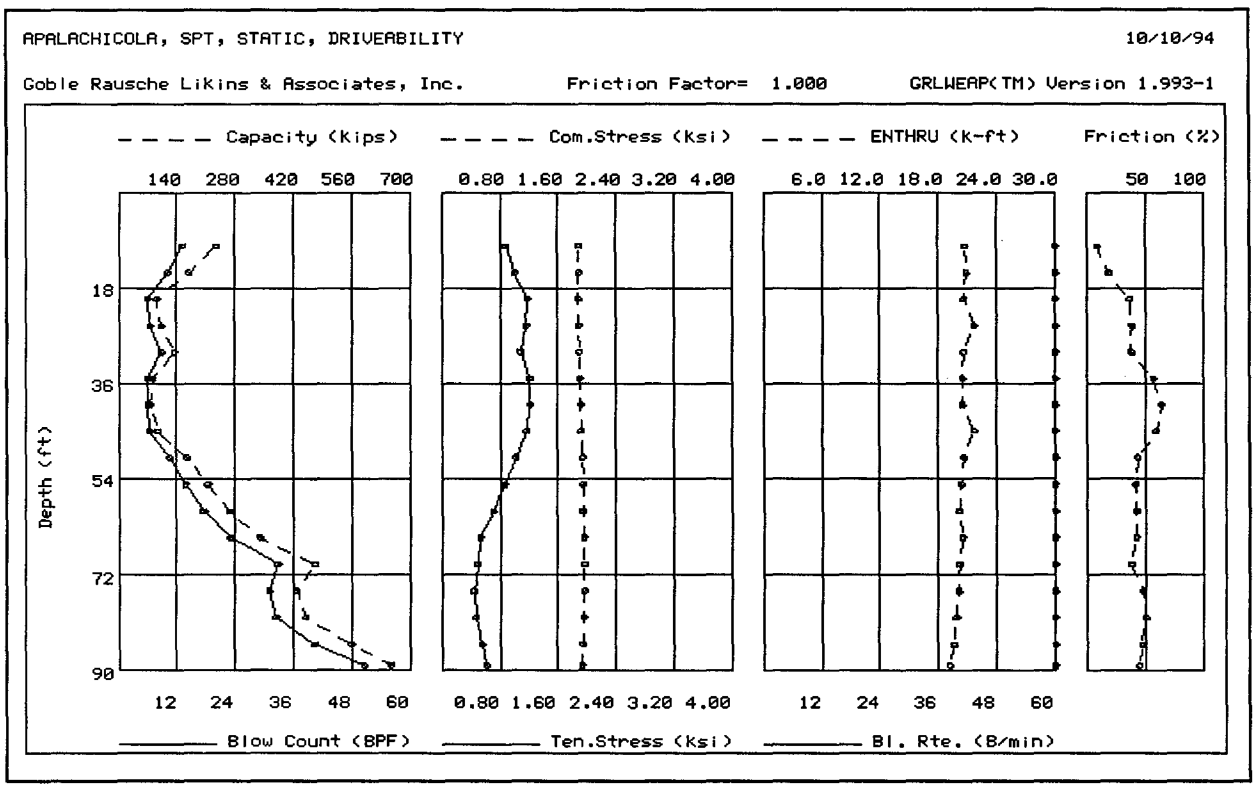

Figure A.79: Driveability Graph SPT-ST Analysis for Apalachicola, FL

APALACHICOLA, SPT, DYNAMIC, DRIVEABILITY 10/10/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
10.0	215.7	26.0	189.6	12.6	1.890	.890	60.0	20.8
15.0	163.8	41.2	122.6	10.2	1.890	.983	60.0	20.9
20.0	102.2	47.1	55.2	6.7	1.891	1.120	60.0	22.1
25.0	112.0	54.4	57.6	7.5	1.891	1.103	60.0	20.9
30.0	146.1	69.4	76.6	9.9	1.896	1.023	60.0	20.8
35.0	102.0	67.9	34.2	7.2	1.914	1.130	60.0	21.0
40.0	99.1	72.4	26.7	7.2	1.927	1.132	60.0	21.0
45.0	119.0	81.8	37.2	9.0	1.940	1.083	60.0	20.5
50.0	181.8	97.2	84.6	12.3	1.955	.938	60.0	20.4
55.0	229.9	116.0	113.9	15.7	1.965	.800	60.0	20.3
60.0	277.7	139.3	138.4	19.2	1.974	.656	60.0	20.1
65.0	339.8	165.3	174.5	24.5	1.984	.560	60.0	20.3
70.0	463.1	200.1	263.1	34.9	1.991	.455	60.0	19.9
75.0	424.3	227.8	196.5	32.8	1.992	.410	60.0	19.8
80.0	445.2	247.2	198.0	34.2	1.984	.428	60.0	19.5
85.0	545.4	282.3	263.1	42.7	1.971	.487	60.0	19.3
89.0	632.6	310.2	322.4	53.9	1.953	.463	60.0	18.9

Total Driving Time 25.85 min. for 60.0 bl/min

Blow Rate:	50 bl/min	40 bl/min	30 bl/min
Total Driving Time:	31.02 min	38.78 min	51.70 min

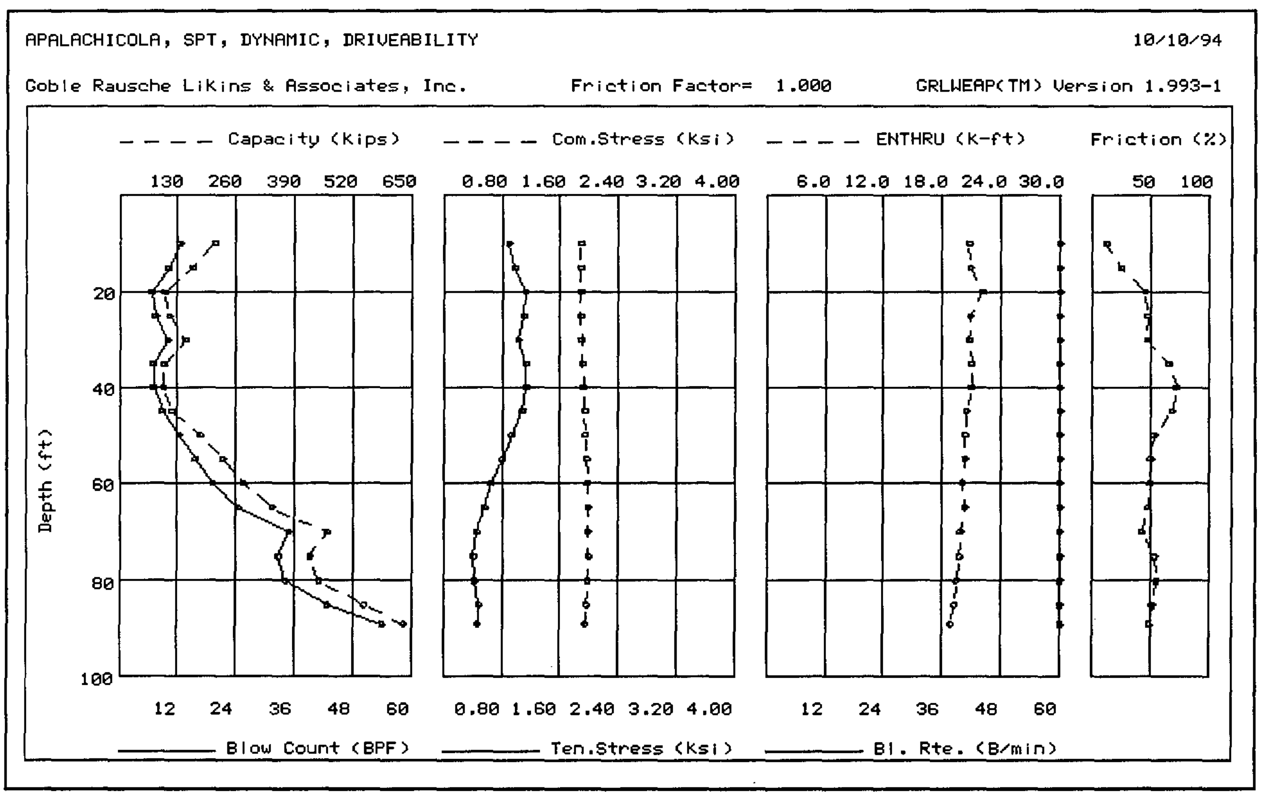

Figure A.80: Driveability Graph SPT-DYN Analysis for Apalachicola, FL

APALACHICOLA, MDF, STATIC, DRIVEABILITY 10/10/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
10.0	235.2	20.0	215.2	14.4	1.891	.903	60.0	20.8
15.0	169.4	31.2	138.2	10.7	1.891	1.003	60.0	20.9
20.0	92.3	34.0	58.4	6.5	1.891	1.161	60.0	20.7
25.0	102.0	39.5	62.5	6.7	1.891	1.143	60.0	21.2
30.0	134.5	50.9	83.7	9.4	1.891	1.067	60.0	20.6
35.0	82.7	47.0	35.7	6.4	1.891	1.187	60.0	20.6
40.0	76.3	49.2	27.1	6.3	1.892	1.202	60.0	20.6
45.0	95.8	57.2	38.6	6.7	1.904	1.153	60.0	21.9
50.0	164.1	71.3	92.7	11.2	1.919	.998	60.0	20.6
55.0	215.5	90.0	125.5	15.0	1.930	.866	60.0	20.5
60.0	268.3	115.1	153.2	19.3	1.937	.727	60.0	20.4
65.0	339.5	143.6	195.9	25.8	1.945	.567	60.0	20.2
70.0	474.1	180.1	294.0	40.3	1.951	.454	60.0	20.1
75.0	428.9	209.2	219.7	35.6	1.952	.448	60.0	20.1
80.0	450.7	229.3	221.4	38.0	1.949	.486	60.0	20.0
85.0	560.1	266.0	294.1	48.2	1.943	.432	60.0	19.8
89.0	655.2	295.0	360.2	61.3	1.933	.451	60.0	19.5

Total Driving Time 27.27 min. for 60.0 bl/min

Blow Rate:	50 bl/min	40 bl/min	30 bl/min
Total Driving Time:	32.72 min	40.90 min	54.54 min

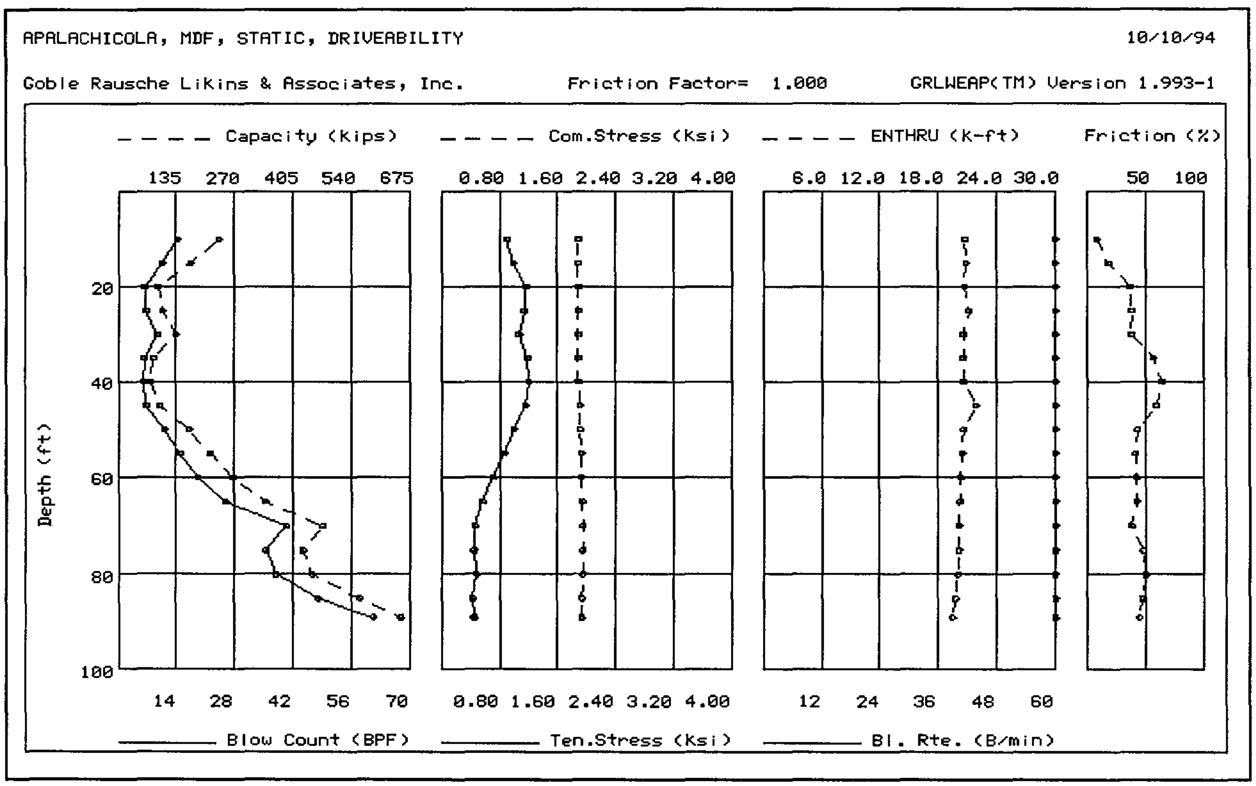

Figure A.81: Driveability Graph MDF-ST Analysis for Apalachicola, FL

APALACHICOLA, Drvblty, MDF CAPACITY, STD 10/10/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
10.0	249.5	32.2	217.3	22.4	1.899	.614	60.0	20.8
15.0	194.9	51.7	143.2	16.9	1.899	.721	60.0	20.8
20.0	126.0	60.7	65.2	10.4	1.899	.939	60.0	20.9
25.0	139.9	70.3	69.6	11.6	1.899	.908	60.0	20.8
30.0	177.1	87.3	89.8	15.0	1.899	.806	60.0	20.8
35.0	129.6	87.9	41.7	10.8	1.906	.986	60.0	20.8
40.0	125.8	93.6	32.3	10.5	1.923	1.015	60.0	20.8
45.0	148.5	104.4	44.1	12.2	1.934	.939	60.0	20.6
50.0	218.4	120.5	97.9	18.6	1.945	.727	60.0	20.5
55.0	280.7	150.0	130.7	25.1	1.952	.561	60.0	20.3
60.0	348.1	190.0	158.0	32.2	1.960	.397	60.0	20.2
65.0	436.3	235.5	200.8	44.1	1.965	.342	60.0	20.0
70.0	590.0	292.1	298.0	66.7	1.970	.400	60.0	19.8
75.0	565.5	341.7	223.8	59.8	1.968	.492	60.0	19.7
80.0	600.4	375.3	225.1	64.9	1.968	.486	60.0	19.5
85.0	713.7	416.1	297.6	93.7	1.961	.447	60.0	19.1
89.0	827.9	464.1	363.8	150.1	1.949	.419	60.0	18.7

Total Driving Time 48.07 min. for 60.0 bl/min

Blow Rate:	50 bl/min	40 bl/min	30 bl/min
Total Driving Time:	57.68 min	72.10 min	96.14 min

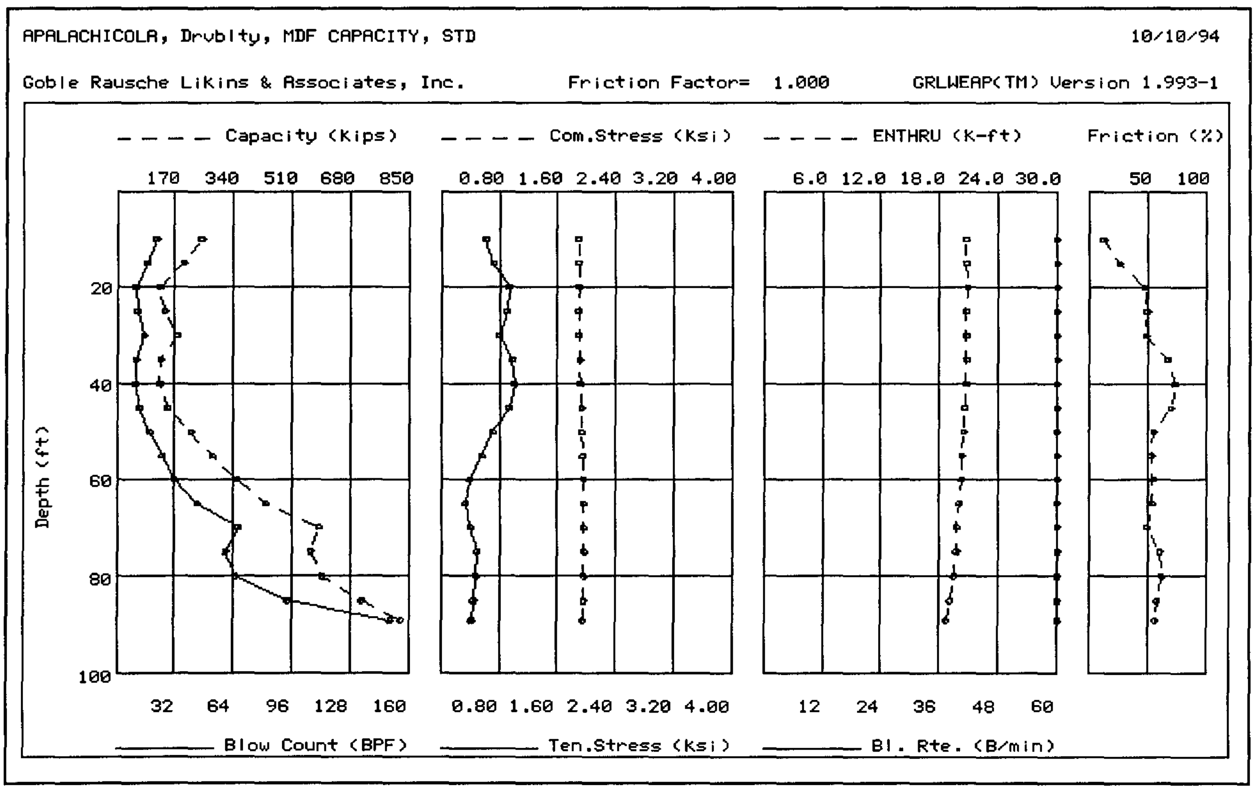

Figure A.82: Driveability Graph MDF-Cap-STD Analysis for Apalachicola, FL

APALACHICOLA, Drvblty, MDF CAPACITY, SPT 10/10/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
10.0	249.5	32.2	217.3	14.3	1.899	.858	60.0	20.7
15.0	194.9	51.7	143.2	11.8	1.899	.950	60.0	20.7
20.0	126.0	60.7	65.2	8.3	1.899	1.097	60.0	20.7
25.0	139.9	70.3	69.6	9.6	1.908	1.076	60.0	20.7
30.0	177.1	87.3	89.8	11.7	1.940	.991	60.0	20.6
35.0	129.6	87.9	41.7	9.5	1.963	1.100	60.0	20.6
40.0	125.8	93.6	32.3	9.5	1.975	1.104	60.0	20.6
45.0	148.5	104.4	44.1	10.7	1.983	1.048	60.0	20.5
50.0	218.4	120.5	97.9	14.8	1.996	.888	60.0	20.3
55.0	280.7	150.0	130.7	19.1	2.006	.706	60.0	20.0
60.0	348.1	190.0	158.0	24.7	2.018	.504	60.0	20.3
65.0	436.3	235.5	200.8	32.2	2.026	.443	60.0	19.8
70.0	590.0	292.1	298.0	44.1	2.031	.583	60.0	19.5
75.0	565.5	341.7	223.8	43.0	2.029	.563	60.0	19.2
80.0	600.4	375.3	225.1	46.8	2.018	.555	60.0	18.8
85.0	713.7	416.1	297.6	62.6	1.994	.550	60.0	18.3
89.0	827.9	464.1	363.8	92.2	1.972	.515	60.0	17.9

Total Driving Time 34.20 min. for 60.0 bl/min

Blow Rate:	50 bl/min	40 bl/min	30 bl/min
Total Driving Time:	41.04 min	51.30 min	68.40 min

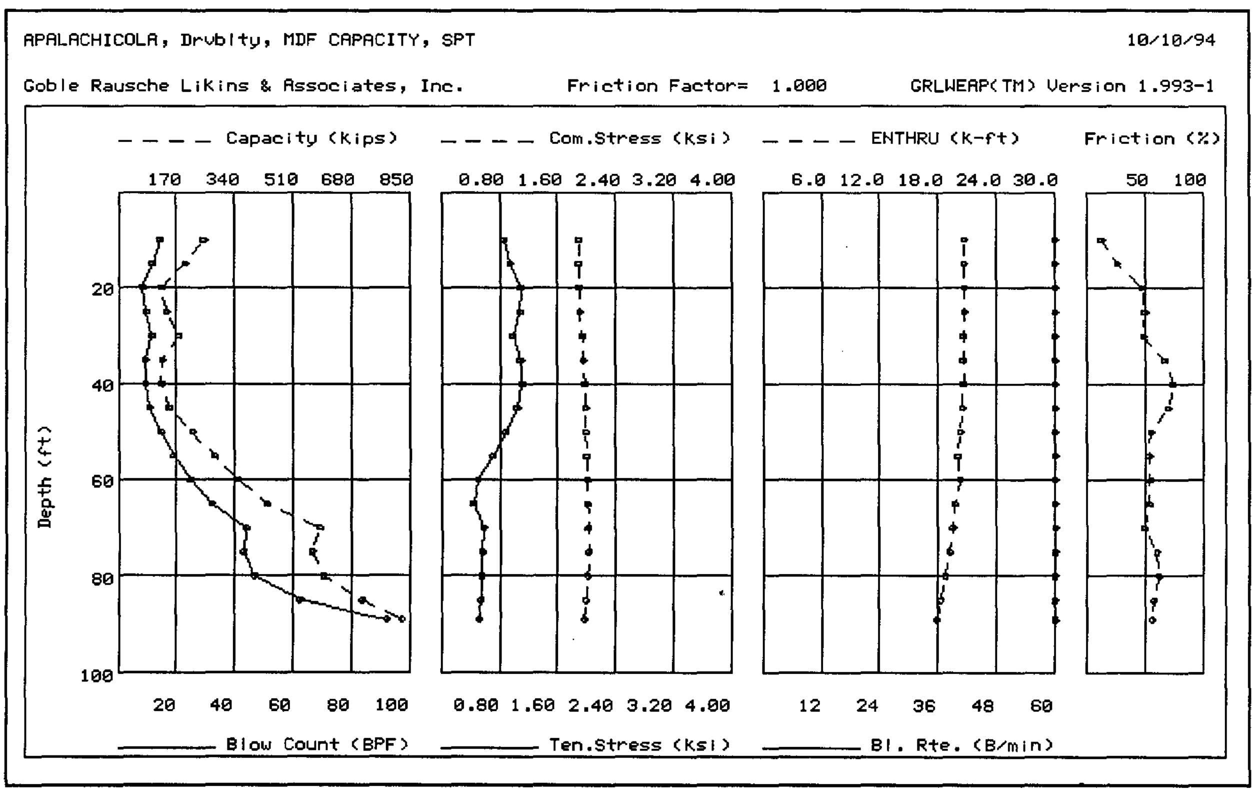

Figure A.83: Driveability Graph MDF-Cap-SPT Analysis for Apalachicola, FL

Aucilla, Driveability, STD, Static 10/10/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
5.0	221.0	19.0	201.9	32.3	1.615	.216	60.0	13.1
10.0	89.3	49.1	40.2	11.7	1.615	.384	60.0	13.0
15.0	170.2	89.6	80.6	22.8	1.616	.332	60.0	13.1
20.0	237.8	120.2	117.6	33.7	1.639	.444	60.0	13.0
25.0	263.8	144.2	119.6	37.4	1.695	.483	60.0	13.0
30.0	287.7	166.8	120.9	41.3	1.765	.418	60.0	12.9
35.0	384.4	197.8	186.6	61.5	1.835	.609	60.0	12.6
40.0	490.2	238.6	251.6	101.0	1.888	.620	60.0	12.2
45.0	394.2	269.3	124.9	63.9	1.888	.510	60.0	12.1
50.0	311.3	279.8	31.5	45.0	1.844	.298	60.0	12.0
55.0	709.4	290.9	418.5	769.7	1.823	.255	60.0	10.9
60.0	599.5	290.5	309.1	256.8	1.774	.159	60.0	10.5
63.0	667.7	291.5	376.1	573.9	1.763	.113	60.0	10.2

Total Driving Time 133.15 min. for 60.0 bl/min

Blow Rate:	50 bl/min	40 bl/min	30 bl/min
Total Driving Time:	159.78 min	199.72 min	266.30 min

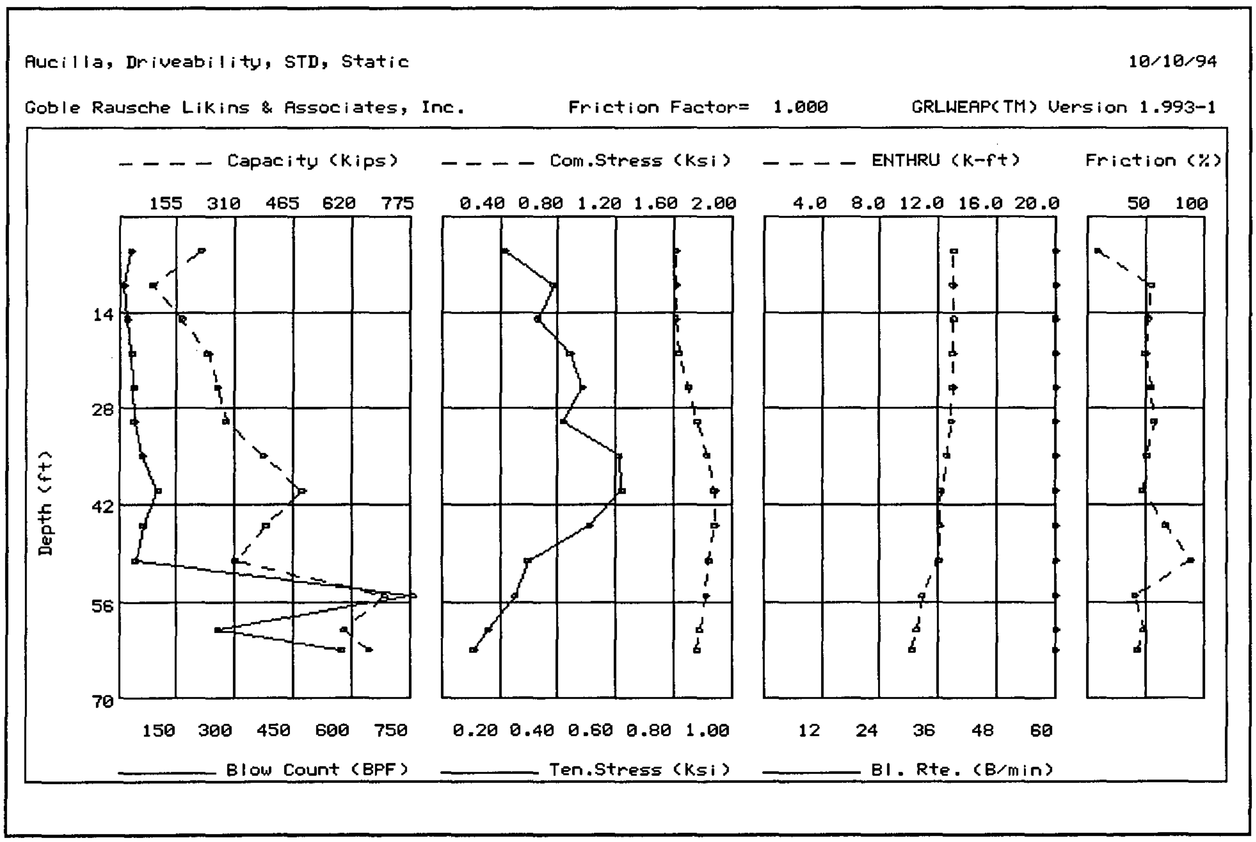

Figure A.84: Driveability Graph STD-ST Analysis for Aucilla, FL

Aucilla, Driveability, STD, Dynamic 10/10/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
5.0	221.0	19.0	201.9	32.3	1.615	.216	60.0	13.1
10.0	89.3	49.1	40.2	11.7	1.615	.384	60.0	13.0
15.0	167.5	87.1	80.4	22.4	1.616	.333	60.0	13.1
20.0	182.6	115.8	66.8	24.7	1.635	.242	60.0	13.0
25.0	216.4	147.6	68.7	30.5	1.690	.447	60.0	13.0
30.0	245.8	175.9	69.8	34.6	1.760	.533	60.0	12.9
35.0	312.8	205.5	107.3	45.8	1.831	.373	60.0	12.8
40.0	383.4	239.3	144.1	61.0	1.887	.574	60.0	12.4
45.0	339.9	267.3	72.6	50.7	1.892	.414	60.0	12.3
50.0	301.8	283.7	18.1	43.2	1.853	.265	60.0	12.0
55.0	580.7	298.8	281.9	202.0	1.829	.253	60.0	11.0
60.0	506.8	298.6	208.3	122.7	1.782	.156	60.0	10.6
63.0	553.0	299.7	253.2	176.6	1.769	.112	60.0	10.2

Total Driving Time 59.16 min. for 60.0 bl/min

Blow Rate:	50 bl/min	40 bl/min	30 bl/min
Total Driving Time:	70.99 min	88.74 min	118.32 min

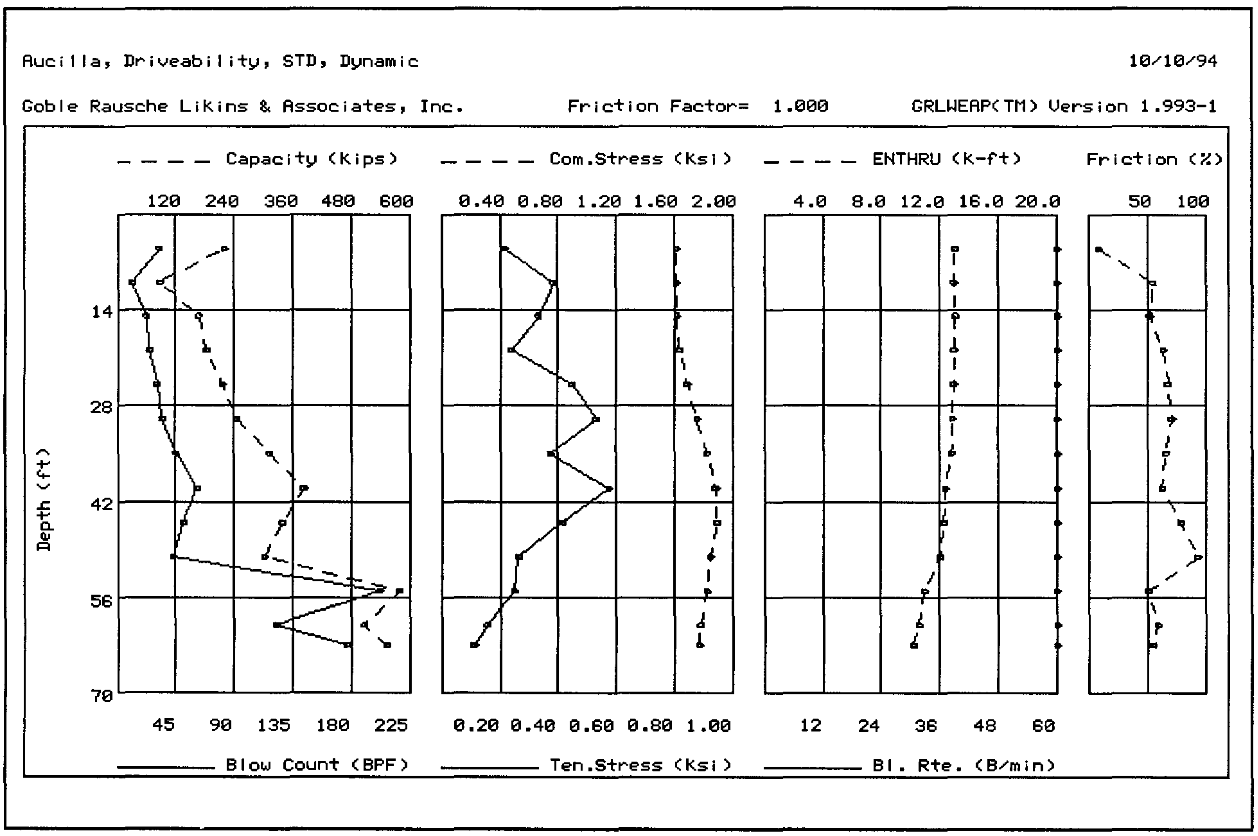

Figure A.85: Driveability Graph STD-DYN Analysis for Aucilla, FL

Aucilla, Driveability, SPT, Static 10/10/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
5.0	221.0	19.0	201.9	19.9	1.616	.461	60.0	13.0
10.0	89.3	49.1	40.2	10.6	1.617	.474	60.0	13.0
15.0	170.2	89.6	80.6	20.2	1.688	.320	60.0	13.1
20.0	237.8	120.2	117.6	29.9	1.784	.360	60.0	12.9
25.0	263.8	144.2	119.6	33.5	1.855	.338	60.0	12.7
30.0	287.7	166.8	120.9	36.7	1.906	.479	60.0	12.3
35.0	384.4	197.8	186.6	49.1	1.953	.524	60.0	11.7
40.0	490.2	238.6	251.6	73.3	1.972	.513	60.0	11.1
45.0	394.2	269.3	124.9	54.9	1.933	.341	60.0	10.7
50.0	311.3	279.8	31.5	43.4	1.871	.332	60.0	10.3
55.0	709.4	290.9	418.5	434.1	1.859	.241	60.0	9.6
60.0	599.5	290.5	309.1	209.5	1.846	.166	60.0	9.1
63.0	667.7	291.5	376.1	369.4	1.848	.114	60.0	8.7

Total Driving Time 90.32 min. for 60.0 bl/min

Blow Rate:	50 bl/min	40 bl/min	30 bl/min
Total Driving Time:	108.38 min	135.48 min	180.64 min

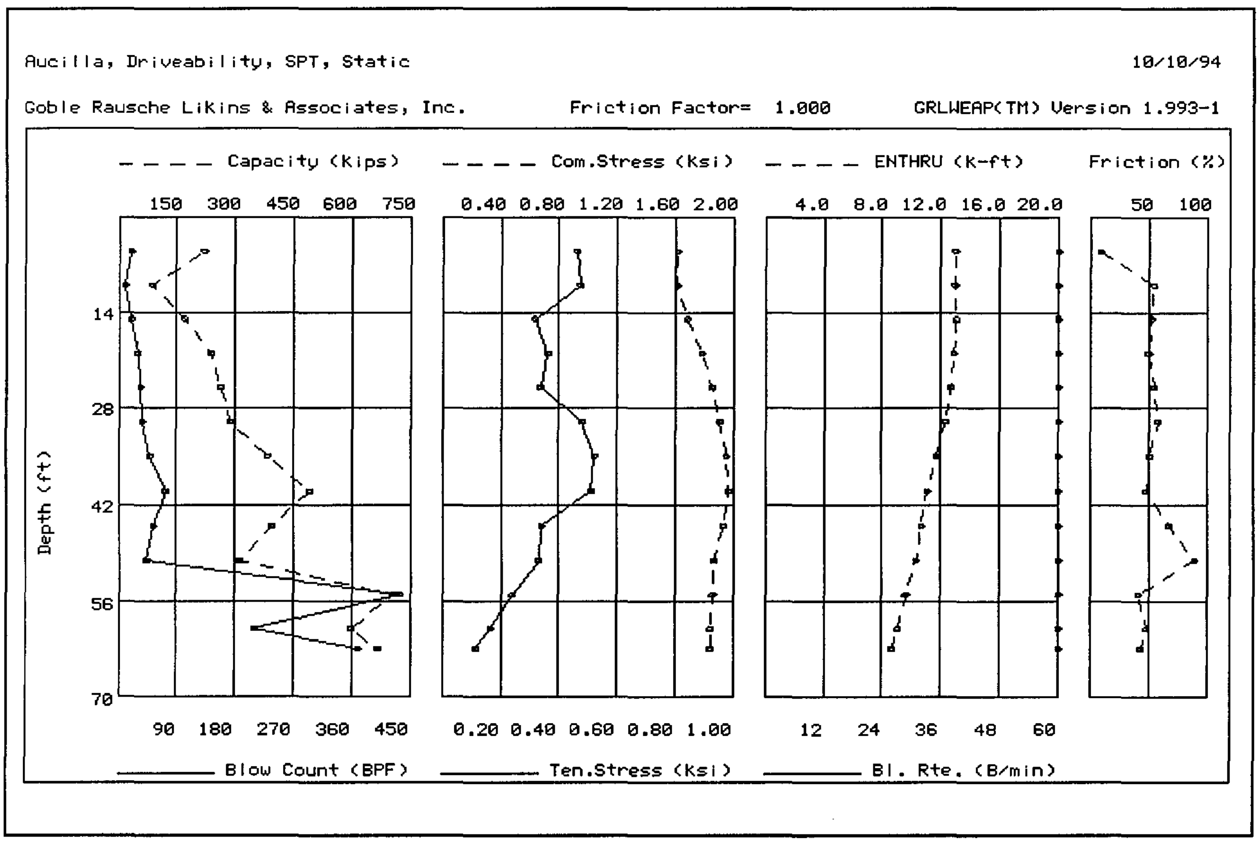

Figure A.86: Driveability Graph SPT-ST Analysis for Aucilla, FL

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
5.0	221.0	19.0	201.9	26.5	1.619	.190	60.0	13.0
10.0	89.3	49.1	40.2	11.0	1.615	.434	60.0	13.0
15.0	167.5	87.1	80.4	21.3	1.635	.333	60.0	13.2
20.0	182.6	115.8	66.8	24.5	1.716	.441	60.0	13.1
25.0	216.4	147.6	68.7	29.7	1.796	.427	60.0	13.0
30.0	245.8	175.9	69.8	33.0	1.858	.351	60.0	12.7
35.0	312.8	205.5	107.3	41.1	1.922	.565	60.0	12.2
40.0	383.4	239.3	144.1	52.5	1.964	.603	60.0	11.5
45.0	339.9	267.3	72.6	46.0	1.945	.504	60.0	11.4
50.0	301.8	283.7	18.1	41.1	1.877	.507	60.0	11.2
55.0	580.7	298.8	281.9	149.7	1.854	.302	60.0	10.0
60.0	506.8	298.6	208.3	98.9	1.822	.183	60.0	9.7
63.0	553.0	299.7	253.2	191.4	1.818	.074	60.0	9.2

Total Driving Time 51.10 min. for 60.0 bl/min

Blow Rate:	50 bl/min	40 bl/min	30 bl/min
Total Driving Time:	61.32 min	76.65 min	102.20 min

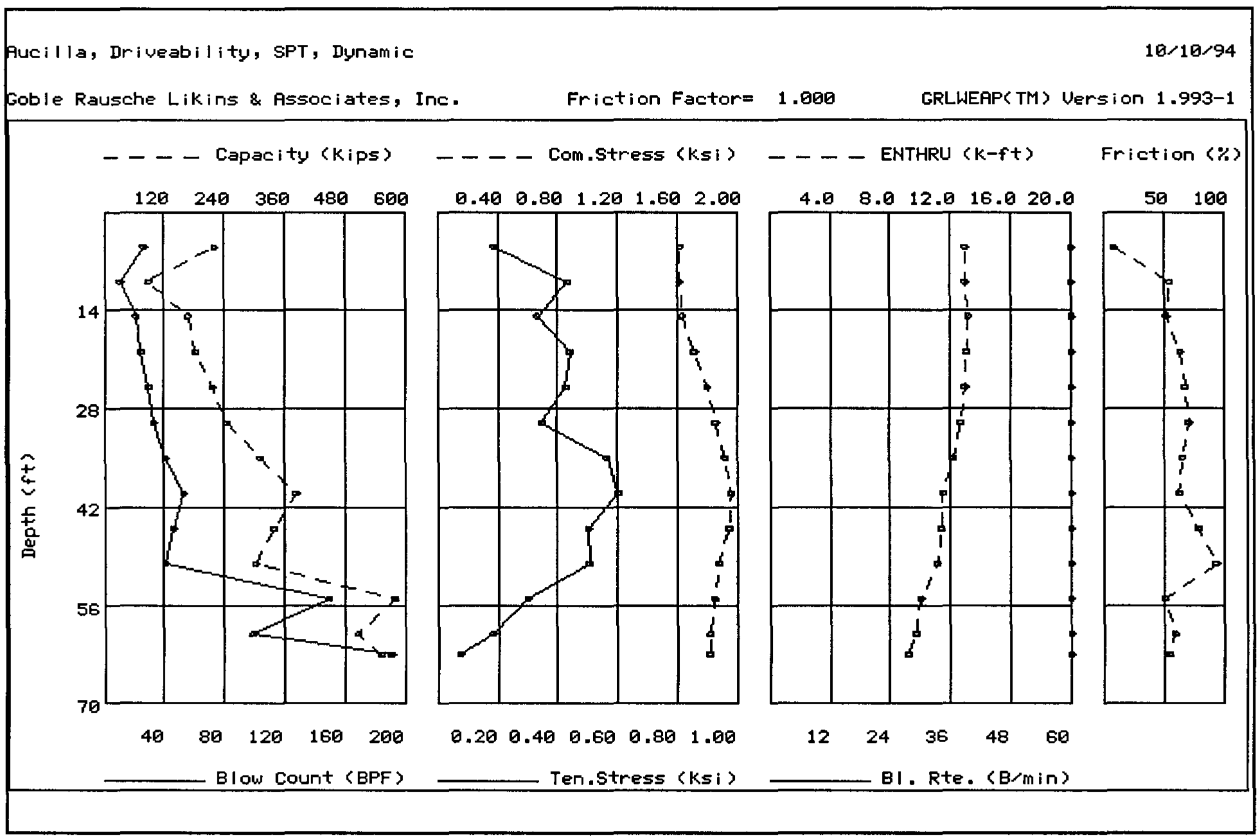

Figure A.87: Driveability Graph STD-DYN Analysis for Aucilla, FL

Aucilla, Driveability, MDF, Static 10/10/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
5.0	221.0	19.0	201.9	21.0	1.615	.240	60.0	13.0
10.0	89.3	49.1	40.2	9.8	1.615	.486	60.0	13.1
15.0	170.2	89.6	80.6	19.1	1.616	.392	60.0	13.1
20.0	237.8	120.2	117.6	28.4	1.639	.496	60.0	13.0
25.0	263.8	144.2	119.6	32.8	1.695	.596	60.0	13.0
30.0	287.7	166.8	120.9	36.3	1.764	.558	60.0	12.9
35.0	384.4	197.8	186.6	51.0	1.834	.579	60.0	12.6
40.0	490.2	238.6	251.6	77.9	1.888	.684	60.0	12.3
45.0	394.2	269.3	124.9	56.5	1.888	.552	60.0	12.2
50.0	311.3	279.8	31.5	43.6	1.844	.291	60.0	12.0
55.0	709.4	290.9	418.5	388.1	1.823	.324	60.0	11.0
60.0	599.5	290.5	309.1	171.9	1.774	.245	60.0	10.6
63.0	667.7	291.5	376.1	320.5	1.763	.184	60.0	10.3

Total Driving Time 83.18 min. for 60.0 bl/min

Blow Rate:	50 bl/min	40 bl/min	30 bl/min
Total Driving Time:	99.82 min	124.77 min	166.36 min

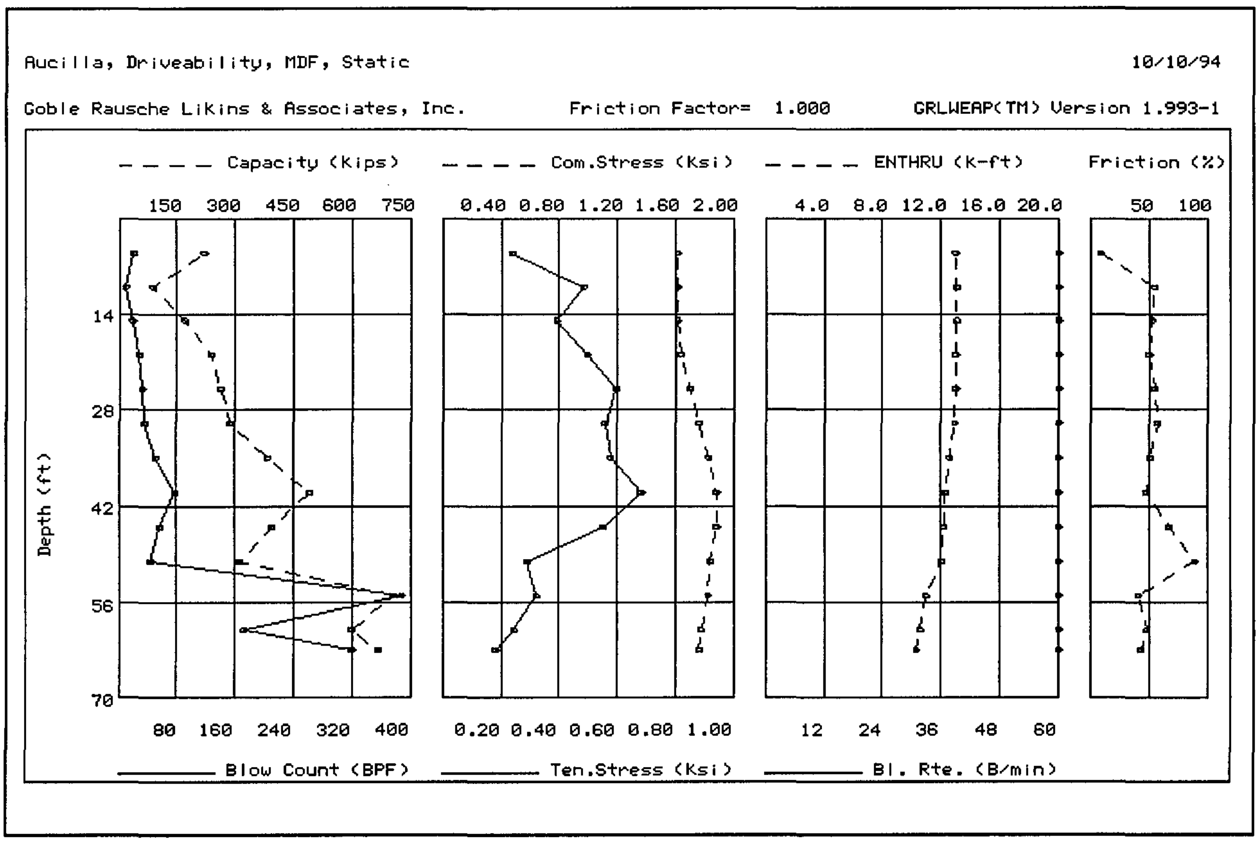

Figure A.88: Driveability Graph MDF-ST Analysis for Aucilla, FL

Aucilla, Driveability, MDF, Dynamic 10/10/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
5.0	221.0	19.0	201.9	21.0	1.615	.240	60.0	13.0
10.0	89.3	49.1	40.2	9.8	1.615	.486	60.0	13.1
15.0	167.5	87.1	80.4	18.8	1.616	.390	60.0	13.1
20.0	182.6	115.8	66.8	21.4	1.635	.377	60.0	13.0
25.0	216.4	147.6	68.7	26.8	1.689	.447	60.0	13.0
30.0	245.8	175.9	69.8	32.0	1.759	.598	60.0	13.0
35.0	312.8	205.5	107.3	41.1	1.830	.420	60.0	12.7
40.0	383.4	239.3	144.1	52.9	1.887	.566	60.0	12.5
45.0	339.9	267.3	72.6	47.2	1.892	.377	60.0	12.2
50.0	301.8	283.7	18.1	42.5	1.853	.261	60.0	11.9
55.0	580.7	298.8	281.9	143.9	1.829	.317	60.0	11.0
60.0	506.8	298.6	208.3	97.0	1.782	.204	60.0	10.7
63.0	553.0	299.7	253.2	129.8	1.769	.170	60.0	10.3

Total Driving Time 47.83 min. for 60.0 bl/min

Blow Rate:	50 bl/min	40 bl/min	30 bl/min
Total Driving Time:	57.40 min	71.75 min	95.66 min

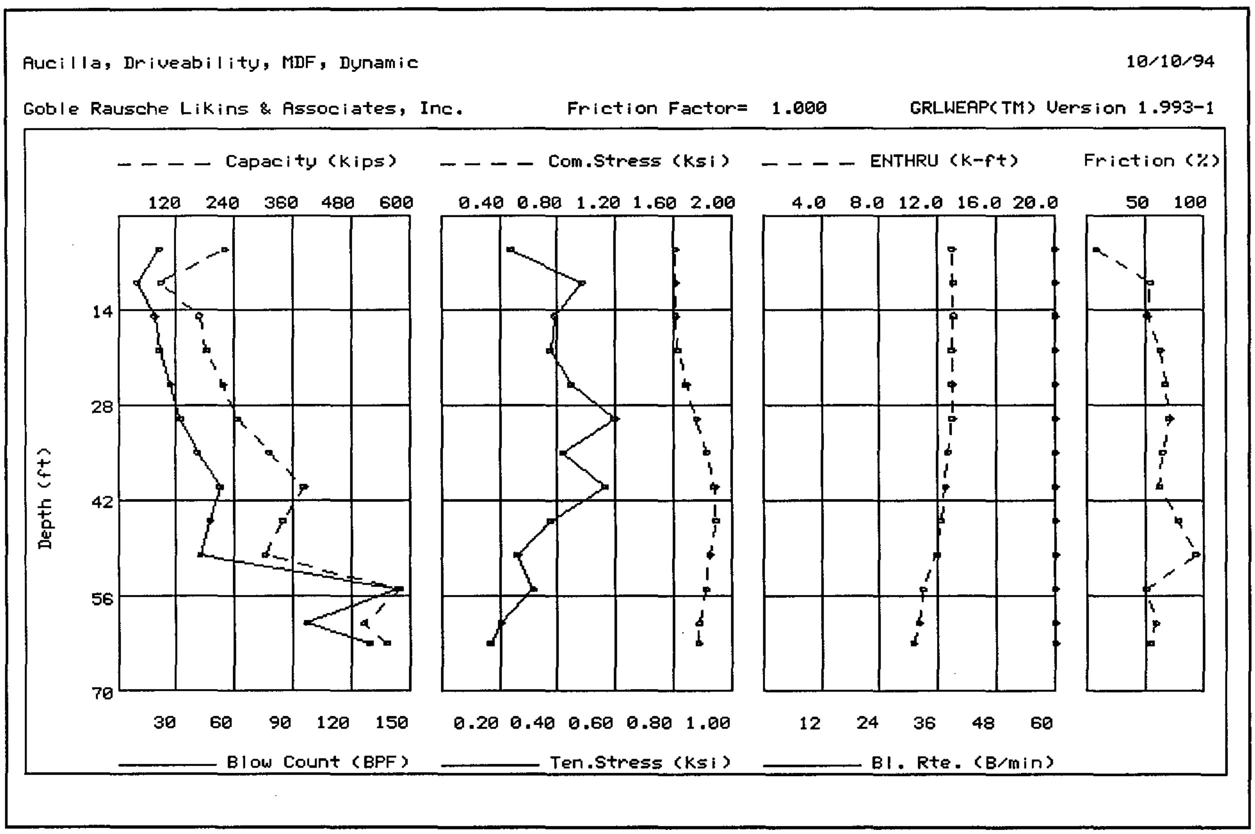

Figure A.89: Driveability Graph MDF-DYN Analysis for Aucilla, FL

Aucilla, Driveability, STD Method 10/10/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
5.0	12.7	1.3	11.4	4.8	1.614	.816	60.0	12.9
10.0	5.1	1.9	3.2	4.4	1.614	.865	60.0	12.9
15.0	12.9	7.9	4.9	4.7	1.614	.817	60.0	12.9
20.0	25.8	20.8	5.1	5.4	1.614	.743	60.0	13.0
25.0	45.0	38.3	6.6	6.3	1.615	.642	60.0	13.0
30.0	61.1	53.7	7.4	7.8	1.624	.567	60.0	13.0
35.0	83.9	72.5	11.4	10.8	1.652	.475	60.0	13.0
40.0	105.9	93.1	12.8	13.6	1.684	.412	60.0	12.9
45.0	120.6	113.6	7.1	15.7	1.702	.404	60.0	12.9
50.0	132.3	127.8	4.5	17.3	1.706	.433	60.0	12.8
55.0	750.4	144.6	605.8	1193.5	1.950	.322	60.0	12.2
60.0	556.5	144.1	412.5	159.5	1.695	.284	60.0	12.1
63.0	839.7	145.3	694.4	9999.0	1.972	.258	60.0	11.8

Total Driving Time 113.68 min. for 60.0 bl/min

Blow Rate:	50 bl/min	40 bl/min	30 bl/min
Total Driving Time:	136.42 min	170.52 min	227.36 min

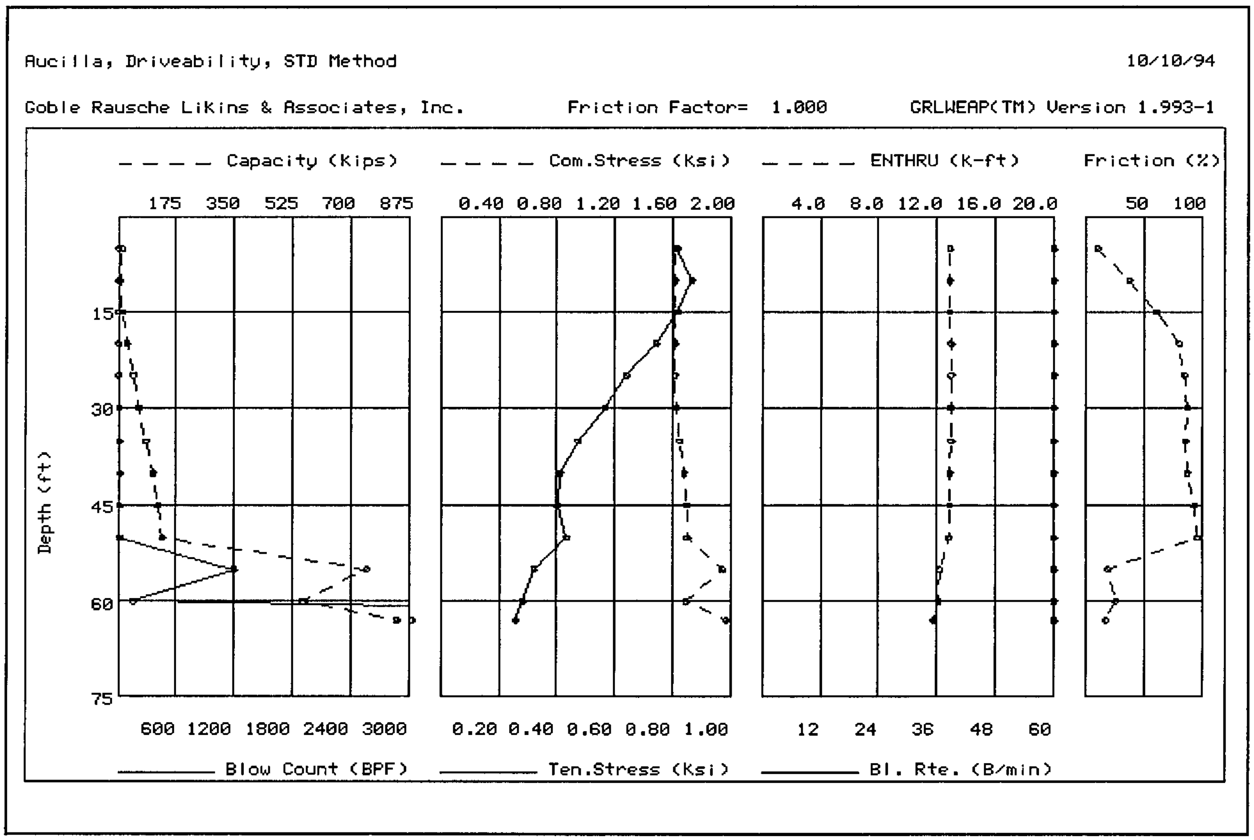

Figure A.90: Driveability Graph STD (FHWA) Analysis for Aucilla, FL

Vilano-East, Driveability, STD, Static 10/10/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
5.0	43.5	1.4	42.1	2.0	1.194	.034	62.0	41.4
10.0	34.2	3.8	30.4	1.7	1.188	.083	62.6	42.9
15.0	22.8	4.8	18.0	1.5	1.102	.089	63.8	40.5
20.0	45.0	8.6	36.4	1.9	1.260	.087	61.6	42.5
25.0	108.6	13.2	95.5	4.9	1.789	.113	54.5	36.8
30.0	292.9	23.9	269.0	18.3	2.253	.037	47.3	30.1
35.0	506.6	32.7	473.9	39.7	2.634	.067	47.3	23.8

Total Driving Time 5.06 min. only if hammer runs continuously

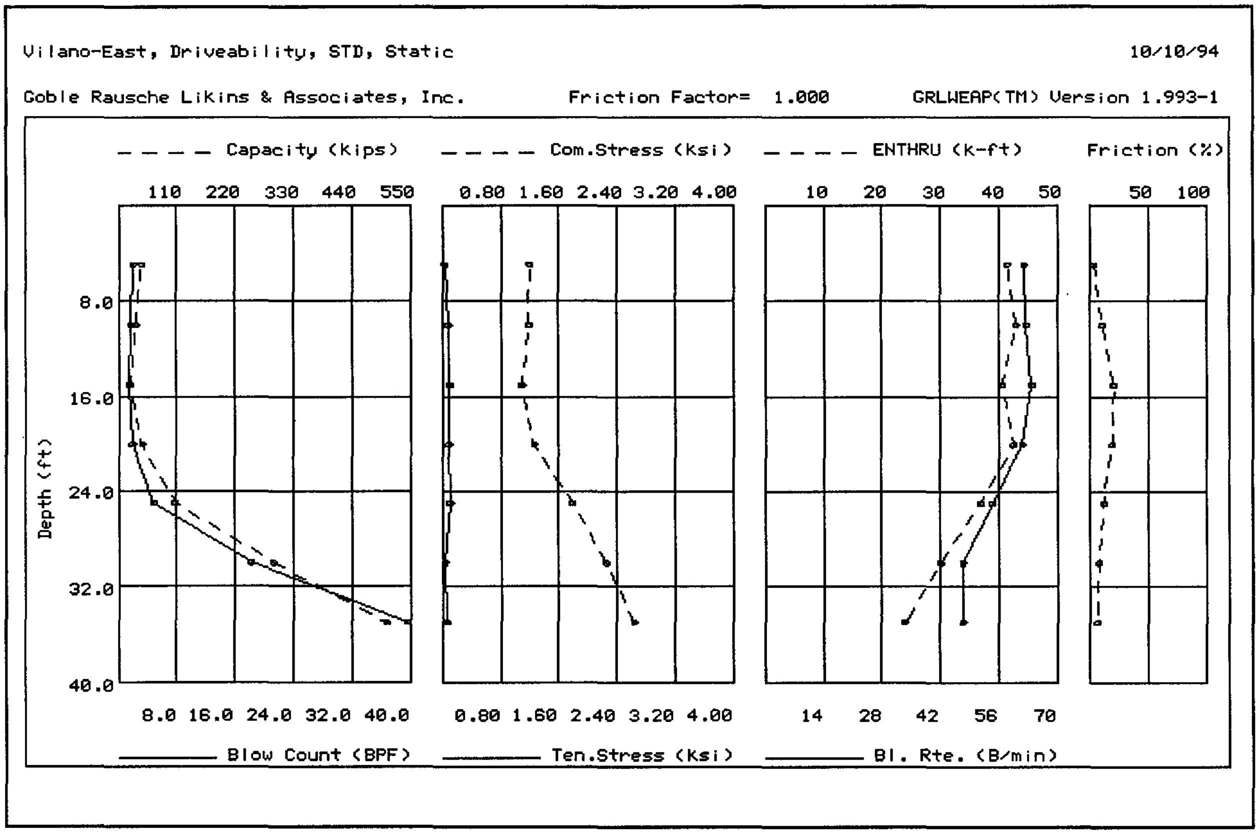

Figure A.91: Driveability Graph STD-ST Analysis for Vilano - East, FL

Vilano-East, Driveability, STD, Dynamic 10/10/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
5.0	26.8	.8	26.0	-1.0	.000	.000	85.6	.0
10.0	20.4	2.1	18.3	1.5	1.066	.074	64.1	40.6
15.0	12.1	2.4	9.7	-1.0	.000	.000	94.3	.0
20.0	1.3	.7	.6	-1.0	.000	.000	100.1	.0
25.0	97.7	8.6	89.1	4.4	1.743	.120	55.2	38.2
30.0	246.4	24.2	222.2	14.1	2.145	.024	48.2	31.4
35.0	426.9	38.8	388.1	31.4	2.421	.000	48.2	24.6

Total Driving Time 3.57 min. only if hammer runs continuously

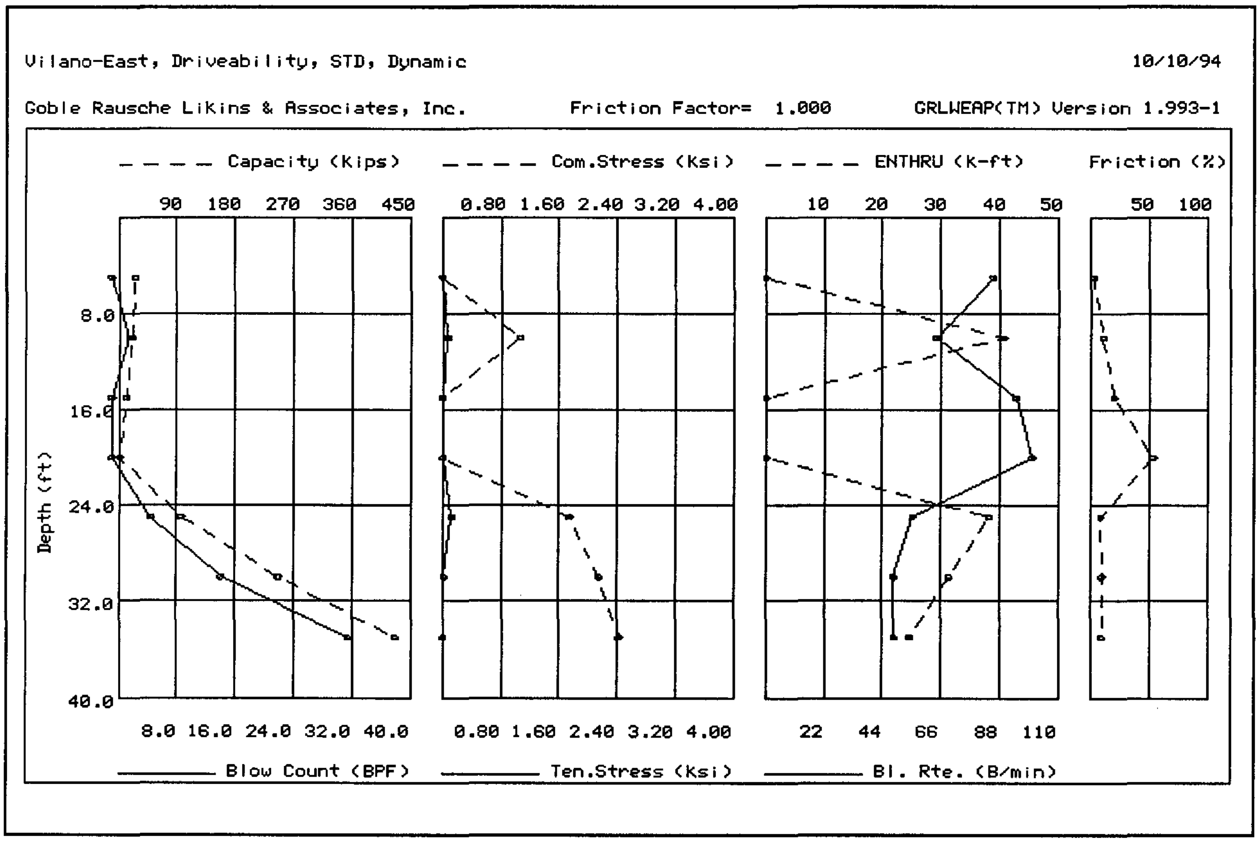

Figure A.92: Driveability Graph STD-DYN Analysis for Vilano - East, FL

Vilano-East, Driveability, SPT, Static 10/10/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
5.0	43.5	1.4	42.1	1.7	1.238	.172	62.6	38.1
10.0	34.2	3.8	30.4	1.5	1.170	.148	63.3	39.3
15.0	22.8	4.8	18.0	-1.0	.000	.000	86.6	.0
20.0	45.0	8.6	36.4	1.6	1.180	.129	62.9	41.1
25.0	108.6	13.2	95.5	5.2	1.816	.106	54.2	36.0
30.0	292.9	23.9	269.0	17.3	2.160	.024	47.5	31.4
35.0	506.6	32.7	473.9	42.3	2.538	.053	47.0	27.1

Total Driving Time 4.94 min. only if hammer runs continuously

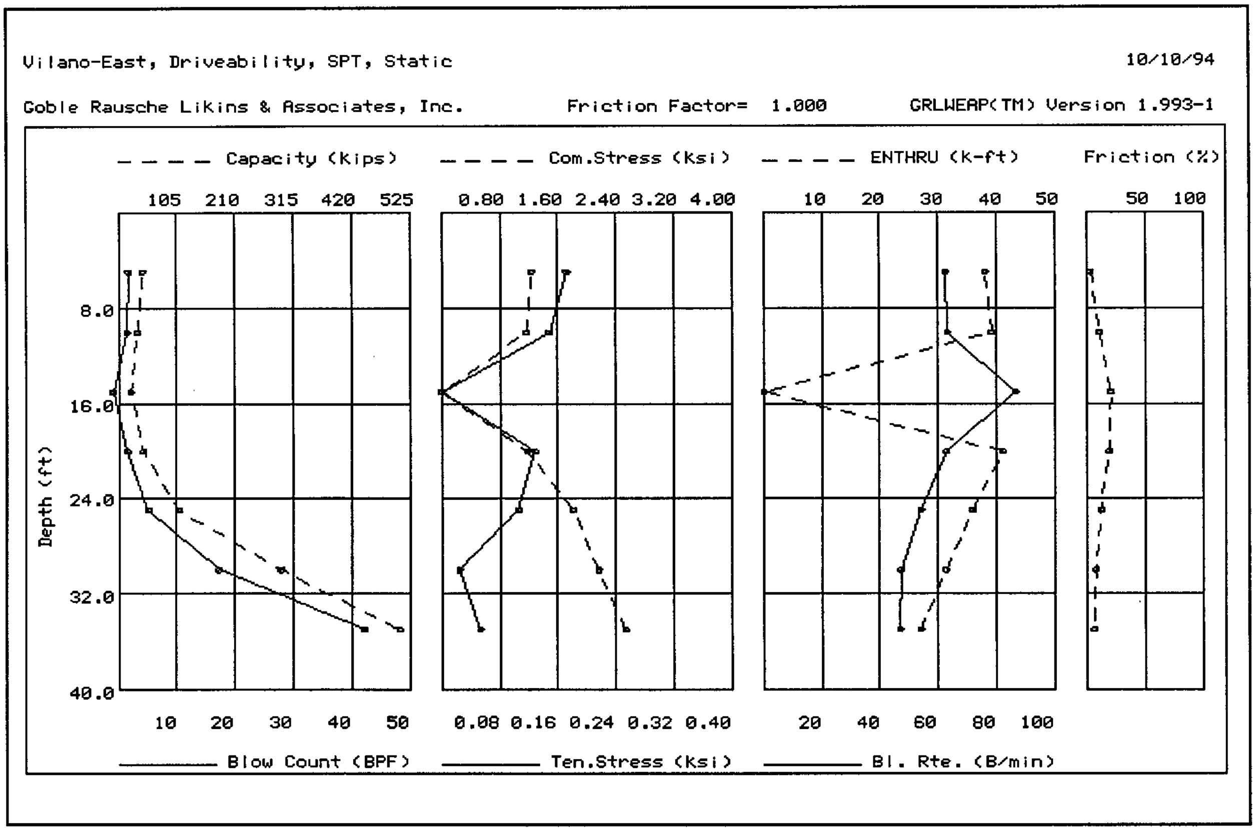

Figure A.93: Driveability Graph SPT-ST Analysis for Vilano - East, FL

Vilano-East, Driveability, SPT, Dynamic 10/10/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
5.0	26.8	.8	26.0	-1.0	.000	.000	89.1	.0
10.0	20.4	2.1	18.3	-1.0	.000	.000	88.1	.0
15.0	12.1	2.4	9.7	-1.0	.000	.000	97.3	.0
20.0	1.3	.7	.6	-1.0	.000	.000	100.3	.0
25.0	97.7	8.6	89.1	4.3	1.714	.104	55.4	38.7
30.0	246.4	24.2	222.2	19.1	2.180	.021	47.3	33.2
35.0	426.9	38.8	388.1	31.4	2.300	.115	48.1	27.2

Total Driving Time 4.01 min. only if hammer runs continuously

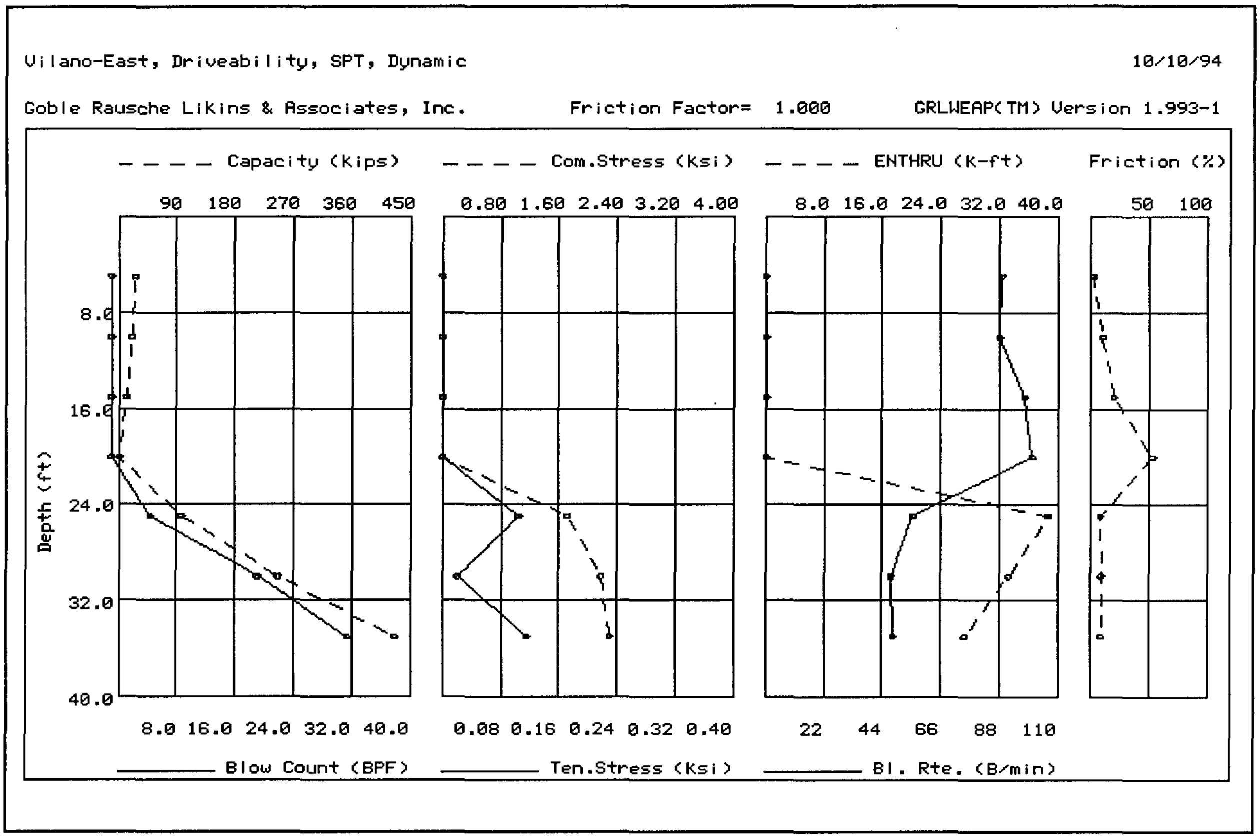

Figure A.94: Driveability Graph SPT-DYN Analysis for Vilano - East, FL

Vilano-East, Driveability, MDF, Static 10/10/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
5.0	43.5	1.4	42.1	-1.0	.000	.000	84.8	.0
10.0	34.2	3.8	30.4	1.5	1.099	.117	63.9	38.5
15.0	22.8	4.8	18.0	1.4	1.050	.115	64.6	37.2
20.0	45.0	8.6	36.4	1.6	1.176	.137	63.0	40.5
25.0	108.6	13.2	95.5	2.9	1.654	.276	57.0	40.1
30.0	292.9	23.9	269.0	10.1	2.065	.096	49.7	32.6
35.0	506.6	32.7	473.9	24.5	2.222	.159	49.1	25.8

Total Driving Time 2.83 min. only if hammer runs continuously

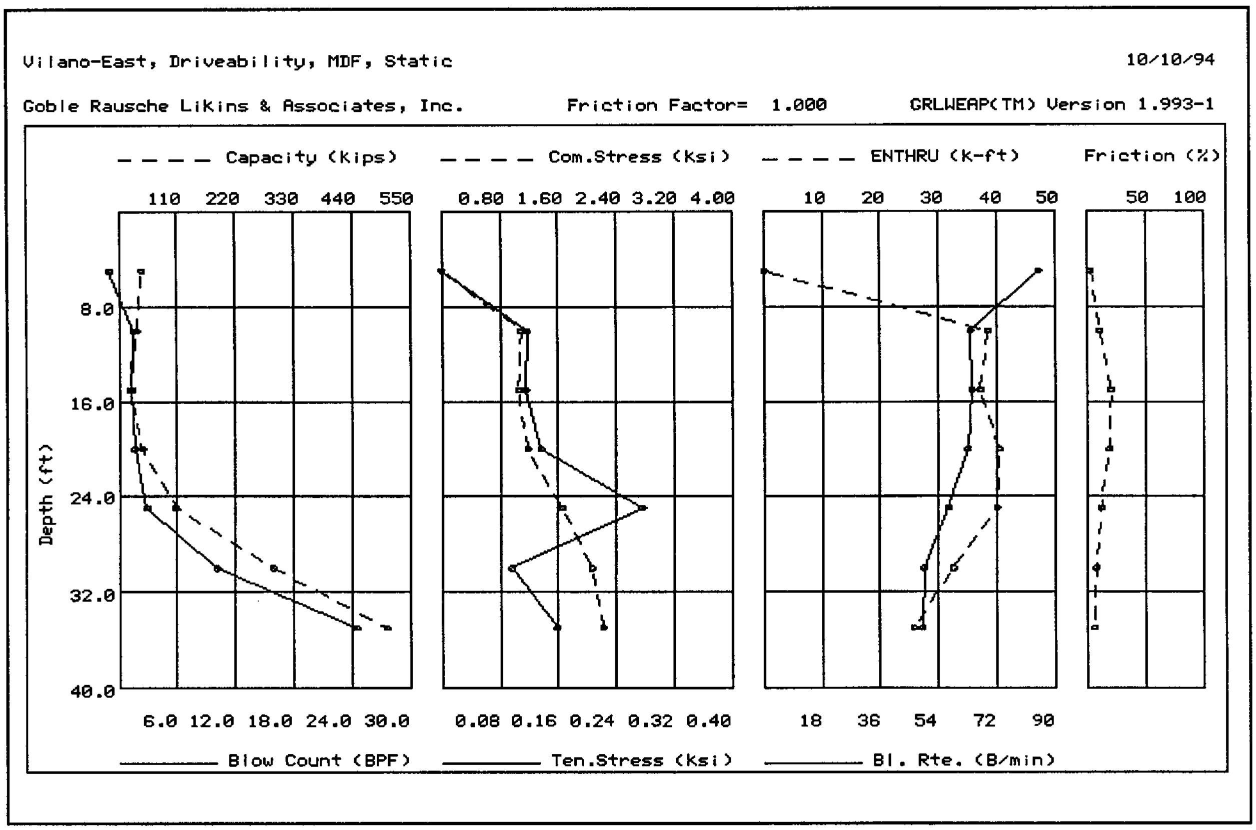

Figure A.95: Driveability Graph MDF-ST Analysis for Vilano - East, FL

Vilano-East, Driveability, MDF, Dynamic 10/10/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
5.0	26.8	.8	26.0	-1.0	.000	.000	90.2	.0
10.0	20.4	2.1	18.3	-1.0	.000	.000	87.7	.0
15.0	12.1	2.4	9.7	-1.0	.000	.000	98.2	.0
20.0	1.3	.7	.6	-1.0	.000	.000	100.3	.0
25.0	97.7	8.6	89.1	2.4	1.627	.281	57.4	42.9
30.0	246.4	24.2	222.2	7.8	2.018	.152	50.8	35.3
35.0	426.9	38.8	388.1	20.1	2.061	.364	49.8	25.8

Total Driving Time 1.96 min. only if hammer runs continuously

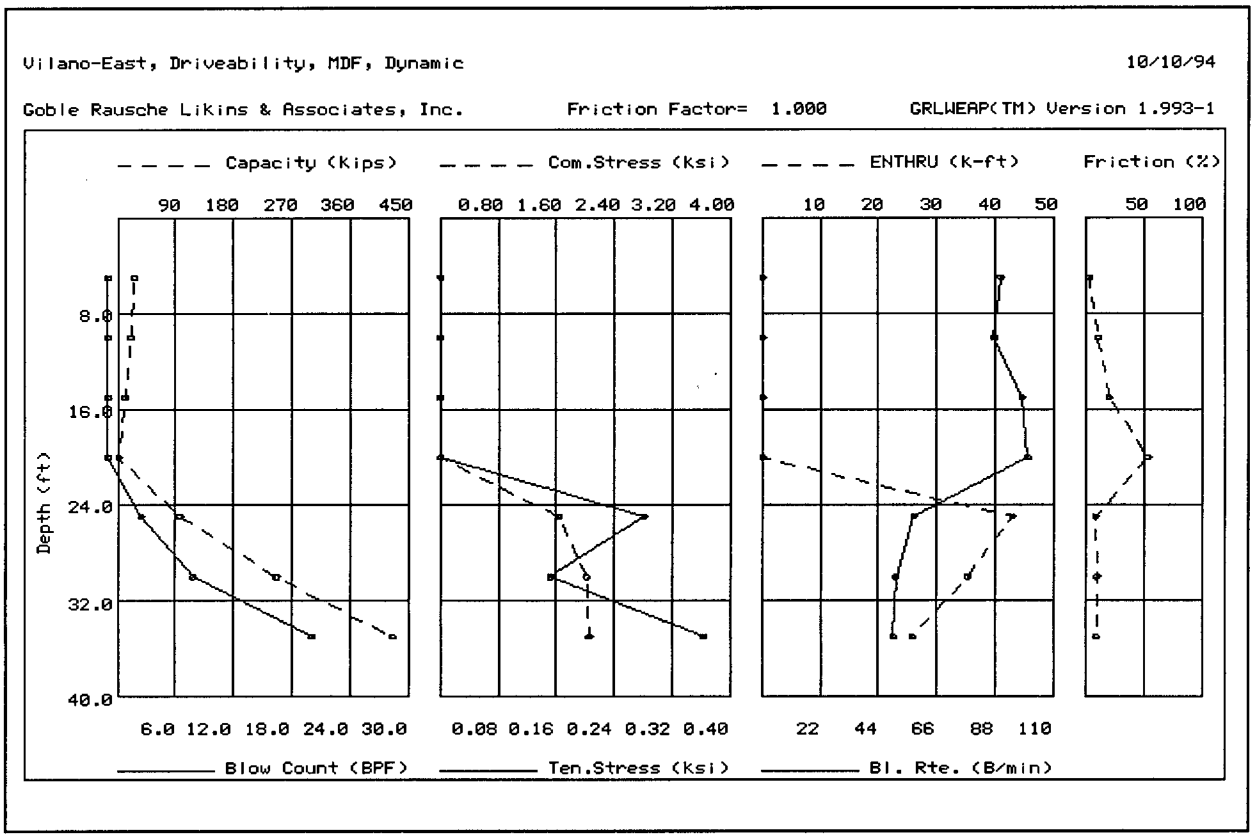

Figure A.96: Driveability Graph MDF-DYN Analysis for Vilano - East, FL

Aucilla, Driveability, STD Method 10/10/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
5.0	12.7	1.3	11.4	4.8	1.614	.816	60.0	12.9
10.0	5.1	1.9	3.2	4.4	1.614	.865	60.0	12.9
15.0	12.9	7.9	4.9	4.7	1.614	.817	60.0	12.9
20.0	25.8	20.8	5.1	5.4	1.614	.743	60.0	13.0
25.0	45.0	38.3	6.6	6.3	1.615	.642	60.0	13.0
30.0	61.1	53.7	7.4	7.8	1.624	.567	60.0	13.0
35.0	83.9	72.5	11.4	10.8	1.652	.475	60.0	13.0
40.0	105.9	93.1	12.8	13.6	1.684	.412	60.0	12.9
45.0	120.6	113.6	7.1	15.7	1.702	.404	60.0	12.9
50.0	132.3	127.8	4.5	17.3	1.706	.433	60.0	12.8
55.0	750.4	144.6	605.8	1193.5	1.950	.322	60.0	12.2
60.0	556.5	144.1	412.5	159.5	1.695	.284	60.0	12.1
63.0	839.7	145.3	694.4	9999.0	1.972	.258	60.0	11.8

Total Driving Time 113.68 min. for 60.0 bl/min

Blow Rate:	50 bl/min	40 bl/min	30 bl/min
Total Driving Time:	136.42 min	170.52 min	227.36 min

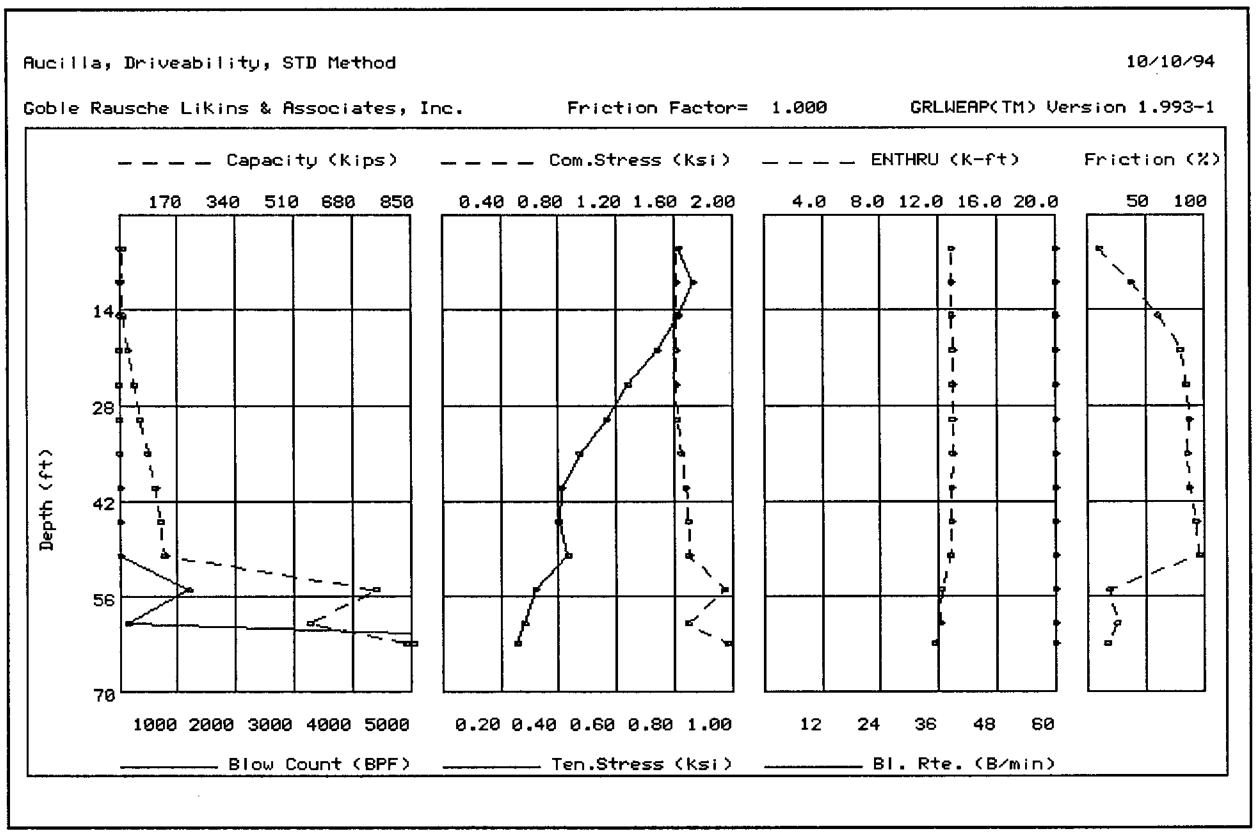

Figure A.97: Driveability Graph STD (FHWA) Analysis for Vilano - East, FL

Vilano-West, Driveability, STD, Static 10/10/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
30.0	42.9	35.9	7.0	2.3	1.932	.556	53.0	44.4
35.0	62.2	54.4	7.8	2.9	1.951	.465	52.5	42.6
40.0	78.8	70.5	8.4	3.7	2.033	.447	51.5	41.1
45.0	86.8	78.2	8.6	4.1	2.046	.461	51.3	39.4
50.0	127.8	91.2	36.6	6.6	2.170	.424	49.7	35.3
55.0	139.6	102.5	37.1	7.5	2.190	.471	49.5	33.6
60.0	183.9	117.4	66.5	10.6	2.269	.454	48.1	30.9
62.0	255.3	130.5	124.8	18.0	2.331	.282	47.1	27.9

Total Driving Time 4.36 min. only if hammer runs continuously

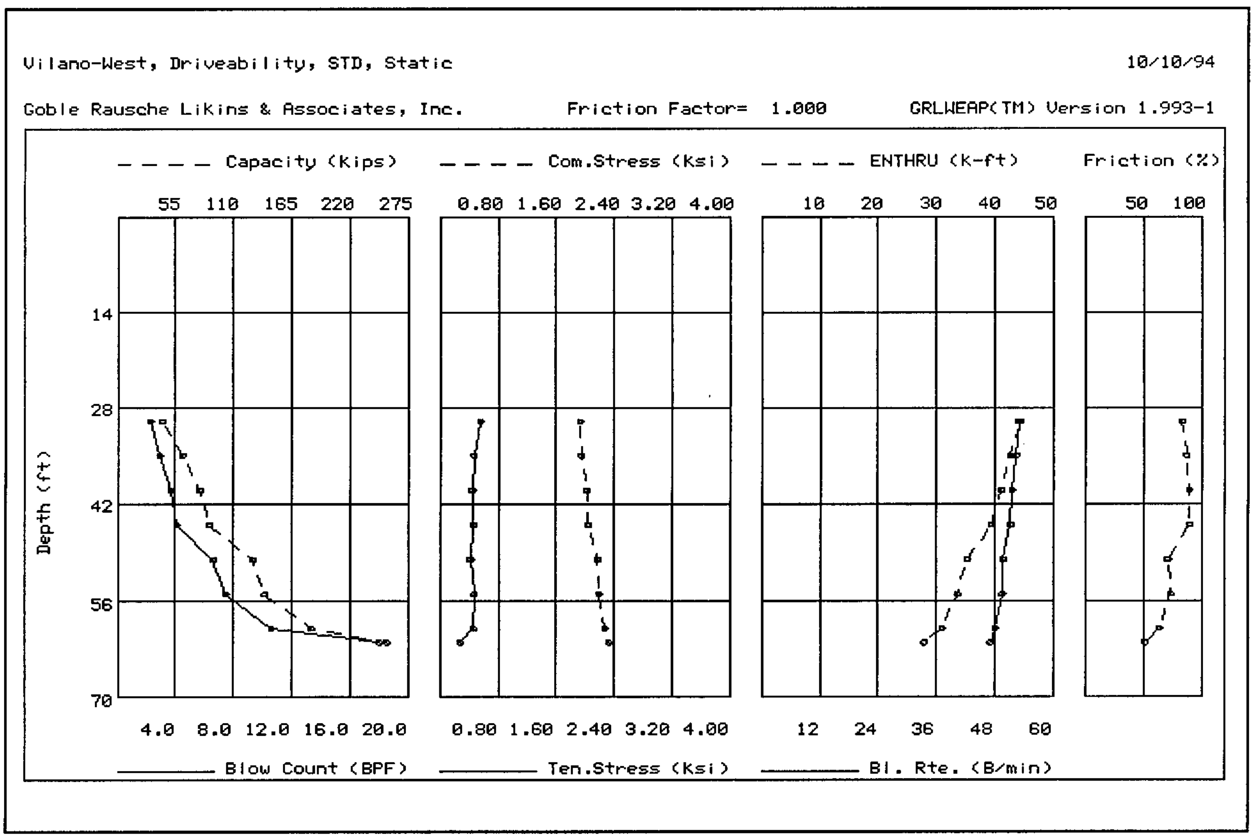

Figure A.98: Driveability Graph STD-ST Analysis for Vilano - West, FL

Vilano-West, Driveability, STD, Dynamic 10/10/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
30.0	42.9	35.9	7.0	2.3	1.932	.556	53.0	44.4
35.0	62.2	54.4	7.8	2.9	1.951	.465	52.5	42.6
40.0	80.1	71.7	8.4	3.7	2.036	.443	51.5	40.9
45.0	90.2	81.6	8.6	4.4	2.055	.449	51.2	38.8
50.0	105.6	93.1	12.6	5.4	2.084	.464	50.7	35.8
55.0	118.2	105.4	12.8	6.2	2.169	.542	49.7	35.4
60.0	178.4	121.2	57.2	10.3	2.268	.470	48.2	31.2
62.0	276.7	129.3	147.4	20.1	2.351	.227	46.8	27.5

Total Driving Time 4.14 min. only if hammer runs continuously

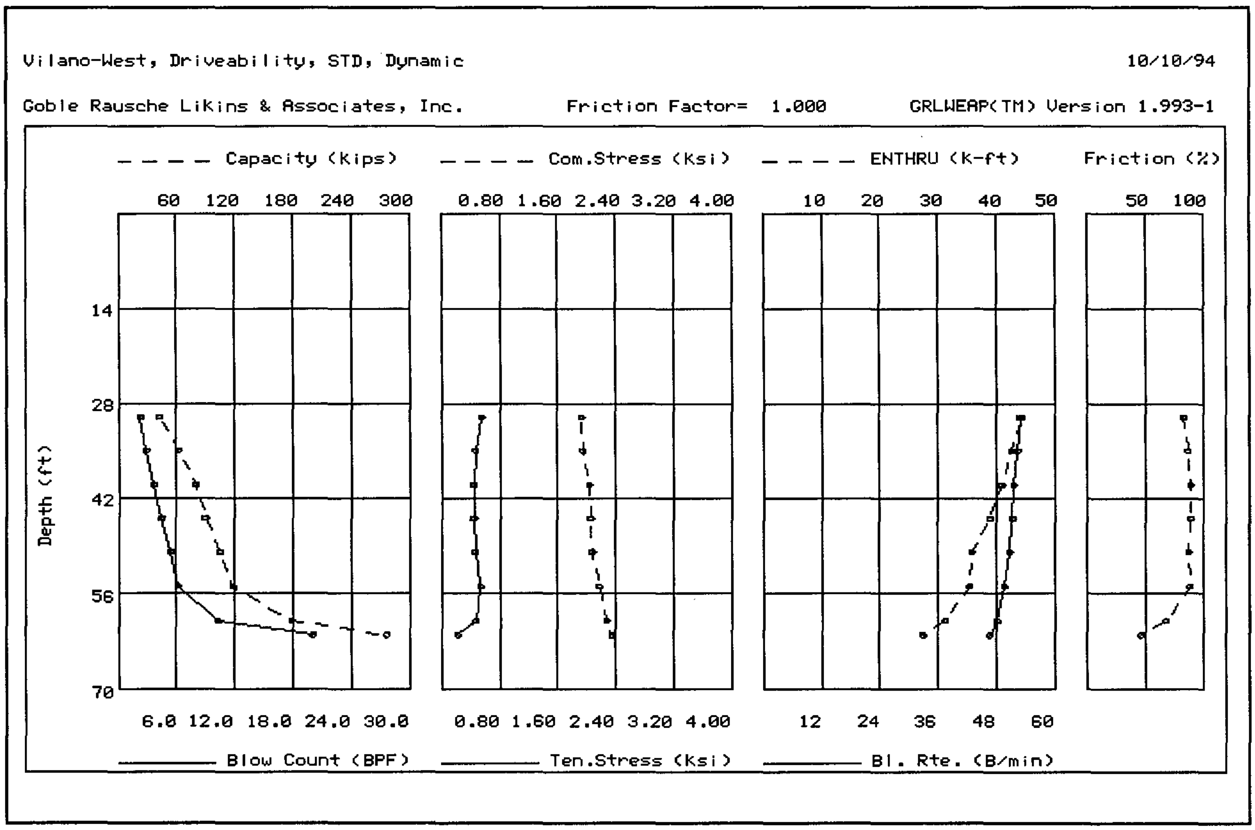

Figure A.99: Driveability Graph STD-DYN Analysis for Vilano - West, FL

Vilano-West, Driveability, SPT, Static 10/10/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
30.0	42.9	35.9	7.0	2.0	1.910	.603	53.3	44.6
35.0	62.2	54.4	7.8	2.5	1.961	.562	52.7	41.9
40.0	78.8	70.5	8.4	2.9	2.073	.593	51.5	40.9
45.0	86.8	78.2	8.6	3.5	2.096	.593	51.2	38.7
50.0	127.8	91.2	36.6	5.8	2.218	.547	49.7	34.1
55.0	139.6	102.5	37.1	7.3	2.248	.550	49.4	31.8
60.0	183.9	117.4	66.5	11.1	2.320	.509	47.9	29.1
62.0	255.3	130.5	124.8	20.4	2.373	.200	46.9	26.6

Total Driving Time 4.10 min. only if hammer runs continuously

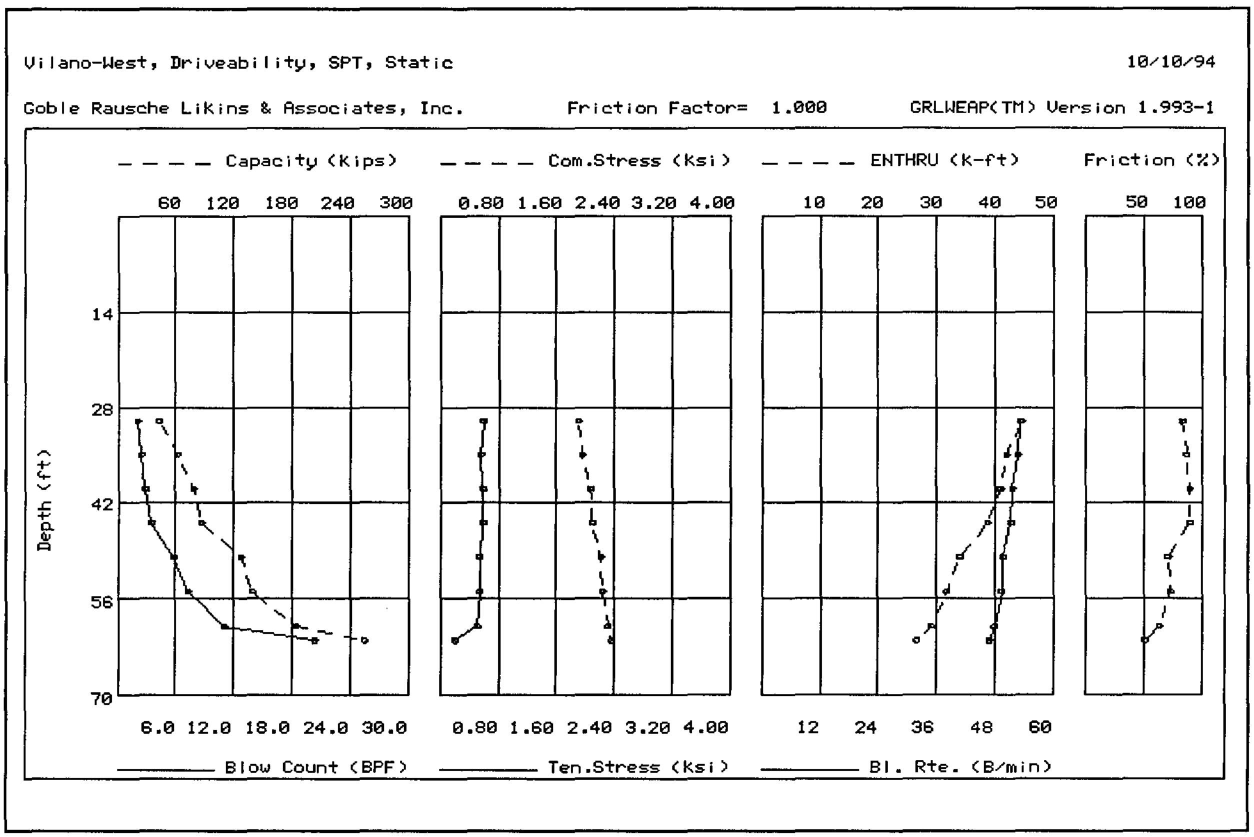

Figure A.100: Driveability Graph SPT-ST Analysis for Vilano - West, FL

Vilano-West, Driveability, SPT, Dynamic 10/10/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
30.0	42.9	35.9	7.0	2.2	1.926	.563	53.0	44.6
35.0	62.2	54.4	7.8	2.8	1.973	.517	52.4	41.6
40.0	80.1	71.7	8.4	3.9	2.102	.488	50.9	38.9
45.0	90.2	81.6	8.6	5.1	2.131	.451	50.5	35.7
50.0	105.6	93.1	12.6	6.7	2.216	.449	49.4	33.6
55.0	118.2	105.4	12.8	7.9	2.239	.480	49.2	31.8
60.0	178.4	121.2	57.2	14.1	2.349	.324	47.5	28.0
62.0	276.7	129.3	147.4	21.0	2.368	.219	46.9	26.6

Total Driving Time 4.85 min. only if hammer runs continuously

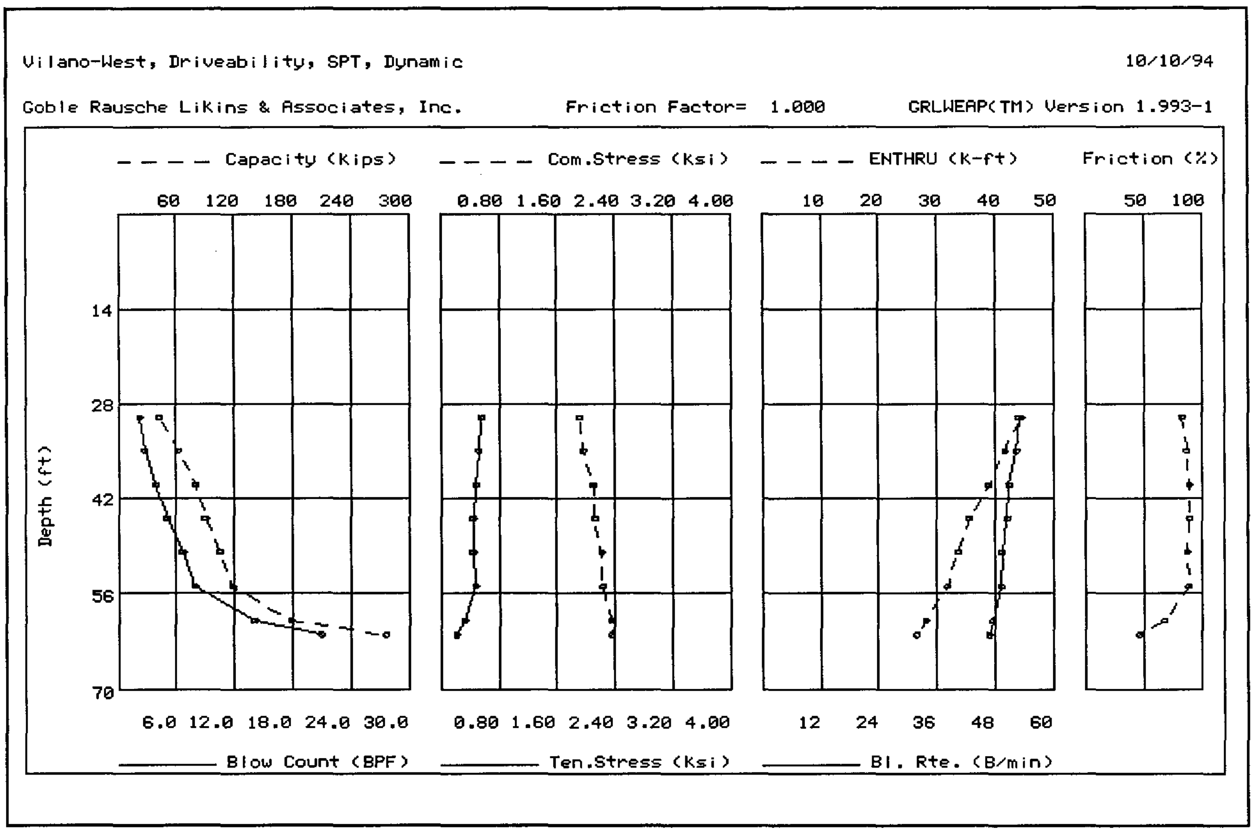

Figure A.101: Driveability Graph SPT-DYN Analysis for Vilano - West, FL

Vilano-West, Driveability, MDF, Static 10/10/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
30.0	42.9	35.9	7.0	2.2	1.928	.572	53.1	44.4
35.0	62.2	54.4	7.8	2.8	1.947	.480	52.6	42.8
40.0	78.8	70.5	8.4	3.5	2.027	.461	51.6	41.4
45.0	86.8	78.2	8.6	4.0	2.040	.477	51.4	39.6
50.0	127.8	91.2	36.6	5.9	2.158	.491	49.9	36.0
55.0	139.6	102.5	37.1	6.7	2.178	.540	49.7	34.2
60.0	183.9	117.4	66.5	9.2	2.254	.573	48.5	31.8
62.0	255.3	130.5	124.8	13.8	2.314	.483	47.4	29.0

Total Driving Time 3.95 min. only if hammer runs continuously

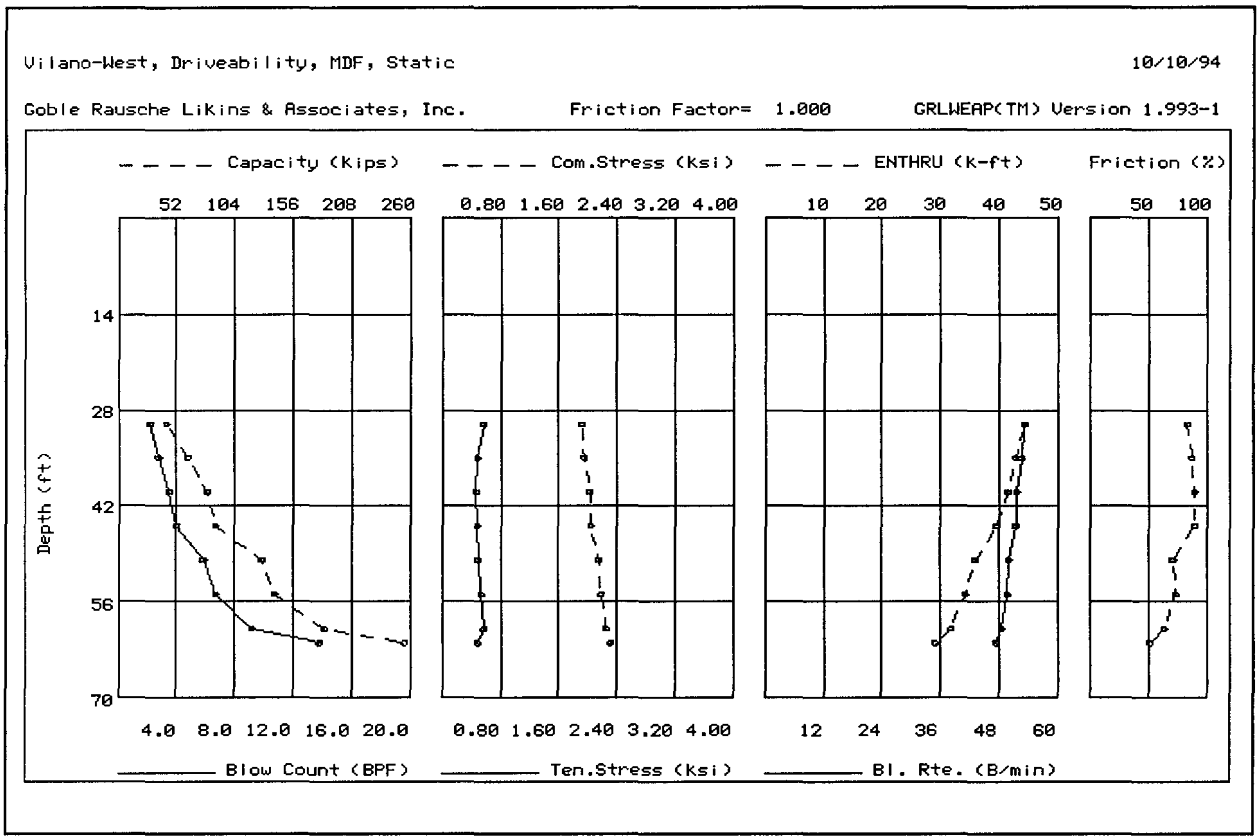

Figure A.102: Driveability Graph MDF-ST Analysis for Vilano - West, FL

Vilano-West, Driveability, MDF, Dynamic 10/10/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
30.0	42.9	35.9	7.0	2.2	1.928	.572	53.1	44.4
35.0	62.2	54.4	7.8	2.8	1.947	.480	52.6	42.8
40.0	80.1	71.7	8.4	3.6	2.032	.457	51.6	41.2
45.0	90.2	81.6	8.6	4.2	2.049	.465	51.3	39.1
50.0	105.6	93.1	12.6	5.1	2.078	.488	50.8	36.2
55.0	118.2	105.4	12.8	5.9	2.167	.569	49.9	35.7
60.0	178.4	121.2	57.2	9.0	2.253	.571	48.6	31.9
62.0	276.7	129.3	147.4	15.4	2.329	.455	47.2	28.3

Total Driving Time 3.83 min. only if hammer runs continuously

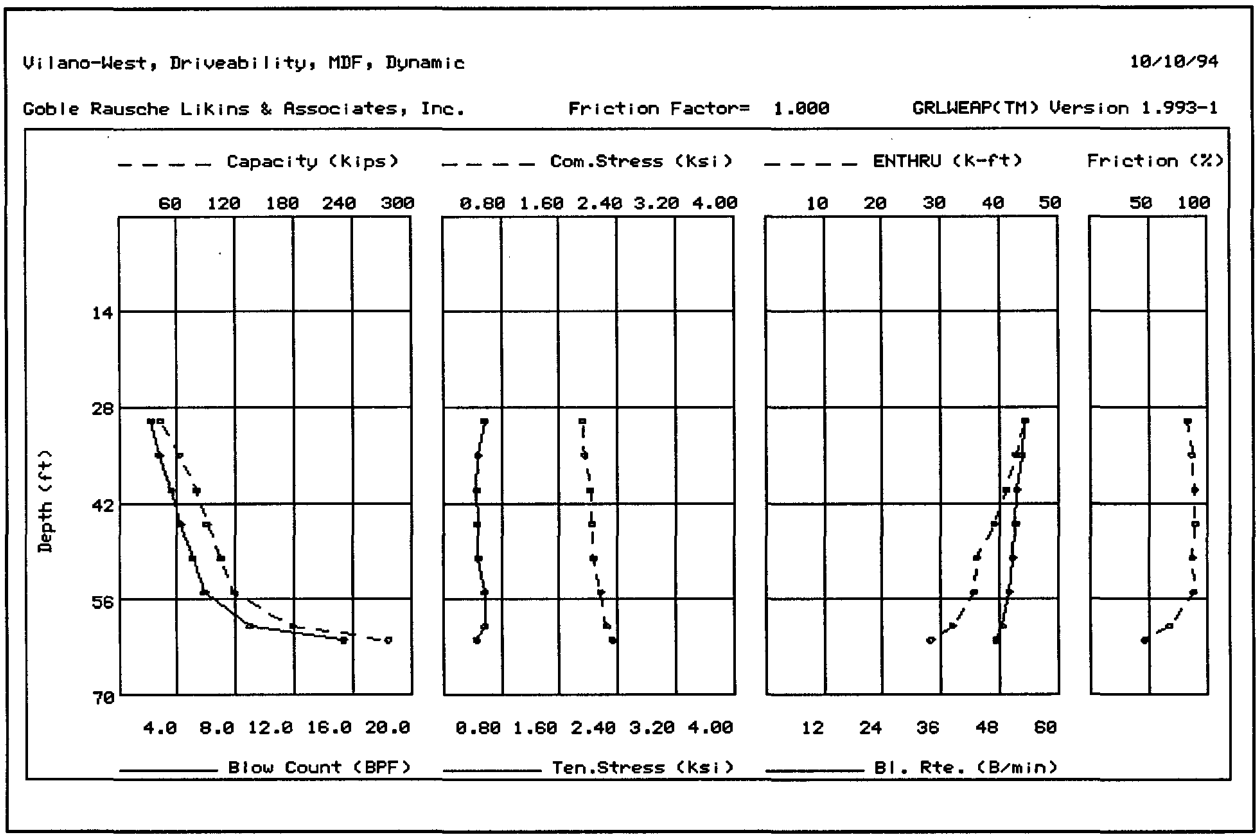

Figure A.103: Driveability Graph MDF-DYN Analysis for Vilano - West, FL

Vilano-West, Driveability, MDF, Static 10/10/94

Friction Loss/Gain Factor 1.000

Depth feet	Ultimate Capacity kips	Skin Friction kips	End Bearing kips	Blow Count bl/ft	Max C. Stress ksi	Max T. Stress ksi	Blow Rate bpm	ENTHRU kip-ft
30.0	42.9	35.9	7.0	2.2	1.928	.572	53.1	44.4
35.0	62.2	54.4	7.8	2.8	1.947	.480	52.6	42.8
40.0	78.8	70.5	8.4	3.5	2.027	.461	51.6	41.4
45.0	86.8	78.2	8.6	4.0	2.040	.477	51.4	39.6
50.0	127.8	91.2	36.6	5.9	2.158	.491	49.9	36.0
55.0	139.6	102.5	37.1	6.7	2.178	.540	49.7	34.2
60.0	183.9	117.4	66.5	9.2	2.254	.573	48.5	31.8
62.0	255.3	130.5	124.8	13.8	2.314	.483	47.4	29.0

Total Driving Time 3.95 min. only if hammer runs continuously

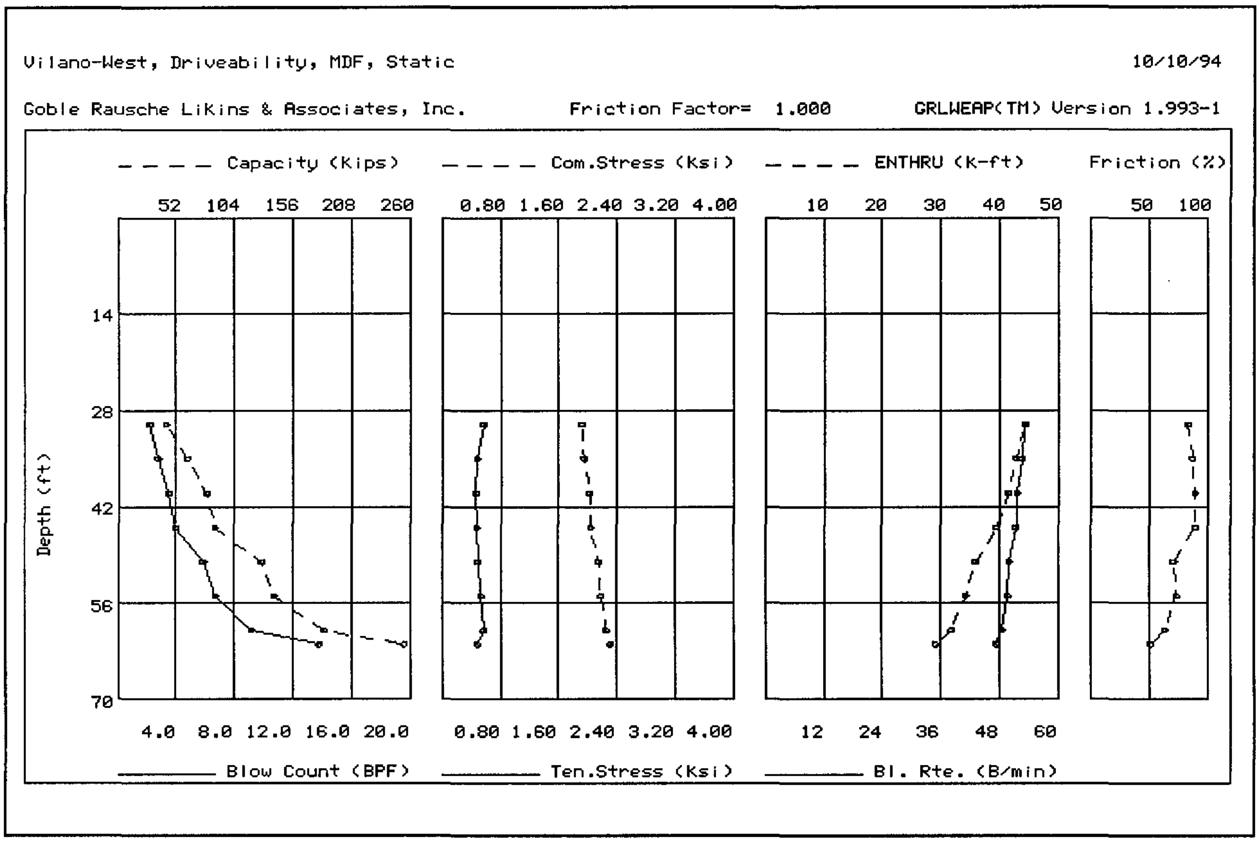

Figure A.104: Driveability Graph STD (FHWA) Analysis for Vilano - West, FL

APPENDIX B

SPT STATIC LOAD TEST RESULTS

B.1 LOAD VERSUS DISPLACEMENT PLOTS

The sampler load *vs* displacement plots presented in this appendix were calculated from top measured load and displacement values, taking into account the weight of the drill rod, and the elastic compression or elongation of the drill rod. For uplift tests, the weight of the rod and the elastic elongation were subtracted from the measured top loads and displacements, respectively. For compression tests, the weight of the rod was added to the measured top loads and the elastic compression was subtracted from the measured top displacements.

The static load tests were often repeated several times at different displacement rates. The loading followed by unloading is indicated on the load-displacement plots as *cycle* and the displacement rate is given in inches per minute for the cycle indicated. Some of the load tests were repeated after a waiting period as indicated on the plot whenever applicable. Also presented on the plots is the soil type based on the Unified Soil Classification System (USCS), the SPT N-value corrected to 60 percent maximum transferred energy (N_{60}), and Davisson's failure criterion line. When an oversized tip was used in a compression test, N_{60} was obtained from the nearest measurement depth. N-values marked * were taken from existing soil borings and therefore uncorrected.

Table B.1 summarizes the static load tests results performed for this study including the test locations, test type (*i.e.*, uplift or compression), the maximum load measured (Ru), and the corresponding figure number. For uplift load tests with very low resistance values, only the load maxima are given in table B.1 and no load-displacement plots.

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Table B.1: Summary of SPT Static Load Test Results					
	Location of Test Site	Test Depth [ft-wait time]	Test type	Ru [kips]	Figure
1.	St. Mary, Cleveland, OH	40	Uplift	1.50	B.1
		65	Uplift	2.10	B.2
		100	Uplift	0.90	B.3
		100-15hours	Uplift	1.40	B.4
		103.5	Uplift	1.30	B.5
		105	Compression	4.00	B.6
2.	Fore River Bridge, Portland, ME	20	Uplift	0.10	--
		30	Uplift	0.18	--
		40	Uplift	0.24	--
		42	Compression	6.50	B.7
		54	Compression	5.50	B.8
		56	Compression	2.10	B.9
3.	C&D Canal, Pier 17, DE	14	Uplift	0.42	B.10
		40	Uplift	0.05	--
		50	Uplift	0.48	B.11
		55	Uplift	0.54	B.12
		55-1hour	Uplift	0.55	B.13
		55-14hours	Uplift	0.80	B.14
		60	Uplift	0.80	B.15
		60-1hour	Uplift	0.70	B.16
		65	Uplift	2.30	B.17
		65-2hours	Uplift	2.70	B.18
		70	Compression	3.50	B.19
4.	C&D Canal, Pier 21, DE	40	Uplift	0.65	B.20
		40-1hour	Uplift	0.60	B.21

Table B.1: Summary of SPT Static Load Test Results (continued)					
	Location of Test Site	Test Depth [ft-wait time]	Test Type	Ru [kips]	Figure
4.	C&D Canal,	55	Uplift	1.00	B.22
	Pier 21, DE	55-1hour	Uplift	0.90	B.23
	(continued)	65	Uplift	1.35	B.24
		70	Compression	1.75	B.25
		71	Compression	2.60	B.26
5.	White City Bridge,	31	Uplift	0.10	--
	TP3, FL	32	Compression	5.00	B.27
		35	Compression	6.00	B.28
6.	White City Bridge,	15.5	Uplift	0.04	--
	TP6, FL	33	Compression	8.00	--
7.	Apalachicola River	20	Uplift	0.10	--
	Bridge, FL	25	Uplift	0.15	--
		25-14hours	Uplift	0.22	--
		55	Uplift	0.75	B.29
		55-1hour	Uplift	0.65	B.30
		75	Uplift	0.58	B.31
		75-1hour	Uplift	0.42	B.32
		89	Compression	5.60	B.33
8.	Sunshine Skyway	27.5	Uplift	0.14	--
	Bridge, FL	27.5-15hours	Uplift	0.14	--
		40	Uplift	0.03	--
		45	Compression	11.50	B.34
		45.5	Uplift	1.25	B.35
		50	Uplift	0.68	B.36
		53	Compression	9.00	B.37

Table B.1: Summary of SPT Static Load Test Results (continued)					
	Location of Test Site	Test Depth [ft-wait time]	Test Type	Ru [kips]	Figure
9.	Aucilla River Bridge, FL	10	Uplift	1.13	B.38
		20	Uplift	0.92	B.39
		30	Uplift	0.82	B.40
		30-1hour	Uplift	0.90	B.40
		30-11hours	Uplift	1.05	B.40
		42	Compression	2.55	B.41
		45	Uplift	0.54	B.42
		45-15mins	Uplift	0.61	B.42
		63	Compression	8.10	B.43
		67.5	Compression	6.75	B.44
10.	Vilano Bridge - East, FL	15	Compression	0.96	B.45
		20	Compression	1.23	B.46
		25	Compression	3.21	B.47
		30	Compression	7.60	B.48
		30	Uplift	0.45	B.49
		30-15mins	Uplift	0.32	B.49
		30-1hour	Uplift	0.17	B.49
		35	Compression	9.90	B.50
		40	Compression	11.60	B.51
11.	Vilano Bridge - West, FL	30	Uplift	0.60	B.52
		35	Uplift	0.50	B.53
		35-15mins	Uplift	0.43	B.53
		35-1hour	Uplift	0.50	B.53
		45	Uplift	0.16	B.54
		45-15mins	Uplift	0.24	B.54

Table B.1: Summary of SPT Static Load Test Results (continued)					
	Location of Test Site	Test Depth [ft-wait time]	Test Type	Ru [kips]	Figure
11.	Vilano Bridge - West, FL (continued)	45-1hour	Uplift	0.31	B.54
		50	Uplift	0.30	B.55
		50-1hour	Uplift	0.51	B.55
		50-14hours	Uplift	0.88	B.55
		52	Compression	0.60	B.56
		55	Uplift	0.28	B.57
		55-15mins	Uplift	0.41	B.57
		55-1hour	Uplift	0.57	B.57
		59	Uplift	0.48	B.58
		59-15mins	Uplift	0.41	B.58
		59-1hour	Uplift	0.49	B.58
		62	Compression	3.25	B.59
		67	Compression	2.70	B.60

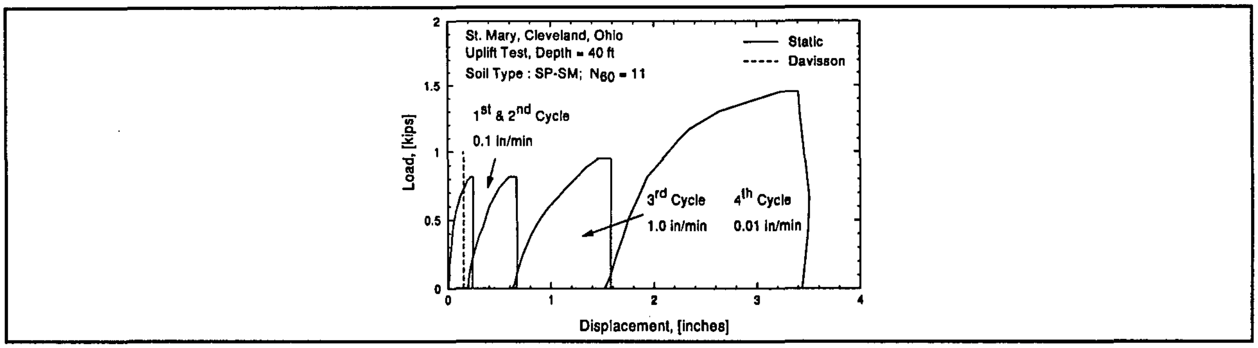


Figure B.1: Load versus Displacement for St. Mary, Cleveland, OH at depth of 40 ft

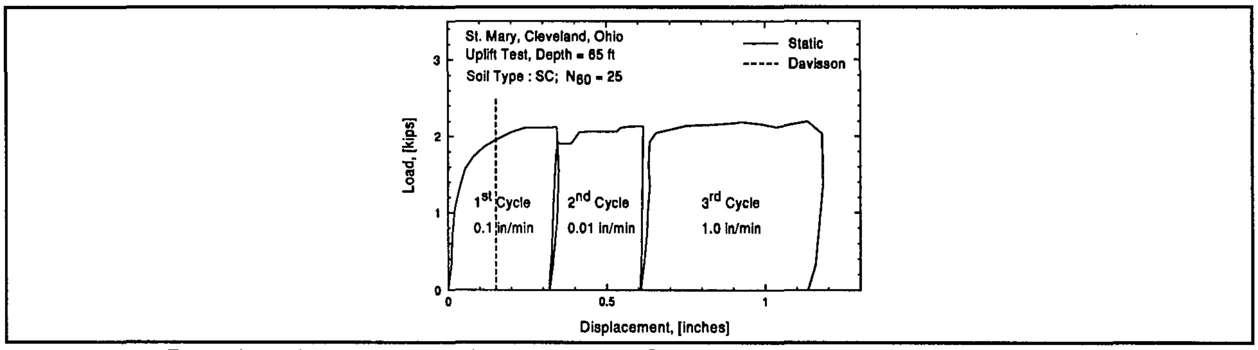


Figure B.2: Load versus Displacement for St. Mary, Cleveland, OH at depth of 65 ft

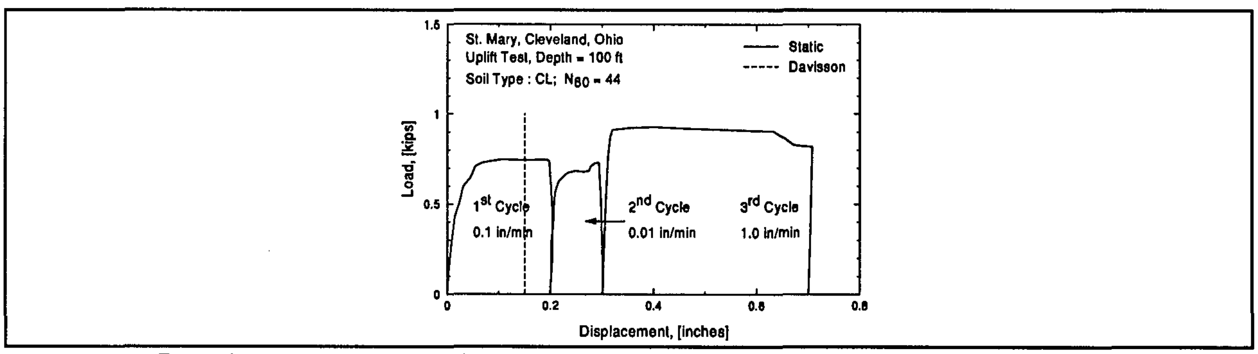


Figure B.3: Load versus Displacement for St. Mary, Cleveland, OH at depth of 100 ft

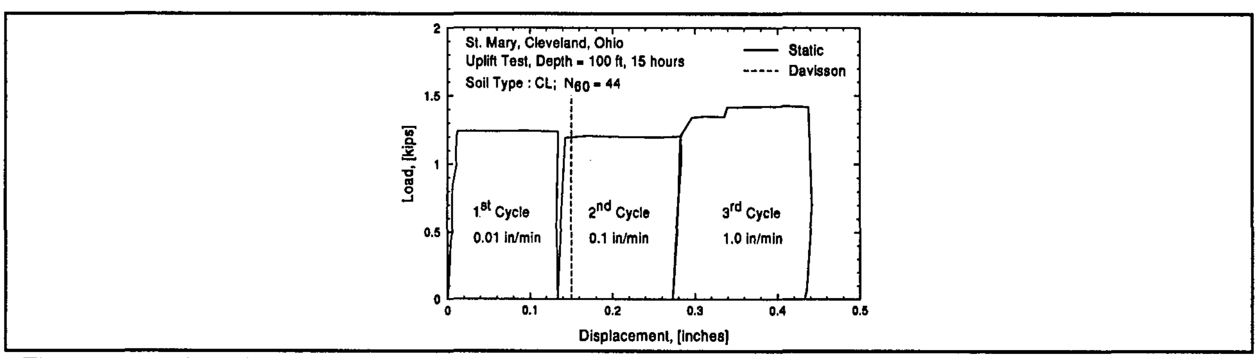


Figure B.4: Load versus Displacement for St. Mary, Cleveland, OH at depth of 100 ft (15 h)

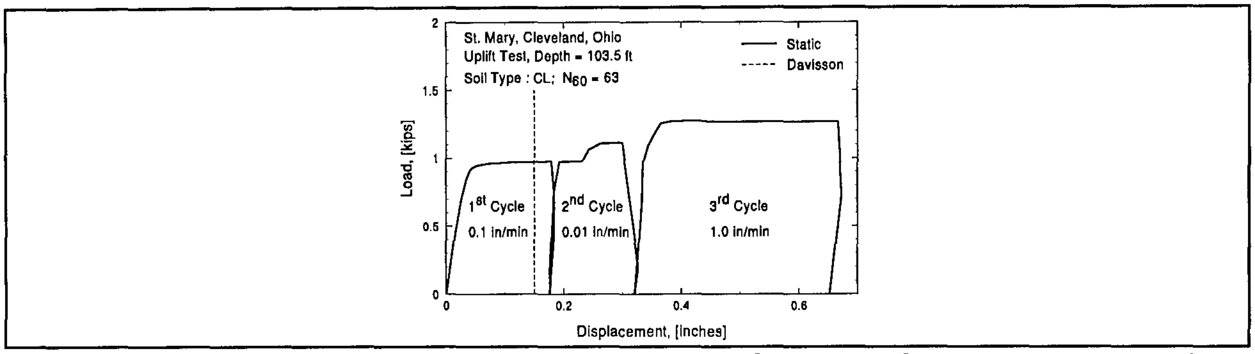


Figure B.5: Load versus Displacement for St. Mary, Cleveland, OH at depth of 103.5 ft

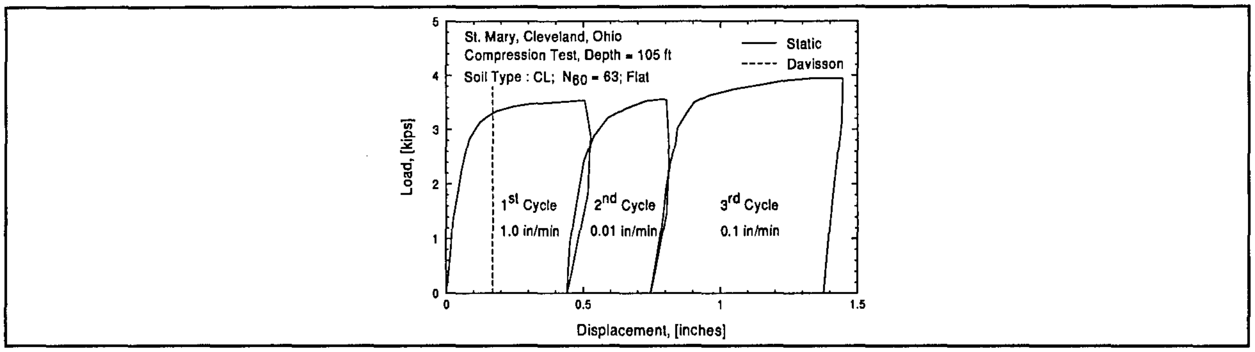


Figure B.6: Load versus Displacement for St. Mary, Cleveland, OH at depth of 105 ft

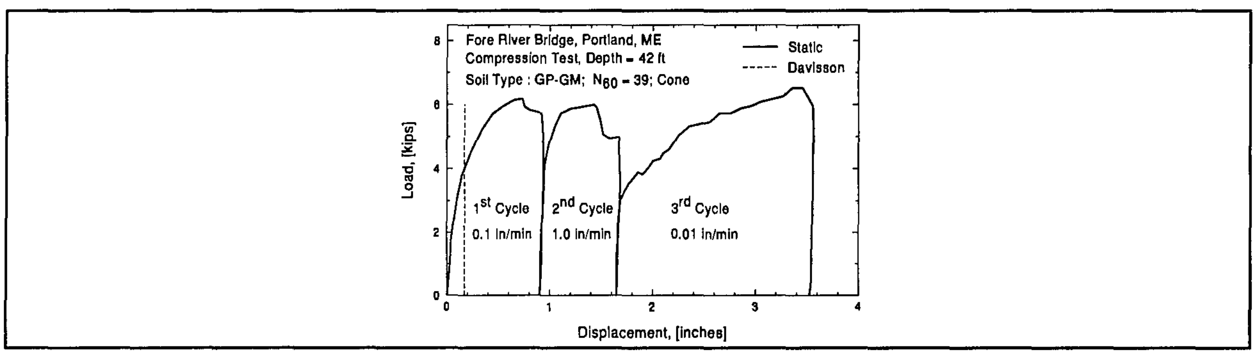


Figure B.7: Load versus Displacement for Fore River Bridge, Portland, ME at depth of 42 ft

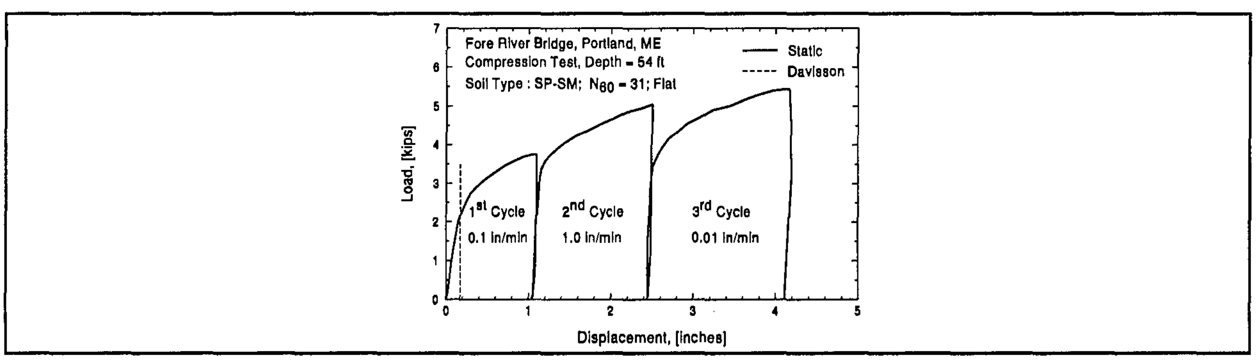


Figure B.8: Load versus Displacement for Fore River Bridge, Portland, ME at depth of 54 ft

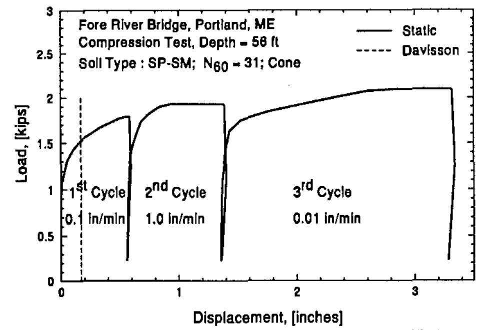


Figure B.9: Load versus Displacement for Fore River Bridge, Portland, ME at depth of 56 ft

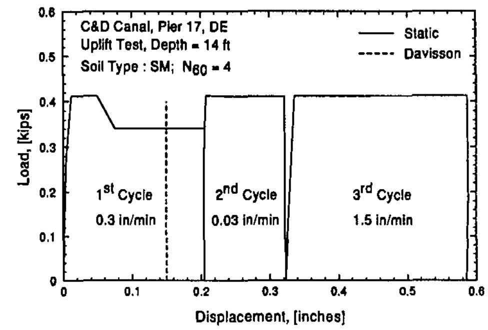


Figure B.10: Load versus Displacement for C&D Canal, Pier 17, DE at depth of 14 ft

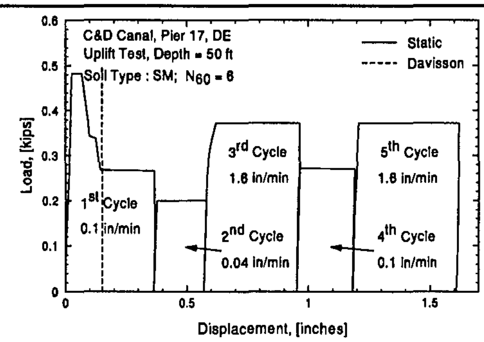


Figure B.11: Load versus Displacement for C&D Canal, Pier 17, DE at depth of 50 ft

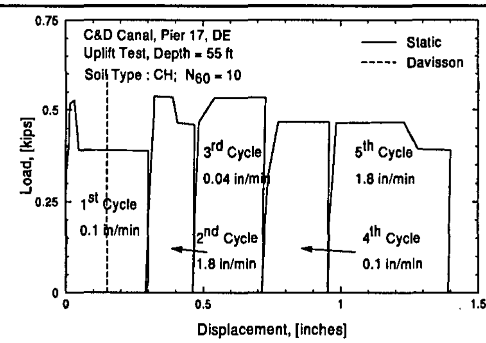


Figure B.12: Load versus Displacement for C&D Canal, Pier 17, DE at depth of 55 ft

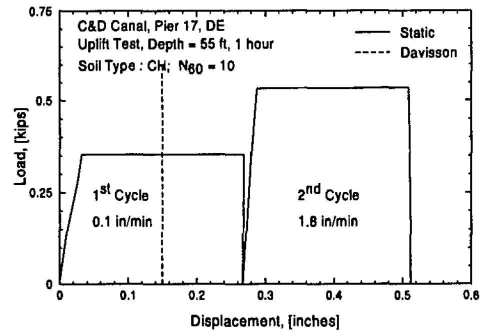


Figure B.13: Load versus Displacement for C&D Canal, Pier 17, DE at depth of 55 ft (1 h)

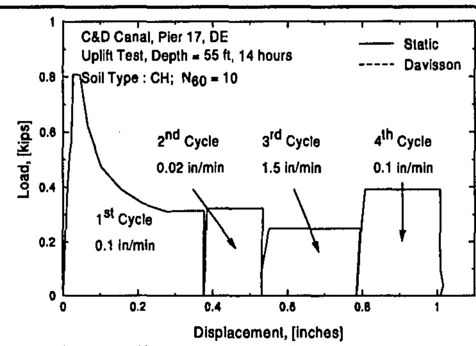


Figure B.14: Load versus Displacement for C&D Canal, Pier 17, DE at depth of 55 ft (14 h)

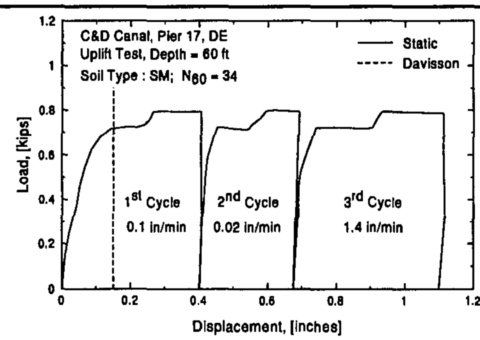


Figure B.15: Load versus Displacement for C&D Canal, Pier 17, DE at depth of 60 ft

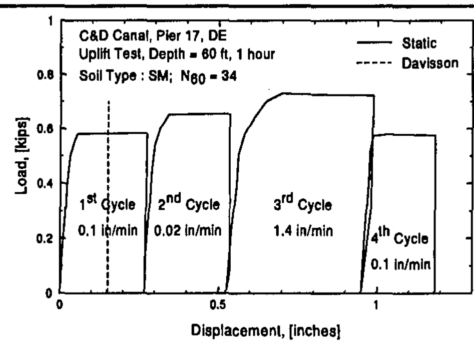


Figure B.16: Load versus Displacement for C&D Canal, Pier 17, DE at depth of 60 ft (1 h)

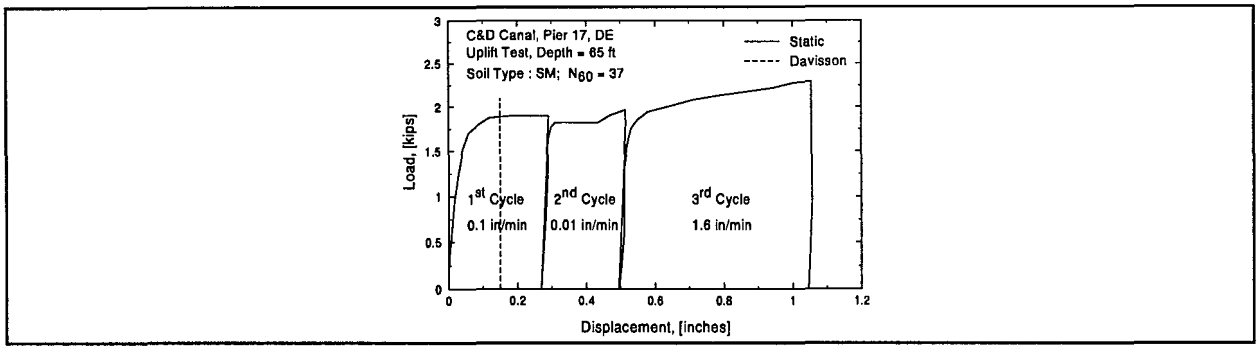


Figure B.17: Load versus Displacement for C&D Canal, Pier 17, DE at depth of 65 ft

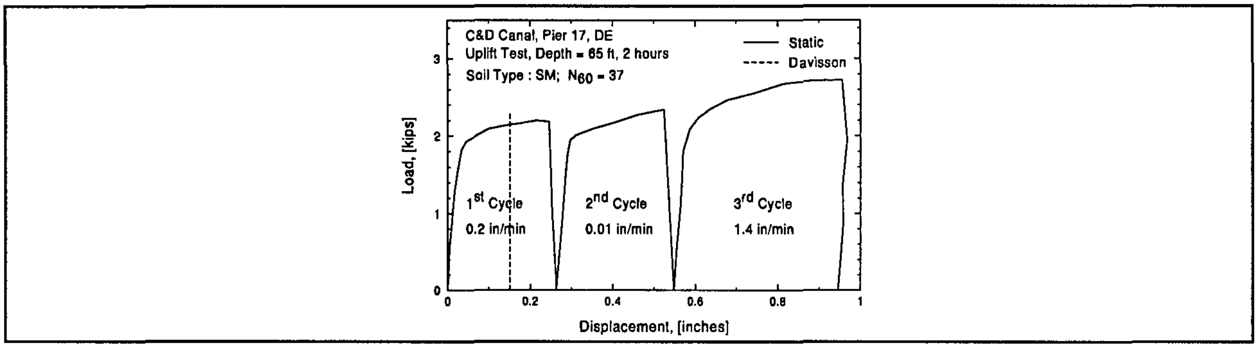


Figure B.18: Load versus Displacement for C&D Canal, Pier 17, DE at depth of 65 ft (2 h)

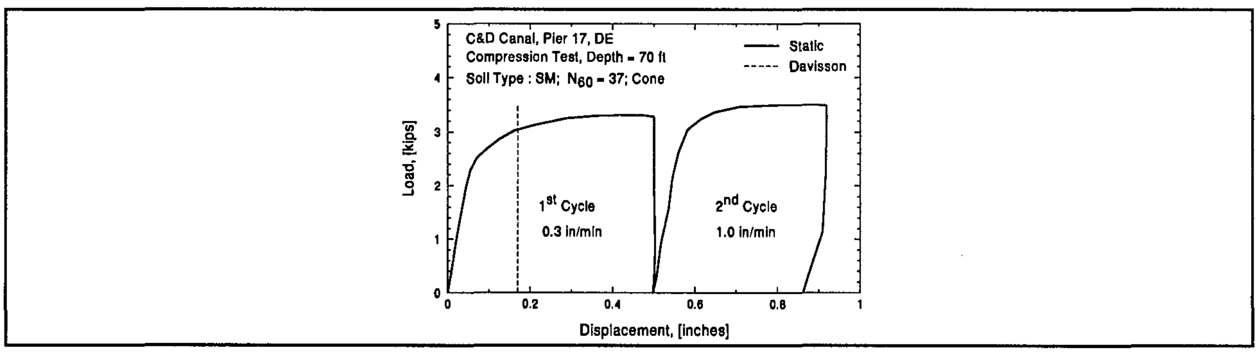


Figure B.19: Load versus Displacement for C&D Canal, Pier 17, DE at depth of 70 ft

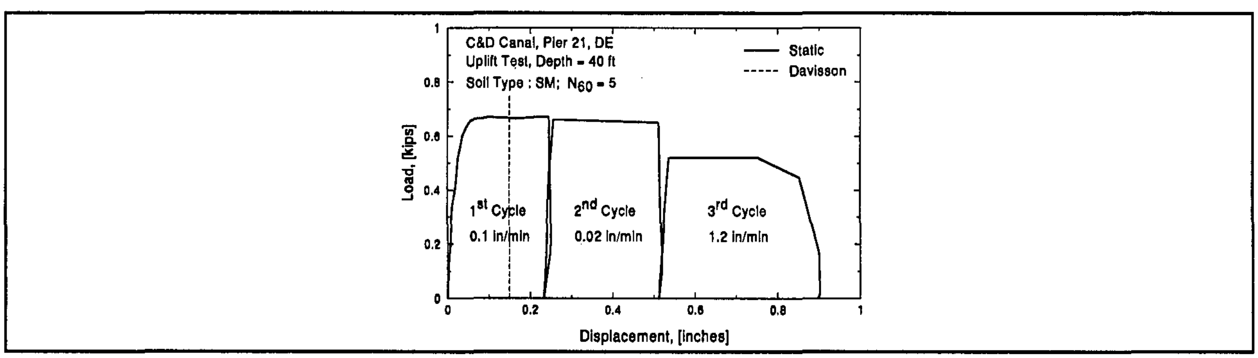


Figure B.20: Load versus Displacement for C&D Canal, Pier 21, DE at depth of 40 ft

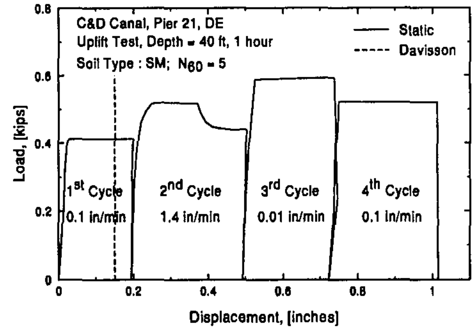


Figure B.21: Load versus Displacement for C&D Canal, Pier 21, DE at depth of 40 ft (1 h)

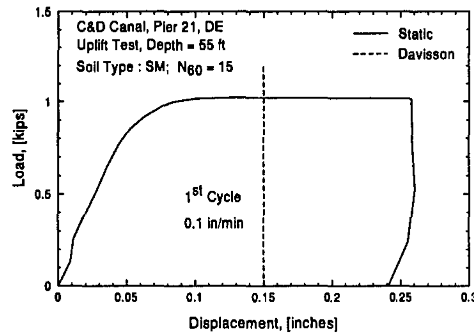


Figure B.22: Load versus Displacement for C&D Canal, Pier 21, DE at depth of 55 ft

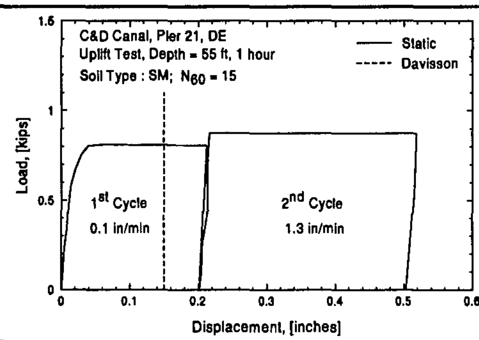


Figure B.23: Load versus Displacement for C&D Canal, Pier 21, DE at depth of 55 ft (1 h)

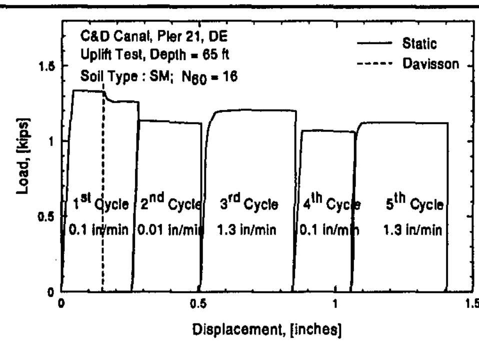


Figure B.24: Load versus Displacement for C&D Canal, Pier 21, DE at depth of 65 ft

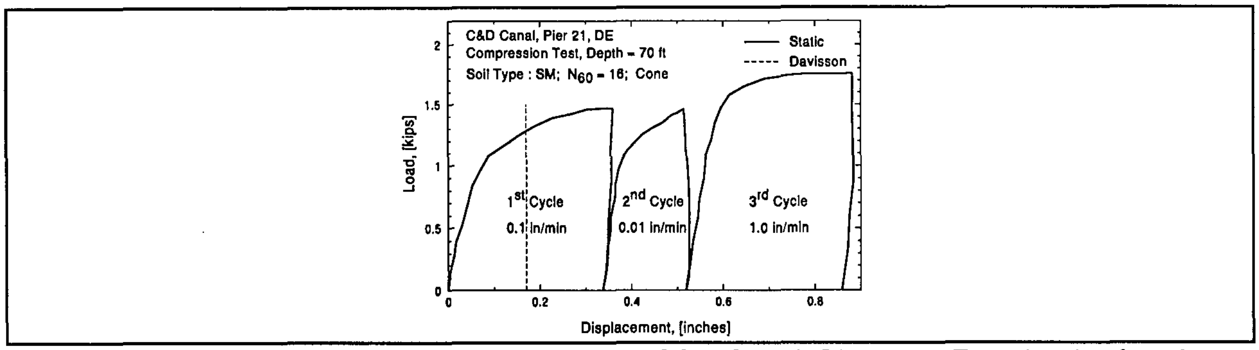


Figure B.25: Load versus Displacement for C&D Canal, Pier 21, DE at depth of 70 ft

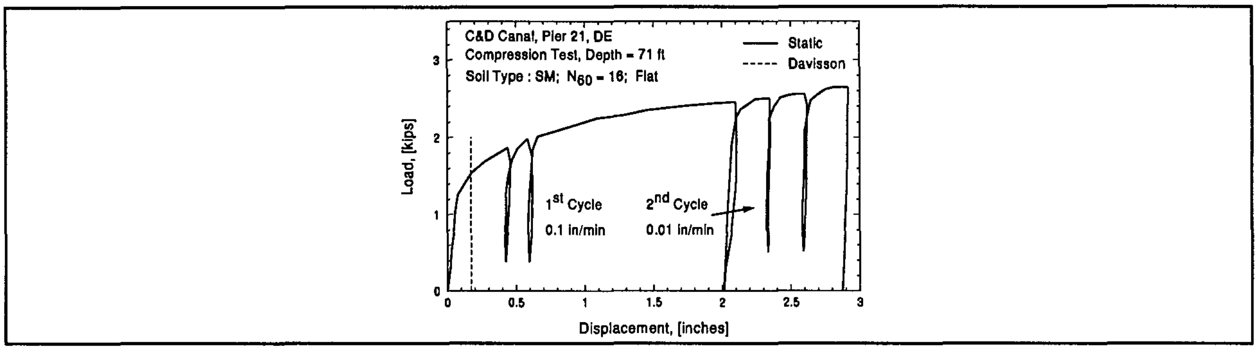


Figure B.26: Load versus Displacement for C&D Canal, Pier 21, DE at depth of 71 ft

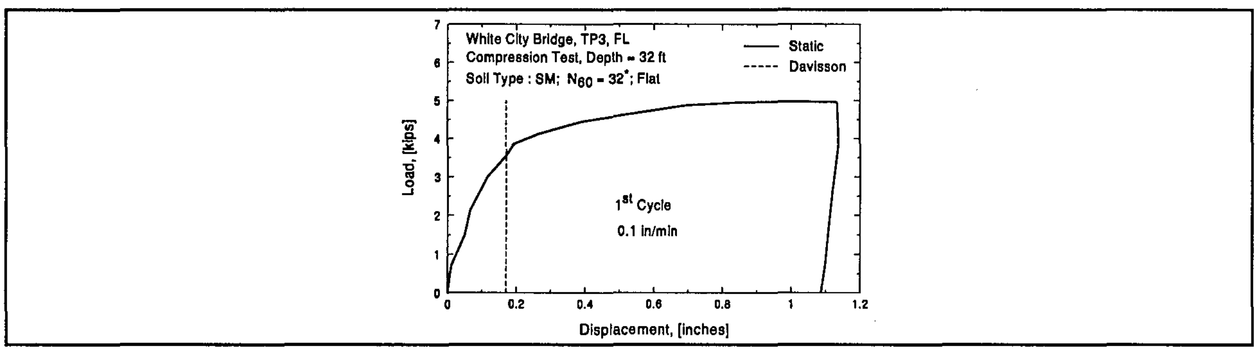


Figure B.27: Load versus Displacement for White City Bridge, TP3, FL at depth of 32 ft

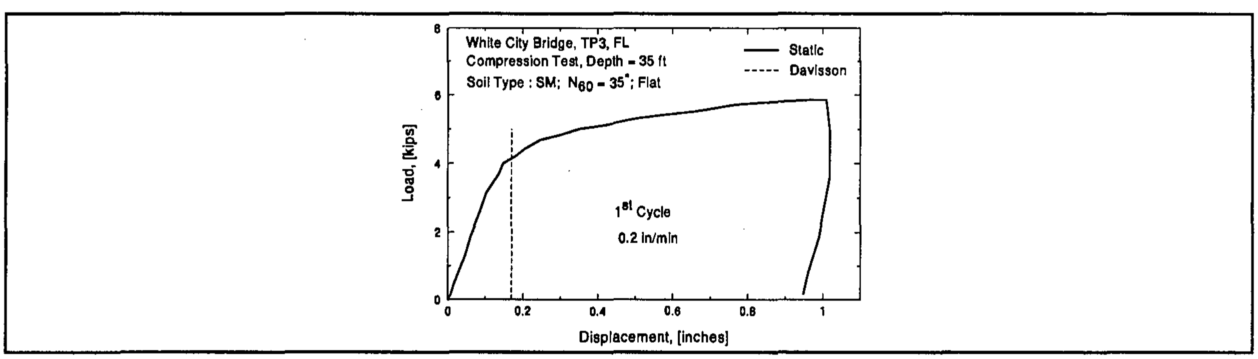


Figure B.28: Load versus Displacement for White City Bridge, TP3, FL at depth of 35 ft

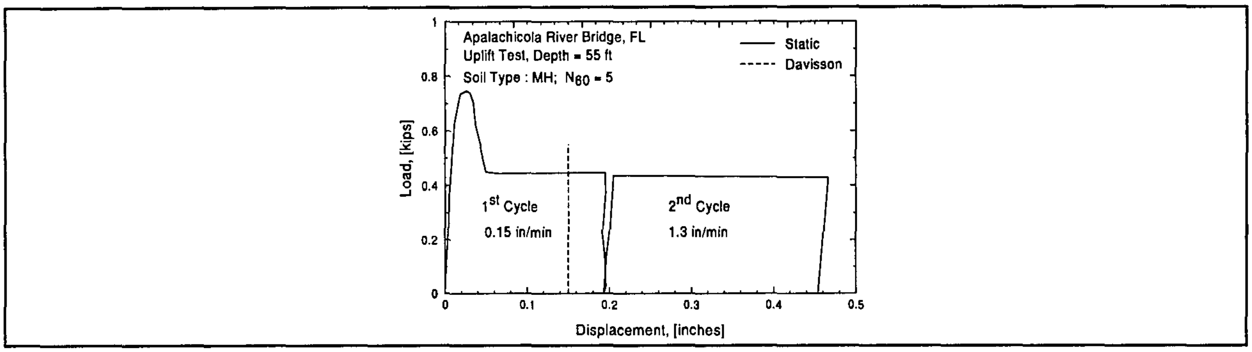


Figure B.29: Load versus Displacement for Apalachicola River Bridge, FL at depth of 55 ft

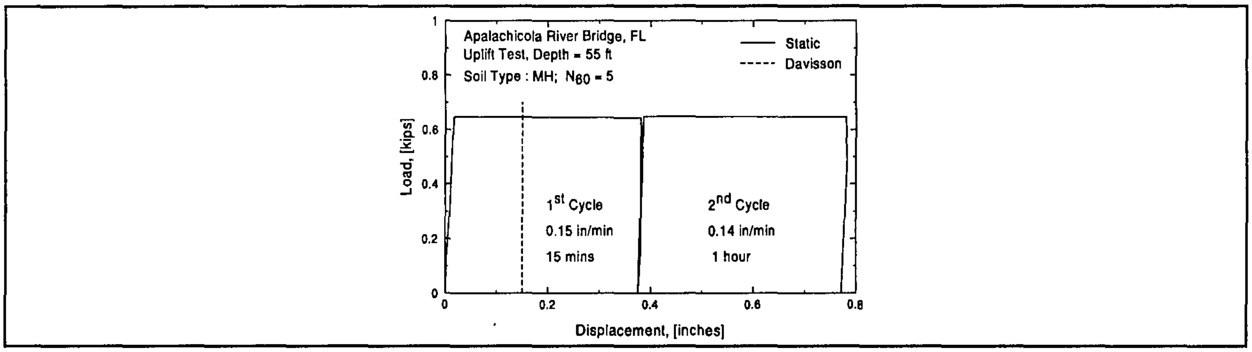


Figure B.30: Load versus Displacement for Apalachicola, FL at depth of 55 ft (15 min & 1h)

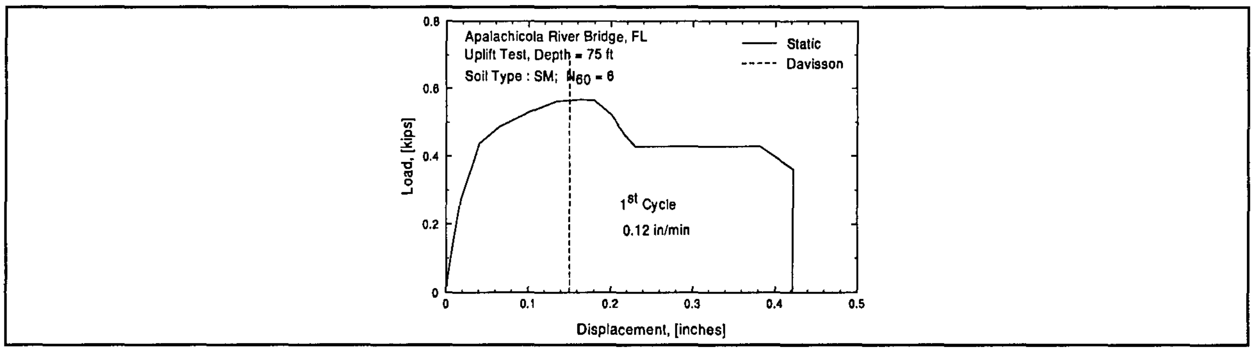


Figure B.31: Load versus Displacement for Apalachicola River Bridge, FL at depth of 75 ft

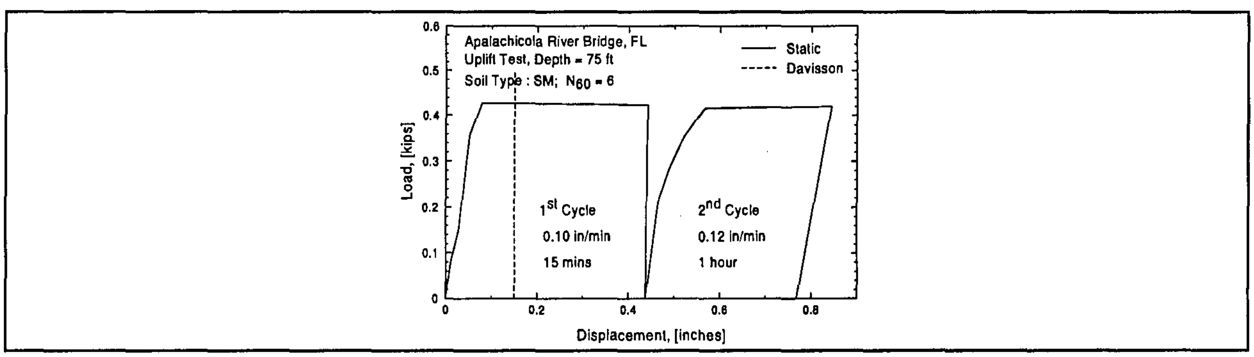


Figure B.32: Load versus Displacement for Apalachicola, FL at depth of 75 ft (15 min & 1 h)

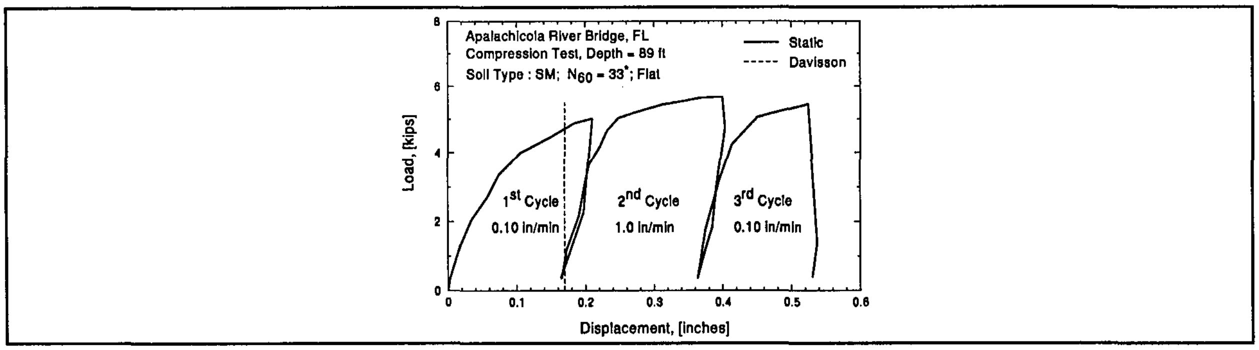


Figure B.33: Load versus Displacement for Apalachicola River Bridge, FL at depth of 89 ft

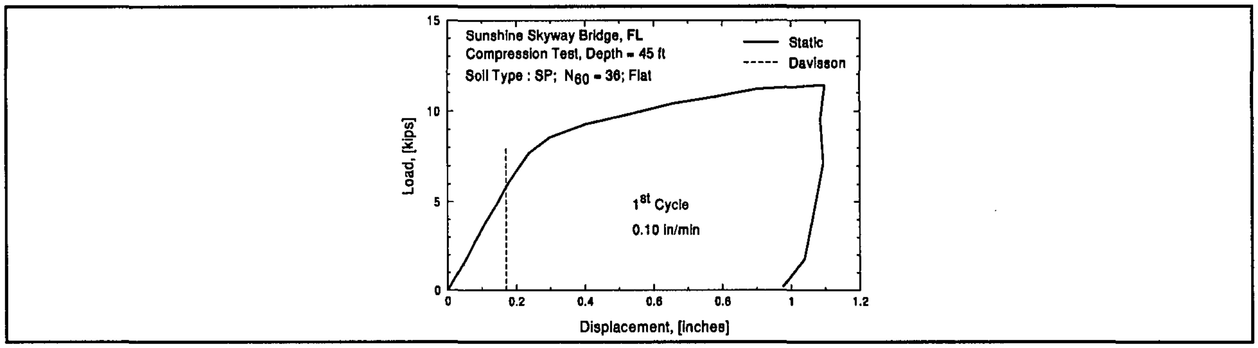


Figure B.34: Load versus Displacement for Sunshine Skyway Bridge, FL at depth of 45 ft

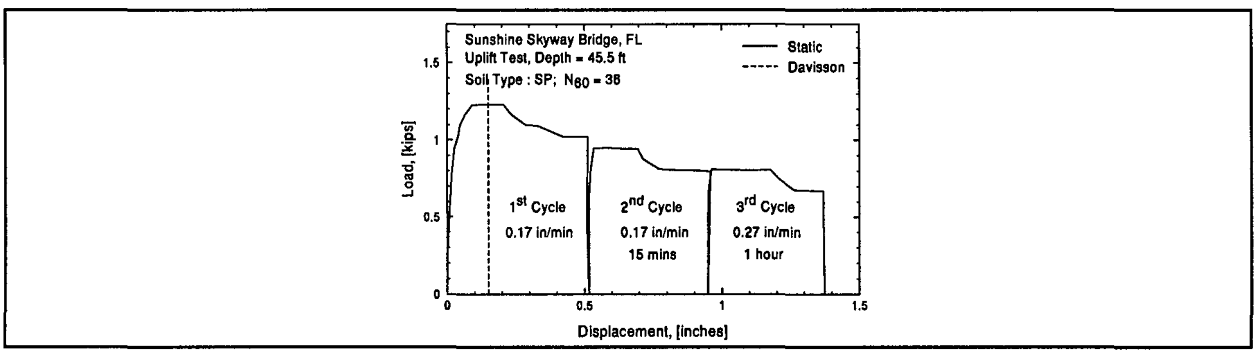


Figure B.35: Load versus Displacement for Sunshine Skyway Bridge, FL at depth of 45.5 ft

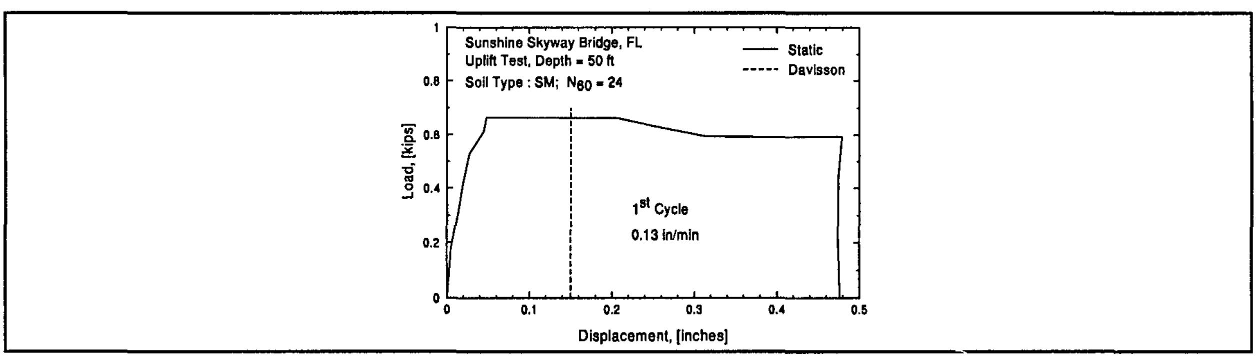


Figure B.36: Load versus Displacement for Sunshine Skyway Bridge, FL at depth of 50 ft

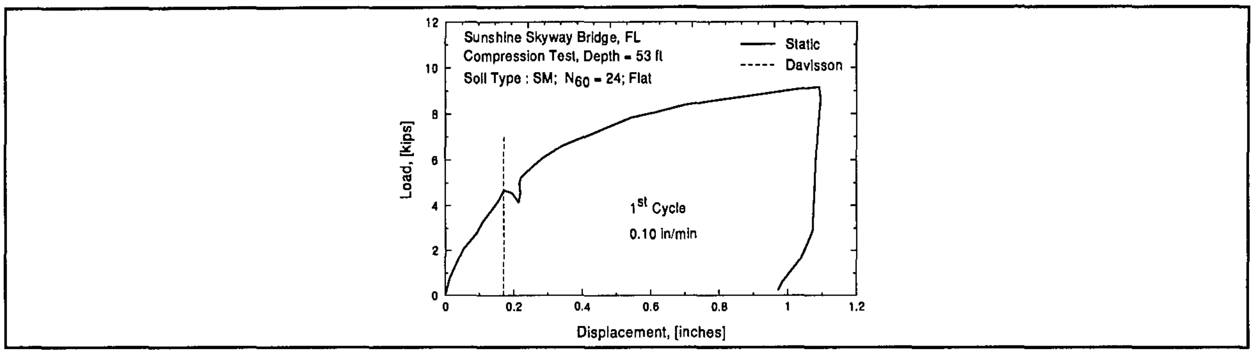


Figure B.37: Load versus Displacement for Sunshine Skyway Bridge, FL at depth of 53 ft

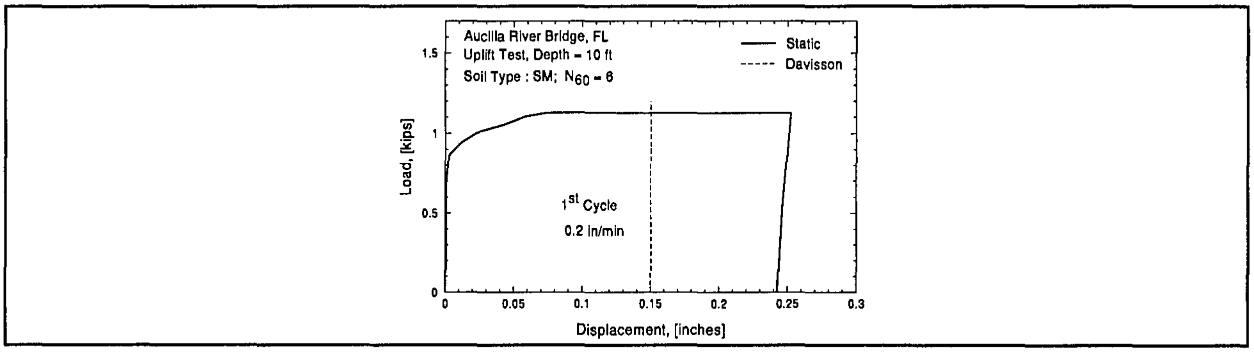


Figure B.38: Load versus Displacement for Aucilla River Bridge, FL at depth of 10 ft

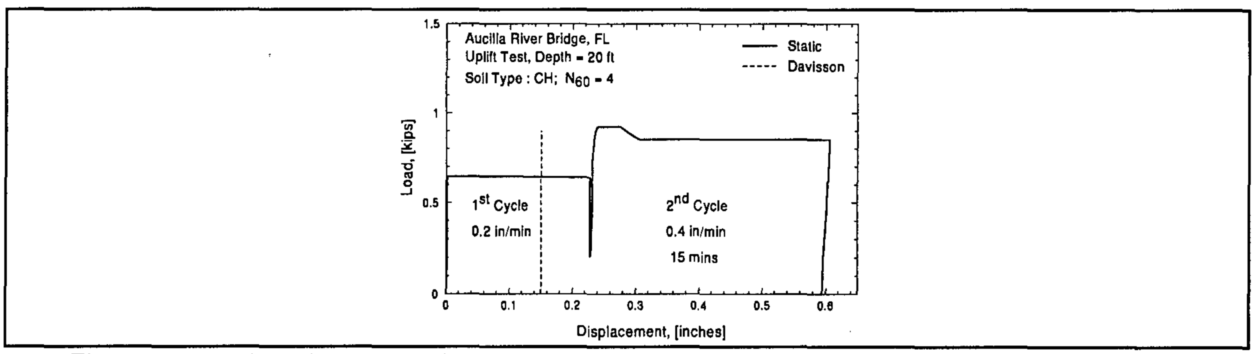


Figure B.39: Load versus Displacement for Aucilla River Bridge, FL at depth of 20 ft

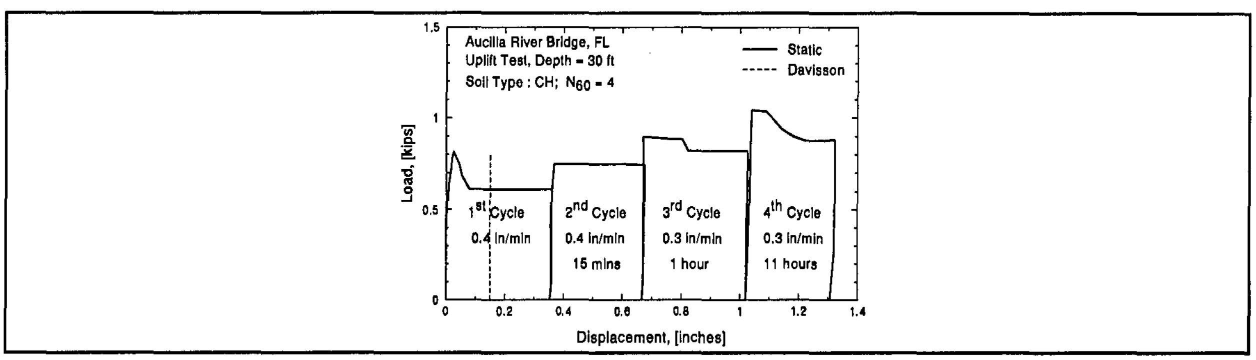


Figure B.40: Load versus Displacement for Aucilla River Bridge, FL at depth of 30 ft

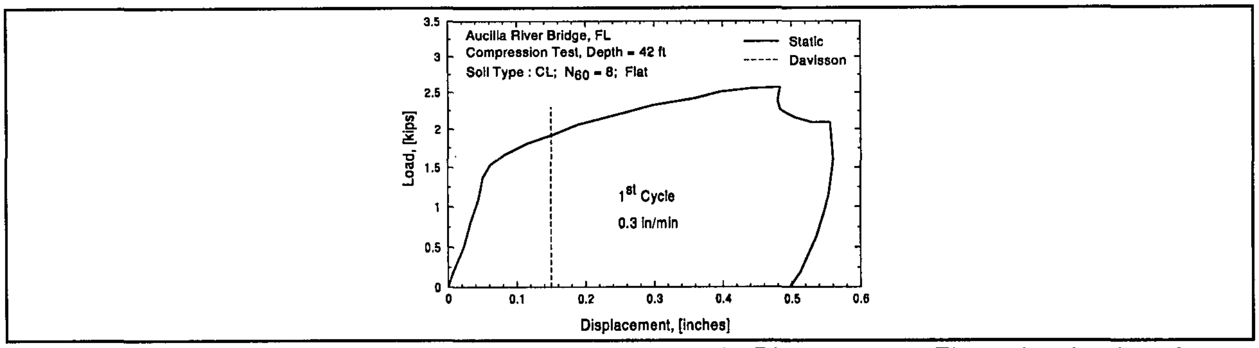


Figure B.41: Load versus Displacement for Aucilla River Bridge, FL at depth of 42 ft

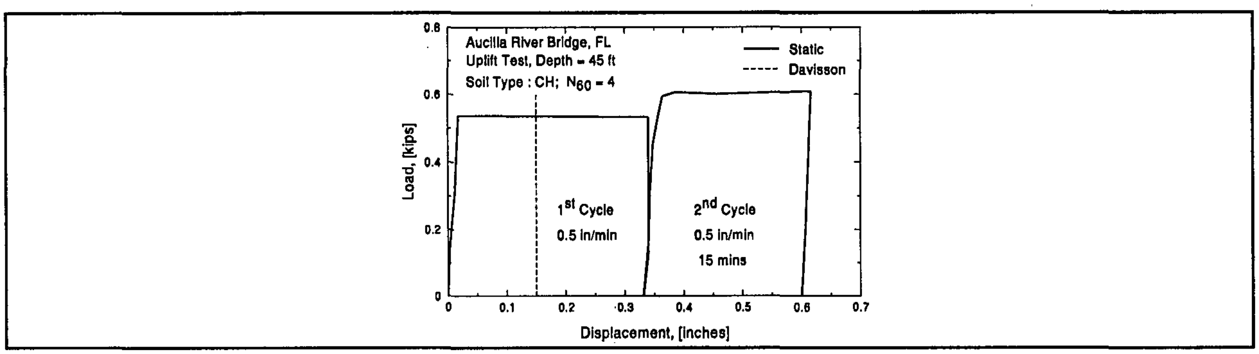


Figure B.42: Load versus Displacement for Aucilla River Bridge, FL at depth of 45 ft

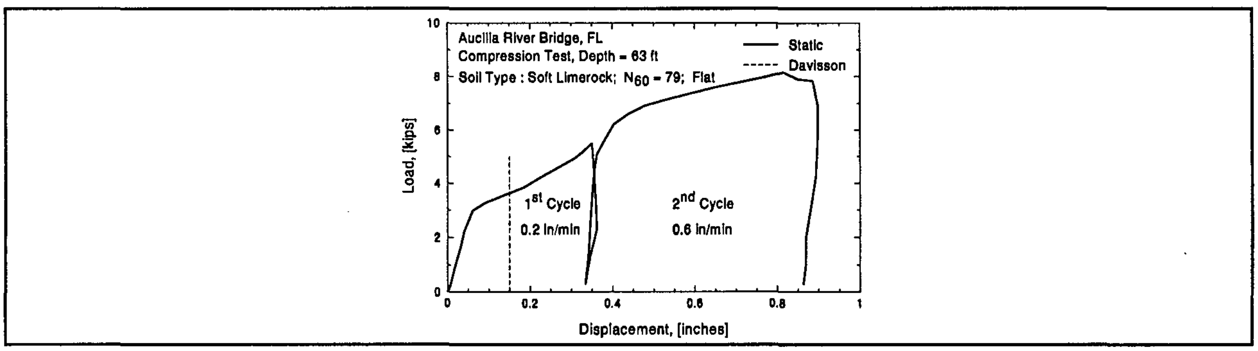


Figure B.43: Load versus Displacement for Aucilla River Bridge, FL at depth of 63 ft

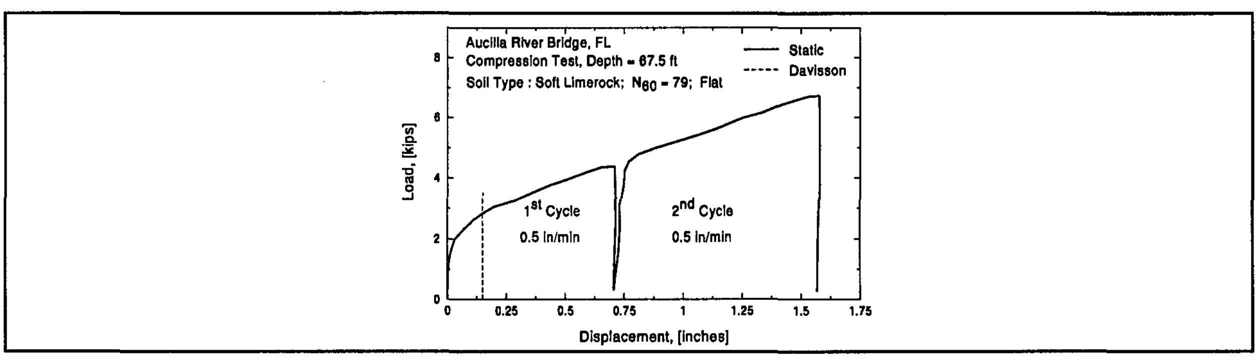


Figure B.44: Load versus Displacement for Aucilla River Bridge, FL at depth of 67.5 ft

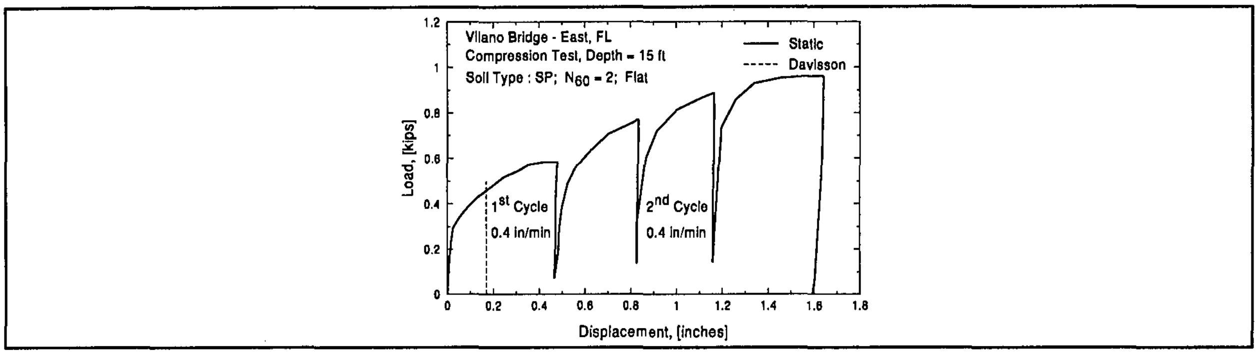


Figure B.45: Load versus Displacement for Vilano Bridge - East, FL at depth of 15 ft

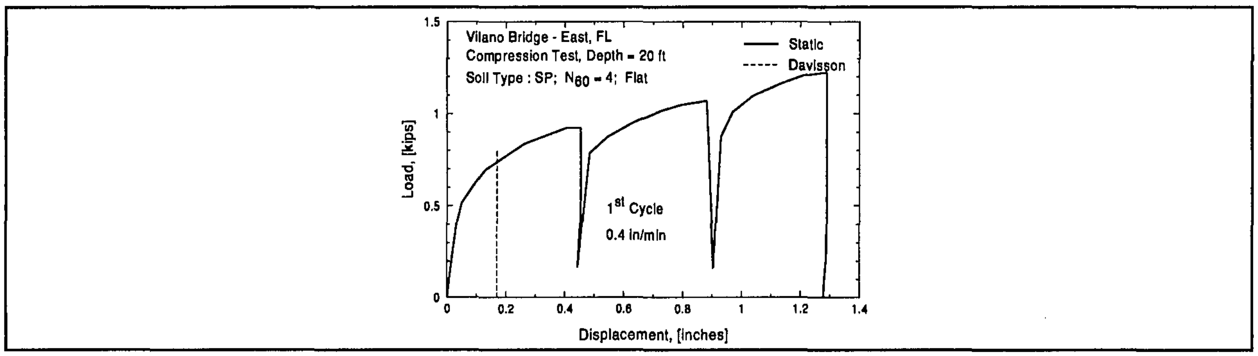


Figure B.46: Load versus Displacement for Vilano Bridge - East, FL at depth of 20 ft

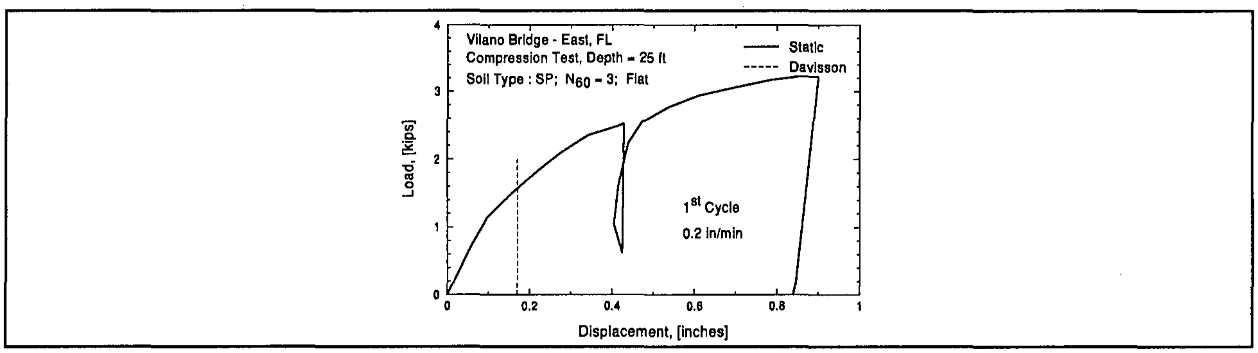


Figure B.47: Load versus Displacement for Vilano Bridge - East, FL at depth of 25 ft

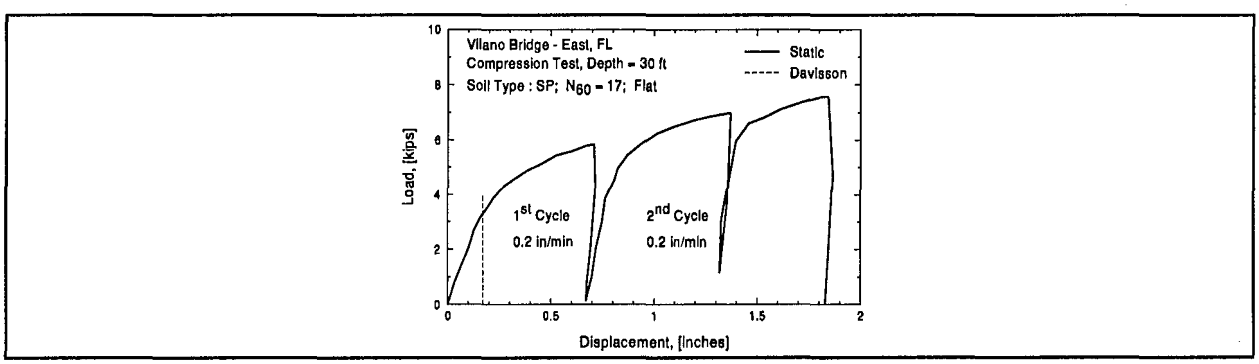


Figure B.48: Load versus Displacement for Vilano - East, FL at depth of 30 ft (Compression)

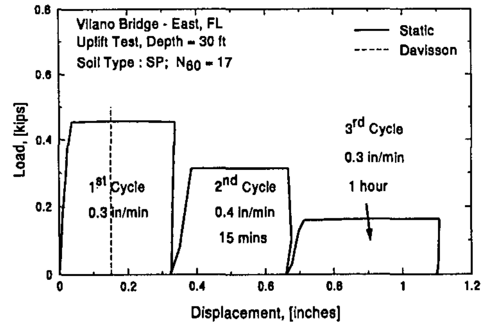


Figure B.49: Load versus Displacement for Vilano -East, FL at depth of 30 ft (Uplift)

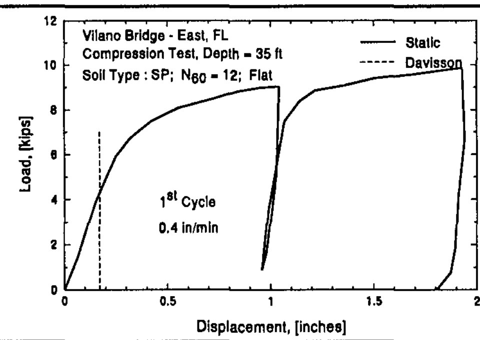


Figure B.50: Load versus Displacement for Vilano Bridge - East, FL at depth of 35 ft

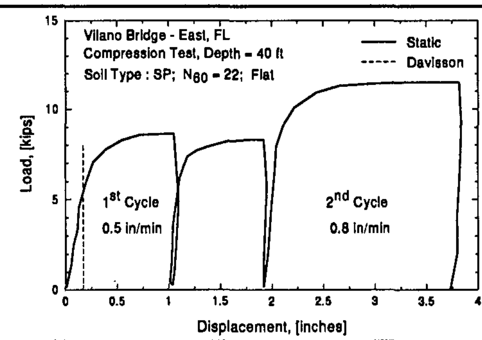


Figure B.51: Load versus Displacement for Vilano Bridge - East, FL at depth of 40 ft

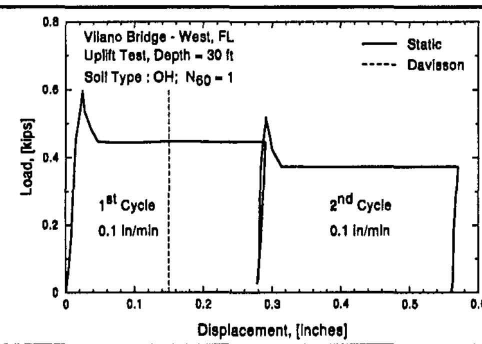


Figure B.52: Load versus Displacement for Vilano Bridge - West, FL at depth of 30 ft

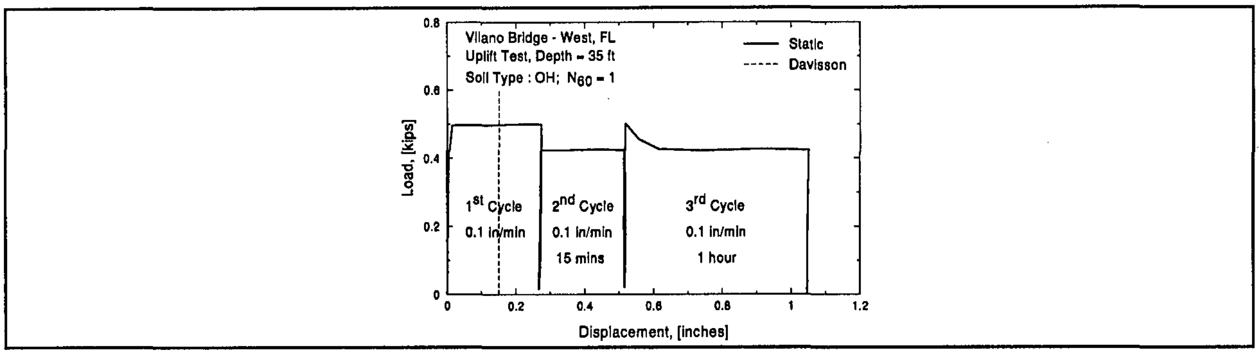


Figure B.53: Load versus Displacement for Vilano Bridge - West, FL at depth of 35 ft

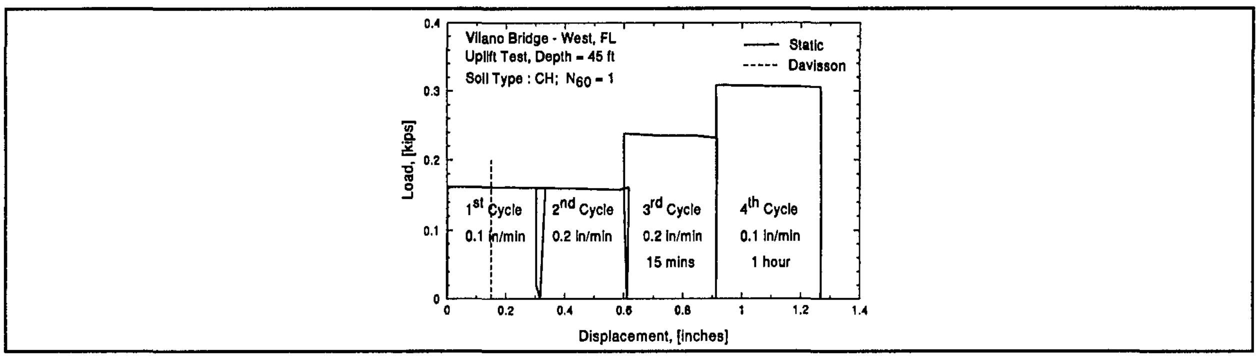


Figure B.54: Load versus Displacement for Vilano Bridge - West, FL at depth of 45 ft

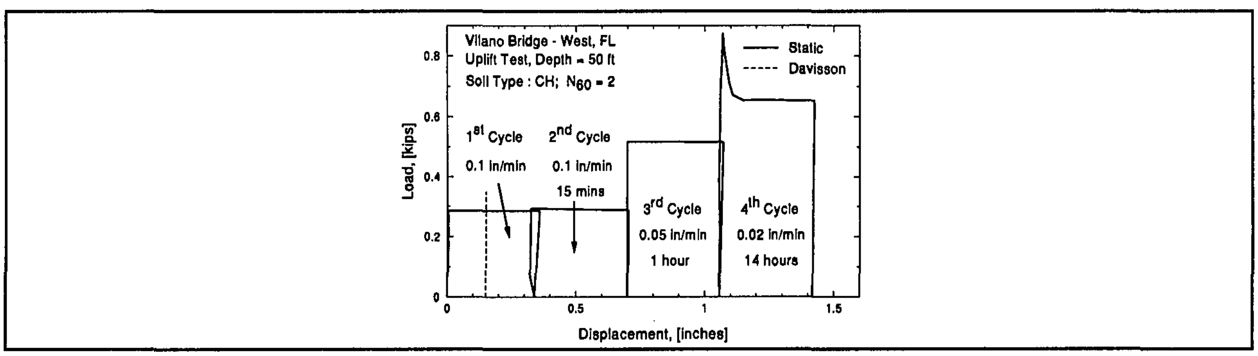


Figure B.55: Load versus Displacement for Vilano Bridge - West, FL at depth of 50 ft

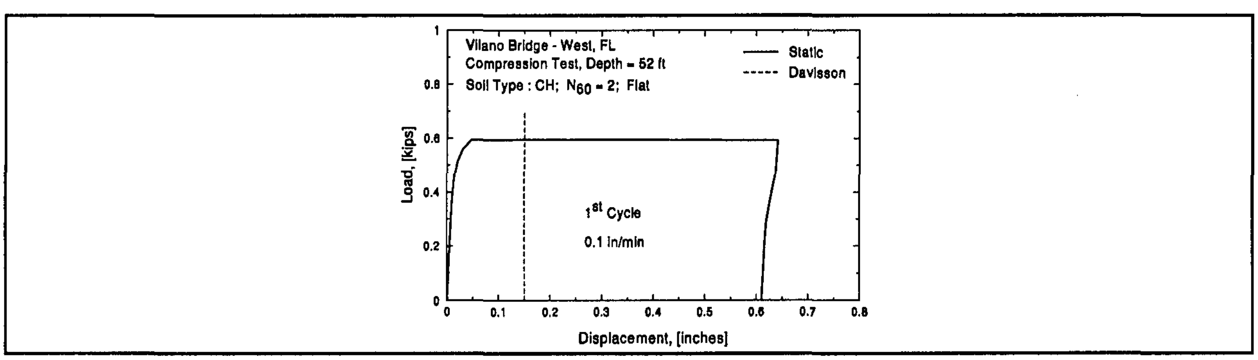


Figure B.56: Load versus Displacement for Vilano Bridge - West, FL at depth of 52 ft

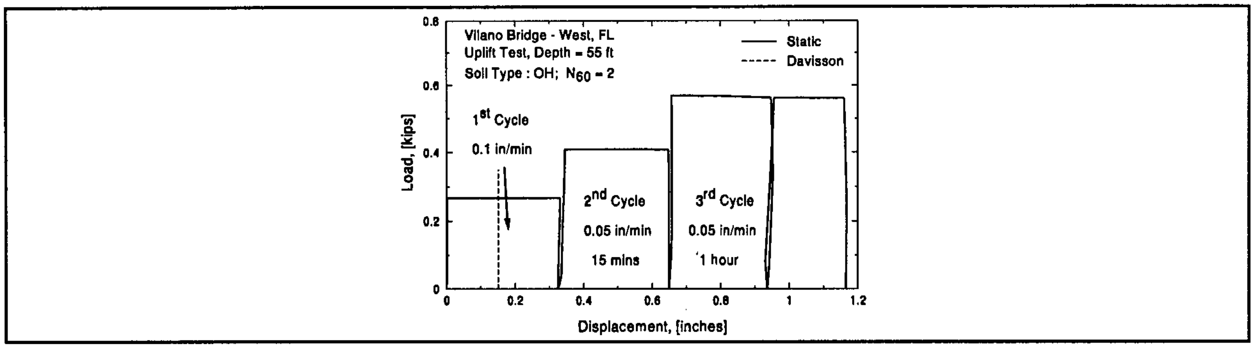


Figure B.57: Load versus Displacement for Vilano Bridge - West, FL at depth of 55 ft

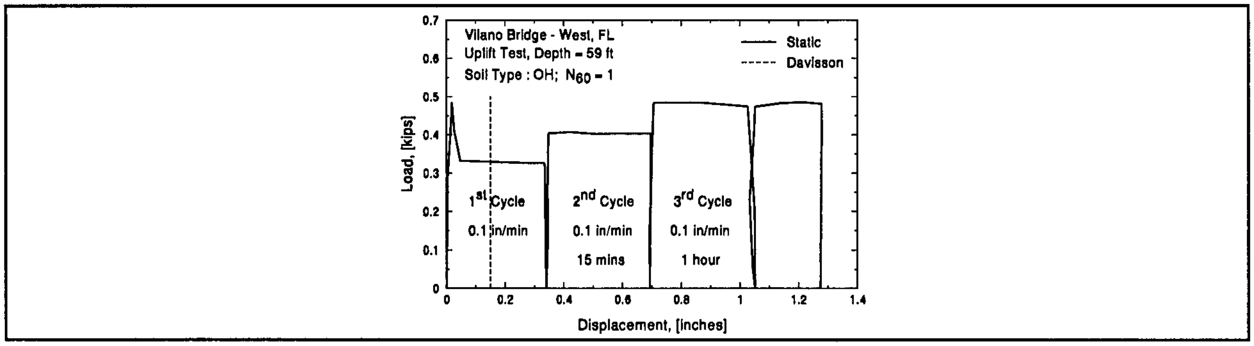


Figure B.58: Load versus Displacement for Vilano Bridge - West, FL at depth of 59 ft

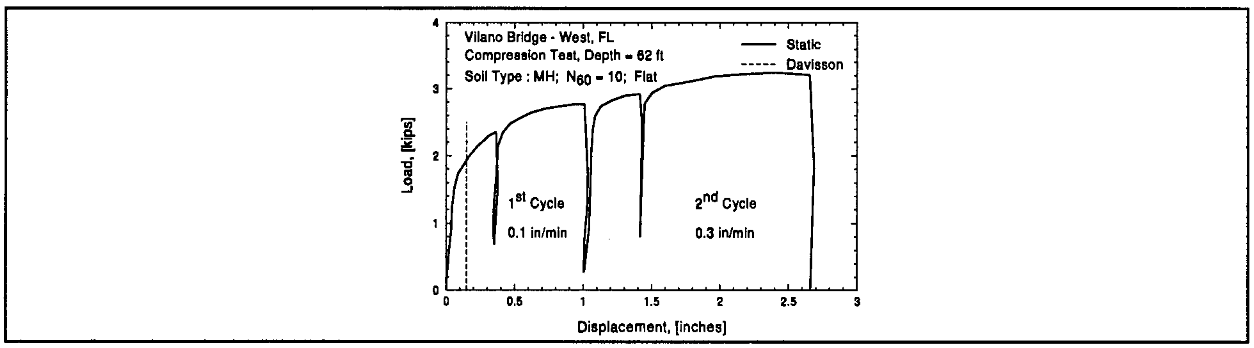


Figure B.59: Load versus Displacement for Vilano Bridge - West, FL at depth of 62 ft

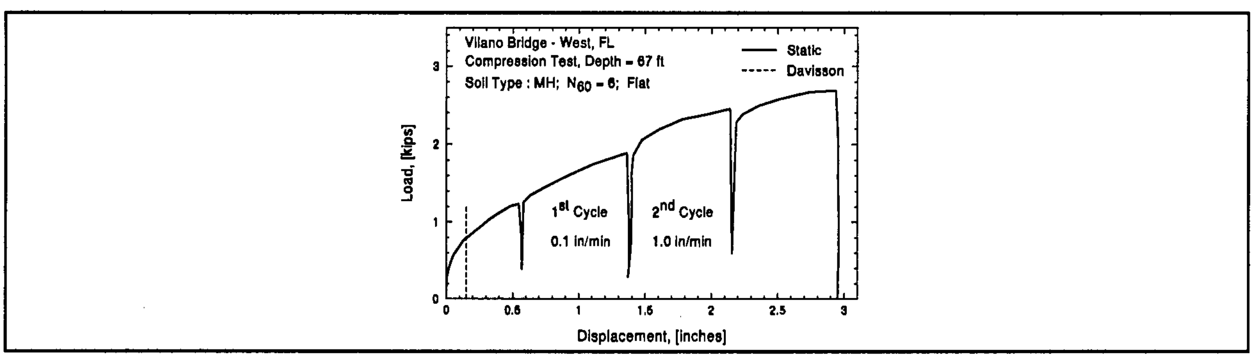


Figure B.60: Load versus Displacement for Vilano Bridge - West, FL at depth of 67 ft

APPENDIX C

TORQUE TEST RESULTS

The torque test results were plotted as torque *vs* angle of rotation measured near the top of the SPT drill string. The results are summarized in table C.1 including peak torque and residual torque. The torque tests were performed with two different types of device, (a) torque wrench and (b) instrumented torque rod. Details about each instrument are discussed in chapter 4. With the torque wrench, only peak and residual values could be recorded. However, both torque and angle of rotation were recorded continuously with the instrumented torque rod, and therefore the torque *vs* angle of rotation plots are presented in figures C.1 to C.15.

The plots of torque *vs* angle of rotation include a shear resistance scale on the right y-axis. Furthermore, for comparison, the uplift resistance of the soil and other shear resistance results (whenever available) are also shown on the plot. For example, for Apalachicola River Bridge, FL, figure C.1 shows both the uplift resistance and the unconfined compressive strength of the soil.

Table C.1: Summary of Torque Test Results					
	Location of Test Site (Test Device)	Test Depth [ft]	Peak Torque [lbs-ft]	Residual Torque [lbs-ft]	Figure
1.	C&D Canal, Pier 17, DE	60	70	70	--
	(Torque Wrench)	65	220	220	--
2.	C&D Canal, Pier 21, DE	40	15	15	--
	(Torque Wrench)	55	130	130	--
		65	150	150	--
3.	Apalachicola River Brg, FL	55	77	54	C.1
	(Instrumented Torque Rod)	75	60	60	C.2
4.	Sunshine Skyway Brg, FL	45.5	125	64	C.3
	(Instrumented Torque Rod)	50	88	55	C.4
5.	Aucilla River Bridge, FL	10	70	22	C.5
	(Instrumented Torque Rod)	20	100	40	C.6
		30	90	45	C.7
		45	62	58	C.8
6.	Vilano Bridge - East, FL	30	30	30	C.9
	(Instrumented Torque Rod)	--	--	--	--
7.	Vilano Bridge - West, FL	30	58	30	C.10
	(Instrumented Torque Rod)	35	65	42	C.11
		45	57	35	C.12
		50	59	27	C.13
		55	73	32	C.14
		59	60	36	C.15

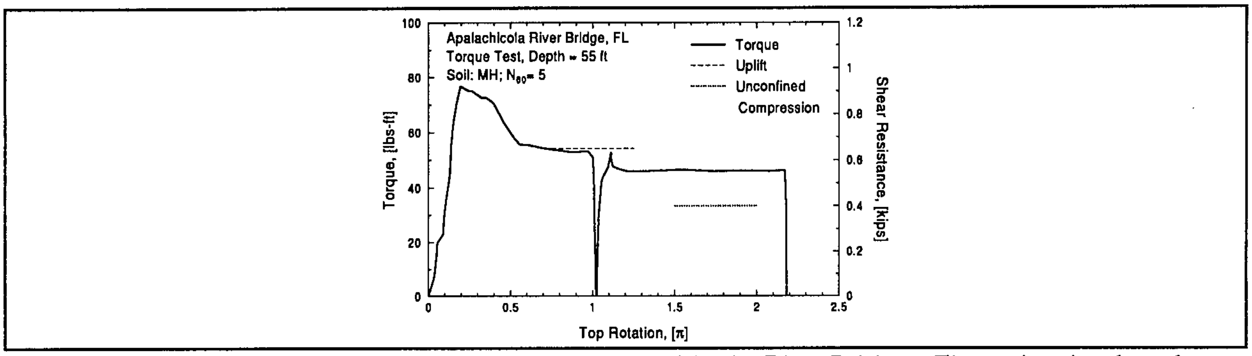


Figure C.1: Torque versus Rotation for Apalachicola RiverBridge, FL at depth of 55 ft

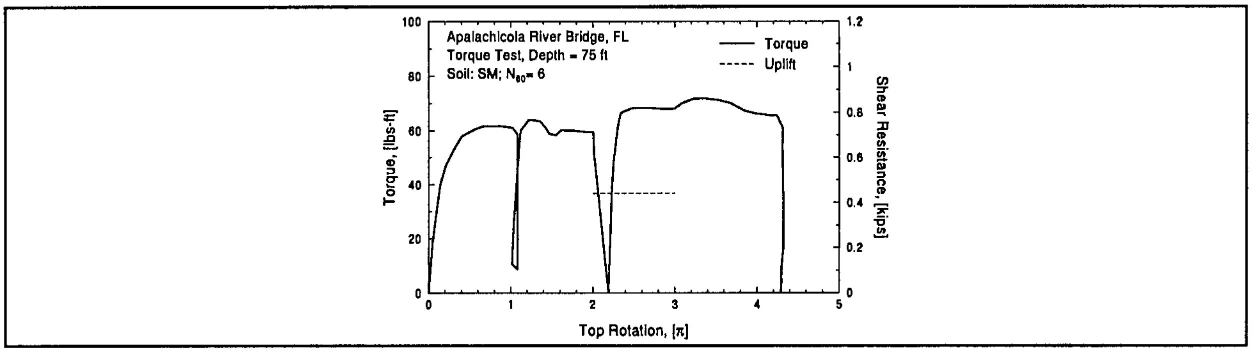


Figure C.2: Torque versus Rotation for Apalachicola River Bridge, FL at depth of 75 ft

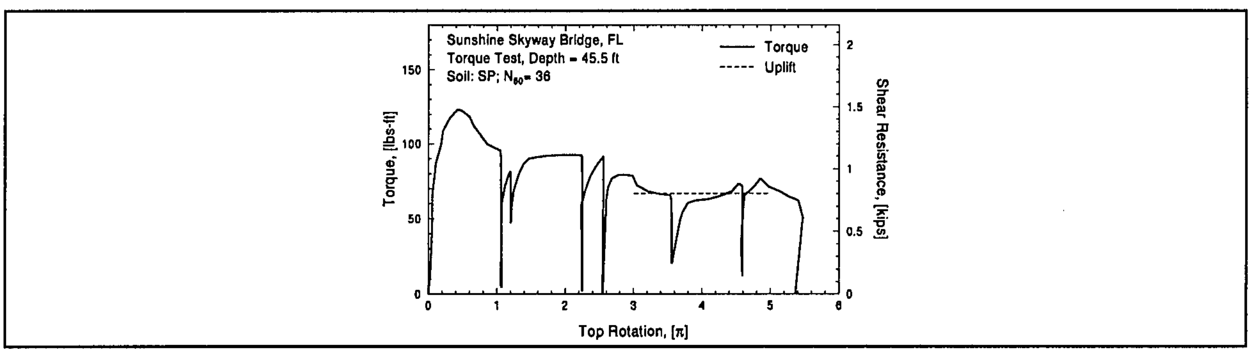


Figure C.3: Torque versus Rotation for Sunshine Skyway Bridge, FL at depth of 45.5 ft

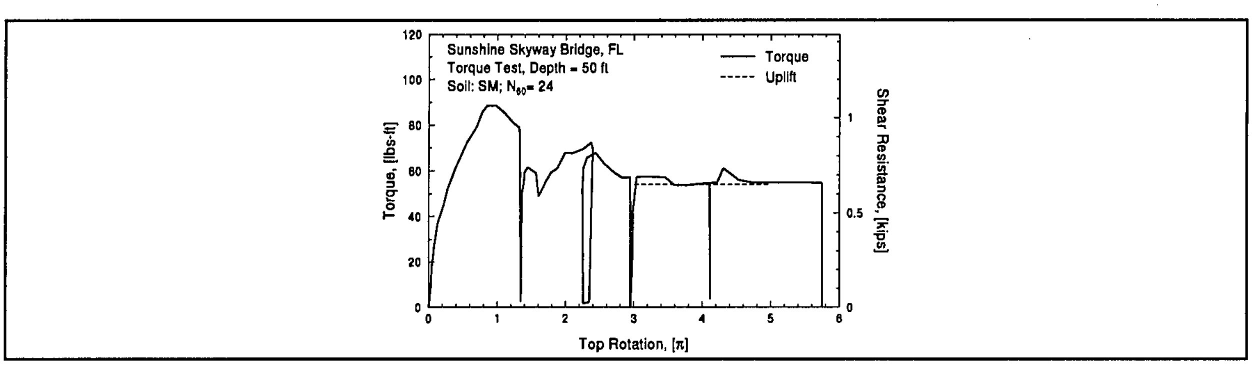


Figure C.4: Torque versus Rotation for Sunshine Skyway Bridge, FL at depth of 50 ft

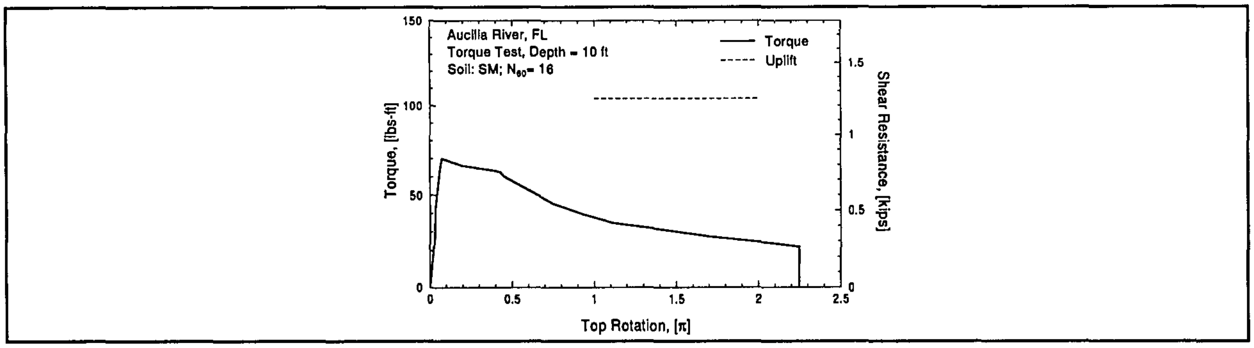


Figure C.5: Torque versus Rotation for Aucilla River Bridge, FL at depth of 10 ft

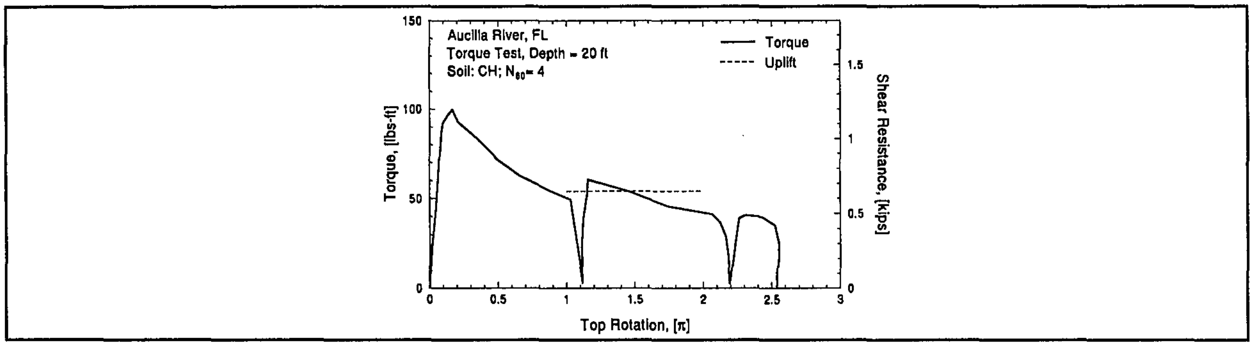


Figure C.6: Torque versus Rotation for Aucilla River Bridge, FL at depth of 20 ft

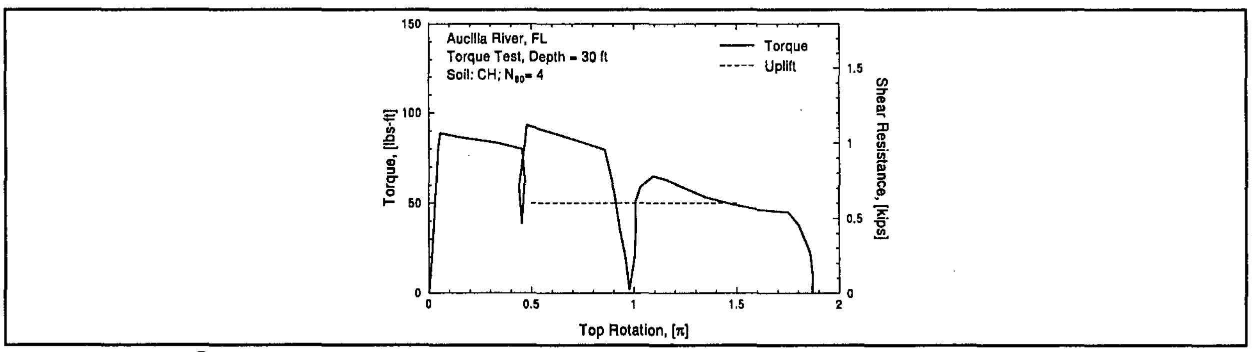


Figure C.7: Torque versus Rotation for Aucilla River Bridge, FL at depth of 30 ft

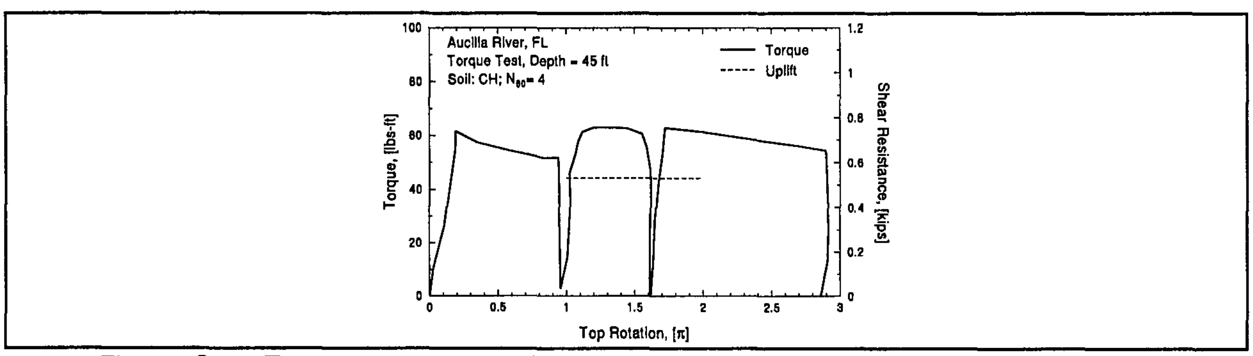


Figure C.8: Torque versus Rotation for Aucilla River Bridge, FL at depth of 45 ft

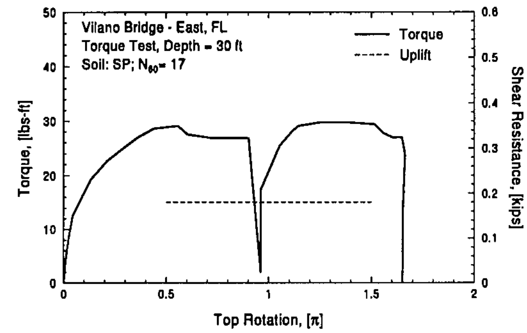


Figure C.9: Torque versus Rotation for Vilano Bridge - East, FL at depth of 30 ft

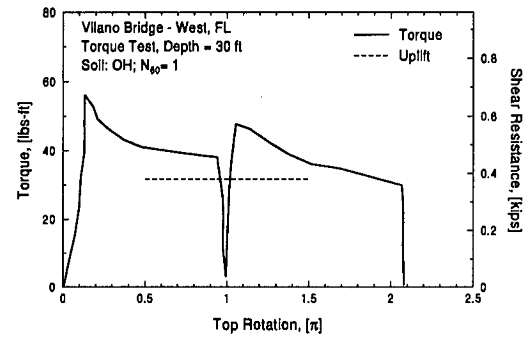


Figure C.10: Torque versus Rotation for Vilano Bridge - West, FL at depth of 30 ft

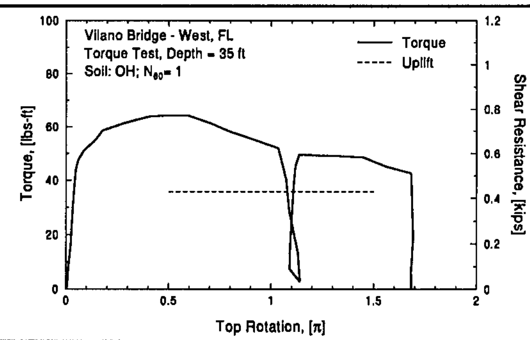


Figure C.11: Torque versus Rotation for Vilano Bridge - West, FL at depth of 35 ft

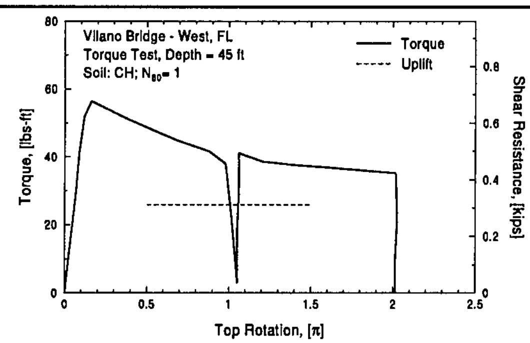


Figure C.12: Torque versus Rotation for Vilano Bridge -West, FL at depth of 45 ft

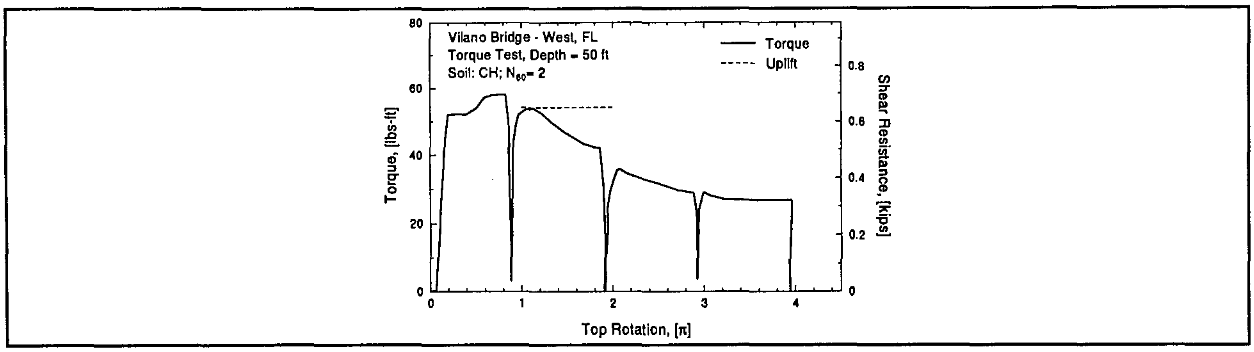


Figure C.13: Torque versus Rotation for Vilano Bridge - West, FL at depth of 50 ft

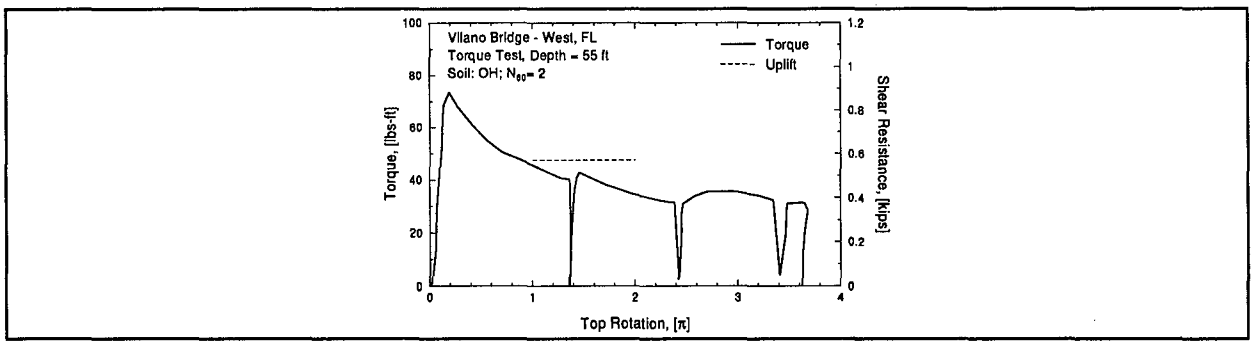


Figure C.14: Torque versus Rotation for Vilano Bridge - West, FL at depth of 55 ft

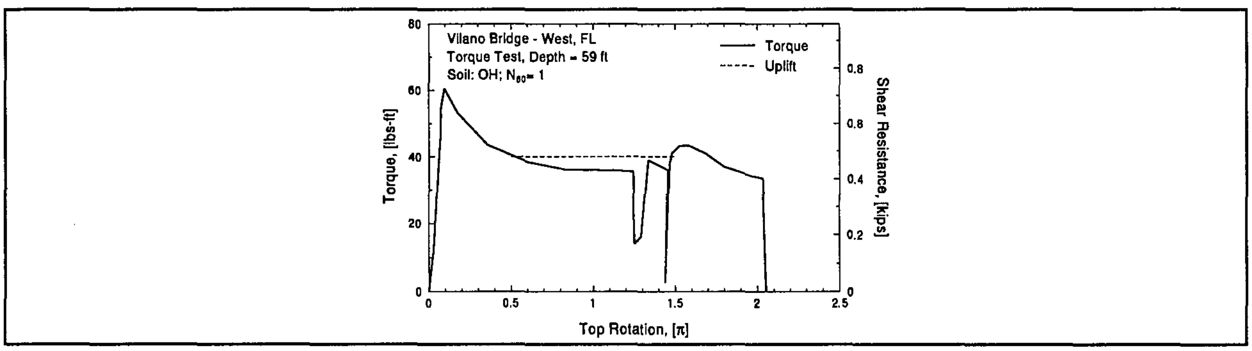


Figure C.15: Torque versus Rotation for Vilano Bridge - West, FL at depth of 59 ft

APPENDIX D

DYNAMIC TEST RESULTS

D.1 FORCE AND VELOCITY TIME HISTORY

The force and velocity (F-V) time histories, measured near the top of the SPT drive rod are presented in this appendix. The calculated F-V time histories at the bottom end of the drill string (when an oversized tip was used) or at the sampler location (when split spoon sampler was used) are also presented here. Both the top and bottom F-V time histories are presented on the same figure, with the top F-V presented in (a) and the bottom F-V in (b). The velocity scales are always calculated from the force scale by dividing with the drive rod impedance. The bottom F-V time histories were determined from the top F-V according to the method discussed in chapter 5. The bottom measured and computed force histories are presented in (c) and (d) when available for statically and dynamically calculated parameters, respectively. Table D.1 summarizes the location (site and depth) of the F-V time histories as well as the corresponding figure number. Note that the "test depth" column in table D.1 also includes the waiting time, whether split spoon sampler or oversized tip was used, and the hammer drop height if different from 30 in. When an oversized tip was used, a letter "C" is indicated on the table. When "C2" is indicated, the test was performed with an oversized tip and after the static load test was conducted. In figures D.96 and D.99, ASLT stands for after static load test.

Table D.1: Summary of Dynamic Test Results			
	Location of Test Site	Test Depth [ft-wait time]	Figure
1.	St. Mary, Cleveland, OH	40	D.1
		65	D.2
		65-25mins	D.3
		65-2hours	D.4
		100	D.5
		100-15hours	D.6
		103.5	D.7
		105 C	D.8
2.	Fore River Bridge, Portland, ME	20	D.9
		30	D.10
		40	D.11
		42 C	D.12
		54 C	D.13
		56 C	D.14
3.	C&D Canal, Pier 17, DE	14	D.15
		40	D.16
		50	D.17
		55	D.18
		55-1hour	D.19
		55-14hours	D.20
		60	D.21
		60-1hour	D.22
		65	D.23
		65-2hours	D.24
		70 C	D.25

Table D.1: Summary of Dynamic Test Results (continued)			
	Location of Test Site	Test Depth [ft-wait time]	Figure
4.	C&D Canal, Pier 21, DE	40	D.26
		40-1hour	D.27
		55	D.28
		55-1hour	D.29
		65	D.30
		70 C	D.31
		71 C	D.32
5.	White City Bridge, TP3, FL	20	D.33
		29	D.34
		31	D.35
		32 C	D.36
		35 C	D.37
6.	White City Bridge, TP6, FL	16	D.38
		32	D.39
		33 C	D.40
7.	Apalachicola River Bridge, FL	20	D.41
		25	D.42
		25-14hours	D.43
		55	D.44
		55-1hour	D.45
		75	D.46
		75-1hour	D.47
		89 C	D.48
8.	Aucilla River Bridge, FL	5	D.49
		10	D.50

Table D.1: Summary of Dynamic Test Results (continued)			
	Location of Test Site	Test Depth [ft-wait time]	Figure
8.	Aucilla River Bridge, FL (continued)	15	D.51
		20	D.52
		20-15mins	D.53
		25	D.54
		30	D.55
		30-11hours	D.56
		35	D.57
		40	D.58
		42 C	D.59
		45	D.60
		50	D.61
		55	D.62
		60	D.63
		63 C	D.64
		65	D.65
		67.5 C	D.66
9.	Vilano Bridge - East, FL	10	D.67
		15 C	D.68
		15	D.69
		20 C	D.70
		25 C	D.71
		25	D.72
		30 C	D.73
		30	D.74
		35 C	D.75

Table D.1: Summary of Dynamic Test Results (continued)			
	Location of Test Site	Test Depth [ft-wait time]	Figure
9.	Vilano Bridge - East, FL (continued)	35	D.76
		40 C	D.77
10.	Vilano Bridge - West, FL	30	D.78
		35	D.79
		35-1hour	D.80
		40	D.81
		42	D.82
		45	D.83
		45-1hour	D.84
		50	D.85
		50-14hours-4"	D.86
		50-14hours-8"	D.87
		52 C	D.88
		55	D.89
		55-1hour-4"	D.90
		55-1hour-20"	D.91
		59	D.92
		59-1hour-5"	D.93
		59-1hour-30"	D.94
		62-C	D.95
		62-C2	D.96
		64	D.97
		67-C	D.98
		67-C2	D.99
		68	D.100

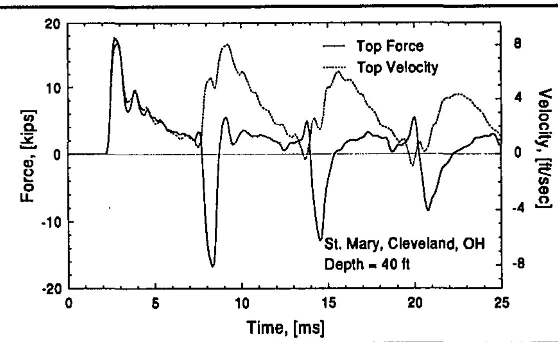


Figure D.1a: Top F-V Time History for St. Mary, Cleveland, OH at depth of 40 ft

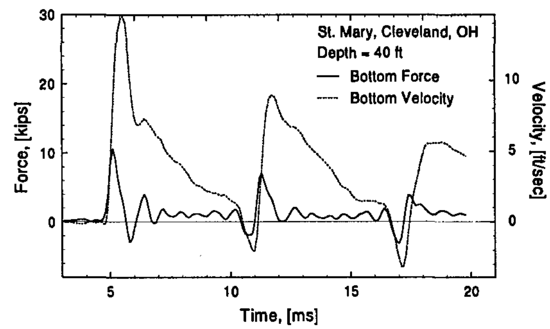


Figure D.1b: Bottom F-V Time History for St. Mary, Cleveland, OH at depth of 40 ft

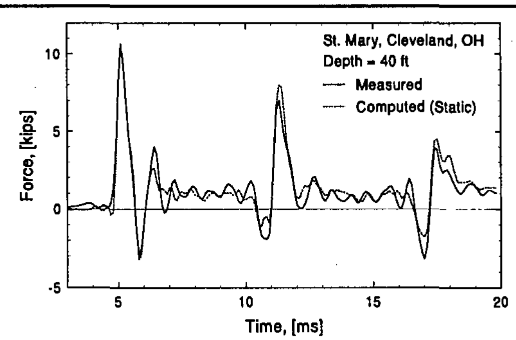


Figure D.1c: Bottom Force Time History (Static) for St. Mary, Cleveland, OH at depth of 40 ft

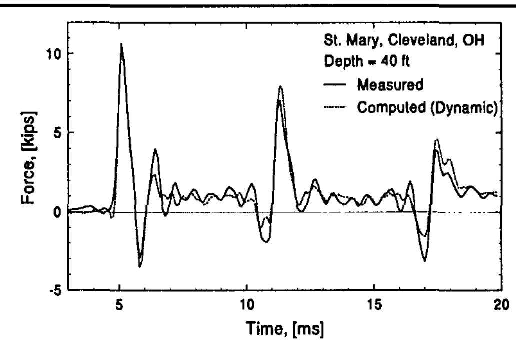


Figure D.1d: Bottom Force Time History (Dynamic) for St. Mary, Cleveland at depth of 40 ft

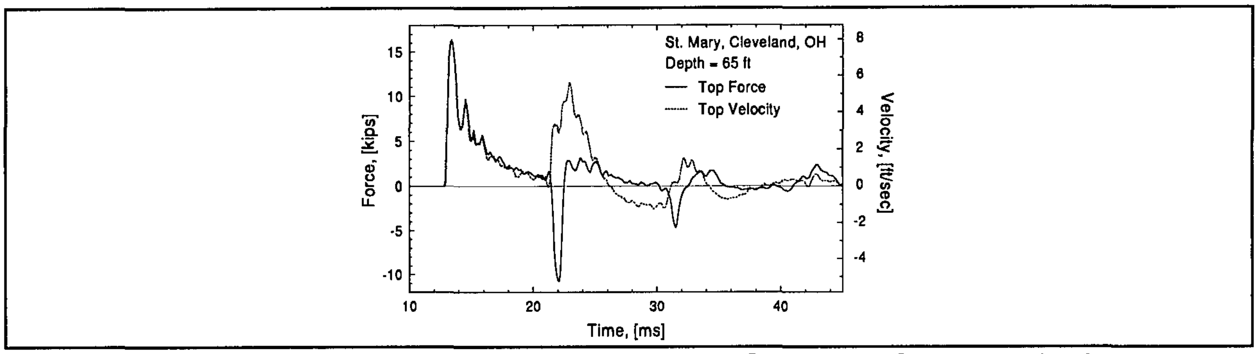


Figure D.2a: Top F-V Time History for St. Mary, Cleveland, OH at depth of 65 ft

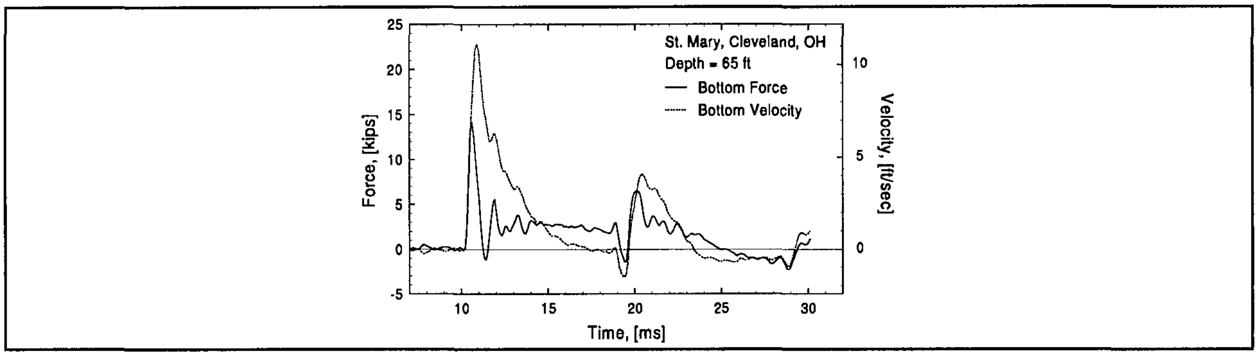


Figure D.2b: Bottom F-V Time History for St. Mary, Cleveland, OH at depth of 65 ft

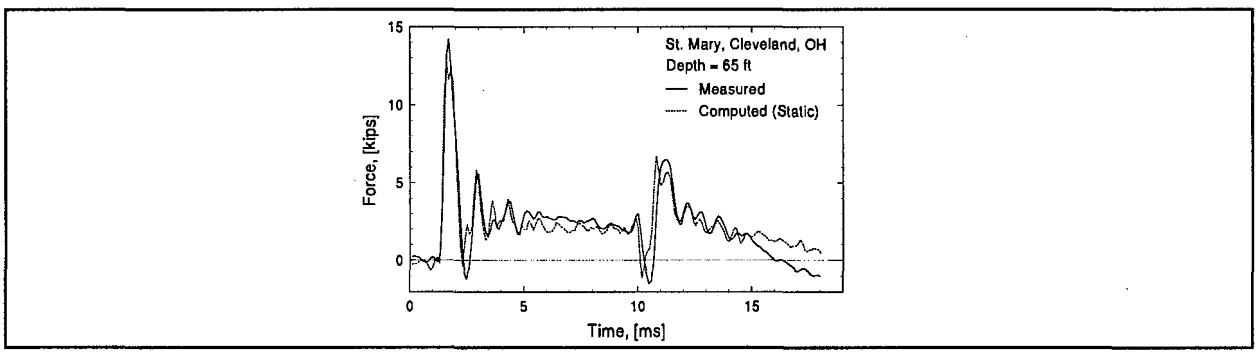


Figure D.2c: Bottom Force Time History (Static) for St. Mary, Cleveland, OH at depth of 65 ft

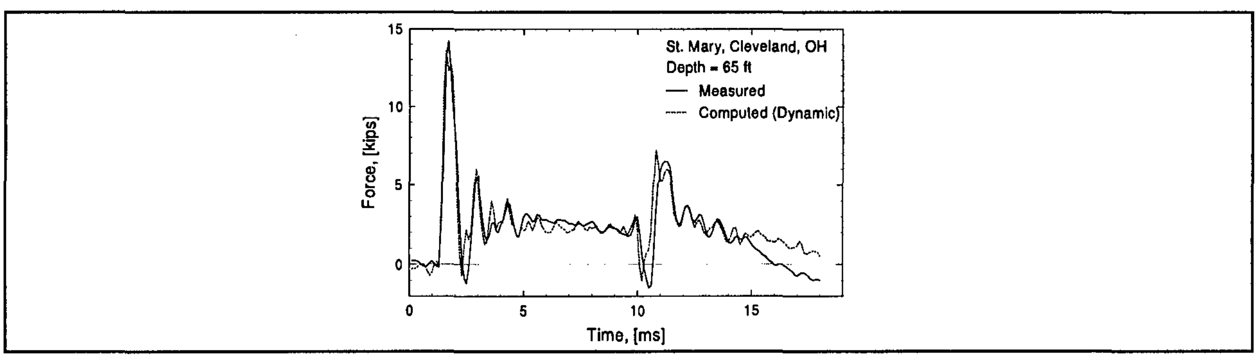


Figure D.2d: Bottom Force Time (Dynamic) History for St. Mary, Cleveland at depth of 65 ft

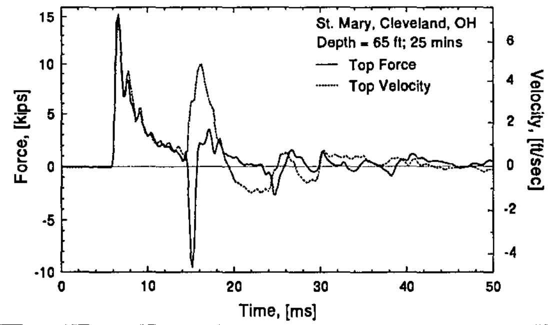


Figure D.3a: Top F-V Time History for St. Mary, Cleveland, OH at depth of 65 ft (25 min)

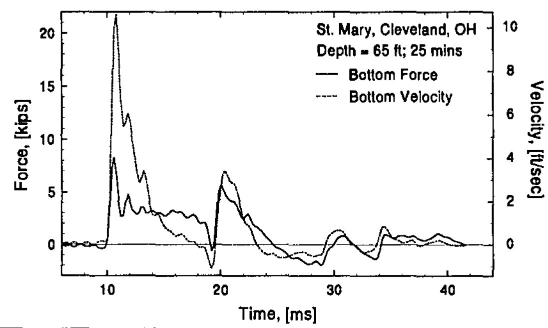


Figure D.3b: Bottom F-V Time History for St. Mary, Cleveland, OH at depth of 65 ft (25 min)

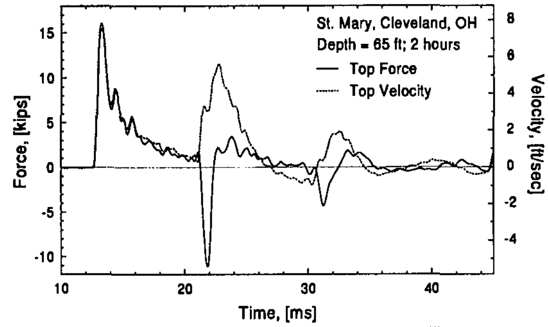


Figure D.4a: Top F-V Time History for St. Mary, Cleveland, OH at depth of 65 ft (2 h)

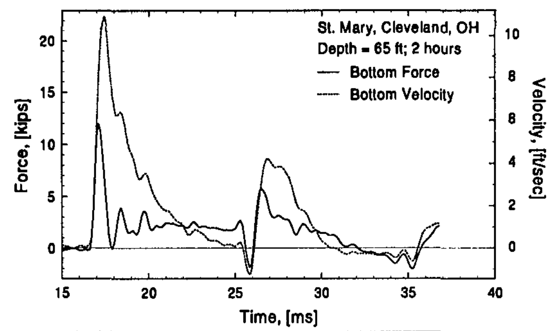


Figure D.4b: Bottom F-V Time History for St. Mary, Cleveland, OH at depth of 65 ft (2 h)

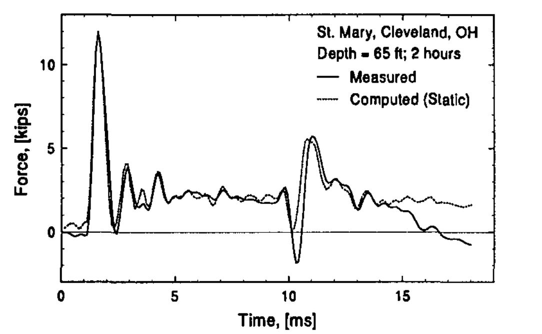


Figure D.4c: Bottom Force Time History (Static) for St. Mary, OH at depth of 65 ft (2 h)

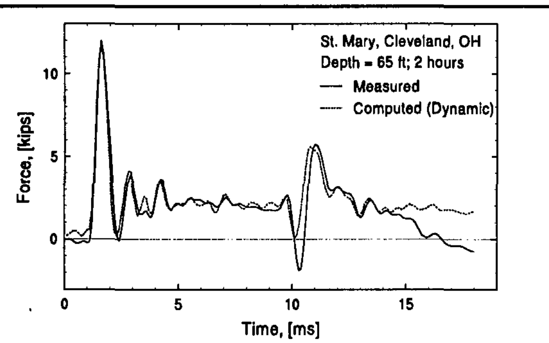


Figure D.4d: Bottom Force Time History (Dynamic) for St. Mary, OH at depth of 65 ft (2 h)

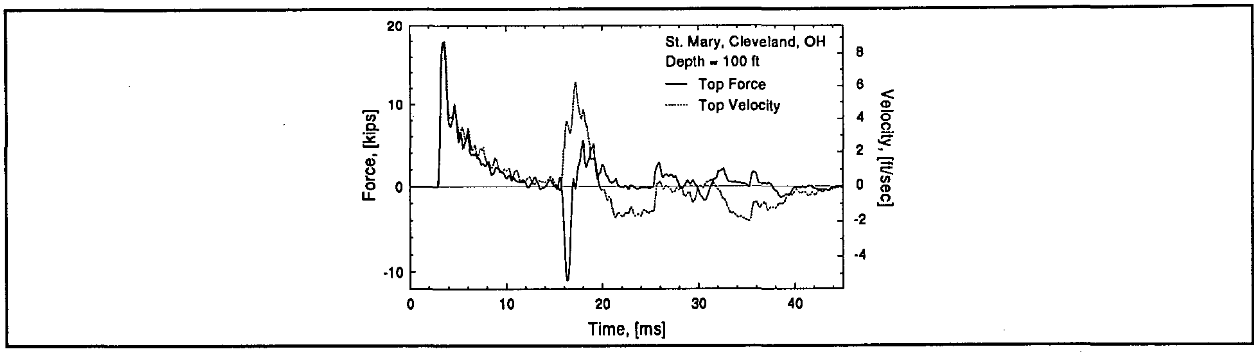


Figure D.5a: Top F-V Time History for St. Mary, Cleveland, OH at depth of 100 ft

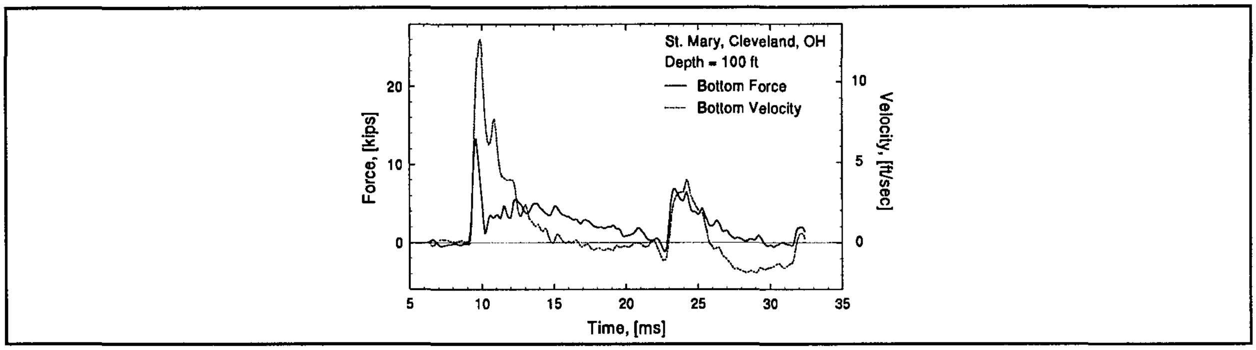


Figure D.5b: Bottom F-V Time History for St. Mary, Cleveland, OH at depth of 100 ft

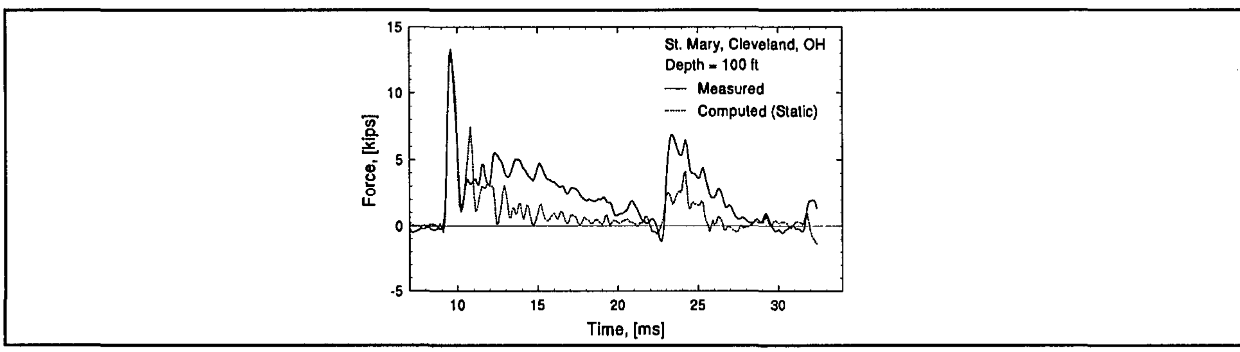


Figure D.5c: Bottom Force Time History (Static) for St. Mary, Cleveland at depth of 100 ft

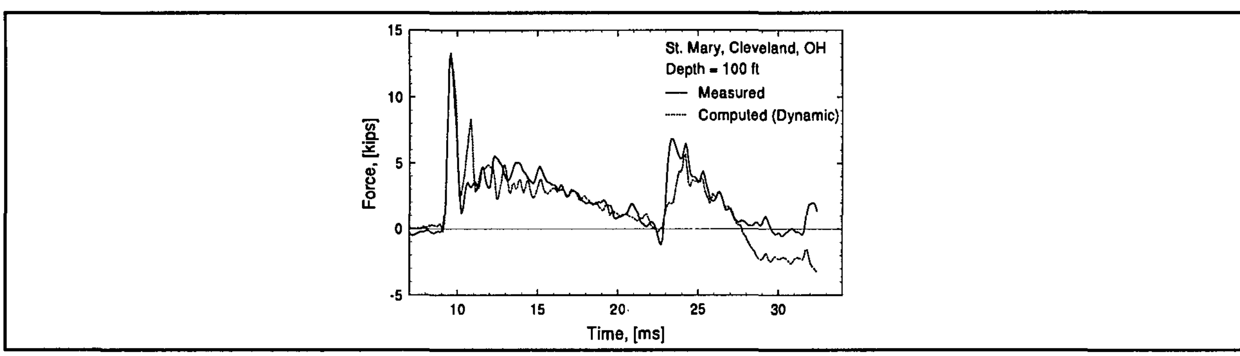


Figure D.5d: Bottom Force Time History (Dynamic) for St. Mary, Cleveland at depth of 100 ft

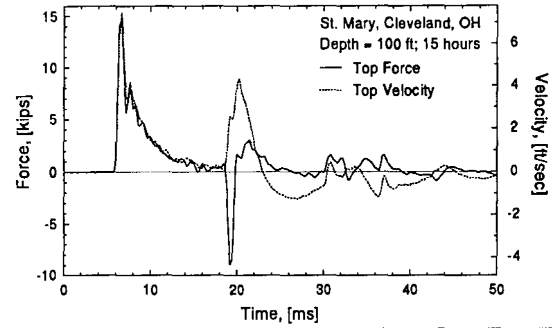


Figure D.6a: Top F-V Time History for St. Mary, Cleveland, OH at depth of 100 ft (15 h)

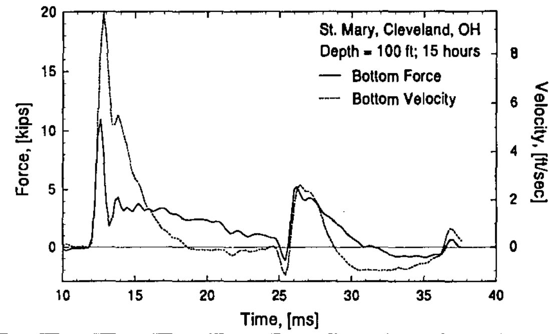


Figure D.6b: Bottom F-V Time History for St. Mary, Cleveland, OH at depth of 100 ft (15 h)

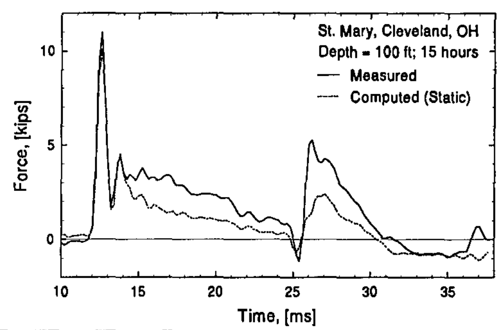


Figure D.6c: Bottom Force Time History (Static) for St. Mary, OH at depth of 100 ft (15 h)

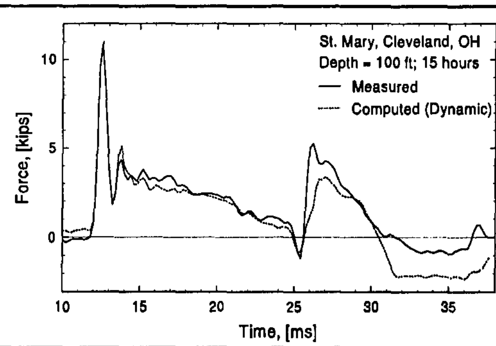


Figure D.6d: Bottom Force Time History (Dynamic) for St. Mary, OH at depth of 100 ft (15 h)

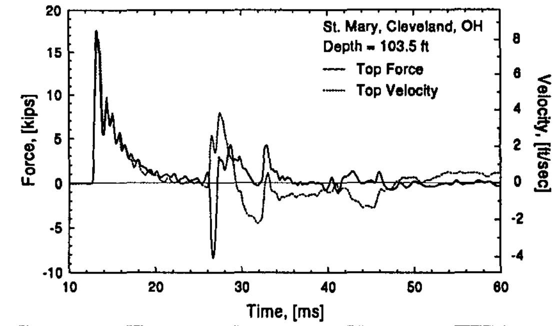


Figure D.7a: Top F-V Time History for St. Mary, Cleveland, OH at depth of 103.5 ft

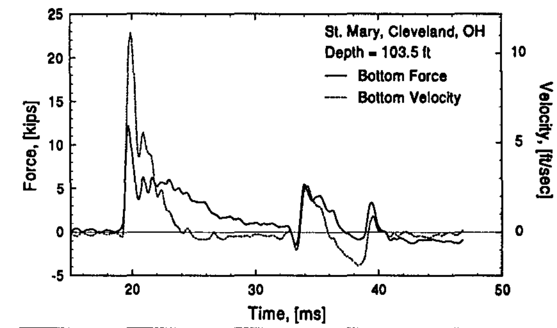


Figure D.7b: Bottom F-V Time History for St. Mary, Cleveland, OH at depth of 103.5 ft

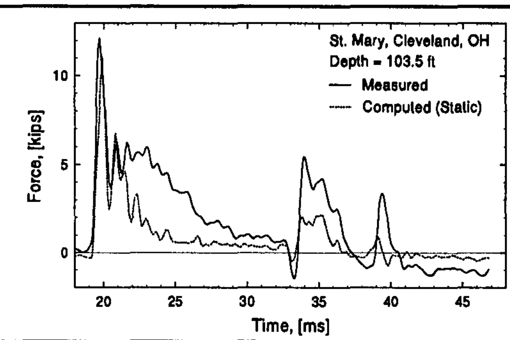


Figure D.7c: Bottom Force Time History (Static) for St. Mary, OH at depth of 103.5 ft

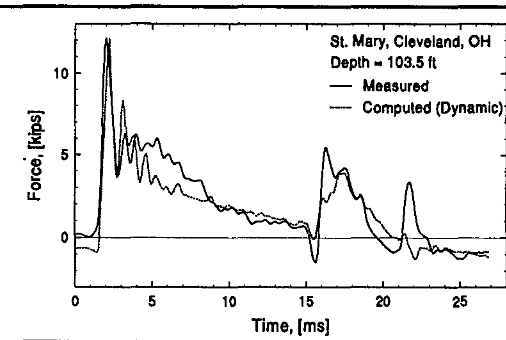


Figure D.7d: Bottom Force Time History (Dynamic) for St. Mary, OH at depth of 103.5 ft

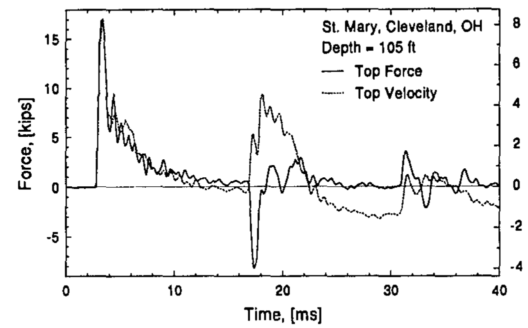


Figure D.8a: Top F-V Time History for St. Mary, Cleveland, OH at depth of 105 ft

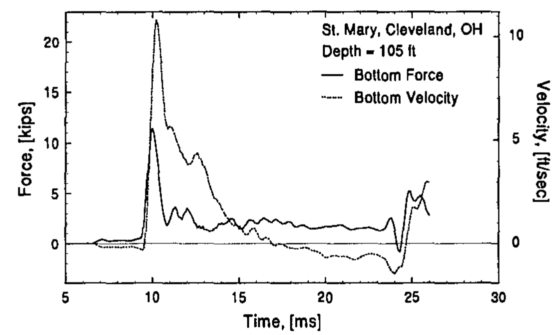


Figure D.8b: Bottom F-V Time History for St. Mary, Cleveland, OH at depth of 105 ft

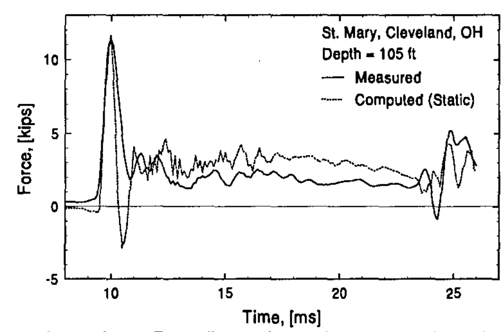


Figure D.8c: Bottom Force Time History (Static) for St. Mary, Cleveland at depth of 105 ft

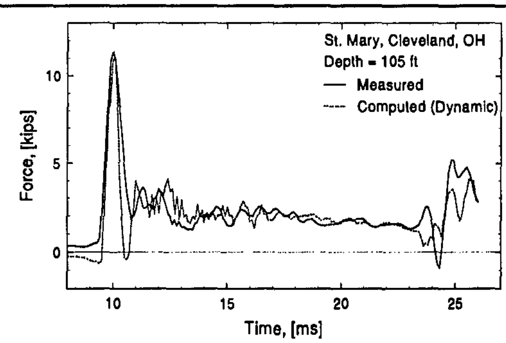


Figure D.8d: Bottom Force Time History (Dynamic) for St. Mary, Cleveland at depth of 105 ft

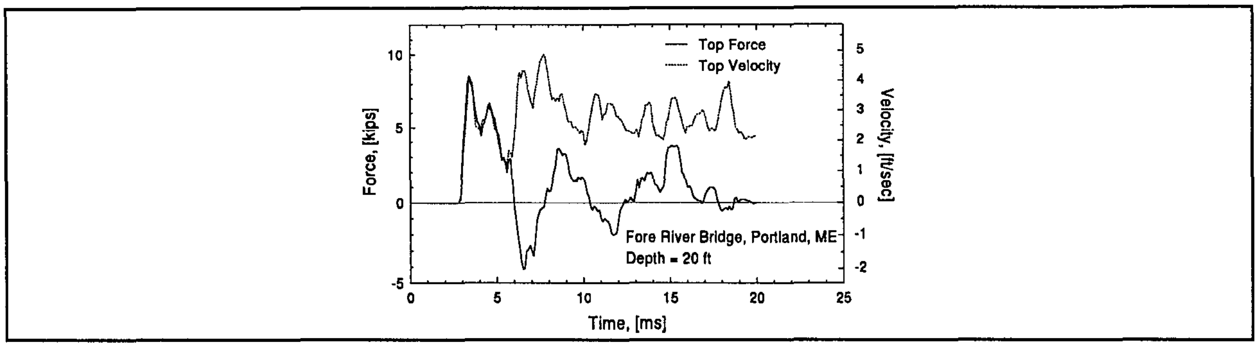


Figure D.9a: Top F-V Time History for Fore River Bridge, Portland, ME at depth of 20 ft

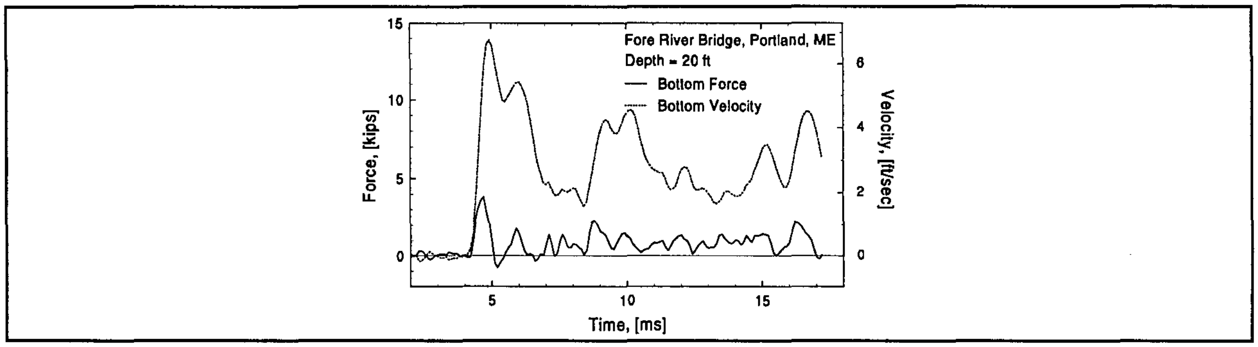


Figure D.9b: Bottom F-V Time History for Fore River Bridge, Portland, ME at depth of 20 ft

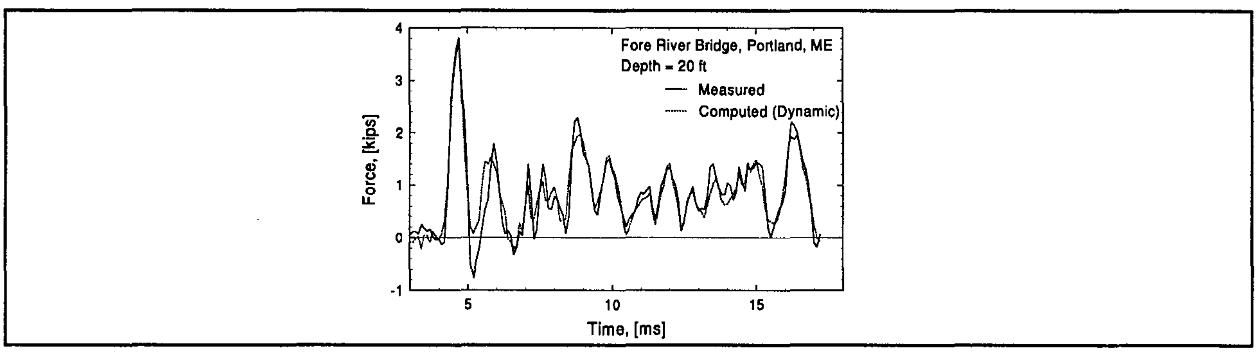


Figure D.9c: Bottom Force Time History (Dynamic) for Fore River Bridge at depth of 20 ft

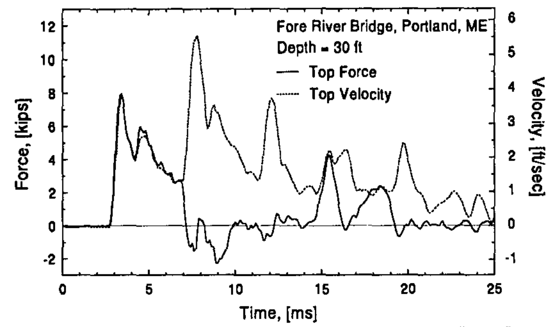


Figure D.10a: Top F-V Time History for Fore River Bridge, Portland, ME at depth of 30 ft

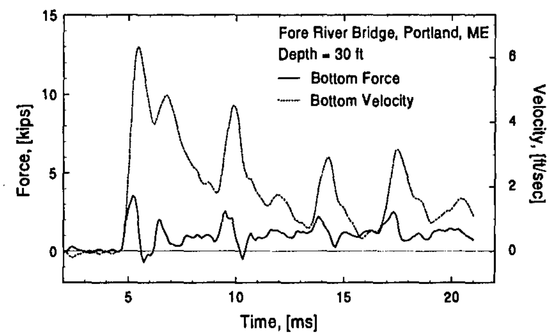


Figure D.10b: Bottom F-V Time History for Fore River Bridge, Portland, ME at depth of 30 ft

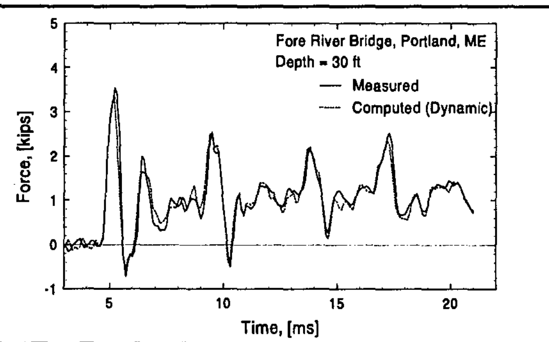


Figure D.10c: Bottom Force Time History (Dynamic) for Fore River Bridge at depth of 30 ft

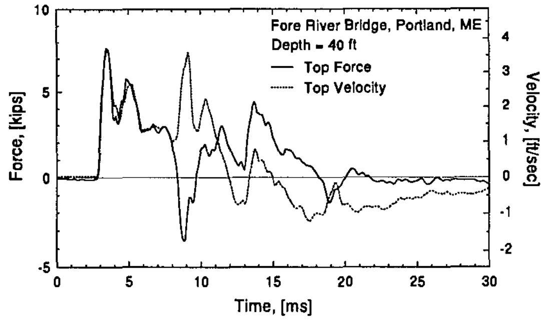


Figure D.11a: Top F-V Time History for Fore River Bridge, Portland, ME at depth of 40 ft

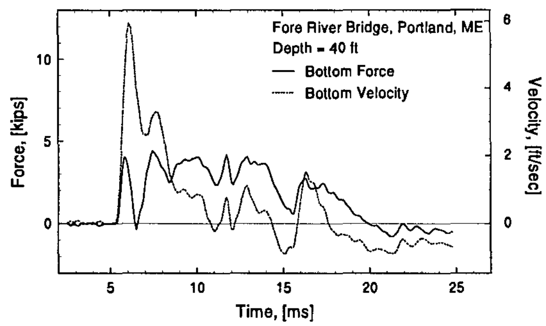


Figure D.11b: Bottom F-V Time History for Fore River Bridge, Portland, ME at depth of 40 ft

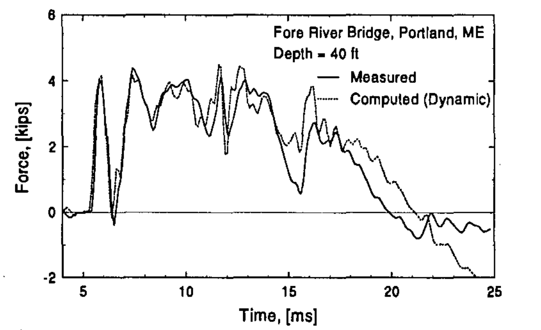


Figure D.11c: Bottom Force Time History (Dynamic) for Fore River Bridge at depth of 40 ft

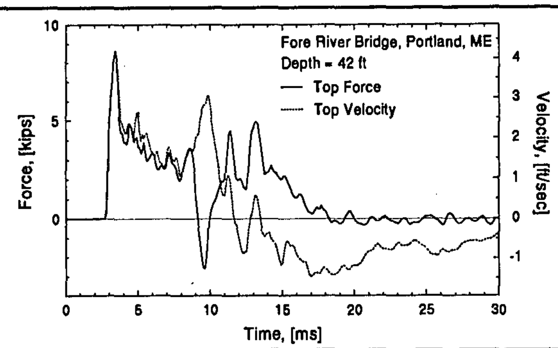


Figure D.12a: Top F-V Time History for Fore River Bridge, Portland, ME at depth of 42 ft

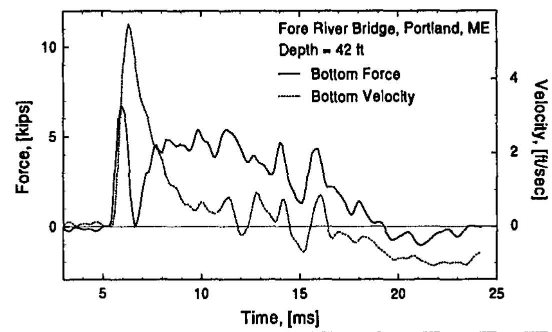


Figure D.12b: Bottom F-V Time History for Fore River Bridge, Portland, ME at depth of 42 ft

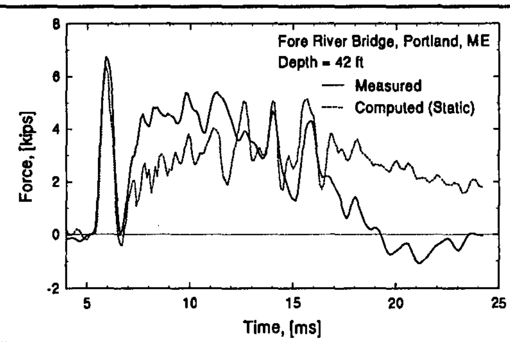


Figure D.12c: Bottom Force Time (Static) History for Fore River Bridge at depth of 42 ft

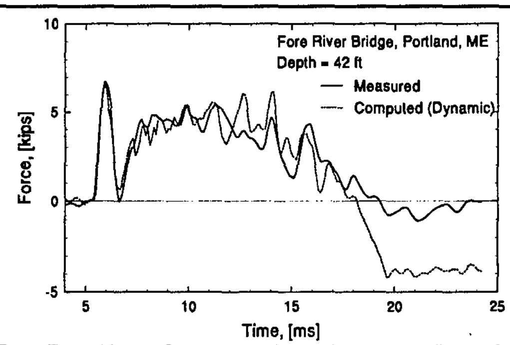


Figure D.12d: Bottom Force Time History (Dynamic) for Fore River Bridge at depth of 42 ft

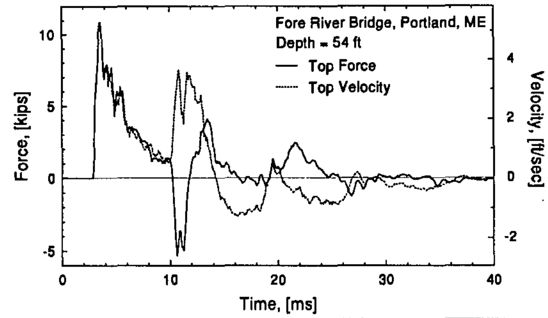


Figure D.13a: Top F-V Time History for Fore River Bridge, Portland, ME at depth of 54 ft

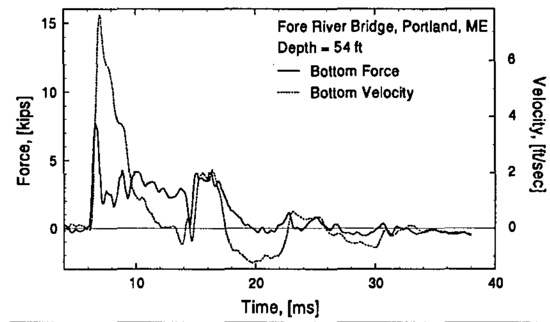


Figure D.13b: Bottom F-V Time History for Fore River Bridge, Portland, ME at depth of 54 ft

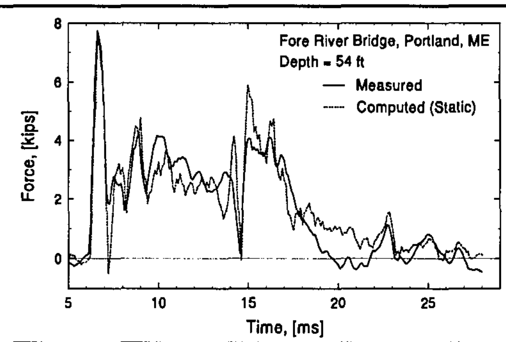


Figure D.13c: Bottom Force Time History (Static) for Fore River Bridge at depth of 54 ft

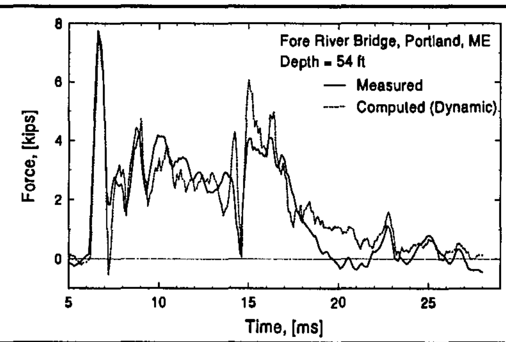


Figure D.13d: Bottom Force Time History (Dynamic) for Fore River Bridge at depth of 54 ft

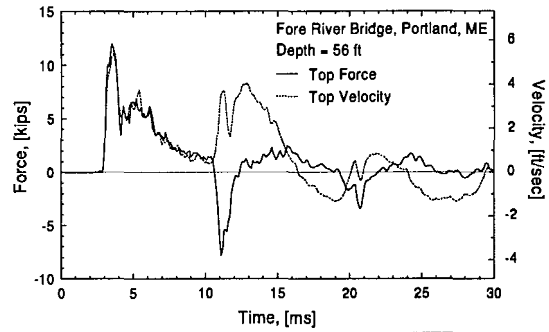


Figure D.14a: Top F-V Time History for Fore River Bridge, Portland, ME at depth of 56 ft

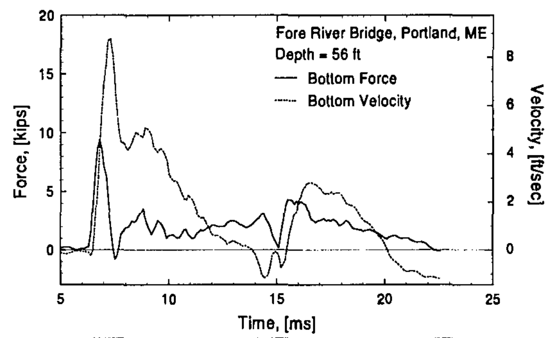


Figure D.14b: Bottom F-V Time History for Fore River Bridge, Portland, ME at depth of 56 ft

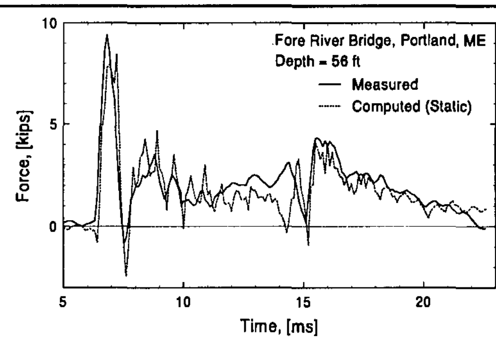


Figure D.14c: Bottom Force Time History (Static) for Fore River Bridge at depth of 56 ft

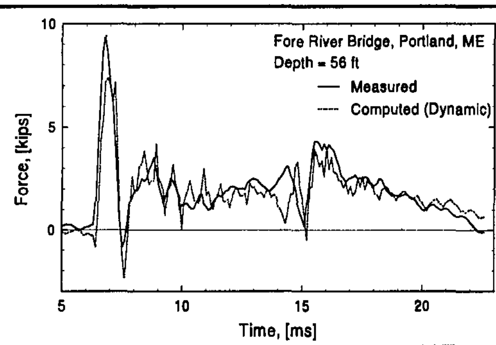


Figure D.14d: Bottom Force Time History (Dynamic) for Fore River Bridge at depth of 56 ft

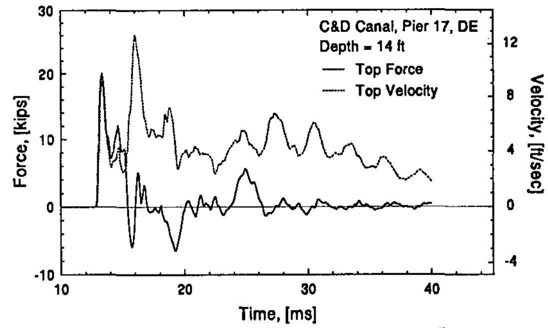


Figure D.15a: Top F-V Time History for C&D Canal, Pier 17, DE at depth of 14 ft

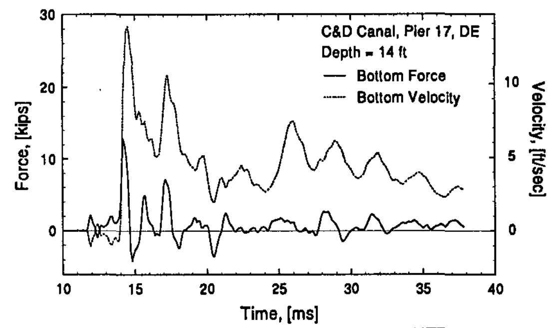


Figure D.15b: Bottom F-V Time History for C&D Canal, Pier 17, DE at depth of 14 ft

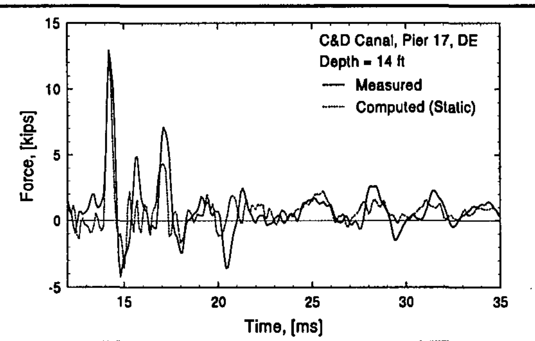


Figure D.15c: Bottom Force Time History (Static) for C&D Canal, Pier 17 at depth of 14 ft

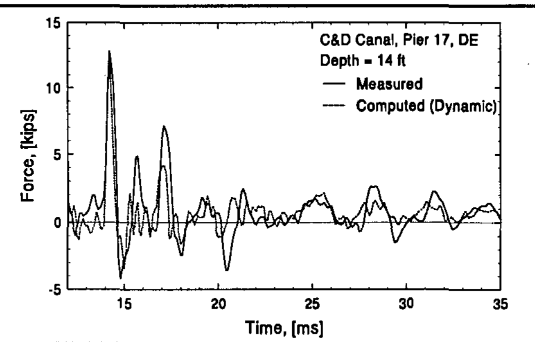


Figure D.15d: Bottom Force Time History (Dynamic) for C&D Canal, Pier 17 at depth of 14 ft

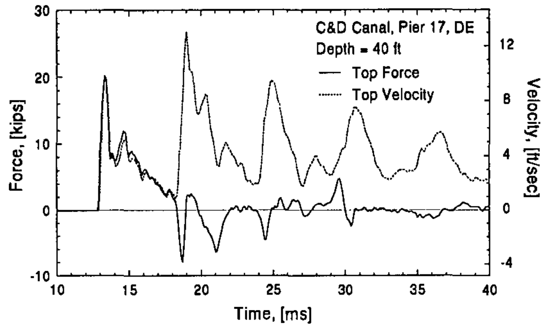


Figure D.16a: Top F-V Time History for C&D Canal, Pier 17, DE at depth of 40 ft

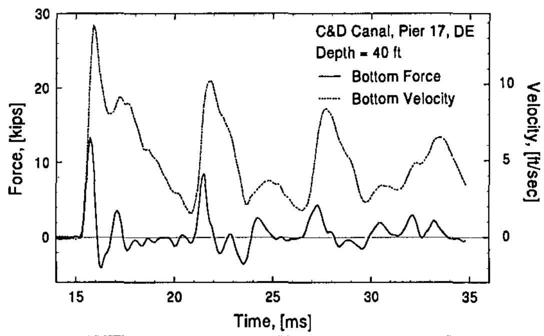


Figure D.16b: Bottom F-V Time History for C&D Canal, Pier 17, DE at depth of 40 ft

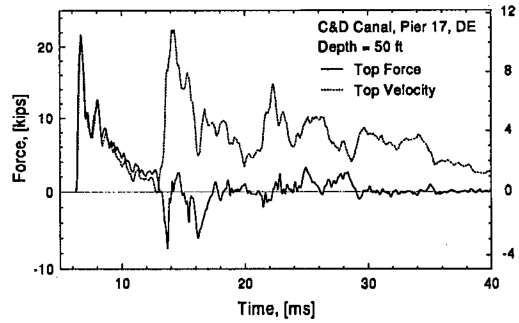


Figure D.17a: Top F-V Time History for C&D Canal, Pier 17, DE at depth of 50 ft

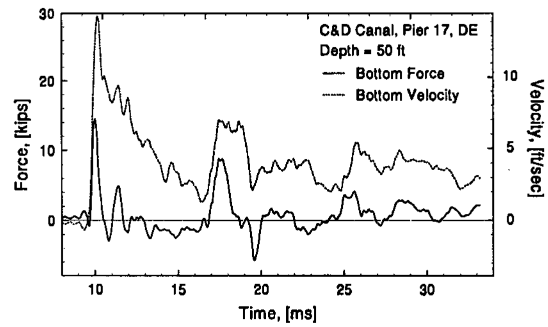


Figure D.17b: Bottom F-V Time History for C&D Canal, Pier 17, DE at depth of 50 ft

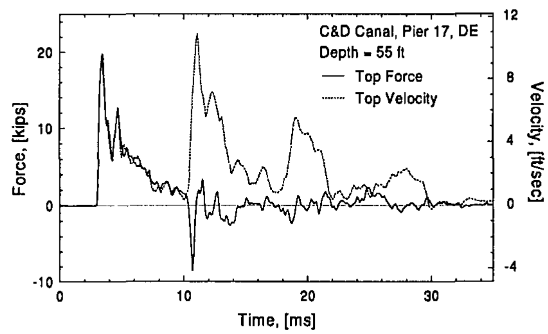


Figure D.18a: Top F-V Time History for C&D Canal, Pier 17, DE at depth of 55 ft

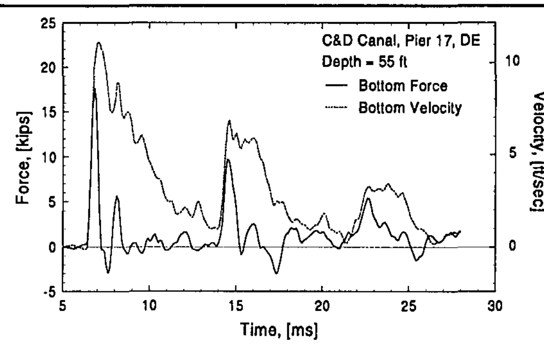


Figure D.18b: Bottom F-V Time History for C&D Canal, Pier 17, DE at depth of 55 ft

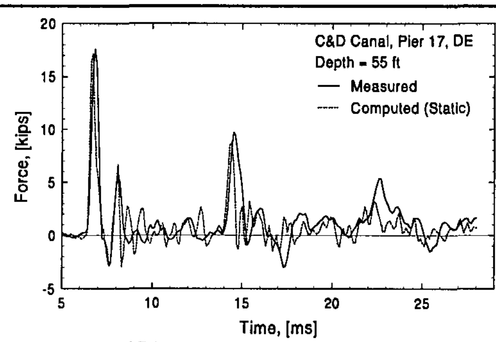


Figure D.18c: Bottom Force Time History (Static) for C&D Canal, Pier 17 at depth of 55 ft

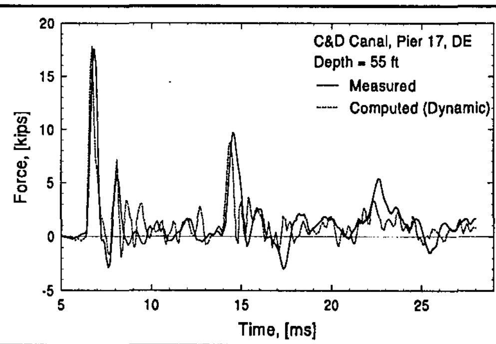


Figure D.18d: Bottom Force Time History (Dynamic) for C&D Canal, Pier 17 at depth of 55 ft

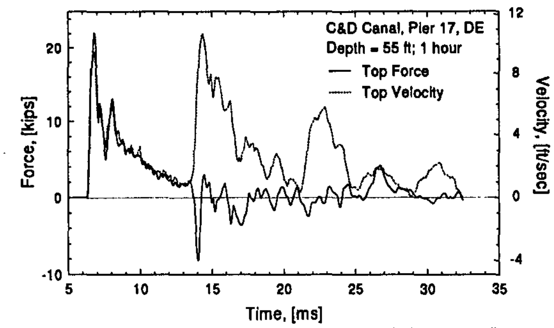


Figure D.19a: Top F-V Time History for C&D Canal, Pier 17, DE at depth of 55 ft (1 h)

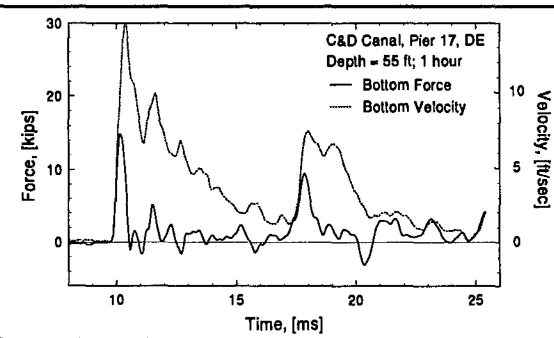


Figure D.19b: Bottom F-V Time History for C&D Canal, Pier 17, DE at depth of 55 ft (1 h)

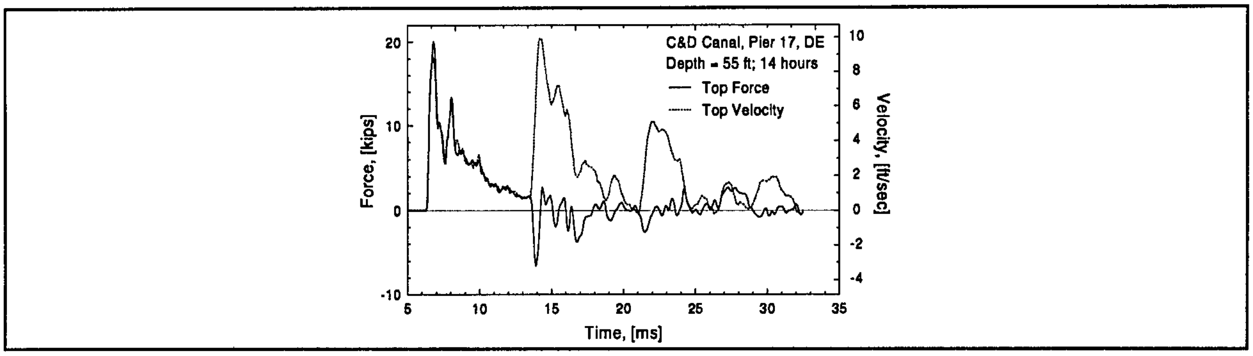


Figure D.20a: Top F-V Time History for C&D Canal, Pier 17, DE at depth of 55 ft (14 h)

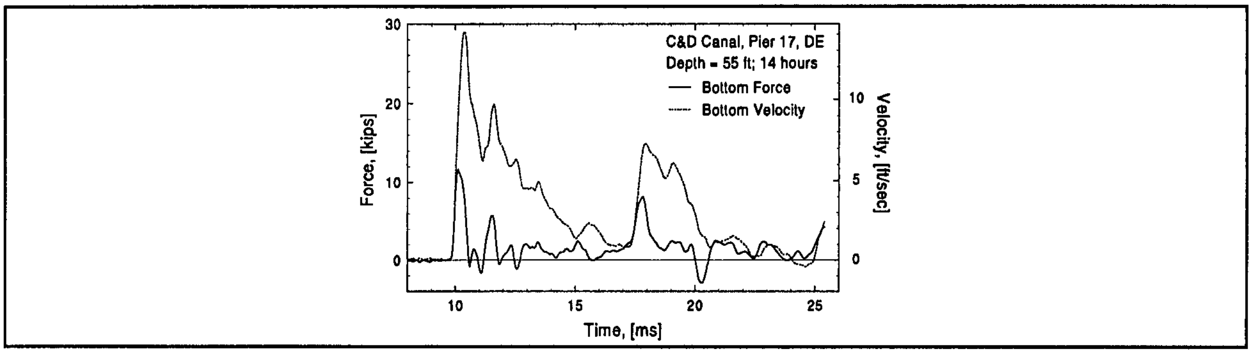


Figure D.20b: Bottom F-V Time History for C&D Canal, Pier 17, DE at depth of 55 ft (14 h)

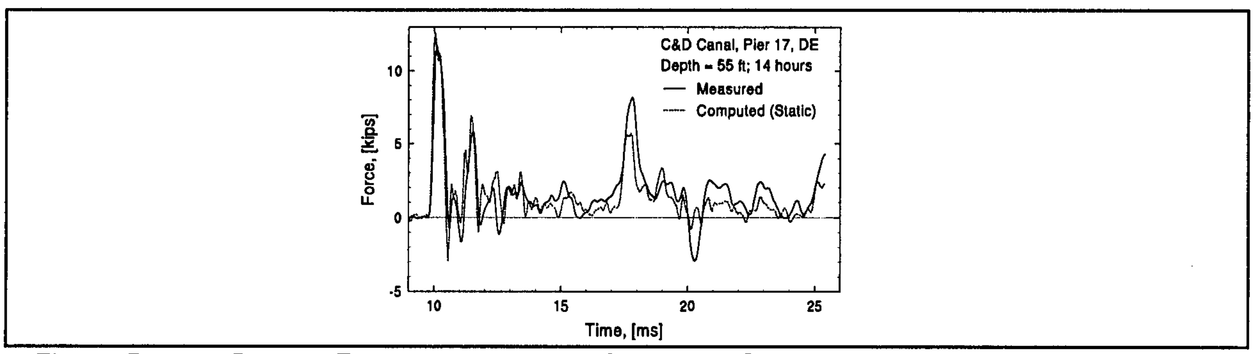


Figure D.20c: Bottom Force Time History (Static) for C&D, Pier 17 at depth of 55 ft (14 h)

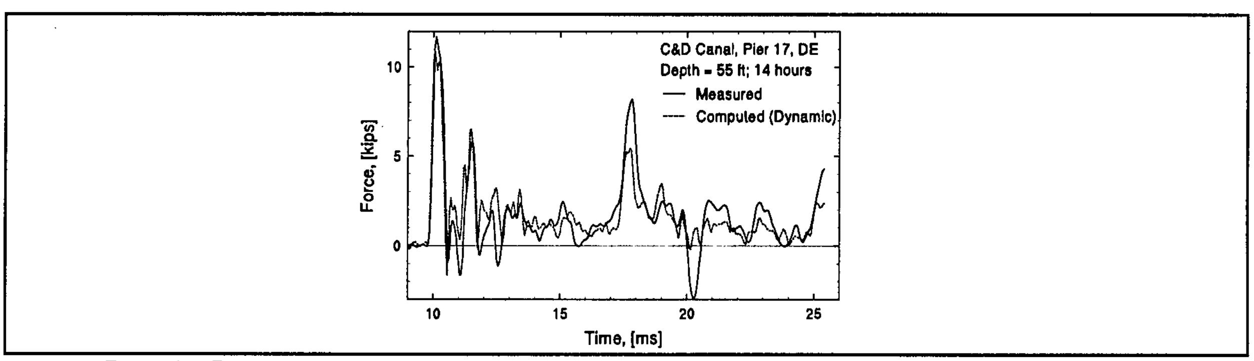


Figure D.20d: Bottom Force Time History (Dynamic) for C&D, Pier 17 at depth of 55 ft (14 h)

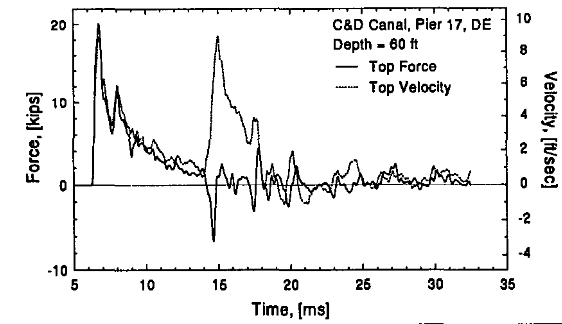


Figure D.21a: Top F-V Time History for C&D Canal, Pier 17, DE at depth of 60 ft

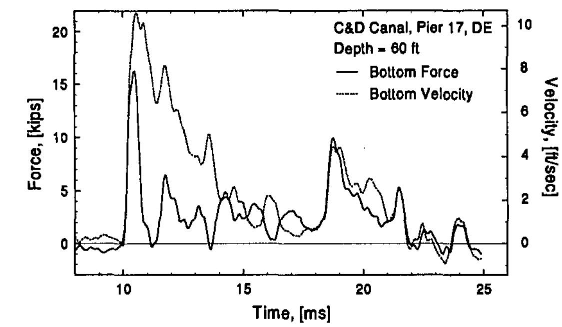


Figure D.21b: Bottom F-V Time History for C&D Canal, Pier 17, DE at depth of 60 ft

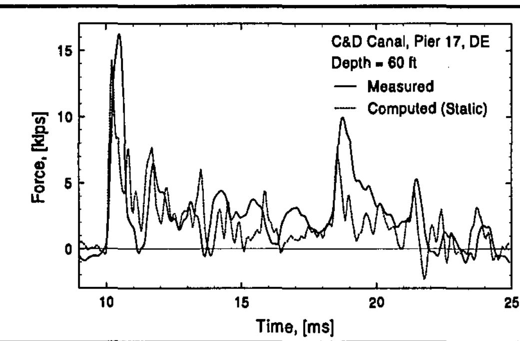


Figure D.21c: Bottom Force Time History (Static) for C&D Canal, Pier 17 at depth of 60 ft

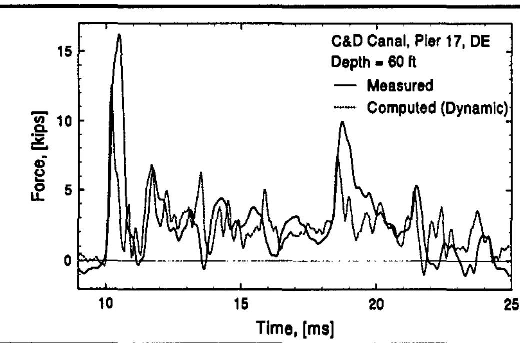


Figure D.21d: Bottom Force Time History (Dynamic) for C&D Canal, Pier 17 at depth of 60 ft

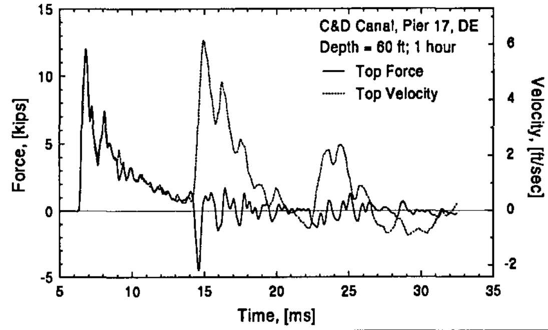


Figure D.22a: Top F-V Time History for C&D Canal, Pier 17, DE at depth of 60 ft (1 h)

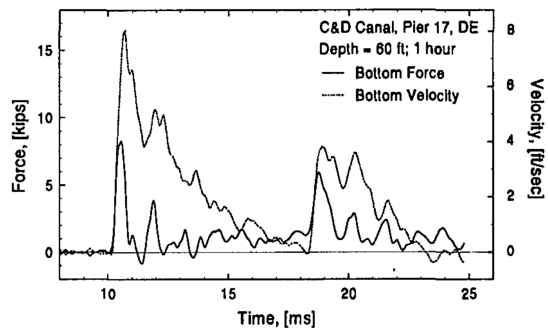


Figure D.22b: Bottom F-V Time History for C&D Canal, Pier 17, DE at depth of 60 ft (1 h)

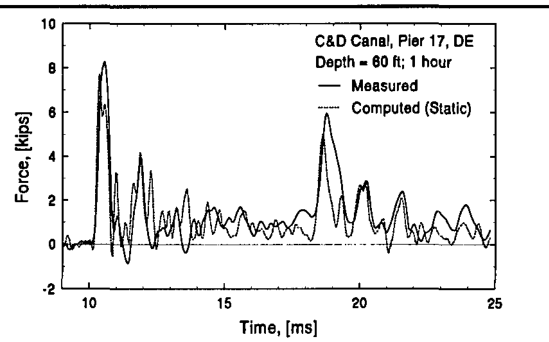


Figure D.22c: Bottom Force Time History (Static) for C&D, Pier 17 at depth of 60 ft (1 h)

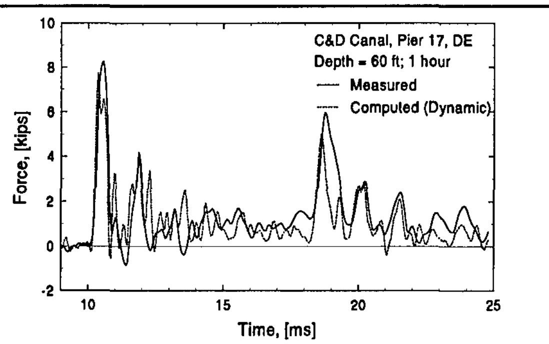


Figure D.22d: Bottom Force Time History (Dynamic) for C&D, Pier 17 at depth of 60 ft (1 h)

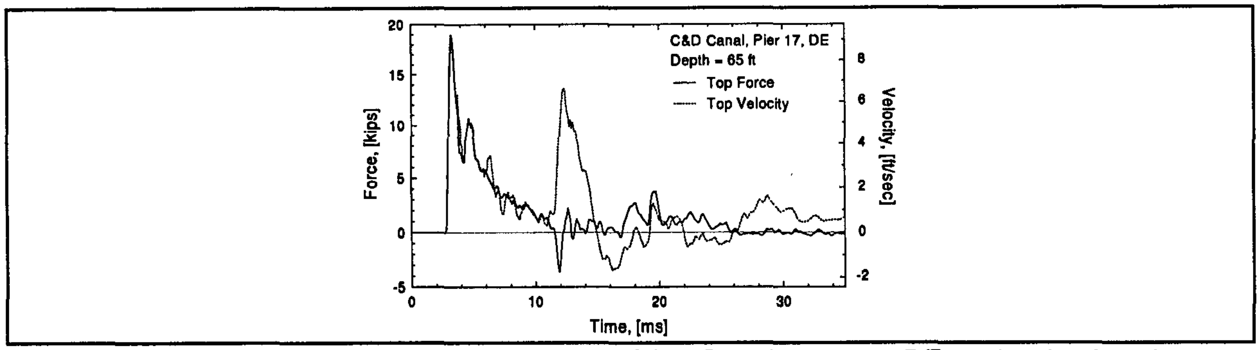


Figure D.23a: Top F-V Time History for C&D Canal, Pier 17, DE at depth of 65 ft

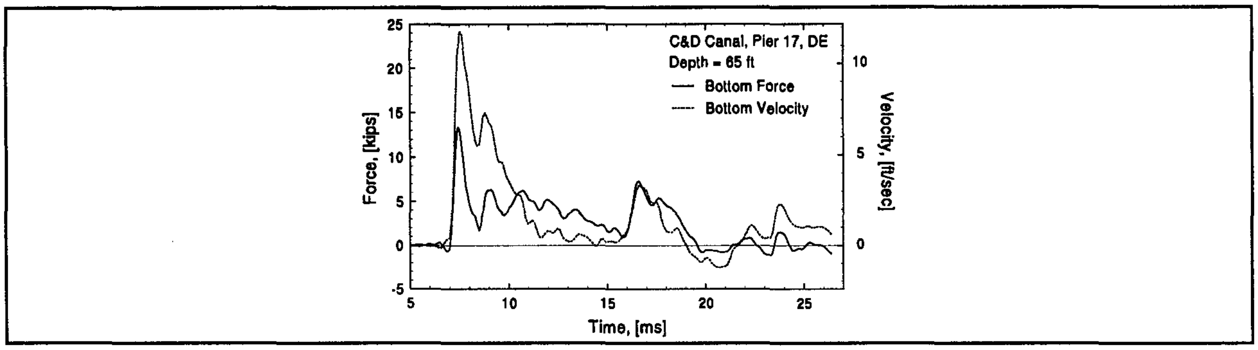


Figure D.23b: Bottom F-V Time History for C&D Canal, Pier 17, DE at depth of 65 ft

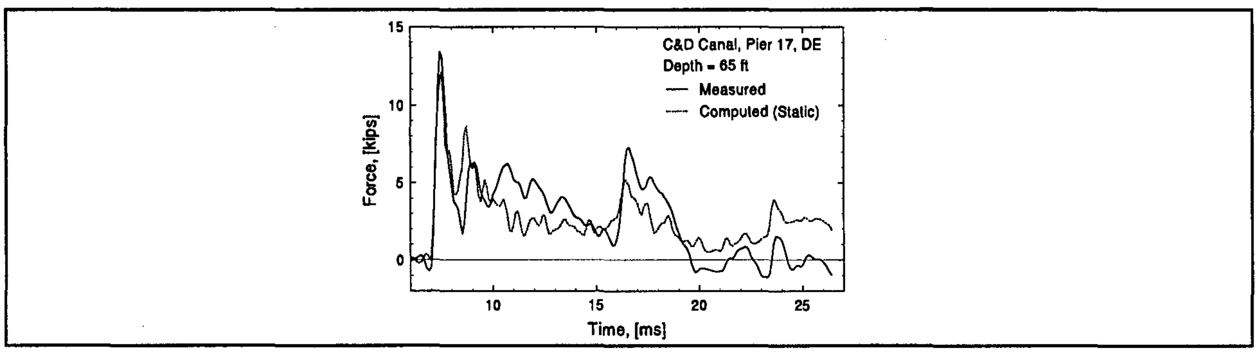


Figure D.23c: Bottom Force Time History (Static) for C&D Canal, Pier 17 at depth of 65 ft

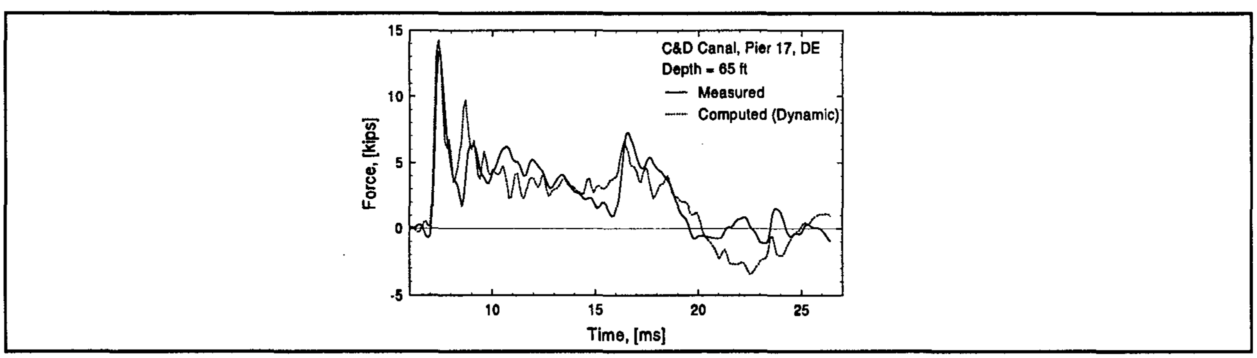


Figure D.23d: Bottom Force Time History (Dynamic) for C&D Canal, Pier 17 at depth of 65 ft

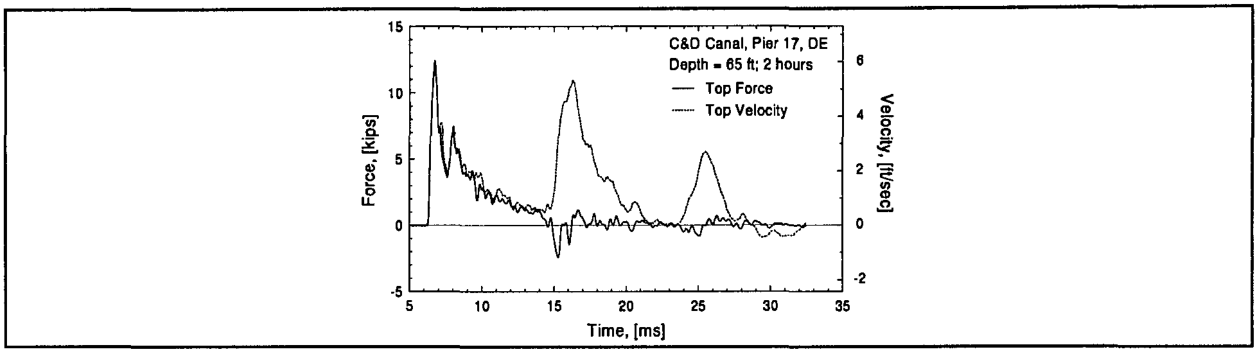


Figure D.24a: Top F-V Time History for C&D Canal, Pier 17, DE at depth of 65 ft (2 h)

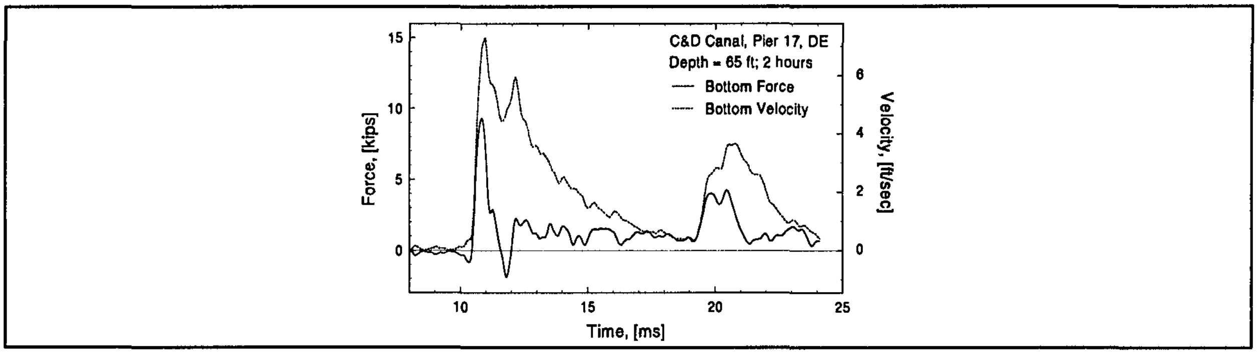


Figure D.24b: Bottom F-V Time History for C&D Canal, Pier 17, DE at depth of 65 ft (2 h)

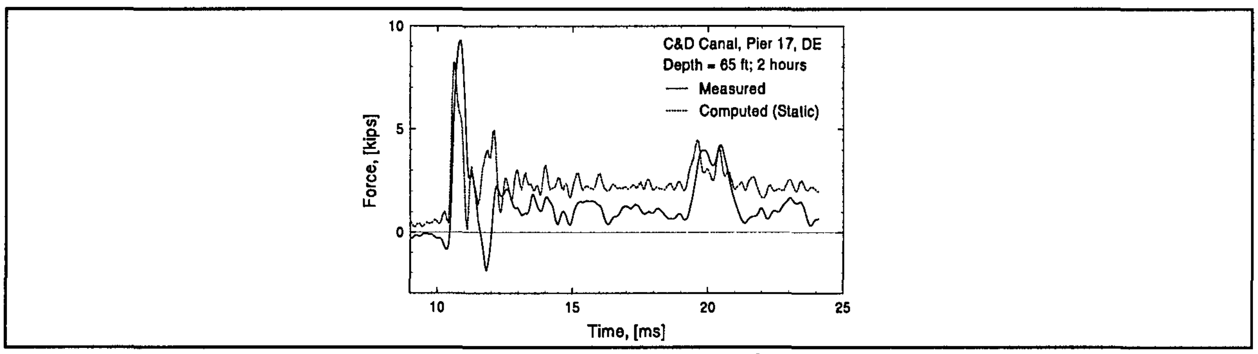


Figure D.24c: Bottom Force Time History (Static) for C&D, Pier 17 at depth of 65 ft (2 h)

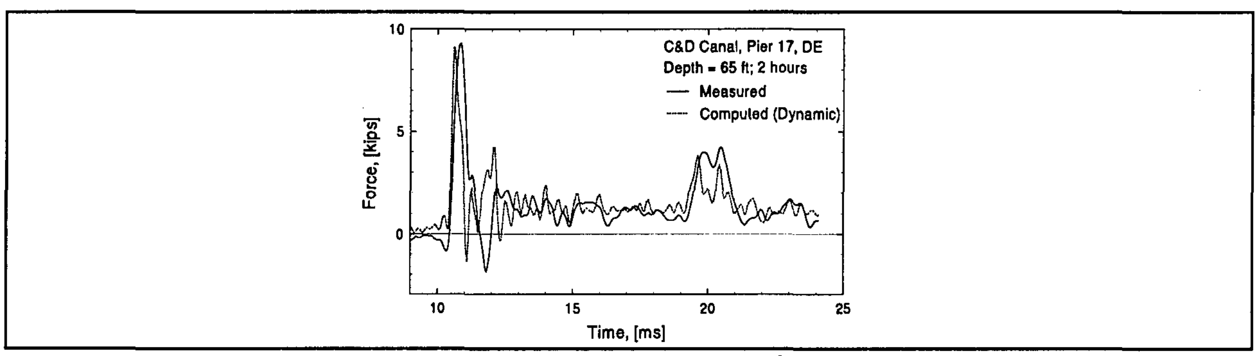


Figure D.24d: Bottom Force Time History (Dynamic) for C&D, Pier 17 at depth of 65 ft (2 h)

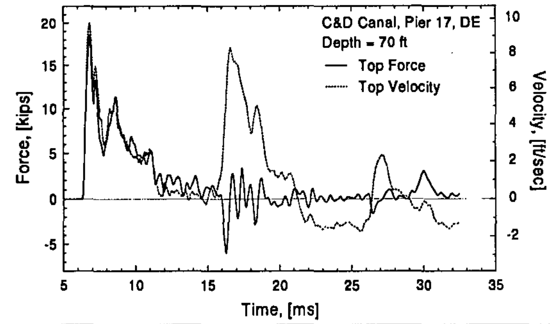


Figure D.25a: Top F-V Time History for C&D Canal, Pier 17, DE at depth of 70 ft

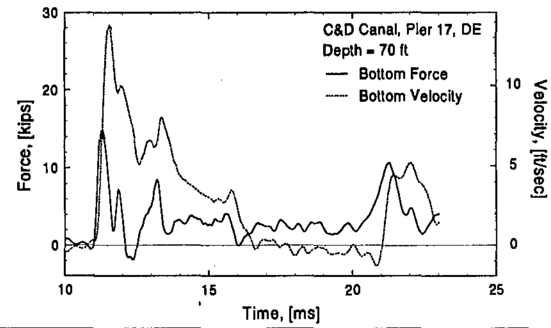


Figure D.25b: Bottom F-V Time History for C&D Canal, Pier 17, DE at depth of 70 ft

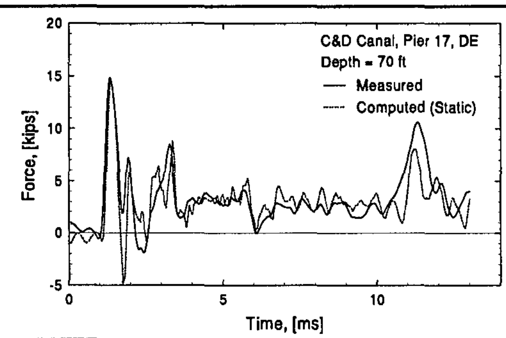


Figure D.25c: Bottom Force Time History (Static) for C&D Canal, Pier 17 at depth of 70 ft

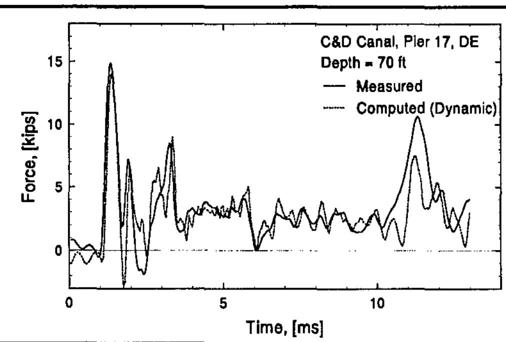


Figure D.25d: Bottom Force Time History (Dynamic) for C&D Canal, Pier 17 at depth of 70 ft

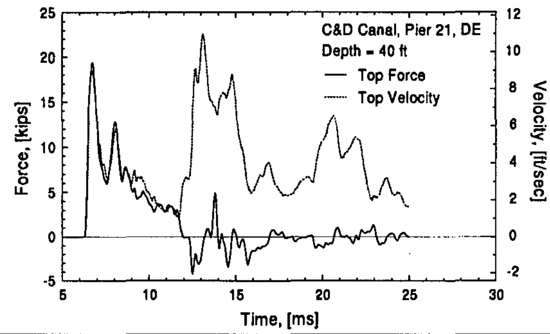


Figure D.26a: Top F-V Time History for C&D Canal, Pier 21, DE at depth of 40 ft

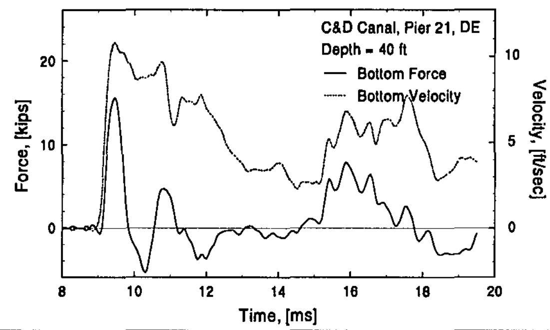


Figure D.26b: Bottom F-V Time History for C&D Canal, Pier 21, DE at depth of 40 ft

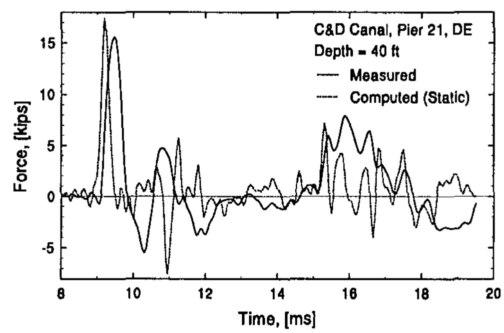


Figure D.26c: Bottom Force Time History (Static) for C&D Canal, Pier 21 at depth of 40 ft

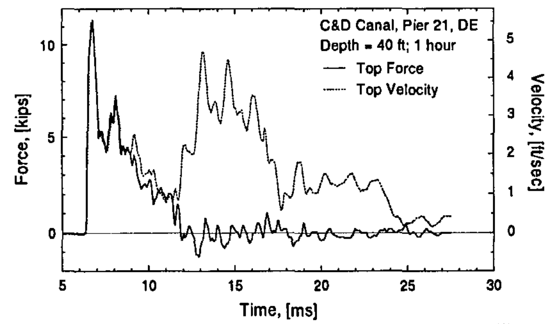


Figure D.27a: Top F-V Time History for C&D Canal, Pier 21, DE at depth of 40 ft (1 h)

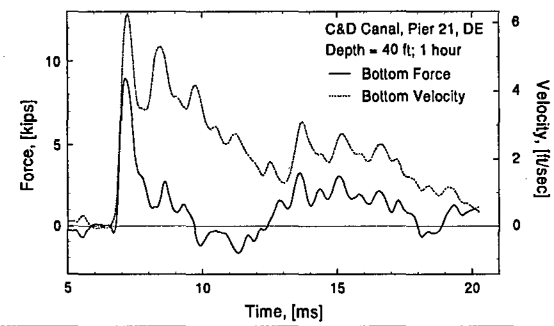


Figure D.27b: Bottom F-V Time History for C&D Canal, Pier 21, DE at depth of 40 ft (1 h)

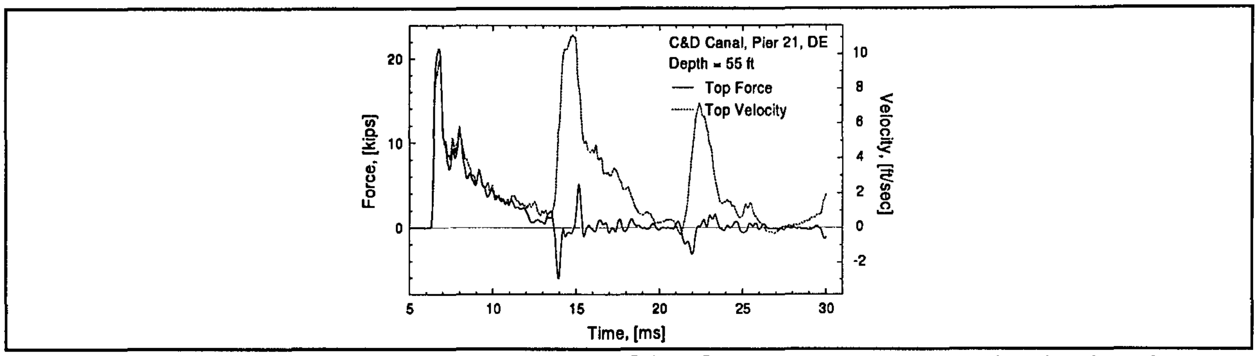


Figure D.28a: Top F-V Time History for C&D Canal, Pier 21, DE at depth of 55 ft

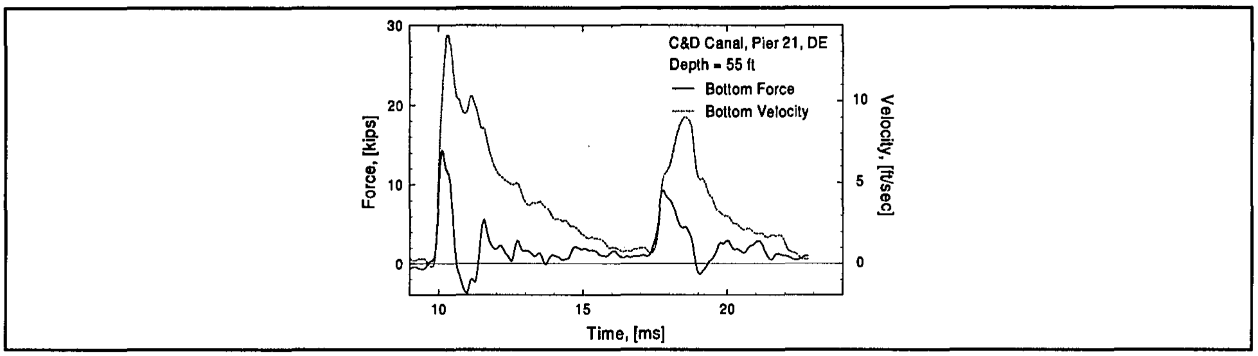


Figure D.28b: Bottom F-V Time History for C&D Canal, Pier 21, DE at depth of 55 ft

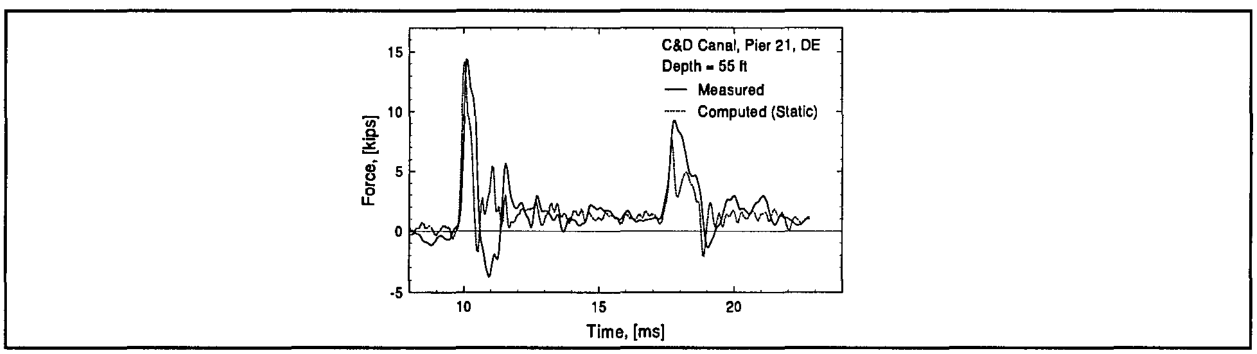


Figure D.28c: Bottom Force Time History (Static) for C&D Canal, Pier 21 at depth of 55 ft

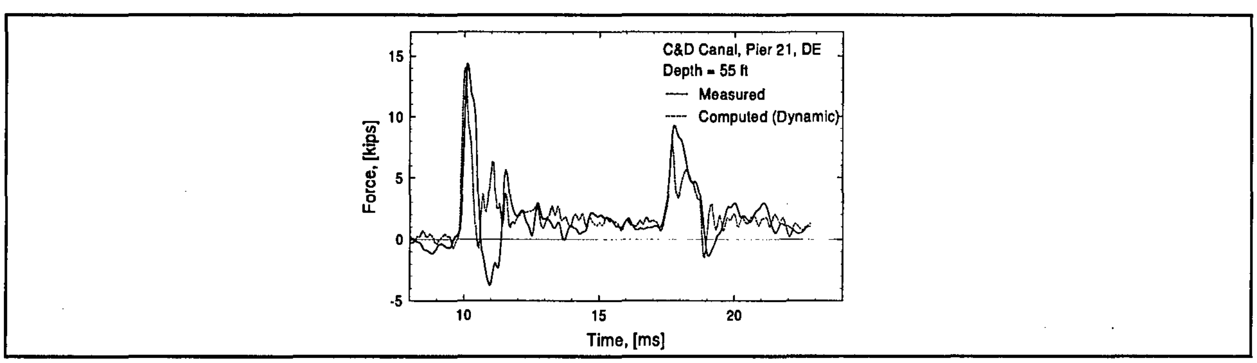


Figure D.28d: Bottom Force Time History (Dynamic) for C&D Canal, Pier 21 at depth of 55 ft

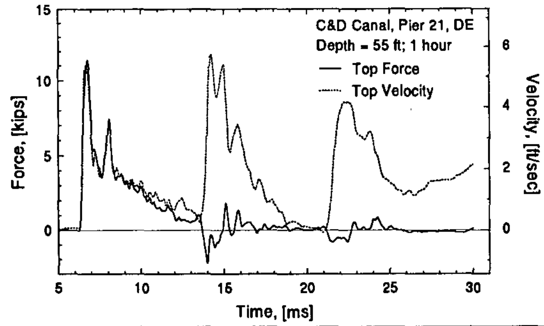


Figure D.29a: Top F-V Time History for C&D Canal, Pier 21, DE at depth of 55 ft (1 h)

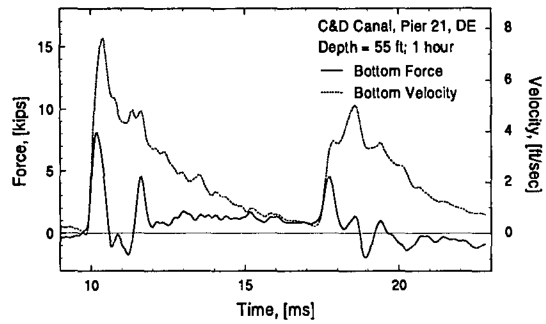


Figure D.29b: Bottom F-V Time History for C&D Canal, Pier 21, DE at depth of 55 ft (1 h)

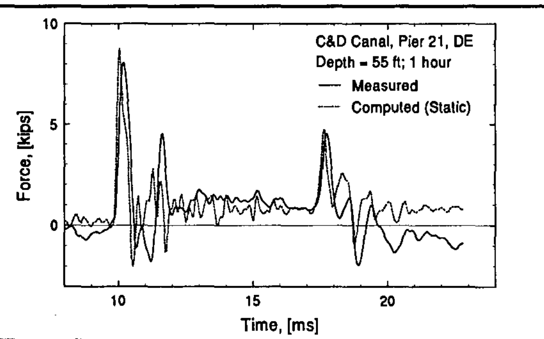


Figure D.29c: Bottom Force Time History (Static) for C&D, Pier 21 at depth of 55 ft (1 h)

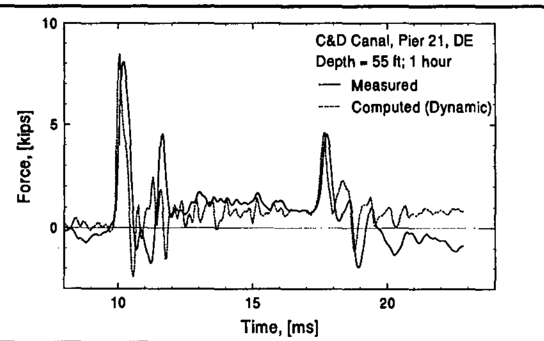


Figure D.29d: Bottom Force Time History (Dynamic) for C&D, Pier 21 at depth of 55 ft (1 h)

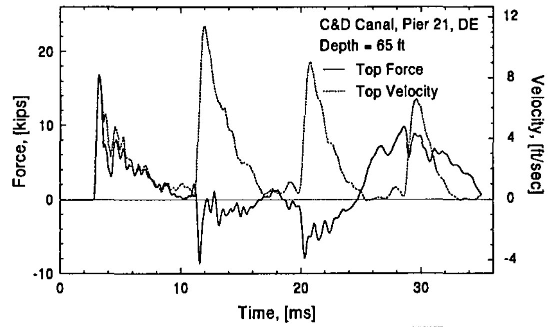


Figure D.30a: Top F-V Time History for C&D Canal, Pier 21, DE at depth of 65 ft

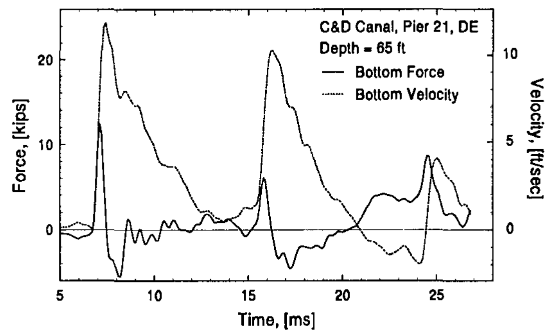


Figure D.30b: Bottom F-V Time History for C&D Canal, Pier 21, DE at depth of 65 ft

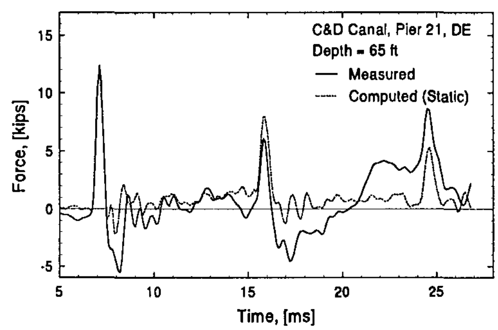


Figure D.30c: Bottom Force Time History (Static) for C&D Canal, Pier 21 at depth of 65 ft

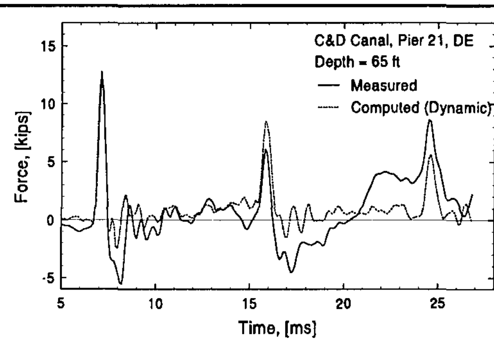


Figure D.30d: Bottom Force Time History (Dynamic) for C&D Canal, Pier 21 at depth of 65 ft

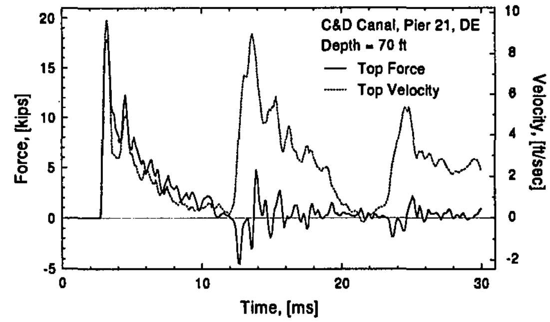


Figure D.31a: Top F-V Time History for C&D Canal, Pier 21, DE at depth of 70 ft

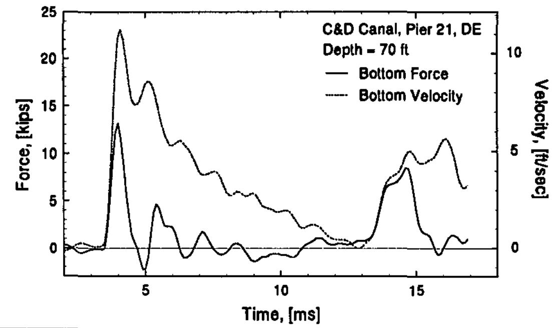


Figure D.31b: Bottom F-V Time History for C&D Canal, Pier 21, DE at depth of 70 ft

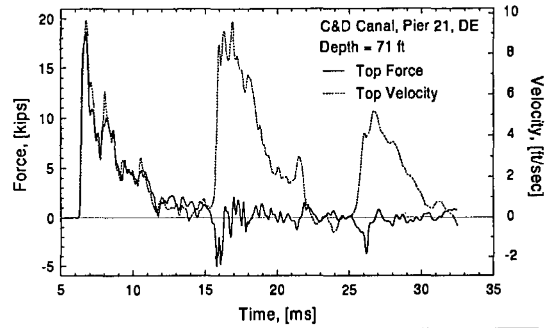


Figure D.32a: Top F-V Time History for C&D Canal, Pier 21, DE at depth of 71 ft

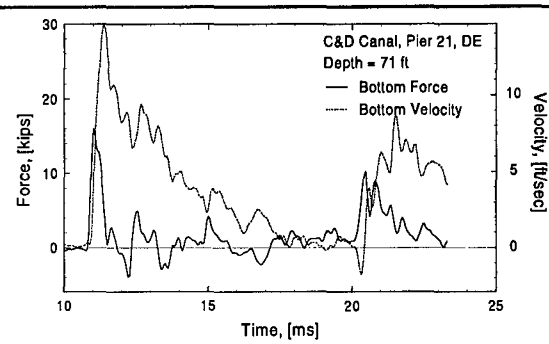


Figure D.32b: Bottom F-V Time History for C&D Canal, Pier 21, DE at depth of 71 ft

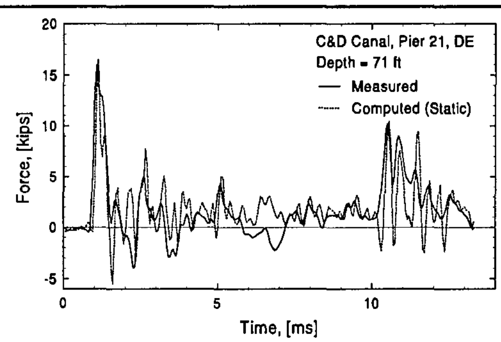


Figure D.32c: Bottom Force Time History (Static) for C&D Canal, Pier 21 at depth of 71 ft

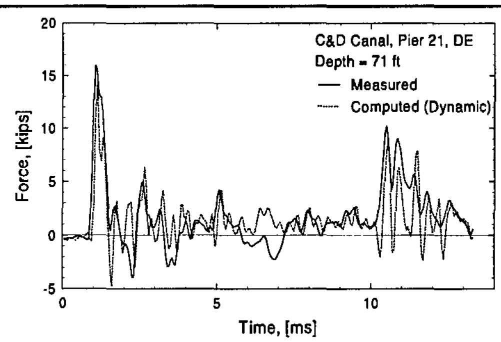


Figure D.32d: Bottom Force Time History (Dynamic) for C&D Canal, Pier 21 at depth of 71 ft

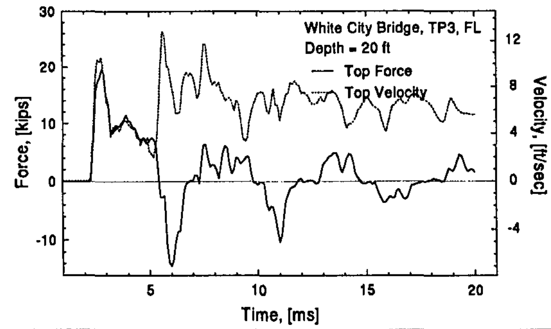


Figure D.33a: Top F-V Time History for White City Bridge, TP3, FL at depth of 20 ft

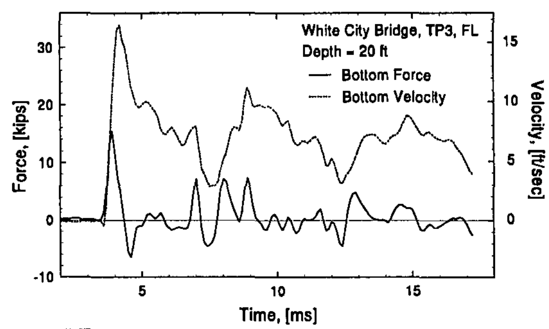


Figure D.33b: Bottom F-V Time History for White City Bridge, TP3, FL at depth of 20 ft

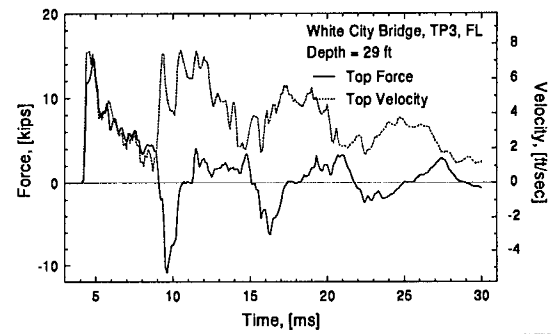


Figure D.34a: Top F-V Time History for White City Bridge, TP3, FL at depth of 29 ft

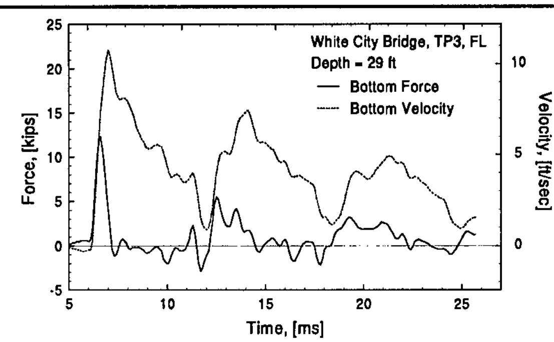


Figure D.34b: Bottom F-V Time History for White City Bridge, TP3, FL at depth of 29 ft

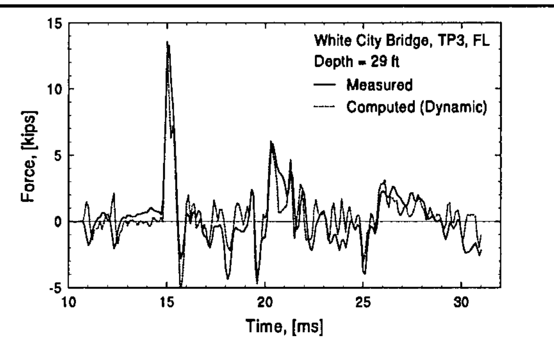


Figure D.34c: Bottom Force Time History (Dynamic) for White City, TP3, FL at depth of 29 ft

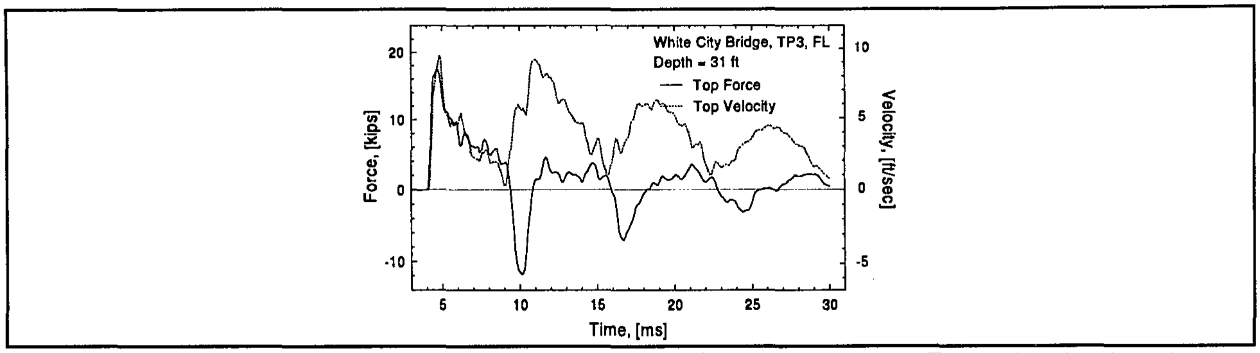


Figure D.35a: Top F-V Time History for White City Bridge, TP3, FL at depth of 31 ft

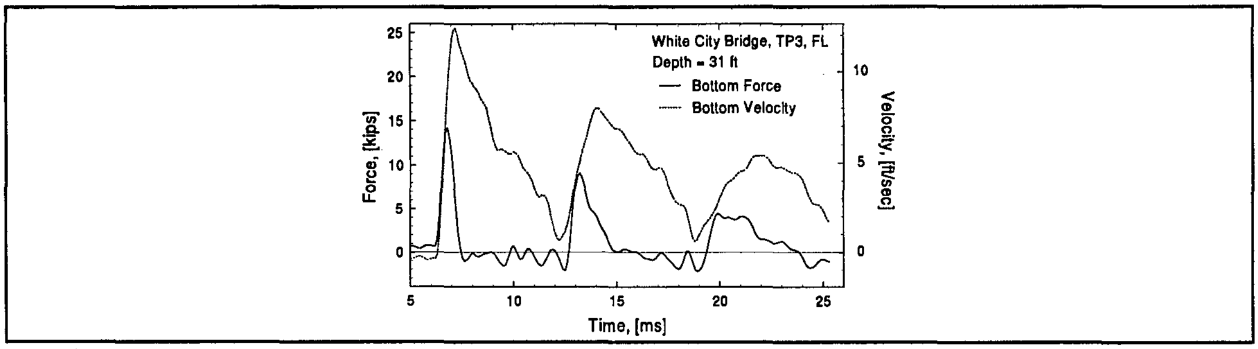


Figure D.35b: Bottom F-V Time History for White City Bridge, TP3, FL at depth of 31 ft

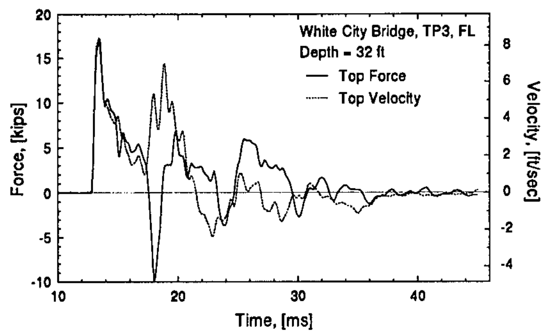


Figure D.36a: Top F-V Time History for White City Bridge, TP3, FL at depth of 32 ft

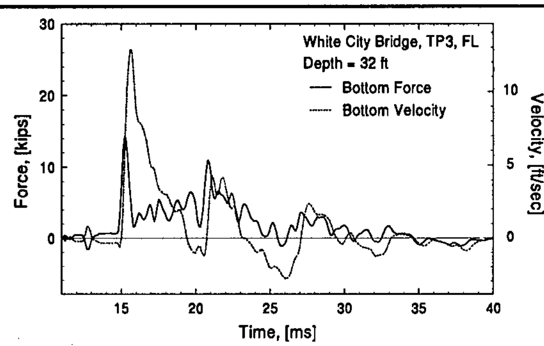


Figure D.36b: Bottom F-V Time History for White City Bridge, TP3, FL at depth of 32 ft

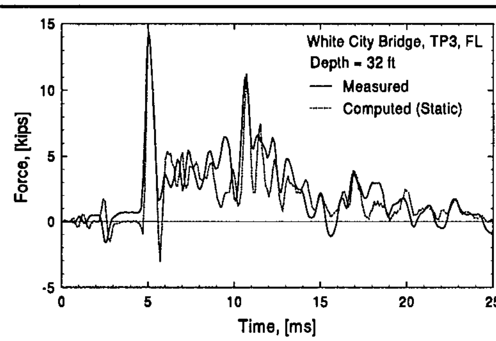


Figure D.36c: Bottom Force Time History (Static) for White City Bridge at depth of 32 ft

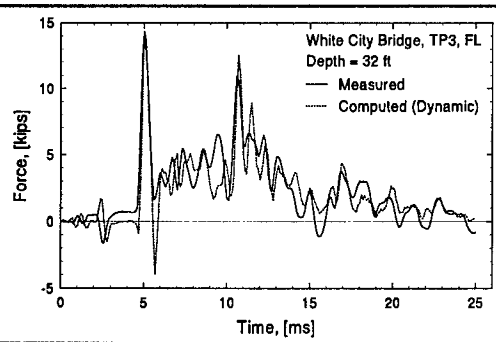


Figure D.36d: Bottom Force Time History (Dynamic) for White City Bridge at depth of 32 ft

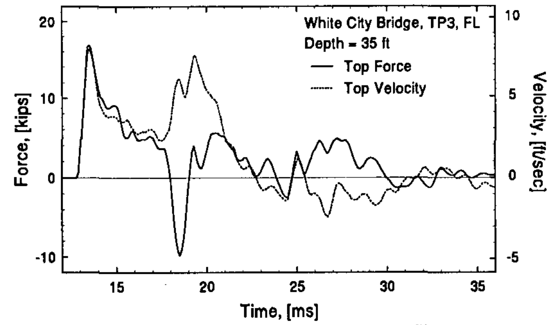


Figure D.37a: Top F-V Time History for White City Bridge, TP3, FL at depth of 35 ft

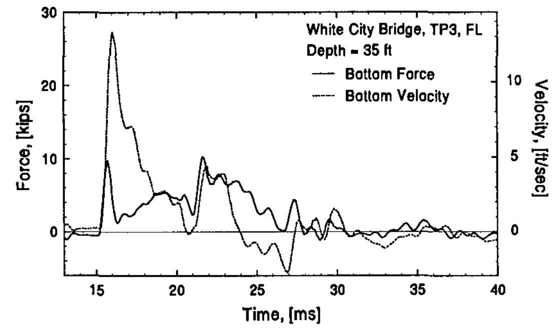


Figure D.37b: Bottom F-V Time History for White City Bridge, TP3, FL at depth of 35 ft

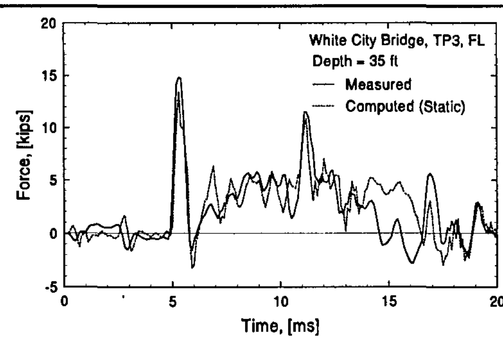


Figure D.37c: Bottom Force Time History (Static) for White City Bridge at depth of 35 ft

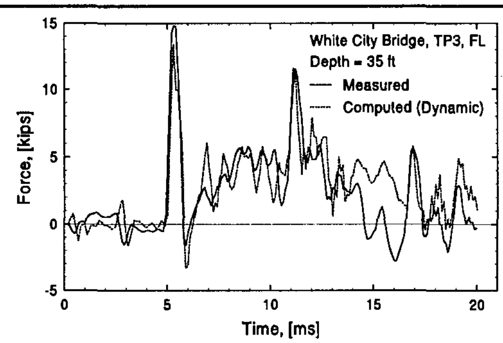


Figure D.37d: Bottom Force Time History (Dynamic) for White City Bridge at depth of 35 ft

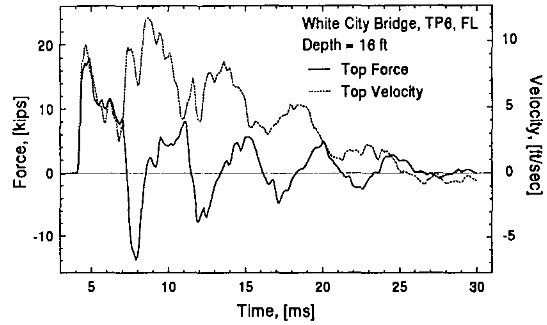


Figure D.38a: Top F-V Time History for White City Bridge, TP6, FL at depth of 16 ft

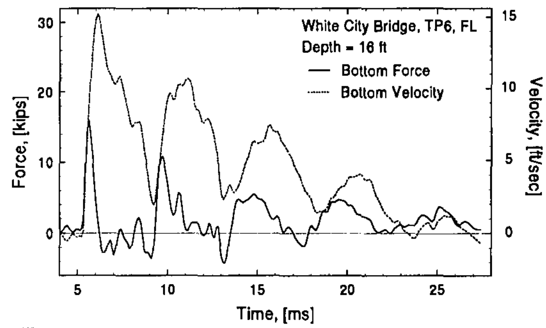


Figure D.38b: Bottom F-V Time History for White City Bridge, TP6, FL at depth of 16 ft

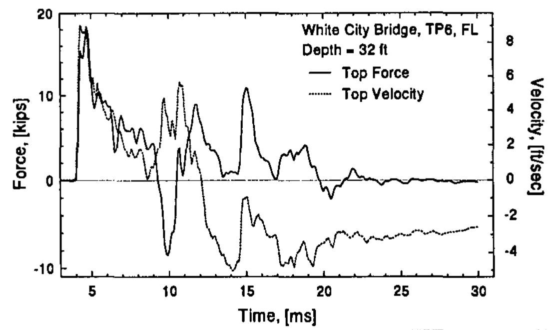


Figure D.39a: Top F-V Time History for White City Bridge, TP6, FL at depth of 32 ft

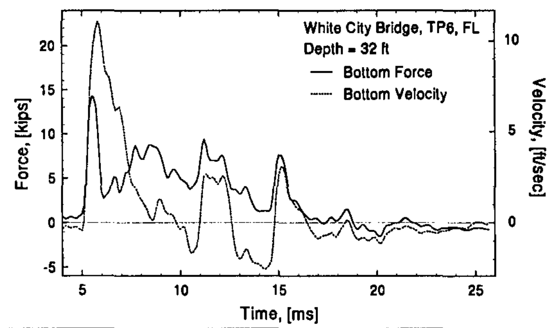


Figure D.39b: Bottom F-V Time History for White City Bridge, TP6, FL at depth of 32 ft

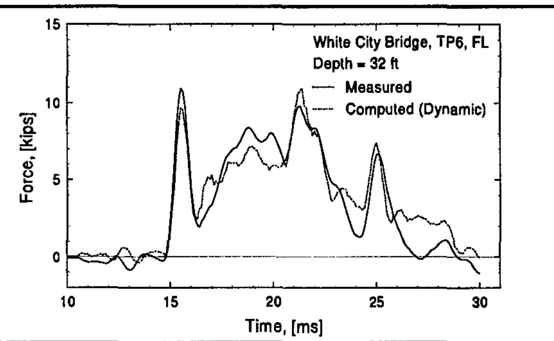


Figure D.39c: Bottom Force Time History (Dynamic) for White City, TP6, FL at depth of 32 ft

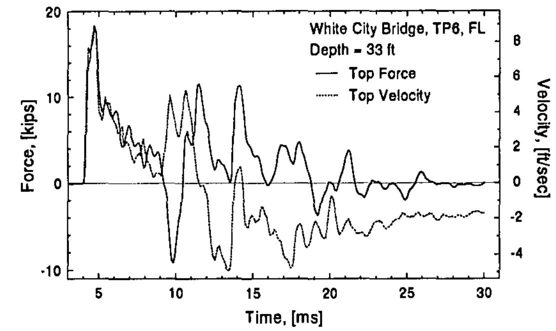


Figure D.40a: Top F-V Time History for White City Bridge, TP6, FL at depth of 33 ft

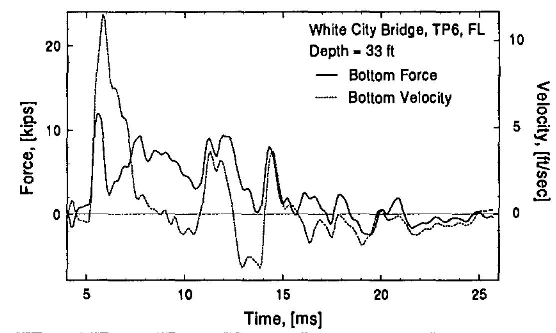


Figure D.40b: Bottom F-V Time History for White City Bridge, TP6, FL at depth of 33 ft

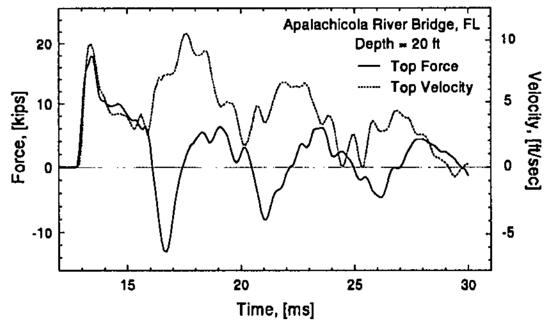


Figure D.41a: Top F-V Time History for Apalachicola River Bridge, FL at depth of 20 ft

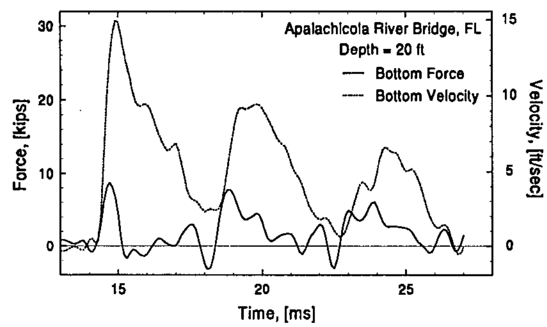


Figure D.41b: Bottom F-V Time History for Apalachicola River Bridge, FL at depth of 20 ft

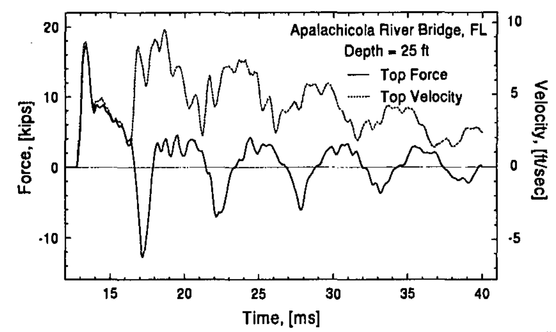


Figure D.42a: Top F-V Time History for Apalachicola River Bridge, FL at depth of 25 ft

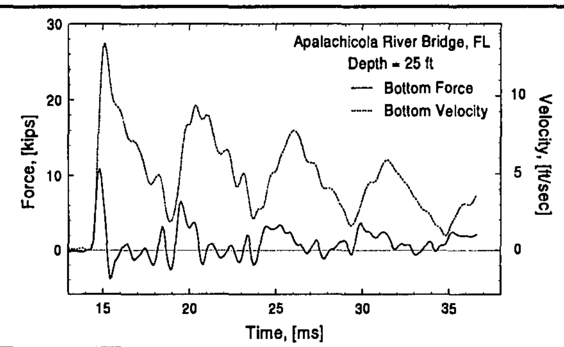


Figure D.42b: Bottom F-V Time History for Apalachicola River Bridge, FL at depth of 25 ft

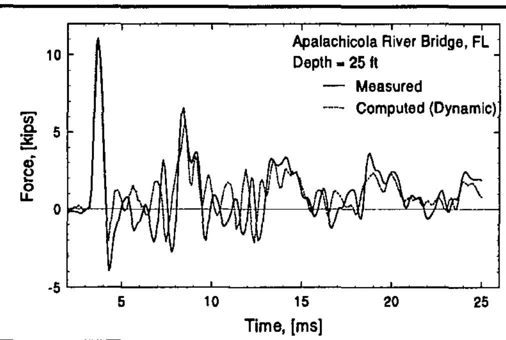


Figure D.42c: Bottom Force Time History (Dynamic) for Apalachicola, FL at depth of 25 ft

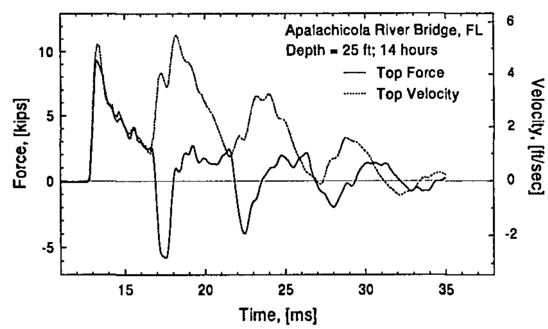


Figure D.43a: Top F-V Time History for Apalachicola River Bridge, FL at depth of 25 ft (14 h)

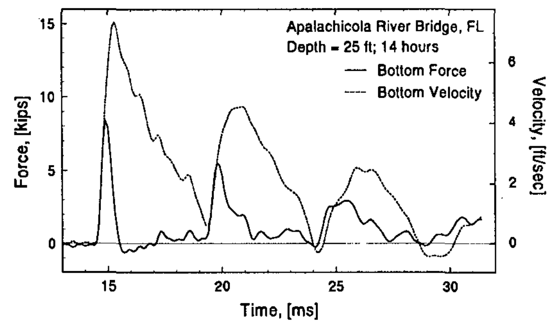


Figure D.43b: Bottom F-V Time History for Apalachicola Bridge, FL at depth of 25 ft (14 h)

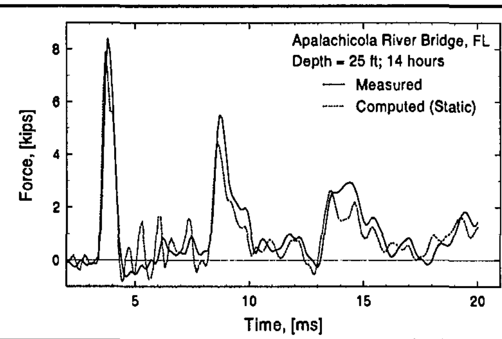


Figure D.43c: Bottom Force Time History (Static) for Apalachicola, FL at depth of 25 ft (14 h)

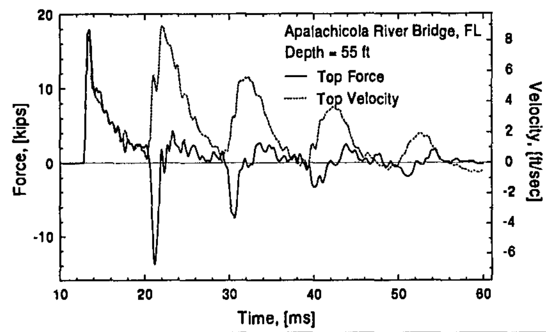


Figure D.44a: Top F-V Time History for Apalachicola River Bridge at depth of 55 ft

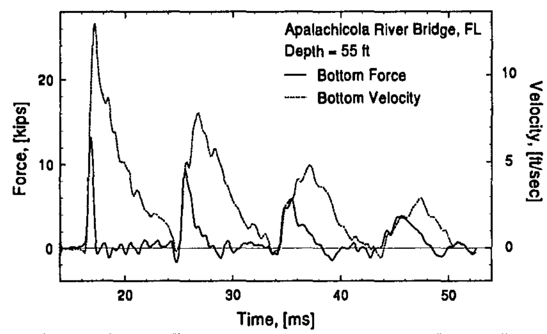


Figure D.44b: Bottom F-V Time History for Apalachicola River Bridge, FL at depth of 55 ft

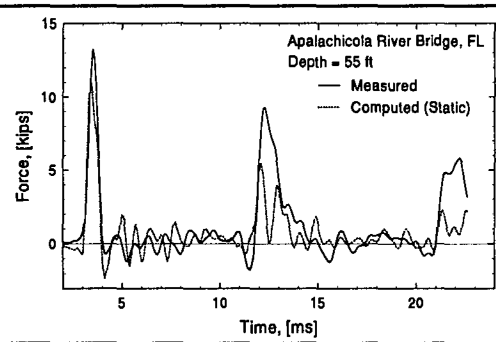


Figure D.44c: Bottom Force Time History (Static) for Apalachicola, FL at depth of 55 ft

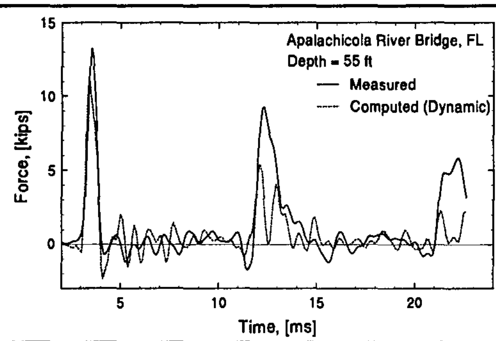


Figure D.44d: Bottom Force Time History (Dynamic) for Apalachicola, FL at depth of 55 ft

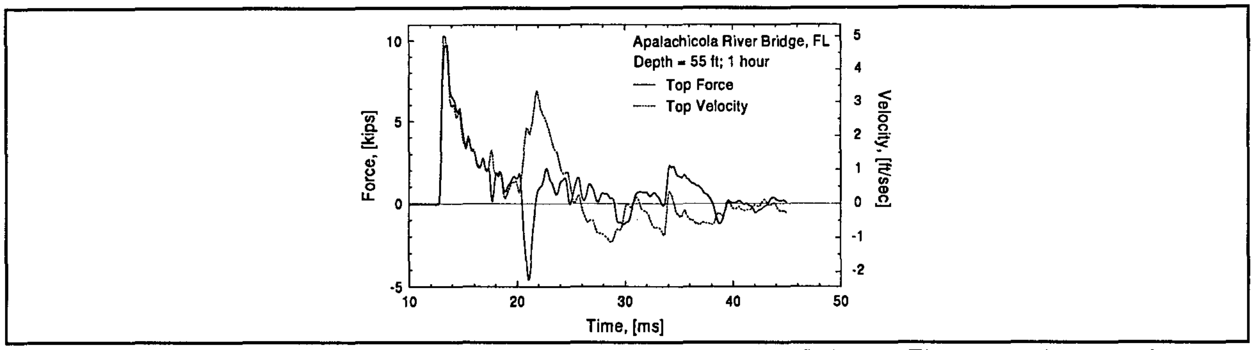


Figure D.45a: Top F-V Time History for Apalachicola River Bridge, FL at depth of 55 ft (1 h)

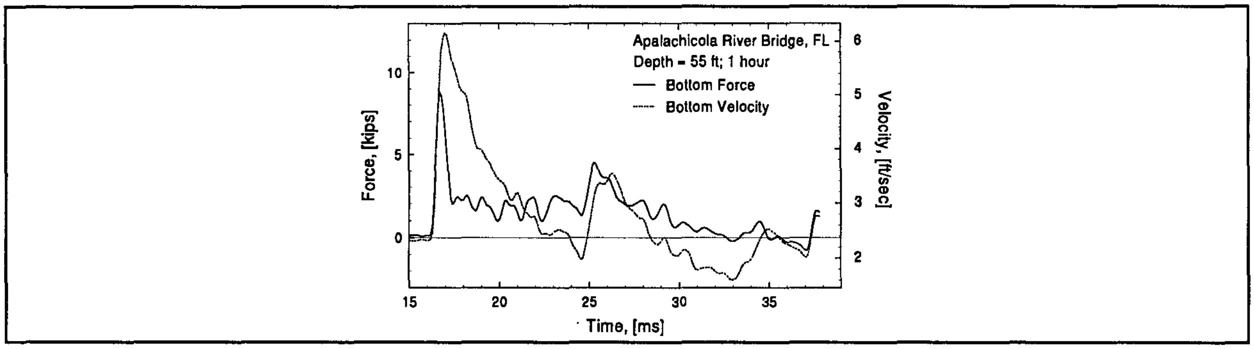


Figure D.45b: Bottom F-V Time History for Apalachicola, FL at depth of 55 ft (1 h)

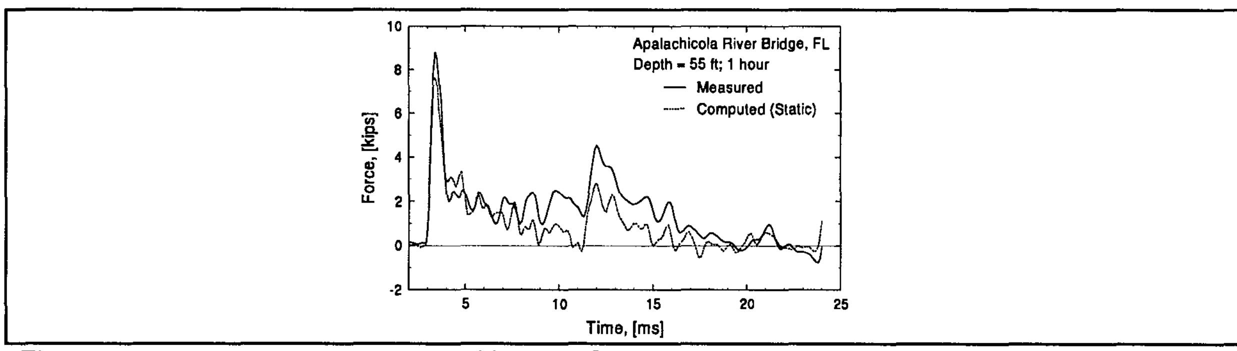


Figure D.45c: Bottom Force Time History (Static) for Apalachicola, FL at depth of 55 ft (1 h)

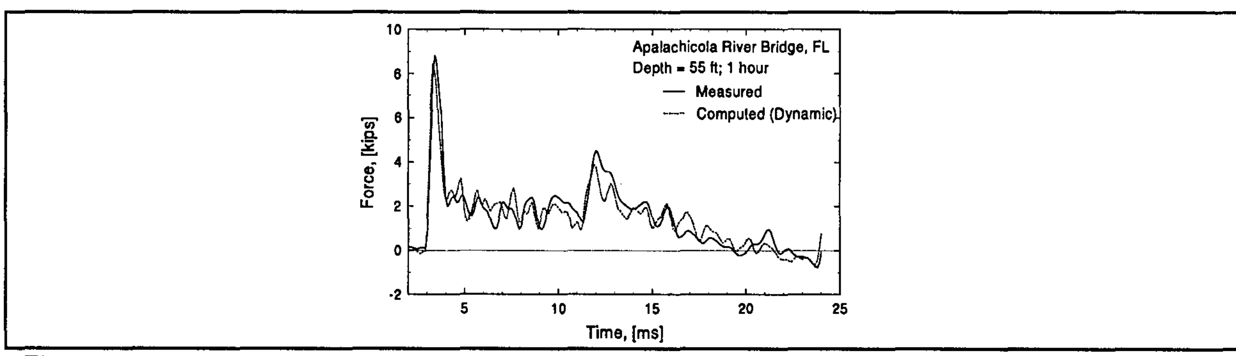


Figure D.45d: Bottom Force Time History (Dynamic) for Apalachicola at depth of 55 ft (1 h)

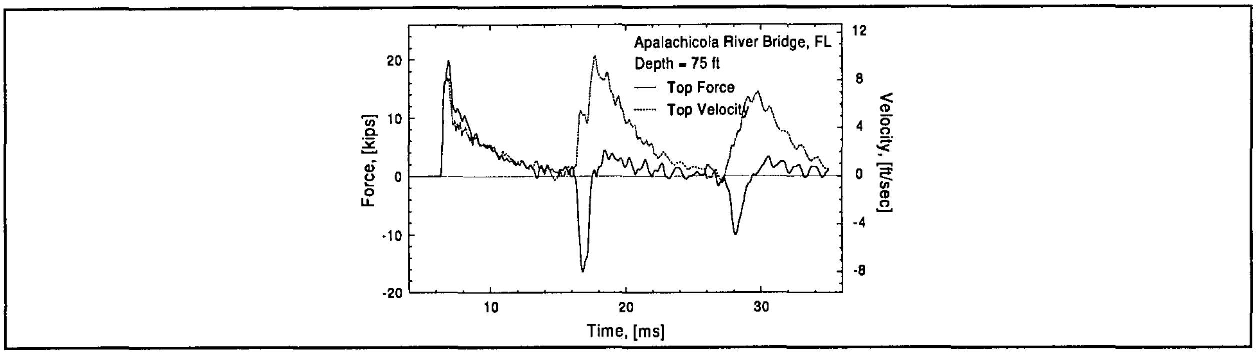


Figure D.46a: Top F-V Time History for Apalachicola River Bridge, FL at depth of 75 ft

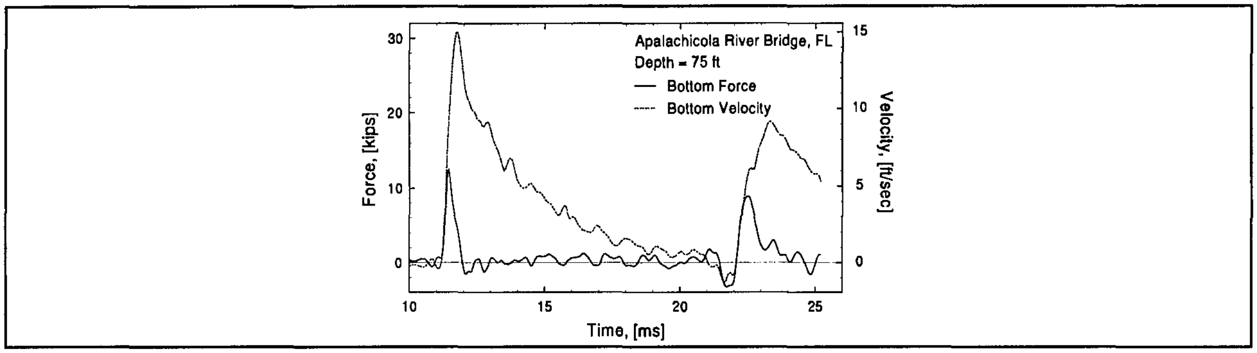


Figure D.46b: Bottom F-V Time History for Apalachicola River Bridge, FL at depth of 75 ft

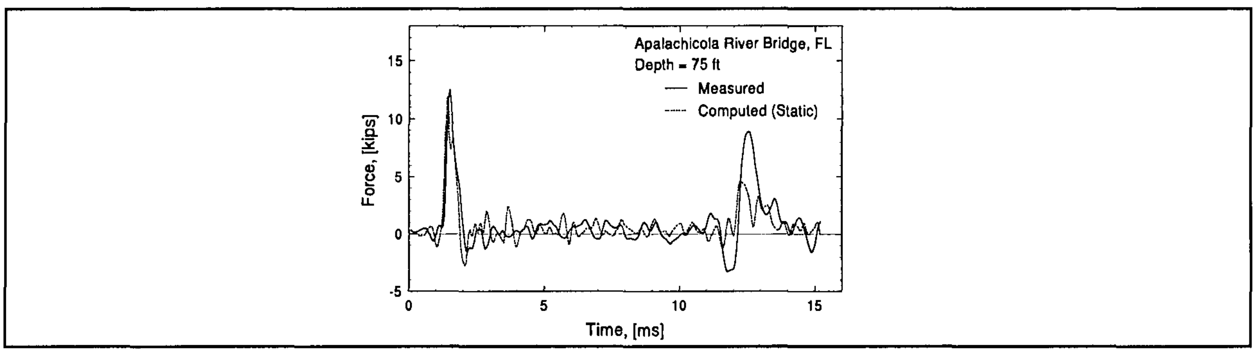


Figure D.46c: Bottom Force Time History (Static) for Apalachicola River at depth of 75 ft

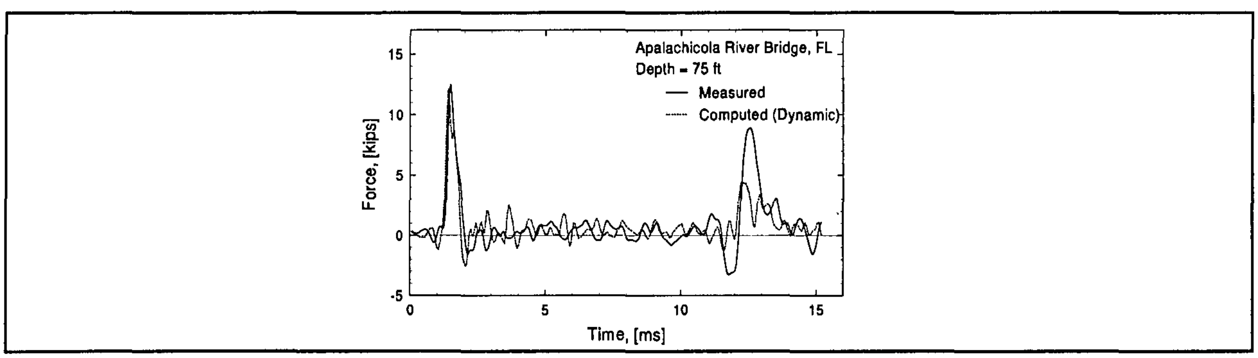


Figure D.46d: Bottom Force Time History (Dynamic) for Apalachicola River at depth of 75 ft

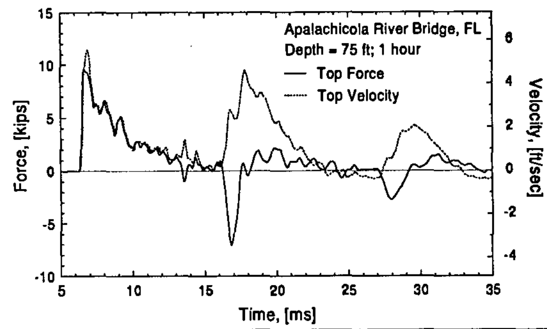


Figure D.47a: Top F-V Time History for Apalachicola River Bridge, FL at depth of 75 ft (1 h)

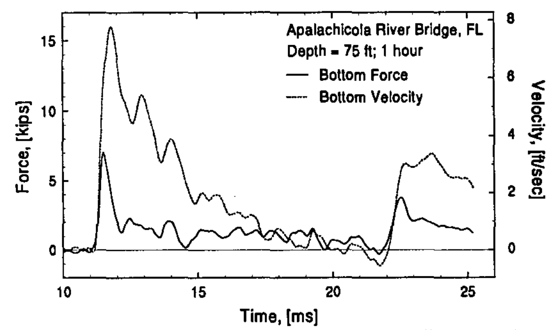


Figure D.47b: Bottom F-V Time History for Apalachicola, FL at depth of 75 ft (1 h)

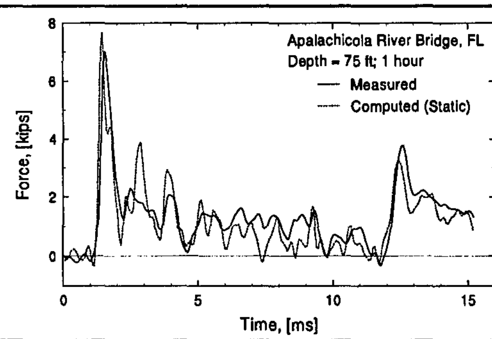


Figure D.47c: Bottom Force Time History (Static) for Apalachicola, FL at depth of 75 ft (1 h)

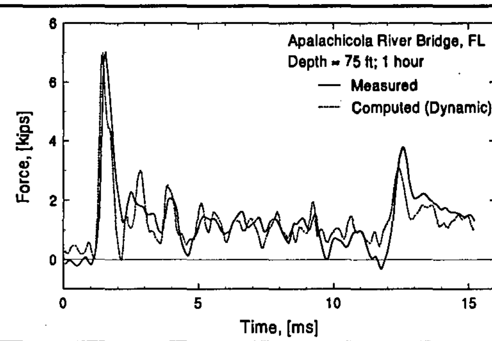


Figure D.47d: Bottom Force Time History (Dynamic) for Apalachicola at depth of 75 ft (1 h)

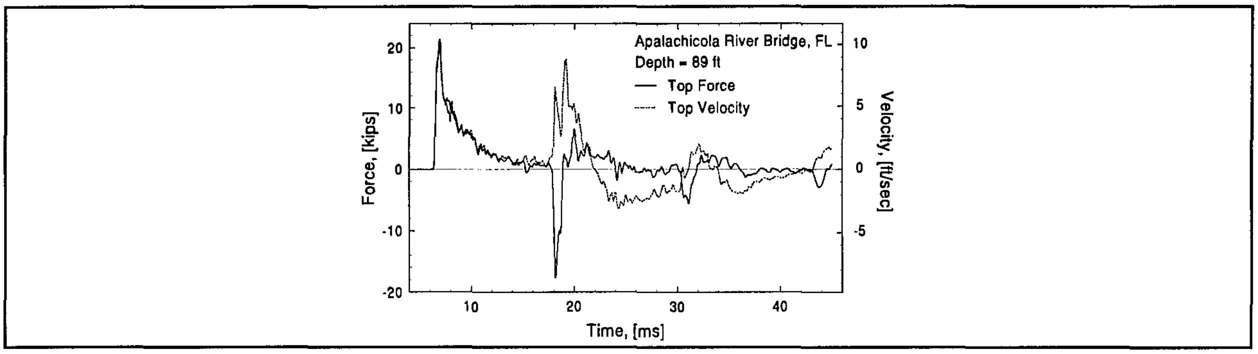


Figure D.48a: Top F-V Time History for Apalachicola River Bridge, FL at depth of 89 ft

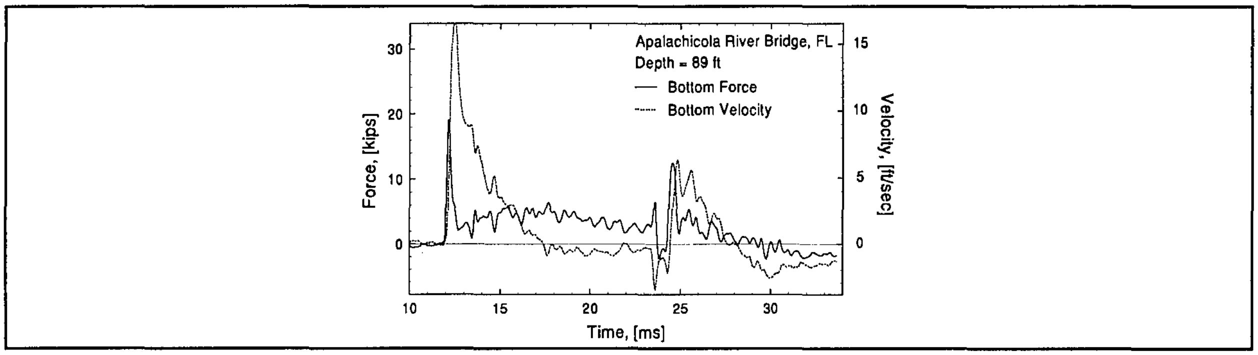


Figure D.48b: Bottom F-V Time History for Apalachicola River Bridge, FL at depth of 89 ft

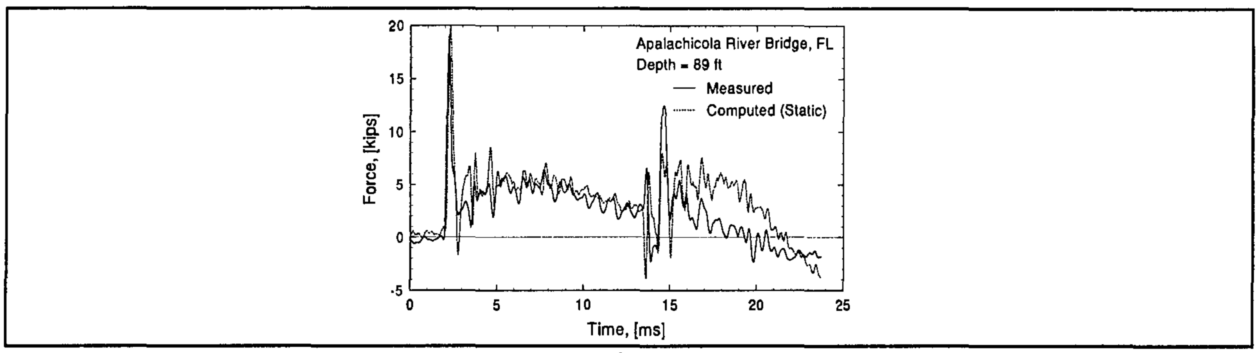


Figure D.48c: Bottom Force Time History (Static) for Apalachicola River at depth of 89 ft

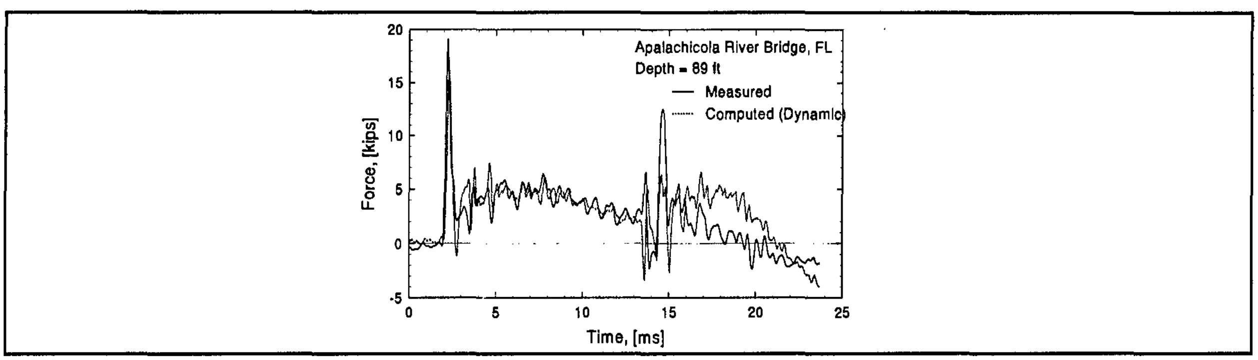


Figure D.48d: Bottom Force Time History (Dynamic) for Apalachicola River at depth of 89 ft

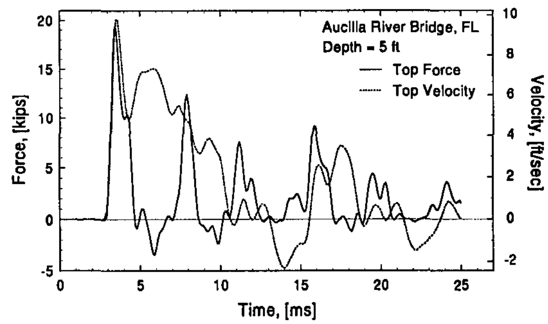


Figure D.49a: Top F-V Time History for Aucilla River Bridge, FL at depth of 5 ft

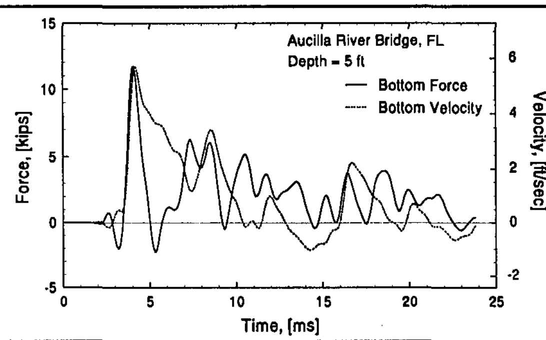


Figure D.49b: Bottom F-V Time History for Aucilla River Bridge, FL at depth of 5 ft

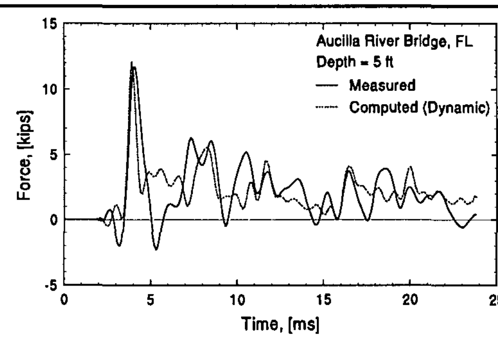


Figure D.49c: Bottom Force Time History (Dynamic) for Aucilla River, FL at depth of 5 ft

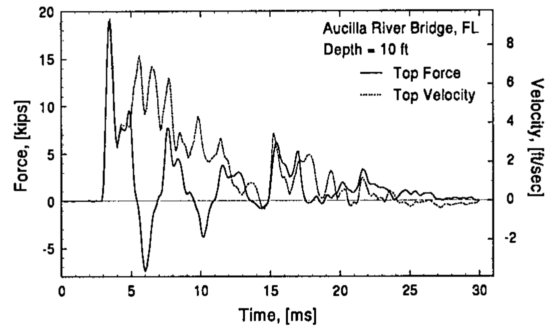


Figure D.50a: Top F-V Time History for Aucilla River Bridge, FL at depth of 10 ft

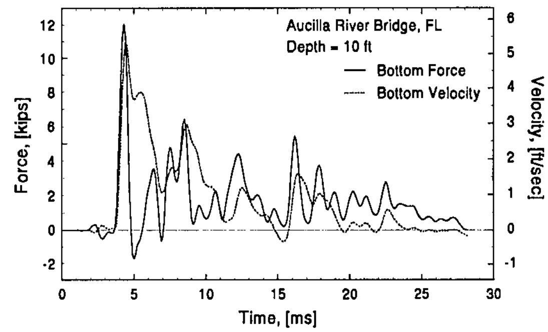


Figure D.50b: Bottom F-V Time History for Aucilla River Bridge, FL at depth of 10 ft

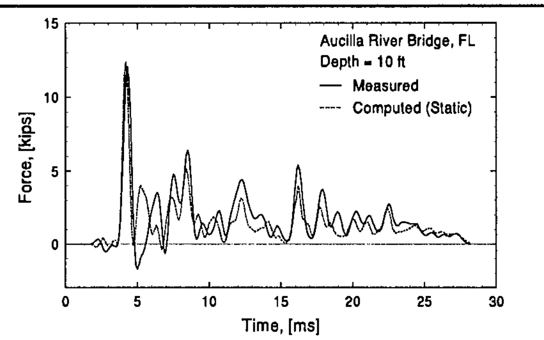


Figure D.50c: Bottom Force Time History (Static) for Aucilla River, FL at depth of 10 ft

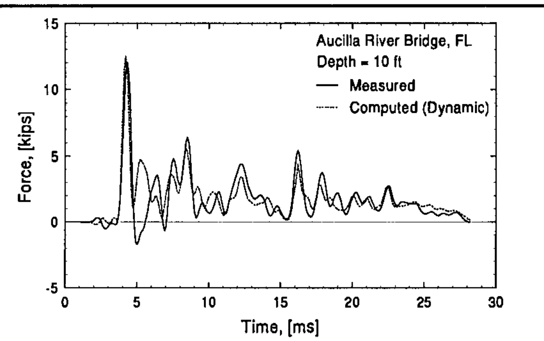


Figure D.50d: Bottom Force Time History (Dynamic) for Aucilla River, FL at depth of 10 ft

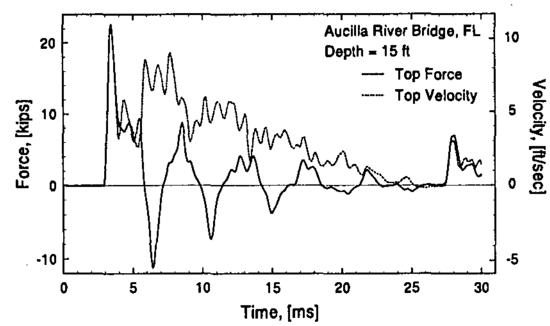


Figure D.51a: Top F-V Time History for Aucilla River Bridge, FL at depth of 15 ft

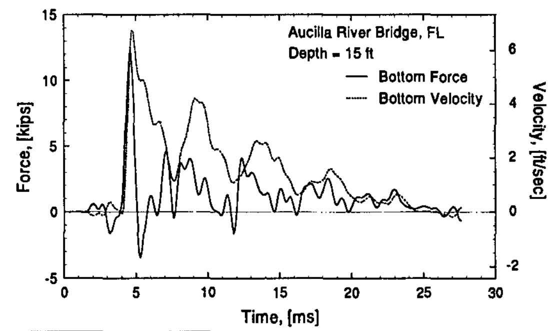


Figure D.51b: Bottom F-V Time History for Aucilla River Bridge, FL at depth of 15 ft

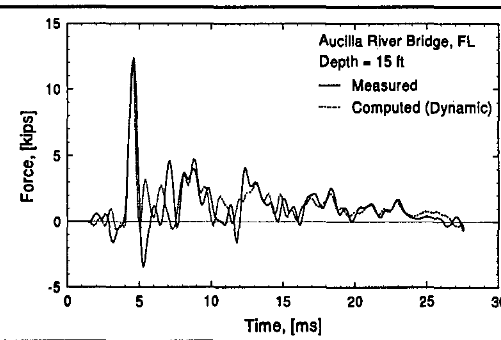


Figure D.51c: Bottom Force Time History (Dynamic) for Aucilla River, FL at depth of 15 ft

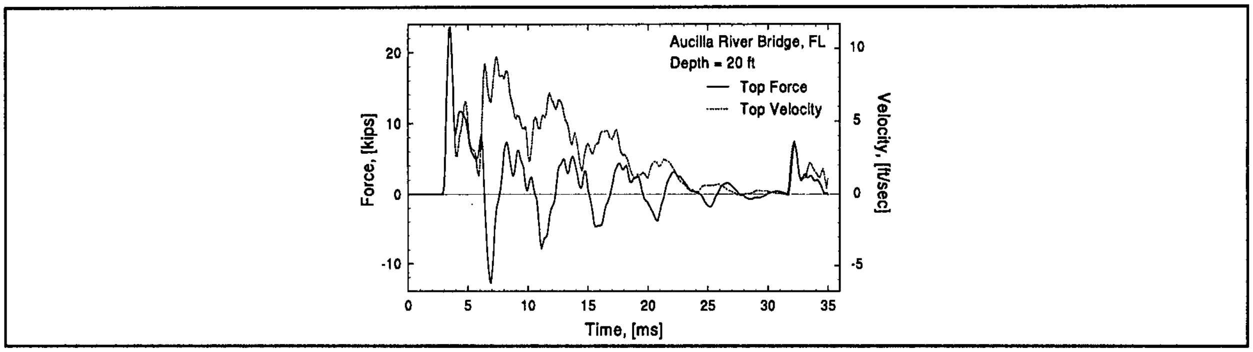


Figure D.52a: Top F-V Time History for Aucilla River Bridge, FL at depth of 20 ft

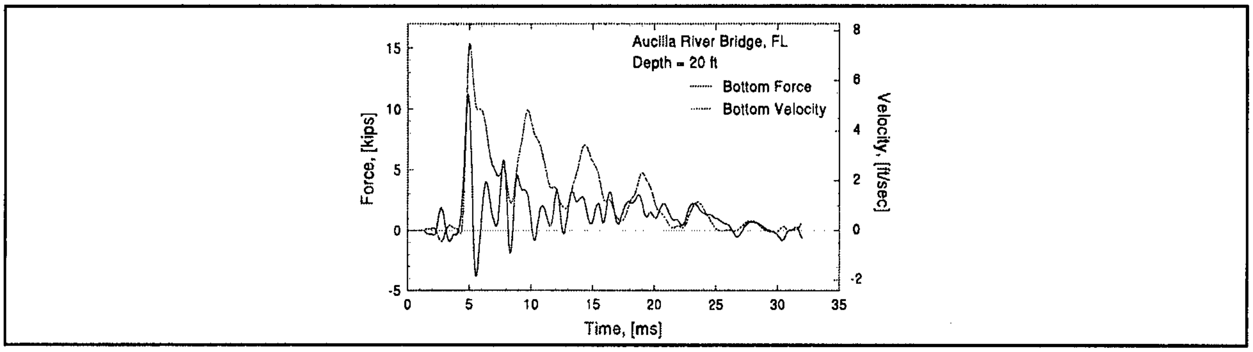


Figure D.52b: Bottom F-V Time History for Aucilla River Bridge, FL at depth of 20 ft

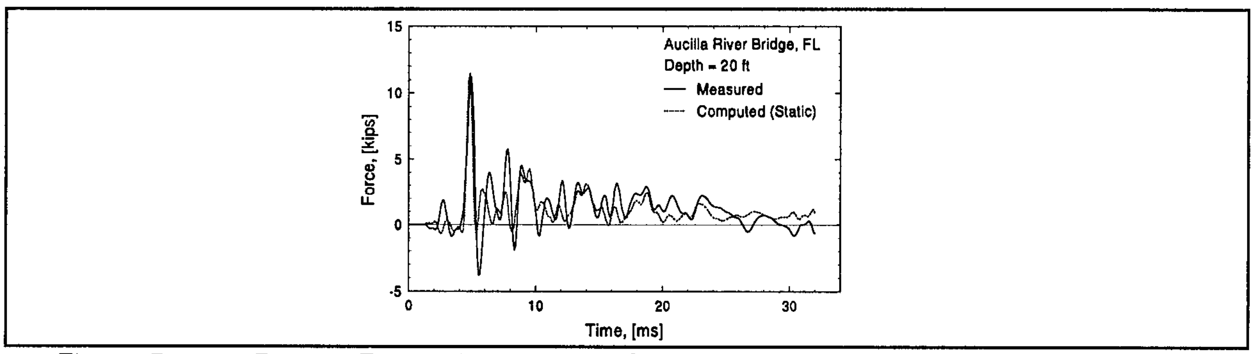


Figure D.52c: Bottom Force Time History (Static) for Aucilla River, FL at depth of 20 ft

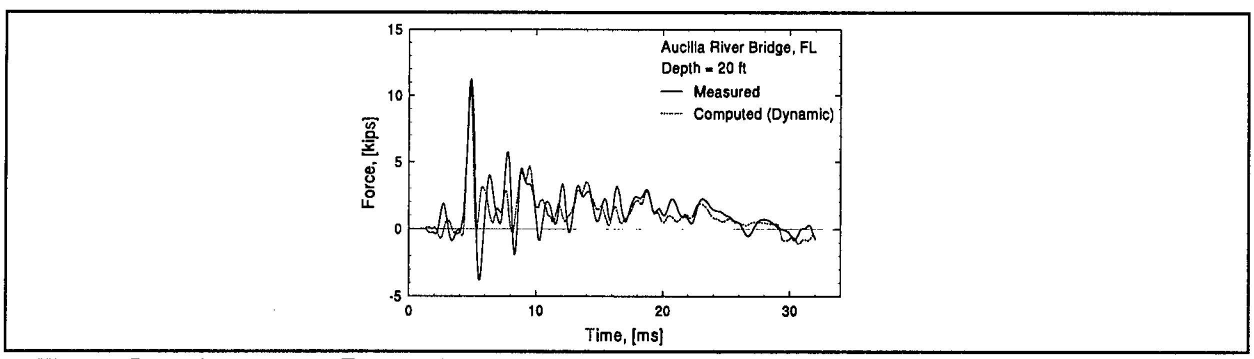


Figure D.52d: Bottom Force Time History (Dynamic) for Aucilla River, FL at depth of 20 ft

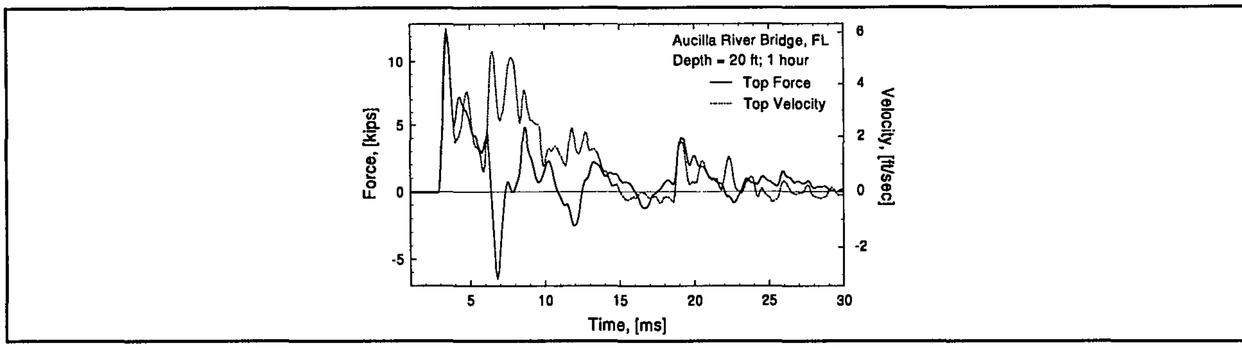


Figure D.53a: Top F-V Time History for Aucilla River Bridge, FL at depth of 20 ft (1 h)

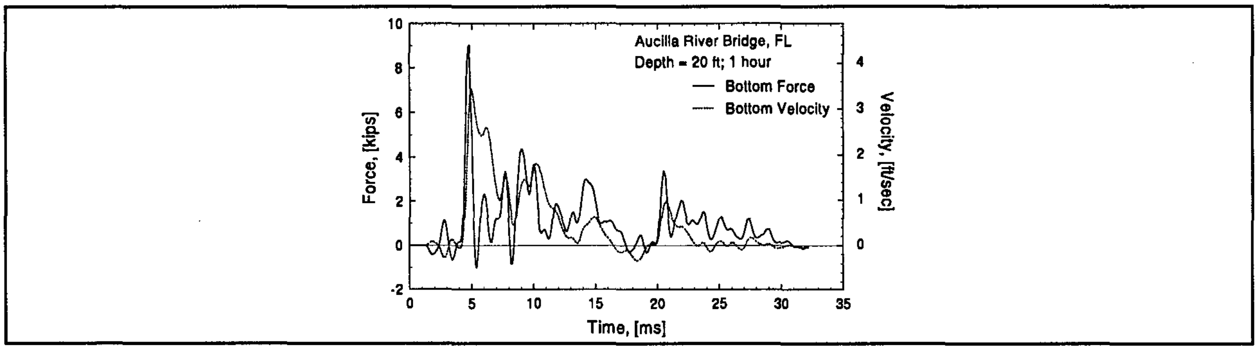


Figure D.53b: Bottom F-V Time History for Aucilla River Bridge, FL at depth of 20 ft (1 h)

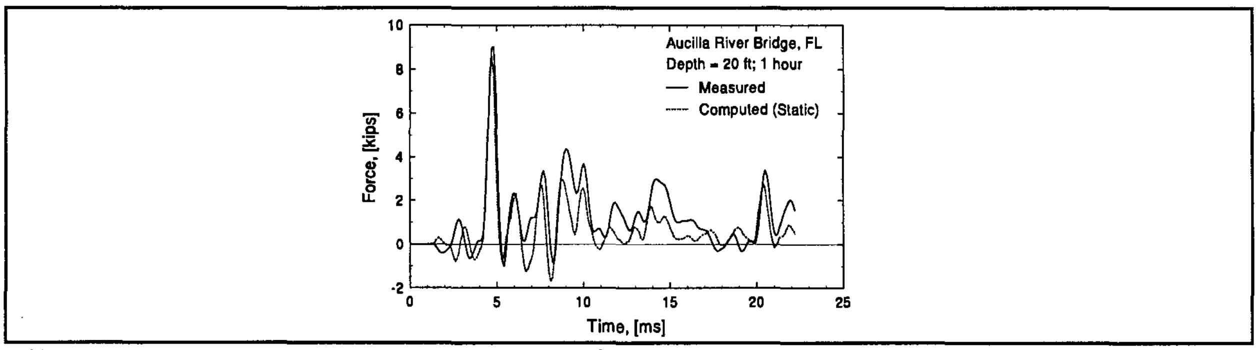


Figure D.53c: Bottom Force Time History (Static) for Aucilla River, FL at depth of 20 ft (1 h)

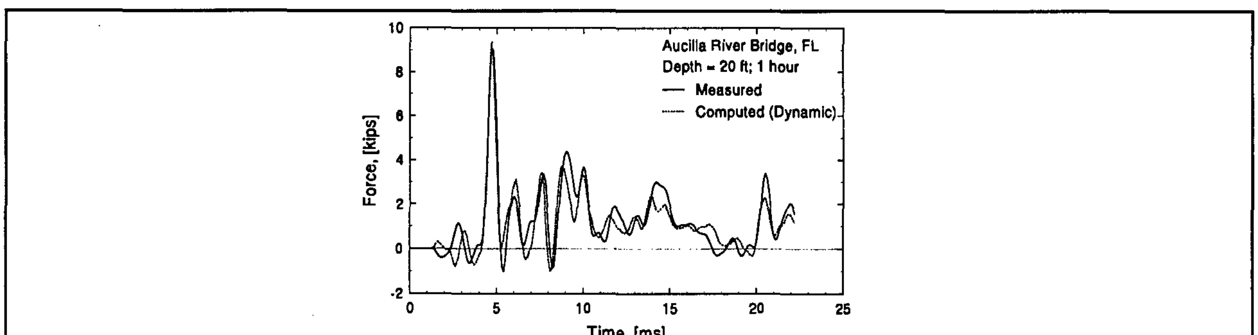


Figure D.53d: Bottom Force Time History (Dynamic) for Aucilla River at depth of 20 ft (1 h)

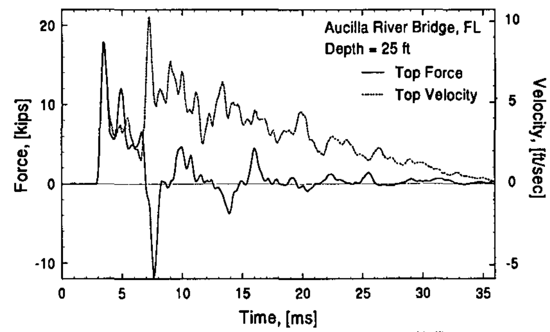


Figure D.54a: Top F-V Time History for Aucilla River Bridge, FL at depth of 25 ft

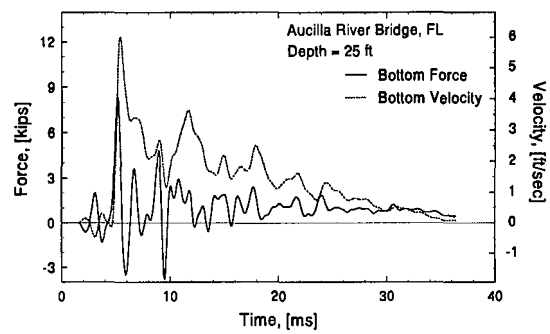


Figure D.54b: Bottom F-V Time History for Aucilla River Bridge, FL at depth of 25 ft

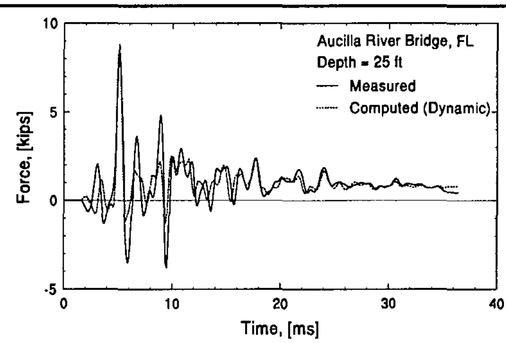


Figure D.54c: Bottom Force Time History (Dynamic) for Aucilla River, FL at depth of 25 ft

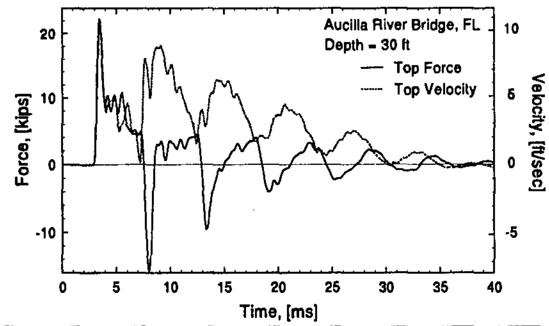


Figure D.55a: Top F-V Time History for Aucilla River Bridge, FL at depth of 30 ft

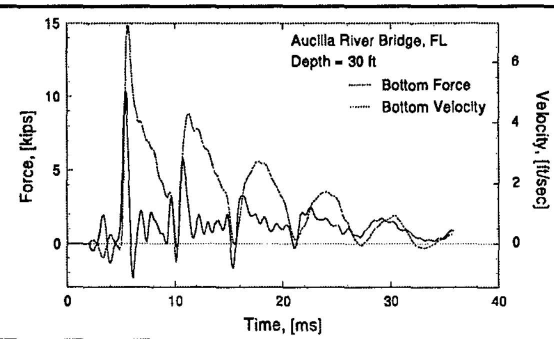


Figure D.55b: Bottom F-V Time History for Aucilla River Bridge, FL at depth of 30 ft

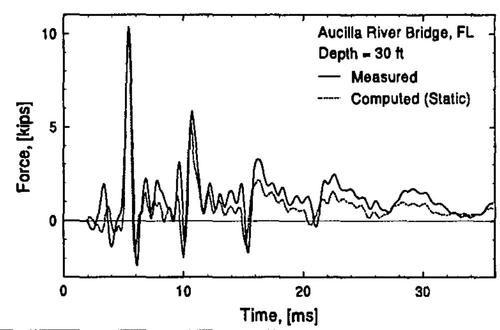


Figure D.55c: Bottom Force Time History (Static) for Aucilla River, FL at depth of 30 ft

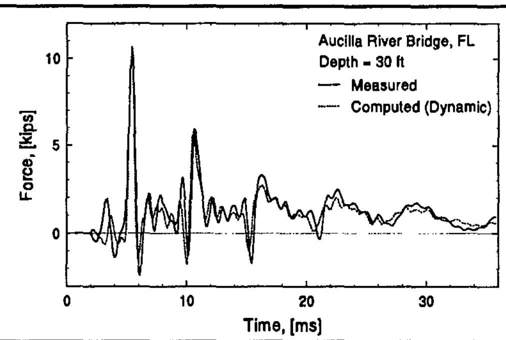


Figure D.55d: Bottom Force Time History (Dynamic) for Aucilla River, FL at depth of 30 ft

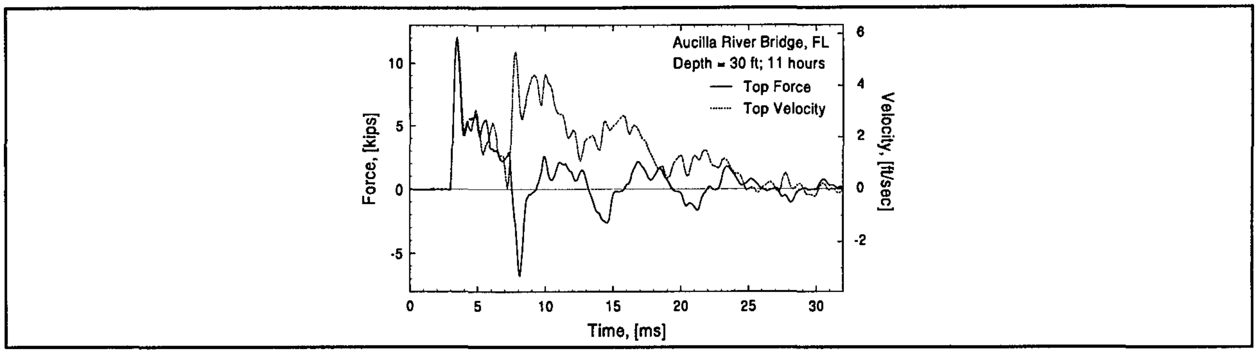


Figure D.56a: Top F-V Time History for Aucilla River Bridge, FL at depth of 30 ft (11 h)

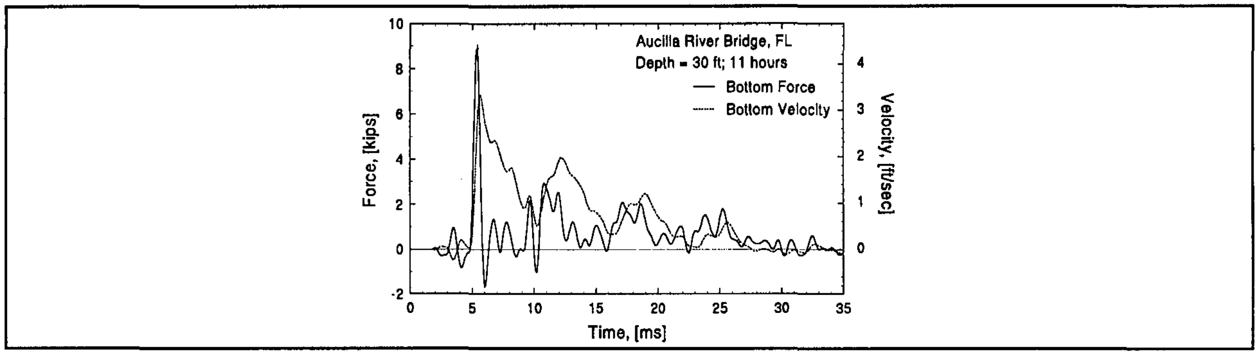


Figure D.56b: Bottom F-V Time History for Aucilla River Bridge, FL at depth of 30 ft (11 h)

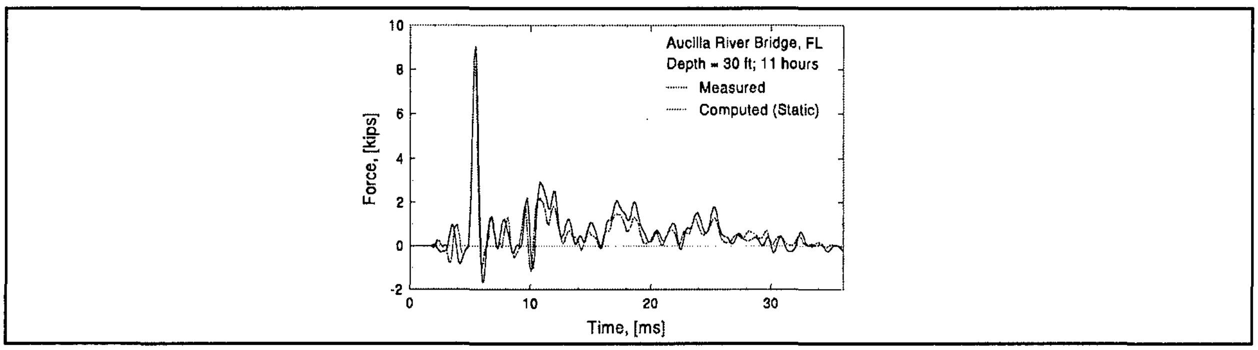


Figure D.56c: Bottom Force Time History (Static) for Aucilla River, FL at depth of 30 ft (11 h)

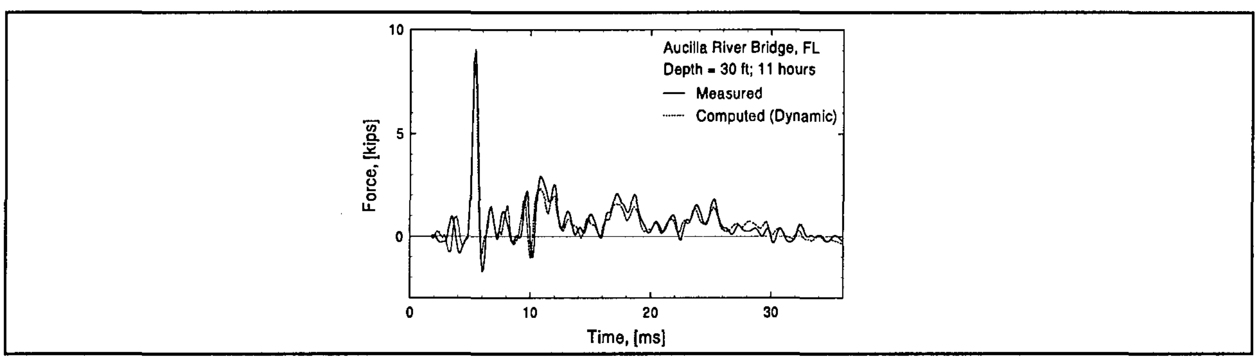


Figure D.56d: Bottom Force Time History (Dynamic) for Aucilla, FL at depth of 30 ft (11 h)

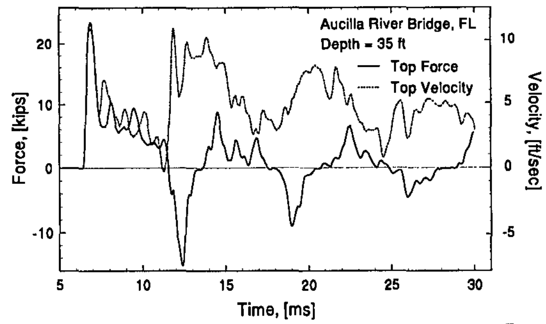


Figure D.57a: Top F-V Time History for Aucilla River Bridge, FL at depth of 35 ft

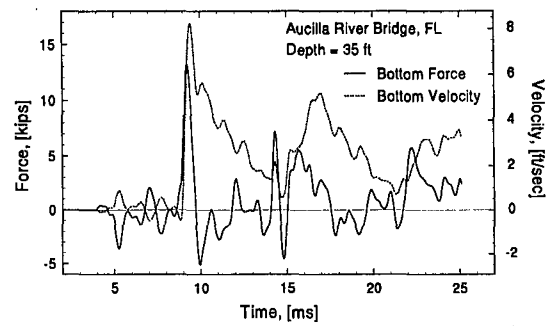


Figure D.57b: Bottom F-V Time History for Aucilla River Bridge, FL at depth of 35 ft

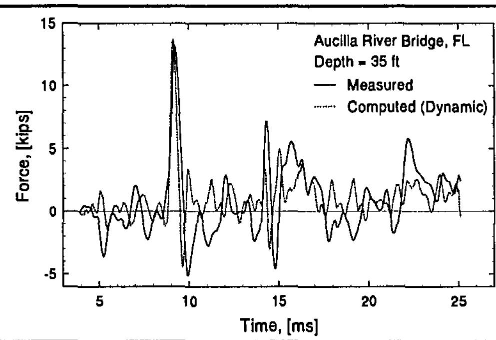


Figure D.57c: Bottom Force Time History (Dynamic) for Aucilla River, FL at depth of 35 ft

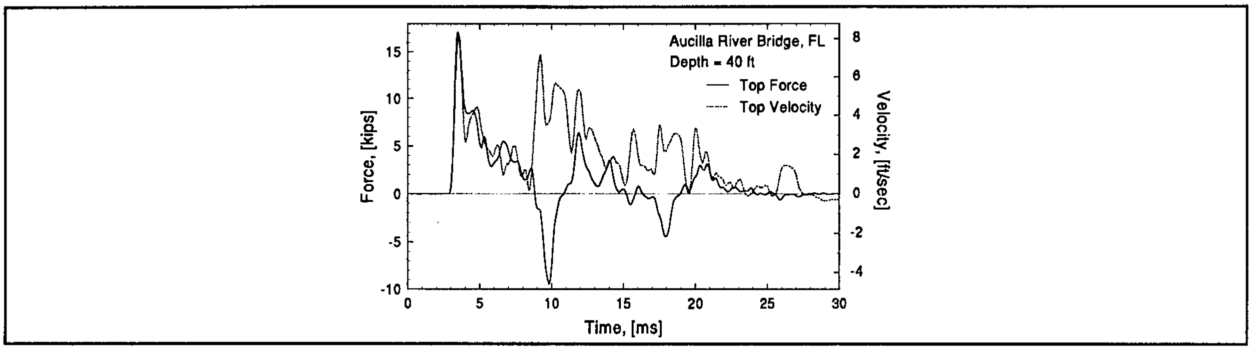


Figure D.58a: Top F-V Time History for Aucilla River Bridge, FL at depth of 40 ft

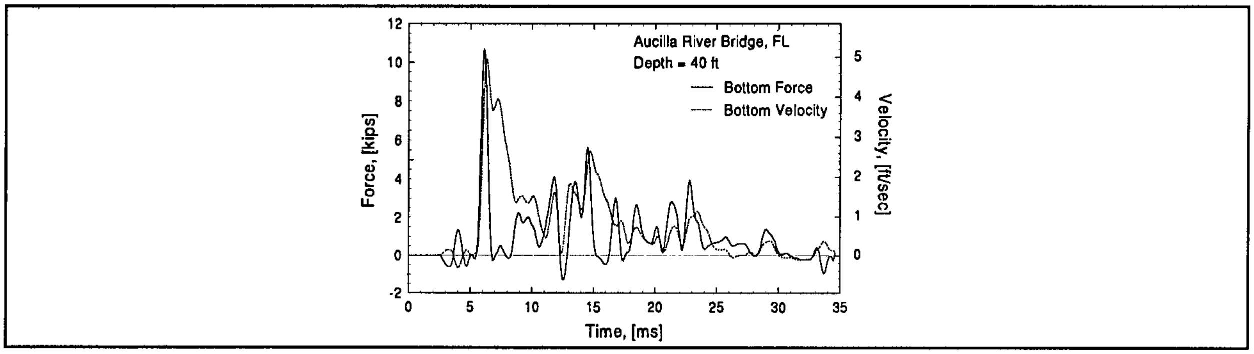


Figure D.58b: Bottom F-V Time History for Aucilla River Bridge, FL at depth of 40 ft

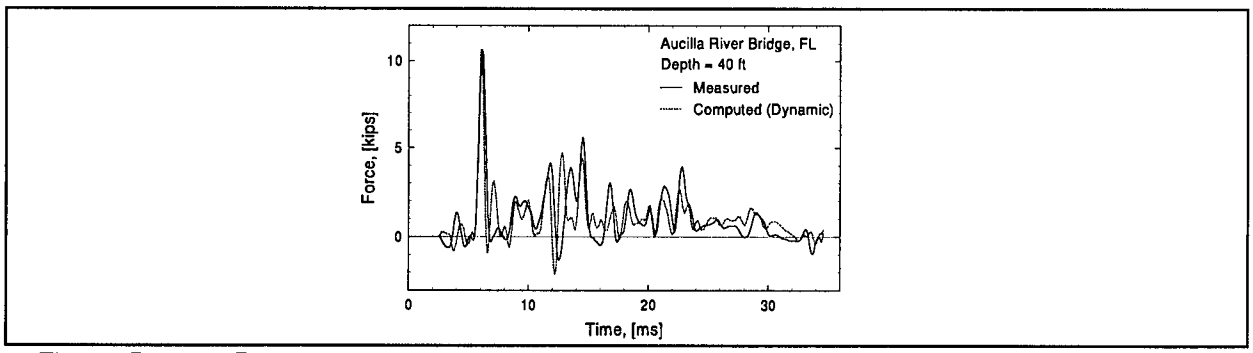


Figure D.58c: Bottom Force Time History (Dynamic) for Aucilla River, FL at depth of 40 ft

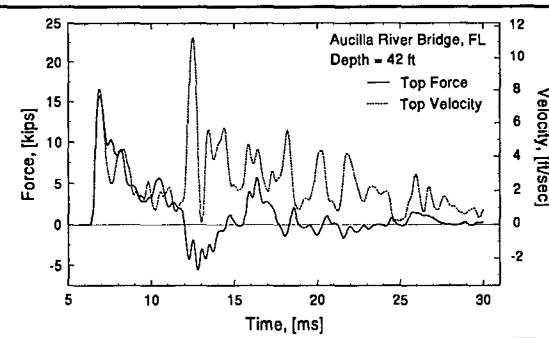


Figure D.59a: Top F-V Time History for Aucilla River Bridge, FL at depth of 42 ft

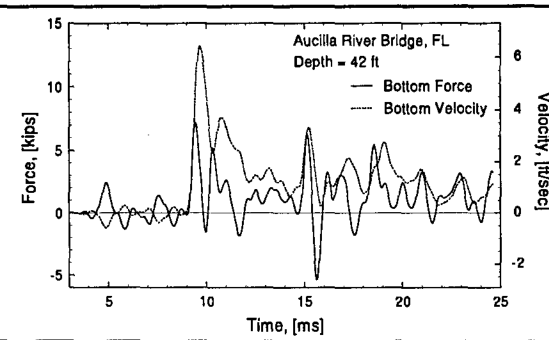


Figure D.59b: Bottom F-V Time History for Aucilla River Bridge, FL at depth of 42 ft

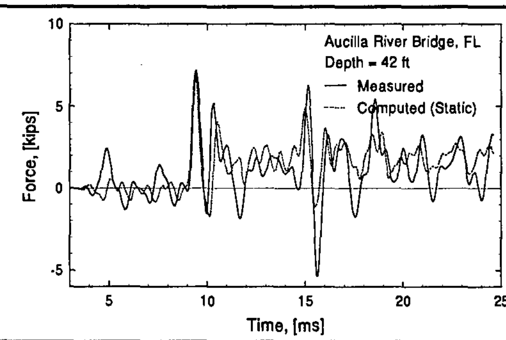


Figure D.59c: Bottom Force Time History (Static) for Aucilla River, FL at depth of 42 ft

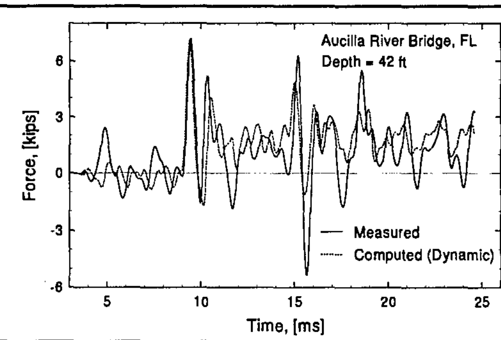


Figure D.59d: Bottom Force Time History (Dynamic) for Aucilla River, FL at depth of 42 ft

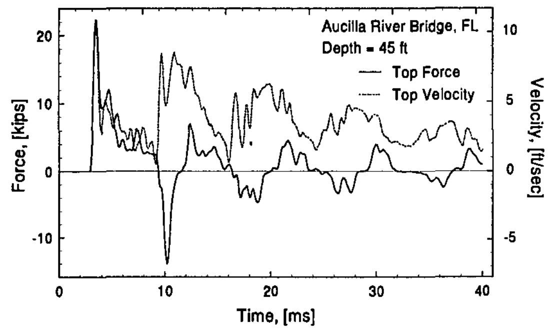


Figure D.60a: Top F-V Time History for Aucilla River Bridge, FL at depth of 45 ft

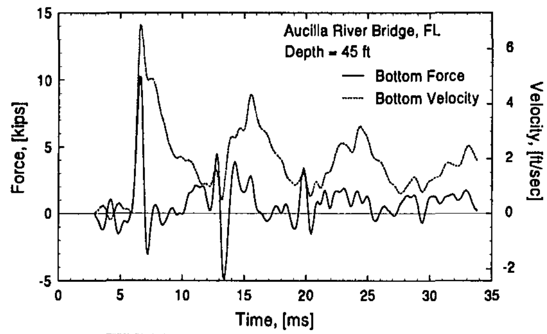


Figure D.60b: Bottom F-V Time History for Aucilla River Bridge, FL at depth of 45 ft

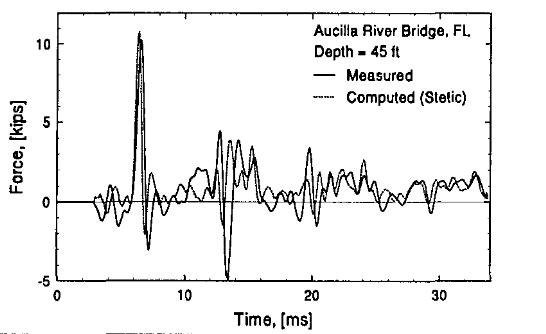


Figure D.60c: Bottom Force Time History (Static) for Aucilla River, FL at depth of 45 ft

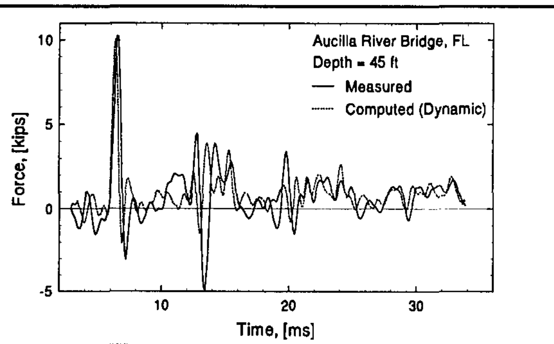


Figure D.60d: Bottom Force Time History (Dynamic) for Aucilla River, FL at depth of 45 ft

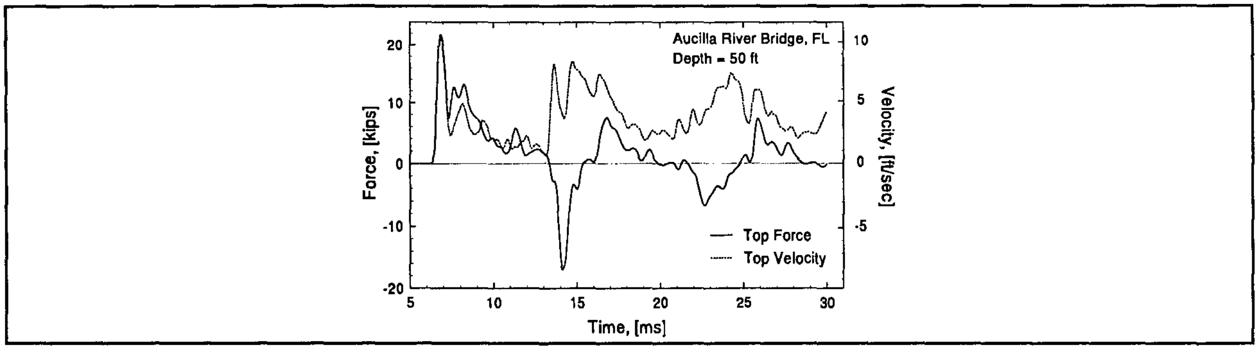


Figure D.61a: Top F-V Time History for Aucilla River Bridge, FL at depth of 50 ft

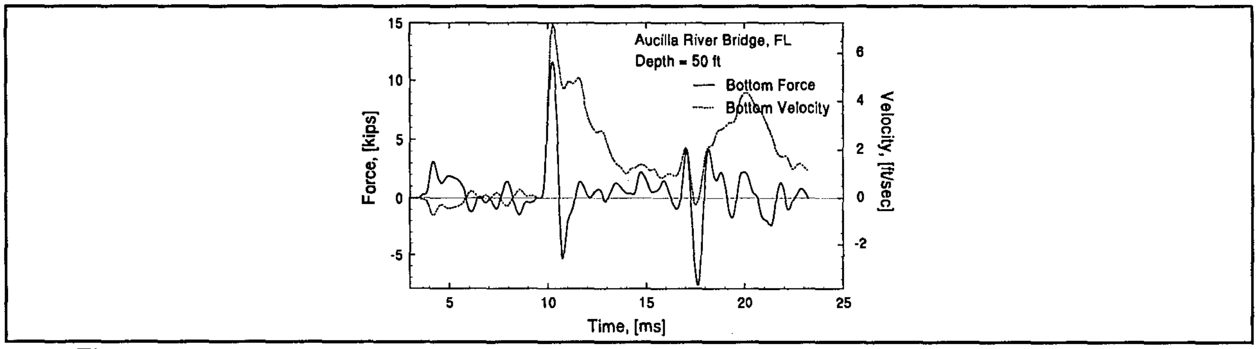


Figure D.61b: Bottom F-V Time History for Aucilla River Bridge, FL at depth of 50 ft

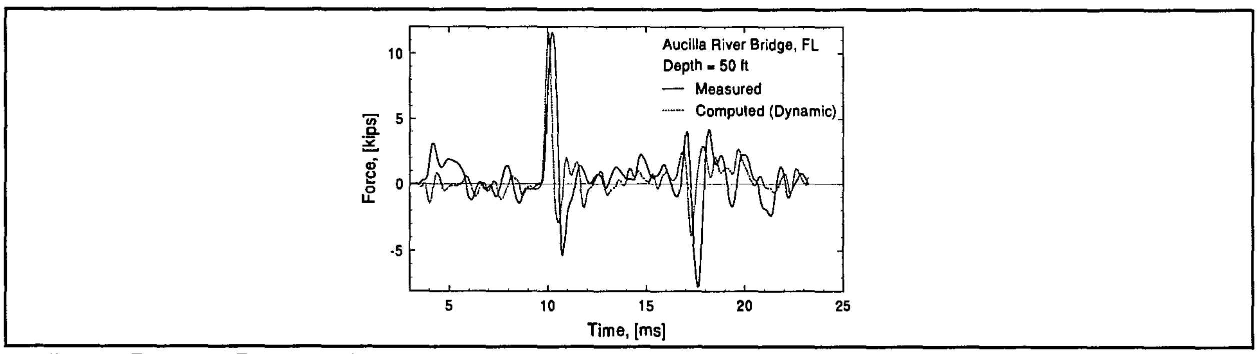


Figure D.61c: Bottom Force Time History (Dynamic) for Aucilla River, FL at depth of 50 ft

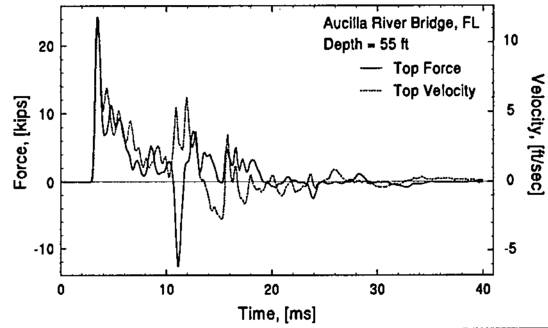


Figure D.62a: Top F-V Time History for Aucilla River Bridge, FL at depth of 55 ft

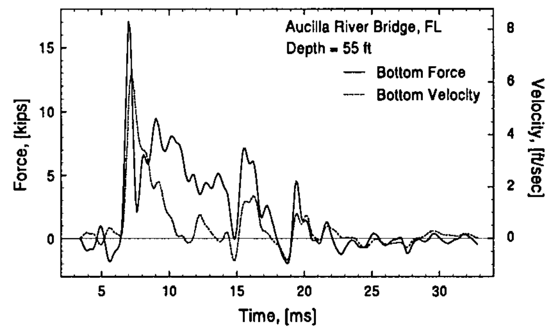


Figure D.62b: Bottom F-V Time History for Aucilla River Bridge, FL at depth of 55 ft

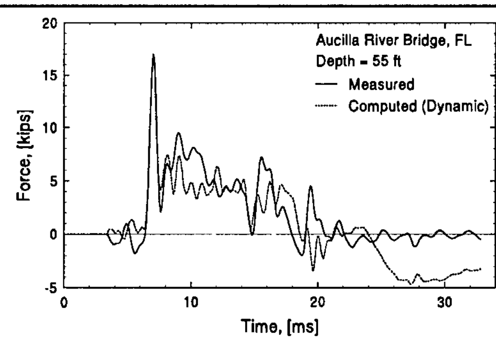


Figure D.62c: Bottom Force Time History (Dynamic) for Aucilla River, FL at depth of 55 ft

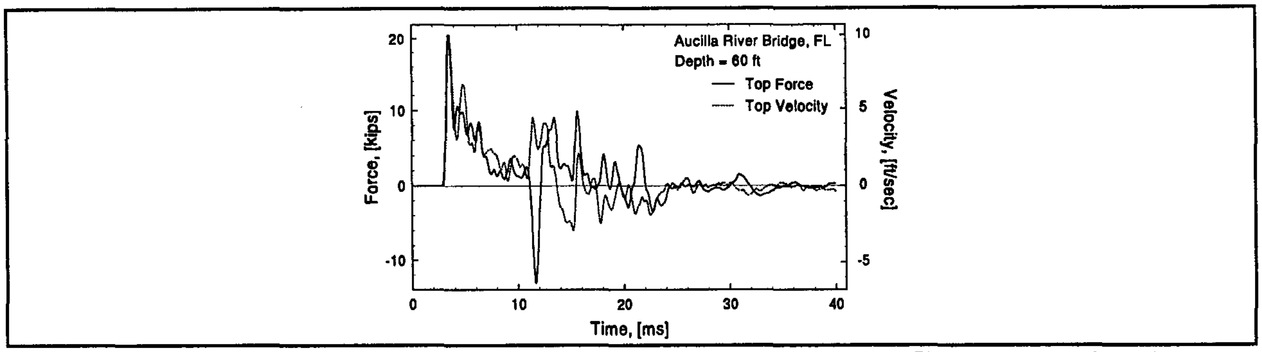


Figure D.63a: Top F-V Time History for Aucilla River Bridge, FL at depth of 60 ft

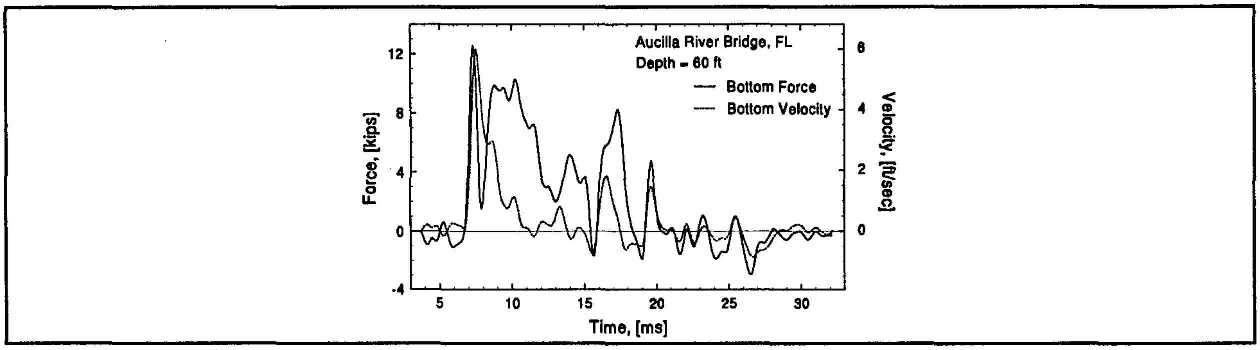


Figure D.63b: Bottom F-V Time History for Aucilla River Bridge, FL at depth of 60 ft

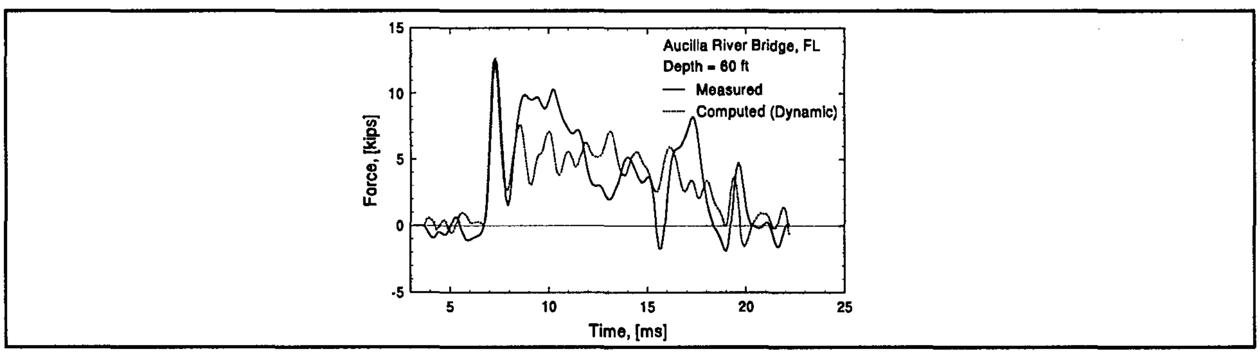


Figure D.63c: Bottom Force Time History (Dynamic) for Aucilla River, FL at depth of 60 ft

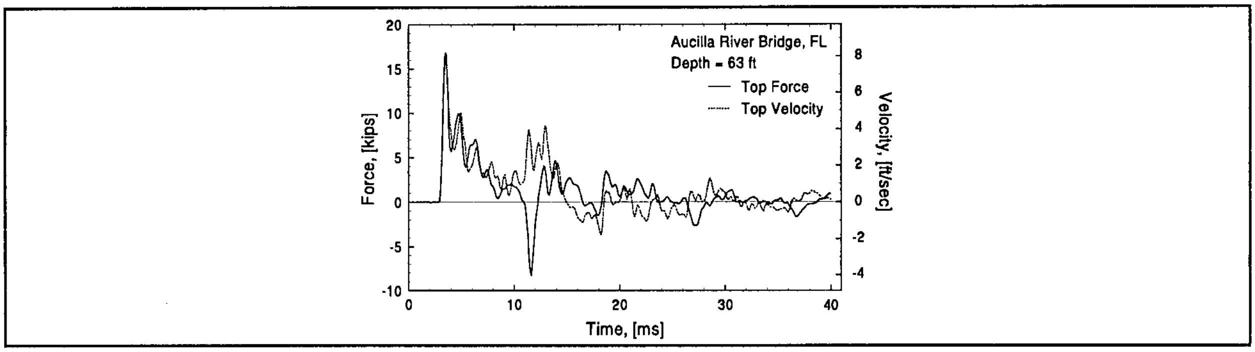


Figure D.64a: Top F-V Time History for Aucilla River Bridge, FL at depth of 63 ft

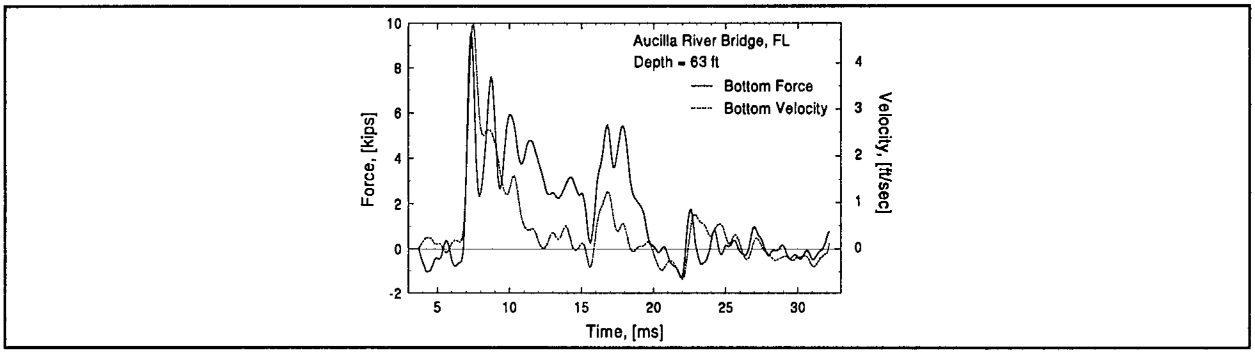


Figure D.64b: Bottom F-V Time History for Aucilla River Bridge, FL at depth of 63 ft

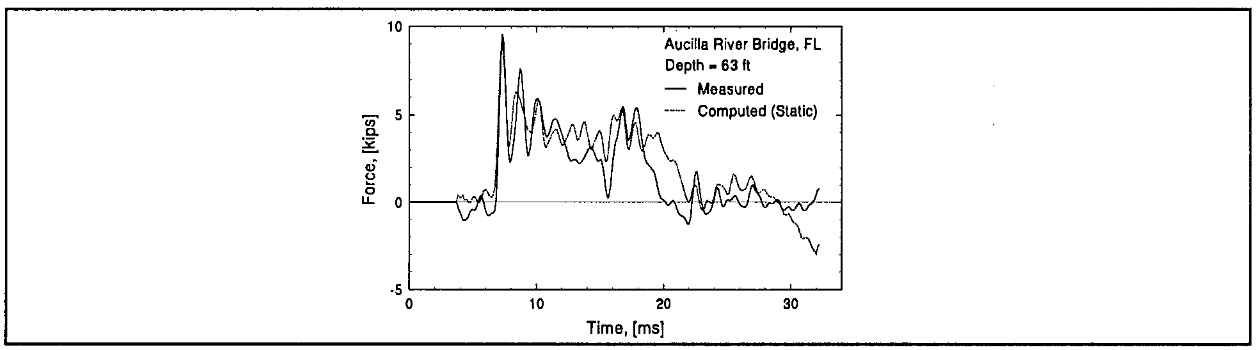


Figure D.64c: Bottom Force Time History (Static) for Aucilla River, FL at depth of 63 ft

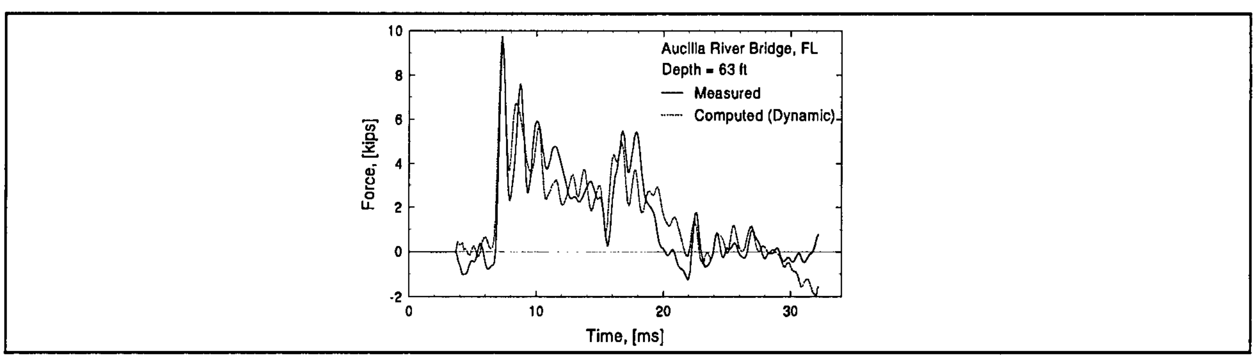


Figure D.64d: Bottom Force Time History (Dynamic) for Aucilla River, FL at depth of 63 ft

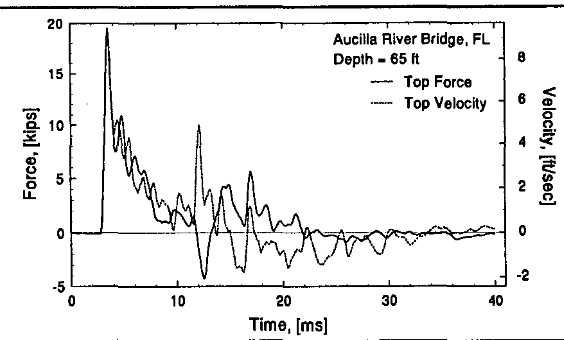


Figure D.65a: Top F-V Time History for Aucilla River Bridge, FL at depth of 65 ft

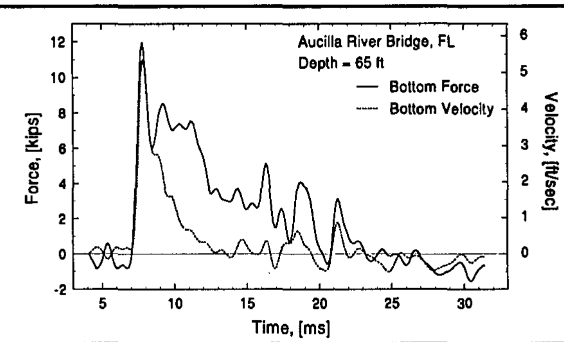


Figure D.65b: Bottom F-V Time History for Aucilla River Bridge, FL at depth of 65 ft

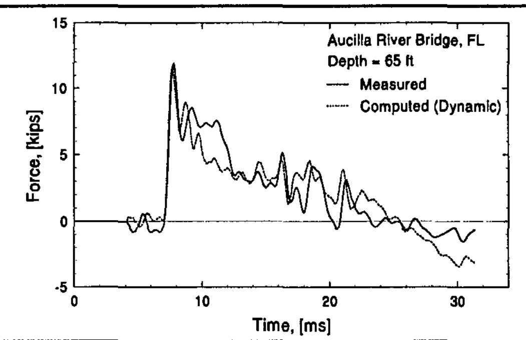


Figure D.65c: Bottom Force Time History (Dynamic) for Aucilla River, FL at depth of 65 ft

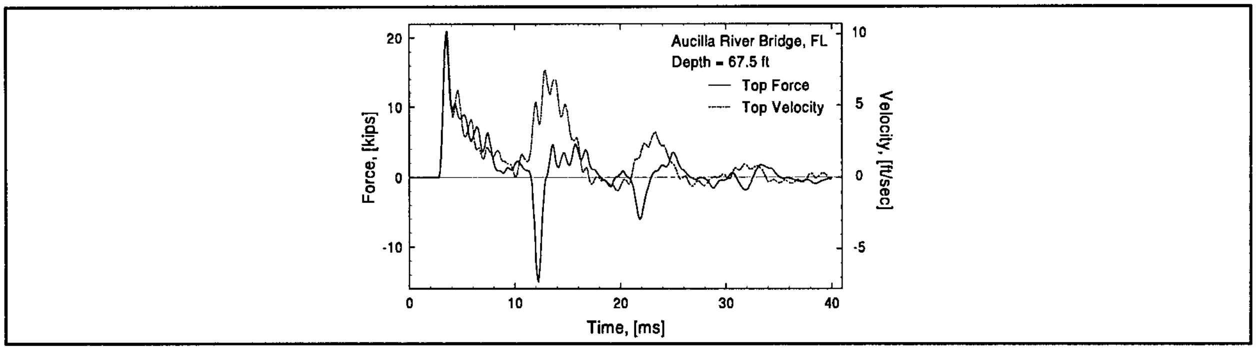


Figure D.66a: Top F-V Time History for Aucilla River Bridge, FL at depth of 67.5 ft

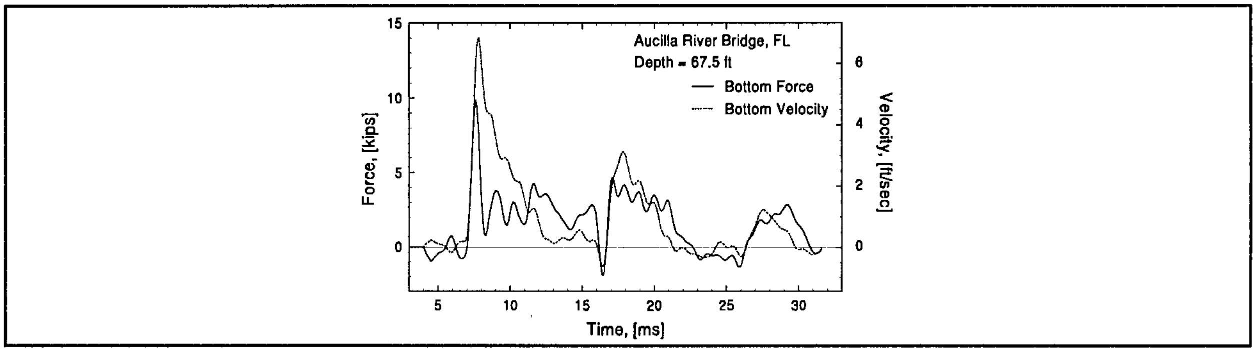


Figure D.66b: Bottom F-V Time History for Aucilla River Bridge, FL at depth of 67.5 ft

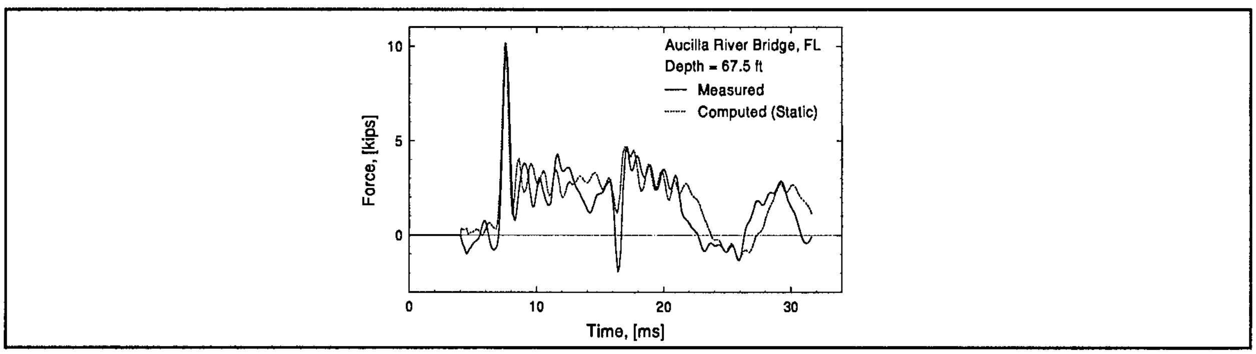


Figure D.66c: Bottom Force Time History (Static) for Aucilla River, FL at depth of 67.5 ft

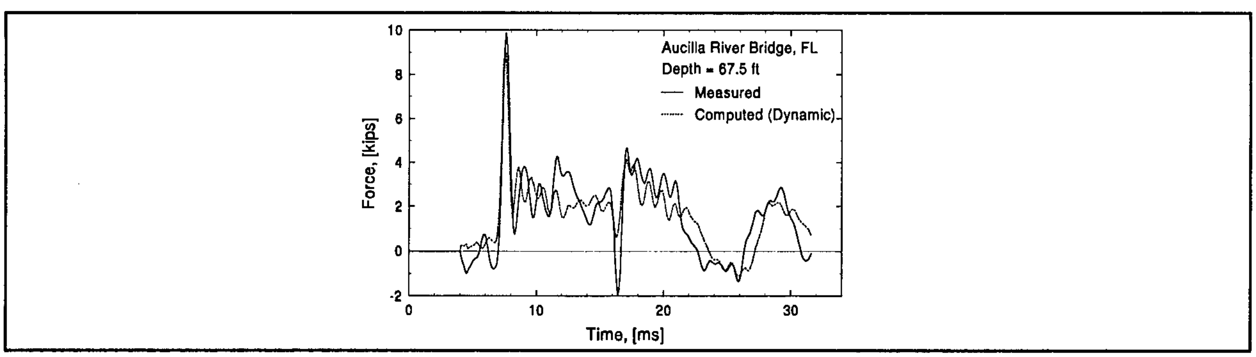


Figure D.66d: Bottom Force Time History (Dynamic) for Aucilla River, FL at depth of 67.5 ft

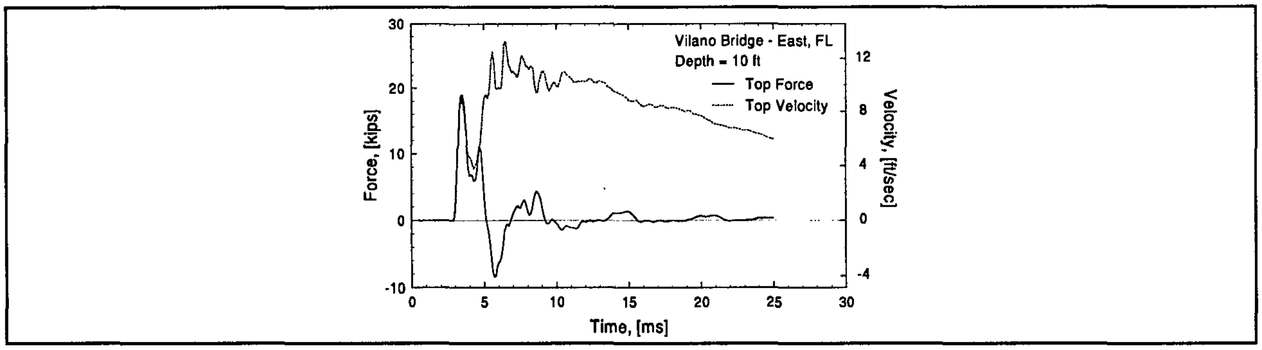


Figure D.67a: Top F-V Time History for Vilano Bridge - East, FL at depth of 10 ft

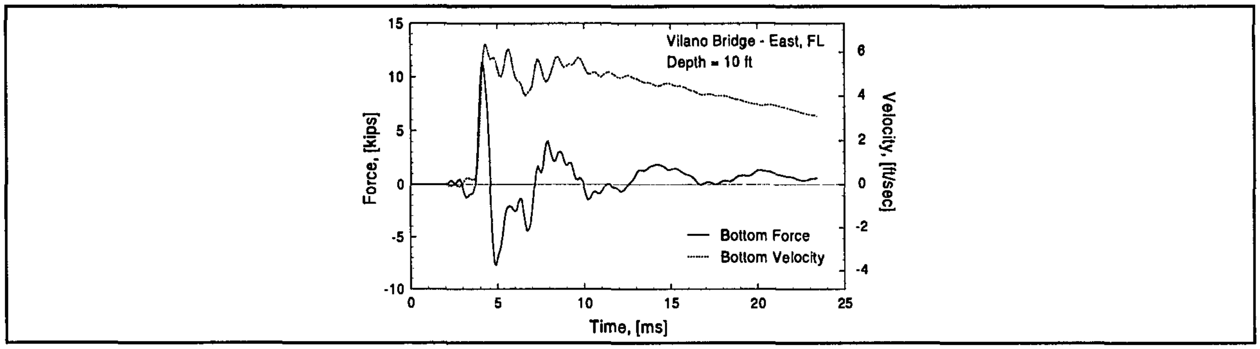


Figure D.67b: Bottom F-V Time History for Vilano Bridge - East, FL at depth of 10 ft

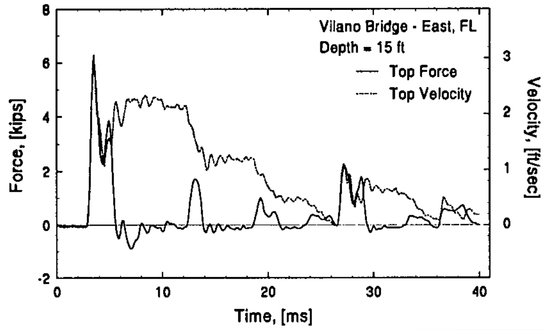


Figure D.68a: Top F-V Time History for Vilano Bridge - East, FL at depth of 15 ft (Tip)

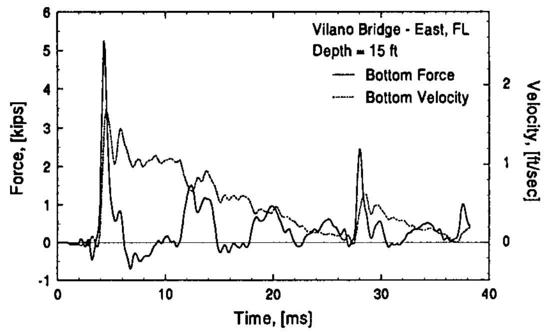


Figure D.68b: Bottom F-V Time History for Vilano Bridge - East, FL at depth of 15 ft (Tip)

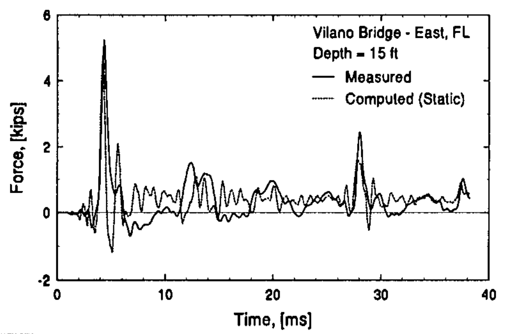


Figure D.68c: Bottom Force Time History (Static) for Vilano - East, FL at depth of 15 ft (Tip)

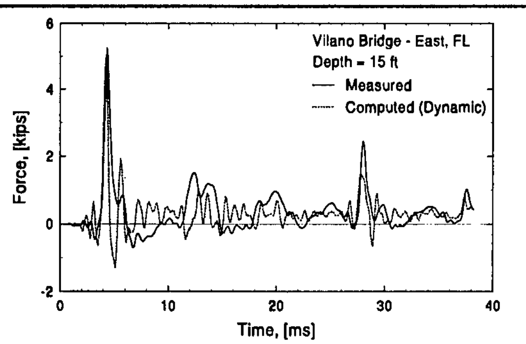


Figure D.68d: Bottom Force Time History (Dynamic) for Vilano - East at depth of 15 ft (Tip)

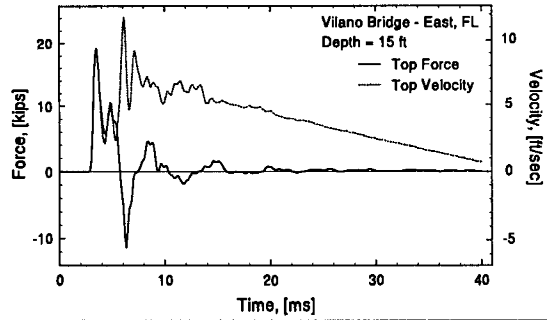


Figure D.69a: Top F-V Time History for Vilano Bridge - East, FL at depth of 15 ft

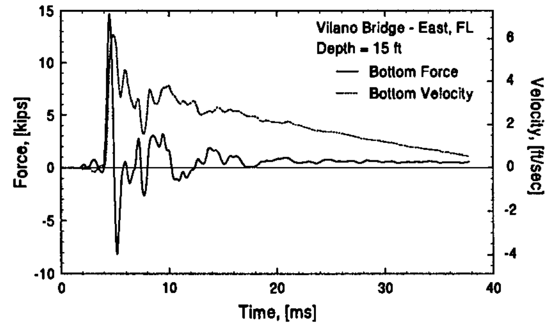


Figure D.69b: Bottom F-V Time History for Vilano Bridge - East, FL at depth of 15 ft

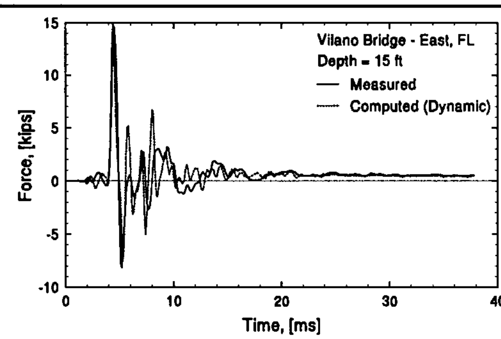


Figure D.69c: Bottom Force Time History (Dynamic) for Vilano - East, FL at depth of 15 ft

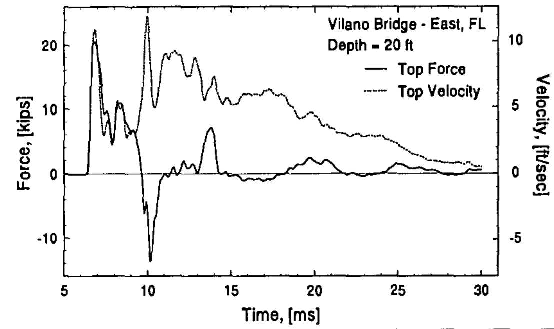


Figure D.70a: Top F-V Time History for Vilano Bridge - East, FL at depth of 20 ft

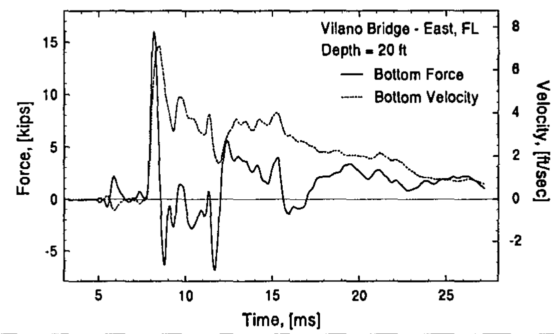


Figure D.70b: Bottom F-V Time History for Vilano Bridge - East, FL at depth of 20 ft

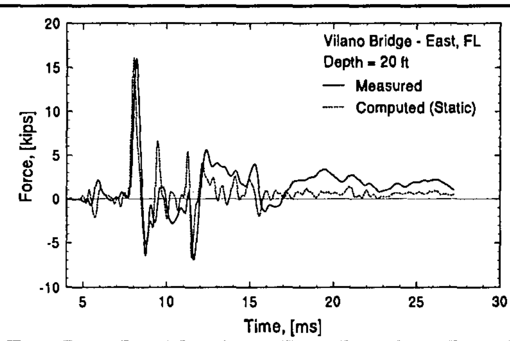


Figure D.70c: Bottom Force Time History (Static) for Vilano - East, FL at depth of 20 ft

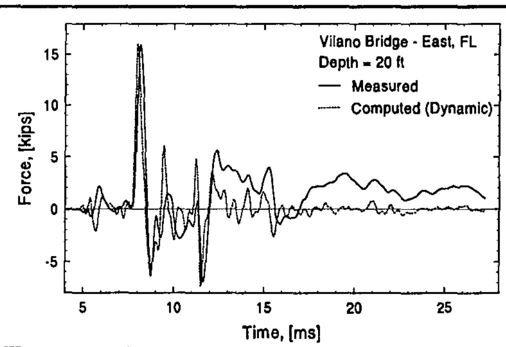


Figure D.70d: Bottom Force Time History (Dynamic) for Vilano - East, FL at depth of 20 ft

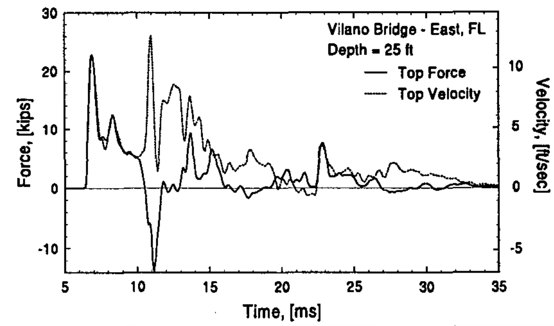


Figure D.71a: Top F-V Time History for Vilano Bridge - East, FL at depth of 25 ft (Tip)

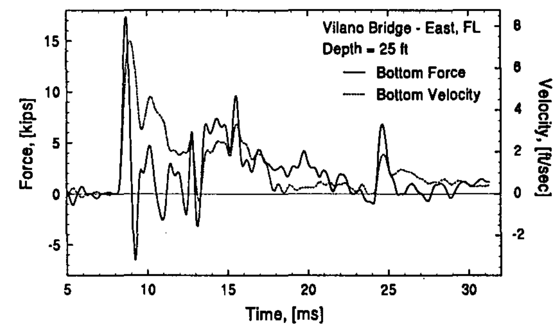


Figure D.71b: Bottom F-V Time History for Vilano Bridge - East, FL at depth of 25 ft (Tip)

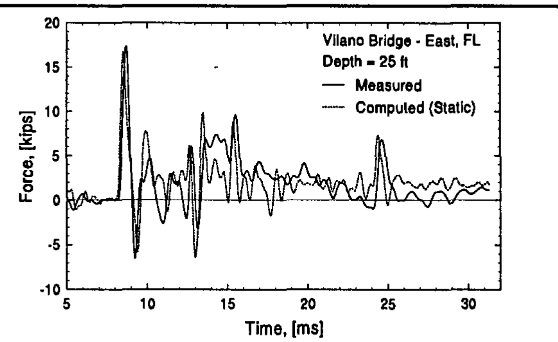


Figure D.71c: Bottom Force Time History (Static) for Vilano - East, FL at depth of 25 ft (Tip)

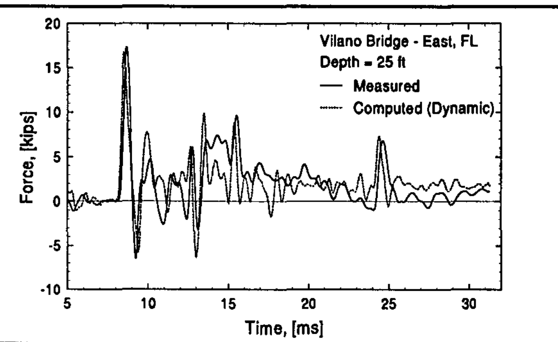


Figure D.71d: Bottom Force Time History (Dynamic) for Vilano - East at depth of 25 ft (Tip)

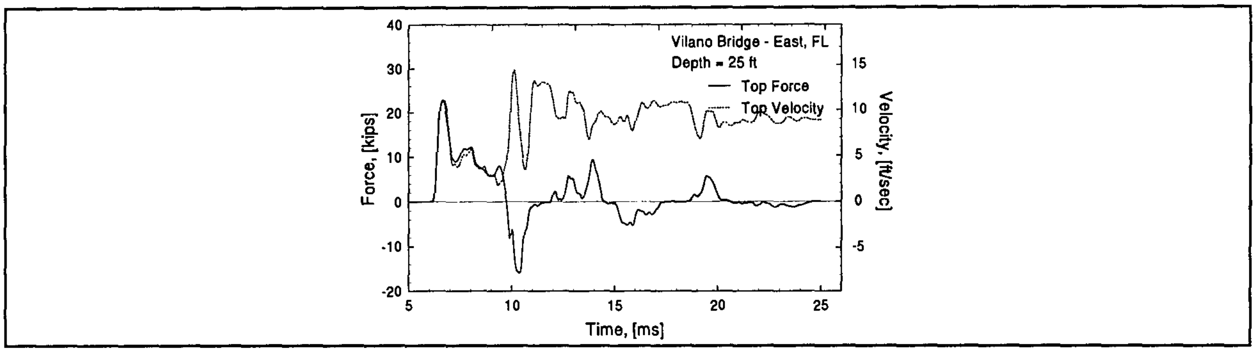


Figure D.72a: Top F-V Time History for Vilano Bridge - East, FL at depth of 25 ft

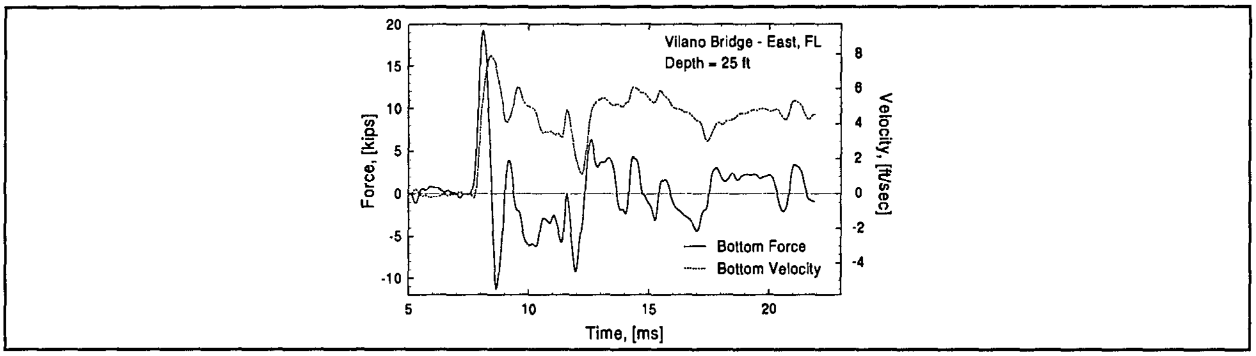


Figure D.72b: Bottom F-V Time History for Vilano Bridge - East, FL at depth of 25 ft

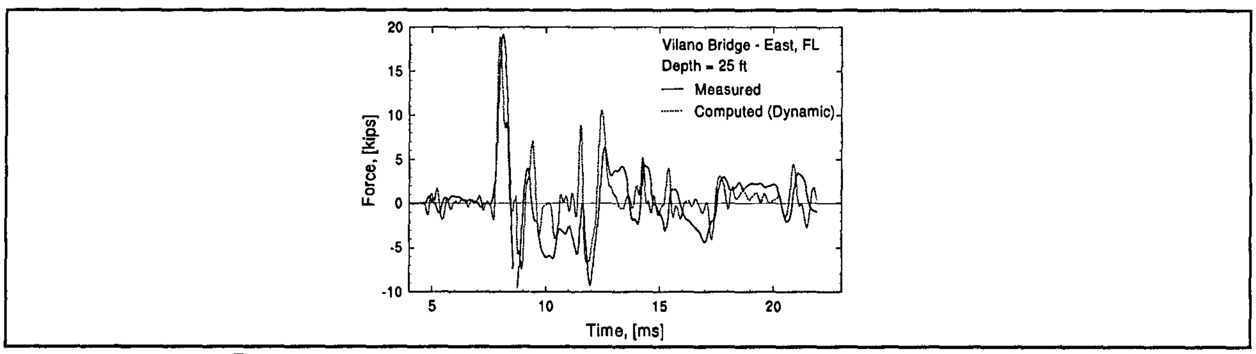


Figure D.72c: Bottom Force Time History (Dynamic) for Vilano - East, FL at depth of 25 ft

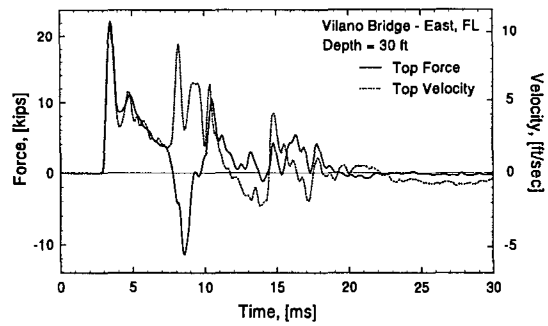


Figure D.73a: Top F-V Time History for Vilano Bridge - East, FL at depth of 30 ft (Tip)

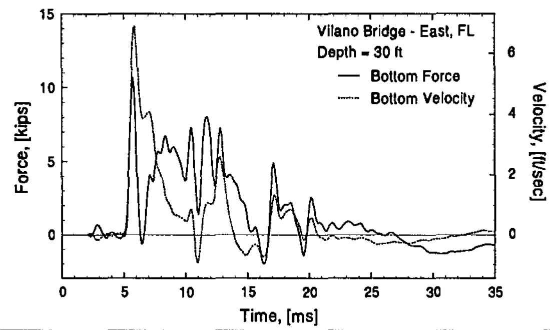


Figure D.73b: Bottom F-V Time History for Vilano Bridge - East, FL at depth of 30 ft (Tip)

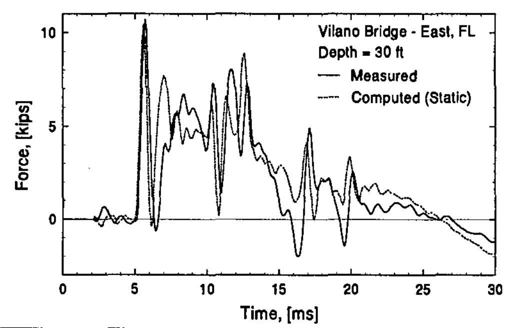


Figure D.73c: Bottom Force Time History (Static) for Vilano - East, FL at depth of 30 ft (Tip)

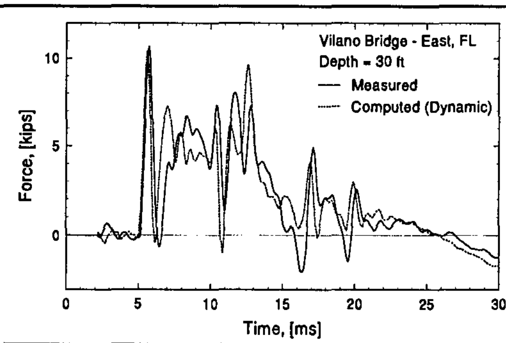


Figure D.73d: Bottom Force Time History (Dynamic) for Vilano - East at depth of 30 ft (Tip)

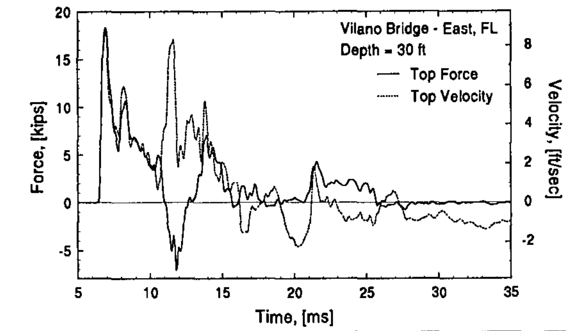


Figure D.74a: Top F-V Time History for Vilano Bridge - East, FL at depth of 30 ft

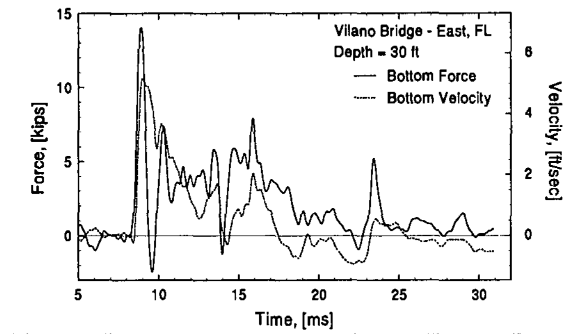


Figure D.74b: Bottom F-V Time History for Vilano Bridge - East, FL at depth of 30 ft

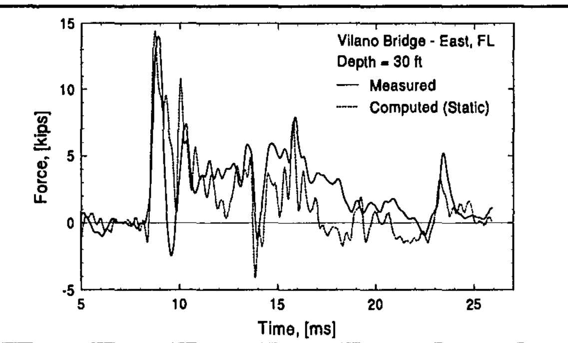


Figure D.74c: Bottom Force Time History (Static) for Vilano - East, FL at depth of 30 ft

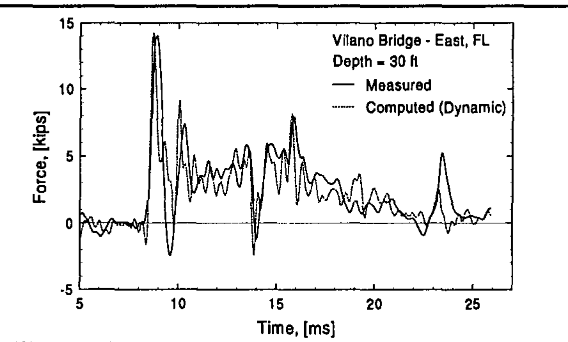


Figure D.74d: Bottom Force Time History (Dynamic) for Vilano - East, FL at depth of 30 ft

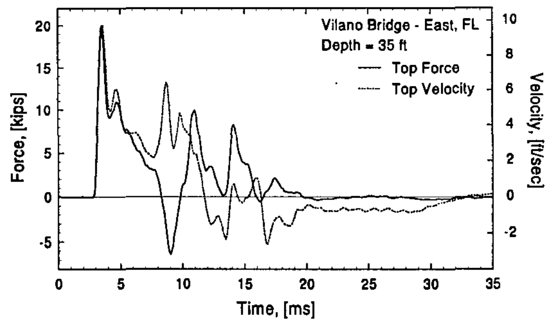


Figure D.75a: Top F-V Time History for Vilano Bridge - East, FL at depth of 35 ft (Tip)

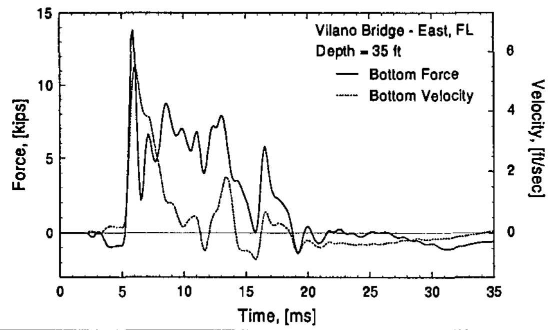


Figure D.75b: Bottom F-V Time History for Vilano Bridge - East, FL at depth of 35 ft (Tip)

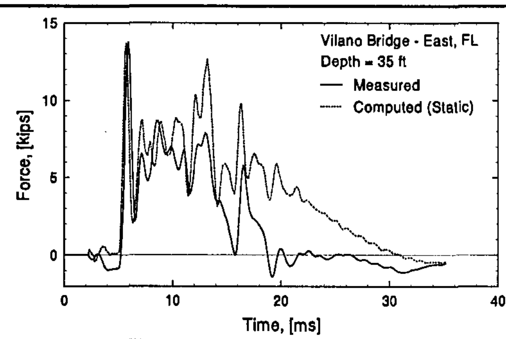


Figure D.75c: Bottom Force Time History (Static) for Vilano - East, FL at depth of 35 ft (Tip)

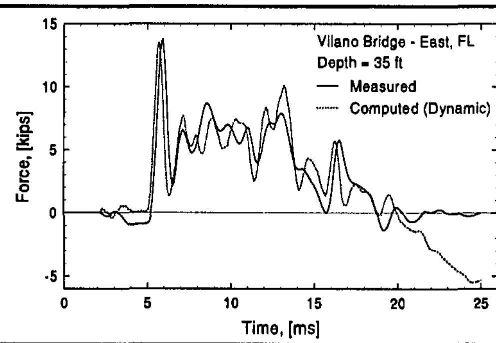


Figure D.75d: Bottom Force Time History (Dynamic) for Vilano - East at depth of 35 ft (Tip)

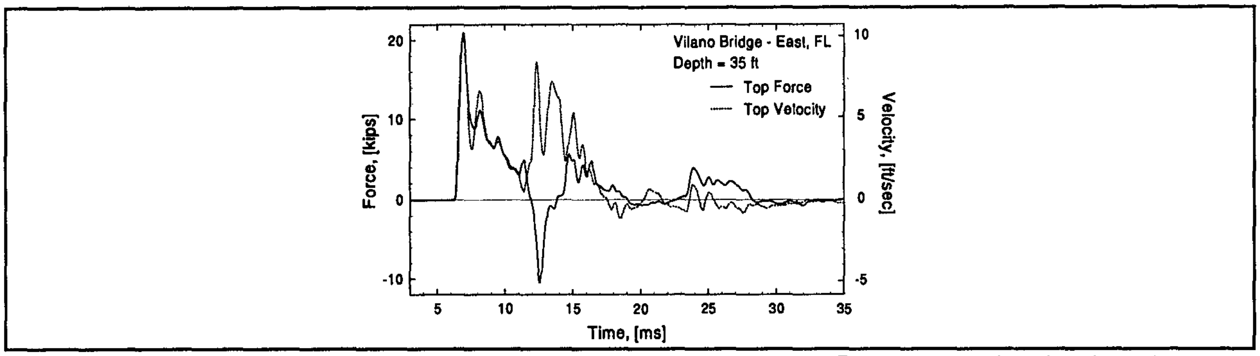


Figure D.76a: Top F-V Time History for Vilano Bridge - East, FL at depth of 35 ft

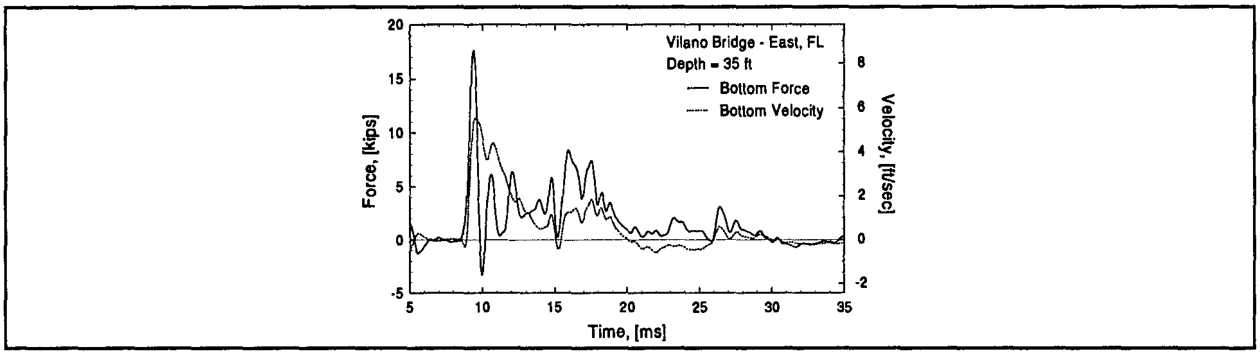


Figure D.76b: Bottom F-V Time History for Vilano Bridge - East, FL at depth of 35 ft

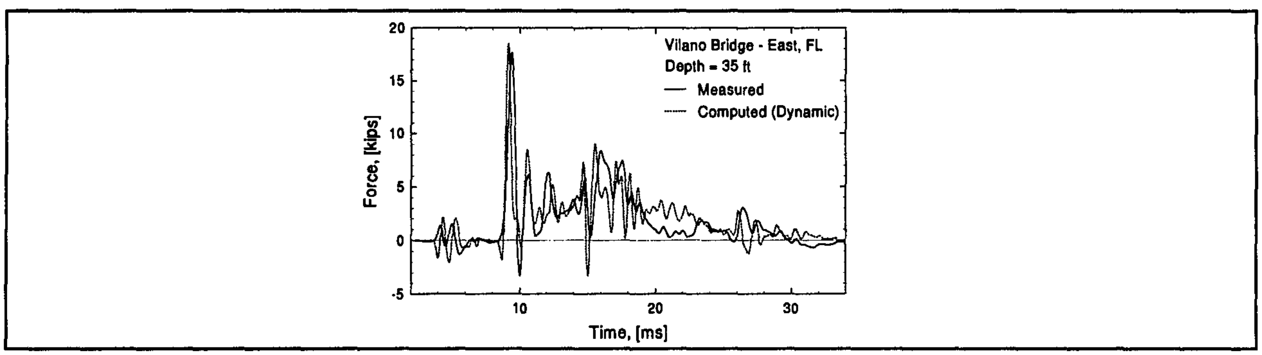


Figure D.76c: Bottom Force Time History (Dynamic) for Vilano - East, FL at depth of 35 ft

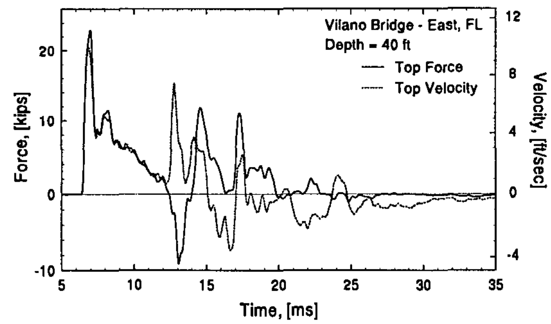


Figure D.77a: Top F-V Time History for Vilano Bridge - East, FL at depth of 40 ft

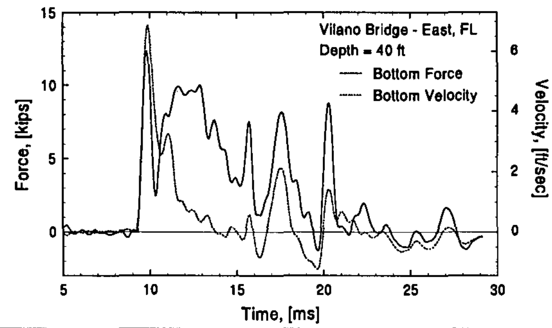


Figure D.77b: Bottom F-V Time History for Vilano Bridge - East, FL at depth of 40 ft

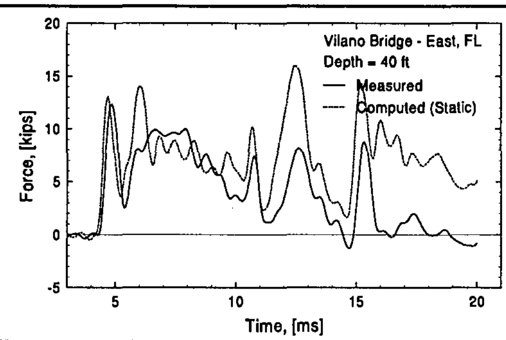


Figure D.77c: Bottom Force Time History (Static) for Vilano - East, FL at depth of 40 ft

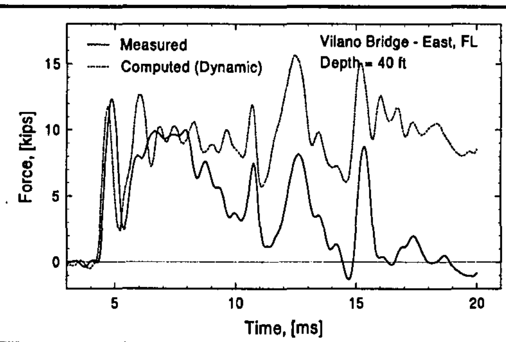


Figure D.77d: Bottom Force Time History (Dynamic) for Vilano - East, FL at depth of 40 ft

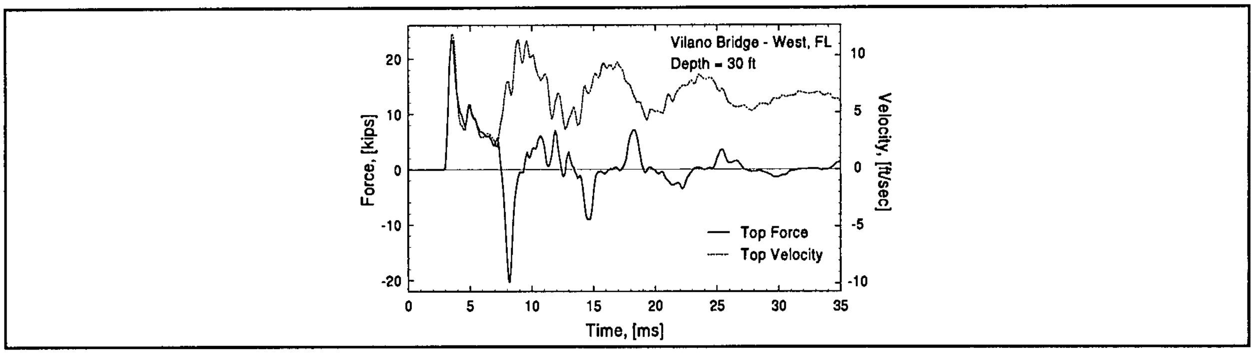


Figure D.78a: Top F-V Time History for Vilano Bridge - West, FL at depth of 30 ft

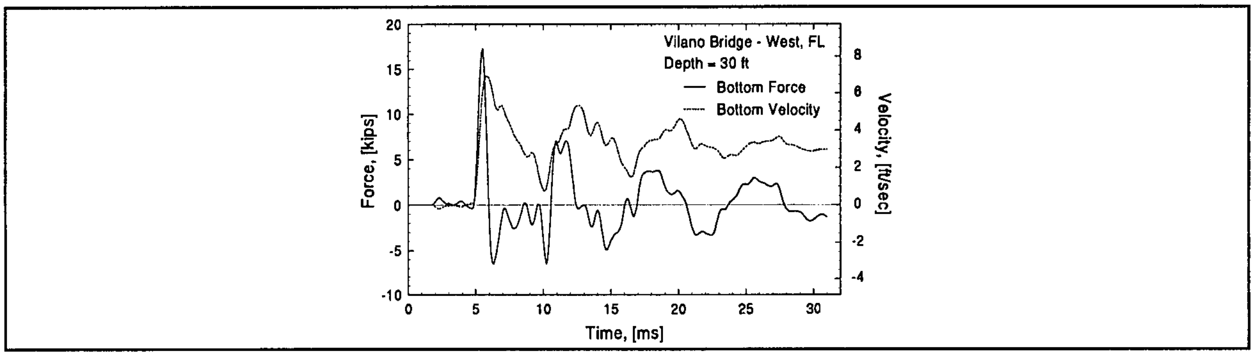


Figure D.78b: Bottom F-V Time History for Vilano Bridge - West, FL at depth of 30 ft

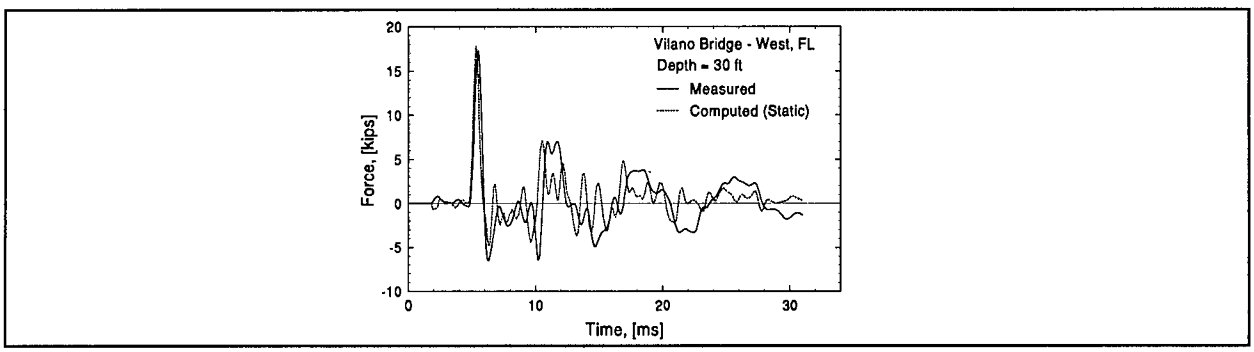


Figure D.78c: Bottom Force Time History (Static) for Vilano - West, FL at depth of 30 ft

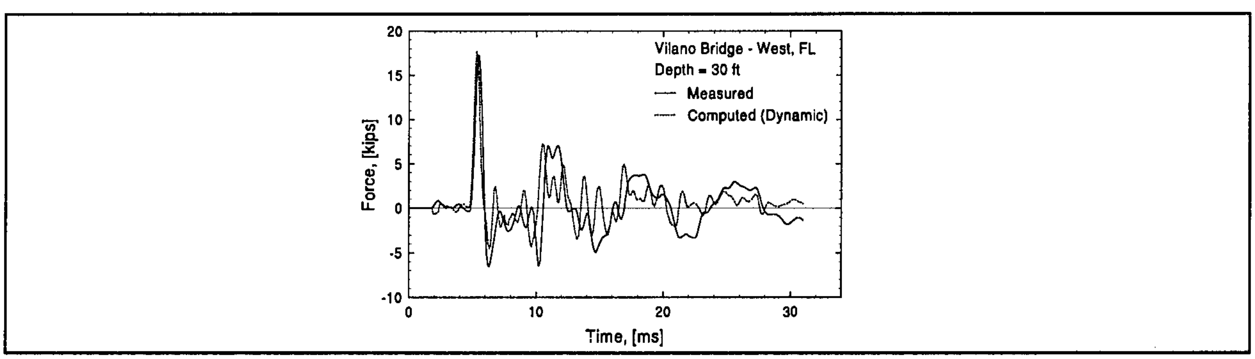


Figure D.78d: Bottom Force Time History (Dynamic) for Vilano - West, FL at depth of 30 ft

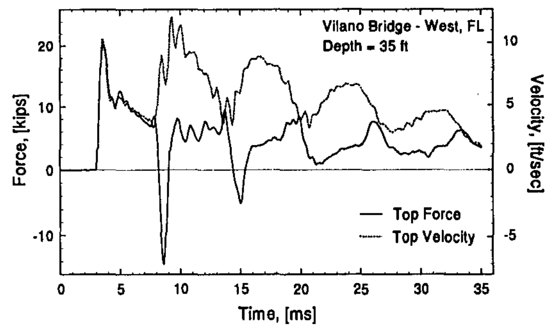


Figure D.79a: Top F-V Time History for Vilano Bridge - West, FL at depth of 35 ft

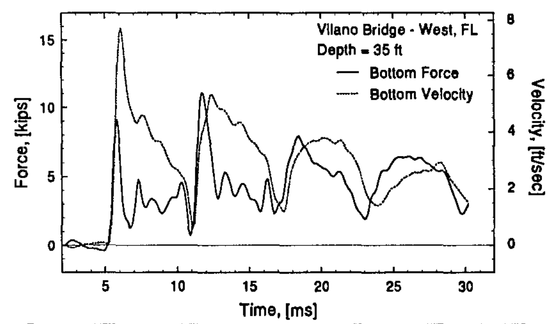


Figure D.79b: Bottom F-V Time History for Vilano Bridge - West, FL at depth of 35 ft

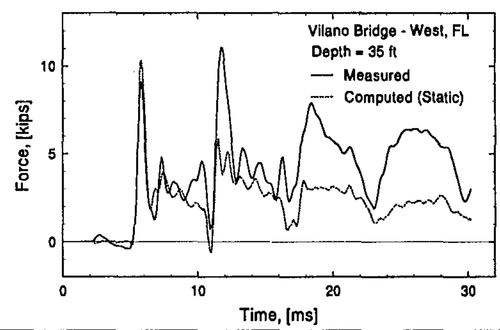


Figure D.79c: Bottom Force Time History (Static) for Vilano - West, FL at depth of 35 ft

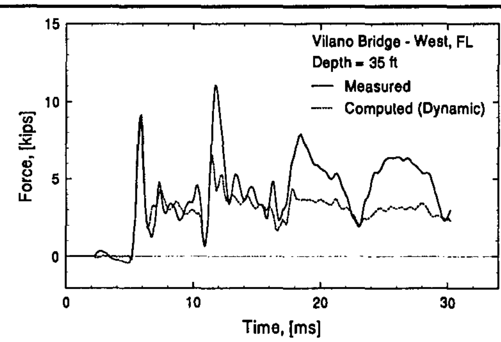


Figure D.79d: Bottom Force Time History (Dynamic) for Vilano - West, FL at depth of 35 ft

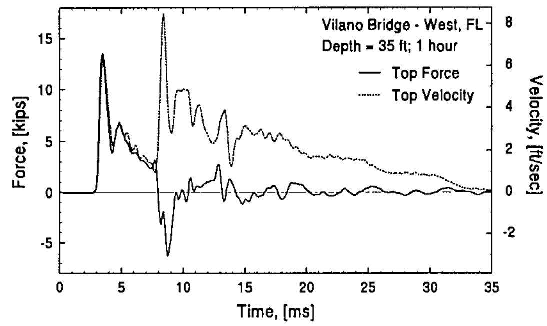


Figure D.80a: Top F-V Time History for Vilano Bridge - West, FL at depth of 35 ft (1 h)

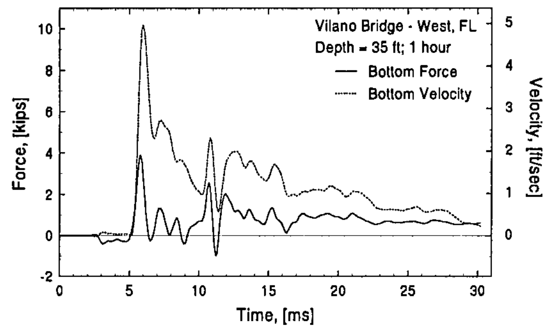


Figure D.80b: Bottom F-V Time History for Vilano Bridge - West, FL at depth of 35 ft (1 h)

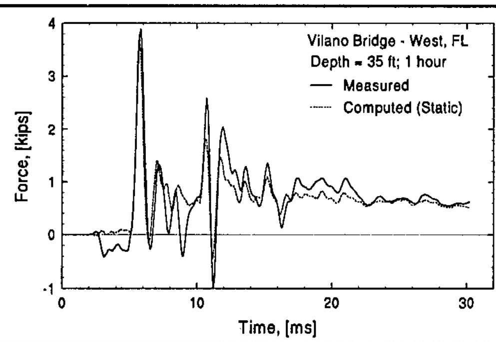


Figure D.80c: Bottom Force Time History (Static) for Vilano - West, FL at depth of 35 ft (1 h)

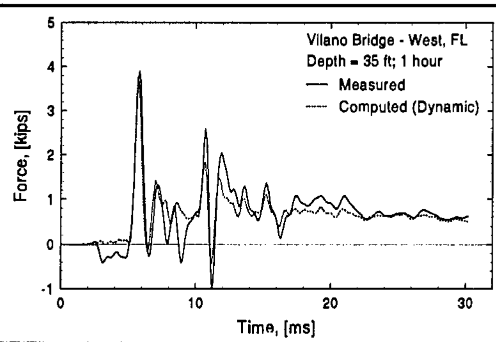


Figure D.80d: Bottom Force Time History (Dynamic) for Vilano - West at depth of 35 ft (1 h)

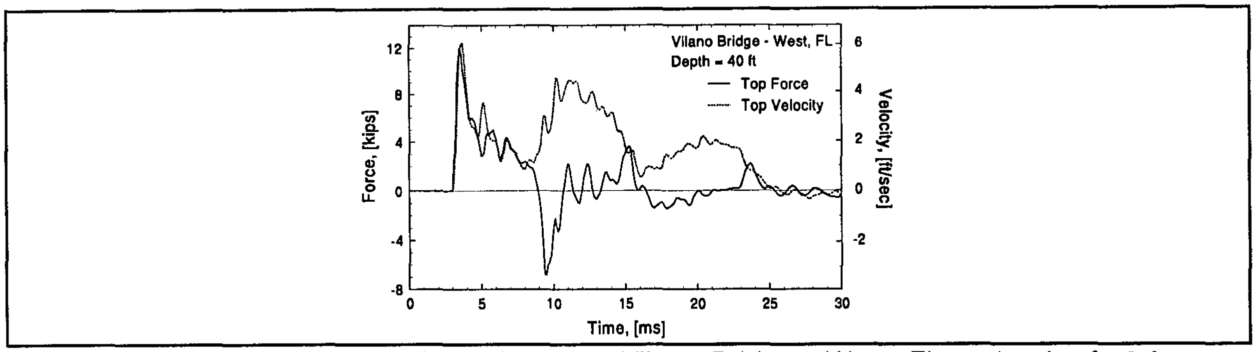


Figure D.81a: Top F-V Time History for Vilano Bridge - West, FL at depth of 40 ft

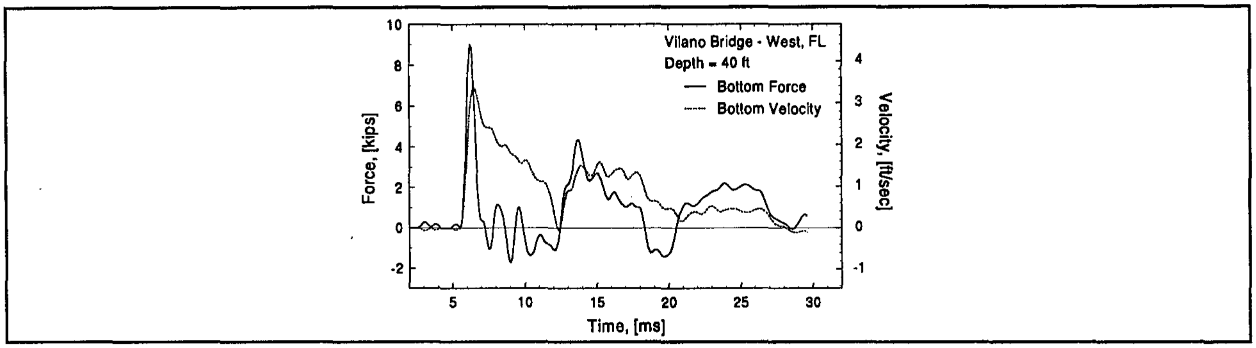


Figure D.81b: Bottom F-V Time History for Vilano Bridge - West, FL at depth of 40 ft

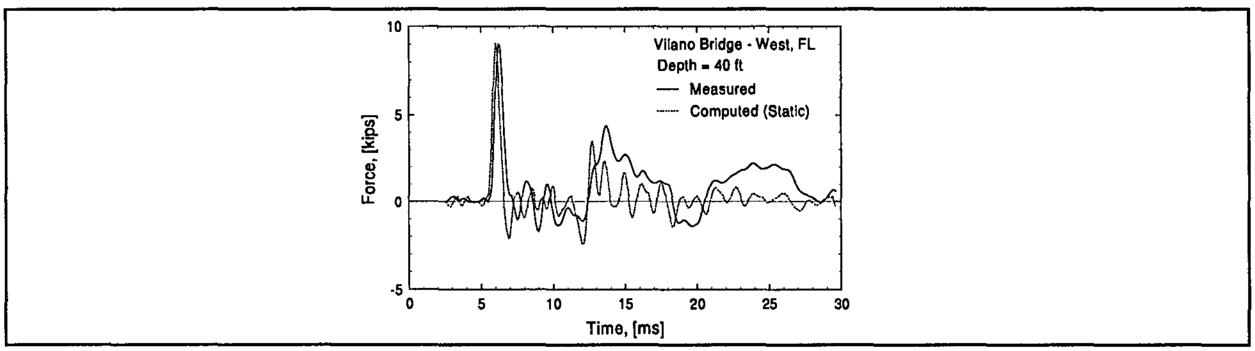


Figure D.81c: Bottom Force Time History (Static) for Vilano - West, FL at depth of 40 ft

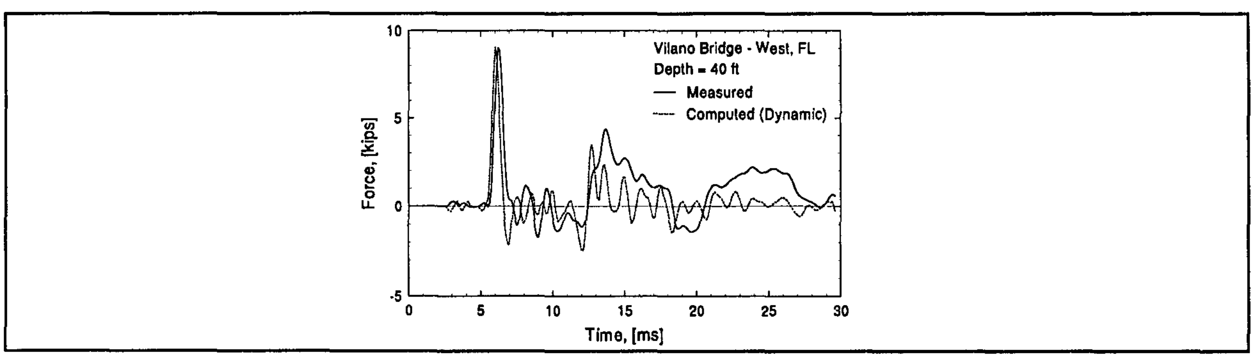


Figure D.81d: Bottom Force Time History (Dynamic) for Vilano - West, FL at depth of 40 ft

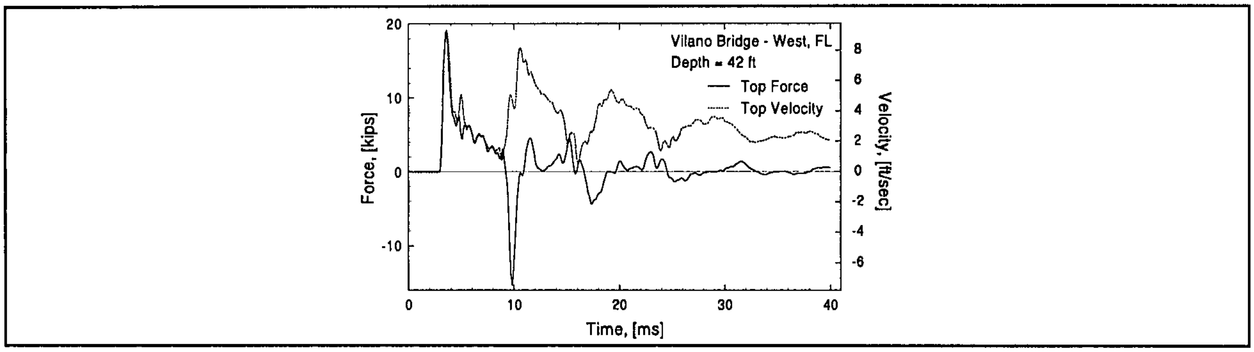


Figure D.82a: Top F-V Time History for Vilano Bridge - West, FL at depth of 42 ft

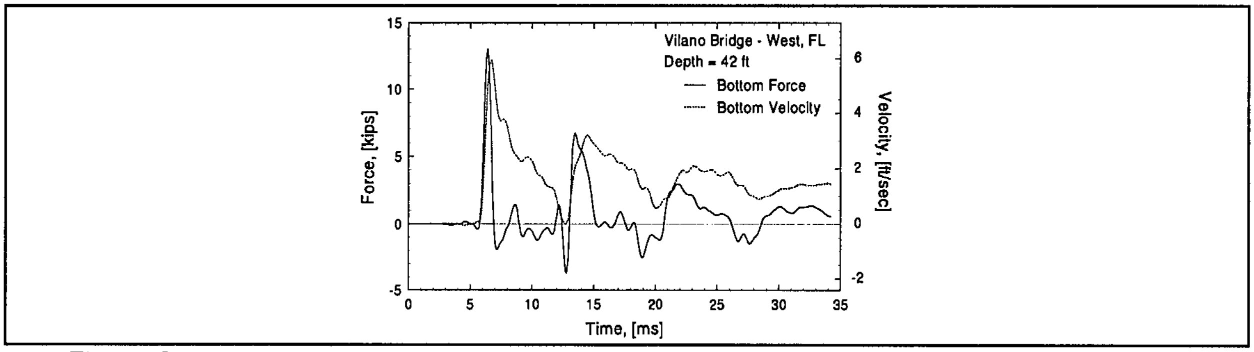


Figure D.82b: Bottom F-V Time History for Vilano Bridge - West, FL at depth of 42 ft

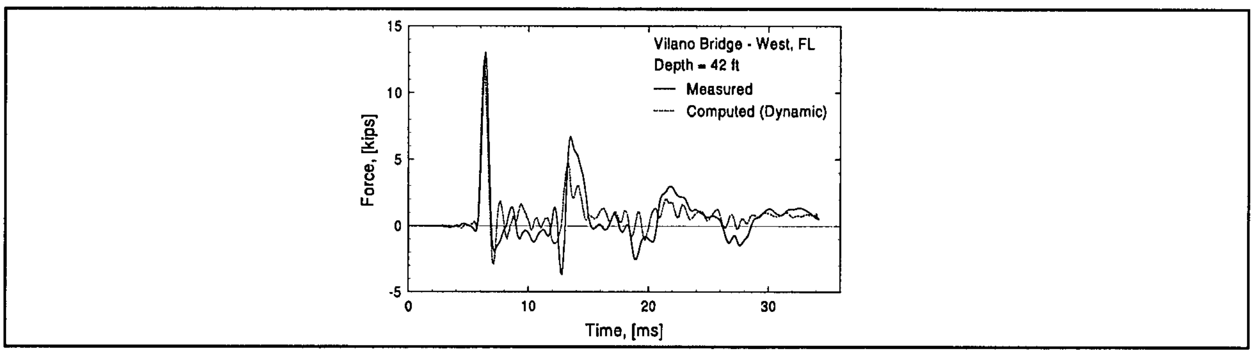


Figure D.82c: Bottom Force Time History (Dynamic) for Vilano - West, FL at depth of 42 ft

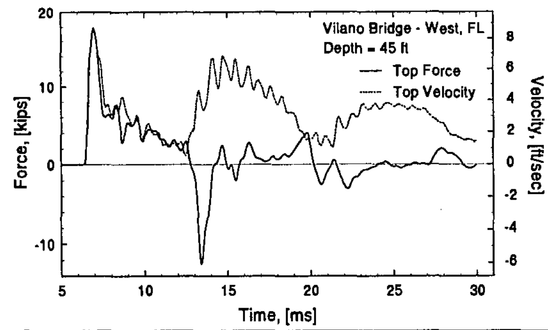


Figure D.83a: Top F-V Time History for Vilano Bridge - West, FL at depth of 45 ft

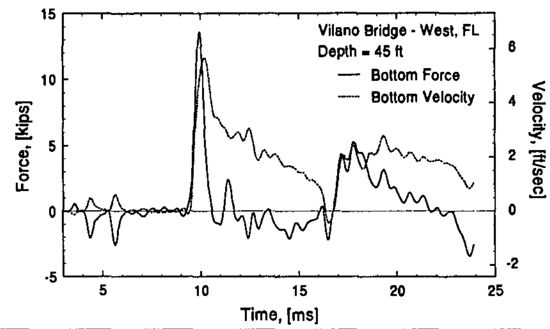


Figure D.83b: Bottom F-V Time History for Vilano Bridge - West, FL at depth of 45 ft

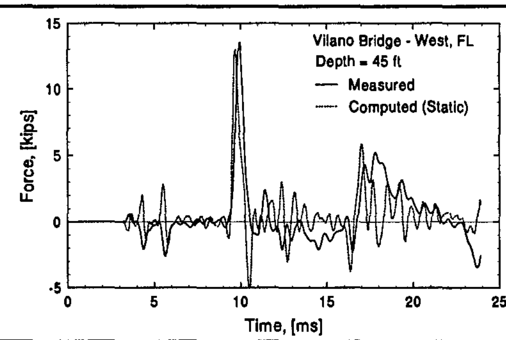


Figure D.83c: Bottom Force Time History (Static) for Vilano - West, FL at depth of 45 ft

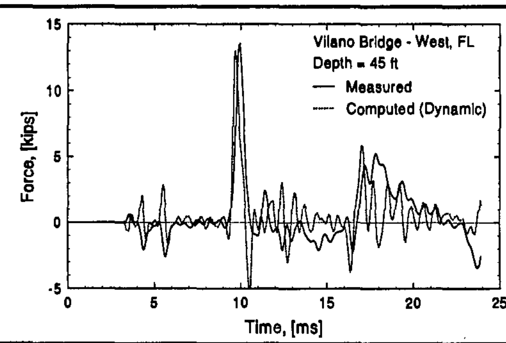


Figure D.83d: Bottom Force Time History (Dynamic) for Vilano - West, FL at depth of 45 ft

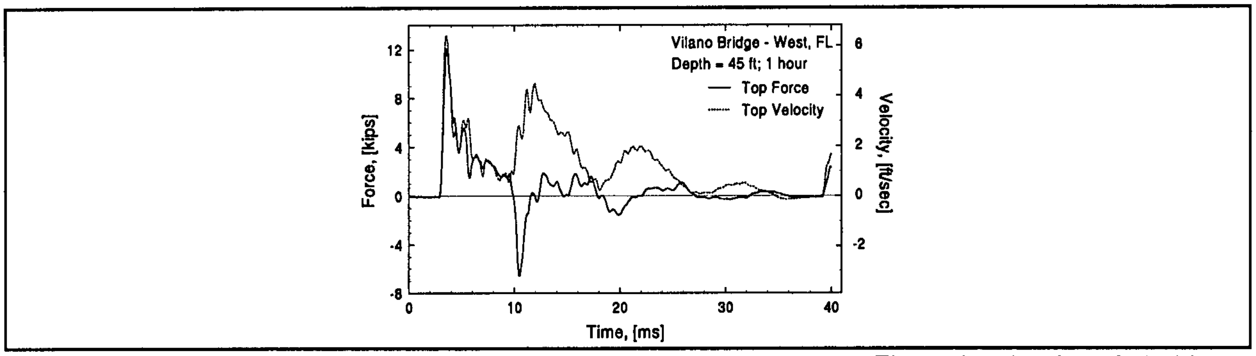


Figure D.84a: Top F-V Time History for Vilano Bridge - West, FL at depth of 45 ft (1 h)

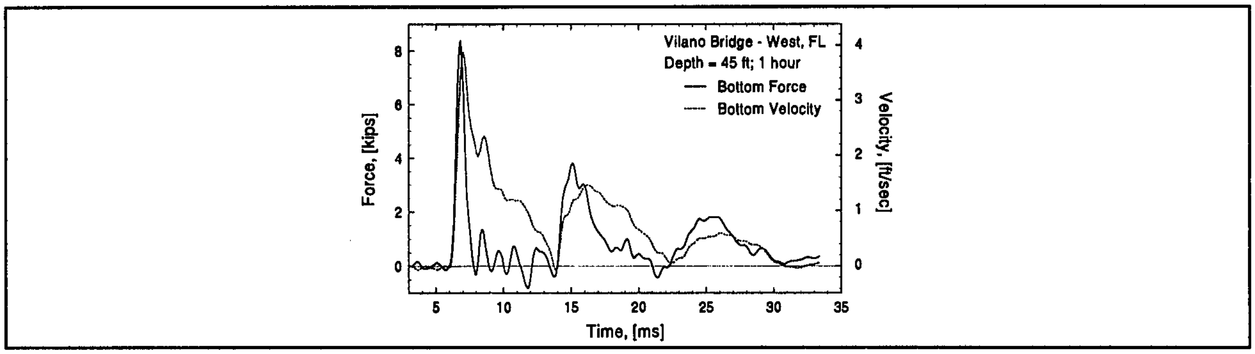


Figure D.84b: Bottom F-V Time History for Vilano Bridge - West, FL at depth of 45 ft (1 h)

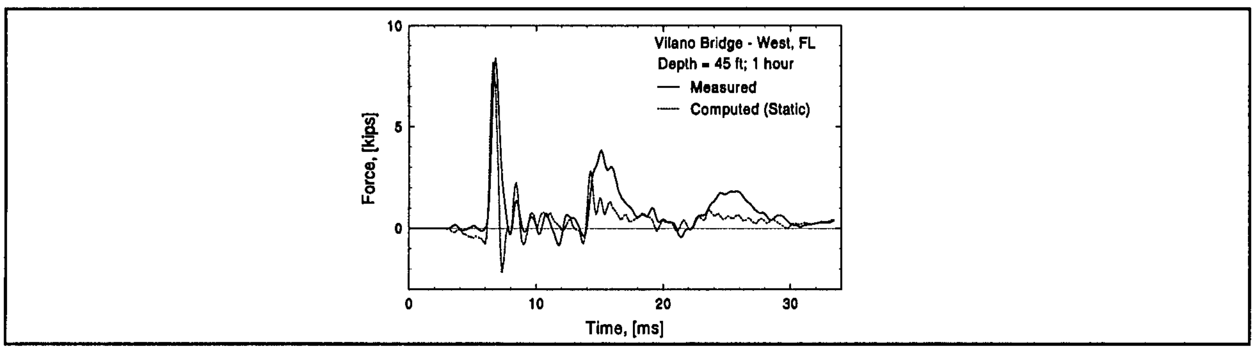


Figure D.84c: Bottom Force Time History (Static) for Vilano - West, FL at depth of 45 ft (1 h)

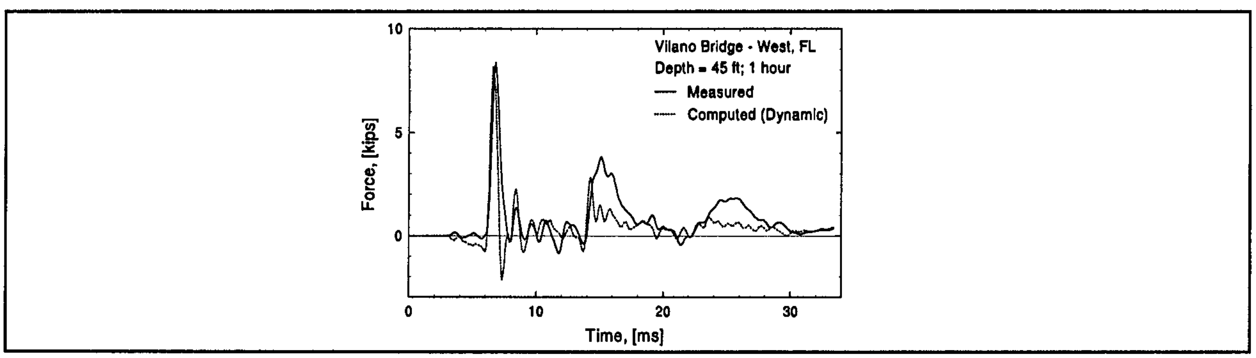


Figure D.84d: Bottom Force Time History (Dynamic) for Vilano - West at depth of 45 ft (1 h)

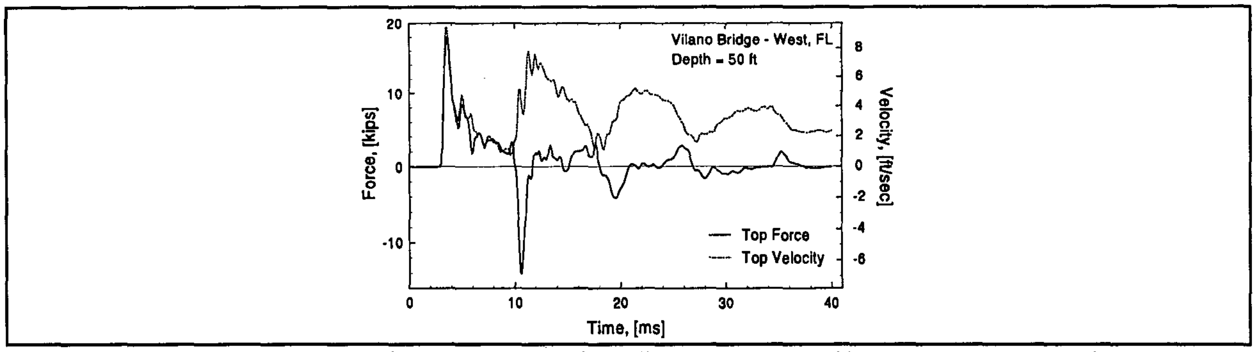


Figure D.85a: Top F-V Time History for Vilano Bridge - West, FL at depth of 50 ft

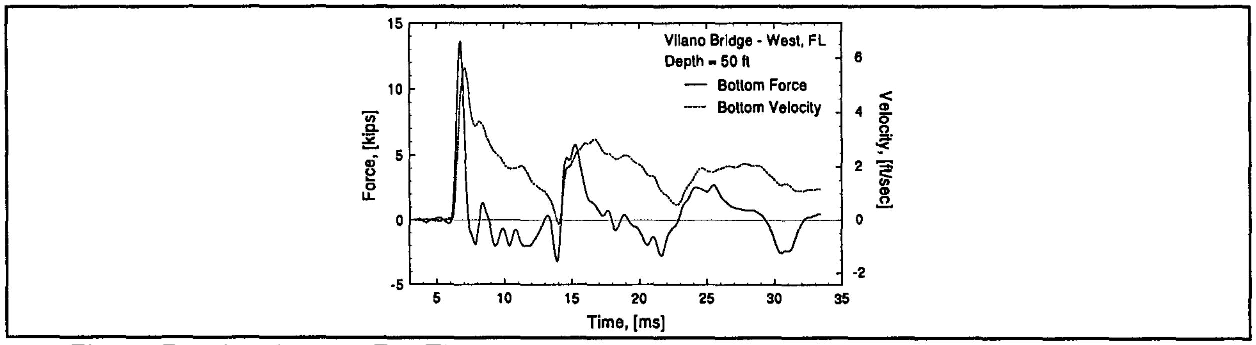


Figure D.85b: Bottom F-V Time History for Vilano Bridge - West, FL at depth of 50 ft

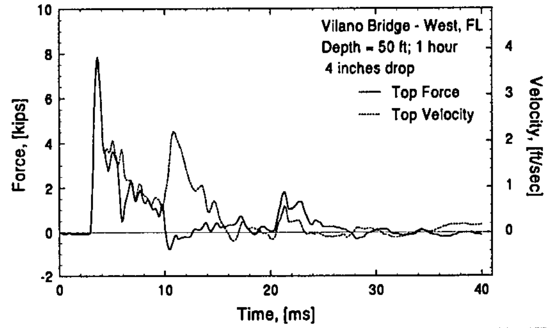


Figure D.86a: Top F-V Time History for Vilano Bridge - West, FL at depth of 50 ft (1 h)

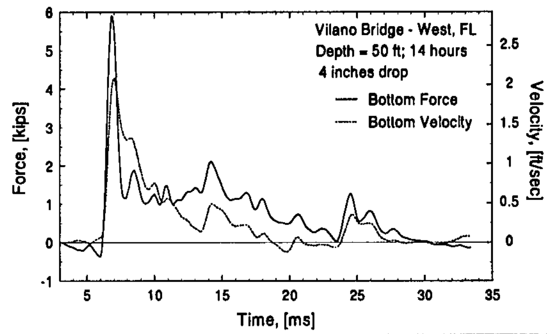


Figure D.86b: Bottom F-V Time History for Vilano Bridge - West, FL at depth of 50 ft (1 h)

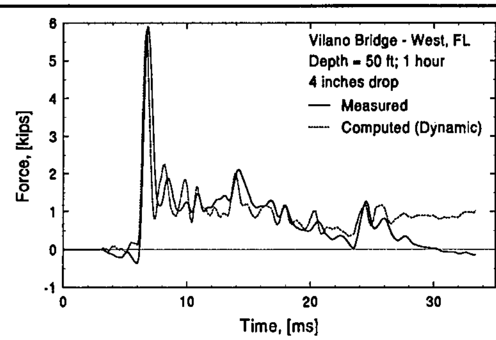


Figure D.86c: Bottom Force Time History (Dynamic) for Vilano - West at depth of 50 ft (1 h)

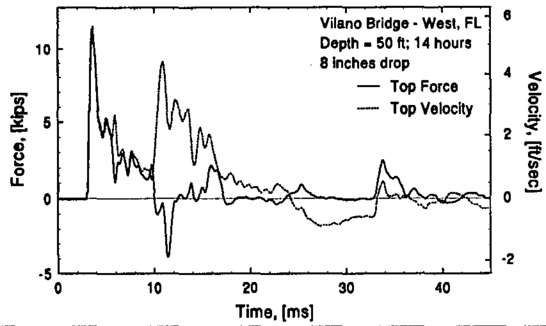


Figure D.87a: Top F-V Time History for Vilano Bridge - West, FL at depth of 50 ft (14 h)

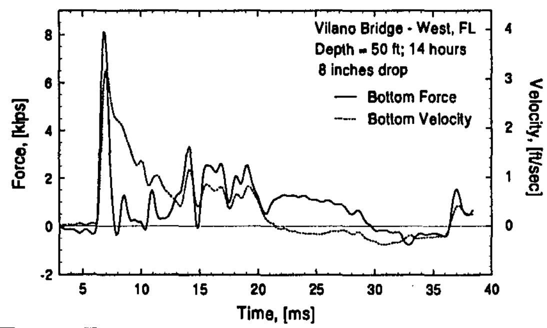


Figure D.87b: Bottom F-V Time History for Vilano Bridge - West, FL at depth of 50 ft (14 h)

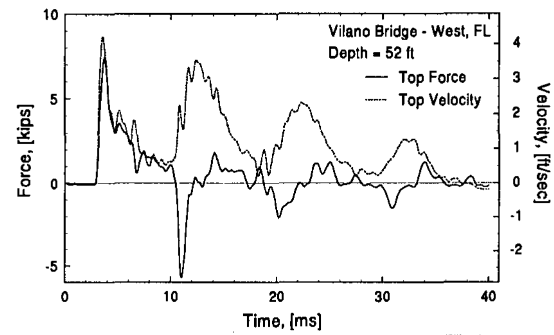


Figure D.88a: Top F-V Time History for Vilano Bridge - West, FL at depth of 52 ft

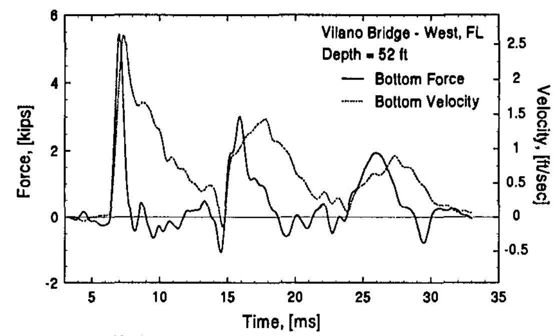


Figure D.88b: Bottom F-V Time History for Vilano Bridge - West, FL at depth of 52 ft

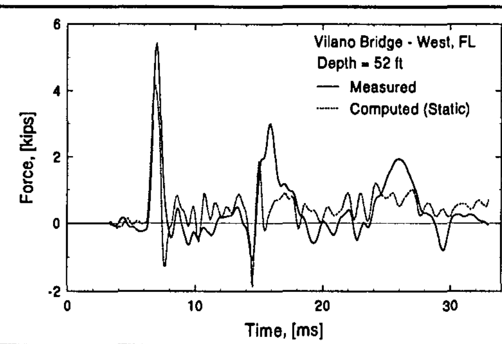


Figure D.88c: Bottom Force Time History (Static) for Vilano - West, FL at depth of 52 ft

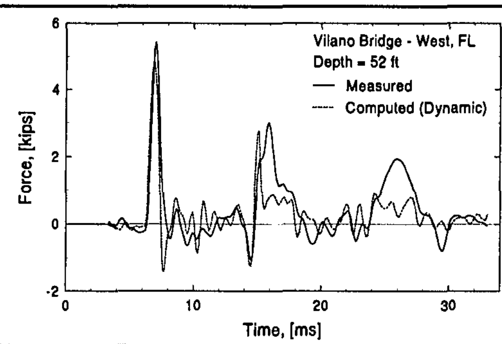


Figure D.88d: Bottom Force Time History (Dynamic) for Vilano - West, FL at depth of 52 ft

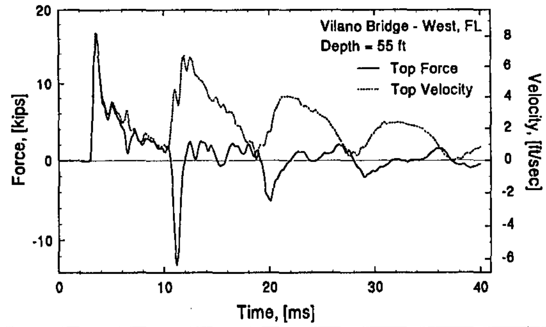


Figure D.89a: Top F-V Time History for Vilano Bridge - West, FL at depth of 55 ft

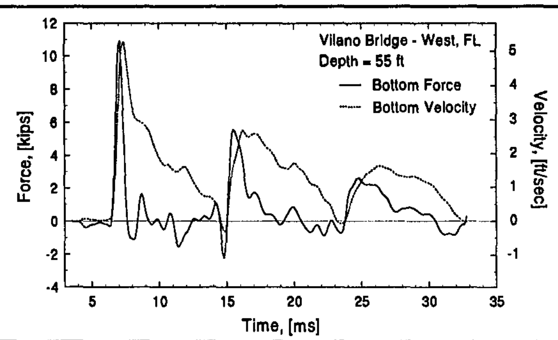


Figure D.89b: Bottom F-V Time History for Vilano Bridge - West, FL at depth of 55 ft

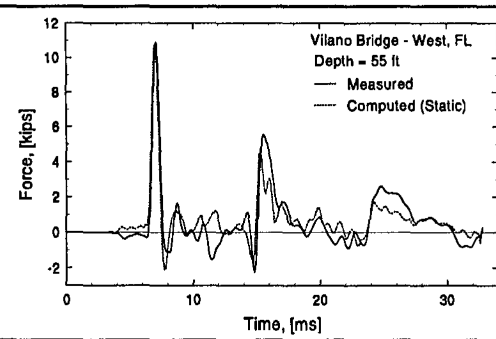


Figure D.89c: Bottom Force Time History (Static) for Vilano - West, FL at depth of 55 ft

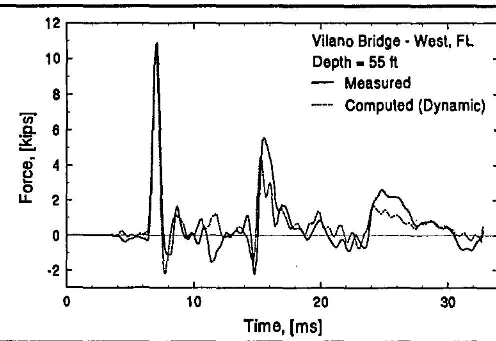


Figure D.89d: Bottom Force Time History (Dynamic) for Vilano - West, FL at depth of 55 ft

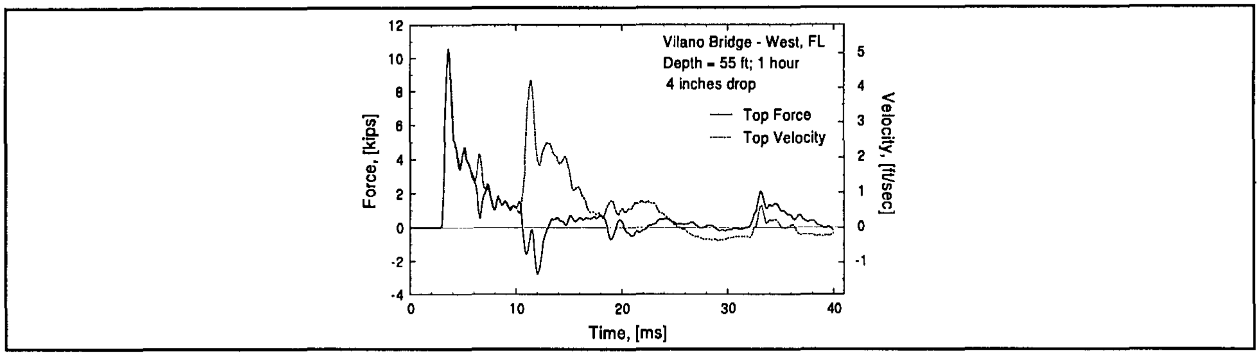


Figure D.90a: Top F-V Time History for Vilano Bridge - West, FL at depth of 55 ft (1 h)

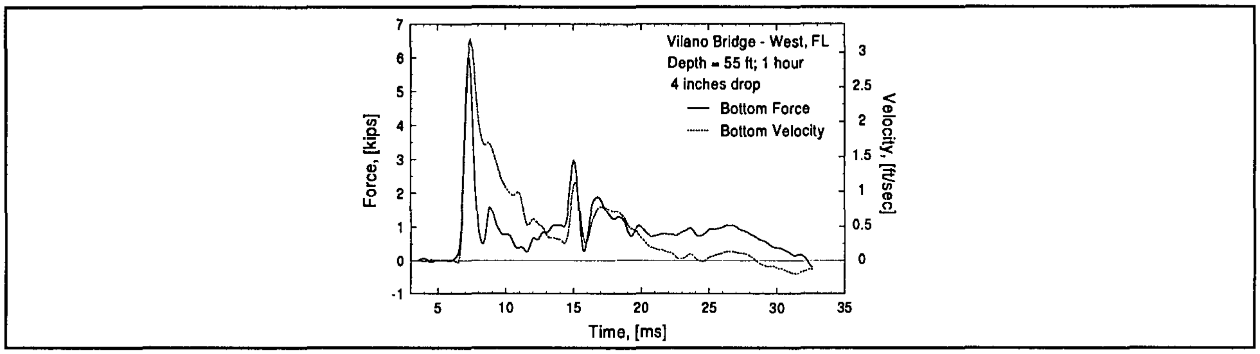


Figure D.90b: Bottom F-V Time History for Vilano Bridge - West, FL at depth of 55 ft (1 h)

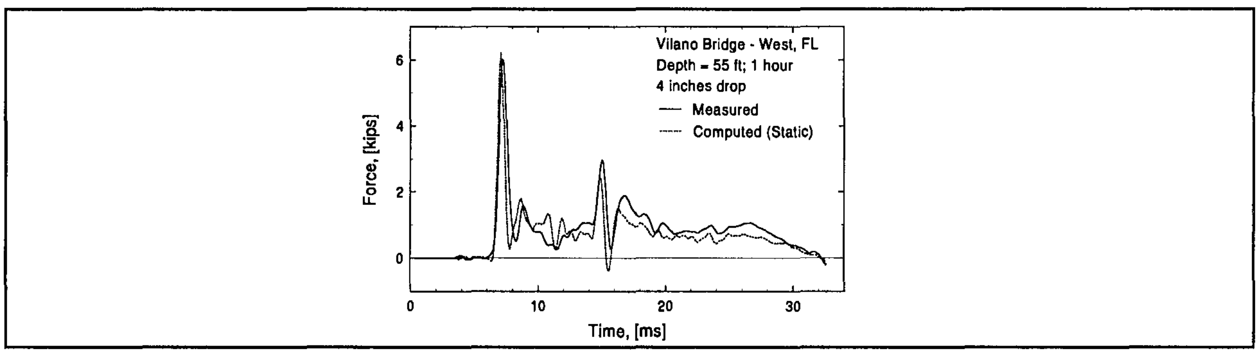


Figure D.90c: Bottom Force Time History (Static) for Vilano - West, FL at depth of 55 ft (1 h)

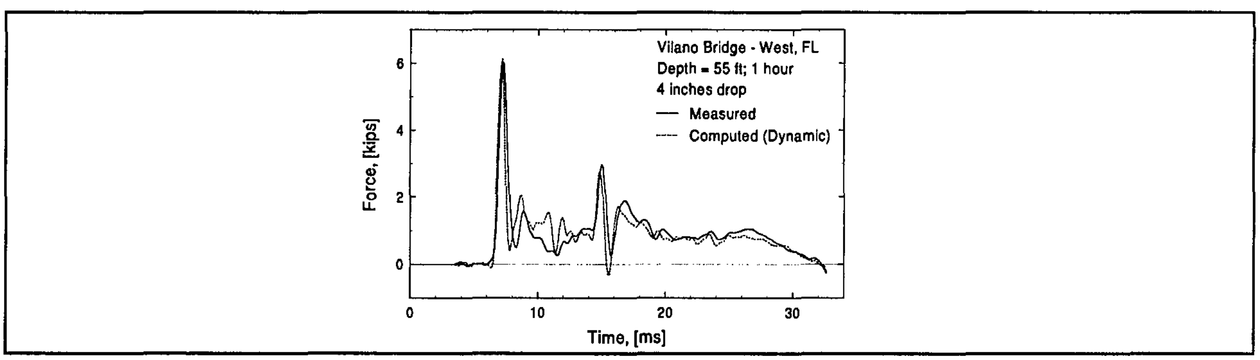


Figure D.90d: Bottom Force Time History (Dynamic) for Vilano - West at depth of 55 ft (1 h)

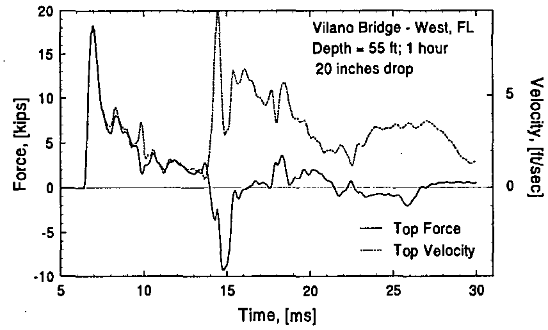


Figure D.91a: Top F-V Time History for Vilano Bridge - West, FL at depth of 55 ft (1 h and 20 in Drop)

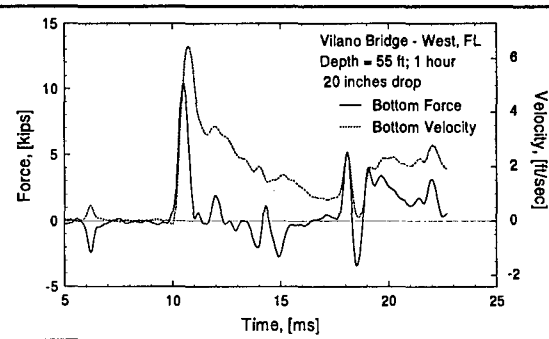


Figure D.91b: Bottom F-V Time History for Vilano Bridge - West, FL at depth of 55 ft (1 h and 20 in Drop)

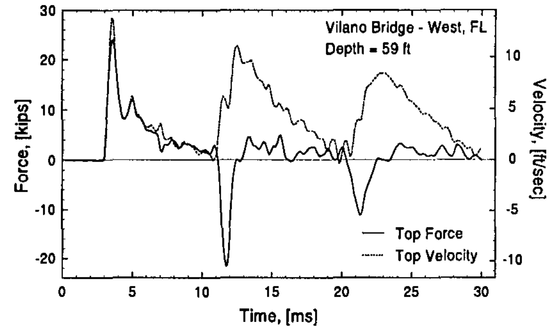


Figure D.92a: Top F-V Time History for Vilano Bridge - West, FL at depth of 59 ft

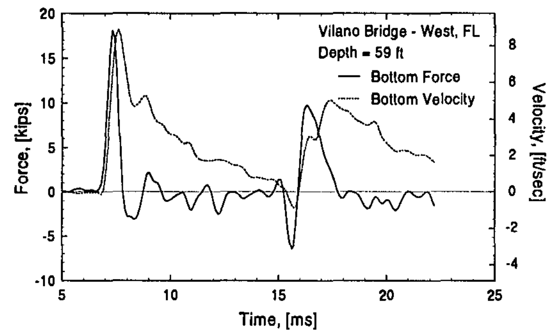


Figure D.92b: Bottom F-V Time History for Vilano Bridge - West, FL at depth of 59 ft

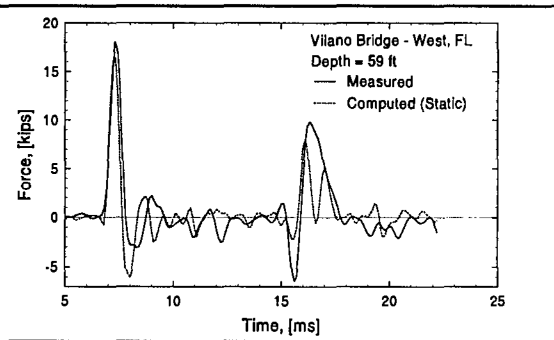


Figure D.92c: Bottom Force Time History (Static) for Vilano - West, FL at depth of 59 ft

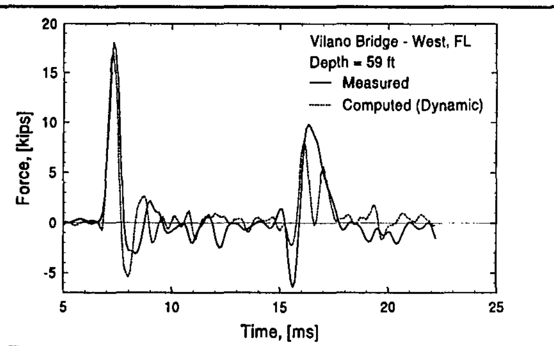


Figure D.92d: Bottom Force Time History (Dynamic) for Vilano - West, FL at depth of 59 ft

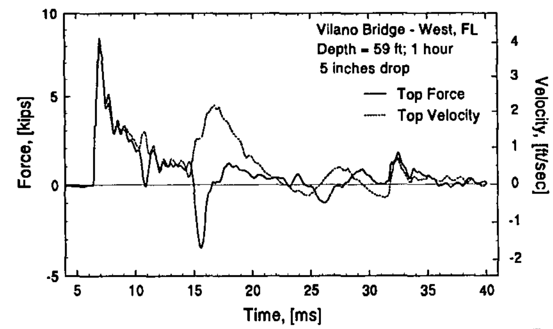


Figure D.93a: Top F-V Time History for Vilano - West, FL at depth of 59 ft (1 h and 5 in)

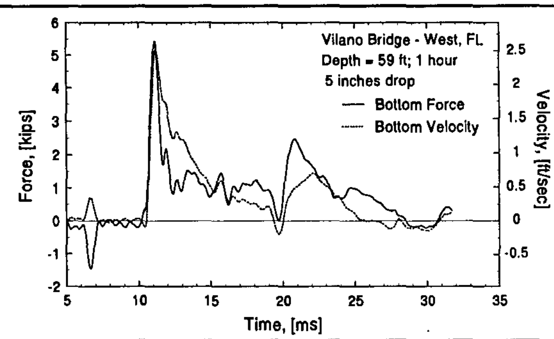


Figure D.93b: Bottom F-V Time History for Vilano - West, FL at depth of 59 ft (1 h and 5 in)

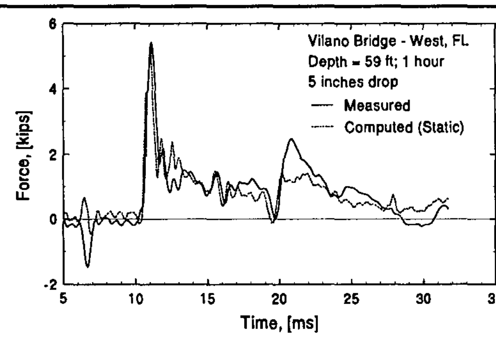


Figure D.93c: Bottom Force Time History (Static) for Vilano - West at depth of 59 ft (5 in)

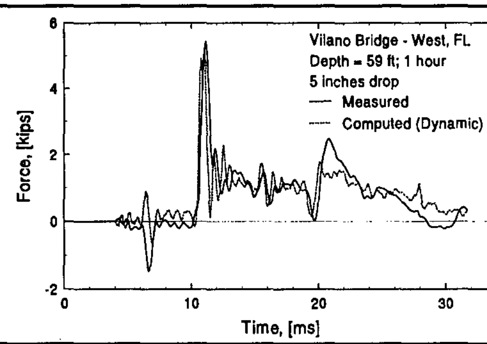


Figure D.93d: Bottom Force Time History (Dynamic) for Vilano - West at depth of 59 ft (5 in)

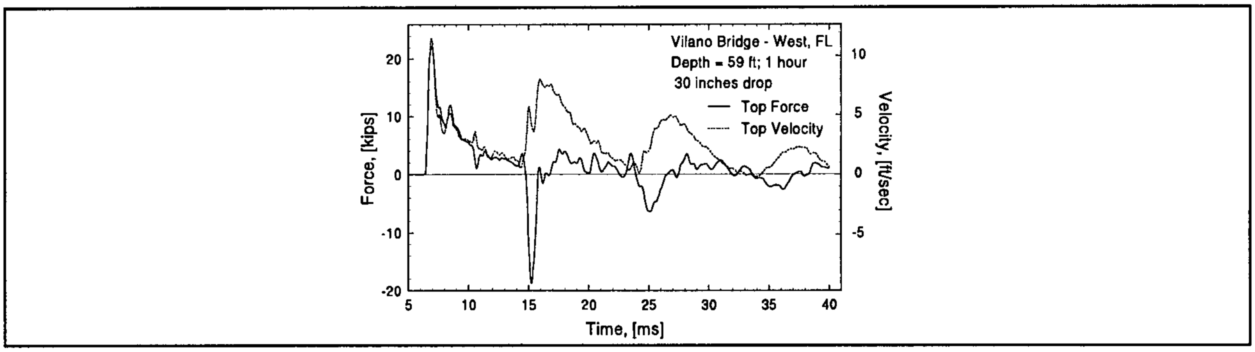


Figure D.94a: Top F-V Time History for Vilano - West, FL at depth of 59 ft (1 h and 30 in)

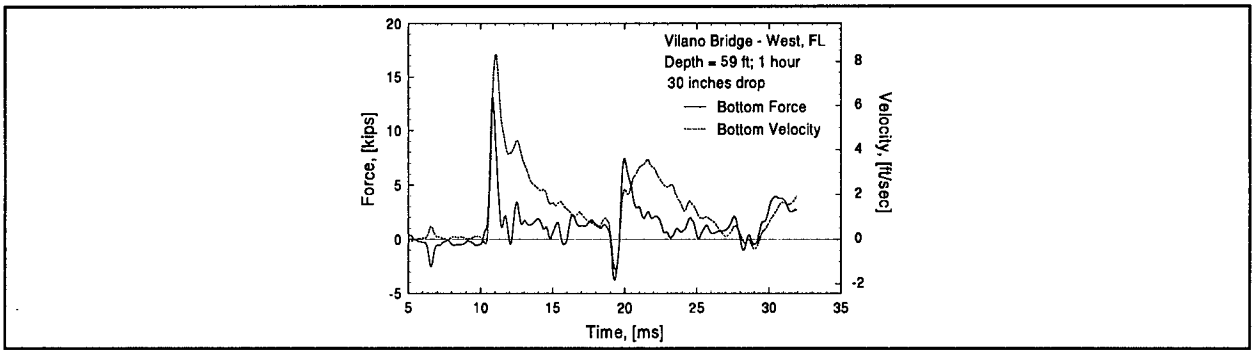


Figure D.94b: Bottom F-V Time History for Vilano - West, FL at depth of 59 ft (1 h and 30 in)

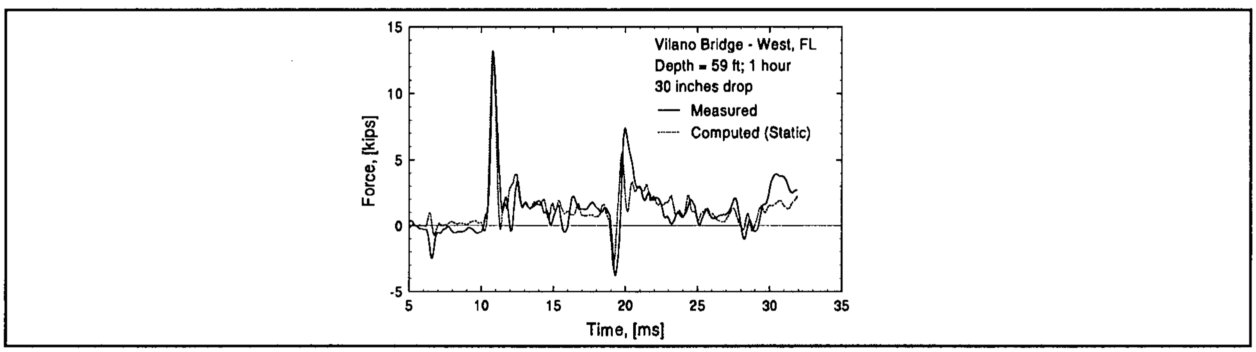


Figure D.94c: Bottom Force Time History (Static) for Vilano - West at depth of 59 ft (30 in)

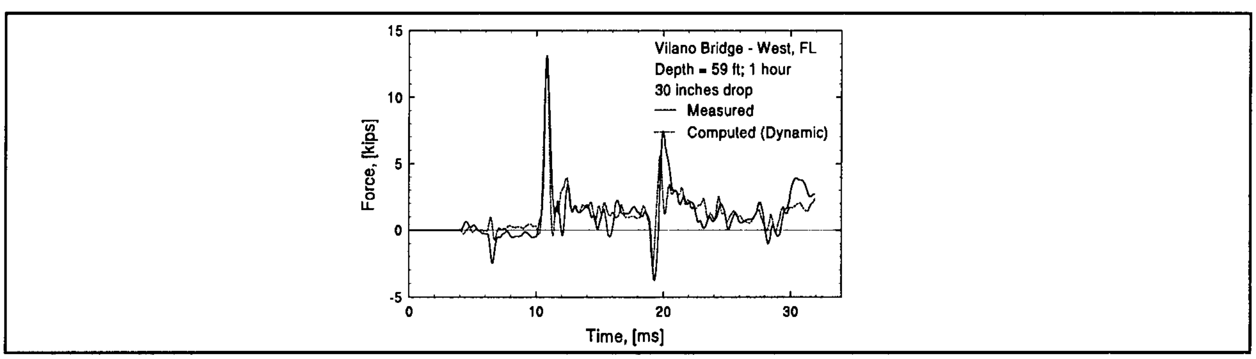


Figure D.94d: Bottom Force Time History (Dynamic) for Vilano - West, depth of 59 ft (30 in)

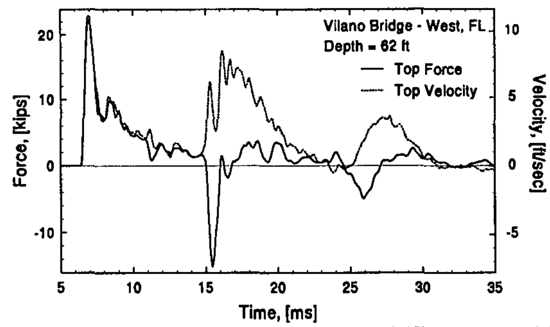


Figure D.95a: Top F-V Time History for Vilano Bridge - West, FL at depth of 62 ft

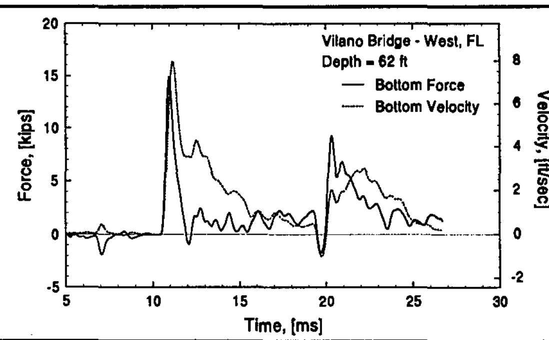


Figure D.95b: Bottom F-V Time History for Vilano Bridge - West, FL at depth of 62 ft

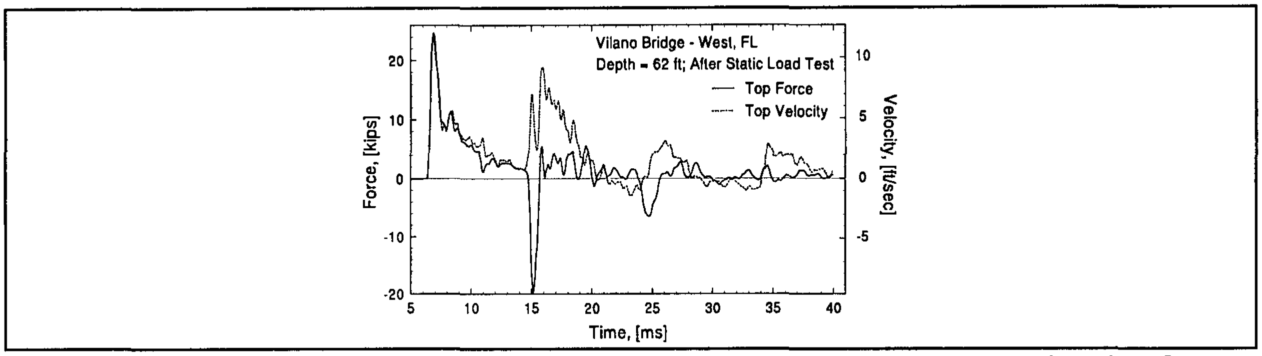


Figure D.96a: Top F-V Time History for Vilano Bridge - West, FL at depth of 62 ft (ASLT)

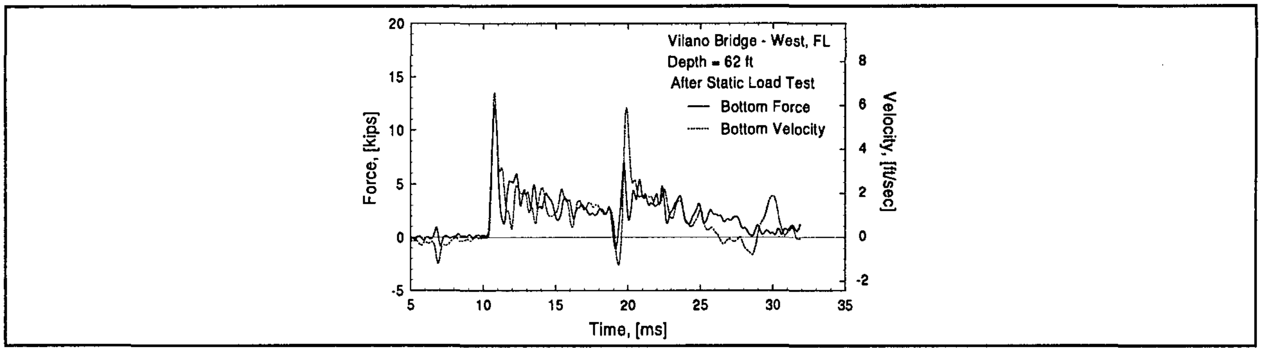


Figure D.96b: Bottom F-V Time History for Vilano Bridge - West, FL at depth of 62 ft (ASLT)

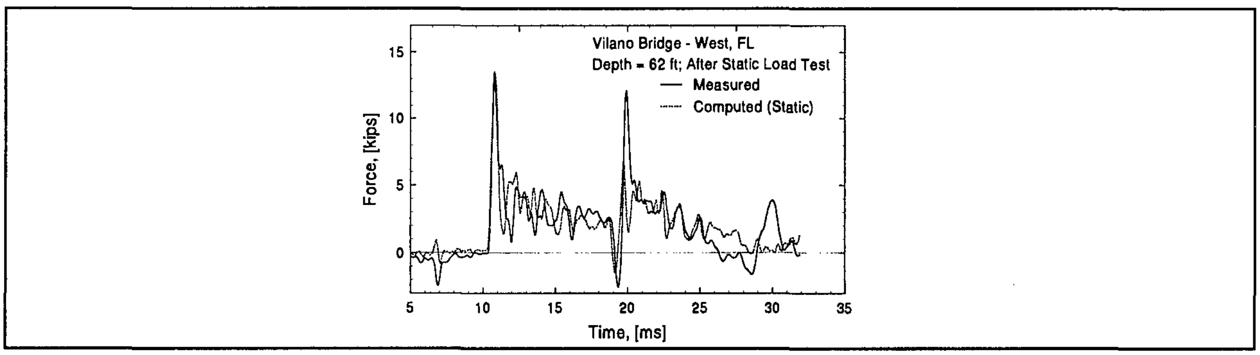


Figure D.96c: Bottom Force Time History (Static) for Vilano - West at depth of 62 ft (ASLT)

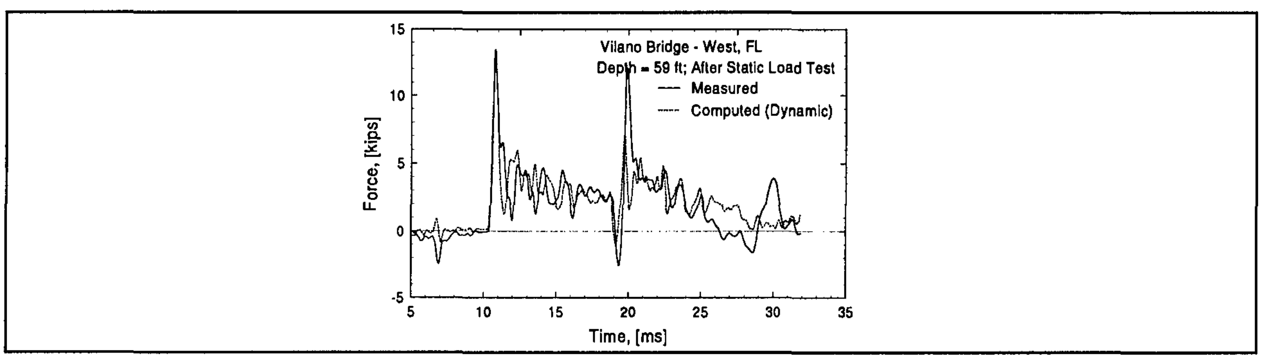


Figure D.96d: Bottom Force Time History (Dynamic) for Vilano-West at depth of 62 ft (ASLT)

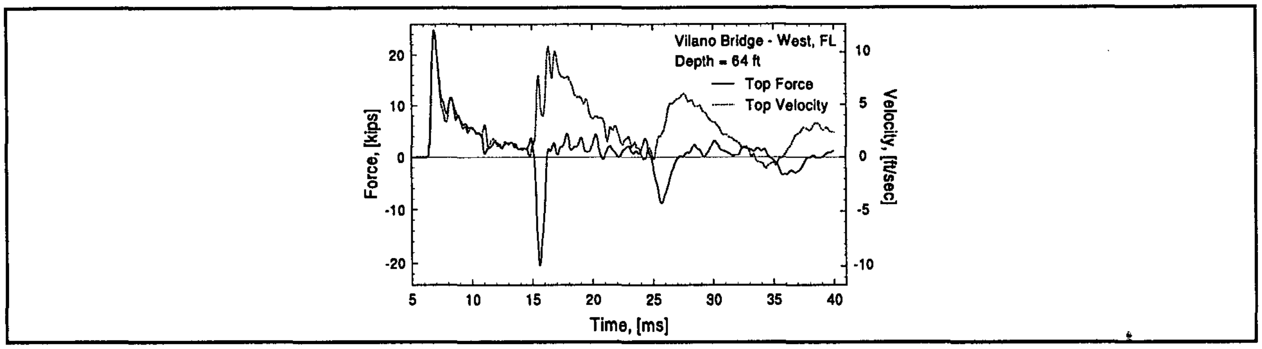


Figure D.97a: Top F-V Time History for Vilano Bridge - West, FL at depth of 64 ft

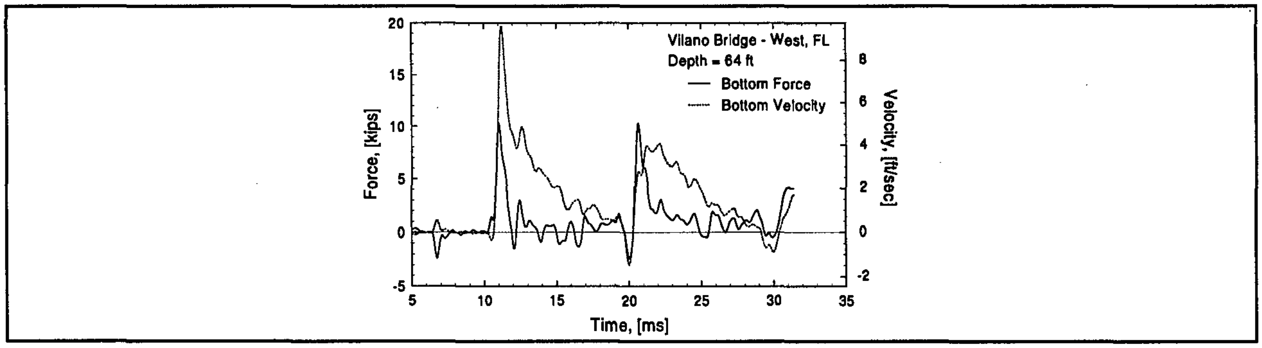


Figure D.97b: Bottom F-V Time History for Vilano Bridge - West, FL at depth of 64 ft

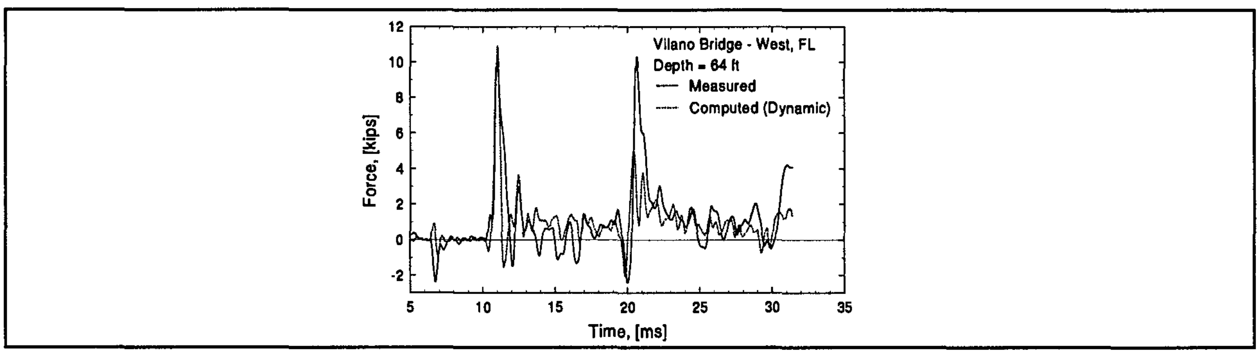


Figure D.97c: Bottom Force Time History (Dynamic) for Vilano - West, FL at depth of 64 ft

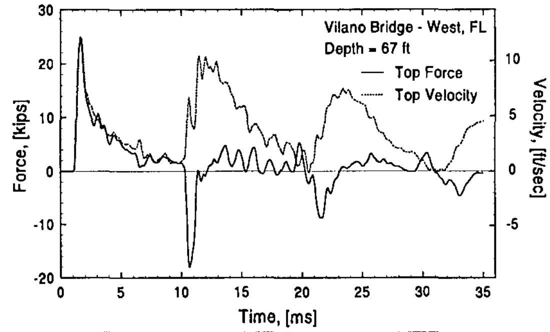


Figure D.98a: Top F-V Time History for Vilano Bridge - West, FL at depth of 67 ft

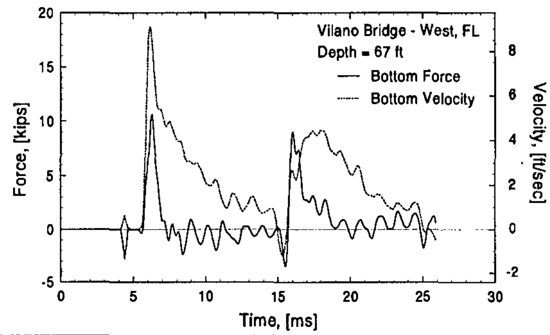


Figure D.98b: Bottom F-V Time History for Vilano Bridge - West, FL at depth of 67 ft

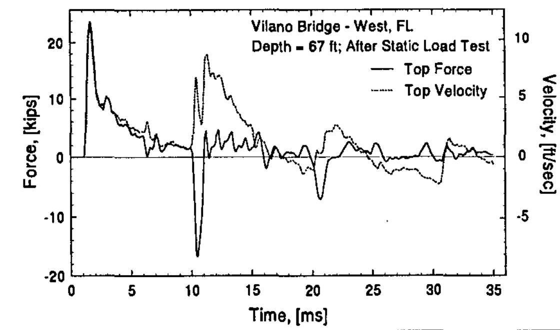


Figure D.99a: Top F-V Time History for Vilano Bridge - West, FL at depth of 67 ft (ASLT)

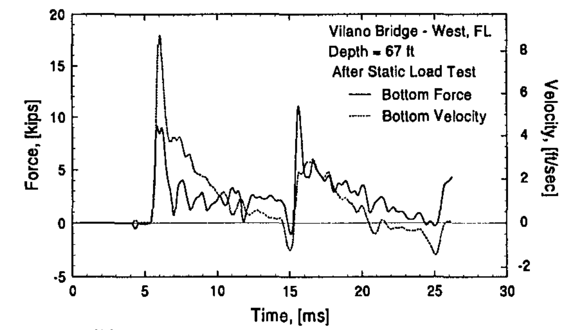


Figure D.99b: Bottom F-V Time History for Vilano Bridge - West, FL at depth of 67 ft (ASLT)

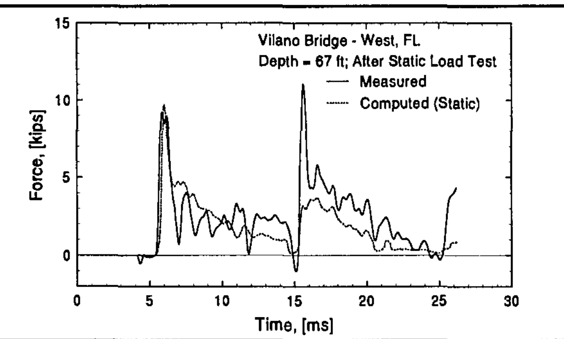


Figure D.99c: Bottom Force Time History (Static) for Vilano - West at depth of 67 ft (ASLT)

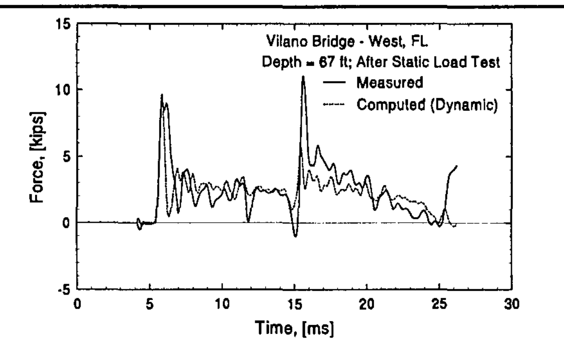


Figure D.99d: Bottom Force Time History (Dynamic) for Vilano-West at depth of 67 ft (ASLT)

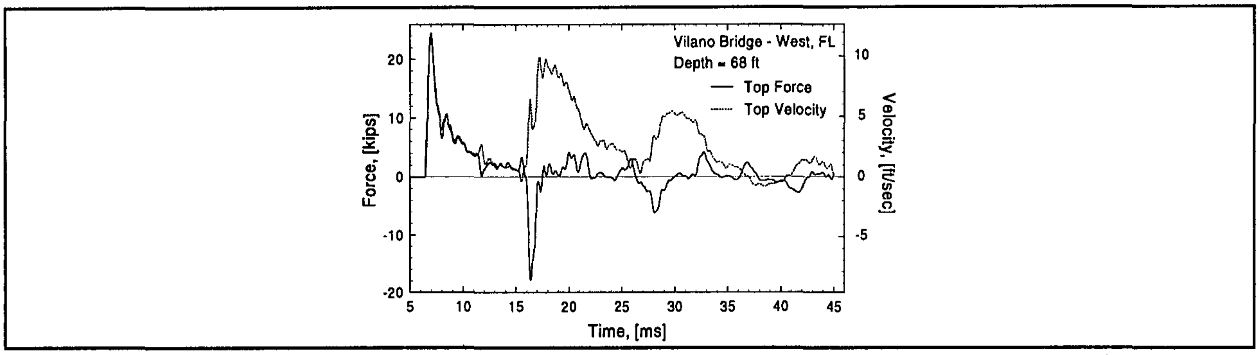


Figure D.100a: Top F-V Time History for Vilano Bridge - West, FL at depth of 68 ft

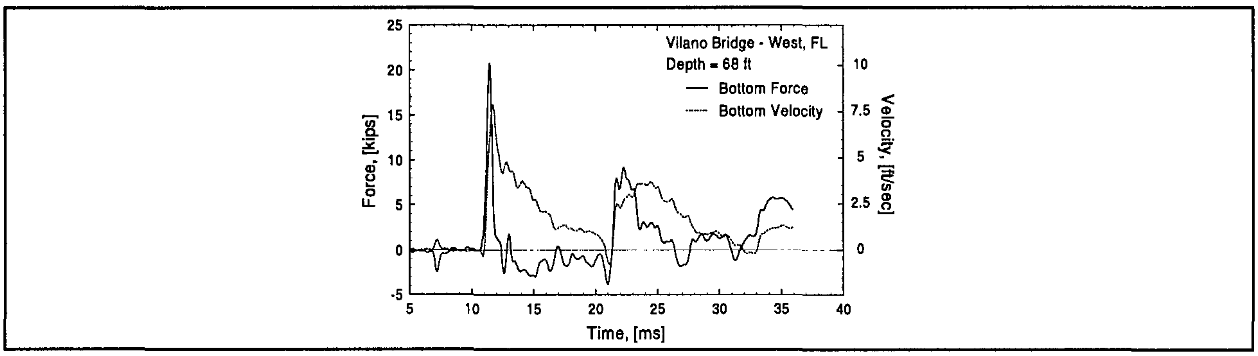


Figure D.100b: Bottom F-V Time History for Vilano Bridge - West, FL at depth of 68 ft

APPENDIX E

SUMMARY OF SPT ROD TOP MEASUREMENTS

The performance of an SPT system can be evaluated by measuring the force and velocity near the top of the SPT drill string during sampler driving and then calculating the energy transferred to the top of the drill sting. Several important SPT quantities will be obtained from force and velocity, including the maximum force at time T1 (FT1), maximum velocity at time T1 (VT1), and the maximum transferred energy (EMX). T1 is defined as the time immediately after impact when the velocity reaches its first major maximum. These three quantities are calculated by the Pile Driving Analyzer (PDA) and are presented in table E.1 averaged over 18 in of sampler driving. For the purpose of this project, the sampler was sometimes replaced with an oversized tip as indicated in table E.1. As indicated in the table, spacers were sometimes installed in the drill string to prevent its buckling during a static compression test

The PDA calculates the energy transferred to the transducer location using the recorded force and velocity records and displays the maximum transferred energy (EMX). This energy is computed by numerically integrating the product of force and velocity. The same technique has been used in impact pile driving, for determining the energy transferred from the hammer to the pile. To evaluate the performance of an SPT system, the term "transfer efficiency" is used. Transfer Efficiency (Eff) is defined as the ratio of maximum transferred energy (EMX) to the theoretical hammer potential energy. For a 140-lb (625 N) hammer freely falling from 30 in (760 mm) height, the theoretical hammer potential energy is 0.35 kip-ft (475 N-m or J). The averaged transfer efficiency at each test depth is summarized in table E.1.

A Hammer Performance Analyzer (HPA) was also used to measure the hammer velocity. The HPA recorded the hammer velocity time history on the strip chart. The maximum hammer velocity just prior to impact (also called hammer impact velocity, V_{impact}) was then used to calculate the hammer kinetic energy. Theoretically, assuming free fall and a drop height of 30 in (760 mm), V_{impact}= 12.68 ft/s (3.86 m/s). Averaged V_{impact} values, measured at each test depth, are summarized in table E.1. The hammer kinetic energy can be calculated using the hammer's mass, m, and the measured impact velocity from

$$E_k = \frac{1}{2}m(v_{impact})^2 \qquad \text{(E.1)}$$

The hammer efficiency is the kinetic energy divided by the potential energy of .35 kip-ft (475 J). Eight different SPT systems were used in performing field tests for this project. Table E.1 summarizes the SPT rod top measurements at different depths for each of the eight systems. Seven of the systems tested utilized a safety hammer with cathead and rope, and one system utilized a donut hammer with hydraulic hoist. A further evaluation of the transfer efficiency and the hammer impact velocity was also performed on the seven safety hammer systems. Since only one donut hammer was tested, no further evaluation was carried out for this system.

The SPT N-value presented in table E.1 can be normalized for 60 percent transferred energy (N_{60}) using the average transfer efficiency of table E.1. This correction is a simple proration. For example, St. Mary at depth of 40 ft, the number of blows for the 18-in sampler driving was 1-4-4 or an SPT N-value of 8. The average calculated transfer efficiency was 43 percent. Therefore,

$$N_{60} = \frac{43}{60}\,8 = 6 \tag{E.2}$$

Figure E.1 shows the transferred energies and transfer efficiencies for various safety hammer systems identified as "Rig #" in the figure. Based on the seven safety hammer systems, the transfer efficiency ranges between 30 and 80 percent with an average of 0.20 kip-ft (266 J) or 56 percent. Figure E.2 shows the hammer kinetic energy for the various systems indicated in figure E.1. The average hammer impact velocity based on the seven systems was about 11.1 ft/s which resulted in an average hammer kinetic energy of 0.27 kip-ft (366 J). Comparing with the theoretical potential energy, the average hammer efficiency (kinetic divided by potential energy) was about 77 percent. Thus, on the average, 21 percent of the rated energy were lost during the impact.

Table E.1: SPT Rod Top Measurements

Depth [ft]	FT1 [kips]	VT1 [ft/s]	EMX [kip-ft]	V_{impact} [ft/s]	$E_{kinetic}$ [kip-ft]	Hammer Efficiency [%]	Transfer Efficiency [%]	N [6"-6"-6"]	N_{60} [12"]	Remarks
Site: St. Mary Cement, Cleveland, OH Hammer Type: Safety Hammer with Cathead and Rope										
40	18.4	8.3	0.15	8.5	0.1572	45	43	1-4-4	6	
65	18.3	8.7	0.15	9.1	0.1802	51	43	10-16-19	25	
100	18.9	8.8	0.15	8.9	0.1724	49	43	12-22-40	44	
103.5	18.0	8.0	0.13	9.0	0.1763	50	37	22-37-64	62	
105	17.5	8.3	0.11	8.9	0.1724	49	31	33blows/6"	N/A	Flat&Spacer
Site: Fore River Bridge, Portland, ME Hammer Type: Donut Hammer with Hydraulic Hoist										
20	9.7	5.3	0.06	8.7	0.1647	47	17	9-7-7	4	
30	9.1	5.4	0.06	8.5	0.1572	45	17	14-8-11	5	

Table E.1: SPT Rod Top Measurements (continued)										
Depth	FT1	VT1	EMX	V_{impact}	$E_{kinetic}$	Hammer Efficiency	Transfer Efficiency	N	N_{60}	Remarks
[ft]	[kips]	[ft/s]	[kip-ft]	[ft/s]	[kip-ft]	[%]	[%]	[6"-6"-6"]	[12"]	
Site: Fore River Bridge, Portland, ME (continued) Hammer Type: Donut Hammer with Hydraulic Hoist										
40	7.9	3.7	0.05	8.3	0.1499	43	14	67-76-89	39	
42	7.8	3.7	0.05	8.4	0.1535	44	14	50blows/2"	N/A	Cone&Spacer
54	8.0	4.1	0.06	8.7	0.1647	47	17	40blows/6"	N/A	Flat&Spacer
56	7.8	3.7	0.05	8.6	0.1609	46	14	25blows/6"	N/A	Cone&Spacer
Site: C&D Canal, Pier 17, DE Hammer Type: Safety Hammer with Cathead and Rope										
14	19.6	11.7	0.14	10.6	0.2445	70	40	4-3-3	4	
40	21.4	13.6	0.19	11.4	0.2828	81	54	1-2-3	5	
50	16.5	8.6	0.13	11.1	0.2681	77	37	4-5-5	6	
55	20.7	12.1	0.17	10.7	0.2491	71	49	3-5-7	10	
60	20.9	10.4	0.19	10.5	0.2399	69	54	7-20-18	34	
65	20.5	11.0	0.23	10.9	0.2585	74	66	6-12-22	31	
70	22.2	10.9	0.20	10.9	0.2585	74	57	25blows/12"	N/A	Cone&Spacer
Site: C&D Canal, Pier 21, DE Hammer Type: Safety Hammer with Cathead and Rope										
40	18.1	9.5	0.14	9.9	0.2133	61	40	2-3-4	5	
55	21.7	12.1	0.19	10.2	0.2264	65	54	5-7-10	15	
65	20.4	11.5	0.17	10.7	0.2491	71	49	5-7-13	16	
70	18.0	10.8	0.14	10.6	0.2445	70	40	7 blows/6"	N/A	Cone&Spacer
71	19.0	10.0	0.19	10.7	0.2491	71	54	9 blows/6"	N/A	Flat&Spacer
Site: White City Bridge, TP3, FL Hammer Type: Safety Hammer with Cathead and Rope										
20	18.6	9.2	0.17	11.1	0.2681	77	49	1-1-2	2	
29	17.0	8.4	0.15	9.6	0.2005	57	43	1-1-1	1	
30.5	19.2	10.5	0.18	11.2	0.273	78	51	2-3-3	5	
32	19.7	9.0	0.17	11.2	0.273	78	49	15blows/2"	N/A	Flat
35	17.9	8.5	0.17	10.6	0.2445	70	49	25blows/6"	N/A	Flat

Table E.1: SPT Rod Top Measurements (continued)										
Depth [ft]	FT1 [kips]	VT1 [ft/s]	EMX [kip-ft]	V_{impact} [ft/s]	$E_{kinetic}$ [kip-ft]	Hammer Efficiency [%]	Transfer Efficiency [%]	N [6"-6"-6"]	N_{60} [12"]	Remarks
Site: White City Bridge, TP6, FL Hammer Type: Safety Hammer with Cathead and Rope										
15.5	19.1	9.8	0.19	11.2	0.273	78	54	5-6-6	11	
32	18.9	9.5	0.17	10.5	0.2399	69	49	35blows/6"	N/A	Flat
33	18.9	8.4	0.14	9.8	0.209	60	30	50blows/6"	N/A	Flat
Site: Apalachicola River Bridge, FL Hammer Type: Safety Hammer with Cathead and Rope										
20	20.3	9.9	0.19	11.4	0.2828	81	54	2-4-4	7	
25	20.0	9.7	0.20	11.1	0.2681	77	57	1-2-2	4	
55	18.8	9.8	0.18	11.2	0.273	78	51	2-2-4	5	
75	20.3	9.1	0.19	11.0	0.2633	75	54	4-4-3	6	
89	22.3	9.9	0.22	11.3	0.2779	79	57	8 blows/6"	N/A	Flat
Site: Sunshine Skyway Bridge, FL Hammer Type: Safety Hammer with Cathead and Rope										
5	17.5	8.7	0.14	10.4	0.2354	67	40	6-6-3	6	
10	17.2	9.3	0.13	10.9	0.2585	74	37	1-2-3	3	
15	17.4	8.9	0.12	10.1	0.222	63	34	4-3-2	3	
20	18.6	9.0	0.15	10.9	0.2585	74	43	4-5-10	11	
25	17.4	8.1	0.15	10.2	0.2264	65	43	1-0-1	1	
27.5	19.2	8.2	0.11	11.2	0.273	78	31	1-0-1	1	
30	19.3	9.1	0.18	11.7	0.2979	85	51	1-4-3	6	
35	16.8	7.7	0.13	10.2	0.2264	65	37	1-3-4	4	
40	18.9	10.2	0.18	12.4	0.3346	96	51	2-3-3	5	
45	17.5	10.4	0.19	11.2	0.273	78	54	40blows/6"	N/A	Flat
45.5	17.4	9.4	0.16	10.3	0.2309	66	46	8-21-26	36	
50	19.7	11.0	0.21	11.9	0.3081	88	60	8-11-13	24	
53	17.6	9.6	0.17	10.6	0.2445	70	49	58blows/6"	N/A	Flat

Table E.1: SPT Rod Top Measurements (continued)										
Depth [ft]	FT1 [kips]	VT1 [ft/s]	EMX [kip-ft]	V_{impact} [ft/s]	$E_{kinetic}$ [kip-ft]	Hammer Efficiency [%]	Transfer Efficiency [%]	N [6"-6"-6"]	N_{60} [12"]	Remarks
Site: Aucilla River Bridge, FL Hammer Type: Safety Hammer with Cathead and Rope; Rig #5										
5	18.9	10.4	0.19	11.7	0.2979	85	54	7-8-10	16	
10	26.0	12.2	0.21	12.0	0.3133	90	60	4-2-2	4	
15	27.4	13.0	0.24	11.7	0.2979	85	69	3-3-3	7	
20	25.6	12.0	0.22	11.5	0.2878	82	63	3-2-2	4	
25	22.2	11.5	0.21	11.8	0.303	87	60	3-2-2	4	
30	24.5	11.6	0.23	11.9	0.3081	88	66	3-2-2	4	
35	23.5	10.9	0.24	11.4	0.2828	81	69	1-2-3	6	
40	25.2	11.8	0.23	11.7	0.2979	85	66	4-3-4	8	
45	24.8	11.5	0.22	11.2	0.273	78	63	1-2-2	4	
55	25.4	12.1	0.27	11.5	0.2878	82	77	19-28-29	73	
60	23.7	11.2	0.25	11.5	0.2878	82	71	18-19-26	53	
65	24.2	11.4	0.25	11.6	0.2928	84	71	33-35-31	78	
Site: Vilano Bridge - East, FL78 Hammer Type: Safety Hammer with Cathead and Rope										
5	22.0	11.6	0.21	12.1	0.3186	91	60	3-2-2	4	
10	22.7	11.8	0.21	11.9	0.3081	88	60	3-2-1	3	
15	25.3	12.0	0.22	12.3	0.3292	94	63	2-1-1	2	
20	18.1	9.0	0.15	12.3	0.3292	94	43	1-1-4	4	
25	24.6	11.6	0.25	12.9	0.3621	103	71	9 blows/6"	N/A	Flat
25	24.0	11.7	0.23	--	0	0	66	1-1-2	3	
30	24.0	11.8	0.25	12.7	0.351	100	71	2-4-10	17	
35	25.5	11.8	0.25	12.1	0.3186	91	71	43blows/12"	N/A	Flat
35	23.3	11.9	0.28	12.7	0.351	100	80	1-2-7	12	
40	25.6	12.1	0.26	12.1	0.3186	91	74	35blows/6"	N/A	Flat
40	24.7	11.7	0.24	12.2	0.3239	93	69	7-10-9	22	

Table E.1: SPT Rod Top Measurements (continued)										
Depth [ft]	FT1 [kips]	VT1 [ft/s]	EMX [kip-ft]	V_{impact} [ft/s]	$E_{kinetic}$ [kip-ft]	Hammer Efficiency [%]	Transfer Efficiency [%]	N [6"-6"-6"]	N_{60} [12"]	Remarks
Site: Vilano Bridge - West, FL Hammer Type: Safety Hammer with Cathead and Rope										
30	23.9	11.8	0.25	--	0	0	71	1-0-1	1	
35	25.9	11.8	0.25	--	0	0	71	1-0-1	1	
42	23.5	12.0	0.27	12.5	0.34	97	77	1-0-1	1	
45	26.2	12.9	0.28	--	0	0	80	1-0-1	1	
50	23.7	11.7	0.25	12.8	0.3565	102	71	1-1-1	2	
55	21.7	10.7	0.21	12.2	0.3239	93	60	1-1-1	2	
59	24.0	12.2	0.25	12.5	0.34	97	71	1-0-1	1	
64	24.4	12.0	0.25	12.5	0.34	97	71	2-3-5	9	
67	24.1	11.9	0.24	--	0	0	69	3 blows/6"	N/A	Flat
68	23.0	11.9	0.25	12.5	0.34	97	71	3-2-3	6	

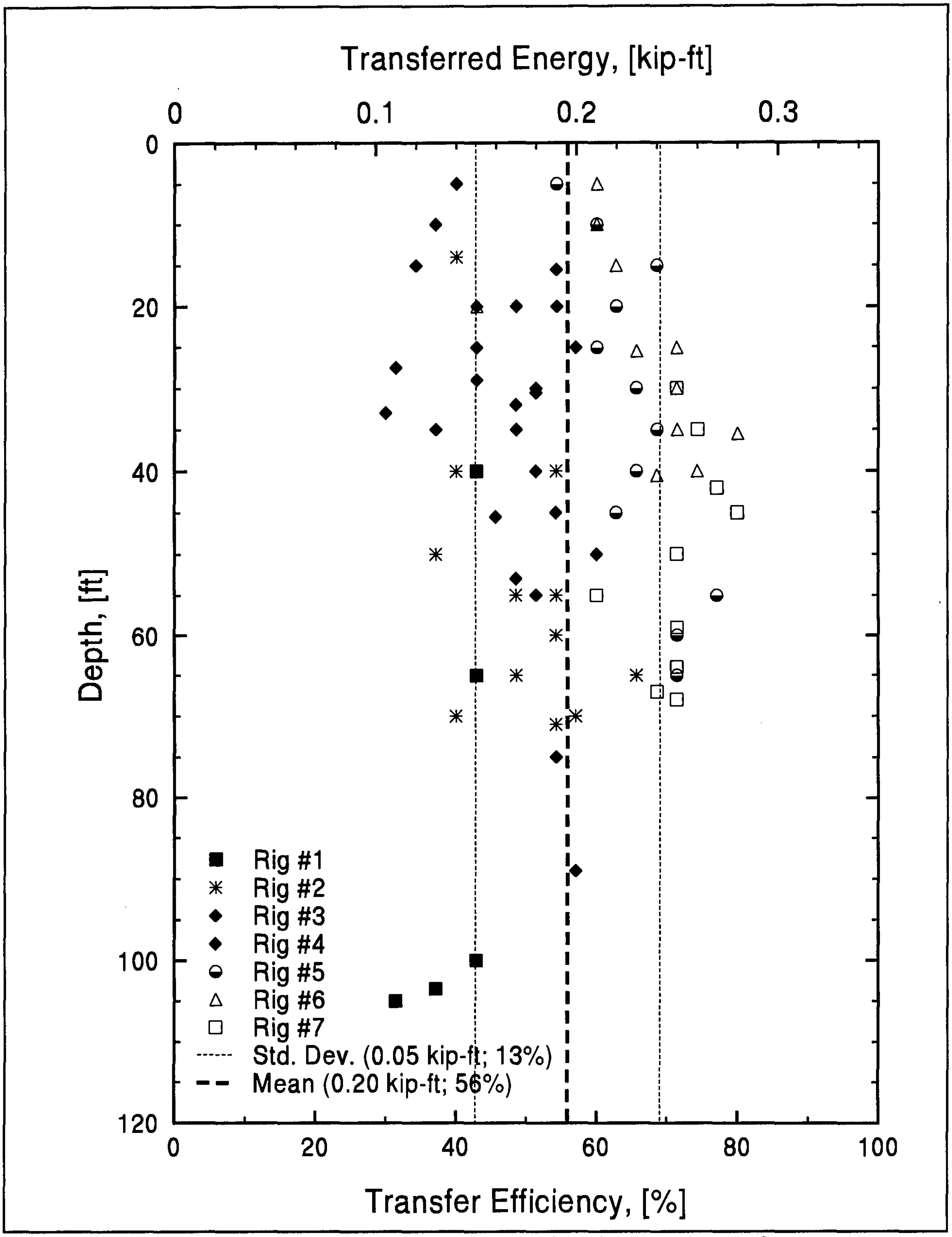


Figure E.1: Transfer Efficiencies of Various SPT Safety Hammer Systems

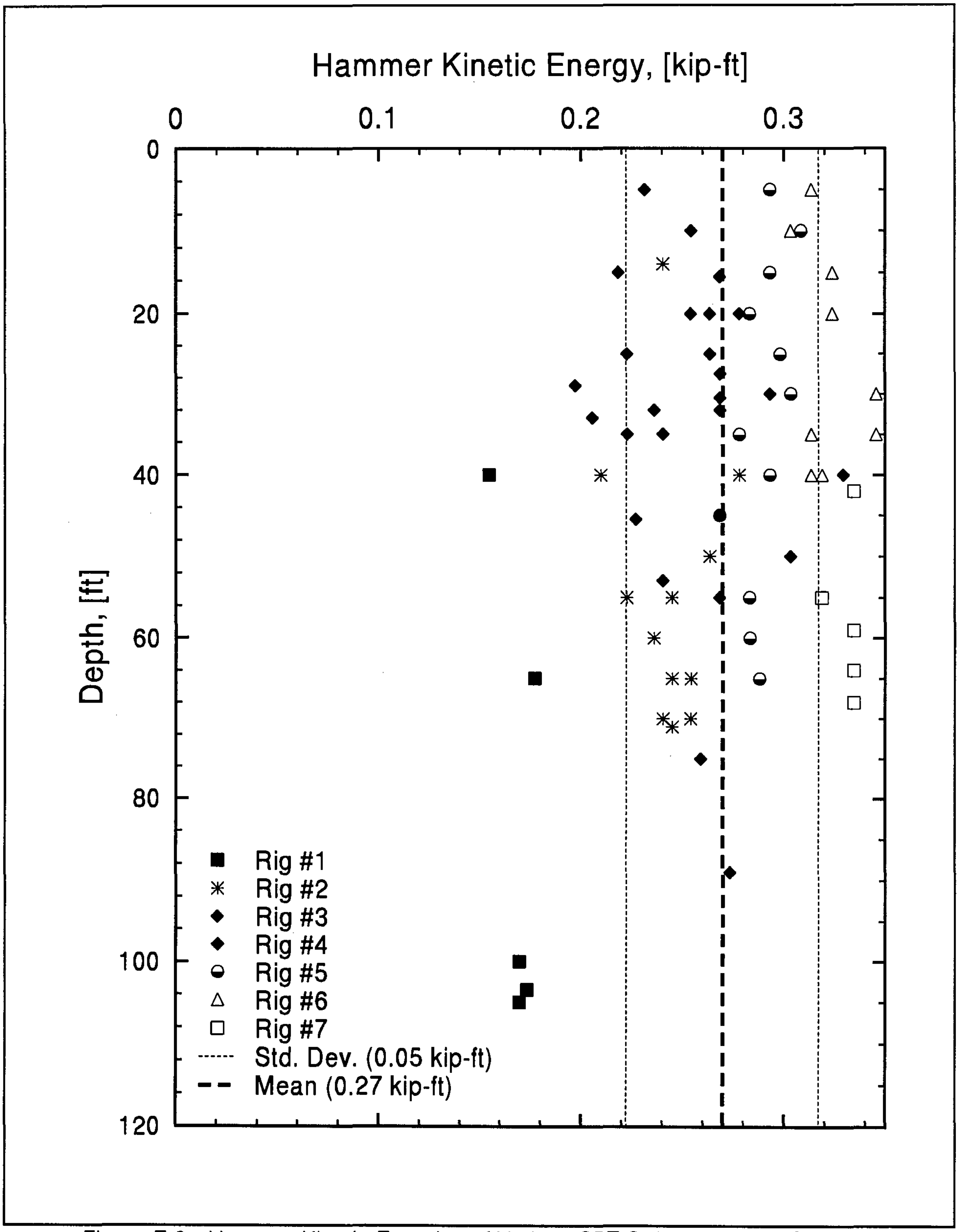


Figure E.2: Hammer Kinetic Energies of Various SPT Safety Hammer Systems

APPENDIX F

TEST SITES INFORMATION

Appendix F presents detailed test site information including site plan, soil, pile, and hammer information, pile driving record, static load test results and cone penetration test results wherever available. The test sites are presented in the following order: St. Mary, Cleveland, OH; Fore River Bridge, Portland, ME; C&D Canal Pier 17 and Pier 21, DE; White City Bridge Test Pile 3 and Test Pile 6, FL; Apalachicola River Bridge, FL; Aucilla River Bridge, FL; Vilano Bridge East and West Embankment, FL.

F.1 ST. MARY, CLEVELAND, OH (DB_ID # 43)

Pile Information:	
Type:	H-Section 12x53 (F'_y=36 ksi or 248 MPa).
Cross Sectional Area:	15.50 in^2 or 10 000 mm^2.
Length:	120 ft or 36.6 m.
Date Driven:	2/26/1992.
Penetration:	105 ft or 32 m.

Hammer Information:	
Manufacturer - Model:	Vulcan 506.
Type:	Single Acting Air Hammer.
Helmet Weight:	Unknown (Standard: 0.75 kips or 3.3 kN).
Hammer Cushion Material:	Unknown (Standard: Hamortex).
Hammer Cushion Area:	Unknown (Standard: 99.4 in^2 or 64 133 mm^2).
Hammer Cushion Thickness:	Unknown (Standard: 7.38 in or 4 762 mm^2).
Pile Cushion Material:	None.
Pile Cushion Area:	None.
Pile Cushion Thickness:	None.

Soil Boring Log No.:	L-4.
CPT Results No.:	None.

Static Load Test Information:	
Test Date:	3/18/1992.
Maximum Load:	330 kips or 1 468 kN.
Davisson's Failure Criterion:	315 kips or 1 401 kN.

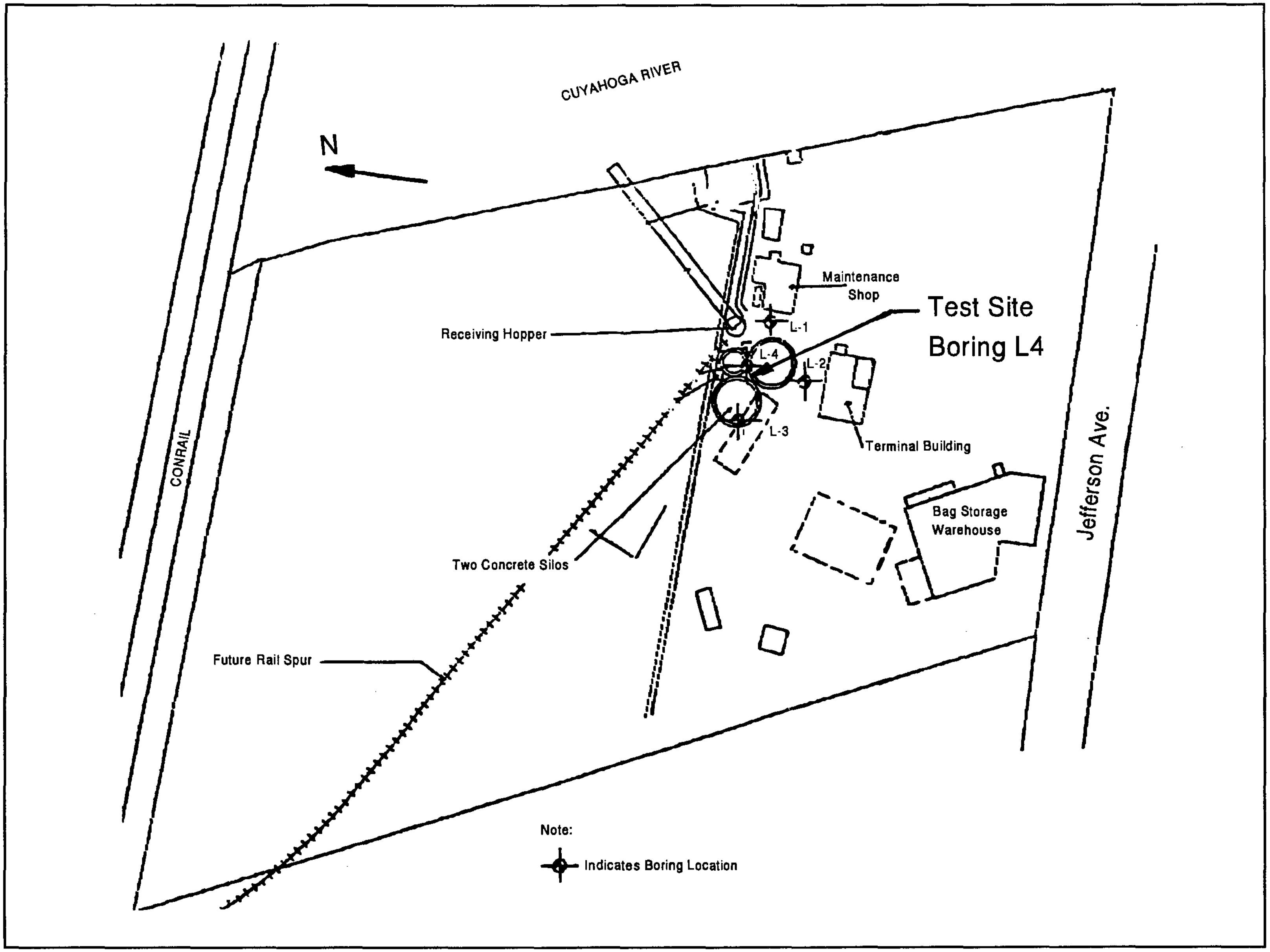


Figure F.1a: Site Plan - St. Mary

[ft]	Description Surface Elevation: 502±	Blows on Spoon for 12"	Depth to bottom of Sample [ft]	Summary of Test Results Col.1 - Natural Moisture, % Col.2 - Unconfined Shear Stress, #/SF Col.3 - Strain, % Col.4 - Loss on Ignition @ 600°C Col.5 - Unit Dry Weight, #/cu-ft				
				1	2	3	4	5
0	Fill: cinders, sand, gravel, brick, slag, some							
	rubble; gray w/ brown silty sandy clay w/slag							
	layers (petroleum odor)	13	4.0					
		14	6.5					
	Silt, gray, clayey, sandy w/s organic material							
10	gary, sandy, w/s sand seams & organic	3	10.0	30.4			3.7	
	materials	* S-1	12.0	32.1	455	10.5	3.6	93
		2/1.5	13.5	27.2			4.6	
	Sand, gray, silty w/tr. gravel, wood & organic	4	15.0	32.6			4.0	
	material							
20	gray w/tr. silt	8	20.0					
	w/s organic material	10	25.0				4.6	
30		11	30.0					
	gray w/sand & gravel seams	6	35.0					
40	Sand & Gravel, gray, silty w/ small cobbles	30	40.0					
		34	45.0					
	Clay, gray, silty w/s sand, tr. gravel							
50		25	50.0	19.1	2705	17.1		112
		42	55.0	19.1	2625	16.3		112
60	gray, silty	34	60.0	19.4	2695	20.0		111
		28	65.0	21.1	2330	14.8		109
70		26	70.0	21.4	1850	20.0		106
		39	75.0	***				
80		27	80.0	21.1	1775	13.3		107
	gray, silty w/tr. sand							
		10	85.0	33.2	560	13.9		90
	(continue...)							

Figure F.1b: Soil Boring Log - St. Mary

[ft]	Description Surface Elevation: 502±	Blows on Spoon for 12"	Depth to bottom of Sample [ft]	Summary of Test Results: Col.1 - Natural Moisture, %	Col.2 - Unconfined Shear Stress, #/SF	Col.3 - Strain, %	Col.4 - Loss on Ignition @ 600°C	Col.5 - Unit Dry Weight, #/cu-ft
				1	2	3	4	5
90		10	90.0	32.0				
		* S-2	93.0	24.5	1670	8.0		95
		14	95.0	29.0	560	20.0		95
	gray, silty, sandy w/ gravel & rock							
100	frags., tr. small sand layers & cobbles	42	100.0	15.7	3340	13.1		118
		**104	105.0	17.7				
	gray, silty, w/s sand, tr. gravel & rock							
110	frags. & some silt seams	50	110.0	20.4	2130	11.7		107
		37	115.0	26.5				
	gray, silty w/tr. gravel & rock frags.							
120		16	120.0	30.5	780	16.7		95
		12	125.0	31.3	515	13.8		93
		* S-3	128.5	31.4	1335	14.4		95
130		17	130.0	30.1				
		13	135.0	25.1	705	17.4		102
140		11	140.0	29.4	790	20.0		97
	gray silty w/tr. sand, some silt seams	20	145.0	27.0				
150		17	150.0	26.1				
	End of Boring at 150.0 ft							
	REMARKS:							
	Encountered water at 5.0 ft							
	Water at 1.0 ft on completion							
	* Shelby Tube							
	** Drove Rock							
	*** No Recovery							
	Boring Completed: 7/25/91							
	Location: Cleveland, OH							
	Job No.: C4775							

Figure F.1b: Soil Boring Log - St. Mary (continued)

Pile Driving Report
Location: St. Mary's Concrete Copr.
Pile Type: H Pile
Dimensions: 12x53x60'
Tip Elevation: 478' ±
Ground Surface Elev. 583' ±

Pile No. 5
Date: 2/26/92
Hammer: Vulcan 506
Energy: 32,500 ft-lb.
Contractor: Great Lakes
(Test Pile)

Depth [ft]	Blows /ft	Depth [ft]	Blows /ft	Depth [ft]	Blows /ft	Depth [ft]	Blows /ft	Depth [ft]	Blows /ft
1		29	2	57	14	85	24	113	
2		30	2	58	20	86	27	114	
3		31	2	59	18	87	25	115	
4		32	2	60	17	88	28	116	
5		33	3	61	17	89	27	117	
6		34	2	62	21	90	27	118	
7		35	3	63	20	91	26	119	
8		36	3	64	20	92	28	120	
9		37	3	65	21	93	29	121	
10		38	4	66	22	94	25	122	
11		39	3	67	22	95	29	123	
12		40	4	68	22	96	29	124	
13		41	4	69	23	97	31	125	
14		42	3	70	23	98	29	126	
15		43	4	71	22	99	34	127	
16		44	4	72	23	100	34	128	
17		45	4	73	27	101	43	129	
18		46	5	74	24	102	44	130	
19		47	6	75	24	103	46	131	
20		48	8	76	27	104	50	132	
21		49	7	77	24	105	52	133	
22		50	6	78	25	106		134	
23		51	8	79	26	107		135	
24		52	8	80	28	108		136	
25		53	6	81	28	109		137	
26		54	11	82	30	110		138	
27		55	10	83	27	111		139	
28	10	56	10	84	27	112		140	

Remarks: Encountered concrete footing to -4' below grade. Bottom 2' of pile was damaged and removed. Obstruction was removed by a backhoe. Splice @ -60', weld time = 8:00 - 9:00.
End of Driving at 105 ft. Signed: SDK

Figure F.1c: Pile Driving Record - St. Mary

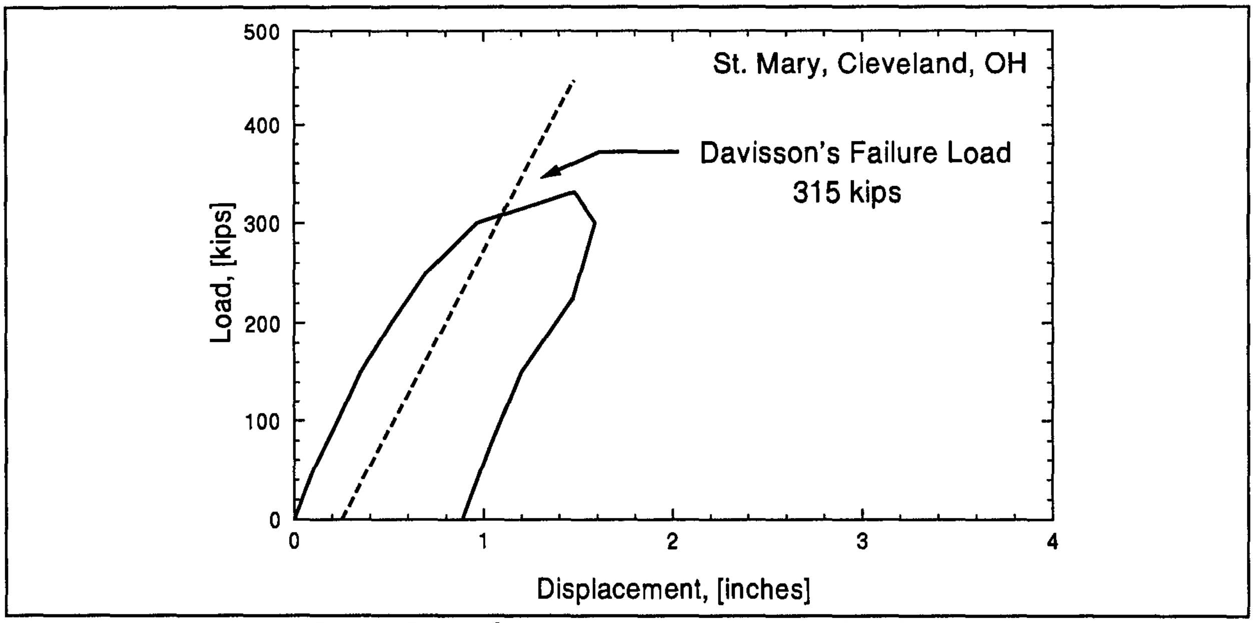


Figure F.1d: Static Load Test Results - St. Mary

F.2 FORE RIVER BRIDGE, PORTLAND, ME (DB_ID # 24)

Pile Information:	
Type:	Closed End Steel Pipe, concrete filled before load test. 18 in or 457 mm O.D.; 0.5 in or 12.7 mm Wall Thickness.
Cross Sectional Area:	27.50 in^2 or 17 743 mm^2.
Length:	59.8 ft or 18.2 m.
Date Driven:	1/19/1990.
Penetration:	50.67 ft or 15.44 m.
Hammer Information:	
Manufacturer - Model:	Kobelco K45.
Type:	Open End Diesel Hammer.
Helmet Weight:	3.25 kips or 14.46 kN.
Hammer Cushion Material:	Micarta.
Hammer Cushion Area:	576 in^2 or 371 635 mm^2.
Hammer Cushion Thickness:	3.5 in or 89 mm.
Pile Cushion Material:	None.
Pile Cushion Area:	None.
Pile Cushion Thickness:	None.
Soil Boring Log No.:	B-558.
CPT Results No.:	None.
Static Load Test Information:	
Test Date:	2/8/1990.
Maximum Load:	400 kips or 1 779 kN.
Davisson's Failure Criterion:	350 kips or 1 557 kN.

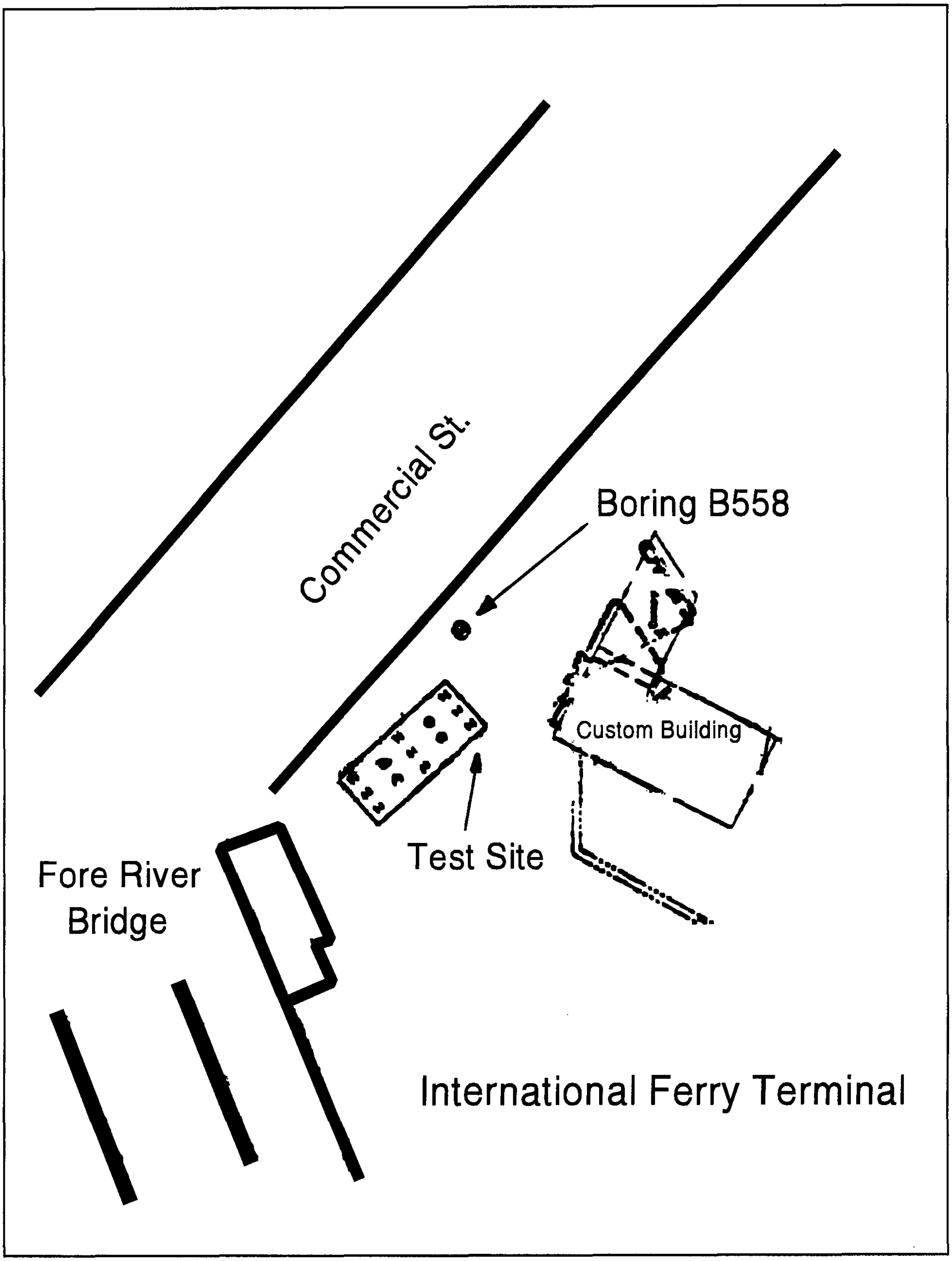


Figure F.2a: Site Plan - Portland

The following is transcribed from Haley and Aldrich's Boring No. 6558-88 Date Aug. 30, 1988			
Elevation	SPT - N	Depth-ft	Description
12.33	22	11.50	Sand
7.33	18	13	Silty Sand
2.33	3	42	Sand
-2.67	300	35.00	Sand and Gravel
-7.67	33	30.00	Sand
-12.67	29		
-17.67	34		Notes:
-22.67	23		Depth 0 = El. 12.33
-27.67	15		Water at depth 9.6 ft
-32.67	34		Sampler 140 lbs, h = 30"
-37.67	32		
-42.67	39		
-47.67	30		
-52.67	57		
-57.67	38		
-62.67	90		
-67.67	28		
-72.67	17		
-77.67	22		
-82.67	26		
-84.67	29		
-87.67	38		
-92.67	60		
-97.67	133		
-102.67	206		

Figure F.2b: Soil Boring Log - Portland

Pile Driving Record

Project: Fore River Bridge Replacement. File No. B946-00
Client: T.Y. LIN International. General Contractor: Reed & Reed, Inc.
Pile Contractor: Same as general. Pile No.: T23
Pile Type: 18" O.D. x 0.5" wall thich; Closed End; Design Capacity: N/A
Pile Hammer: Kobelco K-45. Rated Energy: 92,760 ft.lbs.
Date Driven: 1/19/1990. Date Concrete: 1/26/1990.
Measured Length: 59' 9"; Length deducted after driving: 6' 1"; Total final length: 53'8".
Pile Elevations: Top - 12.5 ft; Tip - -41.2 ft.

Depth [ft]	Blows /ft	Stroke [ft]	Depth [ft]	Blows /ft	Stroke [ft]	Depth [ft]	Blows /ft	Stroke [ft]
1	Auger		26	17		51	16	
2	Auger		27	16		52		
3	Auger		28	18		53		
4	Auger		29	18		54		
5	Auger		30	18		55		
6	2		31	18		56		
7	1		32	20	2.5	57		
8	1		33	18		58		
9	1		34	21		59		
10	2		35	22		60		
11	6	Fall	36	20				
12	10		37	21		Restrike Test		
13	11		38	22		Depth	Blows	Stroke
14	8	0.5	39	19		[in]	/in	[ft]
15	8		40	22		1	2	
16	10		41	17		2	1	
17	11	soft	42	16		3	1	
18	10	blows	43	15		4	1	
19	11	1.5	44	13		5	1	
20	12		45	13		6	1	
21	14	2.0	46	12		12	6	
22	15		47	13	2.0	24	12	
23	13		48	13				
24	13	2.0	49	15				
25	15		50	15				

Remarks: Stop Driving 1/19/1990 at 51.0 ft. Restrike 1/25/1990, 2 ft down to 53.0 ft.

Figure F.2c: Pile Driving Record

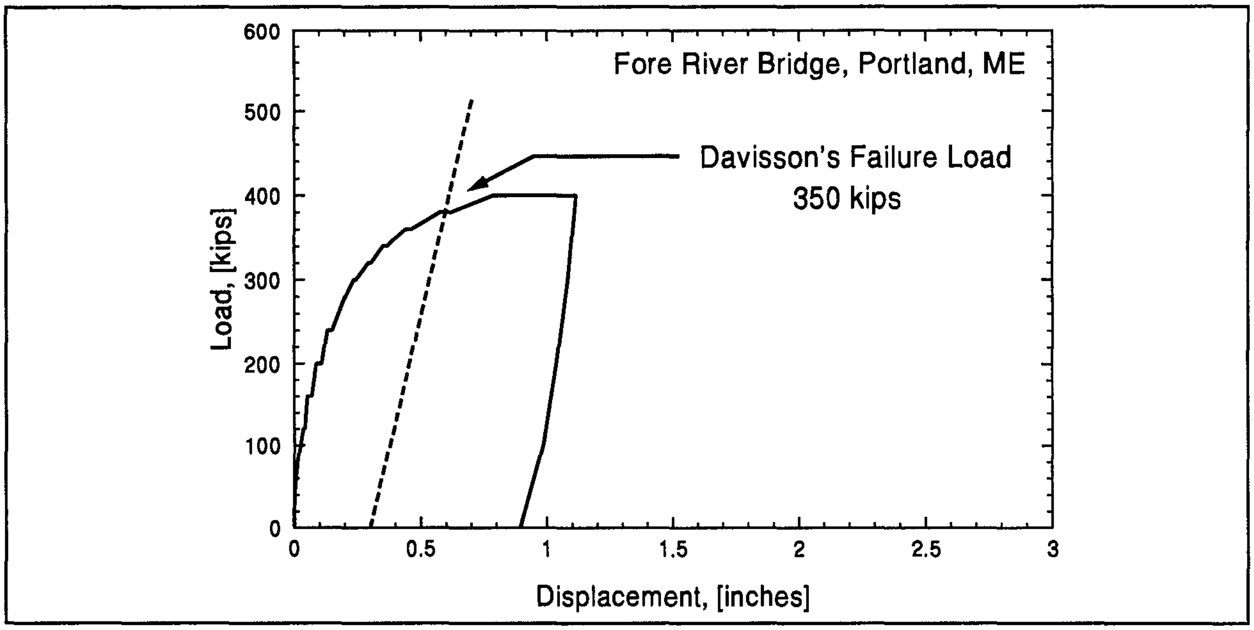


Figure F.2d: Static Load Test Result - Portland

F.3 C&D CANAL, PIER 17, DE (DB_ID # 204)

Pile Information:	
Type:	24 in (610 mm) Square Prestressed Concrete Pile.
Cross Sectional Area:	576 in^2 or 371 635 mm^2.
Length:	75.0 ft or 22.9 m.
Date Driven:	3/10/1993.
Penetration:	66.0 ft or 20.1 m.
Hammer Information:	
Manufacturer - Model:	Delmag D46-32.
Type:	Open End Diesel Hammer.
Helmet Weight:	6.0 kips or 26.7 kN.
Hammer Cushion Material:	Aluminum and Micarta.
Hammer Cushion Area:	415.5 in^2 or 268 080 mm^2.
Hammer Cushion Thickness:	3.0 in or 76 mm.
Pile Cushion Material:	Oak.
Pile Cushion Area:	576 in^2 or 371 635 mm^2.
Pile Cushion Thickness:	8 in or 203 mm.
Soil Boring Log No.:	SB #424.
CPT Results No.:	None.
Static Load Test Information:	
Test Date:	3/31/1993.
Maximum Load:	1,200 kips or 53 376 kN.
Davisson's Failure Criterion:	1,150 kips or 51 152 kN.

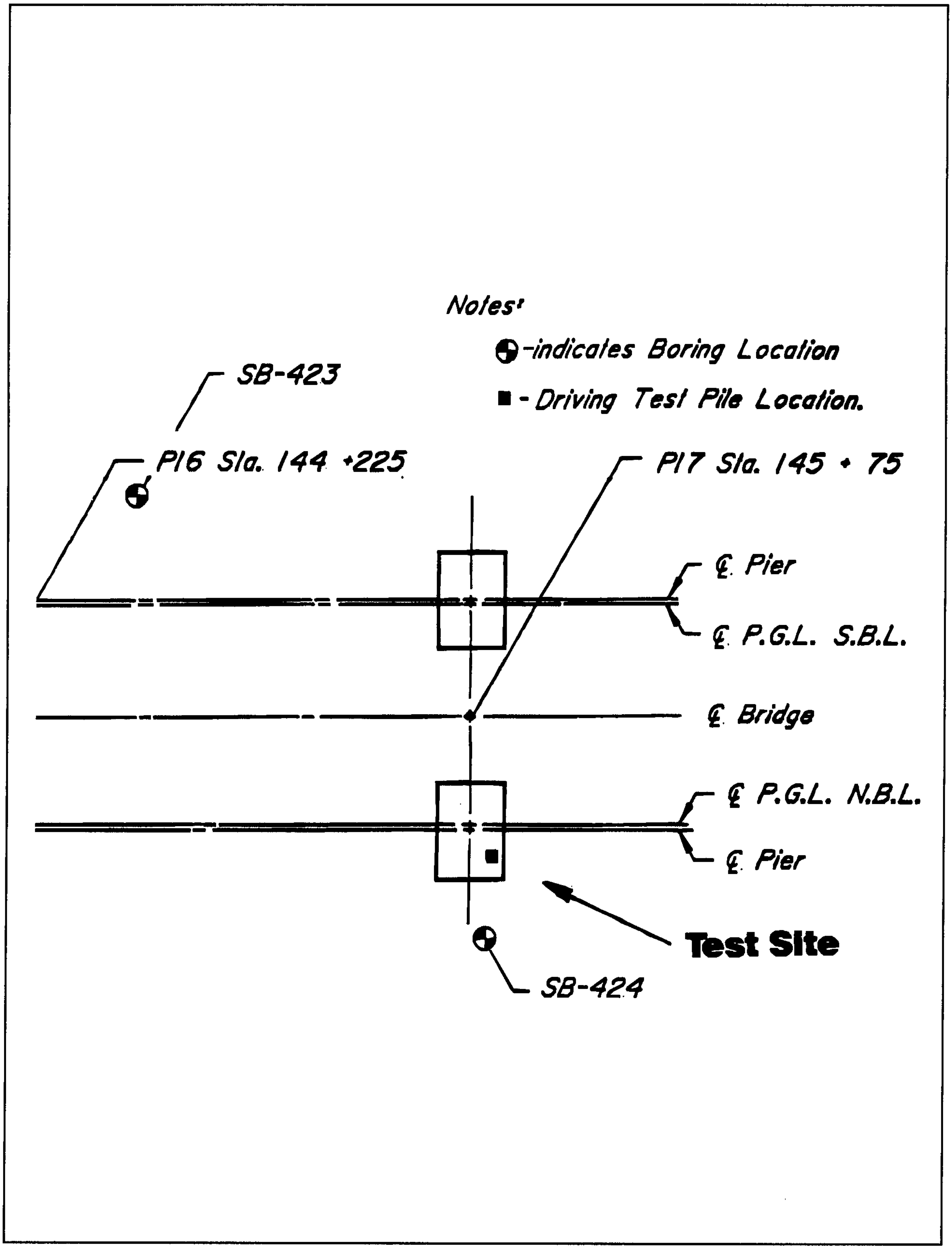


Figure F.3a: Site Plan - CD17

STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

BORING NO. SB # 424

89-110-06 C AND D CANAL BRIDGE (ST. GEORGES) SUBSURFACE INVESTIGATION
LOCATION: STA. 145+80, 65' Rt. CENTERLINE (S.R. 1, U.S. 13, RELIEF ROUTE)

NO.	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	CLASS/G.I.	REMARKS
1	3.5'	3	Moist to wet firm seams of fine sandy clay	A-7-5 (11)	Field Penetrometer
		3	w/light brown thin seams of silty sand,		Reading : 0.5-1.5 T.S.F.
	5.0'	5	some organic matter, trace of gravel.		
			(Spoil Area)		
			16" Sample 16" Recovery		
2	8.5'	3	Wet stiff gray-green clayey fine sandy silt	A-4 (0)	
		7	w/seams of dark gray silt, some organic		
	10.0'	8	matter, trace of coarse sand and gravel.		
			(Spoil Area)		
			14" Sample 14" Recovery		
3	13.5'	4	Wet medium dense gray-green gravelly fine	A-2-4 (0)	
		8	to coarse sand w/seams of gray silt,		
	15.0'	6	trace of organic matter.		
			(Spoil Area)		
			10" Sample 10" Recovery		
4	18.5'	3	Saturated loose gray-green fine sand	A-2-4 (0)	3/8/89 8:00 a.m.
		3	w/some silt and mica, trace of organic		Water @ 19.0'
	20.0'	3	matter and coarse sand.		
			(Spoil Area)		
			12" Sample 12" Recovery		
5	23.5'	1	Saturated very loose gray-green micaceous	A-2-4 (0)	
		2	silty fine sand w/trace of organic matter		
	25.0'	2	and coarse sand.		
			(Spoil Area)		
			16" Sample 16" Recovery		
6	28.5'	1	Saturated soft gray-green micaceous clayey	A-4 (0)	
		1	fine to coarse sandy silt w/trace of gravel		
			and organic matter. (9" Sample)		
7	30.0'	2	Saturated soft light brown organic silty	A-7-5 (9)	
			fine sandy clay w/trace of coarse sand.		
			(9" Sample) (Spoil Area)		
			18" Recovery		
8	33.5'	W/H	Saturated very loose light brown silty	A-2-4 (0)	
		W/H	coarse to fine sand w/some gravel.		
	35.0'	W/H			
			10" Sample 10" Recovery		

Figure F.3b: Soil Boring Log - CD17

STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

BORING NO. SB # 424

89-110-06 C AND D CANAL BRIDGE (ST. GEORGES) SUBSURFACE INVESTIGATION
LOCATION: STA. 145+80, 65' Rt. CENTERLINE (S.R. 1, U.S. 13, RELIEF ROUTE)

NO.	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	CLASS/G.I.	REMARKS
18	73.5' 75.0'	22 17 19 36	Saturated dense brown to gray-green silty fine sand w/some mica, trace of organic matter. 12" Sample 12" Recovery	A-2-4 (0)	
19	78.5' 80.0'	14 13 12 25	Saturated medium dense gray-green micaceous silty fine sand w/some organic matter, trace of coarse sand. 12" Sample 12" Recovery	A-2-4 (0)	Field Penetrometer Reading : 1.0 T.S.F.
20	83.5' 85.0'	6 9 11	Saturated very stiff gray-green micaceous silty fine sandy clay w/some organic matter. 14" Sample 14" Recovery	A-7-5 (2)	Field Penetrometer Reading : 1.0-1.5 T.S.F.
21	88.5' 90.0'	7 10 12	Saturated very stiff gray-green micaceous silty fine sandy clay w/some organic matter. 12" Sample 12" Recovery	A-7-5 (1)	Field Penetrometer Reading : 1.5 T.S.F.
22	93.5' 95.0'	4 9 13	Saturated very stiff gray-green silty fine sandy clay w/some organic matter, trace of mica. 16" Sample 16" Recovery	A-7-6 (9)	Field Penetrometer Reading : 1.5 T.S.F.
23	98.5' 100.0'	9 14 14	Saturated very stiff dark gray organic silty fine sandy clay w/trace of mica. 17" Sample 17" Recovery	A-7-6 (25)	Field Penetrometer Reading : 2.0 T.S.F.
U-2 24	100.0' 102.0'	Press Sample	Saturated dark gray organic silty clay. 23" Recovery	----------	
25	103.5' 105.0'	8 12 14	Saturated very stiff dark gray organic silty fine sandy clay w/trace of mica.	A-7-6 (36)	Field Penetrometer Reading : 2.25 T.S.F.

Figure F.3b: Soil Boring Log - CD17 (continued)

STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

BORING NO. SB # 424

89-110-06 C AND D CANAL BRIDGE (ST. GEORGES) SUBSURFACE INVESTIGATION
LOCATION: STA. 145+80, 65' Rt. CENTERLINE (S.R. 1, U.S. 13, RELIEF ROUTE)

NO.	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	CLASS/G.I.	REMARKS
18	73.5'	22	Saturated dense brown to gray-green silty	A-2-4 (0)	
		17	fine sand w/some mica, trace of organic		
	75.0'	19	matter.		
		36	12" Sample 12" Recovery		
19	78.5'	14	Saturated medium dense gray-green micaceous	A-2-4 (0)	Field Penetrometer
		13	silty fine sand w/some organic matter,		Reading : 1.0 T.S.F.
	80.0'	12	trace of coarse sand.		
		25	12" Sample 12" Recovery		
20	83.5'	6	Saturated very stiff gray-green micaceous	A-7-5 (2)	Field Penetrometer
		9	silty fine sandy clay w/some organic matter.		Reading : 1.0-1.5 T.S.F.
	85.0'	11			
			14" Sample 14" Recovery		
21	88.5'	7	Saturated very stiff gray-green micaceous	A-7-5 (1)	Field Penetrometer
		10	silty fine sandy clay w/some organic matter.		Reading : 1.5 T.S.F.
	90.0'	12			
			12" Sample 12" Recovery		
22	93.5'	4	Saturated very stiff gray-green silty fine	A-7-6 (9)	Field Penetrometer
		9	sandy clay w/some organic matter, trace of		Reading : 1.5 T.S.F.
	95.0'	13	mica.		
			16" Sample 16" Recovery		
23	98.5'	9	Saturated very stiff dark gray organic	A-7-6 (25)	Field Penetrometer
		14	silty fine sandy clay w/trace of mica.		Reading : 2.0 T.S.F.
	100.0'	14			
			17" Sample 17" Recovery		
U-2	100.0'	Press	Saturated dark gray organic silty clay.	----------	
24		Sample			
	102.0'				
			23" Recovery		
25	103.5'	8	Saturated very stiff dark gray organic	A-7-6 (36)	Field Penetrometer
		12	silty fine sandy clay w/trace of mica.		Reading : 2.25 T.S.F.
	105.0'	14			

Figure F.3b: Soil Boring Log - CD17 (continued)

MATERIALS AND RESEARCH DIVISION
SUMMARY OF SOIL ANALYSIS TESTS PAGE 1

CONTRACT- 89-110-06 NAME--- C AND D CANAL BRIDGE(ST.GEO.)
DATE----- MARCH 16, 1989 SUBSURFACE INVESTIGATION
(S.R. 1,U.S. 13,RELIEF ROUTE)

LOCATION	DEPTH	2.5	2	1	3/8	4	10	40	200	LL	PL	MO	OR	PI	CLASS	GI
		*********** PERCENT PASSING ***********														
	(FIELD DATA : 3/8/89,3/9/89,3/10/89)															
SB # 424	S#1 (TEST # 4959-4994)															
STA.	3.5- 5.0	100	100	100	99	99	98	94	55	54	31	38	5	23	A-7-5	11
145+80	S#2															
65' Rt.	8.5-10.0	100	100	100	96	95	94	85	40	29	22	25	4	7	A-4	0
CENTER	S#3															
LINE	13.5-15.0	100	100	100	94	85	75	53	17	--	--	15	3	NP	A-2-4	0
	S#4															
	18.5-20.0	100	100	100	100	100	100	99	17	--	--	37	2	NP	A-2-4	0
	S#5															
	23.5-25.0	100	100	100	100	100	100	99	22	--	--	47	4	NP	A-2-4	0
	S#6															
	28.5-29.2	100	100	100	100	99	96	74	45	24	17	19	2	7	A-4	0
	S#7															
	29.2-30.0	100	100	100	100	100	100	97	54	53	32	52	6	21	A-7-5	9
	S#8															
	33.5-35.0	100	100	100	97	94	89	48	27	--	--	16	--	NP	A-2-4	0
	S#9															
	38.5-40.0	100	100	100	100	100	100	92	80	64	37	55	11	27	A-7-5	25
	S#10															
	43.5-45.0	100	100	100	100	100	100	100	67	84	41	49	7	43	A-7-5	31
	S#11 & U-1															
	46.9-47.0	100	100	100	100	98	97	78	50	21	17	19	1	4	A-4	0
	S#12															
	48.5-50.0	100	100	100	100	100	100	97	31	30	18	25	3	12	A-2-6	0
	S#13															
	53.5-54.5	100	100	100	100	100	100	98	34	37	25	29	4	12	A-2-6	0
	S#14															
	54.5-55.0	100	100	100	100	100	100	98	71	48	21	32	6	27	A-7-6	18
	S#15															
	58.5-60.0	100	100	100	99	99	98	93	19	--	--	27	--	NP	A-2-4	0
	S#16															
	63.5-65.0	100	100	100	100	100	100	98	21	--	--	28	--	NP	A-2-4	0
	S#17															
	68.5-70.0	100	100	100	100	100	100	99	19	--	--	29	--	NP	A-2-4	0

Figure F.3b: Soil Boring Log - CD17 (continued)

MATERIALS AND RESEARCH DIVISION
SUMMARY OF SOIL ANALYSIS TESTS

CONTRACT- 89-110-06
DATE----- MARCH 16, 1989

NAME--- C AND D CANAL BRIDGE(ST.GEO.)
SUBSURFACE INVESTIGATION
(S.R. 1,U.S. 13,RELIEF ROUTE)

		*********** PERCENT PASSING ***********														
LOCATION	DEPTH	2.5	2	1	3/8	4	10	40	200	LL	PL	MO	OR	PI	CLASS	GI
	S#18															
	73.5-75.0	100	100	100	100	100	100	100	25	29	--	28	3	NP	A-2-4	0
	S#19															
	78.5-80.0	100	100	100	100	100	100	99	28	30	--	27	4	NP	A-2-4	0
	S#20															
	83.5-85.0	100	100	100	100	100	100	100	37	45	30	28	4	15	A-7-5	2
	S#21															
	88.5-90.0	100	100	100	100	100	100	100	40	42	31	31	5	11	A-7-5	1
	S#22															
	93.5-95.0	100	100	100	100	100	100	100	54	49	28	31	5	21	A-7-6	9
	S#23 (98.5'-100.0')															
	98.5-100.0	100	100	100	100	100	100	100	73	61	28	31	7	33	A-7-6	25
	S#24 & U-2 (101.9'-102.0')															
	101.9-102.0	PRESS SAMPLE - NO SIEVE ANALYSIS								79	30	41	7	49	-----	--
	S#25 (103.5'-105.0')															
	103.5-105.0	100	100	100	100	100	100	100	77	73	29	33	6	44	A-7-6	36
	S#26 (108.5'-110.0')															
	108.5-110.0	100	100	100	100	100	100	99	65	74	30	34	7	44	A-7-5	28
	S#27 (113.5'-115.0')															
	113.5-115.0	100	100	100	100	100	100	99	78	76	32	33	7	44	A-7-5	38
	S#28 (118.5'-120.0')															
	118.5-120.0	100	100	100	100	100	100	89	45	41	21	26	9	20	A-7-6	5
	S#29 (123.5'-125.0')															
	123.5-125.0	100	100	100	99	97	95	92	46	41	22	21	8	19	A-7-6	5
	S#30 (128.5'-130.0')															
	128.5-130.0	100	100	100	100	100	100	98	51	35	25	25	6	10	A-4	3
	S#31 (133.5'-135.0')															
	133.5-135.0	100	100	100	100	100	100	99	69	37	24	25	7	13	A-6	8
	S#32 (138.5'-139.0')															
	138.5-139.0	100	100	100	97	97	97	95	52	34	21	21	6	13	A-6	4
	S#33 (139.0'-139.6')															
	139.0-139.6	100	100	100	100	100	100	99	66	19	16	15	--	3	A-4	0
	S#34 (143.5'-145.0')															
	143.5-145.0	100	100	100	100	100	100	100	45	16	--	19	--	NP	A-4	0

Figure F.3b: Soil Boring Log - CD17 (continued)

SR-1 Construction | Test Pile Driving Record | Date: 3/10/1993
Location: C&D Canal Bridge; Ref. Bot. of Ft Elev.: 45.1 | Casting Date: 12/18/1992
Hammer Type: Diesel; Make & Model: Delmag D46-32
Pile Type: 24 sq in. Prec. Prest. Conc.; Bent: 17 (NBL); Pile No.: 2; Pile Length: 75 ft
Pile Cushion: 8" oak; Required Bearing: 500 tons.

Depth of Tip [ft]	No. of Blows /ft	No. of Blows /min.	Hammer Stroke [ft]	Remark	Depth of Tip [ft]	No. of Blows /ft	No. of Blows /min.	Hammer Stroke [ft]	Remark
5	9	45	6.8	Fuel #1	40	8	46	6.7	
6	10	45	6.8		41	9	45	6.7	
7	9	45	6.7		42	7	45	6.8	
8	10	45	6.7		43	5	45	7.0	
9	11	46	6.7		44	6	45	7.0	
10	9	46	6.7		45	13	45	7.0	
11	9	45	6.7		46	15	45	7.0	
12	9	46	6.7		47	22	44	7.2	
13	9	45	6.7		48	46	43	7.6	
14	10	45	6.7		49	70	43	7.7	
15	8	46	6.6		50	94	43	7.7	
16	6	46	6.6		51	86	41	8.4	Fuel #3
17	5	46	6.6		52	87	37	10.1	Fuel #4
18	5	46	6.6		53	83	37	10.1	
19	5	46	6.6		54	76	37	10.1	
20	6	46	6.6		55	70	37	10.2	
21	5	46	6.6		56	59	37	10.3	
22	4	46	6.6		57	55	37	10.1	
23	5	46	6.6		58	53	38	9.8	Fuel #3
24	5	45	6.7		59	52	38	9.7	
25	7	45	6.8		60	51	38	9.7	
26	8	45	6.8		61	47	38	9.7	
27	8	45	6.7		62	49	38	9.6	
28	7	45	6.8		63	48	38	9.6	
29	7	45	6.8		64	50	38	9.7	
30	7	45	6.7		65	47	38	9.7	
31	7	45	6.7		66	49	38	9.7	
32	7	46	6.7		67				
33	6	46	6.6		68				
34	7	45	6.7		69				
35	7	45	6.7		70				
36	7	45	6.7		71				
37	7	45	6.7		72				
38	8	45	6.8		73				
39	6	46	6.7		74				

Restrike (3/19/1993): Pile Penetration 51 ft; 20 blows at 9.5 ft Stroke (Fuel#4) and 0.173 movement or 116 blows/ft. Then continue driving.
Restrike (3/25/1993): Pile Penetration 66 ft; 20 blows at 8.9 ft Stroke and 0.155 movement or 129 blows/ft.

Figure F.3c: Pile Driving Log - CD17

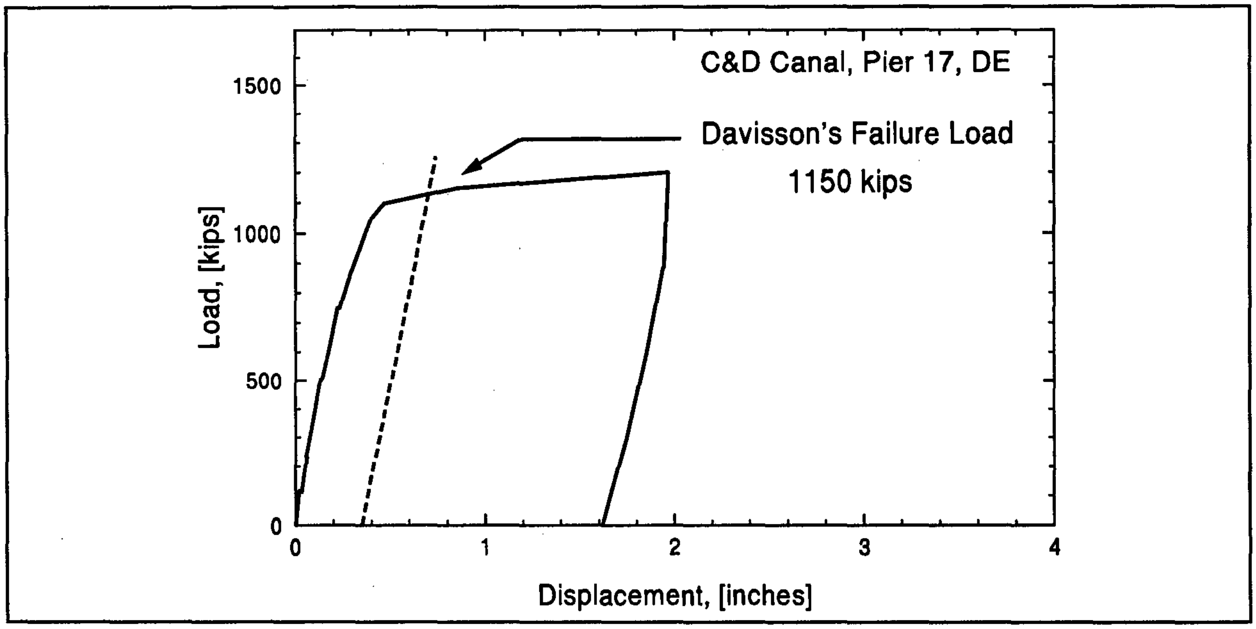


Figure F.3d: Static Load Test Result - CD17

F.4 C&D CANAL, PIER 21, DE (DB_ID # 203)

Pile Information:	
Type:	24 in Square Prestressed Concrete Pile.
Cross Sectional Area:	576 in^2 or 371 612 mm^2.
Length:	75.0 ft or 22.8 m.
Date Driven:	3/9/1993.
Penetration:	72.0 ft or 21.9 m.
Hammer Information:	
Manufacturer - Model:	Delmag D46-32.
Type:	Open End Diesel Hammer.
Helmet Weight:	6.0 kips or 26.7 kN.
Hammer Cushion Material:	Aluminum and Micarta.
Hammer Cushion Area:	415.5 in^2 or 268 063 mm^2.
Hammer Cushion Thickness:	3.0 in or 76.2 mm.
Pile Cushion Material:	Oak.
Pile Cushion Area:	576 in^2 or 371 612 mm^2.
Pile Cushion Thickness:	8 in or 203.2 mm.
Soil Boring Log No.:	SB #428.
CPT Results No.:	None.
Static Load Test Information:	
Test Date:	4/14/1993.
Maximum Load:	1300 kips or 5 785 kN.
Davisson's Failure Criterion:	1300 kips or 5 785 kN.

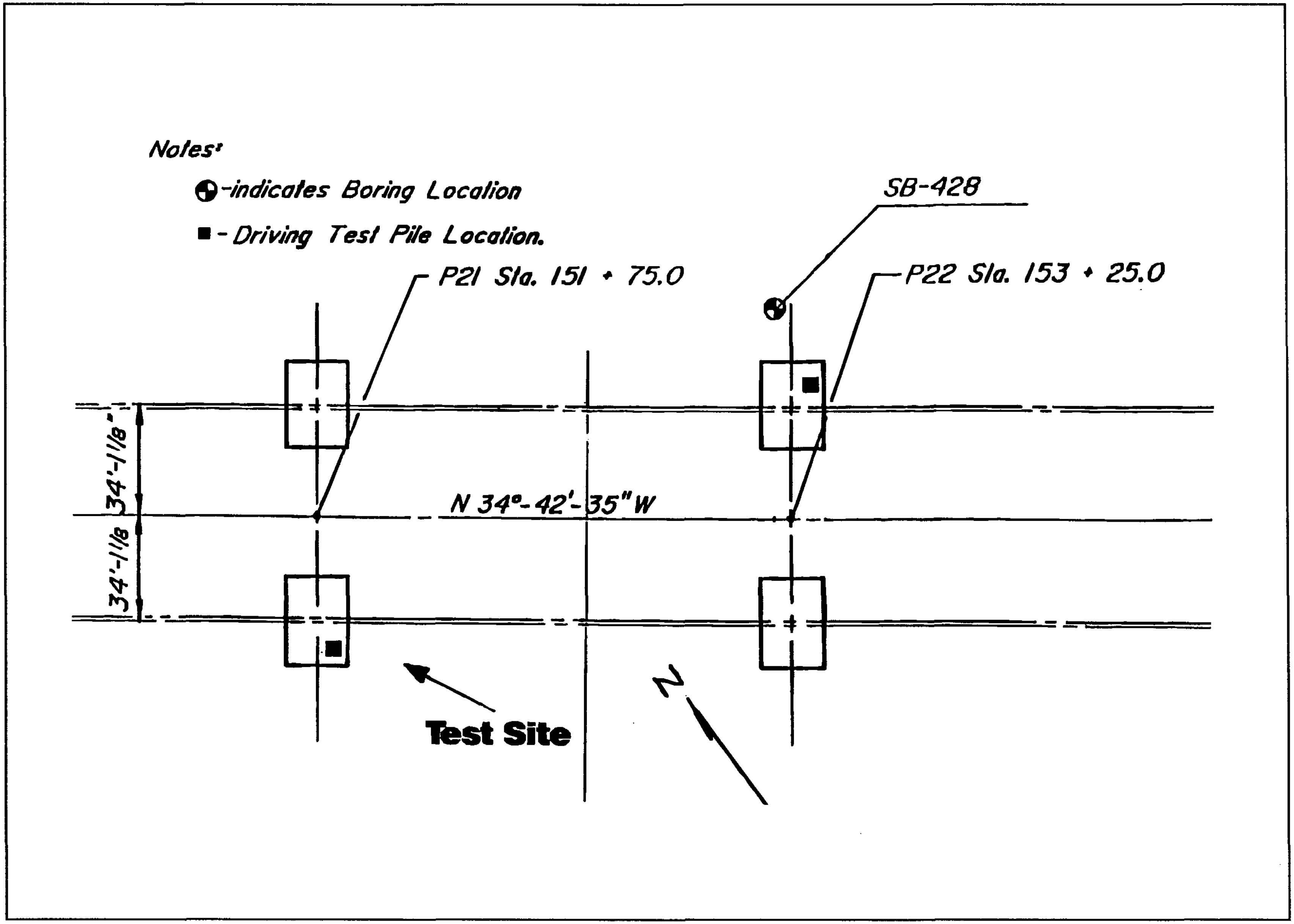


Figure F.4a: Site Plan - CD21

STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

BORING NO. SB # 428

NTRACT: 89-110-06 C AND D CANAL BRIDGE (ST. GEORGES) SUBSURFACE INVESTIGATION
RING LOCATION: STA. 153+20, 65' Lt. CENTERLINE (S.R. 1, U.S. 13, RELIEF ROUTE)

AILY OGRESS	NO.	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	CLASS/G.I.	REMARKS
29/89	1	3.5'	3	Wet firm gray fine sandy silt w/some mica,	A-4 (0)	
			3	trace of organic matter.		
		5.0'	3			
				8" Sample 8" Recovery		
	2	8.5'	4	Wet loose gray-green silty fine sand	A-2-4 (0)	
			3	w/some mica, trace of organic matter.		
		10.0'	2			
				8" Sample 8" Recovery		
	3	13.5'	W/H	Saturated soft gray-green organic silty	A-7-5 (14)	
			W/H	clay w/some fine sand, trace of mica.		
		15.0'	W/H			
				10" Sample 10" Recovery		
	4	18.5'	W/H	Saturated soft gray-green organic clayey	A-4 (3)	
			W/H	fine sandy silt w/trace of mica.		
		20.0'	W/H			
				10" Sample 10" Recovery		
	5	23.5'	W/H	Saturated soft gray-green organic silty	----------	Seams of clay in top of
			W/H	clay.		spoon.
		25.0'	1			Seams of peat in bottom
						of spoon.
				8" Sample 8" Recovery		
	6	28.5'	3	Saturated loose gray-green silty fine sand	A-2-4 (0)	3/29/89 8:30 a.m.
			4	w/some mica, trace of organic matter.		Water @ 30.0'
		30.0'	5			
				9" Sample 9" Recovery		
	7	33.5'	2	Saturated loose gray-green fine sand	A-2-4 (0)	
			3	w/some silt and mica, trace of organic		
		35.0'	3	matter and coarse sand.		
				12" Sample 12" Recovery		
	8	38.5'	5	Saturated stiff gray-green fine sandy silt	A-4 (0)	Seams of clay in bottom
			6	w/some organic matter and mica, trace of		of spoon.
		40.0'	5	coarse sand.		
				12" Sample 12" Recovery		

BORING NO. SB # 428
SURFACE ELEV. + 46.8'
ELEV. REF. : TOPOGRAPHY/PLANS

Figure F.4b: Soil Boring Log - CD21

STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

BORING NO. SB # 428

.AACT: 89-110-06 C AND D CANAL BRIDGE (ST. GEORGES) SUBSURFACE INVESTIGATION
RING LOCATION: STA. 153+20, 65' Lt. CENTERLINE (S.R. 1, U.S. 13, RELIEF ROUTE)

ILY 2RESS	NO.	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	CLASS/G.I.	REMARKS
9/89	9	43.5'	3	Saturated firm gray-green fine sandy silt	A-4 (0)	
			2	w/some organic matter, trace of coarse		
				sand. (8" Sample)		
	10	45.0'	3	Saturated soft gray-green organic silty	----------	
				clay. (6" Sample)		
				14" Recovery		
	U-1	45.0'	Press	Saturated brown silt w/trace of clay and	A-4 (3)	
	11		Sample	fine to coarse sand.		
				(Sample # 11 (46.9'-47.0') removed from		
		47.0'		bottom of tube U-1.)		
				17" Sample 18" Recovery		
	12	48.5'	7	Wet to saturated very stiff gray organic	A-7-5 (61)	
			8	silty clay w/trace of fine to coarse sand.		
		50.0'	10			
				14" Sample 14" Recovery		
	13	53.5'	8	Saturated brown peat. (6" Sample)	----------	
	14	55.0'	10	Saturated very stiff gray-green organic	A-4 (0)	
			9	fine sandy silt w/trace of coarse sand.		
				(8" Sample) 14" Recovery		
	15	58.5'	9	Wet to saturated very stiff gray-green fine	A-4 (0)	
			12	sandy silt w/some organic matter and mica.		
		60.0'	12			
				14" Sample 14" Recovery		
	16	63.5'	5	Saturated stiff gray fine sandy silt	A-4 (0)	
			6	w/some organic matter and mica.		
		65.0'	7			
				13" Sample 13" Recovery		
	17	68.5'	4	Saturated stiff gray fine sandy silt	A-4 (0)	
			7	w/some organic matter, mica and clay.		
		70.0'	8			
				14" Sample 14" Recovery		
	18	73.5'	5	Saturated stiff gray clayey fine sandy silt	A-4 (4)	
			6	w/some organic matter and mica.		
		75.0'	7			
				13" Sample 13" Recovery		

BORING NO. SB # 428
SURFACE ELEV. + 46.8'
ELEV. REF. : TOPOGRAPHY/PLANS

Figure F.4b: Soil Boring Log - CD21 (continued)

STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

BORING NO. SB # 428

TRACT: 89-110-06 C AND D CANAL BRIDGE (ST. GEORGES) SUBSURFACE INVESTIGATION
RING LOCATION: STA. 153+20, 65' Lt. CENTERLINE (S.R. 1, U.S. 13, RELIEF ROUTE)

ILY GRESS	NO.	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	CLASS/G.I.	REMARKS
29/89	19	78.5'	7	Wet very stiff gray organic silty fine	A-7-5 (19)	
			8	sandy clay w/trace of mica.		
		80.0'	9			
	20	83.5'	9	Wet very stiff gray organic silty clay	A-7-6 (35)	
			10	w/some fine sand, trace of mica.		
		85.0'	11			
				13" Sample 13" Recovery		
	21	88.5'	9	Wet very stiff gray organic silty clay	A-7-6 (52)	
			10	w/trace of fine sand and mica.		
		90.0'	10			
				14" Sample 14" Recovery		
	22	93.5'	17	Wet hard gray organic silty clay w/some	A-7-6 (46)	
			19	mica, trace of fine sand.		
		95.0'	23			
				16" Sample 16" Recovery		
30/89	23	98.5'	14	Wet hard gray organic silty fine sandy clay	A-7-6 (42)	
			15	w/some mica, trace of coarse sand.		
		100.0'	23			
				18" Sample 18" Recovery		
	24	103.5'	7	Wet hard gray organic silty fine sandy clay	A-7-6 (23)	
			24	w/some mica, trace of coarse sand.		
		105.0'	26			
				18" Sample 18" Recovery		
	25	108.5'	23	Wet hard gray organic silty fine sandy clay	A-7-6 (7)	
			30	w/some mica, trace of coarse sand.		
		110.0'	37			
				18" Sample 18" Recovery		
	26	113.5'	15	Wet hard gray silty fine sandy clay w/some	A-7-6 (7)	
			28	organic matter and mica, trace of coarse		
		115.0'	37	sand.		
				18" Sample 18" Recovery		

BORING NO. SB # 428
SURFACE ELEV. + 46.8'
ELEV. REF. : TOPOGRAPHY/PLANS

Figure F.4b: Soil Boring Log - CD21 (continued)

MATERIALS AND RESEARCH DIVISION
SUMMARY OF SOIL ANALYSIS TESTS PAGE 1

CONTRACT- 89-110-06
DATE----- APRIL 6, 1989

NAME--- C AND D CANAL BRIDGE(ST.GEO.)
SUBSURFACE INVESTIGATION
(S.R. 1,U.S. 13,RELIEF ROUTE)

(FIELD DATA : 3/29/89,3/30/89)

LOCATION	DEPTH	2.5	2	1	3/8	4	10	40	200	LL	PL	MO	OR	PI	CLASS	GI
		*********** PERCENT PASSING ***********														
SB # 428	S#1 (TEST # 6261-6291)															
STA.	3.5- 5.0	100	100	100	100	100	100	100	39	--	--	37	3	NP	A-4	0
153+20	S#2															
65' Lt.	8.5-10.0	100	100	100	100	100	100	100	21	--	--	36	2	NP	A-2-4	0
CENTER	S#3															
LINE	13.5-15.0	100	100	100	100	100	100	100	84	44	30	51	8	14	A-7-5	14
	S#4															
	18.5-20.0	100	100	100	100	100	100	100	62	35	28	43	9	7	A-4	3
	S#5															
	23.5-25.0	NO SIEVE ANALYSIS								36	28	56	12	8	-----	--
	S#6															
	28.5-30.0	100	100	100	100	100	100	100	23	--	--	39	2	NP	A-2-4	0
	S#7															
	33.5-35.0	100	100	100	100	100	100	99	15	--	--	35	2	NP	A-2-4	0
	S#8															
	38.5-40.0	100	100	100	100	100	100	99	47	30	--	34	5	NP	A-4	0
	S#9															
	43.5-44.5	100	100	100	100	100	100	99	42	29	--	30	5	NP	A-4	0
	S#10															
	44.5-45.0	NO SIEVE ANALYSIS								--	--	62	11	--	-----	--
	S#11 & U-1	PRESS SAMPLE														
	46.9-47.0	100	100	100	100	100	100	99	96	27	24	32	--	3	A-4	3
	S#12															
	48.5-50.0	100	100	100	100	100	100	99	90	97	41	50	14	56	A-7-5	61
	S#13															
	53.5-54.0	NO SIEVE ANALYSIS								--	--	79	28	--	-----	--
	S#14															
	54.0-55.0	100	100	100	100	100	100	96	40	--	--	35	6	NP	A-4	0
	S#15															
	58.5-60.0	100	100	100	100	100	100	100	48	29	--	27	5	NP	A-4	0
	S#16															
	63.5-65.0	100	100	100	100	100	100	100	52	30	--	29	5	NP	A-4	0
	S#17															
	68.5-70.0	100	100	100	100	100	100	100	48	33	29	30	5	4	A-4	0

Figure F.4b: Soil Boring Log - CD21 (continued)

MATERIALS AND RESEARCH DIVISION
SUMMARY OF SOIL ANALYSIS TESTS PAGE 2

CONTRACT- 89-110-06
DATE----- APRIL 6, 1989

NAME--- C AND D CANAL BRIDGE(ST.GEO.)
SUBSURFACE INVESTIGATION
(S.R. 1,U.S. 13,RELIEF ROUTE)

LOCATION	DEPTH	2.5	2	1	3/8	4	10	40	200	LL	PL	MO	OR	PI	CLASS	GI
					*********** PERCENT PASSING ***********											
	S#18 73.5-75.0	100	100	100	100	100	100	100	66	36	29	31	5	7	A-4	4
	S#19 78.5-80.0	100	100	100	100	100	100	100	77	53	30	30	6	23	A-7-5	19
	S#20 83.5-85.0	100	100	100	100	100	100	100	86	63	26	31	6	37	A-7-6	35
	S#21 88.5-90.0	100	100	100	100	100	100	100	93	75	26	34	7	49	A-7-6	52
	S#22 93.5-95.0	100	100	100	100	100	100	100	92	71	28	33	7	43	A-7-6	46
	S#23 (98.5'-100.0') 98.5-100.0	100	100	100	100	100	100	99	75	80	26	34	7	54	A-7-6	42
	S#24 (103.5'-105.0') 103.5-105.0	100	100	100	100	100	100	96	53	79	27	25	9	52	A-7-6	23
	S#25 (108.5'-110.0') 108.5-110.0	100	100	100	100	100	100	99	41	55	25	24	6	30	A-7-6	7
	S#26 (113.5'-115.0') 113.5-115.0	100	100	100	100	100	100	99	50	43	23	26	5	20	A-7-6	7
	S#27 (118.5'-120.0') 118.5-120.0	100	100	100	100	100	100	99	68	43	24	27	6	19	A-7-6	12
	S#28 (123.5'-125.0') 123.5-125.0	100	100	100	100	99	97	93	41	30	20	23	5	10	A-4	1
	S#29 (128.5'-129.0') 128.5-129.0	100	100	100	100	100	99	98	63	16	--	15	--	NP	A-4	0
	S#30 (133.5'-135.0') 133.5-135.0	100	100	100	100	100	100	97	92	23	15	17	--	8	A-4	5
	S#31 (136.5'-140.0') 138.5-140.0	100	100	100	100	100	100	95	77	24	16	15	--	8	A-4	4
	END															

Figure F.4b: Soil Boring Log - CD21 (continued)

SR-1 Construction | Test Pile Driving Record | Date: 3/9/1993

Location: C&D Canal Bridge; Ref. Bot. of Ft Elev.: 37.5 | Casting Date: 12/18/1992

Hammer Type: Diesel; Make & Model: Delmag D46-32

Pile Type: 24 sq in. Prec. Prest. Conc.; Bent: 21 (NBL); Pile No.: 2; Pile Length: 75 ft

Pile Cushion: 8" oak; Required Bearing: 500 tons.

Depth of Tip [ft]	No. of Blows /ft	No. of Blows /min.	Hammer Stroke [ft]	Remark	Depth of Tip [ft]	No. of Blows /ft	No. of Blows /min.	Hammer Stroke [ft]	Remark
0-19				Pile set	54	33	44	7.1	Fuel #1
20	14			Fuel #1	55	31	44	7.1	
21	4	46	6.7		56	27	44	7.1	
22	3				57	54	38	9.9	Fuel #4
23	3				58	44	38	9.9	
24	3				59	40	38	9.8	
25	2				60	41	39	9.4	Fuel #3
26	3				61	38	38	9.5	
27	3				62	35	38	9.6	
28	2				63	33	38	9.6	
29	2				64	32	38	9.6	
30	3				65	32	33	9.3	
31	3				66	37	41	8.4	Fuel #2
32	3				67	36	41	8.5	
33	4				68	38	41	8.4	
34	4				69	33	40	8.6	
35	7	47	6.6		70	36	41	8.5	
36	9	46	6.6		71	34	40	8.7	
37	11	45	6.7		72	34	40	8.8	
38	12	45	6.7		73				
39	14	45	7.0		74				
40	20	44	7.1		75				
41	31	44	7.2		76				
42	45	44	7.3		77				
43	40	44	7.2		78				
44	40	44	7.2		79				
45	27	42	7.9	Fuel #2	80				
46	25	42	7.9		81				
47	22	42	8.8		82				
48	21	42	7.9		83				
49	20	43	7.6		84				
50	19	43	7.7		85				
51	21	43	7.6		86				
52	24	43	7.6		87				
53	27	43	7.6		88				

Restrike (3/19/1993): Pile Penetration 56 ft; 21 blows at 9.7 ft Stroke (Fuel#4) and 0.307 movement or 68 blows/ft. Then continue driving.
Restrike (3/25/1993): Pile Penetration 72 ft; at 9.6 ft Stroke (Fuel#4) and 125 blows/ft.

Figure F.4c: Pile Driving Log - CD21

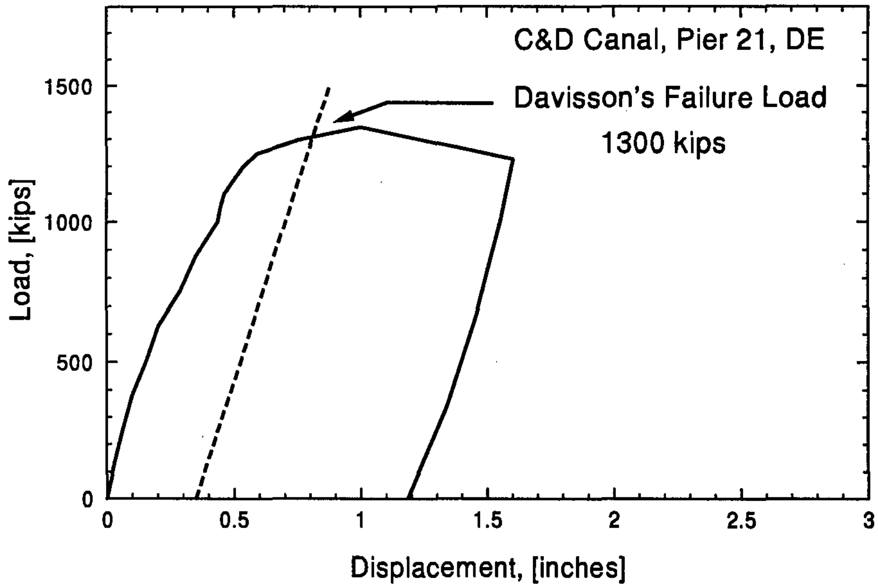


Figure F.4d: Static Load Test Result - CD21

F.5 WHITE CITY BRIDGE, FL ; TP3 AND TP6 (DB_ID # 62 AND 63)

Pile Information:	
Type:	24 in Square Prestressed Concrete Pile.
Cross Sectional Area:	576 in^2 or 371 612 mm^2.
Length:	(50.42 ft or 15.4 m for TP3) and (43.50 ft or 13.3 m for TP6).
Date Driven:	(3/22/1990 for TP3) and (3/13/1990 for TP6).
Penetration:	(37.45 ft or 11.4 m for TP3) and (28.70 ft or 8.7 m for TP6).

Hammer Information:	
Manufacturer - Model:	Delmag D46-32.
Type:	Open End Diesel Hammer.
Helmet Weight:	10.14 kips or 45.1 kN.
Hammer Cushion Material:	Conbest.
Hammer Cushion Area:	415.3 in^2 or 267 934 mm^2.
Hammer Cushion Thickness:	3.5 in or 88.9 mm^2.
Pile Cushion Material:	Plywood.
Pile Cushion Area:	551.0 in^2 or 355 483 mm^2.
Pile Cushion Thickness:	7.50 in or 190.5 mm.

Soil Boring Log No.:	(B-4 for TP3) and (B-8 for TP6).
CPT Results No.:	None.

Static Load Test Information:	TP3	TP6
Test Date:	3/29/1990.	3/23/1990.
Maximum Load:	700 kips or 3 115 kN.	600 kips or 2 670 kN.
Davisson's Failure Criterion:	630 kips or 2 803 kN.	460 kips or 2 047 kN.

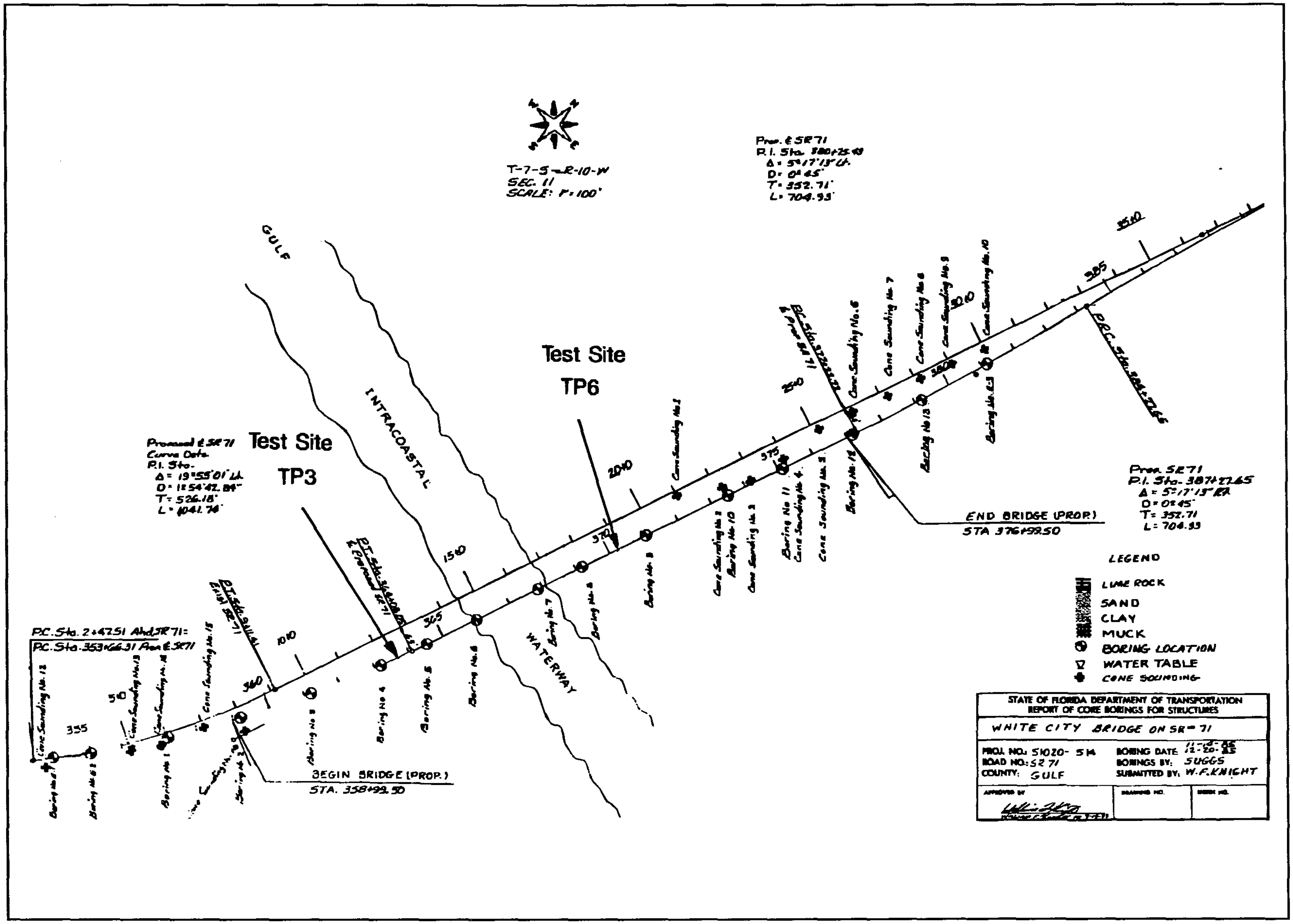


Figure F.5a: Site Plan - White City

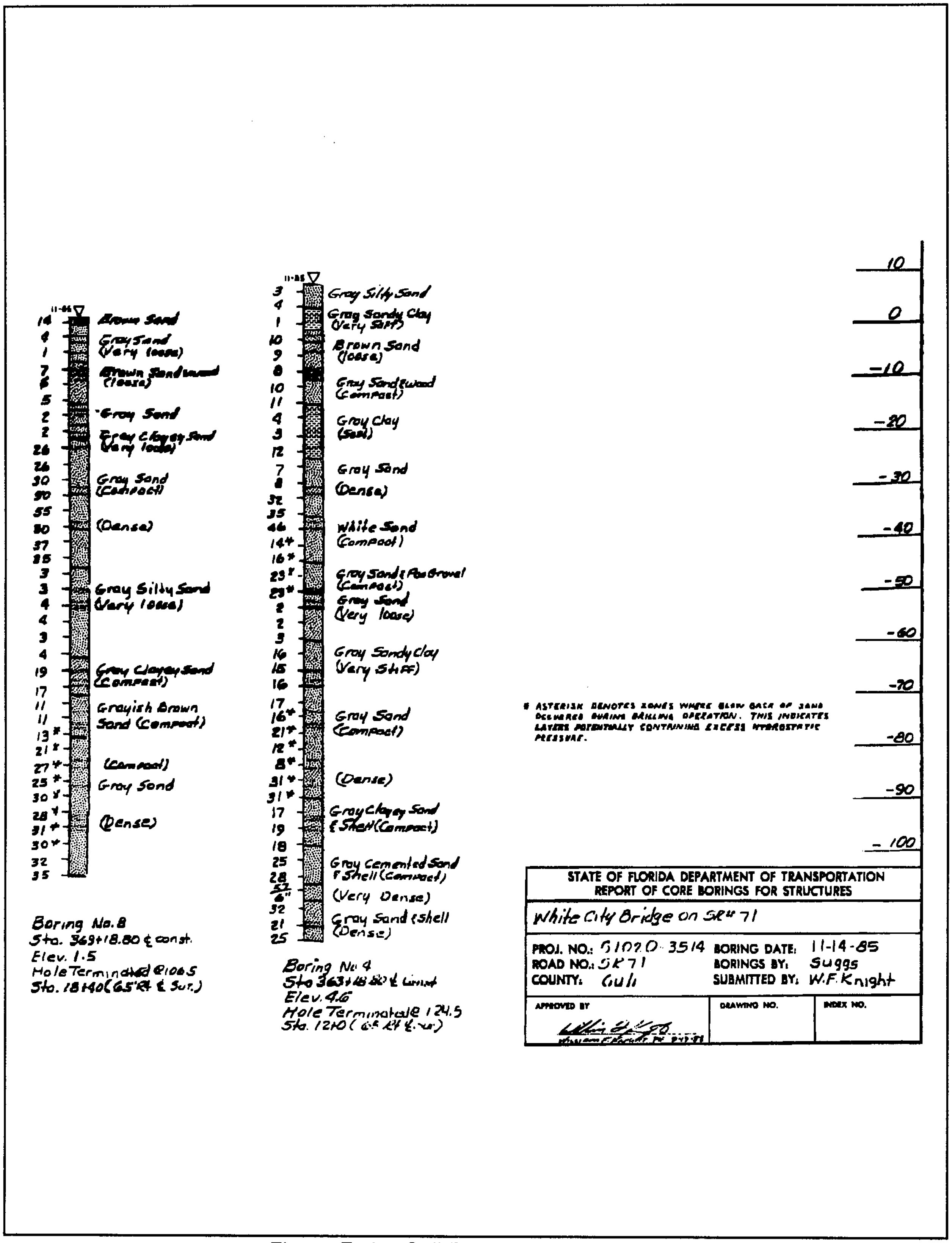


Figure F.5b: Soil Boring Log - White City

Test Pile Driving Record

Job No.:11120-016
Name: White City Bridge
Date 3-22-90
Job Location: White City, FL
Pile No. Test Pile #3
Pile Location: Pier #5
Datum: MSL
Pile Type: Square Prestressed Concrete
Hammer: Make and Model: Delmag D46-02
Tip Diam. 24 in; Butt Diam. 24 in
Time: Start Driving: 10:20 am
Length 50 ft 5 in
Finish Driving: 11:15 am
Penetration:
Remarks: Fuel setting #2
Ground Elev. Before Driving: +4.6 ft
PDA - 450 to 500 kips @ EOD
Tip Elev. After Driving: -32.6 ft
15 min restrike at 28 blows / 3"

Depth of Tip [ft]	No. of Blows	Remarks	Depth of Tip [ft]	No. of Blows	Remarks
0			21	9	
1			22	6	
2			23	5	
3			24	4	
4			25	4	
5			26	4	
6			27	8	
7			28	8	
8			29	8	
9	4		30	8	
10	6		31	7	
11	9		32	6	
12	10		33	9	
13	10		34	12	
14	10		35	30	
15	10		36	65	
16	11		37	85	
17	9			28/3"	EOD
18	8				
19	10				
20	11				

Figure F.5c: Pile Driving Log - White City, TP3

Test Pile Driving Record

Job No.:11120-016
Name: White City Bridge
Date 3-13-90
Job Location: White City, FL
Pile No. Test Pile #6
Pile Location: Pier #8
Datum: MSL
Pile Type: Square Prestressed Concrete
Hammer: Make and Model: Delmag D46-02
Tip Diam. 24 in; Butt Diam. 24 in
Time: Start Driving: 11:40 am
Length 43 ft 6 in
Finish Driving: 11:52 am
Penetration:
Remarks: Pile cushion = 7.5 " plywood
Ground Elev. Before Driving: +2.7 ft
Hammer fuel setting #2
Tip Elev. After Driving: -25.8 ft
PDA - 17 kip-ft

Depth of Tip [ft]	No. of Blows	Remarks	Depth of Tip [ft]	No. of Blows	Remarks
0			21	0	
1			22	2	
2			23	0	
3			24	0	
4			25	2	
5			26	8	
6			27	42	
7			28	65	
8				15/3"	EOD
9				20/2.5"	R1
10	1				
11	1				
12	3				
13	9				
14	15				
15	13				
16	11				
17	9				
18	5				
19	3				
20	2				

Figure F.5d: Pile Driving Log - White City, TP6

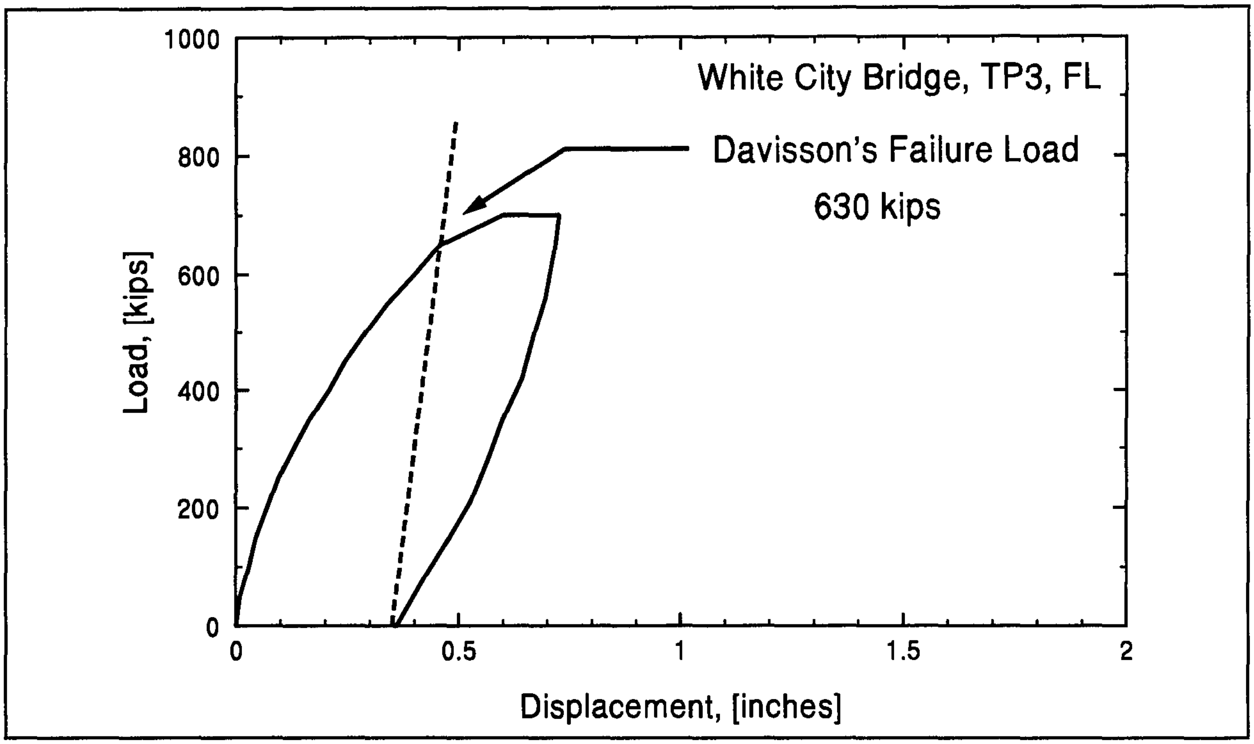


Figure F.5e: Static Load Test Result - White City, TP3

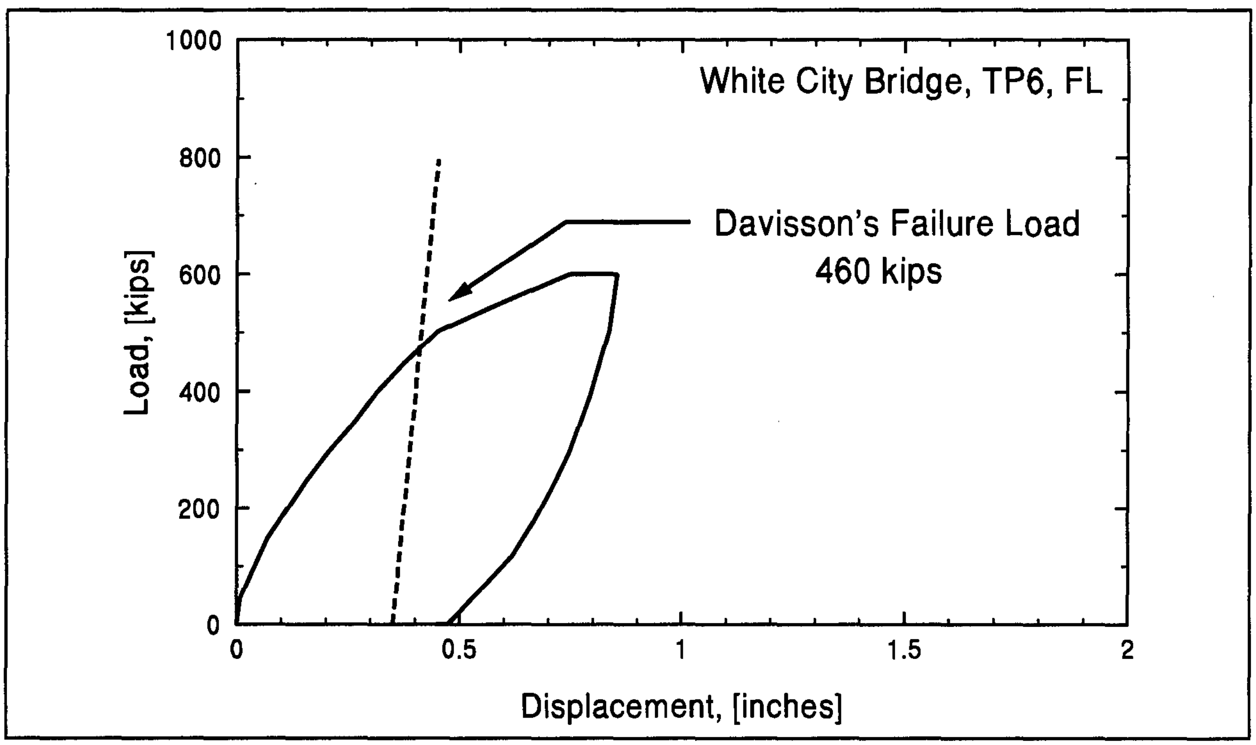


Figure F.5f: Static Load Test Result - White City, TP6

F.6 APALACHICOLA RIVER BRIDGE, FL (DB_ID # 1)

Pile Information:	
Type:	24 in Square Prestressed Concrete Pile with 12 in diameter hollow.
Cross Sectional Area:	462.90 in^2 or 27 677 mm^2.
Length:	98.0 ft or 29.9 m.
Date Driven:	9/4/1986.
Penetration:	90.62 ft or 27.6 m.
Hammer Information:	
Manufacturer - Model:	Vulcan 020.
Type:	Single Acting Air Hammer.
Helmet Weight:	Unknown (Standard: 5.20 kips).
Hammer Cushion Material:	Blue Nylon.
Hammer Cushion Area:	298.7 in^2 or 192 709 mm^2.
Hammer Cushion Thickness:	6.0 in or 152.4 mm.
Pile Cushion Material:	Plywood.
Pile Cushion Area:	576 in^2 or 371 612 mm^2.
Pile Cushion Thickness:	9 in or 228.6 mm.
Soil Boring Log No.:	Hole No. 3.
CPT Results No.:	CP3.
Static Load Test Information:	
Test Date:	9/16/1986.
Maximum Load:	960 kips or 4 272 kN.
Davisson's Failure Criterion:	958 kips or 4 263 kN.

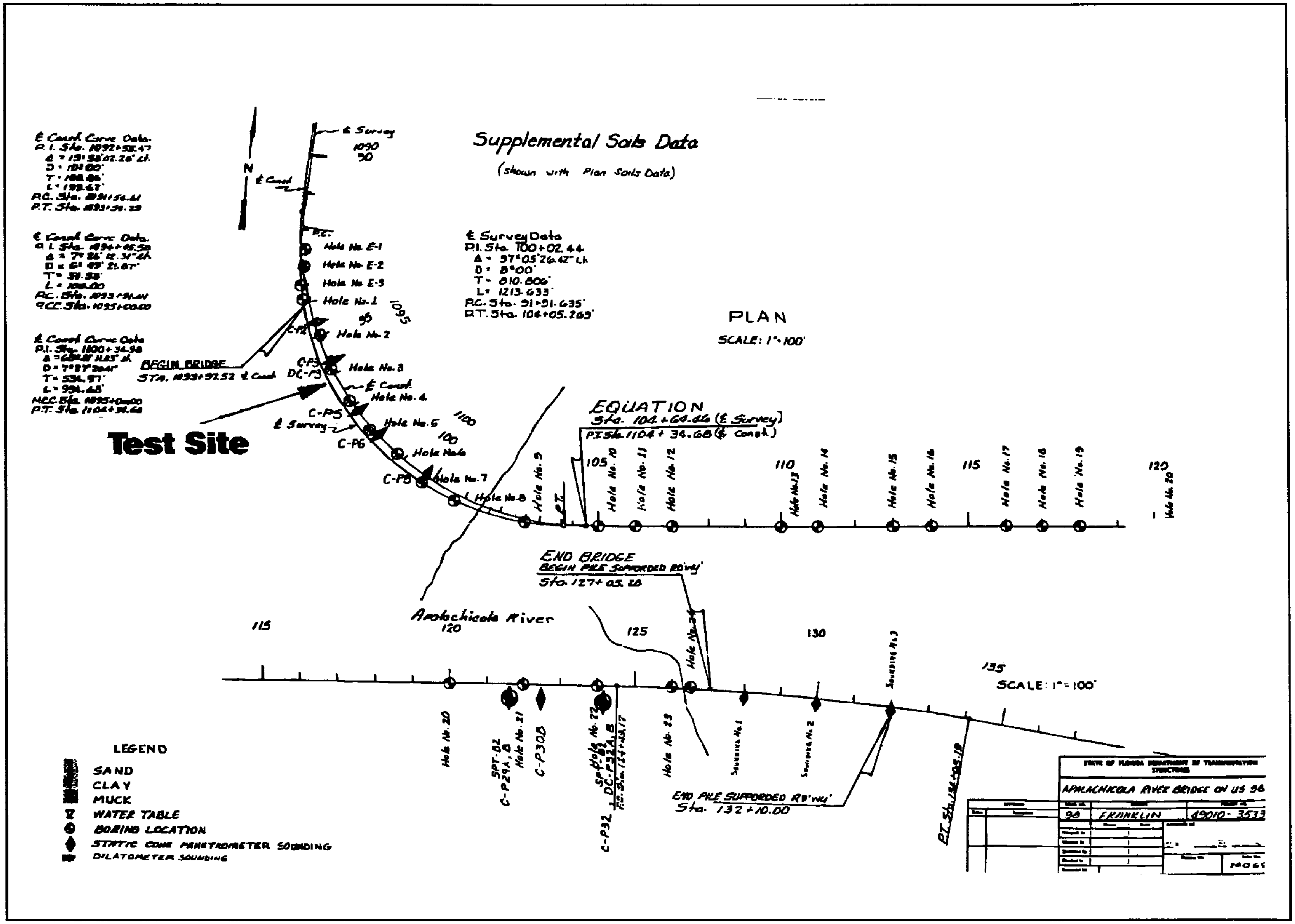


Figure F.6a: Site Plan - Apalachicola

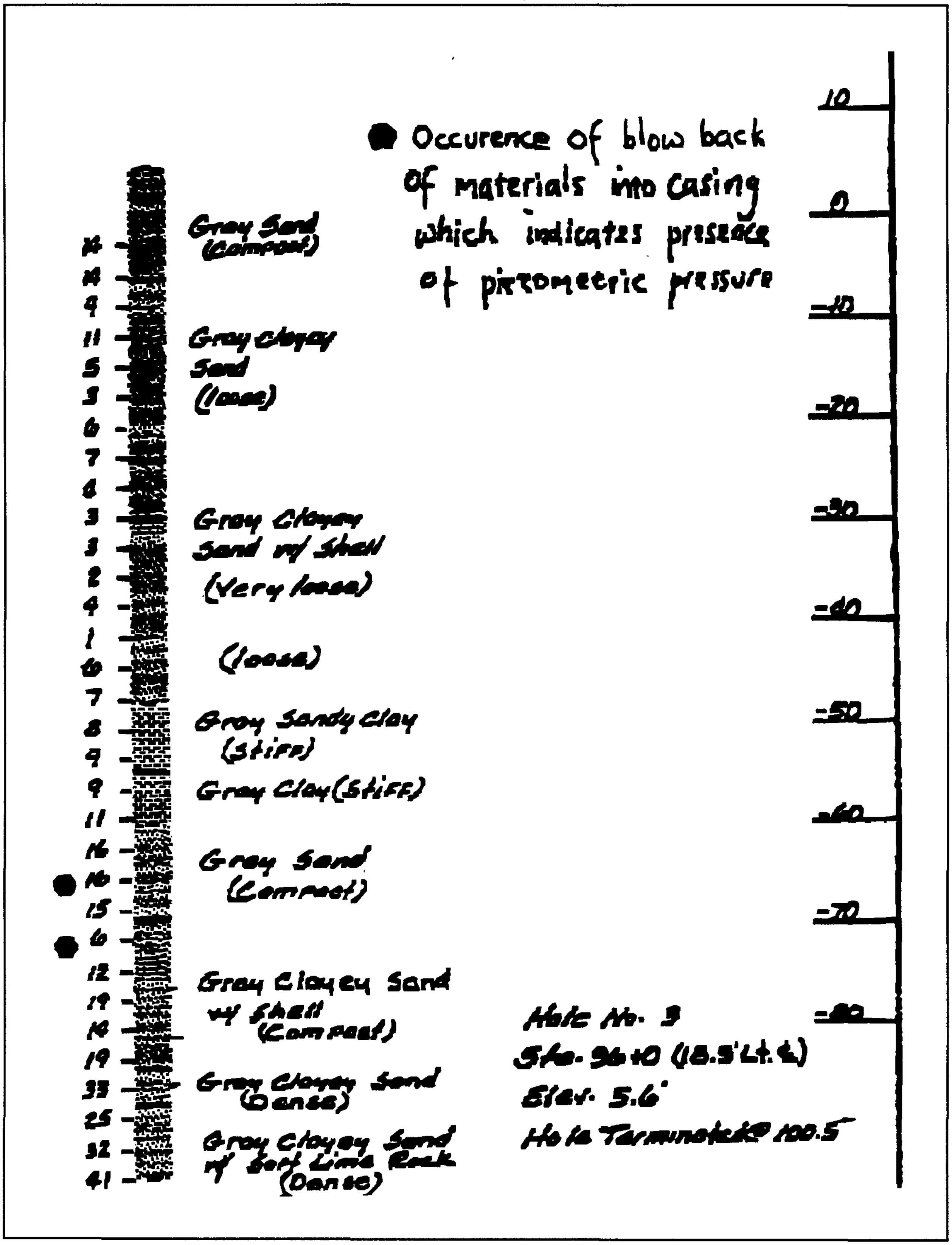


Figure F.6b: Soil Boring Log - Apalachicola

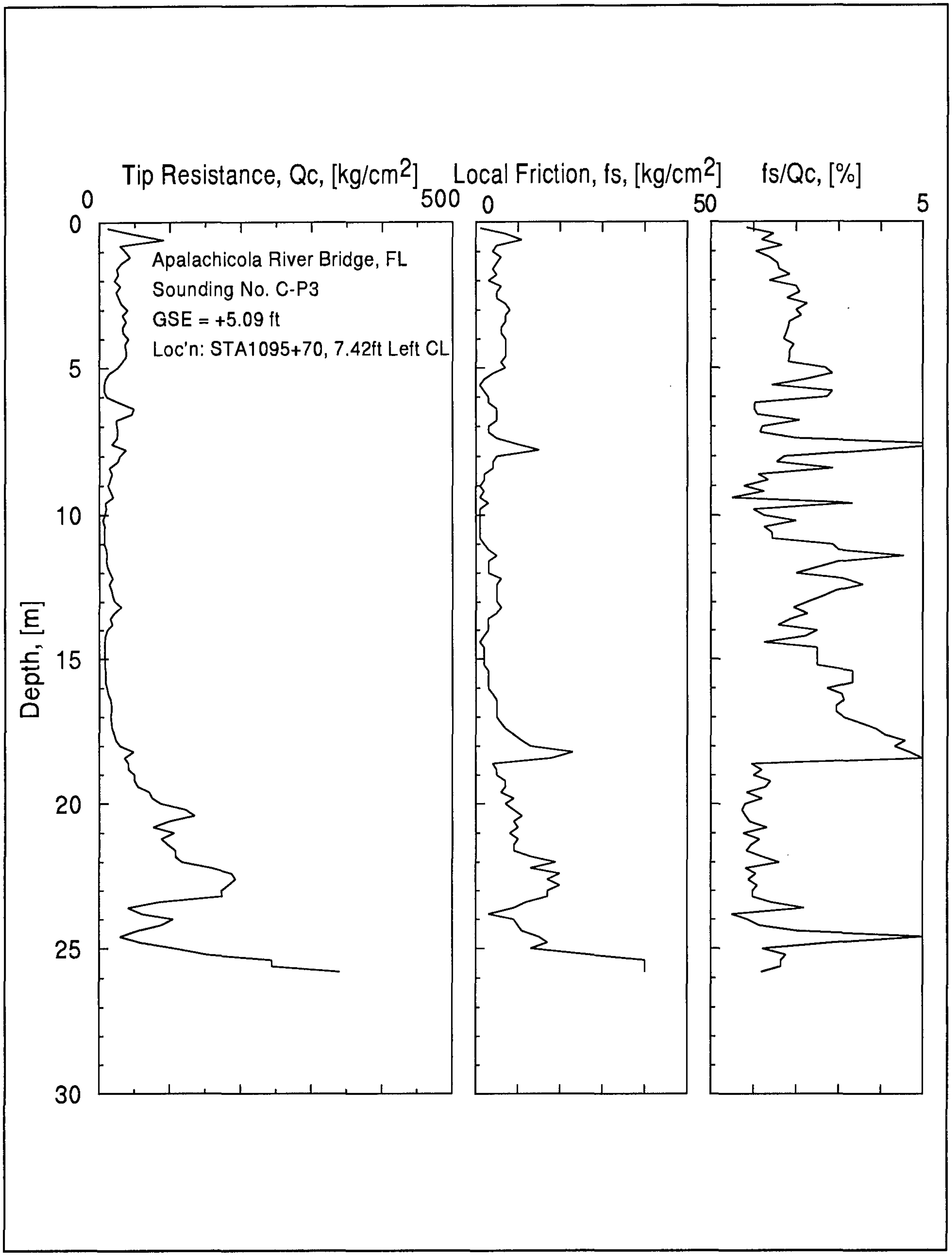


Figure F.6c: CPT Results - Apalachicola

APALACHICOLA RIVER BRIDGE TEST PILE RECORD

Location: PIER 3 | Pile Number: 7 | Pile Type: 24" SQ. CONC.
Original Driven Length: 98 ft | Length at Redrive: 93.25 ft | Point Protector: No
Date Driven: 4 SEP 1986 | Date Final Redrive: 17 SEP 1986 | Final No. of Splices: 0
Hammer No.1 (Original Driving): Vulcan 020
Energy: 60,000 ft-lb | Ram Weight: 20,000 lb
Pile Cushion: 9" Pine Plywood | Capblock: 6" Blue Polymer
Reference Elevation: +7.62 | Approximate Mudline Elevation: +5.22

Elev. Pile Tip	Distance driven [ft or in]	No. of blows	Blows per in	Notes	Elev. Pile Tip	Distance driven [ft or in]	No. of blows	Blows per in	Notes
-24.04				half	-62.04	1'	36	3.00	
-25.04	1'	10	0.83	strokes,	-63.04	1'	37	3.08	
-26.04	1'	9	0.75	instr.	-64.04	1'	36	3.00	
-27.04	1'	9	0.75	attached	-65.04	1'	37	3.08	
-28.04	1'	8	0.67		-66.04	1'	34	2.83	
-29.04	1'	8	0.67		-67.04	1'	34	2.83	
-30.04	1'	8	0.67		-68.04	1'	35	2.92	
-31.04	1'	6	0.67		-69.04	1'	35	2.92	
-32.04	1'	6	0.5		-70.04	1'	39	3.25	
-33.04	1'	5	0.5		-71.04	1'	39	3.25	
-34.04	1'	7	0.42		-72.04	1'	41	3.42	
-35.04	1'	7	0.58		-72.92	10.50"	35	3.33	
-36.04	1'	7	0.58		-73.04	1.50"	1	0.67	15 mins
-37.04	1'	8	0.58		-73.13	1.00"	1	1.00	set chk
-38.04	1'	9	0.67		-73.21	1.00"	1	1.00	
-39.04	1'	11	0.75		-73.29	1.00"	1	1.00	
-40.04	1'	10	0.92		-73.54	3.00"	7	2.33	
-41.04	1'	10	0.83		-74.04	6.00"	23	3.83	
-42.04	1'	9	0.83		-75.04	1'	37	3.08	
-43.04	1'	8	0.75		-76.04	1'	33	2.75	
-44.04	1'	8	0.67		-77.04	1'	31	2.58	
-45.04	1'	10	0.67		-78.04	1'	31	2.58	
-46.04	1'	10	0.83		-79.04	1'	34	2.83	
-47.04	1'	11	0.83		-80.04	1'	31	2.58	
-48.04	1'	11	0.92		-81.04	1'	34	2.83	
-49.04	1'	12	0.92		-82.04	1'	41	3.42	
-50.04	1'	15	1.0		-83.04	1'	44	3.67	
-51.04	1'	14	1.25		-84.04	1'	42	3.50	
-52.04	1'	13	1.17		-85.04	1'	41	3.42	
-53.04	1'	13	1.08		-85.08	0.50"	2	4.00	15 min.
-54.04	1'	16	1.08		-85.17	1.00"	4	4.00	set chk
-55.04	1'	24	1.33		-85.25	1.00"	5	5.00	
-56.04	1'	35	2.00		-85.33	1.00"	4	4.00	
-57.04	1'	78	2.92		-85.40	0.75"	3	4.00	
-58.04	1'	61	6.5		-85.44	0.50"	15	30.00	Final drv
-58.13	1"	9	5.08	(56 half	-85.48	0.50"	9	18.00	
-59.04	11"	58	9.00	5 full)	-85.50	0.25"	3	12.00	
-60.04	1'	43	5.27	full stk					
-61.04	1'	37	3.58	hose brk					

Figure F.6d: Pile Driving Log - Apalachicola

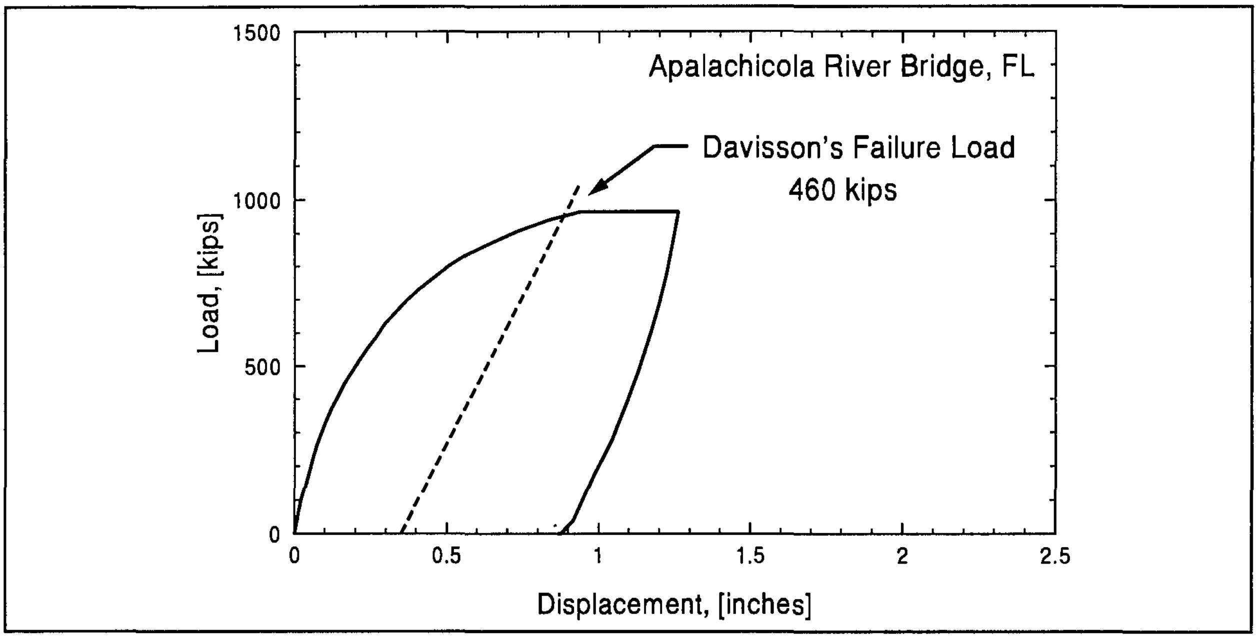


Figure F.6e: Static Load Test Result - Apalachicola

F.7 AUCILLA RIVER BRIDGE, FL (VERIFICATION SITE)

Pile Information:	
Type:	18 in square Prestressed Concrete Pile.
Cross Sectional Area:	324 in^2 or 209 032 mm^2.
Length:	70 ft or 21.3 m.
Date Driven:	3/30/1994.
Penetration:	62.96 ft or 19.2 m.

Hammer Information:	
Manufacturer - Model:	Fairchild F32.
Type:	Single Acting Air Hammer.
Helmet Weight:	1.50 kips or 6.7 kN.
Hammer Cushion Material:	Blue Polymer.
Hammer Cushion Area:	235.6 in^2 or 151 999 mm^2.
Hammer Cushion Thickness:	5.0 in or 127 mm.
Pile Cushion Material:	Plywood.
Pile Cushion Area:	324 in^2 or 2 090 318 mm^2.
Pile Cushion Thickness:	6 in or 152.4 mm.

Soil Boring Log No.:	E-9.
CPT Results No.:	CPT125.

Static Load Test Information:	
Test Date:	3/31/1994.
Maximum Load:	?? kips.
Davisson's Failure Criterion:	?? kips.
Driving Condition:	mostly with 3 ft stroke.

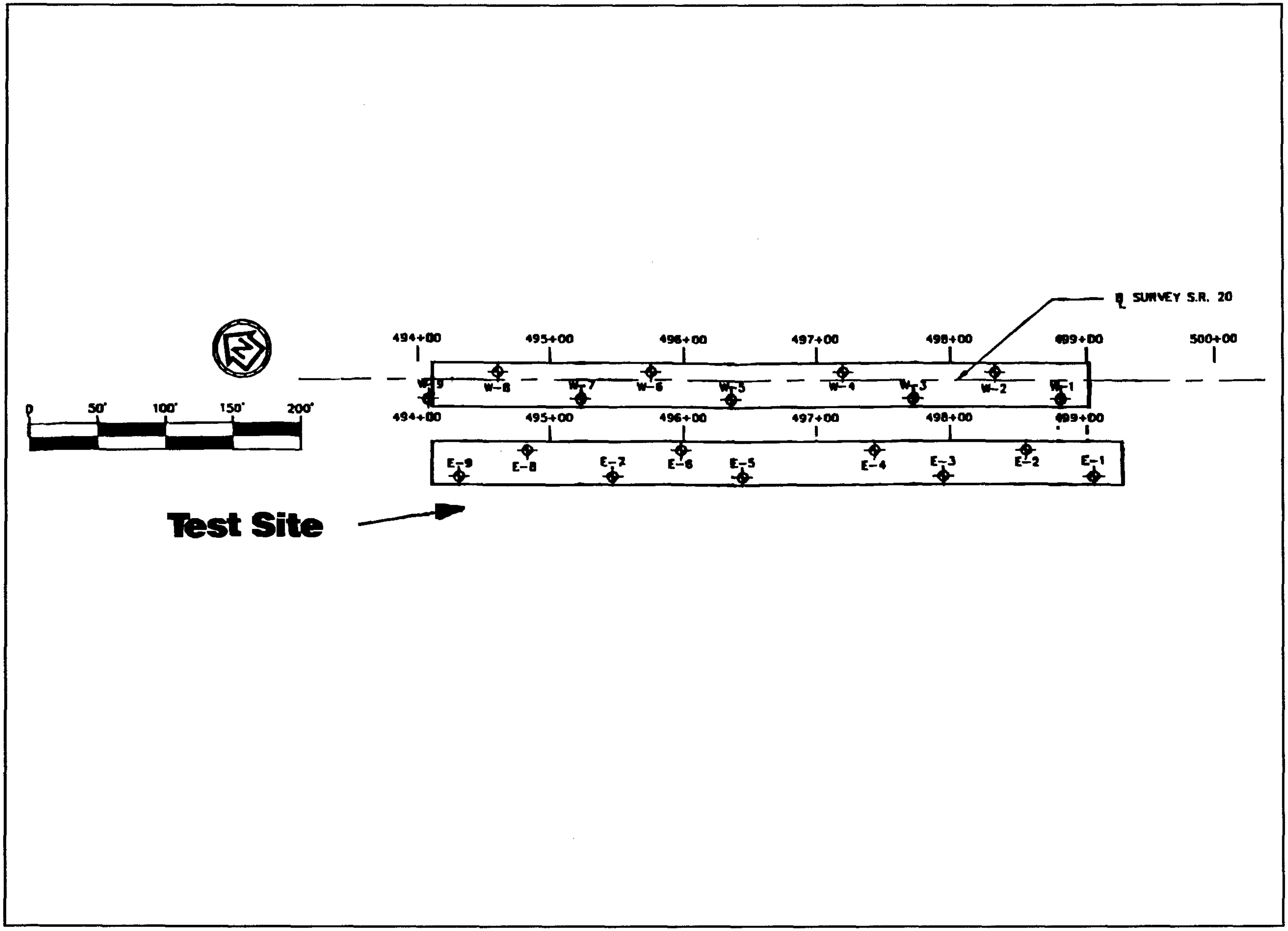


Figure F.7a: Site Plan - Aucilla

Bor. No. E-9
Bl Sta 494+31 73' RT.
Elev. 53'

Depth ft	SPT-N	Description
3	12	Grayish brown clayey sand
5	13	Grayish brown fine to medium sand (SP, SP-SM)
7	14	
9	19	Light gray to brown sandy clay (CL)
11	27	
14	11	Grayish brown fine to medium sand (SP, SP-SM)
17	11	
19	7	Greenish gray to dark brown silty clay (CH)
21	9	
24	9	
26	10	Gray slightly clayey fine sand with trace of consolidated sand (SM-SC)
29	12	
31	4	Greenish gray to dark brown silty clay (CH)
36	8	
39	5	Light to brown sandy clay (CL)
42	4	Dark brown sandy clay with some to abundant gravel (CH)
44	9	Greenish gray to dark brown silty clay (CH)
46	9	
49	4	Light brown clayey silt (ML-MH)
51	7	
54	4	Dark brown sandy clay with some to abundant gravel (CH)
56	3	Brown sandy limestone
59	1	Dark brown sandy clay with some to abundant gravel (CH)
61	26	
63	30	
66	122	White sandy limestone
69	45	
71	44	Brown sandy limestone
76	50/2	White sandy limestone
78	30	Brown sandy limestone
81	23	
84	18	
86	30	White sandy limestone
88	33	
90	31	

Figure F.7b: Soil Boring Log - Aucilla

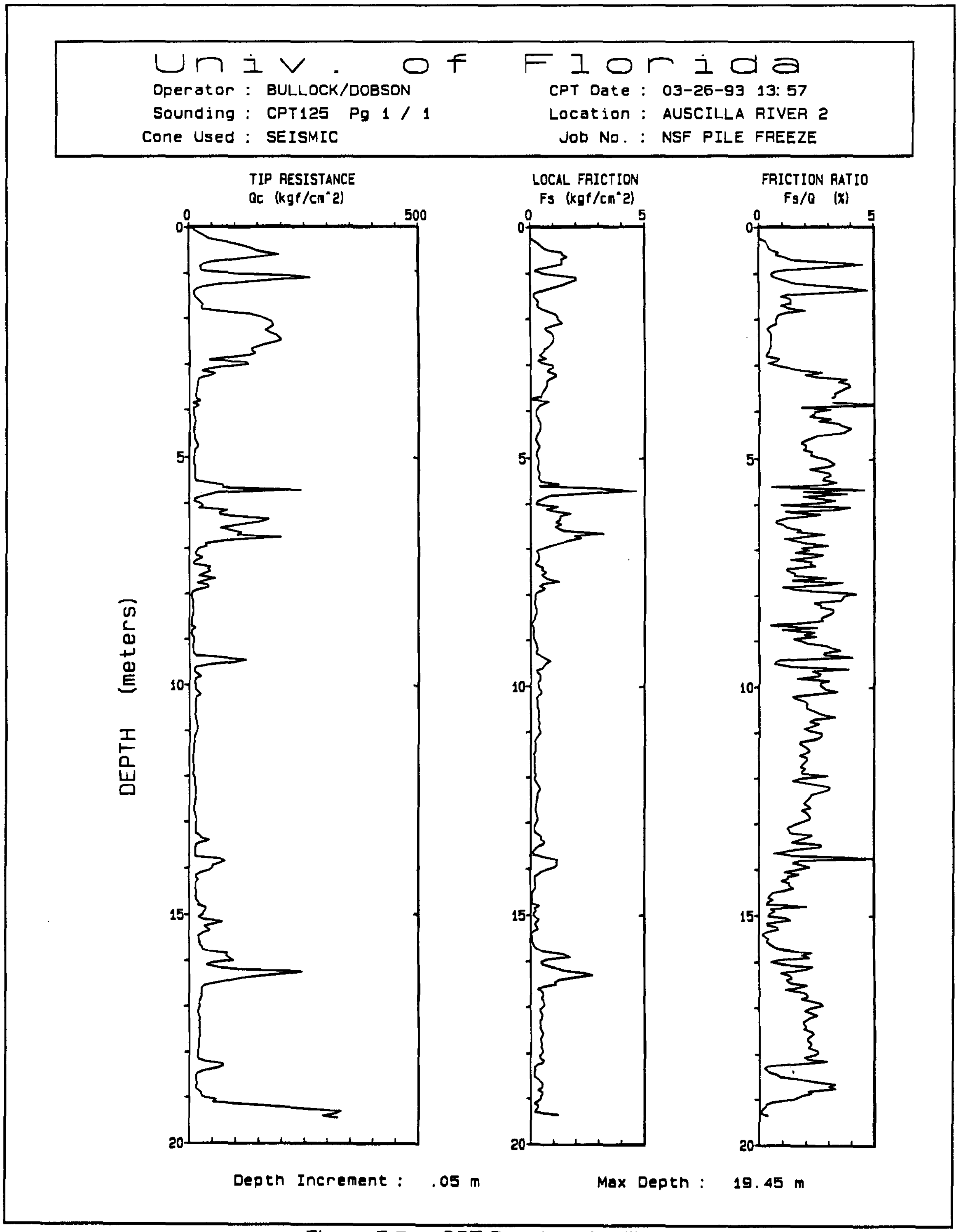


Figure F.7c: CPT Results - Aucilla

F.8 VILANO BRIDGE - EAST AND WEST EMBANKMENT, FL (VERIFICATION SITE)

Pile Information:	
Type:	18 in square Prestressed Concrete Pile.
Cross Sectional Area:	324 in^2 or 209 032 mm^2.
Length:	37 ft or 11.3 m for East. 55.5 ft or 16.9 m for West.
Date Driven:	4/14/1994 for East. to be driven for West.
Penetration:	35.03 ft or 10.7 m for East. to be determined for West.
Hammer Information:	
Manufacturer - Model:	Delmag D46-23.
Type:	Open End Diesel Hammer.
Helmet Weight:	5.62 kips or 25 kN.
Hammer Cushion Material:	Micarta and Aluminum.
Hammer Cushion Area:	241 in^2 or 155 484 mm^2.
Hammer Cushion Thickness:	2.0 in Micarta and 1½ in Aluminum.
Pile Cushion Material:	Plywood.
Pile Cushion Area:	324 in^2 or 209 032 mm^2.
Pile Cushion Thickness:	9.75 in or 248 m.
Soil Boring Log No.:	DOT-7 for East. SL-1 for West.
CPT Results No.:	CPT186 for East. CPT180 for West.
Static Load Test Information:	
East:	
Test Date:	4/14/1994.
Maximum Load:	??.
Davisson's Failure Criterion:	??.
West:	to be performed.
Driving Condition:	Ground Elev. 3.57 ft (1.09 m) to -18.96 ft (-5.78 m) with hammer seting 2. -18.96 ft (-5.78m) to -24.44 ft (-7.45 m) with hammer setting 3. -24.44 ft (-7.45 m) to -27.81 ft (-8.48 m) with hammer setting 4. -27.81 ft (-8.48 m) to -31.46 ft (-9.59m) with hammer setting 3. End of Driving at -31.46 ft or -9.59 m.
SPT N-value for DOT-7:	2,2,8,14,20,22,20,22,22,20,28,26,11,18,16,17,16,12,14, 15,14,12,11,12,13,22,21,20,20,9,8,8,9,8,9,7,7,8,9
SPT N-value for SL-1:	6,15,5,WOH,4,4,3,3,3,3,WOH,3,20,20,12,17,5,10,16,32, 18,24,21,21

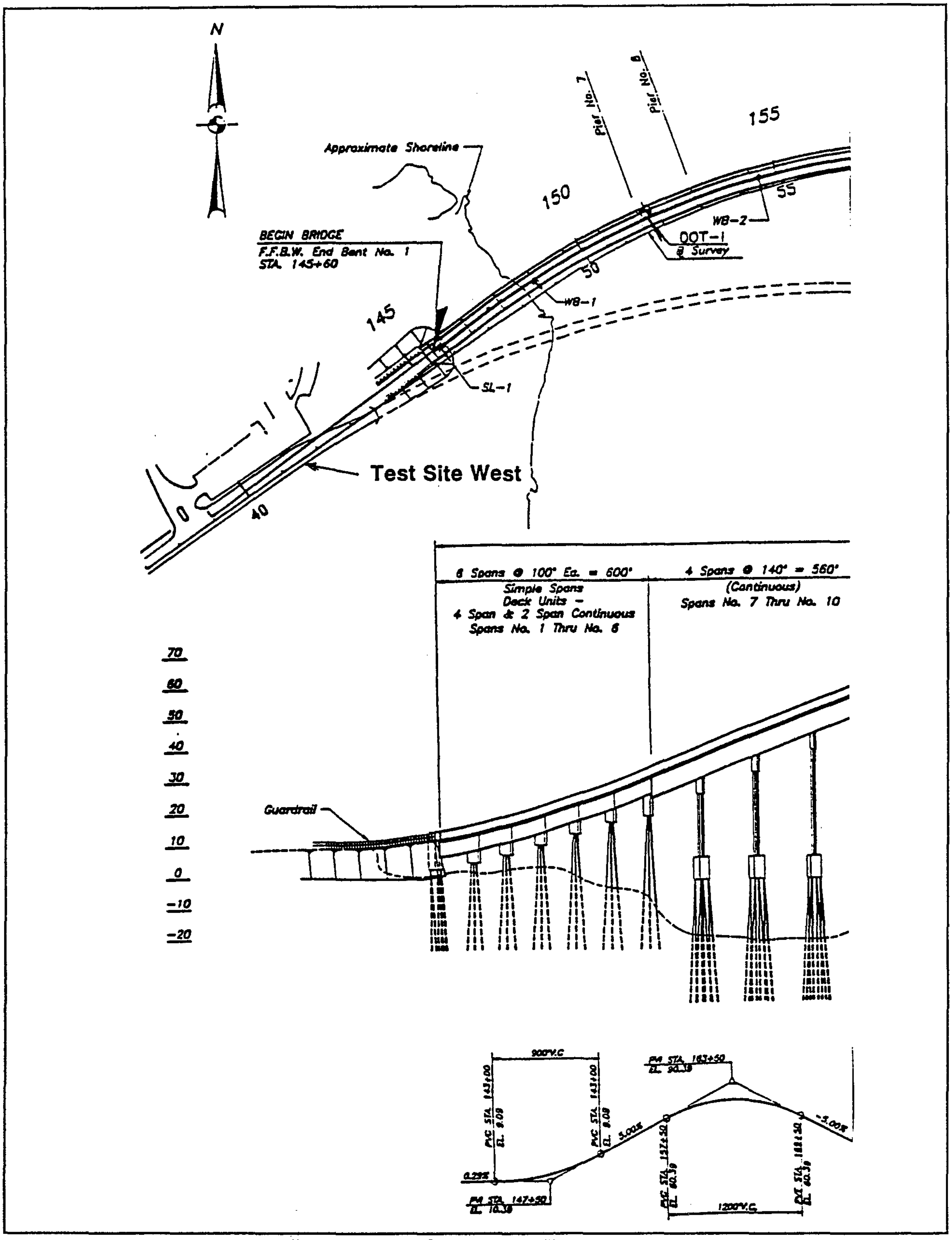


Figure F.8a: Site Plan - Vilano - West

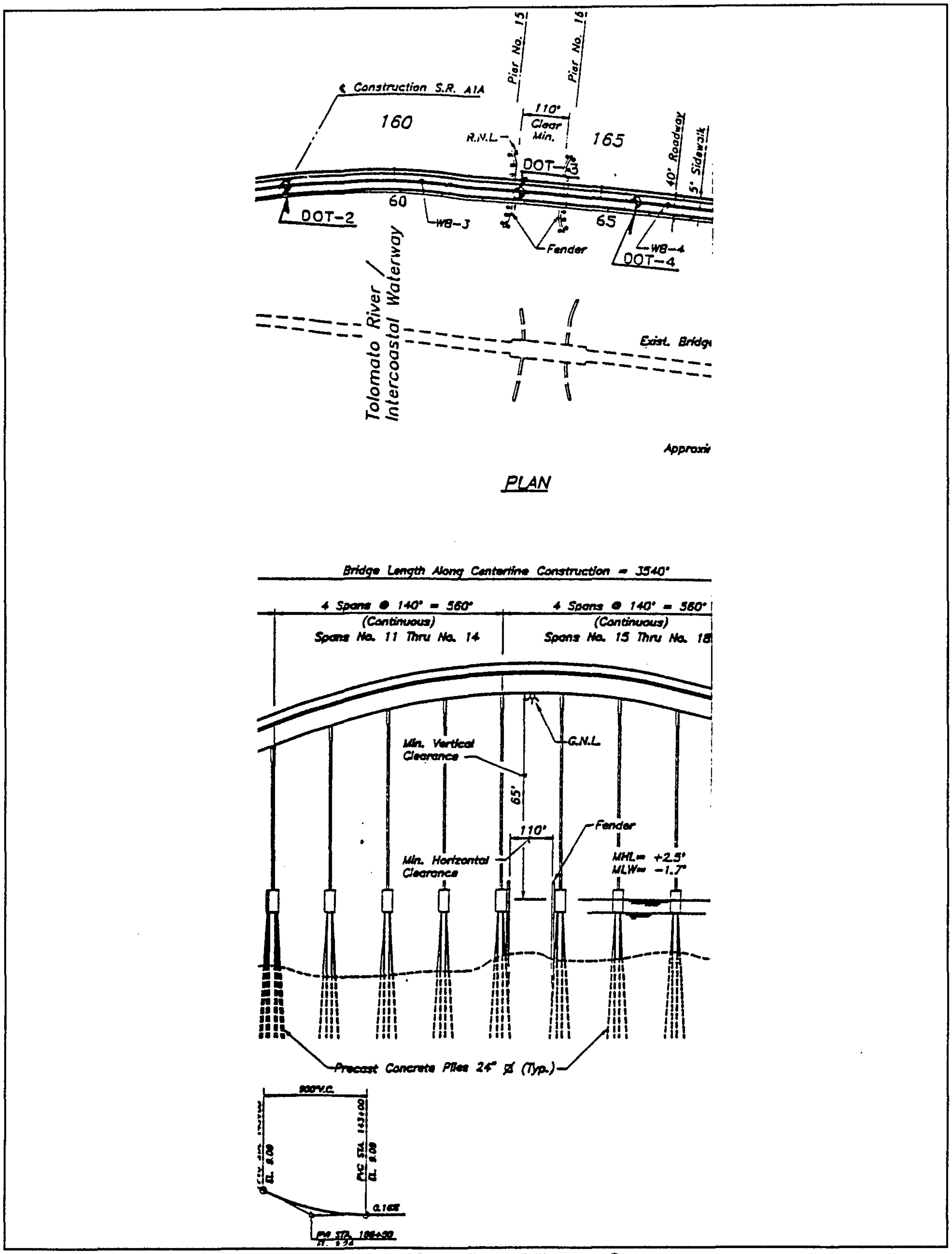


Figure F.8b: Site Plan - Vilano - Center

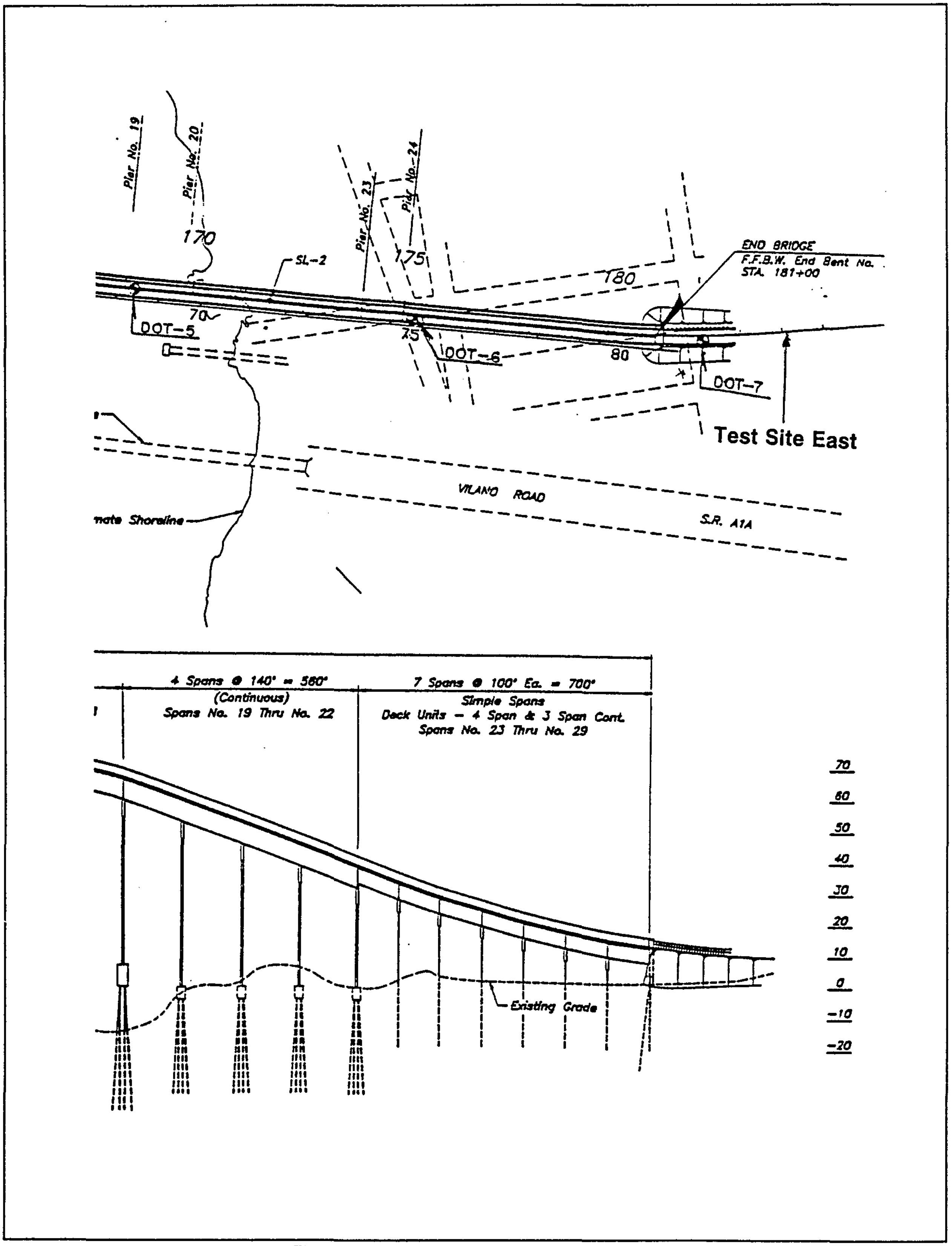


Figure F.8c: Site Plan - Vilano - East

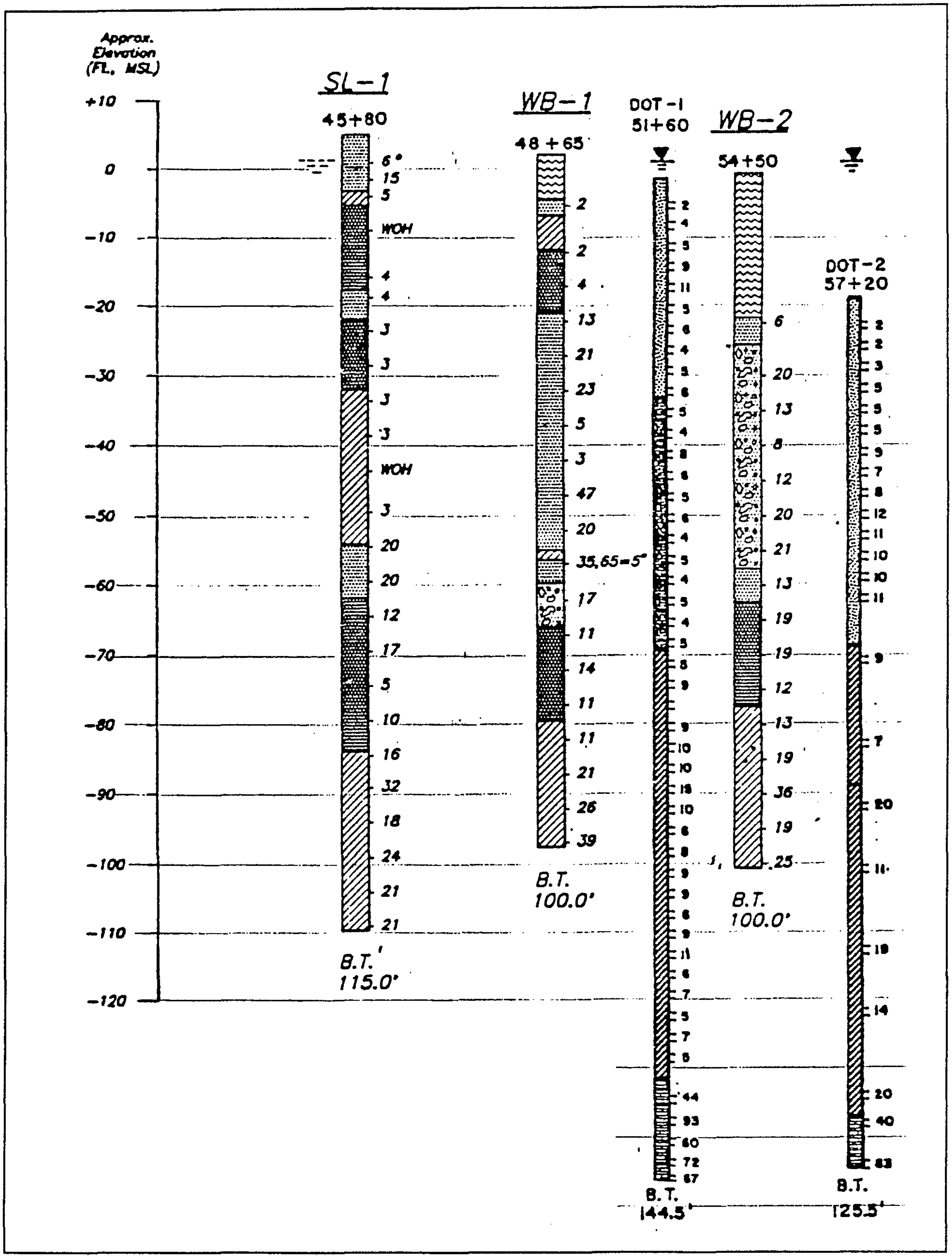


Figure F.8d: Soil Borings - Vilano - West

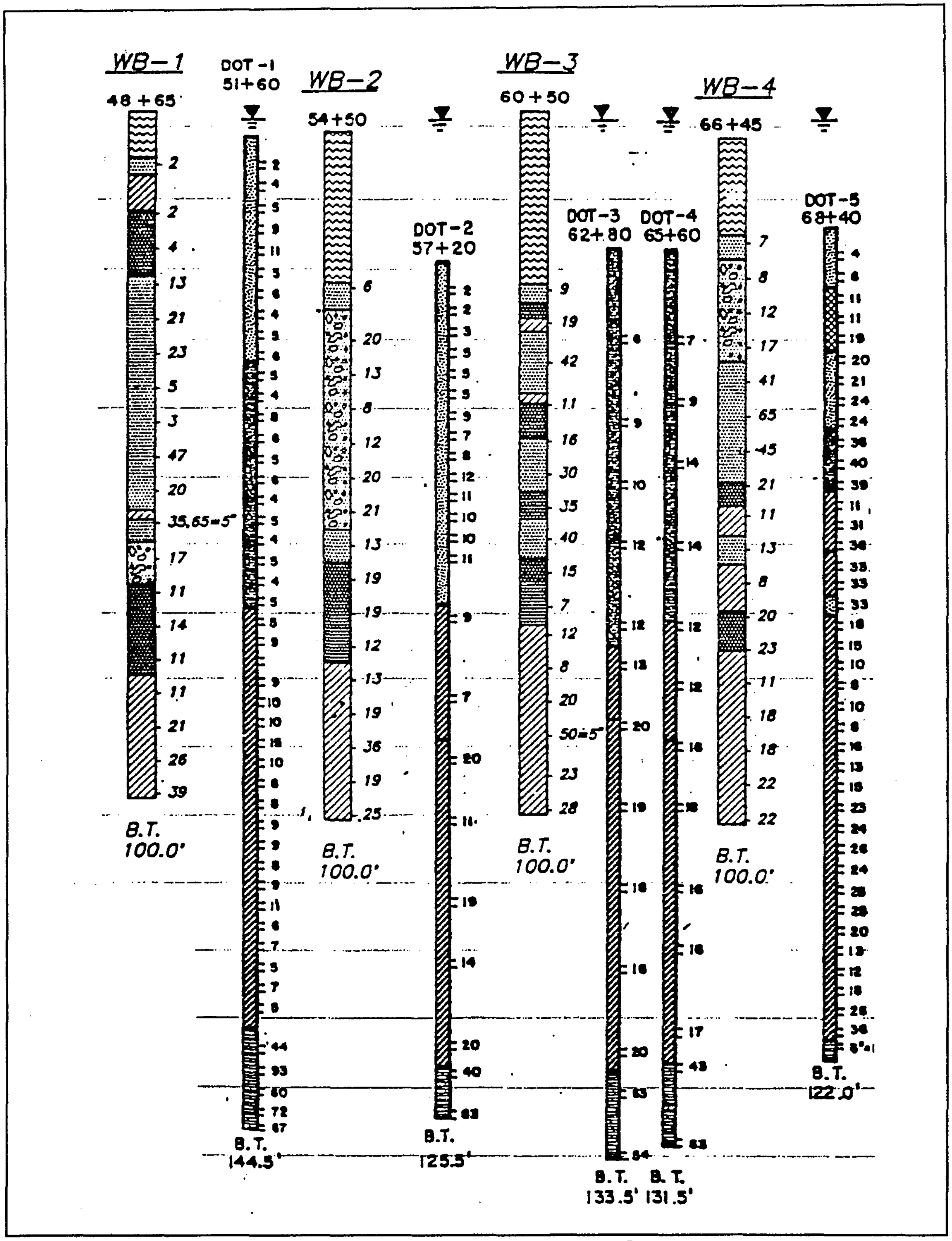


Figure F.8e: Soil Borings - Vilano - Center

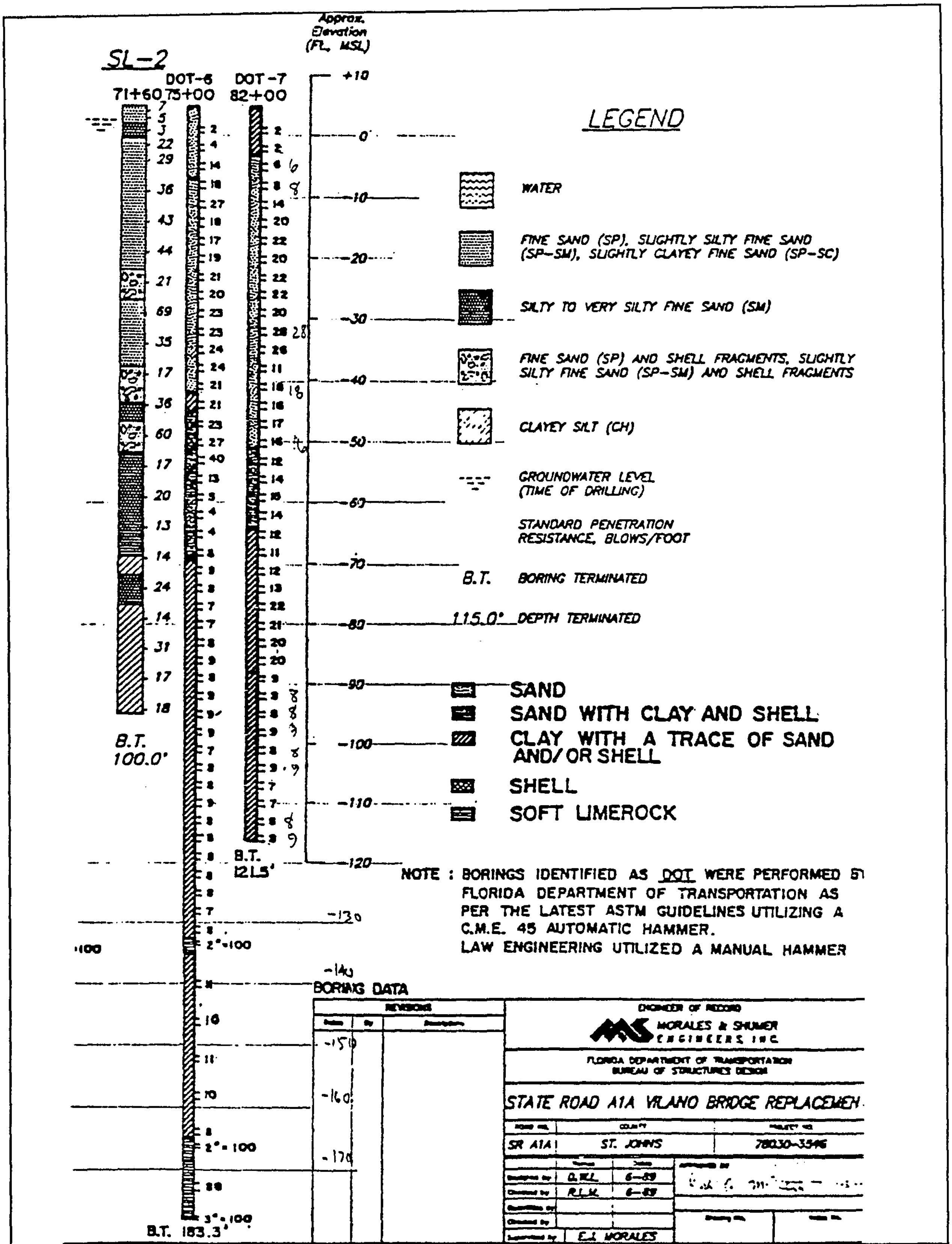


Figure F.8f: Soil Borings - Vilano - East

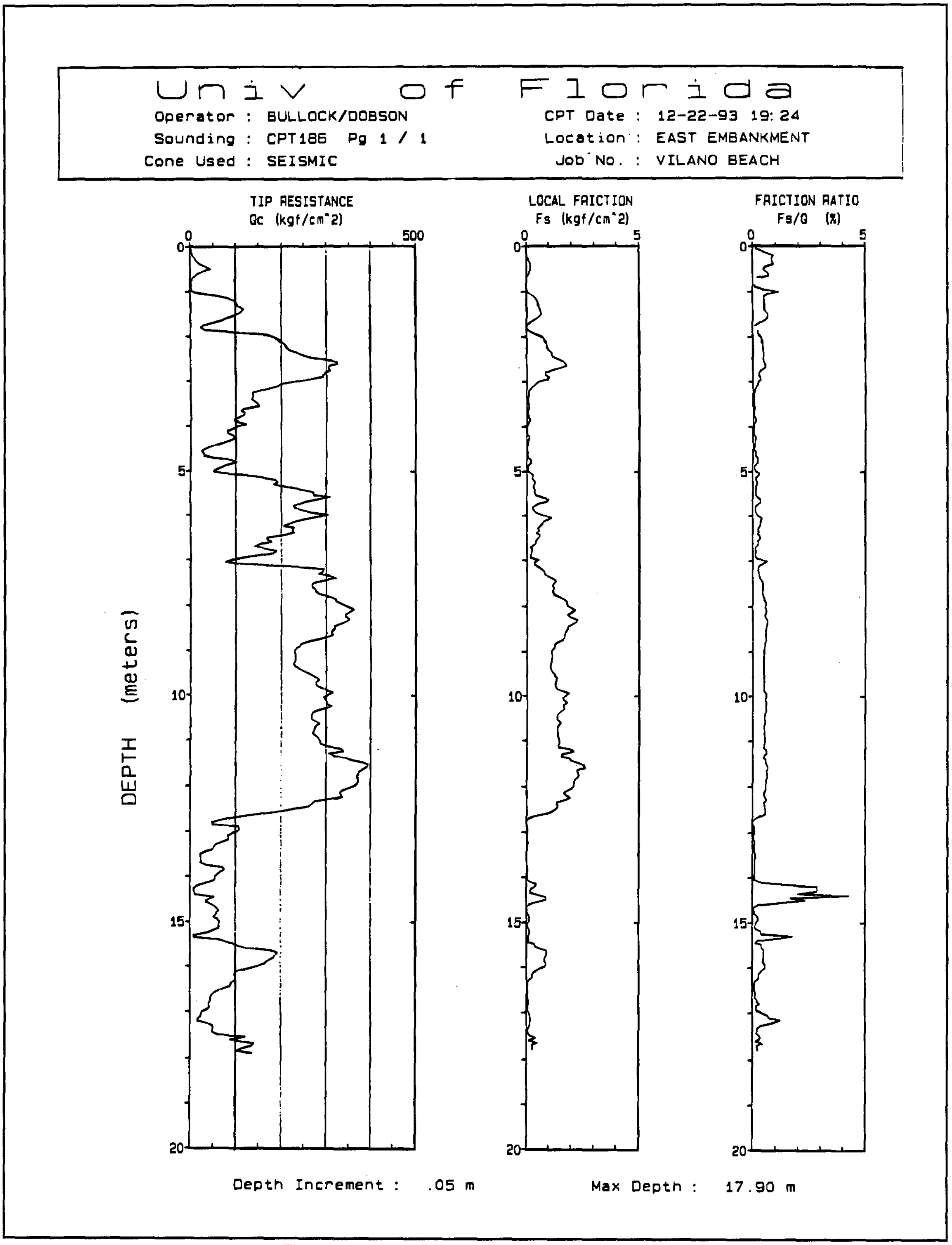


Figure F.8g: CPT Results - Vilano East

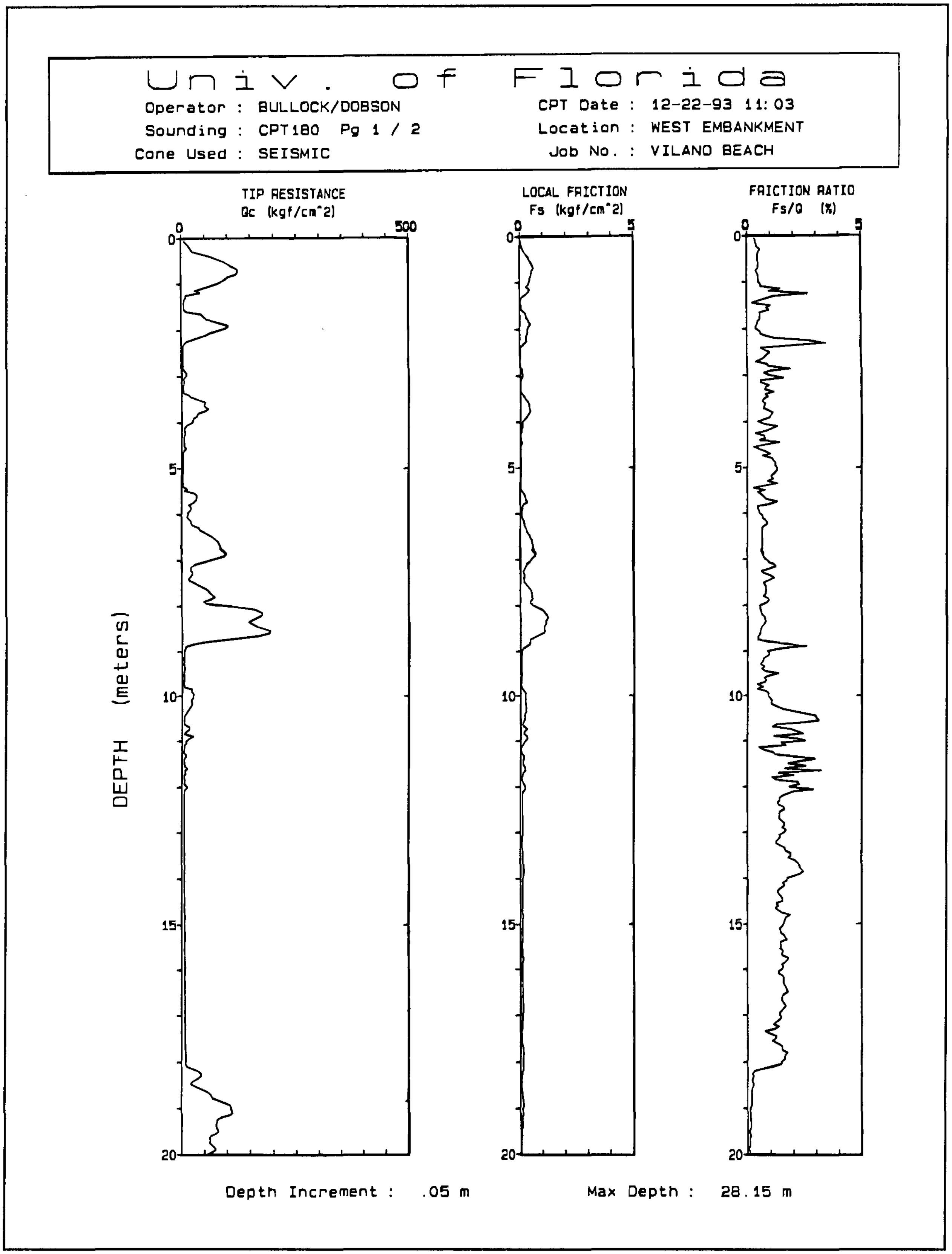


Figure F.8h: CPT Results - Vilano West

APPENDIX G

TRANSDUCER CALIBRATION RESULTS

G.1 TRANSDUCERS CALIBRATION

Four types of transducers were used for Modified SPT field tests during this study: accelerometers, load transducers for static and dynamic measurements, displacement transducers, and torque transducers. Each of these transducers were calibrated before they were used in the field. The calibration results are presented in figures G.1 through G.10. The accelerometers were calibrated by Pile Dynamics, Inc., OH. The load and torque transducers were calibrated by Thomas P. Kicher & Co., OH. The displacement transducers were calibrated by GRL, Inc., OH.

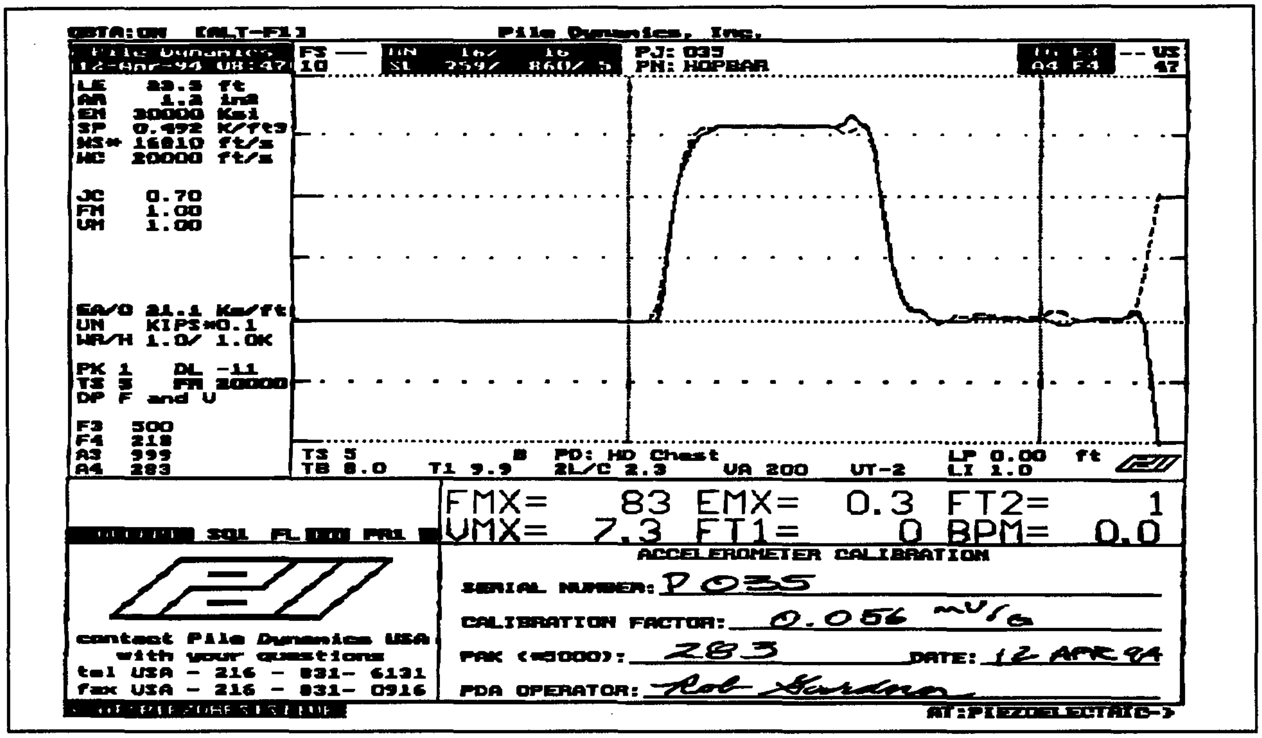


Figure G.1: Piezoresistive Accelerometer (SN# P035) Calibration Results

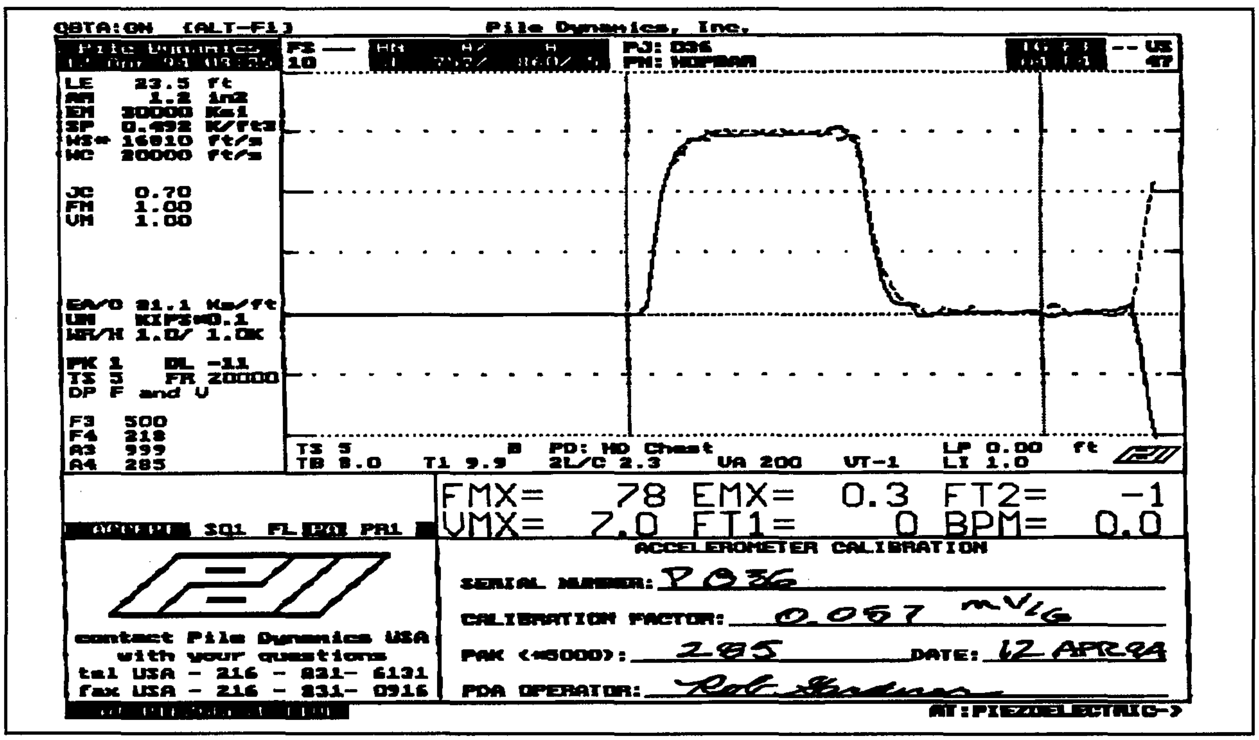


Figure G.2: Piezoresistive Accelerometer (SN# P036) Calibration Results

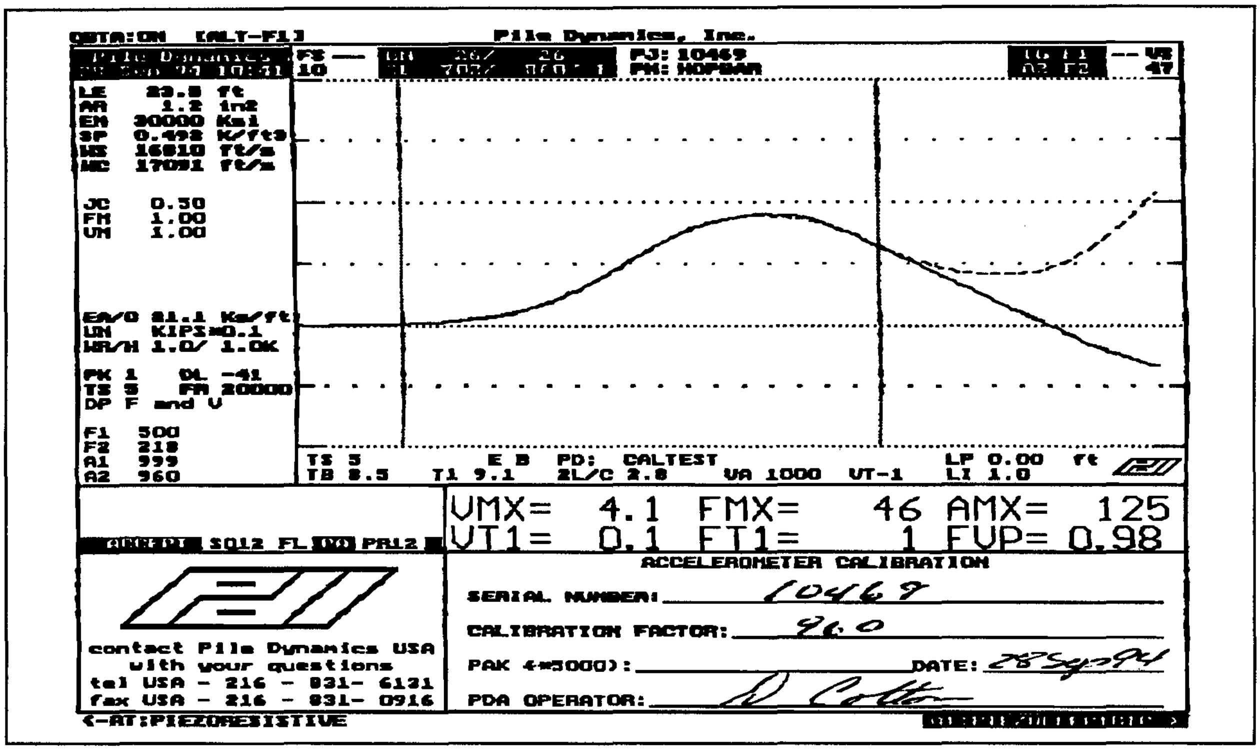


Figure G.3: Piezoelectric Accelerometer (SN# 10469) Calibration Results

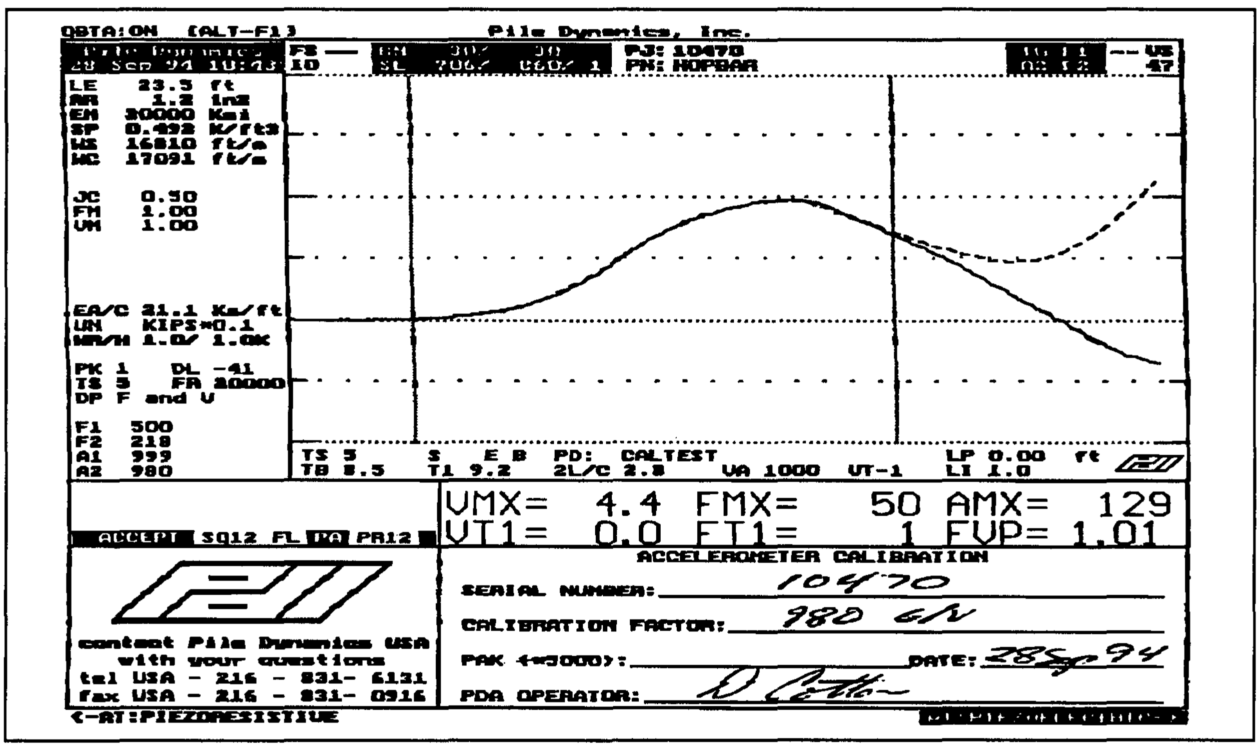


Figure G.4: Piezoelectric Accelerometer (SN# 10470) Calibration Results

Client:	Pile Dynamics, Inc.
Project:	SPT rod calibrations
Date:	01-27-1994
Job #:	94012701
SPT rod	22
Temp (C):	18

Calibration Summary for SPT rod 22

Average Calibration		Span Calibration		Pile Dynamics, Inc. Calibration	
Bridge 1	Bridge 2	Bridge 1	Bridge 2	Bridge 1	Bridge 2
lbs/uE	lbs/uE	lbs/mV/V	lbs/mV/V	uE/V	uE/V
13.6	NA	27131	NA	221	NA
@ Sg = 2.0				A = 1.178 sq.in.	E = 30000 ksi

Reference: STRAINSERT LOADCELL
Model #: FL25U-3DG
Serial #: FL25U-0874

Cal. Date: 10-05-1993
Cal. factor: 0.2416 uE/lbs
Sg: 2.0

Note: Bridge 1 used for calibration. Calibrated in accordance with ASTM E74-91, against a standard traceable to NIST.

Test 1

Load (lbs)	Bridge 1 (uE)	Bridge 2 (uE)
0.0	0	
1117.5	83	
2067.5	154	
2980.1	222	
3973.5	297	
4966.9	371	
5960.3	445	
6953.6	518	
7947.0	591	
8938.3	664	
9933.6	737	
10927.2	808	
11920.5	881	

Regression Output:

Constant		-25.0404
Std Err of Y Est		23.58197
R Squared		0.999966
No. of Observations		13
Degrees of Freedom		11
X Coefficient(s)	13.5179	
Std Err of Coef.	0.023912	

Test 2

Load (lbs)	Bridge 1 (uE)	Bridge 2 (uE)
0.0	0	
1014.1	80	
2028.1	158	
2980.1	232	
3973.5	307	
4966.9	382	
5958.2	457	
6951.6	532	
8029.6	613	
9000.4	685	
9933.6	756	
10927.2	830	
11999.2	909	

Regression Output:

Constant		-59.6538
Std Err of Y Est		28.56496
R Squared		0.99995
No. of Observations		13
Degrees of Freedom		11
X Coefficient(s)	13.21972	
Std Err of Coef.	0.028093	

Test 3

Load (lbs)	Bridge 1 (uE)	Bridge 2 (uE)
0.0	0	
1034.8	74	
2003.3	142	
3019.5	214	
3975.6	281	
4966.9	352	
5999.6	425	
6953.6	493	
8009.1	568	
8961.6	638	
9933.6	708	
10925.1	783	
11916.4	857	

Regression Output:

Constant		35.17748
Std Err of Y Est		40.2074
R Squared		0.999901
No. of Observations		13
Degrees of Freedom		11
X Coefficient(s)	13.95882	
Std Err of Coef.	0.041923	

Calibrated by: Paul T. Kicher 1-27-94

Paul T. Kicher

Figure G.5a: Load Transducer (SPT Rod #22) Calibration Results

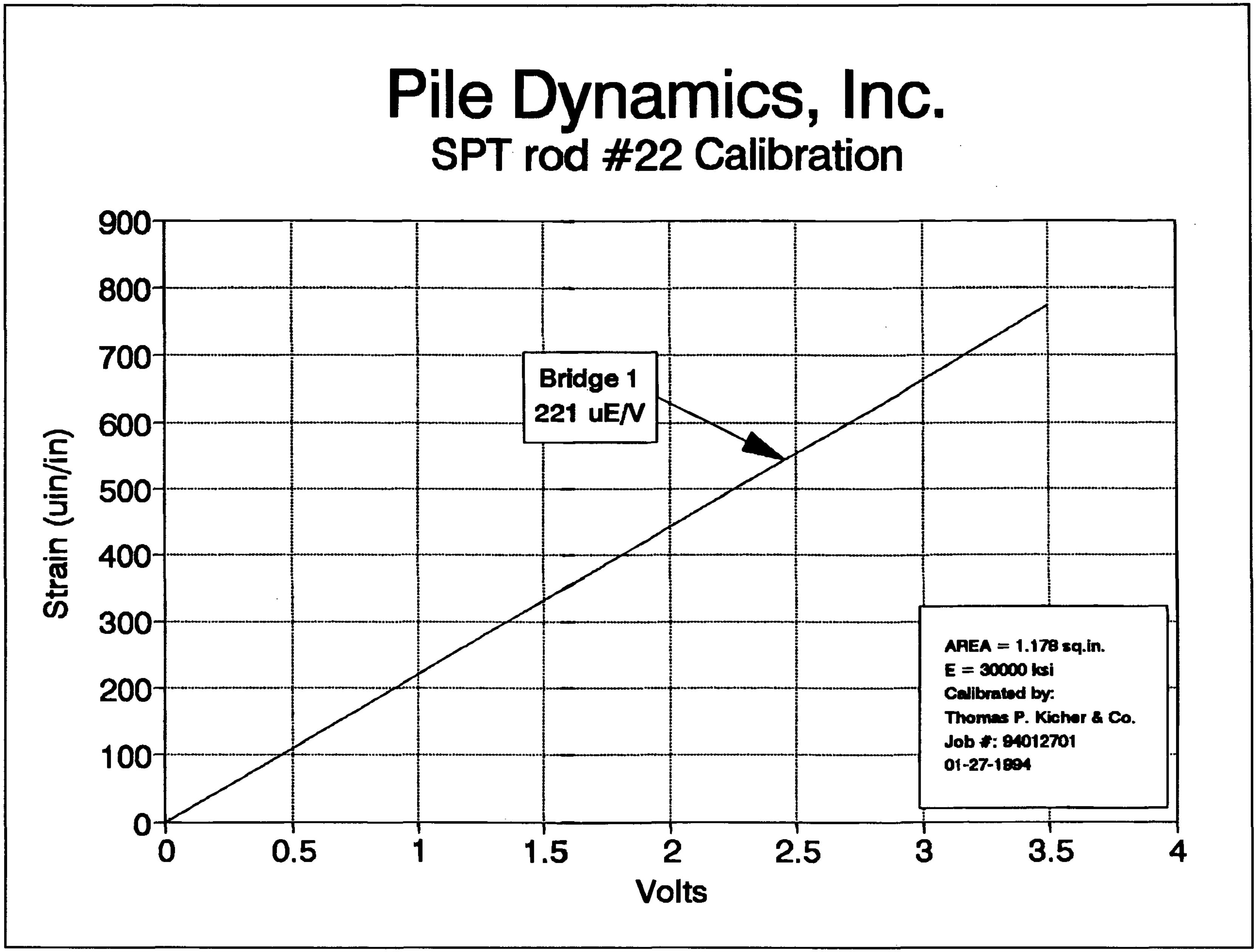


Figure G.5b: Load Transducer (SPT Rod #22) Calibration Plot

Client:	Pile Dynamics, Inc.
Project:	SPT rod calibrations
Date:	01-27-1994
Job #:	94012702
SPT rod	23
Temp (C):	18

Calibration Summary for SPT rod 23

Average Calibration		Span Calibration		Pile Dynamics, Inc. Calibration	
Bridge 1	Bridge 2	Bridge 1	Bridge 2	Bridge 1	Bridge 2
lbs/uE	lbs/uE	lbs/mV/V	lbs/mV/V	uE/V	uE/V
13.5	NA	26916	NA	219	NA
@ Sg = 2.0				A = 1.178 sq.in. E = 30000 ksi	

Reference STRAINSERT LOADCELL
Model #: FL25U-3DG
Serial #: FL25U-0874

Cal. Date: 10-08-1993
Cal. factor 0.2416 uE/lbs
Sg: 2.0

Note: Bridge 1 used for calibration. Calibrated in accordance with ASTM E74-91, against a standard traceable to NIST.

Test 1

Load (lbs)	Bridge 1 (uE)	Bridge 2 (uE)
0.0	0	
993.4	73	
1986.8	146	
2980.1	219	
3973.5	292	
4966.9	365	
5960.3	438	
6953.6	513	
7947.0	587	
8940.4	661	
9933.8	736	
10927.2	810	
11918.5	884	

Regression Output:

Constant		25.69956
Std Err of Y Est		18.45676
R Squared		0.999979
No. of Observations		13
Degrees of Freedom		11
X Coefficient(s)	13.47786	
Std Err of Coef.	0.018564	

Test 2

Load (lbs)	Bridge 1 (uE)	Bridge 2 (uE)
0.0	0	
993.4	76	
2026.1	153	
3021.5	227	
3973.5	298	
4966.9	372	
5960.3	446	
6953.6	518	
7947.0	593	
8940.4	666	
9931.7	739	
10927.2	813	
11920.5	887	

Regression Output:

Constant		-25.5972
Std Err of Y Est		13.10514
R Squared		0.999969
No. of Observations		13
Degrees of Freedom		11
X Coefficient(s)	13.46067	
Std Err of Coef.	0.013185	

Test 3

Load (lbs)	Bridge 1 (uE)	Bridge 2 (uE)
0.0	0	
1026.5	77	
1986.8	150	
2980.1	223	
3973.5	297	
5006.2	374	
5960.3	445	
6953.6	518	
7971.9	593	
8957.0	667	
9950.3	742	
10947.8	816	
11941.2	890	

Regression Output:

Constant		-12.3103
Std Err of Y Est		9.545817
R Squared		0.999994
No. of Observations		13
Degrees of Freedom		11
X Coefficient(s)	13.43495	
Std Err of Coef.	0.00956	

Calibrated by: Paul T Kicher 1-27-94

Paul T. Kicher

Figure G.6a: Load Transducer (SPT Rod #23) Calibration Results

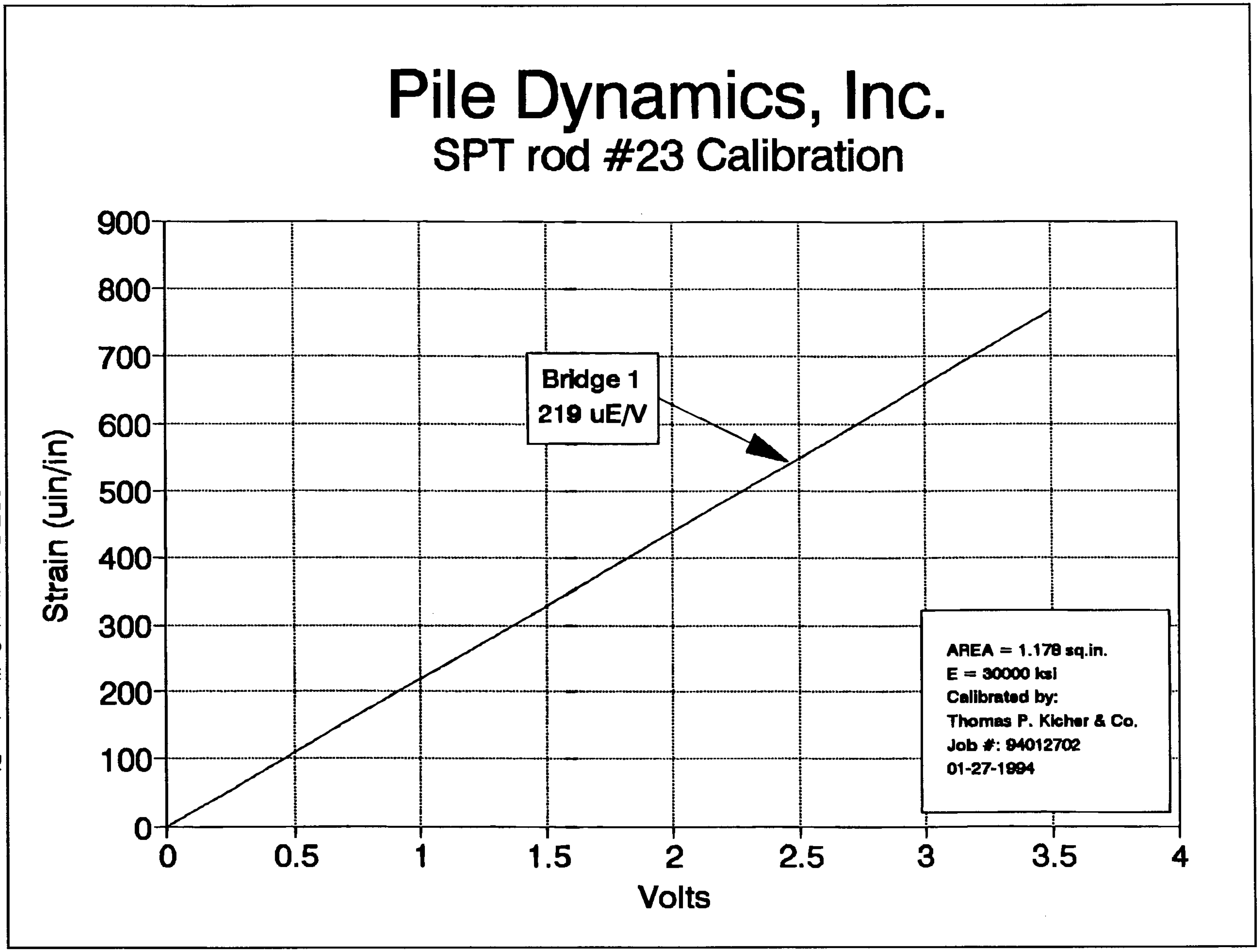


Figure G.6b: Load Transducer (SPT Rod #23) Calibration Plot

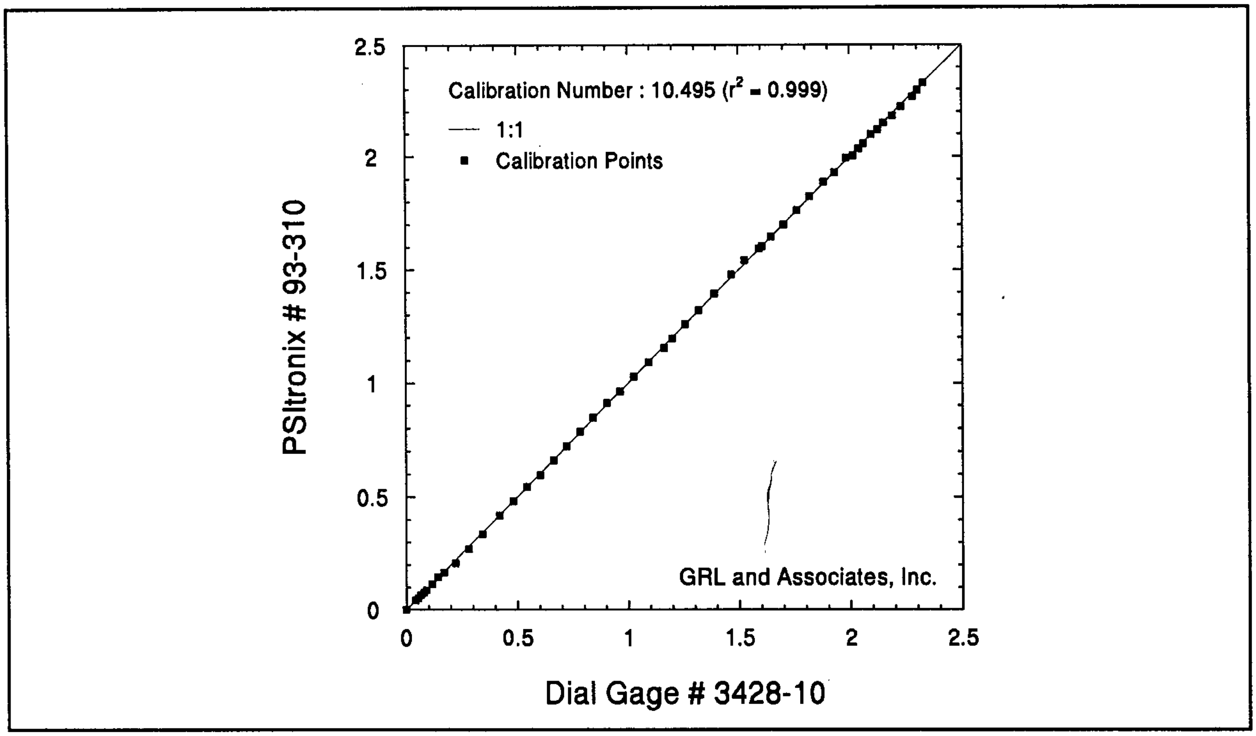


Figure G.7: Displacement Transducer (PSITRONIX, No. 93-310) Calibration Results

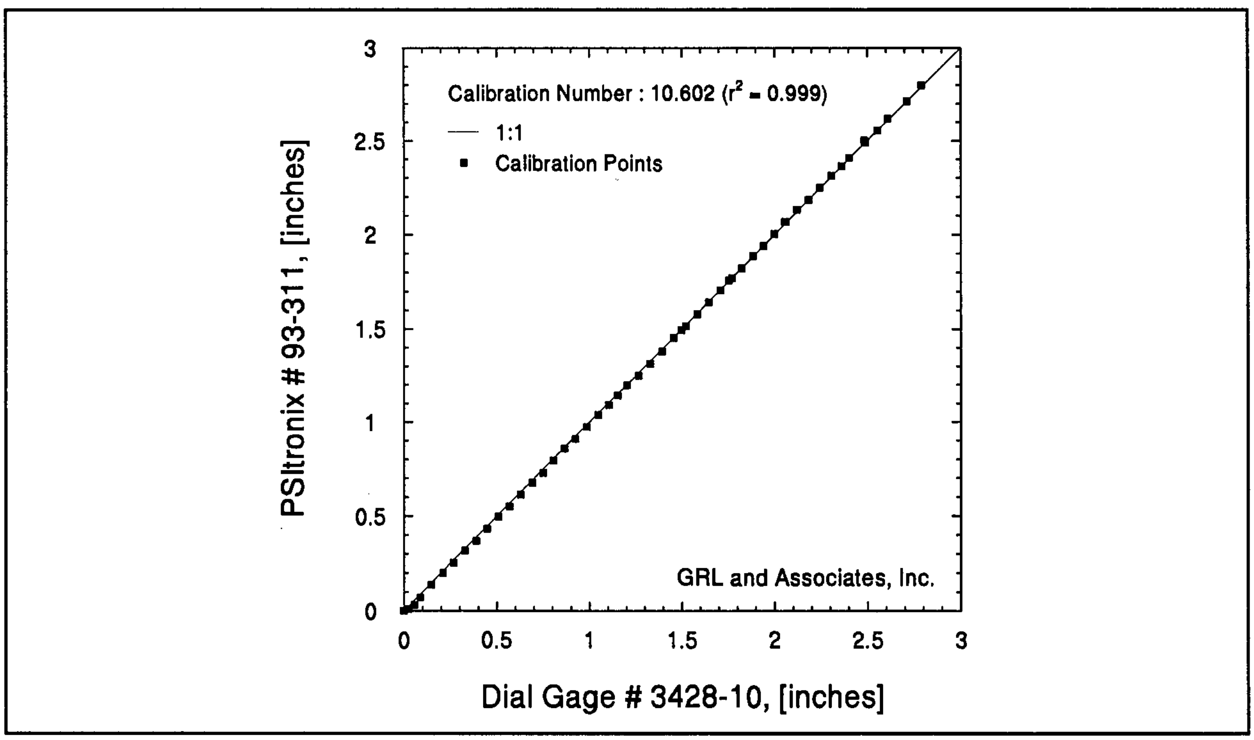


Figure G.8: Displacement Transducer (PSITRONIX No. 93-311) Calibration Results

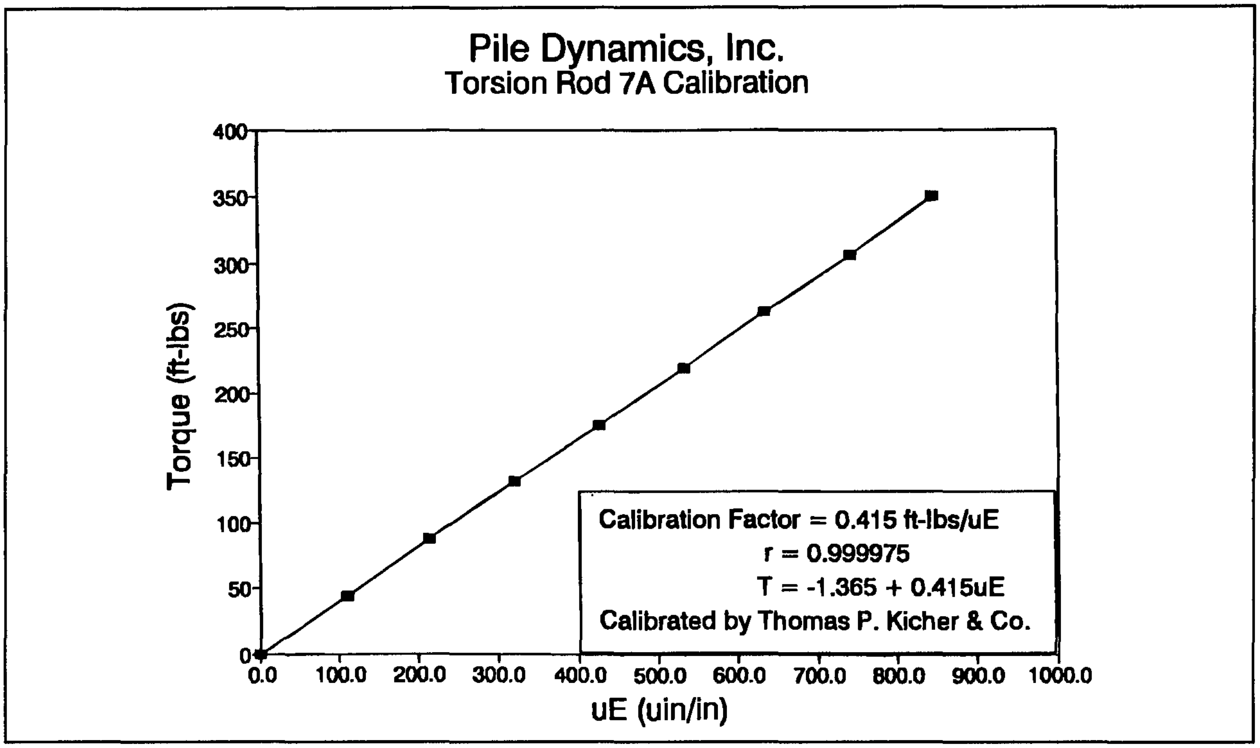


Figure G.9: Torque Transducer (SPT Rod 7A) Calibration Results

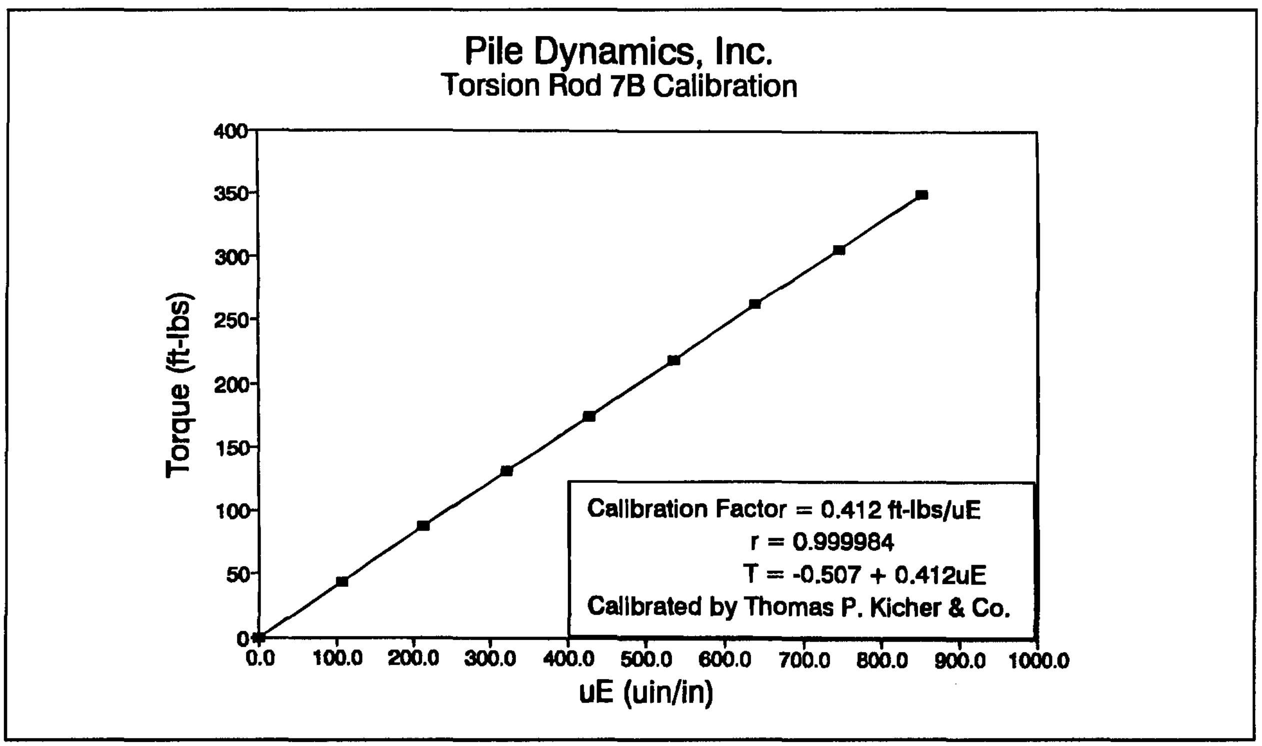


Figure G.10: Torque Transducer (SPT Rod 7B) Calibration Results

APPENDIX H

LABORATORY TESTING RESULTS

H.1 SOIL CLASSIFICATION

Soil classifications according to ASTM Specifications were based on the Unified Soil Classification System (USCS). The grain size tests were based on ASTM D422 and the Atterberg limit tests on ASTM D4318. The tests were performed by either Case Western Reserve University or EDP Consultants, Inc., both in Ohio. Soil samples were obtained from the split-spoon sampler extracted after the standard penetration tests. The results are summarized in table H.1. The complete test results are presented in figures H.1 through H.38 and are arranged in the same order as in table H.1.

H.2 UNCONFINED COMPRESSIVE TEST

A Shelby tube sampler was used at the Apalachicola site to extract a soil sample from a depth of 56.5 to 58.5 ft. Unconfined compressive tests according to ASTM Specifications were performed on this sample at Case Western Reserve University. Two tests were performed on the soil sample taken from depths of 56.5 to 57.0 ft and 57.0 to 57.5 ft. The test results are plotted as unconfined compressive strength versus strain and are presented in figure H.39. The following summarized the test results.

Depth	Unconfined Compressive Strength	Moisture Content
56.5 - 57.0	3.55 psi	83 percent
57.0 - 57.5	21.6 psi	109 percent

Table H.1: Summary of Soil Classifications								
	Test Site	Test Depth [ft]	D_{10} [mm]	D_{30} [mm]	D_{60} [mm]	LL [%]	PL [%]	PI [%]	Soil Type
1.	St. Mary	40.0	0.150	0.240	0.400	--	--	--	SP-SM
		65.0	--	--	0.650	20	15	5	SC
		100.0	--	--	--	32	18	14	CL
		103.5	--	--	--	28	19	9	CL
2.	Portland	30.0	0.150	0.300	0.750	--	--	--	SP-SM
		40.0	0.150	4.750	--	--	--	--	GP-GM
		50.0	0.150	0.840	--	--	--	--	SP-SM
3.	CD17	14.0	--	--	0.380	33	26	7	SM
		30.0	--	0.075	0.085	--	--	--	SM
		40.0	--	--	0.250	31	18	13	CL
		50.0	--	--	0.120	--	--	--	SM
		55.0	--	--	--	71	26	45	CH
		60.0	--	0.088	0.13	--	--	--	SM
		65.0	--	0.090	0.140	--	--	--	SM
4.	CD21	41.0	--	0.090	0.150	--	--	--	SM
		55.0	--	0.080	0.130	--	--	--	SM
		65.0	--	0.075	0.140	--	--	--	SM
5.	WC3	30.5	--	--	0.140	--	--	--	SM
6.	WC6	15.5	0.150	0.280	0.300	--	--	--	SP
7.	AP	20.0	0.130	0.250	0.300	--	--	--	SP
		25.0	0.100	0.210	0.300	--	--	--	SP-SM
		55.0	--	--	0.075	84	53	31	MH
		75.0	0.075	0.200	0.300	--	--	--	SM
8.	Skyway	15.0	0.082	0.130	0.220	--	--	--	SP-SM
		25.0	0.075	0.150	0.220	--	--	--	SP-SM
		27.5	0.088	0.150	0.280	--	--	--	SP-SM
		30.0	0.120	0.200	0.280	--	--	--	SP
		35.0	0.075	0.140	0.420	--	--	--	SM

Table H.1: Summary of Soil Classifications (continued)									
	Test Site	Test Depth [ft]	D_{10} [mm]	D_{30} [mm]	D_{60} [mm]	LL [%]	PL [%]	PI [%]	Soil Type
8.	Skyway (continued)	40.0	0.100	0.220	0.350	--	--	--	SP
		45.5	0.140	0.220	0.240	--	--	--	SP
		50.0	0.075	0.095	0.200	--	--	--	SM
9.	Aucilla	5.0	0.075	0.110	0.220	--	--	--	SM
		10.0	--	--	0.120	--	--	--	SM
		20.0	--	--	--	72	33	39	CH
		25.0	--	--	--	50	20	30	CH
		30.0	--	--	--	65	26	39	CH
		35.0	--	--	--	53	34	19	MH
		40.0	--	--	--	25	17	8	CL
		45.0	--	--	--	77	30	47	CH
10.	VE	5.0	0.090	0.140	0.240	--	--	--	SP
		25.0	0.130	0.210	0.420	--	--	--	SP
		35.0	0.082	0.130	0.210	--	--	--	SP
		45.0	0.140	0.450	1.400	--	--	--	SW
11.	VW	30.0	--	--	--	77	31	46	OH
		42.0	--	--	--	95	36	59	OH
		45.0	--	--	--	85	34	51	CH
		55.0	--	--	--	92	30	62	OH
		59.0	--	--	--	94	28	66	OH
		64.0	--	--	0.150	--	--	--	ML

Notes: D_n is grain diameter corresponding to n percent passing.
LL, PL, and PI are the liquid limit, plastic limit, and plasticity index.
Soil type is based on Unified Soil Classification System.

DETERMINATION-OF-MOISTURE-CONTENT

Description of soil: St. Mary 40
Location:
Sample No.: 0

No. of can	Weight of can, W1 (g)	Weight of can & wet soil, W2 (g)	Weight of can & dry soil, W3 (g)	w(%) = (W2-W3)/(W3-W1) x100
1	150.30	351.10	312.80	23.57

SIEVE-ANALYSIS

Description of soil: St. Mery 40
Location:
Sample No.: 0 Weight of oven dry sample, W (g): 162.39

Sieve No.	Sieve opening (mm)	Weight retained on each sieve (g)	Percent of weight retained on each sieve	Cumulative percent retained	Percent finer
4	4.750	21.38	13.17	13.17	86.83
10	2.000	9.81	6.04	19.21	80.79
20	0.850	9.12	5.62	24.82	75.18
40	0.425	12.58	7.75	32.57	67.43
60	0.250	49.79	30.66	63.23	36.77
100	0.150	41.45	25.52	88.76	11.24
200	0.075	5.21	3.21	91.96	8.04
Pan	---	11.93			

Σ 161.27 = W1

Loss during sieve analysis=[(W-W1)/W]x100= 0.69% (OK if less than 2%)

Figure H.1: Soil Classification for St. Mary, Cleveland, OH at depth of 40 ft

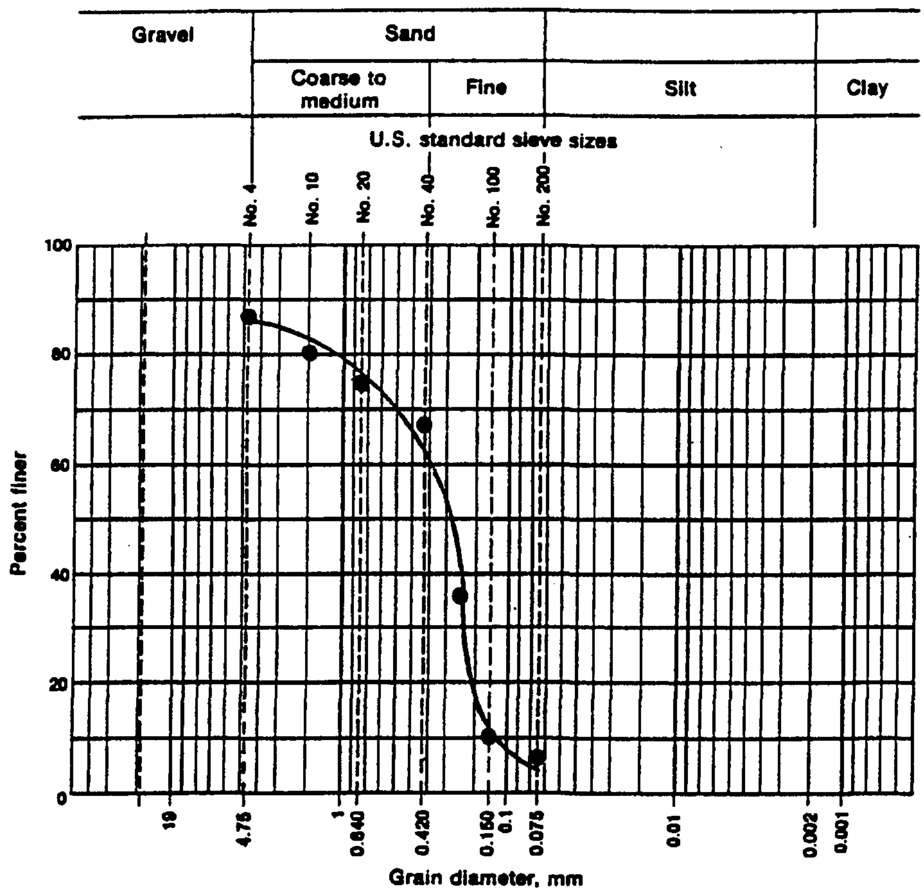
GRAIN SIZE DISTRIBUTION Data Sheet 6

Project GRL Job. No.

Location of Project St. Mary Boring No. Sample No.

Description of Soil Depth of Sample 40 ft

Tested By. Date of Testing



Visual soil description

Soil classification:

SP–SM System

Figure H.1: Soil Classification for St. Mary, Cleveland, OH at depth of 40 ft (continued)

D E T E R M I N A T I O N - O F - M O I S T U R E - C O N T E N T

Description of soil: St. Mary 65
Location:
Sample No.: 0

No. of can	Weight of can, W1 (g)	Weight of can & wet soil, W2 (g)	Weight of can & dry soil, W3 (g)	w(%)=(W2-W3)/(W3-W1)x100
1	149.20	318.60	305.90	8.10

S I E V E - A N A L Y S I S

Description of soil: St. Mary 65
Location:
Sample No.: 0 Weight of oven dry sample, W (g): 131.83

Sieve No.	Sieve opening (mm)	Weight retained on each sieve (g)	Percent of weight retained on each sieve	Cumulative percent retained	Percent finer
4	4.750	6.17	4.68	4.68	95.32
10	2.000	16.65	12.63	17.31	82.69
20	0.850	26.00	19.72	37.03	62.97
40	0.425	13.27	10.07	47.10	52.90
60	0.250	6.87	5.21	52.31	47.69
100	0.150	5.87	4.45	56.76	43.24
200	0.075	5.92	4.49	61.25	38.75
Pan	---	50.27			

Σ 131.02 = W1

Loss during sieve analysis=[(W-W1)/W]x100= 0.61% (OK if less than 2%)

Figure H.2: Soil Classification for St. Mary, Cleveland, OH at depth of 65 ft

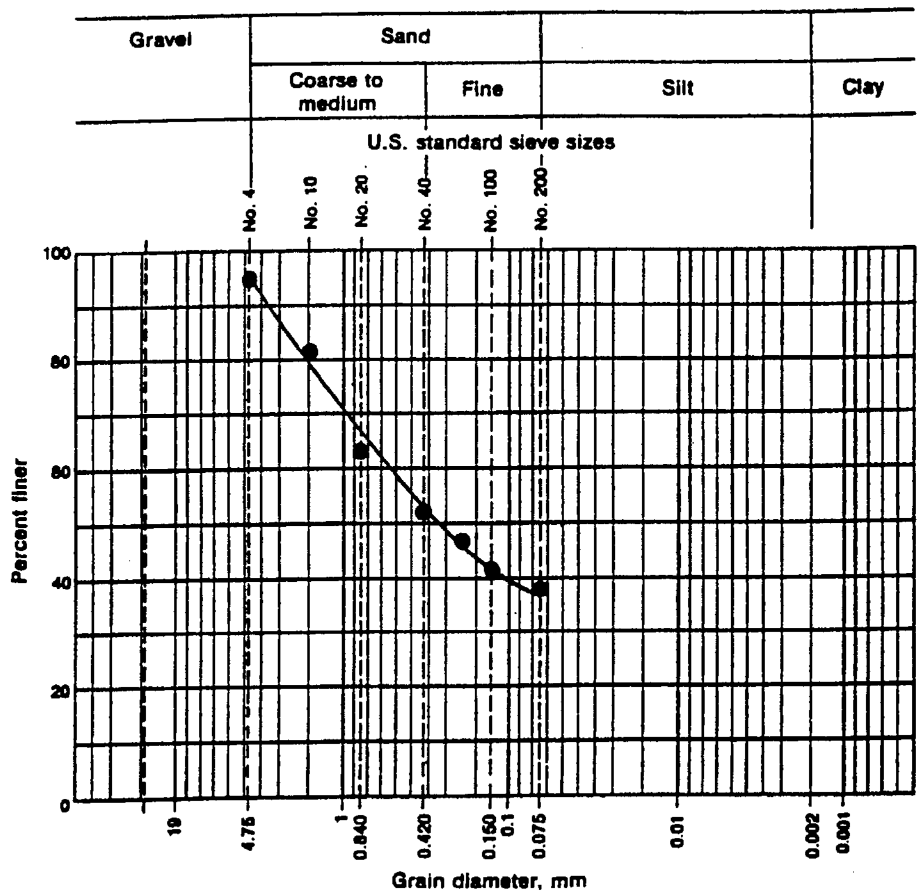
GRAIN SIZE DISTRIBUTION Data Sheet 6

Project GRL Job. No.

Location of Project St. Mary Boring No. Sample No.

Description of Soil Depth of Sample 65 ft

Tested By. Date of Testing



Visual soil description

Soil classification:

SC System

Figure H.2: Soil Classification for St. Mary, Cleveland, OH at depth of 65 ft (continued)

ATTERBERG LIMITS DETERMINATION **Data Sheet 3**

Project ____GRL____ Job No. ________

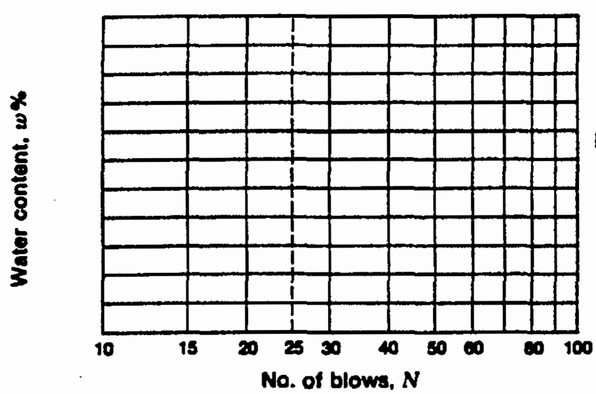
Location of Project ____St. Mary-65 ft____ Boring No. ________ Sample No. ________

Description of Soil ________

Depth of Sample ________ Tested By ________ Date ________

Liquid Limit Determination

Can no.	1					
Wt. of wet soil + can	21.5					
Wt. of dry soil + can	19.4					
Wt. of can	8.8					
Wt. of dry soil	10.6					
Wt. of moisture	2.1					
Water content, w%	19.81					
No. of blows, N	25					



Flow index F_i = ________

Liquid limit = 19.81

Plastic limit = 15.38

Plasticity index I_p = 4.43

Plastic Limit Determination

Can no.	1			
Wt. of wet soil + can	13.4			
Wt. of dry soil + can	12.8			
Wt. of can	8.9			
Wt. of dry soil	3.9			
Wt. of moisture	0.6			
Water content, $w\% = w_P$	15.38			

Figure H.2: Soil Classification for St. Mary, Cleveland, OH at depth of 65 ft (continued)

DETERMINATION-OF-MOISTURE-CONTENT

Description of soil: St. Mary 100
Location:
Sample No.: 0

No. of can	Weight of can, W1 (g)	Weight of can & wet soil, W2 (g)	Weight of can & dry soil, W3 (g)	W(%)=(W2-W3)/(W3-W1)x100
1	529.30	771.80	738.40	15.97

SIEVE-ANALYSIS

Description of soil: St. Mary 100
Location:
Sample No.: 0 Weight of oven dry sample, W (g): 180.7

Sieve No.	Sieve opening (mm)	Weight retained on each sieve (g)	Percent of weight retained on each sieve	Cumulative percent retained	Percent finer
4	4.750	2.00	1.11	1.11	98.89
10	2.000	4.80	2.66	3.76	96.24
20	0.850	6.40	3.54	7.30	92.70
40	0.425	4.80	2.66	9.96	90.04
60	0.250	4.70	2.60	12.56	87.44
100	0.150	5.70	3.15	15.72	84.28
200	0.075	6.70	3.71	19.42	80.58
Pan	---	146.50			

Σ 181.60 = W1

Loss during sieve analysis=[(W-W1)/W]x100=-0.50% (OK if less than 2%)

Figure H.3: Soil Classification for St. Mary, Cleveland, OH at depth of 100 ft

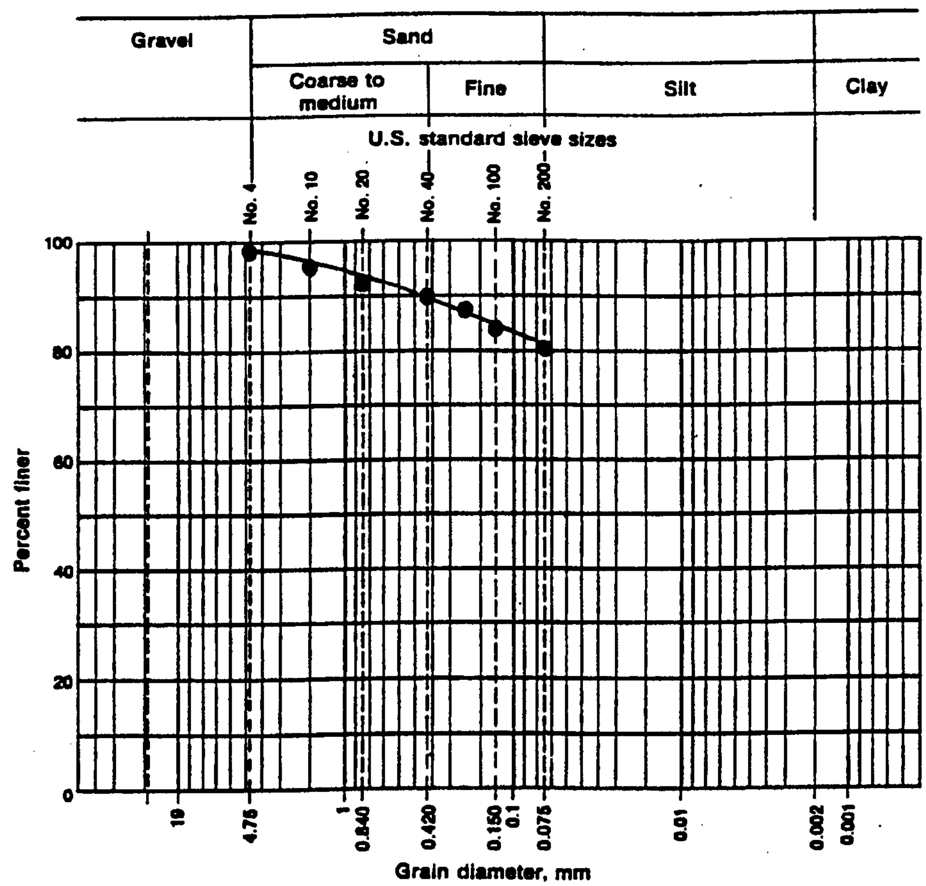
GRAIN SIZE DISTRIBUTION Data Sheet 6

Project GRL Job. No.

Location of Project St. Mary Boring No. Sample No.

Description of Soil Depth of Sample 100 ft

Tested By. Date of Testing



Visual soil description

Soil classification:

CL System

Figure H.3: Soil Classification for St. Mary, Cleveland, OH at depth of 100 ft (continued)

ATTERBERG LIMITS DETERMINATION **Data Sheet 3**

Project GRL Job No. ______

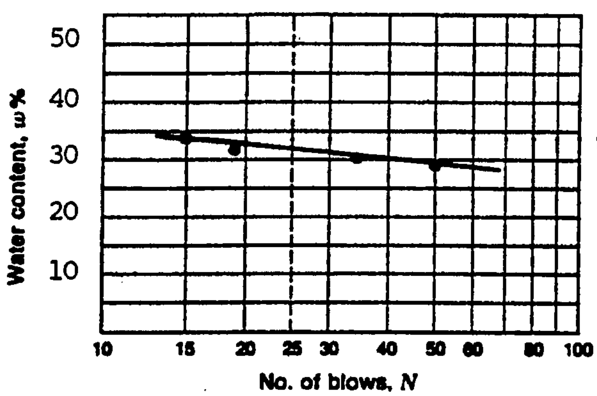
Location of Project St. Mary-100 ft Boring No. ______ Sample No. ______

Description of Soil ______

Depth of Sample ______ Tested By ______ Date ______

Liquid Limit Determination

Can no.	1	2	3	4		
Wt. of wet soil + can	12.3	12.45	16.25	12.45		
Wt. of dry soil + can	11.52	11.55	14.35	11.55		
Wt. of can	8.75	8.70	8.70	8.55		
Wt. of dry soil	2.77	2.85	5.65	3.00		
Wt. of moisture	0.78	0.9	1.9	0.9		
Water content, w%	28.16	31.58	33.63	30.00		
No. of blows, N	25	19	15	35		



Flow index F_i = ______

Liquid limit = 32.0

Plastic limit = 18.33

Plasticity index I_p = 13.67

Plastic Limit Determination

Can no.	1			
Wt. of wet soil + can	15.9			
Wt. of dry soil + can	14.8			
Wt. of can	8.8			
Wt. of dry soil	6.0			
Wt. of moisture	1.1			
Water content, w% = w_p	18.33			

Figure H.3: Soil Classification for St. Mary, Cleveland, OH at depth of 100 ft (continued)

D E T E R M I N A T I O N - O F - M O I S T U R E - C O N T E N T

Description of soil: St. Mary 105
Location:
Sample No.: 0

No. of can	Weight of can, W1 (g)	Weight of can & wet soil, W2 (g)	Weight of can & dry soil, W3 (g)	W2-W3 w(%)=------x100 W3-W1
1	148.60	369.50	338.80	16.14

S I E V E - A N A L Y S I S

Description of soil: St. Mary 105
Location:
Sample No.: 0 Weight of oven dry sample, W (g): 159.17

Sieve No.	Sieve opening (mm)	Weight retained on each sieve (g)	Percent of weight retained on each sieve	Cumulative percent retained	Percent finer
4	4.750	0.96	0.60	0.60	99.40
10	2.000	3.79	2.38	2.98	97.02
20	0.850	3.11	1.95	4.94	95.06
40	0.425	3.05	1.92	6.85	93.15
60	0.250	2.99	1.88	8.73	91.27
100	0.150	3.94	2.48	11.21	88.79
200	0.075	6.43	4.04	15.25	84.75
Pan	---	134.48			

Σ 158.75 = W1

Loss during sieve analysis=[(W-W1)/W]x100= 0.26% (OK if less than 2%)

Figure H.4: Soil Classification for St. Mary, Cleveland, OH at depth of 103.5 ft

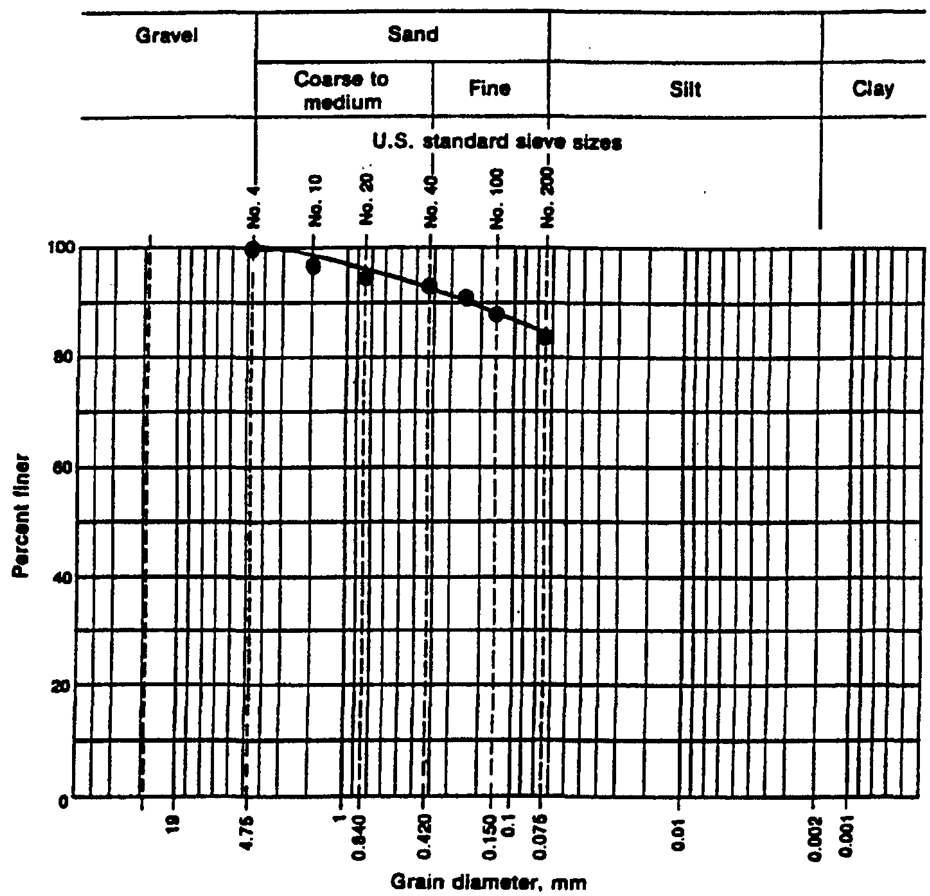
GRAIN SIZE DISTRIBUTION Data Sheet 6

Project GRL Job. No.

Location of Project St. Mary Boring No. Sample No.

Description of Soil Depth of Sample 105 ft

Tested By. Date of Testing



Visual soil description

Soil classification:

CL System

Figure H.4: Soil Classification for St. Mary, Cleveland, OH at depth of 103.5 ft (continued)

ATTERBERG LIMITS DETERMINATION **Data Sheet 3**

Project GRL Job No. ______

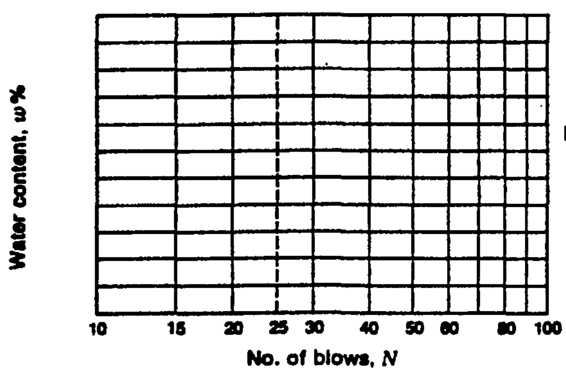
Location of Project St. Mary-105ft Boring No. ______ Sample No. ______

Description of Soil ______

Depth of Sample ______ Tested By ______ Date ______

Liquid Limit Determination

Can no.	1					
Wt. of wet soil + can	20.85					
Wt. of dry soil + can	18.2					
Wt. of can	8.8					
Wt. of dry soil	9.4					
Wt. of moisture	2.65					
Water content, w%	28.19					
No. of blows, N	25					



Flow index F_i = ______

Liquid limit = 28.19

Plastic limit = 19.15

Plasticity index I_p = 9.04

Plastic Limit Determination

Can no.	1			
Wt. of wet soil + can	17.1			
Wt. of dry soil + can	15.75			
Wt. of can	8.7			
Wt. of dry soil	7.05			
Wt. of moisture	1.35			
Water content, $w\% = w_P$	19.15			

Figure H.4: Soil Classification for St. Mary, Cleveland, OH at depth of 103.5 ft (continued)

DETERMINATION-OF-MOISTURE-CONTENT

Description of soil: F. R. 30-31.5
Location:
Sample No.: 0

No. of can	Weight of can, W1 (g)	Weight of can & wet soil, W2 (g)	Weight of can & dry soil, W3 (g)	W(%)=(W2-W3)/(W3-W1)x100
1	212.70	640.80	580.00	16.55

SIEVE-ANALYSIS

Description of soil: F. R. 30-31.5
Location:
Sample No.: 0 Weight of oven dry sample, W (g): 367.4

Sieve No.	Sieve opening (mm)	Weight retained on each sieve (g)	Percent of weight retained on each sieve	Cumulative percent retained	Percent finer
4	4.750	36.28	9.87	9.87	90.13
10	2.000	50.75	13.81	23.69	76.31
20	0.850	45.03	12.26	35.94	64.06
40	0.425	72.82	19.82	55.76	44.24
60	0.250	73.60	20.03	75.80	24.20
100	0.150	50.00	13.61	89.41	10.59
200	0.075	18.83	5.13	94.53	5.47
Pan	---	19.44			

Σ 366.75 = W1

Loss during sieve analysis=[(W-W1)/W]x100= 0.18% (OK if less than 2%)

Figure H.5: Soil Classification for Fore River Bridge, Portland, ME at depth of 30 ft

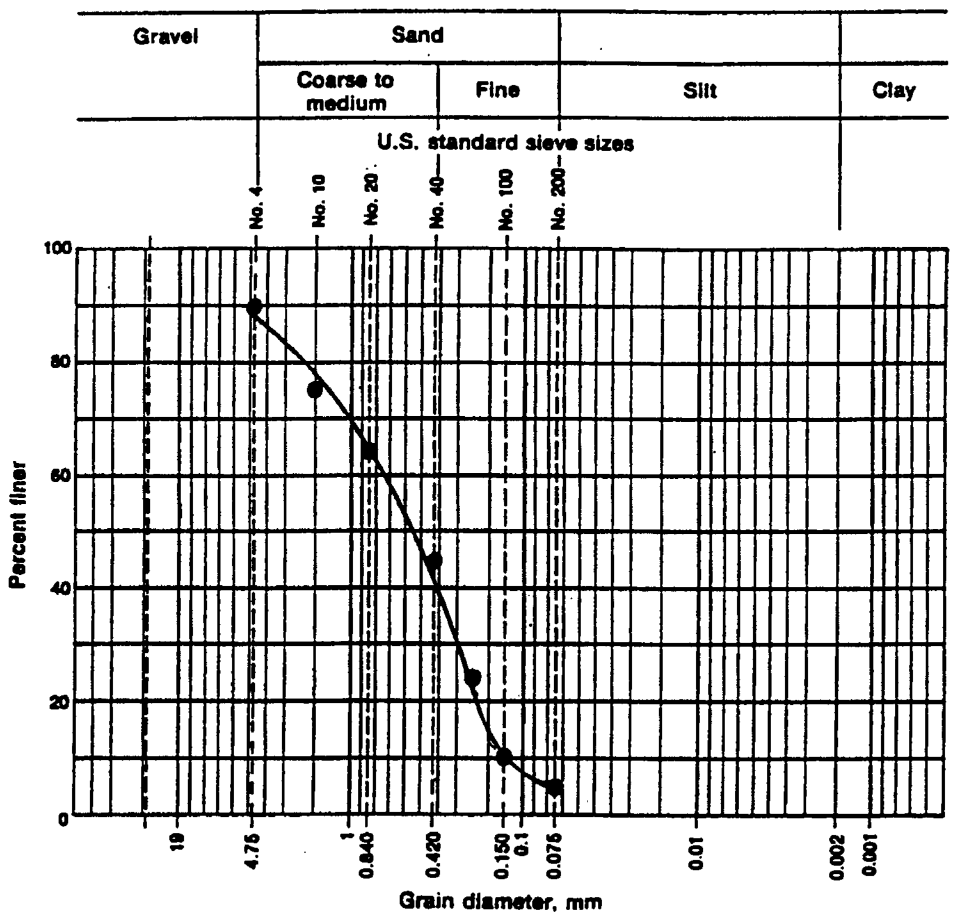
GRAIN SIZE DISTRIBUTION Data Sheet 6

Project GRL Job. No. ______

Location of Project Fore River Boring No. ______ Sample No. ______

Description of Soil ______ Depth of Sample 30 ft

Tested By. ______ Date of Testing ______



Visual soil description ______

Soil classification:

SP–SM System ______

Figure H.5: Soil Classification for Fore River Bridge, Portland at depth of 30 ft (continued)

D E T E R M I N A T I O N - O F - M O I S T U R E - C O N T E N T

Description of soil: F. R. 40-42
Location:
Sample No.: 0

No. of can	Weight of can, W1 (g)	Weight of can & wet soil, W2 (g)	Weight of can & dry soil, W3 (g)	w(%)=(W2-W3)/(W3-W1)x100
1	22.60	187.30	183.50	2.36

S I E V E - A N A L Y S I S

Description of soil: F. R. 40-42
Location:
Sample No.: 0 Weight of oven dry sample, W (g): 160.77

Sieve No.	Sieve opening (mm)	Weight retained on each sieve (g)	Percent of weight retained on each sieve	Cumulative percent retained	Percent finer
4	4.750	111.00	69.04	69.04	30.96
10	2.000	8.85	5.50	74.55	25.45
20	0.850	6.32	3.93	78.48	21.52
40	0.425	6.61	4.11	82.59	17.41
60	0.250	5.80	3.61	86.20	13.80
100	0.150	6.00	3.73	89.93	10.07
200	0.075	5.02	3.12	93.05	6.95
Pan	---	11.38			

Σ 160.98 = W1

Loss during sieve analysis=[(W-W1)/W]x100=-0.13% (OK if less than 2%)

Figure H.6: Soil Classification for Fore River Bridge, Portland, ME at depth of 40 ft

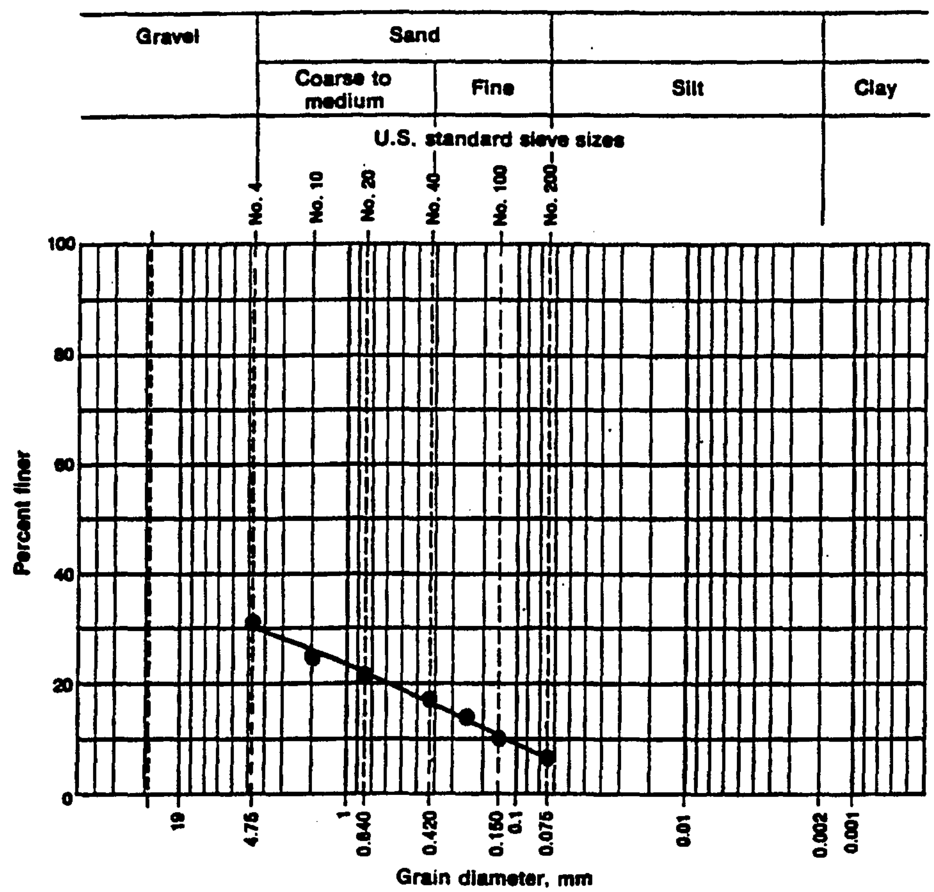
GRAIN SIZE DISTRIBUTION **Data Sheet 6**

Project GRL **Job. No.** ________

Location of Project Fore River **Boring No.** ______ **Sample No.** ______

Description of Soil ________ **Depth of Sample** 40 ft

Tested By. ________ **Date of Testing** ________



Visual soil description ________

Soil classification:

GP–GM **System** ________

Figure H.6: Soil Classification for Fore River Bridge, Portland at depth of 40 ft (continued)

DETERMINATION-OF-MOISTURE-CONTENT

Description of soil: F. R. 50-52
Location:
Sample No.: 0

No. of can	Weight of can, W1 (g)	Weight of can & wet soil, W2 (g)	Weight of can & dry soil, W3 (g)	w(%)=(W2-W3)/(W3-W1)x100
1	193.60	439.70	423.70	6.95

SIEVE-ANALYSIS

Description of soil: F. R. 50-52
Location:
Sample No.: 0 Weight of oven dry sample, W (g): 230.23

Sieve No.	Sieve opening (mm)	Weight retained on each sieve (g)	Percent of weight retained on each sieve	Cumulative percent retained	Percent finer
4	4.750	103.87	45.12	45.12	54.88
10	2.000	24.34	10.57	55.69	44.31
20	0.850	29.43	12.78	68.47	31.53
40	0.425	22.13	9.61	78.08	21.92
60	0.250	13.84	6.01	84.09	15.91
100	0.150	12.63	5.49	89.58	10.42
200	0.075	8.34	3.62	93.20	6.80
Pan	---	15.45			

Σ 230.03 = W1

Loss during sieve analysis=[(W-W1)/W]x100= 0.09% (OK if less than 2%)

Figure H.7: Soil Classification for Fore River Bridge, Portland, ME at depth of 50 ft

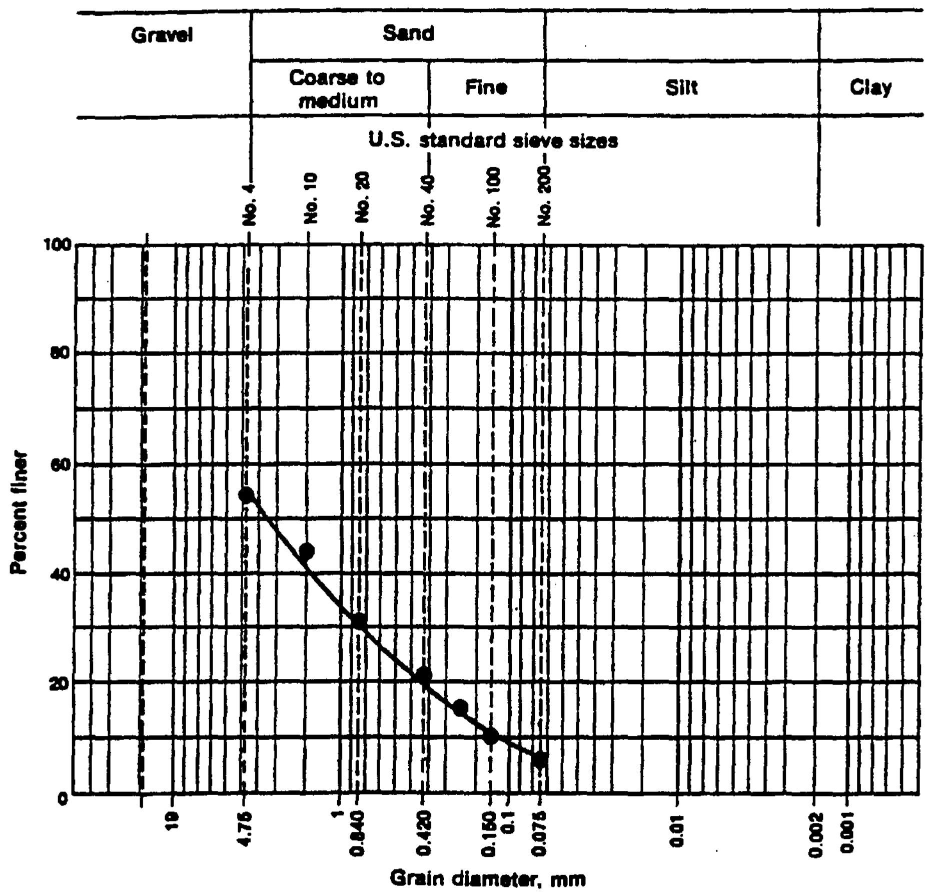
GRAIN SIZE DISTRIBUTION Data Sheet 6

Project GRL Job. No.

Location of Project Fore River Boring No. Sample No.

Description of Soil Depth of Sample 50 ft

Tested By. Date of Testing



Visual soil description

Soil classification:

SP-SM System

Figure H.7: Soil Classification for Fore River Bridge, Portland at depth of 50 ft (continued)

DETERMINATION-OF-MOISTURE-CONTENT

Description of soil: pier 17 14-15.5
Location:
Sample No.: 0

No. of can	Weight of can, W1 (g)	Weight of can & wet soil, W2 (g)	Weight of can & dry soil, W3 (g)	w(%)=(W2-W3)/(W3-W1)x100
1	150.20	415.70	355.60	29.26

SIEVE-ANALYSIS

Description of soil: pier 17 14-15.5
Location:
Sample No.: 0 Weight of oven dry sample, W (g): 206.8

Sieve No.	Sieve opening (mm)	Weight retained on each sieve (g)	Percent of weight retained on each sieve	Cumulative percent retained	Percent finer
4	4.750	22.23	10.75	10.75	89.25
10	2.000	12.97	6.27	17.02	82.98
20	0.850	18.77	9.08	26.10	73.90
40	0.425	23.81	11.51	37.61	62.39
60	0.250	18.57	8.98	46.59	53.41
100	0.150	11.66	5.64	52.23	47.77
200	0.075	17.70	8.56	60.79	39.21
Pan	---	81.02			

Σ 206.73 = W1
Loss during sieve analysis=[(W-W1)/W]x100= 0.03% (OK if less than 2%)

Figure H.8: Soil Classification for C&D Canal, Pier 17, DE at depth of 14 ft

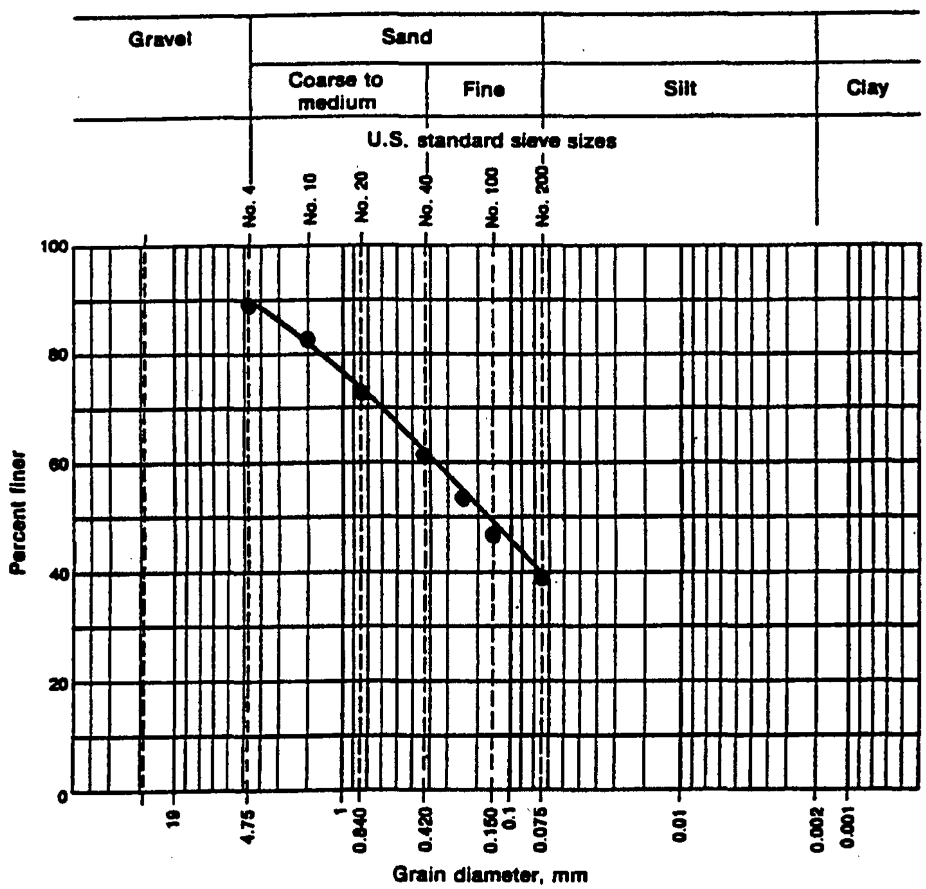
GRAIN SIZE DISTRIBUTION — Data Sheet 6

Project ______ GRL ______ Job. No. ______

Location of Project ______ pier 17 ______ Boring No. ______ Sample No. ______

Description of Soil ______ Depth of Sample ______ 14 ft ______

Tested By. ______ Date of Testing ______



Visual soil description ______

Soil classification:

______ SM ______ System ______

Figure H.8: Soil Classification for C&D Canal, Pier 17, DE at depth of 14 ft (continued)

ATTERBERG LIMITS DETERMINATION Data Sheet 3

Project GRL Job No. ______

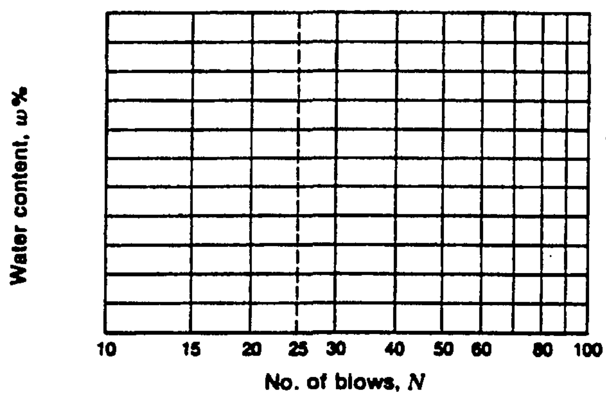
Location of Project pier 17-14 ft Boring No. ______ Sample No. ______

Description of Soil ______

Depth of Sample ______ Tested By ______ Date ______

Liquid Limit Determination

Can no.	1					
Wt. of wet soil + can	24.7					
Wt. of dry soil + can	20.75					
Wt. of can	8.9					
Wt. of dry soil	11.85					
Wt. of moisture	3.95					
Water content, w%	33.33					
No. of blows, N	25					



Flow index F_i = ______

Liquid limit = 33.33

Plastic limit = 26.00

Plasticity index I_p = 7.33

Plastic Limit Determination

Can no.	1			
Wt. of wet soil + can	15.45			
Wt. of dry soil + can	14.1			
Wt. of can	8.9			
Wt. of dry soil	5.2			
Wt. of moisture	1.35			
Water content, $w\% = w_p$	26.00			

Figure H.8: Soil Classification for C&D Canal, Pier 17, DE at depth of 14 ft (continued)

DETERMINATION-OF-MOISTURE-CONTENT

Description of soil: pier 17 30-31.5
Location:
Sample No.: 0

No. of can	Weight of can, W1 (g)	Weight of can & wet soil, W2 (g)	Weight of can & dry soil, W3 (g)	W(%)=(W2-W3)/(W3-W1)x100
1	148.90	434.20	349.60	42.15

SIEVE-ANALYSIS

Description of soil: pier 17 30-31.5
Location:
Sample No.: 0 Weight of oven dry sample, W (g): 202.6

Sieve No.	Sieve opening (mm)	Weight retained on each sieve (g)	Percent of weight retained on each sieve	Cumulative percent retained	Percent finer
4	4.750	0.00	0.00	0.00	100.00
10	2.000	0.00	0.00	0.00	100.00
20	0.850	0.00	0.00	0.00	100.00
40	0.425	0.46	0.23	0.23	99.77
60	0.250	3.46	1.71	1.93	98.07
100	0.150	22.23	10.97	12.91	87.09
200	0.075	108.95	53.78	66.68	33.32
Pan	---	67.05			

Σ 202.15 = W1

Loss during sieve analysis=[(W-W1)/W]x100= 0.22% (OK if less than 2%)

Figure H.9: Soil Classification for C&D Canal, Pier 17, DE at depth of 30 ft

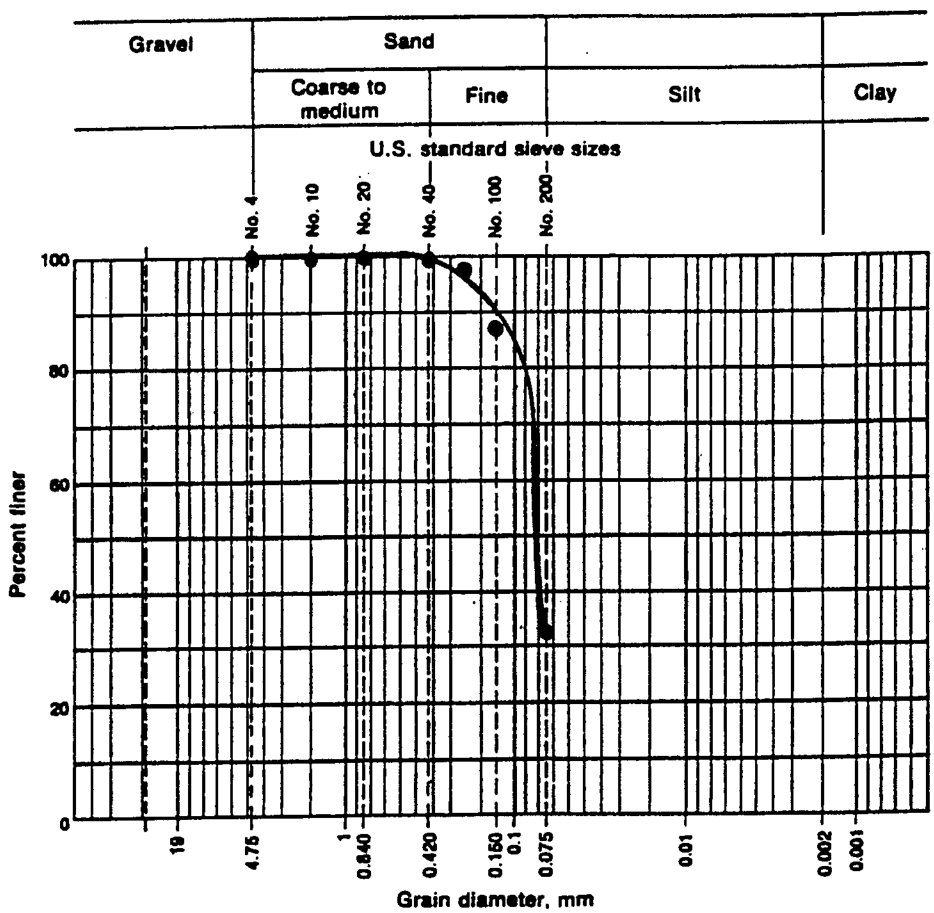
GRAIN SIZE DISTRIBUTION Data Sheet 6

Project GRL Job. No. ____

Location of Project pier 17 Boring No. ____ Sample No. ____

Description of Soil ____ Depth of Sample 30 ft

Tested By. ____ Date of Testing ____



Visual soil description ____

Soil classification:

SM System ____

Figure H.9: Soil Classification for C&D Canal, Pier 17, DE at depth of 30 ft (continued)

DETERMINATION-OF-MOISTURE-CONTENT

Description of soil: pier 17 40-41.5
Location:
Sample No.: 0

No. of can	Weight of can, W1 (g)	Weight of can & wet soil, W2 (g)	Weight of can & dry soil, W3 (g)	$w(\%)=\frac{W2-W3}{W3-W1}\times100$
1	195.80	560.50	503.10	18.68

SIEVE-ANALYSIS

Description of soil: pier 17 40-41.5
Location:
Sample No.: 0 Weight of oven dry sample, W (g): 309.86

Sieve No.	Sieve opening (mm)	Weight retained on each sieve (g)	Percent of weight retained on each sieve	Cumulative percent retained	Percent finer
4	4.750	2.66	0.86	0.86	99.14
10	2.000	9.82	3.17	4.03	95.97
20	0.850	29.71	9.59	13.62	86.38
40	0.425	43.92	14.17	27.79	72.21
60	0.250	32.22	10.40	38.19	61.81
100	0.150	12.74	4.11	42.30	57.70
200	0.075	5.96	1.92	44.22	55.78
Pan	---	172.81			

Σ 309.84 = W1

Loss during sieve analysis=[(W-W1)/W]x100= 0.01% (OK if less than 2%)

Figure H.10: Soil Classification for C&D Canal, Pier 17, DE at depth of 40 ft

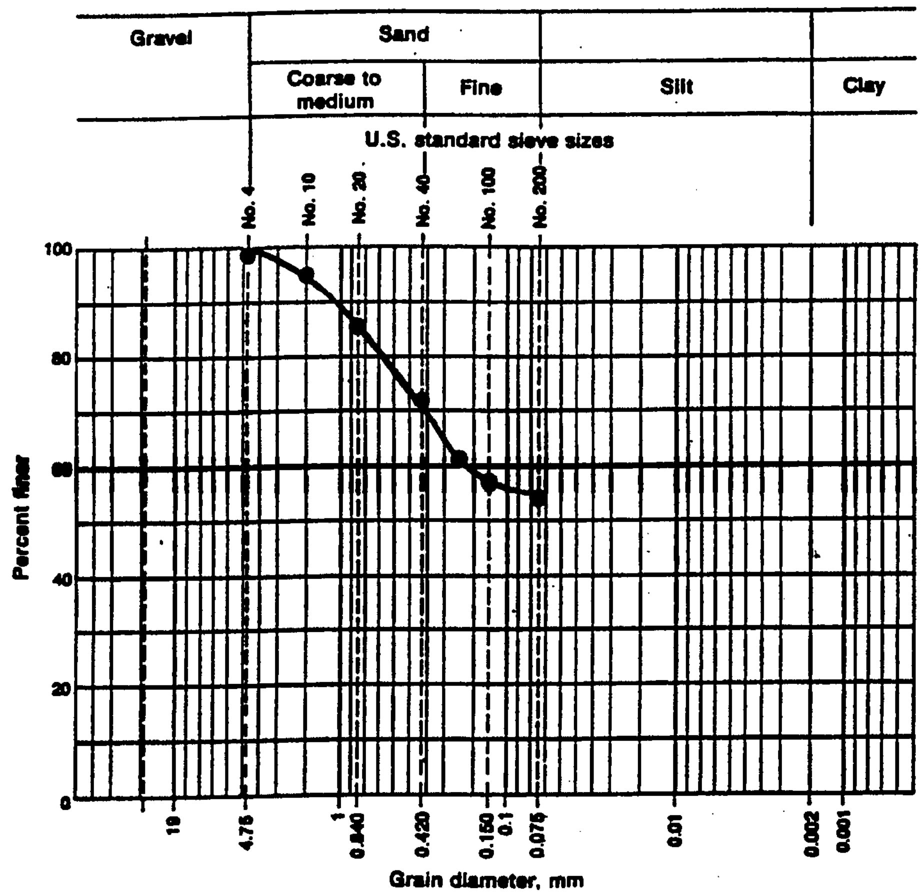
GRAIN SIZE DISTRIBUTION **Data Sheet 6**

Project GRL Job. No.

Location of Project pier 17 Boring No. Sample No.

Description of Soil Depth of Sample 40 ft

Tested By. Date of Testing



Visual soil description

Soil classification:

CL System

Figure H.10: Soil Classification for C&D Canal, Pier 17, DE at depth of 40 ft (continued)

ATTERBERG LIMITS DETERMINATION **Data Sheet 3**

Project GRL Job No. ______

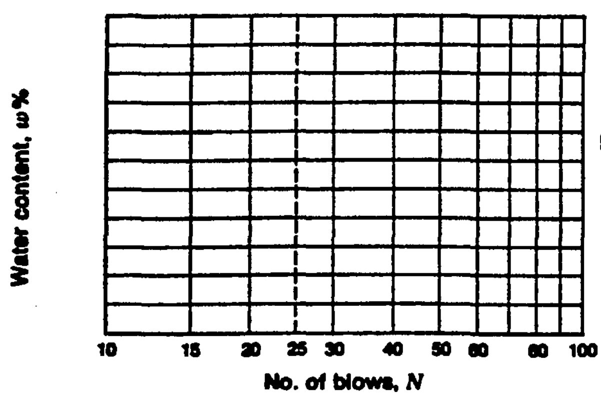
Location of Project pier 17- 40 ft Boring No. ______ Sample No. ______

Description of Soil ______

Depth of Sample ______ Tested By ______ Date ______

Liquid Limit Determination

Can no.	1					
Wt. of wet soil + can	31.45					
Wt. of dry soil + can	26.15					
Wt. of can	8.8					
Wt. of dry soil	17.35					
Wt. of moisture	5.3					
Water content, w%	30.55					
No. of blows, N	25					



Flow index F_i = ______

Liquid limit = 30.50

Plastic limit = 17.65

Plasticity index I_p = 12.90

Plastic Limit Determination

Can no.	1			
Wt. of wet soil + can	12.8			
Wt. of dry soil + can	12.2			
Wt. of can	8.8			
Wt. of dry soil	3.4			
Wt. of moisture	0.6			
Water content, w% = w_P	17.65			

Figure H.10: Soil Classification for C&D Canal, Pier 17, DE at depth of 40 ft (continued)

D E T E R M I N A T I O N - O F - M O I S T U R E - C O N T E N T

Description of soil: pier 17 50-52
Location:
Sample No.: 0

No. of can	Weight of can, W1 (g)	Weight of can & wet soil, W2 (g)	Weight of can & dry soil, W3 (g)	w(%)=(W2-W3)/(W3-W1)x100
1	193.82	502.40	429.20	31.10

S I E V E - A N A L Y S I S

Description of soil: pier 17 50-52
Location:
Sample No.: 0 Weight of oven dry sample, W (g): 241.6

Sieve No.	Sieve opening (mm)	Weight retained on each sieve (g)	Percent of weight retained on each sieve	Cumulative percent retained	Percent finer
4	4.750	0.00	0.00	0.00	100.00
10	2.000	0.45	0.19	0.19	99.81
20	0.850	0.61	0.25	0.44	99.56
40	0.425	1.51	0.62	1.06	98.94
60	0.250	16.07	6.65	7.72	92.28
100	0.150	66.99	27.73	35.44	64.56
200	0.075	58.21	24.09	59.54	40.46
Pan	---	96.60			

Σ 240.44 = W1
Loss during sieve analysis=[(W-W1)/W]x100= 0.48% (OK if less than 2%)

Figure H.11: Soil Classification for C&D Canal, Pier 17, DE at depth of 50 ft

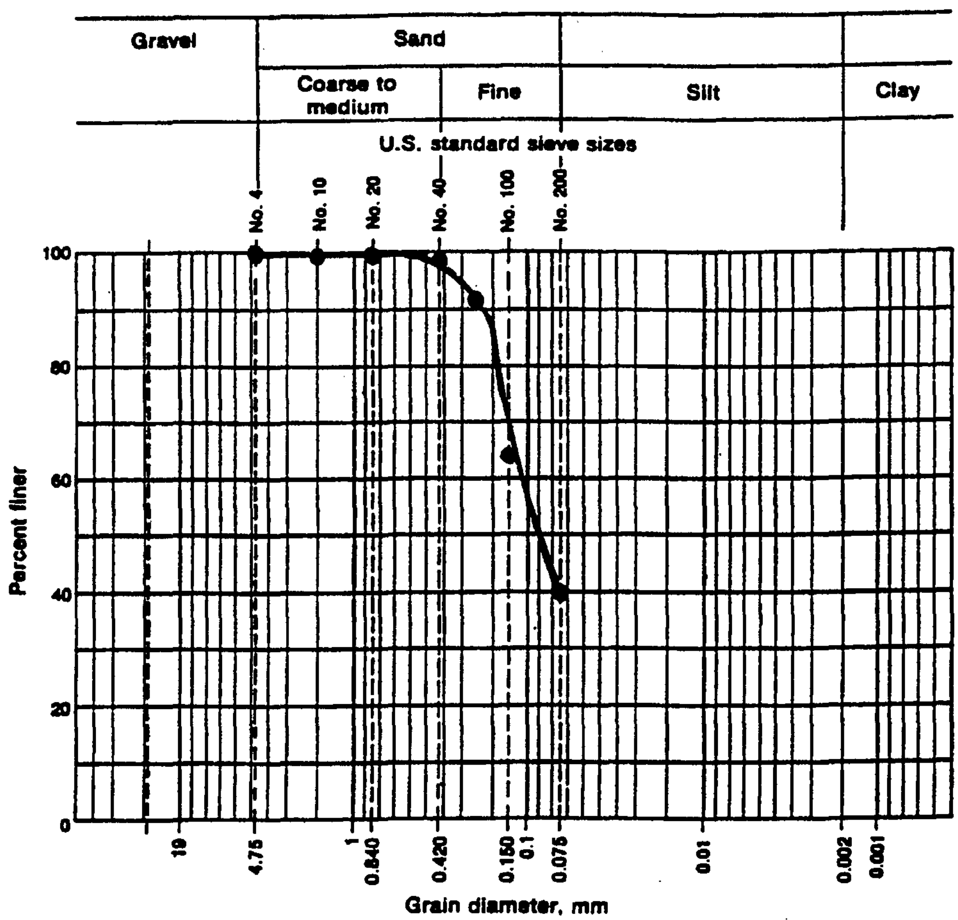
GRAIN SIZE DISTRIBUTION — **Data Sheet 6**

Project: pier 17 — Job. No.: ____

Location of Project: ____ — Boring No.: ____ — Sample No.: ____

Description of Soil: ____ — Depth of Sample: 50 ft

Tested By: ____ — Date of Testing: ____



Visual soil description: ____

Soil classification:

SM — System: ____

Figure H.11: Soil Classification for C&D Canal, Pier 17, DE at depth of 50 ft (continued)

DETERMINATION-OF-MOISTURE-CONTENT

Description of soil: pier 17 55-57
Location:
Sample No.: 0

No. of can	Weight of can, W1 (g)	Weight of can & wet soil, W2 (g)	Weight of can & dry soil, W3 (g)	w(%)=(W2-W3)/(W3-W1)x100
1	149.20	334.30	283.30	38.03

SIEVE-ANALYSIS

Description of soil: pier 17 55-57
Location:
Sample No.: 0 Weight of oven dry sample, W (g): 138.6

Sieve No.	Sieve opening (mm)	Weight retained on each sieve (g)	Percent of weight retained on each sieve	Cumulative percent retained	Percent finer
4	4.750	0.00	0.00	0.00	100.00
10	2.000	0.00	0.00	0.00	100.00
20	0.850	0.10	0.07	0.07	99.93
40	0.425	0.35	0.25	0.32	99.68
60	0.250	1.38	1.00	1.32	98.68
100	0.150	3.49	2.52	3.84	96.16
200	0.075	3.40	2.45	6.29	93.71
Pan	---	129.87			

Σ 138.59 = W1

Loss during sieve analysis=[(W-W1)/W]x100= 0.01% (OK if less than 2%)

Figure H.12: Soil Classification for C&D Canal, Pier 17, DE at depth of 55 ft

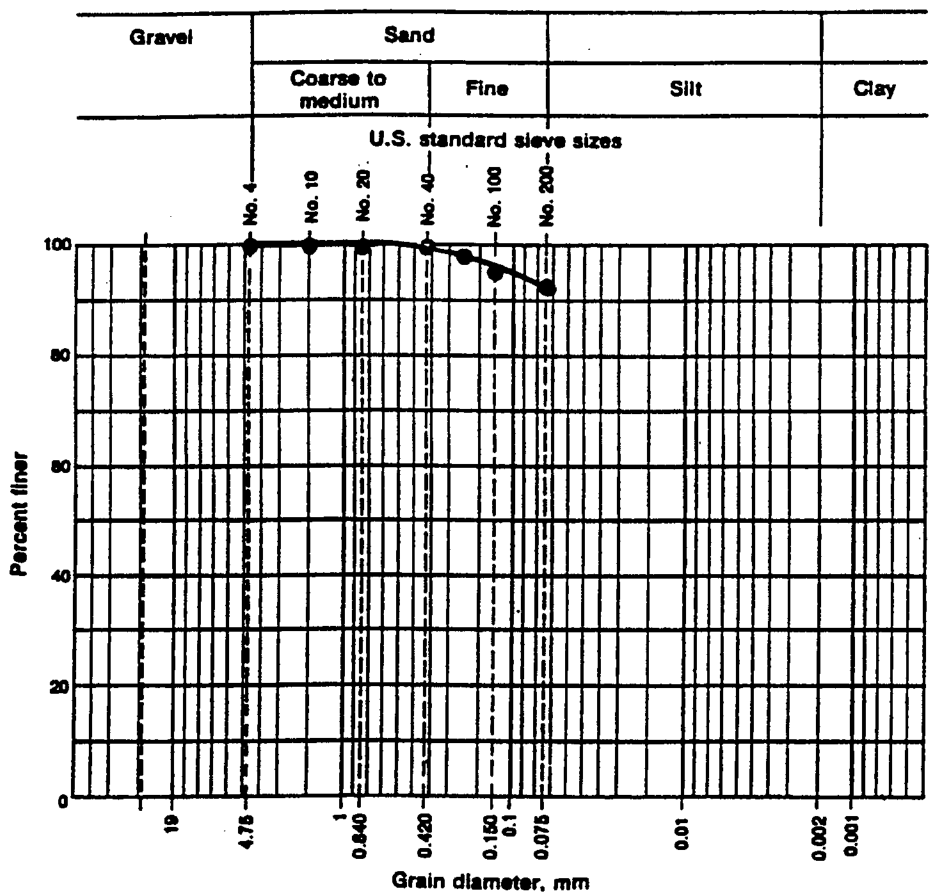
GRAIN SIZE DISTRIBUTION Data Sheet 6

Project GRL Job. No. ______

Location of Project pier 17 Boring No. ______ Sample No. ______

Description of Soil ______ Depth of Sample 55 ft

Tested By. ______ Date of Testing ______



Visual soil description ______

Soil classification:

CH System ______

Figure H.12: Soil Classification for C&D Canal, Pier 17, DE at depth of 55 ft (continued)

ATTERBERG LIMITS DETERMINATION **Data Sheet 3**

Project GRL Job No. ______

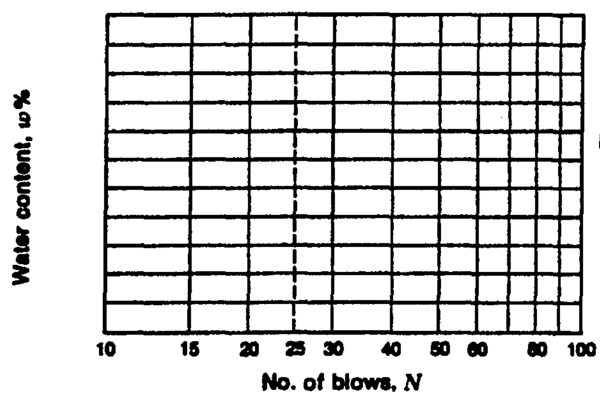
Location of Project pier 17-55 ft Boring No. ______ Sample No. ______

Description of Soil ______

Depth of Sample ______ Tested By ______ Date ______

Liquid Limit Determination

Can no.	1					
Wt. of wet soil + can	22.0					
Wt. of dry soil + can	16.5					
Wt. of can	8.8					
Wt. of dry soil	7.7					
Wt. of moisture	5.5					
Water content, w%	71.43					
No. of blows, *N*	25					



Flow index F_i = ______

Liquid limit = 71.43

Plastic limit = 25.93

Plasticity index I_p = 45.50

Plastic Limit Determination

Can no.	1			
Wt. of wet soil + can	12.2			
Wt. of dry soil + can	11.5			
Wt. of can	8.8			
Wt. of dry soil	2.7			
Wt. of moisture	0.7			
Water content, $w\% = w_P$	25.93			

Figure H.12: Soil Classification for C&D Canal, Pier 17, DE at depth of 55 ft (continued)

DETERMINATION-OF-MOISTURE-CONTENT

Description of soil: pier 17 60-61.5
Location:
Sample No.: 0

No. of can	Weight of can, W1 (g)	Weight of can & wet soil, W2 (g)	Weight of can & dry soil, W3 (g)	W(%)=(W2-W3)/(W3-W1)x100
1	147.70	394.60	336.30	30.91

SIEVE-ANALYSIS

Description of soil: pier 17 60-61.5
Location:
Sample No.: 0 Weight of oven dry sample, W (g): 189.02

Sieve No.	Sieve opening (mm)	Weight retained on each sieve (g)	Percent of weight retained on each sieve	Cumulative percent retained	Percent finer
4	4.750	0.00	0.00	0.00	100.00
10	2.000	0.09	0.05	0.05	99.95
20	0.850	0.24	0.13	0.17	99.83
40	0.425	0.22	0.12	0.29	99.71
60	0.250	7.19	3.80	4.09	95.91
100	0.150	75.23	39.80	43.89	56.11
200	0.075	69.27	36.65	80.54	19.46
Pan	---	36.56			

Σ 188.80 = W1

Loss during sieve analysis=[(W-W1)/W]x100= 0.12% (OK if less than 2%)

Figure H.13: Soil Classification for C&D Canal, Pier 17, DE at depth of 60 ft

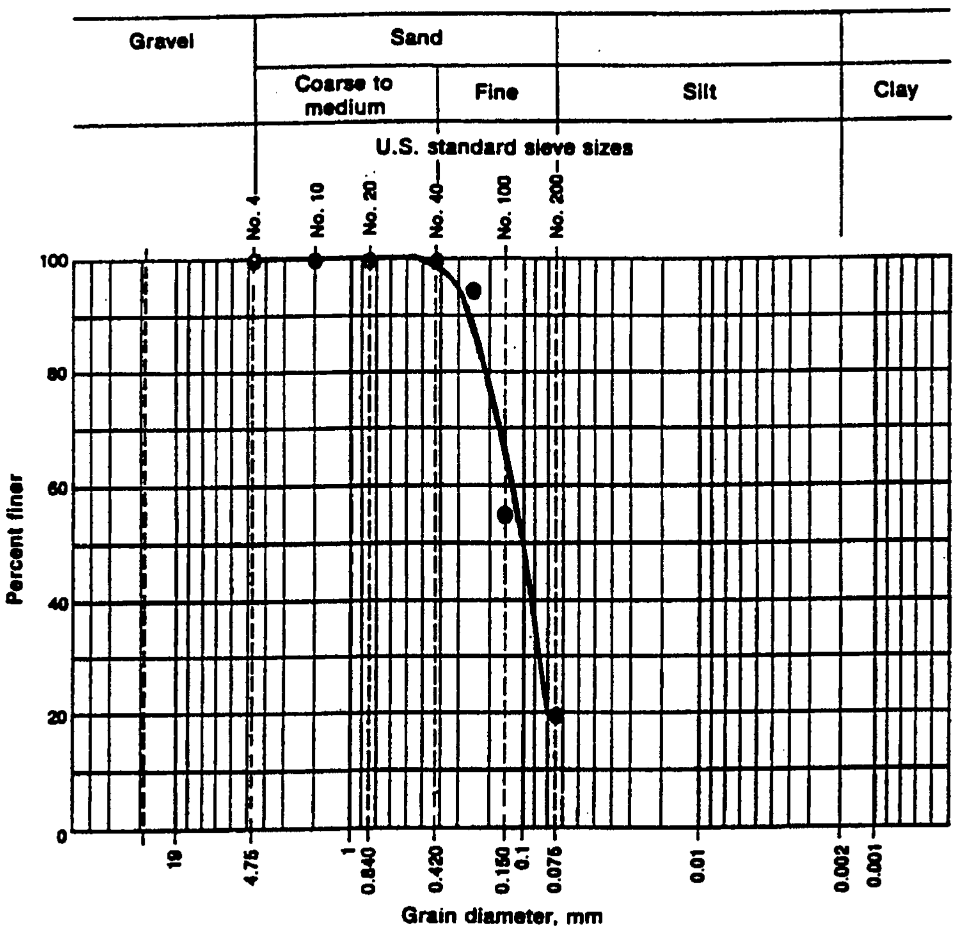
GRAIN SIZE DISTRIBUTION **Data Sheet 6**

Project: GRL Job. No. ____

Location of Project: pier 17 Boring No. ____ Sample No. ____

Description of Soil: ____ Depth of Sample: 60 ft

Tested By: ____ Date of Testing: ____



Visual soil description ____

Soil classification:

SM System ____

Figure H.13: Soil Classification for C&D Canal, Pier 17, DE at depth of 60 ft (continued)

DETERMINATION-OF-MOISTURE-CONTENT

Description of soil: pier 17 65-66.5
Location:
Sample No.: 0

No. of can	Weight of can, W1 (g)	Weight of can & wet soil, W2 (g)	Weight of can & dry soil, W3 (g)	w(%)=(W2-W3)/(W3-W1)x100
1	150.44	492.70	418.40	27.73

SIEVE-ANALYSIS

Description of soil: pier 17 65-66.5
Location:
Sample No.: 0 Weight of oven dry sample, W (g): 268.9

Sieve No.	Sieve opening (mm)	Weight retained on each sieve (g)	Percent of weight retained on each sieve	Cumulative percent retained	Percent finer
4	4.750	0.00	0.00	0.00	100.00
10	2.000	0.50	0.19	0.19	99.81
20	0.850	0.72	0.27	0.45	99.55
40	0.425	0.85	0.32	0.77	99.23
60	0.250	9.19	3.42	4.19	95.81
100	0.150	106.29	39.53	43.72	56.28
200	0.075	102.47	38.11	81.82	18.18
Pan	---	48.38			

Σ 268.40 = W1

Loss during sieve analysis=[(W-W1)/W]x100= 0.19% (OK if less than 2%)

Figure H.14: Soil Classification for C&D Canal, Pier 17, DE at depth of 65 ft

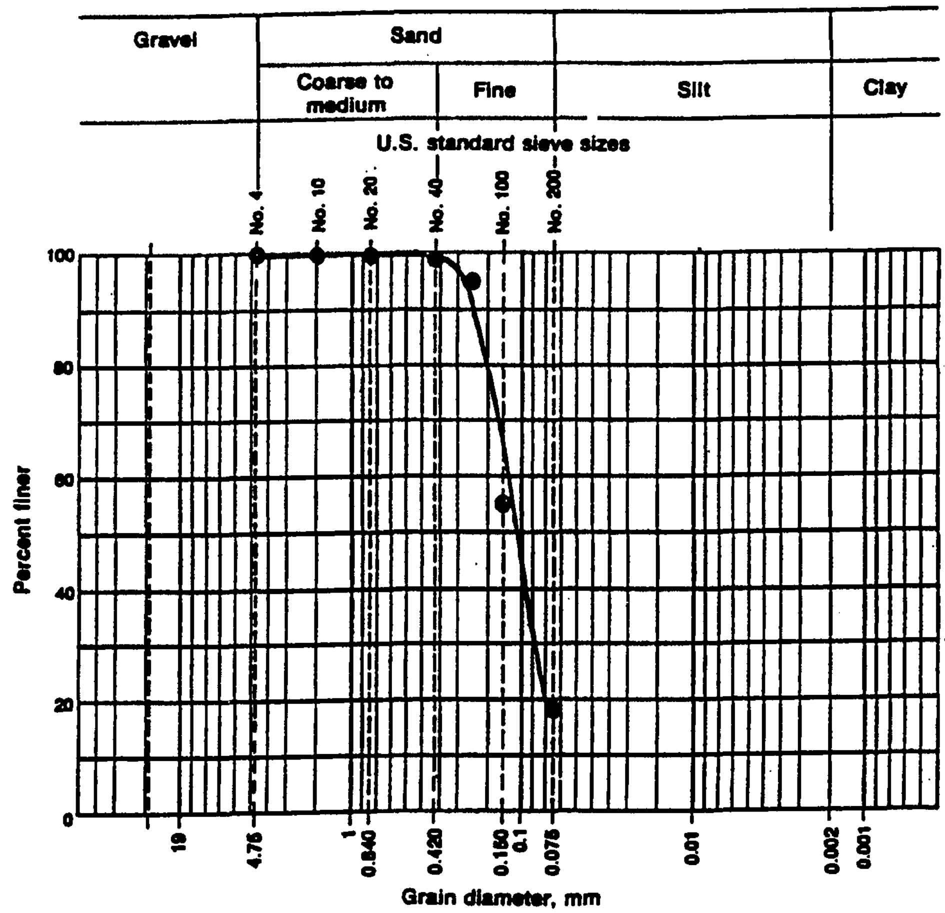
GRAIN SIZE DISTRIBUTION Data Sheet 6

Project GRL Job. No.

Location of Project pier 17 Boring No. Sample No.

Description of Soil Depth of Sample 65 ft

Tested By. Date of Testing



Visual soil description

Soil classification:

SM System

Figure H.14: Soil Classification for C&D Canal, Pier 17, DE at depth of 65 ft (continued)

DETERMINATION-OF-MOISTURE-CONTENT

Description of soil: pier 21 41-41.5
Location:
Sample No.: 0

No. of can	Weight of can, W1 (g)	Weight of can & wet soil, W2 (g)	Weight of can & dry soil, W3 (g)	w(%)=(W2-W3)/(W3-W1)x100
1	148.75	513.60	418.60	35.20

SIEVE-ANALYSIS

Description of soil: Pier 21 41-41.5
Location:
Sample No.: 0 Weight of oven dry sample, W (g): 270.7

Sieve No.	Sieve opening (mm)	Weight retained on each sieve (g)	Percent of weight retained on each sieve	Cumulative percent retained	Percent finer
4	4.750	0.00	0.00	0.00	100.00
10	2.000	0.00	0.00	0.00	100.00
20	0.850	0.00	0.00	0.00	100.00
40	0.425	1.40	0.52	0.52	99.48
60	0.250	12.80	4.73	5.25	94.75
100	0.150	88.70	32.77	38.01	61.99
200	0.075	124.08	45.84	83.85	16.15
Pan	---	42.65			

Σ 269.63 = W1

Loss during sieve analysis=[(W-W1)/W]x100= 0.40% (OK if less than 2%)

Figure H.15: Soil Classification for C&D Canal, Pier 21, DE at depth of 41 ft

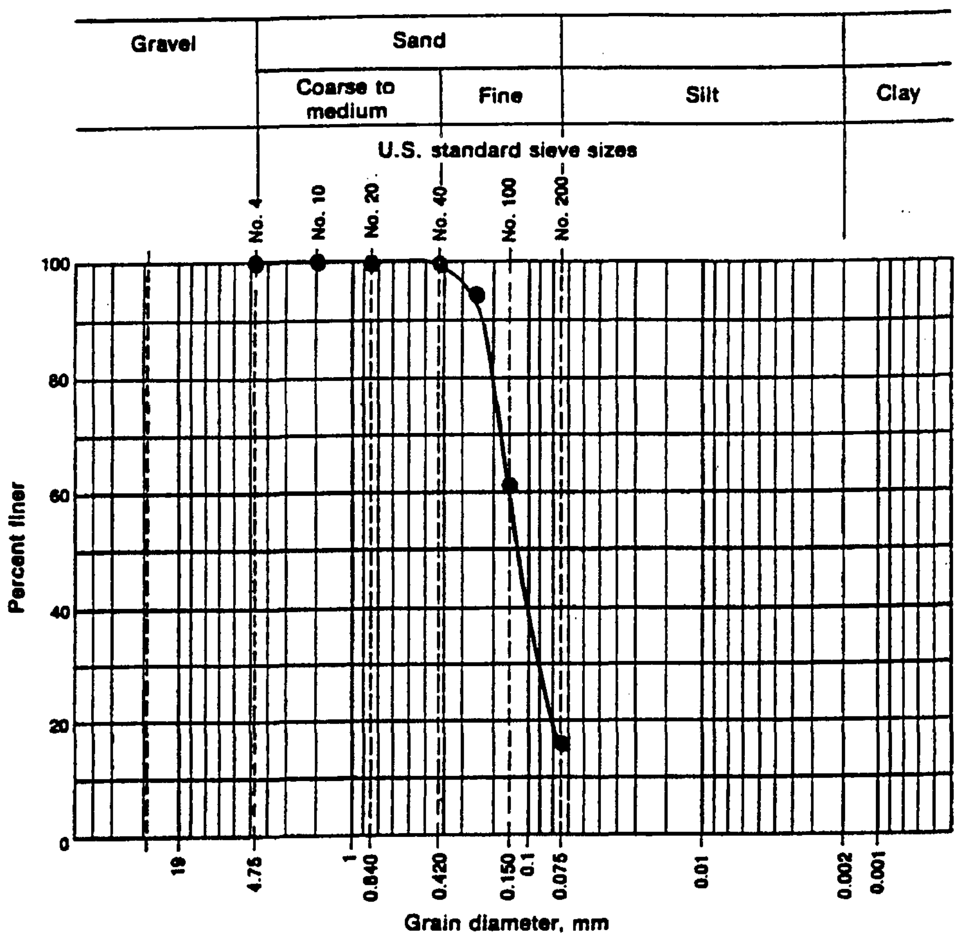
GRAIN SIZE DISTRIBUTION Data Sheet 6

Project ______ GRL ______ Job. No. ______

Location of Project ______ pier 21 ______ Boring No. ______ Sample No. ______

Description of Soil ______ Depth of Sample ______ 41 ft ______

Tested By. ______ Date of Testing ______



Visual soil description ______

Soil classification:

______ SM ______ System ______

Figure H.15: Soil Classification for C&D Canal, Pier 21, DE at depth of 41 ft (continued)

ATTERBERG LIMITS DETERMINATION **Data Sheet 3**

Project GRL **Job No.** ______

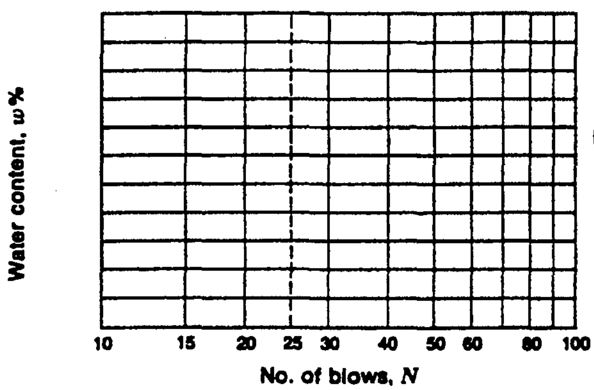
Location of Project pier 21-40 ft **Boring No.** ______ **Sample No.** ______

Description of Soil ______

Depth of Sample ______ **Tested By** ______ **Date** ______

Liquid Limit Determination

Can no.	1					
Wt. of wet soil + can	18.9					
Wt. of dry soil + can	16.5					
Wt. of can	8.9					
Wt. of dry soil	7.6					
Wt. of moisture	2.4					
Water content, w%	31.6					
No. of blows, N	25					



Flow index F_i = ______

Liquid limit = 31.6

Plastic limit = NP

Plasticity index I_p = ______

Plastic Limit Determination

Can no.				
Wt. of wet soil + can				
Wt. of dry soil + can				
Wt. of can				
Wt. of dry soil				
Wt. of moisture				
Water content, $w\% = w_p$				

Figure H.15: Soil Classification for C&D Canal, Pier 21, DE at depth of 41 ft (continued)

DETERMINATION-OF-MOISTURE-CONTENT

Description of soil: pier 21 55-56.5
Location:
Sample No.: 0

No. of can	Weight of can, W1 (g)	Weight of can & wet soil, W2 (g)	Weight of can & dry soil, W3 (g)	$w(\%) = \frac{W2-W3}{W3-W1} \times 100$
1	197.00	541.10	452.00	34.94

SIEVE-ANALYSIS

Description of soil: pier 21 55-56.5
Location:
Sample No.: 0 Weight of oven dry sample, W (g): 257.8

Sieve No.	Sieve opening (mm)	Weight retained on each sieve (g)	Percent of weight retained on each sieve	Cumulative percent retained	Percent finer
4	4.750	0.00	0.00	0.00	100.00
10	2.000	0.00	0.00	0.00	100.00
20	0.850	0.00	0.00	0.00	100.00
40	0.425	0.35	0.14	0.14	99.86
60	0.250	7.23	2.80	2.94	97.06
100	0.150	86.90	33.71	36.65	63.35
200	0.075	101.08	39.21	75.86	24.14
Pan	---	61.75			

Σ 257.31 = W1

Loss during sieve analysis=[(W-W1)/W]x100= 0.19% (OK if less than 2%)

Figure H.16: Soil Classification for C&D Canal, Pier 21, DE at depth of 55 ft

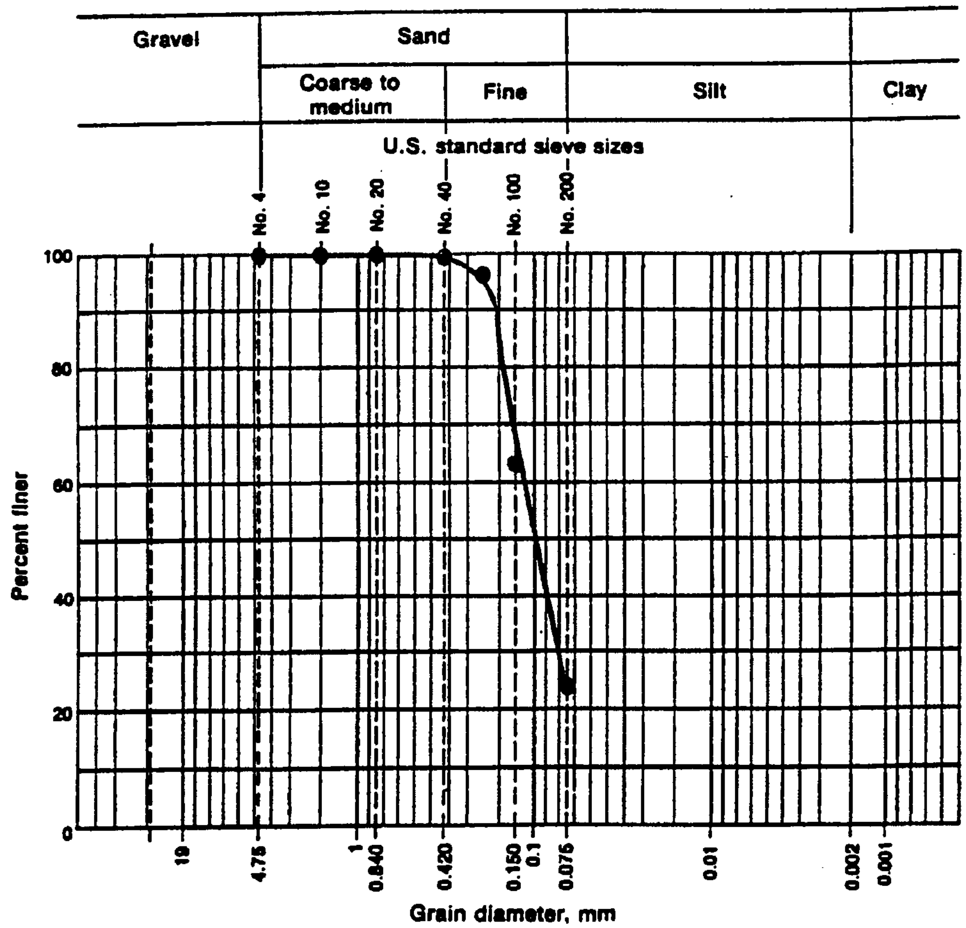
GRAIN SIZE DISTRIBUTION Data Sheet 6

Project GRL Job. No.

Location of Project pier 21 Boring No. Sample No.

Description of Soil Depth of Sample 55 ft

Tested By. Date of Testing



Visual soil description

Soil classification:

SM System

Figure H.16: Soil Classification for C&D Canal, Pier 21, DE at depth of 55 ft (continued)

DETERMINATION-OF-MOISTURE-CONTENT

Description of soil: pier 21 65-66.5
Location:
Sample No.: 0

No. of can	Weight of can, W1 (g)	Weight of can & wet soil, W2 (g)	Weight of can & dry soil, W3 (g)	W2-W3 w(%)=-----x100 W3-W1
1	147.50	461.40	384.58	32.40

SIEVE-ANALYSIS

Description of soil: pier 21 65-66.5
Location:
Sample No.: 0 Weight of oven dry sample, W (g): 239.96

Sieve No.	Sieve opening (mm)	Weight retained on each sieve (g)	Percent of weight retained on each sieve	Cumulative percent retained	Percent finer
4	4.750	0.00	0.00	0.00	100.00
10	2.000	0.00	0.00	0.00	100.00
20	0.850	0.00	0.00	0.00	100.00
40	0.425	0.30	0.13	0.13	99.87
60	0.250	4.70	1.96	2.08	97.92
100	0.150	34.40	14.34	16.42	83.58
200	0.075	128.00	53.34	69.76	30.24
Pan	---	72.10			

Σ 239.50 = W1
Loss during sieve analysis=[(W-W1)/W]x100= 0.19% (OK if less than 2%)

Figure H.17: Soil Classification for C&D Canal, Pier 21, DE at depth of 65 ft

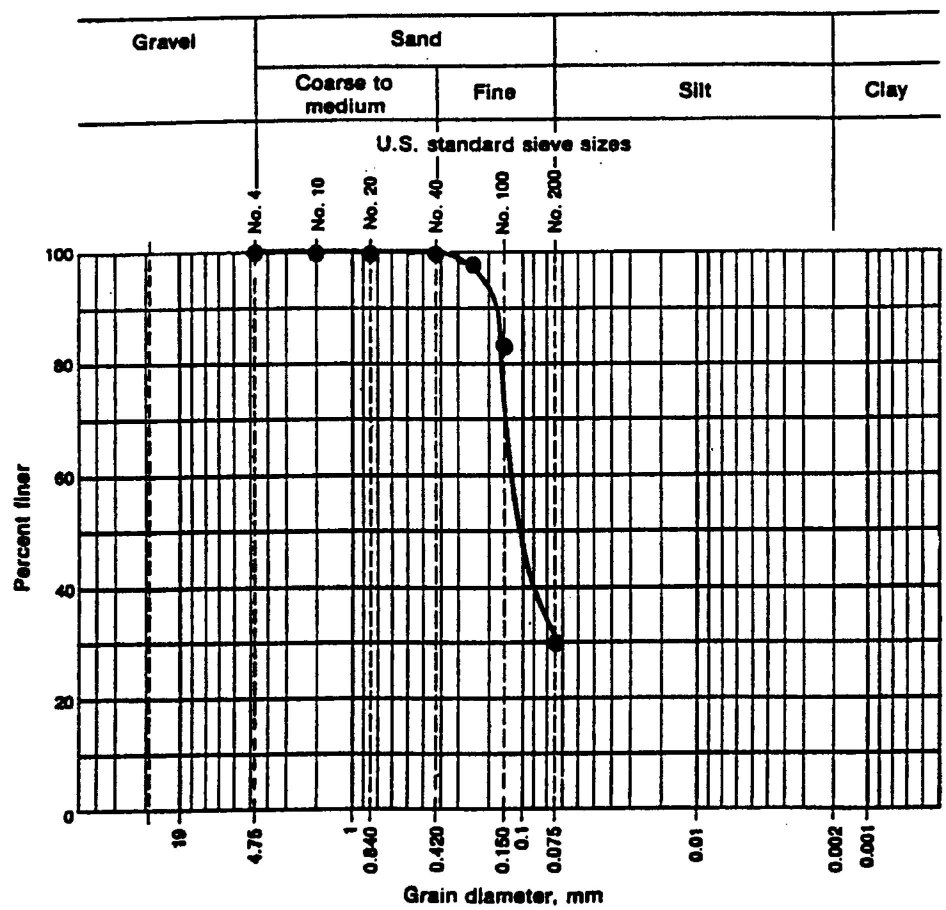
GRAIN SIZE DISTRIBUTION Data Sheet 6

Project GRL Job. No.

Location of Project pier 21 Boring No. Sample No.

Description of Soil Depth of Sample 65 ft

Tested By. Date of Testing



Visual soil description

Soil classification:

SM System

Figure H.17: Soil Classification for C&D Canal, Pier 21, DE at depth of 65 ft (continued)

DETERMINATION-OF-MOISTURE-CONTENT

Description of soil:
Location: White City Bridge - 30.5 ft
Sample No.: 14

No. of can	Weight of can, W1 (g)	Weight of can & wet soil, W2 (g)	Weight of can & dry soil, W3 (g)	w(%)=(W2-W3)/(W3-W1)x100
1	8.90	22.50	20.40	18.26

SIEVE-ANALYSIS

Description of soil:
Location: White City Bridge - 30.5 ft
Sample No.: 14   Weight of oven dry sample, W (g): 168.25

Sieve No.	Sieve opening (mm)	Weight retained on each sieve (g)	Percent of weight retained on each sieve	Cumulative percent retained	Percent finer
4	4.750	0.00	0.00	0.00	100.00
10	2.000	0.00	0.00	0.00	100.00
20	0.850	0.30	0.18	0.18	99.82
40	0.425	2.50	1.49	1.66	98.34
60	0.250	9.40	5.59	7.25	92.75
100	0.150	47.80	28.41	35.66	64.34
200	0.075	51.50	30.61	66.27	33.73
Pan	---	56.15			

Σ 167.65 = W1

Loss during sieve analysis=[(W-W1)/W]x100= 0.36% (OK if less than 2%)

Figure H.18: Soil Classification for White City Bridge, TP3, FL at depth of 30.5 ft

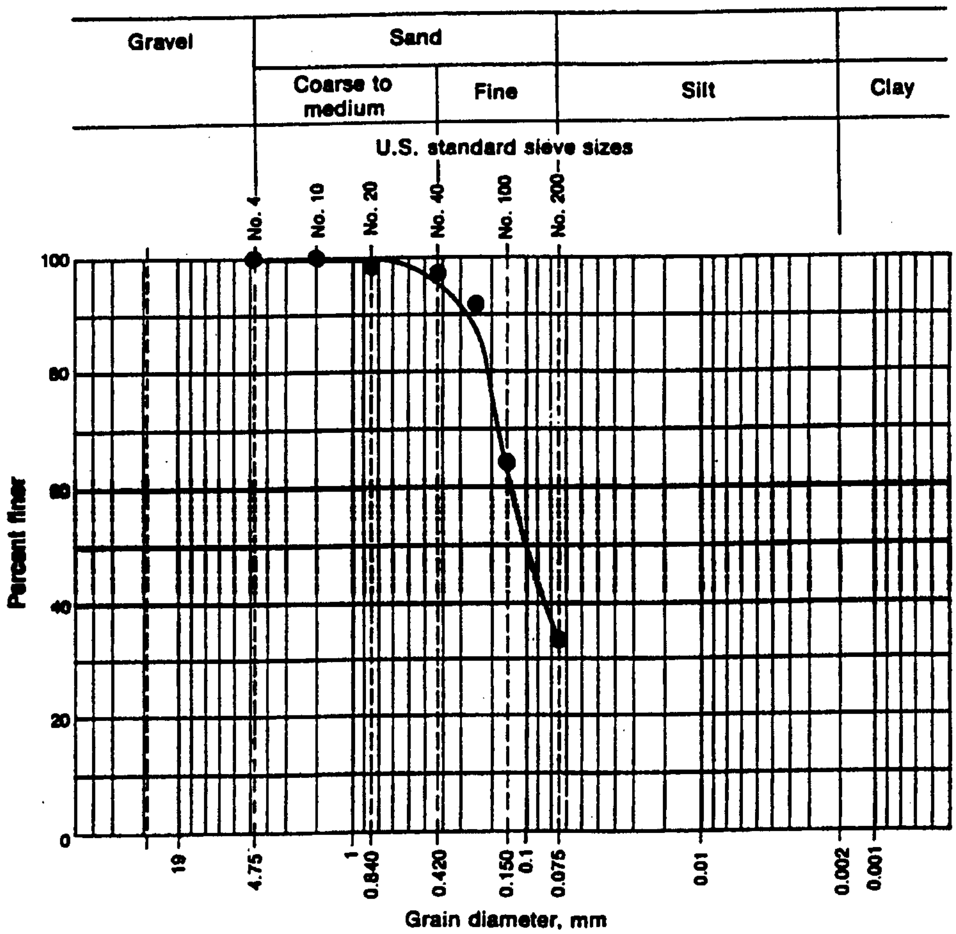
GRAIN SIZE DISTRIBUTION Data Sheet 6

Project GRL **Job. No.**

Location of Project White City Bridge **Boring No.** **Sample No.** 14

Description of Soil **Depth of Sample** 30.5 ft

Tested By. **Date of Testing**



Visual soil description

Soil classification:

SM **System**

Figure H.18: Soil Classification for White City Bridge, TP3, FL at depth of 30.5 ft (continued)

DETERMINATION-OF-MOISTURE-CONTENT

Description of soil:
Location: White City Bridge - 15.5 ft
Sample No.: 13

No. of can	Weight of can, W1 (g)	Weight of can & wet soil, W2 (g)	Weight of can & dry soil, W3 (g)	$w(\%)=\frac{W2-W3}{W3-W1}x100$
1	8.80	22.20	19.70	22.94

SIEVE-ANALYSIS

Description of soil:
Location: White City Bridge - 15.5 ft
Sample No.: 13 Weight of oven dry sample, W (g): 177.5

Sieve No.	Sieve opening (mm)	Weight retained on each sieve (g)	Percent of weight retained on each sieve	Cumulative percent retained	Percent finer
4	4.750	0.00	0.00	0.00	100.00
10	2.000	0.00	0.00	0.00	100.00
20	0.850	1.40	0.79	0.79	99.21
40	0.425	10.30	5.80	6.59	93.41
60	0.250	39.80	22.42	29.01	70.99
100	0.150	109.60	61.75	90.76	9.24
200	0.075	8.70	4.90	95.66	4.34
Pan	---	7.10			

Σ 176.90 = W1

Loss during sieve analysis=[(W-W1)/W]x100= 0.34% (OK if less than 2%)

Figure H.19: Soil Classification for White City Bridge, TP6, FL at depth of 15.5 ft

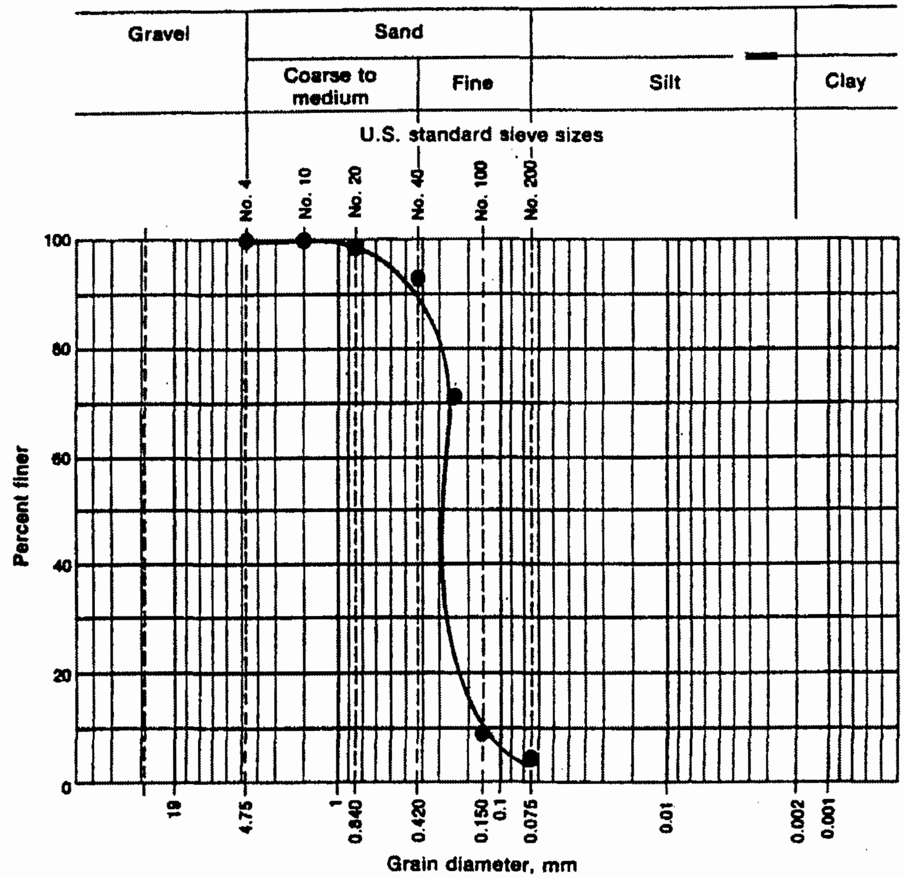
GRAIN SIZE DISTRIBUTION Data Sheet 6

Project GRL Job. No.

Location of Project White City Bridge Boring No. Sample No. 13

Description of Soil Depth of Sample 15.5 ft

Tested By. Date of Testing



Visual soil description

Soil classification:

SP System

Figure H.19: Soil Classification for White City Bridge, TP6, FL at depth of 15.5 ft (continued)

DETERMINATION-OF-MOISTURE-CONTENT

Description of soil:
Location: Appal. River Bridge - 20 ft
Sample No.: 9

No. of can	Weight of can, W1 (g)	Weight of can & wet soil, W2 (g)	Weight of can & dry soil, W3 (g)	$w(\%) = \frac{W2-W3}{W3-W1} \times 100$
1	9.00	23.90	20.80	26.27

SIEVE-ANALYSIS

Description of soil:
Location: Appal. River Bridge - 20 ft
Sample No.: 9   Weight of oven dry sample, W (g): 166.9

Sieve No.	Sieve opening (mm)	Weight retained on each sieve (g)	Percent of weight retained on each sieve	Cumulative percent retained	Percent finer
4	4.750	0.00	0.00	0.00	100.00
10	2.000	0.00	0.00	0.00	100.00
20	0.850	0.00	0.00	0.00	100.00
40	0.425	1.40	0.84	0.84	99.16
60	0.250	14.80	8.87	9.71	90.29
100	0.150	130.20	78.01	87.72	12.28
200	0.075	14.10	8.45	96.17	3.83
Pan	---	5.80			

Σ 166.30 = W1

Loss during sieve analysis=[(W-W1)/W]x100= 0.36% (OK if less than 2%)

Figure H.20: Soil Classification for Apalachicola River Bridge, FL at depth of 20 ft

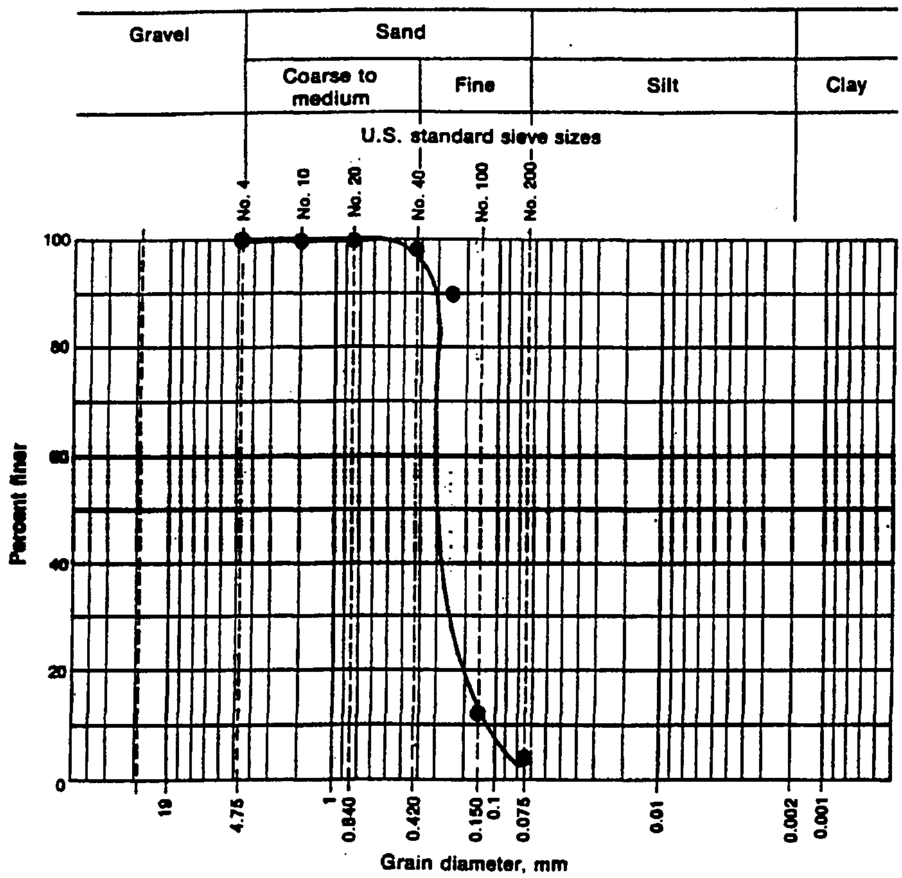
GRAIN SIZE DISTRIBUTION **Data Sheet 6**

Project GRL Job. No. ____

Location of Project Appal. River Bridge Boring No. ____ Sample No. 9

Description of Soil ____ Depth of Sample 20 ft

Tested By. ____ Date of Testing ____



Visual soil description ____

Soil classification:

SP System ____

Figure H.20: Soil Classification for Apalachicola River Bridge at depth of 20 ft (continued)

DETERMINATION-OF-MOISTURE-CONTENT

Description of soil:
Location: Appal. River Bridge - 25 ft
Sample No.: 10

No. of can	Weight of can, W1 (g)	Weight of can & wet soil, W2 (g)	Weight of can & dry soil, W3 (g)	$w(\%)=\frac{W2-W3}{W3-W1}\times 100$
1	8.80	22.75	20.00	24.55

SIEVE-ANALYSIS

Description of soil: (All materials retained on #20 are organic)
Location: Appal. River Bridge - 25 ft
Sample No.: 10 Weight of oven dry sample, W (g): 99.8

Sieve No.	Sieve opening (mm)	Weight retained on each sieve (g)	Percent of weight retained on each sieve	Cumulative percent retained	Percent finer
4	4.750	1.00	1.00	1.00	99.00
10	2.000	1.40	1.40	2.40	97.60
20	0.850	1.40	1.40	3.81	96.19
40	0.425	3.00	3.01	6.81	93.19
60	0.250	9.00	9.02	15.83	84.17
100	0.150	69.20	69.34	85.17	14.83
200	0.075	8.00	8.02	93.19	6.81
Pan	---	6.40			

Σ 99.40 = W1

Loss during sieve analysis=[(W-W1)/W]x100= 0.40% (OK if less than 2%)

Figure H.21: Soil Classification for Apalachicola River Bridge, FL at depth of 25 ft

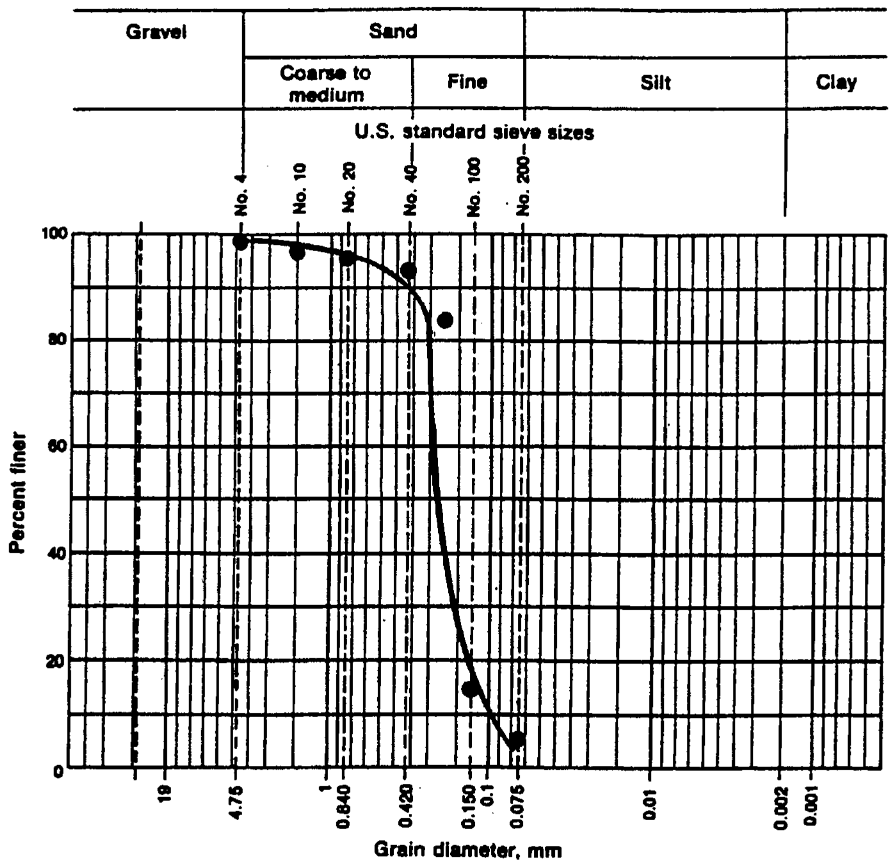
GRAIN SIZE DISTRIBUTION Data Sheet 6

Project GRL Job. No. ______

Location of Project Appal. River Bridge Boring No. ______ Sample No. 10

Description of Soil ______ Depth of Sample 25 ft

Tested By. ______ Date of Testing ______



Visual soil description ______

Soil classification:

SP-SM System ______

Figure H.21: Soil Classification for Apalachicola River Bridge at depth of 25 ft (continued)

DETERMINATION-OF-MOISTURE-CONTENT

Description of soil:
Location: Appal. River Bridge - 55 ft
Sample No.: 11

No. of can	Weight of can, W1 (g)	Weight of can & wet soil, W2 (g)	Weight of can & dry soil, W3 (g)	W(%)=(W2-W3)/(W3-W1)x100
1	8.80	18.20	13.90	84.31

SIEVE-ANALYSIS

Description of soil:
Location: Appal. River Bridge - 55 ft
Sample No.: 11 Weight of oven dry sample, W (g): 42.7

Sieve No.	Sieve opening (mm)	Weight retained on each sieve (g)	Percent of weight retained on each sieve	Cumulative percent retained	Percent finer
4	4.750	0.00	0.00	0.00	100.00
10	2.000	0.00	0.00	0.00	100.00
20	0.850	0.00	0.00	0.00	100.00
40	0.425	0.00	0.00	0.00	100.00
60	0.250	0.00	0.00	0.00	100.00
100	0.150	9.00	21.08	21.08	78.92
200	0.075	7.10	16.63	37.70	62.30
Pan	---	26.30			

Σ 42.40 = W1

Loss during sieve analysis=[(W-W1)/W]x100= 0.70% (OK if less than 2%)

Figure H.22: Soil Classification for Apalachicola River Bridge, FL at depth of 55 ft

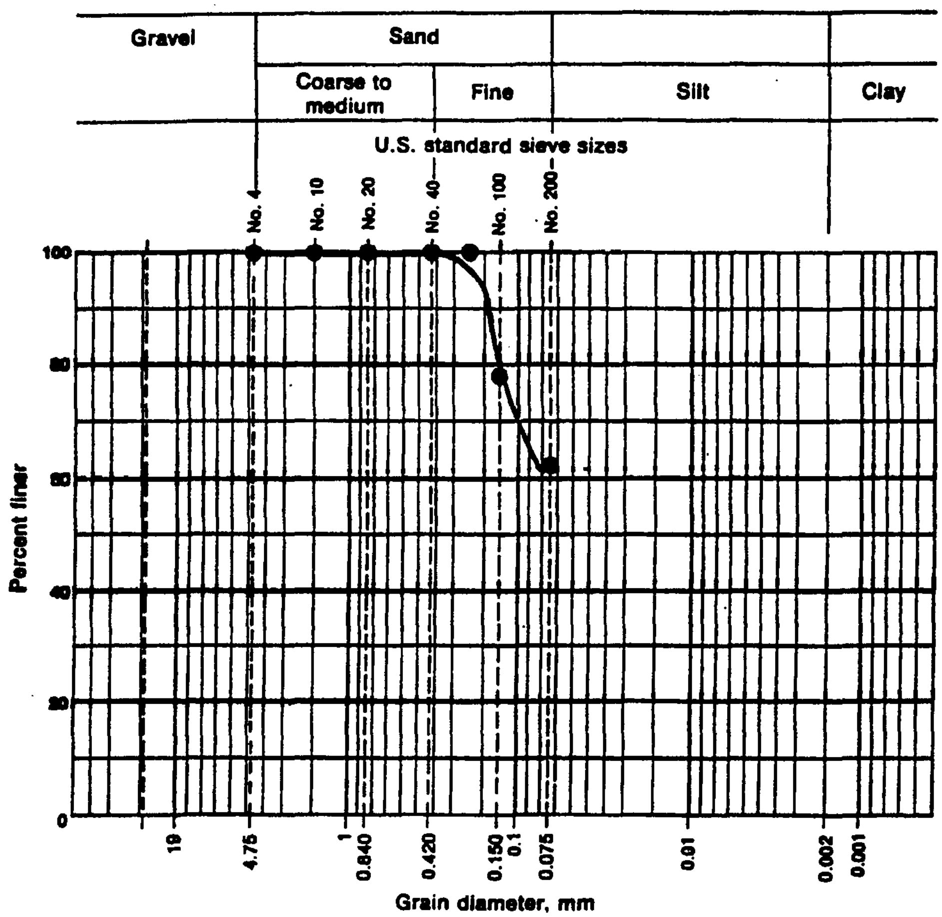
GRAIN SIZE DISTRIBUTION Data Sheet 6

Project GRL Job. No.

Location of Project Appal. River Bridge Boring No. Sample No. 11

Description of Soil Depth of Sample 55 ft

Tested By. Date of Testing



Visual soil description

Soil classification:

MH System

Figure H.22: Soil Classification for Apalachicola River Bridge at depth of 55 ft (continued)

ATTERBERG LIMITS DETERMINATION Data Sheet 3

Project GRL Job No. ______

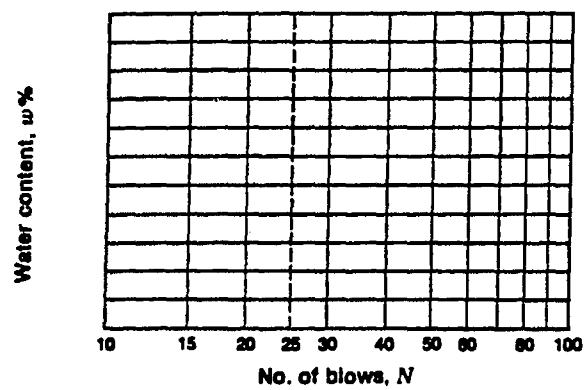
Location of Project Appal. River Bridge Boring No. ______ Sample No. 11

Description of Soil ______

Depth of Sample 55 ft Tested By ______ Date ______

Liquid Limit Determination

Can no.	1					
Wt. of wet soil + can	18.3					
Wt. of dry soil + can	14.0					
Wt. of can	8.9					
Wt. of dry soil	5.1					
Wt. of moisture	4.3					
Water content, w%	84.31					
No. of blows, N	25					



Flow index F_l = ______

Liquid limit = 84.31

Plastic limit = 53.33

Plasticity index I_P = 30.98

Plastic Limit Determination

Can no.	1			
Wt. of wet soil + can	13.4			
Wt. of dry soil + can	11.8			
Wt. of can	8.8			
Wt. of dry soil	3.0			
Wt. of moisture	1.6			
Water content, $w\% = w_P$	53.33			

Figure H.22: Soil Classification for Apalachicola River Bridge at depth of 55 ft (continued)

DETERMINATION-OF-MOISTURE-CONTENT

Description of soil:
Location: Appal. River Bridge - 75 ft
Sample No.: 12

No. of can	Weight of can, W1 (g)	Weight of can & wet soil, W2 (g)	Weight of can & dry soil, W3 (g)	$w(\%)=\frac{W2-W3}{W3-W1}\times 100$
1	8.95	19.90	17.80	23.73

SIEVE-ANALYSIS

Description of soil:
Location: Appal. River Bridge - 75 ft
Sample No.: 12 Weight of oven dry sample, W (g): 154.15

Sieve No.	Sieve opening (mm)	Weight retained on each sieve (g)	Percent of weight retained on each sieve	Cumulative percent retained	Percent finer
4	4.750	0.00	0.00	0.00	100.00
10	2.000	1.40	0.91	0.91	99.09
20	0.850	17.30	11.22	12.13	87.87
40	0.425	30.70	19.92	32.05	67.95
60	0.250	45.40	29.45	61.50	38.50
100	0.150	35.50	23.03	84.53	15.47
200	0.075	4.90	3.18	87.71	12.29
Pan	---	18.00			

Σ 153.20 = W1

Loss during sieve analysis=[(W-W1)/W]x100= 0.62% (OK if less than 2%)

Figure H.23: Soil Classification for Apalachicola River Bridge, FL at depth of 75 ft

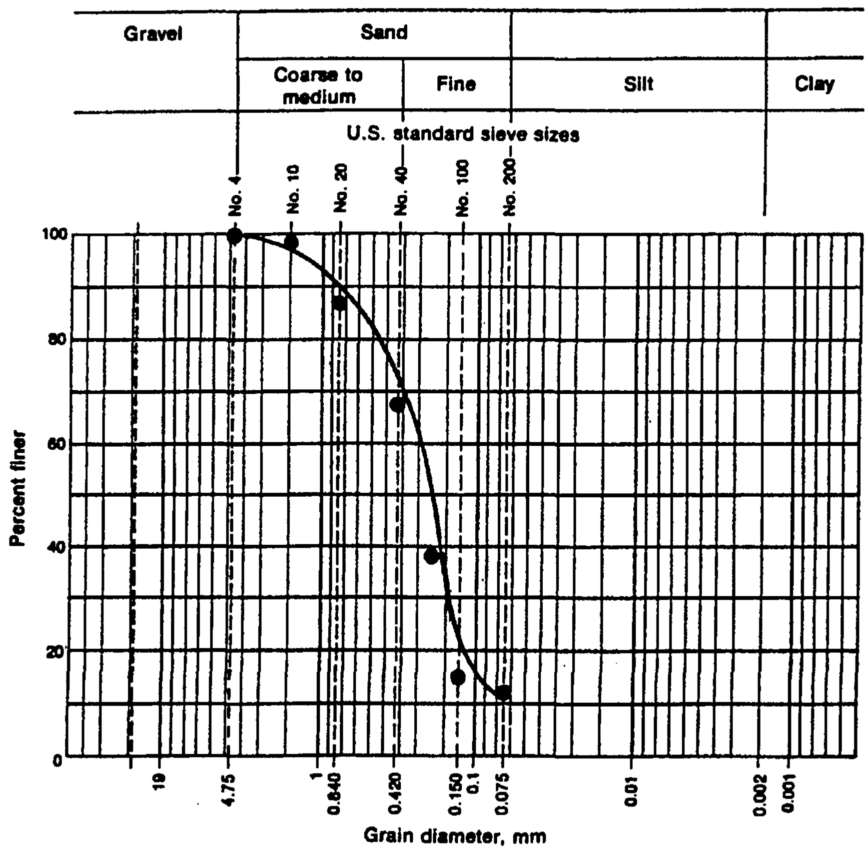
GRAIN SIZE DISTRIBUTION Data Sheet 6

Project GRL Job. No. ____

Location of Project Appal. River Bridge Boring No. ____ Sample No. 12

Description of Soil ____ Depth of Sample 75 ft

Tested By. ____ Date of Testing ____



Visual soil description ____

Soil classification:

SM System ____

Figure H.23: Soil Classification for Apalachicola River Bridge, FL at depth of 75 ft (continued)

DETERMINATION-OF-MOISTURE-CONTENT

Description of soil:
Location: Skyway Bridge - 15 ft
Sample No.: 1

No. of can	Weight of can, W1 (g)	Weight of can & wet soil, W2 (g)	Weight of can & dry soil, W3 (g)	W(%)=(W2-W3)/(W3-W1)x100
1	22.45	50.60	45.50	22.13

SIEVE-ANALYSIS

Description of soil: (All Materials retained on #40 are shells)
Location: Skyway Bridge - 15 ft
Sample No.: 1 Weight of oven dry sample, W (g): 178.9

Sieve No.	Sieve opening (mm)	Weight retained on each sieve (g)	Percent of weight retained on each sieve	Cumulative percent retained	Percent finer
4	4.750	6.70	3.75	3.75	96.25
10	2.000	3.20	1.79	5.53	94.47
20	0.850	5.00	2.79	8.33	91.67
40	0.425	3.40	1.90	10.23	89.77
60	0.250	10.30	5.76	15.99	84.01
100	0.150	102.80	57.46	73.45	26.55
200	0.075	36.50	20.40	93.85	6.15
Pan	---	8.20			

Σ 176.10 = W1
Loss during sieve analysis=[(W-W1)/W]x100= 1.57% (OK if less than 2%)

Figure H.24: Soil Classification for Sunshine Skyway Bridge, FL at depth of 15 ft

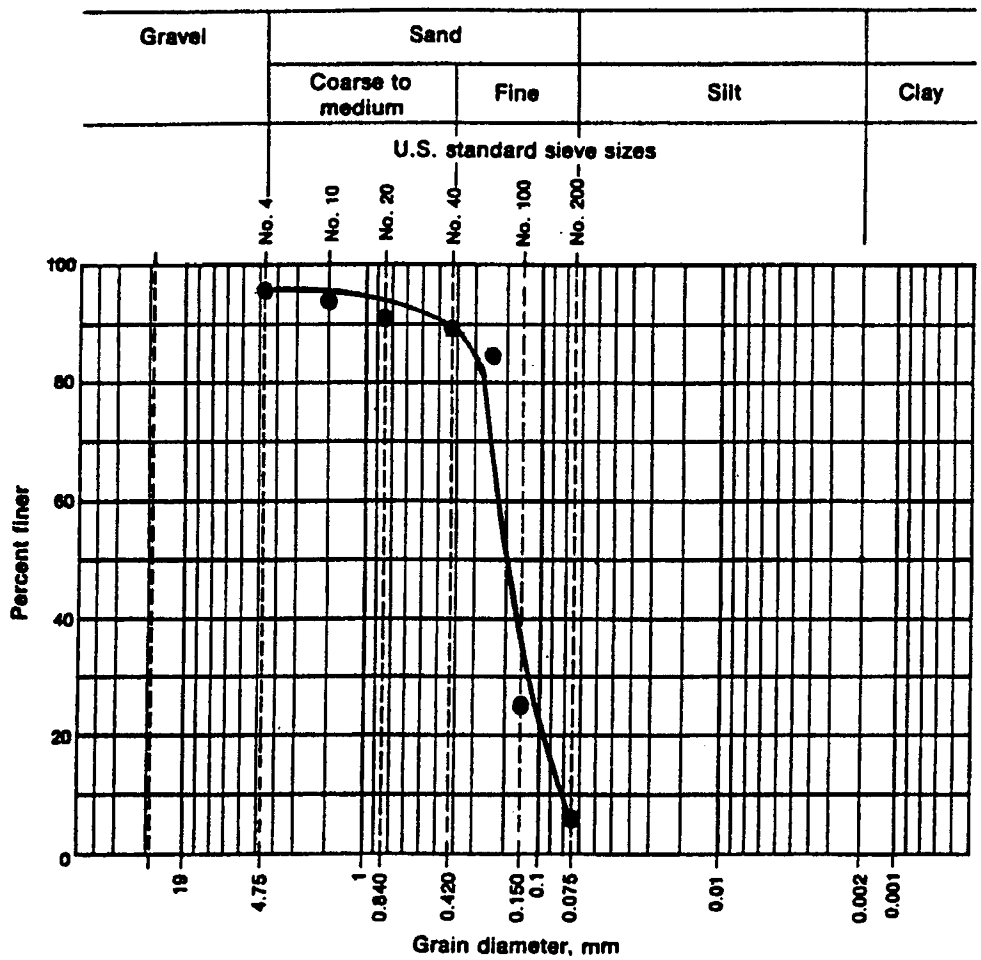
GRAIN SIZE DISTRIBUTION Data Sheet 6

Project GRL Job. No. ______

Location of Project Skyway Bridge Boring No. ______ Sample No. 1

Description of Soil ______ Depth of Sample 15 ft

Tested By. ______ Date of Testing ______



Visual soil description ______

Soil classification:

SP–SM System ______

Figure H.24: Soil Classification for Sunshine Skyway Bridge, FL at depth of 15 ft (continued)

D E T E R M I N A T I O N - O F - M O I S T U R E - C O N T E N T

Description of soil:
Location: Skyway Bridge - 25 ft
Sample No.: 2

No. of can	Weight of can, W1 (g)	Weight of can & wet soil, W2 (g)	Weight of can & dry soil, W3 (g)	w(%)=(W2-W3)/(W3-W1)x100
1	22.40	46.50	41.90	23.59

S I E V E - A N A L Y S I S

Description of soil: (All the materials retained on #60 are shells)
Location: Skyway Bridge - 25 ft
Sample No.: 2 Weight of oven dry sample, W (g): 118.3

Sieve No.	Sieve opening (mm)	Weight retained on each sieve (g)	Percent of weight retained on each sieve	Cumulative percent retained	Percent finer
4	4.750	10.70	9.04	9.04	90.96
10	2.000	7.50	6.34	15.38	84.62
20	0.850	6.20	5.24	20.63	79.37
40	0.425	3.30	2.79	23.42	76.58
60	0.250	7.10	6.00	29.42	70.58
100	0.150	46.10	38.97	68.39	31.61
200	0.075	25.70	21.72	90.11	9.89
Pan	---	11.60			

Σ 118.20 = W1

Loss during sieve analysis=[(W-W1)/W]x100= 0.08% (OK if less than 2%)

Figure H.25: Soil Classification for Sunshine Skyway Bridge, FL at depth of 25 ft

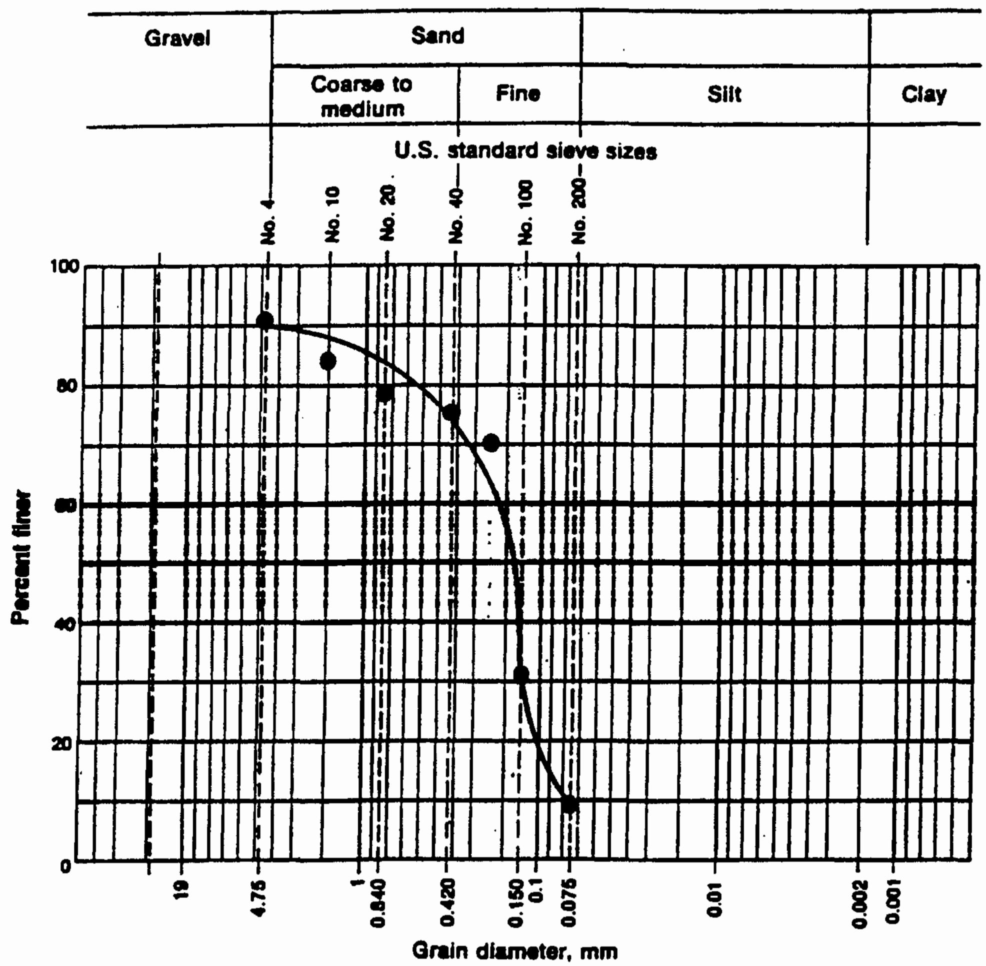
GRAIN SIZE DISTRIBUTION **Data Sheet 6**

Project: GRL
Job. No.:

Location of Project: Skyway Bridge
Boring No.:
Sample No.: 2

Description of Soil:
Depth of Sample: 25 ft

Tested By.:
Date of Testing:



Visual soil description:

Soil classification:

SP-SM
System:

Figure H.25: Soil Classification for Sunshine Skyway Bridge, FL at depth of 25 ft (continued)

DETERMINATION-OF-MOISTURE-CONTENT

Description of soil:
Location: Skyway Bridge - 27.5 ft
Sample No.: 3

No. of can	Weight of can, W1 (g)	Weight of can & wet soil, W2 (g)	Weight of can & dry soil, W3 (g)	$w(\%) = \frac{W2-W3}{W3-W1} \times 100$
1	22.50	33.45	31.05	28.07

SIEVE-ANALYSIS

Description of soil: (All materials retained on #20 are shells)
Location: Skyway Bridge - 27.5 ft
Sample No.: 3 Weight of oven dry sample, W (g): 117.5

Sieve No.	Sieve opening (mm)	Weight retained on each sieve (g)	Percent of weight retained on each sieve	Cumulative percent retained	Percent finer
4	4.750	5.60	4.77	4.77	95.23
10	2.000	4.20	3.57	8.34	91.66
20	0.850	4.50	3.83	12.17	87.83
40	0.425	3.60	3.06	15.23	84.77
60	0.250	8.30	7.06	22.30	77.70
100	0.150	60.60	51.57	73.87	26.13
200	0.075	21.60	18.38	92.26	7.74
Pan	---	7.80			

Σ 116.20 = W1

Loss during sieve analysis=[(W-W1)/W]x100= 1.11% (OK if less than 2%)

Figure H.26: Soil Classification for Sunshine Skyway Bridge, FL at depth of 27.5 ft

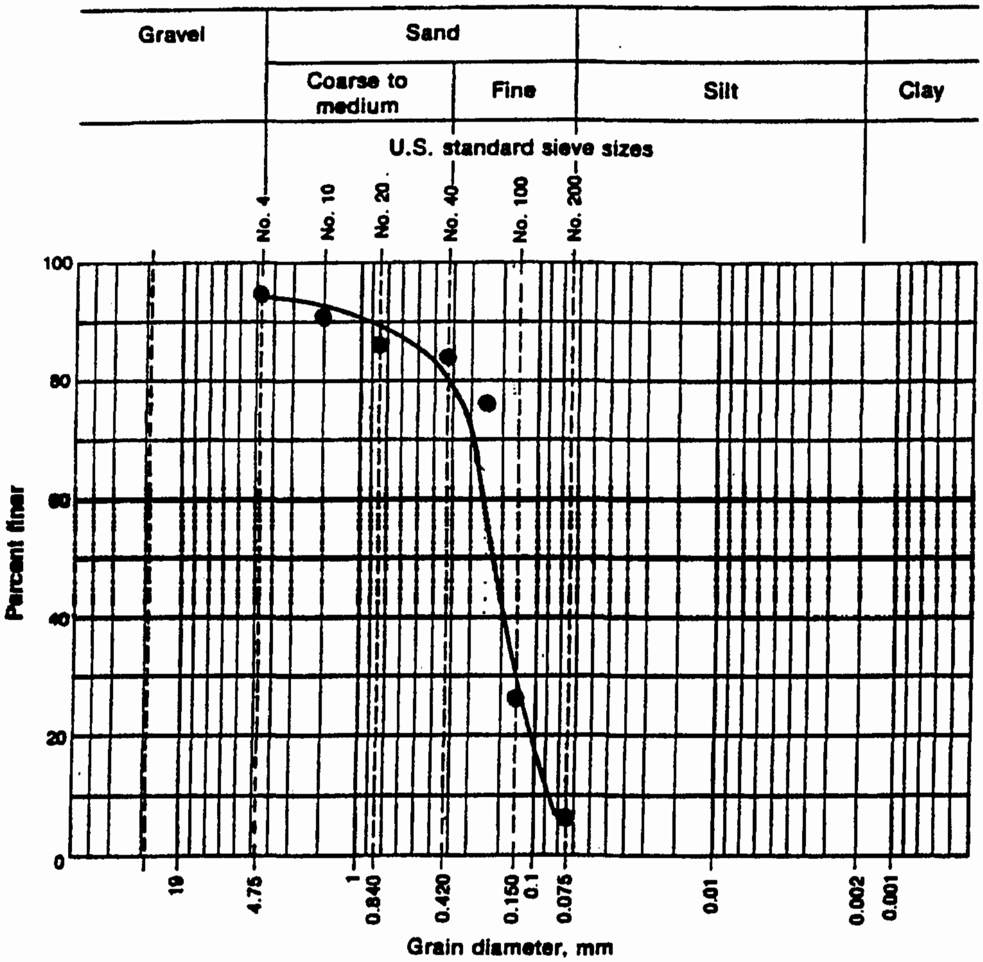
GRAIN SIZE DISTRIBUTION — Data Sheet 6

Project GRL — Job. No. ______

Location of Project Skyway Bridge — Boring No. ______ — Sample No. 3

Description of Soil ______ — Depth of Sample 27.5 ft

Tested By. ______ — Date of Testing ______



Visual soil description ______

Soil classification:

SP-SM System ______

Figure H.26: Soil Classification for Sunshine Skyway Bridge at depth of 27.5 ft (continued)

DETERMINATION-OF-MOISTURE-CONTENT

Description of soil:
Location: Skyway Bridge - 30 ft
Sample No.: 4

No. of can	Weight of can, W1 (g)	Weight of can & wet soil, W2 (g)	Weight of can & dry soil, W3 (g)	w(%)=(W2-W3)/(W3-W1)x100
1	22.60	40.20	36.20	29.41

SIEVE-ANALYSIS

Description of soil: (All materials retained on #20 are shells)
Location: Skyway Bridge - 30 ft
Sample No.: 4 Weight of oven dry sample, W (g): 145

Sieve No.	Sieve opening (mm)	Weight retained on each sieve (g)	Percent of weight retained on each sieve	Cumulative percent retained	Percent finer
4	4.750	14.50	10.00	10.00	90.00
10	2.000	1.70	1.17	11.17	88.83
20	0.850	3.50	2.41	13.59	86.41
40	0.425	2.90	2.00	15.59	84.41
60	0.250	10.50	7.24	22.83	77.17
100	0.150	90.80	62.62	85.45	14.55
200	0.075	18.40	12.69	98.14	1.86
Pan	---	5.30			

Σ 147.60 = W1

Loss during sieve analysis=[(W-W1)/W]x100=-1.79% (OK if less than 2%)

Figure H.27: Soil Classification for Sunshine Skyway Bridge, FL at depth of 30 ft

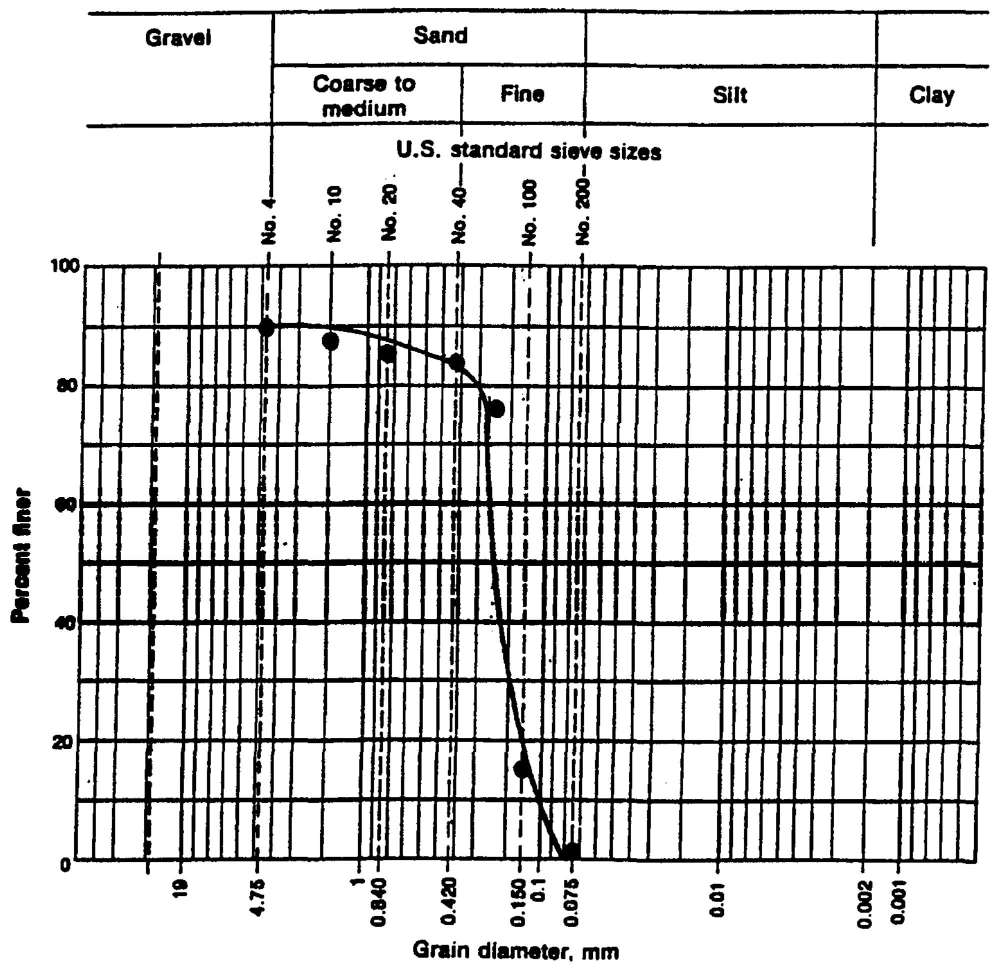
GRAIN SIZE DISTRIBUTION | **Data Sheet 6**

Project GRL | Job. No.

Location of Project Skyway Bridge | Boring No. | Sample No. 4

Description of Soil | Depth of Sample 30 ft

Tested By. | Date of Testing



Visual soil description

Soil classification:

SP System

Figure H.27: Soil Classification for Sunshine Skyway Bridge, FL at depth of 30 ft (continued)

DETERMINATION-OF-MOISTURE-CONTENT

Description of soil:
Location: Skyway Bridge - 35 ft
Sample No.: 5

No. of can	Weight of can, W1 (g)	Weight of can & wet soil, W2 (g)	Weight of can & dry soil, W3 (g)	$w(\%) = \frac{W2-W3}{W3-W1} \times 100$
1	8.70	16.90	14.80	34.43

SIEVE-ANALYSIS

Description of soil:
Location: Skyway Bridge - 35 ft
Sample No.: 5 Weight of oven dry sample, W (g): 92

Sieve No.	Sieve opening (mm)	Weight retained on each sieve (g)	Percent of weight retained on each sieve	Cumulative percent retained	Percent finer
4	4.750	9.20	10.00	10.00	90.00
10	2.000	7.00	7.61	17.61	82.39
20	0.850	9.90	10.76	28.37	71.63
40	0.425	7.50	8.15	36.52	63.48
60	0.250	8.90	9.67	46.20	53.80
100	0.150	30.20	32.83	79.02	20.98
200	0.075	7.50	8.15	87.17	12.83
Pan	---	10.20			

Σ 90.40 = W1

Loss during sieve analysis=[(W-W1)/W]x100= 1.74% (OK if less than 2%)

Figure H.28: Soil Classification for Sunshine Skyway Bridge, FL at depth of 35 ft

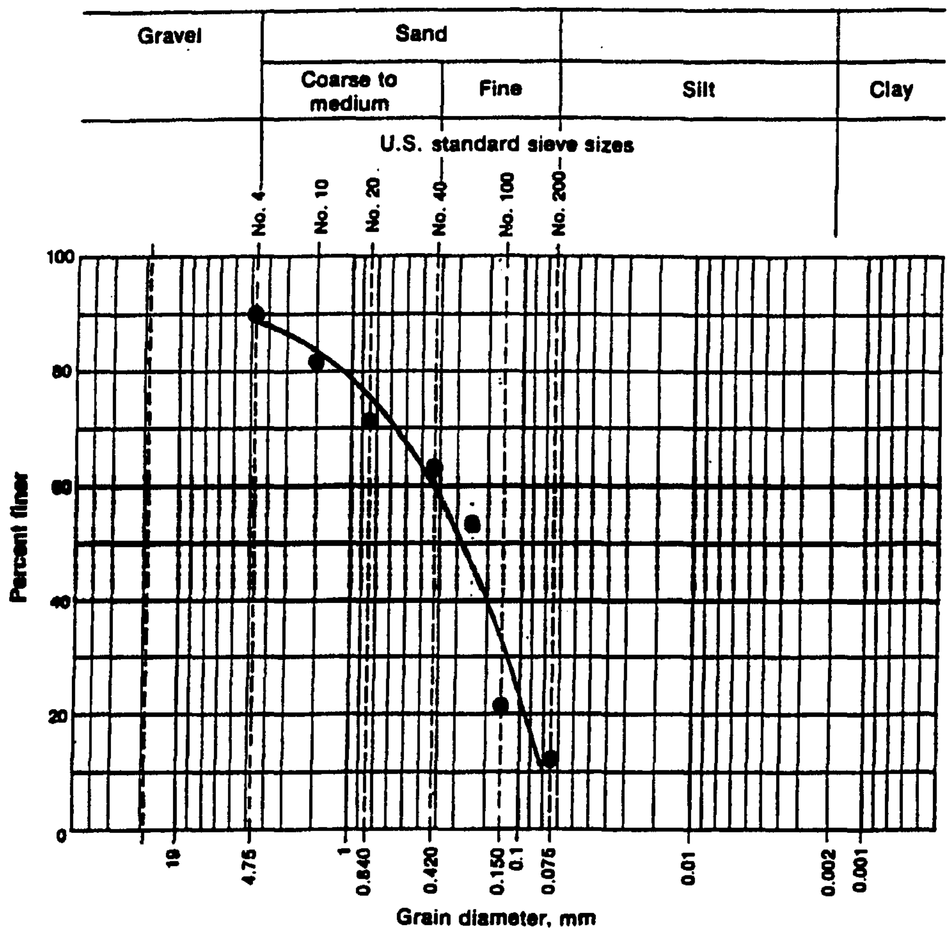
GRAIN SIZE DISTRIBUTION **Data Sheet 6**

Project GRL **Job. No.** ____

Location of Project Skyway Bridge **Boring No.** ____ **Sample No.** 5

Description of Soil ____ **Depth of Sample** 35 ft

Tested By. ____ **Date of Testing** ____



Visual soil description ____

Soil classification:

SM **System** ____

Figure H.28: Soil Classification for Sunshine Skyway Bridge, FL at depth of 35 ft (continued)

DETERMINATION-OF-MOISTURE-CONTENT

Description of soil:
Location: Skyway Bridge - 40 ft
Sample No.: 6

No. of can	Weight of can, W1 (g)	Weight of can & wet soil, W2 (g)	Weight of can & dry soil, W3 (g)	w(%)=(W2-W3)/(W3-W1)x100
1	8.90	16.70	14.95	28.93

SIEVE-ANALYSIS

Description of soil:
Location: Skyway Bridge - 40 ft
Sample No.: 6 Weight of oven dry sample, W (g): 107.5

Sieve No.	Sieve opening (mm)	Weight retained on each sieve (g)	Percent of weight retained on each sieve	Cumulative percent retained	Percent finer
4	4.750	12.80	11.91	11.91	88.09
10	2.000	4.40	4.09	16.00	84.00
20	0.850	5.30	4.93	20.93	79.07
40	0.425	4.60	4.28	25.21	74.79
60	0.250	9.00	8.37	33.58	66.42
100	0.150	56.40	52.47	86.05	13.95
200	0.075	12.90	12.00	98.05	1.95
Pan	---	1.90			

Σ 107.30 = W1

Loss during sieve analysis=[(W-W1)/W]x100= 0.19% (OK if less than 2%)

Figure H.29: Soil Classification for Sunshine Skyway Bridge, FL at depth of 40 ft

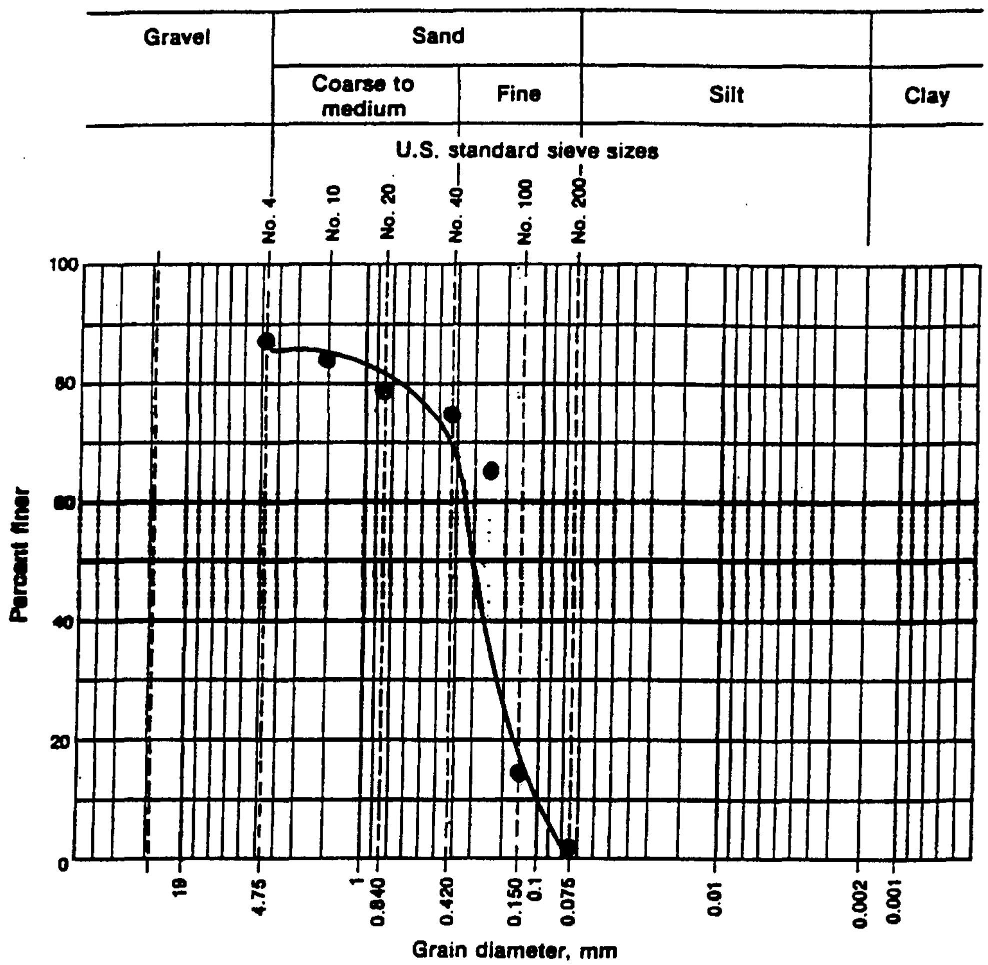
GRAIN SIZE DISTRIBUTION **Data Sheet 6**

Project GRL Job. No.

Location of Project Skyway Bridge Boring No. Sample No. 6

Description of Soil Depth of Sample 40 ft

Tested By. Date of Testing



Visual soil description

Soil classification:

SP System

Figure H.29: Soil Classification for Sunshine Skyway Bridge, FL at depth of 40 ft (continued)

DETERMINATION-OF-MOISTURE-CONTENT

Description of soil:
Location: Skyway Bridge - 45.5 ft
Sample No.: 7

No. of can	Weight of can, W1 (g)	Weight of can & wet soil, W2 (g)	Weight of can & dry soil, W3 (g)	w(%)=(W2-W3)/(W3-W1)x100
1	8.90	17.75	16.20	21.23

SIEVE-ANALYSIS

Description of soil:
Location: Skyway Bridge - 45.5 ft
Sample No.: 7 Weight of oven dry sample, W (g): 124

Sieve No.	Sieve opening (mm)	Weight retained on each sieve (g)	Percent of weight retained on each sieve	Cumulative percent retained	Percent finer
4	4.750	0.00	0.00	0.00	100.00
10	2.000	0.00	0.00	0.00	100.00
20	0.850	0.00	0.00	0.00	100.00
4	4.750	0.50	0.40	0.40	99.60
60	0.250	3.10	2.50	2.90	97.10
100	0.150	110.00	88.71	91.61	8.39
200	0.075	6.40	5.16	96.77	3.23
Pan	---	2.80			

Σ 122.80 = W1
Loss during sieve analysis=[(W-W1)/W]x100= 0.97% (OK if less than 2%)

Figure H.30: Soil Classification for Sunshine Skyway Bridge, FL at depth of 45.5 ft

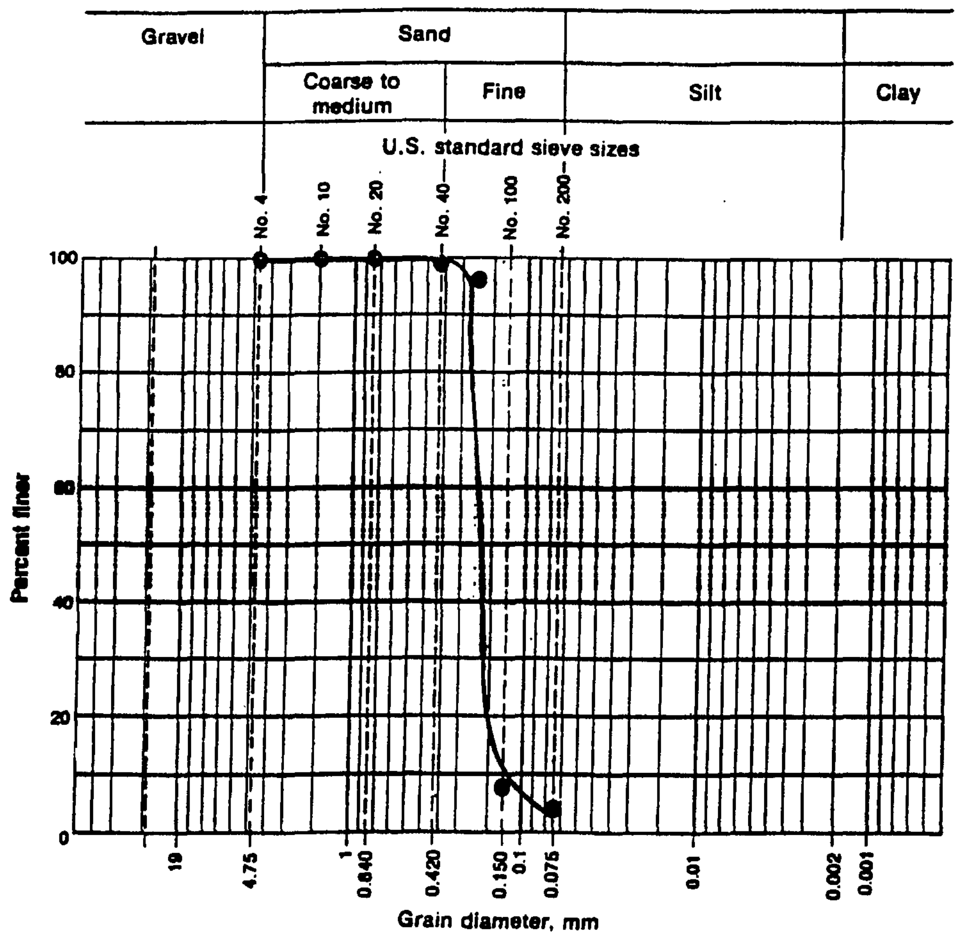
GRAIN SIZE DISTRIBUTION Data Sheet 6

Project GRL Job. No. ____

Location of Project Skyway Bridge Boring No. ____ Sample No. 7

Description of Soil ____ Depth of Sample 45.5 ft

Tested By. ____ Date of Testing ____



Visual soil description ____

Soil classification:

SP System ____

Figure H.30: Soil Classification for Sunshine Skyway Bridge at depth of 45.5 ft (continued)

DETERMINATION-OF-MOISTURE-CONTENT

Description of soil:
Location: Skyway Bridge - 50 ft
Sample No.: 8

No. of can	Weight of can, W1 (g)	Weight of can & wet soil, W2 (g)	Weight of can & dry soil, W3 (g)	W(%)=(W2-W3)/(W3-W1)x100
1	8.95	22.00	20.00	18.10

SIEVE-ANALYSIS

Description of soil: (All materials retained on #40 are shells)
Location: Skyway bridge - 50 ft
Sample No.: 8 Weight of oven dry sample, W (g): 146.8

Sieve No.	Sieve opening (mm)	Weight retained on each sieve (g)	Percent of weight retained on each sieve	Cumulative percent retained	Percent finer
4	4.750	2.40	1.63	1.63	98.37
10	2.000	9.00	6.13	7.77	92.23
20	0.850	10.00	6.81	14.58	85.42
40	0.425	6.30	4.29	18.87	81.13
60	0.250	6.00	4.09	22.96	77.04
100	0.150	43.70	29.77	52.72	47.28
200	0.075	49.40	33.65	86.38	13.62
Pan	---	19.20			

Σ 146.00 = W1

Loss during sieve analysis=[(W-W1)/W]x100= 0.54% (OK if less than 2%)

Figure H.31: Soil Classification for Sunshine Skyway Bridge, FL at depth of 50 ft

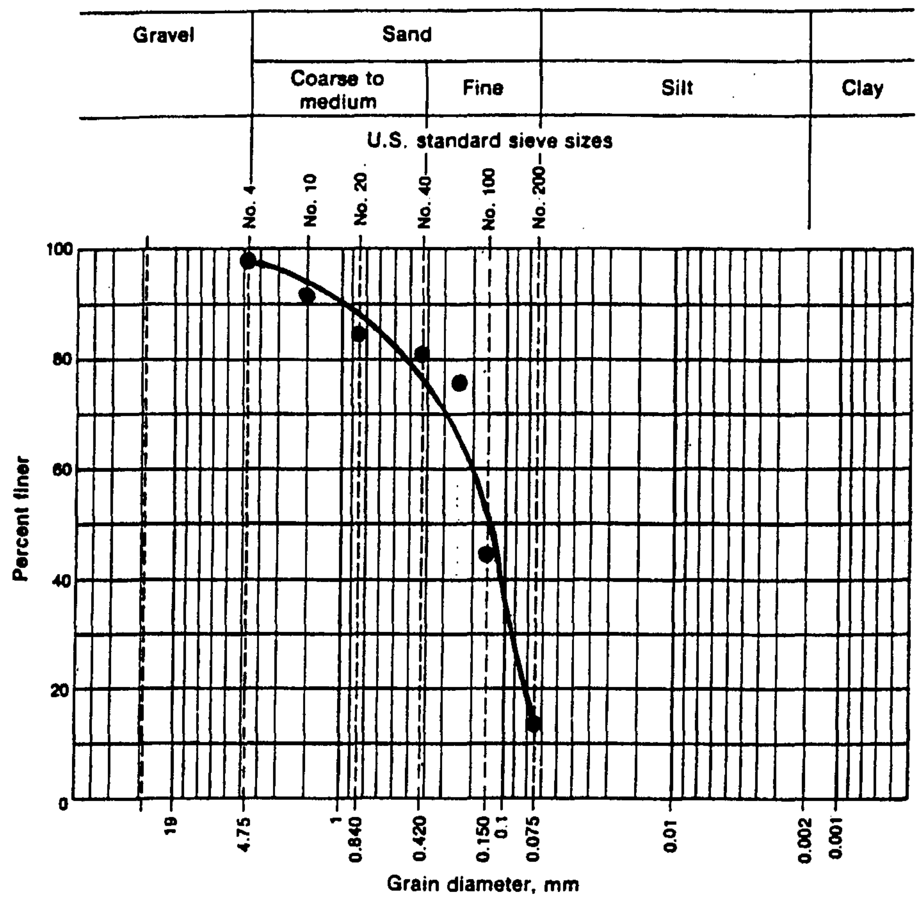
GRAIN SIZE DISTRIBUTION **Data Sheet 6**

Project GRL **Job. No.**

Location of Project Skyway Bridge **Boring No.** **Sample No.** 8

Description of Soil **Depth of Sample** 50 ft

Tested By. **Date of Testing**



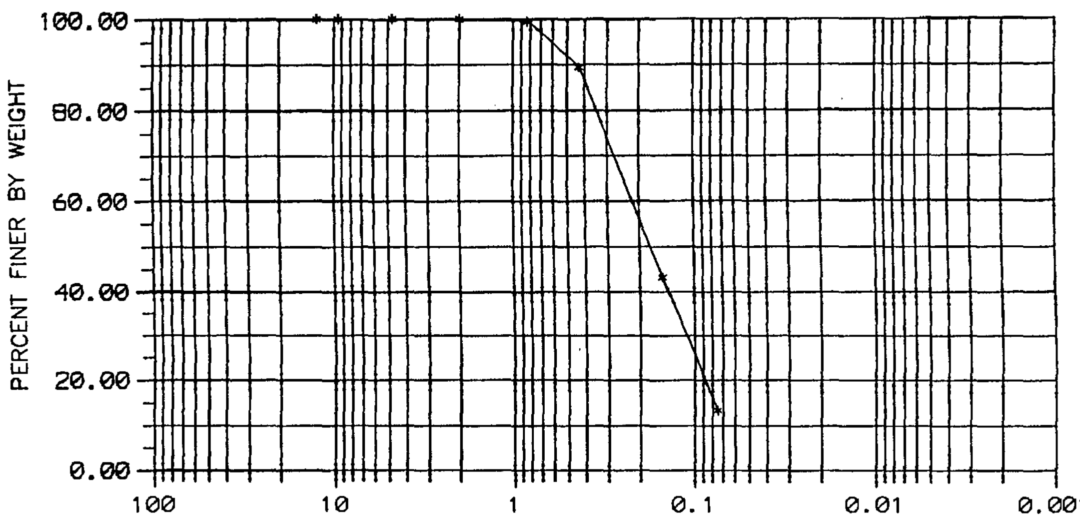
Visual soil description

Soil classification:

SM **System**

Figure H.31: Soil Classification for Sunshine Skyway Bridge, FL at depth of 50 ft (continued)

PARTICLE-SIZE ANALYSIS *(ASTM D422)*



Project	:	G.R.L. Laboratory Testing
Location	:	Warrensville Hts., Ohio
Project Number	:	94349L
Date	:	July 27, 1994
Sample Number	:	S-1
Sample Location	:	GRL-1
Sample Depth	:	5 ft.
Description	:	Gray silty SAND

SIEVE ANALYSIS

Sieve	Size		% Passing
2	(50.0 mm)	:	---
1	(25.0 mm)	:	---
3/4	(19.0 mm)	:	---
1/2	(12.5 mm)	:	100
3/8	(9.5 mm)	:	100
#4	(4.75 mm)	:	100
#8	(2.36 mm)	:	---
#10	(2.00 mm)	:	100
#20	(0.85 mm)	:	99.4
#30	(0.60 mm)	:	---
#40	(0.43 mm)	:	89.4
#60	(0.25 mm)	:	---
#100	(0.15 mm)	:	43.3
#200	(0.075 mm)	:	13.4

HYDROMETER ANALYSIS

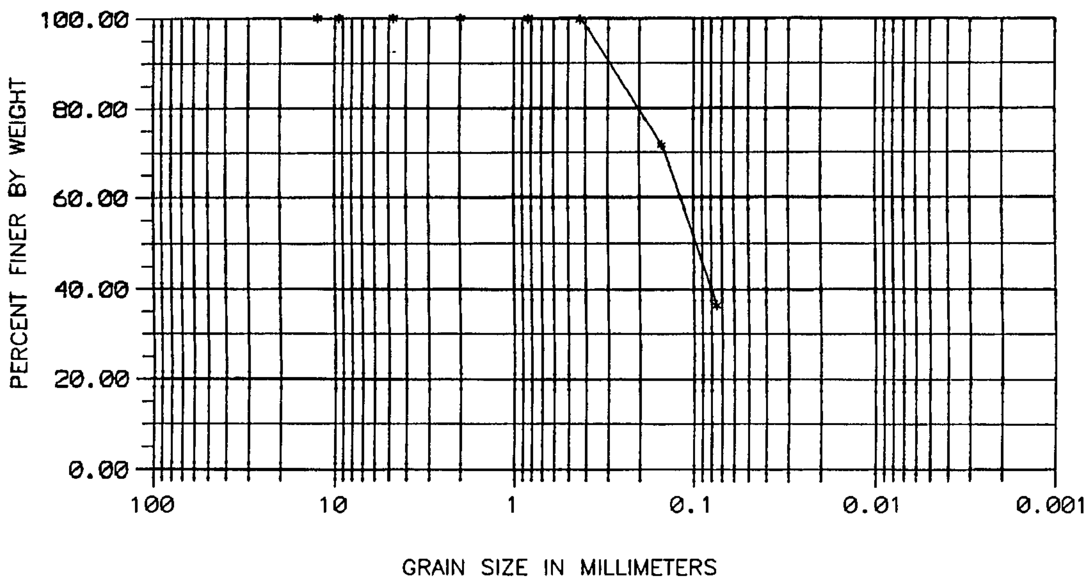
Sieve Size		% Passing
0.075 mm	:	13.4
0.005 mm	:	---
0.001 mm	:	---

Specific Gravity:

EDP CONSULTANTS, INC.
WILLOUGHBY HILLS, OHIO

Figure H.32: Soil Classification for Aucilla River Bridge, FL at depth of 5 ft

PARTICLE-SIZE ANALYSIS *(ASTM D422)*



Project	:	G.R.L. Laboratory Testing
Location	:	Warrensville Hts., Ohio
Project Number	:	94349L
Date	:	July 27, 1994
Sample Number	:	S-2
Sample Location	:	GRL-1
Sample Depth	:	10 ft.
Description	:	Gray silty SAND

SIEVE ANALYSIS

Sieve	Size		% Passing
2	(50.0 mm)	:	---
1	(25.0 mm)	:	---
3/4	(19.0 mm)	:	---
1/2	(12.5 mm)	:	100
3/8	(9.5 mm)	:	100
#4	(4.75 mm)	:	100
#8	(2.36 mm)	:	---
#10	(2.00 mm)	:	100
#20	(0.85 mm)	:	99.9
#30	(0.60 mm)	:	---
#40	(0.43 mm)	:	99.7
#60	(0.25 mm)	:	---
#100	(0.15 mm)	:	71.7
#200	(0.075 mm)	:	36.3

HYDROMETER ANALYSIS

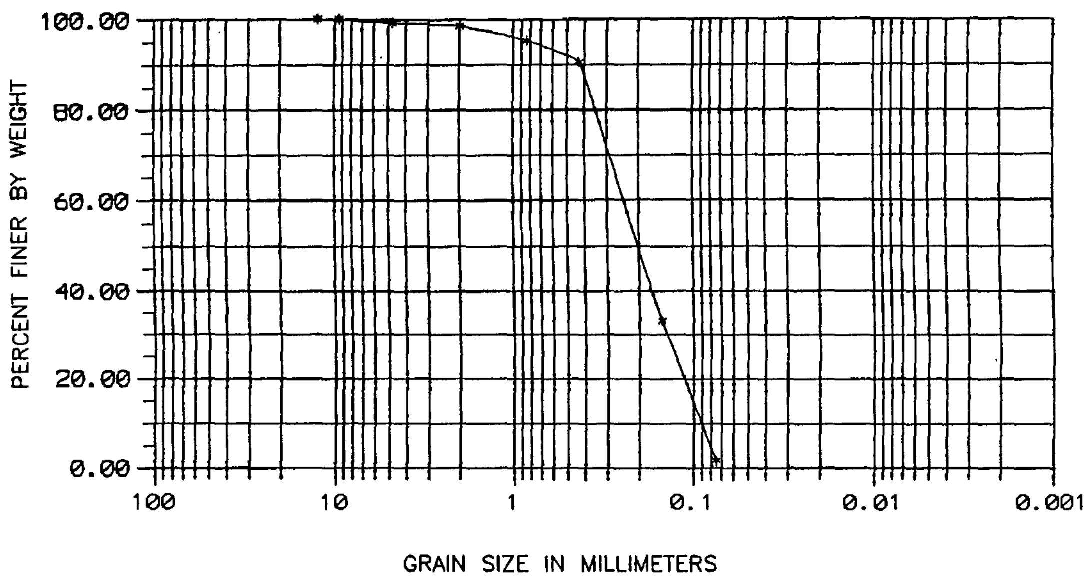
Sieve Size		% Passing
0.075 mm	:	36.3
0.005 mm	:	---
0.001 mm	:	---

Specific Gravity:

EDP CONSULTANTS, INC.
WILLOUGHBY HILLS, OHIO

Figure H.33: Soil Classification for Aucilla River Bridge, FL at depth of 10 ft

PARTICLE-SIZE ANALYSIS *(ASTM D422)*



Project	:	G.R.L. Laboratory Testing
Location	:	Warrensville Hts., Ohio
Project Number	:	94349L
Date	:	July 27, 1994
Sample Number	:	---
Sample Location	:	Vil-W.E.
Sample Depth	:	5 ft.
Description	:	Gray SAND

SIEVE ANALYSIS

Sieve	Size		% Passing
2	(50.0 mm)	:	---
1	(25.0 mm)	:	---
3/4	(19.0 mm)	:	---
1/2	(12.5 mm)	:	100
3/8	(9.5 mm)	:	100
#4	(4.75 mm)	:	99.2
#8	(2.36 mm)	:	---
#10	(2.00 mm)	:	98.6
#20	(0.85 mm)	:	95.4
#30	(0.60 mm)	:	---
#40	(0.43 mm)	:	90.6
#60	(0.25 mm)	:	---
#100	(0.15 mm)	:	33.1
#200	(0.075 mm)	:	1.7

HYDROMETER ANALYSIS

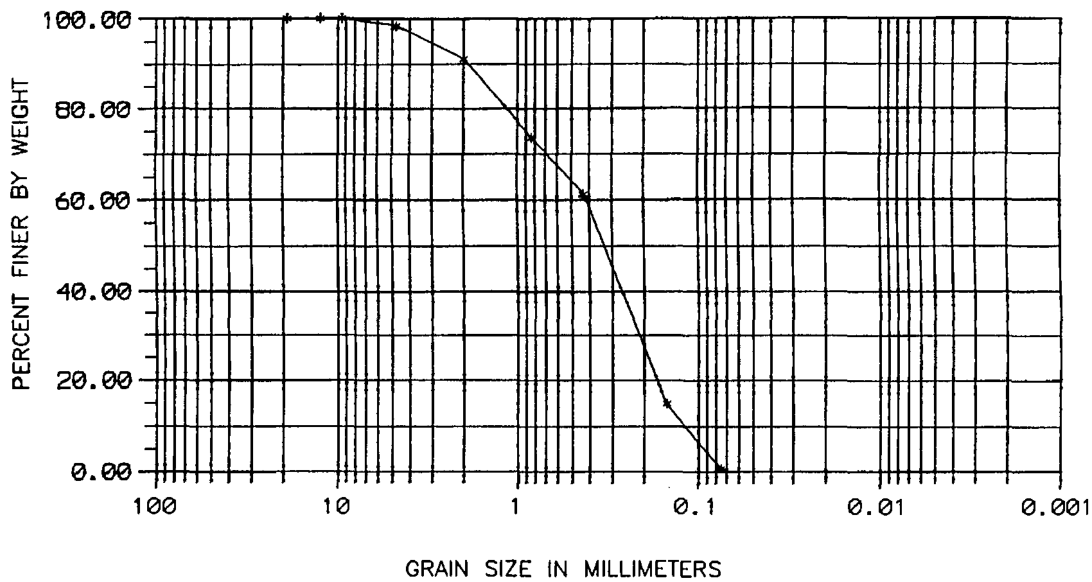
Sieve Size		% Passing
0.075 mm	:	1.7
0.005 mm	:	---
0.001 mm	:	---

Specific Gravity:

EDP CONSULTANTS, INC.
WILLOUGHBY HILLS, OHIO

Figure H.34: Soil Classification for Vilano Bridge - East, FL at depth of 5 ft

PARTICLE-SIZE ANALYSIS *(ASTM D422)*



Project	:	G.R.L. Laboratory Testing
Location	:	Warrensville Hts., Ohio
Project Number	:	94349L
Date	:	July 27, 1994
Sample Number	:	---
Sample Location	:	Vil-W.E.
Sample Depth	:	25 ft.
Description	:	Gray COQUINA

SIEVE ANALYSIS

Sieve	Size		% Passing
2	(50.0 mm)	:	---
1	(25.0 mm)	:	---
3/4	(19.0 mm)	:	100
1/2	(12.5 mm)	:	100
3/8	(9.5 mm)	:	100
#4	(4.75 mm)	:	98.4
#8	(2.36 mm)	:	---
#10	(2.00 mm)	:	91.0
#20	(0.85 mm)	:	73.6
#30	(0.60 mm)	:	---
#40	(0.43 mm)	:	61.2
#60	(0.25 mm)	:	---
#100	(0.15 mm)	:	14.9
#200	(0.075 mm)	:	0.7

HYDROMETER ANALYSIS

Sieve Size		% Passing
0.075 mm	:	0.7
0.005 mm	:	---
0.001 mm	:	---

Specific Gravity:

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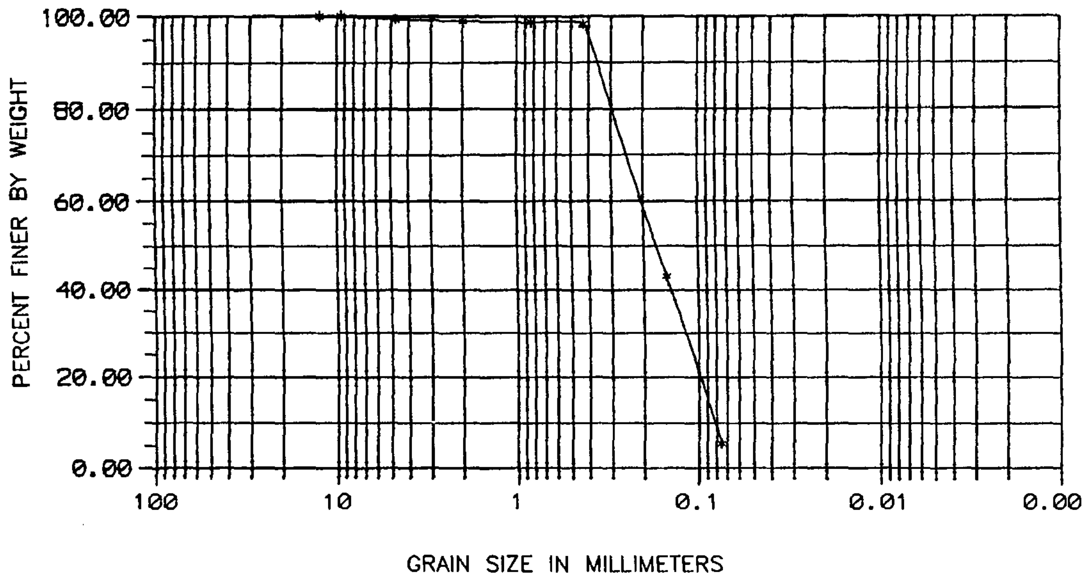
Figure H.35: Soil Classification for Vilano Bridge - East, FL at depth of 25 ft

PARTICLE-SIZE ANALYSIS *(ASTM D422)*



Project	:	G.R.L. Laboratory Testing
Location	:	Warrensville Hts., Ohio
Project Number	:	94349L
Date	:	July 27, 1994
Sample Number	:	---
Sample Location	:	VIL-W.E.
Sample Depth	:	35 ft.
Description	:	Gray SAND with silt

SIEVE ANALYSIS

Sieve	Size		% Passing
2	(50.0 mm)	:	---
1	(25.0 mm)	:	---
3/4	(19.0 mm)	:	---
1/2	(12.5 mm)	:	100
3/8	(9.5 mm)	:	100
#4	(4.75 mm)	:	99.4
#8	(2.36 mm)	:	---
#10	(2.00 mm)	:	98.9
#20	(0.85 mm)	:	98.7
#30	(0.60 mm)	:	---
#40	(0.43 mm)	:	98.3
#60	(0.25 mm)	:	---
#100	(0.15 mm)	:	43.1
#200	(0.075 mm)	:	5.4

HYDROMETER ANALYSIS

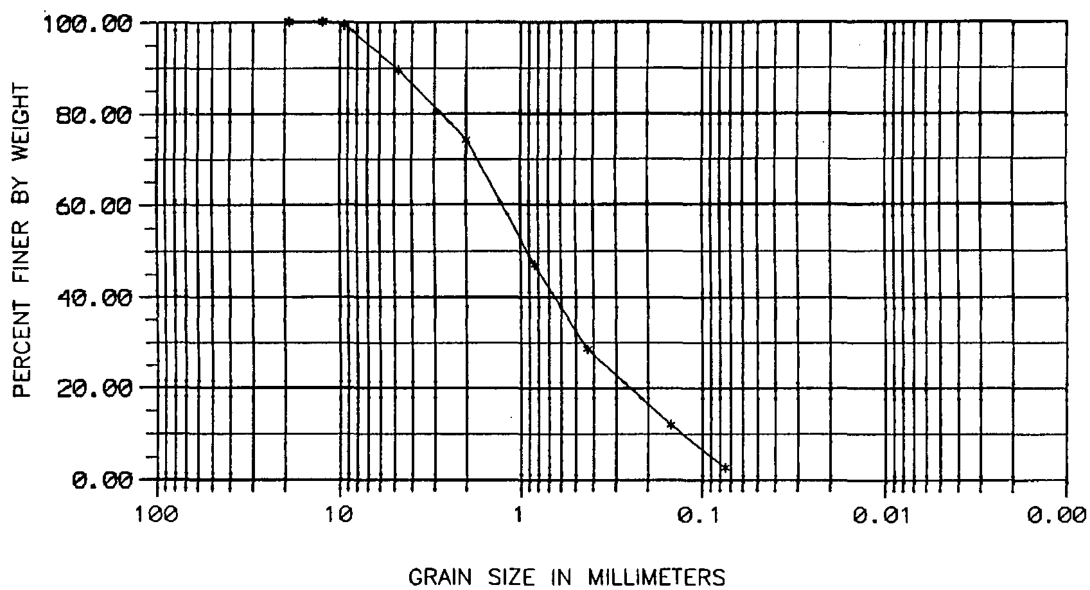
Sieve Size		% Passing
0.075 mm	:	5.4
0.005 mm	:	---
0.001 mm	:	---

Specific Gravity:

EDP CONSULTANTS, INC.
WILLOUGHBY HILLS, OHIO

Figure H.36: Soil Classification for Vilano Bridge - East, FL at depth of 35 ft

PARTICLE-SIZE ANALYSIS *(ASTM D422)*



Project	:	G.R.L. Laboratory Testing
Location	:	**Warrensville Hts., Ohio**
Project Number	:	94349L
Date	:	July 27, 1994
Sample Number	:	---
Sample Location	:	Vil-W.E.
Sample Depth	:	45 ft.
Description	:	Gray COQUINA

SIEVE ANALYSIS

Sieve	Size		% Passing
2	(50.0 mm)	:	---
1	(25.0 mm)	:	---
3/4	(19.0 mm)	:	100
1/2	(12.5 mm)	:	100
3/8	(9.5 mm)	:	99.4
#4	(4.75 mm)	:	89.6
#8	(2.36 mm)	:	---
#10	(2.00 mm)	:	74.3
#20	(0.85 mm)	:	47.1
#30	(0.60 mm)	:	---
#40	(0.43 mm)	:	28.6
#60	(0.25 mm)	:	---
#100	(0.15 mm)	:	12.0
#200	(0.075 mm)	:	2.7

HYDROMETER ANALYSIS

Sieve Size		% Passing
0.075 mm	:	2.7
0.005 mm	:	---
0.001 mm	:	---

Specific Gravity:

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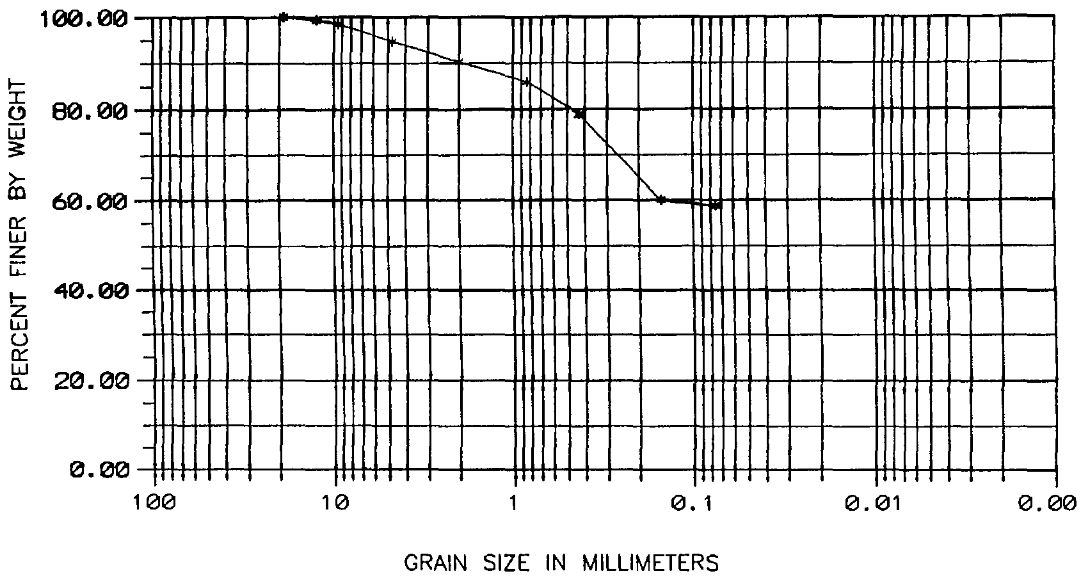
Figure H.37: Soil Classification for Vilano Bridge - East, FL at depth of 45 ft

PARTICLE-SIZE ANALYSIS *(ASTM D422)*



Project	:	G.R.L. Laboratory Testing
Location	:	Warrensville Hts., Ohio
Project Number	:	94349L
Date	:	July 27, 1994
Sample Number	:	---
Sample Location	:	Vil-W
Sample Depth	:	64 ft.
Description	:	Gray sandy SILT

SIEVE ANALYSIS

Sieve	Size		% Passing
2	(50.0 mm)	:	---
1	(25.0 mm)	:	---
3/4	(19.0 mm)	:	100
1/2	(12.5 mm)	:	99.3
3/8	(9.5 mm)	:	98.4
#4	(4.75 mm)	:	94.7
#8	(2.36 mm)	:	---
#10	(2.00 mm)	:	90.2
#20	(0.85 mm)	:	86.0
#30	(0.60 mm)	:	---
#40	(0.43 mm)	:	78.9
#60	(0.25 mm)	:	---
#100	(0.15 mm)	:	60.1
#200	(0.075 mm)	:	58.8

HYDROMETER ANALYSIS

Sieve Size		% Passing
0.075 mm	:	58.8
0.005 mm	:	---
0.001 mm	:	---

Specific Gravity:

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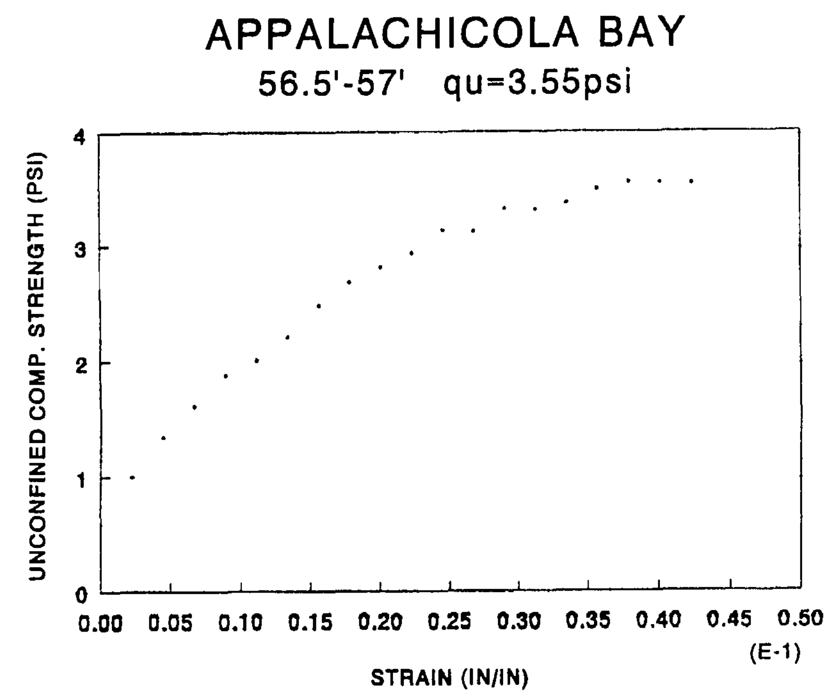
Figure H.38: Soil Classification for Vilano Bridge - West, FL at depth of 64 ft



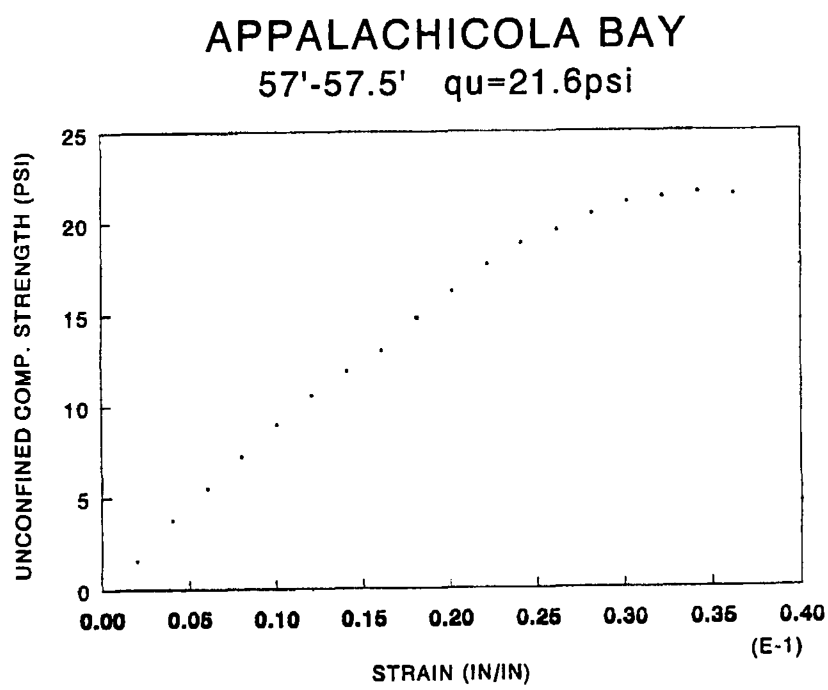


Figure H.39: Unconfined Compression Test Results for Apalachicola River Bridge, FL

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